

Single N-Channel MOSFET

DESCRIPTION

SMC3910J is the N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior, fast switching performance, and withstand high energy pulse in the avalanche and commutation mode.

PART NUMBER INFORMATION

SMC 3910 J - TR G
 a b c d e

- a : Company name.
- b : Product Serial number.
- c : Package code J:SOT-223
- d : Handling code TR:Tape&Reel
- e : Green produce code G:RoHS Compliant

FEATURES

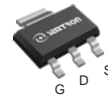
$V_{DS} = 100V, I_D = 3A$

$R_{DS(ON)} = 165m\Omega(Typ.) @ V_{GS} = 10V$
 $R_{DS(ON)} = 170m\Omega(Typ.) @ V_{GS} = 4.5V$

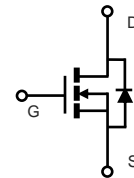
- ◆ 100% EAS Guaranteed
- ◆ Improved dv/dt capability
- ◆ Fast switching

APPLICATIONS

- ◆ LED applications
- ◆ Transformer Driving Switch
- ◆ Load Switch



SOT-223



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

| Symbol | Parameter | Rating | Units |
|-----------|---|--------------------|------------|
| V_{DSS} | Drain-Source Voltage | 100 | V |
| V_{GSS} | Gate-Source Voltage | ± 20 | V |
| I_D | Continuous Drain Current | $T_A = 25^\circ C$ | 3 |
| | | $T_A = 70^\circ C$ | 2.4 |
| I_{DM} | Pulsed Drain Current ^A | 12 | A |
| I_{AS} | Avalanche Current ^A | 5 | A |
| EAS | Single Pulse Avalanche energy $L = 0.3mH$ ^{AF} | 3.75 | mJ |
| P_D | Power Dissipation ^C | $T_A = 25^\circ C$ | 3.6 |
| | | $T_A = 70^\circ C$ | 2.3 |
| 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 ^B | $t \leq 10s$ | 35 | $^\circ C/W$ |
| | Thermal Resistance Junction to Ambient ^{BD} | Steady-State | 70 | |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | | 35 | |

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

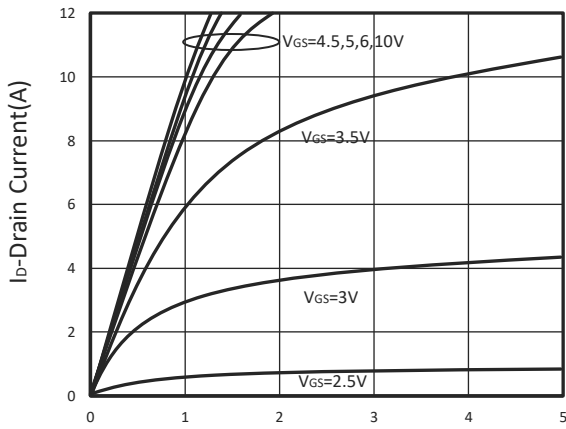
| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|-----|------------|------------|-----------|
| Static Parameters | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | | | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.2 | 1.8 | 2.5 | V |
| I_{GSS} | Gate Leakage Current | $V_{DS}=0V, V_{GS}=\pm 20V$ | | | ± 100 | nA |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$ | | | 1 | μA |
| | | $V_{DS}=24V, V_{GS}=0V, T_J=75^\circ\text{C}$ | | | 10 | |
| $R_{DS(ON)}$ | Drain-source On-Resistance ^E | $V_{GS}=10V, I_D=3A$ $V_{GS}=4.5V, I_D=2A$ | | 165 170 | 180 190 | $m\Omega$ |
| G_{fs} | Forward Transconductance | $V_{DS}=10V, I_D=1A$ | | 5 | | S |
| Diode Characteristics | | | | | | |
| V_{SD} | Diode Forward Voltage ^E | $I_S=1A, V_{GS}=0V$ | | 0.7 | 1 | V |
| I_S | Diode Continuous Forward Current | | | | 3 | A |
| T_{rr} | Reverse Recovery Time | $I_S=3A, di/dt=100A/\mu s$ | | 25 | | ns |
| Q_{rr} | Reverse Recovery Charge | | | 30 | | nC |
| Dynamic and Switching Parameters | | | | | | |
| Q_g | Total Gate Charge | $V_{DS}=30V, V_{GS}=10V, I_D=3A$ | | 11.3 | 16.9 | nC |
| Q_g | Total Gate Charge (4.5V) | | | 5.5 | 11 | |
| Q_{gs} | Gate-Source Charge | | | 2 | 3 | |
| Q_{gd} | Gate-Drain Charge | | | 2.1 | 4.2 | |
| C_{iss} | Input Capacitance | $V_{DS}=30V, V_{GS}=0V, f=1\text{MHz}$ | | 470 | | pF |
| C_{oss} | Output Capacitance | | | 38 | | |
| C_{rss} | Reverse Transfer Capacitance | | | 21 | | |
| $t_{d(on)}$ | Turn-On Time ^E | $V_{DD}=30V, V_{GEN}=10V,$ $R_G=6\Omega, I_D=1A$ | | 9 | 17 | ns |
| t_r | | | | 6.3 | 12 | |
| $t_{d(off)}$ | Turn-Off Time ^E | | | 18 | 34 | |
| t_f | | | | 4.2 | 8 | |

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

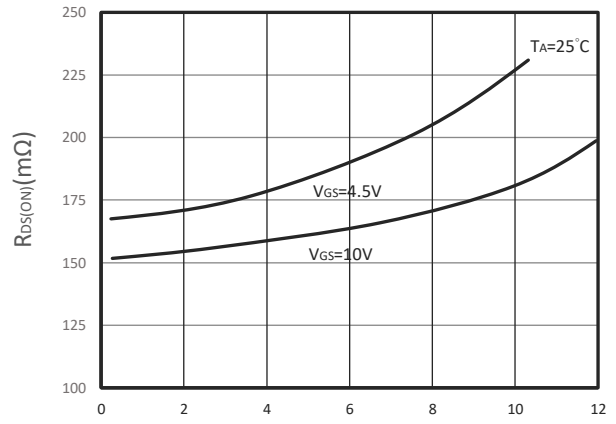
- A. Pulsed width limited by maximum junction temperature, $T_{J(MAX)}=150^\circ\text{C}$.
- B. Measure the value in a still air environment at $T_A=25^\circ\text{C}$, using an installation mounted on a 1 in2 FR-4 board, maximum junction temperature $T_{J(MAX)}=150^\circ\text{C}$.
- C. Using junction-to-case thermal resistance, dissipation limit in the case of additional heat.
- D. $T_{J(MAX)}=150^\circ\text{C}$, using junction-to-case thermal resistance ($R_{\theta JC}$) is more useful in additional heat sinking is used.
- E. The pulse test width is $\leq 300\mu s$ and the duty cycle $\leq 2\%$.
- F. The EAs data shows Maximum, tested and pulse width limited by maximum.

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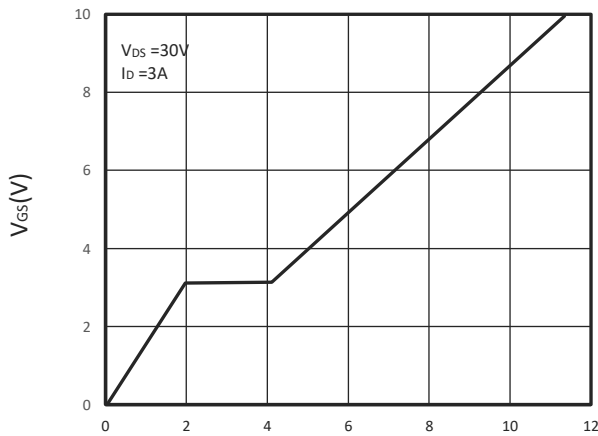
TYPICAL CHARACTERISTICS



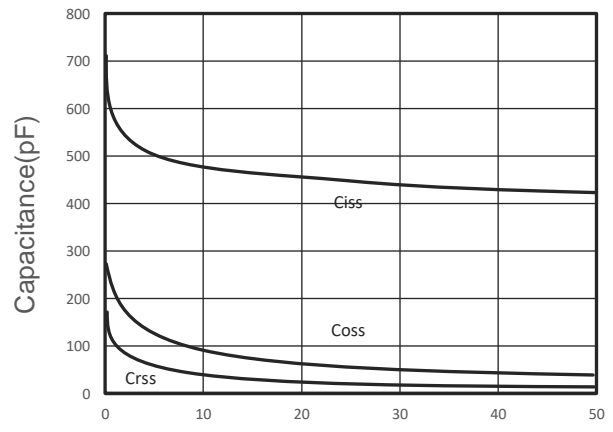
V_{DS}-Drain Source Voltage (V)
Output Characteristics



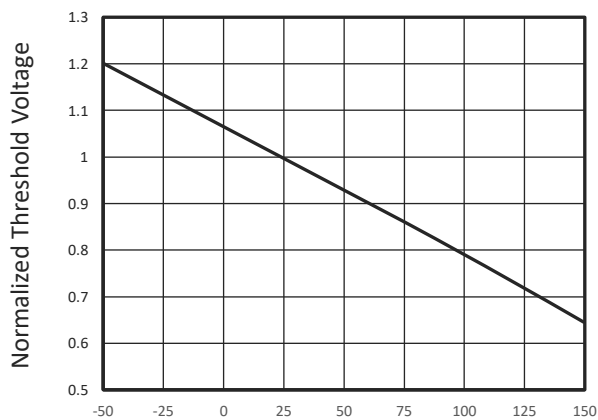
Id-Drain Current (A)
Drain-Source On Resistance



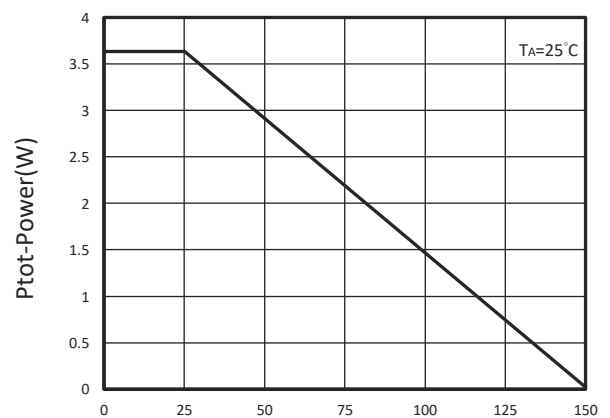
Qg-Gate Charge (nC)
Gate Charge



V_{DS}-Drain Source Voltage (V)
Capacitance

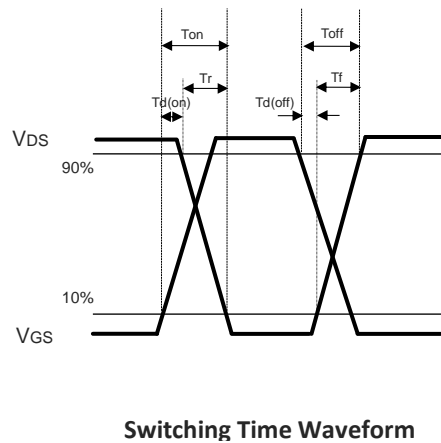
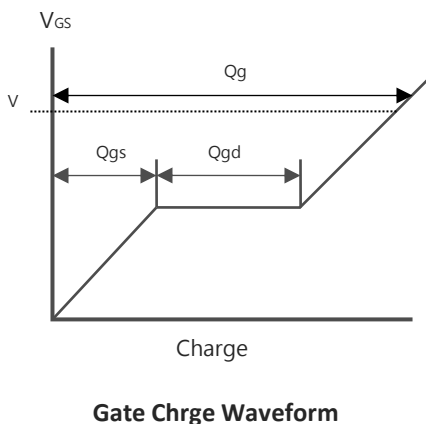
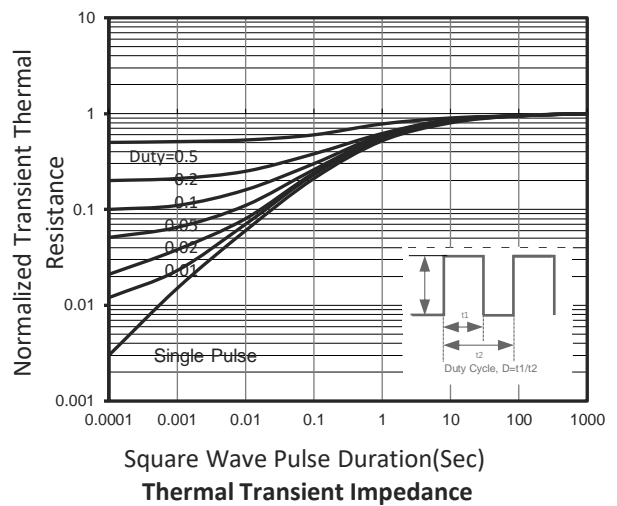
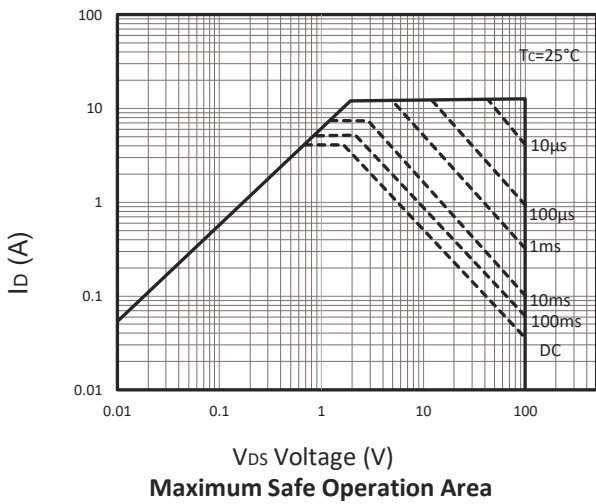
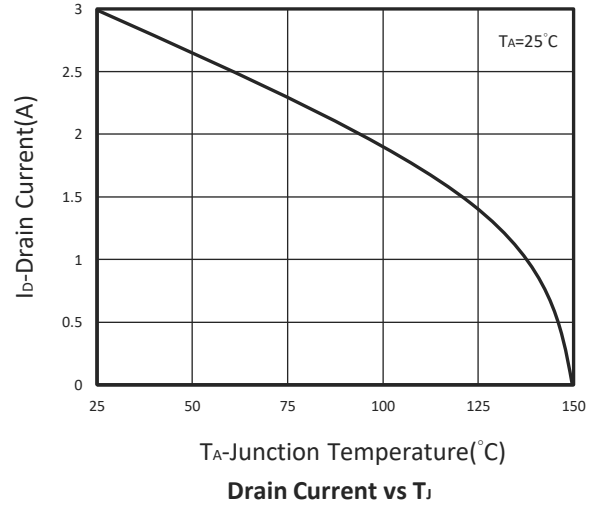
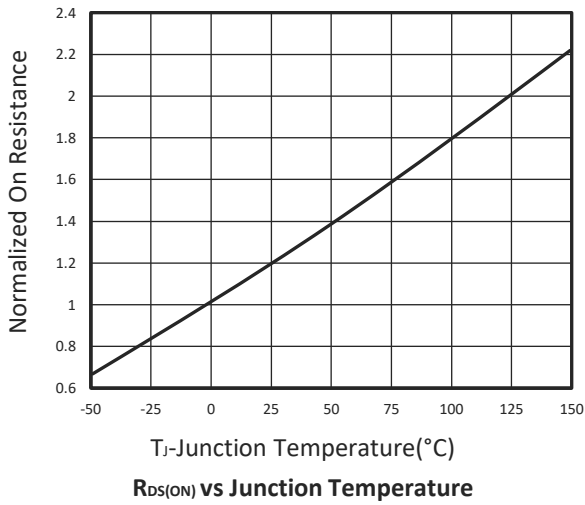


T_J-Junction Temperature (°C)
Gate Threshold Voltage

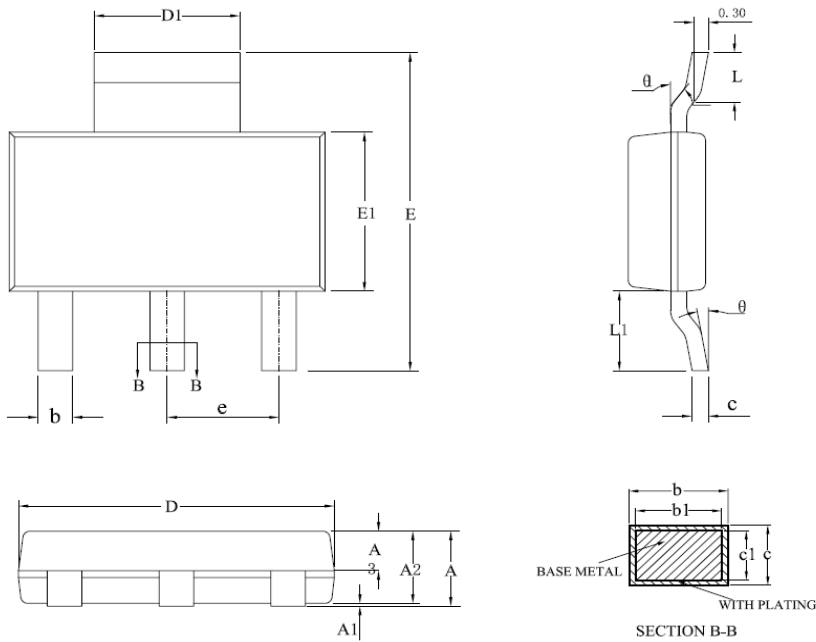


T_J-Junction Temperature (°C)
Power Dissipation

TYPICAL CHARACTERISTICS



■ SOT-223 PACKAGE DIMENSIONS



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.520 | 1.800 | 0.060 | 0.071 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.500 | 1.700 | 0.059 | 0.067 |
| A3 | 0.800 | 1.000 | 0.031 | 0.039 |
| b | 0.660 | 0.820 | 0.026 | 0.032 |
| b1 | 0.680 | 0.740 | 0.027 | 0.029 |
| c | 0.300 | 0.350 | 0.012 | 0.014 |
| c1 | 0.290 | 0.310 | 0.011 | 0.012 |
| D | 6.200 | 6.400 | 0.244 | 0.252 |
| D1 | 2.900 | 3.100 | 0.114 | 0.122 |
| E | 6.830 | 7.070 | 0.269 | 0.278 |
| E1 | 3.300 | 3.700 | 0.130 | 0.146 |
| e | 2.300 BSC. | | 0.091 BSC. | |
| L | 0.900 | 1.150 | 0.035 | 0.045 |
| L1 | 1.75 BSC. | | 0.069 BSC. | |
| θ | 0° | 10° | 0° | 10° |