

## Single P-Channel MOSFET

### DESCRIPTION

SMC3415E 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 3415 ES - TR G**  
 a      b      c d      e f

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

### FEATURES

**$V_{DS} = -20V$ ,  $I_D = -5.3A$**

- $R_{DS(ON)}=31m\Omega(Typ.)@V_{GS}=-4.5V$
- $R_{DS(ON)}=40m\Omega(Typ.)@V_{GS}=-2.5V$
- $R_{DS(ON)}=50m\Omega(Typ.)@V_{GS}=-1.8V$
- $R_{DS(ON)}=60m\Omega(Typ.)@V_{GS}=-1.5V$

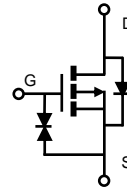
- ◆ ESD protected
- ◆ 1.5V Low gate drive applications

### APPLICATIONS

- ◆ Portable Equipment
- ◆ 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	$\pm 8$	V	
$I_D$	Continuous Drain Current	$T_A=25^\circ C$	-5.3	A
		$T_A=70^\circ C$	-4.2	A
$I_{DM}$	Pulsed Drain Current <sup>A</sup>	-21.2	A	
$P_D$	Power Dissipation <sup>B</sup>	$T_A=25^\circ C$	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 <sup>B</sup>	$t \leq 10s$	80	$^\circ C/W$
	Thermal Resistance Junction to Ambient <sup>BC</sup>	Steady-State	120	

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

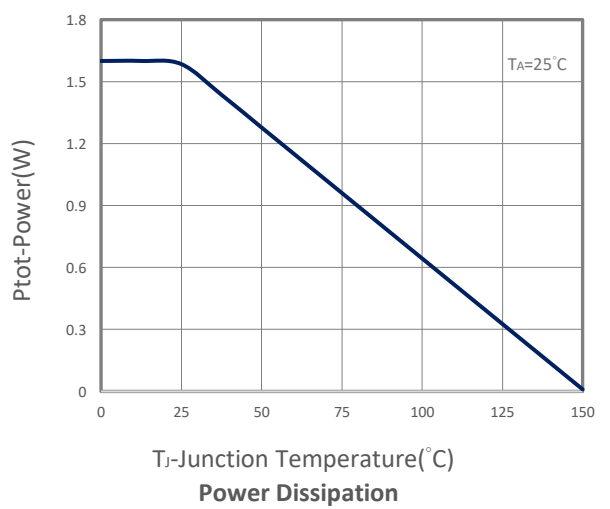
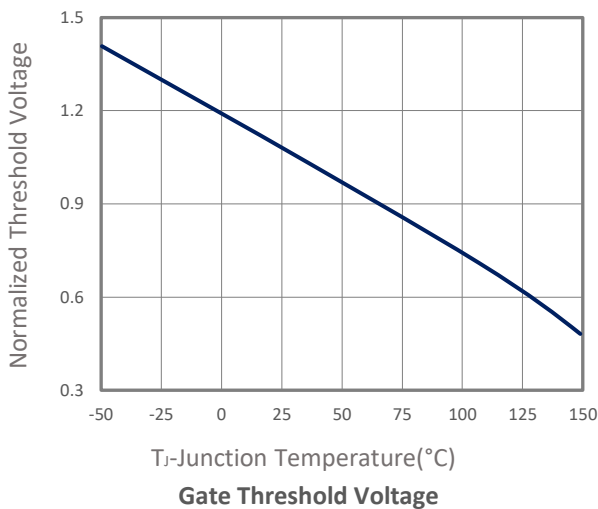
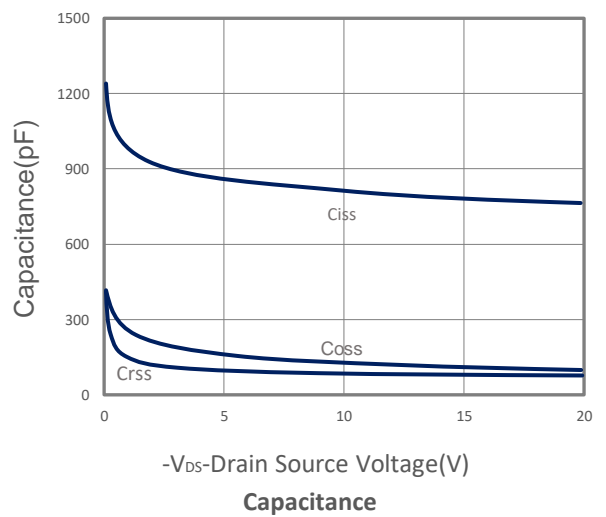
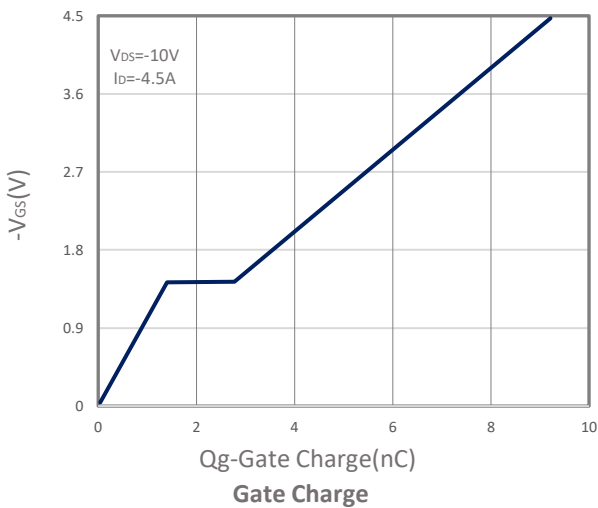
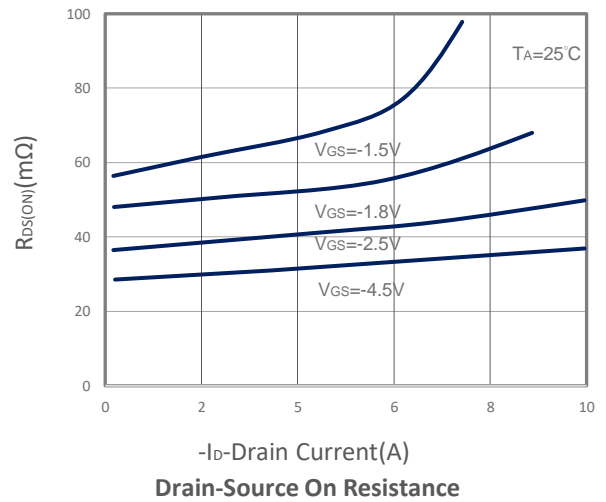
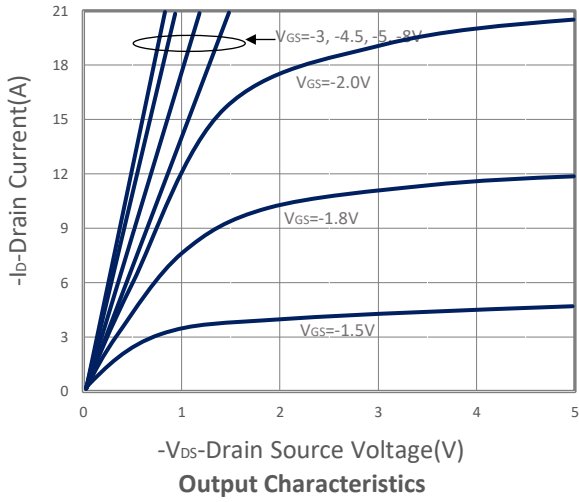
Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250 $\mu$ A	-20			V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250 $\mu$ A	-0.3	-0.5	-1	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = $\pm$ 8V			$\pm$ 10	$\mu$ A
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, T <sub>J</sub> =25 $^\circ$ C			-1	$\mu$ A
		V <sub>DS</sub> =-16V, 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> =-4.5V, I <sub>D</sub> =-4.5A		31	35	m $\Omega$
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-4A		40	45	
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-2A		50	57	
		V <sub>GS</sub> =-1.5V, I <sub>D</sub> =-1.2A		60	70	
G <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-4.5A		16		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				-2.7	A
<b>Dynamic and Switching Parameters</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.5A		9.3	13	nC
Q <sub>gs</sub>	Gate-Source Charge			1.5	2.1	
Q <sub>gd</sub>	Gate-Drain Charge			2.5	3.5	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, f=1MHz		825		pF
C <sub>oss</sub>	Output Capacitance			120		
C <sub>rss</sub>	Reverse Transfer Capacitance			82		
t <sub>d(on)</sub>	Turn-On Time	V <sub>DD</sub> =-10V, V <sub>GEN</sub> =-4.5V, R <sub>G</sub> =3.3 $\Omega$ , I <sub>D</sub> =-1A		10.2	19	nS
t <sub>r</sub>				18	34	
t <sub>d(off)</sub>	Turn-Off Time			46	87	
t <sub>f</sub>				14	27	

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

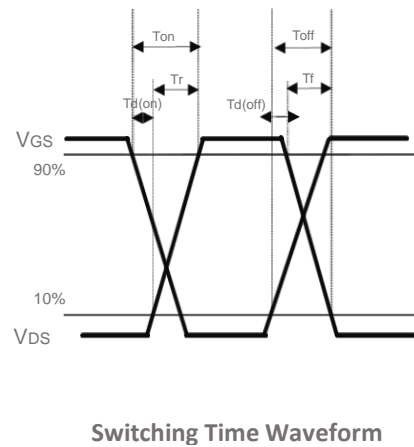
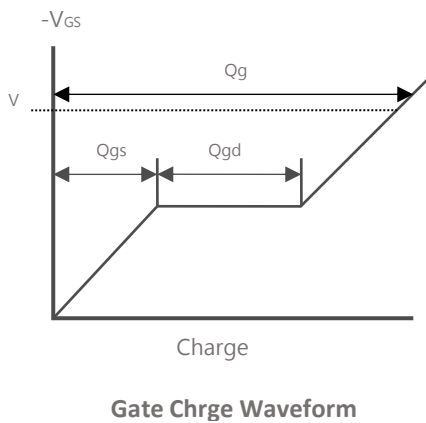
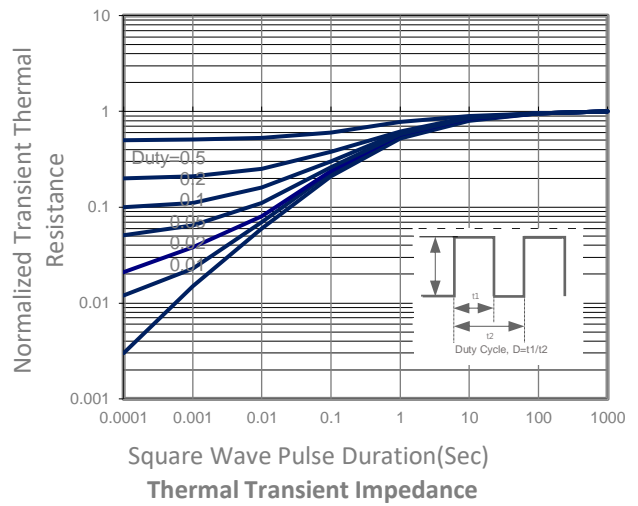
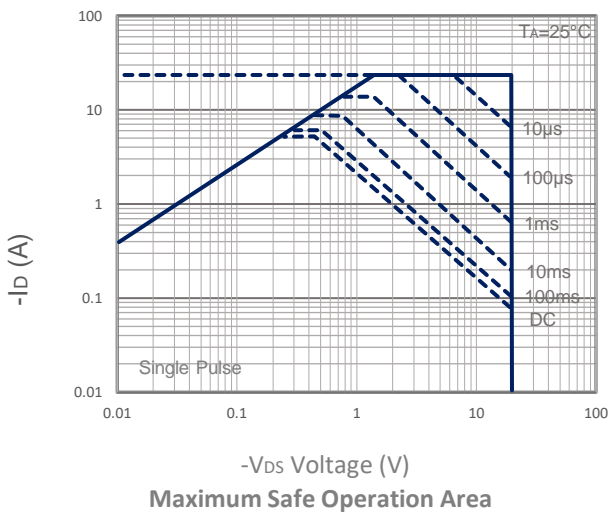
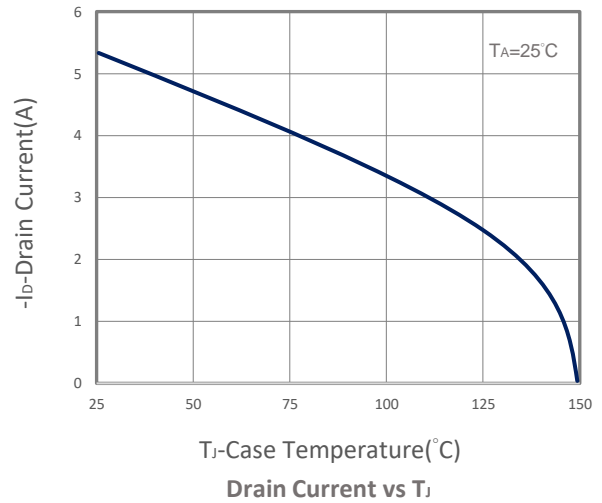
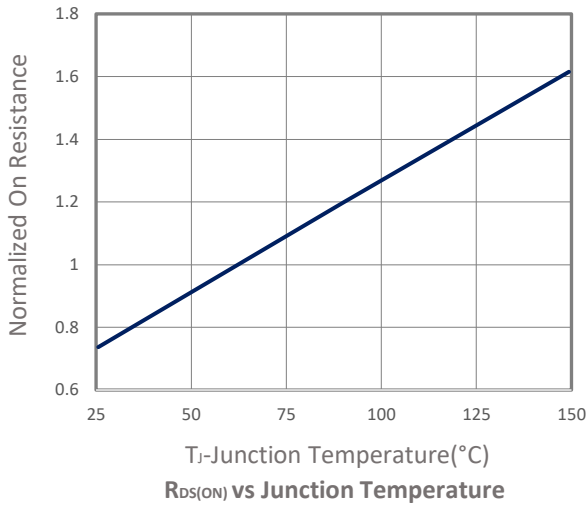
- A. Pulsed width limited by maximum junction temperature, T<sub>J(MAX)</sub>=150 $^\circ$ C.
- B. The value of R $\theta$ JA is measured with the device mounted on 1in2 FR-4 board in a still air environment with maximum junction temperature T<sub>J(MAX)</sub>=150 $^\circ$ C (initial temperature T<sub>A</sub>=25 $^\circ$ C).
- C. T<sub>J(MAX)</sub>=150 $^\circ$ C, using junction-to-case thermal resistance (R $\theta$ JC) is more useful in additional heat sinking is used.

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.

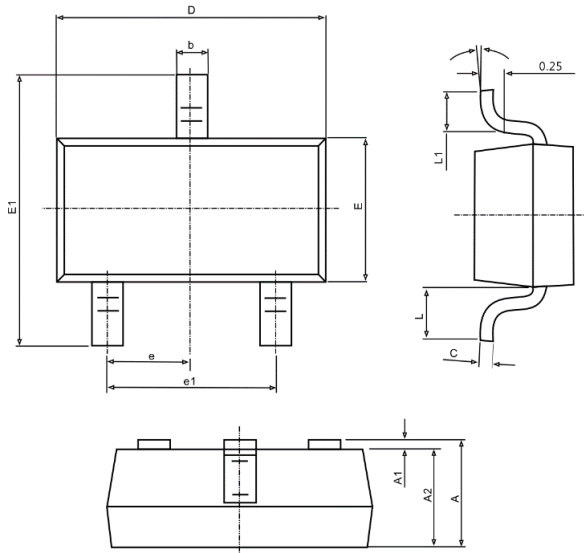
## TYPICAL CHARACTERISTICS



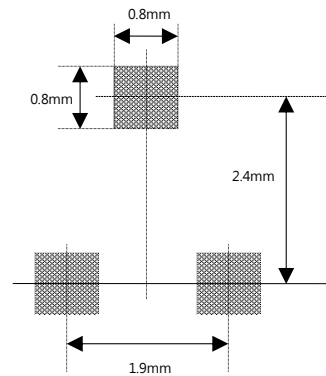
## TYPICAL CHARACTERISTICS



## ■ 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°