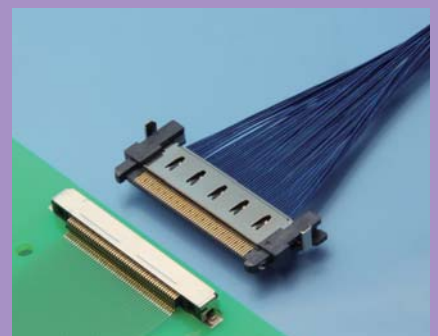
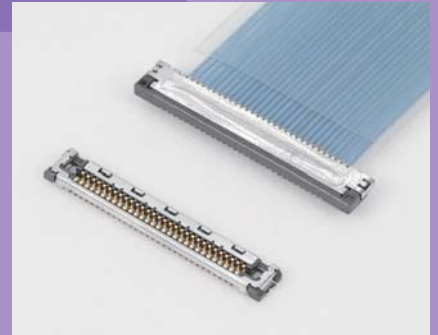
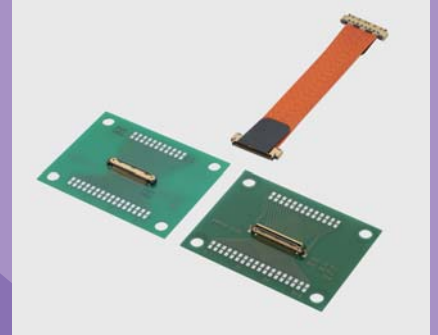


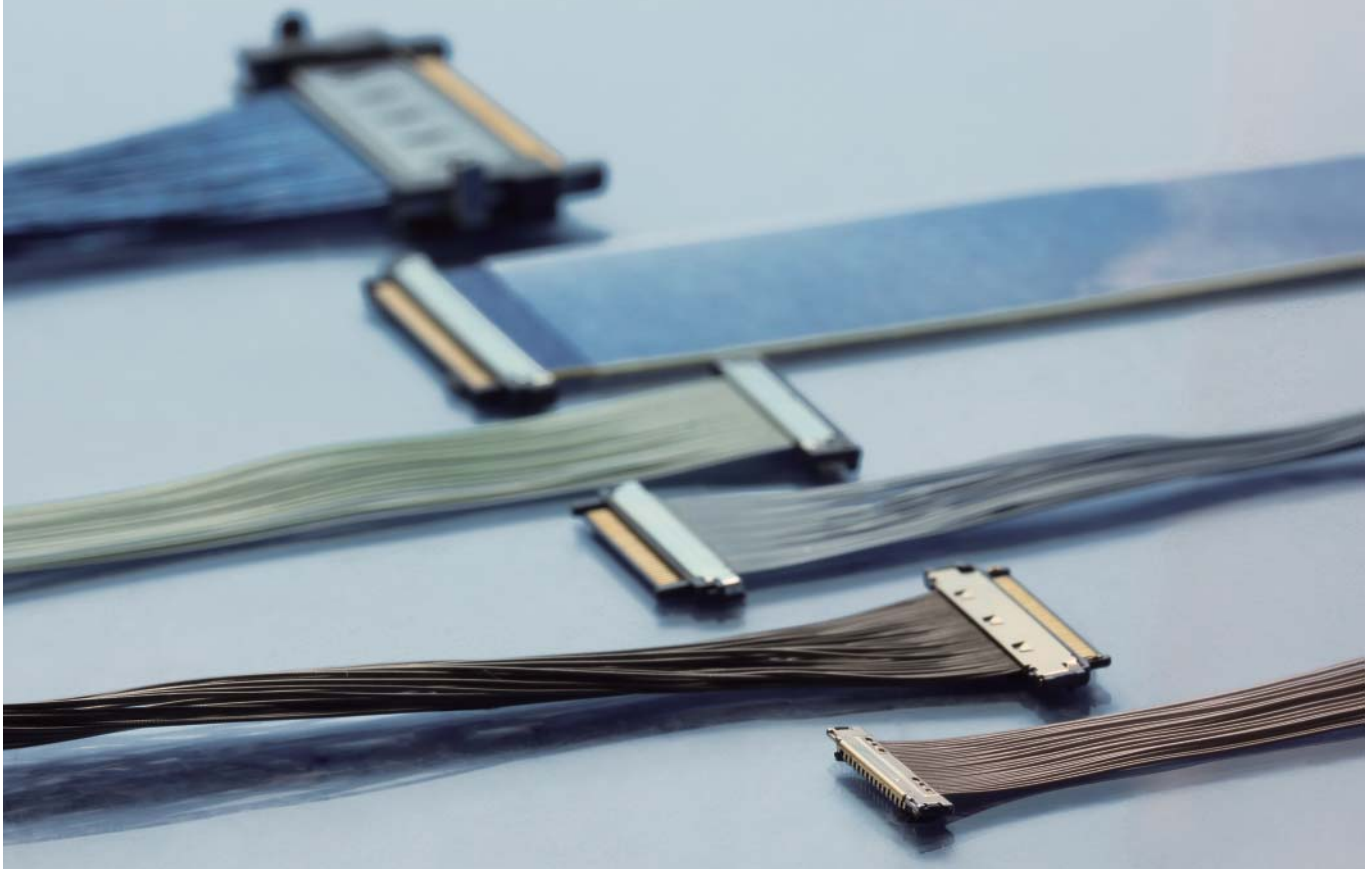
# KEL

## MICRO COAXIAL CONNECTORS HANDBOOK



# Micro Coaxial Connectors

High reliability proved by numerous design achievements

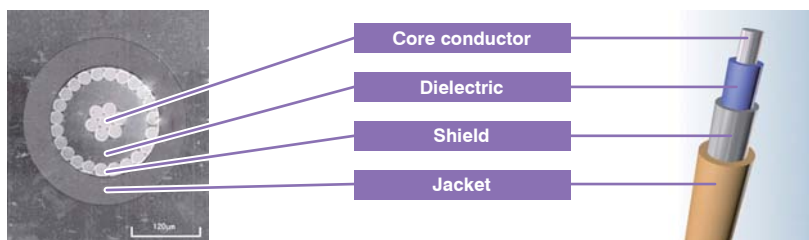


## KEL micro coaxial cable connector

KEL has the long experience in developing small and thin connectors. KEL coaxial cable connectors were developed about 20 years ago targeting devices using small liquid crystal displays such as mobile phones and laptop computers. Despite being thin as hair, Micro coaxial cable has excellent transmission characteristics. It is used in compact devices requiring high speed transmission, such as imaging equipments. Recently, they are being used in an increasingly wider range of fields including medical equipment such as ultrasound diagnostic equipment and endoscopes and automotive equipment such as car infotainments.

## Structure of micro coaxial cable

While it is an extremely fine cable size, it has a coaxial structure with excellent transmission characteristics. Furthermore, it has strong resistance to repeated bending and twisting due to its coaxial structure.



## Uses of micro coaxial cable

- LVDS transmission
- High speed transmission
- Serial transmission
- EMI countermeasures
- Radiation noise countermeasures
- Hinge tubes applications.
- High bend applications.

## Product list

Series name		XLSL	XSL	ASLS	USLS	USL	SSL	TMC	TSL
Pitch		0.25 mm	0.25 mm	0.4 mm	0.4 mm	0.4 mm	0.5 mm	0.5 mm	0.55 mm
Number of contacts		30 / 40 / 52	48	30	20 / 30 / 34 / 40	20 / 30 / 40	10 / 20 / 30 / 40	51	31
Mating type	Horizontal	—	✓	—	—	✓	✓	✓	✓
	Vertical	—	—	—	—	—	✓	✓	✓
	Stack	✓	—	✓	✓	—	—	—	—
Applicable cable		AWG#44 / 46	AWG#44 / 46	AWG#42	AWG#42 *for 34 pins: AWG#40/42/44/46	AWG#42	AWG#40	AWG#36 / 38 / 40	AWG#30 / 32 / 36
Cable jointing method		Soldering	Soldering	IDC	IDC * Soldering for 34 pins	IDC	IDC	Soldering	Soldering
Mating height		1.44 mm	1.0 mm	1.65 mm	1.65 mm	1.0 mm	1.4 mm	3.5 mm	3.25 mm
Mating width		3.05 mm	6.00 mm	2.8 mm	3.05 mm	5.60 mm	6.08 mm	16.3 mm	10.68 mm
Width (for 40 pin)		13.65 mm	16.86 mm * for 48 pins	15.7 mm * for 30 pins	21.4 mm	20.8 mm	26.5 mm	37 mm * for 51 pins	23.82 mm * for 31 pins
Rated current		AWG#44: 0.3 A AWG#46: 0.15 A	0.25 A	0.25 A	0.25 A	0.25 A	0.3 A	AWG#36/38: 0.5 A AWG#40: 0.3 A	AWG#30: 1.0 A AWG#32: 0.9 A AWG#36: 0.6 A

## Application

### Imaging equipment



Surveillance camera



Drone

➔ Due to its high speed signal transmission and small size, it is best suited for surveillance cameras and other imaging equipment.

### Medical equipment



Ultrasound



Endoscope

➔ Due to its high speed signal transmission and high bendability and twistability, it is most suited to probes that are constantly being pulled around.

### In-vehicle equipment



Car infotainment



In-vehicle camera

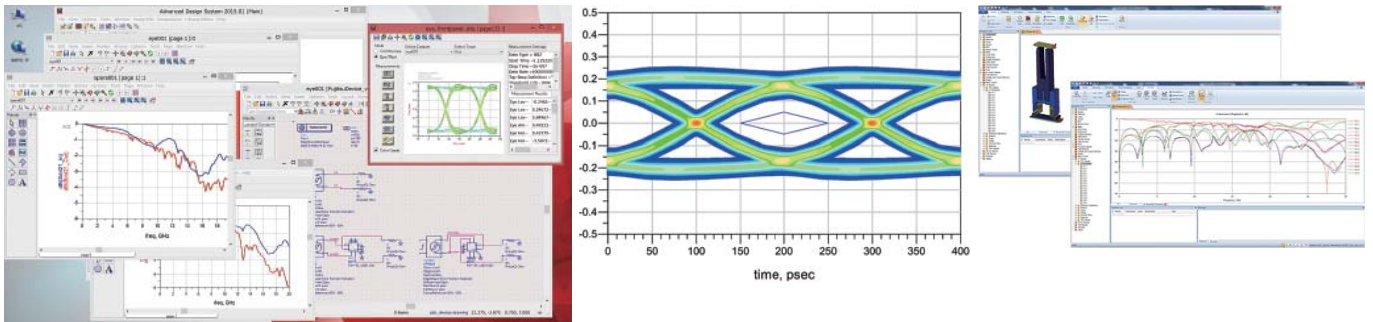
➔ Due to it having thorough measures against noise, such as multipoint ground and a metal shell structure, it is best suited for car infotainment and in-vehicle cameras.

# Features of micro coaxial cable connectors

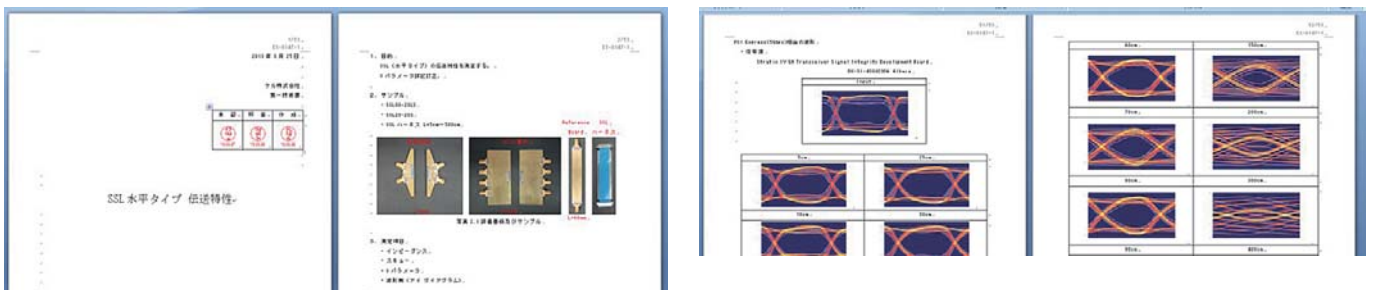
## <Approach to high speed transmission>

KEL has its own facility to measure transmission characteristics and can provide data for simulation (Touchstone) as well as a report summarizing the results.

### Noise level comparison between KEL micro coaxial cable assembly and others.

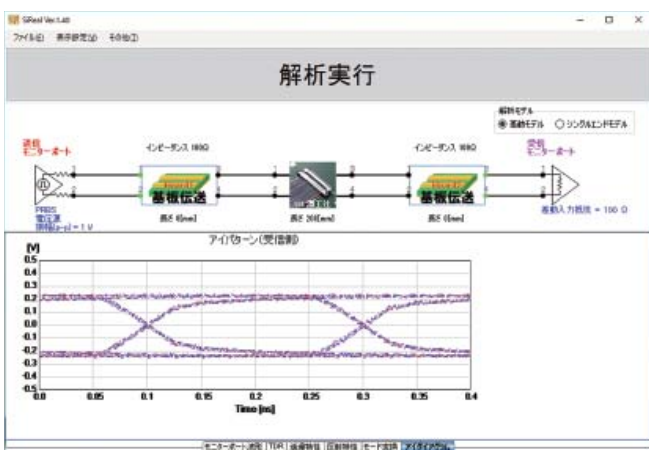


### Test report



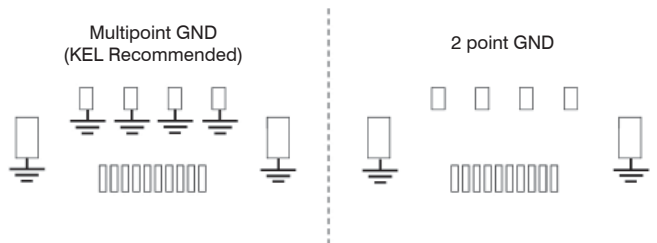
Additionally, we have installed software on sales staff's computers that can easily simulate transmission characteristic data. By inputting customer specifications into this software, you can view simulations of transmission characteristic data on the spot. If you have any problems with high speed transmission, please contact our sales representative.

### Simulation software (SiReal) image diagram

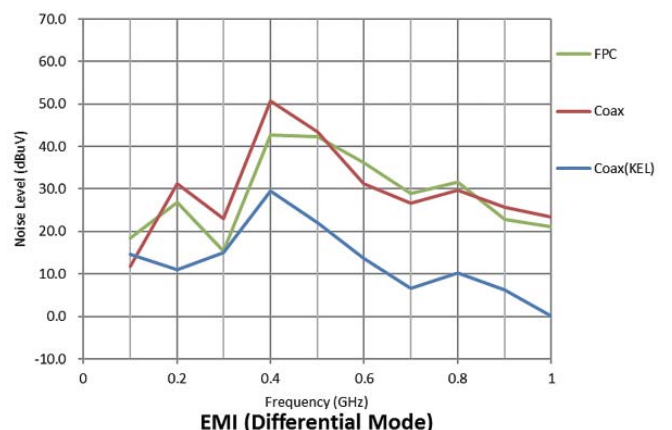


### Advantage of KEL micro coaxial cables

EMI noise characteristics due to multipoint GND



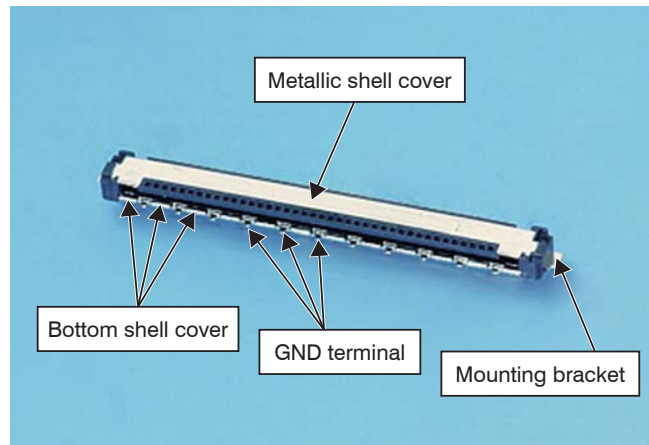
### EMI comparison between KEL micro coaxial cables and others



## Features of micro coaxial cable connectors

### <Noise countermeasures for realizing pure signal transmission>

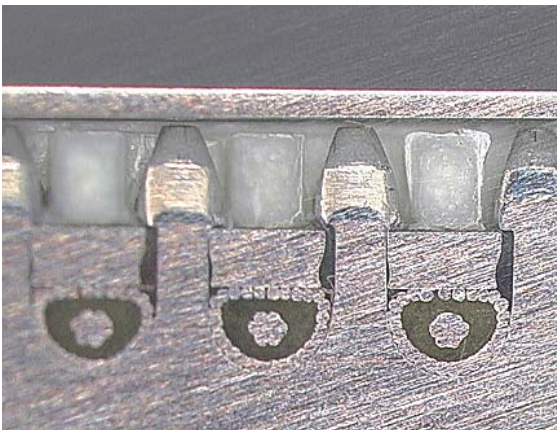
In KEL's micro coaxial connectors, a metallic shell cover is configured in such a way that it surrounds the entire body as a countermeasure against noise, which may become a bottleneck in signal transmission. Furthermore, they are equipped with multiple GND terminals for the purpose of strengthening the ground.



Structure of board side connector (Photo of SSL0X-30L3-XXXX)

### <Provides stable connection by Insulation Displacement Contact>

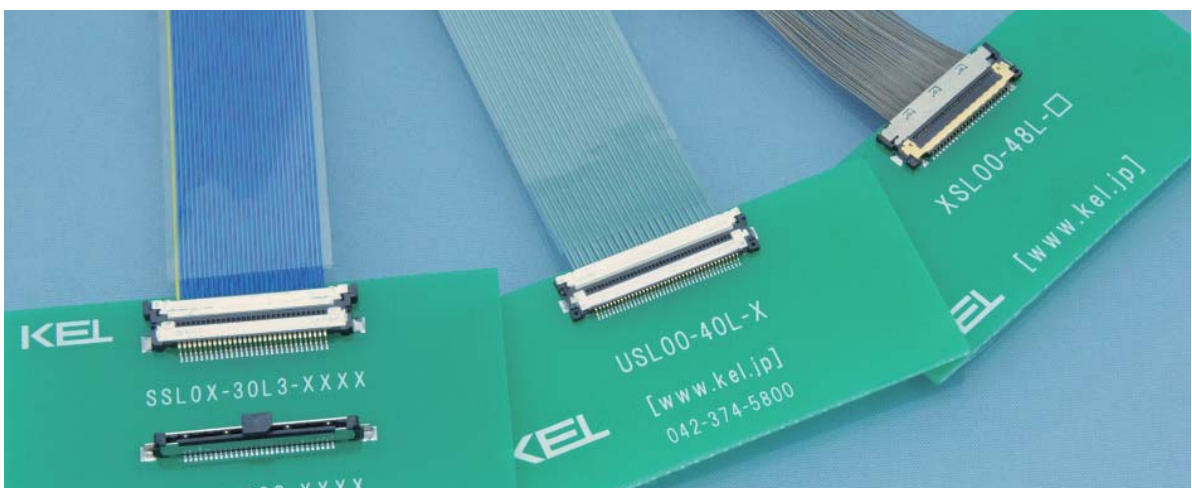
The connector and cable are connected by I.D.C. (except the USLS21/XSL/XSLS Series). By using the I.D.C., the cable and the connector can be connected all at once under uniform conditions, enabling stable connection.



Crimping of shield wire



Insulation Displacement Contact of core wire

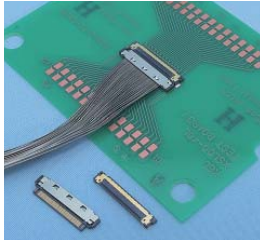


## KEL micro coaxial connectors

### XSL Series

#### 0.25 mm pitch micro coaxial cable connectors

XSL Series consists of 0.25 mm pitch micro coaxial cable connectors, the smallest class in the industry. Low profile with mounting height 1.0 mm.



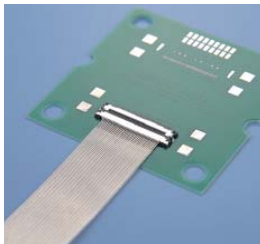
#### Specifications

Rated current	0.25A per contact
Contact resistance	100mΩ max.
Dielectric withstanding voltage	90V AC for 1 minute
Insulation resistance	50MΩ min. at 100V DC
Operating temperature	-40°C to +85°C
Applicable cable	AWG#44/46 micro coaxial cables

### USL Series

#### 0.4 mm pitch micro coaxial cable connectors

USL Series consists of 0.4 mm pitch micro coaxial cable connectors. Low profile with mounting height of 1.0 mm.



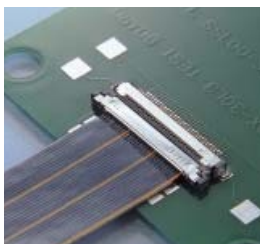
#### Specifications

Rated current	0.25A per contact
Contact resistance	100mΩ max.
Dielectric withstanding voltage	200V AC for 1 minute
Insulation resistance	100MΩ min. at 250V DC
Operating temperature	-40°C to +85°C
Applicable cable	AWG#42 micro coaxial cable

### SSL Series

#### 0.5 mm pitch micro coaxial cable connectors

SSL Series consists of 0.5 mm pitch micro coaxial cable connectors. Straight and right angle types are available on the board side, SSL series has four variations for number of pins between 10 and 40 are available.



#### Specifications

Rated current	0.3A per contact
Contact resistance	100mΩ max.
Dielectric withstanding voltage	200V AC for 1 minute
Insulation resistance	100MΩ min. at 250V DC
Operating temperature	-40°C to +85°C
Applicable cable	AWG#40 micro coaxial cable

### XSLS Series

#### 0.25 mm pitch micro coaxial cable connectors / stacking type

XSLS Series consists of the stack type 0.25 mm pitch micro coaxial cable connectors, the smallest class in the industry. By stack connection, space saving of 56% of the occupied board area is realized in comparison with the XSL Series.



#### Specifications

Rated current	AWG#44: 0.3A per contact AWG#46: 0.15A per contact
Contact resistance	100mΩ max.
Dielectric withstanding voltage	100V AC for 1 minute
Insulation resistance	50MΩ min. at 100V DC
Operating temperature	-40°C to +85°C
Applicable cable	AWG#44/46 micro coaxial cables

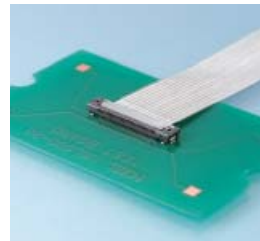
### USLS Series

#### 0.4 mm pitch micro coaxial cable connectors / stacking type

USLS Series consists of the stack type 0.4 mm pitch micro coaxial cable connectors.

By stack connection, space saving of 60% of the occupying board area is realized in comparison with USL Series.

USLS21 Series uses soldered connections and is compatible with four types of AWG#40/42/44/46.



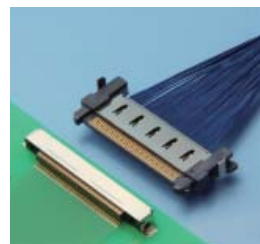
#### Specifications

Rated current	0.25A per contact
Contact resistance	100mΩ max.
Dielectric withstanding voltage	200V AC for 1 minute
Insulation resistance	100MΩ min. at 250V DC
Operating temperature	-40°C to +85°C
Applicable cable	[USLS] AWG#42 micro coaxial cable [USLS21] AWG#40/42/44/46 micro coaxial cables

### TMC Series

#### 0.5 mm pitch micro coaxial cable connectors / compatible with high speed differential transmission

TMC Series consists of 0.5 mm pitch micro coaxial cable connectors. TMC series is compatible with high speed differential signals (TMDS, LVDS), and is equipped with a locking mechanism.



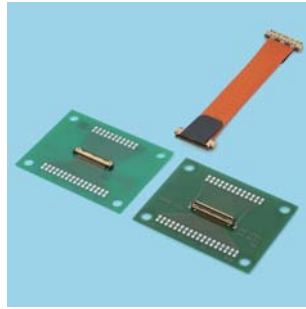
#### Specifications

Rated current	AWG#36/38: 0.5A per contact AWG#40: 0.3A per contact
Contact resistance	100mΩ max.
Dielectric withstanding voltage	200V AC for 1 minute
Insulation resistance	100MΩ min. at 250V DC
Operating temperature	-40°C to +85°C
Applicable cable	AWG#36/38/40 micro coaxial cable

## TSL Series

### 0.55 mm pitch micro coaxial cable connectors / high performance coaxial harness

TSL Series is a high performance coaxial harness with a 0.55mm pitch that enables 32Gbps differential high speed transmission with a cable length of 1,000mm. Ideal for designs that require high speed transmission over long cables for 5G and IoT.



#### Specifications

Rated current	AWG#30: 1.0A per contact AWG#32: 0.9A per contact AWG#36: 0.6A per contact
Contact resistance	100mΩ max.
Dielectric withstanding voltage	200V AC for 1 minute
Insulation resistance	100MΩ min. at 250V DC
Operating temperature	-40°C to +85°C
Applicable cable	AWG #30/32/36 micro coaxial cable*

\* Please contact our sales representative for the cable specifications to be used.

## Harness assembly

### <KEL harness technical division and special facilities>

KEL has a dedicated harness division in the technical unit and has established special facilities for harness assembly. Therefore, KEL can respond flexibly to a user's custom specifications as well as to provide careful follow up services. KEL ensures the quality of harness items and has a system to respond promptly in case of trouble during use.



### <Example of custom harness>

The most frequent demands from the user is for an assembly that bundles cables. Cables are often assembled into a bundle to prevent them getting caught at other parts inside equipment. KEL can respond to customer's request in various ways.



USL Series

Specification for cables being partially bundled with tape. This is the simplest and most cost-effective method.

[Example of cable bundling]  
Partial tape bundle



SSL Series

Specification for the whole cable to be covered by shrinkable tube. Exposure of coaxial lines can be reduced, enabling smooth wiring inside the equipment.

[Example of cable bundling]  
Shrinkable tube bundle



USL Series

Tape is wrapped around the entire cable. Exposure of coaxial cables is reduced and twistability is maintained as the tape is soft.

[Example of cable bundling]  
PTFE tape bundle



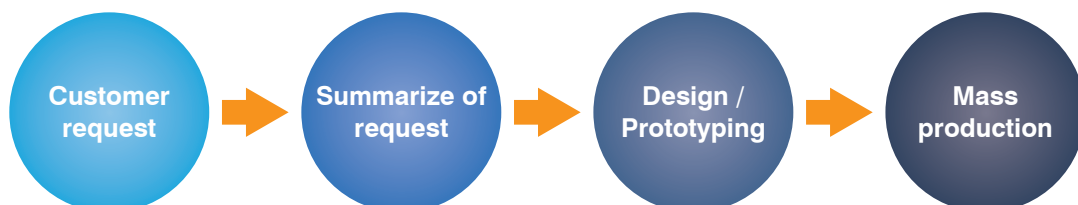
SSL Series

Tape is pasted to the connector joint. The delicate junction between a connector and cables is protected by the tape. It is suited for parts that must be removed for maintenance.

[Example of cable protection]  
Tape pasting

\* KEL can respond flexibly to specifications other than those described above. Please contact your local KEL sales office.

### <Customized harnesses process>

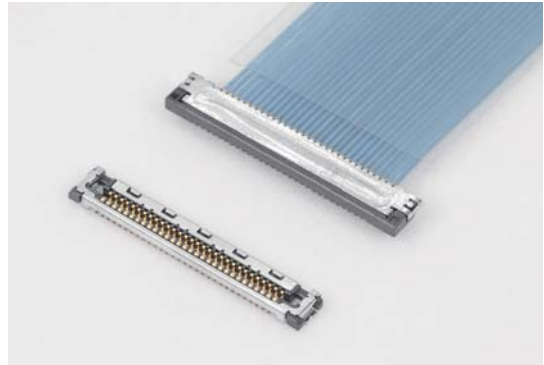


# ASLS Series

### Achieves nonmagnetic properties that are not affected by magnetic fields. 0.4 mm pitch micro coaxial cable connector / stacking type

- This is a 0.4mm pitch micro coaxial harness that has the industry's smallest board area of 44mm<sup>2</sup>.
- It is a nonmagnetic product that is not affected by magnetic fields and is ideal for medical equipment.
- Although it is a small stack type, it has a shell cover that covers the entire product and multi-point grounding, achieving both product strength and noise suppression.
- \* We are considering a shielded product with further enhanced EMC measures so that it can be used near noise sources. If you have any requests, please contact our sales representative.
- A guide structure is adopted to prevent incorrect mating and damage due to misalignment of the mating position, and a click feeling allows for reliable mating.
- This product has excellent contact reliability due to its two-point contact structure and effective mating length of 0.27mm.
- It strengthens the cable retention force and allows for a stable connection.
- Can be used at temperatures up to 105°C.
- 30 pins are available.

\* Products with 40 pins are planned to be prepared. If you require other numbers of pins, please contact our sales representative.



#### Specifications

Rated current	0.25A per contact
Contact resistance	100mΩ max.
Dielectric withstanding voltage	200V AC for 1 minute
Insulation resistance	100MΩ min. at 250V DC
Operating temperature	-40°C to +105°C
Applicable cable	AWG #42

## KEL Company Profile

Trade Name : KEL CORPORATION

Established : July 23, 1962

Total Capital : 1,617 Million Yen

President : Akira Kasuga

Head Office : 6-17-7 Nagayama, Tama,

Address Tokyo 206-0025, Japan

URL : www.kel.jp

### Sales Offices

- Head Office (Tama, Tokyo)
- Utsunomiya Sales Office (Utsunomiya, Tochigi)
- Mito Sales Office (Hitachinaka, Ibaraki)
- Nagoya Sales Office (Nagoya, Aichi)
- Osaka Sales Office (Osaka, Osaka)

### Factories

- Yamanashi Factory (Nishi-Yatsushiro, Yamanashi)
- Nagano Factory (Kita-azumi, Nagano)
- Minami-Alps Factory (Minami-Alps, Yamanashi)

[www.kel.jp/english/](http://www.kel.jp/english/)

KEL serves systems from connectors to racks.

**KEL CORPORATION**

## Global Network



More Information  
[https://www.kel.jp/en/feature/coaxial\\_lp\\_2](https://www.kel.jp/en/feature/coaxial_lp_2)

