Position		WT	Inactive subs (<20%)	Active subs (20%<x<40%)	Active subs (>40%)	>1000% activity	>500% activity	>300% activity	>200% activity	>100% activity	# Inactive Subs	# Active subs	Total subs tested	% active subs (>20%)	% inactive subs	always active	always inactive	60% or more active subs	90% or more active subs	0<x<=30%
1	always active	L			ACEFGHKNPQRSTVW			Q	Q	HKQ	0	15	15	100.00%	0.00%	1	FALSE	1	1	FALSE
2	depends	N	HKWY	I	ACGLPQSTV					T	4	10	14	71.43%	28.57%	FALSE	FALSE	2	FALSE	FALSE
3	depends	F	AGKPTV		EHLY						6	4	10	40.00%	60.00%	FALSE	FALSE	FALSE	FALSE	FALSE
4	depends	R	DEFGLPWY		AISTV					V	8	5	13	38.46%	61.54%	FALSE	FALSE	FALSE	FALSE	FALSE
5	depends	A	DGILMNPQRTVWY		H						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	5
6	depends	P	EFTVY		AHKLNQR						5	7	12	58.33%	41.67%	FALSE	FALSE	FALSE	FALSE	FALSE
7	depends	P	CDFGHIKLQRSTWY		M						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	7
8	depends	V	DEGHNRSW	P	ILM					I	8	4	12	33.33%	66.67%	FALSE	FALSE	FALSE	FALSE	FALSE
9	depends	I	CDEGNP		KLQRSV					L	6	6	12	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
10	depends	P	FILMY		DEGHNQRSW						5	9	14	64.29%	35.71%	FALSE	FALSE	10	FALSE	FALSE
11	depends	N	ACFILPTWY	S	DGHK						9	5	14	35.71%	64.29%	FALSE	FALSE	FALSE	FALSE	FALSE
12	depends	V	GHW		AEIKLNRST					ET	3	9	12	75.00%	25.00%	FALSE	FALSE	12	FALSE	FALSE
13	depends	P	EGILMV		HSTY						6	4	10	40.00%	60.00%	FALSE	FALSE	FALSE	FALSE	FALSE
14	depends	F	AEGHKNPQW		DIMV						9	4	13	30.77%	69.23%	FALSE	FALSE	FALSE	FALSE	FALSE
15	depends	L	EFGKNPQRSY		AMV				V	V	10	3	13	23.08%	76.92%	FALSE	FALSE	FALSE	FALSE	15
16	always inactive	W	ACDEFGHKMPRSTY								14	0	14	0.00%	100.00%	FALSE	16	FALSE	FALSE	FALSE
17	always inactive	A	DEGHILNPQRSTVWY								15	0	15	0.00%	100.00%	FALSE	17	FALSE	FALSE	FALSE
18	always inactive	W	CDFGHILMPQSTVY								14	0	14	0.00%	100.00%	FALSE	18	FALSE	FALSE	FALSE
19	always inactive	N	ACFGHILMPQRSVWY								15	0	15	0.00%	100.00%	FALSE	19	FALSE	FALSE	FALSE
20	depends	A	DEFHKLNPRTVY		S						12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	20
21	always inactive	P	ACDEGHILMRSTVW								14	0	14	0.00%	100.00%	FALSE	21	FALSE	FALSE	FALSE
22	depends	S	CEGKP		HMTY						5	4	9	44.44%	55.56%	FALSE	FALSE	FALSE	FALSE	FALSE
23	depends	E	AFLMNPRSTV		D						10	1	11	9.09%	90.91%	FALSE	FALSE	FALSE	FALSE	23
24	always active	F			AEGHIKLMNRTVY			E	EH	EHRTV	0	13	13	100.00%	0.00%	24	FALSE	24	24	FALSE
25	always inactive	C	DEFGHIKLNPRSTVY								15	0	15	0.00%	100.00%	FALSE	25	FALSE	FALSE	FALSE
26	always active	L			AEGHIKMPQRSTVWY			E	E	AEKMQR	0	15	15	100.00%	0.00%	26	FALSE	26	26	FALSE
27	depends	G	C		ADEFHIKLPQRSTW				K	DEHKQR	1	14	15	93.33%	6.67%	FALSE	FALSE	27	27	FALSE
28	always active	K			ADEFILMNPRSTVW						0	14	14	100.00%	0.00%	28	FALSE	28	28	FALSE
29	always active	F			AEGHIKLMPRSTVW			EP	ELMPS	EGIKLMPRSV	0	14	14	100.00%	0.00%	29	FALSE	29	29	FALSE
30	always active	D			AFGHKLMPQRSTVW				GK	AGHKLMPRS	0	14	14	100.00%	0.00%	30	FALSE	30	30	FALSE
31	always active	E			ACGHIKLPRSTVWY			IKTV	ACHIKLRTV	ACGHIKLPRSTVWY	0	14	14	100.00%	0.00%	31	FALSE	31	31	FALSE
32	always active	P			ACFGHKLMNQRSTVWY				FH	FGHKQRSY	0	16	16	100.00%	0.00%	32	FALSE	32	32	FALSE
33	depends	L	CDHNVY		GMPQRSTW					W	6	8	14	57.14%	42.86%	FALSE	FALSE	FALSE	FALSE	FALSE
34	depends	D	ILNSTV	A	EHKQRW					R	6	7	13	53.85%	46.15%	FALSE	FALSE	FALSE	FALSE	FALSE
35	depends	M	ADGPRS	QV	FHLTY						6	7	13	53.85%	46.15%	FALSE	FALSE	FALSE	FALSE	FALSE
36	depends	S	CFVWY	DN	AGHKLRT					R	5	9	14	64.29%	35.71%	FALSE	FALSE	36	FALSE	FALSE
37	depends	L	CEGNS	W	FIKMPRV			F	F	FM	5	8	13	61.54%	38.46%	FALSE	FALSE	37	FALSE	FALSE
38	depends	F	EGKLNQRTW		Y					Y	9	1	10	10.00%	90.00%	FALSE	FALSE	FALSE	FALSE	38
39	depends	S	CDFW		ALNQRTY				N	ANQT	4	7	11	63.64%	36.36%	FALSE	FALSE	39	FALSE	FALSE
40	depends	F	ADEGKNRSTV		LW					W	10	2	12	16.67%	83.33%	FALSE	FALSE	FALSE	FALSE	40
41	depends	I	Q		ACDEGHNTVW					T	1	10	11	90.91%	9.09%	FALSE	FALSE	41	41	FALSE
42	depends	G	DEHIKLMPQRSTV		A						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	42
43	depends	S	AEFGIKLQRV	N	T						10	2	12	16.67%	83.33%	FALSE	FALSE	FALSE	FALSE	43
44	depends	P	ACFGHILNQRSTWY		E						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	44
45	depends	R	ADFGPW		IK						6	2	8	25.00%	75.00%	FALSE	FALSE	FALSE	FALSE	45
46	depends	I	PW	C	AEFHLMNRSTVY				R	ALRV	2	13	15	86.67%	13.33%	FALSE	FALSE	46	FALSE	FALSE
47	depends	N	V		ADFGHKMQRSTWY					FHT	1	13	14	92.86%	7.14%	FALSE	FALSE	47	47	FALSE
48	depends	A	P		FGHIKMNQRSVY			N	FN	FHKNQS	1	12	13	92.31%	7.69%	FALSE	FALSE	48	48	FALSE
49	depends	T	CDGHP		IKRSV					R	5	5	10	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
50	always active	G		V	ACDEHLMQRSVY					DS	0	13	13	100.00%	0.00%	50	FALSE	50	50	FALSE
51	depends	Q	CFIMPTWY	AR	NS						8	4	12	33.33%	66.67%	FALSE	FALSE	FALSE	FALSE	FALSE
52	depends	G	CEFWY		NPQRST			Q	Q	QS	5	6	11	54.55%	45.45%	FALSE	FALSE	FALSE	FALSE	FALSE
53	always inactive	V	ACDEGHLNPQRSTWY								15	0	15	0.00%	100.00%	FALSE	53	FALSE	FALSE	FALSE

Position		WT	Inactive subs (<20%)	Active subs (20%<x<40%)	Active subs (>40%)	>1000% activity	>500% activity	>300% activity	>200% activity	>100% activity	# Inactive Subs	# Active subs	Total subs tested	% active subs (>20%)	% inactive subs	always active	always inactive	60% or more active subs	90% or more active subs	0<x<=30%
54	depends	T	DEGPRY		AFNQSV						6	6	12	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
55	always inactive	I	ADGHNPQRTVY								11	0	11	0.00%	100.00%	FALSE	55	FALSE	FALSE	FALSE
56	always inactive	F	ACEGHIKLPRSTVW								14	0	14	0.00%	100.00%	FALSE	56	FALSE	FALSE	FALSE
57	always inactive	Y	ADFGIMPQRVW								11	0	11	0.00%	100.00%	FALSE	57	FALSE	FALSE	FALSE
58	depends	V	A		CGHIKLNPQRSWY			KQ	KQ	HKLQRY	1	13	14	92.86%	7.14%	FALSE	FALSE	58	58	FALSE
59	depends	D	AEILMPRTVWY		QN					N	11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	59
60	depends	R	ADFGHILNPQSTVY		K						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	60
61	depends	L	AEFGHNPQRTWY	F	IMV						12	4	16	25.00%	75.00%	FALSE	FALSE	FALSE	FALSE	61
62	always inactive	G	ACDFIKLMPQRSTVY								15	0	15	0.00%	100.00%	FALSE	62	FALSE	FALSE	FALSE
63	depends	Y	CGP		AHIKLMNRSTVW					HIKLMRTW	3	12	15	80.00%	20.00%	FALSE	FALSE	63	FALSE	FALSE
64	always inactive	Y	ACDEFGHIKLPQRSTVW								17	0	17	0.00%	100.00%	FALSE	64	FALSE	FALSE	FALSE
65	depends	P	ACDGHIKNSTVWY		R						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	65
66	depends	Y	ACDEGIKLNPSTV		HR						13	2	15	13.33%	86.67%	FALSE	FALSE	FALSE	FALSE	66
67	depends	I	DEGPRTW	R	FLVY					V	7	5	12	41.67%	58.33%	FALSE	FALSE	FALSE	FALSE	FALSE
68	depends	D	ACIVY	G	EHKLPQRST				H	HKQ	5	10	15	66.67%	33.33%	FALSE	FALSE	68	FALSE	FALSE
69	depends	S	N		ACEFGILMPRTWY	AR	AFGPR	AFGILPR	AFGILMPRWY	ACEFGILMPRWY	1	13	14	92.86%	7.14%	FALSE	FALSE	69	69	FALSE
70	depends	I	Q		ACFGHKLNPRSTVY	AKR	AFGHKNRTV	AFGHKLNPRSTV	ACFGHKLNPRSTV	ACFGHKLNPRSTVY	1	14	15	93.33%	6.67%	FALSE	FALSE	70	70	FALSE
71	depends	T	P		ADGHLMNQRS				R	GLNRS	1	10	11	90.91%	9.09%	FALSE	FALSE	71	71	FALSE
72	depends	G	CFHIPVW	Y	ADEHKLMQRS			M	MQ	KMQ	7	11	18	61.11%	38.89%	FALSE	FALSE	72	FALSE	FALSE
73	depends	V	P		ACDGHKLMQRSTW					AGHKLTW	1	13	14	92.86%	7.14%	FALSE	FALSE	73	73	FALSE
74	always active	T			ACEFGHKLMNPRSVW				ACGNPRVW	ACEFGHKLNPRSVW	0	15	15	100.00%	0.00%	74	FALSE	74	74	FALSE
75	depends	V	DGP		ACFHLMNQRSTY		L	LRT	LRT	FLMQRT	3	12	15	80.00%	20.00%	FALSE	FALSE	75	FALSE	FALSE
76	always inactive	N	ACFGIKLPQRSTVW								14	0	14	0.00%	100.00%	FALSE	76	FALSE	FALSE	FALSE
77	depends	G	DELPQRTV	HK							8	2	10	20.00%	80.00%	FALSE	FALSE	FALSE	FALSE	77
78	always inactive	G	ADIMPTY								7	0	7	0.00%	100.00%	FALSE	78	FALSE	FALSE	FALSE
79	depends	I	ADFGHKNPSWY		LTV					LV	11	3	14	21.43%	78.57%	FALSE	FALSE	FALSE	FALSE	79
80	always inactive	P	ADEFGIKLMNRSTVY								15	0	15	0.00%	100.00%	FALSE	80	FALSE	FALSE	FALSE
81	depends	Q	ACEGHLNPSVWY		P						12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	81
82	depends	K	K	Y	AEGHILMNQRSTV					I	1	14	15	93.33%	6.67%	FALSE	FALSE	82	82	FALSE
83	depends	I	E	K	FGHLNQRSTV					GQ	1	11	12	91.67%	8.33%	FALSE	FALSE	83	83	FALSE
84	always active	S		Y	DEFGHILMNPQRTW		G	G	G	GR	0	15	15	100.00%	0.00%	84	FALSE	84	84	FALSE
85	depends	L	ACDEFGHNQST		V						11	1	12	8.33%	91.67%	FALSE	FALSE	FALSE	FALSE	85
86	depends	Q	C		ADEFGHIKLMNPRSTVW				A	AEGHMNW	1	17	18	94.44%	5.56%	FALSE	FALSE	86	86	FALSE
87	always active	D		P	ACEGHILMQRSTVY				Y	CQRTY	0	15	15	100.00%	0.00%	87	FALSE	87	87	FALSE
88	always inactive	H	ACEFGIKLMPRSTVY								15	0	15	0.00%	100.00%	FALSE	88	FALSE	FALSE	FALSE
89	depends	L	ADEGQSTWY	RPW	CKM					C	9	6	15	40.00%	60.00%	FALSE	FALSE	FALSE	FALSE	FALSE
90	depends	D	C		AEGHIKLNQRSTW					AEHIKLNQRST	1	13	14	92.86%	7.14%	FALSE	FALSE	90	90	FALSE
91	depends	K	DEFGHILT		AQR						8	3	11	27.27%	72.73%	FALSE	FALSE	FALSE	FALSE	91
92	depends	A	EFKPQRWY	H	CLMTV					CLV	8	6	14	42.86%	57.14%	FALSE	FALSE	FALSE	FALSE	FALSE
93	always active	K		PV	DEFGHILMNQRST			IT	IT	ILRST	0	15	15	100.00%	0.00%	93	FALSE	93	93	FALSE
94	depends	K	GP	C	ADEFHLMNQRST			R	R	QRT	2	13	15	86.67%	13.33%	FALSE	FALSE	94	FALSE	FALSE
95	always inactive	D	ACEFGHKLMPQSVWY								15	0	15	0.00%	100.00%	FALSE	95	FALSE	FALSE	FALSE
96	depends	I	SHPRSTW		DLV						7	3	10	30.00%	70.00%	FALSE	FALSE	FALSE	FALSE	96
97	always active	T			ACDEFGILNPQRSWY			G	G	ADEGLNQS	0	15	15	100.00%	0.00%	97	FALSE	97	97	FALSE
98	depends	F	P		ACDEHILMQRSVW					H	1	13	14	92.86%	7.14%	FALSE	FALSE	98	98	FALSE
99	depends	Y	CEGINPVW	A	RS						8	3	11	27.27%	72.73%	FALSE	FALSE	FALSE	FALSE	99
100	always inactive	M	CEFGNPRSTWY								11	0	11	0.00%	100.00%	FALSE	100	FALSE	FALSE	FALSE
101	always inactive	P	ACFHIKLMNQRST								13	0	13	0.00%	100.00%	FALSE	101	FALSE	FALSE	FALSE
102	depends	V	P		ACEGHKLMNQRSTW					KNQST	1	14	15	93.33%	6.67%	FALSE	FALSE	102	102	FALSE
103	depends	D	AEFGHILQRTVWY	N							13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	103
104	depends	N	FPW	I	ACGKMRST					RS	3	9	12	75.00%	25.00%	FALSE	FALSE	104	FALSE	FALSE
105	depends	L	MN	WCH	AGIPQRSTV						2	12	14	85.71%	14.29%	FALSE	FALSE	105	FALSE	FALSE
106	depends	G	ACDFHLMNPSWY		V						12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	106

Position		WT	Inactive subs (<20%)	Active subs (20%<x<40%)	Active subs (>40%)	>1000% activity	>500% activity	>300% activity	>200% activity	>100% activity	# Inactive Subs	# Active subs	Total subs tested	% active subs (>20%)	% inactive subs	always active	always inactive	60% or more active subs	90% or more active subs	0<x<=30%
107	depends	M	ACHKPQSVW		FIL					L	9	3	12	25.00%	75.00%	FALSE	FALSE	FALSE	FALSE	107
108	depends	A	DEFKLMPQTVY		G						11	1	12	8.33%	91.67%	FALSE	FALSE	FALSE	FALSE	108
109	always inactive	V	CDELMRTW								8	0	8	0.00%	100.00%	FALSE	109	FALSE	FALSE	FALSE
110	depends	I	FKLMPW		V						6	1	7	14.29%	85.71%	FALSE	FALSE	FALSE	FALSE	110
111	always inactive	D	HIQ								3	0	3	0.00%	100.00%	FALSE	111	FALSE	FALSE	FALSE
112	always inactive	W	CEGHLNPS								8	0	8	0.00%	100.00%	FALSE	112	FALSE	FALSE	FALSE
113	always inactive	E	RV								2	0	2	0.00%	100.00%	FALSE	113	FALSE	FALSE	FALSE
114	depends	E	ILPTV		AGHMS					A	5	5	10	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
115	always inactive	W	ACDFGHIKLMRSVY								14	0	14	0.00%	100.00%	FALSE	115	FALSE	FALSE	FALSE
116	always inactive	R	ACDEGHILNPQSVW								14	0	14	0.00%	100.00%	FALSE	116	FALSE	FALSE	FALSE
117	depends	P	GIKNQRSVW		D						9	1	10	10.00%	90.00%	FALSE	FALSE	FALSE	FALSE	117
118	depends	T	CDEGPRWY		HKLMNQV			Q	Q	LQ	8	7	15	46.67%	53.33%	FALSE	FALSE	FALSE	FALSE	FALSE
119	depends	W	AKILNR	P	FQY					Y	6	4	10	40.00%	60.00%	FALSE	FALSE	FALSE	FALSE	FALSE
120	always active	A			DFGHILNPRSTVWY				F	FGHILSVY	0	14	14	100.00%	0.00%	120	FALSE	120	120	FALSE
121	always inactive	R	ACEFGHKLMPWY								12	0	12	0.00%	100.00%	FALSE	121	FALSE	FALSE	FALSE
122	depends	N	ACEFIKQRSTV		M						11	1	12	8.33%	91.67%	FALSE	FALSE	FALSE	FALSE	122
123	always inactive	W	ACDEHLMPQRSTVY								14	0	14	0.00%	100.00%	FALSE	123	FALSE	FALSE	FALSE
124	depends	K	CDEFN	LH	R						5	3	8	37.50%	62.50%	FALSE	FALSE	FALSE	FALSE	FALSE
125	depends	P	CDGLNW	A	HRS						6	4	10	40.00%	60.00%	FALSE	FALSE	FALSE	FALSE	FALSE
126	always inactive	K	FHILNPY								7	0	7	0.00%	100.00%	FALSE	126	FALSE	FALSE	FALSE
127	depends	D	K		AEGHLMNQRSTVW				H	EHNQT	1	13	14	92.86%	7.14%	FALSE	FALSE	127	127	FALSE
128	depends	V	EP		ACGIKLQRSW					IK	2	10	12	83.33%	16.67%	FALSE	FALSE	128	FALSE	FALSE
129	always inactive	Y	ACDEGHLPQSTVW								13	0	13	0.00%	100.00%	FALSE	129	FALSE	FALSE	FALSE
130	depends	K	CDGHLNSTWY		IR					R	10	2	12	16.67%	83.33%	FALSE	FALSE	FALSE	FALSE	130
131	depends	N	P		CEFGHILMQRSTVY				GRV	GIQRTV	1	14	15	93.33%	6.67%	FALSE	FALSE	131	131	FALSE
132	depends	R	P		ACEFHIKLNQSTVY					KN	1	14	15	93.33%	6.67%	FALSE	FALSE	132	132	FALSE
133	depends	S	DEFGHLMNPRTVW		I						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	133
134	depends	I	ACDFGHKPQRSW		LTV					LV	12	3	15	20.00%	80.00%	FALSE	FALSE	FALSE	FALSE	134
135	depends	E	P		ACDFGHKLNQRSWY				DGR	DGKQRS	1	14	15	93.33%	6.67%	FALSE	FALSE	135	135	FALSE
136	depends	L	P		ACDFHIMNQRSTW					MW	1	13	14	92.86%	7.14%	FALSE	FALSE	136	136	FALSE
137	depends	V	FGHPRNWY	CSL	AIT					I	8	6	14	42.86%	57.14%	FALSE	FALSE	FALSE	FALSE	FALSE
138	depends	Q	V		ACHILMNRSWY						1	11	12	91.67%	8.33%	FALSE	FALSE	138	138	FALSE
139	depends	Q	P		ACDEFGHKLMRSTV					T	1	14	15	93.33%	6.67%	FALSE	FALSE	139	139	FALSE
140	always active	Q			ACDFGHIKLMRVWY						0	14	14	100.00%	0.00%	140	FALSE	140	140	FALSE
141	always active	N			ADEFGHLMQRSTVWY				H	ADGHQRY	0	15	15	100.00%	0.00%	141	FALSE	141	141	FALSE
142	always active	V			CDEGHIKLMNPQRST					HKQRT	0	15	15	100.00%	0.00%	142	FALSE	142	142	FALSE
143	depends	Q	HPRST	C	EGIKLNV					K	5	8	13	61.54%	38.46%	FALSE	FALSE	143	FALSE	FALSE
144	depends	L	AEFIKPQSVY	R	TW					T	10	3	13	23.08%	76.92%	FALSE	FALSE	FALSE	FALSE	144
145	depends	S	TW		ACDEGHLMNPR					P	2	11	13	84.62%	15.38%	FALSE	FALSE	145	FALSE	FALSE
146	always active	L			ACEGHIKNPQRSTVY					R	0	15	15	100.00%	0.00%	146	FALSE	146	146	FALSE
147	always active	T			ACDFGILMPQRSVWY				RV	AFGLPQRSVY	0	15	15	100.00%	0.00%	147	FALSE	147	147	FALSE
148	always active	E			CFGHIKLQRSTVWY					GHKQS	0	14	14	100.00%	0.00%	148	FALSE	148	148	FALSE
149	depends	A	EP		CGKLMQRSTY					CQRSTV	2	10	12	83.33%	16.67%	FALSE	FALSE	149	FALSE	FALSE
150	depends	T	V		ACDEFGILNPRSWY				G	ADEGWY	1	14	15	93.33%	6.67%	FALSE	FALSE	150	150	FALSE
151	always active	E			ACGHKLMNQRSTVWY				KQ	AGHKLMQRSTVWY	0	15	15	100.00%	0.00%	151	FALSE	151	151	FALSE
152	depends	K	L	W	ACFIMRTVY					RT	1	10	11	90.91%	9.09%	FALSE	FALSE	152	152	FALSE
153	depends	A	EFMPRTV	S	IL						7	3	10	30.00%	70.00%	FALSE	FALSE	FALSE	FALSE	153
154	depends	K	DEGPSWY	I	RTV						7	4	11	36.36%	63.64%	FALSE	FALSE	FALSE	FALSE	FALSE
155	depends	Q	PY		ACDFGHKLMRSTVW					DGHKR	2	14	16	87.50%	12.50%	FALSE	FALSE	155	FALSE	FALSE
156	depends	E	P	C	ADGILMQRSTVW					D	1	13	14	92.86%	7.14%	FALSE	FALSE	156	156	FALSE
157	depends	F	ACDEGHIKLMPQRSTV		W						16	1	17	5.88%	94.12%	FALSE	FALSE	FALSE	FALSE	157
158	depends	E	DKPRY	G	AFHLQS					Q	5	7	12	58.33%	41.67%	FALSE	FALSE	FALSE	FALSE	FALSE
159	depends	K	WY	G	ADEHLMNQRSV						2	12	14	85.71%	14.29%	FALSE	FALSE	159	FALSE	FALSE

Position		WT	Inactive subs (<20%)	Active subs (20%<x<40%)	Active subs (>40%)	>1000% activity	>500% activity	>300% activity	>200% activity	>100% activity	# Inactive Subs	# Active subs	Total subs tested	% active subs (>20%)	% inactive subs	always active	always inactive	60% or more active subs	90% or more active subs	0<x<=30%
160	always active	A		W	CFGHIKLMNQRSVY					SY	0	15	15	100.00%	0.00%	160	FALSE	160	160	FALSE
161	depends	G	W		ACDERSV						1	7	8	87.50%	12.50%	FALSE	FALSE	161	FALSE	FALSE
162	always active	K			ADEGHLMPQRSVWY					MW	0	14	14	100.00%	0.00%	162	FALSE	162	162	FALSE
163	depends	D	CP	WF	AEGKLQRSTV					AEGKLQRST	2	12	14	85.71%	14.29%	FALSE	FALSE	163	FALSE	FALSE
164	depends	F	ACDEGHNPQR		LMVW					LMV	10	4	14	28.57%	71.43%	FALSE	FALSE	FALSE	FALSE	164
165	depends	L	HPT	C	ADFNRSVWY		D	D	DN	DFNSVW	3	10	13	76.92%	23.08%	FALSE	FALSE	165	FALSE	FALSE
166	depends	V	D		ACEFGHLNQRTWY		R	LQRT	ALQRTY	ACEFGHLQRTWY	1	13	14	92.86%	7.14%	FALSE	FALSE	166	166	FALSE
167	depends	E	V	F	ADGHKMNPRSTY					RS	1	13	14	92.86%	7.14%	FALSE	FALSE	167	167	FALSE
168	depends	T	ACDEFGKLPRSVWY		H						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	168
169	depends	I	ADFGHKNPQSTY		LRV				L	L	12	3	15	20.00%	80.00%	FALSE	FALSE	FALSE	FALSE	169
170	depends	K	CDEGMPWY		AQNRV				R	R	8	5	13	38.46%	61.54%	FALSE	FALSE	FALSE	FALSE	FALSE
171	depends	L	CDHMNRSWY		IV						9	2	11	18.18%	81.82%	FALSE	FALSE	FALSE	FALSE	171
172	depends	G	DEILPQTVWY		AC					AC	10	2	12	16.67%	83.33%	FALSE	FALSE	FALSE	FALSE	172
173	depends	K	DEGHILMPSVWY	Q	NR						12	3	15	20.00%	80.00%	FALSE	FALSE	FALSE	FALSE	173
174	depends	L	P	H	AGKMNQRSTVWY				K	AKNRTY	1	13	14	92.86%	7.14%	FALSE	FALSE	174	174	FALSE
175	depends	L	CDGKPRS		EHTVY					T	7	5	12	41.67%	58.33%	FALSE	FALSE	FALSE	FALSE	FALSE
176	depends	R	ACEFGHIPQSTVW		KL						13	2	15	13.33%	86.67%	FALSE	FALSE	FALSE	FALSE	176
177	depends	P	ACDFGHLMQRSTW	V							13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	177
178	depends	N	EILVWY		GKMR					R	6	4	10	40.00%	60.00%	FALSE	FALSE	FALSE	FALSE	FALSE
179	depends	H	W		ACEGIKLMNPRSTV					AK	1	14	15	93.33%	6.67%	FALSE	FALSE	179	179	FALSE
180	depends	L	ACEPRS	I	FGKM						6	5	11	45.45%	54.55%	FALSE	FALSE	FALSE	FALSE	FALSE
181	depends	W	ACDEFHILRS	K	MQ						10	3	13	23.08%	76.92%	FALSE	FALSE	FALSE	FALSE	181
182	depends	G	ACDEHNPQRSTVY		L						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	182
183	depends	Y	CDGIKNPQRSV	E	L						11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	183
184	depends	Y	ACDEFGHKLMPRSV	W							14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	184
185	always inactive	L	ADEFGIKPRSTVWY								14	0	14	0.00%	100.00%	FALSE	185	FALSE	FALSE	FALSE
186	depends	F	ADGHIKLNPQRSVW		Y						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	186
187	always inactive	P	AFGHILMNQRSTVWY								15	0	15	0.00%	100.00%	FALSE	187	FALSE	FALSE	FALSE
188	always inactive	D	ACFGHLMNPQRSTVW								15	0	15	0.00%	100.00%	FALSE	188	FALSE	FALSE	FALSE
189	always inactive	C	AEGHKLMNPRSTVWY								15	0	15	0.00%	100.00%	FALSE	189	FALSE	FALSE	FALSE
190	always inactive	Y	CEFGHKLNQRSTVW								14	0	14	0.00%	100.00%	FALSE	190	FALSE	FALSE	FALSE
191	always inactive	N	AEFGKLMPQRSTVWY								15	0	15	0.00%	100.00%	FALSE	191	FALSE	FALSE	FALSE
192	depends	H	CFGKLMNPQRVWY		ST						13	2	15	13.33%	86.67%	FALSE	FALSE	FALSE	FALSE	192
193	depends	H	ADKLMPV	RF	GQSY						7	6	13	46.15%	53.85%	FALSE	FALSE	FALSE	FALSE	FALSE
194	always inactive	Y	ACILPSTV								8	0	8	0.00%	100.00%	FALSE	194	FALSE	FALSE	FALSE
195	depends	K		V	AGHILNQRSTW						0	12	12	100.00%	0.00%	195	FALSE	195	195	FALSE
196	always active	K		NY	EGLRSTW					T	0	9	9	100.00%	0.00%	196	FALSE	196	196	FALSE
197	depends	P	C	W	ADEFGHKLMQRST					M	1	14	15	93.33%	6.67%	FALSE	FALSE	197	197	FALSE
198	depends	G	V	W	ADEHLNQRSTY					D	1	12	13	92.31%	7.69%	FALSE	FALSE	198	198	FALSE
199	always inactive	Y	EGHIKLPRSW								10	0	10	0.00%	100.00%	FALSE	199	FALSE	FALSE	FALSE
200	depends	N	AFGHKLMPQRSWY	T	D						13	2	15	13.33%	86.67%	FALSE	FALSE	FALSE	FALSE	200
201	always inactive	G	AFLMNPRSTVW								11	0	11	0.00%	100.00%	FALSE	201	FALSE	FALSE	FALSE
202	depends	S	AEFGHKNPQRVWY		M						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	202
203	always inactive	C	ADEGHLMNQRSTV								13	0	13	0.00%	100.00%	FALSE	203	FALSE	FALSE	FALSE
204	depends	F	ACEGHIKQRST	W	P						11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	204
205	always active	N		L	RSTVWY					AE	0	7	7	100.00%	0.00%	205	FALSE	205	205	FALSE
206	depends	V	CDFGPY	Q	HIKLMRST					KLR	6	9	15	60.00%	40.00%	FALSE	FALSE	206	FALSE	FALSE
207	always inactive	E	AFGMPQRSTVW								11	0	11	0.00%	100.00%	FALSE	207	FALSE	FALSE	FALSE
208	depends	I	DGPW		ACKLMQRSTV					RTV	4	10	14	71.43%	28.57%	FALSE	FALSE	208	FALSE	FALSE
209	depends	K	CP	L	AEFGNRST						2	9	11	81.82%	18.18%	FALSE	FALSE	209	FALSE	FALSE
210	always inactive	R	ACDEGKMNPSTVWY								14	0	14	0.00%	100.00%	FALSE	210	FALSE	FALSE	FALSE
211	depends	N	CFGHIKMPRSTV		LW						12	2	14	14.29%	85.71%	FALSE	FALSE	FALSE	FALSE	211
212	depends	D	AGHIKLMPVW		NST					N	10	3	13	23.08%	76.92%	FALSE	FALSE	FALSE	FALSE	212

Position		WT	Inactive subs (<20%)	Active subs (20%<x<40%)	Active subs (>40%)	>1000% activity	>500% activity	>300% activity	>200% activity	>100% activity	# Inactive Subs	# Active subs	Total subs tested	% active subs (>20%)	% inactive subs	always active	always inactive	60% or more active subs	90% or more active subs	0<x<=30%
213	depends	D	PS		AEGHKLMNQRVWY					MNQ	2	13	15	86.67%	13.33%	FALSE	FALSE	213	FALSE	FALSE
214	depends	L	ACDEGHKNPRSTY		Q						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	214
215	depends	S	CP		ADEGHKLMQRTVW					M	2	13	15	86.67%	13.33%	FALSE	FALSE	215	FALSE	FALSE
216	depends	W	DEGHIKLMNPQRTV		Y						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	216
217	depends	L	ACGHPQSTVW		M						10	1	11	9.09%	90.91%	FALSE	FALSE	FALSE	FALSE	217
218	depends	W	AIKLPS	MV	F						6	3	9	33.33%	66.67%	FALSE	FALSE	FALSE	FALSE	FALSE
219	depends	N	P		ACDEHIKLMRSTW				S	AKMRS	1	13	14	92.86%	7.14%	FALSE	FALSE	219	219	FALSE
220	depends	E	GKNPRW	DM	AHILSTV					HILV	6	9	15	60.00%	40.00%	FALSE	FALSE	220	FALSE	FALSE
221	depends	S	DEHKPR	I	ACMQTV					QV	6	7	13	53.85%	46.15%	FALSE	FALSE	FALSE	FALSE	FALSE
222	depends	T	PY		DFGIKLNRSV						2	10	12	83.33%	16.67%	FALSE	FALSE	222	FALSE	FALSE
223	always inactive	A	CDEGHKLPQRSTVWY								15	0	15	0.00%	100.00%	FALSE	223	FALSE	FALSE	FALSE
224	depends	L	ADEFGMPQRSTWY		I						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	224
225	always inactive	Y	ADEGHKPQRTVW								12	0	12	0.00%	100.00%	FALSE	225	FALSE	FALSE	FALSE
226	depends	P	ACDEFGLNQRSTVY		W						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	226
227	always inactive	S	AFGHIKLMPQRTVWY								15	0	15	0.00%	100.00%	FALSE	227	FALSE	FALSE	FALSE
228	always inactive	I	AEFGHLMNPRSTW								13	0	13	0.00%	100.00%	FALSE	228	FALSE	FALSE	FALSE
229	always inactive	Y	EFGKLPQTVW								10	0	10	0.00%	100.00%	FALSE	229	FALSE	FALSE	FALSE
230	depends	L	AEGHKMNPRSTVWY		I						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	230
231	depends	N	ACDFGHIKLPQRSV		T					T	14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	231
232	depends	T	CGHKLNPQVY		FS						10	2	12	16.67%	83.33%	FALSE	FALSE	FALSE	FALSE	232
233	depends	Q	DIPST		AFGKLRY					KR	5	7	12	58.33%	41.67%	FALSE	FALSE	FALSE	FALSE	FALSE
234	depends	Q	ADEGHNPSTVW		LM					M	11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	234
235	depends	S	FLMRWY		AEGHKT						6	6	12	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
236	depends	P	CILNQTY		AGHKRS			R	R	AGR	7	6	13	46.15%	53.85%	FALSE	FALSE	FALSE	FALSE	FALSE
237	always active	V		C	AEFHLNQRSTW					ELQST	0	12	12	100.00%	0.00%	237	FALSE	237	237	FALSE
238	depends	A	FGLPVWY		DEHKQRST				S	QS	7	8	15	53.33%	46.67%	FALSE	FALSE	FALSE	FALSE	FALSE
239	depends	A	CFGHILPRSTVWY	N							13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	239
240	depends	T	EFGNWY		KAMPQRSV					K	6	8	14	57.14%	42.86%	FALSE	FALSE	FALSE	FALSE	FALSE
241	always inactive	L	ACDEGIPRSTVW								12	0	12	0.00%	100.00%	FALSE	241	FALSE	FALSE	FALSE
242	depends	Y	ACDGILMPRSTVW		F					F	13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	242
243	always inactive	V	CDFGHLMPQRSWY								13	0	13	0.00%	100.00%	FALSE	243	FALSE	FALSE	FALSE
244	always inactive	R	ADGIVY								6	0	6	0.00%	100.00%	FALSE	244	FALSE	FALSE	FALSE
245	depends	N	ACFLPQRSTV		H						10	1	11	9.09%	90.91%	FALSE	FALSE	FALSE	FALSE	245
246	always inactive	R	ACDEGHIKLMPSTVW								15	0	15	0.00%	100.00%	FALSE	246	FALSE	FALSE	FALSE
247	depends	V	ACFHNPQRSTWY		ILM				I	I	12	3	15	20.00%	80.00%	FALSE	FALSE	FALSE	FALSE	247
248	depends	R	CDEGIMPT		AHWY						8	4	12	33.33%	66.67%	FALSE	FALSE	FALSE	FALSE	FALSE
249	depends	E	AGHIKMQSY		V						9	1	10	10.00%	90.00%	FALSE	FALSE	FALSE	FALSE	249
250	always inactive	A	CFGHKLMNPQRSTVW								15	0	15	0.00%	100.00%	FALSE	250	FALSE	FALSE	FALSE
251	depends	I	DFGHKPSTW	Y	LM						9	3	12	25.00%	75.00%	FALSE	FALSE	FALSE	FALSE	251
252	always inactive	R	ADEFGHIKLNPSTY								14	0	14	0.00%	100.00%	FALSE	252	FALSE	FALSE	FALSE
253	depends	V	ADEGHLMNQRSW		I						12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	253
254	always inactive	S	CDEGIKLPQRTVWY								14	0	14	0.00%	100.00%	FALSE	254	FALSE	FALSE	FALSE
255	depends	K	CDLPVW	G	ANQRS						6	6	12	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
256	depends	I	CDEGP		AHLV						5	4	9	44.44%	55.56%	FALSE	FALSE	FALSE	FALSE	FALSE
257	depends	P	D	C	AGIKLMNQRTV				T	IRT	1	12	13	92.31%	7.69%	FALSE	FALSE	257	257	FALSE
258	depends	D	LPVW	G	HNRS					NS	4	5	9	55.56%	44.44%	FALSE	FALSE	FALSE	FALSE	FALSE
259	always active	A			EGIKLNPQRSTVWY					P	0	14	14	100.00%	0.00%	259	FALSE	259	259	FALSE
260	depends	K	CP	G	ADEHLMQRSY					Y	2	11	13	84.62%	15.38%	FALSE	FALSE	260	FALSE	FALSE
261	depends	S	P		AFKMNQRTVW				K	KNR	1	10	11	90.91%	9.09%	FALSE	FALSE	261	261	FALSE
262	always inactive	P	ADEGHIKQRSTVWY								14	0	14	0.00%	100.00%	FALSE	262	FALSE	FALSE	FALSE
263	depends	L	EFPQW	H	AKMRTV				K	KR	5	7	12	58.33%	41.67%	FALSE	FALSE	FALSE	FALSE	FALSE
264	depends	P	DEFGLMRTVWY		AH						11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	264
265	depends	V	ADFGHKLMNQRS		I						12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	265

Position		WT	Inactive subs (<20%)	Active subs (20%<x<40%)	Active subs (>40%)	>1000% activity	>500% activity	>300% activity	>200% activity	>100% activity	# Inactive Subs	# Active subs	Total subs tested	% active subs (>20%)	% inactive subs	always active	always inactive	60% or more active subs	90% or more active subs	0<x<=30%
266	depends	F	ACGHMPQRSTVW		Y						12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	266
267	depends	A	DGHIKNRSW		MT					T	9	2	11	18.18%	81.82%	FALSE	FALSE	FALSE	FALSE	267
268	always inactive	Y	ACFGHKLNPQSTVW								14	0	14	0.00%	100.00%	FALSE	268	FALSE	FALSE	FALSE
269	depends	T	EKLMNPQR		ACDS					AS	8	4	12	33.33%	66.67%	FALSE	FALSE	FALSE	FALSE	FALSE
270	depends	R	ACEFGHIPY		MNST						9	4	13	30.77%	69.23%	FALSE	FALSE	FALSE	FALSE	FALSE
271	depends	I	ADEHKTW		FGLMSV	L	L	LM	LM	GLMV	7	6	13	46.15%	53.85%	FALSE	FALSE	FALSE	FALSE	FALSE
272	depends	V	HLNPW	EM	DRST					DT	5	6	11	54.55%	45.45%	FALSE	FALSE	FALSE	FALSE	FALSE
273	depends	F	ACDGILPQSVW		HTY					H	11	3	14	21.43%	78.57%	FALSE	FALSE	FALSE	FALSE	273
274	depends	T	CEGHNQWY		AFS					F	8	3	11	27.27%	72.73%	FALSE	FALSE	FALSE	FALSE	274
275	depends	D	AFGIKMQTW	L	V						9	2	11	18.18%	81.82%	FALSE	FALSE	FALSE	FALSE	275
276	depends	Q	FPW	G	CDEHILMRSY					DEHMRSY	3	11	14	78.57%	21.43%	FALSE	FALSE	276	FALSE	FALSE
277	always active	V			ACDEGHKMNQRSTY					EGHKNRT	0	14	14	100.00%	0.00%	277	FALSE	277	277	FALSE
278	depends	L	MP		AEFGHIKNRSTVY		R	HR	HR	AEFGHKNRSTY	2	13	15	86.67%	13.33%	FALSE	FALSE	278	FALSE	FALSE
279	depends	K	CFGLWY	A	HQRT					R	6	5	11	45.45%	54.55%	FALSE	FALSE	FALSE	FALSE	FALSE
280	depends	F	DIMNRSTVW		GQ						9	2	11	18.18%	81.82%	FALSE	FALSE	FALSE	FALSE	280
281	always inactive	L	ADGHIKNPQRSVW								13	0	13	0.00%	100.00%	FALSE	281	FALSE	FALSE	FALSE
282	depends	S	FLVWY		DGMQ				M	M	5	4	9	44.44%	55.56%	FALSE	FALSE	FALSE	FALSE	FALSE
283	depends	Q	ACDFW		EPRST					PS	5	5	10	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
284	depends	D	CIP	TY	AEGHLMNQS					E	3	11	14	78.57%	21.43%	FALSE	FALSE	284	FALSE	FALSE
285	depends	E	KPRTV	A	FGHMNQY					H	5	8	13	61.54%	38.46%	FALSE	FALSE	285	FALSE	FALSE
286	depends	L	ACDFHKMPTY	W	RS						10	3	13	23.08%	76.92%	FALSE	FALSE	FALSE	FALSE	286
287	depends	V	ACDEGKLPQRS	N	IT						11	3	14	21.43%	78.57%	FALSE	FALSE	FALSE	FALSE	287
288	depends	Y	DEFGHIKPRT		LW						10	2	12	16.67%	83.33%	FALSE	FALSE	FALSE	FALSE	288
289	depends	T	ACEGHLPQRY		KS						10	2	12	16.67%	83.33%	FALSE	FALSE	FALSE	FALSE	289
290	depends	F	DQY		IM					M	3	2	5	40.00%	60.00%	FALSE	FALSE	FALSE	FALSE	FALSE
291	depends	G	ADEFMNTWY	C	QRSV					V	9	5	14	35.71%	64.29%	FALSE	FALSE	FALSE	FALSE	FALSE
292	depends	E	ILT		ACFGHKNPRVW					HKPV	3	11	14	78.57%	21.43%	FALSE	FALSE	292	FALSE	FALSE
293	depends	T	EN		ACDFGKLMPQSVY				MV	ACDFKMPQVY	2	13	15	86.67%	13.33%	FALSE	FALSE	293	FALSE	FALSE
294	depends	V	AEGHKLNPQRSTW		M						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	294
295	always inactive	A	CGHILNPTVY								10	0	10	0.00%	100.00%	FALSE	295	FALSE	FALSE	FALSE
296	always inactive	L	CFGIKMQRSTVWY								13	0	13	0.00%	100.00%	FALSE	296	FALSE	FALSE	FALSE
297	depends	G	CEHLNPQSTY	R	A						10	2	12	16.67%	83.33%	FALSE	FALSE	FALSE	FALSE	297
298	depends	A	CELMNPQSTWY		GI						11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	298
299	always inactive	S	ACDFGHLMPQT								11	0	11	0.00%	100.00%	FALSE	299	FALSE	FALSE	FALSE
300	depends	G	ACDEFLMNPQSTVW		R						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	300
301	depends	I	EGHKMNPQRSWY		AV						12	2	14	14.29%	85.71%	FALSE	FALSE	FALSE	FALSE	301
302	depends	V	CDEFGHLMPRSTY		IW						13	2	15	13.33%	86.67%	FALSE	FALSE	FALSE	FALSE	302
303	depends	I	ACEFGKLMRWY	D	V						11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	303
304	depends	W	ACDMNPQSTVY		GI					GI	11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	304
305	depends	G	LPQRSTVY	N	DE					E	8	3	11	27.27%	72.73%	FALSE	FALSE	FALSE	FALSE	305
306	depends	T	ACHILVWY		DES					S	8	3	11	27.27%	72.73%	FALSE	FALSE	FALSE	FALSE	306
307	depends	L	CIP	G	KNQSTVWY					T	3	9	12	75.00%	25.00%	FALSE	FALSE	307	FALSE	FALSE
308	depends	S	CFLMVWY		DGHKNPRT				N	GHKNR	7	8	15	53.33%	46.67%	FALSE	FALSE	FALSE	FALSE	FALSE
309	always active	I			DEGHKLMNQRSTVW			N	NRT	EGHLMNQRST	0	14	14	100.00%	0.00%	309	FALSE	309	309	FALSE
310	depends	M	CEKL	FY	AGQRSV				G	AGS	4	8	12	66.67%	33.33%	FALSE	FALSE	310	FALSE	FALSE
311	depends	R	CEFILPVW		GHKQST						8	6	14	42.86%	57.14%	FALSE	FALSE	FALSE	FALSE	FALSE
312	depends	S	CEMVW	KL	GNT					N	5	5	10	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
313	depends	M	C		AEGHKLPRSTVY				KR	AHKLPRY	1	12	13	92.31%	7.69%	FALSE	FALSE	313	313	FALSE
314	depends	K	CLW		ADHINQRSTY					H	3	10	13	76.92%	23.08%	FALSE	FALSE	314	FALSE	FALSE
315	depends	S	CIV		AEGHKLMRTY				H	HR	3	10	13	76.92%	23.08%	FALSE	FALSE	315	FALSE	FALSE
316	depends	C	EGIKLMPRSTVWY		D						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	316
317	depends	L	GP		ADHIKMNQRSTW		K	K	KR	AHIKMQRS	2	12	14	85.71%	14.29%	FALSE	FALSE	317	FALSE	FALSE
318	depends	L	CPW		DFGHIKMNQRST					KMR	3	12	15	80.00%	20.00%	FALSE	FALSE	318	FALSE	FALSE

Position		WT	Inactive subs (<20%)	Active subs (20%<x<40%)	Active subs (>40%)	>1000% activity	>500% activity	>300% activity	>200% activity	>100% activity	# Inactive Subs	# Active subs	Total subs tested	% active subs (>20%)	% inactive subs	always active	always inactive	60% or more active subs	90% or more active subs	0<x<=30%
319	always inactive	L	CEFGHIKMPQRSVWY								15	0	15	0.00%	100.00%	FALSE	319	FALSE	FALSE	FALSE
320	depends	D	CP	LV	EGHIKMNRSWY		K	KR	KR	HKRS	2	13	15	86.67%	13.33%	FALSE	FALSE	320	FALSE	FALSE
321	depends	N	EMP		ADHKRSTY					ADKRS	3	8	11	72.73%	27.27%	FALSE	FALSE	321	FALSE	FALSE
322	always inactive	Y	CDEGILNPRSTVW								13	0	13	0.00%	100.00%	FALSE	322	FALSE	FALSE	FALSE
323	depends	M	ACEGHKNRSTV		FIL						11	3	14	21.43%	78.57%	FALSE	FALSE	FALSE	FALSE	323
324	depends	E	CFPVWY		ADHMNRS				R	DNR	6	7	13	53.85%	46.15%	FALSE	FALSE	FALSE	FALSE	FALSE
325	depends	T	CR		ADEGHKMNQSVW		Q	EGHKNQS	EGHKMNQS	ADEGHKMNQSV	2	12	14	85.71%	14.29%	FALSE	FALSE	325	FALSE	FALSE
326	depends	I	EGHNW	C	KLSVY		V	V	V	LV	5	6	11	54.55%	45.45%	FALSE	FALSE	FALSE	FALSE	FALSE
327	depends	L	AEFGHNQRSTVWY		M						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	327
328	always active	N		W	ACGHIKLQRSTVY				KLS	CIKLQSVY	0	14	14	100.00%	0.00%	328	FALSE	328	328	FALSE
329	always inactive	P	CFGHIKLNQRSTVWY								15	0	15	0.00%	100.00%	FALSE	329	FALSE	FALSE	FALSE
330	always inactive	Y	ACDEGILMNPRSVW								14	0	14	0.00%	100.00%	FALSE	330	FALSE	FALSE	FALSE
331	depends	I	ADEFHKQRSTWY	CE	V						12	3	15	20.00%	80.00%	FALSE	FALSE	FALSE	FALSE	331
332	always inactive	I	ACDEFGHKLNPRSTY								15	0	15	0.00%	100.00%	FALSE	332	FALSE	FALSE	FALSE
333	always inactive	N	GHIKPRSTWY								10	0	10	0.00%	100.00%	FALSE	333	FALSE	FALSE	FALSE
334	depends	V	ACDEGMNRS	T	P						9	2	11	18.18%	81.82%	FALSE	FALSE	FALSE	FALSE	334
335	depends	T	FGHIKLPVWY		S						10	1	11	9.09%	90.91%	FALSE	FALSE	FALSE	FALSE	335
336	always inactive	L	AEFGKNPRSTVWY								13	0	13	0.00%	100.00%	FALSE	336	FALSE	FALSE	FALSE
337	always inactive	A	CFGIKLMRTW								10	0	10	0.00%	100.00%	FALSE	337	FALSE	FALSE	FALSE
338	depends	A	CDEFGHIKLPRTV		Q						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	338
339	depends	K	DEFGHLNPSTVWY		M						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	339
340	always inactive	M	ACDEFGHKPRSTVW								14	0	14	0.00%	100.00%	FALSE	340	FALSE	FALSE	FALSE
341	always inactive	C	AEGHKLMNQRSTVY								14	0	14	0.00%	100.00%	FALSE	341	FALSE	FALSE	FALSE
342	depends	S	DEFHKLMPQRTY		A						12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	342
343	depends	Q	CDFIPW		TV						6	2	8	25.00%	75.00%	FALSE	FALSE	FALSE	FALSE	343
344	always inactive	V	FGHLMNPQRSTWY								13	0	13	0.00%	100.00%	FALSE	344	FALSE	FALSE	FALSE
345	always inactive	L	ACEHKNQRTVY								11	0	11	0.00%	100.00%	FALSE	345	FALSE	FALSE	FALSE
346	always inactive	C	ADFGIKLMPRSTVW								14	0	14	0.00%	100.00%	FALSE	346	FALSE	FALSE	FALSE
347	depends	Q	CFIPTVW	L	AEGMRS				GS	GS	7	7	14	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
348	depends	E	CHILPQRTVWY		DGS						11	3	14	21.43%	78.57%	FALSE	FALSE	FALSE	FALSE	348
349	depends	Q	DFGPVWY		AEKMNRT						7	7	14	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
350	always inactive	G	ADEFHKLMNPRSTVY								15	0	15	0.00%	100.00%	FALSE	350	FALSE	FALSE	FALSE
351	depends	V	DEFHNRWY	CIQ	AS					A	8	5	13	38.46%	61.54%	FALSE	FALSE	FALSE	FALSE	FALSE
352	always inactive	C	ADEFGKMPQRSTVWY								15	0	15	0.00%	100.00%	FALSE	352	FALSE	FALSE	FALSE
353	depends	I	CFGHKLMQRSW		TV					V	11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	353
354	always inactive	R	CDEGHIKLMPQSVWY								15	0	15	0.00%	100.00%	FALSE	354	FALSE	FALSE	FALSE
355	always inactive	K	DFGHLMNPQRSTVWY								15	0	15	0.00%	100.00%	FALSE	355	FALSE	FALSE	FALSE
356	depends	N	CGKLPRTVW		ADHS						9	4	13	30.77%	69.23%	FALSE	FALSE	FALSE	FALSE	FALSE
357	depends	W	DEFGLMQR	K	ACST						8	5	13	38.46%	61.54%	FALSE	FALSE	FALSE	FALSE	FALSE
358	depends	N	EHIKPQRW	L	CGT						8	4	12	33.33%	66.67%	FALSE	FALSE	FALSE	FALSE	FALSE
359	depends	S	AFGLPW		DEHKMTV				T	ET	6	7	13	53.85%	46.15%	FALSE	FALSE	FALSE	FALSE	FALSE
360	depends	S	ACEFGIKLMPQRV		T						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	360
361	depends	D	ACEGMNPQRSVW	H							12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	361
362	always inactive	Y	ACEGHKLMNPRSTVW								15	0	15	0.00%	100.00%	FALSE	362	FALSE	FALSE	FALSE
363	always inactive	L	ACDEFGHIPQRSTVW								15	0	15	0.00%	100.00%	FALSE	363	FALSE	FALSE	FALSE
364	always inactive	H	ACDEFGKLMPRSTVY								15	0	15	0.00%	100.00%	FALSE	364	FALSE	FALSE	FALSE
365	always inactive	L	ACDEGMNPQRSTWY								14	0	14	0.00%	100.00%	FALSE	365	FALSE	FALSE	FALSE
366	always inactive	N	ACEFGKMPQRTW								12	0	12	0.00%	100.00%	FALSE	366	FALSE	FALSE	FALSE
367	depends	P	EFILMQV		ACGKRS						7	6	13	46.15%	53.85%	FALSE	FALSE	FALSE	FALSE	FALSE
368	depends	D	CPW		AEGHKLMRSTV					AEKR	3	11	14	78.57%	21.43%	FALSE	FALSE	368	FALSE	FALSE
369	depends	N	CEFIKLPQVW		HRS					H	10	3	13	23.08%	76.92%	FALSE	FALSE	FALSE	FALSE	369
370	always inactive	F	ADEGHKLNPQRSVY								14	0	14	0.00%	100.00%	FALSE	370	FALSE	FALSE	FALSE
371	depends	A	P	G	EFHIKLMRSV					EHKRS	1	11	12	91.67%	8.33%	FALSE	FALSE	371	371	FALSE

Position		WT	Inactive subs (<20%)	Active subs (20%<x<40%)	Active subs (>40%)	>1000% activity	>500% activity	>300% activity	>200% activity	>100% activity	# Inactive Subs	# Active subs	Total subs tested	% active subs (>20%)	% inactive subs	always active	always inactive	60% or more active subs	90% or more active subs	0<x<=30%
372	always inactive	I	ADEFGHKLNPRSTVW								15	0	15	0.00%	100.00%	FALSE	372	FALSE	FALSE	FALSE
373	depends	Q	CPW		AEFKLMRSV					MV	3	9	12	75.00%	25.00%	FALSE	FALSE	373	FALSE	FALSE
374	depends	L	DE	W	AHIMNPRSTVY					HM	2	12	14	85.71%	14.29%	FALSE	FALSE	374	FALSE	FALSE
375	depends	E	CFPVY	I	AGKLMNRST					KT	5	10	15	66.67%	33.33%	FALSE	FALSE	375	FALSE	FALSE
376	depends	K	IPW	L	ADEMQRSTVY						3	11	14	78.57%	21.43%	FALSE	FALSE	376	FALSE	FALSE
377	depends	G	CILV		DEHKPRST			T	PT	DHKPRST	4	8	12	66.67%	33.33%	FALSE	FALSE	377	FALSE	FALSE
378	depends	G	DEFILMQTWY		KNR					KR	10	3	13	23.08%	76.92%	FALSE	FALSE	FALSE	FALSE	378
379	depends	K	ACEFILMW		GHRST						8	5	13	38.46%	61.54%	FALSE	FALSE	FALSE	FALSE	FALSE
380	depends	F	CDEGQRS	VT	ILPWY				W	WY	7	7	14	50.00%	50.00%	FALSE	FALSE	FALSE	FALSE	FALSE
381	depends	T	GLPWY	E	HKNQRSV					K	5	8	13	61.54%	38.46%	FALSE	FALSE	381	FALSE	FALSE
382	always inactive	V	EGHKLMNPQRSTWY								14	0	14	0.00%	100.00%	FALSE	382	FALSE	FALSE	FALSE
383	depends	R	GP		AEHIKLMNSTV					KLV	2	11	13	84.62%	15.38%	FALSE	FALSE	383	FALSE	FALSE
384	always inactive	G	CFMQST								6	0	6	0.00%	100.00%	FALSE	384	FALSE	FALSE	FALSE
385	depends	K	CLMPWY		AGHNQRSTV					AS	6	9	15	60.00%	40.00%	FALSE	FALSE	385	FALSE	FALSE
386	always inactive	P	ACFGHILMNQRSTVY								15	0	15	0.00%	100.00%	FALSE	386	FALSE	FALSE	FALSE
387	depends	T	CEFGHILMNVWY		S						12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	387
388	depends	L	CGPQ		FHIMRTVWY					Y	4	9	13	69.23%	30.77%	FALSE	FALSE	388	FALSE	FALSE
389	depends	E	FV		AGHKLMPQRSTY					AHKS	2	12	14	85.71%	14.29%	FALSE	FALSE	389	FALSE	FALSE
390	always inactive	D	ACEFGHLNPRSTVWY								15	0	15	0.00%	100.00%	FALSE	390	FALSE	FALSE	FALSE
391	depends	L	ADGHKNPQRSTVWY		C						14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	391
392	depends	E	CP	W	AFGKLMQRSTVY					MQV	2	13	15	86.67%	13.33%	FALSE	FALSE	392	FALSE	FALSE
393	depends	Q	CP		ADFHKLMNRST					AFHS	2	11	13	84.62%	15.38%	FALSE	FALSE	393	FALSE	FALSE
394	depends	F	ADEGIKNPQRSTV		LW						13	2	15	13.33%	86.67%	FALSE	FALSE	FALSE	FALSE	394
395	depends	S	CLMP	T	AGHKRW					AR	4	7	11	63.64%	36.36%	FALSE	FALSE	395	FALSE	FALSE
396	depends	E	CFGIPY	L	ADHQRST						6	8	14	57.14%	42.86%	FALSE	FALSE	FALSE	FALSE	FALSE
397	always inactive	K	ACEFGILMPQTV		R						12	1	13	7.69%	92.31%	FALSE	FALSE	FALSE	FALSE	397
398	depends	F	ACEGHINPRSTVWY	L							14	1	15	6.67%	93.33%	FALSE	FALSE	FALSE	FALSE	398
399	depends	Y	DP		ACEKMNQRSTVW				MT	AEKMQRSTVW	2	12	14	85.71%	14.29%	FALSE	FALSE	399	FALSE	FALSE
400	always inactive	C	ADEFGILMPQRSTVY								15	0	15	0.00%	100.00%	FALSE	400	FALSE	FALSE	FALSE
401	depends	S	CFHKRWY	GQ	AEN						7	5	12	41.67%	58.33%	FALSE	FALSE	FALSE	FALSE	FALSE
402	always inactive	C	ADEFLMPQRSTVWY								14	0	14	0.00%	100.00%	FALSE	402	FALSE	FALSE	FALSE
403	depends	Y	ACEGHKLMNPQRT		F						13	1	14	7.14%	92.86%	FALSE	FALSE	FALSE	FALSE	403
404	depends	S	CDFGHLMNRVWY	T	AP						12	3	15	20.00%	80.00%	FALSE	FALSE	FALSE	FALSE	404
405	depends	T	CIV	F	AGKMPQRSWY				G	G	3	11	14	78.57%	21.43%	FALSE	FALSE	405	FALSE	FALSE
406	depends	L	PR		ACEFGINQSTVY					F	2	12	14	85.71%	14.29%	FALSE	FALSE	406	FALSE	FALSE
407	always active	S			ADEFGHLMNPQRVW					ADEFHQR	0	14	14	100.00%	0.00%	407	FALSE	407	407	FALSE
408	always inactive	C	AEFGIKLPRSTVWY								14	0	14	0.00%	100.00%	FALSE	408	FALSE	FALSE	FALSE
409	always active	K			ADEGHIPQRSTV			Q	AQ	AQ	0	12	12	100.00%	0.00%	409	FALSE	409	409	FALSE
410	depends	E	W		DKMNPQRSTVY					T	1	11	12	91.67%	8.33%	FALSE	FALSE	410	410	FALSE
411	depends	K	DEFG	H	ANPRSTV					NS	4	8	12	66.67%	33.33%	FALSE	FALSE	411	FALSE	FALSE
412	depends	A	E	HQ	DGILNPRSVWY						1	13	14	92.86%	7.14%	FALSE	FALSE	412	412	FALSE
413	depends	D	ILP	AHQS	EKNRT						3	9	12	75.00%	25.00%	FALSE	FALSE	413	FALSE	FALSE
414	depends	V	ADEGHRST	KL	IM					I	8	4	12	33.33%	66.67%	FALSE	FALSE	FALSE	FALSE	FALSE
415	depends	K	CDEP	YV	GSW						4	5	9	55.56%	44.44%	FALSE	FALSE	FALSE	FALSE	FALSE
416	depends	D	CS		FGHIKLNQRTVY						2	12	14	85.71%	14.29%	FALSE	FALSE	416	FALSE	FALSE
417	depends	T	ADEFGHKMPQR		I					I	11	1	12	8.33%	91.67%	FALSE	FALSE	FALSE	FALSE	417
418	always active	D			AEFGILMNPQRSVY				P	ELMPQRV	0	14	14	100.00%	0.00%	418	FALSE	418	418	FALSE
419	depends	A	DP		EFGHIKLNRSWY				FS	FHIKRSY	2	12	14	85.71%	14.29%	FALSE	FALSE	419	FALSE	FALSE
420	depends	V	ADFGHKLNRSTWY		IP					I	13	2	15	13.33%	86.67%	FALSE	FALSE	FALSE	FALSE	420
421	always active	D		I	AEGHKLMNQRSTY				KRS	AHKNQRS	0	14	14	100.00%	0.00%	421	FALSE	421	421	FALSE
422	depends	V	CDGHLMNQRSY		IT						11	2	13	15.38%	84.62%	FALSE	FALSE	FALSE	FALSE	422
423	always inactive	C	ADEFGHLMPQRSTVW								15	0	15	0.00%	100.00%	FALSE	423	FALSE	FALSE	FALSE
424	always inactive	I	ACEGHNQRSWY								11	0	11	0.00%	100.00%	FALSE	424	FALSE	FALSE	FALSE

Position		WT	Inactive subs (<20%)	Active subs (20%<x<40%)	Active subs (>40%)	>1000% activity	>500% activity	>300% activity	>200% activity	>100% activity	# Inactive Subs	# Active subs	Total subs tested	% active subs (>20%)	% inactive subs	always active	always inactive	60% or more active subs	90% or more active subs	0<x<=30%
425	depends	A	ELPW	Y	GIKMNRS					GK	4	8	12	66.67%	33.33%	FALSE	FALSE	425	FALSE	FALSE
426	depends	D	CFMR	KS	EGNPQY					P	4	8	12	66.67%	33.33%	FALSE	FALSE	426	FALSE	FALSE
427	depends	G	ACFLPVWY	HTQ	IKS						8	6	14	42.86%	57.14%	FALSE	FALSE	FALSE	FALSE	FALSE
428	depends	V	ACDEGHNRSY		LMPT					L	10	4	14	28.57%	71.43%	FALSE	FALSE	FALSE	FALSE	428
429	always inactive	C	ADKLNPSTVWY								11	0	11	0.00%	100.00%	FALSE	429	FALSE	FALSE	FALSE
430	always inactive	I	ADELMNSTV								9	0	9	0.00%	100.00%	FALSE	430	FALSE	FALSE	FALSE
431	depends	D	P		AEGHIKLNQRSVWY			H	AHQR	AEHIKNQRSV	1	14	15	93.33%	6.67%	FALSE	FALSE	431	431	FALSE
432	depends	A	CFIKLMPY	H	EGNSV						8	6	14	42.86%	57.14%	FALSE	FALSE	FALSE	FALSE	FALSE
433	always active	F			ACDEGHIKLPRSTVW					IKLRTVW	0	15	15	100.00%	0.00%	433	FALSE	433	433	FALSE
434	depends	L	HKPQRW		FGIMV						6	5	11	45.45%	54.55%	FALSE	FALSE	FALSE	FALSE	FALSE
435	always active	K			ACEGHRSTVY					AHRS	0	10	10	100.00%	0.00%	435	FALSE	435	435	FALSE
436	always active	P		C	DEGHIKLMQRSTWY				K	DGK	0	15	15	100.00%	0.00%	436	FALSE	436	436	FALSE
437	depends	P	T		ADGHIKLMQRSY				IM	HIM	1	12	13	92.31%	7.69%	FALSE	FALSE	437	437	FALSE
438	depends	M	Y		ACDEGLNPQRSTVW			T	T	NT	1	14	15	93.33%	6.67%	FALSE	FALSE	438	438	FALSE
439	depends	E	NR		ACFGHKLPQSTVW					AGKPQSTV	2	13	15	86.67%	13.33%	FALSE	FALSE	439	FALSE	FALSE
440	depends	T	Q		ADEFGHILMPRSVY				H	ADHIMRSVY	1	14	15	93.33%	6.67%	FALSE	FALSE	440	440	FALSE
441	depends	E	R		ADFGHKLNQSTVY			F	F	AF	1	13	14	92.86%	7.14%	FALSE	FALSE	441	441	FALSE
442	depends	E	MNS	W	CGHKLPQRTVY			R	R	CR	3	12	15	80.00%	20.00%	FALSE	FALSE	442	FALSE	FALSE
443	depends	P	D		AEFGHLMNQRSTW					AEGHLMNR	1	13	14	92.86%	7.14%	FALSE	FALSE	443	443	FALSE
444	always active	Q		M	DEFGHIKNRVWY					EKNV	0	13	13	100.00%	0.00%	444	FALSE	444	444	FALSE
445	always active	I			AGHLMNPQRSTVWY					HLMNPQRSTV	0	14	14	100.00%	0.00%	445	FALSE	445	445	FALSE
446	always active	F			ACDEGHIKLMQRTVW					ADEGHIMW	0	15	15	100.00%	0.00%	446	FALSE	446	446	FALSE
447	always active	Y			DEFGILMNPQRTVW			D	DQ	DEFILNPQRTVW	0	14	14	100.00%	0.00%	447	FALSE	447	447	FALSE

Analysis (2)

Positions where >=60% subsitutions active	Positions where >= 90% subsitutions active	Positions where >0 substitutions and <= 30% substituions active	Positions where <= 30% substituions active			
1	1	5	5		Minimum tested substitutions at a position	2
2	24	7	7		Maximum tested substitutions at a position	18
10	26	15	15			
12	27	20	16			
24	28	23	17		Median number of tested substitutions at a position	14
26	29	38	18		Mean number of tested substitutions at a position	13
27	30	40	19			
28	31	42	20		Total Inactive Substitutions	3320
29	32	43	21		Total Active Substitutions	2527
30	41	44	23		Total Substitutions tested	5847
31	47	45	25			
32	48	59	38			
36	50	60	40			
37	58	61	42			
39	69	65	43			
41	70	66	44			
46	71	77	45			

Analysis (2)

Positions where >=60% subsitutions active	Positions where >= 90% subsitutions active	Positions where >0 substitutions and <= 30% substituions active	Positions where <= 30% substituions active			
47	73	79	53			
48	74	81	55			
50	82	85	56			
58	83	91	57			
63	84	96	59			
68	86	99	60			
69	87	103	61			
70	90	106	62			
71	93	107	64			
72	97	108	65			
73	98	110	66			
74	102	117	76			
75	120	122	77			
82	127	130	78			
83	131	133	79			
84	132	134	80			
86	135	144	81			
87	136	153	85			
90	138	157	88			
93	139	164	91			
94	140	168	95			
97	141	169	96			
98	142	171	99			
102	146	172	100			
104	147	173	101			
105	148	176	103			
120	150	177	106			
127	151	181	107			

Analysis (2)

Positions where >=60% subsitutions active	Positions where >= 90% subsitutions active	Positions where >0 substitutions and <= 30% substituions active	Positions where <= 30% substituions active			
128	152	182	108			
131	156	183	109			
132	160	184	110			
135	162	186	111			
136	166	192	112			
138	167	200	113			
139	174	202	115			
140	179	204	116			
141	195	211	117			
142	196	212	121			
143	197	214	122			
145	198	216	123			
146	205	217	126			
147	219	224	129			
148	237	226	130			
149	257	230	133			
150	259	231	134			
151	261	232	144			
152	277	234	153			
155	309	239	157			
156	313	242	164			
159	328	245	168			
160	371	247	169			
161	407	249	171			
162	409	251	172			
163	410	253	173			
165	412	264	176			
166	418	265	177			

Analysis (2)

Positions where >=60% subsitutions active	Positions where >= 90% subsitutions active	Positions where >0 substitutions and <= 30% substituions active	Positions where <= 30% substituions active			
167	421	266	181			
174	431	267	182			
179	433	273	183			
195	435	274	184			
196	436	275	185			
197	437	280	186			
198	438	286	187			
205	440	287	188			
206	441	288	189			
208	443	289	190			
209	444	294	191			
213	445	297	192			
215	446	298	194			
219	447	300	199			
220		301	200			
222		302	201			
237		303	202			
257		304	203			
259		305	204			
260		306	207			
261		316	210			
276		323	211			
277		327	212			
278		331	214			
284		334	216			
285		335	217			
292		338	223			
293		339	224			

Analysis (2)

Positions where >=60% subsitutions active	Positions where >= 90% subsitutions active	Positions where >0 substitutions and <= 30% substituions active	Positions where <= 30% substituions active			
307		342	225			
309		343	226			
310		348	227			
313		353	228			
314		360	229			
315		361	230			
317		369	231			
318		378	232			
320		387	234			
321		391	239			
325		394	241			
328		397	242			
368		398	243			
371		403	244			
373		404	245			
374		417	246			
375		420	247			
376		422	249			
377		428	250			
381			251			
383			252			
385			253			
388			254			
389			262			
392			264			
393			265			
395			266			
399			267			

Analysis (2)

Positions where >=60% subsitutions active	Positions where >= 90% subsitutions active	Positions where >0 substitutions and <= 30% substituions active	Positions where <= 30% substituions active			
405			268			
406			273			
407			274			
409			275			
410			280			
411			281			
412			286			
413			287			
416			288			
418			289			
419			294			
421			295			
425			296			
426			297			
431			298			
433			299			
435			300			
436			301			
437			302			
438			303			
439			304			
440			305			
441			306			
442			316			
443			319			
444			322			
445			323			
446			327			

Analysis (2)

Positions where >=60% subsitutions active	Positions where >= 90% subsitutions active	Positions where >0 substitutions and <= 30% substituions active	Positions where <= 30% substituions active			
447			329			
			330			
			331			
			332			
			333			
			334			
			335			
			336			
			337			
			338			
			339			
			340			
			341			
			342			
			343			
			344			
			345			
			346			
			348			
			350			
			352			
			353			
			354			
			355			
			360			
			361			
			362			
			363			

Analysis (2)

Positions where >=60% subsitutions active	Positions where >= 90% subsitutions active	Positions where >0 substitutions and <= 30% substituions active	Positions where <= 30% substituions active			
			364			
			365			
			366			
			369			
			370			
			372			
			378			
			382			
			384			
			386			
			387			
			390			
			391			
			394			
			397			
			398			
			400			
			402			
			403			
			404			
			408			
			417			
			420			
			422			
			423			
			424			
			428			
			429			

Analysis (2)

Positions where >=60% subsitutions active	Positions where >= 90% subsitutions active	Positions where >0 substitutions and <= 30% substituions active	Positions where <= 30% substituions active			
			430			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L001A	0.95		1	352
L001C	0.89		2	
L001E	0.55		3	
L001F	0.41		4	
L001G	0.62		5	
L001H	1.9		6	
L001K	1.39		7	
L001N	0.87		8	
L001P	0.92		9	
L001Q	3.27		10	
L001R	0.72		11	
L001S	0.74		12	
L001T	0.99		13	
L001V	1		14	
L001W	0.88		15	
N002A	0.61		20	
N002C	0.4		22	
G291C	0.27		23	
N002G	0.44		24	
N002L	0.46		26	
N002P	0.54		27	
N002Q	0.84		28	
N002S	0.78		29	
N002T	1.05		30	
N002V	0.65		31	
F003E	0.42		32	
F003H	0.68		33	
F003L	0.59		34	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
F003Y	0.5		35	
R004A	0.73		36	
R004I	0.54		37	
R004S	0.6		38	
R004T	0.66		39	
R004V	1.09		40	
A005H	0.44		41	
P006A	0.78		42	
P006H	0.58		43	
P006K	0.8		44	
P006L	0.76		45	
P006N	0.4		46	
P006Q	0.89		47	
P006R	0.56		48	
P007M	0.57		49	
V008I	1.17		50	
V008L	0.53		51	
V008M	0.47		52	
V008P	0.33		54	
I009K	0.69		58	
I009L	1.08		59	
I009R	0.53		60	
I009S	0.98		61	
I009V	0.84		63	
P010D	0.62		65	
P010E	0.66		66	
P010G	0.55		67	
P010H	0.43		68	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
P010N	0.55		69	
P010Q	0.89		70	
P010R	0.73		71	
P010S	0.55		72	
P010W	0.59		73	
N011D	0.54		74	
N011G	0.45		75	
N011H	0.69		77	
N011K	0.58		79	
N011S	0.39		81	
M310F	0.3		82	
V012A	0.56		83	
V012E	1.86		84	
V012I	0.68		85	
V012K	0.65		86	
V012L	0.44		87	
V012N	0.46		89	
V012R	0.5		90	
V012S	0.75		91	
V012T	1.5		92	
P013H	0.46		93	
P013S	0.68		94	
P013T	0.9		96	
P013Y	0.51		97	
F014D	0.64		98	
F014I	0.42		99	
F014M	0.47		102	
F014V	0.46		103	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L015A	0.65		104	
L015M	0.45		105	
L015V	2.2		106	
A020S	0.5		107	
S022H	0.57		108	
S022M	0.49		110	
S022T	0.48		114	
S022Y	0.45		117	
E023D	0.97		118	
F024A	0.69		119	
F024E	3.99		120	
F024G	0.75		122	
F024H	2.07		124	
F024I	0.7		125	
F024K	0.96		127	
F024L	0.62		128	
F024M	0.85		130	
F024N	0.6		131	
F024R	1.22		132	
F024T	1.18		133	
F024V	1.15		134	
F024Y	0.9		135	
L026A	1.3		136	
L026E	3.22		137	
L026G	0.81		138	
L026H	0.97		139	
L026I	0.51		140	
L026K	1.88		141	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L026M	1.43		142	
L026P	0.55		143	
L026Q	1.44		144	
L026R	1.43		145	
L026S	0.78		146	
L026T	0.87		147	
L026V	0.52		148	
L026W	0.53		149	
L026Y	0.52		150	
G027A	0.79		151	
G027D	1.22		152	
G027E	1.18		153	
G027F	0.61		154	
G027H	1.11		155	
G027I	0.41		156	
G027K	2.71		157	
G027L	0.76		158	
G027P	0.46		159	
G027Q	1.12		160	
G027R	1.88		161	
G027S	0.94		162	
G027T	0.61		163	
G027W	0.76		164	
K028A	0.78		165	
K028D	0.62		166	
K028E	0.54		167	
K028F	0.75		168	
K028I	0.55		169	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
K028L	0.51		170	
K028M	0.67		171	
K028N	0.58		172	
K028P	0.4		173	
K028R	0.71		174	
K028S	0.46		175	
K028T	0.68		176	
K028V	0.76		177	
K028W	0.51		178	
F029A	0.9		179	
F029E	4.03		180	
F029G	1.05		181	
F029H	0.82		182	
F029I	1.53		183	
F029K	1.34		184	
F029L	2.36		186	
F029M	2.08		192	
F029P	3.79		193	
F029R	1.24		195	
F029S	2.21		196	
F029T	0.85		197	
F029V	1.65		198	
F029W	0.48		200	
D030A	1.12		202	
D030F	0.84		204	
D030G	2.02		205	
D030H	1.69		206	
D030K	2.63		208	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
D030L	1.32		209	
D030M	1.85		211	
D030P	1.19		212	
D030Q	0.84		213	
D030R	1.82		214	
D030S	1.62		215	
D030T	0.57		216	
D030V	0.46		217	
D030W	0.62		218	
E031A	2.05		219	
E031C	2.95		220	
E031G	1.27		221	
E031H	2.74		222	
E031I	3.89		224	
E031K	3.13		226	
E031L	2.62		230	
E031P	1.51		231	
E031R	2.27		232	
E031S	1.7		233	
E031T	3.96		234	
E031V	4.57		235	
E031W	1.26		236	
E031Y	1.13		237	
P032A	0.92		238	
P032C	0.4		239	
P032F	2.71		240	
I326C	0.39		242	
I331C	0.27		245	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
P032G	1.6		247	
P032H	2.08		248	
P032K	1.04		249	
P032L	0.82		251	
P032M	0.67		253	
P032N	0.7		255	
P032Q	1.11		256	
P032R	1.17		257	
P032S	1.01		258	
P032T	0.77		259	
P032V	0.81		260	
P032W	0.54		261	
P032Y	1.01		263	
L033G	0.57		264	
L033M	0.69		265	
L033P	0.87		266	
L033Q	0.45		267	
L033R	0.61		269	
L033S	0.48		270	
L033T	0.45		271	
L033W	1.58		272	
D034A	0.38		273	
D034E	0.58		274	
D034H	0.41		275	
D034K	0.54		276	
D034Q	0.59		277	
D034R	1.17		278	
D034W	0.46		279	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
M035F	0.87		280	
M035H	0.6		282	
M035L	0.52		283	
M035T	0.83		284	
M035Y	0.78		285	
S036A	0.45		286	
S036D	0.32		287	
S036G	0.64		288	
S036H	0.54		289	
S036K	0.83		290	
S036L	0.71		291	
S036R	1.09		292	
Q347L	0.39		293	
V351Q	0.34		294	
S036T	0.51		297	
L037F	3.33		298	
L037I	0.62		300	
L037K	0.43		301	
L037M	1.46		302	
L037P	0.63		303	
L037R	0.51		304	
L037V	0.57		305	
F038Y	1.29		306	
S039A	1.06		307	
S039L	0.8		308	
S039N	2.32		309	
S039Q	1.1		310	
S039R	0.56		311	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
S039T	1.57		312	
S039Y	0.56		313	
F040L	0.92		314	
F040W	1.11		315	
I041A	0.67		316	
I041C	0.53		317	
I041D	0.78		318	
I041E	0.51		320	
I041G	0.76		321	
I041H	0.77		323	
I041N	0.4		324	
I041T	1.47		325	
I041V	0.73		326	
I041W	0.66		327	
G042A	0.64		328	
S043T	0.43		331	
P044E	0.59		334	
R045I	0.45		335	
R045K	0.53		338	
I046A	1.04		339	
I046C	0.37		342	
I046E	0.43		343	
I046F	0.73		347	
I046H	0.82		348	
I046L	1.08		349	
I046M	1		351	
I046N	0.66		353	
I046R	2.29		356	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
I046S	0.64		357	
I046T	0.55		358	
I046V	1.01		359	
I046Y	0.76		360	
N047A	0.48		361	
N047D	0.82		367	
N047F	1.32		368	
N047G	0.82		369	
N047H	1.16		371	
N047K	0.67		373	
N047M	0.77		374	
N047Q	0.69		375	
N047R	0.84		376	
N047S	0.85		377	
N047T	1.49		378	
N047W	0.63		379	
N047Y	0.45		380	
A048F	2.51		381	
A048G	0.83		383	
A048H	1.99		385	
A048I	0.64		387	
A048K	1.28		388	
A048M	0.76		389	
A048N	4.25		391	
A048Q	1.05		392	
A048R	0.66		393	
A048S	1.06		394	
A048V	0.6		395	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
A048Y	0.81		396	
T049I	0.42		398	
T049K	0.85		399	
T049R	1.41		401	
T049S	0.92		403	
T049V	0.45		404	
G050A	0.93		405	
G050C	0.41		406	
G050D	1.37		407	
G050E	0.78		409	
G050H	0.74		410	
G050L	0.43		411	
G050M	0.47		412	
G050Q	0.86		413	
G050R	0.86		414	
G050S	1.24		415	
G050V	0.3		416	
G050Y	0.58		417	
Q051N	0.6		418	
Q051S	0.46		419	
G052N	0.89		420	
G052P	0.43		421	
G052Q	3.71		422	
G052R	0.53		425	
G052S	1.32		426	
E375I	0.36		427	
F380V	0.39		428	
G052T	0.49		431	

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
T054A	0.43		432	
T054F	0.56		433	
T054N	0.48		434	
T054Q	0.91		435	
T054S	0.7		436	
T054V	0.66		437	
V058C	0.55		438	
V058G	0.54		439	
V058H	1.09		440	
V058I	0.57		441	
V058K	4.08		442	
V058L	1.54		443	
V058N	0.49		444	
V058P	0.9		445	
V058Q	4.54		446	
V058R	1.92		447	
V058S	0.83			
V058W	0.65			
V058Y	1.07			
D059Q	0.4			
D059N	1.27			
R060K	0.69			
L061I	0.42			
L061M	0.73			
L061V	0.59			
Y063A	0.63			
Y063H	1.07			
Y063I	1.03			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
Y063K	1.36			
Y063L	1.33			
Y063M	1.32			
Y063N	0.96			
Y063R	1.4			
Y063S	1			
Y063T	1.07			
Y063V	0.43			
Y063W	1.53			
P065R	0.57			
Y066H	0.47			
Y066R	0.51			
I067F	1			
I067L	0.45			
I067R	0.24			
I067V	1.8			
I067Y	0.55			
D068E	0.72			
D068H	2.06			
D068K	1.08			
D068L	0.43			
D068P	0.5			
D068Q	1.67			
D068R	0.7			
D068S	0.81			
D068T	0.75			
S069A	22.06			
S069C	1.97			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
S069E	1.48			
S069F	8.75			
S069G	6.06			
S069I	3.12			
S069L	3.44			
S069M	2.67			
S069P	8.14			
S069R	14.06			
S069T	0.58			
S069W	2.18			
S069Y	2.71			
I070A	27			
I070C	2.57			
I070F	5.69			
I070G	6.22			
I070H	9.09			
I070K	14.64			
I070L	3.05			
I070N	6.19			
I070P	3.03			
I070R	13.95			
I070S	3.63			
I070T	5.43			
I070V	6.34			
I070Y	1.26			
T071A	0.86			
T071D	0.5			
T071G	1.41			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
T071H	0.93			
T071L	1.09			
T071M	0.89			
T071N	1.21			
T071Q	0.68			
T071R	2.17			
T071S	1.54			
G072A	0.45			
G072D	0.6			
S395W	0.4			
G072E	0.69			
G072H	0.46			
G072K	1.39			
G072L	0.43			
G072M	3.11			
G072Q	2.33			
G072R	0.65			
G072S	0.51			
V073A	1.38			
V073C	0.84			
V073D	0.94			
V073G	1.17			
V073H	1.54			
V073K	1.42			
V073L	1.59			
V073M	0.68			
V073Q	0.96			
V073R	0.72			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
V073S	0.86			
K297R	0.34			
S401Q	0.39			
V073T	1.34			
V073W	1.91			
T074A	2.28			
T074C	2.18			
T074E	1.38			
T074F	1.43			
T074G	2.75			
T074H	1.4			
T074K	1.29			
T074L	1.43			
T074M	0.52			
T074N	2.12			
T074P	2.45			
T074R	2.22			
T074S	1.8			
T074V	2.27			
T074W	2.13			
V075A	0.71			
V075C	0.46			
V075F	2			
V075H	0.62			
V075L	5.22			
V075M	1.16			
V075N	0.81			
V075Q	1.51			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
V075R	3.02			
V075S	0.76			
V075T	4.34			
V075Y	0.63			
G077H	0.32			
I079L	1.44			
I079T	0.79			
I079V	1.01			
Q081P	0.6			
K082A	0.94			
K082E	0.5			
K082G	0.64			
K082H	0.44			
K082I	1.01			
K082L	0.87			
K082M	0.58			
K082N	0.96			
K082Q	0.76			
K082R	0.85			
K082S	0.62			
K082T	0.56			
K082Y	0.32			
K082V	0.57			
I083F	0.57			
I083G	1.05			
I083L	0.93			
I083N	0.82			
I083Q	1.07			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
I083R	0.45			
I083S	0.79			
I083T	0.95			
I083V	0.99			
S084D	0.98			
S084E	0.52			
S084F	0.72			
S084G	8.68			
S084H	0.96			
S084I	0.9			
S084L	0.92			
S084M	0.77			
S084N	0.89			
S084P	0.57			
S084Q	0.86			
S084R	1.89			
S084T	0.82			
S084W	0.86			
S084Y	0.3			
S221I	0.35			
L085V	0.42			
Q086A	2.7			
Q086D	0.88			
Q086E	1.18			
Q086F	0.54			
Q086G	1.02			
Q086H	1.7			
Q086I	0.65			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
Q086K	0.97			
Q086L	0.92			
Q086M	1.06			
Q086N	1.28			
Q086P	0.42			
Q086R	0.93			
Q086S	0.85			
Q086T	0.58			
Q086V	0.97			
Q086W	1.21			
D087A	1			
D087C	1.77			
D087E	0.86			
D087G	1			
D087H	0.72			
D087I	0.53			
D087L	0.55			
D087M	0.58			
D087P	0.31			
D087Q	1.05			
D087R	1.28			
D087S	0.99			
D087T	1.7			
A412H	0.39			
D413H	0.31			
V414K	0.3			
K415V	0.39			
D087V	0.66			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
D087Y	2.72			
L089C	1.46			
L089R	0.34			
L089K	0.45			
L089M	0.63			
D090A	1.48			
D090E	1.15			
D090G	0.41			
D090H	1.24			
D090I	1.1			
D090K	1.36			
D090L	1.15			
D090N	1.18			
D090Q	1.11			
D090R	1.49			
D090S	1.15			
D090T	1.02			
D090W	0.81			
K091A	0.89			
K091Q	0.43			
K091R	0.67			
A092C	1.97			
A092H	0.22			
A092L	1.29			
A092M	0.86			
A092T	0.7			
A092V	1.09			
K093D	0.71			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
K093E	0.83			
K093F	0.5			
K093G	0.97			
K093H	0.61			
K093I	3.25			
R248H	0.4			
K093L	1.53			
K093M	0.7			
K093N	0.71			
K093Q	0.84			
K093R	1.52			
K093S	1.25			
K093T	3.93			
K093V	0.24			
K094A	0.64			
K094D	0.93			
K094E	0.79			
K094F	0.59			
K094H	0.72			
K094L	0.52			
K094M	0.66			
K094N	0.99			
K094Q	1.22			
K094R	3.94			
K094S	0.94			
K094T	1.14			
I096D	0.69			
I096L	0.46			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
I096V	0.68			
T097A	1.25			
T097C	0.53			
T097D	1.31			
T097E	1.19			
T097F	0.75			
P257C	0.36			
D426K	0.26			
G427H	0.35			
T097G	4.84			
T097I	0.85			
T097L	1.22			
T097N	1.1			
T097P	0.62			
T097Q	1.17			
T097R	0.95			
T097S	1.21			
T097W	0.53			
T097Y	0.74			
F098A	0.6			
F098C	0.58			
F098D	0.47			
F098E	0.44			
F098H	1.06			
F098I	0.52			
F098L	0.58			
F098M	0.87			
F098Q	0.65			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
P436C	0.39			
F098R	0.72			
F098S	0.56			
F098V	0.46			
F098W	0.81			
Y099A	0.33			
Y099R	0.53			
Y099S	0.43			
V102A	0.83			
V102C	0.69			
V102E	0.9			
V102G	0.67			
V102H	0.88			
V102K	1.03			
V102L	0.71			
V102M	0.77			
V102N	1.02			
V102Q	1.03			
V102R	0.94			
V102S	1.41			
V102T	1.26			
V102W	0.76			
D103N	0.39			
N104A	0.69			
N104C	0.41			
N104G	0.48			
N104K	0.88			
N104M	0.61			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
N104R	1.25			
N104S	1.03			
N104T	0.71			
L105A	0.54			
L105G	0.51			
L105I	0.94			
L105P	0.84			
L105Q	0.9			
L105R	0.65			
L105S	0.61			
L105T	0.51			
L105W	0.34			
L105V	0.99			
G106V	0.43			
M107F	0.91			
M107I	0.67			
M107L	1.32			
A108G	0.47			
I110V	0.51			
E114A	1.44			
E114G	0.73			
E114H	0.75			
E114M	0.44			
E114S	0.69			
P117D	0.56			
T118H	0.47			
T118K	0.53			
T118L	1.09			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
T118M	0.53			
T118N	0.67			
T118Q	3.37			
T118V	0.79			
W119F	0.53			
W119P	0.36			
W119Y	1.08			
A120D	0.76			
A120F	2.62			
A120G	1.03			
A120H	1.11			
A120I	1.33			
A120L	1.25			
A120N	0.81			
A120P	0.42			
A120R	0.82			
A120S	1.21			
A120T	0.62			
A120V	1.53			
A120W	0.59			
A120Y	1.95			
N122M	0.56			
K124L	0.34			
K124R	0.62			
P125H	0.43			
P125R	0.63			
P125S	0.54			
D127A	0.89			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
D127E	1.31			
D127G	0.97			
D127H	2.33			
D127L	0.84			
D127M	0.4			
D127N	1.69			
D127Q	1.21			
D127R	0.51			
D127S	0.77			
D127T	1.11			
D127V	0.56			
D127W	0.44			
V128A	0.53			
V128C	0.68			
V128G	0.49			
V128I	1.25			
V128K	1.16			
V128L	0.95			
V128Q	0.55			
V128R	0.74			
V128S	0.53			
V128W	0.5			
K130I	0.5			
K130R	1.42			
N131C	0.6			
N131E	0.44			
N131F	0.63			
N131G	2.47			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
N131H	0.8			
N131I	1.4			
N131L	0.82			
N131M	0.99			
N131Q	1.24			
N131R	2.81			
N131S	0.76			
N131T	1.02			
N131V	2.08			
N131Y	0.85			
R132A	0.68			
R132C	0.58			
R132E	0.7			
R132F	0.6			
R132H	0.66			
K279A	0.27			
E285A	0.34			
R132I	0.56			
R132K	1.05			
R132L	0.76			
R132N	1.28			
R132Q	0.69			
R132S	0.79			
R132T	0.61			
R132V	0.73			
R132Y	0.78			
S133I	0.54			
I134L	1.04			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
I134T	0.6			
I134V	1.08			
E135A	0.99			
E135C	0.77			
E135D	2.68			
E135F	0.73			
E442L	0.4			
E135G	2.79			
E135H	0.79			
E135K	1.15			
E135L	0.82			
E135N	0.56			
E135Q	1.59			
E135R	2.08			
E135S	1.13			
E135W	0.63			
E135Y	0.5			
L136A	0.73			
L136C	0.56			
L136D	0.47			
L136F	0.96			
L136H	1			
L136I	0.65			
L136M	1.05			
L136N	0.48			
L136Q	0.61			
L136R	0.74			
L136S	0.8			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L136T	0.72			
L136W	1.11			
V137A	0.48			
V137I	1.01			
V137T	0.51			
Q138A	0.69			
Q138C	0.65			
Q138H	0.71			
Q138I	0.54			
Q138L	0.59			
Q138M	0.68			
Q138N	0.61			
Q138R	0.53			
Q138S	0.48			
Q138W	0.41			
Q138Y	0.6			
Q139A	0.92			
Q139C	0.44			
Q139D	0.48			
Q139E	0.94			
Q139F	0.53			
Q139G	0.65			
Q139H	0.56			
Q139K	0.73			
Q139L	0.7			
Q139M	0.95			
Q139R	0.79			
Q139S	0.81			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
Q139T	1.31			
Q139V	0.77			
Q140A	0.96			
Q140C	0.5			
Q140D	0.59			
Q140F	0.66			
Q140G	0.73			
Q140H	0.84			
Q140I	0.75			
Q140K	0.93			
Q140L	0.51			
Q140M	0.8			
Q140R	0.85			
Q140V	0.61			
Q140W	0.59			
Q140Y	0.41			
N141A	1.12			
N141D	1.09			
N141E	0.67			
N141F	0.81			
N141G	1.15			
N141H	2.03			
N002I	0.37			
G297A	0.57			
N141L	0.61			
N141M	0.48			
N141Q	1.16			
N141R	1.4			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
N141S	0.72			
N141T	0.45			
N141V	0.5			
N141W	0.83			
N141Y	1.55			
V142C	0.61			
V142D	0.71			
V142E	0.87			
V142G	0.98			
V142H	1.11			
VI42I	0.81			
V142K	1.4			
V142L	0.75			
Y447W	1.07			
V142M	0.76			
V142N	0.98			
V142P	0.88			
V142Q	1.04			
V142R	1.53			
V142S	0.93			
V142T	1.19			
Q143E	0.77			
Q143G	0.62			
Q143I	0.44			
Q143K	1.3			
I009Q	0.4			
Q143L	0.56			
Q143N	0.73			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
Q143V	0.57			
L144T	1.02			
L144W	0.79			
S145A	0.58			
S145C	0.44			
S145D	0.48			
S145E	0.56			
S145G	0.94			
S145H	0.56			
S145L	0.44			
S145M	0.56			
S145N	0.58			
S145P	1.04			
S145R	0.97			
L146A	0.52			
L146C	0.42			
G305N	0.36			
M310Y	0.38			
L146E	0.5			
L146G	0.62			
L146H	0.78			
L146I	0.82			
L146K	0.84			
L146N	0.57			
L146P	0.93			
L146Q	0.84			
L146R	1.47			
L146S	0.71			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L146T	0.74			
L146V	0.84			
L146Y	0.8			
S312K	0.38			
T147A	1.2			
T147C	0.47			
T147D	0.71			
T147F	1.24			
T147G	1.05			
T147I	0.85			
T147L	1.3			
T147M	0.79			
T147P	1.09			
T147Q	1.29			
T147R	2.11			
T147S	1.27			
T147V	2.04			
T147W	0.97			
T147Y	1.04			
E148C	0.66			
E148F	0.42			
E148G	1.05			
E148H	1.24			
E148I	0.73			
E148K	1.63			
E148L	0.85			
E148Q	1.44			
E148R	0.97			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
E148S	1.15			
E148T	0.82			
E148V	0.99			
E148W	0.43			
E148Y	0.95			
A149C	1.15			
A149G	0.52			
A149K	0.51			
A149L	0.88			
A149M	0.88			
A149Q	1.15			
A149R	1.02			
A149S	1.08			
A149T	1.24			
A149V	1.34			
T150A	1.21			
T150C	0.7			
T150D	1.24			
T150E	1.05			
T150F	0.71			
T150G	2.19			
T150I	0.52			
T150L	0.7			
T150N	0.91			
T150P	0.88			
T150R	0.9			
T150S	0.92			
T150W	1.25			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
T150Y	1.36			
E151A	1.27			
E151C	1			
E151G	1.06			
E151H	1.34			
E151K	2.05			
E151L	1.03			
E151M	1.26			
E151N	0.95			
E151Q	2.01			
D320L	0.37			
E151R	1.61			
E151S	1.28			
E151T	1.21			
E151V	1.38			
E151W	1.31			
E151Y	1.31			
K152A	0.51			
K152C	0.52			
K152F	0.61			
K152I	0.65			
K152M	0.75			
K152R	1.85			
K152T	1.2			
K152V	0.82			
K152Y	0.67			
A153I	0.93			
A153L	0.51			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
K154R	0.86			
K154T	0.83			
K154V	0.46			
Q155A	0.91			
Q155C	0.6			
Q155D	1.49			
Q155F	0.7			
Q155G	1.61			
Q155H	1.03			
Q155K	1.57			
Q155L	0.86			
Q155M	0.97			
Q155R	1.27			
Q155S	0.77			
Q155T	0.76			
Q155V	0.73			
Q155W	0.91			
E156A	0.79			
E156D	1.95			
E156G	0.49			
E156I	0.51			
E156L	0.43			
E156M	0.87			
E156Q	0.84			
E156R	0.43			
E156S	0.62			
E156T	0.69			
E156V	0.45			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
E156W	0.49			
F157W	0.61			
E158A	0.56			
E158F	0.51			
E158H	0.54			
I326S	0.95			
I331E	0.34			
E158L	0.44			
E158Q	1.25			
E158S	0.95			
K159A	0.64			
K159D	0.52			
K159E	0.49			
K159H	0.74			
K159L	0.62			
K159M	0.66			
K159N	0.73			
K159Q	0.92			
K159R	0.88			
K159S	0.67			
K159V	0.41			
A160C	0.61			
A160F	0.79			
A160G	0.75			
A160H	0.47			
A160I	0.43			
A160K	0.91			
A160L	0.67			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
M035Q	0.37			
A160M	0.77			
A160N	0.56			
A160Q	0.65			
A160R	0.89			
A160S	1.35			
A160V	0.73			
A160Y	1.07			
G161A	0.99			
G161C	0.44			
G161D	0.86			
G161E	0.49			
G161R	0.48			
S036N	0.38			
G161S	0.77			
G161V	0.42			
K162A	0.5			
K162D	0.77			
K162E	0.51			
V351C	0.35			
W357K	0.36			
K162G	0.56			
K162H	0.62			
K162L	0.54			
K162M	1.04			
K162P	0.64			
K162Q	0.58			
K162R	0.52			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
K162S	0.47			
K162V	0.52			
K162W	1.01			
K162Y	0.72			
D163A	1.52			
D163E	1.63			
D163G	1.15			
D163K	1.9			
D163L	1.18			
D163Q	1.4			
D163R	1.8			
D163S	1.34			
D163T	1.13			
D163V	0.76			
F164L	1.13			
F164M	1.66			
F164V	1.23			
S043N	0.34			
F164W	0.72			
L165A	0.48			
L165D	5.79			
L165F	1.23			
L165N	2.19			
L165R	0.59			
L165S	1.31			
L165V	1.22			
L165W	1.14			
A371G	0.38			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L165Y	0.66			
V166A	2.85			
V166C	1.16			
V166E	1.28			
V166F	1.67			
V166G	1.11			
V166H	1.74			
V166L	4.38			
V166Q	3.61			
V166R	5.56			
V166T	4.26			
V166W	1.26			
V166Y	2.08			
E167A	0.84			
E167D	0.69			
E167G	0.6			
E167H	0.89			
E167K	0.91			
E167M	0.87			
E167N	0.83			
E167P	0.58			
E167R	1.02			
E167S	1.17			
E167T	0.59			
E167Y	0.55			
T168H	0.46			
I169L	2.08			
I169R	0.54			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
I169V	0.74			
K170N	0.72			
K170R	2.58			
K170V	0.58			
L171I	0.73			
L171V	0.64			
G172A	1.2			
G172C	1.03			
K173N	0.44			
K173R	0.82			
L174A	1.2			
L174G	0.4			
L174K	2.39			
L174M	0.79			
L174N	1.36			
L174Q	0.99			
L174R	1.5			
L174S	0.85			
L174T	1.12			
L174V	0.62			
L174W	0.78			
L174Y	1.06			
L175E	0.43			
Q051A	0.34			
L175H	0.57			
L175T	1.43			
L175V	0.94			
L175Y	0.66			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
R176K	0.67			
N178G	0.85			
N178K	0.85			
N178M	0.88			
K376L	0.37			
F380T	0.39			
N178R	1.1			
H179A	1.06			
H179C	0.94			
H179E	0.62			
H179G	0.86			
H179I	0.9			
H179K	1.39			
H179L	0.73			
H179M	0.63			
H179N	0.96			
H179P	0.44			
H179R	0.96			
H179S	0.51			
H179T	0.43			
H179V	0.42			
L180F	0.59			
L180G	0.62			
L180K	0.44			
L180M	0.64			
W181M	0.88			
L061F	0.3			
W181Q	0.88			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
G182L	0.9			
Y183L	0.7			
F186Y	0.59			
H192S	0.49			
H192T	0.5			
H193G	0.68			
H193Q	0.82			
H193S	0.42			
H193Y	0.58			
K195A	0.51			
K195G	0.45			
K195H	0.45			
K195I	0.5			
K195L	0.45			
K195N	0.74			
K195Q	0.71			
K195R	0.85			
K195S	0.42			
K195T	0.58			
K195W	0.49			
K196E	0.43			
D068G	0.37			
K196G	0.41			
K196L	0.65			
K196R	0.58			
K196S	0.68			
K196T	1.18			
K196W	0.55			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
P197A	0.81			
P197D	0.58			
P197E	0.52			
P197F	0.48			
P197G	0.75			
P197H	0.62			
P197K	0.99			
P197L	0.56			
P197M	1.03			
P197Q	0.69			
P197R	0.58			
P197S	0.7			
P197T	0.41			
G198A	0.8			
G198D	1.99			
G198E	0.49			
G198H	0.84			
G198L	0.48			
G198N	0.8			
G198Q	0.55			
G198R	0.58			
G198S	0.76			
G198T	0.41			
G198Y	0.81			
N200D	0.46			
S202M	0.4			
F204P	0.63			
N205A	1.3			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
N205D	0.85			
N205E	1.94			
N205F	0.52			
N205G	0.79			
N205K	0.76			
N205M	0.58			
N205P	0.75			
N205R	0.54			
N205S	0.8			
N205T	0.85			
N205V	0.49			
N205W	0.41			
V206H	0.5			
V206I	0.94			
V206K	1.75			
V206L	1.57			
S395T	0.39			
V206M	0.43			
V206R	1.3			
V206S	0.72			
G072Y	0.35			
V206T	0.59			
I208A	0.62			
I208C	0.48			
I208K	0.91			
I208L	0.84			
I208M	0.88			
I208Q	0.77			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
I208R	1.14			
I208S	0.62			
I208T	1.01			
I208V	1.07			
K209A	0.53			
K209E	0.46			
K209G	0.44			
K209N	0.5			
F398L	0.35			
S404T	0.37			
K209R	0.68			
K209S	0.5			
K209T	0.5			
D212N	1.52			
D212S	0.93			
D212T	0.76			
D213A	0.85			
D213E	0.79			
D213G	0.81			
D213H	0.75			
D213K	0.82			
D213L	0.56			
D213M	1.56			
D213N	1.53			
D213Q	1.04			
D213R	0.92			
D213V	0.47			
D213W	0.49			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
D213Y	0.49			
L214Q	0.57			
S215A	0.74			
S215D	0.62			
S215E	0.74			
S215G	0.88			
S215H	0.91			
S215K	0.99			
S215L	0.6			
S215M	1.77			
S215Q	0.79			
G077K	0.32			
S215R	0.71			
S215T	0.8			
S215V	0.69			
S215W	0.52			
W216Y	0.48			
L217M	0.51			
W218F	0.57			
N219A	1.29			
N219C	0.43			
N219D	0.75			
N219E	0.95			
N219H	0.97			
N219I	0.6			
N219K	1.45			
N219L	0.72			
N219M	1.02			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
I083H	0.4			
N219R	1.1			
N219S	2.48			
N219T	0.82			
N219W	0.48			
E220A	0.75			
E220H	1.4			
E220I	1.34			
E220L	1.45			
E220S	0.62			
E220T	0.91			
E220V	1.35			
S221A	0.72			
S221C	0.59			
S221M	0.46			
S221Q	1.37			
S221T	0.94			
S221V	1.04			
T222D	0.43			
T222F	0.43			
T222G	0.49			
T222K	0.75			
T222L	0.64			
T222N	0.8			
T222R	0.75			
E220D	0.39			
T222I	0.4			
T222S	0.63			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
T222V	0.79			
L224I	0.61			
L230I	0.87			
N231T	1.1			
T232F	0.73			
T232S	0.76			
Q233A	0.71			
Q233F	0.53			
Q233G	0.46			
Q233K	1.69			
Q233L	0.69			
Q233R	1.5			
Q233Y	0.5			
Q234M	1.65			
S235A	0.47			
S235E	1			
S235G	0.95			
S235H	0.44			
S235K	0.53			
S235T	0.66			
P236A	1.07			
P236G	1.09			
P236H	0.46			
P236K	0.71			
P236R	3.09			
Q234L	0.4			
P236S	0.91			
V237A	0.9			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
V237E	1.93			
V237F	0.41			
A412Q	0.35			
A413Q	0.38			
V414L	0.36			
D418G	0.45			
V237H	0.75			
V237L	1.12			
V237N	0.67			
L089W	0.26			
V237Q	1.46			
V237R	0.71			
V237S	1.03			
V237T	1.01			
V237W	0.52			
A238D	0.75			
A238E	0.59			
A238H	0.6			
A238K	0.6			
A238Q	1.02			
A238R	0.49			
A238S	2.62			
A238T	0.44			
T240K	1.13			
T240A	0.48			
T240M	0.48			
T240P	0.56			
T240Q	0.75			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
T240R	0.91			
A239N	0.32			
T240S	0.74			
T240V	0.77			
Y242F	1.08			
N245H	0.5			
V247I	2.01			
V247L	0.83			
V247M	0.52			
R248A	0.43			
R248W	0.52			
R248Y	0.67			
I251Y	0.37			
I251L	0.58			
I251M	0.43			
V253I	0.76			
K255A	0.4			
K255N	0.52			
K255Q	0.91			
K255R	0.71			
K093P	0.38			
K255S	0.43			
I256A	0.42			
I256H	0.51			
I256L	0.64			
I256V	0.51			
P257A	0.82			
P257G	0.51			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
P257I	1.07			
P257K	0.92			
P257L	0.69			
P257M	0.9			
P257N	0.69			
P257Q	0.61			
P257R	1.38			
P257T	2.04			
P257V	0.88			
D258H	0.84			
D258N	1.44			
D258R	0.45			
D258S	1.44			
D258G	0.39			
D426S	0.36			
G427I	0.54			
A259E	0.85			
A259G	0.68			
A259I	0.46			
A259K	0.76			
A259L	0.53			
A259N	0.49			
A259P	1.54			
A259Q	0.7			
A259R	0.72			
A259S	0.63			
A259T	0.51			
A259V	0.41			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
A259W	0.55			
A259Y	0.51			
K260A	0.66			
K260D	0.41			
K260E	0.58			
K260H	0.87			
K260L	0.6			
E249V	495			
K260M	0.85			
K260Q	0.58			
K260R	0.83			
K260S	0.66			
K260G	0.37			
K260Y	1.73			
S261A	0.74			
S261F	0.73			
S261K	2.54			
S261M	0.56			
S261N	1.98			
S261Q	0.76			
S261R	1.19			
S261T	0.66			
S261V	0.48			
S261W	0.44			
L263A	0.76			
L263K	2.73			
L263M	0.89			
L263R	1.63			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L263T	0.49			
N104I	0.35			
L263V	0.75			
P264A	0.43			
P264H	0.6			
V265I	0.58			
F266Y	0.58			
A267M	0.45			
A267T	1.34			
T269A	1.63			
T269C	0.75			
T269D	0.76			
T269S	1.01			
R270M	0.46			
R270N	0.52			
R270S	0.69			
I271F	0.72			
I271G	1.29			
L105C	0.33			
I271L	10.62			
V272E	0.39			
I271M	3.24			
I271S	0.42			
I271V	1.05			
V272D	1.36			
V272R	0.74			
V272S	0.96			
V272T	1.61			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
F273H	1.41			
F273T	0.48			
F273Y	0.9			
T274A	0.51			
T274F	1.28			
T274S	0.62			
Q276C	0.88			
Q276D	1.69			
Q276E	1.05			
Q276H	1.2			
Q276I	0.51			
Q276L	0.48			
W119Q	0.72			
Q276M	1.14			
Q276R	1.3			
Q276S	1.63			
Q276Y	1.94			
V277A	0.65			
V277C	0.41			
V277D	0.79			
V277E	1.02			
V277G	1.18			
V277H	1.09			
V277K	1.51			
V277M	0.94			
V277N	1.15			
V277Q	0.82			
V277R	1.63			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
V277S	0.83			
K124H	0.35			
V277T	1.94			
V277Y	0.66			
L278A	1.13			
L278E	1.03			
L278F	1.26			
L278G	1.33			
L278H	4.5			
L278I	0.93			
L278K	1.75			
D275V	0.4			
L278N	1.74			
L278R	5.87			
L278S	1.67			
L278T	1.66			
L278V	0.44			
L278Y	1.51			
K279H	0.44			
K279Q	0.84			
K279R	1.1			
K279T	0.86			
F280G	0.47			
F280Q	0.43			
S282D	0.41			
S282G	0.54			
S282M	2.64			
S282Q	0.41			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
Q283E	0.63			
Q283P	1.18			
Q283R	0.59			
Q283S	1.73			
Q283T	0.65			
D284A	0.58			
D284E	1.21			
D284G	0.6			
D284H	0.51			
D284L	0.5			
D284M	0.56			
D284N	0.4			
D284Q	0.95			
D284S	0.99			
E285F	0.47			
E285G	0.52			
E285H	1.3			
E285M	0.43			
E285N	0.4			
E285Q	0.59			
E285Y	0.99			
L286S	0.46			
D284T	0.39			
L286R	0.53			
V287I	0.51			
V287T	0.5			
Y288L	0.79			
Y288W	0.49			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
T289K	0.75			
T289S	0.48			
F290I	0.41			
F290M	1.03			
G291Q	0.8			
G291R	0.45			
G291S	0.41			
G291V	1.63			
E292A	0.66			
E292C	0.71			
E292F	0.9			
E292G	0.41			
E292H	1.26			
E442W	0.38			
E292K	1.27			
E292N	0.99			
E292P	1.05			
E292R	0.42			
E292V	1.28			
E292W	0.83			
T293A	1.9			
T293C	1.67			
T293D	1.46			
V137C	0.37			
V137S	0.36			
V137L	0.21			
Q143C	0.28			
L144R	0.26			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
K152W	0.37			
A153S	0.34			
K154I	0.38			
E156C	0.35			
E158G	0.37			
K159G	0.38			
A160W	0.39			
G161V	0.42			
D163W	0.38			
D163F	0.39			
L165C	0.27			
V166N	0.47			
E167F	0.31			
K170A	0.4			
K170Q	0.4			
K173Q	0.32			
L174H	0.38			
R176L	0.4			
P177V	0.36			
L180I	0.38			
W181K	0.29			
Y183E	0.32			
Y184W	0.39			
H193R	0.33			
H193F	0.38			
K195V	0.36			
K196N	0.39			
K196Y	0.39			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
P197W	0.39			
G198W	0.29			
N200T	0.37			
F204W	0.39			
N205L	0.39			
N205Y	0.4			
V206Q	0.33			
K209F	0.4			
K209L	0.38			
N211L	0.41			
N211W	0.51			
W218M	0.38			
W218V	0.28			
T293F	1.94			
T293G	1			
T293K	1.35			
T293L	1			
T293M	2.29			
T293P	1.64			
T293Q	1.83			
T293S	0.89			
T293V	2.15			
T293Y	1.49			
V294M	0.41			
A298G	0.43			
A298I	0.41			
G300R	0.42			
I301A	0.88			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
I301V	0.88			
V287N	0.35			
V302W	0.46			
V302I	0.45			
I303V	0.47			
W304G	1.13			
W304I	1.17			
G305D	1			
G305E	1.62			
T306D	0.76			
T306E	0.52			
T306S	1.02			
L307K	0.43			
L307N	0.76			
L307Q	0.61			
L307S	0.86			
L307T	1.08			
L307V	0.48			
L307W	0.64			
L307Y	0.6			
S308D	0.92			
S308G	1.73			
S308H	1.15			
S308K	1.33			
S308N	2.33			
S308P	0.65			
S308R	1.34			
S308T	0.72			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
I309D	0.72			
I309E	1.99			
I309G	1.44			
I303D	0.34			
I309H	1.3			
I309K	0.98			
I309L	1.72			
I309M	1.47			
I309N	3.11			
I309Q	1.64			
I309R	2.27			
I309S	1.16			
I309T	2.09			
I309V	0.6			
I309W	0.88			
M310A	1.5			
M310G	2.73			
M310Q	0.59			
M310R	0.5			
M310S	1.61			
M310V	0.7			
R311G	0.53			
L307G	0.32			
R311G	0.54			
R311H	0.48			
R311K	0.72			
R311Q	0.43			
R311S	0.84			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
R311T	0.52			
S312G	0.49			
S312N	1.26			
S312T	0.75			
M313A	1.34			
M313E	0.63			
M313G	0.56			
M313H	1.23			
M313K	2.85			
S312L	0.38			
M313L	1.05			
M313P	1.11			
M313R	2.3			
M313S	0.88			
M313T	0.67			
M313V	0.99			
M313Y	1.12			
K314A	0.82			
K314D	0.53			
K314H	1.1			
K314I	0.54			
K314N	0.57			
K314Q	0.62			
K314R	0.95			
K314S	0.61			
K314T	0.61			
K314Y	0.45			
S315A	0.85			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
S315E	0.41			
S315G	0.72			
S315H	2.04			
S315K	0.62			
S315L	0.42			
S315M	0.63			
S315R	1.04			
S315T	0.97			
S315Y	0.5			
C316D	0.41			
L317A	1.27			
L317D	0.61			
L317H	1.05			
L317I	1.76			
L317K	5.11			
L317M	1.2			
L317N	0.73			
L317Q	1.67			
L317R	2.41			
L317S	1.03			
L317T	0.93			
L317W	0.84			
L318D	0.46			
L318F	0.51			
L318G	0.49			
L318H	0.45			
L318I	0.7			
L318K	1.36			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L318M	1.68			
L318N	0.52			
L318Q	0.71			
L318R	1.34			
L318S	0.71			
L318T	0.63			
D320E	0.78			
D320G	0.83			
D320H	1.75			
D320I	1			
D320K	6.42			
D320M	0.79			
D320N	0.52			
D320R	3.19			
D320S	1.19			
D320W	0.4			
D320V	0.35			
D320Y	0.86			
N321A	1.01			
N321D	1.25			
N321H	0.92			
N321K	1.29			
N321R	1.23			
N321S	1.26			
N321T	0.64			
N321Y	0.4			
M323F	0.64			
M323I	0.55			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
M323L	0.55			
E324A	0.59			
E324D	1.15			
E324H	0.79			
E324M	0.5			
E324N	1.01			
E324R	2.28			
E324S	0.62			
T325A	1.87			
T325D	1.78			
T325E	4.03			
T325G	4.21			
T325H	3.45			
T325K	4.37			
T325M	2.11			
T325N	4.64			
T325Q	5.08			
T325S	3.19			
T325V	1.24			
T325W	0.62			
I326K	0.95			
I326L	1.5			
I326V	6.29			
I326Y	0.77			
L327M	0.52			
N328A	0.67			
N328C	1.25			
N328G	0.56			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
N328H	0.88			
N328I	1.85			
N328K	2.12			
N328L	2.01			
N328Q	1.13			
N328R	0.68			
N328S	2.22			
N328T	0.59			
N328V	1.16			
N328Y	1.66			
I331V	0.94			
N328W	0.33			
V334T	0.39			
V334P	0.46			
T335S	0.47			
A338Q	0.63			
K339M	0.61			
S342A	0.68			
Q343T	0.49			
Q343V	0.51			
Q347A	0.78			
Q347E	0.78			
Q347G	2.68			
Q347M	0.61			
Q347R	0.55			
Q347S	2.38			
E348D	0.67			
E348G	0.55			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
E348S	0.44			
Q349A	0.47			
Q349E	0.83			
Q349K	0.93			
Q349M	0.7			
Q349N	0.44			
M035V	0.37			
Q349R	0.73			
Q349T	0.49			
V351A	1.14			
V351S	0.92			
I353T	0.42			
I353V	1.61			
N356A	0.41			
N356D	0.79			
N356H	0.82			
N356S	0.46			
W357A	0.8			
W357C	0.67			
L037W	0.36			
W357S	0.41			
W357T	0.62			
N358C	0.66			
N358G	0.41			
N358T	0.58			
V351I	0.36			
N358L	0.38			
S359D	0.45			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
S359E	1.05			
S359H	0.44			
S359K	0.66			
S359M	0.63			
S359T	2.11			
S359V	0.65			
S360T	0.5			
P367A	0.55			
P367C	0.83			
P367G	0.47			
P367K	0.57			
P367R	0.46			
P367S	0.52			
D368A	1.34			
D368E	1.28			
D368G	0.49			
D368H	0.96			
D368K	1.31			
D368L	0.64			
D368M	0.78			
D368R	1.31			
D368S	0.93			
D368T	0.8			
D361H	0.37			
D368V	0.41			
N369H	1.33			
N369R	0.55			
N369S	0.54			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
A371E	1.05			
A371F	0.52			
A371H	1.2			
A371I	0.5			
A371K	1.76			
L374W	0.34			
A371L	0.57			
A371M	0.57			
A371R	1.51			
A371S	1.45			
A371V	0.94			
Q373A	0.65			
Q373E	0.81			
Q373F	0.62			
Q373K	0.73			
Q373L	0.84			
Q373M	1.43			
Q373R	0.68			
Q373S	0.87			
Q373V	1.05			
L374A	0.6			
L374H	1.42			
L374I	0.8			
L374M	1.11			
L374N	0.43			
L374P	0.43			
L374R	0.83			
L374S	0.58			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L374T	0.47			
L374V	0.56			
L374Y	0.66			
E375A	0.42			
E375G	0.9			
E375K	1.49			
E375L	0.46			
E375M	0.54			
E375N	0.81			
E375R	0.43			
E375S	0.77			
E375T	1.17			
K376A	0.95			
K376D	0.78			
K376E	0.88			
K376M	0.46			
K376Q	0.69			
K376R	0.67			
K376S	0.8			
K376T	0.53			
K376V	0.58			
K376Y	0.42			
G377D	1.35			
G377E	0.59			
G377H	1.49			
G377K	1.5			
G377P	2.3			
G377R	1.28			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
G377S	1.8			
Q051R	0.36			
G377T	3.83			
G378K	1.22			
G378N	0.64			
G378R	1.03			
K379G	0.52			
K379H	0.57			
K379R	0.74			
K379S	0.46			
K379T	0.4			
M035Q	0.37			
F380I	0.56			
F380L	0.67			
F380P	0.47			
F380W	2.15			
F380Y	1.5			
T381H	0.48			
T381K	1.06			
T381N	0.51			
T381Q	0.84			
T381R	0.87			
T381S	0.87			
T381V	0.89			
R383A	0.51			
R383E	0.51			
R383H	0.71			
R383I	0.71			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
R383K	1.3			
R383L	1.31			
R383M	0.61			
R383N	0.77			
T381E	0.35			
R383S	0.87			
R383T	0.98			
R383V	1.05			
K385A	1.12			
K385G	0.62			
K385H	0.5			
K385N	0.41			
K385Q	0.73			
K385R	0.94			
K385S	1.05			
K385T	0.46			
K385V	0.43			
T387S	0.93			
L388F	0.92			
L388H	0.47			
L388I	0.98			
L388M	0.79			
L388R	0.6			
L388T	0.51			
L388V	0.78			
L388W	0.77			
L388Y	1.18			
E392W	0.31			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
E389A	1.14			
E389G	0.91			
E389H	1.17			
E389K	1.91			
E389L	0.65			
E389M	0.6			
E389P	0.75			
E389Q	0.69			
E389R	0.94			
E389S	1.08			
E389T	0.7			
E389Y	0.77			
L391C	0.9			
E392A	0.58			
E392F	0.54			
E392G	1			
E392K	0.66			
E392L	0.8			
E392M	1.54			
E392Q	1.01			
E392R	0.66			
E392S	0.52			
E392T	0.72			
E392V	1.27			
E392Y	0.92			
Q393A	1.26			
Q393D	0.45			
Q393F	1.23			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
Q393H	1.05			
Q393K	0.8			
Q393L	0.91			
Q393M	0.8			
Q393N	0.72			
Q393R	0.74			
Q393S	1.15			
Q393T	0.41			
F394L	0.56			
F394W	0.41			
S395A	1.1			
S395G	0.77			
S395H	0.56			
S395K	0.96			
S395R	1.98			
E396A	0.52			
E396D	0.64			
E396H	0.47			
E396Q	0.73			
E396R	0.61			
E396S	0.61			
E396T	0.89			
E396L	0.39			
Y399A	1.01			
Y399C	0.46			
Y399E	1.49			
S407L	0.4			
Y399K	1.94			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
Y399M	2.7			
Y399N	0.52			
Y399Q	1.18			
Y399R	1.2			
Y399S	1.01			
Y399T	2.4			
Y399V	1.44			
Y399W	1.92			
S401A	0.82			
S401E	0.46			
S401N	0.42			
Y403F	0.62			
S404A	0.63			
S404P	0.64			
S401G	0.38			
T405F	0.36			
T405A	0.56			
T405G	2.32			
T405K	0.74			
T405M	0.48			
T405P	0.64			
T405Q	0.75			
T405R	0.6			
T405S	0.94			
T405W	0.73			
T405Y	0.44			
L406A	0.7			
L406C	0.98			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L406E	0.73			
L406F	1.42			
L406G	1			
L406I	0.61			
L406N	0.76			
L406Q	0.93			
L406S	0.47			
L406T	0.83			
L406V	0.87			
L406Y	0.74			
S407A	1.16			
S407D	1.52			
S407E	1.38			
S407F	1.42			
S407G	0.75			
S407H	1.34			
S407M	0.74			
K411H	0.33			
S407N	0.72			
S407P	0.94			
S407Q	1.71			
S407R	1.04			
S407V	0.56			
S407W	0.41			
K409A	2.18			
K409D	0.65			
K409E	0.62			
K409G	0.5			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
K409H	0.64			
K409I	0.51			
K409P	0.48			
K409Q	3.33			
K409R	0.84			
K409S	0.72			
I083K	0.3			
K409T	0.63			
K409V	0.48			
A412Y	0.66			
E410D	0.47			
E410K	0.7			
E410M	0.42			
E410N	0.67			
E410P	0.73			
E410Q	0.85			
E410R	0.61			
E410S	0.81			
E410T	1.54			
E410V	0.65			
E410Y	0.62			
K411A	0.48			
K411N	1.02			
K411P	0.42			
K411R	0.97			
K411S	1.21			
K411T	0.63			
K411V	0.99			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
A412D	0.74			
A412G	0.8			
A412I	0.81			
E220M	0.36			
P226W	0.51			
A412L	0.65			
A412N	0.86			
A412P	0.77			
A412R	0.66			
A412S	0.86			
A412V	0.53			
A412W	0.54			
D413E	0.52			
D413K	0.42			
D413N	0.94			
D413R	0.5			
D413T	0.41			
V414I	1.12			
V414M	0.53			
K415G	0.4			
K415S	0.42			
K415W	0.42			
D416F	0.41			
D416G	0.67			
D416H	0.57			
D416I	0.63			
D416K	0.76			
D416L	0.75			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
D416N	0.73			
D416Q	0.83			
D416R	0.46			
V237C	0.35			
D416T	0.85			
D416V	0.59			
D416Y	0.4			
T417I	1.22			
D413A	0.38			
D413S	0.39			
K415Y	0.39			
D418A	0.92			
D418E	1.31			
D418F	0.81			
L089P	0.38			
D418G	0.45			
D418I	0.99			
D418L	1.28			
D418M	1.09			
D418N	0.91			
D418P	2.11			
D418Q	1.05			
D418R	1.18			
D418S	0.78			
D418V	1.43			
D418Y	0.97			
A419E	0.45			
A419F	2.17			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
A419G	0.42			
A419H	1.21			
A419I	1.64			
A419K	1.88			
A419L	0.56			
A419N	0.53			
V421I	0.39			
A419R	1.81			
A419S	2.65			
A419W	0.69			
A419Y	1.44			
V420I	1.04			
V420P	0.48			
D421A	1.28			
D421E	0.81			
D421G	0.62			
D421H	1.98			
K255G	0.39			
D421K	2.42			
D421L	0.73			
D421M	0.94			
D421N	1.89			
D421Q	1.54			
D421R	2.21			
D421S	2.12			
K094C	0.33			
D421T	0.8			
D421Y	0.66			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
V422I	0.42			
V422T	0.49			
A425G	1.2			
A425I	0.44			
A425K	1.75			
A425M	0.7			
A425N	0.46			
A425R	0.49			
A425S	0.47			
D426E	0.62			
D426G	0.85			
D426N	0.61			
D426P	1.03			
D426Q	0.42			
D426Y	0.43			
G427K	0.52			
G427S	0.42			
V428L	1.25			
A425Y	0.39			
G427T	0.35			
G427Q	0.39			
V428M	0.42			
V428P	0.82			
V428T	0.62			
D431A	2.42			
D431E	1.27			
D431G	0.55			
D431H	3.13			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
D431I	1.05			
D431K	1.83			
D431L	0.62			
D431N	1.3			
D431Q	2.16			
D431R	2.2			
D431S	1.91			
D431V	1.52			
D431W	0.56			
D431Y	0.85			
A432E	0.6			
A432G	0.52			
A432H	0.34			
A432N	0.51			
A432S	0.61			
A432V	0.56			
F433A	0.97			
R270T	0.4			
F433C	0.69			
F433D	0.95			
F433E	0.82			
F433G	0.54			
F433H	0.83			
F433I	1.06			
F433K	1.36			
F433L	1.87			
F433P	0.95			
F433R	1.63			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
F433S	0.86			
F433T	1.86			
F433V	1.63			
F433W	1.28			
L434F	0.41			
L434G	0.47			
L263H	0.36			
L434I	0.89			
L434M	0.6			
L434V	0.46			
K435A	1.08			
K435C	0.53			
K435E	0.78			
K435G	0.64			
K435H	1.05			
K435R	1.01			
K435S	1.03			
K435T	0.73			
K435V	0.44			
K435Y	0.5			
P436D	1.19			
P436E	0.74			
P436G	1.19			
L105H	0.36			
P436H	0.72			
V272M	0.31			
P436I	0.84			
P436K	2.05			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
P436L	0.63			
P436M	0.61			
P436Q	0.86			
P436R	1			
P436S	0.92			
P436T	0.59			
P436W	0.43			
P436Y	0.49			
P437A	0.56			
P437D	0.62			
P437G	0.5			
P437H	1.11			
P437I	2.46			
P437K	0.83			
P437L	0.51			
P437M	2.55			
P437Q	0.96			
D275L	0.24			
P437R	0.85			
P437S	0.57			
P437Y	0.42			
M438A	0.75			
M438C	0.63			
M438D	0.87			
M438E	0.72			
M438G	0.83			
M438L	0.86			
M438N	1.08			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
M438P	0.81			
M438Q	0.85			
M438R	0.99			
M438S	0.83			
M438T	3.99			
M438V	0.85			
P125A	0.36			
M438W	0.57			
E439A	1.2			
E439C	0.58			
E439F	1			
E439G	1.22			
E439H	0.74			
E439K	1.2			
E439L	0.88			
E439P	1.16			
Q276G	0.36			
E439Q	1.32			
E439S	1.02			
E439T	1.15			
E439V	1.57			
E439W	0.62			
T440A	1.22			
T440D	1.03			
T440E	1			
T440F	0.85			
T440G	0.86			
T440H	3			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
T440I	1.04			
T440L	0.97			
T440M	1.08			
T440P	0.88			
T440R	1.77			
T440S	1.17			
T440V	1.02			
T440Y	1.11			
E441A	1.47			
E441D	0.67			
E441F	3.91			
E441G	0.87			
E441H	0.65			
E441K	0.8			
E441L	0.82			
E441N	0.82			
E441Q	0.81			
E441S	0.79			
E441T	0.66			
E441V	0.54			
E441Y	0.51			
E442C	1.38			
E442G	0.51			
E442H	0.76			
E442K	0.73			
E442P	0.91			
E442Q	0.74			
D284Y	0.37			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
L286W	0.38			
E442R	3.94			
E442T	0.61			
E442V	0.65			
E442Y	0.6			
P443A	1.63			
P443E	1.07			
P443F	0.7			
P443G	1.12			
P443H	1.08			
P443L	1.19			
P443M	1.99			
P443N	1.25			
P443Q	0.96			
P443R	1.04			
P443S	0.99			
P443T	0.87			
P443W	0.64			
Q444M	0.37			
Q444D	0.97			
Q444E	1.19			
Q444F	0.66			
Q444G	0.93			
Q444H	0.97			
Q444I	0.58			
Q444K	1.03			
Q444N	1.01			
Q444R	0.85			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
Q444V	1.12			
Q444W	0.64			
Q444Y	0.67			
I445A	0.97			
I445G	0.98			
I445H	1.35			
I445L	1.06			
I445M	1.57			
I445N	1.24			
I445P	1.67			
I445Q	1.26			
I445R	1.08			
I445S	1.21			
I445T	1.38			
I445V	1.25			
I445W	0.69			
I445Y	0.53			
F446A	1.58			
F446C	0.75			
F446D	1.18			
F446E	1.1			
F446G	1.12			
F446H	1.28			
F446I	1.06			
F446K	0.94			
F446L	0.93			
F446M	1.31			
F446Q	0.72			

Table 9 Actives

Substitution	Average normalized activity		positions with active mutations	Sum positions with active mutations
F446R	0.89			
F446T	0.89			
F446V	0.91			
F446W	1.4			
Y447D	3.25			
Y447E	1.36			
Y447F	1.41			
Y447G	0.92			
Y447I	1.36			
Y447L	1.09			
Y447M	0.9			
Y447N	1.58			
Y447P	1.46			
Y447Q	2.37			
Y447R	1.12			
Y447T	1.9			
Y447V	1.38			

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
N002H	I067G	A153M	L214S	T269L	I332R	T381P			2	407
N002K	I067P	A153P	L214T	T269M	I332S	T381W			3	
N002W	I067R	A153R	L214Y	T269N	I332T	T381Y			4	
N002Y	I067T	A153T	S215C	T269P	I332Y	V382E			5	
F003A	I067W	A153V	S215P	T269Q	N333G	V382G			6	
F003G	D068A	K154D	W216D	T269R	N333H	V382H			7	
F003K	D068C	K154E	W216E	R270A	N333I	V382K			8	
F003P	D068G	K154G	W216G	R270C	N333K	V382L			9	
F003T	D068I	K154P	W216H	R270E	N333P	V382M			10	
F003V	D068L	K154S	W216I	R270F	N333R	V382N			11	
R004D	D068P	K154W	W216K	R270G	N333S	V382P			12	
R004E	D068V	K154Y	W216L	R270H	N333T	V382Q			13	
R004F	D068Y	Q155P	W216M	R270I	N333W	V382R			14	
R004G	S069N	Q155Y	W216N	R270P	N333Y	V382S			15	
R004L	S069T	E156P	W216P	R270Y	V334A	V382T			16	
R004P	I070Q	F157A	W216Q	I271A	V334C	V382W			17	
R004W	T071P	F157C	W216R	I271D	V334D	V382Y			18	
R004Y	G072C	F157D	W216T	I271E	V334E	R383G			19	
A005D	G072F	F157E	W216V	I271H	V334G	R383P			20	
A005G	G072H	F157G	L217A	I271K	V334M	G384C			21	
A005I	G072I	F157H	L217C	I271T	V334N	G384F			22	
A005L	G072P	F157I	L217G	I271W	V334R	G384M			23	
A005M	G072V	F157K	L217H	V272A	V334S	G384Q			25	
A005N	G072W	F157L	L217P	V272H	T335F	G384S			27	
A005P	V073P	F157M	L217Q	V272L	T335G	G384T			33	
A005Q	V075D	F157P	L217S	V272N	T335H	K385C			34	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
A005R	V075G	F157Q	L217T	V272P	T335I	K385L			35	
A005T	V075P	F157R	L217V	V272W	T335K	K385M			36	
A005V	N076A	F157S	L217W	F273A	T335L	K385P			37	
A005W	N076C	F157T	W218A	F273C	T335P	K385W			38	
A005Y	N076F	F157V	W218I	F273D	T335V	K385Y			39	
P006E	N076G	E158D	W218K	F273G	T335W	P386A			40	
P006F	N076I	E158K	W218L	F273I	T335Y	P386C			41	
P006T	N076K	E158P	W218P	F273L	L336A	P386F			42	
P006V	N076L	E158R	W218S	F273P	L336E	P386G			43	
P006Y	N076P	E158Y	W218V	F273Q	L336F	P386H			44	
P007C	N076Q	K159W	N219P	F273S	L336G	P386I			45	
P007D	N076R	K159Y	E220G	F273V	L336K	P386L			46	
P007F	N076S	G161W	E220K	F273W	L336N	P386M			47	
P007G	N076T	D163C	E220N	T274C	L336P	P386N			48	
P007H	N076V	D163P	E220P	T274E	L336R	P386Q			49	
P007I	N076W	F164A	E220R	T274G	L336S	P386R			51	
P007K	G077D	F164C	E220W	T274H	L336T	P386S			52	
P007L	G077E	F164D	S221D	T274N	L336V	P386T			53	
P007Q	G077L	F164E	S221E	T274Q	L336W	P386V			54	
P007R	G077P	F164G	S221H	T274W	L336Y	P386Y			55	
P007S	G077Q	F164H	S221K	T274Y	A337C	T387C			56	
P007T	G077R	F164N	S221P	D275A	A337F	T387E			57	
P007W	G077T	F164P	S221R	D275F	A337G	T387F			58	
P007Y	G077V	F164Q	T222P	D275G	A337I	T387G			59	
V008D	G078A	F164R	T222Y	D275I	A337K	T387H			60	
V008E	G078D	L165C	A223C	D275K	A337L	T387I			61	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
V008G	G078I	L165H	A223D	D275L	A337M	T387L			62	
V008H	G078M	L165P	A223E	D275M	A337R	T387M			63	
V008N	G078P	L165T	A223G	D275Q	A337T	T387N			64	
V008R	G078T	V166D	A223H	D275T	A337W	T387V			65	
V008S	G078Y	E167V	A223K	D275V	A338C	T387W			66	
V008W	I079A	T168A	A223L	D275W	A338D	T387Y			67	
I009C	I079D	T168C	A223P	Q276F	A338E	L388C			68	
I009D	I079F	T168D	A223Q	Q276P	A338F	L388G			69	
I009E	I079G	T168E	A223R	Q276W	A338G	L388P			70	
I009G	I079H	T168F	A223S	L278M	A338H	L388Q			71	
I009N	I079K	T168G	A223T	L278P	A338I	L388S			72	
I009P	I079N	T168K	A223V	K279A	A338K	E389F			73	
P010F	I079P	T168L	A223W	K279C	A338L	E389V			75	
P010I	I079S	T168P	A223Y	K279F	A338P	D390A			76	
P010L	I079W	T168R	L224A	K279G	A338R	D390C			77	
P010M	I079Y	T168S	L224D	K279L	A338T	D390E			78	
P010Y	P080A	T168V	L224E	K279W	A338V	D390F			79	
N011A	P080D	T168W	L224F	K279Y	K339D	D390G			80	
N011C	P080E	T168Y	L224G	F280D	K339E	D390H			81	
N011F	P080F	I169A	L224M	F280I	K339F	D390L			82	
N011I	P080G	I169D	L224P	F280L	K339G	D390N			83	
N011L	P080I	I169F	L224Q	F280M	K339H	D390P			84	
N011P	P080K	I169G	L224R	F280N	K339L	D390R			85	
N011T	P080L	I169H	L224S	F280R	K339N	D390S			86	
N011W	P080M	I169K	L224T	F280S	K339P	D390T			87	
N011Y	P080N	I169N	L224W	F280T	K339S	D390V			88	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
V012G	P080R	I169P	L224Y	F280V	K339T	D390W			89	
V012H	P080S	I169Q	Y225A	F280W	K339V	D390Y			90	
V012W	P080T	I169S	Y225D	L281A	K339W	L391A			91	
P013E	P080V	I169T	Y225E	L281D	K339Y	L391D			92	
P013G	P080Y	I169Y	Y225G	L281G	M340A	L391G			94	
P013I	Q081A	K170C	Y225H	L281H	M340C	L391H			95	
P013L	Q081C	K170D	Y225K	L281I	M340D	L391K			96	
P013M	Q081E	K170E	Y225P	L281K	M340E	L391N			98	
P013V	Q081G	K170G	Y225Q	L281N	M340F	L391P			99	
F014A	Q081H	K170M	Y225R	L281P	M340G	L391Q			100	
F014E	Q081L	K170P	Y225T	L281Q	M340H	L391R			101	
F014G	Q081N	K170W	Y225V	L281R	M340K	L391S			102	
F014H	Q081P	K170Y	Y225W	L281S	M340P	L391T			103	
F014K	Q081S	L171C	P226A	L281V	M340R	L391V			104	
F014N	Q081V	L171D	P226C	L281W	M340S	L391W			105	
F014P	Q081W	L171H	P226D	S282F	M340T	L391Y			106	
F014Q	Q081Y	L171M	P226E	S282L	M340V	E392C			107	
F014W	K082W	L171N	P226F	S282V	M340W	E392P			108	
L015E	K082Y	L171R	P226G	S282W	C341A	Q393C			109	
L015F	I083E	L171S	P226L	S282Y	C341E	Q393P			110	
L015G	I083K	L171W	P226N	Q283A	C341G	F394A			111	
L015K	S084Y	L171Y	P226Q	Q283C	C341H	F394D			112	
L015N	L085A	G172D	P226R	Q283D	C341K	F394E			113	
L015P	L085C	G172E	P226S	Q283F	C341L	F394G			114	
L015Q	L085D	G172I	P226T	Q283W	C341M	F394I			115	
L015R	L085E	G172L	P226V	D284C	C341N	F394K			116	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
L015S	L085F	G172P	P226W	D284I	C341Q	F394N			117	
L015Y	L085G	G172Q	P226Y	D284P	C341R	F394P			118	
W016A	L085H	G172T	S227A	E285K	C341S	F394Q			119	
W016C	L085N	G172V	S227F	E285P	C341T	F394R			121	
W016D	L085Q	G172W	S227G	E285R	C341V	F394S			122	
W016E	L085S	G172Y	S227H	E285T	C341Y	F394T			123	
W016F	L085T	K173D	S227I	E285V	S342D	F394V			124	
W016G	Q086C	K173E	S227K	L286A	S342E	S395C			125	
W016H	Q086P	K173G	S227L	L286C	S342F	S395L			126	
W016K	D087P	K173H	S227M	L286D	S342H	S395M			127	
W016M	H088A	K173I	S227P	L286F	S342K	S395P			128	
W016P	H088C	K173L	S227Q	L286H	S342L	E396C			129	
W016R	H088E	K173M	S227R	L286K	S342M	E396F			130	
W016S	H088F	K173P	S227T	L286M	S342P	E396G			131	
W016T	H088G	K173S	S227V	L286P	S342Q	E396I			132	
W016Y	H088I	K173V	S227W	L286T	S342R	E396P			133	
A017D	H088K	K173W	S227Y	L286Y	S342T	E396Y			134	
A017E	H088L	K173Y	I228A	V287A	S342Y	K397A			135	
A017G	H088M	L174P	I228E	V287C	Q343C	K397C			136	
A017H	H088P	L175C	I228F	V287D	Q343D	K397E			137	
A017I	H088R	L175D	I228G	V287E	Q343F	K397F			138	
A017L	H088S	L175G	I228H	V287G	Q343I	K397G			139	
A017N	H088T	L175K	I228L	V287K	Q343P	K397I			143	
A017P	H088V	L175P	I228M	V287L	Q343W	K397L			144	
A017Q	H088Y	L175R	I228N	V287N	V344F	K397M			145	
A017R	L089A	L175S	I228P	V287P	V344G	K397P			149	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
A017S	L089D	R176A	I228R	V287Q	V344H	K397Q			150	
A017T	L089E	R176C	I228S	V287R	V344L	K397T			152	
A017V	L089G	R176E	I228T	V287S	V344M	K397V			153	
A017W	L089Q	R176F	I228W	Y288D	V344N	F398A			154	
A017Y	L089S	R176G	Y229E	Y288E	V344P	F398C			155	
W018C	L089T	R176H	Y229F	Y288F	V344Q	F398E			156	
W018D	L089W	R176I	Y229G	Y288G	V344R	F398G			157	
W018F	L089Y	R176P	Y229K	Y288H	V344S	F398H			158	
W018G	D090C	R176Q	Y229L	Y288I	V344T	F398I			159	
W018H	D090G	R176S	Y229P	Y288K	V344W	F398L			161	
W018I	K091D	R176T	Y229Q	Y288P	V344Y	F398N			163	
W018L	K091E	R176V	Y229T	Y288R	L345A	F398P			164	
W018M	K091F	R176W	Y229V	Y288T	L345C	F398R			165	
W018P	K091G	P177A	Y229W	T289A	L345E	F398S			166	
W018Q	K091H	P177C	L230A	T289C	L345H	F398T			167	
W018S	K091I	P177D	L230E	T289E	L345K	F398V			168	
W018T	K091L	P177F	L230G	T289G	L345N	F398W			169	
W018V	K091N	P177G	L230H	T289H	L345Q	F398Y			170	
W018Y	K091T	P177H	L230K	T289L	L345R	Y399D			171	
N019A	A092E	P177L	L230M	T289P	L345T	Y399P			172	
N019C	A092F	P177M	L230N	T289Q	L345V	C400A			173	
N019F	A092H	P177Q	L230P	T289R	L345Y	C400D			174	
N019G	A092K	P177R	L230R	T289S	C346A	C400E			175	
N019H	A092P	P177S	L230S	T289Y	C346D	C400F			176	
N019I	A092Q	P177T	L230T	F290D	C346F	C400G			177	
N019L	A092R	P177V	L230V	F290Q	C346G	C400I			178	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
N019M	A092W	P177W	L230W	F290Y	C346I	C400L			179	
N019P	A092Y	N178E	L230Y	G291A	C346K	C400M			180	
N019Q	K094G	N178I	N231A	G291C	C346L	C400P			181	
N019R	K094P	N178L	N231C	G291D	C346M	C400Q			182	
N019S	D095A	N178V	N231D	G291E	C346P	C400R			183	
N019V	D095C	N178W	N231F	G291F	C346R	C400S			184	
N019W	D095E	N178Y	N231G	G291M	C346S	C400T			185	
N019Y	D095F	H179W	N231H	G291N	C346T	C400V			186	
A020D	D095G	L180A	N231I	G291T	C346V	C400Y			187	
A020E	D095H	L180C	N231K	G291W	C346W	S401C			188	
A020F	D095K	L180E	N231L	G291Y	Q347C	S401F			189	
A020H	D095L	L180P	N231P	E292I	Q347F	S401H			190	
A020K	D095M	L180R	N231Q	E292L	Q347I	S401K			191	
A020L	D095P	L180S	N231R	E292T	Q347P	S401R			192	
A020N	D095Q	W181A	N231S	T293E	Q347T	S401W			193	
A020P	D095S	W181C	N231V	T293N	Q347V	S401Y			194	
A020R	D095V	W181D	T232C	V294A	Q347W	C402A			195	
A020T	D095W	W181E	T232G	V294E	E348C	C402D			197	
A020V	D095Y	W181F	T232H	V294G	E348H	C402E			198	
A020Y	I096A	W181H	T232K	V294H	E348I	C402F			199	
P021A	I096C	W181I	T232L	V294K	E348L	C402L			200	
P021C	I096G	W181K	T232N	V294L	E348P	C402M			201	
P021D	I096H	W181L	T232P	V294N	E348Q	C402P			202	
P021E	I096P	W181R	T232Q	V294P	E348R	C402Q			203	
P021G	I096R	W181S	T232V	V294Q	E348T	C402R			204	
P021H	I096S	W181V	T232Y	V294R	E348V	C402S			206	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
P021I	I096T	G182A	Q233D	V294S	E348W	C402T			207	
P021L	I096W	G182C	Q233I	V294T	E348Y	C402V			208	
P021M	F098P	G182D	Q233P	V294W	Q349D	C402W			209	
P021R	Y099C	G182E	Q233S	A295C	Q349F	C402Y			210	
P021S	Y099E	G182H	Q233T	A295G	Q349G	Y403A			211	
P021T	Y099G	G182N	Q234A	A295H	Q349P	Y403C			212	
P021V	Y099I	G182P	Q234D	A295I	Q349V	Y403E			213	
P021W	Y099N	G182Q	Q234E	A295L	Q349W	Y403G			214	
S022C	Y099P	G182R	Q234G	A295N	Q349Y	Y403H			215	
S022E	Y099V	G182S	Q234H	A295P	G350A	Y403K			216	
S022G	Y099W	G182T	Q234N	A295T	G350D	Y403L			217	
S022K	M100C	G182V	Q234P	A295V	G350E	Y403M			218	
S022P	M100E	G182Y	Q234S	A295Y	G350F	Y403N			219	
E023A	M100F	Y183C	Q234T	L296C	G350H	Y403P			220	
E023F	M100G	Y183D	Q234V	L296F	G350K	Y403Q			221	
E023L	M100N	Y183E	Q234W	L296G	G350L	Y403R			222	
E023M	M100P	Y183G	S235F	L296I	G350M	Y403T			223	
E023N	M100R	Y183I	S235L	L296K	G350N	S404C			224	
E023P	M100S	Y183K	S235M	L296M	G350P	S404D			225	
E023R	M100T	Y183N	S235R	L296Q	G350R	S404F			226	
E023S	M100W	Y183P	S235W	L296R	G350S	S404G			227	
E023T	M100Y	Y183Q	S235Y	L296S	G350T	S404H			228	
E023V	P101A	Y183R	P236C	L296T	G350V	S404L			229	
C025D	P101C	Y183S	P236I	L296V	G350Y	S404M			230	
C025E	P101F	Y183V	P236L	L296W	V351C	S404N			231	
C025F	P101H	Y184A	P236N	L296Y	V351D	S404R			232	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
C025G	P101I	Y184C	P236Q	G297C	V351E	S404V			233	
C025H	P101K	Y184D	P236T	G297E	V351F	S404W			234	
C025I	P101L	Y184E	P236Y	G297H	V351H	S404Y			235	
C025K	P101M	Y184F	A238F	G297L	V351N	T405C			236	
C025L	P101N	Y184G	A238G	G297N	V351R	T405I			238	
C025N	P101Q	Y184H	A238L	G297P	V351W	T405V			239	
C025P	P101R	Y184K	A238P	G297Q	V351Y	L406P			240	
C025R	P101S	Y184L	A238V	G297R	C352A	L406R			241	
C025S	P101T	Y184M	A238W	G297S	C352D	C408A			242	
C025T	V102P	Y184P	A238Y	G297T	C352E	C408E			243	
C025V	D103A	Y184R	A239C	G297Y	C352F	C408F			244	
C025Y	D103E	Y184S	A239F	A298C	C352G	C408G			245	
G027C	D103F	Y184V	A239G	A298E	C352K	C408I			246	
L033C	D103G	L185A	A239H	A298L	C352M	C408K			247	
L033D	D103H	L185D	A239I	A298M	C352P	C408L			248	
L033H	D103I	L185E	A239L	A298N	C352Q	C408P			249	
L033N	D103L	L185F	A239P	A298P	C352R	C408R			250	
L033V	D103Q	L185G	A239R	A298Q	C352S	C408S			251	
L033Y	D103R	L185I	A239S	A298S	C352T	C408T			252	
D034I	D103T	L185K	A239T	A298T	C352V	C408V			253	
D034L	D103V	L185P	A239V	A298W	C352W	C408W			254	
D034N	D103W	L185R	A239W	A298Y	C352Y	C408Y			255	
D034S	D103Y	L185S	A239Y	S299A	I353C	E410W			256	
D034T	N104F	L185T	T240E	S299C	I353F	K411D			257	
D034V	N104P	L185V	T240F	S299D	I353G	K411E			258	
M035A	N104W	L185W	T240G	S299F	I353H	K411F			260	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
M035D	L105C	L185Y	T240N	S299G	I353K	K411G			261	
M035G	L105M	F186A	T240W	S299H	I353L	A412E			262	
M035P	L105N	F186D	T240Y	S299L	I353M	A412H			263	
M035R	G106A	F186G	L241A	S299M	I353Q	D413H			264	
M035S	G106C	F186H	L241C	S299P	I353R	D413I			265	
S036C	G106D	F186I	L241D	S299Q	I353S	D413K			266	
S036F	G106F	F186K	L241E	S299T	I353W	D413L			267	
S036V	G106H	F186L	L241G	G300A	R354C	D413P			268	
S036W	G106L	F186N	L241I	G300C	R354D	V414A			269	
S036Y	G106M	F186P	L241P	G300D	R354E	V414D			270	
L037C	G106N	F186Q	L241R	G300E	R354G	V414E			271	
L037E	G106P	F186R	L241S	G300F	R354H	V414G			272	
L037G	G106S	F186S	L241T	G300L	R354I	V414H			273	
L037N	G106W	F186V	L241V	G300M	R354K	V414K			274	
L037S	G106Y	F186W	L241W	G300N	R354L	V414R			275	
F038E	M107A	P187A	Y242A	G300P	R354M	V414S			276	
F038G	M107C	P187F	Y242C	G300Q	R354P	V414T			278	
F038K	M107H	P187G	Y242D	G300S	R354Q	K415C			279	
F038L	M107K	P187H	Y242G	G300T	R354S	K415D			280	
F038N	M107P	P187I	Y242I	G300V	R354V	K415E			281	
F038Q	M107Q	P187L	Y242L	G300W	R354W	K415P			282	
F038R	M107S	P187M	Y242M	I301E	R354Y	D416C			283	
F038T	M107V	P187N	Y242P	I301G	K355D	D416S			284	
F038W	M107W	P187Q	Y242R	I301H	K355F	T417A			285	
S039C	A108D	P187R	Y242S	I301K	K355G	T417D			286	
S039D	A108E	P187S	Y242T	I301M	K355H	T417E			287	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
S039F	A108F	P187T	Y242V	I301N	K355L	T417F			288	
S039W	A108K	P187V	Y242W	I301P	K355M	T417G			289	
F040A	A108L	P187W	V243C	I301Q	K355N	T417H			290	
F040D	A108M	P187Y	V243D	I301R	K355P	T417K			291	
F040E	A108P	D188A	V243F	I301S	K355Q	T417M			292	
F040G	A108Q	D188C	V243G	I301W	K355R	T417P			293	
F040K	A108T	D188F	V243H	I301Y	K355S	T417Q			294	
F040N	A108V	D188G	V243L	V302C	K355T	T417R			295	
F040R	A108Y	D188H	V243M	V302D	K355V	A419D			296	
F040S	V109C	D188L	V243P	V302E	K355W	A419P			297	
F040T	V109D	D188M	V243Q	V302F	K355Y	V420A			298	
F040V	V109E	D188N	V243R	V302G	N356C	V420D			299	
I041Q	V109L	D188P	V243S	V302H	N356G	V420F			300	
G042D	V109M	D188Q	V243W	V302L	N356K	V420G			301	
G042E	V109R	D188R	V243Y	V302M	N356L	V420H			302	
G042H	V109T	D188S	R244A	V302P	N356P	V420K			303	
G042I	V109W	D188T	R244D	V302R	N356R	V420L			304	
G042K	I110F	D188V	R244G	V302S	N356T	V420N			305	
G042L	I110K	D188W	R244I	V302T	N356V	V420R			306	
G042M	I110L	C189A	R244V	V302Y	N356W	V420S			307	
G042P	I110M	C189E	R244Y	I303A	W357D	V420T			308	
G042Q	I110P	C189G	N245A	I303C	W357E	V420W			310	
G042R	I110W	C189H	N245C	I303D	W357F	V420Y			311	
G042S	D111H	C189K	N245F	I303E	W357G	V422C			312	
G042T	D111I	C189L	N245L	I303F	W357L	V422D			313	
G042V	D111Q	C189M	N245P	I303G	W357M	V422G			314	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
S043A	W112C	C189N	N245Q	I303K	W357Q	V422H			315	
S043E	W112E	C189P	N245R	I303L	W357R	V422L			316	
S043F	W112G	C189R	N245S	I303M	N358E	V422M			317	
S043G	W112H	C189S	N245T	I303R	N358H	V422N			318	
S043I	W112L	C189T	N245V	I303W	N358I	V422Q			319	
S043K	W112N	C189V	R246A	I303Y	N358K	V422R			320	
S043L	W112P	C189W	R246C	W304A	N358P	V422S			321	
S043Q	W112S	C189Y	R246D	W304C	N358Q	V422Y			322	
S043R	E113R	Y190C	R246E	W304D	N358R	C423A			323	
S043V	E113V	Y190E	R246G	W304G	N358W	C423D			324	
P044A	E114I	Y190F	R246H	W304I	S359A	C423E			325	
P044C	E114L	Y190G	R246I	W304M	S359F	C423F			326	
P044F	E114P	Y190H	R246K	W304N	S359G	C423G			327	
P044G	E114T	Y190K	R246L	W304P	S359L	C423H			329	
P044H	E114V	Y190L	R246M	W304Q	S359P	C423L			330	
P044I	W115A	Y190N	R246P	W304S	S359W	C423M			331	
P044L	W115C	Y190Q	R246S	W304T	S360A	C423P			332	
P044N	W115D	Y190R	R246T	W304V	S360C	C423Q			333	
P044Q	W115F	Y190S	R246V	W304Y	S360E	C423R			334	
P044R	W115G	Y190T	R246W	G305L	S360F	C423S			335	
P044S	W115H	Y190V	V247A	G305P	S360G	C423T			336	
P044T	W115I	Y190W	V247C	G305Q	S360I	C423V			337	
P044W	W115K	N191A	V247F	G305R	S360K	C423W			338	
P044Y	W115L	N191E	V247H	G305S	S360L	I424A			339	
R045A	W115M	N191F	V247N	G305T	S360M	I424C			340	
R045D	W115R	N191G	V247P	G305V	S360P	I424E			341	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
R045F	W115S	N191K	V247Q	G305Y	S360Q	I424G			342	
R045G	W115V	N191L	V247R	T306A	S360R	I424H			343	
R045P	W115Y	N191M	V247S	T306C	S360V	I424N			344	
R045W	R116A	N191P	V247T	T306H	D361A	I424Q			345	
I046P	R116C	N191Q	V247W	T306I	D361C	I424R			346	
I046W	R116D	N191R	V247Y	T306L	D361E	I424S			347	
N047V	R116E	N191S	R248C	T306V	D361G	I424W			348	
A048P	R116G	N191T	R248D	T306W	D361M	I424Y			349	
T049C	R116H	N191V	R248E	T306Y	D361N	A425E			350	
T049D	R116I	N191W	R248G	L307C	D361P	A425L			351	
T049G	R116L	N191Y	R248I	L307I	D361Q	A425P			352	
T049H	R116N	H192C	R248M	L307P	D361R	A425W			353	
T049P	R116P	H192F	R248P	S308C	D361S	A425Y			354	
Q051C	R116Q	H192G	R248T	S308F	D361V	D426C			355	
Q051F	R116S	H192K	E249A	S308L	D361W	D426F			356	
Q051I	R116V	H192L	E249G	S308M	Y362A	D426M			357	
Q051M	R116W	H192M	E249H	S308V	Y362C	D426R			358	
Q051P	P117D	H192N	E249I	S308W	Y362E	G427A			359	
Q051T	P117G	H192P	E249K	S308Y	Y362G	G427C			360	
Q051W	P117I	H192Q	E249M	M310C	Y362H	G427F			361	
Q051Y	P117K	H192R	E249Q	M310E	Y362K	G427L			362	
G052C	P117N	H192V	E249S	M310F	Y362L	G427P			363	
G052E	P117Q	H192W	E249Y	M310K	Y362M	G427V			364	
G052F	P117R	H192Y	A250C	M310L	Y362N	G427W			365	
G052W	P117S	H193A	A250F	R311C	Y362P	G427Y			366	
G052Y	P117V	H193D	A250G	R311E	Y362R	V428A			367	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
V053A	P117W	H193K	A250H	R311F	Y362S	V428C			368	
V053C	T118C	H193L	A250K	R311I	Y362T	V428D			369	
V053D	T118D	H193M	A250L	R311L	Y362V	V428E			370	
V053E	T118E	H193P	A250M	R311P	Y362W	V428G			371	
V053G	T118G	H193V	A250N	R311V	L363A	V428H			372	
V053H	T118P	Y194A	A250P	R311W	L363C	V428N			373	
V053L	T118R	Y194C	A250Q	S312C	L363D	V428R			374	
V053N	T118W	Y194I	A250R	S312E	L363E	V428S			375	
V053P	T118Y	Y194L	A250S	S312M	L363F	V428Y			376	
V053Q	W119A	Y194P	A250T	S312V	L363G	C429A			377	
V053R	W119I	Y194S	A250V	S312W	L363H	C429D			378	
V053S	W119K	Y194T	A250W	M313C	L363I	C429K			379	
V053T	W119L	Y194V	I251D	K314C	L363P	C429L			380	
V053W	W119N	K195S	I251F	K314L	L363Q	C429N			381	
V053Y	W119P	P197C	I251G	K314W	L363R	C429P			382	
T054D	W119R	G198V	I251H	S315C	L363S	C429S			383	
T054E	R121A	G198W	I251K	S315I	L363T	C429T			384	
T054G	R121C	Y199E	I251P	S315V	L363V	C429V			385	
T054P	R121E	Y199G	I251S	C316E	L363W	C429W			386	
T054R	R121F	Y199H	I251T	C316G	H364A	C429Y			387	
T054Y	R121G	Y199I	I251W	C316I	H364C	I430A			388	
I055A	R121H	Y199K	R252A	C316K	H364D	I430D			389	
I055D	R121K	Y199L	R252D	C316L	H364E	I430E			390	
I055G	R121L	Y199P	R252E	C316M	H364F	I430L			391	
I055H	R121M	Y199R	R252F	C316P	H364G	I430M			392	
I055N	R121P	Y199S	R252G	C316R	H364K	I430N			393	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
I055P	R121W	Y199W	R252H	C316S	H364L	I430S			394	
I055Q	R121Y	N200A	R252I	C316T	H364M	I430T			395	
I055R	N122A	N200F	R252K	C316V	H364P	I430V			396	
I055T	N122C	N200G	R252L	C316W	H364R	D431P			397	
I055V	N122E	N200H	R252N	C316Y	H364S	A432C			398	
I055Y	N122F	N200K	R252P	L317G	H364T	A432F			399	
F056A	N122I	N200L	R252S	L317P	H364V	A432I			400	
F056C	N122K	N200M	R252T	L318C	H364Y	A432K			401	
F056E	N122Q	N200P	R252Y	L318P	L365A	A432L			402	
F056G	N122R	N200Q	V253A	L318W	L365C	A432M			403	
F056H	N122S	N200R	V253D	L319C	L365D	A432P			404	
F056I	N122T	N200S	V253E	L319E	L365E	A432Y			405	
F056K	N122V	N200W	V253G	L319F	L365G	L434H			406	
F056L	W123A	N200Y	V253H	L319G	L365M	L434K			408	
F056P	W123C	G201A	V253L	L319H	L365N	L434P			410	
F056R	W123D	G201F	V253M	L319I	L365P	L434Q			411	
F056S	W123E	G201L	V253N	L319K	L365Q	L434R			412	
F056T	W123H	G201M	V253Q	L319M	L365R	L434W			413	
F056V	W123L	G201N	V253R	L319P	L365S	P437T			414	
F056W	W123M	G201P	V253S	L319Q	L365T	M438Y			415	
Y057A	W123P	G201R	V253W	L319R	L365W	E439N			416	
Y057D	W123Q	G201S	S254C	L319S	L365Y	E439R			417	
Y057F	W123R	G201T	S254D	L319V	N366A	T440Q			419	
Y057G	W123S	G201V	S254E	L319W	N366C	E441R			420	
Y057I	W123T	G201W	S254G	L319Y	N366E	E442M			422	
Y057L	W123V	S202A	S254I	D320C	N366F	E442N			423	

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
Y057M	W123Y	S202E	S254K	D320P	N366G	E442S			424	
Y057P	K124C	S202F	S254L	D320V	N366K	P443D			425	
Y057Q	K124D	S202G	S254P	N321E	N366M				426	
Y057R	K124E	S202H	S254Q	N321M	N366P				427	
Y057V	K124F	S202K	S254R	N321P	N366Q				428	
Y057W	K124N	S202N	S254T	Y322C	N366R				429	
V058A	P125C	S202P	S254V	Y322D	N366T				430	
D059A	P125D	S202Q	S254W	Y322E	N366W				431	
D059E	P125G	S202R	S254Y	Y322G	P367E				432	
D059I	P125L	S202V	K255C	Y322I	P367F				434	
D059L	P125N	S202W	K255D	Y322L	P367I				437	
D059M	P125W	S202Y	K255L	Y322N	P367L				438	
D059P	K126F	C203A	K255P	Y322P	P367M				439	
D059R	K126H	C203D	K255V	Y322R	P367Q				440	
D059T	K126I	C203E	K255W	Y322S	P367V				441	
D059V	K126L	C203G	I256C	Y322T	D368C				442	
D059W	K126N	C203H	I256D	Y322V	D368P				443	
D059Y	K126P	C203L	I256E	Y322W	D368W					
R060A	K126Y	C203M	I256G	M323A	N369C					
R060D	D127K	C203N	I256P	M323C	N369E					
R060F	V128E	C203Q	P257D	M323E	N369F					
R060G	V128P	C203R	D258L	M323G	N369I					
R060H	Y129A	C203S	D258P	M323H	N369K					
R060I	Y129C	C203T	D258V	M323K	N369L					
R060L	Y129D	C203V	D258W	M323N	N369P					
R060N	Y129E	F204A	K260C	M323R	N369Q					

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
R060P	Y129G	F204C	K260P	M323S	N369V					
R060Q	Y129H	F204E	S261P	M323T	N369W					
R060S	Y129L	F204G	P262A	M323V	F370A					
R060T	Y129P	F204H	P262D	E324C	F370D					
R060V	Y129Q	F204I	P262E	E324F	F370E					
R060Y	Y129S	F204K	P262F	E324P	F370G					
L061A	Y129T	F204Q	P262G	E324V	F370H					
L061E	Y129V	F204R	P262H	E324W	F370K					
L061F	Y129W	F204S	P262I	E324Y	F370L					
L061G	K130C	F204T	P262K	T325C	F370N					
L061H	K130D	V206C	P262Q	T325R	F370P					
L061N	K130G	V206D	P262R	I326E	F370Q					
L061P	K130H	V206F	P262S	I326G	F370R					
L061Q	K130L	V206G	P262T	I326H	F370S					
L061R	K130N	V206P	P262V	I326N	F370V					
L061T	K130S	V206Y	P262W	I326W	F370Y					
L061W	K130T	E207A	P262Y	L327A	A371P					
L061Y	K130W	E207F	L263E	L327E	A371W					
G062A	K130Y	E207G	L263F	L327F	I372A					
G062C	N131P	E207M	L263P	L327G	I372D					
G062D	R132P	E207P	L263Q	L327H	I372E					
G062F	S133D	E207Q	L263W	L327N	I372F					
G062I	S133E	E207R	P264D	L327Q	I372G					
G062K	S133F	E207S	P264E	L327R	I372H					
G062L	S133G	E207T	P264F	L327S	I372K					
G062M	S133H	E207V	P264G	L327T	I372L					

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
G062P	S133L	E207W	P264L	L327V	I372N					
G062Q	S133M	I208D	P264M	L327W	I372P					
G062R	S133N	I208G	P264R	L327Y	I372R					
G062S	S133P	I208P	P264T	P329C	I372S					
G062T	S133R	I208W	P264V	P329F	I372T					
G062V	S133T	K209C	P264W	P329G	I372V					
G062Y	S133V	K209P	P264Y	P329H	I372W					
Y063C	S133W	R210A	V265A	P329I	Q373C					
Y063G	I134A	R210C	V265D	P329K	Q373P					
Y063P	I134C	R210D	V265F	P329L	Q373W					
Y064A	I134D	R210E	V265G	P329N	L374D					
Y064C	I134F	R210G	V265H	P329Q	L374E					
Y064D	I134G	R210K	V265K	P329R	E375C					
Y064E	I134H	R210M	V265L	P329S	E375F					
Y064F	I134K	R210N	V265M	P329T	E375P					
Y064G	I134P	R210P	V265N	P329V	E375V					
Y064H	I134Q	R210S	V265Q	P329W	E375Y					
Y064I	I134R	R210T	V265R	P329Y	K376I					
Y064K	I134S	R210V	V265S	Y330A	K376P					
Y064L	I134W	R210W	F266A	Y330C	K376W					
Y064P	E135P	R210Y	F266C	Y330D	G377C					
Y064Q	L136P	N211C	F266G	Y330E	G377I					
Y064R	V137F	N211F	F266H	Y330G	G377L					
Y064S	V137G	N211G	F266M	Y330I	G377V					
Y064T	V137H	N211H	F266P	Y330L	G377V					
Y064V	V137N	N211I	F266Q	Y330M	G378D					

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
Y064W	V137P	N211K	F266R	Y330N	G378D					
P065A	V137R	N211M	F266S	Y330P	G378E					
P065C	V137W	N211P	F266T	Y330R	G378E					
P065D	V137Y	N211R	F266V	Y330S	G378F					
P065G	Q138V	N211S	F266W	Y330V	G378F					
P065H	Q139P	N211T	A267D	Y330W	G378I					
P065I	Q143C	N211V	A267G	I331A	G378I					
P065K	Q143H	N211W	A267H	I331C	G378L					
P065N	Q143P	D212A	A267I	I331D	G378M					
P065R	Q143R	D212G	A267K	I331E	G378Q					
P065S	Q143S	D212H	A267N	I331F	G378T					
P065T	Q143T	D212I	A267R	I331H	G378W					
P065V	L144A	D212K	A267S	I331K	G378Y					
P065W	L144E	D212L	A267W	I331Q	K379A					
P065Y	L144F	D212M	Y268A	I331R	K379C					
Y066A	L144I	D212P	Y268C	I331S	K379E					
Y066C	L144K	D212V	Y268F	I331T	K379F					
Y066D	L144P	D212W	Y268G	I331W	K379I					
Y066E	L144Q	D213P	Y268H	I331Y	K379L					
Y066G	L144S	D213S	Y268K	I332A	K379M					
Y066I	L144V	L214A	Y268L	I332C	K379W					
Y066K	L144Y	L214C	Y268N	I332D	F380C					
Y066L	S145T	L214D	Y268P	I332E	F380D					
Y066N	S145W	L214E	Y268Q	I332F	F380E					
Y066P	A149E	L214G	Y268S	I332G	F380G					
Y066S	A149P	L214H	Y268T	I332H	F380Q					

Table 10 Inactives

Substitutions									positions with inactivating mutations	Sum positions with inactivating mutations
Y066T	T150V	L214K	Y268V	I332K	F380R					
Y066V	K152L	L214N	Y268W	I332L	F380S					
I067D	A153E	L214P	T269E	I332N	T381G					
I067E	A153F	L214R	T269K	I332P	T381L					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
L001A	0.95	FALSE	FALSE	FALSE	FALSE	FALSE	A048F	A048F	A048N	D320K	I070A
L001C	0.89	FALSE	FALSE	FALSE	FALSE	FALSE	A048H	A048N	D320K	I070A	I070K
L001E	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	A048K	A120F	D320R	I070F	I070R
L001F	0.41	FALSE	FALSE	FALSE	FALSE	FALSE	A048N	A238S	D431H	I070G	I271L
L001G	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	A048Q	A419F	E031I	I070H	S069A
L001H	1.9	L001H	FALSE	FALSE	FALSE	FALSE	A048S	A419S	E031K	I070K	S069R
L001K	1.39	L001K	FALSE	FALSE	FALSE	FALSE	A092C	D030G	E031T	I070N	
L001N	0.87	FALSE	FALSE	FALSE	FALSE	FALSE	A092L	D030K	E031V	I070R	
L001P	0.92	FALSE	FALSE	FALSE	FALSE	FALSE	A092V	D068H	E441F	I070T	
L001Q	3.27	L001Q	L001Q	L001Q	FALSE	FALSE	A120F	D087Y	E442R	I070V	
L001R	0.72	FALSE	FALSE	FALSE	FALSE	FALSE	A120G	D127H	F024E	I271L	
L001S	0.74	FALSE	FALSE	FALSE	FALSE	FALSE	A120H	D320K	F029E	I326V	
L001T	0.99	FALSE	FALSE	FALSE	FALSE	FALSE	A120I	D320R	F029P	L165D	
L001V	1	FALSE	FALSE	FALSE	FALSE	FALSE	A120L	D418P	G052Q	L278R	
L001W	0.88	FALSE	FALSE	FALSE	FALSE	FALSE	A120S	D421K	G072M	L317K	
N002A	0.61	FALSE	FALSE	FALSE	FALSE	FALSE	A120V	D421R	G377T	S069A	
N002C	0.4	FALSE	FALSE	FALSE	FALSE	FALSE	A120Y	D421S	I070A	S069F	
N002G	0.44	FALSE	FALSE	FALSE	FALSE	FALSE	A149C	D431A	I070F	S069G	
N002I	0.37	FALSE	FALSE	FALSE	FALSE	FALSE	A149Q	D431H	I070G	S069P	
N002L	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	A149R	D431Q	I070H	S069R	
N002P	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	A149S	D431R	I070K	S084G	
N002Q	0.84	FALSE	FALSE	FALSE	FALSE	FALSE	A149T	E031A	I070L	T325Q	
N002S	0.78	FALSE	FALSE	FALSE	FALSE	FALSE	A149V	E031C	I070N	V075L	
N002T	1.05	N002T	FALSE	FALSE	FALSE	FALSE	A160S	E031H	I070P	V166R	
N002V	0.65	FALSE	FALSE	FALSE	FALSE	FALSE	A160Y	E031I	I070R		
F003E	0.42	FALSE	FALSE	FALSE	FALSE	FALSE	A238Q	E031K	I070S		
F003H	0.68	FALSE	FALSE	FALSE	FALSE	FALSE	A238S	E031L	I070T		
F003L	0.59	FALSE	FALSE	FALSE	FALSE	FALSE	A259P	E031R	I070V		
F003Y	0.5	FALSE	FALSE	FALSE	FALSE	FALSE	A267T	E031T	I271L		
R004A	0.73	FALSE	FALSE	FALSE	FALSE	FALSE	A371E	E031V	I271M		
R004I	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	A371H	E135D	I309N		
R004S	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	A371K	E135G	I326V		
R004T	0.66	FALSE	FALSE	FALSE	FALSE	FALSE	A371R	E135R	K093I		
R004V	1.09	R004V	FALSE	FALSE	FALSE	FALSE	A371S	E151K	K093T		
A005H	0.44	FALSE	FALSE	FALSE	FALSE	FALSE	A419F	E151Q	K094R		
P006A	0.78	FALSE	FALSE	FALSE	FALSE	FALSE	A419H	E324R	K409Q		
P006H	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	A419I	E441F	L001Q		
P006K	0.8	FALSE	FALSE	FALSE	FALSE	FALSE	A419K	E442R	L026E		
P006L	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	A419R	F024E	L037F		
P006N	0.4	FALSE	FALSE	FALSE	FALSE	FALSE	A419S	F024H	L165D		
P006Q	0.89	FALSE	FALSE	FALSE	FALSE	FALSE	A419Y	F029E	L278H		
P006R	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	A425G	F029L	L278R		
P007M	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	A425K	F029M	L317K		
V008I	1.17	V008I	FALSE	FALSE	FALSE	FALSE	D030A	F029P	M438T		
V008L	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	D030G	F029S	P236R		
V008M	0.47	FALSE	FALSE	FALSE	FALSE	FALSE	D030H	F380W	S069A		
V008P	0.33	FALSE	FALSE	FALSE	FALSE	FALSE	D030K	G027K	S069F		
I009K	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	D030L	G052Q	S069G		

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
I009L	1.08	I009L	FALSE	FALSE	FALSE	FALSE	D030M	G072M	S069I		
I009Q	0.4	FALSE	FALSE	FALSE	FALSE	FALSE	D030P	G072Q	S069L		
I009R	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	D030R	G377P	S069P		
I009S	0.98	FALSE	FALSE	FALSE	FALSE	FALSE	D030S	G377T	S069R		
I009V	0.84	FALSE	FALSE	FALSE	FALSE	FALSE	D034R	I046R	S084G		
P010D	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	D059N	I070A	T097G		
P010E	0.66	FALSE	FALSE	FALSE	FALSE	FALSE	D068H	I070C	T118Q		
P010G	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	D068K	I070F	T325E		
P010H	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	D068Q	I070G	T325G		
P010N	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	D087C	I070H	T325H		
P010Q	0.89	FALSE	FALSE	FALSE	FALSE	FALSE	D087Q	I070K	T325K		
P010R	0.73	FALSE	FALSE	FALSE	FALSE	FALSE	D087R	I070L	T325N		
P010S	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	D087T	I070N	T325Q		
P010W	0.59	FALSE	FALSE	FALSE	FALSE	FALSE	D087Y	I070P	T325S		
N011D	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	D090A	I070R	V058K		
N011G	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	D090E	I070S	V058Q		
N011H	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	D090H	I070T	V075L		
N011K	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	D090I	I070V	V075R		
N011S	0.39	FALSE	FALSE	FALSE	FALSE	FALSE	D090K	I169L	V075T		
V012A	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	D090L	I271L	V166L		
V012E	1.86	V012E	FALSE	FALSE	FALSE	FALSE	D090N	I271M	V166Q		
V012I	0.68	FALSE	FALSE	FALSE	FALSE	FALSE	D090Q	I309N	V166R		
V012K	0.65	FALSE	FALSE	FALSE	FALSE	FALSE	D090R	I309R	V166T		
V012L	0.44	FALSE	FALSE	FALSE	FALSE	FALSE	D090S	I309T	Y447D		
V012N	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	D090T	I326V			
V012R	0.5	FALSE	FALSE	FALSE	FALSE	FALSE	D127E	K093I			
V012S	0.75	FALSE	FALSE	FALSE	FALSE	FALSE	D127H	K093T			
V012T	1.5	V012T	FALSE	FALSE	FALSE	FALSE	D127N	K094R			
P013H	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	D127Q	K170R			
P013S	0.68	FALSE	FALSE	FALSE	FALSE	FALSE	D127T	K409A			
P013T	0.9	FALSE	FALSE	FALSE	FALSE	FALSE	D163A	K409Q			
P013Y	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	D163E	L001Q			
F014D	0.64	FALSE	FALSE	FALSE	FALSE	FALSE	D163G	L015V			
F014I	0.42	FALSE	FALSE	FALSE	FALSE	FALSE	D163K	L026E			
F014M	0.47	FALSE	FALSE	FALSE	FALSE	FALSE	D163L	L037F			
F014V	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	D163Q	L165D			
L015A	0.65	FALSE	FALSE	FALSE	FALSE	FALSE	D163R	L165N			
L015M	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	D163S	L174K			
L015V	2.2	L015V	L015V	FALSE	FALSE	FALSE	D163T	L263K			
A020S	0.5	FALSE	FALSE	FALSE	FALSE	FALSE	D212N	L278H			
S022H	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	D213M	L278R			
S022M	0.49	FALSE	FALSE	FALSE	FALSE	FALSE	D213N	L317K			
S022T	0.48	FALSE	FALSE	FALSE	FALSE	FALSE	D213Q	L317R			
S022Y	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	D258N	M310G			
E023D	0.97	FALSE	FALSE	FALSE	FALSE	FALSE	D258S	M313K			
F024A	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	D284E	M313R			
F024E	3.99	F024E	F024E	F024E	FALSE	FALSE	D320H	M438T			
F024G	0.75	FALSE	FALSE	FALSE	FALSE	FALSE	D320K	N131G			

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
F024H	2.07	F024H	F024H	FALSE	FALSE	FALSE	D320R	N131R			
F024I	0.7	FALSE	FALSE	FALSE	FALSE	FALSE	D320S	N131V			
F024K	0.96	FALSE	FALSE	FALSE	FALSE	FALSE	D368A	N141H			
F024L	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	D368E	N219S			
F024M	0.85	FALSE	FALSE	FALSE	FALSE	FALSE	D368K	N328K			
F024N	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	D368R	N328L			
F024R	1.22	F024R	FALSE	FALSE	FALSE	FALSE	D418E	N328S			
F024T	1.18	F024T	FALSE	FALSE	FALSE	FALSE	D418L	P032F			
F024V	1.15	F024V	FALSE	FALSE	FALSE	FALSE	D418M	P032H			
F024Y	0.9	FALSE	FALSE	FALSE	FALSE	FALSE	D418P	P236R			
L026A	1.3	L026A	FALSE	FALSE	FALSE	FALSE	D418Q	P257T			
L026E	3.22	L026E	L026E	L026E	FALSE	FALSE	D418R	P436K			
L026G	0.81	FALSE	FALSE	FALSE	FALSE	FALSE	D418V	P437I			
L026H	0.97	FALSE	FALSE	FALSE	FALSE	FALSE	D421A	P437M			
L026I	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	D421H	Q086A			
L026K	1.88	L026K	FALSE	FALSE	FALSE	FALSE	D421K	Q347G			
L026M	1.43	L026M	FALSE	FALSE	FALSE	FALSE	D421N	Q347S			
L026P	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	D421Q	S039N			
L026Q	1.44	L026Q	FALSE	FALSE	FALSE	FALSE	D421R	S069A			
L026R	1.43	L026R	FALSE	FALSE	FALSE	FALSE	D421S	S069F			
L026S	0.78	FALSE	FALSE	FALSE	FALSE	FALSE	D426P	S069G			
L026T	0.87	FALSE	FALSE	FALSE	FALSE	FALSE	D431A	S069I			
L026V	0.52	FALSE	FALSE	FALSE	FALSE	FALSE	D431E	S069L			
L026W	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	D431H	S069M			
L026Y	0.52	FALSE	FALSE	FALSE	FALSE	FALSE	D431I	S069P			
G027A	0.79	FALSE	FALSE	FALSE	FALSE	FALSE	D431K	S069R			
G027D	1.22	G027D	FALSE	FALSE	FALSE	FALSE	D431N	S069W			
G027E	1.18	G027E	FALSE	FALSE	FALSE	FALSE	D431Q	S069Y			
G027F	0.61	FALSE	FALSE	FALSE	FALSE	FALSE	D431R	S084G			
G027H	1.11	G027H	FALSE	FALSE	FALSE	FALSE	D431S	S261K			
G027I	0.41	FALSE	FALSE	FALSE	FALSE	FALSE	D431V	S282M			
G027K	2.71	G027K	G027K	FALSE	FALSE	FALSE	E031A	S308N			
G027L	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	E031C	S315H			
G027P	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	E031G	S359T			
G027Q	1.12	G027Q	FALSE	FALSE	FALSE	FALSE	E031H	T071R			
G027R	1.88	G027R	FALSE	FALSE	FALSE	FALSE	E031I	T074A			
G027S	0.94	FALSE	FALSE	FALSE	FALSE	FALSE	E031K	T074C			
G027T	0.61	FALSE	FALSE	FALSE	FALSE	FALSE	E031L	T074G			
G027W	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	E031P	T074N			
K028A	0.78	FALSE	FALSE	FALSE	FALSE	FALSE	E031R	T074P			
K028D	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	E031S	T074R			
K028E	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	E031T	T074V			
K028F	0.75	FALSE	FALSE	FALSE	FALSE	FALSE	E031V	T074W			
K028I	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	E031W	T097G			
K028L	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	E031Y	T118Q			
K028M	0.67	FALSE	FALSE	FALSE	FALSE	FALSE	E114A	T147R			
K028N	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	E135D	T147V			
K028P	0.4	FALSE	FALSE	FALSE	FALSE	FALSE	E135G	T150G			

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
K028R	0.71	FALSE	FALSE	FALSE	FALSE	FALSE	E135K	T293M			
K028S	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	E135Q	T293V			
K028T	0.68	FALSE	FALSE	FALSE	FALSE	FALSE	E135R	T325E			
K028V	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	E135S	T325G			
K028W	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	E148G	T325H			
F029A	0.9	FALSE	FALSE	FALSE	FALSE	FALSE	E148H	T325K			
F029E	4.03	F029E	F029E	F029E	FALSE	FALSE	E148K	T325M			
F029G	1.05	F029G	FALSE	FALSE	FALSE	FALSE	E148Q	T325N			
F029H	0.82	FALSE	FALSE	FALSE	FALSE	FALSE	E148S	T325Q			
F029I	1.53	F029I	FALSE	FALSE	FALSE	FALSE	E151A	T325S			
F029K	1.34	F029K	FALSE	FALSE	FALSE	FALSE	E151G	T405G			
F029L	2.36	F029L	F029L	FALSE	FALSE	FALSE	E151H	T440H			
F029M	2.08	F029M	F029M	FALSE	FALSE	FALSE	E151K	V058K			
F029P	3.79	F029P	F029P	F029P	FALSE	FALSE	E151L	V058Q			
F029R	1.24	F029R	FALSE	FALSE	FALSE	FALSE	E151M	V075L			
F029S	2.21	F029S	F029S	FALSE	FALSE	FALSE	E151Q	V075R			
F029T	0.85	FALSE	FALSE	FALSE	FALSE	FALSE	E151R	V075T			
F029V	1.65	F029V	FALSE	FALSE	FALSE	FALSE	E151S	V166A			
F029W	0.48	FALSE	FALSE	FALSE	FALSE	FALSE	E151T	V166L			
D030A	1.12	D030A	FALSE	FALSE	FALSE	FALSE	E151V	V166Q			
D030F	0.84	FALSE	FALSE	FALSE	FALSE	FALSE	E151W	V166R			
D030G	2.02	D030G	D030G	FALSE	FALSE	FALSE	E151Y	V166T			
D030H	1.69	D030H	FALSE	FALSE	FALSE	FALSE	E156D	V166Y			
D030K	2.63	D030K	D030K	FALSE	FALSE	FALSE	E158Q	V247I			
D030L	1.32	D030L	FALSE	FALSE	FALSE	FALSE	E167R	Y399M			
D030M	1.85	D030M	FALSE	FALSE	FALSE	FALSE	E167S	Y399T			
D030P	1.19	D030P	FALSE	FALSE	FALSE	FALSE	E220H	Y447D			
D030Q	0.84	FALSE	FALSE	FALSE	FALSE	FALSE	E220I	Y447Q			
D030R	1.82	D030R	FALSE	FALSE	FALSE	FALSE	E220L				
D030S	1.62	D030S	FALSE	FALSE	FALSE	FALSE	E220V				
D030T	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	E285H				
D030V	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	E292H				
D030W	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	E292K				
E031A	2.05	E031A	E031A	FALSE	FALSE	FALSE	E292P				
E031C	2.95	E031C	E031C	FALSE	FALSE	FALSE	E292V				
E031G	1.27	E031G	FALSE	FALSE	FALSE	FALSE	E324D				
E031H	2.74	E031H	E031H	FALSE	FALSE	FALSE	E324N				
E031I	3.89	E031I	E031I	E031I	FALSE	FALSE	E324R				
E031K	3.13	E031K	E031K	E031K	FALSE	FALSE	E375K				
E031L	2.62	E031L	E031L	FALSE	FALSE	FALSE	E375T				
E031P	1.51	E031P	FALSE	FALSE	FALSE	FALSE	E389A				
E031R	2.27	E031R	E031R	FALSE	FALSE	FALSE	E389H				
E031S	1.7	E031S	FALSE	FALSE	FALSE	FALSE	E389K				
E031T	3.96	E031T	E031T	E031T	FALSE	FALSE	E389S				
E031V	4.57	E031V	E031V	E031V	FALSE	FALSE	E392M				
E031W	1.26	E031W	FALSE	FALSE	FALSE	FALSE	E392Q				
E031Y	1.13	E031Y	FALSE	FALSE	FALSE	FALSE	E392V				
P032A	0.92	FALSE	FALSE	FALSE	FALSE	FALSE	E410T				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
P032C	0.4	FALSE	FALSE	FALSE	FALSE	FALSE	E439A				
P032F	2.71	P032F	P032F	FALSE	FALSE	FALSE	E439G				
P032G	1.6	P032G	FALSE	FALSE	FALSE	FALSE	E439K				
P032H	2.08	P032H	P032H	FALSE	FALSE	FALSE	E439P				
P032K	1.04	P032K	FALSE	FALSE	FALSE	FALSE	E439Q				
P032L	0.82	FALSE	FALSE	FALSE	FALSE	FALSE	E439S				
P032M	0.67	FALSE	FALSE	FALSE	FALSE	FALSE	E439T				
P032N	0.7	FALSE	FALSE	FALSE	FALSE	FALSE	E439V				
P032Q	1.11	P032Q	FALSE	FALSE	FALSE	FALSE	E441A				
P032R	1.17	P032R	FALSE	FALSE	FALSE	FALSE	E441F				
P032S	1.01	P032S	FALSE	FALSE	FALSE	FALSE	E442C				
P032T	0.77	FALSE	FALSE	FALSE	FALSE	FALSE	E442R				
P032V	0.81	FALSE	FALSE	FALSE	FALSE	FALSE	F024E				
P032W	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	F024H				
P032Y	1.01	P032Y	FALSE	FALSE	FALSE	FALSE	F024R				
L033G	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	F024T				
L033M	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	F024V				
L033P	0.87	FALSE	FALSE	FALSE	FALSE	FALSE	F029E				
L033Q	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	F029G				
L033R	0.61	FALSE	FALSE	FALSE	FALSE	FALSE	F029I				
L033S	0.48	FALSE	FALSE	FALSE	FALSE	FALSE	F029K				
L033T	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	F029L				
L033W	1.58	L033W	FALSE	FALSE	FALSE	FALSE	F029M				
D034A	0.38	FALSE	FALSE	FALSE	FALSE	FALSE	F029P				
D034E	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	F029R				
D034H	0.41	FALSE	FALSE	FALSE	FALSE	FALSE	F029S				
D034K	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	F029V				
D034Q	0.59	FALSE	FALSE	FALSE	FALSE	FALSE	F038Y				
D034R	1.17	D034R	FALSE	FALSE	FALSE	FALSE	F040W				
D034W	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	F098H				
M035F	0.87	FALSE	FALSE	FALSE	FALSE	FALSE	F164L				
M035H	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	F164M				
M035L	0.52	FALSE	FALSE	FALSE	FALSE	FALSE	F164V				
M035Q	0.37	FALSE	FALSE	FALSE	FALSE	FALSE	F273H				
M035Q	0.37	FALSE	FALSE	FALSE	FALSE	FALSE	F290M				
M035T	0.83	FALSE	FALSE	FALSE	FALSE	FALSE	F380W				
M035V	0.37	FALSE	FALSE	FALSE	FALSE	FALSE	F380Y				
M035Y	0.78	FALSE	FALSE	FALSE	FALSE	FALSE	F433I				
S036A	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	F433K				
S036D	0.32	FALSE	FALSE	FALSE	FALSE	FALSE	F433L				
S036G	0.64	FALSE	FALSE	FALSE	FALSE	FALSE	F433R				
S036H	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	F433T				
S036K	0.83	FALSE	FALSE	FALSE	FALSE	FALSE	F433V				
S036L	0.71	FALSE	FALSE	FALSE	FALSE	FALSE	F433W				
S036N	0.38	FALSE	FALSE	FALSE	FALSE	FALSE	F446A				
S036R	1.09	S036R	FALSE	FALSE	FALSE	FALSE	F446D				
S036T	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	F446E				
L037F	3.33	L037F	L037F	L037F	FALSE	FALSE	F446G				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
L037I	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	F446H				
L037K	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	F446I				
L037M	1.46	L037M	FALSE	FALSE	FALSE	FALSE	F446M				
L037P	0.63	FALSE	FALSE	FALSE	FALSE	FALSE	F446W				
L037R	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	G027D				
L037V	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	G027E				
L037W	0.36	FALSE	FALSE	FALSE	FALSE	FALSE	G027H				
F038Y	1.29	F038Y	FALSE	FALSE	FALSE	FALSE	G027K				
S039A	1.06	S039A	FALSE	FALSE	FALSE	FALSE	G027Q				
S039L	0.8	FALSE	FALSE	FALSE	FALSE	FALSE	G027R				
S039N	2.32	S039N	S039N	FALSE	FALSE	FALSE	G050D				
S039Q	1.1	S039Q	FALSE	FALSE	FALSE	FALSE	G050S				
S039R	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	G052Q				
S039T	1.57	S039T	FALSE	FALSE	FALSE	FALSE	G052S				
S039Y	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	G072K				
F040L	0.92	FALSE	FALSE	FALSE	FALSE	FALSE	G072M				
F040W	1.11	F040W	FALSE	FALSE	FALSE	FALSE	G072Q				
I041A	0.67	FALSE	FALSE	FALSE	FALSE	FALSE	G172A				
I041C	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	G172C				
I041D	0.78	FALSE	FALSE	FALSE	FALSE	FALSE	G198D				
I041E	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	G291V				
I041G	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	G305E				
I041H	0.77	FALSE	FALSE	FALSE	FALSE	FALSE	G377D				
I041N	0.4	FALSE	FALSE	FALSE	FALSE	FALSE	G377H				
I041T	1.47	I041T	FALSE	FALSE	FALSE	FALSE	G377K				
I041V	0.73	FALSE	FALSE	FALSE	FALSE	FALSE	G377P				
I041W	0.66	FALSE	FALSE	FALSE	FALSE	FALSE	G377R				
G042A	0.64	FALSE	FALSE	FALSE	FALSE	FALSE	G377S				
S043N	0.34	FALSE	FALSE	FALSE	FALSE	FALSE	G377T				
S043T	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	G378K				
P044E	0.59	FALSE	FALSE	FALSE	FALSE	FALSE	G378R				
R045I	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	H179A				
R045K	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	H179K				
I046A	1.04	I046A	FALSE	FALSE	FALSE	FALSE	I009L				
I046C	0.37	FALSE	FALSE	FALSE	FALSE	FALSE	I041T				
I046E	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	I046A				
I046F	0.73	FALSE	FALSE	FALSE	FALSE	FALSE	I046L				
I046H	0.82	FALSE	FALSE	FALSE	FALSE	FALSE	I046R				
I046L	1.08	I046L	FALSE	FALSE	FALSE	FALSE	I046V				
I046M	1	FALSE	FALSE	FALSE	FALSE	FALSE	I067V				
I046N	0.66	FALSE	FALSE	FALSE	FALSE	FALSE	I070A				
I046R	2.29	I046R	I046R	FALSE	FALSE	FALSE	I070C				
I046S	0.64	FALSE	FALSE	FALSE	FALSE	FALSE	I070F				
I046T	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	I070G				
I046V	1.01	I046V	FALSE	FALSE	FALSE	FALSE	I070H				
I046Y	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	I070K				
N047A	0.48	FALSE	FALSE	FALSE	FALSE	FALSE	I070L				
N047D	0.82	FALSE	FALSE	FALSE	FALSE	FALSE	I070N				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
N047F	1.32	N047F	FALSE	FALSE	FALSE	FALSE	I070P				
N047G	0.82	FALSE	FALSE	FALSE	FALSE	FALSE	I070R				
N047H	1.16	N047H	FALSE	FALSE	FALSE	FALSE	I070S				
N047K	0.67	FALSE	FALSE	FALSE	FALSE	FALSE	I070T				
N047M	0.77	FALSE	FALSE	FALSE	FALSE	FALSE	I070V				
N047Q	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	I070Y				
N047R	0.84	FALSE	FALSE	FALSE	FALSE	FALSE	I079L				
N047S	0.85	FALSE	FALSE	FALSE	FALSE	FALSE	I079V				
N047T	1.49	N047T	FALSE	FALSE	FALSE	FALSE	I083G				
N047W	0.63	FALSE	FALSE	FALSE	FALSE	FALSE	I083Q				
N047Y	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	I134L				
A048F	2.51	A048F	A048F	FALSE	FALSE	FALSE	I134V				
A048G	0.83	FALSE	FALSE	FALSE	FALSE	FALSE	I169L				
A048H	1.99	A048H	FALSE	FALSE	FALSE	FALSE	I208R				
A048I	0.64	FALSE	FALSE	FALSE	FALSE	FALSE	I208T				
A048K	1.28	A048K	FALSE	FALSE	FALSE	FALSE	I208V				
A048M	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	I271G				
A048N	4.25	A048N	A048N	A048N	FALSE	FALSE	I271L				
A048Q	1.05	A048Q	FALSE	FALSE	FALSE	FALSE	I271M				
A048R	0.66	FALSE	FALSE	FALSE	FALSE	FALSE	I271V				
A048S	1.06	A048S	FALSE	FALSE	FALSE	FALSE	I309E				
A048V	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	I309G				
A048Y	0.81	FALSE	FALSE	FALSE	FALSE	FALSE	I309H				
T049I	0.42	FALSE	FALSE	FALSE	FALSE	FALSE	I309L				
T049K	0.85	FALSE	FALSE	FALSE	FALSE	FALSE	I309M				
T049R	1.41	T049R	FALSE	FALSE	FALSE	FALSE	I309N				
T049S	0.92	FALSE	FALSE	FALSE	FALSE	FALSE	I309Q				
T049V	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	I309R				
G050A	0.93	FALSE	FALSE	FALSE	FALSE	FALSE	I309S				
G050C	0.41	FALSE	FALSE	FALSE	FALSE	FALSE	I309T				
G050D	1.37	G050D	FALSE	FALSE	FALSE	FALSE	I326L				
G050E	0.78	FALSE	FALSE	FALSE	FALSE	FALSE	I326V				
G050H	0.74	FALSE	FALSE	FALSE	FALSE	FALSE	I353V				
G050L	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	I445H				
G050M	0.47	FALSE	FALSE	FALSE	FALSE	FALSE	I445L				
G050Q	0.86	FALSE	FALSE	FALSE	FALSE	FALSE	I445M				
G050R	0.86	FALSE	FALSE	FALSE	FALSE	FALSE	I445N				
G050S	1.24	G050S	FALSE	FALSE	FALSE	FALSE	I445P				
G050V	0.3	FALSE	FALSE	FALSE	FALSE	FALSE	I445Q				
G050Y	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	I445R				
Q051A	0.34	FALSE	FALSE	FALSE	FALSE	FALSE	I445S				
Q051N	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	I445T				
Q051R	0.36	FALSE	FALSE	FALSE	FALSE	FALSE	I445V				
Q051S	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	K082I				
G052N	0.89	FALSE	FALSE	FALSE	FALSE	FALSE	K093I				
G052P	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	K093L				
G052Q	3.71	G052Q	G052Q	G052Q	FALSE	FALSE	K093R				
G052R	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	K093S				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
G052S	1.32	G052S	FALSE	FALSE	FALSE	FALSE	K093T				
G052T	0.49	FALSE	FALSE	FALSE	FALSE	FALSE	K094Q				
T054A	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	K094R				
T054F	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	K094T				
T054N	0.48	FALSE	FALSE	FALSE	FALSE	FALSE	K130R				
T054Q	0.91	FALSE	FALSE	FALSE	FALSE	FALSE	K152R				
T054S	0.7	FALSE	FALSE	FALSE	FALSE	FALSE	K152T				
T054V	0.66	FALSE	FALSE	FALSE	FALSE	FALSE	K162M				
V058C	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	K162W				
V058G	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	K170R				
V058H	1.09	V058H	FALSE	FALSE	FALSE	FALSE	K196T				
V058I	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	K260Y				
V058K	4.08	V058K	V058K	V058K	FALSE	FALSE	K279R				
V058L	1.54	V058L	FALSE	FALSE	FALSE	FALSE	K314H				
V058N	0.49	FALSE	FALSE	FALSE	FALSE	FALSE	K385A				
V058P	0.9	FALSE	FALSE	FALSE	FALSE	FALSE	K385S				
V058Q	4.54	V058Q	V058Q	V058Q	FALSE	FALSE	K409A				
V058R	1.92	V058R	FALSE	FALSE	FALSE	FALSE	K409Q				
V058S	0.83	FALSE	FALSE	FALSE	FALSE	FALSE	K411N				
V058W	0.65	FALSE	FALSE	FALSE	FALSE	FALSE	K411S				
V058Y	1.07	V058Y	FALSE	FALSE	FALSE	FALSE	K435A				
D059N	1.27	D059N	FALSE	FALSE	FALSE	FALSE	K435H				
D059Q	0.4	FALSE	FALSE	FALSE	FALSE	FALSE	K435R				
R060K	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	K435S				
L061F	0.3	FALSE	FALSE	FALSE	FALSE	FALSE	L001H				
L061I	0.42	FALSE	FALSE	FALSE	FALSE	FALSE	L001K				
L061M	0.73	FALSE	FALSE	FALSE	FALSE	FALSE	L001Q				
L061V	0.59	FALSE	FALSE	FALSE	FALSE	FALSE	L015V				
Y063A	0.63	FALSE	FALSE	FALSE	FALSE	FALSE	L026A				
Y063H	1.07	Y063H	FALSE	FALSE	FALSE	FALSE	L026E				
Y063I	1.03	Y063I	FALSE	FALSE	FALSE	FALSE	L026K				
Y063K	1.36	Y063K	FALSE	FALSE	FALSE	FALSE	L026M				
Y063L	1.33	Y063L	FALSE	FALSE	FALSE	FALSE	L026Q				
Y063M	1.32	Y063M	FALSE	FALSE	FALSE	FALSE	L026R				
Y063N	0.96	FALSE	FALSE	FALSE	FALSE	FALSE	L033W				
Y063R	1.4	Y063R	FALSE	FALSE	FALSE	FALSE	L037F				
Y063S	1	FALSE	FALSE	FALSE	FALSE	FALSE	L037M				
Y063T	1.07	Y063T	FALSE	FALSE	FALSE	FALSE	L089C				
Y063V	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	L136M				
Y063W	1.53	Y063W	FALSE	FALSE	FALSE	FALSE	L136W				
P065R	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	L144T				
Y066H	0.47	FALSE	FALSE	FALSE	FALSE	FALSE	L146R				
Y066R	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	L165D				
I067F	1	FALSE	FALSE	FALSE	FALSE	FALSE	L165F				
I067L	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	L165N				
I067R	0.24	FALSE	FALSE	FALSE	FALSE	FALSE	L165S				
I067V	1.8	I067V	FALSE	FALSE	FALSE	FALSE	L165V				
I067Y	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	L165W				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
D068E	0.72	FALSE	FALSE	FALSE	FALSE	FALSE	L174A				
D068G	0.37	FALSE	FALSE	FALSE	FALSE	FALSE	L174K				
D068H	2.06	D068H	D068H	FALSE	FALSE	FALSE	L174N				
D068K	1.08	D068K	FALSE	FALSE	FALSE	FALSE	L174R				
D068L	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	L174T				
D068P	0.5	FALSE	FALSE	FALSE	FALSE	FALSE	L174Y				
D068Q	1.67	D068Q	FALSE	FALSE	FALSE	FALSE	L175T				
D068R	0.7	FALSE	FALSE	FALSE	FALSE	FALSE	L263K				
D068S	0.81	FALSE	FALSE	FALSE	FALSE	FALSE	L263R				
D068T	0.75	FALSE	FALSE	FALSE	FALSE	FALSE	L278A				
S069A	22.06	S069A	S069A	S069A	S069A	S069A	L278E				
S069C	1.97	S069C	FALSE	FALSE	FALSE	FALSE	L278F				
S069E	1.48	S069E	FALSE	FALSE	FALSE	FALSE	L278G				
S069F	8.75	S069F	S069F	S069F	S069F	FALSE	L278H				
S069G	6.06	S069G	S069G	S069G	S069G	FALSE	L278K				
S069I	3.12	S069I	S069I	S069I	FALSE	FALSE	L278N				
S069L	3.44	S069L	S069L	S069L	FALSE	FALSE	L278R				
S069M	2.67	S069M	S069M	FALSE	FALSE	FALSE	L278S				
S069P	8.14	S069P	S069P	S069P	S069P	FALSE	L278T				
S069R	14.06	S069R	S069R	S069R	S069R	S069R	L278Y				
S069T	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	L307T				
S069W	2.18	S069W	S069W	FALSE	FALSE	FALSE	L317A				
S069Y	2.71	S069Y	S069Y	FALSE	FALSE	FALSE	L317H				
I070A	27	I070A	I070A	I070A	I070A	I070A	L317I				
I070C	2.57	I070C	I070C	FALSE	FALSE	FALSE	L317K				
I070F	5.69	I070F	I070F	I070F	I070F	FALSE	L317M				
I070G	6.22	I070G	I070G	I070G	I070G	FALSE	L317Q				
I070H	9.09	I070H	I070H	I070H	I070H	FALSE	L317R				
I070K	14.64	I070K	I070K	I070K	I070K	I070K	L317S				
I070L	3.05	I070L	I070L	I070L	FALSE	FALSE	L318K				
I070N	6.19	I070N	I070N	I070N	I070N	FALSE	L318M				
I070P	3.03	I070P	I070P	I070P	FALSE	FALSE	L318R				
I070R	13.95	I070R	I070R	I070R	I070R	I070R	L374H				
I070S	3.63	I070S	I070S	I070S	FALSE	FALSE	L374M				
I070T	5.43	I070T	I070T	I070T	I070T	FALSE	L388Y				
I070V	6.34	I070V	I070V	I070V	I070V	FALSE	L406F				
I070Y	1.26	I070Y	FALSE	FALSE	FALSE	FALSE	M107L				
T071A	0.86	FALSE	FALSE	FALSE	FALSE	FALSE	M310A				
T071D	0.5	FALSE	FALSE	FALSE	FALSE	FALSE	M310G				
T071G	1.41	T071G	FALSE	FALSE	FALSE	FALSE	M310S				
T071H	0.93	FALSE	FALSE	FALSE	FALSE	FALSE	M313A				
T071L	1.09	T071L	FALSE	FALSE	FALSE	FALSE	M313H				
T071M	0.89	FALSE	FALSE	FALSE	FALSE	FALSE	M313K				
T071N	1.21	T071N	FALSE	FALSE	FALSE	FALSE	M313L				
T071Q	0.68	FALSE	FALSE	FALSE	FALSE	FALSE	M313P				
T071R	2.17	T071R	T071R	FALSE	FALSE	FALSE	M313R				
T071S	1.54	T071S	FALSE	FALSE	FALSE	FALSE	M313Y				
G072A	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	M438N				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
G072D	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	M438T				
G072E	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	N002T				
G072H	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	N047F				
G072K	1.39	G072K	FALSE	FALSE	FALSE	FALSE	N047H				
G072L	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	N047T				
G072M	3.11	G072M	G072M	G072M	FALSE	FALSE	N104R				
G072Q	2.33	G072Q	G072Q	FALSE	FALSE	FALSE	N104S				
G072R	0.65	FALSE	FALSE	FALSE	FALSE	FALSE	N131G				
G072S	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	N131I				
G072Y	0.35	FALSE	FALSE	FALSE	FALSE	FALSE	N131Q				
V073A	1.38	V073A	FALSE	FALSE	FALSE	FALSE	N131R				
V073C	0.84	FALSE	FALSE	FALSE	FALSE	FALSE	N131T				
V073D	0.94	FALSE	FALSE	FALSE	FALSE	FALSE	N131V				
V073G	1.17	V073G	FALSE	FALSE	FALSE	FALSE	N141A				
V073H	1.54	V073H	FALSE	FALSE	FALSE	FALSE	N141D				
V073K	1.42	V073K	FALSE	FALSE	FALSE	FALSE	N141G				
V073L	1.59	V073L	FALSE	FALSE	FALSE	FALSE	N141H				
V073M	0.68	FALSE	FALSE	FALSE	FALSE	FALSE	N141Q				
V073Q	0.96	FALSE	FALSE	FALSE	FALSE	FALSE	N141R				
V073R	0.72	FALSE	FALSE	FALSE	FALSE	FALSE	N141Y				
V073S	0.86	FALSE	FALSE	FALSE	FALSE	FALSE	N178R				
V073T	1.34	V073T	FALSE	FALSE	FALSE	FALSE	N205A				
V073W	1.91	V073W	FALSE	FALSE	FALSE	FALSE	N205E				
T074A	2.28	T074A	T074A	FALSE	FALSE	FALSE	N219A				
T074C	2.18	T074C	T074C	FALSE	FALSE	FALSE	N219K				
T074E	1.38	T074E	FALSE	FALSE	FALSE	FALSE	N219M				
T074F	1.43	T074F	FALSE	FALSE	FALSE	FALSE	N219R				
T074G	2.75	T074G	T074G	FALSE	FALSE	FALSE	N219S				
T074H	1.4	T074H	FALSE	FALSE	FALSE	FALSE	N231T				
T074K	1.29	T074K	FALSE	FALSE	FALSE	FALSE	N321A				
T074L	1.43	T074L	FALSE	FALSE	FALSE	FALSE	N321D				
T074M	0.52	FALSE	FALSE	FALSE	FALSE	FALSE	N321K				
T074N	2.12	T074N	T074N	FALSE	FALSE	FALSE	N321R				
T074P	2.45	T074P	T074P	FALSE	FALSE	FALSE	N321S				
T074R	2.22	T074R	T074R	FALSE	FALSE	FALSE	N328C				
T074S	1.8	T074S	FALSE	FALSE	FALSE	FALSE	N328I				
T074V	2.27	T074V	T074V	FALSE	FALSE	FALSE	N328K				
T074W	2.13	T074W	T074W	FALSE	FALSE	FALSE	N328L				
V075A	0.71	FALSE	FALSE	FALSE	FALSE	FALSE	N328Q				
V075C	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	N328S				
V075F	2	V075F	FALSE	FALSE	FALSE	FALSE	N328V				
V075H	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	N328Y				
V075L	5.22	V075L	V075L	V075L	V075L	FALSE	N369H				
V075M	1.16	V075M	FALSE	FALSE	FALSE	FALSE	P032F				
V075N	0.81	FALSE	FALSE	FALSE	FALSE	FALSE	P032G				
V075Q	1.51	V075Q	FALSE	FALSE	FALSE	FALSE	P032H				
V075R	3.02	V075R	V075R	V075R	FALSE	FALSE	P032K				
V075S	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	P032Q				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
V075T	4.34	V075T	V075T	V075T	FALSE	FALSE	P032R				
V075Y	0.63	FALSE	FALSE	FALSE	FALSE	FALSE	P032S				
G077H	0.32	FALSE	FALSE	FALSE	FALSE	FALSE	P032Y				
G077K	0.32	FALSE	FALSE	FALSE	FALSE	FALSE	P197M				
I079L	1.44	I079L	FALSE	FALSE	FALSE	FALSE	P236A				
I079T	0.79	FALSE	FALSE	FALSE	FALSE	FALSE	P236G				
I079V	1.01	I079V	FALSE	FALSE	FALSE	FALSE	P236R				
Q081P	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	P257I				
K082A	0.94	FALSE	FALSE	FALSE	FALSE	FALSE	P257R				
K082E	0.5	FALSE	FALSE	FALSE	FALSE	FALSE	P257T				
K082G	0.64	FALSE	FALSE	FALSE	FALSE	FALSE	P436D				
K082H	0.44	FALSE	FALSE	FALSE	FALSE	FALSE	P436G				
K082I	1.01	K082I	FALSE	FALSE	FALSE	FALSE	P436K				
K082L	0.87	FALSE	FALSE	FALSE	FALSE	FALSE	P437H				
K082M	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	P437I				
K082N	0.96	FALSE	FALSE	FALSE	FALSE	FALSE	P437M				
K082Q	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	P443A				
K082R	0.85	FALSE	FALSE	FALSE	FALSE	FALSE	P443E				
K082S	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	P443G				
K082T	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	P443H				
K082V	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	P443L				
K082Y	0.32	FALSE	FALSE	FALSE	FALSE	FALSE	P443M				
I083F	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	P443N				
I083G	1.05	I083G	FALSE	FALSE	FALSE	FALSE	P443R				
I083H	0.4	FALSE	FALSE	FALSE	FALSE	FALSE	Q086A				
I083K	0.3	FALSE	FALSE	FALSE	FALSE	FALSE	Q086E				
I083L	0.93	FALSE	FALSE	FALSE	FALSE	FALSE	Q086G				
I083N	0.82	FALSE	FALSE	FALSE	FALSE	FALSE	Q086H				
I083Q	1.07	I083Q	FALSE	FALSE	FALSE	FALSE	Q086M				
I083R	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	Q086N				
I083S	0.79	FALSE	FALSE	FALSE	FALSE	FALSE	Q086W				
I083T	0.95	FALSE	FALSE	FALSE	FALSE	FALSE	Q139T				
I083V	0.99	FALSE	FALSE	FALSE	FALSE	FALSE	Q143K				
S084D	0.98	FALSE	FALSE	FALSE	FALSE	FALSE	Q155D				
S084E	0.52	FALSE	FALSE	FALSE	FALSE	FALSE	Q155G				
S084F	0.72	FALSE	FALSE	FALSE	FALSE	FALSE	Q155H				
S084G	8.68	S084G	S084G	S084G	S084G	FALSE	Q155K				
S084H	0.96	FALSE	FALSE	FALSE	FALSE	FALSE	Q155R				
S084I	0.9	FALSE	FALSE	FALSE	FALSE	FALSE	Q233K				
S084L	0.92	FALSE	FALSE	FALSE	FALSE	FALSE	Q233R				
S084M	0.77	FALSE	FALSE	FALSE	FALSE	FALSE	Q234M				
S084N	0.89	FALSE	FALSE	FALSE	FALSE	FALSE	Q276D				
S084P	0.57	FALSE	FALSE	FALSE	FALSE	FALSE	Q276E				
S084Q	0.86	FALSE	FALSE	FALSE	FALSE	FALSE	Q276H				
S084R	1.89	S084R	FALSE	FALSE	FALSE	FALSE	Q276M				
S084T	0.82	FALSE	FALSE	FALSE	FALSE	FALSE	Q276R				
S084W	0.86	FALSE	FALSE	FALSE	FALSE	FALSE	Q276S				
S084Y	0.3	FALSE	FALSE	FALSE	FALSE	FALSE	Q276Y				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
L085V	0.42	FALSE	FALSE	FALSE	FALSE	FALSE	Q283P				
Q086A	2.7	Q086A	Q086A	FALSE	FALSE	FALSE	Q283S				
Q086D	0.88	FALSE	FALSE	FALSE	FALSE	FALSE	Q347G				
Q086E	1.18	Q086E	FALSE	FALSE	FALSE	FALSE	Q347S				
Q086F	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	Q373M				
Q086G	1.02	Q086G	FALSE	FALSE	FALSE	FALSE	Q373V				
Q086H	1.7	Q086H	FALSE	FALSE	FALSE	FALSE	Q393A				
Q086I	0.65	FALSE	FALSE	FALSE	FALSE	FALSE	Q393F				
Q086K	0.97	FALSE	FALSE	FALSE	FALSE	FALSE	Q393H				
Q086L	0.92	FALSE	FALSE	FALSE	FALSE	FALSE	Q393S				
Q086M	1.06	Q086M	FALSE	FALSE	FALSE	FALSE	Q444E				
Q086N	1.28	Q086N	FALSE	FALSE	FALSE	FALSE	Q444K				
Q086P	0.42	FALSE	FALSE	FALSE	FALSE	FALSE	Q444N				
Q086R	0.93	FALSE	FALSE	FALSE	FALSE	FALSE	Q444V				
Q086S	0.85	FALSE	FALSE	FALSE	FALSE	FALSE	R004V				
Q086T	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	R132K				
Q086V	0.97	FALSE	FALSE	FALSE	FALSE	FALSE	R132N				
Q086W	1.21	Q086W	FALSE	FALSE	FALSE	FALSE	R383K				
D087A	1	FALSE	FALSE	FALSE	FALSE	FALSE	R383L				
D087C	1.77	D087C	FALSE	FALSE	FALSE	FALSE	R383V				
D087E	0.86	FALSE	FALSE	FALSE	FALSE	FALSE	S036R				
D087G	1	FALSE	FALSE	FALSE	FALSE	FALSE	S039A				
D087H	0.72	FALSE	FALSE	FALSE	FALSE	FALSE	S039N				
D087I	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	S039Q				
D087L	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	S039T				
D087M	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	S069A				
D087P	0.31	FALSE	FALSE	FALSE	FALSE	FALSE	S069C				
D087Q	1.05	D087Q	FALSE	FALSE	FALSE	FALSE	S069E				
D087R	1.28	D087R	FALSE	FALSE	FALSE	FALSE	S069F				
D087S	0.99	FALSE	FALSE	FALSE	FALSE	FALSE	S069G				
D087T	1.7	D087T	FALSE	FALSE	FALSE	FALSE	S069I				
D087V	0.66	FALSE	FALSE	FALSE	FALSE	FALSE	S069L				
D087Y	2.72	D087Y	D087Y	FALSE	FALSE	FALSE	S069M				
L089C	1.46	L089C	FALSE	FALSE	FALSE	FALSE	S069P				
L089K	0.45	FALSE	FALSE	FALSE	FALSE	FALSE	S069R				
L089M	0.63	FALSE	FALSE	FALSE	FALSE	FALSE	S069W				
L089P	0.38	FALSE	FALSE	FALSE	FALSE	FALSE	S069Y				
L089R	0.34	FALSE	FALSE	FALSE	FALSE	FALSE	S084G				
L089W	0.26	FALSE	FALSE	FALSE	FALSE	FALSE	S084R				
D090A	1.48	D090A	FALSE	FALSE	FALSE	FALSE	S145P				
D090E	1.15	D090E	FALSE	FALSE	FALSE	FALSE	S215M				
D090G	0.41	FALSE	FALSE	FALSE	FALSE	FALSE	S221Q				
D090H	1.24	D090H	FALSE	FALSE	FALSE	FALSE	S221V				
D090I	1.1	D090I	FALSE	FALSE	FALSE	FALSE	S261K				
D090K	1.36	D090K	FALSE	FALSE	FALSE	FALSE	S261N				
D090L	1.15	D090L	FALSE	FALSE	FALSE	FALSE	S261R				
D090N	1.18	D090N	FALSE	FALSE	FALSE	FALSE	S282M				
D090Q	1.11	D090Q	FALSE	FALSE	FALSE	FALSE	S308G				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
D090R	1.49	D090R	FALSE	FALSE	FALSE	FALSE	S308H				
D090S	1.15	D090S	FALSE	FALSE	FALSE	FALSE	S308K				
D090T	1.02	D090T	FALSE	FALSE	FALSE	FALSE	S308N				
D090W	0.81	FALSE	FALSE	FALSE	FALSE	FALSE	S308R				
K091A	0.89	FALSE	FALSE	FALSE	FALSE	FALSE	S312N				
K091Q	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	S315H				
K091R	0.67	FALSE	FALSE	FALSE	FALSE	FALSE	S315R				
A092C	1.97	A092C	FALSE	FALSE	FALSE	FALSE	S359E				
A092H	0.22	FALSE	FALSE	FALSE	FALSE	FALSE	S359T				
A092L	1.29	A092L	FALSE	FALSE	FALSE	FALSE	S395A				
A092M	0.86	FALSE	FALSE	FALSE	FALSE	FALSE	S395R				
A092T	0.7	FALSE	FALSE	FALSE	FALSE	FALSE	S407A				
A092V	1.09	A092V	FALSE	FALSE	FALSE	FALSE	S407D				
K093D	0.71	FALSE	FALSE	FALSE	FALSE	FALSE	S407E				
K093E	0.83	FALSE	FALSE	FALSE	FALSE	FALSE	S407F				
K093F	0.5	FALSE	FALSE	FALSE	FALSE	FALSE	S407H				
K093G	0.97	FALSE	FALSE	FALSE	FALSE	FALSE	S407Q				
K093H	0.61	FALSE	FALSE	FALSE	FALSE	FALSE	S407R				
K093I	3.25	K093I	K093I	K093I	FALSE	FALSE	T049R				
K093L	1.53	K093L	FALSE	FALSE	FALSE	FALSE	T071G				
K093M	0.7	FALSE	FALSE	FALSE	FALSE	FALSE	T071L				
K093N	0.71	FALSE	FALSE	FALSE	FALSE	FALSE	T071N				
K093P	0.38	FALSE	FALSE	FALSE	FALSE	FALSE	T071R				
K093Q	0.84	FALSE	FALSE	FALSE	FALSE	FALSE	T071S				
K093R	1.52	K093R	FALSE	FALSE	FALSE	FALSE	T074A				
K093S	1.25	K093S	FALSE	FALSE	FALSE	FALSE	T074C				
K093T	3.93	K093T	K093T	K093T	FALSE	FALSE	T074E				
K093V	0.24	FALSE	FALSE	FALSE	FALSE	FALSE	T074F				
K094A	0.64	FALSE	FALSE	FALSE	FALSE	FALSE	T074G				
K094C	0.33	FALSE	FALSE	FALSE	FALSE	FALSE	T074H				
K094D	0.93	FALSE	FALSE	FALSE	FALSE	FALSE	T074K				
K094E	0.79	FALSE	FALSE	FALSE	FALSE	FALSE	T074L				
K094F	0.59	FALSE	FALSE	FALSE	FALSE	FALSE	T074N				
K094H	0.72	FALSE	FALSE	FALSE	FALSE	FALSE	T074P				
K094L	0.52	FALSE	FALSE	FALSE	FALSE	FALSE	T074R				
K094M	0.66	FALSE	FALSE	FALSE	FALSE	FALSE	T074S				
K094N	0.99	FALSE	FALSE	FALSE	FALSE	FALSE	T074V				
K094Q	1.22	K094Q	FALSE	FALSE	FALSE	FALSE	T074W				
K094R	3.94	K094R	K094R	K094R	FALSE	FALSE	T097A				
K094S	0.94	FALSE	FALSE	FALSE	FALSE	FALSE	T097D				
K094T	1.14	K094T	FALSE	FALSE	FALSE	FALSE	T097E				
I096D	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	T097G				
I096L	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	T097L				
I096V	0.68	FALSE	FALSE	FALSE	FALSE	FALSE	T097N				
T097A	1.25	T097A	FALSE	FALSE	FALSE	FALSE	T097Q				
T097C	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	T097S				
T097D	1.31	T097D	FALSE	FALSE	FALSE	FALSE	T118L				
T097E	1.19	T097E	FALSE	FALSE	FALSE	FALSE	T118Q				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
T097F	0.75	FALSE	FALSE	FALSE	FALSE	FALSE	T147A				
T097G	4.84	T097G	T097G	T097G	FALSE	FALSE	T147F				
T097I	0.85	FALSE	FALSE	FALSE	FALSE	FALSE	T147G				
T097L	1.22	T097L	FALSE	FALSE	FALSE	FALSE	T147L				
T097N	1.1	T097N	FALSE	FALSE	FALSE	FALSE	T147P				
T097P	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	T147Q				
T097Q	1.17	T097Q	FALSE	FALSE	FALSE	FALSE	T147R				
T097R	0.95	FALSE	FALSE	FALSE	FALSE	FALSE	T147S				
T097S	1.21	T097S	FALSE	FALSE	FALSE	FALSE	T147V				
T097W	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	T147Y				
T097Y	0.74	FALSE	FALSE	FALSE	FALSE	FALSE	T150A				
F098A	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	T150D				
F098C	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	T150E				
F098D	0.47	FALSE	FALSE	FALSE	FALSE	FALSE	T150G				
F098E	0.44	FALSE	FALSE	FALSE	FALSE	FALSE	T150W				
F098H	1.06	F098H	FALSE	FALSE	FALSE	FALSE	T150Y				
F098I	0.52	FALSE	FALSE	FALSE	FALSE	FALSE	T240K				
F098L	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	T269A				
F098M	0.87	FALSE	FALSE	FALSE	FALSE	FALSE	T269S				
F098Q	0.65	FALSE	FALSE	FALSE	FALSE	FALSE	T274F				
F098R	0.72	FALSE	FALSE	FALSE	FALSE	FALSE	T293A				
F098S	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	T293C				
F098V	0.46	FALSE	FALSE	FALSE	FALSE	FALSE	T293D				
F098W	0.81	FALSE	FALSE	FALSE	FALSE	FALSE	T293F				
Y099A	0.33	FALSE	FALSE	FALSE	FALSE	FALSE	T293K				
Y099R	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	T293M				
Y099S	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	T293P				
V102A	0.83	FALSE	FALSE	FALSE	FALSE	FALSE	T293Q				
V102C	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	T293V				
V102E	0.9	FALSE	FALSE	FALSE	FALSE	FALSE	T293Y				
V102G	0.67	FALSE	FALSE	FALSE	FALSE	FALSE	T306S				
V102H	0.88	FALSE	FALSE	FALSE	FALSE	FALSE	T325A				
V102K	1.03	V102K	FALSE	FALSE	FALSE	FALSE	T325D				
V102L	0.71	FALSE	FALSE	FALSE	FALSE	FALSE	T325E				
V102M	0.77	FALSE	FALSE	FALSE	FALSE	FALSE	T325G				
V102N	1.02	V102N	FALSE	FALSE	FALSE	FALSE	T325H				
V102Q	1.03	V102Q	FALSE	FALSE	FALSE	FALSE	T325K				
V102R	0.94	FALSE	FALSE	FALSE	FALSE	FALSE	T325M				
V102S	1.41	V102S	FALSE	FALSE	FALSE	FALSE	T325N				
V102T	1.26	V102T	FALSE	FALSE	FALSE	FALSE	T325Q				
V102W	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	T325S				
D103N	0.39	FALSE	FALSE	FALSE	FALSE	FALSE	T325V				
N104A	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	T381K				
N104C	0.41	FALSE	FALSE	FALSE	FALSE	FALSE	T405G				
N104G	0.48	FALSE	FALSE	FALSE	FALSE	FALSE	T417I				
N104I	0.35	FALSE	FALSE	FALSE	FALSE	FALSE	T440A				
N104K	0.88	FALSE	FALSE	FALSE	FALSE	FALSE	T440D				
N104M	0.61	FALSE	FALSE	FALSE	FALSE	FALSE	T440H				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
N104R	1.25	N104R	FALSE	FALSE	FALSE	FALSE	T440I				
N104S	1.03	N104S	FALSE	FALSE	FALSE	FALSE	T440M				
N104T	0.71	FALSE	FALSE	FALSE	FALSE	FALSE	T440R				
L105A	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	T440S				
L105C	0.33	FALSE	FALSE	FALSE	FALSE	FALSE	T440V				
L105G	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	T440Y				
L105H	0.36	FALSE	FALSE	FALSE	FALSE	FALSE	V008I				
L105I	0.94	FALSE	FALSE	FALSE	FALSE	FALSE	V012E				
L105P	0.84	FALSE	FALSE	FALSE	FALSE	FALSE	V012T				
L105Q	0.9	FALSE	FALSE	FALSE	FALSE	FALSE	V058H				
L105R	0.65	FALSE	FALSE	FALSE	FALSE	FALSE	V058K				
L105S	0.61	FALSE	FALSE	FALSE	FALSE	FALSE	V058L				
L105T	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	V058Q				
L105V	0.99	FALSE	FALSE	FALSE	FALSE	FALSE	V058R				
L105W	0.34	FALSE	FALSE	FALSE	FALSE	FALSE	V058Y				
G106V	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	V073A				
M107F	0.91	FALSE	FALSE	FALSE	FALSE	FALSE	V073G				
M107I	0.67	FALSE	FALSE	FALSE	FALSE	FALSE	V073H				
M107L	1.32	M107L	FALSE	FALSE	FALSE	FALSE	V073K				
A108G	0.47	FALSE	FALSE	FALSE	FALSE	FALSE	V073L				
I110V	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	V073T				
E114A	1.44	E114A	FALSE	FALSE	FALSE	FALSE	V073W				
E114G	0.73	FALSE	FALSE	FALSE	FALSE	FALSE	V075F				
E114H	0.75	FALSE	FALSE	FALSE	FALSE	FALSE	V075L				
E114M	0.44	FALSE	FALSE	FALSE	FALSE	FALSE	V075M				
E114S	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	V075Q				
P117D	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	V075R				
T118H	0.47	FALSE	FALSE	FALSE	FALSE	FALSE	V075T				
T118K	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	V102K				
T118L	1.09	T118L	FALSE	FALSE	FALSE	FALSE	V102N				
T118M	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	V102Q				
T118N	0.67	FALSE	FALSE	FALSE	FALSE	FALSE	V102S				
T118Q	3.37	T118Q	T118Q	T118Q	FALSE	FALSE	V102T				
T118V	0.79	FALSE	FALSE	FALSE	FALSE	FALSE	V128I				
W119F	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	V128K				
W119P	0.36	FALSE	FALSE	FALSE	FALSE	FALSE	V137I				
W119Q	0.72	FALSE	FALSE	FALSE	FALSE	FALSE	V142H				
W119Y	1.08	W119Y	FALSE	FALSE	FALSE	FALSE	V142K				
A120D	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	V142Q				
A120F	2.62	A120F	A120F	FALSE	FALSE	FALSE	V142R				
A120G	1.03	A120G	FALSE	FALSE	FALSE	FALSE	V142T				
A120H	1.11	A120H	FALSE	FALSE	FALSE	FALSE	V166A				
A120I	1.33	A120I	FALSE	FALSE	FALSE	FALSE	V166C				
A120L	1.25	A120L	FALSE	FALSE	FALSE	FALSE	V166E				
A120N	0.81	FALSE	FALSE	FALSE	FALSE	FALSE	V166F				
A120P	0.42	FALSE	FALSE	FALSE	FALSE	FALSE	V166G				
A120R	0.82	FALSE	FALSE	FALSE	FALSE	FALSE	V166H				
A120S	1.21	A120S	FALSE	FALSE	FALSE	FALSE	V166L				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
A120T	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	V166Q				
A120V	1.53	A120V	FALSE	FALSE	FALSE	FALSE	V166R				
A120W	0.59	FALSE	FALSE	FALSE	FALSE	FALSE	V166T				
A120Y	1.95	A120Y	FALSE	FALSE	FALSE	FALSE	V166W				
N122M	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	V166Y				
K124H	0.35	FALSE	FALSE	FALSE	FALSE	FALSE	V206K				
K124L	0.34	FALSE	FALSE	FALSE	FALSE	FALSE	V206L				
K124R	0.62	FALSE	FALSE	FALSE	FALSE	FALSE	V206R				
P125A	0.36	FALSE	FALSE	FALSE	FALSE	FALSE	V237E				
P125H	0.43	FALSE	FALSE	FALSE	FALSE	FALSE	V237L				
P125R	0.63	FALSE	FALSE	FALSE	FALSE	FALSE	V237Q				
P125S	0.54	FALSE	FALSE	FALSE	FALSE	FALSE	V237S				
D127A	0.89	FALSE	FALSE	FALSE	FALSE	FALSE	V237T				
D127E	1.31	D127E	FALSE	FALSE	FALSE	FALSE	V247I				
D127G	0.97	FALSE	FALSE	FALSE	FALSE	FALSE	V272D				
D127H	2.33	D127H	D127H	FALSE	FALSE	FALSE	V272T				
D127L	0.84	FALSE	FALSE	FALSE	FALSE	FALSE	V277E				
D127M	0.4	FALSE	FALSE	FALSE	FALSE	FALSE	V277G				
D127N	1.69	D127N	FALSE	FALSE	FALSE	FALSE	V277H				
D127Q	1.21	D127Q	FALSE	FALSE	FALSE	FALSE	V277K				
D127R	0.51	FALSE	FALSE	FALSE	FALSE	FALSE	V277N				
D127S	0.77	FALSE	FALSE	FALSE	FALSE	FALSE	V277R				
D127T	1.11	D127T	FALSE	FALSE	FALSE	FALSE	V277T				
D127V	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	V351A				
D127W	0.44	FALSE	FALSE	FALSE	FALSE	FALSE	V414I				
V128A	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	V420I				
V128C	0.68	FALSE	FALSE	FALSE	FALSE	FALSE	V428L				
V128G	0.49	FALSE	FALSE	FALSE	FALSE	FALSE	W119Y				
V128I	1.25	V128I	FALSE	FALSE	FALSE	FALSE	W304G				
V128K	1.16	V128K	FALSE	FALSE	FALSE	FALSE	W304I				
V128L	0.95	FALSE	FALSE	FALSE	FALSE	FALSE	Y063H				
V128Q	0.55	FALSE	FALSE	FALSE	FALSE	FALSE	Y063I				
V128R	0.74	FALSE	FALSE	FALSE	FALSE	FALSE	Y063K				
V128S	0.53	FALSE	FALSE	FALSE	FALSE	FALSE	Y063L				
V128W	0.5	FALSE	FALSE	FALSE	FALSE	FALSE	Y063M				
K130I	0.5	FALSE	FALSE	FALSE	FALSE	FALSE	Y063R				
K130R	1.42	K130R	FALSE	FALSE	FALSE	FALSE	Y063T				
N131C	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	Y063W				
N131E	0.44	FALSE	FALSE	FALSE	FALSE	FALSE	Y242F				
N131F	0.63	FALSE	FALSE	FALSE	FALSE	FALSE	Y399A				
N131G	2.47	N131G	N131G	FALSE	FALSE	FALSE	Y399E				
N131H	0.8	FALSE	FALSE	FALSE	FALSE	FALSE	Y399K				
N131I	1.4	N131I	FALSE	FALSE	FALSE	FALSE	Y399M				
N131L	0.82	FALSE	FALSE	FALSE	FALSE	FALSE	Y399Q				
N131M	0.99	FALSE	FALSE	FALSE	FALSE	FALSE	Y399R				
N131Q	1.24	N131Q	FALSE	FALSE	FALSE	FALSE	Y399S				
N131R	2.81	N131R	N131R	FALSE	FALSE	FALSE	Y399T				
N131S	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	Y399V				

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
N131T	1.02	N131T	FALSE	FALSE	FALSE	FALSE	Y399W				
N131V	2.08	N131V	N131V	FALSE	FALSE	FALSE	Y447D				
N131Y	0.85	FALSE	FALSE	FALSE	FALSE	FALSE	Y447E				
R132A	0.68	FALSE	FALSE	FALSE	FALSE	FALSE	Y447F				
R132C	0.58	FALSE	FALSE	FALSE	FALSE	FALSE	Y447I				
R132E	0.7	FALSE	FALSE	FALSE	FALSE	FALSE	Y447L				
R132F	0.6	FALSE	FALSE	FALSE	FALSE	FALSE	Y447N				
R132H	0.66	FALSE	FALSE	FALSE	FALSE	FALSE	Y447P				
R132I	0.56	FALSE	FALSE	FALSE	FALSE	FALSE	Y447Q				
R132K	1.05	R132K	FALSE	FALSE	FALSE	FALSE	Y447R				
R132L	0.76	FALSE	FALSE	FALSE	FALSE	FALSE	Y447T				
R132N	1.28	R132N	FALSE	FALSE	FALSE	FALSE	Y447V				
R132Q	0.69	FALSE	FALSE	FALSE	FALSE	FALSE	Y447W				
R132S	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
R132T	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
R132V	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
R132Y	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
S133I	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
I134L	1.04	I134L	FALSE	FALSE	FALSE	FALSE					
I134T	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
I134V	1.08	I134V	FALSE	FALSE	FALSE	FALSE					
E135A	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
E135C	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
E135D	2.68	E135D	E135D	FALSE	FALSE	FALSE					
E135F	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
E135G	2.79	E135G	E135G	FALSE	FALSE	FALSE					
E135H	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
E135K	1.15	E135K	FALSE	FALSE	FALSE	FALSE					
E135L	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
E135N	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
E135Q	1.59	E135Q	FALSE	FALSE	FALSE	FALSE					
E135R	2.08	E135R	E135R	FALSE	FALSE	FALSE					
E135S	1.13	E135S	FALSE	FALSE	FALSE	FALSE					
E135W	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
E135Y	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
L136A	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
L136C	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
L136D	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
L136F	0.96	FALSE	FALSE	FALSE	FALSE	FALSE					
L136H	1	FALSE	FALSE	FALSE	FALSE	FALSE					
L136I	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
L136M	1.05	L136M	FALSE	FALSE	FALSE	FALSE					
L136N	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
L136Q	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
L136R	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
L136S	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
L136T	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
L136W	1.11	L136W	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
V137A	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
V137C	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
V137I	1.01	V137I	FALSE	FALSE	FALSE	FALSE					
V137L	0.21	FALSE	FALSE	FALSE	FALSE	FALSE					
V137S	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
V137T	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138A	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138C	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138H	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138I	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138L	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138M	0.68	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138N	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138R	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138S	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138W	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
Q138Y	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139A	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139C	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139D	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139E	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139F	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139G	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139H	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139K	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139L	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139M	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139R	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139S	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
Q139T	1.31	Q139T	FALSE	FALSE	FALSE	FALSE					
Q139V	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140A	0.96	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140C	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140D	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140F	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140G	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140H	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140I	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140K	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140L	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140M	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140R	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140V	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140W	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
Q140Y	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
N141A	1.12	N141A	FALSE	FALSE	FALSE	FALSE					
N141D	1.09	N141D	FALSE	FALSE	FALSE	FALSE					
N141E	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
N141F	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
N141G	1.15	N141G	FALSE	FALSE	FALSE	FALSE					
N141H	2.03	N141H	N141H	FALSE	FALSE	FALSE					
N141L	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
N141M	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
N141Q	1.16	N141Q	FALSE	FALSE	FALSE	FALSE					
N141R	1.4	N141R	FALSE	FALSE	FALSE	FALSE					
N141S	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
N141T	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
N141V	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
N141W	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
N141Y	1.55	N141Y	FALSE	FALSE	FALSE	FALSE					
V142C	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
V142D	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
V142E	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
V142G	0.98	FALSE	FALSE	FALSE	FALSE	FALSE					
V142H	1.11	V142H	FALSE	FALSE	FALSE	FALSE					
V142K	1.4	V142K	FALSE	FALSE	FALSE	FALSE					
V142L	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
V142M	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
V142N	0.98	FALSE	FALSE	FALSE	FALSE	FALSE					
V142P	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
V142Q	1.04	V142Q	FALSE	FALSE	FALSE	FALSE					
V142R	1.53	V142R	FALSE	FALSE	FALSE	FALSE					
V142S	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
V142T	1.19	V142T	FALSE	FALSE	FALSE	FALSE					
Q143C	0.28	FALSE	FALSE	FALSE	FALSE	FALSE					
Q143E	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
Q143G	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
Q143I	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
Q143K	1.3	Q143K	FALSE	FALSE	FALSE	FALSE					
Q143L	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
Q143N	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
Q143V	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
L144R	0.26	FALSE	FALSE	FALSE	FALSE	FALSE					
L144T	1.02	L144T	FALSE	FALSE	FALSE	FALSE					
L144W	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
S145A	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
S145C	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
S145D	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
S145E	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
S145G	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
S145H	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
S145L	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
S145M	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
S145N	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
S145P	1.04	S145P	FALSE	FALSE	FALSE	FALSE					
S145R	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
L146A	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
L146C	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
L146E	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
L146G	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
L146H	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
L146I	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
L146K	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
L146N	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
L146P	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
L146Q	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
L146R	1.47	L146R	FALSE	FALSE	FALSE	FALSE					
L146S	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
L146T	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
L146V	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
L146Y	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
T147A	1.2	T147A	FALSE	FALSE	FALSE	FALSE					
T147C	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
T147D	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
T147F	1.24	T147F	FALSE	FALSE	FALSE	FALSE					
T147G	1.05	T147G	FALSE	FALSE	FALSE	FALSE					
T147I	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
T147L	1.3	T147L	FALSE	FALSE	FALSE	FALSE					
T147M	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
T147P	1.09	T147P	FALSE	FALSE	FALSE	FALSE					
T147Q	1.29	T147Q	FALSE	FALSE	FALSE	FALSE					
T147R	2.11	T147R	T147R	FALSE	FALSE	FALSE					
T147S	1.27	T147S	FALSE	FALSE	FALSE	FALSE					
T147V	2.04	T147V	T147V	FALSE	FALSE	FALSE					
T147W	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
T147Y	1.04	T147Y	FALSE	FALSE	FALSE	FALSE					
E148C	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
E148F	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
E148G	1.05	E148G	FALSE	FALSE	FALSE	FALSE					
E148H	1.24	E148H	FALSE	FALSE	FALSE	FALSE					
E148I	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
E148K	1.63	E148K	FALSE	FALSE	FALSE	FALSE					
E148L	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
E148Q	1.44	E148Q	FALSE	FALSE	FALSE	FALSE					
E148R	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
E148S	1.15	E148S	FALSE	FALSE	FALSE	FALSE					
E148T	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
E148V	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
E148W	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
E148Y	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
A149C	1.15	A149C	FALSE	FALSE	FALSE	FALSE					
A149G	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
A149K	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
A149L	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
A149M	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
A149Q	1.15	A149Q	FALSE	FALSE	FALSE	FALSE					
A149R	1.02	A149R	FALSE	FALSE	FALSE	FALSE					
A149S	1.08	A149S	FALSE	FALSE	FALSE	FALSE					
A149T	1.24	A149T	FALSE	FALSE	FALSE	FALSE					
A149V	1.34	A149V	FALSE	FALSE	FALSE	FALSE					
T150A	1.21	T150A	FALSE	FALSE	FALSE	FALSE					
T150C	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
T150D	1.24	T150D	FALSE	FALSE	FALSE	FALSE					
T150E	1.05	T150E	FALSE	FALSE	FALSE	FALSE					
T150F	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
T150G	2.19	T150G	T150G	FALSE	FALSE	FALSE					
T150I	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
T150L	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
T150N	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
T150P	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
T150R	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
T150S	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
T150W	1.25	T150W	FALSE	FALSE	FALSE	FALSE					
T150Y	1.36	T150Y	FALSE	FALSE	FALSE	FALSE					
E151A	1.27	E151A	FALSE	FALSE	FALSE	FALSE					
E151C	1	FALSE	FALSE	FALSE	FALSE	FALSE					
E151G	1.06	E151G	FALSE	FALSE	FALSE	FALSE					
E151H	1.34	E151H	FALSE	FALSE	FALSE	FALSE					
E151K	2.05	E151K	E151K	FALSE	FALSE	FALSE					
E151L	1.03	E151L	FALSE	FALSE	FALSE	FALSE					
E151M	1.26	E151M	FALSE	FALSE	FALSE	FALSE					
E151N	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
E151Q	2.01	E151Q	E151Q	FALSE	FALSE	FALSE					
E151R	1.61	E151R	FALSE	FALSE	FALSE	FALSE					
E151S	1.28	E151S	FALSE	FALSE	FALSE	FALSE					
E151T	1.21	E151T	FALSE	FALSE	FALSE	FALSE					
E151V	1.38	E151V	FALSE	FALSE	FALSE	FALSE					
E151W	1.31	E151W	FALSE	FALSE	FALSE	FALSE					
E151Y	1.31	E151Y	FALSE	FALSE	FALSE	FALSE					
K152A	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
K152C	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
K152F	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
K152I	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
K152M	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
K152R	1.85	K152R	FALSE	FALSE	FALSE	FALSE					
K152T	1.2	K152T	FALSE	FALSE	FALSE	FALSE					
K152V	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
K152W	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
K152Y	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
A153I	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
A153L	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
A153S	0.34	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
K154I	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
K154R	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
K154T	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
K154V	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
Q155A	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
Q155C	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
Q155D	1.49	Q155D	FALSE	FALSE	FALSE	FALSE					
Q155F	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
Q155G	1.61	Q155G	FALSE	FALSE	FALSE	FALSE					
Q155H	1.03	Q155H	FALSE	FALSE	FALSE	FALSE					
Q155K	1.57	Q155K	FALSE	FALSE	FALSE	FALSE					
Q155L	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
Q155M	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
Q155R	1.27	Q155R	FALSE	FALSE	FALSE	FALSE					
Q155S	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
Q155T	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
Q155V	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
Q155W	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
E156A	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
E156C	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
E156D	1.95	E156D	FALSE	FALSE	FALSE	FALSE					
E156G	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
E156I	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
E156L	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
E156M	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
E156Q	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
E156R	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
E156S	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
E156T	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
E156V	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
E156W	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
F157W	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
E158A	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
E158F	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
E158G	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
E158H	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
E158L	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
E158Q	1.25	E158Q	FALSE	FALSE	FALSE	FALSE					
E158S	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
K159A	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
K159D	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
K159E	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
K159G	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
K159H	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
K159L	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
K159M	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
K159N	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
K159Q	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
K159R	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
K159S	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
K159V	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
A160C	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
A160F	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
A160G	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
A160H	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
A160I	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
A160K	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
A160L	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
A160M	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
A160N	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
A160Q	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
A160R	0.89	FALSE	FALSE	FALSE	FALSE	FALSE					
A160S	1.35	A160S	FALSE	FALSE	FALSE	FALSE					
A160V	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
A160W	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
A160Y	1.07	A160Y	FALSE	FALSE	FALSE	FALSE					
G161A	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
G161C	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
G161D	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
G161E	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
G161R	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
G161S	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
G161V	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
G161V	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
K162A	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
K162D	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
K162E	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
K162G	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
K162H	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
K162L	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
K162M	1.04	K162M	FALSE	FALSE	FALSE	FALSE					
K162P	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
K162Q	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
K162R	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
K162S	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
K162V	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
K162W	1.01	K162W	FALSE	FALSE	FALSE	FALSE					
K162Y	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
D163A	1.52	D163A	FALSE	FALSE	FALSE	FALSE					
D163E	1.63	D163E	FALSE	FALSE	FALSE	FALSE					
D163F	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
D163G	1.15	D163G	FALSE	FALSE	FALSE	FALSE					
D163K	1.9	D163K	FALSE	FALSE	FALSE	FALSE					
D163L	1.18	D163L	FALSE	FALSE	FALSE	FALSE					
D163Q	1.4	D163Q	FALSE	FALSE	FALSE	FALSE					
D163R	1.8	D163R	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
D163S	1.34	D163S	FALSE	FALSE	FALSE	FALSE					
D163T	1.13	D163T	FALSE	FALSE	FALSE	FALSE					
D163V	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
D163W	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
F164L	1.13	F164L	FALSE	FALSE	FALSE	FALSE					
F164M	1.66	F164M	FALSE	FALSE	FALSE	FALSE					
F164V	1.23	F164V	FALSE	FALSE	FALSE	FALSE					
F164W	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
L165A	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
L165C	0.27	FALSE	FALSE	FALSE	FALSE	FALSE					
L165D	5.79	L165D	L165D	L165D	L165D	FALSE					
L165F	1.23	L165F	FALSE	FALSE	FALSE	FALSE					
L165N	2.19	L165N	L165N	FALSE	FALSE	FALSE					
L165R	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
L165S	1.31	L165S	FALSE	FALSE	FALSE	FALSE					
L165V	1.22	L165V	FALSE	FALSE	FALSE	FALSE					
L165W	1.14	L165W	FALSE	FALSE	FALSE	FALSE					
L165Y	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
V166A	2.85	V166A	V166A	FALSE	FALSE	FALSE					
V166C	1.16	V166C	FALSE	FALSE	FALSE	FALSE					
V166E	1.28	V166E	FALSE	FALSE	FALSE	FALSE					
V166F	1.67	V166F	FALSE	FALSE	FALSE	FALSE					
V166G	1.11	V166G	FALSE	FALSE	FALSE	FALSE					
V166H	1.74	V166H	FALSE	FALSE	FALSE	FALSE					
V166L	4.38	V166L	V166L	V166L	FALSE	FALSE					
V166N	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
V166Q	3.61	V166Q	V166Q	V166Q	FALSE	FALSE					
V166R	5.56	V166R	V166R	V166R	V166R	FALSE					
V166T	4.26	V166T	V166T	V166T	FALSE	FALSE					
V166W	1.26	V166W	FALSE	FALSE	FALSE	FALSE					
V166Y	2.08	V166Y	V166Y	FALSE	FALSE	FALSE					
E167A	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
E167D	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
E167F	0.31	FALSE	FALSE	FALSE	FALSE	FALSE					
E167G	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
E167H	0.89	FALSE	FALSE	FALSE	FALSE	FALSE					
E167K	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
E167M	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
E167N	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
E167P	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
E167R	1.02	E167R	FALSE	FALSE	FALSE	FALSE					
E167S	1.17	E167S	FALSE	FALSE	FALSE	FALSE					
E167T	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
E167Y	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
T168H	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
I169L	2.08	I169L	I169L	FALSE	FALSE	FALSE					
I169R	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
I169V	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
K170A	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
K170N	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
K170Q	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
K170R	2.58	K170R	K170R	FALSE	FALSE	FALSE					
K170V	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
L171I	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
L171V	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
G172A	1.2	G172A	FALSE	FALSE	FALSE	FALSE					
G172C	1.03	G172C	FALSE	FALSE	FALSE	FALSE					
K173N	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
K173Q	0.32	FALSE	FALSE	FALSE	FALSE	FALSE					
K173R	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
L174A	1.2	L174A	FALSE	FALSE	FALSE	FALSE					
L174G	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
L174H	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
L174K	2.39	L174K	L174K	FALSE	FALSE	FALSE					
L174M	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
L174N	1.36	L174N	FALSE	FALSE	FALSE	FALSE					
L174Q	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
L174R	1.5	L174R	FALSE	FALSE	FALSE	FALSE					
L174S	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
L174T	1.12	L174T	FALSE	FALSE	FALSE	FALSE					
L174V	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
L174W	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
L174Y	1.06	L174Y	FALSE	FALSE	FALSE	FALSE					
L175E	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
L175H	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
L175T	1.43	L175T	FALSE	FALSE	FALSE	FALSE					
L175V	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
L175Y	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
R176K	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
R176L	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
P177V	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
N178G	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
N178K	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
N178M	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
N178R	1.1	N178R	FALSE	FALSE	FALSE	FALSE					
H179A	1.06	H179A	FALSE	FALSE	FALSE	FALSE					
H179C	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
H179E	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
H179G	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
H179I	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
H179K	1.39	H179K	FALSE	FALSE	FALSE	FALSE					
H179L	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
H179M	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
H179N	0.96	FALSE	FALSE	FALSE	FALSE	FALSE					
H179P	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
H179R	0.96	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
H179S	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
H179T	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
H179V	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
L180F	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
L180G	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
L180I	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
L180K	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
L180M	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
W181K	0.29	FALSE	FALSE	FALSE	FALSE	FALSE					
W181M	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
W181Q	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
G182L	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
Y183E	0.32	FALSE	FALSE	FALSE	FALSE	FALSE					
Y183L	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
Y184W	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
F186Y	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
H192S	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
H192T	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
H193F	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
H193G	0.68	FALSE	FALSE	FALSE	FALSE	FALSE					
H193Q	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
H193R	0.33	FALSE	FALSE	FALSE	FALSE	FALSE					
H193S	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
H193Y	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
K195A	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
K195G	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
K195H	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
K195I	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
K195L	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
K195N	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
K195Q	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
K195R	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
K195S	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
K195T	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
K195V	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
K195W	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
K196E	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
K196G	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
K196L	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
K196N	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
K196R	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
K196S	0.68	FALSE	FALSE	FALSE	FALSE	FALSE					
K196T	1.18	K196T	FALSE	FALSE	FALSE	FALSE					
K196W	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
K196Y	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
P197A	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
P197D	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
P197E	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
P197F	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
P197G	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
P197H	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
P197K	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
P197L	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
P197M	1.03	P197M	FALSE	FALSE	FALSE	FALSE					
P197Q	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
P197R	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
P197S	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
P197T	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
P197W	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
G198A	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
G198D	1.99	G198D	FALSE	FALSE	FALSE	FALSE					
G198E	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
G198H	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
G198L	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
G198N	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
G198Q	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
G198R	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
G198S	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
G198T	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
G198W	0.29	FALSE	FALSE	FALSE	FALSE	FALSE					
G198Y	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
N200D	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
N200T	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
S202M	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
F204P	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
F204W	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
N205A	1.3	N205A	FALSE	FALSE	FALSE	FALSE					
N205D	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
N205E	1.94	N205E	FALSE	FALSE	FALSE	FALSE					
N205F	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
N205G	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
N205K	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
N205L	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
N205M	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
N205P	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
N205R	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
N205S	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
N205T	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
N205V	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
N205W	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
N205Y	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
V206H	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
V206I	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
V206K	1.75	V206K	FALSE	FALSE	FALSE	FALSE					
V206L	1.57	V206L	FALSE	FALSE	FALSE	FALSE					
V206M	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
V206Q	0.33	FALSE	FALSE	FALSE	FALSE	FALSE					
V206R	1.3	V206R	FALSE	FALSE	FALSE	FALSE					
V206S	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
V206T	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
I208A	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
I208C	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
I208K	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
I208L	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
I208M	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
I208Q	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
I208R	1.14	I208R	FALSE	FALSE	FALSE	FALSE					
I208S	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
I208T	1.01	I208T	FALSE	FALSE	FALSE	FALSE					
I208V	1.07	I208V	FALSE	FALSE	FALSE	FALSE					
K209A	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
K209E	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
K209F	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
K209G	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
K209L	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
K209N	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
K209R	0.68	FALSE	FALSE	FALSE	FALSE	FALSE					
K209S	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
K209T	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
N211L	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
N211W	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
D212N	1.52	D212N	FALSE	FALSE	FALSE	FALSE					
D212S	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
D212T	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
D213A	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
D213E	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
D213G	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
D213H	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
D213K	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
D213L	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
D213M	1.56	D213M	FALSE	FALSE	FALSE	FALSE					
D213N	1.53	D213N	FALSE	FALSE	FALSE	FALSE					
D213Q	1.04	D213Q	FALSE	FALSE	FALSE	FALSE					
D213R	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
D213V	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
D213W	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
D213Y	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
L214Q	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
S215A	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
S215D	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
S215E	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
S215G	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
S215H	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
S215K	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
S215L	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
S215M	1.77	S215M	FALSE	FALSE	FALSE	FALSE					
S215Q	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
S215R	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
S215T	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
S215V	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
S215W	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
W216Y	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
L217M	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
W218F	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
W218M	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
W218V	0.28	FALSE	FALSE	FALSE	FALSE	FALSE					
N219A	1.29	N219A	FALSE	FALSE	FALSE	FALSE					
N219C	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
N219D	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
N219E	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
N219H	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
N219I	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
N219K	1.45	N219K	FALSE	FALSE	FALSE	FALSE					
N219L	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
N219M	1.02	N219M	FALSE	FALSE	FALSE	FALSE					
N219R	1.1	N219R	FALSE	FALSE	FALSE	FALSE					
N219S	2.48	N219S	N219S	FALSE	FALSE	FALSE					
N219T	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
N219W	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
E220A	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
E220D	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
E220H	1.4	E220H	FALSE	FALSE	FALSE	FALSE					
E220I	1.34	E220I	FALSE	FALSE	FALSE	FALSE					
E220L	1.45	E220L	FALSE	FALSE	FALSE	FALSE					
E220M	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
E220S	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
E220T	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
E220V	1.35	E220V	FALSE	FALSE	FALSE	FALSE					
S221A	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
S221C	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
S221I	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
S221M	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
S221Q	1.37	S221Q	FALSE	FALSE	FALSE	FALSE					
S221T	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
S221V	1.04	S221V	FALSE	FALSE	FALSE	FALSE					
T222D	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
T222F	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
T222G	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
T222I	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
T222K	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
T222L	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
T222N	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
T222R	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
T222S	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
T222V	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
L224I	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
P226W	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
L230I	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
N231T	1.1	N231T	FALSE	FALSE	FALSE	FALSE					
T232F	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
T232S	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
Q233A	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
Q233F	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
Q233G	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
Q233K	1.69	Q233K	FALSE	FALSE	FALSE	FALSE					
Q233L	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
Q233R	1.5	Q233R	FALSE	FALSE	FALSE	FALSE					
Q233Y	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
Q234L	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
Q234M	1.65	Q234M	FALSE	FALSE	FALSE	FALSE					
S235A	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
S235E	1	FALSE	FALSE	FALSE	FALSE	FALSE					
S235G	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
S235H	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
S235K	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
S235T	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
P236A	1.07	P236A	FALSE	FALSE	FALSE	FALSE					
P236G	1.09	P236G	FALSE	FALSE	FALSE	FALSE					
P236H	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
P236K	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
P236R	3.09	P236R	P236R	P236R	FALSE	FALSE					
P236S	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
V237A	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
V237C	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
V237E	1.93	V237E	FALSE	FALSE	FALSE	FALSE					
V237F	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
V237H	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
V237L	1.12	V237L	FALSE	FALSE	FALSE	FALSE					
V237N	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
V237Q	1.46	V237Q	FALSE	FALSE	FALSE	FALSE					
V237R	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
V237S	1.03	V237S	FALSE	FALSE	FALSE	FALSE					
V237T	1.01	V237T	FALSE	FALSE	FALSE	FALSE					
V237W	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
A238D	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
A238E	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
A238H	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
A238K	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
A238Q	1.02	A238Q	FALSE	FALSE	FALSE	FALSE					
A238R	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
A238S	2.62	A238S	A238S	FALSE	FALSE	FALSE					
A238T	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
A239N	0.32	FALSE	FALSE	FALSE	FALSE	FALSE					
T240A	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
T240K	1.13	T240K	FALSE	FALSE	FALSE	FALSE					
T240M	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
T240P	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
T240Q	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
T240R	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
T240S	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
T240V	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
Y242F	1.08	Y242F	FALSE	FALSE	FALSE	FALSE					
N245H	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
V247I	2.01	V247I	V247I	FALSE	FALSE	FALSE					
V247L	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
V247M	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
R248A	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
R248H	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
R248W	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
R248Y	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
E249V		FALSE	FALSE	FALSE	FALSE	FALSE					
I251L	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
I251M	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
I251Y	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
V253I	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
K255A	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
K255G	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
K255N	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
K255Q	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
K255R	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
K255S	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
I256A	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
I256H	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
I256L	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
I256V	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
P257A	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
P257C	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
P257G	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
P257I	1.07	P257I	FALSE	FALSE	FALSE	FALSE					
P257K	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
P257L	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
P257M	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
P257N	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
P257Q	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
P257R	1.38	P257R	FALSE	FALSE	FALSE	FALSE					
P257T	2.04	P257T	P257T	FALSE	FALSE	FALSE					
P257V	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
D258G	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
D258H	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
D258N	1.44	D258N	FALSE	FALSE	FALSE	FALSE					
D258R	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
D258S	1.44	D258S	FALSE	FALSE	FALSE	FALSE					
A259E	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
A259G	0.68	FALSE	FALSE	FALSE	FALSE	FALSE					
A259I	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
A259K	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
A259L	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
A259N	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
A259P	1.54	A259P	FALSE	FALSE	FALSE	FALSE					
A259Q	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
A259R	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
A259S	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
A259T	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
A259V	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
A259W	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
A259Y	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
K260A	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
K260D	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
K260E	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
K260G	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
K260H	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
K260L	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
K260M	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
K260Q	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
K260R	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
K260S	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
K260Y	1.73	K260Y	FALSE	FALSE	FALSE	FALSE					
S261A	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
S261F	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
S261K	2.54	S261K	S261K	FALSE	FALSE	FALSE					
S261M	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
S261N	1.98	S261N	FALSE	FALSE	FALSE	FALSE					
S261Q	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
S261R	1.19	S261R	FALSE	FALSE	FALSE	FALSE					
S261T	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
S261V	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
S261W	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
L263A	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
L263H	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
L263K	2.73	L263K	L263K	FALSE	FALSE	FALSE					
L263M	0.89	FALSE	FALSE	FALSE	FALSE	FALSE					
L263R	1.63	L263R	FALSE	FALSE	FALSE	FALSE					
L263T	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
L263V	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
P264A	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
P264H	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
V265I	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
F266Y	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
A267M	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
A267T	1.34	A267T	FALSE	FALSE	FALSE	FALSE					
T269A	1.63	T269A	FALSE	FALSE	FALSE	FALSE					
T269C	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
T269D	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
T269S	1.01	T269S	FALSE	FALSE	FALSE	FALSE					
R270M	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
R270N	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
R270S	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
R270T	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
I271F	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
I271G	1.29	I271G	FALSE	FALSE	FALSE	FALSE					
I271L	10.62	I271L	I271L	I271L	I271L	I271L					
I271M	3.24	I271M	I271M	I271M	FALSE	FALSE					
I271S	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
I271V	1.05	I271V	FALSE	FALSE	FALSE	FALSE					
V272D	1.36	V272D	FALSE	FALSE	FALSE	FALSE					
V272E	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
V272M	0.31	FALSE	FALSE	FALSE	FALSE	FALSE					
V272R	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
V272S	0.96	FALSE	FALSE	FALSE	FALSE	FALSE					
V272T	1.61	V272T	FALSE	FALSE	FALSE	FALSE					
F273H	1.41	F273H	FALSE	FALSE	FALSE	FALSE					
F273T	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
F273Y	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
T274A	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
T274F	1.28	T274F	FALSE	FALSE	FALSE	FALSE					
T274S	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
D275L	0.24	FALSE	FALSE	FALSE	FALSE	FALSE					
D275V	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
Q276C	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
Q276D	1.69	Q276D	FALSE	FALSE	FALSE	FALSE					
Q276E	1.05	Q276E	FALSE	FALSE	FALSE	FALSE					
Q276G	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
Q276H	1.2	Q276H	FALSE	FALSE	FALSE	FALSE					
Q276I	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
Q276L	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
Q276M	1.14	Q276M	FALSE	FALSE	FALSE	FALSE					
Q276R	1.3	Q276R	FALSE	FALSE	FALSE	FALSE					
Q276S	1.63	Q276S	FALSE	FALSE	FALSE	FALSE					
Q276Y	1.94	Q276Y	FALSE	FALSE	FALSE	FALSE					
V277A	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
V277C	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
V277D	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
V277E	1.02	V277E	FALSE	FALSE	FALSE	FALSE					
V277G	1.18	V277G	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
V277H	1.09	V277H	FALSE	FALSE	FALSE	FALSE					
V277K	1.51	V277K	FALSE	FALSE	FALSE	FALSE					
V277M	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
V277N	1.15	V277N	FALSE	FALSE	FALSE	FALSE					
V277Q	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
V277R	1.63	V277R	FALSE	FALSE	FALSE	FALSE					
V277S	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
V277T	1.94	V277T	FALSE	FALSE	FALSE	FALSE					
V277Y	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
L278A	1.13	L278A	FALSE	FALSE	FALSE	FALSE					
L278E	1.03	L278E	FALSE	FALSE	FALSE	FALSE					
L278F	1.26	L278F	FALSE	FALSE	FALSE	FALSE					
L278G	1.33	L278G	FALSE	FALSE	FALSE	FALSE					
L278H	4.5	L278H	L278H	L278H	FALSE	FALSE					
L278I	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
L278K	1.75	L278K	FALSE	FALSE	FALSE	FALSE					
L278N	1.74	L278N	FALSE	FALSE	FALSE	FALSE					
L278R	5.87	L278R	L278R	L278R	L278R	FALSE					
L278S	1.67	L278S	FALSE	FALSE	FALSE	FALSE					
L278T	1.66	L278T	FALSE	FALSE	FALSE	FALSE					
L278V	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
L278Y	1.51	L278Y	FALSE	FALSE	FALSE	FALSE					
K279A	0.27	FALSE	FALSE	FALSE	FALSE	FALSE					
K279H	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
K279Q	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
K279R	1.1	K279R	FALSE	FALSE	FALSE	FALSE					
K279T	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
F280G	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
F280Q	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
S282D	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
S282G	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
S282M	2.64	S282M	S282M	FALSE	FALSE	FALSE					
S282Q	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
Q283E	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
Q283P	1.18	Q283P	FALSE	FALSE	FALSE	FALSE					
Q283R	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
Q283S	1.73	Q283S	FALSE	FALSE	FALSE	FALSE					
Q283T	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
D284A	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
D284E	1.21	D284E	FALSE	FALSE	FALSE	FALSE					
D284G	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
D284H	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
D284L	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
D284M	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
D284N	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
D284Q	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
D284S	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
D284T	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
D284Y	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
E285A	0.34	FALSE	FALSE	FALSE	FALSE	FALSE					
E285F	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
E285G	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
E285H	1.3	E285H	FALSE	FALSE	FALSE	FALSE					
E285M	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
E285N	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
E285Q	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
E285Y	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
L286R	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
L286S	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
L286W	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
V287I	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
V287N	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
V287T	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
Y288L	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
Y288W	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
T289K	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
T289S	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
F290I	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
F290M	1.03	F290M	FALSE	FALSE	FALSE	FALSE					
G291C	0.27	FALSE	FALSE	FALSE	FALSE	FALSE					
G291Q	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
G291R	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
G291S	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
G291V	1.63	G291V	FALSE	FALSE	FALSE	FALSE					
E292A	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
E292C	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
E292F	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
E292G	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
E292H	1.26	E292H	FALSE	FALSE	FALSE	FALSE					
E292K	1.27	E292K	FALSE	FALSE	FALSE	FALSE					
E292N	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
E292P	1.05	E292P	FALSE	FALSE	FALSE	FALSE					
E292R	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
E292V	1.28	E292V	FALSE	FALSE	FALSE	FALSE					
E292W	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
T293A	1.9	T293A	FALSE	FALSE	FALSE	FALSE					
T293C	1.67	T293C	FALSE	FALSE	FALSE	FALSE					
T293D	1.46	T293D	FALSE	FALSE	FALSE	FALSE					
T293F	1.94	T293F	FALSE	FALSE	FALSE	FALSE					
T293G	1	FALSE	FALSE	FALSE	FALSE	FALSE					
T293K	1.35	T293K	FALSE	FALSE	FALSE	FALSE					
T293L	1	FALSE	FALSE	FALSE	FALSE	FALSE					
T293M	2.29	T293M	T293M	FALSE	FALSE	FALSE					
T293P	1.64	T293P	FALSE	FALSE	FALSE	FALSE					
T293Q	1.83	T293Q	FALSE	FALSE	FALSE	FALSE					
T293S	0.89	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
T293V	2.15	T293V	T293V	FALSE	FALSE	FALSE					
T293Y	1.49	T293Y	FALSE	FALSE	FALSE	FALSE					
V294M	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
G297A	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
K297R	0.34	FALSE	FALSE	FALSE	FALSE	FALSE					
A298G	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
A298I	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
G300R	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
I301A	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
I301V	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
V302I	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
V302W	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
I303D	0.34	FALSE	FALSE	FALSE	FALSE	FALSE					
I303V	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
W304G	1.13	W304G	FALSE	FALSE	FALSE	FALSE					
W304I	1.17	W304I	FALSE	FALSE	FALSE	FALSE					
G305D	1	FALSE	FALSE	FALSE	FALSE	FALSE					
G305E	1.62	G305E	FALSE	FALSE	FALSE	FALSE					
G305N	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
T306D	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
T306E	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
T306S	1.02	T306S	FALSE	FALSE	FALSE	FALSE					
L307G	0.32	FALSE	FALSE	FALSE	FALSE	FALSE					
L307K	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
L307N	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
L307Q	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
L307S	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
L307T	1.08	L307T	FALSE	FALSE	FALSE	FALSE					
L307V	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
L307W	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
L307Y	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
S308D	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
S308G	1.73	S308G	FALSE	FALSE	FALSE	FALSE					
S308H	1.15	S308H	FALSE	FALSE	FALSE	FALSE					
S308K	1.33	S308K	FALSE	FALSE	FALSE	FALSE					
S308N	2.33	S308N	S308N	FALSE	FALSE	FALSE					
S308P	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
S308R	1.34	S308R	FALSE	FALSE	FALSE	FALSE					
S308T	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
I309D	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
I309E	1.99	I309E	FALSE	FALSE	FALSE	FALSE					
I309G	1.44	I309G	FALSE	FALSE	FALSE	FALSE					
I309H	1.3	I309H	FALSE	FALSE	FALSE	FALSE					
I309K	0.98	FALSE	FALSE	FALSE	FALSE	FALSE					
I309L	1.72	I309L	FALSE	FALSE	FALSE	FALSE					
I309M	1.47	I309M	FALSE	FALSE	FALSE	FALSE					
I309N	3.11	I309N	I309N	I309N	FALSE	FALSE					
I309Q	1.64	I309Q	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
I309R	2.27	I309R	I309R	FALSE	FALSE	FALSE					
I309S	1.16	I309S	FALSE	FALSE	FALSE	FALSE					
I309T	2.09	I309T	I309T	FALSE	FALSE	FALSE					
I309V	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
I309W	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
M310A	1.5	M310A	FALSE	FALSE	FALSE	FALSE					
M310F	0.3	FALSE	FALSE	FALSE	FALSE	FALSE					
M310G	2.73	M310G	M310G	FALSE	FALSE	FALSE					
M310Q	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
M310R	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
M310S	1.61	M310S	FALSE	FALSE	FALSE	FALSE					
M310V	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
M310Y	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
R311G	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
R311G	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
R311H	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
R311K	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
R311Q	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
R311S	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
R311T	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
S312G	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
S312K	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
S312L	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
S312N	1.26	S312N	FALSE	FALSE	FALSE	FALSE					
S312T	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
M313A	1.34	M313A	FALSE	FALSE	FALSE	FALSE					
M313E	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
M313G	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
M313H	1.23	M313H	FALSE	FALSE	FALSE	FALSE					
M313K	2.85	M313K	M313K	FALSE	FALSE	FALSE					
M313L	1.05	M313L	FALSE	FALSE	FALSE	FALSE					
M313P	1.11	M313P	FALSE	FALSE	FALSE	FALSE					
M313R	2.3	M313R	M313R	FALSE	FALSE	FALSE					
M313S	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
M313T	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
M313V	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
M313Y	1.12	M313Y	FALSE	FALSE	FALSE	FALSE					
K314A	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
K314D	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
K314H	1.1	K314H	FALSE	FALSE	FALSE	FALSE					
K314I	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
K314N	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
K314Q	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
K314R	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
K314S	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
K314T	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
K314Y	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
S315A	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
S315E	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
S315G	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
S315H	2.04	S315H	S315H	FALSE	FALSE	FALSE					
S315K	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
S315L	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
S315M	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
S315R	1.04	S315R	FALSE	FALSE	FALSE	FALSE					
S315T	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
S315Y	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
C316D	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
L317A	1.27	L317A	FALSE	FALSE	FALSE	FALSE					
L317D	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
L317H	1.05	L317H	FALSE	FALSE	FALSE	FALSE					
L317I	1.76	L317I	FALSE	FALSE	FALSE	FALSE					
L317K	5.11	L317K	L317K	L317K	L317K	FALSE					
L317M	1.2	L317M	FALSE	FALSE	FALSE	FALSE					
L317N	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
L317Q	1.67	L317Q	FALSE	FALSE	FALSE	FALSE					
L317R	2.41	L317R	L317R	FALSE	FALSE	FALSE					
L317S	1.03	L317S	FALSE	FALSE	FALSE	FALSE					
L317T	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
L317W	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
L318D	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
L318F	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
L318G	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
L318H	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
L318I	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
L318K	1.36	L318K	FALSE	FALSE	FALSE	FALSE					
L318M	1.68	L318M	FALSE	FALSE	FALSE	FALSE					
L318N	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
L318Q	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
L318R	1.34	L318R	FALSE	FALSE	FALSE	FALSE					
L318S	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
L318T	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
D320E	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
D320G	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
D320H	1.75	D320H	FALSE	FALSE	FALSE	FALSE					
D320I	1	FALSE	FALSE	FALSE	FALSE	FALSE					
D320K	6.42	D320K	D320K	D320K	D320K	FALSE					
D320L	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
D320M	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
D320N	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
D320R	3.19	D320R	D320R	D320R	FALSE	FALSE					
D320S	1.19	D320S	FALSE	FALSE	FALSE	FALSE					
D320V	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
D320W	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
D320Y	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
N321A	1.01	N321A	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
N321D	1.25	N321D	FALSE	FALSE	FALSE	FALSE					
N321H	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
N321K	1.29	N321K	FALSE	FALSE	FALSE	FALSE					
N321R	1.23	N321R	FALSE	FALSE	FALSE	FALSE					
N321S	1.26	N321S	FALSE	FALSE	FALSE	FALSE					
N321T	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
N321Y	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
M323F	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
M323I	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
M323L	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
E324A	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
E324D	1.15	E324D	FALSE	FALSE	FALSE	FALSE					
E324H	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
E324M	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
E324N	1.01	E324N	FALSE	FALSE	FALSE	FALSE					
E324R	2.28	E324R	E324R	FALSE	FALSE	FALSE					
E324S	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
T325A	1.87	T325A	FALSE	FALSE	FALSE	FALSE					
T325D	1.78	T325D	FALSE	FALSE	FALSE	FALSE					
T325E	4.03	T325E	T325E	T325E	FALSE	FALSE					
T325G	4.21	T325G	T325G	T325G	FALSE	FALSE					
T325H	3.45	T325H	T325H	T325H	FALSE	FALSE					
T325K	4.37	T325K	T325K	T325K	FALSE	FALSE					
T325M	2.11	T325M	T325M	FALSE	FALSE	FALSE					
T325N	4.64	T325N	T325N	T325N	FALSE	FALSE					
T325Q	5.08	T325Q	T325Q	T325Q	T325Q	FALSE					
T325S	3.19	T325S	T325S	T325S	FALSE	FALSE					
T325V	1.24	T325V	FALSE	FALSE	FALSE	FALSE					
T325W	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
I326C	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
I326K	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
I326L	1.5	I326L	FALSE	FALSE	FALSE	FALSE					
I326S	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
I326V	6.29	I326V	I326V	I326V	I326V	FALSE					
I326Y	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
L327M	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
N328A	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
N328C	1.25	N328C	FALSE	FALSE	FALSE	FALSE					
N328G	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
N328H	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
N328I	1.85	N328I	FALSE	FALSE	FALSE	FALSE					
N328K	2.12	N328K	N328K	FALSE	FALSE	FALSE					
N328L	2.01	N328L	N328L	FALSE	FALSE	FALSE					
N328Q	1.13	N328Q	FALSE	FALSE	FALSE	FALSE					
N328R	0.68	FALSE	FALSE	FALSE	FALSE	FALSE					
N328S	2.22	N328S	N328S	FALSE	FALSE	FALSE					
N328T	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
N328V	1.16	N328V	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
N328W	0.33	FALSE	FALSE	FALSE	FALSE	FALSE					
N328Y	1.66	N328Y	FALSE	FALSE	FALSE	FALSE					
I331C	0.27	FALSE	FALSE	FALSE	FALSE	FALSE					
I331E	0.34	FALSE	FALSE	FALSE	FALSE	FALSE					
I331V	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
V334P	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
V334T	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
T335S	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
A338Q	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
K339M	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
S342A	0.68	FALSE	FALSE	FALSE	FALSE	FALSE					
Q343T	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
Q343V	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
Q347A	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
Q347E	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
Q347G	2.68	Q347G	Q347G	FALSE	FALSE	FALSE					
Q347L	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
Q347M	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
Q347R	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
Q347S	2.38	Q347S	Q347S	FALSE	FALSE	FALSE					
E348D	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
E348G	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
E348S	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
Q349A	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
Q349E	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
Q349K	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
Q349M	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
Q349N	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
Q349R	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
Q349T	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
V351A	1.14	V351A	FALSE	FALSE	FALSE	FALSE					
V351C	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
V351I	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
V351Q	0.34	FALSE	FALSE	FALSE	FALSE	FALSE					
V351S	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
I353T	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
I353V	1.61	I353V	FALSE	FALSE	FALSE	FALSE					
N356A	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
N356D	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
N356H	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
N356S	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
W357A	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
W357C	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
W357K	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
W357S	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
W357T	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
N358C	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
N358G	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
N358L	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
N358T	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
S359D	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
S359E	1.05	S359E	FALSE	FALSE	FALSE	FALSE					
S359H	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
S359K	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
S359M	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
S359T	2.11	S359T	S359T	FALSE	FALSE	FALSE					
S359V	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
S360T	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
D361H	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
P367A	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
P367C	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
P367G	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
P367K	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
P367R	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
P367S	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
D368A	1.34	D368A	FALSE	FALSE	FALSE	FALSE					
D368E	1.28	D368E	FALSE	FALSE	FALSE	FALSE					
D368G	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
D368H	0.96	FALSE	FALSE	FALSE	FALSE	FALSE					
D368K	1.31	D368K	FALSE	FALSE	FALSE	FALSE					
D368L	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
D368M	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
D368R	1.31	D368R	FALSE	FALSE	FALSE	FALSE					
D368S	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
D368T	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
D368V	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
N369H	1.33	N369H	FALSE	FALSE	FALSE	FALSE					
N369R	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
N369S	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
A371E	1.05	A371E	FALSE	FALSE	FALSE	FALSE					
A371F	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
A371G	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
A371H	1.2	A371H	FALSE	FALSE	FALSE	FALSE					
A371I	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
A371K	1.76	A371K	FALSE	FALSE	FALSE	FALSE					
A371L	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
A371M	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
A371R	1.51	A371R	FALSE	FALSE	FALSE	FALSE					
A371S	1.45	A371S	FALSE	FALSE	FALSE	FALSE					
A371V	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
Q373A	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
Q373E	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
Q373F	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
Q373K	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
Q373L	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
Q373M	1.43	Q373M	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
Q373R	0.68	FALSE	FALSE	FALSE	FALSE	FALSE					
Q373S	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
Q373V	1.05	Q373V	FALSE	FALSE	FALSE	FALSE					
L374A	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
L374H	1.42	L374H	FALSE	FALSE	FALSE	FALSE					
L374I	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
L374M	1.11	L374M	FALSE	FALSE	FALSE	FALSE					
L374N	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
L374P	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
L374R	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
L374S	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
L374T	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
L374V	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
L374W	0.34	FALSE	FALSE	FALSE	FALSE	FALSE					
L374Y	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
E375A	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
E375G	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
E375I	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
E375K	1.49	E375K	FALSE	FALSE	FALSE	FALSE					
E375L	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
E375M	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
E375N	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
E375R	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
E375S	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
E375T	1.17	E375T	FALSE	FALSE	FALSE	FALSE					
K376A	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
K376D	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
K376E	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
K376L	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
K376M	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
K376Q	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
K376R	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
K376S	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
K376T	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
K376V	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
K376Y	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
G377D	1.35	G377D	FALSE	FALSE	FALSE	FALSE					
G377E	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
G377H	1.49	G377H	FALSE	FALSE	FALSE	FALSE					
G377K	1.5	G377K	FALSE	FALSE	FALSE	FALSE					
G377P	2.3	G377P	G377P	FALSE	FALSE	FALSE					
G377R	1.28	G377R	FALSE	FALSE	FALSE	FALSE					
G377S	1.8	G377S	FALSE	FALSE	FALSE	FALSE					
G377T	3.83	G377T	G377T	G377T	FALSE	FALSE					
G378K	1.22	G378K	FALSE	FALSE	FALSE	FALSE					
G378N	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
G378R	1.03	G378R	FALSE	FALSE	FALSE	FALSE					
K379G	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
K379H	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
K379R	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
K379S	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
K379T	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
F380I	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
F380L	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
F380P	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
F380T	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
F380V	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
F380W	2.15	F380W	F380W	FALSE	FALSE	FALSE					
F380Y	1.5	F380Y	FALSE	FALSE	FALSE	FALSE					
T381E	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
T381H	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
T381K	1.06	T381K	FALSE	FALSE	FALSE	FALSE					
T381N	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
T381Q	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
T381R	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
T381S	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
T381V	0.89	FALSE	FALSE	FALSE	FALSE	FALSE					
R383A	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
R383E	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
R383H	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
R383I	0.71	FALSE	FALSE	FALSE	FALSE	FALSE					
R383K	1.3	R383K	FALSE	FALSE	FALSE	FALSE					
R383L	1.31	R383L	FALSE	FALSE	FALSE	FALSE					
R383M	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
R383N	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
R383S	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
R383T	0.98	FALSE	FALSE	FALSE	FALSE	FALSE					
R383V	1.05	R383V	FALSE	FALSE	FALSE	FALSE					
K385A	1.12	K385A	FALSE	FALSE	FALSE	FALSE					
K385G	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
K385H	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
K385N	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
K385Q	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
K385R	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
K385S	1.05	K385S	FALSE	FALSE	FALSE	FALSE					
K385T	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
K385V	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
T387S	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
L388F	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
L388H	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
L388I	0.98	FALSE	FALSE	FALSE	FALSE	FALSE					
L388M	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
L388R	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
L388T	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
L388V	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
L388W	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
L388Y	1.18	L388Y	FALSE	FALSE	FALSE	FALSE					
E389A	1.14	E389A	FALSE	FALSE	FALSE	FALSE					
E389G	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
E389H	1.17	E389H	FALSE	FALSE	FALSE	FALSE					
E389K	1.91	E389K	FALSE	FALSE	FALSE	FALSE					
E389L	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
E389M	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
E389P	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
E389Q	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
E389R	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
E389S	1.08	E389S	FALSE	FALSE	FALSE	FALSE					
E389T	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
E389Y	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
L391C	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
E392A	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
E392F	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
E392G	1	FALSE	FALSE	FALSE	FALSE	FALSE					
E392K	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
E392L	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
E392M	1.54	E392M	FALSE	FALSE	FALSE	FALSE					
E392Q	1.01	E392Q	FALSE	FALSE	FALSE	FALSE					
E392R	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
E392S	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
E392T	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
E392V	1.27	E392V	FALSE	FALSE	FALSE	FALSE					
E392W	0.31	FALSE	FALSE	FALSE	FALSE	FALSE					
E392Y	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
Q393A	1.26	Q393A	FALSE	FALSE	FALSE	FALSE					
Q393D	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
Q393F	1.23	Q393F	FALSE	FALSE	FALSE	FALSE					
Q393H	1.05	Q393H	FALSE	FALSE	FALSE	FALSE					
Q393K	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
Q393L	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
Q393M	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
Q393N	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
Q393R	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
Q393S	1.15	Q393S	FALSE	FALSE	FALSE	FALSE					
Q393T	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
F394L	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
F394W	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
S395A	1.1	S395A	FALSE	FALSE	FALSE	FALSE					
S395G	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
S395H	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
S395K	0.96	FALSE	FALSE	FALSE	FALSE	FALSE					
S395R	1.98	S395R	FALSE	FALSE	FALSE	FALSE					
S395T	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
S395W	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
E396A	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
E396D	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
E396H	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
E396L	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
E396Q	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
E396R	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
E396S	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
E396T	0.89	FALSE	FALSE	FALSE	FALSE	FALSE					
F398L	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
Y399A	1.01	Y399A	FALSE	FALSE	FALSE	FALSE					
Y399C	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
Y399E	1.49	Y399E	FALSE	FALSE	FALSE	FALSE					
Y399K	1.94	Y399K	FALSE	FALSE	FALSE	FALSE					
Y399M	2.7	Y399M	Y399M	FALSE	FALSE	FALSE					
Y399N	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
Y399Q	1.18	Y399Q	FALSE	FALSE	FALSE	FALSE					
Y399R	1.2	Y399R	FALSE	FALSE	FALSE	FALSE					
Y399S	1.01	Y399S	FALSE	FALSE	FALSE	FALSE					
Y399T	2.4	Y399T	Y399T	FALSE	FALSE	FALSE					
Y399V	1.44	Y399V	FALSE	FALSE	FALSE	FALSE					
Y399W	1.92	Y399W	FALSE	FALSE	FALSE	FALSE					
S401A	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
S401E	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
S401G	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
S401N	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
S401Q	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
Y403F	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
S404A	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
S404P	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
S404T	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
T405A	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
T405F	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
T405G	2.32	T405G	T405G	FALSE	FALSE	FALSE					
T405K	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
T405M	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
T405P	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
T405Q	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
T405R	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
T405S	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
T405W	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
T405Y	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
L406A	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
L406C	0.98	FALSE	FALSE	FALSE	FALSE	FALSE					
L406E	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
L406F	1.42	L406F	FALSE	FALSE	FALSE	FALSE					
L406G	1	FALSE	FALSE	FALSE	FALSE	FALSE					
L406I	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
L406N	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
L406Q	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
L406S	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
L406T	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
L406V	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
L406Y	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
S407A	1.16	S407A	FALSE	FALSE	FALSE	FALSE					
S407D	1.52	S407D	FALSE	FALSE	FALSE	FALSE					
S407E	1.38	S407E	FALSE	FALSE	FALSE	FALSE					
S407F	1.42	S407F	FALSE	FALSE	FALSE	FALSE					
S407G	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
S407H	1.34	S407H	FALSE	FALSE	FALSE	FALSE					
S407L	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
S407M	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
S407N	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
S407P	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
S407Q	1.71	S407Q	FALSE	FALSE	FALSE	FALSE					
S407R	1.04	S407R	FALSE	FALSE	FALSE	FALSE					
S407V	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
S407W	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
K409A	2.18	K409A	K409A	FALSE	FALSE	FALSE					
K409D	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
K409E	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
K409G	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
K409H	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
K409I	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
K409P	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
K409Q	3.33	K409Q	K409Q	K409Q	FALSE	FALSE					
K409R	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
K409S	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
K409T	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
K409V	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
E410D	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
E410K	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
E410M	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
E410N	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
E410P	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
E410Q	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
E410R	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
E410S	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
E410T	1.54	E410T	FALSE	FALSE	FALSE	FALSE					
E410V	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
E410Y	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
K411A	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
K411H	0.33	FALSE	FALSE	FALSE	FALSE	FALSE					
K411N	1.02	K411N	FALSE	FALSE	FALSE	FALSE					
K411P	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
K411R	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
K411S	1.21	K411S	FALSE	FALSE	FALSE	FALSE					
K411T	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
K411V	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
A412D	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
A412G	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
A412H	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
A412I	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
A412L	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
A412N	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
A412P	0.77	FALSE	FALSE	FALSE	FALSE	FALSE					
A412Q	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
A412R	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
A412S	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
A412V	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
A412W	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
A412Y	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
D413A	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
D413E	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
D413H	0.31	FALSE	FALSE	FALSE	FALSE	FALSE					
D413K	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
D413N	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
A413Q	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
D413R	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
D413S	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
D413T	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
V414I	1.12	V414I	FALSE	FALSE	FALSE	FALSE					
V414K	0.3	FALSE	FALSE	FALSE	FALSE	FALSE					
V414L	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
V414M	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
K415G	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
K415S	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
K415V	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
K415W	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
K415Y	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
D416F	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
D416G	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
D416H	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
D416I	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
D416K	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
D416L	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
D416N	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
D416Q	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
D416R	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
D416T	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
D416V	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
D416Y	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
T417I	1.22	T417I	FALSE	FALSE	FALSE	FALSE					
D418A	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
D418E	1.31	D418E	FALSE	FALSE	FALSE	FALSE					
D418F	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
D418G	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
D418G	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
D418I	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
D418L	1.28	D418L	FALSE	FALSE	FALSE	FALSE					
D418M	1.09	D418M	FALSE	FALSE	FALSE	FALSE					
D418N	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
D418P	2.11	D418P	D418P	FALSE	FALSE	FALSE					
D418Q	1.05	D418Q	FALSE	FALSE	FALSE	FALSE					
D418R	1.18	D418R	FALSE	FALSE	FALSE	FALSE					
D418S	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
D418V	1.43	D418V	FALSE	FALSE	FALSE	FALSE					
D418Y	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
A419E	0.45	FALSE	FALSE	FALSE	FALSE	FALSE					
A419F	2.17	A419F	A419F	FALSE	FALSE	FALSE					
A419G	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
A419H	1.21	A419H	FALSE	FALSE	FALSE	FALSE					
A419I	1.64	A419I	FALSE	FALSE	FALSE	FALSE					
A419K	1.88	A419K	FALSE	FALSE	FALSE	FALSE					
A419L	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
A419N	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
A419R	1.81	A419R	FALSE	FALSE	FALSE	FALSE					
A419S	2.65	A419S	A419S	FALSE	FALSE	FALSE					
A419W	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
A419Y	1.44	A419Y	FALSE	FALSE	FALSE	FALSE					
V420I	1.04	V420I	FALSE	FALSE	FALSE	FALSE					
V420P	0.48	FALSE	FALSE	FALSE	FALSE	FALSE					
D421A	1.28	D421A	FALSE	FALSE	FALSE	FALSE					
D421E	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
D421G	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
D421H	1.98	D421H	FALSE	FALSE	FALSE	FALSE					
V421I	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
D421K	2.42	D421K	D421K	FALSE	FALSE	FALSE					
D421L	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
D421M	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
D421N	1.89	D421N	FALSE	FALSE	FALSE	FALSE					
D421Q	1.54	D421Q	FALSE	FALSE	FALSE	FALSE					
D421R	2.21	D421R	D421R	FALSE	FALSE	FALSE					
D421S	2.12	D421S	D421S	FALSE	FALSE	FALSE					
D421T	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					
D421Y	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
V422I	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
V422T	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
A425G	1.2	A425G	FALSE	FALSE	FALSE	FALSE					
A425I	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
A425K	1.75	A425K	FALSE	FALSE	FALSE	FALSE					
A425M	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
A425N	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
A425R	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
A425S	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
A425Y	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
D426E	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
D426G	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
D426K	0.26	FALSE	FALSE	FALSE	FALSE	FALSE					
D426N	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
D426P	1.03	D426P	FALSE	FALSE	FALSE	FALSE					
D426Q	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
D426S	0.36	FALSE	FALSE	FALSE	FALSE	FALSE					
D426Y	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
G427H	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
G427I	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
G427K	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
G427Q	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
G427S	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
G427T	0.35	FALSE	FALSE	FALSE	FALSE	FALSE					
V428L	1.25	V428L	FALSE	FALSE	FALSE	FALSE					
V428M	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
V428P	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
V428T	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
D431A	2.42	D431A	D431A	FALSE	FALSE	FALSE					
D431E	1.27	D431E	FALSE	FALSE	FALSE	FALSE					
D431G	0.55	FALSE	FALSE	FALSE	FALSE	FALSE					
D431H	3.13	D431H	D431H	D431H	FALSE	FALSE					
D431I	1.05	D431I	FALSE	FALSE	FALSE	FALSE					
D431K	1.83	D431K	FALSE	FALSE	FALSE	FALSE					
D431L	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
D431N	1.3	D431N	FALSE	FALSE	FALSE	FALSE					
D431Q	2.16	D431Q	D431Q	FALSE	FALSE	FALSE					
D431R	2.2	D431R	D431R	FALSE	FALSE	FALSE					
D431S	1.91	D431S	FALSE	FALSE	FALSE	FALSE					
D431V	1.52	D431V	FALSE	FALSE	FALSE	FALSE					
D431W	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
D431Y	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
A432E	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
A432G	0.52	FALSE	FALSE	FALSE	FALSE	FALSE					
A432H	0.34	FALSE	FALSE	FALSE	FALSE	FALSE					
A432N	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
A432S	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
A432V	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
F433A	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
F433C	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
F433D	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
F433E	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
F433G	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
F433H	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
F433I	1.06	F433I	FALSE	FALSE	FALSE	FALSE					
F433K	1.36	F433K	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
F433L	1.87	F433L	FALSE	FALSE	FALSE	FALSE					
F433P	0.95	FALSE	FALSE	FALSE	FALSE	FALSE					
F433R	1.63	F433R	FALSE	FALSE	FALSE	FALSE					
F433S	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
F433T	1.86	F433T	FALSE	FALSE	FALSE	FALSE					
F433V	1.63	F433V	FALSE	FALSE	FALSE	FALSE					
F433W	1.28	F433W	FALSE	FALSE	FALSE	FALSE					
L434F	0.41	FALSE	FALSE	FALSE	FALSE	FALSE					
L434G	0.47	FALSE	FALSE	FALSE	FALSE	FALSE					
L434I	0.89	FALSE	FALSE	FALSE	FALSE	FALSE					
L434M	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
L434V	0.46	FALSE	FALSE	FALSE	FALSE	FALSE					
K435A	1.08	K435A	FALSE	FALSE	FALSE	FALSE					
K435C	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
K435E	0.78	FALSE	FALSE	FALSE	FALSE	FALSE					
K435G	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
K435H	1.05	K435H	FALSE	FALSE	FALSE	FALSE					
K435R	1.01	K435R	FALSE	FALSE	FALSE	FALSE					
K435S	1.03	K435S	FALSE	FALSE	FALSE	FALSE					
K435T	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
K435V	0.44	FALSE	FALSE	FALSE	FALSE	FALSE					
K435Y	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
P436C	0.39	FALSE	FALSE	FALSE	FALSE	FALSE					
P436D	1.19	P436D	FALSE	FALSE	FALSE	FALSE					
P436E	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
P436G	1.19	P436G	FALSE	FALSE	FALSE	FALSE					
P436H	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
P436I	0.84	FALSE	FALSE	FALSE	FALSE	FALSE					
P436K	2.05	P436K	P436K	FALSE	FALSE	FALSE					
P436L	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
P436M	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
P436Q	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
P436R	1	FALSE	FALSE	FALSE	FALSE	FALSE					
P436S	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
P436T	0.59	FALSE	FALSE	FALSE	FALSE	FALSE					
P436W	0.43	FALSE	FALSE	FALSE	FALSE	FALSE					
P436Y	0.49	FALSE	FALSE	FALSE	FALSE	FALSE					
P437A	0.56	FALSE	FALSE	FALSE	FALSE	FALSE					
P437D	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
P437G	0.5	FALSE	FALSE	FALSE	FALSE	FALSE					
P437H	1.11	P437H	FALSE	FALSE	FALSE	FALSE					
P437I	2.46	P437I	P437I	FALSE	FALSE	FALSE					
P437K	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
P437L	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
P437M	2.55	P437M	P437M	FALSE	FALSE	FALSE					
P437Q	0.96	FALSE	FALSE	FALSE	FALSE	FALSE					
P437R	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
P437S	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
P437Y	0.42	FALSE	FALSE	FALSE	FALSE	FALSE					
M438A	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
M438C	0.63	FALSE	FALSE	FALSE	FALSE	FALSE					
M438D	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
M438E	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
M438G	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
M438L	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
M438N	1.08	M438N	FALSE	FALSE	FALSE	FALSE					
M438P	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
M438Q	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
M438R	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
M438S	0.83	FALSE	FALSE	FALSE	FALSE	FALSE					
M438T	3.99	M438T	M438T	M438T	FALSE	FALSE					
M438V	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
M438W	0.57	FALSE	FALSE	FALSE	FALSE	FALSE					
E439A	1.2	E439A	FALSE	FALSE	FALSE	FALSE					
E439C	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
E439F	1	FALSE	FALSE	FALSE	FALSE	FALSE					
E439G	1.22	E439G	FALSE	FALSE	FALSE	FALSE					
E439H	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
E439K	1.2	E439K	FALSE	FALSE	FALSE	FALSE					
E439L	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
E439P	1.16	E439P	FALSE	FALSE	FALSE	FALSE					
E439Q	1.32	E439Q	FALSE	FALSE	FALSE	FALSE					
E439S	1.02	E439S	FALSE	FALSE	FALSE	FALSE					
E439T	1.15	E439T	FALSE	FALSE	FALSE	FALSE					
E439V	1.57	E439V	FALSE	FALSE	FALSE	FALSE					
E439W	0.62	FALSE	FALSE	FALSE	FALSE	FALSE					
T440A	1.22	T440A	FALSE	FALSE	FALSE	FALSE					
T440D	1.03	T440D	FALSE	FALSE	FALSE	FALSE					
T440E	1	FALSE	FALSE	FALSE	FALSE	FALSE					
T440F	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
T440G	0.86	FALSE	FALSE	FALSE	FALSE	FALSE					
T440H	3	T440H	T440H	FALSE	FALSE	FALSE					
T440I	1.04	T440I	FALSE	FALSE	FALSE	FALSE					
T440L	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
T440M	1.08	T440M	FALSE	FALSE	FALSE	FALSE					
T440P	0.88	FALSE	FALSE	FALSE	FALSE	FALSE					
T440R	1.77	T440R	FALSE	FALSE	FALSE	FALSE					
T440S	1.17	T440S	FALSE	FALSE	FALSE	FALSE					
T440V	1.02	T440V	FALSE	FALSE	FALSE	FALSE					
T440Y	1.11	T440Y	FALSE	FALSE	FALSE	FALSE					
E441A	1.47	E441A	FALSE	FALSE	FALSE	FALSE					
E441D	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
E441F	3.91	E441F	E441F	E441F	FALSE	FALSE					
E441G	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
E441H	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
E441K	0.8	FALSE	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
E441L	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
E441N	0.82	FALSE	FALSE	FALSE	FALSE	FALSE					
E441Q	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					
E441S	0.79	FALSE	FALSE	FALSE	FALSE	FALSE					
E441T	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
E441V	0.54	FALSE	FALSE	FALSE	FALSE	FALSE					
E441Y	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
E442C	1.38	E442C	FALSE	FALSE	FALSE	FALSE					
E442G	0.51	FALSE	FALSE	FALSE	FALSE	FALSE					
E442H	0.76	FALSE	FALSE	FALSE	FALSE	FALSE					
E442K	0.73	FALSE	FALSE	FALSE	FALSE	FALSE					
E442L	0.4	FALSE	FALSE	FALSE	FALSE	FALSE					
E442P	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
E442Q	0.74	FALSE	FALSE	FALSE	FALSE	FALSE					
E442R	3.94	E442R	E442R	E442R	FALSE	FALSE					
E442T	0.61	FALSE	FALSE	FALSE	FALSE	FALSE					
E442V	0.65	FALSE	FALSE	FALSE	FALSE	FALSE					
E442W	0.38	FALSE	FALSE	FALSE	FALSE	FALSE					
E442Y	0.6	FALSE	FALSE	FALSE	FALSE	FALSE					
P443A	1.63	P443A	FALSE	FALSE	FALSE	FALSE					
P443E	1.07	P443E	FALSE	FALSE	FALSE	FALSE					
P443F	0.7	FALSE	FALSE	FALSE	FALSE	FALSE					
P443G	1.12	P443G	FALSE	FALSE	FALSE	FALSE					
P443H	1.08	P443H	FALSE	FALSE	FALSE	FALSE					
P443L	1.19	P443L	FALSE	FALSE	FALSE	FALSE					
P443M	1.99	P443M	FALSE	FALSE	FALSE	FALSE					
P443N	1.25	P443N	FALSE	FALSE	FALSE	FALSE					
P443Q	0.96	FALSE	FALSE	FALSE	FALSE	FALSE					
P443R	1.04	P443R	FALSE	FALSE	FALSE	FALSE					
P443S	0.99	FALSE	FALSE	FALSE	FALSE	FALSE					
P443T	0.87	FALSE	FALSE	FALSE	FALSE	FALSE					
P443W	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
Q444D	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
Q444E	1.19	Q444E	FALSE	FALSE	FALSE	FALSE					
Q444F	0.66	FALSE	FALSE	FALSE	FALSE	FALSE					
Q444G	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
Q444H	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
Q444I	0.58	FALSE	FALSE	FALSE	FALSE	FALSE					
Q444K	1.03	Q444K	FALSE	FALSE	FALSE	FALSE					
Q444M	0.37	FALSE	FALSE	FALSE	FALSE	FALSE					
Q444N	1.01	Q444N	FALSE	FALSE	FALSE	FALSE					
Q444R	0.85	FALSE	FALSE	FALSE	FALSE	FALSE					
Q444V	1.12	Q444V	FALSE	FALSE	FALSE	FALSE					
Q444W	0.64	FALSE	FALSE	FALSE	FALSE	FALSE					
Q444Y	0.67	FALSE	FALSE	FALSE	FALSE	FALSE					
I445A	0.97	FALSE	FALSE	FALSE	FALSE	FALSE					
I445G	0.98	FALSE	FALSE	FALSE	FALSE	FALSE					
I445H	1.35	I445H	FALSE	FALSE	FALSE	FALSE					

Substitution	Average normalized activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity	>100% Activity	>200% Activity	>300% Activity	>500% Activity	>1000% Activity
I445L	1.06	I445L	FALSE	FALSE	FALSE	FALSE					
I445M	1.57	I445M	FALSE	FALSE	FALSE	FALSE					
I445N	1.24	I445N	FALSE	FALSE	FALSE	FALSE					
I445P	1.67	I445P	FALSE	FALSE	FALSE	FALSE					
I445Q	1.26	I445Q	FALSE	FALSE	FALSE	FALSE					
I445R	1.08	I445R	FALSE	FALSE	FALSE	FALSE					
I445S	1.21	I445S	FALSE	FALSE	FALSE	FALSE					
I445T	1.38	I445T	FALSE	FALSE	FALSE	FALSE					
I445V	1.25	I445V	FALSE	FALSE	FALSE	FALSE					
I445W	0.69	FALSE	FALSE	FALSE	FALSE	FALSE					
I445Y	0.53	FALSE	FALSE	FALSE	FALSE	FALSE					
F446A	1.58	F446A	FALSE	FALSE	FALSE	FALSE					
F446C	0.75	FALSE	FALSE	FALSE	FALSE	FALSE					
F446D	1.18	F446D	FALSE	FALSE	FALSE	FALSE					
F446E	1.1	F446E	FALSE	FALSE	FALSE	FALSE					
F446G	1.12	F446G	FALSE	FALSE	FALSE	FALSE					
F446H	1.28	F446H	FALSE	FALSE	FALSE	FALSE					
F446I	1.06	F446I	FALSE	FALSE	FALSE	FALSE					
F446K	0.94	FALSE	FALSE	FALSE	FALSE	FALSE					
F446L	0.93	FALSE	FALSE	FALSE	FALSE	FALSE					
F446M	1.31	F446M	FALSE	FALSE	FALSE	FALSE					
F446Q	0.72	FALSE	FALSE	FALSE	FALSE	FALSE					
F446R	0.89	FALSE	FALSE	FALSE	FALSE	FALSE					
F446T	0.89	FALSE	FALSE	FALSE	FALSE	FALSE					
F446V	0.91	FALSE	FALSE	FALSE	FALSE	FALSE					
F446W	1.4	F446W	FALSE	FALSE	FALSE	FALSE					
Y447D	3.25	Y447D	Y447D	Y447D	FALSE	FALSE					
Y447E	1.36	Y447E	FALSE	FALSE	FALSE	FALSE					
Y447F	1.41	Y447F	FALSE	FALSE	FALSE	FALSE					
Y447G	0.92	FALSE	FALSE	FALSE	FALSE	FALSE					
Y447I	1.36	Y447I	FALSE	FALSE	FALSE	FALSE					
Y447L	1.09	Y447L	FALSE	FALSE	FALSE	FALSE					
Y447M	0.9	FALSE	FALSE	FALSE	FALSE	FALSE					
Y447N	1.58	Y447N	FALSE	FALSE	FALSE	FALSE					
Y447P	1.46	Y447P	FALSE	FALSE	FALSE	FALSE					
Y447Q	2.37	Y447Q	Y447Q	FALSE	FALSE	FALSE					
Y447R	1.12	Y447R	FALSE	FALSE	FALSE	FALSE					
Y447T	1.9	Y447T	FALSE	FALSE	FALSE	FALSE					
Y447V	1.38	Y447V	FALSE	FALSE	FALSE	FALSE					
Y447W	1.07	Y447W	FALSE	FALSE	FALSE	FALSE					
VI42I	0.81	FALSE	FALSE	FALSE	FALSE	FALSE					

Postions where no tested substitutions tolerated	Positions where all tested substitutions tolerated	Positions were some tested substitutions tolerated		Total number of mutants	6753
16	1	2			
17	24	3			
18	26	4			
19	28	5		total positions changed	447
21	29	6		# positions always inactive	95
25	30	7		# positions always active	40
53	31	8		# positions sometimes active	312
55	32	9			
56	50	10			
57	74	11			
62	93	12			
64	97	13			
76	120	14			
78	140	15			
80	141	20			
88	142	22			
95	146	23			
100	147	27			
101	148	33			
109	151	34			
111	160	35			
112	162	36			
113	196	37			
115	205	38			
116	237	39			
121	259	40			
123	277	41			
126	309	42			
129	328	43			
185	407	44			
187	409	45			
188	418	46			
189	421	47			
190	433	48			
191	435	49			
194	436	51			
199	444	52			
201	445	54			
203	446	58			
207	447	59			
210		60			
223		61			
225		63			
227		65			
228		66			
229		67			
241		68			
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299		84			
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329		87			
330		89			
332		90			
333		91			
336		92			

Postions where no tested substitutions tolerated	Positions where all tested substitutions tolerated	Positions were some tested substitutions tolerated		Total number of mutants	6753
337		94			
340		96			
341		98			
344		99			
345		102			
346		103			
350		104			
352		105			
354		106			
355		107			
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364		114			
365		117			
366		118			
370		119			
372		122			
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390		128			
397		130			
400		131			
402		132			
408		133			
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		192			

Postions where no tested substitutions tolerated	Positions where all tested substitutions tolerated	Positions were some tested substitutions tolerated		Total number of mutants	6753
		193			
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		200			
		202			
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Postions where no tested substitutions tolerated	Positions where all tested substitutions tolerated	Positions were some tested substitutions tolerated		Total number of mutants	6753
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Postions where no tested substitutions tolerated	Positions where all tested substitutions tolerated	Positions were some tested substitutions tolerated		Total number of mutants	6753
		389			
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Table 8 Mutants

Substitution													
L001A	L033Y	K397T	D090S	W123V	E148C	W181A	N205M	A238V	I430N	L296I	P329L	R354C	T387F
L001C	D034A	K397V	D090T	W123Y	E148F	W181C	N205P	A238W	I430P	L296K	P329N	R354D	T387G
L001D	D034E	F398A	D090W	K124A	E148G	W181D	N205R	A238Y	I430R	L296M	P329Q	R354E	T387H
L001E	D034G	F398C	K091A	K124C	E148H	W181E	N205S	A239C	I430S	L296P	P329R	R354G	T387I
L001F	D034H	F398E	K091D	K124D	E148I	W181F	N205T	A239F	I430T	L296Q	P329S	R354H	T387K
L001G	D034I	F398G	K091E	K124E	E148K	W181H	N205V	A239G	I430V	L296R	P329T	R354I	T387L
L001H	D034K	F398H	K091F	K124F	E148L	W181I	N205W	A239H	I430W	L296S	P329V	R354K	T387M
L001K	D034L	F398I	K091G	K124G	E148P	W181K	N205Y	A239I	D431A	L296T	P329W	R354L	T387N
L001N	D034N	F398L	K091H	K124H	E148Q	W181L	V206C	A239K	D431E	L296V	P329Y	R354M	T387Q
L001P	D034P	F398N	K091I	K124I	E148R	W181M	V206D	T240K	D431G	L296W	Y330A	R354P	T387S
L001Q	D034Q	F398P	K091L	K124L	E148S	W181N	V206F	A239L	D431H	L296Y	Y330C	R354Q	T387V
L001R	D034R	F398R	K091N	K124N	E148T	W181Q	V206G	A239N	D431I	G297A	Y330D	R354S	T387W
L001S	D034S	F398S	K091Q	K124P	E148V	W181R	V206H	A239P	D431K	G297C	Y330E	R354V	T387Y
L001T	D034T	F398T	K091R	K124R	E148W	W181S	V206I	A239R	D431L	G297E	Y330F	R354W	L388A
L001V	D034V	F398V	K091S	K124S	E148Y	W181V	V206K	A239S	D431N	G297H	Y330G	R354Y	L388C
L001W	D034W	F398W	K091T	K124T	A149C	G182A	V206L	A239T	D431P	G297I	Y330I	K355D	L388F
N002A	M035A	F398Y	K091Y	K124V	A149E	G182C	V206M	A239V	D431Q	G297L	Y330L	K355F	L388G
N002C	M035D	Y399A	A092C	K124W	A149F	G182D	V206P	A239W	D431R	G297N	Y330M	K355G	L388H
N002F	M035F	Y399C	A092E	P125A	A149G	G182E	V206Q	A239Y	D431S	G297P	Y330N	K355H	L388I
N002G	M035G	Y399D	A092F	P125C	A149K	G182H	V206R	T240A	D431V	G297Q	Y330P	K355L	L388M
N002H	M035H	Y399E	A092G	P125D	A149L	G182L	V206S	T240E	D431W	G297R	Y330R	K355M	L388P
N002I	M035I	Y399G	A092H	P125G	A149M	G182M	V206T	T240F	D431Y	G297S	Y330S	K355N	L388Q
N002K	M035L	Y399K	A092K	P125H	A149P	G182N	V206Y	T240G	A432C	G297T	Y330V	K355P	L388R
N002L	M035N	Y399M	A092L	P125I	A149Q	G182P	E207A	T240L	A432E	G297V	I331V	K355Q	L388S
N002P	M035P	Y399N	A092M	P125L	A149R	G182Q	E207F	T240M	A432F	G297W	Y330W	K355R	L388T
N002Q	M035Q	Y399P	A092P	P125N	A149S	G182R	E207G	T240N	A432G	G297Y	I331A	K355S	L388V
N002S	M035R	Y399Q	A092Q	P125Q	A149T	G182S	E207H	T240P	A432H	A298C	I331C	K355T	L388W
N002T	M035S	Y399R	A092R	P125R	A149V	G182T	E207I	T240Q	E441A	A298E	I331D	K355V	L388Y
N002V	M035T	Y399S	A092T	P125S	A149W	G182V	E207K	T240R	E441C	A298G	I331E	K355W	E389A
N002W	M035V	Y399T	A092V	P125T	A149Y	G182Y	E207L	T240S	V265G	A298I	I331F	K355Y	E389F
N002Y	M035Y	Y399V	A092W	P125V	T150A	Y183A	E207M	T240V	V265H	A298L	I331H	N356A	E389G
F003A	S036A	Y399W	A092Y	P125W	T150C	Y183C	E207P	T240W	V265I	A298M	A432L	N356C	E389H

Table 8 Mutants

Substitution													
F003E	S036C	C400A	K093D	P125Y	T150D	Y183D	E207Q	T240Y	V265K	A298N	A432M	N356D	E389I
F003G	S036D	C400D	K093E	K126A	T150E	Y183E	E207R	L241A	V265L	A298P	A432N	N356F	E389K
F003H	S036F	C400E	K093F	K126D	T150F	Y183G	E207S	L241C	V265M	A298Q	A432P	N356G	E389L
F003I	S036G	C400F	K093G	K126E	T150G	Y183I	E207T	L241D	V265N	A298R	A432R	N356H	E389M
F003K	S036H	C400G	K093H	K126F	T150I	Y183K	E207V	L241E	V265P	A298S	A432S	N356K	E389P
F003L	S036K	C400I	K093I	K126G	T150L	Y183L	E207W	L241F	V265Q	A298T	A432V	N356L	E389Q
F003M	S036L	C400L	K093L	K126H	T150N	Y183N	I208A	L241G	V265R	A298V	A432Y	N356P	E389R
F003N	S036N	C400M	K093M	K126I	T150P	Y183P	I208C	L241I	V265S	A298W	F433A	N356Q	E389S
F003P	S036P	C400P	K093N	K126L	T150R	Y183Q	I208D	L241K	V265W	A298Y	F433C	N356R	E389T
F003R	S036R	C400Q	K093P	K126M	T150S	Y183R	I208E	L241P	V265Y	S299A	F433D	N356S	E389V
F003S	S036T	C400R	K093Q	K126N	T150V	Y183S	I208G	L241Q	F266A	S299C	F433E	N356T	E389Y
F003T	S036V	C400S	K093R	K126P	T150W	Y183V	I208K	L241R	F266C	S299D	F433G	N356V	D390A
F003V	S036W	C400T	K093S	K126Q	T150Y	Y183W	I208L	L241S	F266D	S299E	F433H	N356W	D390C
F003Y	S036Y	C400V	K093T	K126R	E151A	Y184A	I208M	L241T	F266G	S299F	F433I	W357A	D390E
R004A	L037A	C400Y	K093V	K126S	E151C	Y184C	I208P	L241V	F266H	S299G	F433K	W357C	D390F
R004D	L037C	S401A	K094A	K126T	E151G	Y184D	I208Q	L241W	F266L	S299H	F433L	W357D	D390G
R004E	L037E	S401C	K094C	K126V	E151H	Y184E	I208R	Y242A	F266M	S299I	F433P	W357E	D390H
R004F	L037F	S401D	K094D	K126W	E151K	Y184F	I208S	Y242C	F266P	S299L	F433R	W357F	D390L
R004G	L037G	S401E	K094E	K126Y	E151L	Y184G	I208T	Y242D	F266Q	S299M	F433S	W357G	D390N
R004I	L037I	S401F	K094F	D127A	E151M	Y184H	I208V	Y242F	F266R	S299P	F433T	W357K	D390P
R004L	L037K	S401G	K094G	D127E	E151N	Y184K	I208W	Y242G	F266S	S299Q	F433V	W357L	D390R
R004M	L037M	S401H	K094H	D127F	E151Q	Y184L	K209A	Y242I	F266T	S299R	F433W	W357M	D390S
R004N	L037N	S401K	K094L	D127G	E151R	Y184M	K209C	Y242K	F266V	S299T	L434F	W357P	D390T
R004P	L037P	S401L	K094M	D127H	E151S	Y184P	K209D	Y242L	F266W	S299Y	L434G	W357Q	D390V
R004S	L037R	S401N	K094N	D127K	E151T	Y184R	K209E	Y242M	F266Y	G300A	L434H	W357R	D390W
R004T	L037S	S401Q	K094P	D127L	E151V	Y184S	K209F	Y242P	A267D	G300C	L434I	W357S	D390Y
R004V	L037T	S401R	K094Q	D127M	E151W	Y184V	K209G	Y242R	A267E	G300D	L434K	W357T	L391A
R004W	L037V	S401T	K094R	D127N	E151Y	Y184W	K209L	Y242S	A267G	G300E	L434M	W357V	L391C
R004Y	L037W	S401W	K094S	D127Q	K152A	L185A	K209N	Y242T	A267H	G300F	L434N	N358C	L391D
A005D	F038A	S401Y	K094T	D127R	K152C	L185D	K209P	Y242V	A267I	G300L	L434P	N358D	L391G
A005G	F038C	C402A	D095A	D127S	K152F	L185E	K209R	Y242W	A267K	G300M	L434Q	N358E	L391H
A005H	F038E	C402D	D095C	D127T	K152G	L185F	K209S	V243A	A267L	G300N	L434R	N358G	L391K

Table 8 Mutants

Substitution													
A005I	F038G	C402E	D095E	D127V	K152I	L185G	K209T	V243C	A267M	G300P	L434S	N358H	L391N
A005L	F038K	C402F	D095F	D127W	K152L	L185I	K209V	V243D	A267N	G300Q	L434T	N358I	L391P
A005M	F038L	C402G	D095G	V128A	K152M	L185K	K209W	V243F	A267P	G300R	L434V	N358K	L391Q
A005N	F038M	C402L	D095H	V128C	K152N	L185N	K209Y	V243G	A267R	G300S	L434W	N358L	L391R
A005P	F038N	C402M	D095K	V128E	K152P	L185P	R210A	V243H	A267S	G300T	L434Y	N358P	L391S
A005Q	F038P	C402P	D095L	V128F	K152R	L185R	R210C	V243L	A267T	G300V	K435A	N358Q	L391T
A005R	F038Q	C402Q	D095M	V128G	K152S	L185S	R210D	V243M	A267V	G300W	K435C	N358R	L391V
A005S	F038R	C402R	D095P	V128H	K152T	L185T	R210E	V243P	A267W	I301A	K435E	N358S	L391W
A005T	F038S	C402S	D095Q	V128I	K152V	L185V	R210G	V243Q	Y268A	I301E	K435F	N358T	L391Y
A005V	F038T	C402T	D095S	V128K	K152W	L185W	R210K	V243R	Y268C	I301G	K435G	N358V	E392A
A005W	F038W	C402V	D095V	V128L	K152Y	L185Y	R210L	V243S	Y268F	I301H	K435H	N358W	E392C
A005Y	F038Y	C402W	D095W	V128P	A153C	F186A	R210M	V243T	Y268G	I301K	K435I	S359A	E392F
P006A	S039A	C402Y	D095Y	V128Q	A153E	F186D	R210N	V243W	Y268H	I301L	K435L	S359C	E392G
P006D	S039C	Y403A	I096A	V128R	A153F	F186G	R210P	V243Y	Y268K	I301M	K435P	S359D	E392K
P006E	S039D	Y403C	I096C	V128S	A153G	F186H	R210S	R244A	Y268L	I301N	K435R	S359E	E392L
P006F	S039F	Y403E	I096D	V128W	A153H	F186I	R210T	R244D	Y268N	I301P	K435S	S359F	E392M
P006G	S039G	Y403F	I096E	V128Y	A153I	F186K	R210V	R244G	Y268P	I301Q	K435T	S359G	E392P
P006H	S039L	Y403G	I096F	Y129A	A153K	F186L	R210W	R244H	Y268Q	I301R	K435V	S359H	E392Q
P006K	S039M	Y403H	I096G	Y129C	A153L	F186N	R210Y	R244I	Y268R	I301S	K435W	S359K	E392R
P006L	S039N	Y403K	I096H	Y129D	A153M	F186P	N211A	R244K	Y268S	I301V	K435Y	S359L	E392S
P006N	S039P	Y403L	I096L	Y129E	A153P	F186Q	N211C	R244M	Y268T	I301W	P436C	S359M	E392T
P006Q	S039Q	Y403M	I096N	Y129G	A153Q	F186R	N211F	R244N	Y268V	I301Y	P436D	S359P	E392V
P006R	S039R	Y403N	I096P	Y129H	A153R	F186S	N211G	R244P	Y268W	V302C	P436E	S359R	E392W
P006S	S039T	Y403P	I096R	Y129L	A153S	F186V	N211H	R244Q	T269A	V302D	P436G	S359T	E392Y
P006T	S039V	Y403Q	I096S	Y129M	A153T	F186W	N211I	R244S	T269C	V302E	P436H	S359V	Q393A
P006V	S039W	Y403R	I096T	Y129P	A153V	F186Y	N211K	R244T	T269D	V302F	P436I	S359W	Q393C
P006W	S039Y	Y403S	I096V	Y129Q	A153W	P187A	N211L	R244V	T269E	V302G	P436K	S360A	Q393D
P006Y	F040A	Y403T	I096W	Y129R	K154A	P187F	N211M	R244W	T269G	V302H	P436L	S360C	Q393F
P007A	F040D	S404A	T097A	Y129S	K154C	P187G	N211P	R244Y	T269K	V302I	P436M	S360E	Q393G
P007C	F040E	S404C	T097C	Y129T	K154D	P187H	N211R	N245A	T269L	V302L	P436Q	S360F	Q393H
P007D	F040G	S404D	T097D	Y129V	K154E	P187I	N211S	N245C	T269M	V302M	P436R	S360G	Q393I
P007F	F040I	S404F	T097E	Y129W	K154G	P187L	N211T	N245F	T269N	V302P	P436S	S360I	Q393K

Table 8 Mutants

Substitution													
P007G	F040K	S404G	T097F	K130C	K154H	P187M	N211V	N245G	T269P	V302R	P436T	S360K	Q393L
P007H	F040L	S404H	T097G	K130D	K154I	P187N	N211W	N245H	T269Q	V302S	P436W	S360L	Q393M
P007I	F040N	S404L	T097I	K130E	K154L	P187Q	D212A	N245I	T269R	V302T	P436Y	S360M	Q393N
P007K	F040Q	S404M	T097L	K130G	K154P	P187R	D212E	N245K	T269S	V302W	P437A	S360N	Q393P
P007L	F040R	S404N	T097N	K130H	K154R	P187S	D212G	N245L	T269V	V302Y	P437D	S360P	Q393R
P007M	F040S	S404P	T097P	K130I	K154S	P187T	D212H	N245P	T269Y	I303A	P437F	S360Q	Q393S
P007Q	F040T	S404R	T097Q	K130L	K154T	P187V	D212I	N245Q	R270A	I303C	P437G	S360R	Q393T
P007R	F040V	S404T	T097R	K130N	K154V	P187W	D212K	N245R	R270C	I303D	P437H	S360T	F394A
P007S	F040W	S404V	T097S	K130Q	K154W	P187Y	D212L	N245S	R270D	I303E	P437I	S360V	F394D
P007T	F040Y	S404W	T097W	K130R	K154Y	D188A	D212M	N245T	R270E	I303F	P437K	D361A	F394E
P007V	I041A	S404Y	T097Y	K130S	Q155A	D188C	D212N	N245V	R270F	I303G	P437L	D361C	F394G
P007W	I041C	T405A	F098A	K130T	Q155C	D188F	D212P	N245W	R270G	I303K	P437M	D361E	F394I
P007Y	I041D	T405C	F098C	K130V	Q155D	D188G	D212Q	R246A	R270H	I303L	P437Q	D361G	F394K
V008A	I041E	T405F	F098D	K130W	Q155F	D188H	D212S	R246C	R270I	I303M	P437R	D361H	F394L
V008D	I041F	T405G	F098E	K130Y	Q155G	D188L	D212T	R246D	R270M	I303P	P437S	D361L	F394N
V008E	I041G	T405I	F098G	N131C	Q155H	D188M	D212V	R246E	R270N	I303R	P437T	D361M	F394P
V008G	I041H	T405K	F098H	N131E	Q155K	D188N	D212W	R246G	R270P	I303S	P437W	D361N	F394Q
V008H	I041N	T405L	F098I	N131F	Q155L	D188P	D213A	R246H	R270Q	I303V	P437Y	D361P	F394R
V008I	I041P	T405M	F098L	N131G	Q155M	D188Q	D213E	R246I	R270S	I303W	M438A	D361Q	F394S
V008L	I041Q	T405P	F098M	N131H	Q155P	D188R	D213G	R246K	R270T	I303Y	M438C	D361R	F394T
V008M	I041R	T405Q	F098P	N131I	Q155R	D188S	D213H	R246L	R270V	W304A	M438D	D361S	F394V
V008N	I041S	T405R	F098Q	N131L	Q155S	D188T	D213K	R246M	R270Y	W304C	M438E	D361V	F394W
V008P	I041T	T405S	F098R	N131M	Q155T	D188V	D213L	R246P	I271A	W304D	M438G	D361W	S395A
V008Q	I041V	T405V	F098S	N131P	Q155V	D188W	D213M	R246S	I271D	W304G	M438L	D361Y	S395C
V008R	I041W	T405W	F098V	N131Q	Q155W	C189A	D213N	R246T	I271E	W304I	M438N	Y362A	S395D
V008S	G042A	T405Y	F098W	N131R	Q155Y	C189E	D213P	R246V	I271F	W304L	M438P	Y362C	S395E
V008T	G042C	L406A	Y099A	N131S	E156A	C189G	D213Q	R246W	I271G	W304M	M438Q	Y362E	S395G
V008W	G042D	L406C	Y099C	N131T	E156C	C189H	D213R	V247A	I271H	W304N	M438R	Y362G	S395H
I009A	G042E	L406D	Y099E	N131V	E156D	C189K	D213S	V247C	I271K	W304P	M438S	Y362H	S395K
I009C	G042H	L406E	Y099F	N131Y	E156G	C189L	D213V	V247F	I271L	W304Q	M438T	Y362K	S395L
I009D	G042I	L406F	Y099G	R132A	E156I	C189M	D213W	V247H	I271M	W304R	M438V	Y362L	S395M
I009E	G042K	L406G	Y099I	R132C	E156K	C189N	D213Y	V247I	I271P	W304S	M438W	Y362M	S395P

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Substitution													
I009G	G042L	L406I	Y099L	R132E	E156L	C189P	L214A	V247L	I271R	W304T	M438Y	Y362N	S395R
I009H	G042M	L406N	Y099N	R132F	E156M	C189R	L214C	V247M	I271S	W304V	E439A	Y362P	S395T
I009K	G042P	K415D	Y099P	R132H	E156P	C189S	L214D	V247N	I271T	W304Y	E439C	Y362R	S395V
I009L	G042Q	K415E	Y099Q	R132I	E156Q	C189T	L214E	V247P	I271V	G305C	E439F	Y362S	S395W
I009N	G042R	Y066S	Y099R	R132K	E156R	C189V	L214G	V247Q	I271W	G305D	E439G	Y362T	S395Y
I009P	G042S	Y066T	Y099S	R132L	E156S	C189W	L214H	V247R	V272A	G305E	E439H	Y362V	E396A
I009Q	G042T	Y066V	Y099T	L406P	E156T	C189Y	L214K	V247S	V272C	G305F	E439K	Y362W	E396C
I009R	G042V	I067C	Y099V	L406Q	E156V	Y190C	L214N	V247T	V272D	G305H	E439L	L363A	E396D
I009S	S043A	I067D	Y099W	L406R	E156W	Y190E	L214P	V247W	V272E	G305K	E439N	L363C	E396F
I009T	S043D	I067E	M100C	L406S	F157A	Y190F	L214Q	V247Y	V272G	G305L	E439P	L363D	E396G
I009V	S043E	I067F	M100E	L406T	F157C	Y190G	L214R	R248A	V272H	G305N	E439Q	L363E	E396H
P010D	S043F	I067G	M100F	L406V	F157D	Y190H	L214S	R248C	V272K	G305P	E439R	L363F	E396I
P010E	S043G	I067H	M100G	L406Y	F157E	Y190K	L214T	R248D	V272L	G305Q	E439S	L363G	E396L
P010F	S043H	I067L	M100K	S407A	F157G	Y190L	L214V	R248E	V272M	G305R	E439T	L363H	E396P
P010G	S043I	I067N	M100L	S407D	F157H	Y190N	L214Y	R248G	V272N	G305S	E439V	L363I	E396Q
P010H	S043K	I067P	M100N	S407E	F157I	Y190P	S215A	R248H	V272P	G305T	E439W	L363P	E396R
P010I	S043L	I067Q	M100P	S407F	F157K	Y190Q	S215C	R248I	V272R	G305V	T440A	L363Q	E396S
P010L	S043N	I067R	M100Q	S407G	F157L	Y190R	S215D	R248L	V272S	G305Y	T440D	L363R	E396T
P010M	S043P	I067T	M100R	S407H	F157M	Y190S	S215E	R248M	V272T	T306A	T440E	L363S	E396V
P010N	S043Q	I067V	M100S	S407L	F157P	Y190T	S215G	R248P	V272W	T306C	T440F	L363T	E396Y
P010Q	S043R	I067W	M100T	S407M	F157Q	Y190V	S215H	R248S	F273A	T306D	T440G	L363V	K397A
P010R	S043T	I067Y	M100V	S407N	F157R	Y190W	S215K	R248T	F273C	T306E	T440H	L363W	K397C
P010S	S043V	D068A	M100W	S407P	F157S	N191A	S215L	R248V	F273D	T306F	T440I	H364A	K397E
P010T	P044A	D068C	M100Y	S407Q	F157T	N191E	S215M	R248W	F273G	T306G	T440L	H364C	K397F
P010W	P044C	D068E	P101A	S407R	F157V	N191F	S215P	R248Y	F273H	T306H	T440M	H364D	K397G
P010Y	P044E	D068G	P101C	S407T	F157W	N191G	S215Q	E249A	F273I	T306I	T440P	H364E	K397I
N011A	P044F	D068H	P101F	S407V	E158A	N191K	S215R	E249G	F273L	T306L	T440Q	H364F	K397L
N011C	P044G	D068I	P101G	S407W	E158C	N191L	S215T	E249H	F273P	T306P	T440R	H364G	K397M
N011D	P044H	D068K	P101H	C408A	E158D	N191M	S215V	E249I	F273Q	T306R	T440S	H364K	K397N
N011E	P044I	D068L	P101I	C408E	E158F	N191P	S215W	E249K	F273R	T306S	T440V	H364L	K397P
N011F	P044L	D068P	P101K	C408F	E158G	N191Q	W216D	E249L	F273S	T306V	T440Y	H364M	K397Q
N011G	P044N	D068Q	P101L	C408G	E158H	N191R	W216E	E249M	F273T	T306W	I331K	H364P	K397R

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Substitution													
N011H	P044Q	D068R	P101M	C408I	E158K	N191S	W216G	E249P	F273V	T306Y	I331L	H364R	K397S
N011I	P044R	D068S	P101N	C408K	E158L	N191T	W216H	E249Q	F273W	L307C	I331Q	H364S	E441D
N011K	P044S	D068T	P101Q	C408L	E158N	N191V	W216I	E249R	F273Y	L307E	I331R	H364T	E441F
N011L	P044T	D068V	P101R	C408N	E158P	N191W	W216K	E249S	T274A	L307F	I331S	H364V	E441G
N011P	P044W	D068Y	P101S	C408P	E158Q	N191Y	W216L	E249T	T274C	L307G	I331T	H364Y	E441H
N011S	P044Y	S069A	P101T	C408R	E158R	H192C	W216M	E249V	T274E	L307I	I331W	L365A	E441K
N011T	R045A	S069C	P101Y	C408S	E158S	H192F	W216N	E249W	T274F	L307K	I331Y	L365C	E441L
N011W	R045D	S069E	V102A	C408T	E158V	H192G	W216P	E249Y	T274G	L307N	I332A	L365D	E441N
N011Y	R045F	S069F	V102C	C408V	E158Y	H192K	W216Q	A250C	T274H	L307P	I332C	L365E	E441Q
V012A	R045G	S069G	V102E	C408W	K159A	H192L	W216R	A250F	T274L	L307Q	I332D	L365G	E441R
V012D	R045H	S069I	V102G	C408Y	K159D	H192M	W216T	A250G	T274N	L307R	I332E	L365I	E441S
V012E	R045I	S069L	V102H	K409A	K159E	H192N	W216V	A250H	T274P	L307S	I332F	L365M	E441T
V012G	R045K	S069M	V102K	K409C	K159F	H192P	W216Y	A250K	T274Q	L307T	I332G	L365N	E441V
V012H	R045M	S069N	V102L	K409D	K159G	H192Q	L217A	A250L	T274R	L307V	I332H	L365P	E441Y
V012I	R045P	S069P	V102M	K409E	K159H	H192R	L217C	A250M	T274S	L307W	I332K	L365Q	E442C
V012K	R045Q	S069R	V102N	K409G	K159L	H192S	L217E	A250N	T274V	L307Y	I332L	L365R	E442G
V012L	R045S	S069T	V102P	K409H	K159M	H192T	L217G	A250P	T274W	S308C	I332N	L365S	E442H
V012M	R045T	S069V	V102Q	K409I	K159N	H192V	L217H	A250Q	T274Y	S308D	I332P	L365T	E442K
V012N	R045V	S069W	V102R	K409L	K159Q	H192W	L217I	A250R	D275A	S308F	I332R	L365V	E442L
V012P	R045W	S069Y	V102S	K409P	K159R	H192Y	L217M	A250S	D275C	S308G	I332S	L365W	E442M
V012R	R045Y	I070A	V102T	K409Q	K159S	H193A	L217P	A250T	D275E	S308H	I332T	L365Y	E442N
V012S	I046A	I070C	V102W	K409R	K159V	H193C	L217Q	A250V	D275F	S308K	I332Y	N366A	E442P
V012T	I046C	I070F	D103A	K409S	K159W	H193D	L217R	A250W	D275G	S308L	N333A	N366C	E442Q
V012W	I046E	I070G	D103E	K409T	K159Y	H193F	L217S	I251C	D275I	S308M	N333E	N366E	E442R
P013A	I046F	I070H	D103F	K409V	A160C	H193G	L217T	I251D	D275K	S308N	N333G	N366F	E442S
P013E	I046H	I070K	D103G	K409W	A160F	H193K	L217V	I251F	D275L	S308P	N333H	N366G	E442T
P013F	I046L	I070L	D103H	A412Y	A160G	H193L	L217W	I251G	D275M	S308R	N333I	N366K	E442V
P013G	I046M	I070N	D103I	E410D	A160H	H193M	L217Y	I251H	D275Q	S308T	N333K	N366L	E442W
P013H	I046N	I070P	D103L	E410G	A160I	H193P	W218A	I251K	D275R	S308V	N333L	N366M	E442Y
P013I	I046P	I070Q	D103N	E410I	A160K	H193Q	W218D	I251L	D275S	S308W	N333M	N366P	P443A
P013L	I046R	I070R	D103Q	E410K	A160L	H193R	W218F	I251M	D275T	S308Y	N333P	N366Q	P443D
P013M	I046S	I070S	D103R	E410L	A160M	H193S	W218G	I251P	D275V	I309D	N333R	N366R	P443E

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Substitution													
P013Q	I046T	I070T	D103S	E410M	A160N	H193T	W218H	I251Q	D275W	I309E	N333S	N366S	P443F
P013R	I046V	I070V	D103T	E410N	A160Q	H193V	W218I	I251S	Q276C	I309G	N333T	N366T	P443G
P013S	I046W	I070Y	D103V	E410P	A160R	H193Y	W218K	I251T	Q276D	I309H	N333V	N366V	P443H
P013T	I046Y	T071A	D103W	E410Q	A160S	Y194A	W218L	I251V	Q276E	I309K	N333W	N366W	P443I
P013V	N047A	T071C	D103Y	E410R	A160V	Y194C	W218M	I251W	Q276F	I309L	N333Y	P367A	P443L
P013W	N047D	T071D	N104A	E410S	A160W	Y194E	W218P	I251Y	Q276G	I309M	V334A	P367C	P443M
P013Y	N047F	T071E	N104C	E410T	A160Y	Y194F	W218Q	R252A	Q276H	I309N	V334C	P367E	P443N
F014A	N047G	T071G	N104F	E410V	G161A	Y194G	W218R	R252D	Q276I	I309Q	V334D	P367F	P443Q
F014D	N047H	T071H	N104G	E410W	G161C	Y194I	W218S	R252E	Q276L	I309R	V334E	P367G	P443R
F014E	N047I	T071L	N104H	E410Y	G161D	Y194L	W218T	R252F	Q276M	I309S	V334G	P367H	P443S
F014G	N047K	T071M	N104I	K411A	G161E	Y194N	W218V	R252G	Q276P	I309T	V334H	P367I	P443T
F014H	N047L	T071N	N104K	K411D	G161H	Y194P	N219A	R252H	Q276R	I309V	V334L	P367K	P443W
F014I	N047M	T071P	N104L	K411E	G161I	Y194Q	N219C	R252I	Q276S	I309W	V334M	P367L	Q444C
F014K	N047P	T071Q	N104M	K411F	G161K	Y194R	N219D	R252K	Q276V	I309Y	V334N	P367M	Q444D
F014M	N047Q	T071R	N104P	K411G	G161L	Y194S	N219E	R252L	Q276W	M310A	V334P	P367Q	Q444E
F014N	N047R	T071S	N104R	K411H	G161M	Y194T	N219G	R252N	Q276Y	M310C	V334Q	P367R	Q444F
F014P	N047S	T071V	N104S	K411I	G161Q	Y194V	N219H	R252P	V277A	M310E	V334R	P367S	Q444G
F014Q	N047T	T071Y	N104T	K411L	G161R	Y194W	N219I	R252S	V277C	M310F	V334S	P367V	Q444H
F014R	N047V	G072A	N104V	K411N	G161S	K195A	N219K	R252T	V277D	M310G	V334T	P367W	Q444I
F014T	N047W	G072C	N104W	K411P	G161T	K195E	N219L	R252V	V277E	M310K	V334Y	D368A	Q444K
F014V	N047Y	G072D	L105A	K411R	G161V	K195F	N219M	R252Y	V277G	M310L	T335A	D368C	Q444L
F014W	A048C	G072E	L105C	K411S	G161W	K195G	N219P	V253A	V277H	M310N	T335C	D368E	Q444M
L015A	A048E	G072F	L105D	K411T	K162A	K195H	N219R	V253D	V277K	M310P	T335F	D368G	Q444N
L015E	A048F	G072H	L105E	K411V	K162D	K195I	N219S	V253E	V277L	M310Q	T335G	D368H	Q444R
L015F	A048G	G072I	L105G	K411W	K162E	K195L	N219T	V253G	V277M	M310R	T335H	D368K	Q444V
L015G	A048H	G072K	L105H	A412D	K162F	K195N	N219W	V253H	V277N	M310S	T335I	D368L	Q444W
L015K	A048I	G072L	L105I	A412E	K162G	K195Q	E220A	V253I	V277Q	M310V	T335K	D368M	Q444Y
L015M	A048K	G072M	L105M	A412G	K162H	K195R	E220D	V253L	V277R	M310W	T335L	D368P	I445A
L015N	A048L	G072P	L105N	A412H	K162L	K195S	E220G	V253M	V277S	M310Y	T335N	D368R	I445C
L015P	A048M	G072Q	L105P	A412I	K162M	K195T	E220H	V253N	V277T	R311A	T335P	D368S	I445D
L015Q	A048N	G072R	L105Q	A412L	K162P	K195V	E220I	V253P	V277Y	R311C	T335Q	D368T	I445G
L015R	A048P	G072S	L105R	A412N	K162Q	K195W	E220K	V253Q	L278A	R311E	T335S	D368V	I445H

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Substitution													
L015S	A048Q	G072T	L105S	A412P	K162R	K195Y	E220L	V253R	L278E	R311F	T335V	D368W	I445K
L015T	A048R	G072V	L105T	A412Q	K162S	K196A	E220M	V253S	L278F	R311G	T335W	D368Y	I445L
L015V	A048S	G072W	L105V	A412R	K162V	K196C	E220N	V253T	L278G	R311H	T335Y	N369A	I445M
L015W	A048V	G072Y	L105W	A412S	K162W	K196D	E220P	V253W	L278H	R311I	L336A	N369C	I445N
L015Y	A048W	V073A	G106A	A412V	K162Y	K196E	E220R	S254C	L278I	R311K	L336E	N369E	I445P
W016A	A048Y	V073C	G106C	A412W	D163A	K196G	E220S	S254D	L278K	R311L	L336F	N369F	I445Q
W016C	T049A	V073D	G106D	D413A	D163C	K196I	E220T	S254E	L278M	R311P	L336G	N369H	I445R
W016D	T049C	V073F	G106E	D413E	D163E	K196L	E220V	S254G	L278N	R311Q	L336H	N369I	I445S
W016E	T049D	V073G	G106F	D413F	D163F	K196N	E220W	S254I	L278P	R311S	L336K	N369K	I445T
W016F	T049F	V073H	G106H	D413G	D163G	K196P	S221A	S254K	L278R	R311T	L336M	N369L	I445V
W016G	T049G	V073K	G106I	D413H	D163H	K196R	S221C	S254L	L278S	R311V	L336N	N369P	I445W
W016H	T049H	V073L	G106L	D413I	D163K	K196S	S221D	S254N	L278T	R311W	L336P	N369Q	I445Y
W016K	T049I	V073M	G106M	D413K	D163L	K196T	S221E	S254P	L278V	S312A	L336R	N369R	F446A
W016L	T049K	V073P	G106N	D413L	D163P	K196V	S221G	S254Q	L278Y	S312C	L336S	N369S	F446C
W016M	T049L	V073Q	G106P	D413N	D163Q	K196W	S221H	S254R	K279A	S312E	L336T	N369T	F446D
W016P	T049N	V073R	G106S	D413P	D163R	K196Y	S221I	S254T	K279C	S312F	L336V	N369V	F446E
W016R	T049P	V073S	G106V	D413Q	D163S	P197A	S221K	S254V	K279D	S312G	L336W	N369W	F446G
W016S	T049R	V073T	G106W	D413R	D163T	P197C	S221L	S254W	K279F	S312H	L336Y	F370A	F446H
W016T	T049S	V073W	G106Y	D413S	D163V	P197D	S221M	S254Y	K279G	S312K	A337C	F370D	F446I
W016Y	T049V	T074A	M107A	D413T	D163W	P197E	S221P	K255A	K279H	S312L	A337F	F370E	F446K
A017D	T049W	T074C	M107C	D413W	F164A	P197F	S221Q	K255C	K279L	S312M	A337G	F370G	F446L
A017E	G050A	T074E	M107D	V414A	F164C	P197G	S221R	K255D	K279P	S312N	A337H	F370H	F446M
A017G	G050C	T074F	M107F	V414D	F164D	P197H	S221T	K255G	K279Q	S312P	A337I	F370I	F446Q
A017H	G050D	T074G	M107G	V414E	F164E	P197K	S221V	K255H	K279R	S312Q	A337K	F370K	F446R
A017I	G050E	T074H	M107H	V414F	F164G	P197L	T222A	K255L	K279S	S312R	A337L	F370L	F446T
A017L	G050F	T074K	M107I	V414G	F164H	P197M	T222D	K255N	K279T	S312T	A337M	F370N	F446V
A017N	G050H	T074L	M107K	V414H	F164L	P197Q	T222E	K255P	K279V	S312V	A337N	F370P	F446W
A017P	G050L	T074M	M107L	V414I	F164M	P197R	T222F	K255Q	K279W	S312W	A337P	F370Q	Y447D
A017Q	G050M	T074N	M107P	V414K	F164N	P197S	T222G	K255R	K279Y	M313A	A337R	F370R	Y447E
A017R	G050P	T074P	M107Q	V414L	F164P	P197T	T222I	K255S	F280D	M313C	A337S	F370S	Y447F
A017S	G050Q	T074R	M107R	V414M	F164Q	P197W	T222K	K255T	F280E	M313D	A337T	F370V	Y447G
A017T	G050R	T074S	M107S	V414Q	F164R	G198A	T222L	K255V	F280G	M313E	A337V	F370Y	Y447I

Table 8 Mutants

Substitution													
A017V	G050S	T074V	M107V	V414R	F164S	G198C	T222N	K255W	F280H	M313F	A337W	A371C	Y447K
A017W	G050V	T074W	M107W	V414S	F164V	G198D	T222P	K255Y	F280I	M313G	A338C	A371E	Y447L
A017Y	G050W	V075A	A108D	V414T	F164W	G198E	T222R	I256A	F280L	M313H	A338D	A371F	Y447M
W018C	G050Y	V075C	A108E	V414Y	L165A	G198H	T222S	I256C	F280M	M313K	A338E	A371G	Y447N
W018D	Q051A	V075D	A108F	K415A	L165C	G198L	T222V	I256D	F280N	M313L	A338F	A371H	Y447P
W018F	Q051C	V075F	A108G	K415C	L165D	G198N	T222W	I256E	F280P	M313P	A338G	A371I	Y447Q
W018G	Q051D	V075G	A108H	C423R	L165F	G198P	T222Y	I256G	F280Q	M313R	A338H	A371K	Y447R
W018H	Q051F	V075H	A108K	C423S	L165G	G198Q	A223C	I256H	F280R	M313S	A338I	A371L	Y447T
W018I	Q051H	V075L	A108L	R132N	L165H	G198R	A223D	I256L	F280S	M313T	A338K	A371M	Y447V
W018L	Q051I	V075M	A108M	R132P	L165N	G198S	A223E	I256M	F280T	M313V	A338L	A371P	Y447W
W018M	Q051K	V075N	A108N	R132Q	L165P	K415G	A223G	I256N	F280V	M313Y	A338P	A371R	
W018P	Q051M	V075P	A108P	R132S	L165Q	K415L	A223H	I256P	F280W	K314A	A338Q	A371S	
W018Q	Q051N	V075Q	A108Q	R132T	L165R	K415M	A223K	I256Q	L281A	K314C	A338R	A371T	
W018R	Q051P	V075R	A108R	R132V	L165S	K415P	A223L	I256R	L281D	K314D	A338S	A371V	
W018S	Q051R	V075S	A108S	R132Y	L165T	K415Q	A223P	I256T	L281F	K314H	A338T	A371W	
W018T	Q051S	V075T	A108T	S133A	L165V	K415R	A223Q	I256V	L281G	K314I	A338V	I372A	
W018V	Q051T	V075W	A108V	S133D	L165W	K415S	A223R	I256W	L281H	K314L	K339D	I372D	
W018Y	Q051W	V075Y	A108Y	S133E	L165Y	K415T	A223S	P257A	L281I	K314N	K339E	I372E	
N019A	Q051Y	N076A	V109A	S133F	V166A	K415V	A223T	P257C	L281K	K314P	K339F	I372F	
N019C	G052A	N076C	V109C	S133G	V166C	K415W	A223V	P257D	L281N	K314Q	K339G	I372G	
N019F	G052C	N076D	V109D	S133H	V166D	K415Y	A223W	P257G	L281P	K314R	K339H	I372H	
N019G	G052E	N076F	V109E	S133I	V166E	D416C	A223Y	P257I	L281Q	K314S	K339L	I372K	
N019H	G052F	N076G	V109F	S133L	V166F	D416F	L224A	P257K	L281R	K314T	K339M	I372L	
N019I	G052H	N076I	V109G	S133M	V166G	D416G	L224D	P257L	L281S	K314V	K339N	I372N	
N019L	G052K	N076K	V109H	S133N	V166H	D416H	L224E	P257M	L281V	K314W	K339P	I372P	
N019M	G052L	N076L	V109L	S133P	V166L	D416I	L224F	P257N	L281W	K314Y	K339R	I372R	
N019P	G052N	N076P	V109M	S133R	V166N	D416K	L224G	P257Q	L281Y	S315A	K339S	I372S	
N019Q	G052P	N076Q	V109P	S133T	V166P	D416L	L224I	P257R	S282A	S315C	K339T	I372T	
N019R	G052Q	N076R	V109Q	S133V	V166Q	D416N	L224M	P257S	S282C	S315E	K339V	I372V	
N019S	G052R	N076S	V109R	S133W	V166R	D416Q	L224P	P257T	S282D	S315G	K339W	I372W	
N019V	G052S	N076T	V109T	I134A	V166T	D416R	L224Q	P257V	S282E	S315H	K339Y	Q373A	
N019W	G052T	N076V	V109W	I134C	V166W	D416S	L224R	P257W	S282F	S315I	M340A	Q373C	

Table 8 Mutants

Substitution													
N019Y	G052W	N076W	V109Y	I134D	V166Y	D416T	L224S	D258A	S282G	S315K	M340C	Q373E	
A020D	G052Y	G077D	I110A	I134F	E167A	D416V	L224T	D258E	S282L	S315L	M340D	Q373F	
A020E	V053A	G077E	I110C	I134G	E167D	D416W	L224V	D258G	S282M	S315M	M340E	Q373G	
A020F	V053C	G077F	I110D	I134H	E167F	D416Y	L224W	D258H	S282P	S315P	M340F	Q373H	
A020G	V053D	G077H	I110F	I134K	E167G	T417A	L224Y	D258I	S282Q	S315R	M340G	Q373K	
A020H	V053E	G077K	I110G	I134L	E167H	T417D	Y225A	D258L	S282R	S315T	M340H	Q373L	
A020K	V053G	G077L	I110H	I134P	E167K	T417E	Y225D	D258N	S282T	S315V	M340K	Q373M	
A020L	V053H	G077M	I110K	I134Q	E167L	T417F	Y225E	D258P	S282V	S315W	M340L	Q373N	
A020N	V053L	G077N	I110L	I134R	E167M	T417G	Y225G	D258Q	S282W	S315Y	M340P	Q373P	
A020P	V053N	G077P	I110M	I134S	E167N	T417H	Y225H	D258R	S282Y	C316A	M340R	Q373R	
A020Q	V053P	G077Q	I110N	I134T	E167P	T417I	Y225K	D258S	Q283A	C316D	M340S	Q373S	
A020R	V053Q	G077R	I110P	I134V	E167R	T417K	Y225L	D258T	Q283C	C316E	M340T	Q373T	
A020S	V053R	G077S	I110R	I134W	E167S	T417L	Y225P	D258V	Q283D	C316G	M340V	Q373V	
A020T	V053S	G077T	I110S	E135A	E167T	T417M	Y225Q	D258W	Q283E	C316I	M340W	Q373W	
A020V	V053T	G077V	I110V	E135C	E167V	T417P	Y225R	D258Y	Q283F	C316K	C341A	L374A	
A020Y	V053W	G077Y	I110W	E135D	E167Y	T417Q	Y225S	A259E	Q283G	C316L	C341E	L374D	
P021A	V053Y	G078A	D111C	E135F	T168A	T417R	Y225T	A259G	Q283H	C316M	C341G	L374E	
P021C	T054A	G078C	D111E	E135G	T168C	T417S	Y225V	A259I	Q283L	C316P	C341H	L374G	
P021D	T054D	G078D	D111G	E135H	T168D	T417W	Y225W	A259K	Q283N	C316R	C341K	L374H	
P021E	T054E	G078H	D111H	E135K	T168E	D418A	P226A	A259L	Q283P	C316S	C341L	L374I	
P021G	T054F	G078I	D111I	E135L	T168F	D418C	P226C	A259M	Q283R	C316T	C341M	L374M	
P021H	T054G	G078K	D111K	E135N	T168G	D418E	P226D	A259N	Q283S	C316V	C341N	L374N	
P021I	T054H	G078L	D111L	E135P	T168H	D418F	P226E	A259P	Q283T	C316W	C341Q	L374P	
P021K	T054I	G078M	D111M	E135Q	T168K	D418G	P226F	A259Q	Q283W	C316Y	C341R	L374R	
P021L	T054M	G078P	D111P	E135R	T168L	D418I	P226G	A259R	Q283Y	L317A	C341S	L374S	
P021M	T054N	G078Q	D111Q	E135S	T168P	D418L	P226L	A259S	D284A	L317C	C341T	L374T	
P021R	T054P	G078R	D111R	E135W	T168R	D418M	P226N	A259T	D284C	L317D	C341V	L374V	
P021S	T054Q	G078S	D111S	E135Y	T168S	D418N	P226Q	A259V	D284E	L317G	C341W	L374W	
P021T	T054R	G078T	D111T	L136A	T168V	D418P	P226R	A259W	D284G	L317H	C341Y	L374Y	
P021V	T054S	G078V	D111V	L136C	T168W	D418Q	P226S	A259Y	D284H	L317I	S342A	E375A	
P021W	T054V	G078Y	D111W	L136D	T168Y	D418R	P226T	K260A	D284I	L317K	S342D	E375C	
S022A	T054Y	I079A	D111Y	L136F	I169A	D418S	P226V	K260C	D284L	L317M	S342E	E375F	

Table 8 Mutants

Substitution													
S022C	I055A	I079D	W112C	L136G	I169D	D418V	P226W	K260D	D284M	L317N	S342F	E375G	
S022D	I055C	I079F	W112D	L136H	I169F	D418Y	P226Y	K260E	D284N	L317P	S342G	E375I	
S022E	I055D	I079G	W112E	L136I	I169G	A419D	S227A	K260G	D284P	L317Q	S342H	E375K	
S022G	I055F	I079H	W112F	L136M	I169H	A419E	S227F	K260H	D284Q	L317R	S342I	E375L	
S022H	I055G	I079K	W112G	L136N	I169K	A419F	S227G	K260L	D284S	L317S	S342K	E375M	
S022K	I055H	I079L	W112H	L136P	I169L	A419G	S227H	K260M	D284T	L317T	S342L	E375N	
S022L	I055L	I079N	W112I	L136Q	I169N	A419H	S227I	K260P	D284V	L317W	S342M	E375P	
S022M	I055N	I079P	W112L	L136R	I169P	A419I	S227K	K260Q	D284Y	L318C	S342P	E375R	
S022N	I055P	I079R	W112N	L136S	I169Q	A419K	S227L	K260R	E285A	L318D	S342Q	E375S	
S022P	I055Q	I079S	W112P	L136T	I169R	A419L	S227M	K260S	E285F	L318F	S342R	E375T	
S022R	I055R	I079T	W112Q	L136W	I169S	A419N	S227P	K260V	E285G	L318G	S342T	E375V	
S022T	I055S	I079V	W112R	V137A	I169T	A419P	S227Q	K260W	E285H	L318H	S342Y	E375Y	
S022V	I055T	I079W	W112S	V137C	I169V	A419R	S227R	K260Y	E285K	L318I	Q343C	K376A	
S022Y	I055V	I079Y	W112V	V137E	I169Y	A419S	S227T	S261A	E285M	L318K	Q343D	K376D	
E023A	I055Y	P080A	W112Y	V137F	K170A	A419T	S227V	S261E	E285N	L318M	Q343E	K376E	
E023D	F056A	P080D	E113A	V137G	K170C	A419W	S227W	S261F	E285P	L318N	Q343F	K376G	
E023F	F056C	P080E	E113C	V137H	K170D	A419Y	S227Y	S261G	E285Q	L318P	Q343G	K376I	
E023G	F056E	P080F	E113D	V137I	K170E	V420A	I228A	S261I	E285R	L318Q	Q343I	K376L	
E023H	F056G	P080G	E113F	V137L	K170G	V420D	I228E	S261K	E285S	L318R	Q343L	K376M	
E023L	F056H	P080I	E113G	V137N	K170I	V420F	I228F	S261L	E285T	L318S	Q343M	K376P	
E023M	F056I	P080K	E113H	V137P	K170L	V420G	I228G	S261M	E285V	L318T	Q343P	K376Q	
E023N	F056K	P080L	E113L	V137Q	K170M	V420H	I228H	S261N	E285W	L318W	Q343R	K376R	
E023P	F056L	P080M	E113P	V137R	K170N	V420I	I228K	S261P	E285Y	L319C	Q343S	K376S	
E023Q	F056N	P080N	E113Q	V137S	K170P	V420K	I228L	S261Q	L286A	L319E	Q343T	K376T	
E023R	F056P	P080R	E113R	V137T	K170Q	V420L	I228M	S261R	L286C	L319F	Q343V	K376V	
E023S	F056R	P080S	E113S	V137W	K170R	V420N	I228N	S261T	L286D	L319G	Q343W	K376W	
E023T	F056S	P080T	E113T	V137Y	K170V	V420P	I228P	S261V	L286E	L319H	Q343Y	K376Y	
E023V	F056T	P080V	E113V	Q138A	K170W	V420R	I228Q	S261W	L286F	L319I	V344E	G377C	
E023W	F056V	P080Y	E113W	Q138C	K170Y	V420S	I228R	P262A	L286G	L319K	V344F	G377D	
F024A	F056W	Q081A	E113Y	Q138E	L171A	V420T	I228S	P262D	L286H	L319M	V344G	G377E	
F024C	Y057A	Q081C	E114A	Q138F	L171C	V420W	I228T	P262E	L286K	L319P	V344H	G377F	
F024E	Y057D	Q081E	E114C	Q138G	L171D	V420Y	I228W	P262F	L286M	L319Q	V344I	G377H	

Table 8 Mutants

Substitution													
F024G	Y057E	Q081F	E114D	Q138H	L171G	D421A	Y229E	P262G	L286P	L319R	V344L	G377I	
F024H	Y057F	Q081G	E114G	Q138I	L171H	D421E	Y229F	P262H	L286R	L319S	V344M	G377K	
F024I	Y057G	Q081H	E114H	Q138L	L171I	D421G	Y229G	P262I	L286S	L319V	V344N	G377L	
F024K	Y057I	Q081L	E114I	Q138M	L171M	D421H	Y229H	P262K	L286T	L319W	V344P	G377M	
F024L	Y057L	Q081M	E114L	Q138N	L171N	D421I	Y229I	P262Q	L286W	L319Y	V344Q	G377P	
F024M	Y057M	Q081N	E114M	Q138R	L171P	D421K	Y229K	P262R	L286Y	D320C	V344R	G377R	
F024N	Y057P	Q081P	E114P	Q138S	L171Q	D421L	Y229L	P262S	V287A	D320E	V344S	G377S	
F024P	Y057Q	Q081R	E114R	Q138V	L171R	D421M	Y229N	P262T	V287C	D320F	V344T	G377T	
F024R	Y057R	Q081S	E114S	Q138W	L171S	D421N	Y229P	P262V	V287D	D320G	V344W	G377V	
F024T	Y057S	Q081V	E114T	Q138Y	L171V	D421Q	Y229Q	P262W	V287E	D320H	V344Y	G377Y	
F024V	Y057T	Q081W	E114V	Q139A	L171W	D421R	Y229R	P262Y	V287F	D320I	L345A	G378D	
F024Y	Y057V	Q081Y	E114W	Q139C	L171Y	D421S	Y229S	L263A	V287G	D320K	L345C	G378E	
C025D	Y057W	K082A	E114Y	Q139D	G172A	D421T	Y229T	L263E	V287I	D320L	L345D	G378F	
C025E	V058A	K082E	W115A	Q139E	G172C	D421W	Y229V	L263F	V287K	D320M	L345E	G378I	
C025F	V058C	K082G	W115C	Q139F	G172D	D421Y	Y229W	L263G	V287L	D320N	L345G	G378K	
C025G	V058D	K082H	W115D	Q139G	G172E	V422A	L230A	L263H	V287N	D320P	L345H	G378L	
C025H	V058G	K082I	W115F	Q139H	G172I	V422C	L230E	L263K	V287P	D320R	L345K	G378M	
C025I	V058H	K082L	W115G	Q139K	G172L	V422D	L230G	L263M	V287Q	D320S	L345N	G378N	
C025K	V058I	K082M	W115H	Q139L	G172M	V422E	L230H	L263N	V287R	D320V	L345P	G378Q	
C025L	V058K	K082N	W115I	Q139M	G172P	V422G	L230I	L263P	V287S	D320W	L345Q	G378R	
C025N	V058L	K082P	W115K	Q139P	G172Q	V422H	L230K	L263Q	V287T	D320Y	L345R	G378S	
C025P	V058N	K082Q	W115L	Q139R	G172R	V422I	L230M	L263R	Y288D	N321A	L345T	G378T	
C025R	V058P	K082R	W115M	Q139S	G172S	V422L	L230N	L263S	Y288E	N321D	L345V	G378V	
C025S	V058Q	K082S	W115P	Q139T	G172T	V422M	L230P	L263T	Y288F	N321E	L345W	G378W	
C025T	V058R	K082T	W115R	Q139V	G172V	V422N	L230R	L263V	Y288G	N321G	L345Y	G378Y	
C025V	V058S	K082V	W115S	Q140A	G172W	V422P	L230S	L263W	Y288H	N321H	C346A	K379A	
C025Y	V058W	K082W	W115V	Q140C	G172Y	V422Q	L230T	P264A	Y288I	N321I	C346D	K379C	
L026A	V058Y	K082Y	W115Y	Q140D	K173D	V422R	L230V	P264D	Y288K	N321K	C346F	K379E	
L026E	D059A	I083E	R116A	Q140F	K173E	V422S	L230W	P264E	Y288L	N321L	C346G	K379F	
L026G	D059E	I083F	R116C	Q140G	K173G	V422T	L230Y	P264F	Y288P	N321M	C346I	K379G	
L026H	D059G	I083G	R116D	Q140H	K173H	V422W	N231A	P264G	Y288Q	N321P	C346K	K379H	
L026I	D059H	I083H	R116E	Q140I	K173I	V422Y	N231C	P264H	Y288R	N321R	C346L	K379I	

Table 8 Mutants

Substitution													
L026K	D059I	I083K	R116G	Q140K	K173L	C423A	N231D	P264L	Y288S	N321S	C346M	K379L	
L026M	D059L	I083L	R116H	Q140L	K173M	C423D	N231F	P264M	Y288T	N321T	C346P	K379M	
L026P	D059M	I083N	R116I	Q140M	K173N	C423E	N231G	P264N	Y288V	N321V	C346Q	K379N	
L026Q	D059N	I083P	R116L	Q140R	K173P	C423F	N231H	P264R	Y288W	N321Y	C346R	K379R	
L026R	D059P	I083Q	R116N	Q140S	K173Q	C423G	N231I	P264S	T289A	Y322C	C346S	K379S	
L026S	D059Q	I083R	R116P	Q140V	K173R	C423H	N231K	P264T	T289C	Y322D	C346T	K379T	
L026T	D059R	I083S	R116Q	Q140W	K173S	C423L	N231L	P264V	T289E	Y322E	C346V	K379V	
L026V	D059T	I083T	R116S	Q140Y	K173V	C423M	N231P	P264W	T289G	Y322F	C346W	K379W	
L026W	D059V	I083V	R116T	N141A	K173W	C423P	N231Q	P264Y	T289H	Y322G	Q347A	F380A	
L026Y	D059W	I083Y	R116V	N141D	K173Y	C423Q	N231R	V265A	T289K	Y322H	Q347C	F380C	
G027A	D059Y	S084D	R116W	N141E	L174A	A432I	N231S	V265C	T289L	Y322I	Q347E	F380D	
G027C	R060A	S084E	P117D	N141F	L174C	A432K	N231T	V265D	T289M	Y322L	Q347F	F380E	
G027D	R060D	S084F	P117E	N141G	L174G	G198T	N231V	V265E	T289N	Y322N	Q347G	F380G	
G027E	R060F	S084G	P117F	N141H	L174H	G198V	T232A	V265F	T289P	Y322P	Q347I	F380I	
G027F	R060G	S084H	P117G	N141L	L174K	G198W	T232C	C423T	T289Q	Y322R	Q347L	F380L	
G027H	R060H	S084I	P117H	N141M	L174M	G198Y	T232F	C423V	T289R	Y322S	Q347M	F380P	
G027I	R060I	S084L	P117I	N141P	L174N	Y199A	T232G	C423W	T289S	Y322T	Q347P	F380Q	
G027K	R060K	S084M	P117K	N141Q	L174P	Y199C	T232H	I424A	T289V	Y322V	Q347R	F380R	
G027L	R060L	S084N	P117N	N141R	L174Q	Y199E	T232K	I424C	T289Y	Y322W	Q347S	F380S	
G027P	R060N	S084P	P117Q	N141S	L174R	Y199G	T232L	I424E	F290A	M323A	Q347T	F380T	
G027Q	R060P	S084Q	P117R	N141T	L174S	Y199H	T232M	I424G	F290C	M323C	Q347V	F380V	
G027R	R060Q	S084R	P117S	N141V	L174T	Y199I	T232N	I424H	F290D	M323E	Q347W	F380W	
G027S	R060S	S084T	P117T	N141W	L174V	Y199K	T232P	I424K	F290G	M323F	Q347Y	F380Y	
G027T	R060T	S084W	P117V	N141Y	L174W	Y199L	T232Q	I424L	F290H	M323G	E348C	T381A	
G027W	R060V	S084Y	P117W	V142C	L174Y	Y199N	T232R	I424N	F290I	M323H	E348D	T381E	
K028A	R060Y	L085A	P117Y	V142D	L175C	Y199P	T232S	I424Q	F290K	M323I	E348G	T381F	
K028D	L061A	L085C	T118C	V142E	L175D	Y199Q	T232V	I424R	F290L	M323K	E348H	T381G	
K028E	L061E	L085D	T118D	V142G	L175E	Y199R	T232Y	I424S	F290M	M323L	E348I	T381H	
K028F	L061F	L085E	T118E	V142H	L175F	Y199S	Q233A	I424T	F290Q	M323N	E348L	T381K	
K028G	L061G	L085F	T118G	V142I	L175G	Y199T	Q233C	I424V	F290R	M323P	E348M	T381L	
K028I	L061H	L085G	T118H	V142K	L175H	Y199W	Q233D	I424W	F290S	M323R	E348P	T381N	
K028L	L061I	L085H	T118K	V142L	L175K	N200A	Q233F	I424Y	F290T	M323S	E348Q	T381P	

Table 8 Mutants

Substitution													
K028M	L061M	L085K	T118L	V142M	L175N	N200D	Q233G	A425C	F290V	M323T	E348R	T381Q	
K028N	L061N	L085N	T118M	V142N	L175P	N200F	Q233I	A425D	F290Y	M323V	E348S	T381R	
K028P	L061P	L085P	T118N	V142P	L175R	N200G	Q233K	A425E	G291A	E324A	E348T	T381S	
K028R	L061Q	L085Q	T118P	V142Q	L175S	N200H	Q233L	A425G	G291C	E324C	E348V	T381V	
K028S	L061R	L085R	T118Q	V142R	L175T	N200K	Q233P	A425I	G291D	E324D	E348W	T381W	
K028T	L061T	L085S	T118R	V142S	L175V	N200L	Q233R	A425K	G291E	E324F	E348Y	T381Y	
K028V	L061V	L085T	T118V	V142T	L175W	N200M	Q233S	A425L	G291F	E324G	Q349A	V382E	
K028W	L061W	L085V	T118W	Q143C	L175Y	N200P	Q233T	A425M	G291H	E324H	Q349D	V382G	
F029A	L061Y	Q086A	T118Y	Q143E	R176A	N200Q	Q233V	A425N	G291L	E324L	Q349E	V382H	
F029C	G062A	Q086C	W119A	Q143F	R176C	N200R	Q233W	A425P	G291M	E324M	Q349F	V382I	
F029E	G062C	Q086D	W119D	Q143G	R176E	N200S	Q233Y	A425R	G291N	E324N	Q349G	V382K	
F029G	G062D	Q086E	W119E	Q143H	R176F	N200T	Q234A	A425S	G291P	E324P	Q349H	V382L	
F029H	G062F	Q086F	W119F	Q143I	R176G	N200V	Q234C	A425V	G291Q	E324R	Q349K	V382M	
F029I	G062I	Q086G	W119G	Q143K	R176H	N200W	Q234D	A425W	G291R	E324S	Q349L	V382N	
F029K	G062K	Q086H	W119I	Q143L	R176I	N200Y	Q234E	A425Y	G291S	E324V	Q349M	V382P	
F029L	G062L	Q086I	W119K	Q143M	R176K	G201A	Q234G	D426A	G291T	E324W	Q349N	V382Q	
F029M	G062M	Q086K	W119L	Q143N	R176L	G201E	Q234H	D426C	G291V	E324Y	Q349P	V382R	
F029P	G062P	Q086L	W119N	Q143P	R176P	G201F	Q234L	D426E	G291W	T325A	Q349R	V382S	
F029R	G062Q	Q086M	W119P	Q143R	R176Q	G201H	Q234M	D426F	G291Y	T325C	Q349S	V382T	
F029S	G062R	Q086N	W119Q	Q143S	R176S	G201K	Q234N	D426G	E292A	T325D	Q349T	V382W	
F029T	G062S	Q086P	W119R	Q143T	R176T	G201L	Q234P	D426I	E292C	T325E	Q349V	V382Y	
F029V	G062T	Q086R	W119S	Q143V	R176V	G201M	Q234R	D426K	E292F	T325G	Q349W	R383A	
F029W	G062V	Q086S	W119V	Q143Y	R176W	G201N	Q234S	D426L	E292G	T325H	Q349Y	R383E	
D030A	G062Y	Q086T	W119Y	L144A	P177A	G201P	Q234T	D426M	E292H	T325I	G350A	R383F	
D030E	Y063A	Q086V	A120C	L144E	P177C	G201Q	Q234V	D426N	E292I	T325K	G350D	R383G	
D030F	Y063C	Q086W	A120D	L144F	P177D	G201R	Q234W	D426P	E292K	T325M	G350E	R383H	
D030G	Y063G	D087A	A120F	L144G	P177F	G201S	S235A	D426Q	E292L	T325N	G350F	R383I	
D030H	Y063H	D087C	A120G	L144I	P177G	G201T	S235E	D426R	E292N	T325Q	G350H	R383K	
D030K	Y063I	D087E	A120H	L144K	P177H	G201V	S235F	D426S	E292P	T325R	G350K	R383L	
D030L	Y063K	D087G	A120I	L144N	P177L	G201W	S235G	D426Y	E292Q	T325S	G350L	R383M	
D030M	Y063L	D087H	A120L	L144P	P177M	S202A	S235H	G427A	E292R	T325V	G350M	R383N	
D030P	Y063M	D087I	A120N	L144Q	P177Q	S202E	S235K	G427C	E292T	T325W	G350N	R383P	

Table 8 Mutants

Substitution													
D030Q	Y063N	D087L	A120P	L144R	P177R	S202F	S235L	G427F	E292V	I326A	G350P	R383S	
D030R	Y063P	D087M	A120R	L144S	P177S	S202G	S235M	G427H	E292W	I326C	G350R	R383T	
D030S	Y063R	D087P	A120S	L144T	P177T	S202H	S235P	G427I	T293A	I326D	G350S	R383V	
D030T	Y063S	D087Q	A120T	L144V	P177V	S202K	S235Q	G427K	T293C	I326E	G350T	R383W	
D030V	Y063T	D087R	A120V	L144W	P177W	S202M	S235R	G427L	T293D	I326G	G350V	G384A	
D030W	Y063V	D087S	A120W	L144Y	P177Y	S202N	S235T	G427P	T293E	I326H	G350Y	G384C	
E031A	Y063W	D087T	A120Y	S145A	N178A	S202P	S235V	G427Q	T293F	I326K	V351A	G384D	
E031C	Y064A	D087V	R121A	S145C	N178D	S202Q	S235W	G427R	T293G	I326L	V351C	G384E	
E031G	Y064C	D087Y	R121C	S145D	N178E	S202R	S235Y	G427S	T293K	I326N	V351D	G384F	
E031H	Y064D	H088A	R121D	S145E	N178G	S202T	P236A	G427T	T293L	I326P	V351E	G384H	
E031I	Y064E	H088C	R121E	S145F	N178I	S202V	P236C	G427V	T293M	I326R	V351F	G384I	
E031K	Y064F	H088E	R121F	S145G	N178K	S202W	P236E	G427W	T293N	I326S	V351G	G384K	
E031L	Y064G	H088F	R121G	S145H	N178L	S202Y	P236G	G427Y	T293P	I326V	V351H	G384L	
E031N	Y064H	H088G	R121H	S145L	N178M	C203A	P236H	V428A	T293Q	I326W	V351I	G384M	
E031P	Y064I	H088I	R121K	S145M	N178P	C203D	P236I	V428C	T293S	I326Y	V351L	G384P	
E031R	Y064K	H088K	R121L	S145N	N178R	C203E	P236K	V428D	T293V	L327A	V351N	G384Q	
E031S	Y064L	H088L	R121M	S145P	N178S	C203G	P236L	V428E	T293Y	L327D	V351Q	G384R	
E031T	Y064P	H088M	R121P	S145R	N178T	C203H	P236N	V428F	V294A	L327E	V351R	G384S	
E031V	Y064Q	H088P	R121S	S145T	N178V	C203L	P236Q	V428G	V294C	L327F	V351S	G384T	
E031W	Y064R	H088R	R121T	S145V	N178W	C203M	P236R	V428H	V294E	L327G	V351W	K385A	
E031Y	Y064S	H088S	R121V	S145W	N178Y	C203N	P236S	V428L	V294G	L327H	V351Y	K385C	
P032A	Y064T	H088T	R121W	L146A	H179A	C203P	P236T	V428M	V294H	L327M	C352A	K385G	
P032C	Y064V	H088V	R121Y	L146C	H179C	C203Q	P236W	V428N	V294K	L327N	C352D	K385H	
P032F	Y064W	H088Y	N122A	L146E	H179E	C203R	P236Y	V428P	V294L	L327Q	C352E	K385L	
P032G	P065A	L089A	N122C	L146G	H179G	C203S	V237A	V428R	V294M	L327R	C352F	K385M	
P032H	P065C	L089C	N122E	L146H	H179I	C203T	V237C	V428S	V294N	L327S	C352G	K385N	
P032K	P065D	L089D	N122F	L146I	H179K	C203V	V237E	V428T	V294P	L327T	C352K	K385P	
P032L	P065F	L089E	N122I	L146K	H179L	C203W	V237F	V428Y	V294Q	L327V	C352M	K385Q	
P032M	P065G	L089G	N122K	L146N	H179M	F204A	V237G	C429A	V294R	L327W	C352P	K385R	
P032N	P065H	L089K	N122L	L146P	H179N	F204C	V237H	C429D	V294S	L327Y	C352Q	K385S	
P032Q	P065I	L089M	N122M	L146Q	H179P	F204E	V237L	C429G	V294T	N328A	C352R	K385T	
P032R	P065K	L089N	N122P	L146R	H179R	F204G	V237N	C429I	V294W	N328C	C352S	K385V	

Table 8 Mutants

Substitution													
P032S	P065N	L089P	N122Q	L146S	H179S	F204H	V237P	C429K	A295C	N328D	C352T	K385W	
P032T	P065R	L089Q	N122R	L146T	H179T	F204I	V237Q	C429L	A295D	N328G	C352V	K385Y	
P032V	P065S	L089R	N122S	L146V	H179V	F204K	V237R	C429M	A295E	N328H	C352W	P386A	
P032W	P065T	L089S	N122T	L146Y	H179W	F204L	V237S	C429N	A295F	N328I	C352Y	P386C	
P032Y	P065V	L089T	N122V	T147A	L180A	F204M	V237T	C429P	A295G	N328K	I353A	P386F	
L033C	P065W	L089W	N122W	T147C	L180C	F204P	V237W	C429R	A295H	N328L	I353C	P386G	
L033D	P065Y	L089Y	W123A	T147D	L180E	F204Q	V237Y	C429S	A295I	N328Q	I353E	P386H	
L033G	Y066A	D090A	W123C	T147F	L180F	F204R	A238D	C429T	A295L	N328R	I353F	P386I	
L033H	Y066C	D090C	W123D	T147G	L180G	F204S	A238E	C429V	A295N	N328S	I353G	P386L	
L033I	Y066D	D090E	W123E	T147I	L180H	F204T	A238F	C429W	A295P	N328T	I353H	P386M	
L033M	Y066E	D090G	W123G	T147L	L180I	F204V	A238G	C429Y	A295Q	N328V	I353K	P386N	
L033N	Y066G	D090H	W123H	T147M	L180K	F204W	A238H	I430A	A295S	N328W	I353L	P386Q	
L033P	Y066H	D090I	W123L	T147P	L180M	N205A	A238K	I430D	A295T	N328Y	I353M	P386R	
L033Q	Y066I	D090K	W123M	T147Q	L180N	N205D	A238L	I430E	A295V	P329C	I353Q	P386S	
L033R	Y066K	D090L	W123P	T147R	L180P	N205E	A238P	I430G	A295Y	P329F	I353R	P386T	
L033S	Y066L	D090N	W123Q	T147S	L180R	N205F	A238Q	I430H	L296A	P329G	I353S	P386V	
L033T	Y066N	D090P	W123R	T147V	L180S	N205G	A238R	I430K	L296C	P329H	I353T	P386Y	
L033V	Y066P	D090Q	W123S	T147W	L180T	N205K	A238S	I430L	L296F	P329I	I353V	T387C	
L033W	Y066R	D090R	W123T	T147Y	L180W	N205L	A238T	I430M	L296G	P329K	I353W	T387E	