



# Test Report: RT-50C

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50W Triple Output Switching Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

## ■ RELIABILITY TEST

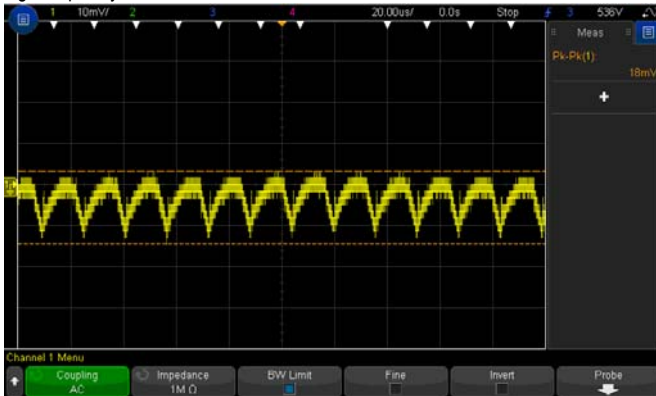
ENVIRONMENT TEST

DESIGN VERIFY TEST

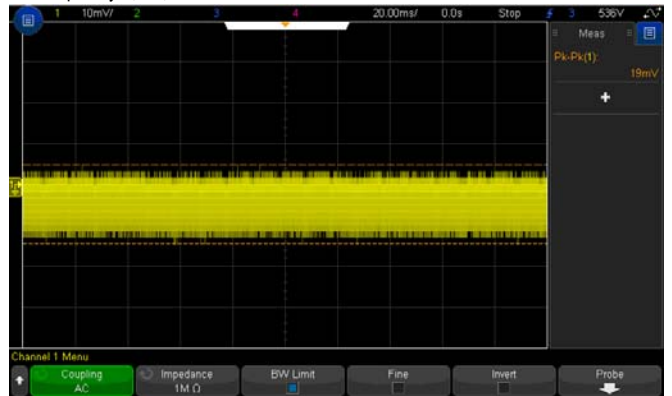
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.75V~ 5.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	4.50V~5.80V/230VAC 4.50V~5.80V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1 : -2%~2 % V2 : -8%~8 % V3 : -3%~3 %	I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1 : -0.22%~0.22% V2 : -0.48%~1.24% V3 : -0.07%~0.09%
3	LINE REGULATION (Max)	V1: -0.5%~0.5% V2: -1.5%~ 1.5% V3: -0.5%~ 0.5%	I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1 : -0.01%~0.01% V2 : -0.43%~0.05% V3 : -0.03%~0.03%
4	LOAD REGULATION(Max)	V1: -1%~1% V2: -3%~3% V3: -1%~1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1 : -0.22%~0.22% V2 : -0.48%~1.24% V3 : -0.07%~0.09%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	5.2%
6	RIPPLE & NOISE(Max)	V1: 80mVp-p V2: 120mVp-p V3: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 19mVp-p V2: 19mVp-p V3: 14mVp-p

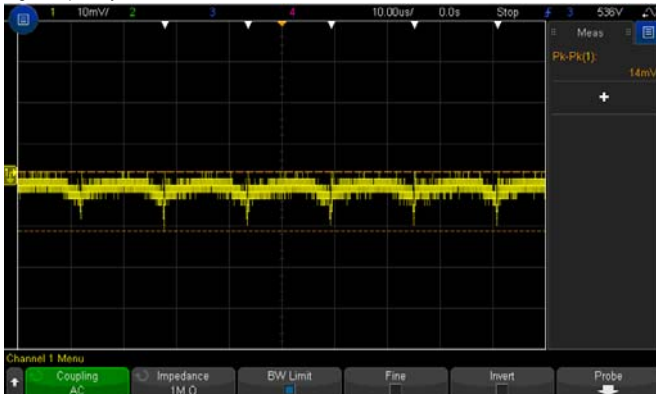
high frequency (V1) :



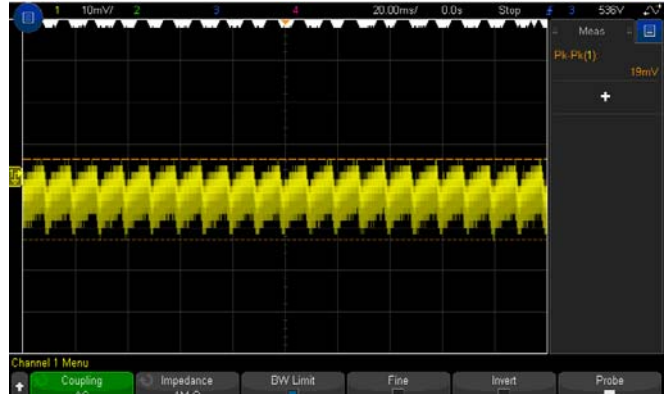
low frequency (V1) :

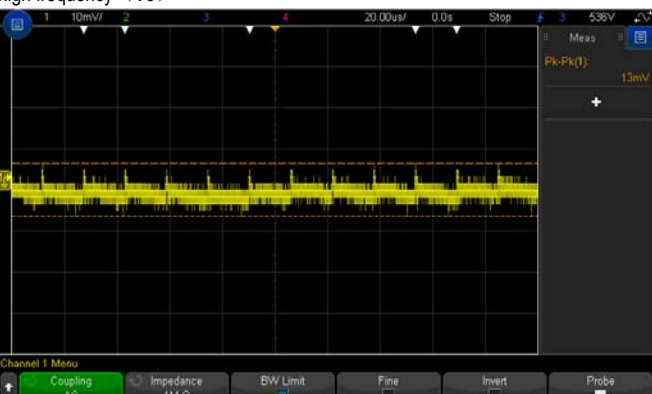
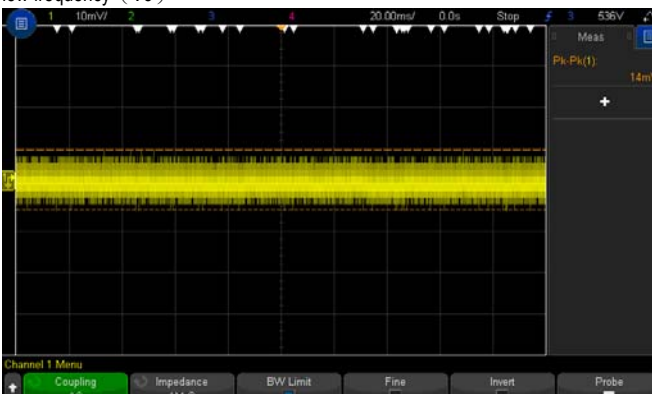
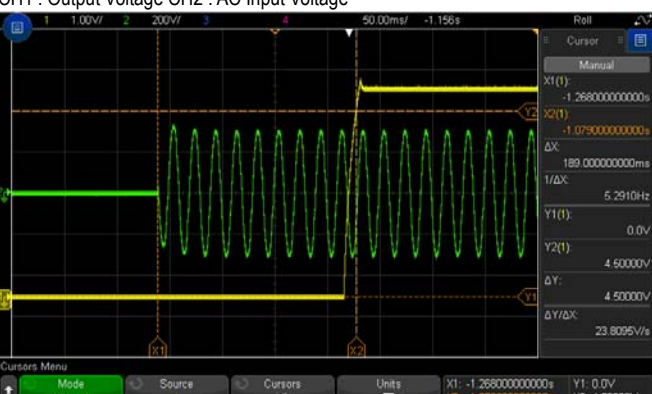
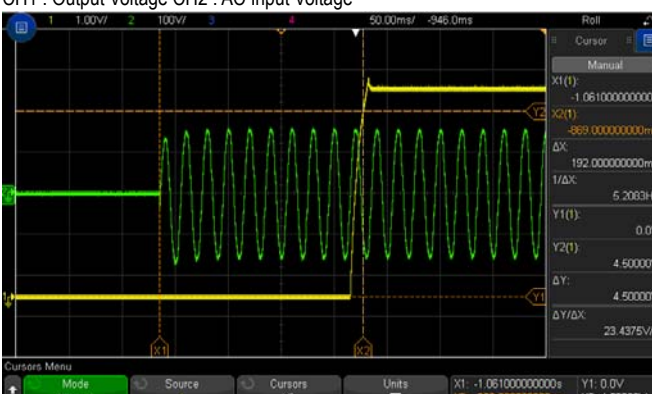

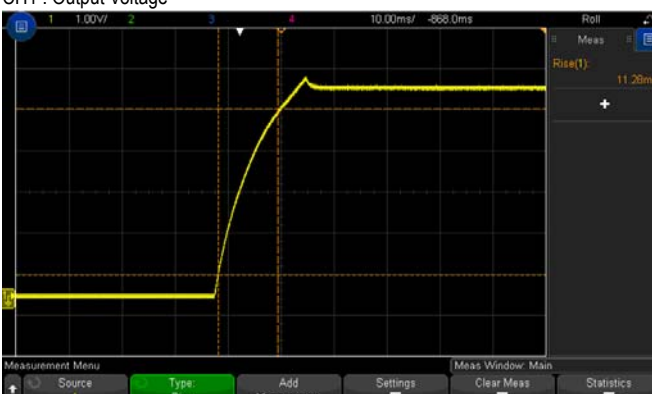


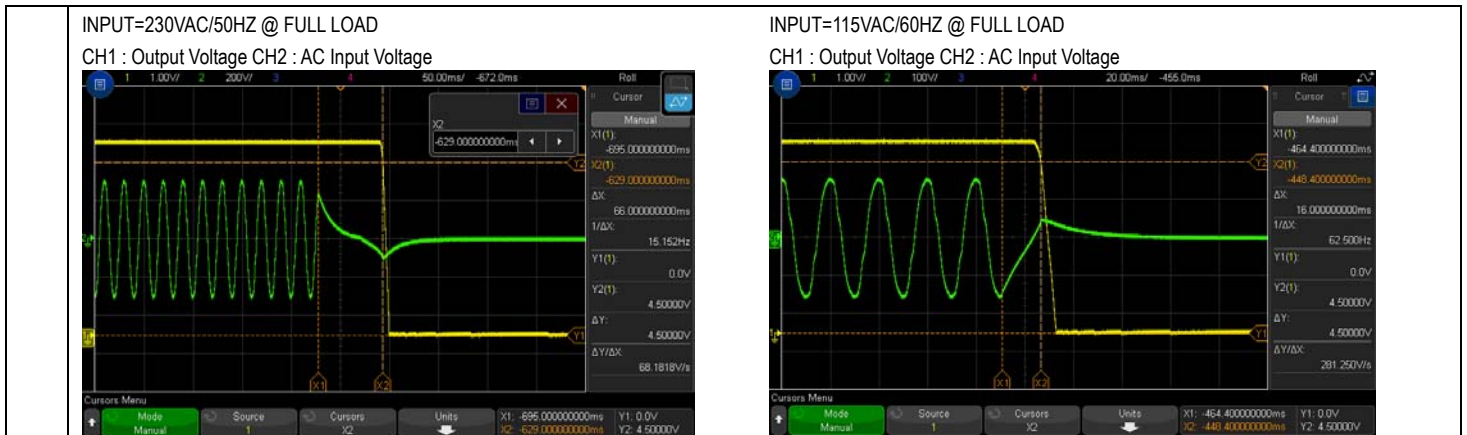
high frequency (V2) :



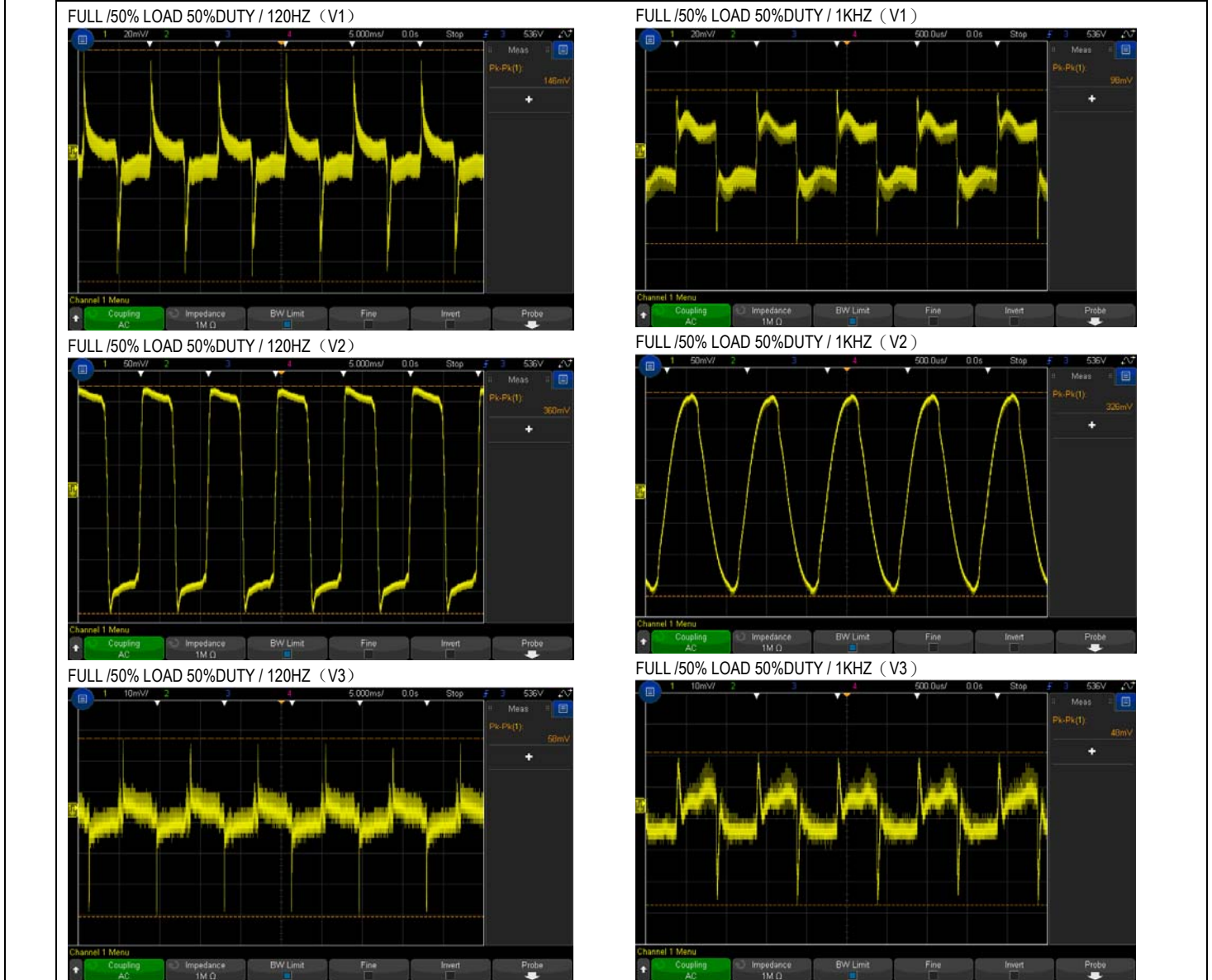
low frequency (V2) :



	<p>high frequency (V3) :</p> 	<p>low frequency (V3) :</p> 	
<p>7 SET UP TIME(Max)</p>	<p>230VAC/500ms 115VAC/1200ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 189ms 115VAC/ 192ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> 			<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> 
<p>8 RISE TIME (Max)</p>	<p>230VAC/20ms 115VAC/30ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 10.78ms 115VAC/ 11.28ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p> 			<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p> 
<p>9 HOLD UP TIE (Typ.)</p>	<p>230VAC/60ms 115VAC/10ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/66.0ms 115VAC/16.0ms</p>



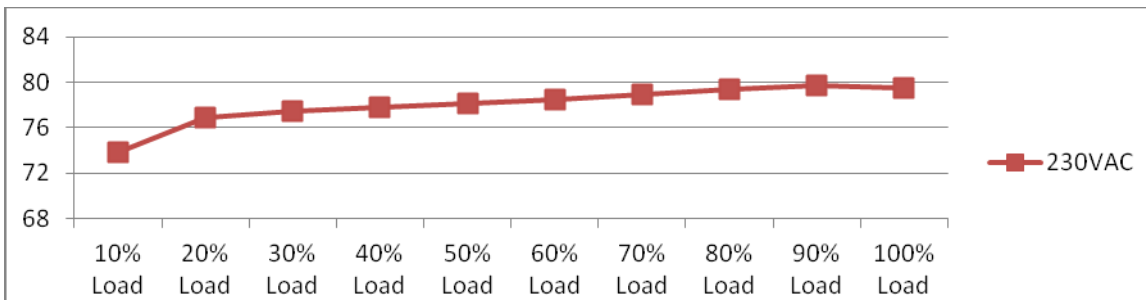
10	DYNAMIC LOAD	<p>V1: 1000 mVp-p V2: 1500 mVp-p V3: 1500 mVp-p</p>	<p>I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C</p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%; text-align: center;">(1)      (2)</td> </tr> <tr> <td></td> <td style="text-align: center;">V1: 146mVp-p    98mVp-p</td> </tr> <tr> <td></td> <td style="text-align: center;">V2: 360mVp-p    326mVp-p</td> </tr> <tr> <td></td> <td style="text-align: center;">V3: 58mVp-p      48mVp-p</td> </tr> </table>		(1)      (2)		V1: 146mVp-p    98mVp-p		V2: 360mVp-p    326mVp-p		V3: 58mVp-p      48mVp-p
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	V1: 146mVp-p    98mVp-p											
	V2: 360mVp-p    326mVp-p											
	V3: 58mVp-p      48mVp-p											



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	88VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	80V~264V
			I/P: LOW-LINE-3V=85 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:88 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/0.8A 115V/ 1.3A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I=0.46A/ 230VAC I=0.86A/ 115VAC
4	LEAKAGE CURRENT	<2 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	0.5 mA
5	EFFICIENCY(Typ.)	76%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	79.5%

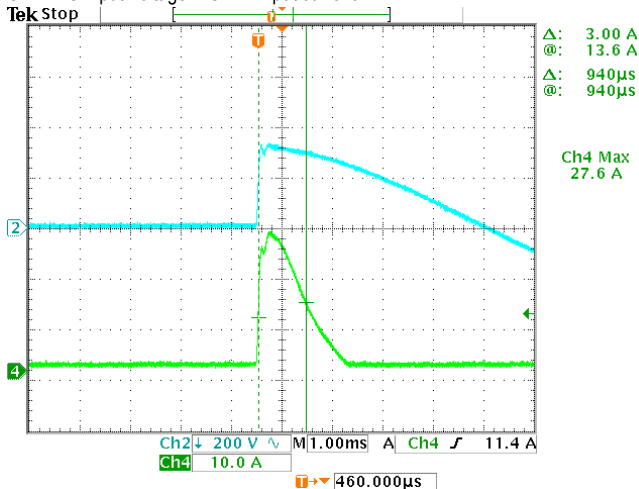
EFFICIENCY vs LOAD



6	INRUSH CURRENT(Typ.)	230V / 36A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	27.6A
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INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current



**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110%~150%	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING Ta:25°C	131.3%/ 264VAC 136.4%/ 230VAC 134.1%/115VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	5.75V~6.75V	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P: MIN LOAD Ta:25°C	6.05V/ 264VAC 6.05V/ 230VAC 6.05V/ 88VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 88VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 600 V	AC ON/OFF I/P: High-Line +3V =267V VDS: O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta:25°C	VDS: (1) 579V (2) 583V (3) 535V
2	O/P Diode	D50 Rated : 200 V  D55 Rated : 100 V  D56 Rated : 400 V	AC ON/OFF I/P: High-Line +3V =267 V O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta:25°C	D50  D55 (1) 156V (1) 51.7V (2) 108V (2) 38.4V (3) 82V (3) 39.6V  D56 (1) 346V (2) 213V (3) 125V
3	Input Capacitor Voltage	C5 Rated : 100 μ / 400 V	I/P: High-Line +3V =267V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change (4) Full load continue Ta:25°C	(1) 386V (2) 374V (3) 374V (4) 374V
4	Control IC Voltage Test	U1 Rated : 7.2V~ 16 V	AC ON/OFF I/P: High-Line +3V =267 V O/P(1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. (5) NO LOAD VRmin(Low LINE) Ta:25°C	(1) 12.8V (2) 13.0V (3) 12.8V (4) 13.0V (5) 13.0V

5	Clamp Diode Peak Voltage	D1 Rated : 1000 V	AC ON/OFF I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 527V (2) 514V
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### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG:2 KVAC/min O/P-FG: 0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P- FG: 2.4 KVAC/min O/P - FG: 0.6 KVAC/min Ta:25°C	I/P-O/P:3.52mA I/P-FG:1.77mA O/P-FG:1.12mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P- FG:500VDC>100MΩ O/P- FG:500VDC>100MΩ	I/P-O/P: 600 VDC I/P- FG: 600 VDC Ta:25°C	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ O/P-FG: 9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta: 25°C/70%RH	4 mΩ

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL
2	CONDUCTION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 <input type="checkbox"/> LIGHT INDUSTRY AIR: 8KV / Contact: 4KV <input checked="" type="checkbox"/> INDUSTRY AIR: 8KV / Contact: 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 <input checked="" type="checkbox"/> INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N : 2KV L/N-PE : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report.			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																
1	TEMPERATURE RISE TEST	MODEL : RT-50B 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 26.6 °C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 48.8°C																																																																																		
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 26.6 °C</th> <th>HIGH AMBIENT Ta=48.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>64.9°C</td><td>86.1°C</td></tr> <tr><td>2</td><td>D56</td><td>97.8°C</td><td>116.1°C</td></tr> <tr><td>3</td><td>BD1</td><td>75.9°C</td><td>98.2°C</td></tr> <tr><td>4</td><td>C10</td><td>56.1°C</td><td>78.6°C</td></tr> <tr><td>5</td><td>D50</td><td>88.9°C</td><td>109.5°C</td></tr> <tr><td>6</td><td>Q1</td><td>91.9°C</td><td>114.7°C</td></tr> <tr><td>7</td><td>D1</td><td>88.1°C</td><td>108.9°C</td></tr> <tr><td>8</td><td>C5</td><td>53.6°C</td><td>75.1°C</td></tr> <tr><td>9</td><td>T1</td><td>88.4°C</td><td>107.1°C</td></tr> <tr><td>10</td><td>D55</td><td>92.4°C</td><td>113.3°C</td></tr> <tr><td>11</td><td>RG1</td><td>82.1°C</td><td>102.4°C</td></tr> <tr><td>12</td><td>C56</td><td>74.7°C</td><td>95.2°C</td></tr> <tr><td>13</td><td>C53</td><td>73.2°C</td><td>94.7°C</td></tr> <tr><td>14</td><td>C63</td><td>75.5°C</td><td>97.4°C</td></tr> <tr><td>15</td><td>R8</td><td>79.5°C</td><td>99.6°C</td></tr> <tr><td>16</td><td>R5</td><td>103.0°C</td><td>119.2°C</td></tr> <tr><td>17</td><td>U1</td><td>59.6°C</td><td>81.0°C</td></tr> <tr><td>18</td><td>D2</td><td>63.2°C</td><td>85.8°C</td></tr> <tr><td>19</td><td>D4</td><td>54.4°C</td><td>76.0°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 26.6 °C	HIGH AMBIENT Ta=48.8 °C	1	LF1	64.9°C	86.1°C	2	D56	97.8°C	116.1°C	3	BD1	75.9°C	98.2°C	4	C10	56.1°C	78.6°C	5	D50	88.9°C	109.5°C	6	Q1	91.9°C	114.7°C	7	D1	88.1°C	108.9°C	8	C5	53.6°C	75.1°C	9	T1	88.4°C	107.1°C	10	D55	92.4°C	113.3°C	11	RG1	82.1°C	102.4°C	12	C56	74.7°C	95.2°C	13	C53	73.2°C	94.7°C	14	C63	75.5°C	97.4°C	15	R8	79.5°C	99.6°C	16	R5	103.0°C	119.2°C	17	U1	59.6°C	81.0°C	18	D2	63.2°C	85.8°C	19	D4	54.4°C	76.0°C
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19	D4	54.4°C	76.0°C																																																																																	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 126% LOAD Ta : 25°C	TEST : OK																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/115VAC O/P : 100 % LOAD Ta= -25°C	TEST : OK																																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL50°C /95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=50 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																
5	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.0017%/°C (0~50°C)																																																																																
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : STATIC		TEST : OK																																																																																





7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C~ +55°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test	TEST : OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 5G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C62 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta=50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME	(1) 113020.3HRS (2) 22477.9HRS (3) 34045.6 HRS (4) 58907.7HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 169.2K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		Wangdz

2018.4.30 GP-A50-F010