

TP0610L VP0610L BS250
 TP0610T VP0610L

Product Summary

| Part Number | $V_{(BR)DSS}$ Min (V) | $r_{DS(on)}$ Max (Ω) | $V_{GS(th)}$ (V) | I_D (A) |
|-------------|-----------------------|-------------------------------|------------------|-----------|
| TP0610L | -60 | 10 @ $V_{GS} = -10$ V | -1 to -2.4 | -0.18 |
| TP0610T | -60 | 10 @ $V_{GS} = -10$ V | -1 to -2.4 | -0.12 |
| VP0610L | -60 | 10 @ $V_{GS} = -10$ V | -1 to -3.5 | -0.18 |
| VP0610L | -60 | 10 @ $V_{GS} = -10$ V | -1 to -3.5 | -0.12 |
| BS250 | -45 | 14 @ $V_{GS} = -10$ V | -1 to -3.5 | -0.18 |

For applications information see AN804.

Features

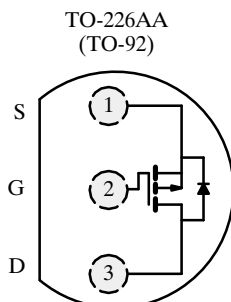
- High-Side Switching
- Low On-Resistance: 8 Ω
- Low Threshold: -1.9 V
- Fast Switching Speed: 16 ns
- Low Input Capacitance: 15 pF

Benefits

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Switching
- Easily Driven Without Buffer

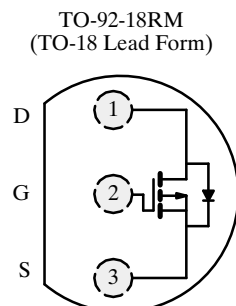
Applications

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



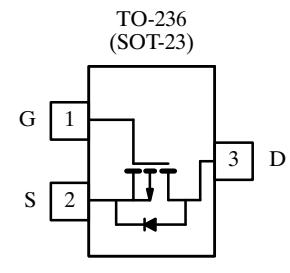
Top View

TP0610L
VP0610L



Top View

BS250



Top View

TP0610T (T0)*
VP0610T (V0)*

*Marking Code for TO-236

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

| Parameter | Symbol | TP0610L | TP0610T | VP0610L | VP0610L | BS250 | Unit | |
|---|----------------|---------------------------|----------|----------|----------|----------|---------------------------|------------------|
| Drain-Source Voltage | V_{DS} | -60 | -60 | -60 | -60 | -45 | V | |
| Gate-Source Voltage | V_{GS} | ± 30 | ± 30 | ± 30 | ± 30 | ± 25 | | |
| Continuous Drain Current ($T_j = 150^\circ\text{C}$) | I_D | $T_A = 25^\circ\text{C}$ | -0.18 | -0.12 | -0.18 | -0.12 | -0.18 | |
| | | $T_A = 100^\circ\text{C}$ | -0.11 | -0.07 | -0.11 | -0.07 | | |
| Pulsed Drain Current ^a | I_{DM} | -0.8 | -0.4 | -0.8 | -0.4 | | A | |
| Power Dissipation | P_D | $T_A = 25^\circ\text{C}$ | 0.8 | 0.36 | 0.8 | 0.36 | 0.83 | |
| | | $T_A = 100^\circ\text{C}$ | 0.32 | 0.14 | 0.32 | 0.14 | | |
| Maximum Junction-to-Ambient | R_{thJA} | 156 | 350 | 156 | 350 | 150 | $^\circ\text{C}/\text{W}$ | |
| Operating Junction & Storage Temperature Range | T_J, T_{stg} | -55 to 150 | | | | | | $^\circ\text{C}$ |

Notes

a. Pulse width limited by maximum junction temperature.

TP0610L/T, VP0610L/T, BS250

Specifications^a

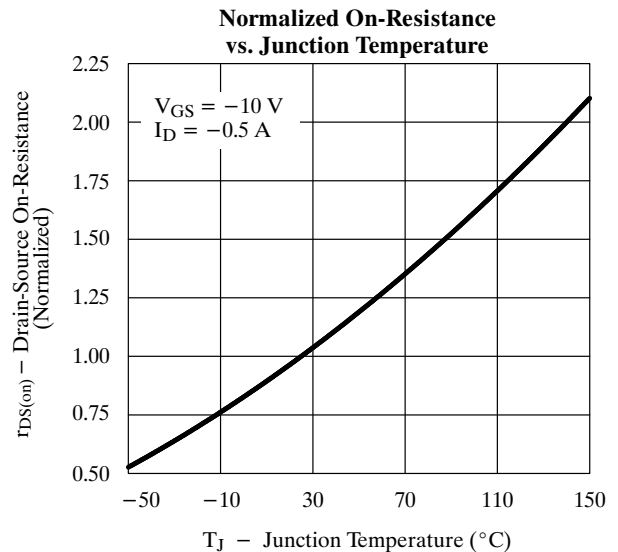
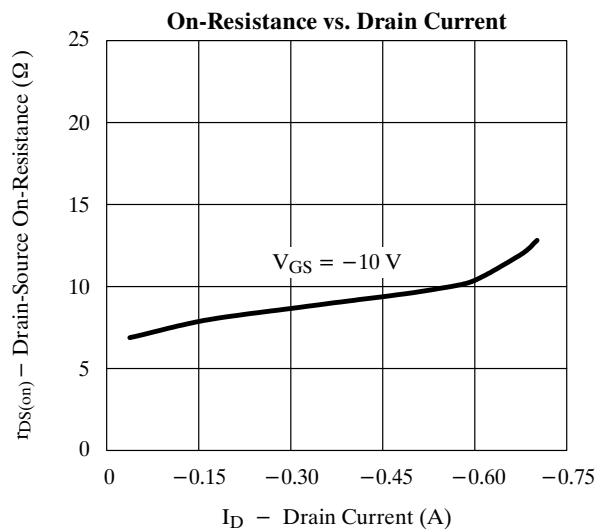
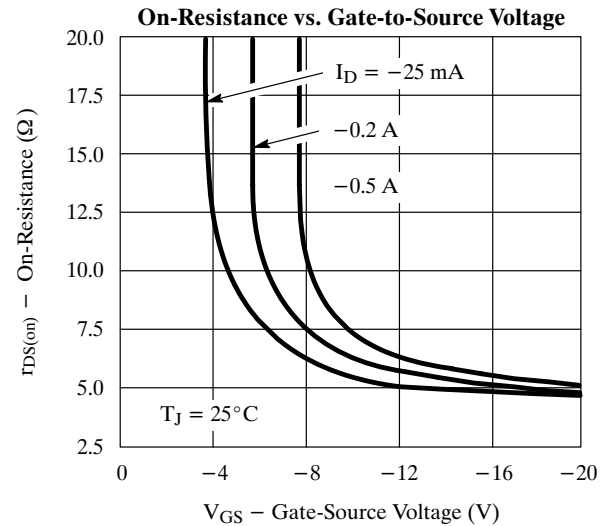
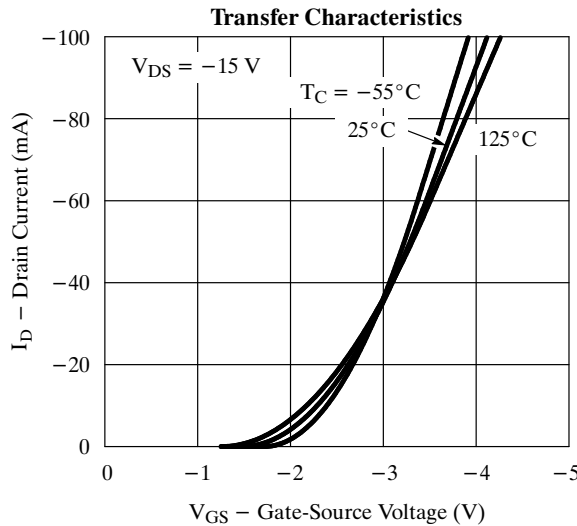
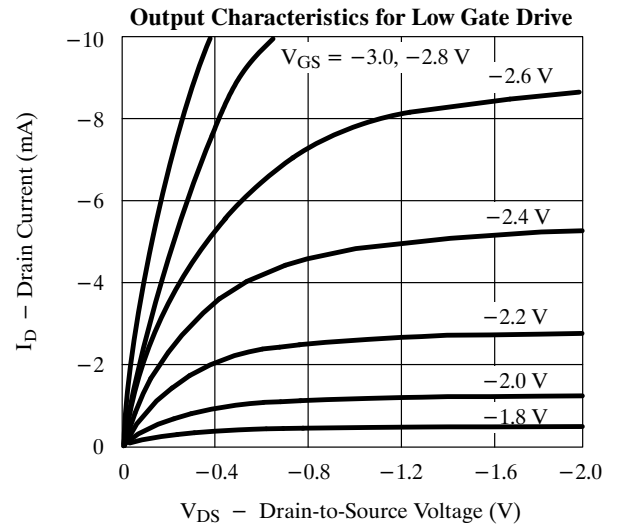
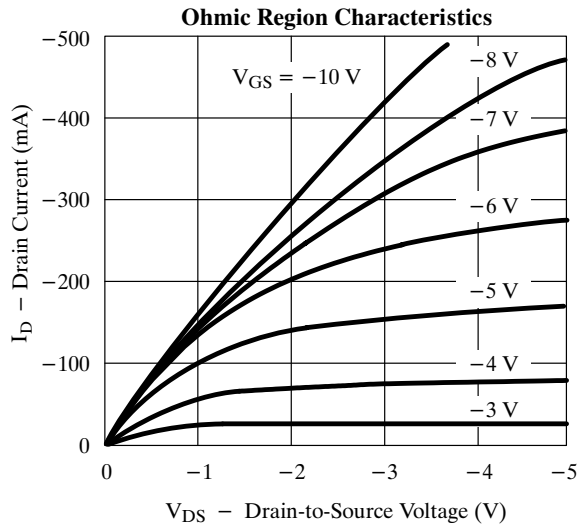
| Parameter | Symbol | Test Conditions | Typ ^b | Limits | | | | | | Unit | |
|---|---------------|--|------------------|-----------|----------|-----------|----------|-------|----------|------|---------------|
| | | | | TP0610L/T | | VP0610L/T | | BS250 | | | |
| | | | | Min | Max | Min | Max | Min | Max | | |
| Static | | | | | | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = -10\text{ }\mu\text{A}$ | -70 | -60 | | -60 | | | | | V |
| | | $V_{GS} = 0\text{ V}, I_D = -100\text{ }\mu\text{A}$ | | | | | | -45 | | | |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -1\text{ mA}$ | -1.9 | -1 | -2.4 | -1 | -3.5 | -1 | -3.5 | | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | | | ± 10 | | ± 10 | | | | nA |
| | | $V_{DS} = 0\text{ V}, V_{GS} = \pm 15\text{ V}$ | | | ± 50 | | | | ± 20 | | |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -48\text{ V}, V_{GS} = 0\text{ V}$ | | | -1 | | -1 | | | | μA |
| | | $T_J = 125^\circ\text{C}$ | | | -20 | | -20 | | | | |
| | | $V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}$ | | | | | | | -0.5 | | |
| On-State Drain Current ^c | $I_{D(on)}$ | $V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}$ | -180 | -50 | | | | | | | mA |
| | | $V_{DS} = -10\text{ V}, V_{GS} = -10\text{ V}$ | L | -750 | | | -60 | | | | |
| | | | T | | | | -22 | | | | |
| Drain-Source On-Resistance ^c | $r_{DS(on)}$ | $V_{GS} = -4.5\text{ V}, I_D = -25\text{ mA}$ | 11 | | 25 | | | | | | Ω |
| | | $V_{GS} = -10\text{ V}, I_D = -0.5\text{ A}$ | L | 8 | | 10 | | 10 | | | |
| | | $T_J = 125^\circ\text{C}$ | 15 | | 20 | | 20 | | | | |
| | | $V_{GS} = -10\text{ V}, I_D = -0.2\text{ A}$ | T | 6.5 | | 10 | | 10 | | 14 | |
| Forward Transconductance ^c | g_{fs} | $V_{DS} = -10\text{ V}, I_D = -0.5\text{ A}$ | L | 125 | 80 | | 80 | | | | mS |
| | | $V_{DS} = -10\text{ V}, I_D = -0.1\text{ A}$ | T | 90 | 60 | | 70 | | | | |
| Diode Forward Voltage | V_{SD} | $I_S = -0.5\text{ A}, V_{GS} = 0\text{ V}$ | -1.1 | | | | | | | | V |
| Dynamic | | | | | | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$ | 15 | | 60 | | 60 | | | | pF |
| Output Capacitance | C_{oss} | | 10 | | 25 | | 25 | | | | |
| Reverse Transfer Capacitance | C_{rss} | | 3 | | 5 | | 5 | | | | |
| Switching^d | | | | | | | | | | | |
| Turn-On Time | t_{ON} | $V_{DD} = -25\text{ V}, R_L = 133\text{ }\Omega$ $I_D = -0.18\text{ A}, V_{GEN} = -10\text{ V}$ $R_G = 25\text{ }\Omega$ | 8 | | | | | | | 10 | ns |
| | $t_{d(on)}$ | | 6 | | 10 | | 10 | | | | |
| | t_r | | 10 | | 15 | | 15 | | | | |
| Turn-Off Time | t_{OFF} | | 8 | | | | | | | 10 | |
| | $t_{d(off)}$ | | 7 | | 15 | | 15 | | | | |
| | t_f | | 8 | | 20 | | 20 | | | | |

Notes

- $T_A = 25^\circ\text{C}$ unless otherwise noted.
- For DESIGN AID ONLY, not subject to production testing.
- Pulse test: $PW \leq 300\text{ }\mu\text{s}$ duty cycle $\leq 2\%$.
- Switching time is essentially independent of operating temperature.

VPDS06

Typical Characteristics (25°C Unless Otherwise Noted)



TP0610L/T, VP0610L/T, BS250

Typical Characteristics (25°C Unless Otherwise Noted) (Cont'd)

