



## N-Channel 20-V MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (mA)
20	2.0 @ $V_{GS} = 4.5$ V	250
	2.5 @ $V_{GS} = 2.5$ V	150

### FEATURES

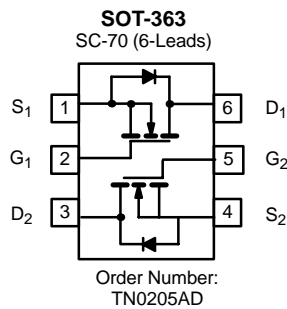
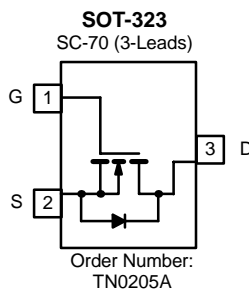
- Low On-Resistance: 2.0  $\Omega$
- Low Threshold: 0.9 V (typ)
- Fast Switching Speed: 35 ns
- 2.5-V or Lower Operation

### BENEFITS

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Battery Voltage Operation

### APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Display, Memories
- Battery operated Systems
- Solid State Relay
- Load/Power Switching-Cell Phones, PDA



Marking Code:  
TN0205A: B/  
TN0205AD: Dw/  
w = Week Code  
/ = Lot Traceability

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	TN0205A	TN0205AD	Unit	
Drain-Source Voltage	$V_{DS}$	20		V	
Gate-Source Voltage	$V_{GS}$	$\pm 8$			
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>	$I_D$	$T_A = 25^\circ\text{C}$	250	mA	
		$T_A = 70^\circ\text{C}$	200		
Pulsed Drain Current	$I_{DM}$	500			
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25^\circ\text{C}$	0.15	0.20 (Total)	W
		$T_A = 70^\circ\text{C}$	0.10	0.13 (Total)	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150		$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	TN0205A	TN0205AD	Unit
Thermal Resistance, Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	833	625 (Total)	$^\circ\text{C/W}$

Notes

a. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>DS</sub> = 0 V, I <sub>D</sub> = 10 μA	20	24		V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 50 μA	0.4	0.9	1.5	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±8 V		±2	±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V		0.001	100	
		V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			5	μA
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5.0 V, V <sub>GS</sub> = 2.5 V	120	160		mA
		V <sub>DS</sub> = 8.0 V, V <sub>GS</sub> = 4.5 V	400	800		
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 150 mA		1.6	2.5	Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 250 mA		1.2	2.0	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 2.5 V, I <sub>D</sub> = 50 mA		200		mS
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = 50 mA, V <sub>GS</sub> = 0 V		0.7	1.2	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 5.0 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 100 mA		350	450	pC
Gate-Source Charge	Q <sub>gs</sub>			25		
Gate-Drain Charge	Q <sub>gd</sub>			100		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 5.0 V, V <sub>GS</sub> = 0 V, f = 1 MHz		20		pF
Output Capacitance	C <sub>oss</sub>			14		
Reverse Transfer Capacitance	C <sub>rss</sub>			5		
<b>Switching<sup>b, c</sup></b>						
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 3.0 V, R <sub>L</sub> = 100 Ω I <sub>D</sub> = 0.25 A, V <sub>GEN</sub> = 4.5 V, R <sub>G</sub> = 10 Ω		7	12	ns
Rise Time	t <sub>r</sub>			25	35	
Turn-Off Delay Time	t <sub>d(off)</sub>			19	30	
Fall Time	t <sub>f</sub>			9	15	

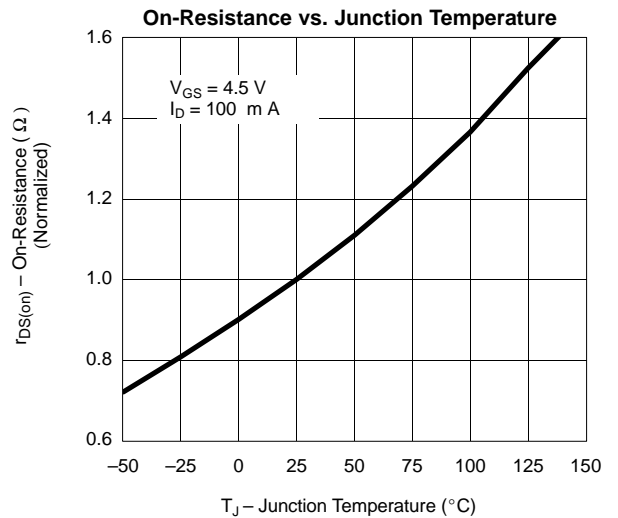
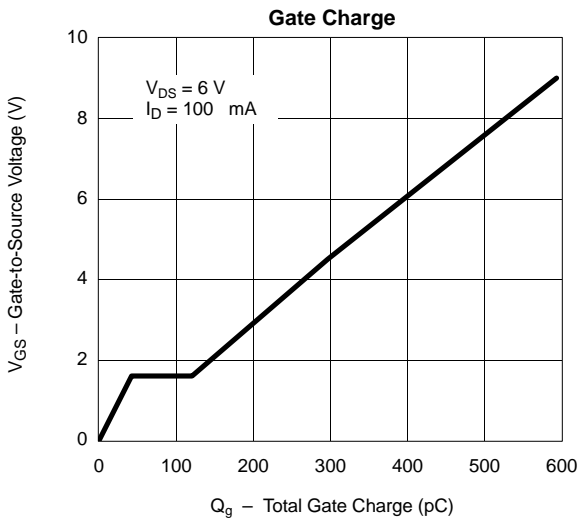
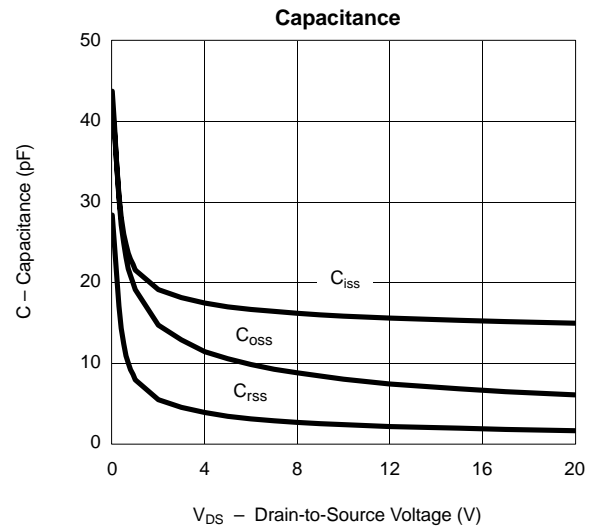
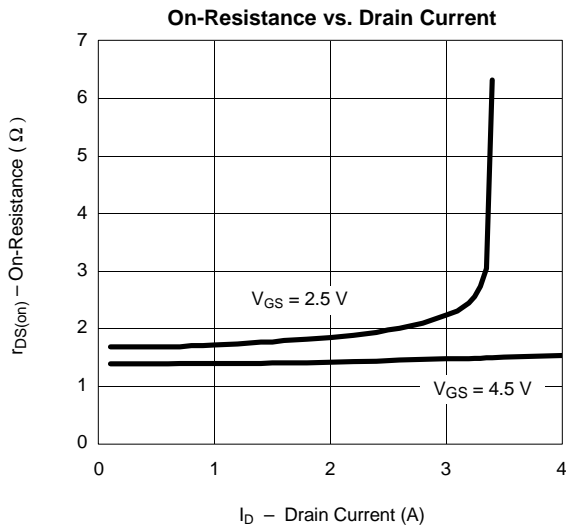
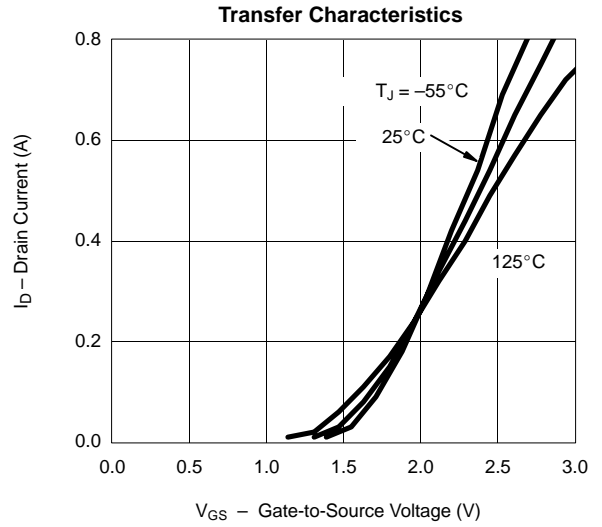
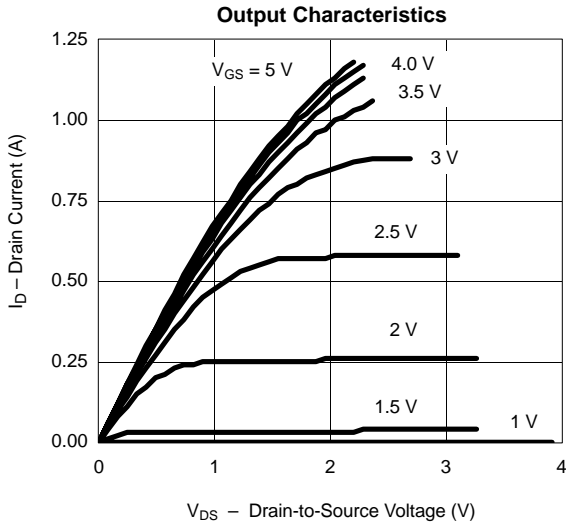
Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- b. For design only, not subject to production testing.
- c. Switching time is essentially independent of operating temperature.

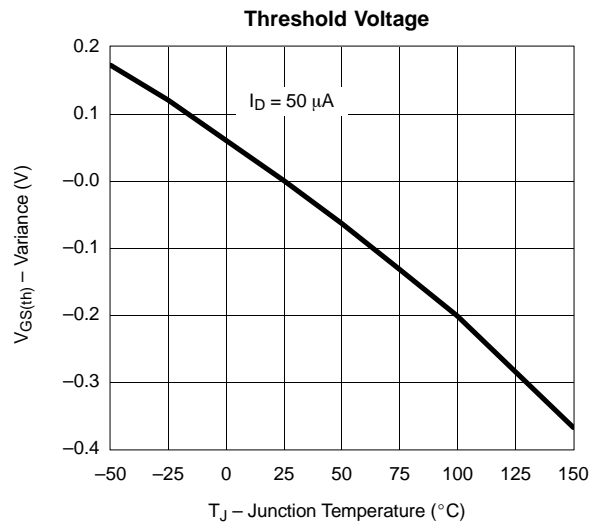
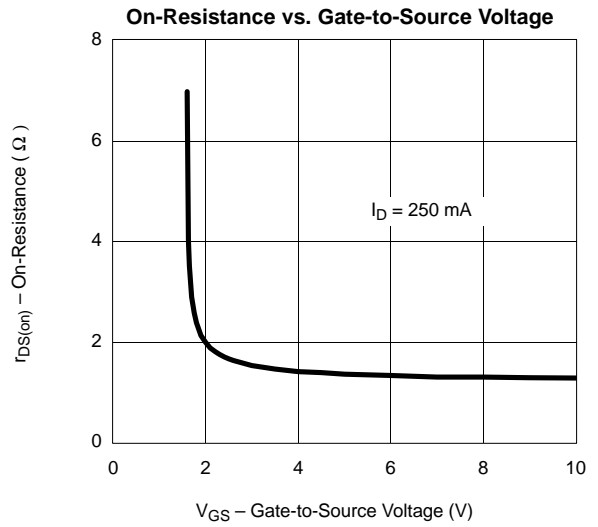
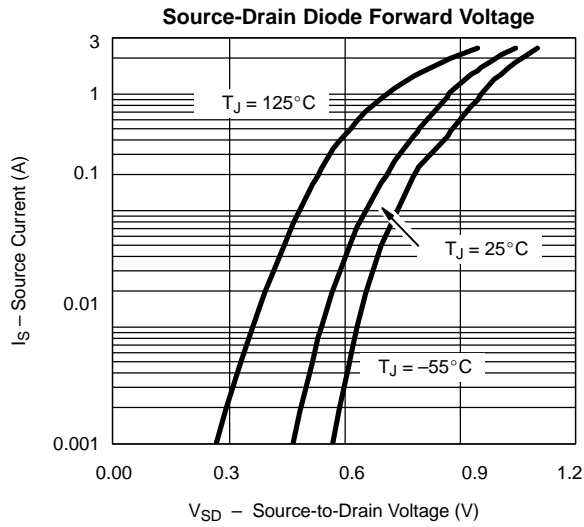
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**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)**



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





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