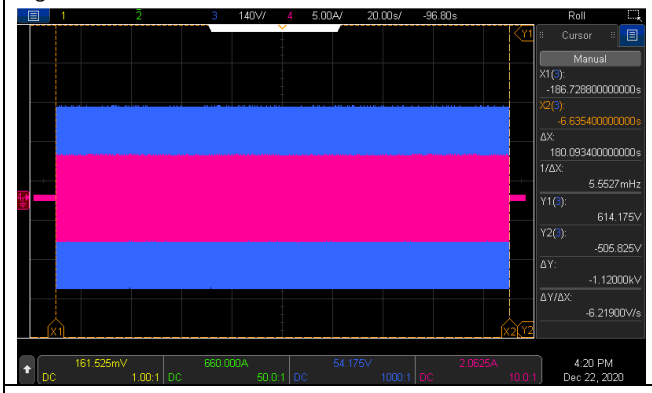
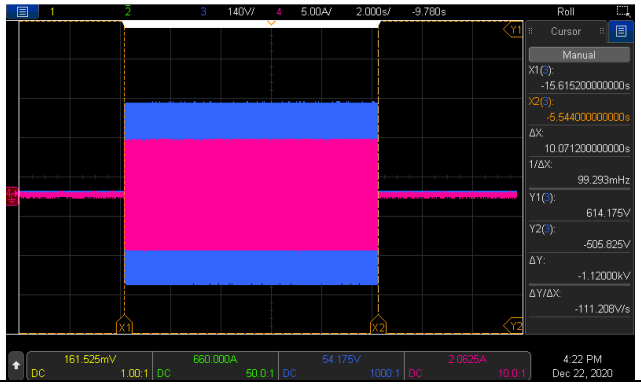
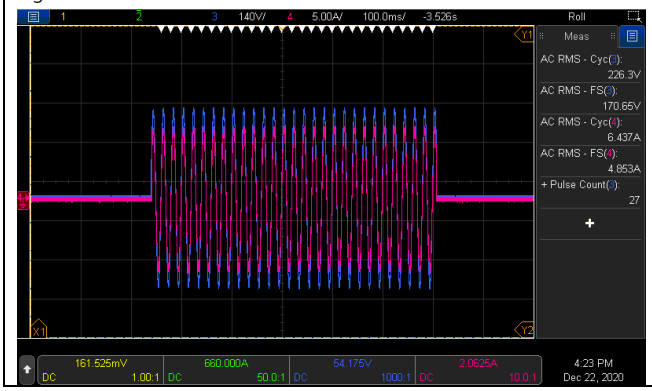
Test Report: NTS-750-224

750W High Reliable 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	750W	IP: 24VDC Ta:25℃	765 W
2	MAXIMUM OUTPUT POWER (TYP)	(1)862W/180sec. (2)1125w/10sec (3)SURGE POWER 1500W FOR 30CYCLE Vin (30 ± 5 CYCLE)	IP: 25VDC OP:TESTING LOAD Ta:25℃	(1) 229.9 V/ 3.75 A/ 180.09 Sec (2) 226.9 V/ 4.82 A/ 10.07 Sec (3) 226.6 V/ 6.45 A/ 27 Cycle
	CH3:O/P VAC CH4:O/P IAC Fig1  Fig2  Fig3 			
3	AC Voltage	200 / 220 / 230 / 240Vac selectable by DIP S.W	IP: 24VDC OP: FULL LOAD Ta:25℃	DIP S.W 200VAC: 199.9 V DIP S.W 220VAC: 220.1 V DIP S.W 230VAC: 229.9 V DIP S.W 240VAC: 240.2 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 24VDC 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: 25VDC OP:80% LOAD(600W) (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25℃	(1) 1.02% / Vo(min) /80% LOAD (2) 1.02% / Vo(nor) / 80% LOAD (3) 1.01% / Vo(max) /80% LOAD

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

Fig1

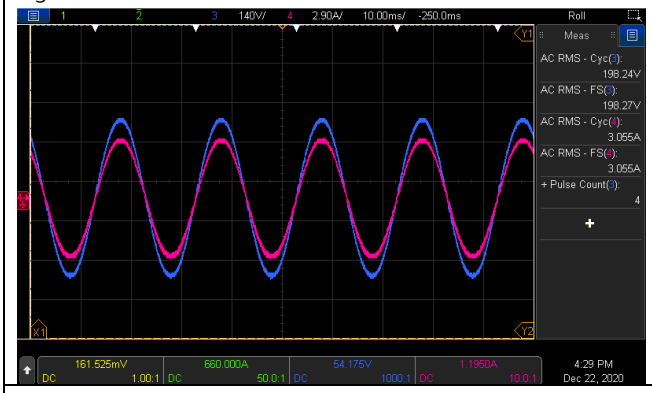


Fig2

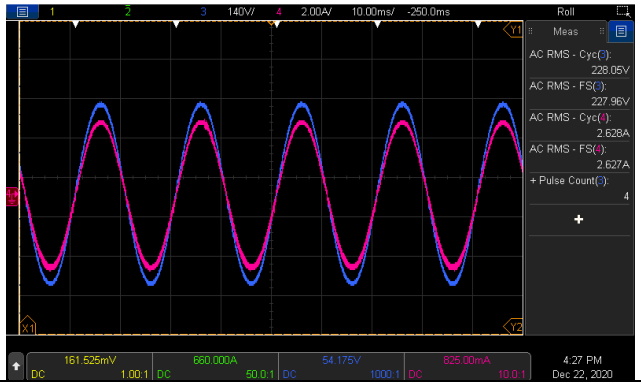
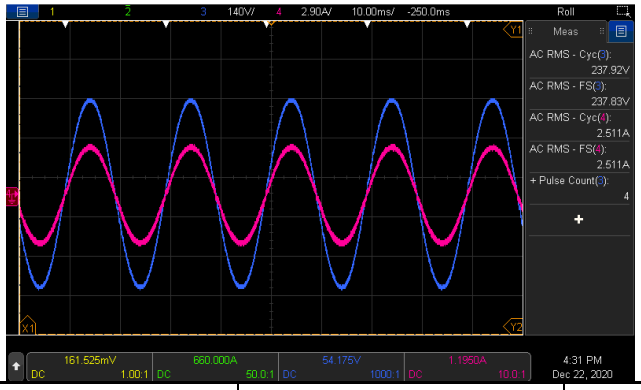


Fig3



6	AC REGULATION	±3%	IP: 25VDC OP:80% LOAD(600W) Ta:25℃	0.15 %
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) -7.9 % (2) -5.9 % (3) -2.6 %
8	O/P voltage DC offset	Vin(nor)= 24 v · Vo<200mV · no load : 89.8 mV / full load: 140 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	25.152Vdc ~31.06 Vdc
Orange	22~ 25Vdc ±0.5v	22.13Vdc ~25.04 Vdc
Red	<22.0 Vdc ±0.5v > 31.0vdc±0.5v	< 22.01 Vdc > 31.37Vdc

● Load test

LED	LOAD RANGE	RESULT
Green	Min. load ~ 40%±5% LOAD	Min. load ~38.8%
Orange	40%±5% ~ 80%±5% LOAD	42%~ 77.7%
Red	≧ 80%±5% LOAD	≧ 81.3%

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℃	20.1 VDC~ 33. 1 VDC/NO LOAD 20.2 VDC~ 33.1 VDC/FULL LOAD
			I/P: LOW-LINE=20.5V 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: 24V O/P:FULL LOAD ON:30ec OFF:30ec 12Hr (POWER ON/OFF NO DAMAGE)	Test: OK

2	DC CURRENT (TYP)	38A	IP: 24VDC OP:FULL LOAD Ta:25℃	33.5 A
3	NO LOAD DISSPATION (Typ.)	NON-Saving Mode=10W	IP: 24VDC OP:NO LOAD Ta:25℃	8.96 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: ≦ 12 W
			IP: 24VDC OP: TESTING LOAD Ta:25℃	1.01 W
4	OFF MODE CURRENT DRAW (Typ.)	≦ 1mA	IP: 24VDC OP: Sw off Ta:25℃	0.74 mA
5	EFFICIENCY(TYP)	600W/93%	IP: 25VDC OP: Po=600W 230V/50HZ (factory setting) Ta:25℃	94.1%

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℃	22.0 V
2	BAT LOW SHUT DOWN	20V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	20.2 V
3	BAT LOW RESTART	25V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	25.1 V
4	BAT HIGH ALARM	31V±0.5VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	31.1 V
5	BAT HIGH SHUT DOWN	33V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	33.1 V
6	BAT HIGH RESTART	30V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	30.1 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). 106 %~114 % 180.1 sec (2). 116 %~148 % 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	Power ON-OFF remote control by front panel dry contact connector (by RELAY) Open : Normal work Short : Remote off	IP: 24VDC OP: FULL LOAD Ta:25℃	Open : Normal work Short : Remote off .TEST: OK

APPLICATION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	LAMP	LAMP: 507 W · turn on OK LAMP: 711 W · turn on OK LAMP: 810 W · turn on OK	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: OK	
2	INDUCTION MOTOR	0.35 HP	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: OK	
3	SWITCHING POWER SUPPLY	WITH PFC: RSP-1600-48 · O/P= 761 W	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: OK	
		NO PFC: SE-1000-48 · O/P= 550 W	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 : 120V /100 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) 79.1V (2) 75.9V (3) 80.7V (4) 79.1V (5) 79.1V

2	DC TO DC Diode Peak Voltage	D 105 Rated : 600V/ 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℃	(1) 537V (2) 545V (3) 537V (4) 525V (5) 525V
3	DC BUS Capacitor Voltage	C118 /C119 Rated : 500 u/ 265 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) 247V (2) 249V (3) 253V (4) 257V (5) 259V C119 (1) 249V (2) 251V (3) 251V (4) 255V (5) 253V
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 200 Rated : 30A / 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℃	(1) 533V (2) 554V (3) 566V (4) 517V (5) 503V
5	AUX PWM MOS	Q504 Rated : 40 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) 92.2V (2) 92.2V (3) 92.2V (4) 92.2V (5) 92.2V Q105 (1) 75.3V (2) 75.3V (3) 75.3V (4) 75.3V (5) 75.3V
6	Control IC Voltage Test	MCU IC U303 Rated 2.4 V~ 3.6 V AUX IC U501 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	U303 (1) 3.35V (2) 3.35V (3) 3.35V (4) 3.35V (5) 3.35V

		8.2V~30V CHARGE IC U101 Rated -0.3V~20V Gate Driver IC U200 Rated -0.3V~20V	(5) Saving mode Ta:25℃	U501 (1) 13.88V (2) 13.88V (3) 13.88V (4) 13.88V (5) 13.88V U101 (1)12.51 V (2) 12.51 V (3) 12.51 V (4) 12.51 V (5) 12.51 V U200 (1) 5.08V (2) 5.08V (3) 5.08V (4) 5.08V (5) 5.08V

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: 1.85 mA AC O/P-FG: 6.54 mA NO DAMAGE
2	GROUNDING CONTINUITY	IEC62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25℃	2mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	▓ EN55032(CISPR32) (expect for Type-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: 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-750-248 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 50VDC O/P： FULL LOAD Ta= 24.6 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 50VDC O/P： FULL LOAD Ta= 43.6 ℃		
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=24.6 ℃	HIGH AMBIENT Ta= 43.6 ℃
1	Q102	43.3℃	62.1℃
2	C101	35.6℃	54.0℃
3	Q103	47.3℃	64.8℃
4	C146	44.1℃	60.1℃
5	T101	70.5℃	78.6℃
6	RT300	43.5℃	61.0℃
7	U501	47.3℃	63.5℃
8	U303	38.8℃	57.1℃
9	L100	36.6℃	53.3℃
10	C113	32.8℃	50.1℃
11	D107	44.4℃	61.0℃
12	D105	43.5℃	60.3℃
13	U101	28.8℃	48.4℃
14	Q200	47.0℃	64.7℃
15	Q202	46.1℃	63.8℃
16	TSW1	32.5℃	50.1℃
17	C119	34.5℃	51.0℃
18	C118	33.5℃	50.3℃
19	ZR200	28.5℃	48.4℃
20	C219	22.7℃	44.4℃
21	L201	27.8℃	48.6℃
22	L200	32.9℃	51.1℃
23	C115	25.8℃	45.9℃
24	T501	35.9℃	55.4℃
25	T100	27.0℃	46.8℃
26	Q504	42.3℃	60.0℃
27	Q501	40.9℃	57.6℃
28	R149	28.5℃	48.3℃
29	U500	37.6℃	55.4℃
30	U200	34.4℃	52.4℃
31	U100	38.2℃	55.1℃

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
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℃~ +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： 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 C146 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) 968402.4HRS (2) 421521.6HRS
8	MTBF	Conducted by Parts Stress Analysis Prediction 715.7K hrs min. Telcordia SR-332 (Bellcore) ; 78.0K 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