

## Single N-Channel MOSFET

### DESCRIPTION

SMC4420M is the N-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 4420 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

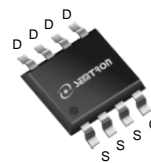
**$V_{DS}=30V, I_D=13A$**

$R_{DS(ON)}=9m\Omega(Typ.)@V_{GS}=10V$   
 $R_{DS(ON)}=11m\Omega(Typ.)@V_{GS}=4.5V$

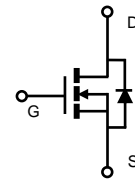
- ◆ 100% EAS Guaranteed
- ◆ Low Gate Charge
- ◆ Fast Switching
- ◆ Improved dv/dt Capability

### APPLICATIONS

- ◆ Power Management
- ◆ DC/DC Power System
- ◆ Load Switch



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	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_A=25^{\circ}C$	13
		$T_A=70^{\circ}C$	10.4
$I_{DM}$	Pulsed Drain Current <sup>B</sup>	52	A
$I_{AS}$	Avalanche Current <sup>B</sup>	20	A
EAS	Single Pulse Avalanche energy $L=0.1mH$ <sup>B</sup>	20	mJ
$P_D$	Power Dissipation <sup>A</sup>	$T_A=25^{\circ}C$	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 <sup>A</sup>		40	$^{\circ}C/W$
	Thermal Resistance Junction to Ambient <sup>AC</sup>	$t \leq 10s$	75	
$R_{\theta JC}$	Thermal Resistance Junction to Case	Steady-State	25	

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C Unless otherwise noted )

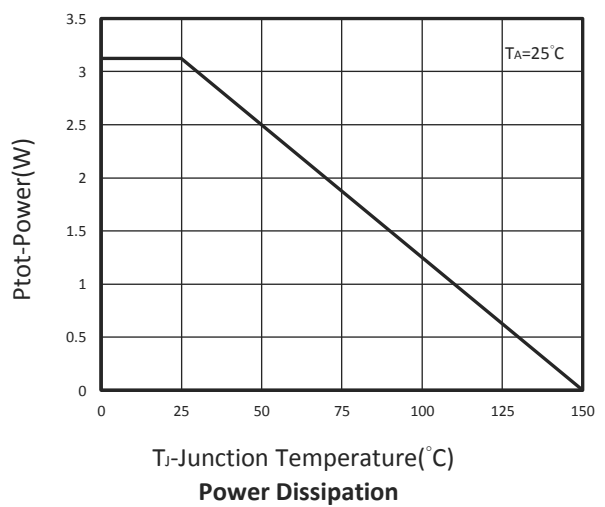
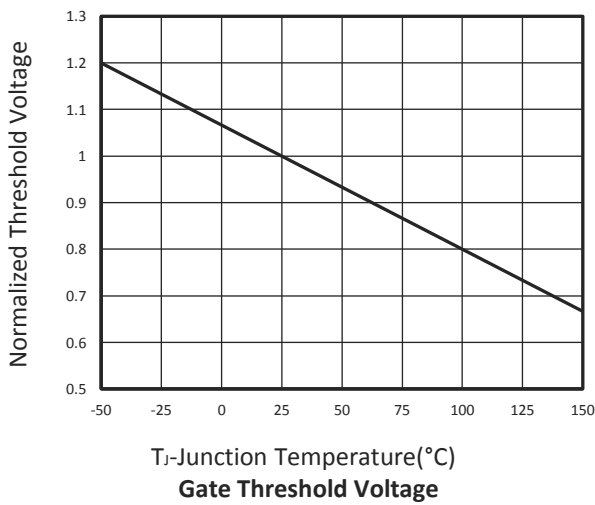
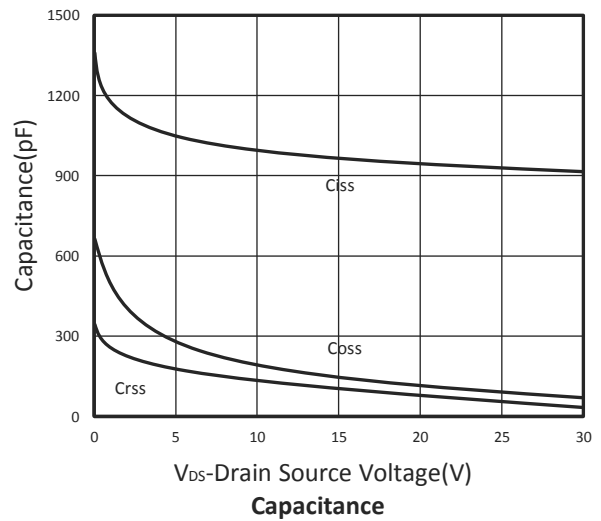
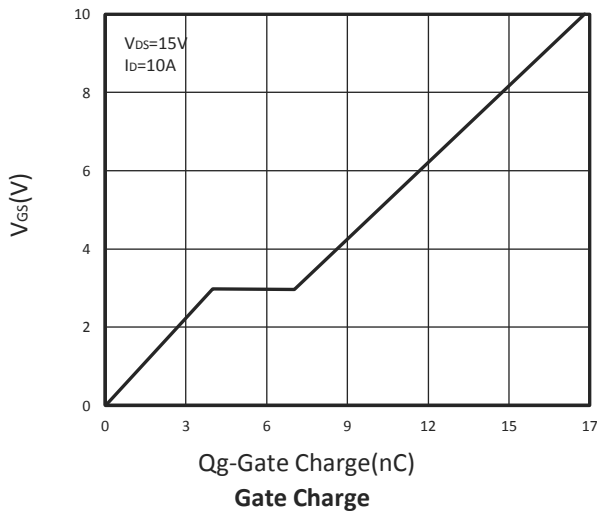
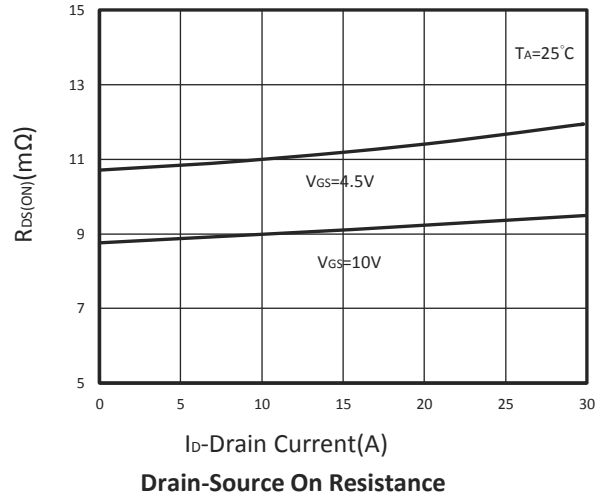
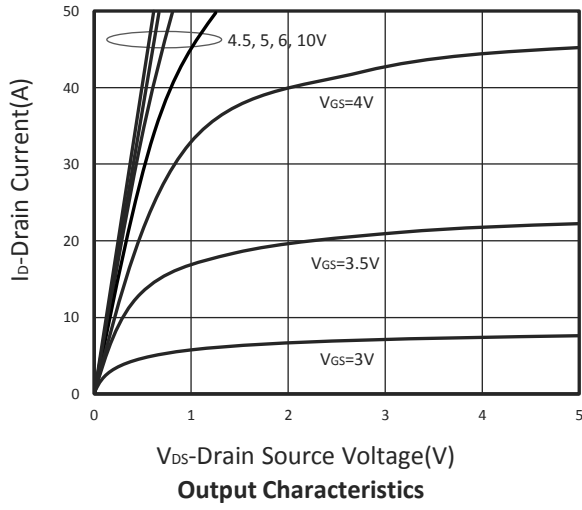
Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30			V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.6	2.5	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			1	μA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =75°C			10	
R <sub>DS(ON)</sub>	Drain-source On-Resistance <sup>D</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =13A		9	11	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		11	14	
G <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =10A		14		S
<b>Diode Characteristics</b>						
V <sub>SD</sub>	Diode Forward Voltage <sup>D</sup>	I <sub>S</sub> =1A, V <sub>GS</sub> =0V			1	V
I <sub>S</sub>	Diode Continuous Forward Current				13	A
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =10A, di/dt=100A/μs		9		ns
Q <sub>rr</sub>	Reverse Recovery Charge			3.2		nC
<b>Dynamic and Switching Parameters <sup>E</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A		16.9		nC
Q <sub>g</sub>	Total Gate Charge (4.5V)			7.9		
Q <sub>gs</sub>	Gate-Source Charge			3.7		
Q <sub>gd</sub>	Gate-Drain Charge			3.2		
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz		955		pF
C <sub>oss</sub>	Output Capacitance			138		
C <sub>rss</sub>	Reverse Transfer Capacitance			110		
R <sub>g</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz		2.5		Ω
t <sub>d(on)</sub>	Turn-On Time	V <sub>DD</sub> =15V, V <sub>GEN</sub> =10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =1A		5	8.7	nS
t <sub>r</sub>				9.6	18	
t <sub>d(off)</sub>	Turn-Off Time			28	53	
t <sub>f</sub>				8	15	

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

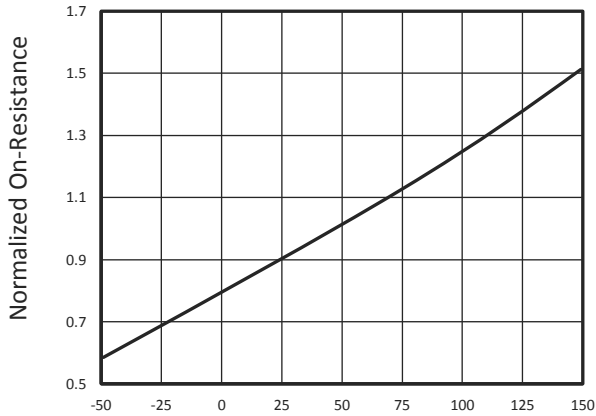
- A. Surface mounted on FR4 board using 1 in<sup>2</sup> pad size.
- B. Pulsed width limited by maximum junction temperature, T<sub>J(MAX)</sub>=150°C (initial temperature T<sub>J</sub>=25°C).
- C. Using ≤ 10s junction-to-ambient thermal resistance is base on T<sub>J(MAX)</sub>=150°C.
- D. Pulse test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

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.

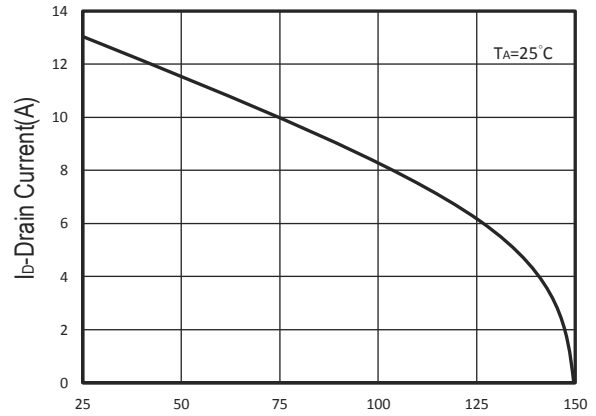
**TYPICAL CHARACTERISTICS**



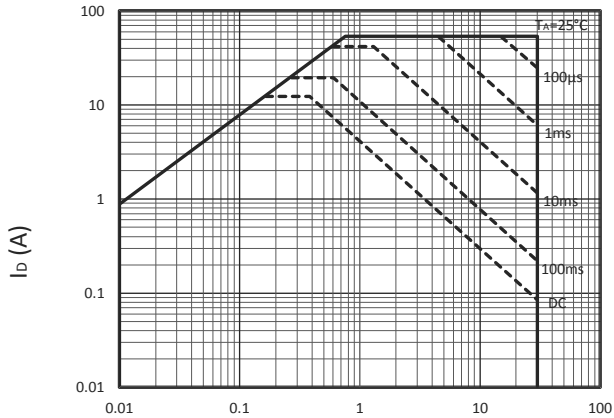
## TYPICAL CHARACTERISTICS



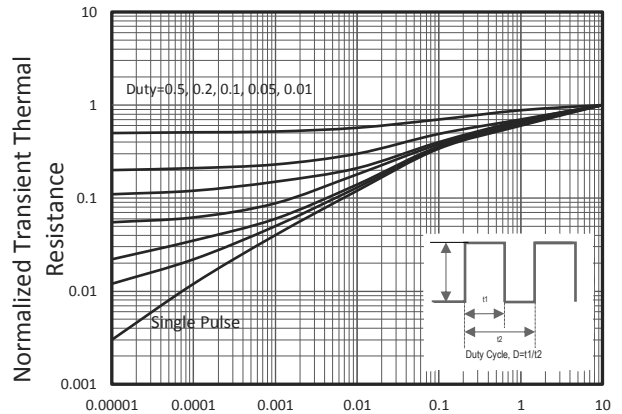
T<sub>J</sub>-Junction Temperature(°C)  
Drain-Source On Resistance



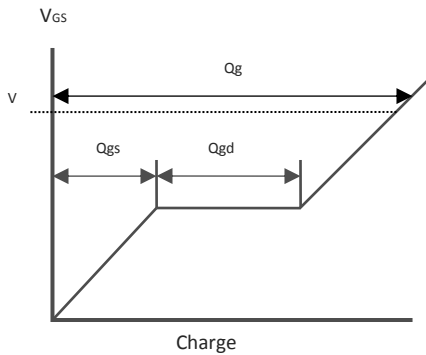
T<sub>J</sub>-Junction Temperature(°C)  
Drain Current vs T<sub>J</sub>



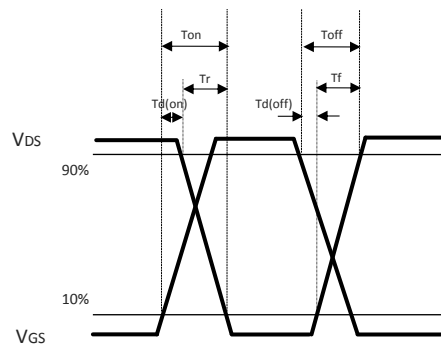
V<sub>DS</sub> Voltage (V)  
Maximum Safe Operation Area



Square Wave Pulse Duration (Sec)  
Thermal Transient Impedance

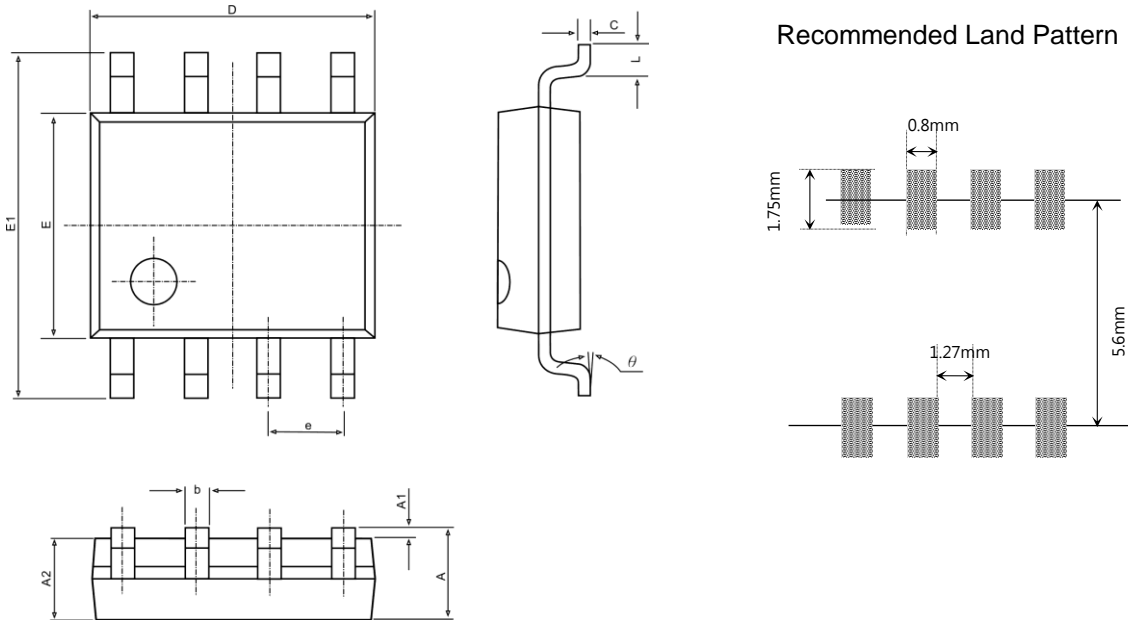


Gate Charge Waveform



Switching Time Waveform

## ■ SOP-8 PACKAGE DIMENSIONS



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	0.004	0.010
A2	1.300	1.500	0.051	0.059
b	0.390	0.490	0.015	0.019
c	0.200	0.250	0.008	0.010
D	4.800	5.100	0.189	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 BSC		0.050 BSC	
L	0.500	0.800	0.020	0.031
θ	0°	8°	0°	8°