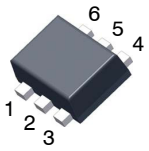
MOSFET – N-Channel Enhancement Mode Field Effect Transistor

60 V, 0.28 A, 2 Ω

2N7002V/2N7002VA



SOT−563
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*Pin 1 and Pin 4 are exchangeable.

Features

- Dual N−Channel MOSFET
- Low On−Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra−Small Surface Mount Package
- This Device is Pb−Free, Halide Free and RoHS Compliant

MOSFET MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter		Ratings	Unit
V_{DSS}	Drain − Source Voltage		60	V
V_{DGR}	Gate − Gate Voltage ($R_{GS} \le 1.0$ MΩ)		60	V
V_{GSS}	Gate−Source Voltage	− Continuous	±20	V
		− Pulsed	±40	
I_D	Drain Current	− Continuous	280	mA
		− Pulsed	1.5	A
T_J, T_{STG}	Junction and Storage Temperature Range		−55 to +150	°C

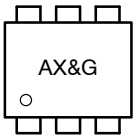
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Ratings	Unit
P_D	Total Device Dissipation	250	mW
	Derate Above T_A = 25°C	2.0	mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 1)	500	°C/W

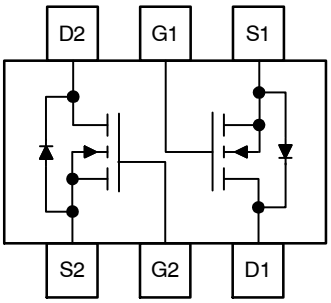
1. Device mounted on FR−4 PCB, 1 inch x 0.85 inch x 0.062 inch. Minimum land pad size.

MARKING DIAGRAM

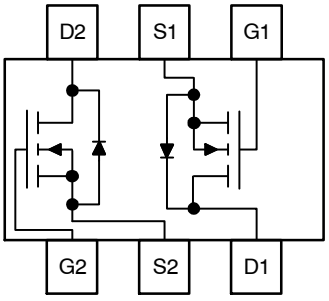


AX = Device Code (X = B or C)
&G = 1−Digit Weekly Date Code

PIN ASSIGNMENT



2N7002V



2N7002VA

ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS} = 0 V, I_D = 10 μA	60	78	–	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60 V, V_{GS} = 0 V	–	0.001	1.0	μA
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 125°		7	500	
I_{GSS}	Gate−Body Leakage	V_{GS} = ±20 V, V_{DS} = 0 V	–	0.2	±100	nA
ON CHARACTERISTICS (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	1.00	1.76	2.50	V
$R_{DS(on)}$	Static Drain−Source On−Resistance	V_{GS} = 5 V, I_D = 0.05 A	–	1.6	7.5	Ω
		V_{GS} = 10 V, I_D = 0.5 A	–	–	2.0	
		V_{GS} = 10 V, I_D = 0.5 A, T_J = 125°C	–	2.53	13.5	
$I_{D(on)}$	On−State Drain Current	V_{GS} = 10 V, V_{DS} = 7.5 V	1.50	1.43	–	A
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 0.2 A	80	356.5	–	mS
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	–	37.8	50	pF
C_{oss}	Output Capacitance		–	12.4	25	pF
C_{rss}	Reverse Transfer Capacitance		–	6.5	7	pF
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = 30 V, I_D = 0.2 A V_{GEN} = 10 V, R_L = 150 Ω, R_{GEN} = 25 Ω	–	5.85	20	ns
$t_{d(off)}$	Turn−Off Delay Time		–	12.5	20	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Short duration test pulse used to minimize self−heating effect.

TYPICAL PERFORMANCE CHARACTERISTICS

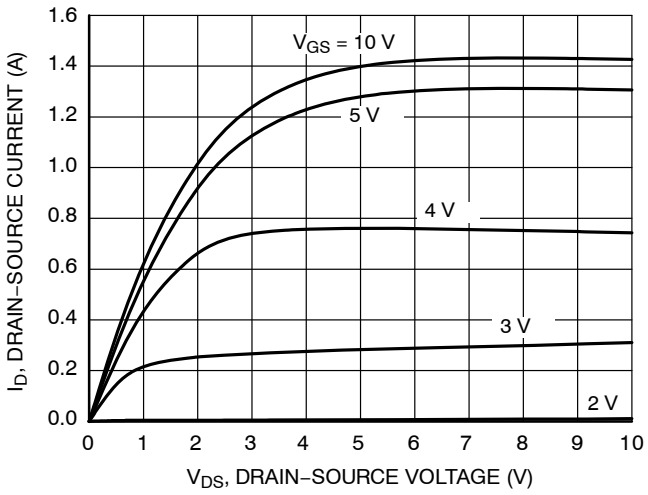


Figure 1. On − Region Characteristics

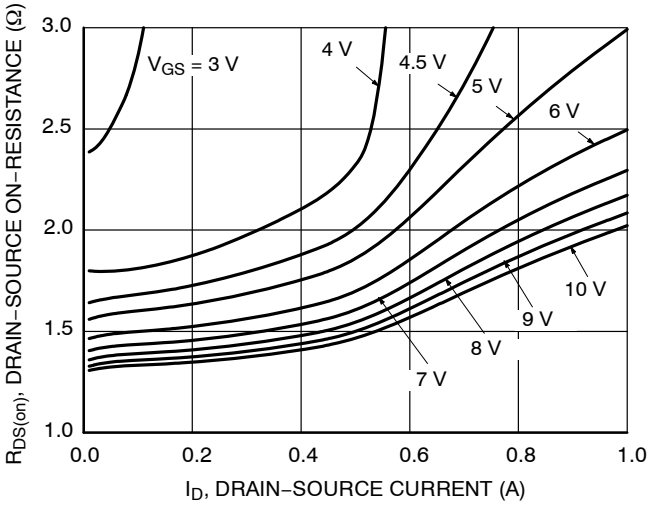


Figure 2. On−Resistance Variation with Gate Voltage and Drain Current

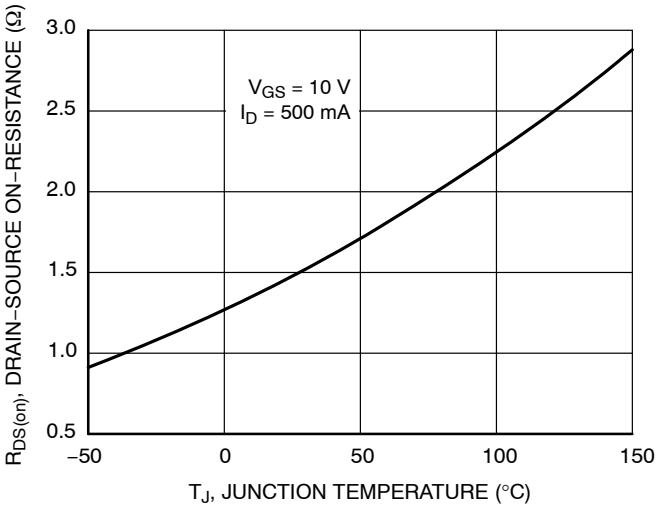


Figure 3. On−Resistance Variation with Temperature

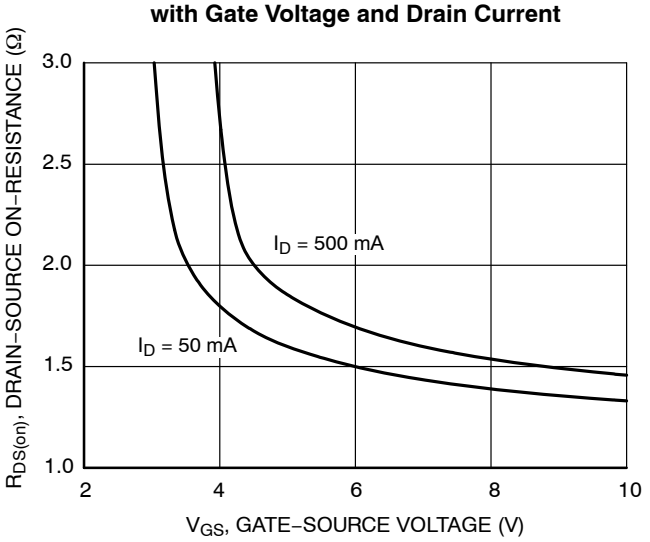


Figure 4. On−Resistance Variation with Gate−Source Voltage

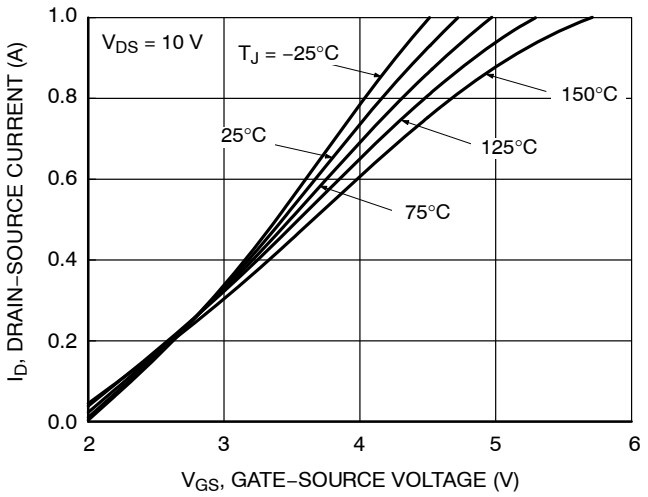


Figure 5. Transfer Characteristics

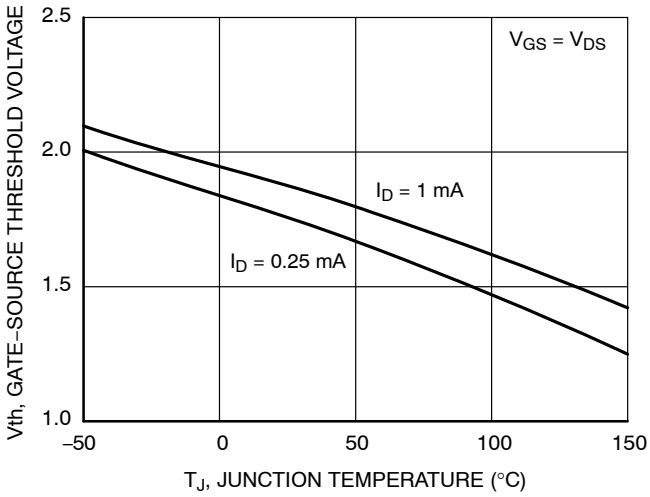


Figure 6. Gate Threshold Variation with Temperature

TYPICAL ELECTRICAL CHARACTERISTICS (continued)

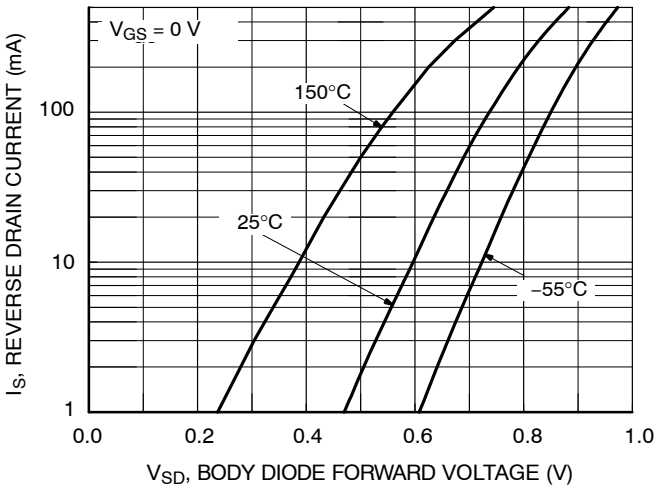


Figure 7. Reverse Drain Current Variation with Diode Forward Voltage and Temperature

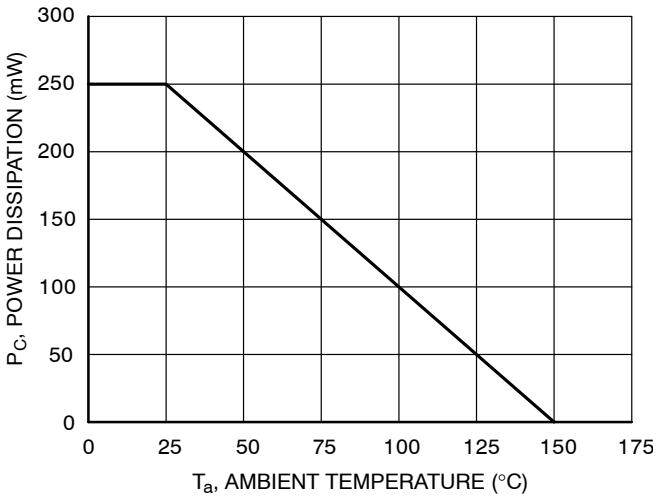


Figure 8. Power Derating

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Shipping†
2N7002V	AB	SOT−563 (Pb−Free)	3000 / Tape & Reel
2N7002VA	AC	SOT−563 (Pb−Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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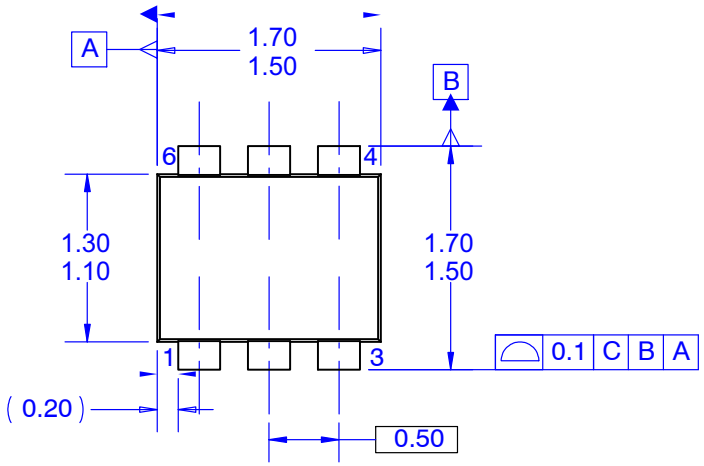
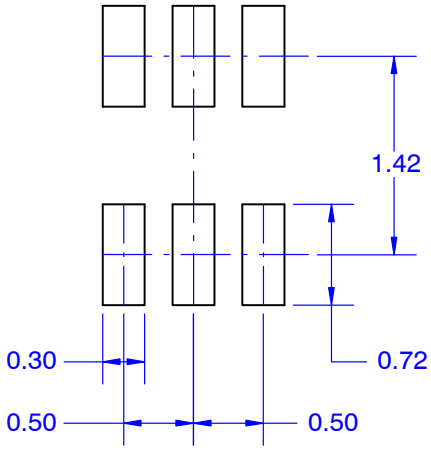
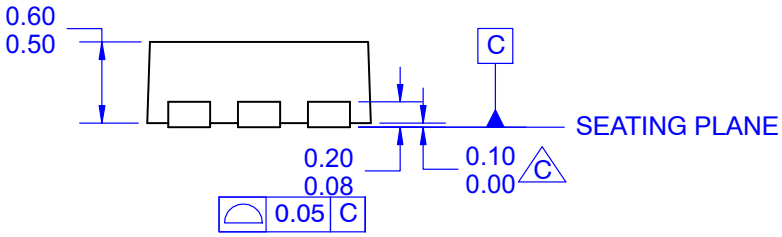
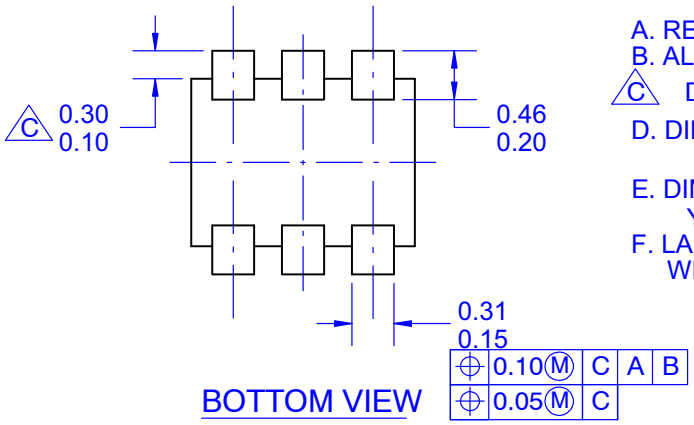


TOP VIEW



LAND PATTERN
RECOMMENDATION





BOTTOM VIEW

NOTES: UNLESS OTHERWISE SPECIFIED.

A. REFERENCE TO JEDEC MO293.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DOES NOT COMPLY JEDEC STANDARD VALUE.
D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSION.
E. DIMENSION AND TOLERANCE AS PER ASME Y14.5−2009.
F. LANDPATTERN RECOMMENDATION GENERATED WITH IPC LANDPATTERN GENERATOR

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