



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

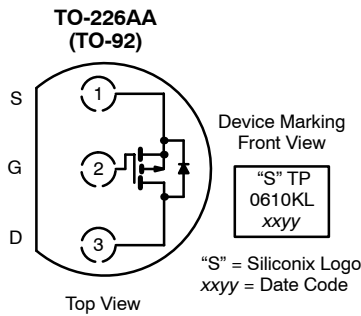
PRODUCT SUMMARY			
$V_{(BR)DSS(min)}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (A)
-60	6 @ $V_{GS} = -10$ V	-1 to -3.0	-0.27
	10 @ $V_{GS} = -4.5$ V		-0.21

## FEATURES

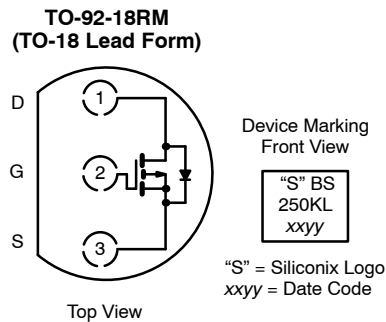
- TrenchFET® Power MOSFET
- ESD Protected: 2000 V

## APPLICATIONS

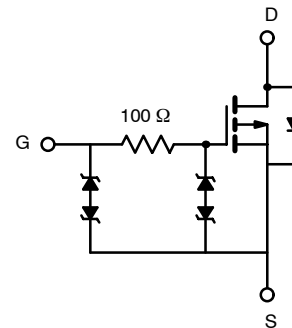
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply, Converter Circuits
- Motor Control



Ordering Information: TP0610KL-TR1



Ordering Information: BS250KL-TR1



ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V <sub>DS</sub>	−60	V
Gate-Source Voltage		V <sub>GS</sub>	± 20	
Continuous Drain Current	T <sub>A</sub> = 25 °C	I <sub>D</sub>	−0.27	A
	T <sub>A</sub> = 70 °C		−0.22	
Pulse Drain Current <sup>a</sup>		I <sub>DM</sub>	−1.0	
Power Dissipation	T <sub>A</sub> = 25 °C	P <sub>D</sub>	0.8	W
	T <sub>A</sub> = 70 °C		0.51	
Maximum Junction-to-Ambient		R <sub>thJA</sub>	156	°C/W
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	−55 to 150	°C

Notes

a. Pulse width limited by maximum junction temperature.

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

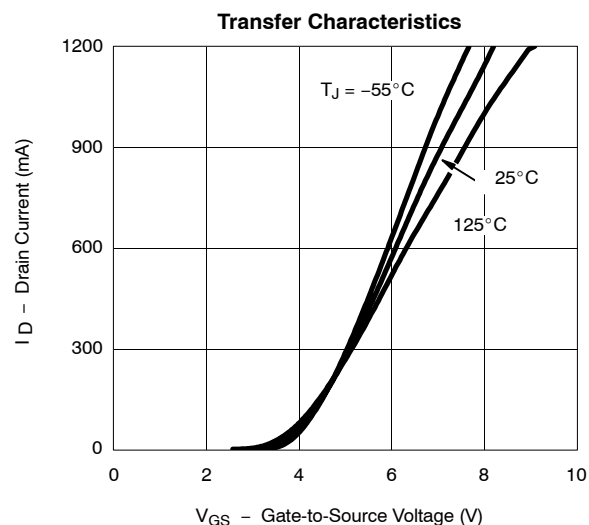
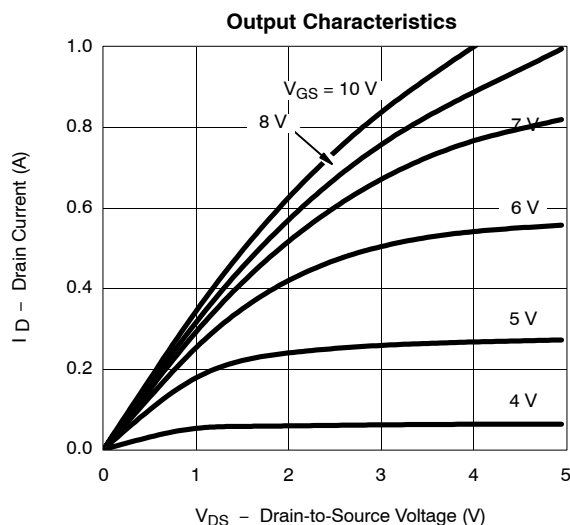
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -10\text{ }\mu\text{A}$	-60			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1	-2.1	-3.0	
Gate-Body Leakage	$I_{GSS}$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

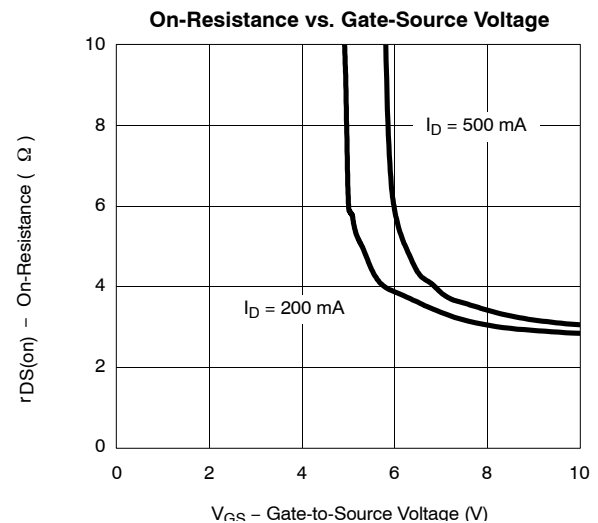
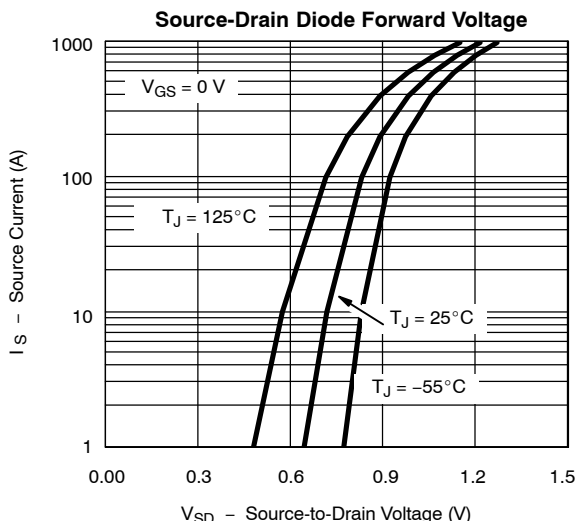
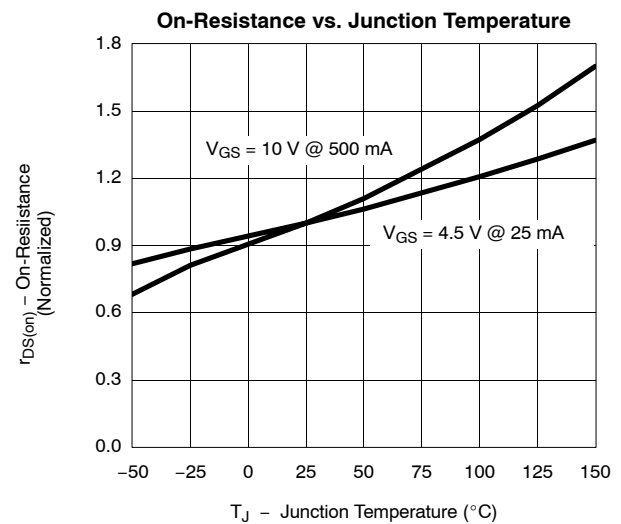
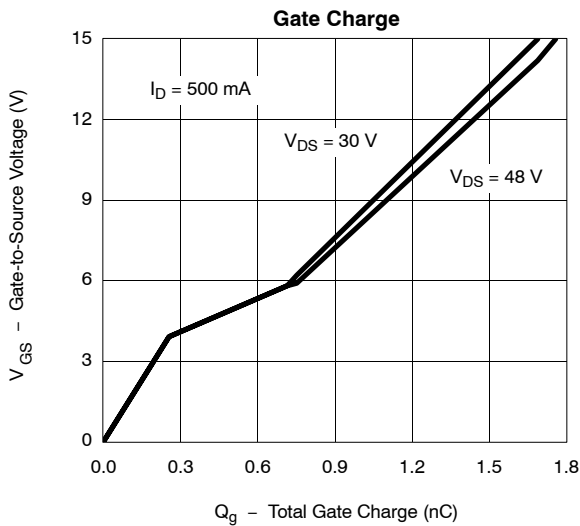
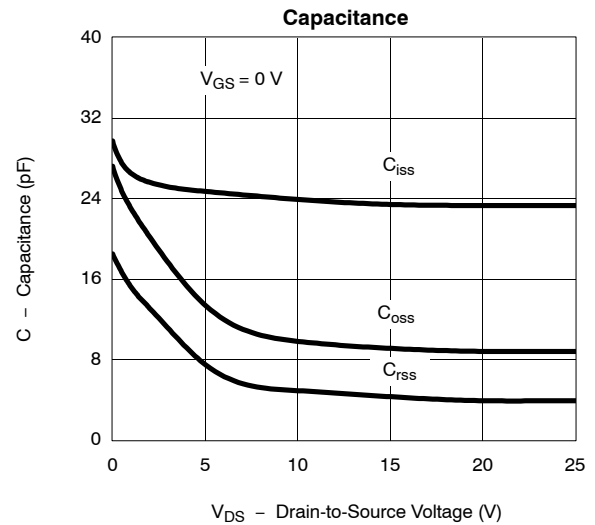
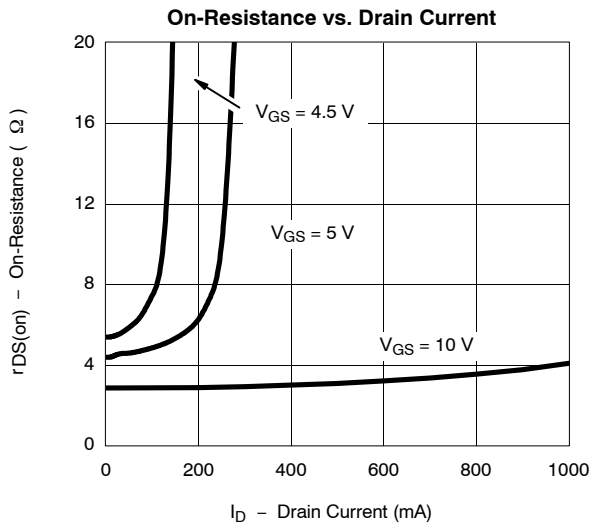
**TYPICAL CHARACTERISTICS ( $25^\circ\text{C}$  UNLESS NOTED)**

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



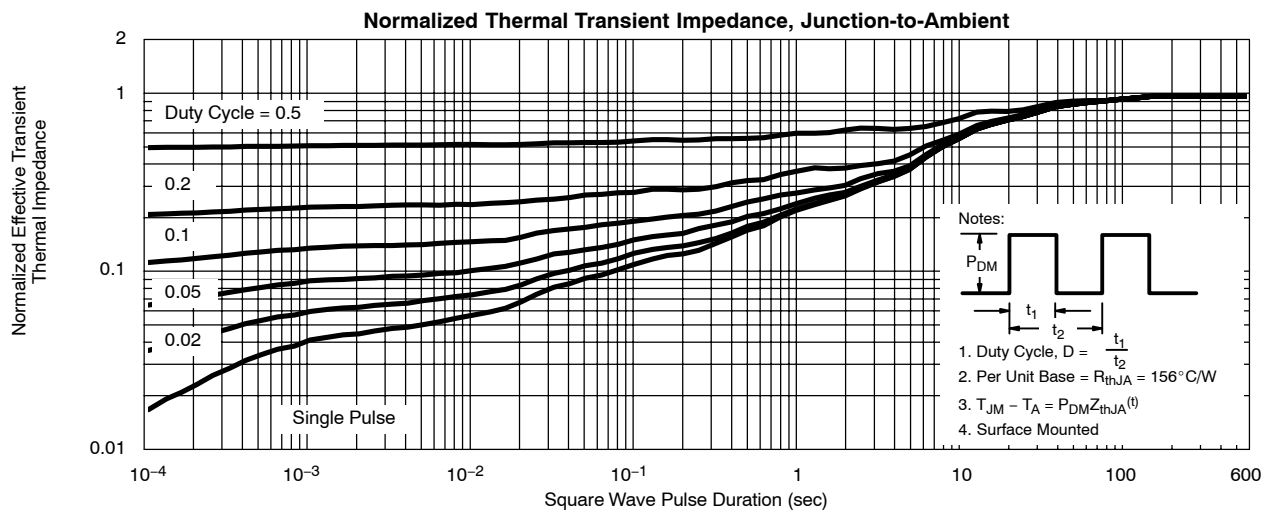
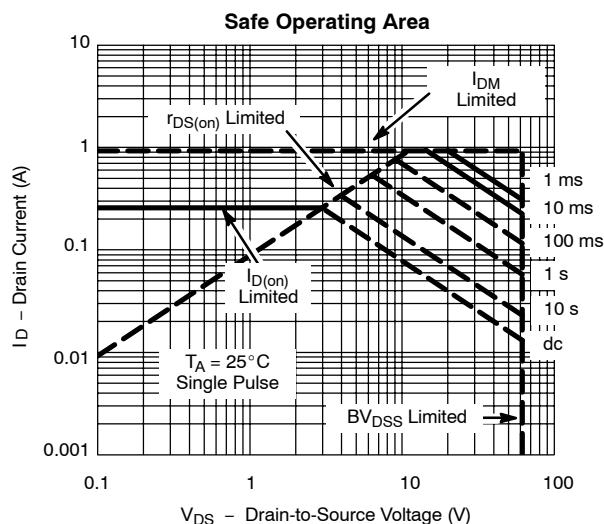
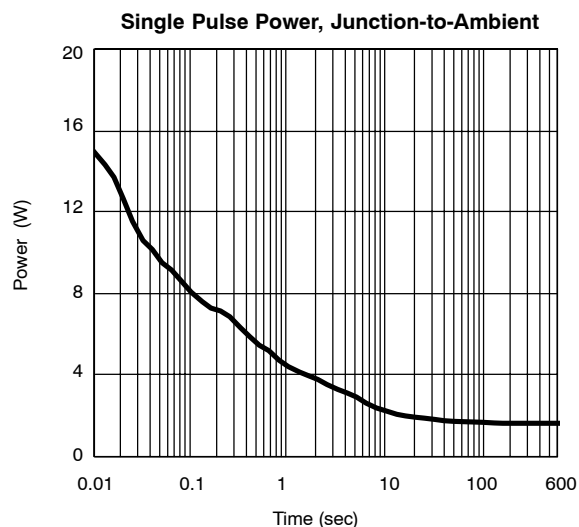
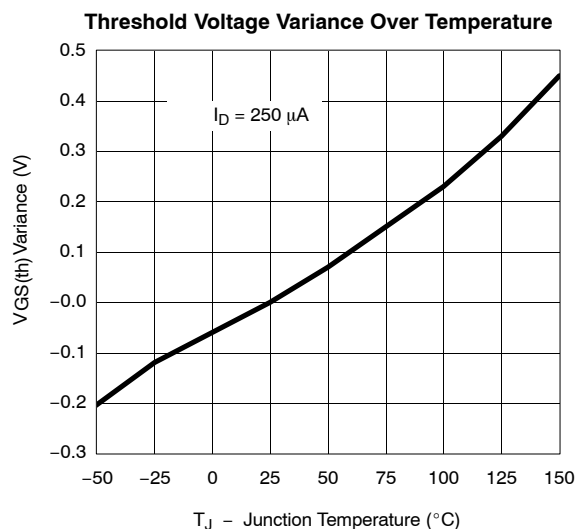
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