



Test Report: NTS-300-112

300W High Reliable Built-in Type True Sine Wave DC-AC Power Inverter

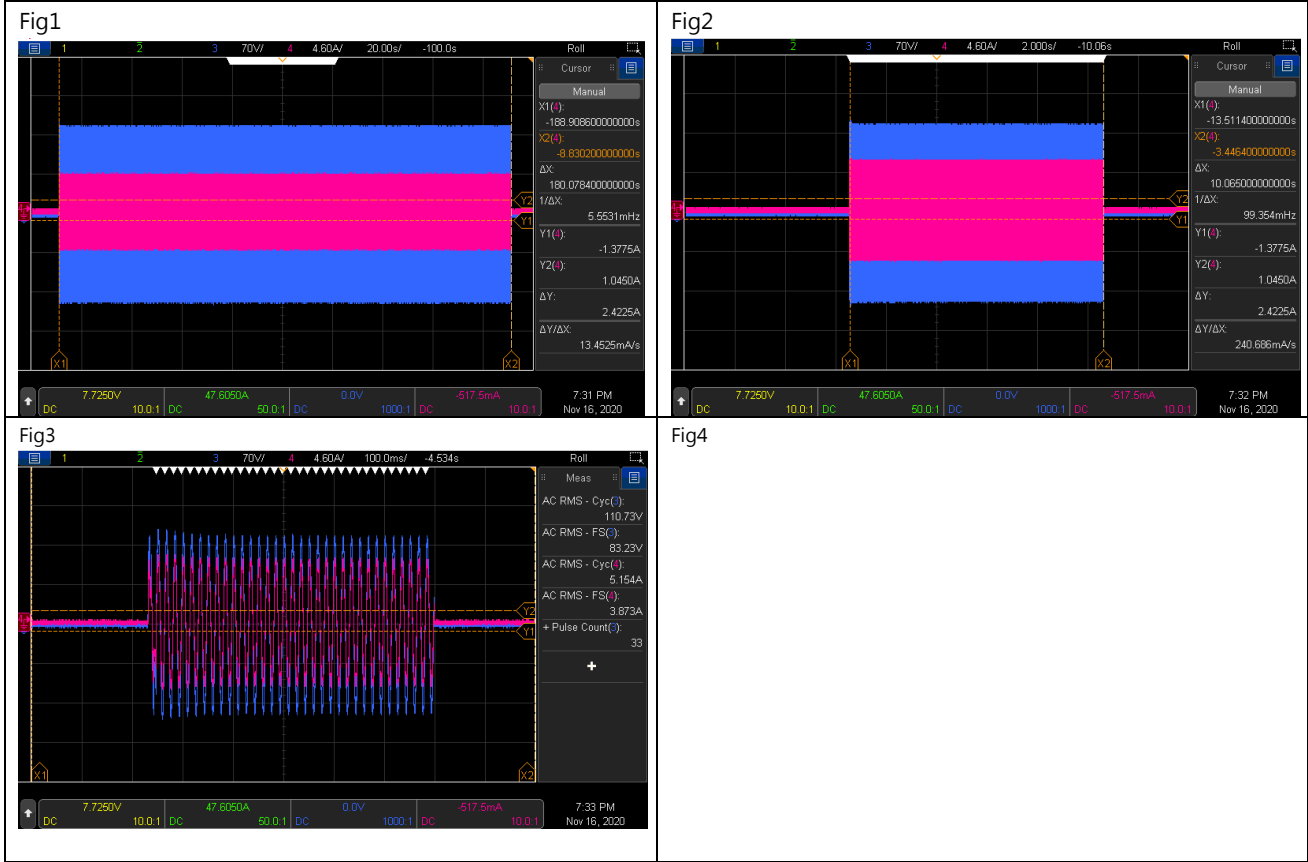
- **DESIGN VERIFY TEST**
 - Output Function Test
 - Input Function Test
 - Protection Function Test
 - Control Function Test
 - APPLICATION Test
 - Component Stress Test
- **SAFETY & E.M.C. TEST**
 - Safety Test
 - E.M.C. Test
- **RELIABILITY TEST**
 - ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED POWER	300W	IP: 12VDC Ta:25°C	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°C	(1) 109.6 V/3.12 A/ 180.7 Sec (2) 109.6 V/4.08 A/ 10.06 Sec (3) 110.20 V/5.13 A/ 33 Cycle

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



3	AC Voltage	100 / 110 / 115 / 120Vac selectable by DIP S.W	IP: 12VDC OP: FULL LOAD Ta:25°C	DIP S.W 100VAC: 99.92 V DIP S.W 110VAC: 110.02 V DIP S.W 115VAC: 114.44 V DIP S.W 120VAC: 120.09 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 12VDC OP: FULL LOAD Ta:25°C	DIP S.W 50HZ: 50.04 HZ DIP S.W 60HZ: 59.93 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°C	(1) 1.13% / Vo(min) /FULL LOAD (2) 1.02 % / Vo(nor) /FULL LOAD (3) 0.92 % / Vo(max) /FULL LOAD
CH3:O/P VAC CH4:O/P IAC				
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>Fig1</p> </div> <div style="width: 48%;"> <p>Fig2</p> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 48%;"> <p>Fig3</p> </div> <div style="width: 48%;"></div> </div>				
6	AC REGULATION	±3%	IP: 12.5VDC OP: FULL LOAD/NO LOAD Ta:25°C	<u> -0.21 </u> %
7	Overshoot /Undershoot	<±10%	IP: 12VDC OP: (1) full load turn on (2) no load turn on (3) full /no load change Ta:25°C	(1) <u> -1.82 </u> % (2) <u> -0.78 </u> % (3) <u> -1.18 </u> %
8	O/P voltage DC offset	Vin(nor)= <u> 12 </u> v · Vo<200mv · no load : <u> 46.5 mV </u> / full load: <u> 66 mV </u>		

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>12.5~15.5Vdc±0.3v</td> <td>12.52~15.05Vdc</td> </tr> <tr> <td> Orange</td> <td>11~ 12.5Vdc ±0.3v</td> <td>11.13Vdc ~ 11.41Vdc</td> </tr> <tr> <td> Red</td> <td><11 Vdc ±0.3v or >15.5 Vdc ±0.3v</td> <td><11.011 Vdc or >15.07 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 ~ 38.3%</td> </tr> <tr> <td> Orange</td> <td>40%±5% ~ 80%±5% LOAD</td> <td>42% ~ 77%</td> </tr> <tr> <td> Red</td> <td>≥ 80%±5% LOAD</td> <td>≥ 80.7 %</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	12.5~15.5Vdc±0.3v	12.52~15.05Vdc	Orange	11~ 12.5Vdc ±0.3v	11.13Vdc ~ 11.41Vdc	Red	<11 Vdc ±0.3v or >15.5 Vdc ±0.3v	<11.011 Vdc or >15.07 Vdc	LED	LOAD RANGE	RESULT	Green	Min. load ~ 40%±5% LOAD	Min. load ~ 38.3%	Orange	40%±5% ~ 80%±5% LOAD	42% ~ 77%	Red	≥ 80%±5% LOAD	≥ 80.7 %
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INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	VOLTAGE RANGE (TYP)	10VDC~16.5VDC	IP: TESTING OP:NO LOAD/FULL LOAD Ta:25°C 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)	<u>10.10 VDC~ 16.50 VDC/NO LOAD</u> <u>10.16VDC~ 16.41 VDC/FULL LOAD</u> Test: <u>OK</u>

2	DC CURRENT (TYP)	30A	IP: 12VDC OP: FULL LOAD Ta: 25°C	<u>27.6</u> A
3	NO LOAD DISSIPATION (Typ.)	$\leq 1.2W$ @ Saving Mode $\leq 10W$ @ NON-Saving Mode	IP: 12VDC OP: NO LOAD Ta: 25°C	<u>0.746</u> W <u>6.24</u> W
4	SAVING MODE TO NORMAL	$P_o \geq 25W$	IP: 12VDC OP: TESTING LOAD Ta: 25°C	<u>$\geq 23.5W$</u>
5	NORMAL TO SAVING MODE	$P_o \leq 10W$	IP: 12VDC OP: TESTING LOAD Ta: 25°C	<u>$\leq 15W$</u>
6	OFF MODE CURRENT DRAW (Typ.)	$\leq 1mA$	IP: 12VDC OP: Sw off Ta: 25°C	<u>0.39</u> mA
7	EFFICIENCY (TYP)	90%	IP: 12.5VDC OP: $P_o = 300W$ 110V/60HZ (factory setting) Ta: 25°C	<u>91.4</u> %

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	11V \pm 0.3VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>10.96</u> V
2	BAT LOW SHUT DOWN	10V \pm 0.3VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>10.16</u> V
3	BAT LOW RESTART	12.5V \pm 0.3VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>12.52</u> V
4	BAT HIGH ALARM	15.5V \pm 0.3VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>15.64</u> V
5	BAT HIGH SHUT DOWN	16.5V \pm 0.3VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>16.51</u> V
6	BAT HIGH RESTART	15V \pm 0.3VDC	IP: TESTING OP: FULL LOAD SW: ON Ta: 25°C	<u>14.87</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: 12VDC 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: 12VDC OP: TESTING SW:ON Ta:25°C	(1). <u> 106% </u> ~ <u> 113% </u> <u> 180.07 </u> sec (2). <u> 115% </u> ~ <u> 148% </u> <u> 10.06 </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	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°C	Open : Normal work Short : Remote off .TEST: <u> OK </u>

APPLICATION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	LAMP	LAMP: <u> 161 </u> W · turn on <u> OK </u> LAMP: <u> 240 </u> W · turn on <u> OK </u> LAMP: <u> 320 </u> W · turn on <u> OK </u>	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u> OK </u>	
2	INDUCTION MOTOR	<u> 0.12 </u> HP	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u> OK </u>	
3	SWITCHING POWER SUPPLY	WITH PFC: <u> EPP-500-48 </u> · O/P= <u> 312 </u> W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u> OK </u>	
		NO PFC: <u> LRS-350-36 </u> · O/P= <u> 104 </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	Q102 Rated : 60V /60A	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	(1) 38.8V (2) 35.6V (3) 37.2V (4) 38.0V (5) 34.8V

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 (3)O.L.P(200%) Turn On (4) NO LOAD Turn On (5) Saving mode Ta:25°C	(1)294V (2) 290V (3) 294V (4) 294V (5) 294V
3	DC BUS Capacitor Voltage	C119 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°C	C119 (1) 290V (2) 290V (3) 290V (4) 290V (5) 294V
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°C	(1) 318V (2) 374V (3) 330V (4) 306V (5) 306V
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°C	Q504 (1) 46.7V (2) 46.7V (3) 46.7V (4) 46.7V (5) 47.1V Q105 (1)35.4 V (2) 35.4V (3) 35.8V (4) 35.8V (5) 35.4V
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°C	U303 (1)3.31 V (2) 3.31V (3) 3.31V (4) 3.31V (5) 3.31V U501 (1) 11.7V (2) 11.7V

		-0.3V~20V		(3) 11.7V (4) 11.7V (5) 11.7V U101 (1) 12.3V (2) 12.3V (3) 12.3V (4) 12.3V (5) 12.3V U200 (1) 5.05V (2) 5.05V (3) 5.05V (4) 5.05V (5) 5.05V
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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°C	BAT I/P-ACO/P: 1.667 mA AC O/P-FG: 2.112 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 CLASS A	I/P:12 VDC O/P: :FULL/50% LOAD Ta:25°C	CLASS A
2	E.S.D	EN61000-4-2 AIR : 8KV / Contact : 4KV	I/P: 12VDC 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 : NTS-300-112 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 12.5VDC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 12.5VDC O/P : FULL LOAD Ta= 40 °C																																																																																																																																		
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31	U500	73.3°C	85.7°C																																																																																																																																	
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 12.5VDC 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 40 °C NO DAMAGE	I/P : 16.1VDC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																																																																

5	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
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -25°C~ +45°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 : 12VDC/Full Load	TEST : OK
7	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
8	CAPACITOR LIFE CYCLE	SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P: 12.5VDC O/P: FULL LOAD Ta= 25 °C LIFE TIME (2) I/P: 12.5VDC O/P: FULL LOAD Ta= 40 °C LIFE TIME	(1) 53525HRS (2) 28485.2HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 845.6K hrs min. Telcordia SR-332 (Bellcore) ; 85.3K hrs min. MIL-HDBK-217F (25°C)	
10	Ongoing Reliability Test	I/P : 12.5VDC 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