



# Test Report: NTS-1200-248

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1200W High Reliable True Sine Wave Power Inverter

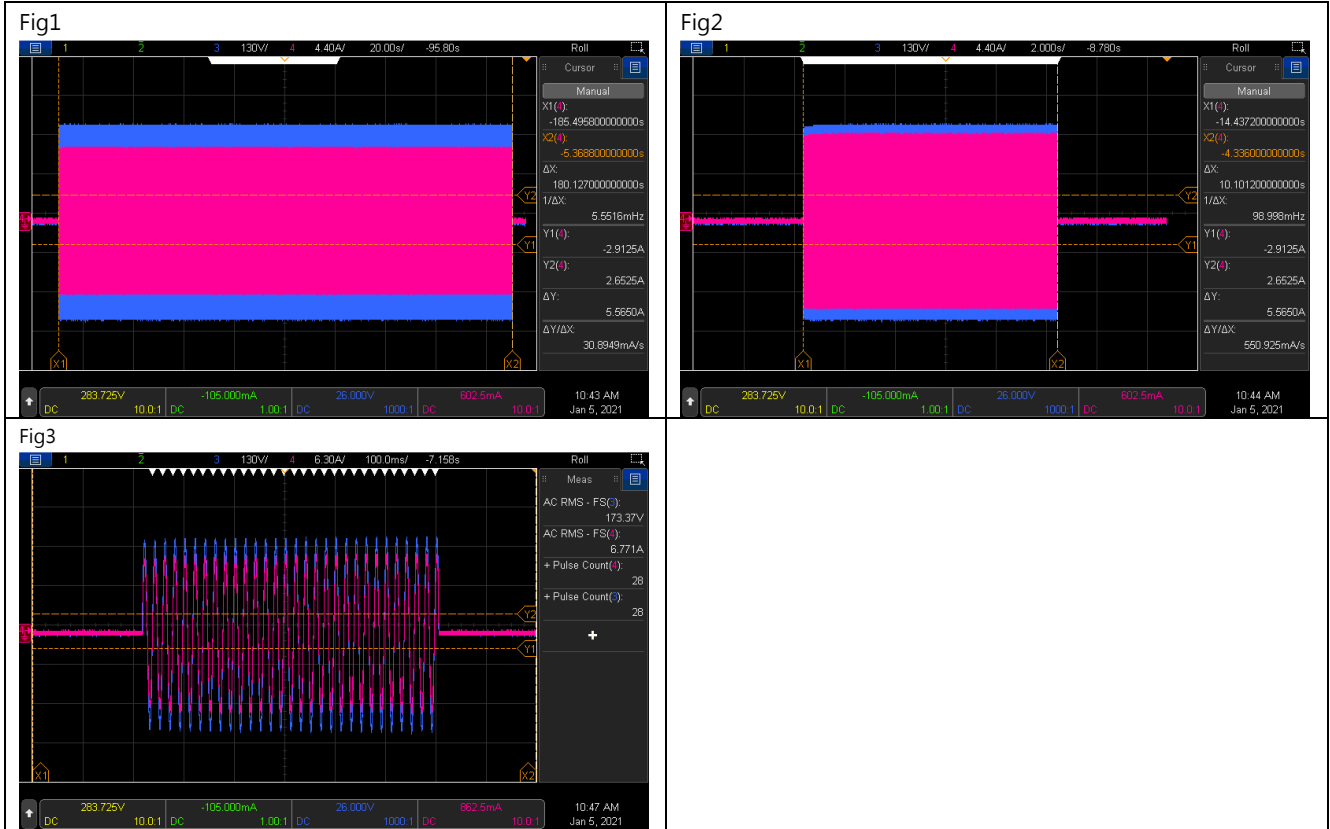
- **DESIGN VERIFY TEST**
  - Output Function Test
  - Input Function Test
  - Protection Function Test
  - Control Function Test
  - APPLICATION Test
  - Component Stress Test
- **SAFETY & E.M.C. TEST**
  - Safety Test
  - E.M.C. Test
- **RELIABILITY TEST**
  - ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST































NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED POWER	1200W	IP: 48VDC Ta:25°C	<u>1224</u> W
2	MAXIMUM OUTPUT POWER (TYP)	(1)1380W/180sec. (2)1800w/10sec (3)SURGE POWER 2000W FOR 30CYCLE Vin (30 ± 5 CYCLE)	IP: 50VDC OP:TESTING LOAD Ta:25°C	(1) 228.8V/ 5.81 A/ 180.12 Sec (2) 228.6V/ 7.76 A/ 10.10 Sec (3) 225.6V/ 8.56 A/ 28 Cycle

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



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>199.28</u> V DIP S.W 220VAC: <u>219.86</u> V DIP S.W 230VAC: <u>229.02</u> V DIP S.W 240VAC: <u>238.92</u> V
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</u> HZ DIP S.W 60HZ: <u>59.959</u> HZ

5	WAVEFORM	True sine wave (THD<3%)	IP: 50VDC OP:75% LOAD( 900W ) (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25°C	(1) 1.45% / Vo(min)/75% LOAD (2) 1.42% / Vo(nor) /75% LOAD (3) 1.41% / Vo(max) /75% LOAD
CH3:O/P VAC CH4:O/P IAC				
6	AC REGULATION	±3%	IP: 50VDC OP:75% LOAD( 900W ) Ta:25°C	<u>          -0.33          </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>          -7.3          </u> % (2) <u>          -6.52          </u> % (3) <u>          -4.52          </u> %
8	O/P voltage DC offset	Vin(nor)= <u>  48  </u> v · Vo< 200mV · no load : <u>  76.7  </u> mV / full load: <u>  86.8  </u> 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><b>Green</b> </td> <td>50.0~62.0 Vdc±1v</td> <td>50.33Vdc ~ 62.22 Vdc</td> </tr> <tr> <td><b>Orange</b> </td> <td>44.0~50.0Vdc ±1v</td> <td>44.25Vdc ~ 50.31Vdc</td> </tr> <tr> <td><b>Red</b> </td> <td>&lt;44.0 Vdc ±1v &gt; 62.0vdc±1v</td> <td>&lt; 44.17Vdc &gt; 62.36 Vdc</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><b>Green</b> </td> <td>Min. load ~ 40%±5% LOAD</td> <td>Min. load ~ 40.58%</td> </tr> <tr> <td><b>Orange</b> </td> <td>40%±5% ~ 80%±5% LOAD</td> <td>40.67% ~ 79.42%</td> </tr> <tr> <td><b>Red</b> </td> <td>≥ 80%±5% LOAD</td> <td>≥ 79.58 %</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	<b>Green</b> 	50.0~62.0 Vdc±1v	50.33Vdc ~ 62.22 Vdc	<b>Orange</b> 	44.0~50.0Vdc ±1v	44.25Vdc ~ 50.31Vdc	<b>Red</b> 	<44.0 Vdc ±1v > 62.0vdc±1v	< 44.17Vdc > 62.36 Vdc	LED	LOAD RANGE	RESULT	<b>Green</b> 	Min. load ~ 40%±5% LOAD	Min. load ~ 40.58%	<b>Orange</b> 	40%±5% ~ 80%±5% LOAD	40.67% ~ 79.42%	<b>Red</b> 	≥ 80%±5% LOAD	≥ 79.58 %
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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=42V 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>40.32</u> VDC~ <u>66.23</u> VDC/NO LOAD <u>40.31</u> VDC~ <u>66.18</u> VDC/FULL LOAD  Test: <u>OK</u>

2	DC CURRENT (TYP)	30A	IP: 48VDC OP: FULL LOAD Ta: 25°C	<u>27.16</u> A
3	NO LOAD DISSIPATION (Typ.)	$\leq 1.5W$ @standby saving mode $\leq 25W$ @NON-Saving Mode	IP: 48VDC OP: NO LOAD Ta: 25°C	<u>1.43</u> W <u>21.13</u> W
4	SAVING MODE TO NORMAL	$P_o \geq 25W$	IP: 48VDC OP: TESTING LOAD Ta: 25°C	<u><math>\geq 19</math></u> W
5	NORMAL TO SAVING MODE	$P_o \leq 10W$	IP: 48VDC OP: TESTING LOAD Ta: 25°C	<u><math>\leq 11</math></u> W
6	OFF MODE CURRENT DRAW (Typ.)	$\leq 1mA$	IP: 48VDC OP: Sw off Ta: 25°C	<u>0.81</u> mA
7	EFFICIENCY(TYP)	900W/93%	IP: 50VDC OP: $P_o=900W$ 230V/50HZ Ta: 25°C	<u>93.7</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>44.108</u> V
2	BAT LOW SHUT DOWN	40V $\pm$ 1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>40.277</u> V
3	BAT LOW RESTART	50V $\pm$ 1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>50.258</u> V
4	BAT HIGH ALARM	62V $\pm$ 1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>62.33</u> V
5	BAT HIGH SHUT DOWN	66V $\pm$ 1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>66.3</u> V
6	BAT HIGH RESTART	60V $\pm$ 1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>60.32</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>104.7 %~113.7 %</u> <u>180.12</u> sec (2). <u>114.9%~ 147.7 %</u> <u>10.10</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	(1).Power ON-OFF remote control by front panel dry contact connector (by RELAY) Open : Normal work Short : Remote off (2). IRC3	IP: 48VDC 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>619</u> W · turn on <u>OK</u> LAMP: <u>1235</u> W · turn on <u>OK</u> LAMP: <u>1432</u> W · turn on <u>OK</u>	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u>OK</u>	
2	INDUCTION MOTOR	<u>0.5</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>1189</u> W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u>OK</u>	
		NO PFC: <u>SE-1000-48</u> O/P= <u>457</u> W	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	Q101/ Q105 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	Q101 (1) 161V (2) 163V (3) 161V (4) 165V (5) 165V	Q105 (1)165V (2)163V (3)163V (4)170V (5)165V
2	DC TO DC Diode Peak Voltage	D 151 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	D151 (1) 538V (2) 587V (3) 583V (4) 579V (5) 563V	D152 (1) 534V (2) 546V (3) 546V (4) 555V (5) 546V
3	DC BUS Capacitor Voltage	C161/C162 Rated : 680 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	C161 (1) 257V (2) 261V (3) 261V (4) 269V (5) 257V	C162 (1) 265V (2) 269V (3) 273V (4) 269V (5) 265V
4	DC TO AC Power Transistor ( D to S) or (C to E) Peak Voltage	Q 1 Rated : 30A / 650 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	Q1 (1)555V (2)571V (3)555V (4)555V (5)551V	Q3 (1)534V (2) 571V (3) 542V (4) 555V (5) 555V
5	AUX PWM MOS	Q201 Rated : 65 A/ 200 V  Q501 Rated : 65 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	Q201 (1) 170V (2) 170V (3) 170V (4) 170V (5) 170V	Q501 (1) 49.0V (2) 49.0V (3) 49.0V (4) 49.0V (5) 49.0V
6	Control IC Voltage Test	MCU IC U301 Rated 2.4 V~ 3.6 V  AUX IC U201 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	U301 (1) 3.41V (2) 3.37V (3) 3.41V (4) 3.41V	U501 (1) 12.36V (2) 12.36V (3) 12.36V (4) 12.36V

	8.2V~30V	(4) NO LOAD Turn On (5) Saving mode Ta:25°C	(5) 3.37V U201 (1) 12.12V (2) 12.12V (3) 12.12V (4) 12.12V (5) 12.12V	(5) 12.36V U81 (1) 5.06V (2) 5.06V (3) 5.06V (4) 5.06V (5) 5.06V
	CHARGE IC U501 Rated -0.3V~20V			
	Gate Driver IC U81 Rated -0.3V~20V			

## SAFETY & EMC TEST

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	BAT I/P-AC O/P: 3 KVAC/min AC O/P-FG: 1.5 KVAC/min	BAT I/P-AC O/P: 3.6 KVAC/min AC O/P-FG:1.8 KVAC/min Ta:25°C	BAT I/P-AC O/P: 7.17 mA AC O/P-FG: 6.09 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	EN55032 CISPR32 (except for Type-UN) CLASS A	I/P:48 VDC O/P: :FULL/50% LOAD Ta:25°C	CLASS A
2	E.S.D	EN61000-4-2 AIR : 8KV / Contact : 4KV	I/P: 48VDC 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 : NTU-1200-248 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 50VDC O/P : FULL LOAD Ta= 25.0 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 50VDC O/P : FULL LOAD Ta= 35.0 °C																																																																																																																																																														
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		12	CT1	31.0°C	40.2°C																																																																																																																																																											
		13	C161	48.4°C	56.6°C																																																																																																																																																											
		14	Q1	70.9°C	81.8°C																																																																																																																																																											
		15	RY1	38.7°C	46.8°C																																																																																																																																																											
		16	C2	31.5°C	41.6°C																																																																																																																																																											
		17	Q2	70.3°C	81.1°C																																																																																																																																																											
		18	D151	70.7°C	77.4°C																																																																																																																																																											
		19	T202	31.9°C	46.6°C																																																																																																																																																											
		20	Q201	32.7°C	43.7°C																																																																																																																																																											
		21	L10	63.8°C	72.4°C																																																																																																																																																											
		22	R223	49.6°C	60.2°C																																																																																																																																																											
		23	C222	40.2°C	50.7°C																																																																																																																																																											
		24	D152	66.4°C	73.4°C																																																																																																																																																											
		25	TSW1	61.6°C	72.3°C																																																																																																																																																											
		26	R213	34.9°C	45.1°C																																																																																																																																																											
		27	U201	40.5°C	50.4°C																																																																																																																																																											
		28	Q203	41.3°C	51.5°C																																																																																																																																																											
		29	U81	46.4°C	57.0°C																																																																																																																																																											
		30	R501	39.3°C	50.0°C																																																																																																																																																											
		31	U501	37.7°C	48.2°C																																																																																																																																																											
		32	D501	37.9°C	49.0°C																																																																																																																																																											
		33	R24	82.0°C	93.4°C																																																																																																																																																											
		34	U301	44.1°C	54.4°C																																																																																																																																																											
		35	U361	49.2°C	58.7°C																																																																																																																																																											
		36	TC1	43.6°C	52.7°C																																																																																																																																																											
		37	TC2	41.4°C	50.2°C																																																																																																																																																											
38	C104	69.1°C	76.0°C																																																																																																																																																													
39	Q361	40.8°C	49.4°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 35 °C NO DAMAGE	I/P : 65VDC O/P : FULL LOAD Ta= 35 °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~ +40°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 C101 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= 35 °C LIFE TIME		(1) 290924.7HRS (2) 191938.7HRS
8	MTBF	Conducted by Parts Stress Analysis Prediction 198.9K hrs min. Telcordia TR/SR-332 (Bellcore) ; 62.0K 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