



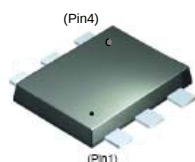
April 2010

2N7002V/VA

N-Channel Enhancement Mode Field Effect Transistor

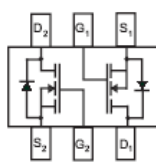
Features

- 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
- Lead Free By Design/RoHS Compliant

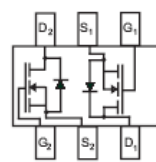


SOT-563F

* Pin1 and Pin4 are exchangeable.



2N7002V
Marking : AB



2N7002VA
Marking : AC

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 $R_{GS} \leq 1.0\text{M}\Omega$	60	V
V_{GSS}	Gate-Source Voltage	Continuous Pulsed	± 20 ± 40 V
I_D	Drain Current	Continuous Pulsed	280 1.5 mA A
T_J, T_{STG}	Junction and 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 $T_A = 25^\circ\text{C}$	250 2.0	mW mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient *	500	$^\circ\text{C/W}$

* 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.	Typ.	Max.	Units
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Off Characteristics (Note1)

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=10\mu A$	60	78	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V$ $V_{DS}=60V, V_{GS}=0V, @T_C=125^\circ\text{C}$	-	0.001 7	1.0 500	μA
I_{GSS}	Gate-Body Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	0.2	± 100	nA

On Characteristics (Note1)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.76	2.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=5V, I_D=0.05A,$ $V_{GS}=10V, I_D=0.5A, @T_J=125^\circ\text{C}$	- -	1.6 2.53	7.5 13.5	Ω
$I_{D(ON)}$	On-State Drain Current	$V_{GS}=10V, V_{DS}=7.5V$	0.5	1.43	-	A
g_{FS}	Forward Transconductance	$V_{DS}=10V, I_D=0.2A$	80	356.5	-	mS

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{MHz}$	-	37.8	50	pF
C_{oss}	Output Capacitance		-	12.4	25	pF
C_{rss}	Reverse Transfer Capacitance		-	6.5	7.0	pF

Switching Characteristics

$t_{D(ON)}$	Turn-On Delay Time	$V_{DD}=30V, I_D=0.2A, V_{GEN}=10V$ $R_L=150\Omega, R_{GEN}=25\Omega$	-	5.85	20	ns
$t_{D(OFF)}$	Turn-Off Delay Time		-	12.5	20	

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

Typical Performance Characteristics

Figure 1. On-Region Characteristics

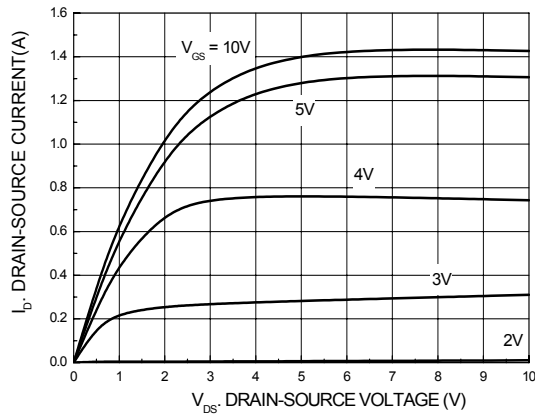


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current

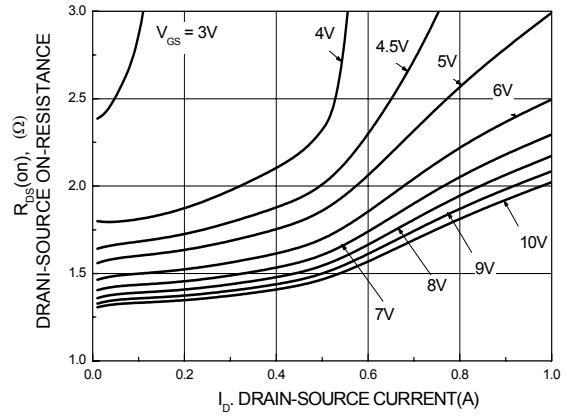


Figure 3. On-Resistance Variation with Temperature

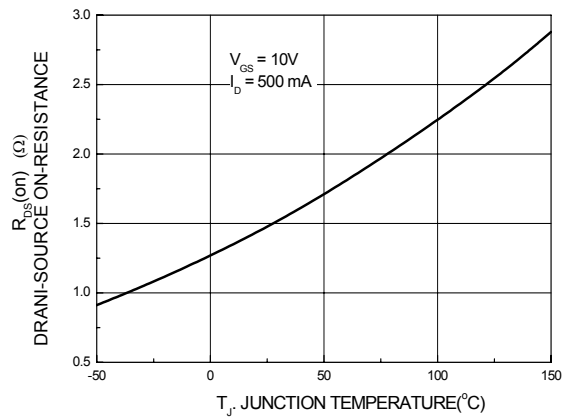


Figure 4. On-Resistance Variation with Gate-Source Voltage

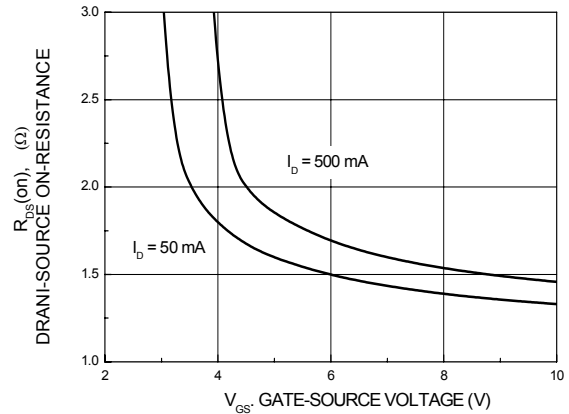


Figure 5. Transfer Characteristics

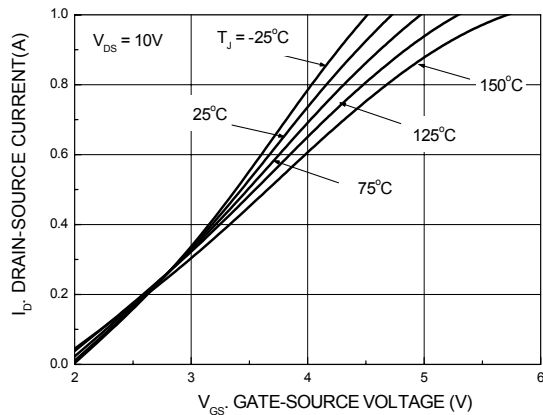
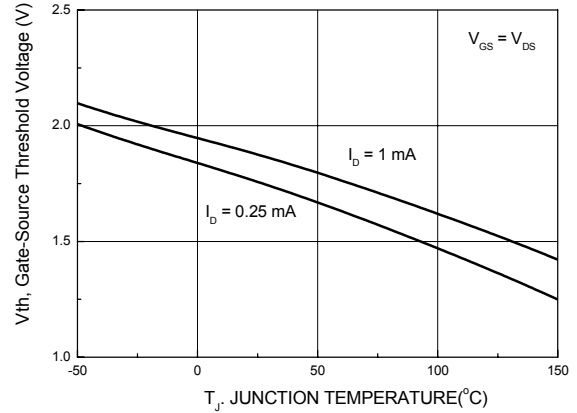


Figure 6. Gate Threshold Variation with Temperature



Typical Performance Characteristics

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

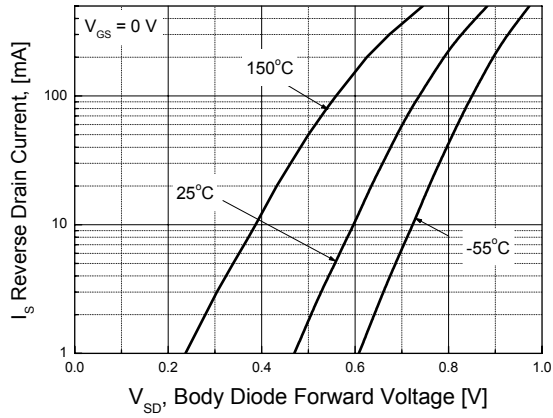
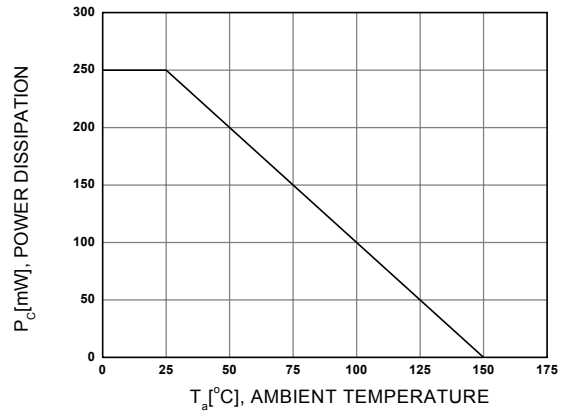


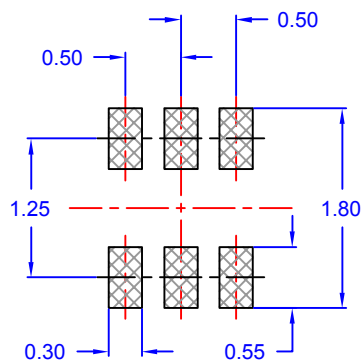
Figure 8. Power Derating



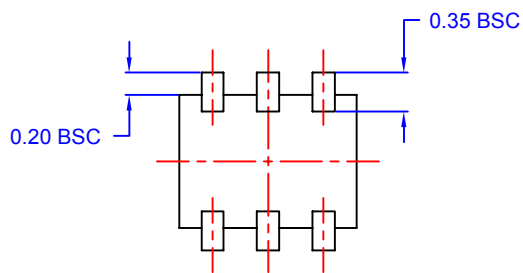
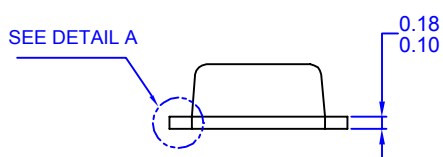
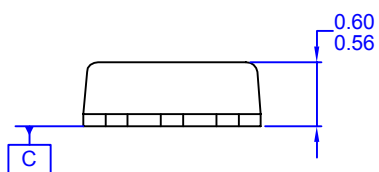
The technical drawing shows a mechanical part with the following dimensions and features:

- Overall Dimensions:**
 - Total width: 1.70
 - Total height: 1.20 BSC (Basic)
- Top Features:**
 - Two rectangular features at the top corners.
 - Feature A: Width 1.50, Height 0.30.
 - Feature B: Width 0.15, Height 0.15.
- Bottom Features:**
 - Three rectangular features along the bottom edge.
 - Feature C: Width 0.10, Height 0.50.
 - Feature D: Width 0.10, Height 1.00.
- Tolerances:**
 - Dimension 1.50 has a tolerance of ±0.05.
 - Dimension 0.30 has a tolerance of ±0.02.
 - Dimension 0.15 has a tolerance of ±0.02.
 - Dimension 0.10 has a tolerance of ±0.02.
 - Dimension 0.50 has a tolerance of ±0.02.
 - Dimension 1.00 has a tolerance of ±0.02.
- Other Annotations:**
 - A dashed red line indicates the centerline of the part.
 - A dimension of 0.20 is shown for the distance from the left edge to the first bottom feature.
 - A dimension of 1.60 is shown for the distance from the right edge of Feature B to the right edge of the part.

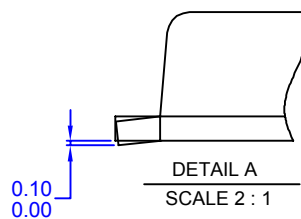
TOP VIEW



LAND PATTERN RECOMMENDATION



BOTTOM VIEW

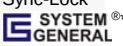


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Rev. 147



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