

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 Pulsed	± 20 ± 40 V
I_D	Drain Current	Continuous Continuous @ 100°C Pulsed	115 73 800 mA
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 1.6	mW 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
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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_{riss}	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

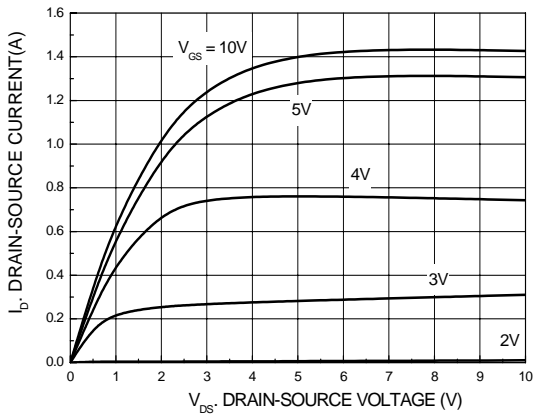


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current

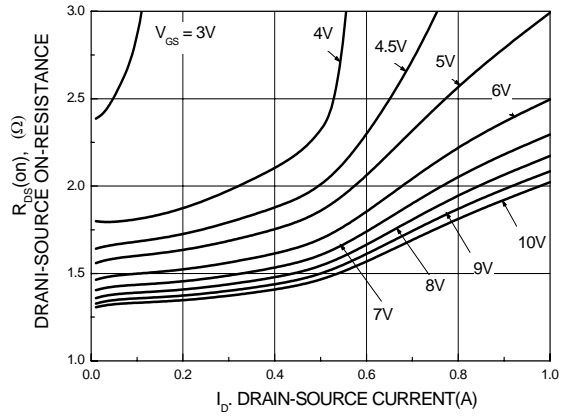


Figure 3. On-Resistance Variation with Temperature

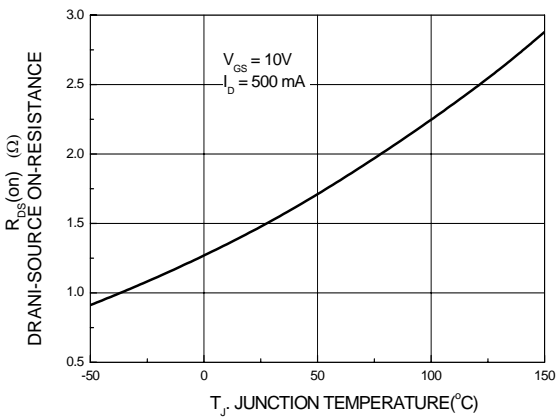


Figure 4. On-Resistance Variation with Gate-Source Voltage

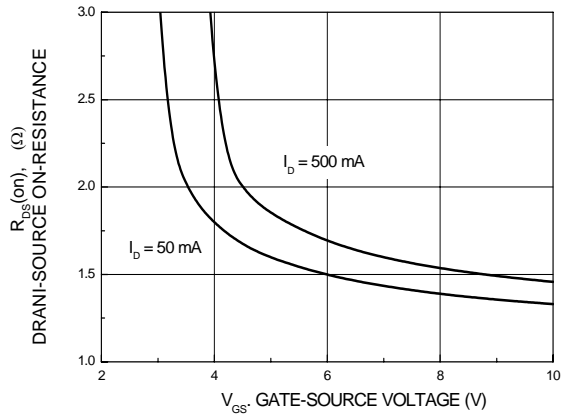


Figure 5. Transfer Characteristics

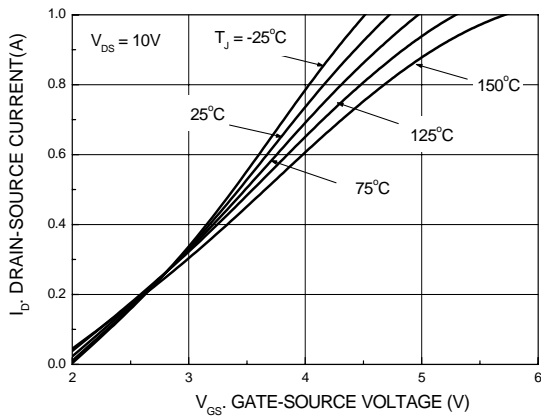
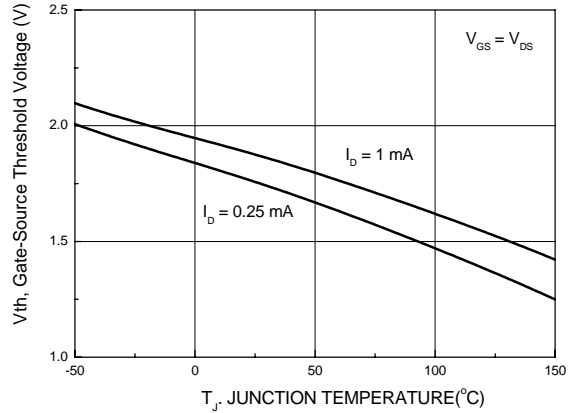


Figure 6. Gate Threshold Variation with Temperature



Typical Performance Characteristics

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

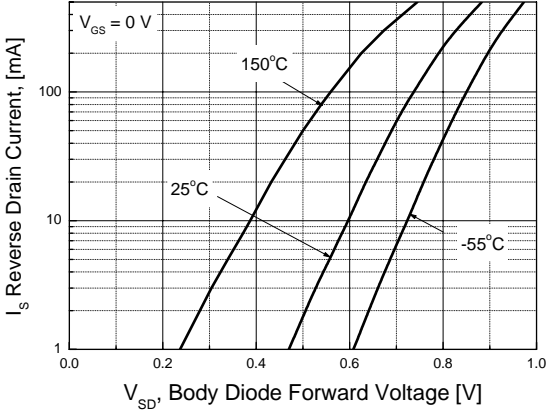
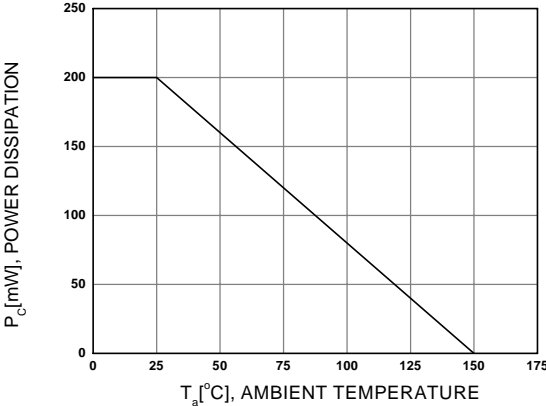
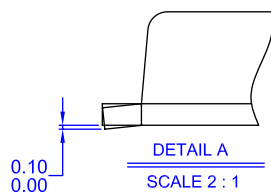
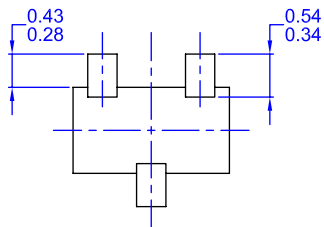
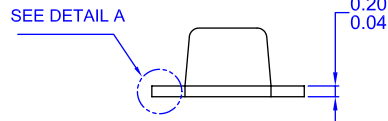
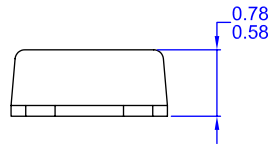
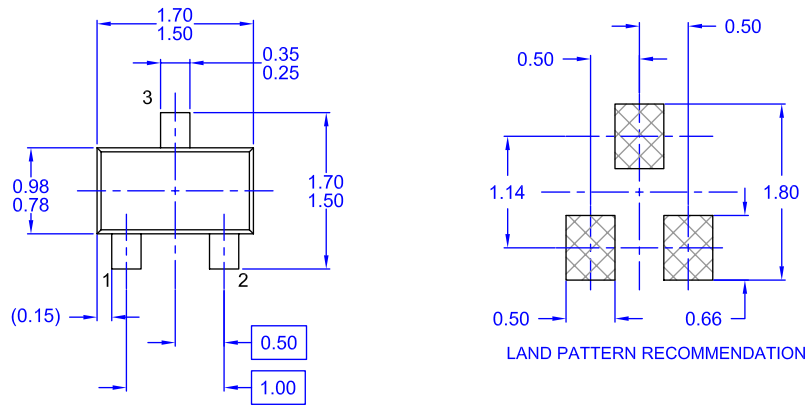


Figure 8. Power Derating



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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