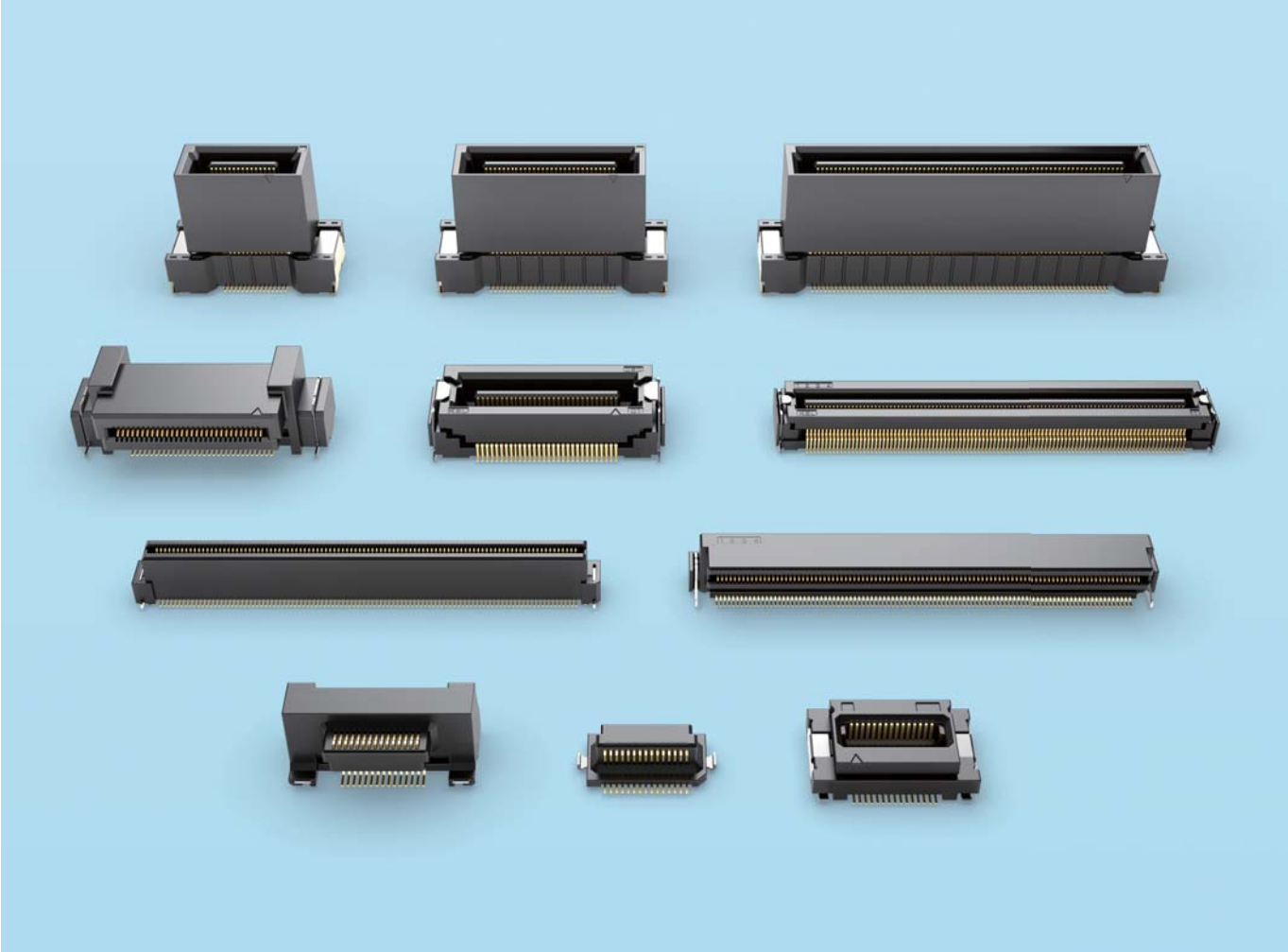
KEL

FLOATING CONNECTORS HANDBOOK

BRO.No.FLOATING-E-202402-0A-K/T

Floating Connectors



Connecting trust,
the industry leading floating connector

Nowadays, many electronic devices are becoming smaller and more sophisticated, and floating connectors can help maintain the quality of electronic devices by reducing problems that occur when tightening screws to secure printed circuit boards or when mating multiple connectors.

KEL's floating connectors are collectively called D-Sign Floating, starting with the 0.5 mm pitch connector DY series, 0.635 mm pitch connector DW series, 0.4 mm pitch connector DU series, and three-dimensional, multi-pin, high-speed transmission compatible. This expanded to the DT series of 0.5 mm pitch floating connectors, and today it stands out as our basic series of floating connectors.

Not satisfied with this, we have developed DT-E series with a power terminal, which has evolved from DT series, DT-E-FS series with a maximum stack height of 30 mm, DT-S series with a shell, and DT-S series, which can handle up to 125°C. We have developed the next-generation product, the heat-resistant DT12/13 series and DU series, with a stack height of 3 mm and a high heat resistance of 125°C.

KEL products are packed with cutting-edge technology and many ideas.

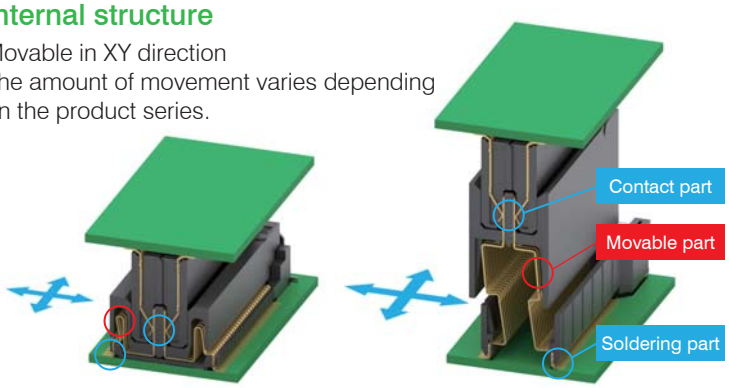
At KEL, we not only use "connectors" as parts to connect, but also seek safety, security, and ease of use. We also consider "connectors" to be things that connect "function to function" and "trust to trust." We aim to manufacture products that are kind to the environment and people.

What is a floating connector?

This connector uses an internal spring structure to absorb mating misalignment without putting stress on the contacts or soldering points.

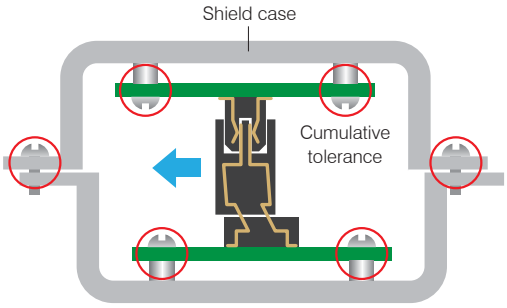
Internal structure

Movable in XY direction
The amount of movement varies depending on the product series.



DT Series　　DT-FS Series

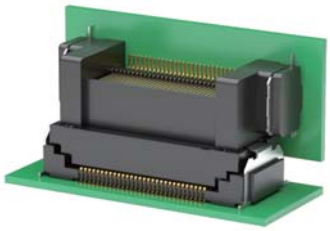
Mating status



Absorbs misalignment when fixing to shield case, etc.

Connection type

Stacking



Vertical

Horizontal

Floating connector features

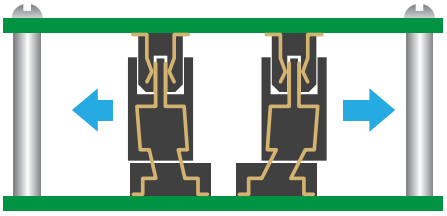
Manufactured in clean area

DT-E, DT-E-FS, DT, DT-FS, DT12/13, DT-S, DY, DY03/04, DUS, DU series are manufacturing by automated production lines in 100,000 class clean area.

Automated production in clean area

Use multiple connectors

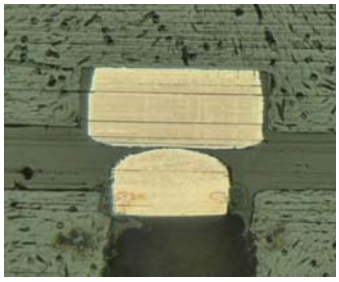
By absorbing misalignment with the floating structure, it is now possible to mount multiple connectors on the same board. Being able to use multiple connectors expands the range of designs and enables unprecedented designs.



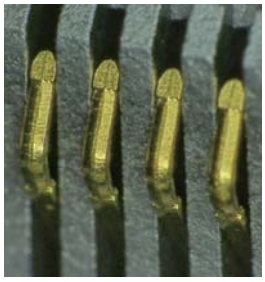
Absorb the misalignment with the floating structure

Roll surface one point contact

The contact has been designed to be arc shaped to reduce the contact area. It improves wipingness by increasing the contact pressure for area per unit. It secures an escape path for foreign matter upon wiping and also prevents jamming caused by foreign matter.



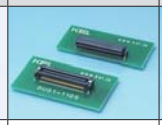
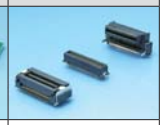
Arc shaped plug side contact



Roll surface

The contact area is a smooth surface with low friction coefficient, because it uses a roll surface for the contact area.

Product list

Series name		DT-E / DT-E-FS	DT / DT-FS	DT12/13	DT-S	DY / DY03/04	DUS	DU	DW
									
Pitch		0.5 mm	0.5 mm	0.5 mm	0.5 mm	0.5 mm	0.4 mm	0.4 mm	0.635 mm
Floating amount (XY direction)		DT-E: ±0.7 mm DT-E-FS: ±1.2 mm	DT: ±0.5 mm DT-FS: ±1.0 mm	±1.0 mm *2	±0.5 mm	±0.5 mm	±0.4 mm	±0.4 mm	±0.7 mm
Number of contacts		30 to 140	30 to 240	60	30, 40, 100	30 to 140	40, 140, 200	80 to 200	40 to 60
Options		7	9	1	3	8	3	5	3
Connection type	Stacking	✓ 8 to 30 mm	✓ 8 to 30 mm	✓ 18 mm	✓ 10 mm	✓ 5 to 14 mm	✓ 3 mm	✓ 5, 7 mm	✓ 6.3, 10, 15 mm
	Vertical	–	✓	–	✓	✓	–	✓	✓
	Horizontal	–	✓	–	–	–	–	–	–
Rated current *1		Signal contacts: 0.4A/pin Power contacts: 6.0A/pin	DT: 0.4A/pin DT-FS: 0.5A/pin	0.4A/pin *2	0.4A/pin	S type: 0.4A/pin L type: 0.3A/pin	0.4A/pin	DU: 0.4A/pin DU12: 0.35A/pin	0.5A/pin
Operating temperature		-40 to +105°C	-40 to +105°C	-40 to +125°C	-40 to +105°C	DY: -40 to +85°C DY03/04: -40 to +105°C	-40 to +125°C	DU: -40 to +85°C DU12: -40 to +105°C	-40 to +105°C
Packaging		Reel	Reel,Tray	Reel	Reel	Reel,Tray	Reel	Reel	Reel

*1 It is possible to design a current capacity exceeding the standard rated current depending on pin count and mating type.
Please note that there is a limit to the number of pins that can be energized at the same time.

*2 When mated with DT0□-□□□FS-10-T on the receptacle side.

Application

Floating connectors have been used in wide range of applications from car infotainment systems for automotive applications as well as medical, manufacturing, regardless of industrial or consumer applications. Abundant options for number of pins and height variations make it possible for the floating connector to be flexible to use regardless of application.

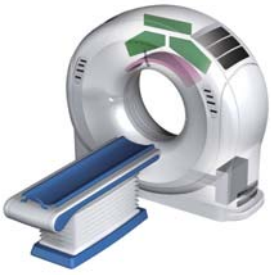
Car navigation

Semiconductor manufacturing machine

FA machinery

Digital camera

Endoscope



CT

ATM

Gaming equipment

Slot machine

0.5 mm pitch Floating Connector

DT-E / DT-E-FS Series

With power terminal, maximum stack height 30mm!

The DT-E and DT-E-FS series are 0.5 mm pitch floating connectors with power terminals. The transmission speed is the same as the DT series, DT-E supports high-speed serial transmission equivalent to SATA standards, and DT-E-FS supports high-speed serial transmission equivalent to 8Gbps. The floating amount in the XY direction is ±0.7 mm for the DT-E series and ±1.2 mm for the DT-E-FS series. There are 7 types of pin counts ranging from 30 to 140 pins, and 8 types of stack heights ranging from 8 to 30 mm.

DT-E Series

DT-E-FS Series

Insulator material	Glass-filled LCP(UL94V-0), Black
Signal contact/Power contact material	Copper alloy
Signal contact/Power contact plating	(Contact area) Gold over Nickel (Terminal area) Gold over Nickel
Retention clip material	Copper alloy
Retention clip plating	Tin over Nickel
Rated current *1	0.4A per contact(Signal contact) *2 6.0A per contact(Power contact)
Contact resistance	80 mΩ max.(Signal contact) 20 mΩ max.(Power contact)
Dielectric withstanding voltage	200 V AC for 1 minute
Insulation resistance	100 MΩ min. at 250 V DC
Operating temperature	-40°C to +105°C

*1 It is possible to design current capacity exceeding standard rated current depending on the pin count and the mating type. Please contact our sales representative for details.

*2 When mated with DT0□E-□□□FS-10-T simultaneous energization:140 pins max.

DT-E / DT-E-FS Series Product list

Connection type	Floating amount (XY direction)	Stack height	30 pin	40 pin	60 pin	80 pin	100 pin	120 pin	140 pin
Stacking	±0.7 mm	8 mm	✓	✓	✓	✓	✓	✓	✓
	±0.7 mm	10 mm	✓	✓	✓	✓	✓	✓	✓
	±0.7 mm	15 mm	✓	✓	✓	✓	✓	✓	✓
	±0.7 mm	20 mm	✓	✓	✓	✓	✓	✓	✓
	±1.2 mm	18 mm	✓	✓	✓	✓	✓	✓	*
	±1.2 mm	20 mm	✓	✓	✓	✓	✓	✓	*
	±1.2 mm	25 mm	✓	✓	✓	✓	✓	✓	*
	±1.2 mm	30 mm	✓	✓	✓	✓	✓	✓	*

* If you need this number of pins, please contact our sales representative.

0.5 mm pitch Floating Connector

DT Series / DT-FS Series

High-speed transmission, 3D connection, Multi-contacts (240 pins), Stack height (30mm)!

Although the 0.5mm pitch floating connector is not an ideal structure for high-speed transmission, DT series supports SATA standards and DT-FS series enables high-speed serial signal transmission equivalent to 8Gbps. The product has a wide variety of connection types, including three-dimensional mounting of stack, vertical, and horizontal connections, multi-pin (maximum 240 pins), and high stack type with floating amount of ±1.0 mm in the XY direction and stack height of 18 to 30 mm.

Insulator material	Glass-filled LCP(UL94V-0), Black
Signal contact/Power contact material	Copper alloy
Signal contact/Power contact plating	(Contact area) Gold over Nickel (Terminal area) Gold over Nickel
Retention clip material	Copper alloy
Retention clip plating	Tin over Nickel (DT0□-□□□FS-10-T)Gold over Nickel(Terminal area)
Rated current *1	0.5A per contact(When mated with DT0□-□□□FS-10-T) 0.4A per contact(When mated with DT0□-□□□S-T, simultaneous energization: 140 pins max.)
Contact resistance	80 mΩ max.
Dielectric withstanding voltage	200 V AC for 1 minute
Insulation resistance	100 MΩ min. at 250 V DC
Operating temperature	-40°C to +105°C

*1 It is possible to design current capacity exceeding standard rated current depending on the pin count and the mating type. (DT series can also support 0.5A)

DT / DT-FS Series Product list

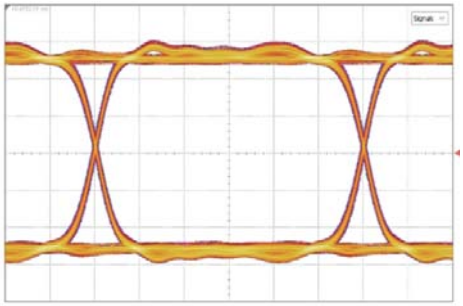
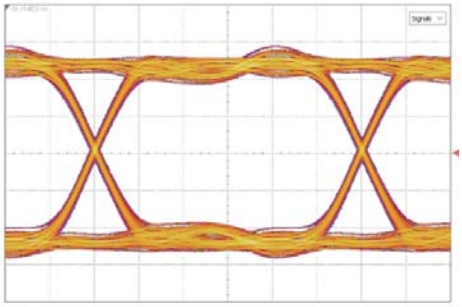
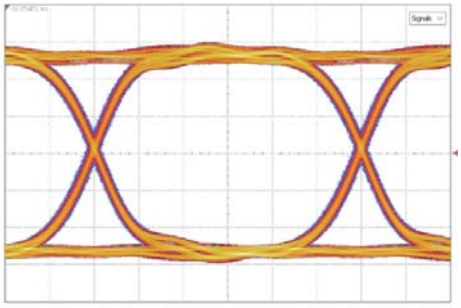
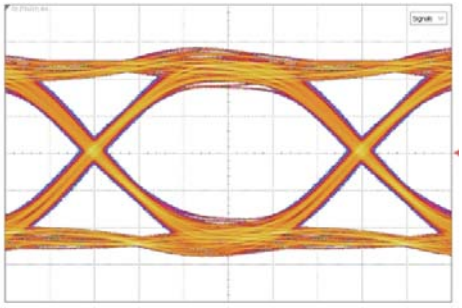
Connection type	Floating amount (XY direction)	Stack height	30 pin	40 pin	60 pin	80 pin	100 pin	120 pin	140 pin	160 pin	240 pin
Stacking	±0.5 mm	8 mm	✓	–	–	–	✓	–	✓	–	–
	±0.5 mm	10 mm	✓	✓	✓	✓	✓	–	✓	✓	✓
	±0.5 mm	11 mm	*	–	–	–	–	*	✓	*	–
	±0.5 mm	15 mm	✓	✓	✓	✓	✓	✓	✓	–	–
	±0.5 mm	16 mm	✓	–	✓	–	✓	✓	–	*	–
	±0.5 mm	17 mm	✓	✓	✓	✓	✓	–	✓	–	–
	±0.5 mm	18 mm	✓	✓	✓	✓	✓	–	✓	–	–
	±0.5 mm	19 mm	✓	✓	✓	✓	✓	–	✓	–	–
	±0.5 mm	20 mm	✓	✓	✓	✓	✓	✓	✓	–	–
	±1.0 mm	18 mm	✓	–	–	–	✓	–	✓	–	–
	±1.0 mm	20 mm	✓	✓	✓	✓	✓	–	✓	–	–
	±1.0 mm	21 mm	*	–	–	–	–	–	✓	–	–
	±1.0 mm	25 mm	✓	✓	✓	✓	✓	✓	✓	–	–
	±1.0 mm	26 mm	✓	–	✓	–	✓	✓	–	–	–
	±1.0 mm	27 mm	✓	✓	✓	✓	✓	–	✓	–	–
	±1.0 mm	28 mm	✓	✓	✓	✓	✓	–	✓	–	–
	±1.0 mm	29 mm	✓	✓	✓	✓	✓	–	✓	–	–
	±1.0 mm	30 mm	✓	✓	✓	✓	✓	✓	✓	–	–
Vertical	±0.5 mm	–	✓	✓	✓	✓	✓	–	✓	–	–
Horizontal	±0.5 mm	–	✓	✓	✓	✓	✓	–	✓	–	–

* If you need this number of pins, please contact our sales representative.

High-speed transmission characteristics

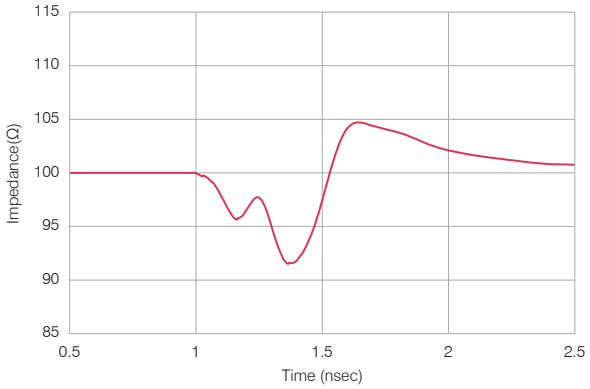
High-speed serial transmission equivalent to 8 Gbps is possible. * When mated with DT0□-□□□FS-10-T
We also simulate S-parameters and Eye diagrams, assuming high-speed transmission.

Eye diagram

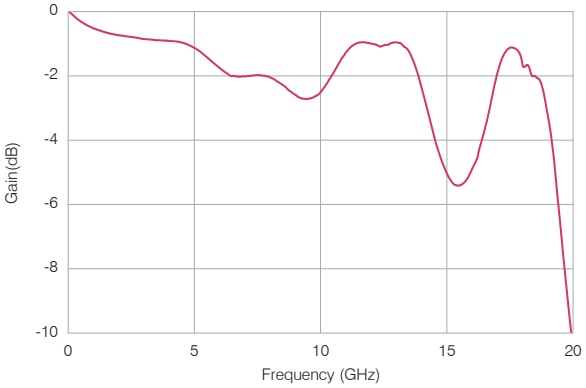
	Input waveform	DT Stacking height 30 mm
8Gbps		
16Gbps		

* Please note that the above data is not a guaranteed value.

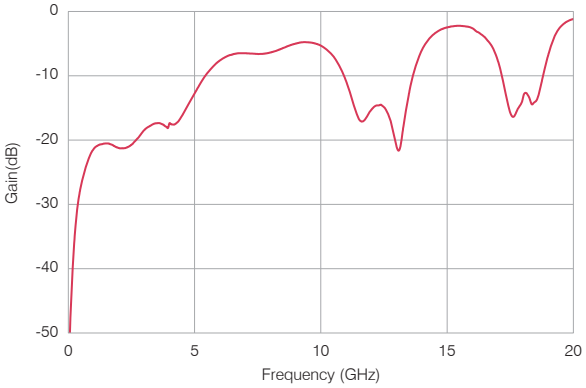
Differential impedance (Reference impedance 100Ω / Tr=100psec, 20-80%)



Differential insertion loss (Reference impedance 100Ω)



Differential return loss (Reference impedance 100Ω)



* Please note that the above data is not a guaranteed value.

0.5 mm pitch Floating Connector

DT12/13 Series

Can be used at temperatures up to 125°C!

DT12/13 series is a high heat resistant type floating connector that can withstand up to 125°C. The effective mating length is 1.5 mm, ensuring stable contact quality. The number of pins is 60 pins and the stack height is 18 mm.

Insulator material	Glass-filled LCP(UL94V-0), Black
Contact material	Copper alloy
Contact plating	(Contact area) Gold over Nickel (Terminal area) Gold over Nickel
Retention clip material	Copper alloy
Retention clip plating	Tin over Nickel
Rated current	0.4A per contact *1
Contact resistance	80 mΩ max.
Dielectric withstanding voltage	200 V AC for 1 minute
Insulation resistance	100 MΩ min. at 250 V DC
Operating temperature	-40°C to +125°C

*1 When mated with DT0□-□□□FS-10-T

DT12/13 Series Product list

Connection type	Floating amount (XY direction)	Stack height	60 pin
Stacking	±1.0 mm	18 mm	✓

0.5 mm pitch Floating Connector

DT-S Series

Shell type suitable for ESD/EMC measures!

The DT-S series is a shell type floating connector suitable for ESD/EMC countermeasures. It supports high-speed serial transmission equivalent to the SATA standard. Three types of pins are available: 30 pins, 40 pins, and 100 pins.

Insulator material	Glass-filled LCP(UL94V-0), Black
Contact / Shell material	Copper alloy
Contact / Shell plating	(Contact area) Gold over Nickel (Terminal area) Gold over Nickel
Rated current *1	0.4A per contact (Simultaneous energization is less than 140 pins.)
Contact resistance	80 mΩ max.
Dielectric withstanding voltage	200 V AC for 1 minute
Insulation resistance	100 MΩ min. at 250 V DC
Operating temperature	-40°C to +105°C

*1 It is possible to design current capacity exceeding standard rated current depending on the pin count and the mating type.

DT-S Series Product list

Connection type	Floating amount (XY direction)	Stack height	30 pin	40 pin	100 pin
Stacking	±0.5 mm	10 mm	✓	✓	✓
Vertical	±0.5 mm	–	–	–	✓

0.5 mm pitch Floating Connector

DY Series / DY03/04 Series

A wide variety of pin counts and stacking heights!

Although the pitch is 0.5 mm, the floating amount secures ±0.5 mm in the XY direction. The effective mating length is 1.25 mm, ensuring stable contact quality. The variation supports stack connection and vertical connection, and the number of contacts and stack height are also abundant.

Insulator material [DY00/01/1□]	Glass-filled LCP(UL94V-0), Black
Insulator material [DY03/04]	Insulator A: Glass-filled LCP(UL94V-0), Black Insulator B: Glass-filled 9T nylon(UL94V-0), Black
Contact material	Copper alloy
Contact plating	(Contact area) Gold over Nickel (Terminal area) Gold over Nickel
Retention clip material	Copper alloy
Retention clip plating	Gold over Nickel
Rated current *1	0.4 A per contact [L Type] 0.3 A per contact
Contact resistance	80 mΩ max. [L Type] 100 mΩ max.
Dielectric withstanding voltage	200 V AC for 1 minute
Insulation resistance	100 MΩ min. at 250 V DC
Operating temperature [DY00/01/1□]	-40°C to +85°C
Operating temperature [DY03/04]	-40°C to +105°C

*1 It is possible to design current capacity exceeding standard rated current depending on the pin count and the mating type

DY Series Product list

DY series has been as long run product, since its release over 15 years ago. Its features include a proven track record and its wide range of variations. Pin count is available in 8 variations from 30 to 140 pins, stacking height is available in 10 variations, from 5 to 14 mm increments of 1 mm. It is also available for stacking mating and vertical mating and its wide range of variations. Since it is already used in automotive devices, we have sufficient evaluation data.

Connection type	Floating amount (XY direction)	Stack height	30 pin	40 pin	50 pin	60 pin	80 pin	100 pin	120 pin	140 pin
Stacking	±0.5 mm	5 mm	✓	✓	✓	✓	✓	✓	✓	✓
	±0.5 mm	6 mm	✓	✓	✓	✓	✓	✓	✓	✓
	±0.5 mm	7 mm	✓	✓	✓	✓	✓	✓	✓	✓
	±0.5 mm	8 mm	–	–	–	✓	✓	✓	✓	✓
	±0.5 mm	9 mm	–	–	–	✓	✓	✓	✓	✓
	±0.5 mm	10 mm	–	–	–	✓	✓	✓	✓	✓
	±0.5 mm	11 mm	–	–	–	✓	✓	✓	✓	✓
	±0.5 mm	12 mm	–	–	–	✓	✓	✓	✓	✓
	±0.5 mm	13 mm	–	–	–	✓	✓	✓	✓	✓
	±0.5 mm	14 mm	–	–	–	✓	✓	✓	✓	✓
Vertical	±0.5 mm	–	✓	✓	✓	✓	✓	✓	✓	✓

0.4 mm pitch Floating Connector

DUS Series

Stack height 3mm low profile floating connector

Similar to the DU series, the pitch is 0.4 mm, but the floating amount is ±0.4 mm in the XY direction. Highly reliable design with effective mating length of 0.8 mm. The connection type is stacking, the stack height is 3 mm, and three types of pins are available: 40 pins, 140 pins, and 200 pins.

Insulator material	Glass-filled LCP(UL94V-0), Black
Contact material	Copper alloy
Contact plating	(Contact area) Gold over Nickel (Terminal area) Gold over Nickel
Retention clip material	Copper alloy
Retention clip plating	Tin over Nickel
Rated current *1	0.4A per contact (Simultaneous energization is less than 60 pins)
Contact resistance	80 mΩ max.
Dielectric withstanding voltage	200 V AC for 1 minute
Insulation resistance	100 MΩ min. at 250 V DC
Operating temperature	-40°C to +125°C

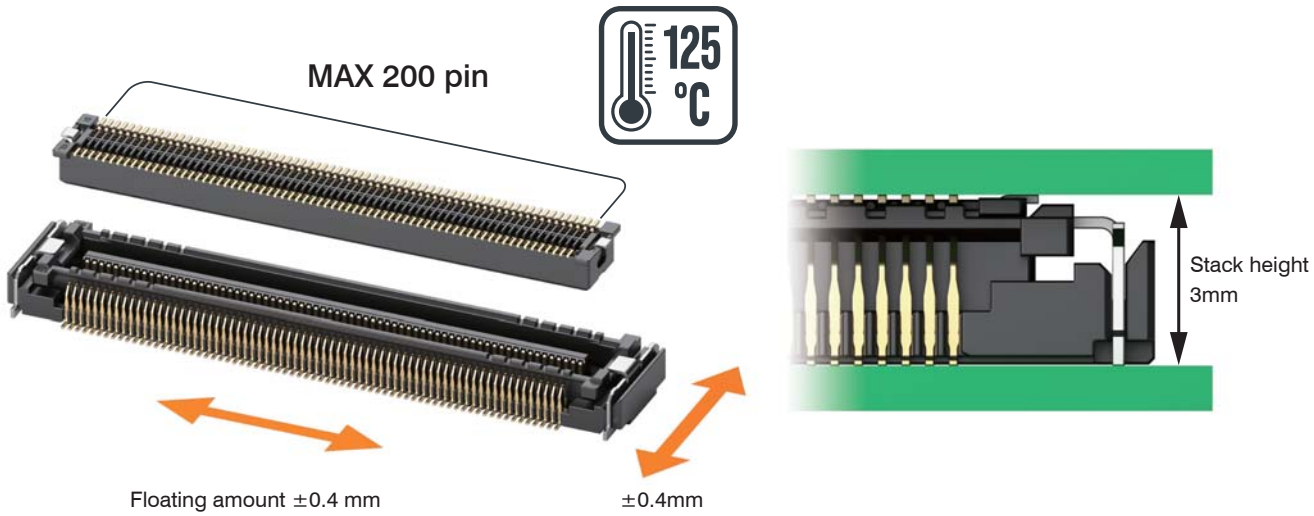
*1 Please contact our sales representative regarding simultaneous energization of the rated current.

DUS Series Product list

Connection type	Floating amount (XY direction)	Stack height	40 pin	140 pin	200 pin
Stacking	±0.4 mm	3 mm	✓	✓	✓

Stack height 3mm, high speed transmission of 16Gbps, high heat resistance, multi-pin

DUS series is a 0.4 mm pitch floating connector capable of high-speed serial transmission of 16Gbps (NRZ, Sdd21:-3dB, @8GHz). The floating amount is secured at ±0.4 mm in the XY direction. It has a low stack height of 3 mm. Supports up to 200 pins and can be used at operating temperatures of up to 125°C.



0.4 mm pitch Floating Connector

DU Series

Compact size with smaller footprint, Available up to Max 200 pins !

In spite of 0.4 mm pitch, DU series has the floating amount ±0.4 mm in X and Y directions with effective mating length of 1.2 mm. In comparison to DY series, it saves over 31% of mounting footprint realizing miniaturization. It also has variations up to 200 pins for pin count. High heat resistance type compatible with +105°C is also available.

Insulator material	Glass-filled LCP(UL94V-0), Black
Contact material	Copper alloy
Contact plating	(Contact area) Gold over Nickel (Terminal area) Gold over Nickel
Retention clip material	Copper alloy
Retention clip plating	Tin over Nickel
Rated current *1	0.4 A per contact (Simultaneous energization is limited to 110 pins) [DU12] 0.35A per contact
Contact resistance	100 mΩ max.
Dielectric withstanding voltage	200 V AC for 1 minute
Insulation resistance	100 MΩ min. at 250 V DC
Operating temperature	-40°C to +85°C [DU12] -40°C to +105°C

*1 It is possible to design a current capacity exceeding the standard rated current depending on pin count and mating type.

DU Series Product list

Connection type	Floating amount (XY direction)	Stack height	80 pin	110 pin	120 pin	140 pin	200 pin
Stacking	±0.4 mm	5 mm	–	✓	–	–	–
	±0.4 mm	7 mm	✓	–	–	–	✓
Vertical	±0.4 mm	–	✓	✓	✓	✓	✓

We are considering commercializing a stack type product, so please contact our sales representative.

Stacking

Vertical

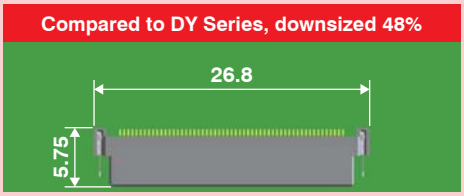
Compact Floating Connector

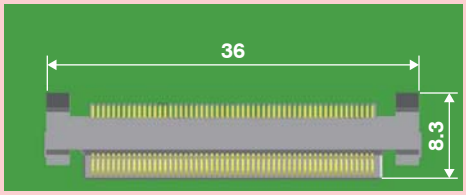
The highlight of DU series feature is its compactness. Compared to the 0.5 mm pitch floating connector DY series, it saves over 48% at the plug side and 31% at the receptacle side for mounting footprint realizing miniaturization.

Unit: mm

Plug

Compared to DY Series, downsized 48%

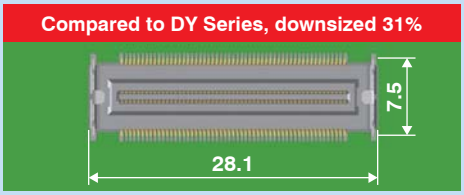


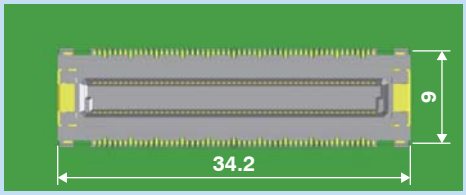


DU **DY**

Receptacle

Compared to DY Series, downsized 31%





0.635 mm pitch Floating Connector

DW Series

The floating amount is ±0.7 mm in both X and Y directions!

0.635 mm pitch floating connector DW series has the floating amount ±0.7 mm in both X and Y directions with effective mating length is 1.4 mm. Stacking mating and vertical mating is also possible.

Insulator material	Glass-filled LCP(UL94V-0), Black
Contact material	Copper alloy
Contact plating	(Contact area) Gold over Nickel (Terminal area) Gold over Nickel
Retention clip material	Copper alloy
Retention clip plating	Tin over Nickel
Rated current *	0.5 A per contact (Simultaneous energization when mated with DW12-□□□FS-10 is less than 40 pins)
Contact resistance	120 mΩ max.
Dielectric withstanding voltage	200 V AC for 1 minute
Insulation resistance	500 MΩ min. at 250 V DC
Operating temperature	-40°C to +105°C

* It is possible to design a current capacity exceeding the standard rated current depending on pin count and mating type. Please contact our sales representative.

DW Series Product list

Connection type	Floating amount (XY direction)	Stack height	40 pin	50 pin	60 pin
Stacking	±0.7 mm	6.3 mm	–	–	✓
	±0.7 mm	10 mm	–	–	✓
	±0.7 mm	15 mm	–	–	✓
Vertical	±0.7 mm	–	✓	✓	✓

For DW series purchasing, special conditions will apply such as ordering lot. Please contact our sales representative.

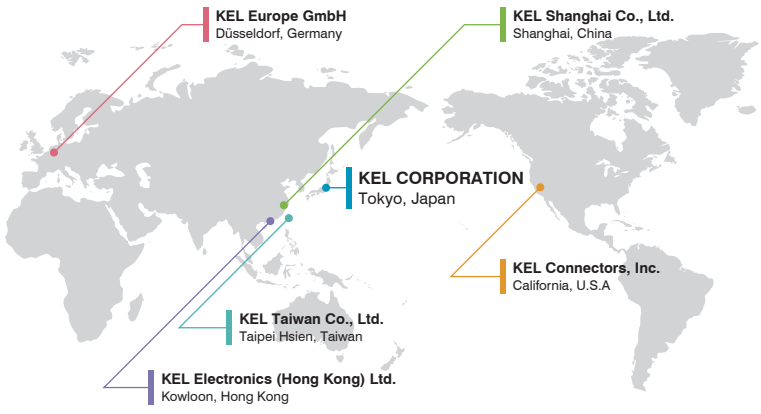
KEL Company Profile

Trade Name: KEL CORPORATION
Established : July 23, 1962
Total Capital: 1,617 Million Yen
President : Akira Kasuga
Head Office Address : 6-17-7 Nagayama, Tama, Tokyo 206-0025, Japan
URL : www.kel.jp

Factories

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

Global Network



Europe Office Düsseldorf, Germany
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Taiwan Office Taipei Hsien, Taiwan
Hong Kong Office Kowloon, Hong Kong

www.kel.jp
KEL provides the products from a connector to a rack.

KEL CORPORATION

More Information
https://www.kel.jp/feature/floating_lp_2