

STANDARD AND CUSTOM ANTENNAS FOR IOT

OVERVIEW AND SELECTION GUIDE

CREATING A SAFER, SUSTAINABLE, PRODUCTIVE AND CONNECTED FUTURE

TE Connectivity (TE) is a leading developer and manufacturer of high performance embedded and external antenna solutions addressing the needs of exponentially-growing wireless traffic. From the advent of mobile phones to the IoT devices of today, TE engineers have been developing antenna solutions for some of the most challenging applications, integrating multiple antennas into small form-factor devices and solving some complex design challenges in multi-radio environments.

TE's antenna portfolio includes standard and custom solutions in the following categories: Cellular, GNSS, Wi-Fi/ Bluetooth/Zigbee, ISM, LPWAN and RF accessories. With our rich antenna portfolio, we thrive on opportunities to solve problems together with our customers.

Across industries TE can provide safe, sustainable, and productive antenna solutions along with implementation and optimization services to enable a more connected world. TE can provide advanced antenna solutions for most wireless devices, with many combinations to address customer required features. Our antenna designs can accommodate a broad range of frequency bands for operation on any network in both regional and global markets.

Recognized as a **GLOBAL INNOVATION LEADER** by several leading indices

COMMUNITY LEADER listed on Dow Jones Sustainability Index and named as one of **WORLD'S MOST ETHICAL COMPANIES** by Ethisphere Institute

Recognized by Fortune in companies that **CHANGE THE WORLD and WORLD'S MOST ADMIRED COMPANIES**

Your Trusted Partner



KEY BENEFITS

- High reliability: high performance and isolation
- High efficiency: optimized throughput, minimal losses
- State of the art antenna laboratories and global footprint
- In-house testing and validation
- Implementation services
- An innovation leader
- Quick-turn designs and prototypes
- World class fully-integrated manufacturing capabilities



WIRELESS PROTOCOLS

- Cellular, sub 6GHz (2G-5G, NB-IoT, LTE-M)
- LPWAN for IoT
- Wi-Fi, Bluetooth, ISM
- GNSS, GPS, Positioning
- Ultra-wideband
- LoRa, Sigfox, Z-wave/ ZigBee
- Combination antennas
- 5G mmWave

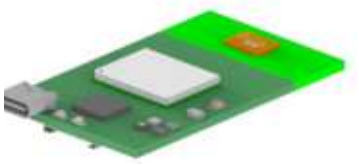


FOCUS APPLICATIONS

- Security & surveillance
- Indoor lighting, street lighting
- Home and building automation
- Smart metering, energy management
- Industrial IoT, predictive maintenance
- Health and medical devices
- Telematics, OBD, asset tracking
- Audio and entertainment
- Agriculture

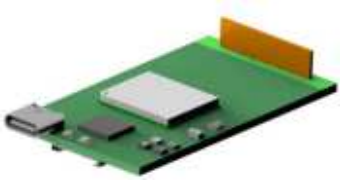
MOUNTING TYPES

Board Mount Antennas



Surface mount

- Consist of: Element + Keep out + Ground
- Small size, low profile
- Ideal for devices with very low height requirement
- Relatively large PCB ground keep out of 10 mm to 20 mm is required



Tab mount

- Consist of: Element + Keep out + Ground
- Higher profile of 10 mm to 20 mm
- Smaller PCB ground keep out of 5 mm to 10 mm is required
- Can save PCB space and offer good antenna performance



Surface mount on ground

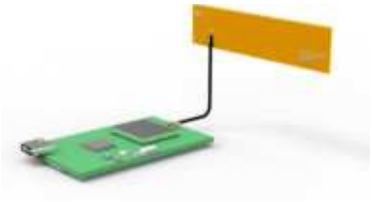
- Consist of: Element + Ground
- Higher profile of 5 mm to 25 mm
- No PCB ground keep out is required
- Can save PCB space
- On-ground type ideal for single/dual high band antennas

Embedded Antennas



Chassis mount, direct feed

- Compact Antenna
- Use existing ground plane
- Ground plane design + components/routing can have strong RF impact
- Automatic and repeatable assembly



Chassis mount, cable feed

- Larger Antenna
- Ground plane independent antenna
- Ground plane + components having little impact on RF
- Manual assembly

External & Terminal Antennas



External

- Stand-alone antenna
- Little to no dependency on device ground
- Preferred option for metal cases
- Option where antenna position different from device position
- Minimal RF design effort, ready to use



Terminal mount

- Stand-alone antenna
- Dependency on device ground increases with lower frequencies
- Preferred option for metal cases
- Higher gain options available
- Adapter cable = adding cost
- Easy manipulation with minimal RF design effort

MANUFACTURING TECHNOLOGIES

Laser Direct Structuring (LDS)

TE is a leading supplier of molded interconnect device (MID) technology with more than 25 years mass production experience. LDS is an exciting technology used to create MIDs.

LDS can save valuable space in your application by integrating high frequency, mechanical and electrical functionality into one component. Laser structuring enables 3-dimensional (3D) design/routing capability, versus the limiting 2-dimensional (2D) capability on a printed circuit board (PCB) or other common substrates.

LDS technology also allows for improved antenna performance because antennas can be placed in the design where they have more room for better bandwidth and efficiency.

TE has been a leader in early adoption of LDS manufacturing process technology, giving us the experience to help get the design solution correct with minimal effort. Our in-house development and fully integrated manufacturing means we can better control the process and timing from end-to-end and can transition quickly from prototype to mass production – helping delivering your product fast to increase your speed to market.

The use of LDS technology is not limited to antennas, and also includes electro-mechanical, shielding, and other components used in a wide variety of applications.

Key benefits

- Ability to selectively and repeatably plate 3 dimensionally
- Space savings
- Ability to produce thin (0.15 mm) traces
- Improved antenna performance
- Applied cost savings
- Fast time to market
- Flexibility for pattern changes during production
- Simple/fast/low cost tooling



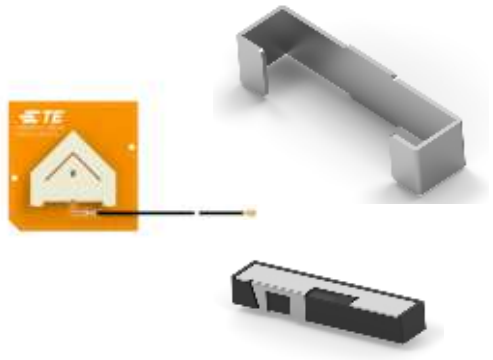
Printed Electronics

TE has deep experience in various printed electronics technologies, covering ink technologies and printing techniques. Our ink technology research includes custom ink formulation in conductive, magnetic, and other functional inks, in addition to access and experience with various commercially available inks. Our printing capabilities can cover analog and digital printing techniques of 2D and 3D surfaces. TE's process and product development focus areas include antennas, sensors, passive components, in-mold electronics, electrodes & contacts, and medical devices.

Contact TE for more information.

Stamped Metal Antennas

Formed metal embedded antennas can offer high efficiency and may be appropriate for smaller devices where there is limited internal space. TE's standard off-the-shelf offering of low profile, high performance stamped antennas can deliver a low cost and highly repeatable manufacturing solution. Custom designs can also be provided, however, this is typically only suitable for higher volume applications, as tooling is necessary for stamping and forming. Various mounting options are available.



PCB & FPC Antennas

Useful for multi-band antennas, flexible printed circuits (FPCs) and printed circuit boards (PCBs) can allow a wide variety of wireless devices to operate at different frequencies without multiple antennas. TE's innovative MetaSpan antenna technology makes wireless connections more reliable by using metamaterials to cover an extensive range of frequency bands. A broad range of standard offerings include low profile and miniaturized antennas. Additional benefits include enhanced bandwidth, reduced size, excellent efficiency, and a smaller keep out zone. Custom solutions are quickly available due to short lead time and smaller investment for tooling, while allowing flexibility for pattern changes. Various mounting options are available.



External & Terminal Antennas

TE can offer a broad range of external and terminal antennas. As external antennas generally do not require additional tuning, they are easy to implement and therefore may reduce the total cost of ownership. External antennas also have the advantage of improved sensitivity due to farther distance from device noise, which can enable excellent coverage and gain for a wide variety of applications and design possibilities. Most of TE's external antennas are offered as standard off-the-shelf solutions which supports very rapid time to market. Additionally, TE can offer supplementary cable assemblies and mating RF receptacles (see page 15) that seamlessly connect to the terminated interfaces of the external antennas, which can provide great flexibility for design.



TE RF IMPLEMENTATION SUPPORT



- Customer project baseline evaluation
- Tuning of standard antenna solution
- Custom specific antenna solution
- Throughput optimization
- Efficiency optimization
- Coexistence optimization
- Active and passive antenna performance
- Radiation pattern/ SAR optimization
- Design for manufacturing
- World class fully-integrated manufacturing capabilities

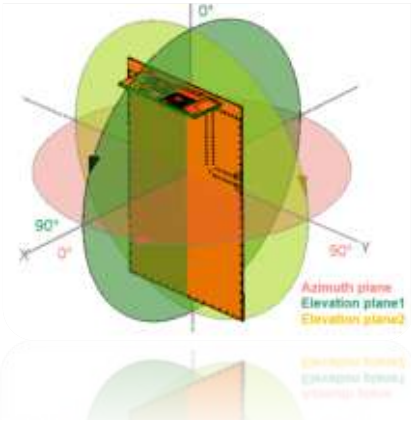
Antenna Design

RF Engineering
Prototyping
Verification



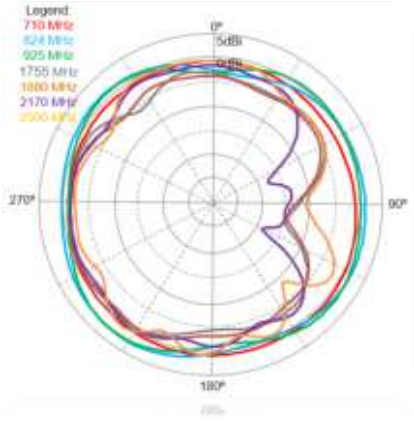
System Design Guide

RF Engineering
Quality of Service
Verification



OTA Optimization

Benchmarking
Throughout Optimization
Industry Compliance



STANDARD ANTENNA PART NUMBER DETAIL

Cellular, NB-IoT, CAT-M, 2G-5G

TE Part Number	Product Image	Frequency Band (MHz)	Wireless Application	Mounting Type	VSWR (Max)	Peak Gain (dB)	Product Length (mm)	Product Width (mm)	Product Height (mm)	Remarks
2108783-1/ -2		617 - 3800	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS Wi-Fi, LoRa, Sigfox	Surface mount	Refer to data sheet	Refer to data sheet	38	7.5	3.2	• Combination antenna • On board PCB • Small form factor • Packaging -1: bulk packaged -2: T&R packaged
2108784-1/ -2		698 - 6000	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS Wi-Fi, LoRa, Sigfox	Surface mount	Refer to data sheet	Refer to data sheet	38	7.5	3,2	• Combination antenna • On board PCB • Small form factor • Packaging -1: bulk packaged -2: T&R packaged
2195728-1		698 - 2700	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS Wi-Fi, LoRa, Sigfox	Tab mount (Through-hole)	3.0 : 1	Refer to data sheet	55	1.6	20	• Combination antenna • On board PCB
2108994-1		698 - 960 1710 - 2170 2300 - 2700	4G, 3G, 2G, NB-IoT, Cat-M, Wi-Fi	Surface mount	<3:1	2.3	40	10	3.2	• On board PCB
2118903-1		698 - 960 1710 - 2170 2300 - 2700	4G, 3G, 2G, NB-IoT, Cat-M	Surface mount	<3:1	2.3	75	11.9	1.64	• On board PCB
2118614-1		698 - 960 1710 - 2170 2300 - 2700	4G, 3G, 2G, NB-IoT, Cat-M	Tab mount (Through-hole)	Refer to data sheet	Refer to data sheet	50	20	1.64	• On board PCB
2118898-1/ -2		902 - 928 2400 - 2483.5	ISM, ZigBee, Bluetooth, Wi-Fi	Adhesive mount	<2:1	2.3	140	20	0.25	• Embedded flexible PCB • Cable lengths: 185, 255 mm, or custom • Mating connector type: MMCX
2361492-1/ -2		698 - 960 1710 - 2170 2300 - 2700	4G, 3G, 2G, NB-IoT, Cat-M	Adhesive mount	Refer to data sheet	Refer to data sheet	65	15	1	• Embedded PCB • Cable lengths: 50, 200 mm, or custom • Mating connector type: MHF (MHF4 available on request)
2372105-1/ -2					Refer to data sheet	Refer to data sheet	65	15	1	• Embedded PCB • Cable lengths: 100, 150 mm, or custom • Mating connector type: MHF (MHF4 available on request)
2367286-1/ -2		698 - 960 1710 - 2170 2300 - 2700	4G, 3G, 2G, NB-IoT, Cat-M	Adhesive mount	Refer to data sheet	Refer to data sheet	65	15	0.14	• Embedded FPC • Cable lengths: 50, 200 mm, or custom • Mating connector type: MHF (MHF4 available on request)
2372112-1/ -2					Refer to data sheet	Refer to data sheet	65	15	0.14	• Embedded FPC • Cable lengths: 100, 150 mm, or custom • Mating connector type: MHF (MHF4 available on request)
2118879-1/ -2/ -4		698-960, 1710-2170, 2300-2700	4G, 3G, 2G, NB-IoT, Cat-M, GNSS, Wi-Fi, LoRa, Sigfox	Adhesive mount	Refer to data sheet	Refer to data sheet	110	14	1.6	• Combination antenna • Embedded PCB • Cable length can be customized • Mating connector type: SMA
2108788-1		824 - 960 1710 - 1990	3G, 2G, ISM	Surface mount	<3:1	1	37.59	11.94	1.57	• On board PCB • Packaging -1: Bulk packaged -2: T&R packaged
2118310-1		698 - 960 1710 - 2700	4G, 3G, 2G, NB-IoT, Cat-M, Wi-Fi	Tab mount (Through-hole)	<3:1	3.5	74	10.56	1.57	• On board PCB
2118308-1/ -2/ -3/ -4/ -5/ -6/ -8		698 - 960 1710 - 2170 2300 - 2700	4G, 3G, 2G, NB-IoT, Cat-M, Wi-Fi	Adhesive mount	<3:1	3.9	110	14	0.51	• Embedded PCB • Cable lengths: 120, 150, 193, 203, 290, 500 mm, or custom • Mating connector types: MHF, MHF4L, MCX
1513317-1		824 - 960 1710 - 2170	3G, 2G, ISM, NB-IoT, Cat-M	Tab mount (Through-hole)	<3:1	2	49.9	20.27	1.58	• On board PCB

Cellular, NB-IoT, CAT-M, 2G-5G (continued)

TE Part Number	Product Image	Frequency Band (MHz)	Wireless Application	Mounting Type	VSWR (Max)	Peak Gain (dB)	Product Length (mm)	Product Width (mm)	Product Height (mm)	Remarks
1513273-1		824 - 960 1710 - 1990	3G, 2G, ISM	Tab mount (Through-hole)	<3:1	2	37.59	15.11	1.57	• On board PCB
1513247-1		824 - 894 1850 - 1990	3G, 2G, ISM	Tab mount (Through-hole)	<3:1	Refer to data sheet	38.1	15.24	1.63	• On board PCB
1513169-1		824 - 894	2G, ISM	Tab mount (Through-hole)	<2.5:1	2	38.1	15.24	1.57	• On board PCB
1513381-1		3100 - 6000	5G	Chassis mount	<3:1	2	29	12	10	• Embedded • Cable lengths: 365 mm or custom • Mating connector type: MHF
2195729-1/-2		617 - 960 1427 - 1661 1710 - 2170 2500 - 2690 3300 - 4200 4400 - 5000 5150 - 5925	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS world band	Terminal mount	Refer to data sheet	Refer to data sheet	135.7	20.1	-	• Terminal dipole • -1 = black, -2 = white • Mating connector type: SMA
2195773-1		698 - 960 1710 - 2700	4G, 3G, 2G, Wi-Fi	Terminal mount	<3:1	Refer to data sheet	115.5	17.75	-	• Terminal monopole • Mating connector type: SMA
2195736-1		700 - 2700	4G, 3G, 2G	Terminal mount	< 2.5:1	2.5	157	17.7	-	• Terminal dipole • Mating connector type: SMA
2195632-1		880 - 960 1710 - 2330	3G, 2G	Terminal mount	<3:1	2.5	47	7.8	-	• Terminal dipole • Mating connector type: SMA
2195771-1		698 - 960 1710 - 2700 3400 - 3800	5G, 4G, 3G, 2G, Wi-Fi	External mount	< 2.0:1	Refer to data sheet	90	185.5	90	• External DAS dipole • Ceiling/Support mount • Cable lengths: 320 mm or custom • Mating connector type: N female (mounting clinch nuts)



GNSS

TE Part Number	Product Image	Frequency Band (MHz)	Wireless Application	Mounting Type	VSWR (Max)	Peak Gain (dB)	Product Length (mm)	Product Width (mm)	Product Height (mm)	Remarks
2195760-1		1559 - 1606 2400 - 2500 5150 - 5875	GNSS, Wi-Fi dual, Combo	Adhesive mount	<2.5:1	3	50	15	0.15	• Embedded FPC • Cable lengths: 150 mm or custom • Combo (GNSS & WiFi) • Mating connector type: MHF
2195761-1		1559 - 1606	GNSS	Surface mount	<3:1	5	25	25	4	• On board ceramic patch
2195762-1		1559 - 1606	GNSS	Surface mount	<3:1	5	35	35	4	• On board ceramic patch
2118900-1		1560 - 1602	GNSS	Surface mount	< 2.0:1	3.5	10	10	1	• On board PCB • Isotropic
1513634-1		1565 - 1585	GPS	Surface mount	<3:1	0	16 dia.	16 dia.	6.05	• On board puck • Isotropic • On ground (no cut out on the ground plane)
2195765-1		1570 - 1580 2400 - 2500	GNSS, Wi-Fi	Surface mount	< 2.0:1	1	3.2	1.7	0.5	• On board ceramic chip
2195764-1		1570 - 1615	GNSS	Surface mount	< 2.0:1	3.2	5.2	3.76	0.7	• On board ceramic chip
2108783-1/-2		617 - 3800	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS Wi-Fi, LoRa, Sigfox	Surface mount	Refer to data sheet	Refer to data sheet	38	7.5	3.2	• Combination antenna • On board PCB • Small form factor • Packaging -1: bulk packaged -2: T&R packaged
2108784-1/-2		698 - 6000	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS Wi-Fi, LoRa, Sigfox	Surface mount	Refer to data sheet	Refer to data sheet	38	7.5	3.2	• Combination antenna • On board PCB • Small form factor • Packaging -1: bulk packaged -2: T&R packaged
2195728-1		698 - 2700	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS Wi-Fi, LoRa, Sigfox	Tab mount (Through-hole)	3.0 : 1	Refer to data sheet	55	1.6	20	• Combination antenna • On board PCB
2118879-1, -2, -4		698-960, 1710-2170, 2300-2700	4G, 3G, 2G, NB-IoT, Cat-M, GNSS, Wi-Fi, LoRa, Sigfox	Adhesive mount	Refer to data sheet	Refer to data sheet	110	14	1.6	• Combination antenna • Embedded PCB • Cable length can be customized • Mating connector type: SMA
2195729-1/-2		617 - 960 1427 - 1661 1710 - 2170 2500 - 2690 3300 - 4200 4400 - 5000 5150 - 5925	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS world band	Terminal mount	Refer to data sheet	Refer to data sheet	135.7	20.1	-	• Terminal dipole • -1 = black, -2 = white • Mating connector type: SMA
L1/L2 High Precision										
2195766-1		1228 1575	GNSS	Surface mount	< 2.0:1	4.5	38	38	8.9	• On board ceramic chip • L1/L2 high precision
2195767-1		1228 1575	GNSS	Surface mount	< 2.0:1	5	38	38	14.86	• On board ceramic chip • L1/L2 high precision
Active										
2195763-1		1559 - 1606	GNSS	Adhesive mount	<3:1	26	35.56	35.5	9	• Embedded patch • Cable lengths: 70 mm or custom • 3 V/4.5 mA • Mating connector type: MHF
2195768-1		1573 - 1577	GNSS	Adhesive mount	< 2.0:1	19	12	12	5.65	• Embedded patch • Cable lengths: 83 mm or custom • 3 V/4.5 mA • Mating connector type: MHF
2195774-1		1575 - 1602	GNSS	External	< 2.0:1	>10 (LNA)	49.14	46.14	15.94	• External patch in plastic housing • Cable lengths: 3000 mm or custom • Active • 3 V/10 mA • Mating connector type: SMA (magnetic mount)

Wi-Fi, Bluetooth, Zigbee

TE Part Number	Product Image	Frequency Band (MHz)	Wireless Application	Mounting Type	VSWR (Max)	Peak Gain (dB)	Product Length (mm)	Product Width (mm)	Product Height (mm)	Remarks
2118907-1		2400 - 2483.5, 5150 - 5875, 5925 - 7125	Wi-Fi triple band, Wi-Fi 6E	Adhesive mount	Refer to data sheet	Refer to data sheet	29.6	41.24	0.36	• Embedded flexible PCB • Cable length can be customized • Mating Connector types: MHF
2118908-1/ -2		2400 - 2483.5, 5150 - 5875, 5925 - 7125	Wi-Fi triple band, Wi-Fi 6E	Surface mount	Refer to data sheet	Refer to data sheet	18.9	6.2	0.76	• On board PCB • Packaging -1: Bulk packaged -2: T&R packaged
2118909-1/ -2/ -4/ -5/ -6/ -8		2400 - 2483.5, 5150 - 5875, 5925 - 7125	Wi-Fi triple band, Wi-Fi 6E	Adhesive mount	Refer to data sheet	Refer to data sheet	40	8	2.6	• Embedded PCB • Cable length can be customized • Mating Connector types: MHF, MHF4
2108792-1		2400 - 2483.5, 5150 - 5875, 5925 - 7125"	Wi-Fi triple band, Wi-Fi 6E	Adhesive mount	Refer to data sheet	Refer to data sheet	40	10	0.12	• Embedded FPC • Cable length can be customized • Mating Connector types: MHF
2246667-1/ -2		2400 - 2483.5 5150 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Chassis mount	<3.5:1	Refer to data sheet	144	34	6.1	• Embedded PCB assembly • MIMO 2X2 dual band • Cable length can be customized • Mating connector types: MHF, MHF4L
2108994-1		698 - 960 1710 - 2170 2300 - 2700	4G, 3G, 2G, NB-IoT, Cat-M, Wi-Fi	Surface mount	<3:1	2.3	40	10	3.2	• On board PCB
2118899-1/ -2/ -3/ -4		2400 - 2483.5 5150 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Chassis mount	<3:1	2.3	54.5	54.5	3.8	• Embedded metal stamping assembly • Cable lengths: 278, 480 mm • Mating connector types: MHF, MHF4L
2344654-1/ -2/ -3/ -4/ -5/ -6/ -7/ -8		2400 - 2483.5 5150 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Adhesive mount	<2:1	Refer to data sheet	30	9.5	1	• Embedded PCB • Cable lengths: 50, 100, 150, 200 mm or custom • Mating connector types: MHF, MHF4
2344655-1/ -2/ -3/ -4/ -5/ -6/ -7/ -8		2400 - 2483.5 5150 - 5875	Wi-Fi triple band, Wi-Fi 6E, Bluetooth, Zigbee	Adhesive mount	<3:1	Refer to data sheet	33	8	1	• Embedded PCB • Cable lengths: 50, 100, 150, 200 mm or custom • Mating connector types: MHF, MHF4
2344656-1/ -2/ -3/ -4/ -5/ -6/ -7/ -8		2400 - 2483.5 5150 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Adhesive mount	<2:1	Refer to data sheet	30	9.5	0.2	• Embedded FPC • Cable lengths: 50, 100, 150, 200 mm or custom • Mating connector types: MHF, MHF4
2344657-1/ -2/ -3/ -4/ -5/ -6/ -7/ -8		2400 - 2483.5 5150 - 5875	Wi-Fi triple band, Wi-Fi 6E, Bluetooth, Zig	Adhesive mount	<3:1	Refer to data sheet	35	8	0.2	• Embedded FPC • Cable lengths: 50, 100, 150, 200 mm or custom • Mating connector types: MHF, MHF4
2118898-1/ -2		902 - 928 2400 - 2483.5	ISM, Wi-Fi, Bluetooth, Zigbee	Adhesive mount	<2:1	2.3	140	20	0.25	• Flexible Embedded FPC • Cable lengths: 185, 255 mm or custom • Mating connector type: MMCX
2108790-1/ -2		2400 - 2483.5	Wi-Fi dual band, Bluetooth, Zigbee	Surface mount	<2:1	2	18.03	3.76	1.57	• On board PCB
2108789-1/ -2		2400 - 2483.5	Wi-Fi dual band, Bluetooth, Zigbee	Surface mount	<2.5:1	1	8.46	6.4	0.79	• On board PCB • Packaging -1: Bulk packaged -2: T&R packaged
2118879-1/ -2/ -4		698-960, 1710-2170, 2300-2700	4G, 3G, 2G, NB-IoT, Cat-M, GNSS, Wi-Fi, LoRa, Sigfox	Adhesive mount	Refer to data sheet	Refer to data sheet	110	14	1.6	• Combination antenna • Embedded PCB • Cable length can be customized • Mating connector type: SMA
2108783-1/ -2		617 - 3800	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS Wi-Fi, LoRa, Sigfox	Surface mount	Refer to data sheet	Refer to data sheet	38	7.5	3.2	• Combination antenna • On board PCB • Small form factor • Packaging -1: Bulk packaged -2: T&R packaged
2108784-1/ -2		698 - 6000	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS Wi-Fi, LoRa, Sigfox	Surface mount	Refer to data sheet	Refer to data sheet	38	7.5	3.2	• Combination antenna • On board PCB • Small form factor • Packaging -1: Bulk packaged -2: T&R packaged
2195728-1		698 - 2700	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS Wi-Fi, LoRa, Sigfox	Tab mount (Through-hole)	3.0 : 1	Refer to data sheet	55	1.6	20	• Combination antenna • On board PCB
2195760-1		1559 - 1606 2400 - 2500 5150 - 5875	GNSS, Wi-Fi dual, Combo	Adhesive mount	<2.5:1	3	50	15	0.15	• Embedded FPC • Cable lengths: 150 mm or custom • Combo (GNSS & WiFi) • Mating connector type: MHF

Wi-Fi, Bluetooth, Zigbee (continued)

TE Part Number	Product Image	Frequency Band (MHz)	Wireless Application	Mounting Type	VSWR (Max)	Peak Gain (dB)	Product Length (mm)	Product Width (mm)	Product Height (mm)	Remarks
2195765-1		1570 - 1580 2400 - 2500	GNSS, Wi-Fi	Surface mount	< 2.0:1	1	3.2	1.7	0.5	• On board ceramic chip
2108964-1		2400 - 2500 4900 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Surface mount	<2:1	Refer to data sheet	10	2.2	2.5	• On board metal stamping • Single or dual band use
2108517-2		2400 - 2500 4900 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Surface mount	<2.5:1	3	22.75	2.4	4.8	• On board metal stamping
2118788-1/ -2		2400 - 2483.5 4900 - 5875	Wi-Fi dual band Bluetooth, Zigbee	Surface mount	< 2.5:1	Refer to data sheet	28.6	6.05	4.28	• On board metal stamping • No ground keep out zone required • Packaging -1: T&R packaged -2: Tray packaged
2118316-1		4900 - 5875	Wi-Fi	Surface mount	<2.5:1	4.9	10.9982	4.25	4.9	• On board metal stamping with standoff • No ground keep out zone required
2118326-1		4900 - 5875	Wi-Fi	Adhesive mount	<2.5:1	2.4	15.0114	10	1	• Embedded PCB • Cable lengths: 120 mm or custom • Mating connector type: MHF
1513472-1/ -3/ -5/ -7/ -8		2400 - 2483.5 5150 - 5875	Wi-Fi dual band Bluetooth, Zigbee	Chassis mount	<3:1	3	29	13	10	• Embedded • Acoustic version available • Cable lengths: 80 - 830 mm or custom • Mating connector types: MHF, MHF4L
1513430-1/ -2		2400 - 2483.5	Wi-Fi, Bluetooth, Zigbee	Surface mount	<2:1	2	12.85	3.76	0.79	• On board PCB • Diversity antennas for WLAN 2.4 to be used together • Mirrored patterns for pattern and spatial diversity • Left and right side feed points: 1513430-1 = right hand feed 1513431-1 = left hand feed • Packaging: -1 T&R / -2 Bulk
1513431-1/ -2										
1513168-1		902 - 928	ISM, ZigBee	Tab mount (Through-hole)	<2:1	0	38.1	15.24	1.57	• On board PCB
2118310-1		698 - 960 1710 - 2700	4G, 3G, 2G, NB-IoT, Cat-M, Wi-Fi	Tab mount (Through-hole)	<3:1	3.5	74	10.56	1.57	• On board PCB
2118059-1		2300 - 3800	Wi-Fi, Bluetooth, Zigbee	Adhesive mount	<3:1	4	30.607	36.85	0.304	• Embedded flexible PCB • Cable lengths: 350 mm or custom • Mating connector type: MHF
2118060-1/ -3		2300 - 3800 5150 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Adhesive mount	<3:1	2	29.591	41.24	0.304	• Embedded flexible PCB • Cable lengths: 60, 80, 350 mm or custom • Mating connector type: MHF
1513353-1		2400 - 2483.5	Wi-Fi, Bluetooth, Zigbee	Tab mount (Through-hole)	<2:1	2	12.7	12.7	0.78	• On board PCB
1513504-1		2400 - 2483.5	Wi-Fi, Bluetooth, Zigbee	Surface mount	<2.5:1	2	16 dia.	16 dia.	6.05	• On board puck • Isotropic radiation pattern • No ground keep out zone required
2118309-1/ -2/ -3/ -4/ -5/ -6/ -8		2400 - 2483.5 4900 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Adhesive mount	<2:1	3.7	40.1625	8	1	• Embedded PCB • Cable lengths: 120 mm - 375 mm or custom • Mating connector types: MHF, MHF4
1513164-1		2400 - 2483.5 5150 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Surface mount	<2.5:1	4	16 dia.	16 dia.	6.05	• On board puck • Isotropic radiation pattern • No ground keep out zone required
2118016-1/ -2		2400 - 2483.5 5150 - 5875	Wi-Fi dual band, Bluetooth, Zigbee	Surface mount	<3:1	2	18.9	6.2	0.79	• On board PCB • Packaging -1: Bulk packaged -2: T&R packaged
2195772-1		2400 - 2500	Wi-Fi IoT	Terminal mount	< 2.0:1	5	196	13	-	• Terminal dipole • Mating connector type: RP-SMA
2195630-1		2400 - 2500 5150 - 5875	Wi-Fi IoT	Terminal mount	< 2.0:1	2	30	10	-	• Terminal dipole • Mating connector type: RP-SMA
4-1982564-1		2400 - 2500 5150 - 5875	Wi-Fi IoT	Terminal mount	< 2.0:1	2	35	9.4	-	• Terminal dipole • Cable lengths: multiple lengths available or custom • Mating connector type: MHF

ISM, LPWAN

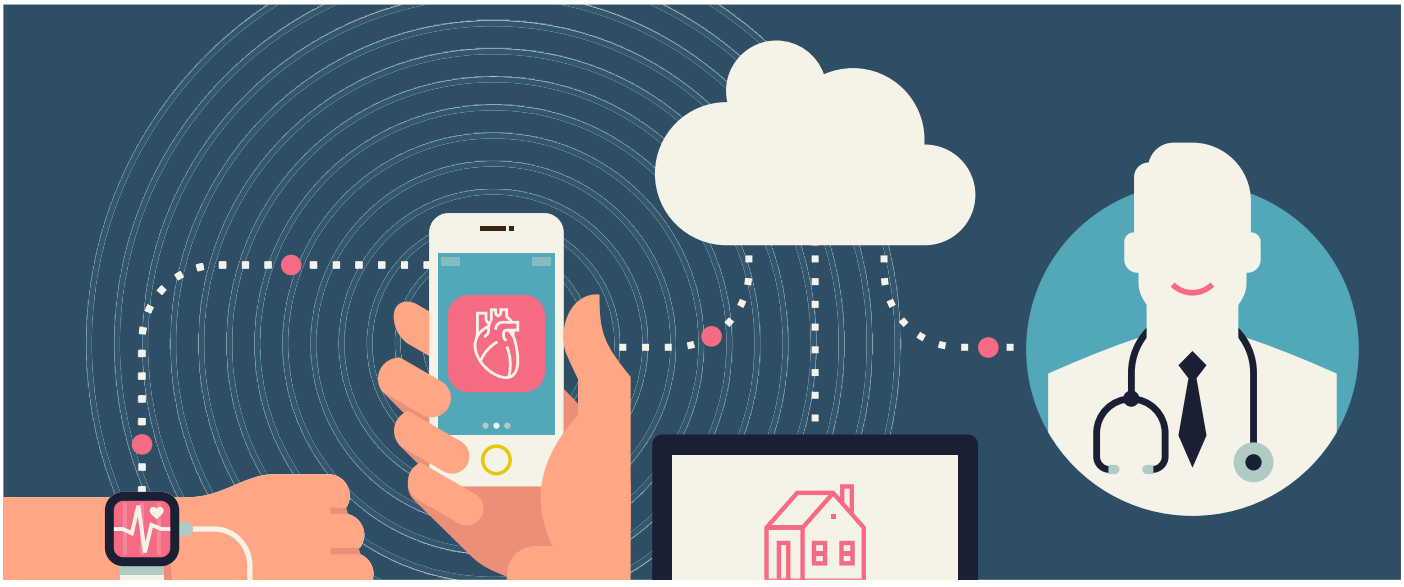
TE Part Number	Product Image	Frequency Band (MHz)	Wireless Application	Mounting Type	VSWR (Max)	Peak Gain (dB)	Product Length (mm)	Product Width (mm)	Product Height (mm)	Remarks
2195835 -1/ -2/ -3		868 / 915	ISM	Adhesive mount	Refer to data sheet	Refer to data sheet	38	9	0.14	• Embedded FPC • Cable length can be customized • Mating connector types: MHF4 (MHF and SMA available on request)
2195835 -4/ -5/ -6		868 / 915	ISM	Adhesive mount	Refer to data sheet	Refer to data sheet	38	9	0.14	• Embedded FPC • Cable length can be customized • Mating connector types: MHF4 (MHF and SMA available on request)
1513156-1/ -2		915	ISM	Surface mount	<2.5:1	1	38.1	6.6	1.57	• On board PCB • Packaging -1: T&R packaged -2: Bulk packaged
1513168-1		915	ISM	Tab mount (Through-hole)	2	0	38.1	15.24	1.57	• On board PCB
2118898-1/ -2		915 2.4 GHz	ISM, Wi-Fi, Bluetooth, ZigBee	Adhesive mount	2	2.3	140	20	0.25	• Embedded flexible PCB • Cable lengths: 185, 255 mm, or custom • Mating connector type: MMCX
2108991-1		698 - 960	IoT, LPWAN, ISM	Surface Mount	<2:1	Refer to data sheet	18	9	1.57	• On board PCB • Packaging -1: Bulk packaged -2: T&R packaged
1513317-1		824 - 960 1710 - 2170	3G, 2G, ISM, NB-IoT, Cat-M	Tab mount (Through-hole)	<2.5:1	2	49.9	20.27	1.58	• On board PCB
2108788-1		824 - 960 1710 - 1990	3G, 2G, ISM	Surface mount	<3:1	1	37.59	11.94	1.57	• On board PCB • Packaging -1: Bulk packaged -2: T&R packaged
1513273-1		824 - 960 1710 - 1990	3G, 2G, ISM	Tab mount (Through-hole)	<3:1	2	37.59	15.11	1.57	• On board PCB
1513247-1		824 - 870 1850 - 1990	3G, 2G, ISM	Tab mount (Through-hole)	<3:1	Refer to data sheet	38.1	15.24	1.63	• On board PCB
1513169-1		824 - 894	2G, ISM	Tab mount (Through-hole)	<2.5:1	2	38.1	15.24	1.57	• On board PCB
2195775-1		433	ISM, Cellular IoT	Terminal mount	<2.0:1	1	51	9.4	-	• Terminal monopole • Mating connector type: SMA
2195773-1		698 - 960 1710 - 2700	ISM, 4G, 3G, 2G, Wi-Fi	Terminal mount	<3:1	Refer to data sheet	115.5	17.75	-	• Terminal monopole • Mating connector type: SMA

mmWave

TE Part Number	Product Image	Frequency Band (GHz)	Wireless Application	Mounting Type	VSWR (Max)	Peak Gain (dB)	Product Length (mm)	Product Width (mm)	Product Height (mm)	Remarks
2108728-1		24 - 44	5G mm Wave	Screw mount	Refer to data sheet	Refer to data sheet	35	35	64	• Mating components 1) Cable assembly: 1-2016661-0 (2.4 mm male straight double end) 2) Adapter: 2081552-1 (2.4 mm plug to 1.85 mm jack)

External

TE Part Number	Product Image	Frequency Band (MHz)	Wireless Application	Mounting Type	VSWR (Max)	Peak Gain (dB)	Product Length (mm)	Product Width (mm)	Product Height (mm)	Remarks
2195729-1/-2		617 - 960 1427 - 1661 1710 - 2170 2500 - 2690 3300 - 4200 4400 - 5000 5150 - 5925	5G, 4G, 3G, 2G, NB-IoT, Cat-M, GNSS world band	Terminal mount	Refer to data sheet	Refer to data sheet	135.7	20.1	-	• Terminal dipole • -1 = black, -2 = white • Mating connector type: SMA
2195775-1		433.05 - 434.79	ISM, Cellular IoT	Terminal mount	< 2.0:1	1	51	9.4	-	• Terminal monopole • Mating connector type: SMA
2195632-1		880 - 960 1710 - 2330	3G, 2G	Terminal mount	<3:1	2.5	47	7.8	-	• Terminal dipole • Mating connector type: SMA
2195773-1		698 - 960 1710 - 2700	4G, 3G, 2G, Wi-Fi	Terminal mount	<3:1	Refer to data sheet	115.5	17.75	-	• Terminal monopole • Mating connector type: SMA
2195736-1		700 - 2700	4G, 3G, 2G	Terminal mount	< 2.5:1	2.5	157	17.7	-	• Terminal dipole • Mating connector type: SMA
2195771-1		698 - 960 1710 - 2700 3400 - 3800	5G, 4G, 3G, 2G, Wi-Fi	External mount	< 2.0:1	Refer to data sheet	90	185.5	90	• External DAS dipole • Ceiling/Support mount • Cable lengths: 320 mm or custom • Mating connector type: N female (mounting clinch nuts)
2195772-1		2400 - 2500	Wi-Fi IoT	Terminal mount	< 2.0:1	5	196	13	-	• Terminal dipole • Mating connector type: RP-SMA
2195630-1		2400 - 2500 5150 - 5875	Wi-Fi IoT	Terminal mount	< 2.0:1	2	108	10	-	• Terminal dipole • Mating connector type: RP-SMA
4-1982564-1		2400 - 2500 5150 - 5875	Wi-Fi IoT	Terminal mount	< 2.0:1	2	104	9.4	-	• Terminal dipole • Cable lengths: multiple lengths available or custom • Mating connector type: MHF
2195774-1		1575 - 1602	GNSS	External mount	< 2.0:1	>10 (LNA)	49.14	46.14	15.94	• External patch in plastic housing • Cable lengths: 3000 mm or custom • Active • 3 V/10 mA • Mating connector type: SMA (Magnetic mount)



Mating Components

Antennas		Mating components											
PN	Image	MHF 2337019-1	MHF4L 2334884-1	MMCX RA 1-1634010-0	MMCX 1-1634009-0	SMA RA 5-1814400-2	SMA 5-1814832-2	RP-SMA 2016504-1	Cable Assembly 1-2016661-0	2.4mm Adapter 2081552-1	SMA to MHF cable Assemblies 2032440-1/ -4	SMA to MHF cable Assemblies x-2016682-x	SMA to MHF cable Assemblies 2016694-2
2118898				● (-1, -2)	● (-1, -2)								
2361492		● (-1, -2)	● (-3, -4)										
2372105		● (-1, -2)	● (-3, -4)										
2367286		● (-1, -2)	● (-3, -4)										
2372112		● (-1, -2)	● (-3, -4)										
2118308		● (-1, -3, -4, -5, -8)	● (-2)										
1513381		● (-1)	● (-3)										
2108728-1									● (-1)	● (-1)			
2118899		● (-1, -2)	● (-3, -4)										
2344654		● (-1, -2, -3, -4)	● (-5, -6, -7, -8)										
2344655		● (-1, -2, -3, -4)	● (-5, -6, -7, -8)										
2344656		● (-1, -2, -3, -4)	● (-5, -6, -7, -8)										
2344657		● (-1, -2, -3, -4)	● (-5, -6, -7, -8)										
2195760		● (-1)											
2118326		● (-1)											
1513472		● (-1, -5, -7, -8)	● (-3)										
2118059		● (-1)											
2118060		● (-1, -3)											
2118309		● (-1, -2, -3, -8)	● (-4, -5, -6)										
2118879						● (-1, -2, -4)	● (-1, -2, -4)						
2246667		● (-1)	● (-2)										
2195763		● (-1)											

Mating Components (continued)

Antennas		Mating components											
PN	Image	MHF 2337019-1	MHF4L 2334884-1	MMCX RA 1-1634010-0	MMCX 1-1634009-0	SMA RA 5-1814400-2	SMA 5-1814832-2	RP-SMA 2016504-1	Cable Assembly 1-2016661-0	2.4mm Adapter 2081552-1	SMA to MHF cable Assemblies 2032440-1/ -4	SMA to MHF cable Assemblies x-2016682-x	SMA to MHF cable Assemblies 2016694-2
2195768		● (-1)											
2195729						● (-1, -2)	● (-1, -2)				● (-1, -2)	● (-1, -2)	● (-1, -2)
2195775						● (-1)	● (-1)				● (-1)	● (-1)	● (-1)
2195632						● (-1)	● (-1)				● (-1)	● (-1)	● (-1)
2195773						● (-1)	● (-1)				● (-1)	● (-1)	● (-1)
2195736						● (-1)	● (-1)				● (-1)	● (-1)	● (-1)
2195772								● (-1)					
2195630								● (-1)					
4-1982564		● (-1)											
2195774						● (-1)	● (-1)				● (-1)	● (-1)	● (-1)

Mating RF Connectors

TE Part Number	Product Image	Product Description	Frequency Band (GHz)	Mounting Type	VSWR (MAX)	Product Length (mm)	Product Width (mm)	Product Height (mm)
2337019-1		UMCC Gen 1 surface-mount receptacle (MHF type)	0 - 6	Surface mount	1.30	3.1	3	1.25
2334884-1		UMCC Gen 4 surface-mount receptacle (MHF4 type)	0 - 6	Surface mount	1.40	2	2	0.6
5-1814400-2		SMA jack, right-angle, PCB-mount	0 - 6	Tab mount (Through-hole)	N/A	14.2	6.3	10.43
5-1814832-2		SMA jack, vertical, PCB-mount	0 - 6	Tab mount (Through-hole)	1.30	6.4	6.4	9.5
2016504-1		RP-SMA jack, right-angle, PCB-mount	0 - 6	Tab mount (Through-hole)	N/A	14.2	6.3	10.43
1-1634010-0		MMCX jack, right-angle, PCB-mount	0 - 6	Tab mount (Through-hole)	1.35	6.5	3.5	3.8
1-1634009-0		MMCX jack, vertical, PCB-mount	0 - 6	Tab mount (Through-hole)	N/A	3.5	3.5	6.5
2081552-1		Adapter 2.4 mm plug to 1.85 mm jack	0 - 50	N/A	1.20	19.13	8	8

Mating RF Cable Assemblies

TE Part Number	Product Image	Product Description	Frequency Band (GHz)	VSWR (MAX)	Connector A Type	Connector B Type	Cable Diameter (mm)	Cable Length (mm)	Cable Color
2118651-6		RF CA, UMCC Gen 1 - Gen 1	0 - 6	N/A	MHF plug	MHF plug	1.13	90	Grey
2195633-6		RF CA, UMCC Gen 1 - Gen 1	0 - 6	2.0	MHF plug	MHF plug	1.32	200	Grey
2015698-2		C/A, UMCC/UMCC	0 - 6	1.5	MHFII plug	MHFII plug	0.81	100	Black
2016677-4		RF CA, UMCC to UMCC	0 - 6	2.0	MHFII plug	MHF4 plug	0.81	80	Black
2016682-2		RF CA,SMA BK to UMCC Gen 1	0 - 6	2.0	MHF plug	SMA jack	1.13	100	Black
2016682-4		RF CA, SMA BK to UMCC Gen 1	0 - 6	2.0	MHF plug	SMA jack	1.13	200	Black
2016693-2		RF CA, RP-SMA bulkhead to UMCC	0 - 6	2.0	MHF plug	RP-SMA jack	1.13	100	Black
2016693-4		RF CA, RP-SMA bulkhead to UMCC I	0 - 6	2.0	MHF plug	RP-SMA jack	1.13	200	Black
2016694-2		RF CA, SMA bulkhead to UMCC IV	0 - 6	2.0	MHF4 plug	SMA jack	1.13	100	Black
2016694-4		RF CA, SMA bulkhead to UMCC IV	0 - 6	2.0	MHF4 plug	SMA jack	1.13	200	Black
2016695-2		RF CA, RP-SMA bulkhead to UMCC IV	0 - 6	2.0	MHF4 plug	RP-SMA jack	1.13	100	Black
2016695-4		RF CA, RP-SMA bulkhead to UMCC IV	0 - 6	2.0	MHF4 plug	RP-SMA jack	1.13	200	Black
1-2016655-0		SMA male double 18 G, without armor	0 - 18	1.3	SMA plug	SMA plug	4.9	1,000	Blue
1-2016661-0		2.40 male double,50 G, without armor, braid	0 - 50	1.3	2.40mm plug	2.40mm plug	6	1,000	Black

ASSOCIATED PRODUCTS

Micro Coax Connectors

TE's micro-coaxial connector can offer excellent electrical performance to connect a RF cable assembly or antenna to a main printed circuit board in very broad range of applications.

Our micro-coaxial connectors can be drop-in replacements for existing RF receptacles in the market so customers may not need to change their PCB layout. Micro-coaxial receptacles can be supplied with competitive price and fast delivery.

With these standard RF receptacles and connectors, existing antenna and RF cable assembly portfolio, TE can provide a complete RF solution.



Micro Coax Assemblies

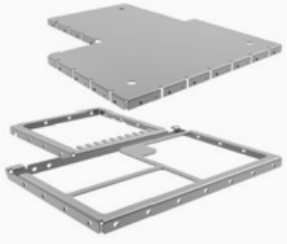
TE's micro-coaxial cable assemblies pair with our micro-coaxial receptacles and antennas to offer an end-to-end RF solution that is competitively priced. These products can provide excellent electrical performance to make a reliable RF or wireless connection to a main printed circuit board in a very broad range of applications, including consumer electronics, wearables, infotainment, medical systems, smart home appliances. TE's global footprint, engineering and manufacturing expertise can enable fast delivery of samples and mass production product.

The cable assemblies can address industry standards and can be mated with micro-coaxial receptacles from other suppliers.



Board-Level Shielding (BLS)

As complexity and functionality increases, there is a growing need for thinner devices with multiple antennas, higher data rates and increased operating frequencies. EMI (Electromagnetic Interference) shields from TE are stamped one and two piece metal shields that help provide isolation of board level components, minimize crosstalk and reduce EMI susceptibility without impacting system speed.



ASSOCIATED PRODUCTS AND RESOURCES

Antennas
Landing Page: www.te.com/antennas
Catalog – Ruggedized Antennas: 1-1773953-3
Catalog – Telematics and M2M Antennas: 1-1773960-1

Board Level Shields (BLS)
Landing Page: www.te.com/bls
Quick Reference Guide: 9-1773700-1

Grounding (Spring Fingers)
Landing Page: www.te.com/products/spring-fingers
Quick Reference Guide: 6-1773460-8

Discrete Wire Connectors
Landing pages: www.te.com/products/ct
www.te.com/products/minict
http://www.te.com/products/hpi
http://www.te.com/lowpowerdrawer
Quick Reference Guides: 1-1773455-8, 6-1773454-5, 1-1773713-2, 1-1773888-2

SIM Card Connectors
Landing page: www.te.com/products/sim
Quick Reference Guide: 2_1773464_0

Fine Pitch Board-to-Board Connectors
Landing page: www.te.com/products/fine-pitch
Quick Reference Guide: 1-1773839-9

RF & Coax Connectors
Landing page: www.te.com/rf
Quick Reference Guide: 1-1773725-8

Battery Connectors
Landing Pages: www.te.com/products/mobile-battery-connector
www.te.com/products/batterypack
Quick Reference Guides: 1-1773839-5, 1-1773839-4

Flexible Printed Circuit (FPC) Connectors
Landing page: www.te.com/products/fpc
Quick Reference Guides: 5-1773461-0, 8-1773459-2

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Catalog: 8-1773450-9

Sensors
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