

## Description:

This N-Channel MOSFET uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge.

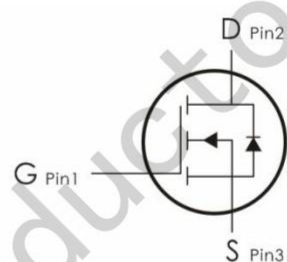
It can be used in a wide variety of applications.

## Features:

- 1)  $V_{DS}=40V, I_D=100A, R_{DS(on)} < 3.8m\Omega @ V_{GS}=10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low  $R_{DS(on)}$ .
- 5) Excellent package for good heat dissipation.



TO-252



## Absolute Maximum Ratings: ( $T_C=25^\circ\text{C}$ unless otherwise noted)

| Symbol         | Parameter                                         | Ratings  | Units            |
|----------------|---------------------------------------------------|----------|------------------|
| $V_{DS}$       | Drain-Source Voltage                              | 40       | V                |
| $V_{GS}$       | Gate-Source Voltage                               | $\pm 20$ | V                |
| $I_D$          | Continuous Drain Current- $T_C=25^\circ\text{C}$  | 100      | A                |
|                | Continuous Drain Current- $T_C=100^\circ\text{C}$ | 50       |                  |
| $I_{DM}$       | Pulsed Drain Current <sup>1</sup>                 | 320      |                  |
| $P_D$          | Power Dissipation                                 | 142      | W                |
| $E_{AS}$       | Single pulse avalanche energy <sup>2</sup>        | 156      | mJ               |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range  | -55-+150 | $^\circ\text{C}$ |

## Thermal Characteristics:

| Symbol          | Parameter                                            | Max  | Units                     |
|-----------------|------------------------------------------------------|------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case                 | 0.88 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient <sup>3</sup> | 31   | $^\circ\text{C}/\text{W}$ |

**Electrical Characteristics:** ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)

| Symbol                             | Parameter                               | Conditions                                                                                 | Min | Typ  | Max   | Units |
|------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------|-----|------|-------|-------|
| Off Characteristics                |                                         |                                                                                            |     |      |       |       |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage          | V <sub>GS</sub> =0V, I <sub>D</sub> =250 μ A                                               | 40  | ---  | ---   | V     |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current         | V <sub>GS</sub> =0V, V <sub>DS</sub> =40V                                                  | --- | ---  | 1     | μ A   |
| I <sub>GSS</sub>                   | Gate-Source Leakage Current             | V <sub>GS</sub> =± 20V, V <sub>DS</sub> =0A                                                | --- | ---  | ± 100 | nA    |
| On Characteristics                 |                                         |                                                                                            |     |      |       |       |
| V <sub>GS(th)</sub>                | GATE-Source Threshold Voltage           | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250 μ A                                 | 1.3 | 1.9  | 2.5   | V     |
| R <sub>DS(ON)</sub>                | Drain-Source On Resistance <sup>4</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A                                                  | --- | 3.8  | ---   | m Ω   |
|                                    |                                         | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A                                                 | --- | 5.7  | ---   | m Ω   |
| Dynamic Characteristics            |                                         |                                                                                            |     |      |       |       |
| C <sub>iss</sub>                   | Input Capacitance                       | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f=1MHz                                          | --- | 3777 | ---   | pF    |
| C <sub>oss</sub>                   | Output Capacitance                      |                                                                                            | --- | 266  | --    |       |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance            |                                                                                            | --- | 223  | ---   |       |
| Switching Characteristics          |                                         |                                                                                            |     |      |       |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                      | V <sub>DS</sub> =20V, I <sub>D</sub> =30A,<br>R <sub>ENG</sub> =3 Ω , V <sub>GS</sub> =10V | --- | 11   | ---   | ns    |
| t <sub>r</sub>                     | Rise Time                               |                                                                                            | --- | 28   | ---   | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                     |                                                                                            | --- | 59   | ---   | ns    |
| t <sub>f</sub>                     | Fall Time                               |                                                                                            | --- | 15   | ---   | ns    |
| Q <sub>gs</sub>                    | Total Gate Charge                       | V <sub>GS</sub> =10V, V <sub>DS</sub> =20V,<br>I <sub>D</sub> =30A                         | --- | 14   | ---   | nc    |
| Q <sub>gd</sub>                    | Gate-Source Charge                      |                                                                                            | --- | 15   | ---   | nc    |
| Q <sub>g</sub>                     | Gate-Drain “Miller” Charge              |                                                                                            | --- | 72   | ---   | nc    |
| Drain-Source Diode Characteristics |                                         |                                                                                            |     |      |       |       |
| V <sub>SD</sub>                    | Diode Forward Voltage                   | V <sub>GS</sub> =0V, I <sub>SD</sub> =30A                                                  | --- | ---  | 1.2   | V     |
| I <sub>S</sub>                     | Continuous Drain Curren                 | VD=VG=0V                                                                                   | --- | ---  | 100   | A     |
| I <sub>SM</sub>                    | Pulsed Drain Current                    |                                                                                            | --- | ---  | 320   | A     |
| Trr                                | Reverse Recovery Time                   | I <sub>F</sub> =20A, T <sub>J</sub> =25 °C                                                 | --- | 16   | ---   | ns    |
| Qrr                                | Reverse Recovery Charge                 | dI/dt=100A/us                                                                              | --- | 10   | ---   | nc    |

### Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. EAS condition: Starting  $T_J=25^\circ\text{C}$ ,  $V_{DD}=20\text{V}$ ,  $V_G=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=0.5\text{mH}$ ,  $I_{AS}=25\text{A}$
3.  $R_{\theta JA}$  is measured with the device mounted on a 1inch<sup>2</sup> pad of 2oz copper FR4 PCB
4. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$ .

**Typical Characteristics:** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

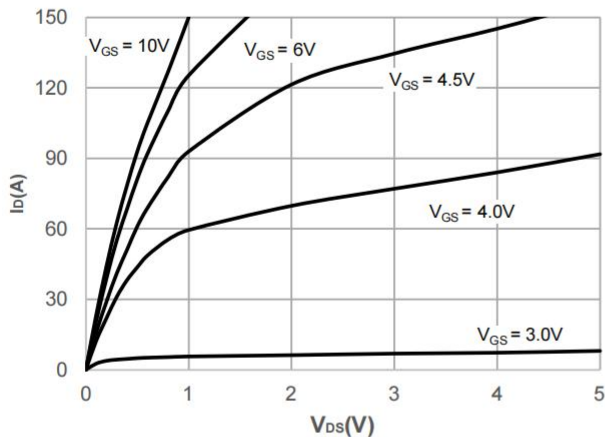


Figure 1: Output Characteristics

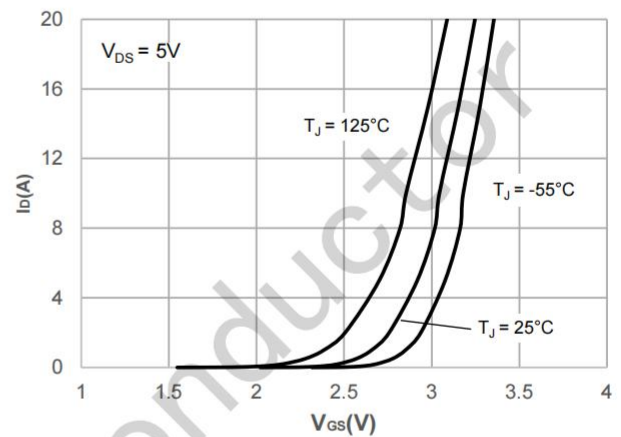


Figure 2: Typical Transfer Characteristics

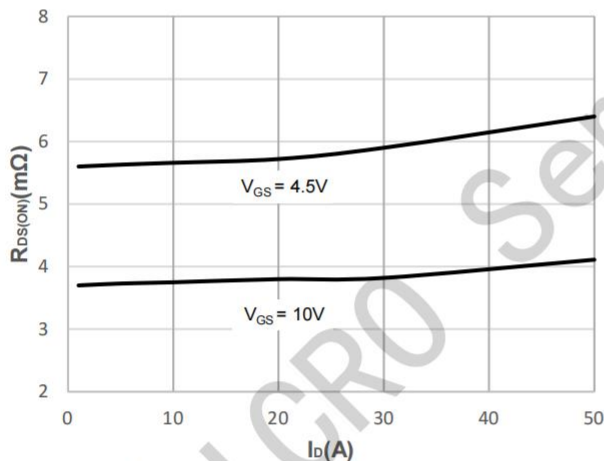


Figure 3: On-resistance vs. Drain Current

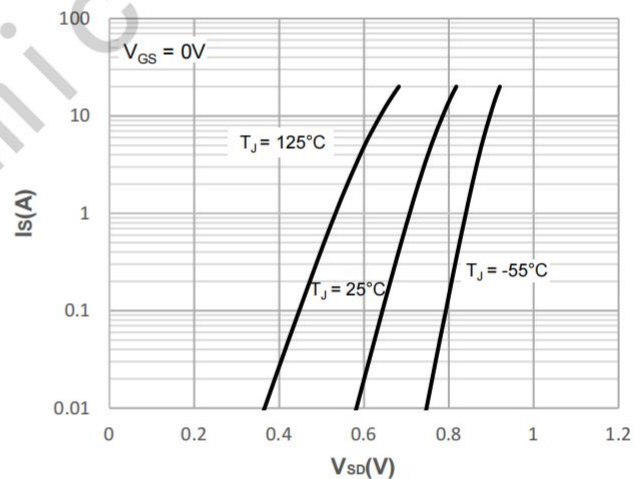


Figure 4: Body Diode Characteristics

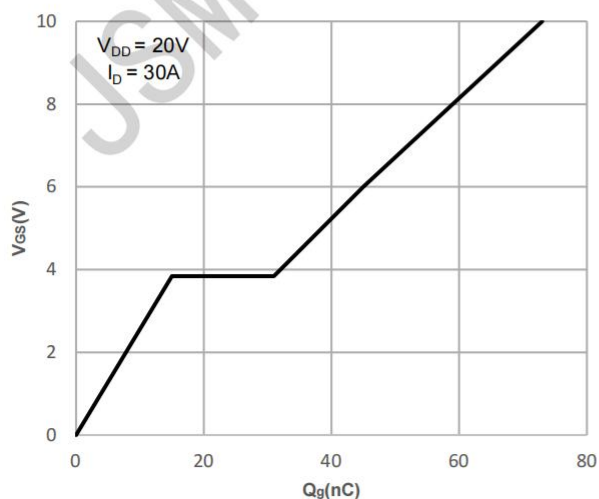


Figure 5: Gate Charge Characteristics

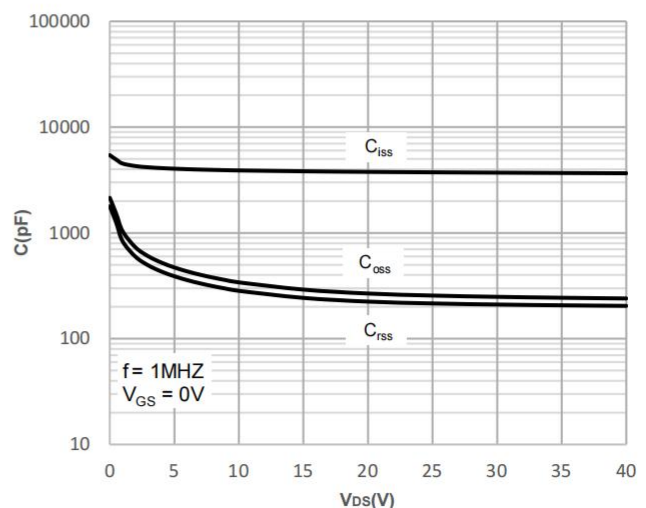


Figure 6: Capacitance Characteristics

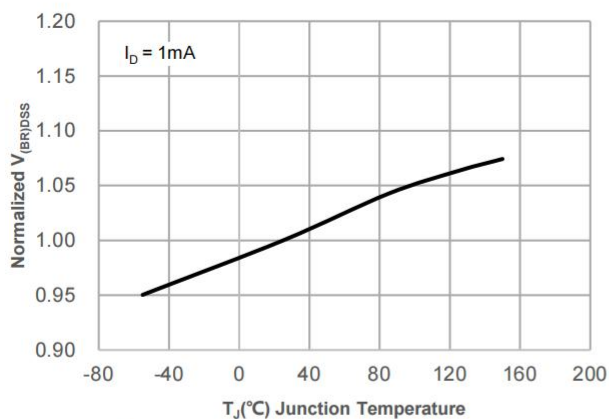


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

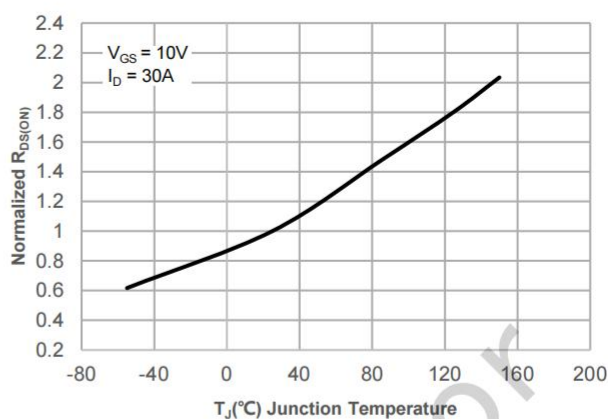


Figure 8: Normalized on Resistance vs. Junction Temperature

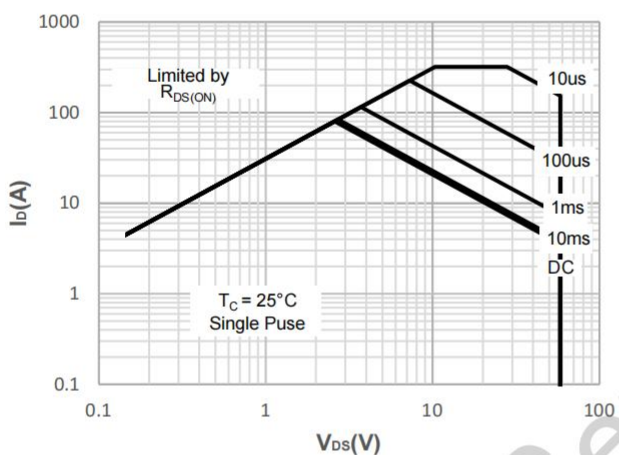


Figure 9: Maximum Safe Operating Area

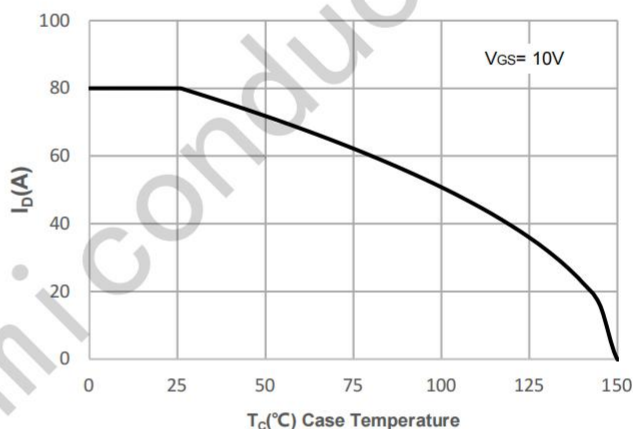


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

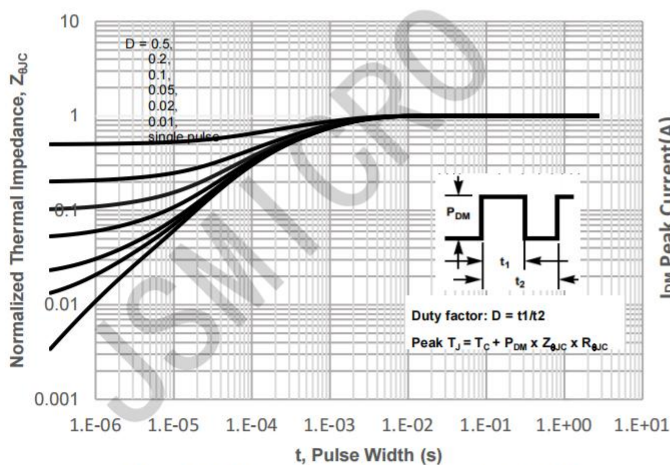


Figure 11: Normalized Maximum Transient Thermal Impedance

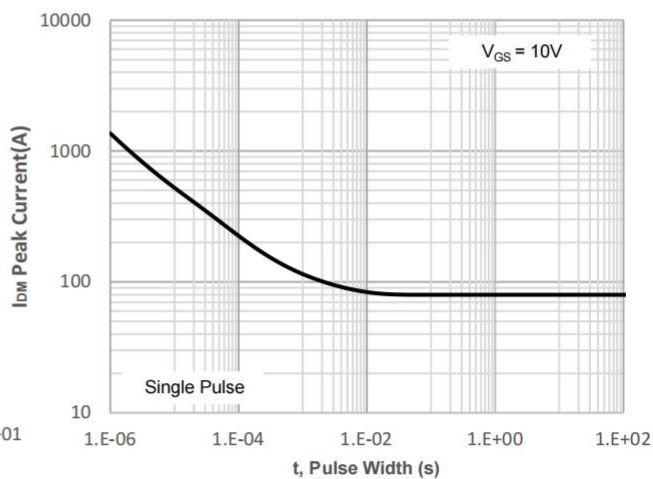


Figure 12: Peak Current Capacity

## Package Information

TO-252



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 6.30                      | 6.90  | 0.248                | 0.272 |
| A1     | 0.00                      | 0.16  | 0.000                | 0.006 |
| B      | 5.70                      | 6.30  | 0.224                | 0.248 |
| C      | 2.10                      | 2.50  | 0.083                | 0.098 |
| D      | 0.30                      | 0.70  | 0.012                | 0.028 |
| E1     | 0.60                      | 0.90  | 0.024                | 0.035 |
| E2     | 0.70                      | 1.00  | 0.028                | 0.039 |
| F      | 0.30                      | 0.60  | 0.012                | 0.024 |
| G      | 0.70                      | 1.20  | 0.028                | 0.047 |
| L1     | 9.60                      | 10.50 | 0.378                | 0.413 |
| L2     | 2.70                      | 3.10  | 0.106                | 0.122 |
| H      | 0.40                      | 1.00  | 0.016                | 0.039 |
| M      | 5.10                      | 5.50  | 0.201                | 0.217 |
| N      | 2.09                      | 2.49  | 0.082                | 0.098 |
| R      | 0.30                      |       | 0.012                |       |
| T      | 1.40                      | 1.60  | 0.055                | 0.063 |
| Y      | 5.10                      | 6.30  | 0.201                | 0.248 |