SemTron Microtech Corporation

SMC4407M

Single P-Channel MOSFET

■DESCRIPTION

SMC4407 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. This device is suitable for use as a load switch or PWM applications.

■PART NUMBER INFORMATION

SMC 4407 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

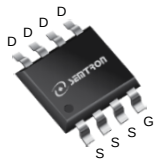
V_{DS} = -30V, I_D = -12A

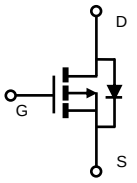
$R_{DS(ON)}$=11mΩ(Typ.)@V_{GS}=-10V
$R_{DS(ON)}$=15mΩ(Typ.)@V_{GS}=-4.5V

◆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°C Unless otherwise noted)

Symbol	Parameter		Rating	Units
V_{DSS}	Drain-Source Voltage		-30	V
V_{GSS}	Gate-Source Voltage		±25	V
I_D	Continuous Drain Current	T_A=25°C	-12	A
		T_A=70°C	-9.6	A
I_{DM}	Pulsed Drain Current [A]		-48	A
I_{AS}	Avalanche Current [A]		-30	A
E_{AS}	Single Pulse Avalanche energy L=0.1mH [AF]		45	mJ
P_D	Power Dissipation [B]	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 [B]	t≦10s		40	°C/W
	Thermal Resistance Junction to Ambient [BD]	Steady-State		70	
$R_{\theta JC}$	Thermal Resistance Junction to Case			27	

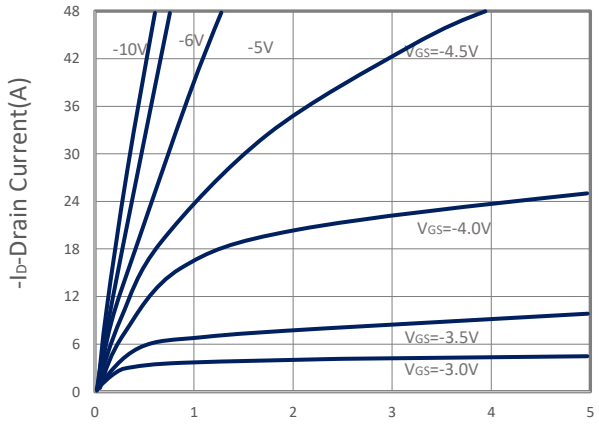
■ELECTRICAL CHARACTERISTICS(T_A = 25°C Unless otherwise noted)

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	-1.6	-2.5	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±25V			±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 [E]	V_{GS}=-10V, I_D=-12A V_{GS}=-4.5V, I_D=-8A		11 15	14 19	mΩ
G_{fs}	Forward Transconductance	V_{DS}=-10V, I_D=-10A		12.5		S
Diode Characteristics						
V_{SD}	Diode Forward Voltage [E]	I_S=-1A,V_{GS}=0V		-0.7	-1	V
I_S	Continuous Source Current				-6	A
t_{rr}	Reverse Recovery Time	I_S=-10A, dI/dt=100A/μs		13.8		ns
Q_{rr}	Reverse Recovery Charge			12.3		nC
Dynamic and Switching Parameters						
Q_g	Total Gate Charge (10V)	V_{DS}=-15V, V_{GS}=-10V I_D=-10A		36	48.6	nC
Q_g	Total Gate Charge (4.5V)			18	24.3	
Q_{gs}	Gate-Source Charge			8.1	10.9	
Q_{gd}	Gate-Drain Charge			11.5	15.5	
C_{iss}	Input Capacitance	V_{DS}=-15V, V_{GS}=0V, f=1MHz		2590		pF
C_{oss}	Output Capacitance			283		
C_{rss}	Reverse Transfer Capacitance			172		
R_g	Gate Resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz		8.8		Ω
$t_{d(on)}$	Turn-On Time	V_{DD}=-15V, V_{GEN}=-10V, R_G=3Ω, I_D=-1A		19.1	36	nS
t_r				4.8	9	
$t_{d(off)}$	Turn-Off Time			58	110	
t_f				11.5	22	

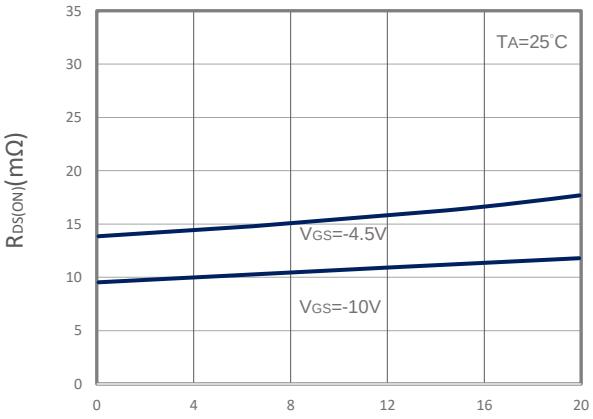
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

A. Pulsed width limited by maximum junction temperature, $T_{J(MAX)}$=150°C.
B. Measure the value in a still air environment at T_A=25°C, using an installation mounted on a 1 in2 FR-4 board, maximum junction temperature $T_{J(MAX)}$=150°C.
C. Using junction-to-case thermal resistance, dissipation limit in the case of additional heat.
D. $T_{J(MAX)}$=150°C,using junction-to-case thermal resistance ($R_{θJC}$) is more useful in additional heat sinking is used.
E. The pulse test width is ≤300μs and the duty cycle ≦ 2%.
F. The EAS data shows Maximum, tested and pulse width limited by maximum.

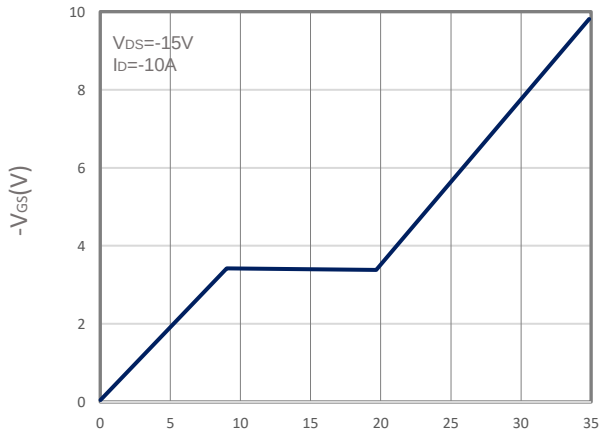
TYPICAL CHARACTERISTICS



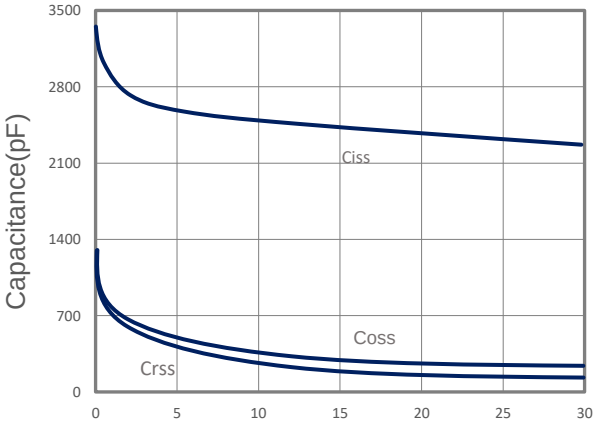
Output Characteristics



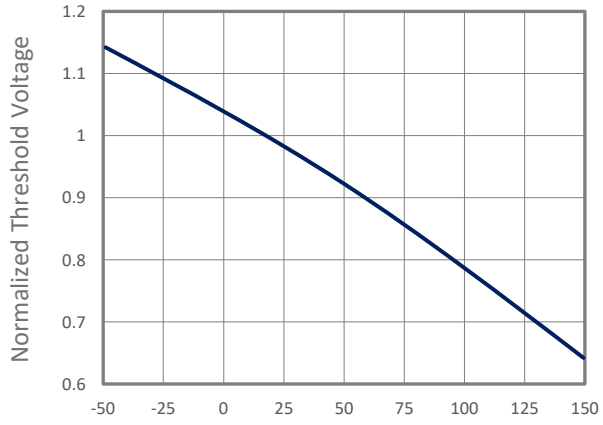
Drain-Source On Resistance



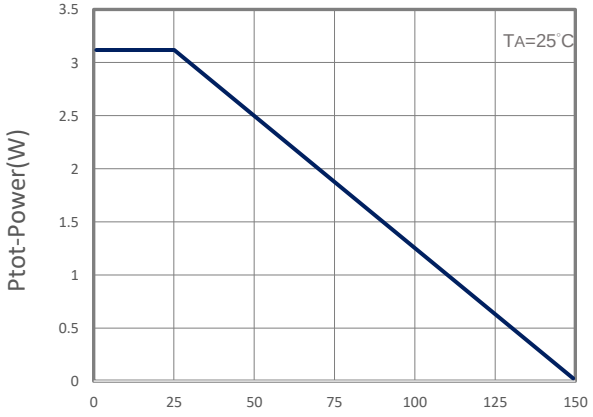
Gate Charge



Capacitance

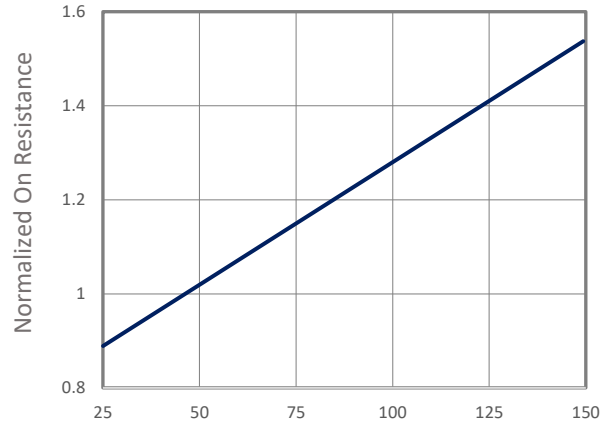


Gate Threshold Voltage

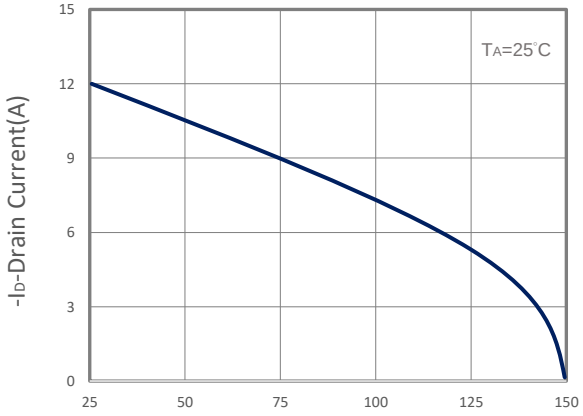


Power Dissipation

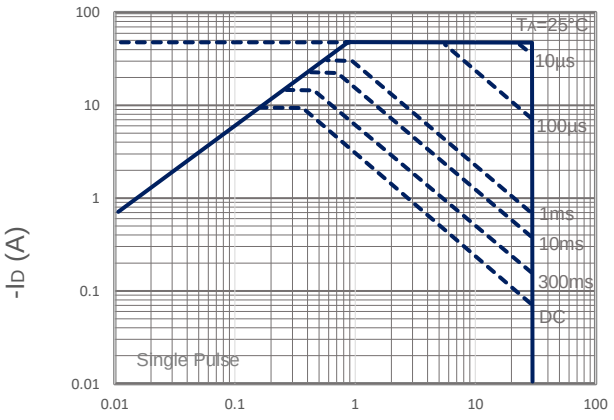
TYPICAL CHARACTERISTICS



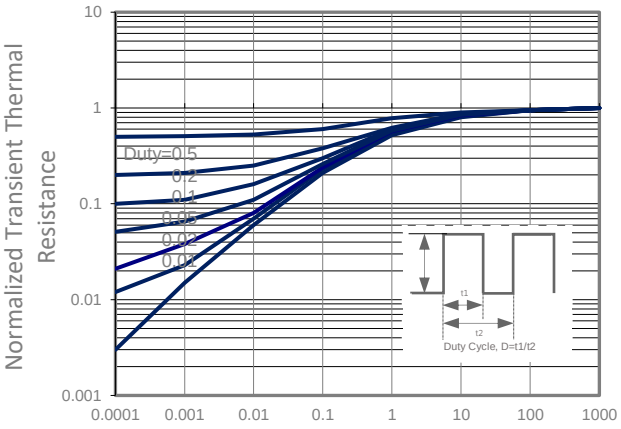
RDS(ON) vs Junction Temperature



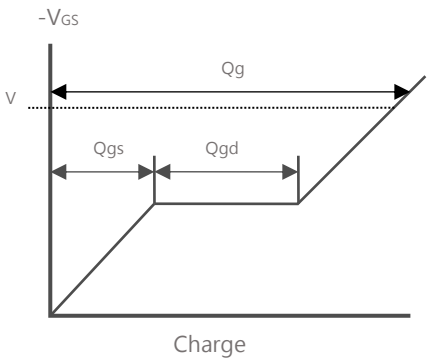
Drain Current vs TJ



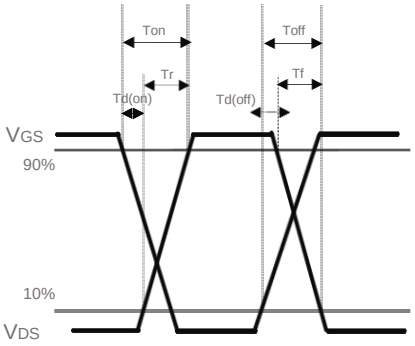
Maximum Safe Operation Area



Thermal Transient Impedance

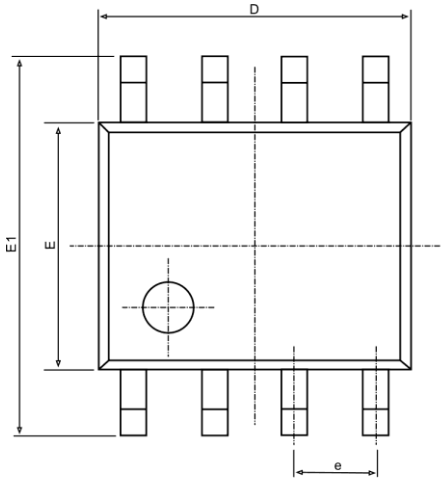


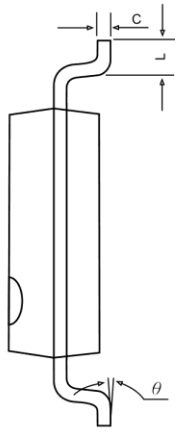
Gate Chrge Waveform

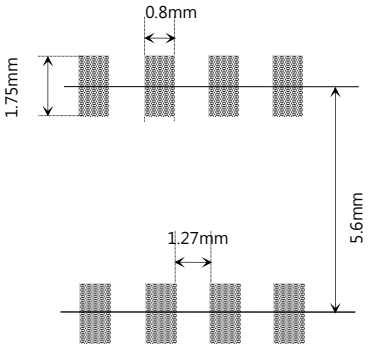


Switching Time Waveform

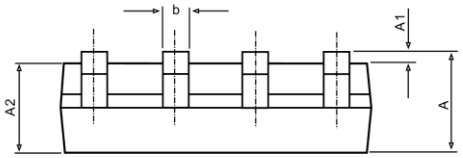
■SOP-8 PACKAGE DIMENSIONS







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°