



# Test Report: GST90A19-P1M

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90W AC-DC High Reliability 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)	V1:180mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 43.2mVp-p (Max)	P
3	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -4%~ 4%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.753 %-0.721 %	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: -4%~ 4%	I/P: 230VAC O/P:FULL -MIN LOAD Ta:25°C	V1: -0.753 %- 0.721 %	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/ 99.710 ms 115VAC/421.909 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/ 21.464 ms 115VAC/ 21.556 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/ 34.500 ms 115VAC/ 23.029 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%	P
10	DYNAMIC LOAD	V1: 1900mVp-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	1000mVp-p 1040mVp-p 1110mVp-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	55.193 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=0.964/230VAC PF=0.988/115VAC	P
4	EFFICIENCY(TYP)	90%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	90.15%	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 =0.442A/ 230VAC I =0.870A/ 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 = 45.65 A/ 230VAC I = 23.75 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	< 0.0514W < 0.0643W	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	131.65%/ 230VAC 125.53%/115VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH:19.95V~25.65V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta:25°C	23.5V/ 230VAC 23.5V/ 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) 584V (2) 498V (3) 574V	P
2	Diode <b>Peak Voltage</b>	Q101 Rated 75A/120V	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) 108V (2) 92.0V (3) 116V (4) 113V	P
3	<b>Input Capacitor Voltage</b>	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) 398V (2) 400V (3) 396V	P
4	<b>Control IC Voltage Test</b>	PWM IC U1 Rated 28 V	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) 19.9V (2) 15.2V (3) 15.3V (4) 23.0V (5) 18.3V	P
6	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 Ta:25°C	(1) 440V (2) 410V (3) 416V	P

7	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) 428V (2) 422V (3) 424V	P
8	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) 538 V (2) 536 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: 2.433mA I/P-FG: 2.711mA O/P-FG:1.461 mA 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 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 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 : GST90A15-P1M 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta=22.5°C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta=44.9°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=22.5°C</th> <th>HIGH AMBIENT Ta=44.9°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>59.7°C</td><td>78.2°C</td></tr> <tr><td>2</td><td>LF2</td><td>57.5°C</td><td>77.2°C</td></tr> <tr><td>3</td><td>BD1</td><td>60.7°C</td><td>80.1°C</td></tr> <tr><td>4</td><td>LF3</td><td>63.6°C</td><td>83.0°C</td></tr> <tr><td>5</td><td>L2</td><td>65.3°C</td><td>84.3°C</td></tr> <tr><td>6</td><td>C5</td><td>65.9°C</td><td>85.2°C</td></tr> <tr><td>7</td><td>D1</td><td>69.5°C</td><td>85.7°C</td></tr> <tr><td>8</td><td>Q31</td><td>65.4°C</td><td>84.9°C</td></tr> <tr><td>9</td><td>Q32</td><td>67.3°C</td><td>87.0°C</td></tr> <tr><td>10</td><td>D30</td><td>77.8°C</td><td>97.8°C</td></tr> <tr><td>11</td><td>C52</td><td>66.8°C</td><td>86.2°C</td></tr> <tr><td>12</td><td>T1</td><td>75.2°C</td><td>94.7°C</td></tr> <tr><td>13</td><td>RTH30</td><td>65.3°C</td><td>84.7°C</td></tr> <tr><td>14</td><td>Q101</td><td>64.6°C</td><td>83.9°C</td></tr> <tr><td>15</td><td>CASE</td><td>50.8°C</td><td>71.0°C</td></tr> <tr><td>16</td><td>Q102</td><td>61.5°C</td><td>81.4°C</td></tr> <tr><td>17</td><td>C109</td><td>64.5°C</td><td>84.3°C</td></tr> <tr><td>18</td><td>U2</td><td>63.8°C</td><td>83.0°C</td></tr> <tr><td>19</td><td>R56</td><td>67.2°C</td><td>84.5°C</td></tr> <tr><td>20</td><td>R64</td><td>67.2°C</td><td>86.7°C</td></tr> <tr><td>21</td><td>R58</td><td>70.4°C</td><td>90.2°C</td></tr> <tr><td>22</td><td>LF101</td><td>58.7°C</td><td>79.3°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=22.5°C	HIGH AMBIENT Ta=44.9°C	1	LF1	59.7°C	78.2°C	2	LF2	57.5°C	77.2°C	3	BD1	60.7°C	80.1°C	4	LF3	63.6°C	83.0°C	5	L2	65.3°C	84.3°C	6	C5	65.9°C	85.2°C	7	D1	69.5°C	85.7°C	8	Q31	65.4°C	84.9°C	9	Q32	67.3°C	87.0°C	10	D30	77.8°C	97.8°C	11	C52	66.8°C	86.2°C	12	T1	75.2°C	94.7°C	13	RTH30	65.3°C	84.7°C	14	Q101	64.6°C	83.9°C	15	CASE	50.8°C	71.0°C	16	Q102	61.5°C	81.4°C	17	C109	64.5°C	84.3°C	18	U2	63.8°C	83.0°C	19	R56	67.2°C	84.5°C	20	R64	67.2°C	86.7°C	21	R58	70.4°C	90.2°C	22	LF101	58.7°C	79.3°C		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 126% 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	±0.012%/°C (0-40°C)	P																																																																																												



6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C~ +85°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	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 C109 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) 171060 HRS (2) 72452 HRS (3) 127834 HRS (4) 240196 HRS	P
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 348.7KHRS		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