



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

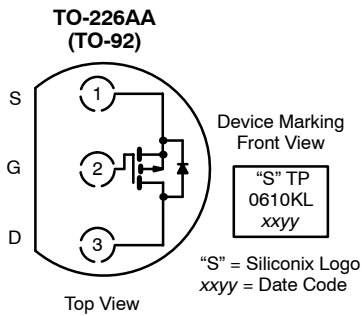
| PRODUCT SUMMARY | | | |
|------------------------|---------------------------|------------------|-----------|
| $V_{(BR)DSS(min)}$ (V) | $r_{DS(on)}$ (Ω) | $V_{GS(th)}$ (V) | I_D (A) |
| -60 | 6 @ $V_{GS} = -10$ V | -1 to -3.0 | -0.27 |
| | 10 @ $V_{GS} = -4.5$ V | | -0.21 |

FEATURES

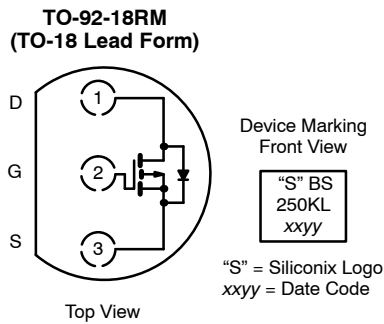
- TrenchFET® Power MOSFET
- ESD Protected: 2000 V

APPLICATIONS

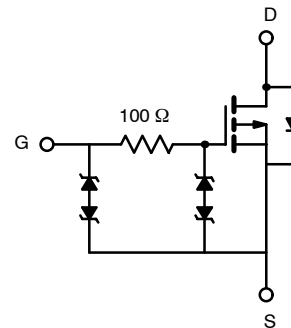
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply, Converter Circuits
- Motor Control



Ordering Information: TP0610KL-TR1



Ordering Information: BS250KL-TR1



| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) | | | | |
|---|----------------|--------------------------|--------------------|---|
| Parameter | Symbol | Limit | Unit | |
| Drain-Source Voltage | V_{DS} | -60 | V | |
| Gate-Source Voltage | V_{GS} | ± 20 | | |
| Continuous Drain Current | I_D | $T_A = 25^\circ\text{C}$ | -0.27 | A |
| | | $T_A = 70^\circ\text{C}$ | -0.22 | |
| Pulse Drain Current ^a | I_{DM} | -1.0 | | |
| Power Dissipation | P_D | $T_A = 25^\circ\text{C}$ | 0.8 | W |
| | | $T_A = 70^\circ\text{C}$ | 0.51 | |
| Maximum Junction-to-Ambient | R_{thJA} | 156 | $^\circ\text{C/W}$ | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 to 150 | $^\circ\text{C}$ | |

Notes

a. Pulse width limited by maximum junction temperature.

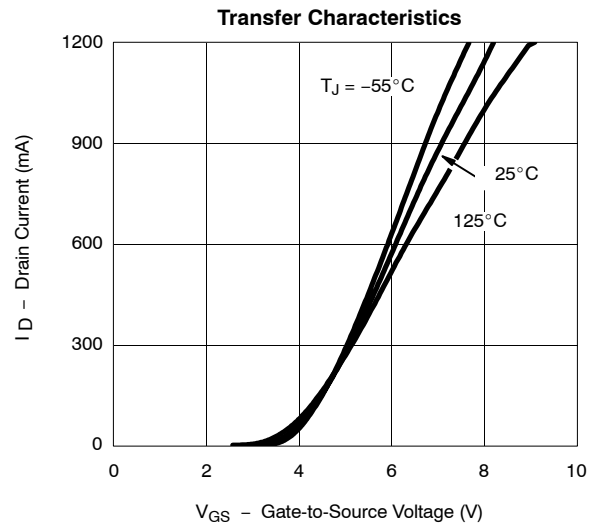
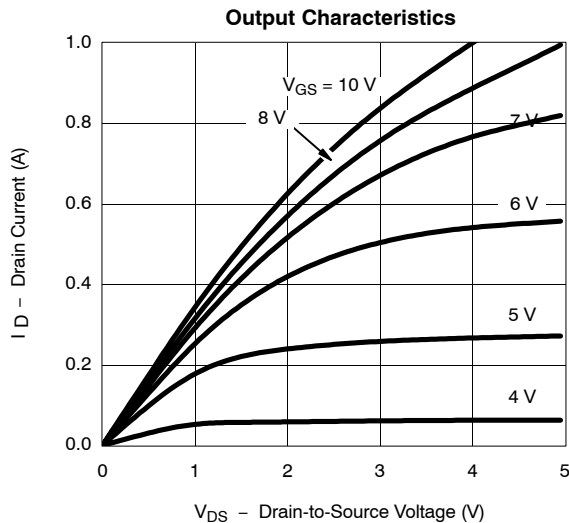
| SPECIFICATIONS (T _A = 25 °C UNLESS OTHERWISE NOTED) | | | | | | |
|--|----------------------|--|------|------|------|------|
| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0 V, I _D = -10 μA | -60 | | | V |
| Gate-Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = -250 μA | -1 | -2.1 | -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 | |
| | | V _{DS} = 0 V, V _{GS} = ±10 V, T _J = 85 °C | | | ±500 | nA |
| | | V _{DS} = 0 V, V _{GS} = ±5 V | | | ±100 | |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = -60 V, V _{GS} = 0 V | | | -1 | μA |
| | | V _{DS} = -60 V, V _{GS} = 0 V, T _J = 55 °C | | | -10 | |
| 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 | | 5.5 | 10 | Ω |
| | | V _{GS} = -10 V, I _D = -500 mA | | 3.1 | 6 | |
| | | V _{GS} = -10 V, I _D = -500 mA, T _J = 125 °C | | 4.7 | 9 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = -10 V, I _D = -100 mA | | 180 | | mS |
| Diode Forward Voltage ^a | V _{SD} | I _S = -200 mA, V _{GS} = 0 V | | -0.9 | -1.4 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q _g | V _{DS} = -30 V, V _{GS} = -15 V, I _D ≅ -500 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 V, R _L = 150 Ω I _D ≅ -150 mA, V _{GEN} = -10 V R _g = 10 Ω | | 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 ≤ 300 ms duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

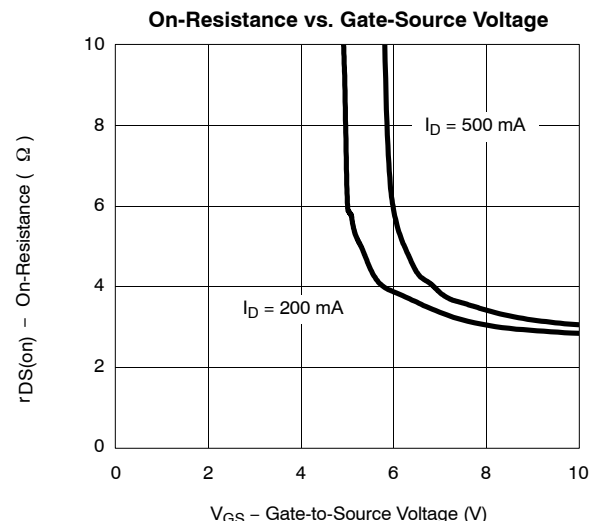
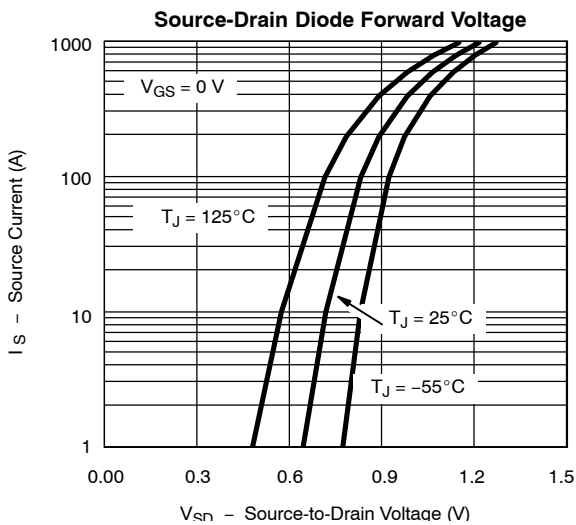
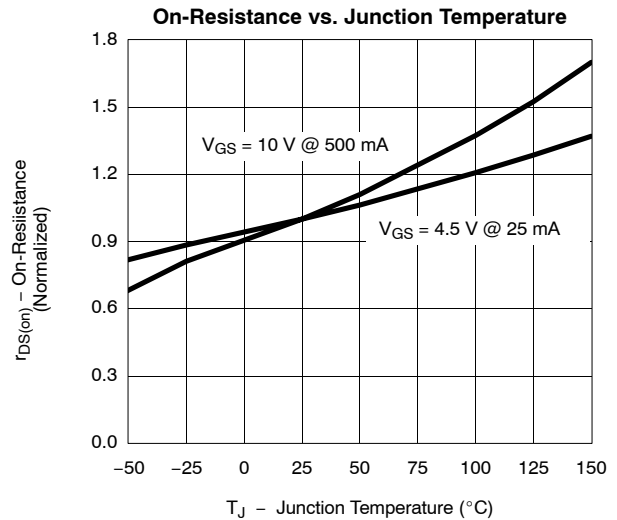
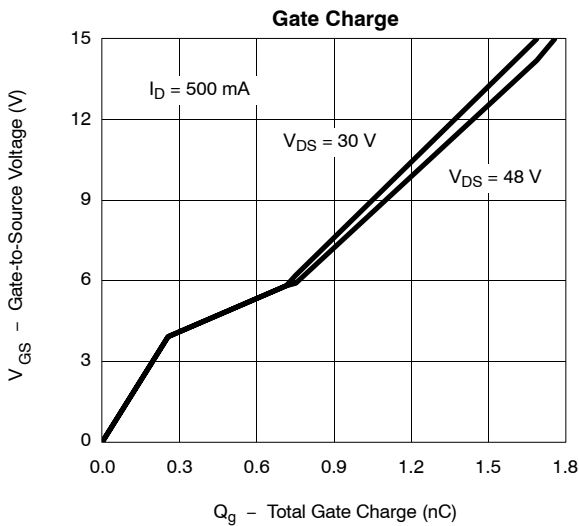
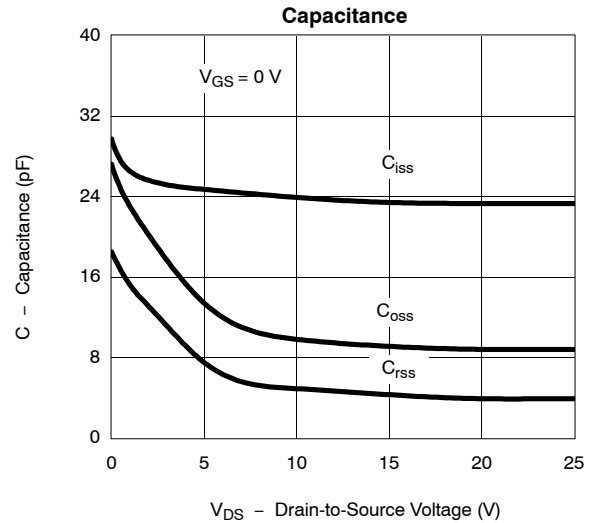
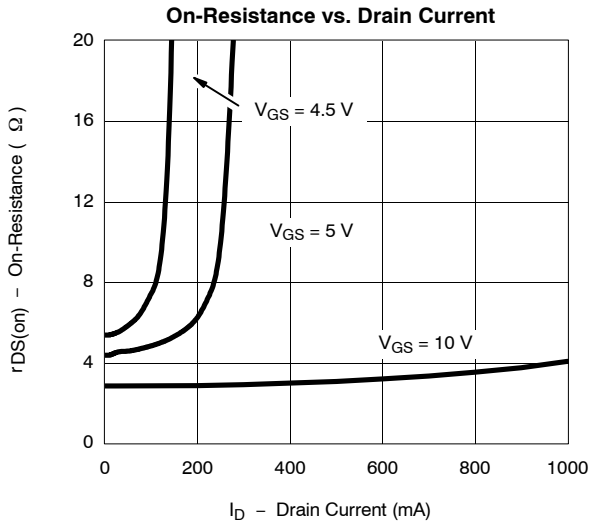
For the following graphs, p-channel negative polarities for all voltage and current values are represented as positive values.





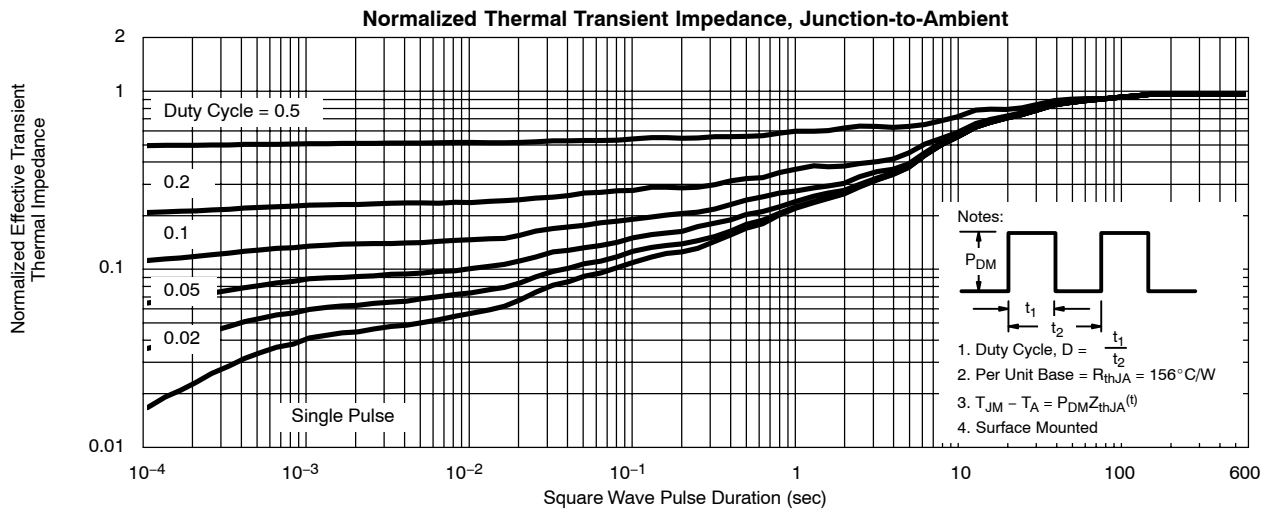
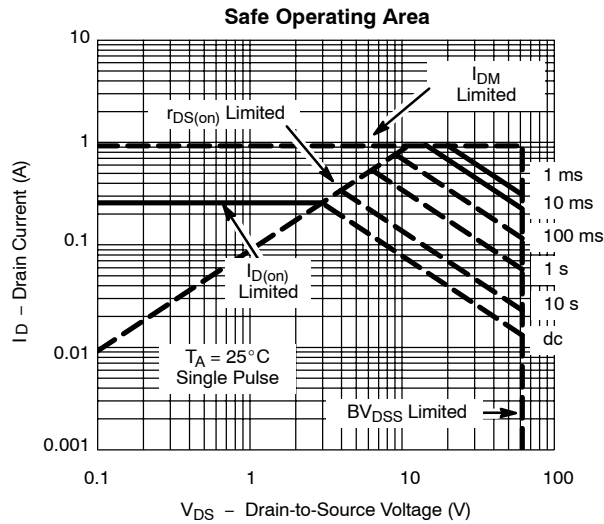
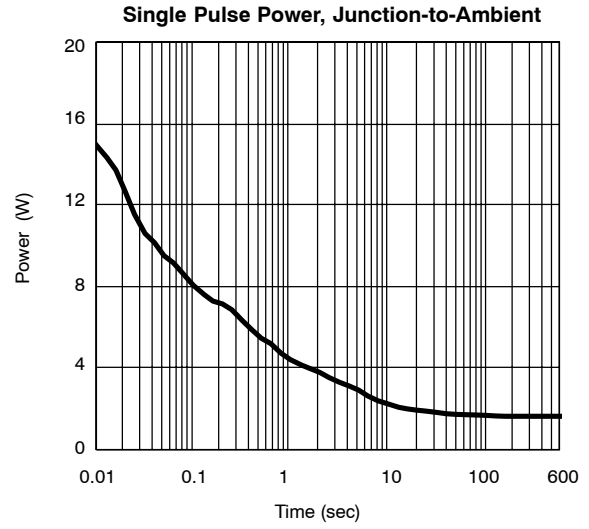
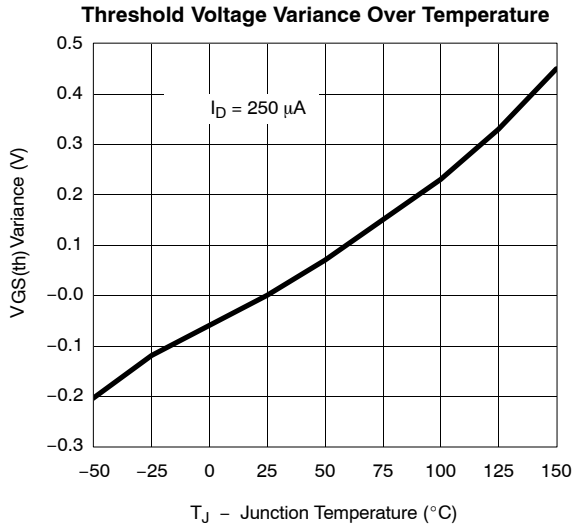
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TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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





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