

## N-Channel 20-V (D-S) MOSFET

<b>PRODUCT SUMMARY</b>			
$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (A)
20	1.0 @ $V_{GS} = 10$ V	1.0 to 3.0	0.39
	1.4 @ $V_{GS} = 4.5$ V		

### FEATURES

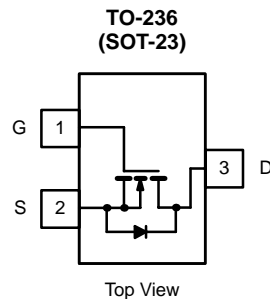
- Low On-Resistance: 0.75  $\Omega$
- Low Threshold: <1.75 V
- Low Input Capacitance: 65 pF
- Fast Switching Speed: 15 ns
- Low Input and Output Leakage

### BENEFITS

- Low Offset Voltage
- Low-Voltage Operation
- Easily Driven Without Buffer
- High-Speed Circuits
- Low Error Voltage

### APPLICATIONS

- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays



Marking Code: N1 w//  
 N1 = Part Number Code for TN0201T  
 w = Week Code  
 // = Lot Traceability

<b>ABSOLUTE MAXIMUM RATINGS (<math>T_A = 25^\circ\text{C}</math> UNLESS OTHERWISE NOTED)</b>				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	20	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )	$I_D$	$T_A = 25^\circ\text{C}$	0.39	A
		$T_A = 70^\circ\text{C}$	0.25	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	0.75		
Power Dissipation	$P_D$	$T_A = 25^\circ\text{C}$	0.35	W
		$T_A = 70^\circ\text{C}$	0.22	
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	357	$^\circ\text{C}/\text{W}$	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$	

Notes  
 a. Pulse width limited by maximum junction temperature.



SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ <sup>a</sup>	Max	
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 10 μA	20	40		V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 0.25 mA	1.0	1.90	3.0	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 14 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			10	
On-State Drain Current <sup>b</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 10 V	0.5	0.75		A
Drain-Source On-Resistance <sup>b</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.1 A		1	1.4	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.3 A		0.75	1.0	
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.2 A		450		mS
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 0.3 A, V <sub>GS</sub> = 0 V		0.85		V
<b>Dynamic<sup>a</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 10 V I <sub>D</sub> ≅ 0.3 A		1400		pC
Gate-Source Charge	Q <sub>gs</sub>			300		
Gate-Drain Charge	Q <sub>gd</sub>			200		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		65		pF
Output Capacitance	C <sub>oss</sub>			35		
Reverse Transfer Capacitance	C <sub>rss</sub>			6		
<b>Switching<sup>a, c</sup></b>						
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 50 Ω I <sub>D</sub> ≅ 0.3 A, V <sub>GEN</sub> = 10 V R <sub>G</sub> = 6 Ω		5		ns
	t <sub>r</sub>			10		
Turn-Off Time	t <sub>d(off)</sub>			12		
	t <sub>f</sub>			6		

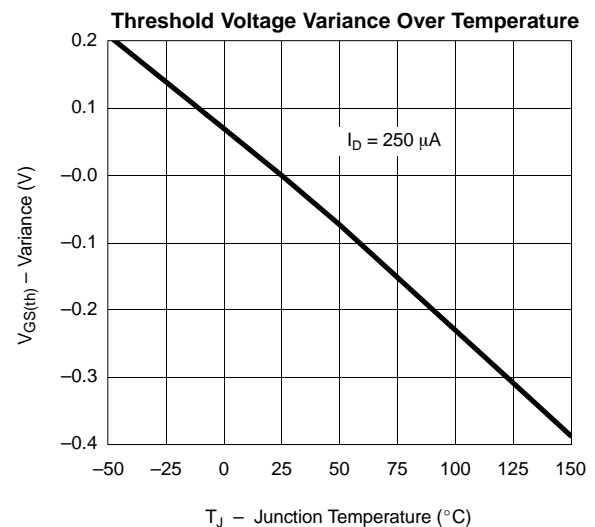
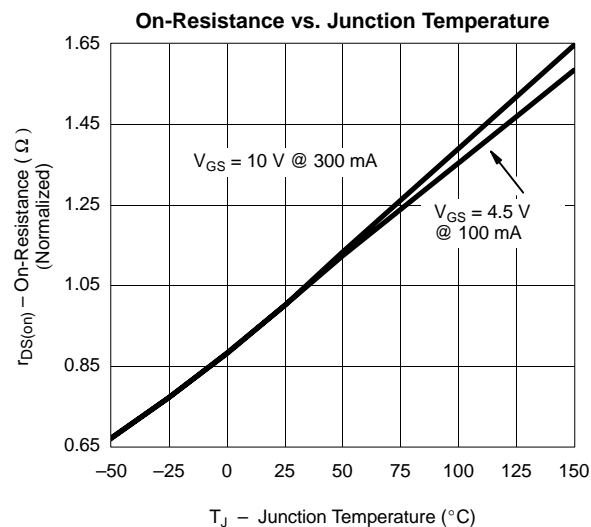
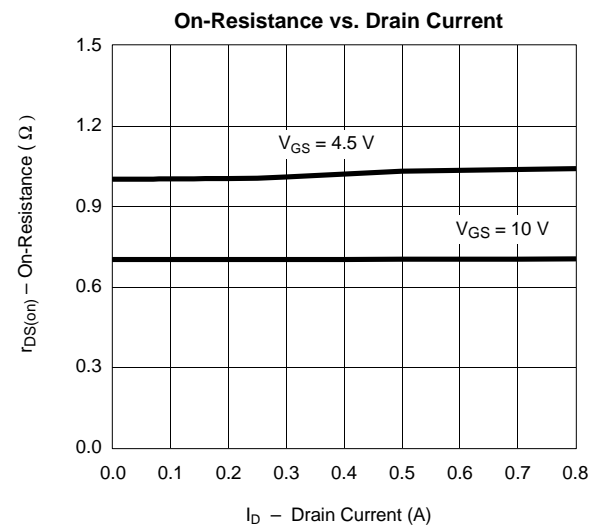
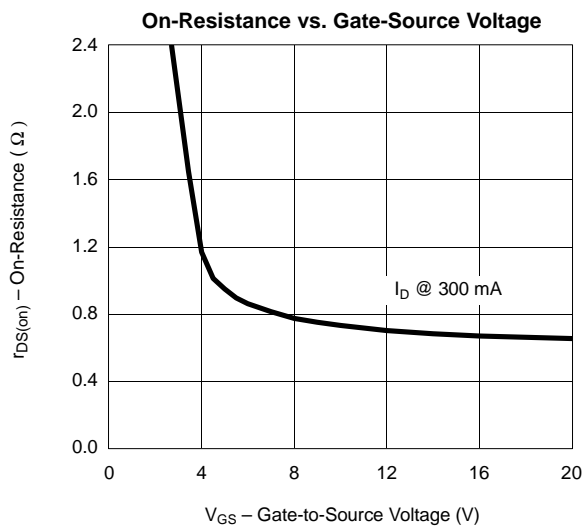
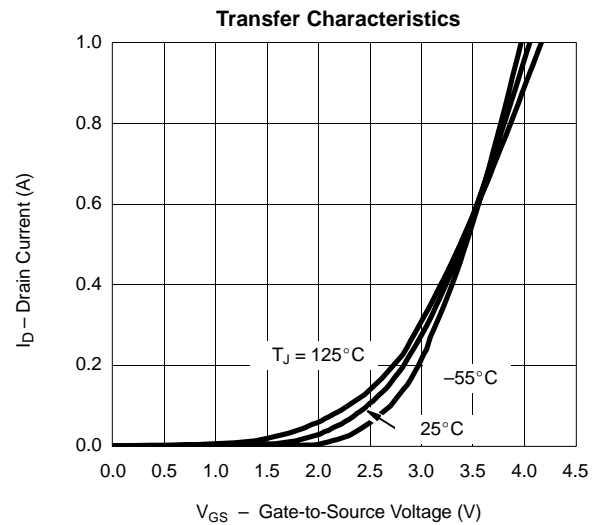
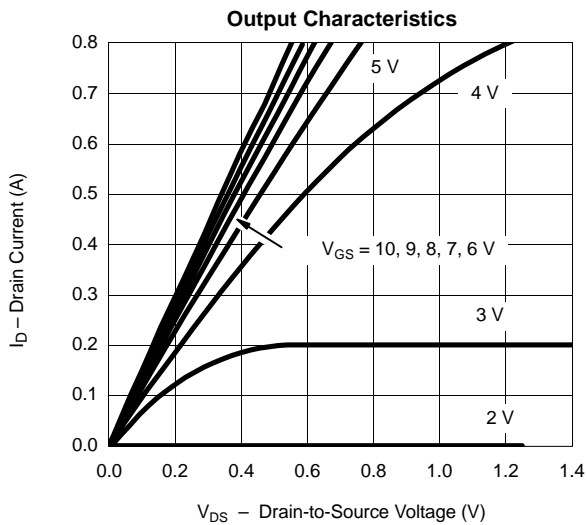
Notes

- a. For DESIGN AID ONLY, not subject to production testing.
- b. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.
- c. Switching time is essentially independent of operating temperature.

VNBP02



**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**



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