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Test Report Summary

HT06303

Electrical, Mechanical and Environmental Testing
of M20-782 Connectors

1. Introduction.

1.1. Description and Purpose

The following tests were performed on the M20-782 series (2.54mm pitch SIL vertical socket), to validate the performance against specification.

1.2. Conclusion

The contacts met the test requirements – all electrical, mechanical and environmental requirements were fulfilled. Further information available on request – please contact technical@harwin.com.

2. Test Method, Requirements and Results

2.1. Specification Parameters

2.2. List of Test Samples

- M20-7824046 - 40 contact single row Female Vertical Thoughboard Connector
- M20-7821046 - 10 contact single row Female Vertical Thoughboard Connector

2.3. Test Method and Results

2.3.1. Contact Resistance: EIA-364-23

Methodology: 5 samples of M20-7824046 connectors were tested for contact resistance with a supply voltage of 20mV at 100mA. Tests conducted at 25±5°C at a relative humidity of 60±20%.
Specification: Contact Resistance = 20mΩ max
Results:

Connector Sample	Contact Resistance (mΩ)	Result
Sample 1	5.23	PASS
Sample 2	4.67	PASS
Sample 3	5.12	PASS
Sample 4	4.95	PASS
Sample 5	5.27	PASS

2.3.2. Insulation Resistance: EIA-364-21

Methodology: 5 Samples of M20-7824046 connectors were tested for insulation resistance with a supply voltage of 1000VDC for duration of 1 minute. Tests conducted at 25±5°C at a relative humidity of 60±20%. Visual check for defects performed after testing.
Specification: Insulation Resistance = 1,000MΩ min
Results: All 5 samples exceeded 1,000MΩ and passed the test.

2.3.3. Dielectric Withstanding Voltage: EIA-364-20

Methodology: 5 Samples of M20-7824046 connectors were tested for the ability to withstand a dielectric voltage of 1,000V AC at <0.5mA. Tests conducted at 25±5°C at a relative humidity of 60±20%. Visual check for defects performed after testing.
Specification: Dielectric Withstanding Voltage = 1,000V AC
Results: All 5 samples passed the test, no defects observed.

2.3.4. Current vs. Temperature Rise: UL1977

Methodology: 6 Samples of M20-7821046 connectors were tested for temperature rise under load. Test conducted for 4 hours 20 minutes until a constant temperature was reached. Test conducted at 25±5°C with a constant current of 3A using 22AWG wire. Pressure check conducted after testing at 60Hz, 1000V AC. Visual check for defects performed before and after testing.
Specification: At a current of 3A, temperature rise not to exceed 30°C above ambient.
Results:

Sample	Temperature Rise (°C)	Temperature Result	Pressure Test Result
1	20	Pass	Pass
2	20	Pass	Pass
3	20	Pass	Pass
4	19.9	Pass	Pass
5	20	Pass	Pass
6	19.9	Pass	Pass

2.3.5. Retention force to EIA-364-29

Methodology: 5 Samples of M20-7824046 connectors were tested for retention force of the first 3 pins. Tests conducted at 25±5°C at a relative humidity of 60±20%.
Specification: Retention Force = 5.88N per contact
Results:

Connector Sample	Retention Force (N)	Result
Sample 1 (Pins 1, 2 and 3)	10.30	Pass
Sample 2 (Pins 1, 2 and 3)	17.75	Pass
Sample 3 (Pins 1, 2 and 3)	18.14	Pass
Sample 4 (Pins 1, 2 and 3)	14.32	Pass
Sample 5 (Pins 1, 2 and 3)	16.87	Pass

2.3.6. Durability: EIA-364-09

Methodology: 5 Samples of M20-7824046 connectors were tested for durability, using an automatic insertion force tester, operating at 25.4mm/minute for 300 cycles. Insertion force, contact resistance, dielectric withstand voltage, insulation resistance and a visual check for defects performed before and after cycling. Tests conducted at 25±5°C at a relative humidity of 60±20%.
Results:

Test	Specification	Condition	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Total Insertion Force (N)	68.7N max	Pre-conditioning	51.58	52.37	51.88	50.90	53.54
		Post-conditioning	60.02	61.19	61.59	61.88	60.70
Contact Resistance	20mΩ max	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
	30mΩ max	Post-conditioning	Pass	Pass	Pass	Pass	Pass
Dielectric Voltage	1,000V DC min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Insulation Resistance	1,000MΩ min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Visual Inspection	-	Post-conditioning	Pass	Pass	Pass	Pass	Pass

2.3.7. Insertion and Withdrawal Force: EIA-364-09

Methodology: 5 Samples of M20-7824046 connectors were tested for insertion and withdrawal forces, using an automatic insertion force tester operating at 25.4mm/minute. Contact resistance and visual check for defects performed before and after testing. Tests conducted at 25±5°C at a relative humidity of 60±20%.
Results:

Test	Specification	Condition	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Total Insertion Force (N)	68.7N max	Pre-conditioning	38.93	38.83	38.93	38.93	38.83
Total Withdrawal Force (N)	9.8N min	Pre-conditioning	30.89	30.69	30.89	31.28	31.19
Contact Resistance	20mΩ max	Pre-conditioning	5.28	5.64	5.29	5.61	5.21
	30mΩ max	Post-conditioning	6.19	6.28	6.41	6.14	6.42
Visual Inspection	-	Post-conditioning	Pass	Pass	Pass	Pass	Pass

2.3.8. Solderability: EIA-364-52

Methodology: 5 Samples of M20-7824046 connectors were tested for solderability, with a solder bath temperature of 245°C±5°C, dipped for 3-5 seconds. Visual check for defects performed after testing. Tests conducted at 25±5°C at a relative humidity of 60±20%.
Specification: Coverage Area of solder = 95%
Results: All 5 samples passed the test, no defects observed.

2.3.9. Vibration: EIA-364-28

Methodology: 5 Samples of M20-7824046 connectors were tested for vibration capability, using a vibration tester with frequencies between 50-2,000Hz in three directions perpendicular to each other for 2 hours each axis. PSD value of 3.13 grams minimum. Insertion force, contact resistance, dielectric withstand voltage, insulation resistance, and visual check performed before and after testing. Tests conducted at 25±5°C at a relative humidity of 60±20%.
Results:

Test	Specification	Condition	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Total Insertion Force (N)	68.7N max	Pre-conditioning	50.90	53.54	51.09	53.54	54.03
		Post-conditioning	60.70	64.14	60.70	61.19	62.47
Contact Resistance	20mΩ max	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
	30mΩ max	Post-conditioning	Pass	Pass	Pass	Pass	Pass
Dielectric Voltage	1,000V DC min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Insulation Resistance	1,000MΩ min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Visual Inspection	-	Post-conditioning	Pass	Pass	Pass	Pass	Pass

2.3.10. Humidity: EIA-364-31

Methodology: 5 Samples of M20-7824046 connectors were tested for humidity capability, using a humidity tester operating at between 25-65°C at 90-95% relative humidity for 96 hours. Insertion force, contact resistance, dielectric withstand voltage, insulation resistance and visual check for defects performed before and after testing.
Results:

Test	Specification	Condition	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Total Insertion Force (N)	68.7N max	Pre-conditioning	51.88	50.60	50.90	51.39	52.37
		Post-conditioning	60.02	61.68	61.10	61.68	64.14
Contact Resistance	20mΩ max	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
	30mΩ max	Post-conditioning	Pass	Pass	Pass	Pass	Pass
Dielectric Voltage	1,000V DC min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Insulation Resistance	1,000MΩ min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Visual Inspection	-	Post-conditioning	Pass	Pass	Pass	Pass	Pass

2.3.11. Thermal Shock: EIA-364-32

Methodology: 5 Samples of M20-7824046 connectors were tested for thermal shock capability. Thermal shock treatment of -40°C for 30 minutes to +105°C for 30 minutes, cycled 5 times. Insertion force, contact resistance, dielectric voltage, insulation resistance and visual check for defects performed before and after testing.
Results:

Test	Specification	Condition	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Total Insertion Force (N)	68.7N max	Pre-conditioning	52.37	51.88	50.60	51.39	52.37
		Post-conditioning	61.59	60.70	64.14	61.29	63.06
Contact Resistance	20mΩ max	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
	30mΩ max	Post-conditioning	Pass	Pass	Pass	Pass	Pass
Dielectric Voltage	1,000V DC min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Insulation Resistance	1,000MΩ min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Visual Inspection	-	Post-conditioning	Pass	Pass	Pass	Pass	Pass

2.3.12. Salt Spray Capability to EIA-364-26

Methodology: 5 Samples of M20-7824046 connectors were tested for salt spray capability. Chamber at 35±2°C at a PH value of 6.5-7.2, with a saline concentration at 5±1% for 24 hours. Insertion force, contact resistance, dielectric voltage, insulation resistance and visual check for defects performed before and after testing.
Results:

Test	Specification	Condition	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Total Insertion Force (N)	68.7N max	Pre-conditioning	51.58	52.37	50.90	50.60	51.39
		Post-conditioning	61.68	63.25	62.17	62.57	61.68
Contact Resistance	20mΩ max	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
	30mΩ max	Post-conditioning	Pass	Pass	Pass	Pass	Pass
Dielectric Voltage	1,000V DC min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Insulation Resistance	1,000MΩ min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Visual Inspection	-	Post-conditioning	Pass	Pass	Pass	Pass	Pass

2.3.13. Temperature Life Capability to EIA-364-17

Methodology: 5 Samples of M20-7824046 connectors were tested for their ability to perform at high temperature for a sustained period. Connectors tested before and after being subjected to 105±2°C for 96 hours. Insertion force, contact resistance, dielectric voltage, insulation resistance and visual check for defects performed before and after testing.
Results:

Test	Specification	Condition	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Total Insertion Force (N)	68.7N max	Pre-conditioning	51.58	51.39	51.88	52.37	55.02
		Post-conditioning	61.19	60.70	61.49	61.10	63.84
Contact Resistance	20mΩ max	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
	30mΩ max	Post-conditioning	Pass	Pass	Pass	Pass	Pass
Dielectric Voltage	1,000V DC min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Insulation Resistance	1,000MΩ min	Pre-conditioning	Pass	Pass	Pass	Pass	Pass
		Post-conditioning	Pass	Pass	Pass	Pass	Pass
Visual Inspection	-	Post-conditioning	Pass	Pass	Pass	Pass	Pass