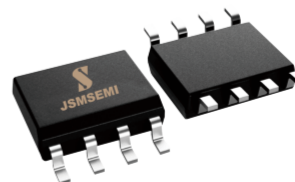


## Description:

This N-Channel MOSFET uses advanced trench technology and

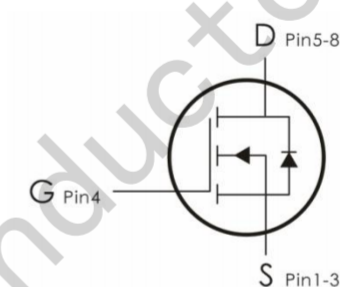
design to provide excellent  $R_{DS(on)}$  with low gate charge.

It can be used in a wide variety of applications.



## Features:

- 1)  $V_{DS}=30V, I_D=12A, R_{DS(on)} < 8m\Omega @ V_{GS}=10V$
- 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: ( $T_a=25^\circ C$ 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- $T_A=25^\circ C$       | 12          | A          |
|                | Continuous Drain Current- $T_A=100^\circ C$      | 9           |            |
| $I_{DM}$       | Drain Current-Pulsed <sup>note1</sup>            | 60          | A          |
| $E_{AS}$       | Single Pulsed Avalanche Energy <sup>note2</sup>  | 39          | mJ         |
| $P_D$          | Power Dissipation                                | 3           | W          |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +150 | $^\circ C$ |

## Thermal Characteristics:

| Symbol          | Parameter                               | Max | Units        |
|-----------------|-----------------------------------------|-----|--------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 41  | $^\circ C/W$ |

**Electrical Characteristics:** ( $T_A=25^{\circ}\text{C}$  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   | 1.5  | 2.5  | V     |
| R <sub>DS(ON)</sub>                | Drain-Source On Resistance <sup>note3</sup>      | V <sub>GS</sub> =10V, I <sub>D</sub> =15A                                                  | --- | 6.5  | 8    | m Ω   |
|                                    |                                                  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A                                                 | --- | 10   | 14   |       |
| Dynamic Characteristics            |                                                  |                                                                                            |     |      |      |       |
| C <sub>iss</sub>                   | Input Capacitance                                | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                          | --- | 1110 | ---  | pF    |
| C <sub>oss</sub>                   | Output Capacitance                               |                                                                                            | --- | 180  | ---  |       |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance                     |                                                                                            | --- | 150  | ---  |       |
| Switching Characteristics          |                                                  |                                                                                            |     |      |      |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                               | V <sub>DS</sub> =15V, I <sub>D</sub> =12A<br>R <sub>GEN</sub> =3 Ω . V <sub>GS</sub> =10V, | --- | 15   | ---  | ns    |
| t <sub>r</sub>                     | Rise Time                                        |                                                                                            | --- | 19   | ---  | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                              |                                                                                            | --- | 35   | ---  | ns    |
| t <sub>f</sub>                     | Fall Time                                        |                                                                                            | --- | 21   | ---  | ns    |
| Q <sub>g</sub>                     | Total Gate Charge                                | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V,<br>I <sub>D</sub> =8A                          | --- | 21   | ---  | nC    |
| Q <sub>gs</sub>                    | Gate-Source Charge                               |                                                                                            | --- | 2.35 | ---  | nC    |
| Q <sub>gd</sub>                    | Gate-Drain “Miller” Charge                       |                                                                                            | --- | 5.9  | ---  | nC    |
| Drain-Source Diode Characteristics |                                                  |                                                                                            |     |      |      |       |
| V <sub>SD</sub>                    | Diode Forward Voltage                            | V <sub>GS</sub> =0V, I <sub>S</sub> =12A                                                   | --- | ---  | 1.2  | V     |
| I <sub>S</sub>                     | Continuous Drain to Source Diode Forward Current |                                                                                            | --- | ---  | 12   | A     |

|                       |                                              |                                    |     |     |    |
|-----------------------|----------------------------------------------|------------------------------------|-----|-----|----|
| <b>I<sub>SM</sub></b> | Pulsed Drain to Source Diode Forward Current | ---                                | --- | 60  | A  |
| <b>t<sub>rr</sub></b> | Reverse Recovery Time                        | I <sub>F</sub> =12A, dI/dt=100A/μs | --- | 14  | ns |
| <b>Q<sub>rr</sub></b> | Reverse Recovery Charge                      |                                    | --- | 4.1 | nC |

### Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T<sub>J</sub>=25°C, V<sub>GS</sub>=15V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=12.6A
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

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

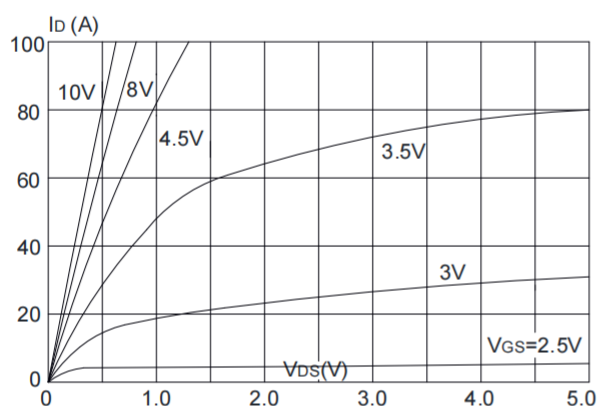


Figure 1: Output Characteristics

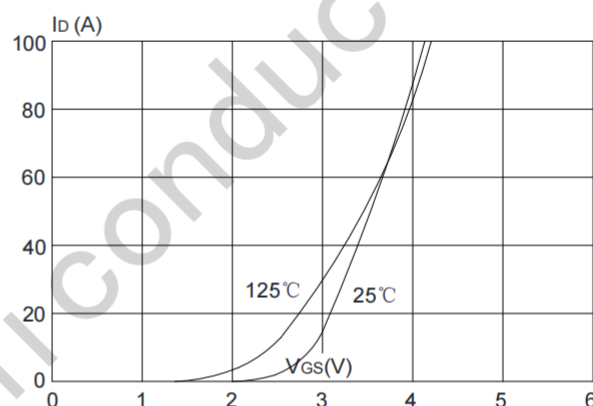


Figure 2: Typical Transfer Characteristics

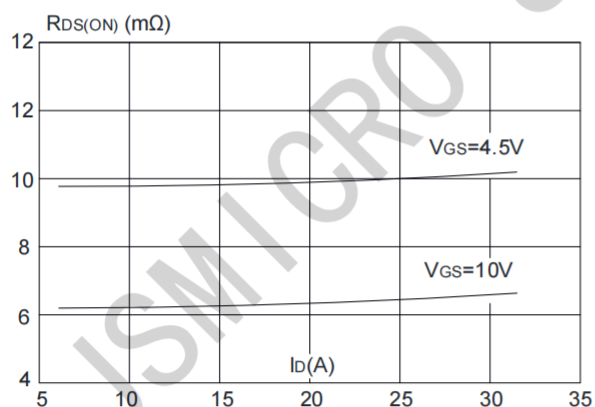


Figure 3: On-resistance vs. Drain Current

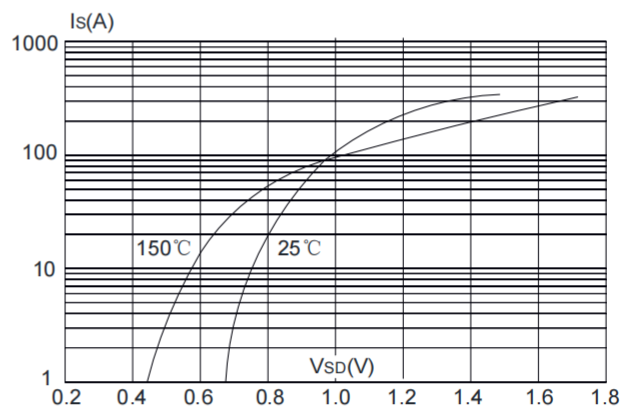
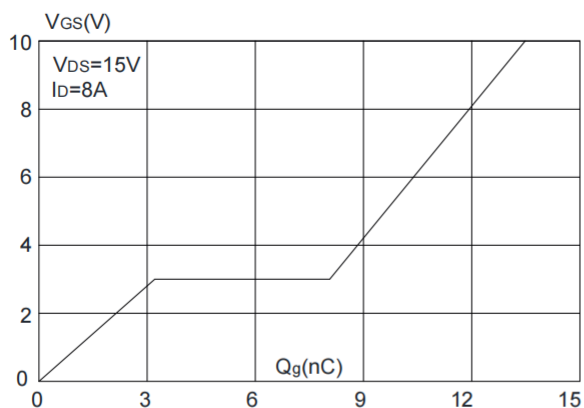
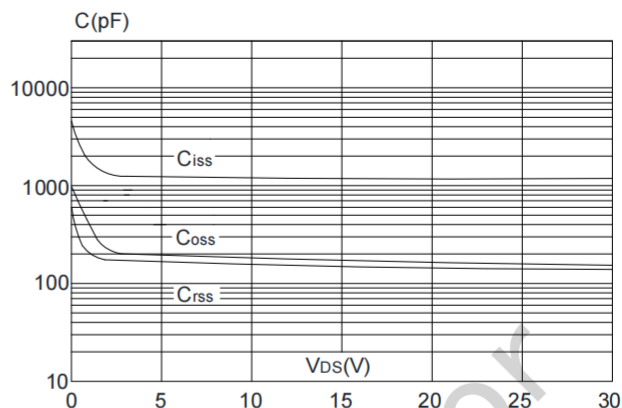


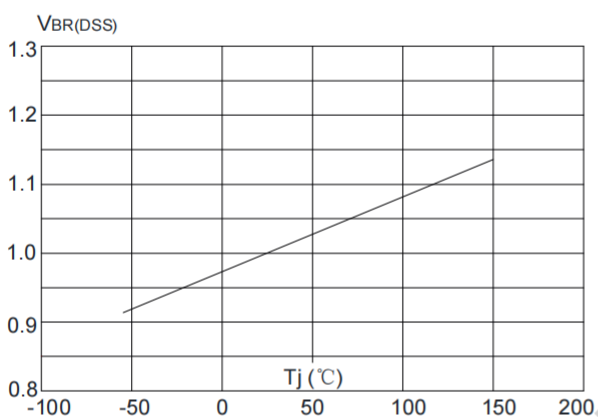
Figure 4: Body Diode Characteristics



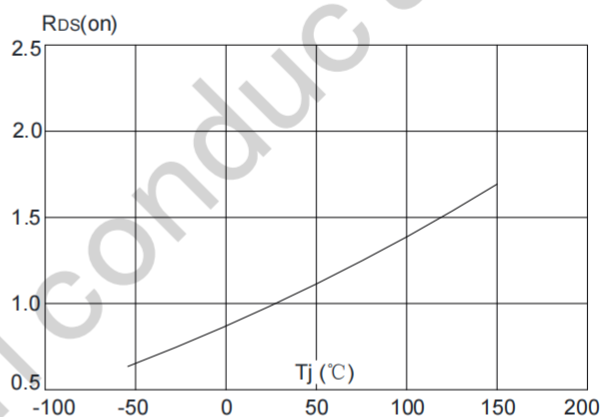
**Figure 5:** Gate Charge Characteristics



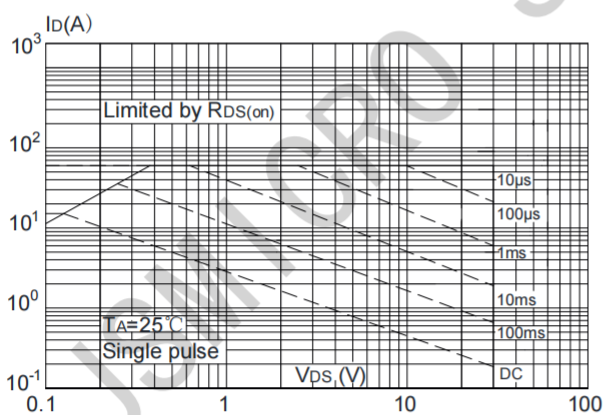
**Figure 6:** Capacitance Characteristics



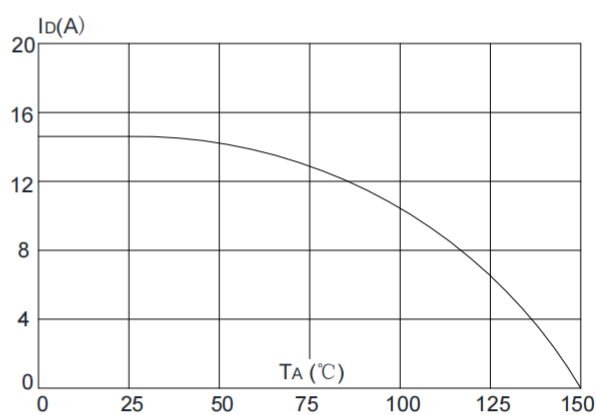
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



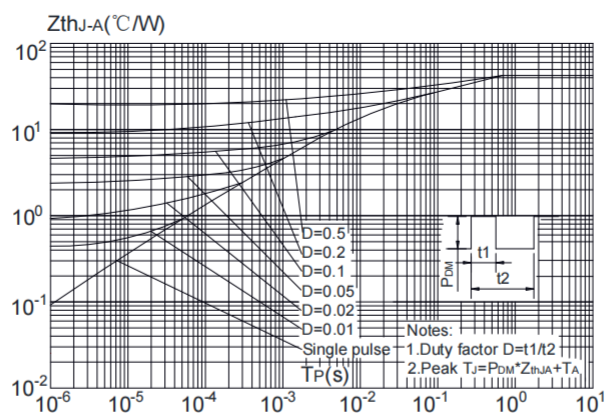
**Figure 8:** Normalized on Resistance vs. Junction Temperature



**Figure 9:** Maximum Safe Operating Area



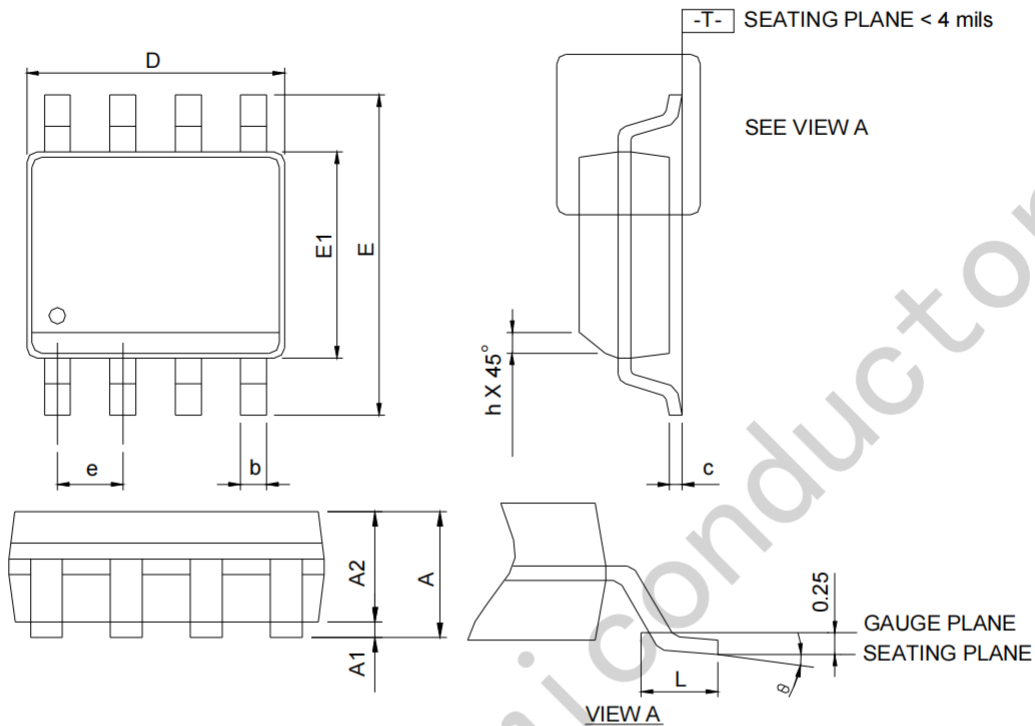
**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature



**Figure.11:** Maximum Effective  
Transient Thermal Impedance, Junction-to-Ambient

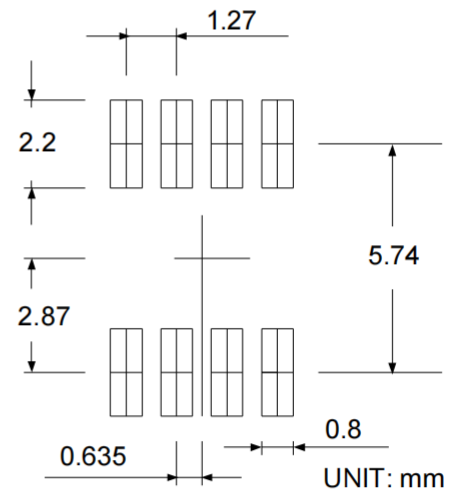
## Package Information

SOP-8



| SYMBOL | SOP-8       |      |           |       |
|--------|-------------|------|-----------|-------|
|        | MILLIMETERS |      | INCHES    |       |
|        | MIN.        | MAX. | MIN.      | MAX.  |
| A      | -           | 1.75 | -         | 0.069 |
| A1     | 0.10        | 0.25 | 0.004     | 0.010 |
| A2     | 1.25        | -    | 0.049     | -     |
| b      | 0.31        | 0.51 | 0.012     | 0.020 |
| c      | 0.17        | 0.25 | 0.007     | 0.010 |
| D      | 4.80        | 5.00 | 0.189     | 0.197 |
| E      | 5.80        | 6.20 | 0.228     | 0.244 |
| E1     | 3.80        | 4.00 | 0.150     | 0.157 |
| e      | 1.27 BSC    |      | 0.050 BSC |       |
| h      | 0.25        | 0.50 | 0.010     | 0.020 |
| L      | 0.40        | 1.27 | 0.016     | 0.050 |
| θ      | 0°          | 8°   | 0°        | 8°    |

### RECOMMENDED LAND PATTERN



Note: 1. Follow JEDEC MS-012 AA.

2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.

3. Dimension "E" does not include inter-lead flash or protrusions. Inter-lead flash and protrusions shall not exceed 10 mil per side.