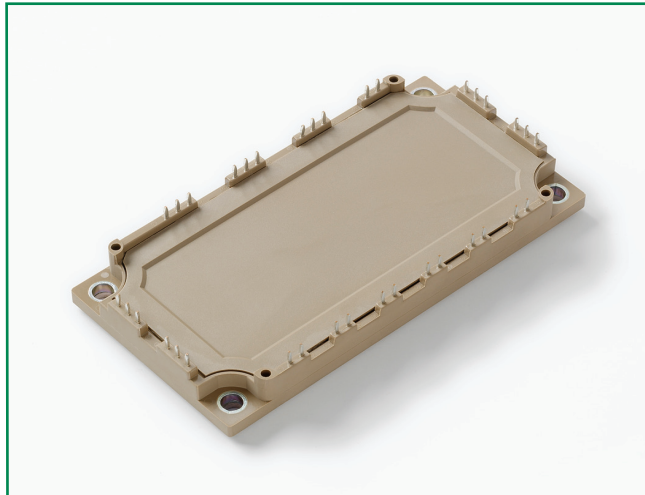


MG1275W-XN2MM

RoHS



### Features

- High level of integration
- IGBT<sup>3</sup> CHIP(Trench+Field Stop technology)
- Low saturation voltage and positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Solderable pins for PCB mounting
- Temperature sense included

### Applications

- AC motor control
- Motion/servo control
- Inverter and power supplies

### Module Characteristics ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

| Symbol       | Parameters                 | Test Conditions  | Min | Typ  | Max | Unit             |
|--------------|----------------------------|------------------|-----|------|-----|------------------|
| $T_{J(max)}$ | Max. Junction Temperature  |                  |     |      | 150 | $^\circ\text{C}$ |
| $T_{J op}$   | Operating Temperature      |                  | -40 |      | 125 | $^\circ\text{C}$ |
| $T_{stg}$    | Storage Temperature        |                  | -40 |      | 125 | $^\circ\text{C}$ |
| $V_{isol}$   | Insulation Test Voltage    | AC, t=1min       |     | 3000 |     | V                |
| CTI          | Comparative Tracking Index |                  | 250 |      |     |                  |
| $M_d$        | Mounting Torque            | Recommended (M5) | 2.5 |      | 5   | N·m              |
| Weight       |                            |                  |     | 300  |     | g                |

### Absolute Maximum Ratings ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

| Symbol       | Parameters                        | Test Conditions                                             | Values   | Unit                 |
|--------------|-----------------------------------|-------------------------------------------------------------|----------|----------------------|
| <b>IGBT</b>  |                                   |                                                             |          |                      |
| $V_{CES}$    | Collector - Emitter Voltage       | $T_J=25^\circ\text{C}$                                      | 1200     | V                    |
| $V_{GES}$    | Gate - Emitter Voltage            |                                                             | $\pm 20$ | V                    |
| $I_C$        | DC Collector Current              | $T_C=25^\circ\text{C}$                                      | 105      | A                    |
|              |                                   | $T_C=80^\circ\text{C}$                                      | 75       | A                    |
| $I_{CM}$     | Repetitive Peak Collector Current | $t_p=1\text{ms}$                                            | 150      | A                    |
| $P_{tot}$    | Power Dissipation Per IGBT        |                                                             | 368      | W                    |
| <b>Diode</b> |                                   |                                                             |          |                      |
| $V_{RRM}$    | Repetitive Reverse Voltage        | $T_J=25^\circ\text{C}$                                      | 1200     | V                    |
| $I_{F(AV)}$  | Average Forward Current           | $T_C=25^\circ\text{C}$                                      | 105      | A                    |
|              |                                   | $T_C=80^\circ\text{C}$                                      | 75       | A                    |
| $I_{FRM}$    | Repetitive Peak Forward Current   | $t_p=1\text{ms}$                                            | 150      | A                    |
| $I^2t$       |                                   | $T_J=125^\circ\text{C}$ , $t=10\text{ms}$ , $V_R=0\text{V}$ | 1150     | $\text{A}^2\text{s}$ |

# Power Module

## 1200V 75A IGBT Module

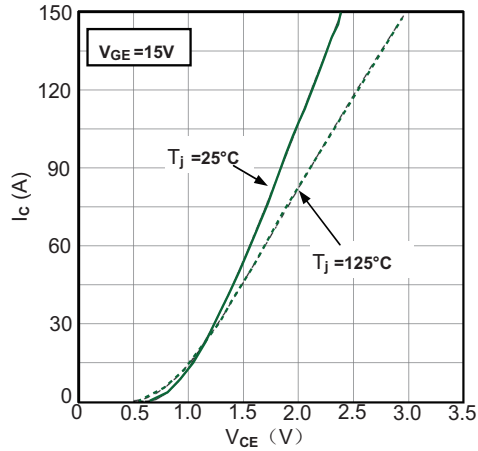
### Electrical and Thermal Specifications ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

| Symbol               | Parameters                                      | Test Conditions                                                                                                 |                       | Min  | Typ  | Max  | Unit |
|----------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------|------|------|------|------|
| IGBT                 |                                                 |                                                                                                                 |                       |      |      |      |      |
| V <sub>GE(th)</sub>  | Gate - Emitter Threshold Voltage                | V <sub>CE</sub> =V <sub>GE</sub> , I <sub>C</sub> =3.0mA                                                        |                       | 5.0  | 5.8  | 6.5  | V    |
| V <sub>CE(sat)</sub> | Collector - Emitter                             | I <sub>C</sub> =75A, V <sub>GE</sub> =15V, T <sub>J</sub> =25°C                                                 |                       |      | 1.7  |      | V    |
|                      | Saturation Voltage                              | I <sub>C</sub> =75A, V <sub>GE</sub> =15V, T <sub>J</sub> =125°C                                                |                       |      | 1.9  |      | V    |
| I <sub>ICES</sub>    | Collector Leakage Current                       | V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V, T <sub>J</sub> =25°C                                               |                       |      |      | 1    | mA   |
|                      |                                                 | V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V, T <sub>J</sub> =125°C                                              |                       |      |      | 10   | mA   |
| I <sub>GES</sub>     | Gate Leakage Current                            | V <sub>CE</sub> =0V, V <sub>GE</sub> =±15V, T <sub>J</sub> =125°C                                               |                       | -400 |      | 400  | nA   |
| R <sub>Gint</sub>    | Integrated Gate Resistor                        |                                                                                                                 |                       |      | 10   |      | Ω    |
| Q <sub>ge</sub>      | Gate Charge                                     | V <sub>CE</sub> =600V, I <sub>C</sub> =75A , V <sub>GE</sub> =±15V                                              |                       |      | 0.7  |      | μC   |
| C <sub>ies</sub>     | Input Capacitance                               | V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f =1MHz                                                              |                       |      | 5.3  |      | nF   |
| C <sub>RES</sub>     | Reverse Transfer Capacitance                    |                                                                                                                 |                       |      | 0.2  |      | nF   |
| t <sub>d(on)</sub>   | Turn - on Delay Time                            | V <sub>CC</sub> =600V<br>I <sub>C</sub> =75A<br>R <sub>G</sub> =4.7Ω<br>V <sub>GE</sub> =±15V<br>Inductive Load | T <sub>J</sub> =25°C  |      | 260  |      | ns   |
|                      |                                                 |                                                                                                                 | T <sub>J</sub> =125°C |      | 290  |      | ns   |
| t <sub>r</sub>       | Rise Time                                       |                                                                                                                 | T <sub>J</sub> =25°C  |      | 30   |      | ns   |
|                      |                                                 |                                                                                                                 | T <sub>J</sub> =125°C |      | 50   |      | ns   |
| t <sub>d(off)</sub>  | Turn - off Delay Time                           |                                                                                                                 | T <sub>J</sub> =25°C  |      | 420  |      | ns   |
|                      |                                                 |                                                                                                                 | T <sub>J</sub> =125°C |      | 520  |      | ns   |
| t <sub>f</sub>       | Fall Time                                       |                                                                                                                 | T <sub>J</sub> =25°C  |      | 70   |      | ns   |
|                      |                                                 |                                                                                                                 | T <sub>J</sub> =125°C |      | 90   |      | ns   |
| E <sub>on</sub>      | Turn - on Energy                                |                                                                                                                 | T <sub>J</sub> =25°C  |      | 6.6  |      | mJ   |
|                      |                                                 |                                                                                                                 | T <sub>J</sub> =125°C |      | 9.4  |      | mJ   |
| E <sub>off</sub>     | Turn - off Energy                               |                                                                                                                 | T <sub>J</sub> =25°C  |      | 6.8  |      | mJ   |
|                      |                                                 |                                                                                                                 | T <sub>J</sub> =125°C |      | 8.0  |      | mJ   |
| I <sub>SC</sub>      | Short Circuit Current                           | t <sub>psc</sub> ≤10μS , V <sub>GE</sub> =15V, T <sub>J</sub> =125°C , V <sub>CC</sub> =900V                    |                       |      | 300  |      | A    |
| R <sub>thJC</sub>    | Junction-to-Case Thermal Resistance (Per IGBT)  |                                                                                                                 |                       |      |      | 0.34 | K/W  |
| Diode                |                                                 |                                                                                                                 |                       |      |      |      |      |
| V <sub>F</sub>       | Forward Voltage                                 | I <sub>F</sub> =75A, V <sub>GE</sub> =0V, T <sub>J</sub> =25°C                                                  |                       |      | 1.65 |      | V    |
|                      |                                                 | I <sub>F</sub> =75A, V <sub>GE</sub> =0V, T <sub>J</sub> =125°C                                                 |                       |      | 1.65 |      | V    |
| t <sub>RR</sub>      | Reverse Recovery Time                           | I <sub>F</sub> =75A, V <sub>R</sub> =600V<br>di <sub>F</sub> /dt=2000A/μs<br>T <sub>J</sub> =125°C              |                       |      | 300  |      | ns   |
| I <sub>RRM</sub>     | Max. Reverse Recovery Current                   |                                                                                                                 |                       |      | 85   |      | A    |
| E <sub>rec</sub>     | Reverse Recovery Energy                         |                                                                                                                 |                       |      | 6.5  |      | mJ   |
| R <sub>thJCD</sub>   | Junction-to-Case Thermal Resistance (Per Diode) |                                                                                                                 |                       |      |      | 0.56 | K/W  |

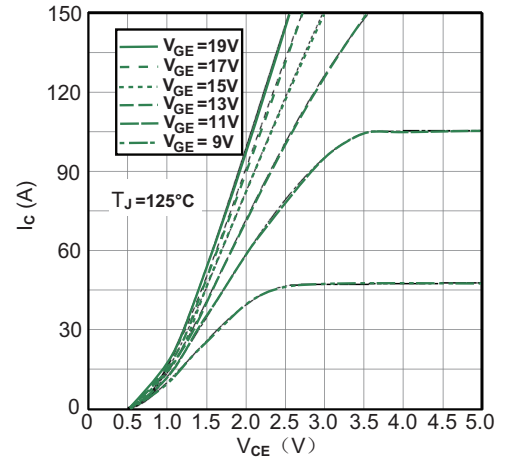
### NTC Characteristics ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

| Symbol      | Parameters | Test Conditions        | Min | Typ  | Max | Unit       |
|-------------|------------|------------------------|-----|------|-----|------------|
| $R_{25}$    | Resistance | $T_c=25^\circ\text{C}$ |     | 5    |     | K $\Omega$ |
| $B_{25/50}$ |            |                        |     | 3375 |     | K          |

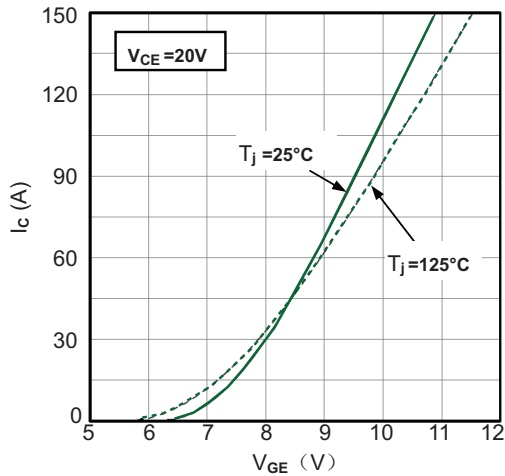
**Figure 1: Typical Output Characteristics for IGBT Inverter**



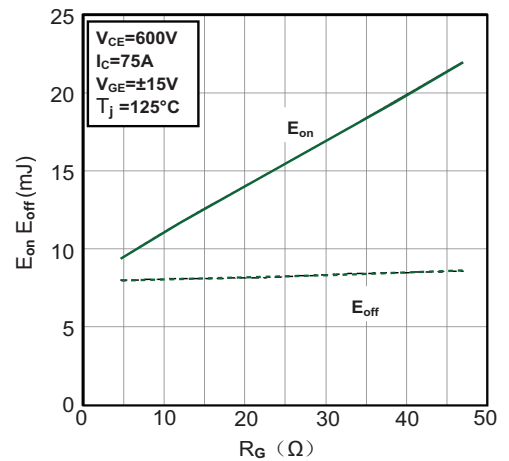
**Figure 2: Typical Output Characteristics for IGBT Inverter**



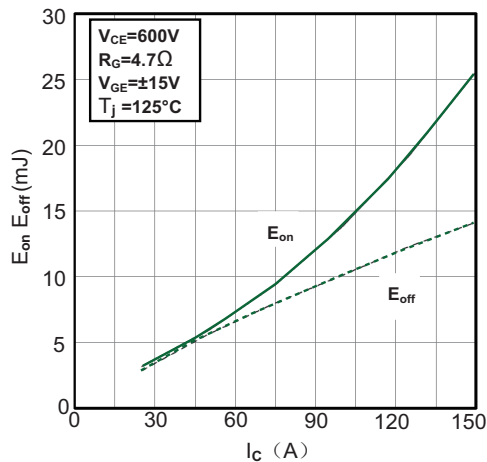
**Figure 3: Typical Transfer Characteristics for IGBT Inverter**



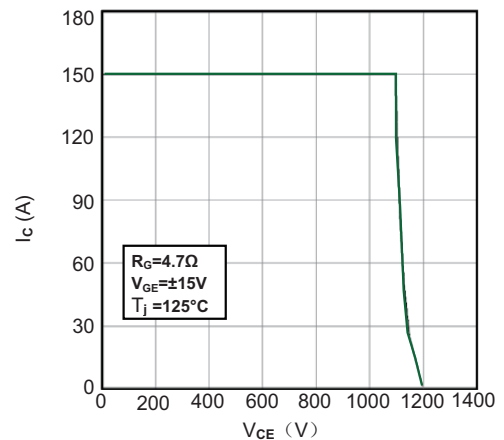
**Figure 4: Switching Energy vs. Gate Resistor for IGBT Inverter**



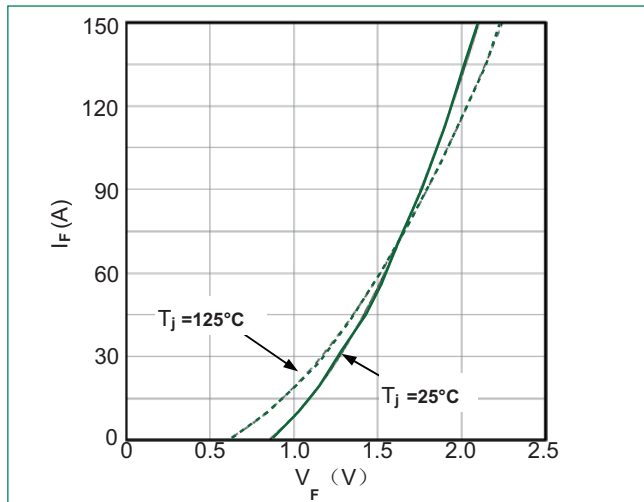
**Figure 5: Switching Energy vs. Collector Current for IGBT Inverter**



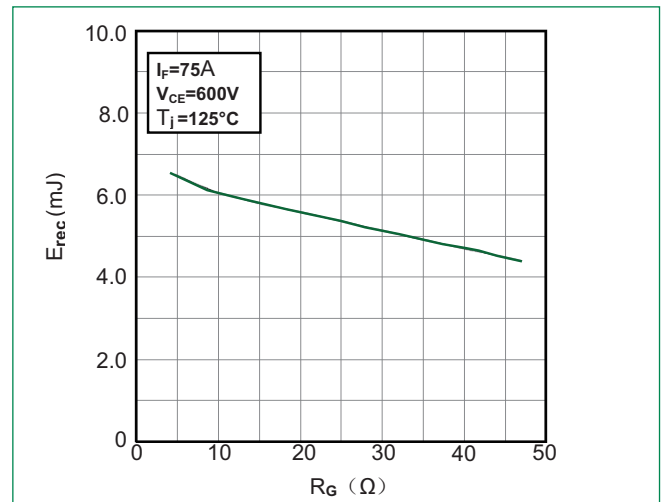
**Figure 6: Reverse Biased Safe Operating Area for IGBT Inverter**



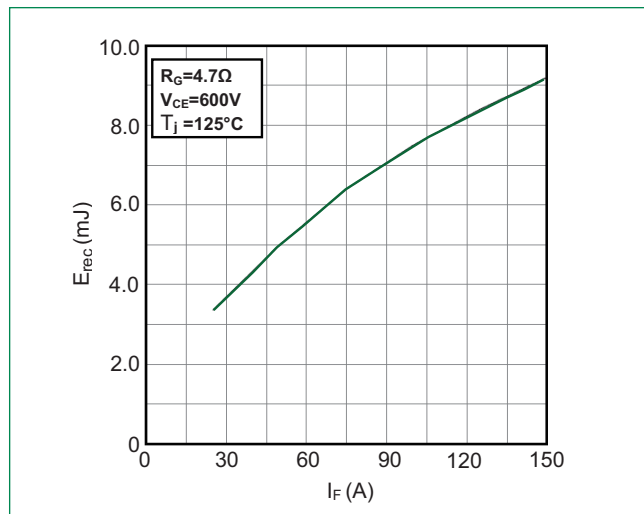
**Figure 7: Diode Forward Characteristics for Diode Inverter**



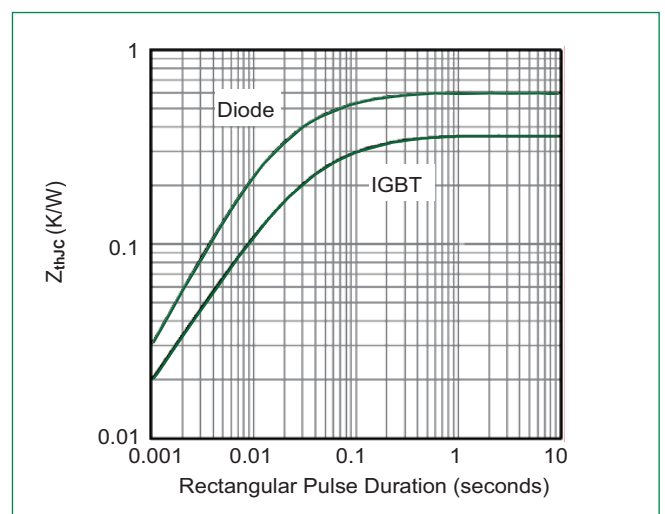
**Figure 8: Switching Energy vs. Gate Resistort for Diode Inverter**



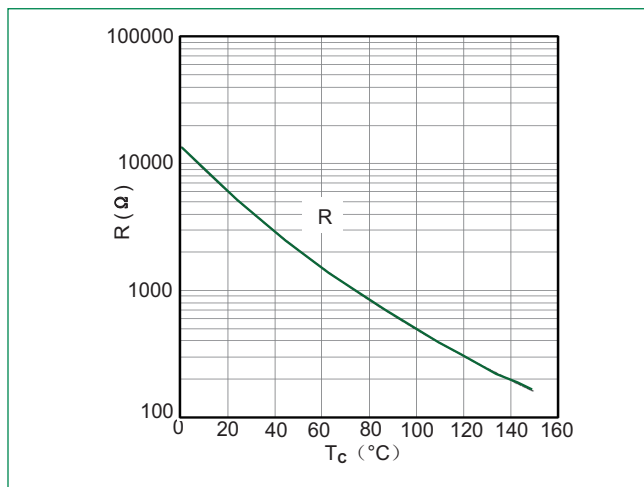
**Figure 9: Switching Energy vs. Forward Current for Diode Inverter**



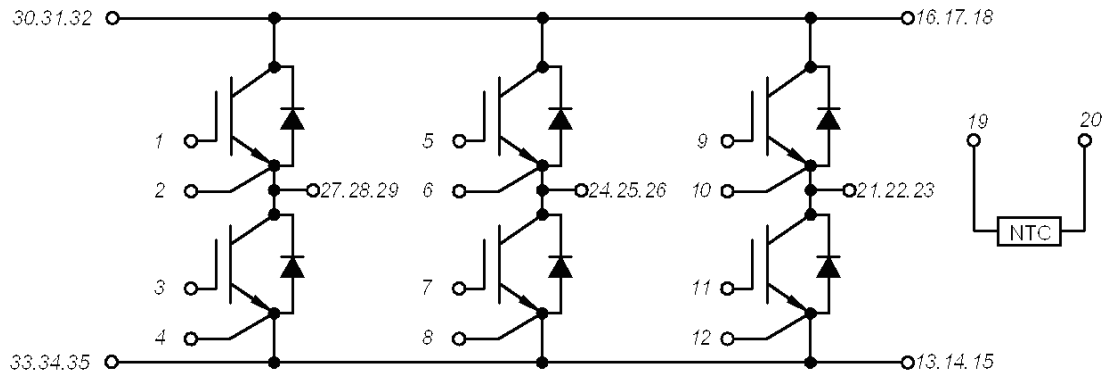
**Figure 10: Transient Thermal Impedance of Diode and IGBT Inverter**



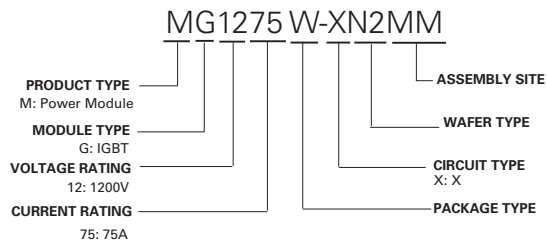
**Figure 11: NTC Characteristics**



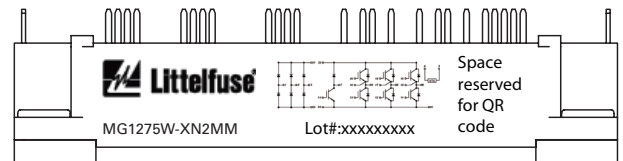
## Circuit Diagram



## Part Numbering System



## Part Marking System



| Part Number    | Marking        | Weight | Packing Mode | M.O.Q |
|----------------|----------------|--------|--------------|-------|
| MG1275W-XBN2MM | MG1275W-XBN2MM | 300g   | Bulk Pack    | 20    |

