



# Test Report: LRS-600N2-36

600W Single Output High Peak Power Supply

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## ■ 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

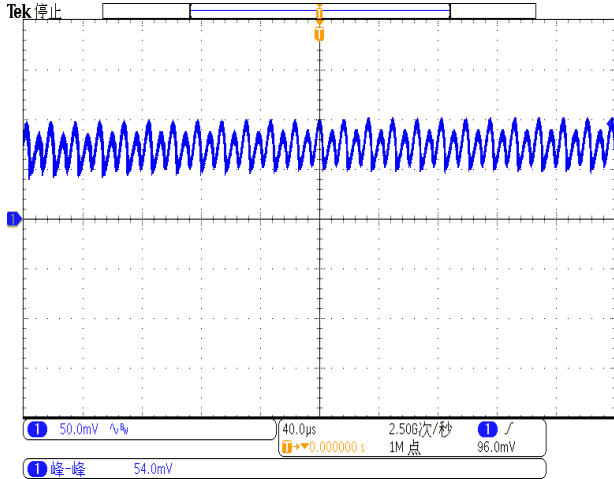
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

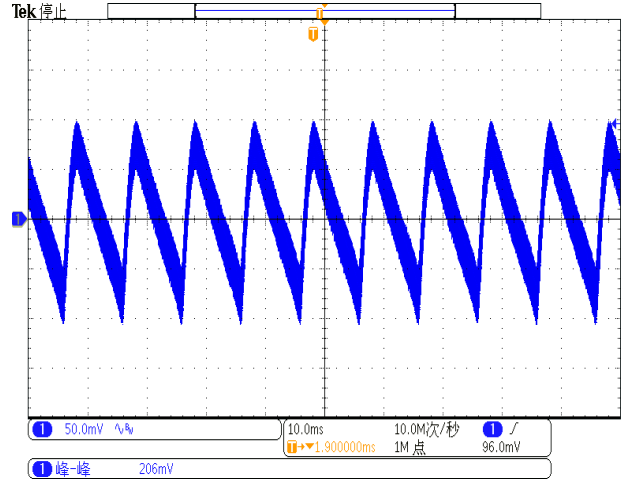
OUTPUT FUNCTION TEST

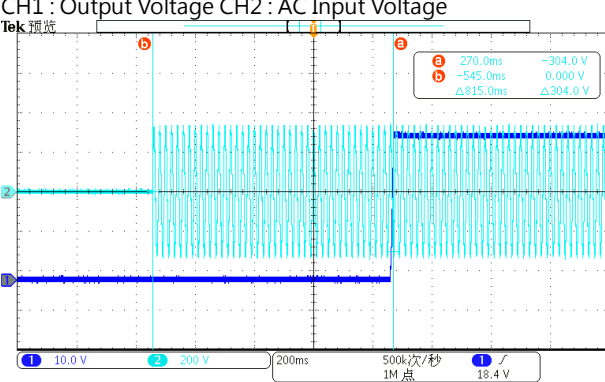
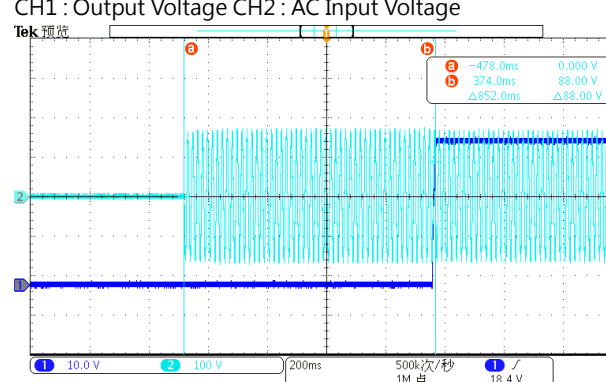
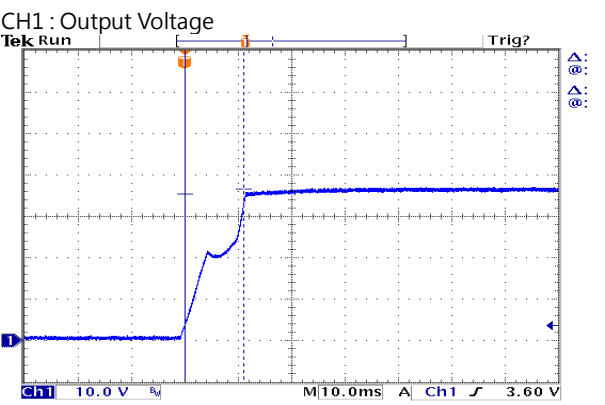
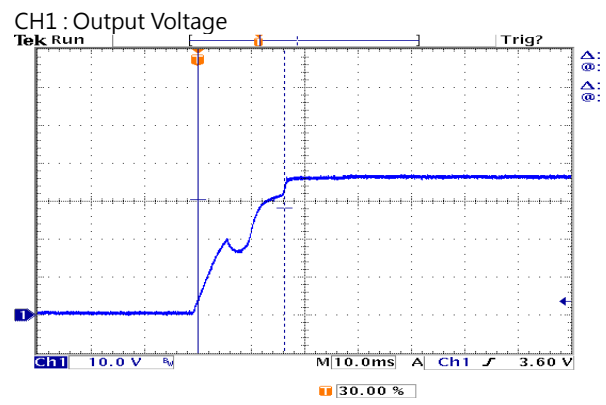
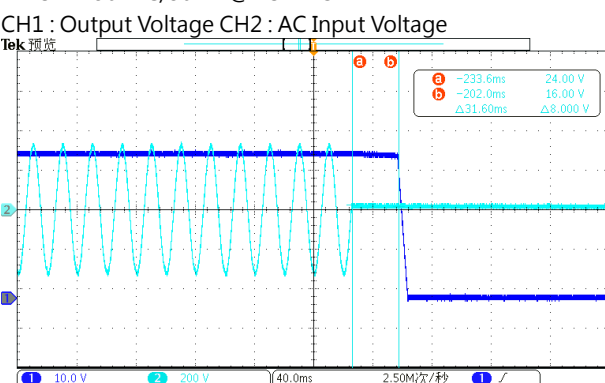
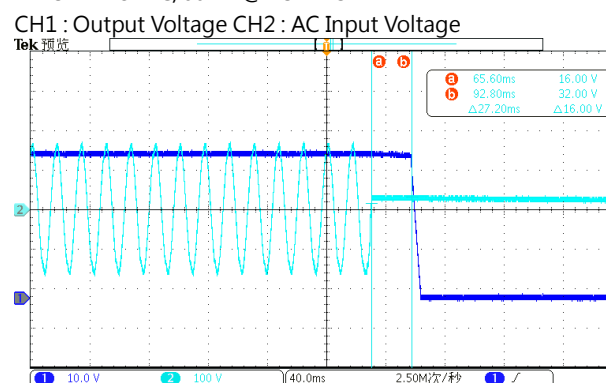
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 34.2 ~ 39.6V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	33.44V~40.79V/230VAC 33.46V~40.76V/115VAC
2	OUTPUT VOLTAGE TOLERANCE	V1:-1.0%~1.0%	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1:0%~0.16%
3	LINE REGULATION	V1:-0.5%~0.5%	I/P: 90VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.02%~0.02%
4	LOAD REGULATION	V1:-0.5%~0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.05%~0.08%
5	OVER/UNDERSHOOT TEST	<± 10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	3.1%
6	RIPPLE & NOISE (Max )	V1:360mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 206mVp-p

high frequency :



low frequency :



7	SET UP TIME(Max)	230VAC/1300ms 115VAC/1300ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/815ms 115VAC/852ms
<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> 		
8	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/11ms 115VAC/16.2ms
<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/20ms 115VAC/16ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/31.66ms 115VAC/27.20ms
<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> 		

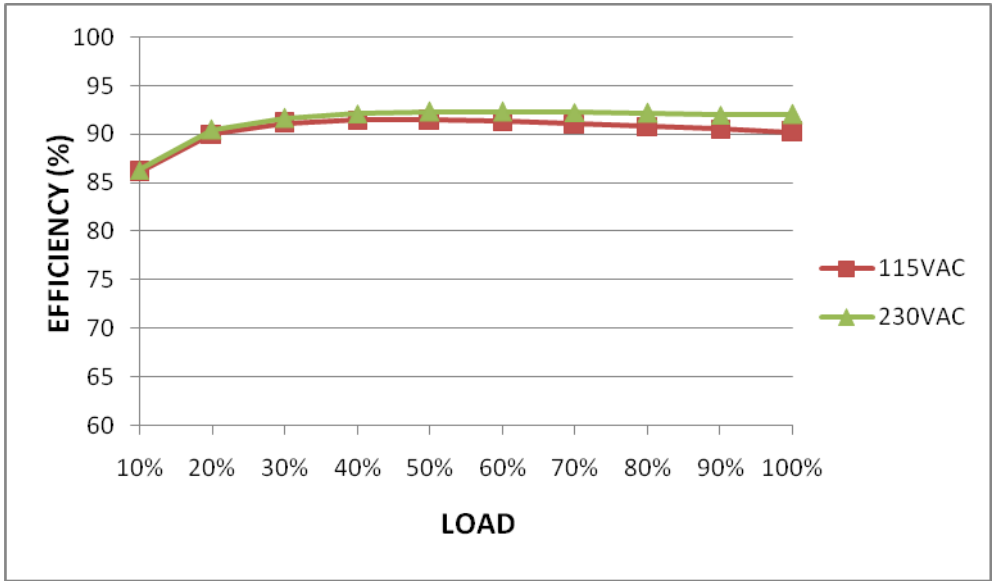
10	DYNAMIC LOAD	V1:1200mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	304mVp-p 280mVp-p
FULL /50% LOAD 50%DUTY / 120HZ				
FULL /50% LOAD 50%DUTY / 1KHZ				

### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90 ~ 132VAC / 180 ~ 264VAC by switch  255 ~ 370VDC (swith on 230VAC)	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25°C  I/P: LOW-LINE-3V=87 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 )	(1) 87 ~ 135VAC / 177 ~ 267VAC (2)252Vdc~373Vdc/FULL LOAD 252Vdc~373Vdc/50% LOAD (3) 252Vdc~373Vdc/FULL LOAD 252Vdc~373Vdc/50% LOAD  TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:90 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/7.5A 115V/12A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =6.21A/ 230VAC I =10.8A/ 115VAC

4	LEAKAGE CURRENT	< 2mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.7275mA N-FG : 0.7322mA
5	EFFICIENCY(Typ.)	92%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	92.06%

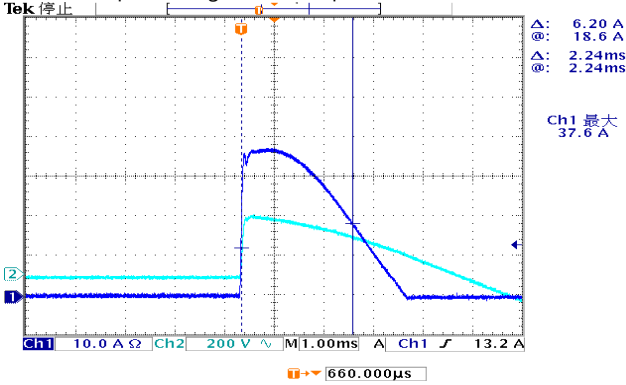
EFFICIENCY vs LOAD



6	INRUSH CURRENT(Typ.)	230V/60A 115V/35A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =37.6A/ 230VAC I =16.8A/ 115VAC T50=2240us/230V
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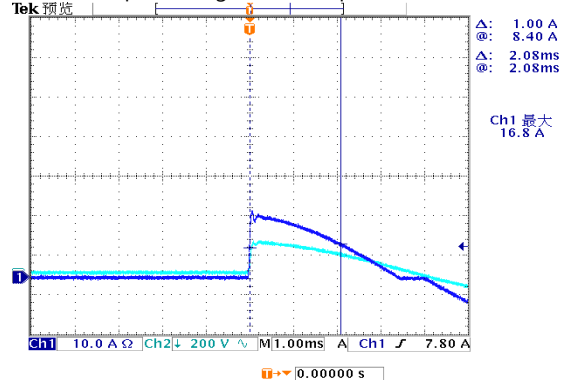
INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH1 : Input current

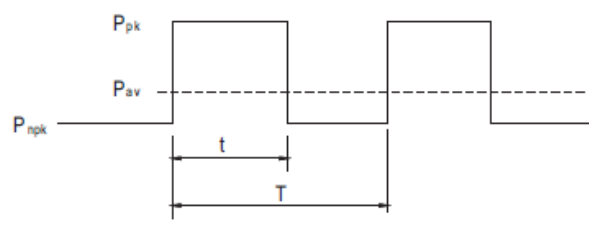


INPUT=115VAC/ 60HZ @ FULL LOAD

CH2 : AC Input Voltage CH1 : Input current



### FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PEAK POWER	I/P: 230 VAC O/P: PEAK LOAD (1Hour NO DAMGE) Ta:25°C Test Result : PASS <b>Function Manual</b> <b>1. Peak Power</b> $P_{av} = \frac{P_{pk} \times t + P_{ngk} \times (T-t)}{T} \leq P_{rated}$ $Duty = \frac{t}{T} \times 100\% \leq 35\%$ $t \leq 5 \text{ sec}$ 		P <sub>av</sub> : Average output power (W) P <sub>pk</sub> : Peak output power (W) P <sub>ngk</sub> : Non-peak output power(W) P <sub>rated</sub> : Rated output power(W) t : Peak power width(sec) T : Period(sec)

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 200%	I/P: 264VAC I/P: 230VAC I/P: 105VAC O/P: TESTING Ta:25°C	126.5%/ 264VAC 126.2%/ 230VAC 125.9%/100VAC PROTECTION TYPE : Output power >105% rated for more than 5 seconds then shut down o/p voltage, re-power on to recover  239.8%/ 264VAC 241.2%/ 230VAC 180.9%/100VAC PROTECTION TYPE : Constant current limiting for output power >200% rated for more than 5 seconds and then shut down o/p voltage, re-power on to recover
2	OVER VOLTAGE PROTECTION	41.4~48.6V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25°C	45.6V/ 264VAC 45.8V/ 230VAC 45.2V/ 90VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover



3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P:FULL LOAD	O.T.P. Active Protection type :Shut down o/p voltage, re-power on to recover
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## COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) Peak Voltage	Q1 35A/650V	AC ON/OFF I/P:High-Line +3V =300V VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8)PEAK LOAD(300VAC@100A)  I/P:Low-Line -3V = 97V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8)PEAK LOAD  Ta:25°C	VDS: (1) 450V (2) 458V (3) 430V  (4) 426V (5) 426V (6) 426V (7) 458V (8) 455V  VDS: (1) 268V (2) 332V (3) 280V (4) 280V (5) 310V (6) 294V (7) 330V (8) 314V

2	Diode Peak Voltage	<p>D100 30A/150V</p> <p>D104 30A/150V</p>	<p>AC ON/OFF I/P:High-Line +3V =300 V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD</p> <p>Ta:25°C</p>	<p>D101: VDS: (1) 101V (2) 7.6V (3) 103V (4) 102V (5) 101V (6) 101V (7) 6.8V (8) 98 V</p> <p>D104: VDS: (1) 104V (2) 22.8V (3) 104V (4) 103V (5) 104V (6) 104V (7) 22.8V (8) 96.4 V</p>
3	Input Capacitor Voltage	<p>C5 Rated: 1000μ /200V Surge voltage:250V</p>	<p>I/P:High-Line +3V =300V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue</p> <p>Ta:25°C</p>	<p>(1)201V (2)211V (3)209V (4) 201V</p>
4	Control IC Voltage Test	<p>U1 Rated 8.9V~15.5V</p> <p>U100 Rated 8V~24V</p>	<p>AC ON/OFF I/P:High-Line +3V =300V O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(Low LINE)</p> <p>Ta:25°C</p>	<p>(1) 14.8V (2) 14.4V (3) 14.8V (4) 15.3V (5) 13.9</p> <p>(1) 12.5V (2) 12.6V (3) 12.6V (4) 12.4V (5) 12V</p>



## ■ SAFETY& E.M.C. TEST

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min I/P-FG :2KVAC/min O/P-FG:0.5KVAC/min	I/P-O/P: 4.125 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6 KVAC/min Ta:25°C	I/P-O/P: 2.931mA I/P-FG:2.425mA O/P-FG:2.628m A 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: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 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	40A / 2min Ta:25°C	12mΩ

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	EAC TP TC 020	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
2	RADIATION	EAC TP TC 020	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
4	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	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
6	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 : LRS-600N2-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=31.6 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=49.4 °C																																																																																																										
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=31.6 °C</th> <th>HIGH AMBIENT Ta=49.4 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>38.2°C</td><td>59.0°C</td></tr> <tr><td>2</td><td>RY1</td><td>36.5°C</td><td>56.9°C</td></tr> <tr><td>3</td><td>BD1</td><td>46.9°C</td><td>66.6°C</td></tr> <tr><td>4</td><td>C92</td><td>40.0°C</td><td>60.5°C</td></tr> <tr><td>5</td><td>C5</td><td>42.8°C</td><td>61.5°C</td></tr> <tr><td>6</td><td>C6</td><td>45.1°C</td><td>63.6°C</td></tr> <tr><td>7</td><td>C16</td><td>40.5°C</td><td>59.6°C</td></tr> <tr><td>8</td><td>Q1</td><td>48.8°C</td><td>70.1°C</td></tr> <tr><td>9</td><td>Q2</td><td>47.1°C</td><td>68.8°C</td></tr> <tr><td>10</td><td>U2</td><td>42.2°C</td><td>62.6°C</td></tr> <tr><td>11</td><td>C36</td><td>43.4°C</td><td>64.7°C</td></tr> <tr><td>12</td><td>C38</td><td>39.3°C</td><td>60.7°C</td></tr> <tr><td>13</td><td>T1</td><td>66.7°C</td><td>88.9°C</td></tr> <tr><td>14</td><td>RG201</td><td>50.9°C</td><td>72.2°C</td></tr> <tr><td>15</td><td>C205</td><td>46.1°C</td><td>66.7°C</td></tr> <tr><td>16</td><td>C207</td><td>40.3°C</td><td>60.5°C</td></tr> <tr><td>17</td><td>D100</td><td>47.9°C</td><td>68.1°C</td></tr> <tr><td>18</td><td>D103</td><td>71.0°C</td><td>91.7°C</td></tr> <tr><td>19</td><td>D104</td><td>65.3°C</td><td>84.0°C</td></tr> <tr><td>20</td><td>C105</td><td>37.6°C</td><td>59.4°C</td></tr> <tr><td>21</td><td>J111</td><td>55.1°C</td><td>76.1°C</td></tr> <tr><td>22</td><td>U102</td><td>43.4°C</td><td>63.9°C</td></tr> <tr><td>23</td><td>RTH3</td><td>55.4°C</td><td>75.6°C</td></tr> <tr><td>24</td><td>TC</td><td>41.1°C</td><td>61.7°C</td></tr> <tr><td>25</td><td>J111</td><td>55.1°C</td><td>76.1°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=31.6 °C	HIGH AMBIENT Ta=49.4 °C	1	LF1	38.2°C	59.0°C	2	RY1	36.5°C	56.9°C	3	BD1	46.9°C	66.6°C	4	C92	40.0°C	60.5°C	5	C5	42.8°C	61.5°C	6	C6	45.1°C	63.6°C	7	C16	40.5°C	59.6°C	8	Q1	48.8°C	70.1°C	9	Q2	47.1°C	68.8°C	10	U2	42.2°C	62.6°C	11	C36	43.4°C	64.7°C	12	C38	39.3°C	60.7°C	13	T1	66.7°C	88.9°C	14	RG201	50.9°C	72.2°C	15	C205	46.1°C	66.7°C	16	C207	40.3°C	60.5°C	17	D100	47.9°C	68.1°C	18	D103	71.0°C	91.7°C	19	D104	65.3°C	84.0°C	20	C105	37.6°C	59.4°C	21	J111	55.1°C	76.1°C	22	U102	43.4°C	63.9°C	23	RTH3	55.4°C	75.6°C	24	TC	41.1°C	61.7°C	25	J111	55.1°C	76.1°C
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16	C207	40.3°C	60.5°C																																																																																																									
17	D100	47.9°C	68.1°C																																																																																																									
18	D103	71.0°C	91.7°C																																																																																																									
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 126%/241% LOAD Ta : 25°C	TEST : OK																																																																																																								
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC 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 CONTROL 45 °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	± 0.009 %/°C(0~50°C)
6	STORAGE TEMPERATURE TEST	-40~85°C	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	
7	THERMAL SHOCK TEST	-20~45°C	1. Thermal shock Temperature : -25°C~ +45°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	
8	VIBRATION TEST	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 6G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C	
9	CAPACITOR LIFE CYCLE	SUPPOSE C106 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) 2080663HRS (2) 386099HRS (3) 516149HRS (4) 656168HRS	
10	MTBF	Conducted by Parts Stress Analysis Prediction 1336.2K hrs min. Telcordia SR-332 (Bellcore) ; 230.8K 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	WUWQ/HUANGMK	WENF	LINKX

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