N-Channel 20-V MOSFET

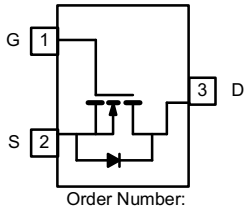
PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (mA)
20	2.0 @ V_{GS} = 4.5 V	250
	2.5 @ V_{GS} = 2.5 V	150

FEATURES
- Low On-Resistance: 2.0 Ω
- 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

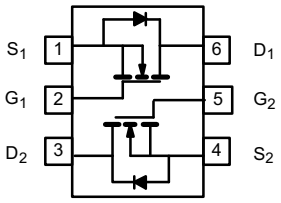
APPLICATIONS
- Drivers: Relays, Solenoids, Lamps, Hammers, Display, Memories
- Battery operated Systems
- Solid State Relay
- Load/Power Switching-Cell Phones, PDA

SOT-323
SC-70 (3-Leads)



Order Number:
TN0205A

SOT-363
SC-70 (6-Leads)



Order Number:
TN0205AD

Marking Code:

TN0205A: B/
TN0205AD: D*wl*

w = Week Code
l = Lot Traceability

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

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	TN0205A	TN0205AD	Unit
Thermal Resistance, Junction-to-Ambient[a]	R_{thJA}	833	625 (Total)	°C/W

Notes
a. Surface Mounted on FR4 Board, t ≤ 10 sec.

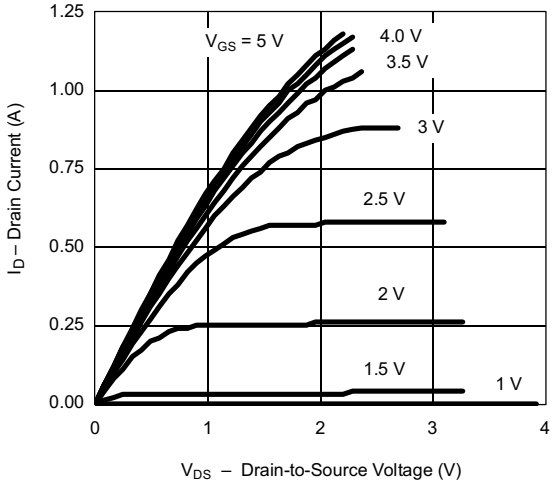
SPECIFICATIONS (T_A = 25°C UNLESS OTHERWISE NOTED)						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typ**	**Max**	**Unit**
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{DS} = 0 V, I_D = 10 μA	20	24		V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 50 μA	0.4	0.9	1.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±8 V		±2	±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V		0.001	100	
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 55°C			5	μA
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5.0 V, V_{GS} = 2.5 V	120	160		mA
		V_{DS} = 8.0 V, V_{GS} = 4.5 V	400	800		
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 2.5 V, I_D = 150 mA		1.6	2.5	Ω
		V_{GS} = 4.5 V, I_D = 250 mA		1.2	2.0	
Forward Transconductance[a]	g_{fs}	V_{DS} = 2.5 V, I_D = 50 mA		200		mS
Diode Forward Voltage[a]	V_{SD}	I_S = 50 mA, V_{GS} = 0 V		0.7	1.2	V
Dynamic						
Total Gate Charge	Q_g	V_{DS} = 5.0 V, V_{GS} = 4.5 V, I_D = 100 mA		350	450	pC
Gate-Source Charge	Q_{gs}			25		
Gate-Drain Charge	Q_{gd}			100		
Input Capacitance	C_{iss}	V_{DS} = 5.0 V, V_{GS} = 0 V, f = 1 MHz		20		pF
Output Capacitance	C_{oss}			14		
Reverse Transfer Capacitance	C_{rss}			5		
Switching[b, c]						
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 3.0 V, R_L = 100 Ω I_D = 0.25 A, V_{GEN} = 4.5 V, R_G = 10 Ω		7	12	ns
Rise Time	t_r			25	35	
Turn-Off Delay Time	$t_{d(off)}$			19	30	
Fall Time	t_f			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.

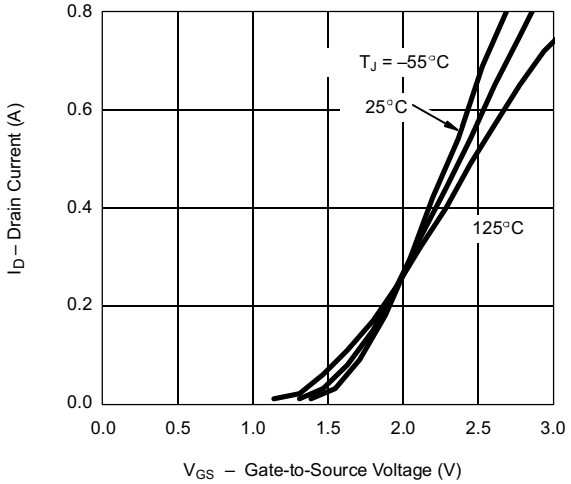
VNOJ

TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

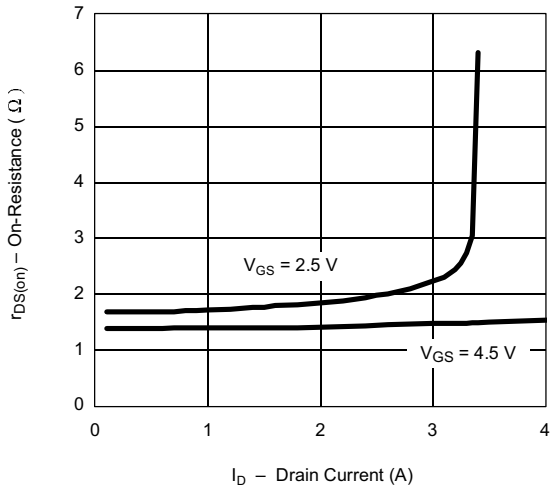
Output Characteristics



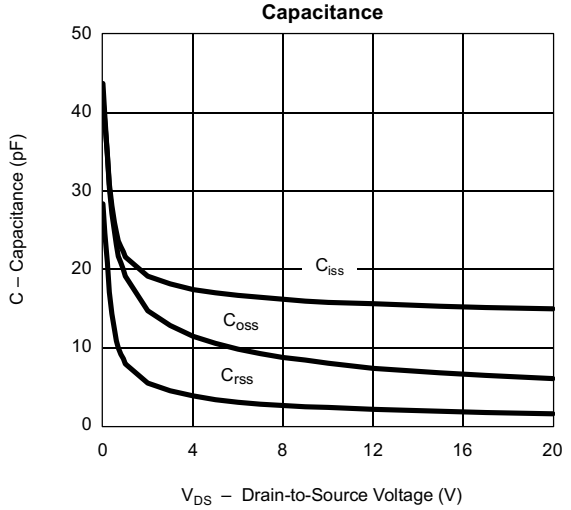
Transfer Characteristics



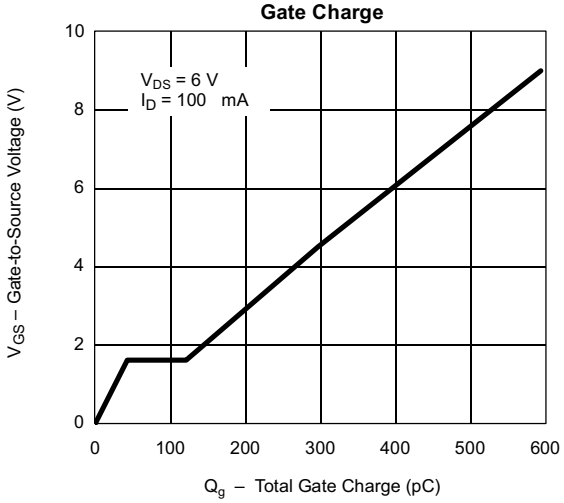
On-Resistance vs. Drain Current



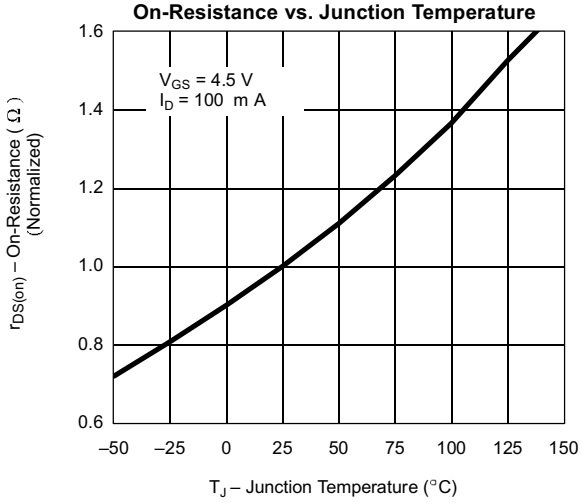
Capacitance



Gate Charge

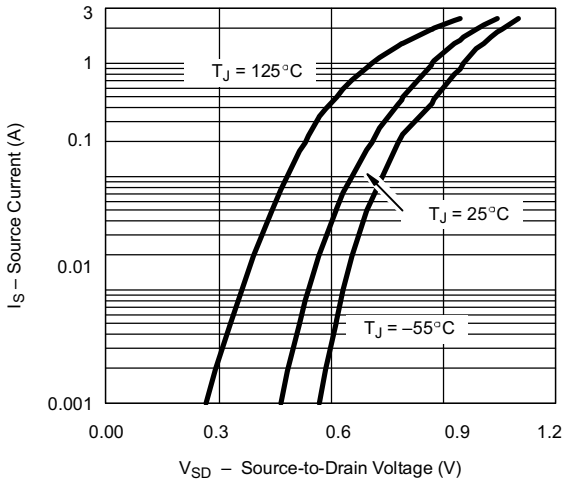


On-Resistance vs. Junction Temperature

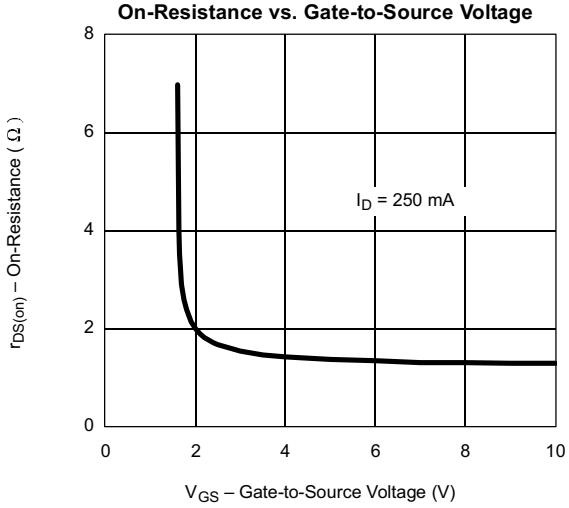


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage