

Murata Manufacturing Co., Ltd

Power Supply Reference Guide for XILINX® FPGAs



Inside:

- Power Requirements of Xilinx Solutions in Typical Applications
- DC-DC Converter Selection Tables
- Reference Designs and List of Materials

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

2006 Sep

Power Requirements of Xilinx Solutions in Typical Applications



This information is intended to provide the designer with a general understanding of the power requirements of Xilinx FPGA families in typical applications. Simulation examples are shown in Appendix 1.

The number of logic gates, operating frequency and other factors affect the value of current consumption.

Please refer to the Xilinx Power Consumption Tools, available at

www.xilinx.com/power, for closer approximations specific to individual applications.

*** Unless otherwise specified all ICCO estimates represent the total operating current contributions of all I/O banks on the FPGAs measured at 85°C ambient temperature.**

	Spartan™-3/3E/3L	Spartan™-IIE	Spartan™-II	Virtex™-5	Virtex™-4	Virtex-II Pro™	Virtex™-II
V _{CCINT}	1.2V @0.2A-5A	1.8V @0.2A-1.5A	2.5V @0.2A-1A	1.0V @0.2A-15A	1.2V @0.2A-20A	1.5V @0.2A-20A	1.5V @0.2A-20A
V _{CCO}	1.2V-3.3V @50mA-3A	1.5V-3.3V @50mA-0.5A	1.5V-3.3V @50mA-0.5A	1.2V-3.3V @50mA-5A	1.2V-3.3V @50mA-3A	1.5V-3.3V @50mA-3A	1.5V-3.3V @50mA-3A
V _{CCAUX}	2.5V @50mA-0.3A	—	—	2.5V @50mA-0.7A	2.5V @50mA-0.7A	2.5V @50mA-0.3A	3.3V @50mA-0.3A
AV _{CCAUTX}	—	—	—	—	1.2V @150mA	2.5V @60mA/MGT	—
AV _{CCAUXRX}	—	—	—	—	1.2V @200mA	2.5V @35mA/MGT	—
AV _{TTX}	—	—	—	—	1.2V-1.575V @50mA	1.8V-2.625V @15mA/MGT	—
AV _{TRX}	—	—	—	—	1.0V-2.625V @15mA	1.8V-2.625V @30mA/MGT	—

Cautionary Note:

1. These power requirement numbers are estimated using Xilinx power tools, and, these numbers represent specific applications or implementations of FPGAs.
Users' specific applications may run at lower or higher power consumption levels.
2. Murata is happy to provide these estimates for use by customers as a guideline, however no guarantee is offered as to the accuracy of the numbers represented herein.

DC-DC Converter Selection Tables



Selection Table for Spartan™-3E/3/L

Table1. DC-DC Converter Selection Table for Spartan™-3E Device

Xilinx				muRata Solutions	
Device	Type	Voltage	Current	Vin=3.0-5.5V	Vin=10.8-13.2V
XC3S100E XC3S250E XC3S500E	V _{CCINT}	1.2V	0.2A-2A	MPD4S014S(1.3A/1A) MPD5S025S(1.6A/1.6A)	MPD4S014S(1.3A/1A)
XC3S1200E XC3S1600E	V _{CCO}	1.2V-3.3V	50mA-2A	MPD6S012S(3A) MPDTY102S(2A)	

Table2. DC-DC Converter Selection Table for Spartan™-3 Device

Xilinx				muRata Solutions	
Device	Type	Voltage	Current	Vin=3.0-5.5V	Vin=10.8-13.2V
XC3S50 XC3S200 XC3S400	V _{CCINT}	1.2V	0.2A-5A	MPD4S014S(1.3A/1A) MPD5S025S(1.6A/1.6A) MPD6S012S(3A) MPDTY102S(2A)	MPD4S014S(1.3A/1A) MPDTY303S(8A) MPDTH12050WAS(6A)
XC3S1000 XC3S1500 XC3S2000 XC3S4000 XC3S5000	V _{CCO}	1.2V-3.3V	50mA-3A	MPDTY301S(7A) MPDTY302S(7A) MPDTY411S(7A) MPDTY412S(7A) MPDTH03050WAS(6A) MPDTH05050WAS(6A)	

Table3. DC-DC Converter Selection Table for Spartan™-3L Device

Xilinx				muRata Solutions	
Device	Type	Voltage	Current	Vin=3.0-5.5V	Vin=10.8-13.2V
XC3S1000L XC3S1500L XC3S4000L	V _{CCINT}	1.2V	0.2A-4A	MPD4S014S(1.3A/1A) MPD5S025S(1.6A/1.6A) MPD6S012S(3A) MPDTY102S(2A)	MPD4S014S(1.3A/1A) MPDTH12050WAS(6A)
	V _{CCO}	1.2V-3.3V	50mA-3A	MPDTH03050WAS(6A) MPDTH05050WAS(6A)	

Note : The Xilinx devices' current requirements in these tables were calculated based on intensive design.
Please refer to Appendix 1 for details.

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

2006 Sep

DC-DC Converter Selection Tables



Selection Table for Spartan™-II/II-E

Table4. DC-DC Converter Selection Table for Spartan™-II-E Device

Xilinx				muRata Solutions	
Device	Type	Voltage	Current	Vin=3.0-5.5V	Vin=10.8-13.2V
XC2S50E	V _{CCINT}	1.8V	0.2A-1.5A	MPD4S014S(1.3A/1A) MPD5S025S(1.6A/1.6A) MPDTY102S(2A)	MPD4S014S(1.3A/1A)
XC2S100E					
XC2S150E					
XC2S200E					
XC2S300E	V _{CCO}	1.5V-3.3V	50mA-0.5A		
XC2S400E					
XC2S600E					

Table5. DC-DC Converter Selection Table for Spartan™-II Device

Xilinx				muRata Solutions	
Device	Type	Voltage	Current	Vin=3.0-5.5V	Vin=10.8-13.2V
XC2S15	V _{CCINT}	2.5V	0.2A-1A	MPD4S014S(1.3A/1A) MPD5S025S(1.6A/1.6A) MPDTY102S(2A)	MPD4S014S(1.3A/1A)
XC2S30					
XC2S50					
XC2S100					
XC2S150	V _{CCO}	1.5V-3.3V	50mA-0.5A		
XC2S200					

Note : The Xilinx devices' current requirements in these tables were calculated based on intensive design. Please refer to Appendix 1 for details.

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2006 Sep

DC-DC Converter Selection Tables



Selection Table for Virtex™-5

Table6. DC-DC Converter Selection Table for Virtex™-5 Device

Xilinx				muRata Solutions	
Device	Type	Voltage	Current	Vin=3.0-5.5V	Vin=10.8-13.2V
XC5VLX30 XC5VLX50 XC5VLX85 XC5VLX110 XC5VLX220 XC5VLX330	V _{CCINT}	1.0V	0.2A-15A	MPD TY301S(7A) MPD TY302S(7A) MPD TY311S(16A) MPD TY312S(16A) MPD TY411S(7A) MPD TY412S(7A) MPD TH03050WAS(6A) MPD TH05050WAS(6A) MPD TH03060WAS(10A) MPD TH05060WAS(10A) MPD TH03010WAS(15A) MPD TH05010WAS(15A)	MPD TY303S(8A) MPD TH12050WAS(6A) MPD TH12060WAS(10A) MPD TH12010WAS(12A)
	V _{CCO}	1.2V-3.3V	50mA-5A	MPD6S012S(3A) MPD TY102S(2A) MPD TY301S(7A) MPD TY302S(7A) MPD TY411S(7A) MPD TY412S(7A) MPD TH03050WAS(6A) MPD TH05050WAS(6A)	MPD TY303S(8A) MPD TH12050WAS(6A)
	V _{CCINT} /V _{CCO} with Large Load Transient	1.0V-3.3V	0.2A-15A	MPD RX002S(16A)	MPD RX004S(12A) MPD RX103S(12A) MPD RX104S(16A)

Note : The Xilinx devices' current requirements in these tables were calculated based on intensive design.
Please refer to Appendix 1 for details.

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2006 Sep

DC-DC Converter Selection Tables



Selection Table for Virtex™-4

Table 7. DC-DC Converter Selection Table for Virtex™-4 Device

Xilinx				muRata Solutions	
Device	Type	Voltage	Current	Vin=3.0-5.5V	Vin=10.8-13.2V
XC4VLX15 XC4VLX25 XC4VLX40 XC4VLX60 XC4VLX80 XC4VLX100 XC4VLX160 XC4VLX200	V _{CCINT}	1.2V	0.2A-20A	MPDTY301S(7A) MPDTY302S(7A) MPDTY311S(16A) MPDTY312S(16A) MPDTY411S(7A) MPDTY412S(7A) MPDTH03050WAS(6A) MPDTH05050WAS(6A) MPDTH03060WAS(10A) MPDTH05060WAS(10A) MPDTH03010WAS(15A) MPDTH05010WAS(15A) MPDTH03020WAS(22A) MPDTH05020WAS(22A)	MPDTY303S(8A) MPDTH12050WAS(6A) MPDTH12060WAS(10A) MPDTH12010WAS(12A) MPDTH12020WAS(18A) MPDTH12030WAS(26A)
XC4VSX25 XC4VSX35 XC4VSX55 XC4VFX12 XC4VFX20 XC4VFX40 XC4VFX60 XC4VFX100	V _{CCO}	1.2V-3.3V	50mA-3A	MPD6S012S(3A) MPDTY102S(2A) MPDTY301S(7A) MPDTY302S(7A) MPDTY411S(7A) MPDTY412S(7A) MPDTH03050WAS(6A) MPDTH05050WAS(6A)	MPDTY303S(8A) MPDTH12050WAS(6A)
	V _{CCINT} /V _{CCO} with Large Load Transient	1.2V-3.3V	0.2A-20A	MPDRX002S(16A)	MPDRX004S(12A) MPDRX103S(12A) MPDRX104S(16A)

Note : The Xilinx devices' current requirements in these tables were calculated based on intensive design.
Please refer to Appendix 1 for details.

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

2006 Sep

DC-DC Converter Selection Tables



Selection Table for Virtex-II Pro™

Table8. DC-DC Converter Selection Table for Virtex-II Pro™ Device

Xilinx				muRata Solutions	
Device	Type	Voltage	Current	Vin=3.0-5.5V	Vin=10.8-13.2V
XC2VP2 XC2VP4 XC2VP7 XC2VP20 XC2VPX20 XC2VP30	V _{CCINT}	1.5V	0.2A-6A	MPD6S012S(3A) MPDTY102S(2A) MPDTY301S(7A) MPDTY302S(7A)	MPDTY303S(8A) MPDTH12050WAS(6A)
	V _{CCO}	1.5V-3.3V	50mA-3A	MPDTY411S(7A) MPDTY412S(7A) MPDTH03050WAS(6A) MPDTH05050WAS(6A)	
	V _{CCINT} /V _{CCO} with Large Load Transient	1.5V-3.3V	0.2A-6A	MPDRX002S(16A)	MPDRX004S(12A) MPDRX103S(12A) MPDRX104S(16A)
	V _{CCINT}	1.5V	0.2A-20A	MPDTY301S(7A) MPDTY302S(7A) MPDTY311S(16A) MPDTY312S(16A) MPDTY411S(7A) MPDTY412S(7A) MPDTH03050WAS(6A) MPDTH05050WAS(6A) MPDTH03060WAS(10A) MPDTH05060WAS(10A) MPDTH03010WAS(15A) MPDTH05010WAS(15A) MPDTH03020WAS(22A) MPDTH05020WAS(22A)	MPDTY303S(8A) MPDTH12050WAS(6A) MPDTH12060WAS(10A) MPDTH12010WAS(12A) MPDTH12020WAS(18A) MPDTH12030WAS(26A)
XC2VP40 XC2VP50 XC2VP70 XC2VPX70 XC2VP100	V _{CCO}	1.5V-3.3V	50mA-3A	MPD6S012S(3A) MPDTY102S(2A) MPDTY301S(7A) MPDTY302S(7A) MPDTY411S(7A) MPDTY412S(7A) MPDTH03050WAS(6A) MPDTH05050WAS(6A)	MPDTY303S(8A) MPDTH12050WAS(6A)
	V _{CCINT} /V _{CCO} with Large Load Transient	1.5V-3.3V	0.2A-20A	MPDRX002S(16A)	MPDRX004S(12A) MPDRX103S(12A) MPDRX104S(16A)

Note : The Xilinx devices' current requirements in these tables were calculated based on intensive design.
Please refer to Appendix 1 for details.

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2006 Sep

DC-DC Converter Selection Tables



Selection Table for Virtex™-II

Table9. DC-DC Converter Selection Table for Virtex™-II Device

Xilinx				muRata Solutions	
Device	Type	Voltage	Current	Vin=3.0-5.5V	Vin=10.8-13.2V
XC2V40 XC2V80 XC2V250 XC2V500 XC2V1000 XC2V1500 XC2V2000 XC2V3000	V _{CCINT}	1.5V	0.2A-6A	MPD6S012S(3A) MPDTY102S(2A) MPDTY301S(7A) MPDTY302S(7A)	MPDTY303S(8A) MPDTH12050WAS(6A)
	V _{CCO}	1.5V-3.3V	50mA-3A	MPDTY411S(7A) MPDTY412S(7A) MPDTH03050WAS(6A) MPDTH05050WAS(6A)	
	V _{CCINT} /V _{CCO} with Large Load Transient	1.5V-3.3V	0.2A-6A	MPDRX002S(16A)	MPDRX004S(12A) MPDRX103S(12A) MPDRX104S(16A)
	V _{CCINT}	1.5V	0.2A-20A	MPDTY301S(7A) MPDTY302S(7A) MPDTY311S(16A) MPDTY312S(16A) MPDTY411S(7A) MPDTY412S(7A) MPDTH03050WAS(6A) MPDTH05050WAS(6A) MPDTH03060WAS(10A) MPDTH05060WAS(10A) MPDTH03010WAS(15A) MPDTH05010WAS(15A) MPDTH03020WAS(22A) MPDTH05020WAS(22A)	MPDTY303S(8A) MPDTH12050WAS(6A) MPDTH12060WAS(10A) MPDTH12010WAS(12A) MPDTH12020WAS(18A) MPDTH12030WAS(26A)
XC2V4000 XC2V6000 XC2V8000	V _{CCO}	1.5V-3.3V	50mA-3A	MPD6S012S(3A) MPDTY102S(2A) MPDTY301S(7A) MPDTY302S(7A) MPDTY411S(7A) MPDTY412S(7A) MPDTH03050WAS(6A) MPDTH05050WAS(6A)	MPDTY303S(8A) MPDTH12050WAS(6A)
	V _{CCINT} /V _{CCO} with Large Load Transient	1.5V-3.3V	0.2A-20A	MPDRX002S(16A)	MPDRX004S(12A) MPDRX103S(12A) MPDRX104S(16A)

Note : The Xilinx devices' current requirements in these tables were calculated based on intensive design.
Please refer to Appendix 1 for details.

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2006 Sep

Power Supply Reference Design List



Table1. Spartan™-3/3E/3L Reference Design

#Design	1.2V	3.3V	2.5V	Description	Page
1	1.3A	0.8A	0.2A	4.5-13.2Vinput, Triple Output MPD4S014S	10
2	1.6A	1.4A	0.2A	5Vinput, Triple Output MPD5S025S	11
3	3A	3A	0.4A	5Vinput, MPD6S012S × 2	12
4	3A	-	0.4A	3.3Vinput, MPD6S012S	13
5	7A	7A	0.4A	5Vinput, MPDXY411S × 2	14
6	8A	8A	0.4A	6.5-14Vinput, MPDXY303S × 2	15

Table2. Spartan™-II/IE Reference Design

#Design	2.5V/1.8V	3.3V	-	Description	Page
1	1.3A	1A	-	4.5-13.2Vinput, Triple Output MPD4S014S	16

Table3. Virtex™-5 Reference Design

#Design	1.0V	3.3V/1.8V	2.5V	Description	Page
1	7A	7A	0.7A	5Vinput, MPDXY411S × 2	17
2	12A	8A	0.7A	7-14Vinput, MPDRX004S+MPDXY303S	18
3	16A	8A	0.7A	5Vinput, MPDRX002S+MPDXY301S	19
4	16A	12A	0.7A	12Vinput, MPDRX103S+MPDRX104S	20

Table4. Virtex™-4 Reference Design

#Design	1.2V	3.3V	2.5V	Description	Page
1	8A	8A	0.7A	6.5-14Vinput, MPDXY303S × 2	21
2	12A	8A	0.7A	7-14Vinput, MPDRX004S+MPDXY303S	22
3	16A	16A	0.7A	5Vinput, MPDRX002S+MPDXY311S	23
4	18A	18A	0.7A	12Vinput, MPDTH12020WAS × 2	24

Table5. Virtex-II Pro™ Reference Design

#Design	1.5V	3.3V	2.5V	Description	Page
1	8A	8A	0.4A	6.5-14Vinput, MPDXY303S × 2	25
2	12A	8A	0.4A	7-14Vinput, MPDRX004S+MPDXY303S	26
3	16A	16A	0.4A	5Vinput, MPDRX002S+MPDXY311S	27
4	18A	18A	0.4A	12Vinput, MPDTH12020WAS × 2	28

Table6. Virtex™-II Reference Design

#Design	1.5V	3.3V	-	Description	Page
1	12A	8A	-	7-14Vinput, MPDRX004S+MPDXY303S	29
2	16A	16A	-	5Vinput, MPDXY311S+MPDXY301S	30

Note: The current values in these tables indicate the power supply current rating.
The FPGA alone does not necessarily require these supply current levels.

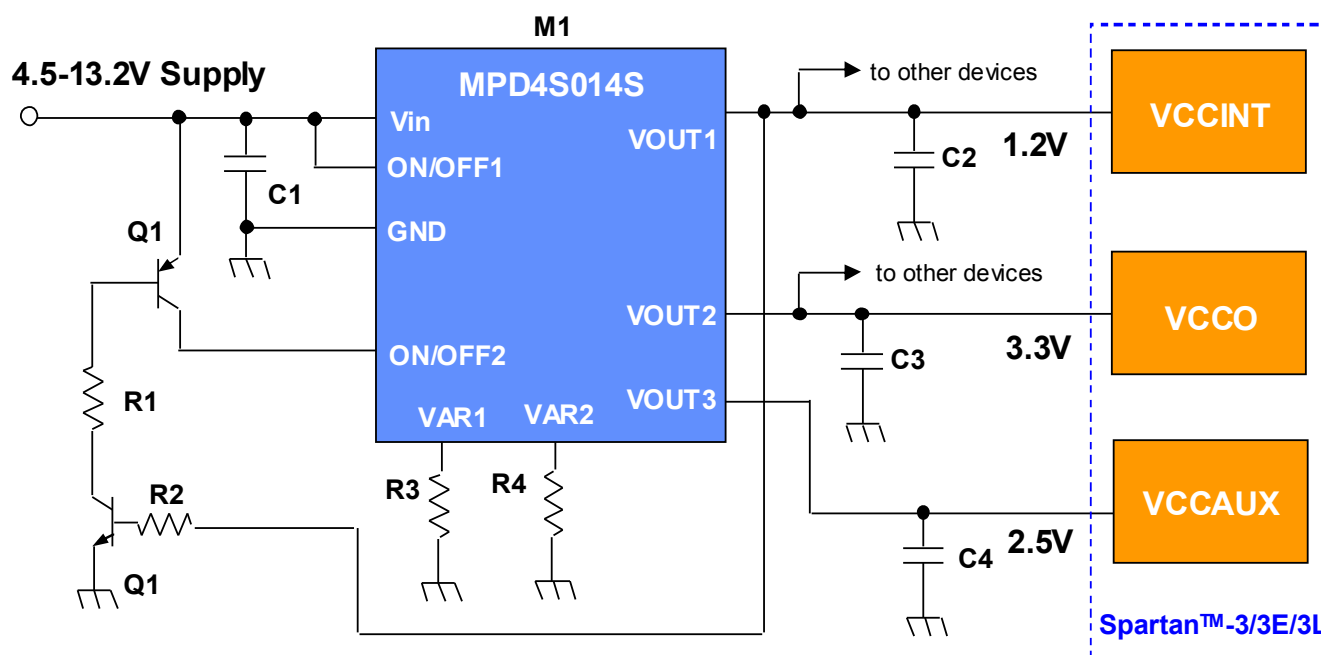
Spartan™-3/3E/3L Design1

4.5-13.2V-Input, 1.3A Solution

[Features]

- 3-Output configuration of the MPD4S014S makes it simple to use.
- Wide Input Voltage Range
- SIP configuration saves PCB space.
- Adjustable Start-up Sequence via On/Off Control Pins.
- Trimmable Output Voltages (Vout1 & Vout2)

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1	1	1.2A/0.9A/0.3A-out DC-DC converter, Triple, SIP	Murata	MPD4S014S
C1,C2,C3,C4	4	Ceramic, 1uF, 16V, B, 10%	Murata	GRM188B31C105KA92
Q1	1	Dual, 50V, 100mA	Panasonic	XP04601
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	2.29kΩ, 1/16W, 0.5%	Std	Std
R4	1	1.8kΩ, 1/16W, 0.5%	Std	Std

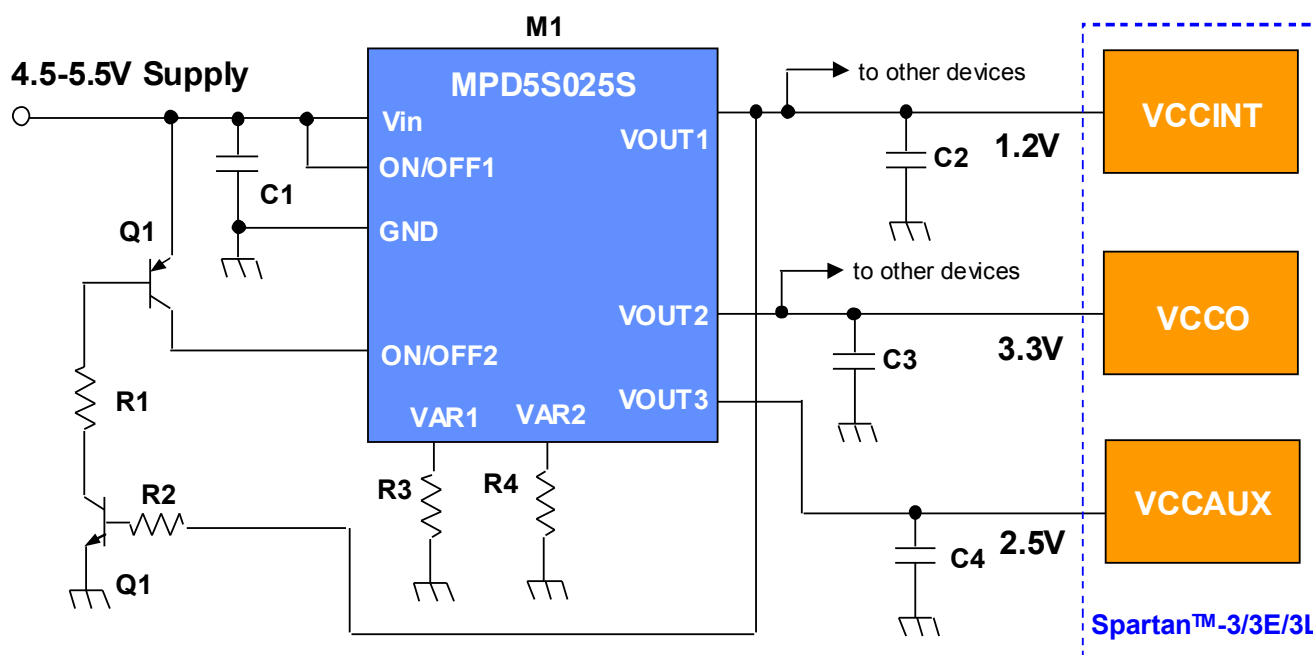
Spartan™-3/3E/3L Design2

5V-Input, 1.6A Solution

[Features]

- 3-Output configuration of the MPD5S025S makes it simple to use.
- SIP configuration saves PCB space.
- Adjustable Start-up Sequence via On/Off Control Pins.
- Trimmable Output Voltages (Vout1 & Vout2)

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1	1	1.6A/1.6A/0.3A-out DC-DC converter, Triple, SIP	Murata	MPD5S025S
C1,C2,C3,C4	4	Ceramic, 1uF, 16V, B, 10%	Murata	GRM188B31C105KA92
Q1	1	Dual, 50V, 100mA	Panasonic	XP04601
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	2.29kΩ, 1/16W, 0.5%	Std	Std
R4	1	1.8kΩ, 1/16W, 0.5%	Std	Std

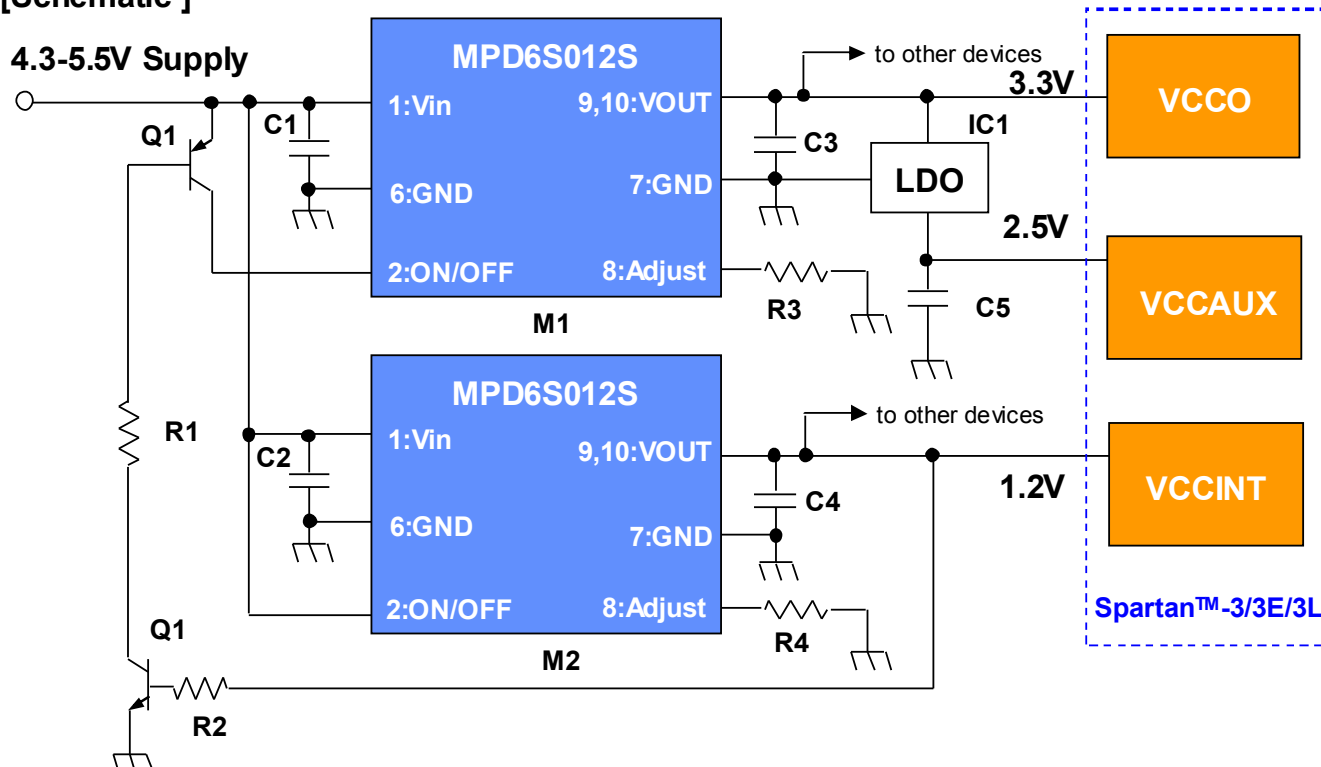
Spartan™-3/3E/3L Design3

5V-Input, 3A Solution

[Features]

- SIP configuration saves PCB space.
- Adjustable Start-up Sequence via On/Off Control Pins.
- Wide input voltage range of MPD6S012S is from 3.0V to 5.5V.
- Trimmable Output Voltage (1.1V to 3.6V)

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	3A-out DC-DC converter, SIP	Murata	MPD6S012S
C1,C2,C3,C4	4	Ceramic, 0.1uF, 50V, R, 10%	Murata	GRM188R11H104KA93
C5	1	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 400mA-out	Torex	XC6203P252FR
Q1	1	Dual, 50V, 100mA	Panasonic	XP04601
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	131.5kΩ, 1/16W, 0.5%	Std	Std
R4	1	750Ω, 1/16W, 0.5%	Std	Std

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2006 Sep

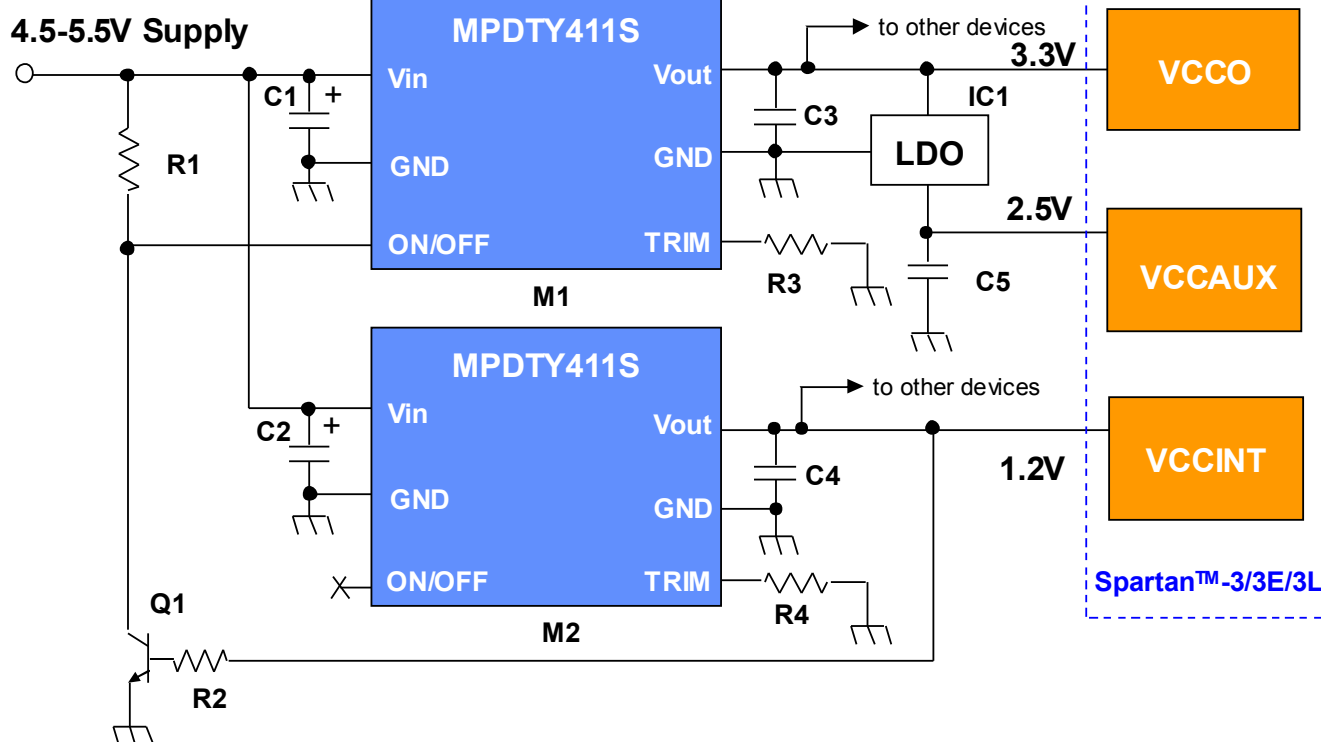
Spartan™-3/3E/3L Design5

5V-Input, 7A Solution

[Features]

- Industry-Standard Pin Compatibility, Small Footprint, High Efficiency
- Adjustable Start-up Sequence via On/Off Control Pins.
- Trimmable Output Voltage (0.8V to 3.3V)

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	7A-out DC-DC converter, SMD	Murata	MPDTY411S
C1,C2	2	Poly-Aluminum, 100uF, 6.3V	Panasonic	EEFUD0J101XR
C3,C4	2	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
C5	1	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 400mA-out	Torex	XC6203P252FR
Q1	1	50V, 150mA	Panasonic	2SD1819A
R1,R2	2	22 kΩ, 1/16W, 5%	Std	Std
R3	1	5.46kΩ, 1/16W, 0.5%	Std	Std
R4	1	60.9kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

2006 Sep

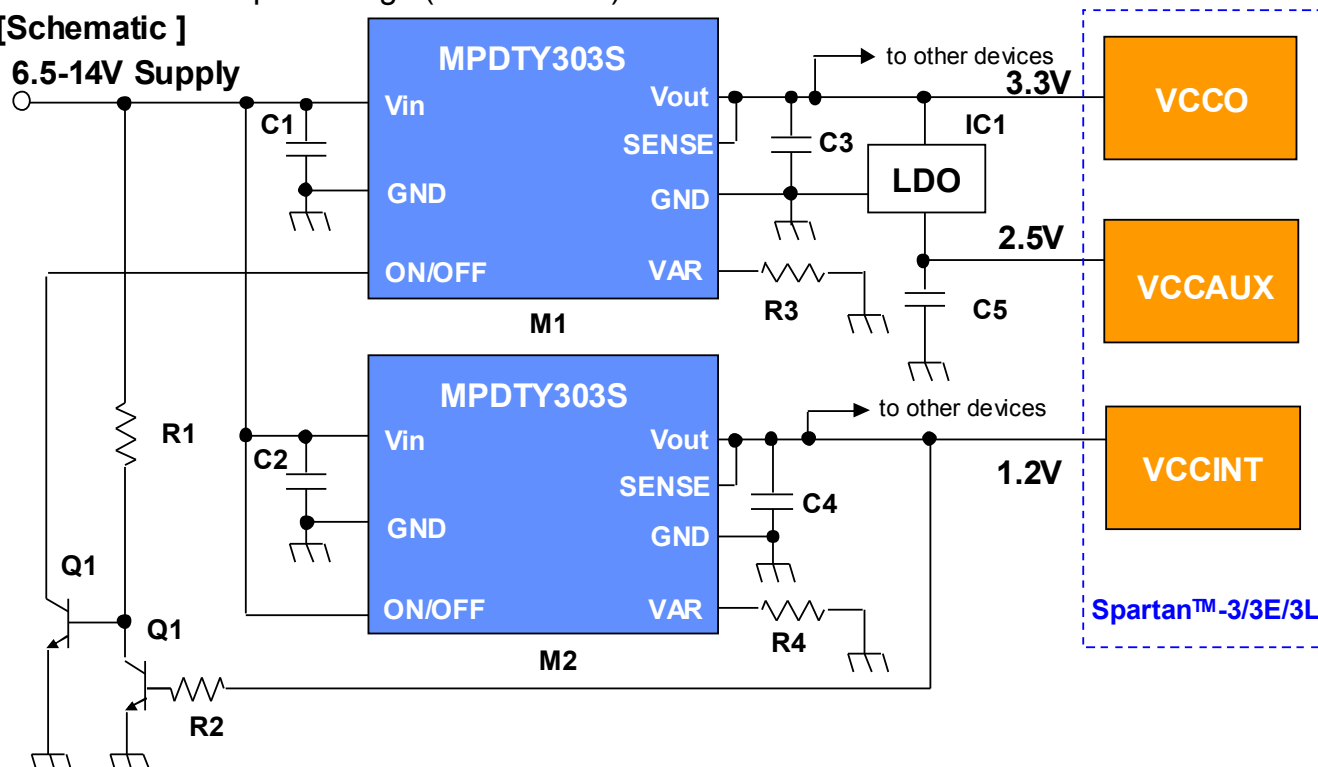
Spartan™-3/3E/3L Design6

6.5-14V-Input, 8A Solution

[Features]

- Low Profile (H<4.2mm)
- Wide Input Range
- High Efficiency (92% @ Rated Current)
- Adjustable Start-up Sequence via On/Off Control Pins
- Trimmable Output Voltage (0.8V to 5.5V)

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	8A-out DC-DC converter, SMD	Murata	MPD TY303S
C1,C2	2	Ceramic, 22uF, 16V, B, 10%	Murata	GRM32EB31C226KE16
C3,C4	2	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
C5	1	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 400mA-out	Torex	XC6203P252FR
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	4.01kΩ, 1/16W, 0.5%	Std	Std
R4	1	45.35kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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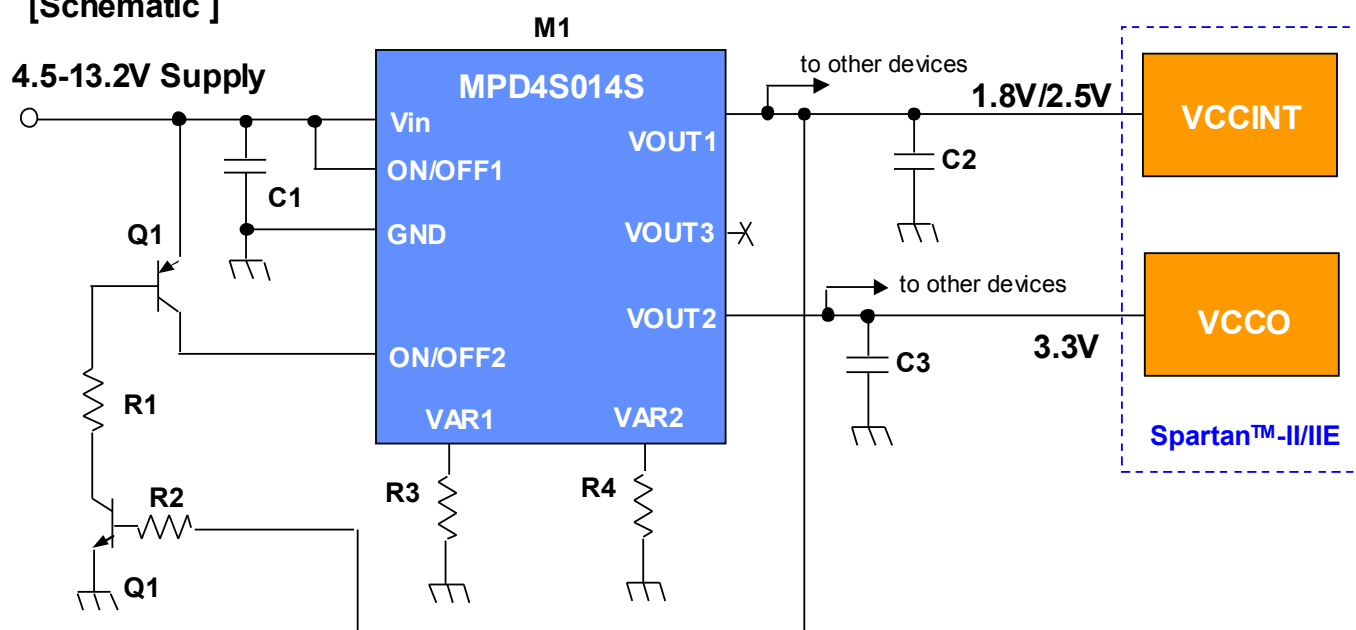
Spartan™-II/IIE Design1

4.5-13.2V-Input, 1.3A Solution

[Features]

- 3-Output configuration of the MPD4S014S makes it simple to use.
- Wide Input Voltage Range
- SIP configuration saves PCB space.
- Adjustable Start-up Sequence via On/Off Control Pins.
- Trimmable Output Voltages (Vout1 & Vout2)

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1	1	1.2A/0.8A/0.2A-out DC-DC converter, Triple, SIP	Murata	MPD4S014S
C1,C2,C3	3	Ceramic, 1uF, 16V, B, 10%	Murata	GRM188B31C105KA92
Q1	1	Dual, 50V, 100mA	Panasonic	XP04601
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	35.51kΩ for Spartan™-II 10.68kΩ for Spartan™-IIE 1/16W, 0.5%	Std	Std
R4	1	1.8kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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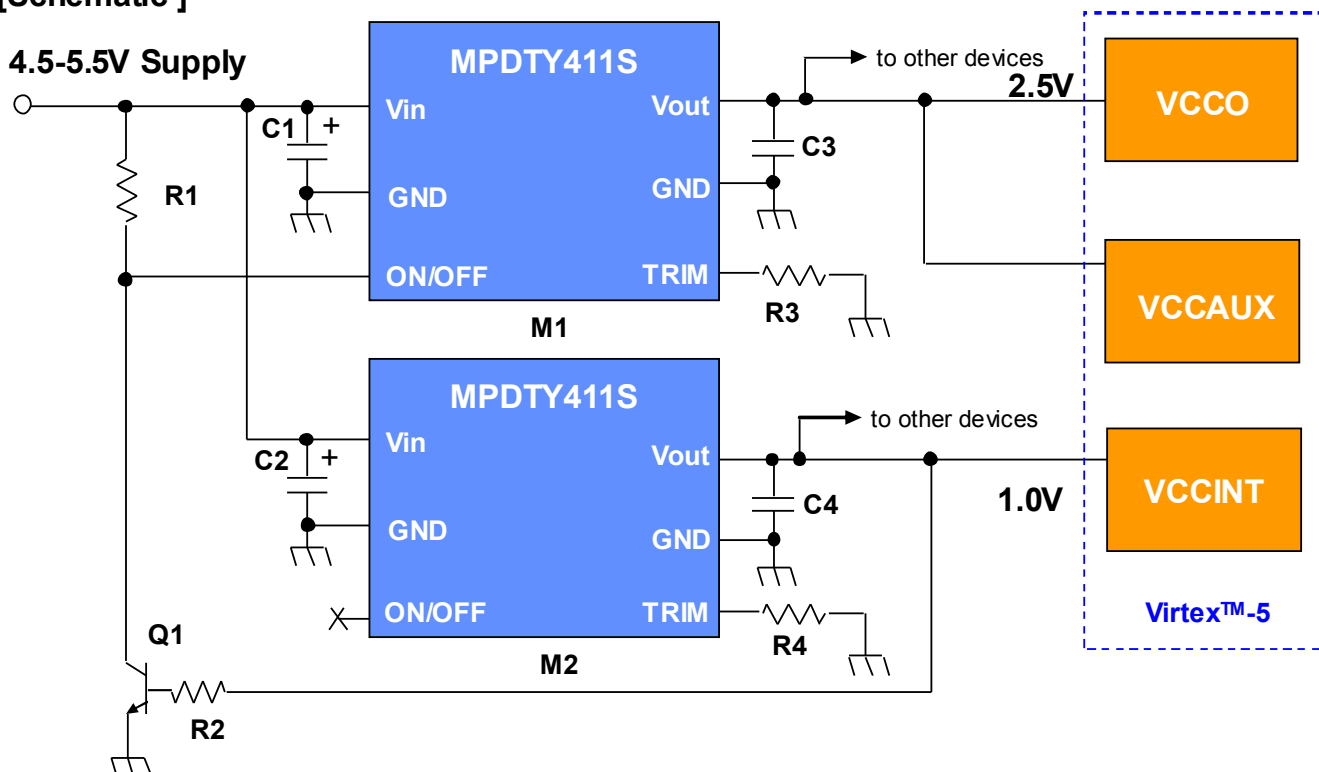
Virtex™-5 Design1

5V-Input, 7A Solution

[Features]

- Industry-Standard Pin Compatibility, Small Footprint, High Efficiency
- Adjustable Start-up Sequence via On/Off Control Pins.
- Trimmable Output Voltage (0.8V to 3.3V)

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	7A-out DC-DC converter, SMD	Murata	MPDTY411S
C1,C2	2	Poly-Aluminum, 100uF, 6.3V	Panasonic	EEFUD0J101XR
C3,C4	2	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
Q1	1	50V, 150mA	Panasonic	2SD1819A
R1,R2	2	22 kΩ, 1/16W, 5%	Std	Std
R3	1	10.43kΩ, 1/16W, 0.5%	Std	Std
R4	1	126.9kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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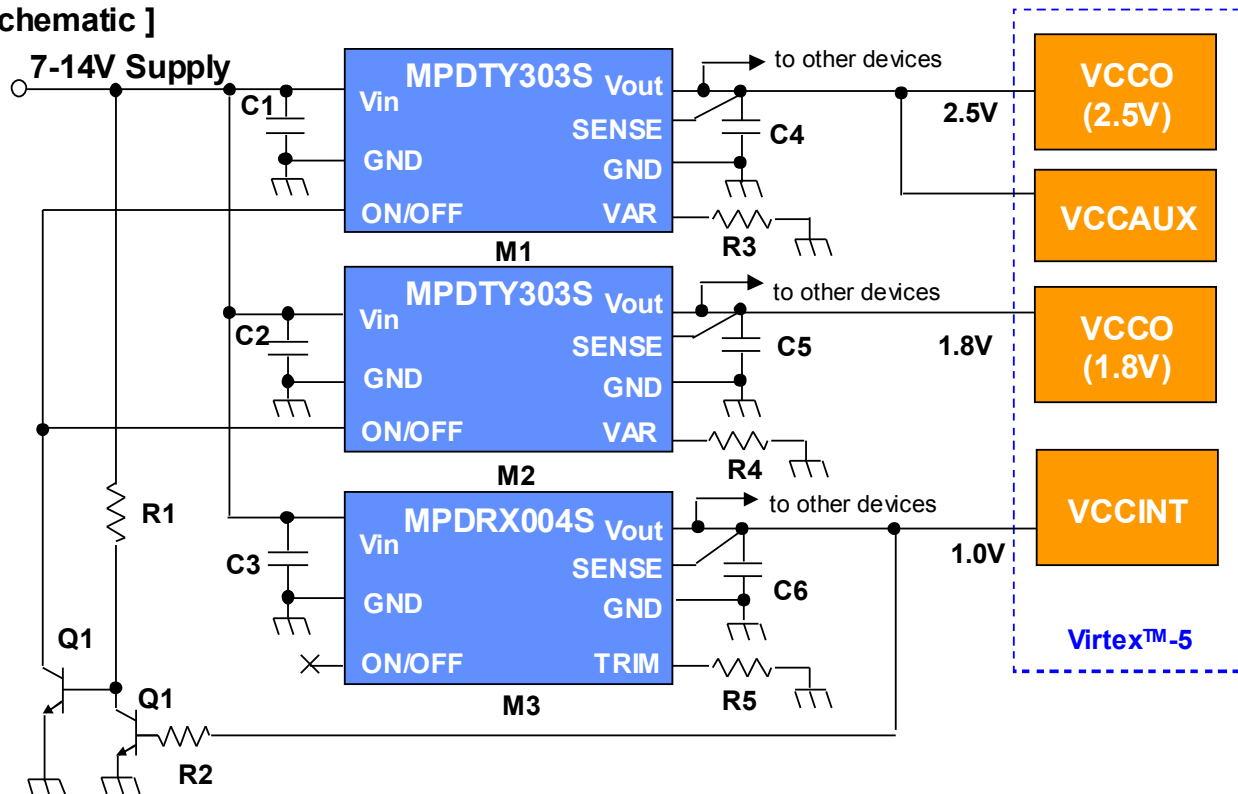
Virtex™-5 Design2

7-14V-Input, 12A Solution

[Features]

- Industry-Standard Pin Compatible, Fast Transient Response, MPDRX004S.
- Adjustable Start-up Sequence via On/Off Control Pins.

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	8A-out DC-DC converter, SMD	Murata	MPDTY303S
M3	1	12A-out DC-DC converter, SMD	Murata	MPDRX004S
C1-C3	3	Ceramic, 22uF, 16V, B, 10%	Murata	GRM32EB31C226KE16
C4-C6	3	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	7.73kΩ, 1/16W, 0.5%	Std	Std
R4	1	15.86kΩ, 1/16W, 0.5%	Std	Std
R5	1	22.1kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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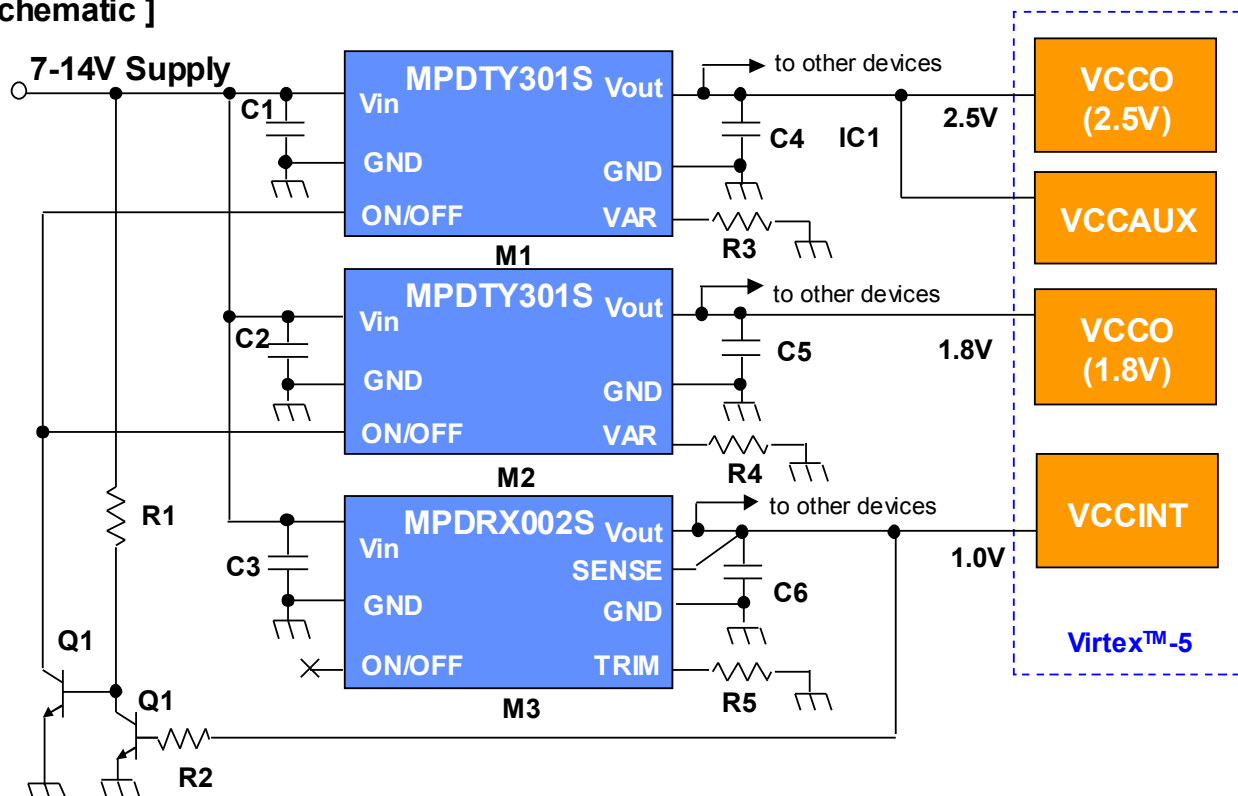
Virtex™-5 Design3

5V-Input, 16A Solution

[Features]

- Industry-Standard Pin Compatible, Fast Transient Response, MPDRX002S.
- Adjustable Start-up Sequence via On/Off Control Pins.

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	7A-out DC-DC converter, SMD	Murata	MPDTY301S
M3	1	16A-out DC-DC converter, SMD	Murata	MPDRX002S
C1-C6	6	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	5.53kΩ, 1/16W, 0.5%	Std	Std
R4	1	16.4kΩ, 1/16W, 0.5%	Std	Std
R5	1	22.1kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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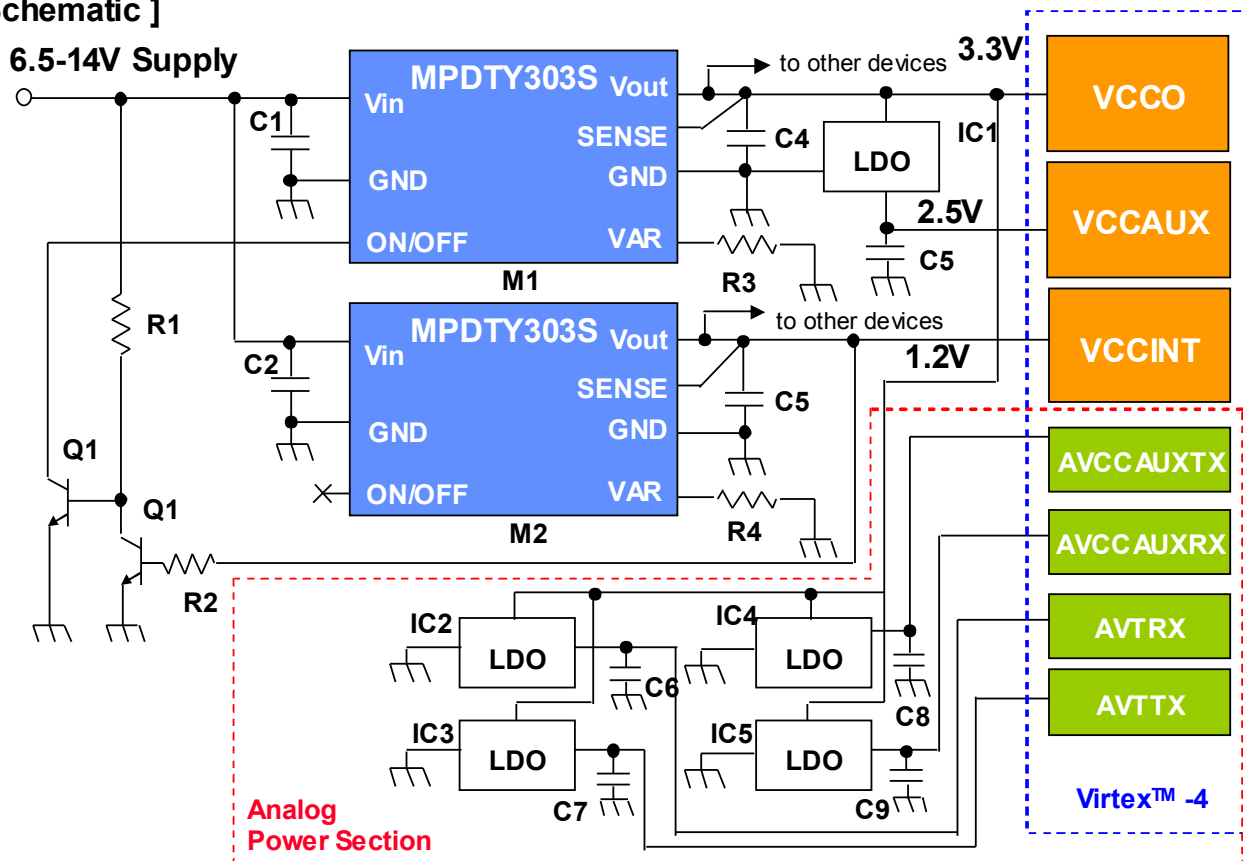
Virtex™-4 Design1

6.5-14V-Input, 8A Solution

[Features]

- Low Profile (H<4.2mm), High Efficiency MPD TY303S.
- Adjustable Start-up Sequence via On/Off Control Pins.

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	8A-out DC-DC converter, SMD	Murata	MPD TY303S
C1,C2	2	Ceramic, 22uF, 16V, B, 10%	Murata	GRM32EB31C226KE16
C3,C4	2	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
C5-C9	5	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 700mA-out	Torex	XC6210P252DR
IC2-IC5	4	1.2V LDO, 700mA-out	Torex	XC6210P122DR
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	4.01kΩ, 1/16W, 0.5%	Std	Std
R4	1	45.35kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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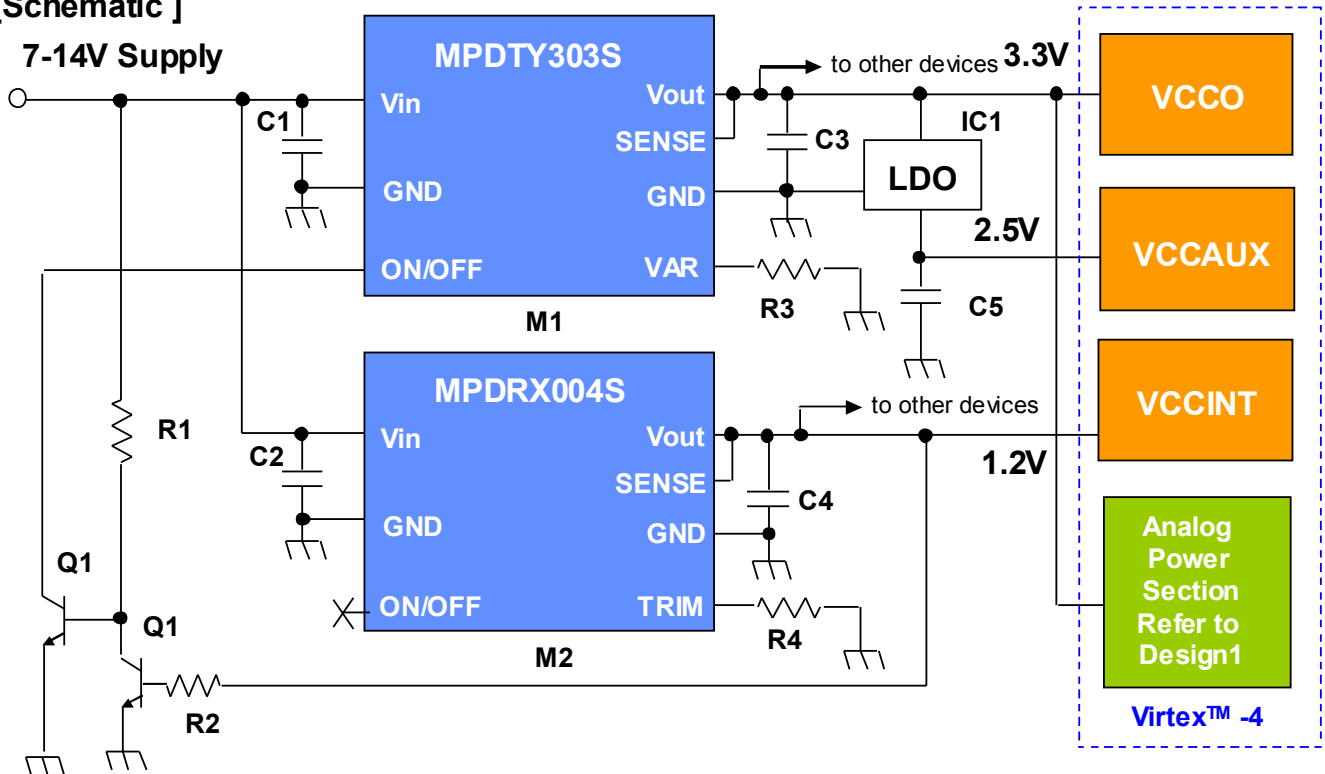
Virtex™-4 Design2

7-14V-Input, 12A Solution

[Features]

- Fast Transient Response, High Efficiency MPDRX004S.
- Adjustable Start-up Sequence via On/Off Control Pins.

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1	1	8A-out DC-DC converter, SMD	Murata	MPDTY303S
M2	1	12A-out DC-DC converter, SMD	Murata	MPDRX004S
C1,C2	2	Ceramic, 22uF, 16V, B, 10%	Murata	GRM32EB31C226KE16
C3,C4	2	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
C5	1	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 700mA-out	Torex	XC6210P252DR
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	4.01kΩ, 1/16W, 0.5%	Std	Std
R4	1	8.5kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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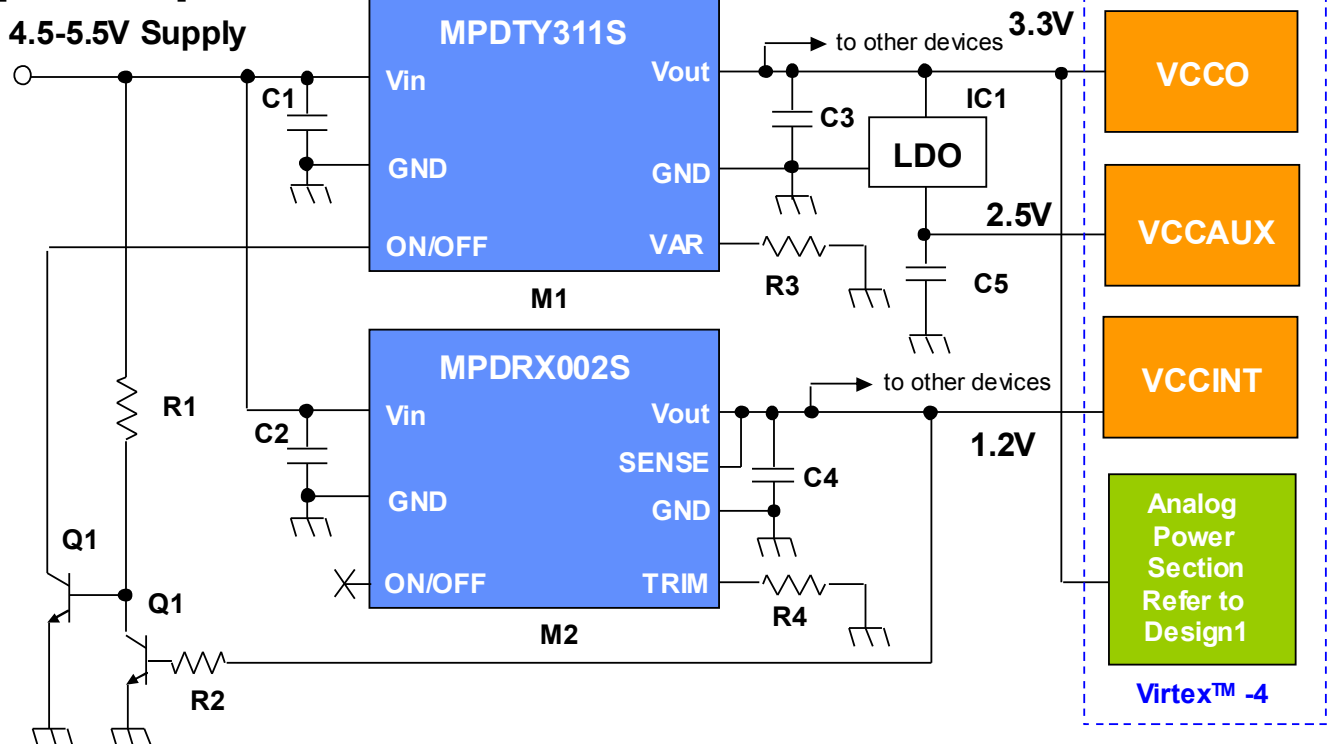
Virtex™-4 Design3

5V-Input, 16A Solution

[Features]

- Fast Transient Response, High Efficiency MPDRX002S.
- Adjustable Start-up Sequence via On/Off Control Pins.

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1	1	16A-out DC-DC converter, SMD	Murata	MPDTY311S
M2	1	16A-out DC-DC converter, SMD	Murata	MPDRX002S
C1-C4	4	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
C5	1	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 700mA-out	Torex	XC6210P252DR
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	560Ω, 1/16W, 0.5%	Std	Std
R4	1	8.5kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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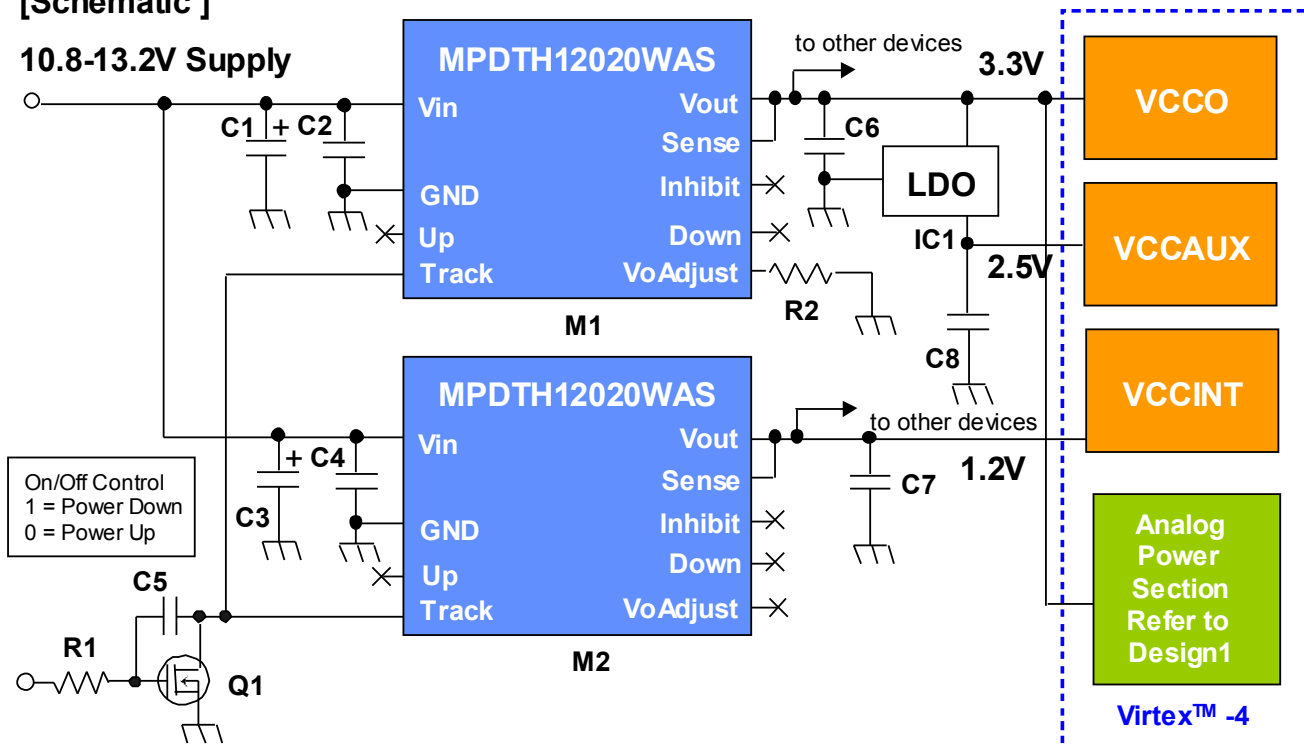
Virtex™-4 Design4

12V-Input, 18A Solution

[Features]

- Auto-Tracking Feature Makes Sequencing Design Easy
- Point-of-Load Alliance Device; MPDTH12020WAS (M1,M2)

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	18A-out DC-DC converter, SMD	Murata	MPDTH12020WAS
C1,C3	2	Poly-Aluminum, 560uF, 25V	Panasonic	EEUFC1E561S
C2,C4	2	Ceramic, 10uF, 16V, R, 10%	Murata	GRM32DR11C106KA01
C5	1	Ceramic, 0.1uF, 50V, R, 10%	Murata	GRM188R11H104KA93
C6,C7	2	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
C8	1	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 700mA-out	Torex	XC6210P252DR
Q1	1	30V, 100mA	Rohm	2SK3019FTL
R1	1	22 kΩ, 1/16W, 5%	Std	Std
R2	1	2kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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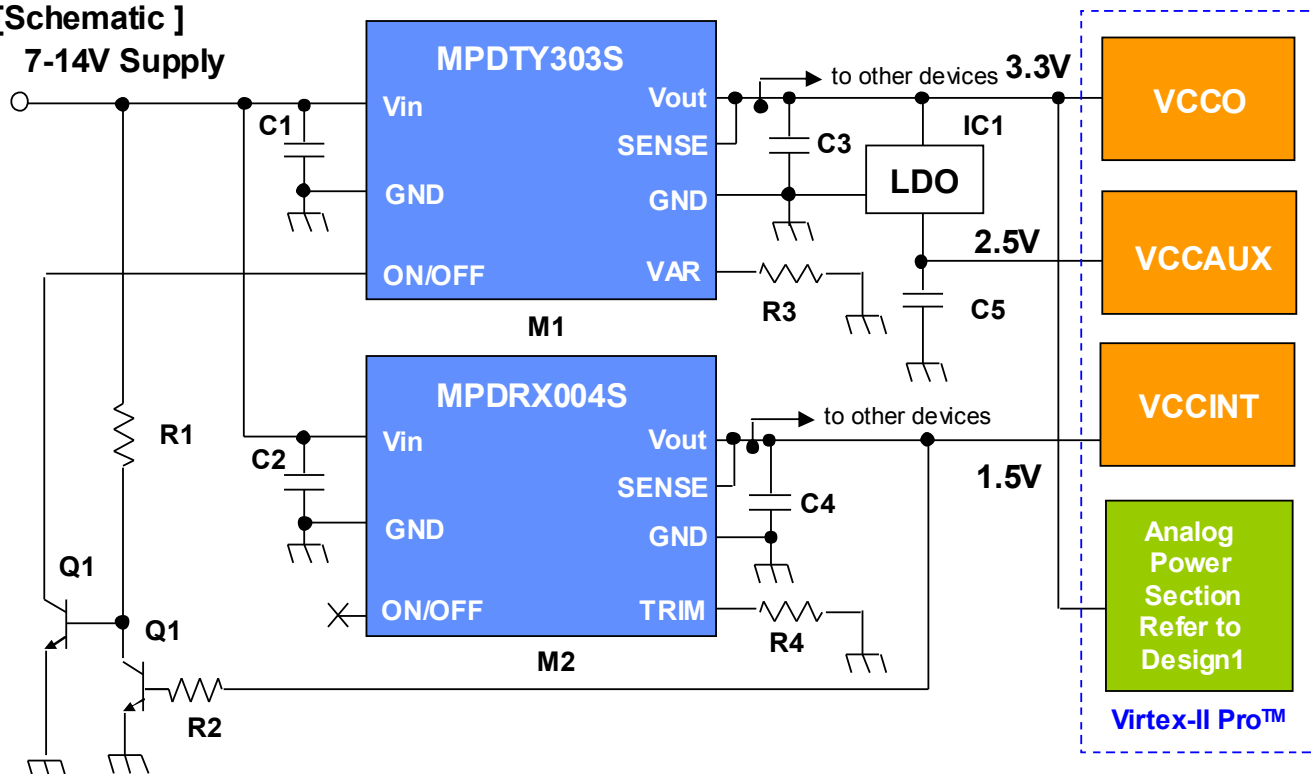
Virtex-II Pro™ Design2

7-14V-Input, 12A Solution

[Features]

- Fast Transient Response, High Efficiency MPDRX004S.
- Adjustable Start-up Sequence via On/Off Control Pins.

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1	1	8A-out DC-DC converter, SMD	Murata	MPDTY303S
M2	1	12A-out DC-DC converter, SMD	Murata	MPDRX004S
C1,C2	2	Ceramic, 22uF, 16V, B, 10%	Murata	GRM32EB31C226KE16
C3,C4	2	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
C5	1	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 400mA-out	Torex	XC6203P252FR
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	4.01kΩ, 1/16W, 0.5%	Std	Std
R4	1	2.671kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

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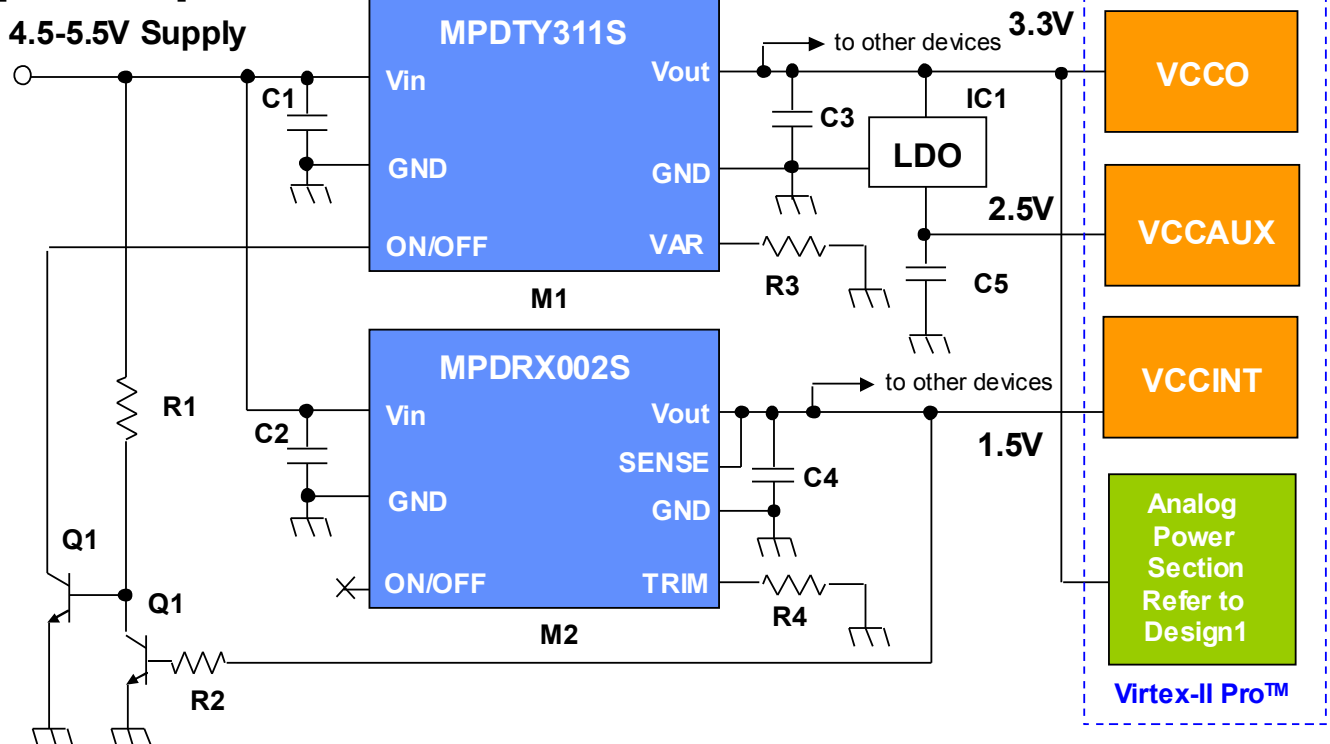
Virtex-II Pro™ Design3

5V-Input, 16A Solution

[Features]

- Fast Transient Response, High Efficiency MPDRX002S.
- Adjustable Start-up Sequence via On/Off Control Pins.

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1	1	16A-out DC-DC converter, SMD	Murata	MPDTY311S
M2	1	16A-out DC-DC converter, SMD	Murata	MPDRX002S
C1-C4	4	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
C5	1	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 400mA-out	Torex	XC6203P252FR
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	560Ω, 1/16W, 0.5%	Std	Std
R4	1	2.67kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

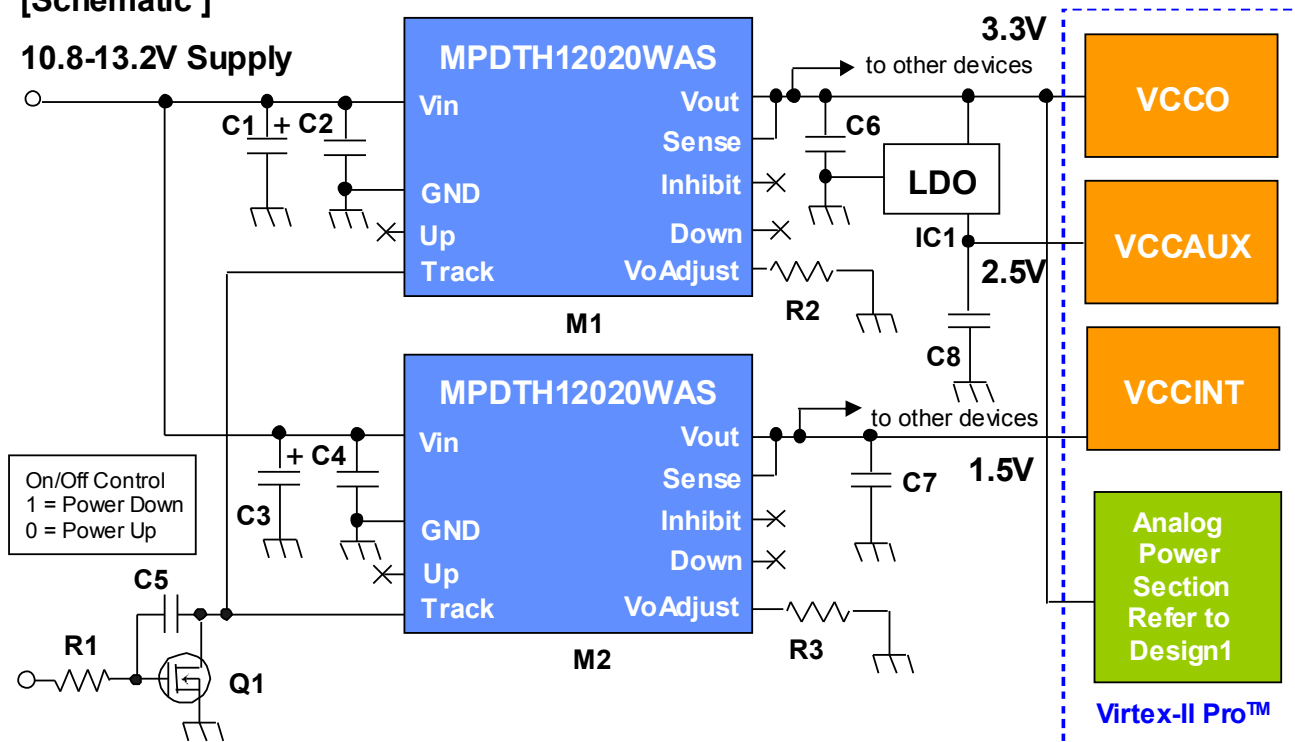
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Virtex-II Pro™ Design4 12V-Input, 18A Solution

[Features]

- Auto-Tracking Feature Makes Sequencing Design Easy
- Point-of-Load Alliance Device; MPDTH12020WAS (M1,M2)

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	18A-out DC-DC converter, SMD	Murata	MPDTH12020WAS
C1,C3	2	Poly-Aluminum, 560uF, 25V	Panasonic	EEUFC1E561S
C2,C4	2	Ceramic, 10uF, 16V, R, 10%	Murata	GRM32DR11C106KA01
C5	1	Ceramic, 0.1uF, 50V, R, 10%	Murata	GRM188R11H104KA93
C6,C7	2	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
C8	1	Tantalum, 1uF, 10V	Std	Std
IC1	1	2.5V LDO, 400mA-out	Torex	XC6203P252FR
Q1	1	30V, 100mA	Rohm	2SK3019FTL
R1	1	22 kΩ, 1/16W, 5%	Std	Std
R2	1	2kΩ, 1/16W, 0.5%	Std	Std
R3	1	24.8kΩ, 1/16W, 0.5%	Std	Std

Download data sheets for DC-DC Converters mentioned in this reference guide at <http://www.murata.com/power/fpga/xilinx/index.html>.

2006 Sep

Innovator in Electronics

- Fast Transient Response, High Efficiency MPDRX004S.
- Adjustable Start-up Sequence via On/Off Control Pins.

The schematic diagram illustrates the power supply circuit for a Virtex™-II device. A 7-14V supply is connected to two DC-DC converters, M1 (MPDTY303S) and M2 (MPDRX004S). M1 outputs 3.3V to VCCO and VCCAUX. M2 outputs 1.5V to VCCINT. The circuit includes various components like capacitors (C1, C2, C3, C4), resistors (R1, R2, R3, R4), and transistors (Q1, Q2).

Reference	Qty	Description	Manufacturer	Part Number
M1	1	8A-out DC-DC converter, SMD	Murata	MPDTY303S
M2	1	12A-out DC-DC converter, SMD	Murata	MPDRX004S
C1-C2	2	Ceramic, 22uF, 16V, B, 10%	Murata	GRM32EB31C226KE16
C3-C4	2	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	4.01kΩ, 1/16W, 0.5%	Std	Std
R4	1	2.67kΩ, 1/16W, 0.5%	Std	Std

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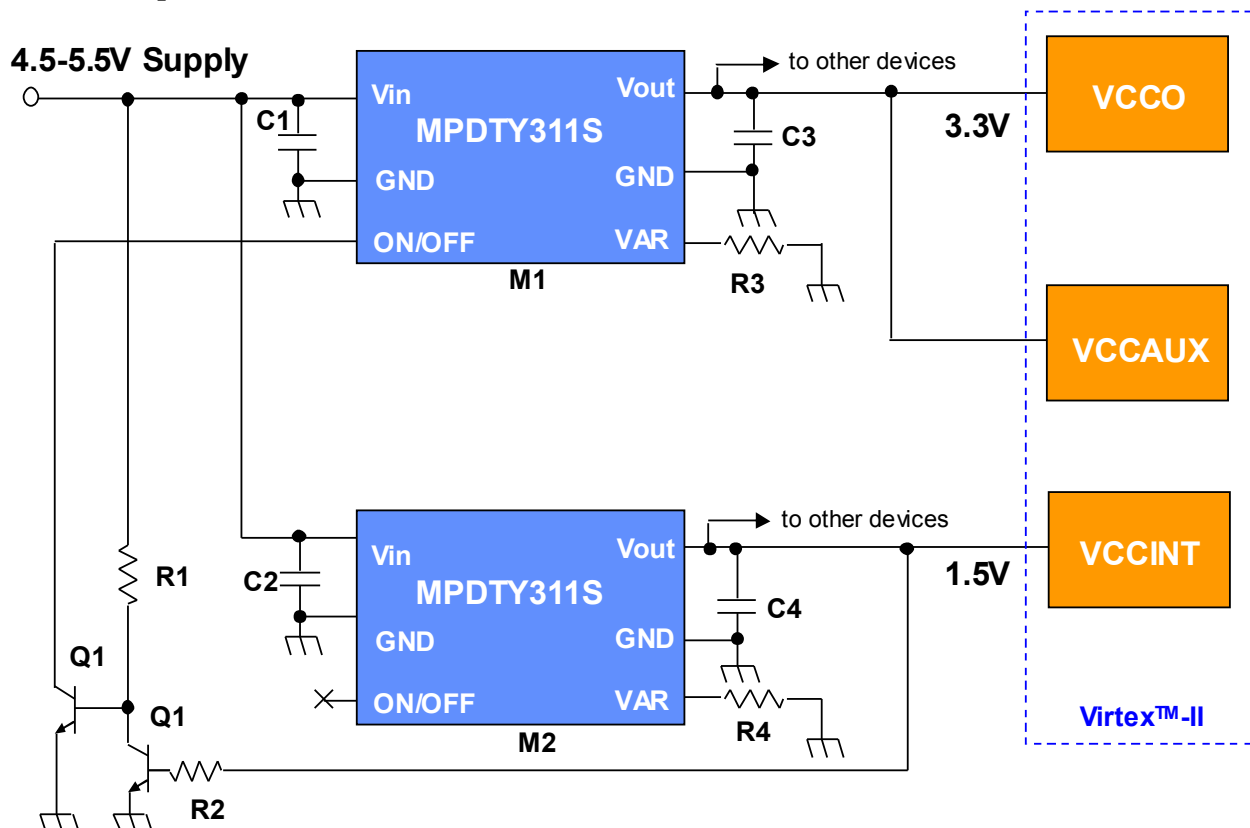
Virtex™-II Design2

5V-Input, 16A Solution

[Features]

- Low Profile (H<4.2mm), High Efficiency MPDTY311S.
- Adjustable Start-up Sequence via On/Off Control Pins.

[Schematic]



[Bill of Materials]

Reference	Qty	Description	Manufacturer	Part Number
M1,M2	2	16A-out DC-DC converter, SMD	Murata	MPDTY311S
C1-C4	4	Ceramic, 47uF, 6.3V, B, 20%	Murata	GRM31CB30J476ME18
Q1	1	Dual, 50V, 100mA	Panasonic	XP06501
R1,R2	2	47 kΩ, 1/16W, 5%	Std	Std
R3	1	560Ω, 1/16W, 0.5%	Std	Std
R4	1	27.68kΩ, 1/16W, 0.5%	Std	Std

**** This SIMULATION data is intended to provide designers with a general understanding of the power requirements of Xilinx FPGA families in typical applications.**

The number of logic gates, operating frequency and so on affect the value of the current consumption. Please refer to the Xilinx "Power Consumption Tools," available at www.xilinx.com/power, for closer approximations specific to individual applications.

Power/Current Requirement Calculation Examples for Spartan™ Devices

Series	Device	VCCINT (V)	VCCO (V)	ICCINT @100MHz (mA)	ICCO @100MHz (mA)
Spartan™-IIE	XC2S50E	1.8	3.3	201	71
	XC2S100E	1.8	3.3	260	79
	XC2S150E	1.8	3.3	362	104
	XC2S200E	1.8	3.3	442	114
	XC2S300E	1.8	3.3	529	129
	XC2S400E	1.8	3.3	786	161
	XC2S600E	1.8	3.3	1127	201

Routing=Medium; Toggle Rate=25%;

BRAM Port Width=8; Port A Read/Write Rate=25%; Port B Read/Write Rate=25%;

DLL Frequency Type=Low;

I/O=LV TTL_2; Input/Output=50%; Avg Toggle Rate=25%; Output load=10pF

Series	Device	VCCINT (V)	VCCO (V)	VCCAUX (V)	ICCINT @100MHz (mA)	ICCO @100MHz (mA)
Spartan™-3	XC3S50	1.2	3.3	2.5	138	82
	XC3S200	1.2	3.3	2.5	354	115
	XC3S400	1.2	3.3	2.5	553	174
	XC3S1000	1.2	3.3	2.5	1009	193
	XC3S1500	1.2	3.3	2.5	1581	322
	XC3S2000	1.2	3.3	2.5	2280	374
	XC3S4000	1.2	3.3	2.5	3644	470
	XC3S5000	1.2	3.3	2.5	4237	518

Tj=100degC

Routing=Medium; Toggle Rate=25%;

BRAM Port Width=18; Port A Read/Write Rate=25%; Port B Read/Write Rate=25%;

Mutiplier Data Toggle Rate=Medium;

DCM Freq Mode=Low;

I/O=LV CMOS33_12; Input/Output=50%; IOB Registers=DDR; Avg Toggle Rate=25%;

Average Output Enable Rate=50%; Output load=20pF;

Series	Device	VCCINT (V)	VCCO (V)	VCCAUX (V)	ICCINT @100MHz (mA)	ICCO @100MHz (mA)
Spartan™-3E	XC3S100E	1.2	3.3	2.5	162	74
	XC3S250E	1.2	3.3	2.5	418	114
	XC3S500E	1.2	3.3	2.5	743	166
	XC3S1200E	1.2	3.3	2.5	1208	201
	XC3S1600E	1.2	3.3	2.5	1792	248

Tj=100degC

Routing=Medium; Toggle Rate=25%;

BRAM Port Width=18; Port A Read/Write Rate=25%; Port B Read/Write Rate=25%;

Mutiplier Data Toggle Rate=Medium;

DCM Freq Mode=Low;

I/O=LV CMOS33_12; Input/Output=50%; IOB Registers=DDR; Avg Toggle Rate=25%;

Average Output Enable Rate=50%; Output load=20pF;

**** This SIMULATION data is intended to provide designers with a general understanding of the power requirements of Xilinx FPGA families in typical applications.**

The number of the logic gates, the operating frequency and so on changes the value of current consumption. Please refer to the Xilinx "Power Consumption Tools," available at www.xilinx.com/power, for closer approximations specific to individual applications.

Power/Current Requirements Calculation Examples for Virtex™-II Devices

Series	Device	VCCINT (V)	VCCO (V)	VCCAUX (V)	ICCINT @100MHz (mA)	ICCO @100MHz (mA)	ICCAUX (mA)
Virtex™-II	XC2V40	1.5	3.3	3.3	166	60	100
	XC2V80	1.5	3.3	3.3	317	82	100
	XC2V250	1.5	3.3	3.3	919	136	100
	XC2V500	1.5	3.3	3.3	1511	180	100
	XC2V1000	1.5	3.3	3.3	2276	294	100
	XC2V1500	1.5	3.3	3.3	3244	359	100
	XC2V2000	1.5	3.3	3.3	4331	425	100
	XC2V3000	1.5	3.3	3.3	6271	490	100
	XC2V4000	1.5	3.3	3.3	9669	621	100
	XC2V6000	1.5	3.3	3.3	13065	752	100
	XC2V8000	1.5	3.3	3.3	18404	754	100

Tj=100degC

Routing=Medium; Toggle Rate=25%;

BRAM Port Width=18; Port A Read/Write Rate=25%; Port B Read/Write Rate=25%;

Mutiplier Data Toggle Rate=Medium;

DCM Freq Mode=Low ;

I/O=LVCMOS33_12; Input/Output=50%; IOB Registers=DDR; Avg Toggle Rate=25%;

Average Output Enable Rate=50%; Output load=20pF;

Series	Device	VCCINT (V)	VCCO (V)	VCCAUX (V)	ICCINT @100MHz (mA)	ICCO @100MHz (mA)	ICCAUX (mA)
Virtex-II Pro™	XC2VP2	1.5	3.3	2.5	855	135	167
	XC2VP4	1.5	3.3	2.5	1637	230	167
	XC2VP7	1.5	3.3	2.5	2395	261	167
	XC2VP20	1.5	3.3	2.5	4208	372	167
	XC2VP30	1.5	3.3	2.5	6185	425	167
	XC2VP40	1.5	3.3	2.5	8583	531	167
	XC2VP50	1.5	3.3	2.5	10499	562	167
	XC2VP70	1.5	3.3	2.5	14639	657	167
	XC2VP100	1.5	3.3	2.5	19468	768	167

Tj=100degC

Routing=Medium; Toggle Rate=25%;

BRAM Port Width=18; Port A Read/Write Rate=25%; Port B Read/Write Rate=25%;

Mutiplier Data Toggle Rate=Medium;

DCM Freq Mode=Low ;

I/O=LVCMOS33_12; Input/Output=50%; IOB Registers=DDR; Avg Toggle Rate=25%;

Average Output Enable Rate=50%; Output load=20pF;

**** This SIMULATION data is intended to provide designers with a general understanding of the power requirements of Xilinx FPGA families in typical applications.**

The number of the logic gates, the operating frequency and so on changes the value of current consumption. Please refer to the Xilinx "Power Consumption Tools," available at www.xilinx.com/power, for closer approximations specific to individual applications.

Power/Current Requirements Calculation Examples for Virtex™-5 Devices

Series	Device	VCCINT (V)	VCCO (V)	VCCAUX (V)	@200MHz (mA)	@200MHz (mA)	@200MHz (mA)
Virtex™-5	XC5VLX30	1.0	1.8	2.5	1185	976	373
	XC5VLX50	1.0	1.8	2.5	1821	976	501
	XC5VLX85	1.0	1.8	2.5	3118	1951	811
	XC5VLX110	1.0	1.8	2.5	3995	1951	811

Tj=100degC

Toggle Rate=25%; Average Fanout=2;

IO=SSTL Class II 1.8V; Input/Output=50%; IOB Registers=DDR; Avg Toggle Rate=25%;

Average Output Enable Rate=50%; Output load=20pF;

BRAM Port Width=18; Read/Write Rate=25%; Enable Rate=100%;

DCM Freq Mode=Low ;

Utilization Rate=100%;