

## Single P-Channel MOSFET

### DESCRIPTION

SMC2327SN 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 are needed in small outline surface mount package.

### PART NUMBER INFORMATION

**SMC 2327 SN - TR G**  
 a b c d e

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

### FEATURES

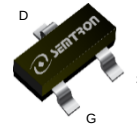
**$V_{DS}=-20V$ ,  $I_D=-4.2A$**

$R_{DS(ON)}=38m\Omega(Typ.)@V_{GS}=-10V$   
 $R_{DS(ON)}=45m\Omega(Typ.)@V_{GS}=-4.5V$   
 $R_{DS(ON)}=60m\Omega(Typ.)@V_{GS}=-2.5V$   
 $R_{DS(ON)}=80m\Omega(Typ.)@V_{GS}=-1.8V$

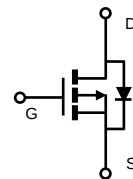
- ◆ Fast switch
- ◆ 1.8V Low gate drive applications
- ◆ High power and current handling capability

### APPLICATIONS

- ◆ Hand-Held Instruments
- ◆ Load Switch



SOT-23



### 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                                      | $\pm 12$          | V           |
| $I_D$     | Continuous Drain Current <sup>A</sup> ( $V_{GS}=-4.5V$ ) | $T_A=25^{\circ}C$ | -4.2        |
|           |                                                          | $T_A=70^{\circ}C$ | -3.4        |
| $I_{DM}$  | Pulsed Drain Current <sup>B</sup>                        | 16.8              | A           |
| $P_D$     | Power Dissipation <sup>A</sup>                           | $T_A=25^{\circ}C$ | 1.3         |
|           |                                                          | $T_A=70^{\circ}C$ | 0.8         |
| $T_J$     | 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>A</sup>  | $t \leq 10s$ | 95  | $^{\circ}C/W$ |
|                 | Thermal Resistance Junction to Ambient <sup>AC</sup> | Steady-State | 130 |               |

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C Unless otherwise noted )

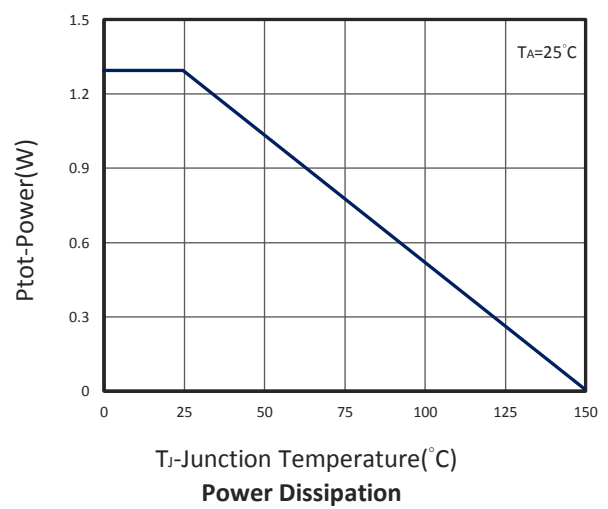
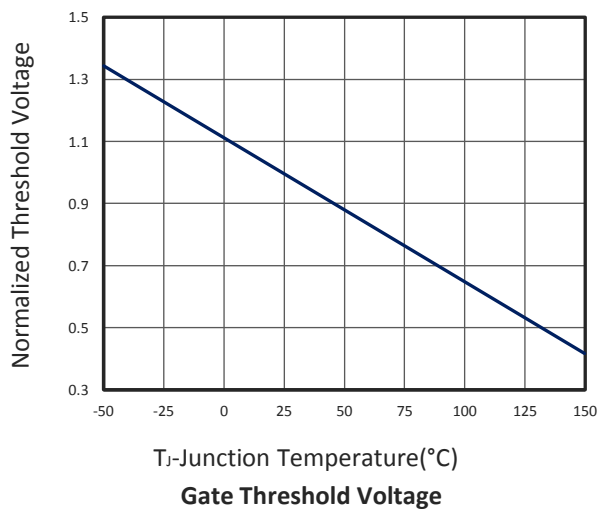
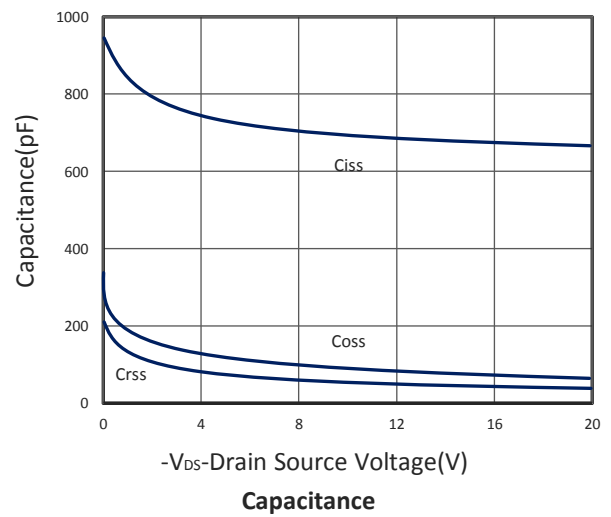
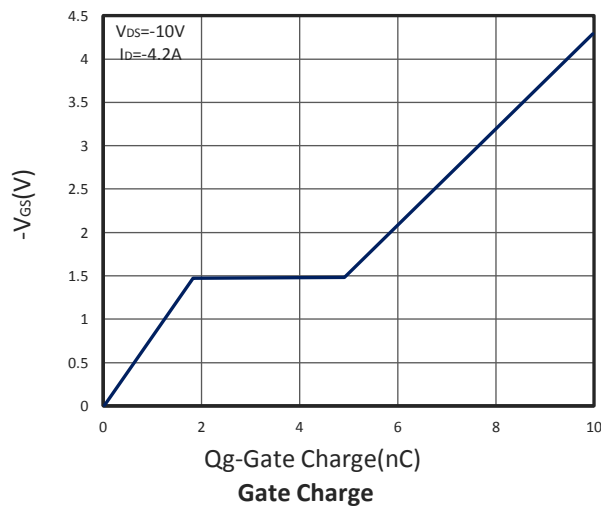
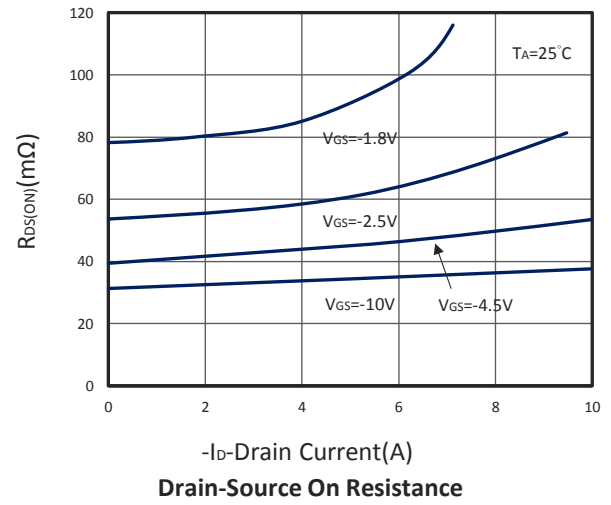
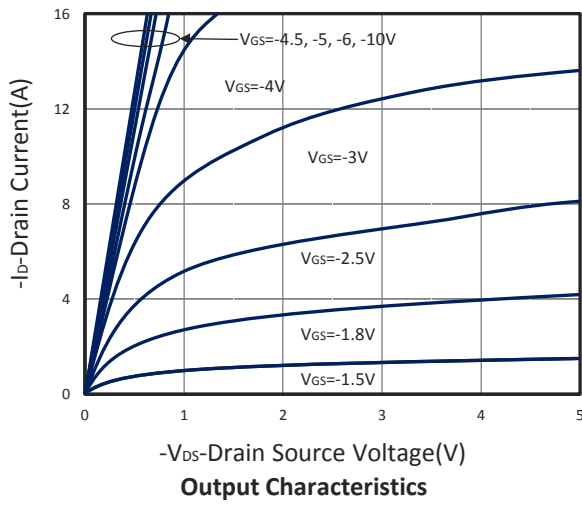
| Symbol                                        | Parameter                               | Condition                                                                                                                                                                                     | Min  | Typ                  | Max                  | Unit |
|-----------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------|----------------------|------|
| Static Parameters                             |                                         |                                                                                                                                                                                               |      |                      |                      |      |
| BV <sub>DSS</sub>                             | Drain-Source Breakdown Voltage          | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                                                                                                                                                   | -20  |                      |                      | V    |
| V <sub>GS(th)</sub>                           | Gate Threshold Voltage                  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                                                                                                                     | -0.5 | -0.7                 | -1                   | V    |
| I <sub>GSS</sub>                              | Gate Leakage Current                    | V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V                                                                                                                                                    |      |                      | ±100                 | nA   |
| I <sub>DSS</sub>                              | Zero Gate Voltage Drain Current         | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                                                                                                                              |      |                      | -1                   | μA   |
|                                               |                                         | V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V, T <sub>J</sub> =75°C                                                                                                                              |      |                      | -10                  |      |
| R <sub>DS(ON)</sub>                           | Drain-source On-Resistance <sup>Ⓟ</sup> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-4.5A<br>V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.2A<br>V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.5A<br>V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-2A |      | 38<br>45<br>60<br>80 | 43<br>50<br>68<br>95 | mΩ   |
| G <sub>fs</sub>                               | Forward Transconductance                | V <sub>DS</sub> =-5V, I <sub>D</sub> =-3A                                                                                                                                                     |      | 12                   |                      | S    |
| Diode Characteristics                         |                                         |                                                                                                                                                                                               |      |                      |                      |      |
| V <sub>SD</sub>                               | Diode Forward Voltage <sup>Ⓟ</sup>      | I <sub>S</sub> =-1A,V <sub>GS</sub> =0V                                                                                                                                                       |      |                      | -1                   | V    |
| I <sub>S</sub>                                | Diode Continuous Forward Current        |                                                                                                                                                                                               |      |                      | -2.1                 | A    |
| t <sub>rr</sub>                               | Reverse Recovery Time                   | I <sub>S</sub> =-3A, dI/dt=100A/μs                                                                                                                                                            |      | 20                   |                      | ns   |
| Q <sub>rr</sub>                               | Reverse Recovery Charge                 |                                                                                                                                                                                               |      | 6.7                  |                      | nC   |
| Dynamic and Switching Parameters <sup>Ⓔ</sup> |                                         |                                                                                                                                                                                               |      |                      |                      |      |
| Q <sub>g</sub>                                | Total Gate Charge                       | V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V<br>I <sub>D</sub> =-4.2A                                                                                                                        |      | 10.3                 | 14.4                 | nC   |
| Q <sub>gs</sub>                               | Gate-Source Charge                      |                                                                                                                                                                                               |      | 1.9                  | 2.5                  |      |
| Q <sub>gd</sub>                               | Gate-Drain Charge                       |                                                                                                                                                                                               |      | 3                    | 4.2                  |      |
| C <sub>iss</sub>                              | Input Capacitance                       | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, f=1MHz                                                                                                                                            |      | 680                  |                      | pF   |
| C <sub>oss</sub>                              | Output Capacitance                      |                                                                                                                                                                                               |      | 76                   |                      |      |
| C <sub>rss</sub>                              | Reverse Transfer Capacitance            |                                                                                                                                                                                               |      | 45                   |                      |      |
| t <sub>d(on)</sub>                            | Turn-On Time                            | V <sub>DD</sub> =-10V, V <sub>GEN</sub> =-4.5V<br>R <sub>G</sub> =3.3Ω, I <sub>D</sub> =-1A                                                                                                   |      | 5.8                  | 11                   | nS   |
| t <sub>r</sub>                                |                                         |                                                                                                                                                                                               |      | 21                   | 40                   |      |
| t <sub>d(off)</sub>                           | Turn-Off Time                           |                                                                                                                                                                                               |      | 32                   | 61                   |      |
| t <sub>f</sub>                                |                                         |                                                                                                                                                                                               |      | 16                   | 30                   |      |

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

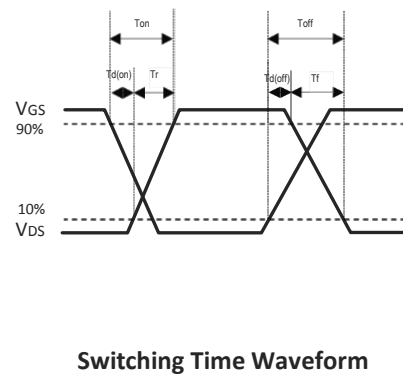
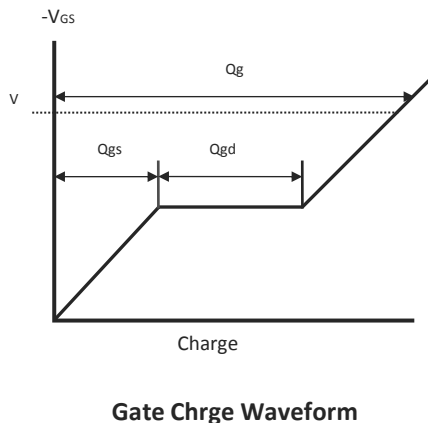
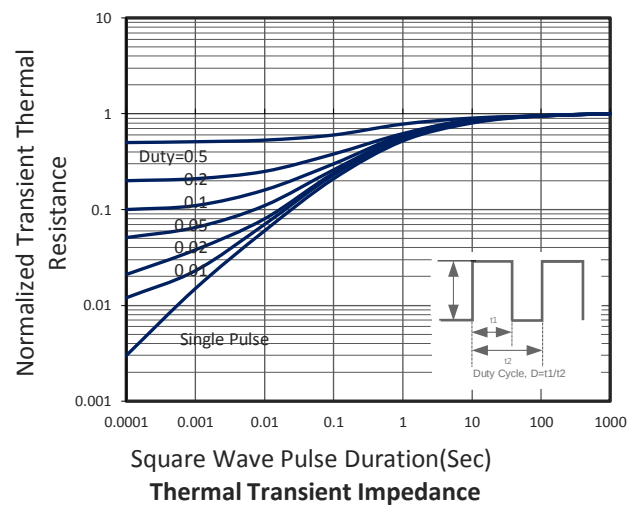
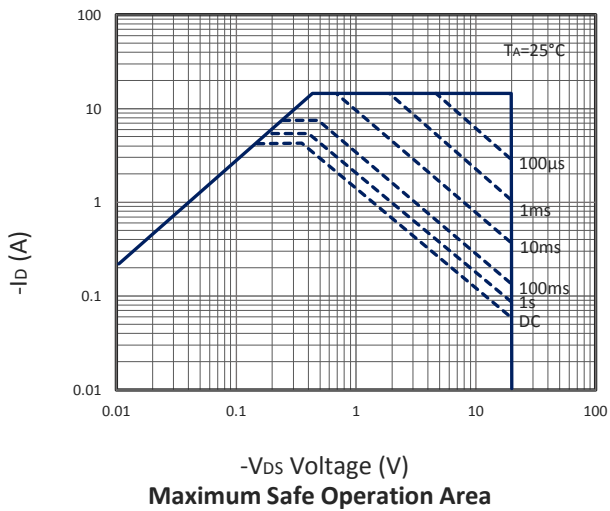
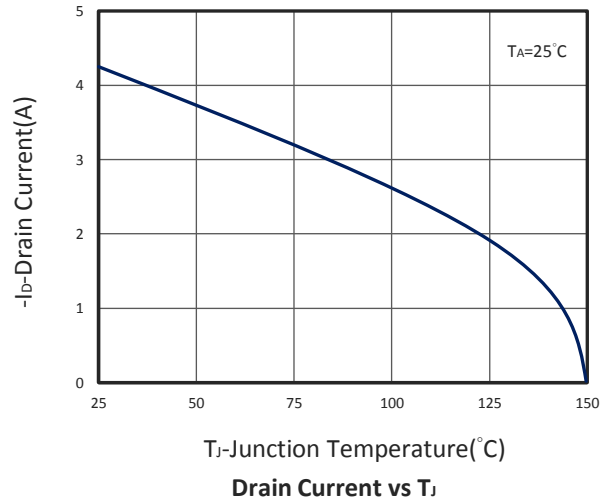
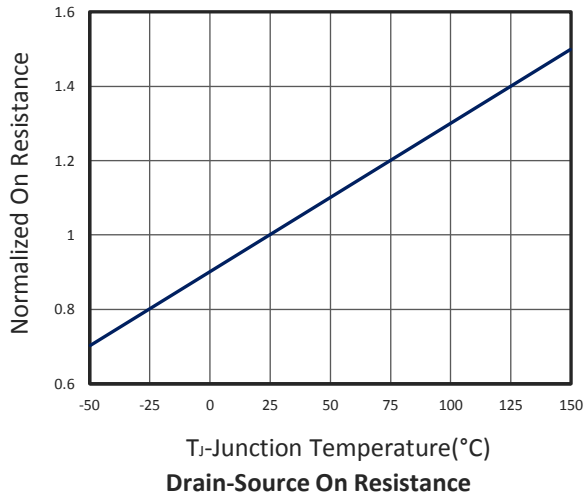
- A. Surface mounted on FR4 board using 1 in<sup>2</sup> pad size.
- B. Pulsed width limited by maximum junction temperature, T<sub>J(MAX)</sub>=150°C (initial temperature T<sub>J</sub>=25°C).
- C. Using ≤ 10s junction-to-ambient thermal resistance is base on T<sub>J(MAX)</sub>=150°C.
- D. Pulse test width ≤300μs and duty cycle ≤ 2%.
- E. Guaranteed by design, not subject to production testing.

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.

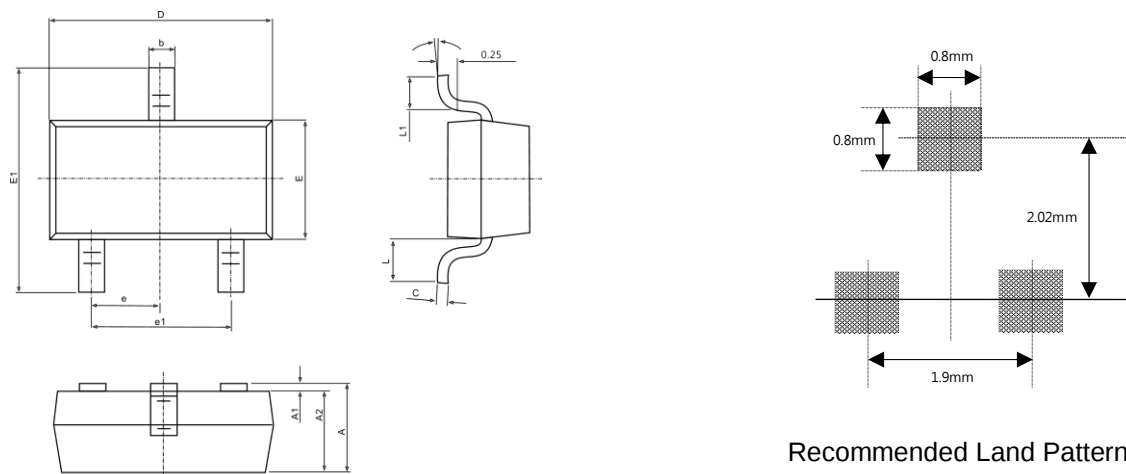
**TYPICAL CHARACTERISTICS**



## TYPICAL CHARACTERISTICS



## SOT-23 PACKAGE DIMENSIONS



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.900                     | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.050 | 0.035                | 0.041 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| 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 TYP.                |       | 0.037 TYP.           |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF.                |       | 0.022 REF.           |       |
| L1     | 0.300                     | 0.500 | 0.012                | 0.020 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |