Test Report: NPB-120-12

120W Compact Size and Wide Output Range 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

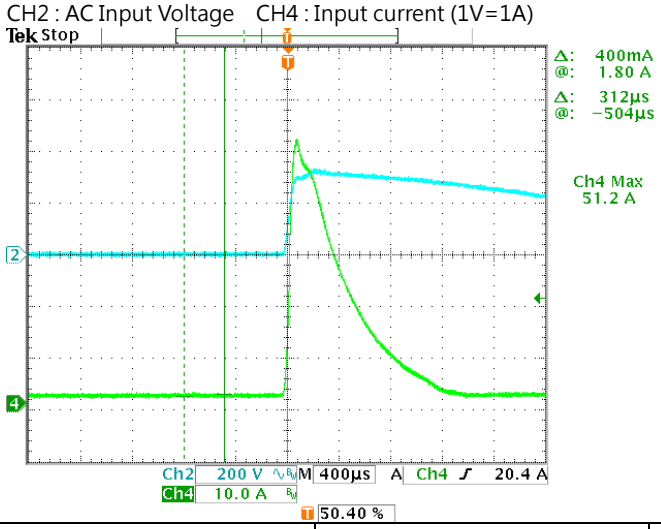
■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BOOST CHARGE VOLTAGE	14.4V± 0.3 V	I/P: 230 VAC O/P: 90% LOAD Ta:25℃	14.42V
2	FLOAT CHARGE VOLTAGE	13.8V± 0.3 V	I/P: 230 VAC O/P:NO LOAD Ta:25℃	13.82V
3	OUTPUT CURRENT	6.8A±3%	I/P: 230 VAC O/P:C.V MODE-1V Ta:25℃	6.81A
4	LEAKAGE CURRENT FROM BATTERY (TYP)	<1mA	I/P: AC OFF O/P:BAT. LOAD Ta:25℃	0.055mA
5	VOLTAGE ADJUSTABLE RANGE	10.5~15.2V	I/P: 230 VAC O/P: 90% LOAD Ta:25℃	9.66V~15.92V
6	CURRENT ADJUSTABLE RANGE	50%~100%	I/P: 230 VAC O/P:C.V MODE-1V Ta:25℃	48.1%~112.3%

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC 127VDC~370VDC	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25℃	(1) 75.6V~264V (2) 105.81Vdc~370Vdc/FULL LOAD 105.8Vdc~370Vdc/50% LOAD (3) 105.89Vdc~370Vdc/FULL LOAD 105.81Vdc~370Vdc/50% LOAD
			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: 90 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK
3	INPUT CURRENT (TYP)	230 V/ 0.8 A 115 V/ 1.5 A	I/P: 230 VAC I/P: 115 VAC O/P:BAT. LOAD Ta:25℃	I =0.537A/ 230VAC I =1.037A/ 115VAC

4	POWER FACTOR (TYP)	0.92/ 230 VAC 0.98/ 115 VAC	I/P: 230 VAC I/P: 115 VAC O/P:BAT. LOAD Ta:25℃	0.926/ 230VAC 0.984/ 115VAC
5	EFFICIENCY (TYP)	87%	I/P: 230 VAC O/P:BAT. LOAD Ta:25℃	88.29 %
6	INRUSH CURRENT (TYP)	230 V/ 55 A COLD START	I/P: 230 VAC O/P:BAT. LOAD Ta:25℃	I =51.2A/ 230VAC
	INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A) 			
7	GAIN-PHASE MARGIN TEST	GAIN MARGIN < -10dB PHASE MARGIN>=60 Gain Curve slope: -10dB/dec~-40dB/dec	(1) CV MODE(MAX) /264Vac (2) CV MODE(MAX)/100Vac (3) CV MODE(Min)/264Vac (4) CV MODE(Min)/100Vac Ta:25℃	(1)96.782 ° /-16.858dB/-14.5dB/dec (2)96.724 ° /-17.091dB/-13.2dB/dec (3)112.081 ° /-14.717dB/-15.2dB/dec (4)112.72 ° /-14.833dB/-10.1dB/dec
8	NO LOAD POWER CONSUMPTION	230V/0.15W	I/P: 230 VAC O/P:NO LOAD （AC S.W OFF） Ta:25℃	0.057 W

PROTECTION FUNCTION TEST

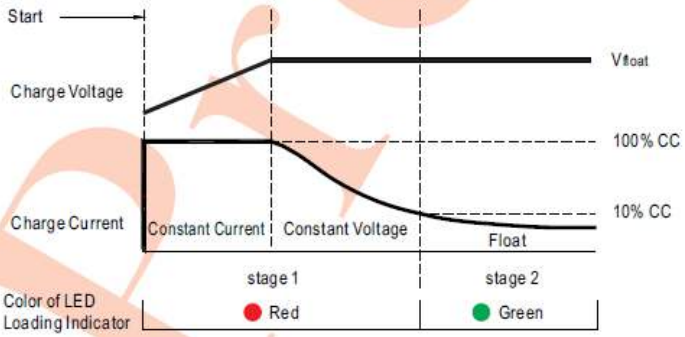
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	CH1: 16 ~ 20V PROTECTION RESULT Shut down and latch off o/p voltage, re-power on to recover	I/P: 264 VAC I/P: 90 VAC O/P:TESTING Ta:25℃	18.5V/ 264VAC 18.5V/ 90VAC PROTECTION TYPE : Shut down and latch off o/p voltage, re-power on to recover

2	OVER TEMPERATURE PROTECTION	SPEC: NO DAMAGE Hiccup, recovers automatically after temperature goes down	I/P: 264 VAC I/P: 90 VAC O/P:BAT. LOAD	O.T.P. Active PROTECTION TYPE： Hiccup, recovers automatically after temperature goes down
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE Constant current limiting, charger will shut down after 5 sec, re-power on to recover	I/P: 264 VAC O/P: BAT. LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE： Constant current limiting, charger will shut down after 5 sec, re-power on to recover
4	BATTERY REVERSE POLARITY	By internal fuse open	I/P: 230 VAC O/P:BAT. LOAD Ta:25℃	By internal fuse open
5	FLOW BACKWARD PROTECTION	BATTERY VOLTAGE： ≤18V	I/P: 230 VAC O/P:BAT. LOAD Ta:25℃	NO DAMAGE

CONTROL FUNCTION TEST

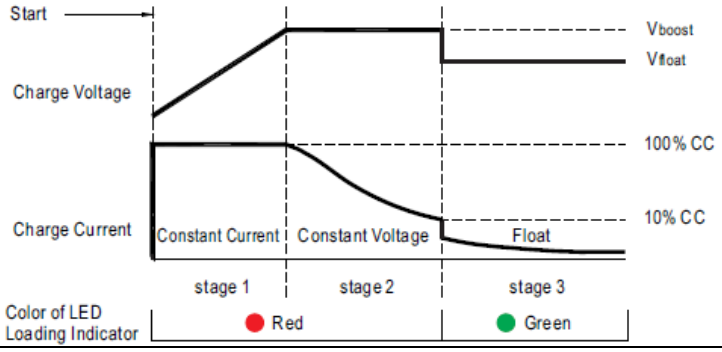
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CHARGE CURE	I/P:230Vac O/P:TESTING Ta:25℃		

◎ Default 2 stage charging curve



	Specification	Result	Specification	Result

◎ Default 3 stage charging curve



			[illegible]	[illegible]	
2.	LED INDICATOR				TEST : OK

LED	Description
Green	FLOATING/FULLY
Red	Charging (stage 1 or stage 2)
Light off	OVP /OUTPUT SHORT/OLP
Green Flash	OTP

I/P: 230V O/P:TESTING LOAD Ta:25℃

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 5/Q6 Rated : 600 V / 11A	AC ON/OFF I/P:High-Line +3V = 267 V VDS : O/P: (1)CV(max) (2)CV(min) (3)no load (4)OUTPUT SHORT Ta:25℃	Q5 VDS : (1) 467V (2) 463V (3) 447V (4) 503V Q6 VDS : (1) 479V (2) 479V (3) 467V (4) 487V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : 600V / 13A	AC ON/OFF I/P:High-Line +3V = 267 V VDS : O/P: (1)CV(max) (2)CV(min) (3)no load (4)OUTPUT SHORT Ta:25℃	VDS : (1) 476V (2) 468V (3) 400V (4) 444V
3	P.F.C DIODE	D 4 Rated : 9A/ 600V	AC ON/OFF I/P:High-Line +3V =267 V O/P: (1)CV(max) (2)CV(min) (3)no load (4)OUTPUT SHORT Ta:25℃	(1) 512V (2) 504V (3) 468V (4) 512V
4	Transistor Peak Voltage	Q210/Q211 Rated : 60 V / 80A	AC ON/OFF I/P:Low-Line -3V = 267 V O/P: (1)CV(max) (2)CV(min) (3)no load (4)OUTPUT SHORT	Q210 VDS : (1) 37.2V (2) 33.6V (3) 35.6V (4) 39.6V Q211 VDS : (1) 41.6V (2) 38.0V (3) 38.8V (4) 42.8V
5	Input Capacitor Voltage	C 5 Rated : 82 u / 420 V	I/P:High-Line +3V =267 V O/P: (1)CV(max) (2)CV(min) (3)no load (4)OUTPUT SHORT Ta:25℃	(1) 416V (2) 412V (3) 402V (4) 408V

6	Control IC Voltage Test	PWM IC U1 Rated 10V~20V PFC IC U2 Rated 9.75V~20V O/P IC U102 Rated 3V~30V	AC ON/OFF I/P:High-Line +3V =267 V O/P: (1)CV(max) (2)CV(min) (3)no load (4)OUTPUT SHORT Ta:25℃	U1 (1) 15.8V (2) 15.8V (3) 15.8V (4) 15.8V U2 (1) 15.2V (2) 15.2V (3) 15.2V (4) 15.2V	U102 (1) 12.6V (2) 12.6V (3) 12.6V (4) 12.6V

■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3 KVAC I/P-FG:2 KVAC O/P-FG:0.5KVAC	I/P-O/P: 3.6 KVAC I/P-FG: 1.8 KVAC O/P-FG: 0.6 KVAC Ta:25℃	I/P-O/P: 2.604 mA I/P-FG: 2.515 mA O/P-FG: 1.880 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: 600 VDC I/P-FG: 600 VDC O/P-FG: 600 VDC Ta:25℃	I/P-O/P: 10G Ω I/P-FG: 10 GΩ O/P-FG 10G Ω NO DAMAGE

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	BS EN/EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25℃	■ PASS
2	CONDUCTION	BS EN/EN55032(CISPR32) EN/EN55014-1 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25℃	■ PASS Test by certified Lab
3	RADIATION	BS EN/EN55032(CISPR32) EN/EN55014-1 CLASS B	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25℃	■ PASS Test by certified Lab
4	E.S.D	BS EN/EN61000-4-2 AIR：8KV / Contact：4KV	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25℃	■ CRITERIA A □ CRITERIA B
5	E.F.T	BS EN/EN61000-4-4 INPUT: 1KV	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25℃	■ CRITERIA A □ CRITERIA B
6	SURGE	BS EN/EN 61000-4-5 L-N :1KV L,N-PE:2KV	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25℃	■ CRITERIA A □ CRITERIA B
7	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL：NPB-120-12 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 230VAC O/P： FULL LOAD Ta= 21.3 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 230VAC O/P： FULL LOAD Ta= 45.8 ℃		

NO	Position	ROOM AMBIENT Ta= 21.3 ℃	HIGH AMBIENT Ta= 45.8 ℃
1	RTH1	64.9℃	82.7℃
2	RTH2	54.6℃	80.3℃
3	ZNR1	46.3℃	70.1℃
4	LF1	40.9℃	65.9℃
5	LF2	51.1℃	76.0℃
6	C2	50.8℃	77.6℃
7	L1	75.9℃	104.9℃
8	C5	57.7℃	84.5℃
9	BD1	56.1℃	81.4℃
10	C6	54.4℃	80.5℃
11	Q1	43.6℃	69.0℃
12	D4	40.8℃	66.1℃
13	Q6	40.9℃	66.6℃
14	U2	52.2℃	89.9℃
15	U1	57.7℃	83.8℃
16	Q15	60.7℃	89.3℃
17	T1coil	64.9℃	91.7℃
18	C14	53.4℃	79.1℃
19	T1core	61.7℃	88.2℃
20	Q210	45.8℃	71.1℃
21	Q215	44.8℃	70.1℃
22	U100	56.6℃	82.8℃
23	LF100	49.3℃	74.5℃
24	C101	58.8℃	84.7℃
25	Q201	61.0℃	86.0℃
26	U110	49.8℃	74.3℃
27	D100	51.9℃	77.2℃
28	C104	50.9℃	76.0℃
29	J101	64.2℃	89.4℃
30	R105	49.3℃	74.9℃
31	D104	51.0℃	76.5℃
32	PCB	51.4℃	76.9℃

2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 264VAC/100VAC O/P： CV-1 Ta= -35℃	TEST：OK
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45 ℃ NO DAMAGE	I/P： 272 VAC O/P：FULL LOAD Ta= 45℃ HUMIDITY= 95 %R.H	TEST：OK
4	TEMPERATURE COEFFICIENT	± 0.05 %/ (0℃~45℃)	I/P： 230 VAC O/P：FULL LOAD	±0.0072 %/℃(0~45℃)
5	STORAGE TEMPERATURE TEST	-40~85℃	1. Thermal shock Temperature： -45℃~ +90℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：10CYCLE 5. Input/Output condition： STATIC	
6	THERMAL SHOCK TEST	-30~45℃	1. Thermal shock Temperature： -35℃~ +50℃ 2. Temperature change rate ：25℃ / 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	
7	VIBRATION TEST	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：10min/sweep cycle (4) Acceleration：3G (5) Test Time：180min in each axis (X.Y.Z) (6) Ta：25℃	
8	CAPACITOR LIFE CYCLE	SUPPOSE C101 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= 45 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 45 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 45 ℃ LIFE TIME		(1) 266741.6HRS (2) 60518.3HRS (3) 81363.7HRS (4) 128208.2HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 631.8K hrs min. Telcordia TR/SR-332 (Bellcore) ; 225.8K hrs min. MIL-HDBK-217F (25℃)		
10	Ongoing Reliability Test	I/P：230VAC O/P：80% LOAD TA=50℃ Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

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