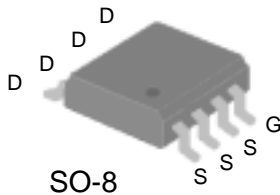


N-channel Enhancement-mode Power MOSFET

PRODUCT SUMMARY

| | |
|--------------|--------------|
| BV_{DSS} | 30V |
| $R_{DS(ON)}$ | 11m Ω |
| I_D | 11.5A |

 **Pb-free; RoHS-compliant SO-8**



DESCRIPTION

The SSM6680GM achieves fast switching performance with low gate charge without a complex drive circuit. It is suitable for low voltage applications such as DC/DC converters and general load-switching circuits.

The SSM6680M is supplied in an RoHS-compliant SO-8 package, which is widely used for medium power commercial and industrial surface mount applications.

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Units |
|-----------|--|------------|---------------------|
| V_{DS} | Drain-source voltage | 30 | V |
| V_{GS} | Gate-source voltage | ± 25 | V |
| I_D | Continuous drain current, $T_C = 25^\circ\text{C}$ $T_C = 70^\circ\text{C}$ | 11.5 | A |
| | | 9.5 | A |
| I_{DM} | Pulsed drain current ¹ | 50 | A |
| P_D | Total power dissipation, $T_C = 25^\circ\text{C}$ | 2.5 | W |
| | Linear derating factor | 0.02 | 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 CHARACTERISTICS

| Symbol | Parameter | Value | Units |
|-----------------|---|-------|---------------------------|
| $R_{\theta JA}$ | Maximum thermal resistance, junction-ambient ³ | 50 | $^\circ\text{C}/\text{W}$ |

Notes:

1. Pulse width must be limited to avoid exceeding the maximum junction temperature of 150 $^\circ\text{C}$.
2. Pulse width <300us, duty cycle <2%.
3. Mounted on a square inch of copper pad on FR4 board ; 125 $^\circ\text{C}/\text{W}$ when mounted on the minimum pad area required for soldering.

ELECTRICAL CHARACTERISTICS (at $T_j = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|------------------------------|--|--|------|------|-----------|--------------------|
| BV_{DSS} | Drain-source breakdown voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | - | - | V |
| $\Delta BV_{DSS}/\Delta T_j$ | Breakdown voltage temperature coefficient | Reference to 25°C , $I_D=1\text{mA}$ | - | 0.02 | - | $V/^\circ\text{C}$ |
| $R_{DS(ON)}$ | Static drain-source on-resistance ² | $V_{GS}=10V, I_D=11.5A$ | - | - | 11 | $\text{m}\Omega$ |
| | | $V_{GS}=4.5V, I_D=9.5A$ | - | - | 18 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate threshold voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1 | - | 3 | V |
| g_{fs} | Forward transconductance | $V_{DS}=10V, I_D=11.5A$ | - | 30 | - | S |
| I_{DSS} | Drain-source leakage current | $V_{DS}=30V, V_{GS}=0V$ | - | - | 1 | μA |
| | | $V_{DS}=24V, V_{GS}=0V, T_j = 70^\circ\text{C}$ | - | - | 25 | μA |
| I_{GSS} | Gate-source leakage current | $V_{GS}=\pm 25V$ | - | - | ± 100 | nA |
| Q_g | Total gate charge ² | $I_D=11.5A$ | - | 16.8 | - | nC |
| Q_{gs} | Gate-source charge | $V_{DS}=15V$ | - | 4.2 | - | nC |
| Q_{gd} | Gate-drain ("Miller") charge | $V_{GS}=5V$ | - | 8 | - | nC |
| $t_{d(on)}$ | Turn-on delay time ² | $V_{DS}=15V$ | - | 8.9 | - | ns |
| t_r | Rise time | $I_D=1A$ | - | 7.3 | - | ns |
| $t_{d(off)}$ | Turn-off delay time | $R_G=5.5\Omega, V_{GS}=10V$ | - | 25.6 | - | ns |
| t_f | Fall time | $R_D=10\Omega$ | - | 18.6 | - | ns |
| C_{iss} | Input capacitance | $V_{GS}=0V$ | - | 1450 | - | pF |
| C_{oss} | Output capacitance | $V_{DS}=25V$ | - | 285 | - | pF |
| C_{rss} | Reverse transfer capacitance | $f=1.0\text{MHz}$ | - | 180 | - | pF |

Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|----------|---|------------------------|------|------|------|-------|
| V_{SD} | Forward voltage ² | $I_S=3.5A, V_{GS}=0V$ | - | - | 1.3 | V |
| I_S | Continuous Source Current (Body Diode) | $V_D=V_G=0V, V_S=1.3V$ | - | - | 1.92 | A |
| | | | | | | |

Notes:

1. Pulse width must be limited to avoid exceeding the maximum junction temperature of 150°C .
2. Pulse width $<300\mu s$, duty cycle $<2\%$.

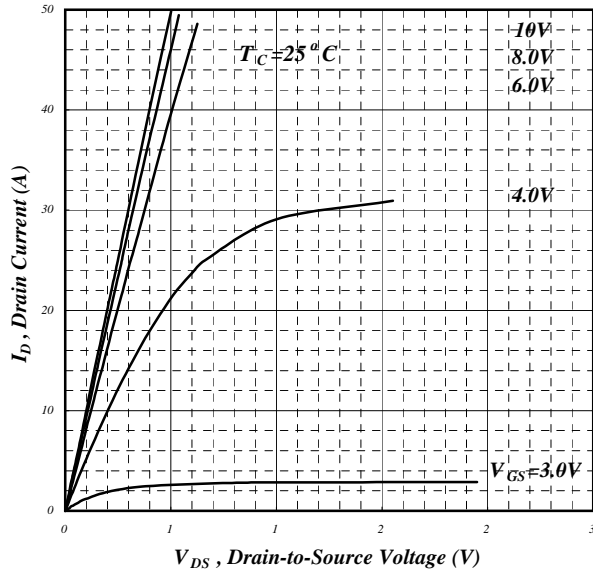


Fig 1. Typical Output Characteristics

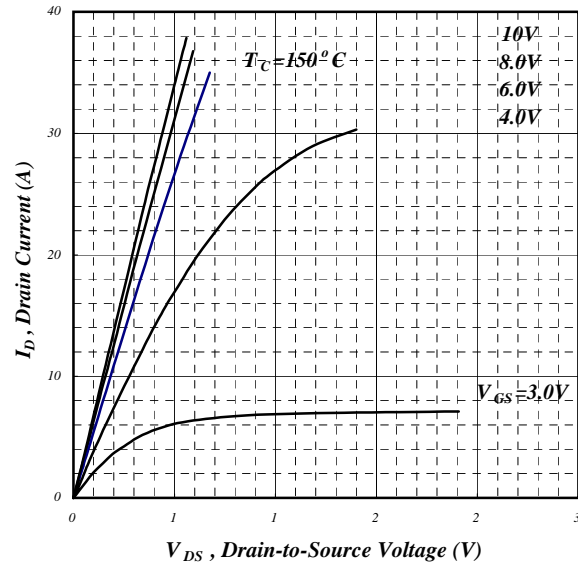


Fig 2. Typical Output Characteristics

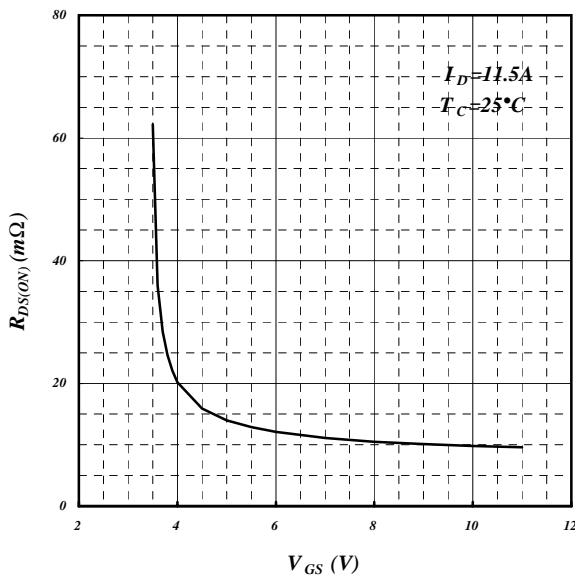


Fig 3. On-Resistance vs. Gate Voltage

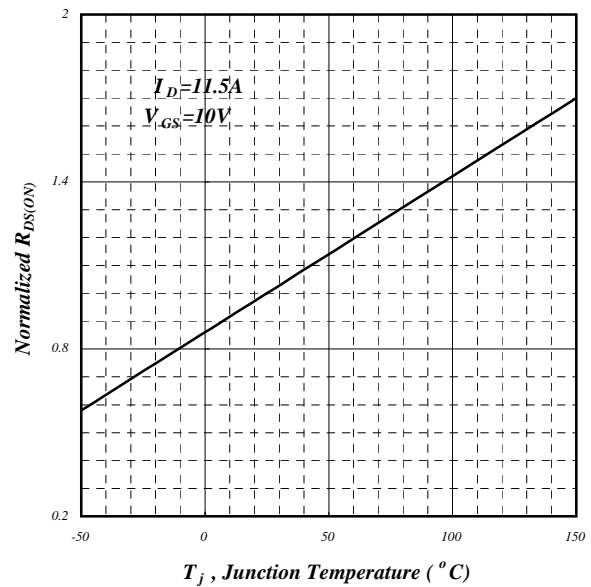


Fig 4. Normalized On-Resistance vs. Junction Temperature

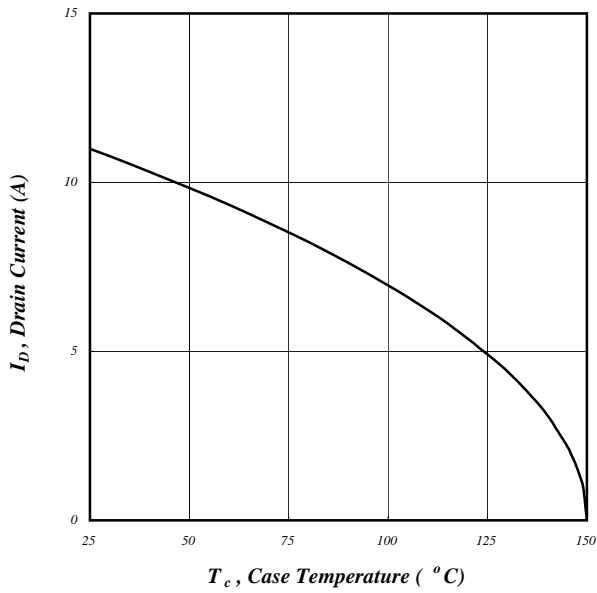


Fig 5. Maximum Drain Current vs. Case Temperature

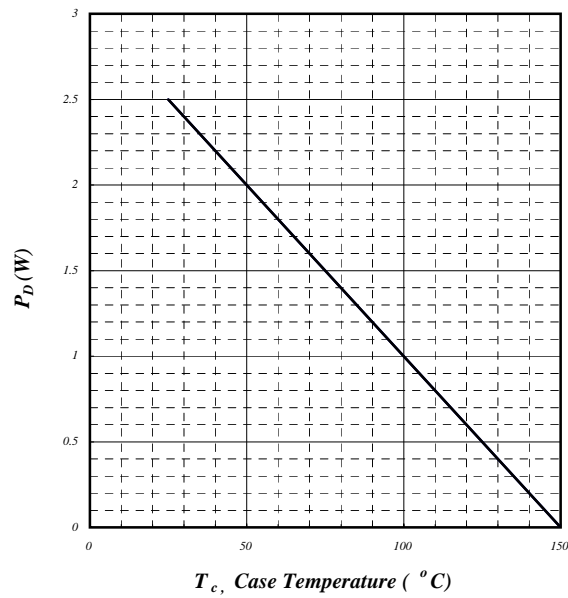


Fig 6. Typical Power Dissipation

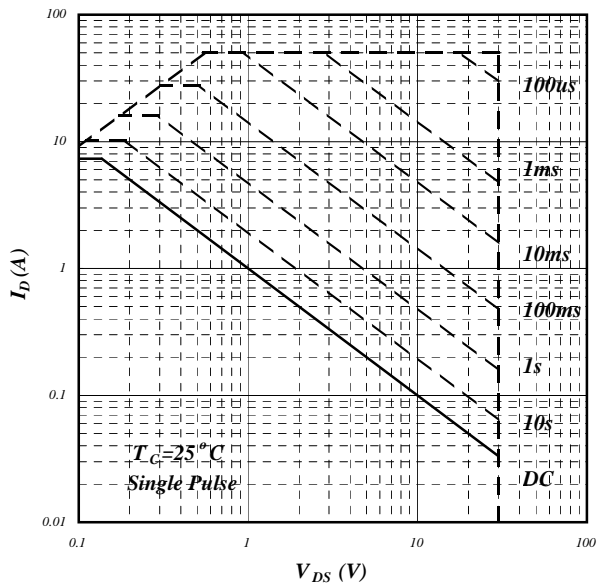


Fig 7. Maximum Safe Operating Area

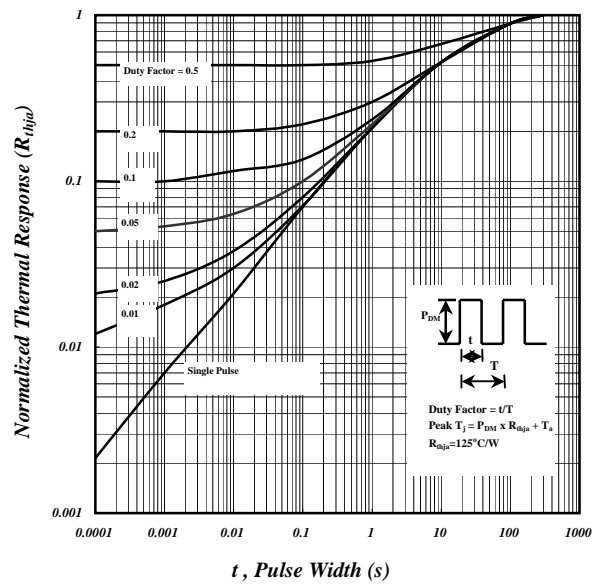


Fig 8. Effective Transient Thermal Impedance

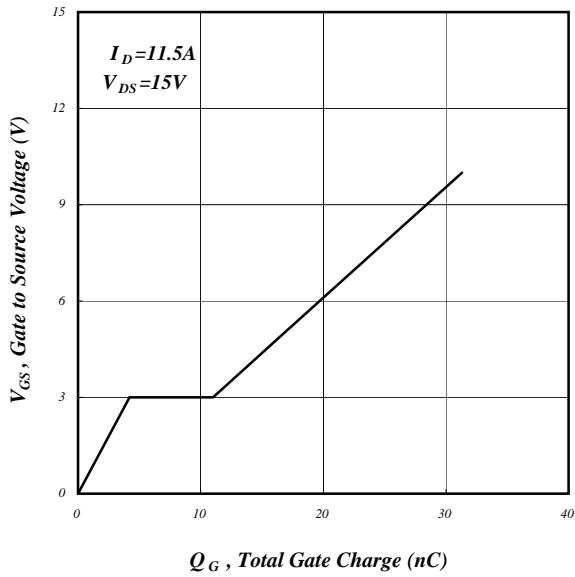


Fig 9. Gate Charge Characteristics

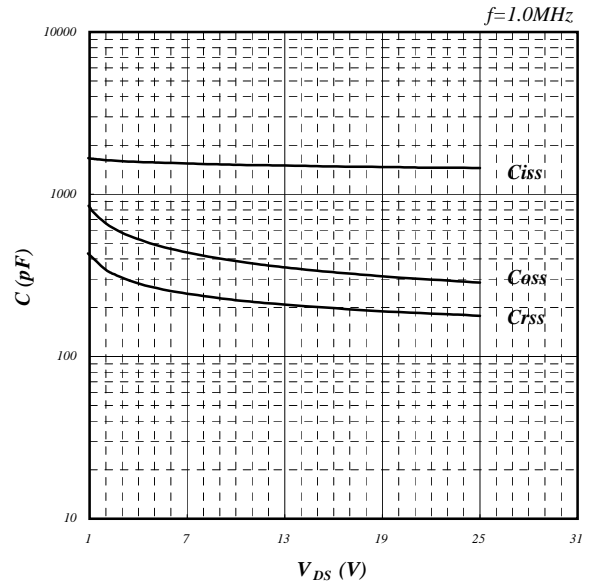


Fig 10. Typical Capacitance Characteristics

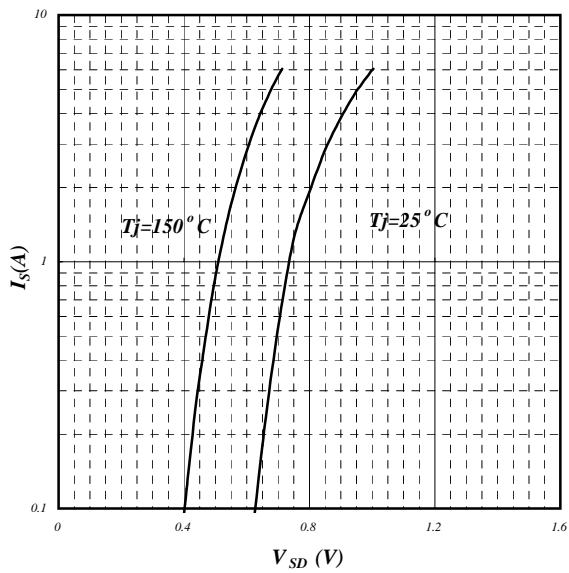


Fig 11. Forward Characteristic of Reverse Diode

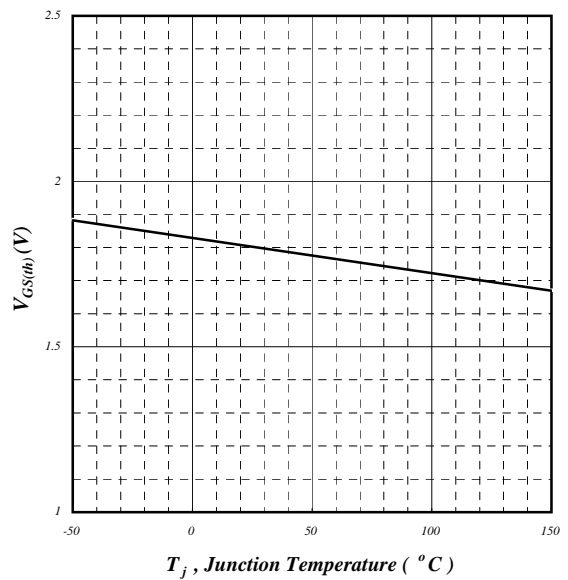


Fig 12. Gate Threshold Voltage vs. Junction Temperature

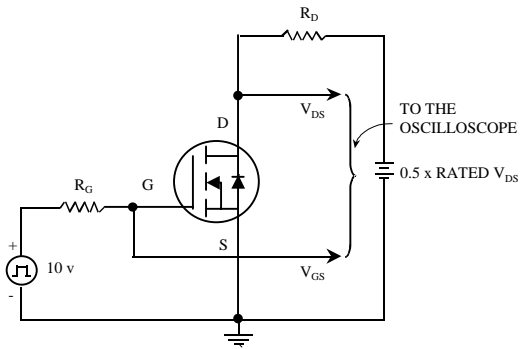


Fig 13. Switching Time Circuit

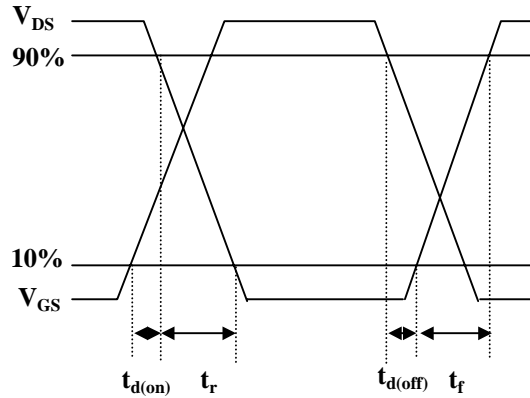


Fig 14. Switching Time Waveform

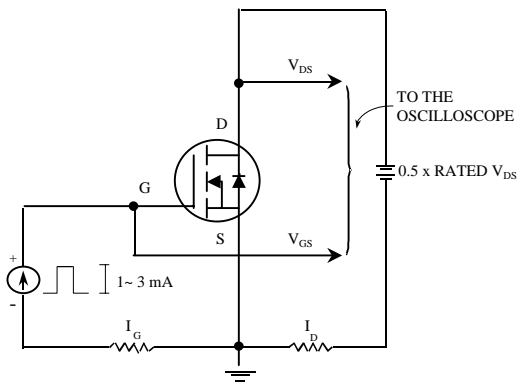


Fig 15. Gate Charge Circuit

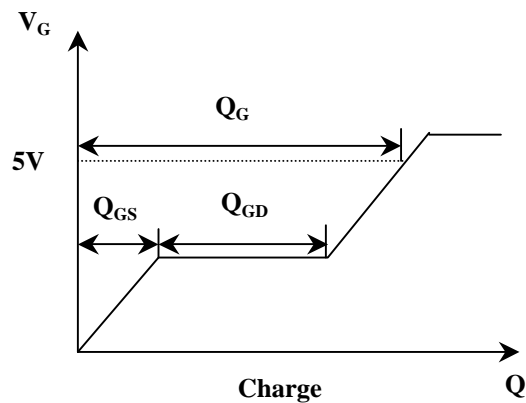
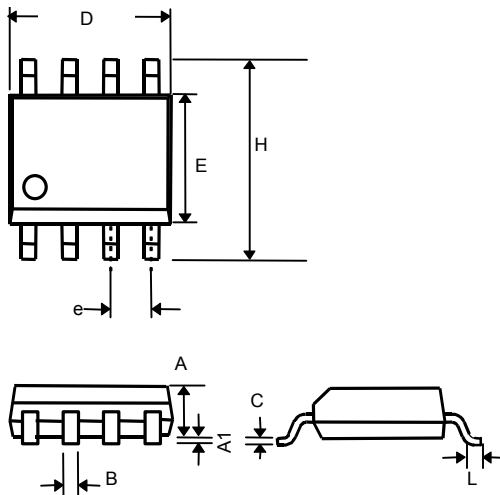


Fig 16. Gate Charge Waveform

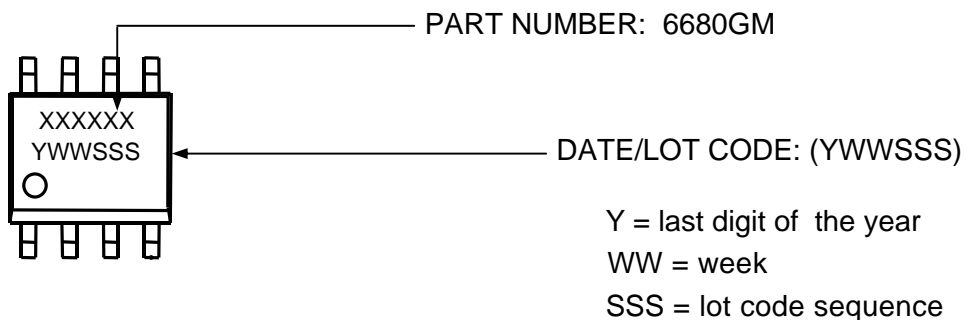
PHYSICAL DIMENSIONS



| SYMBOL | MIN | MAX |
|--------|-----------|------|
| A | 1.35 | 1.75 |
| A1 | 0.10 | 0.25 |
| B | 0.33 | 0.51 |
| C | 0.19 | 0.25 |
| D | 4.80 | 5.00 |
| E | 3.80 | 4.00 |
| e | 1.27(TYP) | |
| H | 5.80 | 6.50 |
| L | 0.38 | 1.27 |

All dimensions in millimeters.
Dimensions do not include mold protrusions.

PART MARKING



PACKING: Moisture sensitivity level MSL3

3000 pcs in antistatic tape on a 13 inch (330mm) reel packed in a moisture barrier bag (MBB).