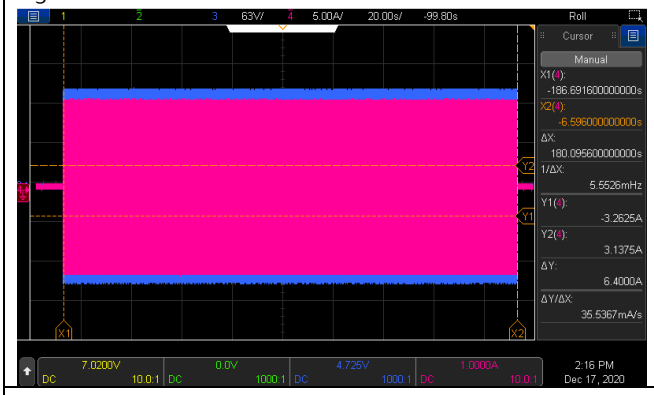
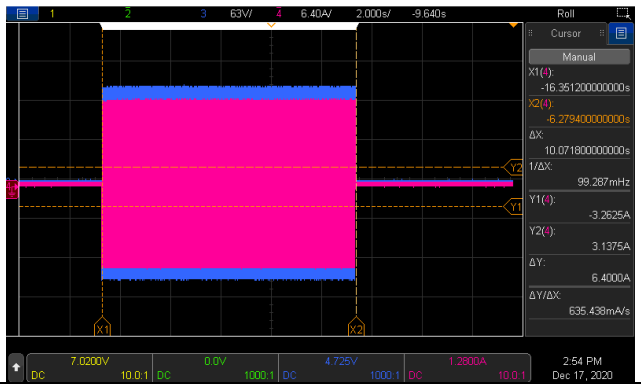
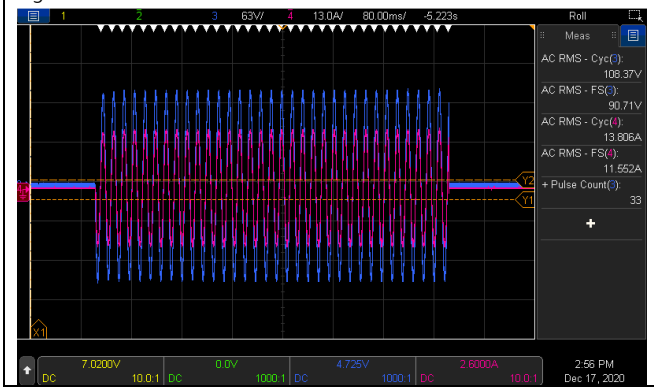
Test Report: NTS-750-148

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℃	765 W
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℃	(1) 109.2 V / 7.87 A / 180.1 Sec (2) 109.2 V/ 10.24 A/ 10.07Sec (3) 108.37 V/ 13.80 A / 33Cycle
	CH3:O/P VAC CH4:O/P IAC Fig1  Fig2  Fig3 			
3	AC Voltage	100 / 110 / 115 / 120Vac selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25℃	DIP S.W 100VAC: 99.23 V DIP S.W 110VAC: 109.17 V DIP S.W 15VAC: 113.66 V DIP S.W 120VAC: 119.27 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 48VDC 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: 50VDC OP:80% LOAD(600W) (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25℃	(1) 1.62 % / Vo(min) /80% LOAD (2) 1.45 % / Vo(nor) /80% LOAD (3) 1.32% / Vo(max) /80% LOAD

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

Fig1

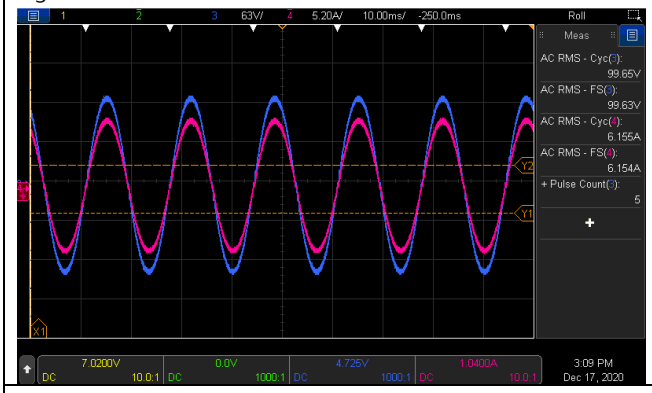


Fig2

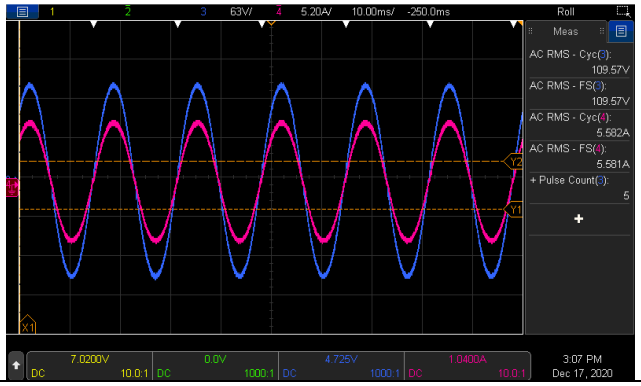
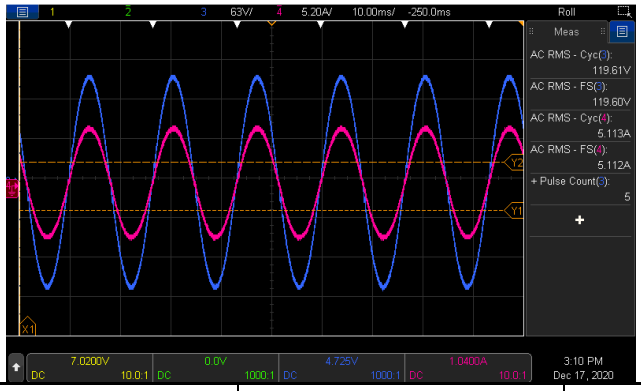


Fig3



6	AC REGULATION	±3%	IP: 50VDC OP:80% LOAD(600W) Ta:25℃	-0.57 %
7	Overshoot /Undershoot	<±10%	IP: 48VDC OP: (1) full load turn on (2) no load turn on (3) full /no load change Ta:25℃	(1) -6.0 % (2) -3.27 % (3) -2.09 %
8	O/P voltage DC offset	Vin(nor)= 48 v · Vo<200mV · no load : 92.3 mV / full load: 80.9 mV		

<table>
<tr><td>9</td><td>LED STATUS</td><td>

● 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	50.0~62.0 Vdc±1v	50.048Vdc ~ 61.84 Vdc
Orange	44.0~50.0Vdc ±1v	44.15Vdc ~ 49.747 Vdc
Red	<44.0 Vdc ±1v > 62.0vdc±1v	< 44.025 Vdc > 62.04 Vdc

● Load test

LED	LOAD RANGE	RESULT
Green	Min. load ~ 40%±5% LOAD	Min. load ~ 39.3 %
Orange	40%±5% ~ 80%±5% LOAD	42.3%~ 78.5 %
Red	≧ 80%±5% LOAD	≧ 81.2 %

</td></tr>
</table>

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℃	40.01 VDC~ 65.80 VDC/NO LOAD 40.04 VDC~ 65.85 VDC/FULL LOAD
			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)	Test： OK

2	DC CURRENT (TYP)	19A	IP: 48VDC OP:FULL LOAD Ta:25℃	17.1 A
3	NO LOAD DISSPATION (Typ.)	≦ 1.5W @ saving mode ≦ 12 W@NON-Saving Mode	IP: 48VDC OP:NO LOAD Ta:25℃	1.13 W 7.48 W
4	SAVING MODE TO NORMAL	Po≥25W	IP: 48VDC OP: TESTING LOAD Ta:25℃	≥22 W
5	NORMAL TO SAVING MODE	Po≦ 10W	IP: 48VDC OP: TESTING LOAD Ta:25℃	≦ 14 W
6	OFF MODE CURRENT DRAW (Typ.)	≦ 1mA	IP: 48VDC OP: Sw off Ta:25℃	0.66 mA
7	EFFICIENCY(TYP)	600W/91%	IP: 50VDC OP: Po=600W 110V/60HZ (factory setting) Ta:25℃	92.6 %

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	44V±1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	43.9 V
2	BAT LOW SHUT DOWN	40V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	40.1 V
3	BAT LOW RESTART	50V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	50.0 V
4	BAT HIGH ALARM	62V±1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	61.9 V
5	BAT HIGH SHUT DOWN	66V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	65.9 V
6	BAT HIGH RESTART	60V±1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	59.9 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: 48VDC 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: 48VDC OP: TESTING SW:ON Ta:25℃	(1). 106.6 %~ 114.5 % 180.1 sec (2). 117.6 %~ 147.6 % 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: 48VDC 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: 456 W · turn on OK LAMP: 753 W · turn on OK LAMP: 906 W · turn on OK	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
2	INDUCTION MOTOR	0.35 HP	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
3	SWITCHING POWER SUPPLY	WITH PFC: RSP-1600-48 · O/P= 758 W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
		NO PFC: SE-1000-48 · O/P= 616 W	1. Vin=HIGH LINE 2. O/P=110V/60Hz 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 : 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℃	(1) 150V (2) 137V (3) 152V (4) 135V (5) 137V

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℃	 (1) 303V (2) 307V (3) 303V (4) 305V (5) 305V
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℃	 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(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)296V (2)393V (3)337V (4)300V (5)309V
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℃	Q504 (1) 172V (2) 172V (3) 172V (4) 172V (5) 172V Q105 (1) 140.0V (2) 140.8V (3) 140.0V (4) 140.0V (5) 140.0V
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℃	U303 (1) 3.35V (2) 3.35V (3) 3.35V (4) 3.35V (5) 3.35V U501 (1)14.8 V (2) 14.8V (3) 14.8V

		Gate Driver IC U200 Rated -0.3V~20V		(4) 14.8V (5) 14.8V U101 (1) 12.41V (2) 12.41V (3) 12.41V (4) 12.41V (5) 12.41V 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: 2.473 mA AC O/P-FG: 6.37 mA NO DAMAGE
2	GROUNDING CONTINUITY	IEC62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25℃	3mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	▓ FCC 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: 24VDC 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

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL：NTS-450-124
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 25VDC O/P： FULL LOAD Ta= 25.0 ℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 25VDC O/P： FULL LOAD Ta= 40.0 ℃

<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=25.0 ℃</th><th>HIGH AMBIENT Ta= 40.0 ℃</th></tr>
<tr><td>1</td><td>C100</td><td>51.3℃</td><td>60.9℃</td></tr>
<tr><td>2</td><td>C101</td><td>53.1℃</td><td>62.3℃</td></tr>
<tr><td>3</td><td>Q103</td><td>53.9℃</td><td>64.5℃</td></tr>
<tr><td>4</td><td>T101</td><td>67.8℃</td><td>76.0℃</td></tr>
<tr><td>5</td><td>L100</td><td>61.1℃</td><td>67.6℃</td></tr>
<tr><td>6</td><td>C112</td><td>53.2℃</td><td>60.3℃</td></tr>
<tr><td>7</td><td>D107</td><td>62.4℃</td><td>72.1℃</td></tr>
<tr><td>8</td><td>C119</td><td>52.3℃</td><td>59.6℃</td></tr>
<tr><td>9</td><td>D105</td><td>62.9℃</td><td>72.5℃</td></tr>
<tr><td>10</td><td>C118</td><td>51.8℃</td><td>57.8℃</td></tr>
<tr><td>11</td><td>Q200</td><td>75.7℃</td><td>86.0℃</td></tr>
<tr><td>12</td><td>U501</td><td>66.9℃</td><td>73.0℃</td></tr>
<tr><td>13</td><td>L201</td><td>47.5℃</td><td>56.0℃</td></tr>
<tr><td>14</td><td>C219</td><td>53.3℃</td><td>57.8℃</td></tr>
<tr><td>15</td><td>L200</td><td>84.7℃</td><td>86.4℃</td></tr>
<tr><td>16</td><td>Q203</td><td>69.4℃</td><td>78.7℃</td></tr>
<tr><td>17</td><td>TSW1</td><td>70.2℃</td><td>75.6℃</td></tr>
<tr><td>18</td><td>ZR200</td><td>40.4℃</td><td>50.4℃</td></tr>
<tr><td>19</td><td>C114</td><td>44.5℃</td><td>53.7℃</td></tr>
<tr><td>20</td><td>T100</td><td>46.0℃</td><td>55.8℃</td></tr>
<tr><td>21</td><td>T501</td><td>57.8℃</td><td>65.4℃</td></tr>
<tr><td>22</td><td>U101</td><td>48.1℃</td><td>57.2℃</td></tr>
<tr><td>23</td><td>Q501</td><td>60.0℃</td><td>67.1℃</td></tr>
<tr><td>24</td><td>Q105</td><td>46.4℃</td><td>55.8℃</td></tr>
<tr><td>25</td><td>RT300</td><td>53.1℃</td><td>62.5℃</td></tr>
<tr><td>26</td><td>Q504</td><td>60.0℃</td><td>68.7℃</td></tr>
<tr><td>27</td><td>U303</td><td>55.0℃</td><td>64.6℃</td></tr>
<tr><td>28</td><td>U100</td><td>56.9℃</td><td>67.0℃</td></tr>
<tr><td>29</td><td>U500</td><td>56.1℃</td><td>66.0℃</td></tr>
<tr><td>30</td><td>U201</td><td>56.5℃</td><td>65.6℃</td></tr>
</table></td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 25VDC
O/P： 100%LOAD
Ta= -25 ℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 40 ℃
NO DAMAGE</td><td>I/P：32.5VDC
O/P：FULL LOAD
Ta= 40 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td></tr>
</table>

5	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
7	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： 24VDC/Full Load	TEST：OK
8	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
9	CAPACITOR LIFE CYCLE	SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P： 25VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 25VDC O/P：FULL LOAD Ta= 40 ℃ LIFE TIME	 (1) 526723.6HRS (2) 378378.2HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 715.7K hrs min. Telcordia SR-332 (Bellcore) ; 78.0K hrs min. MIL-HDBK-217F (25℃)	
11	Ongoing Reliability Test	I/P：25VDC 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