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

TrenchFET® MOSFETs

ESD Protected 2000 V

PRODUCT SUMMARY				
$V_{(BR)DSS(min)}$ (V)	$r_{DS(on)}$ (Ω)	$V_{GS(th)}$ (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	

FEATURES

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

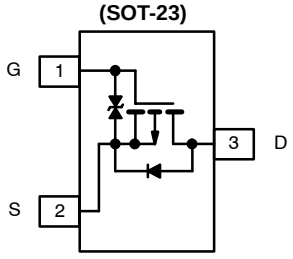
BENEFITS

- 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

TO-236 (SOT-23)



Top View

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

Marking Code: 2K*wll*

2K = Part Number Code for TP0202K
w = Week Code
ll = Lot Traceability

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

Notes
a. Surface mounted on FR4 board.
b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = −100 μA	−30	−38		V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = −250 μA	−1.3	−2	−3.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±5 V			±50	nA
		V_{DS} = 0 V, V_{GS} = ±10 V			±300	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = −30 V, V_{GS} = 0 V			−100	
		V_{DS} = −30 V, V_{GS} = 0 V, T_J = 85°C			−10	μA
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = −10 V, V_{GS} = −10 V	−500			mA
Drain-Source On-Resistance[a]	$r_{DS(on)}$	V_{GS} = −4.5 V, I_D = −50 mA		2.1	3.5	Ω
		V_{GS} = −10 V, I_D = −500 mA		1.25	1.4	
Forward Transconductance[a]	g_{fs}	V_{DS} = −5 V, I_D = −200 mA		315		mS
Diode Forward Voltage[a]	V_{SD}	I_S = −250 mA, V_{GS} = 0 V			−1.2	V
Dynamic						
Total Gate Charge	Q_g	V_{DS} = −16 V, V_{GS} = −10 V, I_D ≅ −200 mA		1000		pC
Gate-Source Charge	Q_{gs}			225		
Gate-Drain Charge	Q_{gd}			175		
Input Capacitance	C_{iss}	V_{DS} = −15 V, V_{GS} = 0 V, f = 1 MHz		31		pF
Output Capacitance	C_{oss}			11		
Reverse Transfer Capacitance	C_{rss}			4		
Switching[b]						
Turn-On Time	$t_{d(on)}$	V_{DD} = −15 V, R_L = 75 Ω I_D ≅ −200 mA, V_{GEN} = −10 V, R_G = 6 Ω		9		ns
	t_r			6		
Turn-Off Time	$t_{d(off)}$			30		
	t_f			20		

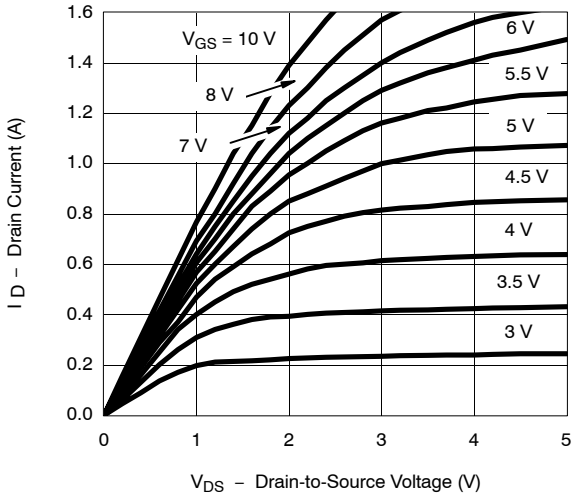
Notes
a. Pulse test: PW ≤ 300 ms duty cycle ≤ 2%.
b. Switching time is essentially independent of operating temperature.

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.

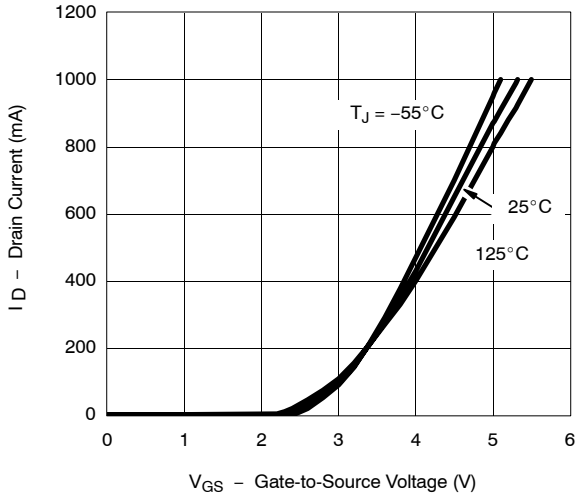
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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

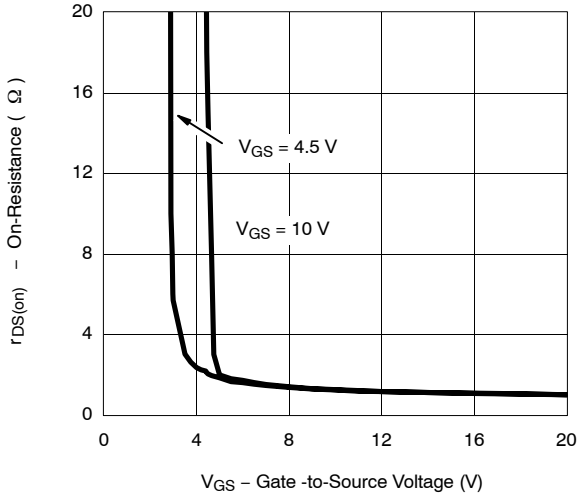
Output Characteristics



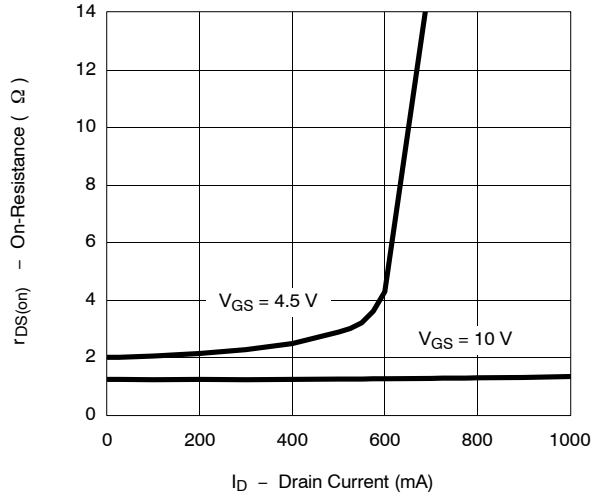
Transfer Characteristics



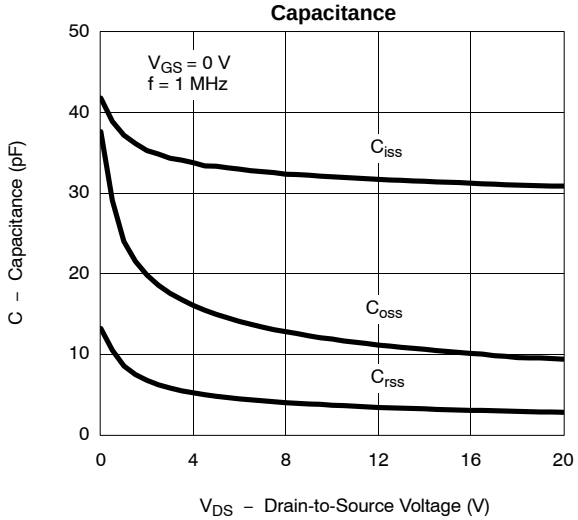
On-Resistance vs. Gate-Source Voltage



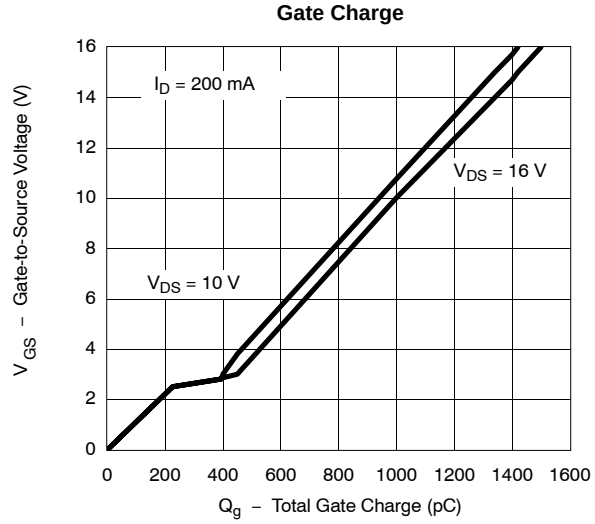
On-Resistance vs. Drain Current



Capacitance



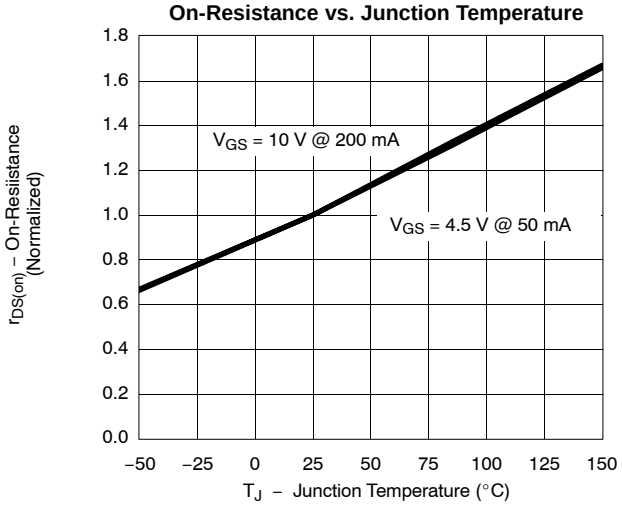
Gate Charge



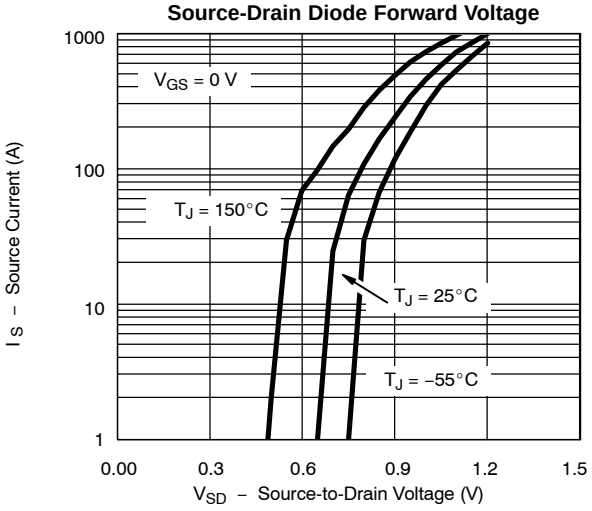
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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

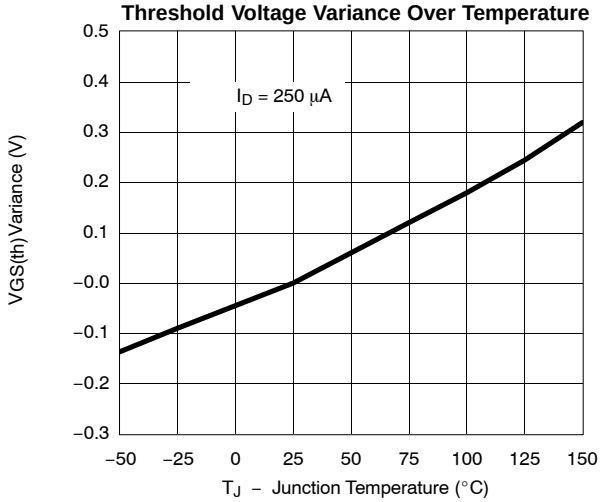
On-Resistance vs. Junction Temperature



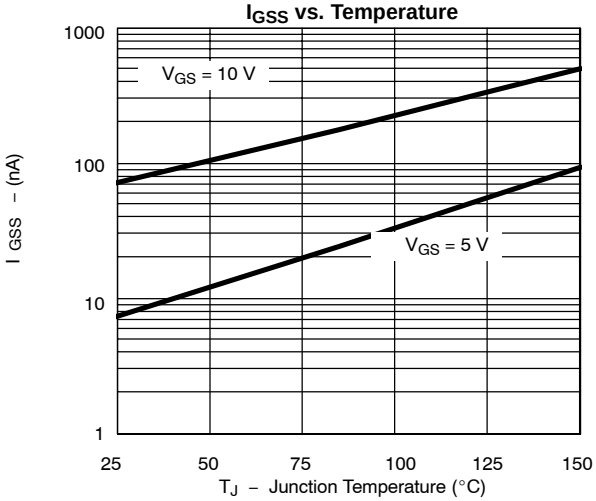
Source-Drain Diode Forward Voltage



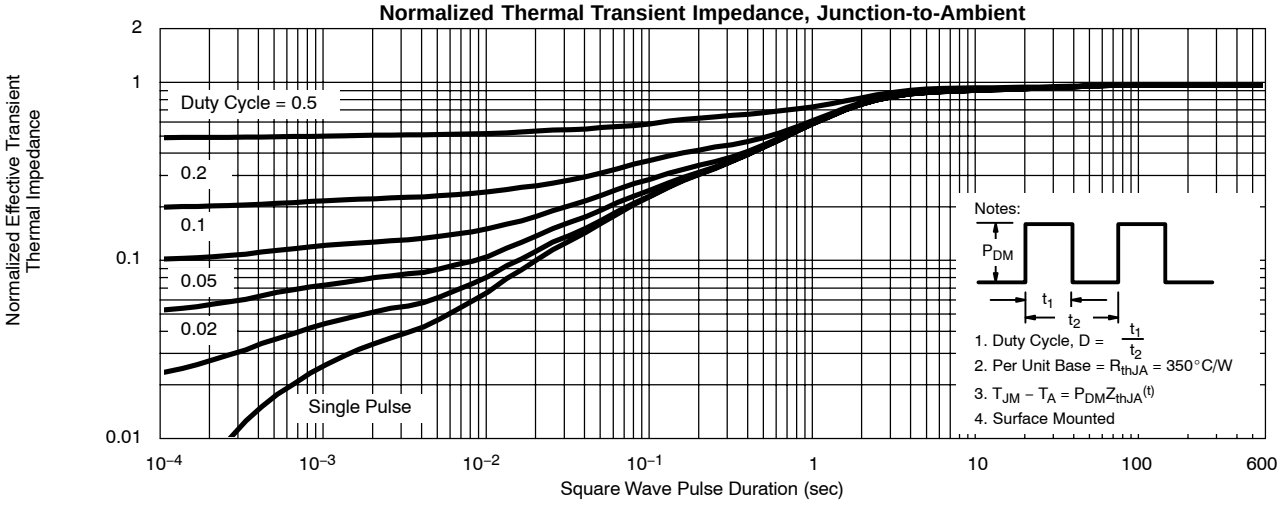
Threshold Voltage Variance Over Temperature



I_{GSS} vs. Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient



Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see http://www.vishay.com/ppg?71609.

Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.