Test Report: NTS-300-212

300W High Reliable Built-in Type 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	300W	IP: 12VDC Ta:25℃	306 W
2	MAXIMUM OUTPUT POWER (TYP)	(1) 345W/180sec. (2) 450w/10sec (3)SURGE POWER 600W FOR 30CYCLE Vin (30±5 CYCLE)	IP: 12.5VDC OP:TESTING LOAD Ta:25℃	(1) 228.1V/ 1.48 A/ 180.08 Sec (2) 227.7 V/ 1.89 A/ 10.07 Sec (3) 229 V/ 2.62 A/ 28 Cycle

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

Fig1

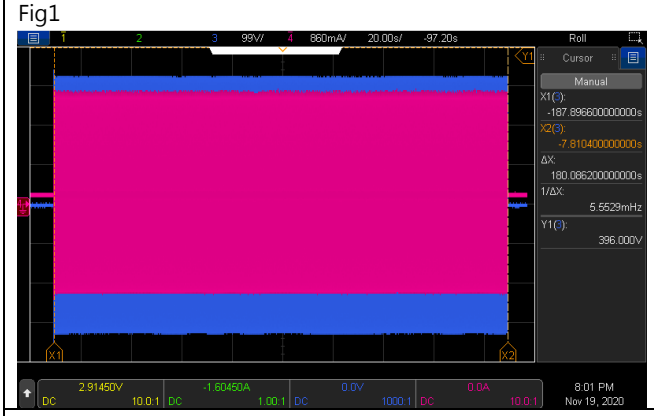


Fig2

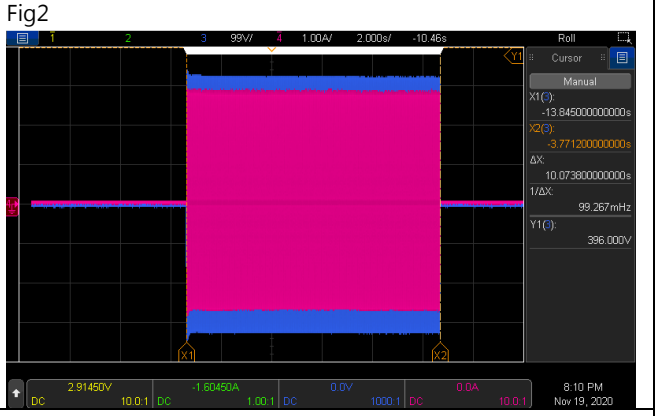


Fig3

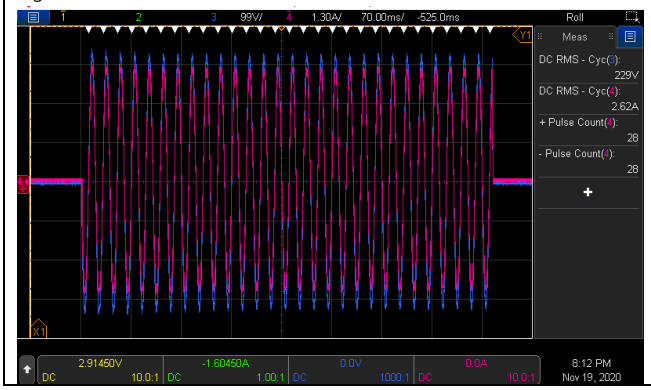


Fig4

3	AC Voltage	200 / 220 / 230 / 240Vac selectable by DIP S.W	IP: 12VDC OP: FULL LOAD Ta:25℃	DIP S.W 200VAC: 198.6 V DIP S.W 220VAC: 218.3 V DIP S.W 230VAC: 228.2 V DIP S.W 240VAC: 238.3 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 12VDC OP: FULL LOAD Ta:25℃	DIP S.W 50HZ: 50.04 HZ DIP S.W 60HZ: 59.95 HZ
5	WAVEFORM	True sine wave (THD<3%)	IP: 12.5VDC OP: FULL LOAD (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25℃	(1) 0.59 % / Vo(min) /FULL LOAD (2) 0.58 % / Vo(nor) /FULL LOAD (3) 0.58 % / Vo(max) /FULL LOAD

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

Fig1

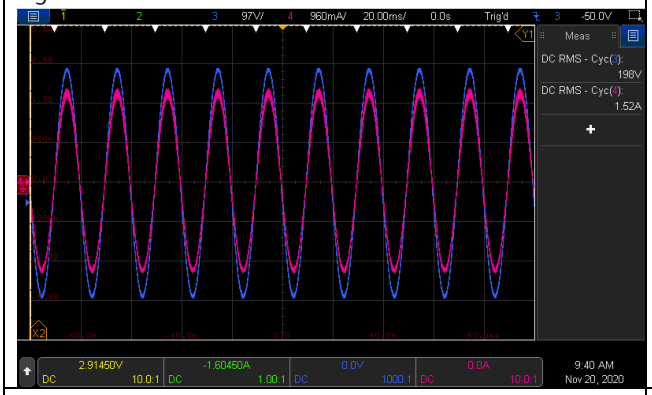


Fig2

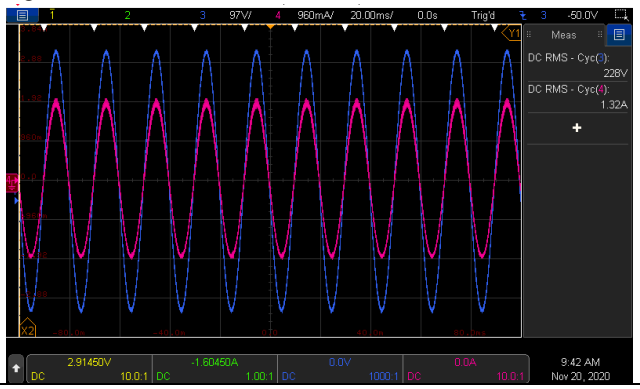
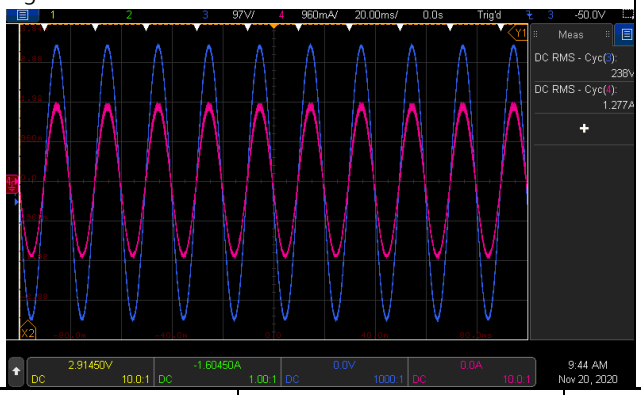


Fig3



6	AC REGULATION	±3%	IP: 12.5VDC OP: FULL LOAD/NO LOAD Ta:25℃	-0.74 %
7	Overshoot /Undershoot	<±10%	IP: 12VDC OP: (1) full load turn on (2) no load turn on (3) full /no load change Ta:25℃	(1) -2.44 % (2) -1.13 % (3) -1.70 %
8	O/P voltage DC offset	Vin(nor)= 12 v · Vo <200mv · no load : 76mv / full load: 75mv		

9	LED STATUS	● 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	15.5Vdc~ 12.50Vdc±0.3v	15.55Vdc~12.48Vdc
Orange	11~12.5Vdc ±0.3v	11.06Vdc~12.55Vdc
Red	Vdc< 11.0V · Vdc>15.5V±0.3v	Vdc< 11.14V · Vdc> 15.5

● Load test

LED	LOAD RANGE	RESULT
Green	Min. load ~ 40%±5% LOAD	Min. load ~ 41.59%
Orange	40%±5% ~ 80%±5% LOAD	41.65 %~ 80.13%
Red	80%±5%~105%±5% LOAD	80.13%~105.3%

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	VOLTAGE RANGE (TYP)	10VDC~16.2VDC	IP: TESTING OP:NO LOAD/FULL LOAD Ta:25℃	10.2 VDC~ 16.3 VDC/NO LOAD 10.3 VDC~ 16.3 VDC/FULL LOAD
			I/P: LOW-LINE=10.5V HIGH-LINE=16.2V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON:30Sec OFF:30Sec 10MIN (POWER ON/OFF NO DAMAGE) I/P: 12V O/P:FULL LOAD ON:30ec OFF:30ec 12Hr (POWER ON/OFF NO DAMAGE)	Test: OK

2	DC CURRENT (TYP)	30A	IP: 12VDC OP:FULL LOAD Ta:25℃	27.0 A
3	NO LOAD DISSPATION (Typ.)	NON-Saving Mode=10W	IP: 12VDC OP:NO LOAD Ta:25℃	7.84 W
		SAVING MODE (1) Po： Default disable, auto detect AC output load ≦ 10W will be changed to saving mode (2) Pi ： ≦1.2 W	IP: 12VDC OP: TESTING LOAD Ta:25℃	NORMAL TO SAVING MODE: ≦ 10.56 W
			IP: 12VDC OP: TESTING LOAD Ta:25℃	0.78 W
4	OFF MODE CURRENT DRAW (Typ.)	≦ 1mA	IP: 12VDC OP: Sw off Ta:25℃	0.48mA
5	EFFICIENCY(TYP)	300W/ 92%	IP: 12.5VDC OP: Po= 300W 230V/50HZ (factory setting) Ta:25℃	93.01 %

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	11V±0.3VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	10.9 V
2	BAT LOW SHUT DOWN	10V±0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	10.2 V
3	BAT LOW RESTART	12.5V±0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	12.4 V
4	BAT HIGH ALARM	15.5V±0.3VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	15.5 V
5	BAT HIGH SHUT DOWN	16.5V±0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	16.4 V
6	BAT HIGH RESTART	15V±0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	14.9 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: 12VDC 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: 12VDC OP: TESTING SW:ON Ta:25℃	(1). 106%~112.3 % 180.08 sec (2). 116%~143 % 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: 12VDC 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: 207 W · turn on OK LAMP: 310 W · turn on OK LAMP: 415.8 W · turn on OK	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: OK	
2	INDUCTION MOTOR	0.12 HP	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: OK	
3	SWITCHING POWER SUPPLY	WITH PFC: EPP-500-48 · O/P= 301.5	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: OK	
		NO PFC: LRS-350-36 · O/P= 300 W	1. Vin=HIGH LINE 2. O/P=230V/50Hz 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 : 60V /60 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)35.2V (2) 35.2V (3) 35.6V (4) 35.6V (5) 34.8V

2	DC TO DC Diode Peak Voltage	D 105 Rated : 600V/10 A	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℃	 (1)512V (2)540V (3)528V (4)512V (5)516V
3	DC BUS Capacitor Voltage	C118/C119 Rated : 330 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℃	C118 (1)254 V (2) 246V (3) 246V (4) 250V (5) 250V C119 (1)246V (2) 246V (3) 250V (4) 246V (5) 246V
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 200 IKP15N65H5 Rated :650 V / 20 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) 531V (2) 607V (3) 566V (4) 530V (5) 530V
5	AUX PWM MOS	Q504 Rated : 18 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) 51.0V (2) 51.0V (3) 51.0V (4) 51.0V (5) 51.0V Q105 (1) 37.3V (2) 37.3V (3) 37.3V (4) 37.3V (5) 37.7V
6	Control IC Voltage Test	 MCU IC U303 Rated 2.4 V~ 3.6 V AUX IC U501 Rated 8.2V~30V	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) 3.36V (2) 3.4V (3) 3.38V (4) 3.36V

		CHARGE IC U101 Rated -0.3V~20V Gate Driver IC U200 Rated -0.3V~20V	(5) Saving mode Ta:25℃	(5) 3.34 V U501 (1) 11.62V (2) 11.62V (3) 11.62V (4) 11.62V (5) 11.62V U101 (1) 12.43V (2) 12.43V (3) 12.43V (4) 12.43V (5) 12.43V U200 (1)5.09 V (2) 5.09V (3) 5.09V (4) 5.09V (5) 5.09V

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: 2.227 mA AC O/P-FG: 1.695 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	EN55032 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: 12VDC 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

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL：NTS-300-212 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 12.5VDC O/P： FULL LOAD Ta= 21.4 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 12.5VDC O/P： FULL LOAD Ta= 40.8 ℃		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 12.5VDC O/P： 100%LOAD Ta= -25 ℃	TEST：OK

NO	Position	ROOM AMBIENT Ta=21.4 ℃	HIGH AMBIENT Ta= 40.8 ℃
1	C100	74.2℃	93.5℃
2	C101	78.2℃	97.6℃
3	Q101	58.0℃	76.7℃
4	Q103	56.2℃	74.9℃
5	RT300	58.7℃	77.0℃
6	T101	78.6℃	101.1℃
7	C112	60.5℃	81.2℃
8	D106	52.5℃	71.2℃
9	D105	53.9℃	72.4℃
10	Q200	58.0℃	76.6℃
11	U101	67.7℃	85.6℃
12	C119	61.8℃	80.5℃
13	U501	82.3℃	100.4℃
14	L201	60.4℃	78.1℃
15	Q202	57.4℃	75.9℃
16	C219	59.0℃	77.1℃
17	L200	64.3℃	83.3℃
18	C118	62.7℃	80.8℃
19	TSW1	63.6℃	82.1℃
20	ZR200	55.5℃	73.1℃
21	T100	60.2℃	77.8℃
22	Q105	62.2℃	79.9℃
23	U303	62.3℃	80.0℃
24	T501	67.1℃	85.0℃
25	Q504	73.5℃	91.4℃
26	Q501	75.9℃	94.5℃
27	TC2	45.1℃	63.5℃
28	U201	59.2℃	76.7℃
29	U500	60.0℃	77.5℃
30	U100	58.7℃	76.8℃

3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 ℃ NO DAMAGE	I/P：16.1VDC O/P：FULL LOAD Ta= 40 ℃ HUMIDITY= 95 %R.H	TEST：OK
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： 12VDC/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： 12.5VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 12.5VDC O/P：FULL LOAD Ta= 40 ℃ LIFE TIME		(1) 84640.2HRS (2) 29924.8HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 845.6K hrs min. Telcordia SR-332 (Bellcore) ; 85.3K hrs min. MIL-HDBK-217F (25℃)		
11	Ongoing Reliability Test	I/P：12.5VDC 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