

ZVP2120GTA-VB Datasheet

P-Channel 200V (D-S)MOSFET

PRODUCT SUMMARY

| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) | Q_g (Typ.) |
|--------------|---------------------------|-----------|--------------|
| - 200 | 0.8 at $V_{GS} = -10$ V | - 2.0 | 8.0 |
| | 0.9 at $V_{GS} = -6.0$ V | - 1.8 | |

FEATURES

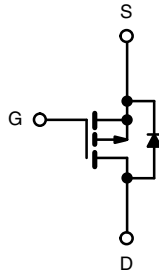
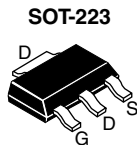
- Halogen-free According to IEC 61249-2-21 Available
- Trench Power MOSFET
- Ultra Low On-Resistance
- Small Size



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Active Clamp Circuits in DC/DC Power Supplies



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

| Parameter | | Symbol | 5 s | Steady State | Unit |
|--|------------------------------------|----------------|-------------|--------------|--------------------|
| Drain-Source Voltage | | V_{DS} | - 200 | | V |
| Gate-Source Voltage | | V_{GS} | \pm 20 | | |
| Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$) ^{a, b} | $T_A = 25\text{ }^{\circ}\text{C}$ | I_D | - 2.0 | - 1.68 | A |
| | $T_A = 70\text{ }^{\circ}\text{C}$ | | - 1.8 | - 1.56 | |
| Pulsed Drain Current | | I_{DM} | - 5.8 | | |
| Continuous Source Current (Diode Conduction) ^{a, b} | | I_S | - 1.0 | - 0.6 | |
| Single Pulse Avalanche Current | L = 1.0 mH | I_{AS} | 4.0 | | |
| Single Pulse Avalanche Energy | | E_{AS} | 1.2 | | |
| Maximum Power Dissipation ^{a, b} | $T_A = 25\text{ }^{\circ}\text{C}$ | P_D | 1.45 | 0.95 | W |
| | $T_A = 70\text{ }^{\circ}\text{C}$ | | 0.8 | 0.48 | |
| Operating Junction and Storage Temperature Range | | T_J, T_{stg} | - 55 to 150 | | $^{\circ}\text{C}$ |

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Typical | Maximum | Unit |
|--|------------|--------------|---------|--------------------|
| Maximum Junction-to-Ambient ^a | R_{thJA} | $t \leq 5$ s | 75 | $^\circ\text{C/W}$ |
| | | Steady State | 120 | |
| Maximum Junction-to-Foot (Drain) | R_{thJF} | 40 | 50 | |

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted

| Parameter | Symbol | Test Conditions | Limits | | | Unit |
|---|---------------|---|--------|-------|-----------|---------------|
| | | | Min. | Typ. | Max. | |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | -200 | | | V |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | -2.5 | | -4.5 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -200\text{ V}, V_{GS} = 0\text{ V}$ | | | -1 | μA |
| | | $V_{DS} = -200\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$ | | | -10 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \leq -15\text{ V}, V_{GS} = 10\text{ V}$ | -1.0 | | | A |
| Drain-Source On-Resistance ^a | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -0.5\text{ A}$ | | 0.80 | | Ω |
| | | $V_{GS} = -6.0\text{ V}, I_D = -0.5\text{ A}$ | | 0.90 | | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = -15\text{ V}, I_D = -0.5\text{ A}$ | | 1.8 | | S |
| Diode Forward Voltage | V_{SD} | $I_S = -1.0\text{ A}, V_{GS} = 0\text{ V}$ | | -0.85 | -1.2 | V |
| Dynamic ^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = -100\text{ V}, V_{GS} = 10\text{ V}$ $I_D \cong -0.5\text{ A}$ | | 8.0 | 12 | nC |
| Gate-Source Charge | Q_{gs} | | | 1.3 | | |
| Gate-Drain Charge | Q_{gd} | | | 2.5 | | |
| Gate Resistance | R_g | $f = 1.0\text{ MHz}$ | | 8.0 | | Ω |
| Input Capacitance | C_{iss} | $V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | | 370 | 510 | pF |
| Output Capacitance | C_{oss} | | | 28 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 16 | | |
| Switching ^c | | | | | | |
| Turn-On Time | $t_{d(on)}$ | $V_{DD} = -100\text{ V}, R_L = 100\text{ }\Omega$ $I_D \cong -1.0\text{ A}, V_{GEN} = -10\text{ V}$ $R_g = 6\text{ }\Omega$ | | 8 | 12 | ns |
| | t_r | | | 11 | 17 | |
| Turn-Off Time | $t_{d(off)}$ | | | 16 | 25 | |
| | t_f | | | 11 | 17 | |
| Body Diode Reverse Recovery Charge | Q_{rr} | $I_F = 0.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | | 140 | 200 | nC |

Notes:

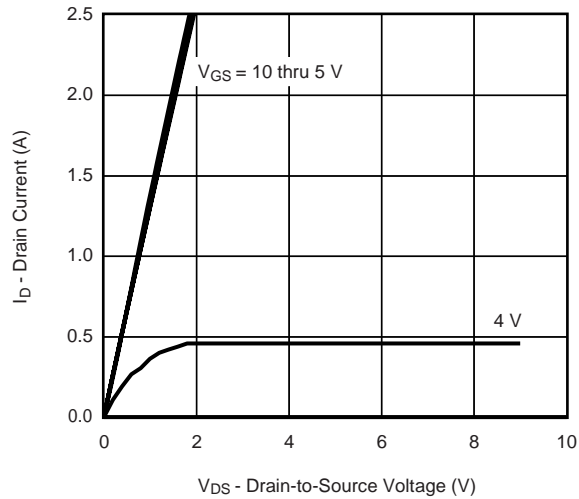
a. Pulse test: $PW \leq 300\text{ }\mu\text{s}$ duty cycle $\leq 2\%$.

b. For DESIGN AID ONLY, not subject to production testing.

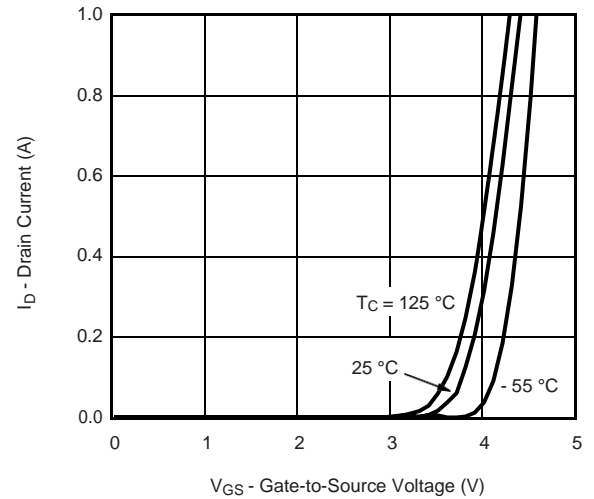
c. Switching time is essentially independent of operating temperature.

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.

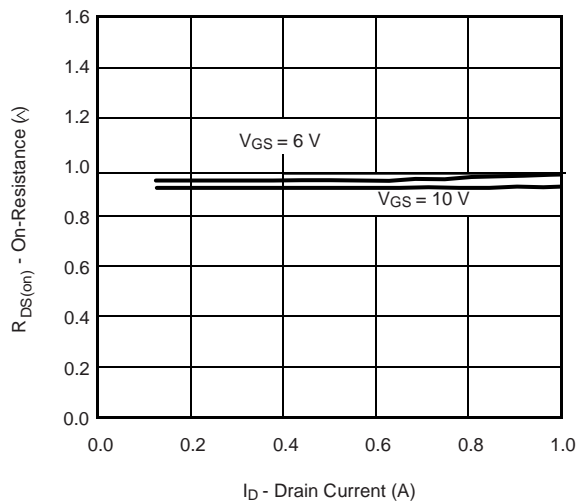
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



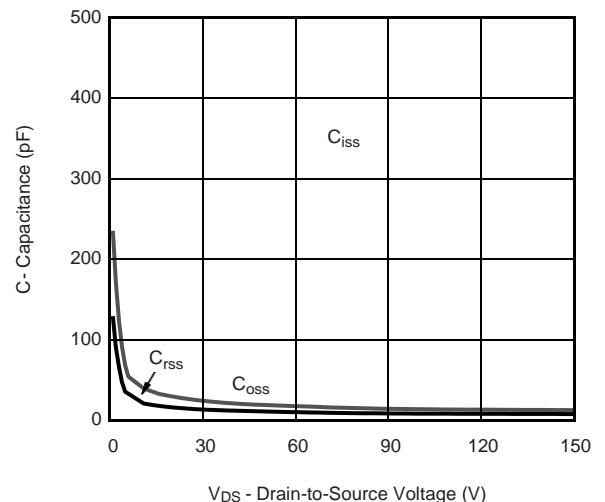
Output Characteristics



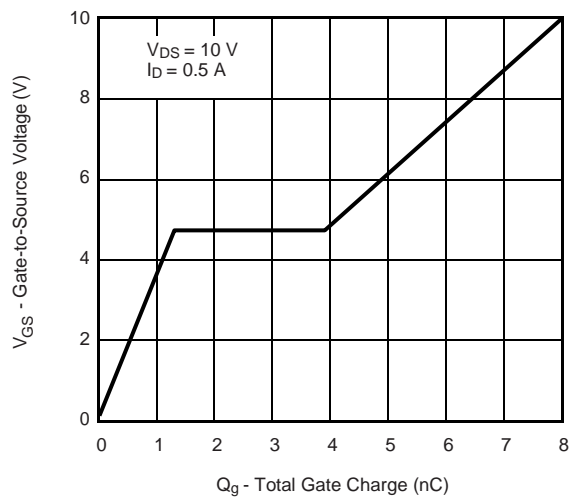
Transfer Characteristics



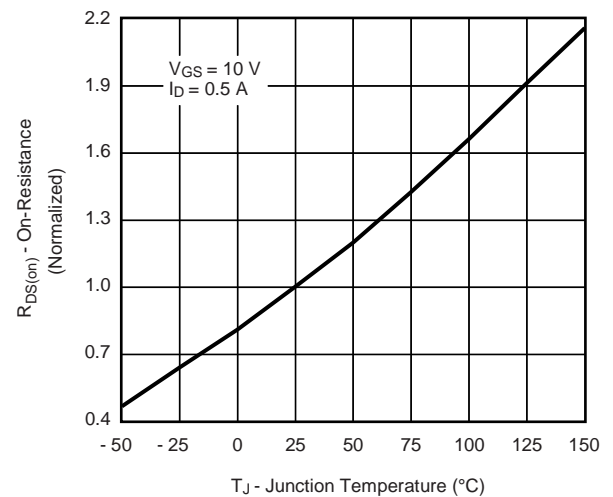
On-Resistance vs. Drain Current



Capacitance

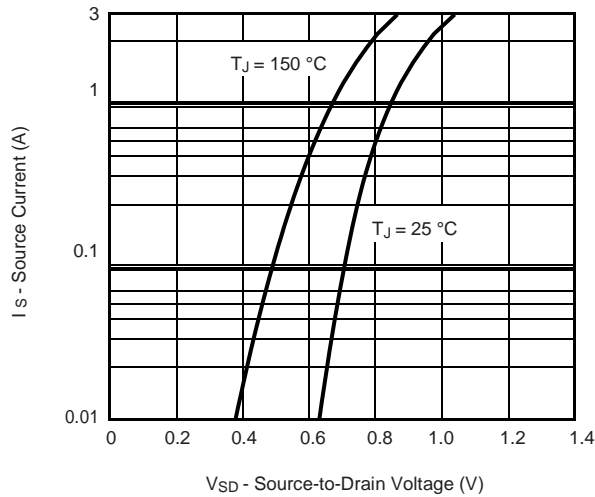


Gate Charge

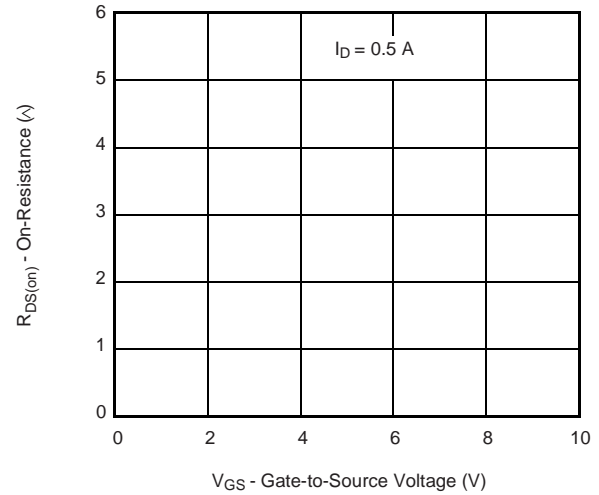


On-Resistance vs. Junction Temperature

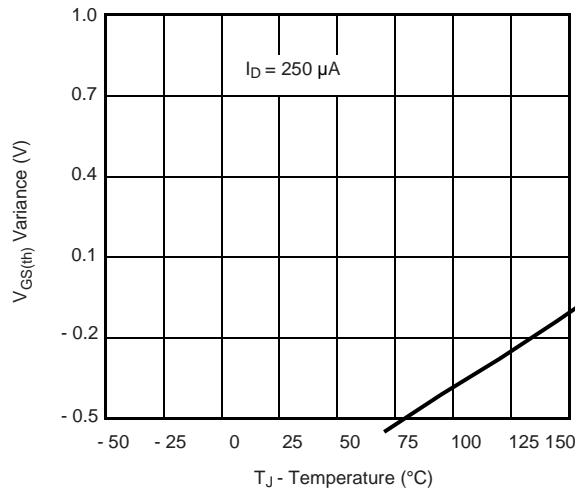
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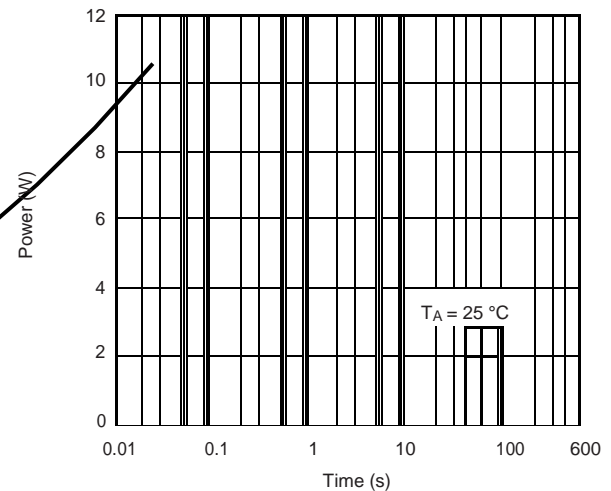
Source-Drain Diode Forward Voltage



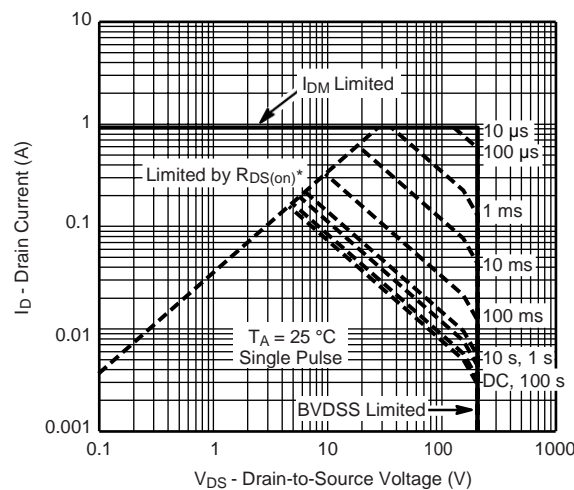
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



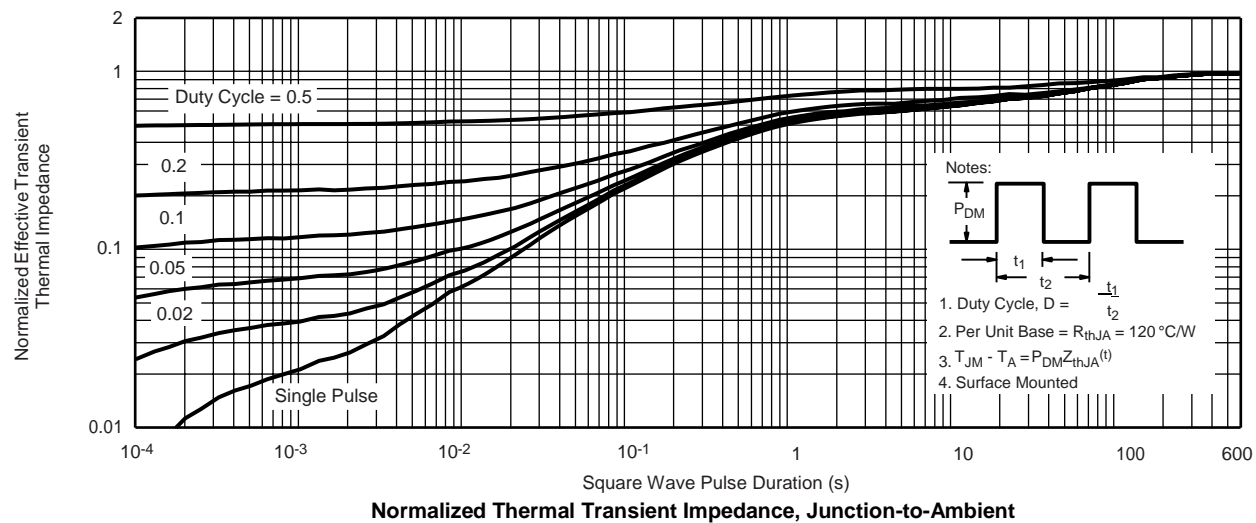
Single Pulse Power



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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