



TEST REPORT: MPM-10-15

10W 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 : 2.5% ~ -2.5% | I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C | V1: 0.20% ~ -0.20% |
| 2 | LINE REGULATION (MAX.) | V1 : 0.3% ~ -0.3% | I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C | V1: 0.00% ~ 0.00% |
| 3 | LOAD REGULATION(MAX.) | V1 : 0.5% ~ -0.5% | I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C | V1: 0.00% ~ 0.00% |
| 4 | OVER/UNDERSHOOT TEST | < ±5% | I/P : 230VAC O/P: FULL LOAD TA : 25°C | TEST< 2.7 % |
| 5 | RIPPLE & NOISE(Max) | V1 : 180 mVp-p | I/P : 230VAC | V1 : 87 mVp-p |
| | | | O/P: FULL LOAD | |
| high frequency: | | | low frequency: | |
| | | | | |
| 6 | SET UP TIME (MAX.) | 230VAC : 1000ms 115VAC : 1000ms | I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C | 230VAC : 416ms 115VAC : 376ms |
| | | 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 : 14.6ms 115VAC : 14.6ms |
| | INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage | | INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage | |
| 8 | HOLD UP TIME (TYP.) | 230VAC : 40ms 115VAC : 8ms | I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C | 230VAC : 66.0ms 115VAC : 14.0ms |
| | 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 : 1500 mVp-p | I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA: 25°C | (1). 348mv (2). 356mv unit:mVp-p |
| | FULL /MIN LOAD 50%DUTY / 120HZ | | FULL /MIN% LOAD 50%DUTY / 1KHZ | |

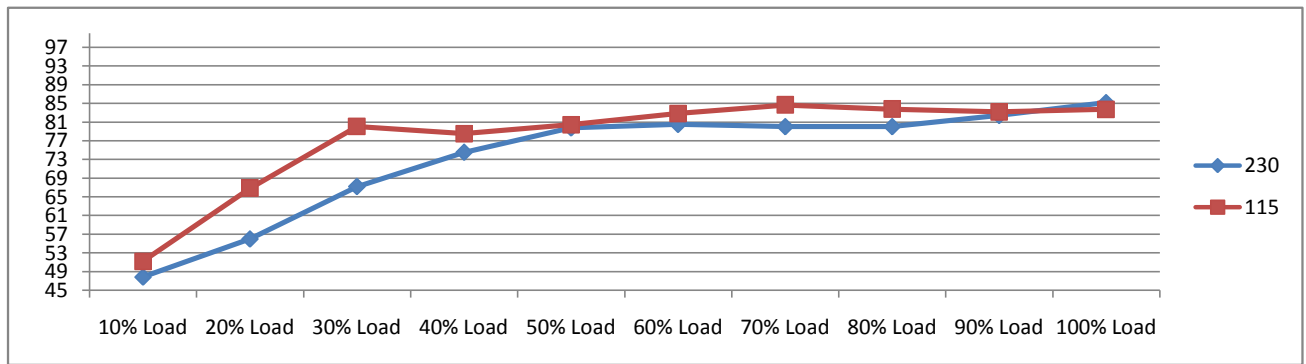
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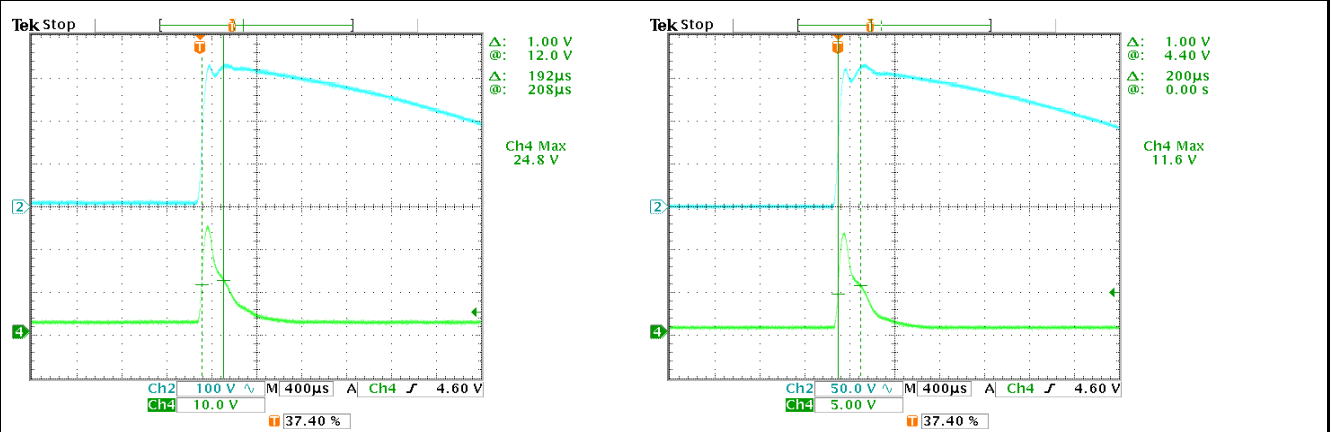
INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---------------------------|--------------------------------|--|--|
| 1 | INPUT VOLTAGE RANGE | 80VAC ~ 264VAC | I/P : TESTING O/P : FULL LOAD Ta : 25°C | 64.0VAC ~ 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 ~ 440HZ NO DAMAGE | I/P : 100VAC ~ 264VAC O/P : FULL-MIN LOAD Ta : 25°C | TEST : OK |
| 3 | INPUT CURRENT (TYP.) | 0.2A / 230VAC 0.3A / 115VAC | I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C | I= 0.083A / 230VAC I= 0.147A / 115VAC |
| 4 | LEAKAGE CURRENT | < 0.08mA | I/P : 264VAC O/P : MIN LOAD TA : 25°C | 0.0275 mA |
| 5 | NO LOAD POWER CONSUMPTION | < 0.075W | I/P : 230VAC O/P : MIN LOAD TA : 25°C | < 0.0521 W |
| | EFFICIENCY (TYP.) | 83.0% | I/P : 230VAC O/P : FULL LOAD TA : 25°C | 85.17 % |



| | | | | |
|---|-----------------------|--|--|---|
| 7 | 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= 24.8A / 230VAC I= 11.6A / 115VAC T50= 192.0us / 230VAC |
| | | INPUT=230VAC/50HZ @ FULL LOAD | INPUT=115VAC/50HZ @ FULL LOAD | |

CH2 : AC Input Voltage CH4 : Input current (1V=1A) CH2 : AC Input Voltage CH4 : Input current (1V=1A)





PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------------|--|---|---|
| 1 | OVER LOAD PROTECTION | 110% ~ 180% | I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING TA: 25°C | 159.00% 264VAC 154.40% 230VAC 143.00% 100VAC Hiccup Mode |
| 2 | OVER VOLTAGE PROTECTION | 17.30V ~ 20.30V | TA: 25°C | 18.30V Shut off o/p voltage,damping by zener diode |
| 3 | 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 |
| 4 | 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 | U1 Rated : 800V 2.0A | 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). 496.00V (2). 490.00V (3). 498.00V |
| 2 | O/P Diode | D100 Rated : 120V 10.0A | I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue | D100 VDS : (1). 102.00V (2). 92.40V (3). 103.00V |
| 3 | Input Capacitor | C5 Rated : 10uf 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). 388.00V (2). 388.00V (3). 388.00V (4). 386.00V |
| 4 | Control IC | U1 Rated : 27V (max) -0.3V (min) | I/P : 267VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)Low Line No Load Vo(min) Ta : 25°C | U1 (1). 17.70V (2). 17.10V (3). 18.20V (4). 19.00V |
| 5 | Clamp Diode | D2 Rated : 1000V 1.0A | I/P : 267VAC O/P : (1)Dynamic Load Full/Min Load (2)Full load continue Ta : 25°C | (1). 464.00V (2). 466.00V |

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: 0.60mA 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: 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 | 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 INPUT: 2KV | I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C | CRITERIA A |
| 6 | SURGE | IEC61000-4-5 L-N: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-10-15 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 21.1°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 61.0°C | <table border="1"> <thead> <tr> <th>NO.</th> <th>Position</th> <th>ROOM AMBIENT 21.1°C</th> <th>HIGH AMBIENT Ta: 61.0°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C4</td><td>45.7°C</td><td>82.3°C</td></tr> <tr><td>2</td><td>C5</td><td>48.7°C</td><td>84.8°C</td></tr> <tr><td>3</td><td>C37</td><td>45.8°C</td><td>82.1°C</td></tr> <tr><td>4</td><td>R1</td><td>48.0°C</td><td>84.5°C</td></tr> <tr><td>5</td><td>U1</td><td>57.7°C</td><td>93.0°C</td></tr> <tr><td>6</td><td>T1</td><td>52.0°C</td><td>88.0°C</td></tr> <tr><td>7</td><td>C101</td><td>43.0°C</td><td>83.7°C</td></tr> <tr><td>8</td><td>D100</td><td>47.4°C</td><td>84.6°C</td></tr> <tr><td>9</td><td>BD1</td><td>43.9°C</td><td>81.0°C</td></tr> <tr><td>10</td><td>D2</td><td>56.5°C</td><td>93.3°C</td></tr> <tr><td>60</td><td>TA</td><td>21.1°C</td><td>61.0°C</td></tr> </tbody> </table> | NO. | Position | ROOM AMBIENT 21.1°C | HIGH AMBIENT Ta: 61.0°C | 1 | C4 | 45.7°C | 82.3°C | 2 | C5 | 48.7°C | 84.8°C | 3 | C37 | 45.8°C | 82.1°C | 4 | R1 | 48.0°C | 84.5°C | 5 | U1 | 57.7°C | 93.0°C | 6 | T1 | 52.0°C | 88.0°C | 7 | C101 | 43.0°C | 83.7°C | 8 | D100 | 47.4°C | 84.6°C | 9 | BD1 | 43.9°C | 81.0°C | 10 | D2 | 56.5°C | 93.3°C | 60 | TA | 21.1°C | 61.0°C | |
| NO. | Position | ROOM AMBIENT 21.1°C | HIGH AMBIENT Ta: 61.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | C4 | 45.7°C | 82.3°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | C5 | 48.7°C | 84.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | C37 | 45.8°C | 82.1°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | R1 | 48.0°C | 84.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | U1 | 57.7°C | 93.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | T1 | 52.0°C | 88.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | C101 | 43.0°C | 83.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | D100 | 47.4°C | 84.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | BD1 | 43.9°C | 81.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | D2 | 56.5°C | 93.3°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | TA | 21.1°C | 61.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | I/P : 230VAC O/P : 136.09% LOAD Ta : 25°C | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | LOW TEMPERATURE TURN ON TEST | NO DAMAGE 1 HOUR (MIN) | I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -35.0°C | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 60°C NO DAMAGE | I/P : 272VAC O/P : FULL LOAD Ta : 60°C HUMIDITY= 95.0% RH | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | TEMPERATURE COEFFICIENT | ±0.03% /(0°C~60°C) | I/P : 230VAC O/P : FULL LOAD | ±0.0032% /(0°C~60°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | STORAGE TEMPERATURE TEST | 1. Thermal shock Temperature : -50°C ~ +125°C 2. Temperature change rate : 25°C / 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 : -35°C ~ +65°C 2. Temperature change rate : 25°C / 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 : 5G (5) Test Time : 60 min in each axis (X.Y.Z) (6) Ta : 25°C | | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



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|----|------------------------------|---|-----------------|------------|-----------|------|-------------|
| 9 | CAPACITOR LIFE CYCLE | :SUPPOSE C101 IS THE MOST CRITICAL COMPONENT | | | | | |
| | | (1) I/P : 230VAC | O/P : FULL LOAD | Ta= 25.0°C | LIFE TIME | (1). | 449361 HRS |
| | | (2) I/P : 230VAC | O/P : FULL LOAD | Ta= 60.0°C | LIFE TIME | (2). | 37566.9 HRS |
| | | (3) I/P : 230VAC | O/P : 75% LOAD | Ta= 60.0°C | LIFE TIME | (3). | 42504 HRS |
| | | (4) I/P : 230VAC | O/P : 50% LOAD | Ta= 60.0°C | LIFE TIME | (4). | 68548.3 HRS |
| 10 | MTBF | Conducted by Parts Stress Analysis Prediction 9314.1K hrs min. Telcordia SR-332 (Bellcore) ; 1756.2K hrs min. MIL-HDBK-217F (25°C) | | | | | |
| 11 | DMTBF /Accelerated Life test | Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA | | | | 60°C | |

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|-------------|--------|--------|----------|
| TEST RESULT | TESTER | REVIEW | APPROVAL |
| PASS | LIUTT | | WANGDZ |