2N7002KW

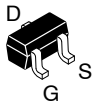
N-Channel Enhancement Mode Field Effect Transistor

ON Semiconductor®

www.onsemi.com

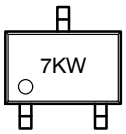
Features

- Low On−Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra−Small Surface Mount Package
- These Devices are Pb−Free and are RoHS Compliant
- ESD HBM = 1000 V as per JESD22 A114 and ESD CDM = 1500 V as per JESD22 C101



SC−70
3 LEAD
CASE 419AB

MARKING DIAGRAM

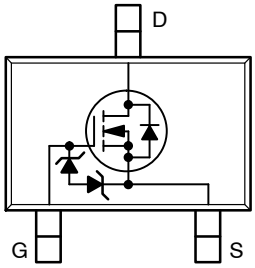


7KW = Specific Device Marking

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

Rating		Symbol	Value	Unit
Drain−Source Voltage		V_{DSS}	60	V
Gate−Source Voltage		V_{GSS}	±20	V
Maximum Drain Current	Continuous T_J = 100°C Pulsed	I_D	310 195 1.2	mA mA A
Operating Junction Temperature Range		T_J	−55 to +150	°C
Storage Temperature Range		T_{STG}	−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

Parameter	Symbol	Value	Unit
Total Device Dissipation Derating above T_A = 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance, Junction to Ambient*	$R_{\theta JA}$	410	°C/W

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

ORDERING INFORMATION†

Device	Package	Shipping†
2N7002KW	SC−70	3000 / Tape & Reel

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

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain−Source Breakdown Voltage	V_{GS} = 0 V, I_D = 10 μA	60	–	–	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60 V, V_{GS} = 0 V V_{DS} = 60 V, V_{GS} = 0 V, T_J = 125°C	–	–	1.0 0.5	μA mA
I_{GSS}	Gate−Body Leakage	V_{DS} = 0 V, V_{GS} = ±20 V	–	–	±10	μA
ON CHARACTERISTICS (Note 1)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	1.1	–	2.1	V
$R_{DS(on)}$	Static Drain−Source On−Resistance	V_{GS} = 10 V, I_D = 500 mA V_{GS} = 10 V, I_D = 500 mA, T_J = 100°C V_{GS} = 5 V, I_D = 50 mA V_{GS} = 5 V, I_D = 50 mA, T_J = 100°C	–	–	1.6 2.4 2 3	Ω
$V_{DS(on)}$	Drain−Source On−Voltage	V_{GS} = 10 V, I_D = 500 mA V_{GS} = 5 V, I_D = 50 mA	–	–	3.75 1.5	V
$I_{D(on)}$	On−State Drain Current	V_{GS} = 10 V, V_{DS} = 2 V	500	–	–	mA
g_{FS}	Forward Transconductance	V_{DS} = 2 V, I_D = 0.2 A	80	–	–	mS
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	–	–	50	pF
C_{oss}	Output Capacitance		–	–	25	pF
C_{rss}	Reverse Transfer Capacitance		–	–	5	pF
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30 V, R_L = 150 Ω, V_{GS} = 10 V, I_D = 200 mA, R_{GEN} = 25 Ω	–	–	20	ns
$t_{d(off)}$	Turn-Off Delay Time		–	–	60	ns
DRAIN−SOURCE DIODE CHARACTERISTICS						
I_S	Maximum Continuous Drain−Source Diode Forward Current		–	–	115	mA
I_{SM}	Maximum Pulsed Drain−Source Diode Forward Current		–	–	0.8	A
V_{SD}	Drain−Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 115 mA	–	–	1.1	V

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.

1. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%.

TYPICAL PERFORMANCE CHARACTERISTICS

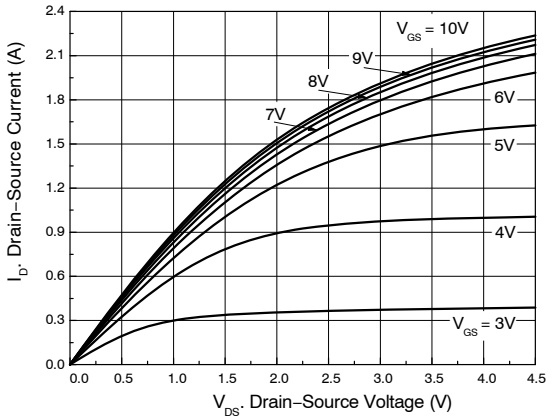


Figure 1. On−Region Characteristics

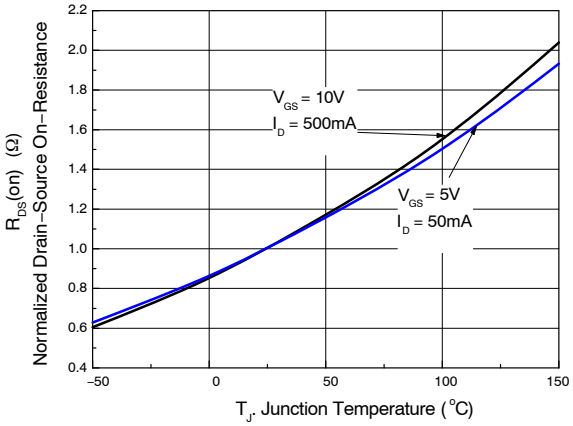


Figure 2. On−Resistance Variation with Temperature

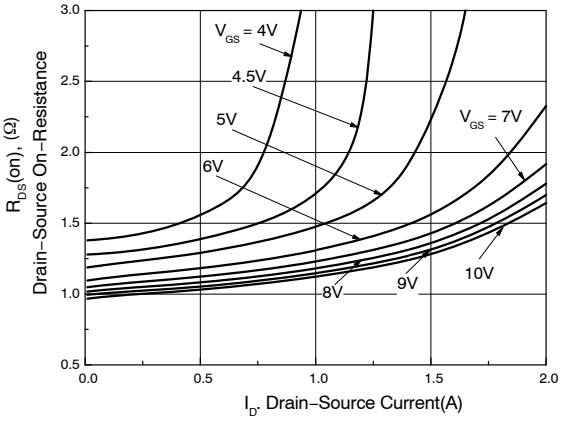


Figure 3. On−Resistance Variation with Gate Voltage and Drain Current

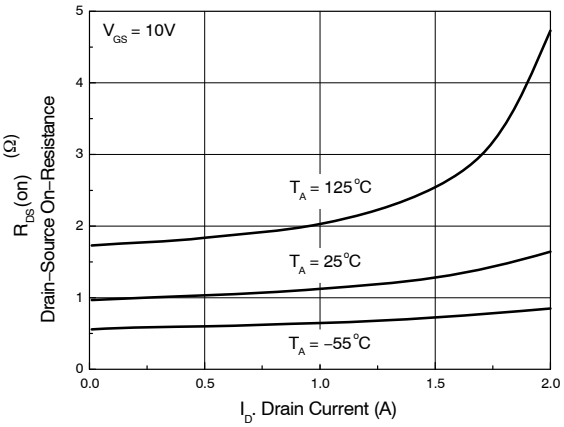


Figure 4. On−Resistance Variation with Drain Current and Temperature

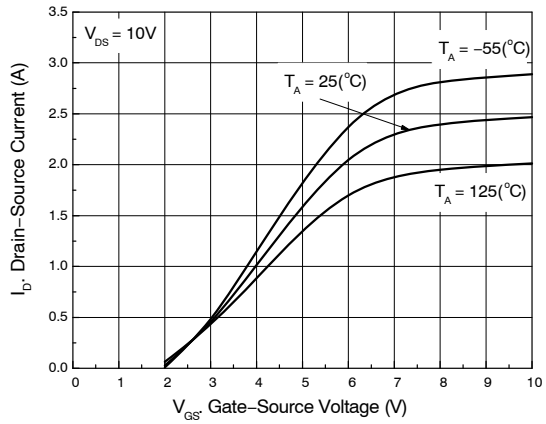


Figure 5. Transfer Characteristics

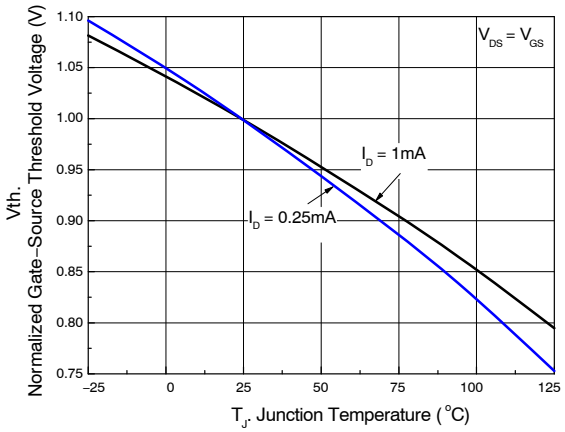


Figure 6. Gate Threshold Variation with Temperature

TYPICAL PERFORMANCE CHARACTERISTICS

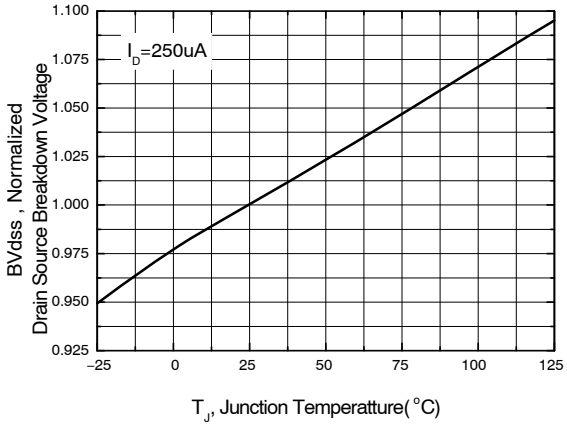


Figure 7. Breakdown Voltage Variation with Temperature

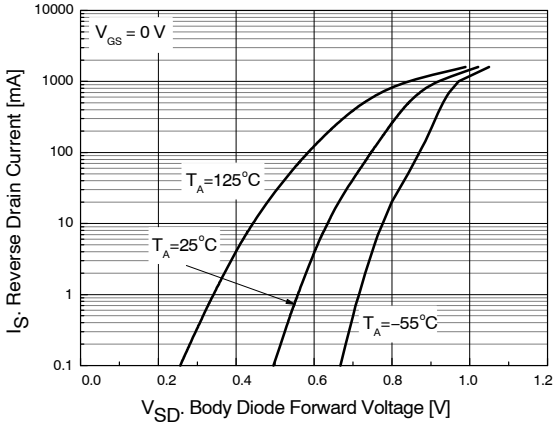


Figure 8. Body Diode Forward Voltage Variation with Source Current and Temperature

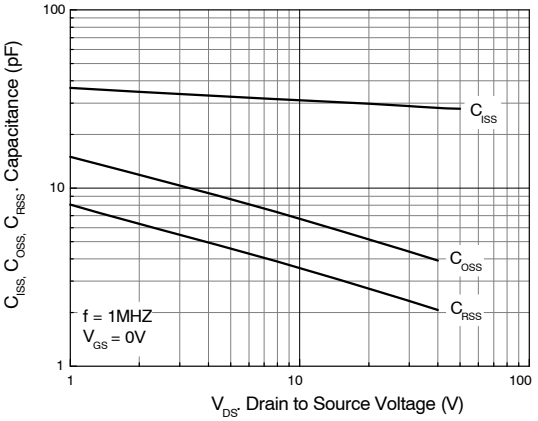


Figure 9. Capacitance Variation

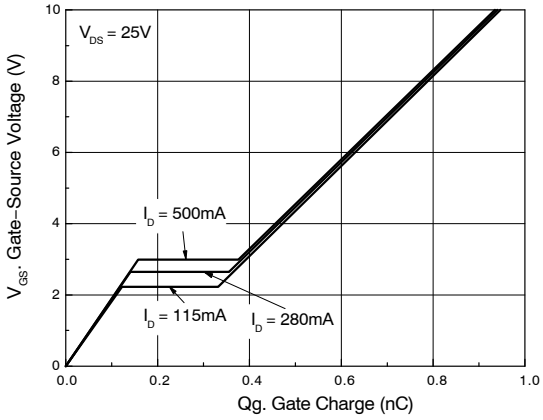


Figure 10. Gate Charge Characteristics

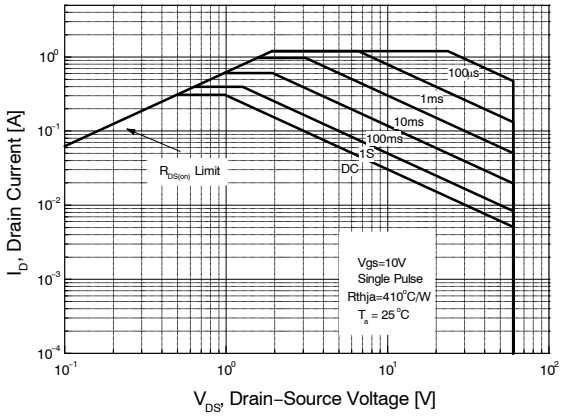


Figure 11. Maximum Safe Operating Area

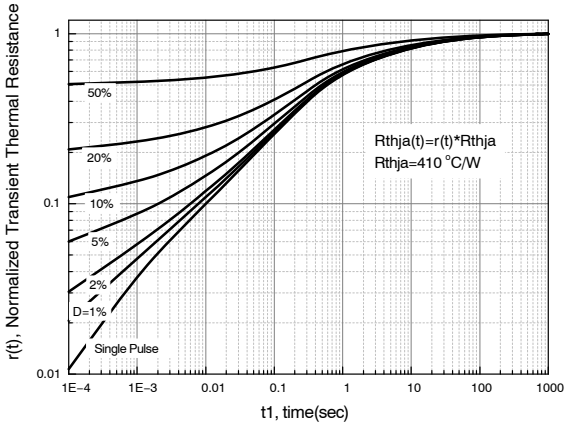
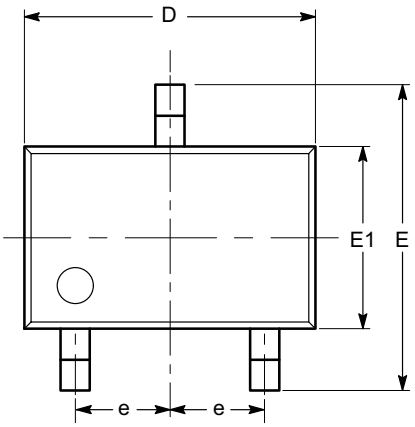


Figure 12. Transient Thermal Response Curve

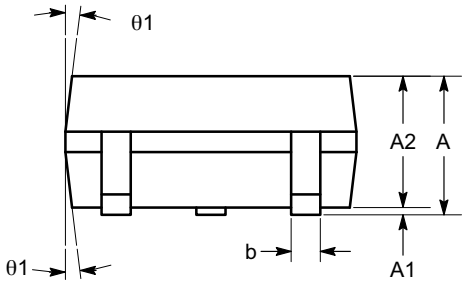
SC−70, 3 Lead, 1.25x2
CASE 419AB−01
ISSUE O

DATE 19 DEC 2008

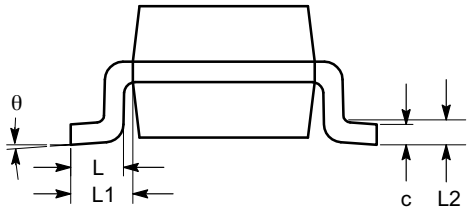


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	0.80		1.10
A1	0.00		0.10
A2	0.80	0.90	1.00
b	0.15		0.30
c	0.08		0.22
D	1.80	2.00	2.20
E	1.80	2.10	2.40
E1	1.15	1.25	1.35
e		0.65 BSC	
L	0.26	0.36	0.46
L1		0.42 REF	
L2		0.15 BSC	
θ	0°		8°
θ1	4°		10°



SIDE VIEW



END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-203.

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