



High Speed Interconnect Solutions

IT3 series

*High-speed mezzanine
Connector System*



November, 2010

**HIROSE ELECTRIC CO., LTD.
HIROSE ELECTRIC USA, INC.**

IT3 Series Design Overview

A New Standard Mezzanine for Flexibility and Performance

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 – 40 mm, IT3 can solve your interface needs for both current and future generations.

Features:

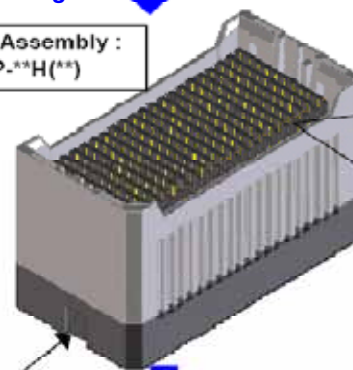
- Unique 3-piece structure for excellent reflow solderability
- Differential, single-ended, and power
- Low mating/extracting forces
- Wide misalignment tolerances
- Stacking heights from 15 to 40mm
- Both SnPb and Pb-free are available
- Staggered 1.5mm x 1.75mm BGA

Mating receptacle : IT3D-***S-BGA(**)



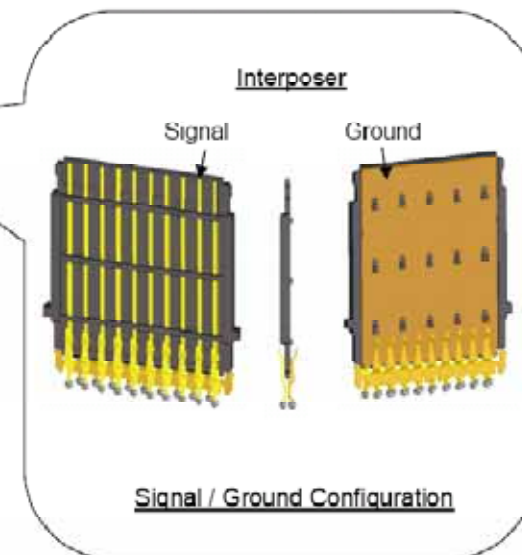
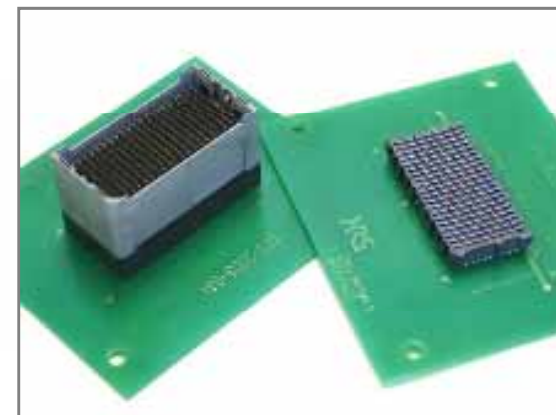
Detachable
(Mating) Side
Mating / Unmating

Interposer Assembly :
IT3-***P-***H(**)



Locking latch
Mounting Side
Installed and locked

Mounting receptacle : IT3M-***S-BGA(**)

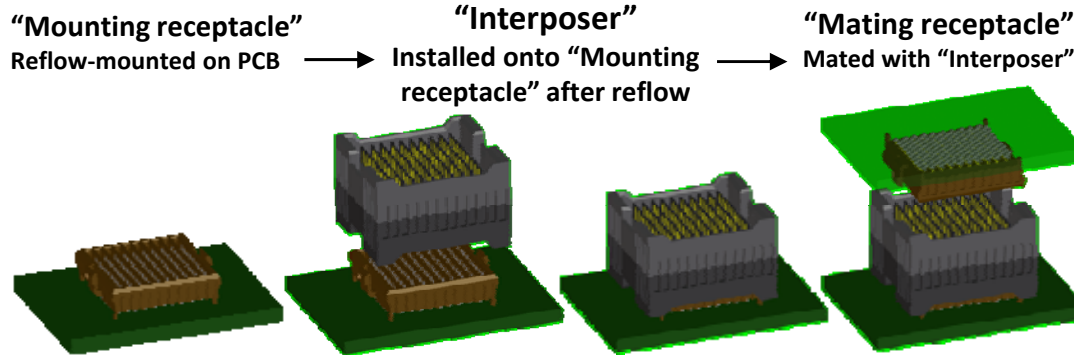


Flexible 3-piece design* has many advantages

3-piece Connector Design Benefits

Assembly friendly unique 3-piece

IT3 series mounting & mating procedure

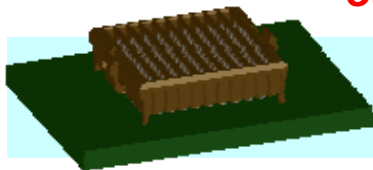


Low Thermal Mass for Reflow process



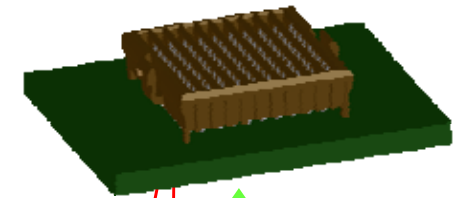
For any stacking height combination, receptacle is always same and its height is 6mm only. Small size of receptacle has wide process window for reflow profile.

Lead-Free applications benefit from our easy reflow process design.

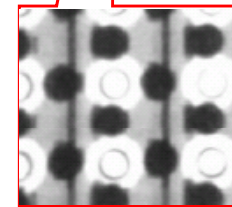


Reflow receptacle only

X-ray Inspection Friendly



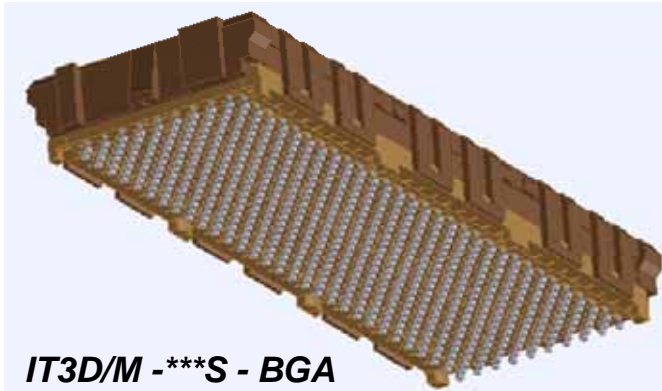
X-ray inspection from bottom side



1. **Significantly reduces frequency of false calls**
2. **Simple receptacle design gives clear vision for X-ray inspection.**

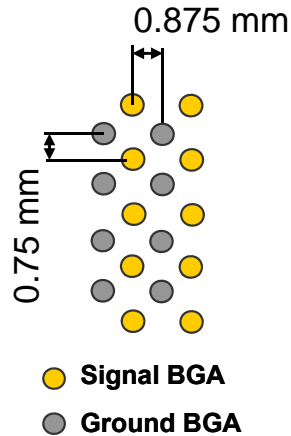
IT3 Design Features & Benefits

Industry standard footprint



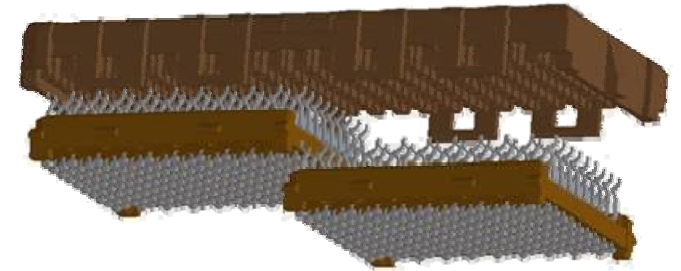
IT3D/M -***S - BGA

IT3's unique 3 piece design and construction gives industry leading BGA reliability, while still providing the density of 73 differential pairs per linear inch.



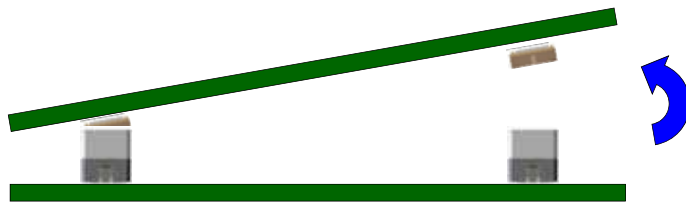
High reliable BGA connection

**Patented Technology*



The IT3's divided receptacle structure reduces thermal stress and ensures long-term reliability of the BGA ball connection with the PWB

Mating / Un-mating operation



HRS IT3 Series : **10° acceptable**
Competitors' : **Not acceptable**

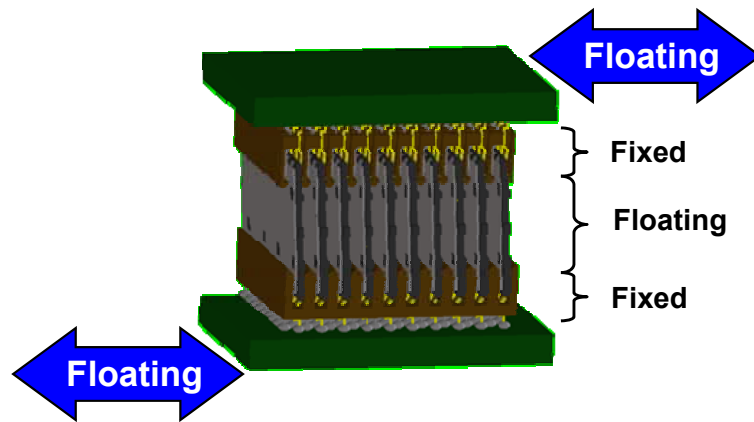


HRS IT3 Series : **3° acceptable**
Competitors' : **Not acceptable**

Mechanical Design Benefit – 1

Floating interposer – unique flexible design

Floating interposer

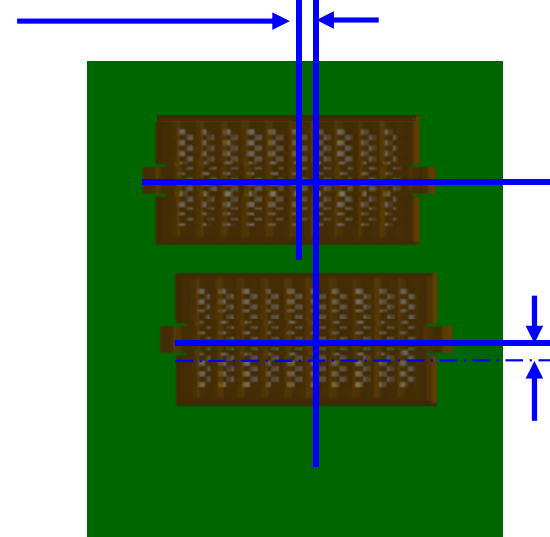


Floating interposer ensures stable signal connection.

Mating and Floating tolerance: $\pm 0.3\text{mm}$ in X direction, $\pm 0.2\text{mm}$ in Y direction

Wide range Mounting tolerance

Error from datum position $\pm 0.3\text{mm Max.}$

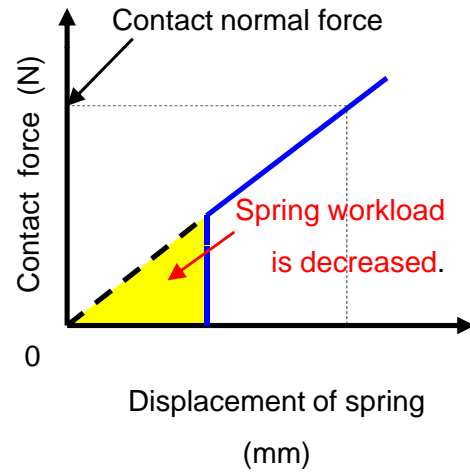


$\pm 0.2\text{mm Max}$
Error from datum position

Mechanical Design Benefit – 2

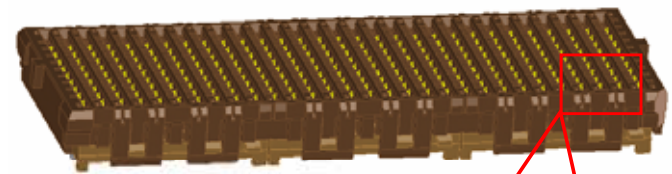
Lower force Insertion and Extraction

Pre-load structure



	IT3	Supplier A
Appx. 200 pos.	90 N	145 N
Appx. 300 pos.	135 N	218 N

Housing design prevents pin stubbing



**IT3
Series**



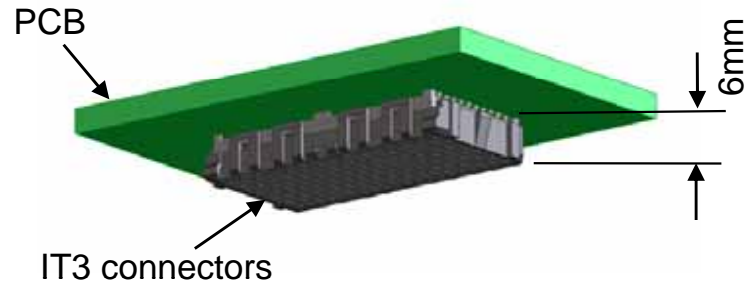
**Existing
solution**



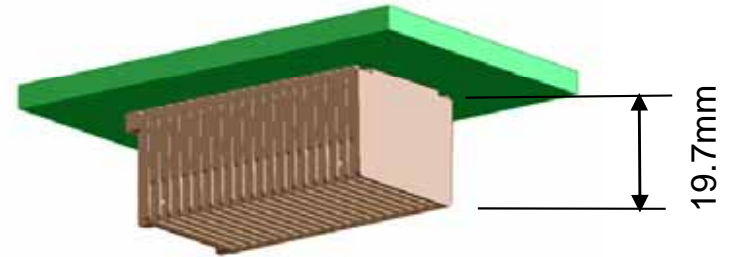
Exposed contacts

3-piece Connector Assembly Benefit

2nd Reflow soldering compatible



IT3 series for 30mm (or any) stacking height application



Other supplier for 30mm height application

May not suitable for 2nd Reflow soldering due to the weight.

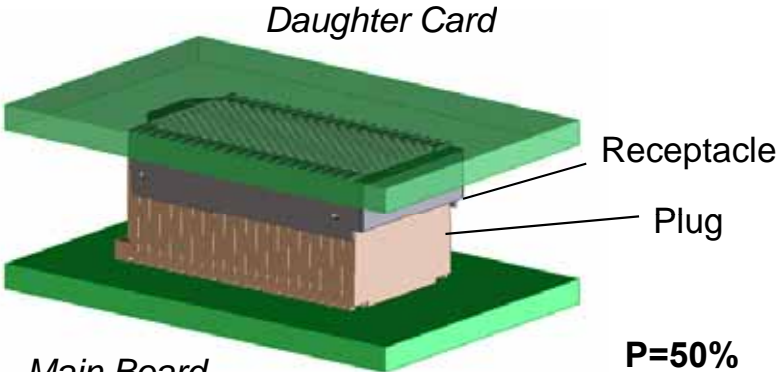
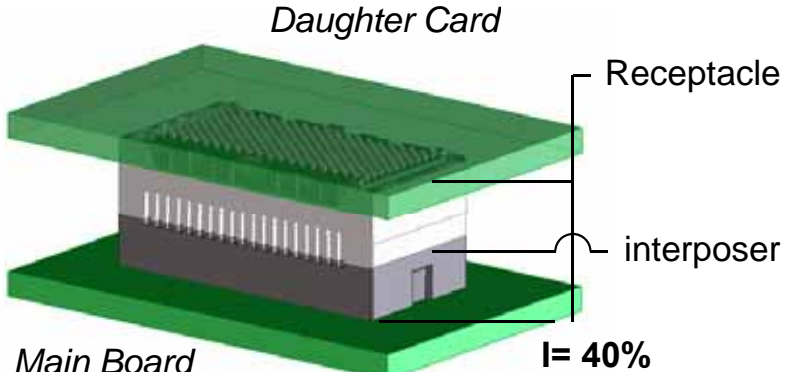
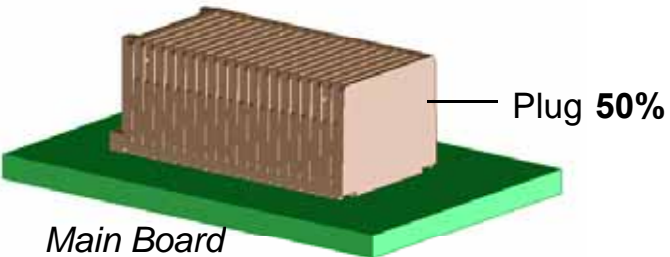
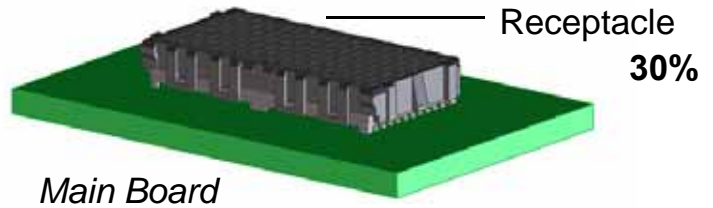
Summary

SMT

- No issues with screen printing, pick & place, and reflow of the improved IT3 connectors
- Good solder joints were observed
- Good continuity were recorded

Already confirmed that there are no issues to mount Hirose IT3 series connectors on the bottom side of PCB for 2nd reflow soldering by major CEMs.

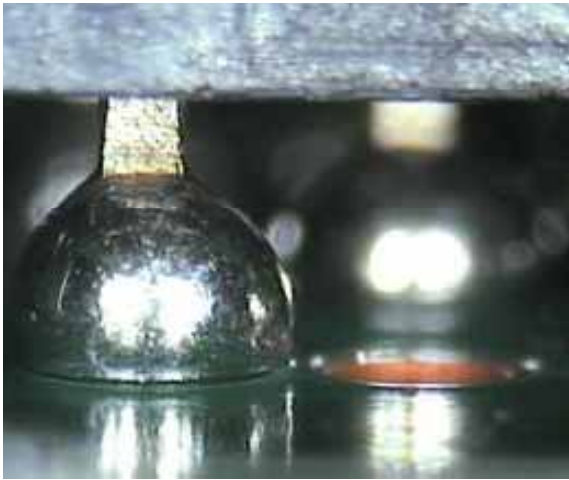
3-piece Structure Pricing Benefit

	Competitor's 2 piece solution	Hirose 3 piece solution
Mated condition	 <p>Daughter Card</p> <p>Main Board</p> <p>Receptacle</p> <p>Plug</p> <p>P=50% +) R=50% Total = 100%</p>	 <p>Daughter Card</p> <p>Main Board</p> <p>Receptacle</p> <p>interposer</p> <p>I= 40% +) R= 30% x 2 pcs Total = 100%</p>
Optional Card etc	 <p>Plug 50%</p> <p>Main Board</p>	 <p>Receptacle 30%</p> <p>Main Board</p>
<div style="background-color: blue; color: yellow; padding: 10px; border-radius: 15px; display: inline-block;"> <h2>Save 20% in Optional card connection</h2> </div>		

Robust Solder Ball Attachment

Hirose IT3 series

As a contact lead is positioned into a solder ball, it prevents the ball from peeling off during severe shock & vibration test.

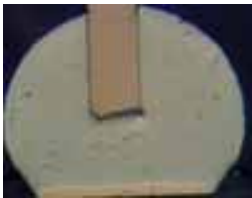
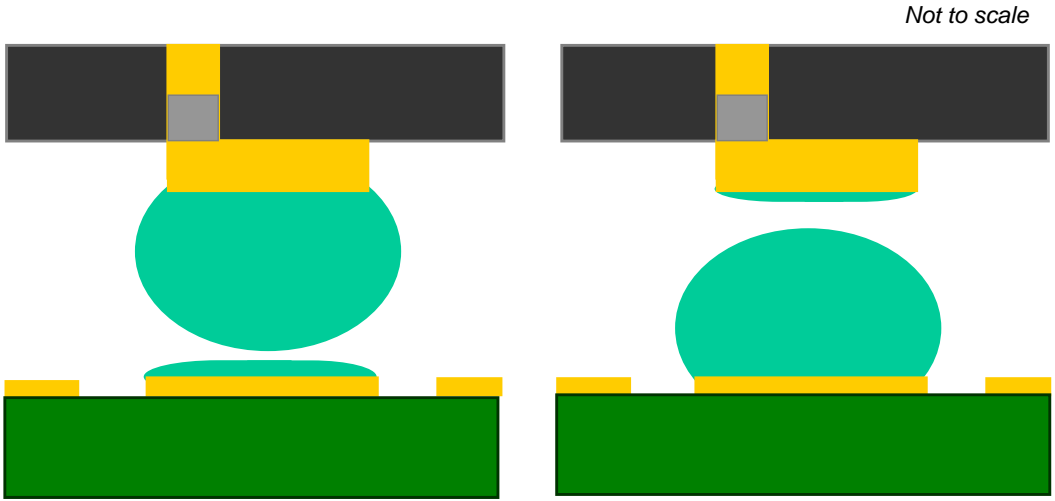


After reflow soldering

Other connector & silicon device package

Uncontrolled co-planarity brings the migration of solder ball from low to high temperature side during reflow, which causes the soldering failure.

The countermeasures are to improve the excess co-planarity or to implement the thicker metal mask to cover such co-planarity.



Since the receptacle's contact resides in the BGA ball, the IT3 is very strong for shock and vibration.
(Patented Technology)

IT3 BGA mount yield test at major CEMs

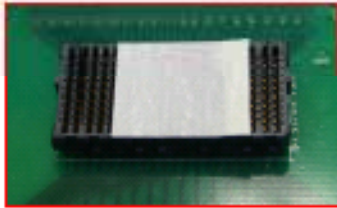
Result	Signal Pin	Stencil Type	Connectors Tested	Pins Tested	5DX Calls				Failure				
					Connector		Pin		Connector		Pin		
					# of Conn.	Call Rate %	# of Pins	Call Rate DPMJ	# of Conn.	Failure Rate %	# of Pins	Failure Rate DPMJ	
CEM1	300 pins	5mil	150	85,500	0	0	0	0	0	0	0	0	
		7mil	75	42,750	6	8.0	6	140.4	0	0	0	0	
	200 pins	5mil	150	57,000	0	0	0	0	0	0	0	0	
		7mil	75	28,500	3	4.0	3	105.3	0	0	0	0	
	MB	300 pins	5mil	150	85,500	3	2.0	4	46.8	1	0.7	1	11.7
			7mil	100	57,000	12	12.0	19	333.3	1	1.0	1	17.5
		200 pins	5mil	150	57,000	2	1.3	2	35.1	0	0	0	0
			7mil	100	38,000	27	27.0	57	1500.0	0	0	0	0
	Total			950	451,250	53	5.6	91	201.7	2	0.2	2	4.4
	CEM2	MB	300 pins	5mil	250	142,500	0	0	0	0	0	0	0
200 pins			5mil	250	95,000	0	0	0	0	0	0	0	
DC		300 pins	5mil	225	128,250	0	0	0	0	0	0	0	
		200 pins	5mil	225	85,500	0	0	0	0	0	0	0	
Total			950	451,250	0	0	0	0	0	0	0		
Total			1,900	902,500	53	2.8	91	100.8	2	0.1	2	2.2	

- 1) 5DX call rate was 2.8%. (Flextronics changed 5DX algorithm and tried to inspect again. At the 2nd time, call rate dropped to 0.84%. This means IT3's call rate is 0.42% right now)
- 2) Two BGA balls failure were confirmed out of 1,900 connectors, "Failure rate is 0.1%, and out of 902,500 balls, "DPMJ; Defect Per Million Joints is 2.2".

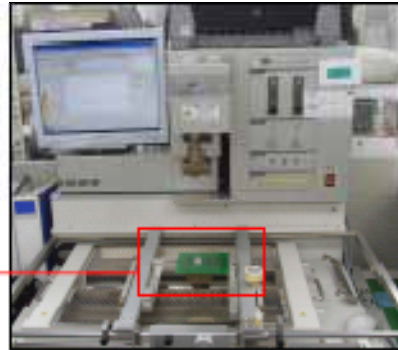
* Failure mode; Head-In-Pillow (Pressure-Contact-open)

IT3's easy rework process

Rework equipment



Receptacle: IT3D(M)-XXXXS-BGA (xx)

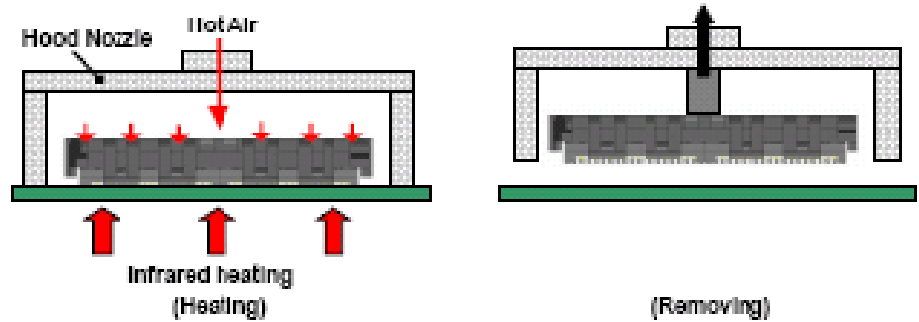


Rework Station

[Repair Equipment]
Type: RD-500 II
Manufacturer: Denon Instruments co.

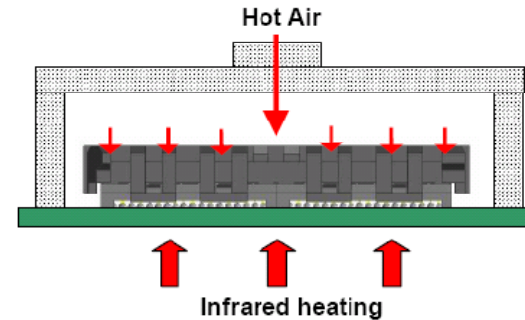
Rework process

6-2-1. Remove the connector in accordance with the recommended temperature profile.

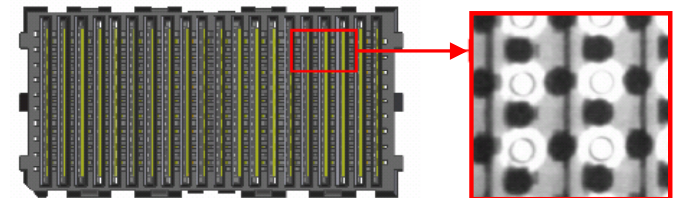


Prior to rework process, interposer assembly must be removed and pick and place tape shall be applied.

6-2-3. Reflow a new receptacle in accordance with the recommended temperature profile.



6-2-4. Inspect the solder joints with X-ray inspection system.



6mm



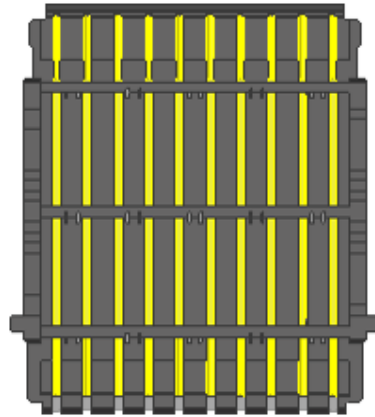
For any stacking height combination, receptacle is always same and its height is only 6mm.

Customer does not need to do any special process for the rework. Also, any special rework nozzle is not required for IT3 rework process. (Standard rework nozzle works for IT3)

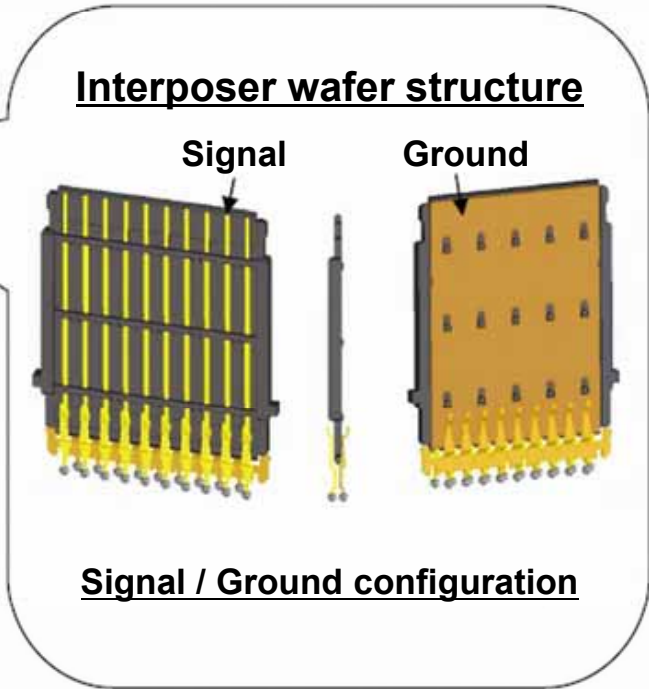
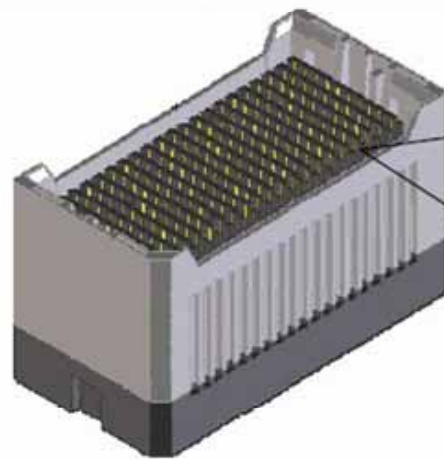
Interposer (middle part) is reusable

Unique interposer design for Signal Integrity

Interposer wafer

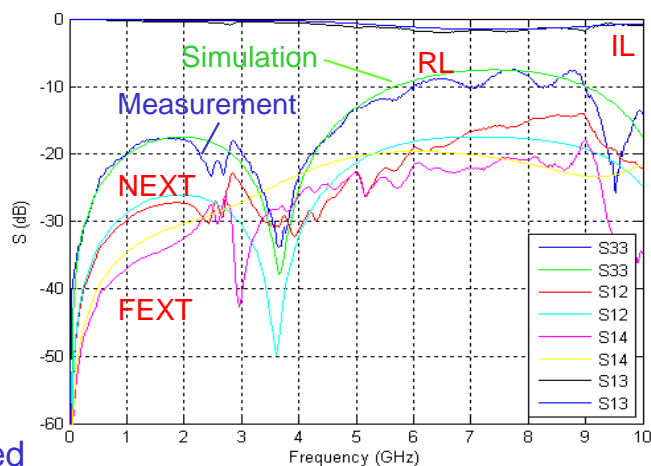


- *Micro strip line structure*
- *Up to 6.25G bps with fully populated pin assignment*
- *Over 10G bps with skipped pin assignment for differential pairs*
- *Also can be used for power lines*

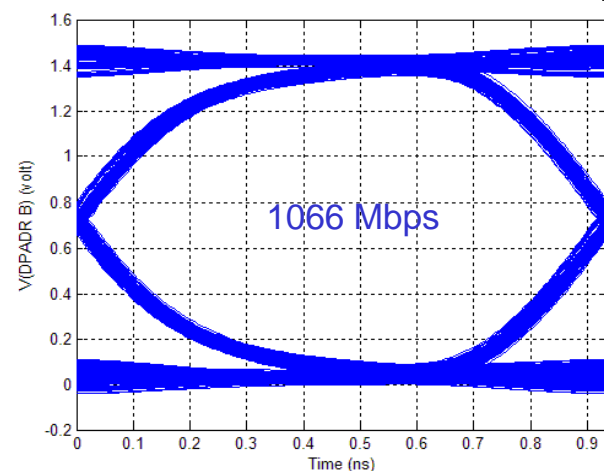
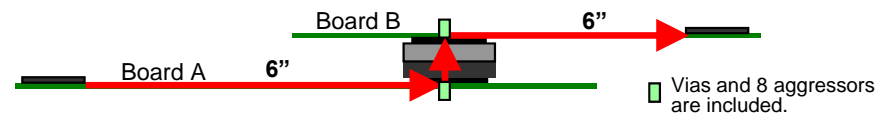


IT3 Signal Integrity – 1

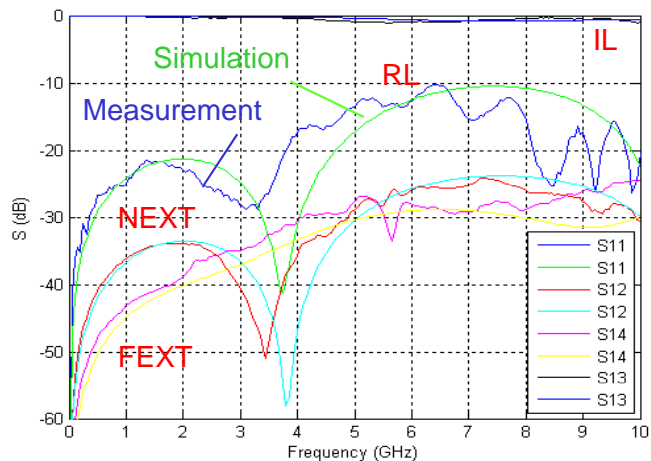
- High-performing IT3 connectors were designed through detailed simulation and measurement correlation for 6.25+ Gbps applications.



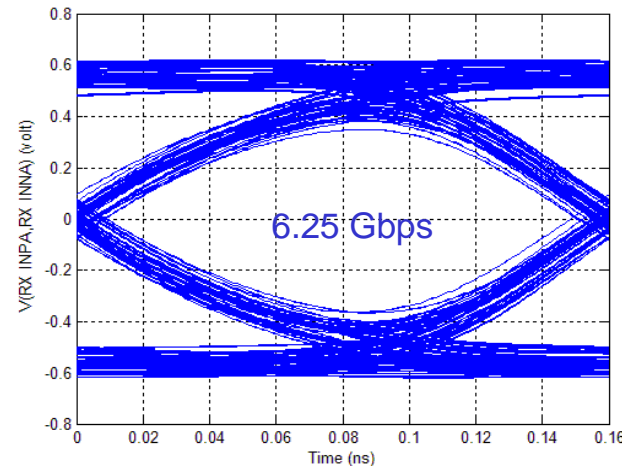
Single-ended



Differential



S Parameters (for IT3-17mm)

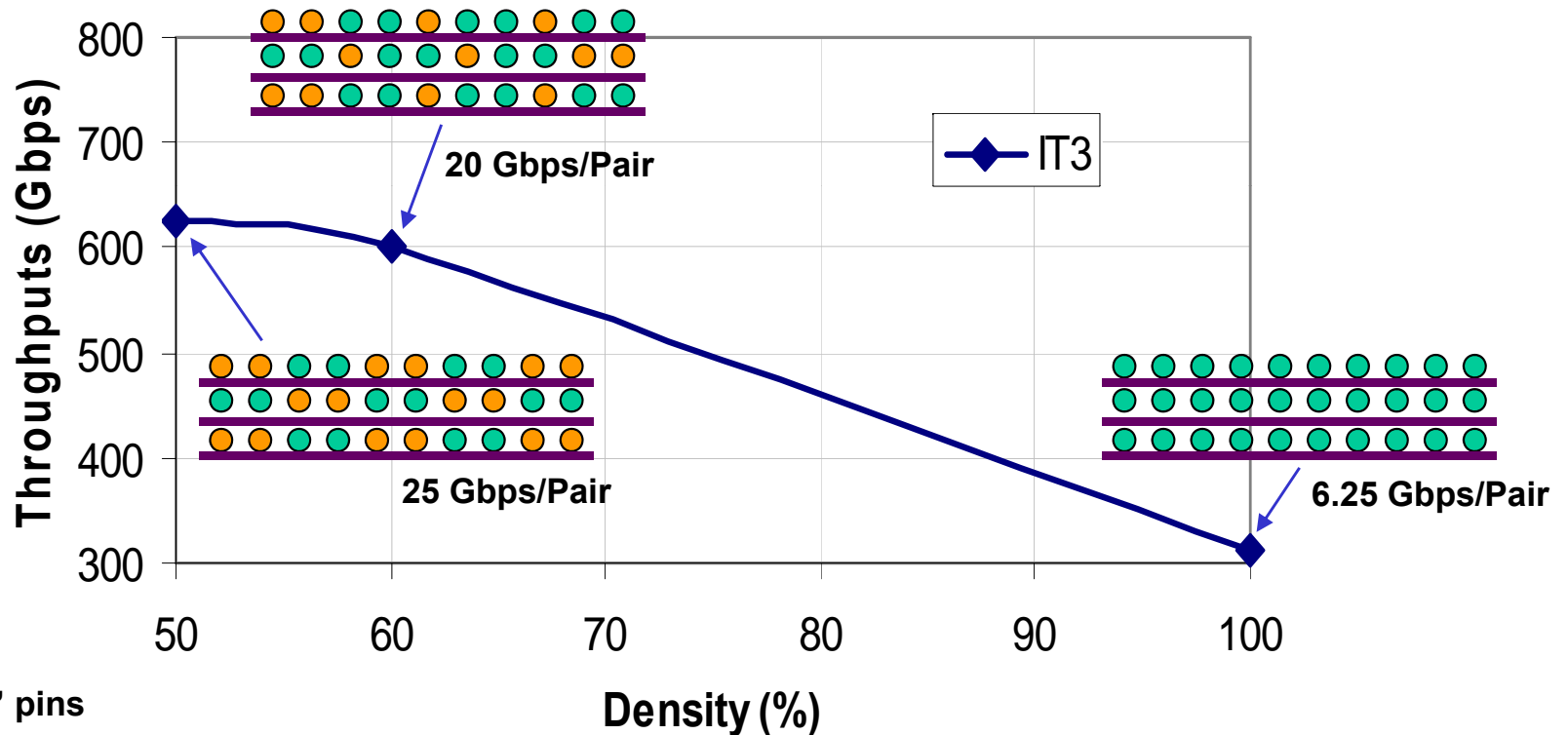


Eye Diagrams (at receiver of 6" + 6" channel)

IT3 Signal Integrity – 2

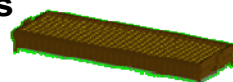
100-pin Connector Throughputs

- Running IT3 at higher data rate and lower density can increase the throughputs.



- 1) 20G ready solutions with good signal density for many years.
- 2) Same design rules can be re-used.
- 3) No need to re-qualify parts, or change operation.

IT3 Series Variations

Stacking Height		100 signals 10 x 10 	200 signals 20 x 10 	300 signals 30 x 10 
Sockets	Pb Mounting	<i>IT3M-100S-BGA(57)</i>	<i>IT3M-200S-BGA(57)</i>	<i>IT3M-300S-BGA(57)</i>
	Pb Mating	<i>IT3D-100S-BGA(57)</i>	<i>IT3D-200S-BGA(57)</i>	<i>IT3D-300S-BGA(57)</i>
	Pb-free Mounting	<i>IT3M-100S-BGA(37)</i>	<i>IT3M-200S-BGA(37)</i>	<i>IT3M-300S-BGA(37)</i>
	Pb-free Mating	<i>IT3D-100S-BGA(37)</i>	<i>IT3D-200S-BGA(37)</i>	<i>IT3D-300S-BGA(37)</i>
Interposers (Plugs)	14 mm	<i>Under planning</i>	<i>Under planning</i>	<i>IT3M-300P-14BGA</i>
	15 mm	<i>Under Development</i>	<i>IT3M-200P-15BGA</i>	<i>IT3M-300P-15BGA</i>
	17 mm	<i>Currently no plan</i>	<i>IT3-200P-17H(03)</i>	<i>IT3-300P-17H(03)</i>
	18 mm	<i>Under planning</i>	<i>Under Development</i>	<i>Under planning</i>
	20 mm	<i>IT3-100P-20H(03)</i>	<i>IT3-200P-20H(03)</i>	<i>IT3-300P-20H(03)</i>
	22 mm	<i>Currently no plan</i>	<i>IT3-200P-22H(03)</i>	<i>IT3-300P-22H(03)</i>
	25 mm	<i>IT3-100P-25H(03)</i>	<i>IT3-200P-25H(03)</i>	<i>IT3-300P-25H(03)</i>
	26 mm	<i>IT3-100P-26H(03)</i>	<i>IT3-200P-26H(03)</i>	<i>IT3-300P-26H(03)</i>
	28 mm	<i>IT3-100P-28H(03)</i>	<i>IT3-200P-28H(03)</i>	<i>IT3-300P-28H(03)</i>
	30 mm	<i>Currently no plan</i>	<i>IT3-200P-30H(03)</i>	<i>IT3-300P-30H(03)</i>
	32 mm	<i>Currently no plan</i>	<i>IT3-200P-32H(03)</i>	<i>IT3-300P-32H(03)</i>
	35 mm	<i>Under planning</i>	<i>Under Development</i>	<i>Under Development</i>
	38 mm	<i>IT3-100P-38H(03)</i>	<i>IT3-200P-38H(03)</i>	<i>IT3-300P-38H(03)</i>
	40 mm	<i>Under Development</i>	<i>IT3-200P-40H(03)</i>	<i>IT3-300P-40H(03)</i>

IT3 family passes EIA364-1000 L1 quals and IPC9702 L2 quals

Note: Part numbers shown are Production Released product

IT3 Specification

Electrical

Low-Level Contact Resistance	50mΩ max *1) (Mated with 17mm height interposer)
Dielectric Withstanding Voltage	150V / 1min.
Insulation Resistance	1,000MΩ / 100V
Contact Current Rating	1.0A continuous duty *2)
Rated voltage	50Vrms

*1) The value of contact resistance includes 2 contact points and the bulk resistance.

*2) Refer to IT3 derating curves on test report TR0636E-20041.

Mechanical

Contact Wiping Length	0.9+/-0.3mm with recommended spacers (1.4+/-0.3mm w/o spacers)
Contact Normal Force	0.45N
Contact Mating Force	Mating force : 45N max/ 100pos signal 90N max/ 200pos signal 135N max/ 300pos signal
Durability	100 cycles

IT3 Specification

Materials and finishes

<p>Insulator</p>	<p>Socket : Glass-reinforced polyester (LCP) UL 94V-0</p> <p>Interposer : Glass-reinforced polyester (LCP&PBT) UL 94V-0</p>
<p>Contact</p>	<p>Copper Alloy</p> <p>Plating: Contact area = Gold 0.76μm over Nickel 1.5μm Mounting area = Gold 0.03μm over Nickel 1.5μm Other = Nickel 1.5μm</p>
<p>Ball grid termination</p>	<p>0.7mm Dia</p> <p>Eutectic : Sn63-Pb37 type</p> <p>Pb-free : Sn-Ag3.0-Cu0.5 type</p>

Application Examples

Servers



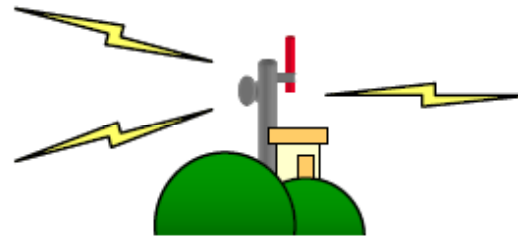
Industrial
Controller
Unit



Medical
Device



BTS



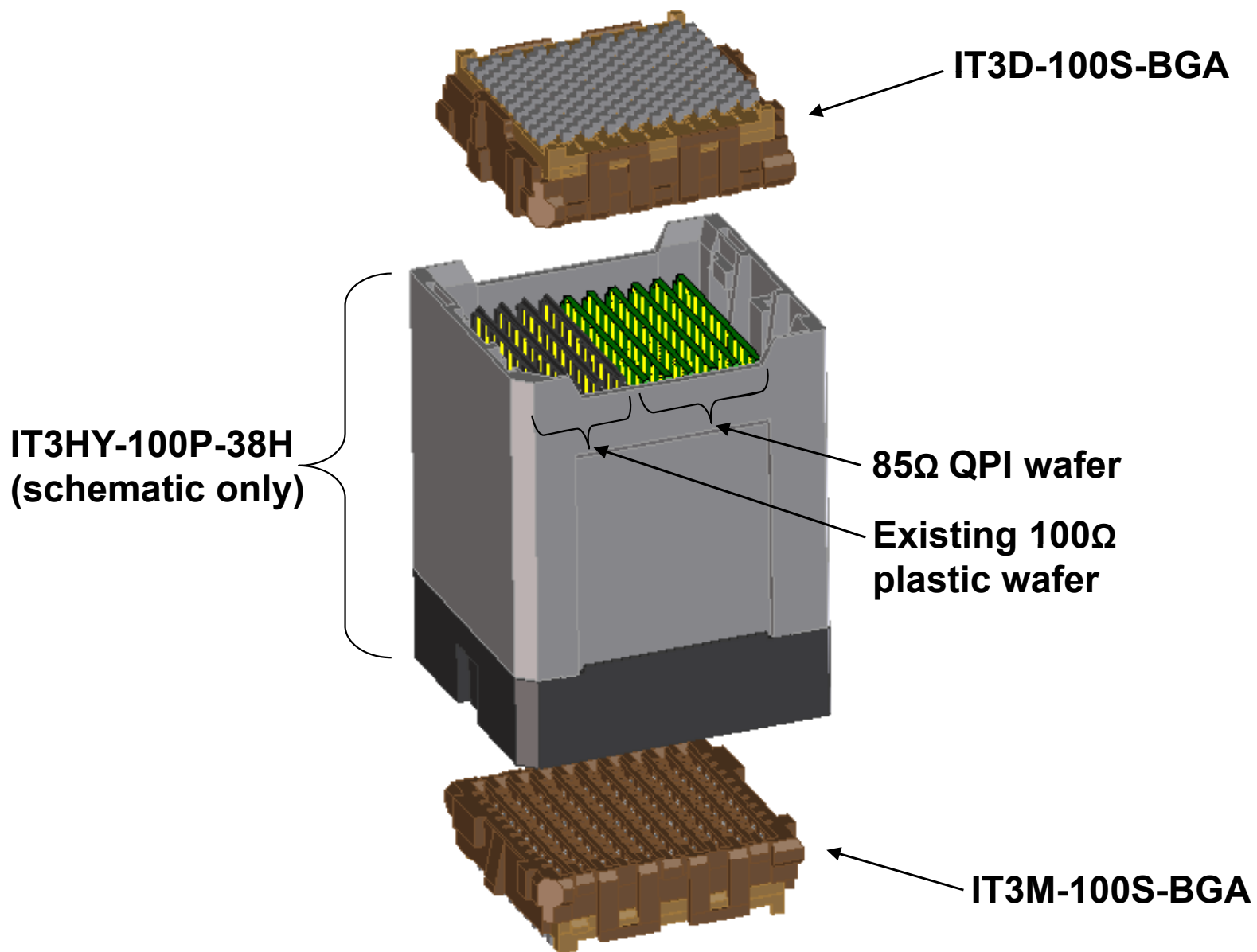
Internet Routers
& Switches



Appendix

Hybrid type is also available

- IT3HY (85&100Ω) mating / internal structure



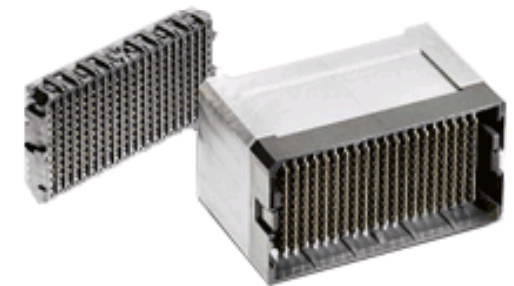
[Home](#) > [Product Innovations](#) > Tyco Electronics and Hirose Electric Company, Ltd. Announce Mezzanine Interconnect Second-Source Agreement

Tyco Electronics and Hirose Electric Company, Ltd. Announce Mezzanine Interconnect Second-Source Agreement

 [Live Product Chat](#)

Tyco Electronics and Hirose Electric Co., Ltd. today announced a second-source agreement under which Tyco Electronics will have the right to manufacture, market, and sell worldwide the Hirose IT3™ mezzanine connector system under the Tyco Electronics brand name of STRADA MZConn3 connector system.

1 Feb 09



Product Features

- Intermateable
- Electrically and mechanically interchangeable
- Low profile receptacle
- Ease of PCB assembly process

Applications

- Parallel Board Stacking Applications
- Mezzanine Connector Systems

Documentation and Additional Information

- ▶ [Get More Information](#)
- ▶ [Find a Part](#)
- ▶ [Contact Us About This Product](#)

Tyco Electronics and Hirose Electric Co., Ltd. today announced a second-source agreement under which Tyco Electronics will have the right to manufacture, market, and sell worldwide the Hirose IT3 mezzanine connector system under the Tyco Electronics brand name of STRADA MZConn3 connector system.