



TEST REPORT: EL-2001-05-066B
TESTED BY: Maxim Parenteau (Dorval), J. Anderson (V.G.)
Gianluigi Bianchinin (Dorval)

REQUESTED BY: Bill Spink
DATES TESTED: 2001 May 24 – 2001 Sept. 28
DATE: 2001 Dec 10

REPORTED BY: R. Nissly _____
(Product Test Engineer)

SUBJECT: MEG-ARRAY[®] Nortel product qualification.

PURPOSE: This report summarizes testing to the specification Nortel NPS25298-2 for MEG-ARRAY product.

CONCLUSIONS: This testing was completed at the Dorval Test laboratory. Following is a summary of results in comparison to Nortel NPS25298:

Temperature Life – Conforms

Thermal Shock/Moisture Resistance – Conforms

Vibration and Mechanical Shock – Conforms

Mixed Flowing Gas – There were 9 high delta LLCR readings after 20 days for EPR 905, with a maximum of 12.76mΩ. EPR 992 had 2 high delta LLCR readings after 20 days with a maximum of 10.59mΩ. The readings returned to acceptable levels after the final durability cycles.

SAMPLE GROUP DESCRIPTION

The samples consisted of:

- EPR 905 - 4mm, 400 position MEG-ARRAY receptacle assemblies, nominal 50μin Au.
- EPR 992 - 4mm, 400 position MEG-ARRAY receptacle assemblies, nominal 50μin Au.
- EPR 915 - 0mm, 400 position MEG-ARRAY plug assemblies, nominal 50μin Au.

The samples were received on 05/24/2001 and were found to be suitable for the requested testing.

Samples that received contact resistance measurements were soldered to contact resistance test boards SK-39042 Rev 2 (plugs) and SK-38711 Rev 2 (receptacles). Those needing event detection monitoring were soldered to continuity boards SK-39872 Rev. 4 (plugs) and SK-39875 Rev. 4 (receptacles). The boards were fitted with press-fit BERGSTIK[®] pin headers for attachment of monitoring equipment.

PROCEDURE/RESULTS

TEMPERATURE LIFE

Sample Group:

– 3 pairs per EPR.

Data Requirement:

LLCR – Minimum of 30 contact interfaces from 3 connector assemblies per EPR.

Specification Limit:

- No defects when visually examined at 10X.
- Initial LLCR <20mΩ per individual contact interface.
- ΔLLCR <5mΩ average, <10mΩ individually.
- LLCR Current Threshold: 100mA.
- LLCR Voltage Threshold: 20mV maximum.

Test Sequence:

1. Visual inspection of product.
2. Initial LLCR.
3. Environmental Exposure to 105°C for 500 hrs (~21 days), mated condition.
4. Final LLCR.

Visual Inspection

The parts were visually examined at 10X and found to be free from defects.

Low Level Contact Resistance (LLCR)

Resistances were measured in accordance with EIA 364-23. Results are shown in Tables 1 and 2.

Table 1. LLCR Summary for Temperature Life, EPR 905.		
(Values in mΩ)		
	Initial	Deltas
No. Data Points	208	208
Maximum	14.69	5.63
Minimum	6.35	-2.01
Overall Mean	8.73	1.58
Overall St. Dev.	1.304	1.094
No. > 20	0	
No. > 10 mΩ Delta		0

Table 2. LLCR Summary for Temperature Life, EPR 992.		
(Values in mΩ)		
	Initial	Deltas
No. Data Points	208	208
Maximum	13.82	12.15
Minimum	6.68	-3.19
Overall Mean	8.89	2.86
Overall St. Dev.	1.308	2.321
No. > 20	0	
No. > 10 mΩ Delta		2

THERMAL SHOCK/MOISTURE RESISTANCE

Sample Groups:

- 3 pairs for LLCR measurements per EPR.
- 3 sets unmated for IR and DWV measurements per EPR.

Data Requirement:

- LLCR – Minimum of 50 contact interfaces from 3 connector assemblies per EPR.

Specification Limits:

- No defects when visually examined at 10X.
- Initial LLCR <20m Ω per individual contact interface.
- Δ LLCR <5m Ω per individual contact interface.
- Average Δ LLCR <2m Ω for each test group.
- LLCR Current Threshold: 100mA maximum
- LLCR Voltage Threshold: 20mV maximum)
- IR – 1000M Ω minimum.
- DWV (initial and final) - no breakdown, flashover, and/or leakage current >1.0mA at a test voltage equal to 1000V RMS with a 60 second voltage hold dwell.

Test Sequence:

1. Visual inspection.
2. Initial LLCR.
3. Initial IR and DWV.
4. Thermal Shock exposure per MIL-STD-202, Method 107, Test Condition A3 at:
 - -55°C to +85°C, 100 cycles.
 - Mated condition - LLCR samples.
 - Unmated condition - IR/DWV samples.
5. IR and DWV
6. LLCR
7. Moisture Resistance environment exposure:
 - +25°C to +65°C at 45%-95% Relative Humidity, 10 cycles.
 - Mated condition - LLCR samples.
 - Unmated condition - IR/DWV samples.
8. Final IR/DW.
9. Final LLCR.

Visual Inspection

The parts were visually examined at 10X and found to be free from defects.

Low Level Contact Resistance (LLCR)

Resistances were measured in accordance with EIA 364-23. Results are shown in Tables 3 and 4.

Table 3. LLCR Summary for Thermal Shock/Moisture Resistance, EPR 905.			
(Values in mΩ)			
	Initial	Post Thermal Shock Deltas	Post Moisture Environment Deltas
No. Data Points	208	208	208
Maximum	13.57	2.60	1.86
Minimum	6.16	-4.10	-4.49
Overall Mean	8.94	-0.23	-0.47
Overall St. Dev.	1.407	1.080	1.144
No. > 20	0		
No. > 5 mΩ Delta		0	0

Table 4. LLCR Summary for Thermal Shock/Moisture Resistance, EPR 992.			
(Values in mΩ)			
	Initial	Post Thermal Shock Deltas	Post Moisture Environment Deltas
No. Data Points	208	208	208
Maximum	14.68	4.56	4.42
Minimum	6.38	-3.97	-5.04
Overall Mean	9.01	0.50	0.28
Overall St. Dev.	1.496	1.069	1.203
No. > 20	0		
No. > 5 mΩ Delta		0	0

Insulation Resistance/Dielectric Withstanding Voltage (IR/DWV)

The testing was performed in accordance with MIL-STD-202, method 301. 1000VDC were applied for 60 seconds between 5 contacts within the same row (adjacent) and 5 contacts between rows (opposite). All measurements passed the specified requirements of no breakdown, flashover, and/or leakage current >1.0mA at a test voltage equal to 1000V RMS with a 60 second voltage hold dwell, and a 1000MΩ minimum insulation resistance – both after thermal shock and after environmental exposure.

VIBRATION AND MECHANICAL SHOCK

Sample groups:

- 3 mated pairs for Vibration and mechanical Shock per EPR.
- 3 mated pairs for Continuity testing per EPR.

Specification Limits:

- No defects when visually examined at 10X.
- LLCR – Minimum of 30 random contacts from three connector pairs.
 - Initial LLCR <20mΩ per individual contact interface.
 - ΔLLCR <5mΩ per individual contact interface.
 - Average ΔLLCR <2mΩ for each test group.
 - LLCR Current Threshold: 100mA maximum.
 - LLCR Voltage Threshold: 20mV maximum.
- No electrical events of 1μs duration or longer.
- Electrical Loading Condition – 100mA flowing in each contact during Vibration & Shock testing.

Test Sequence:

1. Visual inspection.
2. Initial LLCR.
3. Vibration Environmental Exposure per MIL-STD-202, Method 204.
 - Sinusoidal, 10 to 500Hz at 10g, 8 hrs per axis.
 - Log sweep rate = 0.1 octave per minute.
 - Traversed in 15 minutes.
 - 12 times for each of three mutually perpendicular planes.
 - 1μs event detection.
4. LLCR.
5. Mechanical Shock Environment.
 - ½ sine wave form.
 - 50g 11ms Pulse Duration.
 - Three shocks for each of three mutually perpendicular planes (18 total shocks).
6. Final LLCR.

Low Level Contact Resistance (LLCR)

Resistances were measured in accordance with EIA 364-23. Results are shown in Tables 5 and 6.

Table 5. LLCR Summary for Vibration and mechanical Shock, EPR 905.			
(Values in mΩ)			
	Initial	Post Vibration Deltas	Post Mechanical Shock Deltas
No. Data Points	30	30	30
Maximum	10.26	0.73	3.55
Minimum	6.49	-0.85	-0.80
Overall Mean	8.39	0.03	0.29
Overall St. Dev.	1.321	0.365	0.750
No. > 20	0		
No. > 5 mΩ Delta		0	0

Table 6. LLCR Summary for Vibration and Mechanical Shock, EPR 992. (Values in mΩ)			
	Initial	Post Vibration Deltas	Post Mechanical Shock Deltas
No. Data Points	30	30	30
Maximum	11.10	0.17	1.72
Minimum	7.03	-3.11	-2.86
Overall Mean	8.07	-0.68	-0.46
Overall St. Dev.	0.874	0.776	0.836
No. > 20	0		
No. > 5 mΩ Delta		0	0

Discontinuity Monitoring (Event Detection)

No continuity interruption greater than 1μs was detected during vibration. The samples were rated as passed.

MIXED FLOWING GAS (MFG)

Sample Groups:

- 3 mated pairs per EPR.

Specification Limits:

- No defects when visually examined at 10X.
- Gas composition to be 200ppb of NO₂, 10ppb of Cl₂, 10ppb of H₂S and 100ppb of SO₂.
- Coupon mass gain of 15+/- 3 μg/cm².
- LLCR – Minimum of 30 random contacts from three connector pairs.
 - Initial LLCR <20mΩ per individual contact interface.
 - ΔLLCR <10mΩ per individual contact interface.
 - Average ΔLLCR <5mΩ for each test group.
 - LLCR Current Threshold: 100mA maximum.
 - LLCR Voltage Threshold: 20mV maximum.
- Wear Cycle Requirement – 25 durability cycles pre and post environment for a total of 50. **Note:** Although Nortel NPS25298-2 calls for 100 cycles pre and post environment for a total of 200 cycles, per Nortel, MEG-Array is a mezzanine type product and therefore field application dictates 50 cycles total.

Test Sequence E (ASTM, Method B827):

1. Visual Inspection.
2. Initial LLCR.
3. Applied 25 durability cycles.
4. LLCR.
5. MFG exposure - 6 days unmated.
6. Mate and perform LLCR.
7. Unmate and perform MFG exposure - 4 days unmated (completion of 10 days).
8. Mate and perform LLCR.
9. Unmate and perform MFG exposure - 5 days unmated.
10. Mate and perform LLCR.
11. MFG exposure - 5 days mated.
12. LLCR.
13. Applied 25 durability cycles.
14. Final LLCR.

The average corrosion rate for the 20 days of exposure was 15.5 μg/cm²-day.

Low Level Contact Resistance (LLCR)

Resistances were measured in accordance with EIA 364-23. Results are shown in Tables 7 and 8.

Table 7. LLCR Summary for Mixed Flowing Gas, EPR 905. (Values in mΩ)							
	Initial	Post 25 Cycle Deltas	Post 6 Days Unmated Deltas	Post 10 Days Unmated Deltas	Post 15 Days Mated Deltas	Post 20 Days Mated Deltas	Post 50 Cycles Deltas
No. Data Points	207	207	207	207	207	207	207
Maximum	12.46	1.45	4.87	8.27	7.79	12.76	3.31
Minimum	6.30	-3.64	-4.14	-3.10	-3.85	-5.86	-4.15
Overall Mean	8.54	-0.22	-0.79	0.74	0.50	2.33	-0.12
Overall St. Dev.	1.091	0.704	0.880	1.654	1.421	2.825	0.983
No. > 20	0						
No. > 10 mΩ Delta		0	0	0	0	9	0

Table 8. LLCR Summary for Mixed Flowing Gas, EPR 992. (Values in mΩ)							
	Initial	Post 25 Cycle Deltas	Post 6 Days Unmated Deltas	Post 10 Days Unmated Deltas	Post 15 Days Mated Deltas	Post 20 Days Mated Deltas	Post 50 Cycles Deltas
No. Data Points	206	206	206	206	206	206	206
Maximum	14.53	1.23	.60	7.74	7.14	10.59	7.39
Minimum	6.40	-5.04	-5.81	-5.05	-5.22	-4.99	-5.55
Overall Mean	9.05	-.09	.80	.53	.54	1.70	-.06
Overall St. Dev.	1.365	.916	.986	1.909	1.660	2.436	1.555
No. > 20							
No. > 10 mΩ Delta		0	0	0	0	2	0

EQUIPMENT

Table 9. Equipment list.			
ITEM NAME	ASSET # (DORVAL)	V.G. NUMBER	CALIBRATION DUE DATE
Keithley 706 Scanner	N/A	6833	N/A
Keithley 706 Scanner	Q316352	N/A	05/02
Keithley 580 Multimeter	N/A	7393	12/01
Keithley 580 Multimeter	N/A	7002	11/01
Keithley 580 Multimeter	S55903	N/A	05/02
Olympus SZH Stereoscope	N/A	7399	03/01
Polaroid DMC-Ie Digital Camera	N/A	7555	N/A
Criterion Dielectric Strength Tester	Q780166	N/A	05/02
General Radio Megohmmeter 1864	Q318621	N/A	05/02