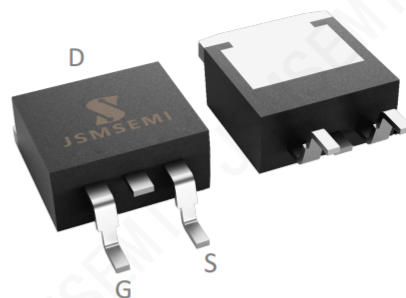


## Product Summary

- $V_{DS}$  100V
- $I_D$  40A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ )  $<27m\Omega$
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

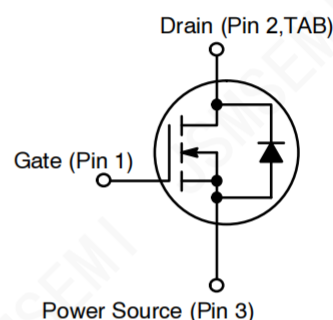


## General Description

- Trench Power MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

## Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor
- Motor drivers



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

| Parameter                              |                   | Symbol         | Limit    | Unit       |
|----------------------------------------|-------------------|----------------|----------|------------|
| Drain-source Voltage                   |                   | $V_{DS}$       | 100      | V          |
| Gate-source Voltage                    |                   | $V_{GS}$       | $\pm 20$ | V          |
| Drain Current                          | $T_C=25^\circ C$  | $I_D$          | 40       | A          |
|                                        | $T_C=100^\circ C$ |                | 25       |            |
| Pulsed Drain Current <sup>A</sup>      |                   | $I_{DM}$       | 160      | A          |
| Avalanche energy <sup>B</sup>          |                   | EAS            | 248      | mJ         |
| Total Power Dissipation <sup>C</sup>   | $T_C=25^\circ C$  | $P_D$          | 156      | W          |
|                                        | $T_C=100^\circ C$ |                | 100      |            |
| Junction and Storage Temperature Range |                   | $T_J, T_{STG}$ | -55~+150 | $^\circ C$ |

### ■ Thermal resistance

| Parameter                                           |              | Symbol          | Typ | Max | Units        |
|-----------------------------------------------------|--------------|-----------------|-----|-----|--------------|
| Thermal Resistance Junction-to-Ambient <sup>D</sup> | Steady-State | $R_{\theta JA}$ | 65  | -   | $^\circ C/W$ |
| Thermal Resistance Junction-to-Case                 | Steady-State | $R_{\theta JC}$ | 1.0 | -   |              |

## Ordering Information

| Order number       | Package | Operation Temperature Range | MSL Grade | Ship, Quantity | Green |
|--------------------|---------|-----------------------------|-----------|----------------|-------|
| RSJ400N10FRATL-JSM | TO-263  | -55 to 150 $^\circ C$       | 1         | T&R, 800       | Rohs  |

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

| Parameter                             | Symbol              | Conditions                                                                               | Min | Typ  | Max  | Units |
|---------------------------------------|---------------------|------------------------------------------------------------------------------------------|-----|------|------|-------|
| Static Parameter                      |                     |                                                                                          |     |      |      |       |
| Drain-Source Breakdown Voltage        | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA                                              | 100 | -    | -    | V     |
|                                       |                     | V <sub>GS</sub> = 0V, I <sub>D</sub> =1mA                                                | 100 | -    | -    | V     |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>    | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V                                               | -   | -    | 1    | μA    |
|                                       |                     | V <sub>DS</sub> = 100V, V <sub>GS</sub> =0V, T <sub>j</sub> =150°C                       | -   | -    | 100  |       |
| Gate-Body Leakage Current             | I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V                                              | -   | -    | ±100 | nA    |
| Gate Threshold Voltage                | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 2.0 | 3.0  | 4.0  | V     |
| Static Drain-Source On-Resistance     | R <sub>DS(ON)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> =50A                                               | -   | 19.0 | 27.0 | mΩ    |
|                                       |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =50A                                               | -   | 7.7  | 9.0  |       |
| Diode Forward Voltage                 | V <sub>SD</sub>     | I <sub>S</sub> =50A, V <sub>GS</sub> =0V                                                 | -   | -    | 1.2  | V     |
| Gate resistance                       | R <sub>G</sub>      | f=1MHz                                                                                   | -   | 2.5  | -    | Ω     |
| Maximum Body-Diode Continuous Current | I <sub>S</sub>      |                                                                                          | -   | -    | 40   | A     |
| Dynamic Parameters                    |                     |                                                                                          |     |      |      |       |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz                                        | -   | 2313 | -    | pF    |
| Output Capacitance                    | C <sub>oss</sub>    |                                                                                          | -   | 680  | -    |       |
| Reverse Transfer Capacitance          | C <sub>rss</sub>    |                                                                                          | -   | 15   | -    |       |
| Switching Parameters                  |                     |                                                                                          |     |      |      |       |
| Total Gate Charge                     | Q <sub>g</sub>      | V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =40A                          | -   | 29   | -    | nC    |
| Gate-Source Charge                    | Q <sub>gs</sub>     |                                                                                          | -   | 10   | -    |       |
| Gate-Drain Charge                     | Q <sub>gd</sub>     |                                                                                          | -   | 8    | -    |       |
| Reverse Recovery Charge               | Q <sub>rr</sub>     | I <sub>F</sub> =50A, di/dt=100A/us                                                       | -   | 63   | -    | nC    |
| Reverse Recovery Time                 | t <sub>rr</sub>     |                                                                                          | -   | 45   | -    | ns    |
| Turn-on Delay Time                    | t <sub>D(on)</sub>  | V <sub>GS</sub> =10V, V <sub>DD</sub> =50V, I <sub>D</sub> =20A<br>R <sub>GEN</sub> =10Ω | -   | 24   | -    | ns    |
| Turn-on Rise Time                     | t <sub>r</sub>      |                                                                                          | -   | 25   | -    |       |
| Turn-off Delay Time                   | t <sub>D(off)</sub> |                                                                                          | -   | 54   | -    |       |
| Turn-off fall Time                    | t <sub>f</sub>      |                                                                                          | -   | 34   | -    |       |

A. Repetitive rating; pulse width limited by max. junction temperature.

 B.  $T_J=25^{\circ}\text{C}$ ,  $V_G=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=0.5\text{mH}$ 

 C.  $P_d$  is based on max. junction temperature, using junction-case and junction-ambient thermal resistance.

■ Typical Electrical and Thermal Characteristics Diagrams

Figure.1 Output Characteristics  $T_J=25^{\circ}\text{C}$

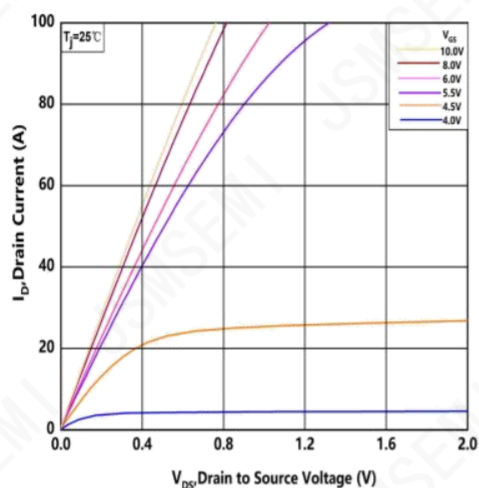


Figure.2 Transfer Characteristic for Various Junction Temperatures

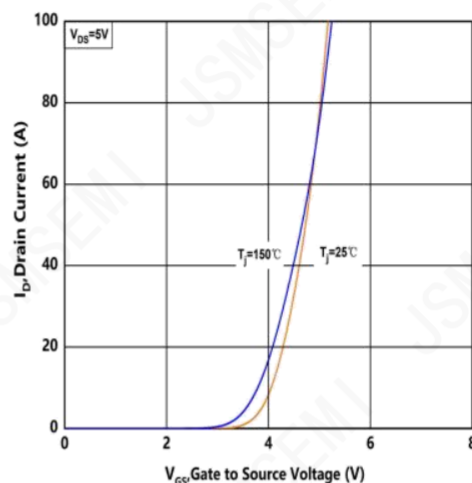


Figure.3 On-Resistance vs Drain Current For Various Gate Voltage

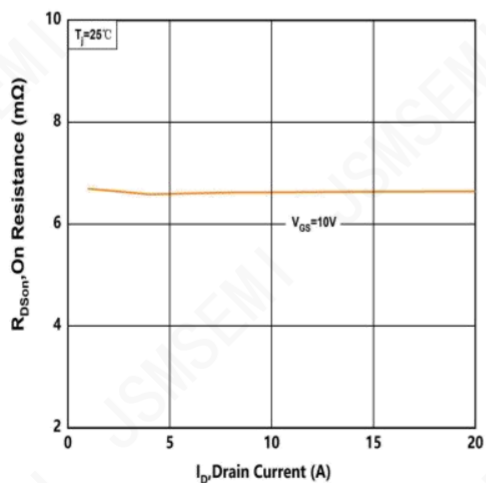


Figure.4 Typical On-Resistance vs Junction Temperature

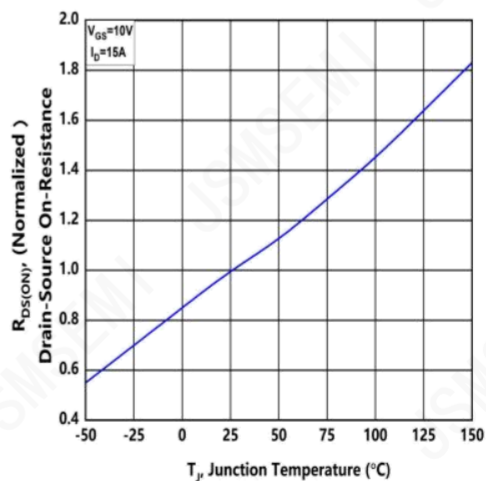


Figure.5 Typical Threshold Voltage vs Junction Temperature

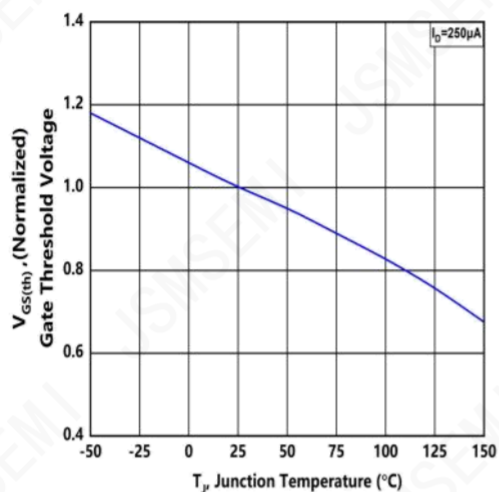


Figure.6 Typical Breakdown Voltage vs Junction Temperature

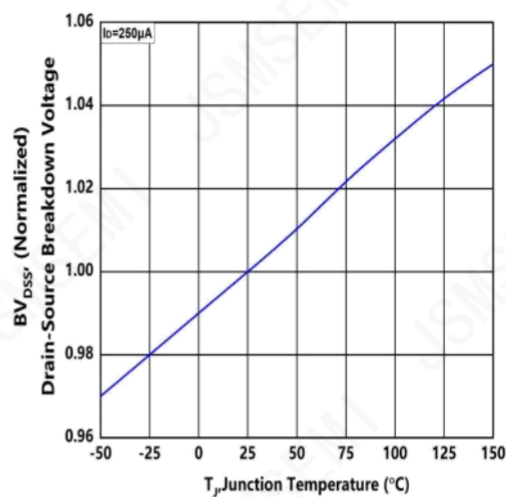


Figure.7 Typical Capacitance vs Drain to Source Voltage

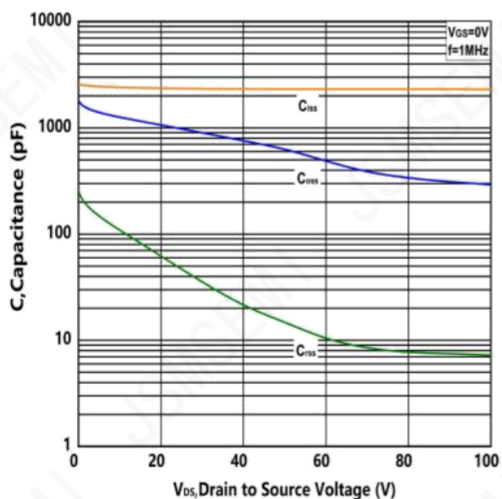


Figure.8 Typical Gate Charge vs Gate to Source Voltage

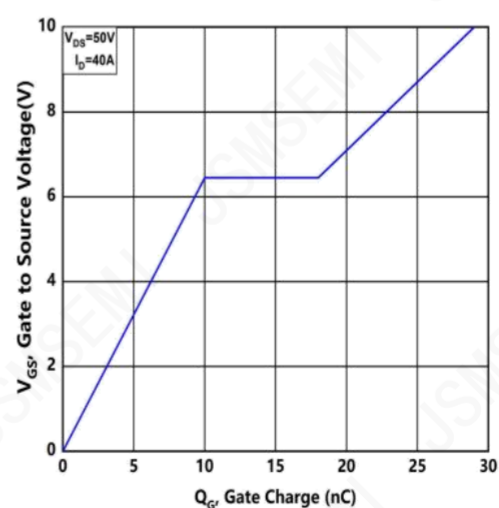


Figure.9 Typical Body Diode Characteristics

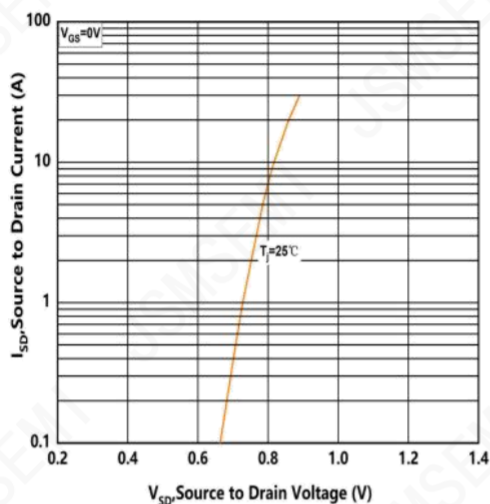


Figure.10 Maximum power Dissipation Derating vs Case Temperature

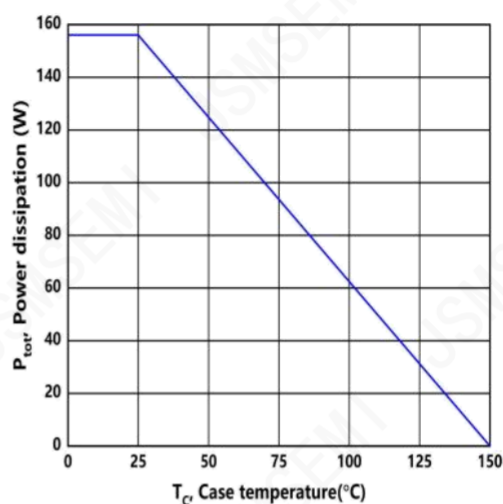


Figure.11 Continuous Drain Current Derating vs Case Temperature

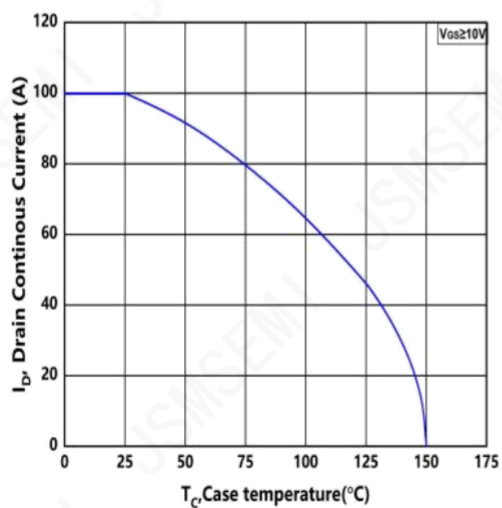
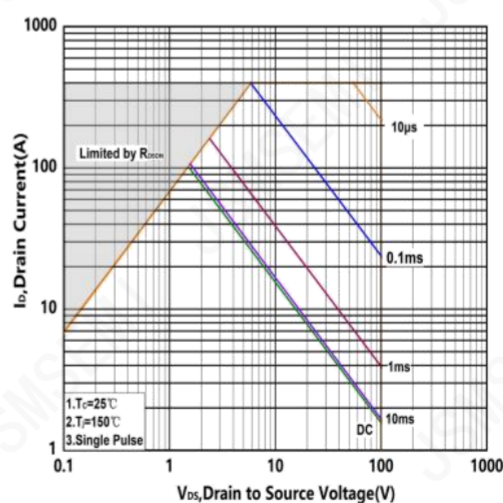
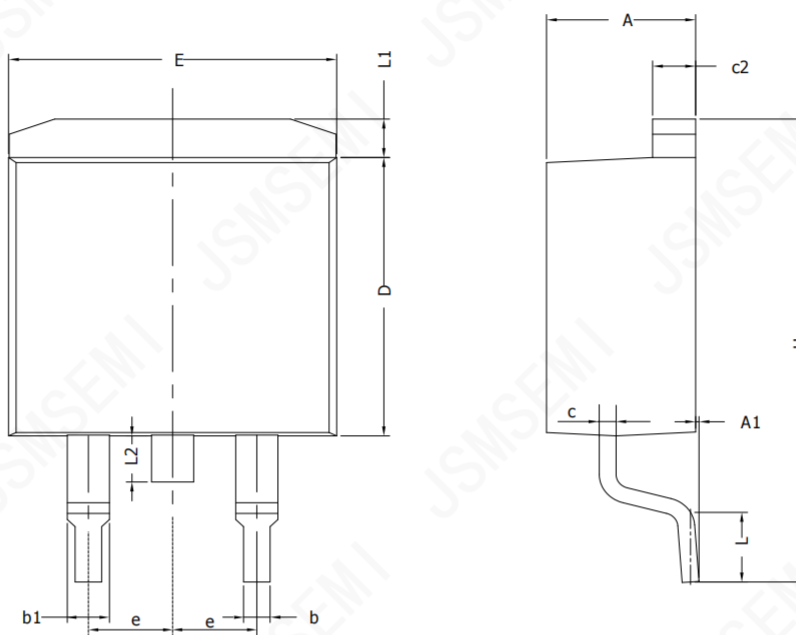


Figure.12 Safe Operating Area



## Package Information

TO-263-2



| SYMBOL | MIN     | NOM  | MAX   |
|--------|---------|------|-------|
| A      | 4.30    | 4.57 | 4.72  |
| A1     | 0       | 0.10 | 0.25  |
| b      | 0.71    | 0.81 | 0.91  |
| c      | 0.30    | ---  | 0.60  |
| c2     | 1.17    | 1.27 | 1.37  |
| D      | 8.50    | ---  | 9.35  |
| E      | 9.80    | ---  | 10.45 |
| e      | 2.54BSC |      |       |
| H      | 14.70   | ---  | 15.75 |
| L      | 2.00    | 2.30 | 2.74  |
| L1     | 1.12    | 1.27 | 1.42  |
| L2     | ---     | ---  | 1.75  |

## Revision History

| Rev. | Change          | Date      |
|------|-----------------|-----------|
| V1.0 | Initial version | 6/27/2021 |
|      |                 |           |

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