

Exhibit 1

Exemplary Infringement Claim Chart for U.S. Patent No. 7,439,862

Claim 1	Infringement by WaveLynx
1. An antenna array for an RFID reader comprising:	WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are RFID readers. WaveLynx describes its Ethos Readers as "multi-technology contactless access control readers" WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2.

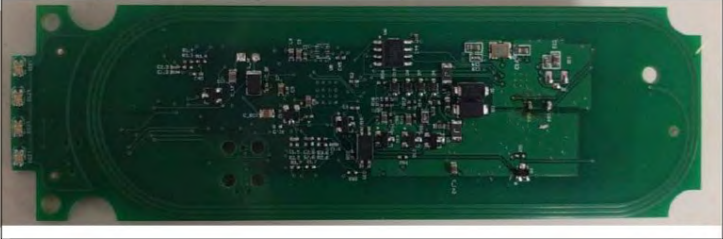
Claim 1	Infringement by WaveLynx								
1[a] a first reader antenna tuned to operate at a first low carrier frequency enabling data communication with a first transponder transmitting data signals at said first low carrier frequency; and	WaveLynx's Ethos Readers include at least a first reader antenna tuned to operate at a first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 125 kHz. <table><tr><th>FEATURES</th><th>Mullion Model ET10</th><th>Single Gang Model ET20</th><th>Keypad Model ET25</th></tr><tr><td>RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile</td><td>Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS</td><td>Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS</td><td>Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS</td></tr></table> Doc. No. 12-4 at 3. WaveLynx's Ethos Readers also include an antenna tuned to operate at a first low carrier frequency. For example, the ET10-7 reader includes an antenna tuned to operate at a first low carrier frequency on the back of the reader.	FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS
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Claim 1	Infringement by WaveLynx
	  ET10 Internal 1 (back of reader) Two views of same product shown.
1[b] a second reader antenna tuned to operate at a second high carrier frequency different from the first low carrier frequency enabling data communication with a second transponder transmitting data signals at said second high carrier	Doc. No. 12-12 at 2. WaveLynx's Ethos Readers include at least a second reader antenna tuned to operate at a second high carrier frequency different from the first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 13.56 MHz.

Claim 1	Infringement by WaveLynx																		
frequency, wherein the first and second antennas are oriented along axes that are substantially parallel to one another.	<table><tr><td></td><td></td><td></td></tr><tr><td>Mullion Model ET10</td><td>Single Gang Model ET20</td><td>Keypad Model ET25</td></tr></table>							Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25									
																			
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Wavelynx’s Ethos Readers also include an antenna tuned to operate at a second high carrier frequency. For example, the ET10-7 reader includes an antenna tuned to operate at a second high carrier frequency on the front of the reader.

Claim 1	Infringement by WaveLynx
	 ET10 Internal 2 (front of reader) Doc. No. 12-12 at 2. Because the low frequency antenna is located on the back of the reader and the high frequency antenna is located on the front of the reader, the two antennas are oriented along axes that are substantially parallel to each other.

Claim 2	Infringement by WaveLynx
2. The antenna array of claim 1, wherein said first low carrier frequency is nominally 125 kHz.	WaveLynx's Ethos Readers include an antenna array of claim 1, wherein said first low carrier frequency is nominally 125 kHz. See claim 1 and claim 1[a].
Claim 3	Infringement by WaveLynx
3. The antenna array of claim 2, wherein said second high carrier frequency is about 13.56 MHz.	WaveLynx's Ethos Readers include an antenna array of claim 2, wherein said second high carrier frequency is about 13.56 MHz. See claim 2 and claim 1[b].
Claim 4	Infringement by WaveLynx
4. The antenna array of claim 1, further comprising a reader housing containing said first and second antennas	WaveLynx's Ethos Readers include the antenna array of claim 1, further comprising a reader housing containing said first and second antennas. For example, the ET10-7 reader includes a housing that contains the reader, which incorporates the low frequency and high frequency antennas.

Claim 4	Infringement by WaveLynx
	 ET10 External 1 (front of reader)

Claim 4	Infringement by WaveLynx  ET10 External 2 (with label placement) Doc. No. 12-13 at 2. See claim 1.
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Claim 5	Infringement by WaveLynx
5. An antenna array for an RFID reader comprising:	WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are RFID readers. WaveLynx describes its Ethos Readers as "multi-technology contactless access control readers" WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire® EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2.

Claim 5	Infringement by WaveLynx								
[5.a] a first reader antenna tuned to operate at a first carrier frequency enabling data communication with a first transponder transmitting data signals at said first carrier frequency; and	WaveLynx's Ethos Readers include at least a first reader antenna tuned to operate at a first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 125 kHz. <table><tr><th>FEATURES</th><th>Mullion Model ET10</th><th>Single Gang Model ET20</th><th>Keypad Model ET25</th></tr><tr><td>RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile</td><td>Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS</td><td>Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS</td><td>Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS</td></tr></table> Doc. No. 12-4 at 3. WaveLynx describes its Ethos Readers as having "[s]tandard technologies" including "Proximity (125 kHz)."	FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS
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Claim 5	Infringement by WaveLynx
	WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers also include an antenna tuned to operate at a first low carrier frequency. For example, the ET10-7 reader includes an antenna tuned to operate at a first low carrier frequency on the back of the reader.

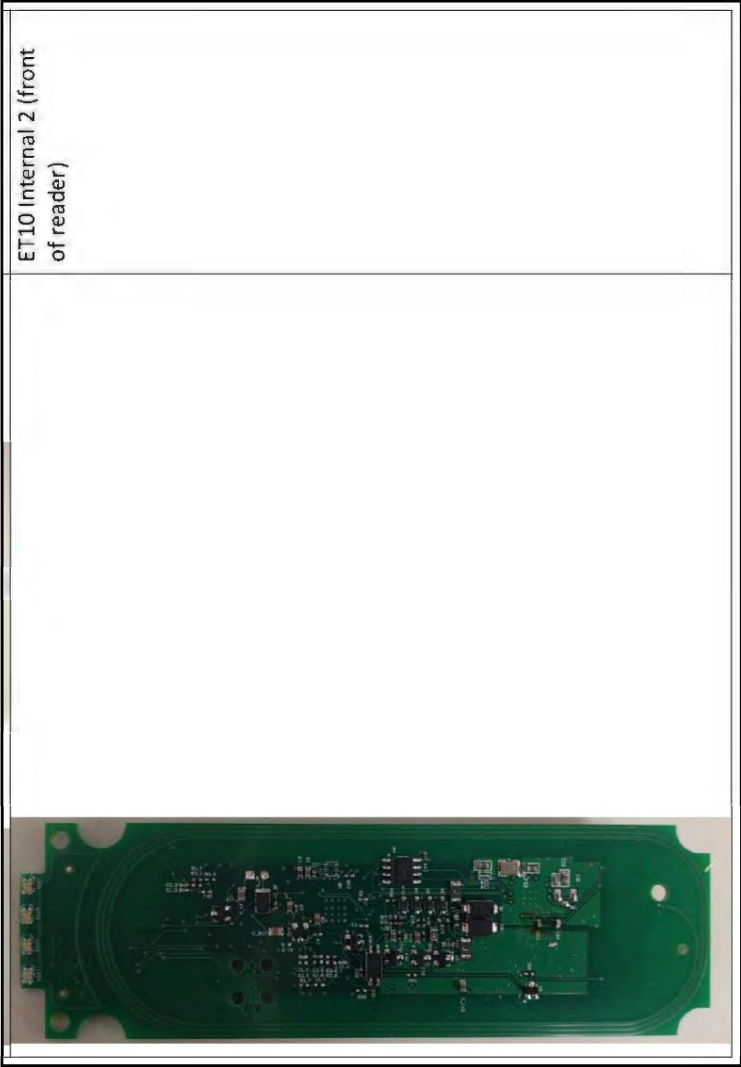
Claim 5	Infringement by WaveLynx
	  ET10 Internal 1 (back of reader) Two views of same product shown.
Doc. No. 12-12 at 2.	 WaveLynx ET-10-7.

Claim 5	Infringement by WaveLynx
	Similarly, the ET20-7 & ET25-7 reader includes an antenna tuned to operate at a first low carrier frequency on the back of the reader.  WaveLynx ET25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a first transponder transmitting data signals at said first low carrier frequency. For example, the technical specifications of the Ethos Readers discuss "read ranges" for "125 kHz up to 4" for each of the ET10, ET20, and ET25 readers. Such "read ranges" relate to the distance a transponder may be placed from the reader to enable data communication.

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Claim 5	Infringement by WaveLynx
	 Doc. No. 12-12 at 2.

Claim 5	Infringement by WaveLynx
	A photograph of a black printed circuit board (PCB) for the WaveLynx ET10. The board is populated with various electronic components, including integrated circuits, capacitors, and resistors. A white label at the top right of the board reads "ET10", "Rev 1.0", and "E301546". WaveLynx ET10. A photograph of a black printed circuit board (PCB) for the WaveLynx ET 20/25-7. The board features a 3x4 grid of gold-plated circular connectors. A white label at the bottom right of the board reads "ETM-3", "W6 04V-0", "E207044", and "4111MCL ET". WaveLynx ET 20/25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a second transponder transmitting data signals at said first high carrier frequency.

Claim 5

Infringement by WaveLynx

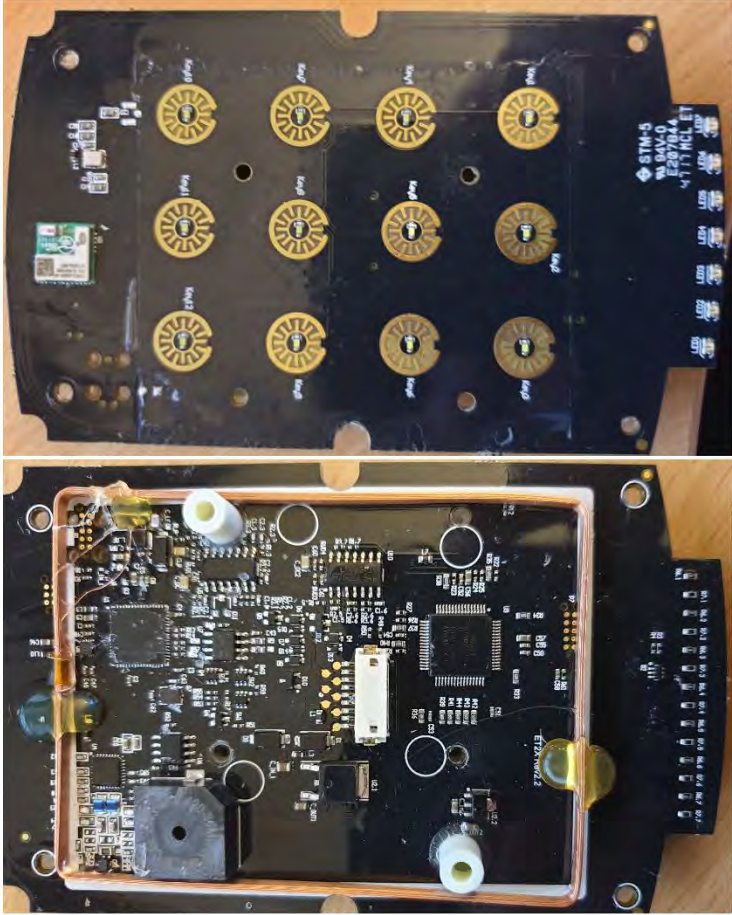
For example, the technical specifications of the Ethos Readers discuss “read ranges” for “EV1” and “EV2” for each of the ET10, ET20, and ET25 readers. On information and belief, EV1 and EV2 refer to the versions of NXP’s MIFARE DESFire technology, which operates at 13.56 MHz. The “read ranges” relate to the distance a transponder may be placed from the reader to enable data communication.

TECHNICAL SPECIFICATIONS

FEATURES				
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	RF Technologies	Part Number	Part Number	Part Number
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[5.c] wherein said first and second antennas are arranged in at least a partially overlapping arrangement on proximate adjacent planes.	Because the low frequency antenna is located on the back of the reader and the high frequency antenna is located on the front of the reader, the two antennas are arranged in at least a partially overlapping arrangement on proximate adjacent planes.

Claim 5	Infringement by WaveLynx
	WaveLynx ET10-7.  WaveLynx ET20/25-7.

Claim 6	Infringement by WaveLynx
6. The antenna array of claim 5, further comprising	WaveLynx's Ethos Readers include the antenna array of claim 5, further comprising a reader housing containing said first and second antennas.

Infringement by WaveLynx	
Claim 6 a reader housing containing said first and second antennas.	For example, the ET10-7 reader includes a housing that contains the reader, which incorporates the low frequency and high frequency antennas.  ET10 External 1 (front of reader)

Claim 6	Infringement by WaveLynx
	 ET10 External 2 (with label placement) Doc. No. 12-13 at 2. See claim 1.

Claim 9	Infringement by WaveLynx
9. An antenna array for an RFID reader comprising:	WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are RFID readers. WaveLynx describes its Ethos Readers as "multi-technology contactless access control readers" WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire® EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are described as operating at multiple "RF Technologies."

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WaveLynx’s Ethos Readers (e.g., ET10, ET20, and ET25) also include an antenna array.

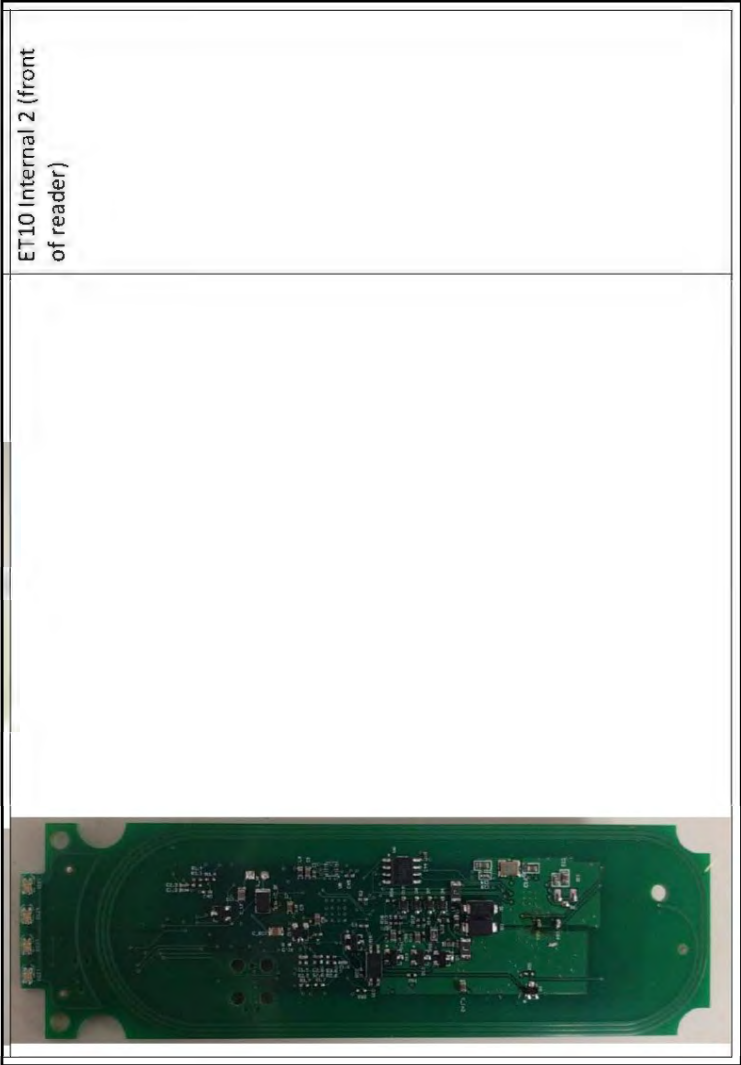
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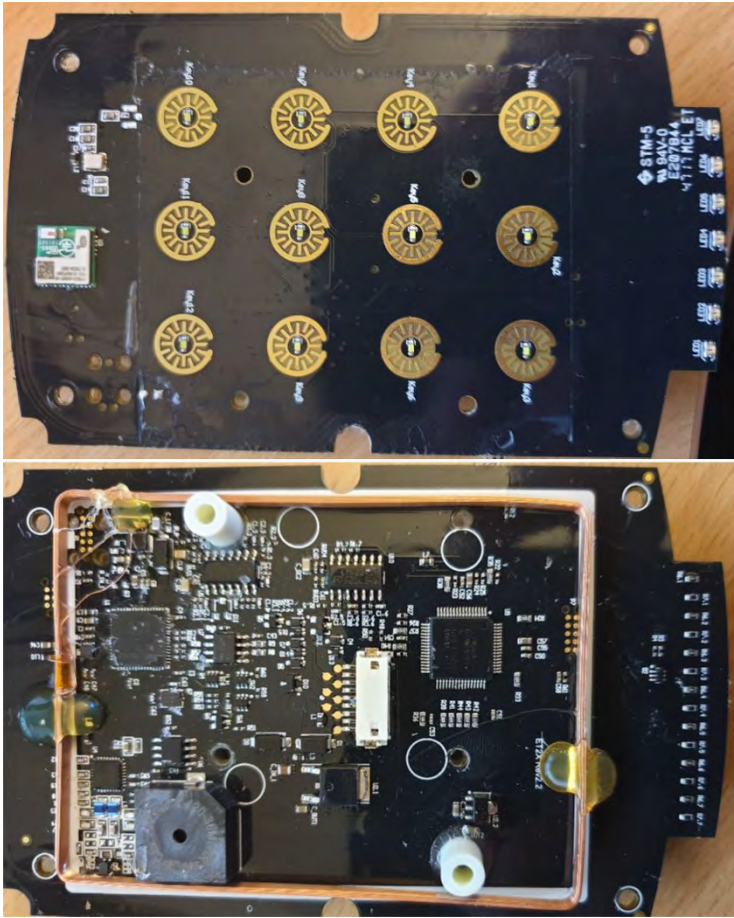
Infringement by WaveLynx



ET10 Internal 1 (back of reader)

Two views of same product shown.

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WaveLynx describes its Ethos Readers as having “[s]tandard technologies” including “Proximity (125 kHz).”

Claim 9	Infringement by WaveLynx
	WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers also include an antenna tuned to operate at a first low carrier frequency. For example, the ET10-7 reader includes an antenna tuned to operate at a first low carrier frequency on the back of the reader.

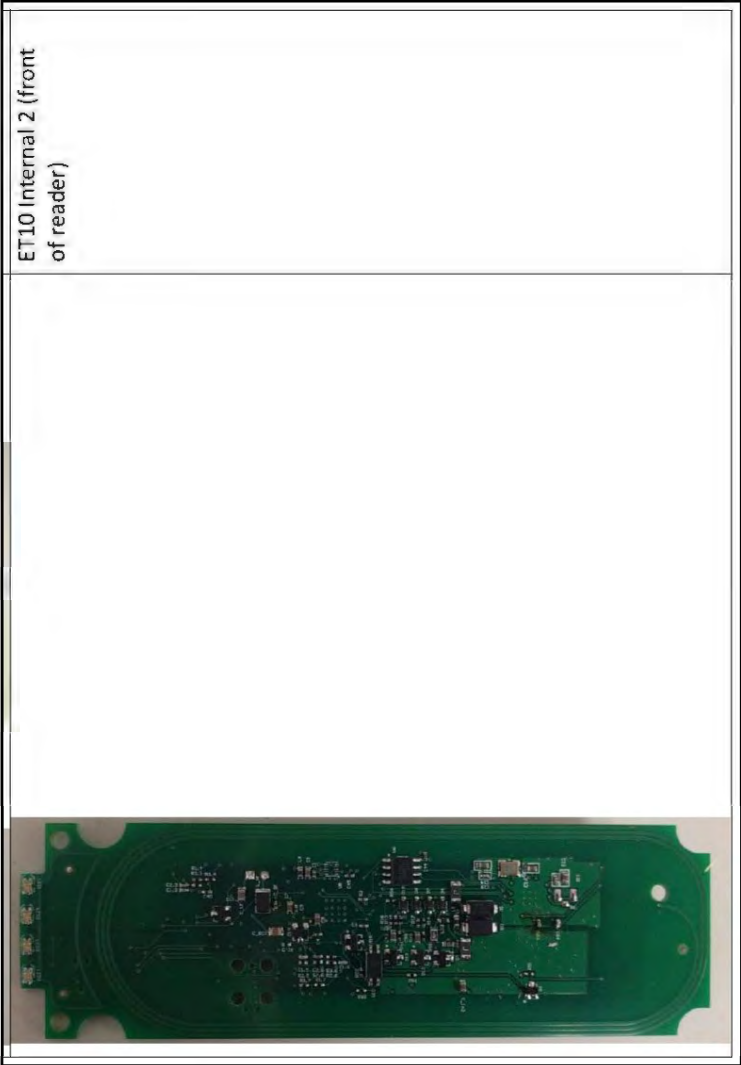
Claim 9	Infringement by WaveLynx		
			ET10 Internal 1 (back of reader) Two views of same product shown.
	Doc. No. 12-12 at 2. 		

Claim 9	Infringement by WaveLynx
	WaveLynx ET-10. Similarly, the ET20-7 & ET25-7 reader includes an antenna tuned to operate at a first low carrier frequency on the back of the reader.  WaveLynx ET25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a first transponder transmitting data signals at said first low carrier frequency. For example, the technical specifications of the Ethos Readers discuss "read ranges" for "125 kHz up to 4'" for each of the ET10, ET20, and ET25 readers. Such "read ranges" relate to the distance a transponder may be placed from the reader to enable data communication.

Claim 9	Doc. No. 12-4 at 3. WaveLynx's Ethos Readers include at least a second reader antenna tuned to operate at a second high carrier frequency different from the first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 13.56 MHz.																												
[9.b] a second reader antenna tuned to operate at a second carrier frequency different from said first carrier frequency enabling data communication with a second transponder transmitting data signals at said second carrier frequency,	TECHNICAL SPECIFICATIONS <table><tr><td>FEATURES</td><td></td><td></td><td></td></tr><tr><td>RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile</td><td>Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS</td><td>Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS</td><td>Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS</td></tr><tr><td>Color</td><td colspan="3">Black (Standard) Beige Custom by Request</td></tr><tr><td>Current</td><td>105 mA average, 145 mA peak</td><td>120 mA average, 170 mA peak</td><td>145 mA average, 195 mA peak</td></tr><tr><td>Voltage</td><td colspan="3">5-16 V DC</td></tr><tr><td>Temperature Range</td><td colspan="3">UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity</td></tr><tr><td>Read Ranges</td><td>EV1: 1.2", EV2: 2.2" 125 kHz up to 4"</td><td>EV1: 1.5", EV2 2.5" 125 kHz up to 4"</td><td></td></tr></table>	FEATURES				RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS	Color	Black (Standard) Beige Custom by Request			Current	105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak	Voltage	5-16 V DC			Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity			Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"	
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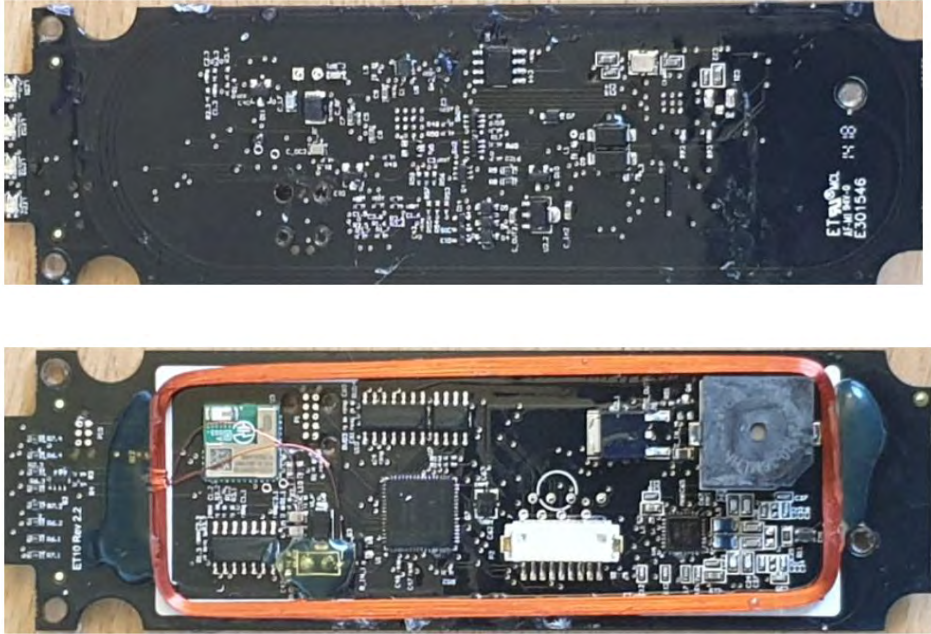
Claim 9	Infringement by WaveLynx																												
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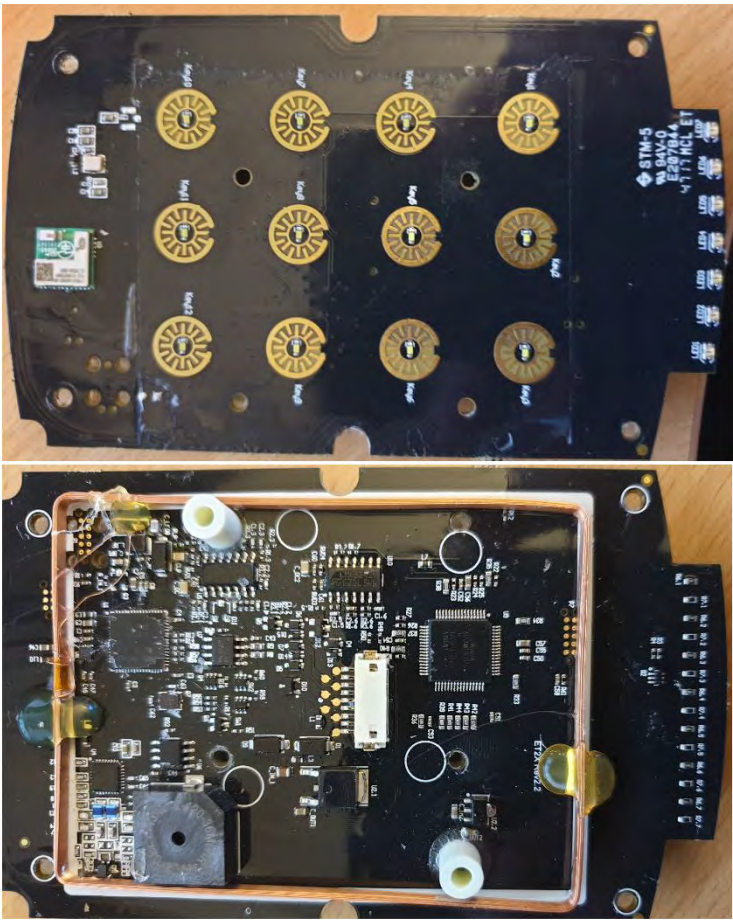
Claim 9	Infringement by WaveLynx
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Claim 9	Infringement by WaveLynx
	 Doc. No. 12-12 at 2.

Claim 9	Infringement by WaveLynx
	A photograph of a black printed circuit board (PCB) for the WaveLynx ET10-7. The board is populated with various electronic components, including integrated circuits, resistors, and capacitors. A white label at the top right corner of the board reads "ET10-7", "Rev. 1.0", and "E301546". WaveLynx ET10-7. A photograph of a black printed circuit board (PCB) for the WaveLynx ET20/25-7. The board features a 3x4 grid of eight gold-colored circular components, likely transponders. A white label at the bottom left corner of the board reads "8-MTS", "0-VMS 4P", "A40755", and "13 JAN 11". WaveLynx ET20/25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a second transponder transmitting data signals at said first high carrier frequency.

Claim 9	For example, the technical specifications of the Ethos Readers discuss “read ranges” for “EV1” and “EV2” for each of the ET10, ET20, and ET25 readers. On information and belief, EV1 and EV2 refer to the versions of NXP’s MIFARE DESFire technology, which operates at 13.56 MHz. The “read ranges” relate to the distance a transponder may be placed from the reader to enable data communication. <table><tr><th colspan="4">TECHNICAL SPECIFICATIONS</th></tr><tr><th>FEATURES</th><th>Mullion Model ET10</th><th>Single Gang Model ET20</th><th>Keypad Model ET25</th></tr><tr><td>RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile</td><td>Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS</td><td>Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS</td><td>Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS</td></tr><tr><td>Color</td><td colspan="3">Black (Standard) Beige Custom by Request</td></tr><tr><td>Current</td><td>105 mA average, 145 mA peak</td><td>120 mA average, 170 mA peak</td><td>145 mA average, 195 mA peak</td></tr><tr><td>Voltage</td><td colspan="3">5-16 V DC</td></tr><tr><td>Temperature Range</td><td colspan="3">UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity</td></tr><tr><td>Read Ranges</td><td>EV1: 1.2", EV2: 2.2" 125 kHz up to 4"</td><td colspan="2">EV1: 1.5", EV2 2.5" 125 kHz up to 4"</td></tr></table> Doc. No. 12-4 at 3.	TECHNICAL SPECIFICATIONS				FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS	Color	Black (Standard) Beige Custom by Request			Current	105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak	Voltage	5-16 V DC			Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity			Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"	
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[9.c] wherein said first and second antennas are arranged in an opposing magnetic flux arrangement.	Because the low frequency antenna is located on the back of the reader and the high frequency antenna is located on the front of the reader, the antennas are arranged in an opposing magnetic flux arrangement.																																

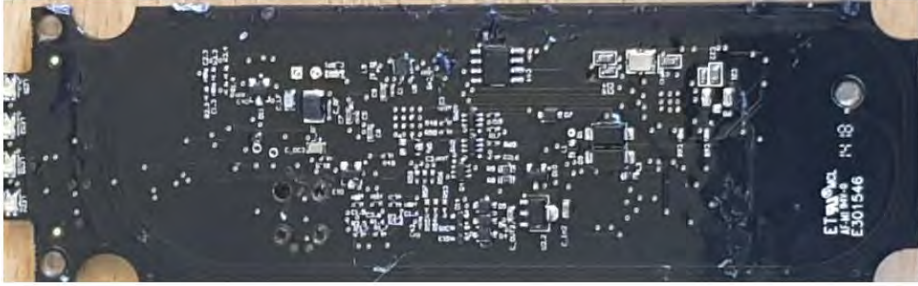
Claim 9	Infringement by WaveLynx
	More particularly, because the low frequency antenna is surrounded by the area of the second high frequency antenna, both positive and negative magnetic flux from the low frequency antenna will necessarily pass through the high frequency reader antenna. 

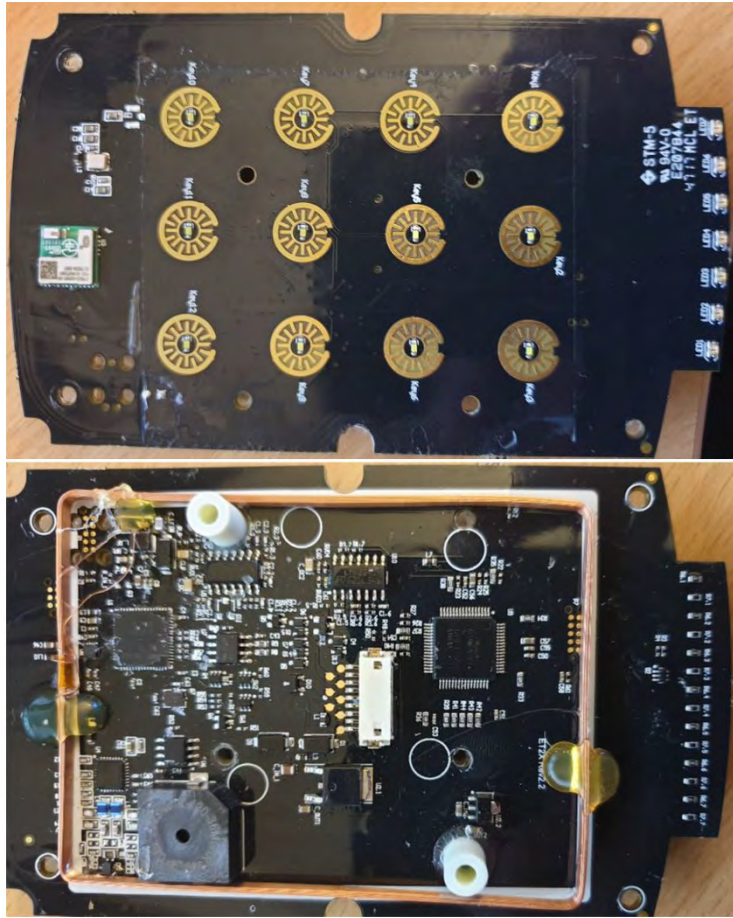
Claim 9	Infringement by WaveLynx
	WaveLynx ET10-7 (low frequency antenna on back shown entirely within area of high frequency antenna on the front of the reader).  WaveLynx ET20/25-7 (low frequency antenna on back shown entirely within area of high frequency antenna on the front of the reader).

Claim 11	Infringement by WaveLynx
11. The antenna array of claim 9, wherein said first reader antenna has a first area, said second reader antenna has a second area, and said first and second reader antennas are arranged relative to one another such that only a portion of said first area aligns with only a portion of said second area. For example, the first reader antenna (low carrier frequency antenna) on the back of the Ethos Readers includes a first area surrounded by the rectangular antenna loop.	WaveLynx's Ethos Readers include the antenna array of claim 9, wherein said first reader antenna has a first area, said second reader antenna has a second area, and said first and second reader antennas are arranged relative to one another such that only a portion of said first area aligns with only a portion of said second area. For example, the first reader antenna (low carrier frequency antenna) on the back of the Ethos Readers includes a first area surrounded by the rectangular antenna loop.  WaveLynx ET10-7. 

Claim 11	Infringement by WaveLynx
	WaveLynx ET20/25-7. Similarly, the second reader antenna (high carrier frequency antenna) on the front of the Ethos Readers includes a second area surrounded by the second rectangular antenna.  WaveLynx ET10-7. 

Claim 11	Infringement by WaveLynx
	WaveLynx ET20/25-7.
[11.c] and said first and second reader antennas are arranged relative to one another such that only a portion of said first area aligns with only a portion of said second area.	Because the low frequency antenna is located on the back of the reader and the high frequency antenna is located on the front of the reader, and the first area and second areas are of different dimensions, a portion of said first area aligns with only a portion of said second area.

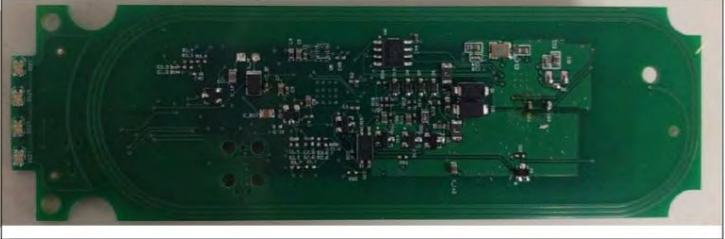
Claim 11	Infringement by WaveLynx
	  WaveLynx ET10-7 (portion of low frequency antenna aligns with portion of high frequency antenna).

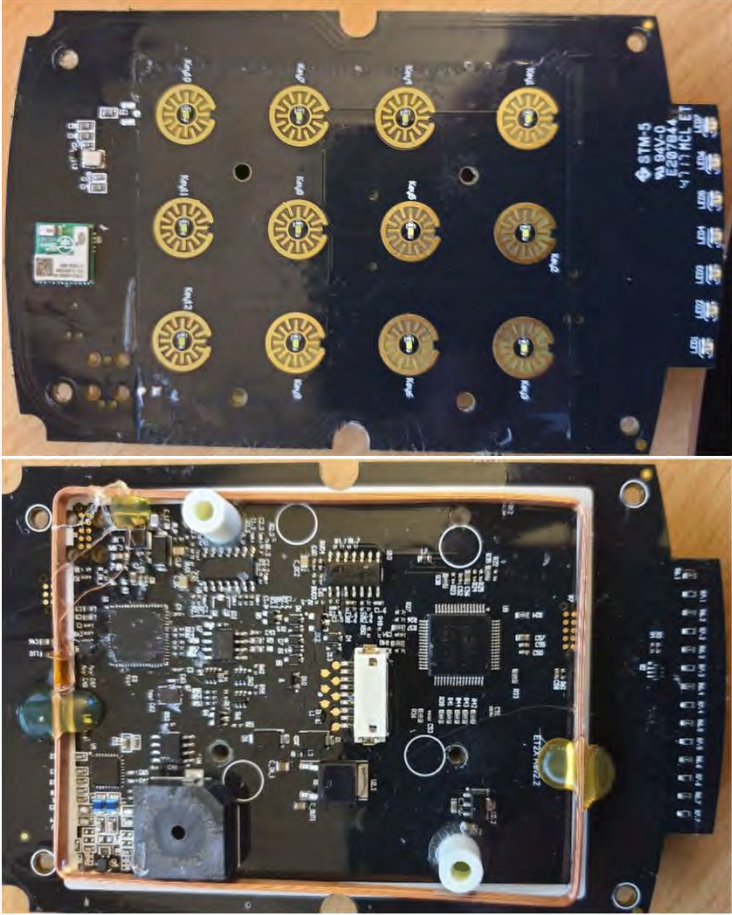


WaveLynx ET20/25-7 (portion of low frequency antenna on the back of the Ethos Reader aligns with portion of high frequency antenna on the front of Ethos Reader).

Claim 14	Infringement by WaveLynx
14. An RFID reader for an RFID system comprising: an antenna array including	WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are RFID readers for an RFID system. WaveLynx describes its Ethos Readers as "multi-technology contactless access control readers" WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire® EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. Additionally, WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are described as operating at multiple "RF Technologies."

Claim 14	Infringement by WaveLynx																
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Claim 14	Infringement by WaveLynx
	 ET10 Internal 2 (front of reader) Doc. No. 12-12 at 2.

Claim 14	Infringement by WaveLynx
	 WaveLynx ET-20/25.
[14.a] a first reader tuned to operate at a first low carrier frequency enabling data communication with a first transponder transmitting data signals at said first low carrier frequency and	WaveLynx's Ethos Readers include at least a first reader antenna tuned to operate at a first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 125 kHz.

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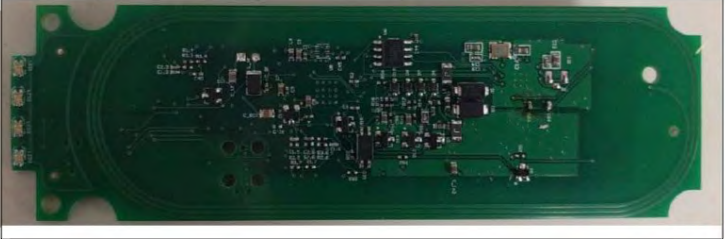
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	WaveLynx ET-10. Similarly, the ET20-7 & ET25-7 reader includes an antenna tuned to operate at a first low carrier frequency on the back of the reader.  WaveLynx ET25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a first transponder transmitting data signals at said first low carrier frequency. For example, the technical specifications of the Ethos Readers discuss "read ranges" for "125 kHz up to 4'" for each of the ET10, ET20, and ET25 readers. Such "read ranges" relate to the distance a transponder may be placed from the reader to enable data communication.

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	TECHNICAL SPECIFICATIONS <table><tr><td>FEATURES</td><td></td><td></td><td></td></tr><tr><td>RF Technologies</td><td>Mullion Model ET10</td><td>Single Gang Model ET20</td><td>Keypad Model ET25</td></tr><tr><td>13.56 MHz</td><td>Part Number</td><td>Part Number</td><td>Part Number</td></tr><tr><td>125 kHz & 13.56 MHz</td><td>ET10-2WS</td><td>ET20-2WS</td><td>ET25-2WS</td></tr><tr><td>13.56 MHz & Mobile</td><td>ET10-3WS</td><td>ET20-3WS</td><td>ET25-3WS</td></tr><tr><td>125 kHz, 13.56MHz, & Mobile</td><td>ET10-6WS</td><td>ET20-6WS</td><td>ET25-6WS</td></tr><tr><td></td><td>ET10-7WS</td><td>ET20-7WS</td><td>ET25-7WS</td></tr><tr><td>Color</td><td colspan="3">Black (Standard) Beige Custom by Request</td></tr><tr><td>Current</td><td>105 mA average, 145 mA peak</td><td>120 mA average, 170 mA peak</td><td>145 mA average, 195 mA peak</td></tr><tr><td>Voltage</td><td colspan="3">5-16 V DC</td></tr><tr><td>Temperature Range</td><td colspan="3">UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity</td></tr><tr><td>Read Ranges</td><td>EV1: 1.2", EV2: 2.2" 125 kHz up to 4"</td><td>EV1: 1.5", EV2 2.5" 125 kHz up to 4"</td><td></td></tr></table> Doc. No. 12-4 at 3.	FEATURES				RF Technologies	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	13.56 MHz	Part Number	Part Number	Part Number	125 kHz & 13.56 MHz	ET10-2WS	ET20-2WS	ET25-2WS	13.56 MHz & Mobile	ET10-3WS	ET20-3WS	ET25-3WS	125 kHz, 13.56MHz, & Mobile	ET10-6WS	ET20-6WS	ET25-6WS		ET10-7WS	ET20-7WS	ET25-7WS	Color	Black (Standard) Beige Custom by Request			Current	105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak	Voltage	5-16 V DC			Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity			Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"	
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Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"																																															
[14.b] a second reader antenna tuned to operate at a second high carrier frequency different from said first low carrier frequency enabling data communication with a second transponder transmitting data signals at	WaveLynx's Ethos Readers include at least a second reader antenna tuned to operate at a second high carrier frequency different from the first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 13.56 MHz.																																																

Claim 14	Infringement by WaveLynx								
said second high carrier frequency,	<table><tr><th>FEATURES</th><th>Mullion Model ET10</th><th>Single Gang Model ET20</th><th>Keypad Model ET25</th></tr><tr><td>RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile</td><td>Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS</td><td>Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS</td><td>Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS</td></tr></table>	FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS
FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25						
RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS						
	Doc. No. 12-4 at 3. WaveLynx describes its Ethos Readers as having “[s]tandard technologies” including “Smart (13.56 MHz).”								

Claim 14	Infringement by WaveLynx
	WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers also include an antenna tuned to operate at a second high carrier frequency. For example, the ET10-7 reader includes an antenna tuned to operate at a second high carrier frequency on the front of the reader.

Claim 14	Infringement by WaveLynx
	 ET10 Internal 2 (front of reader) Doc. No. 12-12 at 2.

Claim 14	Infringement by WaveLynx
	A photograph of a black printed circuit board (PCB) for the WaveLynx ET10-7. The board is populated with various electronic components, including integrated circuits, resistors, and capacitors. A white label in the top right corner reads 'ET10-7', 'Rev 1.0', and 'E301546'. WaveLynx ET10-7. A photograph of a black printed circuit board (PCB) for the WaveLynx ET20/25-7. The board features a 3x4 grid of gold-plated circular connectors. A white label in the bottom right corner reads 'ETM-3', 'Rev 1.0', 'E207044', and '4111MCL ET'. WaveLynx ET20/25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a second transponder transmitting data signals at said first high carrier frequency.

Claim 14**Infringement by WaveLynx**

For example, the technical specifications of the Ethos Readers discuss “read ranges” for “EV1” and “EV2” for each of the ET10, ET20, and ET25 readers. On information and belief, EV1 and EV2 refer to the versions of NXP’s MIFARE DESFire technology, which operates at 13.56 MHz. The “read ranges” relate to the distance a transponder may be placed from the reader to enable data communication.

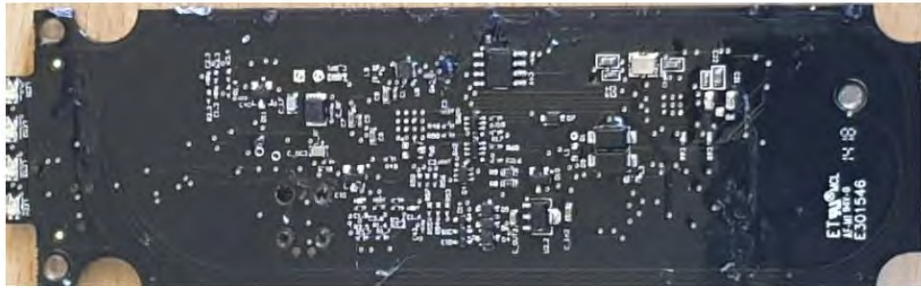
TECHNICAL SPECIFICATIONS

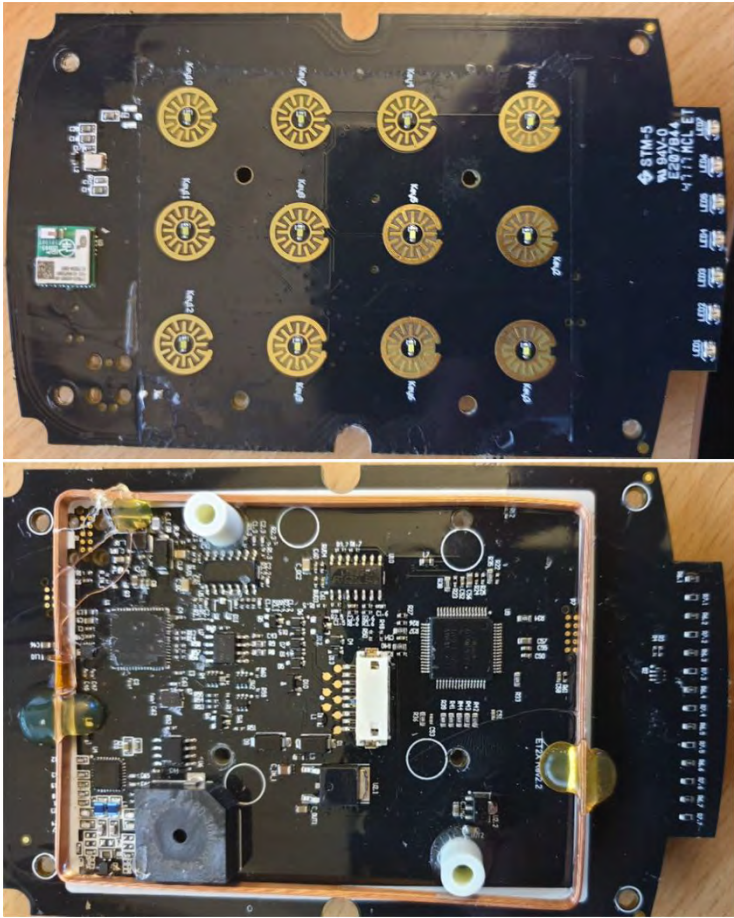
FEATURES			
RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25
	Part Number	Part Number	Part Number
	ET10-2WS	ET20-2WS	ET25-2WS
	ET10-3WS	ET20-3WS	ET25-3WS
	ET10-6WS	ET20-6WS	ET25-6WS
	ET10-7WS	ET20-7WS	ET25-7WS
Color	Black (Standard) Beige Custom by Request		
Current	105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak
Voltage	5-16 V DC		
Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity		
Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"	

Doc. No. 12-4 at 3.

[14.c] wherein the first and second antennas are oriented along axes that are

Because the low frequency antenna is located on the back of the reader and the high frequency antenna is located on the front of the reader, the two antennas are oriented along axes that are substantially parallel to each other.

Claim 14	Infringement by WaveLynx
substantially parallel to one another; and	 WaveLynx ET10-7.

Claim 14	Infringement by WaveLynx
	 WaveLynx ET20/25-7.
[14.d] a signal generator coupled with said first and second reader antennas.	On information and belief, the Ethos Readers include a signal generator coupled with said first and second reader antennas to generate the low carrier frequency and high carrier frequencies interrogation signals that are transmitted to interrogate the transponders. For example, the WaveLynx's Ethos Readers are described as operating on multiple RF technologies:

Claim 14	Infringement by WaveLynx																															
	<table><tr><td></td><td></td><td></td><td></td></tr><tr><td>FEATURES</td><td>Mullion Model ET10</td><td>Single Gang Model ET20</td><td>Keypad Model ET25</td></tr><tr><td>RF Technologies</td><td>Part Number</td><td>Part Number</td><td>Part Number</td></tr><tr><td>13.56 MHz</td><td>ET10-2WS</td><td>ET20-2WS</td><td>ET25-2WS</td></tr><tr><td>125 kHz & 13.56 MHz</td><td>ET10-3WS</td><td>ET20-3WS</td><td>ET25-3WS</td></tr><tr><td>13.56 MHz & Mobile</td><td>ET10-6WS</td><td>ET20-6WS</td><td>ET25-6WS</td></tr><tr><td>125 kHz, 13.56MHz, & Mobile</td><td>ET10-7WS</td><td>ET20-7WS</td><td>ET25-7WS</td></tr></table>								FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies	Part Number	Part Number	Part Number	13.56 MHz	ET10-2WS	ET20-2WS	ET25-2WS	125 kHz & 13.56 MHz	ET10-3WS	ET20-3WS	ET25-3WS	13.56 MHz & Mobile	ET10-6WS	ET20-6WS	ET25-6WS	125 kHz, 13.56MHz, & Mobile	ET10-7WS	ET20-7WS	ET25-7WS
																																
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125 kHz, 13.56MHz, & Mobile	ET10-7WS	ET20-7WS	ET25-7WS																													

Doc. No. 12-4 at 3.

WaveLynx further describes its Ethos Readers as having “[s]tandard technologies” including “Proximity (125 kHz) and “Smart (13.56 MHz)” contactless access capabilities.

Doc. No. 12-4 at 3.

WaveLynx further describes its Ethos Readers as having “[s]tandard technologies” including “Proximity (125 kHz) and “Smart (13.56 MHz)” contactless access capabilities.

Claim 14	Infringement by WaveLynx
	WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. Additionally, the technical specifications of the Ethos Readers discuss “read ranges” for low carrier frequency and high carrier frequency access for each of the ET10, ET20, and ET25 readers.

Claim 14		Infringement by WaveLynx			
TECHNICAL SPECIFICATIONS					
FEATURES RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile					
		Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	
		Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS	
		Color Black (Standard) Beige Custom by Request			
		Current 105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak	
Voltage 5-16 V DC					
Temperature Range UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity					
Read Ranges EV1: 1.2", EV2: 2.2" 125 kHz up to 4"		EV1: 1.5", EV2 2.5" 125 kHz up to 4"			
Doc. No. 12-4 at 3.					
Further, on information and belief, internal images of the WaveLynx's Ethos readers depict a signal generator.					

Claim 14

Infringement by WaveLynx



WaveLynx ET10-7.

Claim 14	
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Infringement by WaveLynx	WaveLynx ET20/25-7. The Atmel microcontroller shown below has a crystal oscillator for generating waveforms and is capable of generating both the 125kHz and 13.56 MHz base waveforms.
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WaveLynx ET10-7.

SAM D20 Family Configuration Summary

.....continued					
Feature	SAM D20J	SAM 20G		SAM D20E	
Packages	VQFN64/TQFP64/ UFBGA64	VQFN48/TQFP48	WLCSP45	VQFN32/TQFP32	WLCSP27
Analog Comparators (AC)		2			
Digital-to-Analog Converter (DAC) channels		1			
Real-Time Counter (RTC)		Yes			
RTC alarms		1			
RTC compare values		One 32-bit value or two 16-bit values			
External Interrupt lines		16		14	
Peripheral Touch Controller (PTC) X and Y lines	16x16	12x10		10x6 9x6	
Maximum CPU frequency		48MHz			
Oscillators		32.768 kHz crystal oscillator (XOSC32K) 0.4-32 MHz crystal oscillator (XOSC) 32.768 kHz internal oscillator (OSC32K) 32 kHz ultra low-power internal oscillator (OSCULP32K) 8 MHz high-accuracy internal oscillator (OSC8M) 48 MHz Digital Frequency Locked Loop (DFLL48M)			
Event System channels		8			
SW Debug Interface		Yes			
Watchdog Timer (WDT)		Yes			

Notes:

1. The WLCSP27 package does not contain TC4/WO[1] and TC5/WO[0], TC5/WO[1] outputs.
2. SERCOM4/SERCOM5 are not available on the VQFN32/TQFP32 and WLCSP27 packages.

Claim 14	Infringement by WaveLynx
	Ex. 1-A (SAM-D20-Family-Data-Sheet-DS60001504) at 12.  Ex. 27 at 4. Further, the WaveLynx board includes two chips as shown above. A first chip is the Cypress CYBLE-022001-00. Ex. 1-B (Infineon-CYBLE-022001-00_EZ-BLE_Creator_Module-DataSheet-v16_00-EN). The top view of the chip from the product manual appears below.

Claim 14	Infringement by WaveLynx
	<i>Id.</i> at 6. A second chip is labeled as being manufactured by NXP. In particular the second chip appears to be the NXP MFSAM3. Ex. 1-C (MF4SAM3_SDS). The MFSAM3 is listed supporting the MIFARE standard. <i>Id.</i> at 1-2. According to various literature, MIFARE SAM AV3 is listed as supporting the 13.56 MHz contactless smart card standard. 1 General description The NXP MIFARE SAM AV3 secure hardware solution is the ideal add-on for reader devices offering additional security services. Supporting DES, TDEA, AES and RSA capabilities, it offers secure storage and secure communication in a variety of infrastructures. Unlike other products in the field, MIFARE SAM AV3 has proven interoperability with all of NXP's broad card and RFID product portfolio, (MIFARE, NTAG DNA, ICODE DNA, UCODE DNA and SmartMX product families), making it the most versatile and secure SAM solution on the market today. <i>Id.</i> Among other components, the MIFARE SAM AV3 is depicted to have an RF interface, which interfaces with an antenna.

4 Block diagram

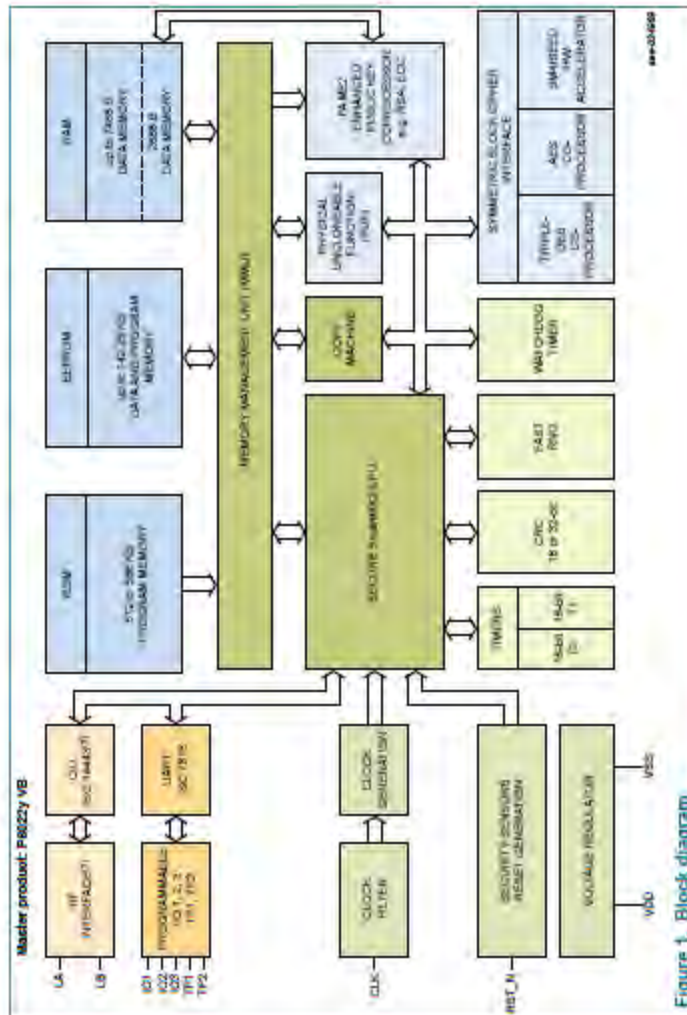


Figure 1. Block diagram

Id. at 5.

Claim 16	Infringement by WaveLynx
16. The RFID reader of claim 14, [16.a] wherein said signal generator includes a discrete first signal generator coupled with said first reader antenna for generating signals for transmission from said first reader antenna and	On information and belief, Wavelynx's Ethos Readers includes the RFID reader of claim 14, wherein said signal generator includes a discrete first signal generator coupled with said first signal generator coupled with said first reader antenna for generating signals for transmission from said reader antenna. For example, on information and belief, WaveLynx's Ethos readers include a low frequency signal generator that utilizes a frequency reference in conjunction with a microcontroller to generate the low carrier frequency drive signal coupled to the first antenna.

Claim 16	Infringement by WaveLynx
	WaveLynx ET10-7 and WaveLynx ET20/25-7. The Atmel microcontroller shown below has a crystal oscillator for generating waveforms and is capable of generating both the 125kHz and 13.56 MHz base waveforms.



WaveLynx ET10-7.

SAM D20 Family Configuration Summary

.....continued					
Feature	SAM D20J	SAM 20G		SAM D20E	
Packages	VQFN64/TQFP64/ UFBGA64	VQFN48/TQFP48	WLCSP45	VQFN32/TQFP32	WLCSP27
Analog Comparators (AC)		2			
Digital-to-Analog Converter (DAC) channels		1			
Real-Time Counter (RTC)		Yes			
RTC alarms		1			
RTC compare values		One 32-bit value or two 16-bit values			
External Interrupt lines		16			14
Peripheral Touch Controller (PTC) X and Y lines	16x16	12x10		10x6	9x6
Maximum CPU frequency		48MHz			
Oscillators		32.768 kHz crystal oscillator (XOSC32K) 0.4-32 MHz crystal oscillator (XOSC) 32.768 kHz internal oscillator (OSC32K) 32 kHz ultra low-power internal oscillator (OSCULP32K) 8 MHz high-accuracy internal oscillator (OSC8M) 48 MHz Digital Frequency Locked Loop (DFLL48M)			
Event System channels		8			
SW Debug Interface		Yes			
Watchdog Timer (WDT)		Yes			

Notes:

1. The WLCSP27 package does not contain TC4W0[1] and TC5W0[0], TC5W0[1] outputs.
2. SERCOM4/SERCOM5 are not available on the VQFN32/TQFP32 and WLCSP27 packages.

Claim 16	Infringement by WaveLynx Ex. 1-A (SAM-D20-Family-Data-Sheet-DS60001504) at 12. Ex. 27 at 4. Further, the WaveLynx board includes two chips as shown above. A first chip is the Cypress CYBLE-022001-00. Ex. 1-B (Infineon-CYBLE-022001-00_EZ-BLE_Creator_Module-DataSheet-v16_00-EN). The top view of the chip from the product manual appears below.
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Claim 16	Infringement by WaveLynx
	<i>Id.</i> at 6. A second chip is labeled as being manufactured by NXP. In particular the second chip appears to be the NXP MFSAM3. Ex. 1-C (MF4SAM3_SDS). The MFSAM3 is listed supporting the MIFARE standard. <i>Id.</i> at 1-2. According to various literature, MIFARE SAM AV3 is listed as supporting the 13.56 MHz contactless smart card standard. 1 General description The NXP MIFARE SAM AV3 secure hardware solution is the ideal add-on for reader devices offering additional security services. Supporting DES, TDEA, AES and RSA capabilities, it offers secure storage and secure communication in a variety of infrastructures. Unlike other products in the field, MIFARE SAM AV3 has proven interoperability with all of NXP's broad card and RFID product portfolio, (MIFARE, NTAG DNA, ICODE DNA, UCODE DNA and SmartMX product families), making it the most versatile and secure SAM solution on the market today. <i>Id.</i> Among other components, the MIFARE SAM AV3 is depicted to have an RF interface, which interfaces with an antenna.

4 Block diagram

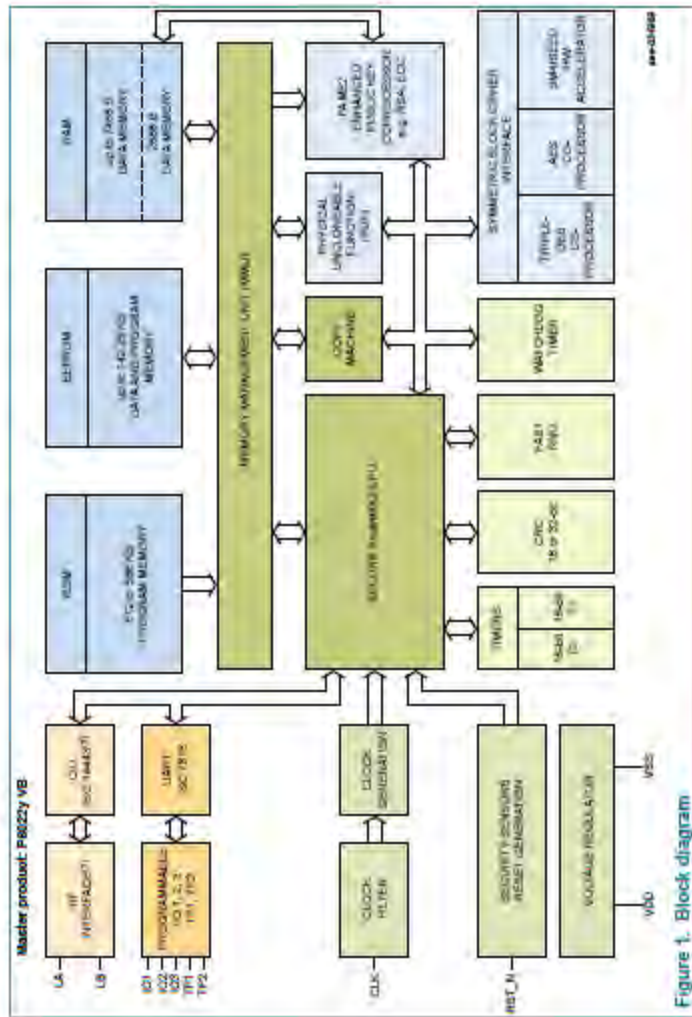


Figure 1. Block diagram

Id. at 5.

Each of the Cypress CYBLE-022001-00 and the NXP MIFARE SAM AV3 are a separate and discrete component.

[16.b] a second discrete second signal generator coupled with said second reader antenna separate

On information and belief, Wavelynx's Ethos Readers further includes a second discrete second signal generator coupled with said second reader antenna separate from said discrete first signal generator for generating signals for transmission for said second reader antenna

Claim 16	Infringement by WaveLynx
from said discrete first signal generator for generating signals for transmission fro said second reader antenna.	For example, on information and belief, the high frequency signal generator of the WaveLynx Ethos Readers uses a different or discrete high carrier frequency reference and reader to generate the high carrier frequency signal coupled to the second antenna. A photograph of a black printed circuit board (PCB) for the WaveLynx ET10-7. The board is populated with various electronic components, including integrated circuits, capacitors, and resistors. A white label in the top right corner reads "ET10-7", "12 M 2013", and "E301546". WaveLynx ET10-7. A photograph of a black printed circuit board (PCB) for the WaveLynx ET20/25-7. The board features a grid of ten gold-colored circular components, likely antennas or connectors, arranged in two rows of five. Various other electronic components and a white label are visible on the board. WaveLynx ET20/25-7.

Claim 16	Infringement by WaveLynx
	The Atmel microcontroller shown below has a crystal oscillator for generating waveforms and is capable of generating both the 125kHz and 13.56 MHz base waveforms.



Claim 16

Infringement by WaveLynx

WaveLynx ET10-7.

SAM D20 Family

Configuration Summary

.....continued Feature	SAM D20J VQFN64/TQFP64/ UFBGA64	SAM 20G VQFN48/TQFP48	SAM 20E VQFN32/TQFP32	WLCSP27
Packages				
Analog Comparators (AC)		2		
Digital-to-Analog Converter (DAC) channels		1		
Real-Time Counter (RTC)		Yes		
RTC alarms		1		
RTC compare values		One 32-bit value or two 16-bit values		
External Interrupt lines		16		14
Peripheral Touch Controller (PTC) X and Y lines	16x16	12x10	10x6	9x6
Maximum CPU frequency		48MHz		
Oscillators	32.768 kHz crystal oscillator (XOSC32K) 0.4-32 MHz crystal oscillator (XOSC) 32.768 kHz internal oscillator (OSC32K) 32 kHz ultra low-power internal oscillator (OSCULP32K) 8 MHz high-accuracy internal oscillator (OSC8M) 48 MHz Digital Frequency Locked Loop (DFLL48M)			
Event System channels		8		
SW Debug Interface		Yes		
Watchdog Timer (WDT)		Yes		

Notes:
1. The WLCSP27 package does not contain TC4WO[1] and TC5WO[0].TC5WO[1] outputs.
2. SERCOM4/SERCOM5 are not available on the VQFN32/TQFP32 and WLCSP27 packages.

Ex. 1-A (SAM-D20-Family-Data-Sheet-DS60001504) at 12.

Claim 16	Infringement by WaveLynx
	Ex. 27 at 4. Further, the WaveLynx board includes two chips as shown above. A first chip is the Cypress CYBLE-022001-00. Ex. 1-B (Infineon-CYBLE-022001-00_EZ-BLE_Creator_Module-DataSheet-v16_00-EN). The top view of the chip from the product manual appears below.

Claim 16	Infringement by WaveLynx
	<i>Id.</i> at 6. A second chip is labelled as being manufactured by NXP. In particular the second chip appears to be the NXP MFSAM3. Ex. 1-C (MF4SAM3_SDS). The MFSAM3 is listed supporting the MIFARE standard. <i>Id.</i> at 1-2. According to various literature, MIFARE SAM AV3 is listed as supporting the 13.56 MHz contactless smart card standard. 1 General description The NXP MIFARE SAM AV3 secure hardware solution is the ideal add-on for reader devices offering additional security services. Supporting DES, TDEA, AES and RSA capabilities, it offers secure storage and secure communication in a variety of infrastructures. Unlike other products in the field, MIFARE SAM AV3 has proven interoperability with all of NXP's broad card and RFID product portfolio, (MIFARE, NTAG DNA, ICODE DNA, UCODE DNA and SmartMX product families), making it the most versatile and secure SAM solution on the market today. <i>Id.</i> Among other components, the MIFARE SAM AV3 is depicted to have an RF interface, which interfaces with an antenna.

4 Block diagram

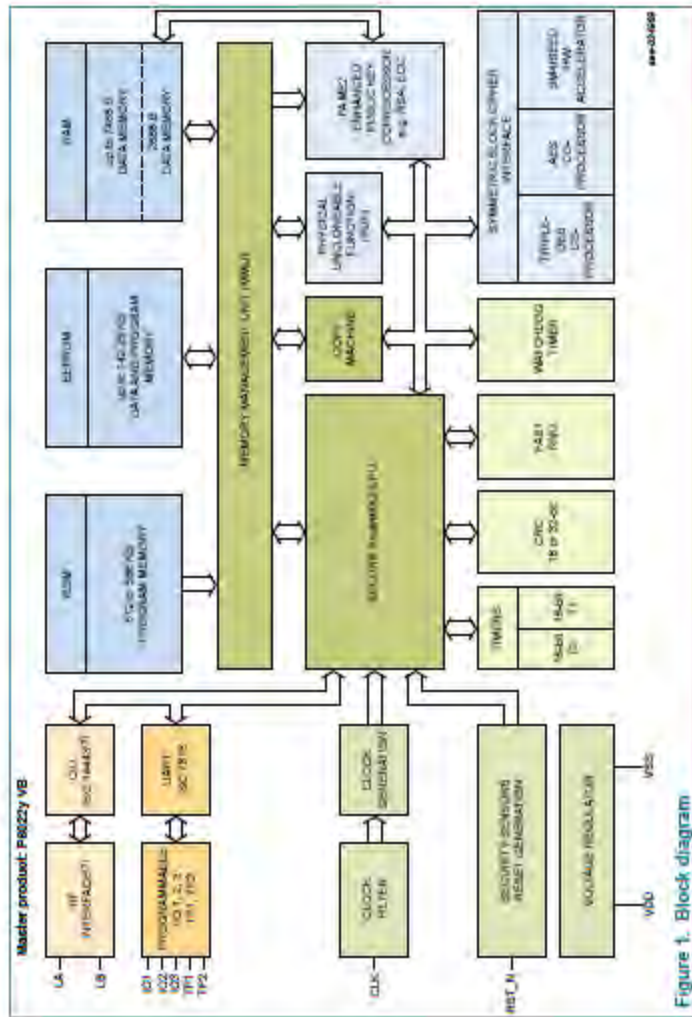


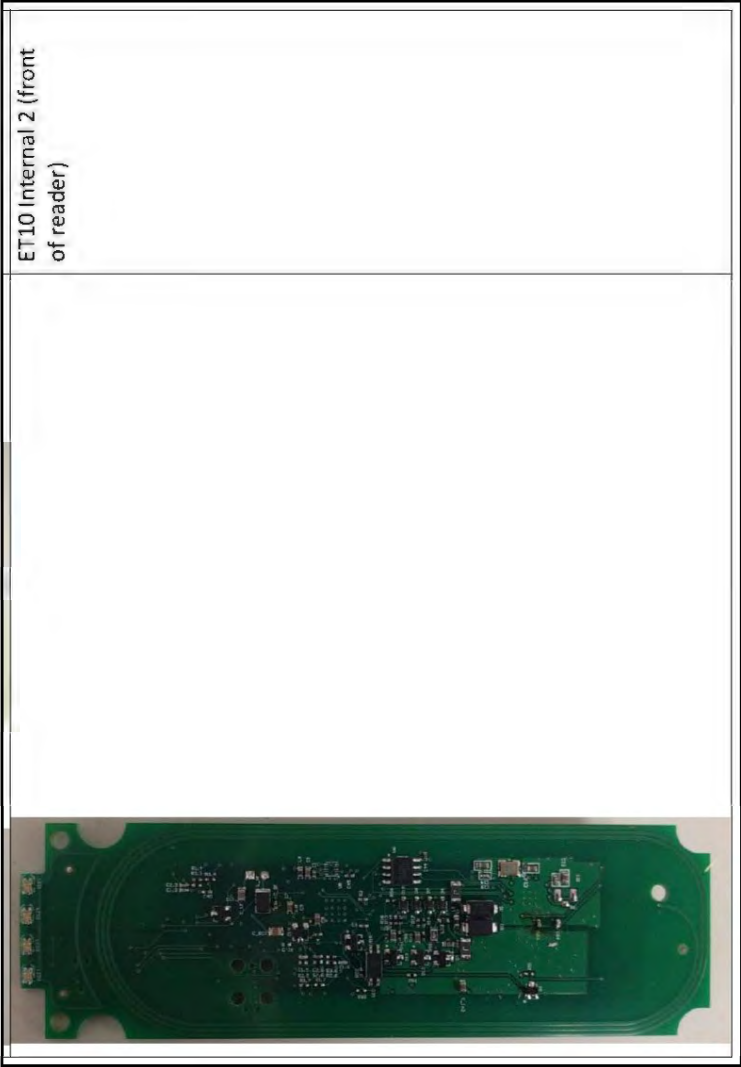
Figure 1. Block diagram

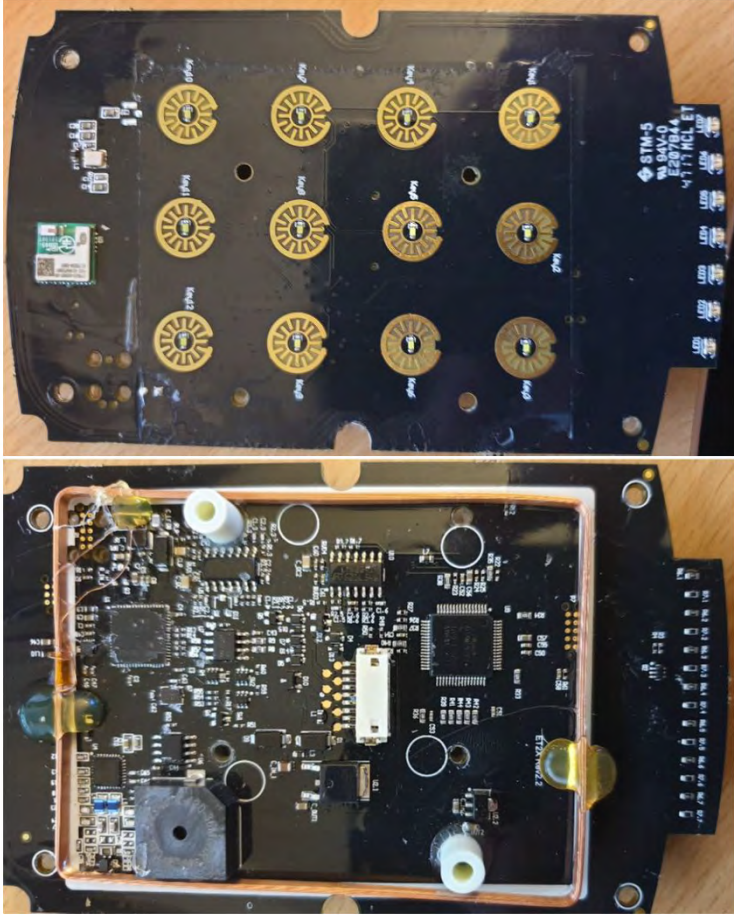
Id. at 5.

Each of the Cypress CYBLE-022001-00 and the NXP MIFARE SAM AV3 are a separate and discrete component.

Claim 17	Infringement by WaveLynx
17. An RFID reader for an RFID system comprising:	To the extent the preamble is construed as limiting, Wavelynx's Ethos Readers (e.g., ET10, ET20, and ET25) are RFID readers for an RFID system. Wavelynx describes its Ethos Readers as "multi-technology contactless access control readers" WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire® EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. Additionally, Wavelynx's Ethos Readers (e.g., ET10, ET20, and ET25) are described as operating at multiple "RF Technologies."

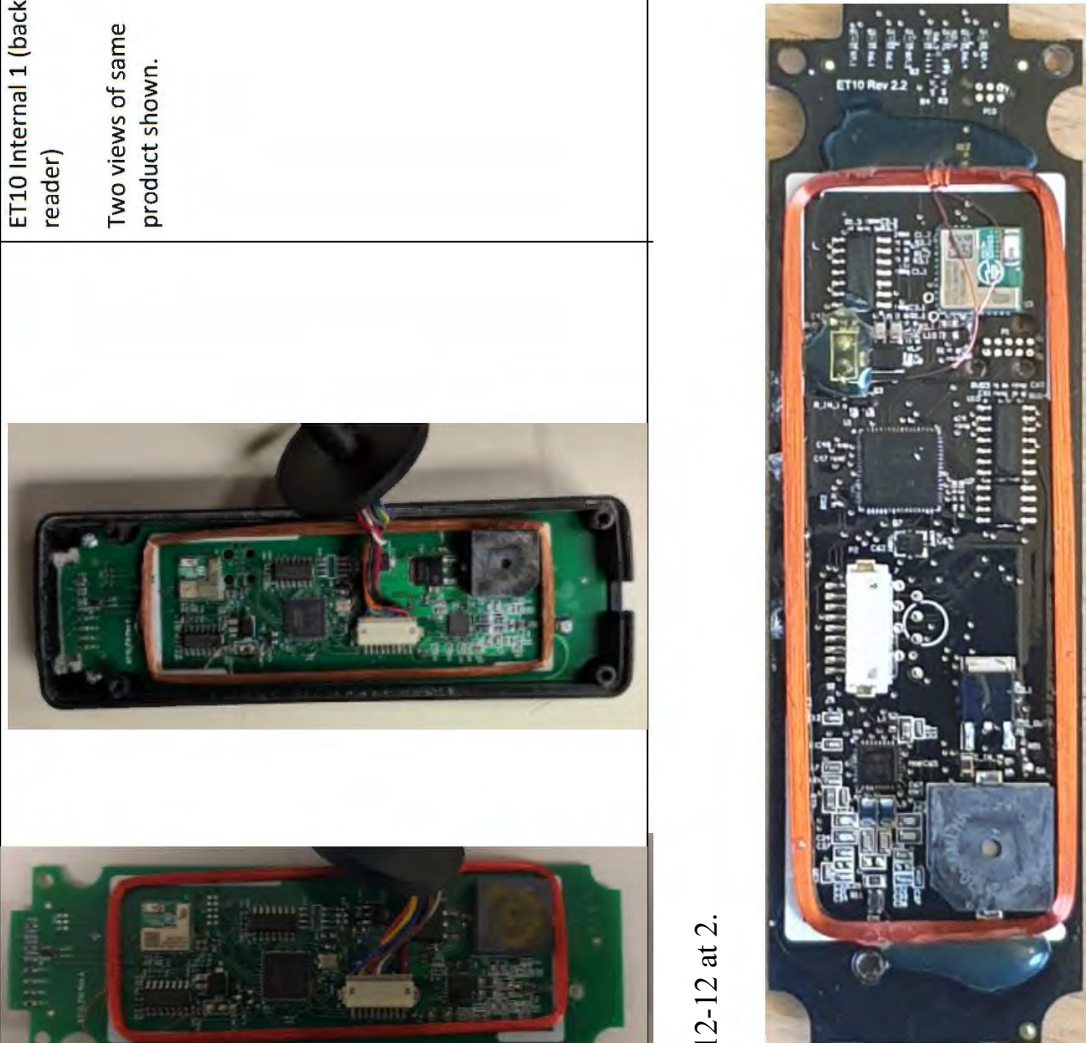
Claim 17	Infringement by WaveLynx												
	<table><tr><td></td><td></td><td></td><td></td></tr><tr><td>FEATURES</td><td>Mullion Model ET10</td><td>Single Gang Model ET20</td><td>Keypad Model ET25</td></tr><tr><td>RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile</td><td>Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS</td><td>Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS</td><td>Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS</td></tr></table> Doc. No. 12-4 at 3. Wavelynx’s Ethos Readers (e.g., ET10, ET20, and ET25) also include an antenna array.  ET10 Internal 1 (back of reader) Two views of same product shown.					FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS
													
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Claim 17	Infringement by WaveLynx
	 Doc. No. 12-12 at 2.

Claim 17	Infringement by WaveLynx
	 WaveLynx ET-20/25.
[17.a] an antenna array including a first reader antenna tuned to operate at a first low carrier frequency enabling data communication with a first transponder transmitting	WaveLynx's Ethos Readers includes an antenna array including at least a first reader antenna tuned to operate at a first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 125 kHz.

Claim 17	Infringement by WaveLynx																															
data signals at said first low carrier frequency and	<table><tr><td></td><td></td><td></td><td></td></tr><tr><td>FEATURES</td><td>Mullion Model ET10</td><td>Single Gang Model ET20</td><td>Keypad Model ET25</td></tr><tr><td>RF Technologies</td><td>Part Number</td><td>Part Number</td><td>Part Number</td></tr><tr><td>13.56 MHz</td><td>ET10-2WS</td><td>ET20-2WS</td><td>ET25-2WS</td></tr><tr><td>125 kHz & 13.56 MHz</td><td>ET10-3WS</td><td>ET20-3WS</td><td>ET25-3WS</td></tr><tr><td>13.56 MHz & Mobile</td><td>ET10-6WS</td><td>ET20-6WS</td><td>ET25-6WS</td></tr><tr><td>125 kHz, 13.56MHz, & Mobile</td><td>ET10-7WS</td><td>ET20-7WS</td><td>ET25-7WS</td></tr></table>								FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies	Part Number	Part Number	Part Number	13.56 MHz	ET10-2WS	ET20-2WS	ET25-2WS	125 kHz & 13.56 MHz	ET10-3WS	ET20-3WS	ET25-3WS	13.56 MHz & Mobile	ET10-6WS	ET20-6WS	ET25-6WS	125 kHz, 13.56MHz, & Mobile	ET10-7WS	ET20-7WS	ET25-7WS
																																
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125 kHz, 13.56MHz, & Mobile	ET10-7WS	ET20-7WS	ET25-7WS																													
Doc. No. 12-4 at 3.																																
WaveLynx describes its Ethos Readers as having “[s]tandard technologies” including “Proximity (125 kHz).”																																

Claim 17	Infringement by WaveLynx
	WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers also include an antenna tuned to operate at a first low carrier frequency. For example, the ET10-7 reader includes an antenna tuned to operate at a first low carrier frequency on the back of the reader.

Claim 17	Infringement by WaveLynx		
			ET10 Internal 1 (back of reader) Two views of same product shown.
	Doc. No. 12-12 at 2.		
			

Claim 17	Infringement by WaveLynx
	WaveLynx ET-10. Similarly, the ET20-7 & ET25-7 reader includes an antenna tuned to operate at a first low carrier frequency on the back of the reader.  WaveLynx ET25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a first transponder transmitting data signals at said first low carrier frequency.

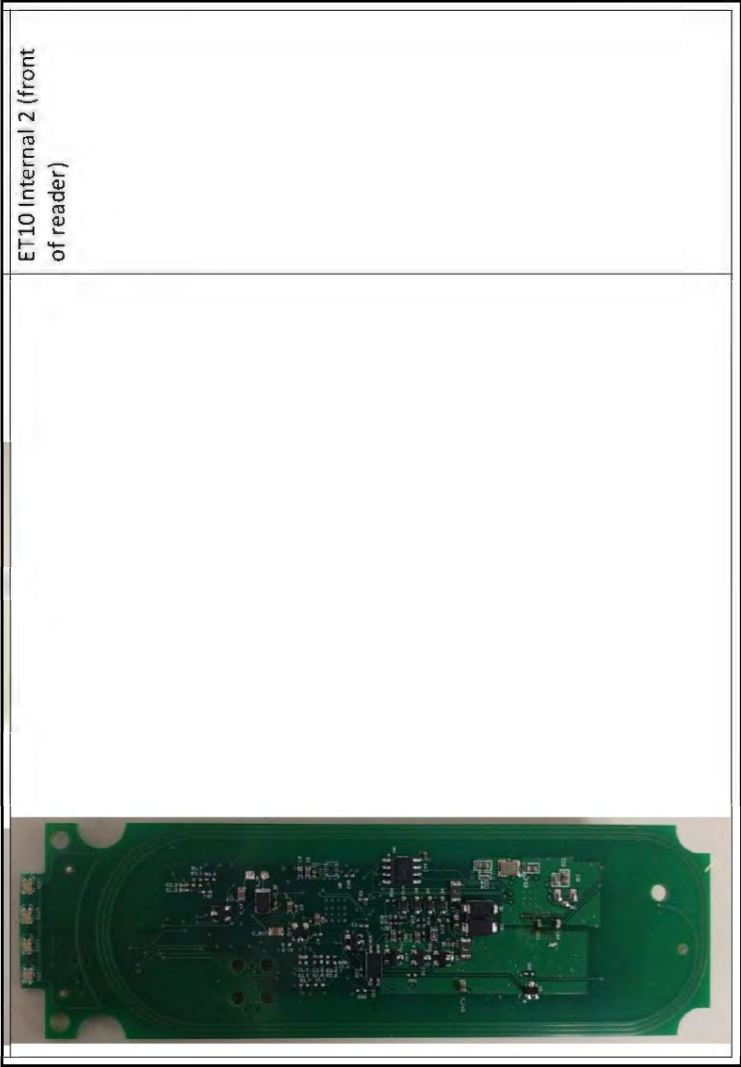
Claim 17	Infringement by WaveLynx For example, the technical specifications of the Ethos Readers discuss “read ranges” for “125 kHz up to 4”” for each of the ET10, ET20, and ET25 readers. Such “read ranges” relate to the distance a transponder may be placed from the reader to enable data communication. TECHNICAL SPECIFICATIONS <table><tr><td>FEATURES</td><td></td><td></td><td></td></tr><tr><td>RF Technologies</td><td>Part Number</td><td>Part Number</td><td>Part Number</td></tr><tr><td>13.56 MHz</td><td>ET10-2WS</td><td>ET20-2WS</td><td>ET25-2WS</td></tr><tr><td>125 kHz & 13.56 MHz</td><td>ET10-3WS</td><td>ET20-3WS</td><td>ET25-3WS</td></tr><tr><td>13.56 MHz & Mobile</td><td>ET10-6WS</td><td>ET20-6WS</td><td>ET25-6WS</td></tr><tr><td>125 kHz, 13.56MHz, & Mobile</td><td>ET10-7WS</td><td>ET20-7WS</td><td>ET25-7WS</td></tr><tr><td>Color</td><td colspan="3">Black (Standard) Beige Custom by Request</td></tr><tr><td>Current</td><td>105 mA average, 145 mA peak</td><td>120 mA average, 170 mA peak</td><td>145 mA average, 195 mA peak</td></tr><tr><td>Voltage</td><td colspan="3">5-16 V DC</td></tr><tr><td>Temperature Range</td><td colspan="3">UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity</td></tr><tr><td>Read Ranges</td><td>EV1: 1.2", EV2: 2.2" 125 kHz up to 4"</td><td colspan="2">EV1: 1.5", EV2 2.5" 125 kHz up to 4"</td></tr></table>	FEATURES				RF Technologies	Part Number	Part Number	Part Number	13.56 MHz	ET10-2WS	ET20-2WS	ET25-2WS	125 kHz & 13.56 MHz	ET10-3WS	ET20-3WS	ET25-3WS	13.56 MHz & Mobile	ET10-6WS	ET20-6WS	ET25-6WS	125 kHz, 13.56MHz, & Mobile	ET10-7WS	ET20-7WS	ET25-7WS	Color	Black (Standard) Beige Custom by Request			Current	105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak	Voltage	5-16 V DC			Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity			Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"	
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[17.b] a second reader antenna tuned to operate at a second high carrier frequency different from said first low carrier frequency enabling data	Doc. No. 12-4 at 3. WaveLynx’s Ethos Readers further include an antenna array having at least a second reader antenna tuned to operate at a second high carrier frequency different from the first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 13.56 MHz.																																												

Claim 17	Infringement by WaveLynx			
communication with a second transponder transmitting data signals at said second high carrier frequency,	FEATURES RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Mullion Model ET10 	Single Gang Model ET20 	Keypad Model ET25 
		Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS

Doc. No. 12-4 at 3.

Wavelynx describes its Ethos Readers as having “[s]tandard technologies” including “Smart (13.56 MHz).”

Claim 17	Infringement by WaveLynx
	WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers also include an antenna tuned to operate at a second high carrier frequency. For example, the ET10-7 reader includes an antenna tuned to operate at a second high carrier frequency on the front of the reader.

Claim 17	Infringement by WaveLynx
	 Doc. No. 12-12 at 2.

Claim 17	Infringement by WaveLynx
	WaveLynx ET10-7.

Claim 17	Infringement by WaveLynx
	WaveLynx ET20/25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a second transponder transmitting data signals at said first high carrier frequency. For example, the technical specifications of the Ethos Readers discuss "read ranges" for "EV1" and "EV2" for each of the ET10, ET20, and ET25 readers. On information and belief, EV1 and EV2 refer to the versions of NXP's MIFARE DESFire technology, which operates at 13.56 MHz. The "read ranges" relate to the distance a transponder may be placed from the reader to enable data communication.

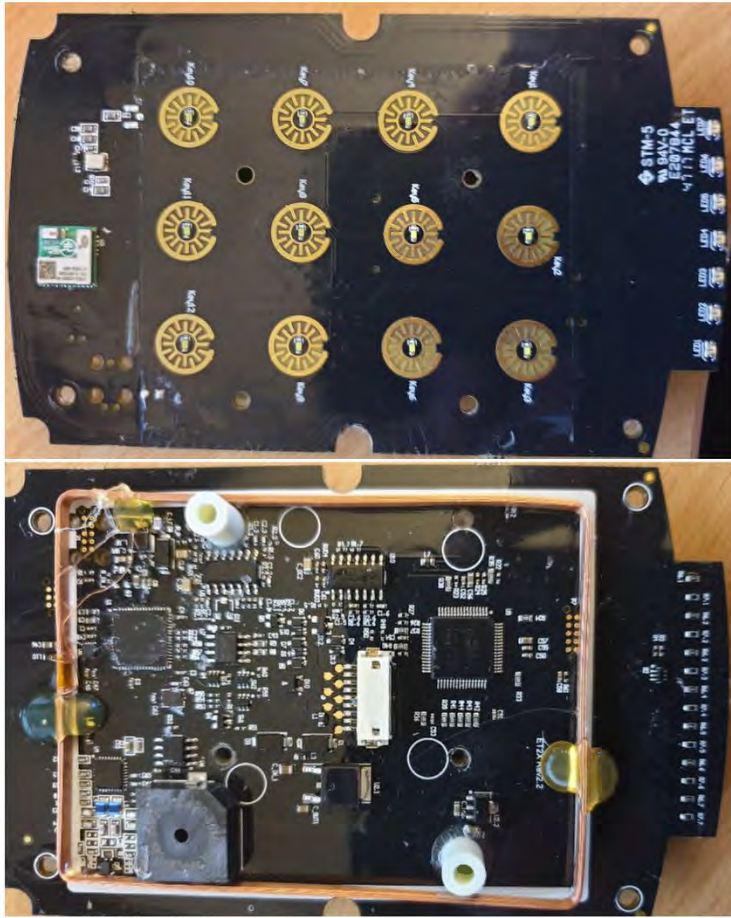
Claim 17	Infringement by WaveLynx																																												
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Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity																																												
Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2: 2.5" 125 kHz up to 4"																																											
[17.c] wherein the first and second antennas are arranged in at least a partially overlapping arrangement along proximate adjacent planes; and																																													

Claim 17	Infringement by WaveLynx
	This photograph shows a WaveLynx ET10-7 circuit board. The board is populated with various electronic components, including a large central processor, memory modules, and various peripheral chips. A red protective frame is visible around the perimeter of the board, and a small green component is visible on the left side. This photograph shows the same WaveLynx ET10-7 circuit board without the red frame. The board is populated with various electronic components, including a large central processor, memory modules, and various peripheral chips. The board is labeled with 'ET10-7', 'N 28', and 'E301546'.

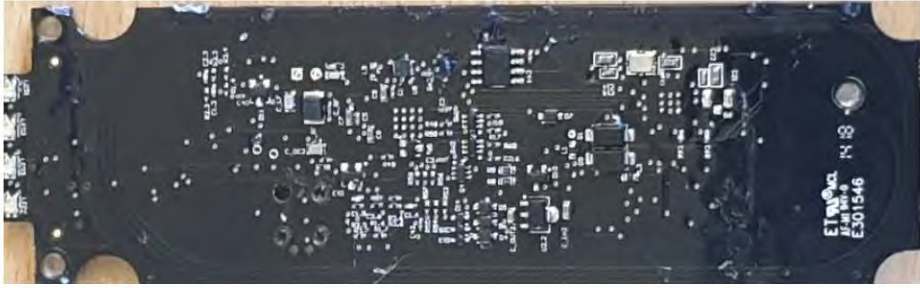
WaveLynx ET10-7.

Claim 17

Infringement by WaveLynx



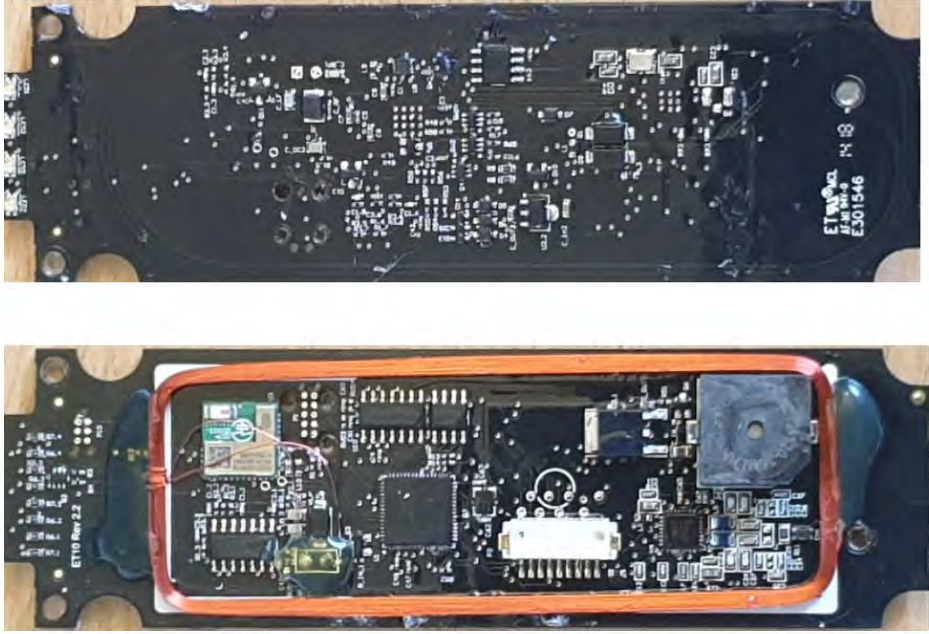
WaveLynx ET20/25-7.

Claim 17	Infringement by WaveLynx
[17.d] receiver electronics coupled with said first and second reader antennas.	On information and belief, the Ethos Readers include receiver electronics coupled with said first and second reader antennas.   WaveLynx ET10-7.

Claim 17	Infringement by WaveLynx
	WaveLynx ET20/25-7. Additionally, the technical specifications of the Ethos Readers discuss “read ranges” for each of the ET10, ET20, and ET25 readers.

Infringement by WaveLynx				
Claim 17	TECHNICAL SPECIFICATIONS			
	FEATURES			
	RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25
		Part Number	Part Number	Part Number
		ET10-2WS	ET20-2WS	ET25-2WS
		ET10-3WS	ET20-3WS	ET25-3WS
	ET10-6WS	ET20-6WS	ET25-6WS	
	ET10-7WS	ET20-7WS	ET25-7WS	
	Color	Black (Standard) Beige Custom by Request		
	Current	105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak
Voltage	5-16 V DC			
Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity			
Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"		
Doc. No. 12-4 at 3.				

Claim 19	Infringement by WaveLynx	
19. The antenna array of claim 17, wherein said receiver electronics includes discrete first receiver electronics coupled with said first reader antenna for conditioning signals received by said first reader antenna and discrete second receiver electronics coupled with said second reader antenna separate from said discrete receiver electronics for conditioning signals received by said second reader antenna.	On information and belief, the Wavelynx's Ethos Readers include an antenna array of claim 17, wherein said receiver electronics includes discrete first receiver electronics coupled with said first reader antenna for conditioning signals received by said first reader antenna and discrete second receiver electronics coupled with said second reader antenna separate from said discrete receiver electronics for conditioning signals received by said second reader antenna.	

Claim 19	Infringement by WaveLynx
conditioning signals received by said first reader antenna and discrete second receiver electronics coupled with said second reader antenna separate from said discrete first receiver electronics for conditioning signals received by said second reader antenna.	For example, on information and belief, the first and second receiver electronics used in the WaveLynx Ethos Readers are discrete from one another, as each is configured to operate with the first antenna (on the back of the reader) and the second antenna (on the front of the reader).  WaveLynx ET10-7.

Claim 19	Infringement by WaveLynx
	WaveLynx ET20/25-7. Additionally, the technical specifications of the Ethos Readers discuss “read ranges” for each of the ET10, ET20, and ET25 readers. The Atmel microcontroller shown below has a crystal oscillator for generating waveforms and is capable of generating both the 125kHz and 13.56 MHz base waveforms.



WaveLynx ET10-7.

SAM D20 Family Configuration Summary

.....Continued					
Feature	SAM D20J VQFN64/TQFP64/ UFBGA64	SAM 20G VQFN48/TQFP48		SAM D20E VQFN32/TQFP32	
Packages					WLCSP27
Analog Comparators (AC)		2			
Digital-to-Analog Converter (DAC) channels		1			
Real-Time Counter (RTC)		Yes			
RTC alarms		1			
RTC compare values	One 32-bit value or two 16-bit values				
External Interrupt lines		16			14
Peripheral Touch Controller (PTC) X and Y lines	16x16	12x10	10x6		9x6
Maximum CPU frequency		48MHz			
Oscillators	32.768 kHz crystal oscillator (XOSC32K) 0.4-32 MHz crystal oscillator (XOSC) 32.768 kHz internal oscillator (OSC32K) 32 kHz ultra low-power internal oscillator (OSCULP32K) 8 MHz high-accuracy internal oscillator (OSC8M) 48 MHz Digital Frequency Locked Loop (DFLL48M)				
Event System channels		8			
SW Debug Interface		Yes			
Watchdog Timer (WDT)		Yes			

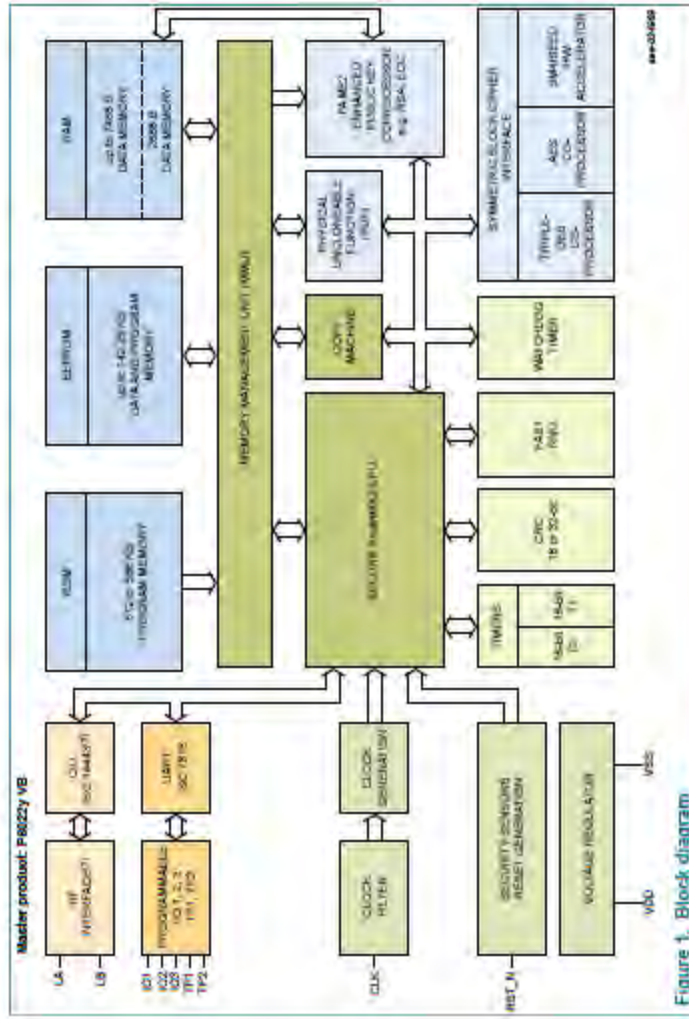
Notes:

1. The WLCSP27 package does not contain TC4/WO(1) and TC5/WO(0), TC5/WO(1) outputs.
2. SERCOM4/SERCOM5 are not available on the VQFN32/TQFP32 and WLCSP27 packages.

Claim 19	Infringement by WaveLynx
Ex. 1-A (SAM-D20-Family-Data-Sheet-DS60001504) at 12.  Ex. 27 at 4. Further, the WaveLynx board includes two chips as shown above. A first chip is the Cypress CYBLE-022001-00. Ex. 1-B (Infineon-CYBLE-022001-00_EZ-BLE_Creator_Module-DataSheet-v16_00-EN). The top view of the chip from the product manual appears below.	

Claim 19	Infringement by WaveLynx
	<i>Id.</i> at 6. A second chip is labelled as being manufactured by NXP. In particular the second chip appears to be the NXP MFSAM3. Ex. 1-C (MF4SAM3_SDS). The MFSAM3 is listed supporting the MIFARE standard. <i>Id.</i> at 1-2. According to various literature, MIFARE SAM AV3 is listed as supporting the 13.56 MHz contactless smart card standard. 1 General description The NXP MIFARE SAM AV3 secure hardware solution is the ideal add-on for reader devices offering additional security services. Supporting DES, TDEA, AES and RSA capabilities, it offers secure storage and secure communication in a variety of infrastructures. Unlike other products in the field, MIFARE SAM AV3 has proven interoperability with all of NXP's broad card and RFID product portfolio, (MIFARE, NTAG DNA, ICODE DNA, UCODE DNA and SmartMX product families), making it the most versatile and secure SAM solution on the market today. <i>Id.</i> Among other components, the MIFARE SAM AV3 is depicted to have an RF interface, which interfaces with an antenna.

4 Block diagram



Id. at 5.

Each of the Cypress CYBLE-022001-00 and the NXP MIFARE SAM AV3 are a separate and discrete component.

Claim 19

Infringement by WaveLynx

TECHNICAL SPECIFICATIONS

FEATURES			
RF Technologies	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25
13.56 MHz	Part Number	Part Number	Part Number
125 kHz & 13.56 MHz	ET10-2WS	ET20-2WS	ET25-2WS
13.56 MHz & Mobile	ET10-3WS	ET20-3WS	ET25-3WS
125 kHz, 13.56MHz, & Mobile	ET10-6WS	ET20-6WS	ET25-6WS
	ET10-7WS	ET20-7WS	ET25-7WS
Color	Black (Standard) Beige Custom by Request		
Current	105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak
Voltage	5-16 V DC		
Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity		
Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"	

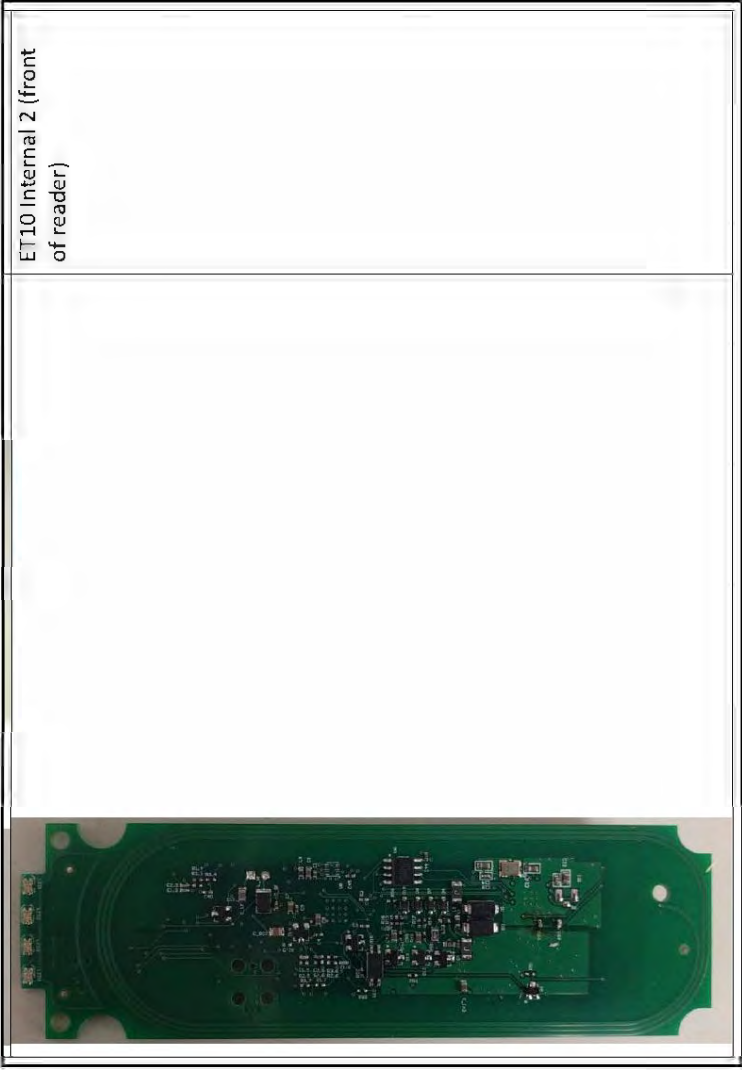
Doc. No. 12-4 at 3.

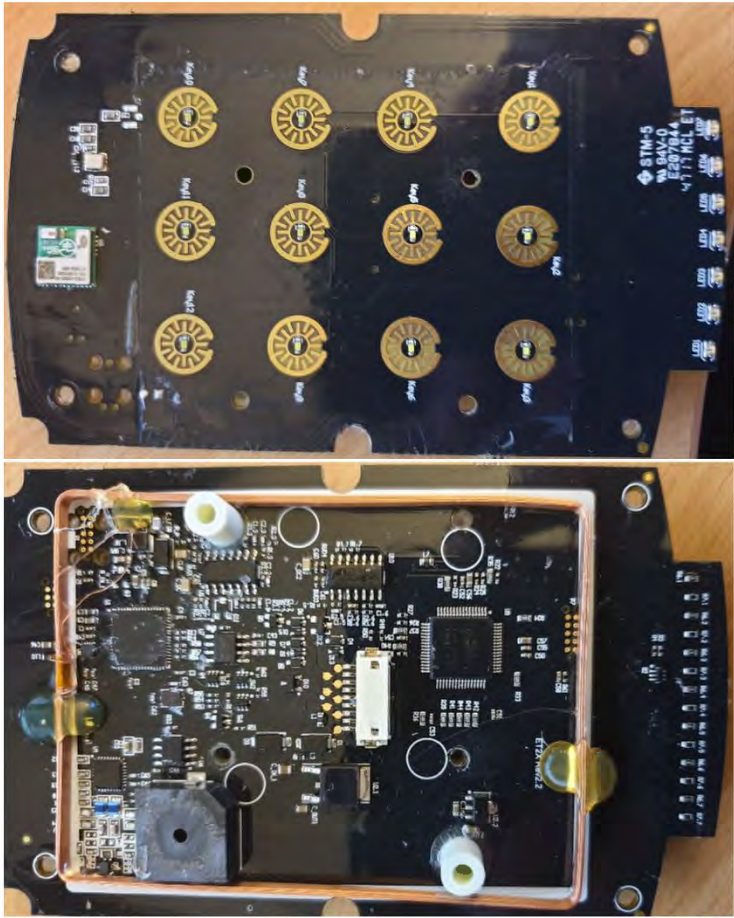
On information and belief, the low frequency receiver electronics includes circuitry for detecting, amplifying, and filtering a modulated signal from a low carrier frequency transponder (i.e., a 125 kHz transponder), as well as converting the detected modulation components into digital pulses (i.e., to condition the signal received by the first reader antenna).

On information and belief, the high frequency receiver electronics is separate from the low frequency receiver electronics, which separately and discretely conditions the signals received by the second reader antenna.

Claim 20	Infringement by WaveLynx
20. An antenna array for an RFID reader comprising:	WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are RFID readers. WaveLynx describes its Ethos Readers as "multi-technology contactless access control readers" WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire® EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are described as operating at multiple "RF Technologies."

Claim 20	Infringement by WaveLynx																											
	<table><tr><th>FEATURES</th><th>Mullion Model ET10</th><th>Single Gang Model ET20</th><th>Keypad Model ET25</th></tr><tr><td>RF Technologies</td><td>Part Number</td><td>Part Number</td><td>Part Number</td></tr><tr><td>13.56 MHz</td><td>ET10-2WS</td><td>ET20-2WS</td><td>ET25-2WS</td></tr><tr><td>125 kHz & 13.56 MHz</td><td>ET10-3WS</td><td>ET20-3WS</td><td>ET25-3WS</td></tr><tr><td>13.56 MHz & Mobile</td><td>ET10-6WS</td><td>ET20-6WS</td><td>ET25-6WS</td></tr><tr><td>125 kHz, 13.56MHz, & Mobile</td><td>ET10-7WS</td><td>ET20-7WS</td><td>ET25-7WS</td></tr></table>	FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies	Part Number	Part Number	Part Number	13.56 MHz	ET10-2WS	ET20-2WS	ET25-2WS	125 kHz & 13.56 MHz	ET10-3WS	ET20-3WS	ET25-3WS	13.56 MHz & Mobile	ET10-6WS	ET20-6WS	ET25-6WS	125 kHz, 13.56MHz, & Mobile	ET10-7WS	ET20-7WS	ET25-7WS	Doc. No. 12-4 at 3. Wavelynx's Ethos Readers (e.g., ET10, ET20, and ET25) also include an antenna array.		
FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25																									
RF Technologies	Part Number	Part Number	Part Number																									
13.56 MHz	ET10-2WS	ET20-2WS	ET25-2WS																									
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		ET10 Internal 1 (back of reader)	Two views of same product shown.																									

Claim 20	Infringement by WaveLynx
	 ET10 Internal 2 (front of reader) Doc. No. 12-12 at 2.

Claim 20	Infringement by WaveLynx
	 WaveLynx ET-20/25.
[20.a] a first reader loop antenna having a first loop and tuned to a first carrier frequency enabling data communication with a first transponder transmitting	WaveLynx's Ethos Readers include at least a first reader loop antenna having a first loop and tuned to operate at a first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 125 kHz.

Claim 20 data signals at said first carrier frequency; and	Infringement by WaveLynx			
	FEATURES RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	 Mullion Model ET10	 Single Gang Model ET20	 Keypad Model ET25
		Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS

Doc. No. 12-4 at 3.

WaveLynx describes its Ethos Readers as having “[s]tandard technologies” including “Proximity (125 kHz).”

Claim 20	Infringement by WaveLynx
	WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers also include a first reader loop antenna having a first loop and tuned to operate at a first low carrier frequency. For example, the ET10-7 reader includes an antenna loop tuned to operate at a first low carrier frequency on the back of the reader.

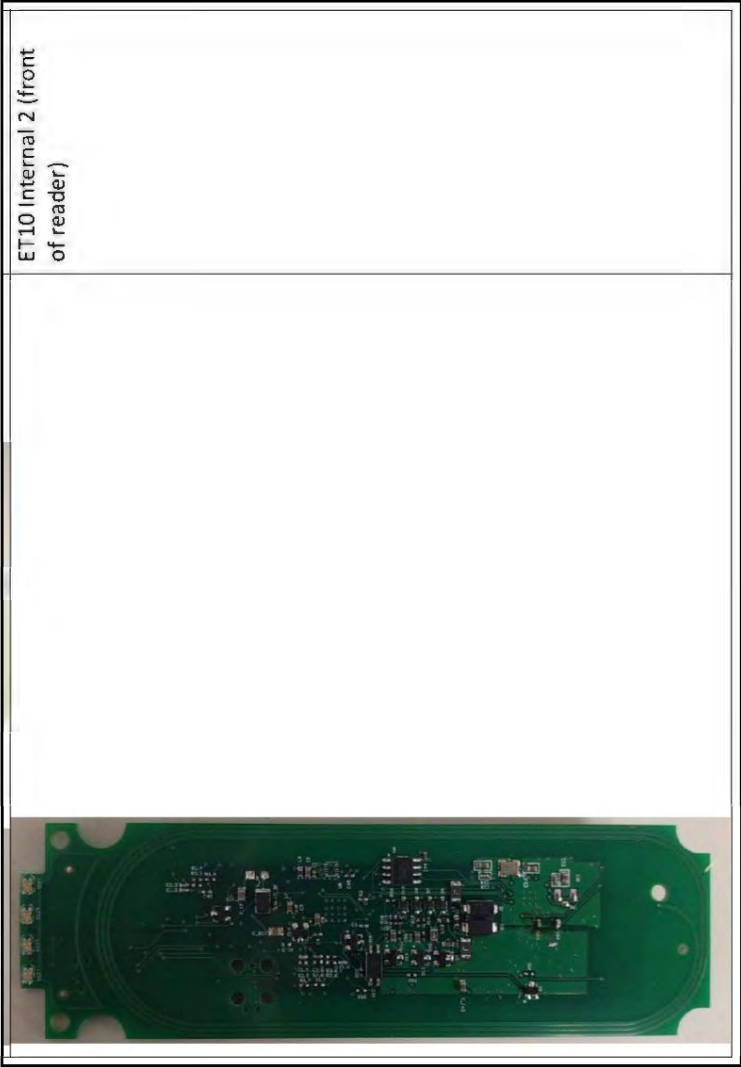
Claim 20	Infringement by WaveLynx		
			ET10 Internal 1 (back of reader) Two views of same product shown.
	Doc. No. 12-12 at 2.		
			

Claim 20	Infringement by WaveLynx
	WaveLynx ET-10. Similarly, the ET20-7 & ET25-7 reader includes a reader antenna loop tuned to operate at a first low carrier frequency on the back of the reader.  WaveLynx ET25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a first transponder transmitting data signals at said first low carrier frequency. For example, the technical specifications of the Ethos Readers discuss "read ranges" for "125 kHz up to 4'" for each of the ET10, ET20, and ET25 readers. Such "read ranges" relate to the distance a transponder may be placed from the reader to enable data communication.

Claim 20	Infringement by WaveLynx																												
TECHNICAL SPECIFICATIONS																													
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Doc. No. 12-4 at 3.																													
[20.b] a second reader loop antenna having a second loop and tuned to operate at a second carrier frequency different from said first carrier frequency enabling data communication with a second transponder transmitting data signals at	WaveLynx's Ethos Readers include at least a second reader loop antenna having a second loop tuned to operate at a second high carrier frequency different from the first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 13.56 MHz.																												

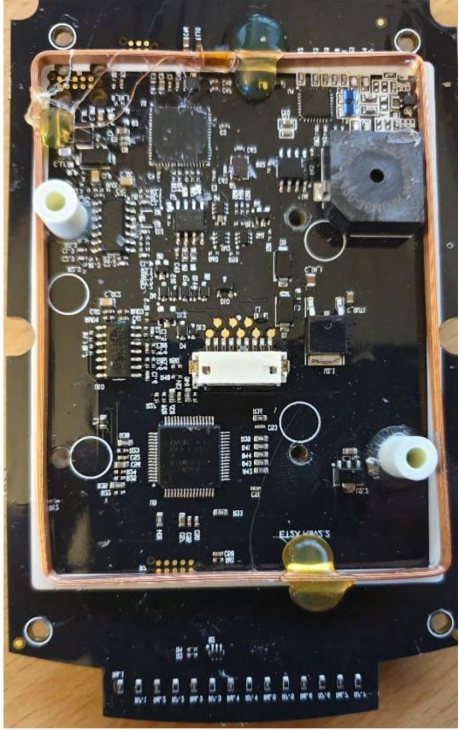
Claim 20	Infringement by WaveLynx																												
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	WaveLynx describes its Ethos Readers as having “[s]tandard technologies” including “Smart (13.56 MHz).”																												

Claim 20	Infringement by WaveLynx
	WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers also include a second loop antenna having a second loop and tuned to operate at a second high carrier frequency. For example, the ET10-7 reader includes a second loop antenna tuned to operate at a second high carrier frequency on the front of the reader.

Claim 20	Infringement by WaveLynx
	 Doc. No. 12-12 at 2.

Claim 20	Infringement by WaveLynx
	A photograph of a black printed circuit board (PCB) for the WaveLynx ET10-7. The board is populated with various electronic components, including integrated circuits, resistors, and capacitors. A white label at the top right corner reads "ET10-7", "Rev 1.0", and "E301546". WaveLynx ET10-7. A photograph of a black printed circuit board (PCB) for the WaveLynx ET20/25-7. The board features a 3x3 grid of nine gold-colored circular components. A white label at the bottom right corner reads "ETM-3", "Rev 1.0", "E207044", and "4111MCL ET". WaveLynx ET20/25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a second transponder transmitting data signals at said first high carrier frequency.

Claim 20	Infringement by WaveLynx For example, the technical specifications of the Ethos Readers discuss “read ranges” for “EV1” and “EV2” for each of the ET10, ET20, and ET25 readers. On information and belief, EV1 and EV2 refer to the versions of NXP’s MIFARE DESFire technology, which operates at 13.56 MHz. The “read ranges” relate to the distance a transponder may be placed from the reader to enable data communication. TECHNICAL SPECIFICATIONS <table><tr><th>FEATURES</th><th>Mullion Model ET10</th><th>Single Gang Model ET20</th><th>Keypad Model ET25</th></tr><tr><td>RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile</td><td>Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS</td><td>Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS</td><td>Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS</td></tr><tr><td>Color</td><td colspan="3">Black (Standard) Beige Custom by Request</td></tr><tr><td>Current</td><td>105 mA average, 145 mA peak</td><td>120 mA average, 170 mA peak</td><td>145 mA average, 195 mA peak</td></tr><tr><td>Voltage</td><td colspan="3">5-16 V DC</td></tr><tr><td>Temperature Range</td><td colspan="3">UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity</td></tr><tr><td>Read Ranges</td><td>EV1: 1.2", EV2: 2.2" 125 kHz up to 4"</td><td colspan="2">EV1: 1.5", EV2 2.5" 125 kHz up to 4"</td></tr></table> Doc. No. 12-4 at 3.	FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS	Color	Black (Standard) Beige Custom by Request			Current	105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak	Voltage	5-16 V DC			Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity			Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"	
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[20.c] wherein a first plane defined by the first area is substantially orthogonal to a direction of magnetic flux	The Ethos Readers include a first plane defined by the first the first area of the first reader loop antenna that is substantially orthogonal to a direction of magnetic flux created through the first antenna.																												

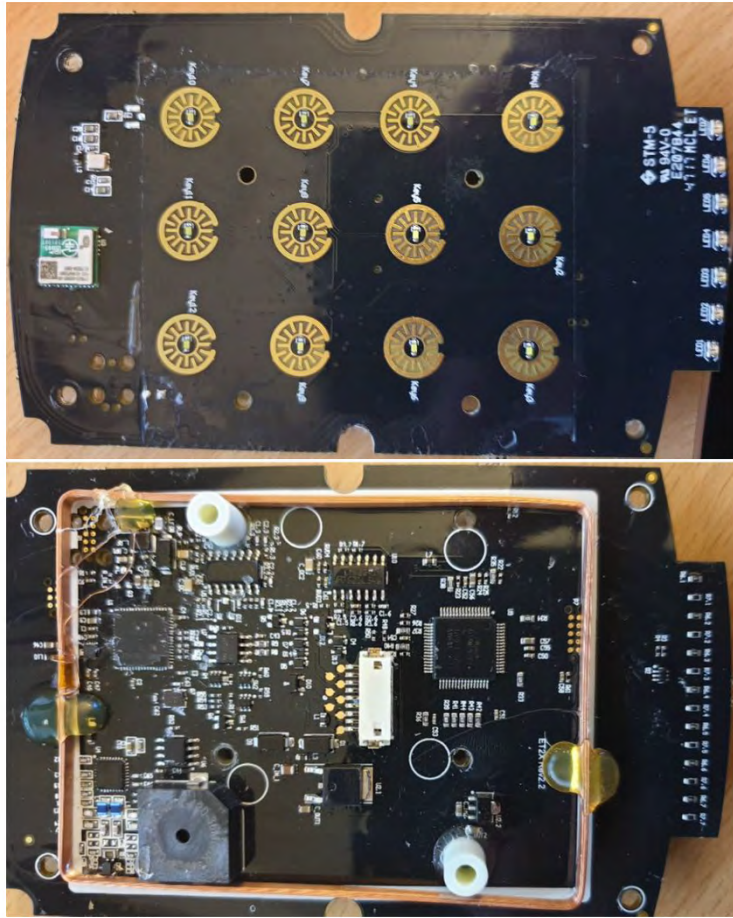
Claim 20	Infringement by WaveLynx
created through the first antenna,	For example, the first reader loop antenna (low carrier frequency antenna) on the back of the Ethos Readers encompasses an area defined within the antenna loop.  WaveLynx ET10-7.  WaveLynx ET20/25-7.

Claim 20	Infringement by WaveLynx
[20.d] wherein a second plane defined by the second area is substantially orthogonal to a direction of magnetic flux created through the second antenna,	On information and belief, the general path of magnetic flux is substantially orthogonal to the plane defined by the first loop antenna area as a result of the direction of the current running through the first loop antenna. WaveLynx's Ethos Readers include a second plane defined by the second area that is substantially orthogonal to a direction of magnetic flux created through the second antenna. For example, the second reader antenna (high carrier frequency antenna) on the front of the Ethos Readers encompasses an area defined within the second antenna. WaveLynx ET10-7.

Claim 20	Infringement by WaveLynx
	 WaveLynx ET20/25-7. On information and belief, the general path of magnetic flux is substantially orthogonal to the plane defined by the second loop antenna area as a result of the direction of the current running through the second loop antenna.
[20.e] wherein said first and second loops are arranged relative to one another such that a portion of the first area in the first plane overlaps a portion of the second area in the second plane.	WaveLynx's Ethos Readers include a first and second loops arranged relative to one another such that a portion of the first area in the first plane overlaps with a portion of the second area in the second plane. Because the first loop is surrounded by the area of the second loop, a portion of the area enclosed by the first reader loop antenna covers or is covered by a portion of the area enclosed by the second reader loop antenna as view along the longitudinal axis.

Claim 20	Infringement by WaveLynx
	This photograph shows the WaveLynx ET10-7 circuit board. It is a black printed circuit board (PCB) populated with various electronic components, including a large central integrated circuit (IC), several smaller ICs, capacitors, and resistors. A red protective frame is visible around the perimeter of the board. The board is oriented vertically. This photograph shows the same WaveLynx ET10-7 circuit board as in the previous image, but without the red protective frame. The board is populated with the same electronic components. The text 'ET10-7', 'N 28', and 'E301546' is visible on the right side of the board.

WaveLynx ET10-7.



WaveLynx ET20/25-7.

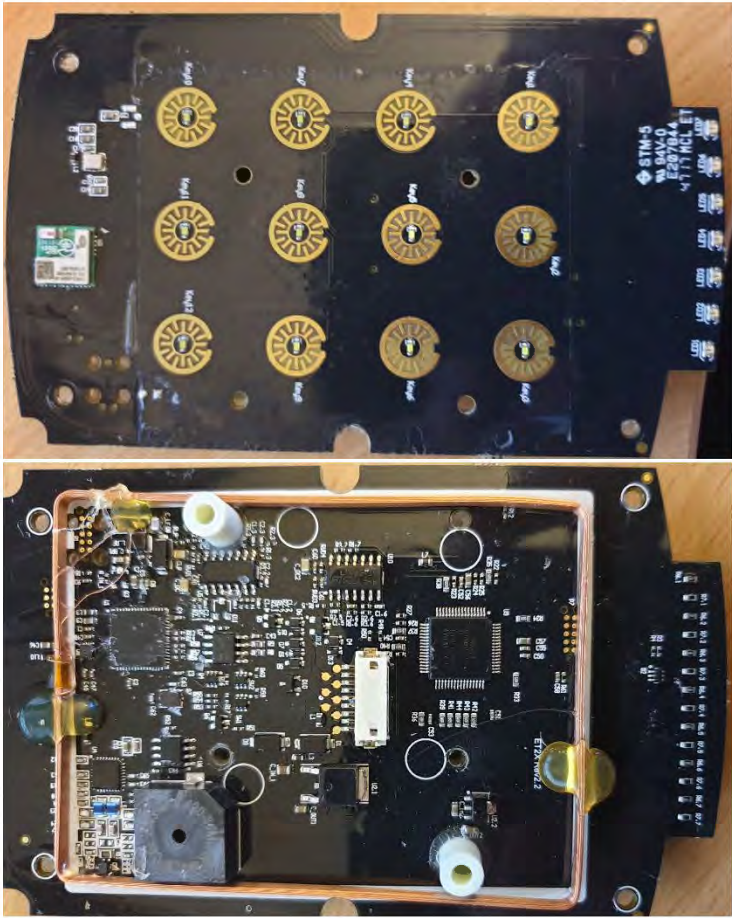
Claim 22	Infringement by WaveLynx
22. The antenna array of claim 20, wherein said first and second loops have a parallel orientation and are arranged relative one another such that a size of the portion of the first area aligning with the portion of the second area is less than at least one of a size of the first area and a size of the second area.	WaveLynx's Ethos Readers include the antenna array of claim 20, including first and second loops having a parallel orientation. For example, because the first loop antenna is located on the back of the reader and the second loop antenna is located on the front of the reader, the two antennas are oriented along axes that are substantially parallel to each other.

Claim 22	Infringement by WaveLynx
	This photograph shows the WaveLynx ET10-7 circuit board. It is a black printed circuit board (PCB) populated with various electronic components, including a large central integrated circuit (IC), several smaller ICs, capacitors, and resistors. A red protective frame is visible around the perimeter of the board. The board is oriented vertically. This photograph shows the same WaveLynx ET10-7 circuit board as in the previous image, but without the red protective frame. The board is populated with the same electronic components. The text 'ET10-7', 'N 28', and 'E301546' is visible on the right side of the board.

WaveLynx ET10-7.

Claim 22	Infringement by WaveLynx
	WaveLynx ET20/25-7. Additionally, the first and second loops of the Ethos Readers are arranged relative one another such that a size of the portion of the first area aligning with the portion of the second area is less than at least one of a size of the first area and a size of the second area. For example, because each of the first low frequency antennas in the Ethos Readers lie within the area circumscribed by the loops of the high frequency antenna when viewed along the axis of the antennas, the size of the portion of the first area aligning with the portion of the second area is equal to the size of the first antenna.

Claim 22	Infringement by WaveLynx
	Accordingly, since the first antenna area is necessarily less than the area of the second, larger antenna, the portion of the first area aligning with the portion of the second area is less than at least one of a size of the first area and a size of the second area. A photograph of a mobile phone's internal circuit board. The board is populated with various electronic components, including a large central processor chip, memory modules, and a battery. A prominent orange protective frame is visible, encircling the central components of the board. A photograph of a mobile phone's internal circuit board, similar to the one above but without the orange protective frame. It shows the same layout of components, including the processor, memory, and battery, against a dark background.

Claim 22	Infringement by WaveLynx
	WaveLynx ET10-7.  WaveLynx ET20/25-7.

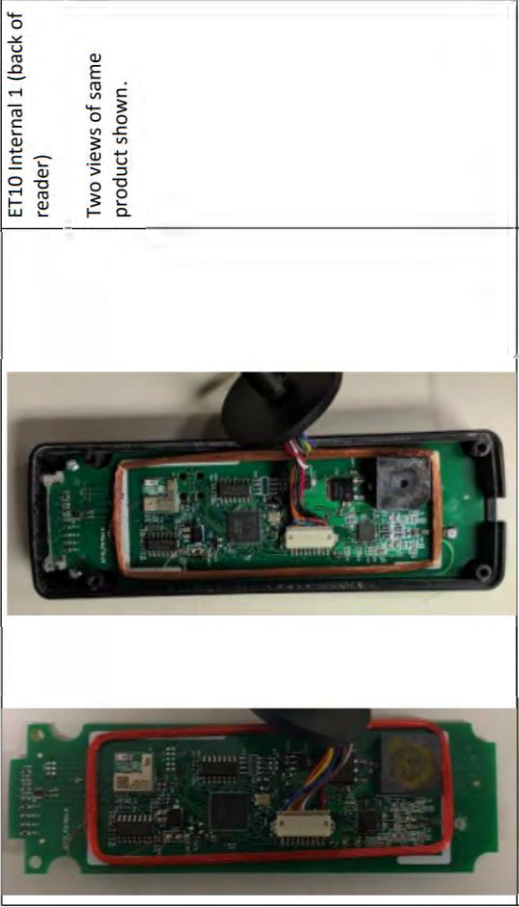
Claim 23	Infringement by WaveLynx
23. An antenna array for an RFID reader comprising:	WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are RFID readers. WaveLynx describes its Ethos Readers as "multi-technology contactless access control readers" WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire® EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers (e.g., ET10, ET20, and ET25) are described as operating at multiple "RF Technologies."

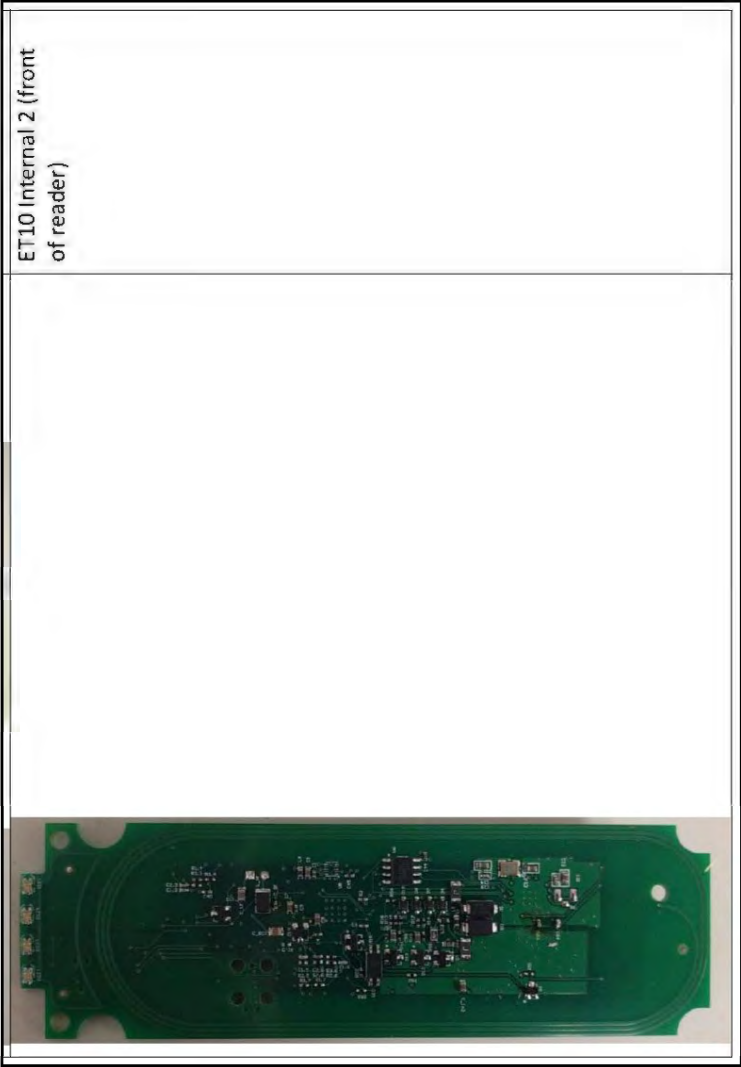
Claim 23	Infringement by WaveLynx											
	<table><tr><th>FEATURES</th><th>Mullion Model ET10</th><th>Single Gang Model ET20</th><th>Keypad Model ET25</th></tr><tr><td>RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile</td><td>Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS</td><td>Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS</td><td>Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS</td></tr></table>	FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25	RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS	  ET10 Internal 1 (back of reader) Two views of same product shown.		
FEATURES	Mullion Model ET10	Single Gang Model ET20	Keypad Model ET25									
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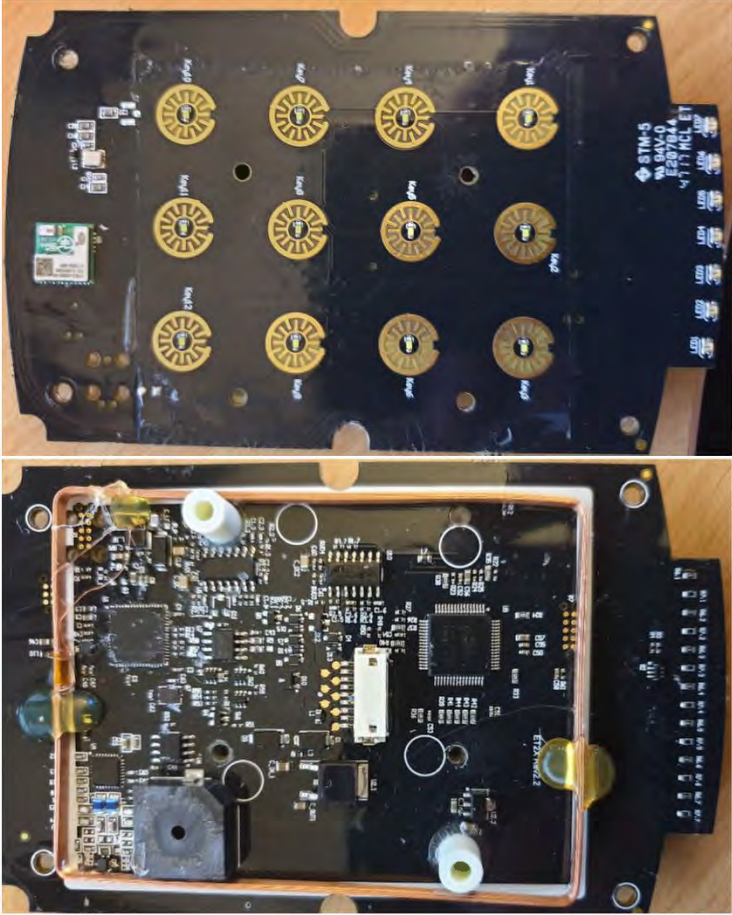
Doc. No. 12-4 at 3.

WaveLynx’s Ethos Readers (e.g., ET10, ET20, and ET25) also include an antenna array.

Doc. No. 12-4 at 3.
Wavelynx's Ethos Readers (e.g., ET10, ET20, and ET25) also include an antenna array.



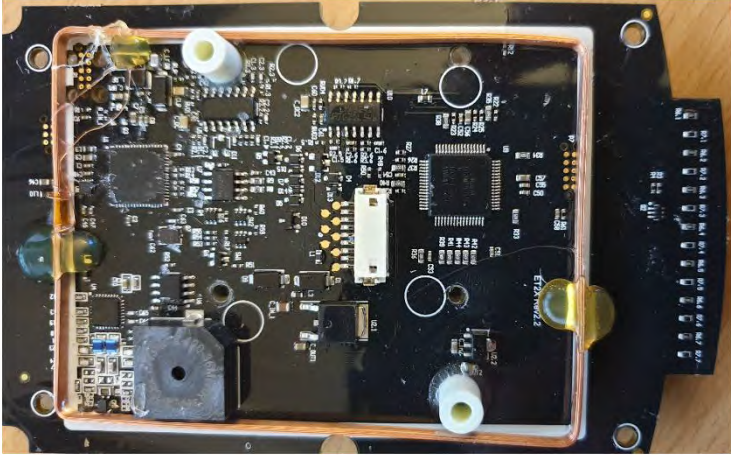
Claim 23	Infringement by WaveLynx
	 Doc. No. 12-12 at 2.

Claim 23	Infringement by WaveLynx
	 WaveLynx ET-20/25.
[23.a] a first reader loop antenna having a first loop and tuned to a first carrier frequency enabling data communication with a first transponder transmitting	WaveLynx's Ethos Readers include at least a first reader loop antenna having a first loop and tuned to operate at a first low carrier frequency. For example, the Ethos Readers are able to communicate over various frequencies including 125 kHz.

Claim 23 data signals at said first carrier frequency; and	Infringement by WaveLynx			
	FEATURES RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	 Mullion Model ET10 Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	 Single Gang Model ET20 Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	 Keypad Model ET25 Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS
	Doc. No. 12-4 at 3. WaveLynx describes its Ethos Readers as having “[s]tandard technologies” including “Proximity (125 kHz).”			

Claim 23	Infringement by WaveLynx
	WaveLynx Technologies' Ethos line of multi-technology contactless access control readers offers a modern aesthetic and a state-of-the-art feature set. Standard technologies include Proximity (125 kHz), Smart (13.56 MHz), NFC, and Bluetooth®, so that customers can set their migration path to secure credentials and security ecosystems. All Ethos readers are fully OSDP™ compliant and are currently enabled for Secure Channel and remote firmware upgrades. Additionally, Ethos readers offer a unique patented feature called OSDP Auto-Detect. They communicate OSDP and Wiegand over the same wires to automatically detect and convert to OSDP Secure Channel protocol when the panels upgraded, eliminating the need to rewire or reconfigure the reader. KEY FEATURES • Multiple technologies in a single reader: Proximity, Smart, NFC & BLE • OSDP Autodetect • OSDP Secure Channel and remote firmware upgradability • MIFARE DESFire®EV1 & EV2 support • Ethos Wiegand/OSDP readers work with MyPass Mobile Credentials • LEAF credential support for secure, open, interoperability • FSK and ASK legacy proximity credentials support for seamless transitions • Accelerometer-based tamper detection • Tri-state LED light bar (red, green, amber) and audible beeper • Accommodates indoor, outdoor installation environments Doc. No. 12-4 at 2. WaveLynx's Ethos Readers also include a first reader loop antenna having a first loop and tuned to operate at a first low carrier frequency. For example, the ET10-7 reader includes an antenna loop tuned to operate at a first low carrier frequency on the back of the reader.

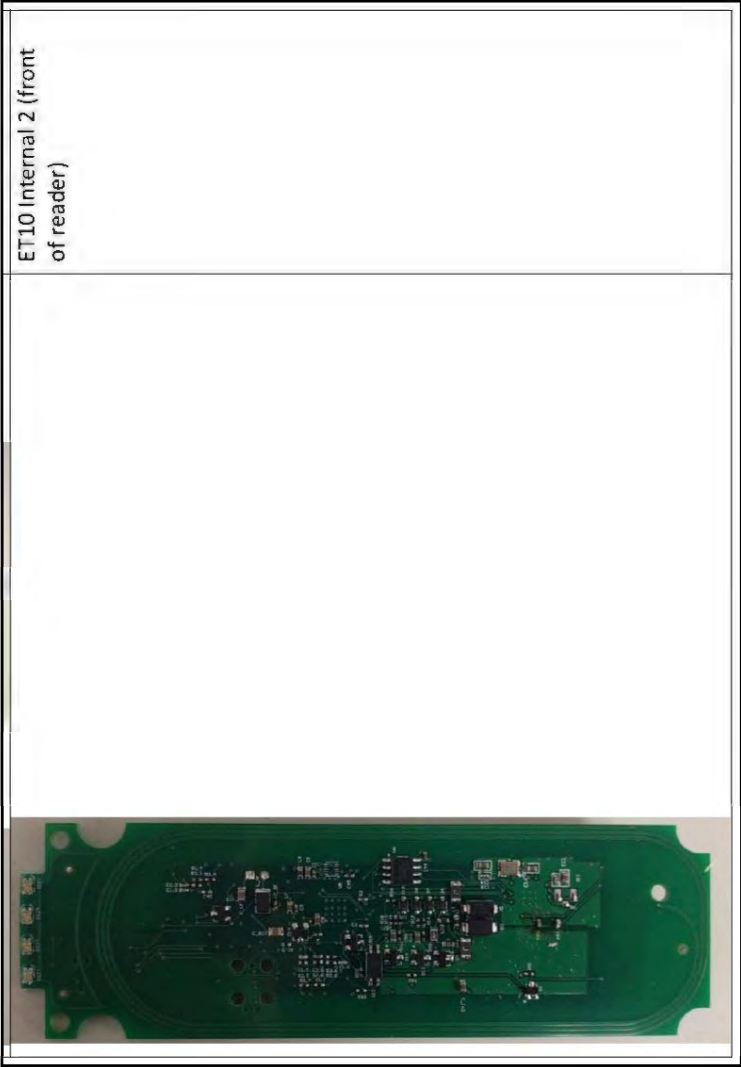
Claim 23	Infringement by WaveLynx
	  ET10 Internal 1 (back of reader) Two views of same product shown. Doc. No. 12-12 at 2. 

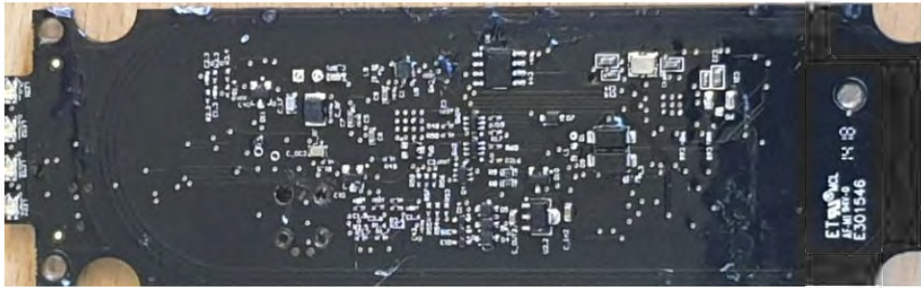
Claim 23	Infringement by WaveLynx
	WaveLynx ET-10. Similarly, the ET20-7 & ET25-7 reader includes a reader antenna loop tuned to operate at a first low carrier frequency on the back of the reader.  WaveLynx ET25-7. Additionally, WaveLynx's Ethos Readers enable data communication with a first transponder transmitting data signals at said first low carrier frequency.

Claim 23	For example, the technical specifications of the Ethos Readers discuss “read ranges” for “125 kHz up to 4”” for each of the ET10, ET20, and ET25 readers. Such “read ranges” relate to the distance a transponder may be placed from the reader to enable data communication. TECHNICAL SPECIFICATIONS <table><tr><td>FEATURES</td><td> Mullion Model ET10</td><td> Single Gang Model ET20</td><td> Keypad Model ET25</td></tr><tr><td>RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile</td><td>Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS</td><td>Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS</td><td>Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS</td></tr><tr><td>Color</td><td colspan="3">Black (Standard) Beige Custom by Request</td></tr><tr><td>Current</td><td>105 mA average, 145 mA peak</td><td>120 mA average, 170 mA peak</td><td>145 mA average, 195 mA peak</td></tr><tr><td>Voltage</td><td colspan="3">5-16 V DC</td></tr><tr><td>Temperature Range</td><td colspan="3">UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity</td></tr><tr><td>Read Ranges</td><td>EV1: 1.2", EV2: 2.2" 125 kHz up to 4"</td><td>EV1: 1.5", EV2 2.5" 125 kHz up to 4"</td><td></td></tr></table> Doc. No. 12-4 at 3.	FEATURES	 Mullion Model ET10	 Single Gang Model ET20	 Keypad Model ET25	RF Technologies 13.56 MHz 125 kHz & 13.56 MHz 13.56 MHz & Mobile 125 kHz, 13.56MHz, & Mobile	Part Number ET10-2WS ET10-3WS ET10-6WS ET10-7WS	Part Number ET20-2WS ET20-3WS ET20-6WS ET20-7WS	Part Number ET25-2WS ET25-3WS ET25-6WS ET25-7WS	Color	Black (Standard) Beige Custom by Request			Current	105 mA average, 145 mA peak	120 mA average, 170 mA peak	145 mA average, 195 mA peak	Voltage	5-16 V DC			Temperature Range	UL™ tested -35° to 66°C and EN -40° to 70°C and 95% humidity			Read Ranges	EV1: 1.2", EV2: 2.2" 125 kHz up to 4"	EV1: 1.5", EV2 2.5" 125 kHz up to 4"	
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[23.b] a second reader loop antenna having a second loop and tuned to operate at a second carrier frequency different from said first carrier frequency enabling	Wavelynx’s Ethos Readers include at least a second reader loop antenna having a second loop tuned to operate at a second high carrier frequency different from the first low carrier frequency.																												
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Claim 23	Infringement by WaveLynx																															
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Claim 23	Infringement by WaveLynx
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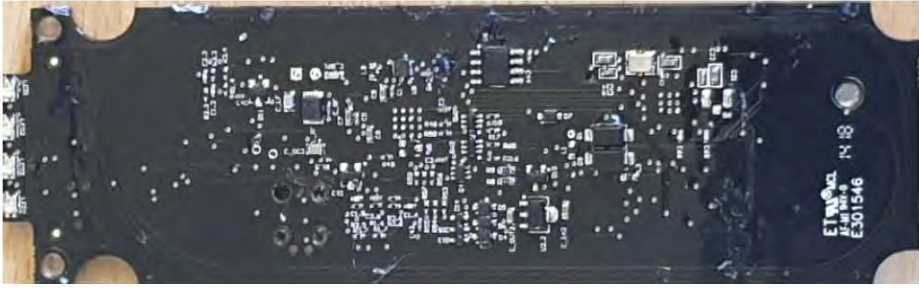
Claim 23	Infringement by WaveLynx
	 Doc. No. 12-12 at 2.

Claim 23	Infringement by WaveLynx
	 WaveLynx ET10-7.

Claim 23	Infringement by WaveLynx
	WaveLynx ET20/25-7. Additionally, WaveLynx’s Ethos Readers enable data communication with a second transponder transmitting data signals at said first high carrier frequency. For example, the technical specifications of the Ethos Readers discuss “read ranges” for “EV1” and “EV2” for each of the ET10, ET20, and ET25 readers. On information and belief, EV1 and EV2 refer to the versions of NXP’s MIFARE DESFire technology, which operates at 13.56 MHz. The “read ranges” relate to the distance a transponder may be placed from the reader to enable data communication.

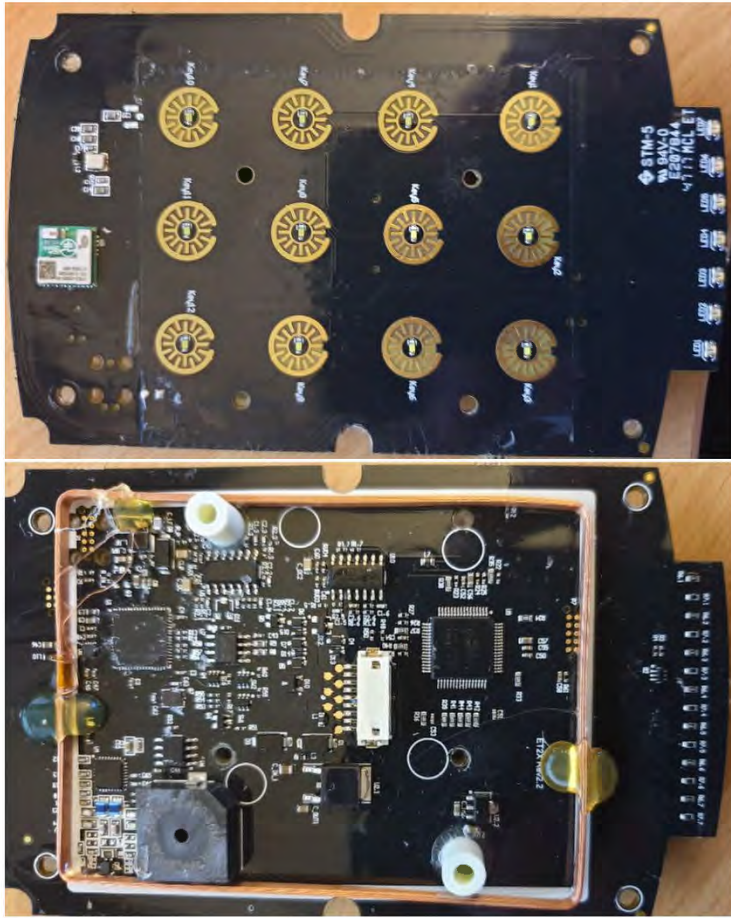
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[23.c] wherein said first and second loops are arranged in an opposing magnetic flux arrangement where the direction of magnetic flux created through the first loop is substantially parallel but opposite to the direction

Claim 23	Infringement by WaveLynx
of magnetic flux created through the second loop.	  WaveLynx ET10-7.

Claim 23

Infringement by WaveLynx



WaveLynx ET20/25-7.