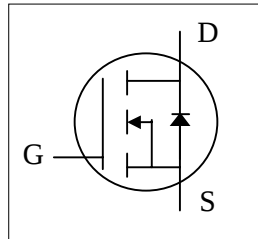


# N-CHANNEL ENHANCEMENT MODE POWER MOSFET

## PRODUCT SUMMARY

Low Gate Charge  
Single Drive Requirement  
Fast Switching Performance

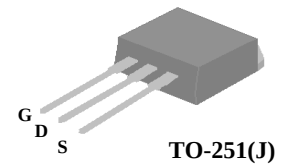
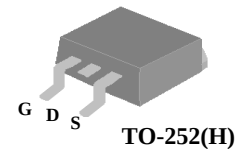


|              |              |
|--------------|--------------|
| $BV_{DSS}$   | 80V          |
| $R_{DS(ON)}$ | 90m $\Omega$ |
| $I_D$        | 15A          |

## DESCRIPTION

The advanced power MOSFETs from Silicon Standard Corp. provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters. The through-hole version (SSM9987GH) are available for low-profile applications.



## ABSOLUTE MAXIMUM RATINGS

| Symbol                          | Parameter                                       | Rating     | Units               |
|---------------------------------|-------------------------------------------------|------------|---------------------|
| $V_{DS}$                        | Drain-Source Voltage                            | 80         | V                   |
| $V_{GS}$                        | Gate-Source Voltage                             | $\pm 25$   | V                   |
| $I_D @ T_C = 25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10\text{V}$ | 15         | A                   |
| $I_D @ T_C = 100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10\text{V}$ | 9          | A                   |
| $I_{DM}$                        | Pulsed Drain Current <sup>1</sup>               | 50         | A                   |
| $P_D @ T_C = 25^\circ\text{C}$  | Total Power Dissipation                         | 34.7       | W                   |
|                                 | Linear Derating Factor                          | 0.28       | W/ $^\circ\text{C}$ |
| $T_{STG}$                       | 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 | Units                     |
|--------|------------------------------------------|-------|---------------------------|
| Rthj-c | Thermal Resistance Junction-case Max.    | 3.6   | $^\circ\text{C}/\text{W}$ |
| Rthj-a | Thermal Resistance Junction-ambient Max. | 110   | $^\circ\text{C}/\text{W}$ |

## ELECTRICAL CHARACTERISTICS

( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

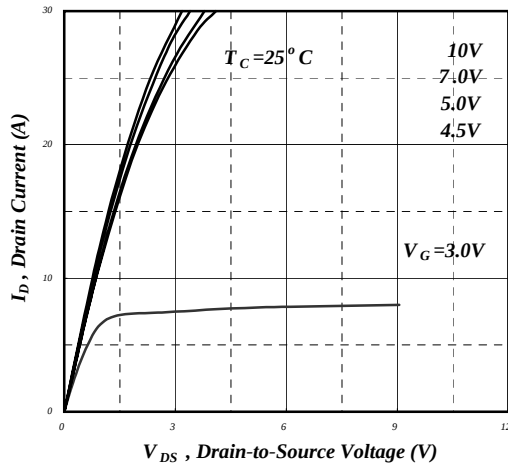
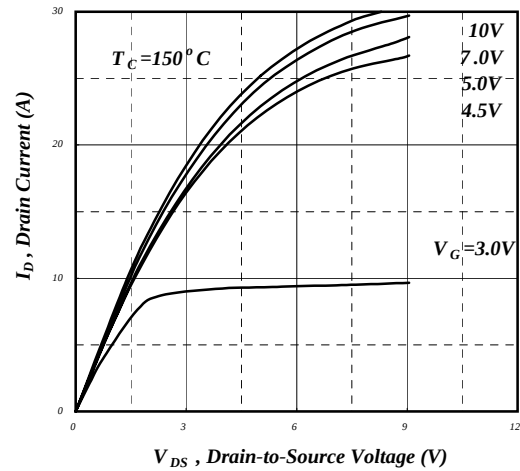
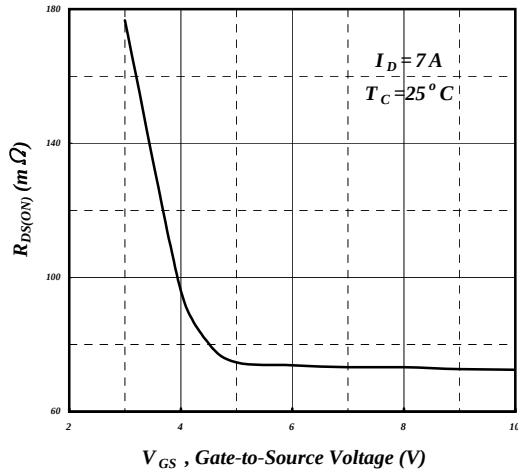
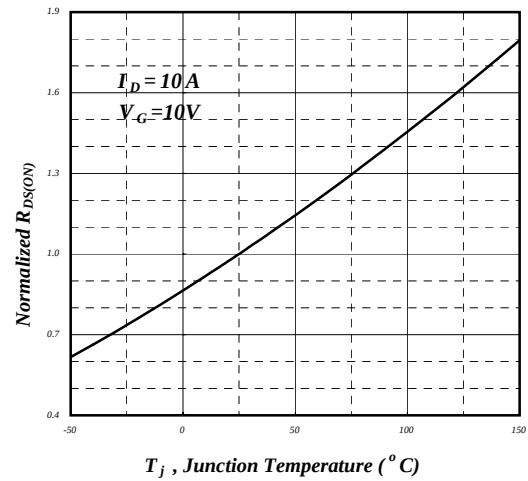
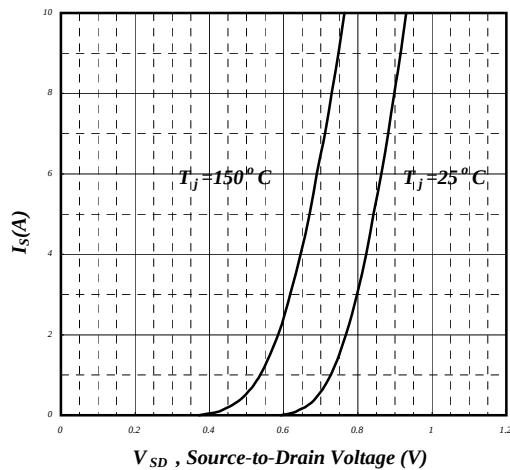
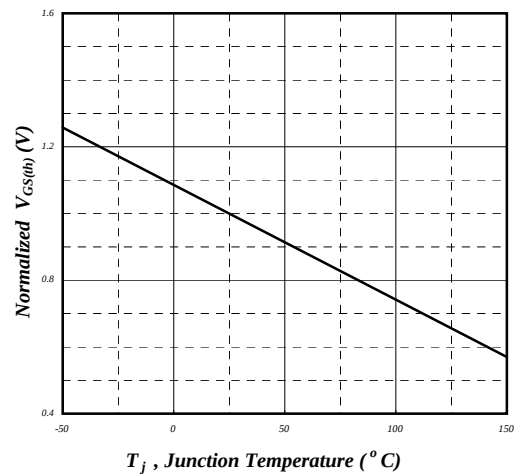
| Symbol                       | Parameter                                                  | Test Conditions                               | Min. | Typ. | Max.      | Units                |
|------------------------------|------------------------------------------------------------|-----------------------------------------------|------|------|-----------|----------------------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage                             | $V_{GS}=0V, I_D=250\mu A$                     | 80   | -    | -         | V                    |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temperature Coefficient                  | Reference to $25^{\circ}\text{C}$ , $I_D=1mA$ | -    | 0.09 | -         | $V/^{\circ}\text{C}$ |
| $R_{DS(ON)}$                 | Static Drain-Source On-Resistance <sup>2</sup>             | $V_{GS}=10V, I_D=10A$                         | -    | -    | 90        | $m\Omega$            |
|                              |                                                            | $V_{GS}=4.5V, I_D=7A$                         | -    | -    | 105       | $m\Omega$            |
| $V_{GS(th)}$                 | Gate Threshold Voltage                                     | $V_{DS}=V_{GS}, I_D=250\mu A$                 | 1    | -    | 3         | V                    |
| $g_{fs}$                     | Forward Transconductance                                   | $V_{DS}=5V, I_D=10A$                          | -    | 15   | -         | S                    |
| $I_{DSS}$                    | Drain-Source Leakage Current ( $T_J=25^{\circ}\text{C}$ )  | $V_{DS}=80V, V_{GS}=0V$                       | -    | -    | 10        | $\mu A$              |
|                              | Drain-Source Leakage Current ( $T_J=150^{\circ}\text{C}$ ) | $V_{DS}=64V, V_{GS}=0V$                       | -    | -    | 100       | $\mu A$              |
| $I_{GSS}$                    | Gate-Source Leakage                                        | $V_{GS}=\pm 25V$                              | -    | -    | $\pm 100$ | nA                   |
| $Q_g$                        | Total Gate Charge <sup>2</sup>                             | $I_D=10A$                                     | -    | 11   | 18        | nC                   |
| $Q_{gs}$                     | Gate-Source Charge                                         | $V_{DS}=64V$                                  | -    | 3    | -         | nC                   |
| $Q_{gd}$                     | Gate-Drain ("Miller") Charge                               | $V_{GS}=4.5V$                                 | -    | 6    | -         | nC                   |
| $t_{d(on)}$                  | Turn-on Delay Time <sup>2</sup>                            | $V_{DS}=40V$                                  | -    | 8    | -         | ns                   |
| $t_r$                        | Rise Time                                                  | $I_D=10A$                                     | -    | 12   | -         | ns                   |
| $t_{d(off)}$                 | Turn-off Delay Time                                        | $R_G=3.3\Omega, V_{GS}=10V$                   | -    | 19   | -         | ns                   |
| $t_f$                        | Fall Time                                                  | $R_D=4\Omega$                                 | -    | 3    | -         | ns                   |
| $C_{iss}$                    | Input Capacitance                                          | $V_{GS}=0V$                                   | -    | 980  | 1570      | pF                   |
| $C_{oss}$                    | Output Capacitance                                         | $V_{DS}=25V$                                  | -    | 75   | -         | pF                   |
| $C_{rss}$                    | Reverse Transfer Capacitance                               | $f=1.0MHz$                                    | -    | 50   | -         | pF                   |
| $R_g$                        | Gate Resistance                                            | $f=1.0MHz$                                    | -    | 1.1  | 1.7       | $\Omega$             |

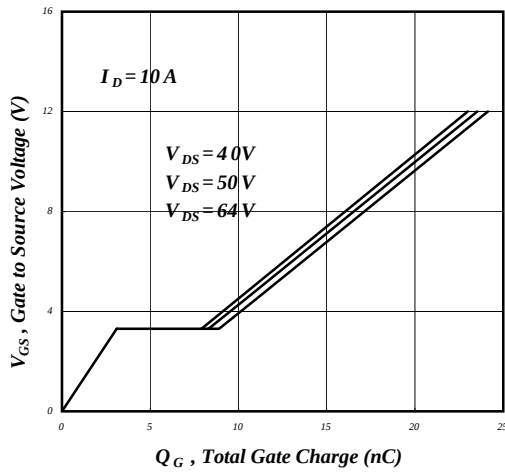
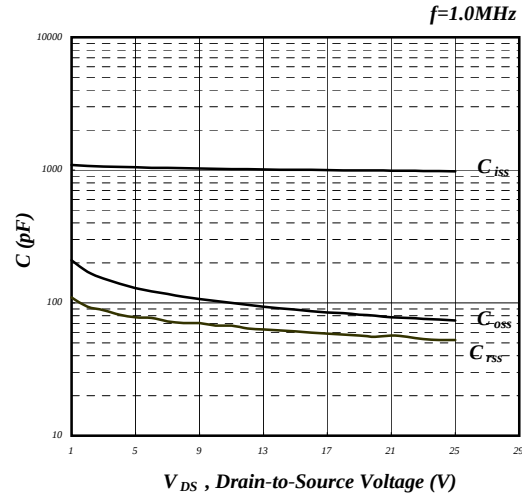
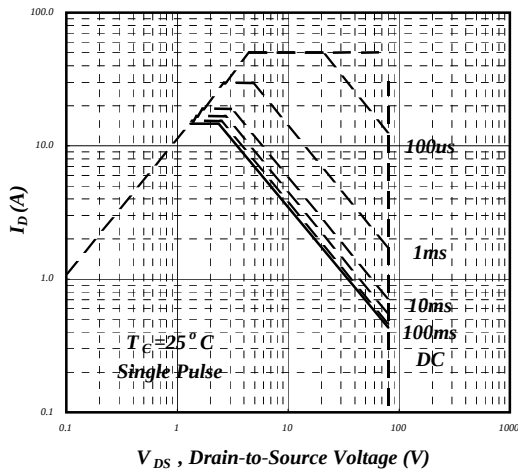
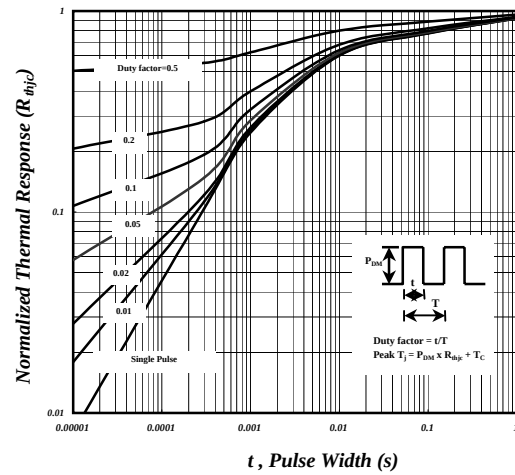
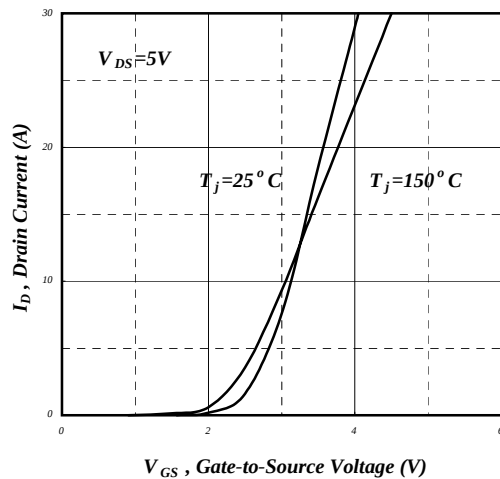
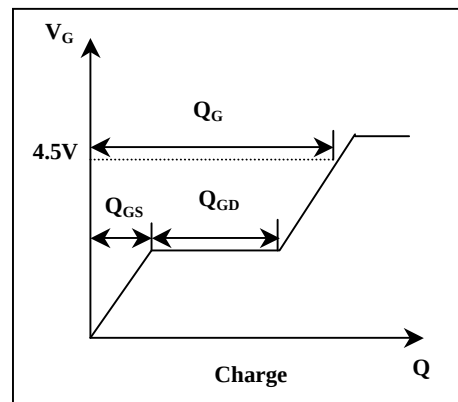
## SOURCE-DRAIN DIODE

| Symbol   | Parameter                          | Test Conditions       | Min. | Typ. | Max. | Units |
|----------|------------------------------------|-----------------------|------|------|------|-------|
| $V_{SD}$ | Forward On Voltage <sup>2</sup>    | $I_S=10A, V_{GS}=0V$  | -    | -    | 1.2  | V     |
| $t_{rr}$ | Reverse Recovery Time <sup>2</sup> | $I_S=10A, V_{GS}=0V,$ | -    | 33   | -    | ns    |
| $Q_{rr}$ | Reverse Recovery Charge            | $dI/dt=100A/\mu s$    | -    | 44   | -    | nC    |

### Notes:

1. Pulse width limited by safe operating area.
2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .


**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 Temperature**

**Fig 5. Forward Characteristic of Reverse Diode**

**Fig 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**

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