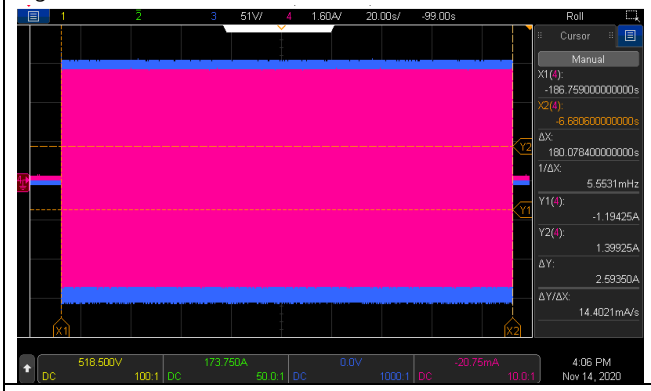
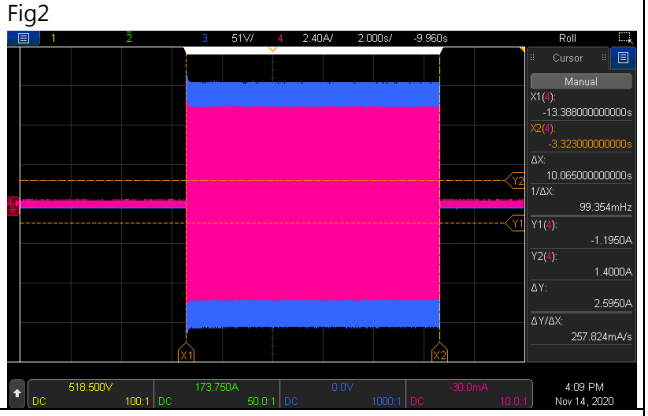
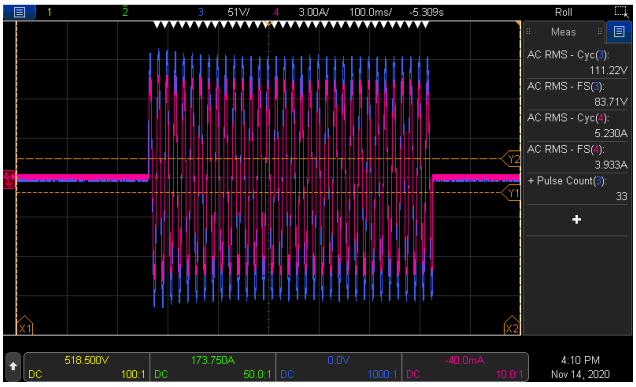
Test Report: NTS-300-124

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: 24VDC 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: 25VDC OP:TESTING LOAD Ta:25℃	(1) 110.3 V/ 3.13 A/180.07 Sec (2) 110.1 V/ 4.02 A/ 10.06 Sec (3) 110.57 V/ 5.198A/ 33 Cycle
	CH3:O/P VAC CH4:O/P IAC			
	Fig1 			
	Fig2 			
	Fig3 			
	Fig4			
3	AC Voltage	100 / 110 / 115 / 120Vac selectable by DIP S.W	IP: 24VDC OP: FULL LOAD Ta:25℃	DIP S.W 100VAC: 100.2 V DIP S.W 110VAC: 110.3 V DIP S.W 115VAC: 114.1 V DIP S.W 120VAC: 120.4 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 24VDC 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: 25VDC OP: FULL LOAD (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25℃	(1) 0.71 % / Vo(min) /FULL LOAD (2) 0.64 % / Vo(nor) /FULL LOAD (3) 0.59 % / Vo(max) /FULL LOAD

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

Fig1

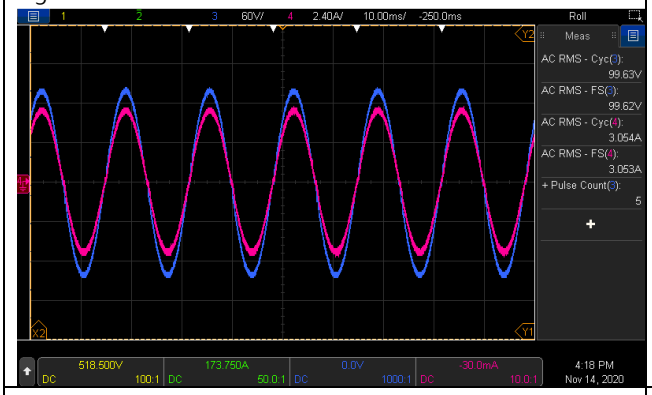


Fig2

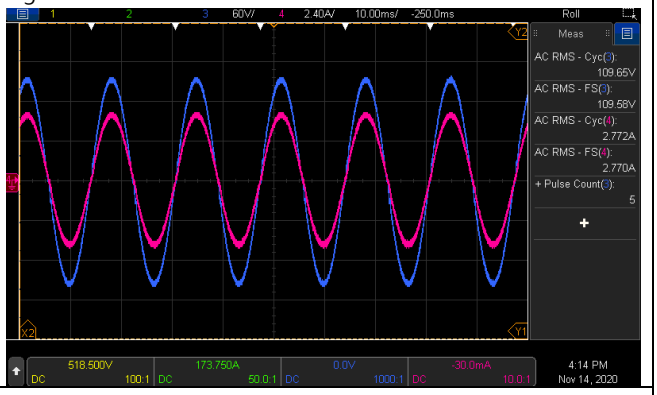
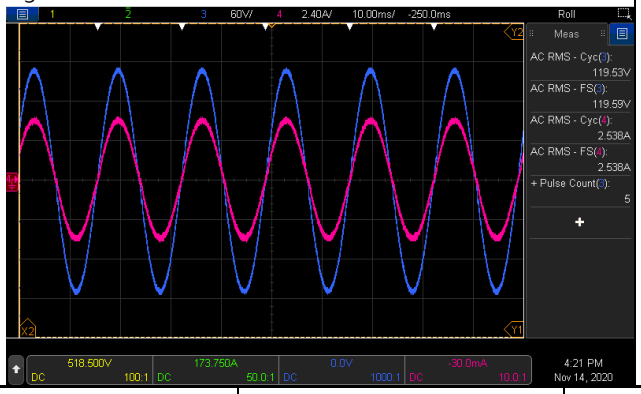


Fig3



6	AC REGULATION	±3%	IP: 25VDC OP: FULL LOAD/NO LOAD Ta:25℃	0.34 %
7	Overshoot /Undershoot	<±10%	IP: 24VDC OP: (1) full load turn on (2) no load turn on (3) full /no load change Ta:25℃	(1) -4.37 % (2) 1.64 % (3) -0.82 %
8	O/P voltage DC offset	Vin(nor)= 24 v · Vo <200mv · no load : 61 mV / 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	25~31Vdc±0.5v	25.03~31.01 Vdc
Orange	22~ 25Vdc ±0.5v	22.08Vdc ~ 24.74Vdc
Red	<22 Vdc ±0.5v ＞31 Vdc ±0.5v	<22.04 Vdc ＞31.03 Vdc

● Load test

LED	LOAD RANGE	RESULT
Green	Min. load ~ 40%±5% LOAD	Min. load ~ 39%
Orange	40%±5% ~ 80%±5% LOAD	42 %~78 %
Red	≧ 80%±5% LOAD	≧ 80.7 %

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℃	20.1 VDC~ 32.9VDC/NO LOAD 20.2 VDC~ 32.8 VDC/FULL LOAD
			I/P: LOW-LINE=21V 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)	Test: OK

2	DC CURRENT (TYP)	15A	IP: 24VDC OP:FULL LOAD Ta:25℃	13.51 A
3	NO LOAD DISSPATION (Typ.)	NON-Saving Mode=10W	IP: 24VDC OP:NO LOAD Ta:25℃	6.56 W
		SAVING MODE (1) Po： Default disable, auto detect AC output load ≦ 10W will be changed to saving mode (2) Pi ： ≦1.3 W	IP: 24VDC OP: TESTING LOAD Ta:25℃	NORMAL TO SAVING MODE: ≦ 15W
			IP: 24VDC OP: TESTING LOAD Ta:25℃	0.822 W
6	OFF MODE CURRENT DRAW (Typ.)	≦ 1mA	IP: 24VDC OP: Sw off Ta:25℃	0.77 mA
7	EFFICIENCY(TYP)	300W/ 92%	IP: 25VDC OP: Po= 300W 110V/60HZ (factory setting) Ta:25℃	92.5 %

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℃	21.9 V
2	BAT LOW SHUT DOWN	20V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	20.12 V
3	BAT LOW RESTART	25V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	24.96 V
4	BAT HIGH ALARM	31V±0.5VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25℃	30.95 V
5	BAT HIGH SHUT DOWN	33V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	32.92 V
6	BAT HIGH RESTART	30V±0.5VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25℃	29.98 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: 24VDC 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: 24VDC OP: TESTING SW:ON Ta:25℃	(1). 107% ~115% 180.07 sec (2). 117% ~ 147 % 10.06sec 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: 24VDC 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: 241 W · turn on OK LAMP: 319 W · turn on OK LAMP: 466 W · turn on OK	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
2	INDUCTION MOTOR	0.12 HP	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
3	SWITCHING POWER SUPPLY	WITH PFC: EPP-500-48 · O/P= 311 W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: OK	
		NO PFC: LRS-350-36 · O/P= 110 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 : 100V /80A	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) 79.8V (2) 72.5V (3) 76.5V (4) 71.3V (5) 71.7V

2	DC TO DC Diode Peak Voltage	D 105 Rated : 600V/ 10A	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)296V (2)296V (3)292V (4)296V (5)300V
3	DC BUS Capacitor Voltage	C118 Rated : 330 u/ 315V	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) 295V (2) 295V (3) 295V (4) 295V (5) 295V
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 200 IKP15N65H5 Rated : 600V / 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)322V (2) 354V (3) 334V (4) 310V (5) 310V
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 (3)O.L.P(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25℃	Q504 (1) 68.5V (2) 69.3V (3) 68.5V (4) 68.5V (5) 68.5V Q105 (1) 73.0V (2) 73.0V (3) 73.3V (4) 73.6V (5) 73.0V
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 Gate Driver IC U200 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 (4) NO LOAD Turn On (5) Saving mode Ta:25℃	 U303 (1) 3.33V (2) 3.33V (3) 3.33V (4) 3.31V (5) 3.33V U501 (1)11.6 V (2) 11.6V

		-0.3V~20V		(3) 11.6V (4) 11.6V (5) 11.6V U101 (1) 12.29V (2) 12.29V (3) 12.29V (4) 12.29V (5) 12.29V U200 (1) 5.14V (2) 5.14V (3) 5.14V (4) 5.14V (5) 5.14V

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: 1.787 mA AC O/P-FG: 2.372 mA NO DAMAGE
2	GROUNDING CONTINUITY	IEC62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25℃	2mΩ

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

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL：NTS-300-124 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 25VDC O/P： FULL LOAD Ta= 23.9 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 25VDC O/P： FULL LOAD Ta= 41.9 ℃		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 25VDC O/P： 100%LOAD Ta= -25 ℃	TEST：OK
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 ℃ NO DAMAGE	I/P：32.5VDC O/P：FULL LOAD Ta= 40 ℃ HUMIDITY= 95 %R.H	TEST：OK

NO	Position	ROOM AMBIENT Ta=23.9 ℃	HIGH AMBIENT Ta= 41.9 ℃
1	Q101	49.7℃	67.0℃
2	Q103	50.7℃	68.0℃
3	RT300	52.9℃	70.0℃
4	C101	54.7℃	72.1℃
5	C100	54.2℃	71.7℃
6	T101	61.8℃	79.6℃
7	L100	57.7℃	76.4℃
8	C112	59.7℃	77.1℃
9	D107	56.8℃	73.8℃
10	D105	61.6℃	78.2℃
11	Q201	67.7℃	84.2℃
12	C119	61.0℃	78.1℃
13	U501	75.4℃	92.2℃
14	L201	61.7℃	78.9℃
15	L200	68.3℃	86.3℃
16	Q202	67.3℃	84.8℃
17	C219	63.0℃	80.5℃
18	C118	61.7℃	78.7℃
19	ZR200	53.3℃	70.4℃
20	C114	55.2℃	72.1℃
21	T100	55.9℃	72.8℃
22	TSW1	65.4℃	83.0℃
23	T501	62.9℃	79.6℃
24	U101	61.6℃	78.3℃
25	Q105	58.1℃	74.8℃
26	Q504	66.6℃	83.6℃
27	Q501	68.1℃	85.0℃
28	U303	60.1℃	76.6℃
29	U201	58.3℃	74.7℃
30	U500	62.5℃	79.0℃
31	U100	55.3℃	72.1℃

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) 444039.8HRS (2) 163658.5HRS
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：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