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Product Summary

| BV_{DSS} | Max $R_{DS(ON)}$ | Max I_D $T_A = +25^\circ C$ |
|------------|----------------------------------|----------------------------------|
| -100V | 1.0 Ω @ $V_{GS} = -10V$ | -0.7A |
| | 1.45 Ω @ $V_{GS} = -6.0V$ | -0.5A |

Description and Applications

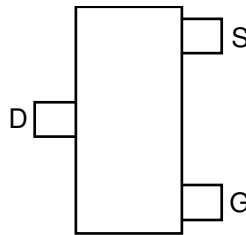
This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- DC-DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

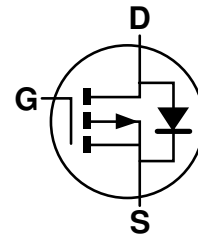
SOT23 (Type DN)



Top View



Top View
Pin Out



Equivalent Circuit

Features and Benefits

- Fast Switching Speed
- Low Input Capacitance
- Low Gate Charge
- Low Threshold
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

- Case: SOT23 (Type DN)
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208
- Weight: 0.009 grams (Approximate)

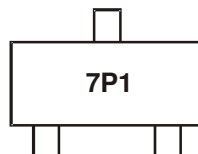
Ordering Information (Note 5)

| Part Number | Case | Packaging |
|---------------|-----------------|--------------------|
| ZXMP10A13FQTA | SOT23 (Type DN) | 3000/Tape & Reel |
| ZXMP10A13FQTC | SOT23 (Type DN) | 10,000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/product-compliance-definitions/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

SOT23 (Type DN)



7P1 = Product Type Marking Code

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

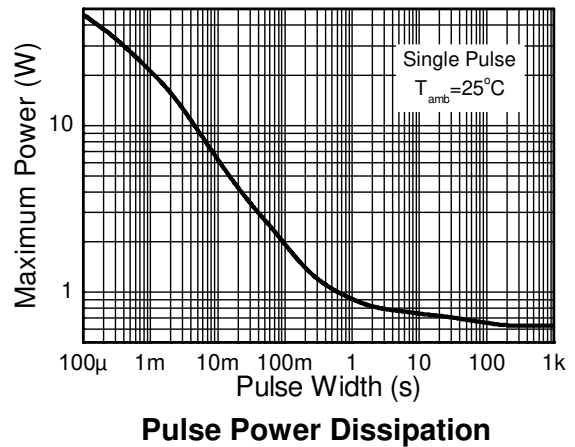
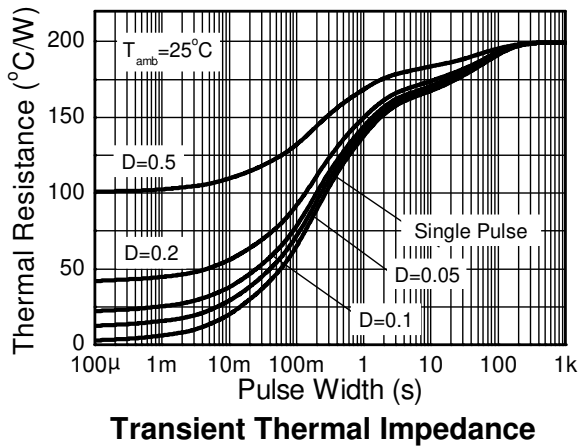
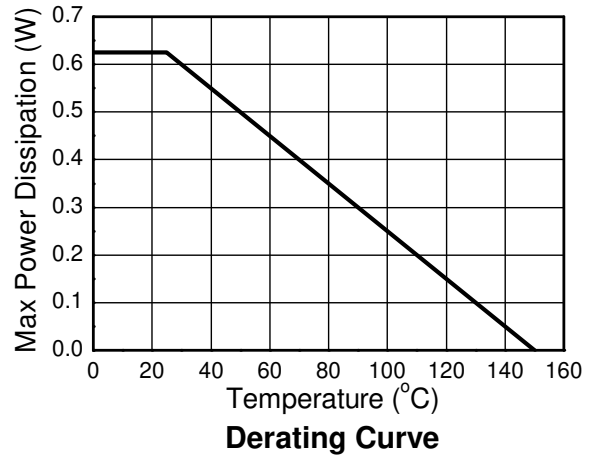
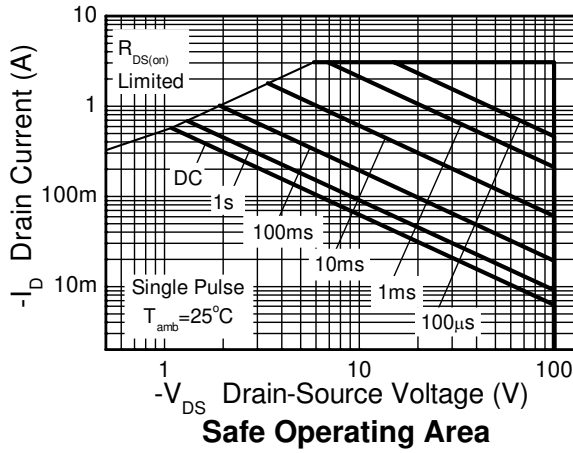
| Characteristic | | | Symbol | Value | Unit |
|---|------------------------|----------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | -100 | V |
| Gate-Source Voltage | | | V _{GS} | ±20 | V |
| Continuous Drain Current | V _{GS} = -10V | (Note 7) | I _D | -0.7 | A |
| | | (Note 7) | | -0.5 | |
| | | (Note 7) | | -0.6 | |
| Pulsed Drain Current (Note 8) | | | I _{DM} | -3.1 | A |
| Continuous Source Current (Body Diode) (Note 6) | | | I _S | -1.1 | A |
| Pulsed Source Current (Body Diode) (Note 8) | | | I _{SM} | -3.1 | A |

Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|--|--|-----------------------------------|-------------|-------|
| Power Dissipation (Note 6) | | P _D | 625 | mW |
| Linear Derating Factor | | | 5 | mW/°C |
| Power Dissipation (Note 7) | | P _D | 806 | mW |
| Linear Derating Factor | | | 6.4 | mW/°C |
| Thermal Resistance, Junction to Ambient (Note 6) | | R _{θJA} | 200 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 7) | | R _{θJA} | 155 | °C/W |
| Thermal Resistance, Junction to Leads (Note 9) | | R _{θJL} | 194 | °C/W |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

- Notes:
6. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
 7. For a device surface mounted on FR-4 PCB measured at t ≤ 5 secs.
 8. Repetitive rating 25mm x 25mm FR-4 PCB, D = 0.05 pulse width = 10µs - pulse current limited by maximum junction temperature.
 9. Thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics

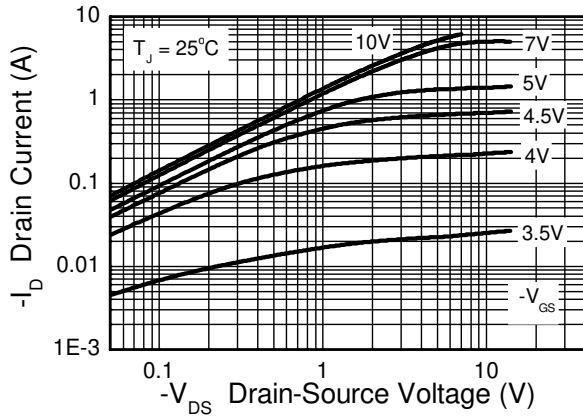


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

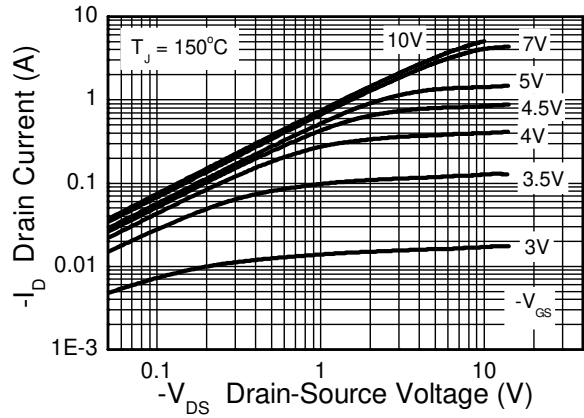
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|------|-------|-------|------|--|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -100 | — | — | V | I _D = -250μA, V _{GS} = 0V |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -1.0 | μA | V _{DS} = -100V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -2.0 | — | -4.0 | V | I _D = -250μA, V _{DS} = V _{GS} |
| Static Drain-Source On-Resistance (Note 10) | R _{DS(ON)} | — | — | 1.0 | Ω | V _{GS} = -10V, I _D = -0.6A |
| | | | | 1.45 | | V _{GS} = -6.0V, I _D = -0.5A |
| Forward Transconductance (Notes 10 and 12) | g _{fs} | — | 1.2 | — | S | V _{DS} = -15V, I _D = -0.6A |
| Diode Forward Voltage (Note 10) | V _{SD} | — | -0.85 | -0.95 | V | T _J = +25°C, I _S = -0.75A, V _{GS} = 0V |
| Reverse Recovery Time (Note 12) | t _{RR} | — | 29 | — | ns | T _J = +25°C, I _F = -0.9A, |
| Reverse Recovery Charge (Note 12) | Q _{RR} | — | 31 | — | nC | di/dt = 100A/μs |
| DYNAMIC CHARACTERISTICS (Note 12) | | | | | | |
| Input Capacitance | C _{iss} | — | 141 | — | pF | V _{DS} = -50V, V _{GS} = 0V f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 13.1 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 10.8 | — | | |
| Turn-On Delay Time (Note 11) | t _{D(ON)} | — | 1.6 | — | ns | V _{DD} = -50V, I _D = -1.0A, R _G ≈ 6.0Ω, V _{GS} = -10V |
| Turn-On Rise Time (Note 11) | t _R | — | 2.1 | — | | |
| Turn-Off Delay Time (Note 11) | t _{D(OFF)} | — | 5.9 | — | | |
| Turn-Off Fall Time (Note 11) | t _F | — | 3.3 | — | | |
| Total Gate Charge (Note 11) | Q _g | — | 1.8 | — | nC | V _{DS} = -50V, V _{GS} = -5.0V, I _D = -0.6A |
| Total Gate Charge (Note 11) | Q _g | — | 3.5 | — | nC | V _{DS} = -50V, V _{GS} = -10V, I _D = -0.6A |
| Gate-Source Charge (Note 11) | Q _{gs} | — | 0.6 | — | | |
| Gate-Drain Charge (Note 11) | Q _{gd} | — | 1.6 | — | | |

Notes: 10. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.
11. Switching characteristics are independent of operating junction temperature.
12. For design aid only, not subject to production testing.

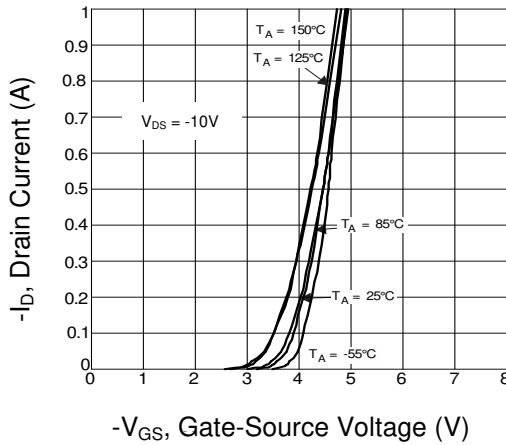
Typical Characteristics



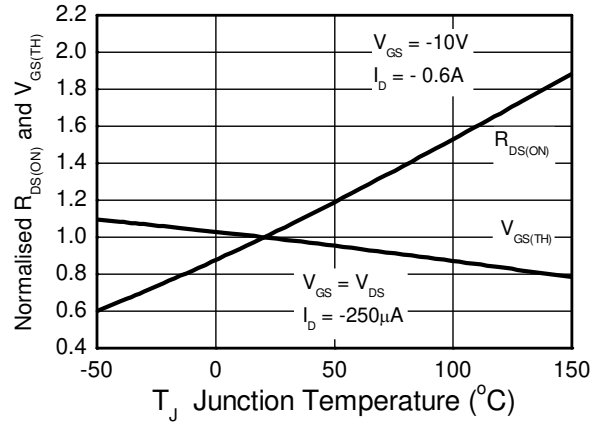
Output Characteristics



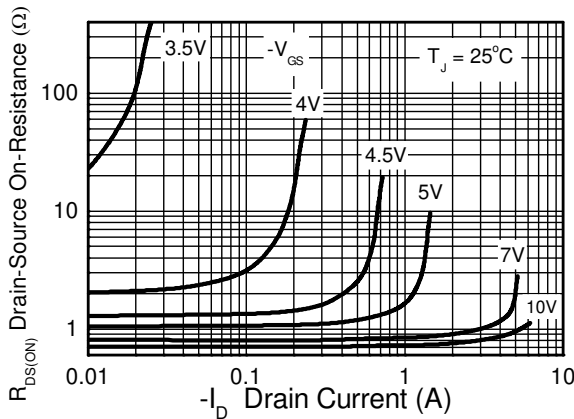
Output Characteristics



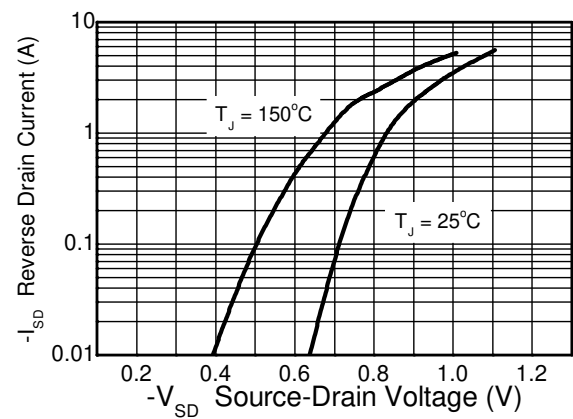
Typical Transfer Characteristics



Normalised Curves v Temperature

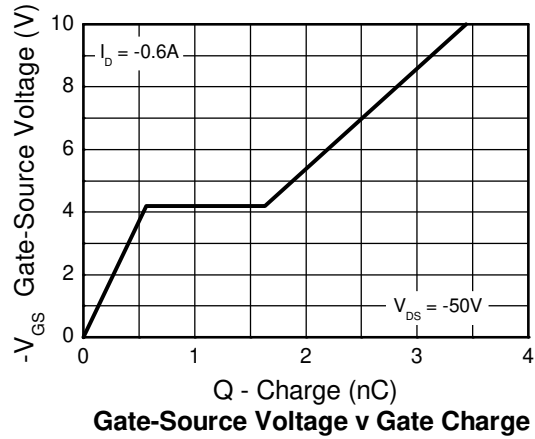
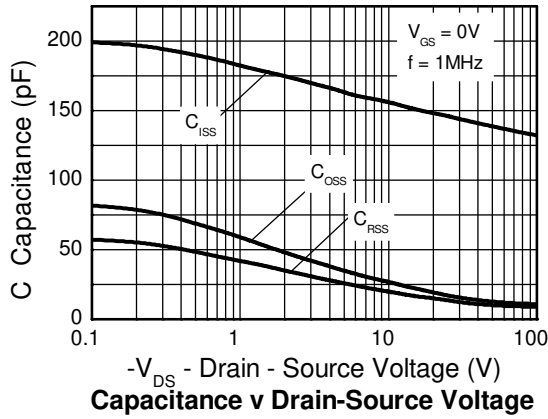


On-Resistance v Drain Current

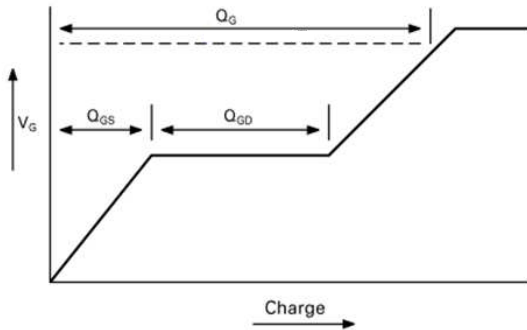


Source-Drain Diode Forward Voltage

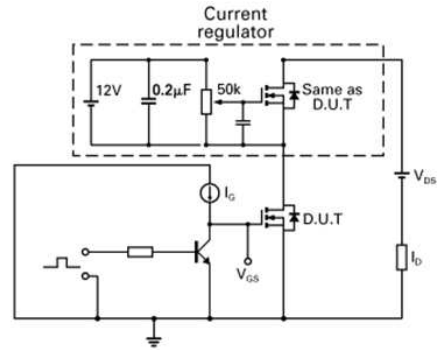
Typical Characteristics (Cont.)



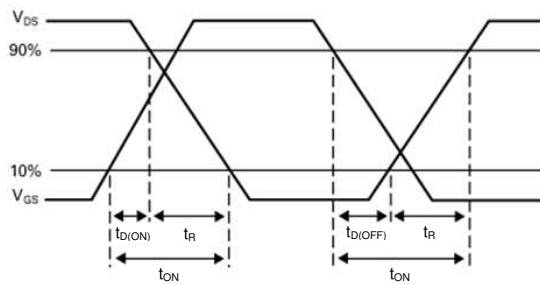
Test Circuits



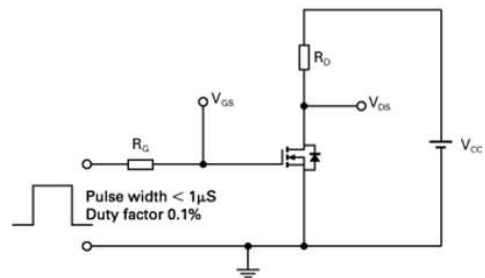
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

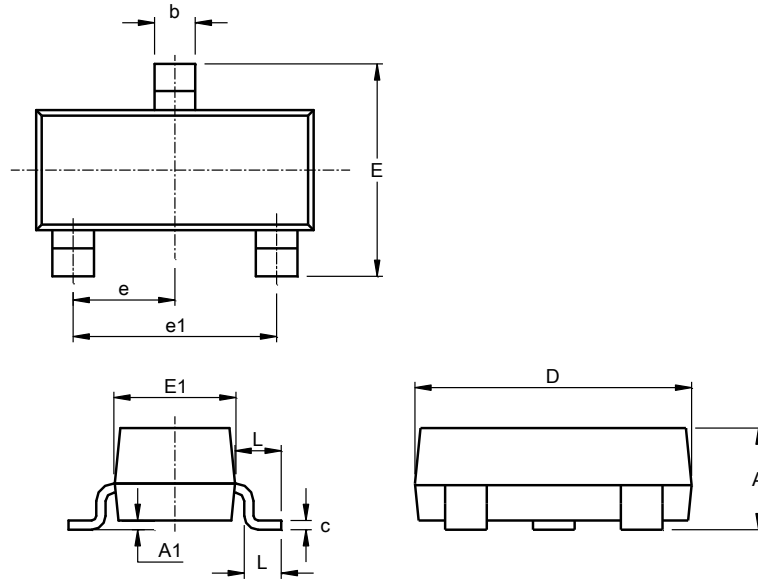


Switching time test circuit

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23 (Type DN)

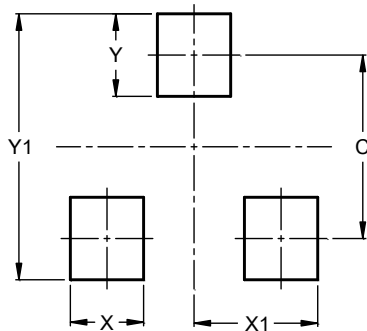


| SOT23 (Type DN) | | | |
|----------------------|----------|------|------|
| Dim | Min | Max | Typ |
| A | 0.89 | 1.12 | 1.00 |
| A1 | 0.01 | 0.10 | 0.05 |
| b | 0.30 | 0.51 | 0.45 |
| c | 0.08 | 0.20 | 0.10 |
| D | 2.80 | 3.04 | 3.00 |
| E | 2.10 | 2.64 | 2.42 |
| E1 | 1.20 | 1.40 | 1.37 |
| e | 0.95 REF | | |
| e1 | 1.90 REF | | |
| L | 0.25 | 0.60 | 0.30 |
| L1 | 0.45 | 0.62 | 0.54 |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23 (Type DN)



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 2.0 |
| X | 0.8 |
| X1 | 1.35 |
| Y | 0.9 |
| Y1 | 2.9 |

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