Test Report: NTS-250P-148

250W High Reliable Built-in Type True Sine Wave DC-AC 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	250W	IP: 48VDC Ta:25℃	256.12 W _
2	MAXIMUM OUTPUT POWER (TYP)	(1)287.5W/180sec. (2)371w/10sec (3)SURGE POWER 500W FOR 30CYCLE Vin (30±5 CYCLE)	IP: 50VDC OP:TESTING LOAD Ta:25℃	(1) 109.76 V/2.631 A/ 180.08Sec (2) 109.59V/ 3.405A/10.06 Sec (3) 110 V/ 4.57A/ 33Cycle

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

Fig1

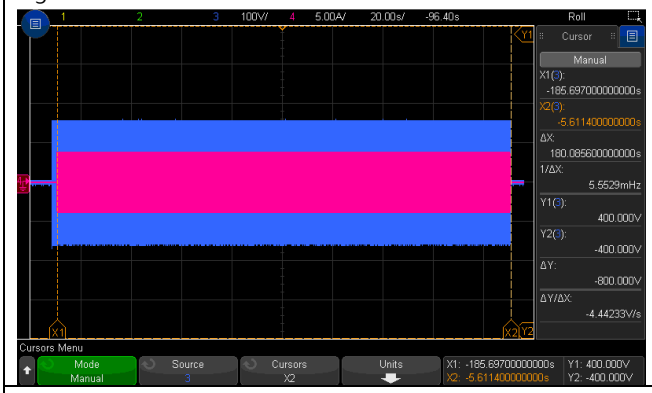


Fig2

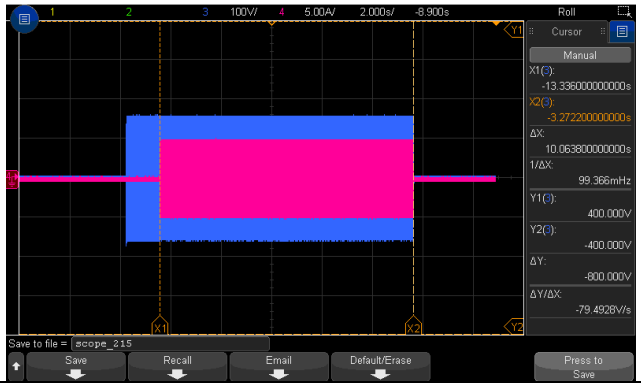


Fig3

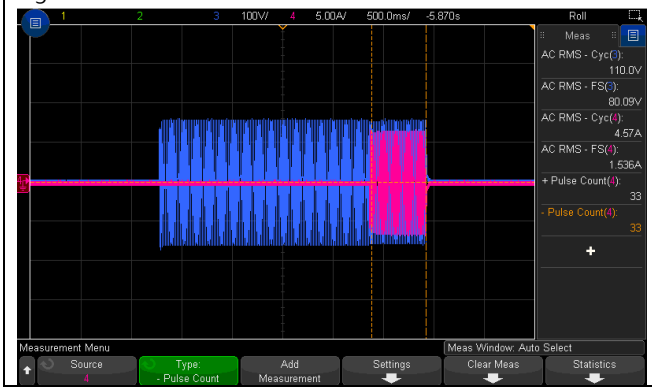


Fig4

3	AC Voltage	100 / 110 / 115 / 120Vac selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25℃	DIP S.W 100VAC: 99.69 V DIP S.W 110VAC: 109.89 V DIP S.W 115VAC: 114.33 V DIP S.W 120VAC: 119.88 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25℃	DIP S.W 50HZ: 50.042 HZ DIP S.W 60HZ: 59.959 HZ
5	WAVEFORM	True sine wave (THD<3%)	IP: 50VDC OP: FULL LOAD (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25℃	(1) 1.059% / Vo(min) /FULL LOAD (2) 1.367% / Vo(nor) /FULL LOAD (3) 0.914% / Vo(max) /FULL LOAD

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

Fig1

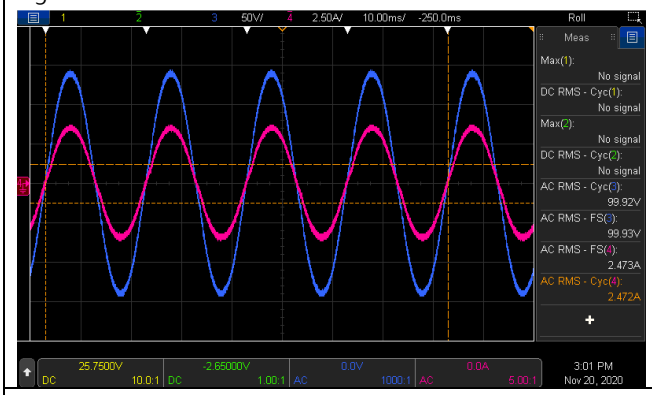


Fig2

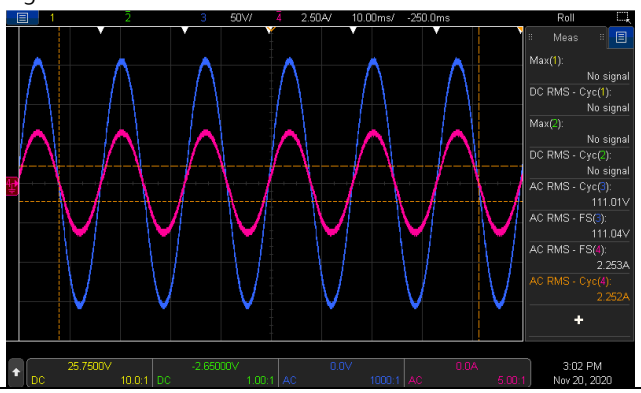
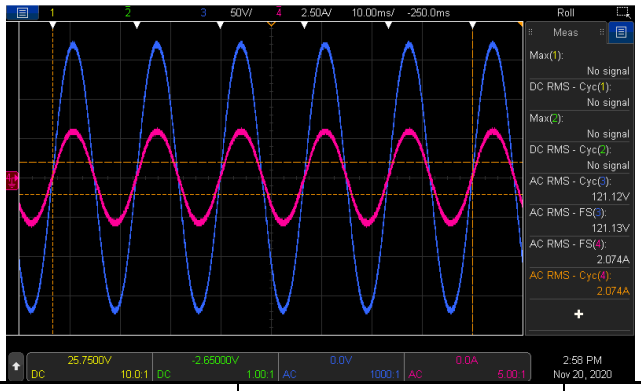


Fig3



6	AC REGULATION	±3%	IP: 50VDC OP: FULL LOAD/NO LOAD Ta:25℃	-0.145 %
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) -7.00 % (2) -3.73 % (3) -1.09 %
8	O/P voltage DC offset	Vin(nor)= 48 v · Vo<200mv · no load : 75mv / full load: 76mv		

10	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	50~62Vdc±1 v	50.14vdc~ 62.06 vdc
Orange	44~50Vdc ±1v	44.057~ 50.13 vdc
Red	<44 Vdc ±1v >62 Vdc ±1v	<44.05vdc > 62.08 vdc

● Load test

LED	LOAD RANGE	RESULT
Green	Min. load ~ 40%±5% LOAD	Min. load ~43.2 %
Orange	40%±5% ~ 80%±5% LOAD	43.6%~ 82%
Red	≧ 80%±5% LOAD	≧ 82.4 %

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℃	40.17 VDC~ 66.03 VDC/NO LOAD 40.17 VDC~ 65.98 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)	7A	IP: 48VDC OP:FULL LOAD Ta:25℃	5.62 A
3	NO LOAD DISSPATION (Typ.)	NON-Saving Mode=12W	IP: 48VDC OP:NO LOAD Ta:25℃	6.72 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: ≦14 W
			IP: 48VDC OP: TESTING LOAD Ta:25℃	1.05 W
4	OFF MODE CURRENT DRAW (Typ.)	≦ 1mA	IP: 48VDC Ta:25℃	0mA
5	EFFICIENCY(TYP)	250W/92 %	IP: 50VDC OP: Po= 250W 100V/50HZ (factory setting) Ta:25℃	92.87%

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	44V±1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	44.046 V
2	BAT LOW SHUT DOWN	40V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	40.145 V
3	BAT LOW RESTART	50V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	50.012 V
4	BAT HIGH ALARM	62V±1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	62.10 V
5	BAT HIGH SHUT DOWN	66V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	66.16 V
6	BAT HIGH RESTART	60V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	60.26 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: 12VDC 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). 106.8~115.2 % 180.08 sec (2). 115.6~148.4 % 10.06 sec Shut down o/p voltage, re-power on to recover

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	REMOTE CONTROL	Power ON-OFF remote control by front panel dry contact connector (by RELAY) Open : Normal work Short : Remote off	IP: 48VDC OP: FULL LOAD Ta:25℃	Open : Normal work Short : Remote off (1). TEST: OK

APPLICATION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	LAMP	LAMP: 153.23 W · turn on OK LAMP: 229.32 W · turn on OK LAMP: 305.79 W · turn on OK	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
2	INDUCTION MOTOR	0.12 HP	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
3	SWITCHING POWER SUPPLY	WITH PFC EPP-500-48 · O/P= 246.88W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
		NO PFC: LRS-350-36 · O/P= 249.78W	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	Q102 Rated : 200V /75 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℃	(1)155V (2)153V (3)157V (4)145V (5)145V

2	DC TO DC Diode Peak Voltage	D 105 Rated : 600V/10 A	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℃	(1) 300V (2) 300V (3) 296 V (4) 304V (5) 304V
3	DC BUS Capacitor Voltage	C118 /C119 Rated : 180u/ 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℃	C118 (1) 296V (2)296V (3) 296V (4) 296V (5) 296V
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 200 Rated : 650V / 40 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℃	(1) 312V (2) 340V (3) 316V (4)304V (5) 312V
5	AUX PWM MOS	Q504 Rated : 18 A/ 200 V Q105 Rated : 40 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℃	Q504 (1) 128V (2) 128V (3) 128V (4) 128V (5) 128V Q105 (1) 163V (2) 161V (3) 161V (4) 161V (5) 163V
6	Control IC Voltage Test	MCU IC U303 Rated 2.4 V~ 3.6 V AUX IC U501 Rated 8.2V~30V CHARGE IC U101 Rated -0.3V~20V Gate Driver IC U200 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 (4) NO LOAD Turn On (5) Saving mode Ta:25℃	U303 (1) 3.41V (2) 3.45V (3) 3.45V (4) 3.37V (5) 3.45V U501 (1) 11.65V (2) 11.65V

		-0.3V~20V		(3)11.65V (4)11.65V (5)11.65V U101 (1)12.62 V (2) 12.62V (3) 12.54V (4) 12.62V (5) 12.62V U200 (1) 5.30V (2) 5.18V (3) 5.18V (4) 5.18V (5) 5.18V

SAFETY &EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	BAT I/P-ACO/P: 3 KVAC/min AC O/P-FG: 1.5 KVAC/min	BATI/P-ACO/P 3.6 KVAC/min AC O/P-FG:1.8 KVAC/min Ta:25℃	BAT I/P-ACO/P: 1.97 mA AC O/P-FG: 2.13 mA NO DAMAGE
2	GROUNDING CONTINUITY	IEC62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25℃	4mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	▓ FCC CLASS A	I/P:24 VDC O/P: :FULL/50% LOAD Ta:25℃	CLASS A
2	E.S.D	EN61000-4-2 AIR：15KV / Contact：8KV	I/P: 12VDC 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：NTS-250P-124 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 12.5VDC O/P： FULL LOAD Ta= 26 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 12.5VDC O/P： FULL LOAD Ta= 41.2 ℃		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 25VDC O/P： 100%LOAD Ta= -25 ℃	TEST：OK
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 ℃ NO DAMAGE	I/P：32.5VDC O/P：FULL LOAD Ta= 40 ℃ HUMIDITY= 95 %R.H	TEST：OK

NO	Position	ROOM AMBIENT Ta=26 ℃	HIGH AMBIENT Ta= 41.2 ℃
1	RT300	62.2℃	76.7℃
2	Q103	65.3℃	80.5℃
3	Q104	65.1℃	80.3℃
4	T101	84.8℃	99.5℃
5	C100	67.3℃	81.9℃
6	C101	72.5℃	87.2℃
7	L100	58.2℃	71.8℃
8	TB1	51.3℃	65.5℃
9	C112	71.8℃	86.3℃
10	D105	72.1℃	89.4℃
11	C119	74.5℃	88.8℃
12	D107	68.2℃	84.4℃
13	Q201	80.7℃	98.9℃
14	L200	71.3℃	88.1℃
15	ZR200	42.5℃	58.4℃
16	Q203	78.6℃	95.4℃
17	L201	58.2℃	73.6℃
18	C219	66.3℃	82.3℃
19	TSW1	68.5℃	84.4℃
20	C118	74.2℃	88.7℃
21	U201	70.6℃	84.4℃
22	T501	75.4℃	88.4℃
23	Q504	79.1℃	91.9℃
24	U501	86.7℃	99.4℃
25	U100	69.6℃	83.9℃
26	Q501	78.6℃	91.8℃
27	T100	74.4℃	87.5℃
28	Q105	72.3℃	86.2℃
29	U303	72.9℃	86.9℃
30	U500	65.7℃	80.2℃

5	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
7	THERMAL SHOCK TEST	1. Thermal shock Temperature： -25℃~ +45℃ 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： 24VDC/Full Load	TEST：OK
8	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
9	CAPACITOR LIFE CYCLE	SUPPOSE C101 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= 40 ℃ LIFE TIME	(1) 148173.8HRS (2) 54234.8HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 836.9K hrs min. Telcordia SR-332 (Bellcore) ; 84.0K hrs min. MIL-HDBK-217F (25℃)	
11	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