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)
–30	1.4 @ V_{GS} = –10 V	–1.3 to –3.0	–385
	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

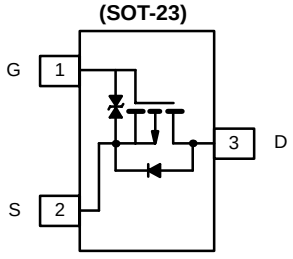
BENEFITS

- 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

Marking Code: K2*wll*

K2 = 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)

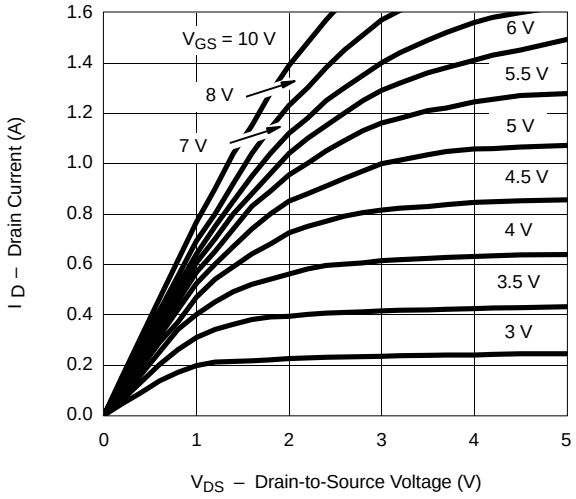
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = –100 μA	–30	–38		V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = –250 μA	–1.3	–2	–3.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±5 V			±50	nA
		V_{DS} = 0 V, V_{GS} = ±10 V			±300	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –24 V, V_{GS} = 0 V			–100	
		V_{DS} = –24 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		175		pC
Gate-Source Charge	Q_{gs}			225		
Gate-Drain Charge	Q_{gd}			1000		
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.

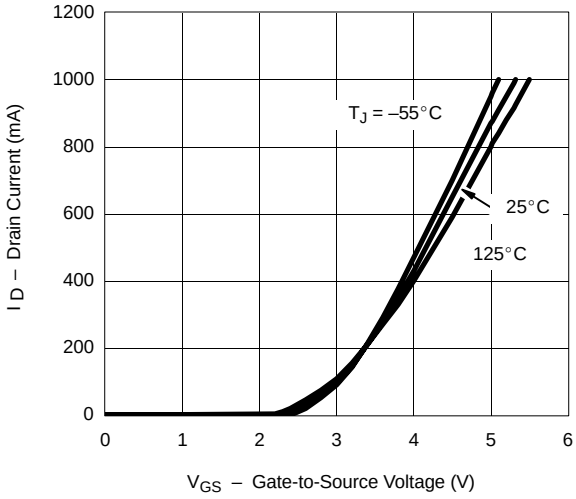
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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

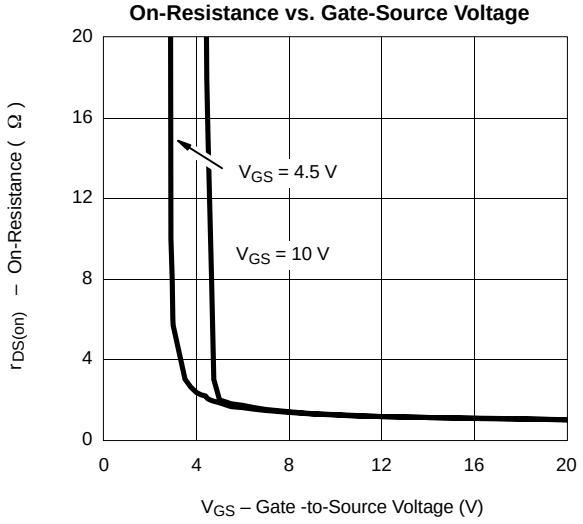
Output Characteristics



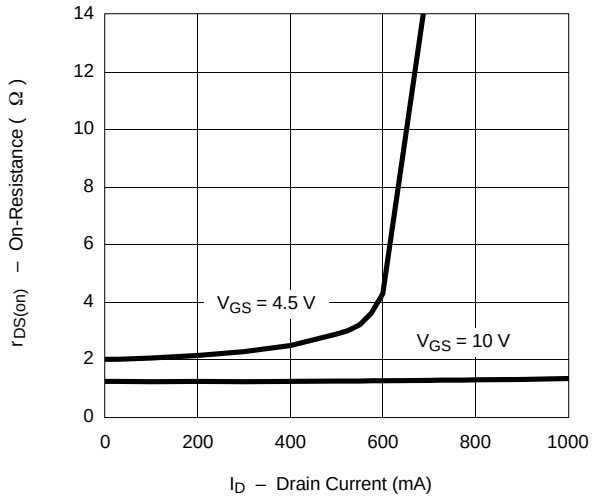
Transfer Characteristics



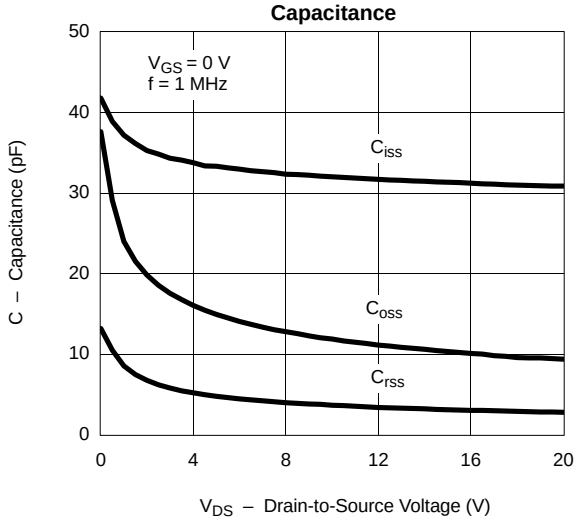
On-Resistance vs. Gate-Source Voltage



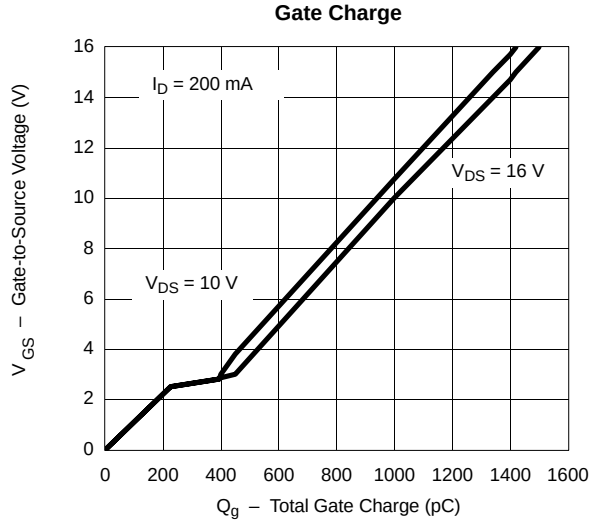
On-Resistance vs. Drain Current



Capacitance



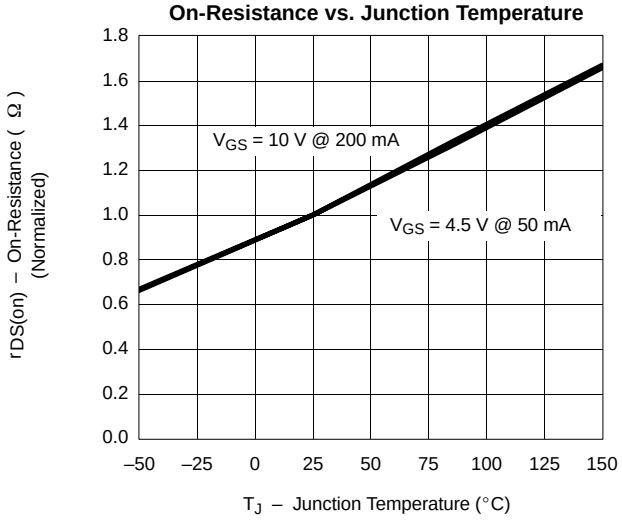
Gate Charge



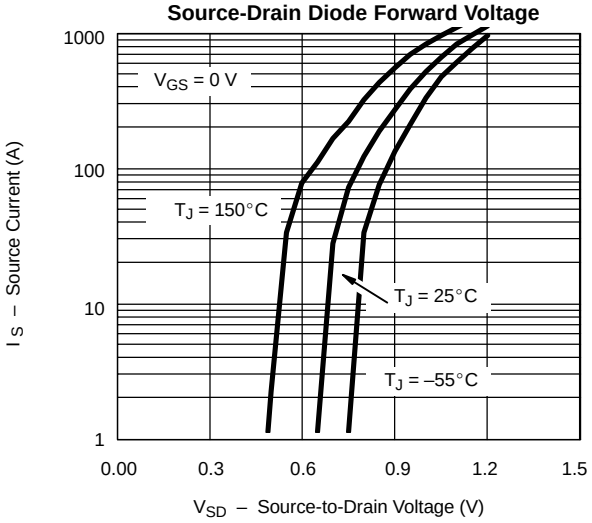
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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

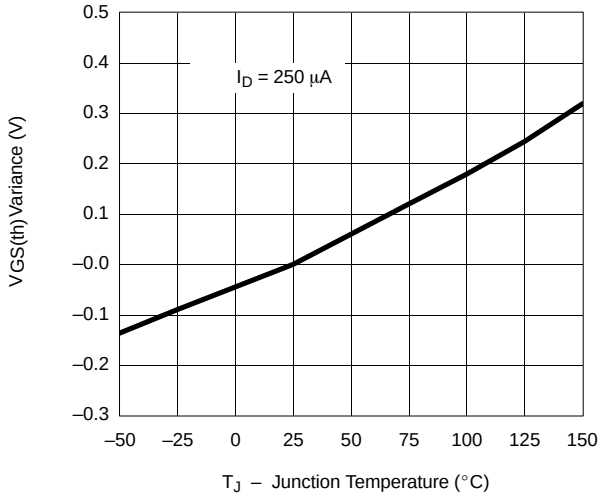
On-Resistance vs. Junction Temperature



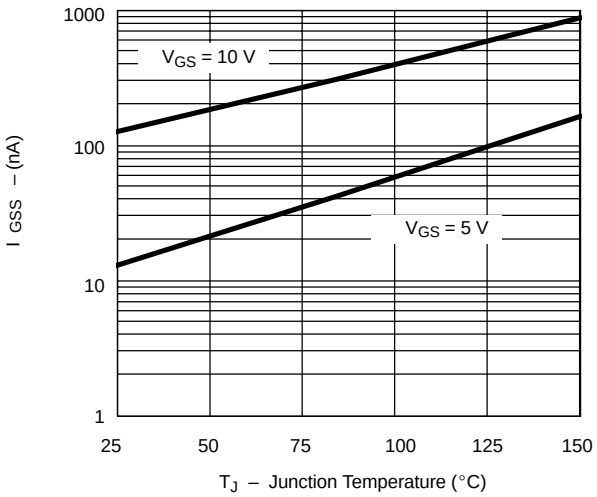
Source-Drain Diode Forward Voltage



Threshold Voltage Variance Over Temperature



I_{GSS} vs. Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient