Test Report: NSP-200-36

200W AC/DC High Reliable Multi-Industries Encolsed 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

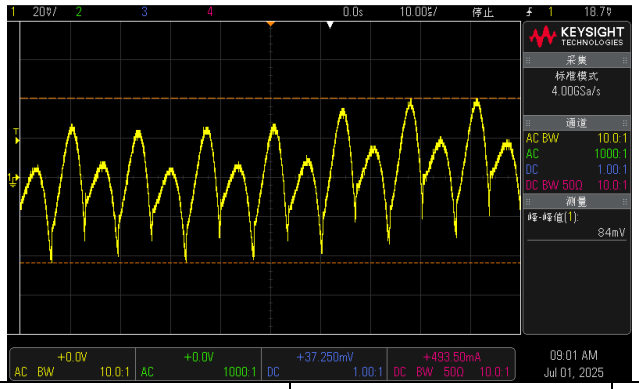
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

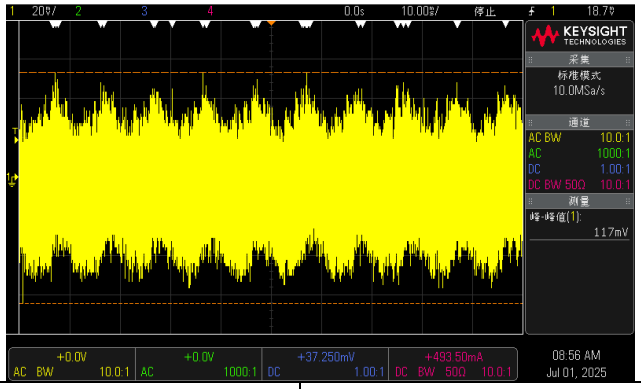
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 32 V~ 43 V	I/P : 230 VAC O/P : MIN LOAD Ta : 25℃	CH1 : 30.7 V ~ 44.6 V/ 230 VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1.0 % ~ +1.0 %	I/P: 85VAC /305VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: - 0.31 % ~ + 0.25 %
3	LINE REGULATION	V1: -0.5 % ~ +0.5 %	I/P: 85VAC~ 305VAC O/P:FULL LOAD Ta:25℃	V1: -0.03 % ~ + 0.00 %
4	LOAD REGULATION	V1: -0.5 % ~ +0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.03 % ~ + 0.03 %
5	OVER/UNDERSHOOT TEST	<± 5 %	I/P: 230VAC O/P:FULL LOAD Ta:25℃	V1 : 1.03 %
6	RIPPLE & NOISE (Max)	V1: 240 mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta:25℃	V1: 117 mVp-p

high frequency :



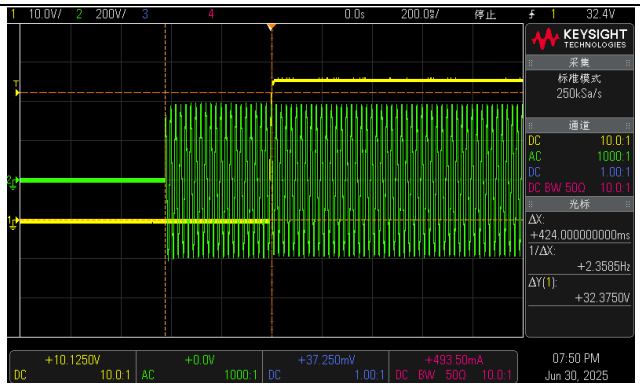
low frequency :

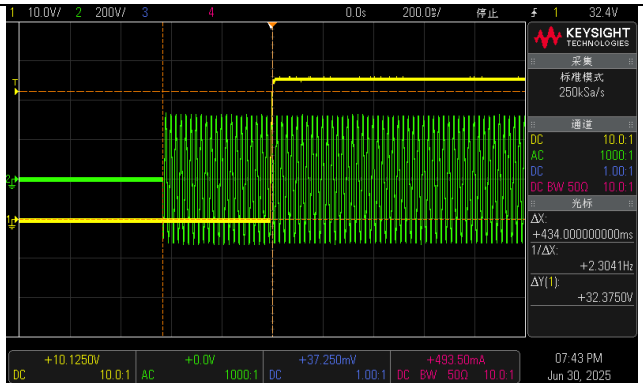


7	SET UP TIME(Max)	277VAC/1000ms 230VAC/1000ms 115VAC/1500ms	I/P : 277 VAC I/P : 230 VAC I/P : 115VAC O/P : FULL LOAD Ta : 25℃	277VAC/ 424 ms 230VAC/ 434 ms 115VAC/ 386 ms

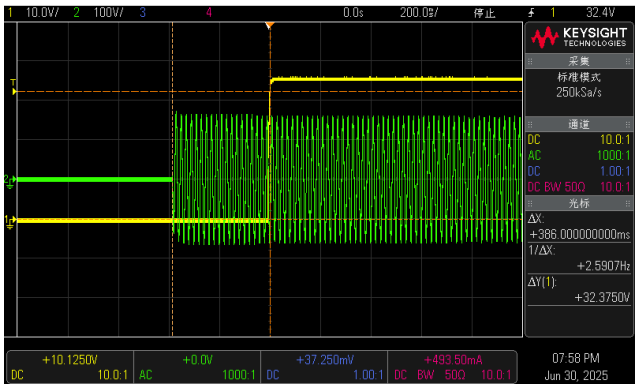
INPUT=277VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



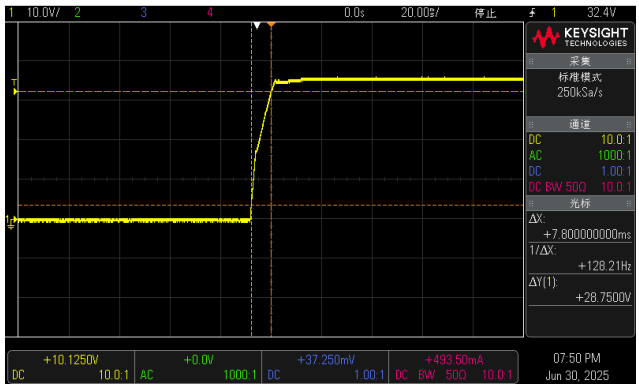


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

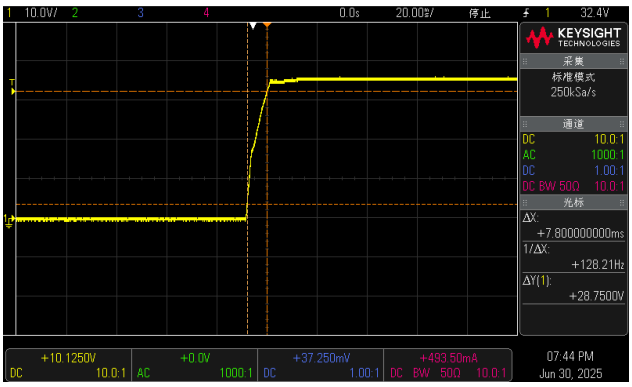


8	RISE TIME (Max)	277VAC/80ms 230VAC/80ms 115VAC/80ms	I/P： 277 VAC I/P： 230 VAC I/P： 115VAC O/P：FULL LOAD Ta：25℃	277VAC/ 7.8 ms 230VAC/ 7.8 ms 115VAC/ 7.8 ms

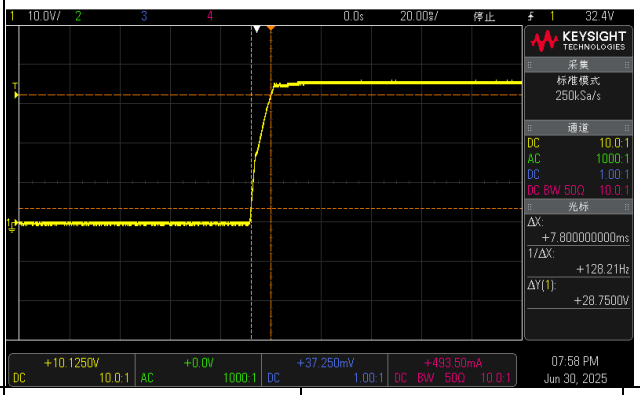
INPUT=277VAC/60HZ @ FULL LOAD
CH1 : Output Voltage



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

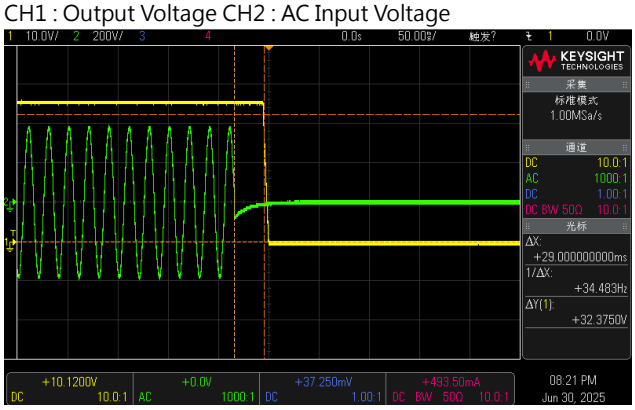


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage

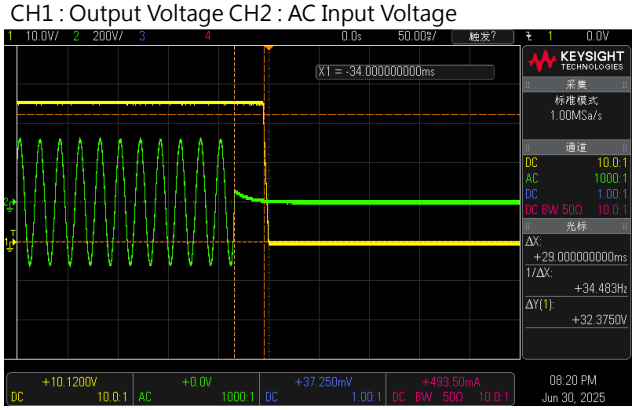


9	HOLD UP TIME (Typ.)	277VAC/16ms 230VAC/16ms 115VAC/16ms	I/P： 277VAC I/P： 230 VAC I/P： 115VAC O/P：FULL LOAD Ta：25℃	277VAC/ 29 ms 230VAC/ 29 ms 115VAC/ 28 ms

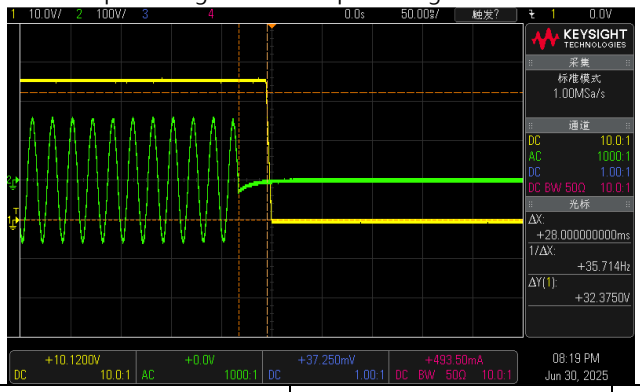
INPUT=277VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



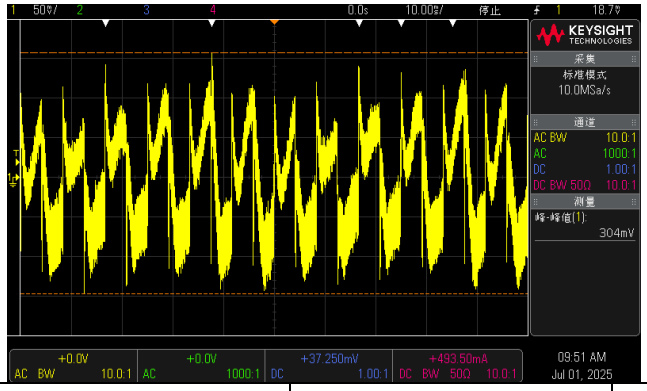
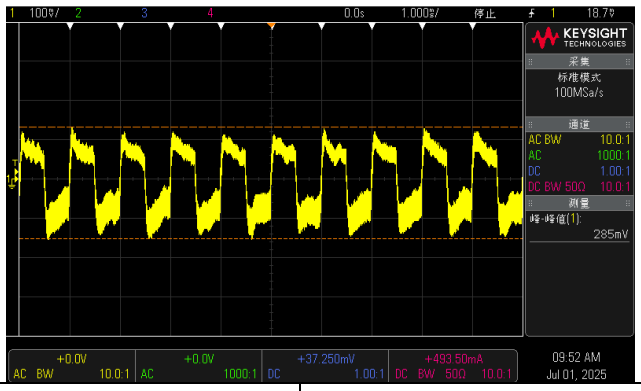
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



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

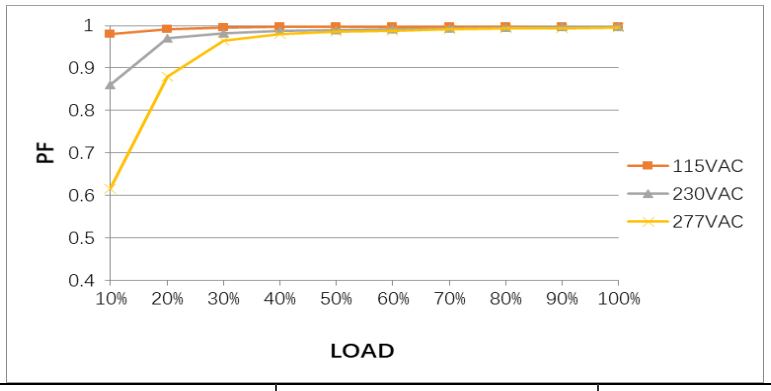
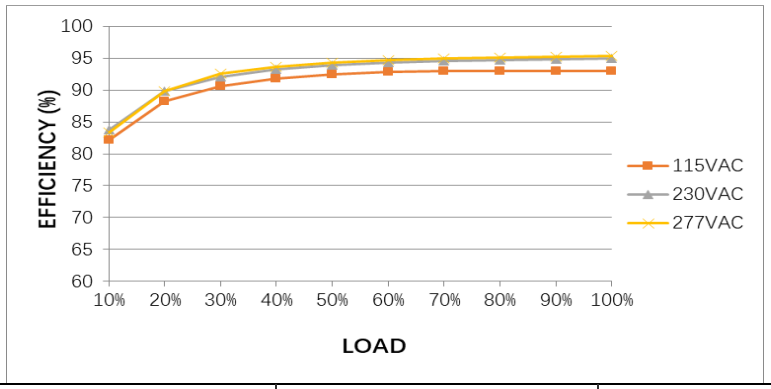


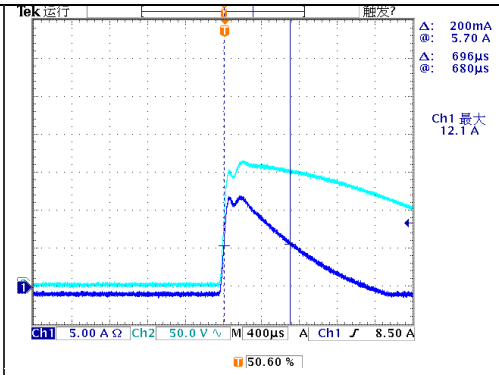
10	DYNAMIC LOAD	V1: 3600 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	 304 mVp-p 285 mVp-p

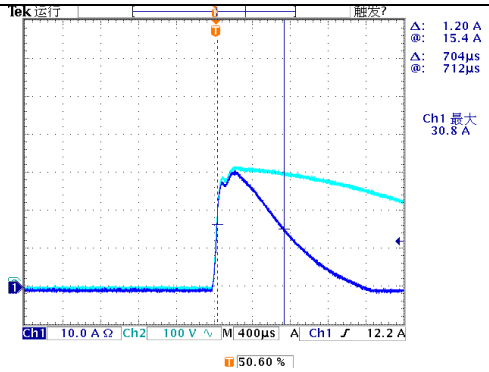
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	
11	TRANSIENT RECOVERY TIME	V1: 3600 mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	289 mVp-p 400 us

INPUT FUNCTION TEST

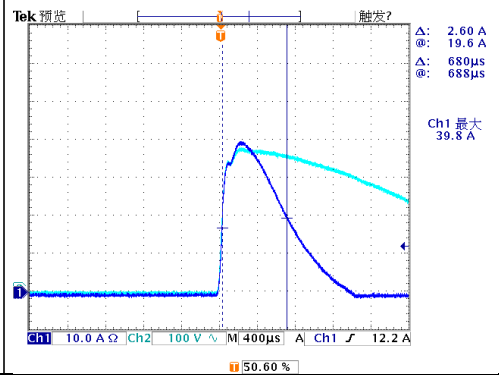
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~305VAC 120VDC~ 431VDC	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25℃	(1) 85 V~305V (2) 120Vdc~ 431 Vdc/FULL LOAD 120 Vdc~ 431Vdc/50% LOAD (3) 120Vdc~ 431Vdc/FULL LOAD 120Vdc~431 Vdc/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: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:85VAC ~305VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK
3	INPUT CURRENT (Typ.)	277VAC/ 0.80A 230VAC/ 1A 115VAC/ 2 A	I/P： 277 VAC I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I =0.76 A/ 277VAC I =0.92 A/ 230VAC I =1.87 A/ 115VAC
4	LEAKAGE CURRENT	<350μA / 277 VAC touch current<100μA (Peak)/ 277 VAC	I/P： 277 VAC O/P：Min LOAD Ta：25℃	165μA for Earth 57μA 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=0.995 / 277VAC PF=0.998 / 230VAC PF=0.998 / 115VAC

			O/P：FULL LOAD Ta：25℃	
	P.F vs LOAD 			
6	EFFICIENCY(Typ.)	94.5 %	I/P:230 VAC O/P:FULL LOAD Ta:25℃	94.9 %
	EFFICIENCY vs LOAD 			
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℃	Remote Power ON： 1.530 W/ 277VAC 1.559 W/ 230VAC 1.646 W/ 115VAC Remote Power OFF： 0.373 W/ 277VAC 0.294 W/ 230VAC 0.125 W/ 115VAC
8	INRUSH CURRENT(Typ.)	115V/23A 230V/40A 277V/50A COLD START	I/P： 115 VAC I/P： 230 VAC I/P： 277 VAC O/P：FULL LOAD Ta：25℃	I =12.1A/ 115VAC T50=696us/115V I =30.8A/ 230VAC T50=704us/230V I =39.8A/ 277VAC T50=680us/277V
	INPUT=115VAC/50HZ @ FULL LOAD CH2: AC Input Voltage CH1 : Input current		INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH1 : Input current	





INPUT=277VAC/50HZ @ FULL LOAD
CH2: AC Input Voltage CH1 : Input current

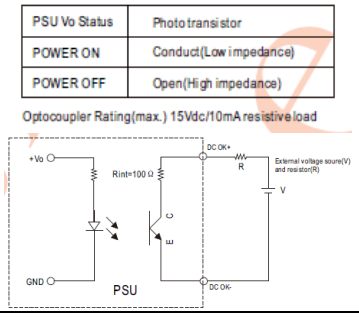
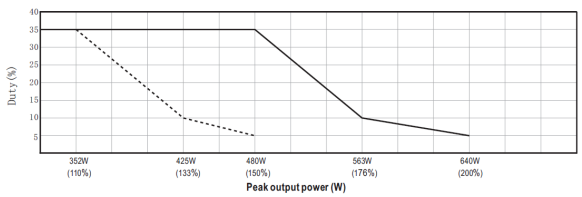


PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 200% 1、Normally works within 105 ~ 200% rated output power for more than 5 seconds and then constant current limiting without shutdown(Vout>30%), recovers automatically after fault condition is removed, or shut down o/p voltage when Vout<30%,AC re-power on to recover 2 、 >200% rated power, constant current limiting (Vout>30%)with auto-recovery after fault condition is removed,	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P:TESTING Ta:25℃	125.00 %/ 305VAC 125.00 %/ 230VAC 125.00 %/ 85VAC PROTECTION TYPE : 1、Normally works within 105 ~ 200% rated output power for more than 5 seconds and then constant current limiting without shutdown(Vout>30%), recovers automatically after fault condition is removed, or shut down o/p voltage when Vout<30%,AC re-power on to recover 2、>200% rated power, constant current limiting (Vout>30%)with auto-recovery after fault condition is removed
2	OVER VOLTAGE PROTECTION	44 V ~ 54 V	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P:MIN LOAD Ta:25℃	47.4 V / 305 VAC 47.4 V / 230 VAC/ 42 47.8 V / 85 VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover

3	OVER TEMPERATURE PROTECTION	Protection type : Shut down o/p voltage, 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, 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℃	NO DAMAGE 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

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℃	TEST: OK
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℃	TEST: OK
3	DC OK SIGNAL	15Vdc/10mA resistive load 	I/P:230VAC O/P:FULL LOAD Ta:25℃	TEST: OK
4	PEAK Power	I/P: 100/305VAC O/P:  -------100VAC ———200VAC		TEST: OK

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q6 Rated OSG65R290FTF-F : 15 A /650 V	AC ON/OFF I/P:High-Line +3V =308V VDS: 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℃	VDS: (1) 472 V (2) 468 V (3) 468 V (4) 488 V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated OSG60R180FT3F : 20A /600V	I/P:High-Line +3V =308V AC ON/OFF 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℃	VDS: (1) 520 V (2) 516 V (3) 512 V (4) 528 V
3	Diode Peak Voltage	Q101 Rated : 45A/150V	AC ON/OFF I/P:High-Line +3V =308 V O/P: (1)Full Load (2) Dynamic Load 100% Load/ Min. Load 90%Duty/5KHz (3)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (4)0%→400% Load. Ta:25℃	Q101: VDS: (1) 96.5 V (2) 96.5 V (3) 99.7 V (4) 98.9 V
4	Control IC Voltage Test	PWM IC U2 Rated 9.6V~ 36V O/P IC U100 Rated 4.2V~ 35V	AC ON/OFF I/P:High-Line +3V =308 V O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)NO LOAD VRmin(LOW LINE) Ta:25℃	U2 (1) 19.0 V (2) 19.0 V (3) 19.0 V (4) 11.9 V U100 (1) 11.5 V (2) 10.3 V (3) 11.5 V (4) 6.38 V

■ 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℃	I/P-O/P: 1.95 mA I/P-FG: 2.26 mA O/P-FG: 1.63 m A NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500 VDC>100MΩ I/P-FG: 500 VDC>100MΩ O/P-FG: 500 VDC >100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25℃	I/P-O/P: >9999 MΩ I/P-FG: >9999 MΩ O/P-FG: >9999 MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	7 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℃	PASS
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℃	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℃	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℃	CRITERIA A
5	E.F.T	EN61000-4-4 INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERI A
6	SURGE	IEC61000-4-5 L-N ：2KV L,N-PE：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	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

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： NSP-200-48
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 29.7 ℃
2. HIGH AMBIENT BURN-IN： HRS
I/P： 230VAC O/P： FULL LOAD Ta= 63.0 ℃</td></tr>
<tr><td colspan="5">
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=29.7 ℃</th><th>HIGH AMBIENT Ta=63.0℃</th></tr>
<tr><td>1</td><td>ZNR1</td><td>52.5℃</td><td>86.0℃</td></tr>
<tr><td>2</td><td>LF1</td><td>54.1℃</td><td>87.7℃</td></tr>
<tr><td>3</td><td>C2</td><td>54.4℃</td><td>87.7℃</td></tr>
<tr><td>4</td><td>LF2</td><td>58.0℃</td><td>91.0℃</td></tr>
<tr><td>5</td><td>RY1</td><td>68.4℃</td><td>100.9℃</td></tr>
<tr><td>6</td><td>RTH1</td><td>58.0℃</td><td>90.7℃</td></tr>
<tr><td>7</td><td>C10</td><td>63.8℃</td><td>97.0℃</td></tr>
<tr><td>8</td><td>L1</td><td>77.4℃</td><td>111.5℃</td></tr>
<tr><td>9</td><td>Q1</td><td>60.9℃</td><td>94.6℃</td></tr>
<tr><td>10</td><td>D8</td><td>57.6℃</td><td>91.0℃</td></tr>
<tr><td>11</td><td>C5</td><td>58.9℃</td><td>91.0℃</td></tr>
<tr><td>12</td><td>C14</td><td>57.3℃</td><td>90.6℃</td></tr>
<tr><td>13</td><td>Q5</td><td>54.1℃</td><td>88.1℃</td></tr>
<tr><td>14</td><td>U2</td><td>64.6℃</td><td>97.4℃</td></tr>
<tr><td>15</td><td>C36</td><td>52.3℃</td><td>85.0℃</td></tr>
<tr><td>16</td><td>T1</td><td>67.0℃</td><td>99.1℃</td></tr>
<tr><td>17</td><td>C105</td><td>63.3℃</td><td>95.2℃</td></tr>
<tr><td>18</td><td>U101</td><td>60.1℃</td><td>91.9℃</td></tr>
<tr><td>19</td><td>U121</td><td>61.3℃</td><td>93.4℃</td></tr>
<tr><td>20</td><td>C200</td><td>57.7℃</td><td>91.4℃</td></tr>
<tr><td>21</td><td>BD2</td><td>62.2℃</td><td>94.7℃</td></tr>
<tr><td>22</td><td>D102</td><td>64.9℃</td><td>96.5℃</td></tr>
<tr><td>23</td><td>D103</td><td>68.8℃</td><td>99.8℃</td></tr>
<tr><td>24</td><td>U3</td><td>56.8℃</td><td>89.4℃</td></tr>
<tr><td>25</td><td>RTH3</td><td>64.9℃</td><td>97.1℃</td></tr>
<tr><td>26</td><td>TC(Q1)</td><td>52.3℃</td><td>84.3℃</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 230 VAC
O/P：122 %LOAD
Ta：25℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 305VAC/100VAC
O/P：100 %LOAD
Ta= -35℃</td><td>TEST：OK</td></tr>
</table>

4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 ℃/95 %R.H NO DAMAGE	I/P： 315 VAC O/P：FULL LOAD Ta= 60 ℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	± 0.05%/℃(0~60℃)	I/P： 230 VAC O/P：FULL LOAD	± 0.0081%/℃(0~60℃)
6	STORAGE TEMPERATURE TEST	-40~85℃	1. Thermal shock Temperature： -45℃~ +90℃ 2. Temperature change rate ：25℃ / 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℃	1. Thermal shock Temperature： -35℃~ +65℃ 2. Temperature change rate ：25℃ / 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℃	
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 60 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 60 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 60 ℃ LIFE TIME		(1) 334808.9HRS (2) 32608.9HRS (3) 50291.4HRS (4) 73898HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1775.2K hrs min. Telcordia SR-332 (Bellcore) ; 244.0K hrs min. MIL-HDBK-217F (25℃)		
11	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure : 50,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	HANXR	LIUTT	WANGZD

2020.10.1 TAG-QA-009