High-Speed 56+Gbps BGA Mezzanine Connectors

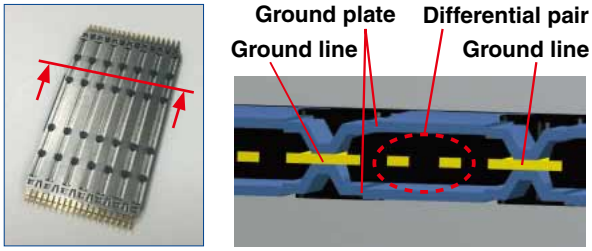
IT8 Series

■Overview

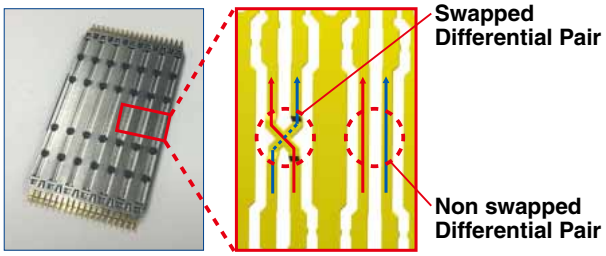
The IT8 mezzanine connector system was developed to enable 56Gbps performance with the highest signal density in the market, featuring Quasi-Coaxial Structure and Polarity-Swap FEXT cancelling technology.
IT8 delivers the most reliable and flexible solution for your current and future needs to design high speed systems.

Patented

■Quasi-Coaxial Structure



■Polarity-Swap FEXT cancelling technology



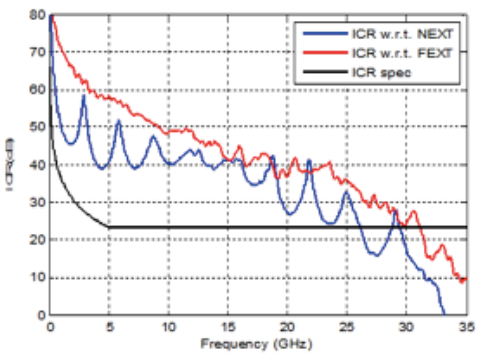
■Mechanical Features

- Stack heights :
  -10 to 13mm (Two-piece type)
  -14 to 46mm (Three-piece type)
- Number of Contacts : 120, 192, 288 signals
- Multiple mating capability
  - Floating amount : +/-0.2mm in X,Y
- Mating alignment : +/-1.5mm
- 1.0×5.5mm BGA interface optimizes routing and SI perfomance
- BGA attachment with “Pin in Ball” ensures reliable solder joints with high SMT processing yields
- Excellent reflow solderability with superior BGA coplanarity control
- Compatible with double-sided and inverted reflow soldering

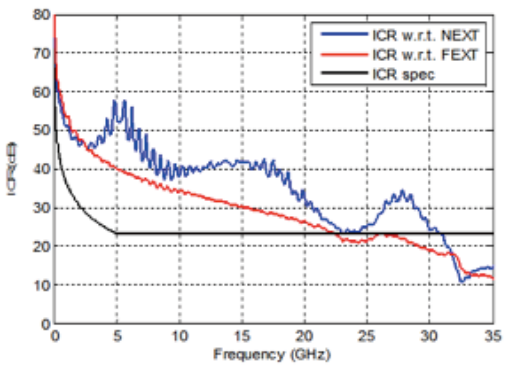
■Signal Integrity Features

- SI capability
  -56+Gbps (18 to 46mm), 28+Gbps (10 to 16mm)
  -92ohm impedance (suitable for both 100ohm & 85ohm system)
- Unique Polarity-Swap FEXT cancelling technology
- Quasi-Coaxial Structure to prevent noise emission to adjacent lines
- Insertion loss to Crosstalk Ratio (ICR)

ICR (18 to 46mm) *56+Gbps*



ICR (10 to 16mm) *28+Gbps*



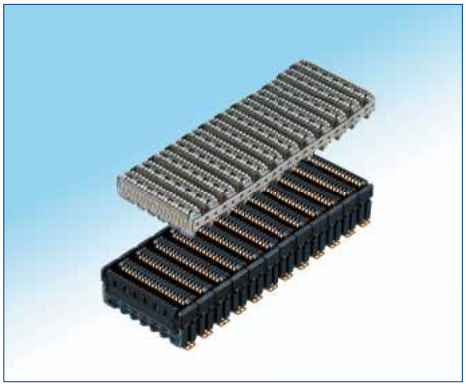
In cases where the application will demand a high level of reliability, such as automotive, please contact a company representative for further information.

■Stacking Height Variations

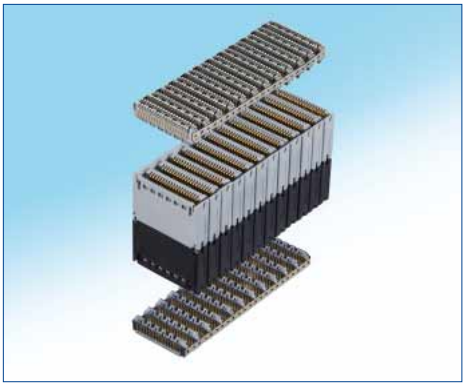
	Two-piece type				Three-piece type																
Stacking Height / Contact Position	10 mm	11 mm	12 mm	13 mm	14 mm	15 mm	16 mm	17 mm	18 mm	19 mm	20 mm	21 mm	22 mm	23 mm	24 mm	25 mm	26 mm	27 mm	28 mm	29 mm	30 mm
120	✔	✔	✔	✔	✔	✔	✔	✻	✔	✔	✔	✻	✔	✔	✔	✔	✔	✔	✔	✔	✔
192	✔	✔	✔	✔	✔	✔	✔	✻	✔	✔	✔	✻	✔	✔	✔	✔	✔	✔	✔	✔	✔
288	✔	✔	✔	✔	✔	✔	✔	✻	✔	✔	✔	✻	✔	✔	✔	✔	✔	✔	✔	✔	✔

	Three-piece type															
Stacking Height / Contact Position	31 mm	32 mm	33 mm	34 mm	35 mm	36 mm	37 mm	38 mm	39 mm	40 mm	41 mm	42 mm	43 mm	44 mm	45 mm	46 mm
120	✻	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
192	✻	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
288	✻	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

✔ Available / ✻ Please contact us



Stacking Height 10mm to 13mm
Two-piece type



Stacking Height 14mm to 46mm
Three-piece type

■Product Specifications

Rating	Operating Temperature Range : -55˚C to +85˚C	Storage Temperature Range : -10˚C to +60˚C
	Voltage Rating : 50Vrms	Operating Humidity Range : For relative humidity, 90% max (No dew condensation is permitted)
	Current Rating : 0.5A / pin (Signal)	

Item	Specification	Conditions
1. Contact Resistance (Note1)	50mΩ MAX (Height : 10 to 19mm) 60mΩ MAX (Height : 20 to 29mm) 70mΩ MAX (Height : 30 to 39mm) 80mΩ MAX (Height : 40 to 46mm)	100mA
2. Insulation Resistance	1000MΩ min.	100V DC
3. Withstanding Voltage	No flashover or insulation breakdown	150V duty for 60 seconds
4. Mechanical Operation (Mating/Un-mating)	1) Contact resistance change : 20mΩ or less 2) No damage, crack or loose part	100 cycles
5. Random Vibration	1) No electrical discontinuity of 1μs or more 2) No damage, crack or loose part	Frequency : 50 to 2000Hz ; power spectrum density : 0.1G²/Hz for 120 minutes in three directions
6. Cyclic Temperature and Humidity	1) Contact resistance change : 20mΩ or less 2) No damage, crack or loose part	25˚C, 80% RH : 60 min dwell time, 30 min ramp time 65˚C, 50% RH : 60 min dwell time under 24 cycles

Note1 : The value of contact resistance includes the bulk resistance.

■Materials / Finish

●Receptacle

Part	Material	Finish	Remarks
Housing	PPS	Black	UL94V-0
Blade	LCP	Black	UL94V-0
Contact	Copper Alloy	Contact Area : Gold (0.76μm min) over Nickel (1.27μm min) Other : Nickel (1.27μm min)	–
Ground Shield	Stainless Steel	———	–
Ground Shield	Stainless Steel	———	–
Retention Peg	Copper Alloy	Gold (0.03μm min) over Nickel (1.0μm min)	–
Solder Ball	Tin (Pb-Free)	Sn(96.5)-Ag(3)-Cu(0.5)	–
Pick Up Tape	Heat Resistant Tape	Polyamide	–
Tray	HIPS	Black	–

●Interposer

Part	Material	Finish	Remarks
Housing (Detachable Side)	PPS	Gray	UL94V-0
Housing (Mounting Side)	PPS	Black	UL94V-0
Guide Plate	Stainless Steel	———	———
Blade	LCP	Black	UL94V-0
Contact	Copper Alloy	Contact Area : Gold (0.76μm min) over Nickel (1.27μm min) Other : Nickel (1.27μm min)	———
Ground Shield	Stainless Steel	———	———
Ground Shield	Stainless Steel	———	———
Tray	HIPS	Not shown in the customer drawing	———

●Plug

Part	Material	Finish	Remarks
Ground Shield	Copper Alloy	Nickel (1.27μm min)	———
Housing	LCP	Black or Gray	UL94V-0
Contact	Copper Alloy	Contact Area : Gold (0.76μm min) over Nickel (1.27μm min) Other : Nickel (1.27μm min)	———
Solder Ball	Tin	Sn(96.5)-Ag(3)-Cu(0.5)	———
Pick Up Cap	PA-M	Black	UL94V-0
Tray	HIPS	———	———

■Product Number Structure

Refer to the chart below when determining the product specifications from the product number.
Please select from the product numbers listed in this catalog when placing orders.

●Plug Mounting Side

IT8 ❶ M ❷ - *** ❸ P ❹ - BGA ❺ - *H ❻

●Interposer

IT8 ❶ - *** ❸ S ❹ - **H ❻

●Plug Detachable Side

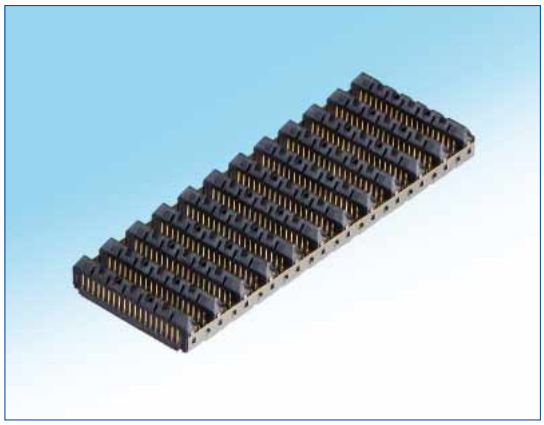
IT8 ❶ D ❷ - *** ❸ P ❹ - BGA ❺ - *H ❻

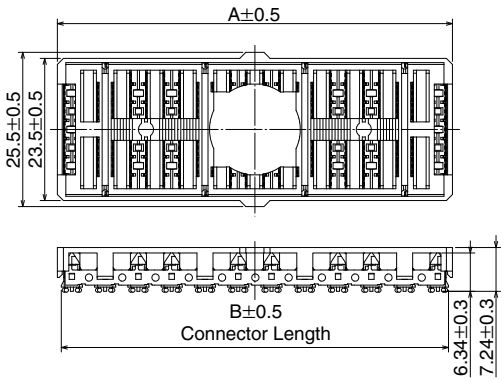
●Mounting Receptacle

IT8 ❶ MB ❷ - *** ❸ S ❹ - BGA ❺ - *H ❻

❶ Series Name : IT8
No Further Designation
❷ Connector Type
IT8M-xxxP-BGA : Mounting Plug IT8D-xxxP-BGA : Detachable Plug IT8MB -xxxS-BGA : Mounting Receptacle
❸ Signal Contact Positions
120, 192, 288
❹ Connector Gender
S : Female (Receptacle or Interposer) P : Male (Plug)
❺ BGA : Ball Grid Array
No Further Designation
❻ Stacking Height (mm)
Mounting Plug : 0, 1 Detachable Plug : 0, 1 Mounting Receptacle : 10, 12 Interposer : 14, 18, 22, 25, 28, 32, 35, 38, 41, 44 Stacking Height : Calculated based on following formula > Three-piece type ; ❻ Interposer + ❻ Mounting Plug + ❻ Detachable Plug > Two-piece type ; ❻ Mounting Receptacle + ❻ Detachable Plug

■Plug

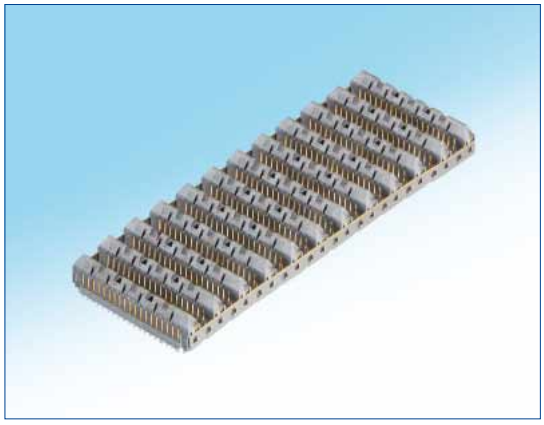


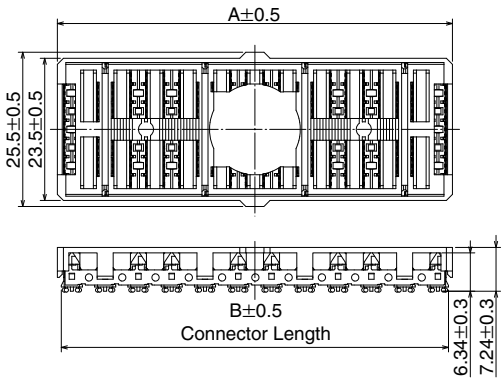


Note : Figure shows a product with a mounting cap.
Products are shipped with mounting caps attached.

Unit : mm

Signal contact No.	Type	Part No.	HRS No.	A	B
120 (+70 ground)	Three piece type Mounting side	IT8M-120P-BGA-0H	636-3001-9 00	26.8	25.5
		IT8M-120P-BGA-1H	636-3100-0 00		
192 (+112 ground)		IT8M-192P-BGA-0H	636-3002-1 00	43.3	42
		IT8M-192P-BGA-1H	636-3101-3 00		
288 (+168 ground)		IT8M-288P-BGA-0H	636-3003-4 00	65.3	64
		IT8M-288P-BGA-1H	636-3102-6 00		



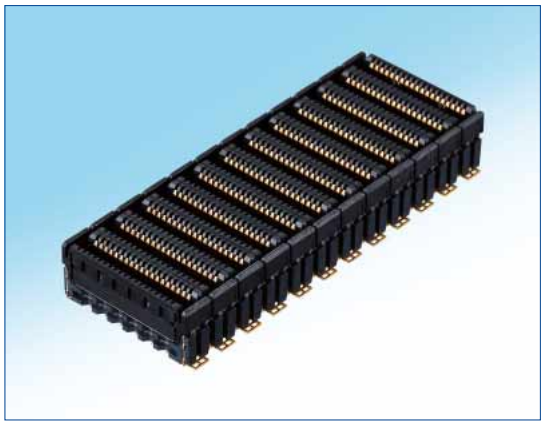


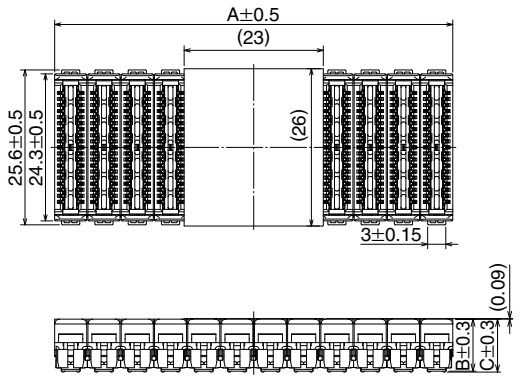
Note : Figure shows a product with a mounting cap.
Products are shipped with mounting caps attached.

Unit : mm

Signal contact No.	Type	Part No.	HRS No.	A	B
120 (+70 ground)	Two / Three piece type Detachable side	IT8D-120P-BGA-0H	636-3200-5 00	26.8	25.5
		IT8D-120P-BGA-1H	636-3300-0 00		
192 (+112 ground)		IT8D-192P-BGA-0H	636-3201-8 00	43.3	42
		IT8D-192P-BGA-1H	636-3301-2 00		
288 (+168 ground)		IT8D-288P-BGA-0H	636-3202-0 00	65.3	64
		IT8D-288P-BGA-1H	636-3302-5 00		

■Receptacle



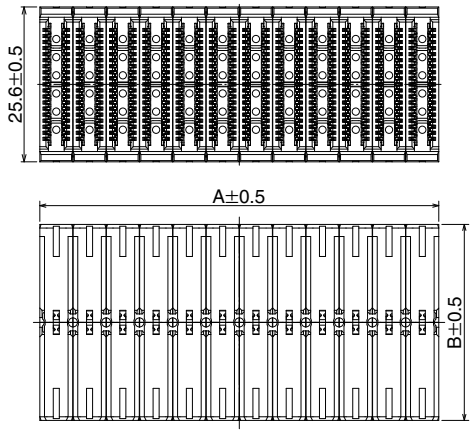


Note : Figure shows a product with a mounting tape.
Products are shipped with mounting tape attached.

Unit : mm

Signal contact No.	Type	Part No.	HRS No.	A	B	C
120 (+70 ground)	Two piece type	IT8MB-120S-BGA-10H	636-3804-0 00	27.3	8.6	8.75
192 (+112 ground)		IT8MB-192S-BGA-10H	636-3805-0 00	43.8	8.6	8.75
288 (+168 ground)		IT8MB-288S-BGA-10H	636-3806-0 00	65.8	8.6	8.75
120 (+70 ground)		IT8MB-120S-BGA-12H	636-3906-0 00	27.3	8.6	10.75
192 (+112 ground)		IT8MB-192S-BGA-12H	636-3905-0 00	43.8	8.6	10.75
288 (+168 ground)		IT8MB-288S-BGA-12H	636-3907-0 00	65.8	8.6	10.75

■Interposer



Unit : mm

Signal contact No.	Part No.	HRS No.	A	B
120 (+70 ground)	IT8-120S-14H	636-3526-0 00	27.44	11.4
	IT8-120S-18H	636-3529-0 00		15.4
	IT8-120S-22H	636-3506-0 00		19.4
	IT8-120S-25H	636-3503-0 00		22.4
	IT8-120S-28H	636-3509-0 00		25.4
	IT8-120S-32H	636-3512-0 00		29.4
	IT8-120S-35H	636-3500-9 00		32.4
	IT8-120S-38H	636-3517-0 00		35.4
	IT8-120S-41H	636-3520-0 00		38.4
	IT8-120S-44H	636-3523-0 00		41.4

Unit : mm

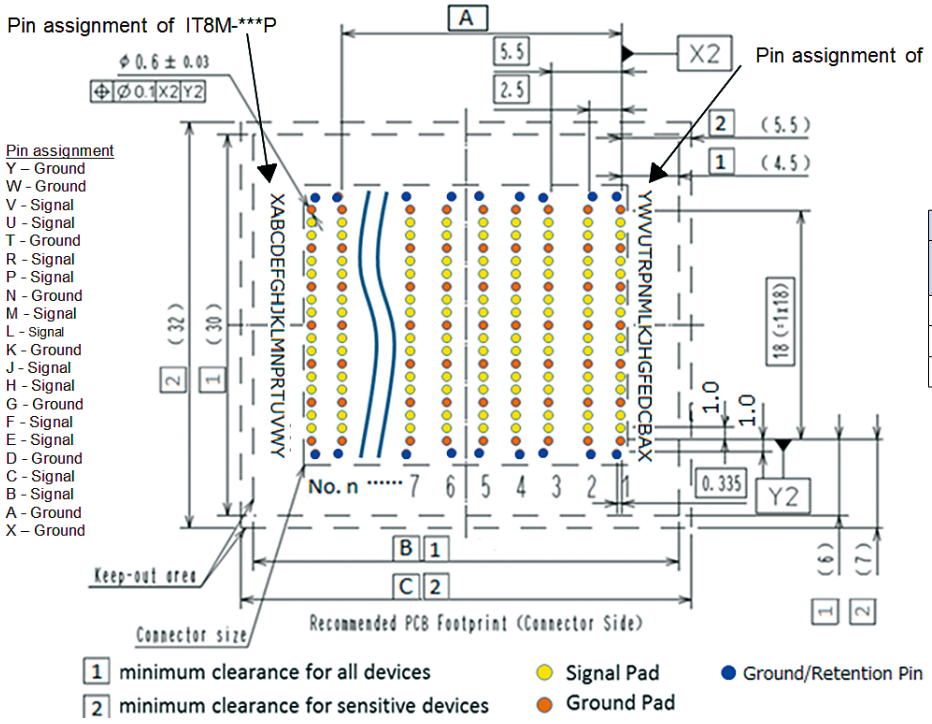
Signal contact No.	Part No.	HRS No.	A	B
288 (+168 ground)	IT8-288S-14H	636-3528-0 00	65.94	11.4
	IT8-288S-18H	636-3531-0 00		15.4
	IT8-288S-22H	636-3508-0 00		19.4
	IT8-288S-25H	636-3505-0 00		22.4
	IT8-288S-28H	636-3511-0 00		25.4
	IT8-288S-32H	636-3514-0 00		29.4
	IT8-288S-35H	636-3502-4 00		32.4
	IT8-288S-38H	636-3519-0 00		35.4
	IT8-288S-41H	636-3522-0 00		38.4
	IT8-288S-44H	636-3525-0 00		41.4

Unit : mm

Signal contact No.	Part No.	HRS No.	A	B
192 (+112 ground)	IT8-192S-14H	636-3527-0 00	43.94	11.4
	IT8-192S-18H	636-3530-0 00		15.4
	IT8-192S-22H	636-3507-0 00		19.4
	IT8-192S-25H	636-3504-0 00		22.4
	IT8-192S-28H	636-3510-0 00		25.4
	IT8-192S-32H	636-3513-0 00		29.4
	IT8-192S-35H	636-3501-1 00		32.4
	IT8-192S-38H	636-3518-0 00		35.4
	IT8-192S-41H	636-3521-0 00		38.4
	IT8-192S-44H	636-3524-0 00		41.4

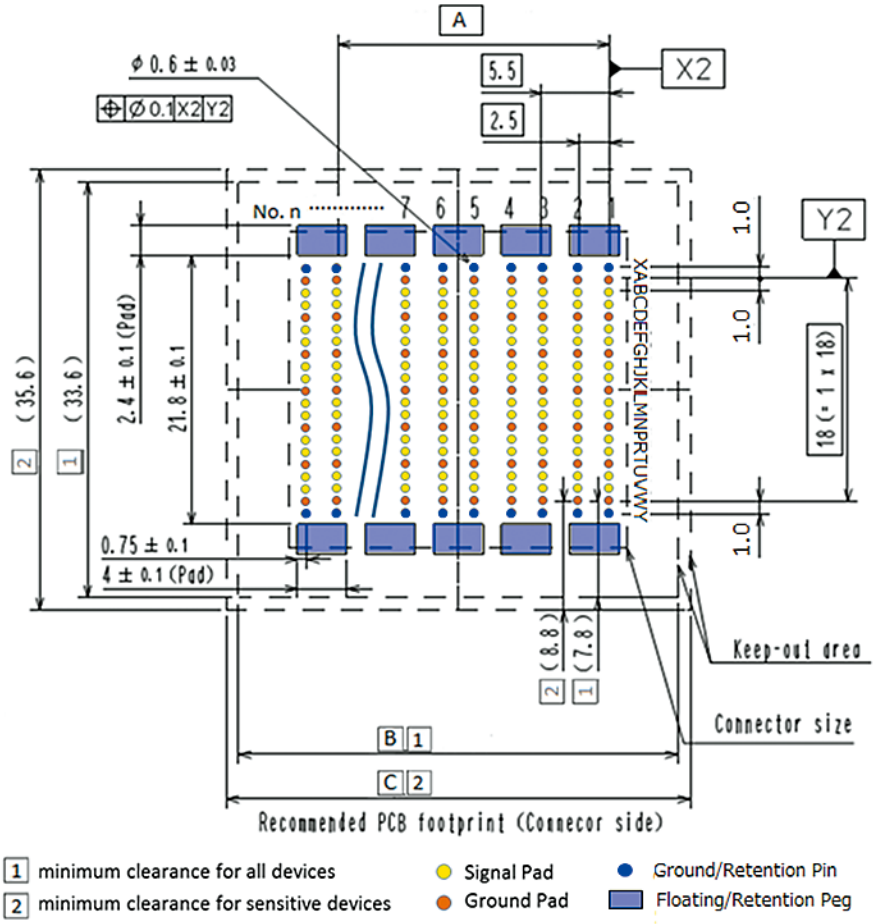
◆Recommended Land Pattern Dimension of PCB (Metal mask thickness : t=0.127 to 0.15mm)

●Plug (IT8M (or D) -∗∗∗P-BGA-∗H)



Dimension(mm)			
	120 pos	192 pos	288 pos
A	22	38.5	60.5
B	33.5	50	72
C	35.5	52	74

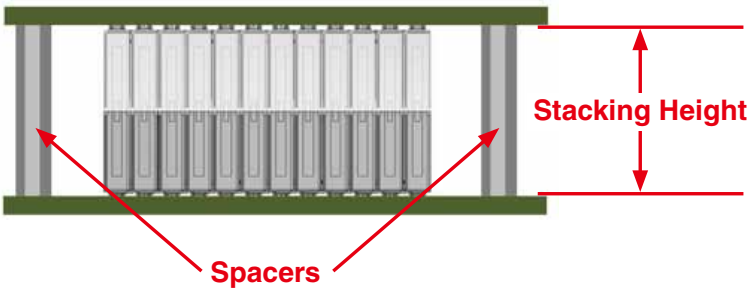
●Receptacle (IT8MB-∗∗∗S-BGA-∗∗H)



Dimension(mm)			
	120 pos	192 pos	288 pos
A	22	38.5	60.5
B	35.5	52	74
C	37.5	54	76

Spacers

Spacers are required to support the PWB's and protect the BGA solder joints.



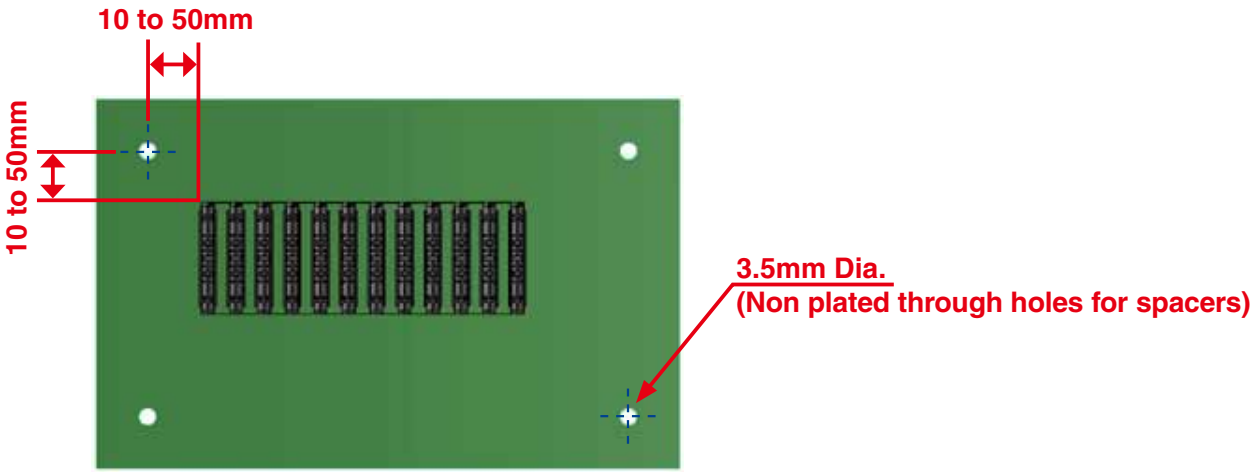
Suggested spacer style is shown below :

Spacer,male-male, M3 thread

The spacer heights must correspond to the stacking heights as shown below.

Stacking Height	Spacer Height
XXmm	XX +/-0.127mm

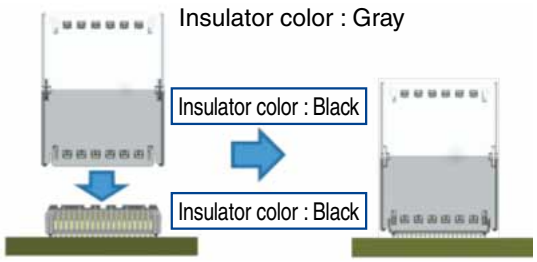
Note : XX is the value of stacking height.



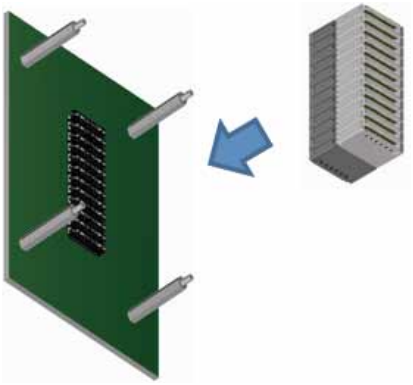
Four spacers located rectangularly or simmiler are required. Spacers should be located 10 to 50mm from the corners of the plugs or receptacles to preventexcessive mechanical loading on the interconnections.
If assembly will be subjected to vibration, spacers should be located to prevent resonance, and additional spacers may be required.

Interposer Installation

Mate black side of the interposer with the black mounting plug, otherwise signal pin-out will change and cause a system error.

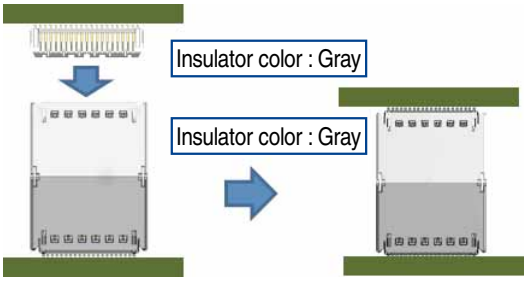


The interposer snaps onto the mounting plug as shown below.

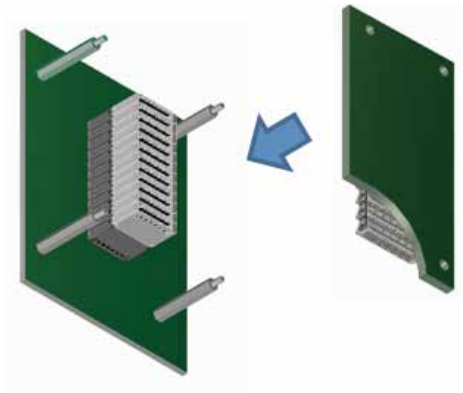


Daughter Card Installation

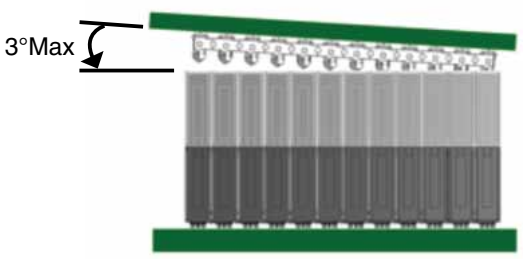
Insulator color of the datachable plug is gray, and the detachable plug must mate with the gray side of the interposer.



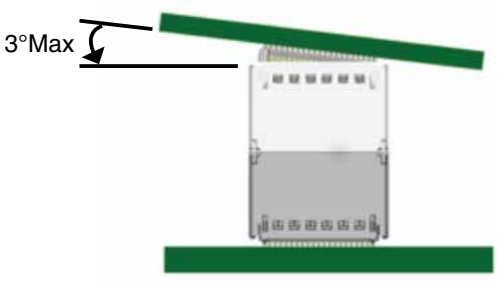
The spacers should be installed prior to the operation. The detachable plug shall be aligned with the interposer and pressed on as shown below.



In mating operation, 0° for following angles are preferred. In case keeping 0° is difficult, following maximum angles should not be exceeded during manual installation of the daughter card as shown below :



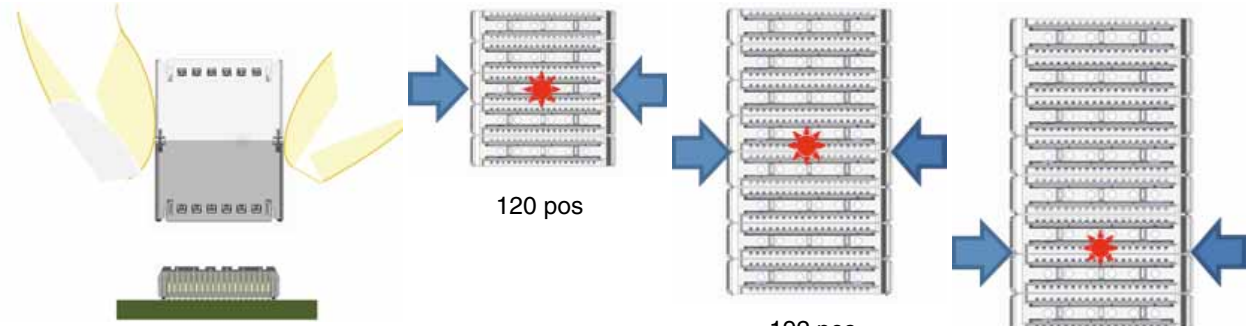
Longitudinal : 3°



Lateral : 3°

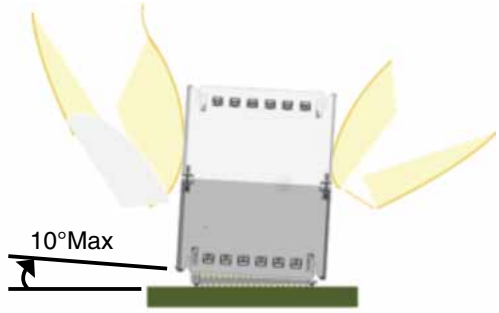
Interposer Removal

The removal of interposer shall be 5 times max. For removal, hold the Interposer on the walls as shown below. Also, please grab the walls close to the grabity center of the interposer to prevent tilting of the interposer during removal operation.

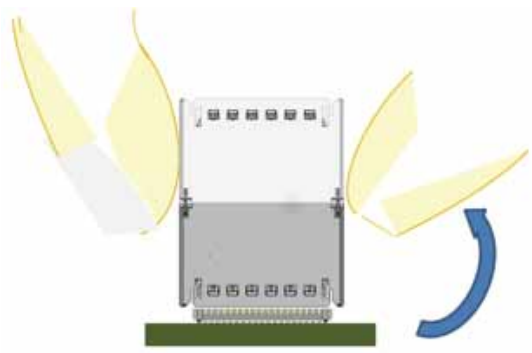


1) Hold the Interposer on the walls.

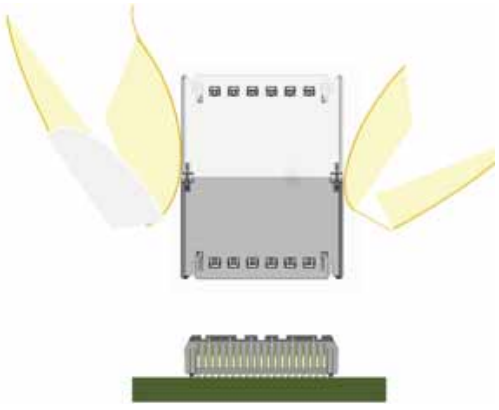
2) Gently rotate one side of the Interposer laterally 10° maximum



3) While gently rotating, pull up on other side of the Interposer.

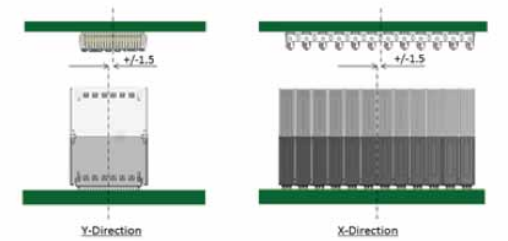


4) The Interposer is removed, and the Mounting Plug is ready to accept another Interposer.



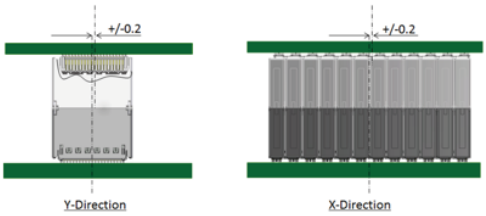
◆Mating Self Alignment

IT8 connector system have wide guiding taper for self alignment so that IT8 accept ±1.5mm tolerance in the both X-direction and Y-direction



◆Mating Tolerance

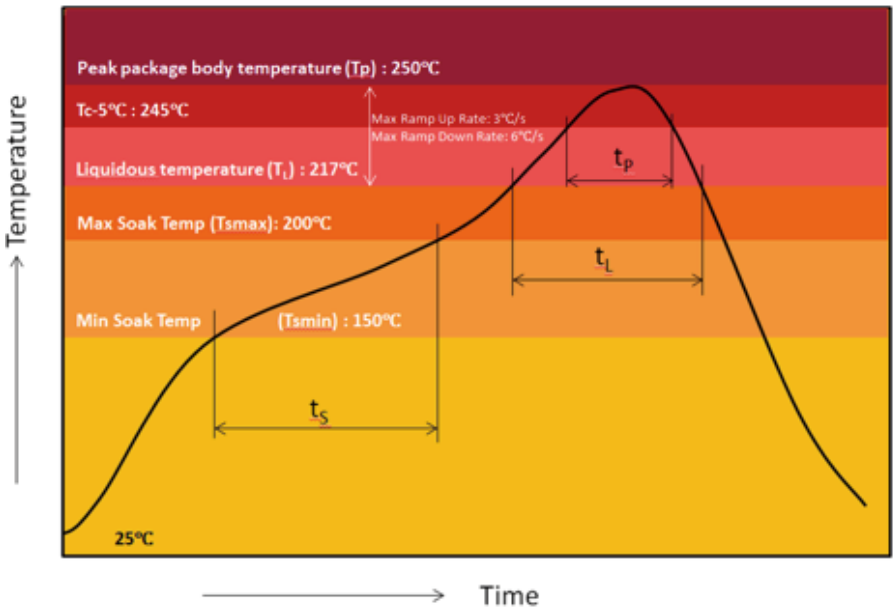
Due to its unique floating structure design, the IT8 connector system can accept mating tolerances of up to ±0.2mm tolerance in the both X-direction and Y-direction for multiple connector use.



◆Assembly Relow Soldering Profile

Profile Feature	Condition	Note
Preheat/Soak Temperature Min (Tsmin) Temperature Max (Tsmax) Time (ts) from (Tsmin to Tsmax)	150°C 200°C 60 to 120 seconds	Soak requirements determined by board design, oven capability, and paste activation requirements. Caution- “oversoaking” may exhaust flux and affect soldering.
Ramp-up rate (TL to Tp)	3°C/second max.	Other components may limit ramp rate to 2°C/sec.
Liquidous temperature (TL) Time (tL) maintained above TL	217°C 60 to 150 seconds	Shorter t_L may require higher peak temperature.
Peak package body temperature (Tp)	250°C max.	Cooler peak temperatures may require longer t_L. For users Tp must not exceed the Classification temp (Tc) of 250°C.
Time (tp)* within 5°C of the specified classification temperature (Tc)	30 seconds max.	
Ramp-down rate (Tp to TL)	6°C/second max.	
Package Body Exposure Limit at Maximum Temperature	5 seconds	Adjust profile if maximum exposure limits approached or exceeded.

All temperatures refer to the center of the connector body, measured on the connector body surface that is facing up during assembly reflow.
Reflow profiles in this document are basically according to IPC/JEDEC J-STD-020D. 1 and are for preconditioning.
Actual board assembly profiles should be developed based on specific process needs and board designs and should not exceed the parameters in upper Table.



Different solder pastes have different thermal performance characteristics.Consult with paste manufacturer for optimum profile setting.

◆Packaging Information

Please order per box with its Minimum Order Quantity (MOQ) of connectors contained.
The number for each configuration is shown below.

(Receptacle) IT8MB-∗∗∗S-BGA-∗∗H
(Plug) IT8M (or D) -∗∗∗P-BGA-∗H

Part No.	Quantity per Tray	Quantity per Box (3 trays + 1 rid *1)
IT8∗-120P (or S) -BGA-∗∗H	36pcs	108pcs
IT8∗-192P (or S) -BGA-∗∗H	24pcs	72pcs
IT8∗-288P (or S) -BGA-∗∗H	16pcs	48pcs

∗1 : The lid is an empty Tray or a specialized lid.

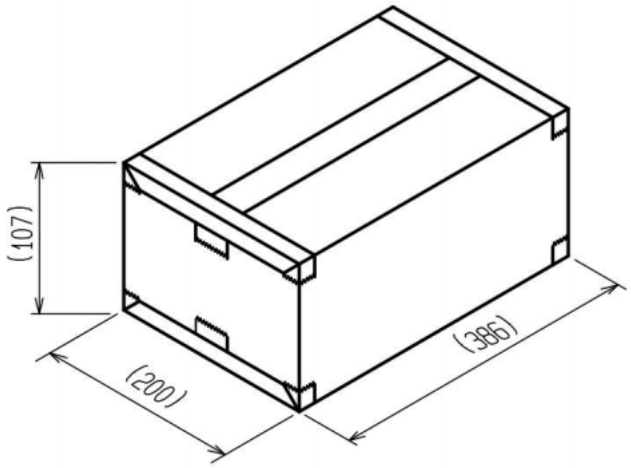
(Interposer) IT8-∗∗∗S-∗∗H

No. of Contacts	Quantity per Tray
120pos	36pcs
192pos	24pcs
288pos	16pcs

No. of Contacts	Quantity per Box (28 to 44H type) (1 trays + 1 rid *2)	Quantity per Box (14 to 25H type) (2 trays + 1 rid *2)
120pos	36pcs	72pcs
192pos	24pcs	48pcs
288pos	16pcs	32pcs

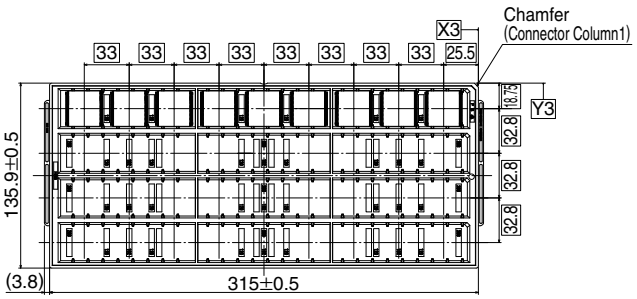
∗2 : The lid is a specialized lid.

◆Final Appearance of Packaging

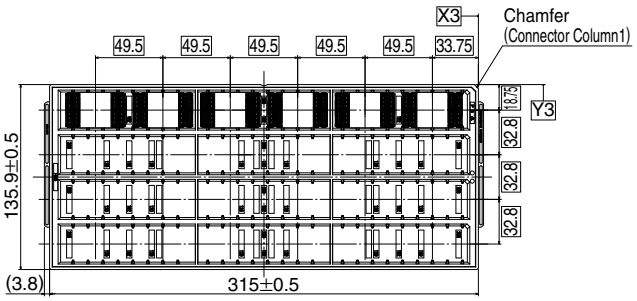


◆Tray dimensions

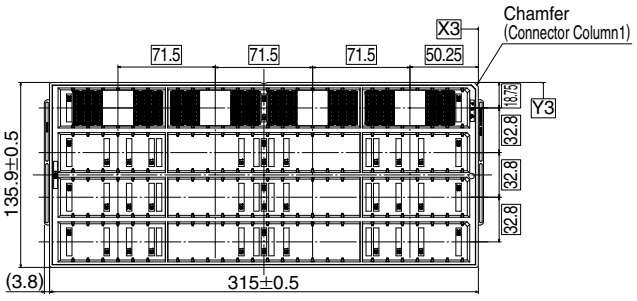
●Receptacle



IT8MB-120S-BGA-∗∗H

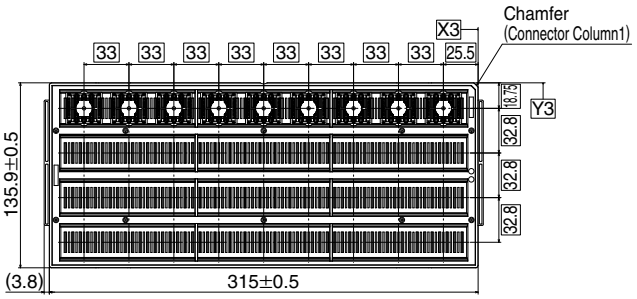


IT8MB-192S-BGA-∗∗H

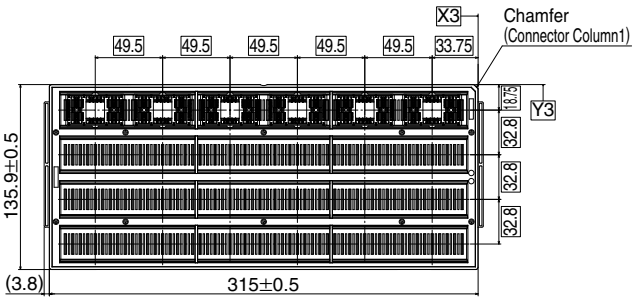


IT8MB-288S-BGA-∗∗H

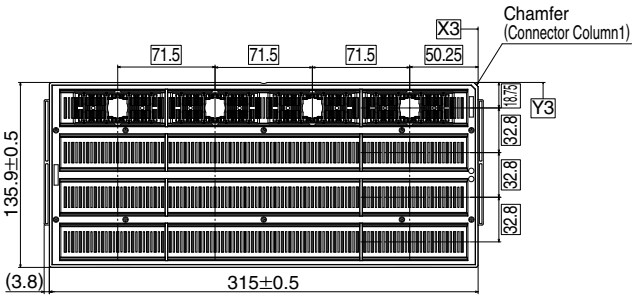
●Plug



IT8M (or D) -120P-BGA-∗H



IT8M (or D) -192P-BGA-∗H



IT8M (or D) -288P-BGA-∗H