

## Description:

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

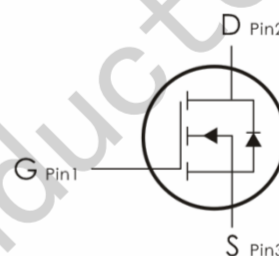
It can be used in a wide variety of applications.



TO-252

## Features:

- 1)  $V_{DS}=30V, I_D=55A, R_{DS(on)} < 10m\Omega @ V_{GS}=10V$
- 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.



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

| Symbol         | Parameter                                        | Ratings     | Units      |
|----------------|--------------------------------------------------|-------------|------------|
| $V_{DS}$       | Drain-Source Voltage                             | 30          | V          |
| $V_{GS}$       | Gate-Source Voltage                              | $\pm 20$    | V          |
| $I_D$          | Continuous Drain Current- $T_C=25^\circ C^1$     | 55          | A          |
|                | Continuous Drain Current- $T_C=100^\circ C$      | 30          |            |
|                | Pulsed Drain Current <sup>2</sup>                | 112         |            |
| $E_{AS}$       | Single Pulse Avalanche Energy <sup>3</sup>       | 24.2        | mJ         |
| $I_{AS}$       | Avalanche Current                                | 22          | A          |
| $P_D$          | Power Dissipation, $T_C=25^\circ C^4$            | 37.5        | W          |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +175 | $^\circ C$ |

## Thermal Characteristics:

| Symbol          | Parameter                                         | Max | Units        |
|-----------------|---------------------------------------------------|-----|--------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case <sup>1</sup> | 4   | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup>  | 62  | $^\circ C/W$ |

**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                                               | 30  | --- | ---   | V     |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current         | V <sub>GS</sub> =0V, V <sub>DS</sub> =30V                                                  | --- | --- | 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                                 | 1.2 | --- | 2.5   | V     |
| R <sub>DS(ON)</sub>                | Drain-Source On Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A                                                  | --- | 7.5 | 10    | m Ω   |
|                                    |                                         | V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A                                                 | --- | 11  | 18    |       |
| Dynamic Characteristics            |                                         |                                                                                            |     |     |       |       |
| C <sub>iss</sub>                   | Input Capacitance                       | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                          | --- | 940 | ---   | pF    |
| C <sub>oss</sub>                   | Output Capacitance                      |                                                                                            | --- | 131 | ---   |       |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance            |                                                                                            | --- | 109 | ---   |       |
| Switching Characteristics          |                                         |                                                                                            |     |     |       |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                      | V <sub>DD</sub> =15V, I <sub>D</sub> =15A,<br>V <sub>GS</sub> =10V, R <sub>GEN</sub> =3.3Ω | --- | 4   | ---   | ns    |
| t <sub>r</sub>                     | Rise Time                               |                                                                                            | --- | 8   | ---   | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                     |                                                                                            | --- | 31  | ---   | ns    |
| t <sub>f</sub>                     | Fall Time                               |                                                                                            | --- | 4   | ---   | ns    |
| Q <sub>g</sub>                     | Total Gate Charge                       | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V,<br>I <sub>D</sub> =15A                        | --- | 9.8 | ---   | nC    |
| Q <sub>gs</sub>                    | Gate-Source Charge                      |                                                                                            | --- | 4.2 | ---   | nC    |
| Q <sub>gd</sub>                    | Gate-Drain “Miller” Charge              |                                                                                            | --- | 3.6 | ---   | nC    |
| Drain-Source Diode Characteristics |                                         |                                                                                            |     |     |       |       |

|                       |                                          |                                                          |     |     |     |    |
|-----------------------|------------------------------------------|----------------------------------------------------------|-----|-----|-----|----|
| <b>V<sub>SD</sub></b> | Source-Drain Diode Forward Voltage       | V <sub>GS</sub> =0V, I <sub>S</sub> =1A                  | --- | --- | 1   | V  |
| <b>I<sub>S</sub></b>  | Continuous Source Current <sup>1,5</sup> | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current        | --- | --- | 43  | A  |
| <b>I<sub>SM</sub></b> | Pulsed Source Current <sup>2,5</sup>     |                                                          | --- | --- | 112 | Ns |
| <b>T<sub>rr</sub></b> | Reverse Recovery Time                    | I <sub>F</sub> =30A, dI/dt=100A/μs, T <sub>J</sub> =25°C | --- | 8.5 | --- |    |
| <b>Q<sub>rr</sub></b> | Reverse Recovery Charge                  |                                                          | --- | 2.2 | --- |    |

**Notes:**

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
3. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=22A
4. The power dissipation is limited by 175°C junction temperature
5. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

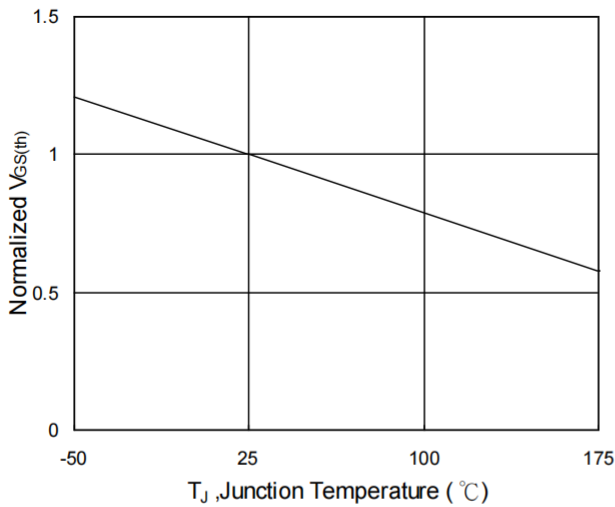
**Typical Characteristics:** (T<sub>C</sub>=25°C unless otherwise noted)

**Fig.1 Typical Output Characteristics**

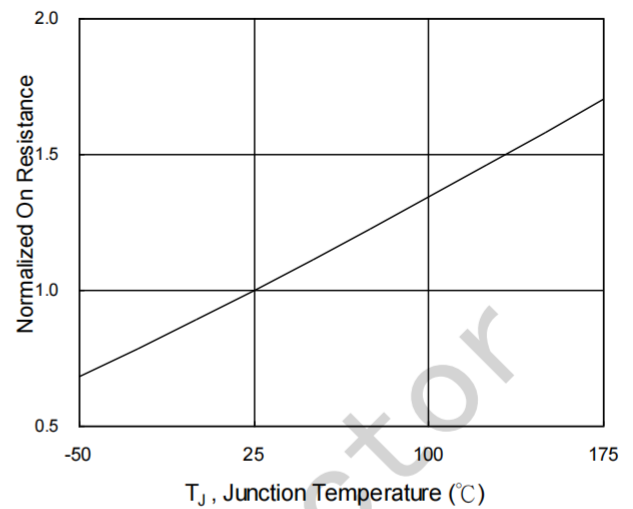
**Fig.2 On-Resistance vs. G-S Voltage**

**Fig.3 Forward Characteristics of Reverse**

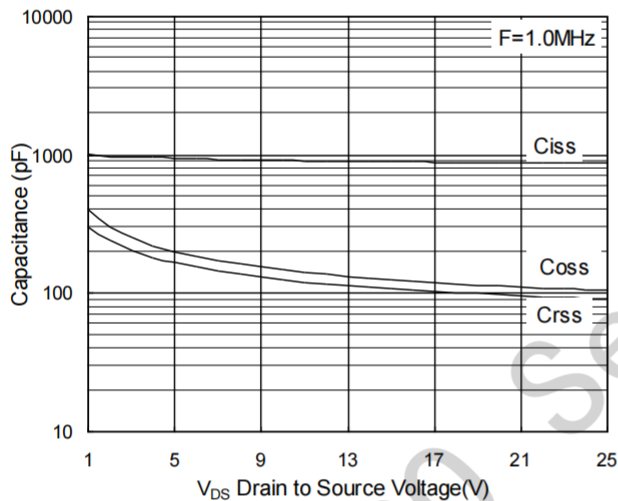
**Fig.4 Gate-Charge Characteristics**



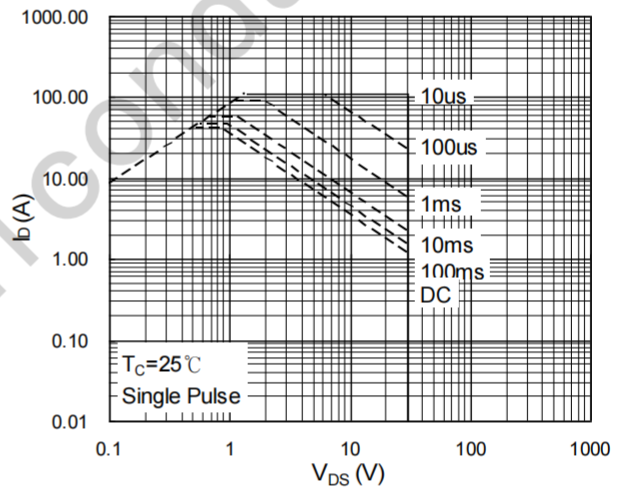
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



**Fig.7 Capacitance**



**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

## 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 |