

## 200V N-Channel MOSFETS

### TO-252 Pin Configuration

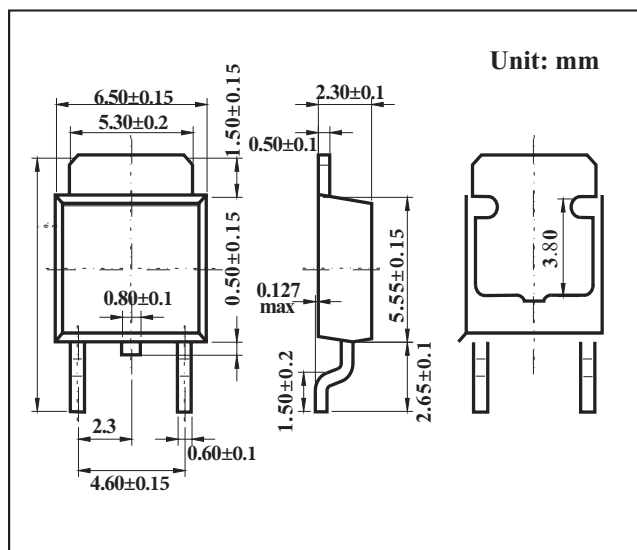
| BVDSS | RDSON | ID |
|-------|-------|----|
| 200V  | 0.240 | 9A |

#### Features

- 200V, 9A,  $R_{DS(ON)} = 0.24\Omega @ V_{GS} = 10V$
- Improved  $dv/dt$  capability
- Fast switching
- Green Device Available

#### Applications

- Networking
- Load Switch
- LED applications



### MAXIMUM RATINGS AND CHARACTERISTICS

@ 25°C Ambient Temperature (unless otherwise noted)

| Parameter                                          | Symbol    | Rating      | Units |
|----------------------------------------------------|-----------|-------------|-------|
| Drain-Source Voltage                               | $V_{DS}$  | 200         | V     |
| Gate-Source Voltage                                | $V_{GS}$  | $\pm 20$    | V     |
| Drain Current – Continuous ( $T_C = 25^\circ C$ )  | $I_D$     | 9           | A     |
| Drain Current – Continuous ( $T_C = 100^\circ C$ ) |           | 5.7         | A     |
| Drain Current – Pulsed <sup>1</sup>                | $I_{DM}$  | 36          | A     |
| Single Pulse Avalanche Energy <sup>2</sup>         | $E_{AS}$  | 220         | mJ    |
| Single Pulse Avalanche Current <sup>2</sup>        | $I_{AS}$  | 21          | A     |
| Power Dissipation ( $T_C = 25^\circ C$ )           | $P_D$     | 44          | W     |
| Power Dissipation – Derate above 25°C              |           | 0.35        | W/°C  |
| Storage Temperature Range                          | $T_{STG}$ | -55 to +150 | °C    |
| Operating Junction Temperature Range               | $T_J$     | -55 to +150 | °C    |

### Thermal Characteristics

| Parameter                              | Symbol          | Typ | Max  | Unit |
|----------------------------------------|-----------------|-----|------|------|
| Thermal Resistance Junction to ambient | $R_{\theta JA}$ | --- | 62   | °C/W |
| Thermal Resistance Junction to Case    | $R_{\theta JC}$ | --- | 2.87 | °C/W |

## MOSFETELECTRICALCHARACTERISTICS<sub>T<sub>A</sub>= 25℃ unless otherwise specified</sub>

### Off Characteristics

| Parameter                      | Symbol            | Conditions                                                         | Min. | Typ. | Max.  | Unit |
|--------------------------------|-------------------|--------------------------------------------------------------------|------|------|-------|------|
| Drain-Source Breakdown Voltage | BV <sub>DSS</sub> | V <sub>GS</sub> =0V , I <sub>D</sub> =250uA                        | 200  | ---  | ---   | V    |
| Drain-Source Leakage Current   | I <sub>DSS</sub>  | V <sub>DS</sub> =200V , V <sub>GS</sub> =0V , T <sub>J</sub> =25℃  | ---  | ---  | 1     | uA   |
|                                |                   | V <sub>DS</sub> =160V , V <sub>GS</sub> =0V , T <sub>J</sub> =125℃ | ---  | ---  | 10    | uA   |
| Gate-Source Leakage Current    | I <sub>GSS</sub>  | V <sub>GS</sub> =± 20V , V <sub>DS</sub> =0V                       | ---  | ---  | ± 100 | nA   |

### On Characteristics

|                                   |                     |                                                          |     |     |      |   |
|-----------------------------------|---------------------|----------------------------------------------------------|-----|-----|------|---|
| Static Drain-Source On-Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V , I <sub>D</sub> =4A                | --- | 0.2 | 0.24 | Ω |
| Gate Threshold Voltage            | V <sub>GS(th)</sub> | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA | 1   | 2   | 3    | V |
| Forward Transconductance          | g <sub>fs</sub>     | V <sub>DS</sub> =30V , I <sub>D</sub> =3A                | --- | 4   | ---  | S |

### Dynamic and switching Characteristics

|                                     |                     |                                                                                           |     |      |     |    |
|-------------------------------------|---------------------|-------------------------------------------------------------------------------------------|-----|------|-----|----|
| Total Gate Charge <sup>3, 4</sup>   | Q <sub>g</sub>      | V <sub>DS</sub> =100V , V <sub>GS</sub> =10V , I <sub>D</sub> =5A                         | --- | 12   | 18  | nC |
| Gate-Source Charge <sup>3, 4</sup>  | Q <sub>gs</sub>     |                                                                                           | --- | 1    | 3   |    |
| Gate-Drain Charge <sup>3, 4</sup>   | Q <sub>gd</sub>     |                                                                                           | --- | 5    | 8   |    |
| Turn-On Delay Time <sup>3, 4</sup>  | T <sub>d(on)</sub>  | V <sub>DD</sub> =100V , V <sub>GS</sub> =10V ,<br>R <sub>G</sub> =60 Ω I <sub>D</sub> =5A | --- | 5    | 9   | ns |
| Rise Time <sup>3, 4</sup>           | T <sub>r</sub>      |                                                                                           | --- | 17.4 | 33  |    |
| Turn-Off Delay Time <sup>3, 4</sup> | T <sub>d(off)</sub> |                                                                                           | --- | 40.7 | 80  |    |
| Fall Time <sup>3, 4</sup>           | T <sub>f</sub>      |                                                                                           | --- | 11.4 | 23  |    |
| Input Capacitance                   | C <sub>iss</sub>    | V <sub>DS</sub> =100V , V <sub>GS</sub> =0V , F=1MHz                                      | --- | 540  | 810 | pF |
| Output Capacitance                  | C <sub>oss</sub>    |                                                                                           | --- | 48   | 72  |    |
| Reverse Transfer Capacitance        | C <sub>rss</sub>    |                                                                                           | --- | 11   | 17  |    |
| Gate resistance                     | R <sub>g</sub>      | V <sub>GS</sub> =0V , V <sub>DS</sub> =0V , F=1MHz                                        | --- | 2.6  | --- | Ω  |

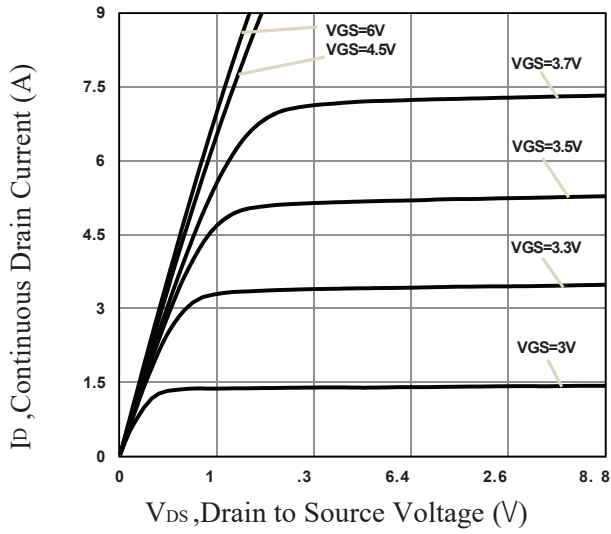
### Drain-Source Diode Characteristics and Maximum Ratings

| Parameter                 | Symbol          | Conditions                                                     | Min. | Typ. | Max. | Unit |
|---------------------------|-----------------|----------------------------------------------------------------|------|------|------|------|
| Continuous Source Current | I <sub>S</sub>  | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current             | ---  | ---  | 9    | A    |
| Pulsed Source Current     | I <sub>SM</sub> |                                                                | ---  | ---  | 18   | A    |
| Diode Forward Voltage     | V <sub>SD</sub> | V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25℃ | ---  | ---  | 1    | V    |
| Reverse Recovery Time     | t <sub>rr</sub> | V <sub>R</sub> =200V, I <sub>S</sub> =5A                       | ---  | 130  | ---  | ns   |
| Reverse Recovery Charge   | Q <sub>rr</sub> | di/dt=100A/μs , T <sub>J</sub> =25℃                            | ---  | 520  | ---  | nC   |

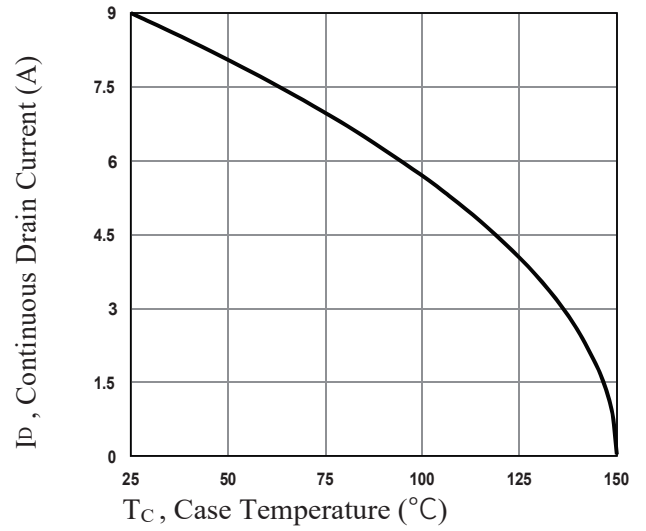
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=50V, V<sub>GS</sub>=10V, L=1mH, I<sub>AS</sub>=21A., R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25℃.
3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

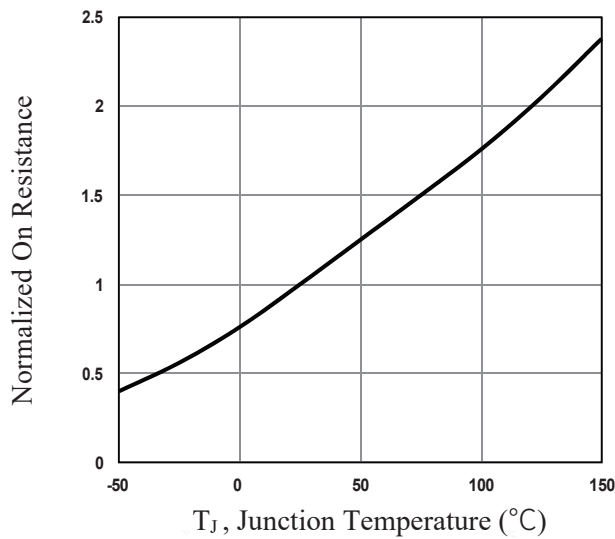
## RATINGS AND CHARACTERISTIC CURVES



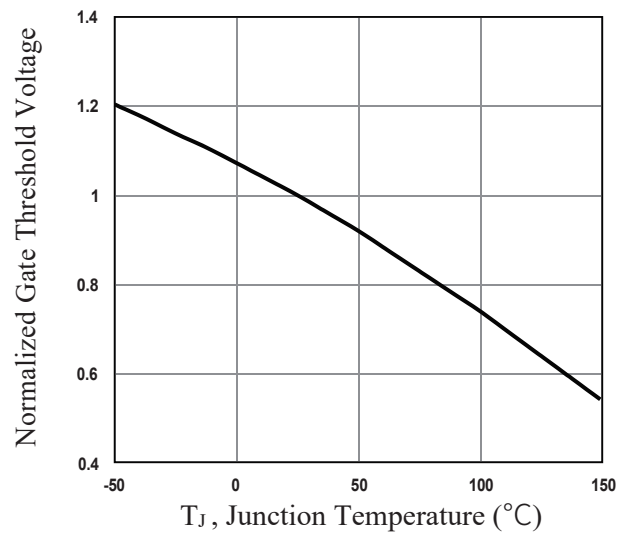
**Fig.1 Typical Output Characteristics**



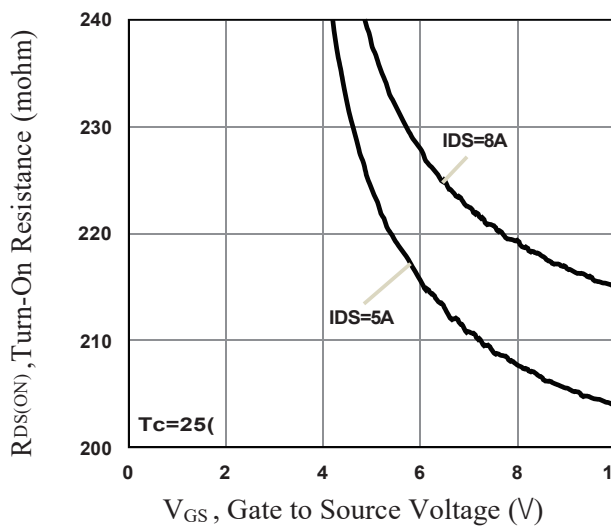
**Fig.2 Continuous Drain Current vs.  $T_C$**



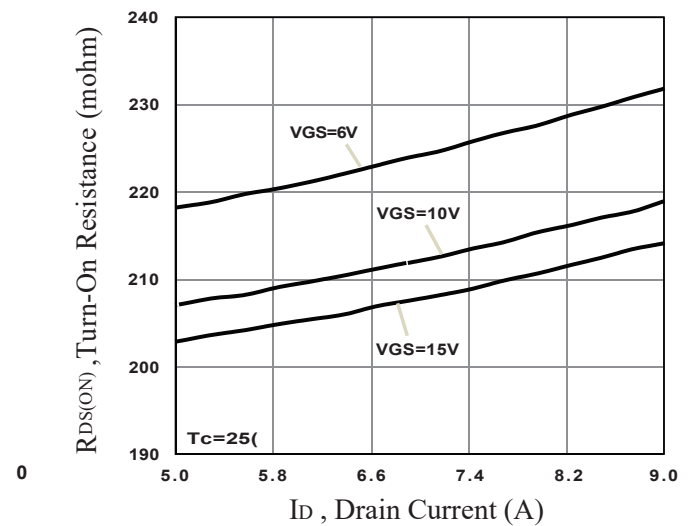
**Fig.3 Normalized  $R_{DS(on)}$  vs.  $T_J$**



**Fig.4 Normalized  $V_{th}$  vs.  $T_J$**

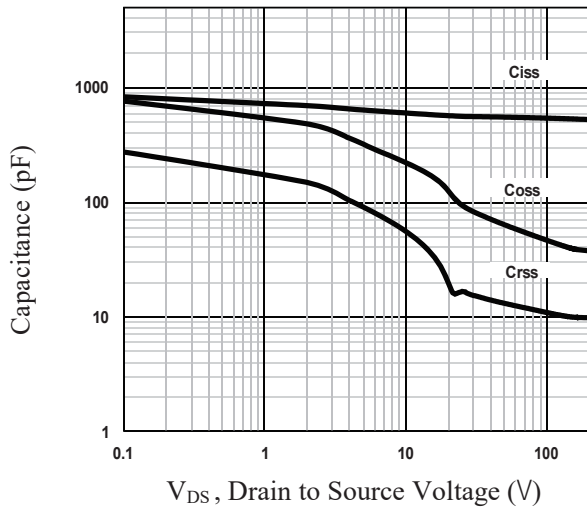


**Fig.5 Turn-On Resistance vs.  $V_{GS}$**

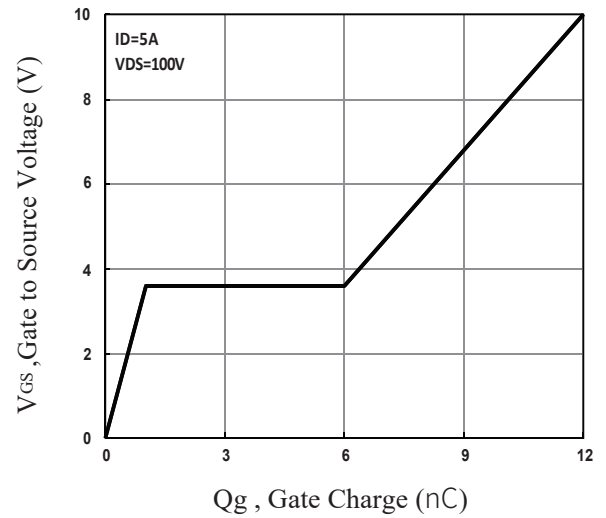


**Fig.6 Turn-On Resistance vs.  $I_D$**

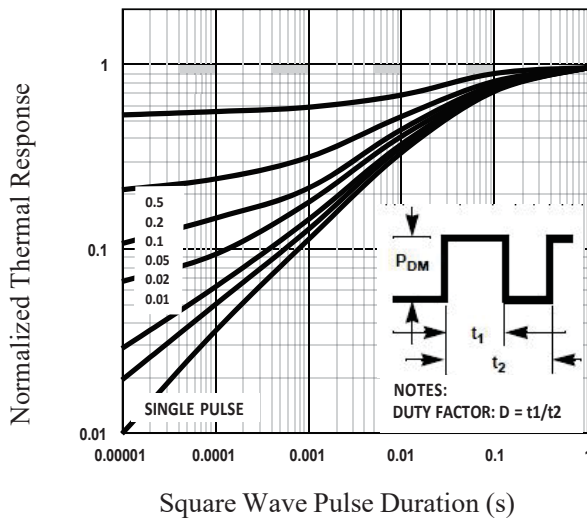
## RATINGS AND CHARACTERISTIC CURVES



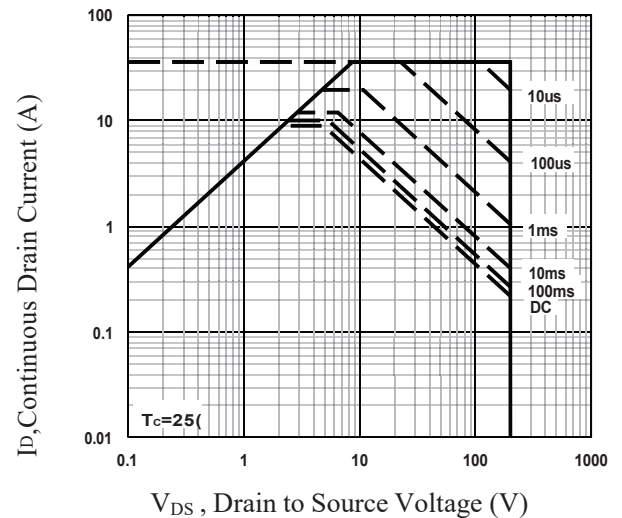
**Fig.7 Capacitance Characteristics**



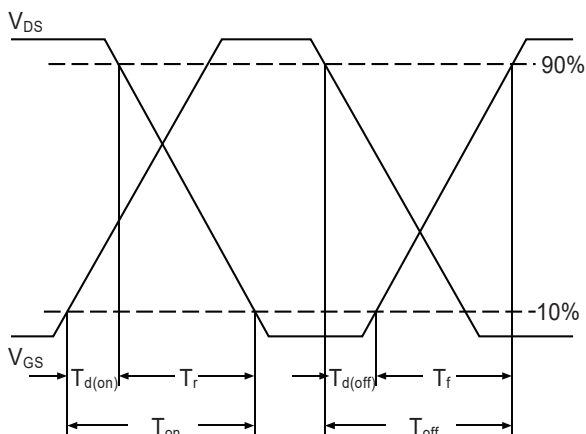
**Fig.8 Gate Charge Characteristics**



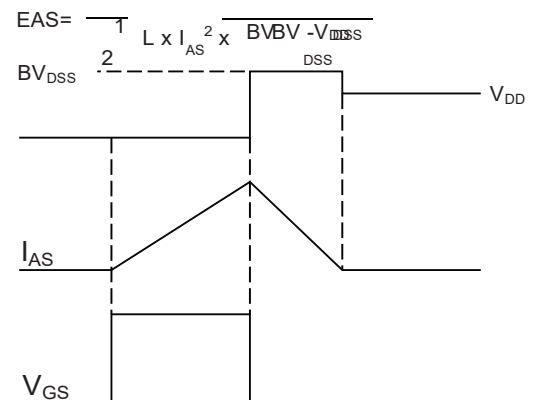
**Fig.9 Normalized Transient Impedance**



**Fig.10 Maximum Safe Operation Area**



**Fig.11 Switching Time Waveform**



**Fig.12 EAS Waveform**