

Single N-Channel MOSFET

DESCRIPTION

SMC2360 is the N-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 are needed in small outline surface mount package.

PART NUMBER INFORMATION

SMC 2360 S - TR G
 a b c d e

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

FEATURES

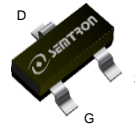
$V_{DS}=60V, I_D=3.8A$

$R_{DS(ON)}=58m\Omega(Typ.)@V_{GS}=10V$
 $R_{DS(ON)}=66m\Omega(Typ.)@V_{GS}=4.5V$

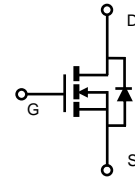
- ◆ Fast switch

APPLICATIONS

- ◆ Hand-Held Instruments
- ◆ Power Management
- ◆ LED Lighting



SOT-23



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

| Symbol | Parameter | Rating | Units |
|-----------|--|------------------|------------|
| V_{DSS} | Drain-Source Voltage | 60 | V |
| V_{GSS} | Gate-Source Voltage | ± 20 | V |
| I_D | Continuous Drain Current | $T_A=25^\circ C$ | 3.8 |
| | | $T_A=70^\circ C$ | 3.1 |
| I_{DM} | Pulsed Drain Current ^B | 15.2 | A |
| I_{AS} | Avalanche Current ^B | 5 | A |
| E_{AS} | Single Pulse Avalanche energy $L=0.3mH$ ^B | 3.75 | mJ |
| P_D | Power Dissipation ^A | $T_A=25^\circ C$ | 1.6 |
| | | $T_A=70^\circ C$ | 1 |
| 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 ($T_A = 25^\circ\text{C}$ Unless otherwise noted)

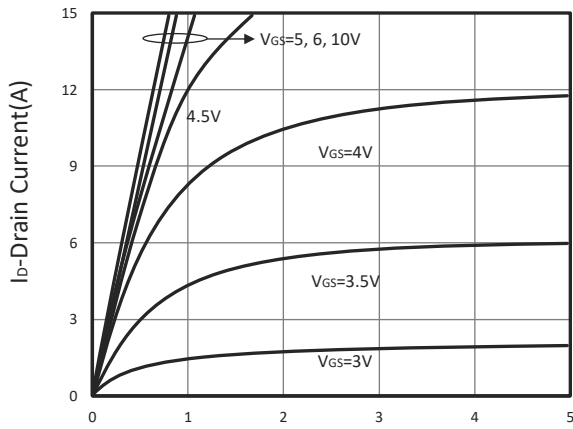
| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|-----|----------|-----------|------------|
| Static Parameters | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250 μ A | 60 | | | V |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250 μ A | 1.2 | 1.8 | 2.5 | V |
| I _{GSS} | Gate Leakage Current | V _{DS} =0V, V _{GS} = \pm 20V | | | \pm 100 | nA |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =60V, V _{GS} =0V, T _J =25 $^\circ$ C | | | 1 | μ A |
| | | V _{DS} =48V, V _{GS} =0V, T _J =75 $^\circ$ C | | | 10 | |
| R _{DS(ON)} | Drain-source On-Resistance ^D | V _{GS} =10V, I _D =3.8A V _{GS} =4.5V, I _D =3.1A | | 58 66 | 64 76 | m Ω |
| G _{fs} | Forward Transconductance | V _{DS} =10V, I _D =3.8A | | 2 | | S |
| Diode Characteristics | | | | | | |
| V _{SD} | Diode Forward Voltage ^D | I _S =1A, V _{GS} =0V | | 0.75 | 1 | V |
| I _S | Diode Continuous Forward Current | | | | 2 | A |
| Dynamic and Switching Parameter ^E | | | | | | |
| Q _g | Total Gate Charge (10V) | V _{DS} =30V, V _{GS} =10V, I _D =3.8A | | 9.2 | 12.9 | nC |
| Q _g | Total Gate Charge (4.5V) | | | 4.6 | 6.4 | |
| Q _{gs} | Gate-Source Charge | | | 2.1 | 2.9 | |
| Q _{gd} | Gate-Drain Charge | | | 1.8 | 2.5 | |
| C _{iss} | Input Capacitance | V _{DS} =30V, V _{GS} =0V, f=1MHz | | 490 | | pF |
| C _{oss} | Output Capacitance | | | 42 | | |
| C _{rss} | Reverse Transfer Capacitance | | | 15 | | |
| t _{d(on)} | Turn-On Time | V _{DD} =30V, V _{GEN} =10V, R _G =3.3 Ω , I _D =1A | | 4.7 | 9 | nS |
| t _r | | | | 9.5 | | |
| t _{d(off)} | Turn-Off Time | | | 18.4 | | |
| t _f | | | | 5.3 | | |

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

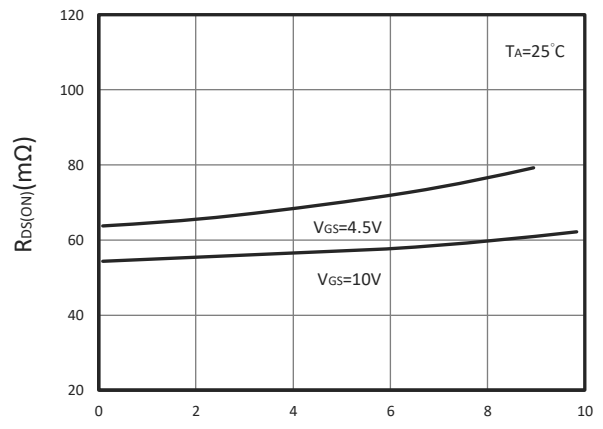
- A. Surface mounted on FR4 board using 1 in² pad size.
- B. Pulsed width limited by maximum junction temperature, T_{J(MAX)}=150 $^\circ$ C.
- C. Using \leq 10s junction-to-ambient thermal resistance is base on T_{J(MAX)}=150 $^\circ$ C.
- D. Pulse test width \leq 300 μ s and duty cycle \leq 2%.
- E.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

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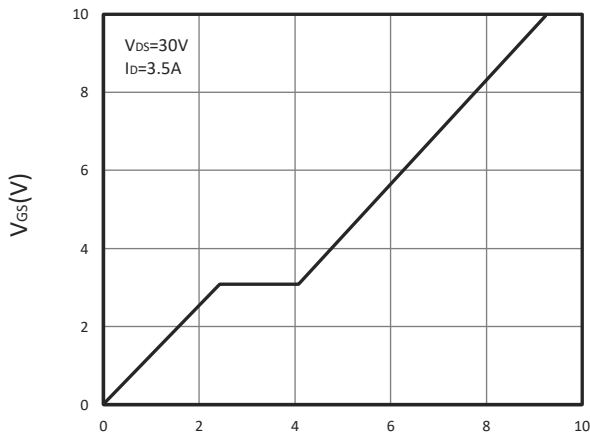
TYPICAL CHARACTERISTICS



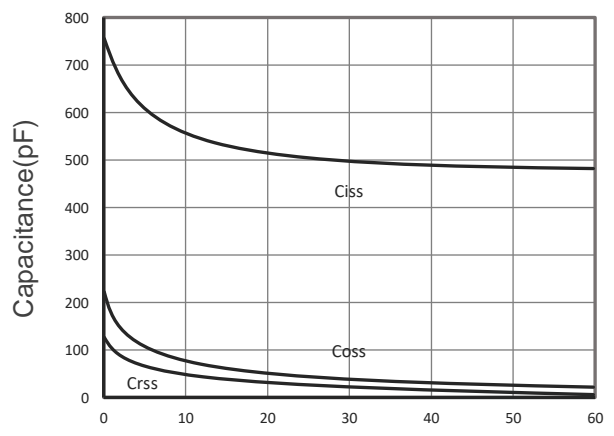
Output Characteristics



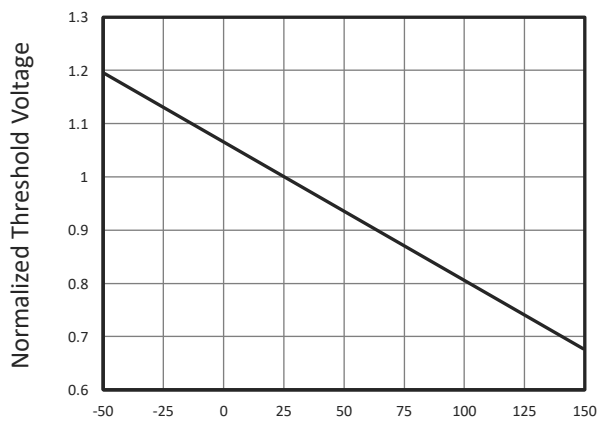
Drain-Source On Resistance



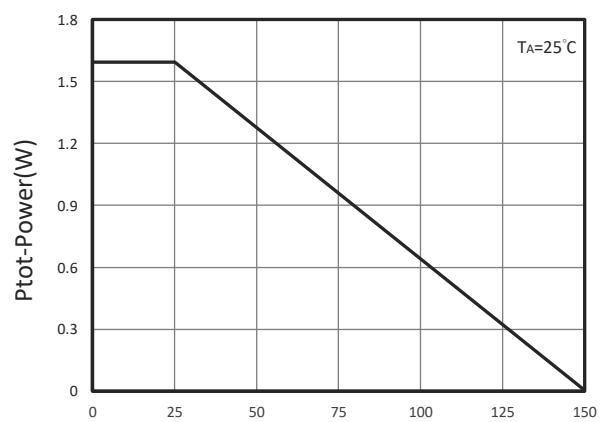
Gate Charge



Capacitance

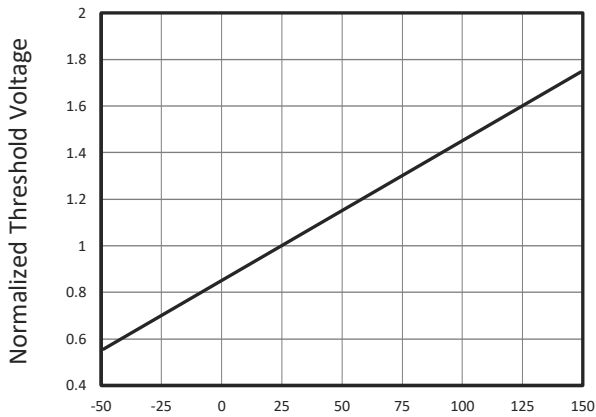


Gate Threshold Voltage

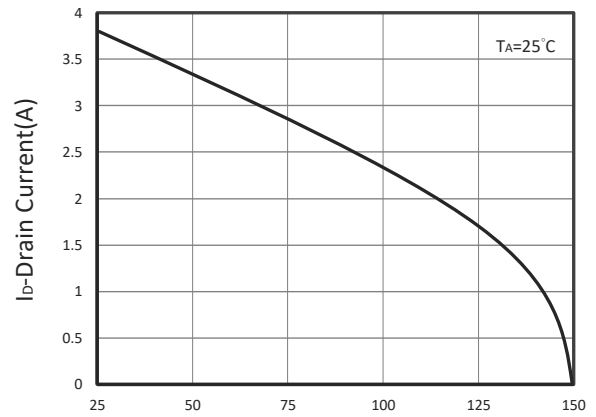


Power Dissipation

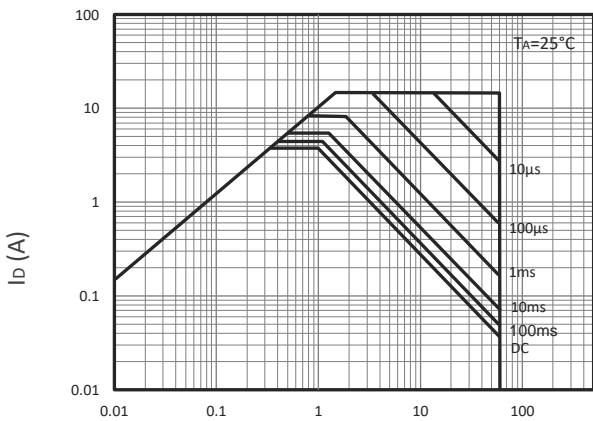
TYPICAL CHARACTERISTICS



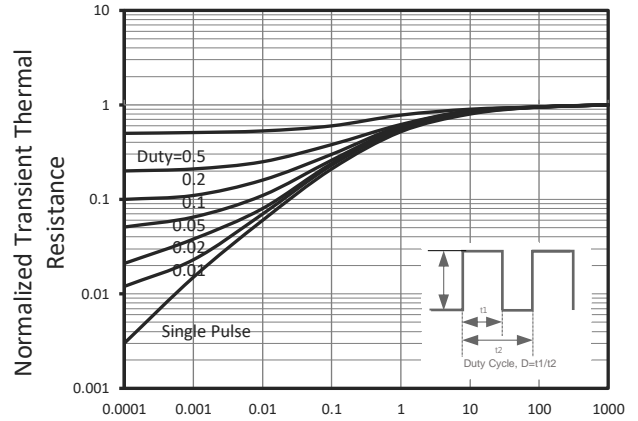
T_J-Junction Temperature(°C)
Gate Threshold Voltage



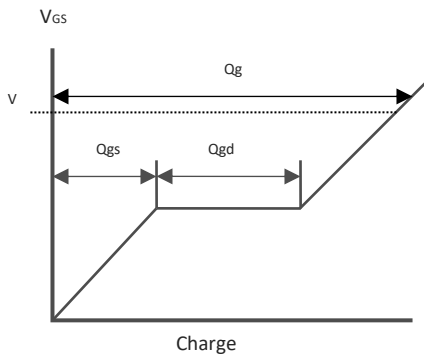
T_J-Junction Temperature(°C)
Drain Current vs T_J



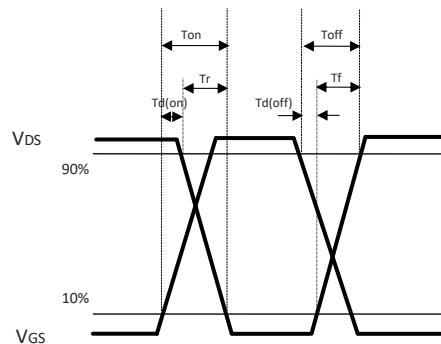
V_{DS} Voltage (V)
Maximum Safe Operation Area



Square Wave Pulse Duration(Sec)
Thermal Transient Impedance

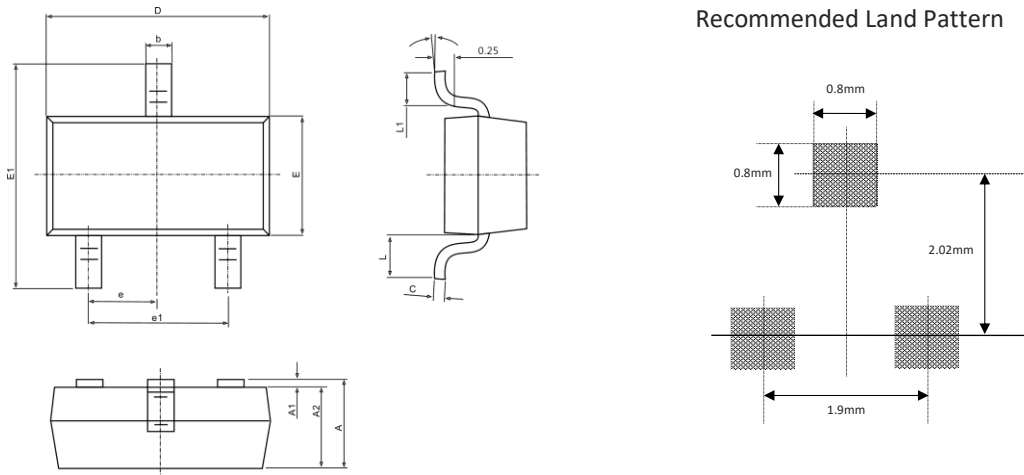


Gate Chrg Waveform



Switching Time Waveform

■ SOT-23 PACKAGE DIMENSIONS



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.940 | 1.120 | 0.037 | 0.044 |
| A1 | 0.040 | 0.120 | 0.002 | 0.005 |
| A2 | 0.900 | 1.000 | 0.035 | 0.039 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.090 | 0.110 | 0.004 | 0.004 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 BSC | | 0.037 BSC | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.500 | 0.600 | 0.020 | 0.024 |
| L | 0.550 BSC | | 0.022 BSC. | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 1° | 7° | 1° | 7° |