

## P-Channel Enhancement-Mode MOS Transistor

### 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	-0.31
	3.5 @ $V_{GS} = -4.5$ V	-1.3 to -3 V	-0.16

For applications information see AN804.

### Features

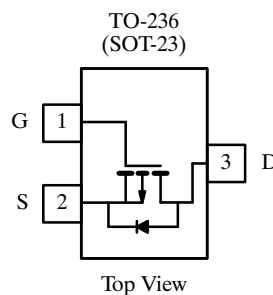
- High-Side Switching
- Low On-Resistance: 0.9  $\Omega$
- Low Threshold: -2.1 V
- Fast Switching Speed: 18 ns
- Low Input Capacitance: 55 pF

### 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



TP0202T (P3)\*

\*Marking Code for TO-236

### 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 ( $T_J = 150^\circ\text{C}$ )	$I_D$	$T_A = 25^\circ\text{C}$	-0.31	A
		$T_A = 70^\circ\text{C}$	-0.25	
Pulsed Drain Current	$I_{DM}$	-0.75		
Power Dissipation	$P_D$	$T_A = 25^\circ\text{C}$	0.2	W
		$T_A = 70^\circ\text{C}$	0.128	
Maximum Junction-to-Ambient	$R_{thJA}$	625	$^\circ\text{C/W}$	
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.

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## Specifications<sup>a</sup>

Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ <sup>b</sup>	Max	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -10\text{ }\mu\text{A}$	-20	-25		V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -0.25\text{ mA}$	-1.3	-2.1	-3	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$ $T_J = 55^\circ\text{C}$			-1	$\mu\text{A}$
					-10	
On-State Drain Current <sup>c</sup>	$I_{D(on)}$	$V_{DS} = -10\text{ V}, V_{GS} = -10\text{ V}$	-0.5	-0.75		A
Drain-Source On-Resistance <sup>c</sup>	$r_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -0.05\text{ A}$		1.7	3.5	$\Omega$
		$V_{GS} = -10\text{ V}, I_D = -0.2\text{ A}$		0.9	1.4	
Forward Transconductance <sup>c</sup>	$g_{fs}$	$V_{DS} = -10\text{ V}, I_D = -0.2\text{ A}$	250	600		mS
Diode Forward Voltage	$V_{SD}$	$I_S = -0.25\text{ A}, V_{GS} = 0\text{ V}$		-0.9	-1.5	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS} = -16\text{ V}, V_{GS} = -10\text{ V}, I_D \cong -200\text{ mA}$		2700		pC
Gate-Source Charge	$Q_{gs}$			500		
Gate-Drain Charge	$Q_{gd}$			600		
Input Capacitance	$C_{iss}$	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		55		pF
Output Capacitance	$C_{oss}$			50		
Reverse Transfer Capacitance	$C_{rss}$			18		
<b>Switching<sup>d</sup></b>						
Turn-On Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 75\text{ }\Omega$ $I_D \cong -0.2\text{ A}, V_{GEN} = -10\text{ V}$ $R_G = 6\text{ }\Omega$		8	12	ns
	$t_r$			20	30	
Turn-Off Time	$t_{d(off)}$			20	35	
	$t_f$			30	40	

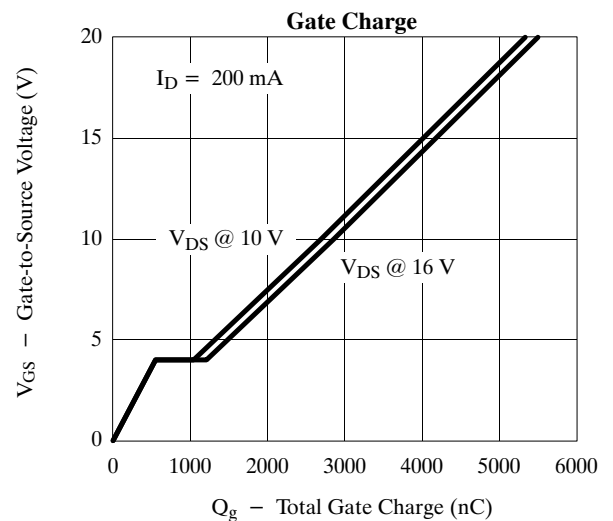
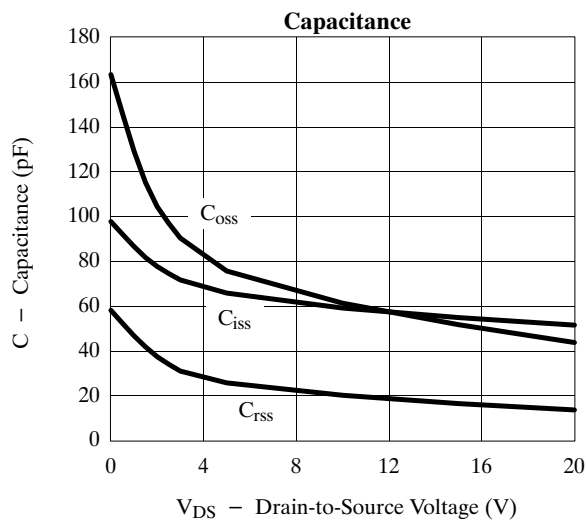
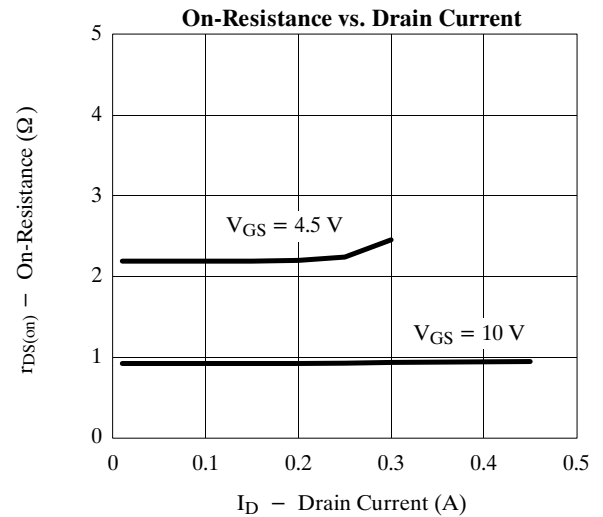
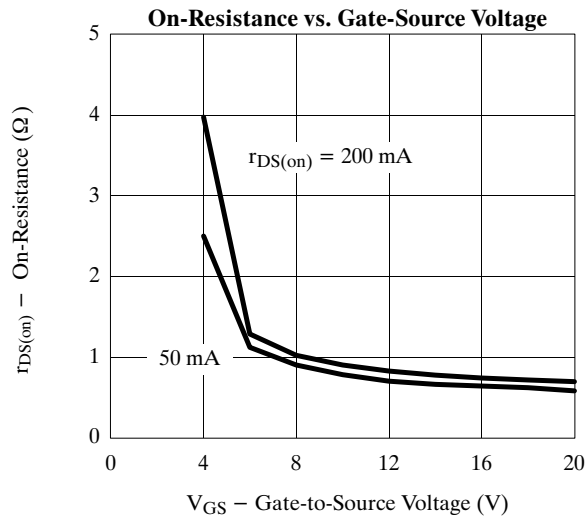
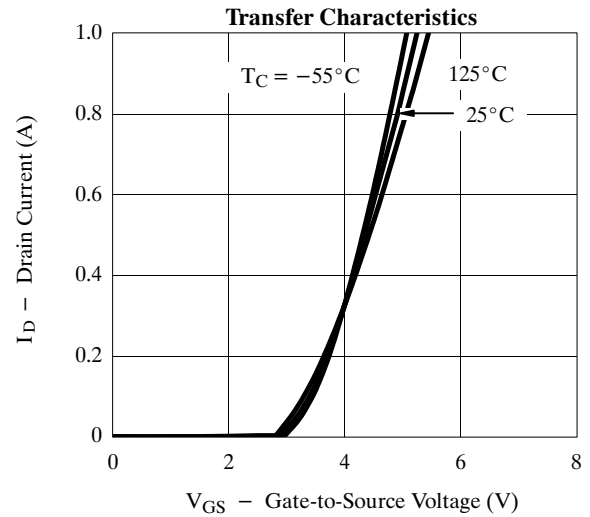
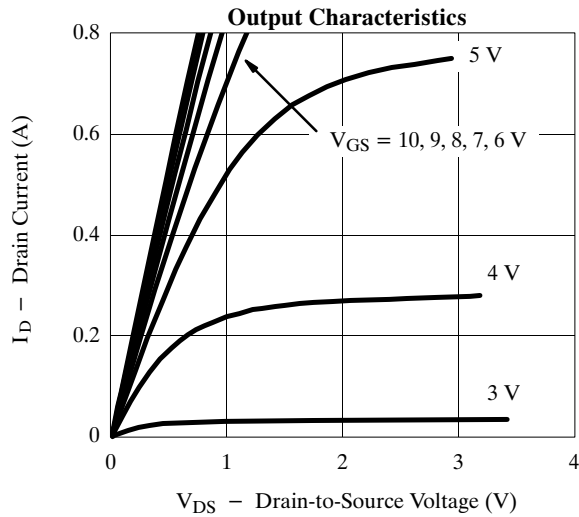
### Notes

- $T_A = 25^\circ\text{C}$  unless otherwise noted.
- 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 (25°C Unless Otherwise Noted)

Negative signs omitted for clarity.



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