



Test Report: HRP-300N3-36

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

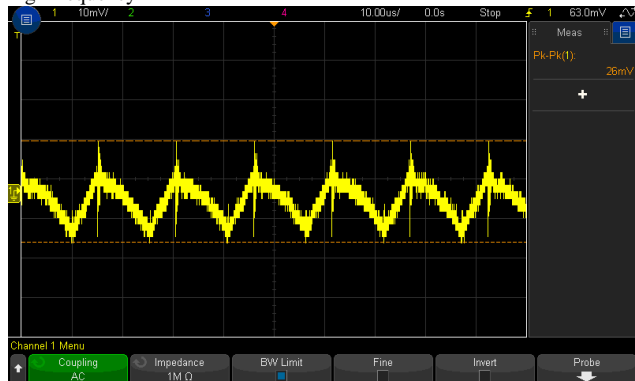
ENVIRONMENT TEST

DESIGN VERIFY TEST

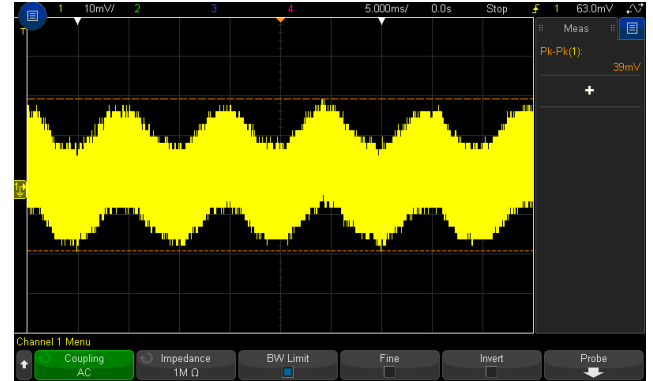
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 28.8 V ~ 39.6 V	I/P : 230VAC I/P : 115VAC O/P : MIN LOAD Ta : 25°C	27.48V ~ 41.11V/230VAC 27.48V ~ 41.11V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1.0 % ~ +1.0 %	I/P: 85VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.02% ~ -0.05 %
3	LINE REGULATION (Max)	V1: -0.2 % ~ +0.2 %	I/P: 85VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.01% ~ 0.02 %
4	LOAD REGULATION(Max)	V1: -0.5 % ~ +0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.02% ~ -0.05 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	0.4%
6	RIPPLE & NOISE(Max)	V1: 250mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 39 mVp-p

high frequency :

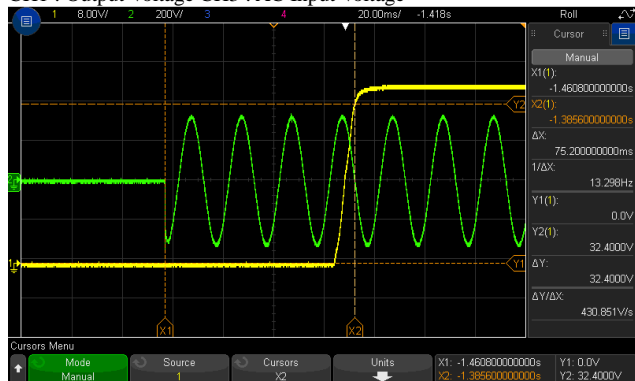


low frequency :

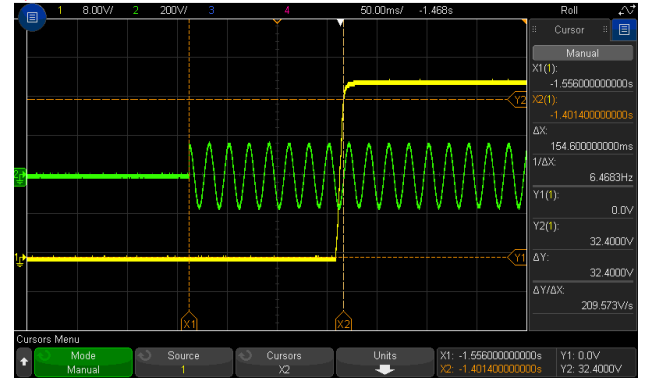


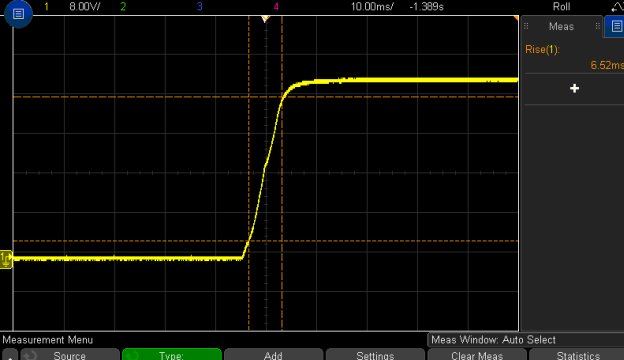
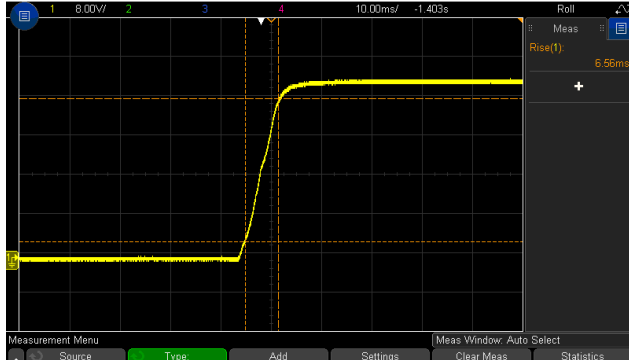
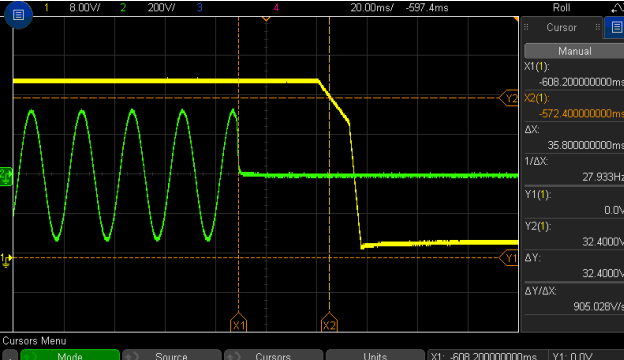
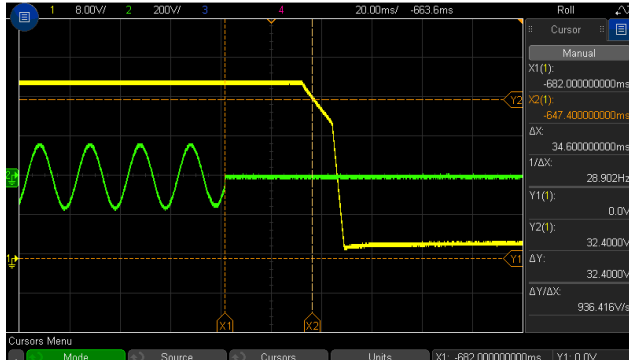
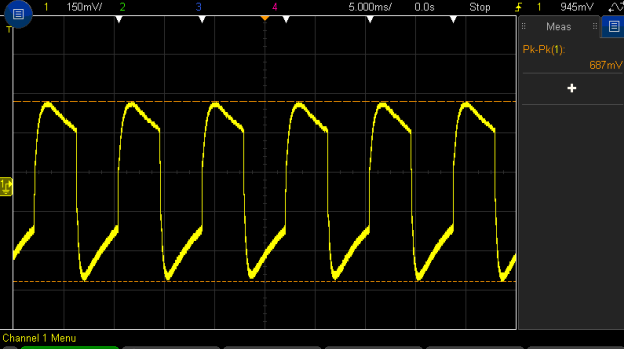
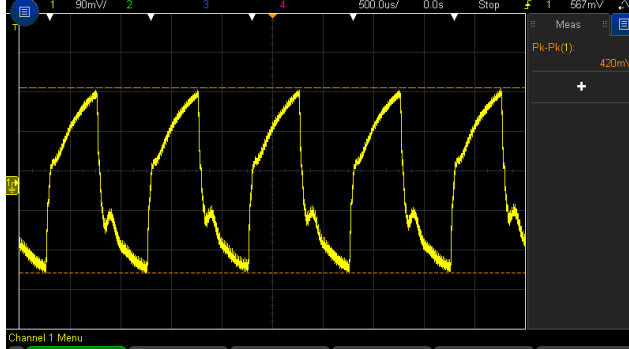
7	SET UP TIME(Max)	230VAC/ 1000ms 115VAC/2500ms	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 75.2ms 115VAC/ 154.6 ms
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INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH3 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH3 : AC Input Voltage

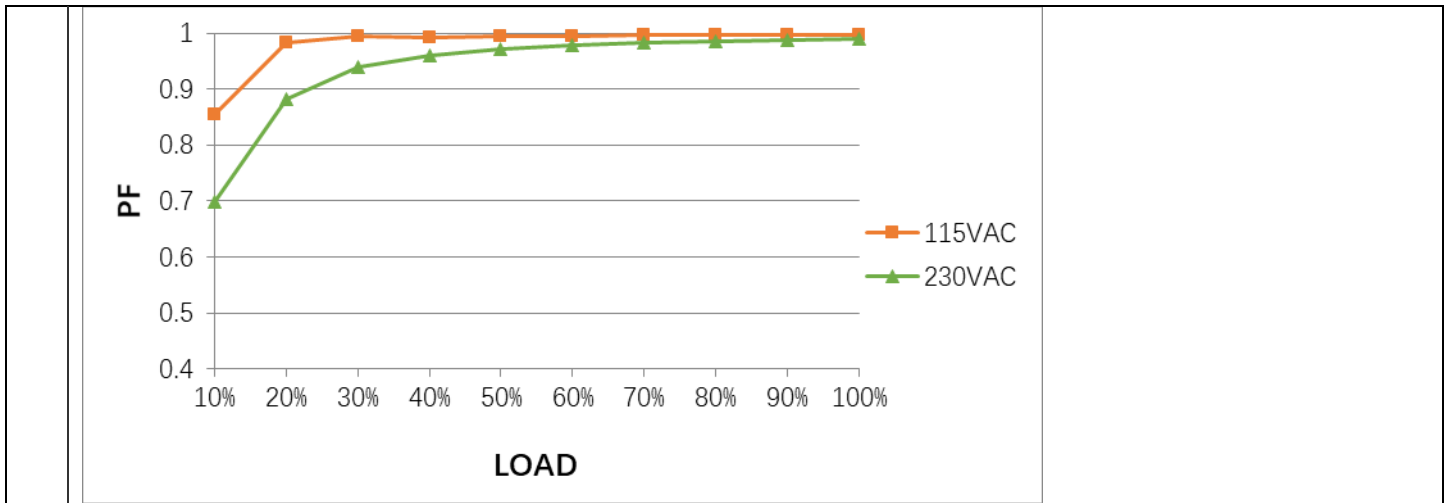


8 RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 6.52 ms 115VAC/ 6.56 ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 	
9 HOLD UP TIME (Typ.)	230VAC/16ms 115VAC/16ms	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 35.8 ms 115VAC/ 34.6 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: 3600 mVp-p	I/P: 230VAC O/P: (1)FULL/50% LOAD 50%DUTY / 120HZ (2)FULL/50% LOAD 50%DUTY / 1KHZ Ta:25°C	687mVp-p 420mVp-p
FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	

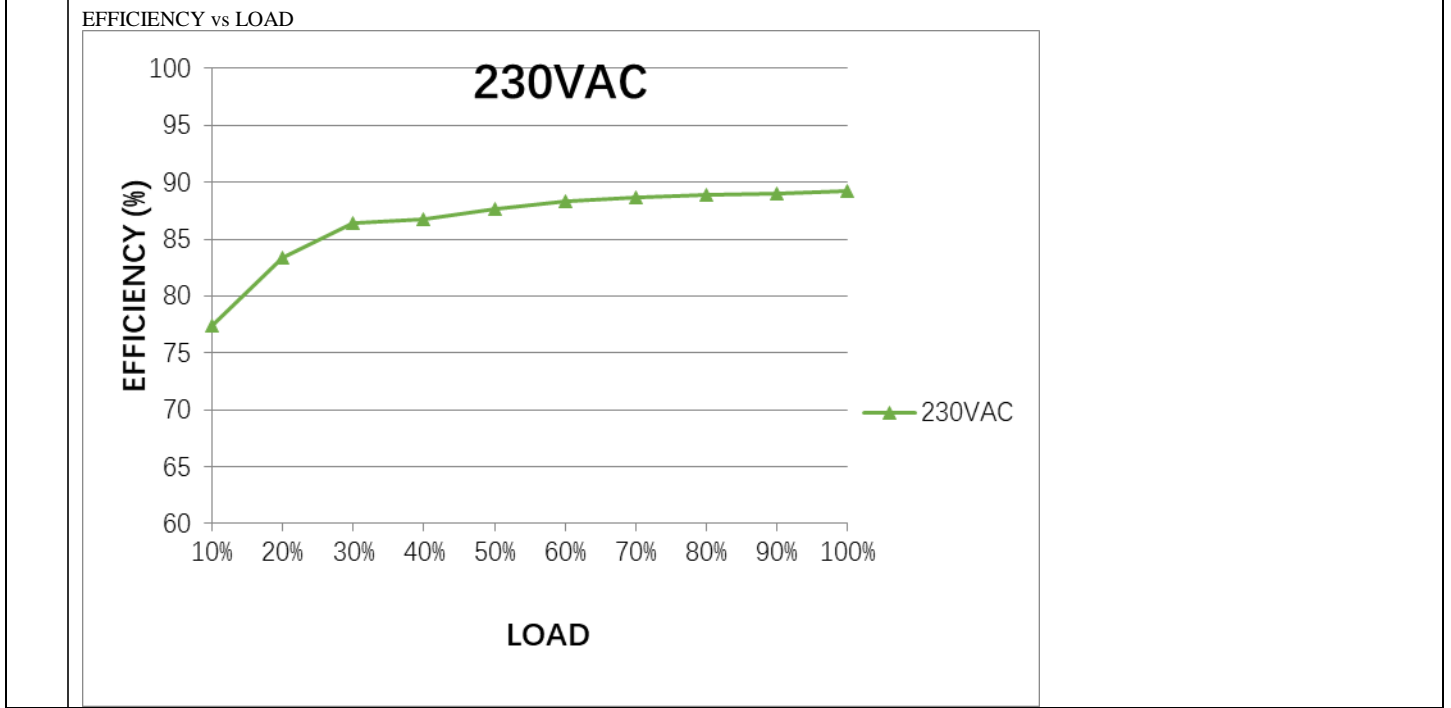
11	TRANSIENT RECOVERY TIME	V1: 3600 mVp-p	I/P: 230VAC O/P:40% LOAD CHANGE 50% DUTY/120HZ 1.25A/us	441mVp-p
12	PEAK POWER	1 HOUR NO DAMAGE <p>Function Manual</p> <p>1 Peak Power</p> $P_{out} = P_{avg} + P_{peak} \times (T/D) \leq P_{max}$ $Duty = \frac{t}{T} \times 100\% \leq 35\%$ $t < 5 \text{ sec}$ <p> P_{avg}: Average output power (W) P_{out}: Peak output power (W) P_{peak}: Non-peak output power(W) P_{max}: Rated output power(W) t: Peak power width(sec) T: Period(sec) </p> <p>(a) If 3 times peak is required, please see below figure (t<5sec)</p> <p>For example (24V model): $V_{in} = 230V$ Duty_max = 35% $P_{avg} = P_{rated} = 300W$ $P_{out} = 800W$ $t < 5 \text{ sec}$ $T \geq \frac{5 \text{ sec}}{35\%} \approx 50 \text{ sec}$ $P_{out} = P_{avg} + P_{peak} \times (T/D) = 300W + P_{peak} \times \frac{50}{35} < 330W$ $P_{peak} < 284 \text{ W}$ </p>	I/P : 200VAC I/P : 100VAC O/P:TESTING Ta:25°C	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	(1) 80.1V~264V
			(2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD	(2) 101.1Vdc~370Vdc/FULL LOAD 101.1Vdc~370Vdc/50% LOAD
			(3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD	(3) 101.1Vdc~370Vdc/FULL LOAD 101.1Vdc~370Vdc/50% LOAD
			Ta:25°C 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°C	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°C	I = 1.61A/ 230VAC I = 3.29 A/ 115VAC
4	LEAKAGE CURRENT	< 2mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	1.477mA
5	POWER FACTOR (Typ.)	0.95/ 230VAC 0.99/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.989 /230VAC PF= 0.996/115VAC
	P.F vs LOAD			

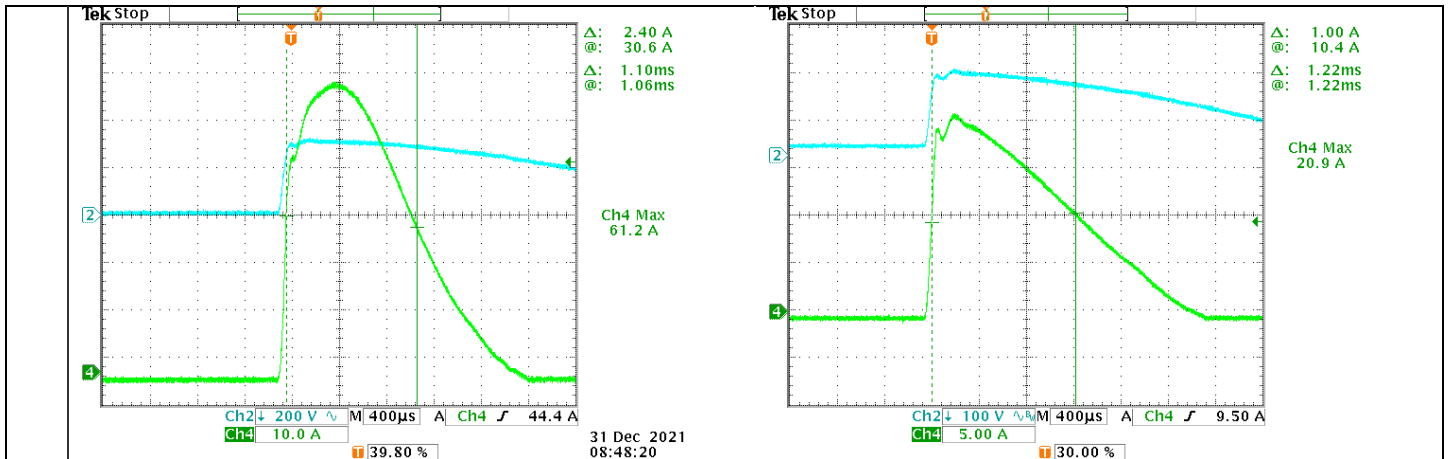


6	EFFICIENCY(Typ.)	88%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	89.2 %
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7	INRUSH CURRENT(Typ.)	230V/75A 115V/35A COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	I = 61.2 A/ 230VAC I = 20.9 A/ 115VAC T50= 1100 us/230V
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INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current		INPUT=115VAC/ 60HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current	
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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°C	110%/ 264VAC 110%/ 230VAC 110%/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	41.4V~48.6V 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°C	44.1V/ 264VAC 44.1V/ 230VAC 44.1V/ 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°C	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°C	0.34V



2	DC OK SIGNAL	High (3.3 ~ 5.6V) :PSU turn on Low (0 ~ 1V) : PSU turn off. I/P: 230 VAC O/P:FULL LOAD Ta:25°C Test Result : <table border="1" data-bbox="625 407 1136 501"> <thead> <tr> <th>Vout</th> <th>DC OK SIGNAL</th> </tr> </thead> <tbody> <tr> <td>PSU turn on</td> <td>5.170V</td> </tr> <tr> <td>PSU turn off</td> <td>0.007V</td> </tr> </tbody> </table>	Vout	DC OK SIGNAL	PSU turn on	5.170V	PSU turn off	0.007V		
Vout	DC OK SIGNAL									
PSU turn on	5.170V									
PSU turn off	0.007V									
3	FAN ON/OFF CONTROL	Load 35±15% or RTH2≥50°C FAN ON	I/P: 230VAC O/P:TESTING	<table border="1" data-bbox="1189 546 1528 611"> <thead> <tr> <th></th> <th>RTH(°C)</th> <th>LOAD(%)</th> </tr> </thead> <tbody> <tr> <td>FAN ON</td> <td>OK</td> <td>33.3%</td> </tr> </tbody> </table>		RTH(°C)	LOAD(%)	FAN ON	OK	33.3%
	RTH(°C)	LOAD(%)								
FAN ON	OK	33.3%								

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																				
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q 3/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°C	<table border="0"> <tr> <td>Q3</td> <td>Q4</td> </tr> <tr> <td>VDS:</td> <td>VDS:</td> </tr> <tr> <td>(1) 496V</td> <td>(1) 488V</td> </tr> <tr> <td>(2) 545V</td> <td>(2) 557V</td> </tr> <tr> <td>(3) 488V</td> <td>(3) 488V</td> </tr> <tr> <td>(4) 492V</td> <td>(4) 488V</td> </tr> <tr> <td>(5) 488V</td> <td>(5) 488V</td> </tr> <tr> <td>(6) 472V</td> <td>(6) 476V</td> </tr> <tr> <td>(7) 545V</td> <td>(7) 553V</td> </tr> <tr> <td>(8) 537V</td> <td>(8) 549V</td> </tr> </table>	Q3	Q4	VDS:	VDS:	(1) 496V	(1) 488V	(2) 545V	(2) 557V	(3) 488V	(3) 488V	(4) 492V	(4) 488V	(5) 488V	(5) 488V	(6) 472V	(6) 476V	(7) 545V	(7) 553V	(8) 537V	(8) 549V
Q3	Q4																							
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(6) 472V	(6) 476V																							
(7) 545V	(7) 553V																							
(8) 537V	(8) 549V																							
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°C	<table border="0"> <tr> <td>Q1</td> </tr> <tr> <td>VDS:</td> </tr> <tr> <td>(1) 432V</td> </tr> <tr> <td>(2) 428V</td> </tr> <tr> <td>(3) 432V</td> </tr> <tr> <td>(4) 436V</td> </tr> <tr> <td>(5) 436V</td> </tr> <tr> <td>(6) 436V</td> </tr> <tr> <td>(7) 448V</td> </tr> <tr> <td>(8) 480V</td> </tr> </table>	Q1	VDS:	(1) 432V	(2) 428V	(3) 432V	(4) 436V	(5) 436V	(6) 436V	(7) 448V	(8) 480V										
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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°C	<table border="0"> <tr> <td>(1) 401V</td> </tr> <tr> <td>(2) 401V</td> </tr> <tr> <td>(3) 401V</td> </tr> <tr> <td>(4) 405V</td> </tr> <tr> <td>(5) 409V</td> </tr> </table>	(1) 401V	(2) 401V	(3) 401V	(4) 405V	(5) 409V															
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4	Diode Peak Voltage	<p>Q101 Rated :20 A/ 200 V</p> <p>Q103 Rated :10 A/400V</p>	<p>AC ON/OFF</p> <p>I/P: High-Line =300V</p> <p>Vomax</p> <p>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%)</p> <p>Vo</p> <p>O/P: (1)Full Load Ta:25°C</p>	<p>Q101: Vomax VDS: (1) 133V (2) 168V (3) 157V (4) 167V (5) 166V (6) 167V (7) 172V (8) 143V (9) 174V</p> <p>Vo (1) 136V</p> <p>Q103: Vomax VDS: (1) 278V (2) 311V (3) 291V (4) 283V (5) 283V (6) 277V (7) 283V (8) 269V (9) 273V</p> <p>Vo (1) 270V</p>
5	Input Capacitor Voltage	C5 Rated: : 150 μ / 400 V	<p>I/P High-Line =267V</p> <p>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%)</p> <p>Ta:25°C</p>	<p>(1) 378V (2) 378V (3) 394V (4) 377V (5) 394V (6) 394V</p>
6	Control IC Voltage Test	<p>PWM IC U1 Rated 11V~ 30 V</p> <p>O/P IC U201/ U110 Rated 3 V~ 30 V</p>	<p>AC ON/OFF</p> <p>I/P: High-Line =300V</p> <p>O/P: (1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. (5) NO LOAD VRmin (LOW LINE)</p> <p>Ta:25°C</p>	<p>U1 (1) 14.8V (2) 14.9V (3) 14.8V (4) 14.8V (5) 14.7V</p> <p>U201 (1) 12.1V (2) 14.1 V (3) 12.0V (4) 18.5V (5) 11.8V</p> <p>U110 (1) 17.2V (2) 17.2V (3) 17.1V (4) 16.0V (5) 16.5V</p>

■ SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	<p>I/P-O/P: 3KVAC/min</p> <p>I/P-FG :2KVAC/min</p> <p>O/P-FG:0.5KVAC/min</p>	<p>I/P-O/P: 3.6 KVAC/min</p> <p>I/P-FG: 2.4 KVAC/min</p> <p>O/P-FG:0.6 KVAC/min</p> <p>Ta:25°C</p>	<p>I/P-O/P: 6.32mA</p> <p>I/P-FG:5.65mA</p> <p>O/P-FG:6.42mA</p> <p>NO DAMAGE</p>
2	ISOLATION RESISTANCE	<p>I/P-O/P:500VDC>100MΩ</p> <p>I/P-FG: 500VDC>100MΩ</p> <p>O/P-FG:500VDC>100MΩ</p>	<p>I/P-O/P: 600 VDC</p> <p>I/P-FG: 600 VDC</p> <p>O/P-FG: 600 VDC</p> <p>Ta:25°C</p>	<p>I/P-O/P:9999MΩ</p> <p>I/P-FG:9999MΩ</p> <p>O/P-FG:9999MΩ</p> <p>NO DAMAGE</p>



3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100mΩ	40A/2min Ta:25°C	3mΩ
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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°C	PASS
2	CONDUCTION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	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°C	CRITERIA A
5	E.F.T	EN61000-4-4 INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	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°C	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-300N3-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25.8 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50.9 °C																																																						
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 110% LOAD Ta : 25°C	TEST : OK																																																																																									
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 %LOAD Ta= -45 °C	TEST : OK																																																																																									
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C/95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																									
5	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.005%/°C (0~50°C)																																																																																									
6	STORAGE TEMPERATURE TEST	-40~85°C	1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / 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°C	1. Thermal shock Temperature : -45°C~ +55°C 2. Temperature change rate : 25°C / 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																																																																																										



300W Ultra-High Peak Power Supply

HRP-300N3 series

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°C
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME	(1) 1609830.5HRS (2) 239302.7HRS (3) 302416.8HRS (4) 367842.5HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 529.1K hrs min. Telcordia SR-332 (Bellcore) ; 201.43K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Liutt		Wangdz

2020.10.01 TAG-QA-009