



# Test Report: GST60A09-P1J

---

60W 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: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 55.6mVp-p	P
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -5%~ 5%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -1.1%~1.1 %	P
3	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~ 0 %	P
4	LOAD REGULATION(Max)	V1: -5%~ 5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -1.1%~1.1 %	P
5	SET UP TIME(Max)	230VAC/1000ms 115VAC/1000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/533.889 ms 115VAC/ 662.776 ms	P
6	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 27.090 ms 115VAC/ 27.009 ms	P
7	HOLD UP TIME(Typ)	230VAC/50ms 115VAC/15ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 93.435 ms 115VAC/ 17.484 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%	P
9	DYNAMIC LOAD	V1: 1800mVp-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	604mVp-p 622mVp-p 630mVp-p 784mVp-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	64.262 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
4	EFFICIENCY(TYP)	89%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	90.26%	P
5	INPUT CURRENT (Typ)	230V/ 1 A 115V/ 1.4 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.437A/ 230VAC I = 0.952A/ 115VAC	P
6	INRUSH CURRENT(Typ)	230ACV/65A 115ACV/35A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =42. 929A/ 230VAC I =22. 057A/ 115VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.379 mA N-FG : 0.379 mA	P
8	NO LOAD CONSUMPTION	< 0.075 W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.0325 W < 0.0325 W	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	128.67%/ 230VAC 132.67%/115VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH:9.4V~12.2V	I/P: 230VAC I/P: 115VAC O/P: MIN LOAD Ta:25°C	10.3V/ 230VAC 10.3V/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 Shut down o/p volotage · recovers automatically after temperature goes down	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	Q1 Rated : 6A/ 800 V	I/P: High-Line +3V =267V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta:25°C	VDS (1)620V (2)504V (3)608V	P
2	Diode Peak Voltage	Q100 Rated : 120A/ 40 V	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 (4) 0%→400% Load. Ta:25°C	Q100: (1)36.6V (2)27.6V (3)36.2V (4)36.2V	P
3	Input Capacitor Voltage	C5 Rated: : 150 $\mu$ / 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)360V (2)364V (3)362V	P
4	Control IC Voltage Test	PWM IC U1 Rated : 30V -0.4V(MIN.)	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.	(1) 26.4V (2) 26.4V (3) 26.4V (4) 15.0V (5) 24.0V	P

			(5)NO LOAD VR MIN LOW LINE Ta:25°C		
5	Clamp Diode Peak Voltage	D1 Rated : 1000V 1A	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) 558 V (2) 552 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. 729mA I/P-FG:3. 425mA O/P-FG:0. 485m 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: 9999MΩ I/P-FG: 9999MΩ O/P-FG:9999 MΩ NO DAMAGE	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 : GST60A24-P1J 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 20.9℃ 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 41.1℃	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 20.9℃</th> <th>HIGH AMBIENT Ta= 41.1℃</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>47.0℃</td><td>70.1℃</td></tr> <tr><td>2</td><td>LF2</td><td>55.3℃</td><td>79.0℃</td></tr> <tr><td>3</td><td>BD1</td><td>59.4℃</td><td>78.6℃</td></tr> <tr><td>4</td><td>R22</td><td>50.6℃</td><td>68.5℃</td></tr> <tr><td>5</td><td>C5</td><td>65.8℃</td><td>80.3℃</td></tr> <tr><td>6</td><td>C15</td><td>52.0℃</td><td>70.4℃</td></tr> <tr><td>7</td><td>RTH2</td><td>51.6℃</td><td>69.6℃</td></tr> <tr><td>8</td><td>T1</td><td>56.8℃</td><td>73.3℃</td></tr> <tr><td>9</td><td>Q100</td><td>65.0℃</td><td>79.6℃</td></tr> <tr><td>10</td><td>C103</td><td>54.9℃</td><td>70.8℃</td></tr> <tr><td>11</td><td>Q1</td><td>50.7℃</td><td>68.5℃</td></tr> <tr><td>12</td><td>U1</td><td>48.3℃</td><td>67.3℃</td></tr> <tr><td>13</td><td>D1</td><td>50.6℃</td><td>68.7℃</td></tr> <tr><td>14</td><td>R5</td><td>54.2℃</td><td>72.0℃</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 20.9℃	HIGH AMBIENT Ta= 41.1℃	1	LF1	47.0℃	70.1℃	2	LF2	55.3℃	79.0℃	3	BD1	59.4℃	78.6℃	4	R22	50.6℃	68.5℃	5	C5	65.8℃	80.3℃	6	C15	52.0℃	70.4℃	7	RTH2	51.6℃	69.6℃	8	T1	56.8℃	73.3℃	9	Q100	65.0℃	79.6℃	10	C103	54.9℃	70.8℃	11	Q1	50.7℃	68.5℃	12	U1	48.3℃	67.3℃	13	D1	50.6℃	68.7℃	14	R5	54.2℃	72.0℃		P
NO	Position	ROOM AMBIENT Ta= 20.9℃	HIGH AMBIENT Ta= 41.1℃																																																														
1	LF1	47.0℃	70.1℃																																																														
2	LF2	55.3℃	79.0℃																																																														
3	BD1	59.4℃	78.6℃																																																														
4	R22	50.6℃	68.5℃																																																														
5	C5	65.8℃	80.3℃																																																														
6	C15	52.0℃	70.4℃																																																														
7	RTH2	51.6℃	69.6℃																																																														
8	T1	56.8℃	73.3℃																																																														
9	Q100	65.0℃	79.6℃																																																														
10	C103	54.9℃	70.8℃																																																														
11	Q1	50.7℃	68.5℃																																																														
12	U1	48.3℃	67.3℃																																																														
13	D1	50.6℃	68.7℃																																																														
14	R5	54.2℃	72.0℃																																																														
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 120 % LOAD Ta : 25℃	TEST : OK	P																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -35℃	TEST : OK	P																																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50.2℃ HUMIDITY= 95%R.H	TEST : OK	P																																																												
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃(0~50℃)	I/P : 230 VAC O/P : FULL LOAD	± 0.017 %/℃(0~50℃)	P																																																												
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃~ +85℃ 2. Temperature change rate : 25℃ / 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℃~ +70℃ 2. Temperature change rate : 25℃ / 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		OK	P																																																												



8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/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 C103 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= 50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=50 °C LIFE TIME	(1) 210085.3HRS (2) 52564.3HRS (3) 68824HRS (4) 94030.8HRS	P
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 709.7 KHRS		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C		P

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014