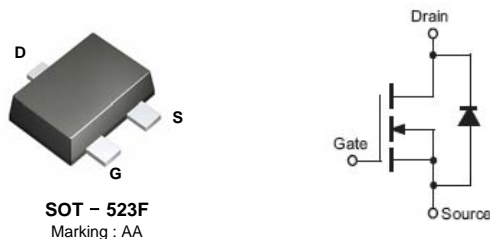


2N7002T

N-Channel Enhancement Mode Field Effect Transistor

Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- Lead Free/RoHS Compliant



Absolute Maximum Ratings * $T_a = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Value | Units |
|-----------|---|----------------------------------|------------------|
| V_{DSS} | Drain-Source Voltage | 60 | V |
| V_{DGR} | Drain-Gate Voltage $R_{GS} \leq 1.0M\Omega$ | 60 | V |
| V_{GSS} | Gate-Source Voltage | Continuous | ± 20 |
| | | Pulsed | ± 40 |
| I_D | Drain Current | Continuous | 115 |
| | | Continuous @ 100°C | 73 |
| | | Pulsed | 800 |
| T_J | Junction Temperature | 150 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ |

* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

Thermal Characteristics

| Symbol | Parameter | Value | Units |
|-----------------|---|-------|---------------------------|
| P_D | Total Device Dissipation Derating above $T_A = 25^\circ\text{C}$ | 200 | mW |
| | | 1.6 | mW/ $^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient * | 625 | $^\circ\text{C}/\text{W}$ |

* Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch. Minimum land pad size,

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Condition | MIN | TYP | MAX | Units |
|--------|-----------|----------------|-----|-----|-----|-------|
|--------|-----------|----------------|-----|-----|-----|-------|

Off Characteristics (Note1)

| | | | | | | |
|------------|---------------------------------|--|----|------------|------------|---------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 10\mu A$ | 60 | 78 | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 60V, V_{GS} = 0V$ $V_{DS} = 60V, V_{GS} = 0V, @T_C = 125^\circ\text{C}$ | - | 0.001 7 | 1.0 500 | μA |
| I_{GSS} | Gate-Body Leakage | $V_{GS} = \pm 20V, V_{DS} = 0V$ | - | 0.2 | ± 10 | nA |

On Characteristics (Note1)

| | | | | | | |
|--------------|----------------------------------|---|--------|-------------|-------------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1.0 | 1.76 | 2.0 | V |
| $R_{DS(ON)}$ | Satic Drain-Source On-Resistance | $V_{GS} = 5V, I_D = 0.05A,$ $V_{GS} = 10V, I_D = 0.5A, @T_j = 125^\circ\text{C}$ | - - | 1.6 2.53 | 7.5 13.5 | Ω |
| $I_{D(ON)}$ | On-State Drain Current | $V_{GS} = 10V, V_{DS} = 7.5V$ | 0.5 | 1.43 | - | A |
| g_{FS} | Forward Transconductance | $V_{DS} = 10V, I_D = 0.2A$ | 80 | 356.5 | - | mS |

Dynamic Characteristics

| | | | | | | |
|-----------|------------------------------|--|---|------|-----|----|
| C_{iss} | Input Capacitance | $V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{MHz}$ | - | 37.8 | 50 | pF |
| C_{oss} | Output Capacitance | | - | 12.4 | 25 | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 6.5 | 7.0 | pF |

Switching Characteristics

| | | | | | | |
|--------------|---------------------|--|---|------|----|----|
| $t_{D(ON)}$ | Turn-On Delay Time | $V_{DD} = 30V, I_D = 0.2A, V_{GEN} = 10V$ $R_L = 150\Omega, R_{GEN} = 25\Omega$ | - | 5.85 | 20 | ns |
| $t_{D(OFF)}$ | Turn-Off Delay Time | | - | 12.5 | 20 | |

Note1 : Short duration test pulse used to minimize self-heating effect.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

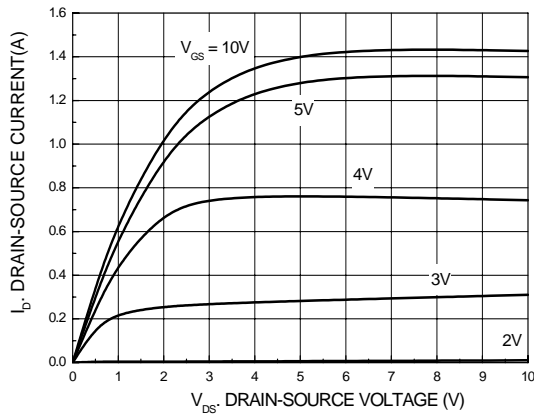


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current

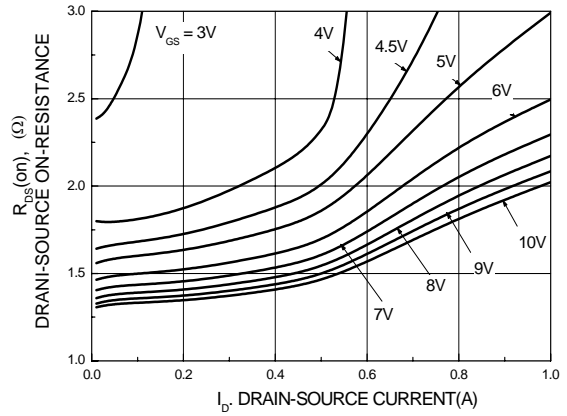


Figure 3. On-Resistance Variation with Temperature

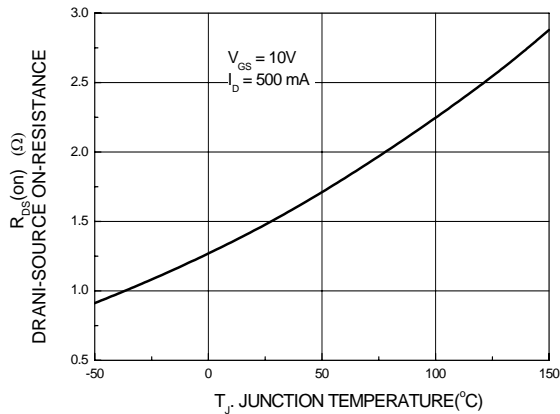


Figure 4. On-Resistance Variation with Gate-Source Voltage

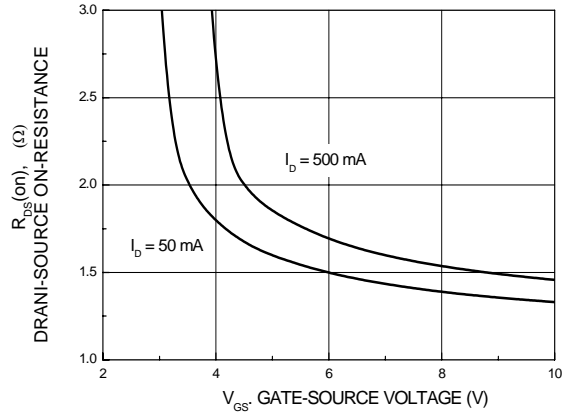


Figure 5. Transfer Characteristics

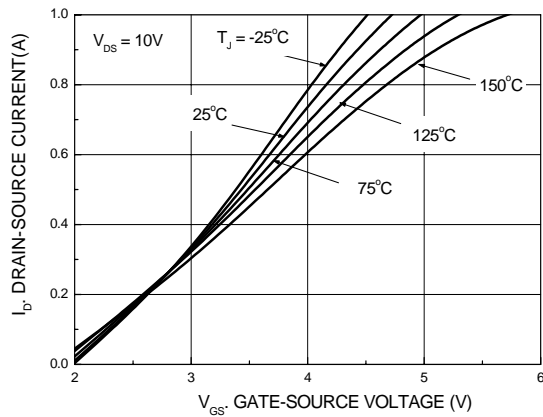
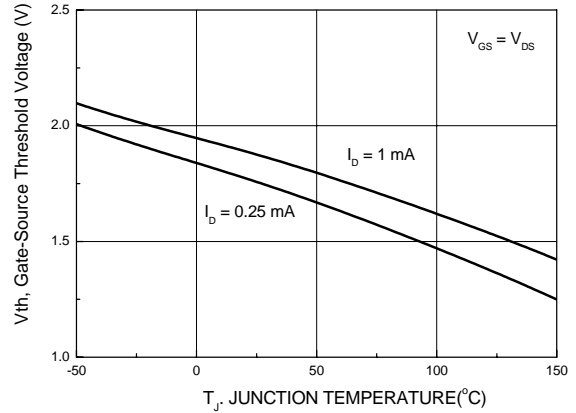


Figure 6. Gate Threshold Variation with Temperature



Typical Performance Characteristics

Figure 7. Reverse Drain Current Variation with Diode Forward Voltage and Temperature

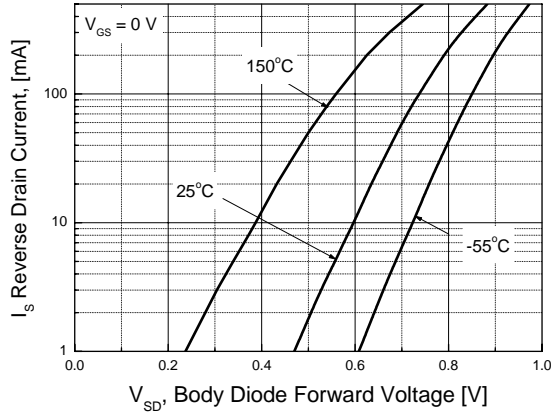
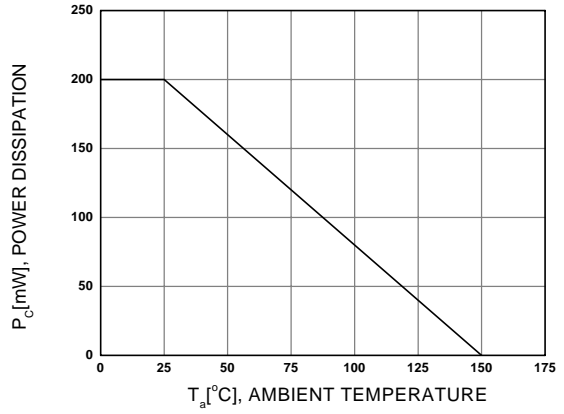
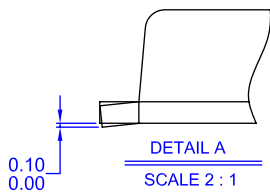
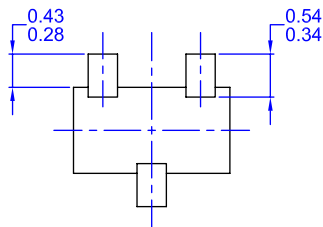
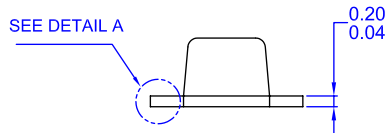
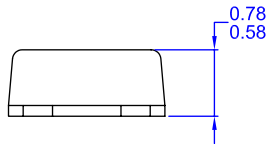
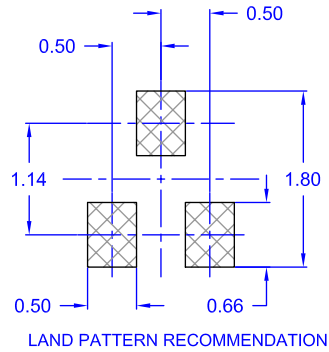
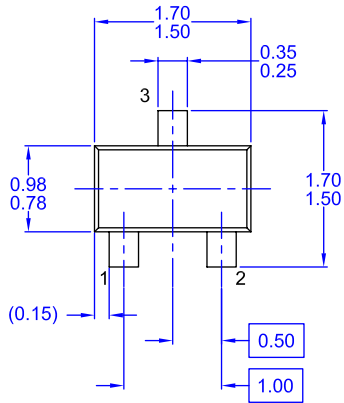


Figure 8. Power Derating



Package Dimensions

SOT-523F




- NOTES: UNLESS OTHERWISE SPECIFIED
 A) THIS PACKAGE CONFORMS TO EIAJ SC89 PACKAGING STANDARD.
 B) ALL DIMENSIONS ARE IN MILLIMETERS.
 C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

Dimensions in Millimeters



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