

# TECHTALK

## *Rutronik*

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**Dr. Levon Altunyan, Product and Marketing Manager**  
**05.07.2022**



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

**2** JL10 Series ▶

**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






# Target Of HIGH Speed BtB


## AUTOMOTIVE

## HIGH SPEED


## AUTOMATION



Infotainment



MCU  
HPC



Head unit Navigation

ADAS ECU  
Central ECU



5G



Industrial PC



MFP



PLC



Robot



Camera



AGV

Environmentally friendly, High reliability

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

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

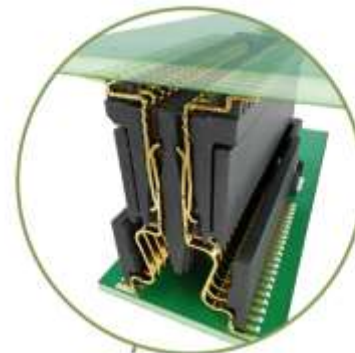
## HIGH SPEED DATA TRANSMISSION

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



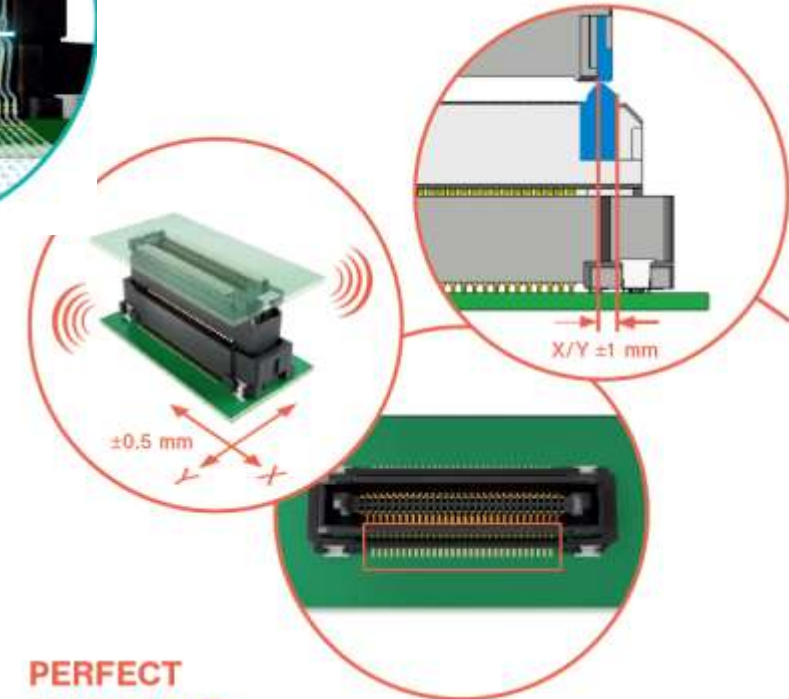
## WIDE OPERATION TEMPERATURE RANGE

- -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

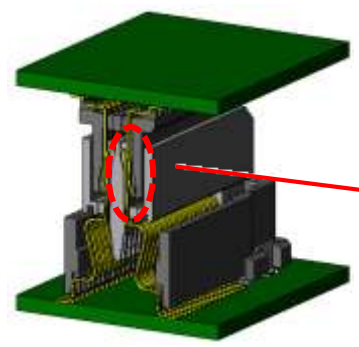
- Effective floating range: X/Y ±0.5 mm movable
- Special mating guide construction (X/Y ±1 mm) prevents misalignment at PCB assembly
- Easy fitting during manual assembly due to special guiding form
- Excellent optical controllability and a production friendly structure: JAE connectors have visible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

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

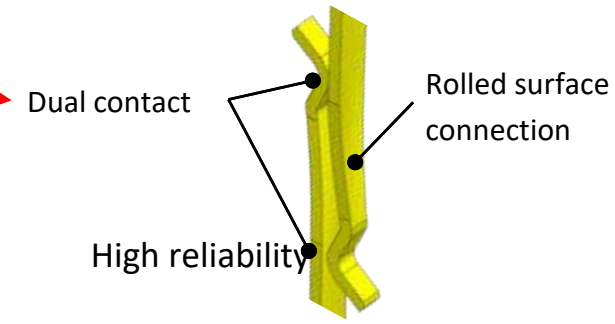


Next generation data transfer  
PCIe Gen3 8Gbps  
PCIe Gen4 16Gbps . . . . .

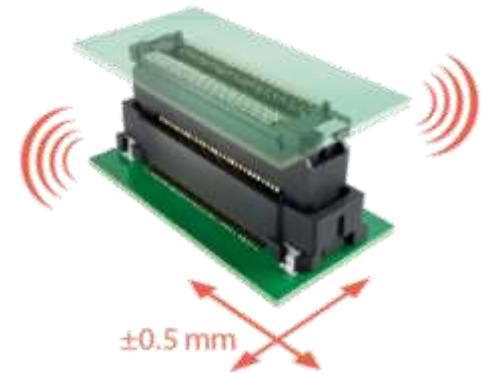
### Dual Contact



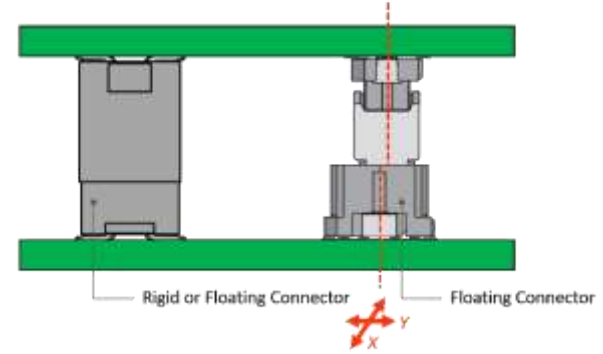
Stubless 2-spring system allows high reliability and low insertion force



### Floating Function

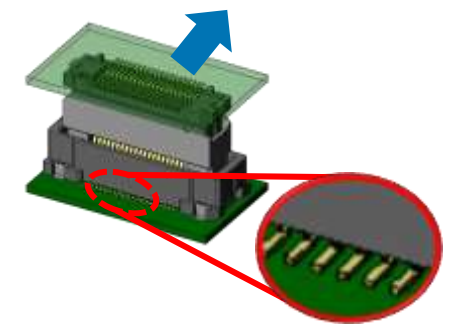


Absorbs Misalignment



Automated assembly and mating

Reduced stress on SMT



Long product life



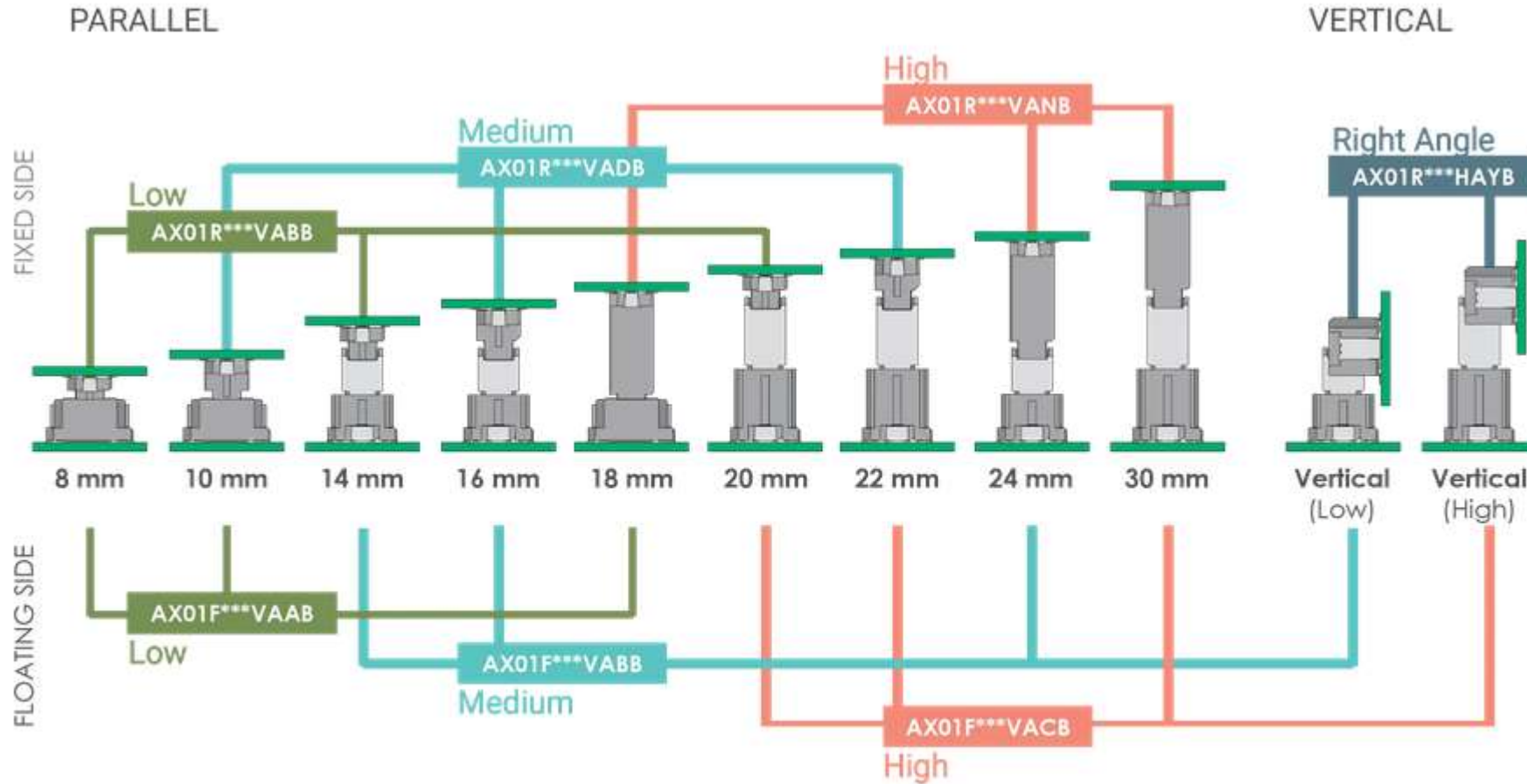
フローティング機構により  
ラフな位置決めでも嵌合できます。







# MA01 / AX01 SERIES HIGH SPEED BTB



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

[Click here for more Info](#)



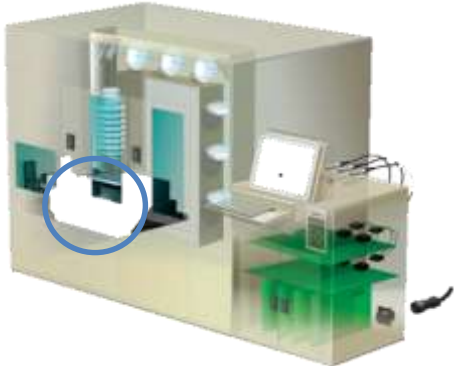


# JL10 SERIES

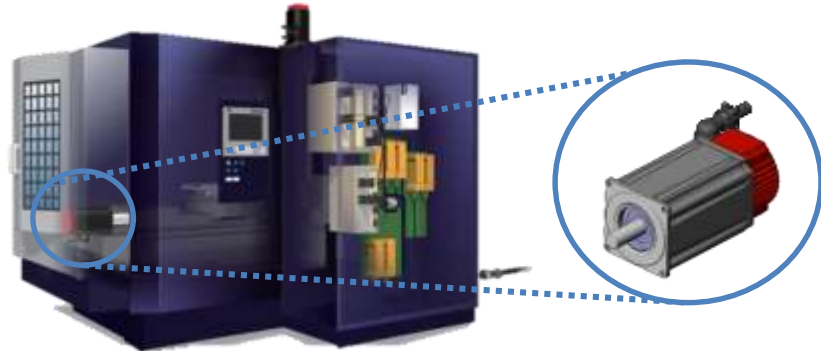
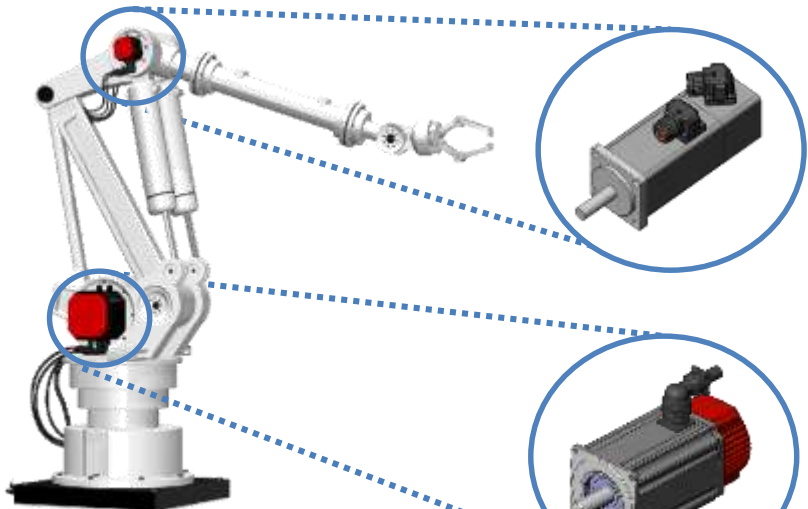
*One-touch/ Screw Mating Compatible Circular  
Waterproof Connector*



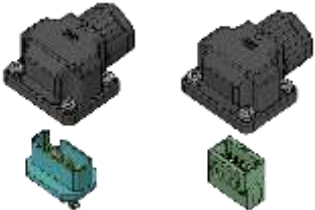
Renowned customers using JL10 for servo motors



- ▶ Semicon. Manufacturing Equipment
- ▶ LCD Manufacturing Equipment (Feeder)



### Small Servo Motor JN14 (Low Profile)



### Mid, Big Servo Motor JL10 (Circular)



### JL04 V (Circular)

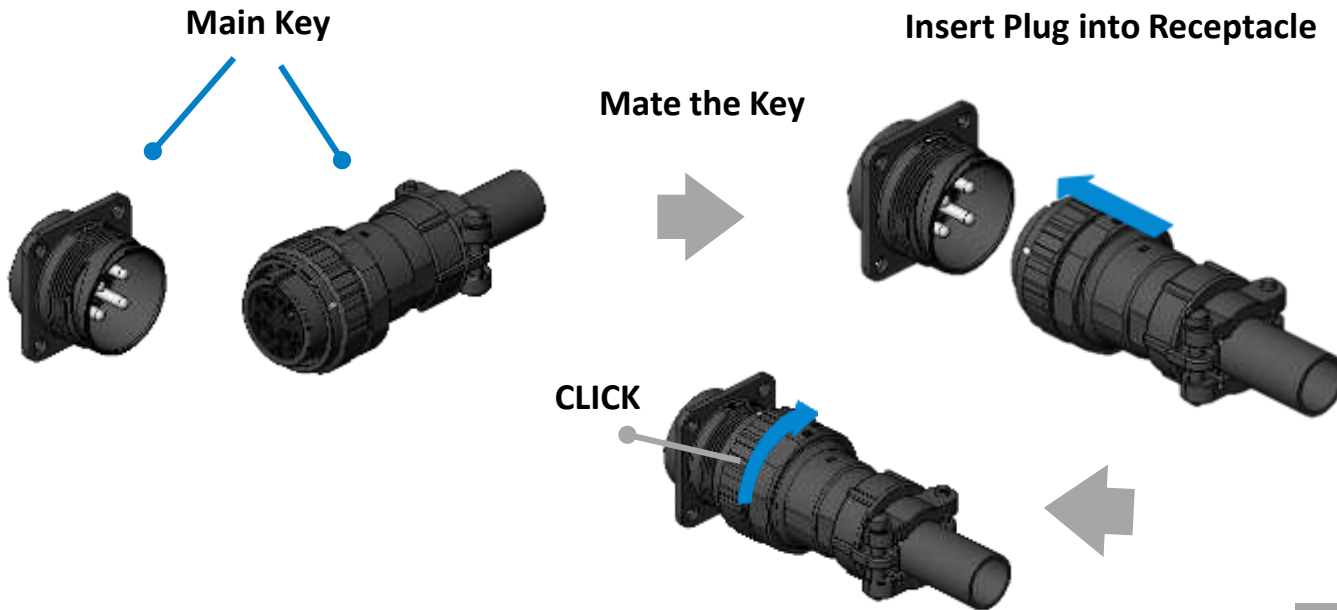


### JN1/JN2 ((Circular)





## JL10 Connector



Items	Duration	
	Screw Lock MS Connector	JL10
Mating (Manual)	15 sec.	3 sec.
Tightening (Plier)	20 sec.	0
Marking (White Mark)	5 sec.	0
<b>Total</b>	<b>40 sec.</b>	<b>3 sec.</b>

### Advantages of Locked with One Touch:

- ▶ Time Saving
- ▶ Torque Management not Needed
- ▶ Obvious Click Feeling & Sound in High /
- ▶ Limited Space

One touch lock is a firm lock that does not require torque management and it is time-saving

## MIL Spec. MS Connector



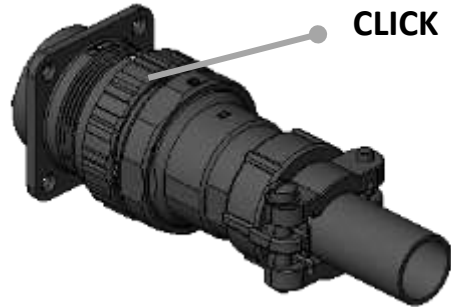
Screw Lock (Time Consuming)  
Torque management is difficult



Mating is difficult in higher/limited space

# FEATURES - ONE TOUCH LOCK

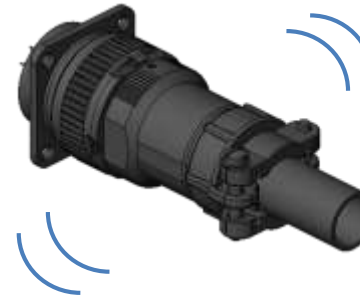
## JL10 Connector



- ▶ Not to get loose or fall off by firm lock
- ▶ Reject any foreign material
- ▶ Dust/water-proof (IP67) when mated

Half Mating is prevented by the firm one-touch lock with additional features (Vibration, Dust and Water Proof)

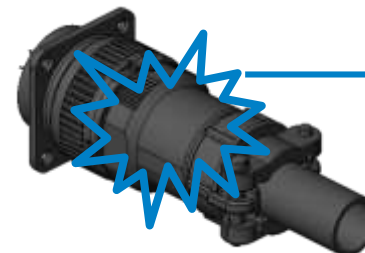
## MIL Spec. MS Connector



Screw lock might get loose or fall off by vibration



When screw is half mated, there might be short circuit due to water or oil ingress

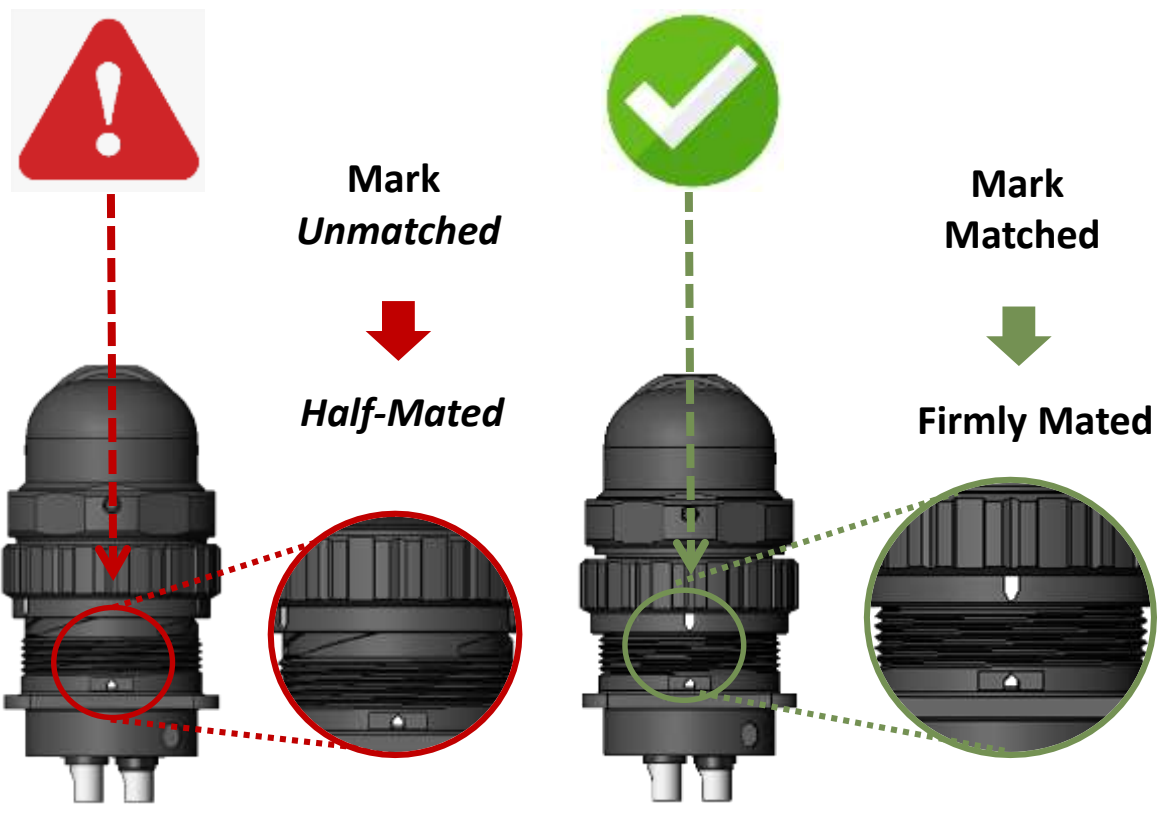


Short Circuit

# FEATURES – CONNECTOR MATING MARK (WHITE)

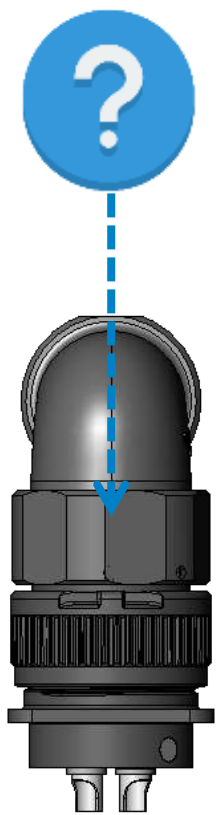
JL10 Connector

MIL Spec. MS Connector



Easy Half Mated Detection

Easy Mating Check

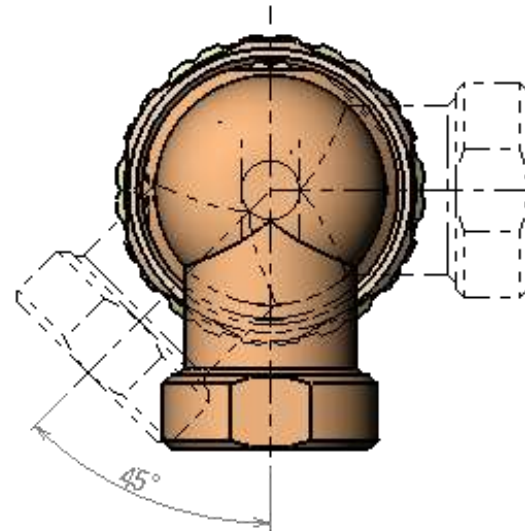
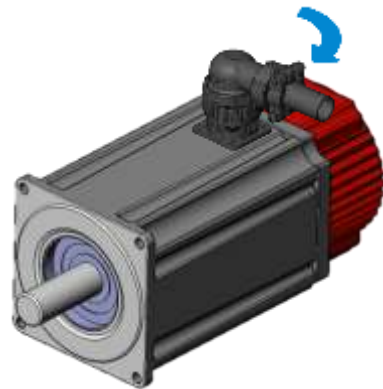


Unable to check visually if screw is tightened firmly

Mating and locking can be visually checked



**Flexible cabling direction allows the end-bell assembly position to be changed**



**Cabling Direction  
8 directions in every 45 degree**

**Flexible layout with multiple cable directions**





# COMPAIRSON BETWEEN JAE AND COMPETITOR'S CONNECTOR

GEU22-058  
20



Same dimension with MIL-DTL-5015 Connector + Two Way Mating

Same Panel Dimension with Conventional  
MIL Spec. Connector ⇒ Drop-in Replacement

**JL10 Receptacle Connector Receptacle**

**JL10 Plug Spec. MS Connector Plug**



Drop-in replacement from  
existing receptacle allows easy  
upgrade to one-touch lock

# VARIATIONS – CONTACT ARRAY VARIATION

Item	18-10	20-4	20-18		20-29
Contact Array					
Pin	#12 x 4 pins	#12 x 4 pins	#12 x 3 pins	#16 x 6 pins	#16 x 17 pins
Rated	23A; 250VAC	23A; 250VAC	23A; 250VAC	13A; 100VAC	13A; 500VAC
Item	22-22	22-14	24-11		32-17
Contact Array					
Pin	#8 x 4 pins	#16 x 19 pins	#8 x 3 pins	#12 x 6 pins	#4 x 4 pins
Rated	46A/ 57A*; 250VAC	13A; 500VAC	46A; 250VAC	23A; 500VAC	80A; 250VAC

\* Array 22-22 + Cables with 8mm<sup>2</sup> or 10mm<sup>2</sup>

A wide range of variations available for servo motors

# VARIATIONS - CONTACT ARRAY VARIATION

Items	28-11		28-21
Contact Array			
Pin	#12 x 4 pins	#16 x 18 pins	#16 x 37 pins
Rated	23A; 250VAC	13A; 250VAC	13A; 500VAC

Items	18-A6 (NEW)		22-A6 (NEW)	
Contact Array				
Pin	#12 x 4 pins	#20 x 2 pins	#8 x 4 pins	#20 x 2 pins
Rated	23A; 250VAC	1A; 48VAC	46A; 250VAC	1A; 48VAC

28 size is for CNC having reverse pin arrangement

Combination		Mating	Dust / Water Proof
Receptacle	Plug		
MS 	JL10 	-	-
MS 	MS 		-
JL10 	MS 		-
JL10 	JL10 	 One Touch	 IP67

*\*JL10 plug cannot be mated with MS receptacle*

*Reason: No Thread for One Touch Lock in MS Receptacle*

JL10 receptacle and plug are dust / water-proof



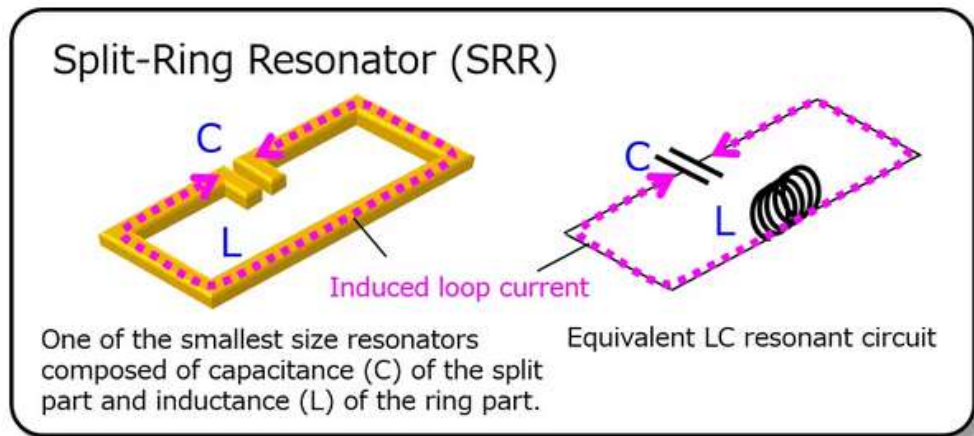




# ANTENNA

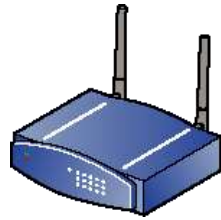


JAE's compact antennas use the Split-Ring Resonator (SRR) technology, which is a basic structure of metamaterials.

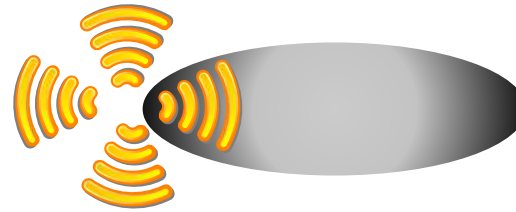


The equivalent circuit of the SRR is an LC resonant circuit, with the split part as a capacitor (C) and the ring part as an inductor (L). Since the characteristic frequency of the antenna is the resonant frequency of this LC resonant circuit, the SRR is less susceptible to the influence of peripheral 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



\* Showing AN01ML27C00 (2.4/5/6 GHz) as an example

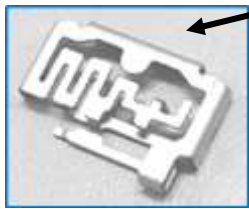
	<b>2.4 GHz</b> <ul style="list-style-type: none"><li>• Keyless Entry (smart key)</li><li>• Electronic Shelf Label</li><li>• In-building Phone</li></ul>	
	<b>2.4 &amp; 5GHz</b> <ul style="list-style-type: none"><li>• Wi-Fi equipment (e.g. routers)</li><li>• Display Audio for Automotive</li><li>• TCU (Telematics 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>	





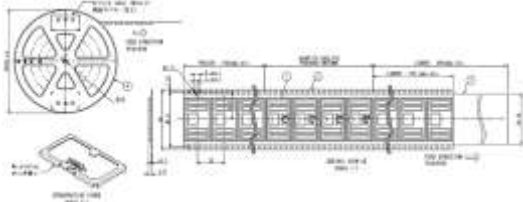
- ◆ High Performance and efficient installation
- ◆ Freedom of placement on PCB, small prohibited area

## Automated Mounting



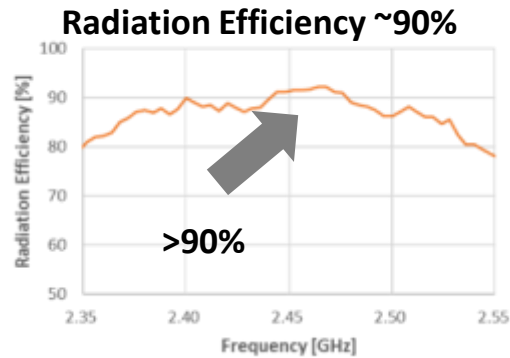
Vacuum area

## Embossed Reel Packaging

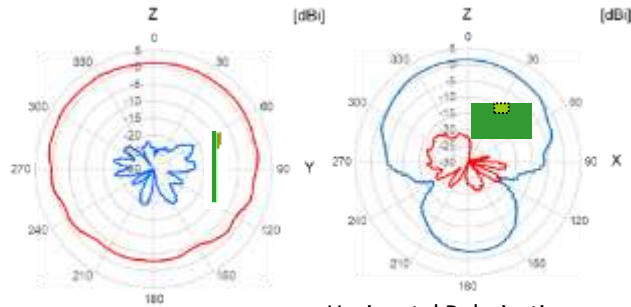


Automotive compatible version is available for 2.4,2.4&5GHz type

## High Efficiency, Near Omni-Directional Radiation Pattern



## Omni Directional Radiation

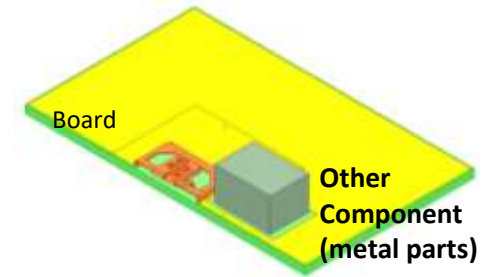


— Horizontal Polarization  
— Vertical Polarization

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

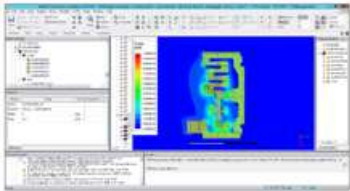
P/N	Supported Band	Product Image	H (mm)	W (mm)	D (mm)
AN01ML27C00	2.4+5+6GHz		2	13	10.15
AN01DL25C00	2.4+5GHz		2	13	8.8
AN012400C00	2.4GHz		1.9	12.5	7.25
AN010920C00	920MHz		1.9	30	16.9
AN010860x00	860MHz		1.9	30	16.9

▶ 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

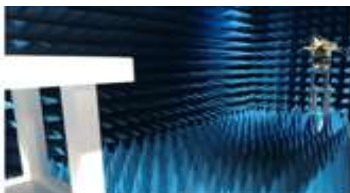
### Antenna Design: Electromagnetic Simulation



### Frequency Characteristics: RF Network Analyzer



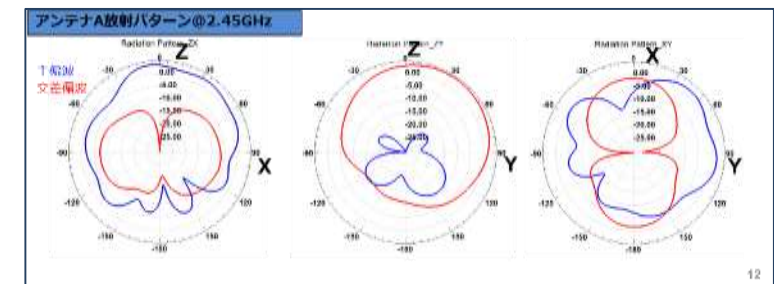
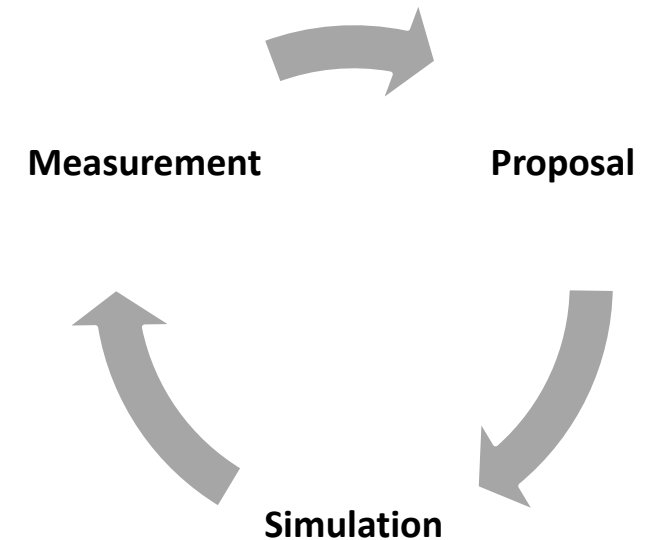
### Radiation Pattern: Anechoic Chamber 7.5x4.0x3.5m



### 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

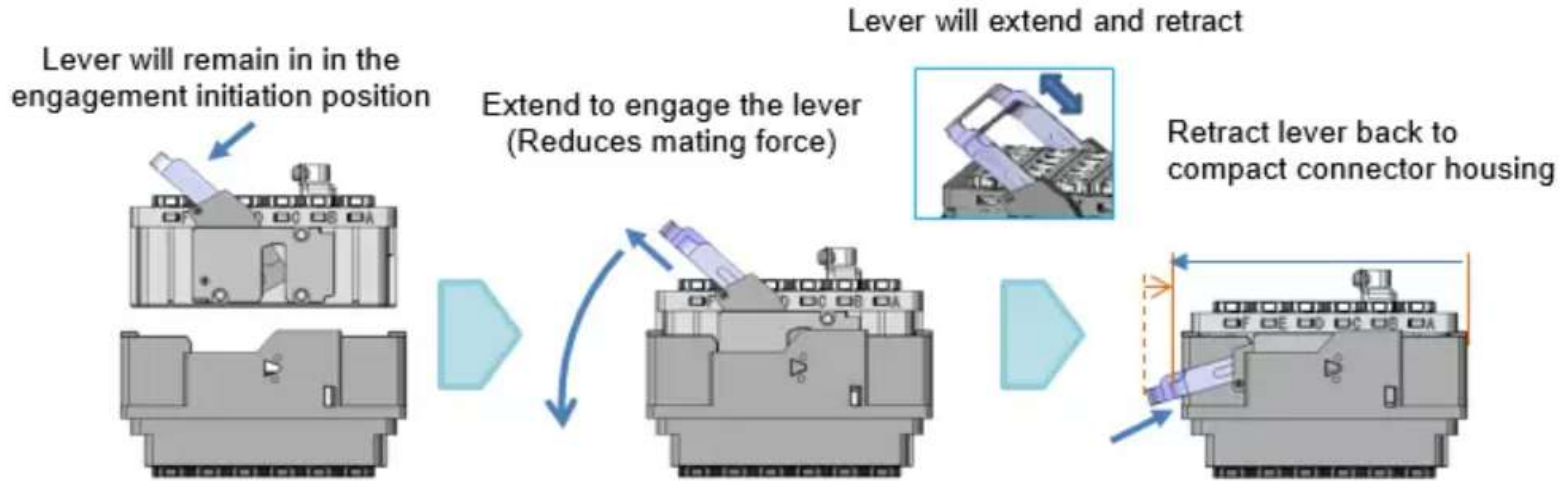
5

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

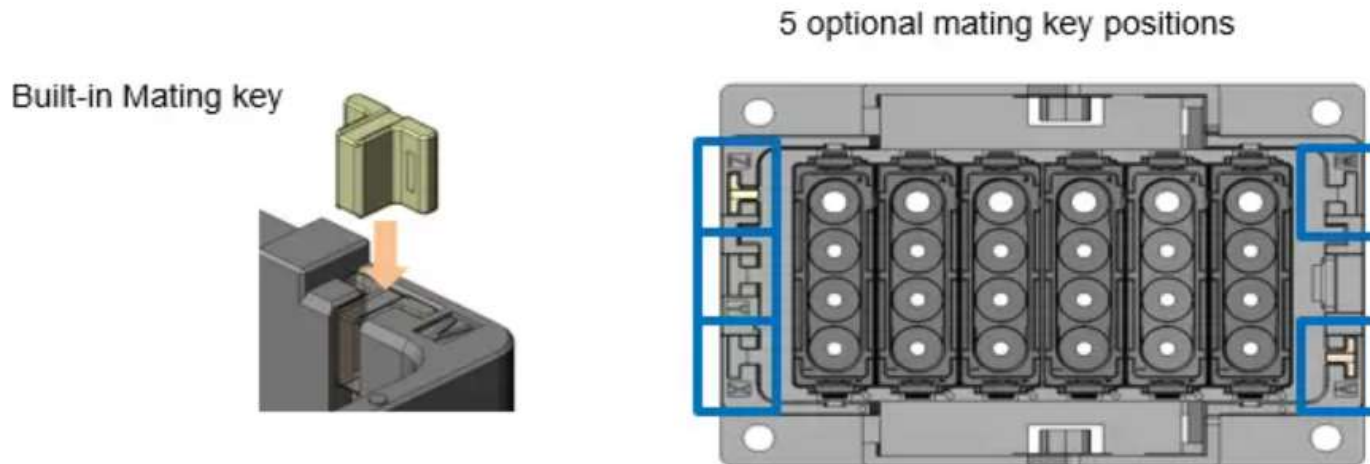
6

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!***