SemTron Microtech Corporation

# SMC5225H

## Single P-Channel MOSFET

## ■DESCRIPTION

SMC5225H 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 and withstand high energy pulse in the avalanche and commutation mode.

## ■FEATURES

**$V_{DS}$=-30V, $I_D$=-22A**

$R_{DS(ON)}$=38mΩ(Typ.)@$V_{GS}$=-10V
$R_{DS(ON)}$=50mΩ(Typ.)@$V_{GS}$=-4.5V

◆High power and current handling capability

## ■APPLICATIONS

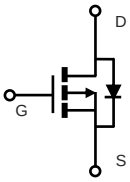
◆LED Application
◆Power Management
◆Load Switch

## ■PART NUMBER INFORMATION

**SMC 5225 H - TR G**
a b c d e

a : Company name.
b : Product Serial number.
c : Package code H:TO-252
d : Handling code TR:Tape&Reel
e : Green produce code G:*RoHS Compliant*

TO-252




## ■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 | $T_C$=25°C | -22 | A |
| | | $T_C$=100°C | -14 | A |
| $I_{DM}$ | Pulsed Drain Current [B] | | -36.8 | A |
| $I_D$ | Continuous Drain Current | $T_A$=25°C | -9.2 | A |
| | | $T_A$=70°C | -7.3 | A |
| $P_D$ | Power Dissipation [A] | $T_A$=25°C | 6.3 | W |
| | | $T_A$=70°C | 4 | W |
| $I_{AS}$ | Avalanche Current [B] | | -20 | A |
| $E_{AS}$ | Single Pulse Avalanche energy L=0.3mH [B] | | 60 | mJ |
| $P_D$ | Power Dissipation [C] | $T_C$=25°C | 35 | W |
| | | $T_C$=100°C | 14 | 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 | | 20 | °C/W |
| | Thermal Resistance Junction to Ambient [AC] | Steady-State | | 50 | |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | | | 3.5 | |

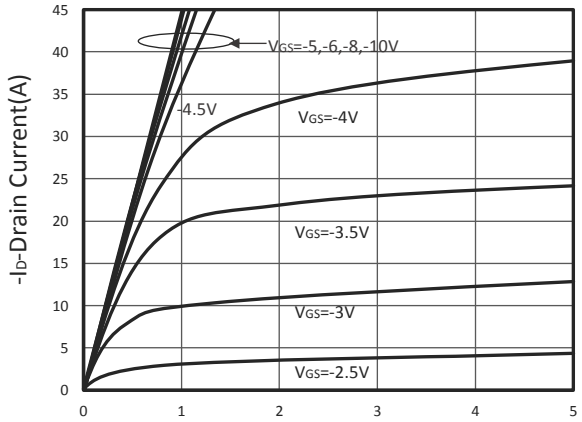
## ELECTRICAL CHARACTERISTICS ($T_A$=25°C Unless otherwise noted )

| 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, $I_D$=-9.2A<br>$V_{GS}$=-4.5V, $I_D$=-7A | | 38<br>50 | 45<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 | | | | -9.2 | A |
| $t_{rr}$ | Revese Recovery Time | $I_S$=-4.5A, dI/dt=100A/μs | | 15 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | | 9.8 | | nC |
| **Dynamic and Switching Parameters** [E] | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=-15V, $V_{GS}$=-10V<br>$I_D$=-4.5A | | 10 | 14 | nC |
| $Q_g$ | Total Gate Charge (4.5V) | | | 4.8 | 6.7 | |
| $Q_{gs}$ | Gate-Source Charge | | | 1.8 | 2.5 | |
| $Q_{gd}$ | Gate-Drain Charge | | | 2 | 2.8 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-15V, $V_{GS}$=0V, f=1MHz | | 583 | | pF |
| $C_{oss}$ | Output Capacitance | | | 70 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 58 | | |
| $t_{d(on)}$ | Turn-On Time | $V_{DD}$=-15V, $V_{GEN}$=-10V<br>$R_G$=6Ω, $I_D$=-1A | | 8.3 | | nS |
| $t_r$ | | | | 10 | | |
| $t_{d(off)}$ | Turn-Off Time | | | 16.8 | | |
| $t_f$ | | | | 7.8 | | |

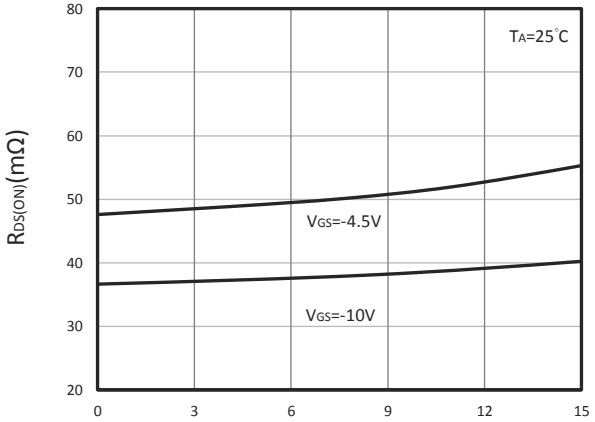
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

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.

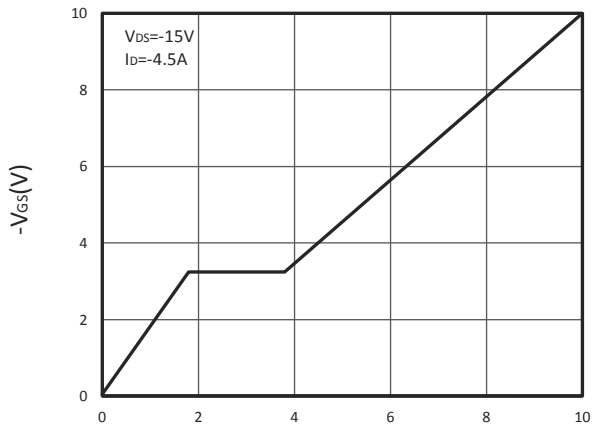
## TYPICAL CHARACTERISTICS



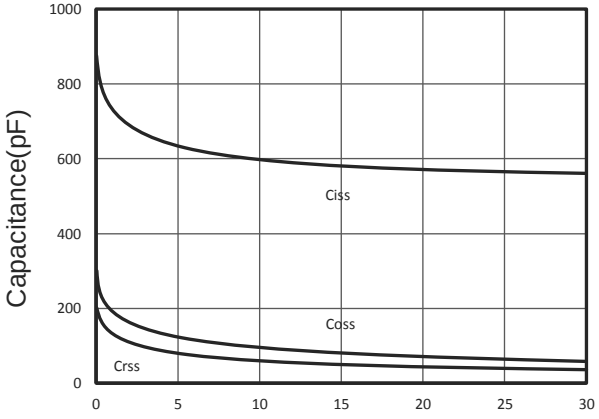

**Output Characteristics**



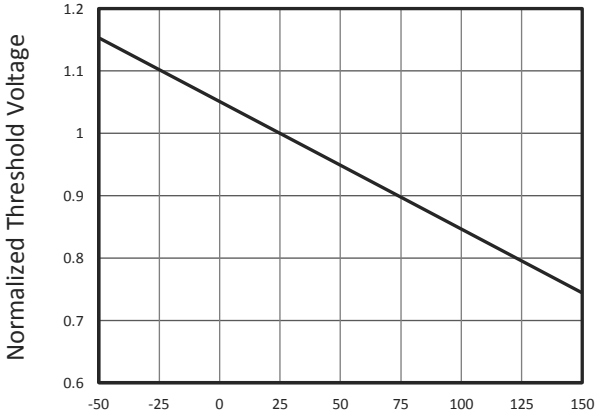

**Drain-Source On Resistance**



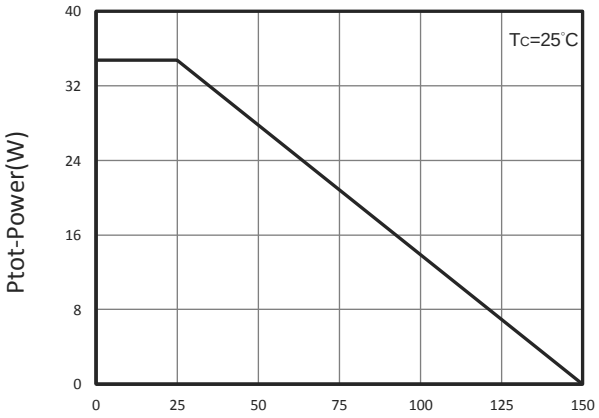

**Gate Charge**




**Capacitance**

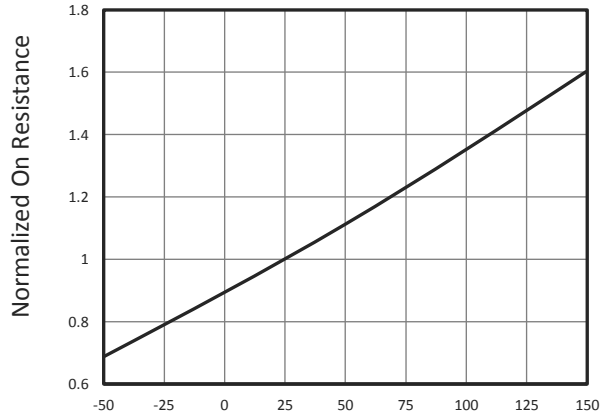



**Gate Threshold Voltage**



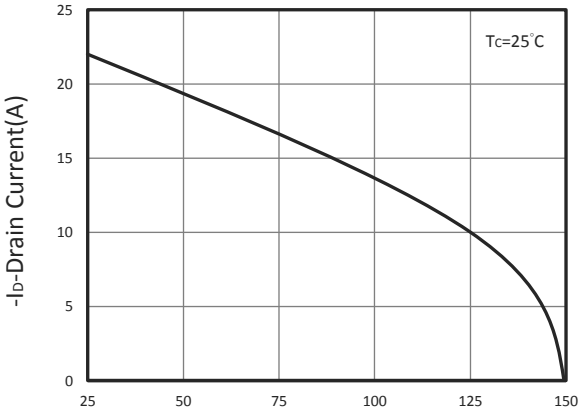

**Power Dissipation**

## TYPICAL CHARACTERISTICS



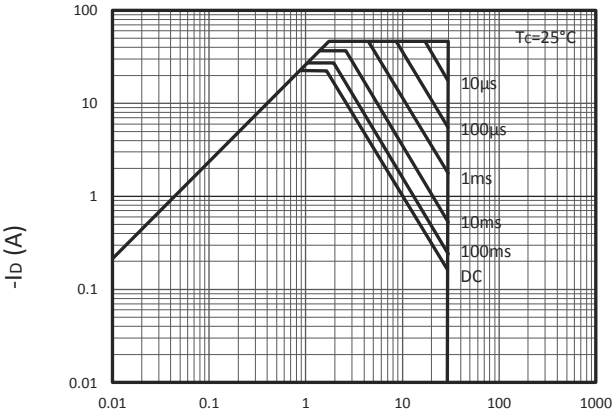

$T_J$-Junction Temperature(°C)

**Drain-Source On Resistance**



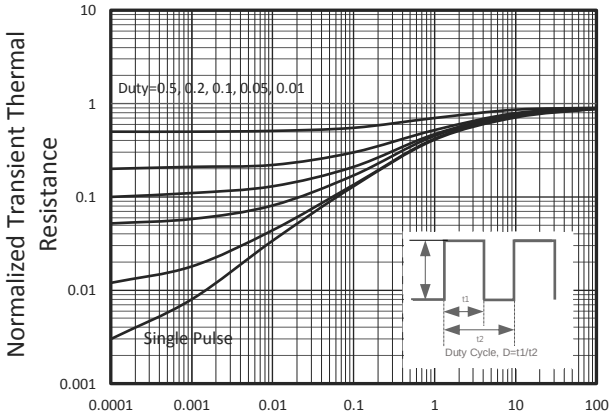

$T_C$-Case Temperature(°C)

**Drain Current vs $T_C$**



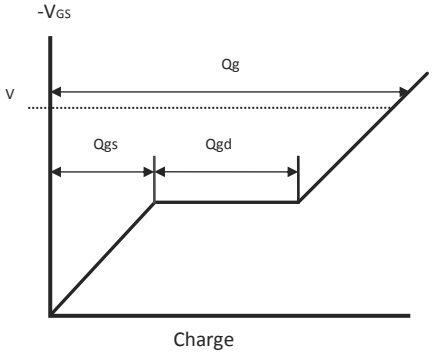

- $V_{DS}$ Voltage (V)

**Maximum Safe Operation Area**

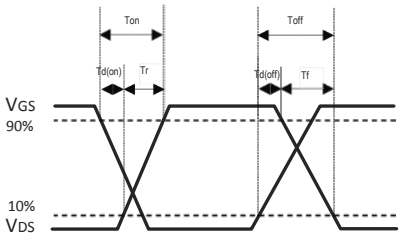



Square Wave Pulse Duration(Sec)

**Thermal Transient Impedance**

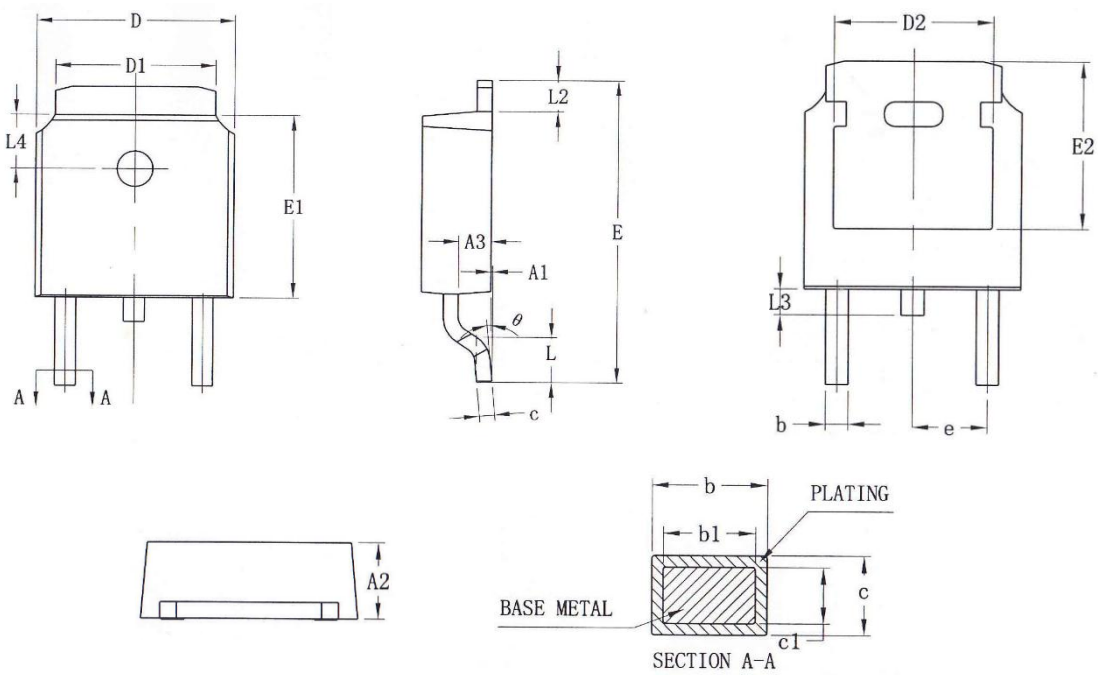



**Gate Chrge Waveform**




**Switching Time Waveform**

## ■TO-252 PACKAGE DIMENSIONS




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 2.200 | 2.400 | 0.087 | 0.094 |
| A3 | 1.020 | 1.120 | 0.040 | 0.044 |
| b | 0.740 | 0.820 | 0.029 | 0.032 |
| b1 | 0.730 | 0.790 | 0.029 | 0.031 |
| c | 0.510 | 0.550 | 0.020 | 0.022 |
| c1 | 0.500 | 0.520 | 0.019 | 0.020 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.330 REF. | | 0.210 REF. | |
| D2 | 4.830 REF. | | 0.190 REF. | |
| E | 9.900 | 10.30 | 0.390 | 0.406 |
| E1 | 6.000 | 6.200 | 0.236 | 0.244 |
| E2 | 5.300 REF. | | 0.209 REF. | |
| e | 2.286 BSC. | | 0.090 BSC. | |
| L | 1.400 | 1.600 | 0.055 | 0.063 |
| L2 | 0.900 | 1.250 | 0.035 | 0.049 |
| L3 | 0.600 | 1.000 | 0.024 | 0.039 |
| L4 | 1.700 | 1.900 | 0.067 | 0.075 |
| Θ | 0° | 8° | 0° | 15° |

Recommended Land Pattern