



Test Report: NTS-750-124

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°C	<u>765</u> 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°C	(1) <u>109.68 V / 7.93 A / 180.08 Sec</u> (2) <u>109.43 V / 10.28 A / 10.07 Sec</u> (3) <u>107.7 V / 13.43 A / 33 Cycle</u>

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

Fig1

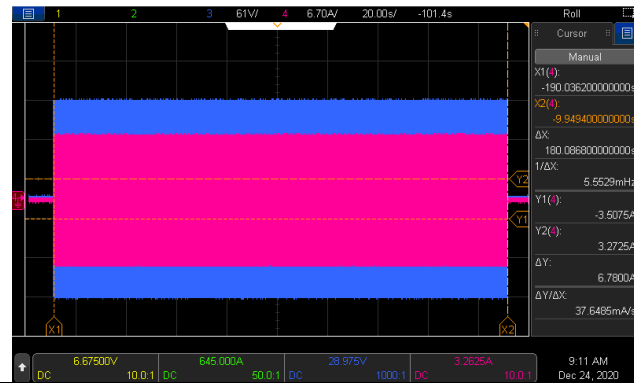


Fig2

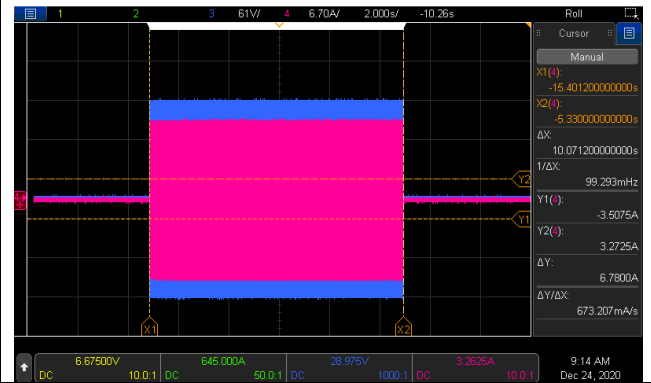
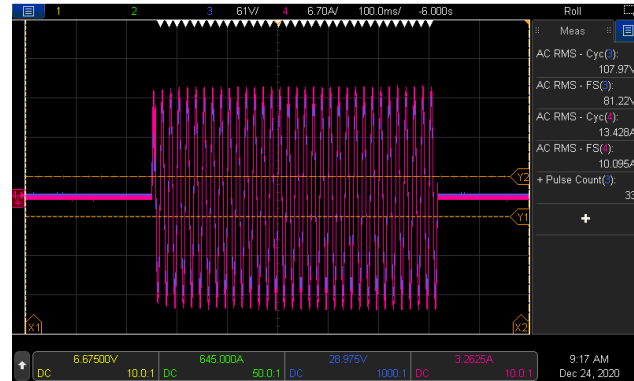


Fig3



3	AC Voltage	100 / 110 / 115 / 120Vac selectable by DIP S.W	IP: 24VDC OP: FULL LOAD Ta:25°C	DIP S.W 100VAC: <u>99.73</u> V DIP S.W 110VAC: <u>109.79</u> V DIP S.W 115VAC: <u>114.20</u> V DIP S.W 120VAC: <u>119.84</u> V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 24VDC OP: FULL LOAD Ta:25°C	DIP S.W 50HZ: <u>50.041</u> HZ DIP S.W 60HZ: <u>59.958</u> 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°C	(1) 1.93 % / Vo(min) /80% LOAD (2) 1.62 % / Vo(nor) /80% LOAD (3) 1.59 % / Vo(max) /80% LOAD
CH3:O/P VAC CH4:O/P IAC				
6	AC REGULATION	±3%	IP: 25VDC OP:80% LOAD(600W) Ta:25°C	-0.155 %
7	Overshoot /Undershoot	<±10%	IP: 24VDC OP: (1) full load turn on (2) no load turn on (3) full /no load change Ta:25°C	(1) -6.91 % (2) -4.64 % (3) -6.64 %
8	O/P voltage DC offset	$V_{in(nor)} = 24 \text{ v} \cdot V_o < 200\text{mV} \cdot \text{no load} : 85 \text{ mV} / \text{full load} : 133.8 \text{ mV}$		

10	LED STATUS	<ul style="list-style-type: none"> Status test <table border="1"> <thead> <tr> <th>LED</th> <th>Status</th> <th>RESULT</th> </tr> </thead> <tbody> <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> </tbody> </table> Battery test <table border="1"> <thead> <tr> <th>LED</th> <th>Battery RANGE</th> <th>RESULT</th> </tr> </thead> <tbody> <tr> <td> Green</td> <td>25.0~31.0 Vdc±0.5v</td> <td>25.126Vdc ~ 31.09Vdc</td> </tr> <tr> <td> Orange</td> <td>22~ 25Vdc ±0.5v</td> <td>22.121Vdc ~ 24.963Vdc</td> </tr> <tr> <td> Red</td> <td><22.0 Vdc ±0.5v > 31.0vdc±0.5v</td> <td>< 22.072 Vdc > 31.139 Vdc</td> </tr> </tbody> </table> Load test <table border="1"> <thead> <tr> <th>LED</th> <th>LOAD RANGE</th> <th>RESULT</th> </tr> </thead> <tbody> <tr> <td> Green</td> <td>Min. load ~ 40%±5% LOAD</td> <td>Min. load ~42.27%</td> </tr> <tr> <td> Orange</td> <td>40%±5% ~ 80%±5% LOAD</td> <td>42.4%~ 81.6%</td> </tr> <tr> <td> Red</td> <td>≥ 80%±5% LOAD</td> <td>≥ 81.73%</td> </tr> </tbody> </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	25.0~31.0 Vdc±0.5v	25.126Vdc ~ 31.09Vdc	Orange	22~ 25Vdc ±0.5v	22.121Vdc ~ 24.963Vdc	Red	<22.0 Vdc ±0.5v > 31.0vdc±0.5v	< 22.072 Vdc > 31.139 Vdc	LED	LOAD RANGE	RESULT	Green	Min. load ~ 40%±5% LOAD	Min. load ~42.27%	Orange	40%±5% ~ 80%±5% LOAD	42.4%~ 81.6%	Red	≥ 80%±5% LOAD	≥ 81.73%
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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°C 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)	<u>20.15</u> VDC~ <u>33.03</u> VDC/NO LOAD <u>20.20</u> VDC~ <u>33.046</u> VDC/FULL LOAD Test: <u>OK</u>

2	DC CURRENT (TYP)	38A	IP: 24VDC OP:FULL LOAD Ta:25°C	<u>34.96</u> A
3	NO LOAD DISSIPATION (Typ.)	$\leq 1.4W$ @ saving mode $\leq 10W$ @NON-Saving Mode	IP: 24VDC OP:NO LOAD Ta:25°C	<u>0.77</u> W <u>6.72</u> W
4	SAVING MODE TO NORMAL	$P_o \geq 25W$	IP: 24VDC OP: TESTING LOAD Ta:25°C	<u>≥ 21.57</u> W
5	NORMAL TO SAVING MODE	$P_o \leq 10W$	IP: 24VDC OP: TESTING LOAD Ta:25°C	<u>≤ 15.22</u> W
6	OFF MODE CURRENT DRAW (Typ.)	$\leq 1mA$	IP: 24VDC OP: Sw off Ta:25°C	<u>0.76</u> mA
7	EFFICIENCY(TYP)	600W/90%	IP: 25VDC OP: $P_o=600W$ 230V/50HZ (factory setting) Ta:25°C	92.38%

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	22V \pm 0.5VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>22.05</u> V
2	BAT LOW SHUT DOWN	20V \pm 0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>20.16</u> V
3	BAT LOW RESTART	25V \pm 0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>25.09</u> V
4	BAT HIGH ALARM	31V \pm 0.5VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>31.11</u> V
5	BAT HIGH SHUT DOWN	33V \pm 0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>33.04</u> V
6	BAT HIGH RESTART	30V \pm 0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>30.13</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: 24VDC O/P: FULL LOAD SW:ON Ta:25°C	Shut down o/p voltage, re-power on to recover LED DISPLAY: <u> OK </u> 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: 24VDC OP: TESTING SW:ON Ta:25°C	(1). <u>105.87 %~ 114.67 %</u> <u>180.08 sec</u> (2). <u>114.8 %~ 147.73 %</u> <u>10.075 sec</u> 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°C	Open : Normal work Short : Remote off TEST: <u> OK </u>

APPLICATION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	LAMP	LAMP: <u>459 W</u> · turn on <u> OK </u> LAMP: <u>756 W</u> · turn on <u> OK </u> LAMP: <u>832 W</u> · turn on <u> OK </u>	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u> OK </u>	
2	INDUCTION MOTOR	<u>0.35</u> HP	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u> OK </u>	
3	SWITCHING POWER SUPPLY	WITH PFC: <u>RSP-1600-48</u> O/P= <u>761 W</u>	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u> OK </u>	
		NO PFC: <u>SE-1000-48</u> O/P= <u>350 W</u>	1. Vin=HIGH LINE 2. O/P=110V/60Hz 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 :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°C	(1) 76.4V (2) 74.0V (3) 78.0V (4) 72.4V (5) 74.8V

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 (5)O.L.P(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25°C	(1) 294V (2) 310V (3) 294V (4) 298V (5) 298V
3	DC BUS Capacitor Voltage	C118 Rated : 390 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°C	C118 (1) 293V (2) 293V (3) 293V (4) 293V (5) 293V
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 200 Rated : 40A / 600 V	I/P: high line O/P:V(min)/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°C	(1) 294V (2)398V (3) 322V (4) 306V (5) 306V
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) 82.8V (2) 82.8V (3) 82.8V (4) 82.8V (5) 82.8V Q105 (1) 65.5V (2) 65.5V (3) 65.1V (4) 65.5V (5) 65.5V
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	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	U303 (1) 3.34V (2) 3.38V (3) 3.34V (4) 3.34V (5) 3.34V U501 (1) 13.67V (2) 13.67V (3) 13.67V

		Gate Driver IC U200 Rated -0.3V~20V		(4) 13.67V (5) 13.67V U101 (1) 12.38V (2) 12.38V (3) 12.38V (4) 12.38V (5) 12.38V U200 (1) 5.06V (2) 5.02V (3) 5.06V (4) 5.06V (5) 5.06V
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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: 2.418 mA AC O/P-FG: 6.38 mA NO DAMAGE
2	GROUNDING CONTINUITY	IEC62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C	3mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	FCC(except for Type-UN) CLASS A	I/P:24 VDC O/P: :FULL/50% LOAD Ta:25°C	
2	E.S.D	EN61000-4-2 AIR : 8KV / Contact : 4KV	I/P: 12VDC O/P:FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> 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-750-124 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 12.5VDC O/P : FULL LOAD Ta= 26.5 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 12.5VDC O/P : FULL LOAD Ta= 44.5 °C			
		NO	Position	ROOM AMBIENT Ta=26.5 °C	HIGH AMBIENT Ta= 44.5 °C
		1	Q102	37.8°C	56.5°C
		2	C101	38.4°C	55.6°C
		3	Q103	40.6°C	59.6°C
		4	C146	44.2°C	60.3°C
		5	T101	50.8°C	65.2°C
		6	RT300	40.7°C	59.1°C
		7	U501	45.5°C	59.7°C
		8	U303	41.5°C	58.2°C
		9	L100	54.0°C	68.9°C
		10	C112	50.7°C	66.1°C
		11	D107	64.3°C	81.6°C
		12	D105	62.5°C	79.7°C
		13	U101	33.4°C	50.5°C
		14	Q200	74.3°C	90.7°C
		15	Q202	74.5°C	90.4°C
		16	TSW1	43.3°C	60.4°C
		17	C119	43.7°C	57.8°C
		18	C118	40.1°C	54.9°C
		19	ZR200	31.9°C	51°C
		20	C219	28.9°C	47.7°C
		21	L201	38.3°C	55.3°C
		22	L200	41.1°C	57.1°C
		23	C115	31.3°C	49°C
		24	T501	33.6°C	51.3°C
		25	T100	31.8°C	49.4°C
		26	Q504	40.0°C	57°C
		27	Q501	45.3°C	60.3°C
		28	R149	33.3°C	50.1°C
		29	U500	38.5°C	56.1°C
		30	U200	41.2°C	58.5°C
31	U100	40.2°C	57.7°C		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 25VDC 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 : 32.5VDC 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 : 25VDC/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: 12.5VDC O/P: FULL LOAD Ta= 25 °C LIFE TIME (2) I/P: 12.5VDC O/P: FULL LOAD Ta= 40 °C LIFE TIME		(1) 1096452.8HRS (2) 438189.1HRS
8	MTBF	Conducted by Parts Stress Analysis Prediction 715.7K hrs min. Telcordia SR-332 (Bellcore) ; 78.0K hrs min. MIL-HDBK-217F (25°C)		
9	Ongoing Reliability Test	I/P : 25VDC 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