

## -20V P-Channel Enhancement Mode MOSFET

### DESCRIPTION

The SMC2333 is the P-Channel logic enhancement mode power field effect transistor is produced using high cell density. advanced trench technology to provide excellent small package  $R_{DS(ON)}$ .

*SMC2333S-TRG ROHS Compliant This is Halogen Free*

### FEATURE

- ◆ -20V/-6.0A,  $R_{DS(ON)} = 22m\Omega(typ)@V_{GS} = -10V$
- ◆ -20V/-6.0A,  $R_{DS(ON)} = 26m\Omega(typ)@V_{GS} = -4.5V$
- ◆ -20V/-3.5A,  $R_{DS(ON)} = 33m\Omega(typ)@V_{GS} = -2.5V$
- ◆ -20V/-2.0A,  $R_{DS(ON)} = 43m\Omega(typ)@V_{GS} = -1.8V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability

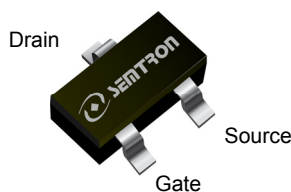
### FEATURE

- ◆ High Frequency Point-of-Load Synchronous Small power switching for MB/NB/UMPC/VGA
- ◆ DC/DC Converter
- ◆ Load Switch

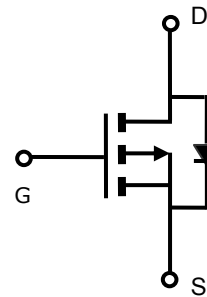


P-Channel Enhancement Mode MOSFET

### PIN CONFIGURATION



SOT-23L  
Top View



### PART NUMBER INFORMATION

<p><b>SMC 2333 S - TR G</b></p> <p>a      b      c      d      e</p>	<p>a : Company name.  b : Product Serial number.  c : Package code  d : Handling code  e : Green produce code</p>
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## ORDERING INFORMATION

Part Number	Package Code	Handling Code	Shipping
SMC2333S-TRG	S : SOT-23L	TR : Tape&Reel	3K/Reel

- ※ Year Code : 0 ~ 9, 2010 : 0
- ※ Week Code : A(1~2) ~ Z(53~54)
- ※ SOT-23L : Only available in tape and reel packaging.

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

Symbol	Parameter	Typical	Unit	
$V_{DSS}$	Drain-Source Voltage	-20	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 12$	V	
$I_D$	Continuous Drain Current ( $T_C=25^\circ\text{C}$ ) <sup>A</sup>	$V_{GS}=-10\text{V}$	-6.0	A
	Continuous Drain Current ( $T_C=70^\circ\text{C}$ ) <sup>A</sup>		-5.0	A
$I_{DM}$	Pulsed Drain Current <sup>B</sup>	-20	A	
$P_D$	Power Dissipation	$T_A=25^\circ\text{C}$	1.4	W
		$T_A=70^\circ\text{C}$	0.9	
$T_J$	Operation Junction Temperature	-55 to 150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
 Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## THERMAL DATA

Symbol	Parameter	Typ	Max	Unit	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient <sup>A</sup>	Steady-State	-	120	$^\circ\text{C}/\text{W}$
$R_{\theta JL}$	Thermal Resistance Junction to Lead <sup>A</sup>	Steady-State	-	80	$^\circ\text{C}/\text{W}$

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

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.6		-1.0	V
$I_{GSS}$	Gate Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$			$\pm 100$	nA
$I_{DSS}$	Zero Gate Voltage, Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V$ $T_J=25^\circ\text{C}$			-1	$\mu A$
		$V_{DS}=-20V, V_{GS}=0V$ $T_J=55^\circ\text{C}$			-5	
$R_{DS(ON)}$	Drain-source On-Resistance <sup>B</sup>	$V_{GS}=-10V, I_D=-6.0A$		22	25	m $\Omega$
		$V_{GS}=-4.5V, I_D=-6.0A$		26	30	
		$V_{GS}=-2.5V, I_D=-3.5A$		33	38	
		$V_{GS}=-1.8V, I_D=-2.0A$		43	50	
<b>Source-Drain Diode</b>						
$V_{SD}$	Diode Forward Voltage	$I_S=-1.0A, V_{GS}=0V$		-0.7	-1.0	V
$I_S$	Continuous Source Current <sup>AD</sup>				-1	A
<b>Dynamic Parameters</b>						
$Q_g (-4.5V)$	Total Gate Charge	$V_{DS}=-15V$ $V_{GS}=-10V$ $I_D=-6.0A$		28.5		nC
$Q_{gs}$	Gate-Source Charge			3.8		
$Q_{gd}$	Gate-Drain Charge			6.8		
$C_{iss}$	Input Capacitance	$V_{DS}=-15V$ $V_{GS}=0V$ $f=1MHz$		2320		pF
$C_{oss}$	Output Capacitance			235		
$C_{rss}$	Reverse Transfer Capacitance			192		
$t_{d(on)}$	Turn-On Time	$V_{DD}=-15V$ $I_D=-6A$		9.8		nS
$t_r$				62		
$t_{d(off)}$	Turn-Off Time	$V_{GEN}=-4.5V$ $R_G=6\Omega$		102		
$t_f$				75		

Note:

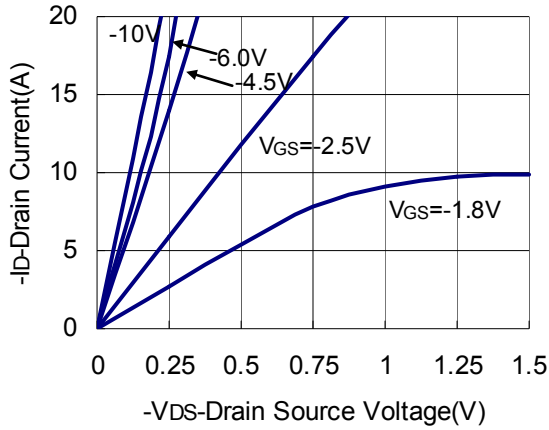
- The value of  $R_{\theta JA}$  is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ .
- The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
- The EAS data shows Max. rating. The test condition is  $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH$ .
- The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

The products and product specifications contained herein are subject to change without notice to improve performance characteristics. Consult us, or our representatives before use, to confirm that the information in this datasheet is up to date

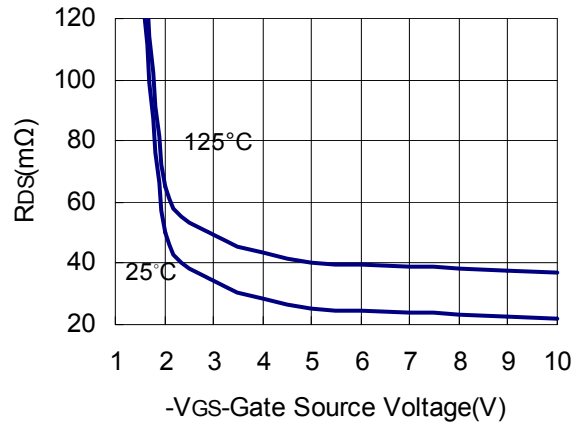
We assume no responsibility for any infringement of patents, patent rights, or other rights arising from the use of any information and circuitry in this datasheet.

## TYPICAL CHARACTERISTICS (25°C Unless Note)

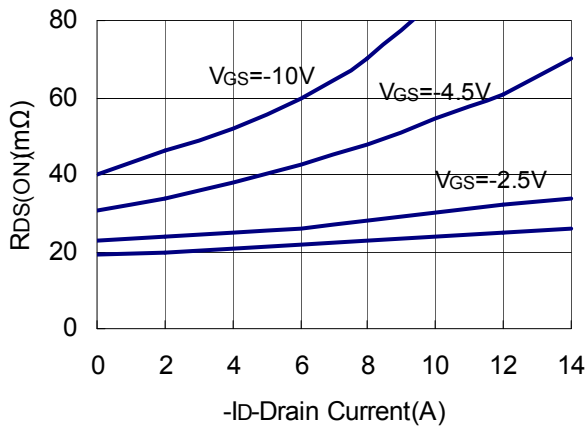
### Output Characteristics



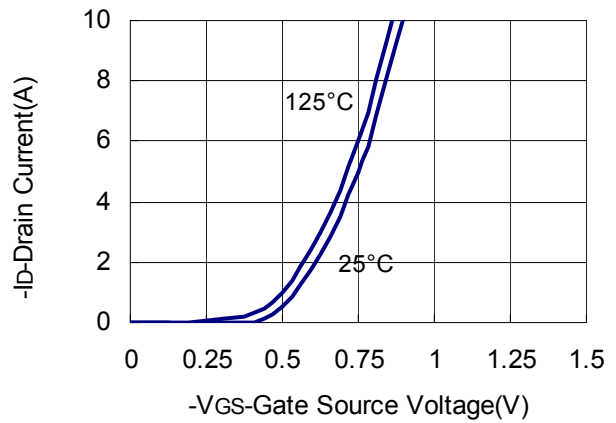
### Drain-Source On Resistance



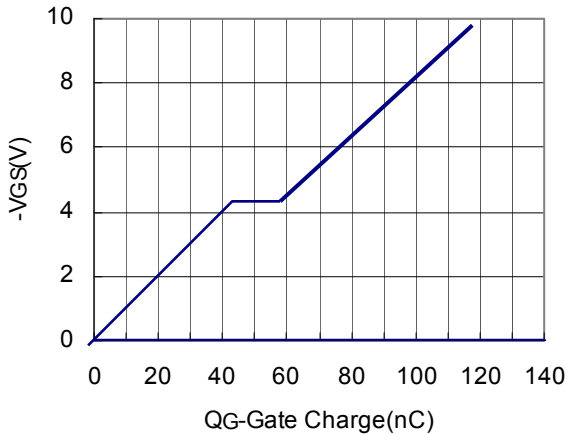
### Drain Source On Resistance



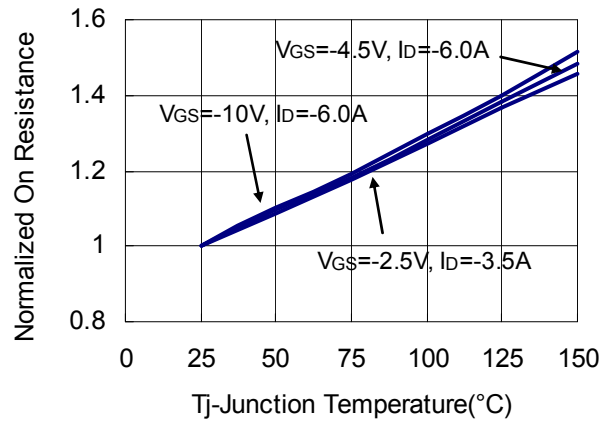
### Transfer Characteristics



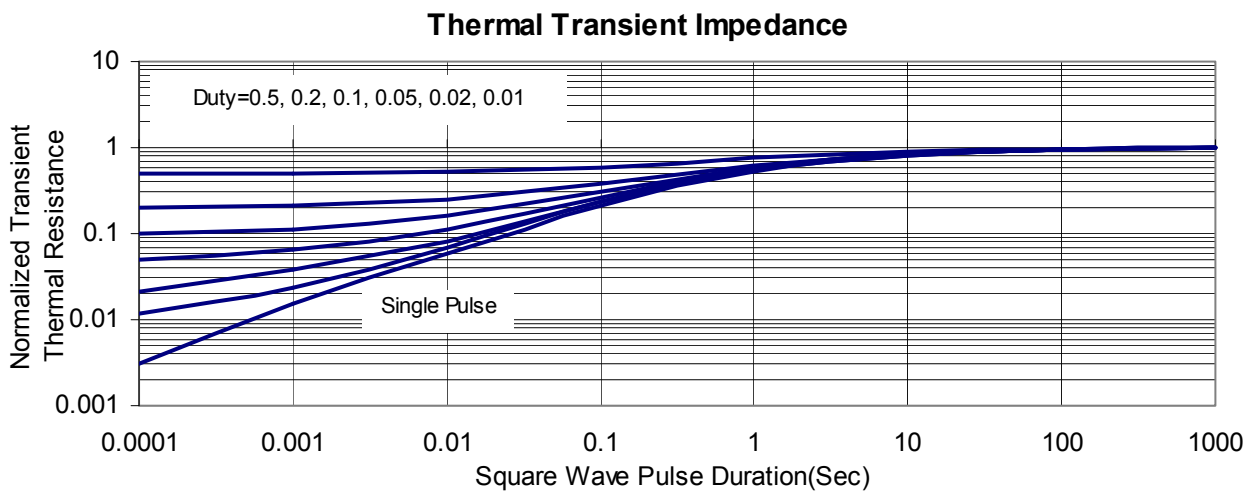
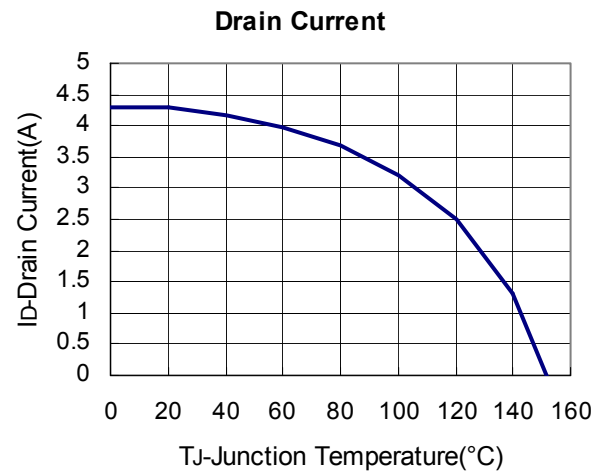
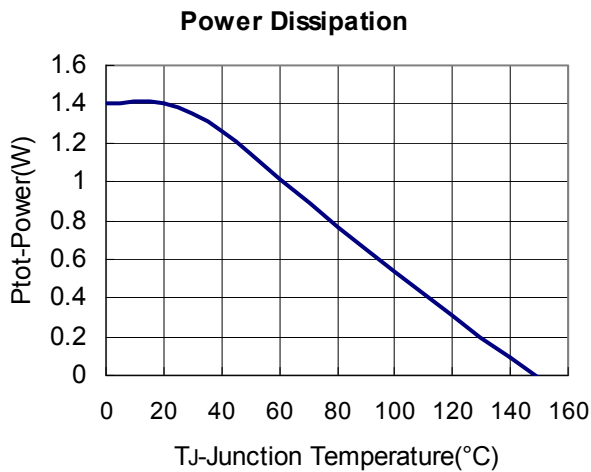
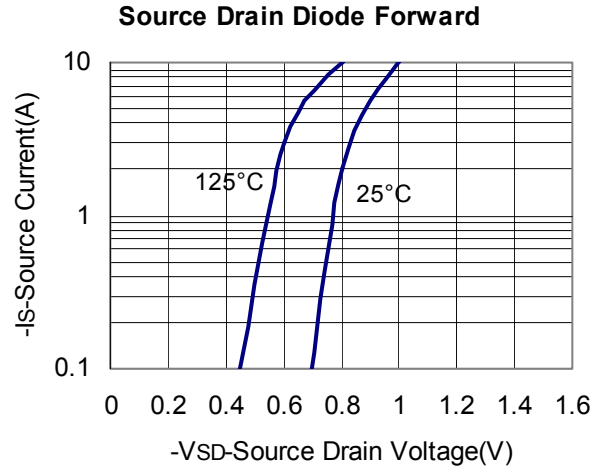
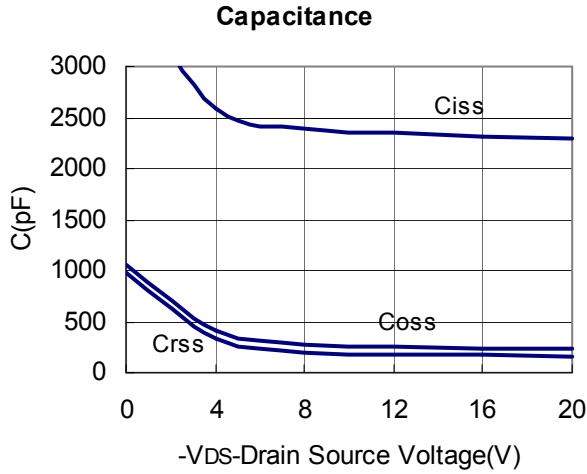
### Gate Charge



### Drain Source Resistance



## TYPICAL CHARACTERISTICS (25°C Unless Note)



## SOT-23L PACKAGE DIMENSIONS

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

SOT-23L PACKAGE OUTLINE DIMENSIONS

