Test Report: NTS-1200-124

1200W High Reliable True Sine Wave Power Inverter

- DESIGN VERIFY TEST

  Output Function Test

  Input Function Test

  Protection Function Test

  Control Function Test

  APPLICATION Test

  Component Stress Test

- SAFETY & E.M.C. TEST

  Safety Test

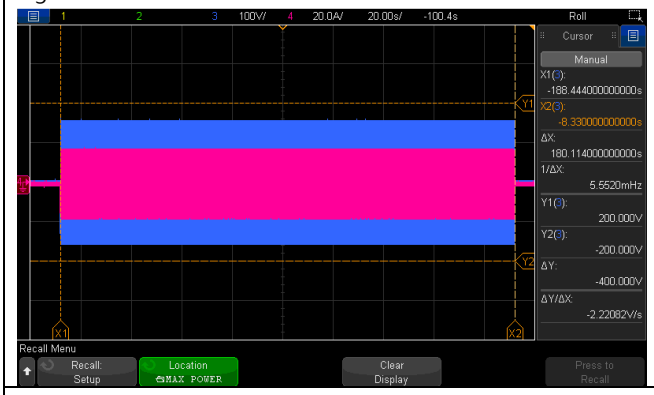
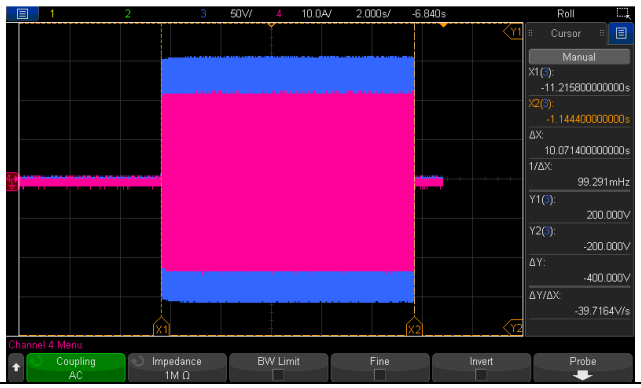
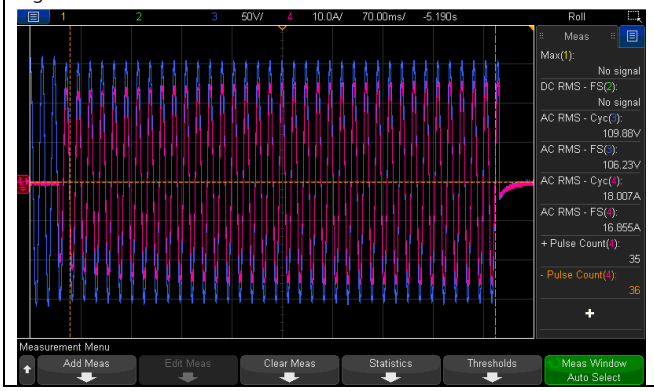
  E.M.C. Test

- RELIABILITY TEST

  ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED POWER	1200W	IP: 24VDC Ta:25℃	1224 W
2	MAXIMUM OUTPUT POWER (TYP)	(1)1380W/180sec. (2)1800w/10sec (3)SURGE POWER 2000W FOR 30CYCLE Vin (30 ± 5 CYCLE)	IP: 25VDC OP:TESTING LOAD Ta:25℃	(1) 110.62 V/ 12.41A/180.11 Sec (2) 110.44V/16.17A/10.07 Sec (3) 109.3 V/17.87A/ 35 Cycle
	CH3:O/P VAC CH4:O/P IAC Fig1  Fig2  Fig3 			
3	AC Voltage	100 / 110 / 115 / 120Vac selectable by DIP S.W	IP: 24VDC OP: FULL LOAD Ta:25℃	DIP S.W 100VAC: 100.48 V DIP S.W 110VAC: 110.63 V DIP S.W 115VAC: 115.68 V DIP S.W120VAC: 120.76 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 24VDC OP: FULL LOAD Ta:25℃	DIP S.W 50HZ: 50.038 HZ DIP S.W 60HZ: 59.958 HZ

5	WAVEFORM	True sine wave (THD<3%)	IP:25VDC OP:75% LOAD(900W) (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25℃	(1) 1.47 % / Vo(min)/75% LOAD (2) 1.36% / Vo(nor) /75% LOAD (3) 1.26% / Vo(max) /75% LOAD

CH3:O/P VAC CH4:O/P IAC

Fig1

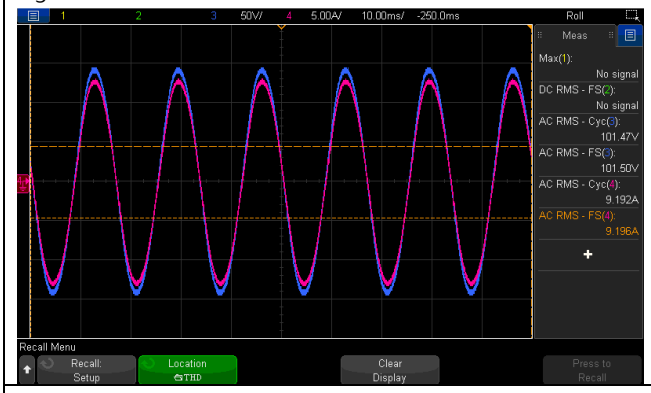


Fig2

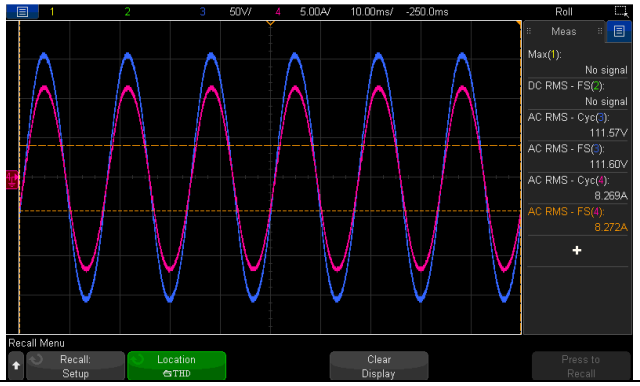
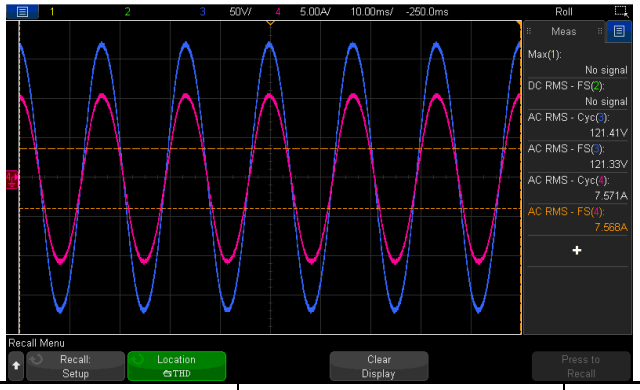


Fig3



6	AC REGULATION	±3%	IP: 25VDC OP:75% LOAD(900W) Ta:25℃	1.09 %
7	Overshoot /Undershoot	<±10%	IP: 24VDC OP: (1) full load turn on (2) no load turn on (3) full /no load change Ta:25℃	(1) -6.82 % (2) -3.73 % (3) -5.45 %
8	O/P voltage DC offset	Vin(nor)= 24 v · Vo< 200mV · no load : 63.2 mV / full load: 64.8 mV		

9	LED STATUS	● Statas test

LED	Statas	RESULT
Green	Inverter OK	OK
Orange	Remote off Saving mode	OK
Red	Abnormal Status (See SPEC)	OK

● Battery test

LED	Battery RANGE	RESULT
Green	25.0~31.0 Vdc±0.5v	25.135Vdc ~ 30.992Vdc
Orange	22.0~25.0Vdc ±0.5v	22.095Vdc ~ 24.953Vdc
Red	<22.0 Vdc ±0.5v > 31.0vdc±0.5v	< 22.024 Vdc > 31.176 Vdc

● Load test

LED	LOAD RANGE	RESULT
Green	Min. load ~ 40%±5% LOAD	Min. load ~ 40.79 %
Orange	40%±5% ~ 80%±5% LOAD	40.88%~ 80.11 %
Red	≧ 80%±5% LOAD	≧ 80.25 %

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	VOLTAGE RANGE (TYP)	20VDC~33VDC	IP: TESTING OP:NO LOAD/FULL LOAD Ta:25℃	20.156 VDC~ 33.045 VDC/NO LOAD 20.159 VDC~ 32.953 VDC/FULL LOAD
			I/P: LOW-LINE=21V HIGH-LINE=32.5V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON:30Sec OFF:30Sec 10MIN (POWER ON/OFF NO DAMAGE) I/P: 48V O/P:FULL LOAD ON:30ec OFF:30ec 12Hr (POWER ON/OFF NO DAMAGE)	Test: OK

2	DC CURRENT (TYP)	60A	IP: 24VDC OP:FULL LOAD Ta:25℃	57.24 A
3	NO LOAD DISSPATION (Typ.)	NON-Saving Mode=15W	IP: 24VDC OP:NO LOAD Ta:25℃	10.64 W
		SAVING MODE (1) Po： Default disable, auto detect AC output load ≦ 10W will be changed to saving mode (2) Pi ： ≦1.4 W	IP: 24VDC OP: TESTING LOAD Ta:25℃	NORMAL TO SAVING MODE: ≦ 11.5 W
			IP: 24VDC OP: TESTING LOAD Ta:25℃	1.228 W
4	OFF MODE CURRENT DRAW (Typ.)	≦ 1mA	IP: 24VDC OP: Sw off Ta:25℃	0.797 mA
5	EFFICIENCY(TYP)	900W/91%	IP: 25VDC OP: Po=900W 110V/60HZ (factory setting) Ta:25℃	91.2 %

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	22V±0.5VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	22.057 V
2	BAT LOW SHUT DOWN	20V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	20.127 V
3	BAT LOW RESTART	25V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	25.116 V
4	BAT HIGH ALARM	31V±0.5VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	31.153 V
5	BAT HIGH SHUT DOWN	33V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	33.111 V
6	BAT HIGH RESTART	30V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	30.162 V

7	OVER TEMPERATURE	Shut down o/p voltage: re-power on	IP: HI LINE/LOW-LINE OP: FULL LOAD SW:ON Ta:25℃	Shut down o/p voltage, re-power on to recover LED DISPLAY: OK
8	OUTPUT SHORT	Shut down o/p voltage: re-power on	IP: 24VDC O/P: FULL LOAD SW:ON Ta:25℃	Shut down o/p voltage, re-power on to recover LED DISPLAY: OK (1).TEST: OK
9	OVER LOAD (typ.)	105%~115%LOAD 180sec 115%~150%LOAD 10 sec Shut down o/p voltage, re-power on to recover	IP: 24VDC OP: TESTING SW:ON Ta:25℃	(1). 105.6%~ 114.37 % 180.11 sec (2). 115.81%~ 148.87 % 10.07 sec Shut down o/p voltage, re-power on to recover

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	REMOTE CONTROL	(1).Power ON-OFF remote control by front panel dry contact connector (by RELAY) Open : Normal work Short : Remote off (2). IRC3	IP: 24VDC OP: FULL LOAD Ta:25℃	Open : Normal work Short : Remote off (1).TEST: OK (2).TEST: OK

APPLICATION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	LAMP	LAMP: 316.34 W · turn on OK LAMP: 772.47 W · turn on OK LAMP: 1145.5 W · turn on OK	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
2	INDUCTION MOTOR	0.5 HP	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
3	SWITCHING POWER SUPPLY	WITH PFC: RSP-1600-48 · O/P= 1294.6 W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
		NO PFC: SE-1000-48 · O/P= 657.66 W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	

COMPONENT WEAFORM TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	DC TO DC Power Transistor (D to S) or (C to E) Peak Voltage	Q101 Rated : 100V /80 A	I/P: high line O/P:V(max)/Freq 60HZ VDS: O/P: (1)Full Load Turn On (2) Output Short (3)O.L.P(2000W) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	Q101 Q105 (1) 87.9V (1)76.7V (2) 87.9V (2)77.5V (3) 87.1V (3)79.1V (4) 87.9V (4)75.9V (5) 87.9V (5)75.9V
2	DC TO DC Diode Peak Voltage	D 151 Rated : 300V/ 20A	I/P: high line O/P:V(max) /Freq 60HZ O/P: (1)Full Load Turn On (2) Output Short (3)O.L.P(2000W) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	D151 D152 (1) 263 V (1)263V (2) 279V (2)277V (3) 263V (3)263V (4) 271V (4)267V (5) 269V (5)273V
3	DC BUS Capacitor Voltage	C161 Rated : 680 u/ 315 V	I/P: high line O/P:V(max) /Freq 60HZ O/P: (1)Full Load Turn On (2) Output Short (3)O.L.P(2000W) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	C161 (1) 265V (2) 265V (3) 265V (4) 265V (5) 267V
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : 40A / 650 V	I/P: high line O/P:V(max) /Freq 60HZ VDS: O/P: (1)Full Load Turn On (2) Output Short (3)O.L.P(2000W) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	Q1 Q3 (1) 277V (1)273V (2) 287V (2)298V (3) 275V (3)274V (4) 271V (4)270V (5)275V (5)276V
5	AUX PWM MOS	Q201 Rated : 65 A/ 200 V Q501 Rated : 120 A/ 60 V	I/P: high line O/P:V(max) /Freq 60HZ O/P: (1)Full Load Turn On (2) Output Short (5)O.L.P(2000W) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	Q201 Q105 (1) 109.7V (1) 38.3V (2) 109.7V (2) 36.7V (3) 108.9V (3) 35.9V (4) 109.7V (4) 36.7V (5) 109.7V (5) 36.3V
6	Control IC Voltage Test	MCU IC U301 Rated 2.4 V~ 3.6 V AUX IC U201 Rated	I/P: high line O/P:V(max) /Freq 60HZ O/P: (1)Full Load Turn On (2) Output Short (3)O.L.P(2000W) Turn On	U301 U501 (1) 3.39V (1) 12.41V (2) 3.43V (2) 12.41V (3) 3.39V (3) 12.41V (4) 3.39V (4) 12.41V

		8.2V~30V CHARGE IC U501 Rated -0.3V~20V Gate Driver IC U81 Rated -0.3V~20V	(4) NO LOAD Turn On (5) Saving mode Ta:25℃	(5) 3.39V U201 (1) 12.17V (2) 12.17V (3) 12.17V (4) 12.17V (5) 12.17V	(5) 12.41V U81 (1) 5.04V (2) 5.04V (3) 5.04V (4) 5.04V (5) 5.04V

SAFETY &EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	BAT I/P-AC O/P: 3 KVAC/min AC O/P-FG: 1.5 KVAC/min	BAT I/P-AC O/P: 3.6 KVAC/min AC O/P-FG:1.8 KVAC/min Ta:25℃	BAT I/P-AC O/P: 7.09 mA AC O/P-FG: 6.06 mA NO DAMAGE
2	GROUNDING CONTINUITY	IEC62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25℃	3mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	▓ FCC(expect for Tyoe-UN) CLASS A	I/P:24 VDC O/P: :FULL/50% LOAD Ta:25℃	CLASS A
2	E.S.D	EN61000-4-2 AIR：8KV / Contact：4KV	I/P: 24VDC O/P:FULL LOAD Ta:25℃	■ CRITERIA A □ CRITERIA B
3	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL：NTU-1200-124 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 25VDC O/P： FULL LOAD Ta= 25.0 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 25VDC O/P： FULL LOAD Ta= 35.0 ℃		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 25VDC O/P： 100%LOAD Ta= -25 ℃	TEST：OK

NO	Position	ROOM AMBIENT Ta=25.0 ℃	HIGH AMBIENT Ta= 35.0 ℃
1	C101	70.5℃	71.5℃
2	C104	70.9℃	73.3℃
4	T101	93.4℃	94.1℃
6	RTH6	66.9℃	72.0℃
7	Q105	67.3℃	72.5℃
8	Q104	64.3℃	70.6℃
9	C531	34.1℃	43.7℃
10	T501	33.4℃	43.7℃
11	Q501	36.7℃	46.6℃
12	Q141	37.6℃	47.4℃
13	U301	38.1℃	49.2℃
14	U361	37.1℃	47.2℃
15	TSW1	52.7℃	61.0℃
16	LF1	57.0℃	66.0℃
17	RY1	42.5℃	52.1℃
18	C2	35.5℃	45.9℃
19	L10	73.7℃	80.2℃
20	T202	33.8℃	44.9℃
21	Q1	90.5℃	99.9℃
22	Q3	80.7℃	89.2℃
23	C222	35.8℃	47.1℃
24	R223	41.8℃	53.3℃
25	Q201	38.3℃	48.4℃
26	D153	78.1℃	82.7℃
27	D152	79.9℃	84.1℃
28	C161	45.6℃	54.0℃
29	TC1	38.2℃	47.6℃
30	TC2	39.6℃	49.4℃
31	U81	41.3℃	50.6℃
32	R501	39.9℃	49.3℃
33	R24	72.9℃	80.6℃
34	U201	44.8℃	56.0℃
35	R213	49.5℃	64.6℃
36	U501	37.2℃	46.7℃
37	D501	37.4℃	46.8℃

3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 35 ℃ NO DAMAGE	I/P：32.5VDC O/P：FULL LOAD Ta= 35 ℃ HUMIDITY= 95 %R.H	TEST：OK
4	STORAGE TEMPERATURE TEST	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：5 CYCLE 5. Input/Output condition： STATIC		TEST：OK
5	THERMAL SHOCK TEST	1. Thermal shock Temperature： -25℃~ +40℃ 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： 25VDC/Full Load		TEST：OK
6	VIBRATION TEST	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：10min/sweep cycle (4) Acceleration：4G (5) Test Time：60min in each axis (X.Y.Z) (6) Ta：25℃		TEST：OK
7	CAPACITOR LIFE CYCLE	SUPPOSE C104 IS THE MOST CRITICAL COMPONENT (1) I/P： 25VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 25VDC O/P：FULL LOAD Ta= 35 ℃ LIFE TIME		(1) 149847.9HRS (2) 126883HRS
8	MTBF	Conducted by Parts Stress Analysis Prediction 596.7K hrs min. Telcordia TR/SR-332 (Bellcore) ; 62.0K hrs min. MIL-HDBK-217F (25℃)		
9	Ongoing Reliability Test	I/P：25VDC O/P：80% LOAD TA=50℃ Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

2018.4.30 GP-A50-F010