

### Product Summary

- $V_{DS}$  -40 V
- $I_{DS}$  -40A
- $R_{DS(ON)}$  (at  $V_{GS} = -10V$ ) 15mΩ(Typ)

### Application

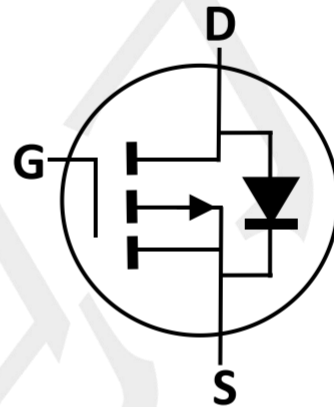
- Reverse Battery protection
- Load switch
- Power management
- PWM Application

### Package and Pin Configuration



TO-252

### Circuit diagram



Equivalent Circuit

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

| PARAMETER                                           | SYMBOL    | LIMIT       | UNIT             |
|-----------------------------------------------------|-----------|-------------|------------------|
| Drain-Source Voltage                                | $V_{DS}$  | -40         | V                |
| Gate-Source Voltage                                 | $V_{GS}$  | $\pm 20$    | V                |
| Continuous Drain Current, $T_C = 25^\circ\text{C}$  | $I_D$     | -40         | A                |
| Continuous Drain Current, $T_C = 100^\circ\text{C}$ | $I_D$     | -28         | A                |
| Pulsed Drain Current (note1)                        | $I_{DM}$  | -50         | A                |
| Maximum Power Dissipation                           | $P_D$     | 62          | W                |
| Operating Junction Temperature Range                | $T_J$     | 150         | $^\circ\text{C}$ |
| Storage Temperature Range                           | $T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |

### Thermal Characteristic

| PARAMETER                                                    | Symbol          | Value | Unit               |
|--------------------------------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance from Junction to Ambient ( $t \leq 10s$ ) | $R_{\theta JA}$ | 20    | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case                                     | $R_{\theta JC}$ | 2.4   | $^\circ\text{C/W}$ |

notes 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. When mounted on 1" square PCB (FR4 material).

### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| PARAMETER                                               | CONDITIONS                                                                                            | SYMBOL              | MIN  | TYP   | MAX  | UNIT |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------|------|-------|------|------|
| Static                                                  |                                                                                                       |                     |      |       |      |      |
| Drain-Source Breakdown Voltage                          | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                                                           | BV <sub>DSS</sub>   | -40  | --    | --   | V    |
| Gate-Source Threshold Voltage                           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA                                            | V <sub>GS(th)</sub> | -1.7 | -1.9  | -3.0 | V    |
| Gate-Source Leakage                                     | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                                           | I <sub>GSS</sub>    | --   | --    | ±100 | nA   |
| Zero Gate Voltage Drain Current                         | V <sub>DS</sub> = -40V, V <sub>GS</sub> =0V                                                           | I <sub>DSS</sub>    | --   | -0.1  | -1   | μA   |
|                                                         | V <sub>DS</sub> = -40V, T <sub>J</sub> =55°C                                                          |                     | --   | -1    | -5   | μA   |
| Drain-Source On-State Resistance (Note 1)               | V <sub>GS</sub> = -10V, I <sub>D</sub> = -12A                                                         | R <sub>DS(on)</sub> | --   | 15    | 22   | mΩ   |
|                                                         | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -8A                                                         |                     | --   | 27    | 33   |      |
| Forward Transconductance (Note 2)                       | V <sub>DS</sub> = -5V, I <sub>D</sub> = -12A                                                          | g <sub>fs</sub>     | --   | 35    | --   | S    |
| Dynamic (Note 2)                                        |                                                                                                       |                     |      |       |      |      |
| Total Gate Charge (Note 3)                              | V <sub>DS</sub> = -20V,<br>I <sub>D</sub> = -12A,<br>V <sub>GS</sub> = -10V                           | Q <sub>g</sub>      | --   | 31.4  | --   | nC   |
| Gate-Source Charge (Note 3)                             |                                                                                                       | Q <sub>gs</sub>     | --   | 7.6   | --   |      |
| Gate-Drain Charge (Note 3)                              |                                                                                                       | Q <sub>gd</sub>     | --   | 6.2   | --   |      |
| Input Capacitance                                       | V <sub>DS</sub> = -20V,<br>V <sub>GS</sub> = 0V,<br>F= 1.0MHz                                         | C <sub>iss</sub>    | --   | 1870  | --   | pF   |
| Output Capacitance                                      |                                                                                                       | C <sub>oss</sub>    | --   | 185   | --   |      |
| Reverse Transfer Capacitance                            |                                                                                                       | C <sub>rss</sub>    | --   | 155   | --   |      |
| Switching                                               |                                                                                                       |                     |      |       |      |      |
| Turn-On Delay Time (Note 3)                             | V <sub>DS</sub> = -20V,<br>R <sub>L</sub> = 1.6Ω,<br>V <sub>GS</sub> = -10V,<br>R <sub>GEN</sub> = 3Ω | t <sub>d(on)</sub>  | --   | 10    | --   | nS   |
| Rise Time (Note 3)                                      |                                                                                                       | t <sub>r</sub>      | --   | 18    | --   |      |
| Turn-Off Delay Time (Note 3)                            |                                                                                                       | t <sub>d(off)</sub> | --   | 38    | --   |      |
| Fall Time (Note 3)                                      |                                                                                                       | t <sub>f</sub>      | --   | 24    | --   |      |
| Source-Drain Diode Ratings and Characteristics (Note 2) |                                                                                                       |                     |      |       |      |      |
| Forward Voltage                                         | V <sub>GS</sub> = 0V, I <sub>SD</sub> = -12A                                                          | V <sub>SD</sub>     | --   | -0.95 | -1.5 | V    |
| Continuous Source Current                               | Integral reverse diode in the MOSFET                                                                  | I <sub>S</sub>      | --   | --    | -28  | A    |
| Pulsed Current (Note 1)                                 |                                                                                                       | I <sub>SM</sub>     | --   | --    | -50  | A    |

Notes:

1. Pulse test; pulse width ≤ 300 μS, duty cycle ≤ 2%.
2. Guaranteed by design, not subject to production testing.
3. Independent of operating temperature

**TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**

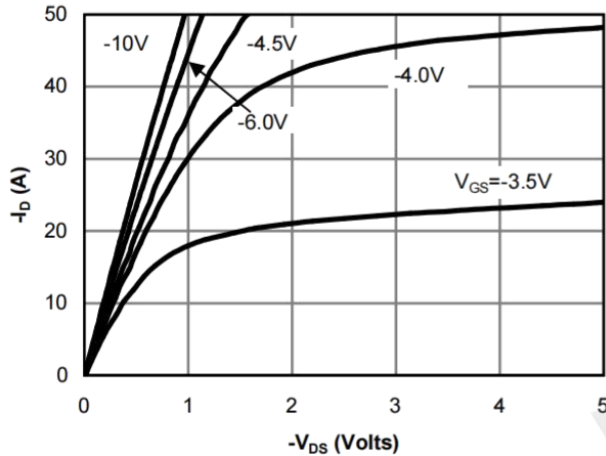


Figure 1: On-Region Characteristics

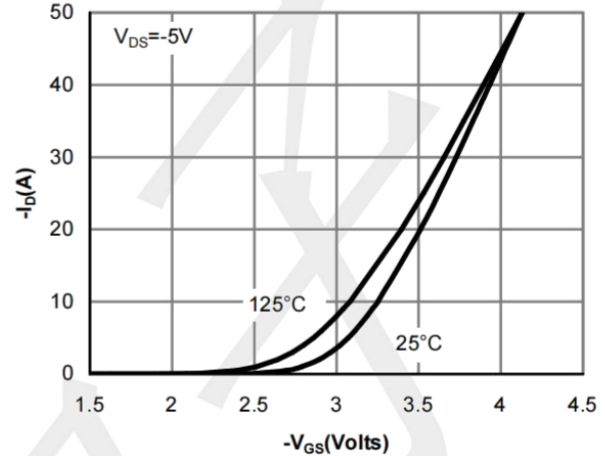


Figure 2: Transfer Characteristics

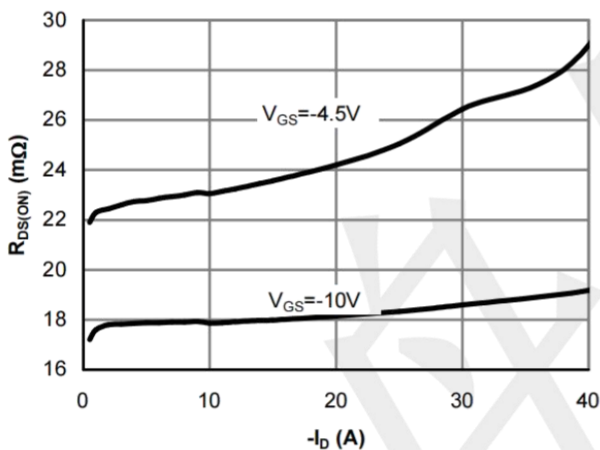


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

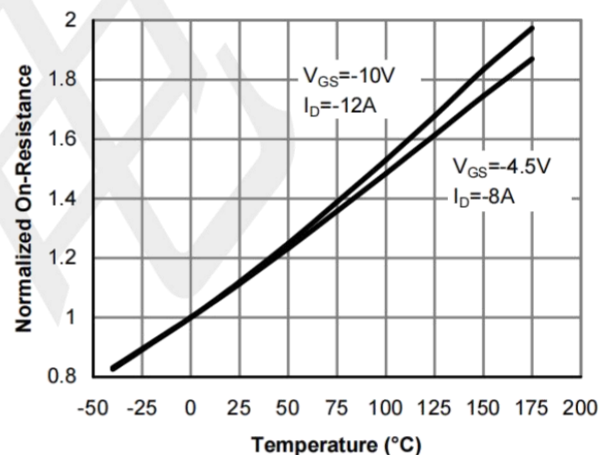


Figure 4: On-Resistance vs. Junction Temperature

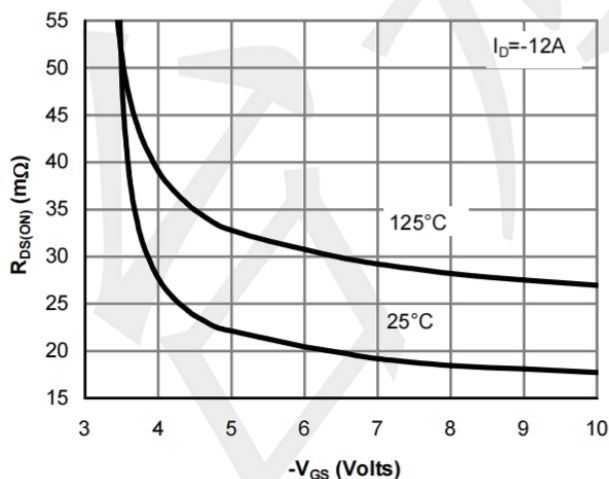


Figure 5: On-Resistance vs. Gate-Source Voltage

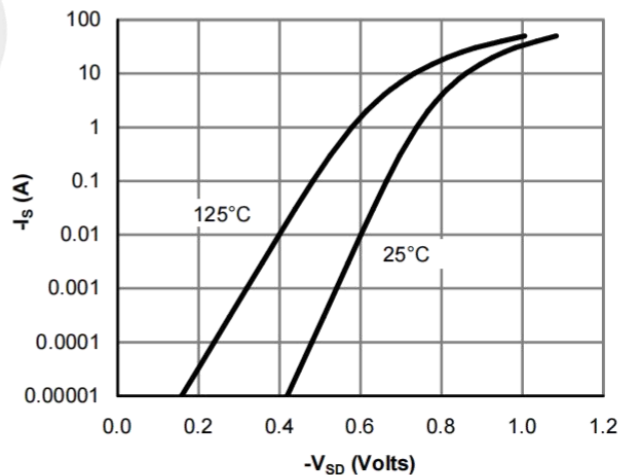
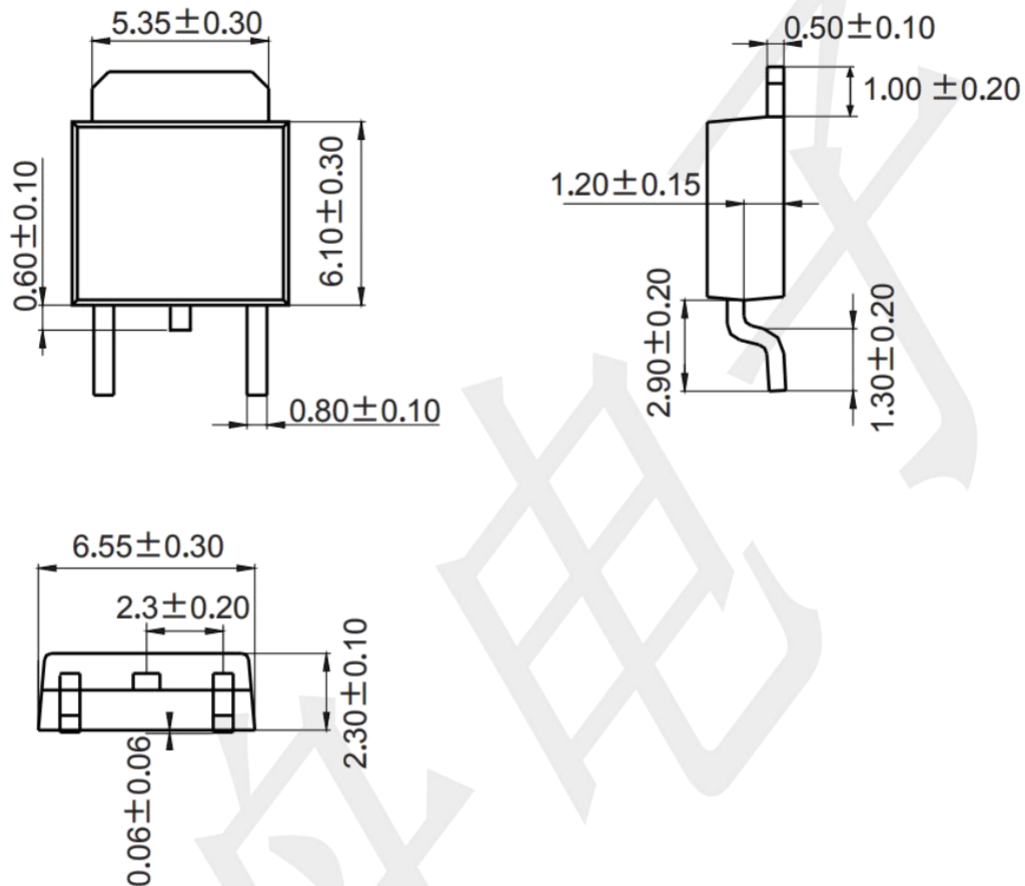


Figure 6: Body-Diode Characteristics

## Package Outline Dimensions (unit: mm)

TO-252



## Mounting Pad Layout (unit: mm)

