



# Test Report: NTS-750-212

---

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: 12VDC 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: 12.5VDC OP:TESTING LOAD Ta:25°C	(1) 229.46 V/ 3.77 A/ 180.1Sec (2) 229.12 V/ 4.93 A/ 10.08Sec (3) 226.02 V/ 6.63 A/ 29 Cycle

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

Fig1



Fig2

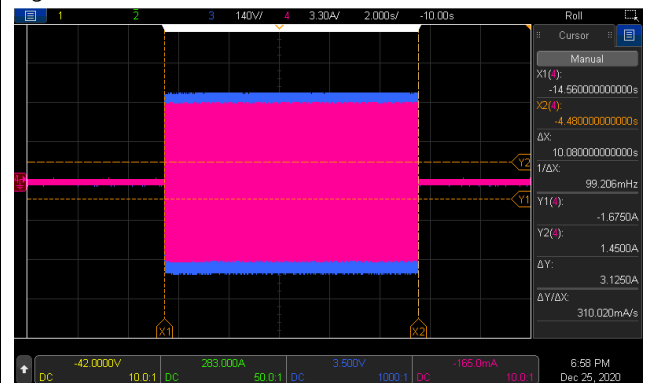
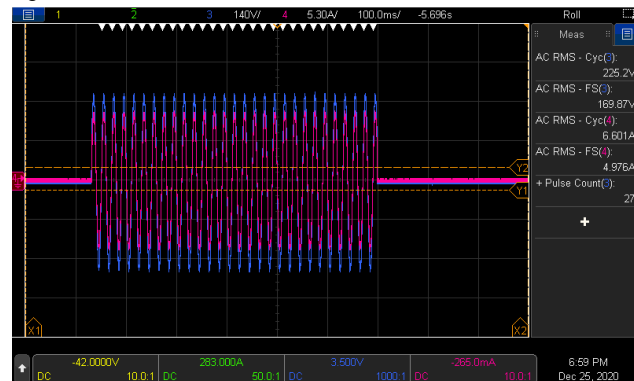


Fig3



3	AC Voltage	200 / 220 / 230 / 240Vac selectable by DIP S.W	IP: 12VDC OP: FULL LOAD Ta:25°C	DIP S.W 200VAC: <u>199.78</u> V DIP S.W 220VAC: <u>219.75</u> V DIP S.W 230VAC: <u>229.72</u> V DIP S.W 240VAC: <u>239.9</u> V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 12VDC OP: FULL LOAD Ta:25°C	DIP S.W 50HZ: <u>50.042</u> HZ DIP S.W 60HZ: <u>59.959</u> HZ

5	WAVEFORM	True sine wave (THD<3%)	IP: 12.5VDC OP:80% LOAD( 600W ) (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25°C	(1) 1.524 % / Vo(min) /80% LOAD (2) 1.488 % / Vo(nor) /80% LOAD (3) 1.473 % / Vo(max) /80% LOAD
CH3:O/P VAC CH4:O/P IAC				
6	AC REGULATION	±3%	IP: 12.5VDC OP:80% LOAD( 600W ) Ta:25°C	-0.239 %
7	Overshoot /Undershoot	<±10%	IP: 12VDC OP: (1) full load turn on (2) no load turn on (3) full /no load change Ta:25°C	(1) -7.48 % (2) -3.91 % (3) -5 %
8	O/P voltage DC offset	Vin(nor)= 12 v · Vo <200mV · no load : 97.2 mV / full load: 92.6 mV		

9	LED STATUS	<ul style="list-style-type: none"> <li> <b>Status test</b> <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> </li> <li> <b>Battery test</b> <table border="1"> <thead> <tr> <th>LED</th> <th>Battery RANGE</th> <th>RESULT</th> </tr> </thead> <tbody> <tr> <td> Green</td> <td>12.5~15.5 Vdc±0.3v</td> <td>12.629Vdc ~ 15.719Vdc</td> </tr> <tr> <td> Orange</td> <td>11~ 12.5Vdc ±0.3v</td> <td>10.98Vdc ~12.576 Vdc</td> </tr> <tr> <td> Red</td> <td>&lt;11.0 Vdc ±0.3v &gt; 15.5vdc±0.3v</td> <td>&lt; 10.97 Vdc &gt; 15.708Vdc</td> </tr> </tbody> </table> </li> <li> <b>Load test</b> <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 ~ 44.8%</td> </tr> <tr> <td> Orange</td> <td>40%±5% ~ 80%±5% LOAD</td> <td>40.93%~ 82.27%</td> </tr> <tr> <td> Red</td> <td>≥ 80%±5% LOAD</td> <td>≥ 83.4%</td> </tr> </tbody> </table> </li> </ul>			LED	Status	RESULT	Green	Inverter OK	OK	Orange	Remote off Saving mode	OK	Red	Abnormal Status (See SPEC)	OK	LED	Battery RANGE	RESULT	Green	12.5~15.5 Vdc±0.3v	12.629Vdc ~ 15.719Vdc	Orange	11~ 12.5Vdc ±0.3v	10.98Vdc ~12.576 Vdc	Red	<11.0 Vdc ±0.3v > 15.5vdc±0.3v	< 10.97 Vdc > 15.708Vdc	LED	LOAD RANGE	RESULT	Green	Min. load ~ 40%±5% LOAD	Min. load ~ 44.8%	Orange	40%±5% ~ 80%±5% LOAD	40.93%~ 82.27%	Red	≥ 80%±5% LOAD	≥ 83.4%
		LED	Status	RESULT																																				
		Green	Inverter OK	OK																																				
		Orange	Remote off Saving mode	OK																																				
		Red	Abnormal Status (See SPEC)	OK																																				
		LED	Battery RANGE	RESULT																																				
		Green	12.5~15.5 Vdc±0.3v	12.629Vdc ~ 15.719Vdc																																				
		Orange	11~ 12.5Vdc ±0.3v	10.98Vdc ~12.576 Vdc																																				
		Red	<11.0 Vdc ±0.3v > 15.5vdc±0.3v	< 10.97 Vdc > 15.708Vdc																																				
		LED	LOAD RANGE	RESULT																																				
		Green	Min. load ~ 40%±5% LOAD	Min. load ~ 44.8%																																				
		Orange	40%±5% ~ 80%±5% LOAD	40.93%~ 82.27%																																				
Red	≥ 80%±5% LOAD	≥ 83.4%																																						

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	VOLTAGE RANGE (TYP)	10VDC~16.5VDC	IP: TESTING OP:NO LOAD/FULL LOAD Ta:25°C  I/P: LOW-LINE=10.5V HIGH-LINE=16.2V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE ) ON:30Sec OFF:30Sec 10MIN (POWER ON/OFF NO DAMAGE) I/P: 12V O/P:FULL LOAD ON:30ec OFF:30ec 12Hr (POWER ON/OFF NO DAMAGE)	<u>10.15</u> VDC~ <u>16.54</u> VDC/NO LOAD <u>10.21</u> VDC~ <u>16.48</u> VDC/FULL LOAD  Test: <u>OK</u>

2	DC CURRENT (TYP)	75A	IP: 12VDC OP:FULL LOAD Ta:25°C	<u>69.42</u> A
3	NO LOAD DISSIPATION (Typ.)	$\leq 1.2W$ @ saving mode $\leq 10W$ @NON-Saving Mode	IP: 12VDC OP:NO LOAD Ta:25°C	<u>0.72</u> W <u>8.34</u> W LED DISPLAY: <u>OK</u>
4	SAVING MODE TO NORMAL	$P_o \geq 25W$	IP: 12VDC OP: TESTING LOAD Ta:25°C	<u>20.092</u> W
5	NORMAL TO SAVING MODE	$P_o \leq 10W$	IP: 12VDC OP: TESTING LOAD Ta:25°C	<u>10.6</u> W
6	OFF MODE CURRENT DRAW (Typ.)	$\leq 1mA$	IP: 12VDC OP: Sw off Ta:25°C	<u>0.501</u> mA
7	EFFICIENCY(TYP)	600W/90%	IP: 12.5VDC OP: $P_o=600W$ 230V/50HZ (factory setting)	93.04 %

**PROTECTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	11V $\pm$ 0.3VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>11.086</u> V
2	BAT LOW SHUT DOWN	10V $\pm$ 0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>10.161</u> V
3	BAT LOW RESTART	12.5V $\pm$ 0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>12.589</u> V
4	BAT HIGH ALARM	15.5V $\pm$ 0.3VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>15.513</u> V
5	BAT HIGH SHUT DOWN	16.5V $\pm$ 0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>16.59</u> V
6	BAT HIGH RESTART	15V $\pm$ 0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>15.081</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: 12VDC 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: 12VDC OP: TESTING SW:ON Ta:25°C	(1). <u>107%~116%</u> <u>180.1</u> sec (2). <u>117%~149%</u> <u>10.08</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: 12VDC OP: FULL LOAD Ta:25°C	Open : Normal work Short : Remote off (1).TEST: <u>    OK    </u> (2).TEST: <u>    OK    </u>

**APPLICATION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	LAMP	LAMP: <u>510</u> W · turn on <u>OK</u> LAMP: <u>706</u> W · turn on <u>OK</u> LAMP: <u>752</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		WITH PFC: RSP-1600-48 O/P= <u>785</u> W	1. Vin=HIGH LINE 2. O/P= 230V/50Hz TEST: <u>    OK    </u>	
		NO PFC: SE-1000-48 O/P= <u>278</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 : 60V /120 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) 36.6V (2) 36.2V (3) 38.2V (4) 37.0V (5) 37.0V

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) 517V (2) 529V (3) 529V (4) 497V (5) 505V
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) 247V (2) 249V (3) 249V (4) 247V (5) 247V  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°C	(1)491V (2)540V (3)531V (4)491V (5)491V
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)41.4 V (2) 41.4 V (3) 41.4 V (4) 41.4 V (5) 41.4 V  Q105 (1) 41.0V (2) 41.4V (3) 41.4V (4) 41.4V (5) 41.0V
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

		<p>CHARGE IC U101 Rated -0.3V~20V</p> <p>Gate Driver IC U200 Rated -0.3V~20V</p>	<p>(5) Saving mode Ta:25°C</p>	<p>U501 (1) 12.62V (2) 12.62V (3) 12.62V (4) 12.62V (5) 12.62V</p> <p>U101 (1) 12.30V (2) 12.22V (3) 12.22V (4) 12.22V (5) 12.30V</p> <p>U200 (1) 5.07V (2) 5.07V (3) 5.07V (4) 5.07V (5) 5.07V</p>
--	--	--	------------------------------------	---

## 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: 2.147 mA AC O/P-FG: 6.36 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	<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-750-212					
		1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 12.5VDC O/P : FULL LOAD Ta= 25.0 °C					
		2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 12.5VDC O/P : FULL LOAD Ta= 40.0 °C					
				NO	Position	ROOM AMBIENT Ta=25.0 °C	HIGH AMBIENT Ta= 40.0 °C
				1	C101	67.3°C	75.5°C
				2	Q101	71.9°C	78.9°C
				3	Q103	72.0°C	78.3°C
				4	C146	81.4°C	88.9°C
				5	T101	80.4°C	88.6°C
				6	RT300	61.4°C	68.8°C
				7	U303	45.9°C	57.7°C
				8	T501	35.7°C	48.8°C
				9	L100	45.7°C	58.0°C
				10	C112	39.9°C	52.5°C
				11	D107	55.0°C	66.9°C
				12	D105	53.7°C	64.7°C
				13	Q200	59.6°C	71.2°C
				14	ZR200	36.9°C	50.8°C
				15	L201	38.2°C	51.4°C
				16	C219	28.1°C	43.6°C
				17	L200	41.3°C	54.8°C
				18	TSW1	34.4°C	48.4°C
				19	C119	41.8°C	53.7°C
				20	C118	39.0°C	51.3°C
				21	Q202	57.7°C	70.6°C
				22	Q105	35.2°C	48.8°C
				23	Q501	52.9°C	62.9°C
				24	U101	35.9°C	49.5°C
				25	U501	52.3°C	63.6°C
				26	T100	33.0°C	47.0°C
		27	U100	58.2°C	66.6°C		
		28	U201	43.4°C	55.3°C		
		29	U500	42.8°C	53.7°C		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 12.5VDC 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 : 16.2VDC 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 : 12.5VDC/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) 67864.1HRS (2) 40352.2HRS
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 : 12.5VDC O/P : 80% LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ