Test Report: NSP-320-15

320W 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

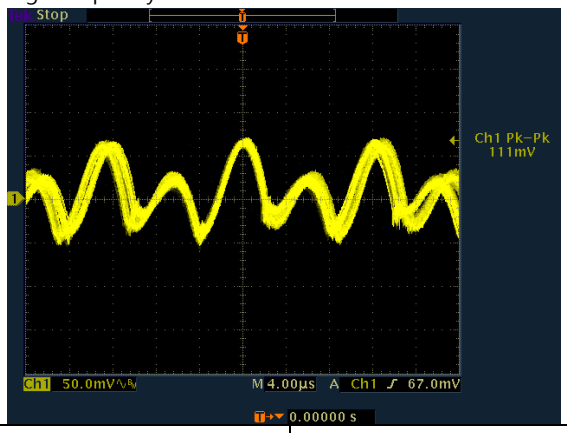
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

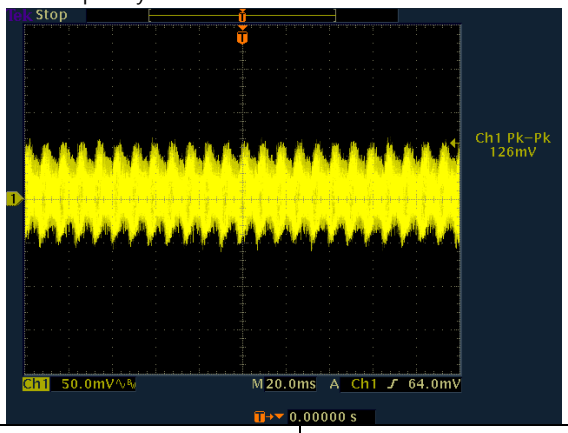
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 15V~19V	I/P： 230 VAC O/P：MIN LOAD Ta：25℃	14.27V~20.05V/230VAC
2	OUTPUT VOLTAGE TOLERANCE	V1:-2%~2%	I/P: 85VAC /305VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.06%~ 0.4%
3	LINE REGULATION	V1: -0.5%~ 0.5%	I/P: 85VAC~ 305VAC O/P:FULL LOAD Ta:25℃	V1: 0%~ 0%
4	LOAD REGULATION	V1: -0.5%~ 0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.02%~0.03%
5	OVER/UNDERSHOOT TEST	<±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	2.26%
6	RIPPLE & NOISE (Max)	V1:200mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta:25℃	V1: 126mVp-p

high frequency :



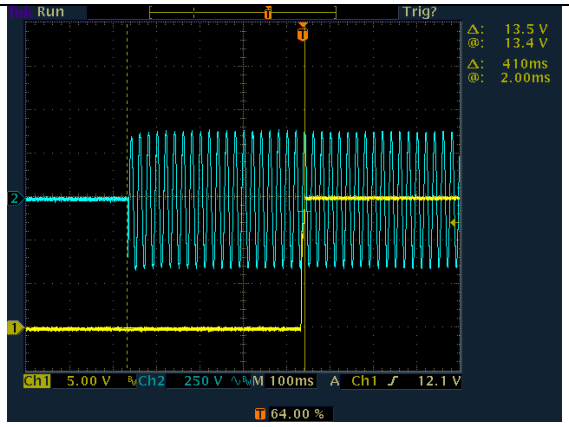
low frequency :

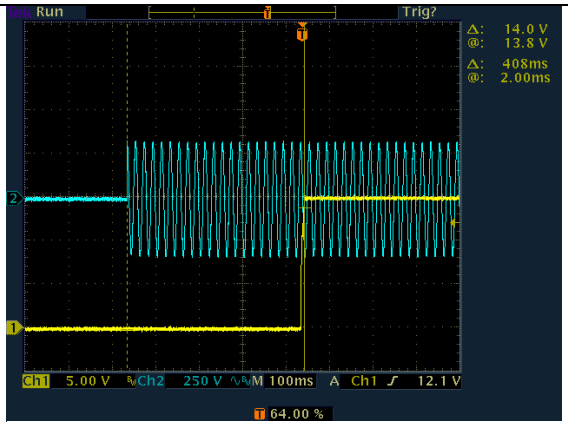


7	SET UP TIME(Max)	277VAC/1000ms 230VAC/1000ms 115VAC/1500ms	I/P： 277 VAC I/P： 230 VAC I/P： 115VAC O/P：FULL LOAD Ta：25℃	277VAC/ 410ms 230VAC/ 408ms 115VAC/360ms

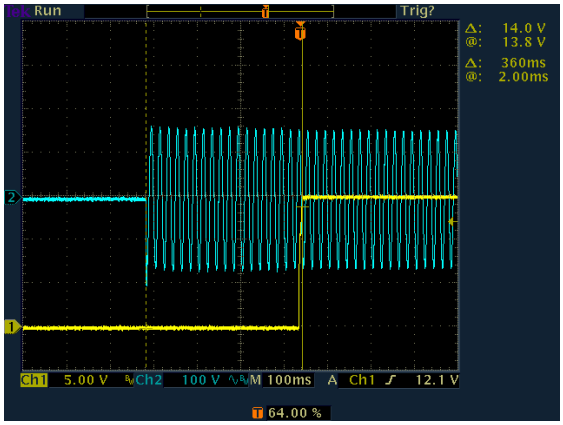
INPUT=277VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

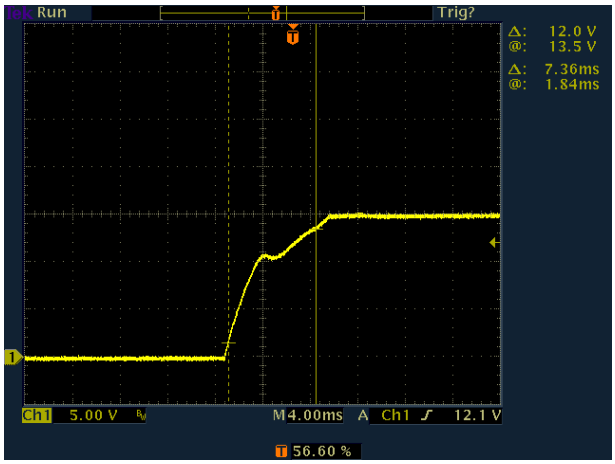
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage





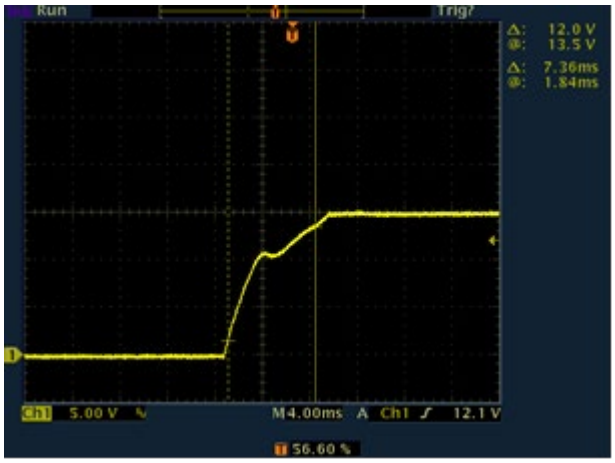
INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



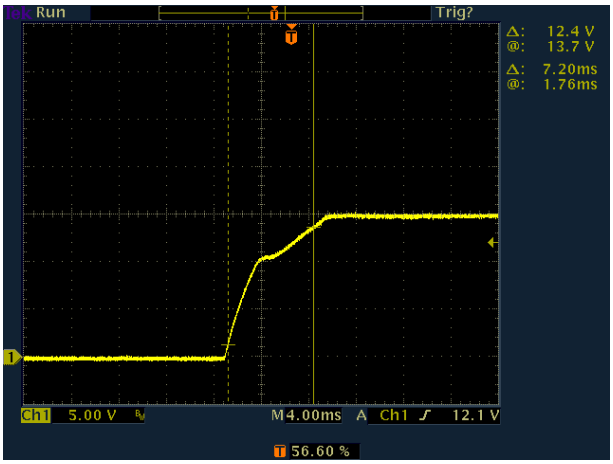


8	RISE TIME (Max)	277VAC/80ms 230VAC/80ms 115VAC/80ms	I/P : 277 VAC I/P : 230 VAC I/P : 115VAC O/P : FULL LOAD Ta : 25℃	277VAC/7.36ms 230VAC/7.2ms 115VAC/ 6.88ms

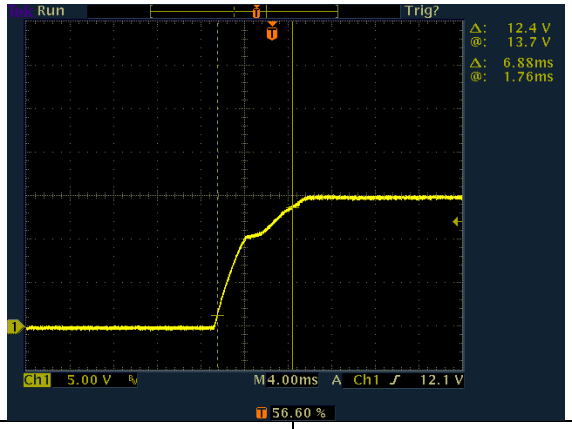
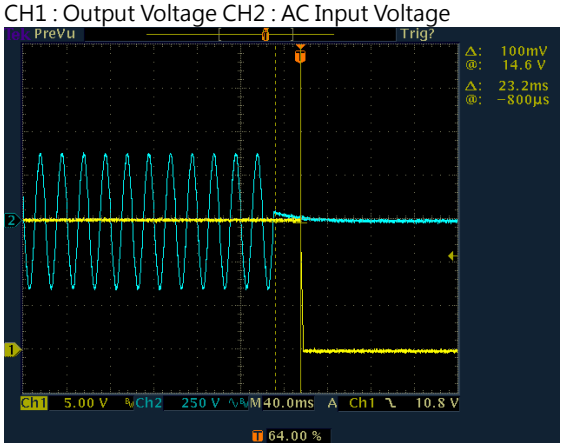
INPUT=277VAC/60HZ @ FULL LOAD
CH1 : Output Voltage

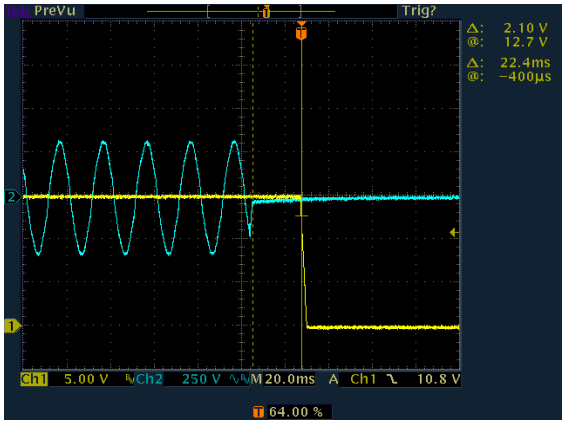


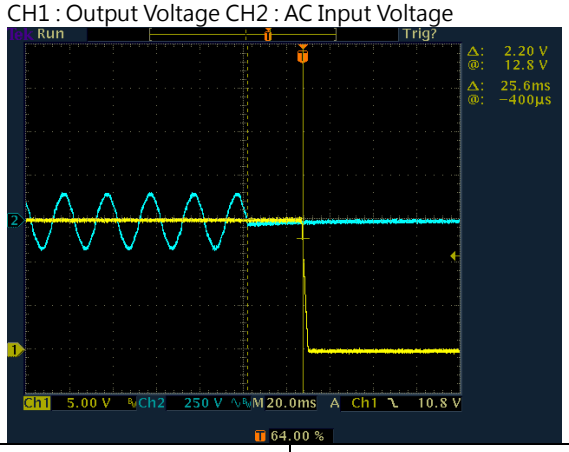
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



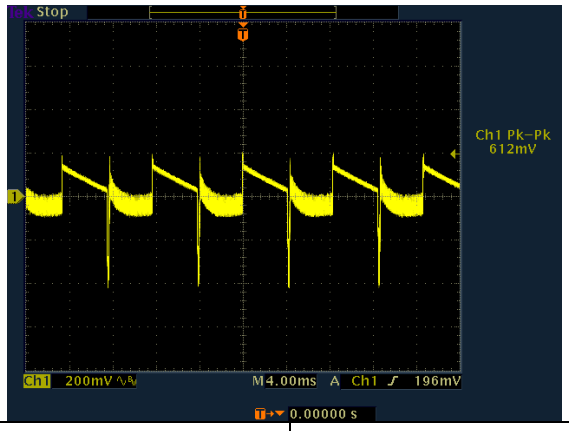
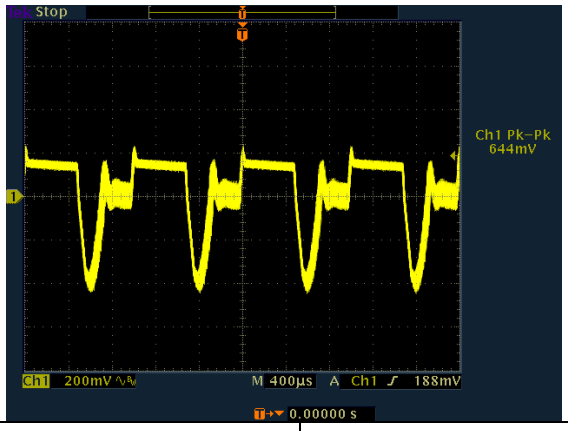
INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage

<table>
<tr><td></td><td colspan="4"> 
</td></tr>
<tr><td>9</td><td>HOLD UP TIME (Typ.)</td><td>277VAC/16ms
230VAC/16ms
115VAC/16ms</td><td>I/P： 277VAC
I/P： 230 VAC
I/P： 115VAC
O/P：FULL LOAD
Ta：25℃</td><td>277VAC/23.2ms
230VAC/ 22.4ms
115VAC/ 25.6ms</td></tr>
<tr><td></td><td colspan="4">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
 
</td></tr>
<tr><td>10</td><td>DYNAMIC LOAD</td><td>V1: 1500mVp-p</td><td>I/P: 230VAC
O/P:
(1)FULL /50% LOAD 50%DUTY / 120HZ
(2)FULL /50% LOAD 50%DUTY / 1KHZ</td><td>

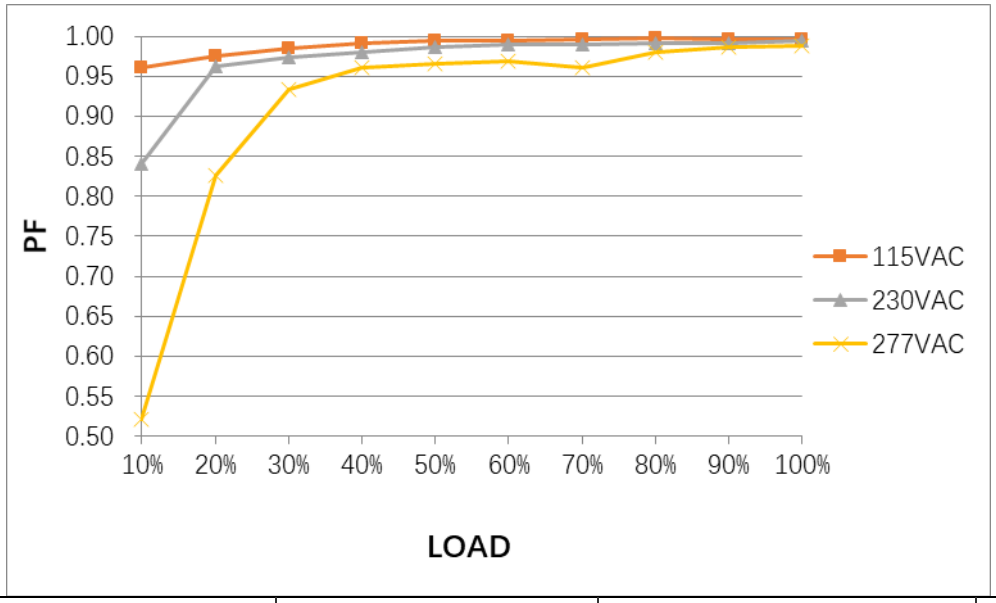
612mVp-p
644mVp-p</td></tr>
</table>

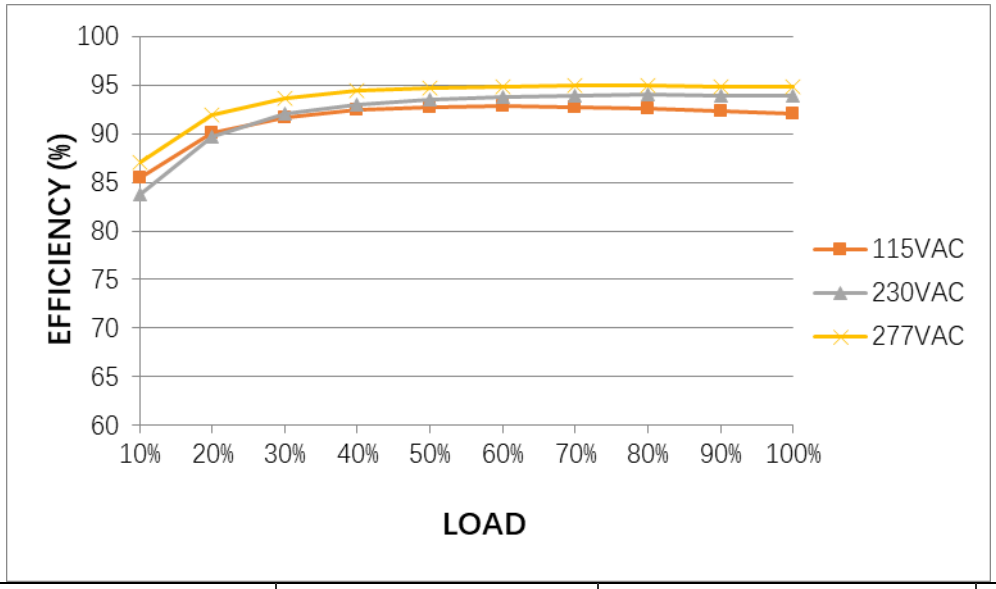
			Ta:25℃	
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	
11	TRANSIENT RECOVERY TIME	V1:1500mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	259mVp-p 144 us

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) 80V~308V (2) 117Vdc~ 424Vdc/FULL LOAD 117Vdc~ 424Vdc/50% LOAD (3) 117Vdc~424Vdc/FULL LOAD 117Vdc~424Vdc/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℃	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℃	I =1.22A/ 277VAC I =1.48A/ 230VAC I =3.01A/ 115VAC
4	LEAKAGE CURRENT	<350µA / 277 VAC touch current<100µA (Peak)/	I/P： 277 VAC O/P：Min LOAD Ta：25℃	282µA for Earth 52µA for touch

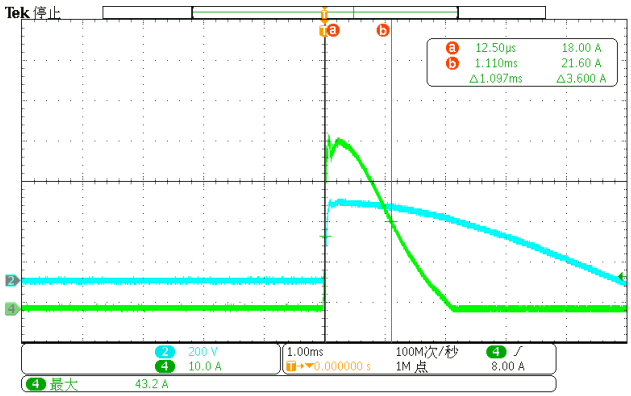
		277 VAC		
5	POWER FACTOR (Typ.)	0.9/ 277VAC 0.93/ 230VAC 0.98/115VAC	I/P： 277 VAC I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	PF=0.988/277VAC PF=0.994/230VAC PF=0.996/115VAC
	P.F vs LOAD			
6	EFFICIENCY(Typ.)	93.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	93.94%
	EFFICIENCY vs LOAD			
7	NO LOAD POWER CONSUMPTION(Typ.)	Remote Power ON： 3W/277VAC 3W/230VAC 3W/115VAC	I/P： 277 VAC I/P： 230 VAC I/P： 115 VAC O/P：RC ON/RC OFF	Remote Power ON： 1.86W/277VAC 1.90W/230VAC 2.06W/115VAC



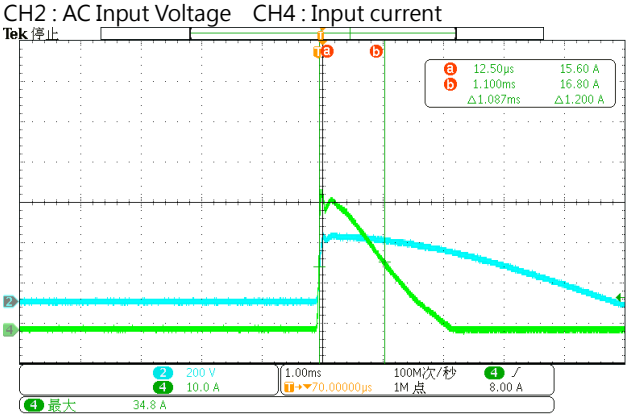


		Remote Power OFF : 0.5W/277VAC 0.5W/230VAC 0.3W/115VAC	Ta：25℃	Remote Power OFF : 0.41W/277VAC 0.31W/230VAC 0.13W/115VAC
8	INRUSH CURRENT(Typ.)	277VAC/50A 230VAC/40A 115VAC/20A COLD START	I/P： 277 VAC I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I =43.2A/ 277VAC T50=1097us/277VAC I =34.8A/ 230VAC T50=1087us/230VAC I =16.8A/ 115VAC T50=877.5 us/115VAC

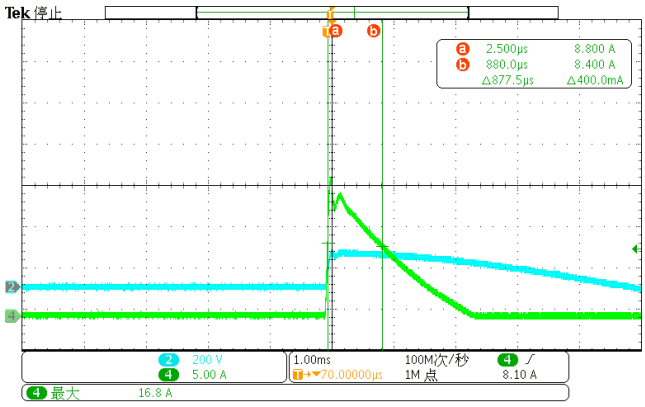
INPUT=277VAC/50HZ @ FULL LOAD
CH2 : AC Input Voltage CH4 : Input current



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



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



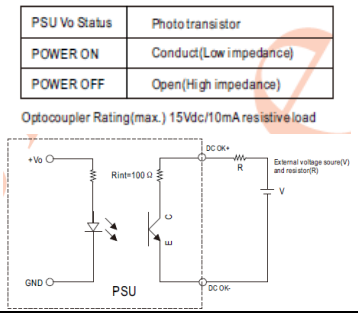
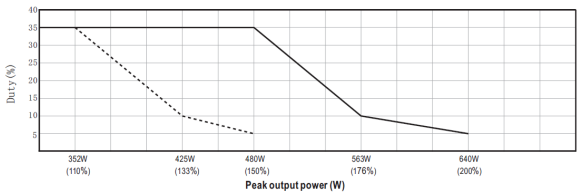
PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 200%	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P:TESTING Ta:25℃	130.2%/ 305VAC 130.1%/ 230VAC 130.2%/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	20V~25V	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P:MIN LOAD Ta:25℃	23.5V/ 305VAC 23.5V/ 230VAC 23.5V/ 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℃	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	FAN CONTROL & NOISE	(1)Fan ON/OFF control : RTH4≥50℃±10℃ FAN ON RTH4≤40℃±10℃ FAN OFF (2) FAN NOISE : ＜40dB@100% load with Ta=25℃	I/P:230VAC O/P: FULL LOAD	TEST: (1) ok (2) 39.8 dB Ta:25℃
5	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 650V/15A	AC ON/OFF I/P:High-Line +3V =308V 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℃	VDS: (1) 482V (2) 478V (3) 486V (4) 486V (5) 490V (6) 482V (7) 490V
2	Diode Peak Voltage	Q101 Rated 80A/ 100V	AC ON/OFF I/P:High-Line +3V =308 V O/P: (1)Full Load (2)Dynamic Load Full Load/	Q101: VDS: (1) 44.6V (2) 45V

			Min. Load 90%Duty/5KHz (3)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (4)0%→400% Load. Ta:25℃	(3) 45V (4) 7.6V
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℃	U2 (1) 19.5V (2) 19.5V (3) 19.5V 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: 4.62 KVAC/min I/P-FG: 2.52 KVAC/min O/P-FG: 1.8 KVAC/min Ta:25℃	I/P-O/P: 2.458 mA I/P-FG: 2.236 mA O/P-FG: 1.852 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℃	10mΩ

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 □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℃	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℃	NA

5	E.F.T	EN61000-4-4 INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	NA
6	SURGE	IEC61000-4-5 L-N ：2KV L,N-PE：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	NA
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-320-12 1. ROOM AMBIENT BURN-IN： 2HRS I/P： 230VAC O/P： FULL LOAD Ta=25.5 ℃ 2. HIGH AMBIENT BURN-IN： 2HRS I/P： 230VAC O/P： FULL LOAD Ta=62.3℃		

NO	Position	ROOM AMBIENT Ta=25.5℃	HIGH AMBIENT Ta=62.3℃
1	C1	33.3℃	70.5℃
2	LF1	39.6℃	77.2℃
3	C2	37.5℃	74.5℃
4	LF2	39.1℃	76.4℃
5	C10	36.6℃	74.2℃
6	L1	52.4℃	92.9℃
7	BD1	43.7℃	79.5℃
8	C5	41.0℃	77.5℃
9	Q2	47.2℃	83.5℃
10	D8	47.5℃	83.8℃
11	Q5	46.8℃	85.9℃
12	U2	44.1℃	82.2℃
13	C36	41.2℃	78.9℃
14	T1coil	53.0℃	93.6℃
15	C201	39.6℃	75.7℃
16	U100	60.2℃	96.2℃
17	Q103	51.2℃	87.7℃
18	C105	45.7℃	82.1℃
19	RTH3	49.0℃	85.1℃
20	TSW1	47.2℃	87.7℃

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 230 VAC O/P： 130.1%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 ℃	TEST：OK
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	± 0.0067%/℃(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) 564504.5HRS (2) 51298.4HRS (3) 98473.1HRS (4) 170307.3HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1699.1K hrs min. Telcordia SR-332 (Bellcore) ; 257.1K 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