



## P-Channel 20-V (D-S) MOSFET, Low-Threshold

PRODUCT SUMMARY		
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (mA)
-20	3.8 @ V <sub>GS</sub> = -4.5 V	-180
	5.0 @ V <sub>GS</sub> = -2.5 V	-100

### FEATURES

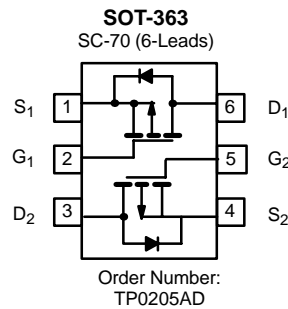
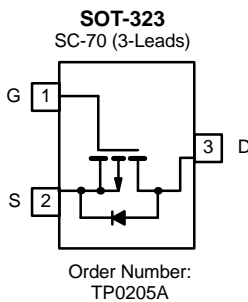
- High-Side Switching
- Low On-Resistance: 2.6 Ω (typ)
- Low Threshold: 0.9 V (typ)
- Fast Switching Speed: 35 ns
- 2.5 V or Lower Operation

### 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
- Load/Power Switching-Cell Phones, PDA



Marking Code:  
TP0205A: A/  
TP0205AD: Cw/  
  
w = Week Code  
/ = Lot Traceability

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)					
Parameter	Symbol	TP0205A	TP0205AD	Unit	
Drain-Source Voltage	V <sub>DS</sub>	-20		V	
Gate-Source Voltage	V <sub>GS</sub>	±8			
Continuous Drain Current (T <sub>J</sub> = 150°C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25°C	-180	mA	
		T <sub>A</sub> = 70°C	-140		
Pulsed Drain Current	I <sub>DM</sub>	-500			
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25°C	0.15	0.20 (Total)	W
		T <sub>A</sub> = 70°C	0.10	0.13 (Total)	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150		°C	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	TP0205A	TP0205AD	Unit
Thermal resistance, Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	833	625 (Total)	°C/W

Notes

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

SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ <sup>b</sup>	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	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>GS</sub> = -4.5 V, V <sub>DS</sub> = -8.0 V	-400			mA
		V <sub>GS</sub> = -2.5 V, V <sub>DS</sub> = -5.0 V	-120			
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -180 mA		2.6	3.8	Ω
		V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -75 mA		4.0	5.0	
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>			125		
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>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

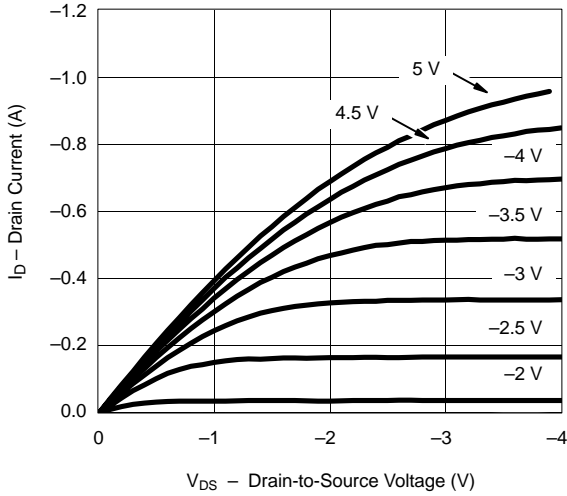
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- b. For design only, not subject to production testing.
- c. Switching time is essentially independent of operating temperature.

VPOJ

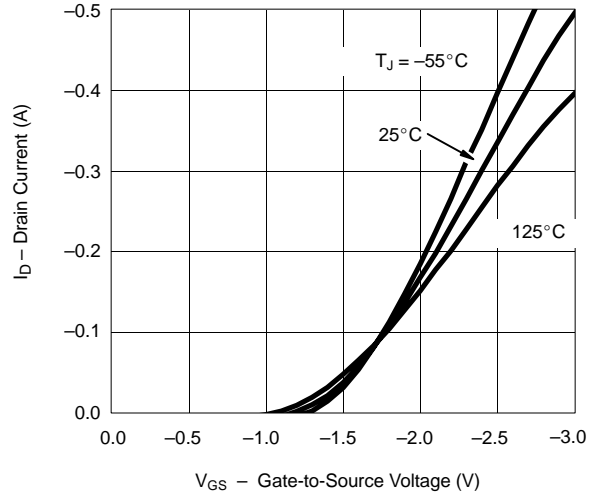


**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

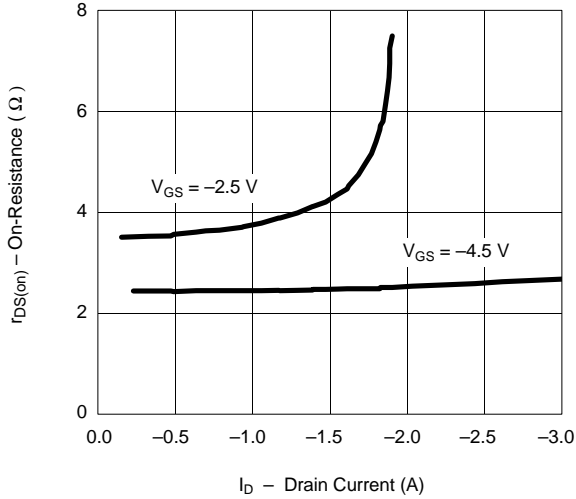
Output Characteristics



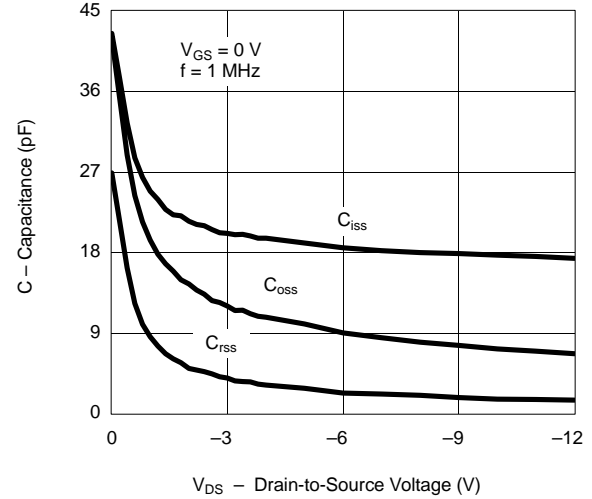
Transfer Characteristics



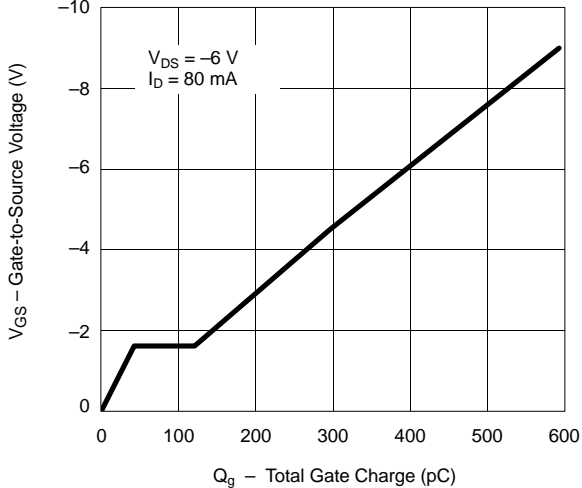
On-Resistance vs. Drain Current



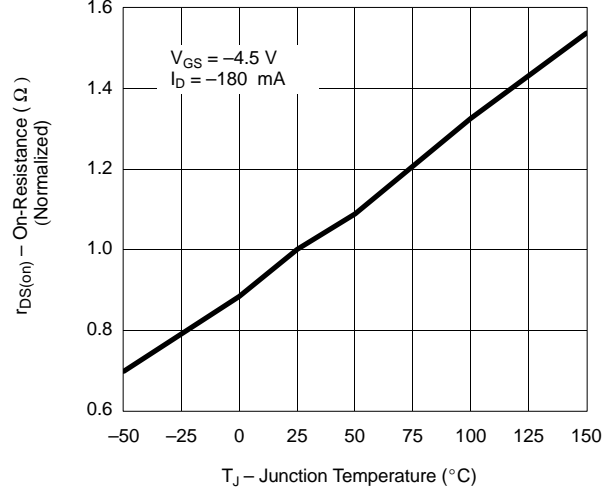
Capacitance



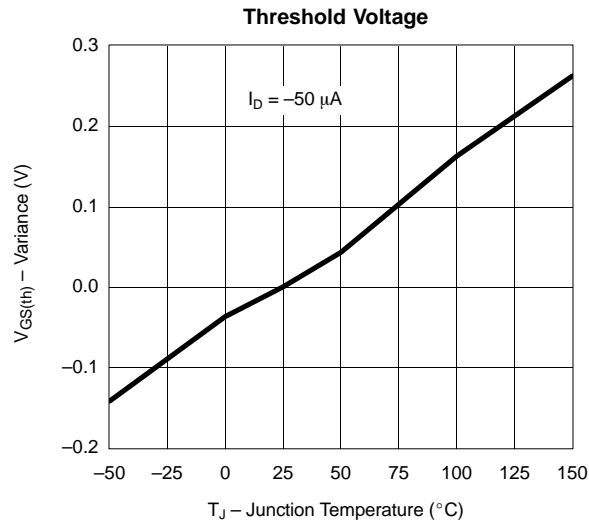
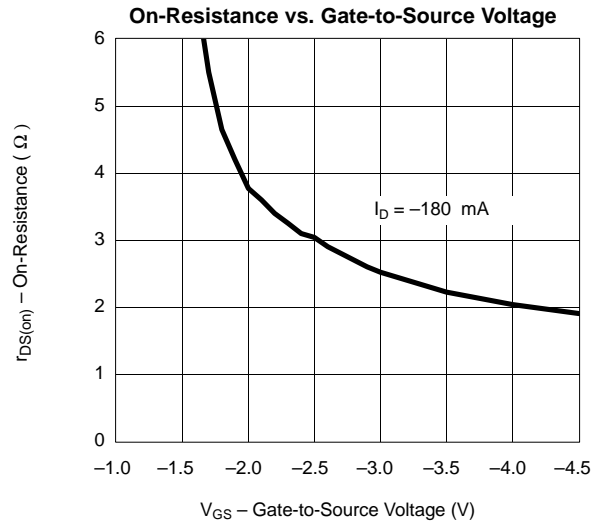
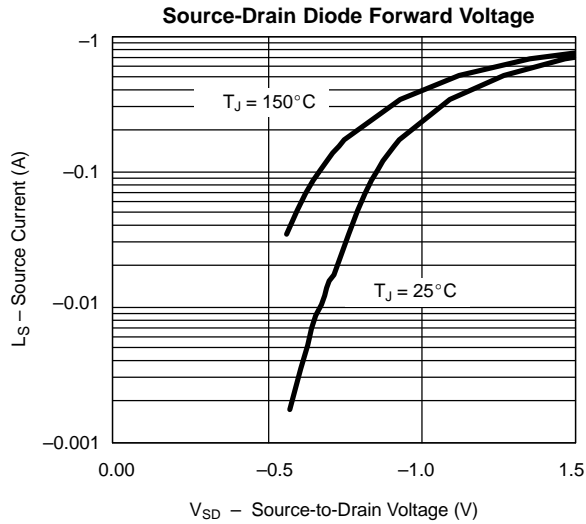
Gate Charge



On-Resistance vs. Junction Temperature



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





## Disclaimer

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