

DESCRIPTION

SMC2301GSN 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 are needed in small outline surface mount package.

PART NUMBER INFORMATION

SMC **2301G** **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

$V_{DS}=-20V$, $I_D=-3A$

$R_{DS(ON)}=85m\Omega(Typ.)@V_{GS}=-4.5V$
 $R_{DS(ON)}=120m\Omega(Typ.)@V_{GS}=-2.5V$
 $R_{DS(ON)}=180m\Omega(Typ.)@V_{GS}=-1.8V$

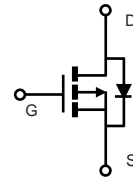
- ◆ Fast switch
- ◆ 1.8V Low gate drive applications

APPLICATIONS

- ◆ Hand-Held Instruments
- ◆ Load Switch



SOT-23



ABSOLUTE MAXIMUM RATINGS ($T_A=25^{\circ}C$ Unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-Source Voltage	-20	V
V_{GSS}	Gate-Source Voltage	± 12	V
I_D	Continuous Drain Current	$T_A=25^{\circ}C$	-3
		$T_A=70^{\circ}C$	-2.4
I_{DM}	Pulsed Drain Current ^B	12	A
P_D	Power Dissipation ^A	$T_A=25^{\circ}C$	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 ^A	$t \leq 10s$	95	$^{\circ}C/W$
	Thermal Resistance Junction to Ambient ^{AC}	Steady-State	130	

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

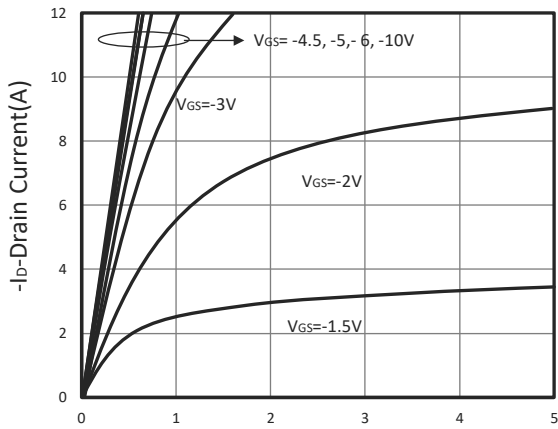
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250 μ A	-20			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250 μ A	-0.3	-0.6	-1	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} = \pm 12V			\pm 100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-20V, V _{GS} =0V, T _J =25 $^{\circ}$ C			-1	μ A
		V _{DS} =-16V, V _{GS} =0V, T _J =75 $^{\circ}$ C			-10	
R _{DS(ON)}	Drain-source On-Resistance ^D	V _{GS} =-4.5V, I _D =-3A		85	95	m Ω
		V _{GS} =-2.5V, I _D =-2.6A		120	150	
		V _{GS} =-1.8V, I _D =-2A		180	240	
G _{fs}	Forward Transconductance	V _{DS} =-5V, I _D =-3A		6		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage ^D	I _S =-1A, V _{GS} =0V			-1	V
I _S	Diode Continuous Forward Current				-1.5	A
t _{rr}	Reverse Recovery Time	I _S =-3A, dI/dt=100A/ μ s		11		ns
Q _{rr}	Reverse Recovery Charge	T _J =25 $^{\circ}$ C		2.7		nC
Dynamic and Switching Parameters ^E						
Q _g	Total Gate Charge	V _{DS} =-10V, V _{GS} =-4.5V, I _D =-3A		5	7	nC
Q _{gs}	Gate-Source Charge		0.82	1.1		
Q _{gd}	Gate-Drain Charge		1.5	2.1		
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz		355		pF
C _{oss}	Output Capacitance		58			
C _{rss}	Reverse Transfer Capacitance		48			
t _{d(on)}	Turn-On Time	V _{DD} =-10V, V _{GEN} =-4.5V, R _G =3 Ω , I _D =-3A		3.8	7	nS
t _r			12.2	23		
t _{d(off)}	Turn-Off Time		19	36		
t _f			9.2	17		

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

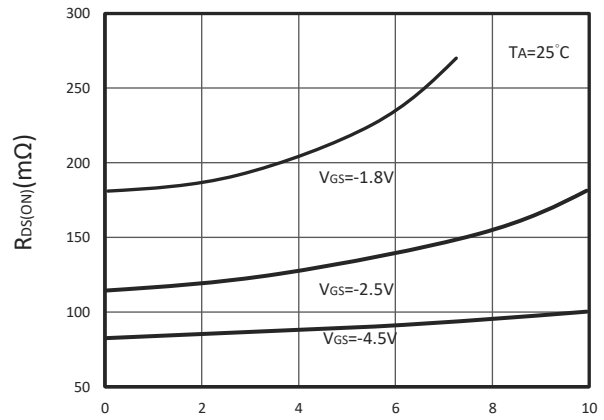
- A. Surface mounted on FR4 board using 1 in² pad size.
- B. Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150 $^{\circ}$ C.
- C. Using \leq 10s junction-to-ambient thermal resistance is base on T_{J(MAX)}=150 $^{\circ}$ C.
- D. Pulse test width \leq 300 μ s and duty cycle \leq 2%.
- E. Guaranteed by design, not subject to production testing.

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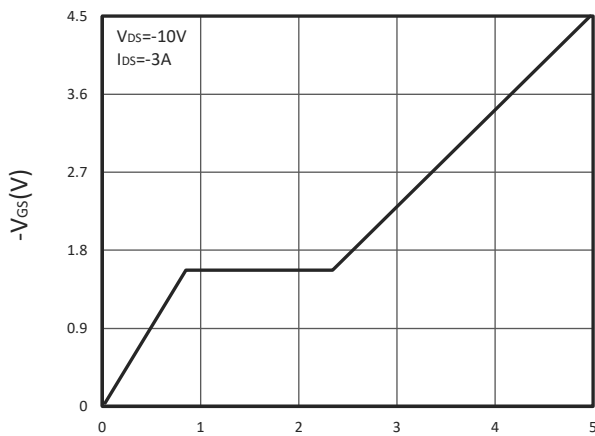
TYPICAL CHARACTERISTICS



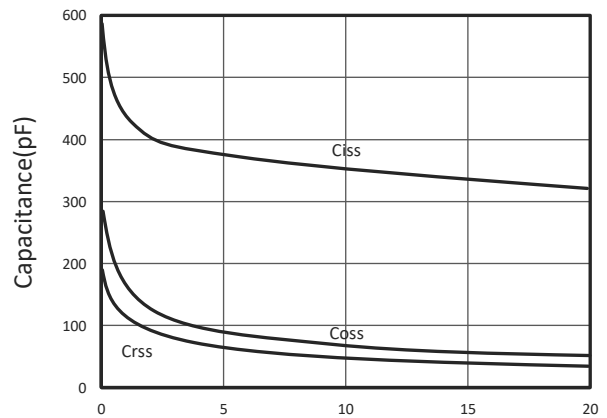
Output Characteristics



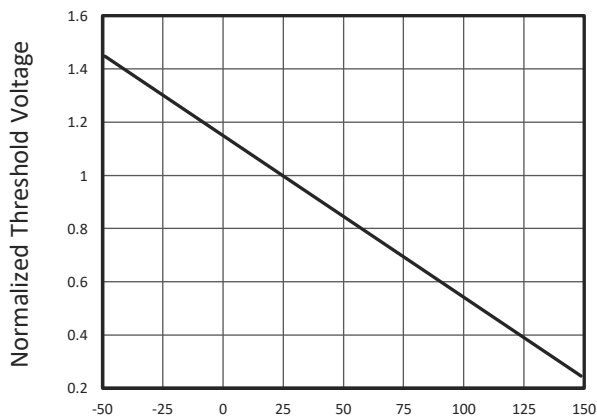
Drain-Source On Resistance



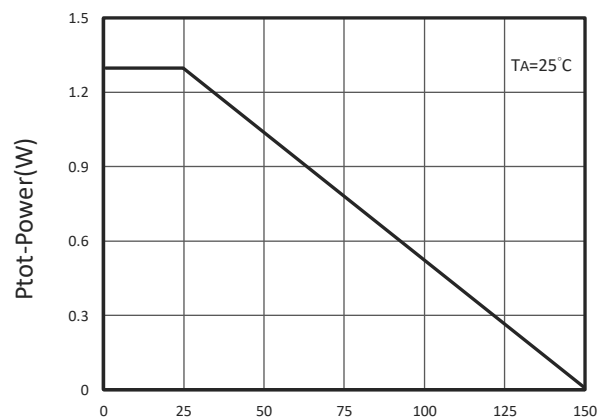
Gate Charge



Capacitance

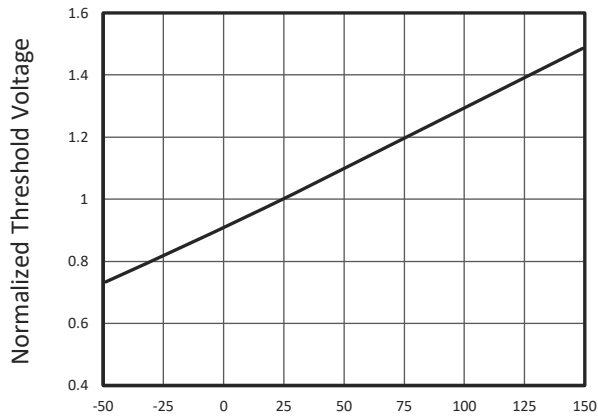


Gate Threshold Voltage

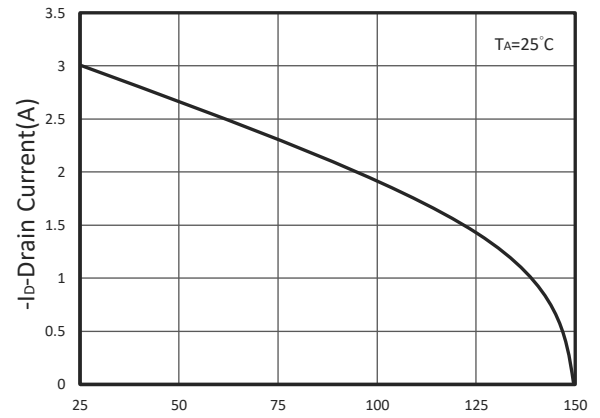


Power Dissipation

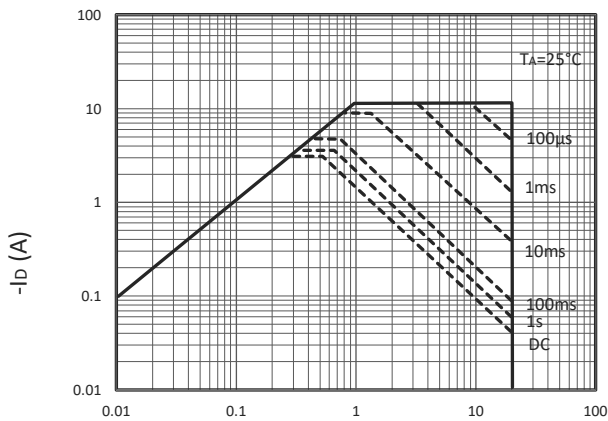
TYPICAL CHARACTERISTICS



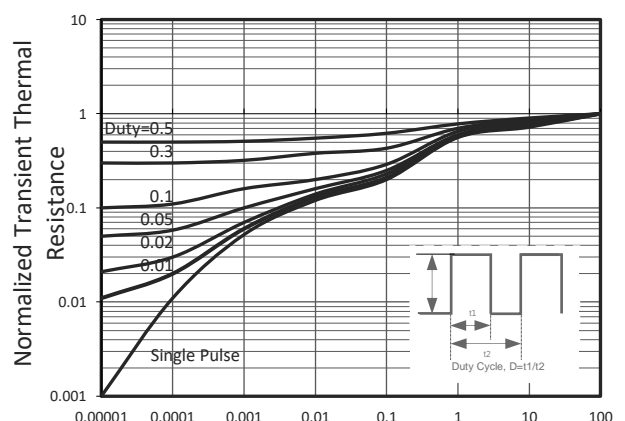
T_J-Junction Temperature(°C)
Gate Threshold Voltage



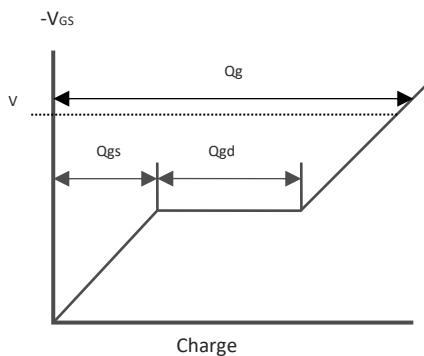
T_J-Junction Temperature(°C)
Drain Current vs T_J



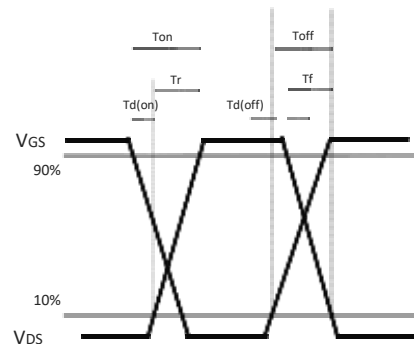
-V_{DS} Voltage (V)
Maximum Safe Operation Area



Square Wave Pulse Duration(Sec)
Thermal Transient Impedance

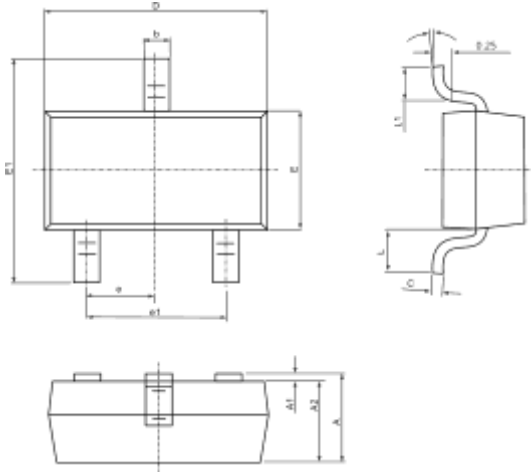


Gate Charge Waveform

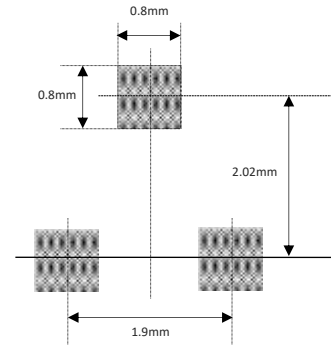


Switching Time Waveform

■ SOT-23 PACKAGE DIMENSIONS



Recommended Land Pattern



1.

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 BSC.		0.037 BSC	
e1	1.800	2.000	0.071	0.079
L	0.550 BSC		0.022 BSC	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°