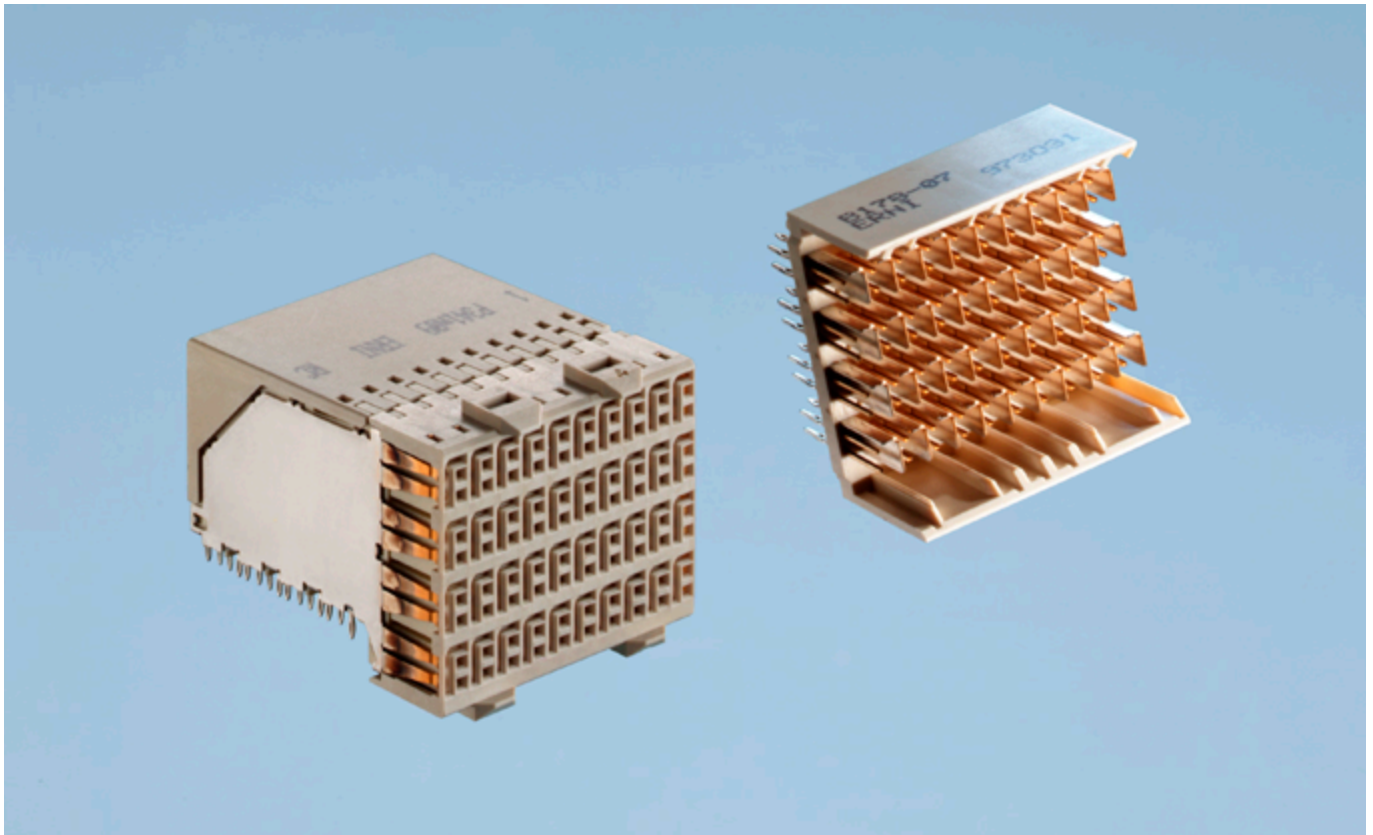


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# ERmet ZDplus

## Application Note Version 2.2





The ERmet ZDplus connector is an enhancement of the ERmet ZD family. This high-speed differential Hard Metric connector system enables data rates of 20 Gbit/s and more.

The ERmet ZDplus is based on the principal mechanical design of the proven ERmet ZD with the same dimensions. To enable higher data rates ERNI Electronics has optimized the signal routing and the pressfit termination of the female connector. To benefit from the maximum performance of the new ERmet ZDplus the usage of backdrilling is recommended. Decreasing via stub length and the related “stub effect” by backdrilling significantly reduces the reflections and the overall BER (Bit Error Rate) of the interconnect.

The first product of the ERmet ZD+® family is the 4-pair right angle female connector with pressfit termination. The ERmet ZDplus female connector is mating compatible to the existing ERmet ZD male connector. This means, that existing backplane designs do not need layout changes on the backplane side, if customers want to upgrade their systems. Of course the layout on the daughtercards has to be modified if using the new ERmet ZDplus female parts.

Single pair and multi pair spice models available. Also s-parameter and spectraquest models

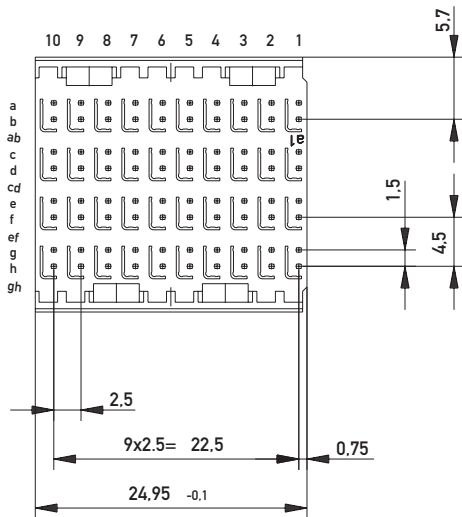
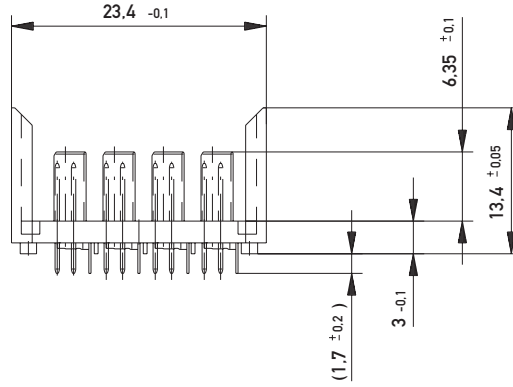
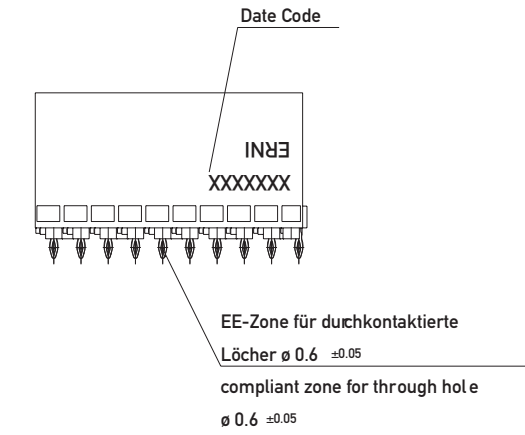
**Technical Features**

- **Modules:** 2-, 3- and 4-pair versions available.
- **Mating:** Compatible to standard ERmet ZD male connectors, backwards compatible to existing backplane systems
- **Design:** Wafers with individually fully shielded pairs of contacts.
- **Contacts:** Low noise, dual beam, leaf contacts with one ground blade for every pair of signals.
- **Wafer pitch:** 2.5 mm from wafer to wafer.
- **Pitch between signal pins:** 1.5 mm between pairs (within wafer).
- **Pitch between pairs:** 4.5 mm (within wafer).
- **Ground arrangement:** In line with signals at termination and surrounding shield.
- **Multiline Crosstalk:** <3% at 100ps rise time, 250 mV swing.
- **Insertion loss:** <3 dB up to 10 GHz.
- **Differential Impedance:** 100 Ω ±5 %
- **Skew Compensation:** max. 3ps differential skew
- **Power Modules:** Closed entry, vertical female backplane modules with stamped blades.
- **Alignment Features:** Improved pre-alignment guide and polarizing features, 4 rigid blades for all modules.
- **Datarate Options:**

Female	Male	Datarate
ZD	ZD	5+ Gbit/s
ZDplus	ZD	15+ Gbit/s
ZD	ZDplus	10+ Gbit/s
ZDplus	ZDplus	20+ Gbit/s

## Dimensional Drawings

ERmet ZD Vertical Male Connectors 4 pair / 10 wafer

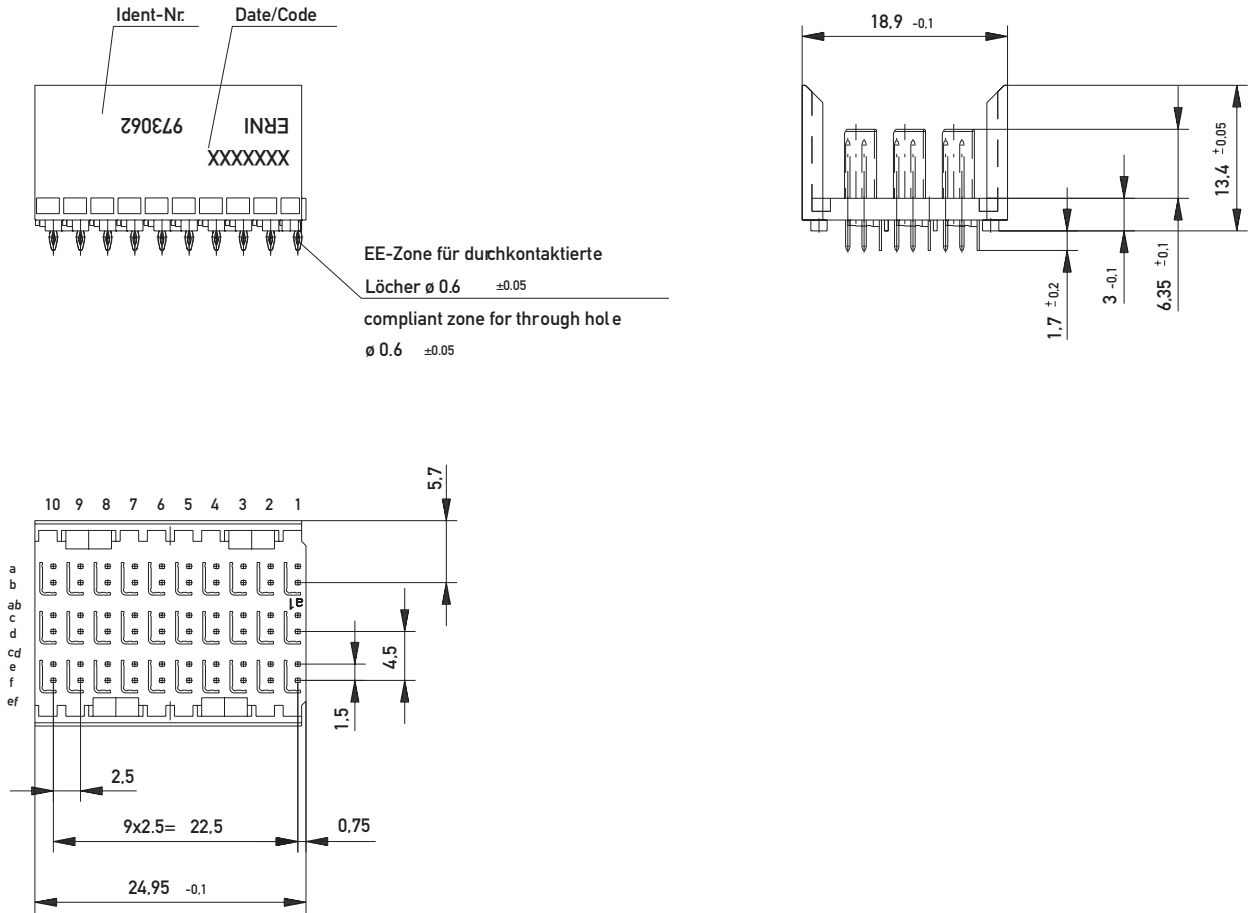


## Part Numbers

Configuration	Pin Version	Part Number
Type 4 (4 pairs) / 10 wafers	D	973031
Type 4 (4 pairs) / 10 wafers	B	973061

## Dimensional Drawings

ERmet ZD Vertical Male Connectors 3 pair / 10 wafer

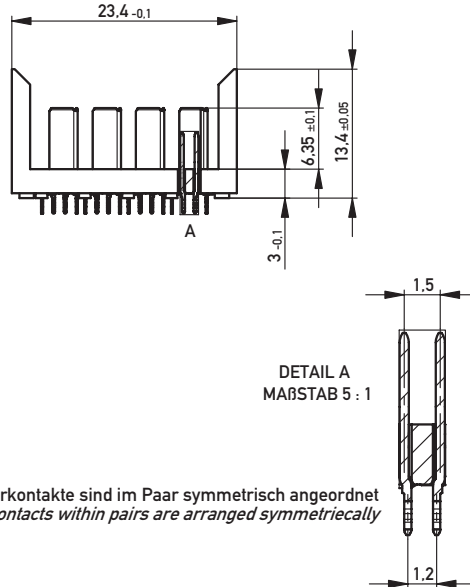
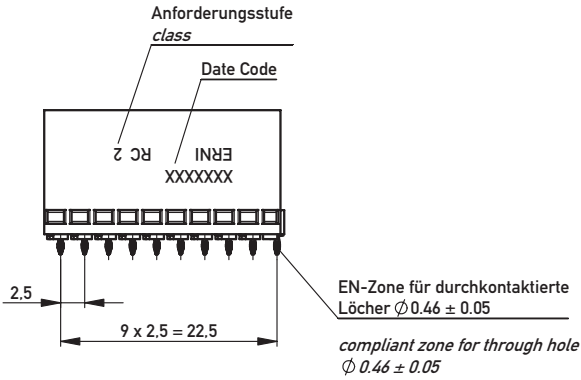


## Part Numbers

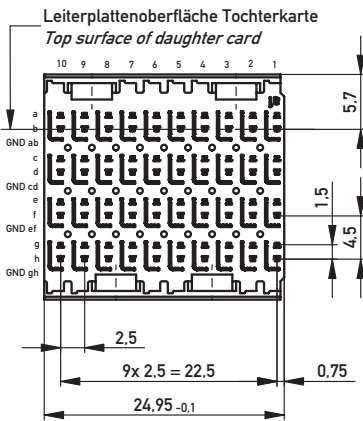
Configuration	Pin Version	Part Number
Type 3 (3 pairs) / 10 wafers	D	973027
Type 3 (3 pairs) / 10 wafers	B	973062

## Dimensional Drawings

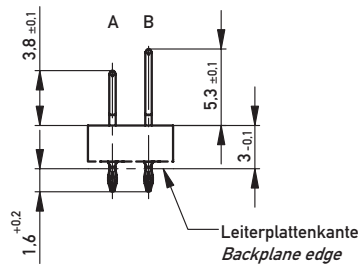
ERmet ZDplus Vertical Male Connectors 4 pair / 10 wafer



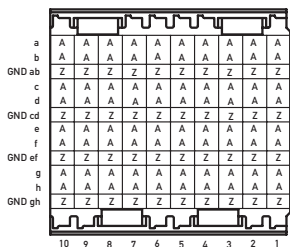
Messkontakte sind im Paar symmetrisch angeordnet  
Male contacts within pairs are arranged symmetrically



Kontaktversionen. Messkontakte  
Contact Selection Options. Male Contacts



Bestückungsplan - contact layout

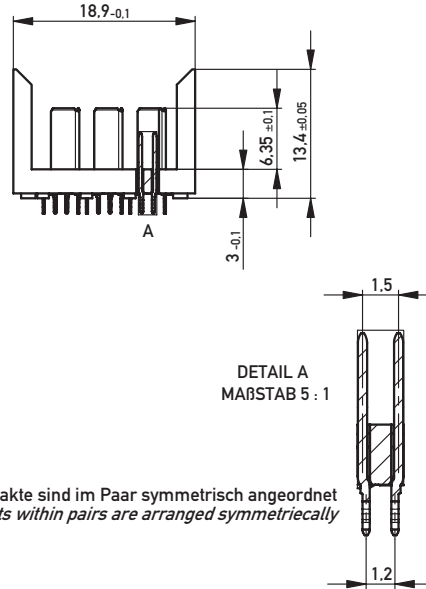
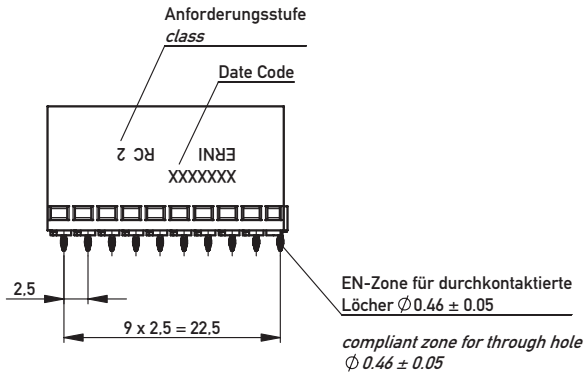


## Part Number

Configuration	Pin Version	Part Number
Type 4 (4 pairs) / 10 wafers	A	394452

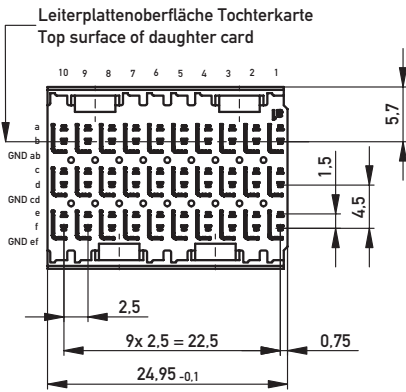
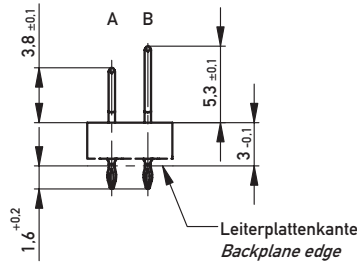
## Dimensional Drawings

ERmet ZDplus Vertical Male Connectors 3 pair / 10 wafer

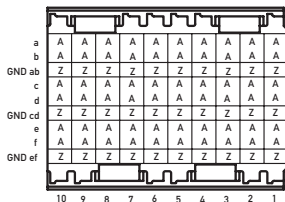


Messerkontakte sind im Paar symmetrisch angeordnet  
Male contacts within pairs are arranged symmetrically

Kontaktversionen, Messerkontakte  
Contact Selection Options, Male Contacts



Bestückungsplan - contact layout

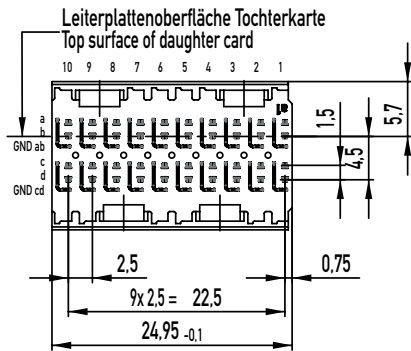
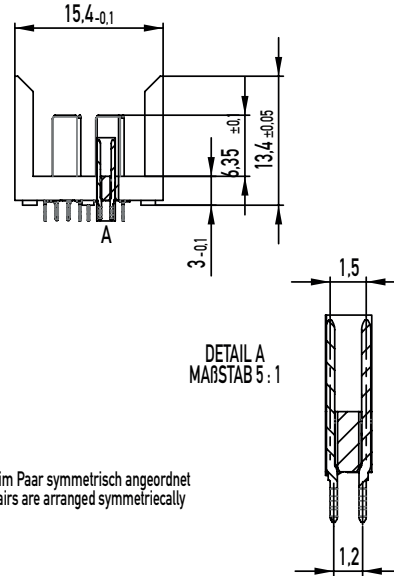
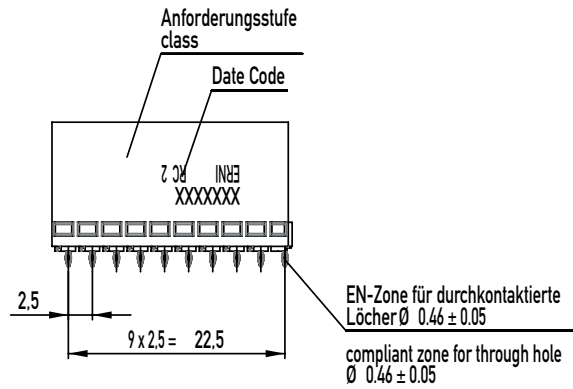


### Part Number

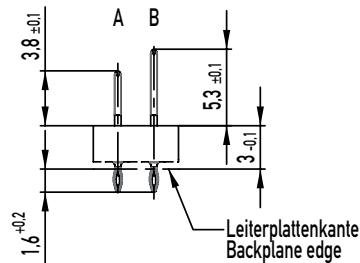
Configuration	Pin Version	Part Number
Type 3 (3 pairs) / 10 wafers	A	464514

## Dimensional Drawings

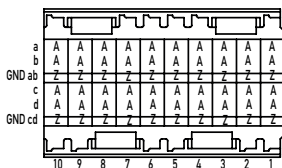
ERmet ZDplus Vertical Male Connectors 2 pair / 10 wafer



Kontaktversionen, Messerkontakte  
Contact Selection Options, Male Contacts



Bestückungsplan - contact layout



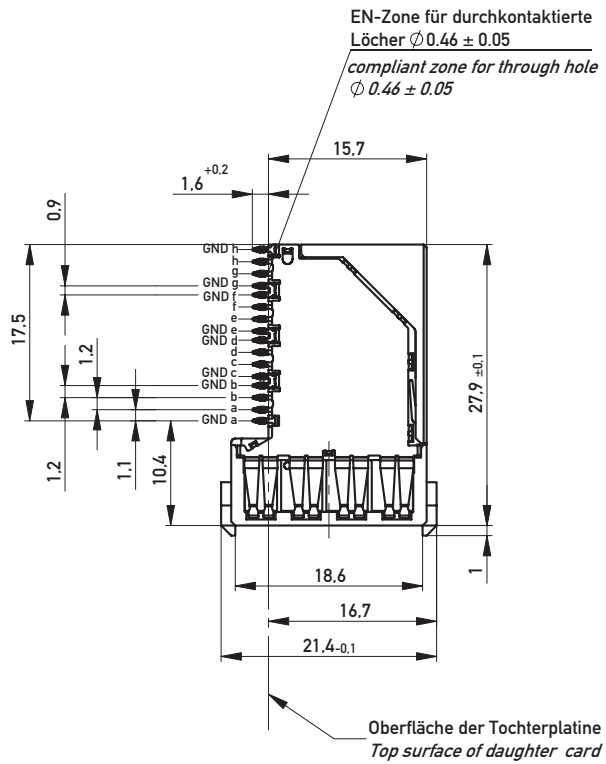
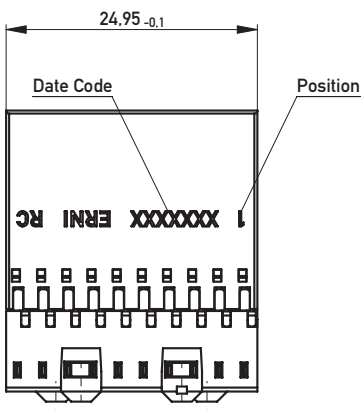
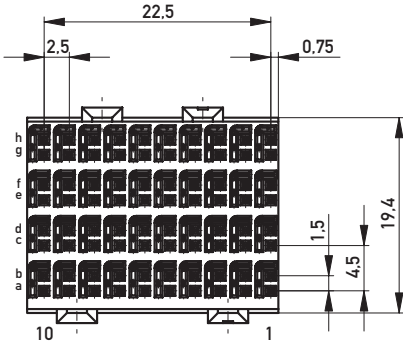
### Part Number

Configuration	Pin Version	Part Number
Type 2 (2 pairs) / 10 wafers	A	464520



## Dimensional Drawings

Right Angle Female Connectors 4 pair / 10 wafer

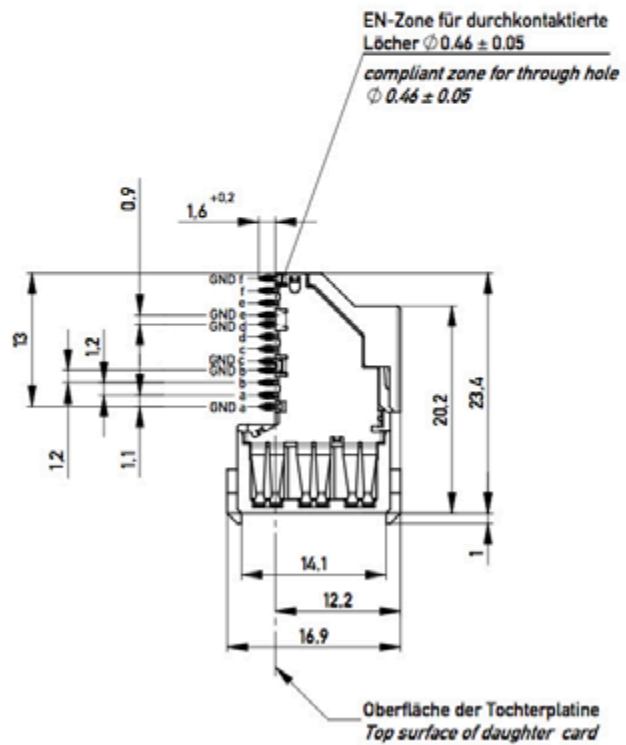
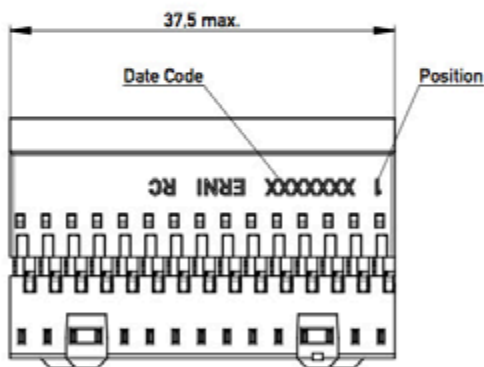
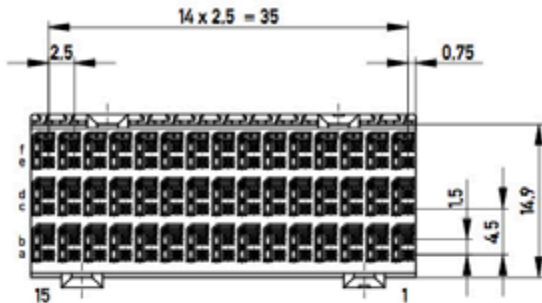


## Part Numbers

Configuration	Part Number
Type 4 (4 pairs) / 10 wafers	384312

## Dimensional Drawings

Right Angle Female Connectors 3 pair / 15 wafer

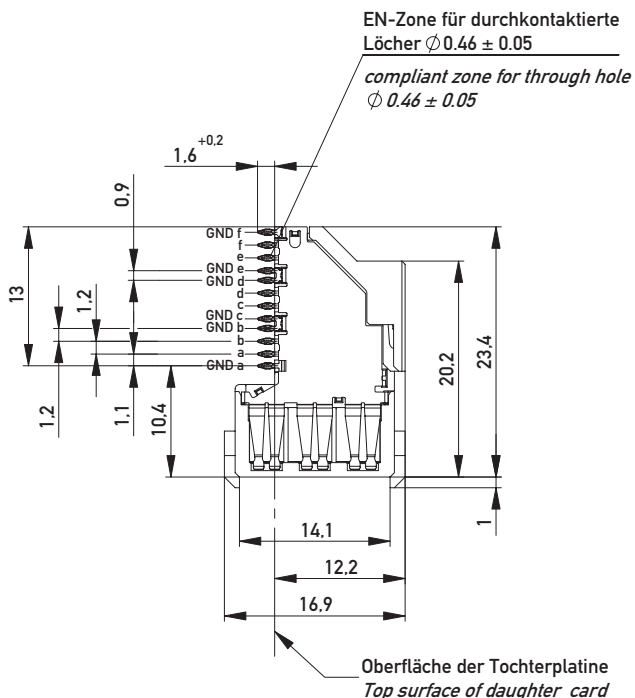
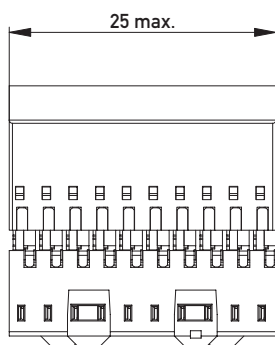
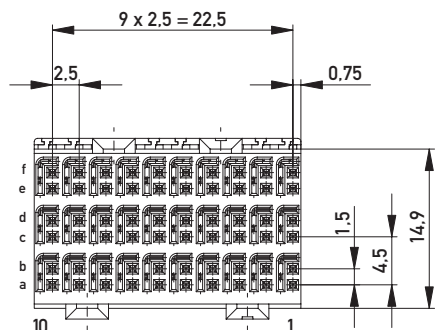


## Part Numbers

Configuration	Part Number
Type 3 (3 pairs) / 15 wafers	384310

## Dimensional Drawings

Right Angle Female Connectors 3 pair / 10 wafer

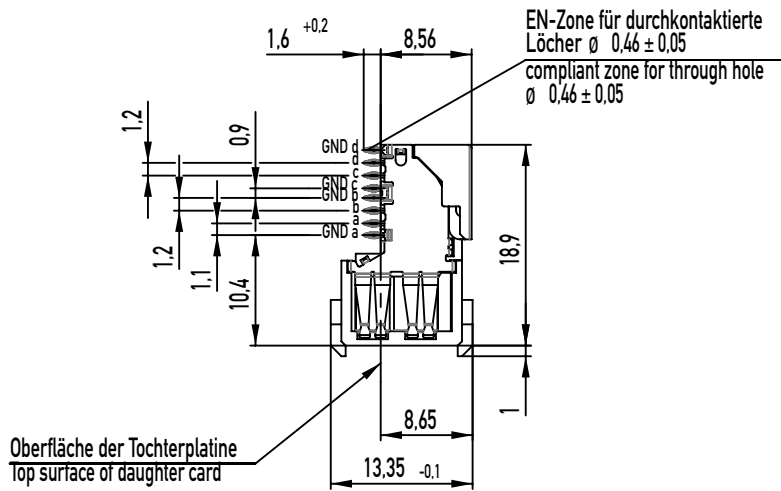
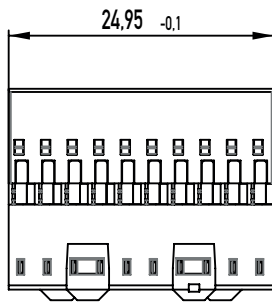
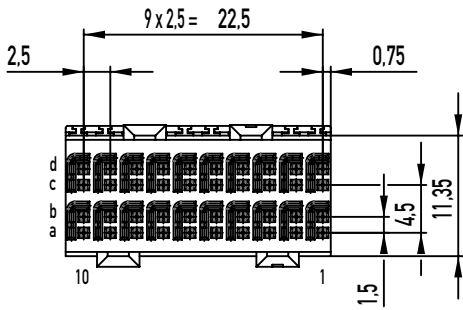


## Part Numbers

Configuration	Part Number
Type 3 (3 pairs) / 10 wafers	454530

## Dimensional Drawings

Right Angle Female Connectors 2 pair / 10 wafer

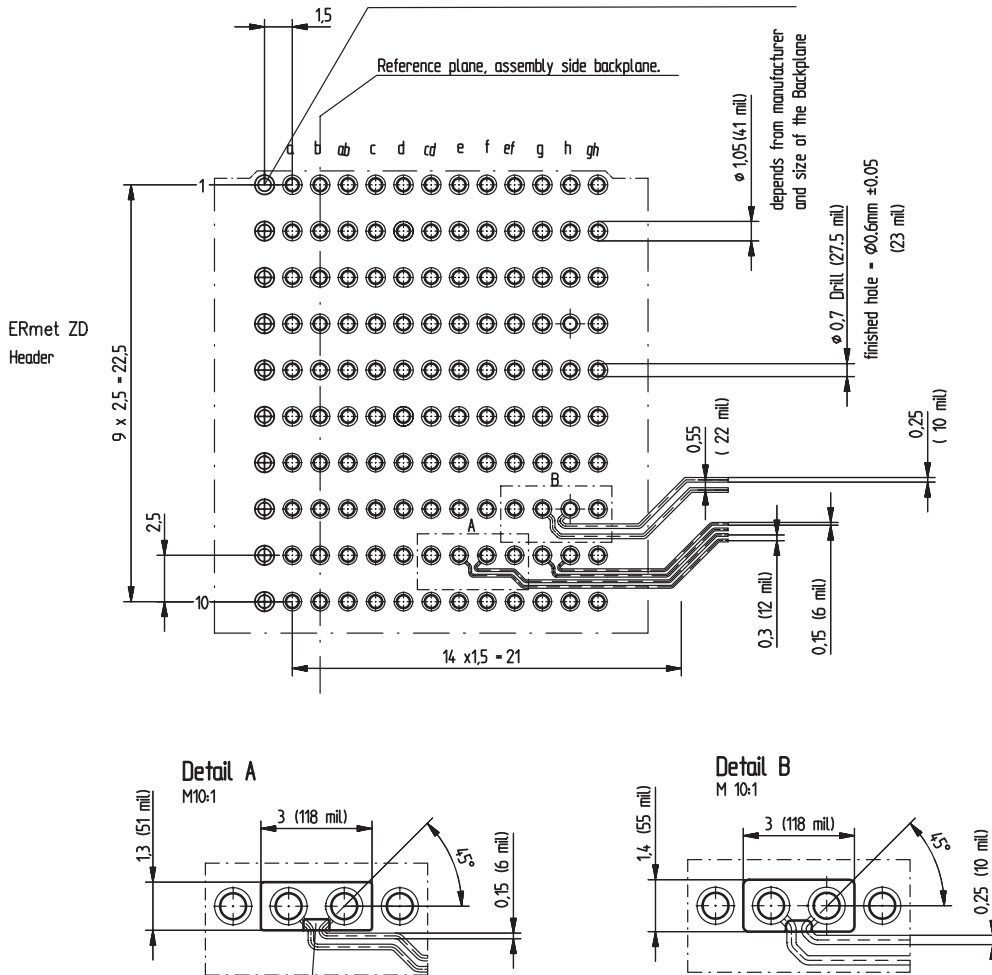


## Part Numbers

Configuration	Part Number
Type 2 (2 pairs) / 10 wafers	464459

## Layout

### Backplane Layout 4 Pair ERmet ZD Male Connector

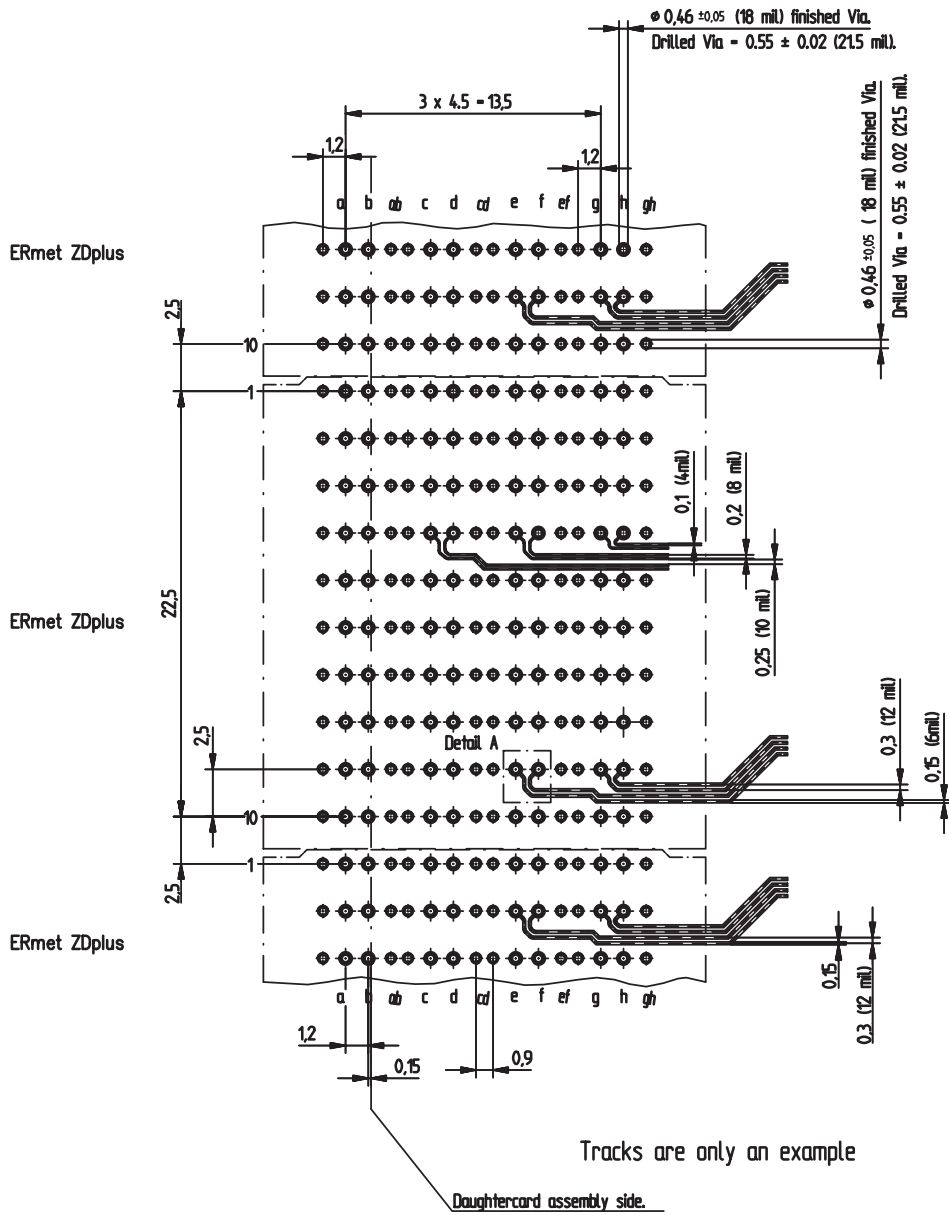


Zusätzliche Schirmnase über und unter der Signallage, verbessert Impedanzverlauf.  
Additional shielding nose under and above of the signal layer improves impedance characteristics.

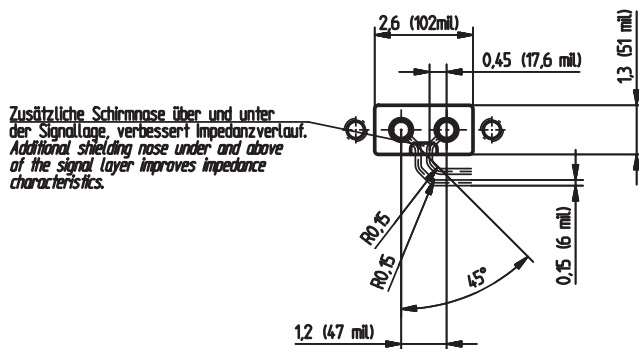
Tracks and Antipads are an example and shown for a permittivity of 3.5. Antipad width is shown for worst case, regarding signal trace covering. Antipad width should not exceed 1,7 mm regarding excessive crosstalk. Layout proposals are shown for a diff. pair compensation of max. 3 ps.

## Layout

### Backplane Layout 4 Pair ERmet ZDplus



Detail A

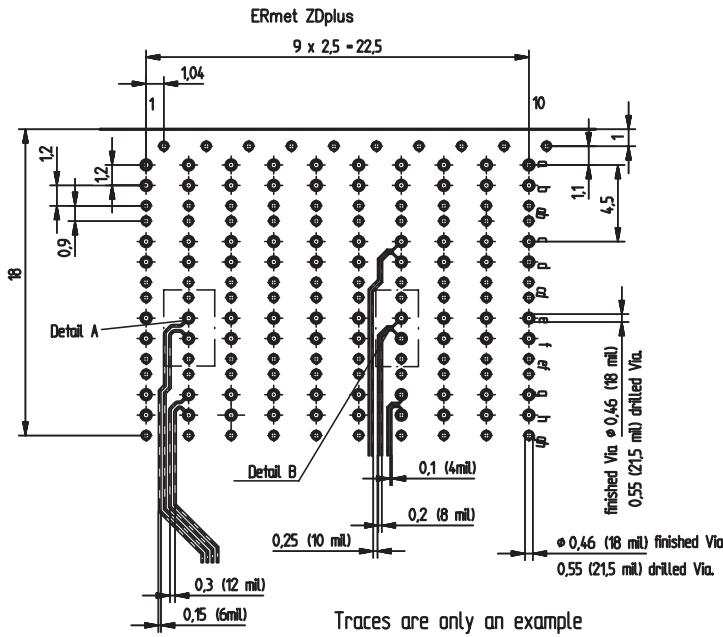


Antipad width is always shown, for worst case, regarding covering the signal traces.

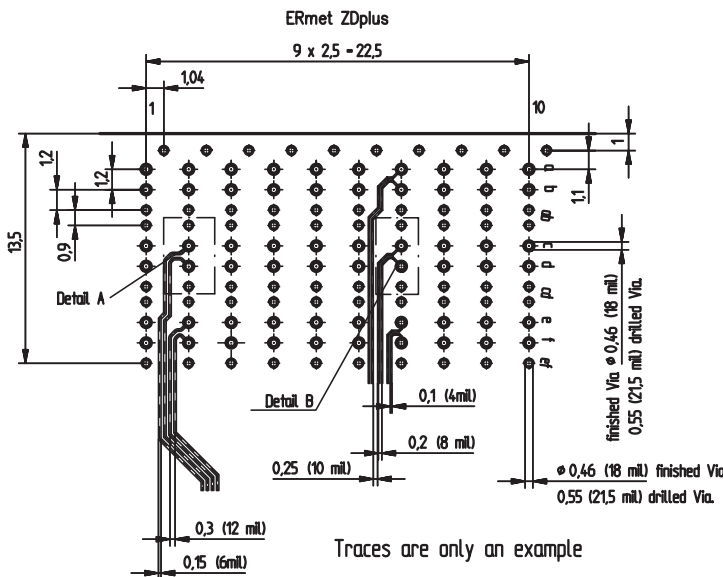
Antipad width should not exceed 1,7mm, regarding crosstalk. Detail A shows a layout proposal with 3 ps diff. Skew.

## Layout

Daughtercard Layout 4 Pair ERmet ZDplus Female Connector

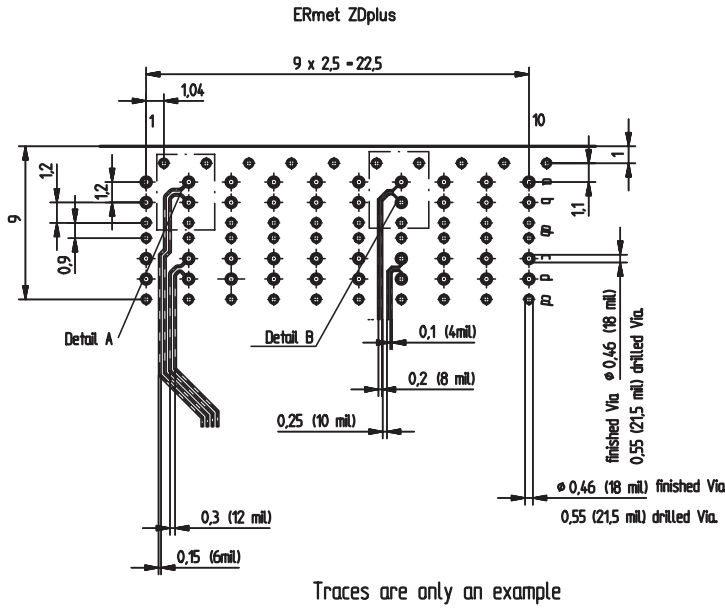


Daughtercard Layout 3 Pair ERmet ZDplus Female Connector

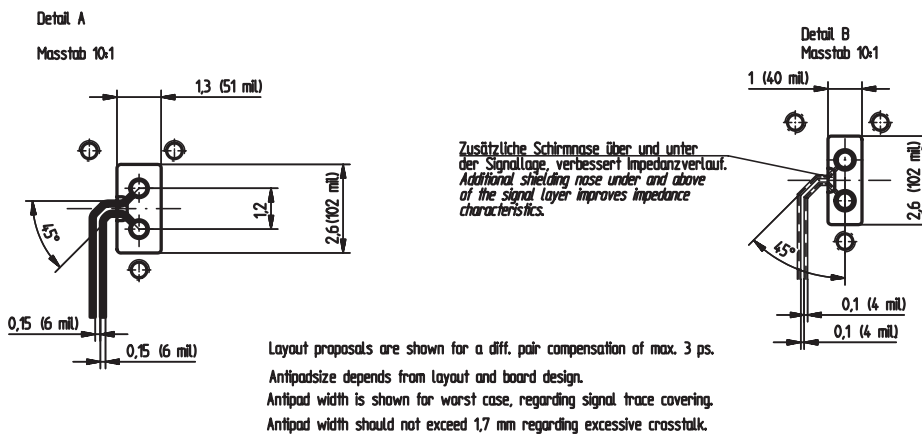


## Layout

Daughtercard Layout 2 Pair ERmet ZDplus Female Connector



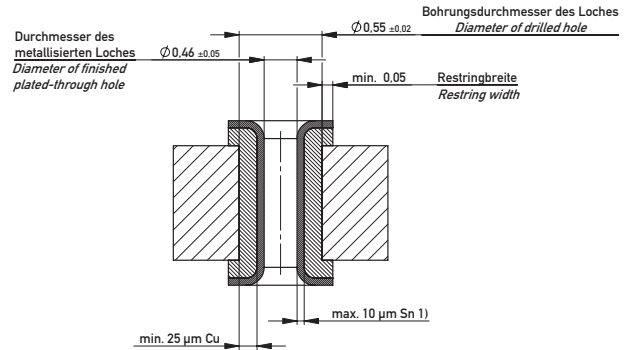
## Trace Routing



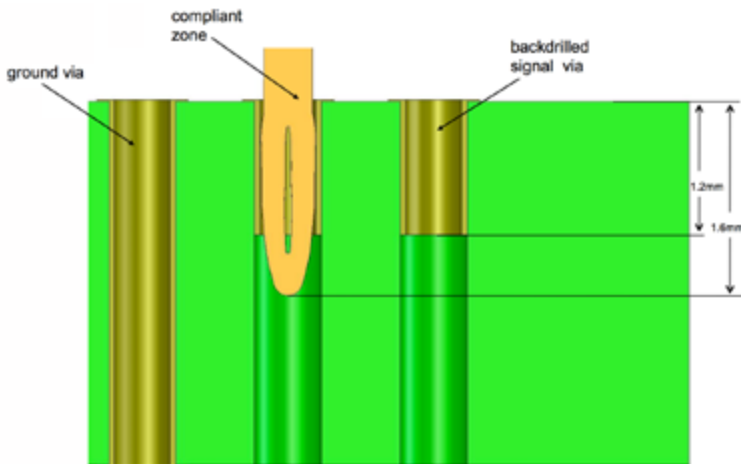


**Plated Through-Holes for Pressfit Terminals**

All pressfit terminals of the ERmet ZDplus modules share the same plated through-hole requirements. These pressfit terminals have been used successfully with reflowed tin-lead, plated tin-lead, immersion tin, organic coatings over bare copper and immersion gold hole plating regimes. The hole recommendations and press in force information shown in this catalog are for reflowed tin-lead and plated tin-lead. Additional test data for other hole plating regimes are available through customer service.

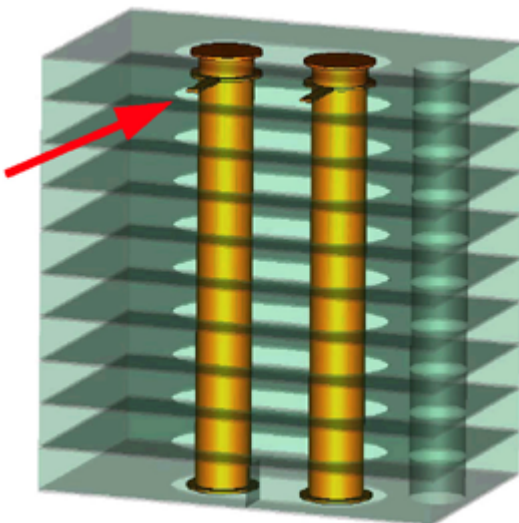


**Backdrilling**

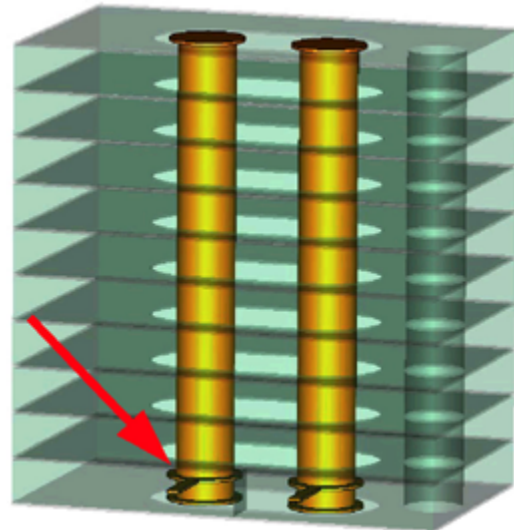


**Stubbing Effect**

Top connection



Bottom connection

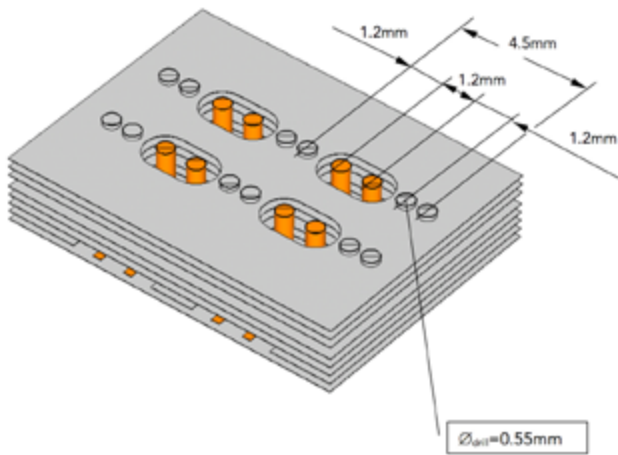


The bottom connection is to prefer, because it don't cause so much reflection.

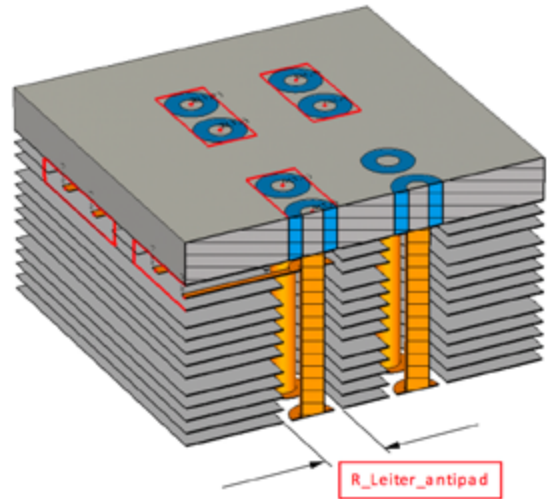
### Simulation Setup

Simulation study with traces in upper and lower layer.

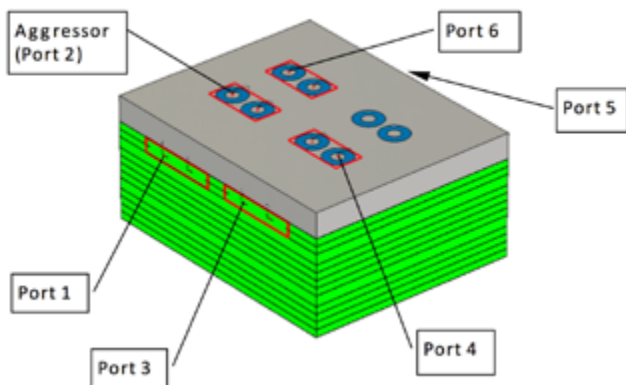
Two Ground Pins



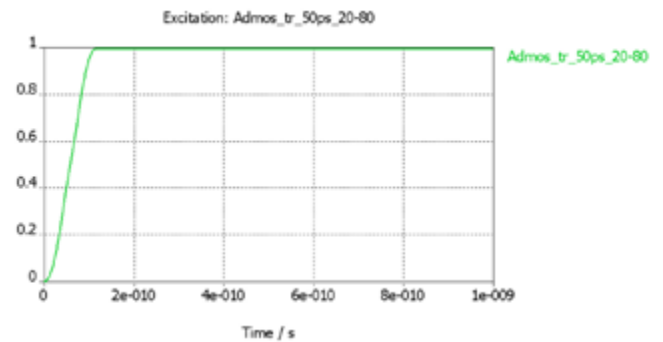
Cross section without insulator



Description Ports



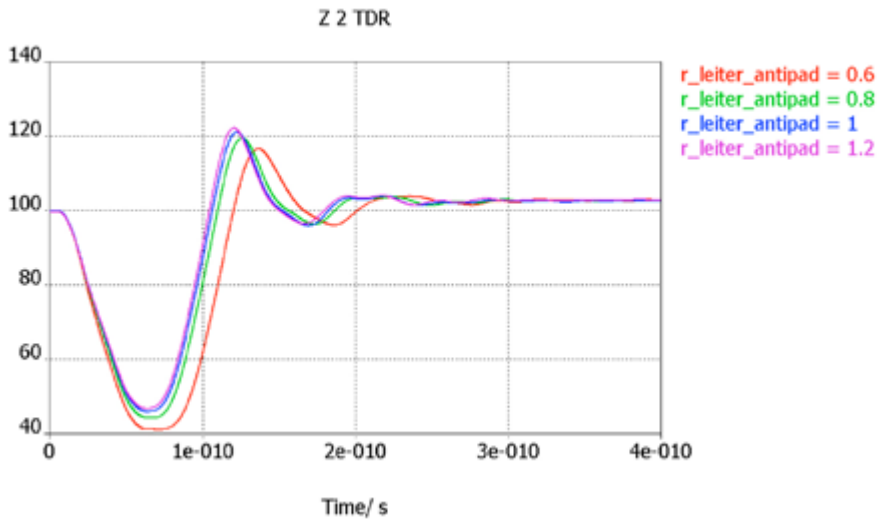
Input Signal  
Signal rise time: 50 ps



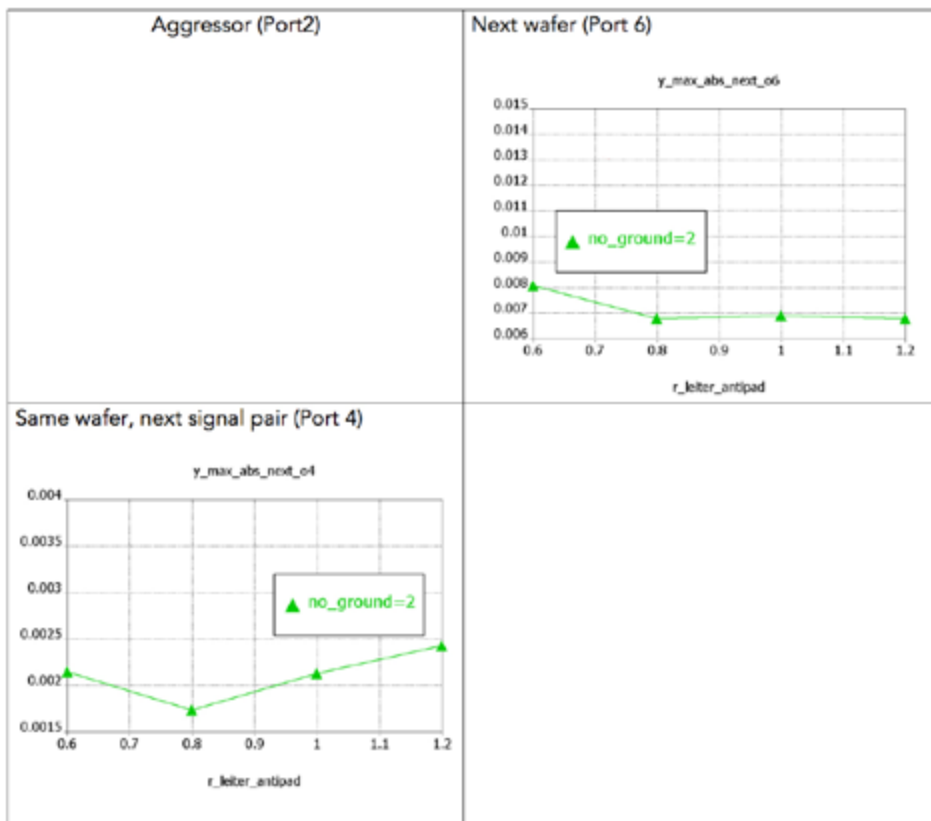


Results for Traces in Upper Layer

Impedance

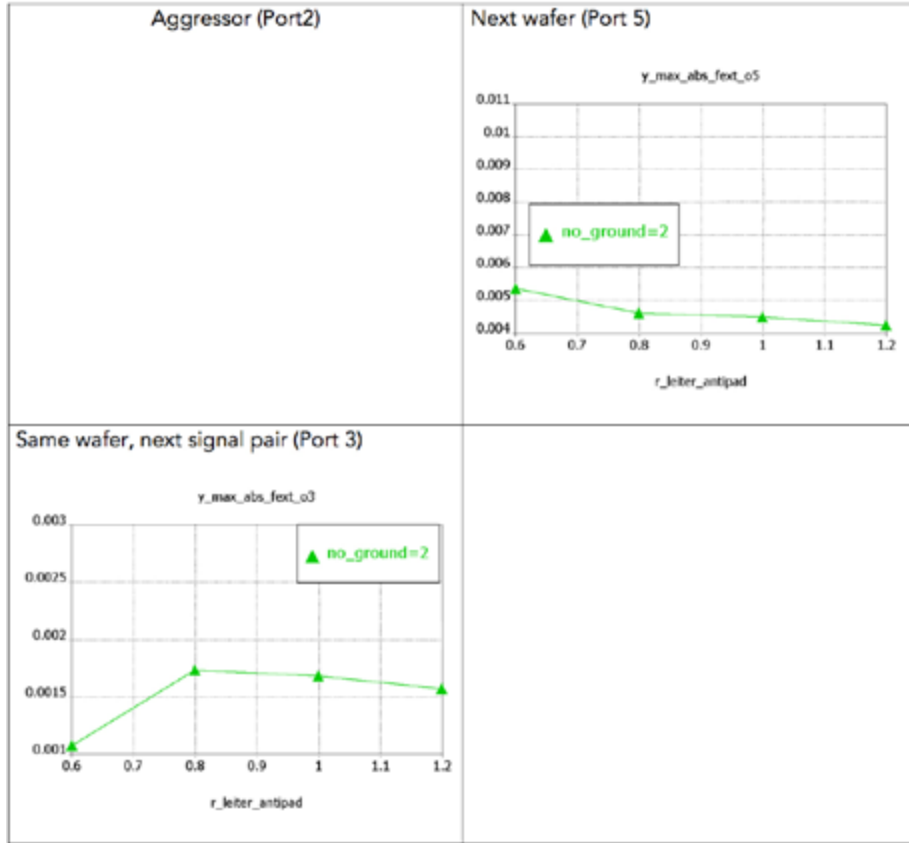


NEXT of neighbored signal pairs



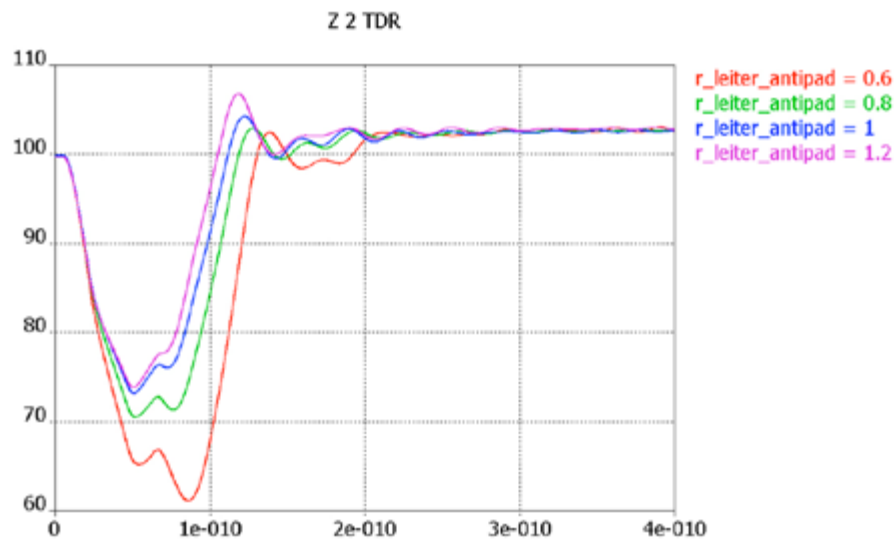


FEXT of neighbored signal pairs

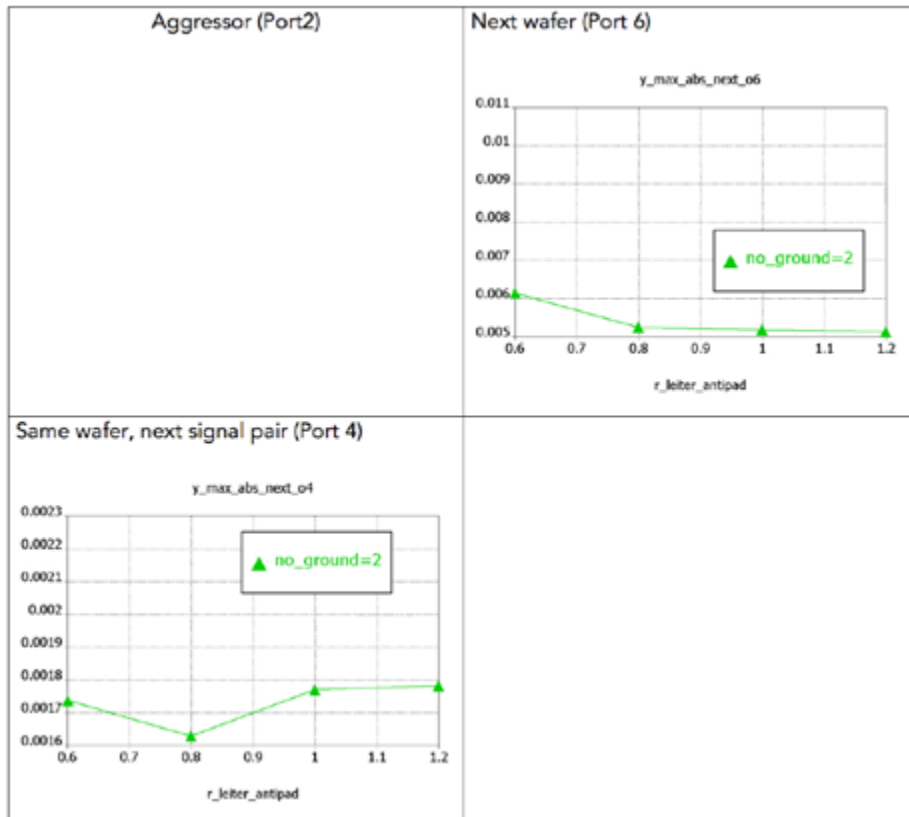


Results for Traces in Lower Layer

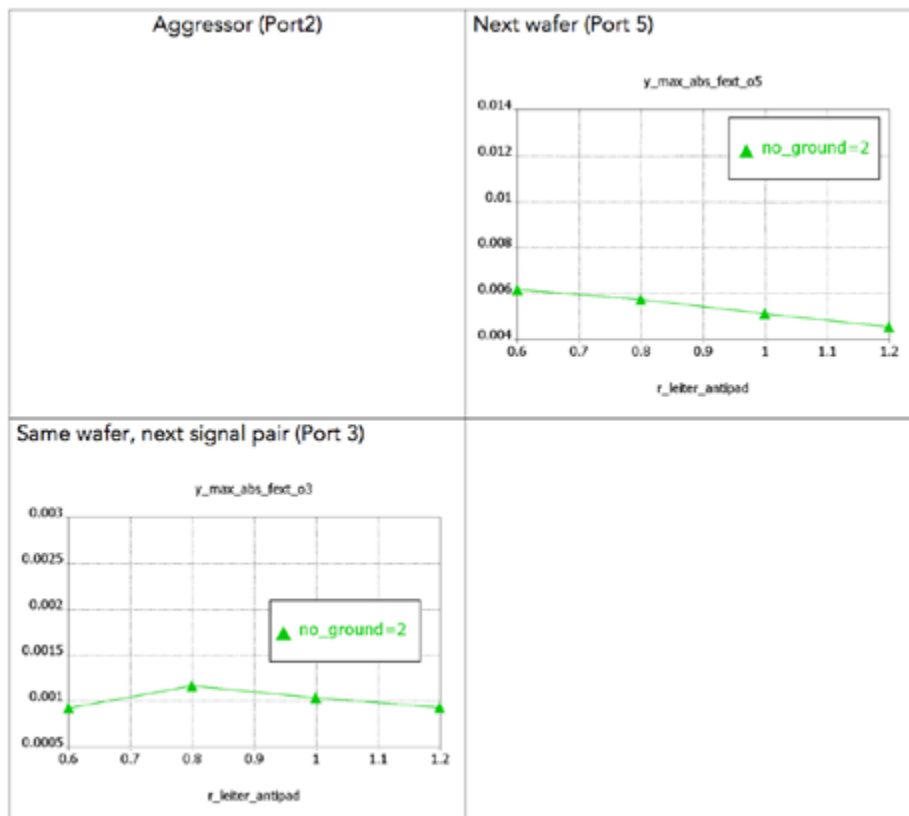
Impedance



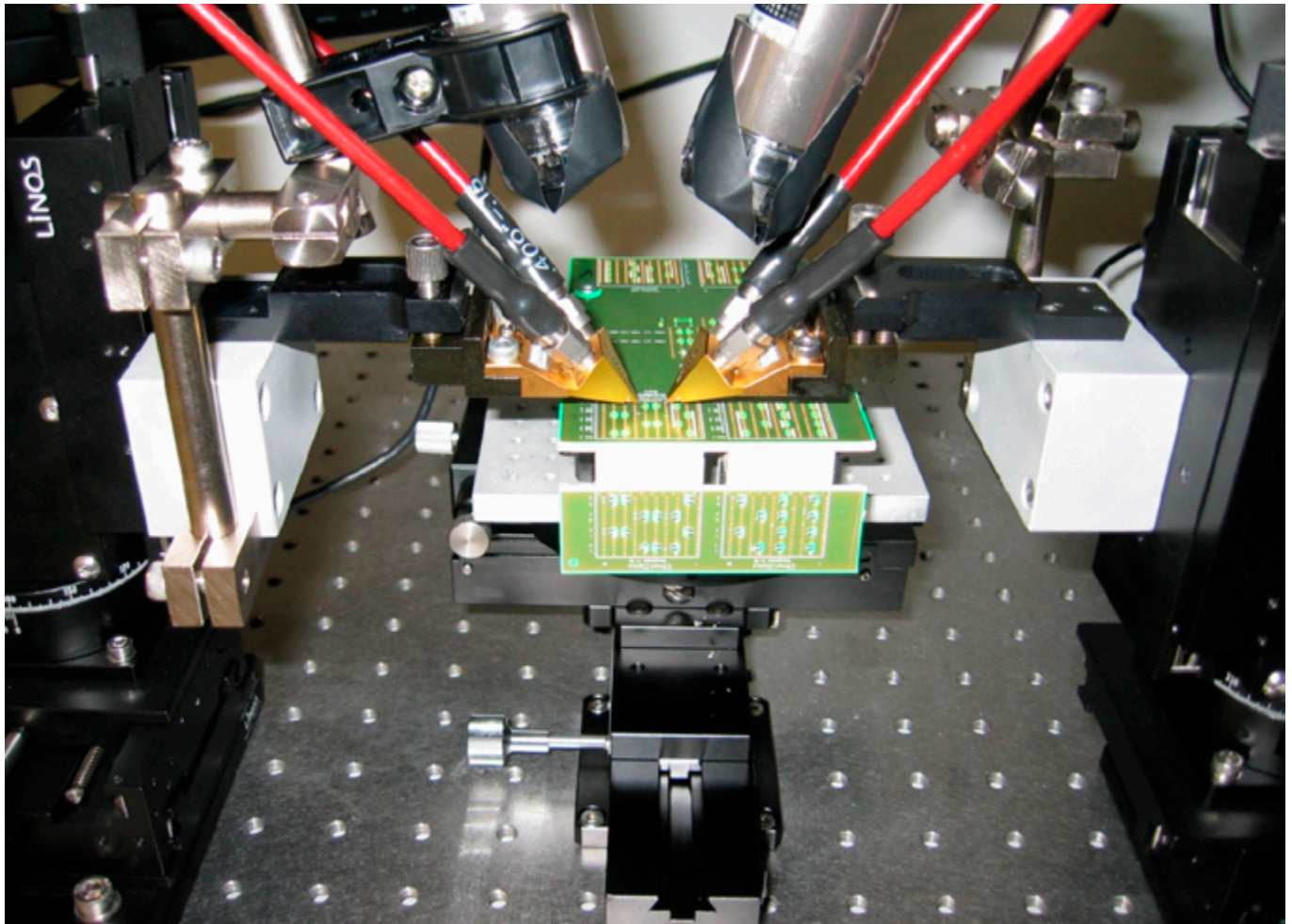
NEXT of neighbored signal pairs



FEXT of neighbored signal pairs



## Measurement Results



### Introduction

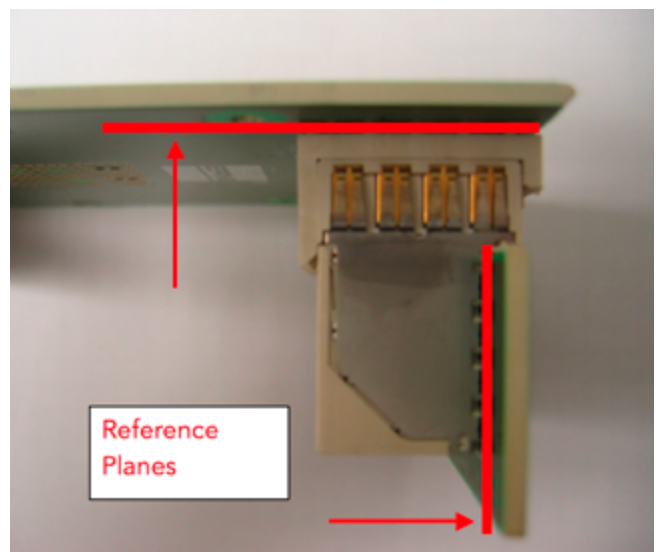
In this abstract several results of ERNI ERmet ZDplus were presented, based on S-Parameter measurements with ZProbe.

Measurement Equipment: Agilent ENA E5071C with Cascade Microtech ZProbes (GSGSG)

Calibration and de-embedding were performed to isolate the connector.

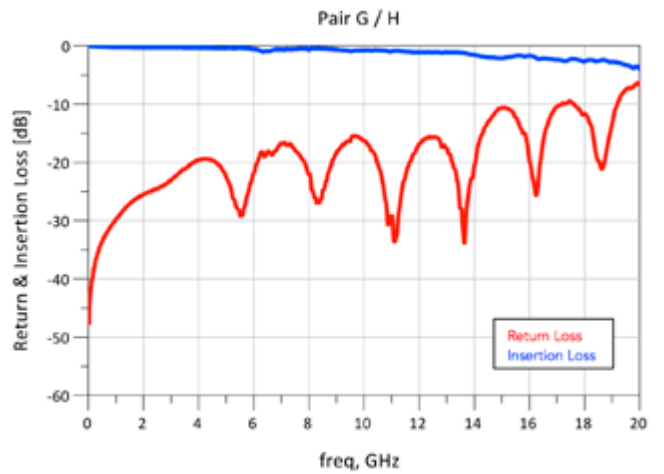
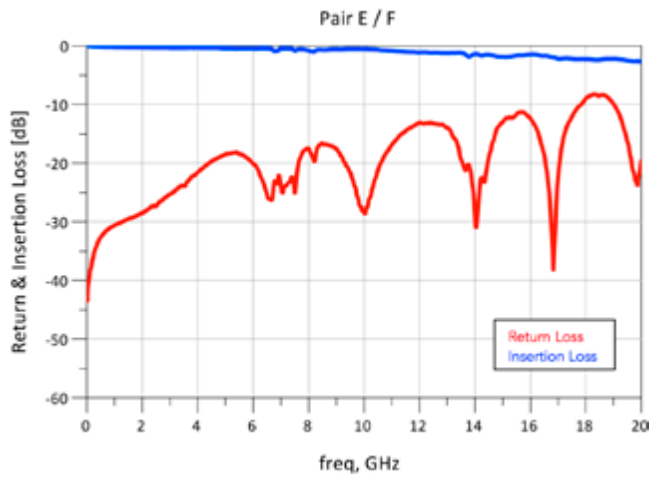
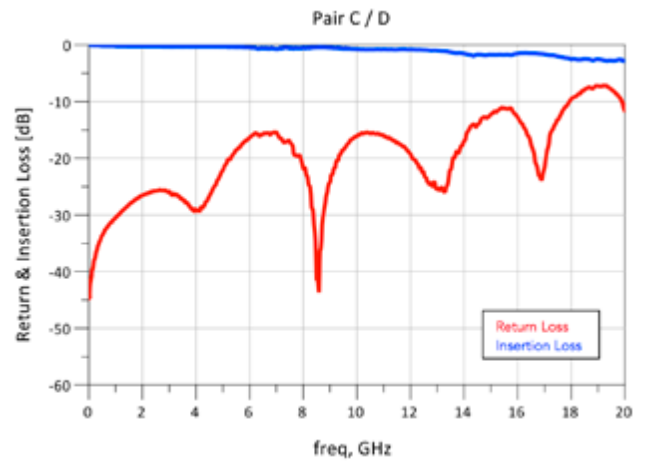
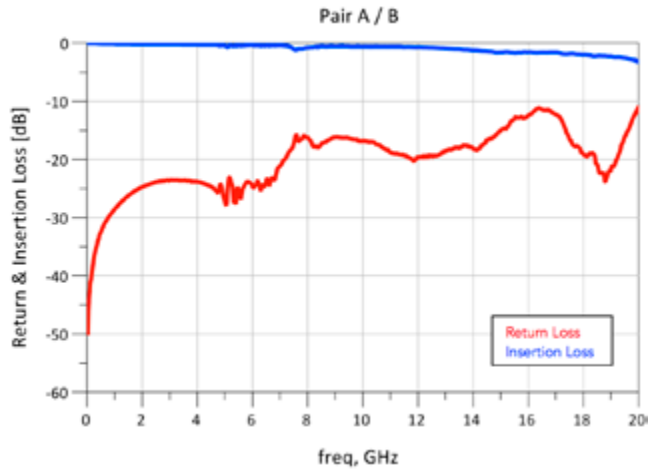
Frequency Range: 300kHz...20GHz  
Sweep points: 3001  
IF Bandwidth: 1kHz

Device Under Test: ZDplus testboard V6 (20.12.2012)



## Measurement Results

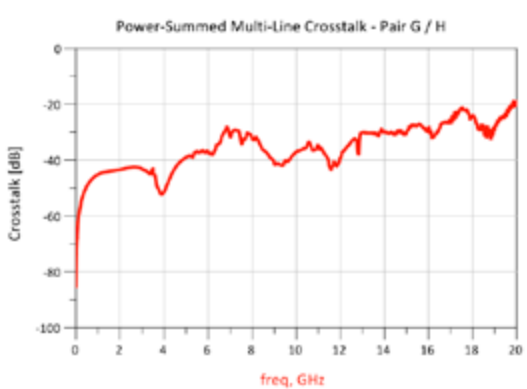
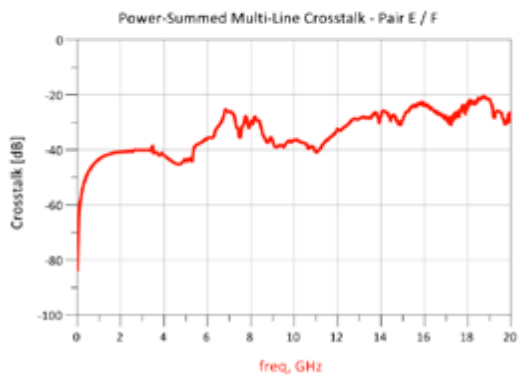
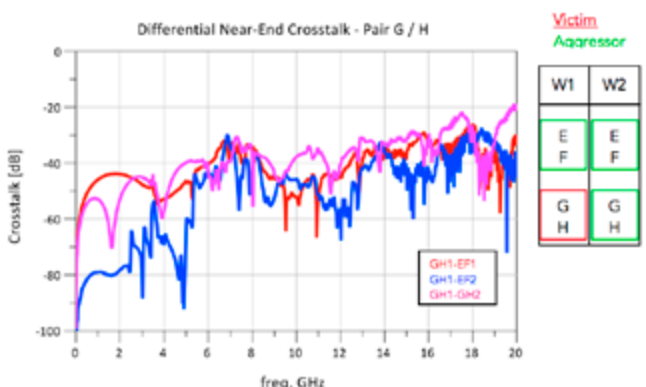
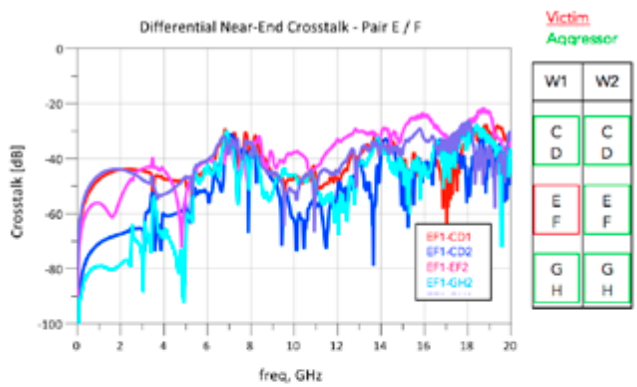
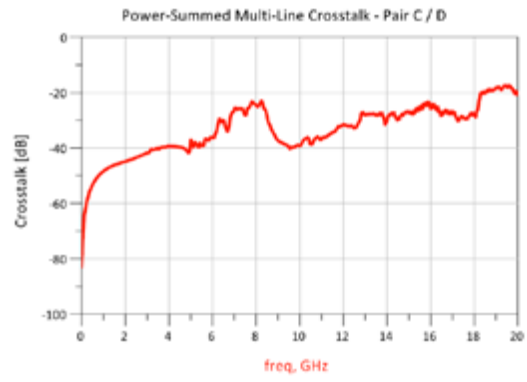
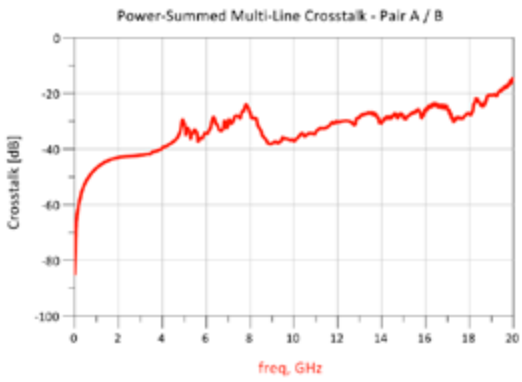
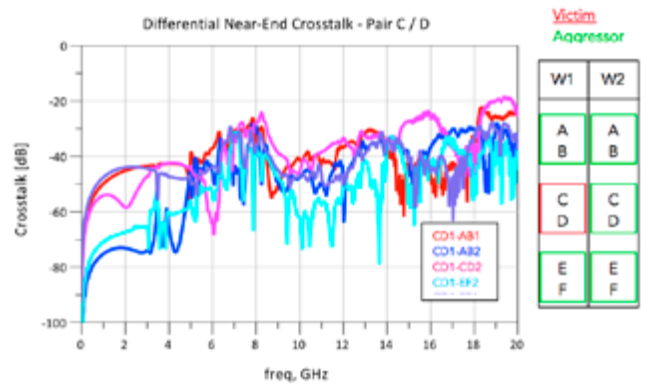
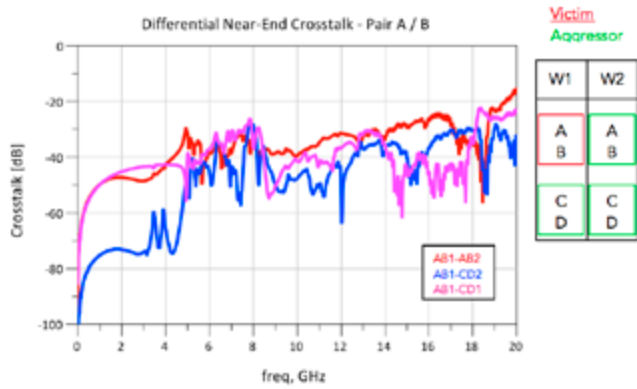
### Return and Insertion Loss





Measurement Results

Crosstalk

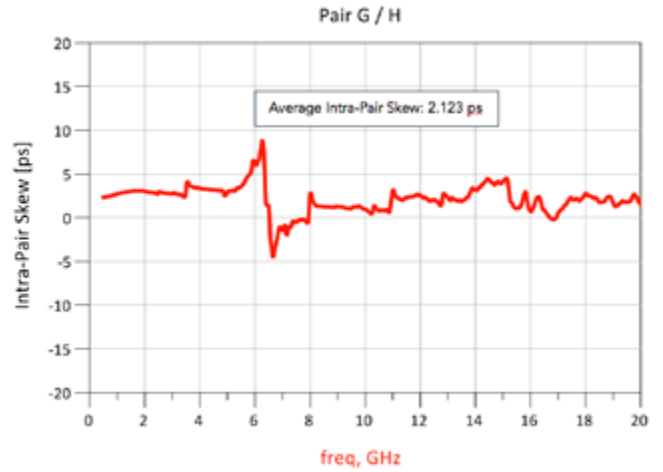
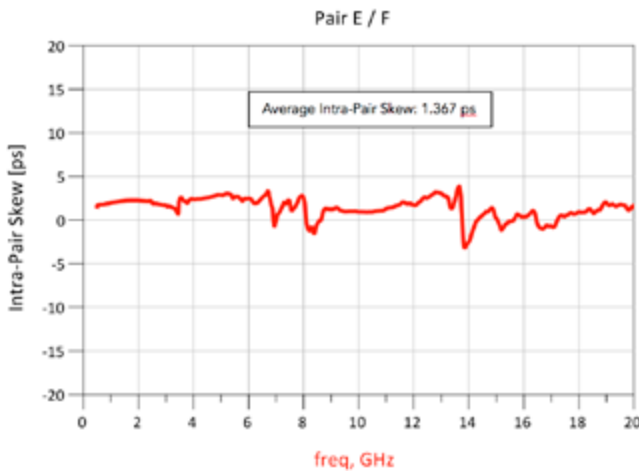
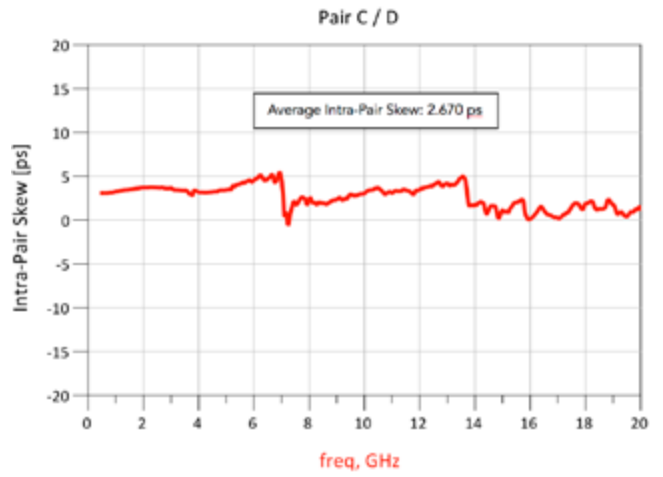
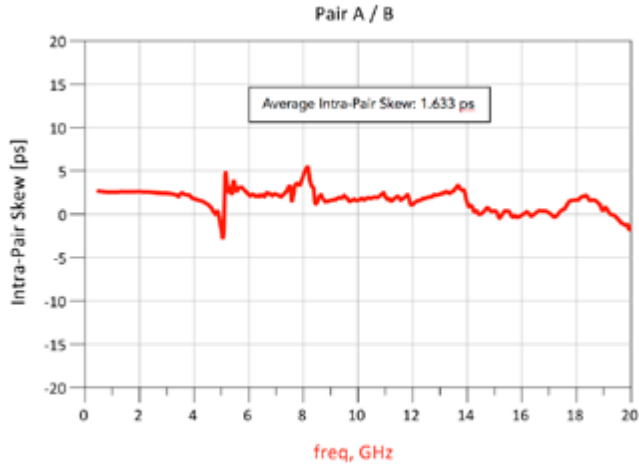






## Measurement Results

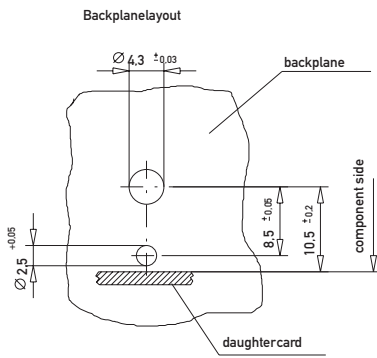
### Intra-Pair Skew



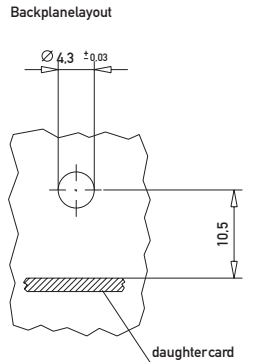


### Layouts

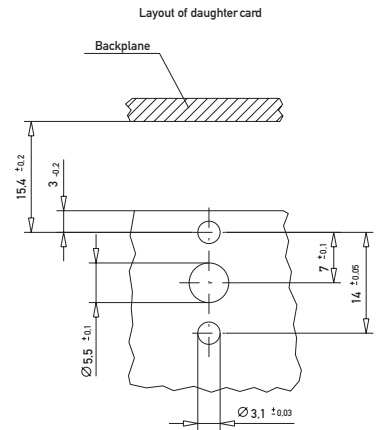
Alignment pin kit with base plate



Alignment pin kit without base plate



Alignment guide bush kit



### Ordering Information

Configuration	PCB Thickness	Electrical Contact	Part Number
Guiding pin kit without base plate	2.5 - 6.0 mm	Yes	214361
Guiding pin kit without base plate	6.0 - 8.0 mm	Yes	214362
Guiding pin kit with base plate	2.5 - 6.0 mm	Yes	214363
Guiding pin kit with base plate	6.0 - 8.0 mm	Yes	214364
Guiding pin kit without base plate	2.5 - 6.0 mm	No	144370
Guiding pin kit without base plate	6.0 - 8.0 mm	No	144371
Guiding pin kit with base plate	2.5 - 6.0 mm	No	144131
Guiding pin kit with base plate	6.0 - 8.0 mm	No	144132
Guid bush kit	1.5 - 2.0 mm	Yes	234675
Guid bush kit	2.0 - 4.5 mm	Yes	164307
Guid bush kit	1.5 - 2.0 mm	No	144127
Guid bush kit	2.0 - 4.5 mm	No	144128



Member



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