



Test Report: RD-65A

65W Dual 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

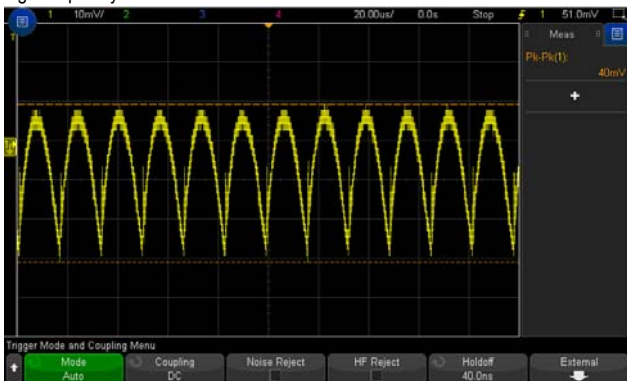
ENVIRONMENT TEST

DESIGN VERIFY TEST

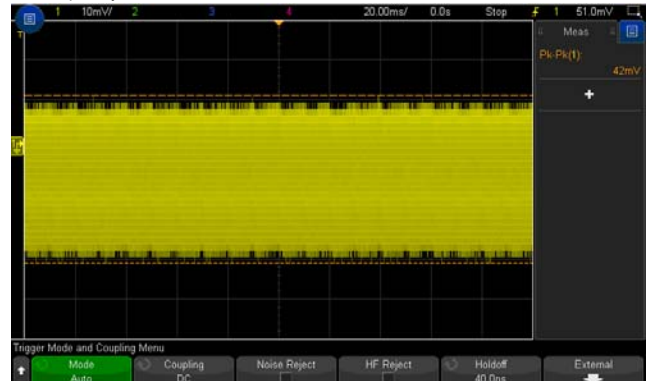
OUTPUT FUNCTION TEST

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	4.58V~5.72V/230VAC 4.58V~5.72V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1 : -2%~2 % V2 : -6%~6 %	I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1 : -0.06%~0.06% V2 : -0.05%~0.72%
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5% V2: -1.5%~ 1.5%	I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1 : -0.01%~0.01% V2 : -0.02%~0.13%
4	LOAD REGULATION(Max)	V1: -0.5%~0.5% V2: -3%~3%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1 : -0.06%~0.06% V2 : -0.05%~0.72%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	2.4%
6	RIPPLE & NOISE(Max)	V1: 80mVp-p V2: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 42mVp-p V2: 26mVp-p

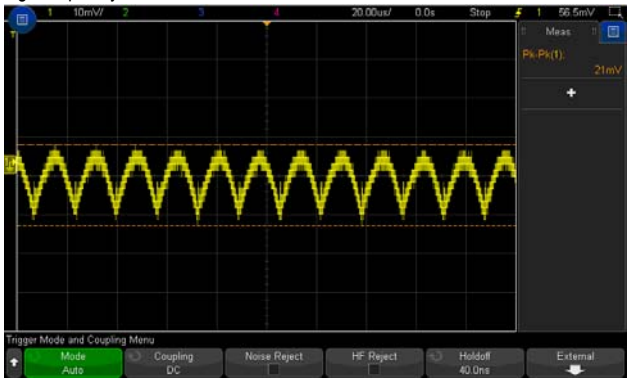
high frequency (V1) :



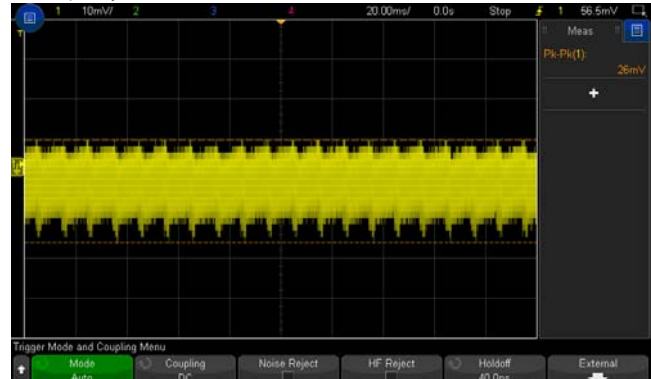
low frequency (V1) :



high frequency (V1) :

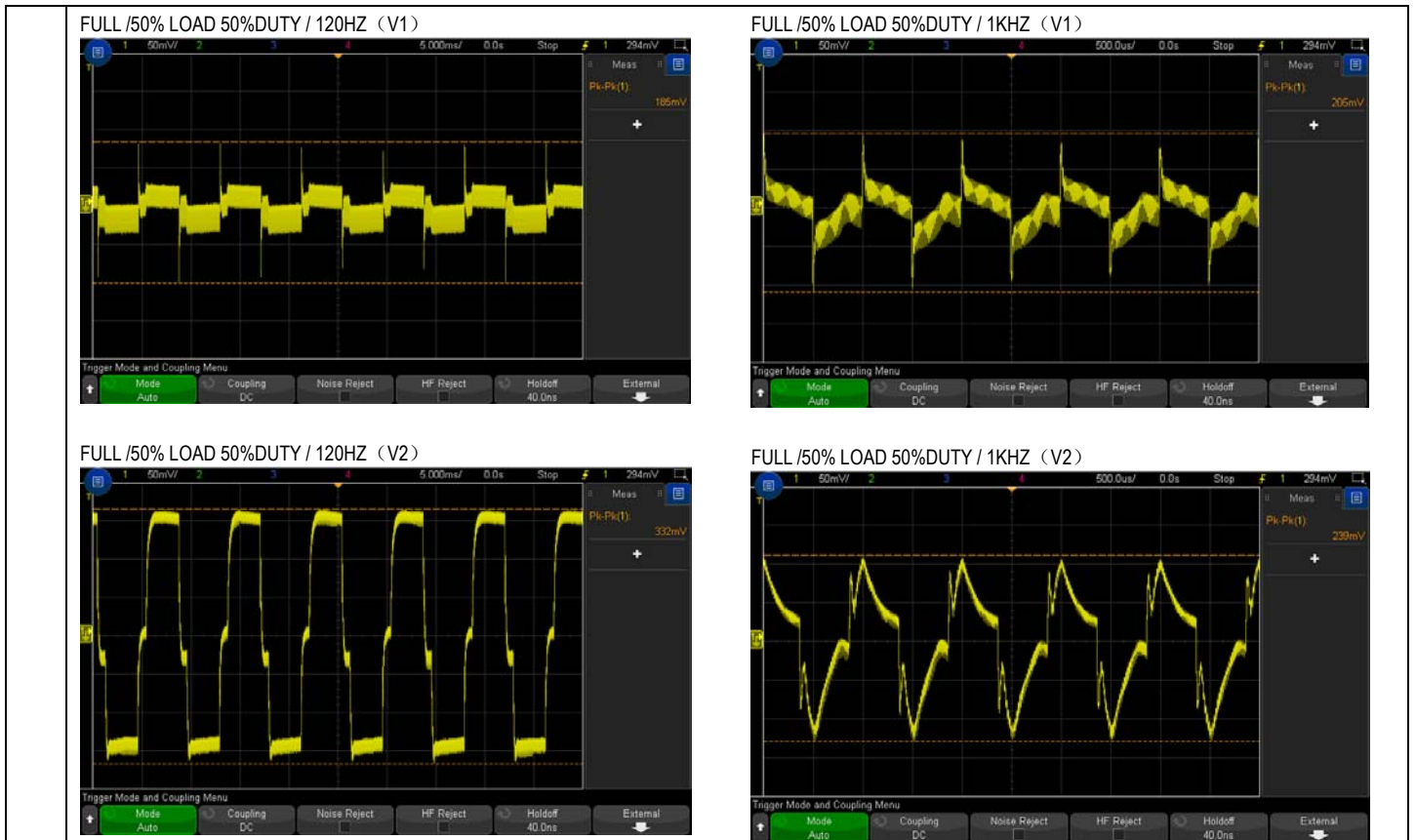


low frequency (V1) :



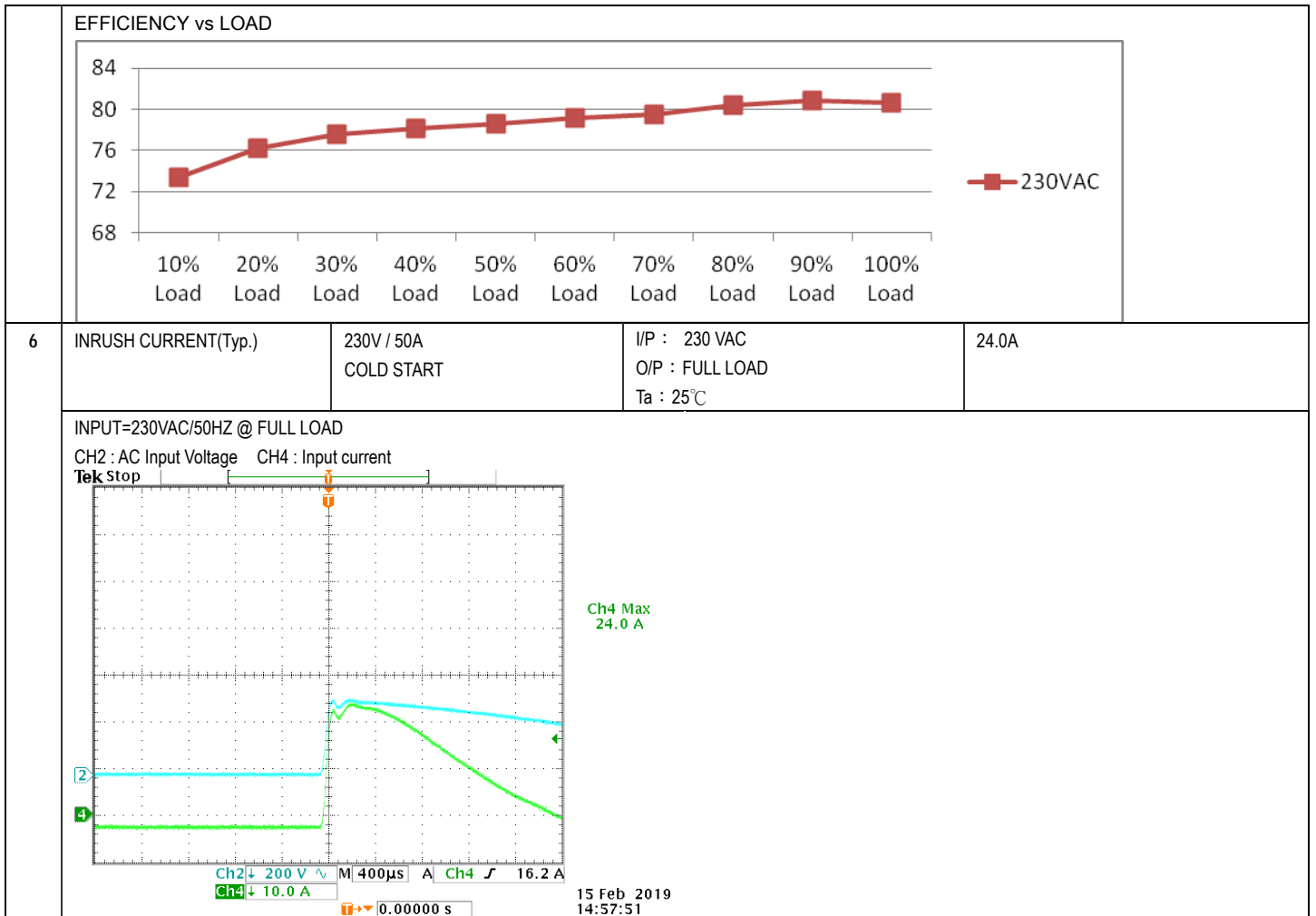
7	SET UP TIME(Max)	230VAC/500ms 115VAC/1200ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 190 ms 115VAC/ 183ms
---	------------------	-------------------------------	----------------------------------------------------------------	---------------------------------

	<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/6.25ms 115VAC/5.81ms</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 TIME (Typ.)</p>	<p>230VAC/60ms 115VAC/14ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 78ms 115VAC/ 17.4ms</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>10 DYNAMIC LOAD</p>	<p>V1: 1000 mVp-p V2: 1200 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>	<p>(1) (2) V1: 185mVp-p 205mVp-p V2: 332mVp-p 239mVp-p</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	75V~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/ 1.2A 115V/ 2A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =0.62A/ 230VAC I =1.07A/ 115VAC
4	LEAKAGE CURRENT	<2 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	0.3mA
5	EFFICIENCY(Typ.)	78%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	80.6%



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	112.5%/ 264VAC 113.0%/ 230VAC 112.7%/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	6.00V/ 264VAC 6.00V/ 230VAC 6.00V/ 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) 587V (2) 579V (3) 587V
2	O/P Diode	D50 Rated : 200 V D55 Rated : 40 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) 47.4V (1) 34.5V (2) 53.0V (2) 30.9V (3) 43.8V (3) 33.3V
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) 377V (2) 377V (3) 377V (4) 363 V
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) 12.8V (3) 12.8V (4) 12.8V (5) 7.9V
5	Clamp Diode Peak Voltage	D1 Rated : 600 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) 561V (2) 561V

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:3.09mA I/P-FG:1.46mA O/P-FG:0.87mA 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	6 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 <u>INDUSTRY</u> 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 <u>INDUSTRY</u> INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 <u>INDUSTRY</u> 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 : RD-65A 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 23.2 °C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 45.6°C																																																																						
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 23.2 °C</th> <th>HIGH AMBIENT Ta=45.6 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>55.0°C</td><td>78.8°C</td></tr> <tr><td>2</td><td>C5</td><td>53.5°C</td><td>76.1°C</td></tr> <tr><td>3</td><td>Q1</td><td>73.2°C</td><td>96.9°C</td></tr> <tr><td>4</td><td>U1</td><td>73.4°C</td><td>94.9°C</td></tr> <tr><td>5</td><td>D1</td><td>79.1°C</td><td>100.2°C</td></tr> <tr><td>6</td><td>T1coil</td><td>99.8°C</td><td>108.9°C</td></tr> <tr><td>7</td><td>T1core</td><td>84.8°C</td><td>106.8°C</td></tr> <tr><td>8</td><td>D55</td><td>72.8°C</td><td>90.5°C</td></tr> <tr><td>9</td><td>D50</td><td>81.0°C</td><td>103.4°C</td></tr> <tr><td>10</td><td>C56</td><td>66.9°C</td><td>87.0°C</td></tr> <tr><td>11</td><td>D53</td><td>71.3°C</td><td>91.1°C</td></tr> <tr><td>12</td><td>D51</td><td>74.1°C</td><td>94.0°C</td></tr> <tr><td>13</td><td>LF1</td><td>50.1°C</td><td>73.1°C</td></tr> <tr><td>14</td><td>R56</td><td>75.9°C</td><td>96.9°C</td></tr> <tr><td>15</td><td>R57</td><td>77.8°C</td><td>98.3°C</td></tr> <tr><td>16</td><td>RTH1</td><td>78.6°C</td><td>95.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 23.2 °C	HIGH AMBIENT Ta=45.6 °C	1	BD1	55.0°C	78.8°C	2	C5	53.5°C	76.1°C	3	Q1	73.2°C	96.9°C	4	U1	73.4°C	94.9°C	5	D1	79.1°C	100.2°C	6	T1coil	99.8°C	108.9°C	7	T1core	84.8°C	106.8°C	8	D55	72.8°C	90.5°C	9	D50	81.0°C	103.4°C	10	C56	66.9°C	87.0°C	11	D53	71.3°C	91.1°C	12	D51	74.1°C	94.0°C	13	LF1	50.1°C	73.1°C	14	R56	75.9°C	96.9°C	15	R57	77.8°C	98.3°C	16	RTH1	78.6°C	95.5°C
NO	Position	ROOM AMBIENT Ta= 23.2 °C	HIGH AMBIENT Ta=45.6 °C																																																																					
1	BD1	55.0°C	78.8°C																																																																					
2	C5	53.5°C	76.1°C																																																																					
3	Q1	73.2°C	96.9°C																																																																					
4	U1	73.4°C	94.9°C																																																																					
5	D1	79.1°C	100.2°C																																																																					
6	T1coil	99.8°C	108.9°C																																																																					
7	T1core	84.8°C	106.8°C																																																																					
8	D55	72.8°C	90.5°C																																																																					
9	D50	81.0°C	103.4°C																																																																					
10	C56	66.9°C	87.0°C																																																																					
11	D53	71.3°C	91.1°C																																																																					
12	D51	74.1°C	94.0°C																																																																					
13	LF1	50.1°C	73.1°C																																																																					
14	R56	75.9°C	96.9°C																																																																					
15	R57	77.8°C	98.3°C																																																																					
16	RTH1	78.6°C	95.5°C																																																																					



2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 129% 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 CONTROL45°C /95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=45 °C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.0067%/°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~ +50°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 C56 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=45 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=45 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 45 °C LIFE TIME		(1) 131104.2HRS (2) 38441.7HRS (3) 77872 HRS (4) 141212.5HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 265.9K 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