



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

**TrenchFET<sup>®</sup>**  
MOSFETs

PRODUCT SUMMARY				
$V_{(BR)DSS(min)}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (mA)	$Q_g$ (Typ)
-30	1.4 @ $V_{GS} = -10$ V	-1.3 to -3.0	-385	1000
	3.5 @ $V_{GS} = -4.5$ V	-1.3 to -3.0	-240	



**ESD Protected  
2000 V**

### FEATURES

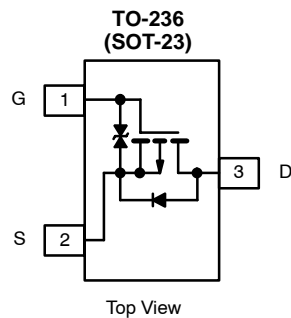
- High-Side Switching
- Low On-Resistance: 1.2  $\Omega$  (typ)
- Low Threshold: -2.0 V (typ)
- Fast Switching Speed: 14 ns (typ)
- Low Input Capacitance: 31 pF (typ)
- Gate-Source ESD Protection

### BENEFITS

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

### APPLICATIONS

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



Ordering Information: TP0202K-T1  
TP0202K-T1—E3 (Lead (Pb)-Free)

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

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>	$I_D$	$T_A = 25^\circ\text{C}$	-385
		$T_A = 85^\circ\text{C}$	-280
Pulse Drain Current <sup>b</sup>	$I_{DM}$	-750	mA
Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25^\circ\text{C}$	350
		$T_A = 85^\circ\text{C}$	185
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	350	$^\circ\text{C}/\text{W}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$

#### Notes

- Surface mounted on FR4 board.
- Pulse width limited by maximum junction temperature.



SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -100 μA	-30	-38		V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-1.3	-2	-3.0	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 5 V			± 50	nA
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 10 V			± 300	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V			-100	μA
		V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85 °C			-10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = -10 V, V <sub>GS</sub> = -10 V	-500			mA
Drain-Source On-Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -50 mA		2.1	3.5	Ω
		V <sub>GS</sub> = -10 V, I <sub>D</sub> = -500 mA		1.25	1.4	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -5 V, I <sub>D</sub> = -200 mA		315		mS
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = -250 mA, V <sub>GS</sub> = 0 V			-1.2	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -16 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> ≅ -200 mA		1000		pC
Gate-Source Charge	Q <sub>gs</sub>			225		
Gate-Drain Charge	Q <sub>gd</sub>			175		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		31		pF
Output Capacitance	C <sub>oss</sub>			11		
Reverse Transfer Capacitance	C <sub>rss</sub>			4		
<b>Switching<sup>b</sup></b>						
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -15 V, R <sub>L</sub> = 75 Ω I <sub>D</sub> ≅ -200 mA, V <sub>GEN</sub> = -10 V, R <sub>G</sub> = 6 Ω		9		ns
	t <sub>r</sub>			6		
Turn-Off Time	t <sub>d(off)</sub>			30		
	t <sub>f</sub>			20		

Notes

- a. Pulse test: PW ≤ 300 ms duty cycle ≤ 2%.
- b. Switching time is essentially independent of operating temperature.

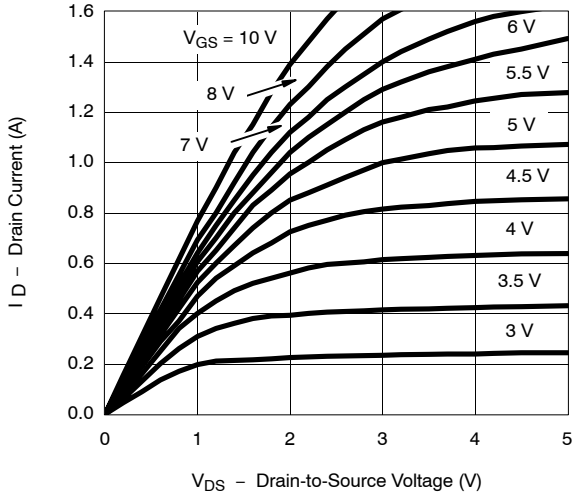
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



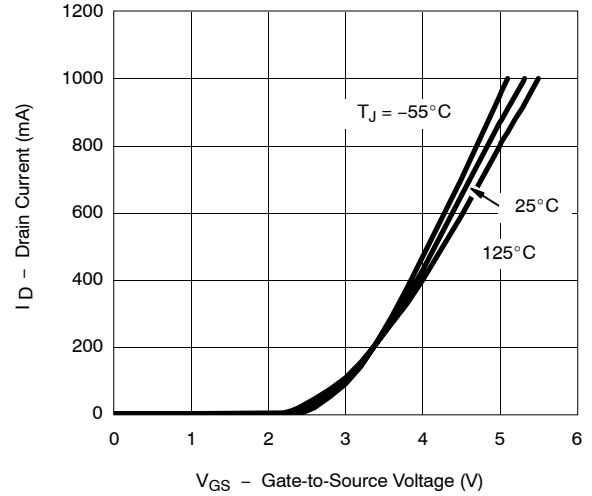
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

For the following graphs, p-channel negative polarities for all voltage and current values are represented as positive values.

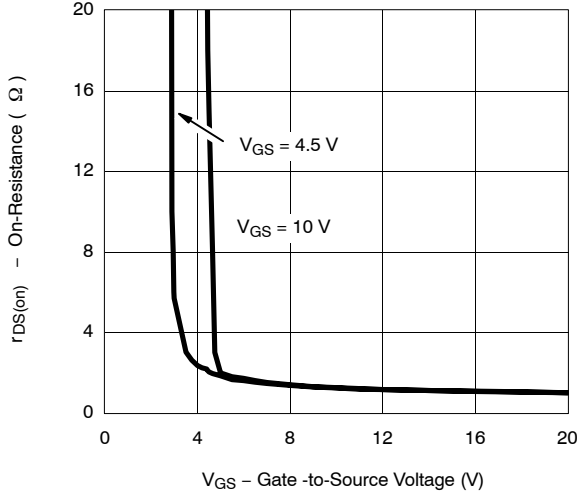
**Output Characteristics**



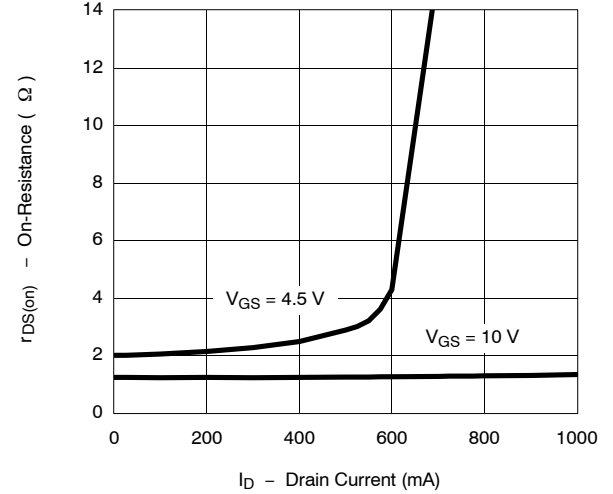
**Transfer Characteristics**



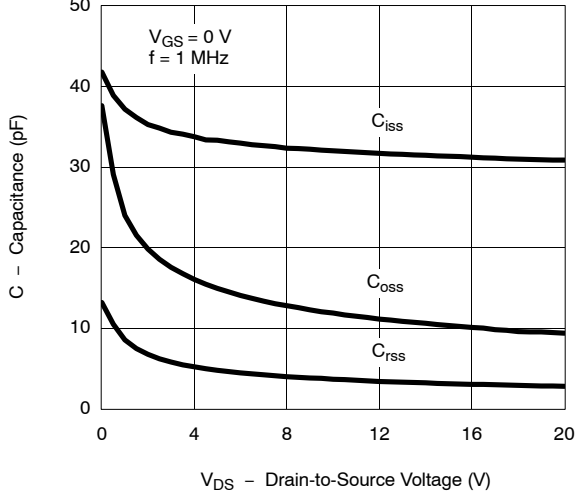
**On-Resistance vs. Gate-Source Voltage**



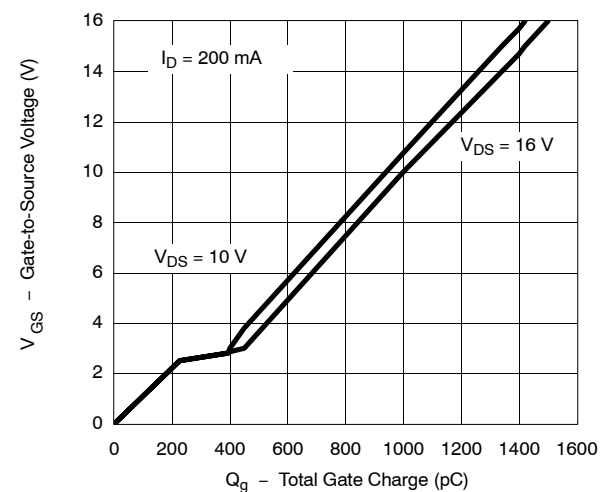
**On-Resistance vs. Drain Current**



**Capacitance**

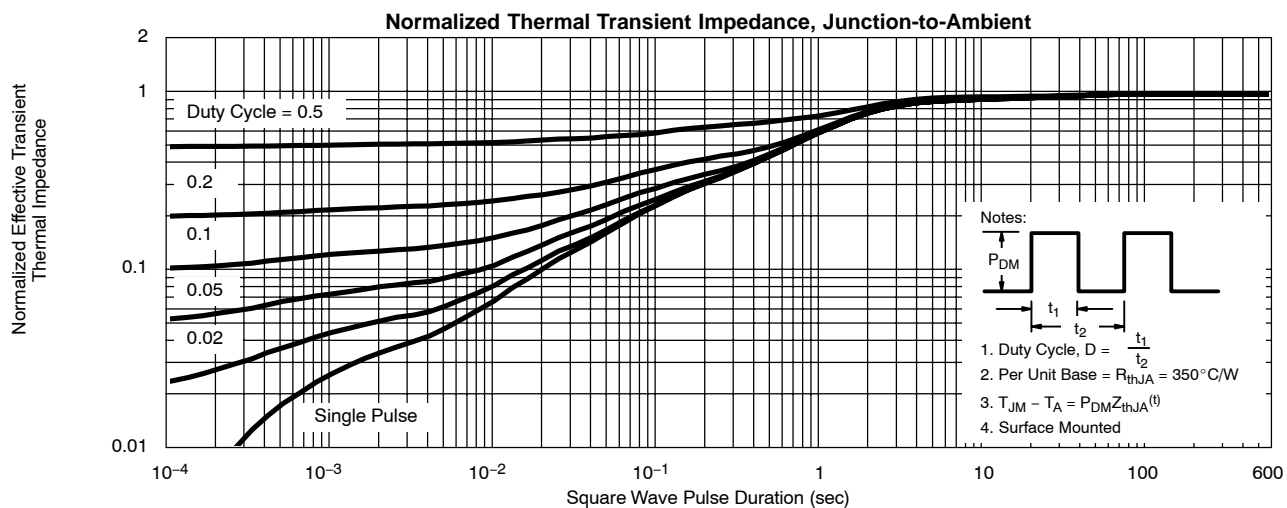
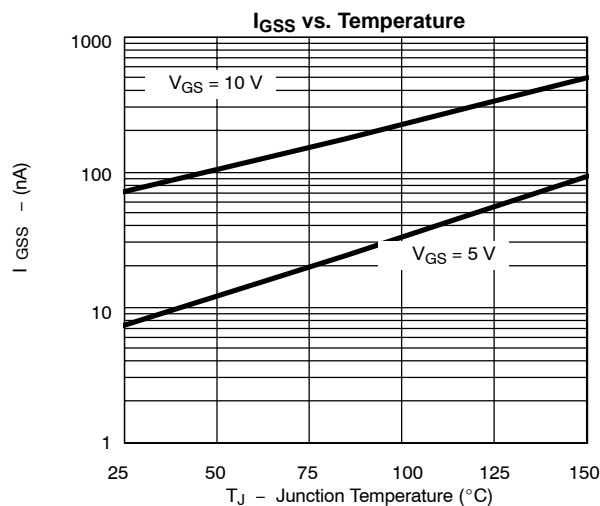
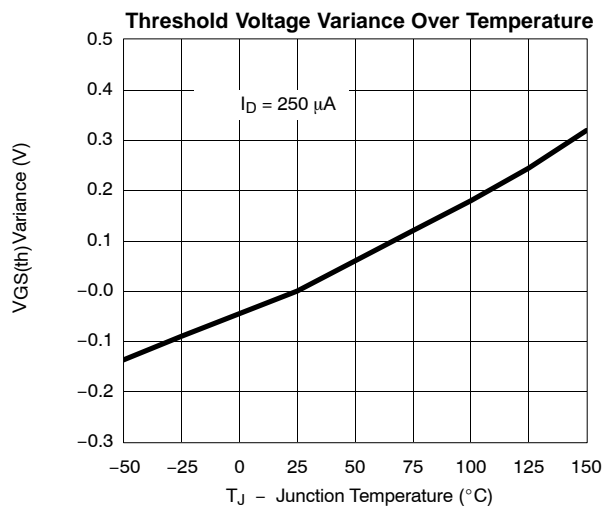
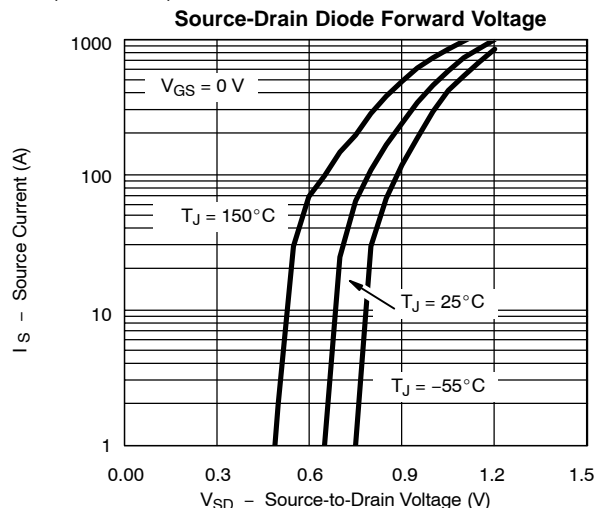
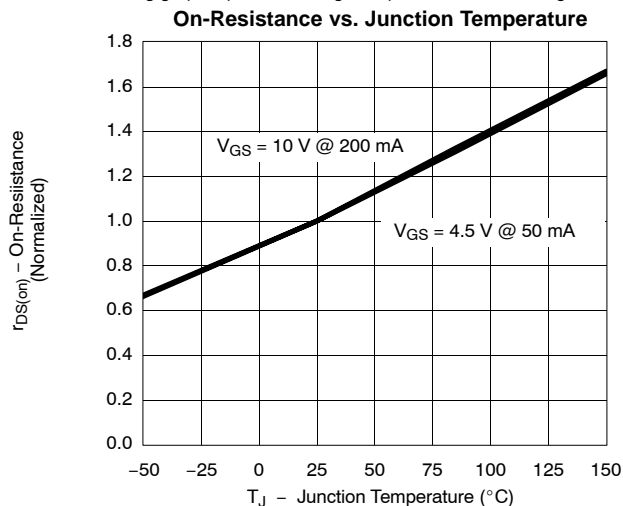


**Gate Charge**



**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

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