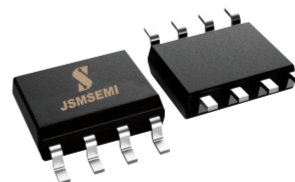


## Description:

This N-Channel MOSFET uses advanced trench technology and

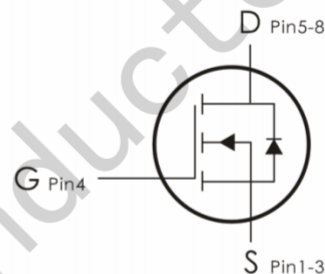
design to provide excellent  $R_{DS(on)}$  with low gate charge.

It can be used in a wide variety of applications.



## Features:

- 1)  $V_{DS}=30V, I_D=20A, R_{DS(on)} < 6.5m\Omega @ V_{GS}=10V$
- 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: ( $T_J=25^\circ C$ unless otherwise noted)

| Symbol         | Parameter                                            | Ratings     | Units      |
|----------------|------------------------------------------------------|-------------|------------|
| $V_{DS}$       | Drain-Source Voltage                                 | 30          | V          |
| $V_{GS}$       | Gate-Source Voltage                                  | $\pm 20$    | V          |
| $I_D$          | Drain Current – Continuous ( $T_A=25^\circ C$ )      | 20          | A          |
|                | Drain Current – Continuous ( $T_A=75^\circ C$ )      | 15.2        |            |
|                | Drain Current – Pulsed① ( $T_A=25^\circ C$ )         | 76          |            |
| $I_{DM}$       | Drain Current – Pulsed① ( $T_A=25^\circ C$ )         | 76          |            |
| $I_S$          | Diode continuous forward current( $T_A=25^\circ C$ ) | 5           |            |
| $P_D$          | Power Dissipation ( $T_A=25^\circ C$ )               | 3.1         | W          |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range     | -50 to +150 | $^\circ C$ |

## Thermal Characteristics:

| Symbol          | Parameter                               | Max | Units        |
|-----------------|-----------------------------------------|-----|--------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 40  | $^\circ C/W$ |

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

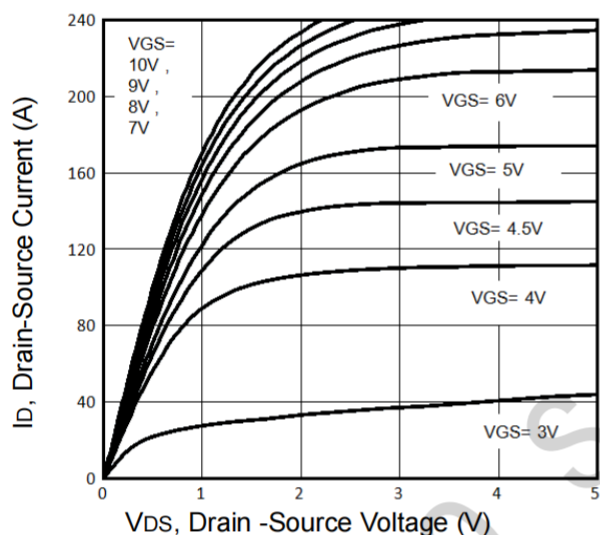
| Symbol                             | Parameter                                          | Conditions                                                                                   | Min | Typ  | Max  | Units |
|------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------|-----|------|------|-------|
| 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>                   | Drain-Source Leakage Current(T <sub>A</sub> =25℃)  | V <sub>DS</sub> =30V , V <sub>GS</sub> =0V                                                   | --- | ---  | 1    | μA    |
|                                    | Drain-Source Leakage Current(T <sub>A</sub> =125℃) | V <sub>DS</sub> =24V , V <sub>GS</sub> =0V                                                   | --- | ---  | 100  | μA    |
| I <sub>GSS</sub>                   | Gate-Source Leakage Current                        | V <sub>GS</sub> =± 20V, V <sub>DS</sub> =0V                                                  | --- | ---  | ±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   | 1.6  | 2.5  | V     |
| R <sub>DS(ON)</sub>                | Static Drain-Source On Resistance②                 | V <sub>GS</sub> =10V, I <sub>D</sub> =15A                                                    | --- | 5.2  | 6.5  | m Ω   |
|                                    |                                                    | V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A                                                    | --- | 7.5  | 9.5  | m Ω   |
| Dynamic Characteristics            |                                                    |                                                                                              |     |      |      |       |
| C <sub>iss</sub>                   | Input Capacitance                                  | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V,<br>f=1MHz                                         | --- | 1320 | ---  | pF    |
| C <sub>oss</sub>                   | Output Capacitance                                 |                                                                                              | --- | 205  | ---  |       |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance                       |                                                                                              | --- | 135  | ---  |       |
| R <sub>g</sub>                     | Gate Resistance                                    | f=1MHz                                                                                       | --- | 4.4  | ---  | Ω     |
| Switching Characteristics          |                                                    |                                                                                              |     |      |      |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                                 | V <sub>DD</sub> =15V, I <sub>D</sub> =3A<br><br>R <sub>G</sub> =3.3 Ω , V <sub>GS</sub> =10V | --- | 11   | ---  | ns    |
| t <sub>r</sub>                     | Rise Time                                          |                                                                                              | --- | 30   | ---  | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                                |                                                                                              | --- | 24   | ---  | ns    |
| t <sub>f</sub>                     | Fall Time                                          |                                                                                              | --- | 8    | ---  | ns    |
| Q <sub>g</sub>                     | Total Gate Charge                                  | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V,<br><br>I <sub>D</sub> =15A                       | --- | 23.5 | ---  | nC    |
| Q <sub>gs</sub>                    | Gate-Source Charge                                 |                                                                                              | --- | 3.3  | ---  | nC    |
| Q <sub>gd</sub>                    | Gate-Drain “Miller” Charge                         |                                                                                              | --- | 4.8  | ---  | nC    |
| Drain-Source Diode Characteristics |                                                    |                                                                                              |     |      |      |       |
| V <sub>SD</sub>                    | Source-Drain Diode Forward Voltage②                | V <sub>GS</sub> =0V, I <sub>SD</sub> =12A                                                    | --- | 0.81 | 1.2  | V     |

|            |                                    |                         |     |    |     |    |
|------------|------------------------------------|-------------------------|-----|----|-----|----|
| <b>Trr</b> | Body Diode Reverse Recovery Time   | $I_{SD}=10A, V_{GS}=0V$ | --- | 31 | --- | Ns |
| <b>Qrr</b> | Body Diode Reverse Recovery Charge | $di/dt=100A/\mu s$      | --- | 20 | --- | Nc |

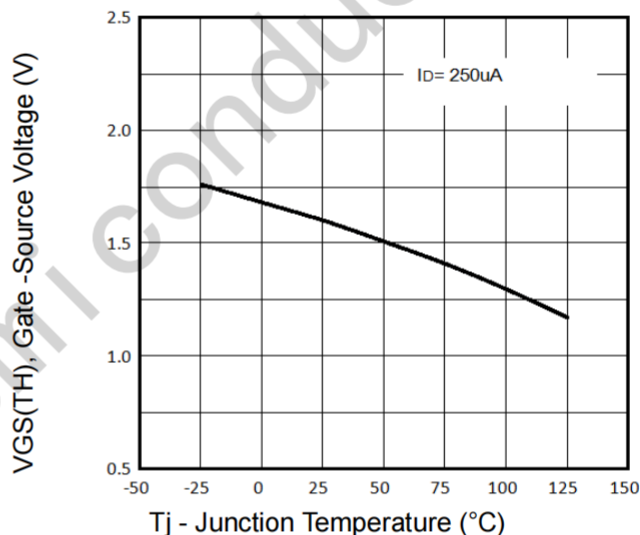
### Notes:

- ① Pulse width limited by maximum allowable junction temperature
- ② Pulse width  $\leq 300 \mu s$ ; duty cycle  $\leq 2\%$ .

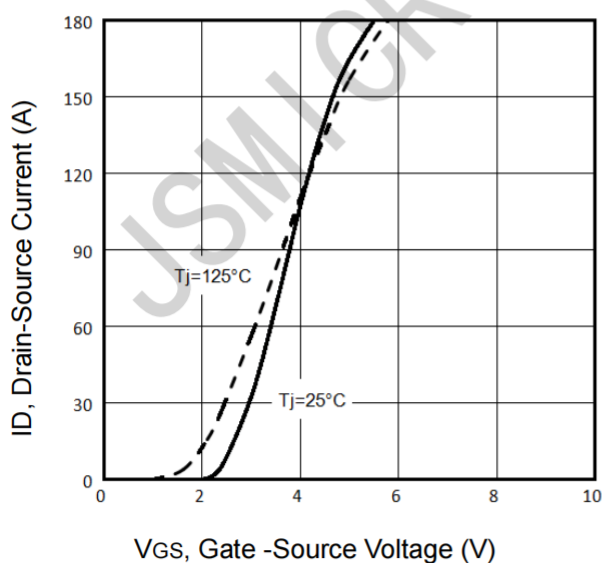
**Typical Characteristics:** ( $T_C=25^\circ C$  unless otherwise noted)



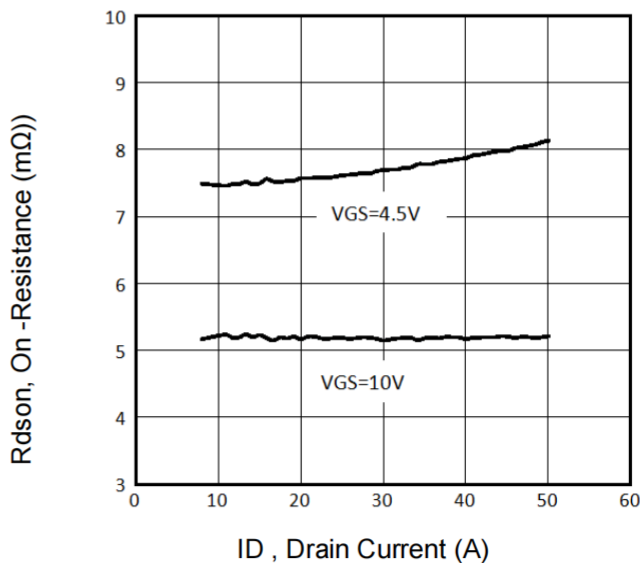
**Fig1.** Typical Output Characteristics



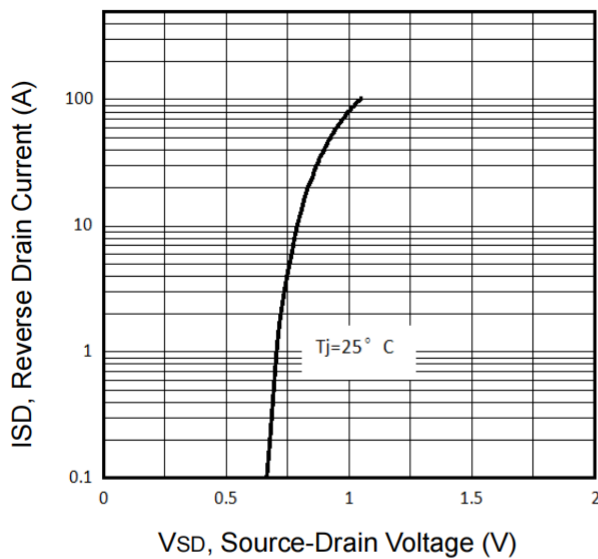
**Fig2.** VGS(TH) Voltage Vs. Temperature



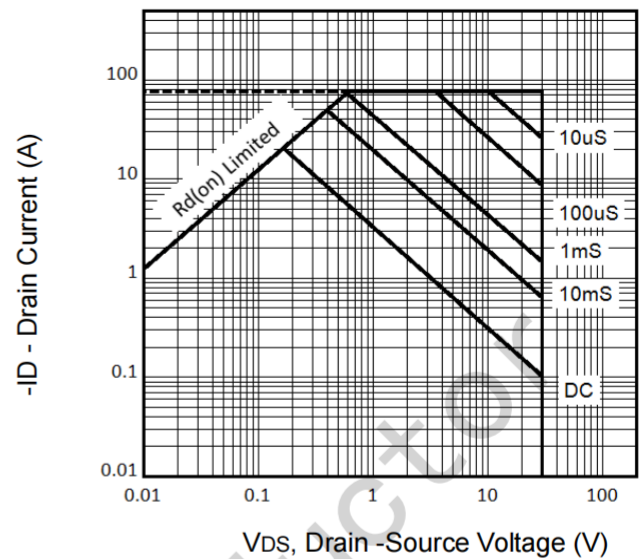
**Fig3.** Typical Transfer Characteristics



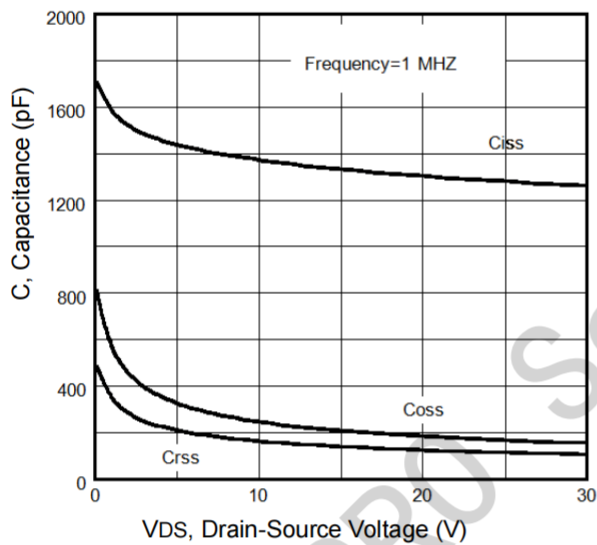
**Fig4.** On-Resistance vs. Drain Current and Gate Voltage



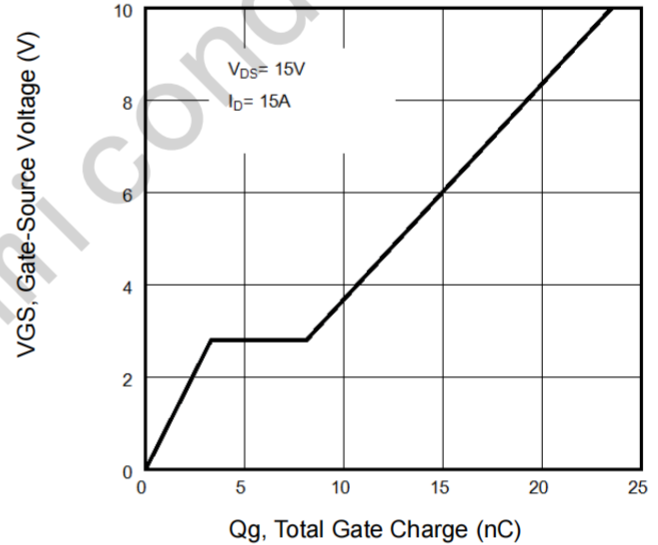
**Fig5.** Typical Source-Drain Diode Forward Voltage



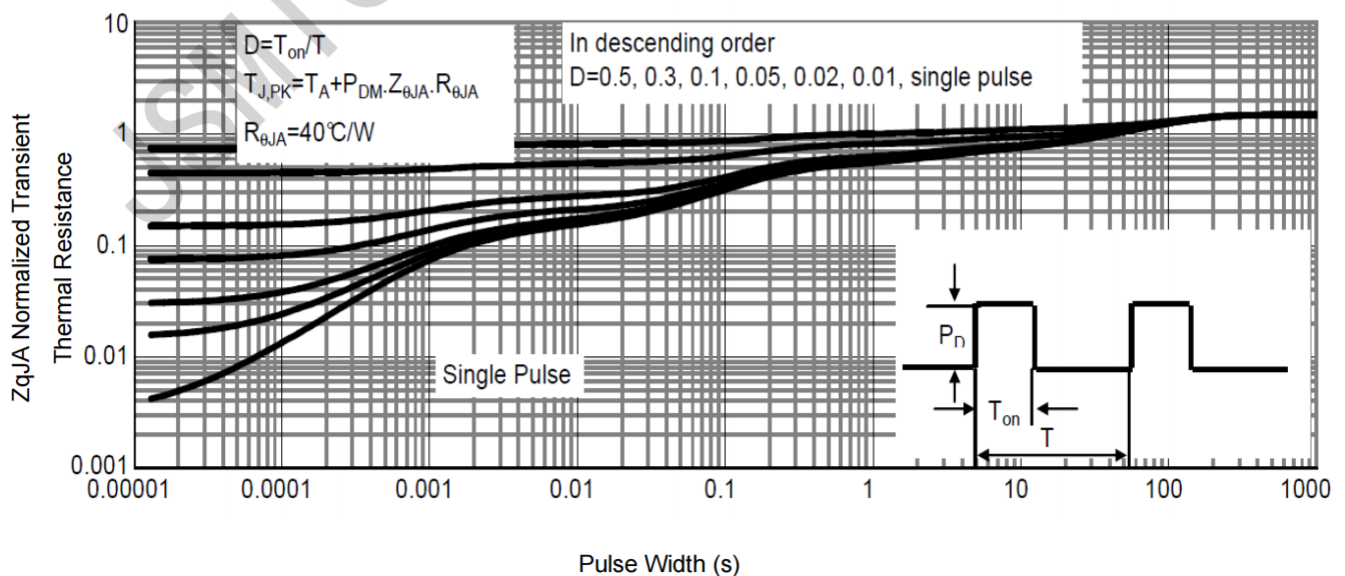
**Fig6.** Maximum Safe Operating Area



**Fig7.** Typical Capacitance Vs. Drain-Source Voltage



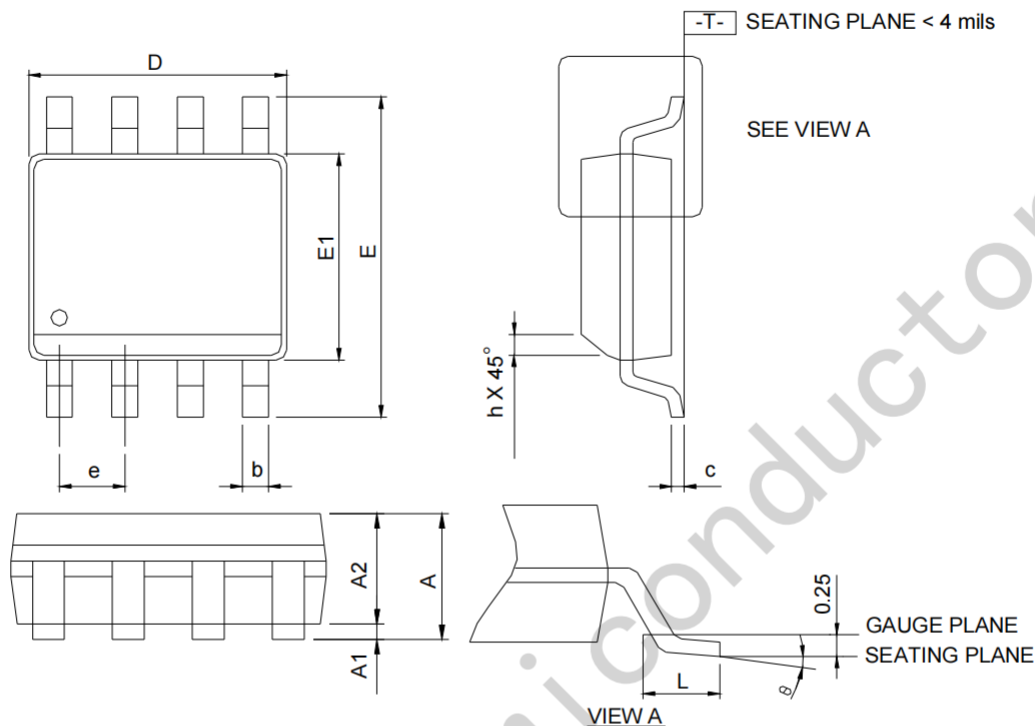
**Fig8.** Typical Gate Charge Vs. Gate-Source Voltage



**Fig9.** Normalized Maximum Transient Thermal Impedance

## Package Information

SOP-8



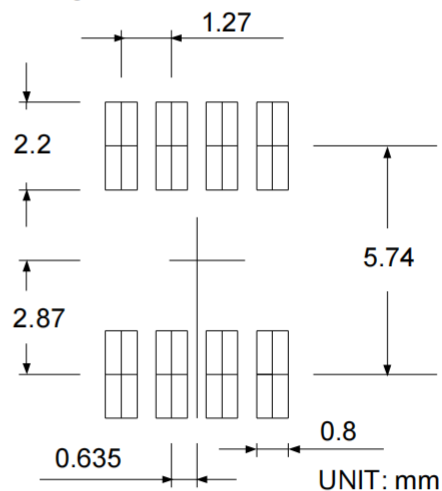
| SYMBOL | SOP-8       |      |           |       |
|--------|-------------|------|-----------|-------|
|        | MILLIMETERS |      | INCHES    |       |
|        | MIN.        | MAX. | MIN.      | MAX.  |
| A      | -           | 1.75 | -         | 0.069 |
| A1     | 0.10        | 0.25 | 0.004     | 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°    |

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.

### RECOMMENDED LAND PATTERN



UNIT: mm