

-20V P-Channel Enhancement Mode MOSFET

DESCRIPTION

The SMC3415 is the P-Channel logic enhancement mode power field effect transistor is produced using high cell density, advanced trench technology to provide excellent $R_{DS(ON)}$.

This device is suitable for use as a load switch or in PWM and gate charge for most of the synchronous buck converter applications.

SMC3415S-TRG ROHS Compliant This is Halogen Free

FEATURE

- ◆ -20V/-4.3A, $R_{DS(ON)} = 36m\Omega(typ)@V_{GS} = -10V$
- ◆ -20V/-3.5A, $R_{DS(ON)} = 43m\Omega(typ)@V_{GS} = -4.5V$
- ◆ -20V/-2.5A, $R_{DS(ON)} = 55m\Omega(typ)@V_{GS} = -2.5V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability

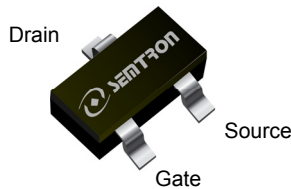
FEATURE

- ◆ DC/DC Converter
- ◆ Load Switch
- ◆ Mobile Battery Powered System

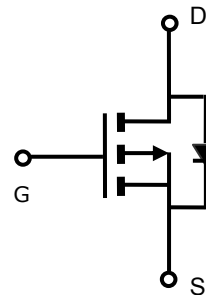


P-Channel Enhancement Mode MOSFET

PIN CONFIGURATION



SOT-23L
Top View



PART NUMBER INFORMATION

| | |
|--|---|
| <p>SMC 3415 S - TR G</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> |
|--|---|

ORDERING INFORMATION

| Part Number | Package Code | Handling Code | Shipping |
|--------------|--------------|----------------|----------|
| SMC3415S-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 | ± 12 | V | |
| I_D | Continuous Drain Current ($T_C=25^\circ\text{C}$) ^A | $V_{GS}=-12\text{V}$ | -4.3 | A |
| | Continuous Drain Current ($T_C=70^\circ\text{C}$) ^A | | -3.6 | A |
| I_{DM} | Pulsed Drain Current ^B | -20 | A | |
| P_D | Power Dissipation | $T_A=25^\circ\text{C}$ | 1.52 | W |
| | | $T_A=70^\circ\text{C}$ | 1.08 | |
| 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 ^A | Steady-State | - | 120 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JL}$ | Thermal Resistance Junction to Lead ^A | 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 |
|---------------------------|---|--|------|-------|-----------|------------|
| Static Parameters | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$ | -20 | | | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -0.4 | -0.65 | -1.0 | V |
| I_{GSS} | Gate Leakage Current | $V_{DS}=0V, V_{GS}=\pm 12V$ | | | ± 100 | nA |
| I_{DSS} | Zero Gate Voltage, Drain-Source Leakage Current | $V_{DS}=-20V, V_{GS}=0V$ $T_J=25^\circ\text{C}$ | | | -1 | μA |
| | | $V_{DS}=-16V, V_{GS}=0V$ $T_J=55^\circ\text{C}$ | | | -5 | |
| $R_{DS(ON)}$ | Drain-source On-Resistance ^B | $V_{GS}=-10V, I_D=-4.3A$ | | 36 | 40 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-3.5A$ | | 43 | 48 | |
| | | $V_{GS}=-2.5V, I_D=-2.5A$ | | 55 | 65 | |
| Source-Drain Diode | | | | | | |
| V_{SD} | Diode Forward Voltage | $I_S=-1.0A, V_{GS}=0V$ | | -0.7 | -1.0 | V |
| I_S | Continuous Source Current ^{AD} | | | | -1 | A |
| Dynamic Parameters | | | | | | |
| $Q_g (-4.5V)$ | Total Gate Charge | $V_{DS}=-15V$ $V_{GS}=-10V$ $I_D=-4.3A$ | | 9.8 | | nC |
| Q_{gs} | Gate-Source Charge | | | 2.1 | | |
| Q_{gd} | Gate-Drain Charge | | | 2.8 | | |
| C_{iss} | Input Capacitance | $V_{DS}=-15V$ $V_{GS}=0V$ $f=1\text{MHz}$ | | 968 | | pF |
| C_{oss} | Output Capacitance | | | 132 | | |
| C_{rss} | Reverse Transfer Capacitance | | | 76 | | |
| $t_{d(on)}$ | Turn-On Time | $V_{DD}=-15V$ $I_D=-4.3A$ | | 6.6 | | nS |
| t_r | | | | 3 | | |
| $t_{d(off)}$ | Turn-Off Time | $V_{GEN}=-10V$ $R_G=6\Omega$ | | 33 | | |
| t_f | | | | 13 | | |

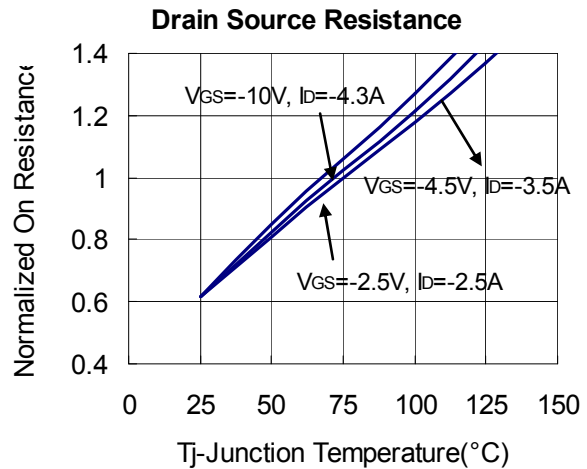
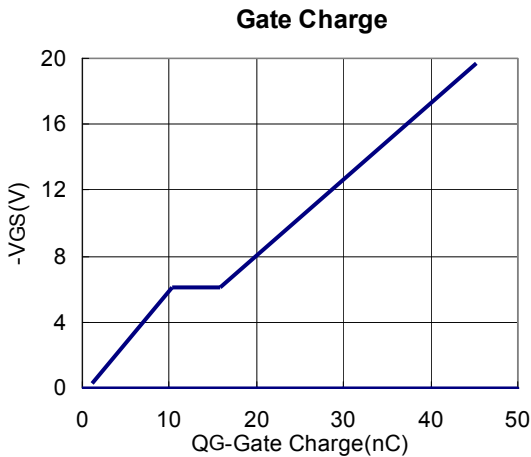
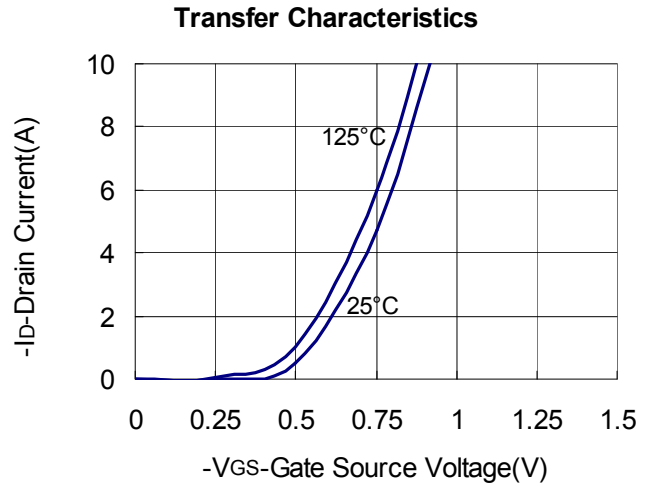
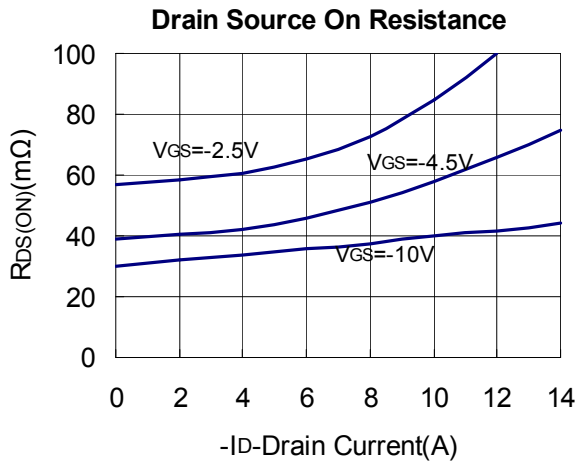
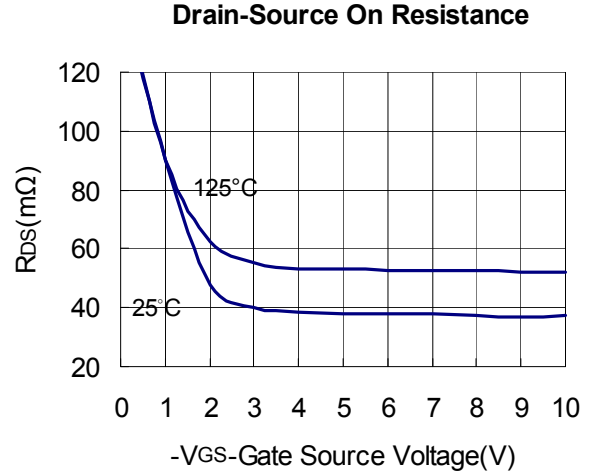
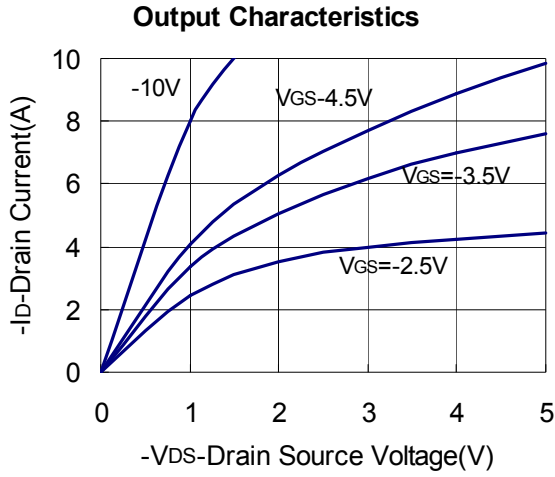
Note:

- 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 $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
- The EAS data shows Max. rating. The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}$.
- 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

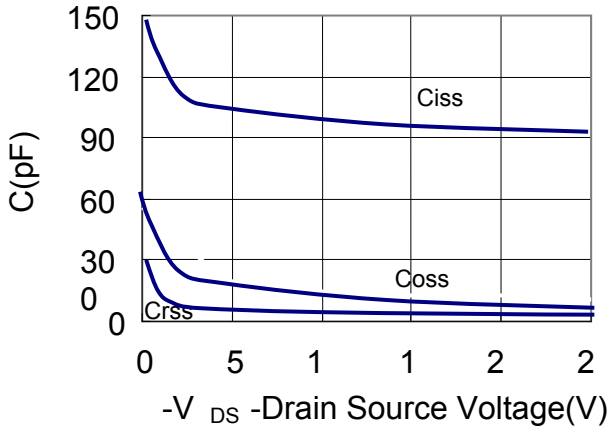
We assume no responsibility for any infringement of patents, patent rights, or other rights arising from the use of any information and circuitry in this datasheet.

TYPICAL CHARACTERISTICS (25°C Unless Note)

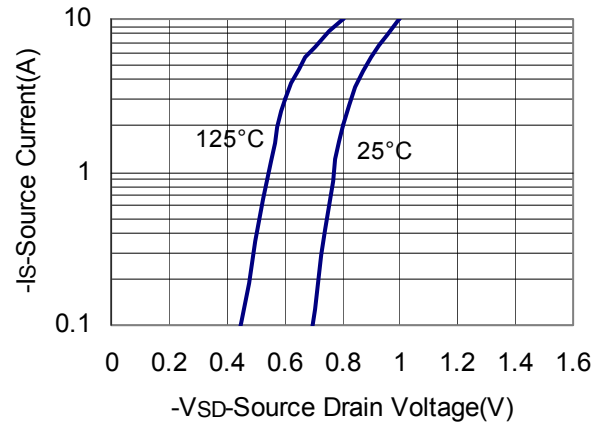


TYPICAL CHARACTERISTICS (25°C Unless Note)

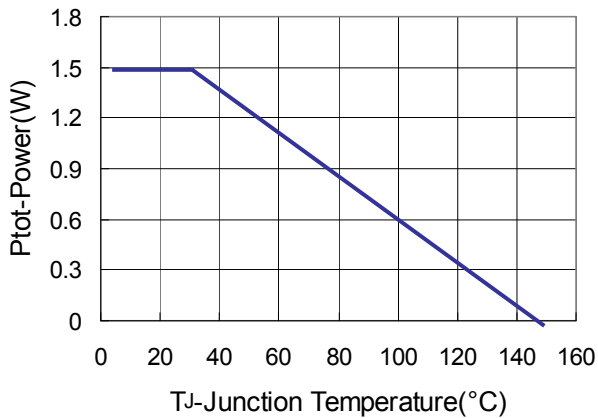
Capacitance



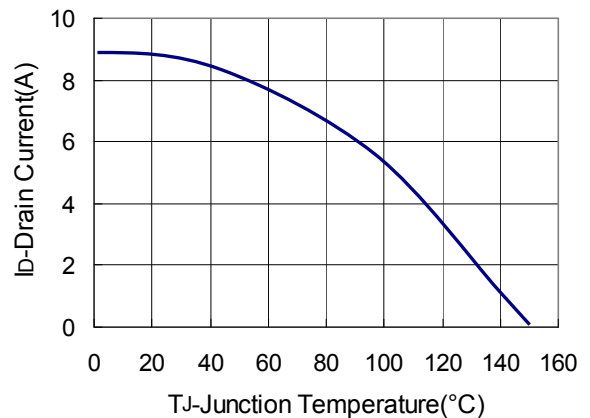
Source Drain Diode Forward



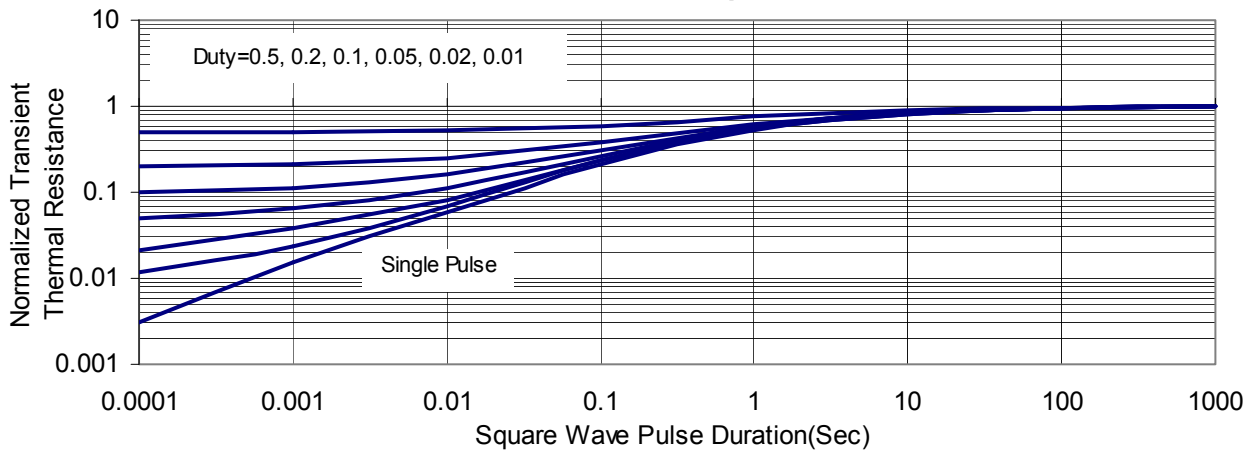
Power Dissipation



Drain Current



Thermal Transient Impedance



■ 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 |
| θ | 0° | 8° | 0° | 8° |

SOT-23L PACKAGE OUTLINE DIMENSIONS

