



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

### PRODUCT SUMMARY

$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (A)
-20	1.4 @ $V_{GS} = -10$ V	-1.3 to -3 V	-0.41
	3.5 @ $V_{GS} = -4.5$ V	-1.3 to -3 V	-0.27

### FEATURES

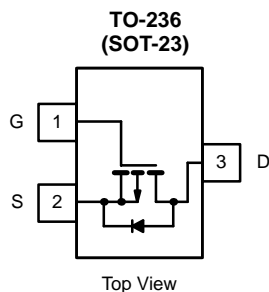
- High-Side Switching
- Low On-Resistance: 0.9  $\Omega$
- Low Threshold: -2.1 V
- Fast Switching Speed: 18 ns
- Low Input Capacitance: 55 pF

### BENEFITS

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Switching
- Easily Driven Without Buffer

### APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply, Converter Circuits
- Motor Control



Marking Code: P3w//

P3 = Part Number Code for TP0202T

w = Week Code

// = Lot Traceability

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )	$T_A = 25^\circ\text{C}$	-0.41	A
	$T_A = 70^\circ\text{C}$	-0.26	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	-0.75	
Power Dissipation	$T_A = 25^\circ\text{C}$	0.35	W
	$T_A = 70^\circ\text{C}$	0.22	
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	357	$^\circ\text{C/W}$
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.

For applications information see AN804.

SPECIFICATIONS (T <sub>A</sub> = 25° C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ <sup>a</sup>	Max	
Static						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = −10 μA	−20	−25		V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = −0.25 mA	−1.3	−2.1	−3	
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
		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> = −0.05 A		1.7	3.5	Ω
		V <sub>GS</sub> = −10 V, I <sub>D</sub> = −0.2 A		0.9	1.4	
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = −10 V, I <sub>D</sub> = −0.2 A	250	600		mS
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = −0.25 A, V <sub>GS</sub> = 0 V		−0.9	−1.5	V
Dynamic						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> −16 V, V <sub>GS</sub> =−10 V, I <sub>D</sub> ≅ −200 mA		2700		pC
Gate-Source Charge	Q <sub>gs</sub>			500		
Gate-Drain Charge	Q <sub>gd</sub>			600		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = −15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		55		pF
Output Capacitance	C <sub>oss</sub>			50		
Reverse Transfer Capacitance	C <sub>rss</sub>			18		
Switching <sup>c</sup>						
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> = −15 V, R <sub>L</sub> = 75 Ω I <sub>D</sub> ≅ −0.2 A, V <sub>GEN</sub> = −10 V R <sub>G</sub> = 6 Ω		8	12	ns
	t <sub>r</sub>			20	30	
Turn-Off Time	t <sub>d(off)</sub>			20	35	
	t <sub>f</sub>			30	40	

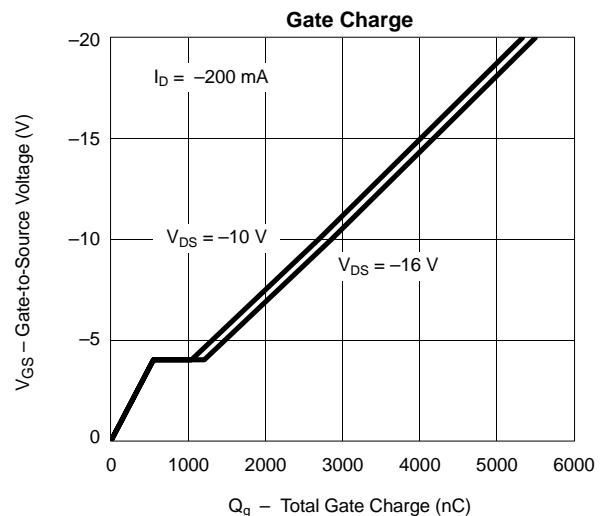
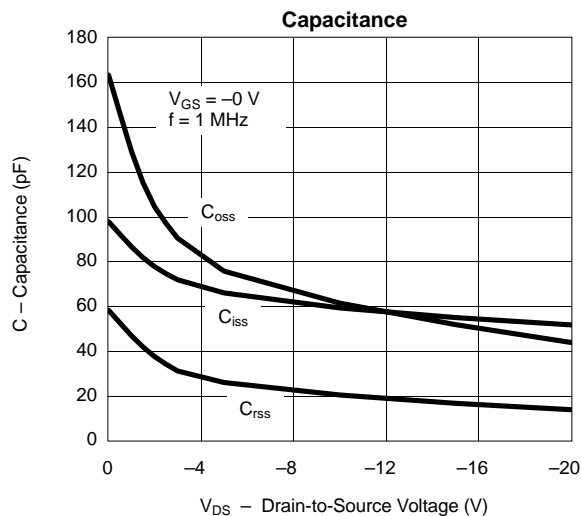
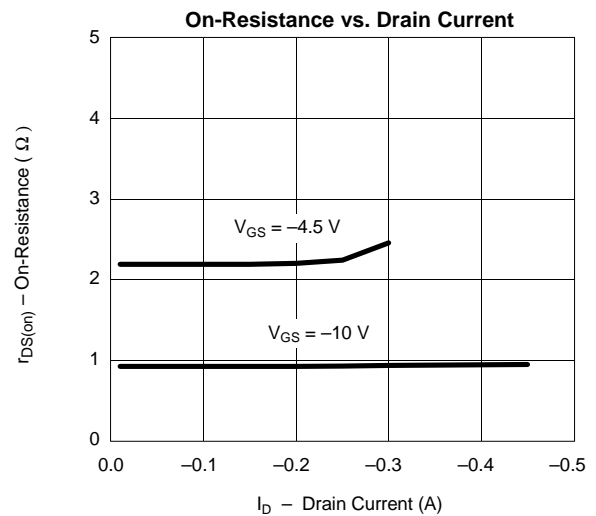
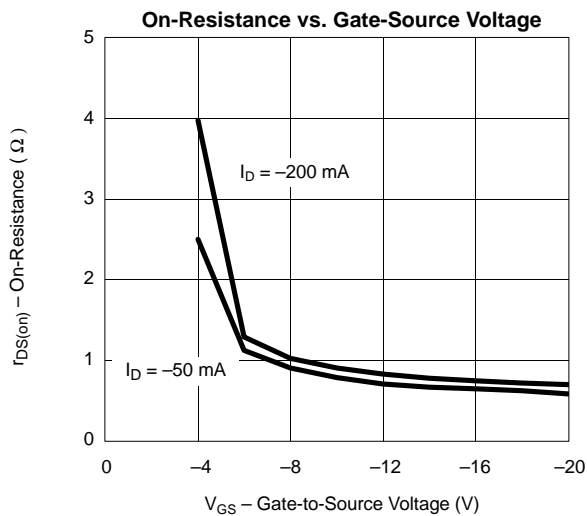
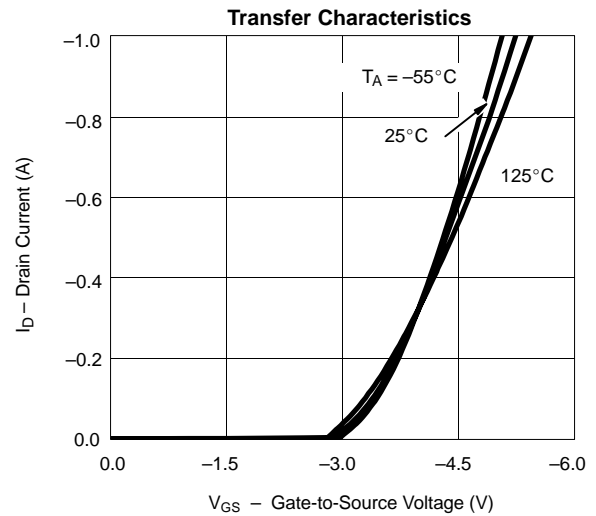
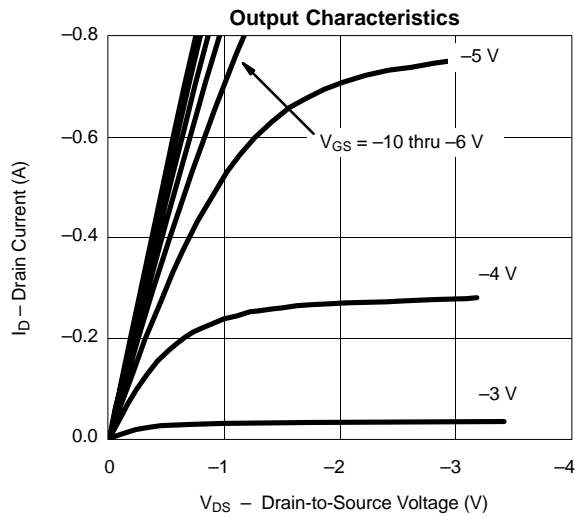
Notes

- For DESIGN AID ONLY, not subject to production testing.
- Pulse test:  $PW \leq 300\text{ }\mu\text{s}$  duty cycle  $\leq 2\%$ .
- Switching time is essentially independent of operating temperature.

VPBP02



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



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