



P-Channel 60-V (D-S) MOSFET

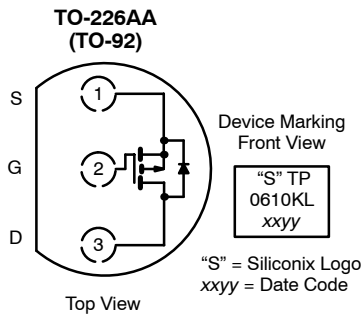
PRODUCT SUMMARY			
$V_{(BR)DSS(min)}$ (V)	$r_{DS(on)}$ (Ω)	$V_{GS(th)}$ (V)	I_D (A)
-60	6 @ $V_{GS} = -10$ V	-1 to -3.0	-0.27
	10 @ $V_{GS} = -4.5$ V		-0.21

FEATURES

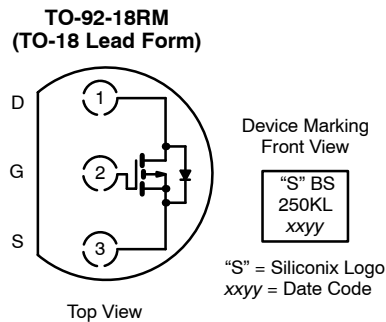
- TrenchFET® Power MOSFET
- ESD Protected: 2000 V

APPLICATIONS

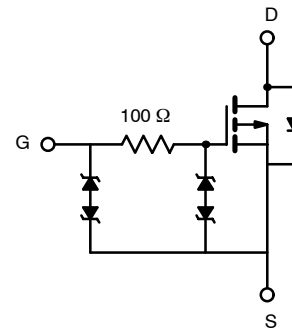
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply, Converter Circuits
- Motor Control



Ordering Information: TP0610KL-TR1



Ordering Information: BS250KL-TR1



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	T _A = 25 °C	I _D	−0.27	A
	T _A = 70 °C		−0.22	
Pulse Drain Current ^a		I _{DM}	−1.0	
Power Dissipation	T _A = 25 °C	P _D	0.8	W
	T _A = 70 °C		0.51	
Maximum Junction-to-Ambient		R _{thJA}	156	°C/W
Operating Junction and Storage Temperature Range		T _J , T _{stg}	−55 to 150	°C

Notes

a. Pulse width limited by maximum junction temperature.

SPECIFICATIONS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

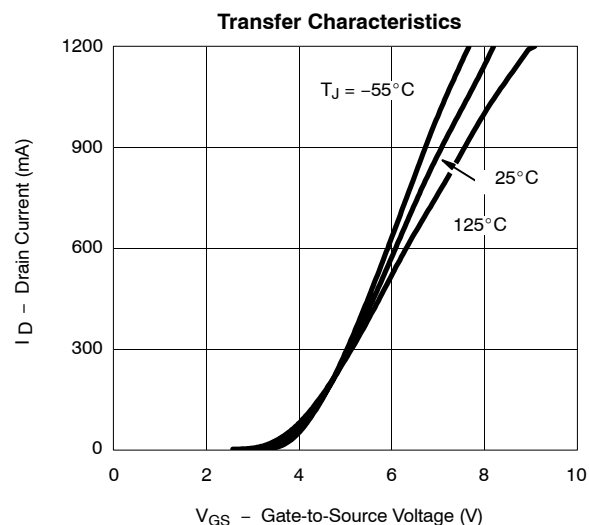
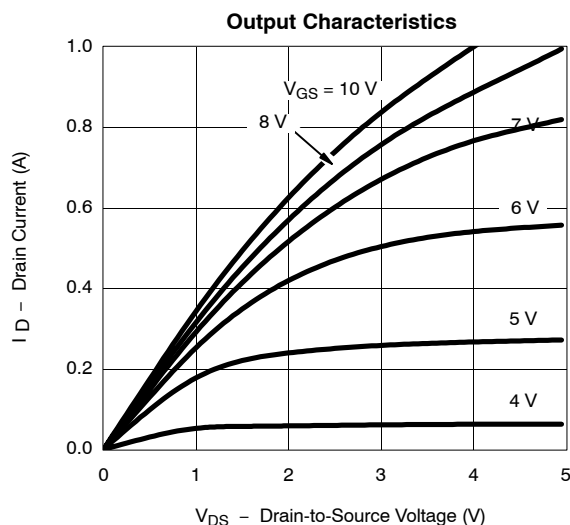
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -10\text{ }\mu\text{A}$	-60			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1	-2.1	-3.0	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 10	μA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			± 200	
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}, T_J = 85^\circ\text{C}$			± 500	nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			± 100	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}$	-50			mA
		$V_{DS} = -10\text{ V}, V_{GS} = -10\text{ V}$	-600			
Drain-Source On-Resistance ^a	$r_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -25\text{ mA}$		5.5	10	Ω
		$V_{GS} = -10\text{ V}, I_D = -500\text{ mA}$		3.1	6	
		$V_{GS} = -10\text{ V}, I_D = -500\text{ mA}, T_J = 125^\circ\text{C}$		4.7	9	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -100\text{ mA}$		180		mS
Diode Forward Voltage ^a	V_{SD}	$I_S = -200\text{ mA}, V_{GS} = 0\text{ V}$		-0.9	-1.4	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -30\text{ V}, V_{GS} = -15\text{ V}, I_D \cong -500\text{ mA}$		1.7	3	nC
Gate-Source Charge	Q_{gs}			0.26		
Gate-Drain Charge	Q_{gd}			0.46		
Gate Resistance	R_g			285		Ω
Turn-On Time	$t_{d(on)}$	$V_{DD} = -25\text{ V}, R_L = 150\text{ }\Omega$ $I_D \cong -150\text{ mA}, V_{GEN} = -10\text{ V}$ $R_g = 10\text{ }\Omega$		2.4	5	ns
	t_r			15.5	25	
Turn-Off Time	$t_{d(off)}$			21	35	
	t_f			12.5	20	

Notes

- a. Pulse test: $PW \leq 300\text{ ms}$ duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

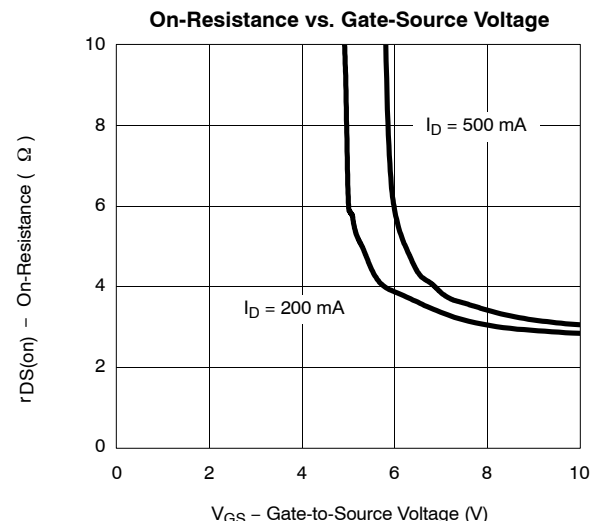
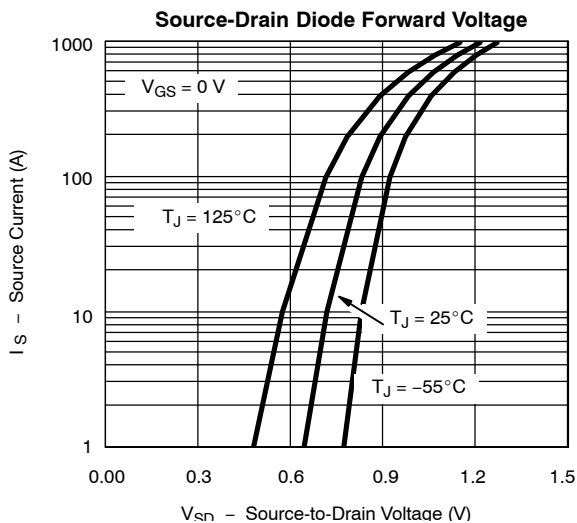
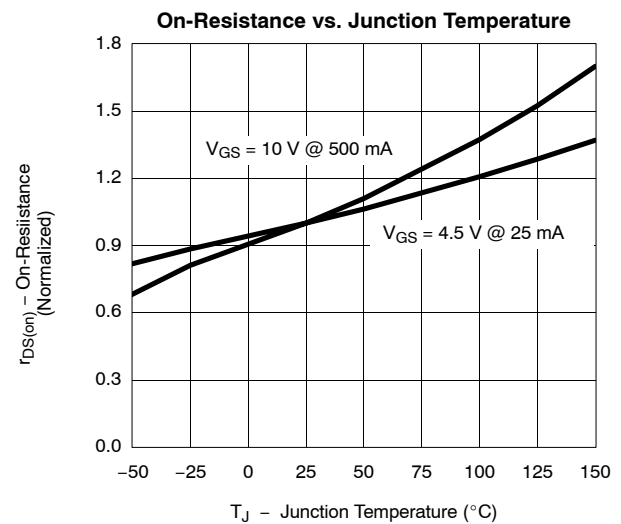
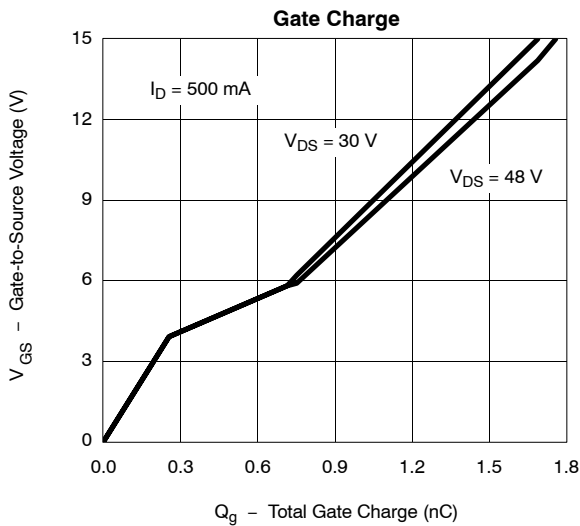
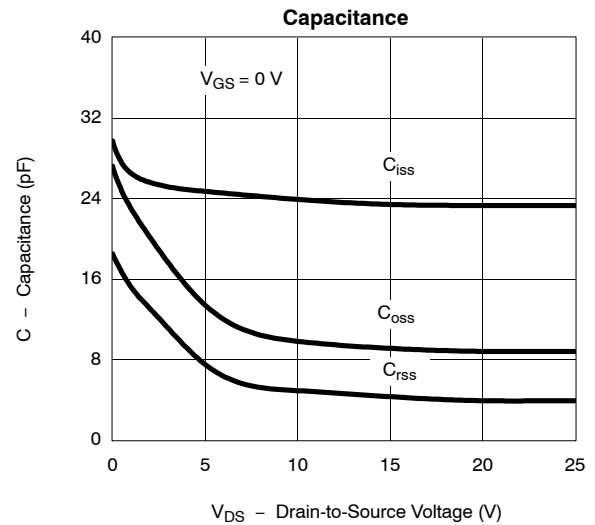
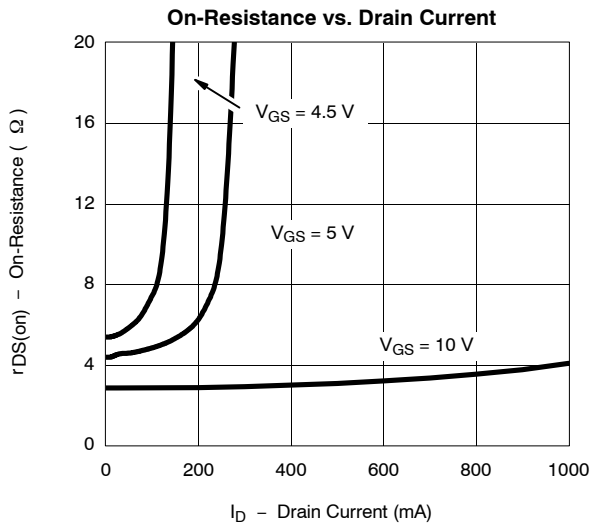
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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



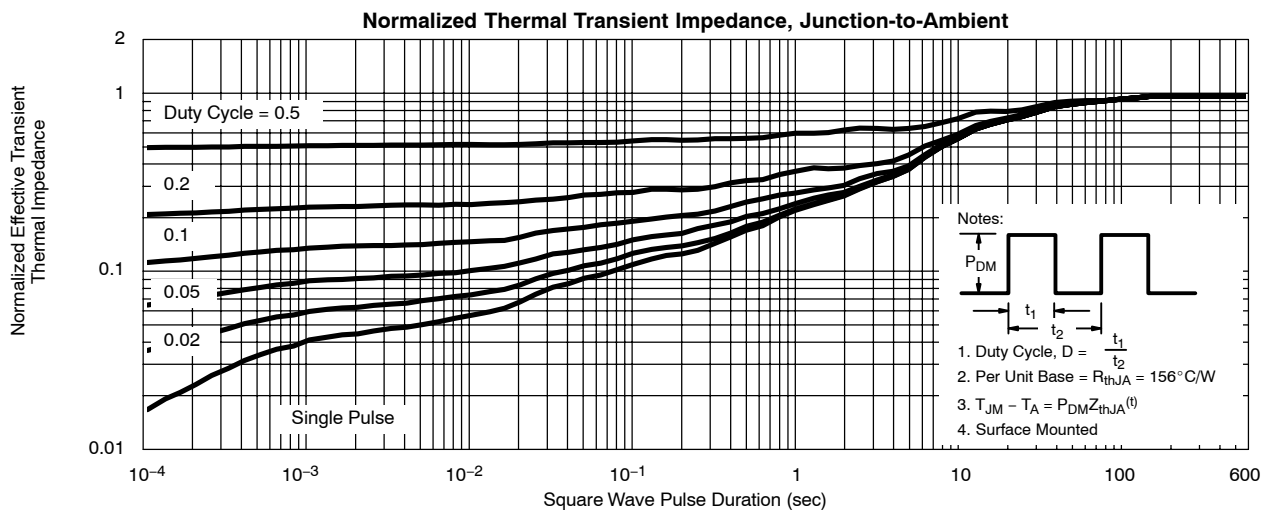
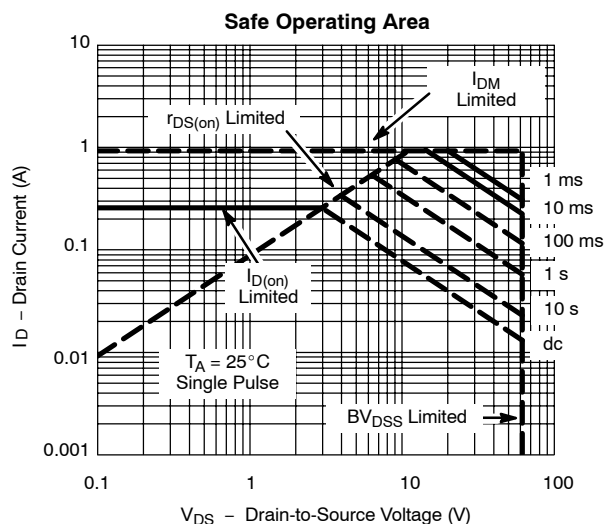
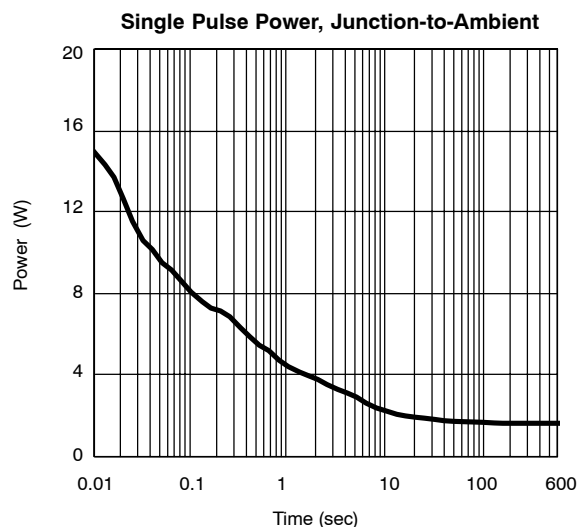
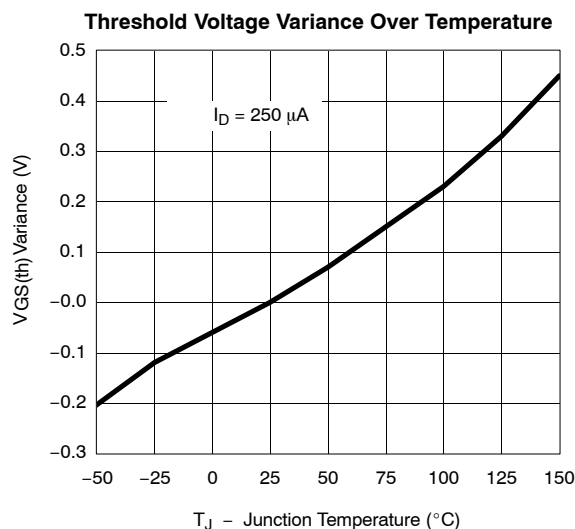
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TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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