

Single P-Channel MOSFET

DESCRIPTION

SMC4237M 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 4237 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

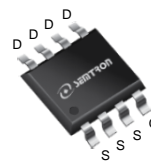
$V_{DS} = -20V$, $I_D = -11.5A$

- $R_{DS(ON)} = 12m\Omega(Typ.) @ V_{GS} = -10V$
- $R_{DS(ON)} = 14m\Omega(Typ.) @ V_{GS} = -4.5V$
- $R_{DS(ON)} = 18m\Omega(Typ.) @ V_{GS} = -2.5V$
- $R_{DS(ON)} = 23m\Omega(Typ.) @ V_{GS} = -1.8V$

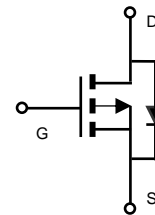
- ◆ Fast switch
- ◆ Low gate charge
- ◆ High power and current handling capability

APPLICATIONS

- ◆ LED Application
- ◆ Portable Equipment
- ◆ DC-DC Power Management



SOP-8



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ Unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Continuous Drain Current ($V_{GS} = -4.5V$)	$T_A = 25^\circ C$	-11.5
		$T_A = 70^\circ C$	-9.2
I_{DM}	Pulsed Drain Current ^A	-46	A
I_{AS}	Avalanche Current ^A	-25	A
E_{AS}	Single Pulse Avalanche energy $L = 0.1mH$ ^{AD}	31	mJ
P_D	Power Dissipation ^B	$T_A = 25^\circ C$	3.6
		$T_A = 70^\circ C$	2.3
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	$t \leq 10s$	35	$^\circ C/W$
	Thermal Resistance Junction to Ambient ^{BC}	Steady-State	70	

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

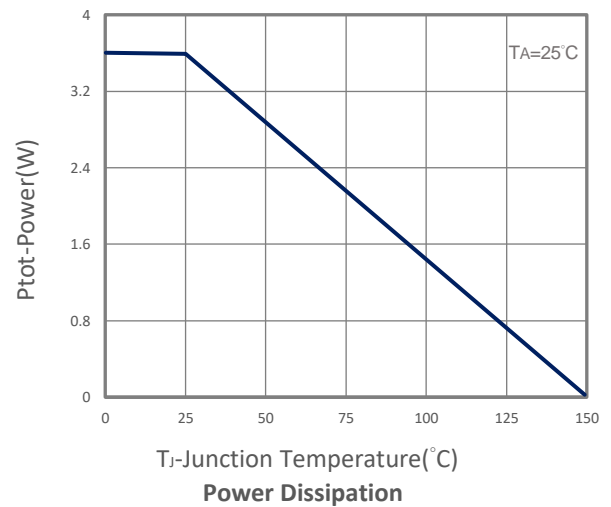
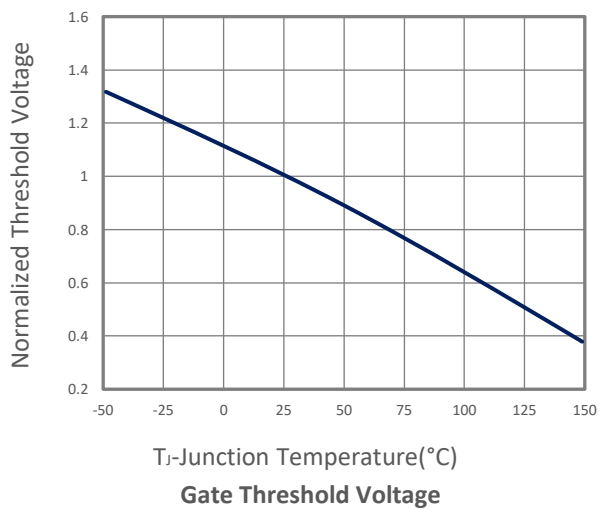
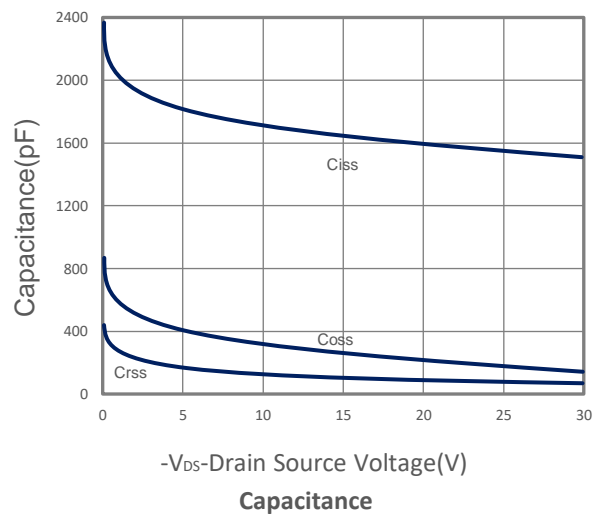
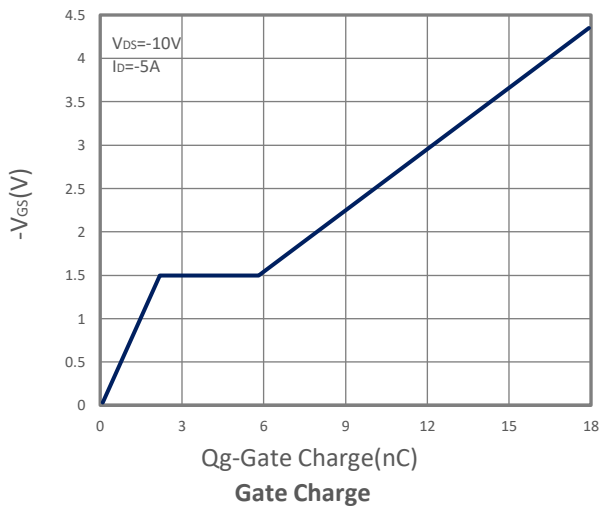
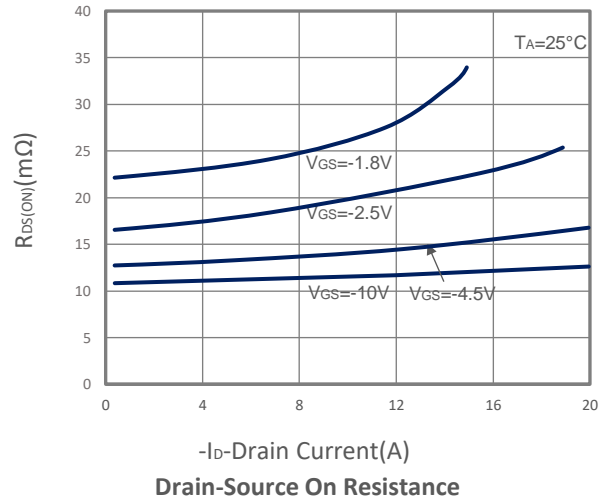
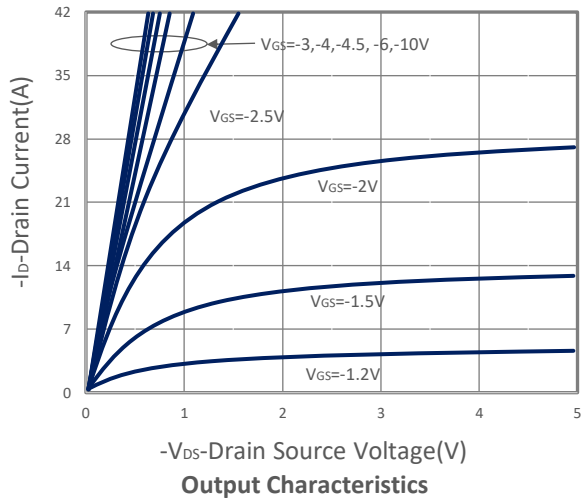
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250 μ A	-20			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250 μ A	-0.4	-0.6	-1	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} = \pm 12V			\pm 100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-20V, V _{GS} =0V, T _J =25 $^\circ$ C			-1	μ A
		V _{DS} =-16V, V _{GS} =0V, T _J =75 $^\circ$ C			-10	
R _{DS(ON)}	Drain-source On-Resistance	V _{GS} =-10V, I _D =-11.5A		12	15	m Ω
		V _{GS} =-4.5V, I _D =-8A		14	17	
		V _{GS} =-2.5V, I _D =-5A		18	22	
		V _{GS} =-1.8V, I _D =-3A		23	28	
G _{fs}	Forward Transconductance	V _{DS} =-10V, I _D =-10A		33		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V			-1	V
I _S	Diode Continuous Current				-5.2	A
t _{rr}	Reverse Recovery Time	I _S =-10A, dI/dt=100A/ μ s		16.8		ns
Q _{rr}	Reverse Recovery Charge			8		nC
Dynamic and Switching Parameters						
Q _g	Total Gate Charge	V _{DS} =-10V, V _{GS} =-4.5V, I _D =-5A		39	54	nC
Q _g	Total Gate Charge (4.5V)			19	26.6	
Q _{gs}	Gate-Source Charge			2.1	2.9	
Q _{gd}	Gate-Drain Charge			3.8	5.3	
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz		1680		pF
C _{oss}	Output Capacitance			228		
C _{rss}	Reverse Transfer Capacitance			115		
t _{d(on)}	Turn-On Time	V _{DD} =-10V, V _{GEN} =-4.5V R _G =10 Ω , I _D =-1A		10	19	nS
t _r				38	72	
t _{d(off)}	Turn-Off Time			86	163	
t _f				25	48	

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

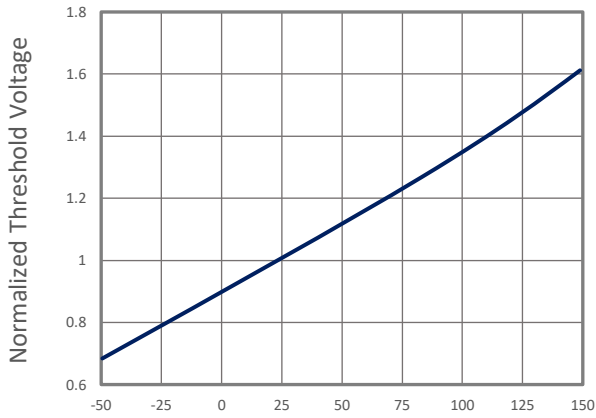
- Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150 $^\circ$ C.
- The value of R _{θ JA} is measured with the device mounted on 1in2 FR-4 board in a still air environment with maximum junction temperature T_{J(MAX)}=150 $^\circ$ C (initial temperature T_A=25 $^\circ$ C).
- T_{J(MAX)}=150 $^\circ$ C, using junction-to-case thermal resistance (R _{θ JC}) is more useful in additional heat sinking is used.
- The EAS data shows Max, tested and pulse width limited by T_{J(MAX)}=150 $^\circ$ C (initial temperature T_J=25 $^\circ$ C).

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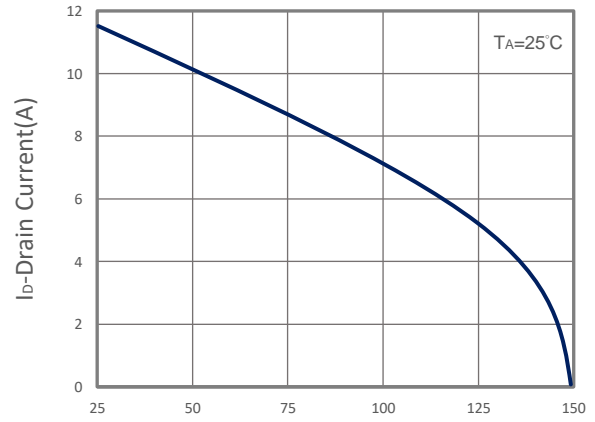
TYPICAL CHARACTERISTICS



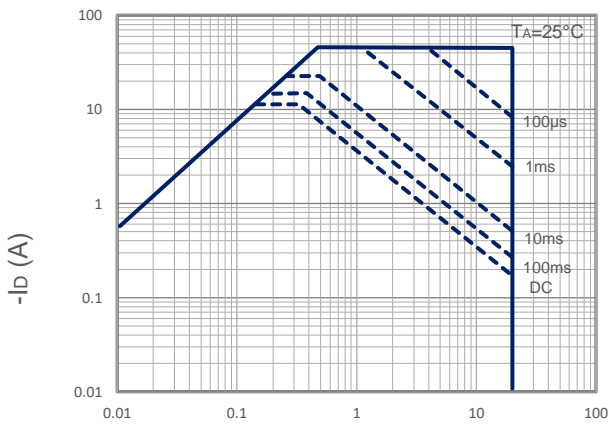
TYPICAL CHARACTERISTICS



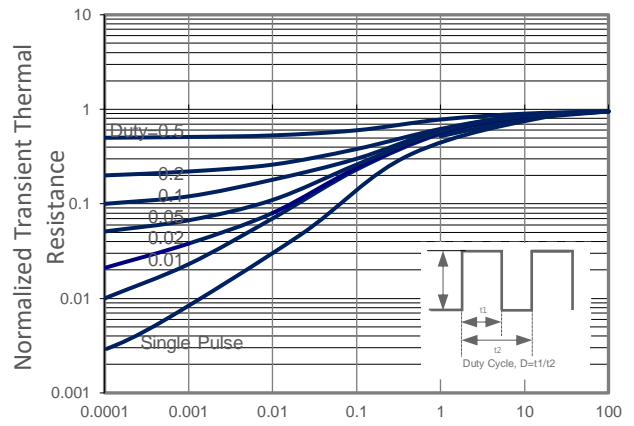
T_J-Junction Temperature(°C)
Gate Threshold Voltage



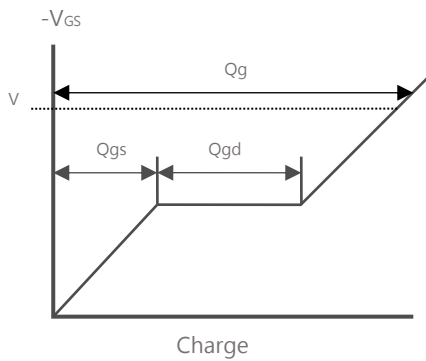
T_J-Junction Temperature(°C)
Drain Current vs T_J



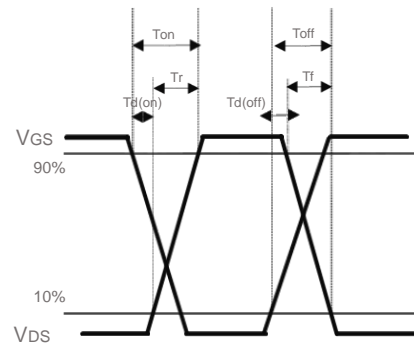
- V_{DS} Voltage (V)
Maximum Safe Operation Area



Square Wave Pulse Duration(Sec)
Thermal Transient Impedance

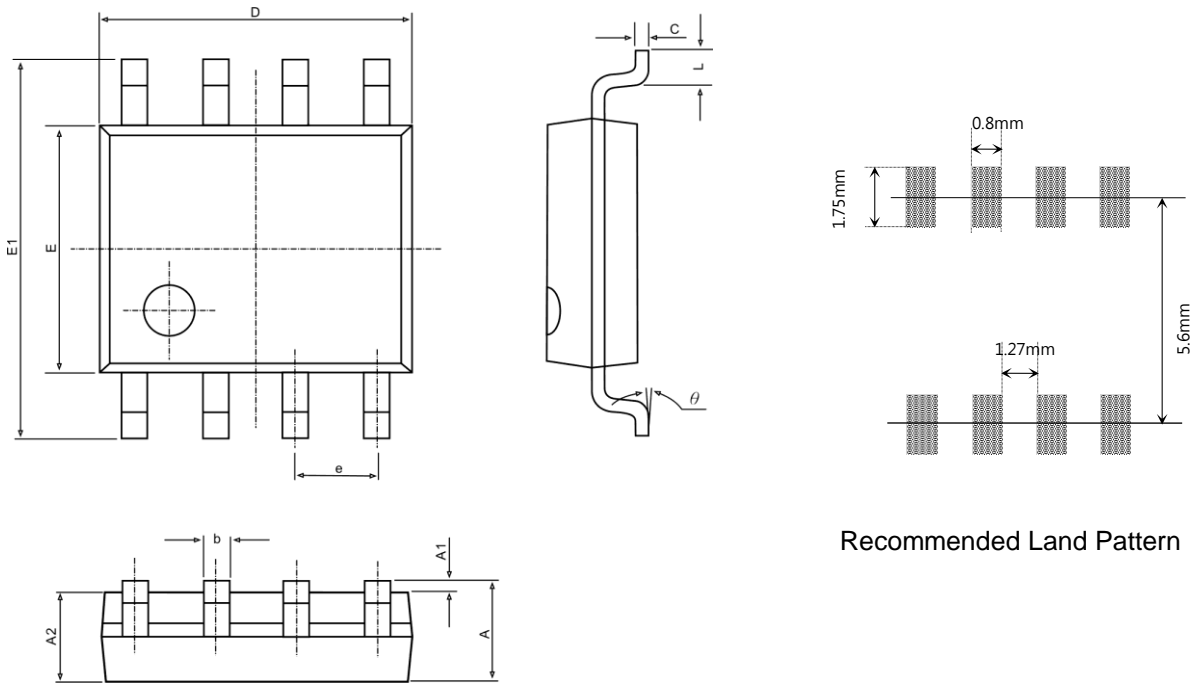


Gate Charge Waveform



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°