



# Test Report: NTS-750-224

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750W High Reliable True Sine Wave DC-AC Power Inverter

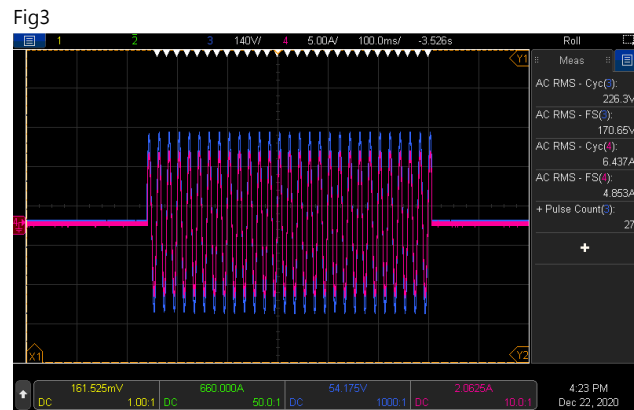
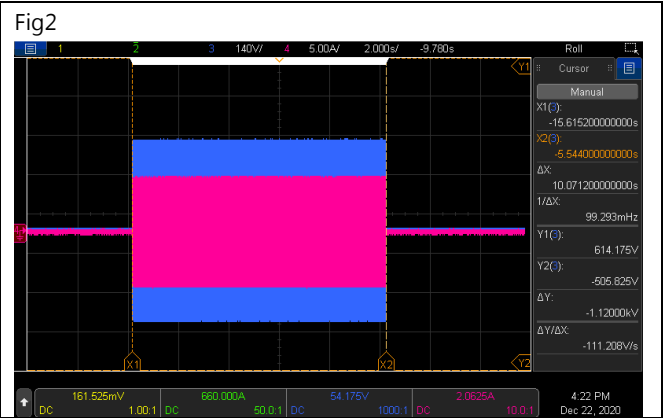
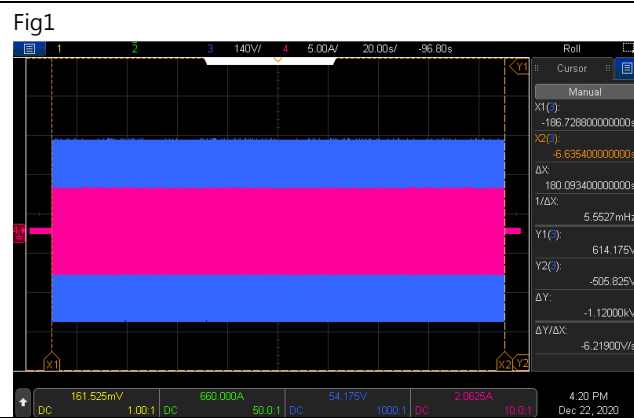
- **DESIGN VERIFY TEST**
  - Output Function Test
  - Input Function Test
  - Protection Function Test
  - Control Function Test
  - APPLICATION Test
  - Component Stress Test
- **SAFETY & E.M.C. TEST**
  - Safety Test
  - E.M.C. Test
- **RELIABILITY TEST**
  - ENVIRONMENT TEST

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) 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



3	AC Voltage	200 / 220 / 230 / 240Vac selectable by DIP S.W	IP: 24VDC OP: FULL LOAD Ta:25°C	DIP S.W 200VAC: <u>199.9</u> V DIP S.W 220VAC: <u>220.1</u> V DIP S.W 230VAC: <u>229.9</u> V DIP S.W 240VAC: <u>240.2</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) 1.02% / 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				
6	AC REGULATION	±3%	IP: 25VDC OP:80% LOAD( 600W ) Ta:25°C	<u>0.15</u> %
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) <u>-7.9</u> % (2) <u>-5.9</u> % (3) <u>-2.6</u> %
8	O/P voltage DC offset	Vin(nor)= <u>24</u> v · Vo<200mV · no load : <u>89.8 mV</u> / full load: <u>140 mV</u>		

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>25.0~31.0 Vdc±0.5v</td> <td>25.152Vdc ~31.06 Vdc</td> </tr> <tr> <td> Orange</td> <td>22~ 25Vdc ±0.5v</td> <td>22.13Vdc ~25.04 Vdc</td> </tr> <tr> <td> Red</td> <td>&lt;22.0 Vdc ±0.5v &gt; 31.0vdc±0.5v</td> <td>&lt; 22.01 Vdc &gt; 31.37Vdc</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 ~38.8%</td> </tr> <tr> <td> Orange</td> <td>40%±5% ~ 80%±5% LOAD</td> <td>42%~ 77.7%</td> </tr> <tr> <td> Red</td> <td>≥ 80%±5% LOAD</td> <td>≥ 81.3%</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	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	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%
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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>20.1 VDC~ 33.1 VDC/NO LOAD</u> <u>20.2 VDC~ 33.1 VDC/FULL LOAD</u>  Test: <u>OK</u>

2	DC CURRENT (TYP)	38A	IP: 24VDC OP:FULL LOAD Ta:25°C	<u>33.5</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>1.01</u> W <u>8.96</u> W LED DISPLAY: <u>OK</u>
4	SAVING MODE TO NORMAL	$P_o \geq 25W$	IP: 24VDC OP: TESTING LOAD Ta:25°C	<u><math>\geq 21</math></u> W
5	NORMAL TO SAVING MODE	$P_o \leq 10W$	IP: 24VDC OP: TESTING LOAD Ta:25°C	<u><math>\leq 12</math></u> W
6	OFF MODE CURRENT DRAW (Typ.)	$\leq 1mA$	IP: 24VDC OP: Sw off Ta:25°C	<u>0.74</u> mA
7	EFFICIENCY(TYP)	600W/93%	IP: 25VDC OP: $P_o=600W$ 230V/50HZ (factory setting) Ta:25°C	94.1%

**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>22.0</u> V
2	BAT LOW SHUT DOWN	20V $\pm$ 0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>20.2</u> V
3	BAT LOW RESTART	25V $\pm$ 0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>25.1</u> V
4	BAT HIGH ALARM	31V $\pm$ 0.5VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>31.1</u> V
5	BAT HIGH SHUT DOWN	33V $\pm$ 0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>33.1</u> V
6	BAT HIGH RESTART	30V $\pm$ 0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>30.1</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> (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: 24VDC OP: TESTING SW:ON Ta:25°C	(1). <u>106 %~114 %</u> <u>180.1</u> sec (2). <u>116 %~148 %</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: 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>507</u> W · turn on <u>    OK    </u> LAMP: <u>711</u> W · turn on <u>    OK    </u> LAMP: <u>810</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>761</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>550</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 :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) 79.1V (2) 75.9V (3) 80.7V (4) 79.1V (5) 79.1V

2	DC TO DC Diode Peak Voltage	D105 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) 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°C	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°C	(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°C	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°C	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
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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	BATI/P-ACO/P 3.6 KVAC/min AC O/P-FG:1.8 KVAC/min Ta:25°C	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°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-750-248 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	HIGH AMBIENT Ta= 43.6 °C
		1	Q102	43.3°C	62.1°C
		2	C101	35.6°C	54.0°C
		3	Q103	47.3°C	64.8°C
		4	C146	44.1°C	60.1°C
		5	T101	70.5°C	78.6°C
		6	RT300	43.5°C	61.0°C
		7	U501	47.3°C	63.5°C
		8	U303	38.8°C	57.1°C
		9	L100	36.6°C	53.3°C
		10	C113	32.8°C	50.1°C
		11	D107	44.4°C	61.0°C
		12	D105	43.5°C	60.3°C
		13	U101	28.8°C	48.4°C
		14	Q200	47.0°C	64.7°C
		15	Q202	46.1°C	63.8°C
		16	TSW1	32.5°C	50.1°C
		17	C119	34.5°C	51.0°C
		18	C118	33.5°C	50.3°C
		19	ZR200	28.5°C	48.4°C
		20	C219	22.7°C	44.4°C
		21	L201	27.8°C	48.6°C
		22	L200	32.9°C	51.1°C
		23	C115	25.8°C	45.9°C
		24	T501	35.9°C	55.4°C
		25	T100	27.0°C	46.8°C
		26	Q504	42.3°C	60.0°C
		27	Q501	40.9°C	57.6°C
		28	R149	28.5°C	48.3°C
		29	U500	37.6°C	55.4°C
		30	U200	34.4°C	52.4°C
31	U100	38.2°C	55.1°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