

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

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>e</sup>
- 20	0.65 at $V_{GS} = - 4.5$ V	- 0.58
	0.85 at $V_{GS} = - 2.5$ V	- 0.5

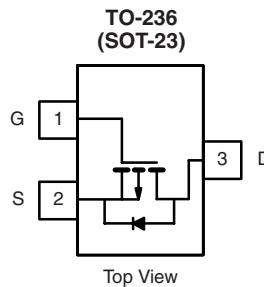
### FEATURES

- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFET
- ESD Protected: 3000 V



### APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems, DC/DC Converters
- Power Supply Converter Circuits
- Load/Power Switching-Cell Phones, Pagers



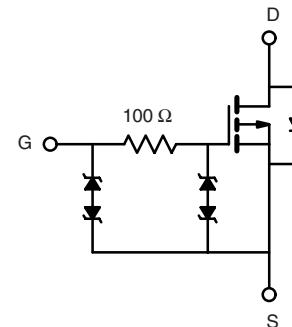
Marking Code: *K4ywI*

*K4* = Part Number Code for TP0101K

*y* = Year Code

*w* = Week Code

*I* = Lot Traceability



Ordering Information: TP0101K-T1-E3 (Lead (Pb)-free)  
TP0101K-T1-GE3 (Lead (Pb)-free and Halogen-free)

### ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	- 20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	
Continuous Drain Current ( $T_J = 150$ °C) <sup>b</sup>	$I_D$ ( $T_A = 25$ °C)	- 0.58	A
	$I_D$ ( $T_A = 70$ °C)	- 0.46	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	- 2	
Continuous Source-Drain (Diode Current) <sup>b</sup>	$I_S$	- 0.3	
Power Dissipation <sup>b</sup>	$P_D$ ( $T_A = 25$ °C)	0.35	W
	$P_D$ ( $T_A = 70$ °C)	0.22	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	°C

Notes:

a. Pulse width limited by maximum junction temperature.

b. Surface Mounted on FR4 board,  $t \leq 10$  s.

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limits	Unit
Thermal Resistance, Junction-to-Ambient <sup>b</sup>	$R_{thJA}$	357	°C/W

Notes:

a. Pulse width limited by maximum junction temperature.

b. Surface Mounted on FR4 board,  $t \leq 10$  s.

**SPECIFICATIONS**  $T_A = 25^\circ\text{C}$ , unless otherwise noted

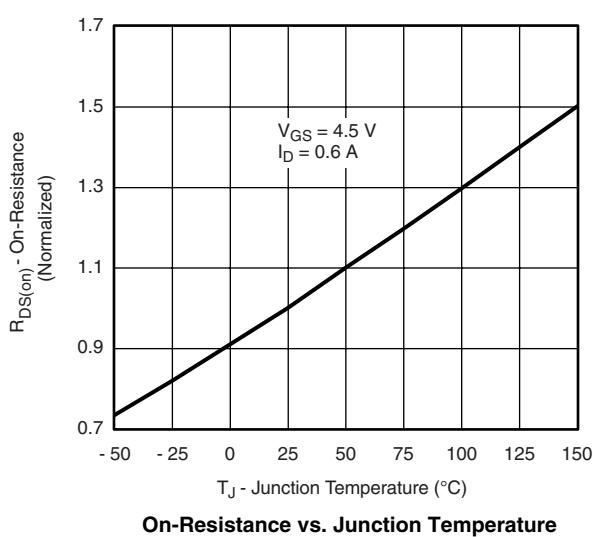
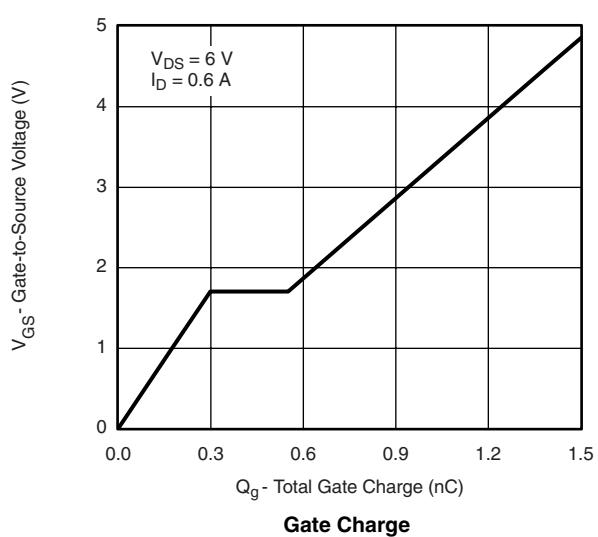
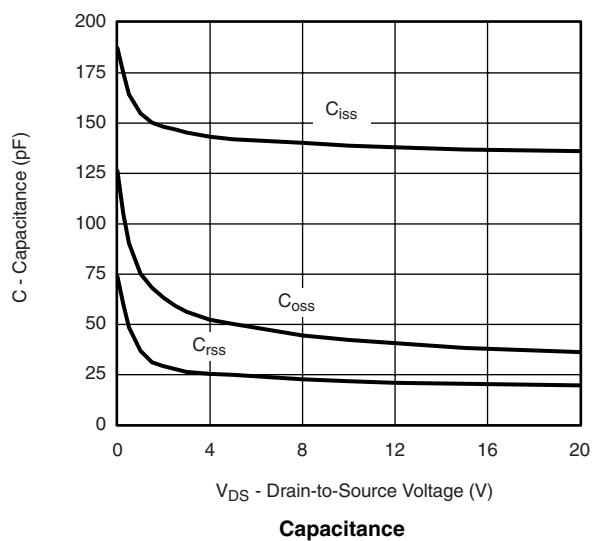
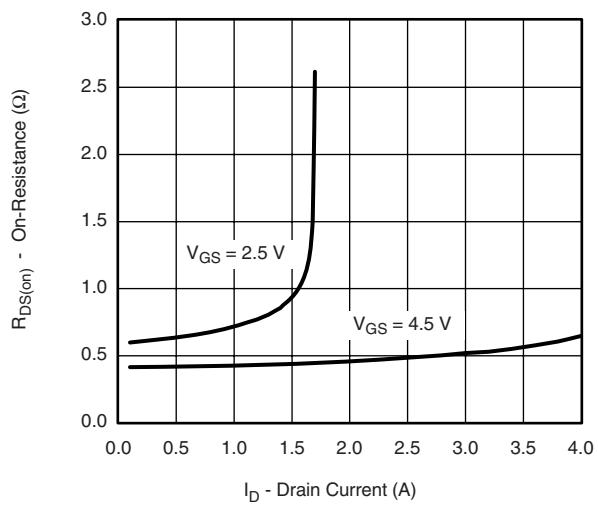
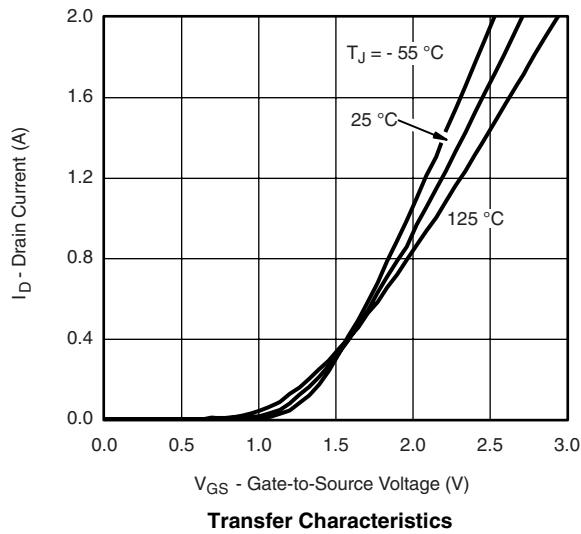
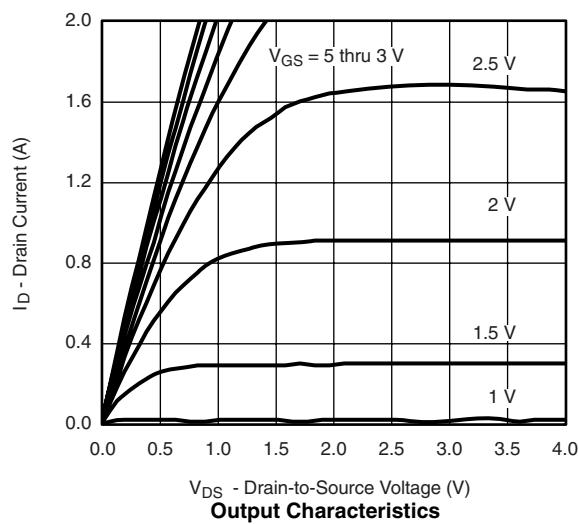
Parameter	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = -10\text{ }\mu\text{A}$	- 20			V
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = -50\text{ }\mu\text{A}$	- 0.5	- 0.7	- 1.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = -0\text{ V}$ , $V_{GS} = \pm 4.5\text{ V}$			$\pm 5$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20\text{ V}$ , $V_{GS} = 0\text{ V}$			- 1	$\mu\text{A}$
		$V_{DS} = -20\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 55^\circ\text{C}$			- 10	
On-State Drain Current <sup>a</sup>	$I_{D(\text{on})}$	$V_{DS} \leq -5\text{ V}$ , $V_{GS} = -4.5\text{ V}$	- 1.2			A
		$V_{DS} \leq -5\text{ V}$ , $V_{GS} = -2.5\text{ V}$	- 0.5			
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(\text{on})}$	$V_{GS} = -4.5\text{ V}$ , $I_D = -0.58\text{ A}$		0.42	0.65	$\Omega$
		$V_{GS} = -2.5\text{ V}$ , $I_D = -0.5\text{ A}$		0.64	0.85	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -5\text{ V}$ , $I_D = -0.58\text{ A}$		1300		$\text{mS}$
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -0.3\text{ A}$ , $V_{GS} = 0\text{ V}$		- 0.9	- 1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -6\text{ V}$ , $V_{GS} = -4.5\text{ V}$ $I_D \geq -0.58\text{ A}$		1400	2200	pC
Gate-Source Charge	$Q_{gs}$			300		
Gate-Drain Charge	$Q_{gd}$			250		
Gate Resistance	$R_g$			150		$\Omega$
Turn-On Time	$t_{d(\text{on})}$	$V_{DD} = -6\text{ V}$ , $R_L = 10\Omega$ $I_D \geq -0.58\text{ A}$ , $V_{GEN} = -4.5\text{ V}$ , $R_g = 6\Omega$		25	35	ns
	$t_r$			30	45	
Turn-Off Time	$t_{d(\text{off})}$			55	85	
	$t_f$			38	60	

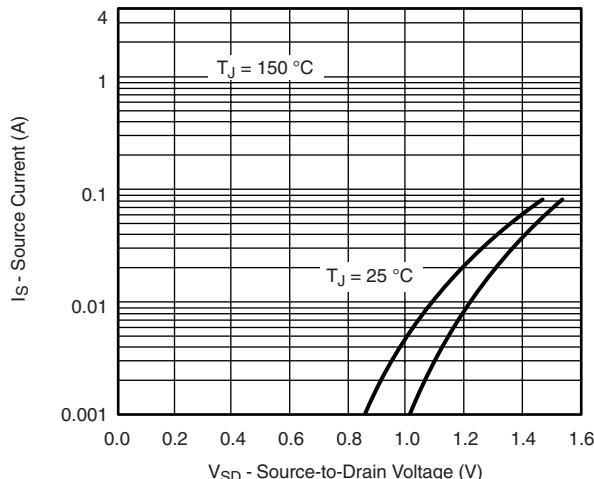
Notes:

a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

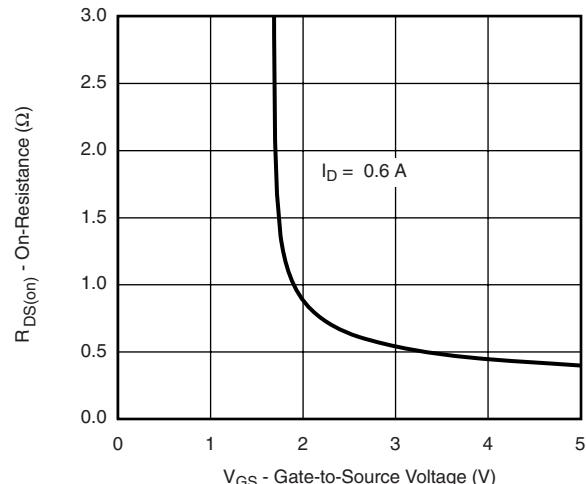
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

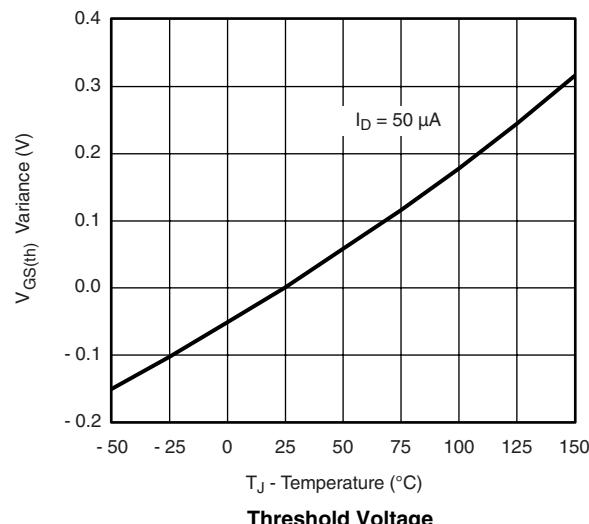
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted


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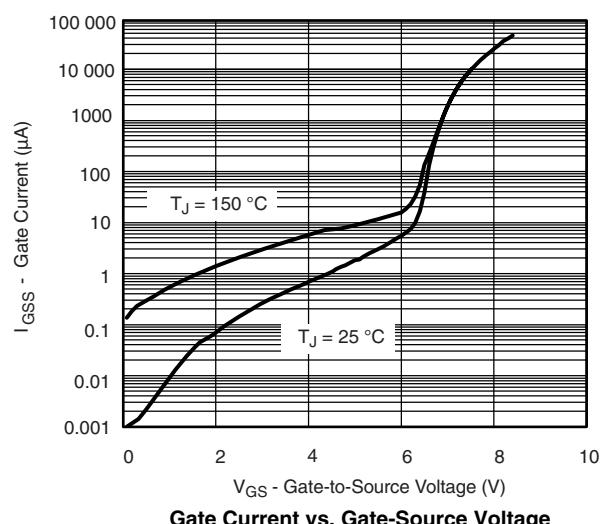
Source-Drain Diode Forward Voltage



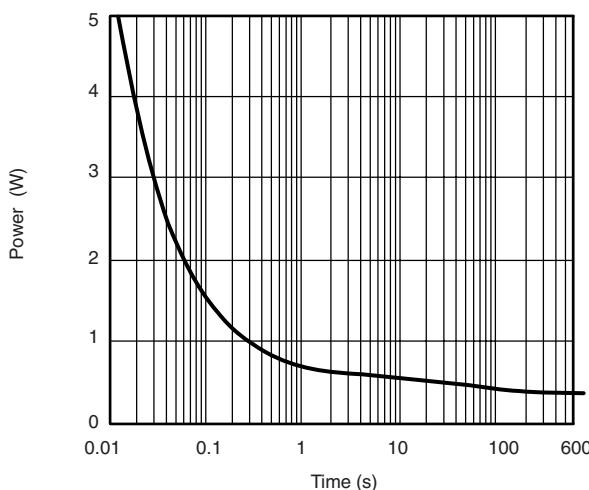
On-Resistance vs. Gate-to-Source Voltage



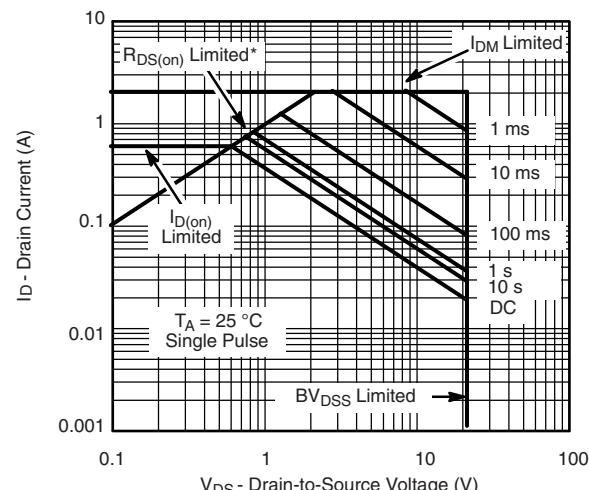
Threshold Voltage



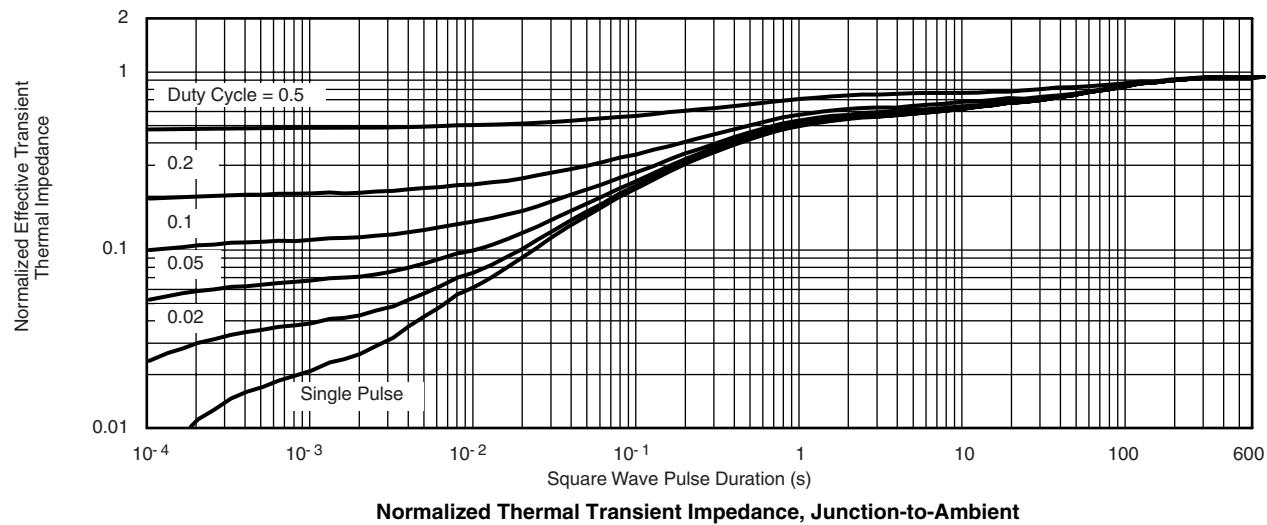
Gate Current vs. Gate-Source Voltage



Single Pulse Power, Junction-to-Ambient



Safe Operating Area, Junction-to-Ambient

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted


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