



TEST REPORT: MPM-30-48

30W High Reliable Green Medical Encapsulated Type

■ 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



30W High Reliable Green Medical Encapsulated Type MFM-30 series

DESIGN VERIFY TEST OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.0% ~ -2.0%	I/P : 80VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.44% ~ -0.40%
2	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 80VAC / 264VAC O/P: FULL LOAD TA: 25°C	V1: 0.00% ~ -0.02%
3	LOAD REGULATION(MAX.)	V1 : 0.5% ~ -0.5%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA: 25°C	V1: 0.02% ~ -0.02%
4	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA: 25°C	TEST< 2.1 %
5	RIPPLE & NOISE(Max)	V1 : 200 mVp-p	I/P : 230VAC O/P: FULL LOAD TA: 25°C	V1 : 62.4 mVp-p
			high frequency:	low frequency:
6	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 100ms 115VAC : 82ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	



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7	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 19.8ms 115VAC : 22.2ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
8	HOLD UP TIME (TYP.)	230VAC : 40ms 115VAC : 12ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 84.0ms 115VAC : 20.0ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	
9	DYNAMIC LOAD	V1 : 4800 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA: 25°C	V1: (1). 298mv (2). 296mv unit:mVp-p
	FULL /MIN LOAD 50%DUTY / 120HZ		FULL /MIN% LOAD 50%DUTY / 1KHZ	

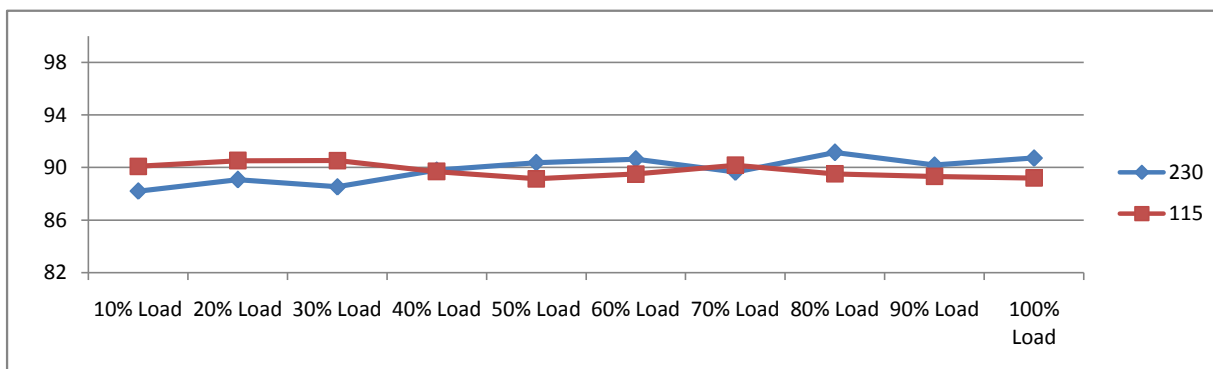


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INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	72.0VAC ~ 264VAC
			I/P : LOW-LINE = 97VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 80VAC ~ 264VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	0.50A / 230VAC 0.75A / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.32A / 230VAC I= 0.52A / 115VAC
4	LEAKAGE CURRENT	< 80.00μA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	46 μA
5	NO LOAD POWER CONSUMPTION	< 0.075W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0699 W
	EFFICIENCY (TYP.)	91.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	90.73 %

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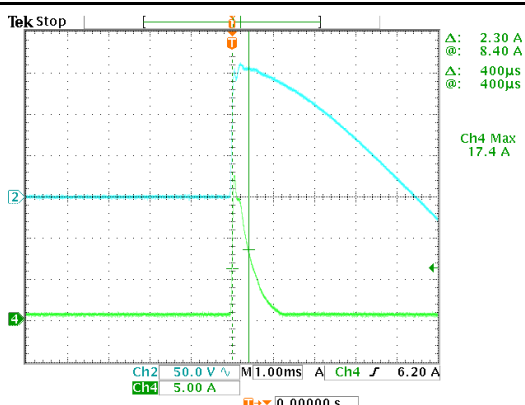
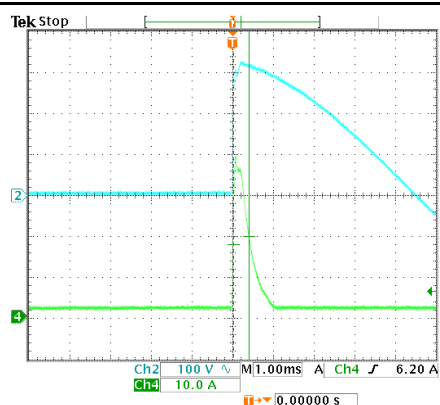


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INRUSH CURRENT (TYP.)	45A / 230VAC 25A / 115VAC twidth= 555 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 39.4A / 230VAC I= 17.4A / 115VAC T50= 380.0us / 230VAC
	INPUT=230VAC/50HZ @ FULL LOAD	INPUT=115VAC/50HZ @ FULL LOAD	

CH2 : AC Input Voltage CH4 : Input current

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PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	115% ~ 165%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta: 25°C	154.46% 264VAC 155.51% 230VAC 153.38% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	50.40V ~ 64.00V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD Ta: 25°C	56.60V 264VAC 56.60V 230VAC 57.00V 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

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q1 Rated : 600V 7.5A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 267VAC VDS: (1). 470.00V (2). 536.00V (3). 470.00V
2	O/P MOSFET	Q100 Rated : 400V 10.0A Rated :	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q100 VDS : (1). 326.00V (2). 336.00V (3). 326.00V
3	Input Capacitor	C5 Rated : 56uf 400V	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change (4)Full Load Continue Ta : 25°C	(1). 368.00V (2). 370.00V (3). 370.00V (4). 368.00V
4	Control IC	U1 Rated : 28V (max) -0.3 (min)	I/P : 267VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 (1). 21.60V (2). 12.10V (3). 21.40V (4). 24.50V (5). 20.80V
5	Clamp Diode	D5 Rated : 1000V 1.0A	I/P : 267VAC O/P : (1)Dynamic Load Full/Min Load (2)Full load continue Ta : 25°C	(1). 468.00V (2). 464.00V

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 4.000KVAC /min	I/P-O/P: 4.250KVAC /min Ta : 25°C	I/P-O/P: 0.95mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999.0MΩ 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



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2	CONDUCTION	EN55011 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55011 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 AIR: 15KV / Contact: 8KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 MEDICAL INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	EN61000-4-5 MEDICAL LINE-LINE:1KV	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 : MPM-30-24																																																																						
		1. ROOM AMBIENT BURN-IN : 1.0hrs																																																																						
		IP: 230VAC O/P: 100% LOAD TA= 29.2℃																																																																						
		2. HIGH AMBIENT BURN-IN : 1.0hrs																																																																						
		IP: 230VAC O/P: 100% LOAD TA= 61.3℃																																																																						
		<table><tr><td>NO.</td><td>Positio</td><td>ROOM AMBIENT 29.2℃</td><td>HIGH AMBIENT Ta: 61.3℃</td></tr><tr><td>1</td><td>LF1</td><td>56.0℃</td><td>83.8℃</td></tr><tr><td>2</td><td>LF2</td><td>57.4℃</td><td>84.6℃</td></tr><tr><td>3</td><td>C5</td><td>60.1℃</td><td>88.5℃</td></tr><tr><td>4</td><td>C40</td><td>58.8℃</td><td>87.5℃</td></tr><tr><td>5</td><td>BD1</td><td>61.2℃</td><td>89.1℃</td></tr><tr><td>6</td><td>R7</td><td>69.3℃</td><td>96.2℃</td></tr><tr><td>7</td><td>T1 COI</td><td>68.0℃</td><td>97.0℃</td></tr><tr><td>8</td><td>Q100</td><td>66.3℃</td><td>94.9℃</td></tr><tr><td>9</td><td>C105</td><td>63.0℃</td><td>91.6℃</td></tr><tr><td>10</td><td>L100</td><td>53.7℃</td><td>83.2℃</td></tr><tr><td>11</td><td>Q1</td><td>65.4℃</td><td>93.2℃</td></tr><tr><td>12</td><td>U1</td><td>60.5℃</td><td>86.9℃</td></tr><tr><td>13</td><td>D5</td><td>69.6℃</td><td>96.6℃</td></tr><tr><td>14</td><td>R40</td><td>65.3℃</td><td>93.0℃</td></tr><tr><td>60</td><td>TA</td><td>29.2℃</td><td>61.3℃</td></tr></table>				NO.	Positio	ROOM AMBIENT 29.2℃	HIGH AMBIENT Ta: 61.3℃	1	LF1	56.0℃	83.8℃	2	LF2	57.4℃	84.6℃	3	C5	60.1℃	88.5℃	4	C40	58.8℃	87.5℃	5	BD1	61.2℃	89.1℃	6	R7	69.3℃	96.2℃	7	T1 COI	68.0℃	97.0℃	8	Q100	66.3℃	94.9℃	9	C105	63.0℃	91.6℃	10	L100	53.7℃	83.2℃	11	Q1	65.4℃	93.2℃	12	U1	60.5℃	86.9℃	13	D5	69.6℃	96.6℃	14	R40	65.3℃	93.0℃	60	TA	29.2℃	61.3℃			
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2	OVER LOAD BURN-IN TEST	NO DAMAGE	I/P : 230VAC	TEST : OK																																																																				
		1 HOUR (MIN)	O/P : 164.0% LOAD Ta : 25℃																																																																					
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -40.0℃	TEST : OK																																																																				
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60℃ NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 60℃ HUMIDITY= 95.0% RH	TEST : OK																																																																				
5	TEMPERATURE COEFFICIENT	±0.03% /℃(0~60℃)	I/P : 230VAC O/P : FULL LOAD	±0.0039% /℃(0~60℃)																																																																				
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -50℃~ +125℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 100 CYCLE 5. Input/Output condition : STATIC		TEST : OK																																																																				
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45℃ ~ 65℃ 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 : 230VAC Full Load AC ON/OFF test turn on 3sec ; turn off 1sec @ 15CYCLE 230VAC Full Load AC ON turn on continue @ 1CYCLE		TEST : OK																																																																				
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (4) Acceleration : 2G (Blank) /5G (ST) (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25℃		TEST : OK																																																																				



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9	CAPACITOR LIFE CYCLE	:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25°C LIFE TIME (1). 348686.2 HRS (2) I/P : 230VAC O/P : FULL LOAD Ta= 60°C LIFE TIME (2). 39278.6 HRS (3) I/P : 230VAC O/P : 75% LOAD Ta= 60°C LIFE TIME (3). 53973.1 HRS (4) I/P : 230VAC O/P : 50% LOAD Ta= 60°C LIFE TIME (4). 92840.8 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 779K hrs min. MIL-HDBK-217F (25°C)
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): 30000HRS @ TA 60°C

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ