



2N7002K-AU

60V N-Channel Enhancement Mode MOSFET – ESD Protected

Voltage

60 V

Current

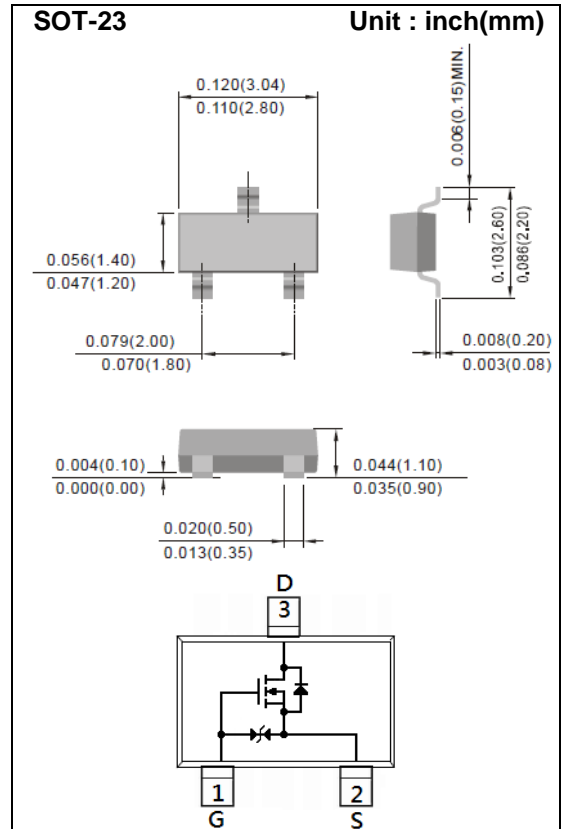
300mA

Features

- $R_{DS(ON)}$, $V_{GS}@10V$, $I_D@500mA < 3\Omega$
- $R_{DS(ON)}$, $V_{GS}@4.5V$, $I_D@200mA < 4\Omega$
- Advanced Trench Process Technology
- High Density Cell Design For Ultra Low On-Resistance
- Very Low Leakage Current In Off Condition
- Specially Designed for Battery Operated Systems, Solid-State Relays Drivers: Relay, Displays, Memories, etc
- ESD Protected 2KV HBM
- AEC-Q101 qualified
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

Mechanical Data

- Case: SOT-23 Package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.0003 ounces, 0.0084 grams



Maximum Ratings and Thermal Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNITS
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	+20	
Continuous Drain Current ^(Note 4)		I_D	300	mA
Pulsed Drain Current ^(Note 1)		I_{DM}	2000	
Power Dissipation	$T_A=25^\circ\text{C}$	P_D	500	mW
	Derate above 25°C		4	mW/ $^\circ\text{C}$
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~150	$^\circ\text{C}$
Typical Thermal Resistance		$R_{\theta JA}$	250	$^\circ\text{C/W}$
- Junction to Ambient ^(Note 3,4)				



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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=10\mu A$	60	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	2.5	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=500mA$	-	-	3	Ω
		$V_{GS}=4.5V, I_D=200mA$	-	-	4	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 10	
Forward Transconductance	g_{fs}	$V_{DS}=15V, I_D=250mA$	100	-	-	mS
Dynamic (Note 5)						
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=250mA,$ $V_{GS}=5V$ (Note 1,2)	-	0.8	-	nC
Gate-Source Charge	Q_{gs}		-	0.35	-	
Gate-Drain Charge	Q_{gd}		-	0.2	-	
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $f=1MHz$	-	35	-	μF
Output Capacitance	C_{oss}		-	13	-	
Reverse Transfer Capacitance	C_{rss}		-	8	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=200mA,$ $V_{GS}=10V,$ $R_G=10\Omega$ (Note 1,2)	-	2.7	-	ns
Turn-On Rise Time	t_r		-	19	-	
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	
Turn-Off Fall Time	t_f		-	23	-	
Drain-Source Diode						
Maximum Continuous Drain-Source Diode Forward Current	I_S	---	-	-	300	mA
Diode Forward Voltage	V_{SD}	$I_S=200mA, V_{GS}=0V$	-	0.82	1.3	V

NOTES:

1. Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature typical characteristics.
3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins mounted on a 1 inch FR-4 with 2oz. square pad of copper.
4. The maximum current rating is package limited.
5. Guaranteed by design, not subject to production testing.



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TYPICAL CHARACTERISTIC CURVES

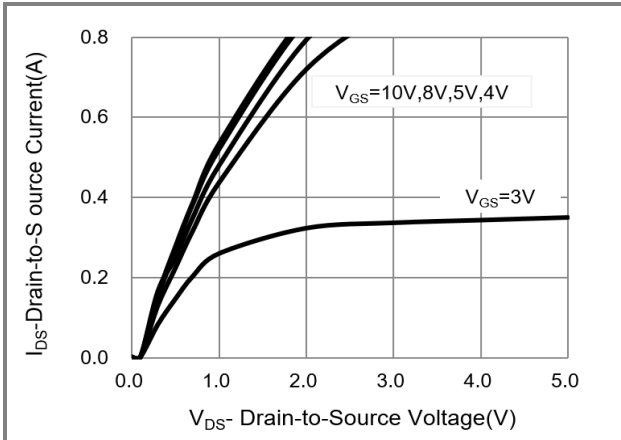


Fig.1 On-Region Characteristics

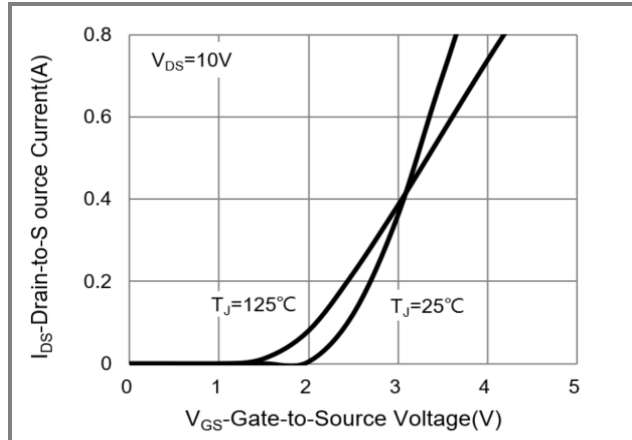


Fig.2 Transfer Characteristics

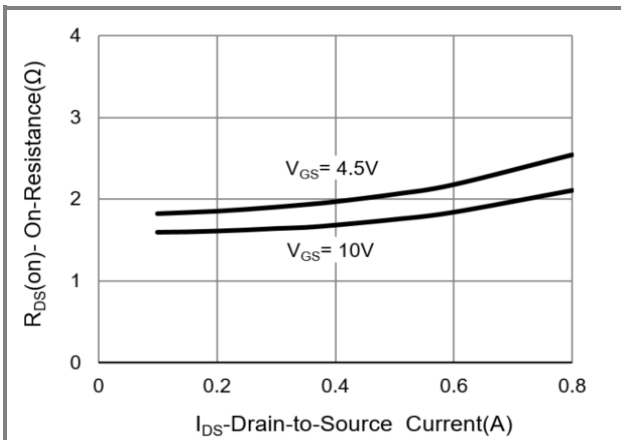


Fig.3 On-Resistance vs. Drain Current

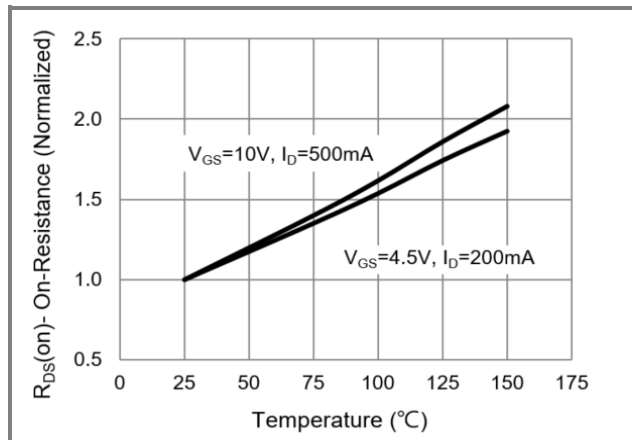


Fig.4 On-Resistance vs. Junction temperature

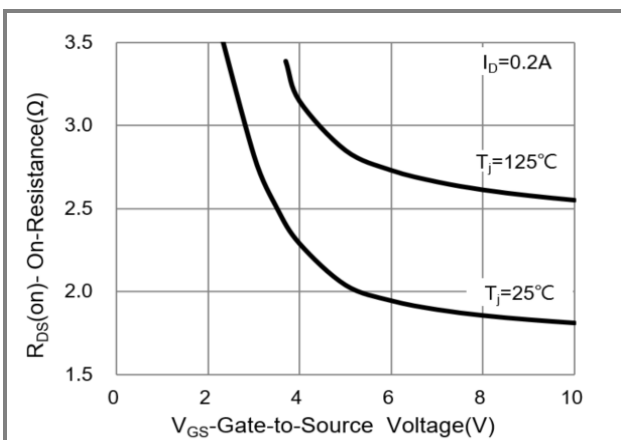


Fig.5 On-Resistance Variation with V_{GS}

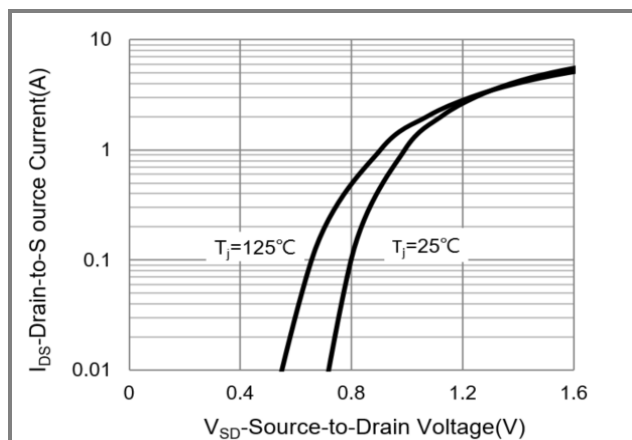


Fig.6 Body Diode Characteristics



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TYPICAL CHARACTERISTIC CURVES

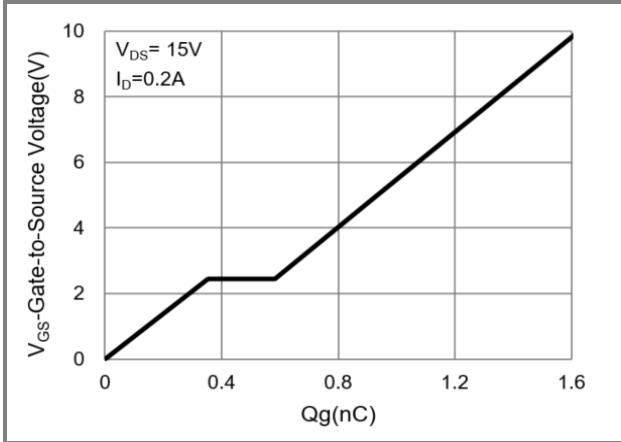


Fig.7 Gate-Charge Characteristics

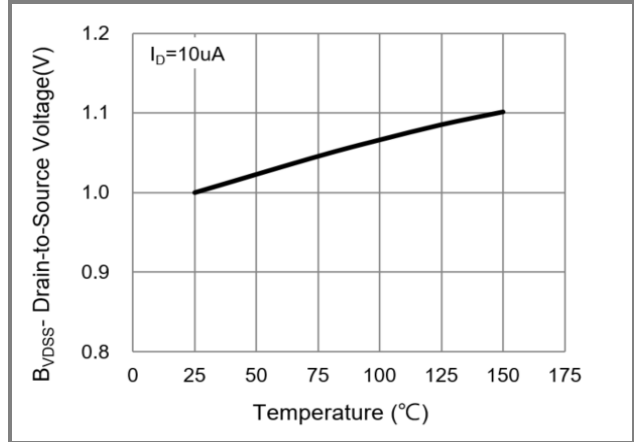


Fig.8 Breakdown Voltage Variation vs. Temperature

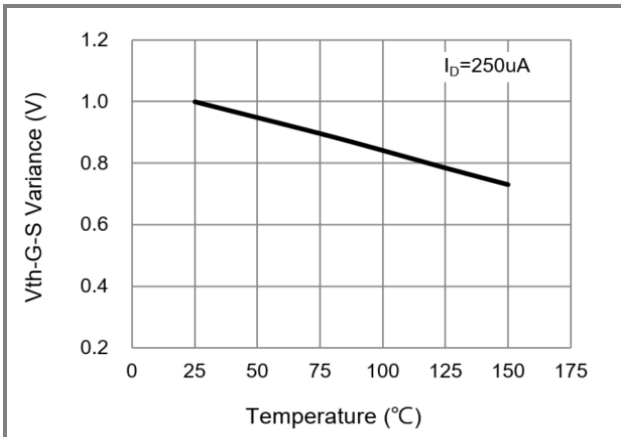


Fig.9 Threshold Voltage Variation with Temperature

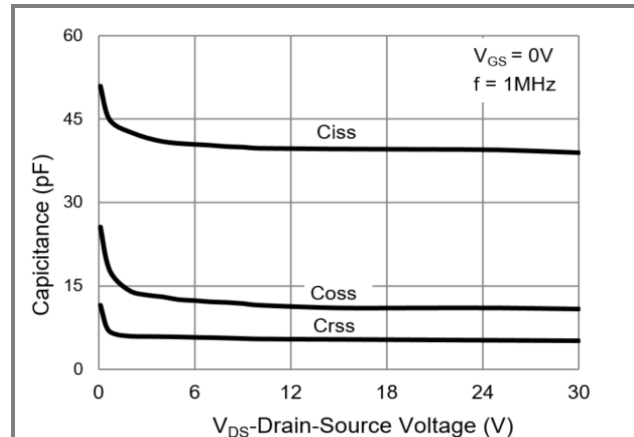


Fig.10 Capacitance vs. Drain-Source Voltage

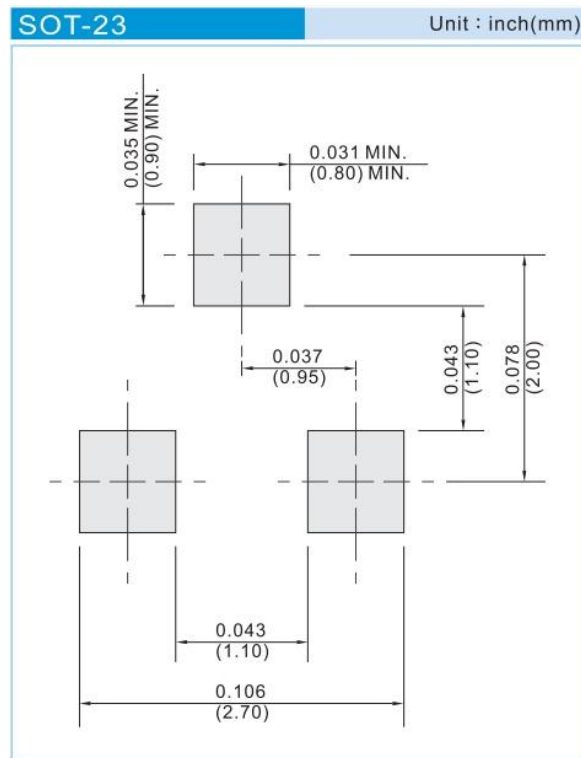


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Part No Packing Code Version

Part No Packing Code	Package Type	Packing Type	Marking	Version
2N7002K-AU_R1_000A2	SOT-23	3K pcs / 7" reel	K72	Halogen free

Mounting Pad Layout





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