



Test Report: NTS-1200-148

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 W</u>
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) 106.97 V/ 12.38 A/ 180.11 Sec (2) 106.46 V/ 15.11 A/ 10.08Sec (3) 109.7V/18.06 A/33 Cycle

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

Fig1

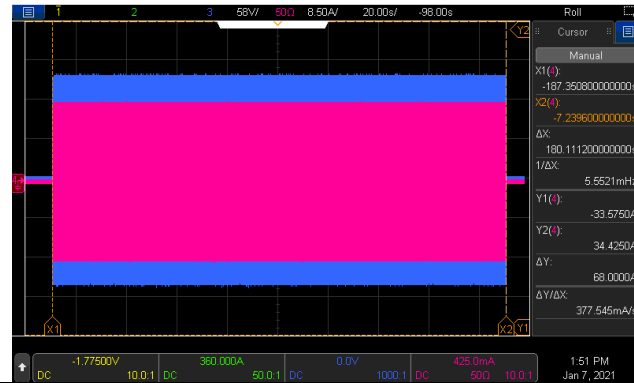


Fig2

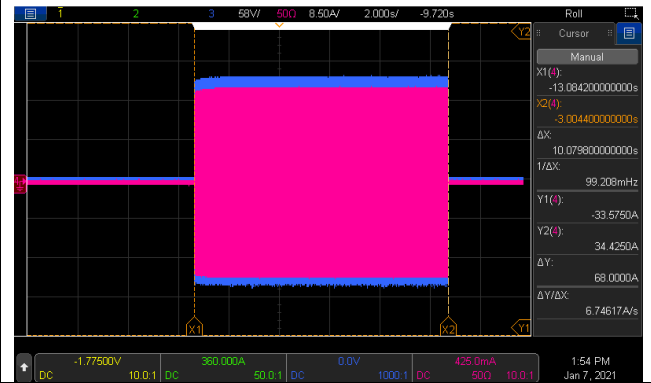
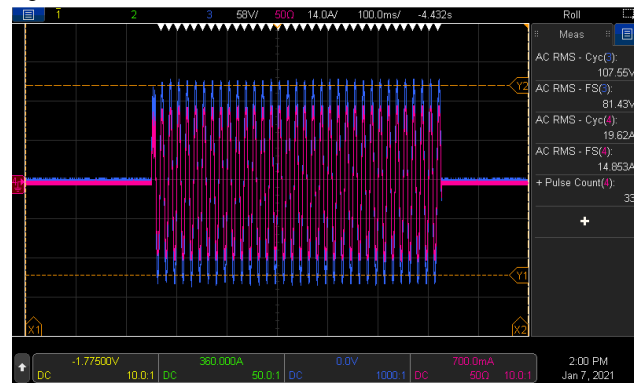


Fig3



3	AC Voltage	100 / 110 / 115 / 120Vac selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25°C	DIP S.W 100VAC: <u>100.18 V</u> DIP S.W 110VAC: <u>110.32 V</u> DIP S.W 115VAC: <u>115.33 V</u> DIP S.W 120VAC: <u>120.32 V</u>
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 HZ</u> DIP S.W 60HZ: <u>59.958 HZ</u>

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) 1.352% / Vo(min)/75% LOAD (2) 1.24% / Vo(nor) /75% LOAD (3) 1.156% / 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>0.4</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>-7.0</u> % (2) <u>-4.27</u> % (3) <u>-5.36</u> %
8	O/P voltage DC offset	Vin(nor) = <u>48</u> v · Vo 需 < 200mV · no load : <u>63.7</u> mV / full load: <u>87.7</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>50.0~62.0 Vdc±1v</td> <td>49.978Vdc ~ 61.81 Vdc</td> </tr> <tr> <td> Orange</td> <td>44.0~50.0Vdc ±1v</td> <td>44.1Vdc ~ 49.918Vdc</td> </tr> <tr> <td> Red</td> <td><44.0 Vdc ±1v > 62.0vdc±1v</td> <td>< 43.878 Vdc > 61.95 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 ~ 37.83 %</td> </tr> <tr> <td> Orange</td> <td>40%±5% ~ 80%±5% LOAD</td> <td>40.5%~76.33 %</td> </tr> <tr> <td> Red</td> <td>≥ 80%±5% LOAD</td> <td>≥ 78.33 %</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	50.0~62.0 Vdc±1v	49.978Vdc ~ 61.81 Vdc	Orange	44.0~50.0Vdc ±1v	44.1Vdc ~ 49.918Vdc	Red	<44.0 Vdc ±1v > 62.0vdc±1v	< 43.878 Vdc > 61.95 Vdc	LED	LOAD RANGE	RESULT	Green	Min. load ~ 40%±5% LOAD	Min. load ~ 37.83 %	Orange	40%±5% ~ 80%±5% LOAD	40.5%~76.33 %	Red	≥ 80%±5% LOAD	≥ 78.33 %
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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)	40.046 VDC~ 65.75 VDC/NO LOAD 40.06 VDC~ 65.73 VDC/FULL LOAD Test: <u>OK</u>

2	DC CURRENT (TYP)	30A	IP: 48VDC OP: FULL LOAD Ta: 25°C	<u>28.67</u> A
3	NO LOAD DISSIPATION (Typ.)	$\leq 1.5W$ @standby saving mode $\leq 15W$ @NON-Saving Mode	IP: 48VDC OP: NO LOAD Ta: 25°C	<u>1.45</u> W <u>11.36</u> W
4	SAVING MODE TO NORMAL	$P_o \geq 25W$	IP: 48VDC OP: TESTING LOAD Ta: 25°C	<u>≥ 18.6</u> W
5	NORMAL TO SAVING MODE	$P_o \leq 10W$	IP: 48VDC OP: TESTING LOAD Ta: 25°C	<u>≤ 12.1</u> W
6	OFF MODE CURRENT DRAW (Typ.)	$\leq 1mA$	IP: 48VDC OP: Sw off Ta: 25°C	<u>0.69</u> mA
7	EFFICIENCY(TYP)	900W/91.5%	IP: 50VDC OP: $P_o=900W$ 110V/60HZ (factory setting) Ta: 25°C	<u>91.9%</u>

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	44V±1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>43.852</u> V
2	BAT LOW SHUT DOWN	40V±1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>39.975</u> V
3	BAT LOW RESTART	50V±1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>49.936</u> V
4	BAT HIGH ALARM	62V±1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>61.89</u> V
5	BAT HIGH SHUT DOWN	66V±1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>65.82</u> V
6	BAT HIGH RESTART	60V±1VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>59.92</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>104.81 %~ 114.02% 180.11 sec</u> (2). <u>114.97 %~ 140.49 % 10.07 sec</u> 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>827</u> W · turn on <u>OK</u> LAMP: <u>1114</u> W · turn on <u>OK</u> LAMP: <u>1259</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: RSP-1600-48 O/P= <u>1194</u> W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u>OK</u>	
		NO PFC: SE-1000-48 O/P= <u>573</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) 163V (2) 165V (3) 163V (4) 168V (5) 168V	Q105 (1) 165V (2) 165V (3) 163V (4) 165V (5) 165V
2	DC TO DC Diode Peak Voltage	D 151 Rated : 300V/ 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) 265V (2) 281V (3) 265V (4) 277V (5) 275V	D152 (1) 261V (2) 277V (3) 261V (4) 265V (5) 265V
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) 266V (2) 266V (3) 266V (4) 266V (5) 268V	
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : 40A / 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)295V (2)341V (3)317V (4)321V (5)317V	Q3 (1)297V (2)337V (3)311V (4) 317V (5) 313V
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 (5)O.L.P(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25°C	Q201 (1) 168V (2) 168V (3) 168V (4) 168V (5) 168V	Q501 (1) 39.9V (2) 39.5V (3) 37.1V (4) 38.5V (5) 36.7V
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) 3.35V (2) 3.35V (3) 3.35V (4) 3.35V	U501 (1) 12.41V (2) 12.41V (3) 12.41V (4) 12.41V

	8.2V~30V	(4) NO LOAD Turn On (5) Saving mode Ta:25°C	(5) 3.35V U201 (1) 12.17V (2) 12.17V (3) 12.17V (4) 12.17V (5) 12.17V	(5) 12.41V U81 (1) 5.04V (2) 5.08V (3) 5.04V (4) 5.04V (5) 5.04V
	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: 7.12 mA AC O/P-FG: 6.13 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	FCC(except for Tyoe-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-1200-148					
		1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 50VDC O/P : FULL LOAD Ta= 25.4 °C					
		2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 50VDC O/P : FULL LOAD Ta= 36.9 °C					
				NO	Position	ROOM AMBIENT Ta=25.4 °C	HIGH AMBIENT Ta= 36.9 °C
				1	C101	59.0°C	60.7°C
				2	C104	61.9°C	64.8°C
				3	RTH6	64.0°C	67.0°C
				4	Q107	67.8°C	70.7°C
				5	Q103	63.3°C	67.0°C
				6	C531	34.4°C	43.0°C
				7	Q501	38.0°C	45.3°C
				8	T501	34.3°C	42.7°C
				9	U301	39.4°C	47.8°C
				10	U361	41.2°C	49.4°C
				13	T101	75.7°C	77.7°C
				14	CC60	41.1°C	49.1°C
				15	D153	88.6°C	88.2°C
				16	Q2	84.7°C	90.4°C
				17	Q3	80.3°C	85.6°C
				18	TSW1	52.4°C	59.5°C
				19	C162	53.1°C	57.6°C
				20	D152	96.5°C	92.7°C
				21	Q201	36.0°C	45.6°C
				22	T202	36.8°C	46.2°C
				23	L10	84.5°C	86.5°C
				24	C2	40.8°C	47.9°C
				25	RY2	40.8°C	50.1°C
				26	LF1	69.9°C	73.9°C
				27	ZNR1	46.1°C	53.0°C
				28	C222	36.8°C	45.0°C
				29	U201	40.6°C	49.3°C
				30	U91	39.0°C	46.8°C
				31	U501	36.0°C	44.3°C
				32	R501	38.9°C	46.3°C
				33	R24	73.7°C	77.9°C
				34	R213	38.3°C	49.2°C
				35	D501	38.4°C	45.4°C
				36	R223	46.7°C	54.4°C
				37	C1	48.4°C	58.0°C
		38	TC	45.3°C	52.9°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 C104 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) 299137.9HRS (2) 265886.5HRS
8	MTBF	Conducted by Parts Stress Analysis Prediction 596.7K 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