



Test Report: NSP-320-60

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

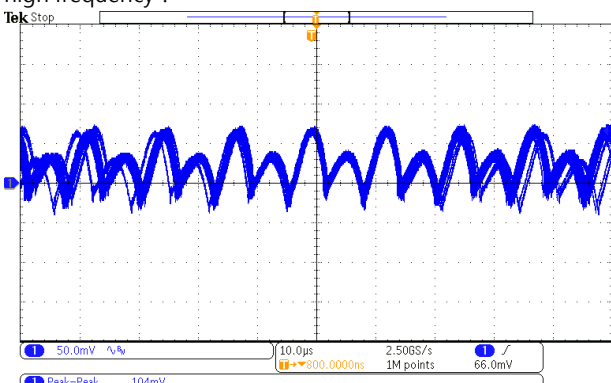
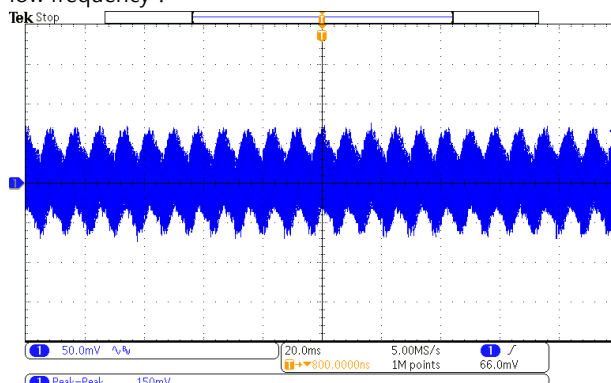
E.M.C. Test

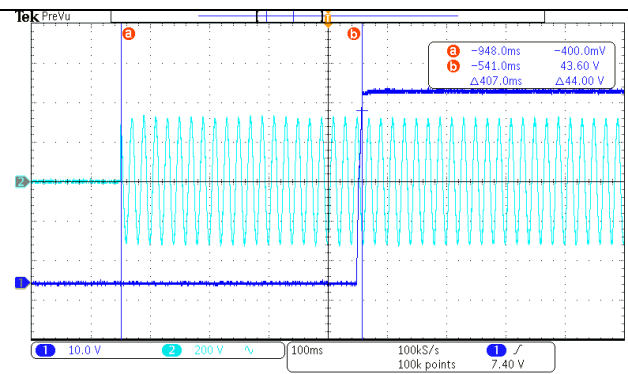
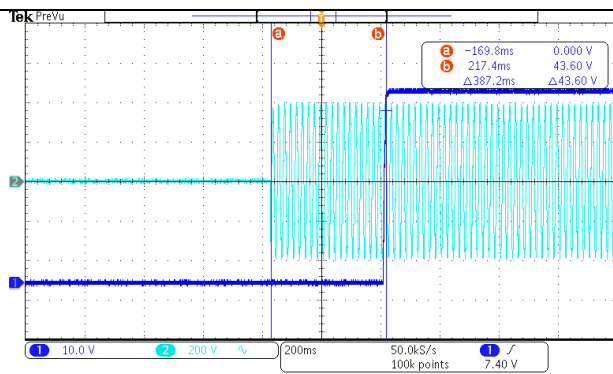
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

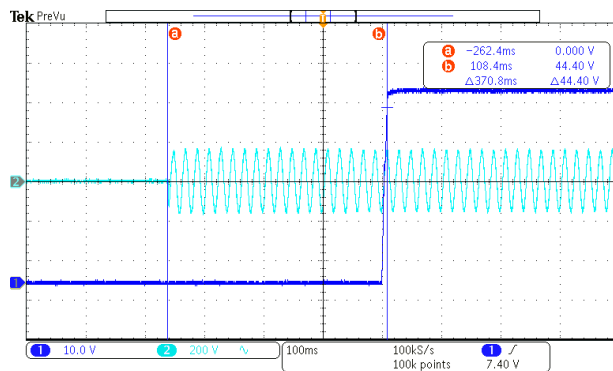
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 54V~72V	I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	52.00V~74.67V/230VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1.0%~ 1.0%	I/P: 85VAC /305VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: 0.05%~0.1%
3	LINE REGULATION	V1: -0.5%~ 0.5%	I/P: 85VAC~ 305VAC O/P:FULL LOAD Ta:25°C	V1: -0.01%~0.01%
4	LOAD REGULATION	V1: -0.5%~ 0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.05%~0%
5	OVER/UNDERSHOOT TEST	< ± 5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	0.52%
6	RIPPLE & NOISE (Max)	V1: 300mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta:25°C	V1: 150mVp-p
high frequency :  low frequency : 				
7	SET UP TIME(Max)	277VAC/1000ms 230VAC/1000ms 115VAC/1500ms	I/P : 277 VAC I/P : 230 VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	277VAC/ 387.2ms 230VAC/407ms 115VAC/370.8ms
INPUT=277VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage			INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



8

RISE TIME (Max)

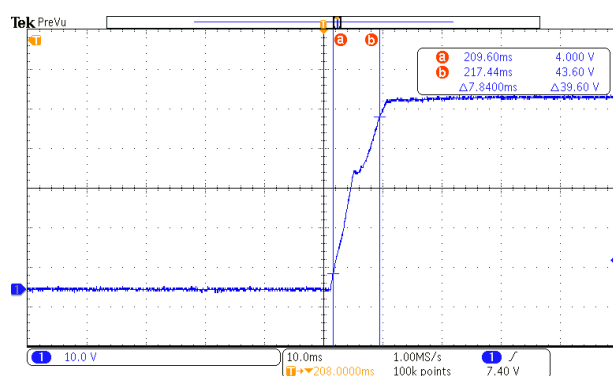
277VAC/80ms
 230VAC/80ms
 115VAC/80ms

I/P : 277 VAC
 I/P : 230 VAC
 I/P : 115VAC
 O/P : FULL LOAD
 Ta : 25°C

277VAC/7.84ms
 230VAC/8.35ms
 115VAC/8.24ms

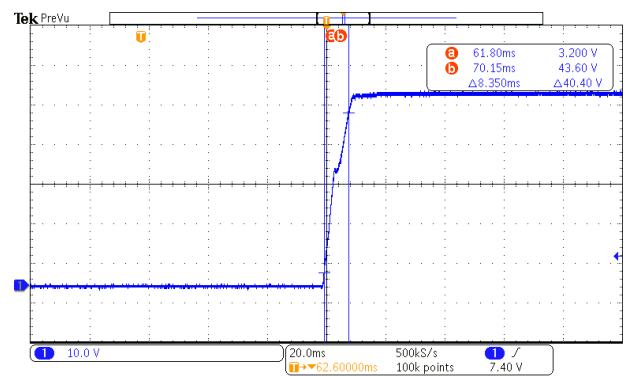
INPUT=277VAC/60HZ @ FULL LOAD

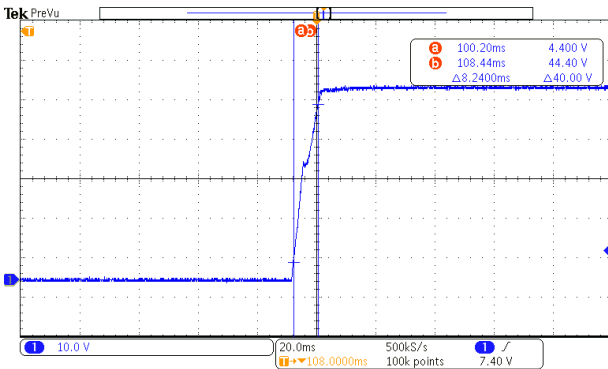
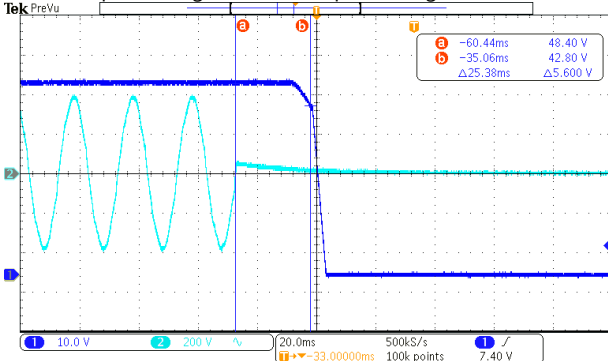
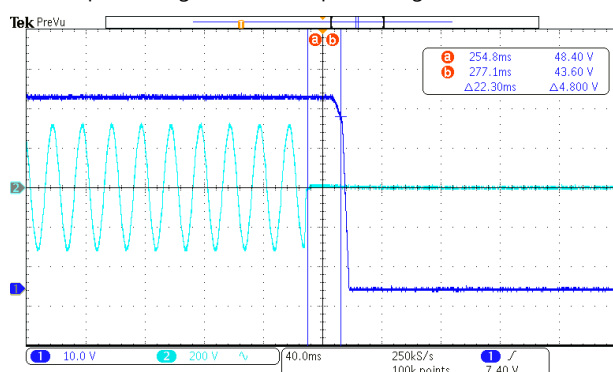
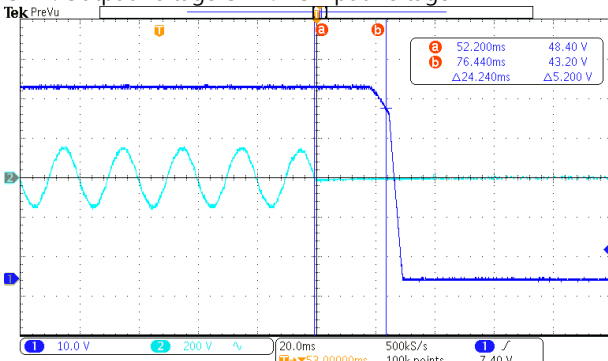
CH1 : Output Voltage

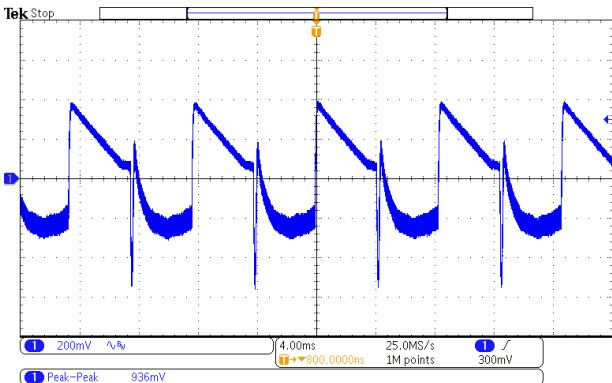
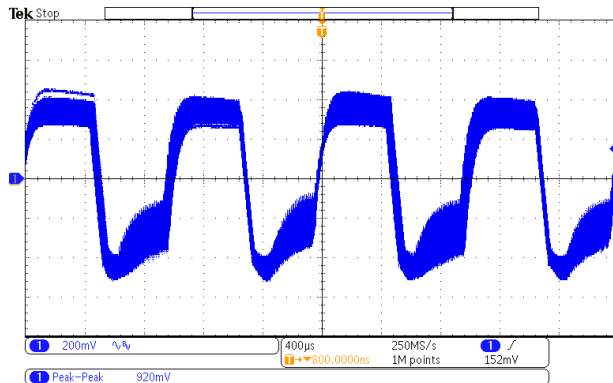


INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage

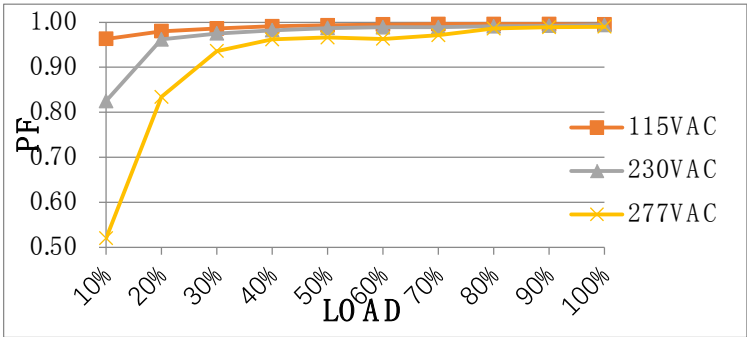
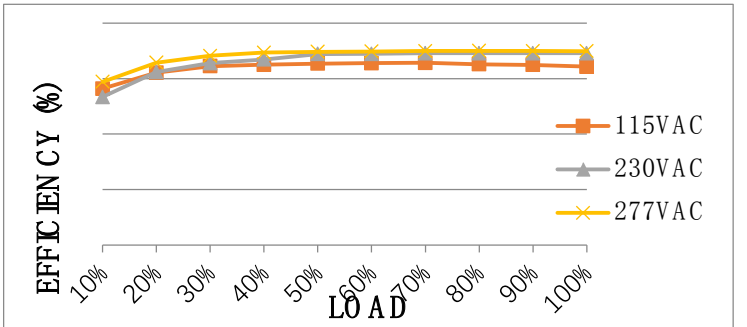


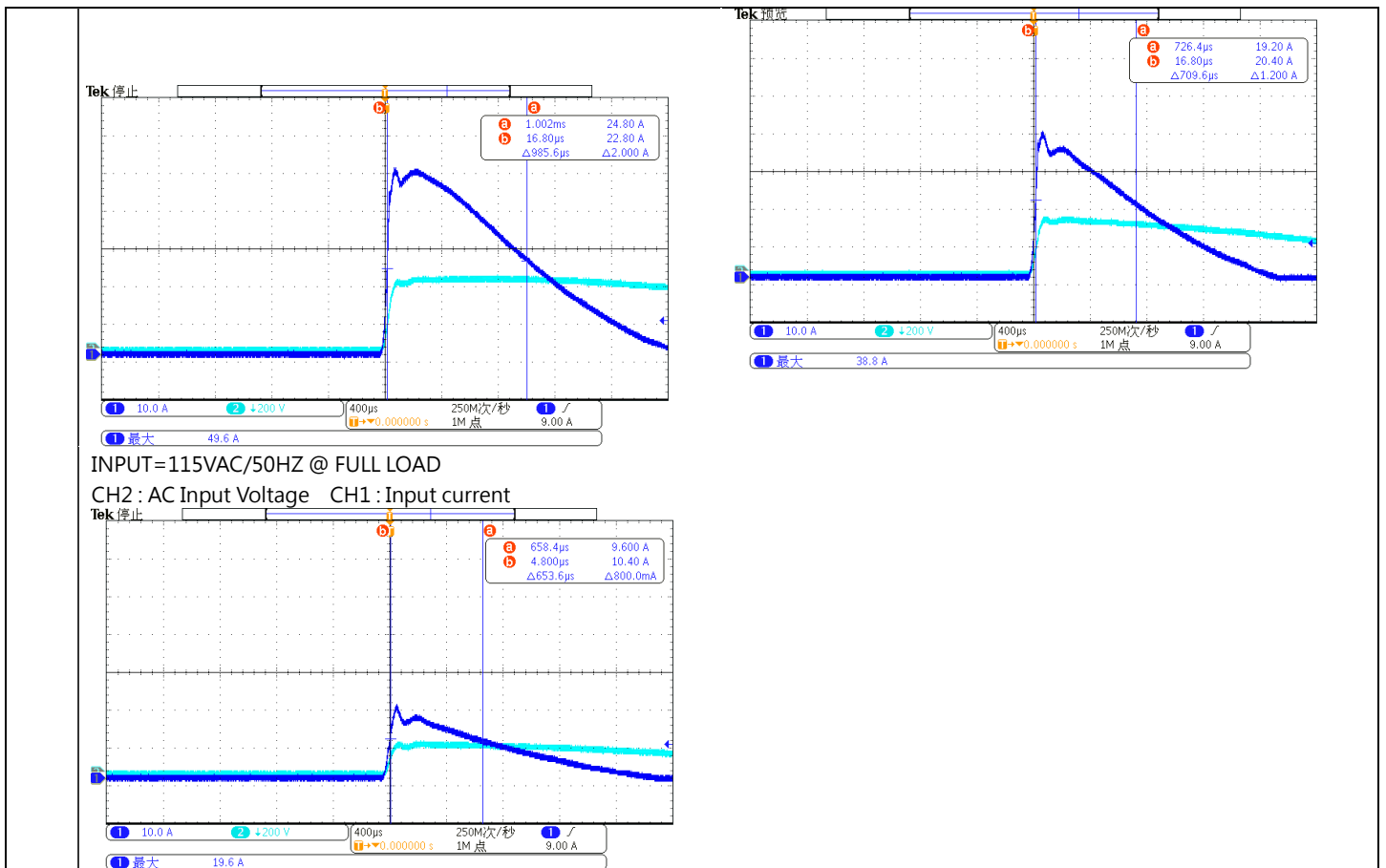
	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage		
9	HOLD UP TIME (Typ.)	277VAC/16ms 230VAC/16ms 115VAC/16ms	I/P : 277VAC I/P : 230 VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C
	INPUT=277VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 
	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		10 DYNAMIC LOAD V1: 6000mVp-p I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C 936mVp-p 920mVp-p

FULL /50% LOAD 50%DUTY / 120HZ  FULL /50% LOAD 50%DUTY / 1KHZ 				
11	TRANSIENT RECOVERY TIME	V1:6000mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	608mVp-p 463 us

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 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)	(1) 80V~308V (2) 117Vdc~ 434Vdc/FULL LOAD 117Vdc~ 434dc/50% LOAD (3) 117Vdc~ 434dc/FULL LOAD 117Vdc~ 434dc/50% LOAD TEST:PASS
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:85VAC ~305VAC 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 =1.23A/ 277VAC I =3.04A/ 230VAC I =1.48A/ 115VAC
4	LEAKAGE CURRENT	Earth leakage current <350μA(rms)@277Vac, touch current<100μA(rms) @ 277Vac	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	267 μA for Earth 29 μA for touch
5	POWER FACTOR (Typ.)	0.90/ 277VAC 0.93/ 230VAC 0.98/115VAC	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC	PF=0.99/277VAC PF=0.995/230VAC PF=0.994/115VAC

			O/P : FULL LOAD Ta : 25°C	
	P.F vs LOAD 			
6	EFFICIENCY(Typ.)	93.5%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	94.55%
	EFFICIENCY vs LOAD 			
7	NO LOAD POWER CONSUMPTION(Typ.)	Remote Power ON : 3W/277VAC 3W/230VAC 3W/115VAC Remote Power OFF : 0.50W/277VAC 0.50W/230VAC 0.30W/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 : 1.8W/277VAC 1.96W/230VAC 1.92W/115VAC Remote Power OFF : 0.41W/277VAC 0.31W/230VAC 0.14W/115VAC
8	INRUSH CURRENT(Typ.)	277VAC/50A 230VAC/40A 115VAC/20A COLD START	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =49.6A/ 277VAC T50= 985.6 us/277VAC I =38.8A/ 230VAC T50=709.6 us/230VAC I =19.6A/ 115VAC T50=653.6us/115VAC
INPUT=277VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH1 : Input current		INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH1 : Input current		

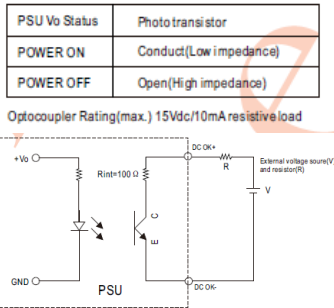


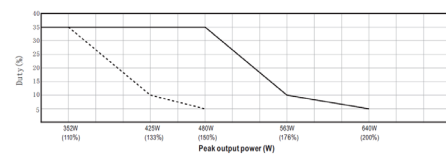
PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~200%	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: TESTING Ta:25°C	126.3%/ 305VAC 126.3%/ 230VAC 126.3%/85VAC Protection type : 1 、 Normally works within 105 ~ 200% rated output power for more than 5 seconds and then constant current limiting without shutdown($V_{out}>30\%$), recovers automatically after fault condition is removed, or shut down o/p voltage when $V_{out}<30\%$, AC re-power on to recover 2 、 >200% rated power, constant current limiting ($V_{out}>30\%$) with auto-recovery after fault condition is removed,

2	OVER VOLTAGE PROTECTION	73V~86V Protection type : Shut down o/p voltage, AC re-power on to recover	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta:25°C	82V/ 305VAC 82.6V/ 230VAC 82V/ 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 : Protection type : Constant current limiting for more than 5 seconds (Vout<30%) and then shut down a/p voltage, AC re-power on to recover 5.25S

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 	I/P:230VAC O/P:FULL LOAD Ta:25°C	TEST: <u>OK</u>
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) 39.8 dB Ta:25°C

5	PEAK Power	I/P: 100/305VAC O/P:  —100VAC —200VAC	TEST: <u>OK</u>
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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 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) 491V (3) 479V (4) 471V (5) 475V (6) 475V (7) 491V
2	Diode Peak Voltage	D101 Rated : 20A/200V	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	D101: VDS: (1) 177V (2) 177V (3) 175V (4) 175V
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 U100 (1) 18.7V (1) 12.1V (2) 18.7V (2) 10.7V (3) 18.5V (3) 12.1V

■ 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: 4.62 KVAC/min I/P-FG: 2.52 KVAC/min O/P-FG: 1.8 KVAC/min Ta:25°C	I/P - O/P: 2.213 mA I / P - F G : 2.359 mA O / P - F G : 1.951 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	■□PASS □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-320-48 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 24.5℃ 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta=62.8 ℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=24.5℃</th><th>HIGH AMBIENT Ta=62.8℃</th></tr><tr><td>1</td><td>C1</td><td>27.7℃</td><td>68.3℃</td></tr><tr><td>2</td><td>LF1</td><td>33.8℃</td><td>74.9℃</td></tr><tr><td>3</td><td>LF2</td><td>32.5℃</td><td>73.4℃</td></tr><tr><td>4</td><td>C2</td><td>32.6℃</td><td>73.7℃</td></tr><tr><td>5</td><td>C10</td><td>31.9℃</td><td>73.2℃</td></tr><tr><td>6</td><td>ZNR1</td><td>31.9℃</td><td>72.7℃</td></tr><tr><td>7</td><td>RY1</td><td>39.3℃</td><td>81.7℃</td></tr><tr><td>8</td><td>L1</td><td>45.1℃</td><td>89.2℃</td></tr><tr><td>9</td><td>BD1</td><td>41.9℃</td><td>82.2℃</td></tr><tr><td>10</td><td>C5</td><td>35.7℃</td><td>75.8℃</td></tr><tr><td>11</td><td>Q1</td><td>42.7℃</td><td>83.3℃</td></tr><tr><td>12</td><td>Q2</td><td>42.7℃</td><td>83.1℃</td></tr><tr><td>13</td><td>D8</td><td>43.2℃</td><td>83.4℃</td></tr><tr><td>14</td><td>C14</td><td>36.5℃</td><td>78.9℃</td></tr><tr><td>15</td><td>Q5</td><td>40.4℃</td><td>81.8℃</td></tr><tr><td>16</td><td>Q6</td><td>39.2℃</td><td>80.3℃</td></tr><tr><td>17</td><td>U2</td><td>41.2℃</td><td>82.4℃</td></tr><tr><td>18</td><td>C36</td><td>39.3℃</td><td>79.7℃</td></tr><tr><td>19</td><td>T1CORE</td><td>48.7℃</td><td>89.9℃</td></tr><tr><td>20</td><td>T1COIL</td><td>55.3℃</td><td>96.3℃</td></tr><tr><td>21</td><td>RG200</td><td>37.9℃</td><td>78.1℃</td></tr><tr><td>22</td><td>C201</td><td>33.4℃</td><td>73.1℃</td></tr><tr><td>23</td><td>U121</td><td>40.8℃</td><td>79.7℃</td></tr><tr><td>24</td><td>D102</td><td>52.9℃</td><td>90.9℃</td></tr><tr><td>25</td><td>D103</td><td>54.9℃</td><td>93.1℃</td></tr><tr><td>26</td><td>C105</td><td>42.5℃</td><td>83.0℃</td></tr><tr><td>27</td><td>C107</td><td>41.4℃</td><td>80.3℃</td></tr><tr><td>28</td><td>RTH3</td><td>45.1℃</td><td>84.7℃</td></tr><tr><td>29</td><td>TSW1</td><td>39.9℃</td><td>81.9℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta=24.5℃	HIGH AMBIENT Ta=62.8℃	1	C1	27.7℃	68.3℃	2	LF1	33.8℃	74.9℃	3	LF2	32.5℃	73.4℃	4	C2	32.6℃	73.7℃	5	C10	31.9℃	73.2℃	6	ZNR1	31.9℃	72.7℃	7	RY1	39.3℃	81.7℃	8	L1	45.1℃	89.2℃	9	BD1	41.9℃	82.2℃	10	C5	35.7℃	75.8℃	11	Q1	42.7℃	83.3℃	12	Q2	42.7℃	83.1℃	13	D8	43.2℃	83.4℃	14	C14	36.5℃	78.9℃	15	Q5	40.4℃	81.8℃	16	Q6	39.2℃	80.3℃	17	U2	41.2℃	82.4℃	18	C36	39.3℃	79.7℃	19	T1CORE	48.7℃	89.9℃	20	T1COIL	55.3℃	96.3℃	21	RG200	37.9℃	78.1℃	22	C201	33.4℃	73.1℃	23	U121	40.8℃	79.7℃	24	D102	52.9℃	90.9℃	25	D103	54.9℃	93.1℃	26	C105	42.5℃	83.0℃	27	C107	41.4℃	80.3℃	28	RTH3	45.1℃	84.7℃	29	TSW1	39.9℃	81.9℃
NO	Position	ROOM AMBIENT Ta=24.5℃	HIGH AMBIENT Ta=62.8℃																																																																																																																									
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12	Q2	42.7℃	83.1℃																																																																																																																									
13	D8	43.2℃	83.4℃																																																																																																																									
14	C14	36.5℃	78.9℃																																																																																																																									
15	Q5	40.4℃	81.8℃																																																																																																																									
16	Q6	39.2℃	80.3℃																																																																																																																									
17	U2	41.2℃	82.4℃																																																																																																																									
18	C36	39.3℃	79.7℃																																																																																																																									
19	T1CORE	48.7℃	89.9℃																																																																																																																									
20	T1COIL	55.3℃	96.3℃																																																																																																																									
21	RG200	37.9℃	78.1℃																																																																																																																									
22	C201	33.4℃	73.1℃																																																																																																																									
23	U121	40.8℃	79.7℃																																																																																																																									
24	D102	52.9℃	90.9℃																																																																																																																									
25	D103	54.9℃	93.1℃																																																																																																																									
26	C105	42.5℃	83.0℃																																																																																																																									
27	C107	41.4℃	80.3℃																																																																																																																									
28	RTH3	45.1℃	84.7℃																																																																																																																									
29	TSW1	39.9℃	81.9℃																																																																																																																									
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 126.3%LOAD Ta : 25℃	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	± 0.0049%/°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 C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 60°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) 973684.5HRS (2) 73890.2HRS (3) 97777.2HRS (4) 138406.8HRS
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