

RoHS Compliant Product  
A Suffix of "-C" specifies halogen & lead-free

## DESCRIPTIONS

The SMS6001 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in DC-DC conversion, load switch and level shift.

## MECHANICAL DATA

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- ESD Rating: 2KV HBM

## APPLICATION

- DC-DC converter circuit
- Load Switch

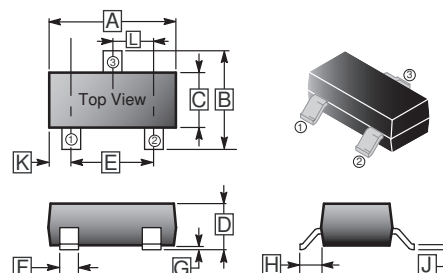
## DEVICE MARKING:

**W61\*** ← \* = Date Code

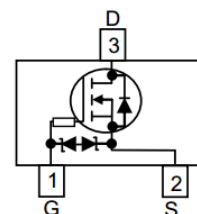
## PACKAGE INFORMATION

| Package | MPQ | Leader Size |
|---------|-----|-------------|
| SOT-23  | 3K  | 7' inch     |

## SOT-23



| REF. | Millimeter |      | REF. | Millimeter |      |
|------|------------|------|------|------------|------|
|      | Min.       | Max. |      | Min.       | Max. |
| A    | 2.70       | 3.10 | G    | 0.09       | 0.18 |
| B    | 2.10       | 2.65 | H    | 0.35       | 0.65 |
| C    | 1.20       | 1.40 | J    | 0.08       | 0.20 |
| D    | 0.89       | 1.15 | K    | 0.6        | REF. |
| E    | 1.78       | 2.04 | L    | 0.95       | BSC. |
| F    | 0.30       | 0.50 |      |            |      |



Pin Configuration (Top View)

## MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                                      | Symbol                   | Rating   |              | Unit                        |
|------------------------------------------------|--------------------------|----------|--------------|-----------------------------|
|                                                |                          | 10S      | Steady State |                             |
| Drain – Source Voltage                         | $V_{DS}$                 | 60       |              | V                           |
| Gate – Source Voltage                          | $V_{GS}$                 | $\pm 20$ |              | V                           |
| Continuous Drain Current <sup>1.4</sup>        | $T_A = 25^\circ\text{C}$ | 0.5      | 0.44         | A                           |
|                                                | $T_A = 70^\circ\text{C}$ | 0.4      | 0.35         |                             |
| Power Dissipation <sup>1.4</sup>               | $T_A = 25^\circ\text{C}$ | 0.69     | 0.53         | W                           |
|                                                | $T_A = 70^\circ\text{C}$ | 0.44     | 0.34         |                             |
| Continuous Drain Current <sup>2.4</sup>        | $T_A = 25^\circ\text{C}$ | 0.47     | 0.42         | A                           |
|                                                | $T_A = 70^\circ\text{C}$ | 0.38     | 0.33         |                             |
| Power Dissipation <sup>2.4</sup>               | $T_A = 25^\circ\text{C}$ | 0.6      | 0.47         | W                           |
|                                                | $T_A = 70^\circ\text{C}$ | 0.39     | 0.3          |                             |
| Pulsed Drain Current <sup>3</sup>              | $I_{DM}$                 | 1        |              | A                           |
| Maximum Junction-to-Lead                       | $R_{\theta JL}$          | 260      |              | $^\circ\text{C} / \text{W}$ |
| Operating Junction & Storage Temperature Range | $T_J, T_{STG}$           | -55~150  |              | $^\circ\text{C}$            |

## THERMAL RESISTANCE RATINGS

| Parameter                                           |              | Symbol          | Rating |      | Unit   |
|-----------------------------------------------------|--------------|-----------------|--------|------|--------|
|                                                     |              |                 | Typ.   | Max. |        |
| Junction-to-Ambient Thermal Resistance <sup>1</sup> | $T \leq 10S$ | $R_{\theta JA}$ | 140    | 180  | °C / W |
|                                                     | Steady State |                 | 176    | 232  |        |
| Junction-to-Ambient Thermal Resistance <sup>2</sup> | $T \leq 10S$ | $R_{\theta JA}$ | 165    | 205  |        |
|                                                     | Steady State |                 | 198    | 261  |        |
| Junction-to-Case Thermal Resistance                 | Steady State | $R_{\theta JC}$ | 100    | 120  |        |

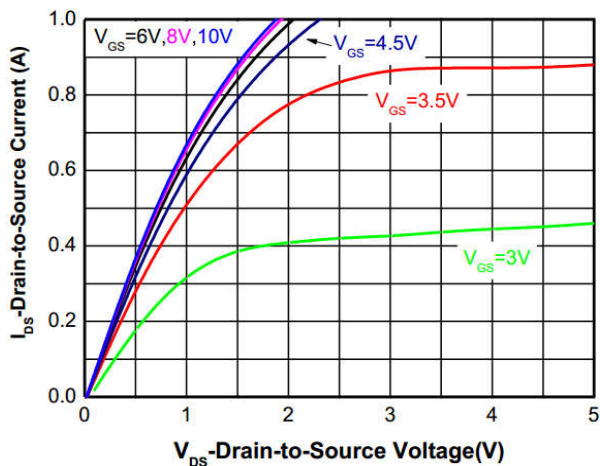
## ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ C$ unless otherwise specified)

| Parameter                                 | Symbol        | Min. | Typ.  | Max.    | Unit     | Teat Conditions                                                   |
|-------------------------------------------|---------------|------|-------|---------|----------|-------------------------------------------------------------------|
| <b>Static</b>                             |               |      |       |         |          |                                                                   |
| Drain-Source Breakdown Voltage            | $V_{(BR)DSS}$ | 60   | -     | -       | V        | $V_{GS}=0, I_D=250\mu A$                                          |
| Zero Gate Voltage Drain Current           | $I_{DSS}$     | -    | -     | 1       | $\mu A$  | $V_{DS}=60V, V_{GS}=0$                                            |
| Gate-Source Leakage                       | $I_{GSS}$     | -    | -     | $\pm 5$ | $\mu A$  | $V_{DS}=0, V_{GS}= \pm 20V$                                       |
| Gate-Threshold Voltage                    | $V_{GS(TH)}$  | 0.8  | 1.3   | 2       | V        | $V_{DS}=V_{GS}, I_D=250\mu A$                                     |
| Drain-Source On Resistance <sup>2,3</sup> | $R_{DS(ON)}$  | -    | 1.4   | 2       | $\Omega$ | $V_{GS}=10V, I_D=0.5A$                                            |
|                                           |               | -    | 1.7   | 2.6     |          | $V_{GS}=4.5V, I_D=0.2A$                                           |
| Forward Transconductance                  | $g_{FS}$      | -    | 0.42  | -       | S        | $V_{DS}=15V, I_D= 0.25A$                                          |
| <b>Body-Drain Diode Ratings</b>           |               |      |       |         |          |                                                                   |
| Diode Forward On–Voltage                  | $V_{SD}$      | -    | 0.9   | 1.5     | V        | $I_S=300mA, V_{GS}=0$                                             |
| <b>Dynamic Characteristics</b>            |               |      |       |         |          |                                                                   |
| Input Capacitance                         | $C_{ISS}$     | -    | 23.37 | -       | pF       | $V_{DS}=25V,$<br>$V_{GS}=0,$<br>$f=1MHz$                          |
| Output Capacitance                        | $C_{OSS}$     | -    | 7.33  | -       |          |                                                                   |
| Reverse Transfer Capacitance              | $C_{RSS}$     | -    | 5.2   | -       |          |                                                                   |
| Total Gate Charge                         | $Q_{G(TOT)}$  | -    | 1.2   | -       | nC       | $V_{DD}=30V,$<br>$V_{GS}=10V,$<br>$I_D=0.37A$                     |
| Threshold Gate Charge                     | $Q_{G(TH)}$   | -    | 0.15  | -       |          |                                                                   |
| Gate-to-Source Charge                     | $Q_{GS}$      | -    | 0.21  | -       |          |                                                                   |
| Gate-to-Drain Charge                      | $Q_{GD}$      | -    | 0.12  | -       |          |                                                                   |
| Turn-on Delay Time                        | $T_{d(ON)}$   | -    | 7.6   | -       | nS       | $V_{DD}=30V,$<br>$I_D=0.2A,$<br>$V_{GEN}=10V,$<br>$R_G=10\Omega.$ |
| Rise Time                                 | $T_r$         | -    | 5.1   | -       |          |                                                                   |
| Turn-off Delay Time                       | $T_{d(OFF)}$  | -    | 24.6  | -       |          |                                                                   |
| Fall Time                                 | $T_f$         | -    | 10    | -       |          |                                                                   |

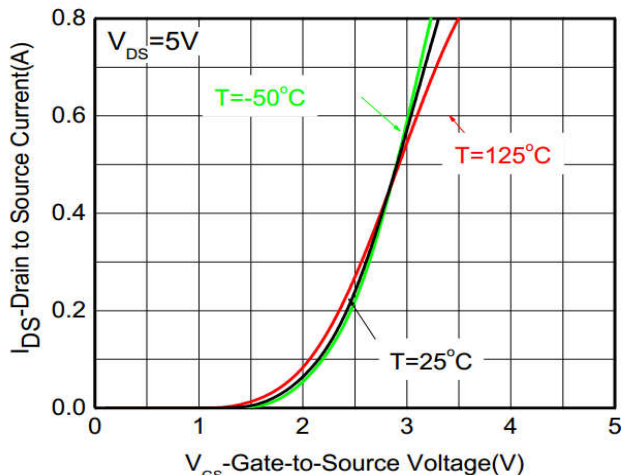
Note:

1. Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper.
2. Surface mounted on FR4 board using minimum pad size, 1oz copper
3. Pulse width<380 $\mu s$
4. Repetitive rating, pulse width limited by junction temperature  $T_J=150^\circ C$ .

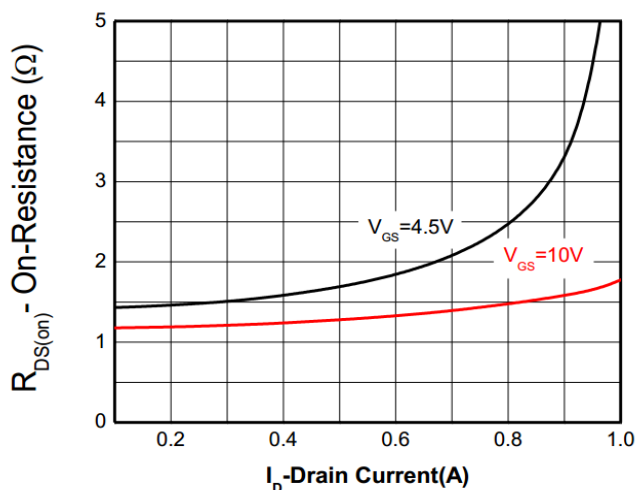
## CHARACTERISTIC CURVES



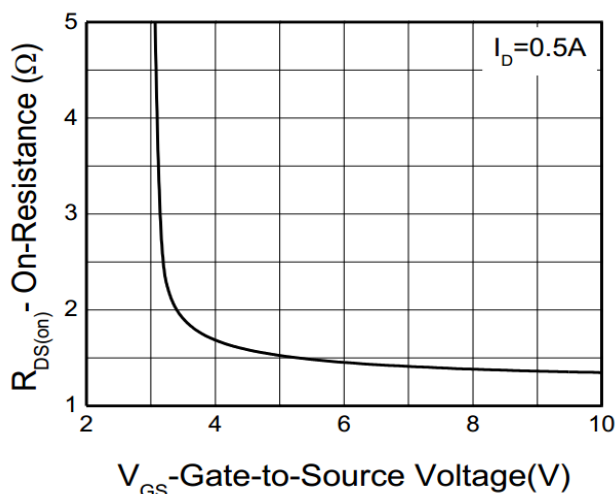
Output characteristics



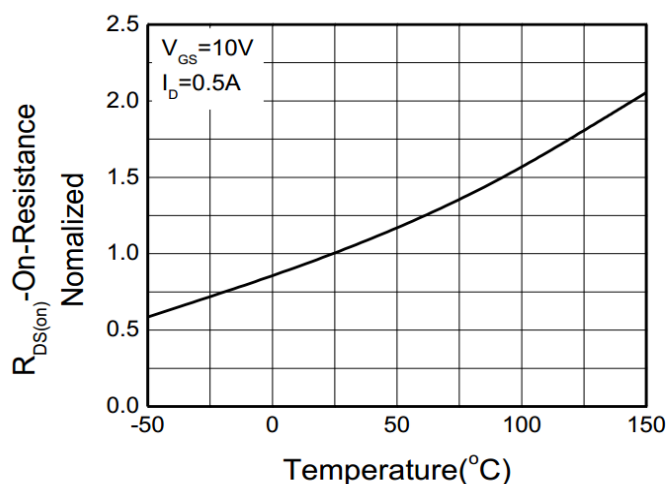
Transfer characteristics



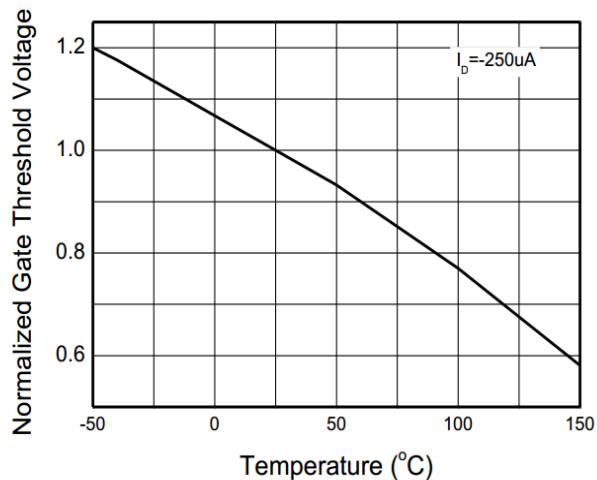
On-Resistance vs. Drain current



On-Resistance vs. Gate-to-Source voltage



On-Resistance vs. Junction temperature



Threshold voltage vs. Temperature

## CHARACTERISTIC CURVES

