

## Single N-Channel MOSFET

### DESCRIPTION

SMC4428 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 4428 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

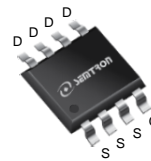
**$V_{DS} = 30V, I_D = 16A$**

$R_{DS(ON)} = 5.5m\Omega (Typ.) @ V_{GS} = 10V$   
 $R_{DS(ON)} = 7.0m\Omega (Typ.) @ V_{GS} = 4.5V$

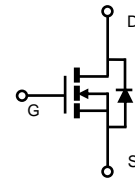
- ◆ Fast switch
- ◆ Improved dv/dt capability
- ◆ High power and current handling capability

### APPLICATIONS

- ◆ Power Management
- ◆ Portable Equipment



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	$T_A = 25^\circ C$	16
		$T_A = 70^\circ C$	13
$I_{DM}$	Pulsed Drain Current <sup>A</sup>	64	A
$I_{AS}$	Avalanche Current <sup>A</sup>	30	A
$E_{AS}$	Single Pulse Avalanche energy $L=0.1mH$ <sup>AF</sup>	45	mJ
$P_D$	Power Dissipation <sup>B</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>B</sup>	$t \leq 10s$	40	$^\circ C/W$
			75	
$R_{\theta JC}$	Thermal Resistance Junction to Case		21	

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

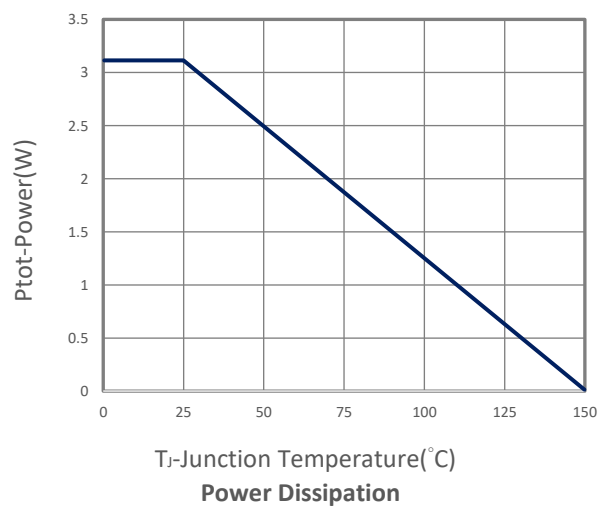
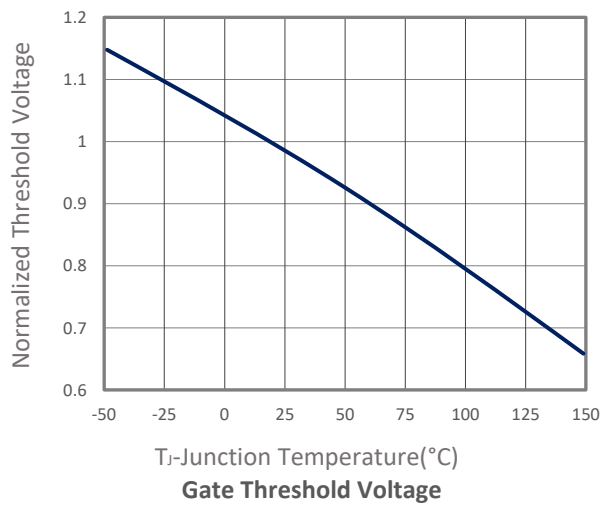
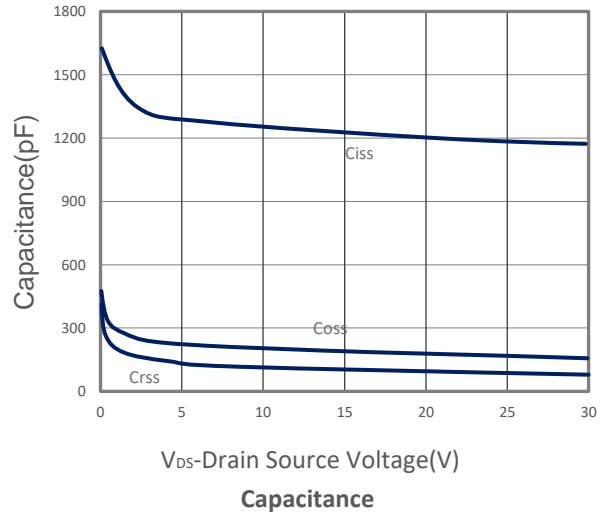
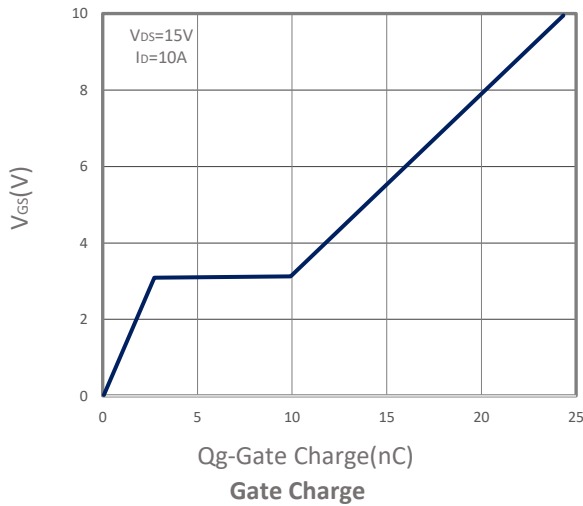
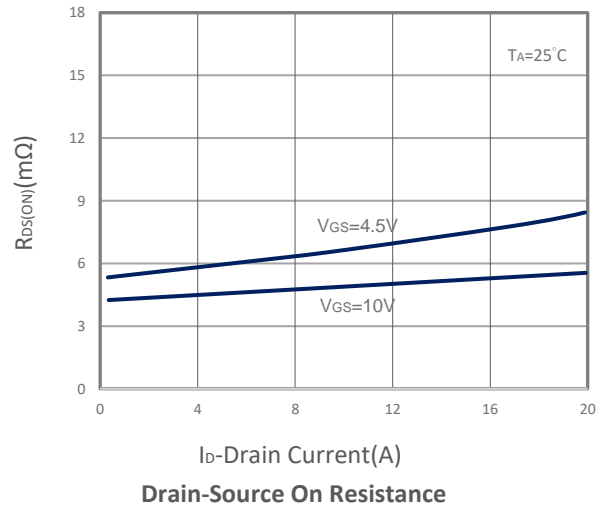
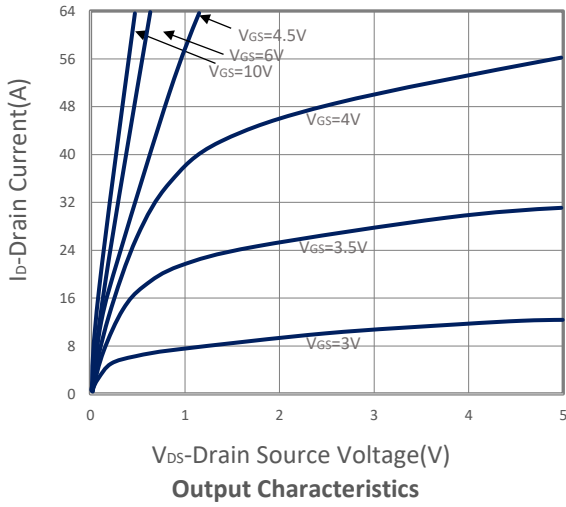
Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250 $\mu$ A	30			V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 $\mu$ A	1.0	1.7	2.5	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = $\pm$ 20V			$\pm$ 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 $^\circ$ C			1	$\mu$ A
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =75 $^\circ$ C			10	
R <sub>DS(ON)</sub>	Drain-source On-Resistance <sup>E</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =16A V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		5.5 7	7 10	m $\Omega$
G <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =10A		28		S
<b>Diode Characteristics</b>						
V <sub>SD</sub>	Diode Forward Voltage <sup>E</sup>	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.7	1.0	V
I <sub>S</sub>	Continuous Source Current				8	A
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =10A, dI/dt=100A/ $\mu$ s		22		ns
Q <sub>rr</sub>	Reverse Recovery Charge			14		nC
<b>Dynamic and Switching Parameters</b>						
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A		24.7	33.4	nC
Q <sub>g</sub>	Total Gate Charge (4.5V)			12	16.8	
Q <sub>gs</sub>	Gate-Source Charge			2.5	3.5	
Q <sub>gd</sub>	Gate-Drain Charge			7.4	10.4	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz		1200		pF
C <sub>oss</sub>	Output Capacitance			220		
C <sub>rss</sub>	Reverse Transfer Capacitance			198		
R <sub>g</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz		2	3	$\Omega$
t <sub>d(on)</sub>	Turn-On Time	V <sub>DD</sub> =15V, V <sub>GEN</sub> =10V, R <sub>G</sub> =3 $\Omega$ , I <sub>D</sub> =1A		8.5	16	nS
t <sub>r</sub>				16.2	31	
t <sub>d(off)</sub>	Turn-Off Time			30	57	
t <sub>f</sub>				10.2	19	

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

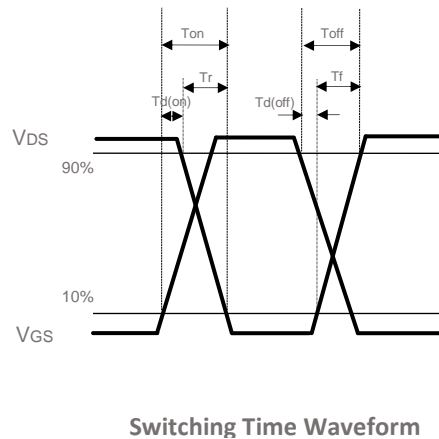
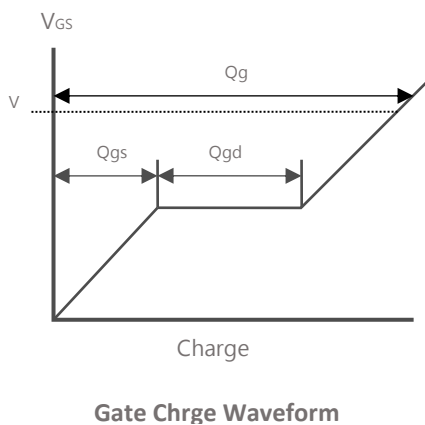
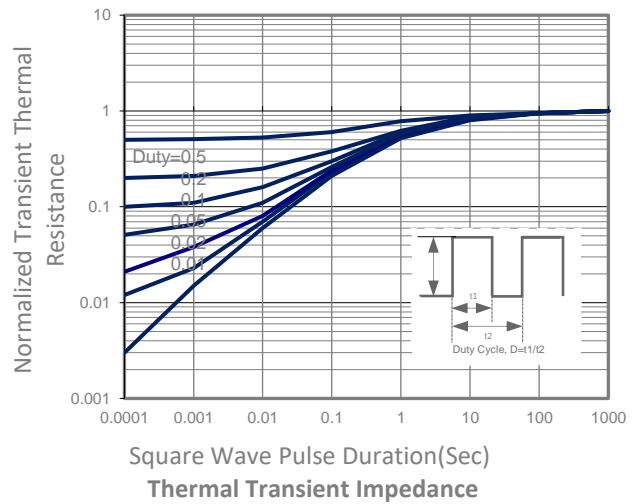
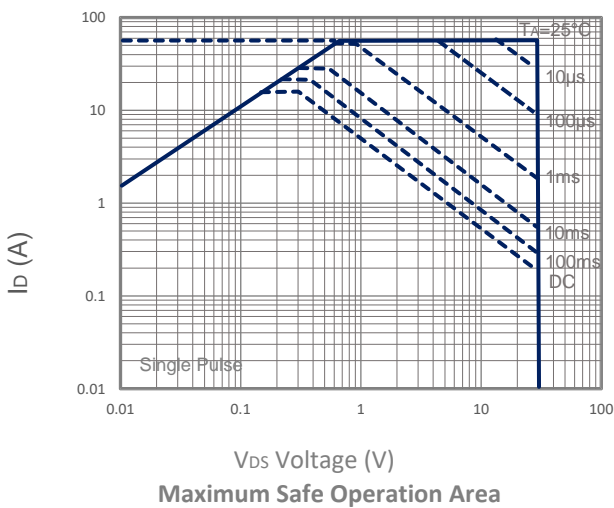
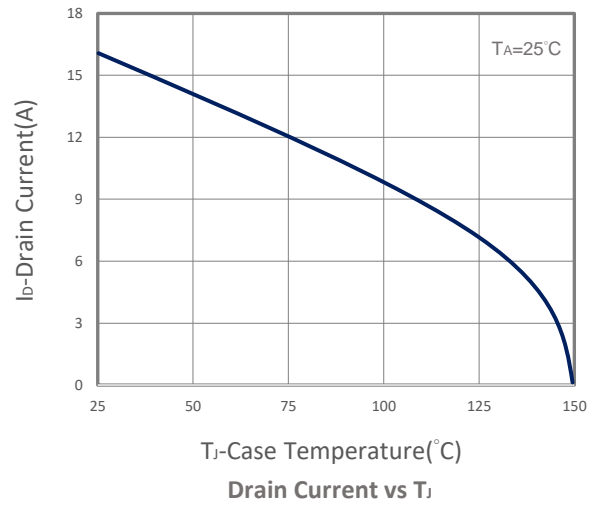
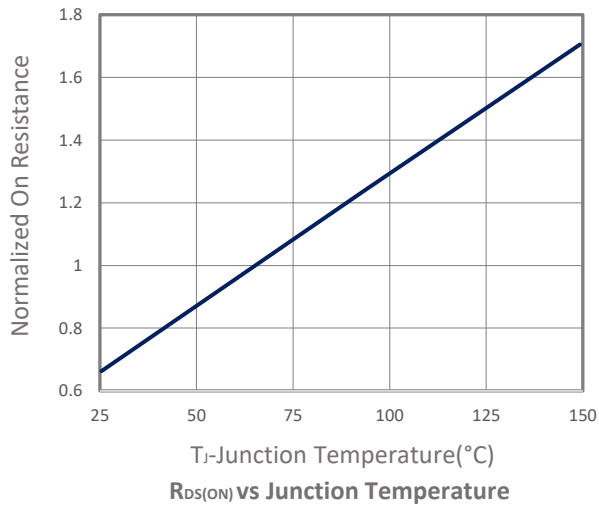
- Pulsed width limited by maximum junction temperature, T<sub>J(MAX)</sub>=150 $^\circ$ C.
- Measure the value in a still air environment at T<sub>A</sub>=25 $^\circ$ C, using an installation mounted on a 1 in2 FR-4 board, maximum junction temperature T<sub>J(MAX)</sub>=150 $^\circ$ C.
- Using junction-to-case thermal resistance, dissipation limit in the case of additional heat.
- T<sub>J(MAX)</sub>=150 $^\circ$ C, using junction-to-case thermal resistance (R<sub>θJC</sub>) 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.

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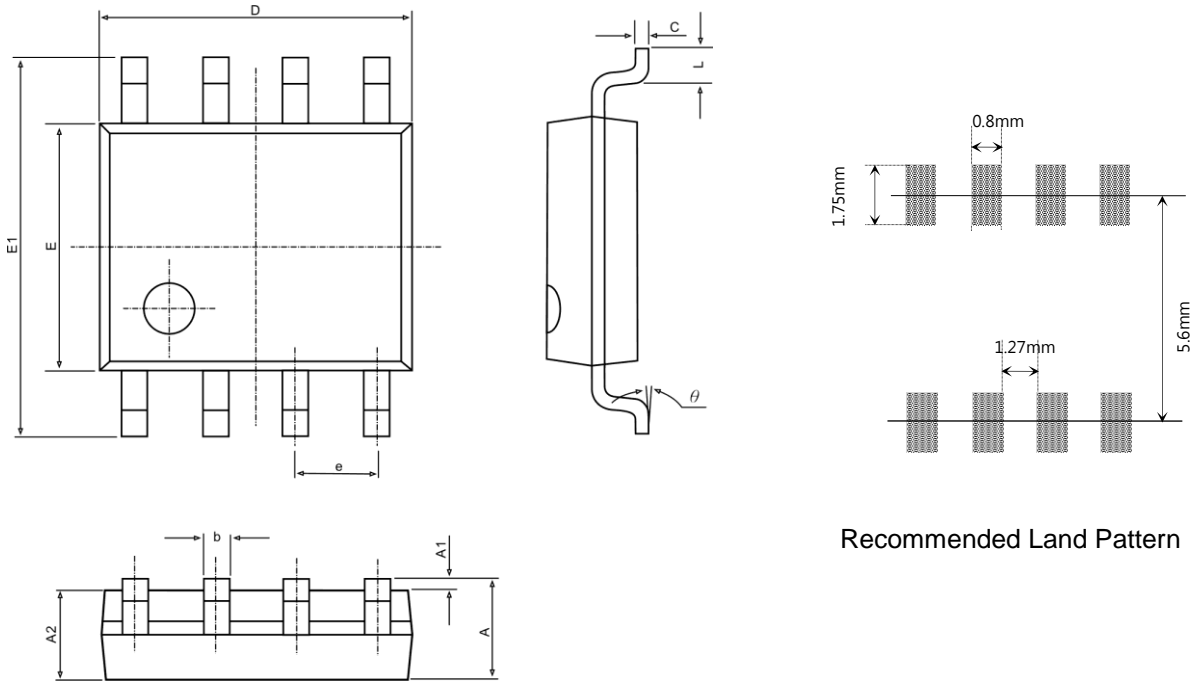
## TYPICAL CHARACTERISTICS



## TYPICAL CHARACTERISTICS



## ■ 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°