



Test Report: NTS-750-112

750W High Reliable 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	750W	IP: 12VDC Ta:25°C	765 W
2	MAXIMUM OUTPUT POWER (TYP)	(1)862W/180sec. (2)1125w/10sec (3)SURGE POWER 1500W FOR 30CYCLE Vin (30 ± 5 CYCLE)	IP: 12.5VDC OP:TESTING LOAD Ta:25°C	(1) 109.9 V / 7.92 A / 180.13 Sec (2) 108.81 V / 9.87 A / 10.07 Sec (3) 108.68 V / 13.12 A / 34 Cycle

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

Fig1

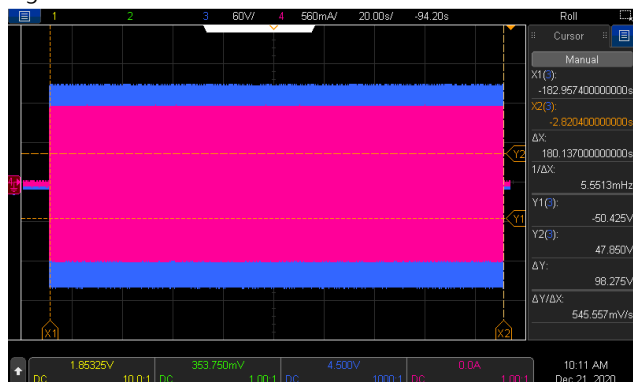


Fig2

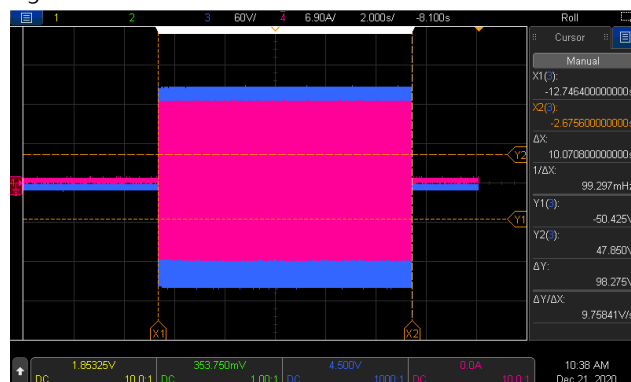
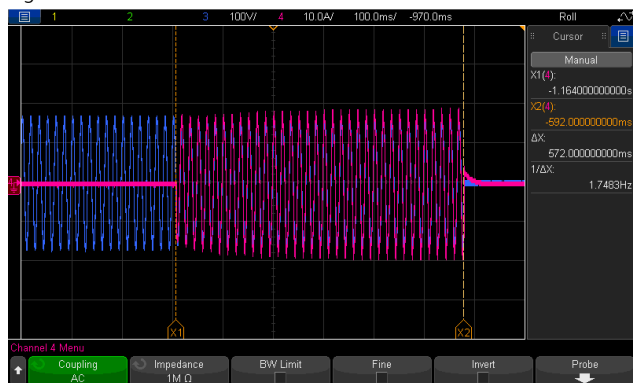
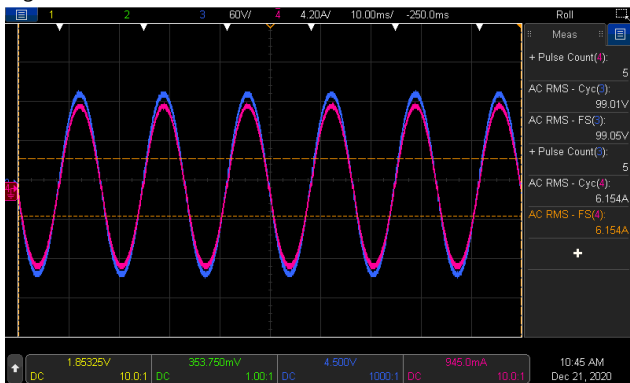
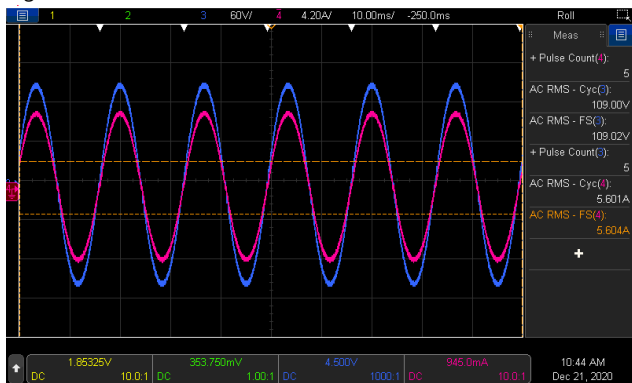
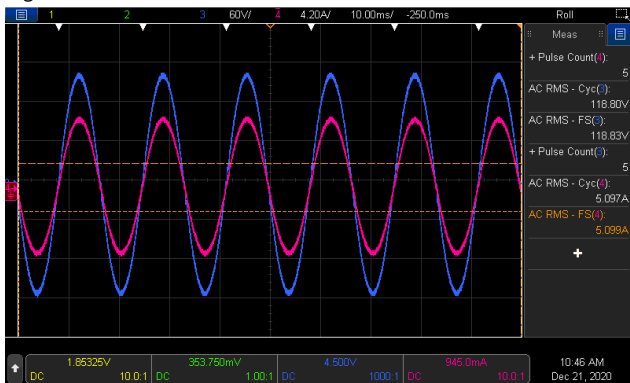


Fig3



3	AC Voltage	100 / 110 / 115 / 120Vac selectable by DIP S.W	IP: 12VDC OP: FULL LOAD Ta:25°C	DIP S.W 100VAC: 99.96 V DIP S.W 110VAC: 110.03 V DIP S.W 115VAC: 114.48 V DIP S.W 120VAC: 120.16 V
4	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP: 12VDC OP: FULL LOAD Ta:25°C	DIP S.W 50HZ: 50.042 HZ DIP S.W 60HZ: 59.958 HZ

5	WAVEFORM	True sine wave (THD<3%)	IP: 12.5VDC OP:80% LOAD(600W) (1) Vo(min) (2) Vo(nor) (3) Vo(max) Ta:25°C	(1) 2.15 % / Vo(min) /80% LOAD (2) 1.96 % / Vo(nor) /80% LOAD (3) 1.84 % / Vo(max) /80% LOAD
CH3:O/P VAC CH4:O/P IAC				
Fig1				
Fig2				
Fig3				
6	AC REGULATION	±3%	IP: 12.5VDC OP:80% LOAD(600W) Ta:25°C	0.15 %
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) -4.45 % (2) 1.82 % (3) 3.64 %
8	O/P voltage DC offset	Vin(nor)= 12 V · V < 200mV · no load : 88 mV / full load: 70 mV		

9	LED STATUS	Status test <table> <tr> <th>LED</th><th>Status</th><th>RESULT</th></tr> <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> </table> Battery test <table> <tr> <th>LED</th><th>Battery RANGE</th><th>RESULT</th></tr> <tr> <td>Green </td><td>12.5~15.5 Vdc±0.3v</td><td>12.509Vdc ~15.441 Vdc</td></tr> <tr> <td>Orange </td><td>11~ 12.5Vdc ±0.3v</td><td>11.04Vdc ~12.455Vdc</td></tr> <tr> <td>Red </td><td><11.0 Vdc ±1v > 15.5vdc±1v</td><td>< 10.985Vdc >15.492Vdc</td></tr> </table> Load test <table> <tr> <th>LED</th><th>LOAD RANGE</th><th>RESULT</th></tr> <tr> <td>Green </td><td>Min. load ~ 40%±5% LOAD</td><td>Min. load ~ 40.0%</td></tr> <tr> <td>Orange </td><td>40%±5% ~ 80%±5% LOAD</td><td>42.9%~79.7%</td></tr> <tr> <td>Red </td><td>≥ 80%±5% LOAD</td><td>≥ 82.4%</td></tr> </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 	12.5~15.5 Vdc±0.3v	12.509Vdc ~15.441 Vdc	Orange 	11~ 12.5Vdc ±0.3v	11.04Vdc ~12.455Vdc	Red 	<11.0 Vdc ±1v > 15.5vdc±1v	< 10.985Vdc >15.492Vdc	LED	LOAD RANGE	RESULT	Green 	Min. load ~ 40%±5% LOAD	Min. load ~ 40.0%	Orange 	40%±5% ~ 80%±5% LOAD	42.9%~79.7%	Red 	≥ 80%±5% LOAD	≥ 82.4%
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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>10.06</u> VDC~ <u>16.52</u> VDC/NO LOAD <u>10.16</u> VDC~ <u>16.56</u> VDC/FULL LOAD Test: <u>OK</u>

2	DC CURRENT (TYP)	75A	IP: 12VDC OP:FULL LOAD Ta:25°C	<u>70.67</u> A
3	NO LOAD DISSIPATION (Typ.)	NON-Saving Mode=10W	IP: 12VDC OP:NO LOAD Ta:25°C	<u>8.88</u> W
		SAVING MODE (1) Po: Default disable, auto detect AC output load $\leq 10W$ will be changed to saving mode	IP: 12VDC OP: TESTING LOAD Ta:25°C	NORMAL TO SAVING MODE: <u>≤ 12</u> W
		(2) Pi : $\leq 1.2 W$	IP: 12VDC OP: TESTING LOAD Ta:25°C	<u>0.91</u> W
4	OFF MODE CURRENT DRAW (Typ.)	$\leq 1mA$	IP: 12VDC OP: Sw off Ta:25°C	<u>0.41</u> mA
5	EFFICIENCY(TYP)	89%	IP: 12.5VDC OP: Po=750W 110V/60HZ (factory setting) Ta:25°C	<u>90.80</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>11.02</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>12.56</u> V
4	BAT HIGH ALARM	15.5V $\pm$ 0.3VDC	IP: TESTING OP:FULL LOAD SW:ON Ta:25°C	<u>15.61</u> V
5	BAT HIGH SHUT DOWN	16.5V $\pm$ 0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>16.59</u> V
6	BAT HIGH RESTART	15V $\pm$ 0.3VDC	IP: TESTING OP: FULL LOAD SW:ON Ta:25°C	<u>15.05</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> 108 </u> %~ <u> 116 </u> % <u> 180.12 </u> sec (2). <u> 117 </u> %~ <u> 149 </u> % <u> 10.07 </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> 457 </u> W · turn on <u> OK </u> LAMP: <u> 751 </u> W · turn on <u> OK </u> LAMP: <u> 903 </u> W · turn on <u> OK </u>	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u> OK </u>	
2	INDUCTION MOTOR	<u> 0.35 </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> 759 </u> W	1. Vin=HIGH LINE 2. O/P=110V/60Hz TEST: <u> OK </u>	
		NO PFC: SE-1000-48 O/P= <u> 336 </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 /120 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)39.6 V (2) 38.7V (3) 42.4V (4) 39.2V (5) 40.0V

2	DC TO DC Diode Peak Voltage	D 108 Rated : 600V/ 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	(1) 300V (2) 302V (3) 300V (4) 298V (5) 302V
3	DC BUS Capacitor Voltage	C118 Rated : 390 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	C118 (1) 292V (2) 292V (3) 292V (4) 290V (5) 290V
4	DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage	Q 200 Rated : 40A / 600 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	(1)298V (2)359V (3)316V (4)302V (5)304V
5	AUX PWM MOS	Q504 Rated : 40 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°C	Q504 (1) 44.3V (2) 43.9V (3) 43.9V (4) 43.9V (5) 43.9V Q105 (1) 37.9V (2) 37.9V (3) 37.9V (4) 38.3V (5) 37.9V
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	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) 3.43V (2) 3.43V (3) 3.43V (4) 3.43V (5) 3.43V U501 (1)12.74 V (2) 12.74V (3) 12.74V

		Gate Driver IC U200 Rated -0.3V~20V		(4) 12.74V (5) 12.74V U101 (1)12.33 V (2) 12.33V (3) 12.33V (4) 12.33V (5) 12.33V 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	BAT I/P-ACO/P 3.6 KVAC/min AC O/P-FG:1.8 KVAC/min Ta:25°C	BAT I/P-ACO/P: 2.616 mA AC O/P-FG: 6.46 mA NO DAMAGE
2	GROUNDING CONTINUITY	IEC62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C	2mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	FCC (expect for Type-UN) CLASS A	I/P:24 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	☒ 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-750-112 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 12.5VDC O/P : FULL LOAD Ta= 25.0 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 12.5VDC O/P : FULL LOAD Ta= 40.0 °C <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta=25.0 °C</th><th>HIGH AMBIENT Ta= 40.0 °C</th></tr><tr><td>1</td><td>C101</td><td>61.0°C</td><td>68.0°C</td></tr><tr><td>2</td><td>T101</td><td>71.9°C</td><td>76.3°C</td></tr><tr><td>3</td><td>L100</td><td>52.1°C</td><td>61.3°C</td></tr><tr><td>4</td><td>C112</td><td>58.6°C</td><td>66.9°C</td></tr><tr><td>5</td><td>Q104</td><td>66.2°C</td><td>72.8°C</td></tr><tr><td>6</td><td>D106</td><td>64.1°C</td><td>73.2°C</td></tr><tr><td>7</td><td>Q103</td><td>57.4°C</td><td>64.6°C</td></tr><tr><td>8</td><td>C146</td><td>70.9°C</td><td>75.2°C</td></tr><tr><td>9</td><td>D108</td><td>66.4°C</td><td>74.8°C</td></tr><tr><td>10</td><td>C119</td><td>48.0°C</td><td>57.1°C</td></tr><tr><td>11</td><td>Q200</td><td>82.5°C</td><td>92.0°C</td></tr><tr><td>12</td><td>Q105</td><td>39.9°C</td><td>50.9°C</td></tr><tr><td>13</td><td>C118</td><td>45.6°C</td><td>55.1°C</td></tr><tr><td>14</td><td>ZR200</td><td>40.5°C</td><td>52.3°C</td></tr><tr><td>15</td><td>L201</td><td>44.2°C</td><td>56.5°C</td></tr><tr><td>16</td><td>C219</td><td>36.6°C</td><td>49.1°C</td></tr><tr><td>17</td><td>L200</td><td>46.8°C</td><td>57.5°C</td></tr><tr><td>18</td><td>TSW1</td><td>46.1°C</td><td>56.6°C</td></tr><tr><td>19</td><td>RT300</td><td>57.7°C</td><td>64.4°C</td></tr><tr><td>20</td><td>U303</td><td>47.7°C</td><td>58.3°C</td></tr><tr><td>21</td><td>T501</td><td>48.8°C</td><td>58.3°C</td></tr><tr><td>22</td><td>T100</td><td>37.1°C</td><td>48.9°C</td></tr><tr><td>23</td><td>U501</td><td>59.3°C</td><td>68.7°C</td></tr><tr><td>24</td><td>U101</td><td>41.4°C</td><td>52.4°C</td></tr><tr><td>25</td><td>Q203</td><td>67.8°C</td><td>77.2°C</td></tr><tr><td>26</td><td>U201</td><td>44.3°C</td><td>54.2°C</td></tr><tr><td>27</td><td>U500</td><td>43.6°C</td><td>54.4°C</td></tr><tr><td>28</td><td>U100</td><td>53.2°C</td><td>60.9°C</td></tr></table>			NO	Position	ROOM AMBIENT Ta=25.0 °C	HIGH AMBIENT Ta= 40.0 °C	1	C101	61.0°C	68.0°C	2	T101	71.9°C	76.3°C	3	L100	52.1°C	61.3°C	4	C112	58.6°C	66.9°C	5	Q104	66.2°C	72.8°C	6	D106	64.1°C	73.2°C	7	Q103	57.4°C	64.6°C	8	C146	70.9°C	75.2°C	9	D108	66.4°C	74.8°C	10	C119	48.0°C	57.1°C	11	Q200	82.5°C	92.0°C	12	Q105	39.9°C	50.9°C	13	C118	45.6°C	55.1°C	14	ZR200	40.5°C	52.3°C	15	L201	44.2°C	56.5°C	16	C219	36.6°C	49.1°C	17	L200	46.8°C	57.5°C	18	TSW1	46.1°C	56.6°C	19	RT300	57.7°C	64.4°C	20	U303	47.7°C	58.3°C	21	T501	48.8°C	58.3°C	22	T100	37.1°C	48.9°C	23	U501	59.3°C	68.7°C	24	U101	41.4°C	52.4°C	25	Q203	67.8°C	77.2°C	26	U201	44.3°C	54.2°C	27	U500	43.6°C	54.4°C	28	U100	53.2°C	60.9°C
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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 : 16.2VDC O/P : FULL LOAD Ta= 40 °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~ +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 : 12.5VDC/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 C146 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) 138788.8HRS (2) 103017.6HRS
8	MTBF	Conducted by Parts Stress Analysis Prediction 715.7K hrs min. Telcordia SR-332 (Bellcore) ; 78.0K hrs min. MIL-HDBK-217F (25°C)	
9	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