

2N7002KW

N-Channel Enhancement Mode Field Effect Transistor

Features

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



Marking : 7KW

Absolute Maximum Ratings * $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Maximum Drain Current - Continuous $T_J = 100^\circ\text{C}$ - Pulsed	310 195 1.2	mA mA A
T_J	Operating Junction Temperature Range	-55 to +150	$^\circ\text{C}$
T_{STG}	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 $T_A = 25^\circ\text{C}$	300 2.4	mW mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient *	410	$^\circ\text{C}/\text{W}$

* 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
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}$, $I_D = 10\mu\text{A}$	60			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{V}$, $V_{GS} = 0\text{V}$ $V_{DS} = 60\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 125^\circ\text{C}$			1.0 0.5	μA mA
I_{GSS}	Gate-Body Leakage	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$			± 10	μA
On Characteristics (Note1)						
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	1.1		2.1	V
$R_{DS(\text{ON})}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{V}$, $I_D = 500\text{mA}$ $V_{GS} = 10\text{V}$, $I_D = 500\text{mA}$, $T_J = 100^\circ\text{C}$ $V_{GS} = 5\text{V}$, $I_D = 50\text{mA}$ $V_{GS} = 5\text{V}$, $I_D = 50\text{mA}$, $T_J = 100^\circ\text{C}$			1.6 2.4 2 3	Ω Ω Ω Ω
$V_{DS(\text{ON})}$	Drain-Source On-Voltage	$V_{GS} = 10\text{V}$, $I_D = 500\text{mA}$ $V_{GS} = 5\text{V}$, $I_D = 50\text{mA}$			3.75 1.5	V V
$I_{D(\text{ON})}$	On-State Drain Current	$V_{GS} = 10\text{V}$, $V_{DS} = 2\text{V}$	500			mA
g_{FS}	Forward Transconductance	$V_{DS} = 2\text{V}$, $I_D = 0.2\text{A}$	80			mS
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$			50	pF
C_{oss}	Output Capacitance				25	pF
C_{rss}	Reverse Transfer Capacitance				5	pF
Switching Characteristics						
$t_{D(\text{ON})}$	Turn-On Delay Time	$V_{DD} = 30\text{V}$, $R_L = 150\Omega$, $V_{GS} = 10\text{V}$			20	ns
$t_{D(\text{OFF})}$	Turn-Off Delay Time	$I_D = 200\text{mA}$, $R_{\text{GEN}} = 25\Omega$			60	ns
Drain-Source Diode Characteristics and Maximum Ratings						
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	$V_{GS} = 0\text{V}$, $I_S = 115\text{mA}$			1.1	V

Note1 : 1. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%.

Typical Performance Characteristics

Figure 1. On-Region Characteristics.

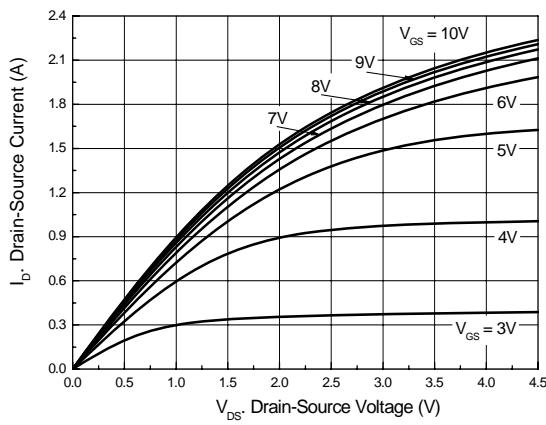


Figure 2. On-Resistance Variation with Temperature.

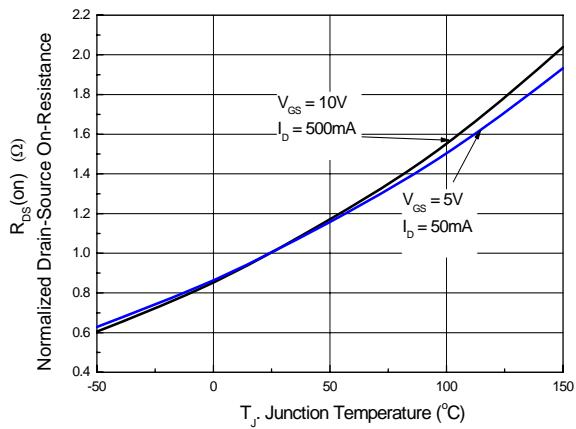


Figure 3. On-Resistance Variation with Gate Voltage and Drain Current.

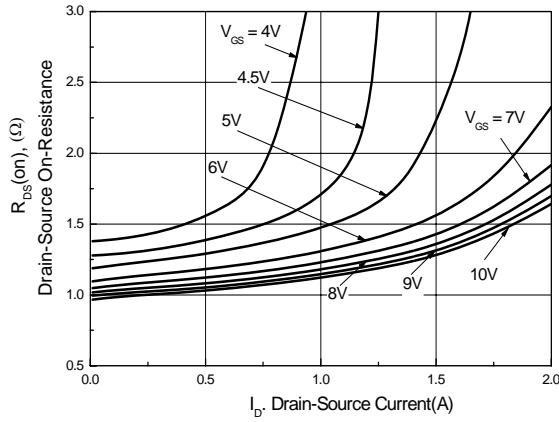


Figure 4. On-Resistance Variation with Drain Current and Temperature.

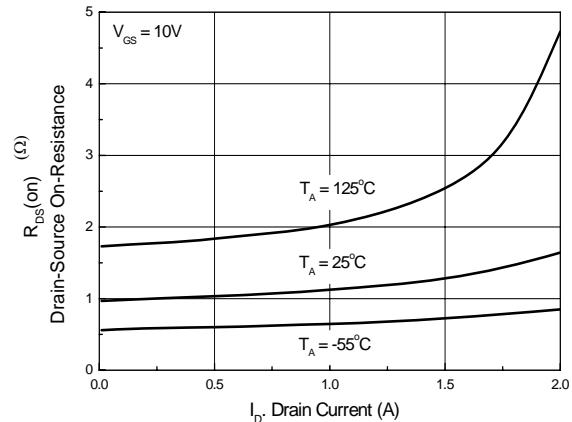


Figure 5. Transfer Characteristics

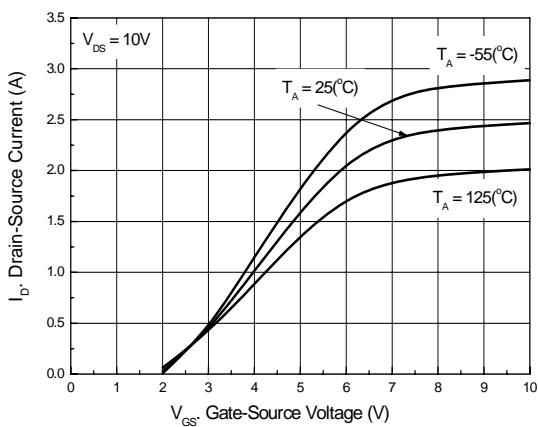
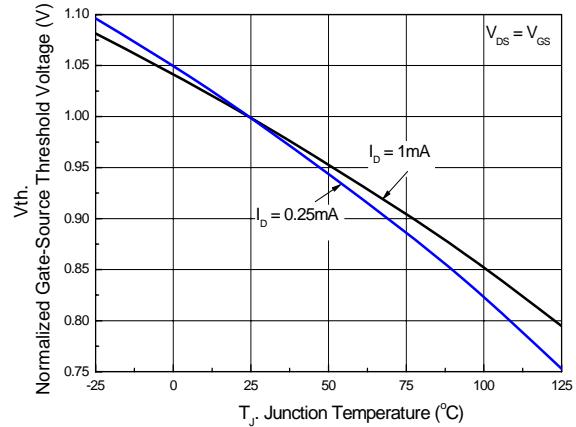


Figure 6. Gate Threshold Variation with Temperature.



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation with Temperature

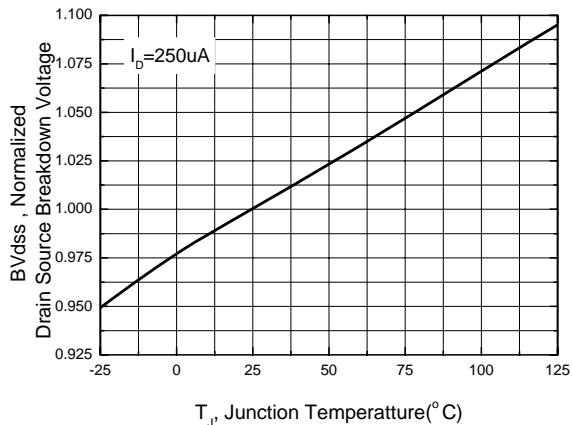


Figure 8. Body Diode Forward Voltage Variation with Source Current and Temperature.

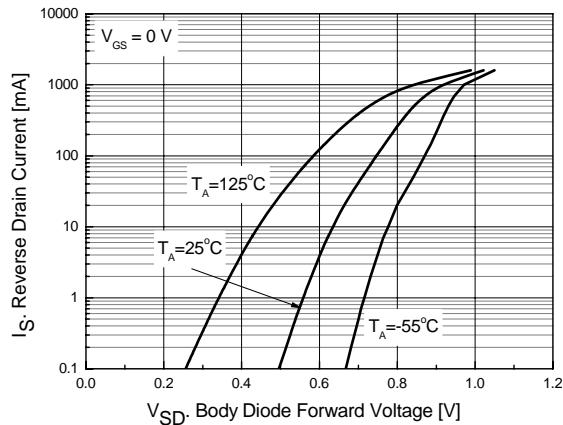


Figure 9. Capacitance Characteristics.

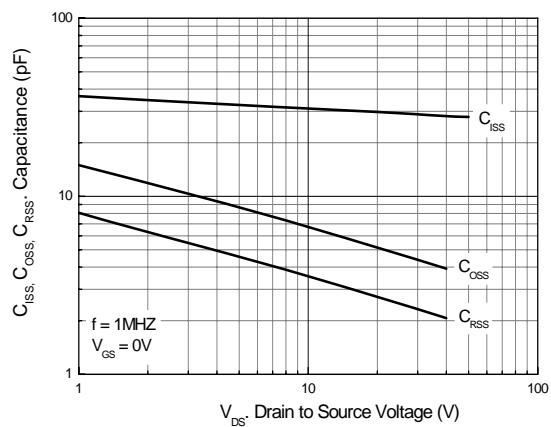


Figure 11. Maximum Safe Operating Area.

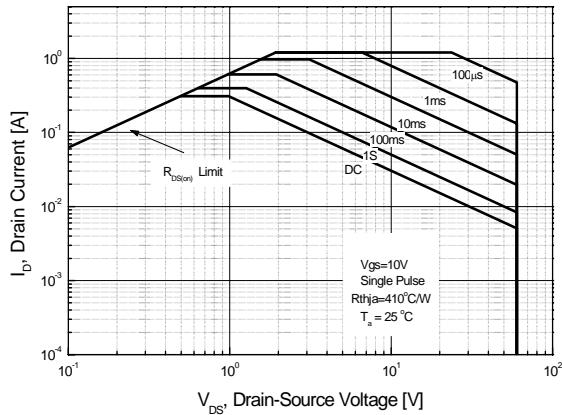


Figure 10. Gate Charge Characteristics.

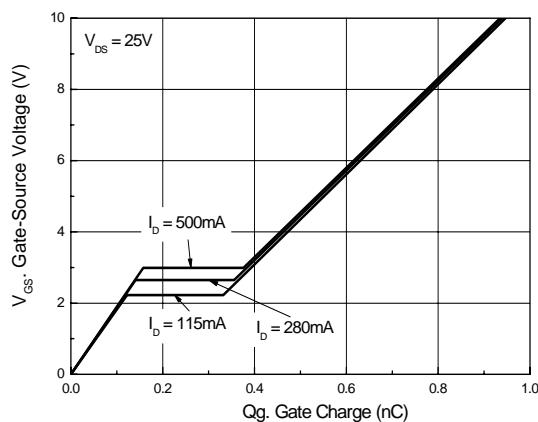
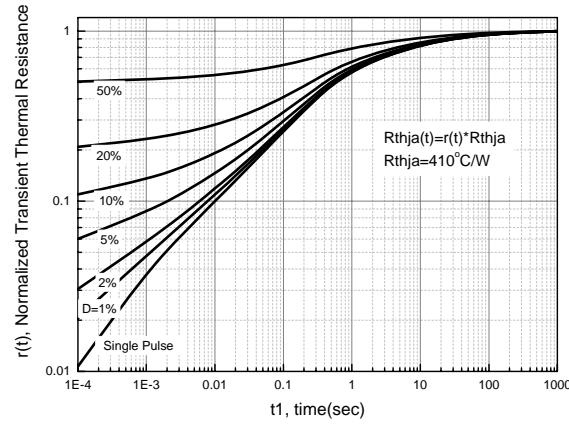
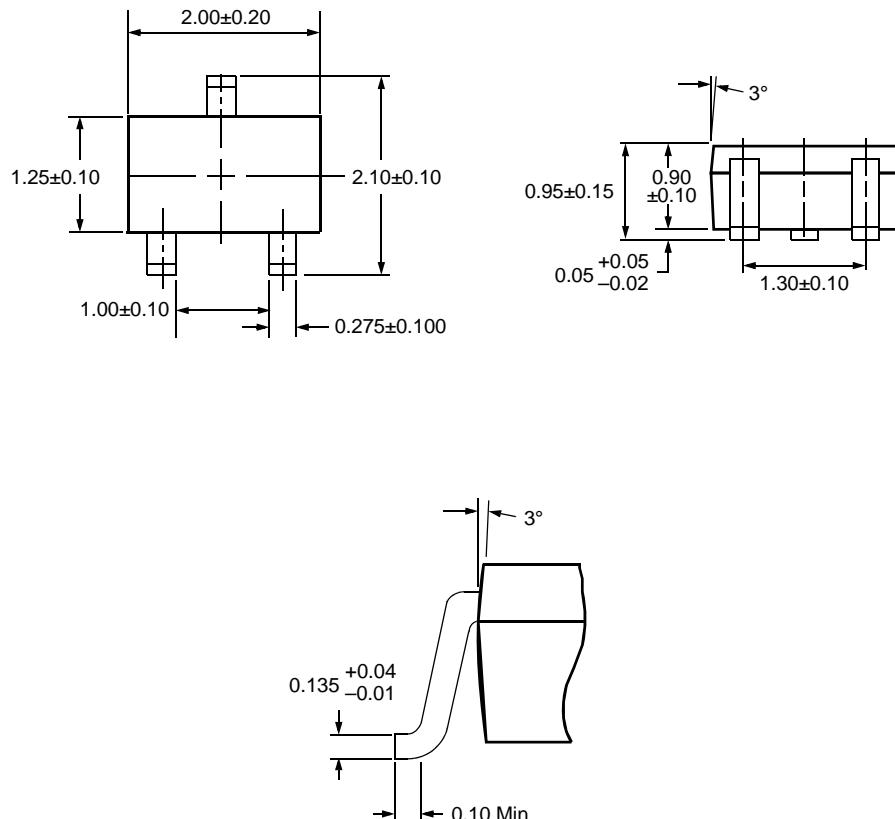


Figure 12. Transient Thermal Response Curve.



Physical Dimensions

SOT-323



Dimensions in Millimeters



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