



Test Report: NTS-1200-224

1200W High Reliable True Sine Wave Power Inverter

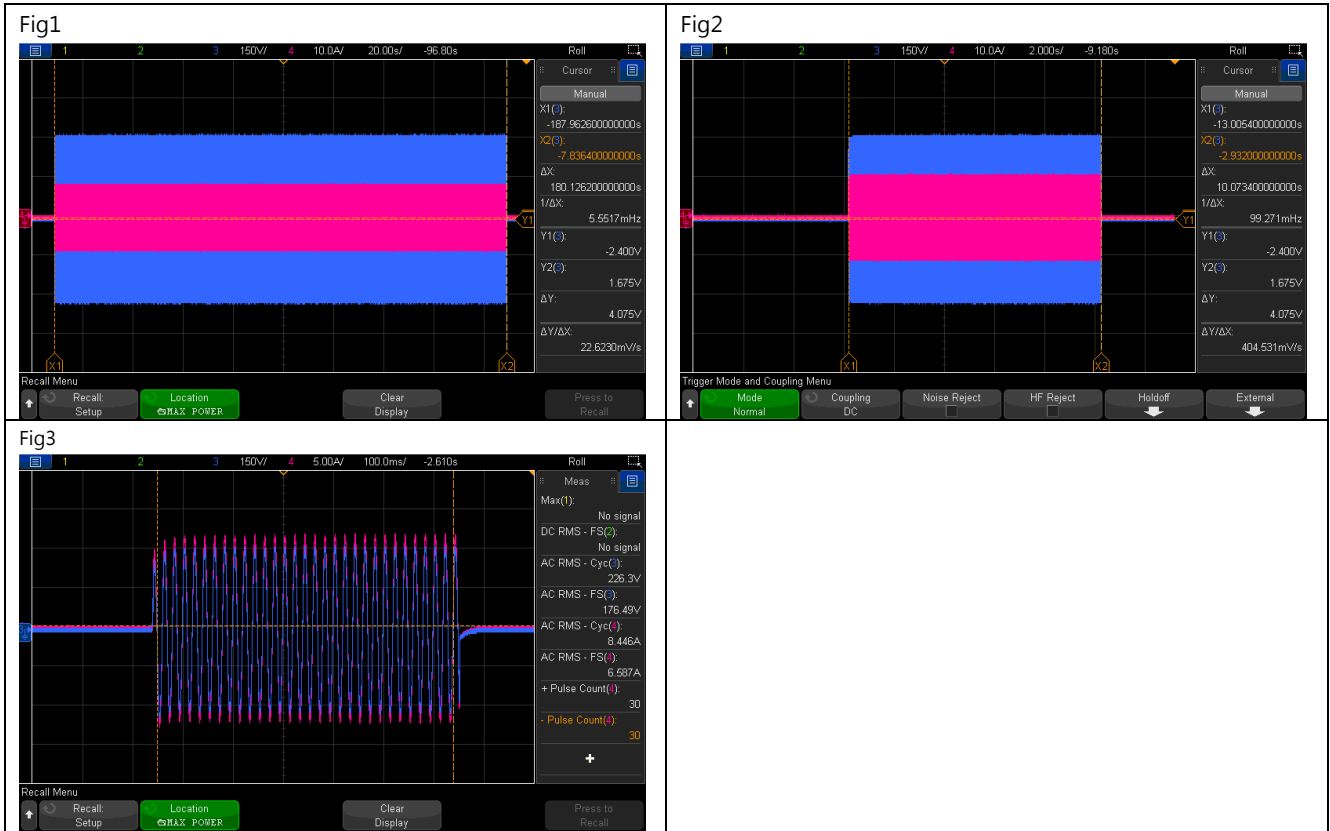
- **DESIGN VERIFY TEST**
 - Output Function Test
 - Input Function Test
 - Protection Function Test
 - Control Function Test
 - APPLICATION Test
 - Component Stress Test
- **SAFETY & E.M.C. TEST**
 - Safety Test
 - E.M.C. Test
- **RELIABILITY TEST**
 - ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED POWER	1200W	IP: 24VDC 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: 25VDC OP:TESTING LOAD Ta:25°C	(1) 229.2 V/ 5.96 A/ 180.12 Sec (2) 228.8 V/ 7.75 A/ 10.07 Sec (3) 226.1 V/ 8.440 A/ 30 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>199.5</u> V DIP S.W 220VAC: <u>219.3</u> V DIP S.W 230VAC: <u>229.2</u> V DIP S.W 240VAC: <u>239.2</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:75% LOAD(900W) (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25°C	(1) 1.33 % / Vo(min)/75% LOAD (2) 1.73 % / Vo(nor) /75% LOAD (3) 1.11 % / Vo(max) /75% LOAD
CH3:O/P VAC CH4:O/P IAC				
6	AC REGULATION	±3%	IP: 25VDC OP:75% LOAD(900W) Ta:25°C	<u> -0.27 </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> -8.91 </u> % (2) <u> -6.26 </u> % (3) <u> -3.13 </u> %
8	O/P voltage DC offset	Vin(nor)= <u> 24 </u> v · Vo < 200mV · no load : <u> 86.3 </u> mV / full load: <u> 76 </u> mV		

9	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>25.05Vdc ~ 30.86 Vdc</td> </tr> <tr> <td> Orange</td> <td>22.0~25.0Vdc ±0.5v</td> <td>22.04Vdc ~ 25.68 Vdc</td> </tr> <tr> <td> Red</td> <td><22.0 Vdc ±0.5v > 31.0vdc±0.5v</td> <td>< 21.98 Vdc > 30.97 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 ~ 40.2 %</td> </tr> <tr> <td> Orange</td> <td>40%±5% ~ 80%±5% LOAD</td> <td>42.5%~ 80.7 %</td> </tr> <tr> <td> Red</td> <td>≥ 80%±5% LOAD</td> <td>≥ 82.5 %</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	25.05Vdc ~ 30.86 Vdc	Orange	22.0~25.0Vdc ±0.5v	22.04Vdc ~ 25.68 Vdc	Red	<22.0 Vdc ±0.5v > 31.0vdc±0.5v	< 21.98 Vdc > 30.97 Vdc	LED	LOAD RANGE	RESULT	Green	Min. load ~ 40%±5% LOAD	Min. load ~ 40.2 %	Orange	40%±5% ~ 80%±5% LOAD	42.5%~ 80.7 %	Red	≥ 80%±5% LOAD	≥ 82.5 %
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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>20.07</u> VDC~ <u>32.8</u> VDC/NO LOAD <u>20.2</u> VDC~ <u>32.9</u> VDC/FULL LOAD Test: <u>OK</u>

2	DC CURRENT (TYP)	60A	IP: 24VDC OP: FULL LOAD Ta:25°C	<u>54.44</u> A
3	NO LOAD DISSIPATION (Typ.)	$\leq 1.4W$ @standby saving mode $\leq 25W$ @NON-Saving Mode	IP: 24VDC OP:NO LOAD Ta:25°C	<u>1.303</u> W <u>20.76</u> W
4	SAVING MODE TO NORMAL	$P_o \geq 25W$	IP: 24VDC OP: TESTING LOAD Ta:25°C	<u>21</u> W
5	NORMAL TO SAVING MODE	$P_o \leq 10W$	IP: 24VDC OP: TESTING LOAD Ta:25°C	<u>15</u> W
6	OFF MODE CURRENT DRAW (Typ.)	$\leq 1mA$	IP: 24VDC OP: Sw off Ta:25°C	<u>0.75</u> mA
7	EFFICIENCY(TYP)	900W/92%	IP: 25VDC OP: $P_o=900W$ 230V/50HZ (factory setting) Ta:25°C	<u>92.5</u> %

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	22V±0.5VDC	IP: TESTING OP: FULL LOAD SW: ON Ta:25°C	<u>21.97</u> V
2	BAT LOW SHUT DOWN	20V±0.5VDC	IP: TESTING OP: FULL LOAD SW: ON Ta:25°C	<u>20.14</u> V
3	BAT LOW RESTART	25V±0.5VDC	IP: TESTING OP: FULL LOAD SW: ON Ta:25°C	<u>25.04</u> V
4	BAT HIGH ALARM	31V±0.5VDC	IP: TESTING OP: FULL LOAD SW: ON Ta:25°C	<u>30.96</u> V
5	BAT HIGH SHUT DOWN	33V±0.5VDC	IP: TESTING OP: FULL LOAD SW: ON Ta:25°C	<u>33.07</u> V
6	BAT HIGH RESTART	30V±0.5VDC	IP: TESTING OP: FULL LOAD SW: ON Ta:25°C	<u>29.97</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> 107 %~ 114 % </u> <u> 180.12 </u> sec (2). <u> 116 %~ 147 % </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	(1).Power ON-OFF remote control by front panel dry contact connector (by RELAY) Open : Normal work Short : Remote off (2). IRC3	IP: 24VDC 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> 618 </u> W · turn on <u> OK </u> LAMP: <u> 1037 </u> W · turn on <u> OK </u> LAMP: <u> 1400 </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> 1245.4 </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> 643.5 </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 Rated : 100V /80 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) 75.4V (2) 76.2V (3) 79.4V (4) 75.4V (5) 76.2V	Q105 (1) 76.6V (2) 77.4V (3) 79.8V (4) 77.4V (5) 77.4V
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) 524V (2) 560V (3) 548V (4) 544V (5) 524V	D152 (1) 520V (2) 548V (3) 548V (4) 544V (5) 524V
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) 258V (2) 258V (3) 256V (4) 258V (5) 256V	C162 (1) 262V (2) 262V (3) 262V (4) 262V (5) 262V
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(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	Q1 (1) 536V (2) 540V (3) 552V (4) 536V (5) 544V	Q4 (1) 540V (2) 540V (3) 540V (4) 544V (5) 548V
5	AUX PWM MOS	Q201 Rated : 65 A/ 200 V Q501 Rated : 120 A/ 60 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	Q201 (1) 109.2V (2) 109.2V (3) 109.2V (4) 109.2V (5) 109.2V	Q105 (1) 49.0 V (2) 49.0V (3) 49.0V (4) 49.0V (5) 49.0V

6	Control IC Voltage Test	MCU IC U301 Rated 2.4V~ 3.6 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	U301 (1) 3.50V (2) 3.42V (3) 3.46V (4) 3.50V (5) 3.46V	U501 (1) 12.30V (2) 12.30V (3) 12.03V (4) 12.30V (5) 12.30V
		AUX IC U201 Rated 8.2V~30V		U201 (1) 12.22V (2) 12.22V (3) 12.22V (4) 12.22V (5) 12.22V	U81 (1) 5.07V (2) 5.07V (3) 5.07V (4) 5.07V (5) 5.07V
		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: 7.16 mA AC O/P-FG: 5.99 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: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: 24VDC 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-1200-224 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 25VDC O/P : FULL LOAD Ta= 25.0 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 25VDC O/P : FULL LOAD Ta= 35.0 °C																																																																																																																																																										
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18	Q201	35.6°C	48.2°C																																																																																																																																																									
19	D154	56.6°C	65.1°C																																																																																																																																																									
20	C161	38.0°C	48.2°C																																																																																																																																																									
21	L10	48.6°C	58.7°C																																																																																																																																																									
22	C222	30.5°C	41.3°C																																																																																																																																																									
23	T202	27.9°C	39.7°C																																																																																																																																																									
24	RY1	34.6°C	45.5°C																																																																																																																																																									
25	ZNR1	27.4°C	38.2°C																																																																																																																																																									
26	LF1	34.2°C	43.8°C																																																																																																																																																									
27	R213	46.4°C	60.1°C																																																																																																																																																									
28	U501	31.8°C	42.7°C																																																																																																																																																									
29	R24	61.3°C	70.7°C																																																																																																																																																									
30	U81	35.6°C	46.1°C																																																																																																																																																									
31	D501	31.4°C	42.3°C																																																																																																																																																									
32	R501	33.5°C	44.4°C																																																																																																																																																									
33	U201	43.6°C	55.0°C																																																																																																																																																									
34	Q203	37.0°C	48.6°C																																																																																																																																																									
35	TC1	34.5°C	44.4°C																																																																																																																																																									
36	TC2	34.0°C	44.5°C																																																																																																																																																									
37	C104	58.9°C	67.1°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 35 °C NO DAMAGE	I/P : 32.5VDC 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 : 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 C101 IS THE MOST CRITICAL COMPONENT (1) I/P : 25VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 25VDC O/P : FULL LOAD Ta= 35 °C LIFE TIME		(1) 302931HRS (2) 172786.3HRS
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 : 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