



TEST REPORT: EPP-200-24

200W Single Output With PFC Function

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

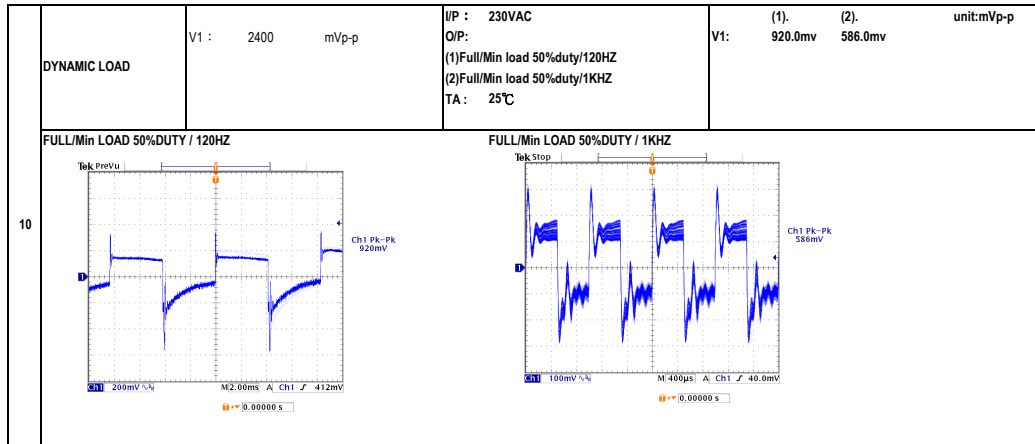
E.M.C. Test

■ RELIABILITY TEST

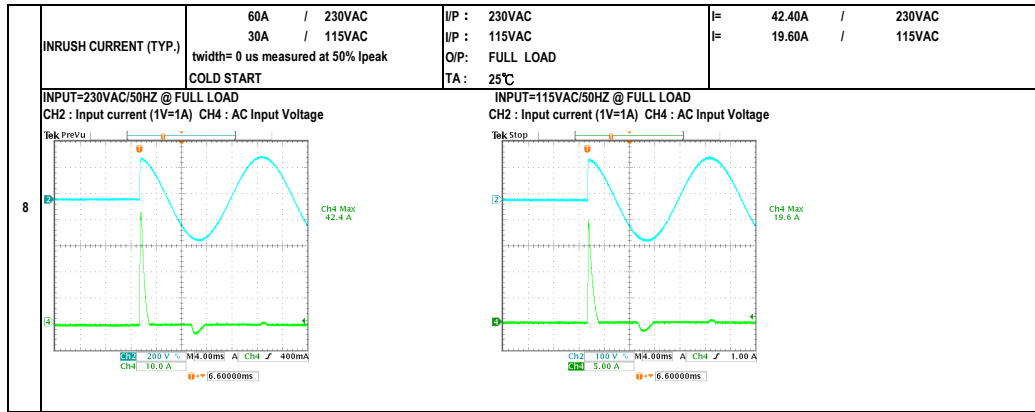
ENVIRONMENT TEST

DESIGN VERIFY TEST
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 22.80V ~ 25.20V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 22.08V ~ 25.77V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.58% ~ 0.50%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.04% ~ -0.04%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST < 2.905 %
6	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	high frequency :	low frequency :
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC	230VAC : 222ms 115VAC : 180ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 12.8ms 115VAC : 12.2ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
9	HOLD UP TIME (TYP.)	230VAC : 12ms 115VAC : 12ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 20.2ms 115VAC : 20.2ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	



INPUT FUNCTION TEST				
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC 113VDC ~ 370VDC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	68.0VAC ~ 264VAC 100VDC ~ 370VDC
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 115VAC ~ 264VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	1 / 230VAC 1.8 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.972 / 230VAC I= 1.692 / 115VAC
4	LEAKAGE CURRENT	< 0.75mA	I/P : 240VAC O/P: MIN LOAD TA : 25°C	L-FG: 0.073 mA N-FG: 0.074 mA O/P-FG: 0.056 mA
5	NO LOAD POWER CONSUMPTION	< 0.50W	I/P : 230VAC O/P: MIN LOAD TA : 25°C	< 0.3496 W
6	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	PF= 0.957 / 230VAC PF= 0.99 / 115VAC
7	EFFICIENCY (TYP.)	94.0%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	94.66 %



PROTECTION FUNCTION TEST				
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110% ~ 140%	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING TA: 25°C	120.90% 264VAC 120.90% 230VAC 120.90% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	26.40V ~ 31.20V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA: 25°C	29.30V 264VAC 29.40V 230VAC 29.30V 80VAC Shut down Re- power ON
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode
4	OVER TEMPERATURE PROTECTION	Shut down Re- power ON	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P. Active Shut down Re- power ON

CONTROL FUNCTION TEST				
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	AUXILIARY POWER	12V / 0.5A ripple & noise: * mv Tolerance: -15~15 %	I/P: 230VAC O/P: FULL LOAD TA: 25°C	11.475 V/ 0.4997 A ripple & noise: * mv Tolerance: -4.38% %

COMPONENT STRESS TEST				
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q5 Rated : 500V 13.0A Q6 Rated : 500V 13.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q5 Q6 (1). 490.00V 494.00V (2). 482.00V 490.00V (3). 442.00V 450.00V
2	Input Capacitor	C5 Rated : 100uf 420V	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 419.00V (2). 417.00V (3). 419.00V
3	Control IC	U1 Rated : 38.0V (max) 13.0V (min) U101 Rated : 24V (max) 6V (min)	I/P : 267VAC O/P : (1)Full Load (2)Output Short Change (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 U101 (1). 28.90V 12.50V (2). 20.10V 2.14V (3). 20.10V 2.36V (4). 31.30V 14.60V (5). 22.90V 11.20V
4	O/P Diode (MOSFET)	Q101 Rated : 60V 76A Q102 Rated : 60V 76A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q101 Q102 (1). 57.20V 58.00V (2). 7.90V 8.80V (3). 55.20V 56.80V
5	PFC Power Transistor	Q1 Rated : 600V 20.2A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 550.00V (2). 546.00V (3). 502.00V
6	PFC Diode	D1 Rated : 600V 5.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Dynamic Load Full/Min Load 90%Duty/5KHz (4)Dynamic Load Full/Min Load 50%Duty/120Hz Ta : 25°C	(1). 495.00V (2). 478.00V (3). 476.00V (4). 460.00V

SAFETY & E.M.C. TEST
SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.000KVAC /min I/P-FG : 2.000KVAC /min O/P-FG : 0.500KVAC /min	I/P-O/P: 3.600KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta : 25°C	I/P-O/P: 1.01mA I/P-FG: 1.41mA O/P-FG: 0.60mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ	I/P-O/P: 500VDC I/P-FG: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ NO DAMAGE

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 : 230VAC /50HZ O/P : FULL LOAD / 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 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 INDUSTRY INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N: 2KV;L/N-PE: 4KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																												
1	TEMPERATURE RISE TEST	MODEL : EPP-200-24 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 24.3°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 50.6°C	ROOM AMBIENT Ta: 24.3°C HIGH AMBIENT Ta: 50.6°C																																																																																													
			<table border="1"> <thead> <tr> <th>NO.</th> <th>Position</th> <th>ROOM AMBIENT Ta</th> <th>HIGH AMBIENT Ta</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>54.3°C</td><td>78.2°C</td></tr> <tr><td>2</td><td>LF2</td><td>50.3°C</td><td>75.0°C</td></tr> <tr><td>3</td><td>L2</td><td>63.3°C</td><td>88.8°C</td></tr> <tr><td>4</td><td>BD1</td><td>69.3°C</td><td>94.0°C</td></tr> <tr><td>5</td><td>Q1</td><td>71.9°C</td><td>98.0°C</td></tr> <tr><td>6</td><td>C5</td><td>60.4°C</td><td>85.3°C</td></tr> <tr><td>7</td><td>CB1</td><td>53.9°C</td><td>80.8°C</td></tr> <tr><td>8</td><td>L1</td><td>69.2°C</td><td>95.9°C</td></tr> <tr><td>9</td><td>T1</td><td>77.5°C</td><td>106.6°C</td></tr> <tr><td>10</td><td>C105</td><td>61.4°C</td><td>99.4°C</td></tr> <tr><td>11</td><td>L100</td><td>56.6°C</td><td>91.8°C</td></tr> <tr><td>12</td><td>Q5</td><td>85.7°C</td><td>114.6°C</td></tr> <tr><td>13</td><td>Q6</td><td>86.7°C</td><td>112.1°C</td></tr> <tr><td>14</td><td>R4</td><td>66.7°C</td><td>91.3°C</td></tr> <tr><td>15</td><td>R5</td><td>68.4°C</td><td>93.7°C</td></tr> <tr><td>16</td><td>U1</td><td>78.3°C</td><td>74.3°C</td></tr> <tr><td>17</td><td>D151</td><td>64.6°C</td><td>95.7°C</td></tr> <tr><td>18</td><td>Q101</td><td>64.5°C</td><td>97.0°C</td></tr> <tr><td>19</td><td>Q102</td><td>67.0°C</td><td>102.4°C</td></tr> <tr><td>20</td><td>R100</td><td>68.5°C</td><td>101.4°C</td></tr> <tr><td>21</td><td>U101</td><td>64.0°C</td><td>98.4°C</td></tr> <tr><td>22</td><td>D1</td><td>79.5°C</td><td>106.7°C</td></tr> </tbody> </table>	NO.	Position	ROOM AMBIENT Ta	HIGH AMBIENT Ta	1	LF1	54.3°C	78.2°C	2	LF2	50.3°C	75.0°C	3	L2	63.3°C	88.8°C	4	BD1	69.3°C	94.0°C	5	Q1	71.9°C	98.0°C	6	C5	60.4°C	85.3°C	7	CB1	53.9°C	80.8°C	8	L1	69.2°C	95.9°C	9	T1	77.5°C	106.6°C	10	C105	61.4°C	99.4°C	11	L100	56.6°C	91.8°C	12	Q5	85.7°C	114.6°C	13	Q6	86.7°C	112.1°C	14	R4	66.7°C	91.3°C	15	R5	68.4°C	93.7°C	16	U1	78.3°C	74.3°C	17	D151	64.6°C	95.7°C	18	Q101	64.5°C	97.0°C	19	Q102	67.0°C	102.4°C	20	R100	68.5°C	101.4°C	21	U101	64.0°C	98.4°C	22	D1	79.5°C	106.7°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 119.00% LOAD Ta : 25°C	TEST : OK																																																																																												
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 115VAC O/P : FULL LOAD Ta : -30.0°C	TEST : OK																																																																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50°C HUMIDITY= 95.0% RH	TEST : OK																																																																																												
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C-50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0000% /(0°C-50°C)																																																																																												
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C ~ +85°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		TEST : OK																																																																																												
7	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		TEST : OK																																																																																												



8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (4) Acceleration : 2G (5) Test Time : 60 min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50.0°C LIFE TIME	(1). 437778 HRS (2). 80132 HRS (3). 179640 HRS (4). 297469.9 HRS
10	MTBF	2672.7K hrs min. Telcordia SR-332 (Bellcore) ; 500.3K hrs min. MIL-HDBK-217F (25°C)	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 50°C O/P : FULL LOAD	
TEST RESULT		TESTER	REVIEW
PASS		FRANK	GESG
		APPROVAL	
		WANGDZ	

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