



Test Report: NSP-320-7.5

320W AC/DC High Reliable Multi-Industries Enclosed Type Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

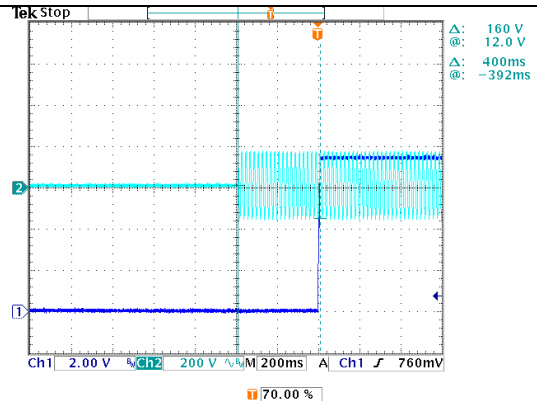
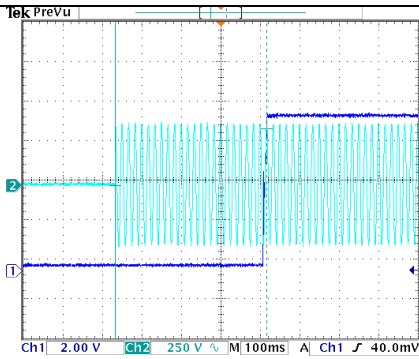
■ SAFETY & E.M.C. TEST

Safety Test

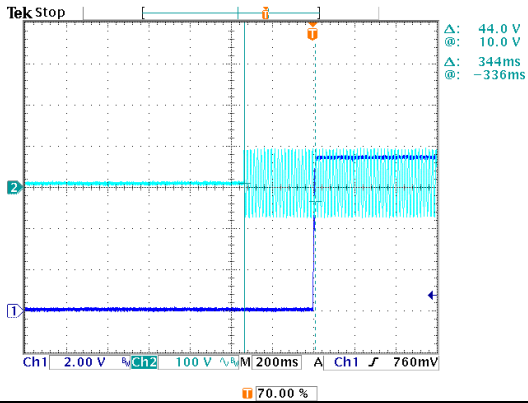
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST



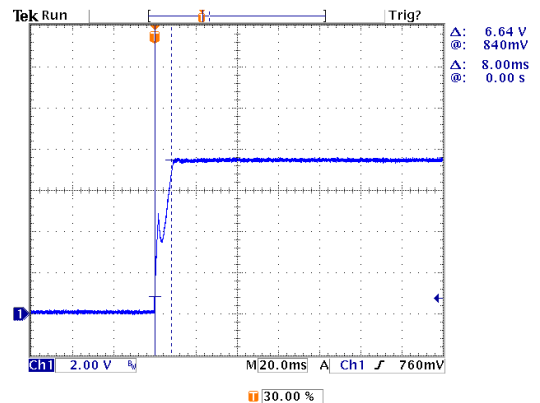
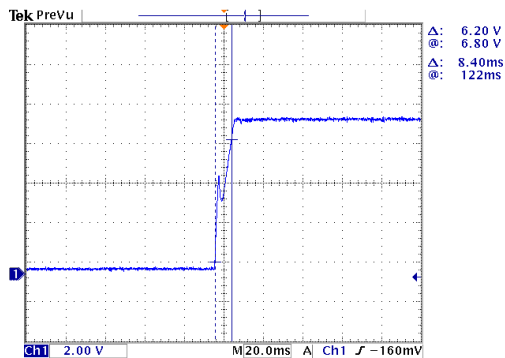
INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

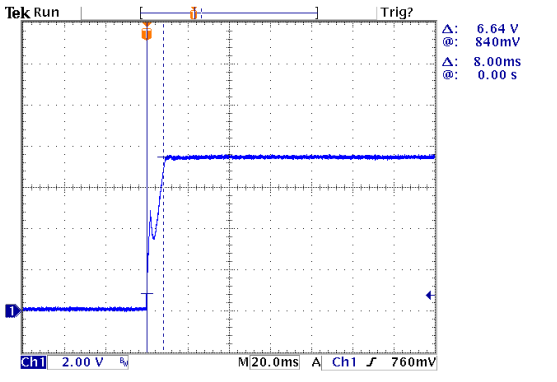
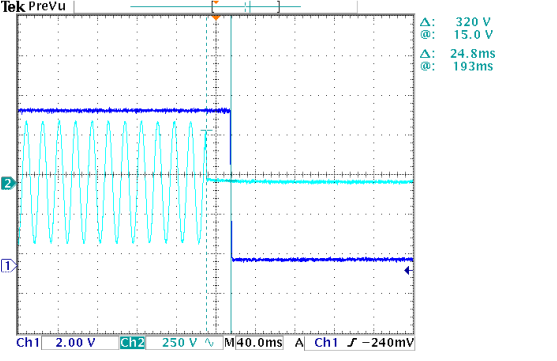
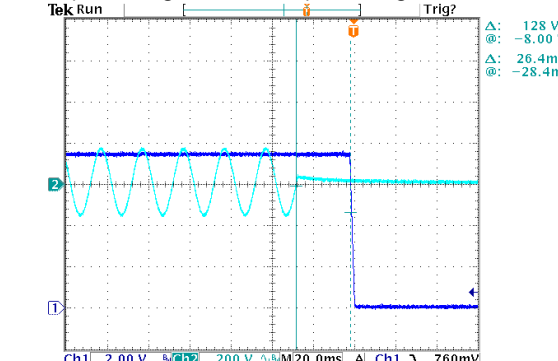
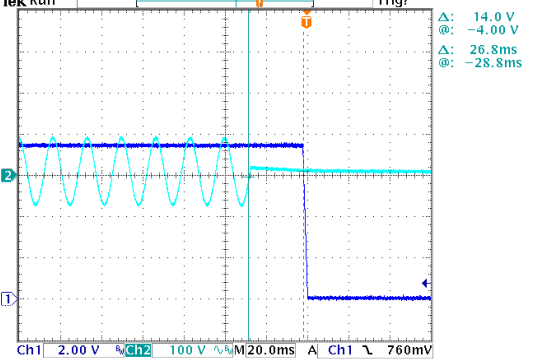


8	RISE TIME (Max)	277VAC/80ms 230VAC/80ms 115VAC/80ms	I/P : 277 VAC I/P : 230 VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	277VAC/8.4ms 230VAC/8ms 115VAC/8 ms
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INPUT=277VAC/60HZ @ FULL LOAD
CH1 : Output Voltage

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>  <p>Δ: 6.64 V @: 840mV Δ: 8.00ms @: 0.00 s</p>		
9	<p>HOLD UP TIME (Typ.)</p>	<p>277VAC/16ms 230VAC/16ms 115VAC/16ms</p>	<p>I/P : 277VAC I/P : 230 VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C</p>
<p>INPUT=277VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>  <p>Δ: 320 V @: 15.0 V Δ: 24.8ms @: 193ms</p>		<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>  <p>Δ: 128 V @: -8.00 V Δ: 26.4ms @: -28.4ms</p>	
<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>  <p>Δ: 14.0 V @: -4.00 V Δ: 26.8ms @: -28.8ms</p>			
10	<p>DYNAMIC LOAD</p>	<p>V1: 1500mVp-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>

11	TRANSIENT RECOVERY TIME	V1:1500mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	208mVp-p 168us

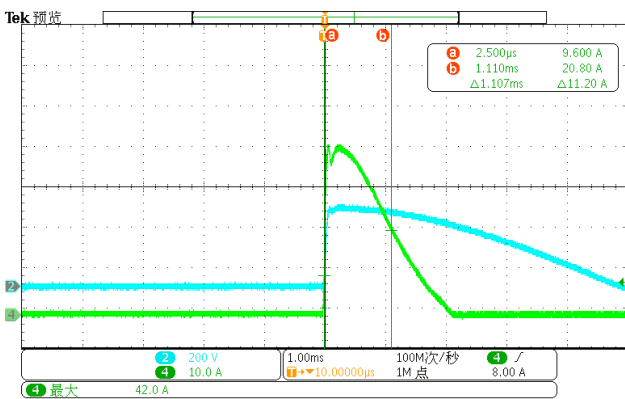
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~305VAC 120VDC~ 431VDC	(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	(1) 80V~308V (2) 117Vdc~434Vdc/FULL LOAD 117Vdc~ 434Vdc/50% LOAD (3) 117Vdc~ 434Vdc/FULL LOAD 117Vdc~434Vdc/50% LOAD
			I/P: LOW-LINE-3V=82 V HIGH-LINE+10V=315 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST:PASS
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:85 VAC ~305 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: PASS
3	INPUT CURRENT (Typ.)	277VAC/1.4A 230VAC/1.6A 115VAC/3.2A	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =1.16A/ 277VAC I =1.41A/ 230VAC I =2.85A/ 115VAC
4	LEAKAGE CURRENT	<350µA / 277 VAC touch current<100µA (Peak)/ 277 VAC	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	L-FG : 259 µA N-FG : 262 µA Touch current: 30µA
5	POWER FACTOR (Typ.)	0.90/ 277VAC 0.93/ 230VAC	I/P : 277 VAC I/P : 230 VAC	PF=0.988/277VAC PF=0.994/230VAC

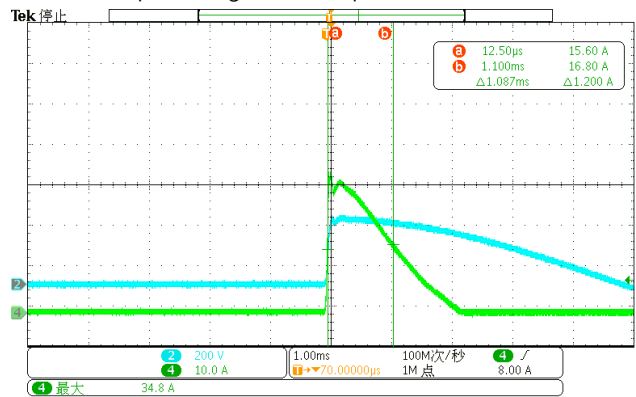
		0.98/115VAC	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF=0.997/115VAC																																												
	<p>P.F vs LOAD</p> <table border="1"> <caption>P.F vs LOAD Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>115VAC</th> <th>230VAC</th> <th>277VAC</th> </tr> </thead> <tbody> <tr><td>10%</td><td>0.95</td><td>0.82</td><td>0.52</td></tr> <tr><td>20%</td><td>0.97</td><td>0.95</td><td>0.81</td></tr> <tr><td>30%</td><td>0.98</td><td>0.97</td><td>0.93</td></tr> <tr><td>40%</td><td>0.985</td><td>0.975</td><td>0.96</td></tr> <tr><td>50%</td><td>0.99</td><td>0.98</td><td>0.97</td></tr> <tr><td>60%</td><td>0.99</td><td>0.98</td><td>0.97</td></tr> <tr><td>70%</td><td>0.99</td><td>0.98</td><td>0.97</td></tr> <tr><td>80%</td><td>0.99</td><td>0.98</td><td>0.97</td></tr> <tr><td>90%</td><td>0.99</td><td>0.98</td><td>0.97</td></tr> <tr><td>100%</td><td>0.99</td><td>0.98</td><td>0.97</td></tr> </tbody> </table>				LOAD (%)	115VAC	230VAC	277VAC	10%	0.95	0.82	0.52	20%	0.97	0.95	0.81	30%	0.98	0.97	0.93	40%	0.985	0.975	0.96	50%	0.99	0.98	0.97	60%	0.99	0.98	0.97	70%	0.99	0.98	0.97	80%	0.99	0.98	0.97	90%	0.99	0.98	0.97	100%	0.99	0.98	0.97
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6	EFFICIENCY(Typ.)	91%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	91.25%																																												
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7	NO LOAD POWER CONSUMPTION(Typ.)	Remote Power ON : 3W/277VAC 3W/230VAC 3W/115VAC Remote Power OFF : 0.5W/277VAC 0.5W/230VAC 0.3W/115VAC	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : RC ON/RC OFF Ta : 25°C	Remote Power ON : 1.43W/277VAC 1.55W/230VAC 1.5W/115VAC Remote Power OFF : 0.4W/277VAC 0.3W/230VAC 0.13W/115VAC																																												

8	INRUSH CURRENT(Typ.)	277VAC/50A	I/P : 277 VAC	I =42A/ 277VAC
		230VAC/40A	I/P : 230 VAC	T50= 1107 us/277V
		115VAC/20A	I/P : 115 VAC	I =34.2A/ 230VAC
		COLD START	O/P : FULL LOAD	T50=1087us/230V
			Ta : 25°C	I =16.2A/ 115VAC
				T50=877us/115V

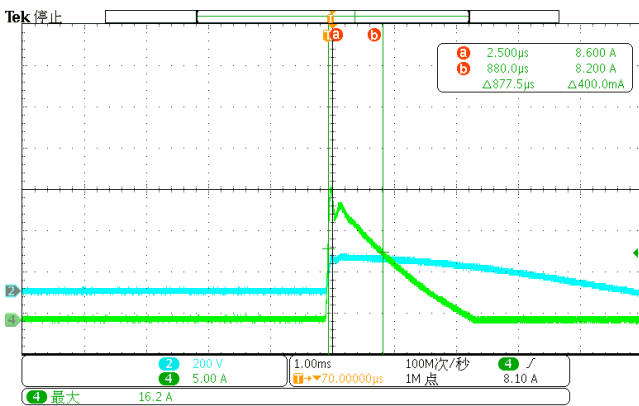
INPUT=277VAC/50HZ @ FULL LOAD
CH2 : AC Input Voltage CH4 : Input current



INPUT=230VAC/50HZ @ FULL LOAD
CH2 : AC Input Voltage CH4 : Input current



INPUT=115VAC/50HZ @ FULL LOAD
CH2 : AC Input Voltage CH4 : Input current

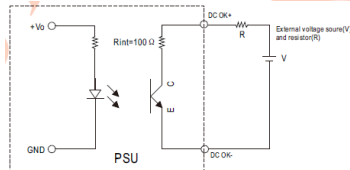


PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~150%	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: TESTING Ta:25°C	122.5%/ 305VAC 122.3%/ 230VAC 122.3%/85VAC Protection type : Constant current limiting for more than 5 seconds and then shut down o/p voltage, AC re-power on to recover

2	OVER VOLTAGE PROTECTION	9.2V~13V	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P:MIN LOAD Ta:25°C	11.3V/ 305VAC 11.4V/ 230VAC 11.3V/ 85VAC Protection type : Shut down o/p voltage, AC re-power on to recover
3	OVER TEMPERATURE PROTECTION	Protection type : Shut down o/p voltage, AC re-power on to recover	I/P: 305VAC I/P: 85VAC O/P:FULL LOAD	O.T.P Active Protection type : Shut down o/p voltage, AC re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 85VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Protection type : Constant current limiting for more than 5 seconds , and then shut down o/p voltage, AC re-power on to recover

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT						
1	REMOTE CONTROL	Power ON: Pin5 and Pin6 open or keep 0~0.8Vdc Power OFF: Pin5 and Pin6 keep 3.3~10Vdc	I/P:230VAC O/P:FULL LOAD Ta:25°C	TEST: <u>OK</u>						
2	REMOTE SENSE	S+ / S- The remote sensing compensates voltage drop on the load wiring up to 0.3V	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST: <u>OK</u>						
3	DC OK SIGNAL	15Vdc/10mA resistive load <table border="1" style="margin-left: 20px;"> <tr> <td>PSU Vo Status</td> <td>Photo transistor</td> </tr> <tr> <td>POWER ON</td> <td>Conduct(Low impedance)</td> </tr> <tr> <td>POWER OFF</td> <td>Open(High impedance)</td> </tr> </table> <p style="margin-left: 20px;">Optocoupler Rating(max.) 15Vdc/10mA resistive load</p> 	PSU Vo Status	Photo transistor	POWER ON	Conduct(Low impedance)	POWER OFF	Open(High impedance)	I/P:230VAC O/P:FULL LOAD Ta:25°C	TEST: <u>OK</u>
PSU Vo Status	Photo transistor									
POWER ON	Conduct(Low impedance)									
POWER OFF	Open(High impedance)									
4	FAN CONTROL & NOISE	(1)Fan ON/OFF control : RTH4≥50°C±10°C FAN ON RTH4≤40°C±10°C FAN OFF (2) FAN NOISE : < 40dB@100% load with Ta=25°C	I/P:230VAC O/P: FULL LOAD	TEST: (1) <u>ok</u> (2) <u>39.8</u> dB Ta:25°C						

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q6 Rated 650V/15A	AC ON/OFF I/P:High-Line +3V =308V 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. Ta:25°C	VDS: (1) 479V (2) 479V (3) 475V (4) 479V (5) 471V (6) 479V (7) 479V
2	Diode Peak Voltage	Q101 Rated : 114 A/ 30V	AC ON/OFF I/P:High-Line +3V =308 V O/P: (1)Full Load (2)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (3)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (4)0%→400% Load. Ta:25°C	Q101 : VDS: (1) 23.2V (2) 22.8V (3) 23V (4) 7.4V
3	Control IC Voltage Test	PFC/PWM IC U2 Rated 9.6V~ 36 V O/P IC U101 Rated 3V~ 30 V	AC ON/OFF I/P:High-Line +3V =308 V O/P(1)FULL LOAD (2) Output Short (3)O.L.P Ta:25°C	U2 (1) 19.4V (2) 20V (3) 19.6V U101 (1) 12.8V (2) 12.8V (3) 12.8V

■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4.2 K VAC/min I/P-FG : 2.1 K VAC/min O/P-FG: 1.5 KVAC/min	I/P-O/P: 4.6 KVAC/min I/P-FG: 2.5 KVAC/min O/P-FG: 1.8 KVAC/min Ta:25°C	I/P - O/P: 2.462 mA I / P - F G : 2.259 mA O / P - F G : 1.863 m A NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500 VDC>100MΩ I/P - F G : 500 VDC>100MΩ O/P-FG: 500 VDC >100MΩ	I/P-O/P: 500 VDC I/P - F G : 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P - O/P: 9999 MΩ I / P - F G : 9999 MΩ O / P - F G : 9999 MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	9mΩ

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 type="checkbox"/> PASS <input type="checkbox"/> FAIL
2	CONDUCTION	BS EN/EN55032(CISPR32),CNS 15936 EN/EN55014-1(CISPR14-1) EN/EN55011(CISPR11)	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	BS EN/EN55032(CISPR32),CNS 15936 EN/EN55014-1(CISPR14-1) EN/EN55011(CISPR11)	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 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 : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 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 : NSP-320-5 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta=36.8°C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 63.8°C																																																																																		
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=36.8°C</th> <th>HIGH AMBIENT Ta=63.8°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C1</td><td>44.6°C</td><td>75.1°C</td></tr> <tr><td>2</td><td>LF1</td><td>52.2°C</td><td>79.3°C</td></tr> <tr><td>3</td><td>C2</td><td>50.2°C</td><td>79.9°C</td></tr> <tr><td>4</td><td>C10</td><td>52.9°C</td><td>82.0°C</td></tr> <tr><td>5</td><td>R5</td><td>62.7°C</td><td>92.8°C</td></tr> <tr><td>6</td><td>L1</td><td>67.6°C</td><td>96.9°C</td></tr> <tr><td>7</td><td>C5</td><td>54.2°C</td><td>85.4°C</td></tr> <tr><td>8</td><td>Q1</td><td>61.3°C</td><td>94.5°C</td></tr> <tr><td>9</td><td>Q2</td><td>63.1°C</td><td>94.5°C</td></tr> <tr><td>10</td><td>C14</td><td>59.7°C</td><td>90.6°C</td></tr> <tr><td>11</td><td>Q5</td><td>59.7°C</td><td>94.1°C</td></tr> <tr><td>12</td><td>U2</td><td>59.9°C</td><td>90.8°C</td></tr> <tr><td>13</td><td>T1coil</td><td>82.8°C</td><td>103.0°C</td></tr> <tr><td>14</td><td>Tcore</td><td>79.4°C</td><td>110.1°C</td></tr> <tr><td>15</td><td>U100</td><td>83.7°C</td><td>111.6°C</td></tr> <tr><td>16</td><td>Q102</td><td>86.4°C</td><td>113.8°C</td></tr> <tr><td>17</td><td>C105</td><td>74.9°C</td><td>104.1°C</td></tr> <tr><td>18</td><td>RTH3</td><td>73.4°C</td><td>99.5°C</td></tr> <tr><td>19</td><td>TSW1</td><td>63.9°C</td><td>92.8°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=36.8°C	HIGH AMBIENT Ta=63.8°C	1	C1	44.6°C	75.1°C	2	LF1	52.2°C	79.3°C	3	C2	50.2°C	79.9°C	4	C10	52.9°C	82.0°C	5	R5	62.7°C	92.8°C	6	L1	67.6°C	96.9°C	7	C5	54.2°C	85.4°C	8	Q1	61.3°C	94.5°C	9	Q2	63.1°C	94.5°C	10	C14	59.7°C	90.6°C	11	Q5	59.7°C	94.1°C	12	U2	59.9°C	90.8°C	13	T1coil	82.8°C	103.0°C	14	Tcore	79.4°C	110.1°C	15	U100	83.7°C	111.6°C	16	Q102	86.4°C	113.8°C	17	C105	74.9°C	104.1°C	18	RTH3	73.4°C	99.5°C	19	TSW1	63.9°C	92.8°C		
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1	C1	44.6°C	75.1°C																																																																																	
2	LF1	52.2°C	79.3°C																																																																																	
3	C2	50.2°C	79.9°C																																																																																	
4	C10	52.9°C	82.0°C																																																																																	
5	R5	62.7°C	92.8°C																																																																																	
6	L1	67.6°C	96.9°C																																																																																	
7	C5	54.2°C	85.4°C																																																																																	
8	Q1	61.3°C	94.5°C																																																																																	
9	Q2	63.1°C	94.5°C																																																																																	
10	C14	59.7°C	90.6°C																																																																																	
11	Q5	59.7°C	94.1°C																																																																																	
12	U2	59.9°C	90.8°C																																																																																	
13	T1coil	82.8°C	103.0°C																																																																																	
14	Tcore	79.4°C	110.1°C																																																																																	
15	U100	83.7°C	111.6°C																																																																																	
16	Q102	86.4°C	113.8°C																																																																																	
17	C105	74.9°C	104.1°C																																																																																	
18	RTH3	73.4°C	99.5°C																																																																																	
19	TSW1	63.9°C	92.8°C																																																																																	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 122.3%LOAD Ta : 25°C	TEST : OK																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/100VAC O/P : 100%LOAD Ta= -35°C	TEST : OK																																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C/95 %R.H NO DAMAGE	I/P : 315 VAC O/P : FULL LOAD Ta= 60°C HUMIDITY= 95 %R.H	TEST : OK																																																																																
5	TEMPERATURE COEFFICIENT	± 0.05%/°C(0~60°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.033 %/°C(0~60°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	-30~60°C	1. Thermal shock Temperature : -35°C~ +65°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, 2G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 3G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C
9	CAPACITOR LIFE CYCLE	SUPPOSE C109 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= 60°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 60°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 60°C LIFE TIME	(1) 3767298HRS (2) 27927HRS (3) 202316HRS (4) 693474HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1699.1K hrs min. Telcordia SR-332 (Bellcore) ; 257.1K 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 : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Hanxr	Liutt	Wangzd

2020.10.1 TAG-QA-009