



Test Report: MSP-100-24

100W Single Output with PFC Function

■ 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 : 85 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 22.8V ~ 28.8V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	21.15 V ~ 30.99 V / 230 VAC 21.14 V ~ 30.99 V / 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 1.5 % ~ -1.5 % (Max)	I/P : 100 VAC / 264 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : 0.3 % ~ -0.3 %	P
4	LINE REGULATION	V1 : 0.2 % ~ -0.2 % (Max)	I/P : VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 % ~ 0 %	P
5	LOAD REGULATION	V1 : 0.5 % ~ -0.5 % (Max)	I/P : 230 VAC O/P : FULL -MIN LOAD Ta : 25°C	V1 : 0.3 % ~ -0.3 %	P
6	SET UP TIME	230VAC : 2500 ms (Max) 115VAC : 2500 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 453 ms 115VAC/ 906 ms	P
7	RISE TIME	230VAC : 100 ms (Max) 115VAC : 100 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 15 ms 115VAC/ 15 ms	P
8	HOLD UP TIME	230VAC : 50 ms (TYP) 115VAC : 20 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 57 ms 115VAC/ 22 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 5 %	P
10	DYNAMIC LOAD	V1 : 2400 mVp-p	I/P : 230 VAC O/P : FULL /Min LOAD 90%DUTY/ 1KHZ Ta : 25°C	276 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	85VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	79 V~264V	P
			I/P : LOW-LINE -3V= 82 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 : 85 VAC ~ 264 VAC O/P : FULL -MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.95 / 230 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.96 / 230 VAC	P
		0.98 / 115 VAC(TYP)		PF= 1 / 115 VAC	
4	EFFICIENCY	88.5 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	88.8 %	P
5	NO LOAD POWER CONSUMPTION	<0.5W	I/P : 240 VAC O/P : NO LOAD Ta : 25°C	0.4W	P
6	INPUT CURRENT	230V/ 0.6 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.54 A/ 230 VAC	P
		115V/ 1.2 A (TYP)		I = 1.09 A/ 115 VAC	
7	INRUSH CURRENT	230V/ 65 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 32 A/ 230 VAC	P
		115V/ 35 A(TYP) COLD START		I = 16 A/ 115 VAC	
8	LEAKAGE CURRENT	< 300 uA/ for earth leakage current	I/P: 264 VAC O/P:Min LOAD Ta:25°C	L-FG 210 uA	P
		< 100 uA/ for touch leakage current		N-FG 210 uA	
				L-V+ 83 uA	
				L-V- 83 uA	
				N-V+ 83 uA	
				N-V- 83 uA	

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %- 135 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	128 %/ 230 VAC 127 %/ 115 VAC Constant current limiting for Vo=50 ~ 100% of rated voltage, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	CH1 : 30 V~ 34.8V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	32.79 V/ 230 VAC 32.82 V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION (optional)	SPEC : TSW1 : 85 ± 5°C O.T.P. TSW1 : detect on heatsink Q101 of power transistor 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	P
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	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	REMOTE CONTROL	Rc+ / Rc- 0 V- 0.8 V POWER ON 4 V- 10V POWER OFF	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	0 V-1.7 V POWER ON 1.8 V-10 V POWER OFF	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q3 Rated : 2SK3673-01MR 10A/700V	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) 664 V (2) 536 V (3) 644 V	P
2	Diode Peak Voltage	Q101 Rated : MBR20150CT 20A/150V Q102 Rated : MBR20150CT 20A/150V	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) 133 V (2) 138 V (3) 115 V (1) 133 V (2) 137 V (3) 114 V	P
3	Clamp Diode Peak Voltage	D2 Rated : 3A/600V 1N5406	I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 424 V (2) 420 V	P
4	Input Capacitor Voltage	C5 Rated : 100u/400V 105°C	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) 382.5 V (2) 377.4 V (3) 378.2 V	P
5	Control IC Voltage Test	U1 Rated : PFC FAN6921MR 30V(max) 7.8V(min) U101 Rated : TEA1761T 38V(max) 8.35V(min)	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) 23.15 V (2) 19.6 V (3) 19.6 V (1) 25.14 V (2) 20.48 V (3) 20.48 V	P
6	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 2SK4106 12A/500V	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) 476 V (2) 390 V (3) 446 V	P

SAFETY & E.M.C. TEST
SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 4 KVAC/min I/P-FG: 2 KVAC/min O/P-FG: 0.5 KVAC/min	I/P-O/P: 4.2KVAC/min I/P-FG: 2.4KVAC/min O/P-FG: 0.6 KVAC/min Ta:25°C	I/P-O/P: 2.581 mA I/P-FG: 1.991 mA O/P-FG: 0.947 mA NO DAMAGE	P
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 : 30 GΩ I/P-FG : 30 GΩ O/P-FG : 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	12 mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS D	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55011 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55011 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 INDUSTRY AIR:8KV / Contact:6KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

RELIABILITY TEST
ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																																									
1	TEMPERATURE RISE TEST	MODEL : MSP-100-24 1. ROOM AMBIENT BURN-IN : 3 HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.1 °C 2. HIGH AMBIENT BURN-IN : 5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 43.1 °C			P																																																																																																									
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 27.1 °C</th> <th>HIGH AMBIENT Ta= 43.1 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>D2</td><td>3A/600V 1N5406 DO-201</td><td>92.0°C</td><td>106.0°C</td></tr> <tr><td>2</td><td>D30</td><td>1A/1KV 1N4007</td><td>135.0°C</td><td>149.1°C</td></tr> <tr><td>3</td><td>D150</td><td>1A/1KV 1N4007</td><td>64.3°C</td><td>79.3°C</td></tr> <tr><td>4</td><td>LF2</td><td>TR653-R2</td><td>53.4°C</td><td>68.9°C</td></tr> <tr><td>5</td><td>BD1</td><td>6A/800V US6KB80R-7000</td><td>61.6°C</td><td>76.6°C</td></tr> <tr><td>6</td><td>L1</td><td>TR654-R4</td><td>62.0°C</td><td>76.7°C</td></tr> <tr><td>7</td><td>L3</td><td>TF1965</td><td>55.5°C</td><td>70.8°C</td></tr> <tr><td>8</td><td>C11</td><td>474/450V 10% P=10 MMX</td><td>58.0°C</td><td>73.3°C</td></tr> <tr><td>9</td><td>D1</td><td>BYV29X-600 7A/600V</td><td>52.0°C</td><td>66.8°C</td></tr> <tr><td>10</td><td>Q1</td><td>2SK4106 12A/500V</td><td>53.2°C</td><td>68.2°C</td></tr> <tr><td>11</td><td>Q3</td><td>2SK3673-01MR 10A/700V</td><td>57.7°C</td><td>73.6°C</td></tr> <tr><td>12</td><td>C5</td><td>100u/400V 105°C 18*25 KMG</td><td>66.5°C</td><td>80.8°C</td></tr> <tr><td>13</td><td>T1</td><td>TF1958</td><td>102.0°C</td><td>118.1°C</td></tr> <tr><td>14</td><td>C18</td><td>47u/50V 6.3*11 YXF</td><td>89.5°C</td><td>103.7°C</td></tr> <tr><td>15</td><td>C61</td><td>47u/50V 6.3*11 KY</td><td>69.6°C</td><td>83.6°C</td></tr> <tr><td>16</td><td>C150</td><td>47u/50V 6.3*11 YXF</td><td>51.8°C</td><td>67.8°C</td></tr> <tr><td>17</td><td>C105</td><td>470u/35V UL7Kh 10*20 KY</td><td>55.7°C</td><td>70.3°C</td></tr> <tr><td>18</td><td>C108</td><td>470u/35V UL7Kh 10*20 KY</td><td>53.2°C</td><td>69.3°C</td></tr> <tr><td>19</td><td>Q101</td><td>IRF3415 43A/150V</td><td>70.9°C</td><td>84.7°C</td></tr> <tr><td>20</td><td>TSW1</td><td>ST-22W-R3 85°C 90mm</td><td>62.7°C</td><td>77.4°C</td></tr> </tbody> </table>	NO	Position		P/N	ROOM AMBIENT Ta= 27.1 °C	HIGH AMBIENT Ta= 43.1 °C	1	D2	3A/600V 1N5406 DO-201	92.0°C	106.0°C	2	D30	1A/1KV 1N4007	135.0°C	149.1°C	3	D150	1A/1KV 1N4007	64.3°C	79.3°C	4	LF2	TR653-R2	53.4°C	68.9°C	5	BD1	6A/800V US6KB80R-7000	61.6°C	76.6°C	6	L1	TR654-R4	62.0°C	76.7°C	7	L3	TF1965	55.5°C	70.8°C	8	C11	474/450V 10% P=10 MMX	58.0°C	73.3°C	9	D1	BYV29X-600 7A/600V	52.0°C	66.8°C	10	Q1	2SK4106 12A/500V	53.2°C	68.2°C	11	Q3	2SK3673-01MR 10A/700V	57.7°C	73.6°C	12	C5	100u/400V 105°C 18*25 KMG	66.5°C	80.8°C	13	T1	TF1958	102.0°C	118.1°C	14	C18	47u/50V 6.3*11 YXF	89.5°C	103.7°C	15	C61	47u/50V 6.3*11 KY	69.6°C	83.6°C	16	C150	47u/50V 6.3*11 YXF	51.8°C	67.8°C	17	C105	470u/35V UL7Kh 10*20 KY	55.7°C	70.3°C	18	C108	470u/35V UL7Kh 10*20 KY	53.2°C	69.3°C	19	Q101	IRF3415 43A/150V	70.9°C	84.7°C	20	TSW1	ST-22W-R3 85°C 90mm	62.7°C	77.4°C		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 123 % LOAD Ta : 25°C	TEST : OK	P																																																																																																									
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -40 °C	TEST : OK	P																																																																																																									
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 40°C HUMIDITY= 95 %R.H	TEST : OK	P																																																																																																									
5	TEMPERATURE COEFFICIENT	± 0.04 %(0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0 %(0-50°C)	P																																																																																																									
6	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	P																																																																																																									

7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -40°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/Full Load	OK	P
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	P
9	CAPACITOR LIFE CYCLE	MSP-100-24:SUPPOSE C105 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) 303588.6HRS (2) 118301.4HRS (3) 167292.3HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 295.7K HRS		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2012/8/1	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023