

## Single N-Channel MOSFET

### DESCRIPTION

SMC3400SN is the N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced trench technology devices are well suited for high efficiency fast switching applications, low in-line power loss are needed in small outline surface mount package.

### PART NUMBER INFORMATION

**SMC 3400 SN - TR G**  
 a      b      c      d      e

- a : Company name.
- b : Product Serial number.
- c : Package code      SN: SOT-23
- d : Handling code      TR: Tape&Reel
- e : Green produce code    G: *RoHS Compliant*

### FEATURES

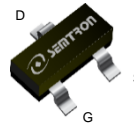
**$V_{DS}=30V, I_D=5.8A$**

$R_{DS(ON)}=20m\Omega(Typ.)@V_{GS}=10V$   
 $R_{DS(ON)}=23m\Omega(Typ.)@V_{GS}=4.5V$   
 $R_{DS(ON)}=27m\Omega(Typ.)@V_{GS}=2.5V$

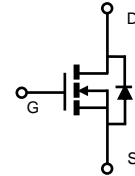
- ◆ Fast switch
- ◆ Low gate drive applications
- ◆ High power and current handling capability

### APPLICATIONS

- ◆ Hand-Held Instruments
- ◆ Load Switch
- ◆ PWM Applications



SOT-23



### 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	$\pm 12$	V
$I_D$	Continuous Drain Current <sup>A</sup>	$T_A=25^\circ C$	5.8
		$T_A=70^\circ C$	4.7
$I_{DM}$	Pulsed Drain Current <sup>B</sup>	23	A
$I_{AS}$	Avalanche Current <sup>B</sup>	15	A
$E_{AS}$	Single Pulse Avalanche energy $L=0.1mH$ <sup>B</sup>	11	mJ
$P_D$	Power Dissipation <sup>A</sup>	$T_A=25^\circ C$	1.3
		$T_A=70^\circ C$	0.8
$T_J$	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>	$t \leq 10s$	95	$^\circ C/W$
	Thermal Resistance Junction to Ambient <sup>AC</sup>	Steady-State	130	

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

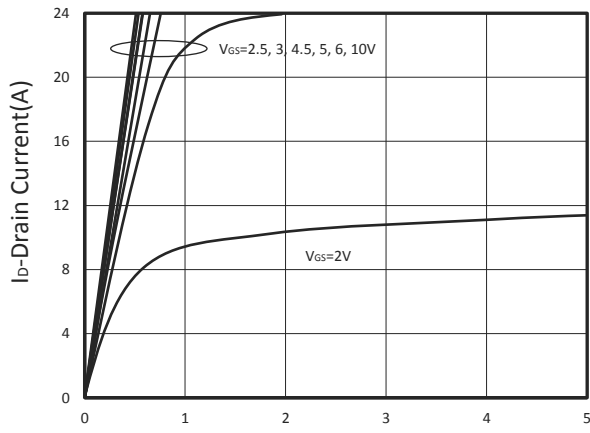
Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250 $\mu$ A	30			V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 $\mu$ A	0.5	0.7	1	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = $\pm$ 12V			$\pm$ 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>D</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =5.8A		20	24	m $\Omega$
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A		23	26	
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.2A		27	32	
G <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =5A		11		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			1.0	V
I <sub>S</sub>	Diode Continuous Forward Current				3	A
<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> =5A		15.4	21.5	nC
Q <sub>g</sub>	Total Gate Charge (4.5V)			7.5	10.5	
Q <sub>gs</sub>	Gate-Source Charge			1.3	1.8	
Q <sub>gd</sub>	Gate-Drain Charge			1.8	2.5	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz		645		pF
C <sub>oss</sub>	Output Capacitance			63		
C <sub>rss</sub>	Reverse Transfer Capacitance			52		
t <sub>d(on)</sub>	Turn-On Time	V <sub>DD</sub> =15V, V <sub>GEN</sub> =10V R <sub>G</sub> =3.3 $\Omega$ , I <sub>D</sub> =1A		4.7	9	nS
t <sub>r</sub>				12.5	24	
t <sub>d(off)</sub>	Turn-Off Time			28.5	54	
t <sub>f</sub>				4.2	8	

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

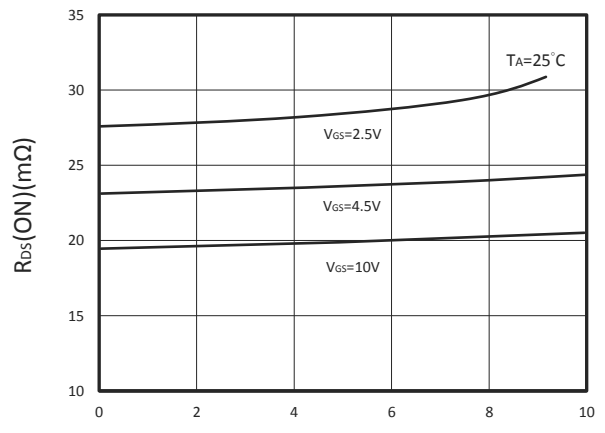
- A. Surface mounted on FR4 board using 1 in<sup>2</sup> pad size.
- B. Pulsed width limited by maximum junction temperature, T<sub>J(MAX)</sub>=150 $^\circ$ C (initial temperature T<sub>J</sub>=25 $^\circ$ C).
- C. Using  $\leq$  10s junction-to-ambient thermal resistance is base on T<sub>J(MAX)</sub>=150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

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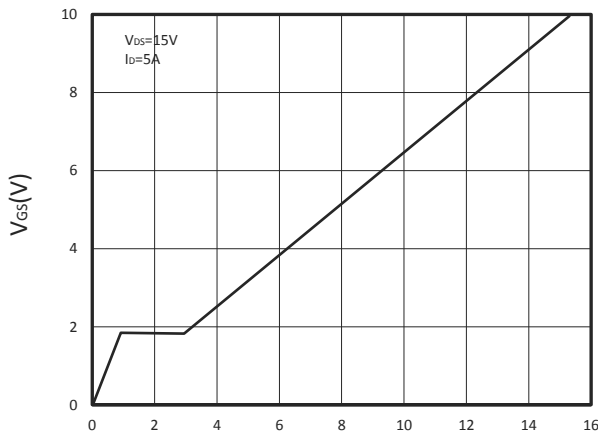
## TYPICAL CHARACTERISTICS



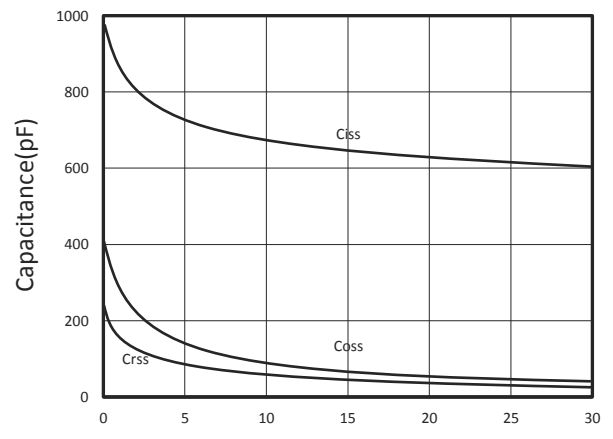
**Output Characteristics**



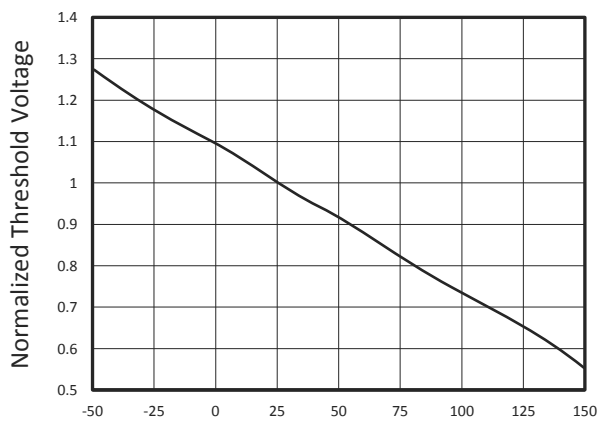
**Drain-Source On Resistance**



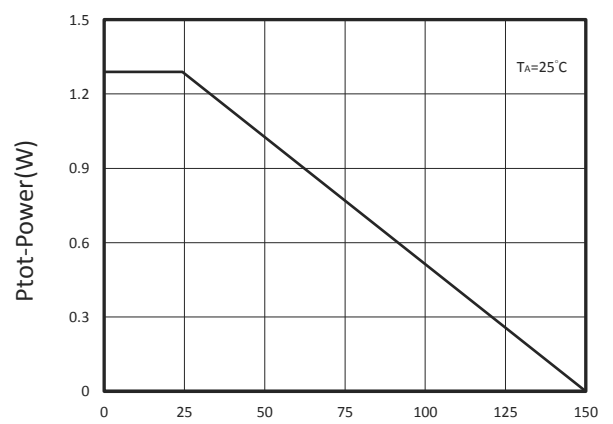
**Gate Charge**



**Capacitance**

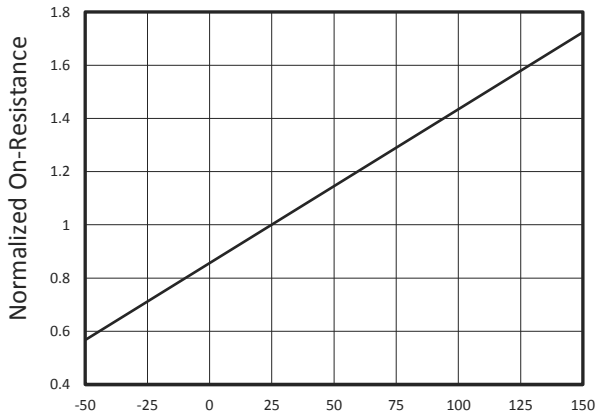


**Gate Threshold Voltage**

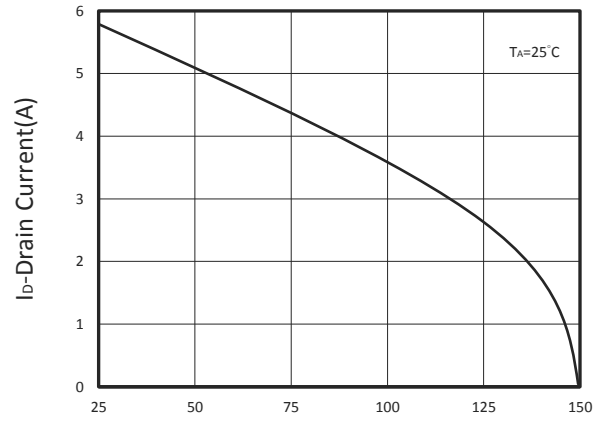


**Power Dissipation**

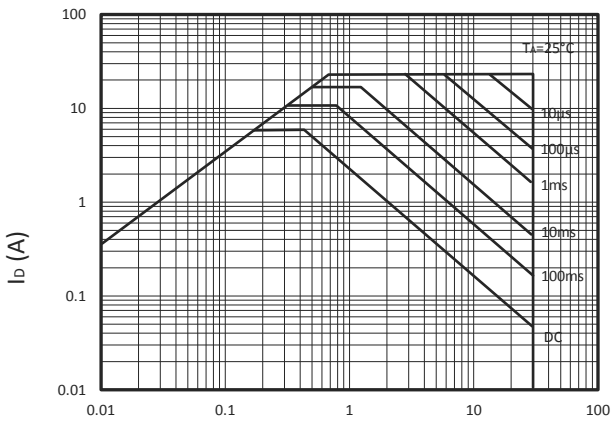
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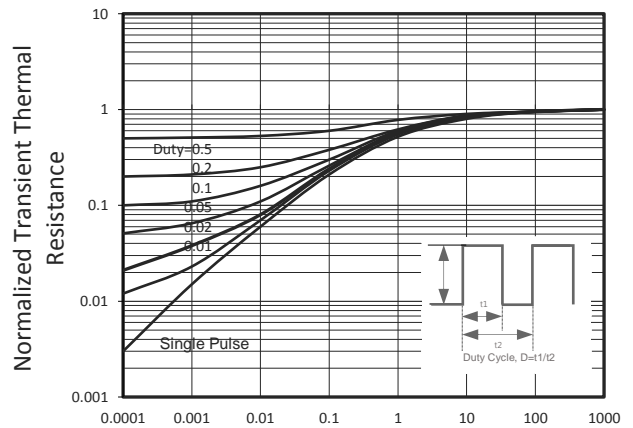
T<sub>J</sub>-Junction Temperature(°C)  
**Drain\_Source On Resistance**



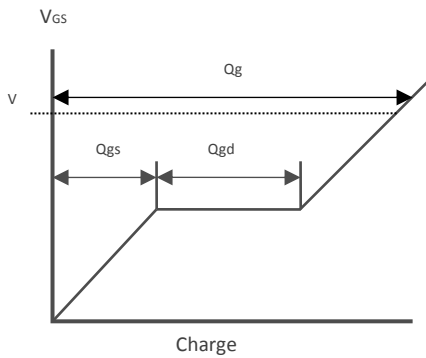
T<sub>J</sub>-Junction Temperature(°C)  
**Drain Current vs T<sub>J</sub>**



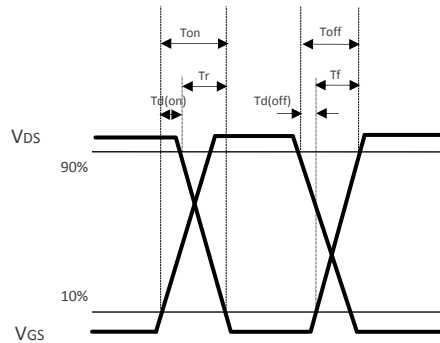
V<sub>Ds</sub> Voltage (V)  
**Maximum Safe Operation Area**



Square Wave Pulse Duration(Sec)  
**Thermal Transient Impedance**

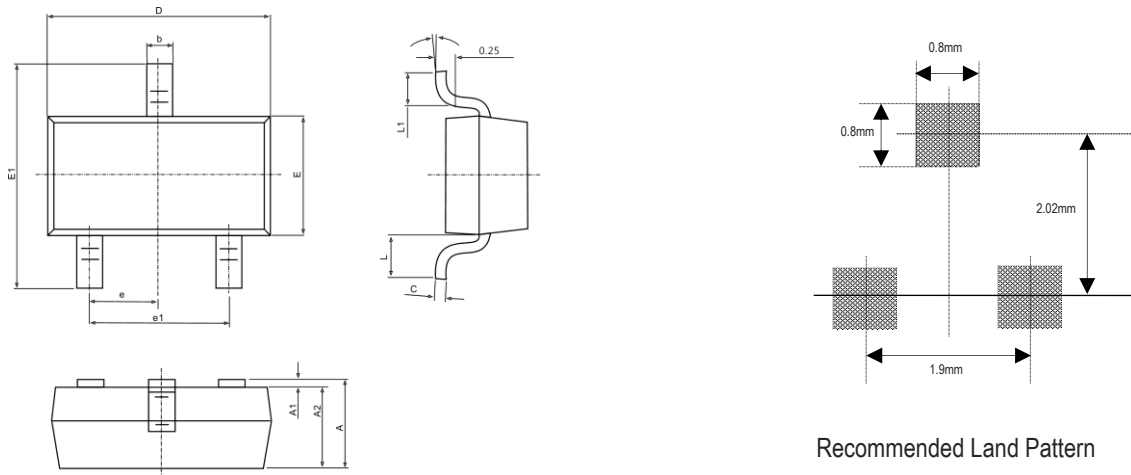


**Gate Chrg Waveform**



**Switching Time Waveform**

## SOT-23 PACKAGE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
$\theta$	0°	8°	0°	8°