



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

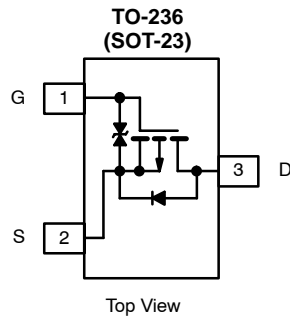
- High-Side Switching
- Low On-Resistance: 6 Ω
- Low Threshold: -2 V (typ)
- Fast Switching Speed: 20 ns (typ)
- Low Input Capacitance: 20 pF (typ)
- Gate-Source ESD Protection

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



Marking Code: 6Kw//

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

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

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ^a	I_D	$T_A = 25^\circ\text{C}$	-185
		$T_A = 100^\circ\text{C}$	-115
Pulse Drain Current ^b	I_{DM}	-800	mA
Power Dissipation ^a	P_D	$T_A = 25^\circ\text{C}$	
		$T_A = 100^\circ\text{C}$	140
Maximum Junction-to-Ambient ^a	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 _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	nA
		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.

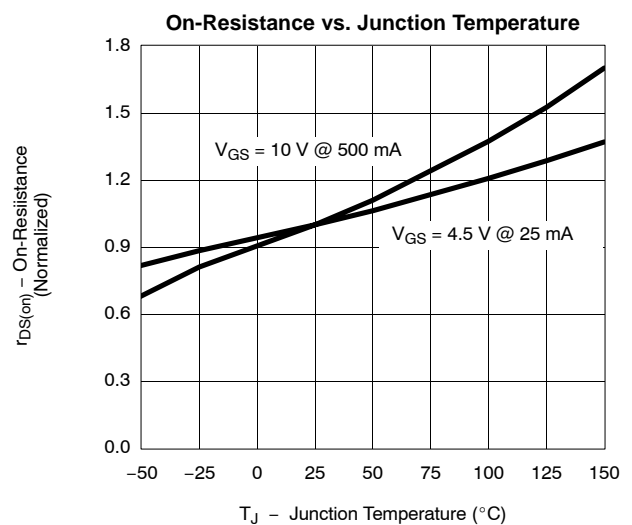
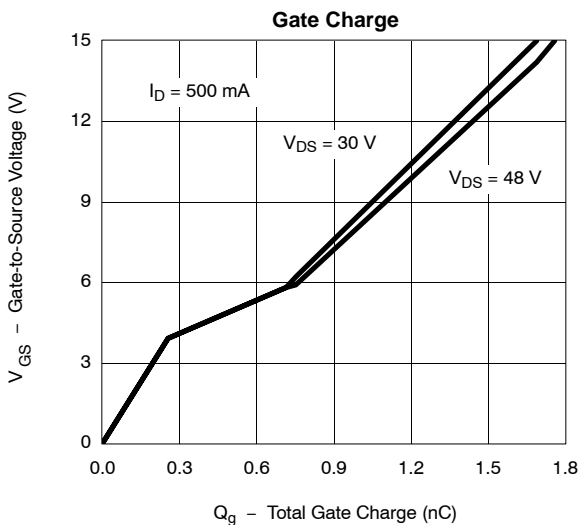
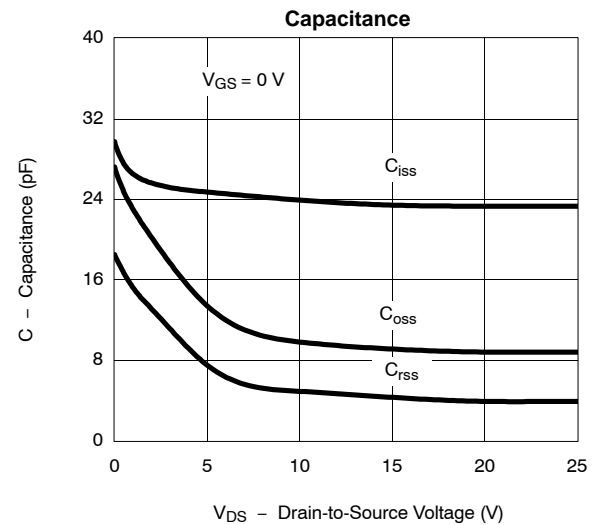
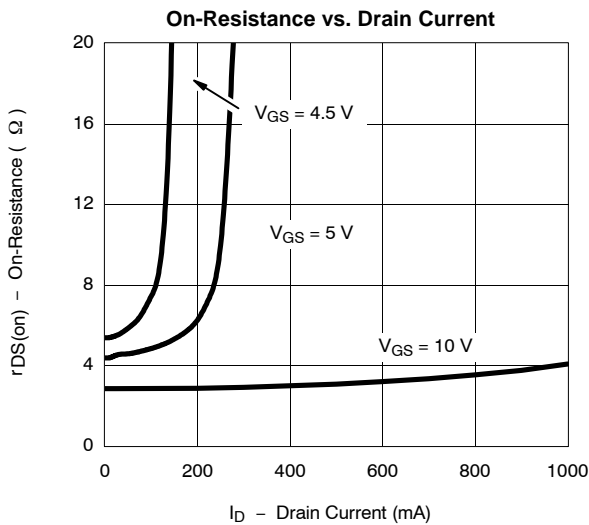
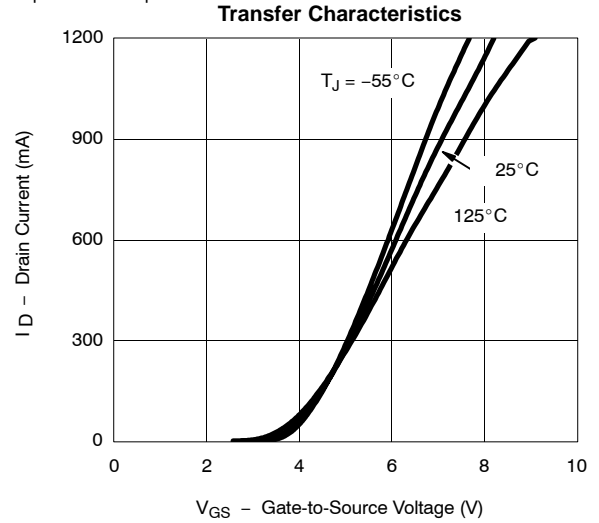
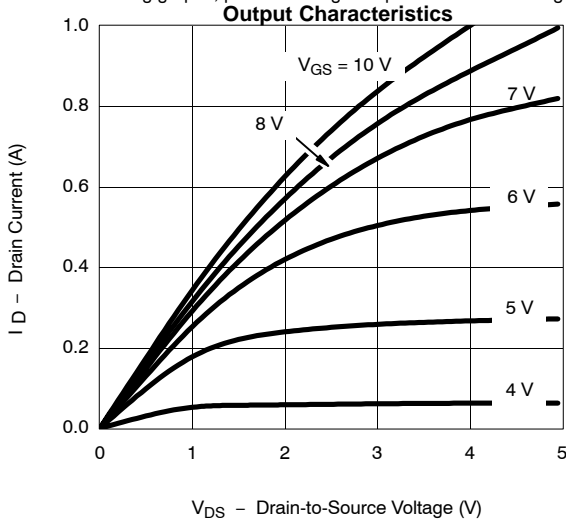
TPJ060

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.



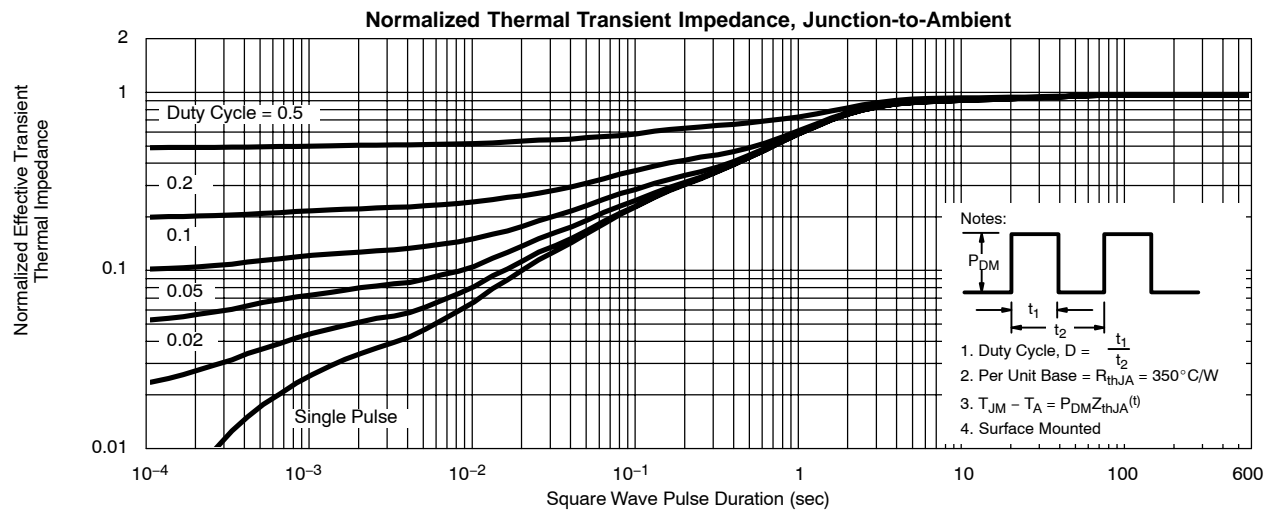
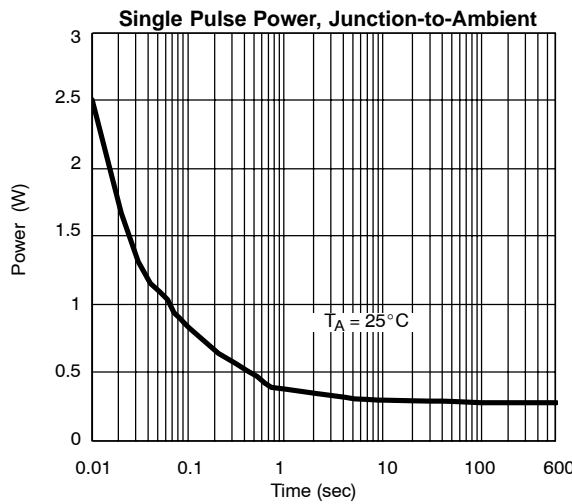
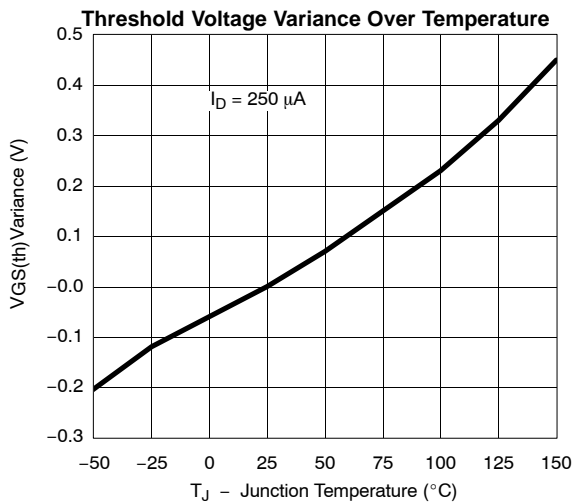
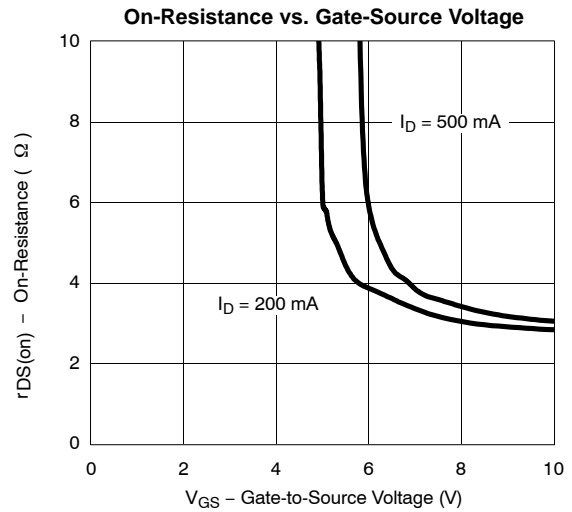
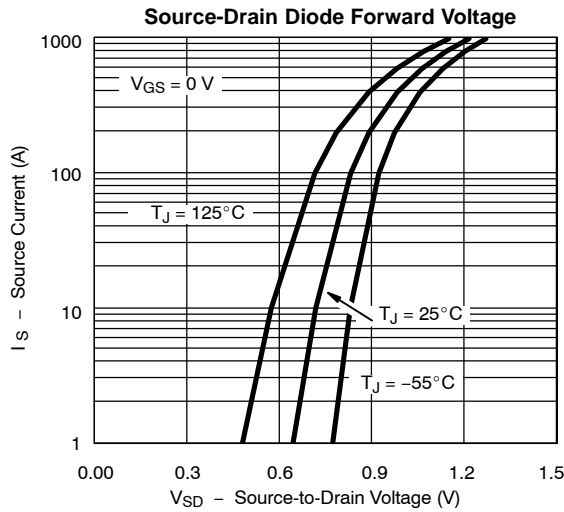
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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



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