Test Report: NSP-3200-24

3200W Power Supply with Single Output

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Control Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

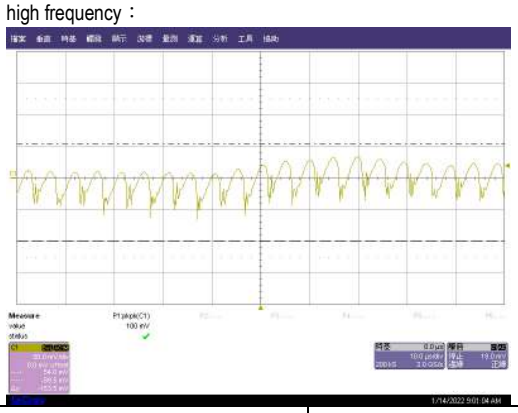
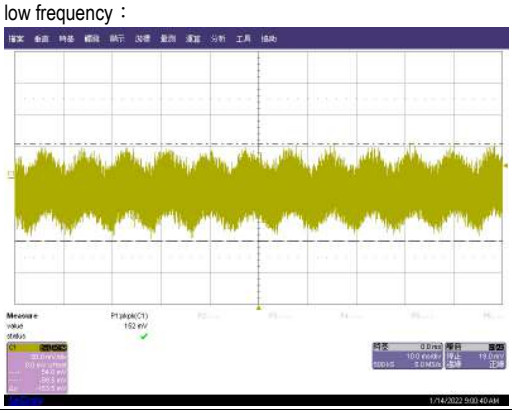
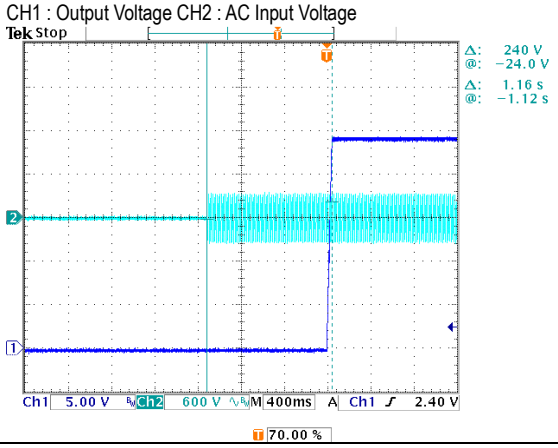
Safety Test
E.M.C. Test

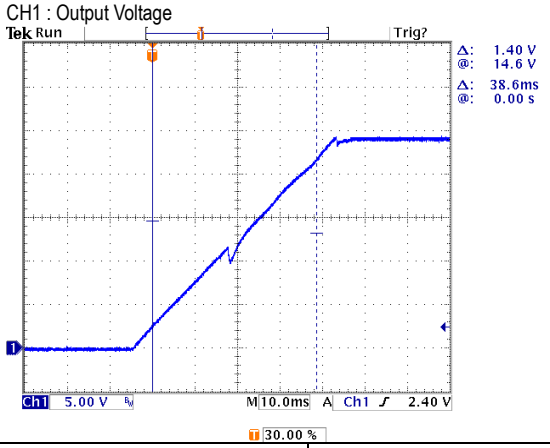
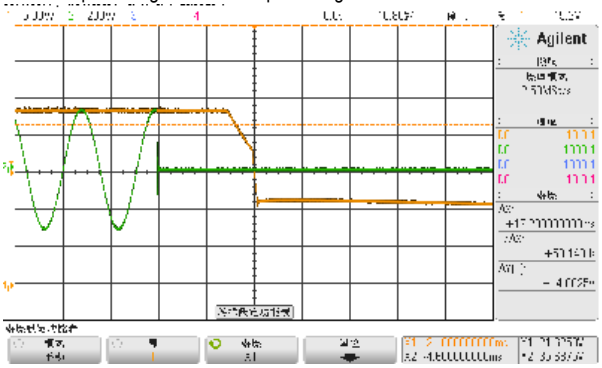
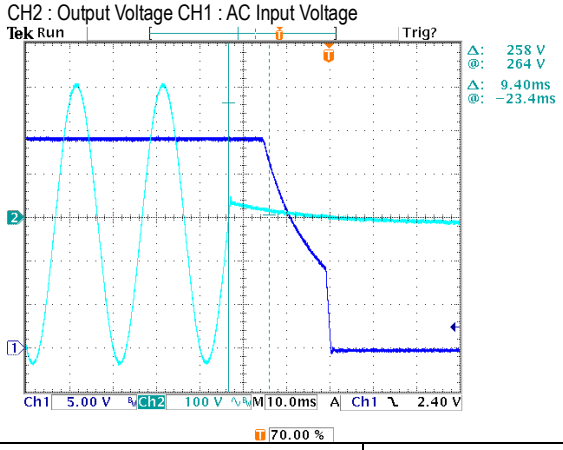
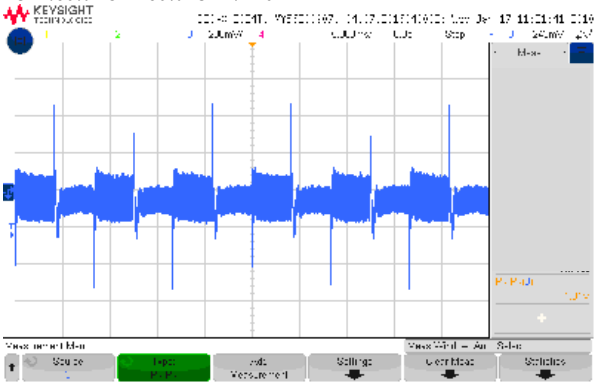
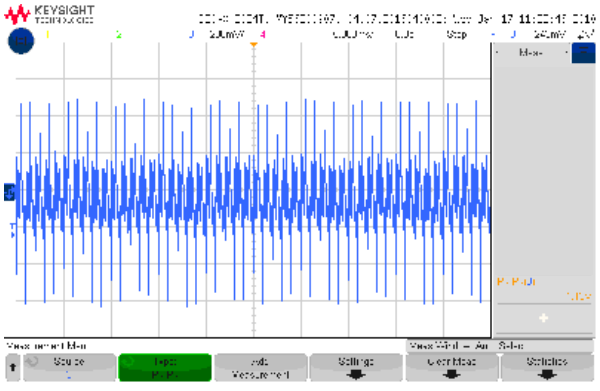
■ RELIABILITY TEST

ENVIRONMENT TEST

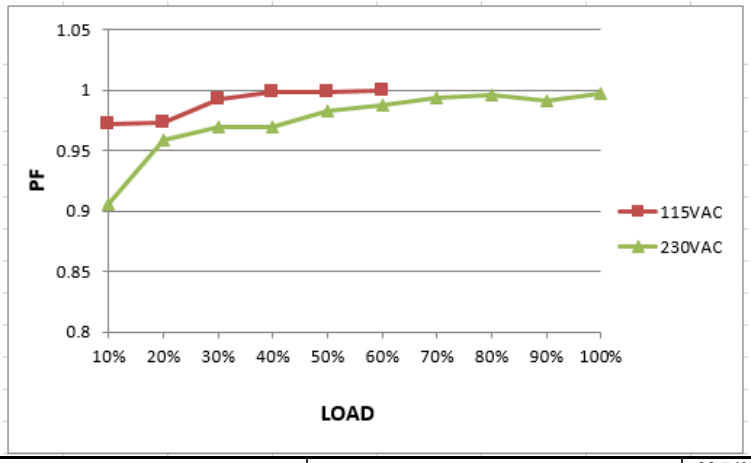
■ DESIGN VERIFY TEST

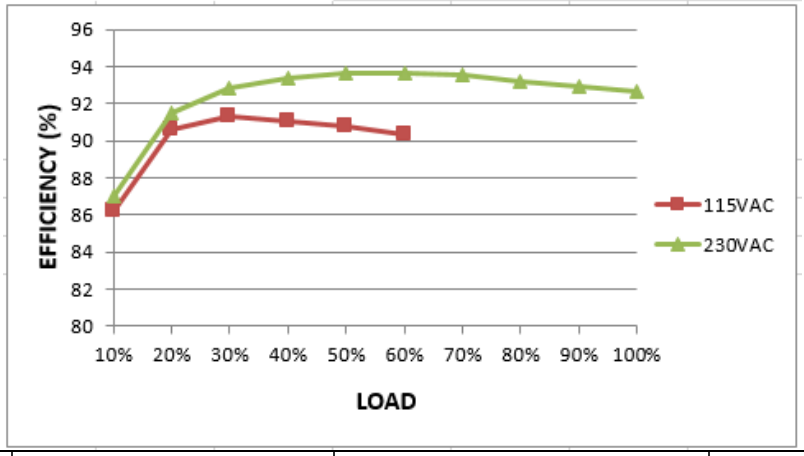
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 23.5 V~ 30V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	22.86V~30.99V/230VAC 22.86V~30.99V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 1 %~ -1 %	I/P: 180VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: 0.33%~0.33%
3	LINE REGULATION (Max)	V1: 0.5 %~ -0.5 %	I/P: 180VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1:0.13 %~-0.13%
4	LOAD REGULATION(Max)	V1: 0.5 %~ -0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: 0.33%~0.33%
5	OVER/UNDERSHOOT TEST	±10%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	<10%
6	RIPPLE & NOISE(Max)	V1: 300mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1 152 mVp-p
	high frequency： 		low frequency： 	
7	SET UP TIME(Max)	230VAC/1500ms	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 1160 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			

8	RISE TIME (Max)	230VAC/60ms	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 38.6ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 			
9	HOLD UP TIME (Typ.)	230VAC 70%/ 16ms 230VAC 100%/8ms	I/P： 230 VAC O/P：70% LOAD O/P：100% LOAD Ta：25℃	17.2ms (70% load) 9.4ms (100% load)
	INPUT=230VAC/50HZ @70% LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		INPUT=230VAC/50HZ @100% LOAD CH2 : Output Voltage CH1 : AC Input Voltage 	
10	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	 1010mVp-p(120HZ) 1130mVp-p(1KHZ)
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	

INPUT FUNCTION TEST

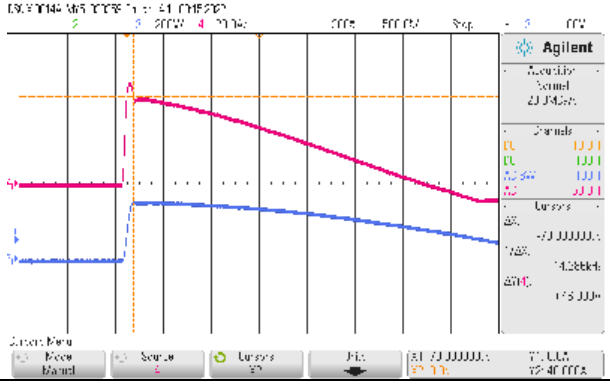
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC 127VDC~400VDC	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD (PLEASE CHECK DERATING CURVE) Ta:25℃	(1)168Vac~264Vac/FULL LOAD 85Vac~264Vac/50%LOAD (2)242Vdc~400Vdc/FULL LOAD 108Vdc~400Vdc/50% LOAD (3) 242Vdc~400Vdc/FULL LOAD 107Vdc~400Vdc/50% LOAD
			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)	TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:180 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 17 A	I/P ： 230 VAC O/P ：FULL LOAD Ta ：25℃	I =15.32 A/ 230VAC
4	LEAKAGE CURRENT	<2 mA / 230 VAC	I/P ： 230 VAC O/P ：Min LOAD Ta ：25℃	L-FG ：0.85 mA N-FG ：0.85 mA
5	POWER FACTOR (Typ.)	0.97 / 230VAC	I/P ： 230 VAC O/P ：FULL LOAD Ta ：25℃	PF= 0.996/230VAC
	P.F vs LOAD			
6	EFFICIENCY(Typ.)	93.5% / (75%LOAD)	I/P:230 VAC O/P:75%LOAD Ta:25℃	93.74%
	EFFICIENCY vs LOAD			



7	INRUSH CURRENT(Typ.)	230V/55 A COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I =46A/ 230VAC T50=1562 us/230V

INPUT=230VAC/50HZ @ FULL LOAD

CH4 : Input current CH3: input voltage



PROTECTION FUNCTION TEST

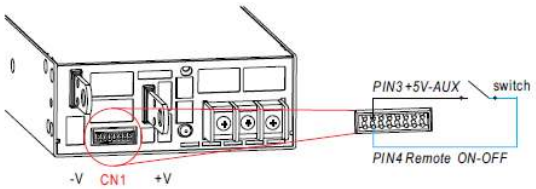
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105 %~ 115 % PROTECTION TYPE： Constant current limiting, shut down O/P voltage 5 sec. after O/P voltage is down low, re-power on to recover	I/P: 264VAC I/P: 230VAC I/P: 180VAC O/P:TESTING Ta:25℃	110.45%/ 264VAC 110.45%/ 230VAC 110.22%/180VAC PROTECTION TYPE：Constant current limiting, shut down O/P voltage 5 sec. after O/P voltage is down low, re-power on to recover
2	OVER VOLTAGE PROTECTION	31.5 V~ 37.5 V PROTECTION TYPE： Shut down o/p voltage, re-power on to recover	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P:MIN LOAD Ta:25℃	33.35V/ 264VAC 33.33V/ 230VAC 33.35V/ 90VAC PROTECTION TYPE：Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	NO DAMAGE PROTECTION TYPE： Shut down o/p voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 180VAC O/P:FULL LOAD	O.T.P. Active ROTECTION TYPE：Shut down o/p voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE PROTECTION TYPE： Constant current limiting, shut down	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE：Constant current limiting, shut down O/P voltage 5 sec. after O/P voltage is down low, re-power on to recover

		O/P voltage 5 sec. after O/P voltage is down low, re-power on to recover		

CONTROL FUNCTION 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>AUXILIARY POWER (AUX)</td><td colspan="3">Auxiliary voltage output, 10.6~13.2V, referenced to GND-AUX (pin2).
The maximum load current is 0.8A. This output has the built-in "Oring diodes" and is not controlled by “Remote ON-OFF”.
I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃

Test Result：
<table>
<tr><th>AUX</th><th>TOLERANCE</th><th>RIPPLE</th><th>TEST RESULT</th></tr>
<tr><td>12V / 0.8A</td><td>10.8~13.2 V</td><td>450mVp-p</td><td>11.73V /0.8A
226 mVp-p</td></tr>
</table></td></tr>
<tr><td>2</td><td>REMOTE ON/OFF CONTROL</td><td colspan="3">3. Remote ON-OFF Control
※ The power supply can be turned ON/OFF individually or along with other units by using the "Remote ON-OFF" function.

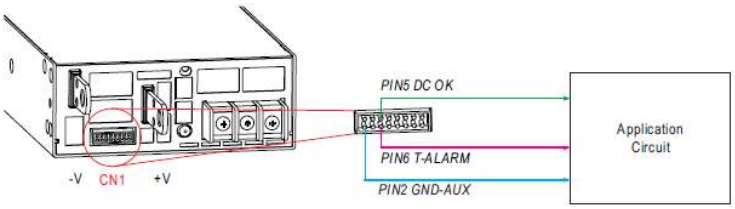
 

<table>
<tr><th>Between Remote ON-OFF and +5V-AUX</th><th>Power Supply Status</th></tr>
<tr><td>Switch Short</td><td>ON</td></tr>
<tr><td>Switch Open</td><td>OFF</td></tr>
</table>
I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃

Test Result：
<table>
<tr><th>Between ON/OFF and +5V-AUX</th><th>Power Supply Status</th></tr>
<tr><td>SW SHORT</td><td>ON</td></tr>
<tr><td>SW OPEN</td><td>OFF</td></tr>
</table></td></tr>
<tr><td>3</td><td>REMOTE SENSE</td><td>S+ / S-
>0.5V
Compensate voltage drop on the load wiring up to 0.5V.</td><td>I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃</td><td>> 0.5 V</td></tr>
</table>

4 ALARM SIGNAL

※ There are 2 alarm signals, DC OK and T-ALARM, in TTL signal form, on CN1. These signals are isolated from output. The maximum sink current is 10mA.



DC OK Fail signal	Power Supply Status
"High" > 3.5~5.5V	Vout ≦ 77%±5%
"Low" < -0.5~0.5V	Vout ≧ 80%±5%

T-ALARM	Power Supply Status
"High" > 3.5~5.5V	OFF (OTP or Fan Fail)
"Low" < -0.5~0.5V	ON (Normal Work)

DC OK SIGNAL
I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃

Test Result：

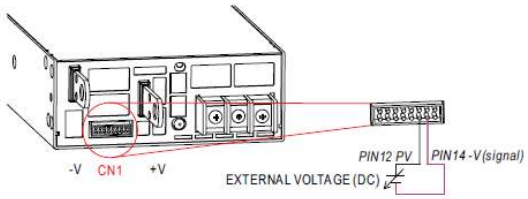
Vout	DC OK SIGNAL
Vout≦ 72%	4.9612V
Vout≧ 85%	0.0081v

T-ALARM
High (3.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm, or when Fan fails.
Low (-0.5 ~ 0.5V) : When the internal temperature is normal, and when Fan works normally.
The maximum sourcing current is 10mA and only for output(Note.2)
I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃

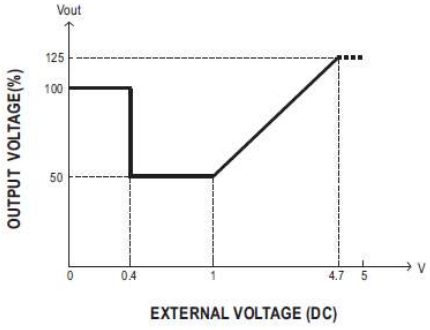
Test Result：

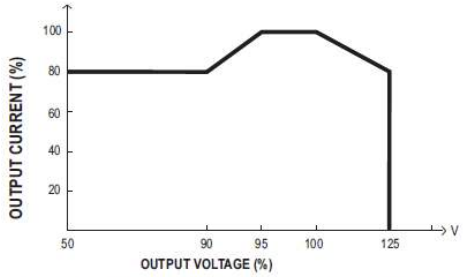
P.SU STATUS	Vo	T-ALARM SPEC	T-ALARM TEST
NORMAL	100%±2%	-0.5 ~0.5V	0.0081v
OTP	0V	3.5~5.5V	4.961V
FAN LOCK	0V	3.5~5.5V	4.961V

5	OUTPUT VOLTAGE PROGRAMMABLE (PV)	**2. Output Voltage Programming (or, PV / remote voltage programming / remote adjust / margin programming / dynamic voltage trim)** ※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed to 50~125% of the nominal voltage by applying EXTERNAL VOLTAGE.



◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.





◎ The rated current should change with the Output Voltage Programming accordingly.
◎ For Remote Sense / Local Sense, please refer to "Voltage Drop Compensation" section.

I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃
TEST RESULT：

PV / MODEL	<0.3V	1V	3.435V	4.7V	5V
SPEC	24V±5%	12V±5%	24V±5%	30V±5%	30V±5%
Vout	24.03V	12.063V	24.068V	30.47V	30.99V

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 52A/600V Q3 Rated 52A/600V	I/P:High-Line +3V =267V AC ON/OFF 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	Q1: VDS: (1)477 V (2)481 V (3)489V (4)493V (5)497V (6)493V (7)501V	Q3 VDS: (1)493 V (2)501 V (3) 493V (4)497V (5)501V (6)493V (7)493V

			(5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. PV=1V (8)100% LOAD (9)50% LOAD (10)10% LOAD	(8)477 V (9)469V (10)433V	(8)497 V (9) 493V (10)413 V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 900 Rated 52 A/600V Q 902 Rated 52 A/600V	I/P:High-Line +3V =267 V AC ON/OFF 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.	Q900: VDS: (1)505V (2)505V (3)505V (4)501V (5)503V (6)473V (7)477V	Q902: VDS: (1)493V (2)493V (3)491V (4)493V (5)497V (6)477V (7)457V
3	P.F.C DIODE	D8 Rated 16 A/600V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25℃	(1) 441V (2) 449V (3) 421V (4) 421V	
4	Diode Peak Voltage	Q101 Rated 100 A/100 V Q104 Rated 100 A/100 V Q107 Rated 100 A/100 V Q110 Rated 100 A/100 V	I/P:High-Line +3V =267 V AC ON/OFF 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).NO LOAD (9) burst mode	Q101: VDS: (1)85.7V (2)95V (3)68.8V (4)68.8V (5)68.8V (6)68V (7)67.2V (8)68V (9)58.3 Q107: VDS: (1)77.7V (2)96.2V (3)66.5V (4)68.1V (5)68.6V (6)69.4V (7)68.6V (8)69.4V (9)71V	Q104: VDS: (1)72.1V (2)83.4V (3)64.9V (4)64.1V (5)64.9V (6)62.5V (7)64.1V (8)71.3V (9)60.3V Q110: VDS: (1)80.2V (2)93.1V (3)74.6V (4)73.4V (5)68.2V (6)69.8V (7)70.5V (8)61.8V (9)65.8V

5	Input Capacitor Voltage	C5 Rated: 330μ/ 450V 105 ℃	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℃	(1)432V (2)424V (3)448V (4) 432V
6	Control IC Voltage Test	PWM IC U201 Rated 6.5 V~30V PFC IC U900 Rated 4.5V~20 V	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRMIN.(LOW LINE) Ta:25℃	U201 U900 (1) 14.9V (1) 13.9V (2) 15.1V (2)14.5V (3) 15.1 (3)14.9V (4) 12.7V (4)13.5V (5) 13.3V (5)12.7V
7	TOP SWITCHING STAND BY POWER	U71 Rate 20 A/ 800V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Remote On/Off Ta:25℃	 (1) 645V (2) 645V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG :2KVAC/min O/P-FG:1.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.8 KVAC/min Ta:25℃	I/P-O/P: 12.04 mA I/P-FG: 10.73mA O/P-FG: 23 m 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℃	I/P-O/P: 13 GΩ I/P-FG: 2.86GΩ O/P-FG: 5 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	25mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:100% LOAD Ta:25℃	Test by certified Lab
2	CONDUCTION	EN55022 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	Test by certified Lab
3	RADIATION	EN55022 CLASS A	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR：8KV / Contact：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A

6	SURGE	IEC61000-6-2 INDUSTRY 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

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL： NSP-3200-24 1. ROOM AMBIENT BURN-IN：1 HRS I/P： 230VAC O/P： FULL LOAD 2. HIGH AMBIENT BURN-IN： 1 HRS I/P： 230VAC O/P： FULL LOAD		

NO	Position	ROOM AMBIENT Ta= 25℃	HIGH AMBIENT Ta= 50℃
1	BD1	55.8℃	83.9℃
2	Q3	63.1℃	100.8℃
3	D7	62.9℃	96.0℃
4	Q902	57.9℃	92.4℃
5	Q109	56.2℃	93.1℃
6	Q104	52.6℃	87.3℃
7	C5	45.3℃	77.7℃
8	T1-2	44.2℃	78.3℃
9	T1-1	57.8℃	90.8℃
10	T2-2	59.4℃	93.4℃
11	T2-1	64.4℃	99.1℃
12	L3	62.4℃	97.6℃
13	T301	51.7℃	83.3℃
14	U71	58.4℃	91.2℃
15	C121	36.3℃	68.9℃
16	RT90	52.7℃	86.6℃
17	RT52	25.0℃	53.6℃
18	U110	37.9℃	71.6℃

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 230 VAC O/P： 110 % LOAD Ta：25℃	TEST：OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 230VAC /180VAC O/P： 100 % LOAD Ta= -25℃	TEST：OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃ NO DAMAGE	I/P： 272 VAC O/P：FULL LOAD Ta= 50℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃(0~50℃)	I/P： 230 VAC O/P：FULL LOAD	± 0.002 %/℃(0~50℃)

6	STORAGE TEMPERATURE TEST	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	OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature： -25℃~ +55℃ 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	OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：12min/sweep cycle (4) Acceleration：2G (5) Test Time：60min in each axis (X.Y.Z) (6) Ta：25℃	TEST：OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C121 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= 50 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 50 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 50 ℃ LIFE TIME	(1) 413789HRS (2) 43196HRS (3) 159061HRS (4) 427594HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 637.4K hrs min. Telcordia SR-332 (Bellcore) ; 63.7K 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	DANIEL GAO	SANFORD SU	VINCENT TSENG

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