

N-Channel SOT-323

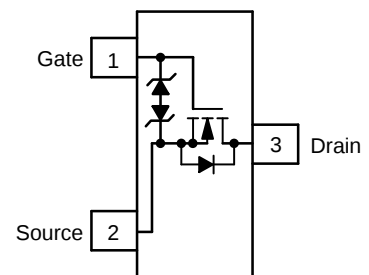
- We declare that the material of product compliance with RoHS requirements.
- ESD Protected:1000V
- **Pb-Free package is available**
RoHS product for packing code suffix "G"
Halogen free product for packing code suffix "H"



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	V _{dc}
Drain-Gate Voltage ($R_{GS} = 1.0 \text{ M}\Omega$)	V_{DGR}	60	V _{dc}
Drain Current – Continuous $T_C = 25^\circ\text{C}$ (Note 1.) $T_C = 100^\circ\text{C}$ (Note 1.) – Pulsed (Note 2.)	I_D I_D I_{DM}	± 115 ± 75 ± 800	mAdc
Gate-Source Voltage – Continuous – Non-repetitive ($t_p \leq 50 \mu\text{s}$)	V_{GS} V_{GSM}	± 20 ± 40	V _{dc} V _{pk}

Simplified Schematic



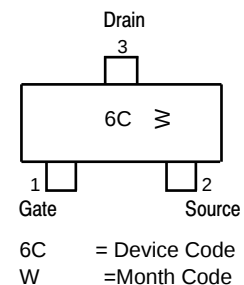
(Top View)

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 3.) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (Note 4.) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

1. The Power Dissipation of the package may result in a lower continuous drain current.
2. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.
3. FR-5 = $1.0 \times 0.75 \times 0.062 \text{ in.}$
4. Alumina = $0.4 \times 0.3 \times 0.025 \text{ in.}$ 99.5% alumina.

MARKING DIAGRAM & PIN ASSIGNMENT



ORDERING INFORMATION

Device	Marking	Shipping
2N7002WT1	6C/K72/702/72	3000 Tape & Reel

Small Signal MOSFET 115 mA, 60 V

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain–Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 10\ \mu\text{Adc}$)	$V_{(BR)DSS}$	60	–	–	Vdc
Zero Gate Voltage Drain Current ($V_{GS} = 0$, $V_{DS} = 60\ \text{Vdc}$)	I_{DSS}	$T_J = 25^\circ\text{C}$	–	1.0	μAdc
		$T_J = 125^\circ\text{C}$	–	500	μAdc
Gate–Body Leakage Current, Forward ($V_{GS} = 20\ \text{Vdc}$)	I_{GSSF}	–	–	1	μAdc
Gate–Body Leakage Current, Reverse ($V_{GS} = -20\ \text{Vdc}$)	I_{GSSR}	–	–	-1	μAdc

ON CHARACTERISTICS (Note 2.)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{Adc}$)	$V_{GS(th)}$	1.0	1.6	2.5	Vdc
On–State Drain Current ($V_{DS} \geq 2.0\ \text{V}_{DS(on)}$, $V_{GS} = 10\ \text{Vdc}$)	$I_{D(on)}$	500	–	–	mA
Static Drain–Source On–State Voltage ($V_{GS} = 10\ \text{Vdc}$, $I_D = 500\ \text{mAdc}$) ($V_{GS} = 5.0\ \text{Vdc}$, $I_D = 50\ \text{mAdc}$)	$V_{DS(on)}$	–	–	3.75	Vdc
		–	–	0.375	Vdc
Static Drain–Source On–State Resistance ($V_{GS} = 10\ \text{V}$, $I_D = 500\ \text{mAdc}$) $T_C = 25^\circ\text{C}$ $T_C = 125^\circ\text{C}$ ($V_{GS} = 5.0\ \text{Vdc}$, $I_D = 50\ \text{mAdc}$) $T_C = 25^\circ\text{C}$ $T_C = 125^\circ\text{C}$	$r_{DS(on)}$	–	1.4	7.5	Ohms
		–	–	13.5	Ohms
		–	1.8	7.5	Ohms
		–	–	13.5	Ohms
Forward Transconductance ($V_{DS} \geq 2.0\ \text{V}_{DS(on)}$, $I_D = 200\ \text{mAdc}$)	g_{FS}	80	–	–	mmhos

DYNAMIC CHARACTERISTICS

Input Capacitance ($V_{DS} = 25\ \text{Vdc}$, $V_{GS} = 0$, $f = 1.0\ \text{MHz}$)	C_{iss}	–	17	50	pF
Output Capacitance ($V_{DS} = 25\ \text{Vdc}$, $V_{GS} = 0$, $f = 1.0\ \text{MHz}$)	C_{oss}	–	10	25	pF
Reverse Transfer Capacitance ($V_{DS} = 25\ \text{Vdc}$, $V_{GS} = 0$, $f = 1.0\ \text{MHz}$)	C_{rss}	–	2.5	5.0	pF

SWITCHING CHARACTERISTICS (Note 2.)

Turn–On Delay Time	$(V_{DD} = 25\ \text{Vdc}$, $I_D \cong 500\ \text{mAdc}$, $R_G = 25\ \Omega$, $R_L = 50\ \Omega$, $V_{gen} = 10\ \text{V}$)	$t_{d(on)}$	–	7	20	ns
Turn–Off Delay Time		$t_{d(off)}$	–	11	40	ns

BODY–DRAIN DIODE RATINGS

Diode Forward On–Voltage ($I_S = 11.5\ \text{mAdc}$, $V_{GS} = 0\ \text{V}$)	V_{SD}	–	–	-1.5	Vdc
Source Current Continuous (Body Diode)	I_S	–	–	-115	mAdc
Source Current Pulsed	I_{SM}	–	–	-800	mAdc

2. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

TYPICAL ELECTRICAL CHARACTERISTICS

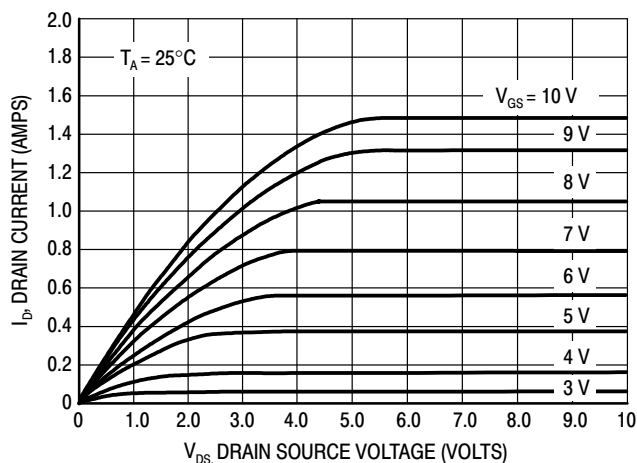


Figure 1. Ohmic Region

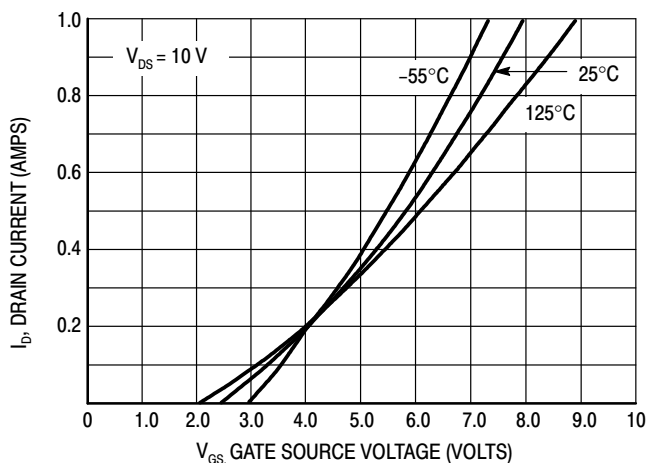


Figure 2. Transfer Characteristics

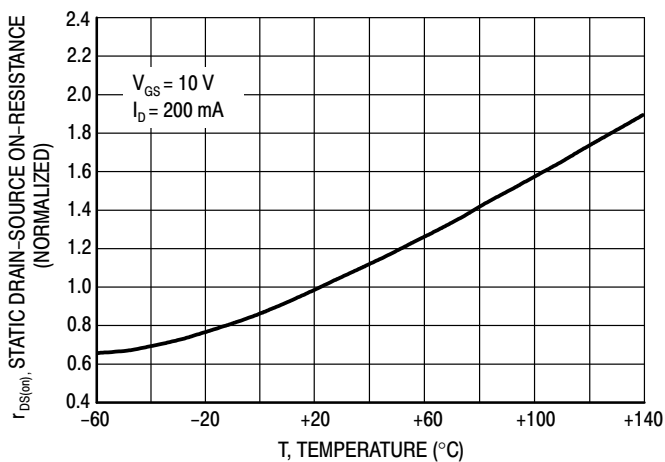


Figure 3. Temperature versus Static Drain-Source On-Resistance

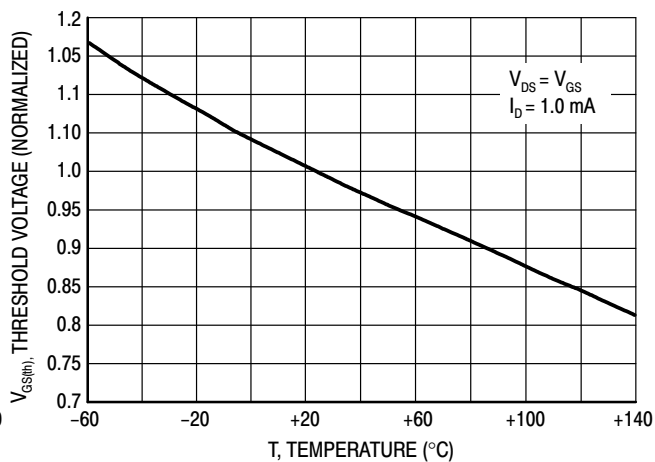
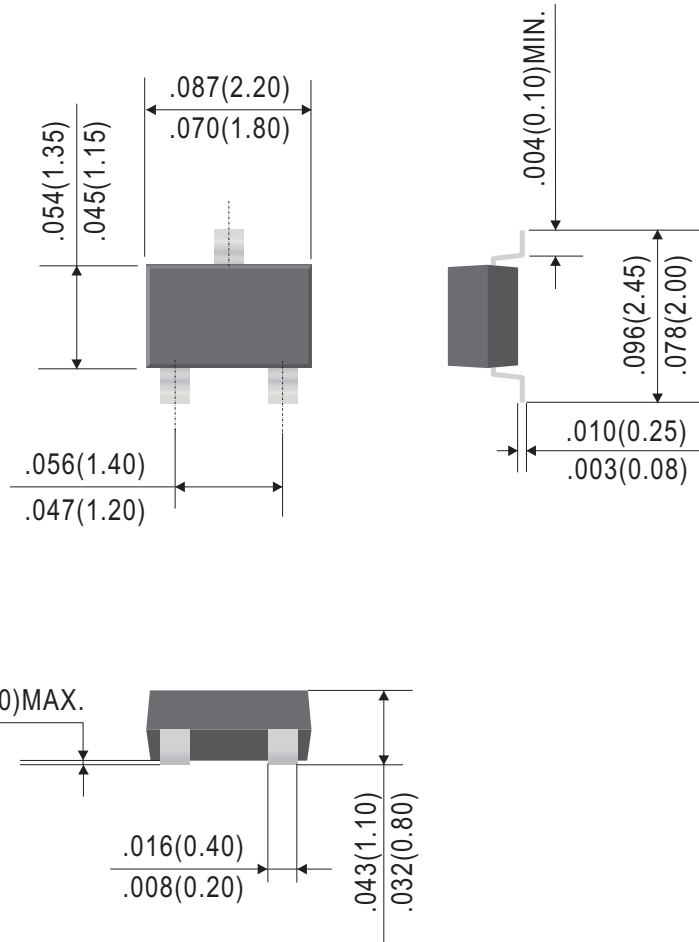


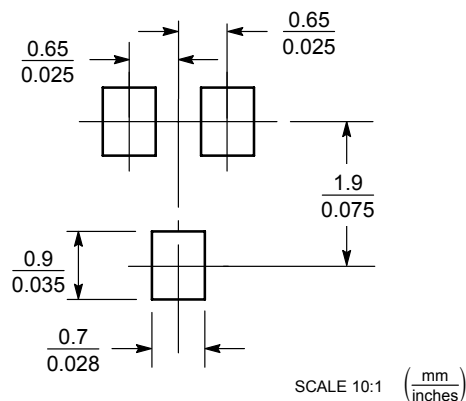
Figure 4. Temperature versus Gate Threshold Voltage

SOT-323



Dimensions in inches and (millimeters)

SOLDERING FOOTPRINT*



Ordering Information:

Device PN	Packing
2N7002WT1G ⁽¹⁾ -WS	Tape&Reel: 3 Kpcs/Reel

Note: (1) RoHS product for packing code suffix "G" ; Halogen free product for packing code suffix "H"

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