



Test Report: ENC-120-12

120W 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	14.4V±0.2V	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	14.43 V
2	FLOAT CHARGE VOLTAGE	13.8V±0.2V	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	13.83 V
3	OUTPUT CURRENT	8A±0.4A	I/P: 230 VAC O/P:C.V MODE-2V Ta:25°C	8.17A
4	LEAKAGE CURRENT FROM BATTERY (TYP)	<1mA	I/P: AC OFF O/P:BAT. LOAD Ta:25°C	292 μA

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	65V~ 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: 0.64mA N-FG: 0.64mA
4	INPUT CURRENT (TYP)	230 V/ 0.63 A 115 V/ 1.25 A	I/P: 230 VAC I/P: 115 VAC O/P:BAT. LOAD Ta:25°C	I = 0.576A/ 230VAC I = 1.15A/ 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=0.973 / 230VAC PF= 0.994/ 115VAC
6	EFFICIENCY (TYP)	89%	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	89.02%
7	INRUSH CURRENT (TYP)	230 V/ 65 A COLD START	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	I =50A/230VAC T50=480 us/230V
INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH1: Input current				



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	CH1:15.5-18.2V 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	15.9 V/230VAC 15.89V/ 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)				
		Ta=0°C	Ta=25°C	Ta=50°C		
		14.85±0.2V	14.4±0.2V	13.95±0.2V		
2	Charging curve	I/P:230Vac O/P:TESTING Ta:25°C	I/P: 230 VAC O/P:NO . LOAD Ta:25°C	Constant voltage point(V)		
				Ta=0°C	Ta=25°C	Ta=50°C
				14.9V	14.471V	14.015V

	<p>Start →</p> <p>Charge Voltage</p> <p>Charge Current</p> <p>Color of LED</p> <p>stage 1 stage 2 stage 3</p> <p>Orange Green</p> <p>100% CC</p> <p>10% CC</p> <p>V_{boost}</p> <p>V_{float}</p> <p>Constant Current Constant Voltage Float</p> <p>⊙ Suitable for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese).</p> <table border="1"> <thead> <tr> <th>MODEL</th> <th>Constant voltage(V_{boost})</th> <th>Float (V_{float})</th> <th>Turn state current</th> </tr> </thead> <tbody> <tr> <td rowspan="2">12V</td> <td>14.4V± 0.2V</td> <td>13.8V± 0.2V</td> <td>8A± 0.4A</td> </tr> <tr> <td>14.43V</td> <td>13.83V</td> <td>8.17A</td> </tr> </tbody> </table>	MODEL	Constant voltage(V _{boost})	Float (V _{float})	Turn state current	12V	14.4V± 0.2V	13.8V± 0.2V	8A± 0.4A	14.43V	13.83V	8.17A
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<p>3 LED Status Indicators</p>	<table border="1"> <thead> <tr> <th>LED</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>● Green</td> <td>Float (stage 3)</td> </tr> <tr> <td>● Orange</td> <td>Charging (stage 1 or stage 2)</td> </tr> </tbody> </table> <p>RESULT : TEST OK</p>	LED	Description	● Green	Float (stage 3)	● Orange	Charging (stage 1 or stage 2)					
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COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 2 Rated 12 A/800V	I/P:High-Line +3V = 267 V AC ON/OFF VDS : O/P: (1)CV=13.8V (2)OUTPUT SHORT (3)CV=13.8V continue I/P:High-Line +3V = 97 V AC ON/OFF VDS : O/P: (1)CV=13.8V (2)OUTPUT SHORT (3)CV=13.8V continue Ta:25°C	VDS : (1) 650V (2) 392V (3) 650V VDS : (1) 510V (2) 261V (3) 502V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated 20A/600V	I/P:High-Line +3V = 267 V AC ON/OFF VDS : O/P: (1)CV=13.8V (2)OUTPUT SHORT (3)CV=13.8V continue I/P:High-Line +3V = 97 V AC ON/OFF VDS : O/P: (1)CV=13.8V (2)OUTPUT SHORT (3)CV=13.8V continue Ta:25°C	VDS : (1) 425V (2) 377V (3) 433V VDS : (1) 305V (2) 134V (3) 319V

3	P.F.C DIODE	D5 Rated 8A/600 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)CV=13.8V (2)OUTPUT SHORT (3)CV=13.8V continue Ta:25°C	(1) 389V (2) 4.7V (3) 401V
4	Diode Peak Voltage	Q 101 Rated 75V80A	I/P:High-Line +3V = 267 V AC ON/OFF O/P: (1)CV=13.8V (2)OUTPUT SHORT (3)CV=13.8V continue Ta:25°C	(1)46.9 V (2) 0 V (3) 46.9V
5	Clamp Diode Peak Voltage	D30 Rated 800V /2 A	I/P:High-Line +3V = 267 V O/P: (1)BAT. LOAD (2)Output Short (3)CV=13.8V continue Ta:25°C	(1) 563V (2)4V (3)563V
6	Input Capacitor Voltage	C 5 Rated 100 μ 400V105°C	I/P:High-Line +3V =267 V O/P: (1)CV=13.8V (2)OUTPUT SHORT (3)CV=13.8V continue Ta:25°C	(1)398V (2) 390V (3)398V
7	Control IC Voltage Test	PWM IC U1 Rate 10V-28V	I/P:High-Line +3V =267 V O/P: (1)CV=13.8V (2)OUTPUT SHORT (3)CV=13.8V continue Ta:25°C	(1)20.7V (2)14.8V (3)21V

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: 5.56 mA I/P-FG: 4.85 mA O/P-FG: 4.08mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M Ω I/P-FG: 500VDC>100M Ω O/P-FG:500VDC>100M Ω	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P:13.3G Ω I/P-FG: 5.13G Ω O/P-FG:21.6G Ω NO DAMAGE
3	GROUNDING CONTINUITY	EN 60950-1 FG(PE) TO CHASSIS OR TRACE < 100 m Ω	40A / 2min Ta:25°C	21m Ω

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 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-120-12 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 32.5 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 49.2 °C																																																																														
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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 %/°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 : 10 CYCLE 5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec		OK
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 3G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C108 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) 146404HRS (2) 22040HRS (3) 64321HRS (4) 143471HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 206K 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