



# Test Report: GST90A24-P1M

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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: 48.3mVp-p (Max)	P
3	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -3%~ 3%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.494 %~0.494 %	P
4	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0 %~ 0%	P
5	LOAD REGULATION(Max)	V1: -3%~ 3%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.494 %~0.494 %	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/ 298.517 ms 115VAC/ 403.889 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/ 19.781 ms 115VAC/ 19.820 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/ 36.782 ms 115VAC/ 24.544 ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<+5%	P
10	DYNAMIC LOAD	V1: 2400mVp-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	832mVp-p 764mVp-p 848mVp-p 1190mVp-p	P

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
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1	INPUT VOLTAGE RANGE	90VAC~264VAC 127VDC ~ 370VDC	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25°C	(1) 55.206V~264V (2) 106.28Vdc~370Vdc/FULL LOAD 106.28Vdc~370Vdc/50% LOAD (3) 106.26Vdc~370Vdc/FULL LOAD 106.25Vdc~370Vdc/50% LOAD	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=0.963/230VAC PF=0.989/115VAC	P
4	EFFICIENCY(TYP)	90%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	90.88%	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 =0.441A/ 230VAC I =0.859A/ 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 = 48.54A/ 230VAC I = 25.16A/ 115VAC	P
7	LEAKAGE CURRENT	< 1 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.41 mA N-FG : 0.41 mA	P
8	NO LOAD CONSUMPTION	< 0.15 W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.0604W < 0.0706W	P

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	110%~ 150%	I/P: 230VAC I/P: 115VAC O/P: TESTING Ta:25°C	134.4%/ 230VAC 128.8%/115VAC Protection type : Hiccup mode, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	CH:25.2V~32.4V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta:25°C	29.7V/ 230VAC 29.7V/ 115VAC Protection type : Shut down o/p voltage, re-power on to recover	P
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recover	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) Peak Voltage	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) 566V (2) 466 V (3) 572V	P
2	Diode Peak Voltage	Q101 Rated 43A/150V	I/P: High-Line +3V =267 V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) 0%→400% Load (4).NO LOAD Ta:25°C	Q101: (1) 148V (2) 131V (3) 147V (4) 144V	P
3	Input Capacitor Voltage	C5 Rated: 100u/400V 105°C	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) 396V (2) 394V (3) 398V	P
4	Control IC Voltage Test	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) 18.1V (2) 15.4V (3) 15.4V (4) 21.2V (5) 17.1V	P
5	P.F.C Transistor ( D to S) or (C to E) Peak Voltage	Q31 Rated : TK16A60W 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 Ta:25°C	(1) 444V (2) 424V (3) 422V	P
6	P.F.C DIODE	D1 Rated : MUR460 4A/600V	I/P: High-Line +3V =267 V AC ON/OFF	(1) 424V (2) 422V	P

			O/P: (1)Full Load (2)Output Short (3)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C	(3) 422V	
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) 530 V (2) 524 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: 1.478mA I/P-FG: 2.004mA O/P-FG: 0.439mA 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	BS EN/EN61000-3-2,GB9254 CLASS A	I/P:230VAC/50HZ O/P:100%,75%,50%OAD Ta:25°C	PASS	P
2	CONDUCTION	BS EN/EN55032(CISPR32), FCC PART 15 / CISPR22 CAN ICES-3(B)/NMB-3(B),CNS13438, GB17625.1 EAC TP TC 020, MSIP KN32 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	BS EN/EN55032(CISPR32), FCC PART 15 / CISPR22 CAN ICES-3(B)/NMB-3(B),CNS13438, GB17625.1 EAC TP TC 020, MSIP KN32 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
4	E.S.D	BS EN/EN61000-4-2 LIGHT INDUSTRY AIR : 15KV / Contact : 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
5	E.F.T	BS EN/EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	BS EN/EN61000-4-5 LIGHT INDUSTRY 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	1. Thermal shock Temperature : -30°C~ +70°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 : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec		TEST : OK	P																																																																												



8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	P
9	CAPACITOR LIFE CYCLE	SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME	(1) 240783HRS (2) 109312HRS (3) 154490HRS (4) 226257HRS	P
10	MTBF	2529.4K hrs min. Telcordia SR-332 (Bellcore) ; 389.3K hrs min. MIL-HDBK-217F (25°C)		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C		P

TEST RESULT	TESTER	APPROVAL
PASS	FRANK	WANGDZ

2007/3/20 A50-S014