

MODEL : MDR-60-24

OUTPUT FUNCTION TEST

| NO | TEST ITEM                   | SPECIFICATION                                 | TEST CONDITION  | RESULT   | VERDICT |
|----|-----------------------------|---|---|--|---------|
| 1  | RIPPLE & NOISE              | V1: 150 mVp-p (Max)                           | I/P: 230VAC<br>O/P:FULL LOAD<br>Ta:25°C                       | V1: 15 mVp-p (Max)                                   | P       |
| 2  | OUTPUT VOLTAGE ADJUST RANGE | CH1: 24 V~ 30V                                | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:MIN LOAD<br>Ta:25°C       | 22.81 V~ 31.6 V/ 230 VAC<br>22.81 V~ 31.6 V/ 115 VAC | P       |
| 3  | OUTPUT VOLTAGE TOLERANCE    | V1: 1 %- -1 % (Max)                           | I/P: 100VAC / 264 VAC<br>O/P:FULL/ MIN LOAD<br>Ta:25°C        | V1: 0.08 %- -0.08 %                                  | P       |
| 4  | LINE REGULATION             | V1: 1 %- -1 % (Max)                           | I/P: 100VAC ~ 264 VAC<br>O/P:FULL LOAD<br>Ta:25°C             | V1: 0 %- 0 %   | P       |
| 5  | LOAD REGULATION             | V1: 1 %- -1 % (Max)                           | I/P: 230 VAC<br>O/P:FULL ~MIN LOAD<br>Ta:25°C                 | V1: 0.08 %- -0.08 %                                  | P       |
| 6  | SET UP TIME                 | 230VAC: 500 ms (Max)<br>115 VAC: 500 ms (Max) | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C      | 230VAC/ 270 ms<br>115VAC/ 183 ms                     | P       |
| 7  | RISE TIME                   | 230VAC: 30 ms (Max)<br>115VAC: 30 ms (Max)    | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C      | 230VAC/ 11 ms<br>115VAC/ 11 ms                       | P       |
| 8  | HOLD UP TIME                | 230VAC: 50 ms (TYP)<br>115VAC: 20 ms (TYP)    | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C      | 230VAC/ 101 ms<br>115VAC/ 21.9 ms                    | P       |
| 9  | OVER/UNDERSHOOT TEST        | < ±5%   | I/P: 230 VAC<br>O/P:FULL LOAD<br>Ta:25°C                      | TEST: <5 %   | P       |
| 10 | DYNAMIC LOAD                | V1: 2400 mVp-p                                | I/P: 230 VAC<br>O/P:FULL /Min LOAD<br>90%DUTY/1KHZ<br>Ta:25°C | 177 mVp-p  | P       |

INPUT FUNCTION TEST

| NO | TEST ITEM             | SPECIFICATION                                      | TEST CONDITION   | RESULT                                     | VERDICT |
|----|-----------------------|--|--|--|---------|
| 1  | INPUT VOLTAGE RANGE   | 85VAC~264 VAC                                      | I/P:TESTING<br>O/P:FULL LOAD<br>Ta:25°C  | 50V~264V                                   | P       |
|    |                       |  | I/P:<br>LOW-LINE-3V= 82 V<br>HIGH-LINE+15%=300 V<br>O/P:FULL/MIN LOAD<br>ON: 30 Sec . OFF: 30 Sec 10MIN<br>( AC POWER ON/OFF NO DAMAGE ) | TEST: OK                                   |         |
| 2  | INPUT FREQUENCY RANGE | 47HZ ~63 HZ<br>NO DAMAGE OSC                       | I/P: 85 VAC ~ 264 VAC<br>O/P:FULL~MIN LOAD<br>Ta:25°C  | TEST: OK                                   | P       |
| 3  | EFFICIENCY            | 88 % (TYP)   | I/P: 230 VAC<br>O/P:FULL LOAD<br>Ta:25°C   | 88.3%                                      | P       |
| 4  | INPUT CURRENT         | 230V/ 1 A (TYP)<br>115V/ 1.8 A (TYP)               | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C   | I = 0.61 A/ 230 VAC<br>I = 1.09 A/ 115 VAC | P       |
| 5  | INRUSH CURRENT        | 230V/ 60 A (TYP)<br>115V/ 30 A (TYP)<br>COLD START | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C   | I = 52 A/ 230 VAC<br>I = 26 A/ 115 VAC     | P       |
| 6  | LEAKAGE CURRENT       | < 1 mA / 240 VAC                                   | I/P: 254 VAC<br>O/P:Min LOAD<br>Ta:25°C  | L-FG: 0.64 mA<br>N-FG: 0.64 mA             | P       |

PROTECTION FUNCTION TEST

| NO | TEST ITEM               | SPECIFICATION                          | TEST CONDITION  | RESULT  | VERDICT |
|----|-------------------------|--|---|---|---------|
| 1  | OVER LOAD PROTECTION    | 105 %~ 150 %                           | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:TESTING<br>Ta:25°C  | 121 % / 230 VAC<br>120 % / 115 VAC<br>Constant Current Limiting | P       |
| 2  | OVER VOLTAGE PROTECTION | CH1: 31.2V~ 36V                        | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:MIN LOAD<br>Ta:25°C | 33.6 V/ 230 VAC<br>33.6 V/ 115 VAC<br>Shunt down Re- power ON   | P       |
| 3  | SHORT PROTECTION        | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE | I/P: 264 VAC<br>O/P:FULL LOAD<br>Ta:25°C                | NO DAMAGE<br>Constant Current Limiting                          | P       |

CONTROL FUNCTION TEST

| NO | TEST ITEM                  | SPECIFICATION | TEST CONDITION   | RESULT                            | VERDICT |
|----|----------------------------|---------------|--|-----------------------------------|---------|
| 1  | NO LOAD POWER CON SUMPTION | <0.75W        | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:NO LOAD<br>Ta:25°C | 230 VAC/ 0.68 W<br>115 VAC/ 0.6 W | P       |
| 2  | DC OK SIGNAL               | 30V/ 1A       | I/P: 230 VAC<br>O/P: FULL LOAD<br>Ta:25°C              | OK                                | P       |

ENVIRONMENT TEST

| NO | TEST ITEM   | SPECIFICATION  | TEST CONDITION   | RESULT            | VERDICT |
|----|---|--|--|-------------------|---------|
| 1  | TEMPERATURE RISE TEST   | MODEL : MDR-60-24<br>1. ROOM AMBIENT BURN-IN : 1 HRS<br>I/P: 230VAC O/P: FULL LOAD Ta=29.5 °C<br>2. HIGH AMBIENT BURN-IN : 2 HRS<br>I/P: 230VAC O/P: FULL LOAD Ta=55.6 °C                    |  |                   | P       |
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| 2  | OVER LOAD BURN-IN TEST  | NO DAMAGE<br>1 HOUR ( MIN )  | I/P: 230 VAC<br>O/P:124 % LOAD<br>Ta:25°C                      | TEST : OK         | P       |
| 3  | LOW TEMPERATURE<br>TURN ON TEST                                   | TURN ON AFTER 2 HOUR   | I/P: 230 VAC<br>O/P: 100 % LOAD<br>Ta= -20°C                   | TEST : OK         | P       |
| 4  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 60°C<br>NO DAMAGE   | I/P: 272 VAC<br>O/P:FULL LOAD<br>Ta= 60°C<br>HUMIDITY= 95 %R.H | TEST : OK         | P       |
| 5  | TEMPERATURE<br>COEFFICIENT  | ± 0.03 %(0-50°C)   | I/P: 230 VAC<br>O/P:FULL LOAD                                  | ± 0.021 %(0-50°C) | P       |
| 6  | VIBRATION TEST  | 1 Carton & 1 Set<br>(1) Waveform: Sine Wave<br>(2) Frequency:10-500Hz<br>(3) Sweep Time:10min/sweep cycle<br>(4) Acceleration:2G<br>(5) Test Time:1 hour in each axis (X.Y.Z)<br>(6) Ta:25°C |  | TEST : OK         | P       |

**SAFETY TEST**

| NO | TEST ITEM            | SPECIFICATION   | TEST CONDITION   | RESULT  | VERDICT |
|----|----------------------|---|--|---|---------|
| 1  | WITHSTAND VOLTAGE    | I/P-O/P: 3 KVAC/min<br>I/P-FG: 1.5 KVAC/min<br>O/P-FG: 0.5 KVAC/min | I/P-O/P: 3.6 KVAC/min<br>I/P-FG: 1.8 KVAC/min<br>O/P-FG: 0.6 KVAC/min<br>Ta:25°C | I/P-O/P: 6.07 mA<br>I/P-FG: 4.97 mA<br>O/P-FG: 3.24 mA<br>NO DAMAGE | P       |
| 2  | ISOLATION RESISTANCE | I/P-O/P:500VDC>100MΩ<br>I/P-FG: 500VDC>100MΩ<br>O/P-FG:500VDC>100MΩ | I/P-O/P: 500 VDC<br>I/P-FG: 500 VDC<br>O/P-FG: 500 VDC<br>Ta:25°C                | I/P-O/P: 4 GΩ<br>I/P-FG: 5 GΩ<br>O/P-FG: 6 GΩ<br>NO DAMAGE          | P       |
| 3  | GROUNDING CONTINUITY | FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ                              | 40 A / 2min<br>Ta:25°C   | 14 mΩ   | P       |
| 4  | APPROVAL             | TUV: Certificate NO : R50100751<br>UL: File NO : E215312 / E183223  |  |   | P       |

**E.M.C TEST**

| NO | TEST ITEM                                   | SPECIFICATION                                      | TEST CONDITION                                      | RESULT                        | VERDICT |
|----|---|--|---|-------------------------------|---------|
| 1  | HARMONIC                                    | EN61000-3-2<br>CLASS A                             | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C       | PASS                          | P       |
| 2  | CONDUCTION                                  | EN55022<br>CLASS B                                 | I/P: 230 VAC (50HZ)<br>O/P:FULL/50% LOAD<br>Ta:25°C | PASS<br>Test by certified Lab | P       |
| 3  | RADIATION                                   | EN55022<br>CLASS B                                 | I/P: 230 VAC (50HZ)<br>O/P:FULL LOAD<br>Ta:25°C     | PASS<br>Test by certified Lab | P       |
| 4  | E.S.D                                       | EN61000-4-2<br>INDUSTRY<br>AIR:8KV / Contact:4KV   | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C       | CRITERIA A                    | P       |
| 5  | E.F.T                                       | EN61000-4-4<br>INDUSTRY<br>INPUT: 2KV              | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C       | CRITERIA A                    | P       |
| 6  | SURGE                                       | IEC61000-4-5<br>INDUSTRY<br>L-N :2KV<br>L,N-PE:4KV | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C       | CRITERIA A                    | P       |
| 7  | Test by certified Lab & Test Report Prepare |  |   |                               |         |

**M.T.B.F & LIFE CYCLE CALCULATION**

| NO | TEST ITEM                   | SPECIFICATION   | TEST CONDITION | RESULT | VERDICT |
|----|-----------------------------|---|----------------|--------|---------|
| 1  | CAPACITOR<br>LIFE CYCLE     | MDR-60-24: SUPPOSE C105 IS THE MOST CRITICAL COMPONENT<br>I/P: 230VAC O/P:FULL LOAD Ta= 25°C LIFE TIME=413612 HRS<br>I/P: 230VAC O/P:FULL LOAD Ta= 60°C LIFE TIME=56593 HRS |                |        | P       |
| 2  | MTBF                        | MIL-HDBK-217F NOTICES2 PARTS COUNT<br>TOTAL FAILURE RATE: 299.2KHRS   |                |        | P       |
| 3  | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure : Above 30,000 hours @ TA 55°C  |                |        | P       |

**COMPONENT STRESS TEST**

| NO | TEST ITEM   | SPECIFICATION                       | TEST CONDITION   | RESULT                                    | VERDICT |
|----|---|-------------------------------------|--|---|---------|
| 1  | Power Transistor<br>( D to S) or (C to E) <b>Peak Voltage</b> | Q1 Rated<br>STP9NK70 : 700V 7.5A    | I/P:High-Line +3V = 267 V<br>O/P: (1)Full Load Turn on<br>(2) Output Short<br>Ta:25°C  | (1) 578 V<br>(2) 570 V                    | P       |
| 2  | Diode <b>Peak Voltage</b>                                     | D100 Rated<br>BYQ28X-200 : 10A/200V | I/P:High-Line +3V = 267 V<br>O/P: (1)Full Load Turn on<br>(2)Output Short<br>Ta:25°C   | (1) 184 V<br>(2) 186 V                    | P       |
| 3  | Clamp Diode <b>Peak Voltage</b>                               | D1 Rated<br>EGP20J : 600V 2A        | I/P:High-Line +3V = 267 V<br>O/P: (1) Dynamic Load<br>90%Duty/1KHz<br>Ta:25°C  | (1) 502 V                                 | P       |
| 4  | <b>Input Capacitor Voltage</b>                                | C5 Rated<br>:150u / 400V/ 105°C     | I/P:High-Line +3V = 267 V<br>O/P: (1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load Change<br>Ta:25°C | (1) 376 V<br>(2) 378 V<br>(3) 378 V       | P       |
| 5  | <b>Control IC Voltage Test</b>                                | U1 Rated<br>1200D60R2G : 16V        | I/P:High-Line +3V = 267 V<br>O/P: (1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load Change<br>Ta:25°C | (1) 11.92 V<br>(2) 10.86 V<br>(3) 11.92 V | P       |

| DATE       | SAMPLE                     | TEST RESULT | TESTER        | APPROVAL |
|------------|----------------------------|-------------|---------------|----------|
| 2006/12/14 | RD SAMPLE                  | PASS        | VINCENT TSENG | MAX LIN  |
| 2007/3/6   | PRODUCT SAMPLE<br>W0701B07 | PASS        | VINCENT TSENG | MAX LIN  |
| 2007/5/9   | PRODUCT SAMPLE<br>W0703A07 | PASS        | VINCENT TSENG | MAX LIN  |

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