



Test Report: NPB-240-12

240W 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

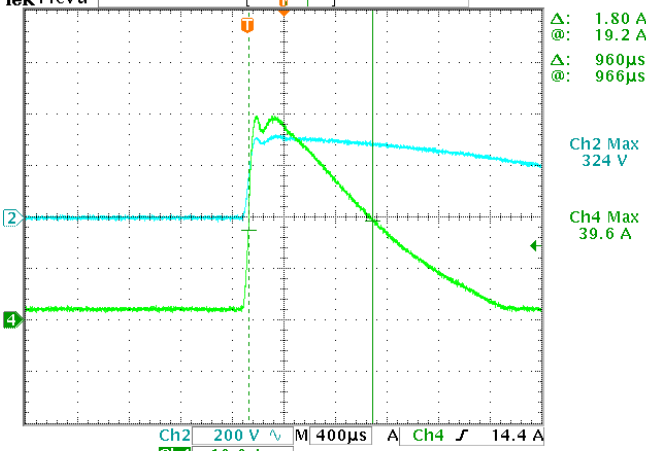
■ DESIGN VERIFY TEST

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°C	14.45V
2	FLOAT CHARGE VOLTAGE	13.8V± 0.3 V	I/P: 230 VAC O/P:NO LOAD Ta:25°C	13.86V
3	OUTPUT CURRENT	13.5A±3%	I/P: 230 VAC O/P:C.V MODE-1V Ta:25°C	13.598A
4	LEAKAGE CURRENT FROM BATTERY (TYP)	<1mA	I/P: AC OFF O/P:BAT. LOAD Ta:25°C	0.056mA
5	CHARGE VOLTAGE RANGE	10.5~15.2V	I/P: 230 VAC O/P: 90% LOAD Ta:25°C	9.48V~15.91V
6	CURRENT ADJUSTABLE RANGE	50%~100%	I/P: 230 VAC O/P:C.V MODE-1V Ta:25°C	43.44%~105.76%

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°C	(1) 75.21V~264V (2) 105.18Vdc~370Vdc/FULL LOAD 105.18Vdc~370Vdc/50% LOAD (3) 105.09Vdc~370Vdc/FULL LOAD 105.09Vdc~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°C	TEST: OK
3	INPUT CURRENT (TYP)	230 V/ 1.5 A 115 V/ 3 A	I/P: 230 VAC I/P: 115 VAC O/P:BAT. LOAD Ta:25°C	I =0.981A/ 230VAC I =1.91A/ 115VAC

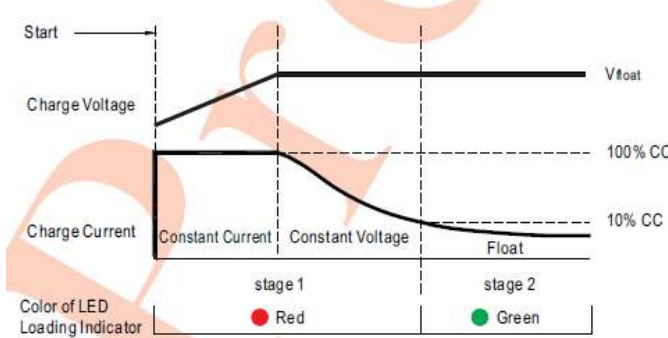
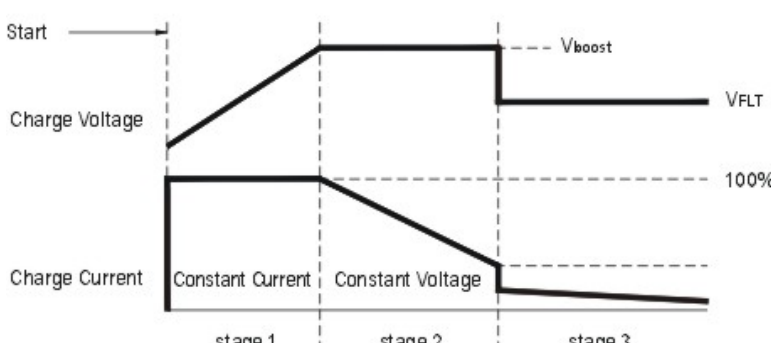
4	POWER FACTOR (TYP)	0.95/ 230 VAC 0.98/ 115 VAC	I/P: 230 VAC I/P: 115 VAC O/P:BAT. LOAD Ta:25°C	0.960/ 230 VAC 0.988/ 115 VAC
5	EFFICIENCY (TYP)	89%	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	91.42%
6	INRUSH CURRENT (TYP)	230 V/ 50 A COLD START	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	I =39.6A
INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A)  Ch2 Max 324 V Ch4 Max 39.6 A Δ: 1.80 A @: 19.2 A Δ: 960μs @: 966μs Ch2 200 V ~ M 400μs A Ch4 14.4 A Ch4 10.0 A 278.000μs				
7	GAIN-PHASE MARGIN TEST	GAIN MARGIN < -10dB PHASE MARGIN > =60 <u>Gain Curve slope:</u> <u>-10dB/dec~-40dB/dec</u>	(1) CV MODE(Vmax)/264Vac (2) CV MODE(Vmax)/90Vac (3) CV MODE(Min)/264Vac (4) CV MODE(Min)/90Vac Ta:25°C	(1) 80.7 ° / -19.9 dB / -33.4dB/dec (2) 80.8 ° / -20.5 dB / -35.4dB/dec (3) 104.5 ° / -16.3 dB / -21.9dB/dec (4) 103 ° / -16 dB / -24.1dB/dec
8	NO LOAD POWER CONSUMPTION	230V/0.15W	I/P: 230 VAC O/P:NO LOAD (AC S.W OFF) Ta:25°C	0.086 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°C	18.4 V/ 264VAC 18.4V/ 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: NO LOAD Ta:25°C	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°C	By internal fuse open
5	FLOW BACKWARD PROTECTION	BATTERY VOLTAGE : ≤ 18V NO DAMAGE	I/P: 230 VAC O/P: BAT. LOAD Ta:25°C	NO DAMAGE

CONTROL FUNCTION TEST

N O	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																			
1	CHARGE CURE	I/P:230Vac O/P:TESTING Ta:25°C ☉ Default 2 stage charging curve  <table><tr><td rowspan="2"></td><td colspan="2">2 Stage</td><td colspan="2">2 Stage</td></tr><tr><td>Specification</td><td>Result</td><td>Specification</td><td>Result</td></tr><tr><td>Charge Voltage</td><td>100% CC</td><td>100% CC</td><td>100% CC</td><td>100% CC</td></tr><tr><td>Charge Current</td><td>10% CC</td><td>10% CC</td><td>10% CC</td><td>10% CC</td></tr></table> Color of LED Loading Indicator: stage 1 (Red), stage 2 (Green)		2 Stage		2 Stage		Specification	Result	Specification	Result	Charge Voltage	100% CC	100% CC	100% CC	100% CC	Charge Current	10% CC	10% CC	10% CC	10% CC		
	2 Stage			2 Stage																			
	Specification	Result	Specification	Result																			
Charge Voltage	100% CC	100% CC	100% CC	100% CC																			
Charge Current	10% CC	10% CC	10% CC	10% CC																			
		3 Stage 																					

			輸入電圧範囲	出力電圧範囲 充電時出力電圧	出力電流範囲 充電時出力電流	
			△ ()	充電時出力電圧	充電時出力電流	
2.	LED INDICATOR	LED		Description		TEST : <u>OK</u>
		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°C				

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 / 13A VGS: ±25V	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°C	Q5 VDS : (1) 438V (2) 434V (3) 414V (4) 473V	Q6 VDS : (1) 409V (2) 413V (3) 388V (4) 441V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : 600V / 18A	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°C	Q1 VDS : (1) 445V (2) 437V (3) 388V (4) 405V	
3	P.F.C DIODE	D 4 Rated : 15A/ 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°C	(1) 462V (2) 474V (3) 446V (4) 457V	
4	Transistor Peak Voltage	Q210/Q211 Rated : 60 V /120 A -	AC ON/OFF I/P:Low-Line -3V = 267 V O/P: (1)CV(max) (2)CV(min) (3)no load (4)OUTPUT SHORT Ta:25°C	Q210 VDS : (1) 38.3V (2) 38.2V (3) 35.9V (4) 40.9V	Q211 VDS : (1) 40.2V (2) 40.6V (3) 37.4V (4) 43.3V
5	Input Capacitor Voltage	C 5 Rated : 180 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°C	(1) 401V (2) 401V (3) 389V (4) 401V	

6	Control IC Voltage Test	PWM IC U1 Rated 10V~20V	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°C	U1	U102
		PFC IC U2 Rated 9.75V~20V		(1) 15.8V (2) 15.8V (3) 15.8V (4) 15.8V	(1) 12.6V (2) 12.4V (3) 12.4V (4) 12.6V
		O/P IC U102 Rated 3V~30V		U2 (1) 15.4V (2) 15.4V (3) 15.4V (4) 15.4V	

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°C	I/P-O/P: 2.652 mA I/P-FG: 2.593 mA O/P-FG: 1.870 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°C	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°C	■ PASS
2	CONDUCTION	BS EN/EN55032(CISPR32) EN/EN55014-1 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	■ 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°C	■ 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°C	■ 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°C	■ 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°C	■ 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-240-12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25.8 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 47.0 °C <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 25.8 °C</th><th>HIGH AMBIENT Ta= 47.0 °C</th></tr><tr><td>1</td><td>LF1</td><td>53.1°C</td><td>74.9°C</td></tr><tr><td>2</td><td>ZNR1</td><td>54.1°C</td><td>75.8°C</td></tr><tr><td>3</td><td>RTH1</td><td>58.1°C</td><td>79.8°C</td></tr><tr><td>4</td><td>RY1</td><td>61.7°C</td><td>83.0°C</td></tr><tr><td>5</td><td>LF2</td><td>60.7°C</td><td>82.7°C</td></tr><tr><td>6</td><td>C2</td><td>58.8°C</td><td>80.8°C</td></tr><tr><td>7</td><td>LF3</td><td>58.7°C</td><td>80.6°C</td></tr><tr><td>8</td><td>BD2</td><td>55.3°C</td><td>76.9°C</td></tr><tr><td>9</td><td>C6</td><td>58.0°C</td><td>79.7°C</td></tr><tr><td>10</td><td>R10</td><td>62.6°C</td><td>84.2°C</td></tr><tr><td>11</td><td>L1</td><td>68.5°C</td><td>91.1°C</td></tr><tr><td>12</td><td>C5</td><td>67.9°C</td><td>89.8°C</td></tr><tr><td>13</td><td>C48</td><td>67.1°C</td><td>88.7°C</td></tr><tr><td>14</td><td>RTH2</td><td>69.9°C</td><td>91.7°C</td></tr><tr><td>15</td><td>Q2</td><td>60.1°C</td><td>81.8°C</td></tr><tr><td>16</td><td>D4</td><td>60.6°C</td><td>82.5°C</td></tr><tr><td>17</td><td>Q6</td><td>61.1°C</td><td>83.8°C</td></tr><tr><td>18</td><td>U2</td><td>66.7°C</td><td>88.3°C</td></tr><tr><td>19</td><td>U1</td><td>72.4°C</td><td>94.0°C</td></tr><tr><td>20</td><td>C14</td><td>70.2°C</td><td>91.4°C</td></tr><tr><td>21</td><td>T1coil</td><td>74.4°C</td><td>97.2°C</td></tr><tr><td>22</td><td>T1core</td><td>73.6°C</td><td>96.6°C</td></tr><tr><td>23</td><td>U100</td><td>86.9°C</td><td>107.3°C</td></tr><tr><td>24</td><td>Q211</td><td>62.3°C</td><td>86.5°C</td></tr><tr><td>25</td><td>Q215</td><td>62.1°C</td><td>84.9°C</td></tr><tr><td>26</td><td>C102</td><td>83.6°C</td><td>106.3°C</td></tr><tr><td>27</td><td>C124</td><td>83.3°C</td><td>105.2°C</td></tr><tr><td>28</td><td>LF100</td><td>78.9°C</td><td>102.2°C</td></tr><tr><td>29</td><td>U110</td><td>67.9°C</td><td>89.6°C</td></tr><tr><td>30</td><td>PCB</td><td>61.0°C</td><td>82.5°C</td></tr><tr><td>31</td><td>U5</td><td>55.5°C</td><td>77.1°C</td></tr><tr><td>32</td><td>D104</td><td>67.4°C</td><td>88.8°C</td></tr><tr><td>33</td><td>Q201</td><td>83.8°C</td><td>101.9°C</td></tr><tr><td>34</td><td>TC</td><td>53.1°C</td><td>74.8°C</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 25.8 °C	HIGH AMBIENT Ta= 47.0 °C	1	LF1	53.1°C	74.9°C	2	ZNR1	54.1°C	75.8°C	3	RTH1	58.1°C	79.8°C	4	RY1	61.7°C	83.0°C	5	LF2	60.7°C	82.7°C	6	C2	58.8°C	80.8°C	7	LF3	58.7°C	80.6°C	8	BD2	55.3°C	76.9°C	9	C6	58.0°C	79.7°C	10	R10	62.6°C	84.2°C	11	L1	68.5°C	91.1°C	12	C5	67.9°C	89.8°C	13	C48	67.1°C	88.7°C	14	RTH2	69.9°C	91.7°C	15	Q2	60.1°C	81.8°C	16	D4	60.6°C	82.5°C	17	Q6	61.1°C	83.8°C	18	U2	66.7°C	88.3°C	19	U1	72.4°C	94.0°C	20	C14	70.2°C	91.4°C	21	T1coil	74.4°C	97.2°C	22	T1core	73.6°C	96.6°C	23	U100	86.9°C	107.3°C	24	Q211	62.3°C	86.5°C	25	Q215	62.1°C	84.9°C	26	C102	83.6°C	106.3°C	27	C124	83.3°C	105.2°C	28	LF100	78.9°C	102.2°C	29	U110	67.9°C	89.6°C	30	PCB	61.0°C	82.5°C	31	U5	55.5°C	77.1°C	32	D104	67.4°C	88.8°C	33	Q201	83.8°C	101.9°C	34	TC	53.1°C	74.8°C
NO	Position	ROOM AMBIENT Ta= 25.8 °C	HIGH AMBIENT Ta= 47.0 °C																																																																																																																																													
1	LF1	53.1°C	74.9°C																																																																																																																																													
2	ZNR1	54.1°C	75.8°C																																																																																																																																													
3	RTH1	58.1°C	79.8°C																																																																																																																																													
4	RY1	61.7°C	83.0°C																																																																																																																																													
5	LF2	60.7°C	82.7°C																																																																																																																																													
6	C2	58.8°C	80.8°C																																																																																																																																													
7	LF3	58.7°C	80.6°C																																																																																																																																													
8	BD2	55.3°C	76.9°C																																																																																																																																													
9	C6	58.0°C	79.7°C																																																																																																																																													
10	R10	62.6°C	84.2°C																																																																																																																																													
11	L1	68.5°C	91.1°C																																																																																																																																													
12	C5	67.9°C	89.8°C																																																																																																																																													
13	C48	67.1°C	88.7°C																																																																																																																																													
14	RTH2	69.9°C	91.7°C																																																																																																																																													
15	Q2	60.1°C	81.8°C																																																																																																																																													
16	D4	60.6°C	82.5°C																																																																																																																																													
17	Q6	61.1°C	83.8°C																																																																																																																																													
18	U2	66.7°C	88.3°C																																																																																																																																													
19	U1	72.4°C	94.0°C																																																																																																																																													
20	C14	70.2°C	91.4°C																																																																																																																																													
21	T1coil	74.4°C	97.2°C																																																																																																																																													
22	T1core	73.6°C	96.6°C																																																																																																																																													
23	U100	86.9°C	107.3°C																																																																																																																																													
24	Q211	62.3°C	86.5°C																																																																																																																																													
25	Q215	62.1°C	84.9°C																																																																																																																																													
26	C102	83.6°C	106.3°C																																																																																																																																													
27	C124	83.3°C	105.2°C																																																																																																																																													
28	LF100	78.9°C	102.2°C																																																																																																																																													
29	U110	67.9°C	89.6°C																																																																																																																																													
30	PCB	61.0°C	82.5°C																																																																																																																																													
31	U5	55.5°C	77.1°C																																																																																																																																													
32	D104	67.4°C	88.8°C																																																																																																																																													
33	Q201	83.8°C	101.9°C																																																																																																																																													
34	TC	53.1°C	74.8°C																																																																																																																																													

2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : CV-1 Ta= -35°C	TEST : OK
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 45°C HUMIDITY= 95 %R.H	TEST : OK
4	TEMPERATURE COEFFICIENT	± 0.05 %/ (0°C~45°C)	I/P : 230 VAC O/P : FULL LOAD	±0.0051 %/°C(0~45°C)
5	STORAGE TEMPERATURE TEST	-40~85°C	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 : 10CYCLE 5. Input/Output condition : STATIC	
6	THERMAL SHOCK TEST	-30~45°C	1. Thermal shock Temperature : -35°C~ +50°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	
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°C	
8	CAPACITOR LIFE CYCLE	SUPPOSE C102 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= 45 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 45 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 45 °C LIFE TIME	(1) 63012.2HRS (2) 34197.4HRS (3) 87123.6HRS (4) 238447.1HRS	
9	MTBF	Conducted by Parts Stress Analysis Prediction 428.3K hrs min. Telcordia TR/SR-332 (Bellcore) ; 157.5K hrs min. MIL-HDBK-217F (25°C)		
10	Ongoing Reliability Test	I/P : 230VAC O/P : 80% LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

2020.10.01 TAG-QA-009