

Single P-Channel MOSFET

DESCRIPTION

SMC3251 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 3251 S - TR G
 a b c d e

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

FEATURES

$V_{DS} = -30V$, $I_D = -4A$

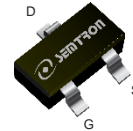
$R_{DS(ON)} = 56m\Omega (Typ.) @ V_{GS} = -10V$

$R_{DS(ON)} = 78m\Omega (Typ.) @ V_{GS} = -4.5V$

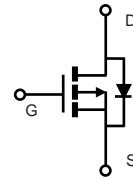
- ◆ Fast switch

APPLICATIONS

- ◆ Portable Equipment
- ◆ Power Management
- ◆ Load Switch



SOT-23L



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	± 20	V	
I_D	Continuous Drain Current	$T_A = 25^\circ C$	-4	A
		$T_A = 70^\circ C$	-3.2	A
I_{DM}	Pulsed Drain Current ^A	-16	A	
P_D	Power Dissipation ^B	$T_A = 25^\circ C$	1.6	W
		$T_A = 70^\circ C$	1	W
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	$t \leq 10s$	80	$^\circ C/W$
	Thermal Resistance Junction to Ambient ^{BC}	Steady-State	120	

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

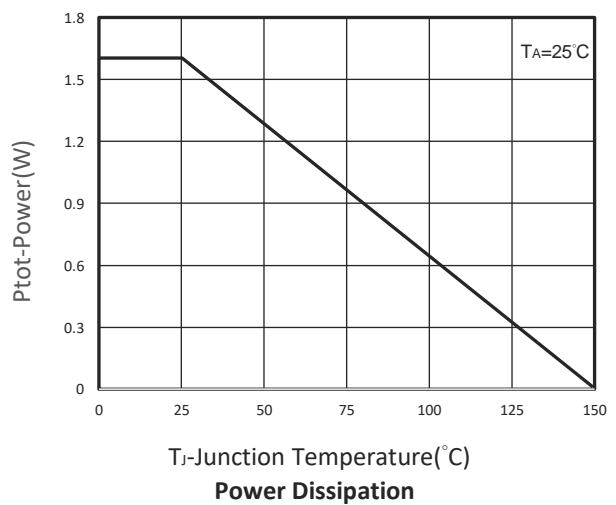
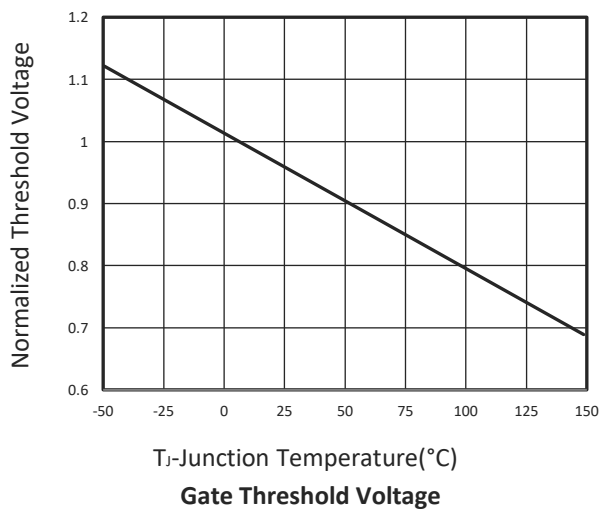
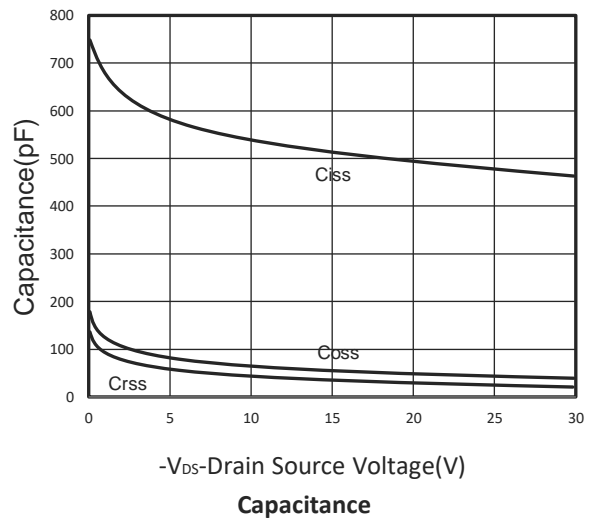
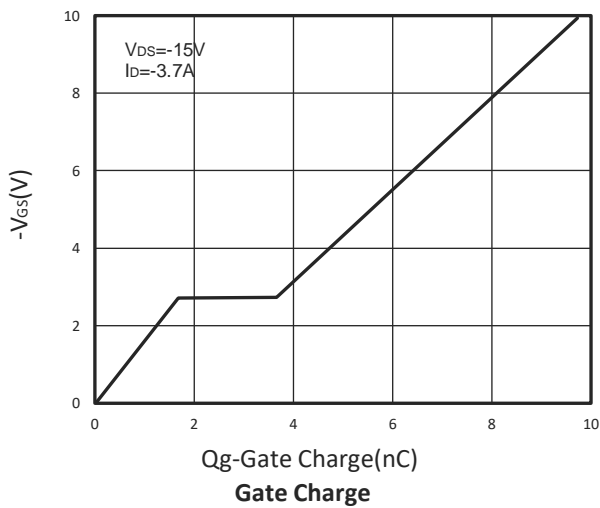
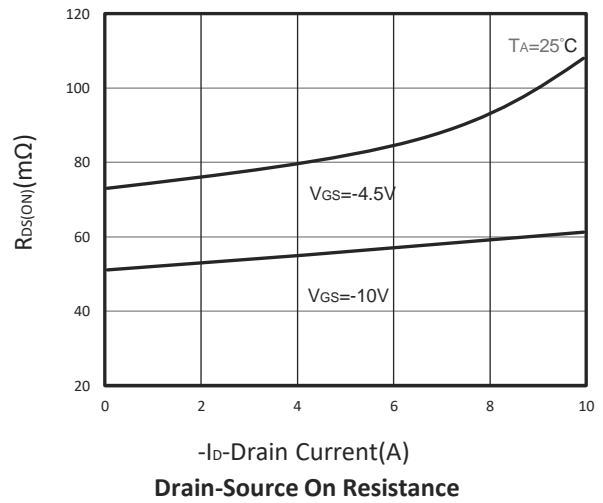
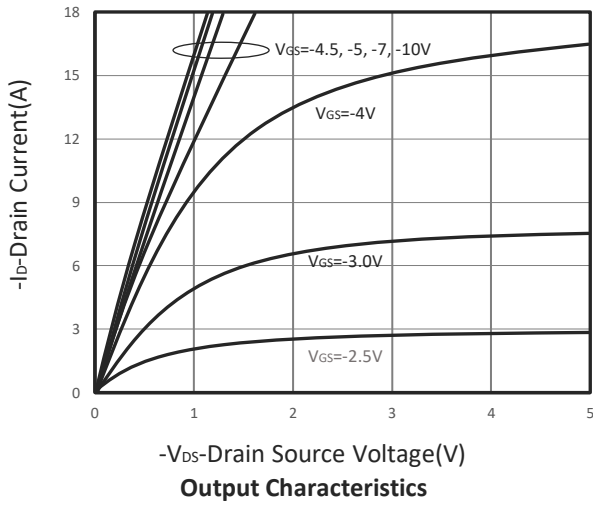
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250 μ A	-30			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250 μ A	-1	-1.5	-2	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} = \pm 20V			\pm 100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V, T _J =25 $^\circ$ C			-1	μ A
		V _{DS} =-24V, V _{GS} =0V, T _J =75 $^\circ$ C			-10	
R _{DS(ON)}	Drain-source On-Resistance	V _{GS} =-10V, I _D =-4A V _{GS} =-4.5V, I _D =-3A		56 78	65 90	m Ω
G _{fs}	Forward Transconductance	V _{DS} =-10V, I _D =-4A		7.1		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.7	-1	V
I _S	Continuous Source Current				-4	A
Dynamic and Switching Parameters						
Q _g	Total Gate Charge	V _{DS} =-15V, V _{GS} =-10V I _D =-3.7A		9.8	13.8	nC
Q _g	Total Gate Charge (4.5V)			4.8	5.8	
Q _{gs}	Gate-Source Charge			1.7	2	
Q _{gd}	Gate-Drain Charge			2	2.8	
C _{iss}	Input Capacitance	V _{DS} = -15V, V _{GS} = 0V, f = 1MHz		510		pF
C _{oss}	Output Capacitance			48		
C _{rss}	Reverse Transfer Capacitance			31		
t _{d(on)}	Turn-On Time	V _{DD} =-15V, V _{GEN} =-10V R _G =3.3 Ω , I _D =-1A		3.2	6	nS
t _r				9.5	18	
t _{d(off)}	Turn-Off Time			16	30	
t _f				5.7	11	

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

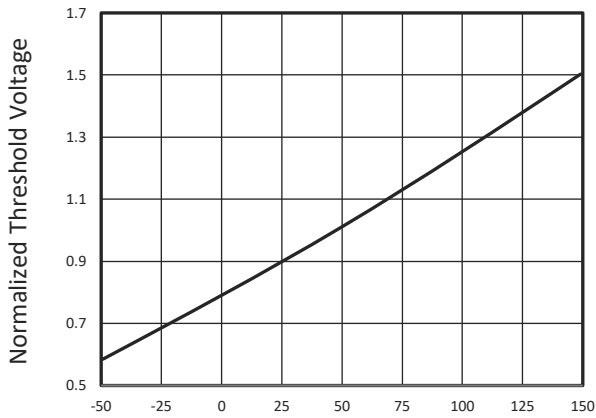
- Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150 $^\circ$ C.
- Measure the value in a still air environment at T_A=25 $^\circ$ C, using an installation mounted on a 1 in2 FR-4 board, maximum junction temperature T_{J(MAX)}=150 $^\circ$ C.
- T_{J(MAX)}=150 $^\circ$ C, using junction-to-case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

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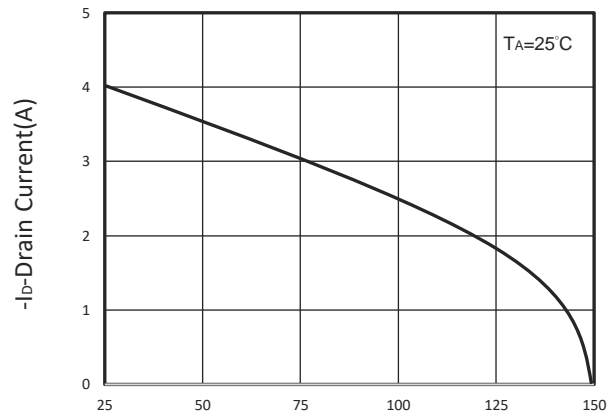
TYPICAL CHARACTERISTICS



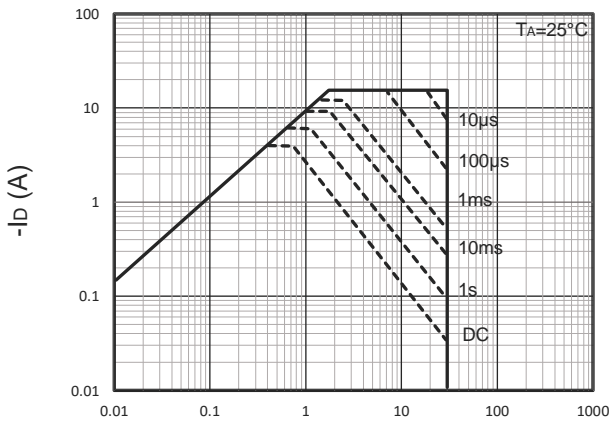
TYPICAL CHARACTERISTICS



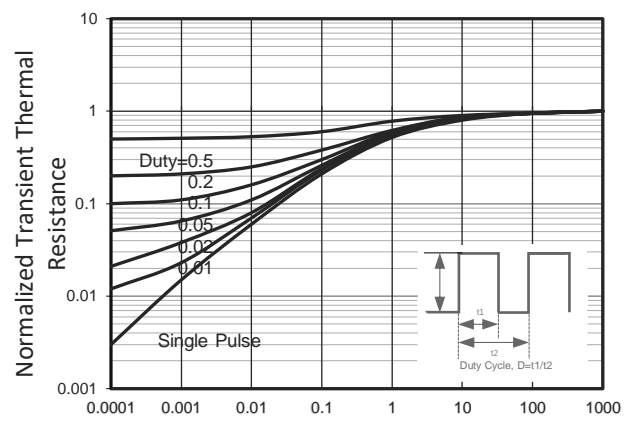
T_J-Junction Temperature(°C)
Gate Threshold Voltage



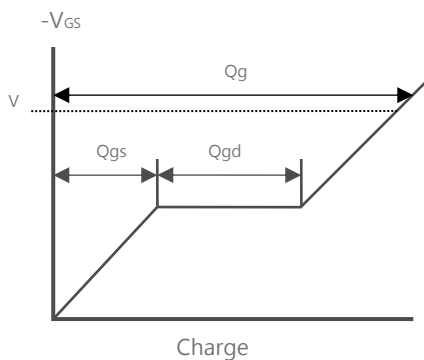
T_J-Case Temperature(°C)
Drain Current vs T_J



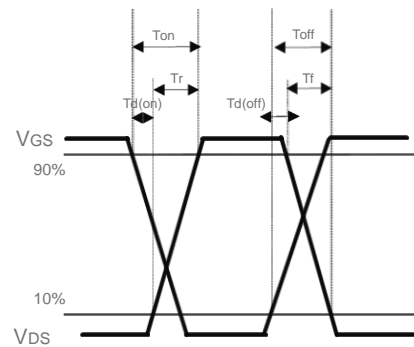
- V_{DS} Voltage (V)
Maximum Safe Operation Area



Square Wave Pulse Duration(Sec)
Thermal Transient Impedance

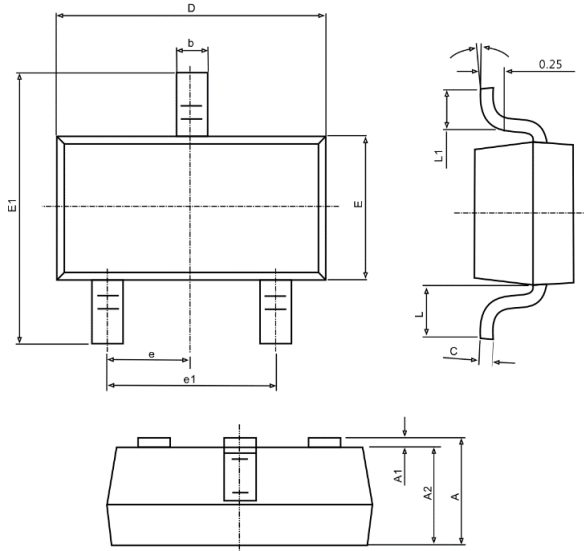


Gate Chrg Waveform

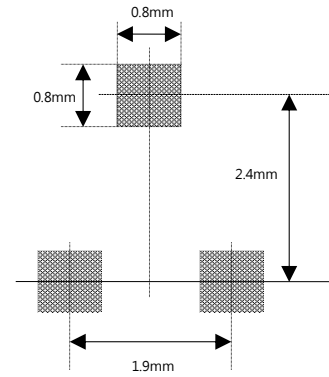


Switching Time Waveform

■ SOT-23L PACKAGE DIMENSIONS



Recommended Minimum Pad(mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.000	1.300	0.039	0.049
A1	0.000	0.100	0.000	0.004
A2	1.000	1.200	0.039	0.047
b	0.300	0.500	0.012	0.020
c	0.047	0.207	0.002	0.008
D	2.800	3.000	0.110	0.118
E	1.500	1.700	0.059	0.067
E1	2.600	3.000	0.102	0.118
e	0.950 TYP.		0.037 TYP.	
e1	1.900 TYP.		0.075 TYP.	
L1	0.250	0.550	0.010	0.022
θ	0°	8°	0°	8°