# MMK35LB160HB

**Half Controlled Single Phase Rectifier Bridge**

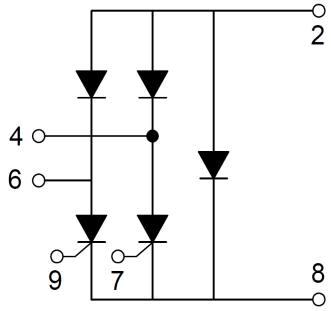
**May 2015** **Version 01** **RoHS Compliant**

## PRODUCT FEATURES

- Electrically Isolated by DBC Ceramic
- High Surge Current Capability
- Low Inductance Package

## APPLICATIONS

- DC Motor Control and Drives
- Supply for DC power Equipment





## MAXIMUM VOLTAGE RATINGS

*$T_C$=25°C unless otherwise specified*

| Symbol | Parameter/Test Conditions | Values | Unit |
|---|---|---|---|
| | | MMK35LB160HB | |
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 1600 | V |
| $V_{DRM}$ | Repetitive Peak Off State Voltage | 1600 | |
| $V_{RSM}$ | Non-Repetitive Peak Reverse Voltage | 1700 | |

## ABSOLUTE MAXIMUM RATINGS (Thyristor)

| Symbol | Parameter/Test Conditions | | Values | Unit |
|---|---|---|---|---|
| $I_{T(AV)}$ | Average On State Current | Single phase, half wave, 180°conduction, Tc= 95℃ | 35 | A |
| $I_{T(RMS)}$ | R.M.S. On State Current | | 55 | |
| $I_{TSM}$ | Non-Repetitive Surge On-State Current | 1/2 cycle, 50/60HZ, peak value, Tc =45℃ | 450/500 | |
| $I^2t$ | For Fusing | 1/2 cycle, 50/60HZ, peak value ,Tc =45℃ | 1012/1037 | $A^2S$ |
| $T_J$ | Junction Temperature(Thyristor) | | -40 to +125 | ℃ |

## ABSOLUTE MAXIMUM RATINGS (Diode)

| Symbol | Parameter/Test Conditions | | Values | Unit |
|---|---|---|---|---|
| $I_{F(AV)}$ | Average Forward Current | Single phase, half wave, 180°conduction, Tc= 105 ℃ | 35 | A |
| $I_{F(RMS)}$ | R.M.S. Forward Current | | 55 | |
| $I_{FSM}$ | Non-Repetitive Surge Forward Current | 1/2 cycle, 50/60HZ, peak value, Tc =45℃ | 600/650 | |
| $I^2t$ | For Fusing | 1/2 cycle, 50/60HZ, peak value ,Tc =45℃ | 1800/1753 | $A^2S$ |
| $T_J$ | Junction Temperature(Diode) | | -40 to +150 | ℃ |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## ELECTRICAL CHARACTERISTICS (Thyristor)

*$T_C$=25°C unless otherwise specified*

| Symbol | Parameter/Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{DRM}$ | Maximum Peak Off-State Current | $V_D = V_{DRM}$, $T_J$ = 125℃ | | | 25 | mA |
| $I_{RRM}$ | Maximum Peak Reverse Current | $V_R = V_{RRM}$, $T_J$ = 125℃ | | | 25 | |
| $V_{TM}$ | Maximum on-state voltage drop | $I_{TM}$=110A,td=10 ms, half sine | | | 1.75 | V |
| $V_{TO}$ | For power-loss calculations only | $T_J$ = 125℃ | | | 0.97 | V |
| $r_T$ | | | | | 8.8 | mΩ |
| $V_{GT}$ | Max. required DC gate voltage to trigger | $V_A$=6V, $R_A$=1Ω,$T_J$ = -40℃ | | | 4.0 | V |
| | | $V_A$=6V, $R_A$=1Ω | | 1.0 | 2.5 | |
| | | $V_A$=6V, $R_A$=1Ω,$T_J$ = 125℃ | | | 1.7 | |
| $I_{GT}$ | Max. required DC gate current to trigger | $V_A$=6V, $R_A$=1Ω,$T_J$ = -40℃ | | | 270 | mA |
| | | $V_A$=6V, $R_A$=1Ω | | 75 | 150 | |
| | | $V_A$=6V, $R_A$=1Ω,$T_J$ = 125℃ | | | 80 | |
| $V_{GD}$ | Max. required DC gate voltage not to trigger,$V_D = V_{DRM}$, $T_J$ = 125℃ | | | | 0.25 | V |
| $I_{GD}$ | Max. required DC gate current not to trigger,$V_D = V_{DRM}$, $T_J$ = 125℃ | | | | 6 | mA |
| $I_H$ | Maximum holding current | | | 100 | 200 | mA |
| $I_L$ | Maximum latching current | | | 200 | 400 | mA |
| $P_{GM}$ | Maximum peak gate power | | | | 10 | W |
| $P_{G(AV)}$ | Maximum average gate power | | | | 2.5 | |
| $I_{GM}$ | Maximum peak gate current | | | | 2.5 | A |
| $-V_{GM}$ | Maximum peak negative gate voltage | | | | 10 | V |
| dv/dt | Critical Rate of Rise of Off-State Voltage,$T_J$=125℃,exponential to 67% rated $V_{DRM}$ | | | | 1000 | V/μs |
| di/dt | Max.Rate of Rise of Turned-on Current, $T_J$ =125℃,$I_{TM}$=110A, rated $V_{DRM}$ | | | | 150 | A/μs |

## ELECTRICAL CHARACTERISTICS (Diode)

| Symbol | Parameter/Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{RM}$ | Maximum Reverse Leakage Current | $V_R = V_{RRM}$ | | | 0.5 | mA |
| | | $V_R = V_{RRM}$, $T_J$ = 125℃ | | | 10 | |
| $V_F$ | Forward Voltage Drop | $I_F$=35A | | 1.02 | 1.25 | V |
| $V_{TO}$ | For power-loss calculations only , $T_J$ = 125℃ | | | | 0.88 | V |
| $r_T$ | | | | | 8.5 | mΩ |

## MODULE CHARACTERISTICS

*$T_C$=25°C unless otherwise specified*

| | | | | |
|---|---|---|---|---|
| $T_J$ | Junction Temperature | | -40 to +125 | ℃ |
| $T_{STG}$ | Storage Temperature Range | | -40 to +125 | ℃ |
| $V_{ISO}$ | Isolation Breakdown Voltage | AC, 50Hz(R.M.S), t=1minute | 3000 | V |
| Torque | to heatsink | Recommended（M5） | 2.5～5 | N.m |
| $R_{th(J-C)}$ | Junction-to-Case Thermal Resistance(Per Thyristor/Per Diode) | | 0.6/1.0 | K /W |
| Weight | | | 85 | g |

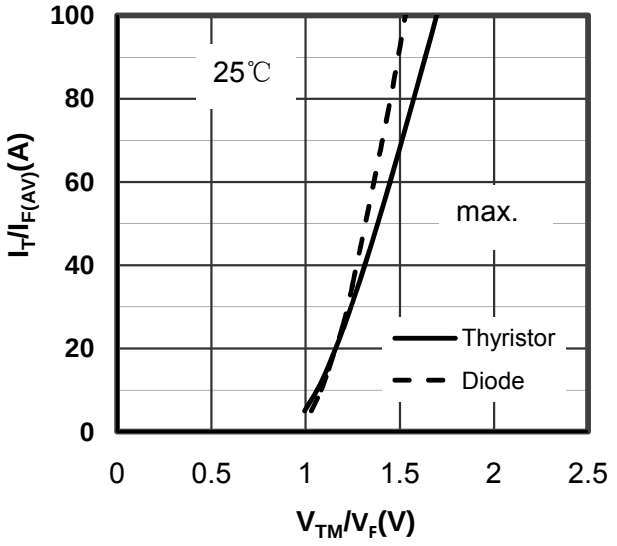



**Figure1. Forward Voltage Drop vs Forward Current**

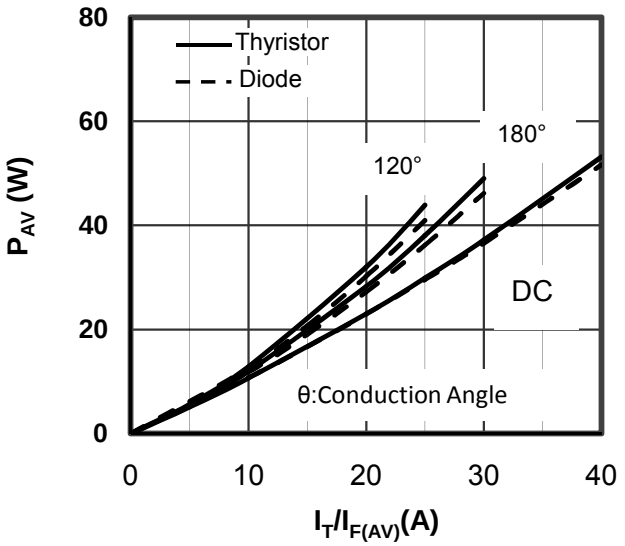



**Figure2. Power dissipation vs. $I_T/I_{F(AV)}$**

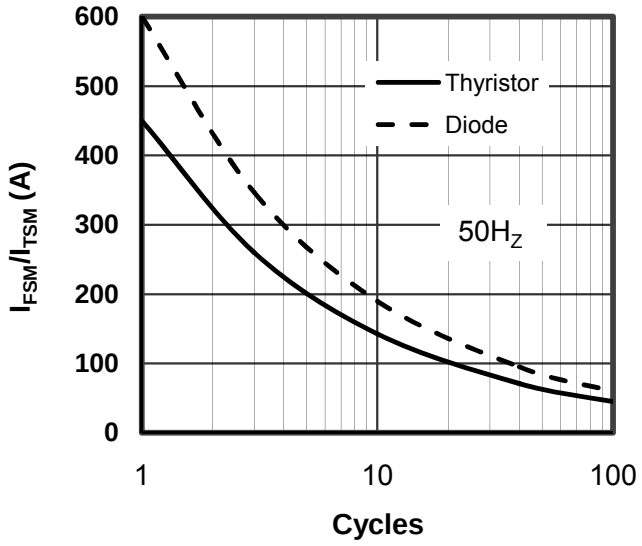



**Figure3. Diode and SCR Max Non-Repetitive Surge**

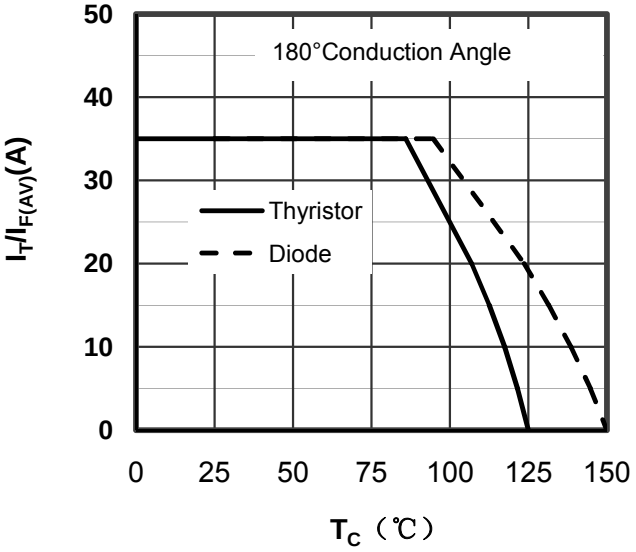



**Figure4. Diode $I_{F(AV)}$ and SCR $I_{T(AV)}$vs.$T_C$**

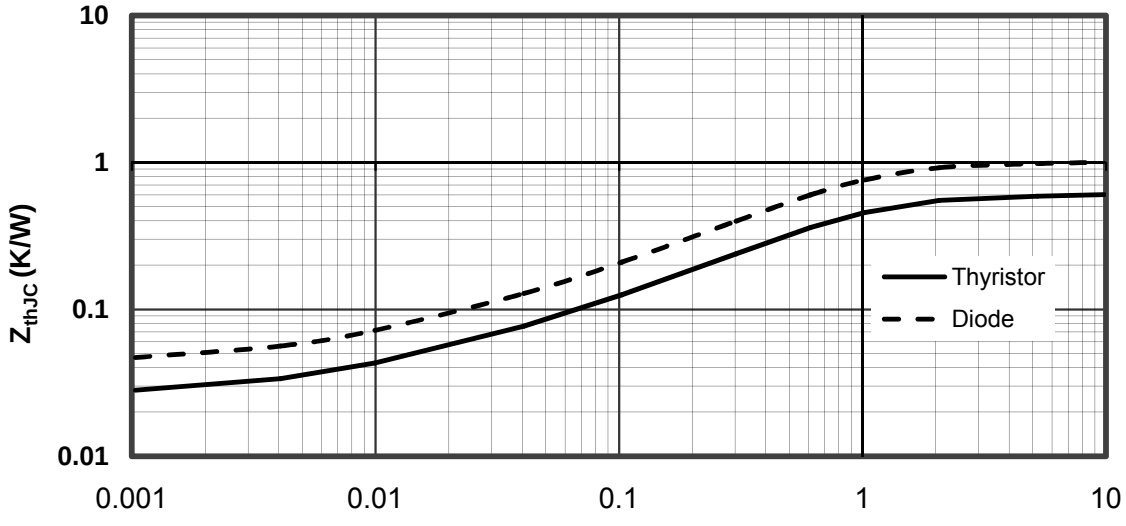



**Figure5. Transient Thermal Impedance of Diode and SCR**

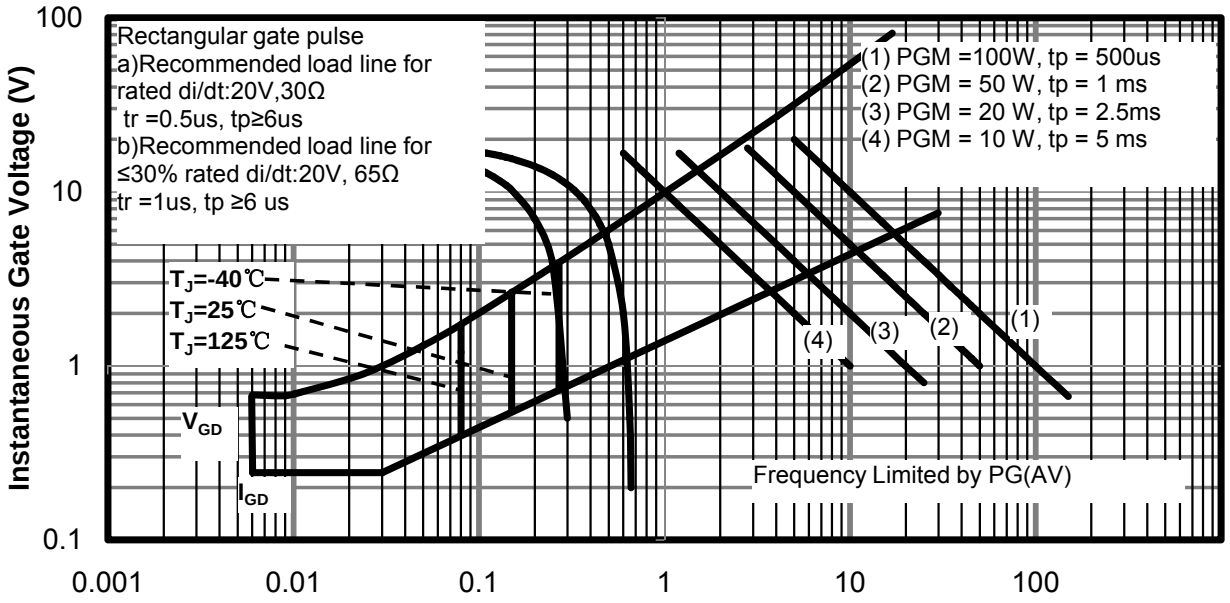
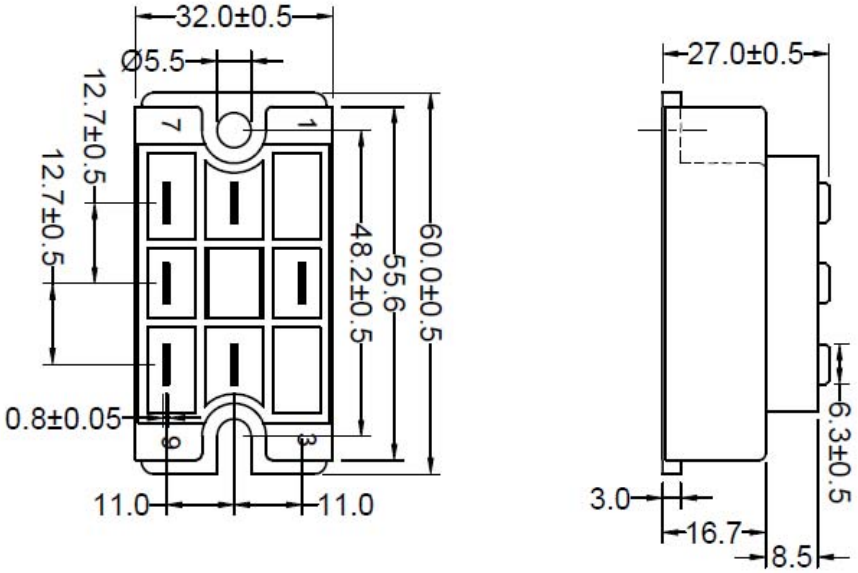



**Figure 6. SCR Gate Characteristics**




**Dimensions in (mm)**

**Figure7. Package Outline**