



200W Single Output DC-DC Converter

SD-200 series



■ Features :

- 2:1 wide input range
- Protections: Short circuit / Overload / Over voltage / Over temperature
- 1500VDC I/O isolation
- Cooling by free air convection
- 100% full load burn-in test
- 24V and 48V input voltage design refer to LVD
- 2 years warranty

c  us (for SD-200C-24 type only) **CB** (for D type only) 

SPECIFICATION

MODEL		SD-200B				SD-200C			
OUTPUT	DC VOLTAGE	5V	12V	24V	48V	5V	12V	24V	48V
	RATED CURRENT	34A	16.7A	8.4A	4.2A	40A	16.7A	8.4A	4.2A
	CURRENT RANGE	0 ~ 34A	0 ~ 16.7A	0 ~ 8.4A	0 ~ 4.2A	0 ~ 40A	0 ~ 16.7A	0 ~ 8.4A	0 ~ 4.2A
	RATED POWER	170W	200.4W	201.6W	201.6W	200W	200.4W	201.6W	201.6W
	RIPPLE & NOISE (max.) Note.2	100mVp-p	120mVp-p	150mVp-p	200mVp-p	100mVp-p	120mVp-p	150mVp-p	200mVp-p
	VOLTAGE ADJ. RANGE	4.5 ~ 5.5VDC	11 ~ 16VDC	23 ~ 30VDC	43 ~ 53VDC	4.5 ~ 5.5VDC	11 ~ 16VDC	23 ~ 30VDC	43 ~ 53VDC
	VOLTAGE TOLERANCE Note.3	±2.0%	±1.0%	±1.0%	±1.0%	±2.0%	±1.0%	±1.0%	±1.0%
	LINE REGULATION	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%
SETUP, RISE TIME		300ms, 50ms at full load							
INPUT	VOLTAGE RANGE	B:19 ~ 36VDC		C:36 ~ 72VDC		D:72 ~144VDC			
	EFFICIENCY (Typ.)	79%	82%	85%	86%	81%	84%	86%	86%
	DC CURRENT (Typ.)	10.8A/24V	10.6A/24V	10.4A/24V	10.4A/24V	5.4A/48V	5.2A/48V	6.7A/48V	5A/48V
	INRUSH CURRENT (Typ.)	C:45A/48VDC		D:45A/96VDC					
PROTECTION	OVERLOAD	105 ~ 135% rated output power Protection type : Shut down o/p voltage, re-power on to recover							
	OVER VOLTAGE	5.75 ~ 6.75V	16.8 ~ 20V	31.5 ~ 37.5V	53 ~ 65V	5.75 ~ 6.75V	16.8 ~ 20V	31.5 ~ 37.5V	53 ~ 65V
		Protection type : Shut down o/p voltage, re-power on to recover							
	OVER TEMPERATURE	95℃±5℃ (100℃±5℃ for SD-200B-12 only) TSW1 detect on main power transistor Protection type : Shut down o/p voltage, recovers automatically after temperature goes down							
ENVIRONMENT	WORKING TEMP.	-20 ~ +60℃ (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	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes							
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL60950-1approved (for SD-200C-24 type only), IEC60950-1 CB approved by TUV (for D type only)							
	WITHSTAND VOLTAGE	I/P-O/P:1.5KVAC 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 EN55022 (CISPR22) Class B							
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,6,8; ENV50204, light industry level, criteria A							
OTHERS	MTBF	218.2K hrs min. MIL-HDBK-217F (25℃)							
	DIMENSION	215*115*50mm (L*W*H)							
	PACKING	1.1Kg; 12pcs/14.4Kg/0.92CUFT							
NOTE	1. All parameters NOT specially mentioned are measured at 24,48,96VDC 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.								



200W Single Output DC-DC Converter

SD-200 series



■ Features :

- 2:1 wide input range
- Protections: Short circuit / Overload / Over voltage / Over temperature
- 1500VDC I/O isolation
- Cooling by free air convection
- 100% full load burn-in test
- 24V and 48V input voltage design refer to LVD
- 2 years warranty

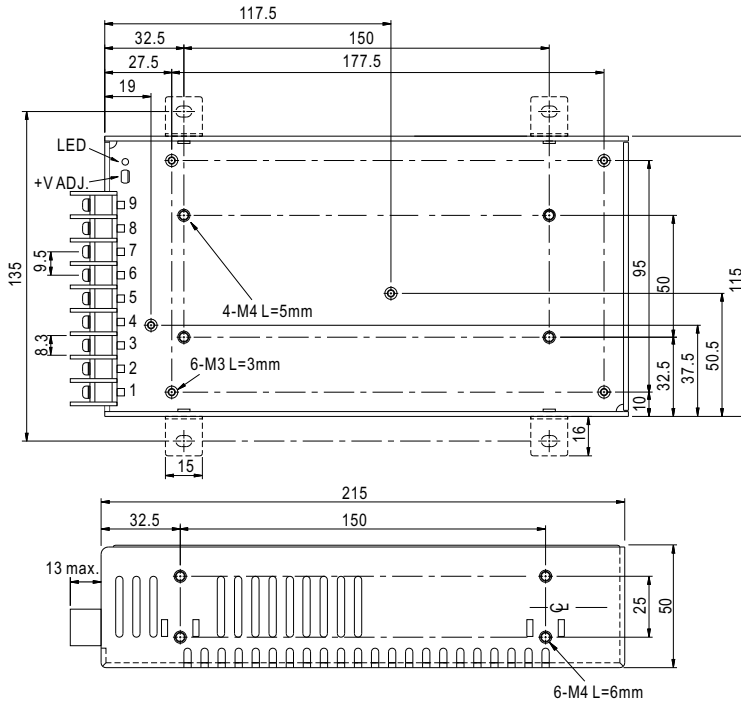
CB (for D type only) **CE**

SPECIFICATION

MODEL		SD-200D			
OUTPUT	DC VOLTAGE	5V	12V	24V	48V
	RATED CURRENT	40A	16.7A	8.4A	4.2A
	CURRENT RANGE	0 ~ 40A	0 ~ 16.7A	0 ~ 8.4A	0 ~ 4.2A
	RATED POWER	200W	200.4W	201.6W	201.6W
	RIPPLE & NOISE (max.) Note.2	100mVp-p	120mVp-p	150mVp-p	200mVp-p
	VOLTAGE ADJ. RANGE	4.5 ~ 5.5VDC	11 ~ 16VDC	23 ~ 30VDC	43 ~ 53VDC
	VOLTAGE TOLERANCE Note.3	±2.0%	±1.0%	±1.0%	±1.0%
	LINE REGULATION	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION	±1.0%	±1.0%	±1.0%	±1.0%
SETUP, RISE TIME		300ms, 50ms at full load			
INPUT	VOLTAGE RANGE	B:19 ~ 36VDC C:36 ~ 72VDC D:72 ~144VDC			
	EFFICIENCY (Typ.)	82%	82%	84%	90%
	DC CURRENT (Typ.)	3.5A/96V	3.5A/96V	3.5A/96V	3.5A/96V
	INRUSH CURRENT (Typ.)	C:45A/48VDC D:45A/96VDC			
PROTECTION	OVERLOAD	105 ~ 135% rated output power Protection type : Shut down o/p voltage, re-power on to recover			
	OVER VOLTAGE	5.75 ~ 6.75V	16.8 ~ 20V	31.5 ~ 37.5V	53 ~ 65V
	OVER TEMPERATURE	85°C ±5°C (TSW1) detect on main power transistor			
		Protection type : Shut down o/p voltage, recovers automatically after temperature goes down			
ENVIRONMENT	WORKING TEMP.	-20 ~ +60°C (Refer to output load derating curve)			
	WORKING HUMIDITY	20 ~ 90% RH non-condensing			
	STORAGE TEMP., HUMIDITY	-40 ~ +85°C, 10 ~ 95% RH			
	TEMP. COEFFICIENT	±0.03%/°C (0 ~ 50°C)			
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes			
SAFETY & EMC (Note 4)	SAFETY STANDARDS	IEC60950-1 CB approved by TUV (for D type only)			
	WITHSTAND VOLTAGE	I/P-O/P:1.5KVAC 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°C / 70% RH			
	EMI CONDUCTION & RADIATION	Compliance to EN55022 (CISPR22) Class B			
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,6,8; ENV50204, light industry level, criteria A			
OTHERS	MTBF	218.2K hrs min. MIL-HDBK-217F (25°C)			
	DIMENSION	215*115*50mm (L*W*H)			
	PACKING	1.1Kg; 12pcs/14.4Kg/0.92CUFT			
NOTE	1. All parameters NOT specially mentioned are measured at 24,48,96VDC input, rated load and 25°C 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.				

■ Mechanical Specification

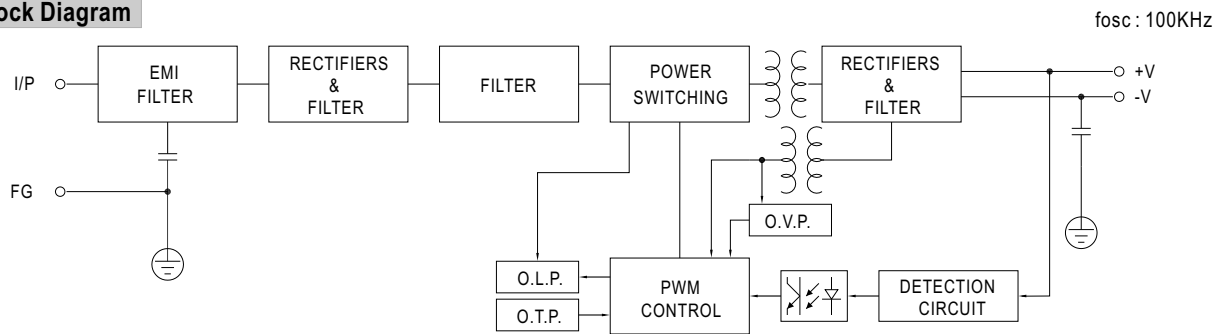
Case No. 912H Unit:mm



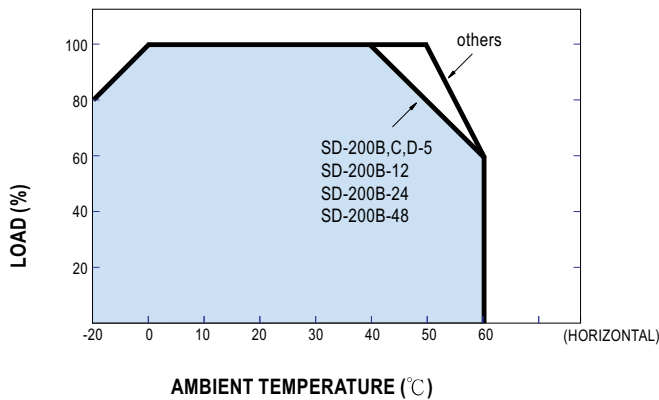
Terminal Pin No. Assignment :

Pin No.	Assignment	Pin No.	Assignment
1	DC INPUT V+	4,5,6	DC OUTPUT V-
2	DC INPUT V-	7,8,9	DC OUTPUT V+
3	FG $\perp$		

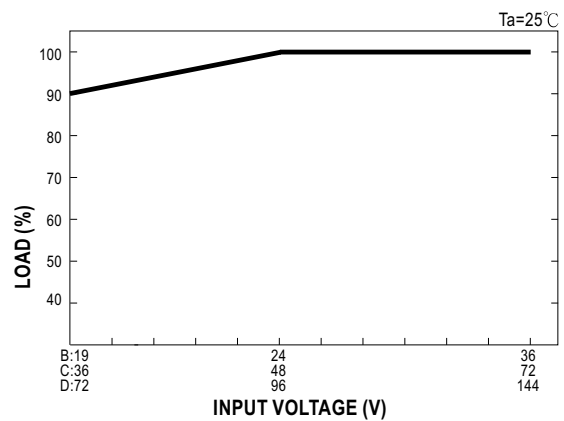
■ Block Diagram



■ Derating Curve



■ Static Characteristics



MODEL : SD-200D-5

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 100 mVp-p (Max)	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	V1: 22 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.5 V~ 5.5 V	I/P: 96 VDC O/P:MIN LOAD Ta:25°C	4.28V~ 5.73 V	P
3	OUTPUT VOLTAGE TOLERANCE	V1: 2 %~ -2 % (Max)	I/P:96 VDC / 144 VDC O/P:FULL/ MIN LOAD Ta:25°C	V1: 0.7 %~ -0.7 %	P
4	LINE REGULATION	V1: 0.5 %~ -0.5 % (Max)	I/P:96 VDC / 144 VDC O/P:FULL LOAD Ta:25°C	V1: 0.15 %~ -0.15 %	P
5	LOAD REGULATION	V1: 1 %~ -1 % (Max)	I/P: 96 VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.63 %~ -0.63 %	P
6	SET UP TIME	300 ms (Max)	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	45 ms	P
7	RISE TIME	50 ms (Max)	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	34 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	TEST: <5 %	P
9	DYNAMIC LOAD	V1: 1000 mVp-p	I/P: 96 VDC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25°C	74 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	72VDC~ 144 VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	60 V~ 144 V	P
			I/P: LOW-LINE-0.2V= 71.8 V HIGH-LINE+5%= 151.2 V O/P:FULL/MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST: OK	
2	EFFICIENCY	82 % (TYP)	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	82.3 %	P
3	INPUT CURRENT	2.6A (TYP)	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	I = 2.5 A	P
4	INRUSH CURRENT	45 A (TYP) COLD START	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	I = 34 A	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %~ 135 %	I/P: 96 VDC O/P:TESTING Ta:25°C	117 % Shunt down Re-power ON	P
2	OVER VOLTAGE PROTECTION	CH1: 5.75 V~ 6.75 V	I/P: 96 VDC O/P:MIN LOAD Ta:25°C	6.2 V Shunt down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC: 85± 5 °C O.T.P. NO DAMAGE	I/P: 96 VDC O/P:FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 96 VDC O/P: FULL LOAD Ta:25°C	NO DAMAGE Shunt down Re-power ON	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																
1	TEMPERATURE RISE TEST	MODEL : SD-200D-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P: 96 VDC O/P: FULL LOAD Ta= 29.1 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P: 96 VDC O/P: FULL LOAD Ta= 49.4 °C <table><thead><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 29.1 °C</th><th>HIGH AMBIENT Ta= 49.4 °C</th></tr></thead><tbody><tr><td>1</td><td>LF1</td><td>TR-507</td><td>51.4°C</td><td>70.2°C</td></tr><tr><td>2</td><td>Q6</td><td>IRFP250N 30A/200V IR</td><td>48.2°C</td><td>66.6°C</td></tr><tr><td>3</td><td>C6</td><td>470U/200V RUB 85°C USP</td><td>52.5°C</td><td>71.1°C</td></tr><tr><td>4</td><td>Q4</td><td>IRFP460A 20A/500V IR</td><td>56.3°C</td><td>75.1°C</td></tr><tr><td>5</td><td>U1</td><td>SG3525 ON</td><td>65.3°C</td><td>83.3°C</td></tr><tr><td>6</td><td>U4</td><td>HA358</td><td>64.7°C</td><td>82.7°C</td></tr><tr><td>7</td><td>T1 COIL</td><td>TF-959</td><td>70.3°C</td><td>88.4°C</td></tr><tr><td>8</td><td>LF2</td><td>TR-507</td><td>52.5°C</td><td>71.1°C</td></tr><tr><td>9</td><td>Q1</td><td>IRFP460A 20A/500V IR</td><td>56.6°C</td><td>75.1°C</td></tr><tr><td>10</td><td>Q5</td><td>C5763 7A/400V SANYO</td><td>57.5°C</td><td>74.1°C</td></tr><tr><td>11</td><td>C25</td><td>100U/25V RUB 105°C YXG</td><td>59.7°C</td><td>76.8°C</td></tr><tr><td>12</td><td>RG1</td><td>L7815CV 1A/15V</td><td>58.8°C</td><td>73.1°C</td></tr><tr><td>13</td><td>R104</td><td>680Ω /2W R/MO</td><td>103.4°C</td><td>122.0°C</td></tr><tr><td>14</td><td>C111</td><td>470U/63V NCC 105°C LXZ</td><td>59.7°C</td><td>77.3°C</td></tr><tr><td>15</td><td>D101</td><td>S20LC20U 20A/200V SHI</td><td>71.3°C</td><td>86.1°C</td></tr></tbody></table>			NO	Position	P/N	ROOM AMBIENT Ta= 29.1 °C	HIGH AMBIENT Ta= 49.4 °C	1	LF1	TR-507	51.4°C	70.2°C	2	Q6	IRFP250N 30A/200V IR	48.2°C	66.6°C	3	C6	470U/200V RUB 85°C USP	52.5°C	71.1°C	4	Q4	IRFP460A 20A/500V IR	56.3°C	75.1°C	5	U1	SG3525 ON	65.3°C	83.3°C	6	U4	HA358	64.7°C	82.7°C	7	T1 COIL	TF-959	70.3°C	88.4°C	8	LF2	TR-507	52.5°C	71.1°C	9	Q1	IRFP460A 20A/500V IR	56.6°C	75.1°C	10	Q5	C5763 7A/400V SANYO	57.5°C	74.1°C	11	C25	100U/25V RUB 105°C YXG	59.7°C	76.8°C	12	RG1	L7815CV 1A/15V	58.8°C	73.1°C	13	R104	680Ω /2W R/MO	103.4°C	122.0°C	14	C111	470U/63V NCC 105°C LXZ	59.7°C	77.3°C	15	D101	S20LC20U 20A/200V SHI	71.3°C	86.1°C	P
NO	Position	P/N	ROOM AMBIENT Ta= 29.1 °C	HIGH AMBIENT Ta= 49.4 °C																																																																																	
1	LF1	TR-507	51.4°C	70.2°C																																																																																	
2	Q6	IRFP250N 30A/200V IR	48.2°C	66.6°C																																																																																	
3	C6	470U/200V RUB 85°C USP	52.5°C	71.1°C																																																																																	
4	Q4	IRFP460A 20A/500V IR	56.3°C	75.1°C																																																																																	
5	U1	SG3525 ON	65.3°C	83.3°C																																																																																	
6	U4	HA358	64.7°C	82.7°C																																																																																	
7	T1 COIL	TF-959	70.3°C	88.4°C																																																																																	
8	LF2	TR-507	52.5°C	71.1°C																																																																																	
9	Q1	IRFP460A 20A/500V IR	56.6°C	75.1°C																																																																																	
10	Q5	C5763 7A/400V SANYO	57.5°C	74.1°C																																																																																	
11	C25	100U/25V RUB 105°C YXG	59.7°C	76.8°C																																																																																	
12	RG1	L7815CV 1A/15V	58.8°C	73.1°C																																																																																	
13	R104	680Ω /2W R/MO	103.4°C	122.0°C																																																																																	
14	C111	470U/63V NCC 105°C LXZ	59.7°C	77.3°C																																																																																	
15	D101	S20LC20U 20A/200V SHI	71.3°C	86.1°C																																																																																	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P: 96 VDC O/P: 120 % LOAD Ta:25°C	TEST : OK	P																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 96 VDC O/P: 100 % LOAD Ta= -20 °C	TEST : OK	P																																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P: 144VDC O/P:FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																																																
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50°C)	I/P: 96 VDC O/P:FULL LOAD	± 0.01 %(0~50°C)	P																																																																																
6	VIBRATION TEST	1 Carton & 1 Set Operating at I/P: 96 VDC NO LOAD (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°C		TEST : OK	P																																																																																

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 1.5 KVAC/min I/P-FG: 1.5 KVAC/min O/P-FG: 0.5 KVAC/min	I/P-O/P: 1.8 KVAC/min I/P-FG: 1.8 KVAC/min O/P-FG: 0.6 KVAC/min Ta:25°C	I/P-O/P: 4.61 mA I/P-FG: 4.82 mA O/P-FG: 7.07 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°C	I/P-O/P: 8 G Ω I/P-FG: 7G Ω O/P-FG: 6G Ω NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C	11 mΩ	P
4	APPROVAL	TUV: Certificate NO : UL: File NO :			N/A

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RADIATION	EN55022 CLASS B	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	P
2	E.S.D	EN61000-4-2 INDUSTRY AIR:8KV / Contact:4KV	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	CRITERIA A	P
3	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 96 VDC O/P:FULL LOAD Ta:25°C	CRITERIA A	P
4	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	SUPPOSE C 111 IS THE MOST CRITICAL COMPONENT I/P: 96VDC O/P: FULL LOAD Ta= 25 °C LIFE TIME= 263682 HRS I/P: 96VDC O/P: FULL LOAD Ta= 50 °C LIFE TIME= 561172 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 218.2K HRS			P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated IRFP460A : 500 V 20 A	I/P: High-Line +3V = 147 VDC O/P: (1) Full Load Turn on (2) Full Load (3) Output Short Ta: 25°C	(1) 254 V (2) 316 V (3) 147 V	P
2	Diode Peak Voltage	D 100 Rated S60SC4M : 40V 60 A	I/P: High-Line +3V = 147 VDC O/P: (1) Full Load Turn on (2) Full Load (3) Output Short Ta: 25°C	(1) 35.4 V (2) 36.8 V (3) 0 V	P
3	Input Capacitor Voltage	C 8 Rated : 470u / 200 V / 85°C	I/P: High-Line +3V = 147 VDC O/P: (1) Full Load Turn on / Off (2) Min load Turn on / Off (3) Full Load / Min load Change Ta: 25°C	(1) 149 V (2) 149 V (3) 151 V	P
4	Control IC Voltage Test	U 1 Rated SG3525 : 35 V	I/P: High-Line +3V = 147 VDC O/P: (1) Full Load Turn on / Off (2) Min load Turn on / Off (3) Full Load / Min load Change Ta: 25°C	(1) 14.5 V (2) 14.5 V (3) 14.5 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2004/6/7	RD SMAPLE	PASS	VINCENT TSENG	MAX LIN
2004/8/20	PRODUCT SMAPLE A407A22	PASS	VINCENT TSENG	MAX LIN
2004/11/25	PRODUCT SMAPLE W0411A24	PASS	VINCENT TSENG	MAX LIN

2003/12/12 A50-F023