

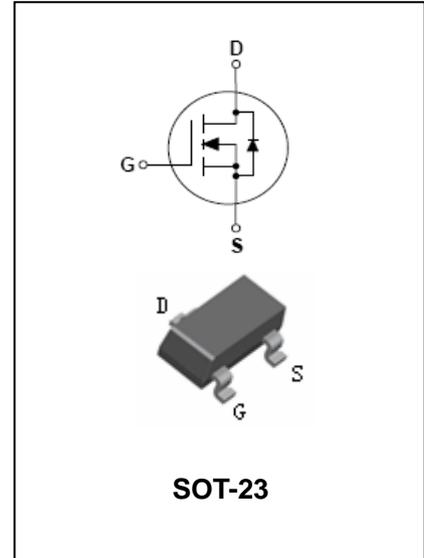


# N-Channel Enhancement Mode Field Effect Transistor

## 2N7002

### FEATURES

- High Density Cell Design For Low  $R_{DS(ON)}$ .
- Voltage Controlled Small Signal Switch.
- Rugged and Reliable.
- High Saturation Current Capability.



### APPLICATIONS

- N-channel enhancement mode effect transistor.
- Switching application.

### ORDERING INFORMATION

Type No.	Marking	Package Code
2N7002	7002	SOT-23

### MAXIMUM RATING @ $T_a=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain-Source voltage	60	V
$V_{DGR}$	Drain-Gate voltage( $R_{GS} \leq 1\text{M}\Omega$ )	60	V
$V_{GSS}$	Gate -Source voltage - continuous -Non Repetitive ( $t_p < 50\mu\text{s}$ )	$\pm 20$ $\pm 40$	V
$I_D$	Maximum Drain current -continuous -Pulsed	115 800	mA
$P_D$	Power Dissipation	200	mW
$R_{\theta JA}$	Thermal resistance,Junction-to-Ambient	625	$^\circ\text{C}/\text{W}$
$T_J, T_{stg}$	Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$



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### ELECTRICAL CHARACTERISTICS @ Ta=25°C unless otherwise specified

Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=10\mu A$	60	70	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	2.0	
Gate-body Leakage	$I_{GSS}$	Forward $V_{DS}=0V, V_{GS}=20V$	-	-	100	nA
		Reverse $V_{DS}=0V, V_{GS}=-20V$	-	-	-100	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$	-	-	1	$\mu A$
		$V_{DS}=60V, V_{GS}=0V, T_j=125^\circ C$	-	-	500	
On-state Drain Current	$I_{D(on)}$	$V_{GS}=10V, V_{DS} \geq 2.0V_{DS(on)}$	0.5	1.0	-	A
Drain-Source on-voltage	$V_{DS(on)}$	$V_{GS}=10V, I_D=500mA$	-	0.6	3.75	V
		$V_{GS}=5V, I_D=50mA$	-	0.09	1.5	
Forward transconductance	$g_{FS}$	$V_{DS}=10, I_D=200mA$	80	-	-	mS
Static drain-Source on-resistance	$R_{DS(on)}$	$V_{GS}=5.0V, I_D=50mA$	-	3.2	7.5	$\Omega$
		$V_{GS}=10V, I_D=500mA, T_j=125^\circ C$	-	4.4	13.5	
On-state drain current	$I_{D(on)}$	$V_{GS}=10V, V_{DS}=7.5V$	0.5	1.0	-	A
Drain-Source diode forward voltage	$V_{SD}$	$V_{GS}=0V, I_D=115mA$	-	0.88	1.5	V
Input capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$	-	20	50	pF
Output capacitance	$C_{OSS}$		-	11	25	
Reverse transfer capacitance	$C_{RSS}$		-	4	5	
Turn-On Delay Time	$t_{D(on)}$	$V_{DD} = 30V, I_D = 0.2A,$ $R_L = 150\Omega, V_{GS} = 10V,$	-	-	20	ns
Turn-Off Delay Time	$t_{D(off)}$	$R_{GEN} = 25\Omega$	-	-	20	ns

### TYPICAL CHARACTERISTICS @ Ta=25°C unless otherwise specified

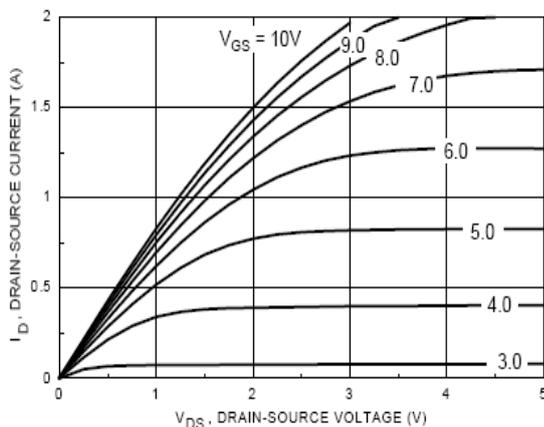


Figure 1. On-Region Characteristics

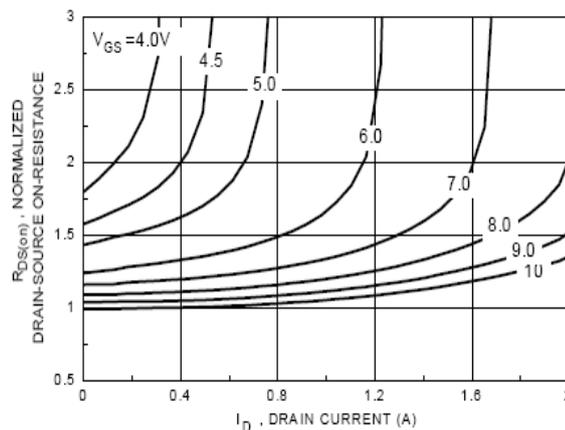
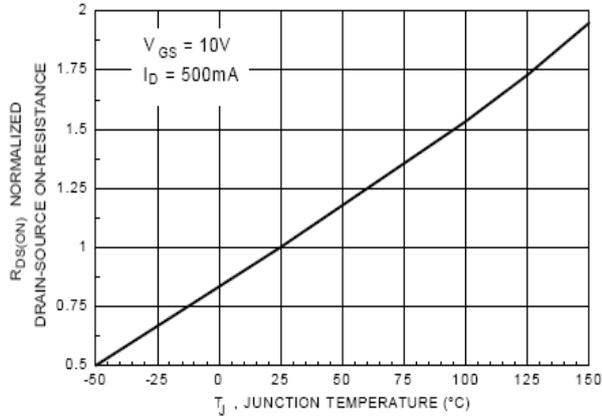


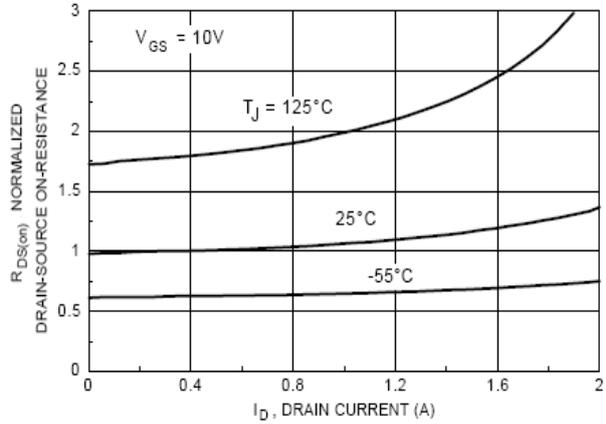
Figure 2. On-Resistance Variation with Gate Voltage and Drain Current

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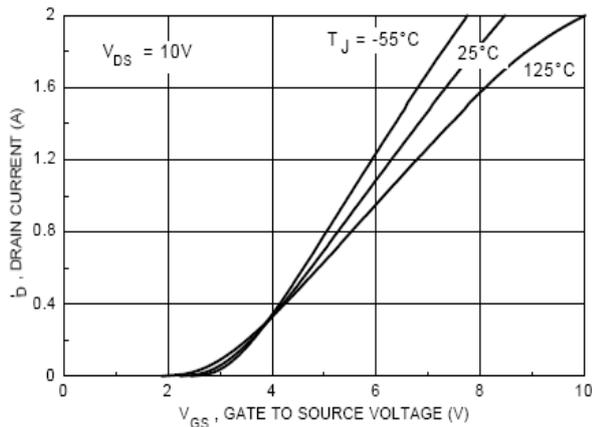
## 2N7002



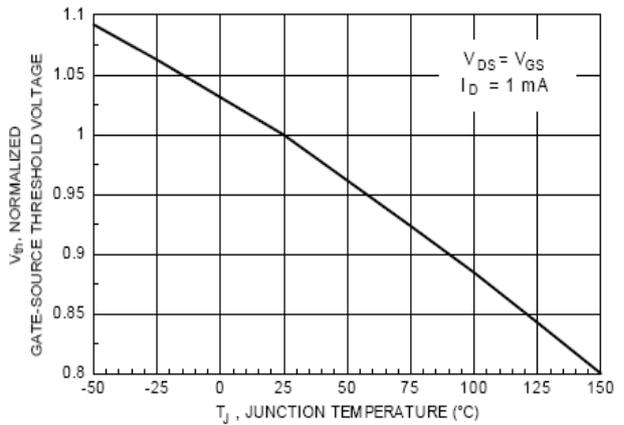
**Figure 3. On-Resistance Variation with Temperature**



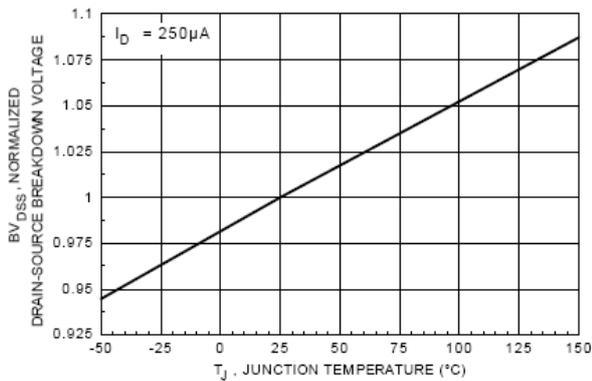
**Figure 4. On-Resistance Variation with Drain Current and Temperature**



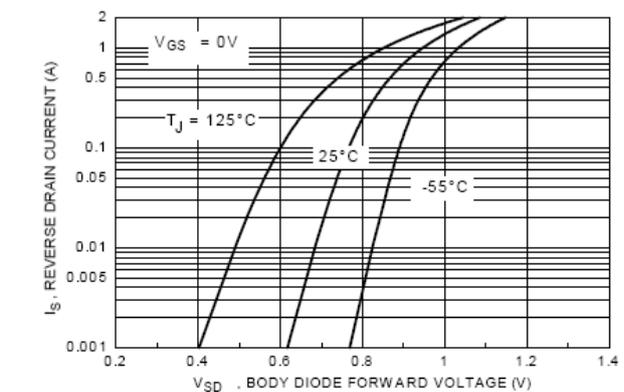
**Figure 5. Transfer Characteristics**



**Figure 6. Gate Threshold Variation with Temperature**



**Figure 7. Breakdown Voltage Variation with Temperature**



**Figure 8. Body Diode Forward Voltage Variation with Temperature**

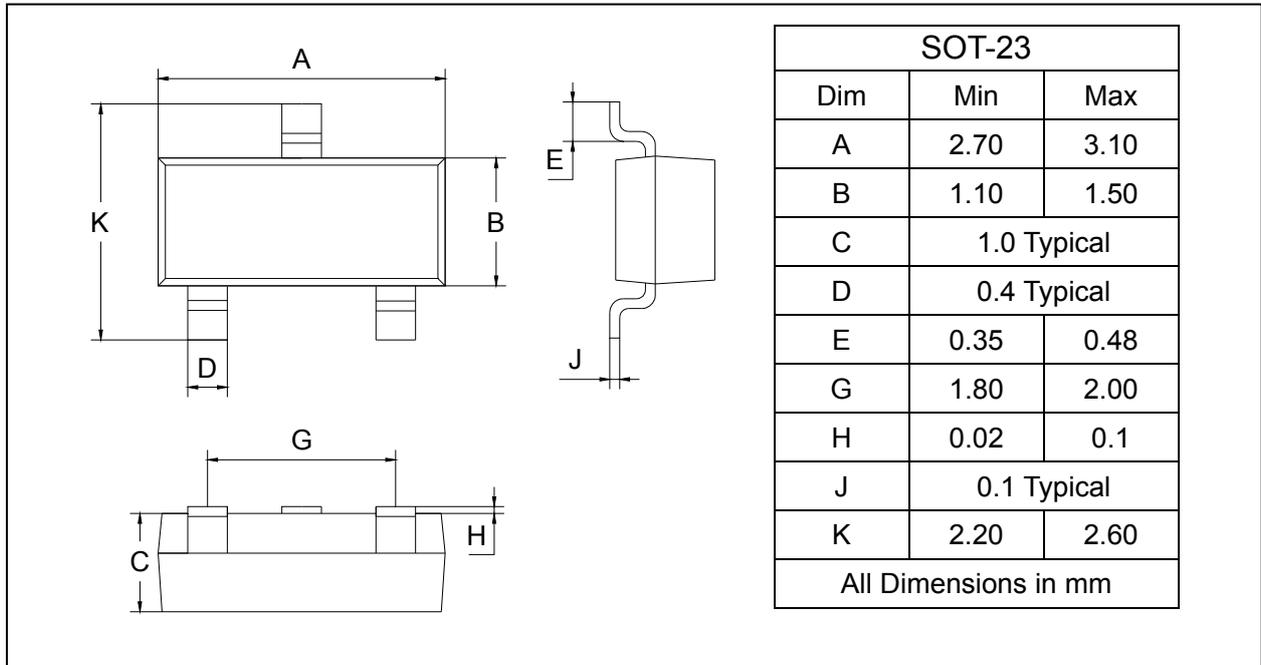
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## 2N7002

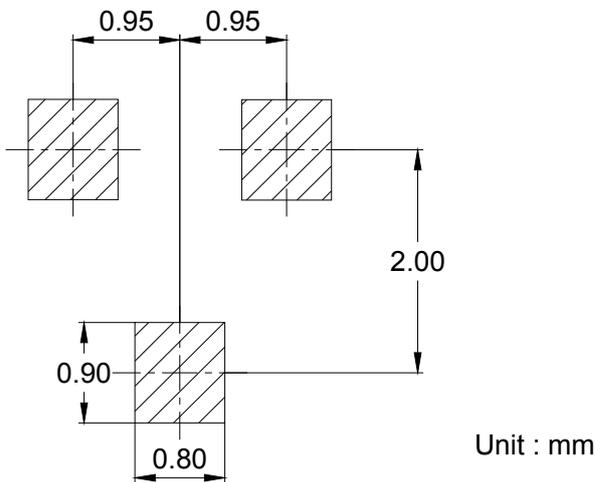
### PACKAGE OUTLINE

Plastic surface mounted package

SOT-23



### SOLDERING FOOTPRINT



### PACKAGE INFORMATION

Device	Package	Shipping
2N7002	SOT-23	3000/Tape&Reel