TE Connectivity (TE) Empowers the Future for Next-Generation Robotics with Wireless Connectivity
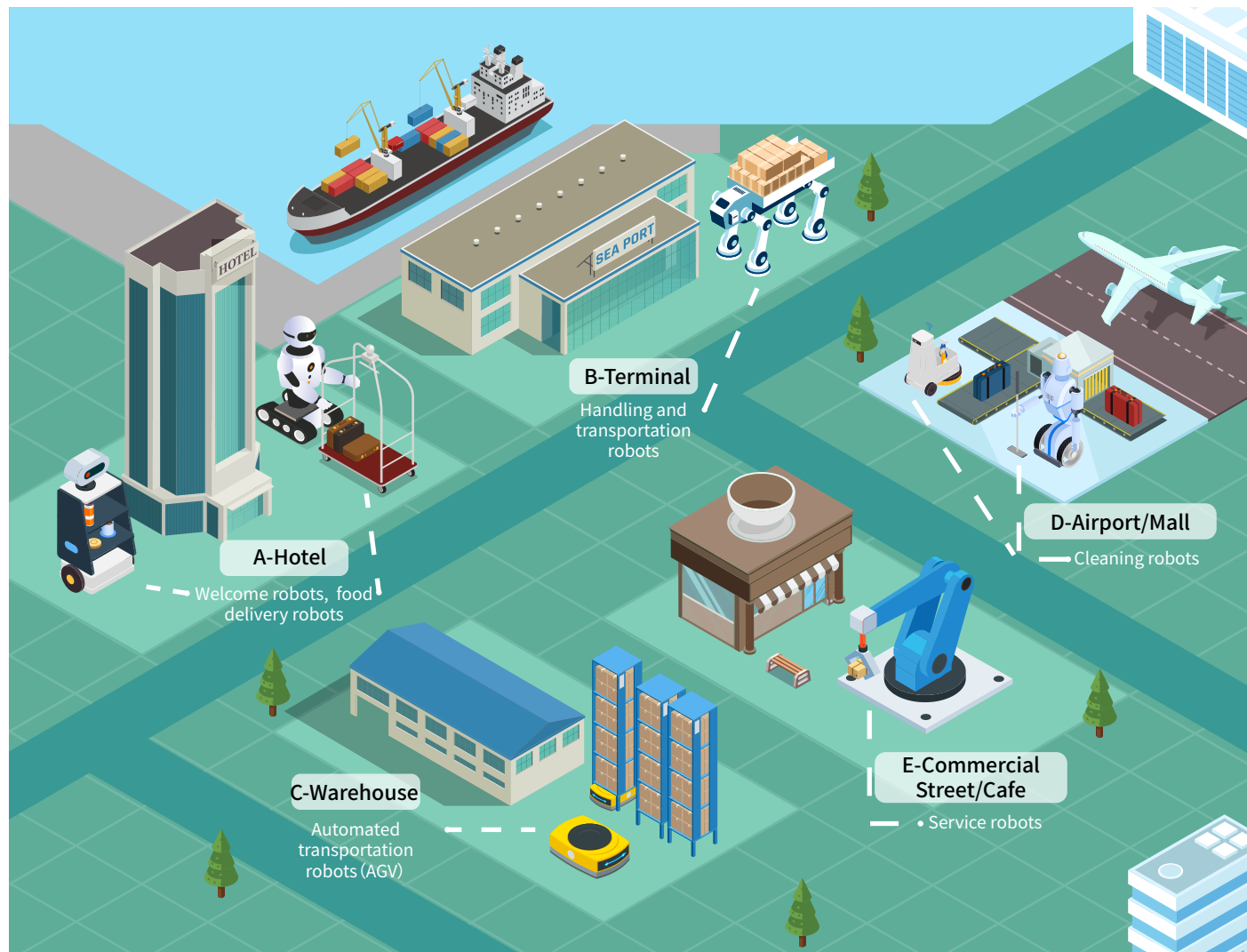## Application Guide for Service Robot Connectivity

With a product portfolio of industry-leading antennas and connectors for a wide range of applications and support for specialized electronic information connectivity technologies, TE is expanding horizontally into other industries and application scenarios, such as consumer electronics manufacturing, with the aim of realizing intelligent scheduling of AI and an innovative ecosystem for service robots.

Learn more at te.com/service-robot ▶

TE Components for Service Robots | Application Scenario Reference

Future-oriented casting of robot applications with both industrialized and lifestyle scenarios

A-Hotel
Welcome robots, food delivery robots

B-Terminal
Handling and transportation robots

C-Warehouse
Automated transportation robots (AGV)

D-Airport/Mall
Cleaning robots

E-Commercial Street/Cafe
• Service robots

With the increasing diversification and generalization of robot functions, the industrial division of labor is becoming more sophisticated. At the same time, along with continuous cost optimization, applicable scenarios and potential applications are growing across a wide range of fields such as manufacturing and automatic warehousing, creating broader market opportunities.

A-Hotel

• Welcome robots

• Food delivery robots

B-Terminal

• Handling and transportation robots

C-Warehouse

• Automated transportation robots

D-Airport/Mall

• Cleaning robots

E-Commercial Street/Cafe

• Service robots

Considerations for Service Robot Connectivity Solutions

What are some other key factors to consider when selecting wireless connectivity technology for robots?

Special attention should to be paid to key factors such as interference immunity, coverage, stability and reliability of the connection, low power consumption during operation, and high bandwidth with low latency. These factors are essential for smooth operation and stable performance of robots in various applications.

What should be evaluated when selecting connectors during the robot design phase?

As early as the robot design phase, connectors should be selected with consideration of product adaptability, durability and reliability, ease of maintenance, and size and interface fit. Water and dust resistance, electrical performance, and future expandability also need to be taken into account in order to support better robot designs as well as their future development.

Connection Design Requirements for Service Robots

Stability and reliability
Reliable performance for high-quality, high-performance omni-directional wireless transmission

Vibration resistance
Shock resistance to minimize damage caused by vibration, drops, and shocks

High speed
High-speed connectivity to embrace the growing demands of digital transformation

Space saving
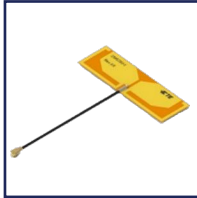Small connectors to save as much space as possible

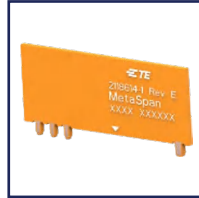# Product Recommendations for Applications

Cleaning robots

Obstacle detection is required and a stable current is needed for safety and efficiency.

Recommended antennas:

Wi-Fi/Bluetooth	GNSS	UWB

Recommended connectors:

Micro coaxial connector	Board-to-wire connector	D-type connector	USB Type-C
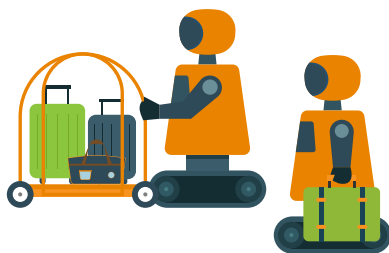
Welcome robots

There is a need for interactive commands and, given the small format of the robot, smaller component sizes are critical.
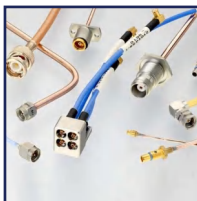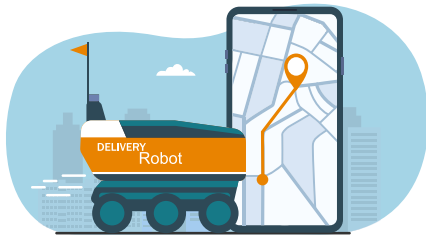
Recommended antennas:

Wi-Fi/Bluetooth	NFC

Recommended connectors:

Micro coaxial connector	Fine pitch connector	USB Type-C

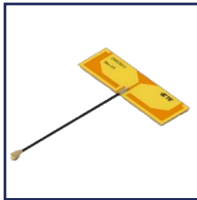## Handling and transportation robots

There is a need for GPS positioning for data transfer to and from the designated shipment, and there are requirements for the deployment environment.
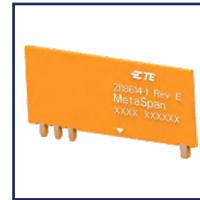
Recommended antennas:

Wi-Fi/Bluetooth	NFC	GNSS	Multi-port

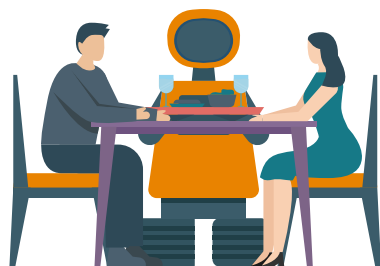Recommended connectors:

Micro coaxial connector	D-type connector	RJ45 connector

Food delivery robots

There is a need for interactive commands, stability, and shock-proof performance, as well as high power supply requirements.
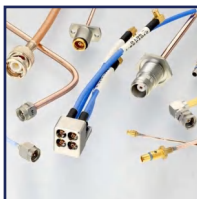
Recommended antennas:

Wi-Fi/Bluetooth	NFC

Recommended connectors:

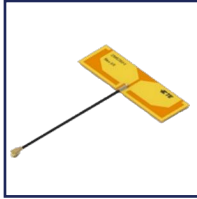|			
Micro coaxial connector	Fine pitch connector	USB Type-C	Power connector

AGV AMR

There is a need for GPS positioning for cargo records, statistics, etc., and there are requirements for the deployment environment.
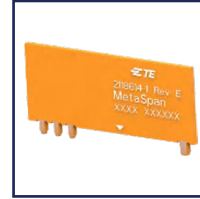
Recommended antennas:

Wi-Fi/Bluetooth	NFC	GNSS	Multi-port

Recommended connectors:

Micro coaxial connector	Fine pitch connector	USB Type-C

Customized antennas

Features

- Customize off-the-shelf antenna products based on component selection, frequencies, etc.
- Laser Direct Structuring (LDS) antennas can be designed around existing components or structures to save equipment space while providing 3D antennas with enhanced performance.
- Custom logos can be printed/embossed on antennas.

If you are looking for a customized antenna solution or expert support for your design……

Click here

Internal/Embedded antennas

Features

- Cellular, 5G NR, LPWA/mMTC, NBIoT, LTEM, LoRaWAN, Sigfox, WLAN/Wi-Fi, 2.4GHzlSM,
- Bluetooth, GNSSL1+L2+L5, UWB, etc.
- Antenna mounting methods include surface mounting, through-hole mounting, adhesive mounting and connector mounting.
- More than 300 standardized internal antenna SKUs support rapid sample testing
- Customized solutions, including high performance and small footprint solutions, are available to support your needs

Ordering information

Part Number	Description
2108921-2	Adhesive-mount FPC antenna, 6177125 MHz, for cellular, GNSS and Wi-Fi 6E networks
2118908-2	Wi-Fi 6E tri-band on-board antenna
2108783-2	Chip antenna, surface-mount, for 5G, CatM/NBIoT, ISM, LPWA, Wi-Fi, Bluetooth, cellular and Remote WAN
ANT-LTE-CER-T	Chip antenna, surface-mount, for CatM/NBIoT, LTE and cellular
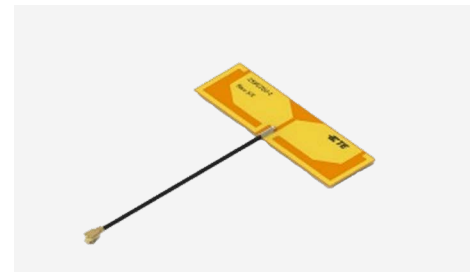
External antennas

Features

- Rod antennas, blade antennas, whip antennas, spherical antennas, panel antennas, dome antennas, Yagi-type antennas, automotive fin antennas, ceiling antennas, and many more form factors are available
- Support for cellular, Wi-Fi, Bluetooth, ISMs Lora, GNSS and many more frequencies
- High reliability: high performance, ruggedized packages that has passed extensive environmental testing
- Wide range of connector options for broad compatibility

Ordering information

Part Number	Description
ANT-W63-WRT-SMA	Flat panel antenna, tri-band, single port, 2400 - 7125 MHz
ANT-W63-SPS1-1	Flat panel antenna, single-band, single port, 2400 - 2485 MHz

Spring Finger Contacts

Features

- Used for grounding between equipment and PCB

- Provide shielding for applications within the device that may cause vibration, such as motors, speakers and microphones

- Cost-effective solution with a small footprint

Ordering information

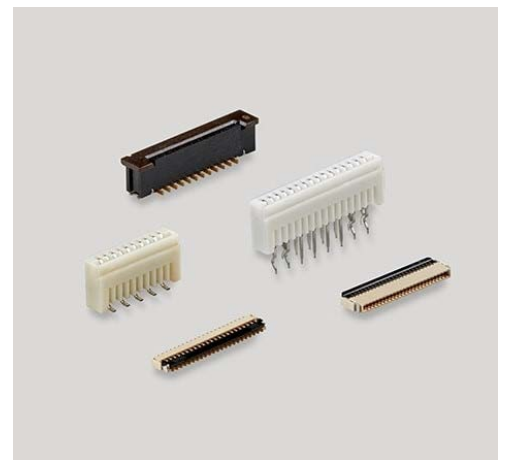| Part Number	Length
2329497-2	2.7mm
2306454-3	2.4mm
2199248-6	3.9mm
1551575-5	3.26mm

FPC connectors

Features

- Ideal for small products

- Meet the need for interconnect solutions with shorter centerline spacing

- Enable smaller form factor and lighter weight products

Ordering information

Part Number	Positions
1-2328702-0	10
2328702-4	4
2328702-8	8
1-2328724-3	13

MULTI-BEAM XL and MULTI-BEAM XLE Connectors

Features

- Highly customizable

- Blind mateable

- High current density

- High reliability

Ordering information

| Part Number	Rated Current (max.) (A)
6450503-3	42
1-6450543-4	42
3-6600330-1	42
5-6450850-0	63

Input/Output (I/O)

Features

- Helps protect connections from environmental conditions and damage due to stresses

- Heat-resistant design to reduce internal footprint and application weight

- Meet complete connection requirements

Ordering information

Part Number	Positions
5748676-1	9
5748676-3	25

Part Number	Thickness (µin)
166051-1	0.76
66504-3	30
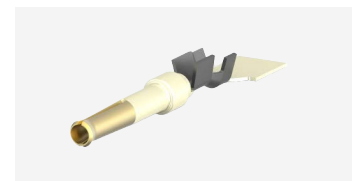
Why TE?

Throughout our long history of commitment to design engineering, we have built global manufacturing capabilities and accumulated significant strengths in areas such as materials science expertise and signal integrity analysis, which means a higher value partnership for customers. At TE, we are committed to supporting and creating value for our customers through innovative and customized solutions.

Design for the Future

TE products are designed for future technology needs and are supported by global and regional engineers to meet specific needs.

Diverse Product Solutions

We offer a broad product portfolio, including connectors, RF solutions and antennas, as well as customized solutions to meet diverse needs.

High Customization

With a wide range of product features ranging from space saving, high speed, water proof, vibration resistance, high performance to reliable connectivity, we are able to meet the highly customized needs of our customers.
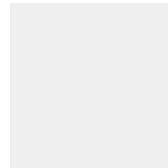
Strong Global Brand Recognition

TE is trusted by distributors and customers around the world as an outstanding supplier in the IoT antenna field.

High Quality and Reliability

With industry-leading quality and reliability, we offer a one-stop shop for shorter time-to-market and the innovative solutions.

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te.com/service-robot

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TE Technical Support Center

US:	1.800.522.6752
Canada:	1 .905.475.6222
Mexico:	52.0.55.1106.0800
Latin/South America:	54.0.11.4733.2200
Germany:	49.0.6251.133.1999
UK:	44.0.800.267666
France:	33.0.1.3420.8686
Netherlands:	31.0.73.6246.999
China:	86.0.400.820.6015
Japan:	044 844 8052