Test Report: HRP-300N3-12

300W Ultra-High Peak 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

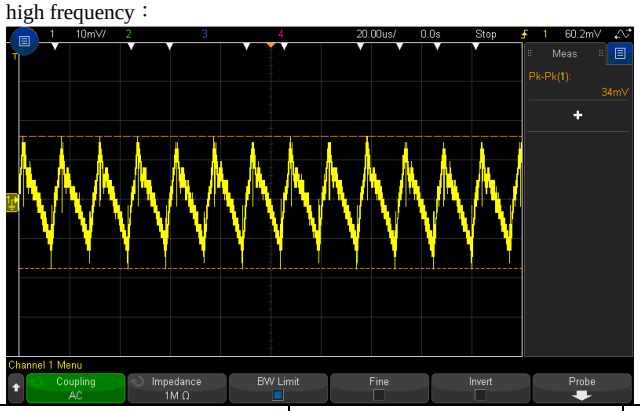
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

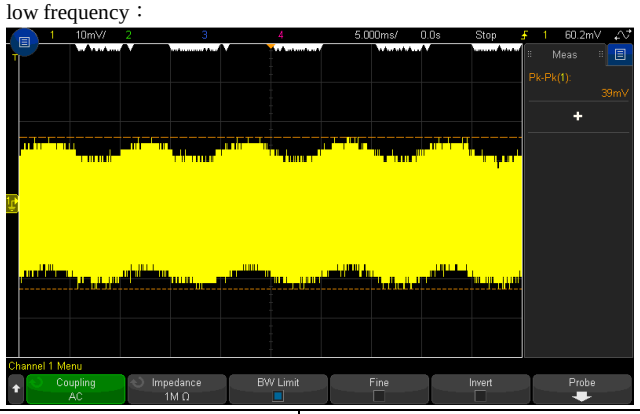
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1:10.2 V~ 13.8 V	I/P：230VAC I/P：115VAC O/P：MIN LOAD Ta：25℃	9.83V~ 14.61V/230VAC 9.83V~ 14.61V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1:-1.0 % ~ +1.0 %	I/P: 85VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.04 % ~ 0.02 %
3	LINE REGULATION (Max)	V1:-0.3 % ~ +0.3 %	I/P: 85VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: -0.01 % ~ 0.01 %
4	LOAD REGULATION(Max)	V1:-0.5 % ~ +0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.04 % ~ 0.02 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	0.8%
6	RIPPLE & NOISE(Max)	V1: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 39mVp-p

high frequency：



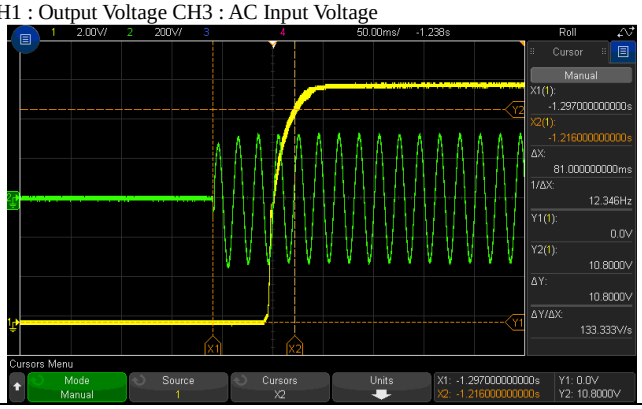
low frequency：



7	SET UP TIME(Max)	230VAC/ 1000ms 115VAC/2500ms	I/P：230VAC I/P：115VAC O/P：FULL LOAD Ta：25℃	230VAC/ 81 ms 115VAC/ 151.8 ms

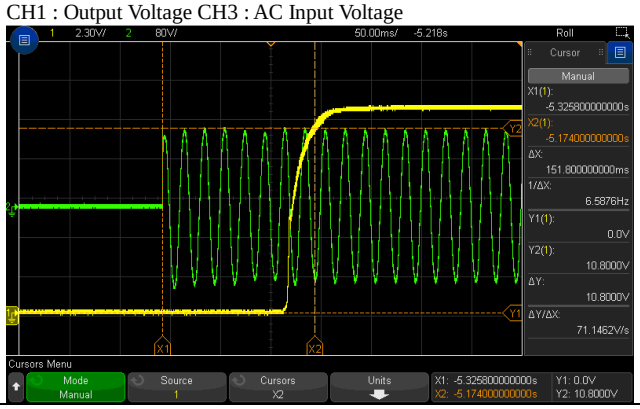
INPUT=230VAC/50HZ @ FULL LOAD

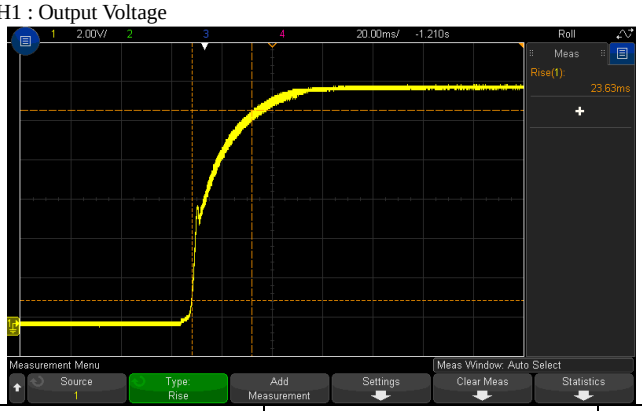
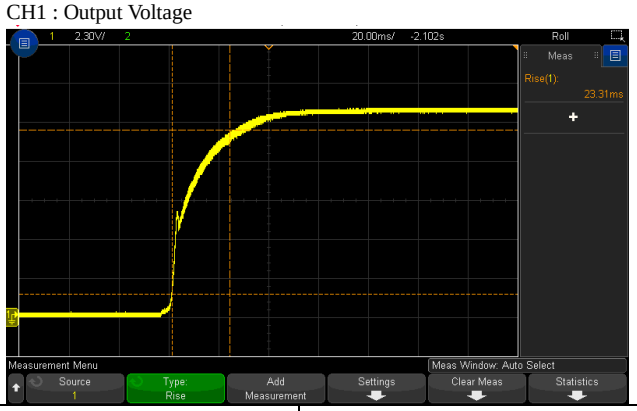
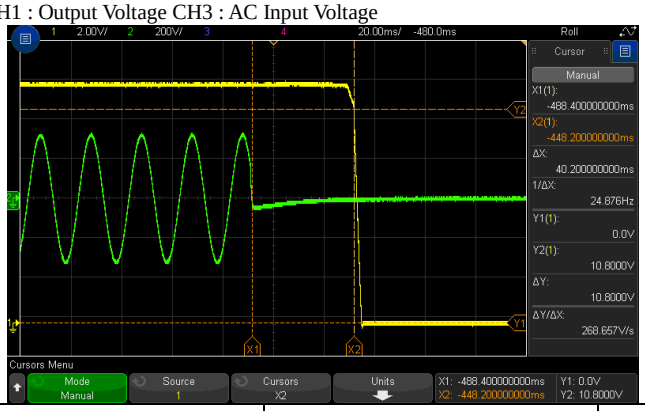
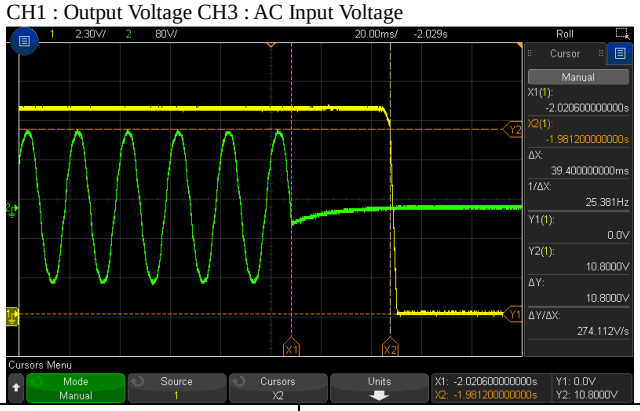
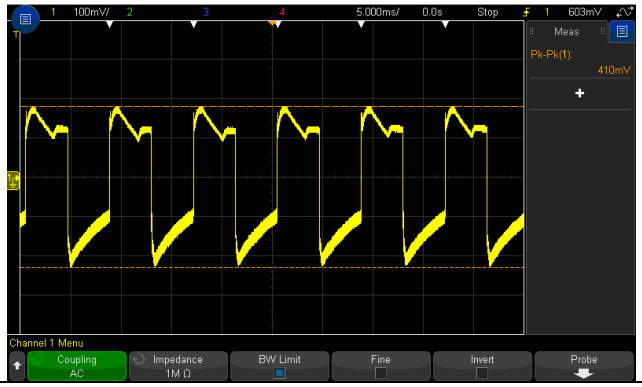
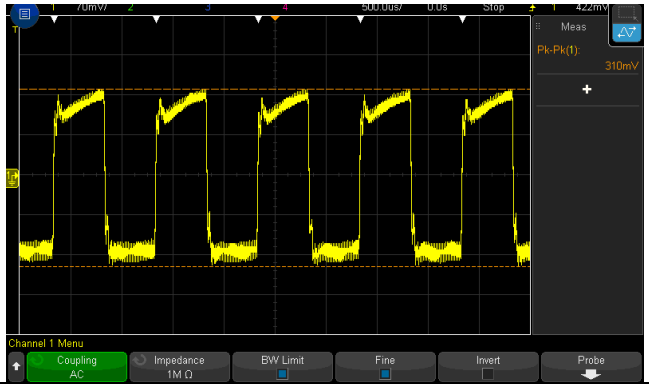
CH1 : Output Voltage CH3 : AC Input Voltage

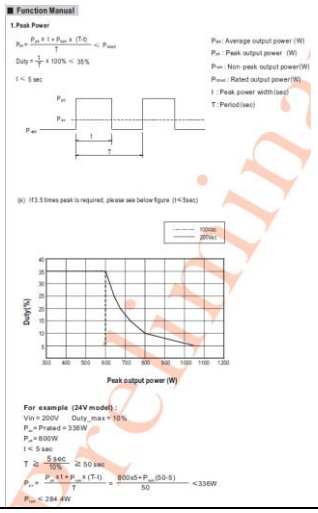


INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH3 : AC Input Voltage

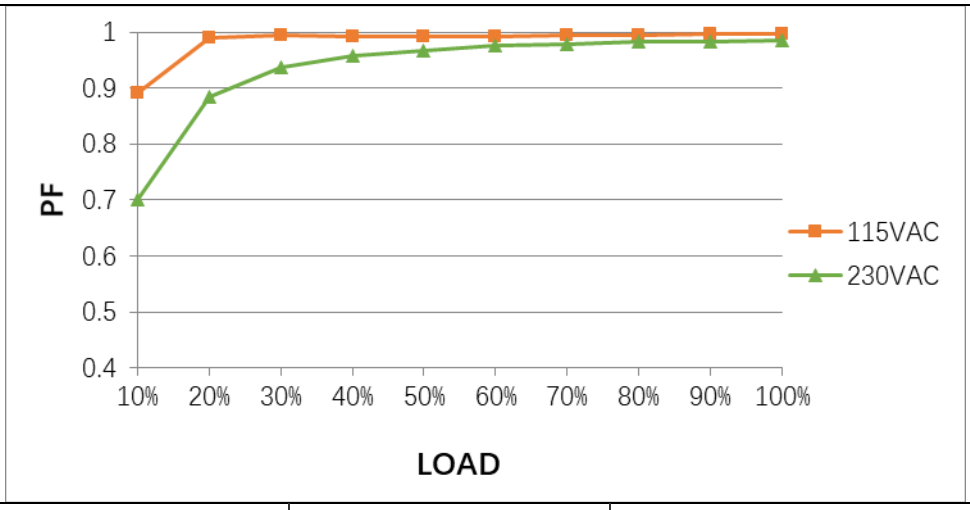


8	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P：230VAC I/P：115VAC O/P：FULL LOAD Ta：25℃	230VAC/ 23.6 ms 115VAC/ 23.31 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 	
9	HOLD UP TIME (Typ.)	230VAC/16ms 115VAC/16ms	I/P：230VAC I/P：115VAC O/P：FULL LOAD Ta：25℃	230VAC/ 40.2 ms 115VAC/ 39.4 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH3 : AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH3 : AC Input Voltage 	
10	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 230VAC O/P: (1)FULL/50% LOAD 50%DUTY / 120HZ (2)FULL/50% LOAD 50%DUTY / 1KHZ Ta:25℃	410mVp-p 310mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	

11	TRANSIENT RECOVERY TIME	V1: 1200 mVp-p	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	241mVp-p
12	PEAK POWER	1 HOUR NO DAMAGE 	I/P：200VAC I/P：100VAC O/P:TESTING Ta:25℃	TEST: OK

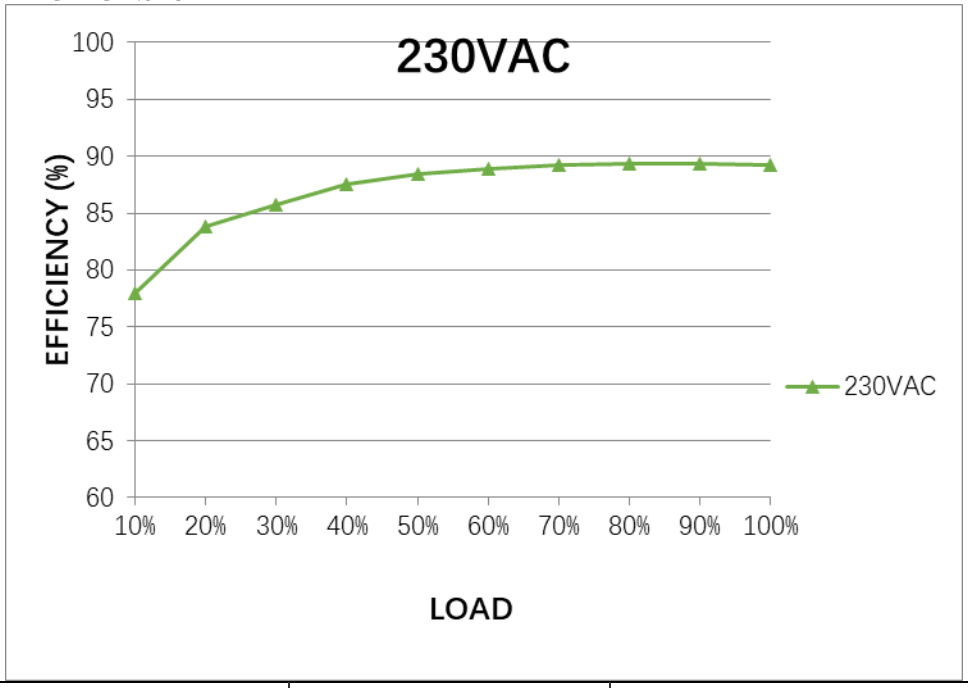
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~264VAC 120VDC~ 370VDC	(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) 79.5V~264V (2) 101.1 Vdc~370Vdc/FULL LOAD 101.0Vdc~370Vdc/50% LOAD (3) 101.0Vdc~370Vdc/FULL LOAD 101.0Vdc~370Vdc/50% LOAD
			I/P: LOW-LINE-3V=97 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:85 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 1.8 A 115V/ 3.5A	I/P：230VAC I/P：115VAC O/P：FULL LOAD Ta：25℃	I = 1.62A/230VAC I =3.30 A/115VAC
4	LEAKAGE CURRENT	< 2mA / 240 VAC	I/P：240 VAC O/P：Min LOAD Ta：25℃	1.34 mA
5	POWER FACTOR (Typ.)	0.95/ 230VAC 0.99/115VAC	I/P：230 VAC I/P：115 VAC O/P：FULL LOAD Ta：25℃	PF= 0.986 /230VAC PF= 0.995 /115VAC
	P.F vs LOAD			



6	EFFICIENCY(Typ.)	88%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	89.1 %

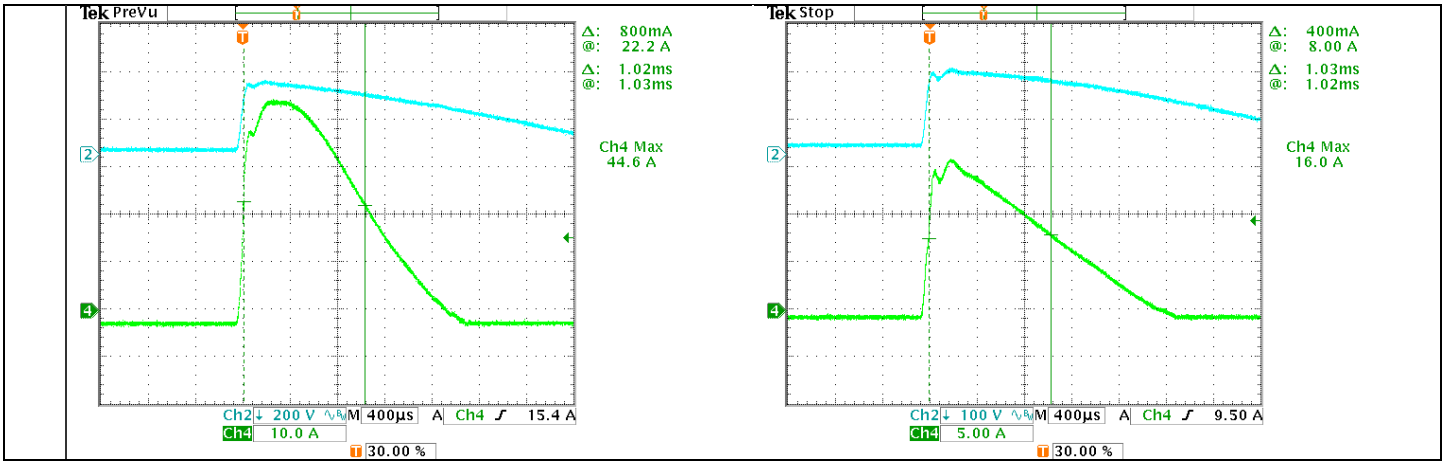
EFFICIENCY vs LOAD



7	INRUSH CURRENT(Typ.)	230V/75A 115V/35A COLD START	I/P：230VAC I/P：115VAC O/P：FULL LOAD Ta：25℃	I = 44.6 A/ 230VAC I = 16.0 A/ 115VAC T50= 1020 us/230V

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

INPUT=115VAC/ 60HZ @ FULL LOAD
CH2 : AC Input Voltage CH4 : Input current



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	Output power >105% rated for more than 5 seconds then shut down o/p voltage, re-power on to recover Constant current limiting for output power >380%（1140W）rated for more than 5 seconds and then shut down o/p voltage, re-power on to recover	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P:TESTING Ta:25℃	117%/ 264VAC 117%/ 230VAC 117%/100VAC 5S TEST: OK PROTECTION TYPE： Output power >105% rated for more than 5 seconds then shut down o/p voltage, re-power on to recover Constant current limiting for output power >380%（1140W） rated for more than 5 seconds and then shut down o/p voltage, re-power on to recover
2	OVER VOLTAGE PROTECTION	14.4V~16.8V Protection type：Shut down o/p voltage, re-power on to recover	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P:MIN LOAD Ta:25℃	15.4V/ 264VAC 15.4V/ 230VAC 15.4V/ 85VAC PROTECTION TYPE：OK Shut down o/p voltage , re-power on to recover .
3	OVER TEMPERATURE PROTECTION	Protection type : TSW1: Shut down o/p voltage , recovers automatically after temperature goes down . RTH3: Shut down o/p voltage , re-power on to recover	I/P: 264VAC I/P: 85VAC O/P:FULL LOAD	O.T.P. Active PROTECTION TYPE：OK TSW1: Shut down o/p voltage , recovers automatically after temperature goes down . RTH3: Shut down o/p voltage , re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 85VAC O/P: FULL LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE：OK Constant current limiting, and shut down after 5 seconds , re-power on to recover .

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	REMOTE SENSE	S+ / S- >0.3V Compensate voltage drop on the load wiring up to 0.3V.	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	1.06V

<table>
<tr><td>2</td><td>DC OK SIGNAL</td><td colspan="3">High (3.3 ~ 5.6V) :PSU turn on
Low (0 ~ 1V) : PSU turn off.
I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃
Test Result：
<table>
<tr><th>Vout</th><th>DC OK SIGNAL</th></tr>
<tr><td>PSU turn on</td><td>5.118V</td></tr>
<tr><td>PSU turn off</td><td>0.09V</td></tr>
</table></td></tr>
<tr><td>3</td><td>FAN ON/OFF CONTROL</td><td>Load 35±15% or RTH2≥50℃
FAN ON</td><td>I/P: 230VAC
O/P:TESTING</td><td>
<table>
<tr><td></td><td>RTH(℃)</td><td>LOAD(%)</td></tr>
<tr><td>FAN ON</td><td>OK</td><td>33.3%</td></tr>
</table></td></tr>
</table>

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q3/Q4 Rated : 18 A/ 600 V	AC ON/OFF I/P: High-Line =300V 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)Peak Load (350%) Ta:25℃	Q3 VDS: (1) 561V (2) 565V (3) 553V (4) 553V (5) 557V (6) 557V (7) 553V (8) 541V Q4 VDS: (1) 557V (2) 553V (3) 549V (4) 557V (5) 557V (6) 549V (7) 553V (8) 557V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated :34 A/ 600 V	I/P: High-Line =267V AC ON/OFF 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)Peak Load (350%) Ta:25℃	Q1 VDS: (1) 429V (2) 429V (3) 429V (4) 429V (5) 429V (6) 429V (7) 429V (8) 429V
3	P.F.C DIODE	D1 Rated : 8A/ 600 V	I/P: High-Line =267V 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 (5)Peak Load (350%) Ta:25℃	(1) 384V (2) 392V (3) 384V (4) 384V (5) 400V

4	Diode Peak Voltage	Q101 Rated :75 A/ 100 V VGS :± 20V Q103 Rated :75 A/100 V VGS :± 20 V	AC ON/OFF I/P: High-Line =300V Vomax 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)Peak Load (350%) Vo: O/P: (1)Full Load Ta:25℃	Q101: Vomax VDS: (1) 83.7V (2) 82.9V (3) 82.9V (4) 83.7V (5) 83.7V (6) 83.7V (7) 80.5V (8) 80.5V (9) 74.0V Vo: (1) 81.3V Q103: Vomax VDS: (1) 91.9V (2) 89.3V (3) 92.7V (4) 92.7V (5) 91.9V (6) 91.9V (7) 86.1V (8) 85.3V (9) 86.3V Vo: (1) 92.7V
5	Input Capacitor Voltage	C5 Rated: : 150 μ / 400 V	I/P High-Line =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 (5)Peak Load on/off (350%) (6)Peak Load continue (350%) Ta:25℃	(1) 380V (2) 376V (3) 396V (4) 380V (5) 396V (6) 396V
6	Control IC Voltage Test	PWM IC U1 Rated 11V~ 30 V O/P IC U201/ U101 Rated 3 V~ 30 V	AC ON/OFF I/P: High-Line =300V O/P: (1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. (5) NO LOAD VRmin (LOW LINE) Ta:25℃	U1 (1) 14.7V (2) 14.9V (3) 14.7V (4) 14.7V (5) 14.7V U110 (1) 16.5V (2) 14.7V (3) 16.4V (4) 15.7V (5) 13.V U201/U101 (1) 12.2V (2) 12.7V (3) 12.2V (4) 14.7V (5) 11.9V

■ SAFETY& E.M.C. TEST

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:0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6 KVAC/min Ta:25℃	I/P-O/P: 6.25mA I/P-FG: 5.58mA O/P-FG: 7.64mA 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: 600 VDC I/P-FG: 600 VDC O/P-FG: 600 VDC Ta:25℃	I/P-O/P:9999MΩ I/P-FG:9999MΩ O/P-FG:9999MΩ NO DAMAGE

3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100mΩ	40A / 2min Ta:25℃	3mΩ

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	EN55032 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 AIR：8KV / Contact：4KV	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： HRP-300N3-12 1. ROOM AMBIENT BURN-IN： 2HRS I/P： 230VAC O/P： FULL LOAD Ta= 25.0℃ 2. HIGH AMBIENT BURN-IN： 2HRS I/P： 230VAC O/P： FULL LOAD Ta= 50.0℃		

NO	Position	ROOM AMBIENT Ta= 25.0 ℃	HIGH AMBIENT Ta= 50.0 ℃
1	ZNR1	25.8℃	53.6℃
2	LF1	28.9℃	56.0℃
3	LF2	29.6℃	57.4℃
4	RTH1	28.9℃	56.6℃
5	RY1	41.3℃	68.9℃
6	BD1	38.4℃	65.2℃
7	L3	51.1℃	77.1℃
8	D1	40.6℃	67.2℃
9	Q1	38.7℃	65.7℃
10	C5	34.0℃	61.4℃
11	TSW1	33.8℃	61.0℃
12	U1	41.6℃	68.9℃

NO	Position	ROOM AMBIENT Ta= 25.0 ℃	HIGH AMBIENT Ta= 50.0 ℃
13	T2	41.5℃	69.3℃
14	Q3	45.6℃	74.7℃
15	Q4	46.1℃	74.9℃
16	T1 Core	55.2℃	82.0℃
17	T1 Coil	49.3℃	76.3℃
18	C124	43.6℃	71.8℃
19	R28	44.0℃	71.3℃
20	Q101	41.3℃	70.1℃
21	Q103	38.3℃	66.8℃
22	L100	55.7℃	84.7℃
23	C105	39.1℃	66.4℃
24	C106	35.1℃	62.1℃
25	RTH3	55.2℃	83.7℃
26	U201	33.2℃	60.2℃
27	U110	36.3℃	63.2℃
28	ZD102	43.0℃	70.9℃
29	J111	46.6℃	72.7℃
30	U101	43.5℃	71.3℃
31	R105	43.0℃	72.4℃
32	U2	35.7℃	63.0℃
33	D30	39.2℃	66.5℃

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 230 VAC O/P： 117% LOAD Ta：25℃	TEST： OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 264VAC/100VAC O/P： 100 %LOAD Ta= -45 ℃	TEST： OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃/95 %R.H 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	± 0.009%/℃(0~50℃)
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	-40~50℃	1. Thermal shock Temperature： -45℃~ +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	

8	VIBRATION TEST	10 ~ 500Hz, 5G 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：6G (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= 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) 1286350.6HRS (2) 193886.5HRS (3) 268320.7HRS (4) 341452.5HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 529.1K hrs min. Telcordia SR-332 (Bellcore) ; 201.43K 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	Liutt		Wangdz

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