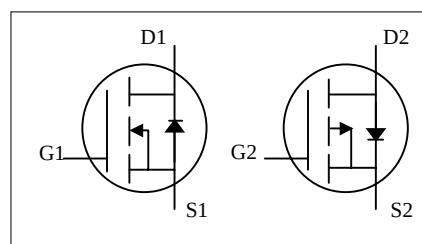
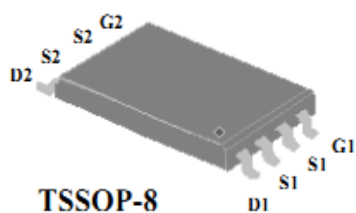


## N- and P-Channel 30-V (D-S) MOSFET

- ▼ Simple Drive Requirement
- ▼ Lower Gate Charge
- ▼ Fast Switching Performance
- ▼ RoHS Compliant & Halogen-Free

|      |              |              |
|------|--------------|--------------|
| N-CH | $BV_{DSS}$   | 30V          |
|      | $R_{DS(ON)}$ | 22m $\Omega$ |
|      | $I_D$        | 6.2A         |
| P-CH | $BV_{DSS}$   | -30V         |
|      | $R_{DS(ON)}$ | 45m $\Omega$ |
|      | $I_D$        | -5.0A        |



### Absolute Maximum Ratings

| Symbol                         | Parameter                             | Rating     |           | Units            |
|--------------------------------|---------------------------------------|------------|-----------|------------------|
|                                |                                       | N-channel  | P-channel |                  |
| $V_{DS}$                       | Drain-Source Voltage                  | 30         | -30       | V                |
| $V_{GS}$                       | Gate-Source Voltage                   | $\pm 20$   | $\pm 20$  | V                |
| $I_D @ T_A = 25^\circ\text{C}$ | Continuous Drain Current <sup>3</sup> | 6.2        | -5.0      | A                |
| $I_D @ T_A = 70^\circ\text{C}$ | Continuous Drain Current <sup>3</sup> | 5.0        | -4.0      | A                |
| $I_{DM}$                       | Pulsed Drain Current <sup>1</sup>     | 20         | -18       | A                |
| $P_D @ T_A = 25^\circ\text{C}$ | Total Power Dissipation               | 1.35       |           | W                |
| $T_{STG}$                      | Storage Temperature Range             | -55 to 150 |           | $^\circ\text{C}$ |
| $T_J$                          | Operating Junction Temperature Range  | -55 to 150 |           | $^\circ\text{C}$ |

### Thermal Data

| Symbol      | Parameter                                                 | Value | Unit                      |
|-------------|-----------------------------------------------------------|-------|---------------------------|
| $R_{thj-a}$ | Maximum Thermal Resistance, Junction-ambient <sup>3</sup> | 90    | $^\circ\text{C}/\text{W}$ |

**N-CH Electrical Characteristics@T<sub>j</sub>=25°C(unless otherwise specified)**

| Symbol              | Parameter                                      | Test Conditions                                          | Min. | Typ. | Max. | Units |
|---------------------|------------------------------------------------|----------------------------------------------------------|------|------|------|-------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA               | 30   | -    | -    | V     |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =6A                 | -    | 22   | -    | mΩ    |
|                     |                                                | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A                | -    | 30   | -    | mΩ    |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA | 1    | -    | 3    | V     |
| g <sub>fs</sub>     | Forward Transconductance                       | V <sub>DS</sub> =10V, I <sub>D</sub> =6A                 | -    | 14   | -    | S     |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V                | -    | -    | 1    | uA    |
| I <sub>GSS</sub>    | Gate-Source Leakage                            | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V               | -    | -    | ±100 | nA    |
| Q <sub>g</sub>      | Total Gate Charge                              | I <sub>D</sub> =6A                                       | -    | 7    | 11   | nC    |
| Q <sub>gs</sub>     | Gate-Source Charge                             | V <sub>DS</sub> =15V                                     | -    | 2    | -    | nC    |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge                   | V <sub>GS</sub> =4.5V                                    | -    | 4    | -    | nC    |
| t <sub>d(on)</sub>  | Turn-on Delay Time                             | V <sub>DS</sub> =15V                                     | -    | 6    | -    | ns    |
| t <sub>r</sub>      | Rise Time                                      | I <sub>D</sub> =1A                                       | -    | 6    | -    | ns    |
| t <sub>d(off)</sub> | Turn-off Delay Time                            | R <sub>G</sub> =3.3Ω                                     | -    | 17   | -    | ns    |
| t <sub>f</sub>      | Fall Time                                      | V <sub>GS</sub> =10V                                     | -    | 4    | -    | ns    |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>GS</sub> =0V                                      | -    | 550  | -    | pF    |
| C <sub>oss</sub>    | Output Capacitance                             | V <sub>DS</sub> =15V                                     | -    | 105  | -    | pF    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   | f=1.0MHz                                                 | -    | 90   | -    | pF    |
| R <sub>g</sub>      | Gate Resistance                                | f=1.0MHz                                                 | -    | 1.7  | -    | Ω     |

**Source-Drain Diode**

| Symbol          | Parameter                       | Test Conditions                           | Min. | Typ. | Max. | Units |
|-----------------|---------------------------------|-------------------------------------------|------|------|------|-------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup> | I <sub>S</sub> =1.2A, V <sub>GS</sub> =0V | -    | -    | 1.2  | V     |
| t <sub>rr</sub> | Reverse Recovery Time           | I <sub>S</sub> =6A, V <sub>GS</sub> =0V,  | -    | 15   | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge         | di/dt=100A/μs                             | -    | 7    | -    | nC    |

**P-CH Electrical Characteristics@T<sub>j</sub>=25°C(unless otherwise specified)**

| Symbol              | Parameter                                      | Test Conditions                                                                               | Min. | Typ. | Max. | Units |
|---------------------|------------------------------------------------|-----------------------------------------------------------------------------------------------|------|------|------|-------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA                                                   | -30  | -    | -    | V     |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-5A                                                    | -    | 45   | -    | mΩ    |
|                     |                                                | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A                                                   | -    | 66   | -    | mΩ    |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA                                     | -1   | -    | -3   | V     |
| g <sub>fs</sub>     | Forward Transconductance                       | V <sub>DS</sub> =-10V, I <sub>D</sub> =-5A                                                    | -    | 18   | -    | S     |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V                                                    | -    | -    | -1   | uA    |
| I <sub>GSS</sub>    | Gate-Source Leakage                            | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                    | -    | -    | ±100 | nA    |
| Q <sub>g</sub>      | Total Gate Charge                              | I <sub>D</sub> =-5A<br>V <sub>DS</sub> =-15V<br>V <sub>GS</sub> =-4.5V                        | -    | 14.4 | 23   | nC    |
| Q <sub>gs</sub>     | Gate-Source Charge                             |                                                                                               | -    | 5.5  | -    | nC    |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge                   |                                                                                               | -    | 5    | -    | nC    |
| t <sub>d(on)</sub>  | Turn-on Delay Time                             | V <sub>DS</sub> =-15V<br>I <sub>D</sub> =-1A<br>R <sub>G</sub> =3.3Ω<br>V <sub>GS</sub> =-10V | -    | 7    | -    | ns    |
| t <sub>r</sub>      | Rise Time                                      |                                                                                               | -    | 6.5  | -    | ns    |
| t <sub>d(off)</sub> | Turn-off Delay Time                            |                                                                                               | -    | 36   | -    | ns    |
| t <sub>f</sub>      | Fall Time                                      |                                                                                               | -    | 28   | -    | ns    |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>GS</sub> =0V<br>V <sub>DS</sub> =-15V<br>f=1.0MHz                                      | -    | 960  | -    | pF    |
| C <sub>oss</sub>    | Output Capacitance                             |                                                                                               | -    | 190  | -    | pF    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   |                                                                                               | -    | 170  | -    | pF    |
| R <sub>g</sub>      | Gate Resistance                                | f=1.0MHz                                                                                      | -    | 6    | -    | Ω     |

**Source-Drain Diode**

| Symbol          | Parameter                       | Test Conditions                                            | Min. | Typ. | Max. | Units |
|-----------------|---------------------------------|------------------------------------------------------------|------|------|------|-------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup> | I <sub>S</sub> =-1.2A, V <sub>GS</sub> =0V                 | -    | -    | -1.2 | V     |
| t <sub>rr</sub> | Reverse Recovery Time           | I <sub>S</sub> =-5A, V <sub>GS</sub> =0V,<br>dI/dt=100A/μs | -    | 19   | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge         |                                                            | -    | 9    | -    | nC    |

**Notes:**

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board , t ≤10sec ; 208°C/W when mounted on min. copper pad.

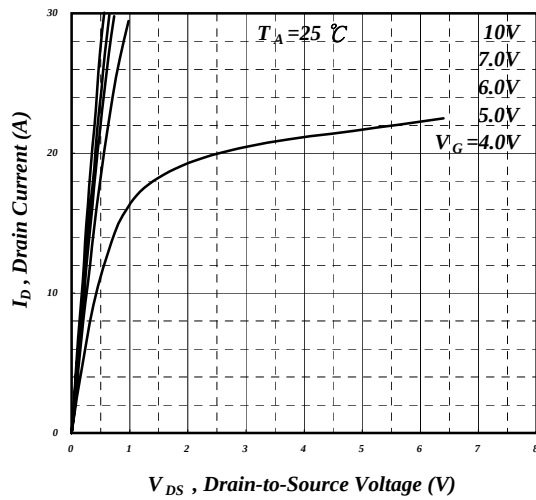


Fig 1. Typical Output Characteristics

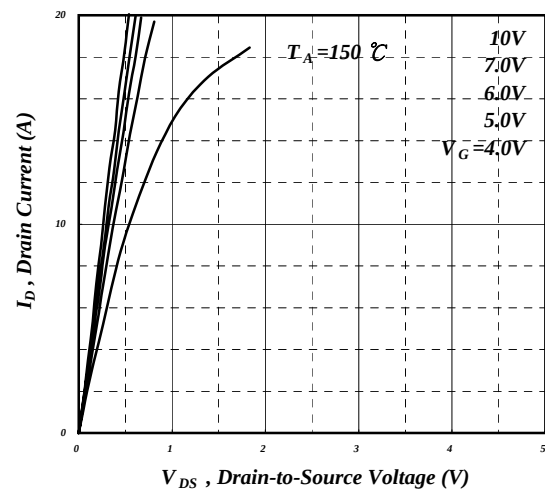


Fig 2. Typical Output Characteristics

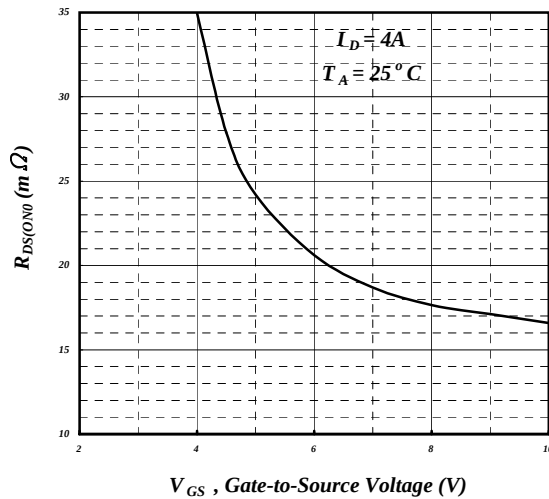
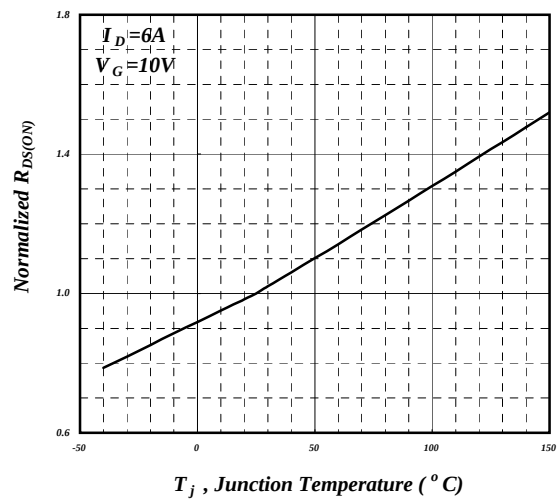
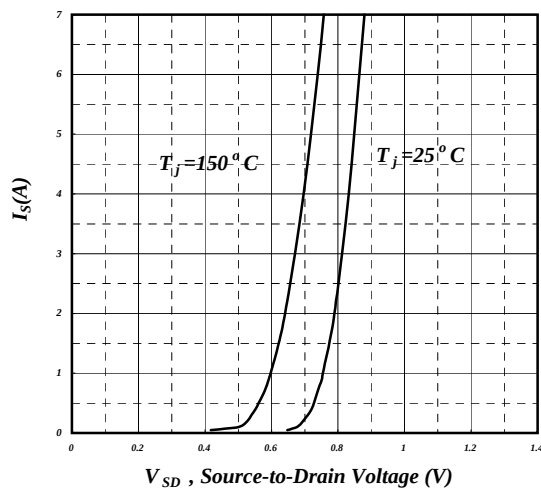
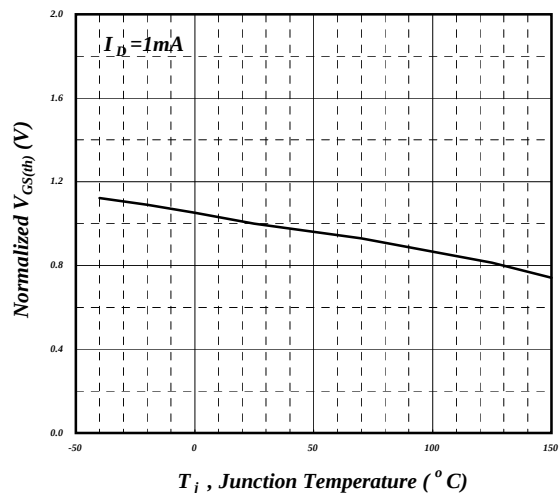


Fig 3. On-Resistance v.s. Gate Voltage

Fig 4. Normalized On-Resistance  
v.s. Junction TemperatureFig 5. Forward Characteristic of  
Reverse DiodeFig 6. Gate Threshold Voltage v.s.  
Junction Temperature

## N-Channel

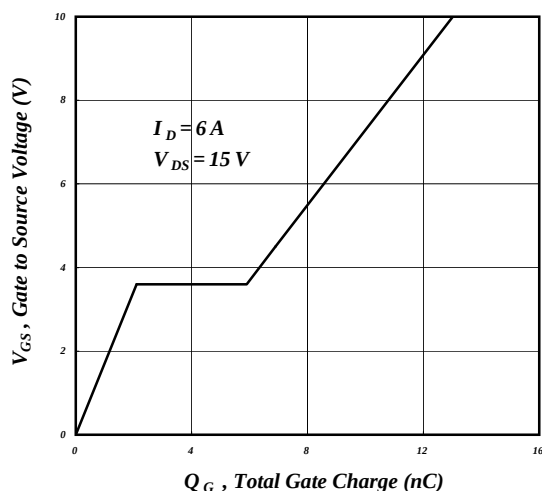


Fig 7. Gate Charge Characteristics

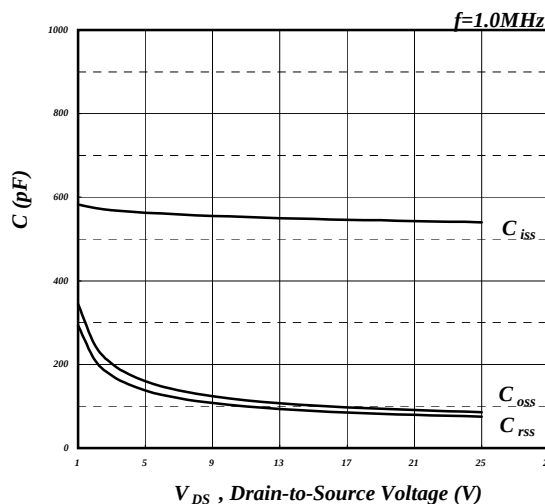


Fig 8. Typical Capacitance Characteristics

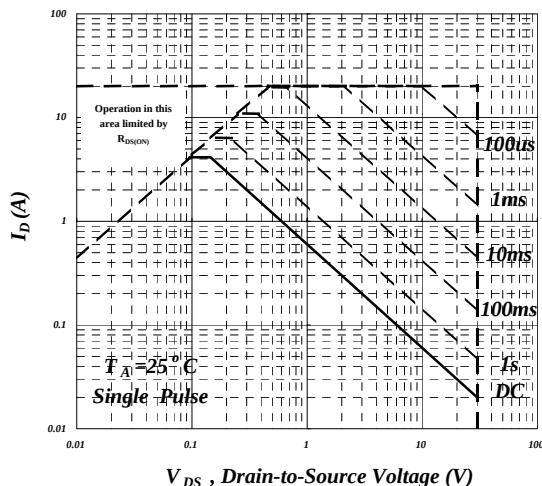


Fig 9. Maximum Safe Operating Area

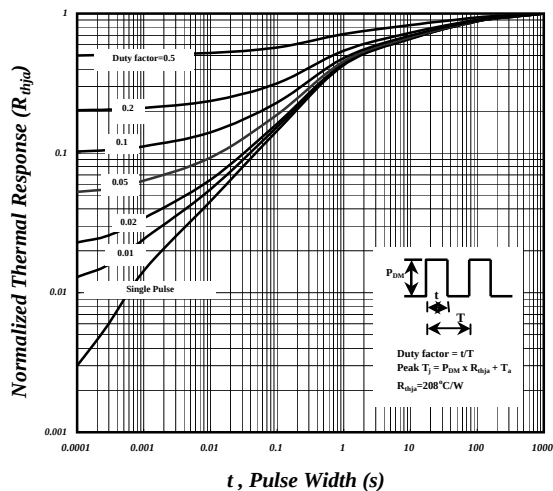


Fig 10. Effective Transient Thermal Impedance

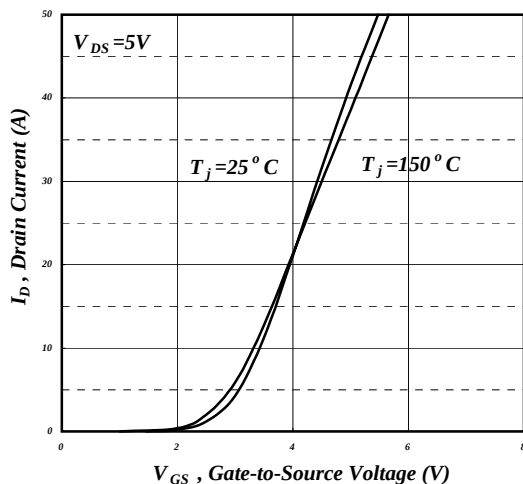


Fig 11. Transfer Characteristics

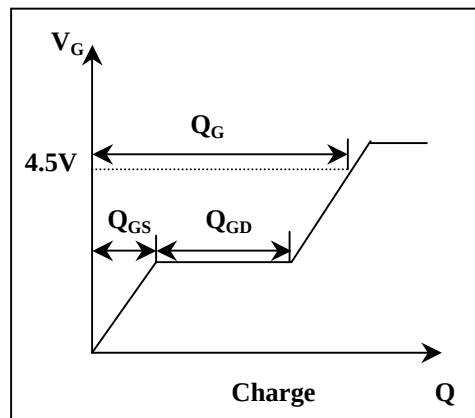


Fig 12. Gate Charge Waveform

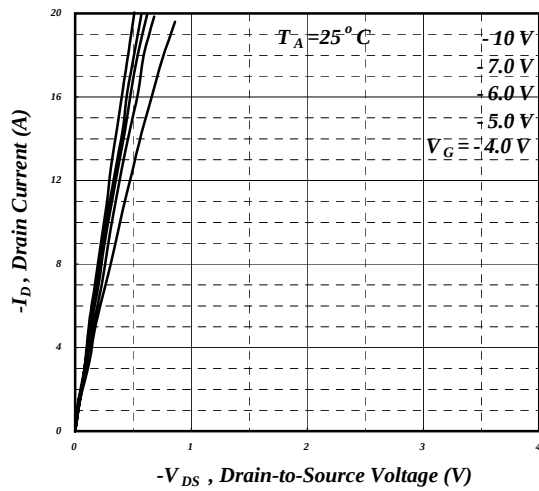


Fig 1. Typical Output Characteristics

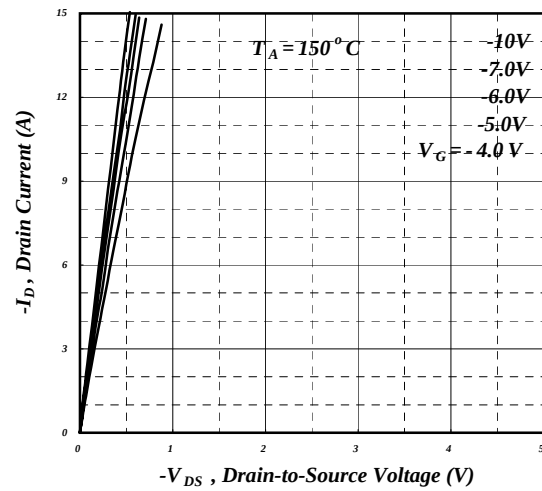


Fig 2. Typical Output Characteristics

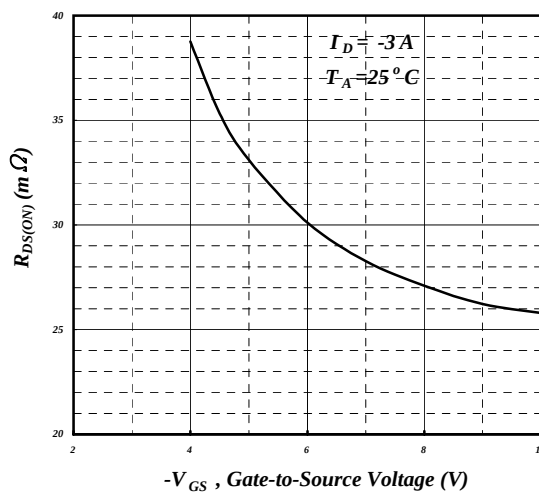
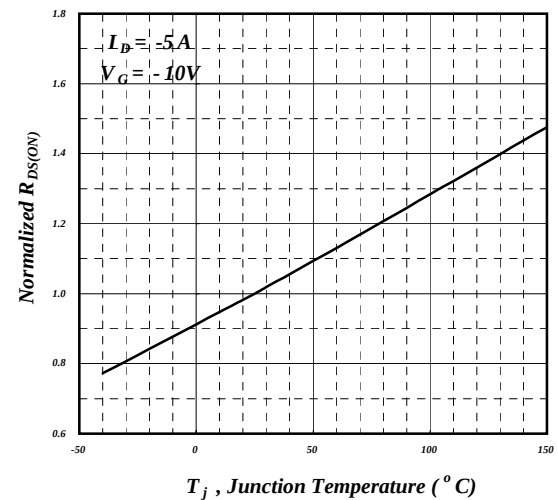
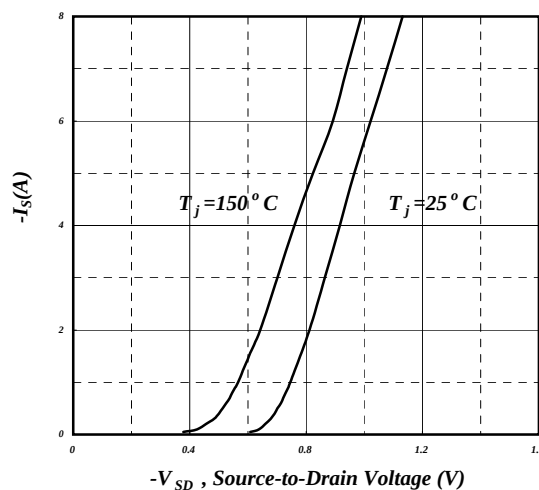
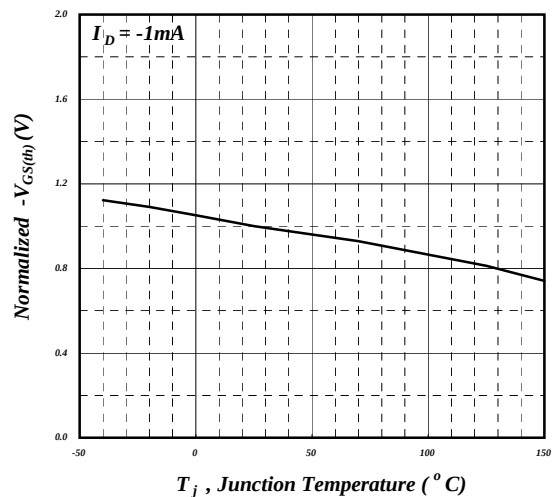


Fig 3. On-Resistance v.s. Gate Voltage

Fig 4. Normalized On-Resistance  
v.s. Junction TemperatureFig 5. Forward Characteristic of  
Reverse DiodeFig 6. Gate Threshold Voltage v.s.  
Junction Temperature

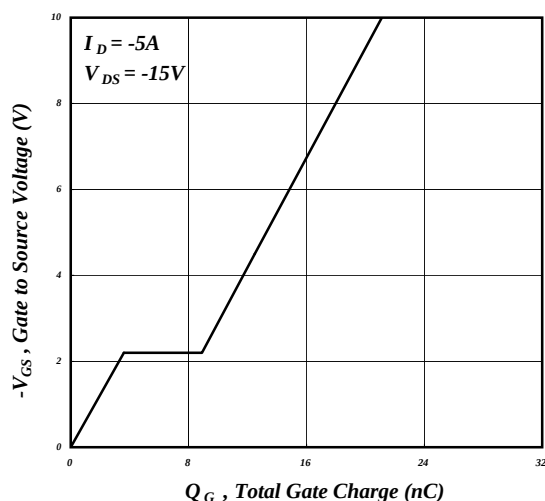


Fig 7. Gate Charge Characteristics

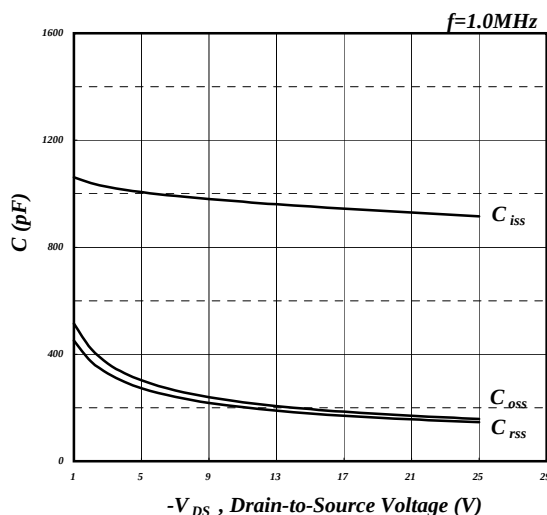


Fig 8. Typical Capacitance Characteristics

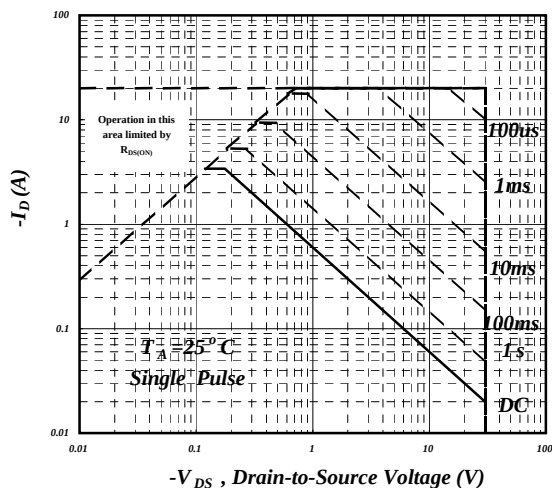


Fig 9. Maximum Safe Operating Area

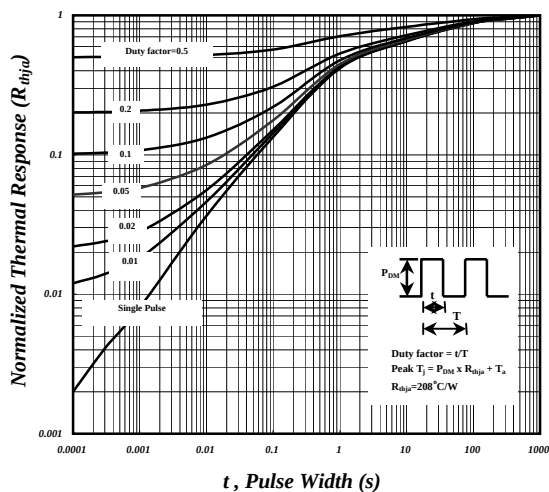


Fig 10. Effective Transient Thermal Impedance

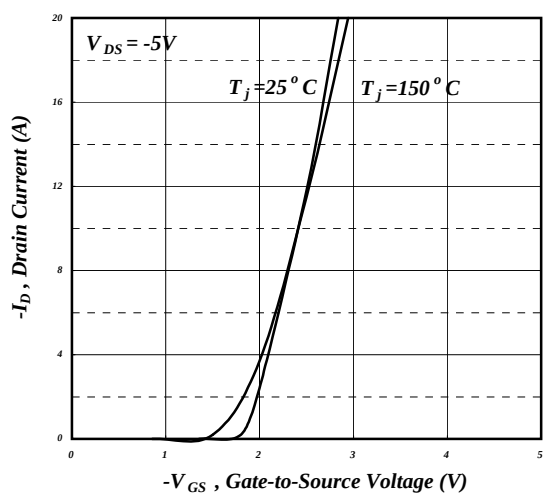


Fig 11. Transfer Characteristics

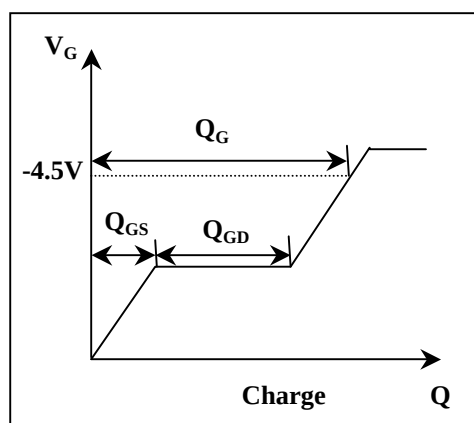
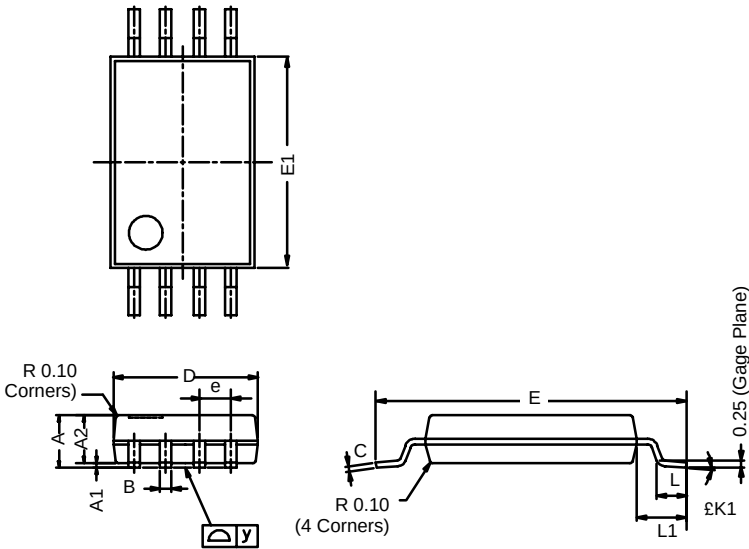


Fig 12. Gate Charge Waveform

**TSSOP: 8-LEAD**

JEDEC Part Number: MO-153



| Dim                                         | MILLIMETERS |       |      |
|---------------------------------------------|-------------|-------|------|
|                                             | Min         | Nom   | Max  |
| A                                           | —           | —     | 1.20 |
| A <sub>1</sub>                              | 0.05        | 0.10  | 0.15 |
| A <sub>2</sub>                              | 0.80        | 1.00  | 1.05 |
| B                                           | 0.19        | 0.28  | 0.30 |
| C                                           | —           | 0.127 | —    |
| D                                           | 2.90        | 3.00  | 3.10 |
| E                                           | 6.20        | 6.40  | 6.60 |
| E <sub>1</sub>                              | 4.30        | 4.40  | 4.50 |
| e                                           | —           | 0.65  | —    |
| L                                           | 0.45        | 0.60  | 0.75 |
| L <sub>1</sub>                              | 0.90        | 1.00  | 1.10 |
| Y                                           | —           | —     | 0.10 |
| £K1                                         | 0°          | 3°    | 6°   |
| ECN: S-03946—Rev. G, 09-Jul-01<br>DWG: 5844 |             |       |      |



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