# M2D-1200-0030

## Silicon Carbide Power MOSFET Bare Die

## N-Channel Enhancement Mode

### Features

- High Blocking Voltage with Low On-Resistance
- High- Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

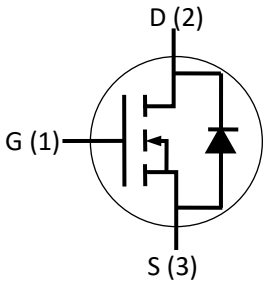
### Benefits

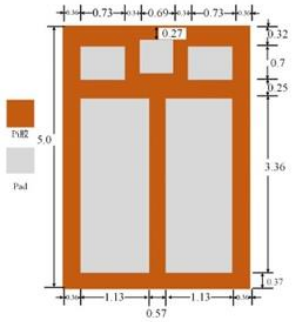
- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

### Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power applications

### Package




| Part Number | Die Size(mm) |
|---|---|
| M2D-1200-0030 | 3.65*5.01 |

### Maximum Ratings ($T_c$ = 25°C unless otherwise specified)

| Symbol | Parameter | Value | Unit | Test Conditions | Note |
|---|---|---|---|---|---|
| $V_{DSmax}$ | Drain - Source Voltage | 1200 | V | $V_{GS}$=0V, $I_D$=100μA | |
| $V_{GSmax}$ | Gate - Source Voltage | -10/+22 | V | Absolute maximum values | |
| $V_{GSop}$ | Gate - Source Voltage | -6/+18 | V | Recommended operational values | |
| $I_D$ | Continuous Drain Current | 76<br>68 | A | $V_{GS}$=18V, $T_C$=25°C<br>$V_{GS}$=18V, $T_C$=100°C | |
| $T_J$, $T_{stg}$ | Operating Junction and Storage Temperature | -55 to +175 | °C | | |

## Electrical Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | 1200 | | | V | $V_{GS}$=0V, $I_D$=100μA | |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.2 | 3.2 | 4.5 | V | $V_{GS}$= $V_{DS}$, $I_{DS}$=9.5mA,$T_C$=25°C | |
| | | | 2.2 | | | $V_{GS}$= $V_{DS}$, $I_{DS}$=9.5mA,$T_C$=175°C | |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | | 5 | 50 | μA | $V_{DS}$= 1200V, $V_{GS}$=0V | |
| $I_{GSS+}$ | Gate-Source Leakage Current | | | 100 | nA | $V_{GS}$=18V, $V_{DS}$= 0V | |
| $I_{GSS-}$ | Gate-Source Leakage Current | | | 100 | nA | $V_{GS}$=-6V, $V_{DS}$= 0V | |
| $R_{DS(on)}$ | Drain-Source on-state Resistance | 20 | 30 | 40 | mΩ | $V_{GS}$=18V, $I_D$=40A, $T_C$=25°C | |
| | | | 48 | | | $V_{GS}$=18V, $I_D$=40A, $T_C$=175°C | |
| $g_{fs}$ | Transconductance | | 25 | | S | $V_{GS}$ = 18 V, $I_D$ = 40A, $T_J$ = 25 °C | |
| | | | 15 | | S | $V_{GS}$ = 18 V, $I_D$ = 40A, $T_J$ = 175 °C | |
| Ciss | Input Capacitance | | 2940 | | pF | $V_{GS}$=0V, $V_{DS}$=1000 V, f=1MHz $V_{AC}$=25 mV | |
| Coss | Output Capacitance | | 129 | | | | |
| Crss | Reverse Transfer Capacitance | | 15 | | | | |
| $E_{ON}$ | Turn-On Switching Energy | | 1.278 | | mJ | $V_{DS}$=800V, $V_{GS}$=-5/18V, $I_D$= 40 A, | |
| $E_{OFF}$ | Turn-Off Switching Energy | | 0.154 | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | | 14 | | ns | $V_{DS}$=800V, $V_{GS}$=-5/18 V $I_D$ = 40A, | |
| $t_r$ | Rise Time | | 32 | | | | |
| $t_{d(off)}$ | Turn-Off Delay Time | | 32 | | | | |
| $t_f$ | Fall Time | | 12 | | | | |
| $R_{G(int)}$ | Internal Gate Resistance | | 2.2 | | Ω | f=1 MHz, $V_{AC}$=25mV | |
| $Q_{gs}$ | Gate to Source Charge | | 34 | | nC | $V_{DS}$=800V, $V_{GS}$=-5/18 V $I_D$ = 40A | |
| $Q_{gd}$ | Gate to Drain Charge | | 35 | | | | |
| $Q_g$ | Total Gate Charge | | 138 | | | | |

### Reverse Diode Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Diode Forward Voltage | 4.9 | | V | $V_{GS}$ = -4V, $I_{SD}$ = 20 A, $T_J$ = 25 °C | |
| | | 4.4 | | V | $V_{GS}$ =- 5V, $I_{SD}$ = 25 A, $T_J$ = 175 °C | |
| $I_S$ | Continuous Diode Forward Current | 68 | | A | $T_c$ = 25°C | |

## Mechanical Parameters

| Parameter | Typ. | Unit |
|---|---|---|
| Die Size | 3.65 x 5.01 | mm |
| Source Pad Size (power & signal) | 1.13 x 3.36 & 0.73 x 0.7 | mm |
| Gate Pad Size | 0.69 x 0.7 | mm |
| Thickness | 150 ± 10% | μm |
| Wafer Size | 150 | mm |
| Top Side Metalization (AlCu) | 5 | μm |
| Bottom Side Metalization (Ti-Ni-Ag) | 1.55 | μm |