Product Data Sheet

PD-0053-A

3M™ Mini D Ribbon (MDR)
Connector
MDR Surface Mount
Right Angle Receptacle
102XX-1210 XE
102XX-1S10 XE

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1.0 Scope

This data sheet summarizes test methods, test conditions and product performance for the 3M MDR Surface Mount Right Angle Receptacle 102XX-1XX0 XX.

2.0 Product Tested

Product:	MDR Surface Mount Right Angle Receptacle
Product Number:	102XX-1210 XE, 102XX-1S10 XE
Related Specification Sheets:	TS-0755, TS-2242
Mating Product:	3M MDR Wire Mount Plug
Mating Product Number:	101XX-6000 XX

This test report applies to the MDR receptacles listed below, which have identical mating contact structure and plating specifications:

- 102XX-1210 VE, PE (Wiping Area Plating: 0.50 µm [20 µ″] Min. Gold)
- 102XX-1S10 VE, PE (Wiping Area Plating: 0.50 µm [20 µ″] Min. Gold)

3.0 General Conditions

3.1 Test Specimens

The test specimens shall be strictly in compliance with the design, construction details and physical properties detailed in the relevant Technical Specification Sheet (See Section 2).

3.2 Standard Test Conditions

The test shall be done under the following conditions:

Temperature:	15°C to 35°C
Relative Humidity:	45% to 75%
Atmospheric pressure:	650 to 800 mm Hg

4.0 Test Results Summary

Items		Specification	Test Method	Results
General	Visual	No defects such as deformation, blister, damage, crack, etc.	Sumitomo 3M Design Spec	Pass
	Contact Resistance	Max. R: < 50 mΩ	MIL-STD-202F Method 307	Pass
Environmental	Moisture Resistance	Max. Δ R: < ±25 mΩ 10 Cycles	MIL-STD-202F Method 106F	Pass
	Salt Atmosphere (Corrosion)	No Physical abnormalities after test Max. Δ R: < ±25 mΩ	MIL-STD-202F Method 101D Condition B	Pass
	Thermal Shock	No Physical abnormalities after test Max. Δ R: < ±25 mΩ 5 Cycles, –55 °C to +85 °C	MIL-STD-202F Method 107G Condition A	Pass
	Humidity (Steady State)	Max. Δ R: < ±25 mΩ Conditions: 40° ±2°C / 90 – 95 %RH for 96 Hours	MIL-STD-202F Method 103B, Condition B	Pass
	Life at Elevated Ambient Temperature (Thermal Aging)	No Physical abnormalities after test Max. Δ R: < ±25 mΩ 85 °C for 1000 Hours	MIL-STD-202F Method 108A, Condition D	Pass
	Hydrogen Sulfide Gas	No Physical abnormalities after test Max. Δ R: < ±25 mΩ Conditions: H_2S 3± 1 PPM, 40°C, 70–80 %RH for 96 hours	JEIDA-38-1984	Pass
Mechanical	Vibration	No Physical abnormalities after test Max. Δ R: < ±25 mΩ No electrical discontinuity > 1 μ sec	MIL-STD-202F Method 201A	Pass
	Mating and Unmating Forces	Mating force: 1.47N/pin Max Unmating force: 0.39N/pin Min	EIA-364-13A	Pass
	Durability	Insertions/Withdrawals Max. Δ R: < ±25 mΩ	Sumitomo 3M Design Spec	Pass
	Mechanical Shock	No Physical abnormalities after test Max. Δ R: < ±25 mΩ No electrical discontinuity > 1 μ sec	MIL-STD-202F Method 213B Condition A Half sine, (11 milliseconds) 50 g ± X,Y,Z (9 total shocks)	Pass
	Resistance To Soldering Heat	No Physical abnormalities after test.	JEDEC J-STD-020C	Pass
Electrical	Dielectric Withstanding Voltage	500 VAC_{RMS} @ Sea Level	MIL-STD-202F Method 301	Pass
	Insulation Resistance	500 MΩ @ 500 V_{DC}	MIL-STD-202F Method 302 Condition B	Pass

5.0 Testing

Test methods are based upon Sumitomo 3M test procedures, the United States Department of Defense MIL-STD-202F, 1 April 1980, "Test Method Standard - Electronic And Electrical Component Parts" and the Japan Electronic Industry Development Association JEIDA-38-1984, "Hydrogen Sulphide Test for Electronic Equipment Connectors."

5.1 General

Visual (Appearance)

Purpose
The purpose of this test is to visually examine and dimensionally inspect the connector in order to determine whether the connector conforms to the applicable specification and detail documents not covered by performance requirements.

Test Method
The examination shall be made in accordance with Sumitomo 3M design specifications. The visual examination shall include inspection of the following features as a minimum: workmanship, marking, materials, finish, standards, design and construction. The dimensional inspection shall be a check for compliance with the outline drawings of the detail specification.

Contact Resistance — MIL-STD-202F Method 307

Purpose
The purpose of this test is to evaluate contact resistance characteristics of electrical contacts under conditions where applied voltages and currents do not alter the physical contact interface or modify the conductive oxide films which may be present.

Test Method
The low-signal level contact resistance shall be tested with circuit current of 1.5 mA and open circuit voltage of 20 mV maximum. The termination resistance includes contact to wire interface resistance, bulk resistance of contact, and resistance of solder joints of connectors to circuit boards. See Figure 1.

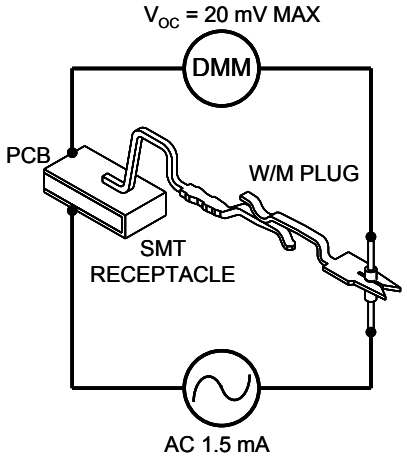

Figure 1. Contact resistance measurement method

Test Results
The initial readings are in milliohms. All other readings are the change in resistance from the initial reading in milliohms. All initial readings meet the specification requirement of less than 50 milliohms.

5.2 Environmental

Test Sequence #1

Introduction
In this test sequence, initial contact resistance measurements are taken for a sample of connectors. The sample is then subjected to a series of three tests: Insertion/withdrawal (50 cycles), Moisture Resistance and Salt Atmosphere (Corrosion). Measurements are taken after each test to record the change in connection resistance (Delta-R). The results follow.

Insertion/withdrawal (50 cycles)

Purpose
The purpose of this test is to determine the effects of subjecting electrical connectors to a conditioning action of mating and unmating of connector simulating typical operation of the connector.

Test Method
The plug and receptacle were mated and un-mated manually 50 times at the approximate rate of one cycle per second. Contact resistance was measured at completion.

Condition:	50 Cycles

Moisture Resistance — MIL-STD-202F Method 106F

Purpose
The purpose of this test is to evaluate, in an accelerated manner, the resistance of component parts and constituent materials to the deteriorative effects of the high-humidity and heat conditions typical of tropical environments. This test differs from the steady-state humidity test (Method 103B) and derives its added effectiveness in its employment of temperature cycling, which provides alternate periods of condensation and drying essential to the development of the corrosion processes and, in addition, produces a "breathing" action of moisture into partially sealed containers. Increased effectiveness is also obtained by use of a higher temperature, which intensifies the effects of humidity.

Test Method
Mated connectors shall be tested in accordance with MIL-STD-202F Method 106F.

Temperature Cycle:	-10 °C to 65 °C
Relative Humidity:	90 – 100 %RH
Duration:	10 Cycles (10 Days)

Salt Atmosphere (Corrosion) — MIL-STD-202F Method 101D

Purpose
The purpose of this test is to determine the effects of a controlled salt laden atmosphere on the electrical connector.

Test Method
Mated connectors shall be tested in accordance with MIL-STD-202F Method 101D, Test Condition B.

Salt Solution:	5 ±1%
Temperature:	35 °C±3 °C (95 °F ±5 °F).
Duration:	48 Hours

Test Results

N = 100	Initial	I/W (50 cycles)		Moisture (10 cycles)		Salt Atmosphere (48 hours)	
Resistance (mΩ)	R	R	ΔR	R	ΔR	R	ΔR
Maximum:	38.71	37.03	2.82	47.38	12.41	53.83	19.38
Average:	34.93	34.85	-0.07	35.14	0.22	36.20	1.27
Minimum:	32.53	32.60	-2.60	32.69	-2.98	32.72	-2.55
Standard Deviation:	1.44	1.04	1.33	1.96	2.15	3.38	3.41

Test Sequence #2

Introduction
In this test sequence, initial contact resistance measurements are taken for a sample of connectors. The sample is then subjected to a series of three tests: Thermal Shock, Humidity and Vibration. Measurements are taken after each test to record the change in connection resistance (Delta-R). The results follow.

Thermal Shock — MIL-STD-202F Method 107G

Purpose
The purpose of this test is to determine the resistance of a given electrical connector to exposure at extremes of high and low temperatures and to the shock of alternate exposures to these extremes, simulating the worst probable conditions of storage, transportation and application.

Test Method
Mated connectors shall be tested in accordance with MIL-STD-202F Method 107G, Test Condition A.

Temperature:	-55 °C & +85 °C
Cycle Time:	30 minutes each Temperature
Transition Time:	5 minute maximum
Cycles:	5

Humidity (Steady State) — MIL-STD-202F Method 103B

Purpose
The purpose of this test is to permit evaluation of the properties of materials used in connectors as they are influenced or deteriorated by the effects of high humidity and heat condition.

Test Method
Mated connectors shall be tested in accordance with MIL-STD-202F Method 103B, Test Condition B.

Temperature Range:	40 ± 2 °C
Relative Humidity:	90 – 95 %RH
Duration:	96 Hours

Vibration — MIL-STD-202F Method 201A

Purpose
The purpose of this test is to determine the effects of vibration within the predominant or random vibration frequency ranges and magnitudes that may be encountered during the life of the connector.

Test Method
Mated connectors shall be tested in accordance with MIL-STD-202F Method 201A.

Amplitude:	0.03 inch (0.06 inch max. total excursion)
Frequency:	10 to 55 Hz
Duration:	2 hours in each of 3 mutually perpendicular directions (total of 6 hours)

Test Results

N = 100	Initial	Thermal Shock		Humidity (Steady State)		Vibration	
Resistance (mΩ)	R	R	ΔR	R	ΔR	R	ΔR
Maximum:	38.41	45.71	8.08	46.55	8.92	46.99	9.44
Average:	34.88	35.17	0.29	35.26	0.38	35.86	0.98
Minimum:	32.43	32.51	-1.32	32.62	-2.16	32.81	-0.46
Standard Deviation:	1.55	1.71	0.94	1.98	1.43	2.34	1.42

Test Sequence #3: Life (at Elevated Ambient Temperature) — MIL-STD-202F Method 108A

Introduction
In this test sequence, initial contact resistance measurements are taken for a sample of connectors. The sample is then subjected to exposure to an elevated ambient temperature for a specified length of time. A sequence of contact resistance measurements are taken after 42, 180, 630 and 1000 hours to record the change in connection resistance (Delta-R). The results follow.

Purpose
The purpose of this test is to determine the effects on the electrical and mechanical characteristics of the connector resulting from exposure of the connector to an elevated ambient temperature for a specified length of time.

Test Method
Mated connectors shall be tested in accordance with MIL-STD-202F Method 108A, Test Condition D.

Temperature:	85 °C
Duration:	1000 hours

Test Results

N = 100	Initial	42 Hrs		180 Hrs		630 Hrs		1000 Hrs	
Resistance, mΩ	R	R	ΔR	R	ΔR	R	ΔR	R	ΔR
Maximum:	37.54	38.13	4.76	45.67	12.30	42.14	5.92	48.38	10.84
Average:	34.26	34.53	0.27	34.98	0.72	34.84	0.58	35.22	0.95
Minimum:	32.89	33.10	-2.03	32.86	-1.53	32.92	-1.60	33.14	-1.23
Standard Deviation:	0.94	1.06	0.81	1.84	1.57	1.37	1.05	1.97	1.48

H_2S Gas Sequence

Introduction
In this test sequence, initial contact resistance measurements are taken for a sample of connectors. The sample is then subjected to a series of two tests: Insertion/withdrawal (50 cycles) and Hydrogen Sulfide Test for Electronic Equipment Connectors. Measurements are taken after each test to record the change in connection resistance (Delta-R). The results follow.

Insertion/withdrawal (50 cycles)

Purpose
The purpose of this test is to determine the effects of subjecting electrical connectors to a conditioning action of mating and unmating of connector simulating typical operation of the connector.

Test Method
The plug and receptacle were mated and un-mated manually 50 times at the approximate rate of one cycle per second. Contact resistance was measured at completion.

Condition:	50 Cycles

Hydrogen Sulfide Test for Electronic Equipment Connectors — JEIDA-38-1984

Purpose
The purpose of this test is to determine the effects of a controlled environmentally related corrosive atmosphere on the electrical connector.

Test Method
Mated connectors shall be tested in accordance with JEIDA-38-1984.

Relative Humidity:	70 – 80 %
Temperature:	40 ± 2 °C
Duration:	96 Hours
H_2S:	3 ± 1 ppm

Test Results

N = 100	Initial	I/W (50 cycles)		H_2S	
Resistance (mΩ)	R	R	ΔR	R	ΔR
Maximum:	38.17	37.14	2.35	37.26	1.42
Average:	35.27	35.46	0.19	35.05	-0.21
Minimum:	33.13	33.25	-2.83	33.27	-3.03
Standard Deviation:	1.19	1.10	0.79	1.14	0.89

5.3 Mechanical

Mating and Unmating Forces — EIA-364-13A

Purpose
The purpose of this test is to determine the mechanical forces required to mate and unmate electrical connectors.

Test Method
Using the tensile tester, a 50-position plug is inserted in the receptacle at 5mm/minute. The maximum load is measured. In the removal test, the receptacle is removed from the plug at 5 mm/minute and the maximum load is measured.

Test Results

	Per connector	Per contact
Force:	N [kgf]	N [gf]
Mating:	43.1 [4.4] Max	0.86 [88] Max.
Unmating:	26.5 [2.7] Min.	0.53 [54] Min.

Durability

Purpose
The purpose of this test is to determine the effects of subjecting electrical connectors to a conditioning action of mating and unmating of connector simulating operations approximating the life of the connector.

Test Method
The plug and receptacle were mated and un-mated manually 500 times at the approximate rate of one cycle per second. Contact resistance was measured at completion.

Condition:	500 Cycles

Test Results

N = 100	Initial R (mΩ)	Final ΔR (mΩ)
Maximum:	37.80	9.76
Average:	34.30	0.43
Minimum:	32.61	-4.56
Standard Deviation:	1.18	1.40

Mechanical Shock — MIL-STD-202F Method 213B

Purpose
This test is conducted to determine the suitability of connectors when subjected to shocks such as those expected from rough handling, transportation and operation.

Test Method
Mated connectors shall be tested in accordance with MIL-STD-202F Method 213B, Test Condition A.

Normal Duration:	11 milliseconds
Peak Acceleration:	50 g
Wave form:	Half Sine
Cycles:	3 times each in +/- X, Y & Z directions

Test Results

N = 100	Initial R (mΩ)	Final ΔR (mΩ)
Maximum:	28.88	14.86
Average:	19.27	0.18
Minimum:	4.90	-9.64
Standard Deviation:	4.65	1.66

Solder Heat Resistance (Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices) — JEDEC J-STD-020C.

Purpose
The purpose of this standard is to identify the classification level of nonhermetic solid state surface mount devices (SMDs) that are sensitive to moisture-induced stress so that they can be properly packaged, stored, and handled to avoid damage during assembly solder reflow attachment and/or repair operations.

Test Method
Surface mount connectors shall be tested in accordance with JEDEC J-STD-020C.

Process: Baking → Moisture soak → Reflow → Room temp. → Reflow → Room temp. → Reflow

(1) Pre-Treatment/Baking: 24 hours minimum at 125 +5/-0 °C.

(2) Pre-Treatment/Moisture Soak: 85 °C/ 85% relative humidity for 168 +5/-0 hours.

(3) Reflow Soldering: The samples are mounted on the board under the following soldering conditions.

Test Board:	FR-4 or higher grade, 1.6mm thickness, thickness of copper foil 0.035 mm, with pre-flux treatment. Through hole diameter and land shape of each terminal were designed under each recommended pc board foot pattern.
Reflow:	Preheat: 150 to 200 °C for 60 to 180 seconds Soldering: more than 217 °C for 60 to 150seconds Peak 255 to 260 °C for 20 to 40seconds

Test Results

TEST	TEST CONDTION (JEDEC J-STD-020C)	SAMPLE	RESULT	
			Appearance	Wiper Gap
Solder Heat Resistance	Bake Moisture Soak Reflow – 3 times	102XX-1210 XE	Passed	Passed
		102XX-1S10 XE	Passed	Passed

There were not any appearance changes (such as melting, crazing or blistering) on the bodies. The discoloration levels by each sample were very slight. The changes of the wiper gaps (distance between opposite contacts on mating side) were slight.

5.4 Electrical

Dielectric Withstanding Voltage — MIL-STD-202F Method 301

Purpose
The purpose of this test is to prove that a given electrical connector can operate safely at its rated voltage and withstand momentary overpotentials due to switching, surges, and other similar phenomena.

Test Method
Withstanding voltage shall be tested in accordance with MIL-STD-202F Method 301.

Applied Voltage:	500 VAC_{RMS} @ Sea Level
Duration:	1 minute
Observation:	No evidence of a breakdown

Test Results

All samples passed

Insulation Resistance — MIL-STD-202F Method 302

Purpose
The purpose of this test is to establish the methods and procedures to be followed in determining the resistance offered by the insulation materials and the various seals of a connector to a direct current potential tending to produce a leakage of current through or on the surface of these members.

Test Method
Insulation resistance shall be tested in accordance with MIL-STD-202F Method 302, Test Condition B.

Applied Voltage:	500 V_{DC}
Duration:	1 minute

Test Results

	Resistance
Between pins:	10,000 MΩ Minimum

Important Notice

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