

Single P-Channel MOSFET

DESCRIPTION

SMC4427 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. These devices are well suited for high efficiency fast switching applications.

PART NUMBER INFORMATION

SMC 4427 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

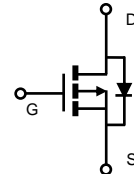
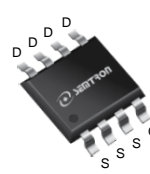
$V_{DS} = -30V, I_D = -15A$

$R_{DS(ON)} = 7.5m\Omega(Typ.) @ V_{GS} = -10V$
 $R_{DS(ON)} = 11.5m\Omega(Typ.) @ V_{GS} = -4.5V$

- ◆ Fast switch
- ◆ High power and current handling capability

APPLICATIONS

- ◆ Load Switch
- ◆ LED Application
- ◆ DC-DC Power Management



SOP-8

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ 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 | $T_A = 25^\circ C$ | -15 |
| | | $T_A = 70^\circ C$ | -12 |
| I_{DM} | Pulsed Drain Current ^A | -60 | A |
| I_{AS} | Avalanche Current ^A | -30 | A |
| E_{AS} | Single Pulse Avalanche energy $L=0.1mH$ ^{AF} | 45 | mJ |
| P_D | Power Dissipation ^C | $T_A = 25^\circ C$ | 3.1 |
| | | $T_A = 70^\circ C$ | 2 |
| T_J | Operation Junction Temperature | -55/150 | $^\circ C$ |
| T_{STG} | Storage Temperature Range | -55/150 | $^\circ C$ |

THERMAL RESISTANCE

| Symbol | Parameter | Typ | Max | Units |
|-----------------|--|--------------|-----|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient ^B | $t \leq 10s$ | 40 | $^\circ C/W$ |
| | Thermal Resistance Junction to Ambient ^{BD} | Steady-State | 75 | |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | | 25 | |

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise noted)

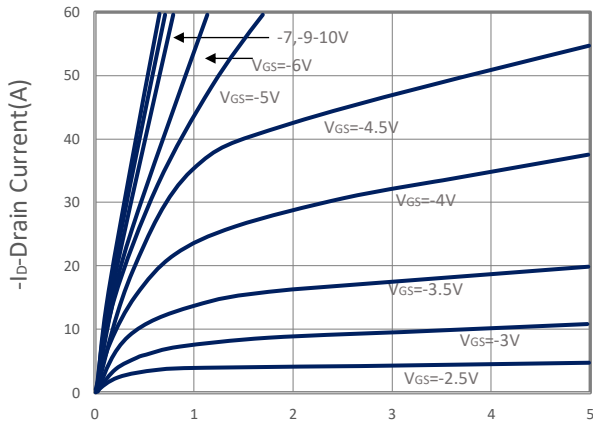
| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|-----|-------------|-----------|------------|
| Static Parameters | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$ | -30 | | | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -1 | -1.6 | -2.5 | V |
| I_{GSS} | Gate Leakage Current | $V_{DS}=0V, V_{GS}=\pm 20V$ | | | ± 100 | nA |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=-30V, V_{GS}=0V, T_J=25^\circ\text{C}$ | | | -1 | μA |
| | | $V_{DS}=-24V, V_{GS}=0V, T_J=75^\circ\text{C}$ | | | -10 | |
| $R_{DS(ON)}$ | Drain-source On-Resistance ^E | $V_{GS}=-10V, I_D=-15A$ $V_{GS}=-4.5V, I_D=-10A$ | | 7.5 11.5 | 9 14 | m Ω |
| G_{fs} | Forward Transconductance | $V_{DS}=-10V, I_D=-10A$ | | 14.6 | | S |
| Diode Characteristics | | | | | | |
| V_{SD} | Diode Forward Voltage ^E | $I_S=-1A, V_{GS}=0V$ | | -0.7 | -1 | V |
| I_S | Continuous Source Current | | | | -7.5 | A |
| t_{rr} | Reverse Recovery Time | $I_S=-10A, dI/dt=100A/\mu s$ | | 21 | | ns |
| Q_{rr} | Reverse Recovery Charge | | | 15.5 | | nC |
| Dynamic and Switching Parameters | | | | | | |
| Q_g | Total Gate Charge (10V) | $V_{DS}=-15V, V_{GS}=-10V, I_D=-10A$ | | 61 | 85 | nC |
| Q_g | Total Gate Charge (4.5V) | | | 30 | 42 | |
| Q_{gs} | Gate-Source Charge | | | 10.6 | 14.3 | |
| Q_{gd} | Gate-Drain Charge | | | 9 | 12.2 | |
| C_{iss} | Input Capacitance | $V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$ | | 3376 | | pF |
| C_{oss} | Output Capacitance | | | 369 | | |
| C_{rss} | Reverse Transfer Capacitance | | | 224 | | |
| R_g | Gate Resistance | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$ | | 8.2 | | Ω |
| $t_{d(on)}$ | Turn-On Time | $V_{DD}=-15V, V_{GEN}=-10V, R_G=3\Omega, I_D=-1A$ | | 24 | 46 | nS |
| t_r | | | | 11.6 | 22 | |
| $t_{d(off)}$ | Turn-Off Time | | | 78.8 | 150 | |
| t_f | | | | 33.8 | 63 | |

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

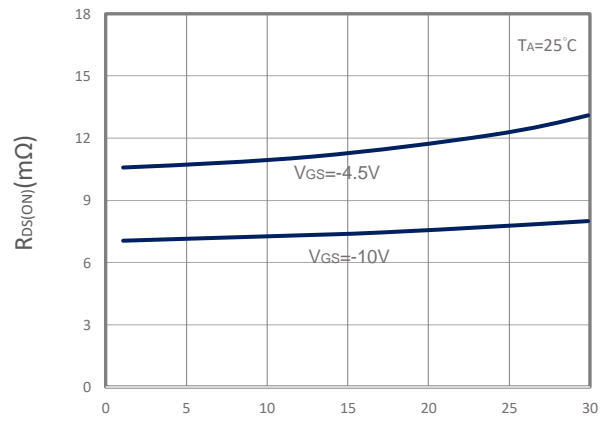
- Pulsed width limited by maximum junction temperature, $T_{J(MAX)}=150^\circ\text{C}$.
- Measure the value in a still air environment at $T_A=25^\circ\text{C}$, using an installation mounted on a 1 in2 FR-4 board, maximum junction temperature $T_{J(MAX)}=150^\circ\text{C}$.
- Using junction-to-case thermal resistance, dissipation limit in the case of additional heat.
- $T_{J(MAX)}=150^\circ\text{C}$, using junction-to-case thermal resistance ($R_{\theta JC}$) is more useful in additional heat sinking is used.
- The pulse test width is $\leq 300\mu s$ and the duty cycle $\leq 2\%$.
- The EAS data shows Maximum, tested and pulse width limited by maximum.

The products and product specifications contained herein are subject to change without notice to improve performance characteristics. Consult us, or our representatives before use, to confirm that the information in this datasheet is up to date. We assume no responsibility for any infringement of patents, patent rights, or other rights arising from the use of any information and circuitry in this datasheet.

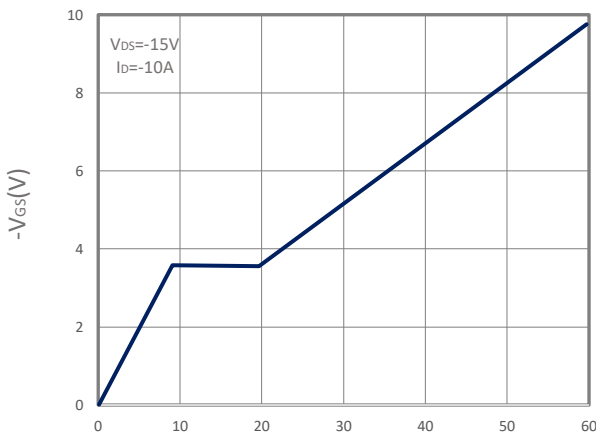
TYPICAL CHARACTERISTICS



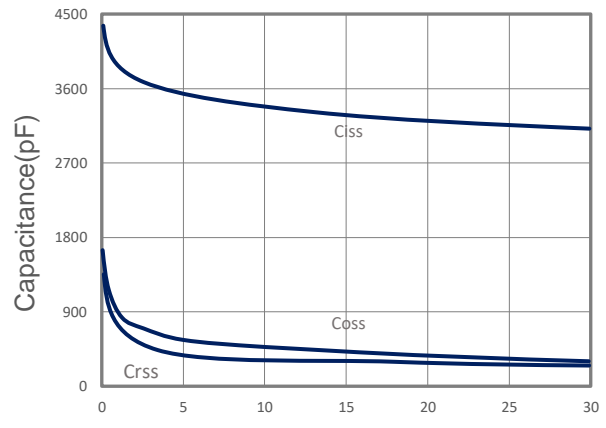
Output Characteristics



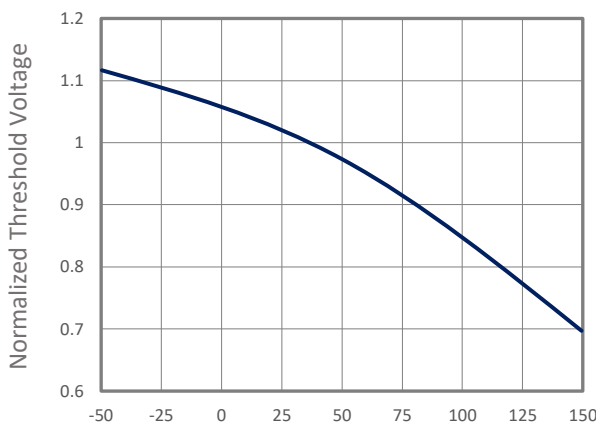
Drain-Source On Resistance



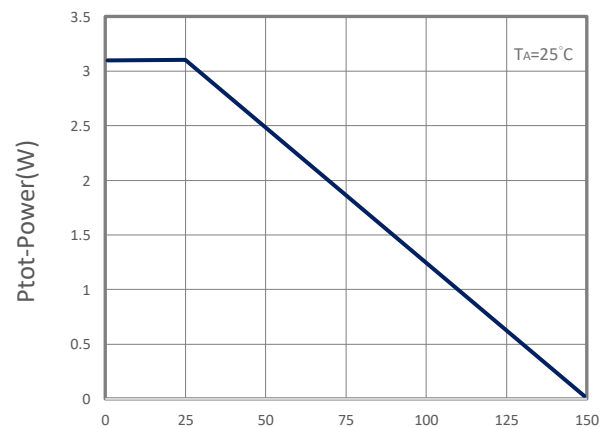
Gate Charge



Capacitance

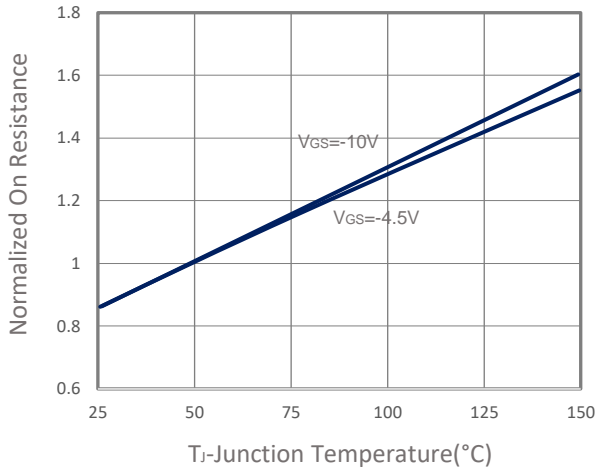


Gate Threshold Voltage

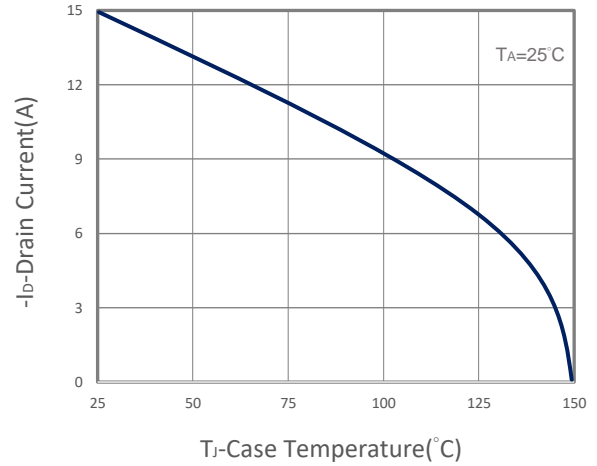


Power Dissipation

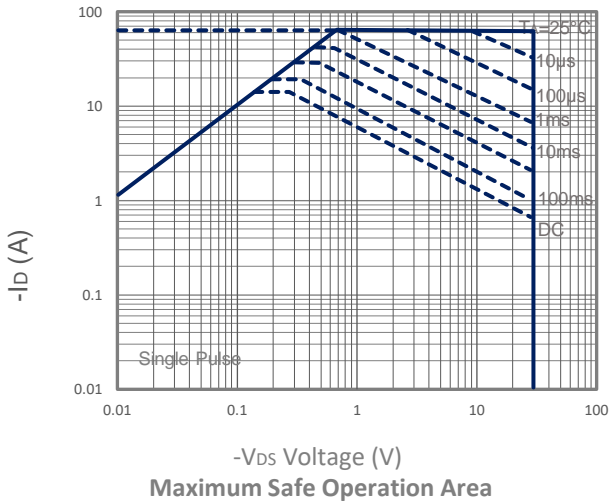
TYPICAL CHARACTERISTICS



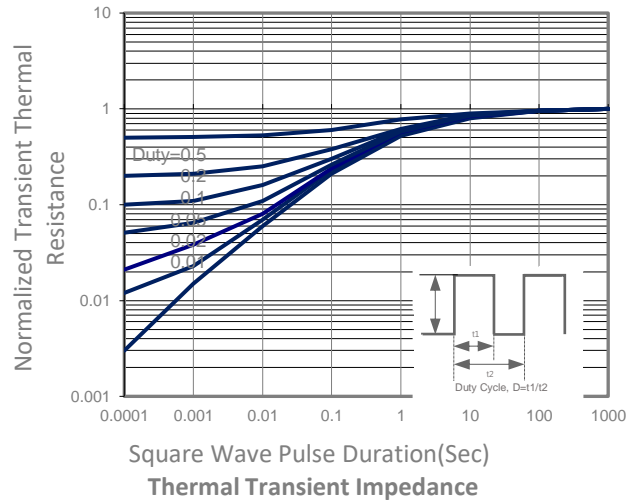
$R_{DS(ON)}$ vs Junction Temperature



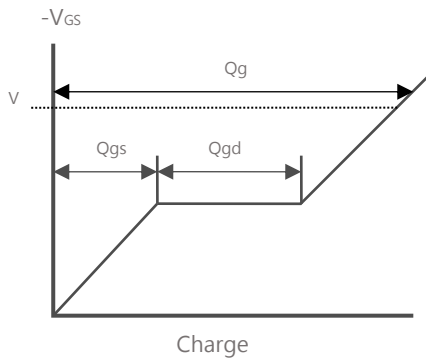
Drain Current vs T_j



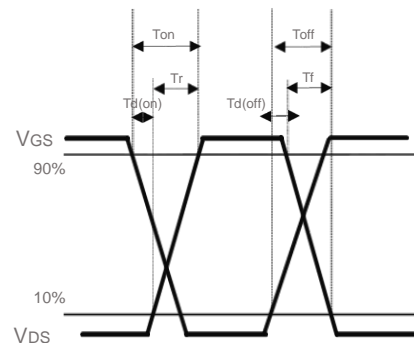
Maximum Safe Operation Area



Thermal Transient Impedance

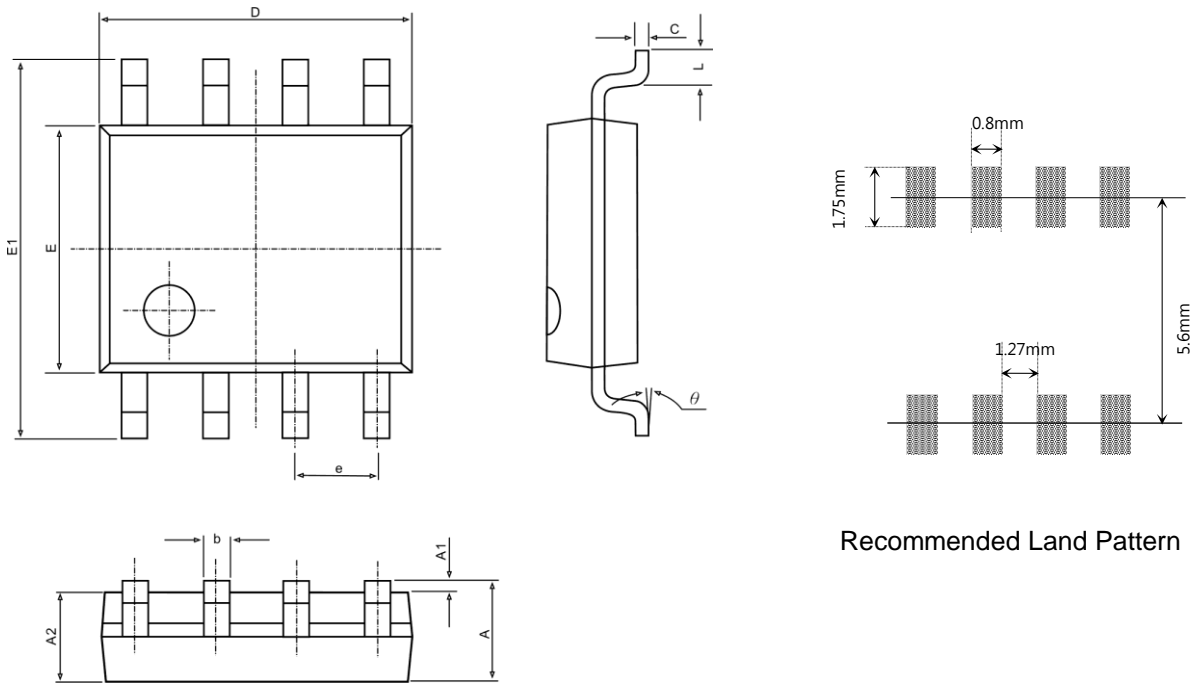


Gate Charge Waveform



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° |