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

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[e]
- 20	0.65 at V_{GS} = - 4.5 V	- 0.58
	0.85 at V_{GS} = - 2.5 V	- 0.5

FEATURES

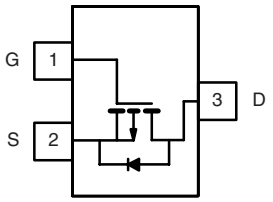
- **Halogen-free According to IEC 61249-2-21 Available**
- TrenchFET® Power MOSFET
- ESD Protected: 3000 V

Pb-free
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

TO-236 (SOT-23)

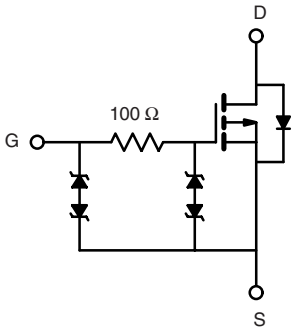


Top View

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_A = 25 °C, unless otherwise noted				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	- 20	V
Gate-Source Voltage		V_{GS}	± 8	
Continuous Drain Current (T_J = 150 °C)[b]	T_A = 25 °C	I_D	- 0.58	A
	T_A = 70 °C		- 0.46	
Pulsed Drain Current[a]		I_{DM}	- 2	
Continuous Source-Drain (Diode Current)[b]		I_S	- 0.3	
Power Dissipation[b]	T_A = 25 °C	P_D	0.35	W
	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 ≤ 10 s.

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limits	Unit
Thermal Resistance, Junction-to-Ambient[b]	R_{thJA}	357	°C/W

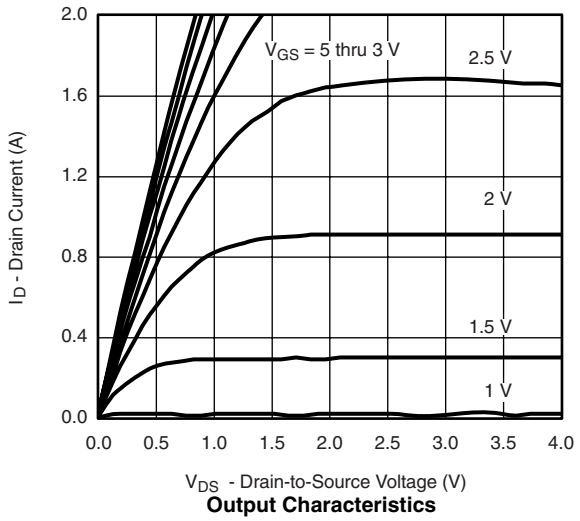
Notes:
a. Pulse width limited by maximum junction temperature.
b. Surface Mounted on FR4 board, t ≤ 10 s.

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

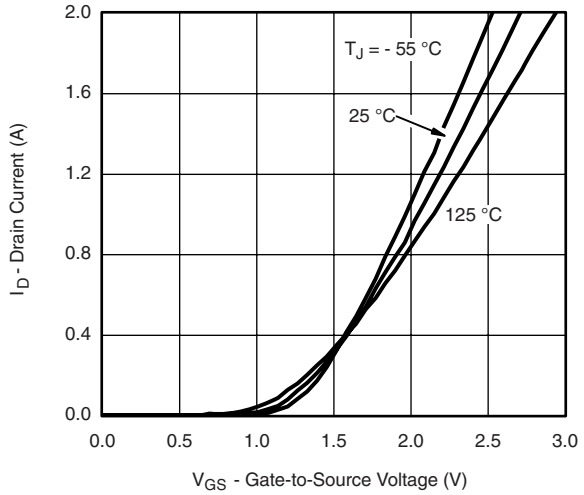
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

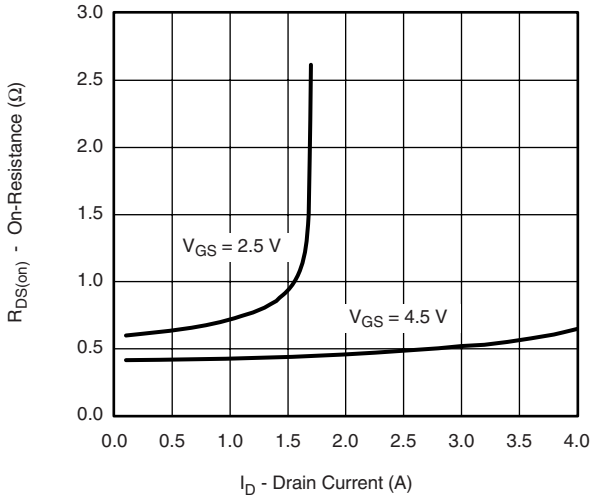
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



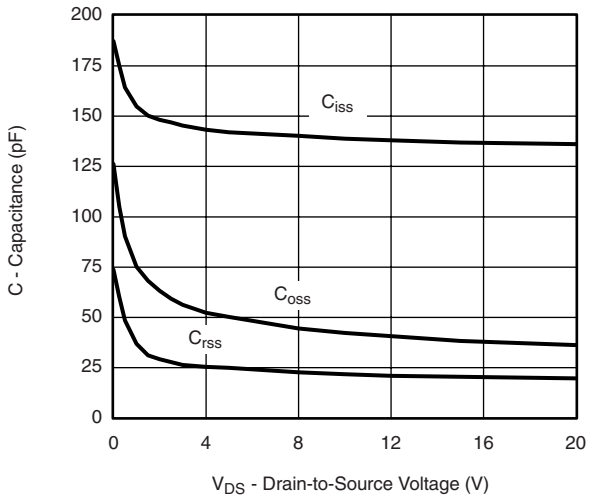
Output Characteristics



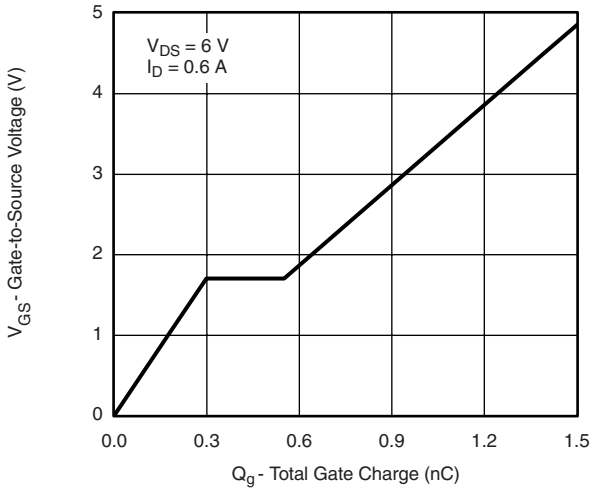
Transfer Characteristics



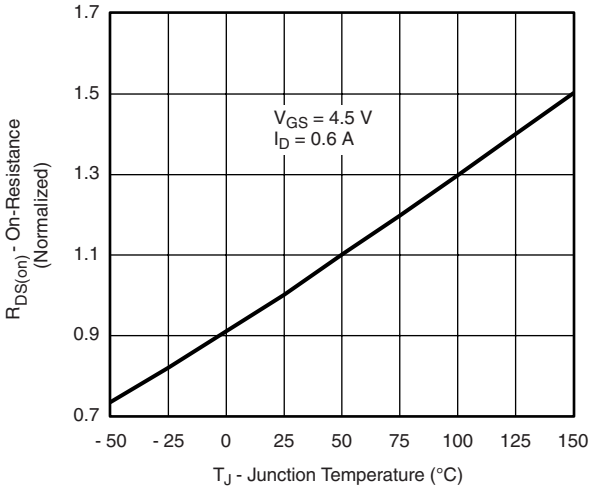
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

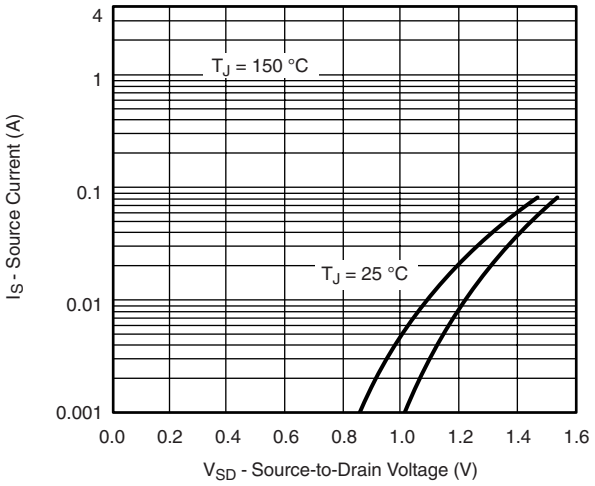


Gate Charge

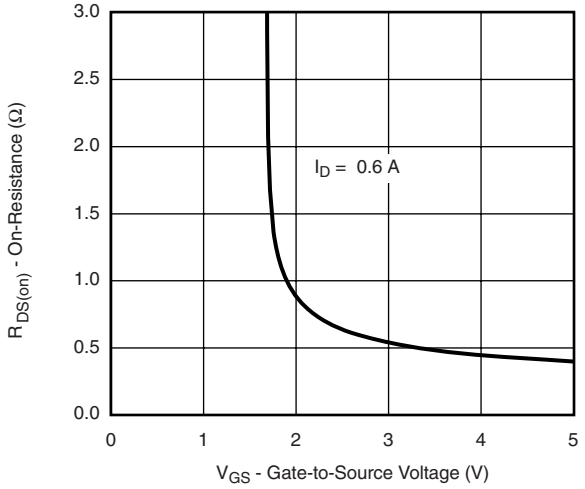


On-Resistance vs. Junction Temperature

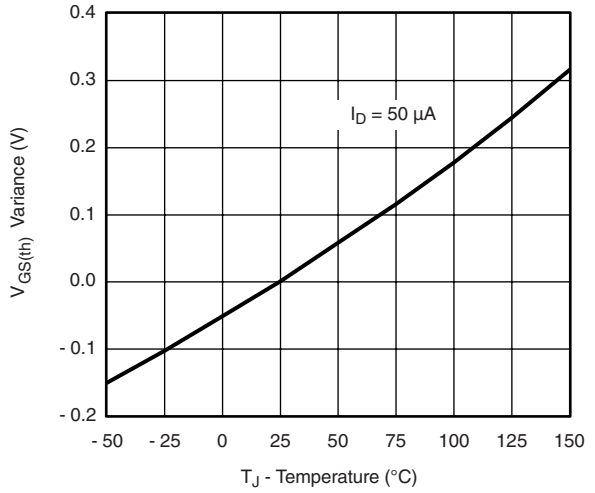
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



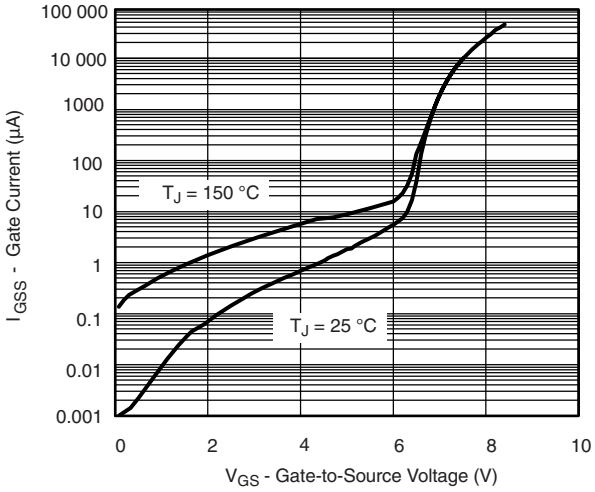
Source-Drain Diode Forward Voltage



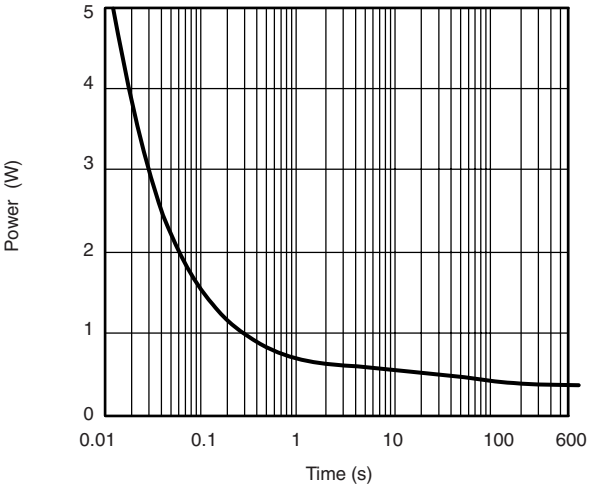
On-Resistance vs. Gate-to-Source Voltage



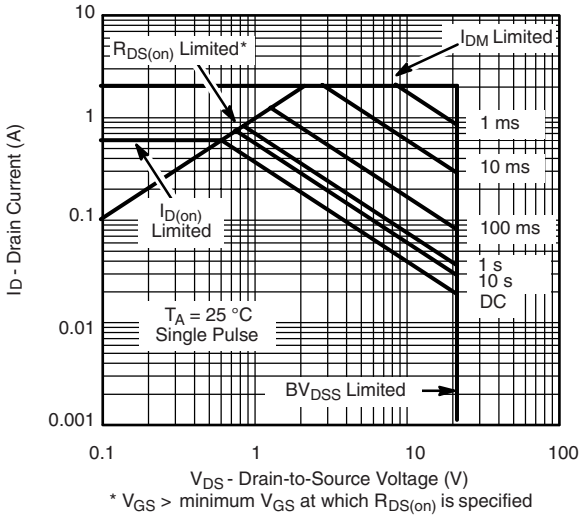
Threshold Voltage



Gate Current vs. Gate-Source Voltage

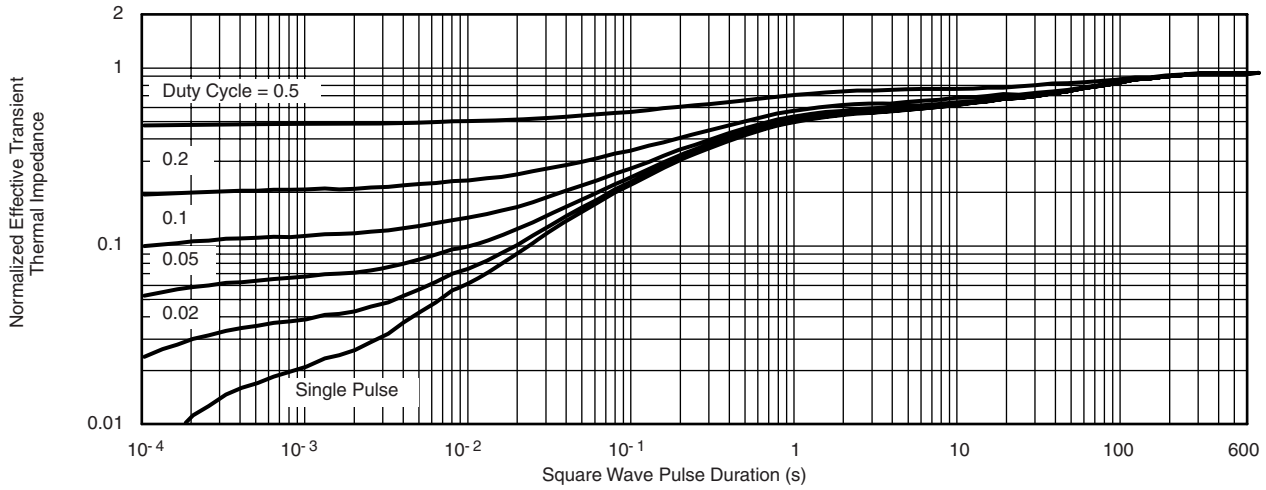


Single Pulse Power, Junction-to-Ambient



Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient

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