

N-Channel Small Signal MOSFET
PRIMARY CHARACTERISTICS

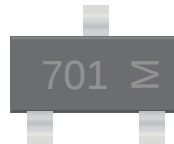
BV_{DSS}	60V
$R_{DS(ON)}$	2.8Ω
I_D	380mA

FEATURES

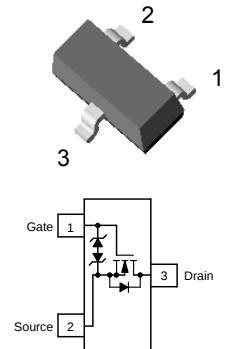
- ESD Protected
- Low RDS(on)
- Surface Mount Package
- This is a Pb-Free Device

SOT-323
PACKAGE

Marking :



M = Month Code


MECHANICAL DATA

- Case : Molded plastic, SOT-323
- Polarity : Shown above
- Terminals : Plated terminals, solderable per MIL-STD-750, Method 2026
- Epoxy : UL94-V0 rated flame retardant

MAXIMUM RATINGS($T_j = 25^\circ\text{C}$ unless otherwise stated)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	60	Vdc
Gate-to-Source Voltage	V_{GS}	± 20	Vdc
Drain Current	I_D		mAdc
– Steady State $T_A = 25^\circ\text{C}$		320	
$T_A = 85^\circ\text{C}$		230	
– $t < 5\text{ s}$ $T_A = 25^\circ\text{C}$		380	
$T_A = 85^\circ\text{C}$		270	
Power Dissipation (Note 1)	P_D		mW
Steady State		300	
$t < 5\text{ s}$		420	
Pulsed Drain Current ($t_p = 10\text{ }\mu\text{s}$)	I_{DM}	1.5	A
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to $+150$	$^\circ\text{C}$
Source Current (Body Diode)	I_S	300	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	$^\circ\text{C}$
Gate-Source ESD Rating (HBM, Method 3015)	ESD	2000	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)

N-Channel Small Signal MOSFET
● THERMAL CHARACTERISTICS

Characteristic	Max	Value	Unit
Junction-to-Ambient - Steady	$R_{\theta JA}$	417	°C/W
Junction-to-Ambient - $t \leq 5$ s	$R_{\theta JA}$	300	

● ELECTRICAL CHARACTERISTICS (Ta= 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0$ V, $I_D = 250$ μ A	60			V
Voltage Temperature	$V_{(BR)DSS}/T_J$			71		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0$ V, $T_J = 25^\circ\text{C}$			1	μ A
		$V_{DS} = 60$ V, $T_J = 125^\circ\text{C}$			500	μ A
		$V_{GS} = 0$ V, $V_{DS} = 50$ V, $T_J = 25^\circ\text{C}$			100	nA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V			± 10	μ A

ON CHARACTERISTICS (Note 2.)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$, $I_D = 250$ μ A	1		2.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			4		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10$ V, $I_D = 500$ mA			2.8	Ω
		$V_{GS} = 4.5$ V, $I_D = 200$ mA			3.2	Ω
Forward Transconductance	G_{fs}	$V_{DS} = 5$ V, $I_D = 200$ mA	80			mS

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0$ V, $f = 1$ MHz, $V_{DS} = 25$ V		21		pF
Output Capacitance	C_{OSS}			12		
Reverse Transfer Capacitance	C_{RSS}			0.35		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5$ V, $V_{DS} = 10$ V; $I_D = 500$ mA		0.44		nC
Gate-to-Source Charge	Q_{GS}			0.2		
Gate-to-Drain Charge	Q_{GD}			0.1		

SWITCHING CHARACTERISTICS (VGS = V (Note 3))

Turn-On Delay Time	$t_{d(ON)}$	$V_{DS} = 30$ V, $V_{GEN} = 10$ V, $I_D = 500$ mA, $R_G = 25$ Ω , $R_L = 60$ Ω		2.7		ns
Rise Time	t_r			2.5		
Turn-Off Delay Time	$t_{d(OFF)}$			13		
Fall Time	t_f			8		

DRAIN-SOURCE DIODE CHARACTERISTICS

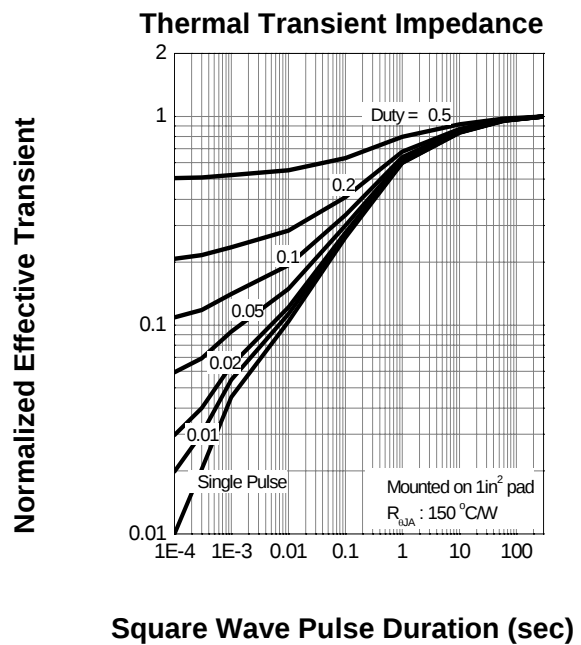
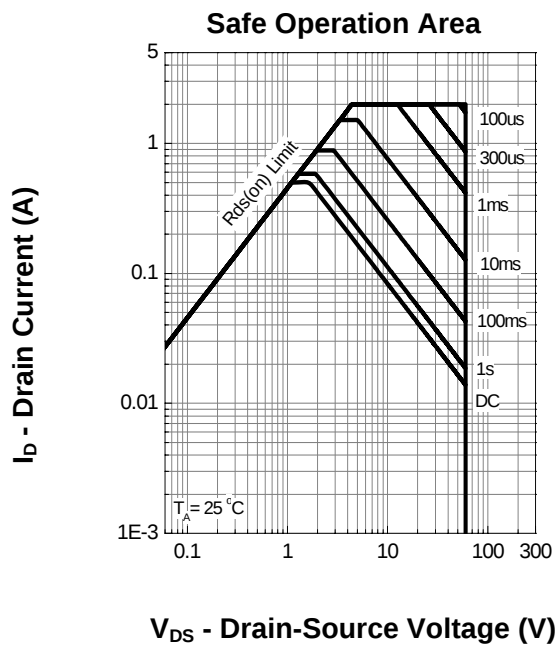
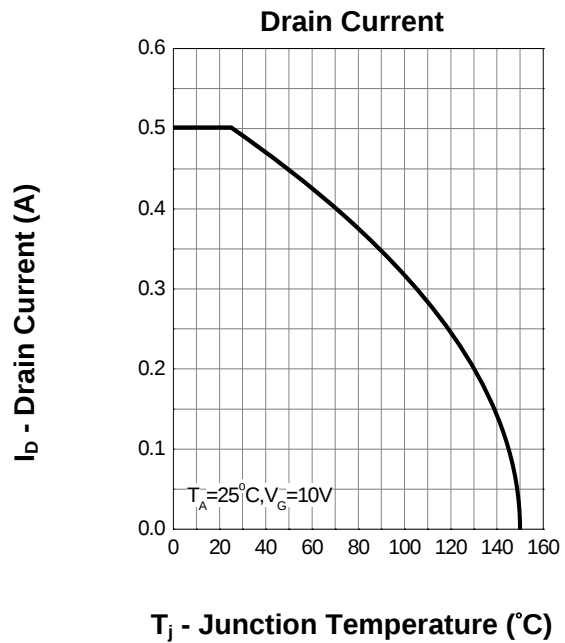
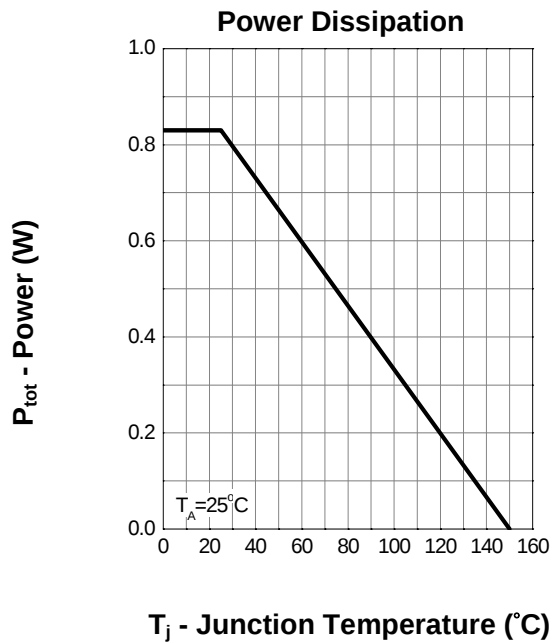
Forward Diode Voltage	V_{SD}	$V_{GS} = 0$ V, $I_S = 0.5$ A		0.85		V
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2. Pulse Test: pulse width ≤ 300 μ s, duty cycle $\leq 2\%$

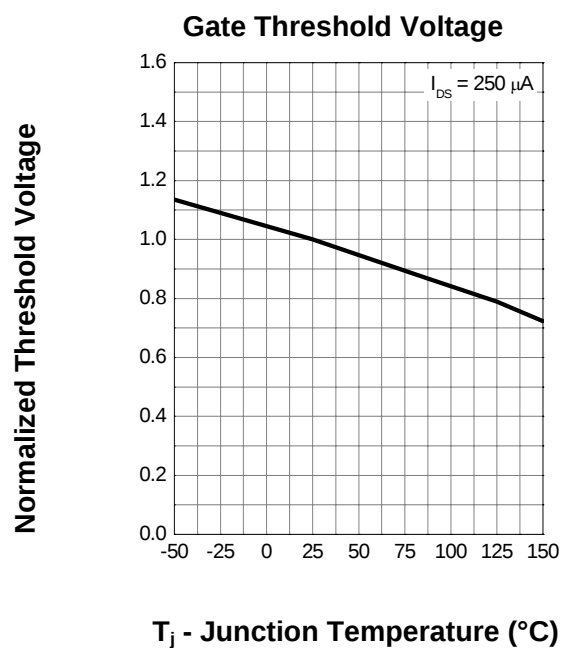
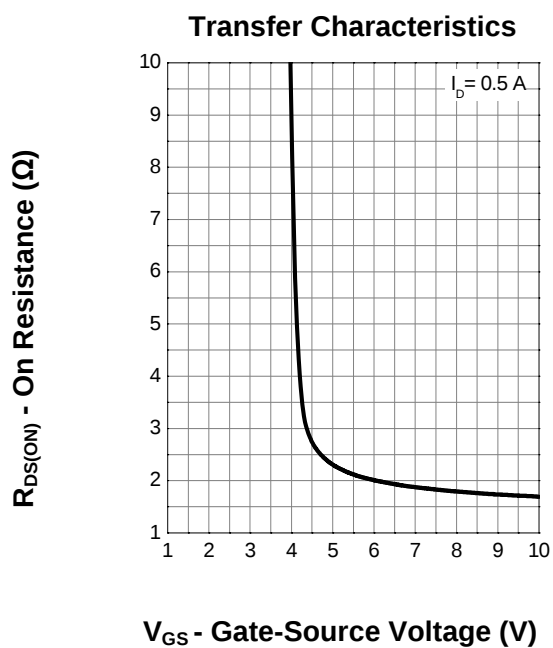
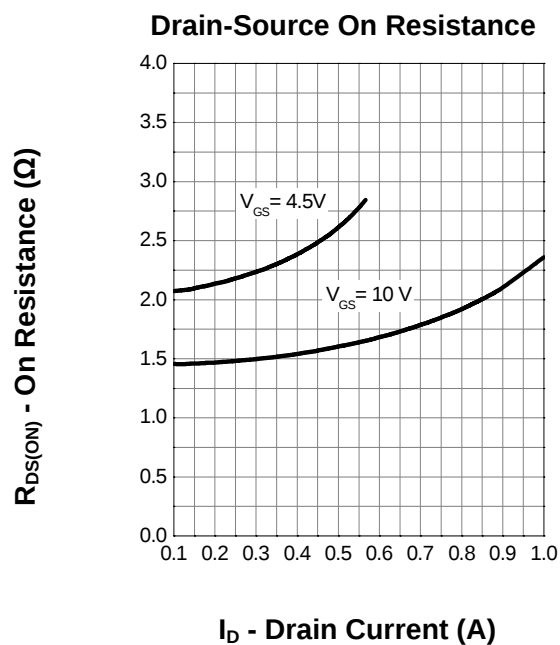
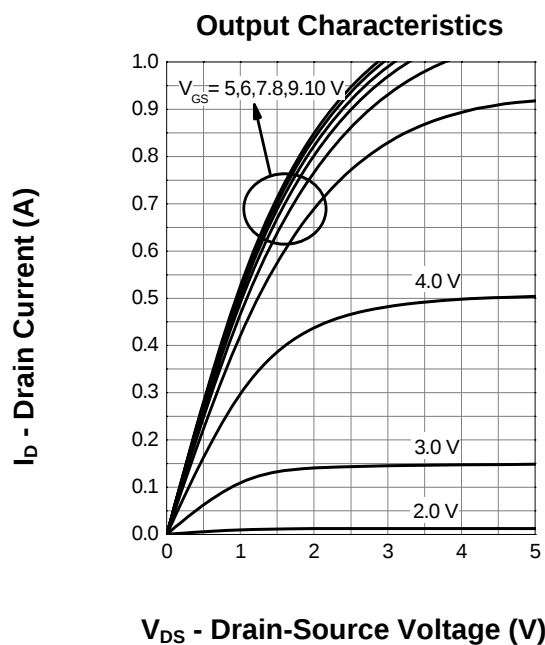
3. Switching characteristics are independent of operating junction temperatures



ELECTRICAL CHARACTERISTIC CURVES

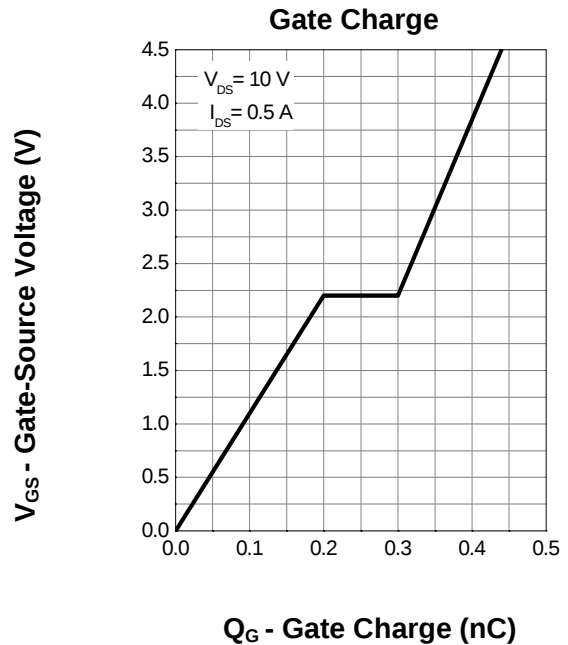
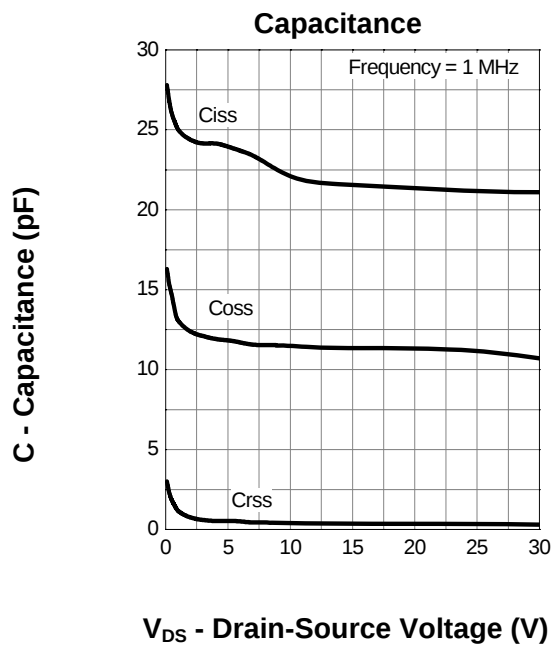
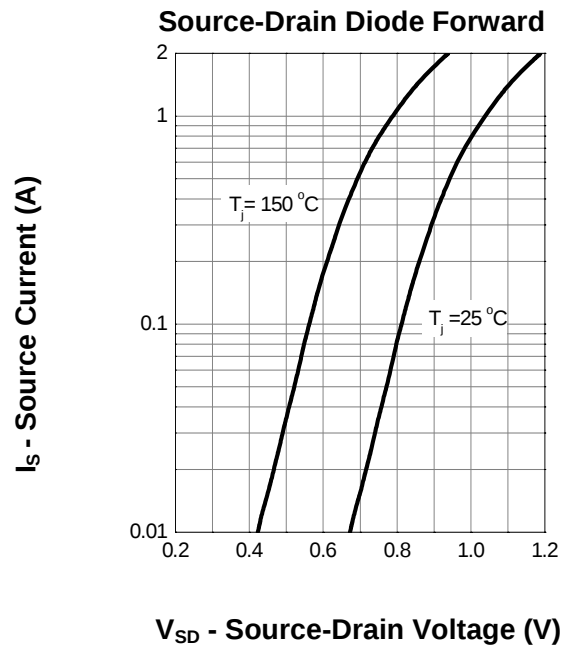
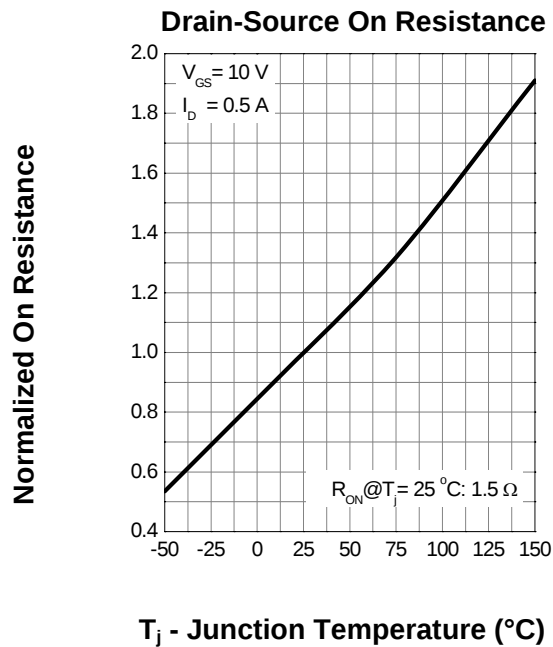


ELECTRICAL CHARACTERISTIC CURVES

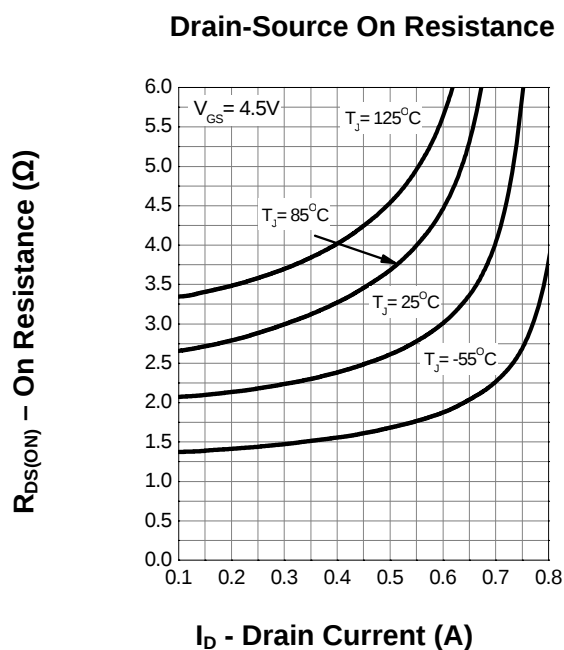
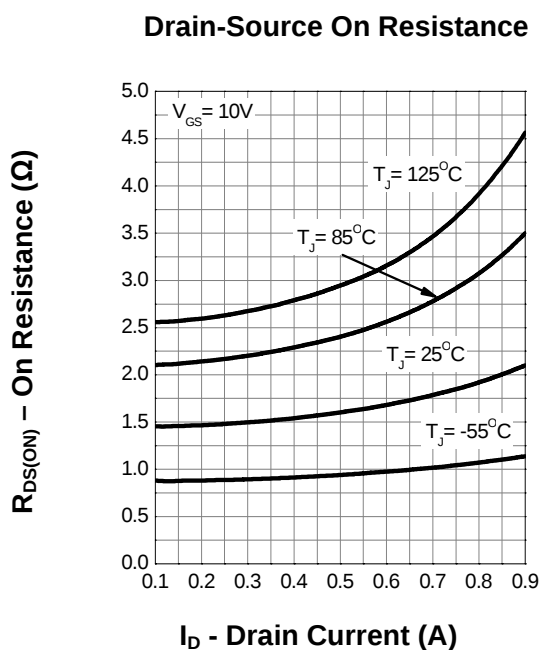
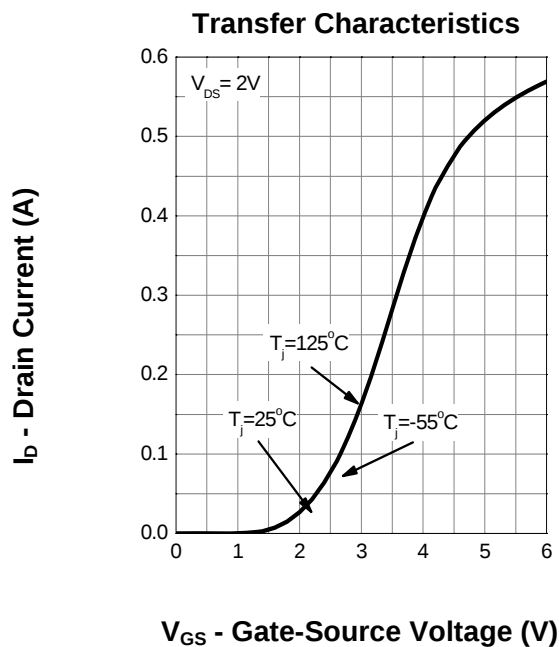
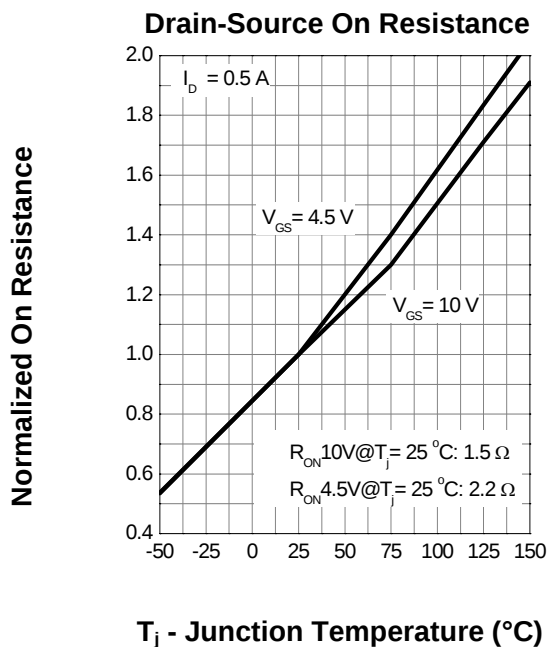




ELECTRICAL CHARACTERISTIC CURVES

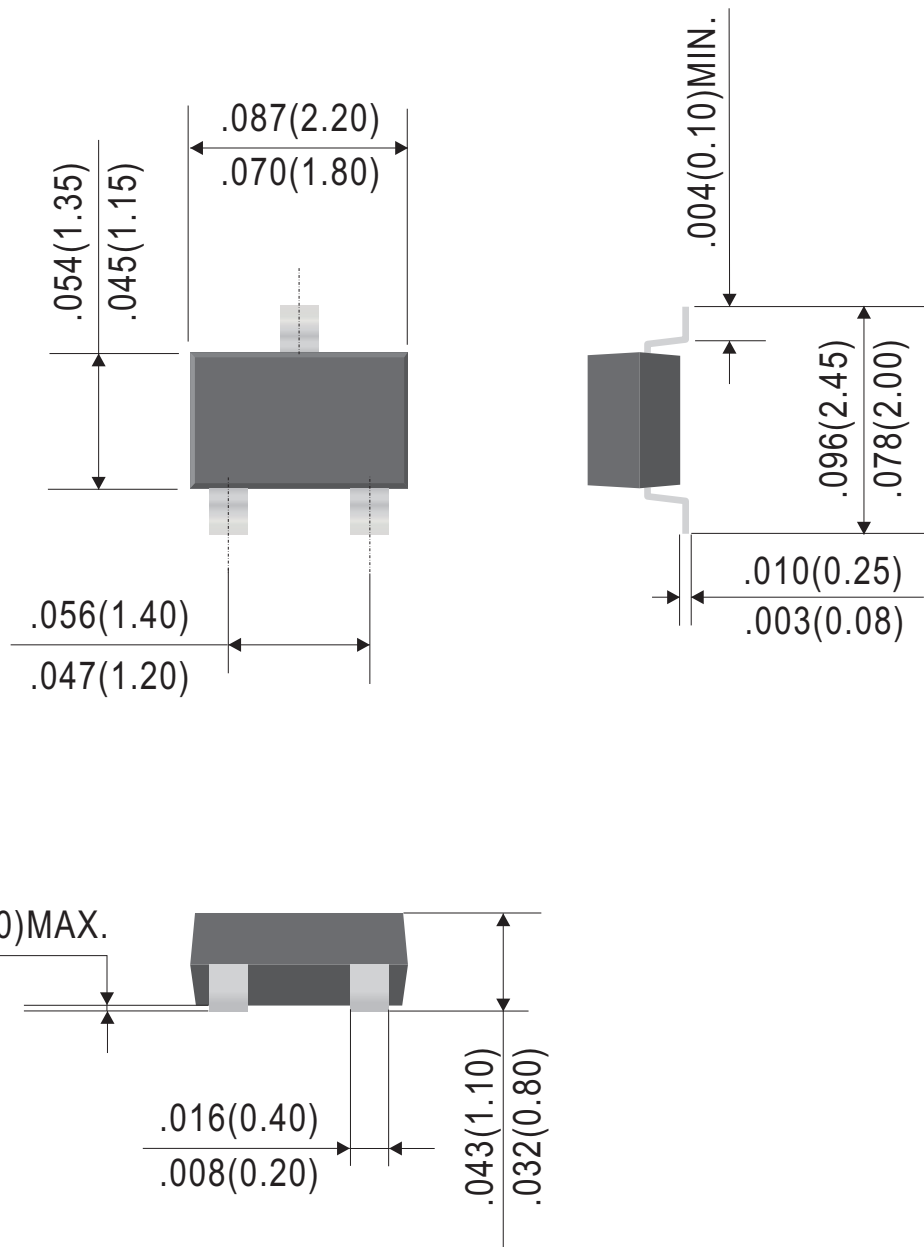


ELECTRICAL CHARACTERISTIC CURVES



Outline Drawing

SOT-323



Dimensions in inches and (millimeters)

Rev.D

Ordering Information:

Device PN	Packing
2N7002SWT1 ⁽¹⁾ H ⁽²⁾ -WS	Tape&Reel: 3 Kpcs/Reel

Note: (1) Packing code, Tape & Reel Packing

(2) Halogen free product for packing code suffix "H"

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