



Test Report: NTS-750-248

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

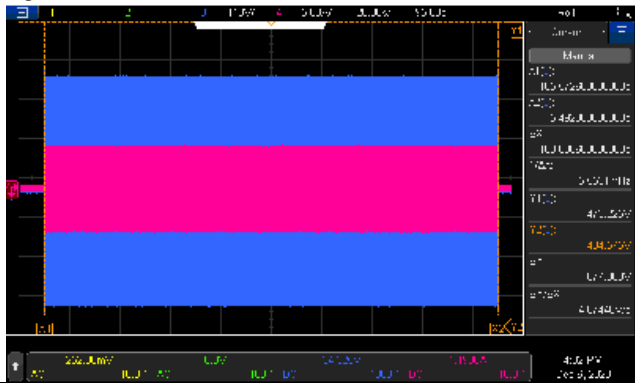
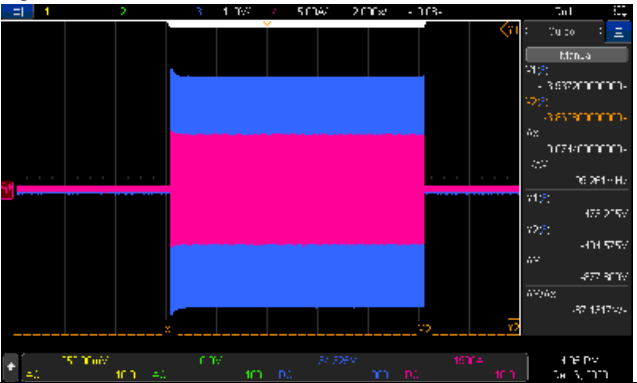
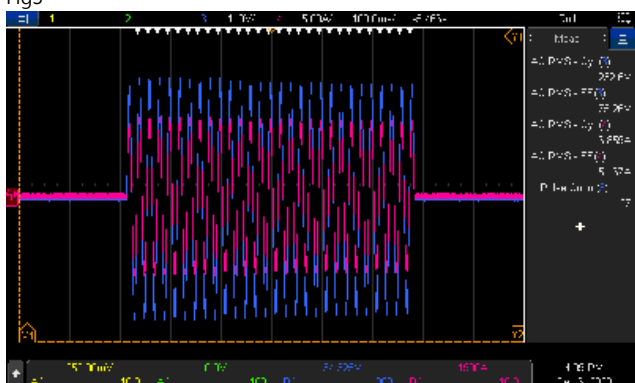
- E.M.C. Test

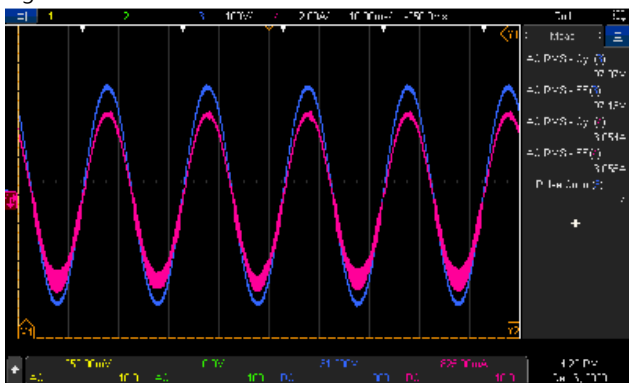
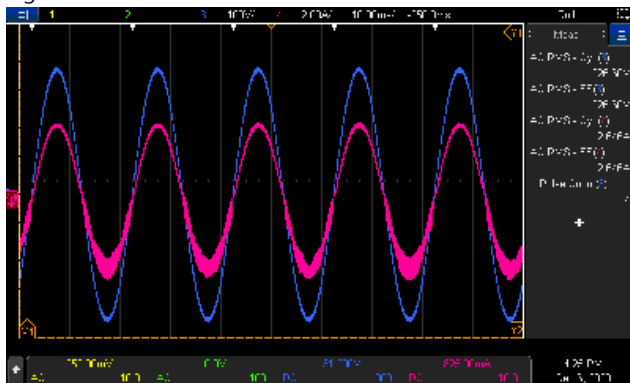
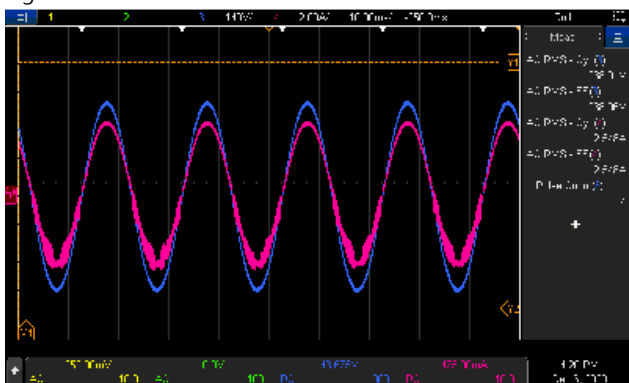
- **RELIABILITY TEST**

- ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED POWER	750W	IP: 48VDC Ta:25°C	<u>765 W</u>
2	MAXIMUM OUTPUT POWER (TYP)	(1)862W/180sec. (2)1125w/10sec (3)SURGE POWER 1500W FOR 30CYCLE Vin (30 ± 5 CYCLE)	IP: 50VDC OP:TESTING LOAD Ta:25°C	(1) 229.5V/ 3.76 A/ 180.08 Sec (2) 228.7V/ 4.72 A/ 10.07 Sec (3) 227.5V/ 6.71 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: 48VDC OP: FULL LOAD Ta:25°C	DIP S.W 200VAC: <u>199.8 V</u> DIP S.W 220VAC: <u>219.8 V</u> DIP S.W 230VAC: <u>229.7 V</u> DIP S.W 240VAC: <u>239.9 V</u>
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25°C	DIP S.W 50HZ: <u>50.041 HZ</u> DIP S.W 60HZ: <u>59.959 HZ</u>

5	WAVEFORM	True sine wave (THD<3%)	IP: 50VDC OP:80% LOAD(600W) (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25°C	(1) 0.98 % / Vo(min) /80% LOAD (2) 0.96% / Vo(nor) /80% LOAD (3) 0.96% / Vo(max) /80% LOAD
CH3:O/P VAC CH4:O/P IAC				
Fig1				
Fig2				
Fig3				
6	AC REGULATION	±3%	IP: 50VDC OP:80% LOAD(600W) Ta:25°C	<u>-0.3</u> %
7	Overshoot /Undershoot	<±10%	IP: 48VDC OP: (1) full load turn on (2) no load turn on (3) full /no load change Ta:25°C	(1) <u>-8.3%</u> (2) <u>-5.7%</u> (3) <u>-2.5%</u>
8	O/P voltage DC offset	Vin(nor)= <u>48</u> v · Vo<200mV · no load : <u>81.2mV</u> / full load: <u>144mV</u>		

9	LED STATUS	Status test <table> <tr> <th>LED</th><th>Status</th><th>RESULT</th></tr> <tr> <td>Green</td><td> Inverter OK</td><td>OK</td></tr> <tr> <td>Orange</td><td> Remote off  Saving mode</td><td>OK</td></tr> <tr> <td>Red</td><td> Abnormal Status (See SPEC)</td><td>OK</td></tr> </table> Battery test <table> <tr> <th>LED</th><th>Battery RANGE</th><th>RESULT</th></tr> <tr> <td>Green </td><td>50.0~62.0 Vdc±1v</td><td>49.99Vdc ~ 62.08Vdc</td></tr> <tr> <td>Orange </td><td>44.0~50.0Vdc ±1v</td><td>44.059Vdc ~ 49.89Vdc</td></tr> <tr> <td>Red </td><td><44.0 Vdc ±1v > 62.0vdc±1v</td><td>< 43.96 Vdc > 62.15 Vdc</td></tr> </table> Load test <table> <tr> <th>LED</th><th>LOAD RANGE</th><th>RESULT</th></tr> <tr> <td>Green </td><td>Min. load ~ 40%±5% LOAD</td><td>Min. load ~42.2%</td></tr> <tr> <td>Orange </td><td>40%±5% ~ 80%±5% LOAD</td><td>43.33%~ 82.93%</td></tr> <tr> <td>Red </td><td>≥ 80%±5% LOAD</td><td>≥ 83.07%</td></tr> </table>	LED	Status	RESULT	Green	 Inverter OK	OK	Orange	 Remote off  Saving mode	OK	Red	 Abnormal Status (See SPEC)	OK	LED	Battery RANGE	RESULT	Green 	50.0~62.0 Vdc±1v	49.99Vdc ~ 62.08Vdc	Orange 	44.0~50.0Vdc ±1v	44.059Vdc ~ 49.89Vdc	Red 	<44.0 Vdc ±1v > 62.0vdc±1v	< 43.96 Vdc > 62.15 Vdc	LED	LOAD RANGE	RESULT	Green 	Min. load ~ 40%±5% LOAD	Min. load ~42.2%	Orange 	40%±5% ~ 80%±5% LOAD	43.33%~ 82.93%	Red 	≥ 80%±5% LOAD	≥ 83.07%
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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°C I/P: LOW-LINE=41V 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)	<u>40.08</u> VDC~ <u>65.86</u> VDC/NO LOAD <u>40.88</u> VDC~ <u>65.85</u> VDC/FULL LOAD Test: <u>OK</u>

2	DC CURRENT (TYP)	19A	IP: 48VDC OP:FULL LOAD Ta:25°C	<u>16.8</u> A
3	NO LOAD DISSIPATION (Typ.)	$\leq 1.5W$ @ saving mode $\leq 12 W$ @NON-Saving Mode	IP: 48VDC OP:NO LOAD Ta:25°C	<u>0.96</u> W <u>8.96</u> W LED DISPLAY: <u>OK</u>
4	SAVING MODE TO NORMAL	$P_o \geq 25W$	IP: 48VDC OP: TESTING LOAD Ta:25°C	<u>20.54</u> W
5	NORMAL TO SAVING MODE	$P_o \leq 10W$	IP: 48VDC OP: TESTING LOAD Ta:25°C	<u>13.25</u> W
6	OFF MODE CURRENT DRAW (Typ.)	$\leq 1mA$	IP: 48VDC OP: Sw off Ta:25°C	<u>0.66</u> mA
7	EFFICIENCY(TYP)	600W/93%	IP: 50VDC OP: $P_o=600W$ 230V/50HZ (factory setting) Ta:25°C	<u>93.86</u> %

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	44V $\pm$ 1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>43.942</u> V
2	BAT LOW SHUT DOWN	40V $\pm$ 1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>40.074</u> V
3	BAT LOW RESTART	50V $\pm$ 1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>50.033</u> V
4	BAT HIGH ALARM	62V $\pm$ 1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>61.97</u> V
5	BAT HIGH SHUT DOWN	66V $\pm$ 1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>65.98</u> V
6	BAT HIGH RESTART	60V $\pm$ 1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>60.01</u> V

7	OVER TEMPERATURE	Shut down o/p voltage: re-power on	IP: HI LINE/LOW-LINE OP: FULL LOAD SW:ON Ta:25°C	Shut down o/p voltage, re-power on to recover LED DISPLAY: <u>OK</u>
8	OUTPUT SHORT	Shut down o/p voltage: re-power on	IP: 48VDC O/P: FULL LOAD SW:ON Ta:25°C	Shut down o/p voltage, re-power on to recover LED DISPLAY: <u>OK</u> (1).TEST: <u>OK</u>
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°C	(1). <u>106~114</u> % <u>180.08</u> sec (2). <u>116.5~148.5</u> % <u>10.07</u> 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°C	Open : Normal work Short : Remote off TEST: <u>OK</u>

APPLICATION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	LAMP	LAMP: <u>413</u> W · turn on <u>OK</u> LAMP: <u>608</u> W · turn on <u>OK</u> LAMP: <u>730</u> W · turn on <u>OK</u>	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: <u>OK</u>	
2	INDUCTION MOTOR	<u>0.35</u> HP	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: <u>OK</u>	
3	SWITCHING POWER SUPPLY	WITH PFC: <u>RSP-1600-48</u> · O/P= <u>748</u> W	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: <u>OK</u>	
		NO PFC: <u>SE-1000-48</u> · O/P= <u>566</u> W	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: <u>OK</u>	

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 /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°C	(1) 147V (2) 147V (3) 149V (4) 145V (5) 145V

2	DC TO DC Diode Peak Voltage	D 108 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°C	(1) 536V (2) 517V (3) 533V (4) 297 V (5) 517V
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°C	C118 (1) 251V (2) 251V (3) 251V (4) 251V (5) 251V C119 (1) 249V (2) 249V (3) 249V (4) 251V (5) 251V
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°C	(1) 534V (2) 545V (3) 545V (4) 501V (5) 501V
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 (5)O.L.P(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25°C	Q504 (1) 170V (2) 170V (3) 170V (4) 170V (5) 170V Q105 (1) 136V (2) 136V (3) 136V (4) 136V (5) 136V
6	Control IC Voltage Test	MCU IC U303 Rated 2.4 V~ 3.6 V AUX IC U501 Rated 8.2V~30V	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) 3.34V (2) 3.34V (3) 3.34V (4) 3.34V (5) 3.34V

		CHARGE IC U101 Rated -0.3V~20V Gate Driver IC U200 Rated -0.3V~20V	(5) Saving mode Ta:25°C	U501 (1) 14.65V (2) 14.65V (3) 14.65V (4) 14.65V (5) 14.65V U101 (1) 12.48V (2) 12.48V (3) 12.48V (4) 12.48V (5) 12.48V U200 (1) 5.32V (2) 5.36V (3) 5.36V (4) 5.36V (5) 5.20V
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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	BAT I/P-ACO/P 3.6 KVAC/min AC O/P-FG:1.8 KVAC/min Ta:25°C	BAT I/P-ACO/P: 2.268 mA AC O/P-FG: 6.29 mA NO DAMAGE
2	GROUNDING CONTINUITY	IEC62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C	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°C	CLASS A
2	E.S.D	EN61000-4-2 AIR : 8KV / Contact : 4KV	I/P: 12VDC O/P:FULL LOAD Ta:25°C	☒ 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 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 50VDC O/P : FULL LOAD Ta= 43.6 °C		
		NO	Position	ROOM AMBIENT Ta=24.6 °C
		1	Q102	43.3°C
		2	C101	35.6°C
		3	Q103	47.3°C
		4	C146	44.1°C
		5	T101	70.5°C
		6	RT300	43.5°C
		7	U501	47.3°C
		8	U303	38.8°C
		9	L100	36.6°C
		10	C113	32.8°C
		11	D107	44.4°C
		12	D105	43.5°C
		13	U101	28.8°C
		14	Q200	47.0°C
		15	Q202	46.1°C
		16	TSW1	32.5°C
		17	C119	34.5°C
		18	C118	33.5°C
		19	ZR200	28.5°C
		20	C219	22.7°C
		21	L201	27.8°C
		22	L200	32.9°C
		23	C115	25.8°C
		24	T501	35.9°C
		25	T100	27.0°C
		26	Q504	42.3°C
		27	Q501	40.9°C
		28	R149	28.5°C
		29	U500	37.6°C
		30	U200	34.4°C
		31	U100	38.2°C
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 50VDC O/P : 100%LOAD Ta= -25 °C	TEST : OK

3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P : 65VDC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK
4	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / 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°C~ +45°C 2. Temperature change rate : 25°C / 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°C		TEST : OK
7	CAPACITOR LIFE CYCLE	SUPPOSE C146 IS THE MOST CRITICAL COMPONENT (1) I/P : 50VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 50VDC O/P : FULL LOAD Ta= 40 °C LIFE TIME		(1) 968402.4HRS (2) 421521.6HRS
8	MTBF	Conducted by Parts Stress Analysis Prediction 238.6K hrs min. Telcordia SR-332 (Bellcore) ; 78K hrs min. MIL-HDBK-217F (25°C)		
9	Ongoing Reliability Test	I/P : 50VDC O/P : 80% LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

2018.4.30 GP-A50-F010