

## 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) <sup>e</sup>
- 20	0.65 at V <sub>GS</sub> = - 4.5 V	- 0.58
	0.85 at V <sub>GS</sub> = - 2.5 V	- 0.5

### FEATURES

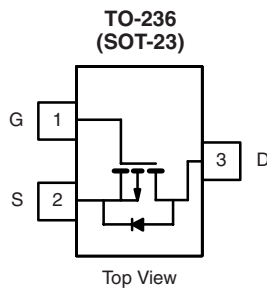
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET<sup>®</sup> Power MOSFET
- ESD Protected: 3000 V



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

### APPLICATIONS

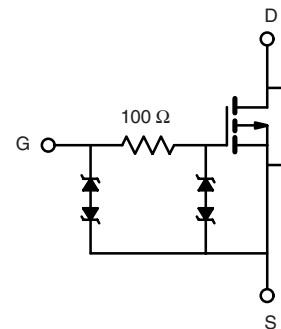
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems, DC/DC Converters
- Power Supply Converter Circuits
- Load/Power Switching-Cell Phones, Pagers



Marking Code: K4ywl

K4 = Part Number Code for TP0101K

y = Year Code  
w = Week Code  
l = Lot Traceability



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

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted			
Parameter	Symbol	Limit	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>b</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	- 0.58
		T <sub>A</sub> = 70 °C	- 0.46
Pulsed Drain Current <sup>a</sup>	I <sub>DM</sub>	- 2	A
Continuous Source-Drain (Diode Current) <sup>b</sup>	I <sub>S</sub>	- 0.3	
Power Dissipation <sup>b</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	0.35
		T <sub>A</sub> = 70 °C	0.22
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C

Notes:

- a. Pulse width limited by maximum junction temperature.  
b. Surface Mounted on FR4 board, t ≤ 10 s.

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

Notes:

- a. Pulse width limited by maximum junction temperature.  
b. Surface Mounted on FR4 board, t ≤ 10 s.

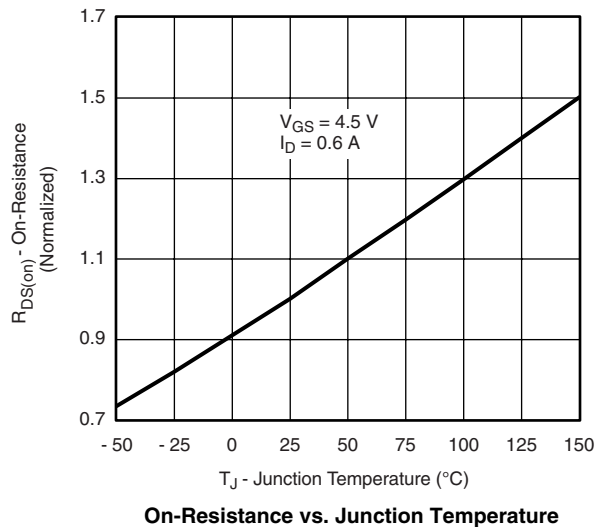
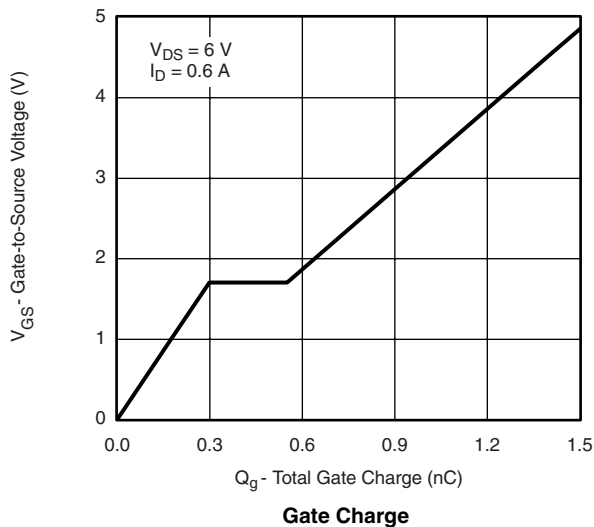
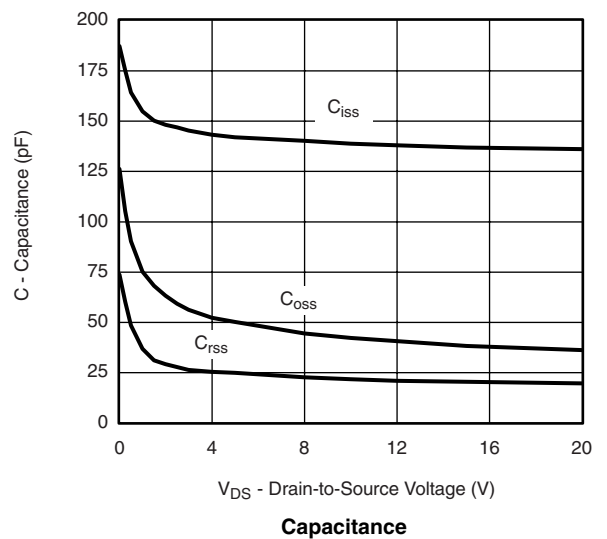
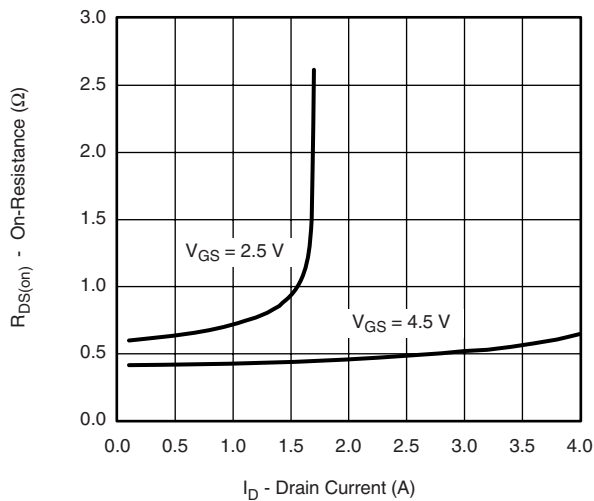
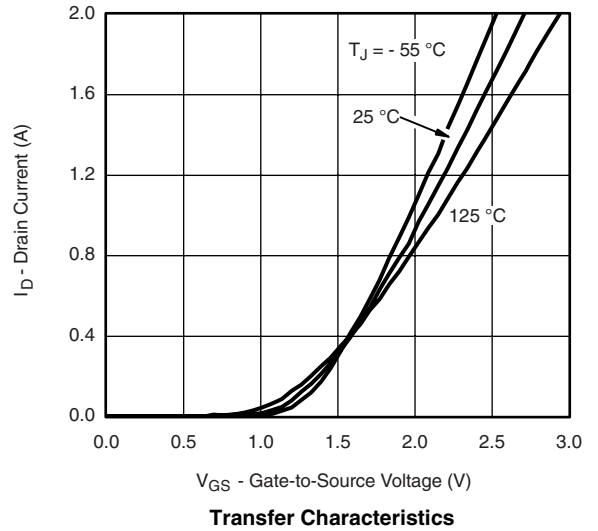
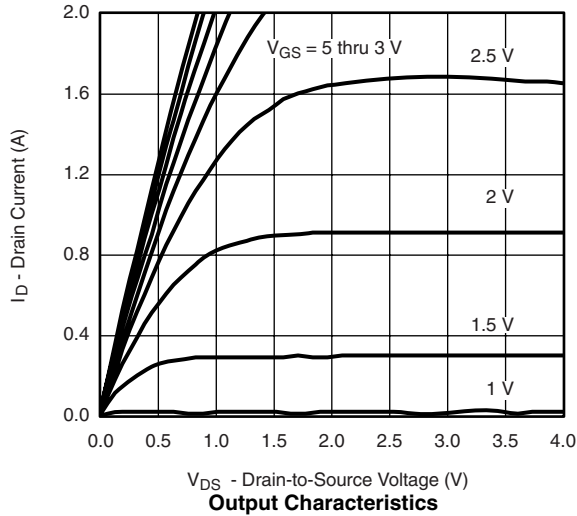
<b>SPECIFICATIONS</b> $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -10\text{ }\mu\text{A}$	-20			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -50\text{ }\mu\text{A}$	-0.5	-0.7	-1.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = -0\text{ V}, V_{GS} = \pm 4.5\text{ V}$			$\pm 5$	$\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			-1	
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	-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>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -0.58\text{ A}$		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		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	$Q_g$	$V_{DS} = -6\text{ V}, V_{GS} = -4.5\text{ V}$ $I_D \cong -0.58\text{ A}$		1400	2200	$\mu\text{C}$
Gate-Source Charge	$Q_{gs}$			300		
Gate-Drain Charge	$Q_{gd}$			250		
Gate Resistance	$R_g$			150		$\Omega$
Turn-On Time	$t_{d(on)}$	$V_{DD} = -6\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong -0.58\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$		25	35	ns
	$t_r$			30	45	
Turn-Off Time	$t_{d(off)}$			55	85	
	$t_f$			38	60	

Notes:

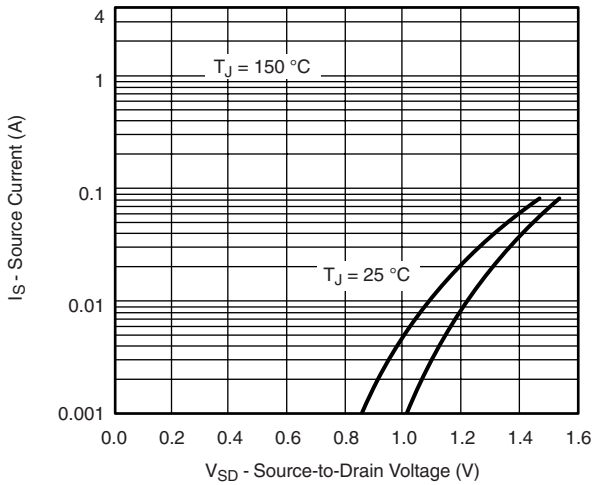
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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.

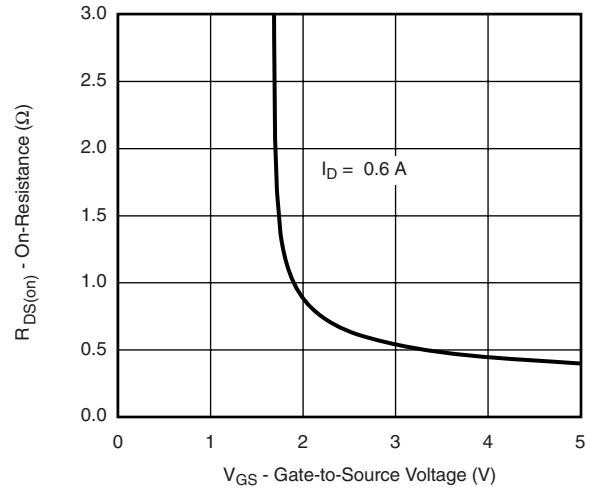
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



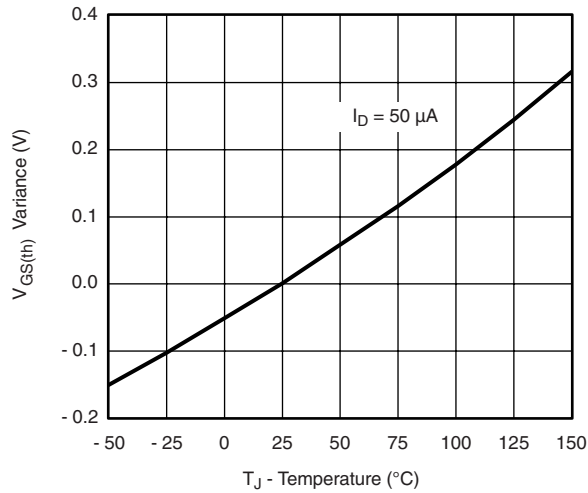
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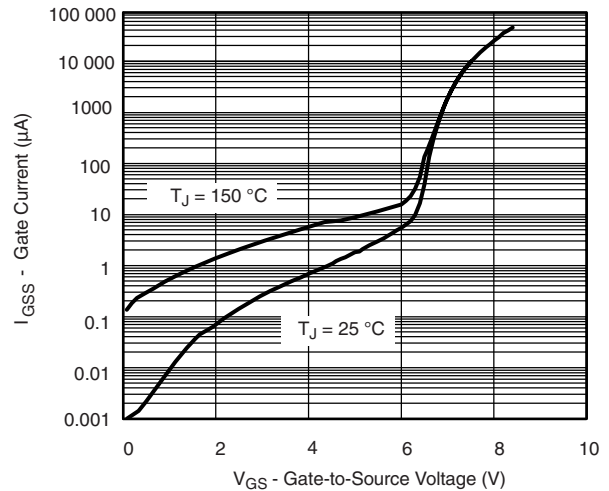
**Source-Drain Diode Forward Voltage**



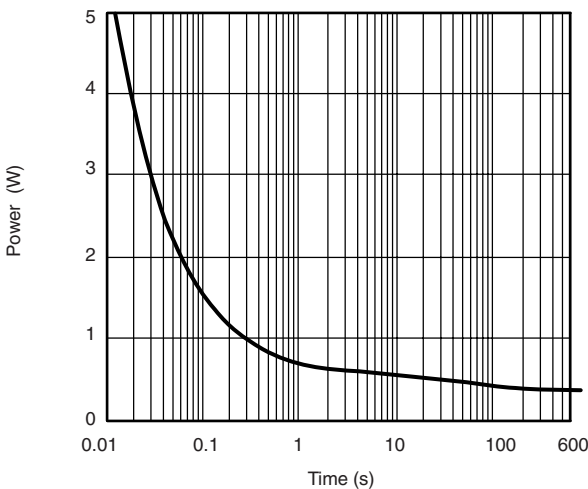
**On-Resistance vs. Gate-to-Source Voltage**



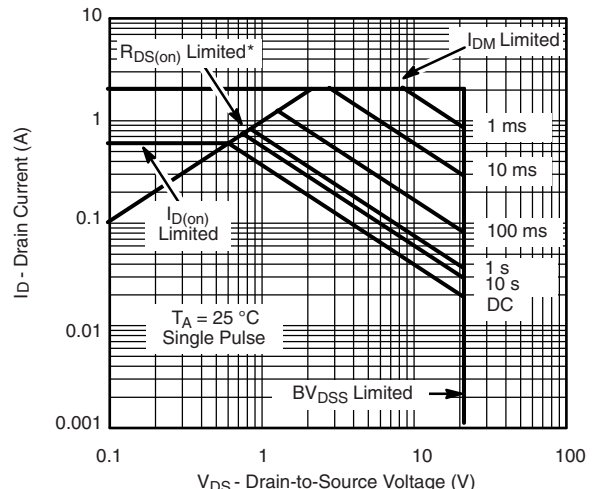
**Threshold Voltage**



**Gate Current vs. Gate-Source Voltage**



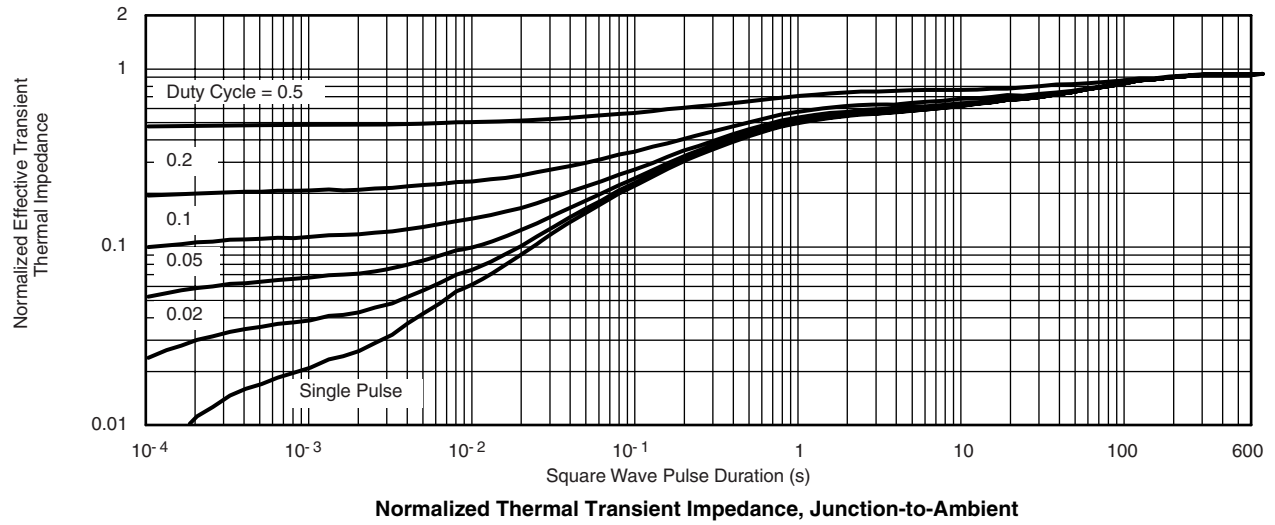
**Single Pulse Power, Junction-to-Ambient**



**Safe Operating Area, Junction-to-Ambient**  
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified



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



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