



Test Report: NTS-300-248

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

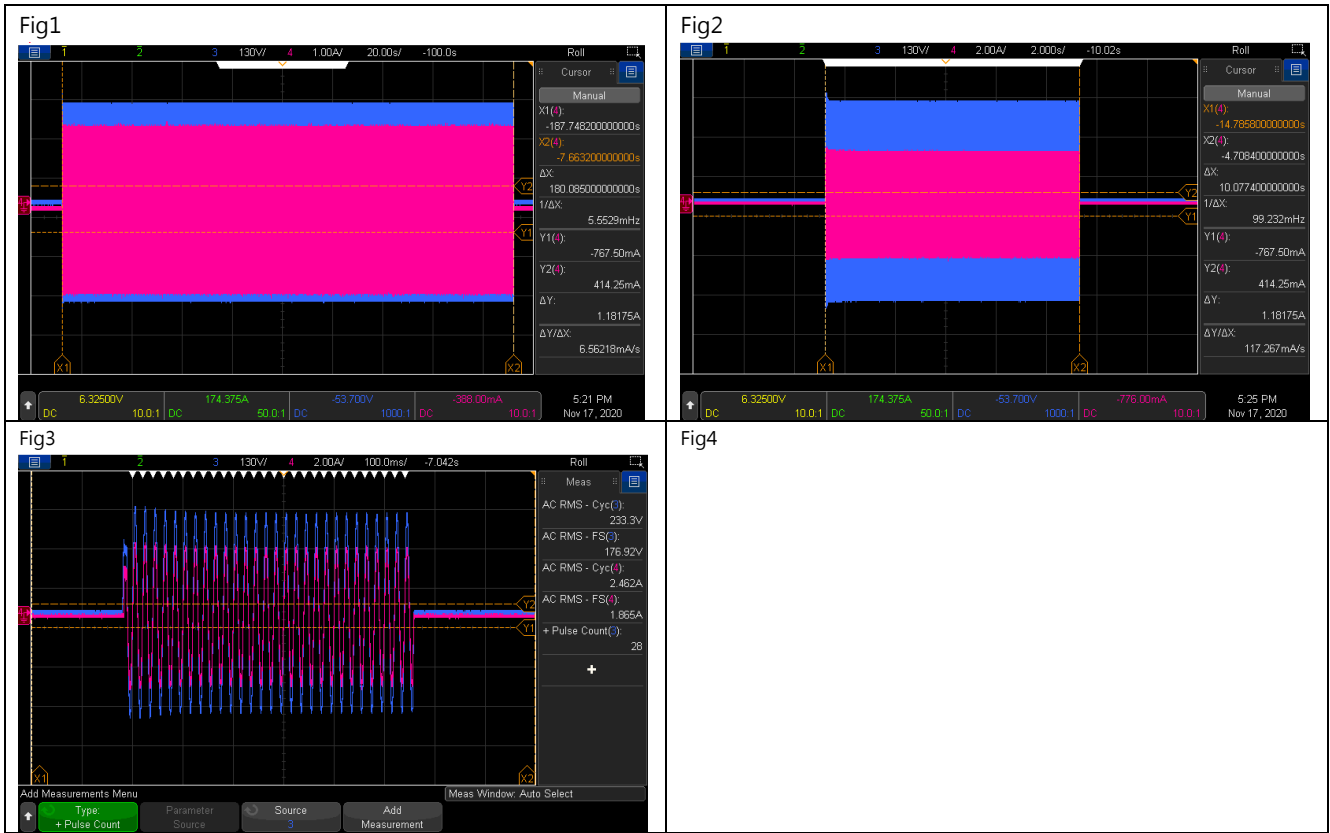
- **DESIGN VERIFY TEST**
 - Output Function Test
 - Input Function Test
 - Protection Function Test
 - Control Function Test
 - APPLICATION Test
 - Component Stress Test
- **SAFETY & E.M.C. TEST**
 - Safety Test
 - E.M.C. Test
- **RELIABILITY TEST**
 - ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED POWER	300W	IP: 48VDC Ta:25°C	307.05 W
2	MAXIMUM OUTPUT POWER (TYP)	(1) 345W/180sec. (2) 450W/10sec (3) SURGE POWER 600W FOR 30CYCLE Vin (30±5 CYCLE)	IP: 50VDC OP: TESTING LOAD Ta:25°C	(1) 228.8 V/ 1.48A/ 180.08 Sec (2) 228.3V/ 1.91 A/ 10.07 Sec (3) 231.0 V/ 2.44 A/ 28 Cycle

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



3	AC Voltage	200 / 220 / 230 / 240Vac selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25°C	DIP S.W 200VAC: 198.9 V DIP S.W 220VAC: 218.9 V DIP S.W 230VAC: 228.9 V DIP S.W 240VAC: 239.0 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 48VDC OP: FULL LOAD Ta:25°C	DIP S.W 50HZ: 50.041 HZ DIP S.W 60HZ: 59.958 HZ
5	WAVEFORM	True sine wave (THD<3%)	IP: 50VDC OP: FULL LOAD (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25°C	(1) 0.62% / Vo(min) /FULL LOAD (2) 0.64% / Vo(nor) /FULL LOAD (3) 0.63% / Vo(max) /FULL LOAD

CH3:O/P VAC CH4:O/P IAC				
Fig1		Fig2		
Fig3				
6	AC REGULATION	±3%	IP: 50VDC OP: FULL LOAD/NO LOAD Ta:25°C	<u> -0.52 </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> -1.96 </u> % (2) <u> -1.1 </u> % (3) <u> -1.52 </u> %
8	O/P voltage DC offset	Vin(nor)= <u> 48 </u> v · Vo<200mv · no load : <u>80.2 mV</u> / full load: <u> 96 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>50~62Vdc±1 v</td> <td>50.14vdc~ 62.01 vdc</td> </tr> <tr> <td> Orange</td> <td>44~ 50Vdc ±1v</td> <td>44.415Vdc ~ 49.2Vdc</td> </tr> <tr> <td> Red</td> <td><44 Vdc ±1v >62 Vdc ±1v</td> <td><44.01vdc > 62.12 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 ~ 38.7%</td> </tr> <tr> <td> Orange</td> <td>40%±5% ~ 80%±5% LOAD</td> <td>39.5% ~ 77.3%</td> </tr> <tr> <td> Red</td> <td>≥ 80%±5% LOAD</td> <td>≥ 81%</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	50~62Vdc±1 v	50.14vdc~ 62.01 vdc	Orange	44~ 50Vdc ±1v	44.415Vdc ~ 49.2Vdc	Red	<44 Vdc ±1v >62 Vdc ±1v	<44.01vdc > 62.12 vdc	LED	LOAD RANGE	RESULT	Green	Min. load ~ 40%±5% LOAD	Min. load ~ 38.7%	Orange	40%±5% ~ 80%±5% LOAD	39.5% ~ 77.3%	Red	≥ 80%±5% LOAD	≥ 81%
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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)	<u>40.2 VDC~ 65.9 VDC/NO LOAD</u> <u>40.5 VDC~ 65.9 VDC/FULL LOAD</u> Test: <u>OK</u>

2	DC CURRENT (TYP)	8A	IP: 48VDC OP:FULL LOAD Ta:25°C	<u>6.66</u> A
3	NO LOAD DISSIPATION (Typ.)	≤ 1.5 @ Saving Mode ≤ 12 @NON-Saving Mode	IP: 48VDC OP:NO LOAD Ta:25°C	<u>0.926</u> W <u>9.28</u> W
4	SAVING MODE TO NORMAL	$P_o \geq 25$ W	IP: 48VDC OP: TESTING LOAD Ta:25°C	<u>≥ 22</u> W
5	NORMAL TO SAVING MODE	$P_o \leq 10$ W	IP: 48VDC OP: TESTING LOAD Ta:25°C	<u>≤ 17</u> W
6	OFF MODE CURRENT DRAW (Typ.)	≤ 1 mA	IP: 48VDC OP: Sw off Ta:25°C	<u>0.76</u> mA
7	EFFICIENCY(TYP)	300W/ 93%	IP:50VDC OP: $P_o = 300$ W 230V/50HZ (factory setting) Ta:25°C	<u>93.9</u> %

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	44V \pm 1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>43.9</u> V
2	BAT LOW SHUT DOWN	40V \pm 1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>40</u> V
3	BAT LOW RESTART	50V \pm 1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>49.97</u> V
4	BAT HIGH ALARM	62V \pm 1VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>62.1</u> V
5	BAT HIGH SHUT DOWN	66V \pm 1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>66.10</u> V
6	BAT HIGH RESTART	60V \pm 1VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>60.03</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> 105 % ~ 112.6 % </u> <u> 180.08 sec </u> (2). <u> 117% ~145 % </u> <u> 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	Power ON-OFF remote control by front panel dry contact connector (by RELAY) Open : Normal work Short : Remote off	IP: 48VDC 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> 209 </u> W · turn on <u> OK </u> LAMP: <u> 314 </u> W · turn on <u> OK </u> LAMP: <u> 400 </u> W · turn on <u> OK </u>	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: <u> OK </u>	
2	INDUCTION MOTOR	<u> 0.12 </u> HP	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: <u> OK </u>	
3	SWITCHING POWER SUPPLY	WITH PFC: <u> EPP-500-48 </u> · O/P= <u> 303 </u> W	1. Vin=HIGH LINE 2. O/P=230V/50Hz TEST: <u> OK </u>	
		NO PFC: <u> LRS-350-36 </u> · O/P= <u> 86 </u> W	1. Vin=HIGH LINE 2. O/P=230V/50Hz 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 :200V /40A	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) 155V (2) 153V (3) 165V (4) 151V (5) 151V

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) 546V (2) 550V (3) 558V (4) 570V (5) 570V												
3	DC BUS Capacitor Voltage	C118/C119 Rated : 390 u/ 265V	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	<table border="0"> <tr> <td>C118</td> <td>C119</td> </tr> <tr> <td>(1) 247V</td> <td>(1) 251</td> </tr> <tr> <td>(2) 247V</td> <td>(2) 251</td> </tr> <tr> <td>(3) 247V</td> <td>(3) 243V</td> </tr> <tr> <td>(4) 243V</td> <td>(4) 255V</td> </tr> <tr> <td>(5) 247V</td> <td>(5) 251V</td> </tr> </table>	C118	C119	(1) 247V	(1) 251	(2) 247V	(2) 251	(3) 247V	(3) 243V	(4) 243V	(4) 255V	(5) 247V	(5) 251V
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(5) 247V	(5) 251V															
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 200 Rated : 650V / 15 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) 548V (2) 620V (3) 576V (4) 548V (5) 544 V												
5	AUX PWM MOS	<p>Q504 Rated : 18 A/ 200 V</p> <p>Q105 Rated : 40 A/ 200 V</p>	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	<p>Q504</p> <p>(1) 134.5V (2) 133.7V (3) 134.5V (4) 134.5V (5) 133.7V</p> <p>Q105</p> <p>(1) 143.2V (2) 142.4 (3) 143.2V (4) 143.2V (5) 142.6V</p>												
6	Control IC Voltage Test	<p>MCU IC U303 Rated 2.4 V~ 3.6 V</p> <p>AUX IC U501 Rated 8.2V~30V</p> <p>CHARGE IC U101 Rated -0.3V~20V</p> <p>Gate Driver IC U200 Rated</p>	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	<p>U303</p> <p>(1) 3.32V (2) 3.32V (3) 3.34V (4) 3.32V (5) 3.32V</p> <p>U501</p> <p>(1) 11.7V (2) 11.7V</p>												

		-0.3V~20V		(3) 11.7V (4) 11.6V (5) 11.7V U101 (1) 12.40V (2) 12.40V (3) 12.40V (4) 12.40V (5) 12.40V U200 (1) 5.08V (2) 5.08V (3) 5.08V (4) 5.08V (5) 5.08V
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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: 2.931 mA AC O/P-FG: 6.19 mA NO DAMAGE
2	GROUNDING CONTINUITY	IEC62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C	4mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	EN55032 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 : NTS-300-224 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 50VDC O/P : FULL LOAD Ta= 25.9 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 50VDC O/P : FULL LOAD Ta= 40.5 °C																																																																																																																																		
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		26	U101	65.7°C	80.6°C																																																																																																																															
		27	Q504	74.4°C	89.1°C																																																																																																																															
		28	C114	59.0°C	73.9°C																																																																																																																															
		29	U500	66.2°C	81.2°C																																																																																																																															
30	U201	63.5°C	78.2°C																																																																																																																																	
31	U100	56.3°C	71.1°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 40 °C NO DAMAGE	I/P : 32.5VDC 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
7	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 : 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°C		TEST : OK
9	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= 40 °C LIFE TIME		(1) 376133.5HRS (2) 119851.2HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 845.6K hrs min. Telcordia SR-332 (Bellcore) ; 85.3K hrs min. MIL-HDBK-217F (25°C)		
11	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