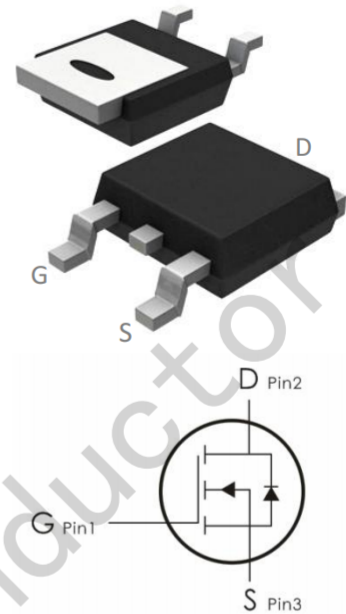


## Description:

This N-Channel MOSFET uses advanced SGT 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)  $V_{DS}=100V, I_D=36A, R_{DS(on)} < 20m\ \Omega$  @  $V_{GS}=10V$
- 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                                              | 100         | V          |
| $V_{GS}$       | Gate-Source Voltage                                               | $\pm 20$    | V          |
| $I_D$          | Continuous Drain Current <sup>1)</sup> , $T_C=25^\circ C$         | 36          | A          |
| $I_{D, pulse}$ | Pulsed drain current <sup>2)</sup> , $T_C=25^\circ C$             | 90          | A          |
| $I_S$          | Continuous diode forward current <sup>1)</sup> , $T_C=25^\circ C$ | 30          | A          |
| $I_{S, pulse}$ | Diode pulsed current <sup>2)</sup> , $T_C=25^\circ C$             | 90          | A          |
| $P_D$          | Power dissipation <sup>3)</sup> , $T_C=25^\circ C$                | 71          | W          |
| $E_{AS}$       | Single pulsed avalanche energy <sup>5)</sup>                      | 57          | mJ         |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range                  | -55 to +150 | $^\circ C$ |

## Thermal Characteristics:

| Symbol          | Parameter                                             | Max  | Units        |
|-----------------|-------------------------------------------------------|------|--------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case                  | 1.76 | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient <sup>4)</sup> | 62   |              |

**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-Sourtce Breakdown Voltage    | V <sub>GS</sub> =0V, I <sub>D</sub> =250 μ A                                        | 100 | ---  | ---  | V     |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current    | V <sub>GS</sub> =0V, V <sub>DS</sub> =100V                                          | --- | ---  | 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                          | 1.4 | ---  | 2.5  | V     |
| R <sub>DS(ON)</sub>                | Drain-Source On Resistance         | V <sub>GS</sub> =10V, I <sub>D</sub> =10A                                           | --- | 13.8 | 20   | m Ω   |
|                                    |                                    | V <sub>GS</sub> =4.5V, I <sub>D</sub> =7A                                           | --- | 17.4 | 26   |       |
| Dynamic Characteristics            |                                    |                                                                                     |     |      |      |       |
| C <sub>iss</sub>                   | Input Capacitance                  | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=100KHz                                 | --- | 1000 | ---  | pF    |
| C <sub>OSS</sub>                   | Output Capacitance                 |                                                                                     | --- | 180  | ---  |       |
| C <sub>rSS</sub>                   | Reverse Transfer Capacitance       |                                                                                     | --- | 9.5  | ---  |       |
| Switching Characteristics          |                                    |                                                                                     |     |      |      |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                 | V <sub>DS</sub> =50V, I <sub>D</sub> =5A, V <sub>GS</sub> =10V, R <sub>G</sub> =10Ω | --- | 16.6 | --   | ns    |
| t <sub>r</sub>                     | Rise Time                          |                                                                                     | --- | 3.8  | ---  | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                |                                                                                     | --- | 75.5 | ---  | ns    |
| t <sub>f</sub>                     | Fall Time                          |                                                                                     | --- | 46   | ---  | ns    |
| Q <sub>g</sub>                     | Total Gate Charge                  | V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =5A                      | --- | 16.2 | ---  | nC    |
| Q <sub>gs</sub>                    | Gate-Source Charge                 |                                                                                     | --- | 2.8  | ---  | nC    |
| Q <sub>gd</sub>                    | Gate-Drain Charge                  |                                                                                     | --- | 4.1  | ---  | nC    |
| V <sub>plateau</sub>               | Gate plateau voltage               |                                                                                     | --- | 3    | ---  | V     |
| Drain-Source Diode Characteristics |                                    |                                                                                     |     |      |      |       |
| V <sub>SD</sub>                    | Source-Drain Diode Forward Voltage | V <sub>GS</sub> =0V, I <sub>S</sub> =12A                                            | --- | ---  | 1.3  | V     |

|                        |                               |                                                                         |      |      |      |     |
|------------------------|-------------------------------|-------------------------------------------------------------------------|------|------|------|-----|
| <b>trr</b>             | Reverse Recovery Time         | $V_R=50\text{ V}, I_S=5\text{ A},$<br>$di/dt=100\text{ A}/\mu\text{ s}$ | ---- | 49   | ---- | Nsn |
| <b>qrr</b>             | Reverse Recovery Charge       |                                                                         | ---- | 61.8 | ---- | c   |
| <b>I<sub>rrm</sub></b> | Peak reverse recovery current |                                                                         |      | 2.4  |      | A   |

### Notes:

- 1)2 Calculated continuous current based on maximum allowable junction temperature.
- 3) Repetitive rating; pulse width limited by max. junction temperature.
- 4)5 Pd is based on max. junction temperature, using junction-case thermal resistance.
- ) The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_a=25^\circ\text{C}$ .  
 $V_{DD}=50\text{ V}, V_{GS}=10\text{ V}, L=0.3\text{ mH}$ , starting  $T_j=25^\circ\text{C}$ .

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

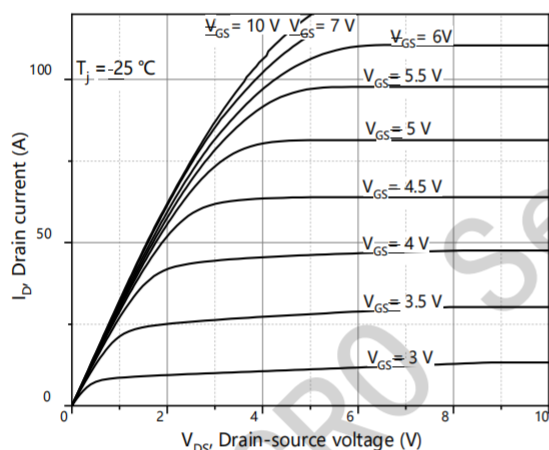


Figure 1. Typ. output characteristics

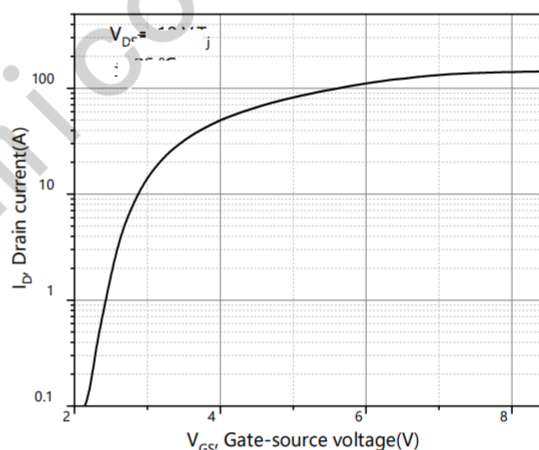


Figure 2. Typ. transfer characteristics

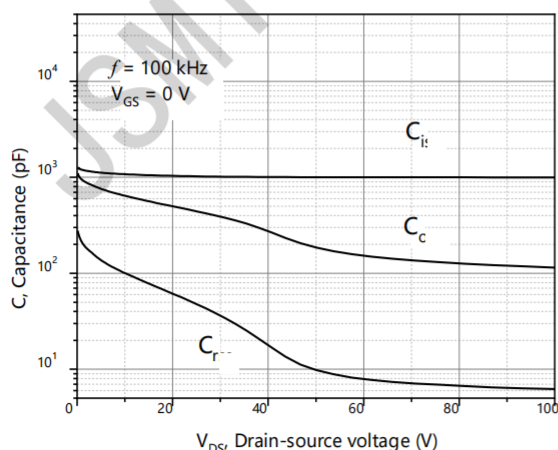


Figure 3. Typ. capacitances

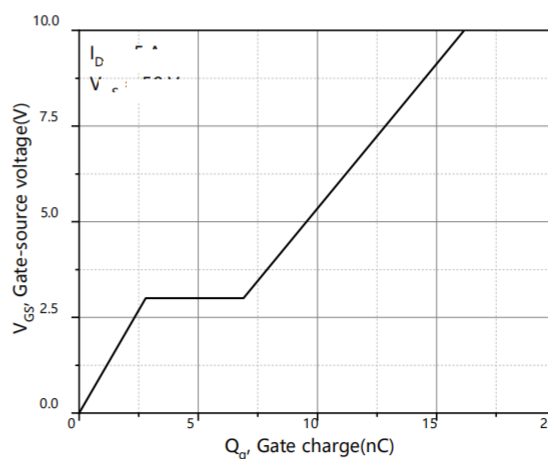


Figure 4. Typ. gate charge

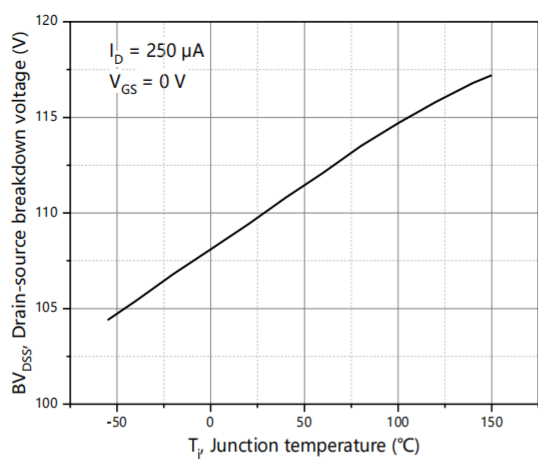


Figure 5. Drain-source breakdown voltage

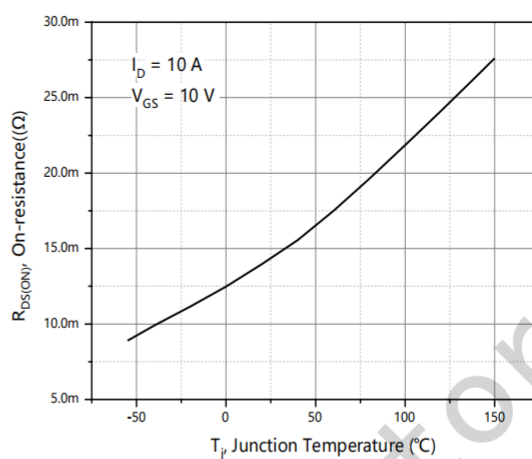


Figure 6. Drain-source on-state resistance

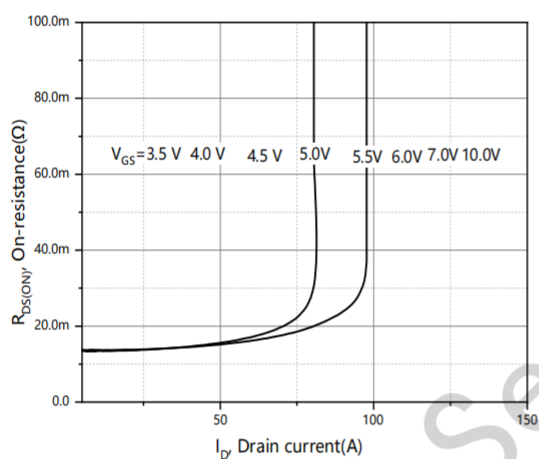


Figure 7. Drain-source on-state resistance

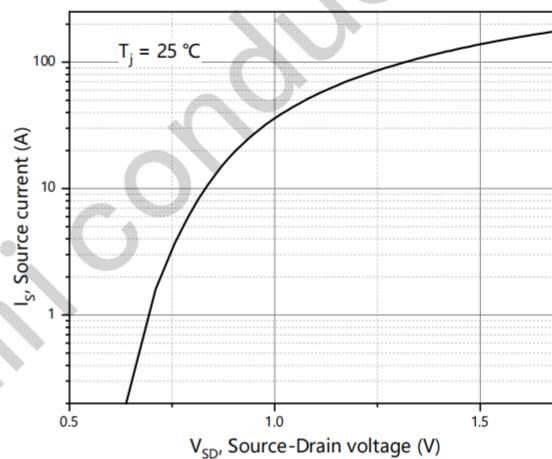


Figure 8. Forward characteristic of body diode

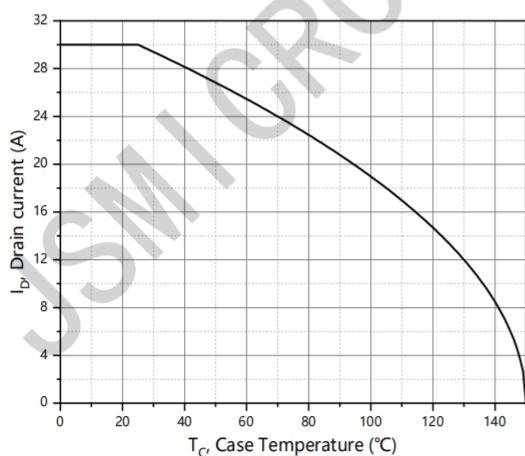


Figure 9. Drain current

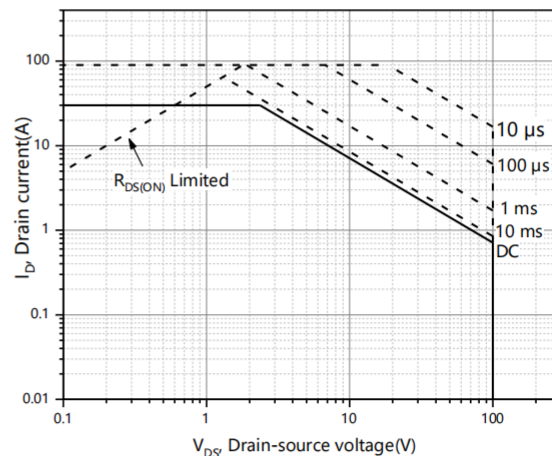


Figure 10. Safe operation area  $T_C=25\text{ }^{\circ}\text{C}$

## 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 |