



Test Report: HRP-150N3-12

150W 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

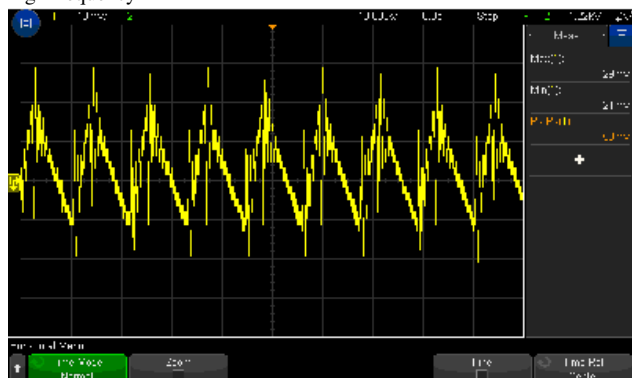
ENVIRONMENT TEST

DESIGN VERIFY TEST

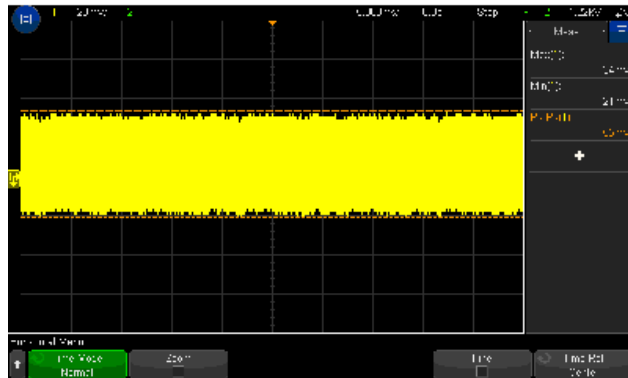
OUTPUT FUNCTION TEST

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°C	9.171V~ 14.754V/230VAC 9.171V~ 14.754V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1.5 % ~ +1.5 %	I/P: 85VAC /264VAC O/P:FULL/MIN. LOAD Ta:25°C	V1: -0.0495% ~ 0.0412%
3	LINE REGULATION (Max)	V1: -0.3 % ~ +0.3 %	I/P: 85VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.0083% ~ 0.033%
4	LOAD REGULATION(Max)	V1: -0.5 % ~ +0.5 %	I/P: 230VAC O/P:FULL~MIN LOAD Ta:25°C	V1: -0.0495% ~ 0.0412%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	2.5%
6	RIPPLE & NOISE(Max)	V1: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1:55mVp-p

high frequency :

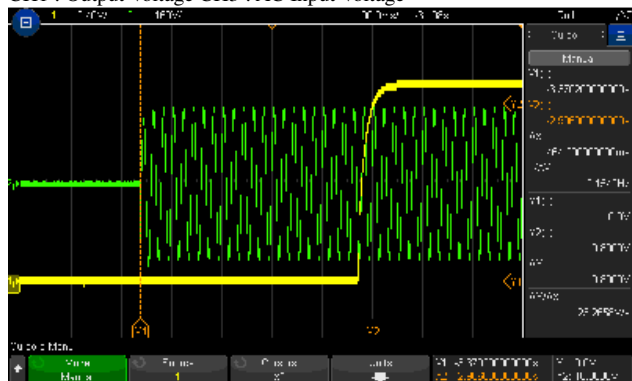


low frequency :

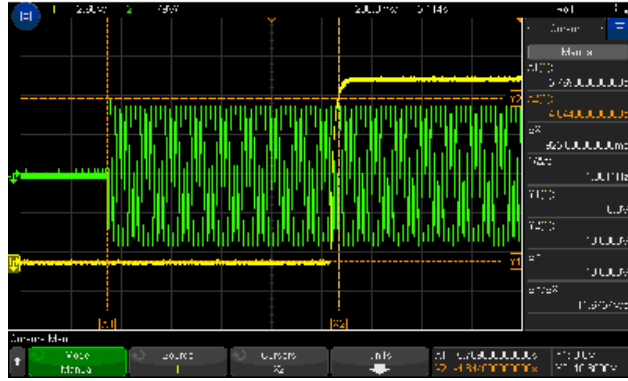


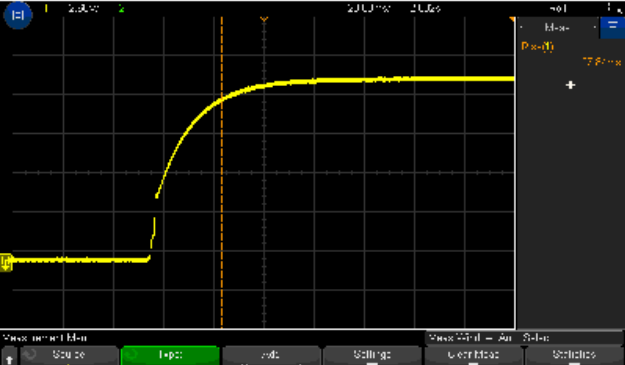
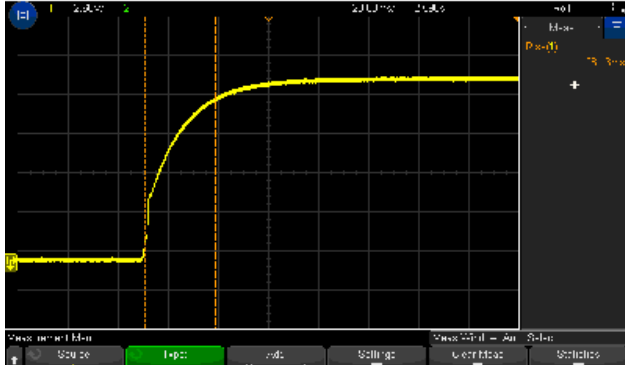
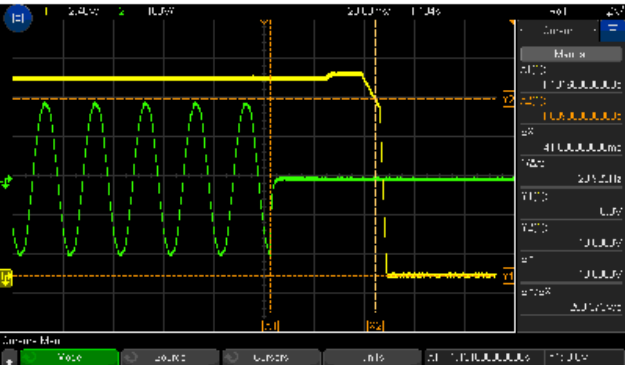
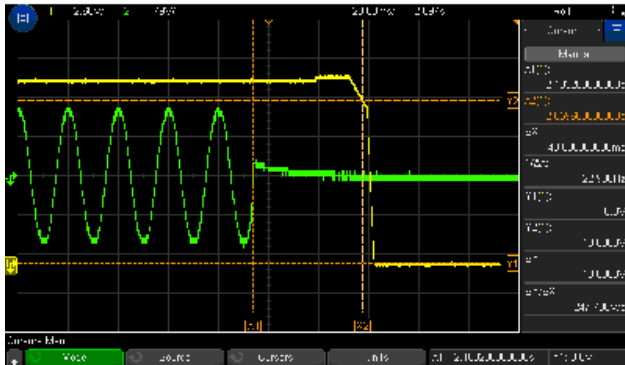
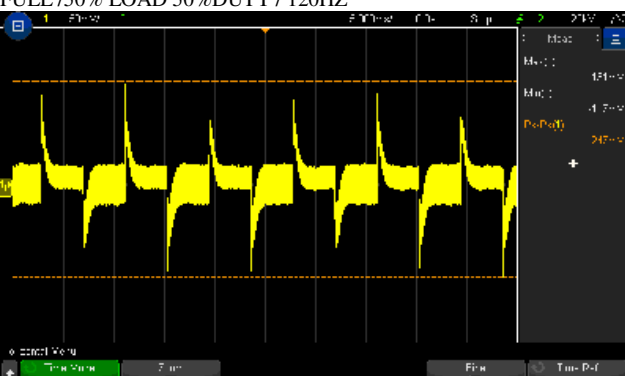
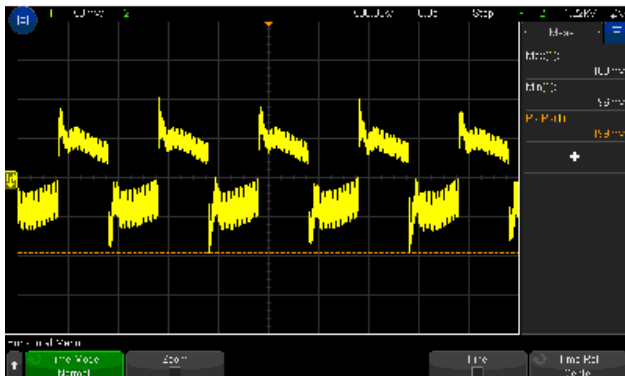
7	SET UP TIME(Max)	230VAC/ 3000ms 115VAC/3000ms	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 464.2 ms 115VAC/ 925 ms
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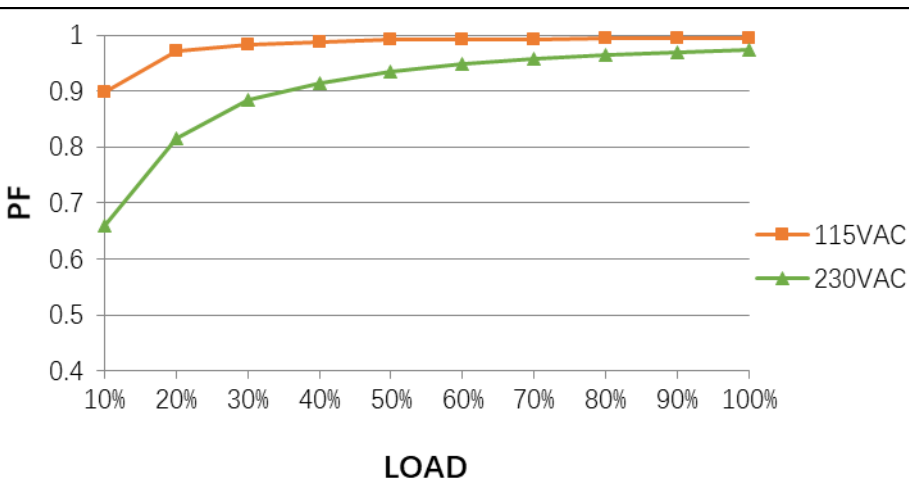
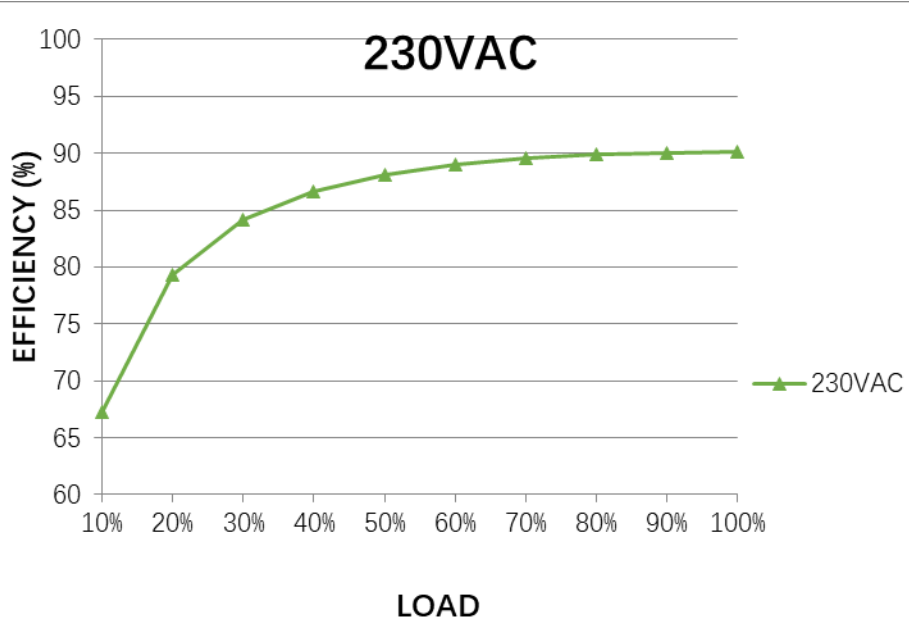
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH3 : AC Input Voltage

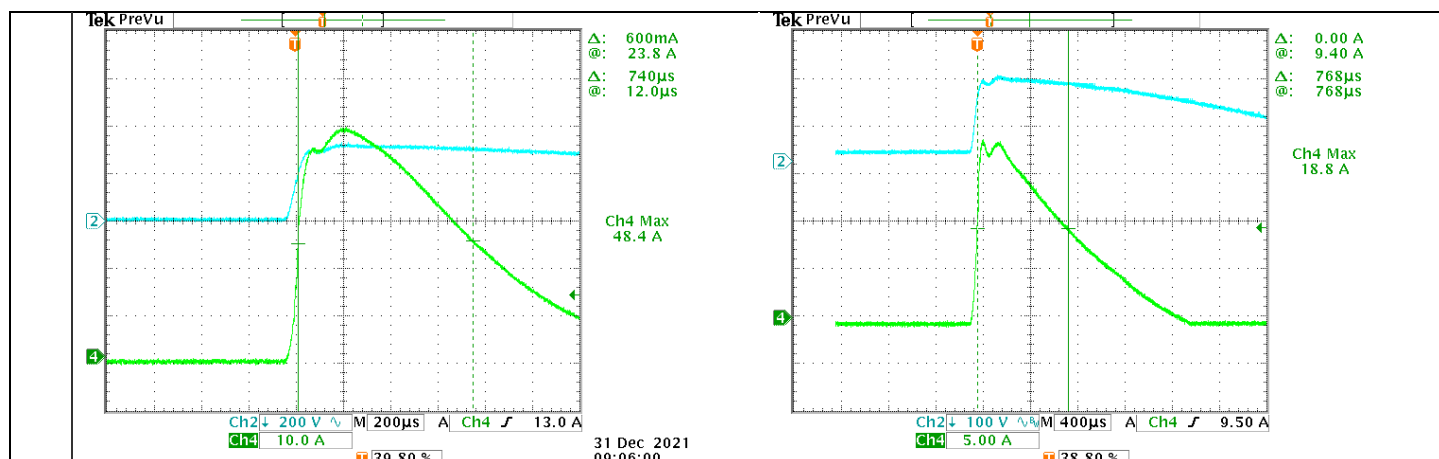


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH3 : AC Input Voltage



8	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 27.84 ms 115VAC/ 28.13ms
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/ 41.8 ms 115VAC/ 43.6 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	VI: 1200 mVp-p	I/P: 230VAC O/P: (1)FULL/50% LOAD 50%DUTY / 120HZ (2)FULL/50% LOAD 50%DUTY / 1KHZ Ta:25°C	247mVp-p 199mVp-p
FULL /50% LOAD 50%DUTY / 120HZ 				
FULL /50% LOAD 50%DUTY / 1KHZ 				

				
6	EFFICIENCY(Typ.)	88%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	90.20%
	EFFICIENCY vs LOAD 			
7	INRUSH CURRENT(Typ.)	230V/70A 115V/35A COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	I = 48.4A / 230VAC I = 18.8A / 115VAC T50= 740us/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 >330% 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	107.54%/ 264VAC 107.54%/ 230VAC 107.46%/ 100VAC 5S TEST: OK PROTECTION TYPE : OK 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% 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°C	15.2V/ 264VAC 15.2V/ 230VAC 15.2V/ 85VAC PROTECTION TYPE : OK Shut down o/p voltage , re-power on to recover .
3	OVER TEMPERATURE PROTECTION	Protection type : Shut down o/p voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 85VAC O/P: FULL LOAD	O.T.P. Active PROTECTION TYPE : OK Shut down o/p voltage , recovers automatically after temperature goes down .
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	0.791V

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 :13 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 (300%) Ta:25°C	Q3 VDS: (1) 560V (2) 548V (3) 564V (4) 520V (5) 524V (6) 572V (7) 552V (8) 564V	Q4 VDS: (1) 524V (2) 544V (3) 560V (4) 528V (5) 508V (6) 560V (7) 544V (8) 548V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated :18 A/ 600 V VGS ± 25 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 (300%) Ta:25°C	Q1 VDS: (1) 484V (2) 468V (3) 472V (4) 476V (5) 460V (6) 480V (7) 476V (8) 464V	
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 (300%) Ta:25°C	(1) 424V (2) 424V (3) 416V (4) 432V (5) 404V	
4	Diode Peak Voltage	Q101 Rated :80 A/ 100 V Q103 Rated :80 A/100 V	AC ON/OFF I/P: High-Line =300V 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/ (7)Peak Load (300%)	Q101: Vomax VDS: (1) 83.0V (2) 77.3V (3) 90.7V (4) 92.6V (5) 91.8V (6) 87.8V (7) 78.9V	Q103: Vomax VDS: (1) 76.4V (2) 78.9V (3) 78.1V (4) 78.1V (5) 79.7V (6) 78.9V (7) 82.9V

			Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD (9)Peak Load (300%) Vo: O/P: (1)Full Load Ta:25°C	(8) 77.3V (9) 84.3V Vo: (1) 85.1V	(8) 74.8V (9) 78.1V Vo: (1) 74.8V
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 (300%) (6)Peak Load continue (300%) Ta:25°C	(1) 394V (2) 382V (3) 398V (4) 386V (5) 398V (6) 398V	
6	Control IC Voltage Test	PWM IC U1 Rated 11V~ 30 V O/P IC U102/ 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°C	U1 (1) 15.5V (2) 15.6V (3) 15.6V (4) 15.7V (5) 15.7V	U102 (1) 11.7V (2) 11.4V (3) 11.5V (4) 14.5V (5) 8.6V

■ 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°C	I/P-O/P: 2.519mA I/P-FG: 2.651mA O/P-FG:1.943 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M Ω I/P-FG: 500VDC>100M Ω O/P-FG:500VDC>100M Ω	I/P-O/P: 600 VDC I/P-FG: 600 VDC O/P-FG: 600 VDC Ta:25°C	I/P-O/P: 9999M Ω I/P-FG:9999M Ω O/P-FG:9999M Ω NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m Ω	40A / 2min Ta:25°C	3m Ω

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

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	
1	TEMPERATURE RISE TEST	MODEL : HRP-150N3-12			
		1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 26.6 °C			
		2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 41.1 °C			
		NO	Position	ROOM AMBIENT Ta= 26.6 °C	HIGH AMBIENT Ta= 41.1 °C
		1	LF1	45.7°C	57.5°C
		2	ZNR1	45.1°C	56.5°C
		3	LF2	51.7°C	63.1°C
		4	RY1	77.6°C	89.8°C
		5	RTH1	47.1°C	57.2°C
		6	BD1	68.9°C	79.3°C
		7	L3	61.8°C	74.3°C
		8	TSW1	55.1°C	68.0°C
		9	Q1	62.3°C	75.6°C
		10	D1	56.9°C	71.0°C
		11	C5	65.0°C	79.3°C
		12	Q3	79.8°C	94.4°C
		13	T2	62.3°C	77.5°C
		14	Q4	82.7°C	96.0°C
		15	U1	50.6°C	64.0°C
		16	T1 Core	78.4°C	93.4°C
		17	T1 Coil	73.2°C	88.2°C
		18	RTH2	58.8°C	73.4°C
		19	Q101	65.1°C	79.5°C
		20	Q104	64.7°C	79.4°C
		21	L100	74.2°C	88.4°C
		22	C105	65.8°C	79.9°C
		23	C238	60.5°C	74.0°C
24	U101	58.5°C	72.4°C		
25	U102	61.6°C	79.4°C		
26	U2	52.0°C	66.9°C		
27	J111	62.8°C	76.4°C		

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 107.54% 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 40°C/95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 40°C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.04 %/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.0086 %/°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	-40~40°C	1. Thermal shock Temperature : -45°C ~ +45°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	
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= 40°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40°C LIFE TIME		(1) 246877.3HRS (2) 89738.2HRS (3) 175916.7HRS (4) 238300.6HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 578.15K hrs min. Telcordia SR-332 (Bellcore) ; 221.71K hrs min. MIL-HDBK-217F (25°C)		
11	Ongoing Reliability Test	I/P : 230VAC O/P : 80% LOAD TA=50°C Demonstration Mean Time Between Failure : 50000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Liutt		Wangdz

2020.10.1 TAG-QA-009