SemTron Microtech Corporation

# SMC9435M

## Single P-Channel MOSFET

## ■DESCRIPTION

SMC9435M is the P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior fast switching performance.These devices are well suited for high efficiency fast switching applications.

## ■PART NUMBER INFORMATION

**SMC 9435 M - TR G**
a b c d e

a : Company name.
b : Product Serial number.
c : Package code M:SOP-8
d : Handling code TR:Tape&Reel
e : Green produce code G:*RoHS Compliant*

## ■FEATURES

***$V_{DS}$=-30V, $I_D$=-6.5A***

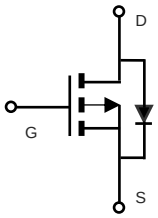
*$R_{DS(ON)}$=40mΩ(Typ.)@$V_{GS}$=-10V*
*$R_{DS(ON)}$=54mΩ(Typ.)@$V_{GS}$=-4.5V*

◆Fast switch
◆Low gate charge
◆High power and current handling capability

## ■APPLICATIONS

◆Load Switch
◆Portable Equipment
◆DC-DC Power Management


SOP-8




## ■ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C Unless otherwise noted )

| Symbol | Parameter | | Rating | Units |
|---|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | | -30 | V |
| $V_{GSS}$ | Gate-Source Voltage | | ±20 | V |
| $I_D$ | Continuous Drain Current | $T_A$=25°C | -6.5 | A |
| | | $T_A$=70°C | -5.2 | A |
| $I_{DM}$ | Pulsed Drain Current [B] | | -26 | A |
| $I_{AS}$ | Avalanche Current [B] | | -20 | A |
| $E_{AS}$ | Single Pulse Avalanche energy L=0.3mH [B] | | 60 | mJ |
| $P_D$ | Power Dissipation [A] | $T_A$=25°C | 3.1 | W |
| | | $T_A$=70°C | 2 | W |
| $T_J$ | Operation Junction Temperature | | -55/150 | °C |
| $T_{STG}$ | Storage Temperature Range | | -55/150 | °C |

## ■THERMAL RESISTANCE

| Symbol | Parameter | | Typ | Max | Units |
|---|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient [A] | t≦10s | | 40 | °C/W |
| | Thermal Resistance Junction to Ambient [AC] | Steady-State | | 80 | |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | | | 30 | |

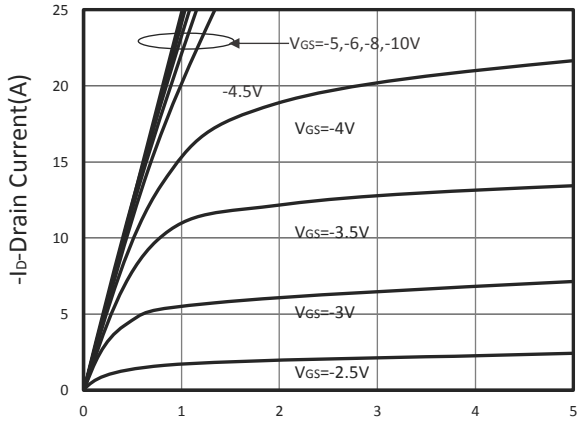
## ■ELECTRICAL CHARACTERISTICS($T_A$ = 25°C Unless otherwise noted )

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Parameters** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=-250μA | -30 | | | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -1 | -1.5 | -2 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{DS}$=0V, $V_{GS}$=±20V | | | ±100 | nA |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=-30V, $V_{GS}$=0V, $T_J$=25°C | | | -1 | μA |
| | | $V_{DS}$=-24V, $V_{GS}$=0V, $T_J$=75°C | | | -10 | |
| $R_{DS(ON)}$ | Drain-source On-Resistance [D] | $V_{GS}$=-10V, $I_D$=-6.5A<br>$V_{GS}$=-4.5V, $I_D$=-4A | | 40<br>54 | 48<br>65 | mΩ |
| $G_{fs}$ | Forward Transconductance | $V_{DS}$=-10V, $I_D$=-4.5A | | 12 | | S |
| **Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage [D] | $I_S$=-1A, $V_{GS}$=0V | | | -1 | V |
| $I_S$ | Diode Continuous Forward Current | | | | -6.4 | A |
| $t_{rr}$ | Revese Recovery Time | $I_S$=-4.5A, dI/dt=100A/μs<br>$T_J$=25°C | | 15 | | ns |
| $Q_{rr}$ | Revese Recovery Charg | | | 9.8 | | nC |
| **Dynamic and Switching Parameters** [E] | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=-15V, $V_{GS}$=-10V<br>$I_D$=-4.5A | | 9.8 | 13.8 | nC |
| $Q_g$ | Total Gate Charge (4.5V) | | | 4.8 | 6.7 | |
| $Q_{gs}$ | Gate-Source Charge | | | 1.7 | 2.4 | |
| $Q_{gd}$ | Gate-Drain Charge | | | 2 | 2.8 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-15V, $V_{GS}$=0V, f=1MHz | | 580 | | pF |
| $C_{oss}$ | Output Capacitance | | | 68 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 58 | | |
| $t_{d(on)}$ | Turn-On Time [D] | $V_{DD}$=-15V, $V_{GEN}$=-10V<br>$R_G$=6Ω, $I_D$=-1A | | 8.3 | | nS |
| $t_r$ | | | | 10 | | |
| $t_{d(off)}$ | Turn-Off Time [D] | | | 16.8 | | |
| $t_f$ | | | | 7.8 | | |

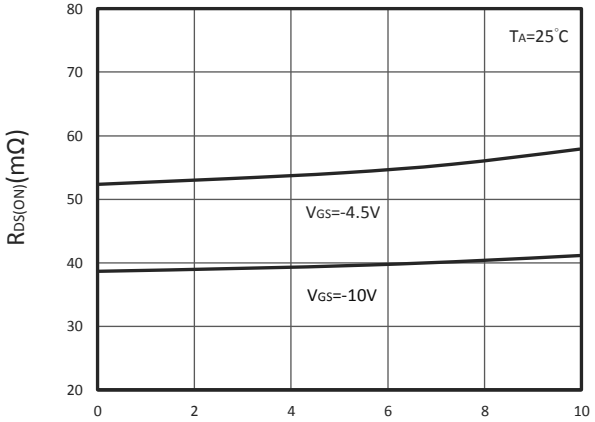
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

A. Surface mounted on FR4 board using 1 $in^2$ pad size.
B. Pulsed width limited by maximum junction temperature, $T_{J(MAX)}$=150°C (initial temperature $T_J$=25°C).
C. Using ≤ 10s junction-to-ambient thermal resistance is base on $T_{J(MAX)}$=150°C.
D. Pulse test width ≤300μs and duty cycle ≤ 2%.
E. Guaranteed by design, not subject to production testing.

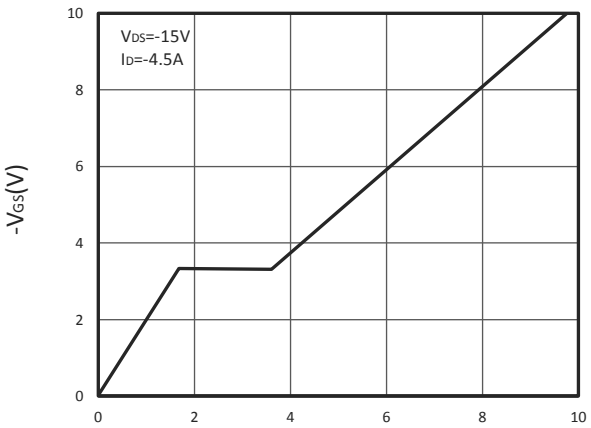
## TYPICAL CHARACTERISTICS



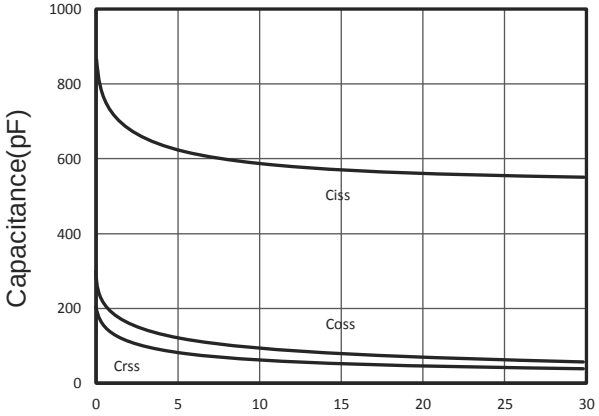

**Output Characteristics**



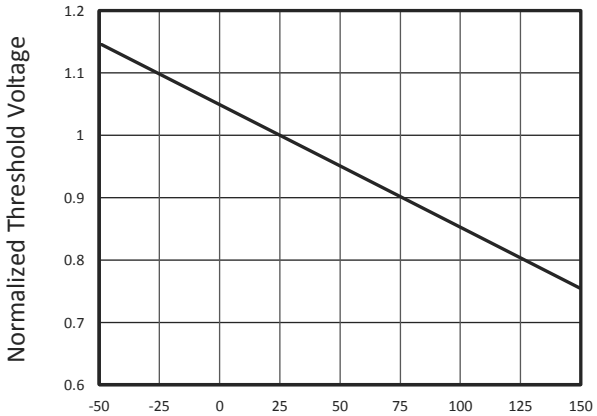

**Drain-Source On Resistance**



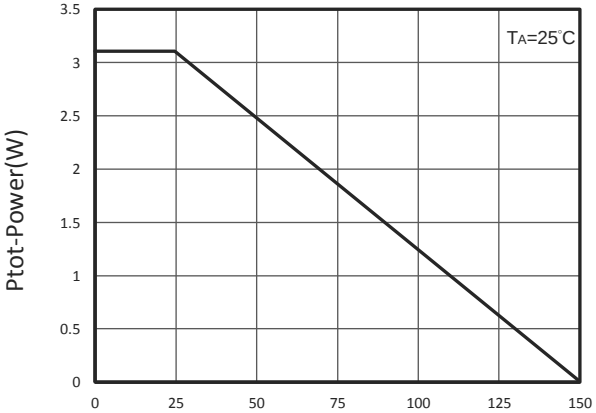

**Gate Charge**




**Capacitance**

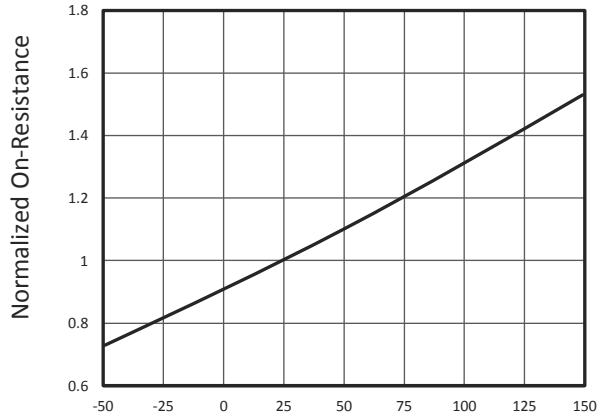



**Gate Threshold Voltage**



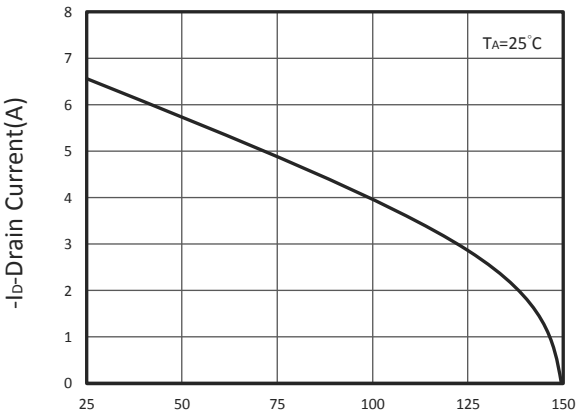

**Power Dissipation**

## TYPICAL CHARACTERISTICS



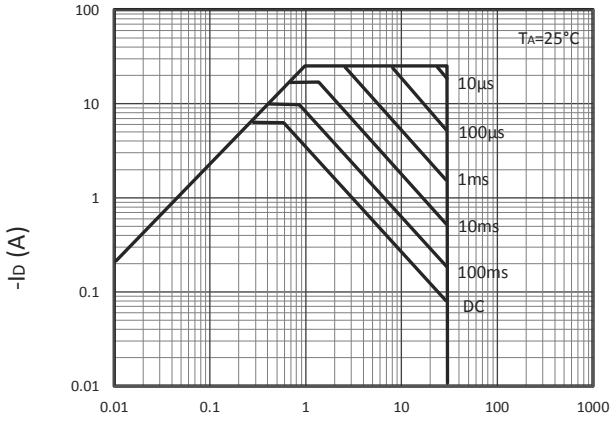

$T_J$-Junction Temperature(°C)

**Drain-Source On Resistance**



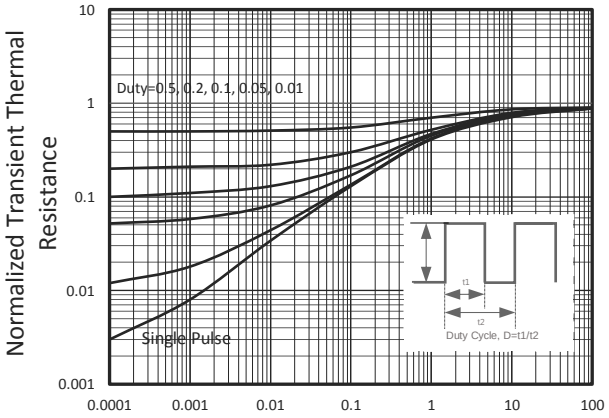

$T_J$-Junction Temperature(°C)

**Drain Current vs $T_J$**



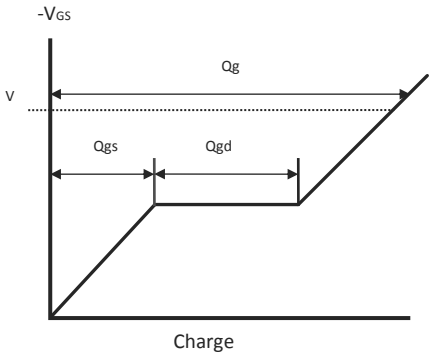

- $V_{DS}$ Voltage (V)

**Maximum Safe Operation Area**

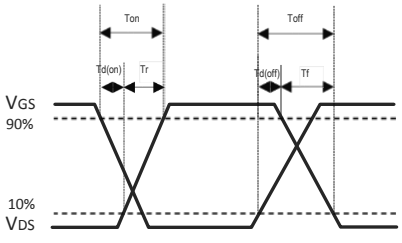



Square Wave Pulse Duration(Sec)

**Thermal Transient Impedance**

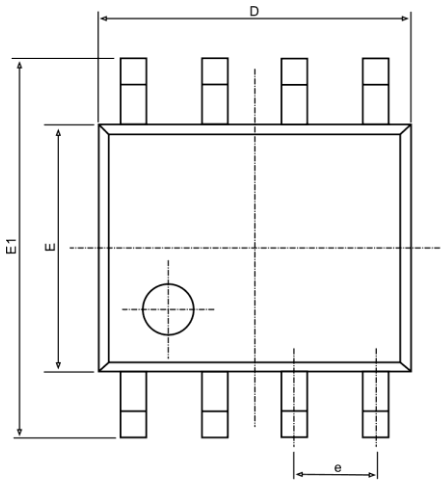


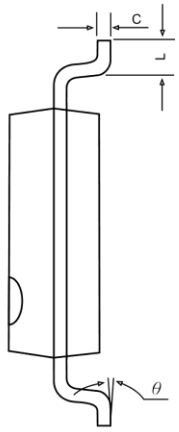

**Gate Chrge Waveform**

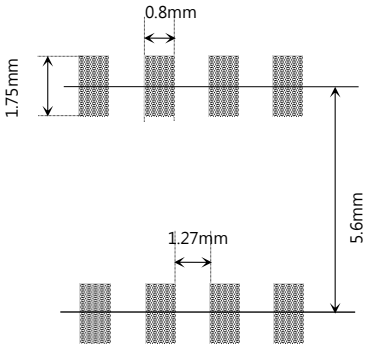



**Switching Time Waveform**

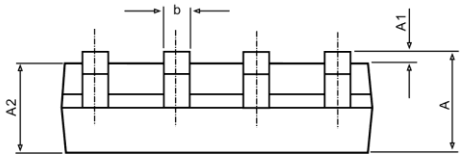
## ■SOP-8 PACKAGE DIMENSIONS




Recommended Land Pattern




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.040. | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.130 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270BSC. | | 0.050BSC. | |
| L | 0.400 | 1.270 | 0.016 | 0.005 |
| Θ | 0° | 8° | 0° | 8° |