HIGH SPEED ELECTRICAL TEST SUMMARY
TDP™ TRIAD™ DIFFERENTIAL PAIR CABLE ASSEMBLIES

1.0 SCOPE
This Test Summary covers high speed electrical performance for the Triad Differential Pair cable assemblies. The test report covers some of the combinations of lengths of 1 meter, 3 meter, 5 meter, and 8 meter for 2 different wire gauge sizes. Data rates included in the testing were 1.25 Gbps, 2.5 Gbps, and 5.0 Gbps. The following electrical parameters are included: differential impedance, differential insertion loss, eye pattern, skew, and crosstalk. The pinout for the tested assemblies includes two ground terminals between each triad differential pair.
Note: At this time, all combinations of signal conductor sizes, lengths, and data rates were not included, primarily due to anticipated attenuation requirements.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND PART NUMBER(S)

A. PRODUCT NAME
TRIAD DIFFERENTIAL PAIR (TDP) CABLE ASSEMBLIES
CABLE ASSEMBLIES INCLUDE TDP 18 CKT PLUGS AT EACH END MATED TO 18 CKT TDP BOARD MOUNT RECEPTACLES. THE CABLE ASSEMBLIES VARIED IN LENGTH FROM 1 TO 8 METERS, AND IN TWO AWG SIZES, 24 AWG AND 28 AWG.

(NOTE: 18 CKT CONNECTORS WERE SELECTED FOR THE TESTING, TO UTILIZE CURRENT AVAILABLE HIGH SPEED TEST BOARDS. ELECTRICAL PERFORMANCE OF A DIFFERENTIAL PAIR WILL BE RELATIVELY THE SAME FOR LARGER CKT SIZES AS THE TWO ROW CONNECTOR GEOMETRY REPEATS ITSELF, AND THUS SIMILAR PERFORMANCE).

B. MOLEX PART NUMBERS
79925-XXXX

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

3.1 TESTING PROCEDURES AND SEQUENCES
Reference EIA 364 High Speed Electrical Test Methods

4.0 QUALIFICATION
Laboratory conditions and sample selection are in accordance with EIA-364.
## 5.0 PERFORMANCE SUMMARY

<table>
<thead>
<tr>
<th>Electrical Parameter</th>
<th>Test Condition</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Differential Impedance</strong></td>
<td>2.5 Gbps data rate 150 ps (10% - 90%) rise time</td>
<td>Connector/termination region: 100 ohms +/- 10 ohms Bulk cable: 100 ohms +/- 5 ohms (Representative data shown below)</td>
</tr>
<tr>
<td></td>
<td>5.0 Gbps 75 ps (10% - 90%) rise time</td>
<td>Connector/termination region: 100 ohms +/- 18 ohms Bulk cable: 100 ohms +/- 5 ohms (Representative data shown below)</td>
</tr>
<tr>
<td><strong>Differential Insertion Loss</strong></td>
<td>1.25 GHz (2.5 Gbps data rate) 1.)</td>
<td>28 AWG Construction 24 AWG Construction</td>
</tr>
<tr>
<td></td>
<td>2.5 GHz (5.0 Gbps data rate) 2.) and 3.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 meter</td>
<td>-2.2 dB N/A 4.)</td>
</tr>
<tr>
<td></td>
<td>3 meter</td>
<td>-4.6 dB N/A 4.)</td>
</tr>
<tr>
<td></td>
<td>5 meter</td>
<td>-6.7 dB -4.9 dB</td>
</tr>
<tr>
<td></td>
<td>8 meter</td>
<td>N/A 4.) -7.2 dB</td>
</tr>
<tr>
<td></td>
<td>5 meter</td>
<td>-3.3 dB N/A 4.)</td>
</tr>
<tr>
<td></td>
<td>3 meter</td>
<td>-6.6 dB N/A 4.)</td>
</tr>
<tr>
<td></td>
<td>5 meter</td>
<td>-9.9 dB -7.1 dB</td>
</tr>
<tr>
<td></td>
<td>8 meter</td>
<td>N/A 4.) -10.8 dB</td>
</tr>
<tr>
<td><strong>Within Pair Skew</strong></td>
<td>5 meter</td>
<td>N/A 4.) Less than 100 ps</td>
</tr>
<tr>
<td></td>
<td>8 meter</td>
<td>N/A 4.) Less than 120 ps</td>
</tr>
<tr>
<td><strong>Near End Crosstalk (NEXT)</strong></td>
<td>5 meter</td>
<td>N/A 4.) Less than 4%</td>
</tr>
<tr>
<td></td>
<td>8 meter</td>
<td>N/A 4.) Less than 4%</td>
</tr>
<tr>
<td><strong>Eye Pattern</strong></td>
<td>1.25 Gbps, 2.5 Gbps and 5.0 Gbps data rates</td>
<td>For reference, an industry standard eye pattern mask was used to show relative performance for various data rates; see attached data graphs for eye pattern data.</td>
</tr>
<tr>
<td></td>
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<td>Input Signal: 1V differential peak to peak, 100ps (10% - 90%) rise time, 2^11-1 PRBS data stream; ½ Mark Ratio Eye Mask: +/- 325mV and 0.25UI.</td>
</tr>
</tbody>
</table>
1. Test system rise time includes filtering effects of the test fixture up to the input connector interface.
2. Due to the calibration structures available for the PCB test fixtures, the data shown includes the fixture losses and reflections.
3. Nominal values shown.
4. N/A; these cables currently not available. The 24 AWG cable construction was only used for the 5m length assemblies. If needed, for reasons of lower signal loss (attenuation), the shorter length assemblies could be built and tested.
5. Crosstalk values noted are using a 75 ps (10% to 90%) differential rise time test pulse.
Assembly Test Data:

Differential Impedance
The following two graphs show representative data for the connector and termination region of the assemblies. Each data graph shows the 2.5 Gbps and the 5.0 Gbps TDR impedance traces, for a given assembly. The rise time of for each data rate is 150 ps (10%-90%) for the 2.5 Gbps data rate, and 75 ps (10% - 90%) for the 5.0 Gbps data rate. As noted above in the results table, the differential impedance specification for the connector/termination region is:

100 ohms +/- 10 ohms for 2.5 Gbps
100 ohms +/- 18 ohms for 5.0 Gbps

2.5 Gbps data rate: 150 ps (10% - 90%) rise time

![Graph showing differential impedance data]
5.0 Gbps data rate: 75 ps (10% - 90%) rise time
**Differential Insertion Loss (SDD12):**
The following five graphs represent the nominal differential attenuation (SDD12) curves for the various assembly lengths and wire gauge sizes. The first three graphs represent the 28 AWG signal conductor assemblies of 1 meter, 3 meters, and 5 meters. The forth and fifth graphs are for the 5 meter and 8 meter assemblies, both utilizing the 24 AWG signal conductors.

1 meter assembly / 28awg signal conductors

![Graph 1 meter assembly / 28awg signal conductors]

3 meter assembly / 28awg signal conductors

![Graph 3 meter assembly / 28awg signal conductors]
5 meter assembly / 28awg signal conductors

5 meter assembly / 24awg signal conductors
8 meter assembly / 24awg signal conductors

8 meter assembly / 24awg signal conductors
Eye Pattern Data:
The following eye pattern data included graphs for 1.25 Gbps, 2.5 Gbps, and 5.0 Gbps data rates for each of the different assemblies. The system eye pattern is shown below and includes the test equipment and the high speed coax test cables. The input signal was a PRBS data stream, 1V differential peak to peak, 100 ps rise time (10%-90%), 2^{11}-1 PRBS data stream; ½ Mark Ratio. In order to provide a basic comparison to some industry standard requirements, an eye mask was placed on the data, which was constructed of 325mV eye height and a 0.25UI eye width.

System Input: 2.5 Gbps System only eye pattern with 2.5 Gbps eye mask

System Input: 5.0 Gbps System only eye pattern with 5.0 Gbps eye mask
1 meter assembly, 28 AWG signal conductors

1.25 Gbps

2.5 Gbps

5.0 Gbps
3 meter assembly, 28 AWG signal conductors

1.25 Gbps

2.5 Gbps
5 meter assembly, 28 AWG signal conductors

1.25 Gbps

5 meter assembly, 24 AWG signal conductors

1.25 Gbps

2.5 Gbps
### TDP™ Triad™ Differential Pair Cable Assemblies

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<th>CHECKED BY:</th>
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<td>TS-79925-001</td>
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</tbody>
</table>

8 meter assembly, 24 AWG signal conductors

1.25 Gbps
Skew Data:
The following graphs show the skew data for the 5 meter and 8 meter assemblies for the 24 AWG signal conductors. The fastest system rise time available was launched into the cable assemblies, as plus and minus signals, and the output individual pulse rise times are shown in the graphs. The measurement was taken at the 50% crossing levels.

5 meter assembly, 24 AWG signal conductors

8 meter assembly, 24 AWG signal conductors
Crosstalk Data:
The following graphs show the near end crosstalk (NEXT) data for the 5 meter and 8 meter assemblies for the 24 AWG signal conductors. The differential launch voltage for the signals was 500 mV and a 75 ps rise time, and the crosstalk levels were measured as baseline to peak in mV.

5 meter assembly, 24 AWG signal conductors

8 meter assembly, 24 AWG signal conductors
6.0 FIXTURES AND TEST EQUIPMENT

6.1 TEST FIXTURES

6.2 TEST EQUIPMENT

Time Domain:
- Advantest D3186 Pattern Generator
- Rhode and Schwartz SMP02 Clock
- Tektronix TDS8000 Digital Sampling Oscilloscope
  80E03/80E04 Differential test heads
- Tektronix 11801 Digital Sampling Oscilloscope
  SD-22 and SD-26 Differential test heads

Frequency Domain:
- Agilent 8720ES S-Parameter Vector Network Analyzer with N4418A box

7.0 OTHER INFORMATION

N/A