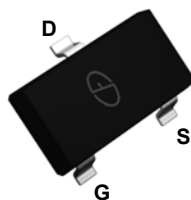
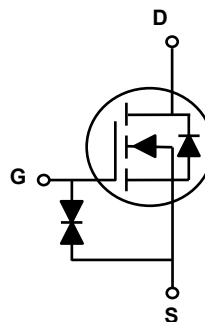


Main Product Characteristics

V_{DS}	60V
$R_{DS(ON)}$	3.0Ω
I_D	300mA



SOT-23



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery
- AEC-Q101 qualified



Description

The 2N7002KAU utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supplies and a wide variety of other applications.

Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous @ Current-Pulsed ¹	I_D	0.3	A
	$I_D (70^{\circ}\text{C})$	0.26	
	I_{DM}	0.8	A
Maximum Power Dissipation	P_D	0.43	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C
Thermal Resistance, Junction-to-Ambient ²	$R_{\theta JA}$	350	°C/W

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On / Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±5V, V _{DS} =0V	-	-	100	nA
		V _{GS} =±10V, V _{DS} =0V	-	-	150	nA
		V _{GS} =±20V, V _{DS} =0V	-	-	10	μA
Gate-Source Breakdown Voltage	BV _{GSO}	I _G =±250uA, V _{DS} =0V	±20	-	-	V
Static Drain-Source On-Resistance ³	R _{DS(ON)}	V _{GS} =10V, I _D =0.5A	-	-	3	Ω
		V _{GS} =5V, I _D =0.05A	-	-	3.5	Ω
Forward Transconductance ³	g _{fs}	V _{DS} =10V, I _D =0.2A	0.08	-	-	S
Gate Threshold Voltage ³	V _{GS(th)}	V _{GS} =V _{DS} , I _D =250uA	1	-	2.5	V
Dynamic and Switching Characteristics						
Turn-on Delay Time ⁴	t _{d(on)}	V _{DD} =30V, V _{GS} =10V, R _{GEN} =6Ω, I _D =0.3A	-	4	-	nS
Rise Time ⁴	t _r		-	2.7	-	
Turn-Off Delay Time ⁴	t _{d(off)}		-	9.4	-	
Fall Time ⁴	t _f		-	33	-	
Total Gate Charge ⁴	Q _g	V _{DS} =10V, I _D =0.3A, V _{GS} =10V	-	1.6	-	nC
Gate to Source Charge ⁴	Q _{gs}		-	0.3	-	
Gate to Drain Charge ⁴	Q _{gd}		-	0.45	-	
Input Capacitance ⁴	C _{iss}	V _{DS} =25V, V _{GS} =0V, F=1MHz	-	30	-	pF
Output Capacitance ⁴	C _{oss}		-	6	-	
Reverse Transfer Capacitance ⁴	C _{rss}		-	3	-	
Drain-Source Diode Characteristics and Maximum Ratings						
Diode Forward Voltage ³	V _{SD}	V _{GS} =0V, I _S =0.2A	-	-	1.3	V
Reverse Recovery Time	t _{rr}	I _F =0.5A, V _R =10V dI/dI=100A/us	-	8.2	-	nS
Reverse Recovery Charge	Q _{rr}		-	3.2	-	nC

Notes:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production testing.

Typical Electrical and Thermal Characteristics

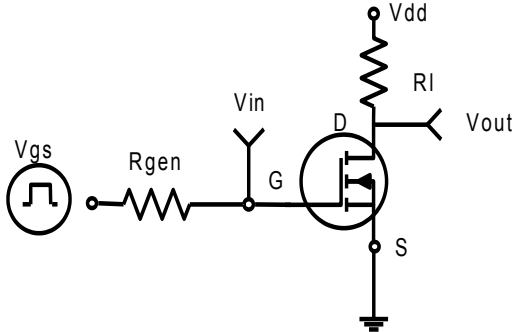


Figure 1. Switching Test Circuit

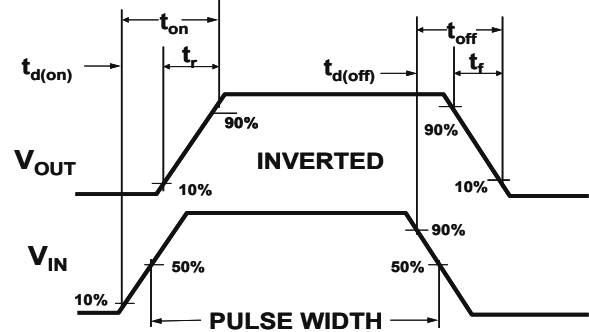


Figure 2. Switching Waveforms

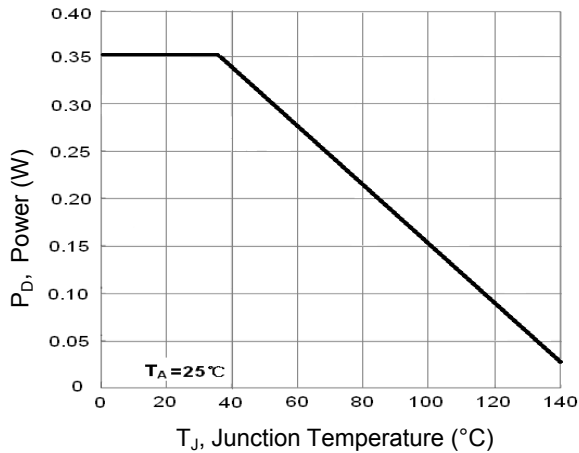


Figure 3. Power Dissipation

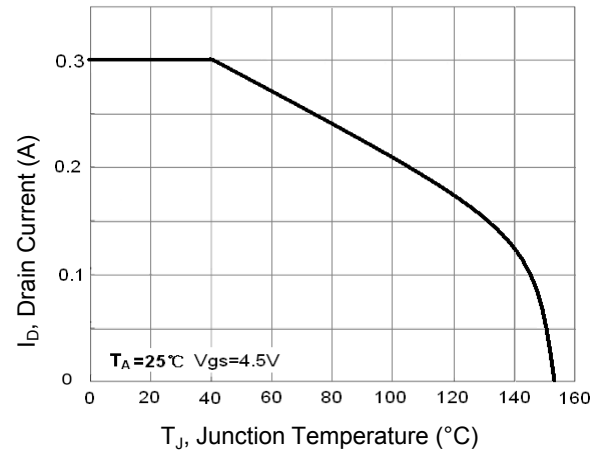


Figure 4. Drain Current

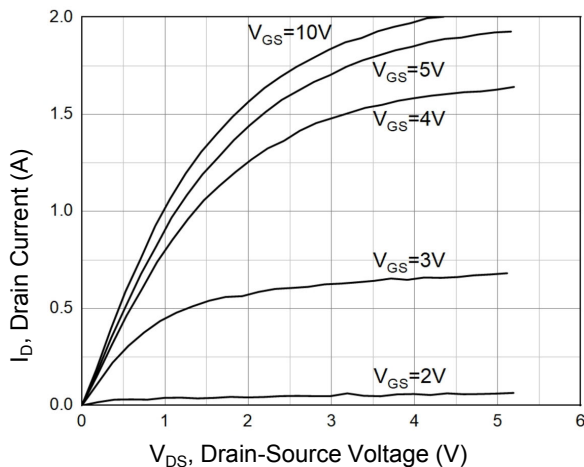


Figure 5. Output Characteristics

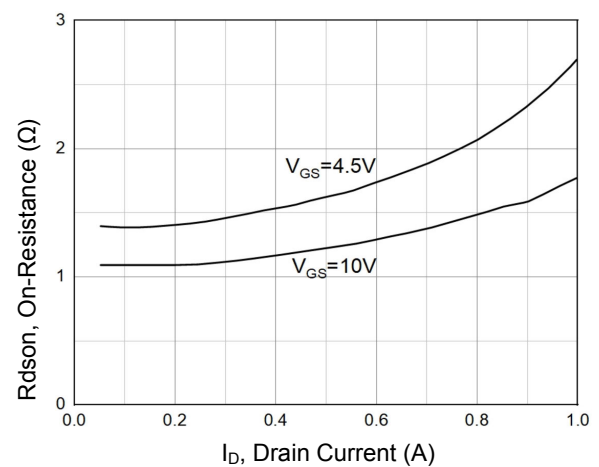


Figure 6. Drain-Source On-Resistance

Typical Electrical and Thermal Characteristics

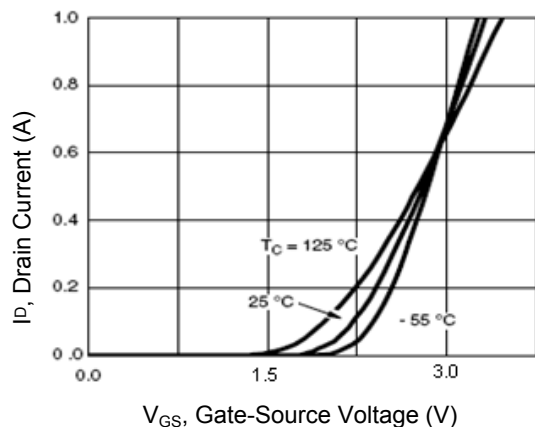


Figure 7. Transfer Characteristics

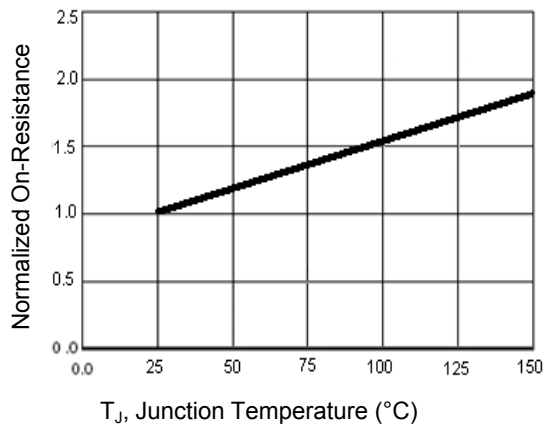


Figure 8. Drain-Source On-Resistance

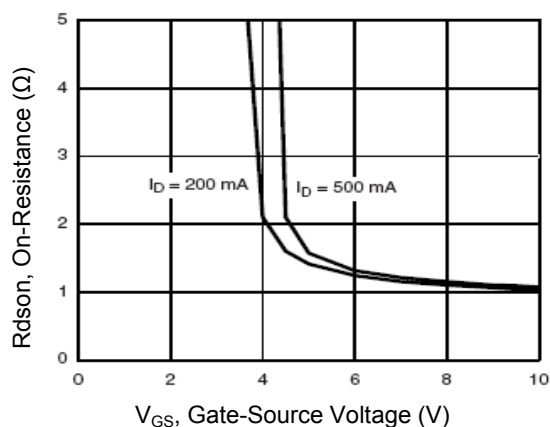


Figure 9. Rdson vs. V_{GS}

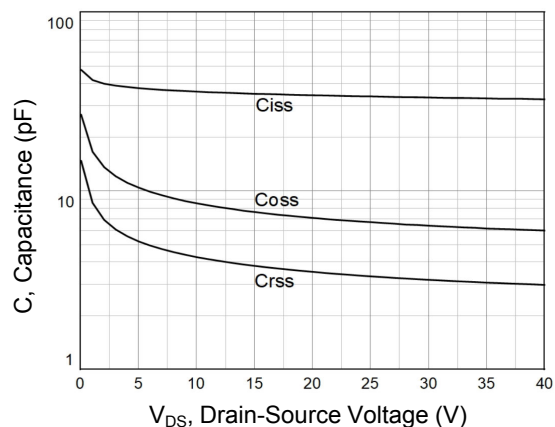


Figure 10. Capacitance vs. V_{DS}

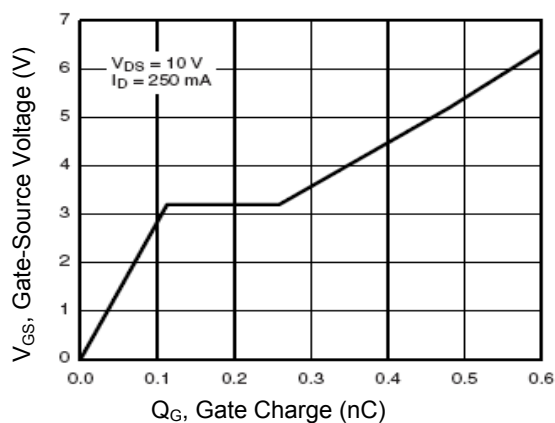


Figure 11. Gate Charge

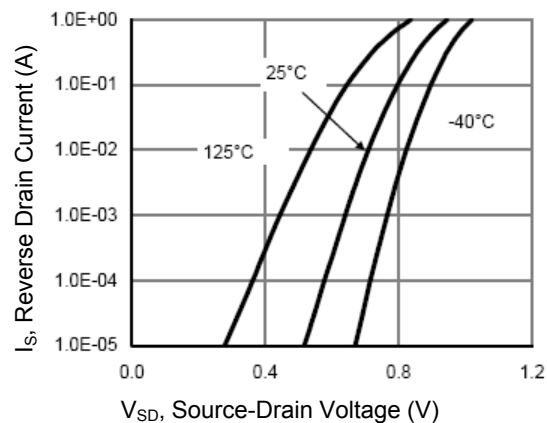


Figure 12. Source-Drain Diode Forward

Typical Electrical and Thermal Characteristics

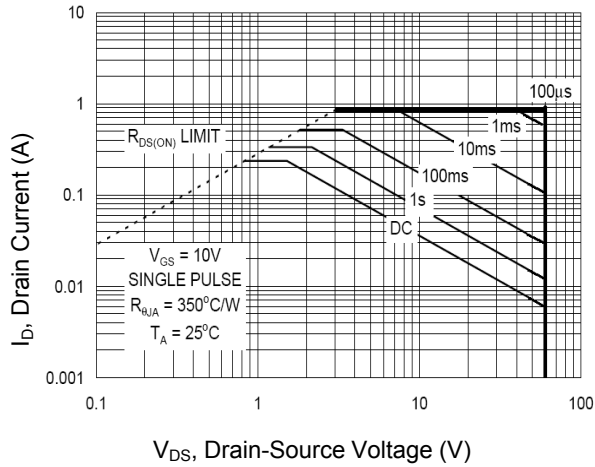


Figure 13. Safe Operation Area

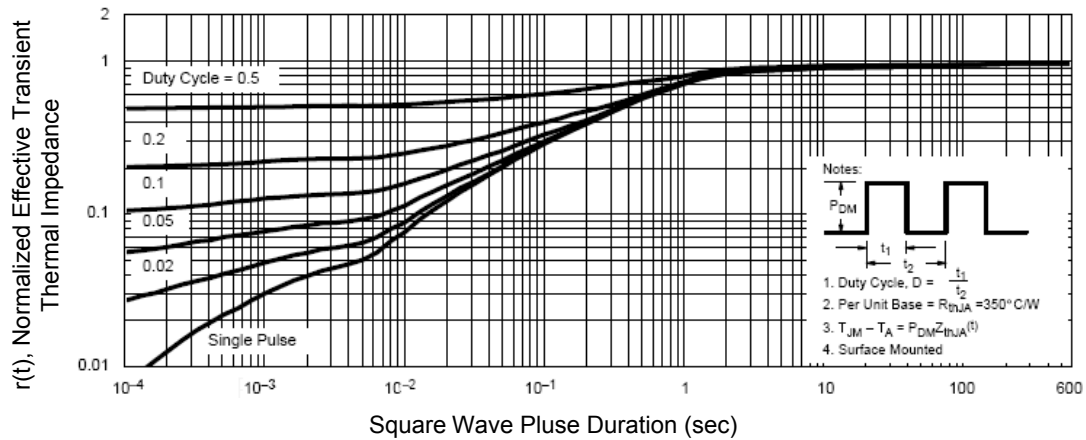
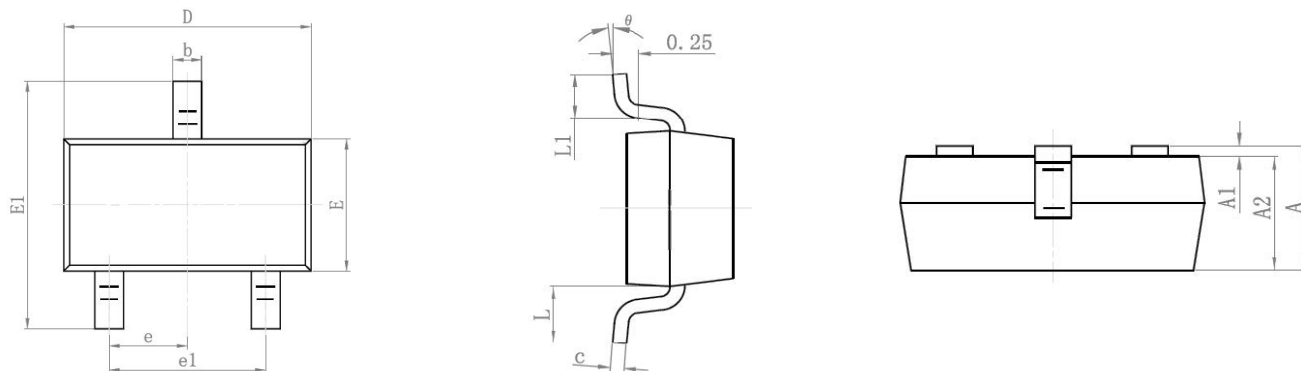


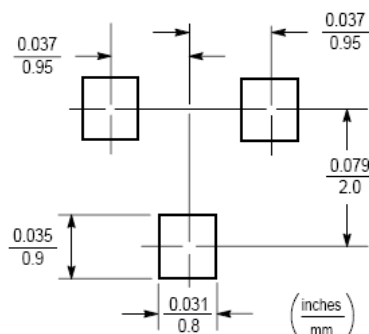
Figure 14. Normalized Maximum Transient Thermal Impedance

Package Outline Dimensions (SOT-23)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

Recommended Pad Layout



Notes:

1. Tolerance $\pm 0.10\text{mm}$ (4 mil) unless otherwise specified.
2. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
3. Dimension L is measured in gauge plane.

Order Information

Device	Package	Marking	Carrier	Quantity
2N7002KAU	SOT-23	S72AU	Tape & Reel	3,000pcs / Reel