BORN SEMICONDUCTOR

# BMI5N50

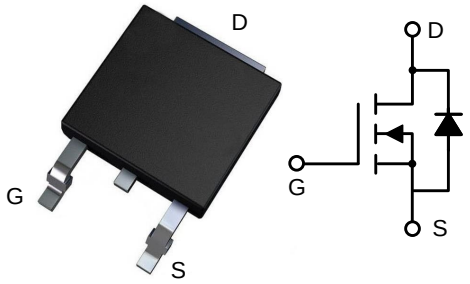
**N-Channel MOSFET**

## Features

- $V_{(BR)DSS}$=500V, $I_D$=5A
- $R_{DS(on)}$ @$V_{GS}$=10V, MAX=1.6Ω
- Fast switching capability
- Low gate charge
- Lead free in compliance with EU RoHS directive
- Green molding compound

## Package

TO-252-2




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

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{DS}$ | Drain - Source Voltage | 500 | V |
| $V_{GS}$ | Gate - Source Voltage | ±30 | V |
| $I_D$ | Continuous Drain Current | 5 | A |
| $I_{DM}$ | Pulsed Drain Current (1) | 20 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy (2) | 250 | mJ |
| $P_D$ | Power Dissipation | 54 | W |
| $T_J$, $T_{stg}$ | Junction and Storage Temperature Range | -55 to +150 | °C |

Notes:

(1) Repetitive Rating: pulse width limited by maximum junction temperature.

(2) L=10mH, $I_{AS}$=7.1A, $V_{DD}$=50V, $R_G$=2.4Ω, Starting $T_J$=25°C.

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**Electrical Characteristics ($T_C$=25°C unless otherwise noted)**

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$=250uA | 500 | – | – | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 500V, $V_{GS}$=0V | – | – | 1 | uA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±30V, $V_{DS}$=0V | – | – | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$=250uA | 2.0 | – | 4.0 | V |
| Static Drain-Source On Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=2.5A | – | 1.4 | 1.6 | Ω |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =25V, | – | 554 | – | pF |
| Output Capacitance | $C_{oss}$ | $V_{GS}$ =0V, | – | 65 | – | |
| Reverse Transfer Capacitance | $C_{rss}$ | f = 1MHz | – | 8 | – | |
| **Switching Characteristics** (1,2) | | | | | | |
| Turn-On Delay Time | $T_{d(on)}$ | $V_{DD}$=30V, | – | 30 | – | ns |
| Turn-On Rise Time | $T_r$ | $I_D$=0.5A, | – | 50 | – | |
| Turn-Off Delay Time | $T_{d(off)}$ | $R_G$ =25Ω | – | 140 | – | |
| Turn-Off Fall Time | $T_f$ | | – | 70 | – | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=400V, | – | 17 | – | nC |
| Gate-Source Charge | $Q_{gs}$ | $V_{GS}$=10V, | – | 3 | – | |
| Gate-Drain Charge | $Q_{gd}$ | $I_D$=5A | – | 8 | – | |
| **Source-Drain Diode Characteristics** | | | | | | |
| Continuous Diode Forward Current | $I_S$ | – | – | – | 5 | A |
| Pulsed Diode Forward Current | $I_{SM}$ | – | – | – | 20 | A |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=1A | – | – | 1 | V |

Notes:

(1) Pulsed Test: pulse width ≤ 300us, duty cycle ≤ 2%.

(2) Essentially independent of operating temperature.

## Typical Performance Characteristics

**Figure 1: Drain Current vs. Drain-Source Breakdown Voltage**

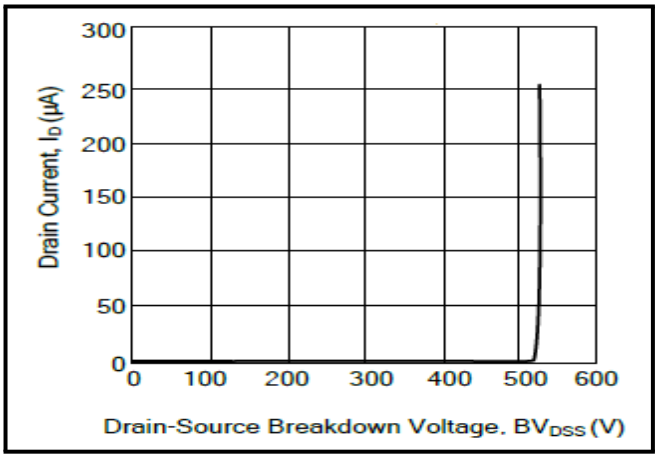



**Figure 2: Drain Current vs. Gate Threshold Voltage**

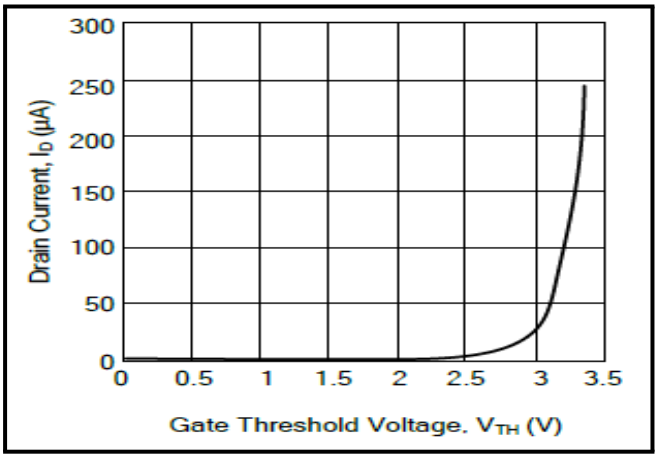



**Figure 3: Normalized on Resistance vs. Junction Temperature**

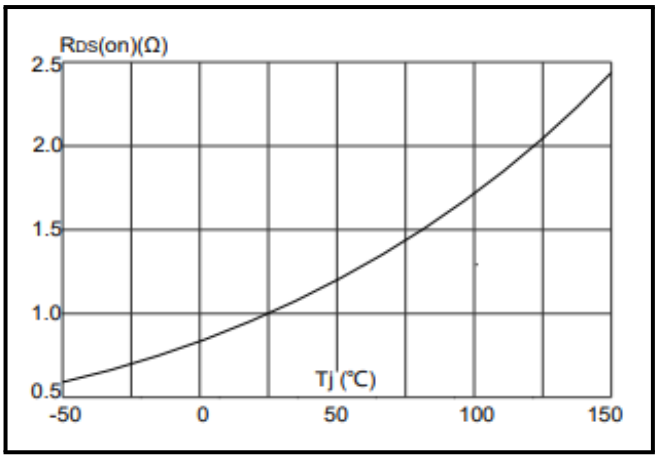
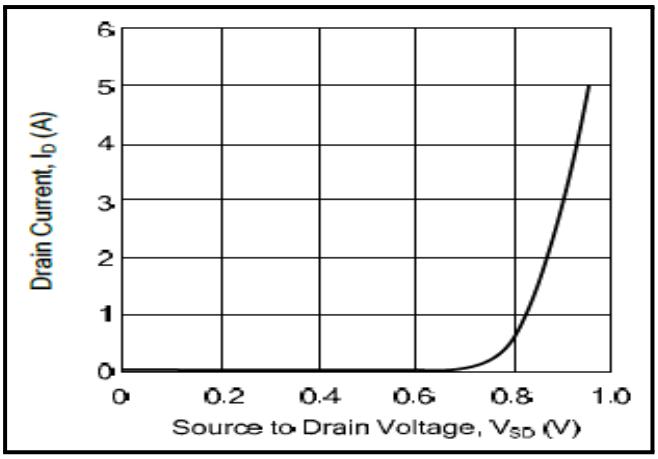



**Figure 4: Drain Current vs. Source to Drain Voltage**



## Typical Performance Characteristics

**Figure 5: Capacitance Characteristics**

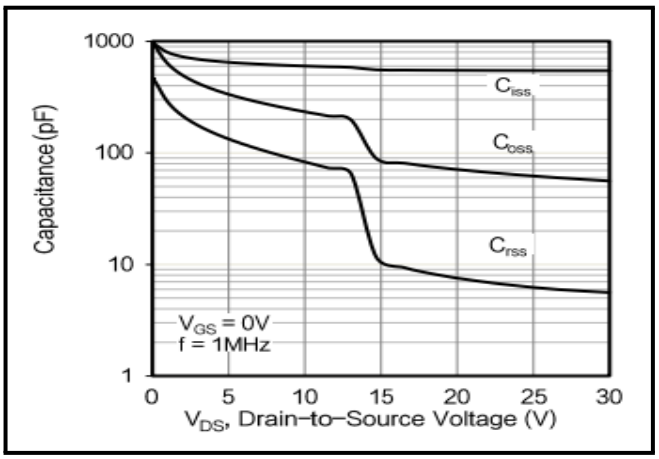



**Figure 6: Drain Current vs. Temperature**

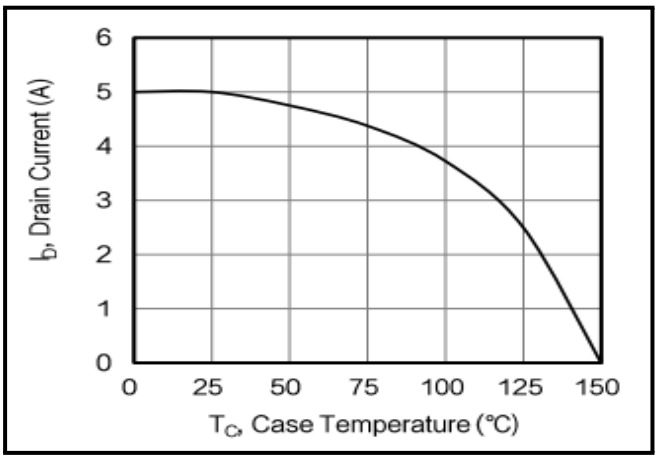



**Figure 7: Gate Charge Characteristics**

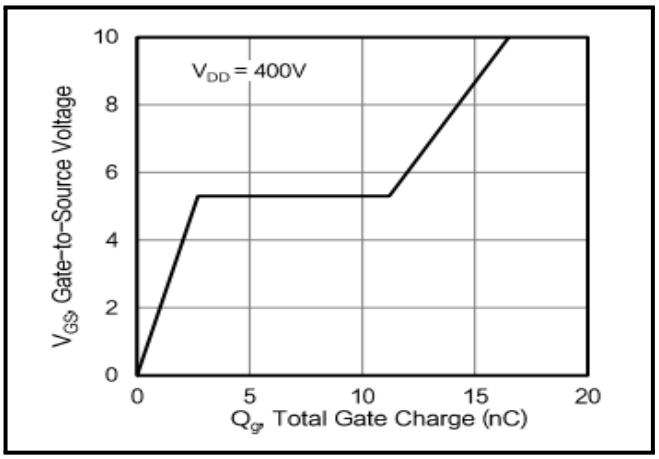
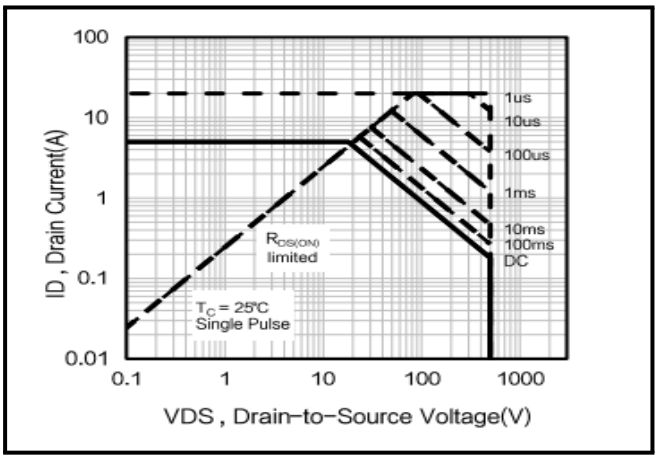



**Figure 8: Safe Operating Area**



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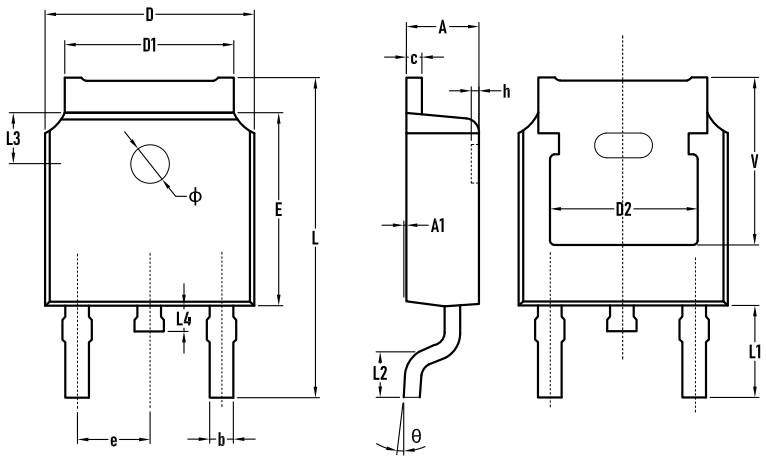
## Packaging Tape - TO-252-2




| Symbol | Millimeters | | Inches | |
|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.660 | 0.860 | 0.026 | 0.034 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 4.830 TYP. | | 0.190 TYP. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.800 | 10.400 | 0.386 | 0.409 |
| L1 | 2.900 TYP. | | 0.114 TYP. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600 TYP. | | 0.063 TYP. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| $\phi$ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.350 TYP. | | 0.211 TYP. | |