



Test Report: ENC-240-48

240W Desktop Single Output Battery Charger

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Control Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

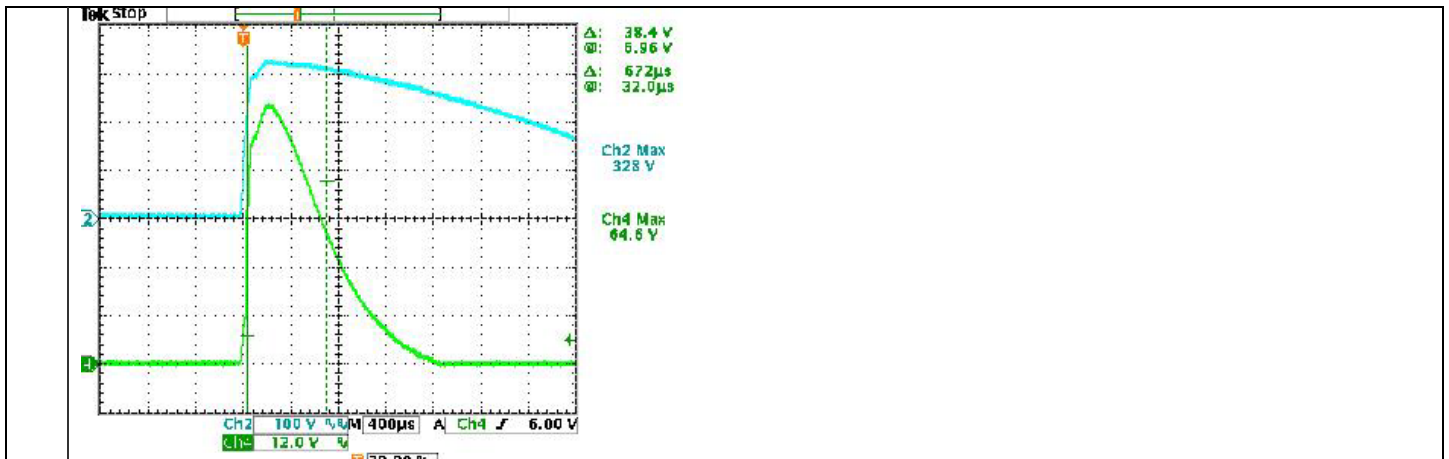
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BOOST CHARGE VOLTAGE	57.6V±0.8V	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	57.61V
2	FLOAT CHARGE VOLTAGE	55.2V±0.8V	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	55.23V
3	OUTPUT CURRENT	4A±0.4A	I/P: 230 VAC O/P:C.V MODE-2V Ta:25°C	3.98 A
4	LEAKAGE CURRENT FROM BATTERY (TYP)	<1mA	I/P: AC OFF O/P:BAT. LOAD Ta:25°C	290 μ A

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:BAT. LOAD Ta:25°C	76V~ 264 V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%= 300 V O/P:BAT. LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec . OFF: 30 Sec 10MIN (AC 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
3	LEAKAGE CURRENT	< 3.5 mA / 240VAC	I/P: 240 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.9 mA N-FG: 0.9 mA
4	INPUT CURRENT (TYP)	230 V/ 1.25 A 115 V/ 2.5 A	I/P: 230 VAC I/P: 115 VAC O/P:BAT. LOAD Ta:25°C	I = 1.079A/ 230VAC I = 2.15A/ 115VAC
5	POWER FACTOR (TYP)	0.95/ 230 VAC 0.98/ 115 VAC	I/P: 230 VAC I/P: 115 VAC O/P:BAT. LOAD Ta:25°C	PF= 0.966 / 230VAC PF= 0.992 / 115VAC
6	EFFICIENCY (TYP)	93%	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	93.83 %
7	INRUSH CURRENT (TYP)	230 V/ 75 A COLD START	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	I = 64.6A/230VAC T50= 672us/230V
INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH1: Input current (1V=1A)				

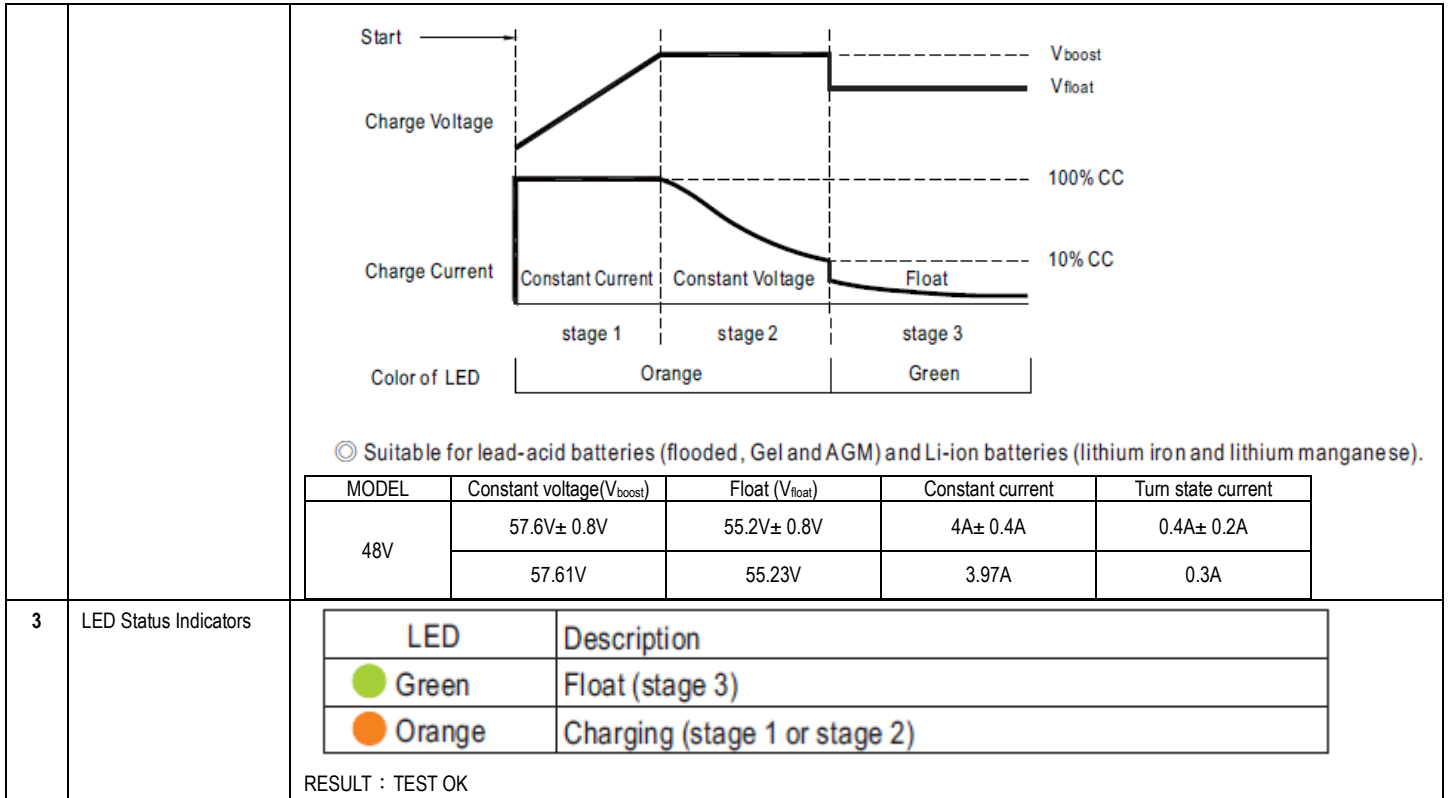


PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	CH1:62.1~72.9V PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover	I/P: 264 VAC I/P: 90 VAC O/P:TESTING Ta:25°C	65.25V/264VAC 64.8 V/ 90VAC PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover
2	OVER TEMPERATURE PROTECTION	SPEC: NO DAMAGE PROTECTION TYPE : Shut down O/P voltage, recovers automatically after temperature goes down	I/P: 264 VAC I/P: 90 VAC O/P:BAT. LOAD	O.T.P.Active PROTECTION TYPE : Shut down O/P voltage, recovers automatically after temperature goes down
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE PROTECTION TYPE : Shut down O/P voltage, re-power on to recover	I/P: 264 VAC O/P: NO LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Shut down O/P voltage, re-power on to recover
4	BATTERY REVERSE POLARITY	By internal fuse.	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	Fuse open

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT			
1	TEMPERATURE COMPENSATION	Constant voltage point(V)			Constant voltage point(V)		
		Ta=0°C	Ta=25°C	Ta=50°C	Ta=0°C	Ta=25°C	Ta=50°C
		59.3±0.8V	57.6±0.8V	55.8±0.8V	59.37V	57.61V	55.73
2	Charging curve	I/P:230Vac O/P:TESTING Ta:25°C					



COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 902 Rated 600V/16A	I/P:High-Line +3V = 267 V AC ON/OFF VDS : O/P: (1)CV=55.2V (2)OUTPUT SHORT (3)CV=55.2V continue I/P:High-Line +3V = 97 V AC ON/OFF VDS : O/P: (1)CV=55.2V (2)OUTPUT SHORT (3)CV=55.2V continue Ta:25°C	VDS : (1) 456V (2) 448V (3) 424V VDS : (1) 444V (2) 444V (3) 440V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated 600V/20A	I/P:High-Line +3V = 267 V AC ON/OFF VDS : O/P: (1)CV=55.2V (2)OUTPUT SHORT (3)CV=55.2V continue I/P:High-Line +3V = 97 V AC ON/OFF VDS : O/P: (1)CV=55.2V (2)OUTPUT SHORT (3)CV=55.2V continue Ta:25°C	VDS : (1) 516V (2) 428V (3) 452V VDS : (1) 500V (2) 440V (3) 500V
3	P.F.C DIODE	D1 Rated 15 A/600 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)CV=55.2V	(1) 520V (2) 412V (3) 432V

			(2)OUTPUT SHORT (3)CV=55.2V continue Ta:25°C	
4	Diode Peak Voltage	Q 100 Rated 30A/150V Q101 Rated 30A/150V	I/P:High-Line +3V = 267 V AC ON/OFF O/P: (1)CV=55.2V (2)OUTPUT SHORT (3)CV=55.2V continue (4) NO LOAD Ta:25°C	Q100: Q101: (1) 126.5V (1) 125.7V (2) 12.7V (2) 14V (3) 126.5V (3) 124.9V (4) 120.1V (4) 123.3V
6	Input Capacitor Voltage	C 5 Rated 180uF/420V	I/P:High-Line +3V =267 V O/P: (1)CV=55.2V (2)OUTPUT SHORT (3)CV=55.2V continue Ta:25°C	(1) 420V (2) 407V (3) 416V
7	Control IC Voltage Test	PWM IC U1 Rated 10V~28 V PWM IC U901 Rated 10V~20V	I/P:High-Line +3V =267 V O/P: (1)CV=55.2V (2)OUTPUT SHORT (3)CV=55.2V continue Ta:25°C	U1: U901: (1) 17.5V (1) 17.7V (2) 16.7V (2) 16.9V (3) 16.7V (3) 16.5V (4) 16.5V (4) 16.3V

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	EN 60950-1 I/P-O/P: 3 KVAC/min I/P-FG:2 KVAC/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: 6.58 mA I/P-FG: 6 mA O/P-FG: 5.9 mA NO DAMAGE
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:13G Ω I/P-FG: 6.02GΩ O/P-FG :30 G Ω NO DAMAGE
3	GROUNDING CONTINUITY	EN 60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	25mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS
2	CONDUCTION	EN55022 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab

4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N :1KV L,N-PE:2KV	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																
1	TEMPERATURE RISE TEST	MODEL : ENC-240-12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50 °C																																																																																																		
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25 °C</th> <th>HIGH AMBIENT Ta= 50 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>V1</td><td>13.65V</td><td>13.68V</td></tr> <tr><td>2</td><td>C1</td><td>51.9°C</td><td>73.7°C</td></tr> <tr><td>3</td><td>ZR1</td><td>46.1°C</td><td>68.8°C</td></tr> <tr><td>4</td><td>RT1</td><td>86.6°C</td><td>101.4°C</td></tr> <tr><td>5</td><td>LF1</td><td>55.7°C</td><td>77.6°C</td></tr> <tr><td>6</td><td>LF2</td><td>56.6°C</td><td>78.3°C</td></tr> <tr><td>7</td><td>U1</td><td>55.6°C</td><td>77.3°C</td></tr> <tr><td>8</td><td>C10</td><td>51.5°C</td><td>73.4°C</td></tr> <tr><td>9</td><td>BD1</td><td>51.9°C</td><td>73.2°C</td></tr> <tr><td>10</td><td>C11</td><td>53.0°C</td><td>75.0°C</td></tr> <tr><td>11</td><td>L1</td><td>61.0°C</td><td>82.7°C</td></tr> <tr><td>12</td><td>C5</td><td>56.8°C</td><td>78.3°C</td></tr> <tr><td>13</td><td>Q1</td><td>50.7°C</td><td>74.9°C</td></tr> <tr><td>14</td><td>D1</td><td>52.0°C</td><td>75.7°C</td></tr> <tr><td>15</td><td>C90</td><td>63.7°C</td><td>84.5°C</td></tr> <tr><td>16</td><td>TSW1</td><td>50.9°C</td><td>73.0°C</td></tr> <tr><td>17</td><td>C42</td><td>61.0°C</td><td>82.3°C</td></tr> <tr><td>18</td><td>T1-1</td><td>82.3°C</td><td>97.9°C</td></tr> <tr><td>19</td><td>T1-2</td><td>81.8°C</td><td>101.0°C</td></tr> <tr><td>20</td><td>Q101</td><td>65.7°C</td><td>79.9°C</td></tr> <tr><td>21</td><td>C202</td><td>61.2°C</td><td>81.7°C</td></tr> <tr><td>22</td><td>C109</td><td>67.9°C</td><td>90.1°C</td></tr> <tr><td>23</td><td>U901</td><td>65.5°C</td><td>86.8°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta= 50 °C	1	V1	13.65V	13.68V	2	C1	51.9°C	73.7°C	3	ZR1	46.1°C	68.8°C	4	RT1	86.6°C	101.4°C	5	LF1	55.7°C	77.6°C	6	LF2	56.6°C	78.3°C	7	U1	55.6°C	77.3°C	8	C10	51.5°C	73.4°C	9	BD1	51.9°C	73.2°C	10	C11	53.0°C	75.0°C	11	L1	61.0°C	82.7°C	12	C5	56.8°C	78.3°C	13	Q1	50.7°C	74.9°C	14	D1	52.0°C	75.7°C	15	C90	63.7°C	84.5°C	16	TSW1	50.9°C	73.0°C	17	C42	61.0°C	82.3°C	18	T1-1	82.3°C	97.9°C	19	T1-2	81.8°C	101.0°C	20	Q101	65.7°C	79.9°C	21	C202	61.2°C	81.7°C	22	C109	67.9°C	90.1°C	23	U901	65.5°C	86.8°C
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240W Desktop Single Output Battery Charger

ENC-240 series

2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -35 °C	TEST : OK
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK
4	TEMPERATURE COEFFICIENT	± 0.05 %/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.009 %/°C (0~50°C)
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°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
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +55°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test		OK
7	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
8	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= 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) 152760HRS (2) 30108HRS (3) 94670HRS (4) 201052HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 1423.3K hrs min. Telcordia SR-332 (Bellcore) ; 155.9K hrs min. MIL-HDBK-217F (25°C)		
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT ZENG

12.10.30 A50-F031