



# Test Report: GST90A48

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90W AC-DC Reliable Green Industrial Adaptor

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function 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	VERDICT
1	RIPPLE & NOISE(Max)	V1:200mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 43.4mVp-p (Max)	P
3	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -2%~ 2%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.211 %~0.393 %	P
4	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0 %~ 0.211 %	P
5	LOAD REGULATION(Max)	V1: -2%~ 2%	I/P: 230VAC O/P:FULL -MIN LOAD Ta:25°C	V1: -0.211 %~0.393 %	P
6	SET UP TIME(Max)	230VAC/1000ms 115VAC/1000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 437.714 ms 115VAC/ 143.512 ms	P
7	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 26.058 ms 115VAC/ 26.406 ms	P
8	HOLD UP TIME(Typ)	230VAC/20ms 115VAC/20ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 31.418 ms 115VAC/ 21.304 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%	P
10	DYNAMIC LOAD	V1: 4800mVp-p	I/P: 230VAC O/P(1)FULL /Min LOAD 90%DUTY / 1KHZ (2) (1)FULL /Min LOAD 90%DUTY / 3KHZ (3)FULL /Min LOAD 90%DUTY / 5KHZ (4)FULL /Min LOAD 50%DUTY / 120HZ Ta:25°C	666mVp-p 536mVp-p 514mVp-p 1060mVp-p	P

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	100VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	55.200 V~264V	P
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON:3Sec OFF:3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	TEST: OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:100 VAC ~264 VAC O/P:FULL-MIN LOAD Ta:25°C	TEST: OK	P
3	POWER FACTOR(TYP)	0.91/ 230VAC 0.95/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF=0.961 /230VAC PF= 0.989/115VAC	P
4	EFFICIENCY(TYP)	91%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	91.01%	P
5	INPUT CURRENT (Typ)	230V/ 0.6A 115V/1.3A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.434A/ 230VAC I = 0.851A/ 115VAC	P
6	INRUSH CURRENT(Typ)	230VAC/70A 115VAC/35A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 46.45 A/ 230VAC I = 24.23 A/ 115VAC	P
7	LEAKAGE CURRENT	< 1 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.53 mA N-FG : 0.53 mA	P
8	NO LOAD CONSUMPTION	< 0.15 W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.0551W < 0.0671W	P

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105%~ 150%	I/P: 230VAC I/P: 115VAC O/P: TESTING Ta:25°C	133.15%/ 230VAC 126.74%/115VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH:50.4V-64.8V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta:25°C	58.4V/ 230VAC 58.4V/115VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shunt down Re-power ON	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Hiccup Mode	P

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	PWM Transistor (D to S) or (C to E) <b>Peak Voltage</b>	Q32 Rated 11A/700V	I/P: High-Line +3V =267V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta:25°C	(1) 562V (2) 480V (3) 546V	P
2	Diode <b>Peak Voltage</b>	Q101 Rated 10A / 400V	I/P: High-Line +3V =267 V AC ON/OFF O/P: O/P: (1) Full Load (2) Output Short (3) 0%→400% Load. (4).NO LOAD Ta:25°C	Q101: (1) 325V (2) 332V (3) 352V (4) 351V	P
3	<b>Input Capacitor Voltage</b>	C5 Rated: : 100u/400V	I/P: High-Line +3V =267 V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change Ta:25°C	(1) 398V (2) 398V (3) 398V	P
4	<b>Control IC Voltage Test</b>	PWM IC U1 Rated 28 V(MAX.)	I/P: High-Line +3V =267 V AC ON/OFF O/P: (1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. (5) NO LOAD VR MIN LOW LINE Ta:25°C	(1) 19.7V (2) 15.1V (3) 15.1V (4) 21.9V (5) 17.1V	P
5	P.F.C Transistor (D to S) or (C to E) <b>Peak Voltage</b>	Q31 Rated 15.8A/600V	I/P: High-Line +3V =267 V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full Load Continue	(1) 446V (2) 410V (3) 414V	P

			Ta:25°C			
6	P.F.C DIODE	D1 Rated 4A/600V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C	(1) 430V (2) 414V (3) 430V	P	
7	Clamp Diode Peak Voltage	D30 Rated : 800V/ 2A	I/P : High-Line +3V = 267 V AC ON/OFF O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 510 V (2) 510 V	P	

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG :2KVAC/min O/P-FG:0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6 KVAC/min Ta:25°C	I/P-O/P:2.433 mA I/P-FG: 2.70mA O/P-FG: 1.491m A NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P:9999 MΩ I/P-FG: 9999MΩ O/P-FG: 9999MΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	15 mΩ BY PCB	P

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:100%,75%,50%OAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2  AIR : 15KV / Contact : 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4  INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	EN61000-4-5  L-N : 1KV L,N-PE : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

■ **RELIABILITY TEST**

**ENVIRONMENT TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																												
1	TEMPERATURE RISE TEST	MODEL : GST90A48-P1J 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta=20.8 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta=43.8 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 20.8 °C</th> <th>HIGH AMBIENT Ta=43.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td><b>LF1</b></td><td>61.1°C</td><td>78.7°C</td></tr> <tr><td>2</td><td><b>LF2</b></td><td>58.9°C</td><td>77.8°C</td></tr> <tr><td>3</td><td><b>BD1</b></td><td>62.2°C</td><td>81.2°C</td></tr> <tr><td>4</td><td><b>LF3</b></td><td>66.7°C</td><td>85.1°C</td></tr> <tr><td>5</td><td><b>L2</b></td><td>66.3°C</td><td>84.4°C</td></tr> <tr><td>6</td><td><b>C5</b></td><td>70.6°C</td><td>88.5°C</td></tr> <tr><td>7</td><td><b>D1</b></td><td>75.3°C</td><td>93.4°C</td></tr> <tr><td>8</td><td><b>Q31</b></td><td>68.9°C</td><td>87.5°C</td></tr> <tr><td>9</td><td><b>Q32</b></td><td>68.4°C</td><td>88.9°C</td></tr> <tr><td>10</td><td><b>D30</b></td><td>74.0°C</td><td>91.1°C</td></tr> <tr><td>11</td><td><b>T1</b></td><td>75.0°C</td><td>93.3°C</td></tr> <tr><td>12</td><td><b>RTH30</b></td><td>72.3°C</td><td>90.6°C</td></tr> <tr><td>13</td><td><b>Q101</b></td><td>77.2°C</td><td>94.2°C</td></tr> <tr><td>14</td><td><b>CASE</b></td><td>45.6°C</td><td>65.0°C</td></tr> <tr><td>15</td><td><b>C102</b></td><td>57.9°C</td><td>77.3°C</td></tr> <tr><td>16</td><td><b>U2</b></td><td>66.0°C</td><td>84.5°C</td></tr> <tr><td>17</td><td><b>R56</b></td><td>69.6°C</td><td>87.9°C</td></tr> <tr><td>18</td><td><b>R64</b></td><td>71.6°C</td><td>90.2°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 20.8 °C	HIGH AMBIENT Ta=43.8 °C	1	<b>LF1</b>	61.1°C	78.7°C	2	<b>LF2</b>	58.9°C	77.8°C	3	<b>BD1</b>	62.2°C	81.2°C	4	<b>LF3</b>	66.7°C	85.1°C	5	<b>L2</b>	66.3°C	84.4°C	6	<b>C5</b>	70.6°C	88.5°C	7	<b>D1</b>	75.3°C	93.4°C	8	<b>Q31</b>	68.9°C	87.5°C	9	<b>Q32</b>	68.4°C	88.9°C	10	<b>D30</b>	74.0°C	91.1°C	11	<b>T1</b>	75.0°C	93.3°C	12	<b>RTH30</b>	72.3°C	90.6°C	13	<b>Q101</b>	77.2°C	94.2°C	14	<b>CASE</b>	45.6°C	65.0°C	15	<b>C102</b>	57.9°C	77.3°C	16	<b>U2</b>	66.0°C	84.5°C	17	<b>R56</b>	69.6°C	87.9°C	18	<b>R64</b>	71.6°C	90.2°C		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 120% LOAD Ta : 25°C	TEST : OK	P																																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -30°C	TEST : OK	P																																																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																																												
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0-40°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.008 %/°C (0-40°C)	P																																																																												
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°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		OK	P																																																																												



7	THERMAL SHOCK TEST	<ol style="list-style-type: none"> <li>1. Thermal shock Temperature : -30°C~ +70°C</li> <li>2. Temperature change rate : 25°C / MIN</li> <li>3. Dwell time low and high temperature : 30 MIN/EACH</li> <li>4. Total test cycle : 10 CYCLE</li> <li>5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec</li> </ol>	TEST : OK	P
8	VIBRATION TEST	<ol style="list-style-type: none"> <li>1 Carton &amp; 1 Set</li> <li>(1) Waveform : Sine Wave</li> <li>(2) Frequency : 10-500Hz</li> <li>(3) Sweep Time : 12min/sweep cycle</li> <li>(4) Acceleration : 2G</li> <li>(5) Test Time : 60min in each axis (X.Y.Z)</li> <li>(6) Ta : 25°C</li> </ol>	TEST : OK	P
9	CAPACITOR LIFE CYCLE	<p>SUPPOSE C102 IS THE MOST CRITICAL COMPONENT</p> <ol style="list-style-type: none"> <li>(1) I/P : 230VAC O/P : FULL LOAD Ta= 25°C LIFE TIME</li> <li>(2) I/P : 230VAC O/P : FULL LOAD Ta= 40 °C LIFE TIME</li> <li>(3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME</li> <li>(4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME</li> </ol>	<ol style="list-style-type: none"> <li>(1) 240783HRS</li> <li>(2) 109312HRS</li> <li>(3) 154490HRS</li> <li>(4) 226257HRS</li> </ol>	P
10	MTBF	<p>MIL-HDBK-217F</p> <p>TOTAL FAILURE RATE : 348.7 KHRS</p>		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 40°C		P

TEST RESULT	TESTER	APPROVAL
PASS	FRANK	WANGDZ

2007/3/20 A50-S014