



September 2007

FDPF2710T

250V N-Channel PowerTrench MOSFET

General Description

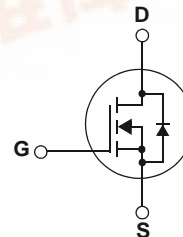
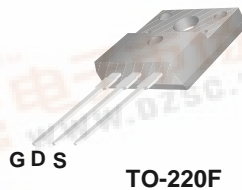
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Description

- 25A, 250V, $R_{DS(on)} = 36.3m\Omega @ V_{GS} = 10V$
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low $R_{DS(on)}$
- High power and current handling capability

Application

- Ballast Application



Absolute Maximum Ratings

| Symbol | Parameter | Rated | Unit |
|----------------|--|--------------------------------------|------------|
| V_{DS} | Drain-Source Voltage | 250 | V |
| V_{GS} | Gate-Source voltage | ± 30 | V |
| I_D | Drain Current | - Continuous ($T_C = 25^\circ C$) | 25 |
| | | - Continuous ($T_C = 100^\circ C$) | 18.8 |
| I_{DM} | Drain Current - Pulsed | (Note 1) 100 | A |
| E_{AS} | Single Pulsed Avalanche Energy | (Note 2) 145 | mJ |
| dv/dt | Peak Diode Recovery dv/dt | (Note 3) 4.5 | V/ns |
| P_D | Power Dissipation | ($T_C = 25^\circ C$) | 62.5 |
| | | - Derate above $25^\circ C$ | 0.5 |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +150 | $^\circ C$ |
| T_L | Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds | 300 | $^\circ C$ |

Thermal Characteristics

| Symbol | Parameter | Min | Max | Unit |
|-----------------|---|-----|------|--------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | -- | 2.0 | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | -- | 62.5 | $^\circ C/W$ |

FDPF2710T 250V N-Channel PowerTrench MOSFET



Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|-----------|---------|-----------|------------|----------|
| FDPF2710T | FDPF2710T | TO-220F | -- | -- | 50 |

Electrical Characteristics T_C = 25°C unless otherwise noted

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|--|-----|------|-----------|----------|
| Off Characteristics | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} = 0V, I _D = 250μA, T _J = 25°C | 250 | -- | -- | V |
| ΔBV _{DSS} / ΔT _J | Breakdown Voltage Temperature Coefficient | I _D = 250μA, Referenced to 25°C | -- | 0.25 | -- | V/°C |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 250V, V _{GS} = 0V V _{DS} = 250V, V _{GS} = 0V, T _C = 125°C | -- | -- | 10 500 | μA μA |
| I _{GSSF} | Gate-Body Leakage Current, Forward | V _{GS} = 30V, V _{DS} = 0V | -- | -- | 100 | nA |
| I _{GSSR} | Gate-Body Leakage Current, Reverse | V _{GS} = -30V, V _{DS} = 0V | -- | -- | -100 | nA |
| On Characteristics | | | | | | |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = 250μA | 3.0 | 3.9 | 5.0 | V |
| R _{DS(on)} | Static Drain-Source On-Resistance | V _{GS} = 10V, I _D = 25A | -- | 36.3 | 42.5 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} = 10V, I _D = 25A (Note 4) | -- | 63 | -- | S |
| Dynamic Characteristics | | | | | | |
| C _{iss} | Input Capacitance | V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz | -- | 5470 | 7280 | pF |
| C _{oss} | Output Capacitance | | -- | 426 | 567 | pF |
| C _{rss} | Reverse Transfer Capacitance | | -- | 97 | 146 | pF |
| Switching Characteristics | | | | | | |
| t _{d(on)} | Turn-On Delay Time | V _{DD} = 125V, I _D = 50A V _{GS} = 10V, R _{GEN} = 25Ω (Note 4, 5) | -- | 80 | 170 | ns |
| t _r | Turn-On Rise Time | | -- | 252 | 514 | ns |
| t _{d(off)} | Turn-Off Delay Time | | -- | 112 | 234 | ns |
| t _f | Turn-Off Fall Time | | -- | 154 | 318 | ns |
| Q _g | Total Gate Charge | V _{DS} = 125V, I _D = 50A V _{GS} = 10V (Note 4, 5) | -- | 78 | 101 | nC |
| Q _{gs} | Gate-Source Charge | | -- | 34 | -- | nC |
| Q _{gd} | Gate-Drain Charge | | -- | 18 | -- | nC |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I _S | Maximum Continuous Drain-Source Diode Forward Current | | -- | -- | 25 | A |
| I _{SM} | Maximum Pulsed Drain-Source Diode Forward Current | | -- | -- | 150 | A |
| V _{SD} | Drain-Source Diode Forward Voltage | V _{GS} = 0V, I _S = 25A | -- | -- | 1.2 | V |
| t _{rr} | Reverse Recovery Time | V _{GS} = 0V, I _S = 50A di _F /dt = 130A/μs (Note 4) | -- | 163 | -- | ns |
| Q _{rr} | Reverse Recovery Charge | | -- | 1.3 | -- | μC |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 1mH, I_{AS} = 17A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 50A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

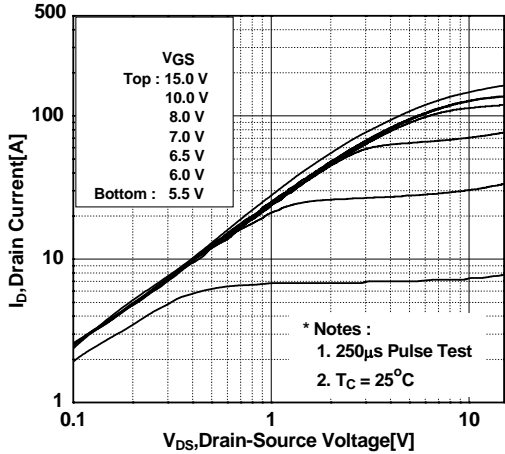


Figure 2. Transfer Characteristics

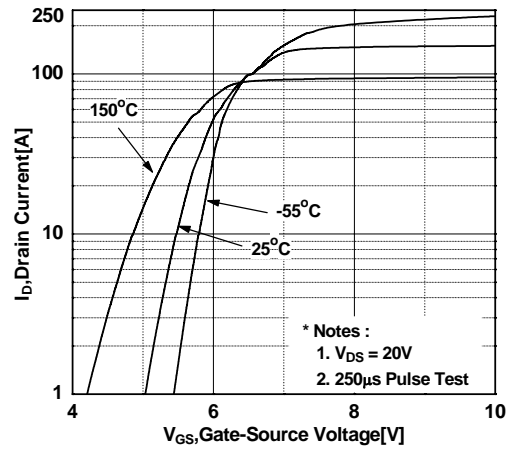


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

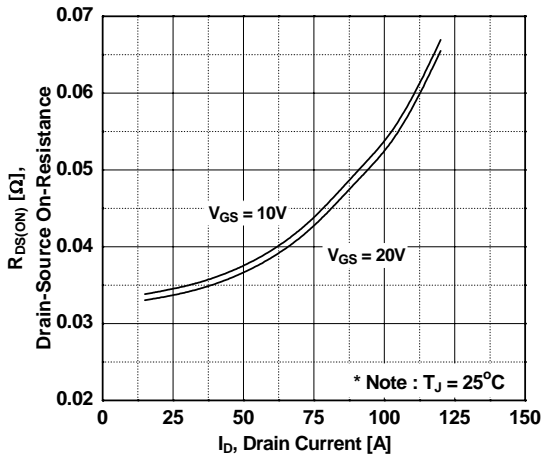


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

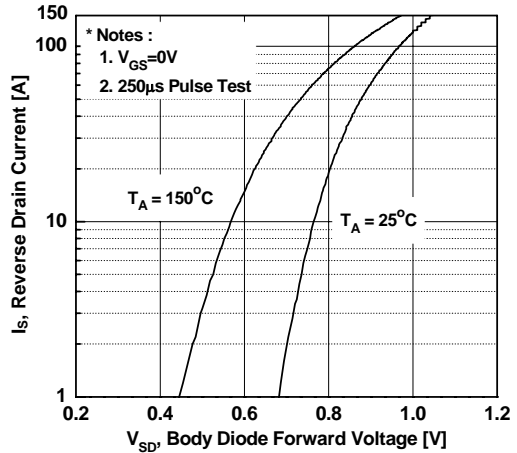


Figure 5. Capacitance Characteristics

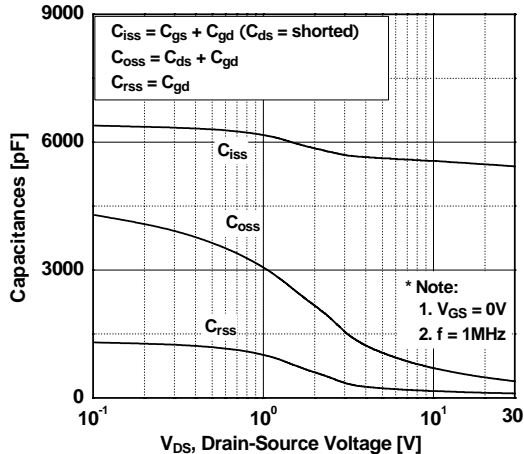
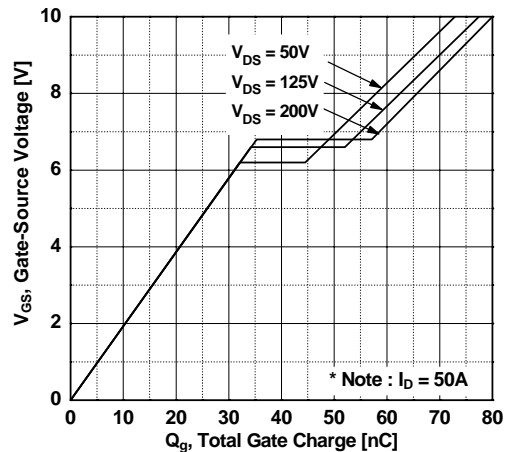


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

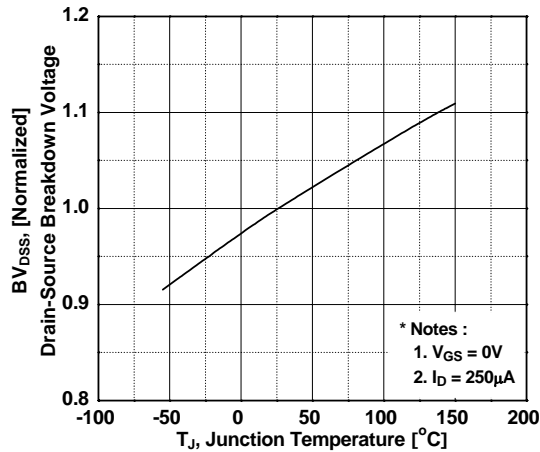


Figure 8. On-Resistance Variation vs. Temperature

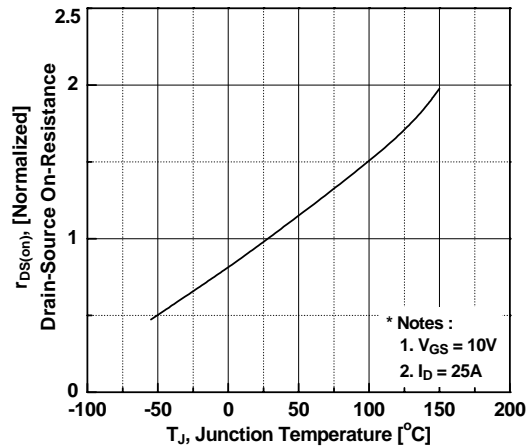


Figure 9. Maximum Safe Operating Area

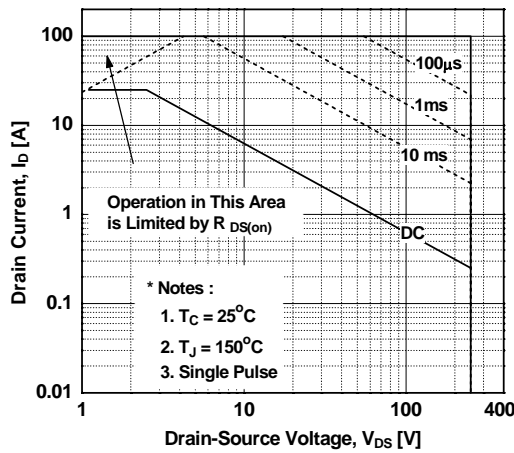


Figure 10. Maximum Drain Current vs. Case Temperature

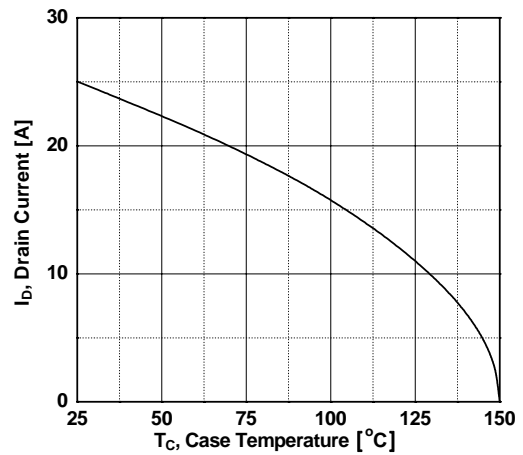
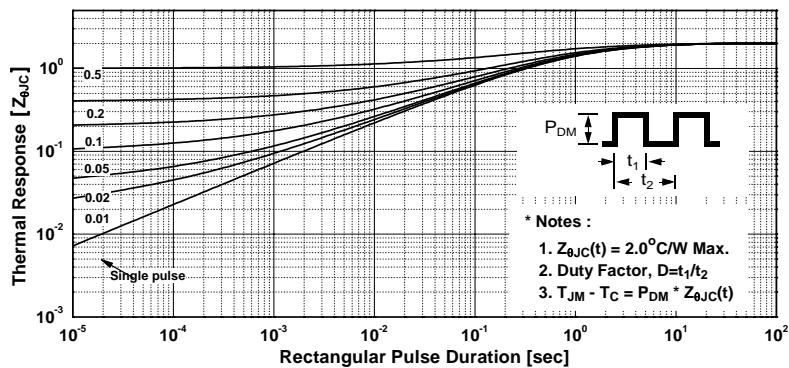
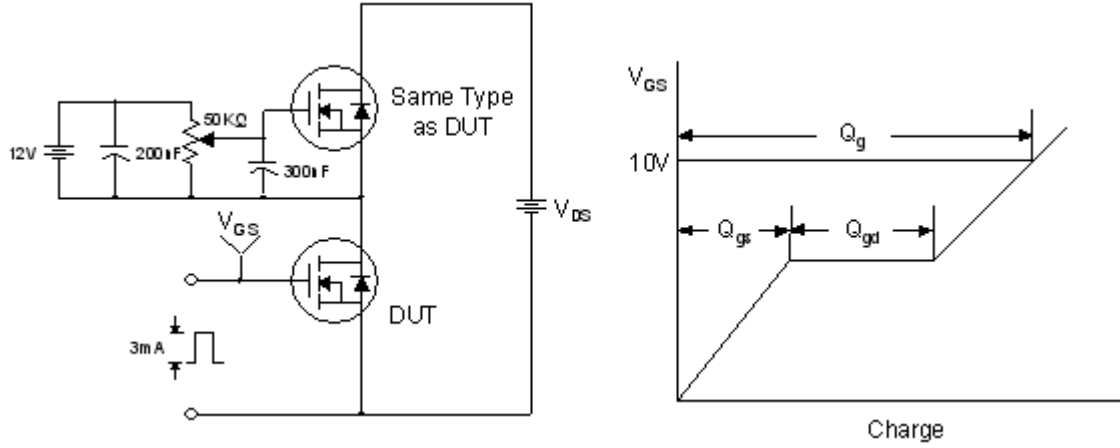


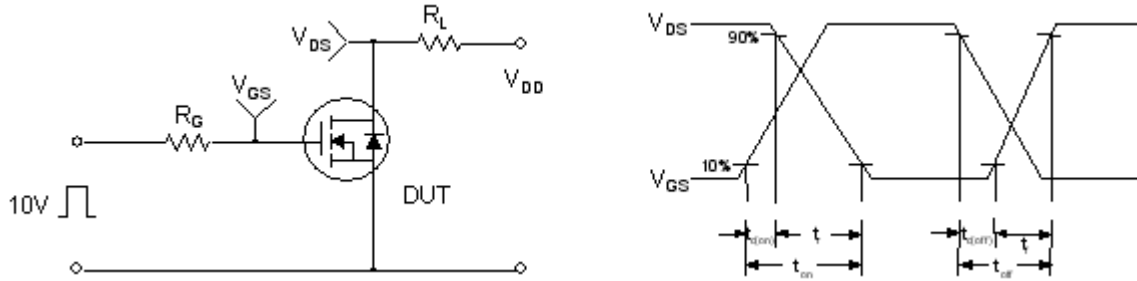
Figure 11. Transient Thermal Response Curve



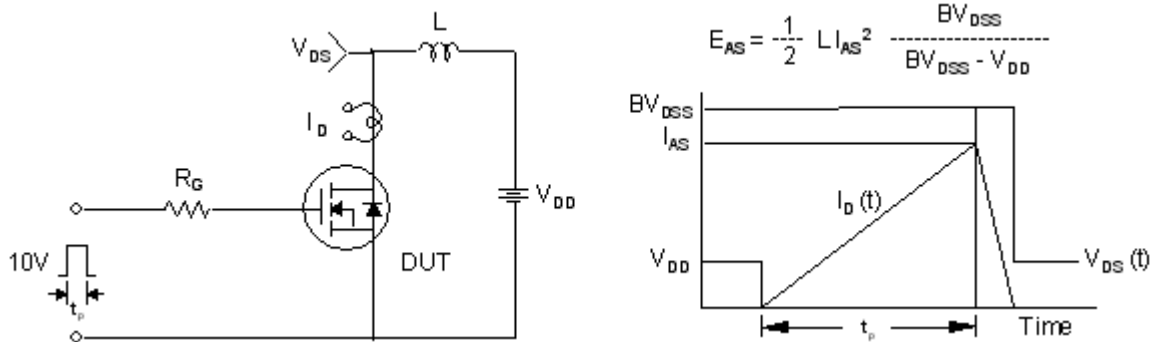
Gate Charge Test Circuit & Waveform



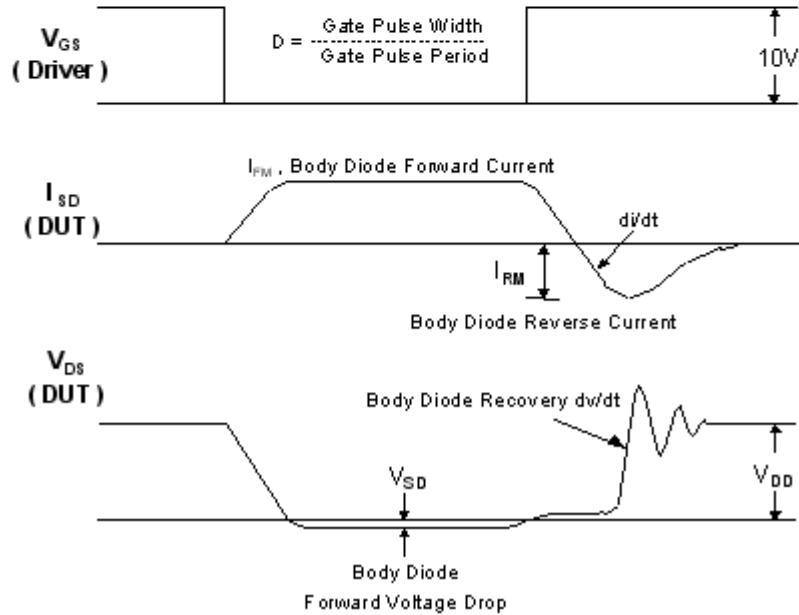
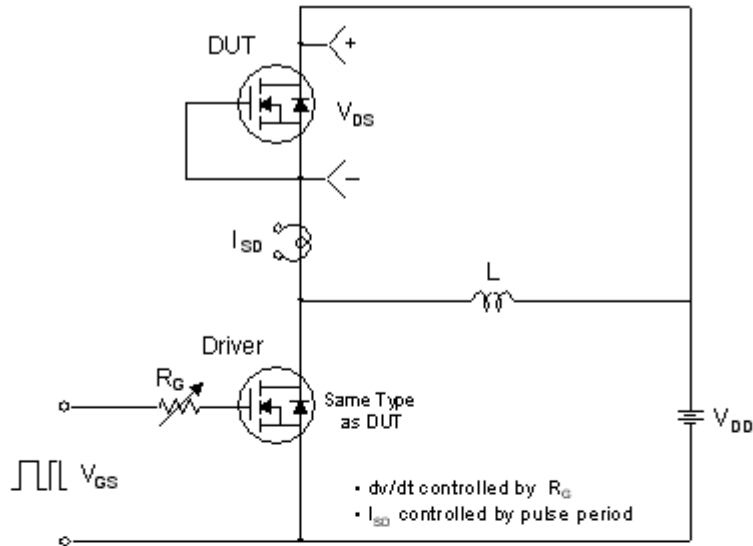
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

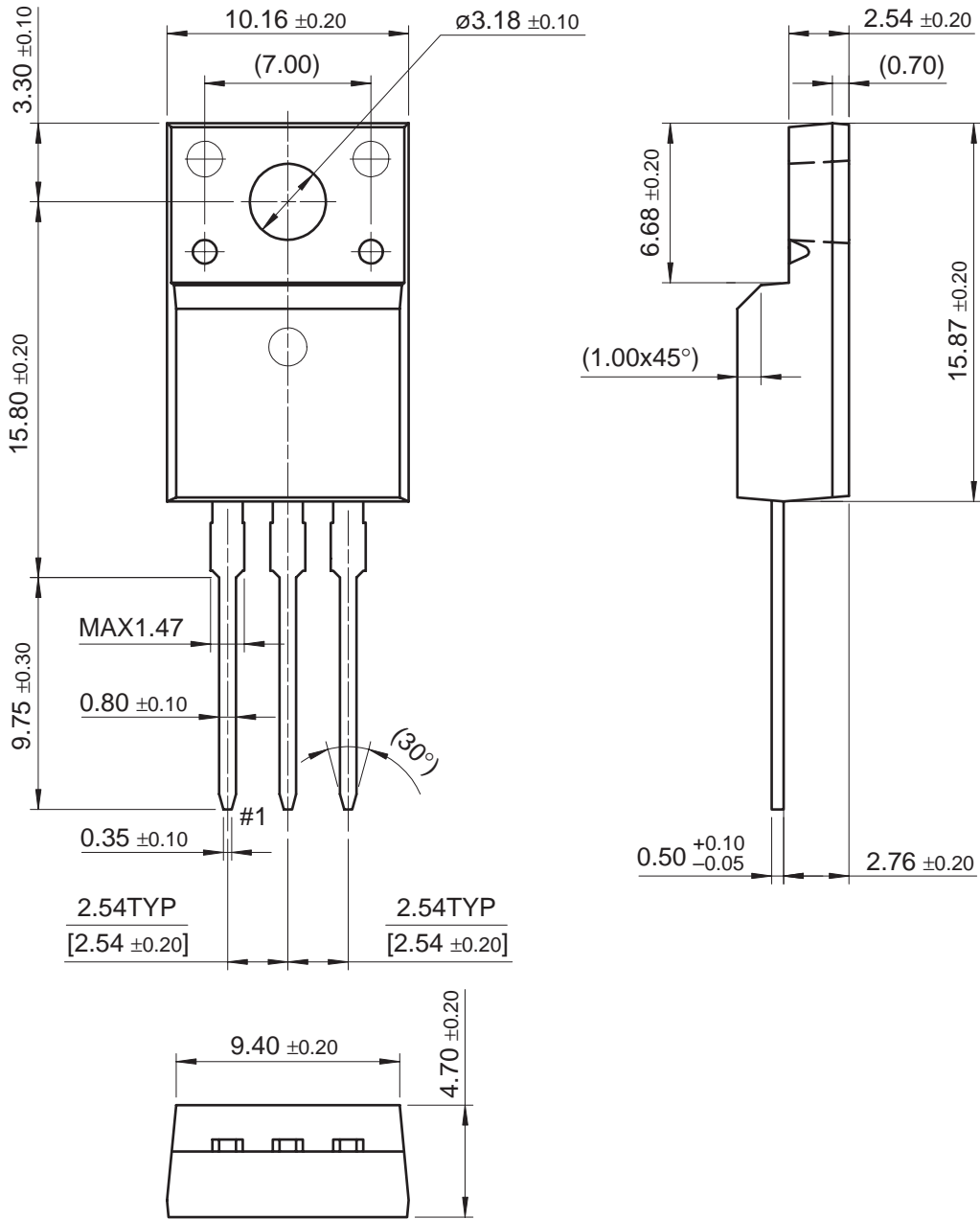


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions


TO-220F





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