

Single P-Channel MOSFET

DESCRIPTION

SMC2333 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 2333 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

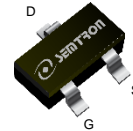
$V_{DS} = -20V, I_D = -6A$

- $R_{DS(ON)} = 22m\Omega (Typ.) @ V_{GS} = -10V$
- $R_{DS(ON)} = 26m\Omega (Typ.) @ V_{GS} = -4.5V$
- $R_{DS(ON)} = 33m\Omega (Typ.) @ V_{GS} = -2.5V$
- $R_{DS(ON)} = 43m\Omega (Typ.) @ V_{GS} = -1.8V$

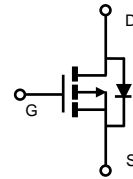
- ◆ 1.8V Low gate drive applications

APPLICATIONS

- ◆ Portable Equipment
- ◆ Battery Protection
- ◆ Power Management



SOT-23L



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 ($V_{GS} = -4.5V$)	$T_A = 25^\circ C$	-6	A
		$T_A = 70^\circ C$	-4.8	A
I_{DM}	Pulsed Drain Current ^B	-24	A	
P_D	Power Dissipation ^A	$T_A = 25^\circ C$	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 ^A	$t \leq 10s$	80	$^\circ C/W$
	Thermal Resistance Junction to Ambient ^{AC}	Steady-State	120	

ELECTRICAL CHARACTERISTICS (T_A=25°C Unless otherwise noted)

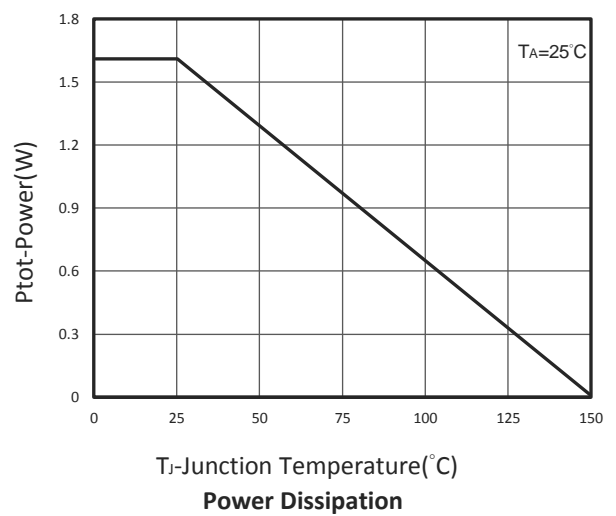
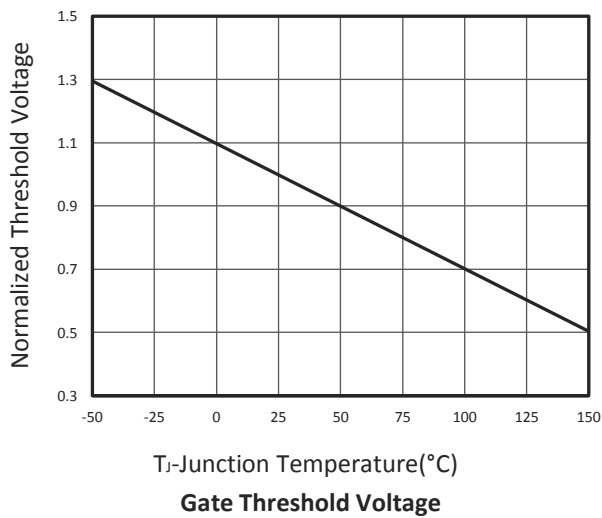
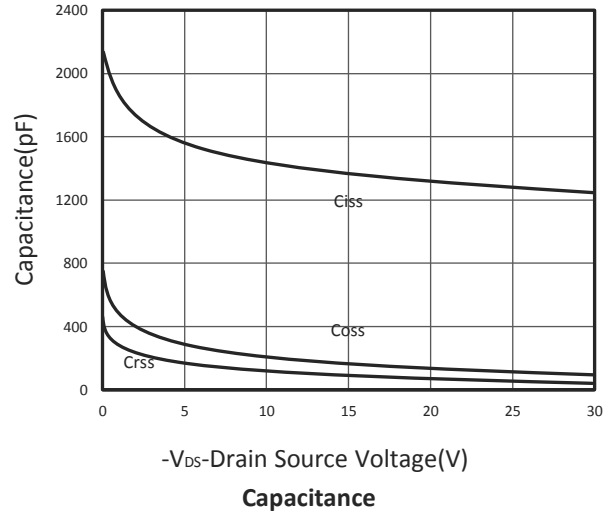
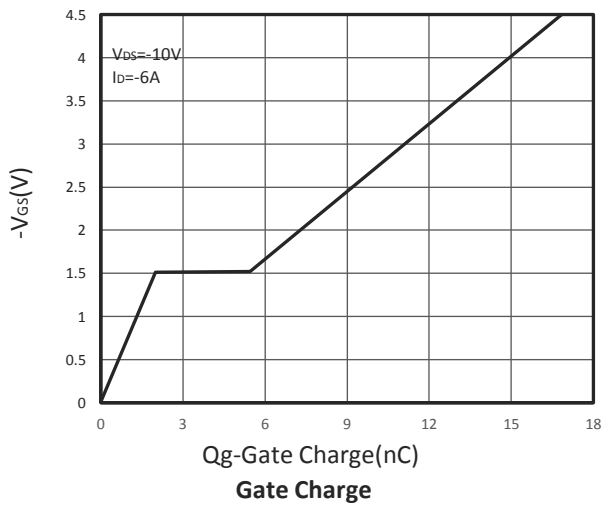
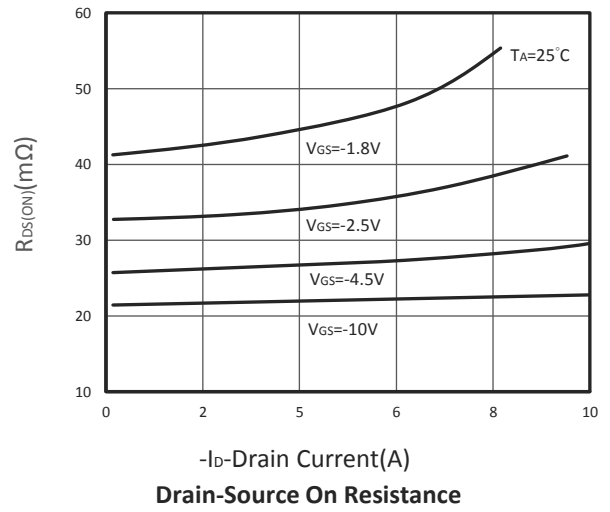
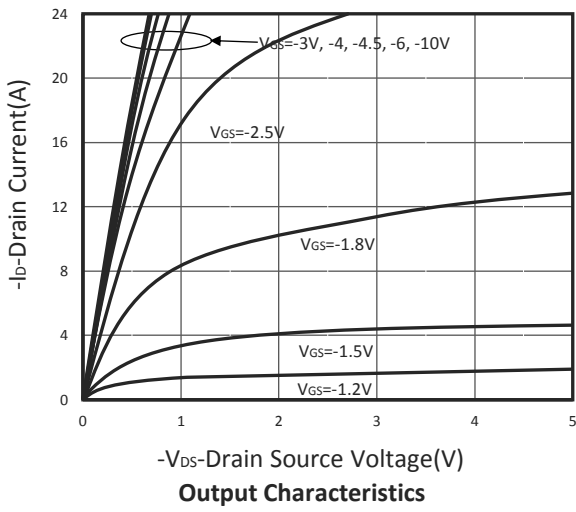
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	-20			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-0.4	-0.7	-1	V
I _{GSS}	Gate Leakage Current	V _{DS} =0V, V _{GS} =±12V			±100	nA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-20V, V _{GS} =0V, T _J =25°C			-1	μA
		V _{DS} =-16V, V _{GS} =0V, T _J =75°C			-10	
R _{DS(ON)}	Drain-source On-Resistance ^D	V _{GS} =-10V, I _D =-6A		22	25	mΩ
		V _{GS} =-4.5V, I _D =-6A		26	30	
		V _{GS} =-2.5V, I _D =-3.5A		33	38	
		V _{GS} =-1.8V, I _D =-3A		43	50	
G _{fs}	Forward Transconductance	V _{DS} =-10V, I _D =-6A		12		S
Diode Characteristics						
V _{SD}	Diode Forward Voltage ^D	I _S =-1A, V _{GS} =0V			-1	V
I _S	Diode Continuous Forward Current				-3	A
Dynamic and Switching Parameters ^E						
Q _g	Total Gate Charge	V _{DS} =-10V, V _{GS} =-4.5V, I _D =-6A		16.7	23.4	nC
Q _{gs}	Gate-Source Charge			2	2.8	
Q _{gd}	Gate-Drain Charge			3.7	5.2	
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz		1410		pF
C _{oss}	Output Capacitance			165		
C _{rss}	Reverse Transfer Capacitance			110		
t _{d(on)}	Turn-On Time	V _{DD} =-10V, V _{GEN} =-4.5V R _G =3Ω, I _D =-1A		9.3	18	nS
t _r				34	65	
t _{d(off)}	Turn-Off Time			78	148	
t _f				22	42	

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

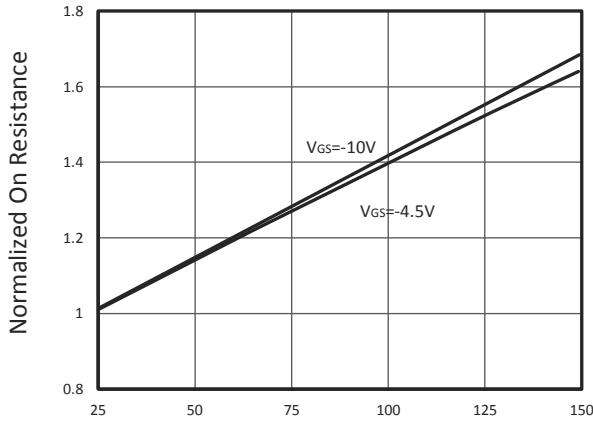
- A. Surface mounted on FR4 board using 1 in² pad size.
- B. Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150°C (initial temperature T_J=25°C).
- C. Using ≤ 10s junction-to-ambient thermal resistance is base on T_{J(MAX)}=150°C.
- D. Pulse test width ≤300μs and duty cycle ≤ 2%.
- E. Guaranteed by design, not subject to production testing.

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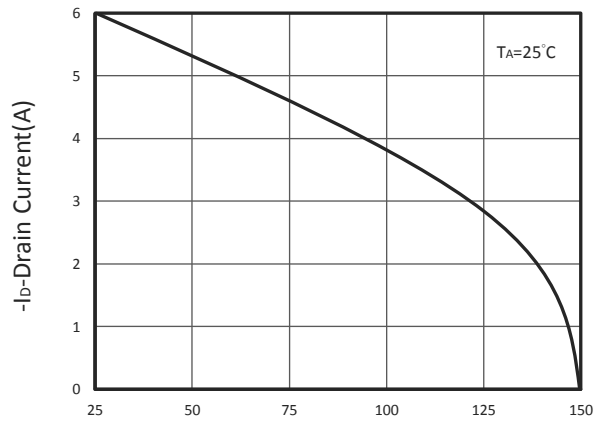
TYPICAL CHARACTERISTICS



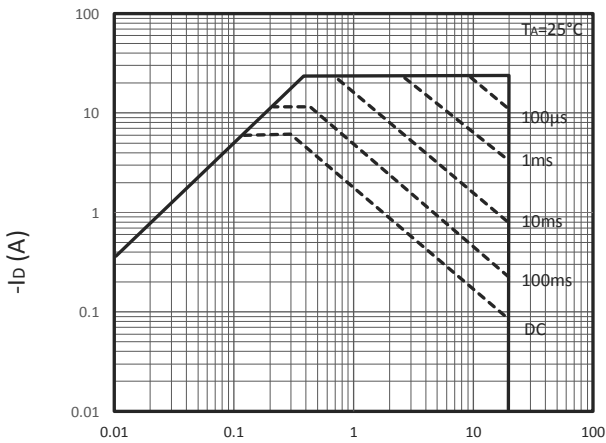
TYPICAL CHARACTERISTICS



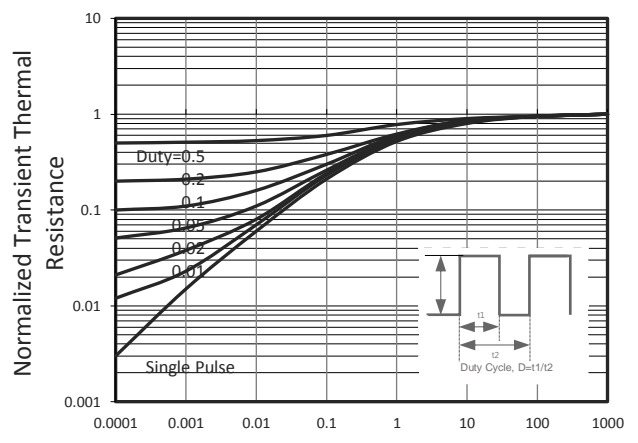
T_J-Junction Temperature(°C)
R_{DS(ON)} vs Junction Temperature



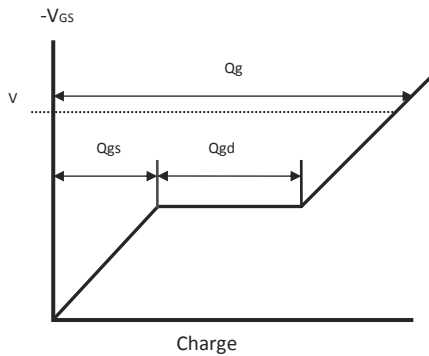
T_J-Junction Temperature(°C)
Drain Current vs T_J



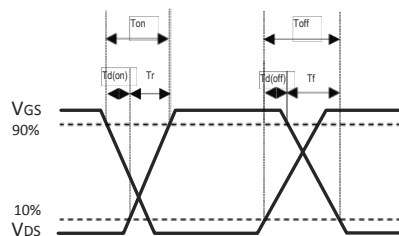
Maximum Safe Operation Area



Thermal Transient Impedance

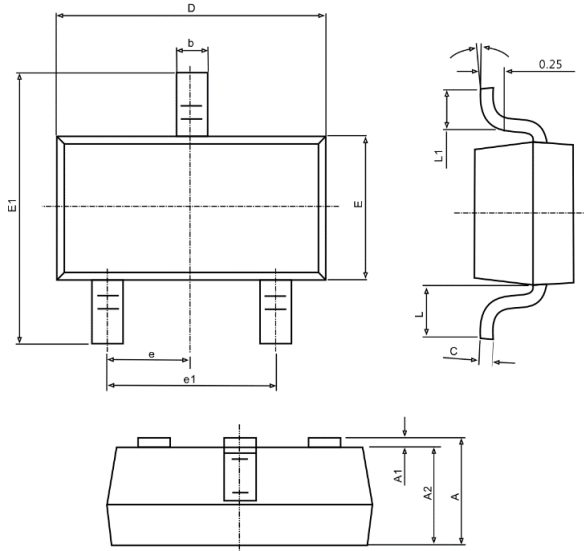


Gate Chrg Waveform

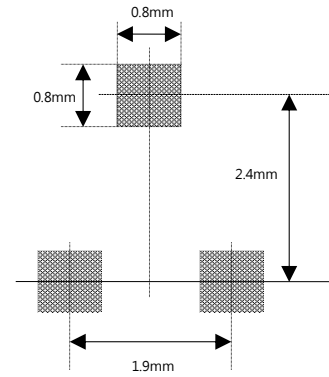


Switching Time Waveform

■ 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°