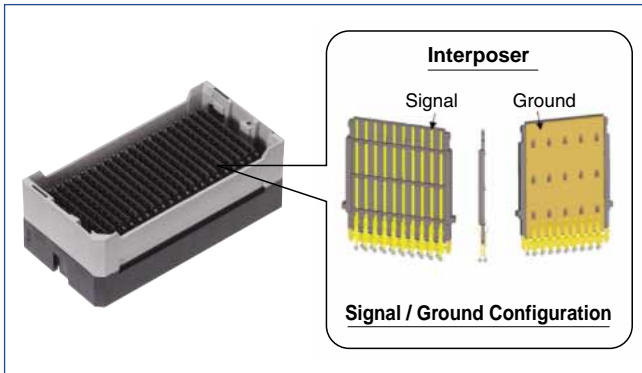
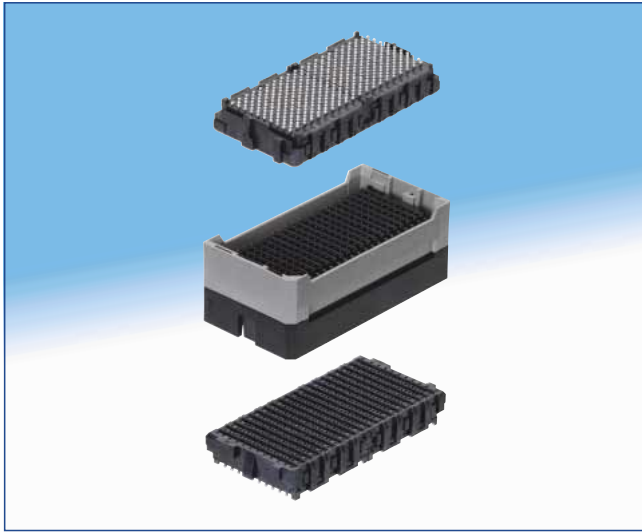


High-Speed(10+Gbps) BGA Mezzanine Connectors

IT3 Series



Flexibility

Hirose's IT3 mezzanine connector system is as comfortable in today's data rates of PCIe and XAUI as it is in tomorrow's 10+Gbps systems.

With the ability to transmit differential, single-ended, and power through one package and being stackable from 15 – 40mm, IT3 can solve your interface needs for both current and future generations.

Mechanical features

- Unique 3-piece structure for flexibility
- Stacking heights from 15 to 40mm (*15mmH is 2-piece)
- Staggered 1.5mm × 1.75mm ball grid array
- Number of Contacts: 100, 200, & 300 signals + 90% additional grounds
- Differential, single-ended, and power
- Low mating/extracting forces
- Wide misalignment tolerances for multiple connector use
- Both of SnPb and Pb-free are available
- Excellent reflow solderability

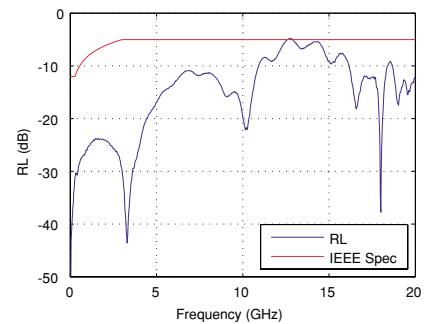
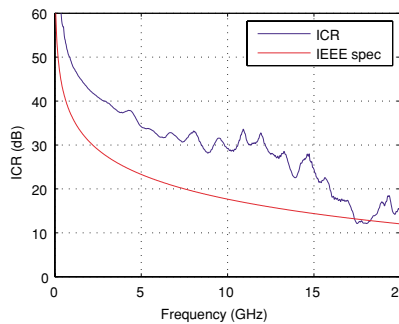
Signal integrity features

Insertion loss to Crosstalk Ratio (ICR)

The ICR performance meets the extrapolated IEEE 802.3ap specification for 6.25Gbps with fully-populated pin assignment, and 10+Gbps with skipped pin assignment.

Return Loss

The differential return loss meets the extrapolated IEEE 802.3ap specification up to 12GHz.



Stacking height variations

| Stacking Height / Contact Position | 17mm | 20mm | 22mm | 25mm | 26mm | 28mm | 30mm | 32mm | 38mm | 40mm |
|------------------------------------|------|------|------|------|------|------|------|------|------|------|
| 100 | * | ✓ | * | ✓ | ✓ | ✓ | * | * | ✓ | ✓ |
| 200 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 300 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

* : Under planning

■ Product Specifications

| | | |
|--------|---|--|
| Rating | Current Rating: 1.0A / pin (note 1) | Operating Temperature Range: -55°C to +85°C Operating Humidity Range: For relative humidity, 90% max (no condensation is permitted) |
| | Voltage Rating: 50Vrms | |
| | Storage Temperature Range: -10°C to +60°C | |

| Item | Specification | Conditions |
|------------------------------------|---|---|
| 1. Insulation Resistance | 1000MΩ min. | 100V DC |
| 2. Withstanding Voltage | No flashover or insulation breakdown | 150V duty for 60 seconds (2mA max leak) |
| 3. Contact Resistance | 50mΩ max. (height 15-24mm) (note 2) 55mΩ max. (height 25-32mm) 60mΩ max. (height 33-40mm) | 100mA |
| 4. Vibration | 1) No electrical discontinuity of 1μs or more 2) No damage, crack, or loose part | Frequency: 20 to 500Hz; power spectrum density: 0.02G ² /Hz Overall rms G: 3.1 Grms; for 15 minutes in three directions |
| 5. Cyclic Temperature and Humidity | 1) Contact resistance change: 20mΩ or less 2) Insulation resistance: 100MΩ min. 3) 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 |
| 6. Durability (Mating/Un-mating) | 1) Contact resistance change: 20mΩ or less 2) No damage, crack or loose part | 100 cycles |

Note1: Refer to IT3 derating curves on test report TR636E-20041 for power application.

Note2: The value of contact resistance includes 2 contact points and the bulk resistance.

■ Material Information

● Receptacle

| Component | Material | Finish & Remarks |
|--------------|-----------------|--|
| Housing | LCP | Black , UL 94V-0 |
| Locator | LCP | Black , UL 94V-0 |
| Contact | Copper Alloy | Contact Area : Gold (0.76 μm) over Nickel (1.5 μm) Mounting Area : Gold (0.03 μm) over Nickel (1.5 μm) Other : Nickel (1.5 μm) |
| Solder Ball | Tin-Lead (SnPb) | Sn(63)-Pb(37) |
| | Tin (Pb-Free) | Sn(96.5)-Ag(3)-Cu(0.5) |
| Tray | Polystyrene | Black |
| Pick Up Cap | Stainless steel | 300pos |
| Pick Up Tape | Paper (Nomex) | 100pos and 200pos |

● Interposer

| Component | Material | Finish & Remarks |
|--------------------------------|---------------|--|
| Guide (Mounting Side) | PBT | Black , UL 94V-0 |
| Guide (Detachable/Mating Side) | LCP | Gray , UL 94V-0 |
| | PBT | Gray , UL 94V-0 |
| Blade | LCP | Black , UL 94V-0 |
| Contact | Copper Alloy | Contact Area : Gold (0.76 μm) over Nickel (1.5 μm) |
| Ground Shield | Copper Alloy | Other : Nickel (1.5 μm) |
| Tray | Polypropylene | — |

■Ordering Information

●Receptacle

IT 3 ** - * S - BGA ** (**)**

① ② ③ ④ ⑤ ⑥ ⑦

●Interposer

IT 3 ** - * P - ** H ** (**)**

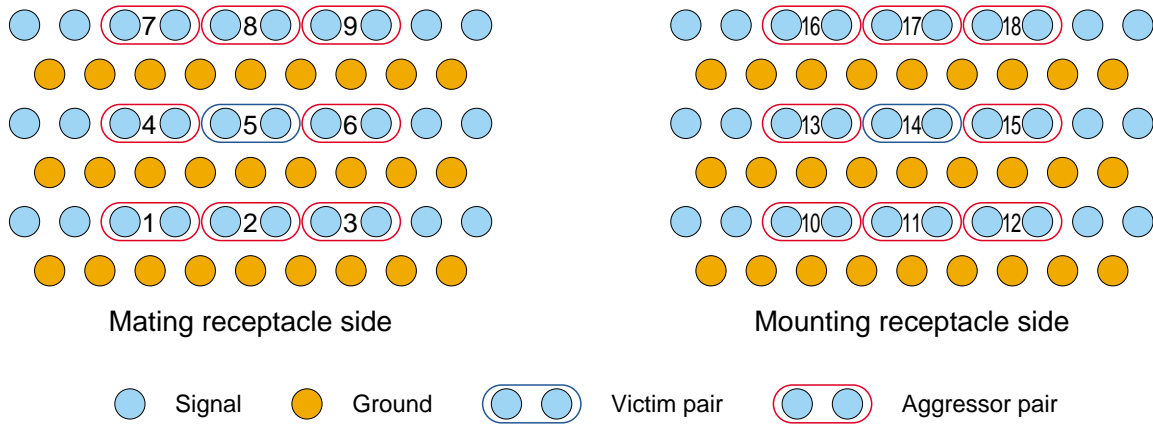
① ② ③ ④ ⑧ ⑥ ⑨

| | |
|---|--|
| ① Series name : IT3 | ⑤ BGA : Ball Grid Array |
| ② Receptacle Type D : Mating Receptacle D* : Mating Receptacle (Customized) M : Mounting Receptacle M* : Mounting Receptacle (Coustomized) Interposer Type Blank: Standard ** : Customized | ⑥ Package Specification Blank : Standard ** : Customized |
| ③ Contact Positions : 100, 180*, 200, 300 *180 pos. is 2 columns depopulated version for higher voltage proof. | ⑦ Material and Plating Specification of Receptacle (37) : Pb-free Solder Sn(96.5)-Ag(3.0)-Cu(0.5) Contact Area : Au(0.76μm)+Ni(1.5μm) (57) : Eutectic Solder Sn(63)-Pb(37) Contact Area : Au(0.76μm)+Ni(1.5μm) |
| ④ Connector type S : Receptacle P : Interposer | ⑧ Stacking Height (mm) 17, 20, 22, 25, 26, 28, 30, 32, 38, 40 ⑨ Plating Specification of Interposer (03) : Contact Area : Au(0.76μm)+Ni(1.5μm) |

Signal Integrity

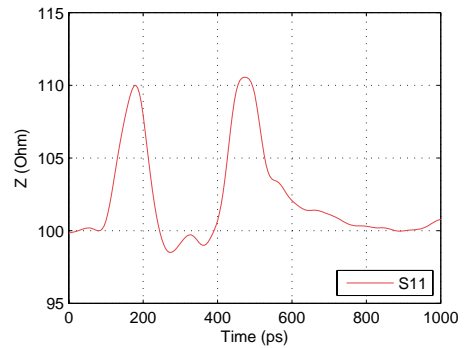
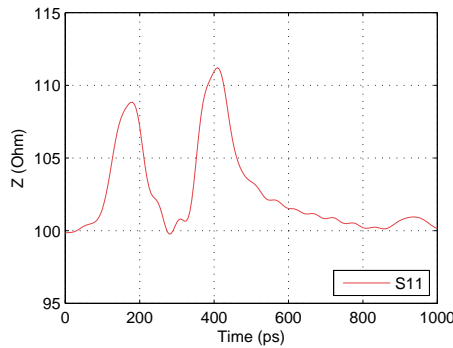
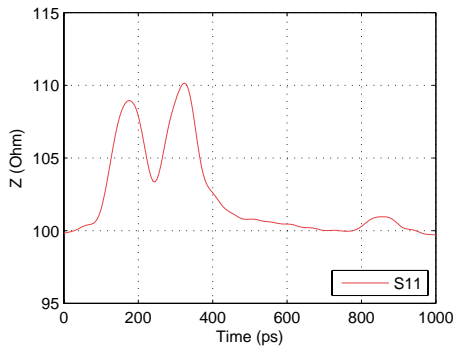
Pin assignment

For the fully-populated pin assignment, adjacent pins are grouped into differential pairs as shown in the figures below. In the following data, one victim pair and eight aggressor pairs are included.



Impedance profile at 60ps rise time (20-80%)

The impedance profiles (of connector only) for the center pair are shown below. The IT3 receptacles are designed with higher impedance to offset the via's low impedance.

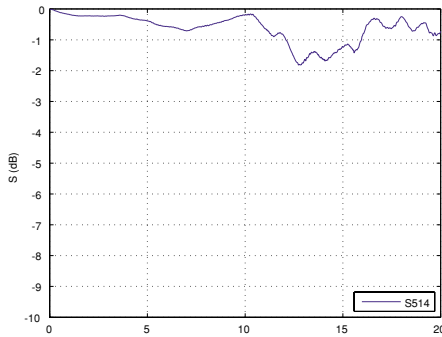


Differential propagation delay

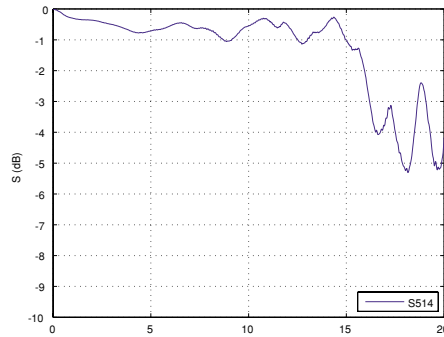
| | | | |
|----------------------|--------|--------|--------|
| Stacking Height (mm) | 17 | 25 | 32 |
| Delay (ps) | 101.05 | 146.69 | 188.48 |

● **Differential Insertion Loss**

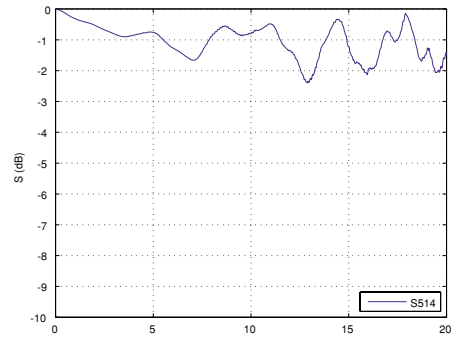
The differential insertion loss is less than -2dB up to 12GHz.



17mm Height



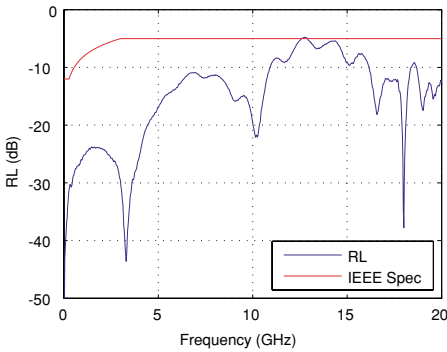
25mm Height



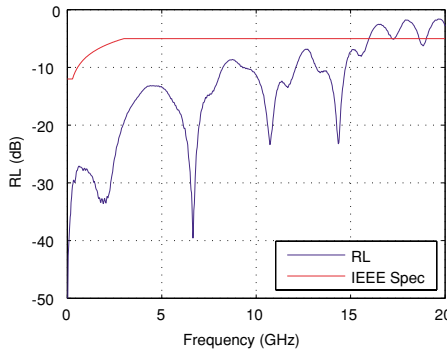
32mm Height

● **Differential Return Loss**

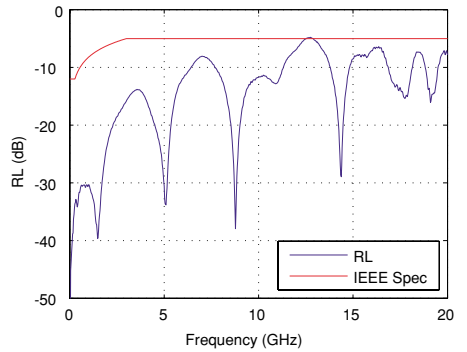
The connector-only differential return loss for the center pair meets the extrapolated IEEE 802.3ap spec up to 12GHz. (The attenuation of PCB traces in the channel will give an even larger margin.)



17mm Height



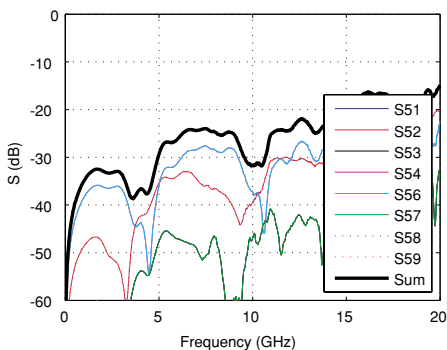
25mm Height



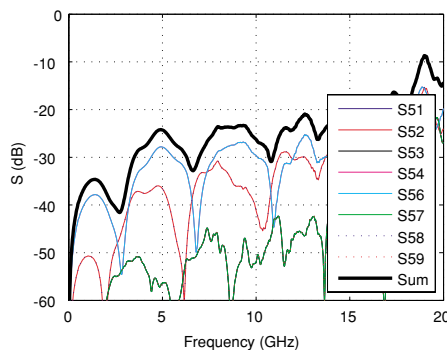
32mm Height

● **Differential Near-End Crosstalk (NEXT)**

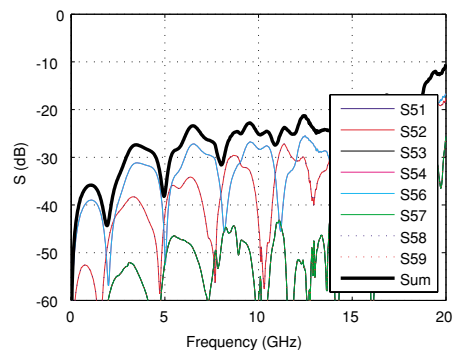
The near-end crosstalk at the center pair from surrounding 8 aggressors is shown below. The NEXT is not as critical because TX and RX can be grouped into separate wafers.



17mm Height



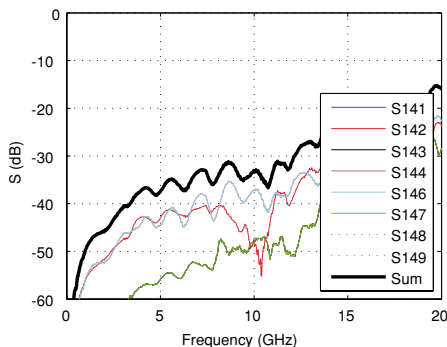
25mm Height



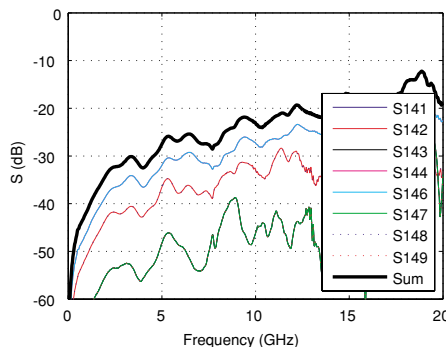
32mm Height

● Differential Far-End Crosstalk (FEXT)

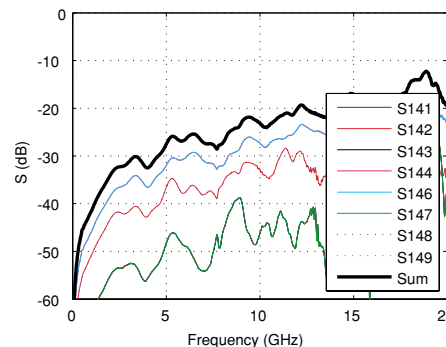
Low far-end crosstalk at the center pair from surrounding 8 aggressors is observed. Even lower crosstalk can be achieved by skipping pins.



17mm Height



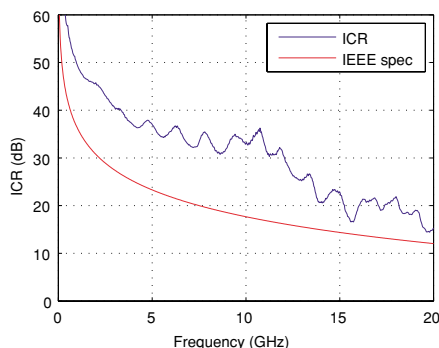
25mm Height



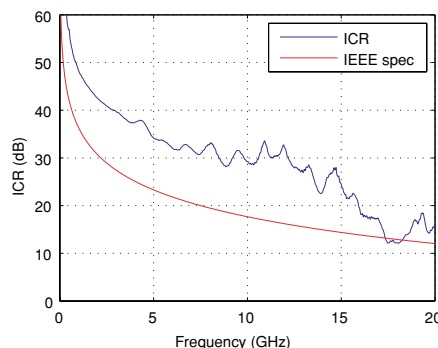
32mm Height

● Insertion-Loss-to-Crosstalk-Ratio (ICR) for FEXT

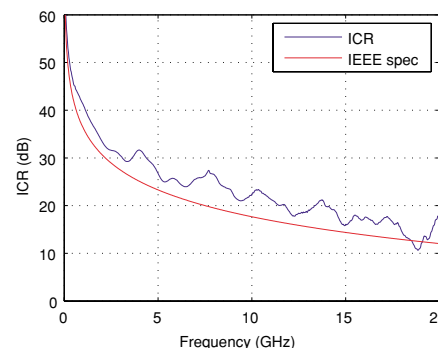
The insertion-loss-to-crosstalk-ratio (ICR) for 8-aggressor FEXT meets the extrapolated IEEE 802.3ap specification up to 12GHz.



17mm Height

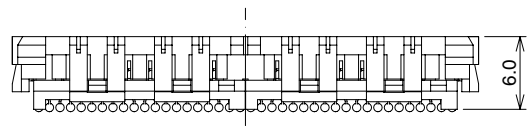
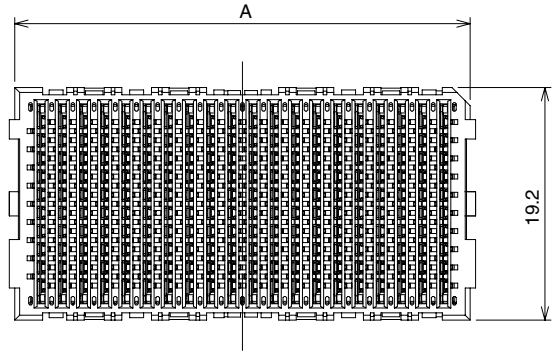
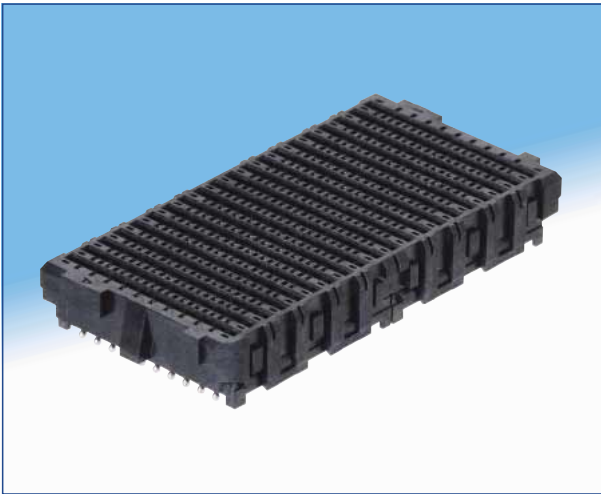


25mm Height



32mm Height

Receptacle

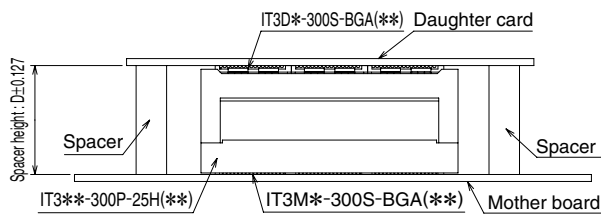
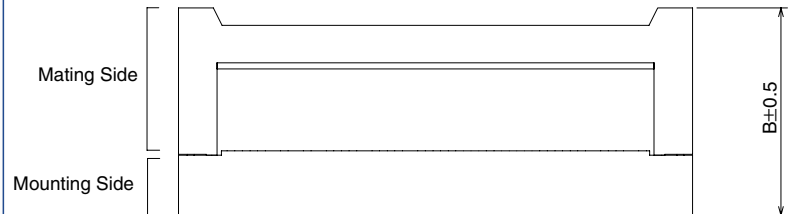
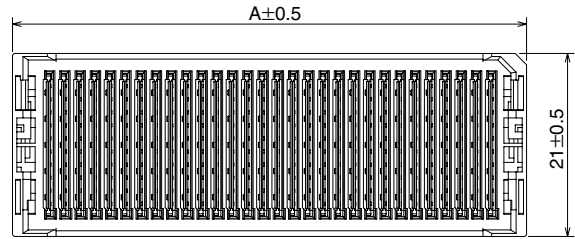


Shown: 200 position mating receptacle, IT3M-200S-BGA

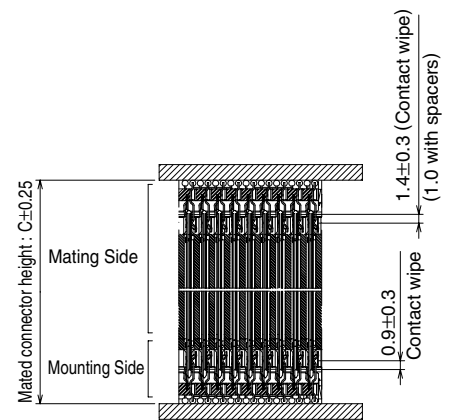
*Unit: mm

| Contact Positions | Type | Solder Ball Material | Part Number | CL No. | A |
|----------------------------------|---------------------|-------------------------|--------------------|---------------|------|
| 100 (100 signals/90 grounds) | Mating Receptacle | Pb-free (SAC305) solder | IT3D-100S-BGA(37) | 636-0013-1-37 | 21.0 |
| | | SnPb solder | IT3D-100S-BGA(57) | 636-0013-1-57 | |
| | Mounting Receptacle | Pb-free (SAC305) solder | IT3M-100S-BGA(37) | 636-0014-4-37 | |
| | | SnPb solder | IT3M-100S-BGA(57) | 636-0014-4-57 | |
| 180 (180 signals/162 grounds) | Mating Receptacle | Pb-free (SAC305) solder | IT3D2-180S-BGA(37) | 636-0011-6-37 | 38.5 |
| | | SnPb solder | IT3D2-180S-BGA(57) | 636-0011-6-57 | |
| | Mounting Receptacle | Pb-free (SAC305) solder | IT3M2-180S-BGA(37) | 636-0012-9-37 | |
| | | SnPb solder | IT3M2-180S-BGA(57) | 636-0012-9-57 | |
| 200 (200 signals/180 grounds) | Mating Receptacle | Pb-free (SAC305) solder | IT3D-200S-BGA(37) | 636-0003-8-37 | 38.5 |
| | | SnPb solder | IT3D-200S-BGA(57) | 636-0003-8-57 | |
| | Mounting Receptacle | Pb-free (SAC305) solder | IT3M-200S-BGA(37) | 636-0004-0-37 | |
| | | SnPb solder | IT3M-200S-BGA(57) | 636-0004-0-57 | |
| 300 (300 signals/270 grounds) | Mating Receptacle | Pb-free (SAC305) solder | IT3D-300S-BGA(37) | 636-0007-9-37 | 56.0 |
| | | SnPb solder | IT3D-300S-BGA(57) | 636-0007-9-57 | |
| | Mounting Receptacle | Pb-free (SAC305) solder | IT3M-200S-BGA(37) | 636-0008-1-37 | |
| | | SnPb solder | IT3M-200S-BGA(57) | 636-0008-1-57 | |

Interposer



Mating condition with spacers



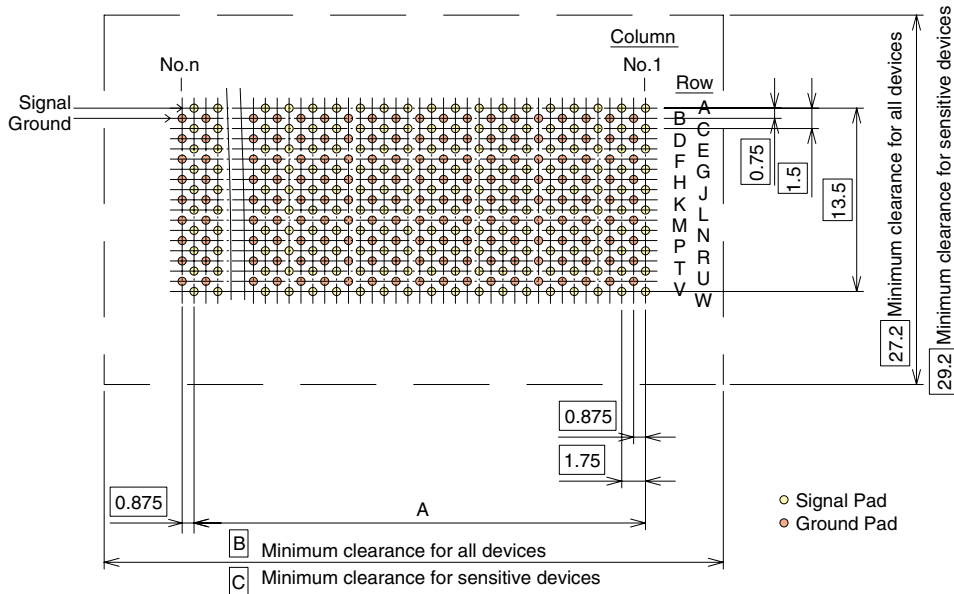
Mating Cross Section(FREE)

Mating condition without spacers

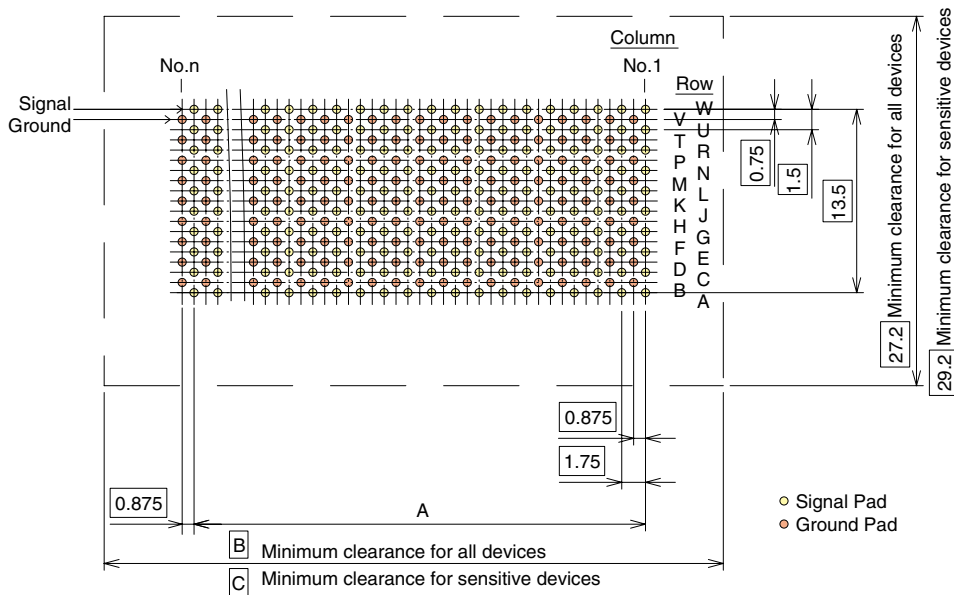
*Unit: mm

| Height (mm) | Part Number | CL No. | A | B | C | D | Height (mm) | Part Number | CL No. | A | B | C | D |
|-------------|--------------------|---------------|------|------|------|------|------------------|--------------------|---------------|------|------|------|------|
| 17 | IT3-200P-17H(03) | 636-0100-4-03 | 41.5 | 15.8 | 16.6 | 17.0 | 28 | IT3-100P-28H(03) | 636-0170-0-03 | 24.0 | 26.8 | 27.6 | 28.0 |
| | IT3-300P-17H(03) | 636-0130-5-03 | 59.0 | | | | | IT3M2-180P-28H(03) | 636-0107-3-03 | 41.5 | | | |
| 20 | IT3-100P-20H(03) | 636-0223-4-03 | 24.0 | 18.8 | 19.6 | 20.0 | | IT3-200P-28H(03) | 636-0105-8-03 | 41.5 | | | |
| | IT3-200P-20H(03) | 636-0224-7-03 | 41.5 | | | | | IT3-300P-28H(03) | 636-0140-9-03 | 59.0 | | | |
| | IT3-300P-20H(03) | 636-0225-0-03 | 59.0 | | | | | IT3-200P-30H(03) | 636-0180-3-03 | 41.5 | | | |
| 22 | IT3-200P-22H(03) | 636-0209-3-03 | 41.5 | 20.8 | 21.6 | 22.0 | | IT3-300P-30H(03) | 636-0185-7-03 | 59.0 | 30.8 | 31.6 | 32.0 |
| | IT3-300P-22H(03) | 636-0210-2-03 | 59.0 | | | | IT3-200P-32H(03) | 636-0115-1-03 | 41.5 | | | | |
| | IT3-100P-25H(03) | 636-0150-2-03 | 24.0 | | | | IT3-300P-32H(03) | 636-0145-2-03 | 59.0 | | | | |
| 25 | IT3M2-180P-25H(03) | 636-0157-1-03 | 41.5 | 23.8 | 24.6 | 25.0 | IT3-100P-38H(03) | 636-0200-9-03 | 24.0 | 36.8 | 37.6 | 38.0 | |
| | IT3-200P-25H(03) | 636-0155-6-03 | 41.5 | | | | IT3-200P-38H(03) | 636-0195-0-03 | 41.5 | | | | |
| | IT3-300P-25H(03) | 636-0160-6-03 | 59.0 | | | | IT3-300P-38H(03) | 636-0190-7-03 | 59.0 | | | | |
| 26 | IT3-100P-26H(03) | 636-0165-0-03 | 24.0 | 24.8 | 25.6 | 26.0 | IT3-100P-40H(03) | 636-0230-0-03 | 24.0 | 38.8 | 39.6 | 40.0 | |
| | IT3-200P-26H(03) | 636-0110-8-03 | 41.5 | | | | IT3-200P-40H(03) | 636-0227-5-03 | 41.5 | | | | |
| | IT3-300P-26H(03) | 636-0135-9-03 | 59.0 | | | | IT3-300P-40H(03) | 636-0175-3-03 | 59.0 | | | | |

PCB footprint (mounting foot pattern)



Mounting Receptacle – IT3M



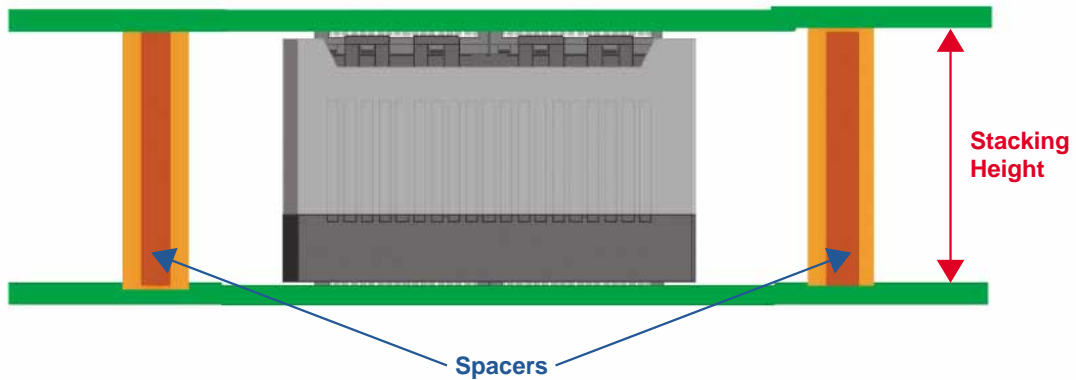
Mating Receptacle – IT3D

*Unit: mm

| Dimension (mm) | 100 | 180 / 200 | 300 |
|----------------|-------|-----------|-------|
| A | 15.75 | 33.25 | 50.75 |
| B | 28.10 | 45.60 | 63.10 |
| C | 30.10 | 47.50 | 65.10 |

Spacers

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



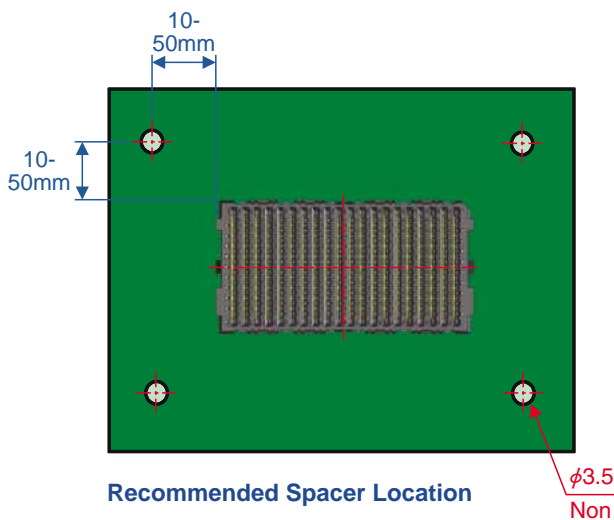
Suggested spacer style is shown below:



Spacer, male-male, M3 thread

The recommended spacer height corresponds to the interposer stacking height as shown in the chart below:

| Stacking Height | Recommended Spacer Height |
|-----------------|---------------------------|
| 17 mm | 17 +/-0.127 mm |
| 20 mm | 20 +/-0.127 mm |
| 22 mm | 22 +/-0.127 mm |
| 25 mm | 25 +/-0.127 mm |
| 26 mm | 26 +/-0.127 mm |
| 28 mm | 28 +/-0.127 mm |
| 30 mm | 30 +/-0.127 mm |
| 32 mm | 32 +/-0.127 mm |
| 38 mm | 38 +/-0.127 mm |
| 40 mm | 40 +/-0.127 mm |



Recommended Spacer Location

φ3.5
Non plated through hole

Two spacers located diagonally are minimally required. Some applications may require 4 spacers. Spacers should be located 10 – 50 mm from the corners of the 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.

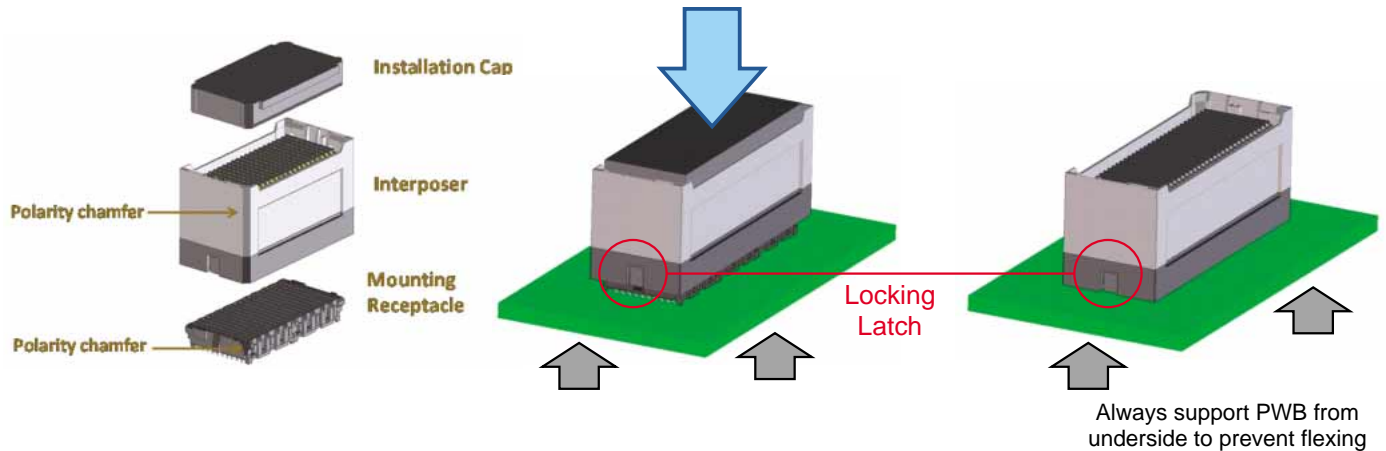
Interposer installation

Position interposer directly over mounting receptacle, aligning the polarity chamfers. If positioned properly, the interposer should slide easily onto the mounting receptacle. Place installation cap onto interposer and push straight down to engage the locking latches:

Manual Installation

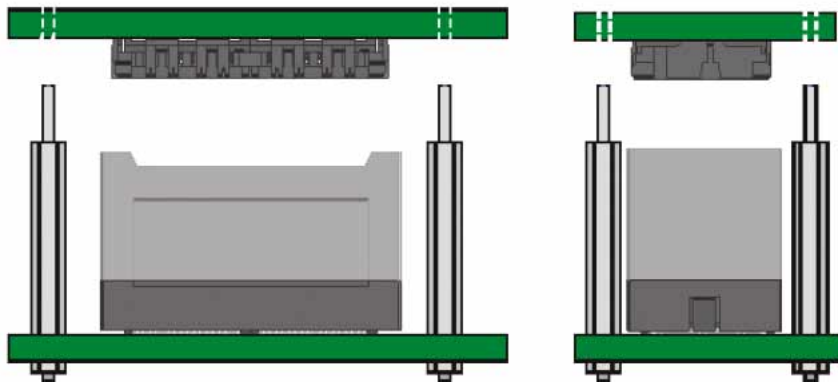
*Installation caps are available upon request for manual operation

Press firmly on installation cap only, not on wafers or interposer body

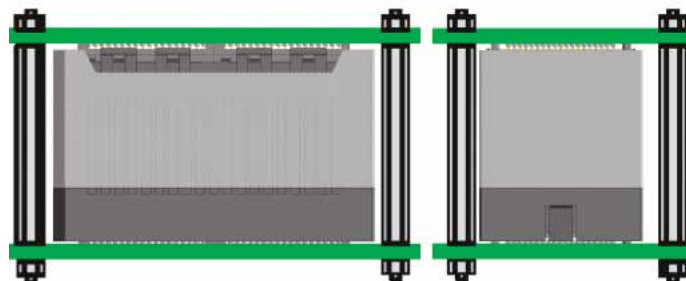


Daughter card installation

After the interposer is mounted, install spacers onto motherboard. To install mating receptacle, align the spacer holes in the daughter card with the threads on the spacers.

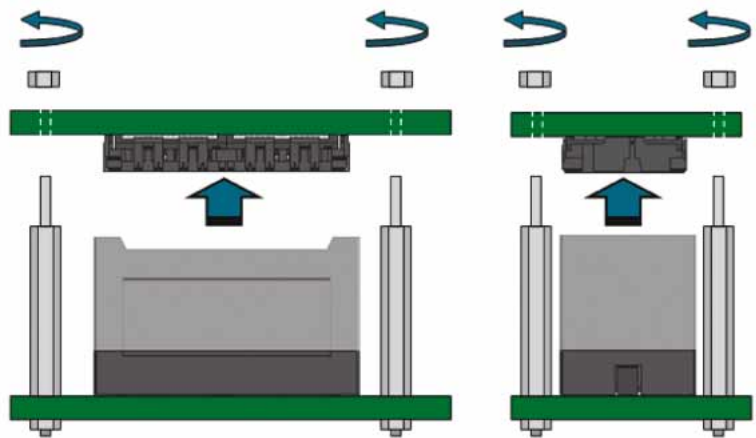


The spacers help align the mating receptacle with the interposer. If positioned correctly, the mating receptacle will slip down into the interposer. Push directly down on the assembly to lock the mating receptacle in place. Install nuts onto the spacer threads. Tighten nuts to specified torque.



■ Daughter card removal

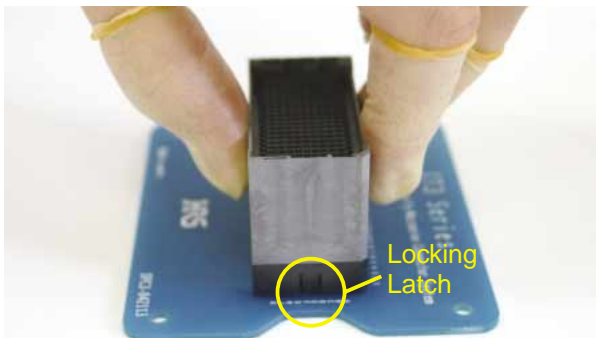
To remove a daughter card, first remove the nuts from the reinforcing spacers, then lift the daughter card straight off the interposers, as shown right.



■ Interposer removal

Interposer Removal

- 1) Hold the Interposer Assembly on the walls without locking latches

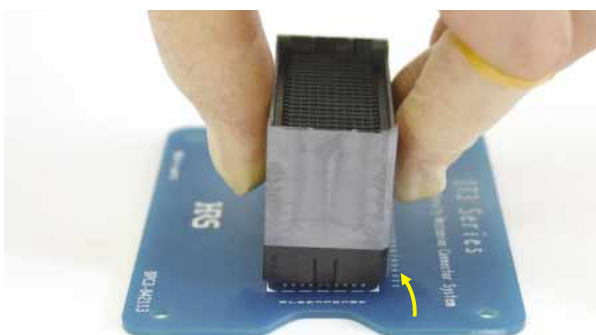


- 2) Gently rotate one side of the Interposer Assembly laterally 10° maximum

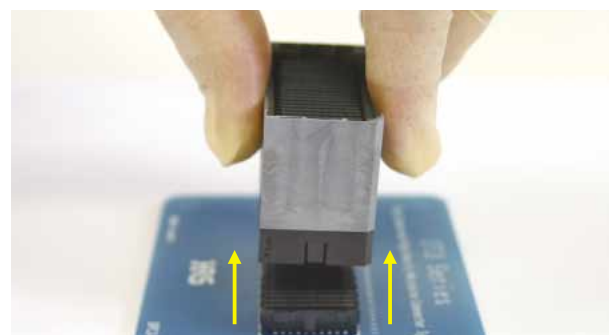


Caution: do not rotate more than 10 degrees

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



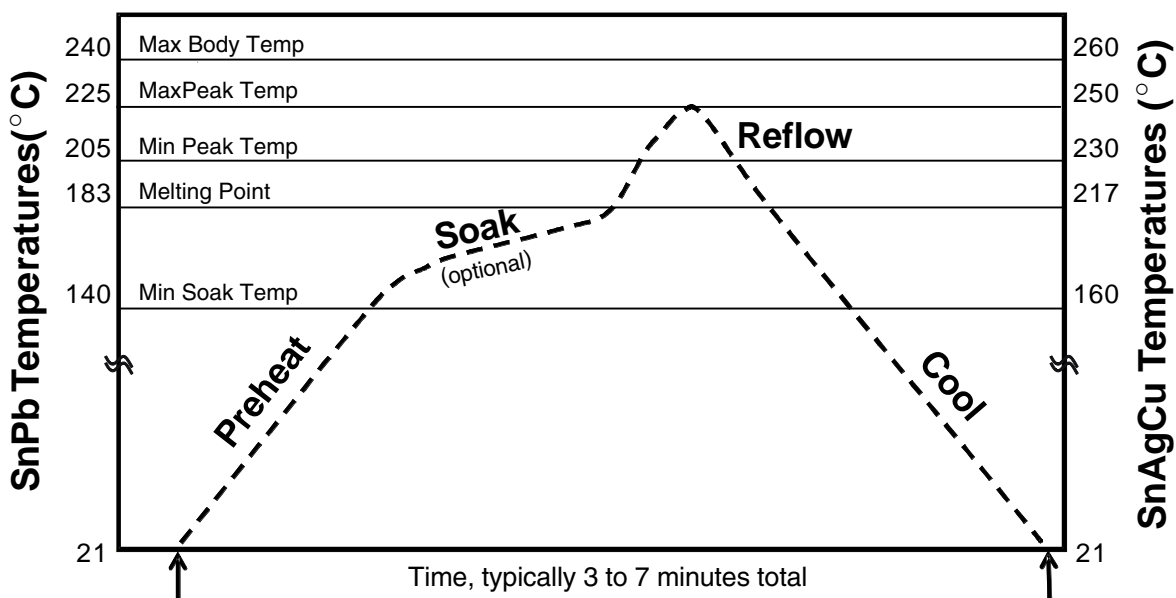
- 4) The Interposer Assembly is removed, and the Mounting Receptacle is ready to accept another Interposer Assembly.



Assembly reflow soldering profile

| Parameters | Eutectic (SnPb) | Pb-Free | Comment |
|--|-----------------|--------------|--|
| Preheat Ramp Rate | 2 - 3°C/sec | 2 - 3°C/sec | Other components may limit ramp rate to 2°C/sec |
| Soak Time | 0 - 120 sec | 0 - 120 sec | Soak requirements determined by board design, oven capability, and paste activation requirements |
| Soak Temperature | 140 - 180°C | 160 - 215°C | Caution - "oversoaking" may exhaust flux and affect soldering |
| Peak Reflow Temperature | 205 - 225°C | 230 - 250°C | Cooler peak temperatures may require longer TAL's |
| Time Above Liquidus (TAL) | 30 - 90 sec | 45 - 120 sec | Shorter TAL's may require higher peak temperatures |
| Cooling Rate | >6°C/sec | >6°C/sec | Faster cooling rates produce finer grain structures and smoother joint appearances |
| Maximum Package Body Temperature (T) | 240°C | 260°C | Open body design allows for low delta T between package and solder joint |
| Maximum Delta T between Body and PWB at Liquidus | 10°C | 10°C | Standard practice is easy to achieve with open body design |
| Package Body Exposure Limit at Maximum Temperature | 5 sec | 5 sec | Adjust profile if maximum exposure limit is approached or exceeded |

Reflow Profile

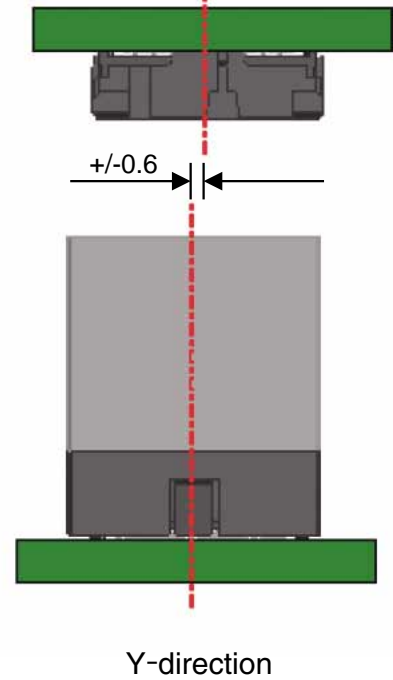
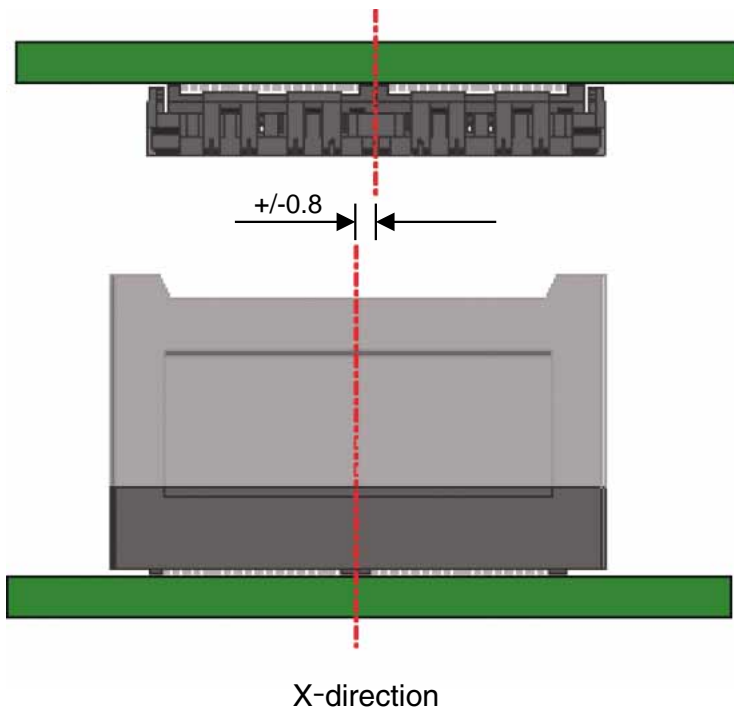


Different solder pastes have different thermal performance characteristics. Consult with paste manufacturer for optimum profile settings.

Check thermal exposure limits of PWB laminate if processing with Pb-free solder.

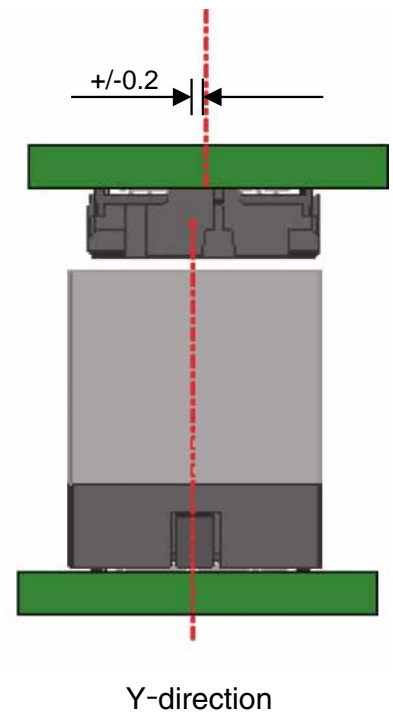
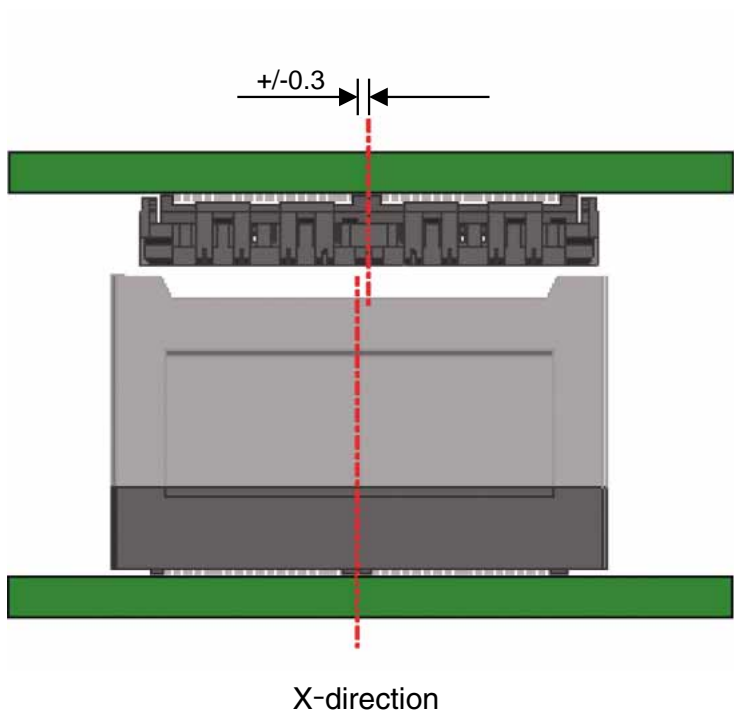
■ Mating self alignment

*Unit: mm



■ Mating tolerance

Due to its 3-piece design, the IT3 connector system can accept mating tolerances of up to ± 0.3 mm tolerance in the X-axis and up to ± 0.2 mm in the Y-axis.



■Packaging information

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

●Receptacles

IT 3 - ***S - BGA(57)...SnPb / Au0.76μm**

IT 3 - ***S - BGA(37)...Pb-Free / Au0.76μm**

(1)

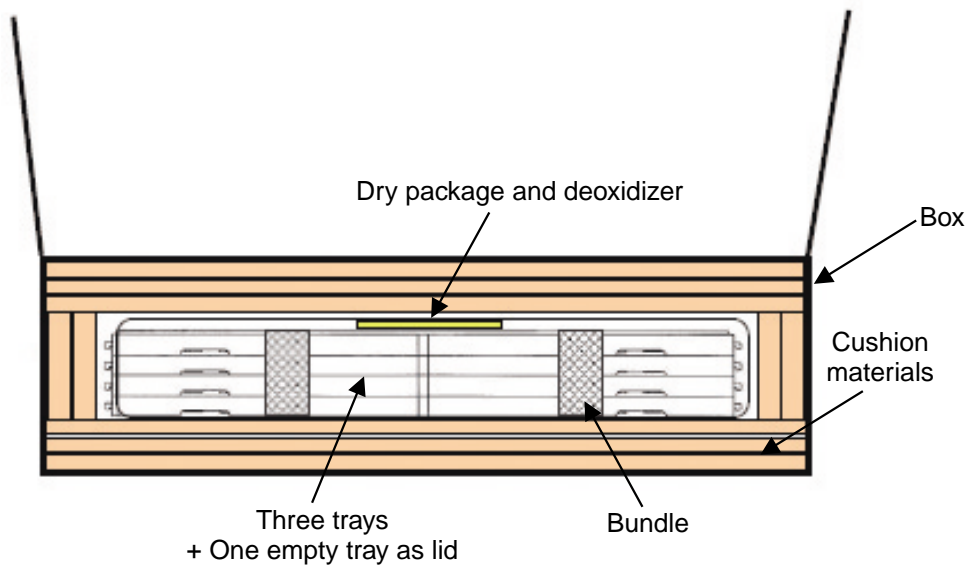
(2)

Unit: pcs

| (1) \ (2) | 100S | 180S | 200S | 300S |
|-----------|------|------|------|------|
| M | 120 | — | 72 | 48 |
| D | 120 | — | 72 | 48 |
| M* | — | 72 | — | — |
| D* | — | 72 | — | — |

This is also a packaging quantity, therefore please multiply integrally based on this MOQ quantity when you place more.

Ex.) 240pcs of IT3M-300S-BGA(57) (= 5 of vacuum packed boxes)



■ Packaging information

● Interposers

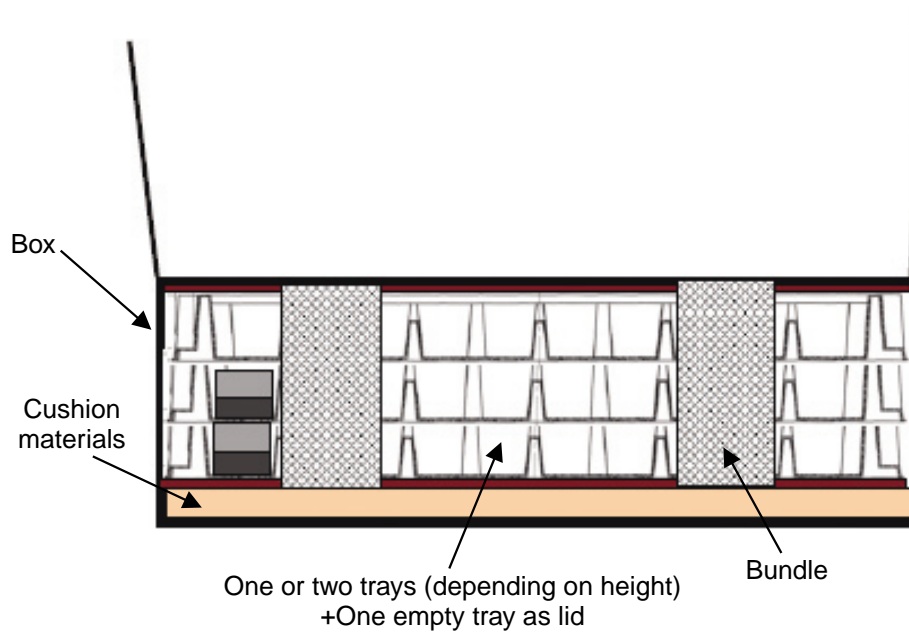
IT 3 - ***P - **H(03)...Au0.76μm
(3) (4)

Unit: pcs

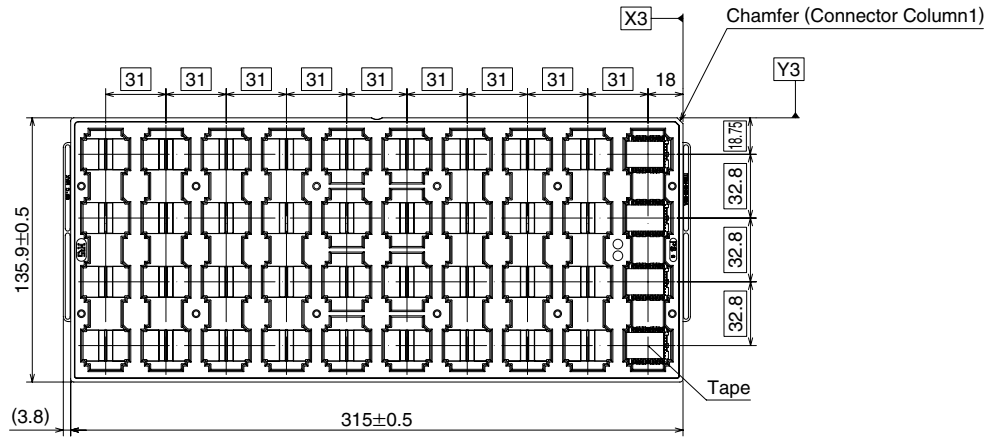
| (3) \ (4) | 100P | 180P | 200P | 300P |
|-----------|------|------|------|------|
| 17H | — | — | 80 | 60 |
| 20H | 100 | — | 80 | 60 |
| 22H | — | — | 80 | 60 |
| 25H | 100 | 80 | 80 | 60 |
| 26H | 100 | — | 80 | 60 |
| 28H | 50 | 40 | 40 | 30 |
| 30H | — | — | 40 | 30 |
| 32H | — | — | 40 | 30 |
| 38H | 50 | — | 40 | 30 |
| 40H | 50 | — | 40 | 30 |

This is also a packaging quantity, therefore please multiply integrally based on this MOQ quantity when you place more.

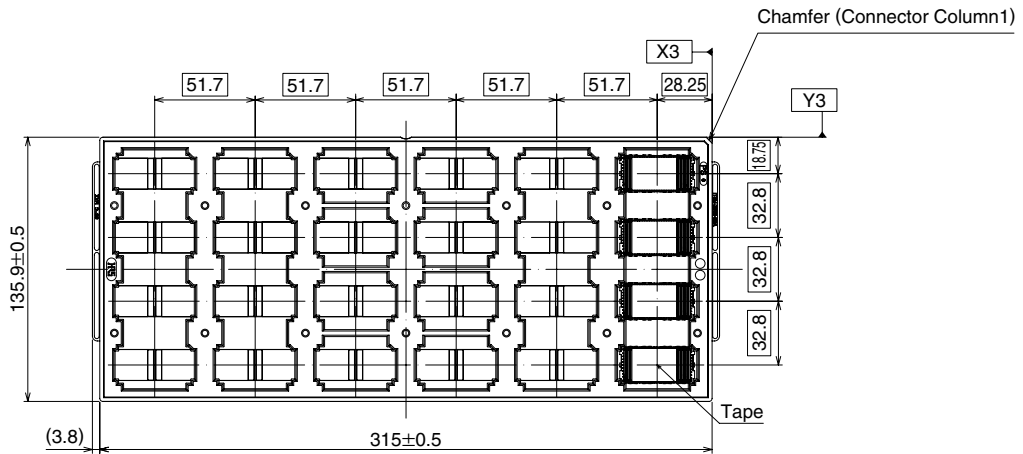
Ex.) 240pcs of IT3M-300S-BGA(57) (= 5 of vacuum packed boxes)



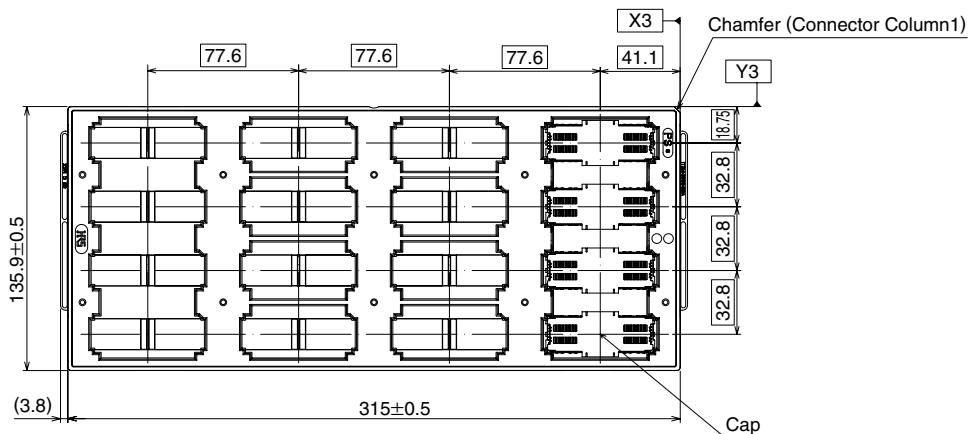
Tray information



JEDEC Tray for IT3M 100 Position Receptacles

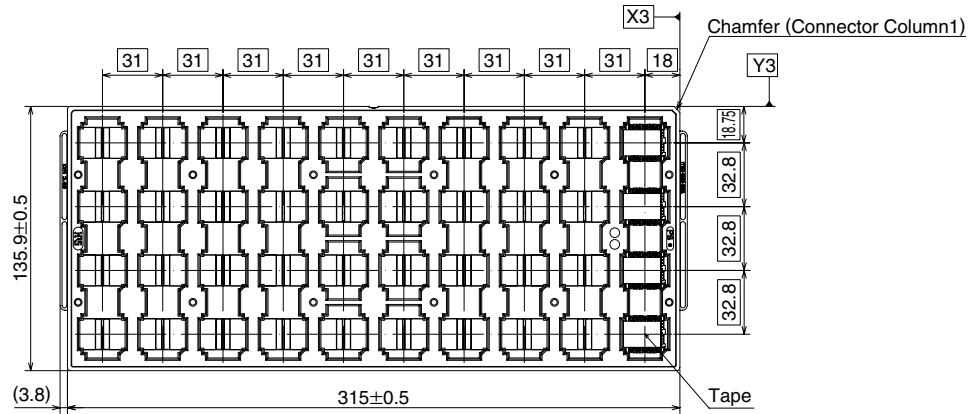


JEDEC Tray for IT3M 200 Position Receptacles

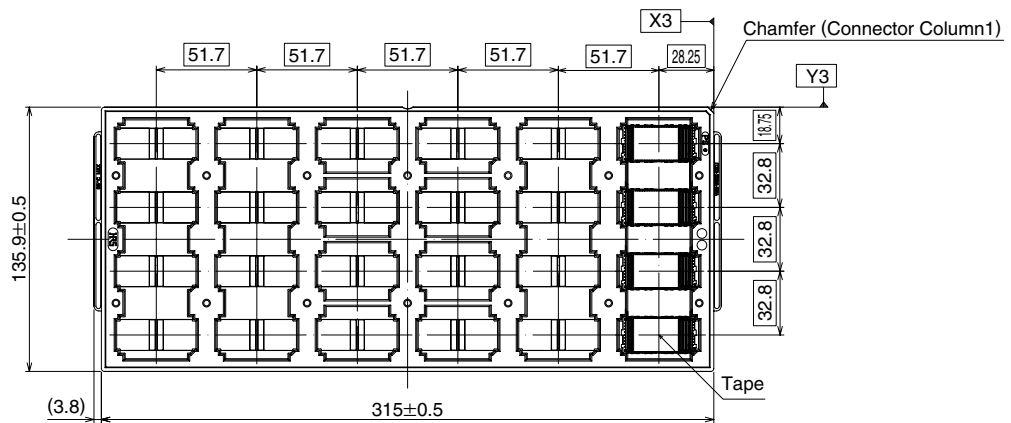


JEDEC Tray for IT3M 300 Position Receptacles

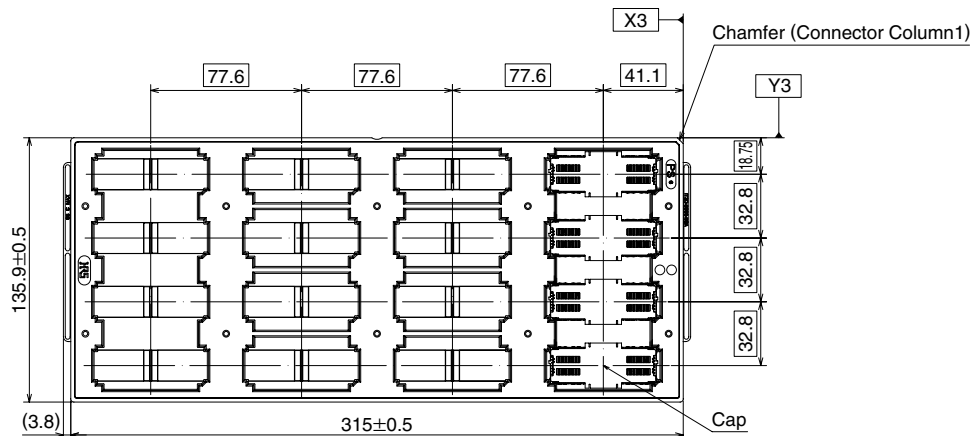
Tray information (con't)



JEDEC Tray for IT3D 100 Position Receptacles



JEDEC Tray for IT3D 200 Position Receptacles



JEDEC Tray for IT3D 300 Position Receptacles

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