

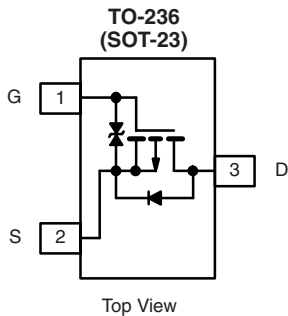


**THE DATASHEET OF  
TP0202K-T1-GE3**



## P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY				
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	V <sub>GS(th)</sub> (V)	I <sub>D</sub> (mA)	Q <sub>g</sub> (Typ.)
- 30	1.4 at V <sub>GS</sub> = - 10 V	- 1.3 to - 3.0	- 385	1000
	3.5 at V <sub>GS</sub> = - 4.5 V	- 1.3 to - 3.0	- 240	



Marking Code: 2Kw//  
 2K = Part Number Code for TP0202K  
 w = Week Code  
 // = Lot Traceability

Ordering Information: TP0202K-T1-E3 (Lead (Pb)-free)  
 TP0202K-T1-GE3 (Lead (Pb)-free and Halogen-free)

### FEATURES

- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFET
- High-Side Switching
- Low On-Resistance: 1.2 Ω (typ.)
- Low Threshold: - 2 V (typ.)
- Fast Switching Speed: 14 ns (typ.)
- Low Input Capacitance: 31 pF (typ.)
- 2000 V ESD Protection



### APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Display, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply Converter Circuits
- Solid-State Relays

### BENEFITS

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Easily Driven without Buffer

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	- 30	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	- 385
		T <sub>A</sub> = 85 °C	- 280
Pulsed Drain Current <sup>b</sup>	I <sub>DM</sub>	- 750	mA
Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	350
		T <sub>A</sub> = 85 °C	185
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	350	°C/W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C

Notes:

- a. Surface Mounted on FR4 board.  
 b. Pulse width limited by maximum junction temperature.

<b>SPECIFICATIONS</b> $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -100\text{ }\mu\text{A}$	- 30	- 38		V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1.3	- 2	- 3.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			$\pm 50$	nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			$\pm 300$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			- 100	
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			- 10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = -10\text{ V}, V_{DS} = -10\text{ V}$	- 500			mA
Drain-Source On-Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -50\text{ mA}$		2.1	3.5	$\Omega$
		$V_{GS} = -10\text{ V}, I_D = -500\text{ mA}$		1.25	1.4	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -5\text{ V}, I_D = -200\text{ mA}$		315		mS
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -250\text{ mA}, V_{GS} = 0\text{ V}$			- 1.2	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS} = -16\text{ V}, V_{GS} = -10\text{ V}$ $I_D \cong -200\text{ mA}$		1000		pC
Gate-Source Charge	$Q_{gs}$			225		
Gate-Drain Charge	$Q_{gd}$			175		
Input Capacitance	$C_{iss}$	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$		31		pF
Output Capacitance	$C_{oss}$			11		
Reverse Transfer Capacitance	$C_{rss}$			4		
<b>Switching<sup>b</sup></b>						
Turn-On Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 75\text{ }\Omega$ $I_D \cong -200\text{ mA}, V_{GEN} = -10\text{ V}, R_G = 6\text{ }\Omega$		9		ns
	$t_r$			6		
Turn-Off Time	$t_{d(off)}$			30		
	$t_f$			20		

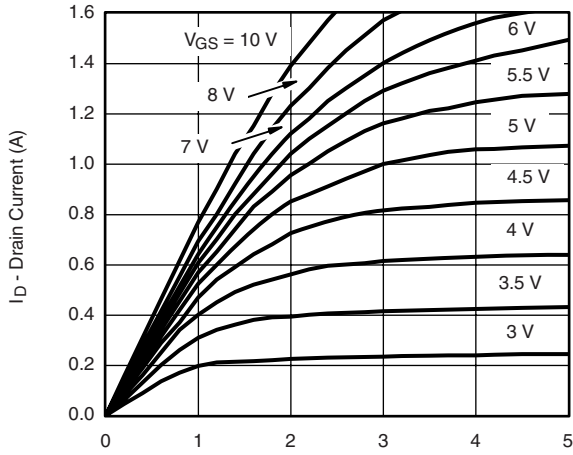
Notes:

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

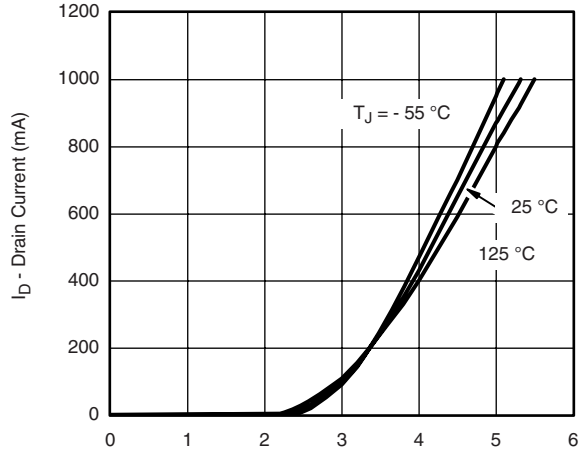
b. Switching time is essentially independent of operating temperature.

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.

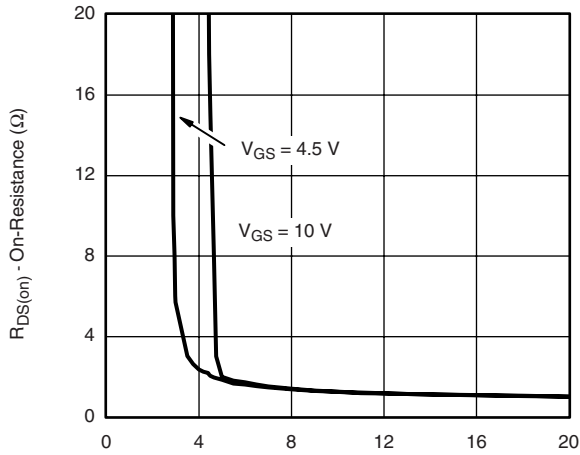
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



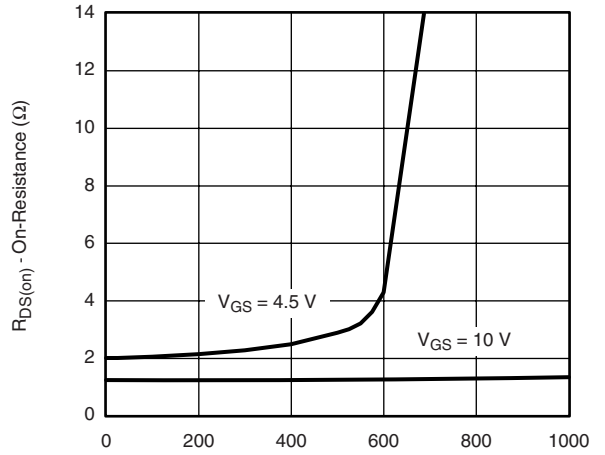
**Output Characteristics**



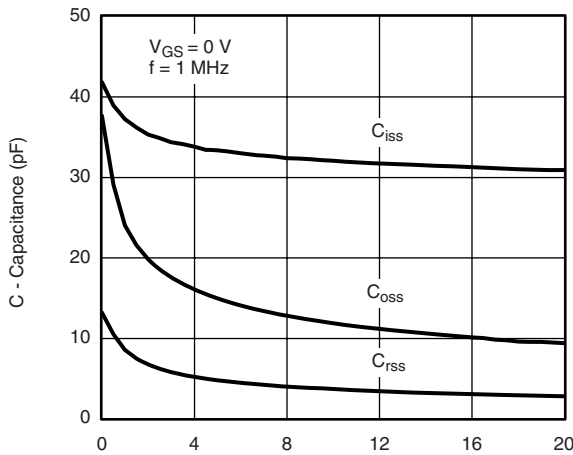
**Transfer Characteristics**



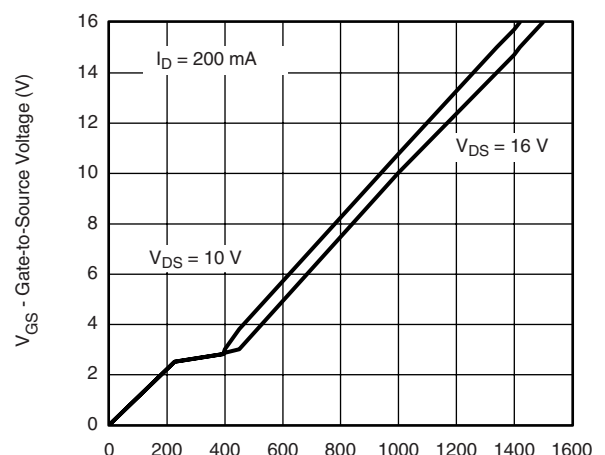
**On-Resistance vs. Gate-Source Voltage**



**On-Resistance vs. Drain Current**



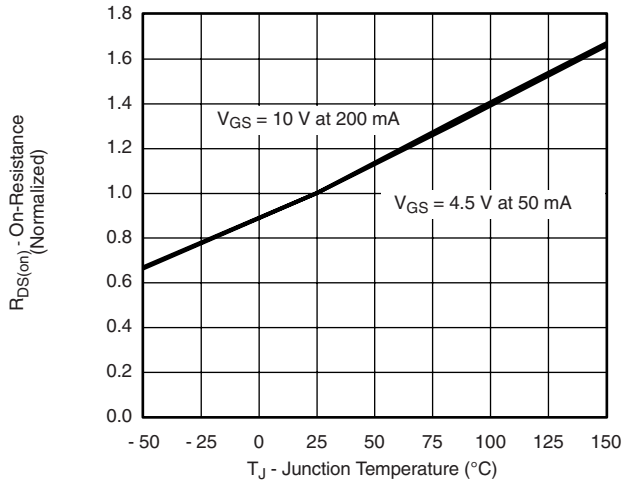
**Capacitance**



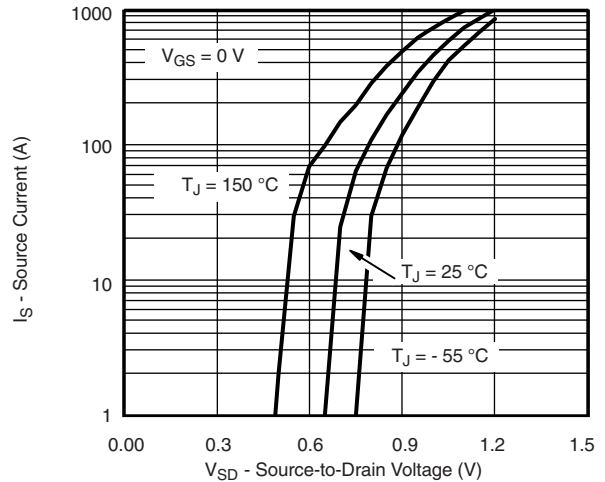
**Gate Charge**



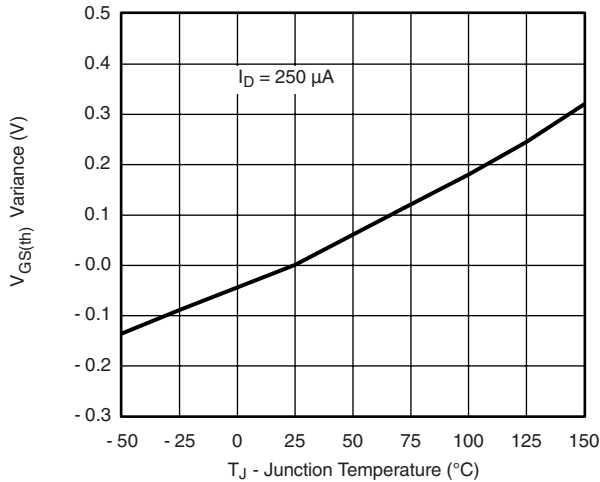
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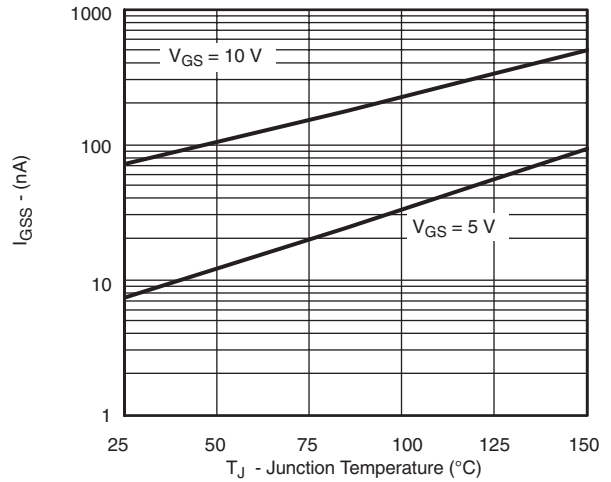
**On-Resistance vs. Junction Temperature**



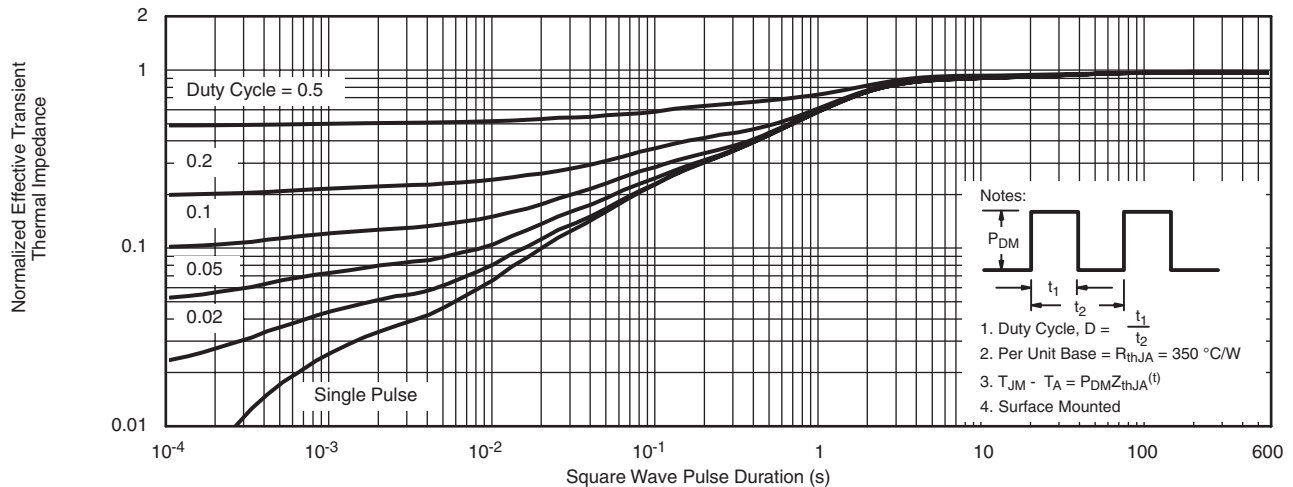
**Source-Drain Diode Forward Voltage**



**Threshold Voltage Variance Over Temperature**



**$I_{GSS}$  vs. Temperature**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

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