Test Report: NTS-1200-148

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

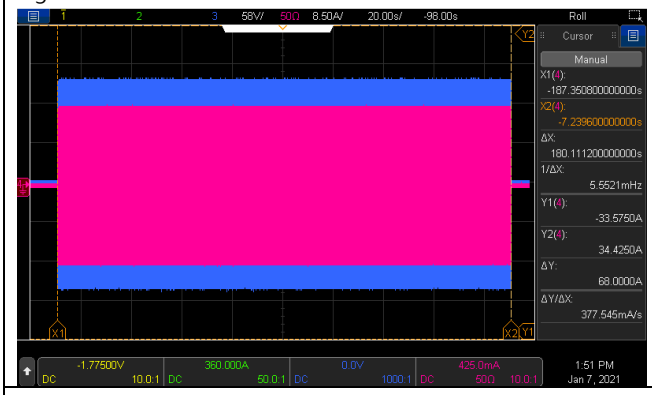
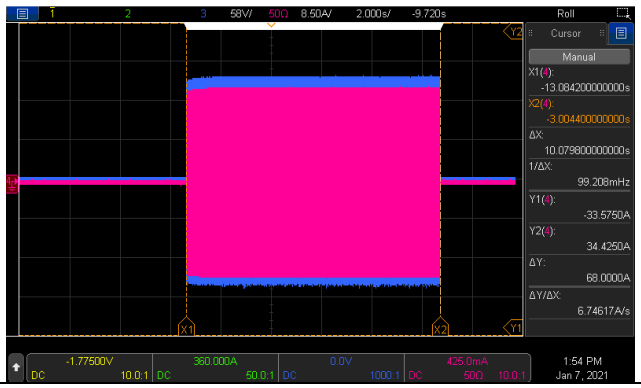
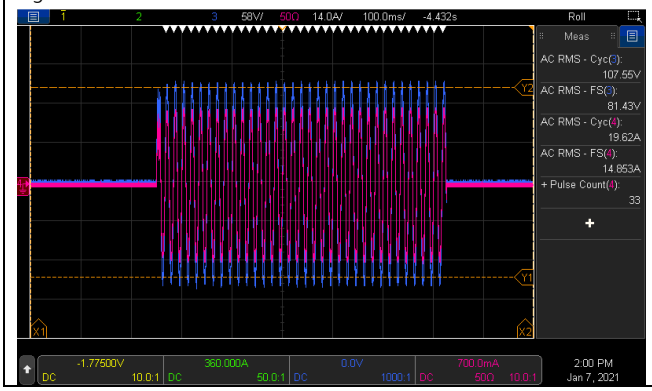
  E.M.C. Test

- RELIABILITY TEST

  ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED POWER	1200W	IP: 48VDC 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: 50VDC OP:TESTING LOAD Ta:25℃	(1) 106.97 V/ 12.38 A/ 180.11 Sec (2) 106.46 V/ 15.11 A/ 10.08Sec (3) 109.7V/18.06 A/33 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: 48VDC OP: FULL LOAD Ta:25℃	DIP S.W 100VAC: 100.18 V DIP S.W 110VAC: 110.32 V DIP S.W 115VAC: 115.33 V DIP S.W 120VAC: 120.32 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25℃	DIP S.W 50HZ: 50.041 HZ DIP S.W 60HZ: 59.958 HZ

5	WAVEFORM	True sine wave (THD<3%)	IP: 50VDC OP:75% LOAD(900W) (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25℃	(1) 1.352% / Vo(min)/75% LOAD (2) 1.24% / Vo(nor) /75% LOAD (3) 1.156% / Vo(max) /75% LOAD

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

Fig1

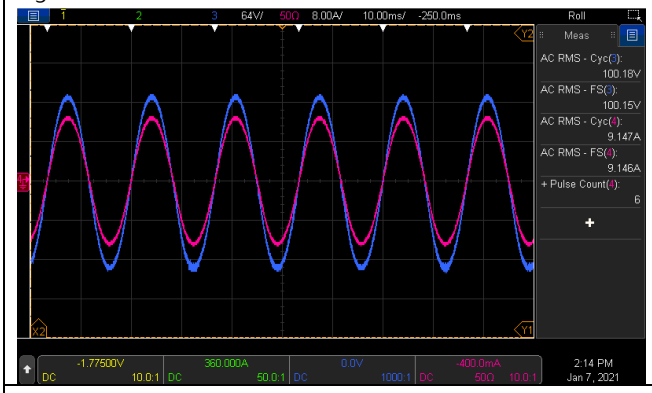


Fig2

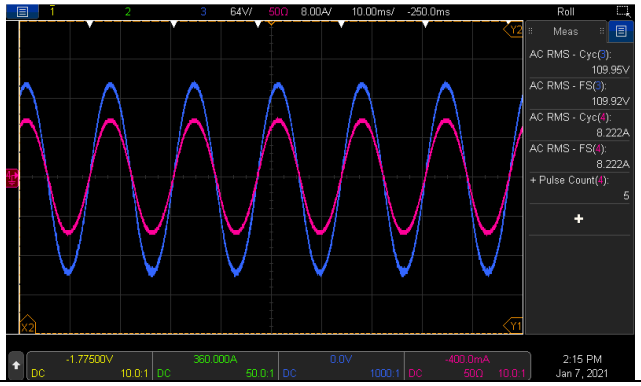
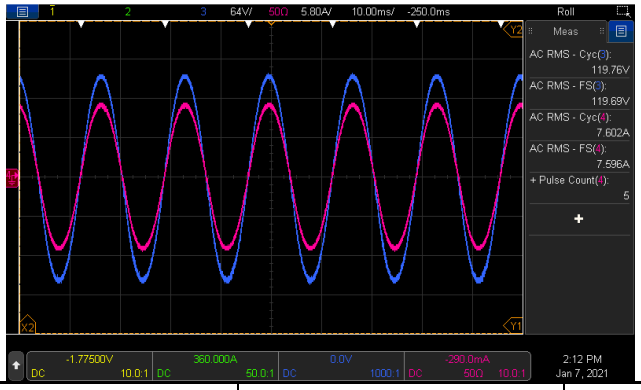


Fig3



6	AC REGULATION	±3%	IP: 50VDC OP:75% LOAD(900W) Ta:25℃	0.4 %
7	Overshoot /Undershoot	<±10%	IP: 48VDC OP: (1) full load turn on (2) no load turn on (3) full /no load change Ta:25℃	(1) -7.0 % (2) -4.27 % (3) -5.36 %
8	O/P voltage DC offset	Vin(nor)= 48 v · Vo 需< 200mV · no load : 63.7 mV / full load: 87.7 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	50.0~62.0 Vdc±1v	49.978Vdc ~ 61.81 Vdc
Orange	44.0~50.0Vdc ±1v	44.1Vdc ~ 49.918Vdc
Red	<44.0 Vdc ±1v > 62.0vdc±1v	< 43.878 Vdc > 61.95 Vdc

● Load test

LED	LOAD RANGE	RESULT
Green	Min. load ~ 40%±5% LOAD	Min. load ~ 37.83 %
Orange	40%±5% ~ 80%±5% LOAD	40.5%~76.33 %
Red	≧ 80%±5% LOAD	≧ 78.33 %

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	VOLTAGE RANGE (TYP)	40VDC~66VDC	IP: TESTING OP:NO LOAD/FULL LOAD Ta:25℃	40.046 VDC~ 65.75 VDC/NO LOAD 40.06 VDC~ 65.73 VDC/FULL LOAD
			I/P: LOW-LINE=42V HIGH-LINE=65V 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)	30A	IP: 48VDC OP:FULL LOAD Ta:25℃	28.67 A
3	NO LOAD DISSPATION (Typ.)	NON-Saving Mode=15W	IP: 48VDC OP:NO LOAD Ta:25℃	11.36 W
		SAVING MODE (1) Po： Default disable, auto detect AC output load ≦ 10W will be changed to saving mode (2) Pi ： ≦1.5 W	IP: 48VDC OP: TESTING LOAD Ta:25℃	NORMAL TO SAVING MODE: ≦ 11.5 W
			IP: 48VDC OP: TESTING LOAD Ta:25℃	1.45 W
6	OFF MODE CURRENT DRAW (Typ.)	≦ 1mA	IP: 48VDC OP: Sw off Ta:25℃	0.69 mA
7	EFFICIENCY(TYP)	900W/91.5%	IP: 50VDC OP: Po=900W 110V/60HZ (factory setting) Ta:25℃	91.9%

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	44V±1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	43.852 V
2	BAT LOW SHUT DOWN	40V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	39.975 V
3	BAT LOW RESTART	50V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	49.936 V
4	BAT HIGH ALARM	62V±1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	61.89 V
5	BAT HIGH SHUT DOWN	66V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	65.82 V
6	BAT HIGH RESTART	60V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	59.92 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: 48VDC 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: 48VDC OP: TESTING SW:ON Ta:25℃	(1). 104.81 %~ 114.02% 180.11 sec (2). 114.97 %~ 140.49 % 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: 48VDC 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: 827 W · turn on OK LAMP: 1114 W · turn on OK LAMP: 1259 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= 1194 W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
		NO PFC: SE-1000-48 · O/P= 573 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/Q105 Rated : 200V /65 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(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	Q101 Q105 (1) 163V (1) 165V (2) 165V (2) 165V (3) 163V (3) 163V (4) 168V (4) 165V (5) 168V (5) 165V
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(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	D151 D152 (1) 265V (1) 261V (2) 281V (2) 277V (3) 265V (3) 261V (4) 277V (4) 265V (5) 275V (5) 265V
3	DC BUS Capacitor Voltage	C161/C162 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(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	C161 (1) 266V (2) 266V (3) 266V (4) 266V (5) 268V
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(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	Q1 Q3 (1)295V (1)297V (2)341V (2)337V (3)317V (3)311V (4)321V (4) 317V (5)317V (5) 313V
5	AUX PWM MOS	Q201 Rated : 65 A/ 200 V Q501 Rated : 65 A/ 200 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(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	Q201 Q501 (1) 168V (1) 39.9V (2) 168V (2) 39.5V (3) 168V (3) 37.1V (4) 168V (4) 38.5V (5) 168V (5) 36.7V
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(200%) Turn On	U301 U501 (1) 3.35V (1) 12.41V (2) 3.35V (2) 12.41V (3) 3.35V (3) 12.41V (4) 3.35V (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) 3.35V U201 (1) 12.17V (2) 12.17V (3) 12.17V (4) 12.17V (5) 12.17V	(5) 12.41V U81 (1) 5.04V (2) 5.08V (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: 7.12 mA AC O/P-FG: 6.13 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:48 VDC O/P: :FULL/50% LOAD Ta:25℃	CLASS A
2	E.S.D	EN61000-4-2 AIR：8KV / Contact：4KV	I/P: 48VDC 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-1200-148 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 50VDC O/P： FULL LOAD Ta= 25.4 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 50VDC O/P： FULL LOAD Ta= 36.9 ℃		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 50VDC O/P： 100%LOAD Ta= -25 ℃	TEST：OK

NO	Position	ROOM AMBIENT Ta=25.4 ℃	HIGH AMBIENT Ta= 36.9 ℃
1	C101	59.0℃	60.7℃
2	C104	61.9℃	64.8℃
3	RTH6	64.0℃	67.0℃
4	Q107	67.8℃	70.7℃
5	Q103	63.3℃	67.0℃
6	C531	34.4℃	43.0℃
7	Q501	38.0℃	45.3℃
8	T501	34.3℃	42.7℃
9	U301	39.4℃	47.8℃
10	U361	41.2℃	49.4℃
13	T101	75.7℃	77.7℃
14	CC60	41.1℃	49.1℃
15	D153	88.6℃	88.2℃
16	Q2	84.7℃	90.4℃
17	Q3	80.3℃	85.6℃
18	TSW1	52.4℃	59.5℃
19	C162	53.1℃	57.6℃
20	D152	96.5℃	92.7℃
21	Q201	36.0℃	45.6℃
22	T202	36.8℃	46.2℃
23	L10	84.5℃	86.5℃
24	C2	40.8℃	47.9℃
25	RY2	40.8℃	50.1℃
26	LF1	69.9℃	73.9℃
27	ZNR1	46.1℃	53.0℃
28	C222	36.8℃	45.0℃
29	U201	40.6℃	49.3℃
30	U91	39.0℃	46.8℃
31	U501	36.0℃	44.3℃
32	R501	38.9℃	46.3℃
33	R24	73.7℃	77.9℃
34	R213	38.3℃	49.2℃
35	D501	38.4℃	45.4℃
36	R223	46.7℃	54.4℃
37	C1	48.4℃	58.0℃
38	TC	45.3℃	52.9℃

3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 35 ℃ NO DAMAGE	I/P：65VDC 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： 50VDC/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： 50VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 50VDC O/P：FULL LOAD Ta= 35 ℃ LIFE TIME		(1) 299137.9HRS (2) 265886.5HRS
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：50VDC 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