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FDP2614

N-Channel PowerTrench® MOSFET 200 V, 62 A, 27 mΩ

Features

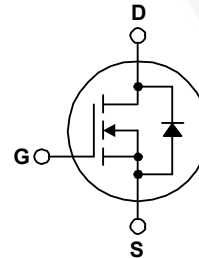
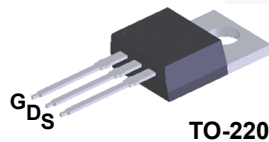
- $R_{DS(on)} = 22.9 \text{ m}\Omega$ (Typ.) @ $V_{GS} = 10 \text{ V}$, $I_D = 31 \text{ A}$
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

General Description

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

Applications

- Consumer Appliances
- Synchronous Rectification
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | FDP2614 | Unit |
|----------------|--|--------------|---------------------|
| V_{DS} | Drain-Source Voltage | 200 | V |
| V_{GS} | Gate-Source Voltage | ± 30 | V |
| I_D | Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$) | 62 | A |
| | | 39.3 | A |
| I_{DM} | Drain Current - Pulsed (Note 1) | see Figure 9 | 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 ($T_C = 25^\circ\text{C}$) - Derate above 25°C | 260 | W |
| | | 2.1 | W/ $^\circ\text{C}$ |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ |
| T_L | Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds | 300 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | FDP2614 | Unit |
|-----------------|---|---------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case, Max. | 0.48 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient, Max. | 62.5 | $^\circ\text{C}/\text{W}$ |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|---------|---------|-----------|------------|----------|
| FDP2614 | FDP2614 | TO-220 | Tube | N/A | 50 units |

Electrical Characteristics T_C = 25°C unless otherwise noted

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|--|-----|------|-----------|----------|
| Off Characteristics | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} = 0V, I _D = 250μA, T _J = 25°C | 200 | -- | -- | V |
| ΔBV _{DSS} / ΔT _J | Breakdown Voltage Temperature Coefficient | I _D = 250μA, Referenced to 25°C | -- | 0.2 | -- | V/°C |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 200V, V _{GS} = 0V V _{DS} = 200V, V _{GS} = 0V, T _J = 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 | 4.0 | 5.0 | V |
| R _{DS(on)} | Static Drain-Source On-Resistance | V _{GS} = 10V, I _D = 31A | -- | 22.9 | 27 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} = 10V, I _D = 31A | -- | 72 | -- | S |
| Dynamic Characteristics | | | | | | |
| C _{ISS} | Input Capacitance | V _{DS} = 25V, V _{GS} = 0V f = 1.0MHz | -- | 5435 | 7230 | pF |
| C _{OSS} | Output Capacitance | | -- | 505 | 675 | pF |
| C _{RSS} | Reverse Transfer Capacitance | | -- | 110 | 165 | pF |
| Switching Characteristics | | | | | | |
| t _{d(on)} | Turn-On Delay Time | V _{DD} = 100V, I _D = 62A V _{GS} = 10V, R _{GEN} = 25Ω (Note 4) | -- | 77 | 165 | ns |
| t _r | Turn-On Rise Time | | -- | 284 | 560 | ns |
| t _{d(off)} | Turn-Off Delay Time | | -- | 103 | 220 | ns |
| t _f | Turn-Off Fall Time | | -- | 162 | 335 | ns |
| Q _g | Total Gate Charge | V _{DS} = 100V, I _D = 62A V _{GS} = 10V (Note 4) | -- | 76 | 99 | nC |
| Q _{gs} | Gate-Source Charge | | -- | 35 | -- | nC |
| Q _{gd} | Gate-Drain Charge | | -- | 18 | -- | nC |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I _S | Maximum Continuous Drain-Source Diode Forward Current | | -- | -- | 62 | A |
| I _{SM} | Maximum Pulsed Drain-Source Diode Forward Current | | -- | -- | 186 | A |
| V _{SD} | Drain-Source Diode Forward Voltage | V _{GS} = 0V, I _S = 62A | -- | -- | 1.2 | V |
| t _{rr} | Reverse Recovery Time | V _{GS} = 0V, I _S = 62A di _f /dt = 100A/μs | -- | 145 | -- | ns |
| Q _{rr} | Reverse Recovery Charge | | -- | 0.81 | -- | 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} ≤ 62A, di/dt ≤ 100A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

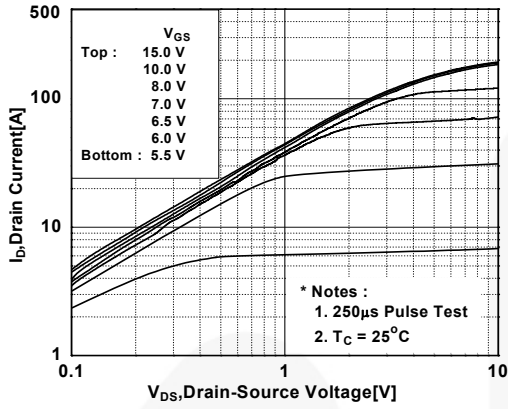


Figure 2. Transfer Characteristics

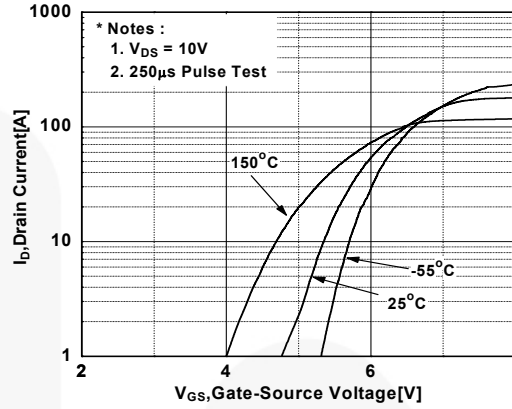


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

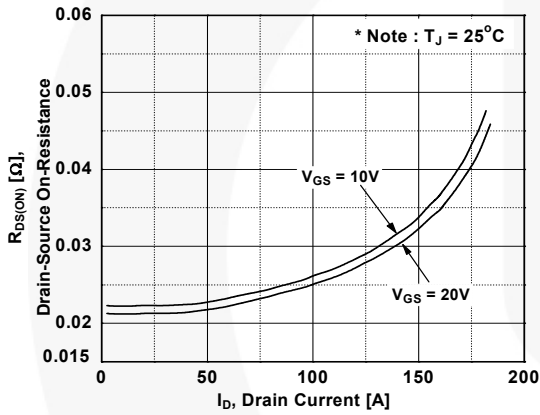


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

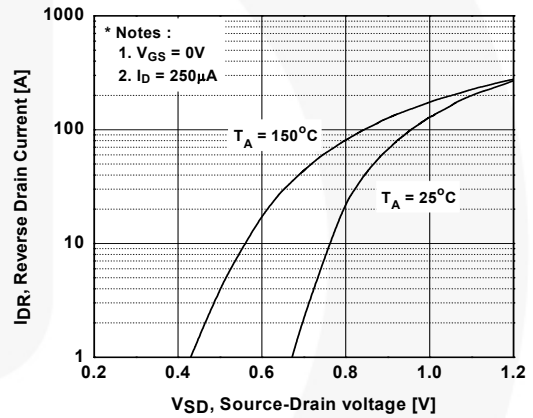


Figure 5. Capacitance Characteristics

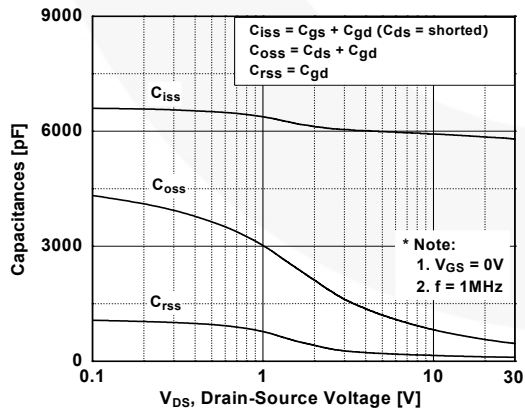
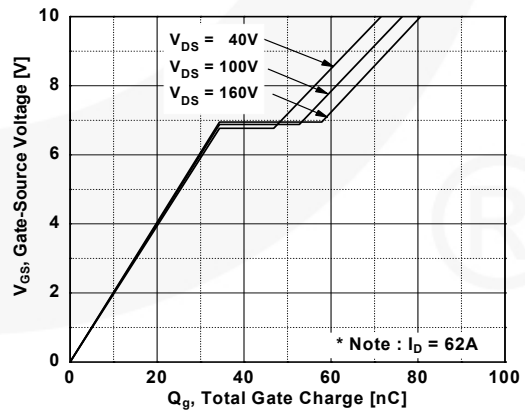


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

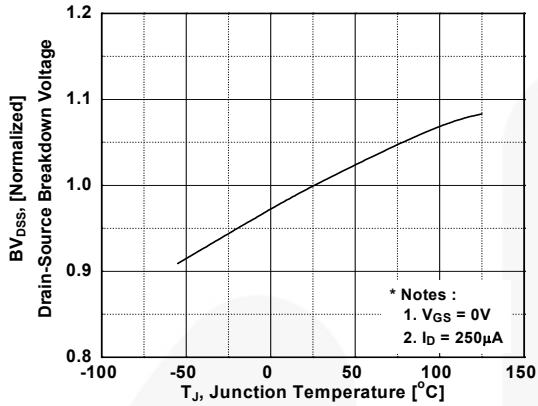


Figure 8. On-Resistance Variation vs. Temperature

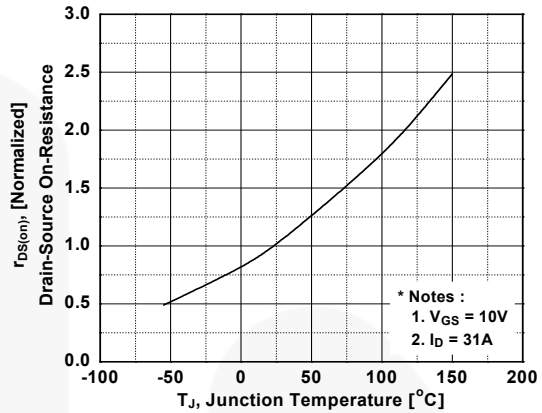


Figure 9. Maximum Safe Operating Area

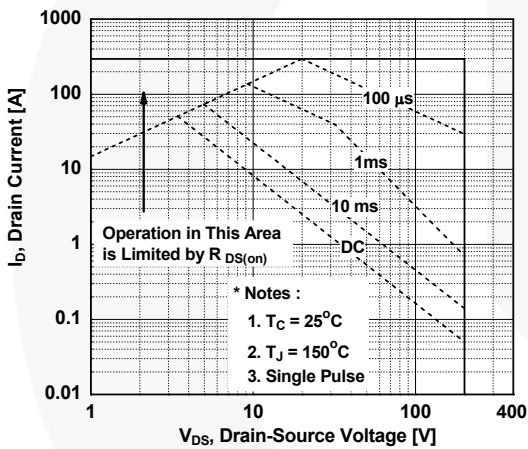


Figure 10. Maximum Drain Current vs. Case Temperature

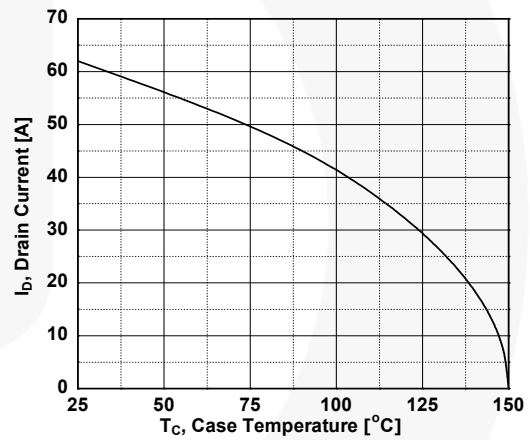


Figure 11. Transient Thermal Response Curve

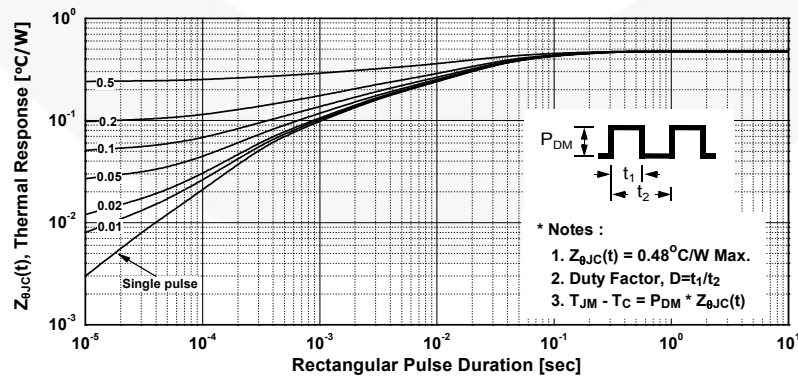


Figure 12. Gate Charge Test Circuit & Waveform

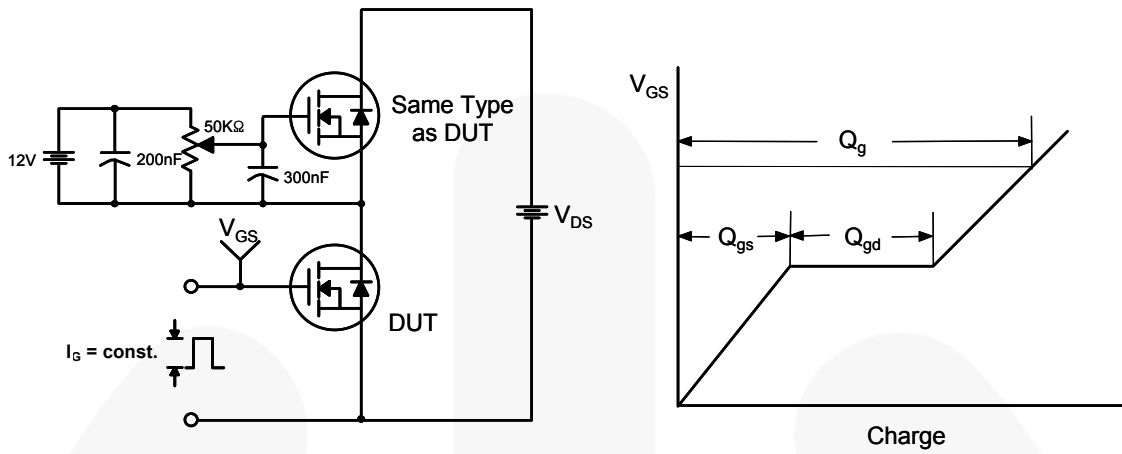


Figure 13. Resistive Switching Test Circuit & Waveforms

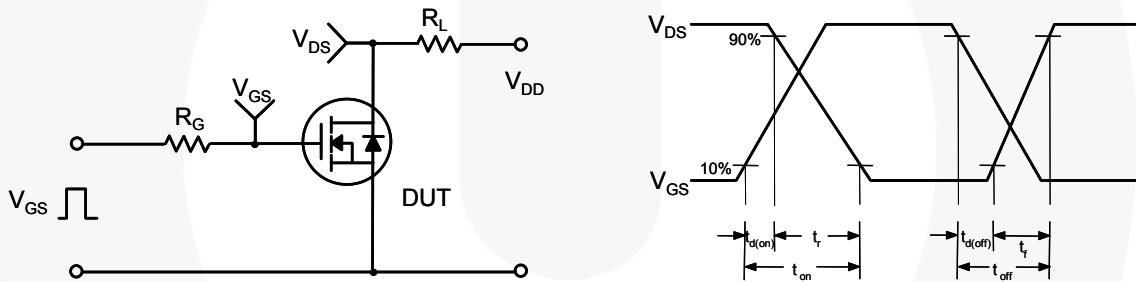


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

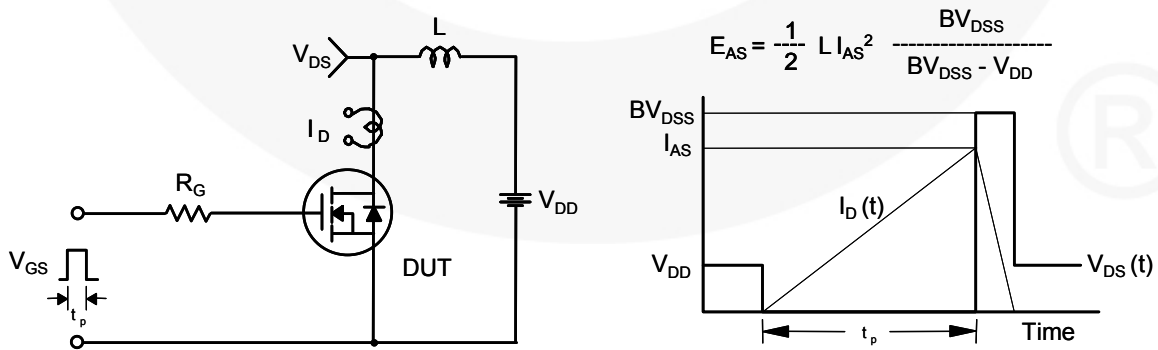
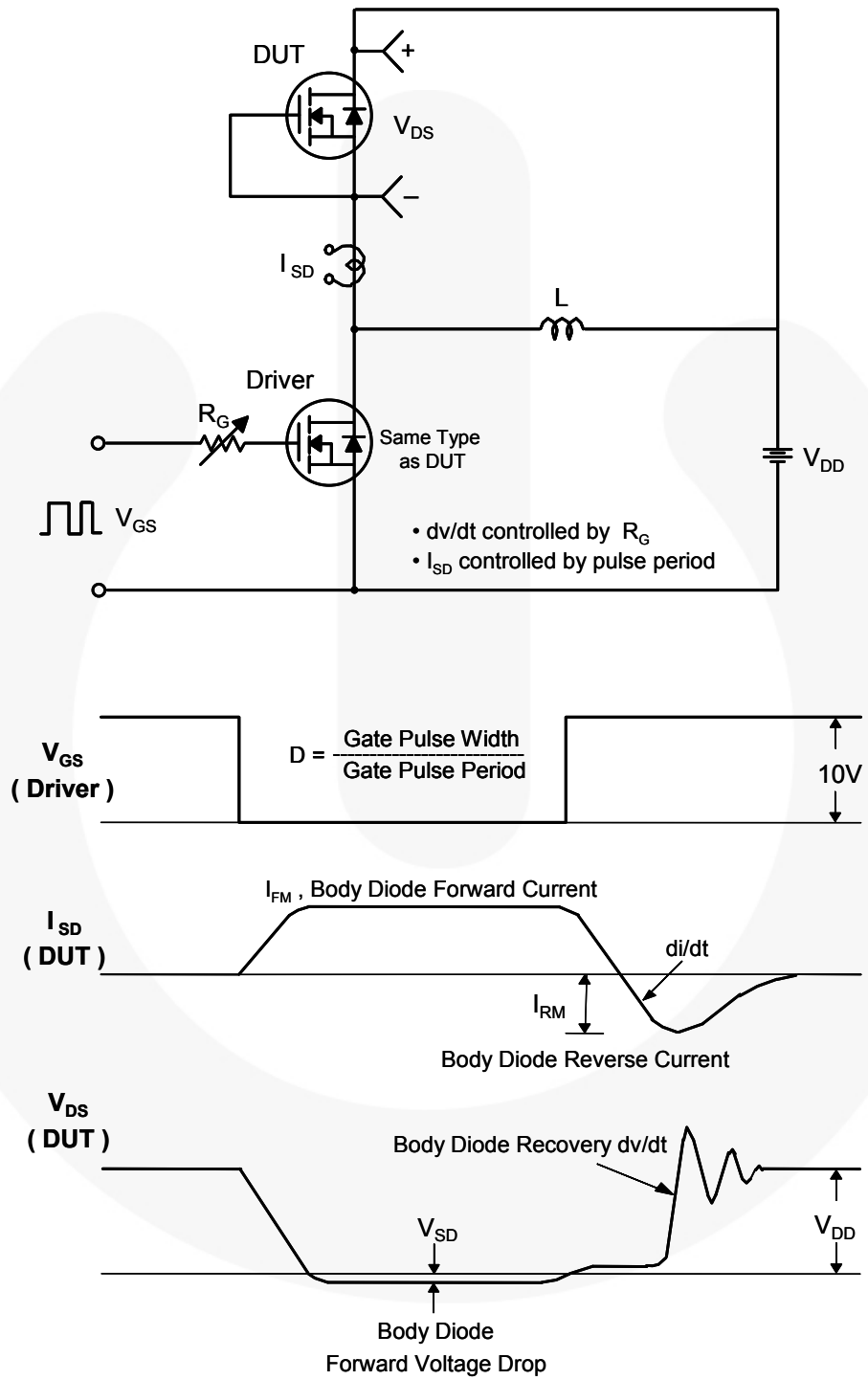


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

TO-220 3L

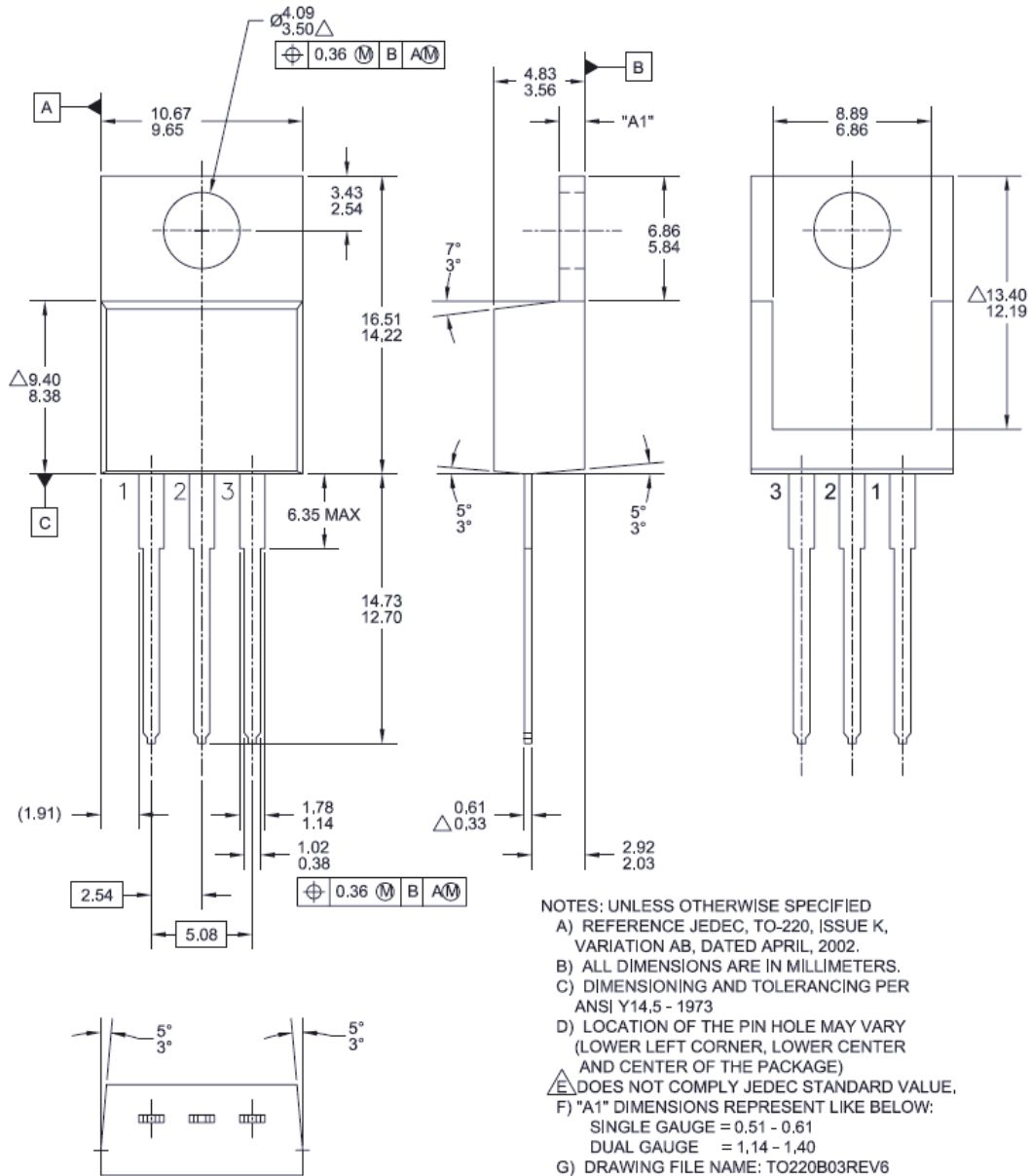


Figure 16. TO-220, Molded, 3Lead, Jedec Variation AB

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Dimension in Millimeters

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