P-Channel 60-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)
−60	6 @ V_{GS} = −10 V	−1 to −3.0	−185

FEATURES

- High-Side Switching
- Low On-Resistance: 6 Ω
- Low Threshold: −2 V (typ)
- Fast Swtiching Speed: 20 ns (typ)
- Low Input Capacitance: 20 pF (typ)
- Gate-Source ESD Protection

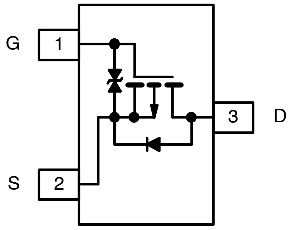
BENEFITS

- 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: 6K*wll*

6K = Part Number Code for TP0610K
w = Week Code
ll = Lot Traceability

Ordering Information: TP0610K-T1
TP0610K-T1—E3 (Lead (Pb)-Free)

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	−60	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current[a]	T_A = 25°C	I_D	−185	mA
	T_A = 100°C		−115	
Pulse Drain Current[b]		I_{DM}	−800	
Power Dissipation[a]	T_A = 25°C	P_D	350	mW
	T_A = 100°C		140	
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 = −10 µA	−60			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = −250 µA	−1		−3.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±10	µA
		V_{DS} = 0 V, V_{GS} = ±10 V			±200	nA
		V_{DS} = 0 V, V_{GS} = ±10 V, T_J = 85°C			±500	
		V_{DS} = 0 V, V_{GS} = ±5 V			±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = −60 V, V_{GS} = 0 V			−25	
		V_{DS} = −60 V, V_{GS} = 0 V, T_J = 85°C			−250	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = −10 V, V_{GS} = −4.5 V	−50			mA
		V_{DS} = −10 V, V_{GS} = −10 V	−600			
Drain-Source On-Resistance[a]	$r_{DS(on)}$	V_{GS} = −4.5 V, I_D = −25 mA			10	Ω
		V_{GS} = −10 V, I_D = −500 mA			6	
		V_{GS} = −10 V, I_D = −500 mA, T_J = 125°C			9	
Forward Transconductance[a]	g_{fs}	V_{DS} = −10 V, I_D = −100 mA	80			mS
Diode Forward Voltage[a]	V_{SD}	I_S = −200 mA, V_{GS} = 0 V			−1.4	V
Dynamic						
Total Gate Charge	Q_g	V_{DS} = −30 V, V_{GS} = −15 V, I_D ≅ −500 mA		1.7		nC
Gate-Source Charge	Q_{gs}			0.26		
Gate-Drain Charge	Q_{gd}			0.46		
Input Capacitance	C_{iss}	V_{DS} = −25 V, V_{GS} = 0 V, f = 1 MHz		23		pF
Output Capacitance	C_{oss}			10		
Reverse Transfer Capacitance	C_{rss}			5		
Switching[b]						
Turn-On Time	t_{ON}	V_{DD} = −25 V, R_L = 150 Ω I_D ≅ −200 mA, V_{GEN} = −10 V R_g = 10 Ω		20		ns
Turn-Off Time	t_{OFF}			35		

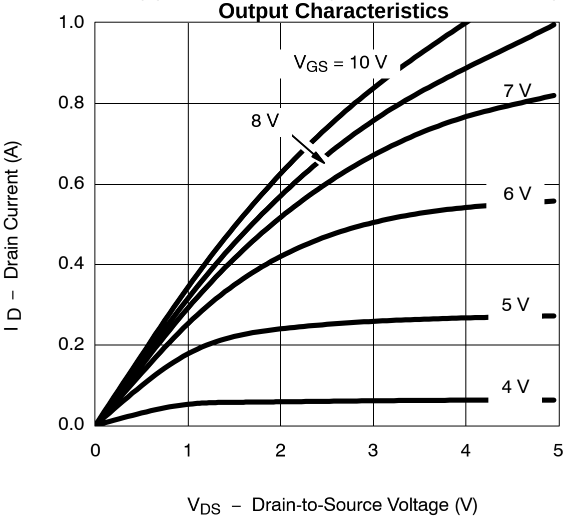
Notes
a. Pulse test: PW ≤300 ms duty cycle ≤2%.
b. Switching time is essentially independent of operating temperature.

TPJO60

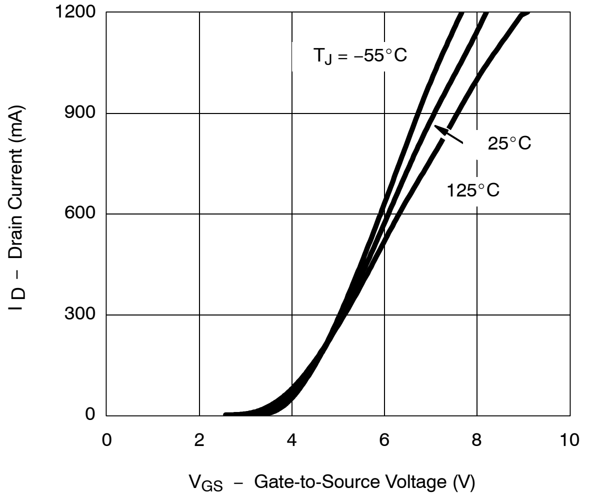
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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

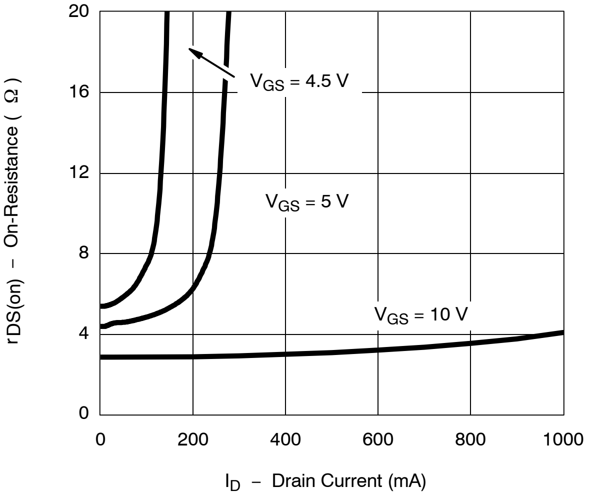
Output Characteristics



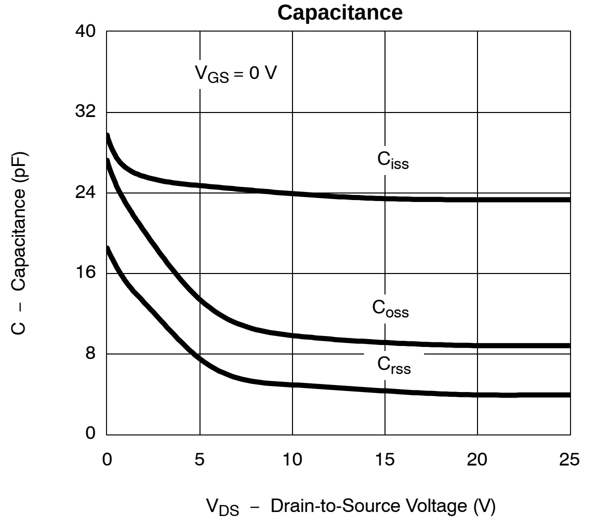
Transfer Characteristics



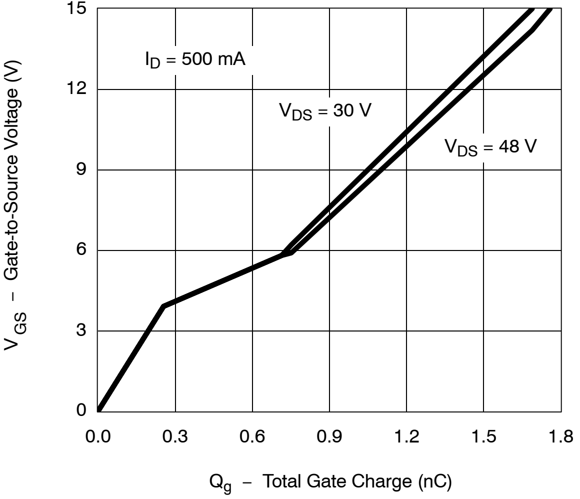
On-Resistance vs. Drain Current



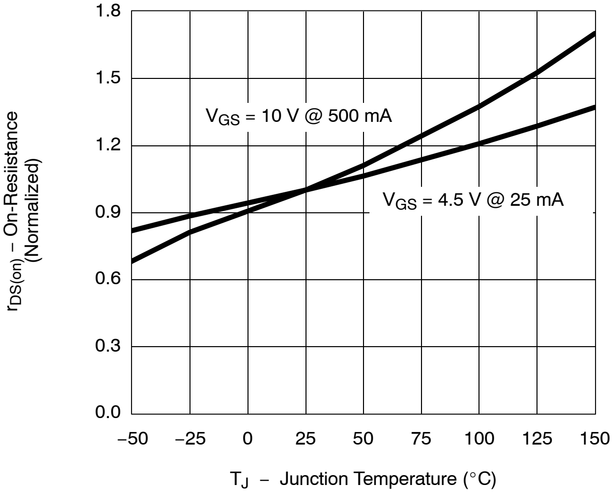
Capacitance



Gate Charge



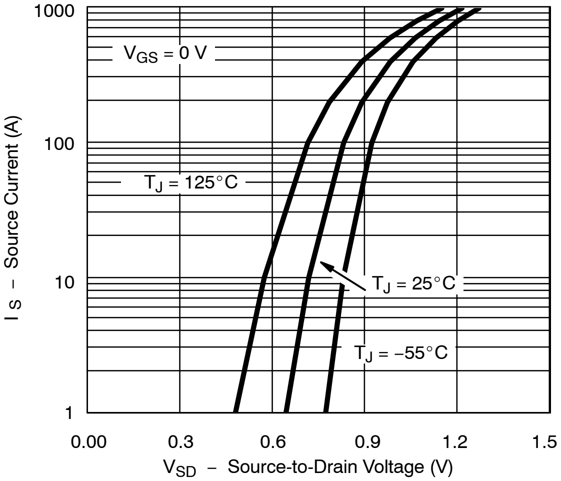
On-Resistance vs. Junction Temperature



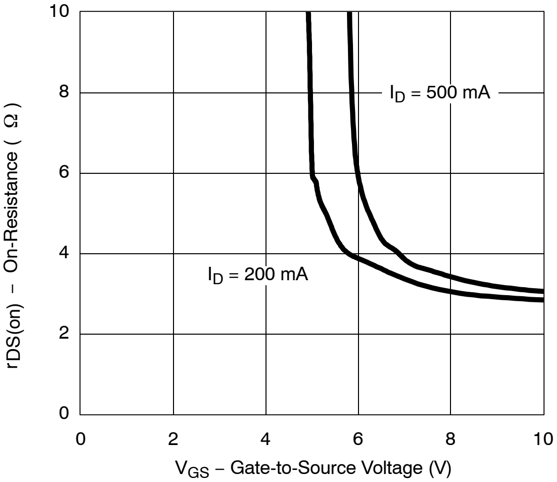
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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

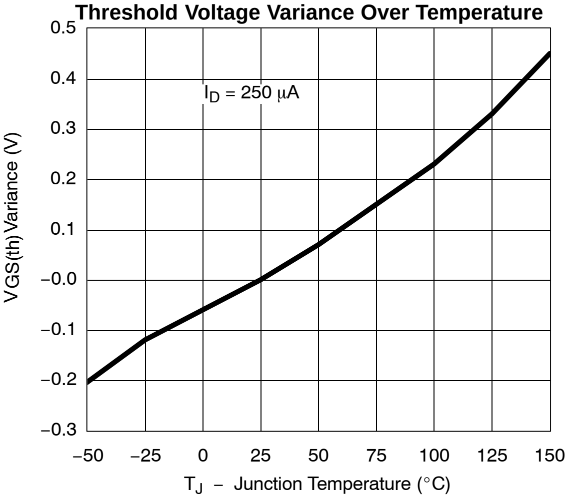
Source-Drain Diode Forward Voltage



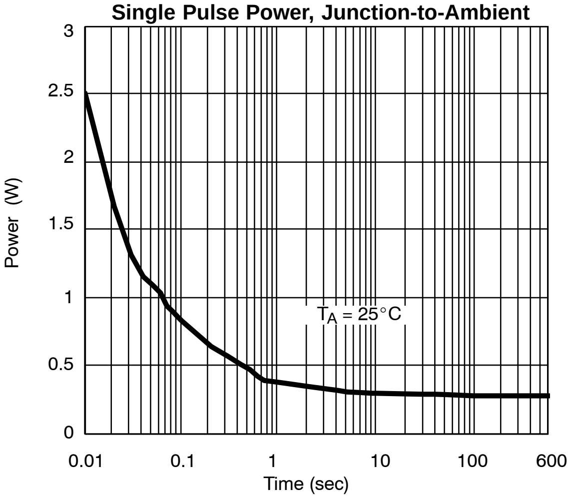
On-Resistance vs. Gate-Source Voltage



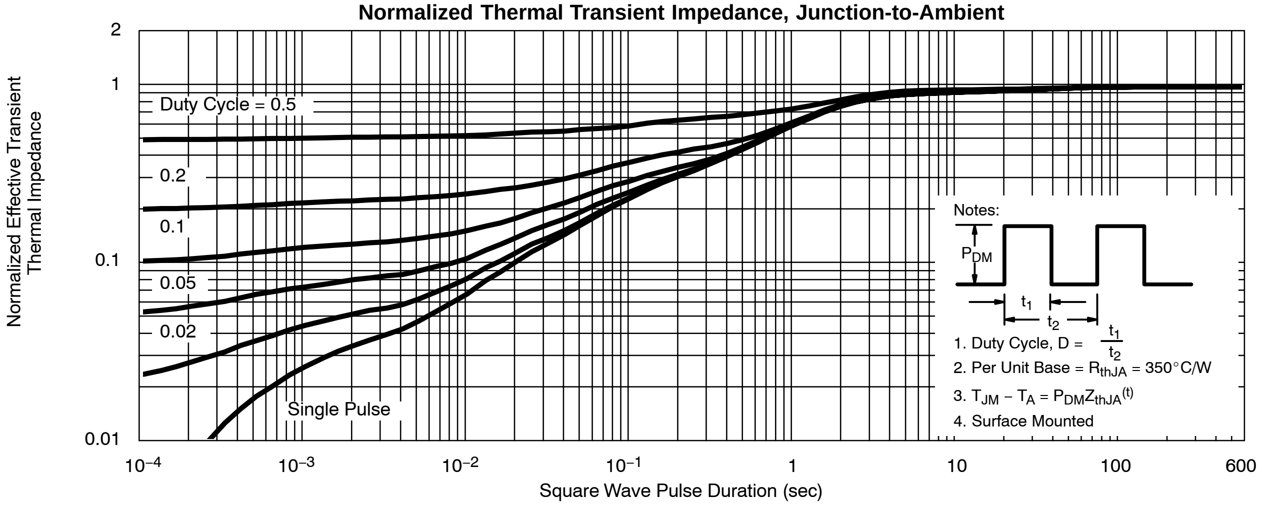
Threshold Voltage Variance Over Temperature



Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient



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