Test Report: NSP-320-36

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

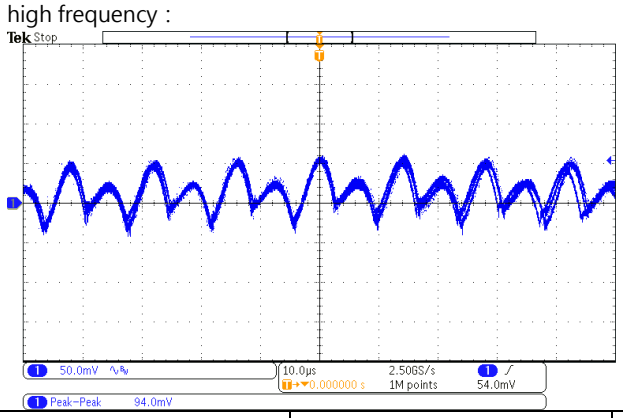
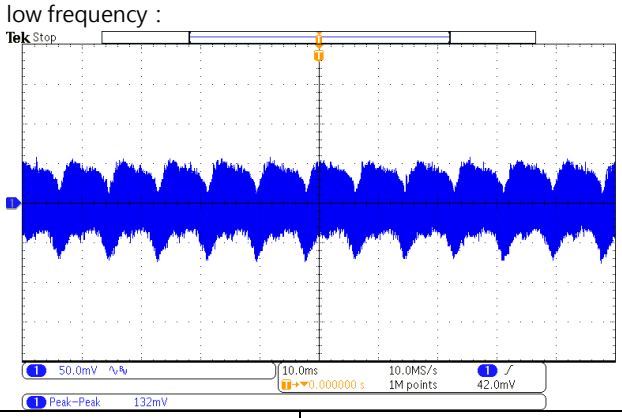
Safety Test
E.M.C. Test

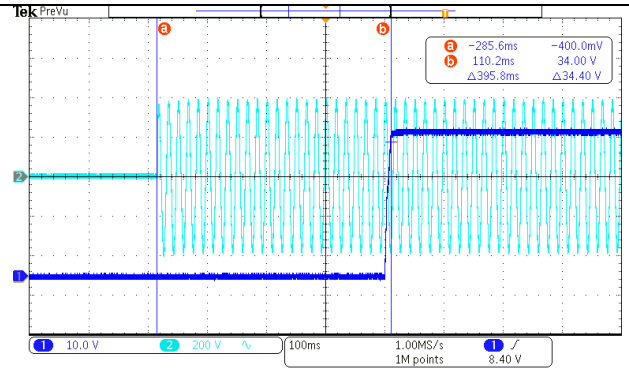
■ RELIABILITY TEST

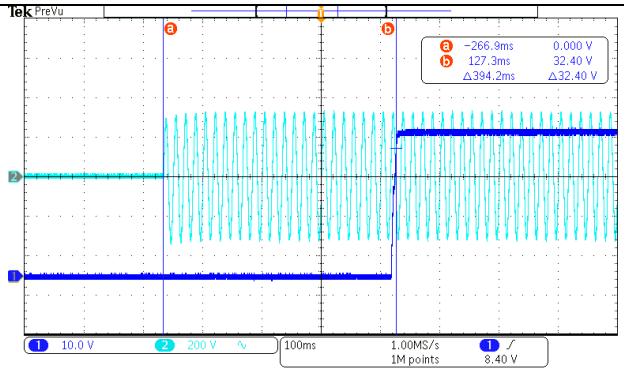
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

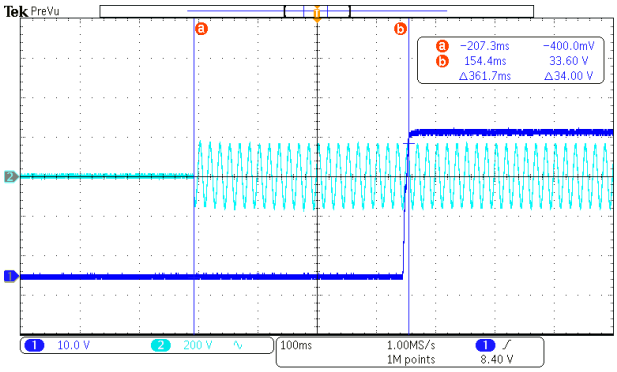
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 32V~ 43V	I/P： 230 VAC O/P：MIN LOAD Ta：25℃	31.02V~44.44V/230VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1.0%~ 1.0%	I/P: 85VAC /305VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: 0.27%~0.3%
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: -0.03%~0.03%
5	OVER/UNDERSHOOT TEST	<± 5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	1.05%
6	RIPPLE & NOISE (Max)	V1:240mVp-p	I/P: 230 VAC O/P: FULL LOAD Ta:25℃	V1: 132mVp-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/395.8ms 230VAC/394.2ms 115VAC/361.7ms
	INPUT=277VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	



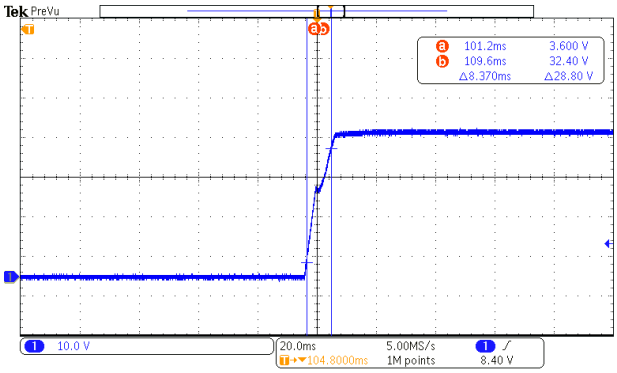


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

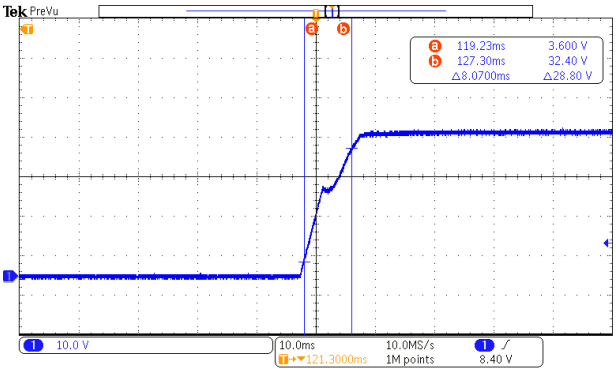


8	RISE TIME (Max)	277VAC/80ms 230VAC/80ms 115VAC/80ms	I/P： 277 VAC I/P： 230 VAC I/P： 115VAC O/P：FULL LOAD Ta：25℃	277VAC/8.37ms 230VAC/8.07ms 115VAC/8.74ms

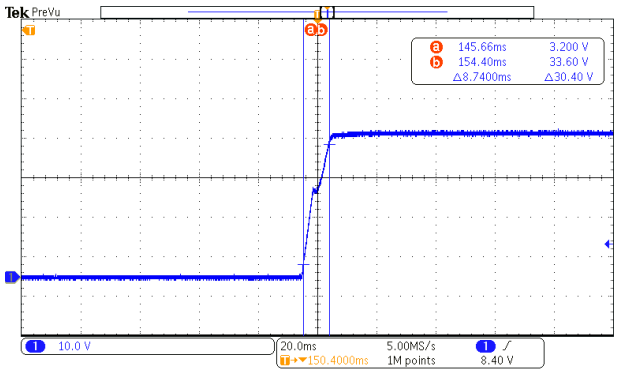
INPUT=277VAC/60HZ @ FULL LOAD
CH1 : Output Voltage



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

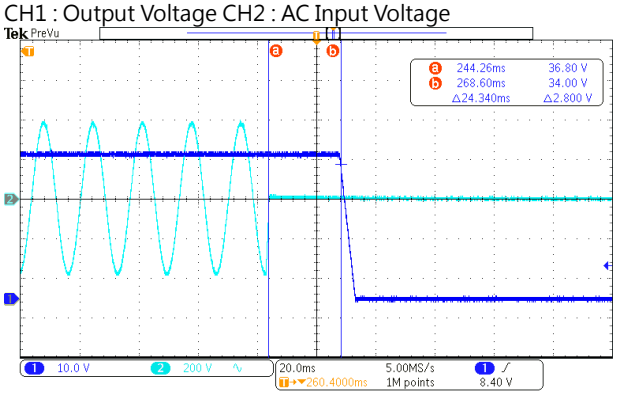


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage

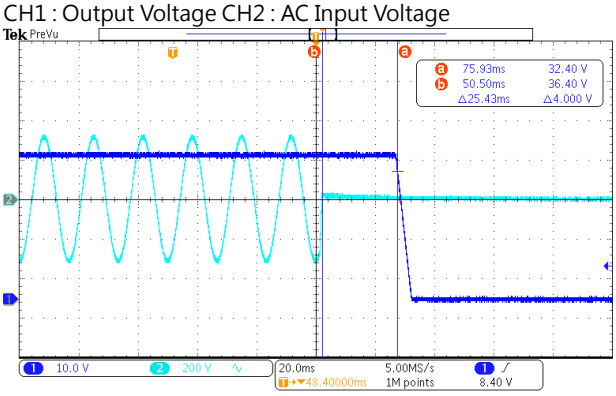


9	HOLD UP TIME (Typ.)	277VAC/16ms 230VAC/16ms 115VAC/16ms	I/P： 277VAC I/P： 230 VAC I/P： 115VAC O/P：FULL LOAD Ta：25℃	277VAC/24.34ms 230VAC/25.43ms 115VAC/25.77ms

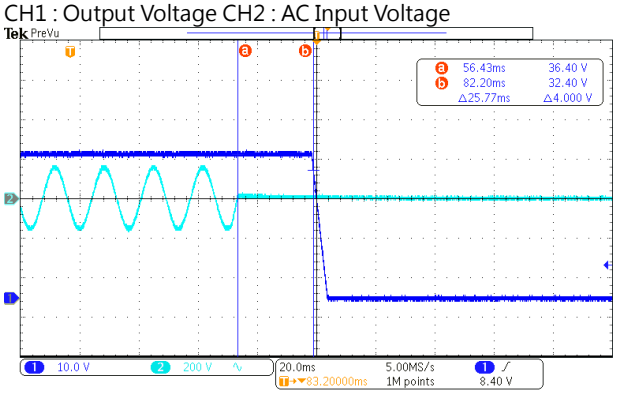
INPUT=277VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



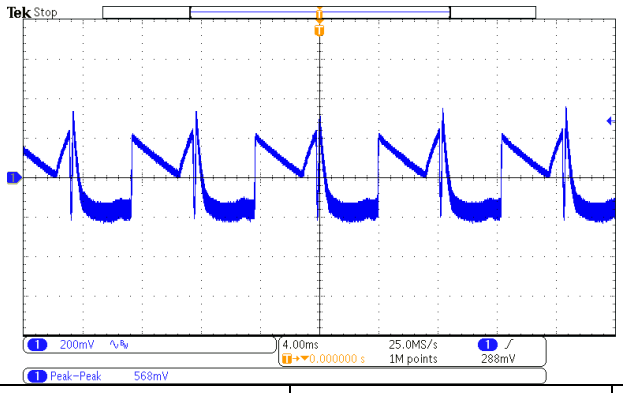
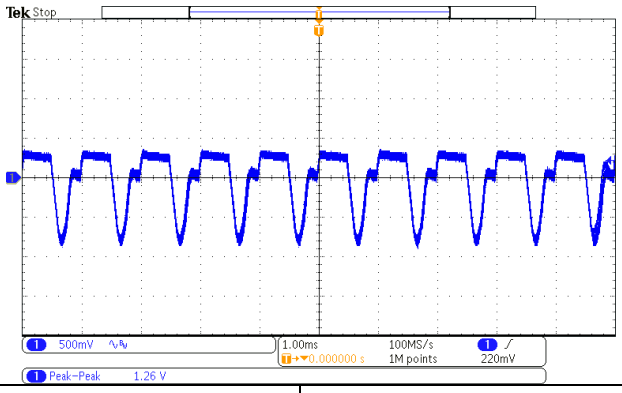
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



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

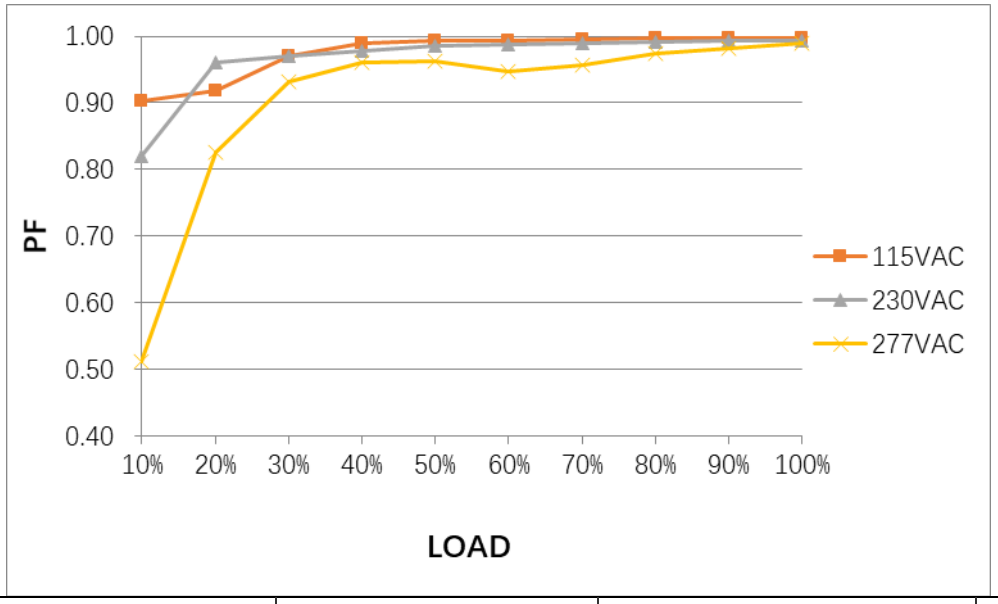
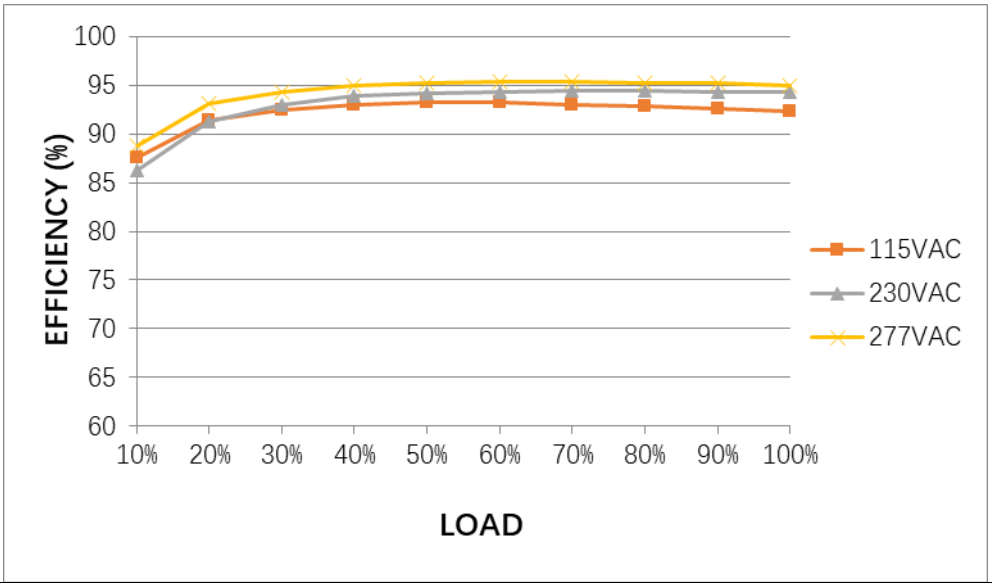


10	DYNAMIC LOAD	V1: 3600mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	 568mVp-p 1260mVp-p

	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	
11	TRANSIENT RECOVERY TIME	V1: 3600mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	392mVp-p 371us

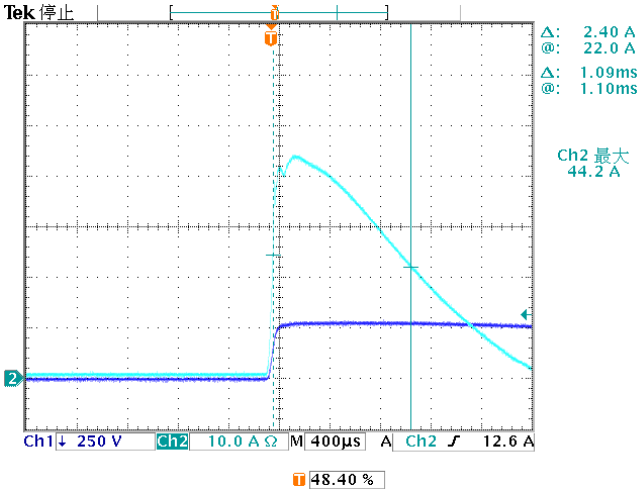
INPUT FUNCTION TEST

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~ 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:85VAC ~305VAC 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 =1.47A/ 230VAC I =2.99A/ 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℃	263μA for Earth 28μA 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=0.989/277VAC PF=0.994/230VAC PF=0.998/115VAC

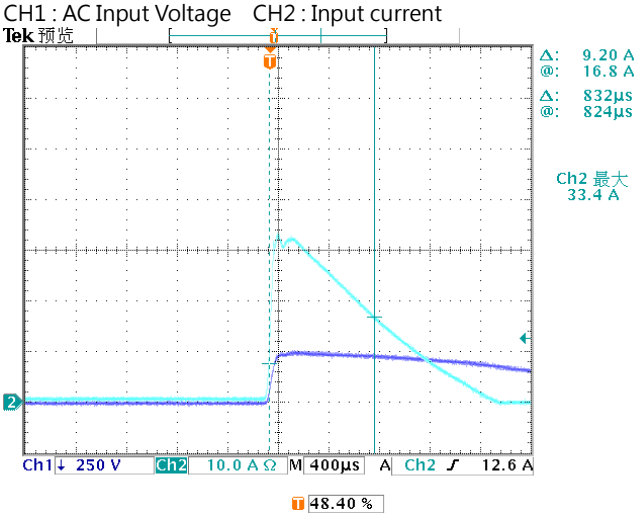
			O/P：FULL LOAD Ta：25℃	
	P.F vs LOAD 			
6	EFFICIENCY(Typ.)	93.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	94.27%
	EFFICIENCY vs LOAD 			
7	NO LOAD POWER CONSUMPTION(Typ.)	Remote Power ON： 3W/277VAC 3W/230VAC 3W/115VAC Remote Power OFF： 0.50W/277VAC 0.50W/230VAC 0.30W/115VAC	I/P： 277 VAC I/P： 230 VAC I/P： 115 VAC O/P：RC ON/RC OFF Ta：25℃	Remote Power ON： 2.56W/277VAC 2.57W/230VAC 2.66W/115VAC 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 =44.2A/ 277VAC T50=1090 us/277VAC I =33.4A/ 230VAC T50= 832us/230VAC I =16.9A/ 115VAC T50= 912us/115VAC

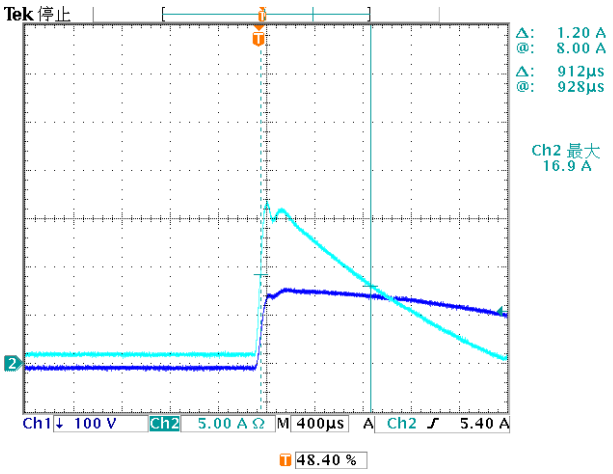
INPUT=277VAC/50HZ @ FULL LOAD
CH2 : AC Input Voltage CH2 : Input current



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



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



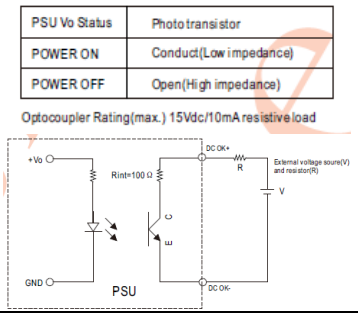
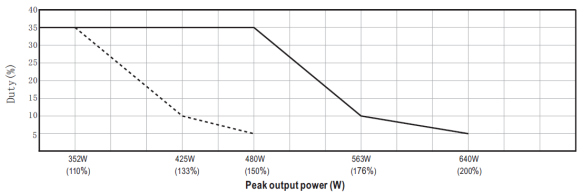
PROTECTION FUNCTION TEST

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℃	124.7%/ 305VAC 124.6%/ 230VAC 124.7%/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	44V~54V 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℃	48.6V/ 305VAC 48.6V/ 230VAC 48.6V/ 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	TEST: OK

			Ta:25℃	
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) 39.5 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	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℃	VDS: (1) 483V (2) 487V (3) 179V (4) 483V (5) 479V (6) 499V (7) 487V
2	Diode Peak Voltage	Q102 Rated 45A/150V	AC ON/OFF I/P:High-Line +3V =308 V O/P: (1)Full Load	Q102: VDS: (1) 107V

			(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℃	(2) 106V (3) 107V (4) 35.6V
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) 19.3V (2) 19.3V (3) 19.3V U101 (1) 12.9V (2) 10.9V (3) 12.9V

■ 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℃	I/P-O/P: 2.368 mA I/P-FG: 2.136 mA O/P-FG: 1.951 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℃	8mΩ

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℃	CRITERIA A
5	E.F.T	EN61000-4-4 INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	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℃	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-320-24 1. ROOM AMBIENT BURN-IN： 2HRS I/P： 230VAC O/P： FULL LOAD Ta= 36.8℃ 2. HIGH AMBIENT BURN-IN： 2HRS I/P： 230VAC O/P： FULL LOAD Ta= 63.8℃		

NO	Position	ROOM AMBIENT Ta=36.8℃	HIGH AMBIENT Ta=63.8℃
1	C1	38.8℃	69.1℃
2	LF1	44.5℃	74.5℃
3	C2	42.1℃	74.3℃
4	C10	41.7℃	74.3℃
5	R5	53.8℃	84.2℃
6	L1	56.0℃	90.1℃
7	C5	47.3℃	78.8℃
8	Q1	54.8℃	86.1℃
9	Q2	55.2℃	86.2℃
10	C14	48.3℃	82.4℃
11	Q5	52.2℃	88.2℃
12	U2	50.9℃	82.7℃
13	T1coil	56.8℃	87.7℃
14	T1core	51.6℃	83.2℃
15	U100	56.1℃	88.1℃
16	Q102	52.9℃	87.8℃
17	C105	46.7℃	78.0℃
18	RTH3	52.5℃	83.6℃
19	TSW1	52.1℃	86.0℃

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 230 VAC O/P： 124.26 % 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	± 0.002 %/℃(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) 1711137.4HRS (2) 110717.5HRS (3) 147368.8HRS (4) 175287.3HRS	
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