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℃	V1: 55.6mVp-p	P
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -5%~ 5%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: −1.1%~1.1 %	P
3	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: 0%~0 %	P
4	LOAD REGULATION(Max)	V1: -5%~ 5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	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℃	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℃	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℃	230VAC/93.435 ms 115VAC/17.484 ms	P
8	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	< ±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℃	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℃	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℃	TEST: OK	P
4	EFFICIENCY(TYP)	89%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	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℃	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℃	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℃	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℃	< 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℃	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℃	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℃	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℃	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℃	Q100: (1)36.6V (2)27.6V (3)36.2V (4)36.2V	P
3	**Input Capacitor Voltage**	C5 Rated: : 150μ/ 400V 105℃	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℃	(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℃		
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℃	(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℃	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℃	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℃	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	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℃	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℃	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℃	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

■ RELIABILITY TEST

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">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>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 20.9 ℃</th><th>HIGH AMBIENT Ta= 41.1 ℃</th></tr>
<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>
</table></td><td>P</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 230 VAC
O/P： 120 % LOAD
Ta：25℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 264VAC/100VAC
O/P： 100 % LOAD
Ta= -35 ℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50 ℃
NO DAMAGE</td><td>I/P： 272 VAC
O/P：FULL LOAD
Ta= 50.2 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %/℃(0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>± 0.017 %/℃(0~50℃)</td><td>P</td></tr>
<tr><td>6</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">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</td><td>OK</td><td>P</td></tr>
<tr><td>7</td><td>THERMAL SHOCK TEST</td><td colspan="2">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</td><td>OK</td><td>P</td></tr>
</table>

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℃	TEST：OK	P
9	CAPACITOR LIFE CYCLE	SUPPOSE C103 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 50 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 50 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta=50 ℃ 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 30,000 hours @ TA 50℃		P

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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