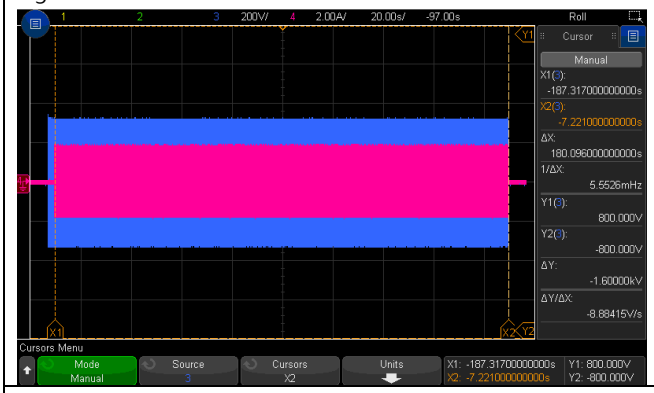
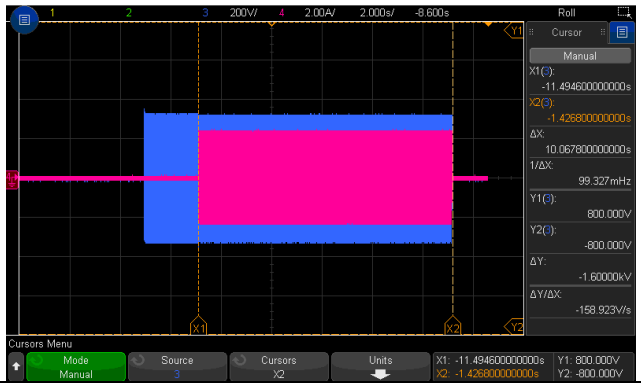
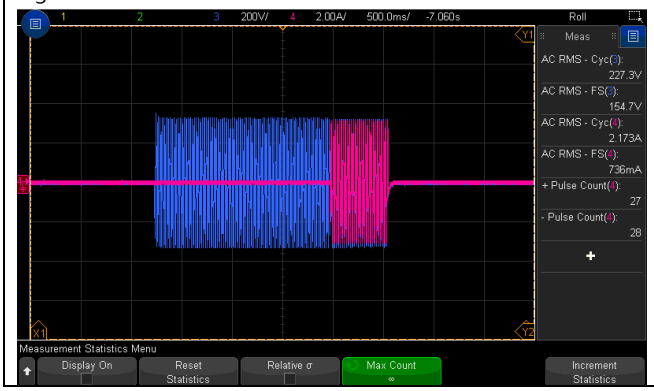
Test Report: NTS-250P-248

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℃	255.64 W
2	MAXIMUM OUTPUT POWER (TYP)	(1)287.5W/180sec. (2)372w/10sec (3)SURGE POWER 500W FOR 30CYCLE Vin (30±5 CYCLE)	IP: 50VDC OP:TESTING LOAD Ta:25℃	(1) 229.12 V/1.2587A/ 180.09 Sec (2) 228.9 V/ 1.6295 A/ 10.06 Sec (3) 227.3V/ 2.173 A/ 27Cycle
	CH3:O/P VAC CH4:O/P IAC Fig1  Fig2  Fig3  Fig4			
3	AC Voltage	200 / 220 / 230 / 240Vac selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25℃	DIP S.W 200VAC: 199.28 V DIP S.W 220VAC: 219.26 V DIP S.W 230VAC: 229.18 V DIP S.W 240VAC: 239.32 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25℃	DIP S.W 50HZ: 50.042 HZ DIP S.W 60HZ: 59.958 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) 0.852% / Vo(min) /FULL LOAD (2) 0.896% / Vo(nor) /FULL LOAD (3) 1..19% / Vo(max) /FULL LOAD

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

Fig1

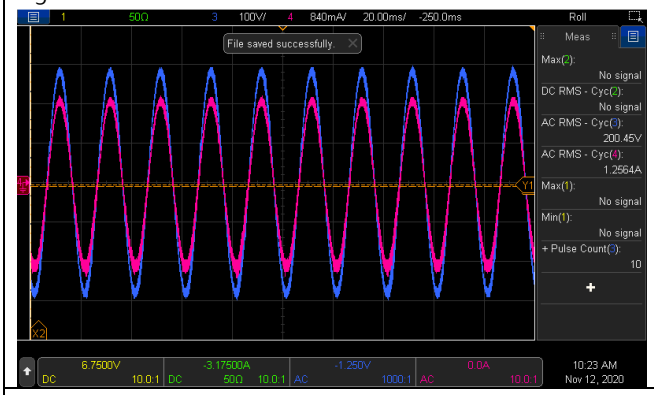


Fig2

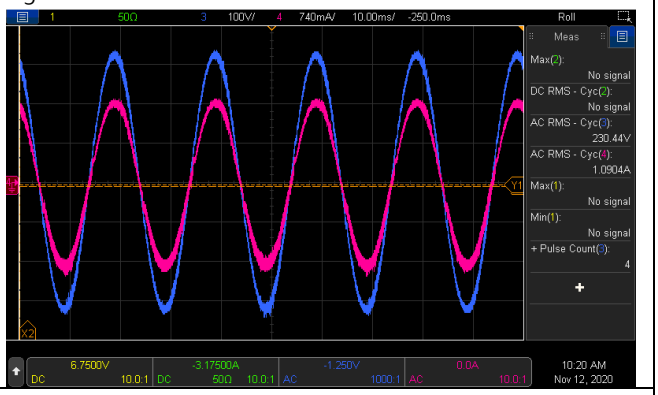
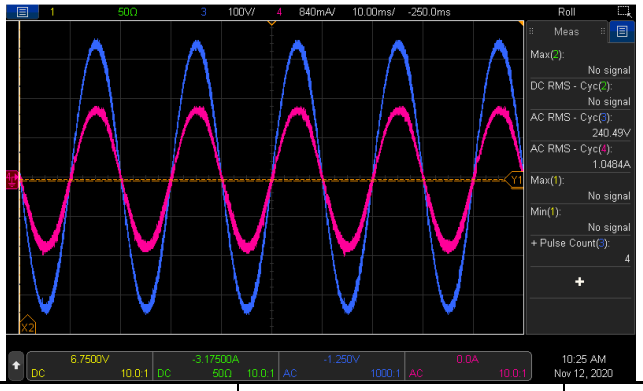


Fig3



6	AC REGULATION	±3%	IP: 50VDC OP: FULL LOAD/NO LOAD Ta:25℃	-0.39 %
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) -4.52 % (2) -6.04 % (3) -1.83 %
8	O/P voltage DC offset	Vin(nor)= 48 v · Vo<200mv · no load : 83.5mV / full load: 140mV		

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~ 62Vdc ±1v	49.971Vdc ~ 61.92Vdc
Orange	44~ 50Vdc ±1v	44.019Vdc ~ 49.923Vdc
Red	<44 Vdc ±1v >62Vdc±1v	<43.928 Vdc >61.98Vdc

● Load test

LED	LOAD RANGE	RESULT
Green	Min. load ~ 40%±5% LOAD	Min. load ~ 42.4%
Orange	40%±5% ~ 80%±5% LOAD	42.8%~ 81.6%
Red	≧ 80%±5% LOAD	≧ 82%

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℃	40.143 VDC~ 65.89 VDC/NO LOAD 40.098 VDC~ 65.44 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℃	4.6 A
3	NO LOAD DISSPATION (Typ.)	NON-Saving Mode=12W	IP: 48VDC OP:NO LOAD Ta:25℃	7.64 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: ≦15 W
			IP: 48VDC OP: TESTING LOAD Ta:25℃	1.39 W
4	OFF MODE CURRENT DRAW (Typ.)	≦ 1mA	IP: 48VDC OP: Sw off Ta:25℃	0 mA
5	EFFICIENCY(TYP)	250W/93 %	IP: 50VDC OP: Po= 250W 240V/60HZ (factory setting) Ta:25℃	93.94%

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	44V±1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	43.966 V
2	BAT LOW SHUT DOWN	40V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	40.067 V
3	BAT LOW RESTART	50V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	50.189 V
4	BAT HIGH ALARM	62V±1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	62.05 V
5	BAT HIGH SHUT DOWN	66V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	66.03 V
6	BAT HIGH RESTART	60V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	59.98 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). 106.4 %~ 115.2% 180.096 sec (2). 115.6%~ 148.8% 10.067 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: 204.32 W · turn on OK LAMP: 309.22 W · turn on OK	1. Vin=HIGH LINE 2. O/P = 230V/50Hz TEST: OK	
2	INDUCTION MOTOR	0.12 HP	1. Vin=HIGH LINE 2. O/P = 230V/50Hz TEST: OK	
3	SWITCHING POWER SUPPLY	WITH PFC: EPP-500-48 · O/P= 250.163W	1. Vin=HIGH LINE 2. O/P = 230V/50Hz TEST: OK	
		NO PFC: LRS-350-36 · O/P= 250.12W	1. Vin=HIGH LINE 2. O/P = 230V/50Hz 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 /40 A	I/P: high line O/P:V(max)/Freq 50HZ 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)159V (2) 153V (3)175V (4)155V (5)155V

2	DC TO DC Diode Peak Voltage	D 105 Rated : 600V/10 A	I/P: high line O/P:V(max) /Freq 50HZ 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) 528V (2) 536V (3) 528V (4) 544V (5) 536V
3	DC BUS Capacitor Voltage	C118 /C119 Rated : 220u/ 265 V	I/P: high line O/P:V(max) /Freq 50HZ 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) 261V (2) 252V (3) 250V (4) 250V (5) 250V
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 200 Rated : 650V / 15 A	I/P: high line O/P:V(max) /Freq 50HZ 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)517V (2) 537V (3) 521V (4) 529V (5) 525V
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 (3)O.L.P(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	Q504 (1) 128.6V (2) 127.8V (3) 127.8V (4) 128.6V (5) 128.6V Q105 (1) 142V (2) 144V (3) 144V (4) 144V (5) 144V
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) 3.38V (2) 3.38V (3) 3.42V (4) 3.38V (5) 3.38V U501 (1) 11.66V (2) 11.66V

		-0.3V~20V		(3)11.90V (4)11.82V (5)11.90V U101 (1) 12.67V (2) 12.59V (3) 12.67V (4) 12.67V (5) 12.59V U200 (1) 5.19V (2) 5.19V (3) 5.15V (4) 5.15V (5) 5.19V

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: 2.16 mA AC O/P-FG: 3.22 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	EN55032 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-248 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 50VDC O/P： FULL LOAD Ta= 25.9 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 50VDC O/P： FULL LOAD Ta= 40.5 ℃		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 50VDC 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：65VDC O/P：FULL LOAD Ta= 40 ℃ HUMIDITY= 95 %R.H	TEST：OK

NO	Position	ROOM AMBIENT Ta=25.9 ℃	HIGH AMBIENT Ta= 40.5 ℃
1	TB1	44.1℃	60.2℃
2	C100	58.2℃	74.0℃
3	C101	64.4℃	79.7℃
4	Q101	60.3℃	76.0℃
5	Q103	61.3℃	76.9℃
6	T101	77.6℃	92.6℃
7	C112	64.9℃	79.0℃
8	L100	54.9℃	66.8℃
9	D106	61.0℃	75.6℃
10	D105	62.0℃	77.0℃
11	C119	68.9℃	83.4℃
12	Q200	67.4℃	82.7℃
13	C118	66.3℃	80.8℃
14	L200	64.7℃	80.6℃
15	Q202	66.5℃	82.2℃
16	C219	59.7℃	75.4℃
17	ZR200	60.7℃	76.3℃
18	L201	45.7℃	61.5℃
19	U100	66.9℃	81.6℃
20	U303	71.5℃	85.3℃
21	RT300	58.5℃	73.4℃
22	Q105	67.3℃	82.0℃
23	T100	71.1℃	85.1℃
24	T501	74.4℃	88.7℃
25	Q504	78.6℃	92.3℃
26	U501	85.1℃	99.0℃
27	Q501	78.9℃	92.5℃
28	C114	69.4℃	83.8℃
29	U201	68.8℃	83.3℃
30	U500	72.2℃	86.8℃
31	C225	61.1℃	76.6℃
32	TSW1	63.2℃	78.9℃

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： 48VDC/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： 50VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 50VDC O/P：FULL LOAD Ta= 40 ℃ LIFE TIME	(1) 261149.2HRS (2) 87957.2HRS
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：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