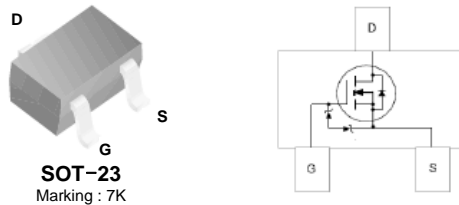


# 2N7002K

## 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
- Pb Free/RoHS Compliant
- ESD HBM=2000V (Typical:3000V) as per JESD22 A114 and ESD CDM=2000V as per JESD22 C101



### 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	$\pm 20$	V
$I_D$	Drain Current	Continuous	300
		Pulsed	800
$T_J$	Operating Junction Temperature Range	-55 to +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 $T_A = 25^\circ\text{C}$	350	mW
		2.8	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient *	350	$^\circ\text{C}/\text{W}$

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

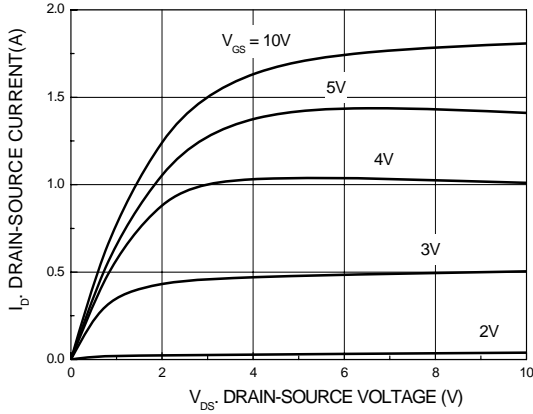
**Electrical Characteristics**  $T_A = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Condition	MIN	MAX	Units
<b>Off Characteristics</b> (Note1)					
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 10\mu A$	60		V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 60V, V_{GS} = 0V$ $V_{DS} = 60V, V_{GS} = 0V, @T_C=125^\circ\text{C}$		1.0 500	$\mu A$
$I_{GSS}$	Gate-Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$		$\pm 10$	$\mu A$
<b>On Characteristics</b> (Note1)					
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	2.5	V
$R_{DS(ON)}$	Satic Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 0.5A$ $V_{GS} = 4.5V, I_D = 200mA$		2 4	$\Omega$
$I_{D(ON)}$	On-State Drain Current	$V_{GS} = 10V, V_{DS} = 7.5V$	1.5		A
$g_{FS}$	Forward Transconductance	$V_{DS} = 10V, I_D = 0.2A$	200		mS
<b>Dynamic Characteristics</b>					
$C_{iss}$	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$		50	pF
$C_{oss}$	Output Capacitance			15	pF
$C_{rss}$	Reverse Transfer Capacitance			6	pF
<b>Switching Characteristics</b>					
$t_{D(ON)}$	Turn-On Delay Time	$V_{DD} = 30V, I_{DSS} = 200mA,$ $R_G = 10\Omega, V_{GS} = 10V$		5	ns
$t_{D(OFF)}$	Turn-Off Delay Time			30	

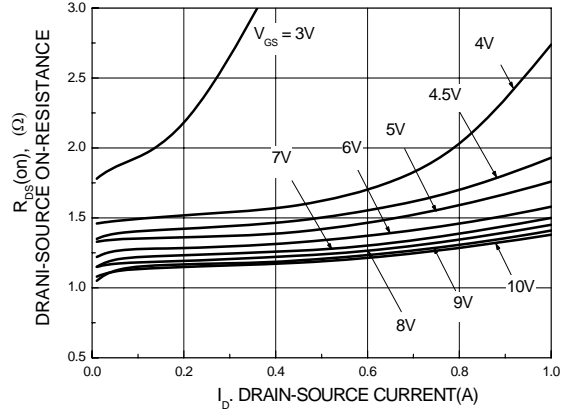
Note1 : Short duration test pulse used to minimize self-heating effect.

## Typical Performance Characteristics

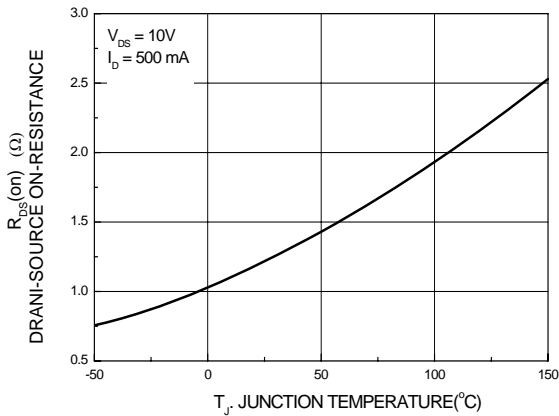
**Figure 1. On-Region Characteristics**



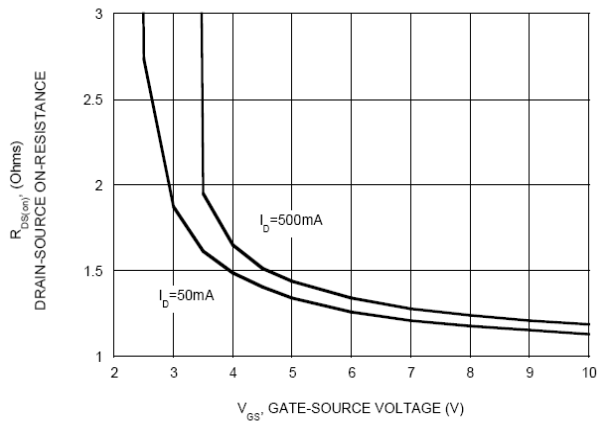
**Figure 2. On-Resistance Variation with Gate Voltage and Drain Current**



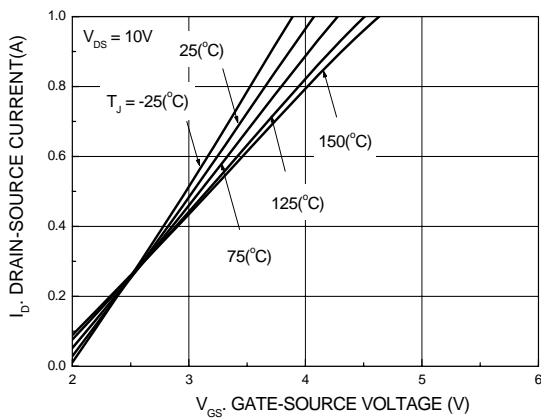
**Figure 3. On-Resistance Variation with Temperature**



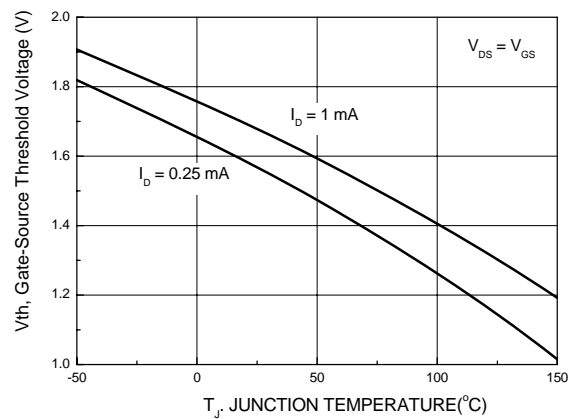
**Figure 4. On-Resistance Variation with Gate-Source Voltage**



**Figure 5. Transfer Characteristics**

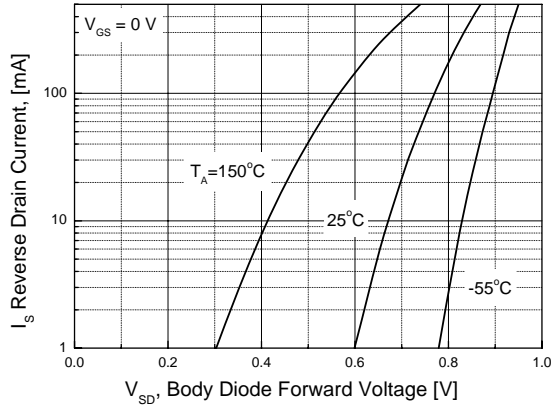


**Figure 6. Gate Threshold Variation with Temperature**



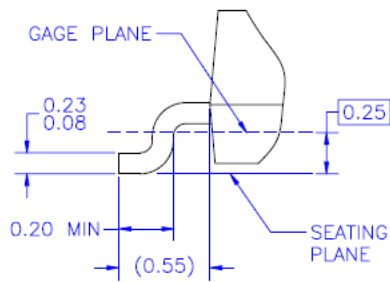
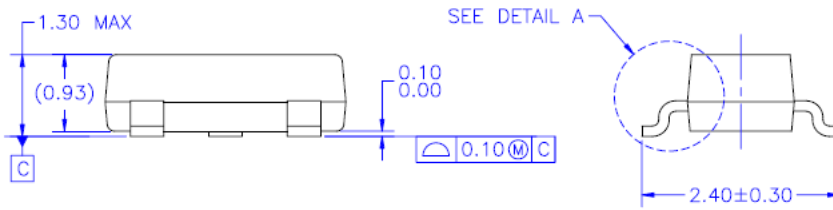
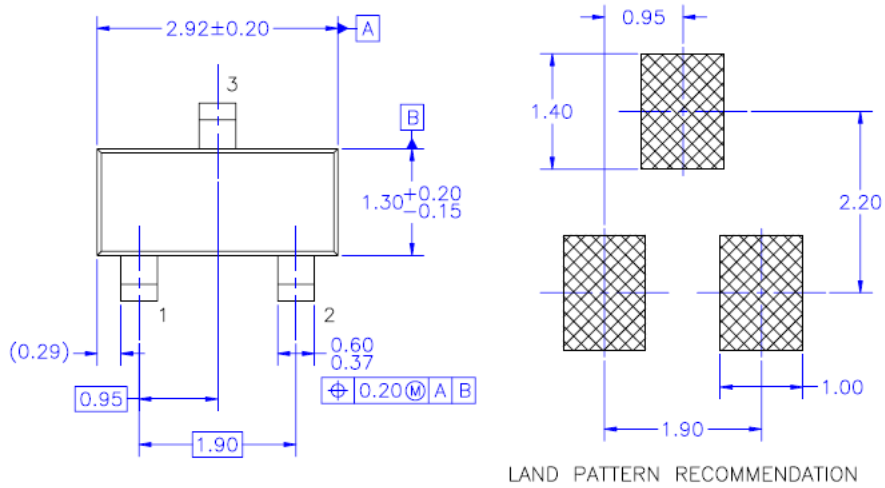
Typical Performance Characteristics (Continue)

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



**Physical Dimensions**

**SOT-23**



DETAIL A  
SCALE: 2X

NOTES: UNLESS OTHERWISE SPECIFIED






- A) REFERENCE JEDEC REGISTRATION TO-236, VARIATION AB, ISSUE H.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M - 1994.
- E) DRAWING FILE NAME: MA03DREV9

Dimensions in Millimeters



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- |                                                                                   |                                                |                                                                                   |                                                                                     |
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| AccuPower™                                                                        | F-PFS™                                         | PowerTrench®                                                                      | the power franchise                                                                 |
| Auto-SPM™                                                                         | FRFET®                                         | PowerXS™                                                                          | TinyBoost™                                                                          |
| AX-CAP™*                                                                          | Global Power Resource™                         | Programmable Active Droop™                                                        | TinyBuck™                                                                           |
| BitSiC™                                                                           | GreenBridge™                                   | QFET®                                                                             | TinyCalc™                                                                           |
| Build it Now™                                                                     | Green FPS™                                     | QS™                                                                               | TinyLogic™                                                                          |
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| CTL™                                                                              | IntelliMAX™                                    | Saving our world, 1mW/W/kW at a time™                                             | TinyWire™                                                                           |
| Current Transfer Logic™                                                           | ISOPLANAR™                                     | SignalWise™                                                                       | TranSiC™                                                                            |
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| Dual Cool™                                                                        | MegaBuck™                                      | SMART START™                                                                      | TRUECURRENT®*                                                                       |
| EcoSPARK®                                                                         | MICROCOUPLER™                                  | Solutions for Your Success™                                                       | μSerDes™                                                                            |
| EfficientMax™                                                                     | MicroFET™                                      | SPM®                                                                              |  |
| ESBC™                                                                             | MicroPak™                                      | STEALTH™                                                                          | UHC®                                                                                |
|  | MicroPak2™                                     | SuperFET®                                                                         | Ultra FRFET™                                                                        |
| Fairchild®                                                                        | MillerDrive™                                   | SuperSOT™-3                                                                       | UniFET™                                                                             |
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| FACT Quiet Series™                                                                | Motion-SPM™                                    | SuperSOT™-8                                                                       | VisualMax™                                                                          |
| FACT®                                                                             | mWSaver™                                       | SupreMOS®                                                                         | VoltagePlus™                                                                        |
| FAST®                                                                             | OptoHiT™                                       | SyncFET™                                                                          | XS™                                                                                 |
| FastvCore™                                                                        | OPTOLOGIC®                                     | Sync-Lock™                                                                        |                                                                                     |
| FETBench™                                                                         | OPTOPLANAR®                                    |  |                                                                                     |
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