

# TECHTALK MEETS INDUSTRY4.0



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**1** Board to Board Connectivity – MA01 / AX01 Series

**2** Single Pair Ethernet

**3** Antenna

**4** KN06 Series

# BOARD TO BOARD CONNECTIVITY

*MA01/AX01-series  
(High Speed Transmission Floating  
Board-to-Board Connectors)*



- ▶ Perfect Alignment
- ▶ High Speed Data Transmission
- ▶ High Contact Reliability
- ▶ Small, Compact Design
- ▶ Multiple Mounting Options
- ▶ Wide Operation Temperature Range



[Link to the movie](#)

# Target Of HIGH Speed BtB

## AUTOMOTIVE

## HIGH SPEED

## AUTOMATION



Infotainment

ADAS ECU  
Central ECU



MCU  
HPC

Head unit Navigation



Environmentally friendly, High reliability

5G



MFP



Industrial PC



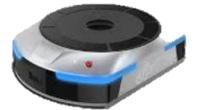
PLC



Camera



AGV



Robot



Automatic assembly, Productivity improvement

Pitch	Speed	Series	2020	2021	2022	2023	2024	2025
0.635 mm	8Gbps	AX01	Develop for industrial market		For industrial			
		MA01	Expand to automotive market		For automotive			
0.5 mm	16Gbps	MA02	High spec for next generation			High speed & power		
0.4mm or less	8Gbps	MA03	Fine pitch & High speed				For cameras	

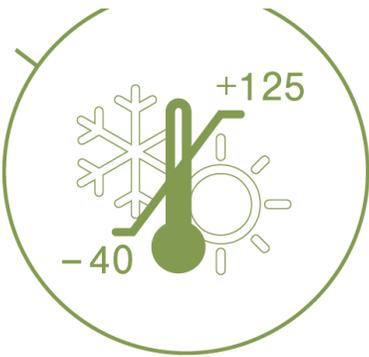
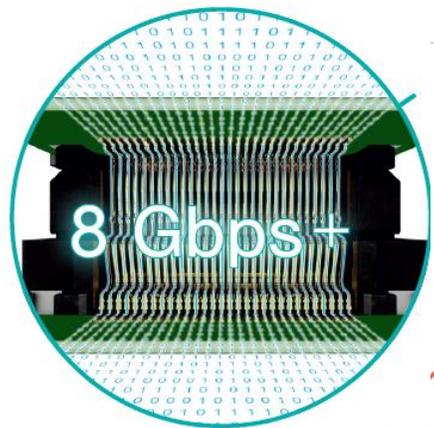
★ Under development

# MA01 / AX01 FEATURES

- ▶ Perfect Alignment
- ▶ High Speed Data Transmission
- ▶ High Contact Reliability
- ▶ Small, Compact Design
- ▶ Multiple Mounting Options
- ▶ Wide Operation Temperature Range

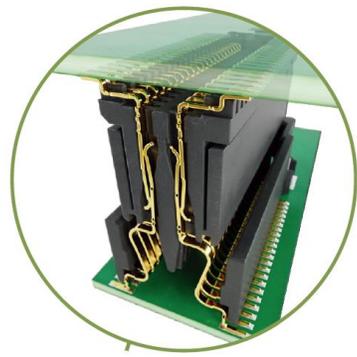
## HIGH SPEED DATA TRANSMISSION

- High data rate transmission: 8 Gbps+
- Equivalent to 10GBASE-KR, PCIe Gen3



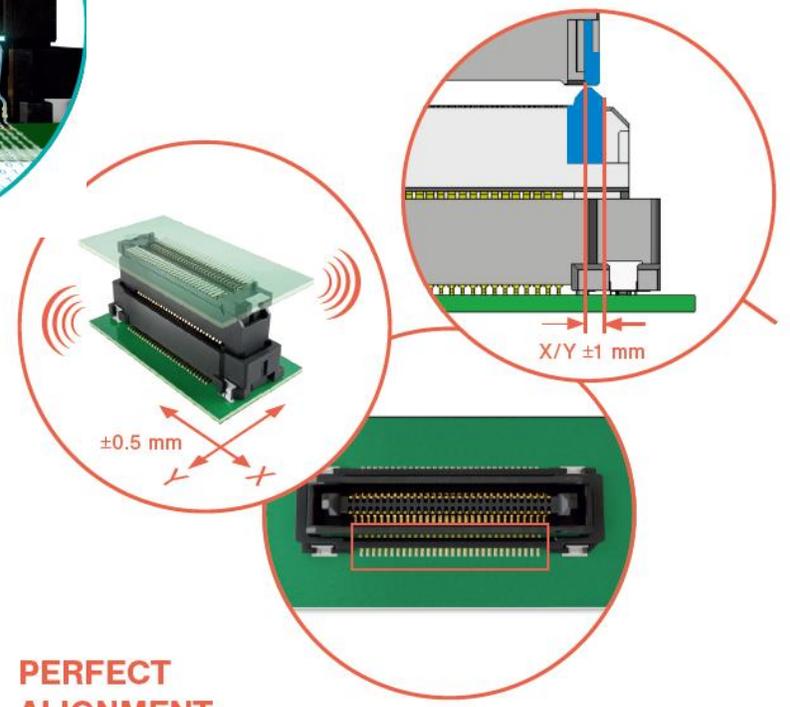
## WIDE OPERATION TEMPERATURE RANGE

- -40 °C to +125 °C
- Tailored to automotive market requirements



## HIGH CONTACT RELIABILITY

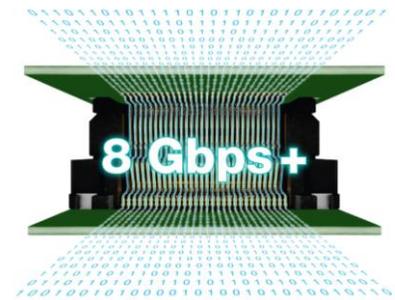
- Double contact structure
- Rolled surface connection (lower insertion force, higher wear resistance)



## PERFECT ALIGNMENT

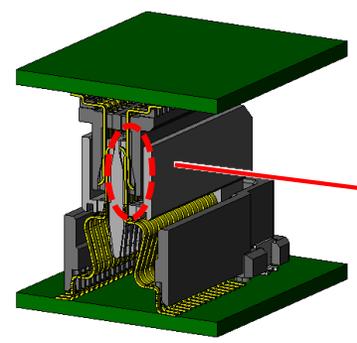
- Effective floating range: X/Y ±0.5 mm movable
- Special mating guide construction (X/Y ±1 mm) prevents misalignment at PCB assembly
- Easy fitting during manual assembly due to special guiding form
- Excellent optical controllability and a production friendly structure: JAE connectors have visible SMT contacts

## High-speed transmission, floating board-to-board connector

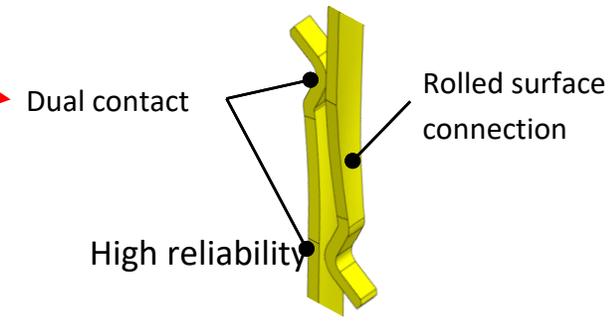


Next generation data transfer  
PCIe Gen3 8Gbps  
PCIe Gen4 16Gbps . . . . .

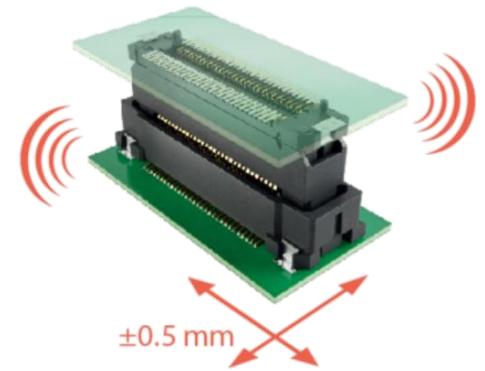
### Dual Contact



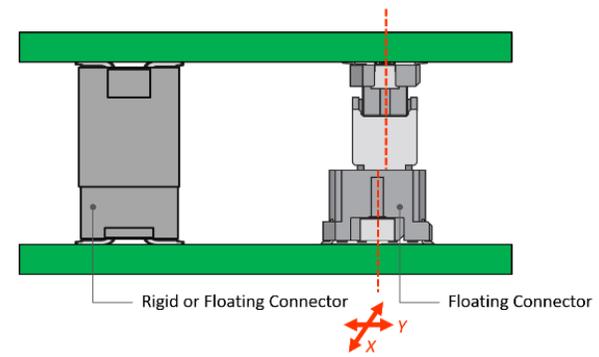
Stubless 2-spring system allows high reliability and low insertion force



### Floating Function

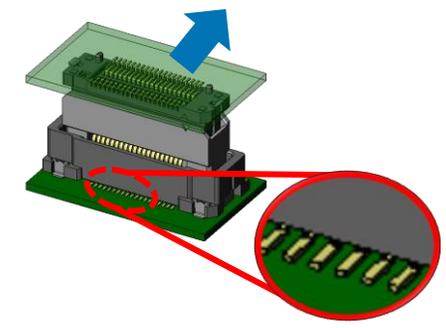


#### Absorbs Misalignment



Automated assembly and mating

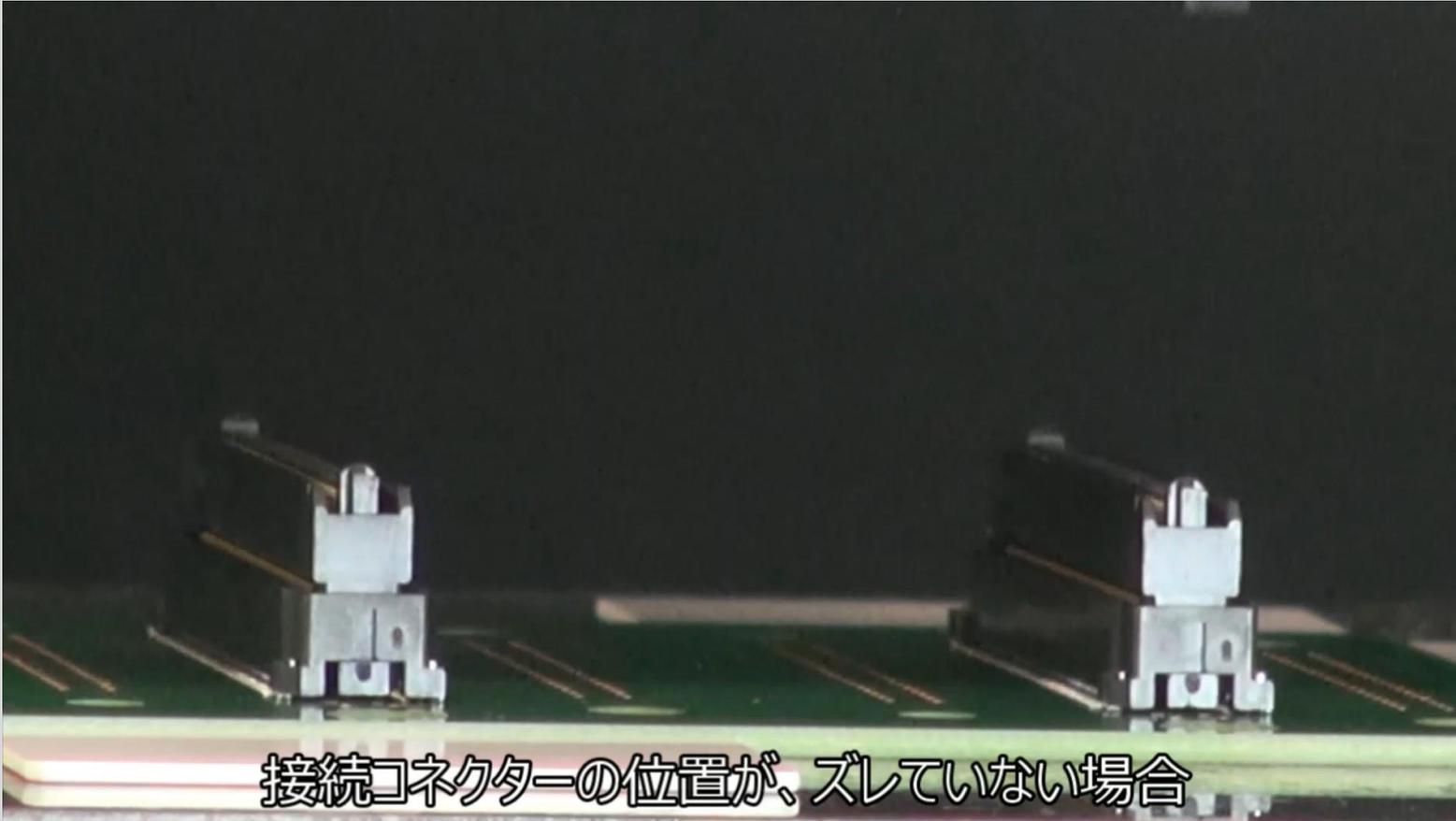
#### Reduced stress on SMT



Long product life



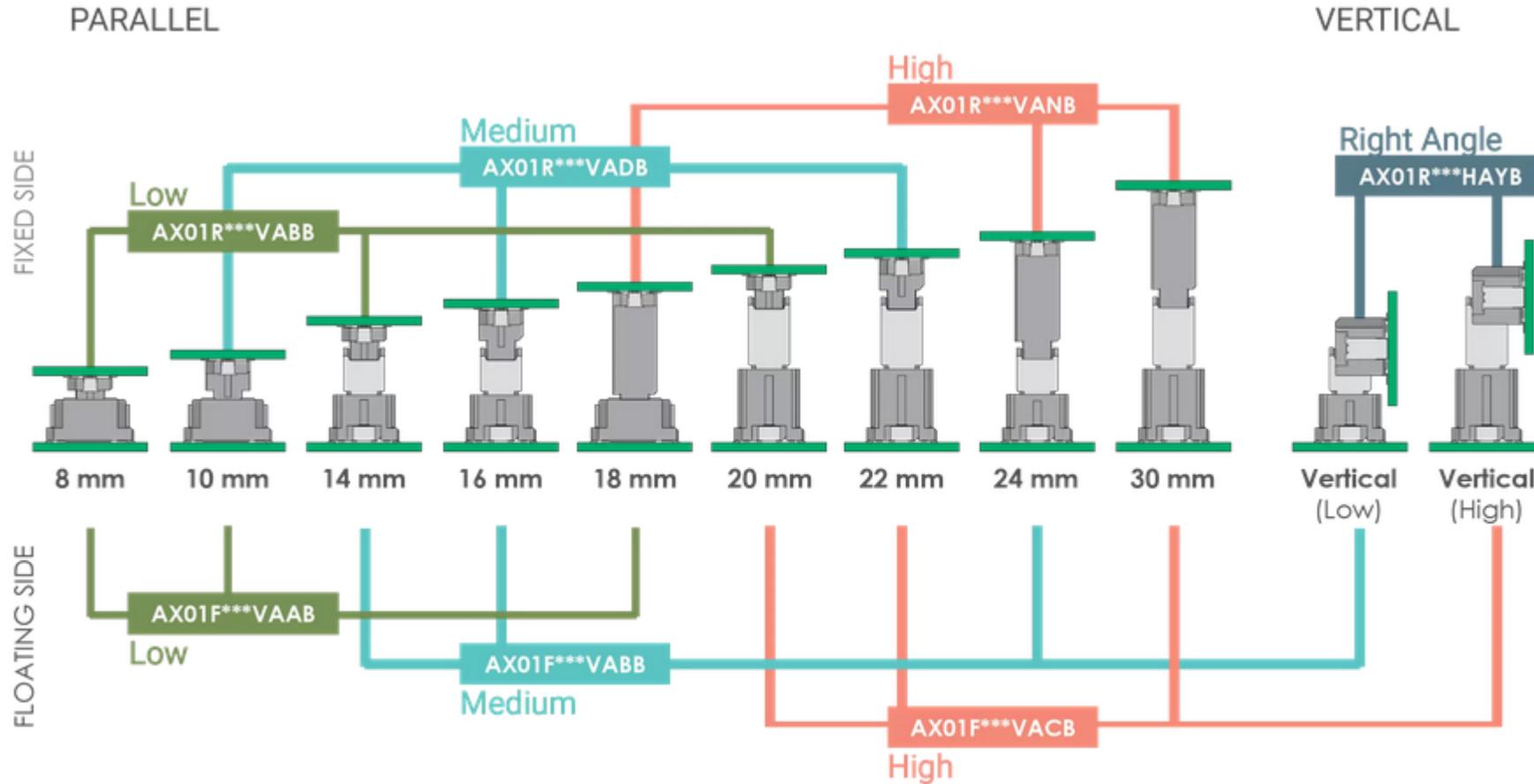
フローティング機構により  
ラフな位置決めでも嵌合できます。



# MA01 / AX01 SERIES HIGH SPEED BTB

GEU22-019

10



\*Tolerance in stacking height between PCBs:  $\pm 0.5$  mm in Z axis

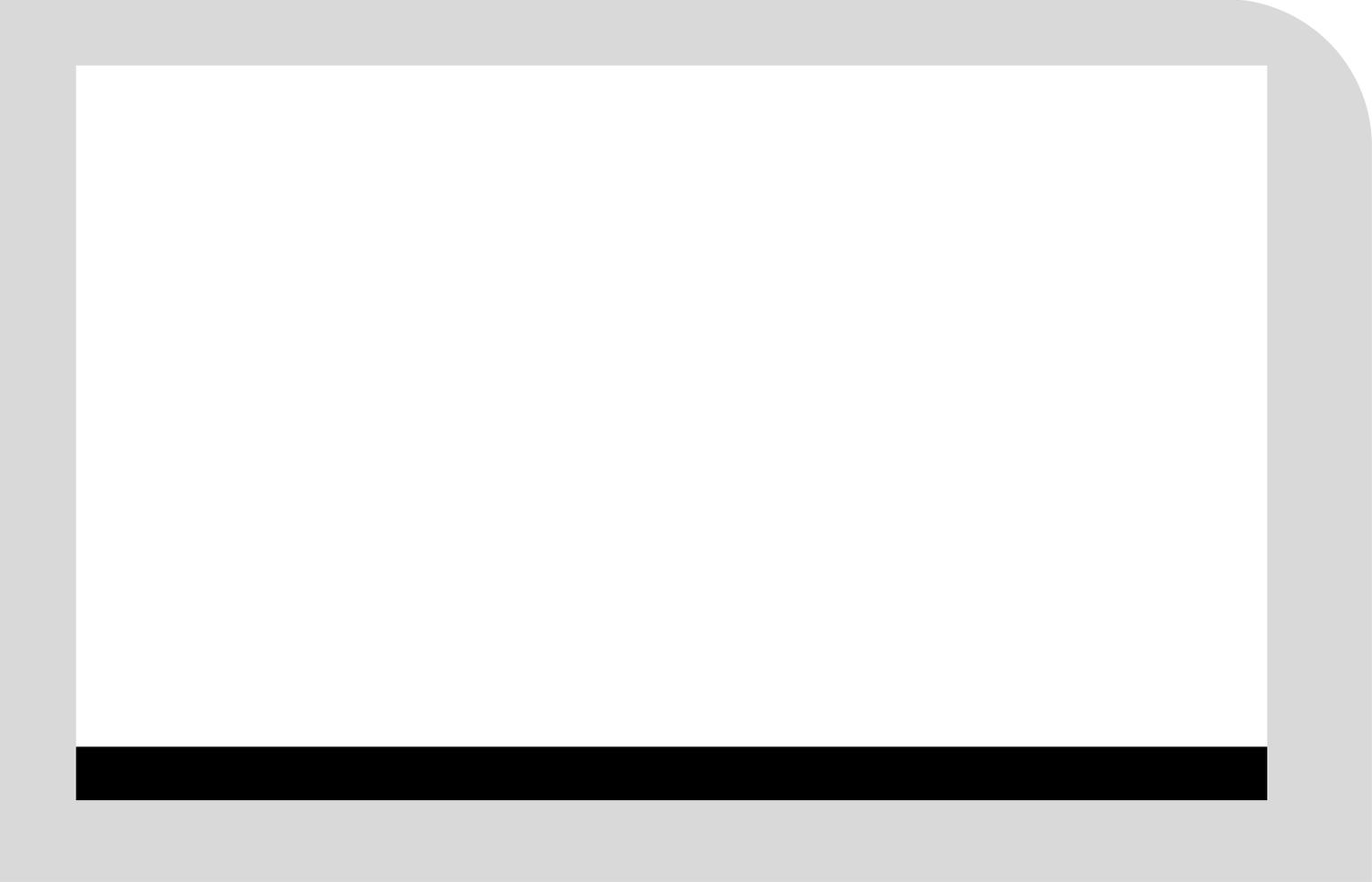
[Click here for more Info](#)



# SINGLE PAIR ETHERNET



[Link to the movie](#)

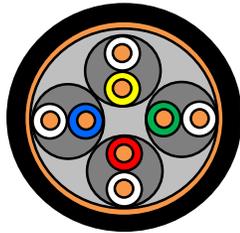


[More About JAE's Commitment within SPE](#)

A technology that enables Ethernet communication with one pair instead of the conventional two or four pairs.  
Since data and power can be transmitted on a single pair of wires, it is attracting attention as a new type of sensor network.

## Comparison with normal Ethernet

Standard Ethernet



- ▶ 4 pairs (8 pins)
- ▶ RJ45 (IEC-60603-7 compliant)
- ▶ PoE support (simultaneous supply of signal and power)
- ▶ Transmission speed; 100Mbps to 10Gbps
- ▶ Maximum transmission distance; 100m

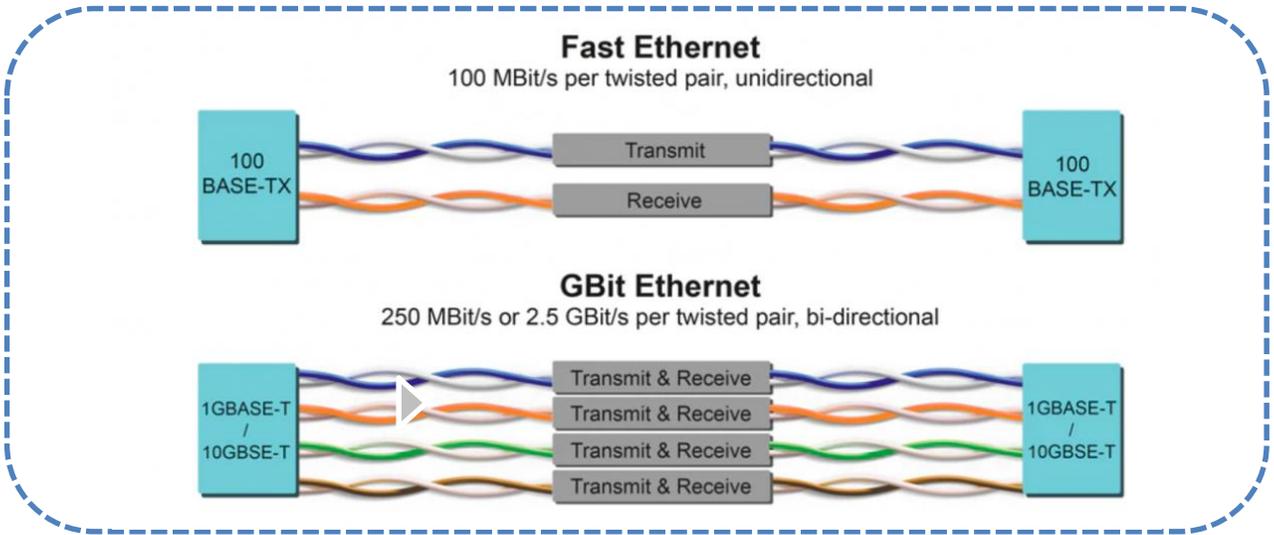


- ▶ 1 pair (2 pins)
- ▶ NEW I/O (IEC-63171 compliant)
- ▶ PoDL support (simultaneous supply of signal and power)
- ▶ Transmission speed; 100Mbps to 1Gbps
- ▶ Maximum transmission distance; 100m



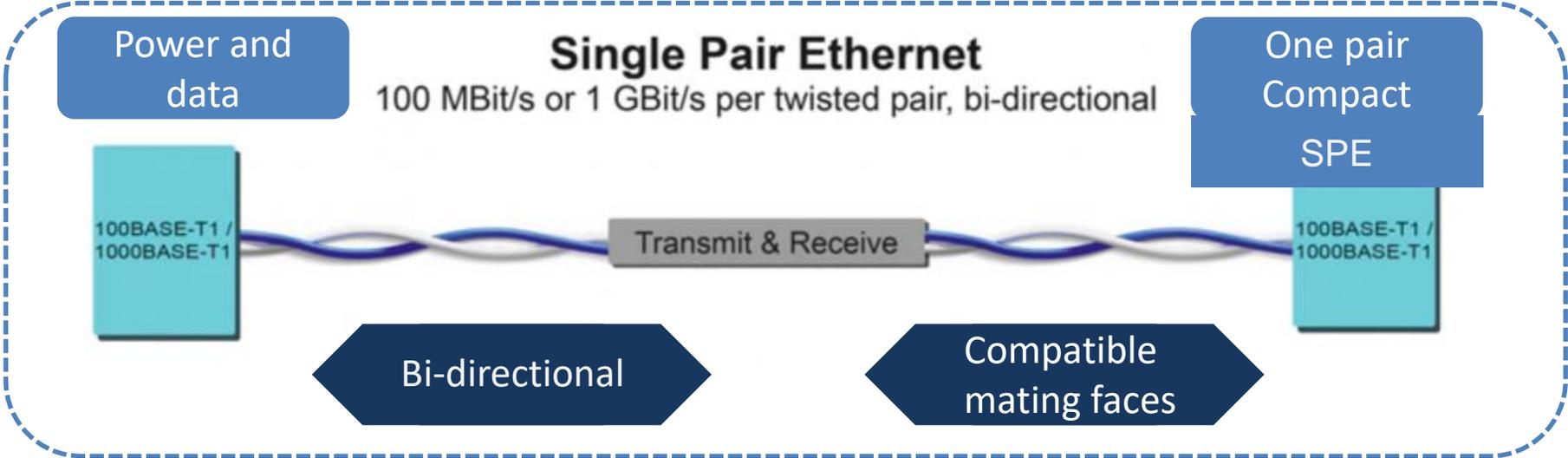
Single Pair Ethernet

# SPE MARKETS AND THE IEC 63171-6 STANDARD



## Possible Applications

- ▶ Intra-panel wiring
- ▶ Field machine wiring
- ▶ Wiring between devices
- ▶ Machine vision
- ▶ Sensors

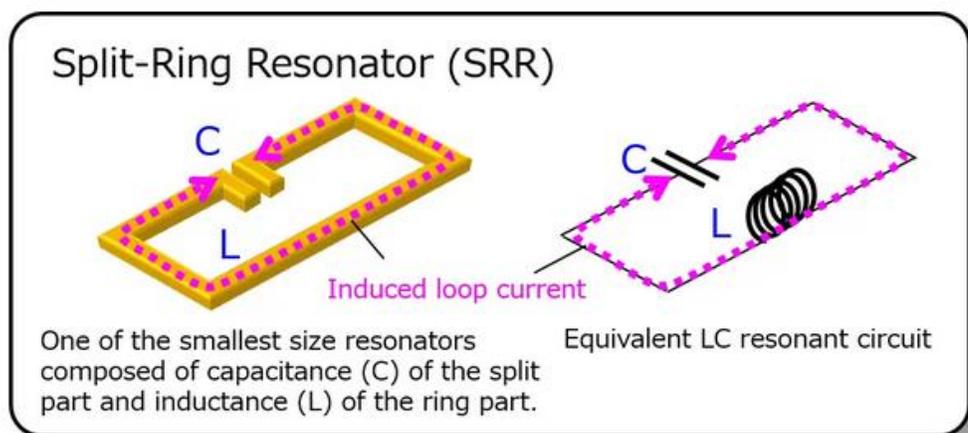




# ANTENNA

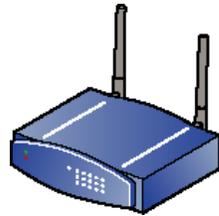


JAE's compact antennas use the Split-Ring Resonator (SRR) technology, which is a basic structure of metamaterials.

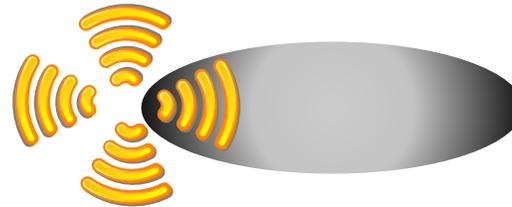


The equivalent circuit of the SRR is an LC resonant circuit, with the split part as a capacitor (C) and the ring part as an inductor (L). Since the characteristic frequency of the antenna is the resonant frequency of this LC resonant circuit, the SRR is less susceptible to the influence of peripheral components when it is embedded in a device, and stable antenna performance can be achieved. By optimizing the shape of the antenna using this SRR through the precision processing technology of JAE, we have realized a compact antenna (\*) with high efficiency and near omnidirectional radiation characteristics as an easy-to-handle surface mount component.\* Patent pending

Too large to stick out of the device / Small but poor antenna performance



The signal cannot reach in a certain direction, creating blind spots.



Complicated manual installation, loss of goods



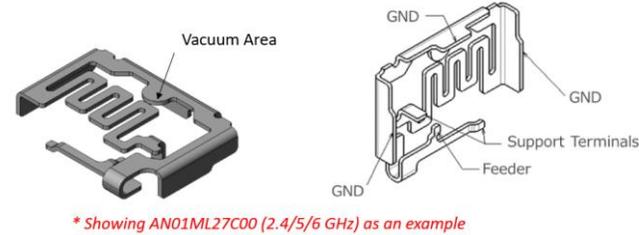
When attached to a real device, the antenna performance will be degraded.

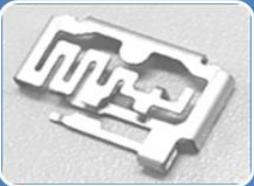


**JAE's antennas help to overcome these challenges**



- ▶ Small size metal antenna
- ▶ Robust performance
- ▶ Highly efficient & Omni-directional radiation
- ▶ Supports automatic mounting
- ▶ Freedom of placement, Small keep-out area
- ▶ Automotive grade is available for vibration-rich environment

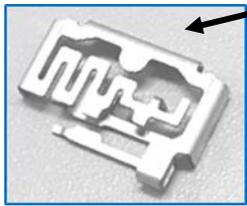


	<b>2.4 GHz</b> <ul style="list-style-type: none"><li>• Keyless Entry (smart key)</li><li>• Electronic Shelf Label</li><li>• In-building Phone</li></ul>	
	<b>2.4 &amp; 5GHz</b> <ul style="list-style-type: none"><li>• Wi-Fi equipment (e.g. routers)</li><li>• Display Audio for Automotive</li><li>• TCU (Telematics Control Unit)</li></ul>	
	<b>920 MHz</b> <ul style="list-style-type: none"><li>• Smart Meters (Electricity, Gas, Water)</li><li>• Electronic Shelf Label</li><li>• IoT Devices</li></ul>	



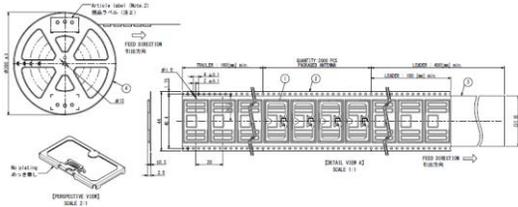
- ◆ High Performance and efficient installation
- ◆ Freedom of placement on PCB, small prohibited area

## Automated Mounting



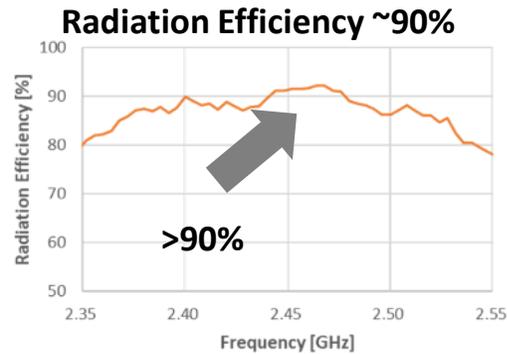
Vacuum area

## Embossed Reel Packaging

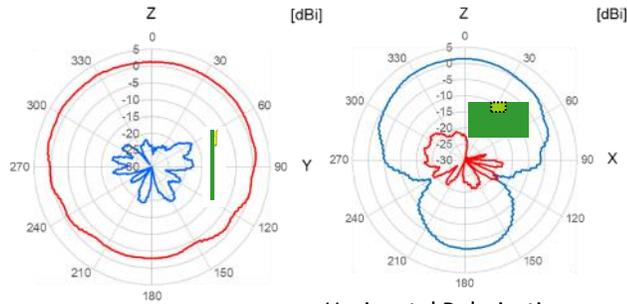


Automotive compatible version is available for 2.4,2.4&5GHz type

## High Efficiency, Near Omni-Directional Radiation Pattern



## Omni Directional Radiation

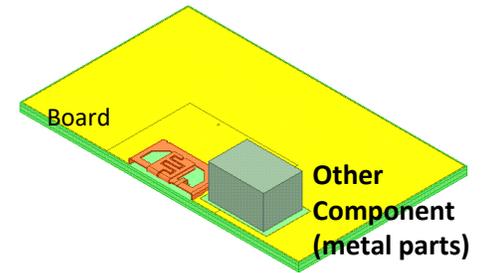


— Horizontal Polarization  
— Vertical Polarization

at 2.45GHz

## Freedom of Placement

Other components can be placed near the antenna



\*Within 1mm distance from the antenna is prohibited area

Area suitable for mounting AN01 antenna



Highly efficient except for mounting at corners

# AN01 SERIES LINEUP

GEU22-019

20



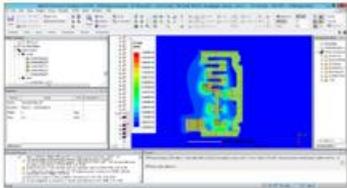
P/N	Supported Band	Product Image	H (mm)	W (mm)	D (mm)
AN01ML27C00	2.4+5+6GHz		2	13	10.15
AN01DL25C00	2.4+5GHz		2	13	8.8
AN012400C00	2.4GHz		1.9	12.5	7.25
AN010920C00	920MHz		1.9	30	16.9
AN010860x00	860MHz		1.9	30	16.9

▶ Please check [online](#) for the latest lineup

## Total support in the simulation, the measurement and the proposal

- Measurement of the antenna enclosed in customer's chassis
- Anechoic chamber and reverberation chamber available at JAE-Akishima
- Proposal of antenna installation method and antenna structure
- Also support customization such as LTE 5G

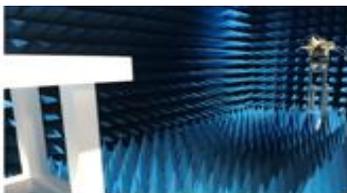
### Antenna Design: Electromagnetic Simulation



### Frequency Characteristics: RF Network Analyzer



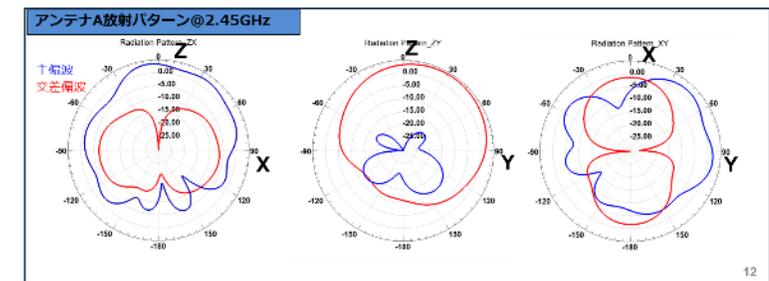
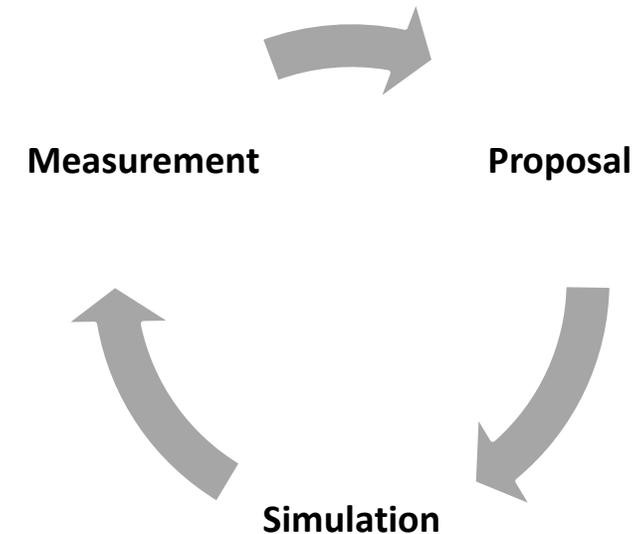
### Radiation Pattern: Anechoic Chamber 7.5x4.0x3.5m



### Radiation Efficiency: Reverberation Chamber



Bluetest RTS65  
640MHz~6GHz





# KN06 SERIES

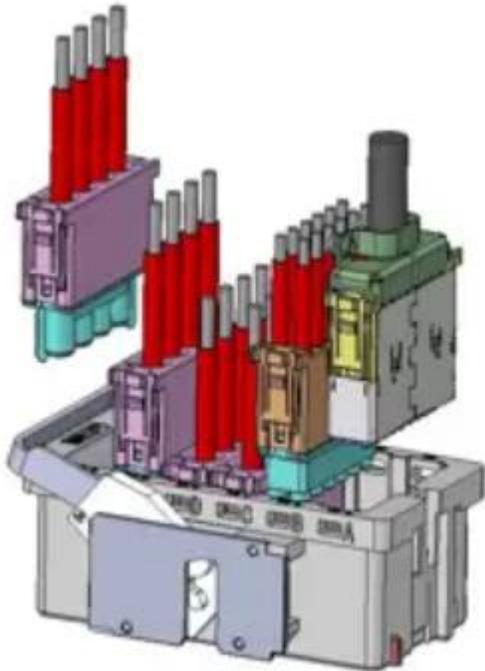


# KN SERIES LINEUP

	KN01L Large Size	KN06L Large Size	KN01M Medium Size	KN02S Small Size
<b>Ingress Protection</b>	IP67	Non- Waterproof	IP67	Non-waterproof
<b>Number of Modules</b>	6	6	4	2
<b>Module Variation</b>	30A Class x 4 positions 23A Class x 12 positions 3A Class x18 positions, 50 positions 2A Class x 42 positions		16A Class x 16 positions 3A Class x 16 positions	13A Class x 8 positions +4A Class x 4 positions 2A Class x 30 positions
<b>Signal Module With Shield</b>	3A Class x 18 positions		3A Class x 14 positions	4A Class x 16 positions 2A Class x 16 positions
<b>Outer Shell</b>	Aluminum die cast	Plastic	Aluminum die cast	Plastic + Ni plating
<b>Locking Type</b>	Lever operation rack and pinion	Lever operation rack and pinion	Lever operation rack and pinion	One-touch
<b>Flange Dimensions of Panel mounting (in mm)</b>	72.5 x 103	71 x 103	66.4 x 74.5	44 x 54
<b>Connector Image</b>				



Capable of multi-pole, single-engagement of up to 6 modules (300 positions), using a lever locking method



1

Multi-pole, single-engagement operation, lever engagement

2

Plastic outer shell for weight reduction

3

Capable of housing up to six modular insulator blocks for various combinations (Shared insulator blocks with KN01L Series)

4

Lever remains in engagement initiation position while unmated, and provides tactile click when completely mated

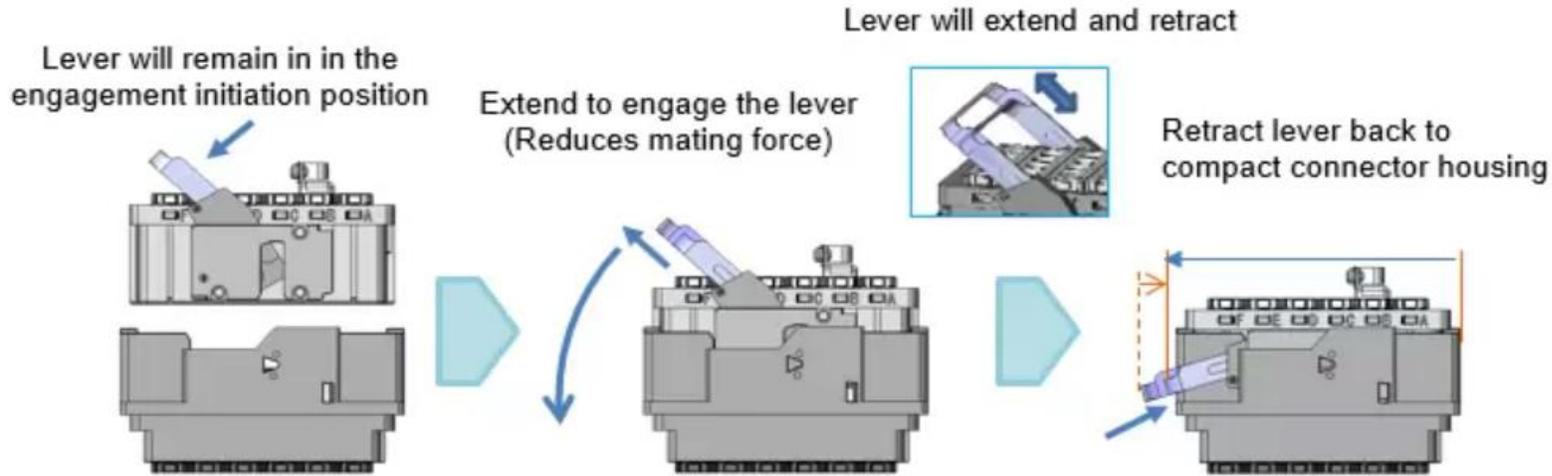
5

Extendable lever structure for ease of mating and retract for connector compactness

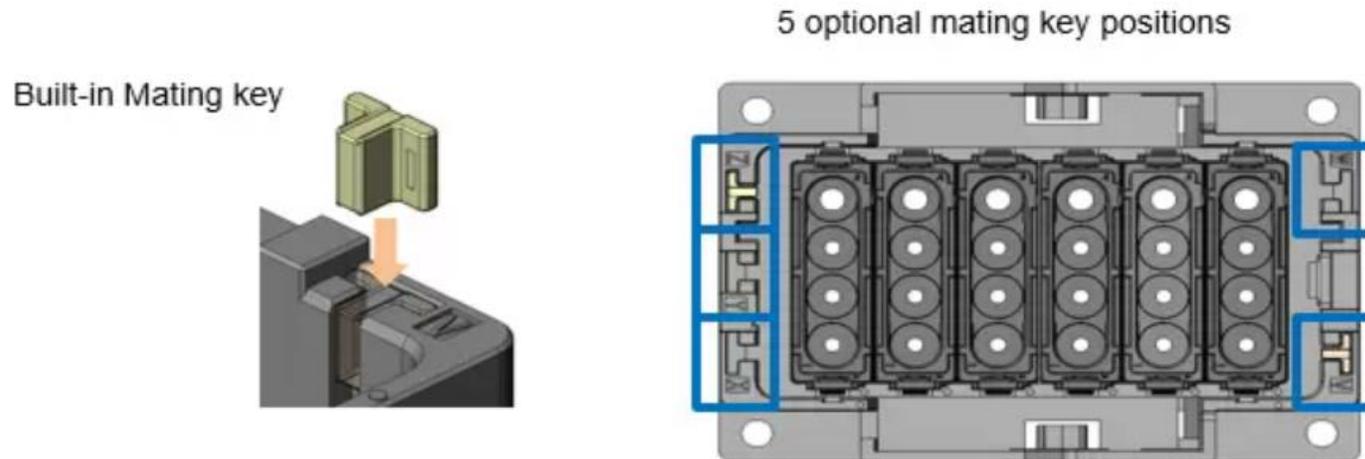
6

Built-in mating key provides up to 32 positions of mis-mating prevention options

## Excellent lever design structure enables easy mating



## Built-in mating key to customize key positioning





***Thank you!***