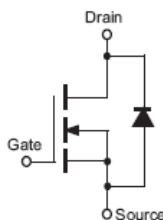
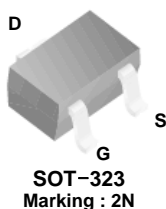


# 2N7002W

## 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 $R_{GS} \leq 1.0\text{M}\Omega$	60	V
$V_{GSS}$	Gate-Source Voltage	Continuous Pulsed	$\pm 20$ $\pm 40$ V
$I_D$	Drain Current	Continuous Continuous @ $100^\circ\text{C}$ Pulsed	115 73 800 mA
$T_J, T_{STG}$	Junction and 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**  $T_A = 25^\circ\text{C}$  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	$\mu A$
$I_{GSS}$	Gate-Body Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	0.2	$\pm 10$	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
$R_{DS(ON)}$	Static 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	$\Omega$
$I_{D(ON)}$	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

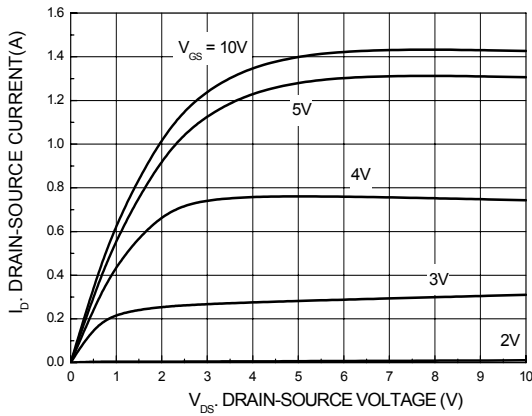
**Switching Characteristics**

$t_{D(ON)}$	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	

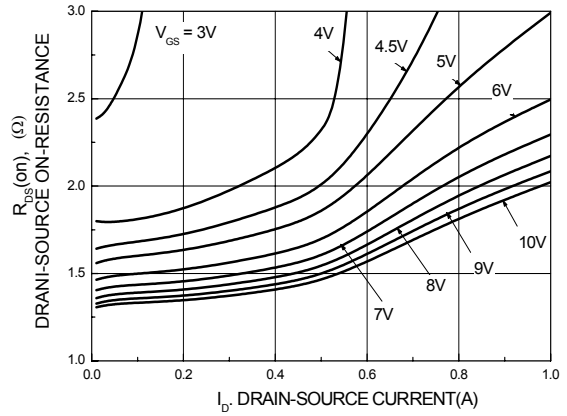
Note1 : Short duration test pulse used to minimize self-heating effect.

## Typical Performance Characteristics

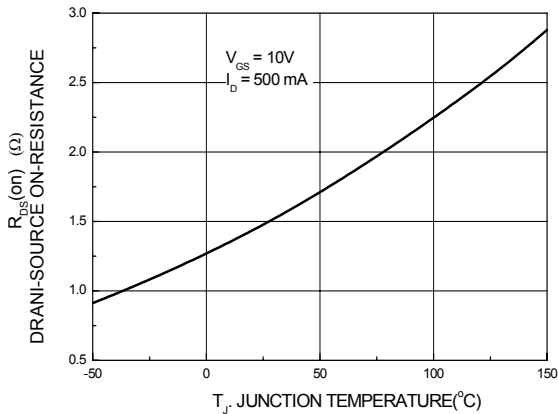
**Figure 1. On-Region Characteristics**



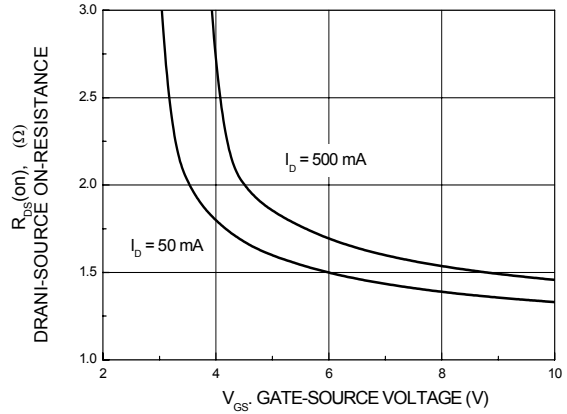
**Figure 2. On-Resistance Variation with Gate Voltage and Drain Current**



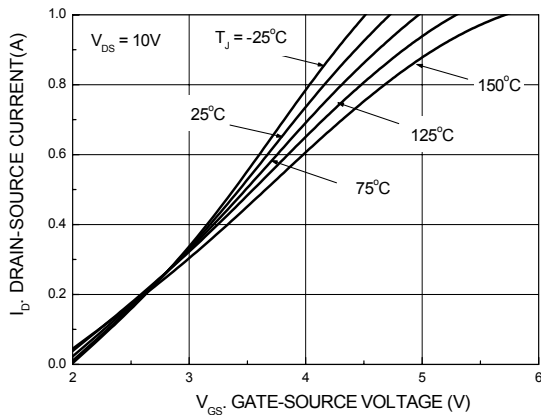
**Figure 3. On-Resistance Variation with Temperature**



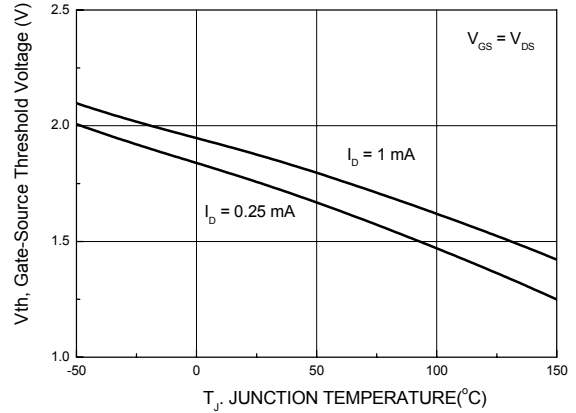
**Figure 4. On-Resistance Variation with Gate-Source Voltage**



**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

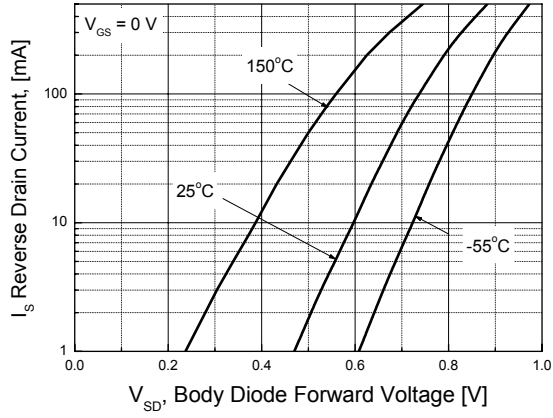
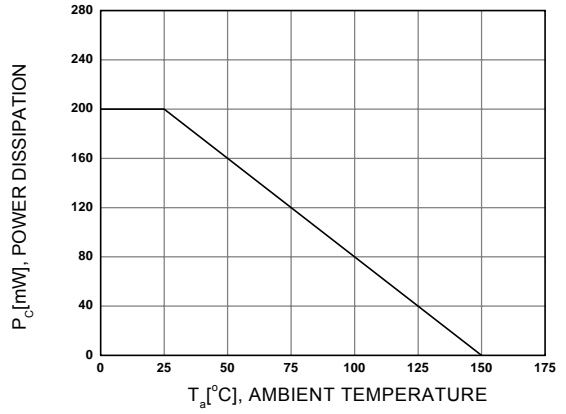
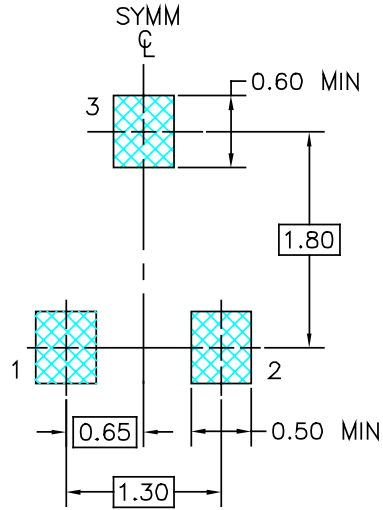
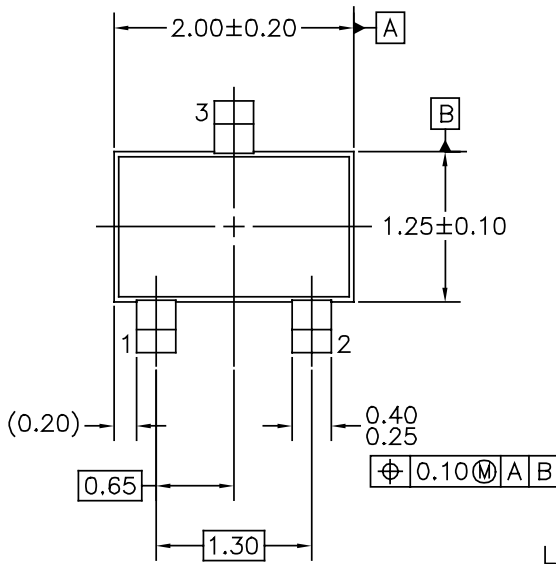


Figure 8. Power Derating

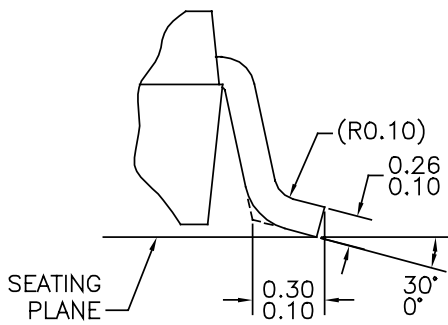
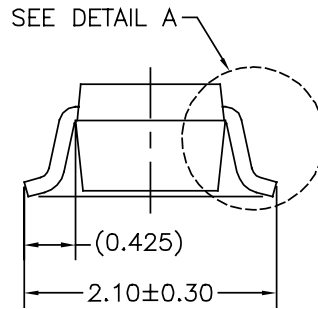
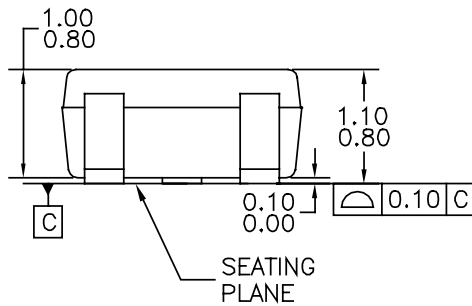


# Package Dimensions

## SOT323



LAND PATTERN RECOMMENDATION



DETAIL A  
SCALE: 2X





NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO EIAJ SC-70.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.



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