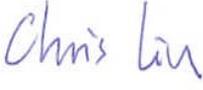


TEST REPORT SEMI S22-0715a SAFETY GUIDELINE FOR THE ELECTRICAL DESIGN OF SEMICONDUCTOR MANUFACTURING EQUIPMENT	
Report Ref. No	RD/2016/10005
Name and address of the Applicant	J-Material Co., Ltd. 6F.-1, No.66, Sec. 2, Nankan Rd., Luzhu Dist., Taoyuan City 338, Taiwan (R.O.C.)
Name and address of the Manufacturer	J-Material Co., Ltd. 6F.-1, No.66, Sec. 2, Nankan Rd., Luzhu Dist., Taoyuan City 338, Taiwan (R.O.C.)
Rating(s)	1 Phase, AC 110 V, 60 Hz, 30 A
Product Name	SPECIAL GAS CABINET
Model/type	JM-GC3-2
Serial no	20150001
Test specification	SEMI S22-0715a
Name and address of the Testing laboratory	SGS Taiwan Ltd No. 33, Wu Chyuan Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan
Tested site	6F.-1, No.66, Sec. 2, Nankan Rd., Luzhu Dist., Taoyuan City 338, Taiwan (R.O.C.)
Tested date	Jan. 19, 2016
Compiled by: Chris Liu Engineer Jan. 26, 2016  _____ Signature	Reviewed by: Jason Lin Reviewer Jan. 26, 2016  _____ Signature
Possible test case verdicts:	<ul style="list-style-type: none"> - test case does not apply to the test object : N/A - test object does meet the requirement..... : P(Pass) - test object does not meet the requirement : F(Fail)
<p>Details and test results are given in subsequent pages of this report. This report refers only to the unit(s) submitted for test. This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.</p>	

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List of Tests

Test Items	Test Result
<input type="checkbox"/> 1. Leakage Current Test for Cord-and-Plug Equipment	N/A
<input checked="" type="checkbox"/> 2. Protective Bonding Circuit Test	Pass
<input checked="" type="checkbox"/> 3. Input Current Test	Pass
<input checked="" type="checkbox"/> 4. Insulation Resistance Test	Pass
<input checked="" type="checkbox"/> 5. Dielectric Voltage Withstand Test	Pass
<input checked="" type="checkbox"/> 6. Protection Against Residual Voltages Test	Pass
<input checked="" type="checkbox"/> 7. Transformer Output Short Circuit Test	N/A
<input checked="" type="checkbox"/> 8. Power Supply Output Short Circuit Test	Pass
<input checked="" type="checkbox"/> 9. Strain Relief Test	Pass
<input checked="" type="checkbox"/> 10. Safety Circuit Function Test And Safety Circuit Conductor Disconnection Test	Pass
<input checked="" type="checkbox"/> 11. Temperature Test	Pass
<input checked="" type="checkbox"/> 12. 250N Steady Force Test	Pass
<input checked="" type="checkbox"/> 13. Sound Pressure Level Test	Pass

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1. Leakage Current Test for Cord-and-Plug Equipment

1.1 Reference Standards

SEMI S22-0715a, Clause 22.2

1.2 Test Requirements

A 1500 ohm resistor shunted by a 0.15 μ F capacitor (impedance network) and a true RMS voltmeter with an accuracy of 1.0%. The impedance network may be a separate assembly or incorporated within a leakage current measuring instrument.

1.3 Test Procedure

For equipment connected to the facility branch circuit with a cord-and-plug (plug/socket combination), ensure that the equipment is isolated (e.g., by placing the equipment on a wooden or other nonconductive surface). Connect the equipment to its rated source of supply with the protective earthing conductor disconnected and operate it at the least favorable conditions specified by the manufacturer. Connect the impedance network between each accessible metal part and the protective earthing conductor. In determining accessibility of energized parts, remove all doors, panels, etc. that are to be removed by the operator during normal operation. Using a true RMS voltmeter, measure the voltage drop across the impedance network. Calculate the leakage current using the formula:

$$I_{\text{leakage}} = \frac{\text{Voltage}_{\text{measured}}}{1500 \text{ ohms}}$$

1.4 Test Results

The maximum calculated leakage current does not exceed 3.5 mA.

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Leakage Current Test for Cord-and-Plug Equipment Test Data

Test Equipment			
Item 1		Item 2	
Description	N/A	Description	N/A
Manufacturer	N/A	Manufacturer	N/A
Model	N/A	Model	N/A
Serial Number	N/A	Serial Number	N/A
Calibration Date	N/A	Calibration Date	N/A
Leakage Current Test for Cord-and-Plug Equipment Test Data			
Voltage Measurements(V)	Real Leakage Current(A)	Test Result	
N/A	N/A	N/A	
Test Comments and Notes			
N/A			

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2. Continuity of the Protective Bonding Circuit Test

2.1 Reference Standards

SEMI S22-0715a, Clause 22.3

2.2 Test Requirement

The resistance between the protective earthing conductor terminal and each accessible part should not exceed 0.1 ohm.

2.3 Test Procedure

- 1) De-energize, lock out/ tagout the machine from the supply source.
- 2) Disconnect the main equipment ground conductor from the supply from the ground terminal.
- 3) Connect the common terminal of the multi-meter or current injection test source to the protective earth (PE) or main ground terminal.
- 4) Measure and record the ground resistance from accessible metal parts of the system to the ground terminal.

2.4 Test Results

- 1) The ground impedance of the system was tested using the current injection method. A test current of 10A was injected from the ground terminal to accessible metal parts of the system.
- 2) The impedance measured between all locations tested on the system and the protective grounding circuit was 0.1ohms or less.

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Continuity of the Protective Bonding Circuit Test Data

Test Equipment			
Ground Impedance Test			
Item 1		Item 2	
Description	CE MultiTester	Description	N/A
Manufacturer	METREL	Manufacturer	N/A
Model	MI 2094	Model	N/A
Serial Number	11130175	Serial Number	N/A
Calibration Date	Aug. 18, 2015	Calibration Date	N/A
Continuity of the Protective Bonding Circuit Test Results			
Component/Location Under Test	Test Current (A)	Measured Resistance (mΩ)	Test Result
Earthing terminal 1 of left electrical box to PE	10	43	Pass
PE pin of PS01 to PE	10	18	Pass
PE pin of PS02 to PE	10	23	Pass
PE pin of SR01 to PE	10	23	Pass
PE pin of PS03 to PE	10	17	Pass
Earthing terminal 1 of right pneumatic box to PE	10	33	Pass
Earthing terminal 2 of left cylinder door to PE	10	55	Pass
Earthing terminal 2 of right cylinder door to PE	10	55	Pass
PE pin of TH01 to PE	10	63	Pass
Test Comments and Notes			
<div style="display: flex; justify-content: space-around;">   </div>			

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3. Input Current Test

3.1 Reference Standards

SEMI S22-0715a, Clause 22.5

3.2 Test Requirements

The measured input current must be less than or equal to 110% of the machine nameplate full load current value.

Note – This test is performed to confirm input current and document test conditions

3.3 Test Procedure

- 1) Set the machine up to run in a full load production mode or a simulated production mode and start and run the machine.
- 2) Measure and record the input voltages from phase to phase and phase to ground for all phases of each supply to the system under test.
- 3) Measure and record the input current for each phase of the system under test.
 - a) Install the meter and clamp on current transformer on the phase under test.
 - b) Set the meter to the RMS record mode.
 - c) Measure and record the average and maximum current over a 5 minute period. The period can be extended to a longer measuring period if required due to the operation cycle of the machine.
- 4) Measure and record the ground current on the machine equipment grounding conductor.

3.4 Test Results

- 1) The system was operated in diagnostic mode for the testing.
- 2) The system full load current met the parameters established in SEMI S22 No. significant ground currents were measured. Test data is included on the test data sheet on the following page.

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Input Voltage and Current Test Data

Test Equipment			
Item 1		Item 2	
Description	AC/DC Clamp Meter	Description	N/A
Manufacturer	LUTRON	Manufacturer	N/A
Model	DM-6046	Model	N/A
Serial Number	I.300265	Serial Number	N/A
Calibration Date	Oct. 09 , 2014	Calibration Date	N/A
Input Voltage and Current Test Data and Results			
Voltage Measurements	Phase To Ground [Va.c.]		
Test Location	V_{L1-PE}	V_{L2-PE}	--
Main Breaker terminals (AC power L1/L2)	64	59	--
Voltage Measurements	Phase To Phase [Va.c.]		
Main Breaker terminals (AC power L1/L2)	V_{L1-L2}	--	--
	125	--	--
Current Measurements	Maximum Load [A]		
Test Location	I_{L1}	I_{L2}	--
Main Breaker terminals (AC power L1/L2)	0.4	0.3	--
Ground Current Measurements		Average Values (Amps)	
Test Location		I_{ground}	
Equipment Grounding and Input Conductors		0	

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Test Comments and Notes



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4. Insulation Resistance Test

4.1 Reference Standards

EN 60204-1:2006/A1:2009, Clause 18.3

4.2 Test Requirements

The insulation resistance of between the power conductors and the protective bonding circuit needs to be 1 Meg-Ohm or greater.

4.3 Test Procedure

- 1) De-energize, lock out, and tag out the machine from the supply source.
- 2) Connect the negative (-) terminal of the insulation tester to the machine "PE" terminal.
- 3) Connect the positive (+) terminal of the insulation tester to the circuit under test.
- 4) Apply a voltage of 500 V for a period of one minute. After one minute record the insulation resistance value in Meg-Ohms on the test data sheet.
- 5) Apply the test voltage to each phase of the machine power circuits simultaneously or individually.

4.4 Test Results

The insulation resistance was measured on each of the machine's main power circuits to be 1 Meg-Ohm or greater.

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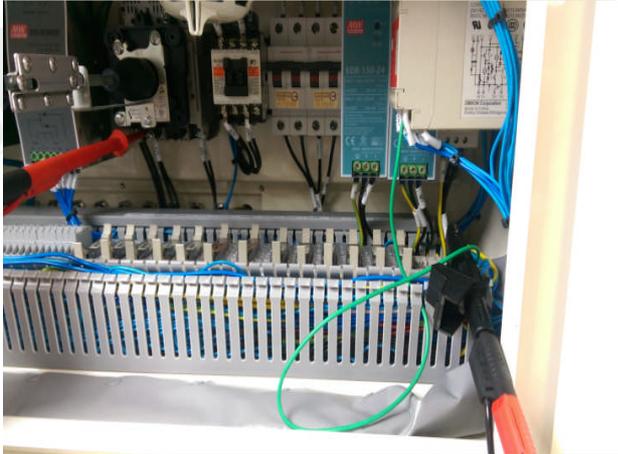
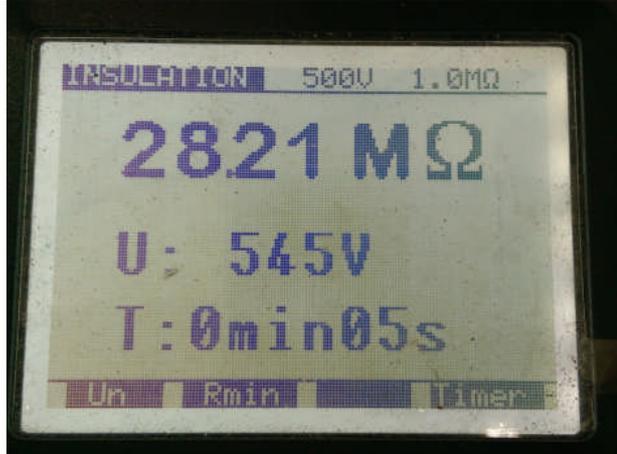
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Insulation Resistance Test Data

Test Equipment				
Item 1		Item 2		
Description	CE MultiTester	Description	N/A	
Manufacturer	METREL	Manufacturer	N/A	
Model	MI 2094	Model	N/A	
Serial Number	11130175	Serial Number	N/A	
Calibration Date	Aug. 18, 2015	Calibration Date	N/A	
Insulation Resistance Test Data and Results				
Test Voltage	500 V	Insulation Resistance [MΩ]		Test Results
Description Of Circuit Tested		Phase L1-PE	Phase L2-PE	
Main disconnecting device Secondary		28.21	28.30	Pass
Test Comments and Notes				
<div style="display: flex; justify-content: space-around;">   </div>				

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5. Dielectric Withstand Test

5.1 Reference Standards

SEMI S22-0715a, Clause 22.6

5.2 Test Requirements

The electrical equipment shall withstand a dielectric test voltage applied for a period of at least one second between the conductors of all circuits and the protective bonding circuit, except for those circuits intended to operate at or below PELV voltages.

5.3 Test Procedure

- 1) De-energize and lock out power to the equipment under test from the facility source.
- 2) Ensure the test set is in calibration and is capable of delivering at least 500VA to the test specimen.
- 3) Remove printed wiring assemblies or other electronic components that may be damaged from the high voltage test potential.
- 4) Energize each phase of all power circuits in the equipment with the AC test potential for a period of 1 minute.

5.4 Test Results

Dielectric withstand testing was performed per the requirements SEMI S22-0715a. Testing was performed at 1,500VAC for 1 minute. The machine passed all tests without insulation breakdown.

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Dielectric Withstand Test Data

Test Equipment				
Item 1		Item 2		
Description	CE MultiTester	Description	N/A	
Manufacturer	METREL	Manufacturer	N/A	
Model	MI 2094	Model	N/A	
Serial Number	11130175	Serial Number	N/A	
Calibration Date	Aug. 18, 2015	Calibration Date	N/A	
Dielectric Withstand Test Data And Results				
Test Voltage	1,500 VAC	Leakage Current [mA]		Test Results
Description Of Circuit Tested		Phase L1-PE	Phase L2-PE	
Main disconnecting device Secondary		4.8	4.8	Pass

Test Comments and Notes				
<div style="display: flex; justify-content: space-around;">   </div>				

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6. Protection against Residual Voltage Test

6.1 Reference Standards

EN 60204-1:2006/A1:2009, Clause 18.5
SEMI S22-0715a, Clause 22.12

6.2 Test Requirements

Live parts having a residual voltage greater than 60V after the supply has been disconnected shall be discharged to 60V or less within a time period of 5 seconds after disconnection of the supply voltage provided that rate of discharge does not interfere with the proper functioning of the equipment.

6.3 Test Procedure

- 1) Operate the equipment under normal full load conditions.
- 2) Place the digital multi-meter on the power circuit terminals and verify that line voltage exists on the terminals under test.
- 3) De-energize the equipment and measure the time it takes for the voltage to fall to 60V or less.

6.4 Test Results

The residual voltage on the machine's power circuit(exposed terminals) fell to 60V in less than 5 seconds.

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Protection against Residual Voltage Test Data

Test Equipment			
Item 1		Item 2	
Description	AC/DC Clamp Meter	Description	N/A
Manufacturer	LUTRON	Manufacturer	N/A
Model	DM-6046	Model	N/A
Serial Number	I.300265	Serial Number	N/A
Calibration Date	Oct. 09 , 2014	Calibration Date	N/A
Residual Voltage data			
Initial Condition			
Voltage Measurements	Phase To Phase [Va.c.]		
Test Location	V_{L1-L2}	--	--
Main Breaker terminals (L1/L2)	126.9	--	--
Test Data			
Test Location	T=5 Sec	T=30 Sec	Test Result
Main Breaker terminals (L1/L2)	0V	0V	Pass
Test Comments and Notes			
			

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7. Transformer Output Short Circuit Test

7.1 Reference Standards

SEMI S22-0715a, Clause 22.8

7.2 Test Requirements

Timer with accuracy of ± 5 minutes. A substantial conductor suitable for carrying the short circuit current.

7.3 Test Procedure

With the equipment in its standby condition, short circuit the output of each power transformer.

NOTE 72: If overcurrent protection is connected to the output of the transformer under test, connect the short-circuit jumper after this protective device.

EXCEPTION 1: Where the overcurrent protective devices on the input or output of the transformer are rated at not more than 125% of the rated current of the transformer respectively and the overcurrent protective devices are certified by an accredited testing laboratory, the transformer need not be subjected to this test.

EXCEPTION 2: A thermally-protected or impedance-protected transformer that is certified by an accredited testing laboratory need not be subjected to this test.

7.4 Test Results

A hazardous condition (e.g., smoke, fire, or molten material) does not exist within 8 hours or before activation of overcurrent protection, thermal protection, or other protective circuit/device, whichever occurs first.

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Transformer Output Short Circuit Test Data

Transformer Output Short Circuit Test Data	
Transformer Related Document	Test Result
Transformer	N/A
Test Comments and Notes	
N/A	

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8. Power Supply Output Short Circuit Test

8.1 Reference Standards

SEMI S22-0715a, Clause 22.9

8.2 Test Requirements

Timer with accuracy of ± 5 minutes. A substantial conductor suitable for carrying the short circuit current.

8.3 Test Procedure

With the equipment in its standby condition, short circuit the output of each power supply, one at a time.

NOTE 73: If overcurrent protection is connected to the output of the power supply under test, connect the short circuit jumper after this protective device.

EXCEPTION: A power supply that is certified by an accredited testing laboratory and used in accordance with its certification and the manufacturer's instructions need not be subjected to this test.

8.4 Test Results

A hazardous condition (e.g., smoke, fire, or molten material) does not exist within 8 hours or before activation of overcurrent protection, thermal protection, or other protective circuit/device, whichever occurs first.

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Power Supply Output Short Circuit Test Data

Power Supply Output Short Circuit Test Data	
Power Supply Related Document	Test Result
Certification provided	Pass
Test Comments and Notes	
<p>EDR-150-24</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>150W Single Output Industrial DIN RAIL</p> </div> <div style="text-align: right;"> <p>EDR-150-24</p> </div> </div> <div style="text-align: center; margin: 10px 0;">  </div> <div style="display: flex; justify-content: center; margin: 10px 0;">    </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>■ Features</p> <ul style="list-style-type: none"> • Universal AC input / Full range • Protections: Short circuit / Overload / Over voltage / Over temperature • Cooling by free air convection • Can be installed on DIN rail TS-35/7.5 or 15 • UL 508 (industrial control equipment) approved • EN61000-6-2(EN50082-2) industrial immunity level • 100% full load burn-in test • 2 years warranty <p>■ Description</p> <p>EDR-150 is one economical slim 150W Din rail power supply series, adapt to be installed on TS-35/7.5 or TS-35/15 mounting rails. The body is designed 40mm in width, which allows space saving inside the cabinets. The entire series adopts the full range AC input from 90VAC to 264VAC and conforms to EN61000-3-2(≤80% Load), the norm the European Union regulates for harmonic current.</p> <p>EDR-150 is designed with metal housing that enhances the unit's power dissipation. With working efficiency up to 87%, the entire series can operate at the ambient temperature between -20°C and 60°C under air convection. It is equipped with constant current mode for over-load protection, fitting various inductive or capacitive applications. The complete protection functions and relevant certificates for industrial control apparatus (UL508, TUV EN60950-1, and etc.) make EDR-150 a very competitive power supply solution for industrial applications.</p> <p>■ Model Encoding</p> <p>EDR - 150 - 24</p> <pre> graph TD A[EDR - 150 - 24] --- B[Model name] A --- C[Output wattage] A --- D[Output voltage] </pre> </div> <div style="width: 45%;"> <p>■ Applications</p> <ul style="list-style-type: none"> • Industrial control system • Semiconductor fabrication equipment • Factory automation • Electro-mechanical apparatus </div> </div> <p style="text-align: right; font-size: small; margin-top: 20px;">File Name: EDR-150-3K-SPEC_2016-01-07</p>	

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Power Supply Output Short Circuit Test Data Test Comments and Notes

DR-RDN20



20A Power Supply Redundancy Module

DR-RDN20



- Features :
 - * Suitable for redundant operation of 24V system
 - * Installed on DIN Rail TS35 / 7.5 or 15
 - * Relay contact signal output and LED indicator for input failure alarm
 - * Cooling by free air convection
 - * 3 years warranty



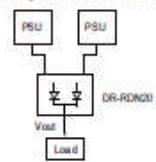
SPECIFICATION

MODEL		DR-RDN20
OUTPUT	REVERSE VOLTAGE (max.)	30V
	OUTPUT CURRENT (max.)	20A
	VOLTAGE DROP	0.6V
LED INDICATORS		Two green LEDs indicating each input is "OK" or "N/A"
INPUT	INPUT VOLTAGE RANGE	21 ~ 28V
	NUMBER OF INPUTS	Two
FUNCTION	INPUT CURRENT (max.)	20A per input
	INPUT VOLTAGE ALARM	When input is > 20V (±5%) or < 20V (±5%) relay contacts
ENVIRONMENT	RELAY CONTACT RATING (max.)	30VDC, 1A
	WORKING TEMP.	-40 ~ +70°C
SAFETY & EMC (Note 2)	WORKING HUMIDITY	20 ~ 90% RH non condensing
	STORAGE TEMP., HUMIDITY	-40 ~ +85°C, 10 ~ 95% RH
	VIBRATION	10 ~ 500Hz, 2.0/10min./1cycle, period for 60min, each along X, Y, Z axis; Mounting: Compliance to IEC60068-2-6
OTHERS	SAFETY STANDARDS	UL508 approved
	WITHSTAND VOLTAGE	Terminal-Chassis: 0.5kVAC, Relay Contacts-Termin: 0.5kVAC
	ISOLATION RESISTANCE	Terminal-Chassis: >100M Ohms / 50VDC / 25°C / 70% RH
NOTE	EMC EMISSION	Compliance to EN55022 (CISPR22) Class B, EN61000-3-2, 3
	EMC IMMUNITY	Compliance to EN61000-4-2, 3, 3.4, 5, 5.5, 11, heavy industry level, criteria A
MTBF	MTBF	916,800hrs min. MIL-HDBK-217F (25°C)
	DIMENSION	55.5*125.2*10.0mm (W*H*D)
PACKING	PACKING	0.5Kg, 20pcs/11Kg/1,290 UFT

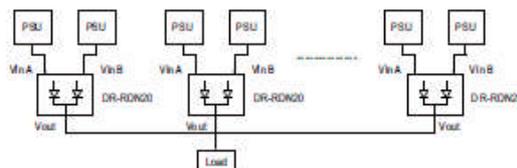
■ Typical Application Notes

1. 1+1 Redundancy

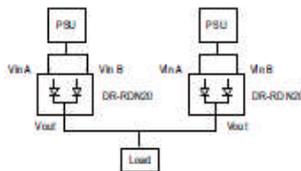
Using 1 more PSU as the redundant unit



2. 1+N Redundancy: Using more PSUs as the redundant units to increase the reliability



3. Single Use: Connecting only one PSU to one DR-RDN20 to reduce the stress of the diodes and hence increase the reliability



File Name: DR-RDN20-SPEC_2016-08-08

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Power Supply Output Short Circuit Test Data Test Comments and Notes

MDR-40



40W Single Output Industrial DIN Rail Power Supply

MDR-40 series



Features:

- Universal AC Input/Full range
- Protections: Short circuit / Overload / Over voltage
- Cooling by free air convection
- Can be installed on DIN rail TS-35/7.5 or 15
- Class I, Div 2 Hazardous Locations T4
- LED indicator for power on
- DC OK relay contact
- No load power consumption <0.75W
- 100% full load burn-in test
- 3 years warranty



SPECIFICATION

MODEL	MDR-40-5	MDR-40-12	MDR-40-24	MDR-40-48	
OUTPUT	DC VOLTAGE	5V	12V	24V	48V
	RATED CURRENT	6A	3.33A	1.7A	0.83A
	CURRENT RANGE	0-6A	0-3.33A	0-1.7A	0-0.83A
	RATED POWER	30W	40W	40.8W	39.6W
	RIPPLE & NOISE (max.) Note 2	80mVp-p	120mVp-p	150mVp-p	200mVp-p
	VOLTAGE ADJ. RANGE	5-6V	12-15V	24-30V	48-56V
	VOLTAGE TOLERANCE Note 3	±2.0%	±1.0%	±1.0%	±1.0%
	LINE REGULATION	±1.0%	±1.0%	±1.0%	±1.0%
	LOAD REGULATION	±1.0%	±1.0%	±1.0%	±1.0%
	SETUP, RISE TIME Note 4	500ms, 3.0mA/230VAC	500ms, 30mA/115VAC at full load		
INPUT	HOLD UP TIME (Typ.)	50ms/230VAC	20ms/115VAC at full load		
	VOLTAGE RANGE	85-264VAC	120-370VDC		
	FREQUENCY RANGE	47-63Hz			
	EFFICIENCY (Typ.)	78%	86%	88%	88%
	AC CURRENT (Typ.)	1.1A/115VAC	0.7A/230VAC		
	IN RUSH CURRENT (Typ.)	COLD START 30A/115VAC	60A/230VAC		
PROTECTION	LEAKAGE CURRENT	<1mA/240VAC			
	OVERLOAD	105-150% rated output power Protection type: Constant current limiting, recovers automatically after fault condition is removed			
FUNCTION	OVER VOLTAGE	6.25-7.25V	15.6-18V	31.2-36V	57.6-64.8V
	DC OK SIGNAL	Relay contact rating(max.): 30V/1A resistive			
ENVIRONMENT	WORKING TEMP.	-30-+70°C (Refer to "Derating Curve")			
	WORKING HUMIDITY	30-90% RH non-condensing			
	STORAGE TEMP., HUMIDITY	-40-+85°C, 10-95% RH			
SAFETY & EMC (Note 4)	TEMP. COEFFICIENT	±0.03%/°C (0-50°C)			
	VIBRATION	Component: 10-500Hz, 20-10min./cycle, period for 60 min. each along X, Y, Z axes; Mounting: C compliance to IEC60068-2-6			
	SAFETY STANDARDS	UL508, UL60950-1, TUV EN 60950-1, Class I, Div 2 Group A, B, C, D Hazardous Locations T4 approved			
	WITHSTAND VOLTAGE	IP-OP: 30VAC IP-FG: 20VAC OP-FG: 0.5kVAC			
	ISOLATION RESISTANCE	IP-OP/IP-FG, OP-FG >100 M Ohms / 500VDC / 25°C / 70% RH			
OTHERS	EMC EMISSION	Compliance to EN55011, EN55022 (CISPR22), EN61204-3 Class B, EN61000-3-2, 3			
	EMC IMMUNITY	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11, EN55024, EN61000-6-2, EN61204-3, heavy industry level, criteria A			
NOTE	MTBF	301.7K hrs min. MIL-HDBK-217F (25°C)			
	DIMENSION	40*90*100mm (W*H*D)			
	PACKING	0.3Kg, 40pcs/3.6Kg/0.82CUFT			

File Name: MDR-40-SPCC_2016-10-22

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9. Strain Relief Test

9.1 Reference Standards

SEMI S22-0715a, Clause 22.7

9.2 Test Requirements

Timer with accuracy of ± 5 seconds. A calibrated weight to apply a force of 156 N (35 lbs.) ± 1.56 N (0.35 lbs.). A supporting surface on which to secure the equipment.

9.3 Test Procedure

Support the equipment on a surface so it will not move when the force is applied to the cord. Disconnect the internal connections for the cord. Mark the external portion of the cord with tape where it meets the strain relief.

Apply a direct pull of 156 N (35 lbs.) to the equipment supply cord from the least favorable angle. If necessary, use pulleys or other means to adjust the angle of force applied to the strain relief on the equipment. Apply the force gradually by slowly suspending the weight on the cord and maintain the applied force for a period of one minute.

9.4 Test Results

No displacement of the tape demonstrates an acceptable result.

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Strain Relief Test Data

Test Equipment			
Item 1		Item 2	
Description	Handy Force Gauge	Description	N/A
Manufacturer	SHIMPO	Manufacturer	N/A
Model	FGE-500HX	Model	N/A
Serial Number	Z9812J544	Serial Number	N/A
Calibration Date	December 04, 2015	Calibration Date	N/A
Strain Relief Test Data			
Test force		Test Result	
168 N		Pass	
Test Comments and Notes			
			

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10. Safety Circuit Function Test And Safety Circuit Conductor Disconnection Test

10.1 Reference Standards

SEMI S22-0715a, Clause 22.10
SEMI S22-0715a, Clause 22.11

10.2 Test Requirements

The functions of electrical equipment shall be tested, particularly those related to safety and safeguarding

10.3 Test Procedure

- 1) Set up and energize the equipment. Operate the equipment in a normal running condition.
- 2) Activate each EMO button on the machine. Ensure the EMO buttons operate per the requirement of NFPA79 and the design intent for the system.
- 3) Activate each safety interlock on the system. Ensure that interlocks perform per the requirement of NFPA79 and their design intent. Where necessary ensure single point failures do not disable the interlock.
- 4) For each independent safety interlock circuit (such as door safety interlock), EMO, and safety sensor (e.g., exhaust sensor, low fluid level sensor), disconnect each safety interlock circuit one conductor at a time.

10.4 Test Results

EMO buttons and Door interlock switches were activated. EMO buttons and Door interlock switches operate per the requirement of NFPA 79 and the design intent of the system. The opening of the safety circuit causes the equipment to be placed in a safe condition as if the safety device had been actuated. Reconnecting the conductor should not cause the system to resume operation.

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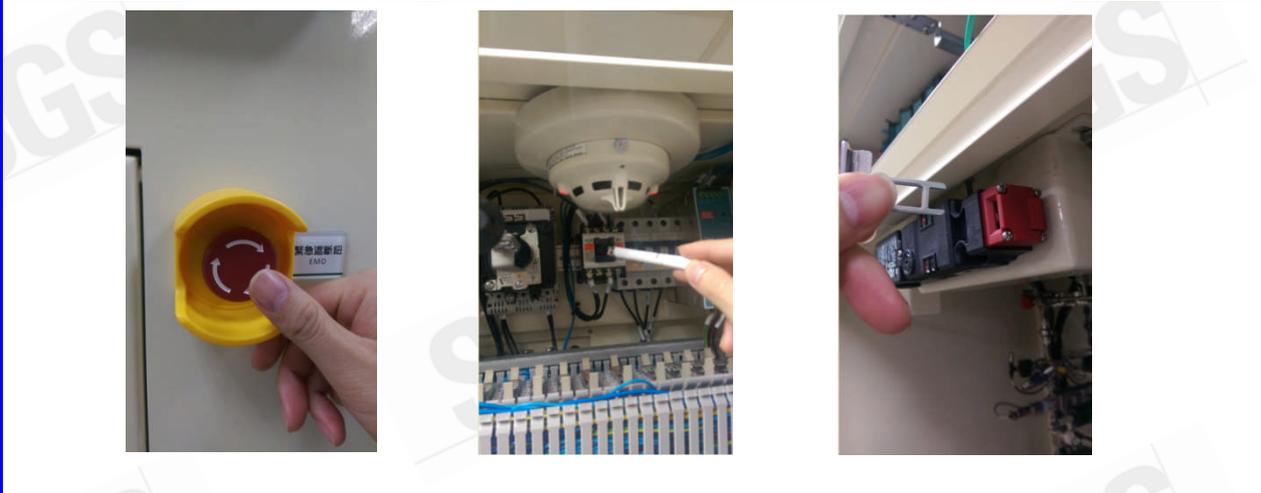
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Functional Test Results

Test Equipment				
Item 1		Item 2		
Description	N/A	Description	N/A	
Manufacturer	N/A	Manufacturer	N/A	
Model	N/A	Model	N/A	
Serial Number	N/A	Serial Number	N/A	
Calibration Date	N/A	Calibration Date	N/A	
Functional Test Results				
Test	Component/Location under Test	Circuit Function	Fail safe Device	Not Auto Reset
1	EMO	Pass	Pass	Pass
2	DPS(EX01)	Pass	Pass	Pass
3	DPS(EX02)	Pass	Pass	Pass
4	Smoke Fire Detector	Pass	Pass	Pass
5	Door Lock	Pass	Pass	Pass
Test Comments and Notes				
				

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11. Temperature Test

11.1 Reference Standards

SEMI S22-0715a, Clause 22.13

11.2 Test Procedure

The equipment is to be operated at the manufacturer's maximum design load for 8 hours or until thermal equilibrium is reached (whichever occurs first). Measure and record the ambient room temperature. Measure and record the temperatures of the various components and devices for comparison as table 3.

Table 3 Maximum Temperature Limit

Parts of the Equipment	Temperature Limit (°C)
Knife switch blade and contact jaws	55
Fuse and fuse clip	110
Insulated conductors	#1
Field wiring terminals	--
Equipment marked for 60°C or 60°C/75°C supply wires	75
Equipment marked for 75°C supply wires	90
Buses and connecting straps or bars	125
Capacitors	#2
Power switching semiconductors	#3
Printed wiring boards	#4
Motors and Transformers	#5

#1 The temperature as marked on the conductor or otherwise the rated temperature designated by the conductor manufacturer.

#2 The temperature marked on the capacitor or otherwise the rated temperature designated by the conductor manufacturer.

#3 The case temperature for the applied power dissipation recommended by the semiconductor manufacturer.

#4 The operating temperature of the board as specified by the board manufacturer.

#5 The rated temperature of the motor or transformer as specified by the manufacturer, if provided. When not provided, use appropriate standards such as IEC 61010-1 for guidance.

11.3 Test Results

Acceptable Results — The ambient temperature should be subtracted from 40°C or the maximum ambient temperature specified in the manufacturer's documentation, whichever is greater. This difference should be added to all the measured temperatures and these results should not exceed the values listed in Table 3.

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Temperature Test Data

Test Equipment			
Item 1		Item 2	
Description	Infrared Thermometer	Description	N/A
Manufacturer	FLUKE	Manufacturer	N/A
Model	FLUKE-59 ESP	Model	N/A
Serial Number	26180090	Serial Number	N/A
Calibration Date	Oct. 02, 2014	Calibration Date	N/A
Temperature Test Results			
Component/Location Under Test		Measured Temperature(°C)	Test Result
	SE01	33.0	Pass
	SE02	29.6	Pass
	SE06	28.8	Pass
	SE07	28.2	Pass
	RM	30.4	Pass
	QF1	28.6	Pass
	KM0	38.2	Pass
	CB01	39.6	Pass
	PS01	34.2	Pass
	PS02	33.2	Pass
	SR01	28.6	Pass
	PS03	33.0	Pass
	KA1	38.8	Pass
	KA2	37.4	Pass
	KA20	28.4	Pass
	KA21	27.4	Pass
	KA22	37.0	Pass
	KA31	26.4	Pass
	SD01	34.6	Pass
	PL01	25.0	Pass
	DO01	23.2	Pass
	HL02	23.2	Pass
	HL01	24.6	Pass
	IA01	29.4	Pass
	YV-10	22.6	Pass
	YV-1	22.8	Pass
	YV-5	22.4	Pass
	EX01	22.8	Pass
	TH01	32.8	Pass
	EMO	23.2	Pass
	DL01	22.4	Pass

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12. 250 N Steady Force Test

12.1 Reference Standards

SEMI S22-0715a, Clause 22.14

12.2 Test Procedure

The panel is to be subjected to a steady force of 250 N \pm 10 N (55.55 lbs. \pm 2.22 lbs.) for a period of 5 seconds, applied to the enclosure, fitted to the equipment, by means of a suitable test tool providing contact over a circular plane surface 30 mm in diameter.

12.3 Test Results

If flexing of the enclosure panel occurs, it should not cause shorting or reduction of a clearance distance to less than that stipulated between the enclosure and hazardous energized parts inside.

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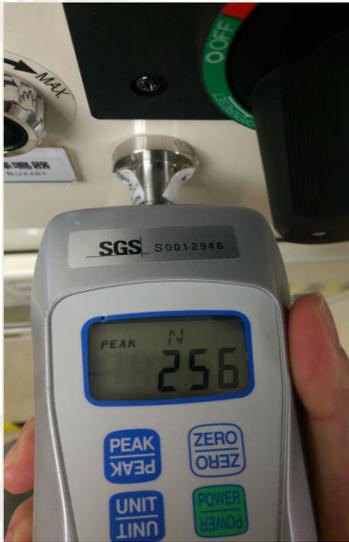
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250 N Steady Force Test

Test Equipment			
Item 1		Item 2	
Description	Digital Force Gauges	Description	N/A
Manufacturer	SHIMPO	Manufacturer	N/A
Model	FGE-500HX	Model	N/A
Serial Number	Z9812J544	Serial Number	N/A
Calibration Date	October 28 , 2014	Calibration Date	N/A
250 N Steady Force Test			
Test force		Test Result	
250 N \pm 10 N		Pass	
Test Comments and Notes			
			

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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13. Sound Pressure Level Test

13.1 Reference Standards

SEMI S2-0712b, Clause 27

13.2 Test Requirements

The sound pressure level shall not be exceeded 80dBA.

13.3 Test Procedure

- 1) Measure and record the ambient noise level.
- 2) Noise level will be measured at a distance of 1 meter from the surface of the machinery and at a height of 1.6 meters from the floor or access platform.

13.4 Test Results

The measured sound level is under 80 dBA.

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Sound Pressure Level Test Data

Test Equipment			
Item 1		Item 2	
Description	Sound level meter	Description	N/A
Manufacturer	TES	Manufacturer	N/A
Model	1351	Model	N/A
Serial Number	050509868	Serial Number	N/A
Calibration Date	Sep. 04, 2015	Calibration Date	N/A
Sound Pressure Level Test			
Location		Measured sound level(dBA)	
Front Side		40.2	
Right Side		40.3	
Left Side		48.0	
Test Comments and Notes			
Measured Ambient Sound Level: 43.3 dBA			
Remarks			

- End of report -

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