



TEST REPORT: MPM-30-5

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

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: 0.10% ~ -0.10%
2	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 80VAC / 264VAC O/P: FULL LOAD TA: 25°C	V1: 0.00% ~ 0.00%
3	LOAD REGULATION(MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA: 25°C	V1: 0.10% ~ -0.10%
4	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230VAC O/P: FULL LOAD TA: 25°C	TEST< 4.0 %
5	RIPPLE & NOISE(Max)	V1 : 80 mVp-p	I/P : 230VAC O/P: FULL LOAD TA: 25°C	V1 : 26.8 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 : 74ms 115VAC : 58ms

INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage Ch1 Pk-Pk 21.2mV Ch1 10.0mV/V M10.0μs A Ch1 21.4mV 26 Jun 2017 11:51:42 50.80 %		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage Ch1 Pk-Pk 26.8mV Ch1 10.0mV/V M4.00ms A Ch1 25.2mV 26 Jun 2017 11:50:01 50.80 %	
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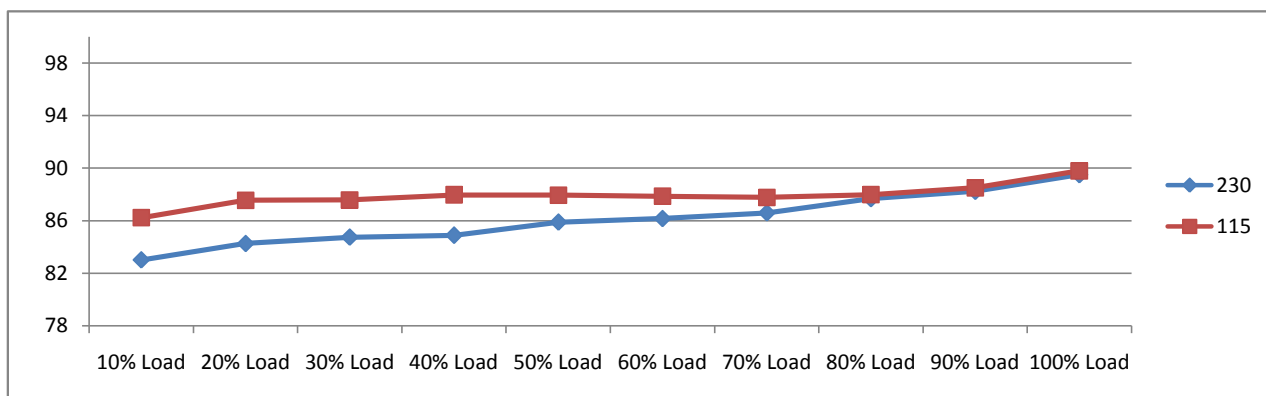
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage Ch1 1.00V Ch2 600V/V M100ms A Ch1 500mV 70.00 %		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage Ch1 1.00V Ch2 400V/V M100ms A Ch1 500mV 70.00 %	
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7	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC TA : 25°C	230VAC : 3.6ms 115VAC : 4.2ms
		INPUT=230VAC/50HZ @ 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 : 50.0ms 115VAC : 22.0ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		
9	DYNAMIC LOAD	V1 : 1000 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). 392mv (2). 272mv unit:mVp-p
		FULL /MIN LOAD 50%DUTY / 120HZ FULL /MIN% LOAD 50%DUTY / 1KHZ 		

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 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)	72.0VAC ~ 264VAC 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= 0.25A / 230VAC I= 0.47A / 115VAC
4	LEAKAGE CURRENT	< 80.00uA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	Touch current 51.3 μA
5	NO LOAD POWER CONSUMPTION	< 0.075W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0721 W
	EFFICIENCY (TYP.)	86.5%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	89.5 %

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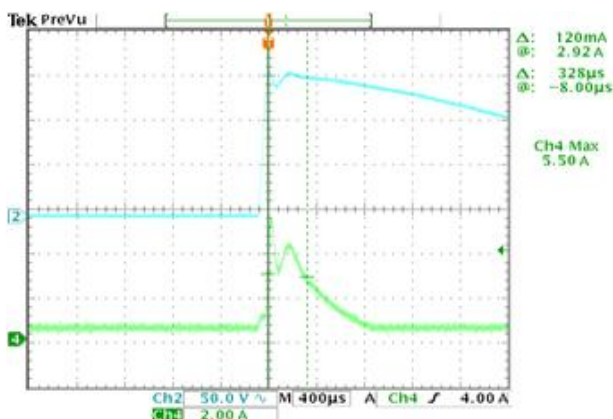
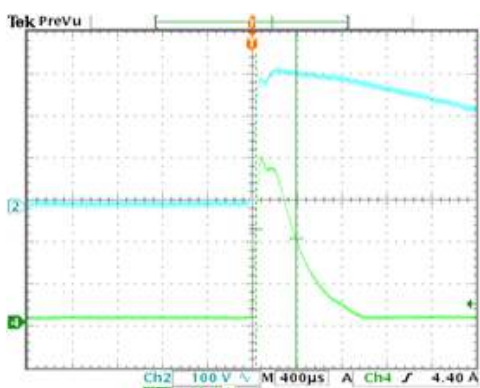
INRUSH CURRENT (TYP.)	45A / 230VAC 25A / 115VAC twidth= 555 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 39.6A / 230VAC I= 5.5A / 115VAC T50= 360.0us / 230VAC
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INPUT=230VAC/50HZ @ FULL LOAD

INPUT=115VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current

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	146.66% 264VAC 148.30% 230VAC 148.30% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	5.30V ~ 6.80V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD Ta: 25°C	6.45V 264VAC 6.42V 230VAC 6.39V 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 OK

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). 468.00V (2). 456.00V (3). 458.00V
2	O/P MOSFET	Q100 Rated : 60V 60.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q100 VDS : (1). 38.40V (2). 33.40V (3). 35.80V
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). 354.00V (2). 356.00V (3). 354.00V (4). 354.00V
4	Control IC	U1 Rated : 28V (max) -0.3 (min) U100 Rated : 38V (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 U100 (1). 20.40V 26.80V (2). 13.80V 20.40V (3). 20.80V 26.20V (4). 24.40V 28.40V (5). 18.20V 10.60V
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). 444.00V (2). 434.00V

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	EN55015 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 INDUSTRY 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-30-5 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><th>NO.</th><th>Position</th><th>ROOM AMBIENT 29.2℃</th><th>HIGH AMBIENT Ta: 61.3℃</th></tr><tr><td>1</td><td>LF1</td><td>52.4℃</td><td>81.9℃</td></tr><tr><td>2</td><td>LF2</td><td>53.1℃</td><td>81.9℃</td></tr><tr><td>3</td><td>C5</td><td>57.2℃</td><td>87.5℃</td></tr><tr><td>4</td><td>C40</td><td>61.0℃</td><td>91.5℃</td></tr><tr><td>5</td><td>BD1</td><td>63.1℃</td><td>92.6℃</td></tr><tr><td>6</td><td>R40</td><td>69.8℃</td><td>99.2℃</td></tr><tr><td>7</td><td>T1</td><td>66.4℃</td><td>97.9℃</td></tr><tr><td>8</td><td>Q100</td><td>61.7℃</td><td>93.1℃</td></tr><tr><td>9</td><td>C105</td><td>65.0℃</td><td>96.5℃</td></tr><tr><td>10</td><td>L100</td><td>58.2℃</td><td>89.1℃</td></tr><tr><td>11</td><td>Q1</td><td>63.4℃</td><td>93.8℃</td></tr><tr><td>12</td><td>U1</td><td>61.1℃</td><td>90.7℃</td></tr><tr><td>60</td><td>TA</td><td>29.2℃</td><td>61.3℃</td></tr></table>	NO.	Position	ROOM AMBIENT 29.2℃	HIGH AMBIENT Ta: 61.3℃	1	LF1	52.4℃	81.9℃	2	LF2	53.1℃	81.9℃	3	C5	57.2℃	87.5℃	4	C40	61.0℃	91.5℃	5	BD1	63.1℃	92.6℃	6	R40	69.8℃	99.2℃	7	T1	66.4℃	97.9℃	8	Q100	61.7℃	93.1℃	9	C105	65.0℃	96.5℃	10	L100	58.2℃	89.1℃	11	Q1	63.4℃	93.8℃	12	U1	61.1℃	90.7℃	60	TA	29.2℃	61.3℃	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 159.0% LOAD Ta : 25℃	TEST : OK																																																								
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	±0.0062% /℃(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																																																								



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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°C	TEST : OK
9	CAPACITOR LIFE CYCLE	: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= 60°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 60°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 60°C LIFE TIME	(1). 215470.2 HRS (2). 30493.9 HRS (3). 34062.7 HRS (4). 54721 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