



## 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> (A)	
		TP0101T	TP0101TS
-20	0.65 @ V <sub>GS</sub> = -4.5 V	-0.6	-1.0
	0.85 @ V <sub>GS</sub> = -2.5 V	-0.5	-0.9

### FEATURES

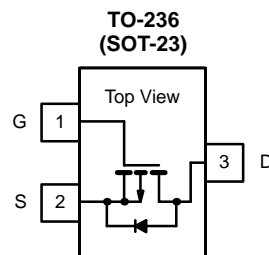
- High-Side Switching
- Low On-Resistance: 0.45 Ω
- Low Threshold: 0.9 V (typ)
- Fast Switching Speed: 32 ns
- 2.5-V or Lower Operation

### 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, Displays, Memories
- Battery Operated Systems, DC/DC Converters
- Power Supply Converter Circuits
- Load/Power Switching—Cell Phones, Pagers



Marking Code:

TP0101T: POw//  
TP0101TS: PSw//

w = Week Code  
/ = Lot Traceability

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)					
Parameter	Symbol	TP0101T	TP0101TS <sup>c</sup>	Unit	
Drain-Source Voltage	V <sub>DS</sub>	-20	-20	V	
Gate-Source Voltage	V <sub>GS</sub>	±8	±8		
Continuous Drain Current (T <sub>J</sub> = 150°C) <sup>b</sup>	I <sub>D</sub>	T <sub>A</sub> = 25°C	-0.6	-1.0	A
		T <sub>A</sub> = 70°C	-0.48	-0.8	
Pulsed Drain Current <sup>a</sup>	I <sub>DM</sub>	-3	-3		
Continuous Source Current (Diode Conduction) <sup>b</sup>	I <sub>S</sub>	-0.6	-1.0		
Power Dissipation <sup>b</sup>	P <sub>D</sub>	T <sub>A</sub> = 25°C	0.35	1.0	W
		T <sub>A</sub> = 70°C	0.22	0.65	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150	-55 to 150	°C	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	TP0101T	TP0101TS <sup>c</sup>	Unit
Thermal Resistance, Junction-to-Ambient <sup>b</sup>	R <sub>thJA</sub>	357	125	°C/W

#### Notes

- Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board, t ≤ 10 sec.
- Copper lead frame.

SPECIFICATIONS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -10\ \mu\text{A}$	-20	-26		V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -50\ \mu\text{A}$	-0.5	-0.9	-1.5	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -9.6\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$T_J = 55^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	-2.5			A
		$V_{DS} \leq -5\text{ V}, V_{GS} = -2.5\text{ V}$	-0.5			
Drain-Source On-Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -0.6\text{ A}$		0.45	0.65	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -0.5\text{ A}$		0.69	0.85	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -5\text{ V}, I_D = -0.6\text{ A}$		1300		mS
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -0.6\text{ A}, V_{GS} = 0\text{ V}$		-0.9	-1.2	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS} = -6\text{ V}, V_{GS} = -4.5\text{ V}$ $I_D \cong -0.6\text{ A}$		2020	3000	pC
Gate-Source Charge	$Q_{gs}$			180		
Gate-Drain Charge	$Q_{gd}$			720		
Input Capacitance	$C_{iss}$	$V_{DS} = -6\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$		110		pF
Output Capacitance	$C_{oss}$			80		
Reverse Transfer Capacitance	$C_{rss}$			30		
<b>Switching</b>						
Turn-On Time	$t_{d(on)}$	$V_{DD} = -6\text{ V}, R_L = 12\ \Omega$ $I_D \cong -0.6\text{ A}, V_{GEN} = -4.5\text{ V}$ $R_G = 6\ \Omega$		7	12	ns
	$t_r$			25	35	
Turn-Off Time	$t_{d(off)}$			19	30	
	$t_f$			9	15	

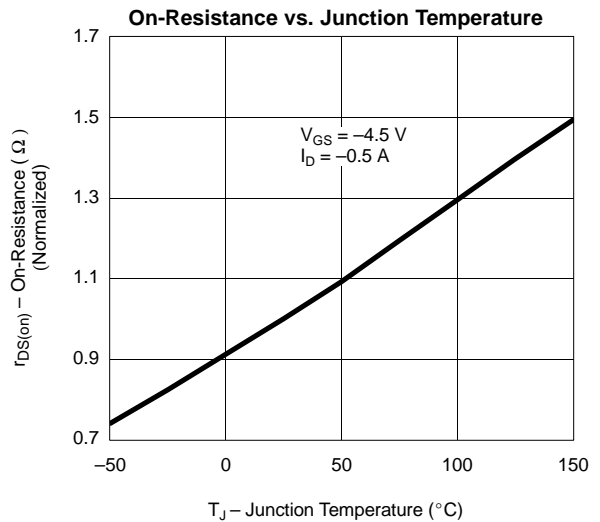
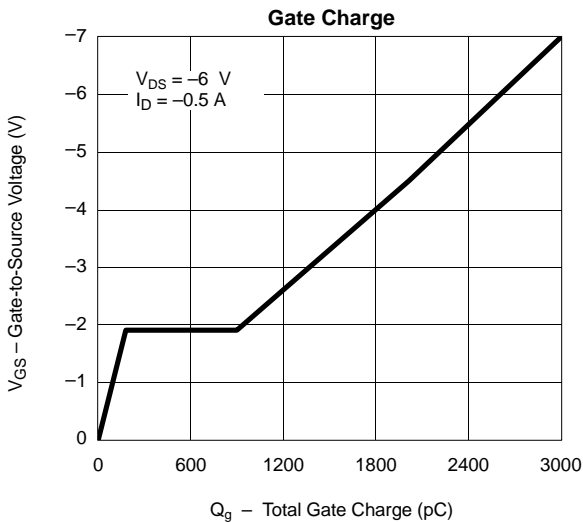
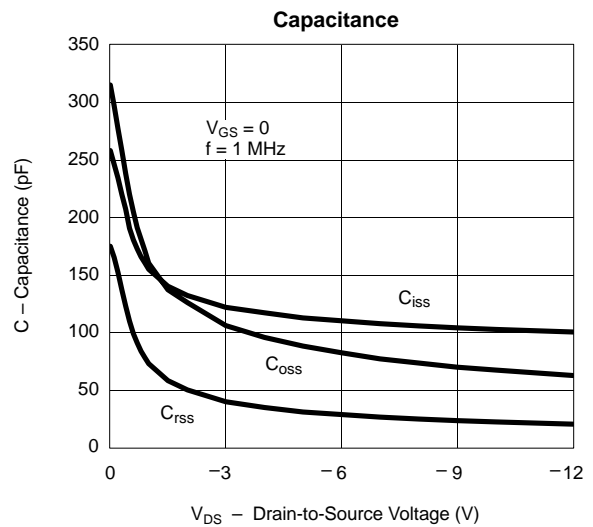
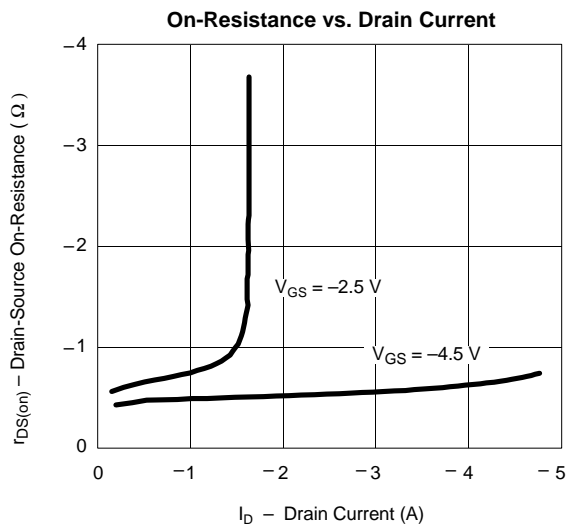
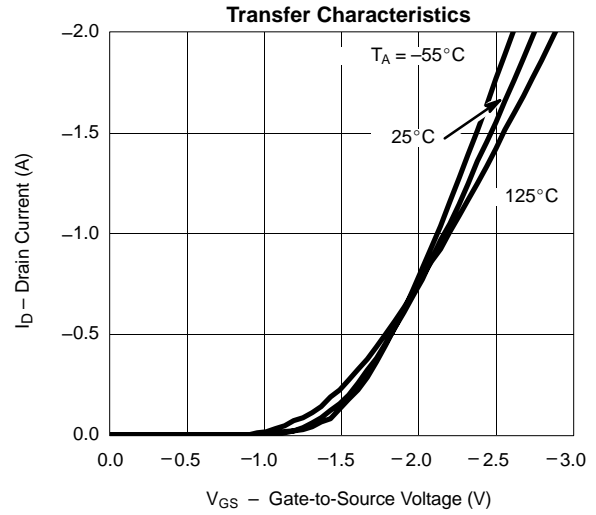
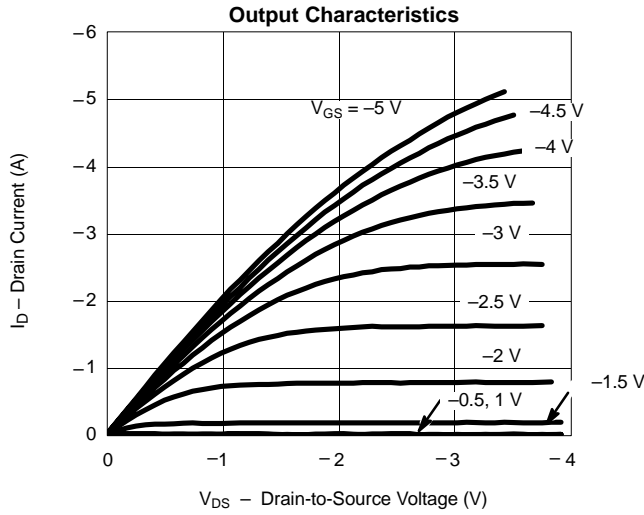
Notes

a. Pulse test:  $PW \leq 300\ \mu\text{s}$  duty cycle  $\leq 2\%$ .

VPLJ01



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



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