



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

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)	
		TN0200T	TN0200TS
20	0.4 @ V <sub>GS</sub> = 4.5 V	0.73	1.2
	0.5 @ V <sub>GS</sub> = 2.5 V	0.65	1.1

### FEATURES

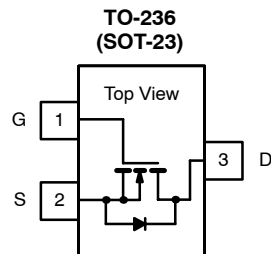
- Low On-Resistance: 0.29 Ω
- Low Threshold: 0.9 V (typ)
- 2.5-V or Lower Operation
- Fast Switching Speed: 22 ns
- Low Input and Output Leakage

### BENEFITS

- Low Offset Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Error Voltage
- Low Battery Voltage Operation

### APPLICATIONS

- Direct Logic-Level Interfaced: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers
- Battery Operated Systems, DC/DC Converters
- Solid-State Relays
- Load/Power Switching—Cell Phones, Pagers



Marking Code:

TN0200T: NOw//  
TN0200TS: NSw//  
w = Week Code  
// = Lot Traceability

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)				
Parameter	Symbol	TN0200T	TN0200TS <sup>c</sup>	Unit
Drain-Source Voltage	V <sub>DS</sub>	20	20	V
Gate-Source Voltage	V <sub>GS</sub>	±8	±8	
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>b</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	0.73	A
		T <sub>A</sub> = 70 °C	0.58	
Pulsed Drain Current <sup>a</sup>	I <sub>DM</sub>	4	4	
Continuous Source Current (Diode Conduction) <sup>b</sup>	I <sub>S</sub>	0.6	1.0	
Power Dissipation <sup>b</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	0.35	W
		T <sub>A</sub> = 70 °C	0.22	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150		°C

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	TN0200T	TN0200TS <sup>c</sup>	Unit
Maximum Junction-to-Ambient <sup>b</sup>	R <sub>thJA</sub>	357	125	°C/W

Notes

- Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board, t ≤ 10 sec.
- Copper lead frame.

SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	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	36		V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 50 μA	0.5	0.9	1.5	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±8 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V			0.1	μA
		T <sub>J</sub> = 85 °C			2	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 4.5 V	2.5			A
		V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 2.5 V	1.5			
Drain-Source On-Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.6 A		0.29	0.4	Ω
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 0.6 A		0.34	0.5	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 0.6 A		2.2		S
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = 0.6 A, V <sub>GS</sub> = 0 V		0.8	1.2	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.6 A		1900	2800	pC
Gate-Source Charge	Q <sub>gs</sub>			50		
Gate-Drain Charge	Q <sub>gd</sub>			750		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz		90		pF
Output Capacitance	C <sub>oss</sub>			45		
Reverse Transfer Capacitance	C <sub>rss</sub>			12		
<b>Switching</b>						
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 16 Ω I <sub>D</sub> ≈ 0.6 A, V <sub>GEN</sub> = 4.5 V, R <sub>G</sub> = 6 Ω		8	13	ns
Rise Time	t <sub>r</sub>			14	21	
Turn-Off Delay Time	t <sub>d(off)</sub>			21	30	
Fall-Time	t <sub>f</sub>			7	11	

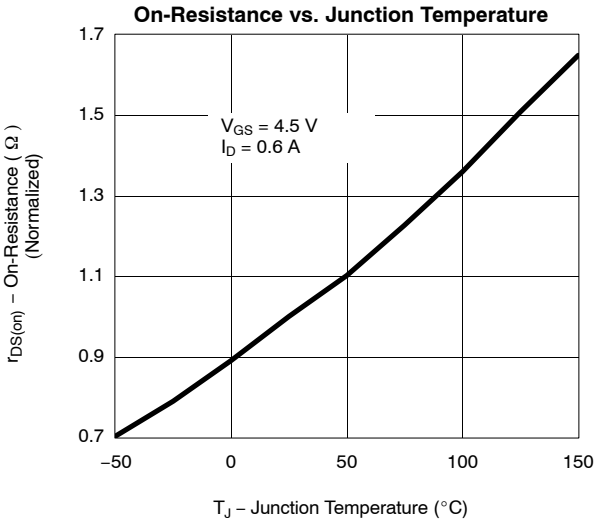
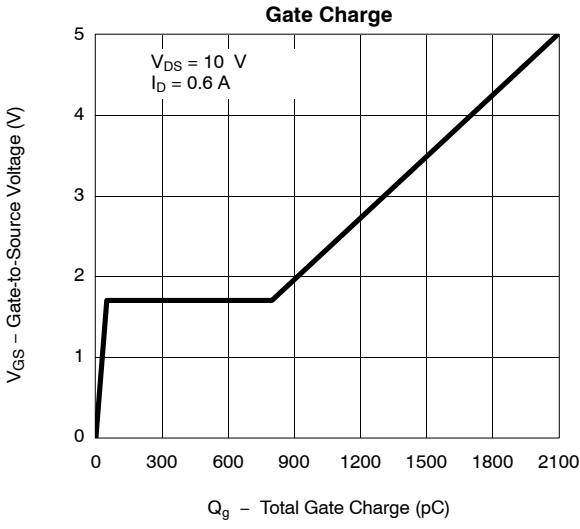
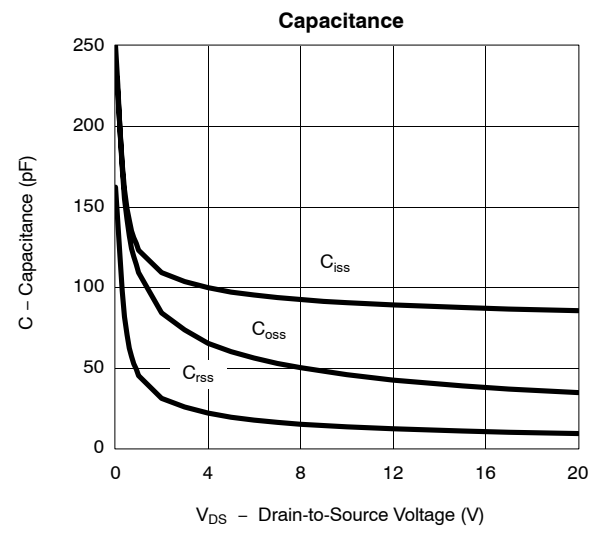
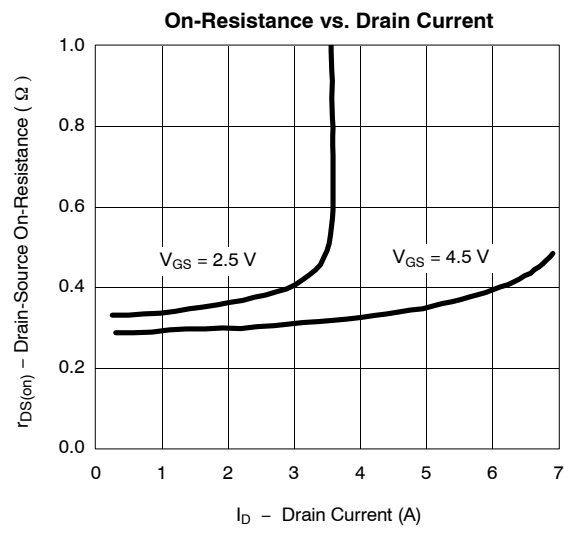
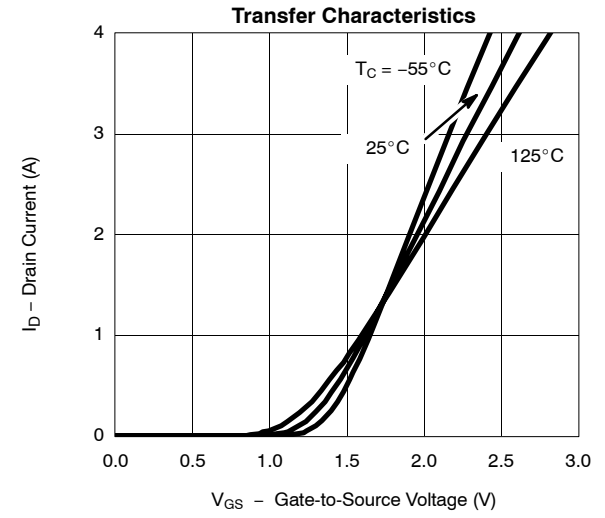
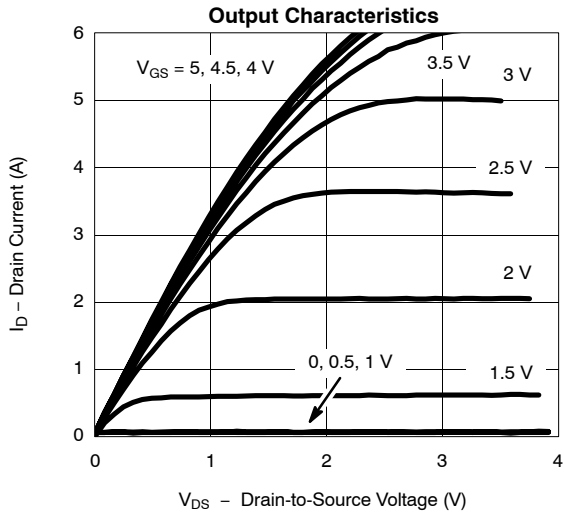
Notes

a. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.

VNLJ02



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



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