

High-Speed 56+Gbps BGA Mezzanine Connectors

IT8 Series

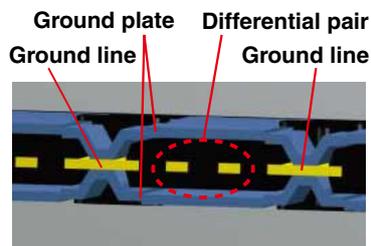
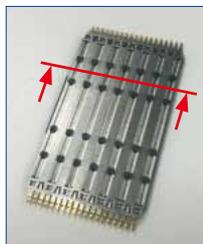


Overview

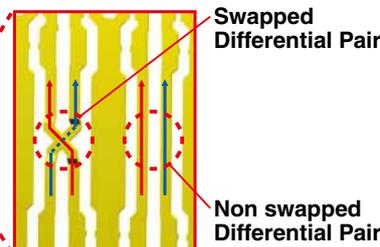
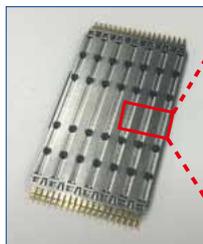
The IT8 mezzanine connector system was developed to enable 56Gbps performance with the highest signal density in the market, featuring Quasi-Coaxial Structure and Polarity-Swap FEXT cancelling technology. IT8 delivers the most reliable and flexible solution for your current and future needs to design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

Patented

Quasi-Coaxial Structure



Polarity-Swap FEXT cancelling technology



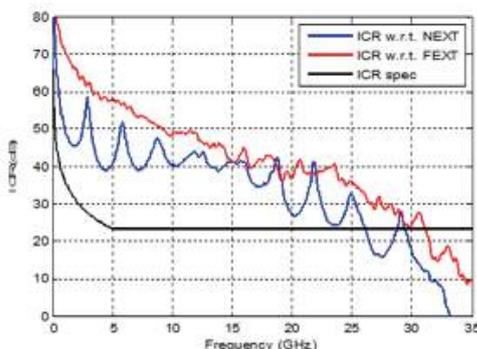
Mechanical Features

- 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
- 1.0x5.5mm BGA interface optimizes routing and SI performance
- 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

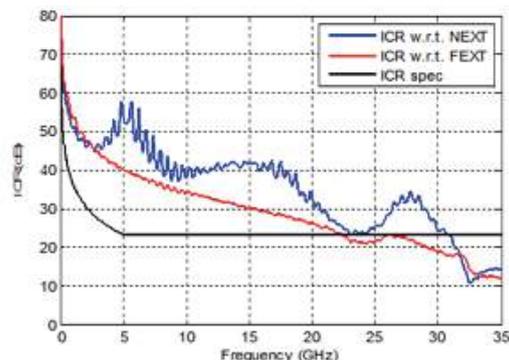
Signal Integrity Features

- 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

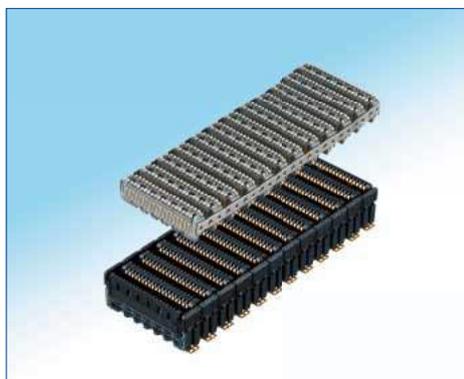


Stacking Height Variations

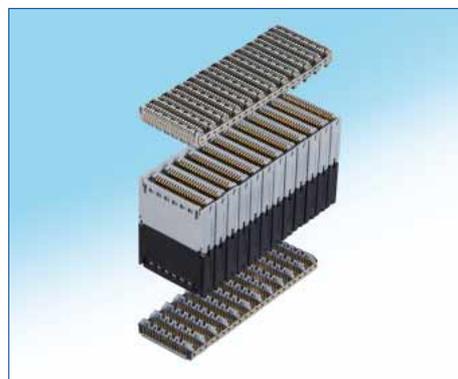
| Stacking Height Contact Position | Two-piece type | | | | Three-piece type | | | | | | | | | | | | | | | | | |
|-------------------------------------|----------------|-------|-------|-------|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| | 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 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | * | ✓ | ✓ | ✓ | * | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| Stacking Height Contact Position | Three-piece type | | | | | | | | | | | | | | | |
|-------------------------------------|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 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 : 0.1G ² /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 M - * P - BGA - *H**

① ② ③ ④ ⑤ ⑥

● Interposer

IT8 - * S - *H**

① ③ ④ ⑥

● Plug Detachable Side

IT8 D - * P - BGA - *H**

① ② ③ ④ ⑤ ⑥

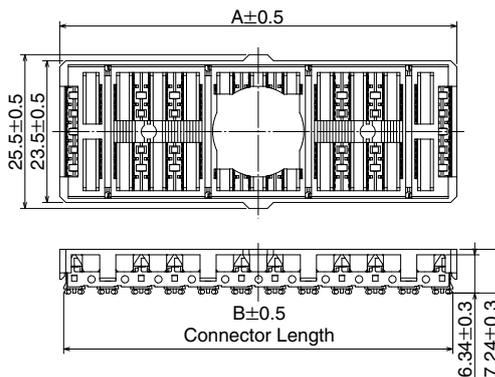
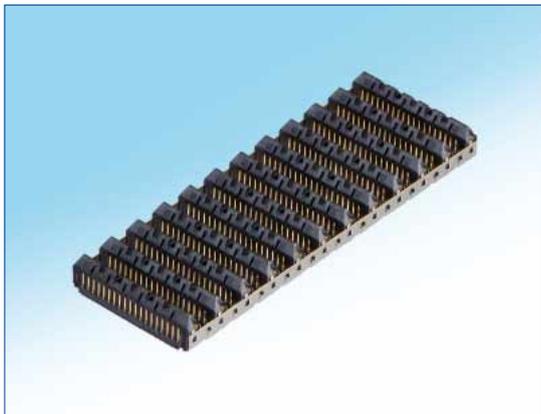
● Mounting Receptacle

IT8 MB - * S - BGA - *H**

① ② ③ ④ ⑤ ⑥

| |
|---|
| ① Series Name : IT8 |
| No Further Designation |
| ② Connector Type |
| IT8M-xxxP-BGA : Mounting Plug IT8D-xxxP-BGA : Detachable Plug IT8MB-xxxS-BGA : Mounting Receptacle |
| ③ Signal Contact Positions |
| 120, 192, 288 |
| ④ Connector Gender |
| S : Female (Receptacle or Interposer) P : Male (Plug) |
| ⑤ BGA : Ball Grid Array |
| No Further Designation |
| ⑥ 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 ; ⑥ Interposer + ⑥ Mounting Plug + ⑥ Detachable Plug > Two-piece type ; ⑥ Mounting Receptacle + ⑥ Detachable Plug |

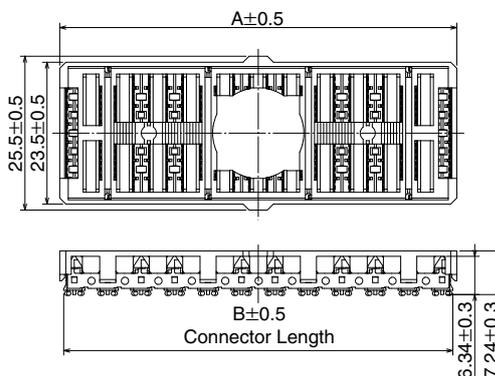
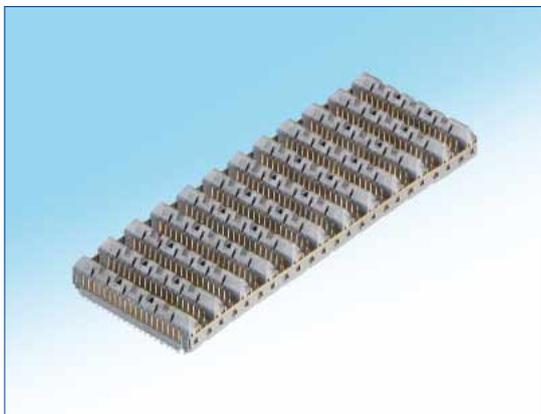
Plug



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 | | |

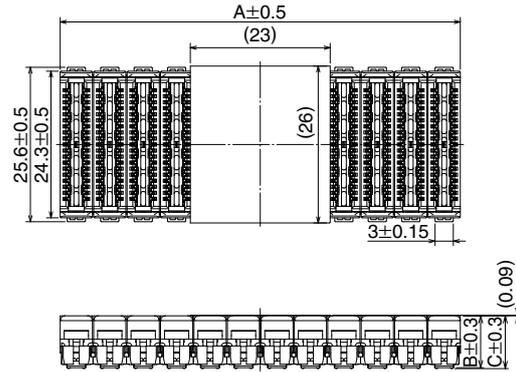
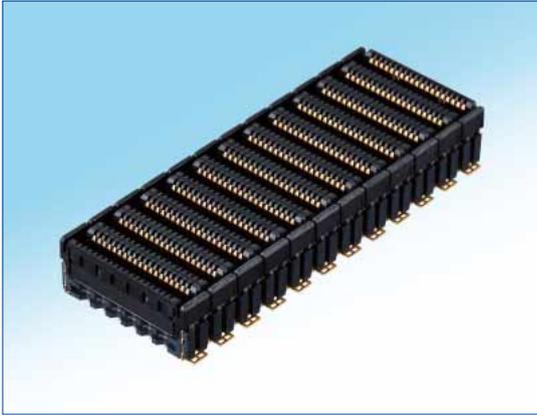


Note : Figure shows a product with a mounting cap.
Products are shipped with mounting caps attached.

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

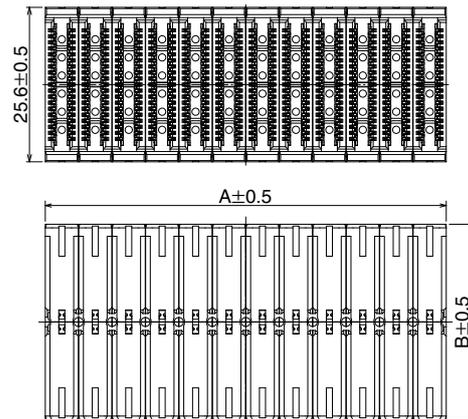


Note : Figure shows a product with a mounting tape.
Products are shipped with mounting tape attached.

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 |
|--------------------|---------------|---------------|-------|------|
| 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 | | |

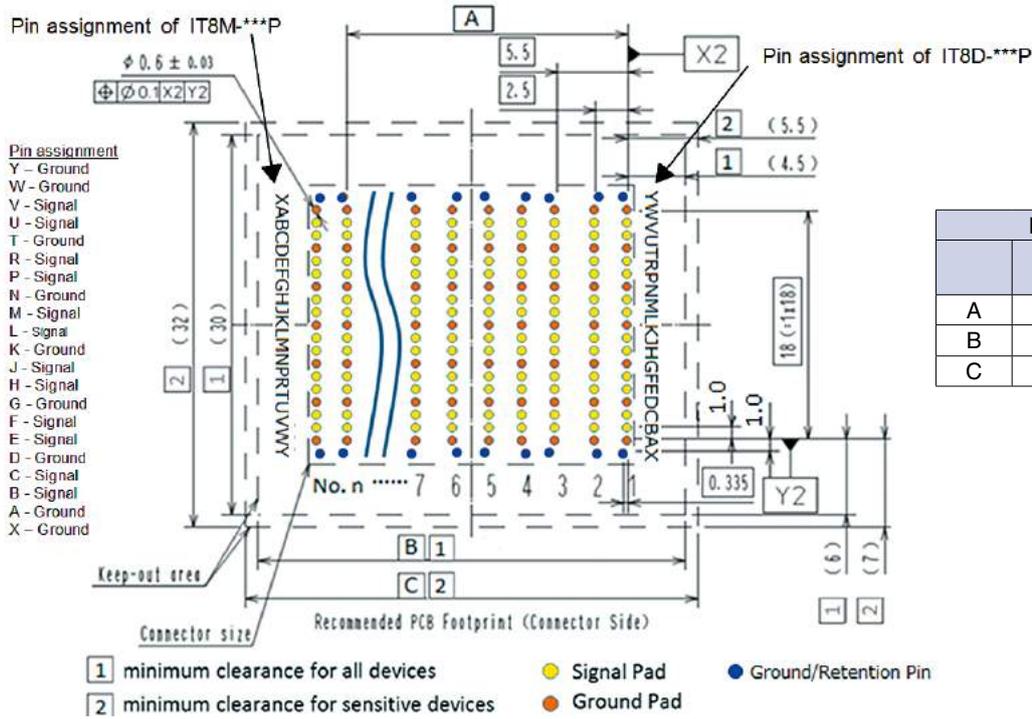
Unit : mm

| 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 | | |

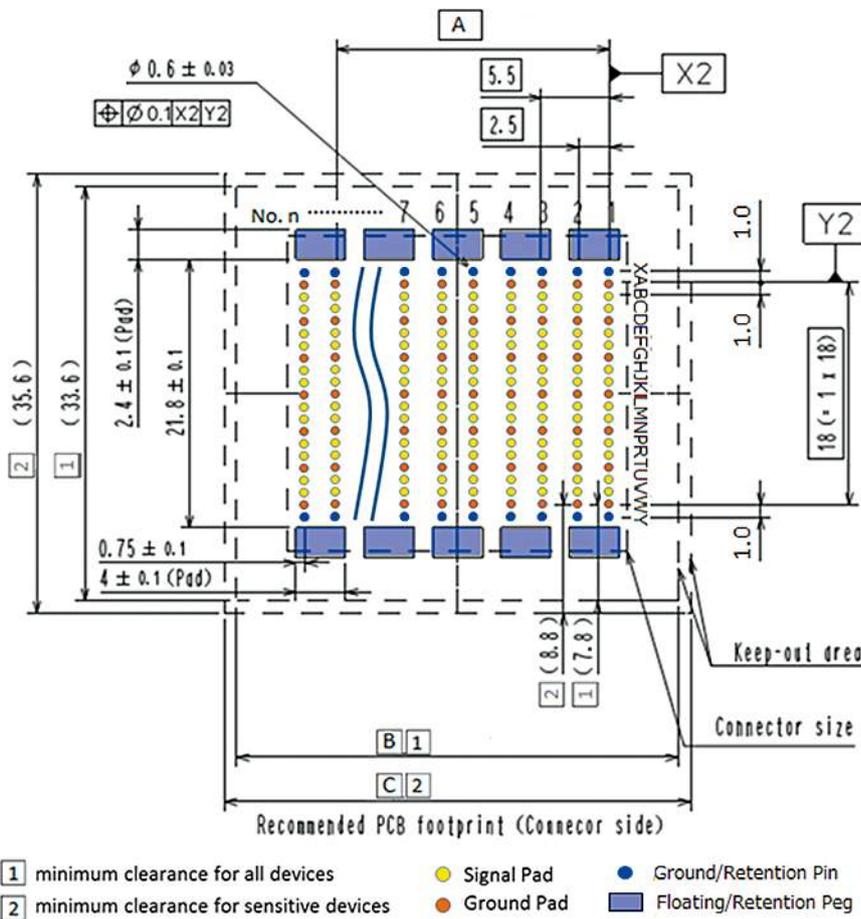
Unit : mm

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

Plug (IT8M (or D) -***P-BGA-*H)



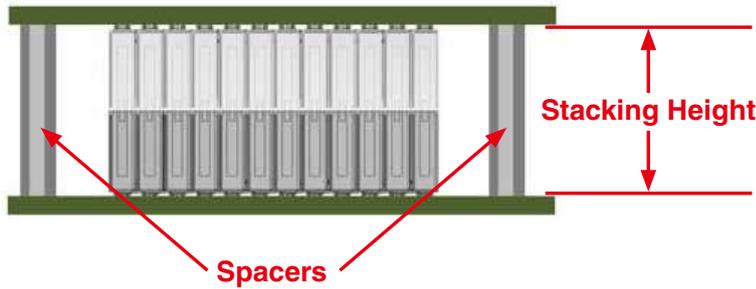
Receptacle (IT8MB-***S-BGA-*H)



◆ Spacers

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

Suggested spacer style is shown below :

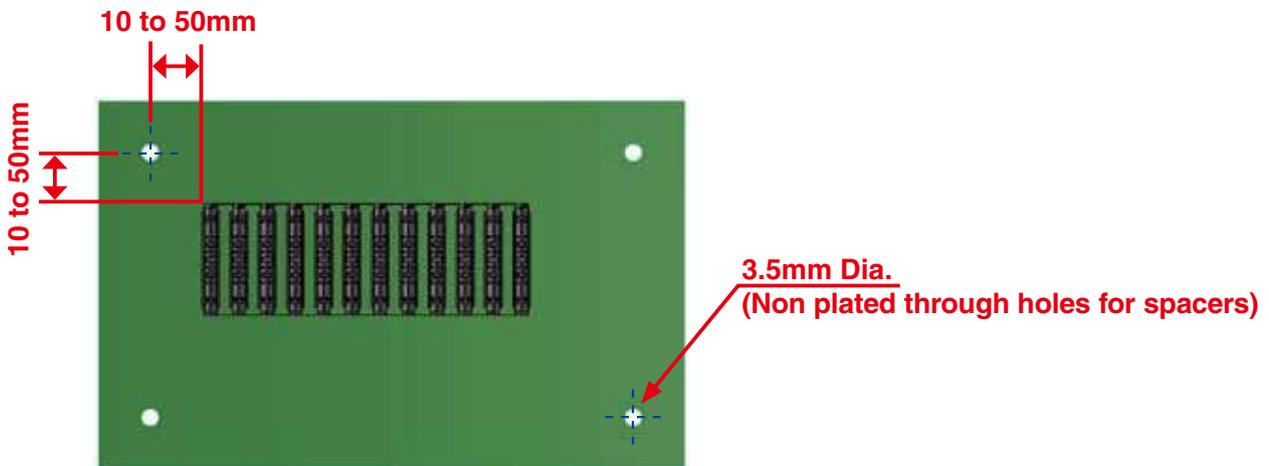


Spacer, male-male, M3 thread

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.



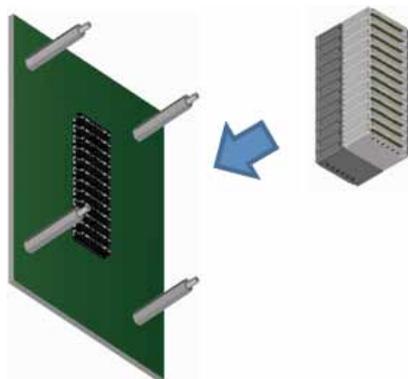
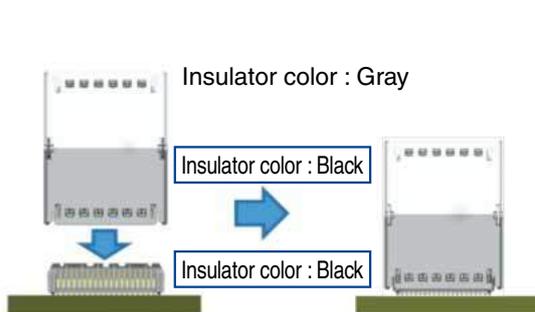
Four spacers located rectangularly or similar are required. Spacers should be located 10 to 50mm from the corners of the plugs or receptacles to prevent excessive mechanical loading on the interconnections.

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.

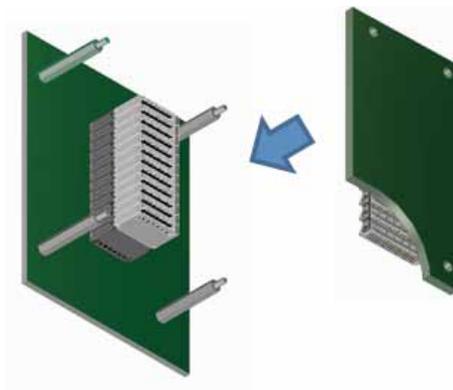
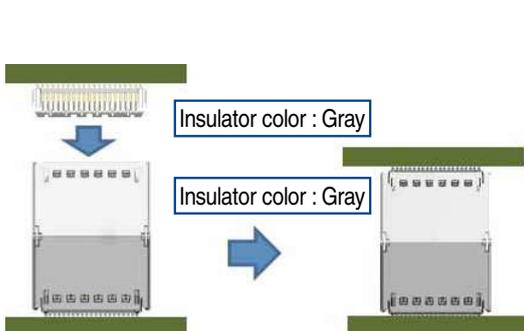
The interposer snaps onto the mounting plug as shown below.



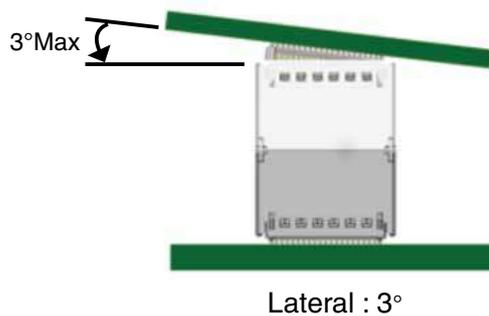
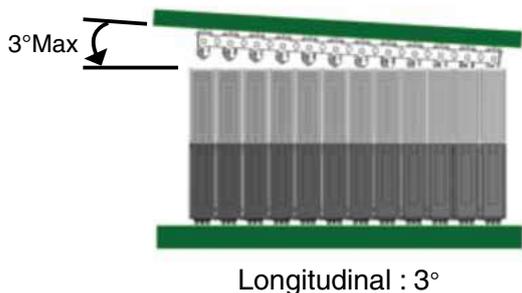
◆ Daughter Card Installation

Insulator color of the detachable 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.

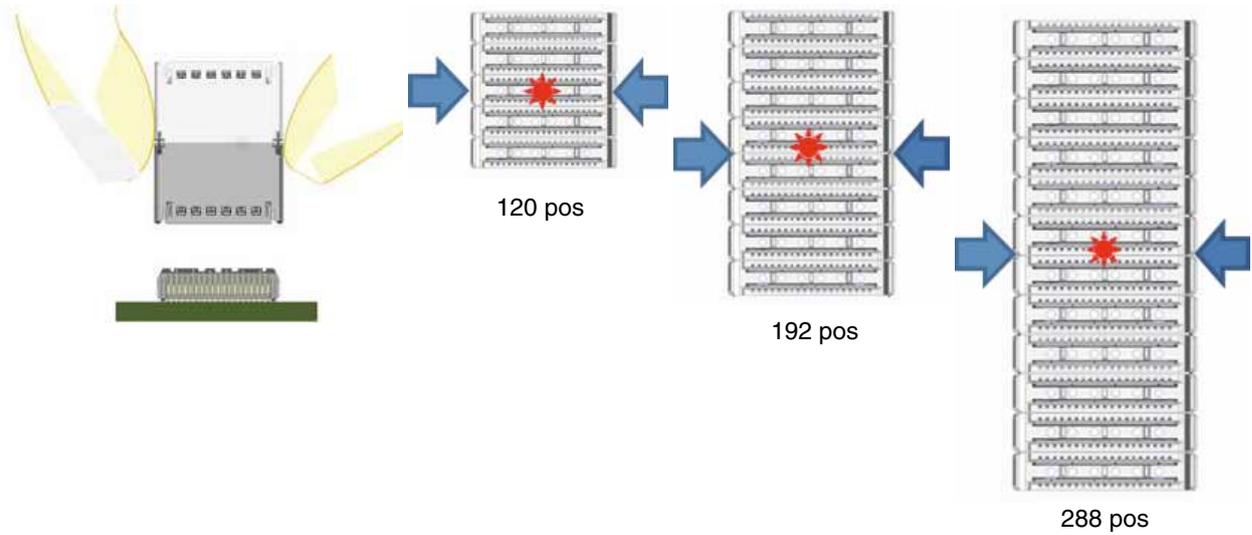


In mating operation, 0° for following angles are preferred. In case keeping 0° is difficult, following maximum angles should not be exceeded during manual installation of the daughter card as shown below :



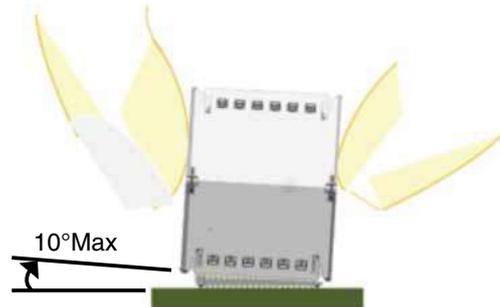
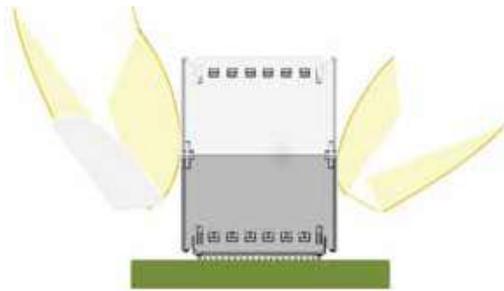
◆ Interposer Removal

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 gravity center of the interposer to prevent tilting of the interposer during removal operation.



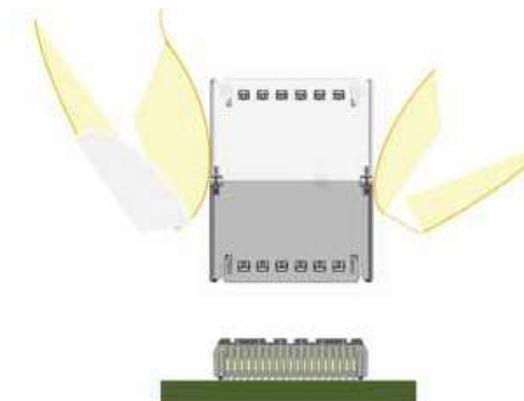
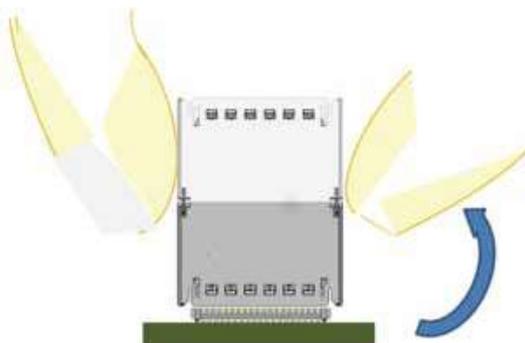
1) Hold the Interposer on the walls.

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



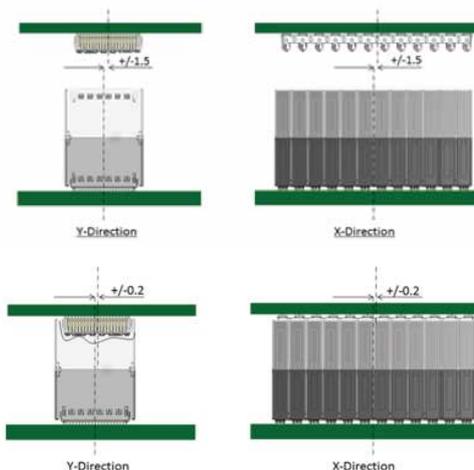
3) While gently rotating, pull up on other side of the Interposer.

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 $\pm 1.5\text{mm}$ tolerance in the both X-direction and Y-direction



◆ Mating Tolerance

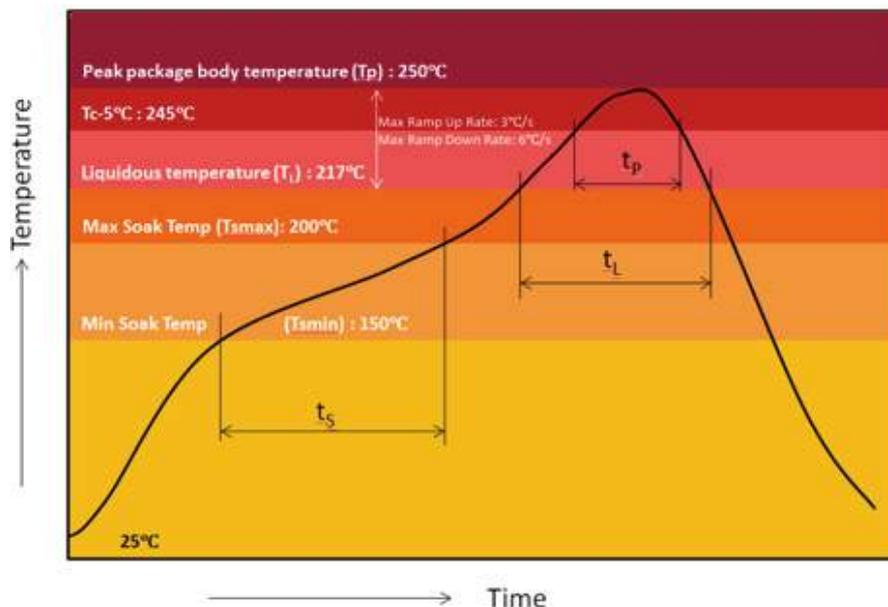
Due to its unique floating structure design, the IT8 connector system can accept mating tolerances of up to $\pm 0.2\text{mm}$ tolerance in the both X-direction and Y-direction for multiple connector use.

◆ Assembly Reflow Soldering Profile

| Profile Feature | Condition | Note |
|--|-------------------------------------|---|
| Preheat/Soak Temperature Min (T _{smin}) Temperature Max (T _{smax}) Time (ts) from (T _{smin} to T _{smax}) | 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.

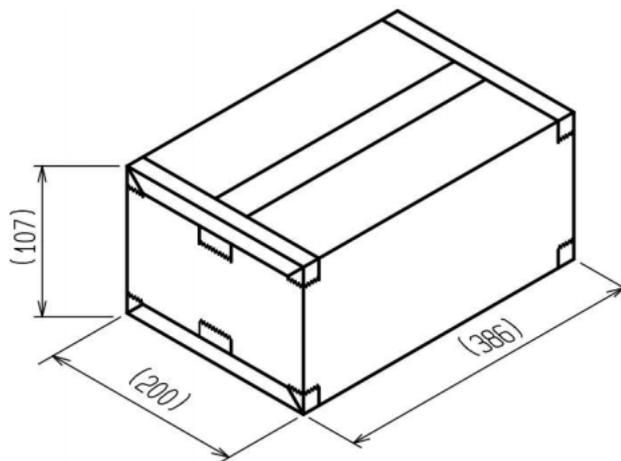
(Interposer) IT8-*S-***H**

| 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.

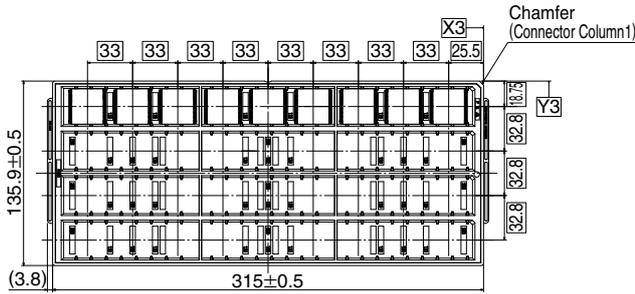
◆ Final Appearance of Packaging



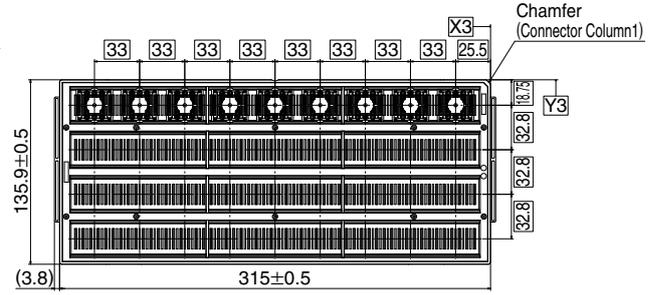
◆ Tray dimensions

● Receptacle

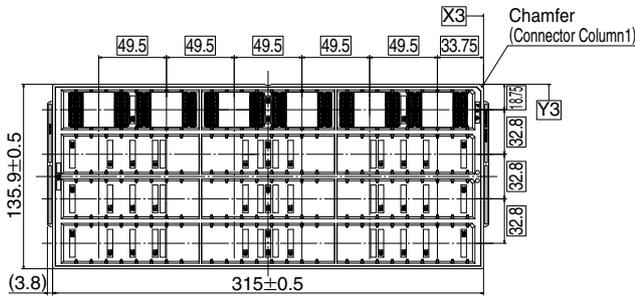
● Plug



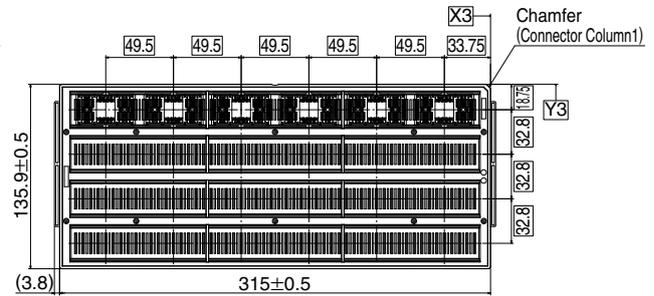
IT8MB-120S-BGA-***H



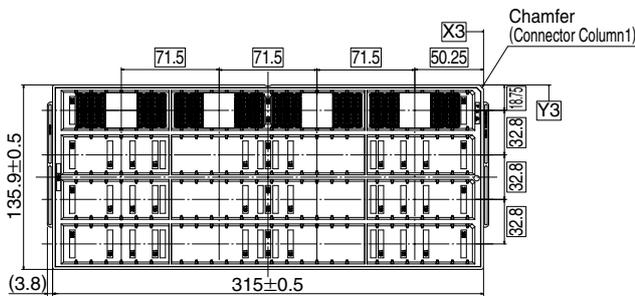
IT8M (or D) -120P-BGA-***H



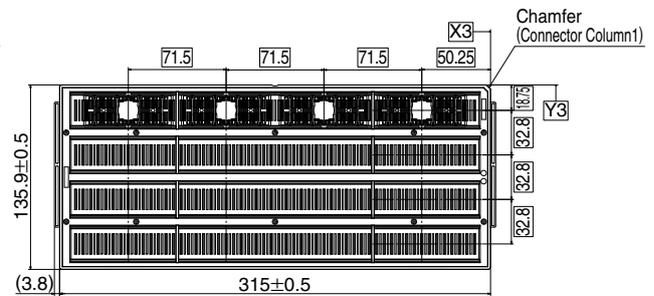
IT8MB-192S-BGA-***H



IT8M (or D) -192P-BGA-***H



IT8MB-288S-BGA-***H



IT8M (or D) -288P-BGA-***H

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