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:**

<table>
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<tr>
<th>Female</th>
<th>Male</th>
<th>Datarate</th>
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<tbody>
<tr>
<td>ZD</td>
<td>ZD</td>
<td>5+ Gbit/s</td>
</tr>
<tr>
<td>ZDplus</td>
<td>ZD</td>
<td>15+ Gbit/s</td>
</tr>
<tr>
<td>ZD</td>
<td>ZDplus</td>
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<td>20+ Gbit/s</td>
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ERmet ZD Vertical Male Connectors 4 pair / 10 wafer

Part Numbers

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<tr>
<th>Configuration</th>
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<tr>
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ERmet ZD Vertical Male Connectors 3 pair / 10 wafer

Part Numbers

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ERmet ZDplus Vertical Male Connectors 4 pair / 10 wafer

**Part Number**

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ERmet ZDplus - Application Note Version 2.2
Dimensional Drawings

ERmet ZDplus Vertical Male Connectors 3 pair / 10 wafer

Configuration | Pin Version | Part Number
--- | --- | ---
Type 3 (3 pairs) / 10 wafers | A | 464514
ERmet ZDplus Vertical Male Connectors 2 pair / 10 wafer

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Right Angle Female Connectors 4 pair / 10 wafer

Part Numbers

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Right Angle Female Connectors 3 pair / 15 wafer

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Right Angle Female Connectors 3 pair / 10 wafer

EN-Zone für durchkontaktierte Löcher  0.46 ± 0.05
compliant zone for through hole  0.46 ± 0.05

Top surface of daughter card

Part Numbers

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## Right Angle Female Connectors 2 pair / 10 wafer

![Diagram of connector dimensions]

### Part Numbers

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Backplane Layout 4 Pair ERmet ZD Male Connector

Details:
- **Detail A**: HD 1, 3 (18 mil), 0.5 (6 mil)
- **Detail B**: M 10, 3 (18 mil), 0.5 (10 mil)

Guideline: Schematic shown is a reference only and not for soldering. Additional soldering may be required, depending on the application.

Tracks and Antipads are an example and shown for a density of 35%. Antipad width is shown for worst case, regarding signal trace covering. Antipad width should not exceed 17 mm regarding excessive crosstalk.

Layout proposals are shown for a different pair compensation of max. 3 ps.
Backplane Layout 4 Pair ERmet ZDplus

Tracks are only an example

Detail A

Zusätzliche Schirrmasse über und unter
der Signalage, verbessert Impedanzverhalten.
Additional shielding zone under and above
of the signal layer improves impedance
characteristics.
Daughtercard Layout 4 Pair ERmet ZDplus Female Connector

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Daughtercard Layout 3 Pair ERmet ZDplus Female Connector

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Traces are only an example
Daughtercard Layout 2 Pair ERmet ZDplus Female Connector

Traces are only an example

Trace Routing

Layout proposals are shown for a diff. pair compensation of max. 3 ps. Antipad size depends from layout and board design. Antipad width is shown for worst case, regarding signal trace covering. Antipad should not exceed 1.7 mm regarding excessive crosstalk.
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

Z 2 TDR
NEXT of neighbored signal pairs

FEXT of neighbored signal pairs
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

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Measurement Results

Return and Insertion Loss

Pair A / B

Return & Insertion Loss [dB]

freq, GHz

Pair C / D

Return & Insertion Loss [dB]

freq, GHz

Pair E / F

Return & Insertion Loss [dB]

freq, GHz

Pair G / H

Return & Insertion Loss [dB]

freq, GHz
Crosstalk

Measurement Results
Intra-Pair Skew

**Pair A / B**

Average Intra-Pair Skew: 1.633 ps

**Pair C / D**

Average Intra-Pair Skew: 2.670 ps

**Pair E / F**

Average Intra-Pair Skew: 1.267 ps

**Pair G / H**

Average Intra-Pair Skew: 2.23 ps
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Guiding System

Layouts

Alignment pin kit with base plate
Alignment pin kit without base plate
Alignment guide bush kit

Ordering Information

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