



Test Report: RQ-85NB

85W Quad 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

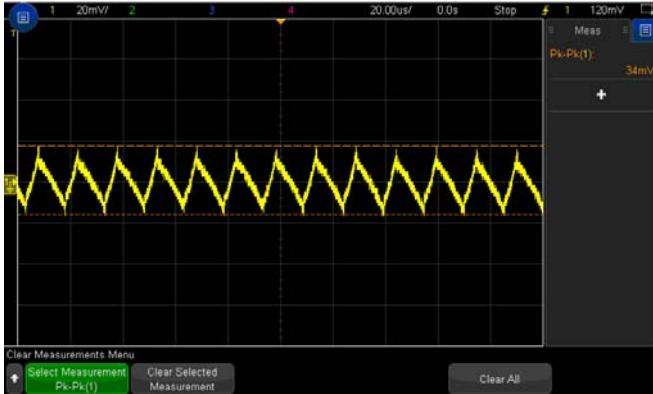
ENVIRONMENT TEST

DESIGN VERIFY TEST

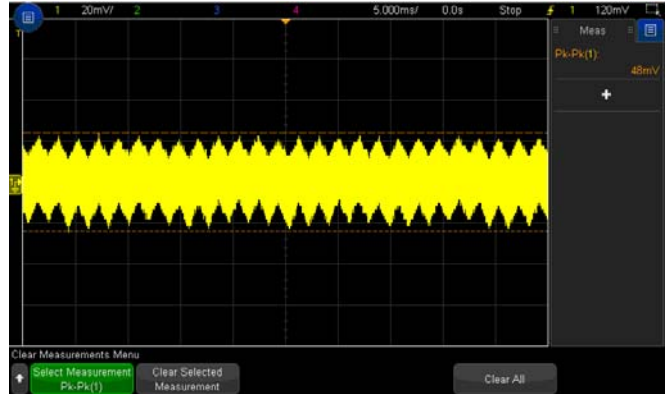
OUTPUT FUNCTION TEST

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	4.52V~5.81V/230VAC 4.52V~5.81V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1 : -2%~2 % V2 : -3%~7 % V3 : -8%~8 % V4 : -5%~5 %	I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1 : -0.10%~0.09% V2 : -0.67%~2.17% V3 : -0.94%~4.6% V4 : -0.16%~0.07%
3	LINE REGULATION (Max)	V1: -0.5%~0.5% V2: -1%~ 1% V3: -1%~ 1% V4: -1%~ 1%	I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1 : -0.01%~0.01% V2 : -0.03%~0.03% V3 : -0.04%~0.04% V4 : -0.03%~0.03%
4	LOAD REGULATION(Max)	V1: -1%~1% V2: -3%~3% V3: -6%~6% V4: -2%~2%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1 : -0.10%~0.09% V2 : -0.67%~2.17% V3 : -0.94%~4.61% V4 : -0.16%~0.07%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	2.8%
6	RIPPLE & NOISE(Max)	V1: 80mVp-p V2: 120mVp-p V3: 100mVp-p V4: 80mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 48mVp-p V2: 68mVp-p V3: 45mVp-p V4: 37mVp-p

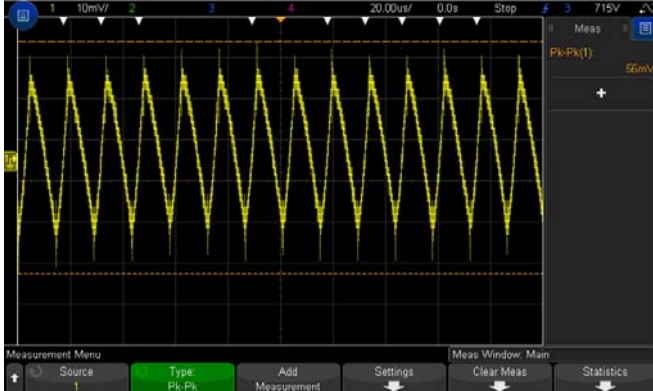
high frequency (V1) :



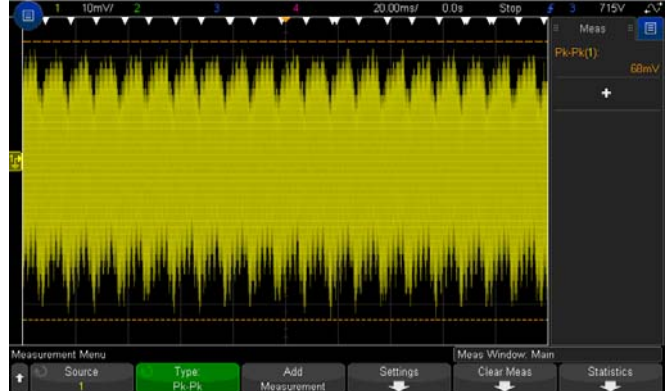
low frequency (V1) :



high frequency (V2) :

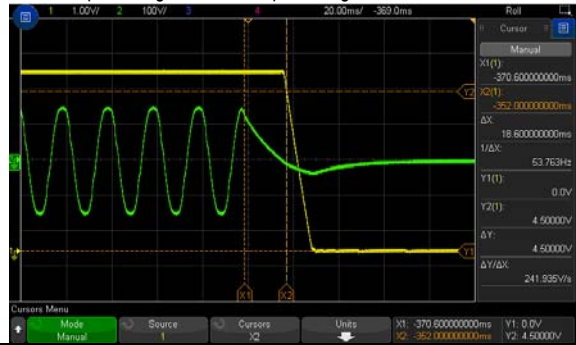
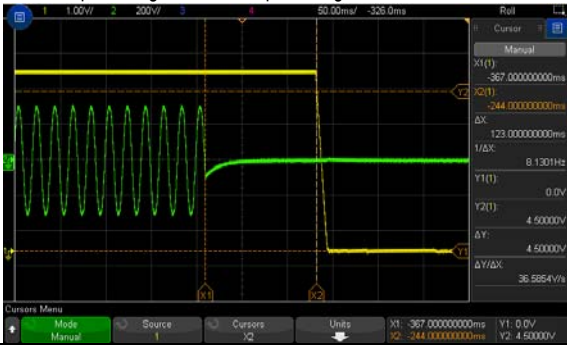


low frequency (V2) :



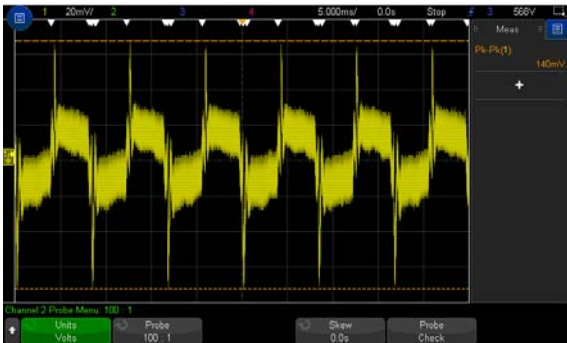
	<p>high frequency (V3) :</p>	<p>low frequency (V3) :</p>	<p>high frequency (V4) :</p>	<p>low frequency (V4) :</p>
<p>7 SET UP TIME(Max)</p>	<p>230VAC/500ms 115VAC/1200ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 209 ms 115VAC/ 200ms</p>	
<p>INPUT=230VAC/50HZ @ FULL LOAD 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/ 19.41ms 115VAC/ 10.63ms</p>	
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>			

9	HOLD UP TIME (Typ.)	230VAC/100ms 115VAC/18ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/123ms 115VAC/ 18.6ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	

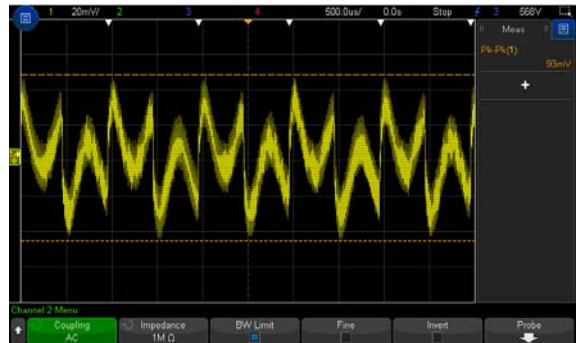


10	DYNAMIC LOAD	V1: 1000 mVp-p V2: 1200 mVp-p V3: 1000 mVp-p V4: 1200 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	(1)	(2)
				V1: 140mVp-p V2: 800mVp-p V3: 291mVp-p V4: 85mVp-p	93mVp-p 820mVp-p 241mVp-p 105mVp-p

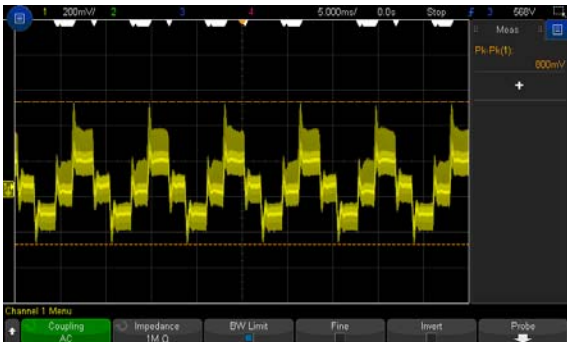
FULL /50% LOAD 50%DUTY / 120HZ (V1)



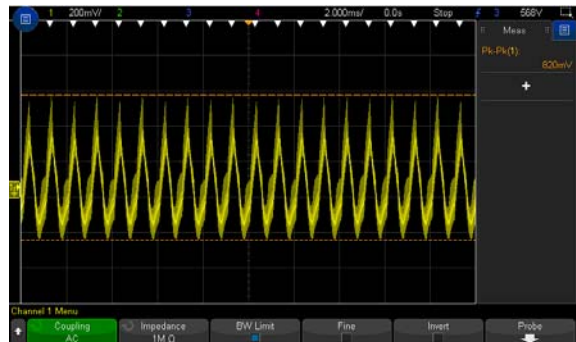
FULL /50% LOAD 50%DUTY / 1KHZ (V1)



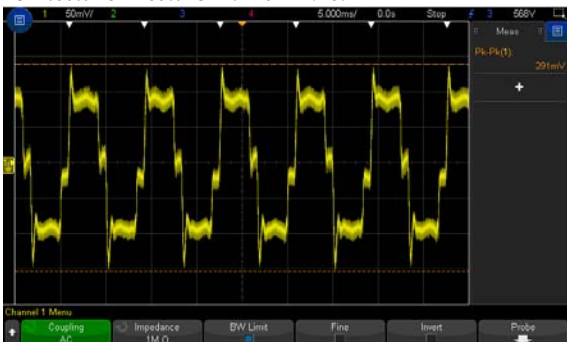
FULL /50% LOAD 50%DUTY / 120HZ (V2)



FULL /50% LOAD 50%DUTY / 1KHZ (V2)

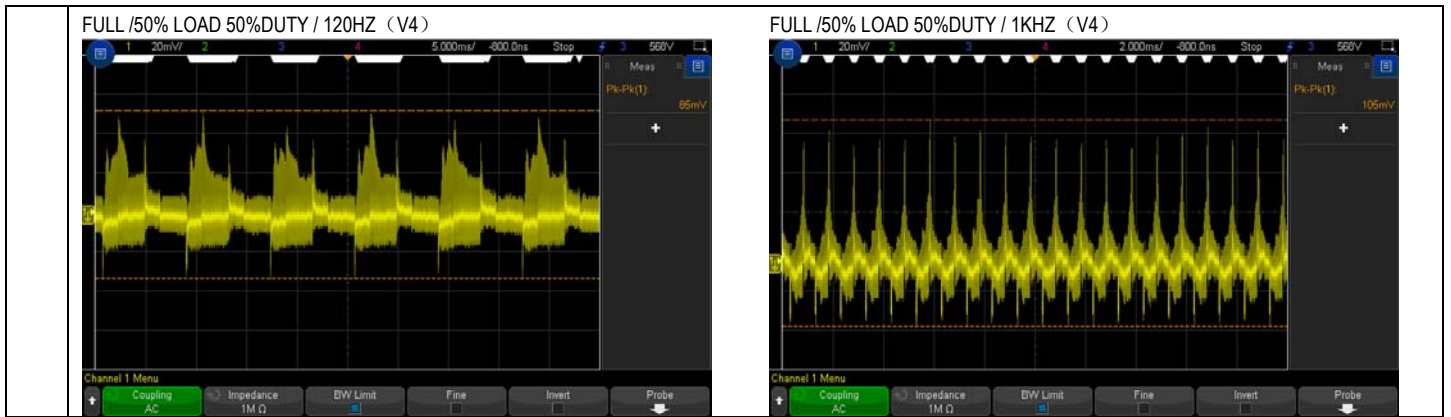


FULL /50% LOAD 50%DUTY / 120HZ (V3)



FULL /50% LOAD 50%DUTY / 1KHZ (V3)

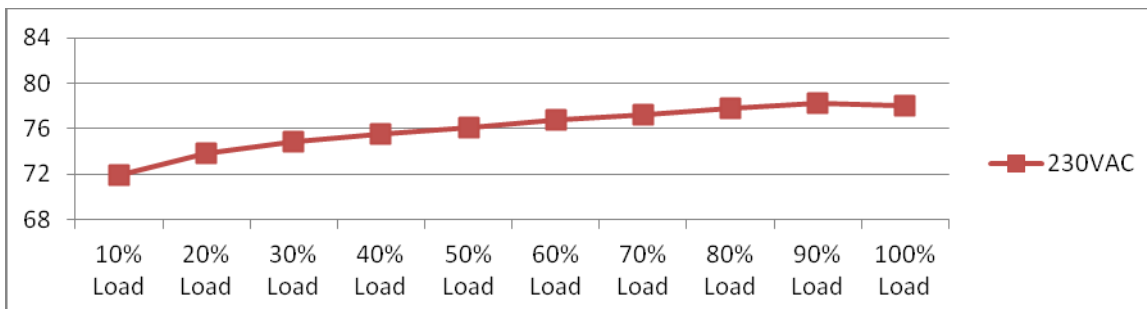




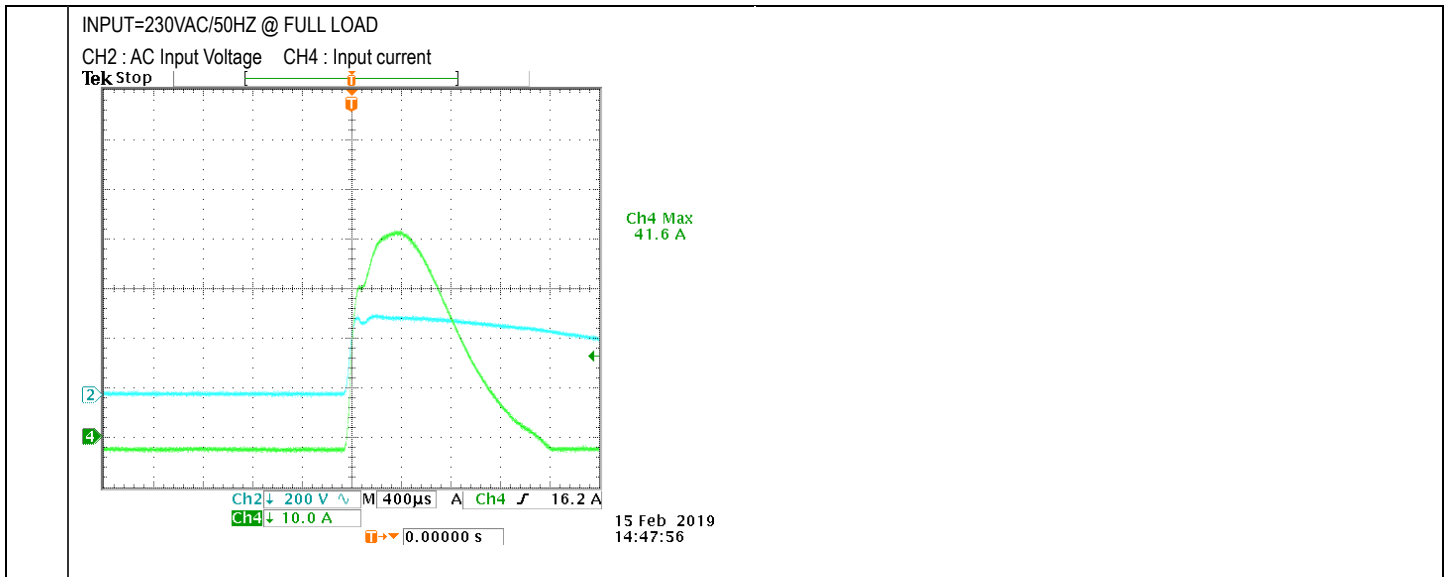
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	88VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	69V~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/ 1.5A 115V/ 2.5A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I=0.80A/ 230VAC I=1.31A/ 115VAC
4	LEAKAGE CURRENT	<2 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	0.7mA
5	EFFICIENCY(Typ.)	76.0%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	78.0%

EFFICIENCY vs LOAD



6	INRUSH CURRENT(Typ.)	230V / 50A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	41.6A
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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	120.8%/ 264VAC 128.3%/ 230VAC 140.7%/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	6.31V/ 264VAC 6.31V/ 230VAC 6.31V/ 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 : 900 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) 514V (2) 562V (3) 514V
2	O/P Diode	D50 Rated : 200 V D52 Rated : 600V	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 D52 (1) 61.0V (1) 219V (2) 61.8V (2) 241V (3) 61.0V (3) 191V



		D55 Rated : 200 V		D55 D60
		D60 Rated : 60 V		(1) 97.1V (1) 58.5V (2) 97.9V (2) 58.5V (3) 83.4V (3) 56.9V
3	Input Capacitor Voltage	C5 Rated : 150 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) 371V (2) 367V (3) 367V (4) 361V
4	Control IC Voltage Test	U1 Rated : 8.4V~ 21 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) 15.4V (2) 12.6V (3) 12.6V (4) 12.8V (5) 12.6V
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) 476V (2) 472V

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: 3.97mA I/P-FG: 3.15mA O/P-FG: 1.43mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC > 100M Ω I/P- FG: 500VDC > 100M Ω O/P- FG: 500VDC > 100M Ω	I/P-O/P: 600 VDC I/P- FG: 600 VDC Ta: 25°C	I/P-O/P: 9999M Ω I/P-FG: 9999M Ω O/P-FG: 9999M Ω NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m Ω	40 A / 2min Ta: 25°C / 70%RH	11m Ω

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 <input type="checkbox"/> Din rail Model : AIR: 15KV / Contact: 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 <input type="checkbox"/> LIGHT INDUSTRY INPUT : 1KV <input type="checkbox"/> MEDICAL <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 : RQ-85D 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 22.1°C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 36.7°C																																																																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 22.1 °C</th> <th>HIGH AMBIENT Ta=36.7 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>61.4°C</td><td>78.5°C</td></tr> <tr><td>2</td><td>BD1</td><td>59.0°C</td><td>76.2°C</td></tr> <tr><td>3</td><td>C5</td><td>45.0°C</td><td>63.6°C</td></tr> <tr><td>4</td><td>R8</td><td>58.9°C</td><td>76.6°C</td></tr> <tr><td>5</td><td>R2</td><td>59.6°C</td><td>78.5°C</td></tr> <tr><td>6</td><td>Q1</td><td>67.7°C</td><td>85.7°C</td></tr> <tr><td>7</td><td>C10</td><td>62.3°C</td><td>79.9°C</td></tr> <tr><td>8</td><td>T1</td><td>82.4°C</td><td>100.2°C</td></tr> <tr><td>9</td><td>D55</td><td>75.4°C</td><td>92.9°C</td></tr> <tr><td>10</td><td>D60</td><td>84.2°C</td><td>101.0°C</td></tr> <tr><td>11</td><td>D50</td><td>75.1°C</td><td>91.8°C</td></tr> <tr><td>12</td><td>RG1</td><td>76.7°C</td><td>93.1°C</td></tr> <tr><td>13</td><td>L60</td><td>72.2°C</td><td>89.8°C</td></tr> <tr><td>14</td><td>C62</td><td>53.5°C</td><td>70.4°C</td></tr> <tr><td>15</td><td>C56</td><td>57.5°C</td><td>73.8°C</td></tr> <tr><td>16</td><td>C53</td><td>66.0°C</td><td>82.9°C</td></tr> <tr><td>17</td><td>C51</td><td>64.5°C</td><td>81.6°C</td></tr> <tr><td>18</td><td>L61</td><td>68.8°C</td><td>85.5°C</td></tr> <tr><td>19</td><td>R70</td><td>86.8°C</td><td>103.6°C</td></tr> <tr><td>20</td><td>U1</td><td>64.0°C</td><td>81.2°C</td></tr> <tr><td>21</td><td>D1</td><td>63.6°C</td><td>81.2°C</td></tr> <tr><td>22</td><td>D4</td><td>63.4°C</td><td>80.6°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 22.1 °C	HIGH AMBIENT Ta=36.7 °C	1	LF1	61.4°C	78.5°C	2	BD1	59.0°C	76.2°C	3	C5	45.0°C	63.6°C	4	R8	58.9°C	76.6°C	5	R2	59.6°C	78.5°C	6	Q1	67.7°C	85.7°C	7	C10	62.3°C	79.9°C	8	T1	82.4°C	100.2°C	9	D55	75.4°C	92.9°C	10	D60	84.2°C	101.0°C	11	D50	75.1°C	91.8°C	12	RG1	76.7°C	93.1°C	13	L60	72.2°C	89.8°C	14	C62	53.5°C	70.4°C	15	C56	57.5°C	73.8°C	16	C53	66.0°C	82.9°C	17	C51	64.5°C	81.6°C	18	L61	68.8°C	85.5°C	19	R70	86.8°C	103.6°C	20	U1	64.0°C	81.2°C	21	D1	63.6°C	81.2°C	22	D4	63.4°C	80.6°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 115% 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 CONTROL35°C /95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=35 °C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.02%/°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~ +40°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=35 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=35 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 35 °C LIFE TIME		(1) 428757.9HRS (2) 182787HRS (3) 233604.1 HRS (4) 290159.9HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 206.8K 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