



Test Report : NTN-5K-124

5KW True Sine Wave Inverter with AC Charger / UPS

- **DESIGN VERIFY TEST**

 - Output Function Test

 - Input Function Test

 - Protection Function Test

 - Control Function Test

 - AC UPS Test

 - AC Charger 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	4000W	IP : 25VDC OP : 110V / 60Hz Ta : 25°C	<u>4000</u> W
2	OVER RATED POWER	4600W/3 Min.	IP : 25VDC OP : TESTING LOAD Ta : 25°C	108.66V / 41.57A / 3Min
3	PEAK POWER	5600W/10 sec	IP : 25VDC OP : TESTING LOAD Ta : 25°C	108.43V/ 54.597A / 10.2 Sec
4	SURGE POWER	7000W/30 Cycle	IP : 25VDC OP : TESTING LOAD Ta : 25°C	108.86V/72.364A / 40 Cycle
5	AC Voltage	100 / 110 / 115 / 120Vac selectable by DIP S.W	IP : 25VDC OP : FULL LOAD Ta : 25°C	DIP S.W 100VAC : <u>98.9 V</u> DIP S.W 110VAC : <u>108.9 V</u> DIP S.W 115VAC : <u>113.9 V</u> DIP S.W 120VAC : <u>118.9 V</u>
6	FREQUENCY	50/60Hz (±0.1HZ) selectable by DIP S.W	IP : 25VDC OP : FULL LOAD Ta : 25°C	DIP S.W 60Hz : <u>50.06</u> HZ DIP S.W 60HZ : <u>59.99</u> HZ
7	WAVEFORM	True sine wave (THD<3%)	IP : 25VDC OP : full lad / 75% Load 110V / 60Hz Ta : 25°C	2.95% Full Load 2.14% 75% Load
8	AC REGULATION	±3%	IP : 25VDC OP : (1)4000W/No Load (2)3000W/No Load Ta : 25°C	(1)0.39%/-0.14% (2)0.34@/-0.14%
9	Overshoot /Undershoot	<± 10%	IP : 25VDC OP : (1) full load turn on (2) no load turn on (3) full /no load change Ta : 25°C	< ± 10%
10	LED STATUS	IP : TEST OP : TEST Ta : 25°C		

Normal work:

	Green	Orange	Red
Status	Inverter OK	Remote off	Abnormal Status (See below table)
	System check	Saving mode	

	Green	Orange	Red
DC Input	25~31Vdc	22~25Vdc	<22Vdc or >31Vdc <44Vdc or >62Vdc <300Vdc or >420Vdc
	50~62Vdc	44~50Vdc	
	300~370Vdc	260~300Vdc	
	Maintain	Charging	

	Green	Orange	Red
Load			
Inverter Mode	<40% load	40~80% load	>80% load
Bypass Mode	<40% load	40~80% load	>80% load

	Green	Orange	Red
AC Input	Utility OK	----	----
	Utility error	----	----
	Utility disconnected		

Abnormal status :

LED Indicator	Abnormal Indication
Status DC Input Load	Output overload or AC output short circuit
Status DC Input Load	Abnormal DC voltage
Status DC Input Load	Over temperature or Fan lock
Status DC Input Load	Inverter fail

- Light
- Light off
- Flash

TEST : PASS

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	VOLTAGE RANGE (TYP)	19VDC~33VDC Tol. \pm 0.5V	IP : TESTING OP : NO LOAD/FULL LOAD Ta : 25°C	19.1 ~ 32.9(VDC) / NO LOAD 19.1~ 32.91(VDC) / FULL LOAD
			I/P : HIGH-LINE=32V O/P : FULL LOAD ON : 30Sec OFF : 30 Sec 12Hr LOW-LINE=21V O/P : FULL LOAD ON : 30Sec OFF : 30Sec 1Hr (POWER ON/OFF NO DAMAGE)	TEST : PASS
2	DC CURRENT (TYP)	200A	IP : 25VDC OP : FULL LOAD Ta : 25°C	<u>184.4</u> A
3	NO LOAD DISSIPATION (Typ.)	NON-SAVING MODE=2.5A	IP : 25VDC OP : NO LOAD Ta : 25°C	<u>1.55</u> A
		SAVING MODE (1) Po : Default disable, auto detect AC output load \leq 10W will be changed to saving mode (2) Pi : <25W	IP : 25VDC OP : TESTING LOAD Ta : 25°C	NORMAL TO SAVING MODE: \leq 14W
			IP : 25VDC OP : saving mode Ta : 25°C	22W
4	OFF MODE CURRENT DRAW (Typ.)	\leq 2mA	IP: 25VDC OP: Sw off Ta:25°C	1.21mA
5	EFFICIENCY(TYP)	89%	IP : 25VDC OP : 3000W(75%) Ta : 25°C	(1) 89.01 %

PROTECTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BAT LOW ALARM	22V \pm 0.5VDC	IP : TESTING OP : FULL LOAD SW : ON Ta : 25°C	<u>21.8</u> V

2	BAT LOW SHUT DOWN	19V±0.5VDC	IP : TESTING OP : FULL LOAD SW : ON Ta : 25°C	<u>19.1</u> V
3	BAT LOW RESTART	25V±0.5VDC	IP : TESTING OP : FULL LOAD SW : ON Ta : 25°C	<u>25</u> V
4	BAT HIGH ALARM	31V±0.5VDC	IP : TESTING OP : FULL LOAD SW : ON Ta : 25°C	<u>31</u> V
5	BAT HIGH SHUT DOWN	33V±0.5VDC	IP : TESTING OP : FULL LOAD SW : ON Ta : 25°C	<u>33</u> V
6	BAT HIGH RESTART	30V±0.5VDC	IP : TESTING OP : FULL LOAD SW : ON Ta : 25°C	<u>30</u> V
7	REVERSE POLARITY	No damage, re-power on to recover after fault condition is removed	IP : BAT +/- (Reverse) OP : FULL LOAD Ta : 25°C	TEST: PASS
8	OVER TEMPERATURE	Shut down o/p voltage, recovers automatically after temperature goes down	IP : HI LINE/LOW-LINE OP : FULL LOAD SW : ON Ta : 25°C	Shut down o/p voltage, recovers automatically after temperature goes down
9	OUTPUT SHORT	Shut down o/p voltage: re-power on	IP : 25VDC O/P : FULL LOAD SW : ON Ta : 25°C	Shut down o/p voltage, re-power on to recover
10	OVER LOAD (typ.)	105%~115%LOAD 180sec 115%~140%LOAD 10 sec Shut down o/p voltage, re-power on to recover	IP : 25VDC OP : TESTING SW : ON Ta : 25°C	(1). <u>110</u> % <u>180</u> sec (2). <u>135</u> % <u>10</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 : 25VDC OP : FULL LOAD Ta : 25°C	<table border="1"> <tr> <td>Between ON/OFF and +5V-AUX</td> <td>Power Supply Status</td> </tr> <tr> <td>SW SHORT</td> <td>ON</td> </tr> <tr> <td>SW OPEN</td> <td>OFF</td> </tr> </table>	Between ON/OFF and +5V-AUX	Power Supply Status	SW SHORT	ON	SW OPEN	OFF
Between ON/OFF and +5V-AUX	Power Supply Status									
SW SHORT	ON									
SW OPEN	OFF									
2	FAN SPEED CONTROL	CN21 SHORT=80%Duty	IP : 25VDC OP : FULL LOAD Ta : 25°C	Fan Duty= <u>77.37</u> %						

3	SOLAR_ON_OFF	External MPPT charger control. I/P : DC<26.5V->High (4.5~5.5V) DC>28.5V->Low(0~0.5V)	IP : Test Voltage O/P : No load Ta : 25°C	TEST : DC= 26.3 V ->SOLAR=4.8 V DC =28.6 V ->SOLAR=0 V
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AC UPS MODE

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																													
1	AC INPUT RANGE	SPEC: 100/110/115/120Vac±16%, recover±13% <table border="1"> <thead> <tr> <th>Vac</th> <th>H_protection</th> <th>H_restart</th> <th>L_protection</th> <th>L_restart</th> </tr> </thead> <tbody> <tr><td>100</td><td>116</td><td>113</td><td>84</td><td>87</td></tr> <tr><td>110</td><td>128</td><td>124</td><td>92</td><td>96</td></tr> <tr><td>115</td><td>133</td><td>130</td><td>97</td><td>100</td></tr> <tr><td>120</td><td>139</td><td>136</td><td>101</td><td>104</td></tr> <tr><td>200</td><td>232</td><td>226</td><td>168</td><td>174</td></tr> <tr><td>220</td><td>255</td><td>249</td><td>185</td><td>191</td></tr> <tr><td>230</td><td>267</td><td>260</td><td>193</td><td>200</td></tr> <tr><td>240</td><td>278</td><td>271</td><td>202</td><td>209</td></tr> </tbody> </table> 1xx series tolerance ±4V 2xx series tolerance ±8V TEST : OK	Vac	H_protection	H_restart	L_protection	L_restart	100	116	113	84	87	110	128	124	92	96	115	133	130	97	100	120	139	136	101	104	200	232	226	168	174	220	255	249	185	191	230	267	260	193	200	240	278	271	202	209		
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120	139	136	101	104																																													
200	232	226	168	174																																													
220	255	249	185	191																																													
230	267	260	193	200																																													
240	278	271	202	209																																													
2	FREQUENCY RANGE	45 ~ 65Hz	IP : 25VDC OP : (1) No load (2) Full load Ta : 25°C	TEST : OK																																													
3	TRANSFER TIME (TYP)	inverter->by pass t =10±5ms	IP : 25VDC OP : (1) No load (2) Full load Ta : 25°C	(1) no load a. INVERTER->BY PASS 4.4 ms b. BY PASS->INVERTER 9.2 ms (2) full load c. INVERTER->BY PASS 4.2 ms d. BY PASS->INVERTER 10.2 ms																																													

AC CHARGER

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BOOST CHARGE VOLTAGE	28.8V± 0.24V	I/P : 110VAC O/P : BAT. LOAD Ta : 25°C	<u>28.8 V</u>
2	FLOAT CHARGE VOLTAGE	27.6V± 0.24V	I/P : 110VAC O/P : BAT. LOAD Ta : 25°C	<u>27.6 V</u>

3	CONSTANT CURRENT	120A± 2.4A	I/P : 110VAC O/P : C.V MODE-2V Ta : 25°C	<u>118</u> A												
4	TEMPERATURE COMPENSATION	<p>5. Temperature compensation(3 stage only)</p> <p>Temperature compensation function to prolong battery life for lead-acid batteries. Temperature compensation range is 0 ~ 40°C. The battery temperature sensor comes along with the charger can be connected to the unit to allow temperature compensation of the charging voltage. If the sensor is not used, the charger works normally.</p> <p>I/P : 110VAC O/P : BAT. LOAD Ta : 25°C</p> <table border="1"> <thead> <tr> <th>BAT. TEMP.</th> <th>Vo COMPENSATION</th> <th>RESULT</th> </tr> </thead> <tbody> <tr> <td>10°C</td> <td>24V = 29.34V ±0.24V</td> <td>PASS</td> </tr> <tr> <td>25°C</td> <td>24V = 28.8V ±0.24V</td> <td>PASS</td> </tr> <tr> <td>50°C</td> <td>24V = 28.26V ±0.24V</td> <td>PASS</td> </tr> </tbody> </table>			BAT. TEMP.	Vo COMPENSATION	RESULT	10°C	24V = 29.34V ±0.24V	PASS	25°C	24V = 28.8V ±0.24V	PASS	50°C	24V = 28.26V ±0.24V	PASS
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APPLICATION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INDUCTION MOTOR	<u>1</u> HP	I/P : HIGH LINE O/P : 110V/60Hz SW on 5sec/off 5sec 10min	TEST : OK
2	COMBINED LOAD TEST	1. Air conditioner: <u>670</u> W 2. Micro-wave oven: <u>1150</u> W 3. motor: <u>1</u> HP 4. S.PS : <u>RSP-1600-48</u> O/P= <u>1600</u> W 5. R-LOAD=7400W	I/P : HIGH LINE O/P : 110V/60Hz Load : 1+2+3+4+5 OLP TEST	TEST : OK Shut down o/p voltage, re-power on to recover

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	DC TO DC Power Transistor (D to S) or (C to E) Peak Voltage	Q124 : Rated : 60V 195 A@TC=25°C 195 A@TC=100°C VGS : ± 20 V	I/P : 32V O/P : 120V/ 60HZ VDS : O/P : (1)Full Load Turn On (2) Output Short (3)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode (6) bat=OVP full load (7) bat=UVP full load	(1)47.391V (2)34.229V (3)52.134V (4)34.229V (5)46.482V (6)0V (7)46.087V

			<p>VGS :</p> <p>O/P : (1)Full Load Turn On (2) Output Short (3)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode (6) bat=OVP full load (7) bat=UVP full load</p> <p>I/P : 23V O/P : 100V/ 60Hz</p> <p>VDS :</p> <p>O/P : (1)Full Load Turn On (2) Output Short (3)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode</p> <p>VGS :</p> <p>O/P : (1)Full Load Turn On (2) Output Short (3)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode</p> <p>Ta : 25°C</p>	<p>(1)11.794V/-4.174V (2)12.111V/-4.174V (3)12.585V/-4.174V (4)11.953V/-4.174V (5)13.534V/-3.383V (6)0V/-4.332V (7)11.953V/-4.016V</p> <p>(1)38.182V (2)24.822V (3)46.087V (4)25.929V (5)33.439V</p> <p>(1)11.794V/-5.913V (2)11.636V/-4.016V (3)11.794V/-6.545V (4)11.794V/-4.016V (5)13.375V/-3.383V</p>
2	BUCK DIODE	<p>D 901 :</p> <p>Rated : 650 V 20 A@(TC<125°C)</p>	<p>I/P : 110V / 60Hz O/P : 110V/ Freq 60Hz Load : CV 27.8V</p> <p>O/P : (1)Full Load Turn On Ta : 25°C</p>	<p>(1) 497V</p>
3	BUCK MOS	<p>Q 901 :</p> <p>Rated : 650 V 80A@TC=25°C 50A@TC=100°C VGS : ±30V</p>	<p>I/P : 110V / 60Hz O/P : 110V/ Freq 60Hz Load : CV 27.8V O/P : (1)Full Load Turn On VGS :</p> <p>O/P : (1)Full Load Turn On Ta : 25°C</p>	<p>(1) 357V (1) 29.76V</p>
4	SR MOS	<p>Q914 :</p> <p>Rated : 650V 97A(TC=25°C) 70A(TC=100°C) Vgs max -8/+19 V Vgs Recommended -4/+15 V</p>	<p>I/P : 32V O/P : 120V/ 60HZ O/P : (1)Full Load Turn On (2) Output Short (3)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode (6) bat=OVP full load (7) bat=UVP full load</p>	<p>(1)282.85V (2)254.39V (3)351.58V (4)251.23V (5)257.55V (6)0V (7)216.44V</p>

			<p>VGS :</p> <p>O/P : (1)Full Load Turn On (1) 16.379V/-3.699V (2) Output Short (2) 16.379V/-3.383V (3)O.L.P Turn On (3) 16.379V/-3.699V (4) NO LOAD Turn On (4) 16.379V/-3.383V (5) Saving mode (5) 16.538V/-5.123V (6) bat=OVP full load (6) 0V/-1.328V (7) bat=UVP full load (7) 16.379V/-3.383V</p> <p>I/P : 23V O/P : 100V/ 60Hz</p> <p>O/P : (1)Full Load Turn On (1) 239.68V (2) Output Short (2) 178.02V (3)O.L.P Turn On (3) 264.83V (4) NO LOAD Turn On (4) 174.86V (5) Saving mode (5) 195.42V</p> <p>VGS :</p> <p>O/P : (1)Full Load Turn On (1) 16.221V/-3.858V (2) Output Short (2) 16.854V/-3.542V (3)O.L.P Turn On (3) 16.538V/-5.123V (4) NO LOAD Turn On (4) 16.221V/-3.383V (5) Saving mode (5) 16.538V-4.806V</p> <p>Ta : 25°C</p>	
5	DC BUS Capacitor Voltage	C5 : Rated : 820u / 315V	<p>I/P : 32V O/P : 120V/ 60HZ O/P : (1)Full Load Turn On (1)256.72V (2) Output Short (2)260.67V (5)O.L.P Turn On (3)258.7V (4) NO LOAD Turn On (4)256.72V (5) Saving mode (5)260.67V (6) bat=OVP full load (6)191.5V (7) bat=UVP full load (7)223.12V</p> <p>I/P : 23V O/P : 100V/ 60Hz O/P : (1)Full Load Turn On (1)176.44V (2) Output Short (2)181.19V (3)O.L.P Turn On (3)195.42V (4) NO LOAD Turn On (4)174.86V (5) Saving mode (5)174.86V</p> <p>Ta : 25°C</p>	

6	<p>DC TO AC Power Transistor (D to S) or (C to E) Peak Voltage</p>	<p>Q3 : Rated : 650V 80A@TC=100°C VGE : ±20V</p>	<p>I/P : 32V O/P : 120V/ 60HZ VCE : O/P : (1)Full Load Turn On (2) Output Short (3)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode (6) bat=OVP full load (7) bat=UVP full load VGE : O/P : (1)Full Load Turn On (2) Output Short (3)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode (6) bat=OVP full load (7) bat=UVP full load I/P : 23V O/P : 100V/ 60Hz VCE : O/P : (1)Full Load Turn On (2) Output Short (3)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode VGE : O/P : (1)Full Load Turn On (2) Output Short (3)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode Ta : 25°C</p>	<p>(1)306.13V (2)391.7V (3)329.84V (4)262.65V (5)260.67V (6)0V (7)213.34V (1)14.166V / -5.123V (2)14.798V / -8.287V (3)14.482V (4)14.324V / -6.387V (5)14.166V / -5.123V (6)-4.49V (7)14.482V (1)206.48V (2)293.68V (3)258.67V (4)183.45V (5)181.42V (1)14.407V / -6.651V (2)14.64V (3)14.42V / -4.838V (4)14.426V / -6.434V (5)14.209V/ -5.076V</p>
7	<p>AUX PWM MOS</p>	<p>Q701 : Rated : 100V72A(TC=100°C)</p>	<p>I/P : 32V O/P : 120V/ 60HZ O/P : (1)Full Load Turn On (2) Output Short (5)O.L.P Turn On (4) NO LOAD Turn On (5) Saving mode (6) bat=OVP full load (7) bat=UVP full load Ta : 25°C</p>	<p>(1) 88.9V (2) 88.9V (3) 88.9V (4) 88.9V (5) 88.9V (6) 88.9V (7) 88.9V</p>

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P (DC) – O/P (AC):3.0KVAC/min O/P (AC) – FG:1.5KVAC/min	I/P (DC) – O/P(AC):3.6KVAC/min O/P (AC) – FG:1.8 KVAC/min Ta:25°C	I/P (DC) – O/P(AC):19.8mA O/P (AC) – FG:16.04mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P(DC)– O/P(AC):500VDC>100MΩ O/P (AC) – FG :500VDC>100MΩ	I/P (DC) – O/P (AC) : 500 VDC O/P (AC) – FG : 500 VDC Ta:25°C	I/P (DC) – O/P (AC): >100 GΩ O/P (AC) – FG: 19.5 GΩ
3	GROUNDING CONTINUITY	EN 62368 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	50 A / 2min Ta:25°C	21 mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	EN55032 CLASS A	I/P : 24 VDC O/P : FULL/50% LOAD Ta : 25°C	PASS
2	RADIATION	EN55032 CLASS A	I/P : 24 VDC O/P : FULL/50% LOAD Ta : 25°C	PASS
3	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 24VDC O/P : FULL LOAD Ta : 25°C	CRITERIA B
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 24VDC O/P : FULL LOAD Ta : 25°C	CRITERIA B
5	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N : 1KV L,N-PE : 2KV	I/P : 24 VDC O/P : FULL LOAD Ta : 25°C	CRITERIA B
6	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : NTN-5K-124 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 24VDC O/P : FULL LOAD Ta=31.9 °C 2. HIGH AMBIENT BURN-IN : 2.5 HRS I/P : 24VDC O/P : FULL LOAD Ta= 40°C		

NO	Position	ROOM AMBIENT Ta=31.9°C	HIGH AMBIENT Ta= 40 °C
1	Q3	62.6°C	70.6°C
2	Q7	71.3°C	79.5°C
3	Q8	73.1°C	81.3°C
4	Q2	67.3°C	75.3°C
5	Q4	52.3°C	59.5°C
6	Q6	66.2°C	74.1°C
7	L11	42.8°C	49.8°C
8	C2	35.2°C	43.3°C
9	C6	43.5°C	51.8°C
10	Q902	57.2°C	66.1°C
11	D903	46.3°C	54.7°C
12	Q913	54.1°C	61.1°C
13	Q917	53.9°C	61.1°C
14	Q912	49.6°C	57.4°C
15	Q918	49.5°C	57.2°C
16	Q701	71.3°C	78.7°C
17	L901	59.7°C	66.6°C
18	T701	54.4°C	60.6°C
19	T1-Wire-1	62.0°C	70.7°C
20	T1-Wire-2	93.0°C	102.0°C
21	T1-core	57.9°C	66.2°C
22	T2-Wir-1	66.6°C	74.6°C
23	T2-Wire-2	95.0°C	102.8°C
24	T2-core	58.9°C	66.7°C
25	Q225	53.0°C	58.3°C
26	Q224	51.1°C	56.2°C
27	Q233	61.2°C	67.1°C
28	Q232	56.1°C	61.7°C
29	Q203	59.3°C	68.4°C
30	C201	50.9°C	57.9°C
31	C204	59.9°C	66.8°C
32	C101	65.7°C	73.1°C
33	C103	57.0°C	64.1°C
34	LF1	34.4°C	41.8°C
35	C907	62.9°C	69.7°C
36	C12	40.8°C	48.5°C
37	RG1	46.1°C	51.0°C
38	D311	65.1°C	72.3°C
39	RG74	54.1°C	59.6°C
40	C711	60.5°C	67.5°C
41	RY1	35.9°C	43.6°C
42	RY2	35.1°C	41.6°C
43	LF4	29.4°C	35.7°C
44	Q125	58.8°C	66.7°C
45	C908	61.2°C	68.4°C

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 24VDC O/P : 104.9 % LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 33VDC/23VDC O/P : 100 % LOAD Ta= -30°C	TEST : OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C/95 %R.H NO DAMAGE	I/P : 33VDC O/P : FULL LOAD Ta= 40°C HUMIDITY= 95 %R.H	TEST : OK
5	STORAGE TEMPERATURE TEST	-30~70°C	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 : 10 CYCLE 5. Input/Output condition : STATIC	
6	THERMAL SHOCK TEST	-30~40°C	1. Thermal shock Temperature : -32°C~ +45°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:24V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:24V/ FULL LOAD Burn In Test	
7	VIBRATION TEST	10 ~ 500Hz, 3G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 4G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C	
8	CAPACITOR LIFE CYCLE	SUPPOSE C204 IS THE MOST CRITICAL COMPONENT (1) I/P : 24VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 24VDC O/P : FULL LOAD Ta= 40 °C LIFE TIME (3) I/P : 24VDC O/P : 75% LOAD Ta= 40 °C LIFE TIME (4) I/P : 24VDC O/P : 50% LOAD Ta= 40 °C LIFE TIME		(1) 251782HRS (2) 112676HRS (3) 219189HRS (4) 348746HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 200.9K hrs min. Telcordia TR/SR-332 (Bellcore) ; 17.8K hrs min. MIL-HDBK-217F (25°C)		
10	Ongoing Reliability Test	I/P : 24VDC O/P : FULL LOAD TA=40°C Demonstration Mean Time Between Failure : 50,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

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