



Test Report: ERP-350-12

350W Single Output Switching Power Supply

■ 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	VERDICT
1	RIPPLE & NOISE	V1 : 150 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 64 mVp-p (Max)	PASS
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 10.8 V~ 13.2 V	I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	10.487 V~ 13.474 V/230 VAC	PASS
3	OUTPUT VOLTAGE TOLERANCE	V1 : -1 %~ 1 % (Max)	I/P : 200 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : -0.174 %~ 0.224 %	PASS
4	LINE REGULATION	V1 : -0.5 %~ 0.5 % (Max)	I/P : 200VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.008 %~ 0.033 %	PASS
5	LOAD REGULATION	V1 : -0.5 %~ 0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.174 %~ 0.224 %	PASS
7	SET UP TIME	230VAC : 1500 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 683.5 ms	PASS
8	RISE TIME	230VAC : 50 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 6.4 ms	PASS
9	HOLD UP TIME	230VAC : 20 ms (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 25.5 ms	PASS
10	OVER/UNDERSHOOT TEST	< +5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : ±3.6 %	PASS
11	DYNAMIC LOAD	V1 : 1200 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1). 238 mVp-p (2). 856 mVp-p	PASS

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	170V ~ 272 V	PASS
			I/P : LOW-LINE-3V= 177 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST : OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 180 VAC ~ 264 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	PASS

3	EFFICIENCY	87% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	87.5 %	PASS
4	INPUT CURRENT	230V/ 4.0 A (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 2.74 A / 230 VAC	PASS
5	INRUSH CURRENT	230V/ 90 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 88.28 A / 230 VAC	PASS
6	LEAKAGE CURRENT	< 1.0 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.495 mA N-FG : 0.485 mA	PASS

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	110 %~ 140 %	I/P : 264 VAC I/P : 230 VAC I/P : 200 VAC O/P : TESTING Ta : 25°C	130%/ 264 VAC 128.8%/ 230 VAC 128.7%/ 200 VAC Hiccup Mode	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 13.8 V~ 16.2 V	I/P : 264 VAC I/P : 230 VAC I/P : 180 VAC O/P : MIN LOAD Ta : 25°C	15.057V/ 264 VAC 15.054V/ 230 VAC 14.688V/ 180 VAC Hiccup Mode	PASS
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 110 ± 5°C O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down	PASS
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup Mode	PASS

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated FMV20N60S1HF: 600 V /20A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 476V 8.4A (2) 240V 4.52A (3) 420V 7.0A	PASS
2	Diode Peak Voltage	D100 Rated SP30100C: 100V/30A D102 Rated 30CPQ100: 100V/30A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 89.0 V (2) 21.0 V (3) 87.0 V (1) 81.5 V (2) 75.5 V (3) 77.0 V	PASS

3	Input Capacitor Voltage	C5 Rated :150 u / 400 V 105 °C / HS Series	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 376 V (2) 364 V (3) 358 V	PASS
4	Control IC Voltage Test	U1 Rated NCP1252: 30 V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 19.9 V (2) 19.6 V (3) 19.9 V	PASS

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min I/P-FG : 1.5 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 1.8 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 2.771 mA I/P-FG : 2.592 mA O/P-FG : 1.929 mA NO DAMAGE	PASS
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/70% RH	I/P-O/P : 7381 MΩ I/P-FG : >9999 MΩ O/P-FG : 6907 MΩ NO DAMAGE	PASS
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70% RH	8 mΩ	PASS

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	CONDUCTION	EN55022 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	PASS
2	RADIATION	EN55022 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	PASS
3	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N : 1KV L,N-PE : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	PASS
4	Test by certified Lab & Test Report Prepare				

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																				
1	TEMPERATURE RISE TEST	MODEL : ERP-350-12 1. ROOM AMBIENT BURN-IN : 1.0 HRS I/P : 230VAC O/P : 100%LOAD Ta=32.1 °C 2. HIGH AMBIENT BURN-IN : 1.0 HRS I/P : 230VAC O/P : 100%LOAD Ta=39.8 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 32.1 °C</th> <th>HIGH AMBIENT Ta= 39.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>96.5°C</td><td>105.4°C</td></tr> <tr><td>2</td><td>C5</td><td>93.7°C</td><td>102.1°C</td></tr> <tr><td>3</td><td>T2</td><td>98.8°C</td><td>107.6°C</td></tr> <tr><td>4</td><td>D5</td><td>103.0°C</td><td>112.3°C</td></tr> <tr><td>5</td><td>Q1</td><td>106.1°C</td><td>116.6°C</td></tr> <tr><td>6</td><td>Q2</td><td>104.5°C</td><td>114.8°C</td></tr> <tr><td>7</td><td>R17</td><td>108.1°C</td><td>115.8°C</td></tr> <tr><td>8</td><td>U1</td><td>92.5°C</td><td>101.4°C</td></tr> <tr><td>9</td><td>C36</td><td>95.7°C</td><td>104.6°C</td></tr> <tr><td>10</td><td>D30</td><td>99.9°C</td><td>108.3°C</td></tr> <tr><td>11</td><td>T1</td><td>108.1°C</td><td>117.3°C</td></tr> <tr><td>12</td><td>D100</td><td>110.5°C</td><td>119.1°C</td></tr> <tr><td>13</td><td>D101</td><td>111.6°C</td><td>122.4°C</td></tr> <tr><td>14</td><td>D102</td><td>118.2°C</td><td>131.1°C</td></tr> <tr><td>15</td><td>D103</td><td>118.4°C</td><td>129.4°C</td></tr> <tr><td>16</td><td>L100</td><td>112.0°C</td><td>119.6°C</td></tr> <tr><td>17</td><td>C106</td><td>92.8°C</td><td>102.8°C</td></tr> <tr><td>18</td><td>C108</td><td>91.3°C</td><td>100.5°C</td></tr> <tr><td>19</td><td>TSW1</td><td>94.1°C</td><td>104.4°C</td></tr> <tr><td>20</td><td>Tc</td><td>95.4°C</td><td>102.2°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 32.1 °C	HIGH AMBIENT Ta= 39.8 °C	1	BD1	96.5°C	105.4°C	2	C5	93.7°C	102.1°C	3	T2	98.8°C	107.6°C	4	D5	103.0°C	112.3°C	5	Q1	106.1°C	116.6°C	6	Q2	104.5°C	114.8°C	7	R17	108.1°C	115.8°C	8	U1	92.5°C	101.4°C	9	C36	95.7°C	104.6°C	10	D30	99.9°C	108.3°C	11	T1	108.1°C	117.3°C	12	D100	110.5°C	119.1°C	13	D101	111.6°C	122.4°C	14	D102	118.2°C	131.1°C	15	D103	118.4°C	129.4°C	16	L100	112.0°C	119.6°C	17	C106	92.8°C	102.8°C	18	C108	91.3°C	100.5°C	19	TSW1	94.1°C	104.4°C	20	Tc	95.4°C	102.2°C		PASS
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/200VAC O/P : 100% LOAD Ta= -30°C	TEST : OK	PASS																																																																																				
3	TEMPERATURE COEFFICIENT	± 0.05 % (0~50°C)	I/P : 230 VAC O/P : 100% LOAD	± 0.004% (0~50°C)	PASS																																																																																				
4	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -35°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	PASS																																																																																				
5	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +45°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/100% Load AC ON/OFF TEST turn on 58sec ; turn off 2sec		OK	PASS																																																																																				

6	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 4G (5) Test Time : 90min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	PASS
7	CAPACITOR LIFE CYCLE	ERP-350-12:SUPPOSE C106 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=40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=40 °C LIFE TIME	(1) 46215.3 HRS (2) 19650.6 HRS (3) 61013.9 HRS	PASS
8	MTBF	Conducted by Parts Stress Analysis Prediction 2396.7K hrs min. Telcordia SR-332 (Bellcore); 321K hrs min. MIL-HDBK-217F (25°C)		PASS
9	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ TA 40 °C		PASS

SAMPLE	TEST RESULT	TESTER	APPROVAL
PRODUCT SAMPLE	PASS	ZHOUB/ZHUOKB	LIUWY

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