Jameco Part Number 1943465

60W Single Output Industrial DIN Rail Power Supply MDR-60 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
- NEC class 2 / LPS compliant (24V,48V only)
- 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

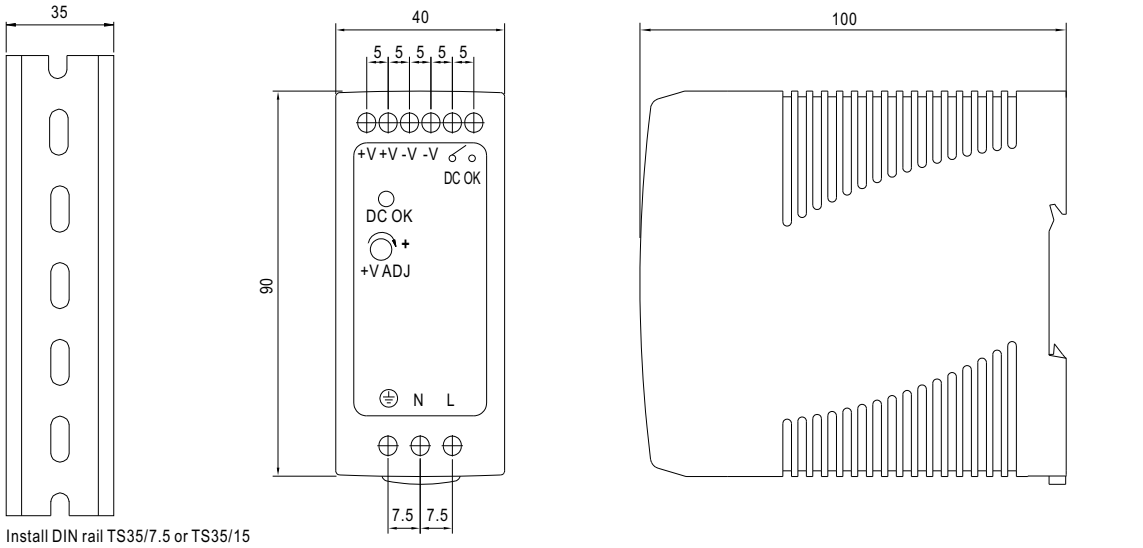
MODEL		MDR-60-5	MDR-60-12	MDR-60-24	MDR-60-48
OUTPUT	DC VOLTAGE	5V	12V	24V	48V
	RATED CURRENT	10A	5A	2.5A	1.25A
	CURRENT RANGE	0 ~ 10A	0 ~ 5A	0 ~ 2.5A	0 ~ 1.25A
	RATED POWER	50W	60W	60W	60W
	RIPPLE & NOISE (max.) Note.2	80mVp-p	120mVp-p	150mVp-p	200mVp-p
	VOLTAGE ADJ. RANGE	5 ~ 6V	12 ~ 15V	24 ~ 30V	48 ~ 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	±1.5%	±1.0%	±1.0%	±1.0%
	SETUP, RISE TIME Note.5	500ms, 30ms/230VAC 500ms, 30ms/115VAC at full load			
	HOLD UP TIME (Typ.)	50ms/230VAC 20ms/115VAC at full load			
INPUT	VOLTAGE RANGE	85 ~ 264VAC 120 ~ 370VDC			
	FREQUENCY RANGE	47 ~ 63Hz			
	EFFICIENCY (Typ.)	78%	86%	88%	87%
	AC CURRENT (Typ.)	1.8A/115VAC 1A/230VAC			
	INRUSH CURRENT (Typ.)	COLD START 30A/115VAC 60A/230VAC			
	LEAKAGE CURRENT	<1mA / 240VAC			
PROTECTION	OVERLOAD	105 ~ 150% rated output power			
		Protection type : Constant current limiting, recovers automatically after fault condition is removed			
	OVER VOLTAGE	6.25 ~ 7.25V	15.6 ~ 18V	31.2 ~ 36V	57.6 ~ 64.8V
		Protection type : Shut down o/p voltage, re-power on to recover			
FUNCTION	DC OK SIGNAL	Relay contact rating(max.): 30V/1A resistive			
ENVIRONMENT	WORKING TEMP.	-20 ~ +70℃ (Refer to output load derating curve)			
	WORKING HUMIDITY	20 ~ 90% RH non-condensing			
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH			
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)			
	VIBRATION	Component : 10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes ; Mounting : Compliance to IEC60068-2-6			
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL508, TUV EN60950-1 approved, NEC class 2 / LPS compliant (24V,48V only)			
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:1.5KVAC O/P-FG:0.5KVAC			
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:>100M Ohms/500VDC 25℃ 70%RH			
	EMI CONDUCTION & RADIATION	Compliance to EN55011, EN55022 (CISPR22), EN61204-3 Class B			
	HARMONIC CURRENT	Compliance to EN61000-3-2,-3			
	EMS IMMUNITY	Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11, ENV50204, EN55024, EN61000-6-2, EN61204-3, heavy industry level, criteria A			
OTHERS	MTBF	299.2K hrs min. MIL-HDBK-217F (25℃)			
	DIMENSION	40*90*100mm (W*H*D)			
	PACKING	0.33Kg; 42pcs/14.8Kg/0.82CUFT			

NOTE

1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
3. Tolerance : includes set up tolerance, line regulation and load regulation.
4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives.
5. Length of set up time is measured at first cold start. Turning ON/OFF the power supply may lead to increase of the set up time.

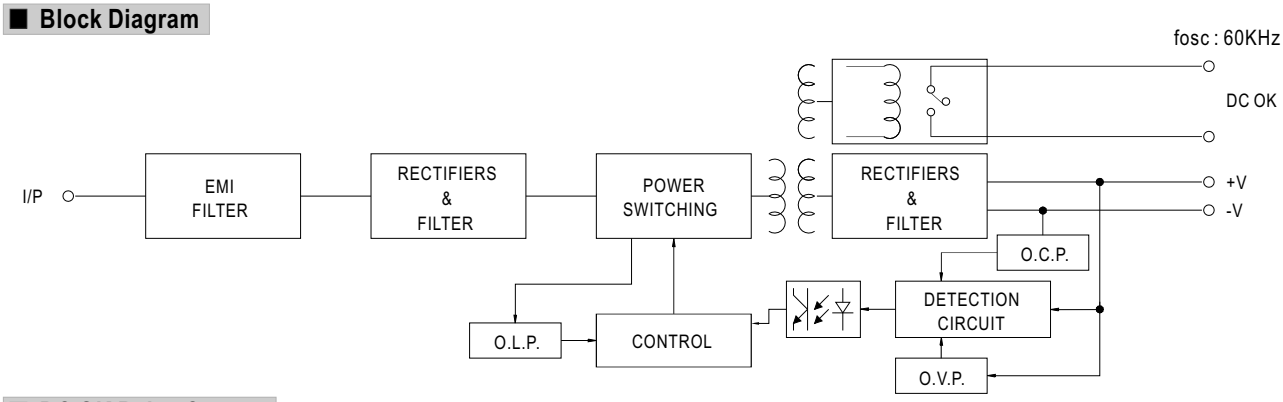
■ Mechanical Specification

Case No.962A Unit:mm



Install DIN rail TS35/7.5 or TS35/15

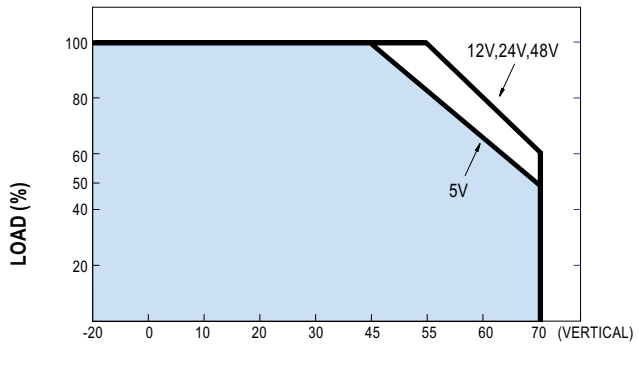
■ Block Diagram



■ DC OK Relay Contact

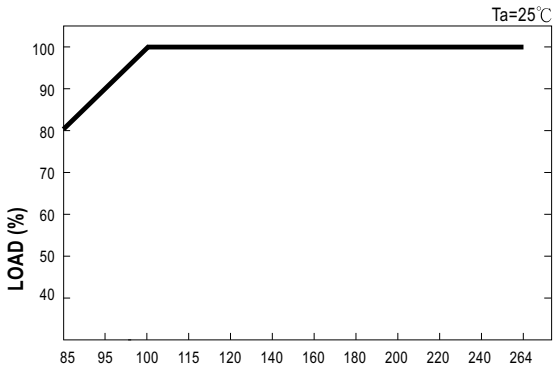
Contact Close	When the output voltage reaches the adjusted output voltage.
Contact Open	When the output voltage drop below 90% output voltage.
Contact Ratings (max.)	30V/1A resistive load

■ Derating Curve



AMBIENT TEMPERATURE (℃)

■ Output Derating VS Input Voltage



INPUT VOLTAGE (VAC) 60Hz

MODEL：MDR-60-24

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 150 mVp-p (Max)	I/P: 230VAC O/P:FULL LOAD Ta:25℃	V1: 15 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 24 V~ 30V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25℃	22.81 V~ 31.6 V/ 230 VAC 22.81 V~ 31.6 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1: 1 %~ -1 % (Max)	I/P: 100VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25℃	V1: 0.08 %~ -0.08 %	P
4	LINE REGULATION	V1: 1 %~ -1 % (Max)	I/P: 100VAC ~ 264 VAC O/P:FULL LOAD Ta:25℃	V1: 0 %~ 0 %	P
5	LOAD REGULATION	V1: 1 %~ -1 % (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: 0.08 %~ -0.08 %	P
6	SET UP TIME	230VAC: 500 ms (Max) 115 VAC: 500 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 270 ms 115VAC/ 183 ms	P
7	RISE TIME	230VAC: 30 ms (Max) 115VAC: 30 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 11 ms 115VAC/ 11 ms	P
8	HOLD UP TIME	230VAC: 50 ms (TYP) 115VAC: 20 ms (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 101 ms 115VAC/ 21.9 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	TEST: <5 %	P
10	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 230 VAC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25℃	177 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	85VAC~264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25℃	50V~264V	P
			I/P: LOW-LINE-3V= 82 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST: OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 85 VAC ~ 264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK	P
3	EFFICIENCY	88 % (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	88.3%	P
4	INPUT CURRENT	230V/ 1 A (TYP) 115V/ 1.8 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	I = 0.61 A/ 230 VAC I = 1.09 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 60 A (TYP) 115V/ 30 A(TYP) COLD START	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	I = 52 A/ 230 VAC I = 26 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 1 mA / 240 VAC	I/P: 254 VAC O/P:Min LOAD Ta:25℃	L-FG: 0.64 mA N-FG: 0.64 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %~ 150 %	I/P: 230 VAC I/P: 115 VAC O/P:TESTING Ta:25℃	121 % / 230 VAC 120 % / 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1: 31.2V~ 36V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25℃	33.6 V/ 230 VAC 33.6 V/ 115 VAC Shunt down Re- power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264 VAC O/P:FULL LOAD Ta:25℃	NO DAMAGE Constant Current Limiting	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	NO LOAD POWER CON SUMPTION	<0.75W	I/P: 230 VAC I/P: 115 VAC O/P:NO LOAD Ta:25℃	230 VAC/ 0.68 W 115 VAC/ 0.6 W	P
2	DC OK SIGNAL	30V/ 1A	I/P: 230 VAC O/P: FULL LOAD Ta:25℃	OK	P

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL：MDR-60-24
1. ROOM AMBIENT BURN-IN： 1 HRS
I/P: 230VAC O/P: FULL LOAD Ta=29.5 ℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P: 230VAC O/P: FULL LOAD Ta=55.6 ℃

<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT
Ta= 29.5 ℃</th><th>HIGH AMBIENT
Ta= 55.6 ℃</th></tr>
<tr><td>1</td><td>Q1</td><td>P9NK70ZFP 7.5A/700V</td><td>71.1℃</td><td>99.0℃</td></tr>
<tr><td>2</td><td>D1</td><td>EGP20J 2A/600V</td><td>69.7℃</td><td>97.5℃</td></tr>
<tr><td>3</td><td>ZD1</td><td>P6KE150A</td><td>61.1℃</td><td>87.2℃</td></tr>
<tr><td>4</td><td>T1 COIL</td><td>TF-1582</td><td>77.4℃</td><td>103.1℃</td></tr>
<tr><td>5</td><td>C5</td><td>150U/400V HU4 105℃</td><td>47.6℃</td><td>73.6℃</td></tr>
<tr><td>6</td><td>BD1</td><td>KBJ608G 6A/800V</td><td>49.2℃</td><td>75.1℃</td></tr>
<tr><td>7</td><td>C36</td><td>100U/50V KY 105℃</td><td>58.4℃</td><td>84.3℃</td></tr>
<tr><td>8</td><td>C200</td><td>22U/50V YXM 105℃</td><td>60.1℃</td><td>85.3℃</td></tr>
<tr><td>9</td><td>D100</td><td>BYQ28X-200 10A/200V</td><td>66.1℃</td><td>90.1℃</td></tr>
<tr><td>10</td><td>C105</td><td>470U/35V KY 105℃</td><td>57.7℃</td><td>82.5℃</td></tr>
<tr><td>11</td><td>L100</td><td>RB010E</td><td>56.4℃</td><td>81.3℃</td></tr>
<tr><td>12</td><td>LF1</td><td>TF-484</td><td>44.2℃</td><td>71.1℃</td></tr>
<tr><td>13</td><td>U1</td><td>NCP1200</td><td>57.0℃</td><td>83.0℃</td></tr>
<tr><td>14</td><td>U100</td><td>AP4310</td><td>54.0℃</td><td>79.1℃</td></tr>
<tr><td>15</td><td>RY1</td><td>OUAZ-1SS-112L 1A/24V</td><td>51.8℃</td><td>76.6℃</td></tr>
</table>
</td><td>P</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P: 230 VAC
O/P:124 % LOAD
Ta:25℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P: 230 VAC
O/P: 100 % LOAD
Ta= -20℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 60℃
NO DAMAGE</td><td>I/P: 272 VAC
O/P:FULL LOAD
Ta= 60℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %(0~50℃)</td><td>I/P: 230 VAC
O/P:FULL LOAD</td><td>± 0.021 %(0~50℃)</td><td>P</td></tr>
<tr><td>6</td><td>VIBRATION TEST</td><td colspan="2">1 Carton & 1 Set
(1) Waveform: Sine Wave
(2) Frequency:10~500Hz
(3) Sweep Time:10min/sweep cycle
(4) Acceleration:2G
(5) Test Time:1 hour in each axis (X.Y.Z)
(6) Ta:25℃</td><td>TEST：OK</td><td>P</td></tr>
</table>

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 3 KVAC/min I/P-FG: 1.5 KVAC/min O/P-FG: 0.5 KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 1.8 KVAC/min O/P-FG: 0.6 KVAC/min Ta:25℃	I/P-O/P: 6.07 mA I/P-FG: 4.97 mA O/P-FG: 3.24 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25℃	I/P-O/P: 4 GΩ I/P-FG: 5 GΩ O/P-FG: 6 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25℃	14 mΩ	P
4	APPROVAL	TUV: Certificate NO：R50100751 UL: File NO：E215312			P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25℃	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25℃	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

M.T.B.F & LIFE CYCLE CALCULATION

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	CAPACITOR LIFE CYCLE	MDR-60-24: SUPPOSE C105 IS THE MOST CRITICAL COMPONENT I/P: 230VAC O/P:FULL LOAD Ta= 25℃ LIFE TIME=413612 HRS I/P: 230VAC O/P:FULL LOAD Ta= 60℃ LIFE TIME=56593 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 299.2KHRS			P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) **Peak Voltage**	Q1 Rated STP9NK70 : 700V 7.5A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Output Short Ta:25℃	(1) 578 V (2) 570 V	P
2	Diode Peak **Voltage**	D100 Rated BYQ28X-200 : 10A/200V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2)Output Short Ta:25℃	(1) 184 V (2) 186 V	P
3	Clamp Diode Peak **Voltage**	D1 Rated EGP20J : 600V 2A	I/P:High-Line +3V = 267 V O/P: (1) Dynamic Load 90%Duty/1KHz Ta:25℃	(1) 502 V	P
4	**Input Capacitor Voltage**	C5 Rated :150u / 400V/ 105℃	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta:25℃	(1) 376 V (2) 378 V (3) 378 V	P
5	**Control IC Voltage Test**	U1 Rated 1200D60R2G : 16V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta:25℃	(1) 11.92 V (2) 10.86 V (3) 11.92 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2006/12/14	RD SAMPLE	PASS	VINCENT TSENG	MAX LIN
2007/3/6	PRODUCT SAMPLE W0701B07	PASS	VINCENT TSENG	MAX LIN
2007/5/9	PRODUCT SAMPLE W0703A07	PASS	VINCENT TSENG	MAX LIN

2003/12/12 A50-F023