

### Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- Wide Bandgap SiC MOSFET Technology
- Halogen free, RoHs compliant
- Easy to Parallel and Simple to Drive
- Robust against Parasitic Turn on Even 0V Turn off Gate Voltage

| Product Summary |                             |                    |                      |
|-----------------|-----------------------------|--------------------|----------------------|
| V <sub>DS</sub> | R <sub>DS(on)</sub> (mΩ)Typ | I <sub>D</sub> (A) | Q <sub>g</sub> (Typ) |
| 650V            | 180@ 15V 8.5A               | 20                 | 28nc                 |

TO-252  
(DPAK)



### Mechanical Data

- Case:TO-252 Package

### Application

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Pulsed Power Applications
- Motor Drives

### Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

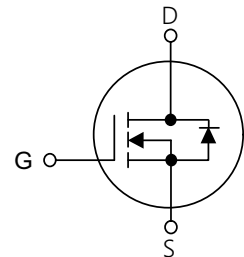


Table1 Absolute Maximum Ratings (T<sub>C</sub>=25°C, unless otherwise specified)

| Parameter                                  | Symbol                           | Value                 | Unit |
|--------------------------------------------|----------------------------------|-----------------------|------|
| Drain-Source Voltage                       | V <sub>DS</sub>                  | 650                   | V    |
| Gate-Source Voltage(Max)                   | V <sub>GS(max)</sub>             | -10/+22               | V    |
| Recommend Gate-Source Voltage              | V <sub>GSop</sub>                | 0/+18                 | V    |
| Continuous Drain Current                   | I <sub>D</sub>                   | T <sub>C</sub> =25°C  | 20   |
|                                            |                                  | T <sub>C</sub> =100°C | 18   |
| Pulsed Drain Current (Note 1)              | I <sub>DM</sub>                  | 40                    | A    |
| Power Dissipation T <sub>C</sub> =25°C     | P <sub>D</sub>                   | 52                    | W    |
| Operating Junction and Storage Temperature | T <sub>J</sub> /T <sub>STG</sub> | -55 ~ +175            | °C   |

Table 2.Thermal Characteristics

| Parameter                           | Symbol           | SC180N65M | Unit |
|-------------------------------------|------------------|-----------|------|
| Thermal resistance Junction to Case | R <sub>θJC</sub> | 2.88      | °C/W |

Table 3. Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise specified)

| Parameter                                                      |         | Symbol              | Test Conditions                                                                                                | Min | Typ  | Max  | Unit |
|----------------------------------------------------------------|---------|---------------------|----------------------------------------------------------------------------------------------------------------|-----|------|------|------|
| Off Characteristics                                            |         |                     |                                                                                                                |     |      |      |      |
| Drain-Source Breakdown Voltage                                 |         | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V,I <sub>D</sub> =500μA                                                                      | 650 | -    | -    | V    |
| Drain-Source Leakage Current                                   |         | I <sub>DSS</sub>    | V <sub>DS</sub> =650V,V <sub>GS</sub> =0V                                                                      | -   | -    | 10   | μA   |
| Gate- Source Leakage Current                                   | Forward | I <sub>GSS</sub>    | V <sub>GS</sub> =18V,V <sub>DS</sub> =0V                                                                       | -   | 10   | 250  | nA   |
|                                                                | Reverse |                     | V <sub>GS</sub> = -4V,V <sub>DS</sub> =0V                                                                      | -   | -10  | -250 | nA   |
| On Characteristics                                             |         |                     |                                                                                                                |     |      |      |      |
| Gate Threshold Voltage                                         |         | V <sub>GS(TH)</sub> | V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =3.5mA                                                        | 2.7 | -    | 4.5  | V    |
| Static Drain-Source On-State Resistance                        |         | R <sub>DS(ON)</sub> | V <sub>GS</sub> =15V,I <sub>D</sub> =8.5A,T <sub>J</sub> =25°C                                                 | -   | 180  | 240  | mΩ   |
|                                                                |         |                     | V <sub>GS</sub> =15V,I <sub>D</sub> =8.5A,T <sub>J</sub> =175°C                                                | -   | 160  | -    |      |
|                                                                |         |                     | V <sub>GS</sub> =18V,I <sub>D</sub> =8.5A,T <sub>J</sub> =25°C                                                 | -   | 120  | -    |      |
|                                                                |         |                     | V <sub>GS</sub> =18V,I <sub>D</sub> =8.5A,T <sub>J</sub> =175°C                                                | -   | 130  | -    |      |
| Gate Resisitance                                               |         | R <sub>G</sub>      | f=1MHz                                                                                                         | -   | 6.5  | -    | Ω    |
| Dynamic Characteristics                                        |         |                     |                                                                                                                |     |      |      |      |
| Input Capacitance                                              |         | C <sub>ISS</sub>    | V <sub>DS</sub> =500V,V <sub>GS</sub> =0V, f=1MHz                                                              | -   | 491  | -    | pF   |
| Output Capacitance                                             |         | C <sub>OSS</sub>    |                                                                                                                | -   | 39   | -    | pF   |
| Reverse Transfer Capacitance                                   |         | C <sub>RSS</sub>    |                                                                                                                | -   | 4.2  | -    | pF   |
| Turn-On Delay Time                                             |         | td(on)              | V <sub>DS</sub> =500V,I <sub>D</sub> =8.5A<br>V <sub>GS</sub> =0/15V,R <sub>G</sub> =10Ω, T <sub>J</sub> =25°C | -   | 16   | -    | ns   |
| Turn-On Rise Time                                              |         | t <sub>R</sub>      |                                                                                                                | -   | 55   | -    | ns   |
| Turn-Off Delay Time                                            |         | td(off)             |                                                                                                                | -   | 34   | -    | ns   |
| Turn-Off Fall Time                                             |         | t <sub>f</sub>      |                                                                                                                | -   | 71   | -    | ns   |
| Total Gate Charge                                              |         | Q <sub>G</sub>      | V <sub>DD</sub> =500V,I <sub>D</sub> =8.5A, V <sub>GS</sub> =0/15V                                             | -   | 28   | -    | nC   |
| Gate-Source Charge                                             |         | Q <sub>GS</sub>     |                                                                                                                | -   | 8.3  | -    | nC   |
| Gate-Drain Charge                                              |         | Q <sub>GD</sub>     |                                                                                                                | -   | 13.8 | -    | nC   |
| Drain-Source Diode Characteristics and Maximum Ratings(Note 2) |         |                     |                                                                                                                |     |      |      |      |
| Drain-Source Diode Forward Voltage                             |         | V <sub>SD</sub>     | V <sub>GS</sub> =0V,I <sub>S</sub> =5A                                                                         | -   | 3.4  | -    | V    |
| Continuous Diode Forward Current                               |         | I <sub>S</sub>      |                                                                                                                | -   | 20   | -    | A    |
| Reverse Recovery Time                                          |         | trr                 | V <sub>R</sub> =500V,V <sub>GS</sub> =0V<br>I <sub>SD</sub> =8.5A, di/dt=530A/us                               | -   | 17.6 | -    | ns   |
| Recovered charge                                               |         | Q <sub>rr</sub>     |                                                                                                                | -   | 43   | -    | nC   |
| Peak reverse recovery current                                  |         | I <sub>rrm</sub>    |                                                                                                                | -   | 4.2  | -    | A    |

Notes: 1 Repetitive Rating Pulse width limited by maximum junction temperature

2 Pulse Test: Pulse width ≤300μs, Duty cycle ≤2%

## Typical Characteristics Diagrams

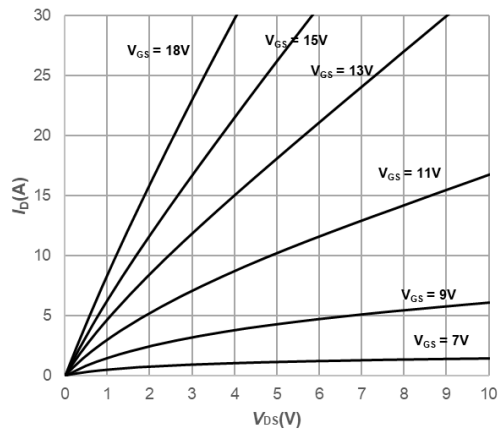


Fig1. Output Characteristics  $T_j = 25^\circ\text{C}$

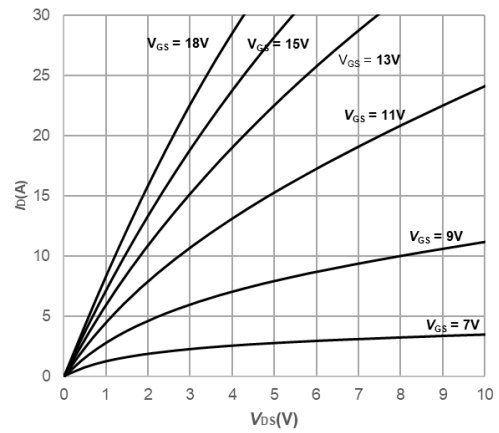


Fig2. Output Characteristics  $T_j = 175^\circ\text{C}$

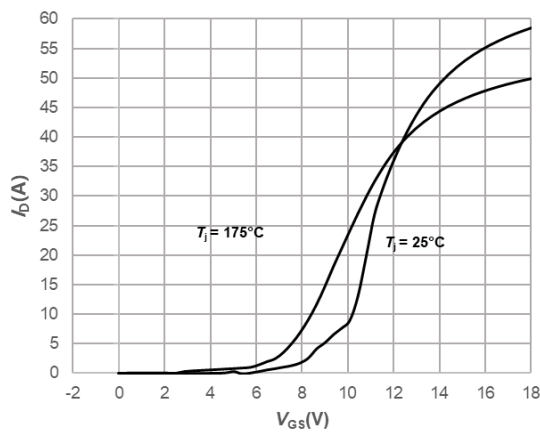


Fig3. Typical Transfer Characteristics

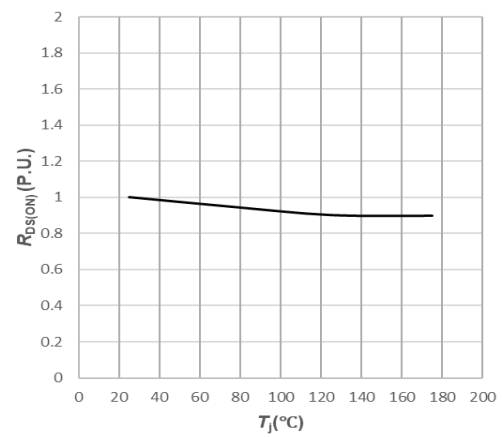


Fig4. Normalized On-Resistance vs. Temperature

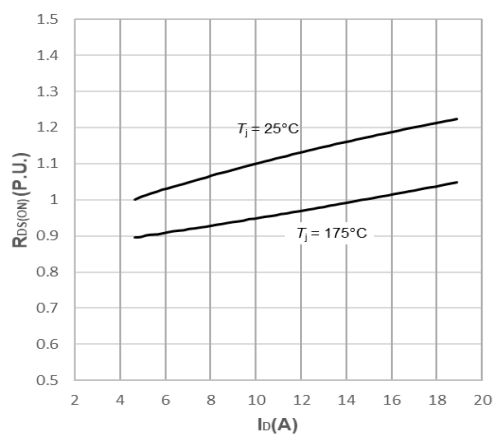


Fig5. Normalized On-Resistance vs. Drain Current For Various Temperatures

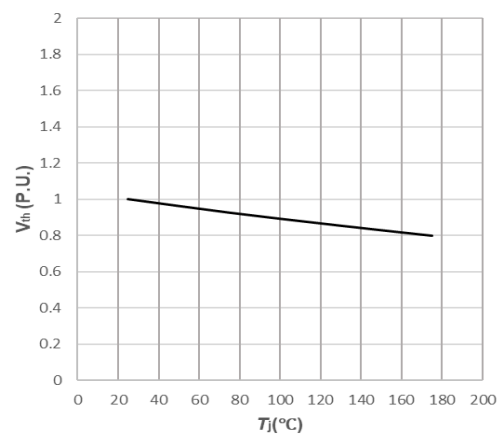


Fig6. Normalized Threshold Voltage vs. Temperature

## Typical Characteristics Diagrams

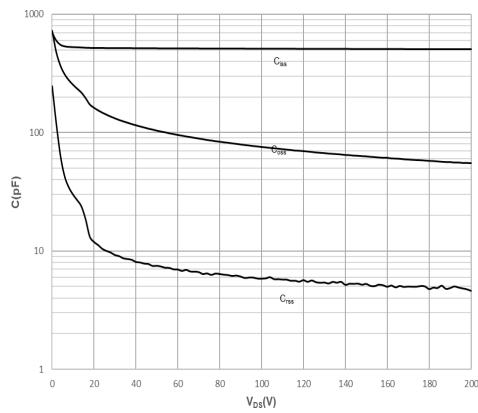


Fig7. Capacitances vs. Drain-Source Voltage (0-200V)

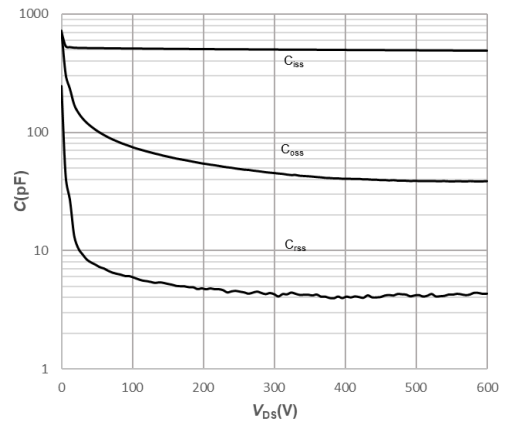


Fig8. Capacitances vs. Drain-Source Voltage (0-600V)

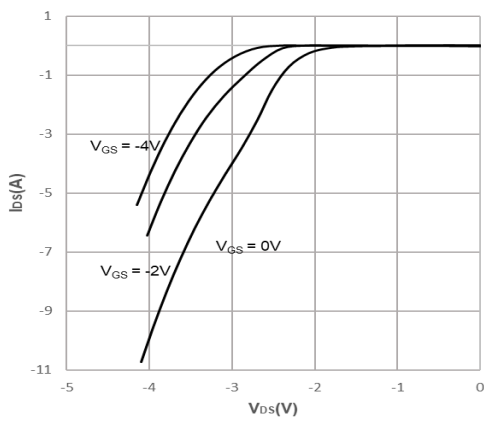
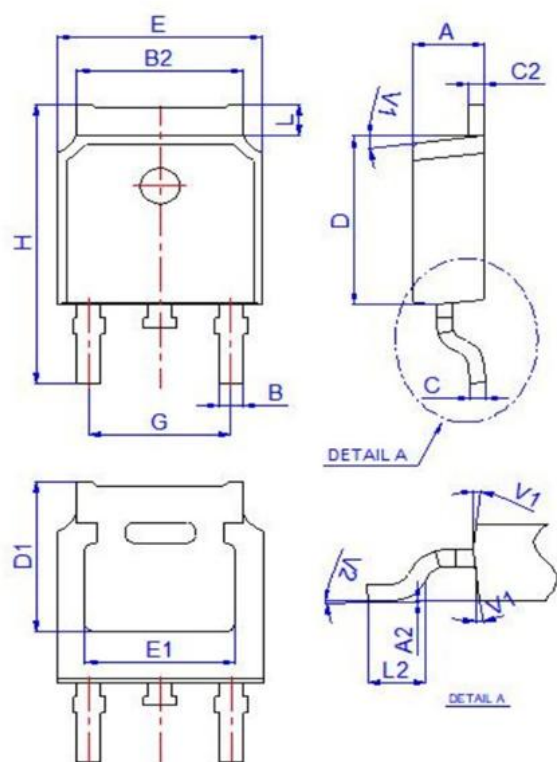


Fig9. Body Diode Characteristics

# Dimensions

## TO-252 package



| Ref. | Dimensions  |      |       |          |      |       |
|------|-------------|------|-------|----------|------|-------|
|      | Millimeters |      |       | Inches   |      |       |
|      | Min.        | Typ. | Max.  | Min.     | Typ. | Max.  |
| A    | 2.10        |      | 2.50  | 0.083    |      | 0.098 |
| A2   | 0           |      | 0.10  | 0        |      | 0.004 |
| B    | 0.66        |      | 0.86  | 0.026    |      | 0.034 |
| B2   | 5.18        |      | 5.48  | 0.202    |      | 0.216 |
| C    | 0.40        |      | 0.60  | 0.016    |      | 0.024 |
| C2   | 0.44        |      | 0.58  | 0.017    |      | 0.023 |
| D    | 5.90        |      | 6.30  | 0.232    |      | 0.248 |
| D1   | 5.30REF     |      |       | 0.209REF |      |       |
| E    | 6.40        |      | 6.80  | 0.252    |      | 0.268 |
| E1   | 4.63        |      |       | 0.182    |      |       |
| G    | 4.47        |      | 4.67  | 0.176    |      | 0.184 |
| H    | 9.50        |      | 10.70 | 0.374    |      | 0.421 |
| L    | 1.09        |      | 1.21  | 0.043    |      | 0.048 |
| L2   | 1.35        |      | 1.65  | 0.053    |      | 0.065 |
| V1   |             | 7°   |       |          | 7°   |       |
| V2   | 0°          |      | 6°    | 0°       |      | 6°    |

## Friendship Reminder

■ JiNan JingHeng (hereinafter referred to as JH) reserves the right to make changes to this document and its products and specifications at anytime without notice.

■ Customers should obtain and confirm the latest product information and specifications before final design, purchase or use.

■ JH makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does JH assume any liability for application assistance or customer product design.

■ JH does not warrant or accept any liability with products which are purchased or used for any unintended or unauthorized application.

■ No license is granted by implication or otherwise under any intellectual property rights of JH.

■ JH's products are not authorized for use as critical components in life support devices or systems without express written approval of JH.