

### DESCRIPTION

SMC3401G is the P-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 needed in small outline surface mount package.

### PART NUMBER INFORMATION

**SMC 3401G 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

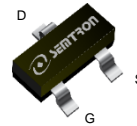
**$V_{DS} = -30V$ ,  $I_D = -3.8A$**

$R_{DS(ON)}=50m\Omega(Typ.)@V_{GS}=-10V$   
 $R_{DS(ON)}=62m\Omega(Typ.)@V_{GS}=-4.5V$   
 $R_{DS(ON)}=83m\Omega(Typ.)@V_{GS}=-2.5V$

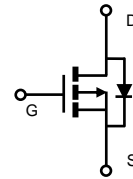
- ◆ Fast switch
- ◆ 2.5V Low gate drive applications

### APPLICATIONS

- ◆ Portable Equipment
- ◆ Power Management



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	$T_A=25^\circ C$	-3.8
		$T_A=70^\circ C$	-3.0
$I_{DM}$	Pulsed Drain Current <sup>A</sup>	-15.2	A
$P_D$	Power Dissipation <sup>B</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>B</sup>	$t \leq 10s$	95	$^\circ C/W$
	Thermal Resistance Junction to Ambient <sup>BC</sup>	Steady-State	130	

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

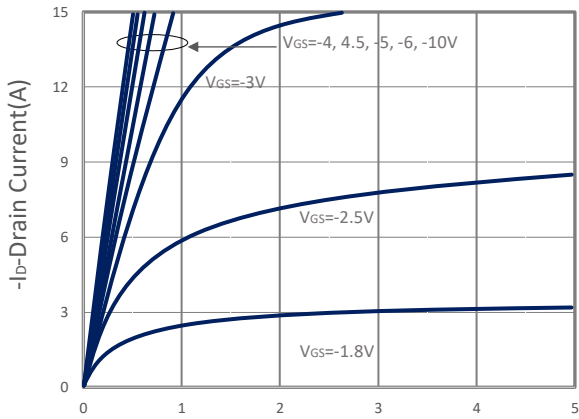
Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250 $\mu$ A	-30			V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250 $\mu$ A	-0.5	-0.7	-1	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	V <sub>GS</sub> =-10V, I <sub>D</sub> =-3.8A		50	58	m $\Omega$
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A		62	72	
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.2A		83	95	
G <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-3.8A		5		S
<b>Diode Characteristics</b>						
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.7	-1	V
I <sub>S</sub>	Continuous Source Current				-3.8	A
<b>Dynamic and Switching Parameters</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-10V I <sub>D</sub> =-3.8A		14.4	20.2	nC
Q <sub>g</sub>	Total Gate Charge (4.5V)			7	8.4	
Q <sub>gs</sub>	Gate-Source Charge			1.55	1.9	
Q <sub>gd</sub>	Gate-Drain Charge			2	2.8	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz		630		pF
C <sub>oss</sub>	Output Capacitance			71		
C <sub>rss</sub>	Reverse Transfer Capacitance			42		
t <sub>d(on)</sub>	Turn-On Time	V <sub>DD</sub> =-15V, V <sub>GEN</sub> =-10V R <sub>G</sub> =6 $\Omega$ , I <sub>D</sub> =-1A		4.8	9	nS
t <sub>r</sub>				8.2	16	
t <sub>d(off)</sub>	Turn-Off Time			36.5	69	
t <sub>f</sub>				9.6	18	

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

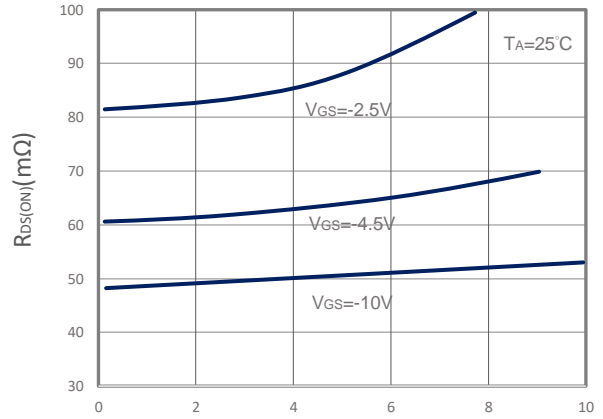
- Pulsed width limited by maximum junction temperature, T<sub>J(MAX)</sub>=150 $^\circ$ C.
- Measure the value in a still air environment at T<sub>A</sub>=25 $^\circ$ C, using an installation mounted on a 1 in2 FR-4 board, maximum junction temperature T<sub>J(MAX)</sub>=150 $^\circ$ C.
- T<sub>J(MAX)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

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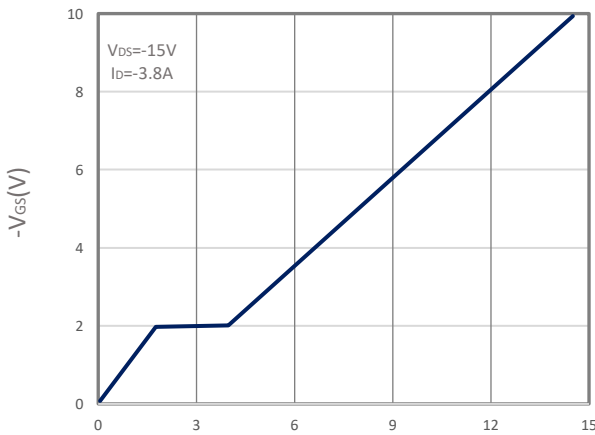
## TYPICAL CHARACTERIS



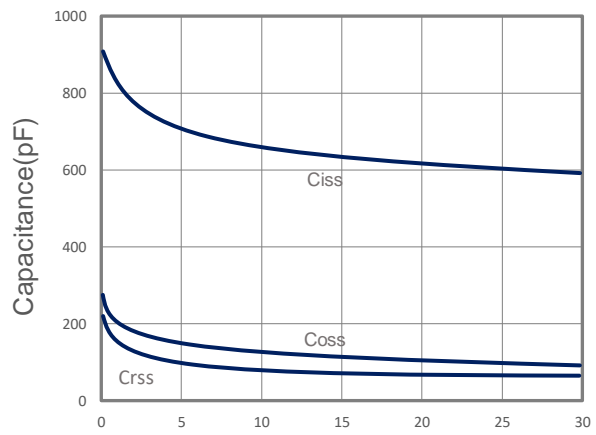
$-V_{DS}$ -Drain Source Voltage(V)  
Output Characteristics



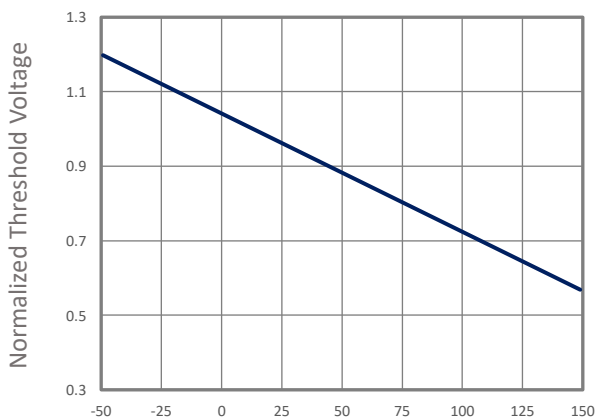
$-I_D$ -Drain Current(A)  
Drain-Source On Resistance



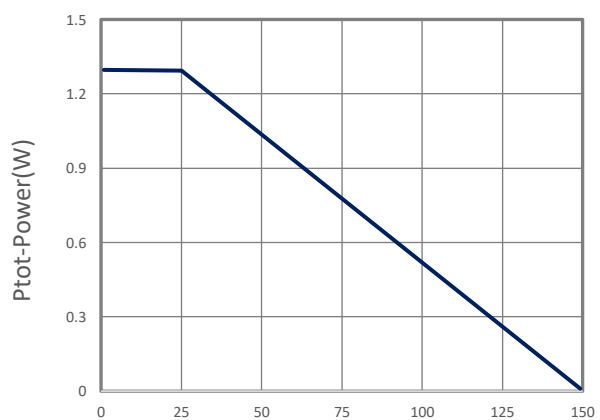
$Q_g$ -Gate Charge (nC)  
Gate Charge



$-V_{DS}$ -Drain Source Voltage(V)  
Capacitance

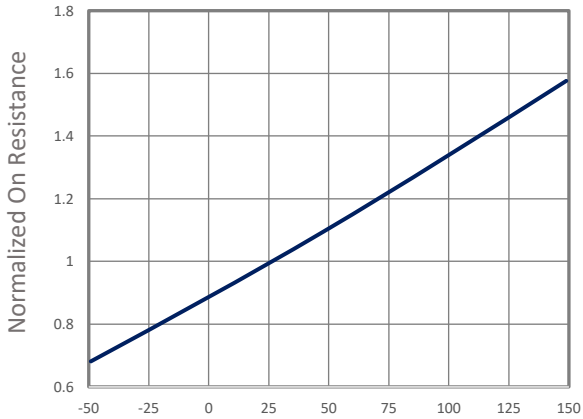


$T_J$ -Junction Temperature( $^\circ C$ )  
Gate Threshold Voltage

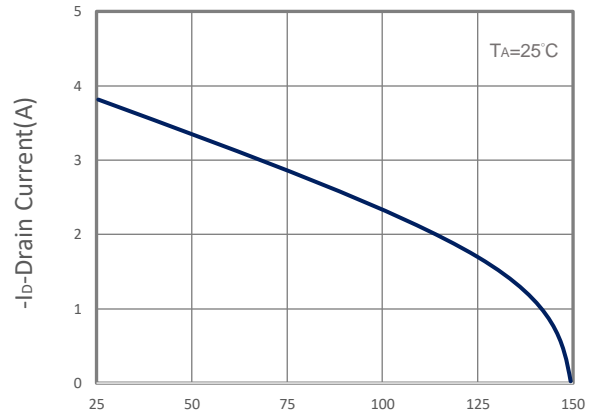


$T_J$ -Junction Temperature( $^\circ C$ )  
Power Dissipation

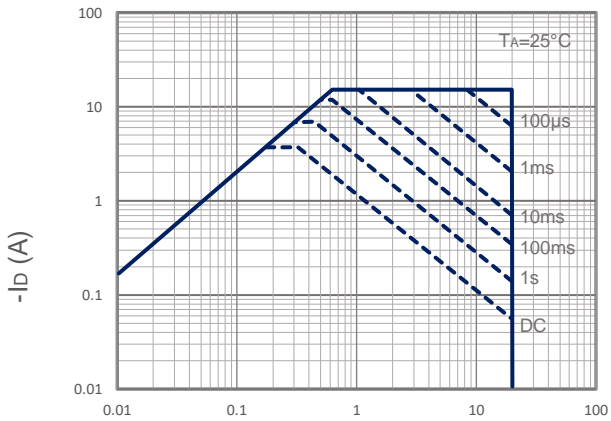
## TYPICAL CHARACTERISTICS



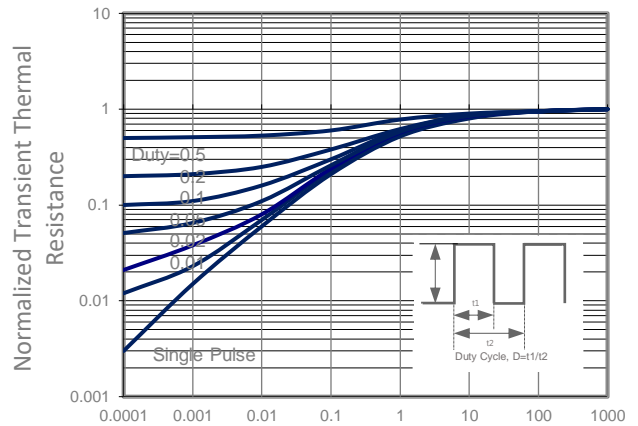
$R_{DS(ON)}$  vs Junction Temperature



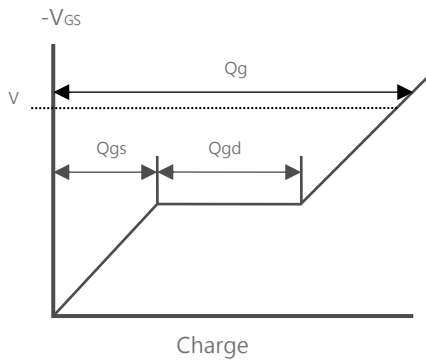
Drain Current vs  $T_J$



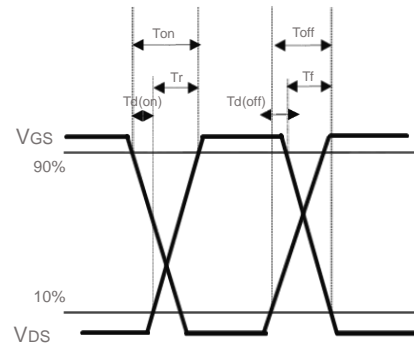
Maximum Safe Operation Area



Thermal Transient Impedance

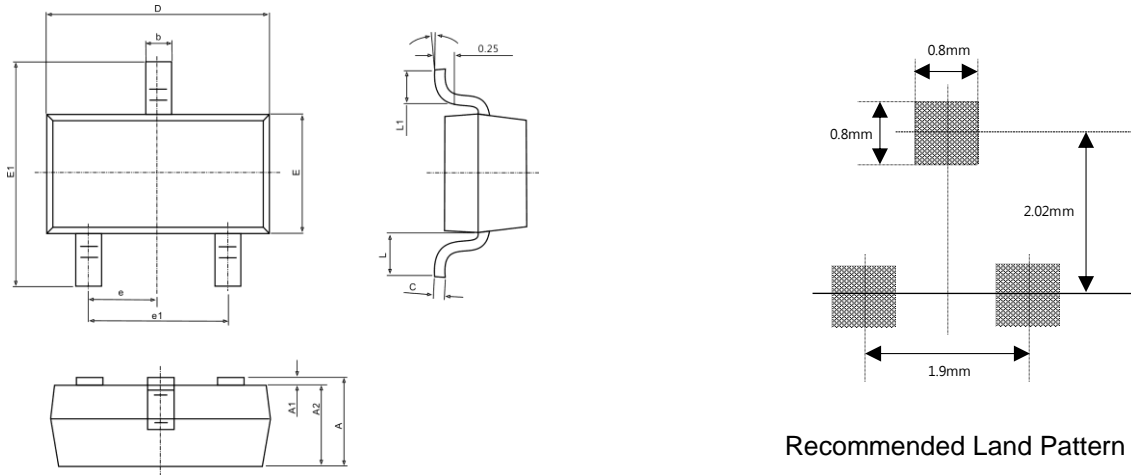


Gate Chrg Waveform



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°