

Advanced Power MOSFET

IRLZ44A

FEATURES

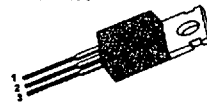
- Logic-Level Gate Drive
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 10 μ A (Max.) @ $V_{DS} = 60V$
- Lower $R_{DS(on)}$: 0.02 Ω (Typ.)

$$BV_{DSS} = 60 V$$

$$R_{DS(on)} = 0.025 \Omega$$

$$I_D = 50 A$$

TO-220



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

| Symbol | Characteristic | Value | Units |
|----------------|---|--------------|------------|
| V_{DSS} | Drain-to-Source Voltage | 60 | V |
| I_D | Continuous Drain Current ($T_c=25^\circ C$) | 50 | A |
| | Continuous Drain Current ($T_c=100^\circ C$) | 35 | |
| I_{DM} | Drain Current-Pulsed ① | 175 | A |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| E_{AS} | Single Pulsed Avalanche Energy ② | 857 | mJ |
| I_{AR} | Avalanche Current ① | 50 | A |
| E_{AR} | Repetitive Avalanche Energy ① | 12.5 | mJ |
| dv/dt | Peak Diode Recovery dv/dt ③ | 5.5 | V/ns |
| P_D | Total Power Dissipation ($T_c=25^\circ C$) | 125 | W |
| | Linear Derating Factor | 0.83 | |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | - 55 to +175 | $^\circ C$ |
| T_L | Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5-seconds | 300 | |

Thermal Resistance

| Symbol | Characteristic | Typ. | Max. | Units |
|-----------------|---------------------|------|------|--------------|
| $R_{\theta JC}$ | Junction-to-Case | -- | 1.2 | $^\circ C/W$ |
| $R_{\theta CS}$ | Case-to-Sink | 0.5 | -- | |
| $R_{\theta JA}$ | Junction-to-Ambient | -- | 62.5 | |



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N-CHANNEL POWER MOSFET

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

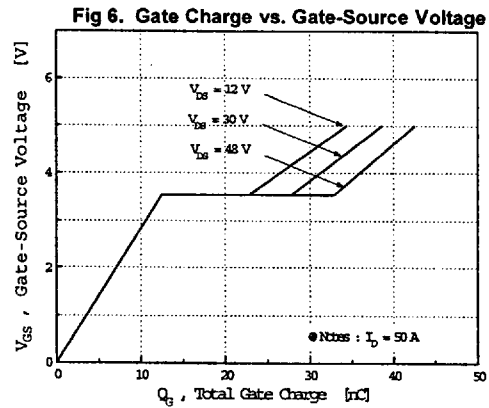
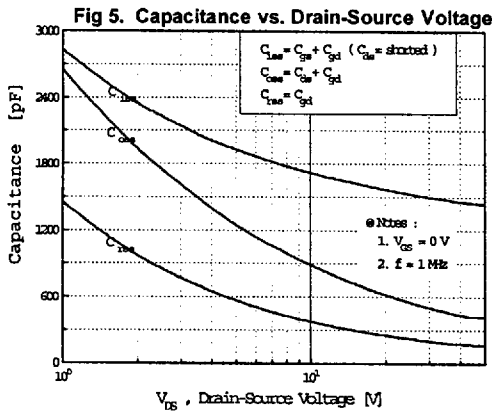
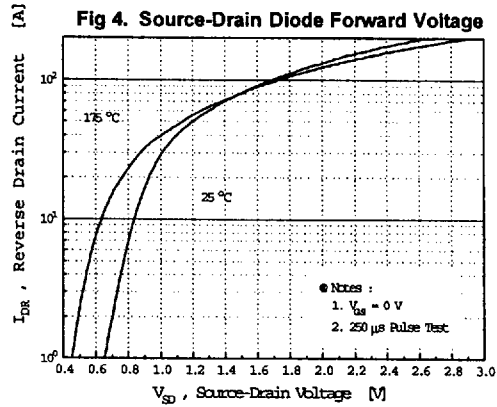
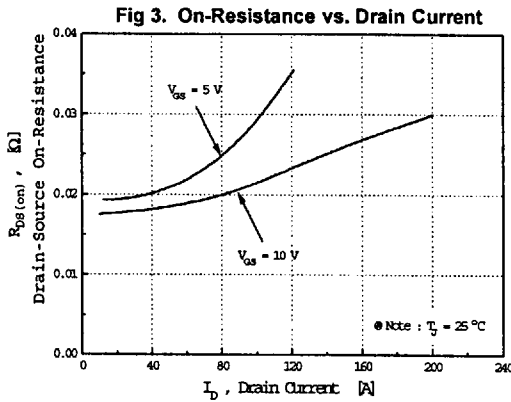
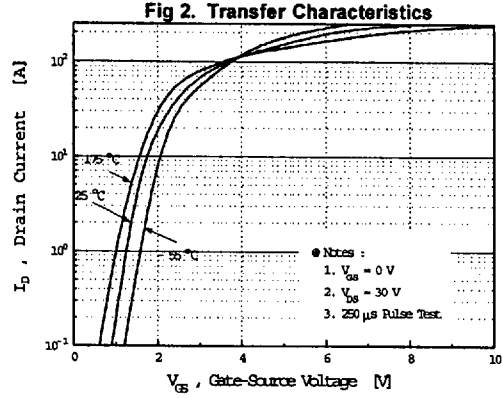
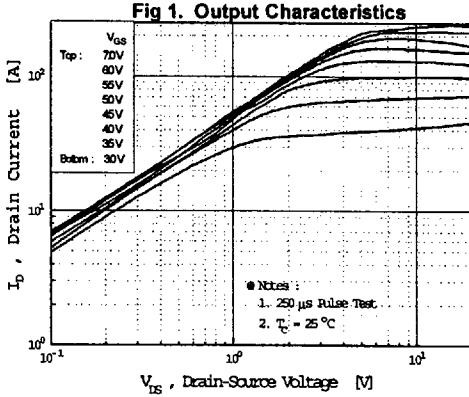
| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|------------------------|---|------|-------|-------|---------------------|---|
| BV_{DSS} | Drain-Source Breakdown Voltage | 60 | – | – | V | $V_{GS}=0V, I_D=250\mu A$ |
| $\Delta BV/\Delta T_J$ | Breakdown Voltage Temp. Coeff. | – | 0.056 | – | V/ $^\circ\text{C}$ | $I_D=250\mu A$ See Fig 7 |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.0 | – | 2.0 | V | $V_{DS}=5V, I_D=250\mu A$ |
| I_{GSS} | Gate-Source Leakage, Forward | – | – | 100 | nA | $V_{GS}=20V$ |
| | Gate-Source Leakage, Reverse | – | – | -100 | nA | $V_{GS}=-20V$ |
| I_{DSS} | Drain-to-Source Leakage Current | – | – | 10 | μA | $V_{DS}=60V$ |
| | | – | – | 100 | | $V_{DS}=48V, T_C=150^\circ\text{C}$ |
| $R_{DS(on)}$ | Static Drain-Source On-State Resistance | – | – | 0.025 | Ω | $V_{GS}=5V, I_D=25A$ ④ |
| g_{fs} | Forward Transconductance | – | 40 | – | \bar{O} | $V_{DS}=30V, I_D=25A$ ④ |
| C_{iss} | Input Capacitance | – | 1530 | 1990 | pF | $V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$ See Fig 5 |
| C_{oss} | Output Capacitance | – | 555 | 640 | | |
| C_{rss} | Reverse Transfer Capacitance | – | 225 | 260 | | |
| $t_{d(on)}$ | Turn-On Delay Time | – | 14 | 40 | ns | $V_{DD}=30V, I_D=50A,$ $R_G=4.6\Omega$ See Fig 13 ④ ⑤ |
| t_r | Rise Time | – | 24 | 60 | | |
| $t_{d(off)}$ | Turn-Off Delay Time | – | 43 | 95 | | |
| t_f | Fall Time | – | 37 | 85 | | |
| Q_g | Total Gate Charge | – | 42 | 55 | nC | $V_{DS}=48V, V_{GS}=5V,$ $I_D=50A$ See Fig 6 & Fig 12 ④ ⑤ |
| Q_{gs} | Gate-Source Charge | – | 12 | – | | |
| Q_{gd} | Gate-Drain ("Miller") Charge | – | 20 | – | | |

Source-Drain Diode Ratings and Characteristics

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|----------|---------------------------|------|-------|------|---------------|--|
| I_S | Continuous Source Current | – | – | 50 | A | Integral reverse pn-diode in the MOSFET |
| I_{SM} | Pulsed-Source Current ① | – | – | 175 | | |
| V_{SD} | Diode Forward Voltage ④ | – | – | 1.8 | V | $T_J=25^\circ\text{C}, I_S=50A, V_{GS}=0V$ |
| t_{rr} | Reverse Recovery Time | – | 72 | – | ns | $T_J=25^\circ\text{C}, I_F=50A$ |
| Q_{rr} | Reverse Recovery Charge | – | 0.133 | – | μC | $di_F/dt=100A/\mu\text{s}$ ④ |

Notes :

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② $L=0.4\text{mH}, I_{AS}=50A, V_{DD}=25V, R_G=27\Omega$, Starting $T_J=25^\circ\text{C}$
- ③ $I_{SD} \leq 50A, di/dt \leq 350A/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width = 250 μs , Duty Cycle $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature



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N-CHANNEL POWER MOSFET

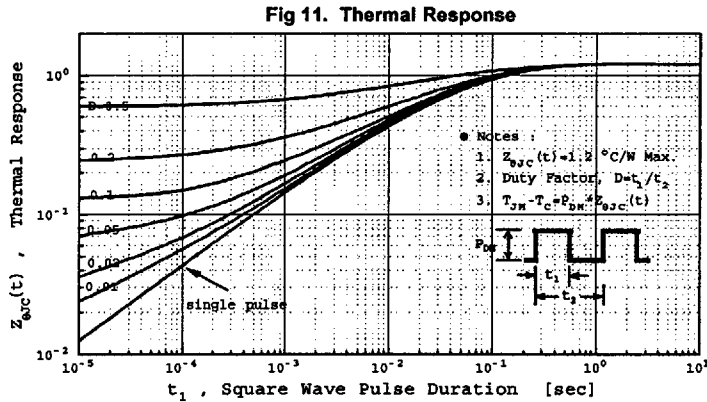
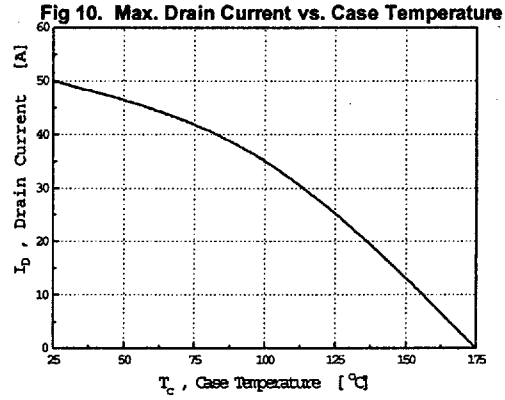
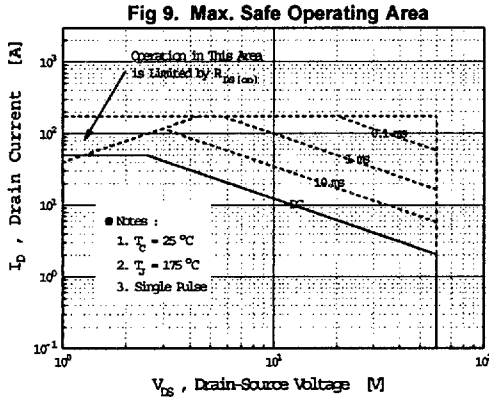
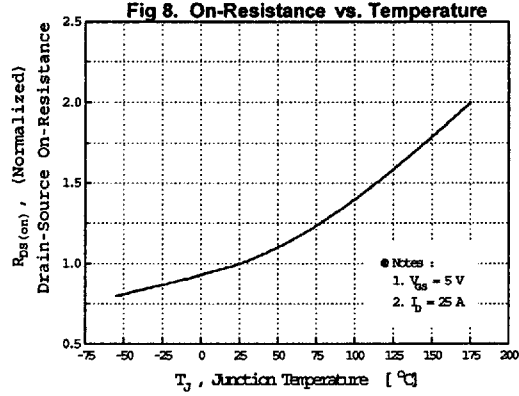
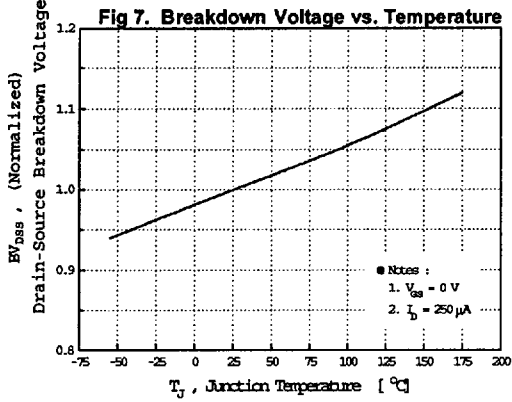


Fig 12. Gate Charge Test Circuit & Waveform

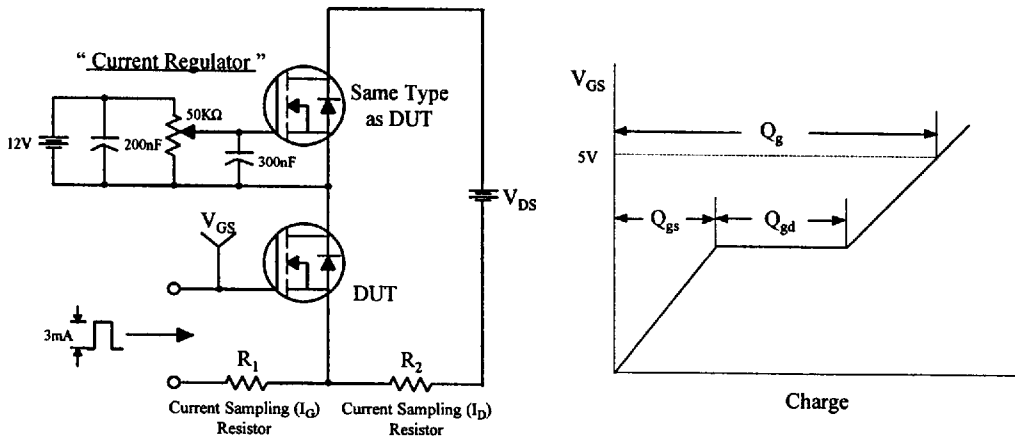


Fig 13. Resistive Switching Test Circuit & Waveforms

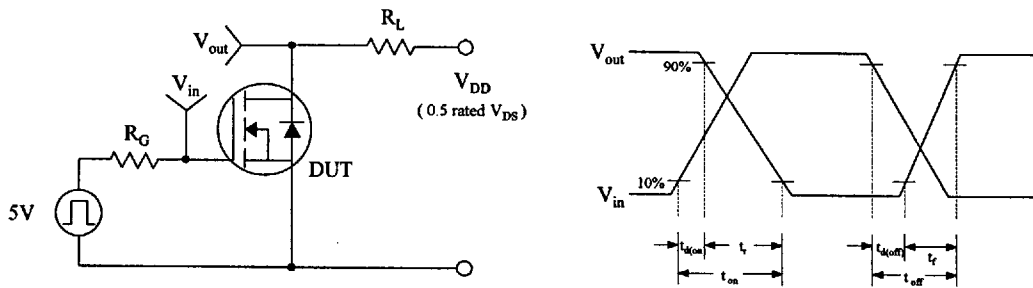


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

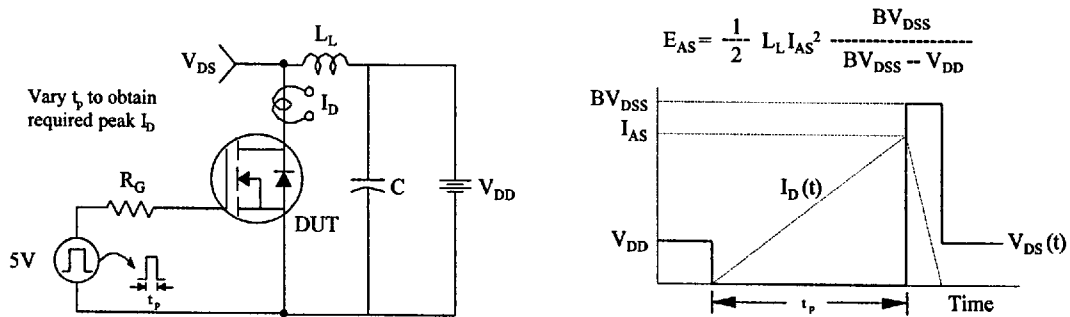
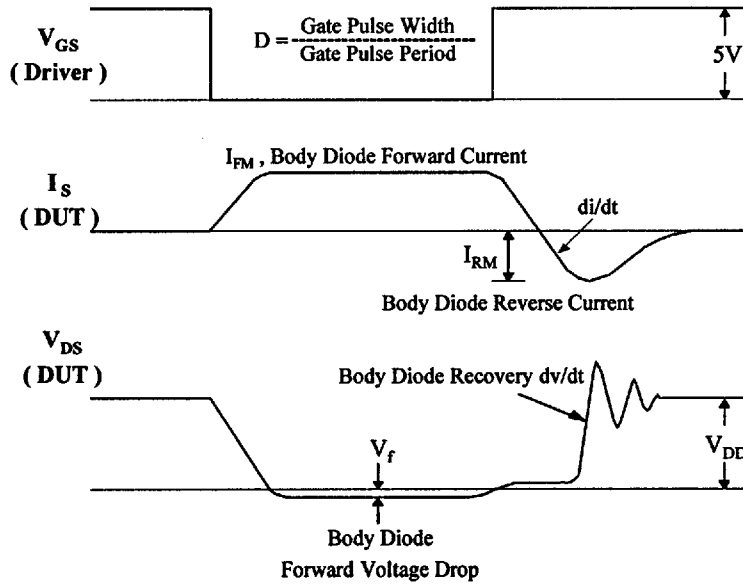
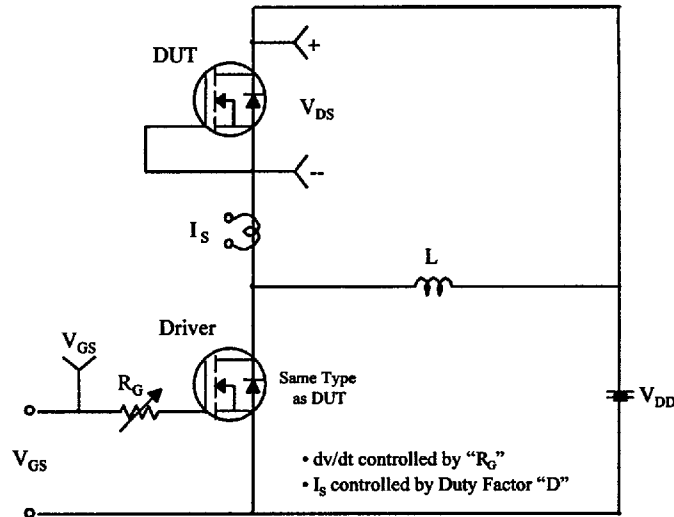
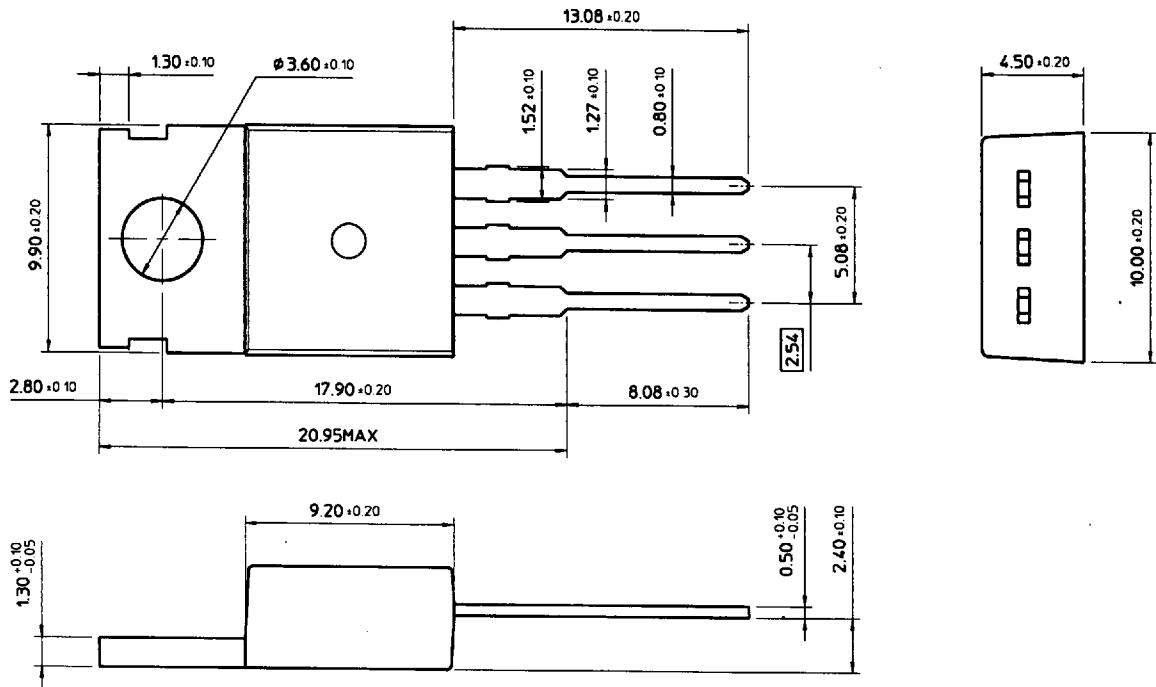


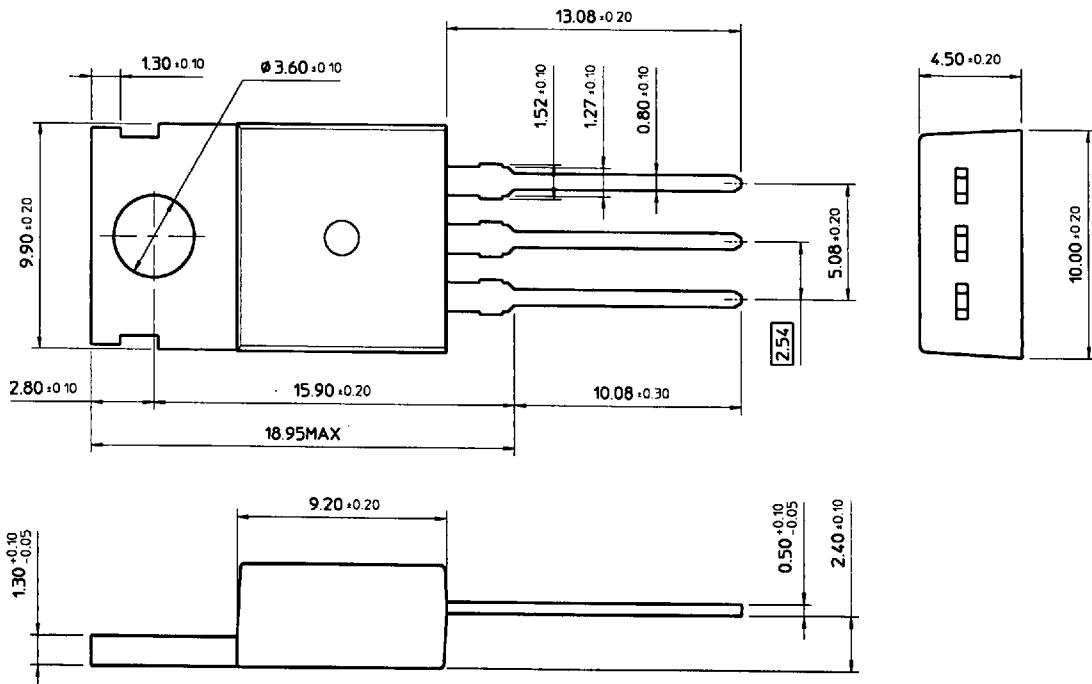
Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



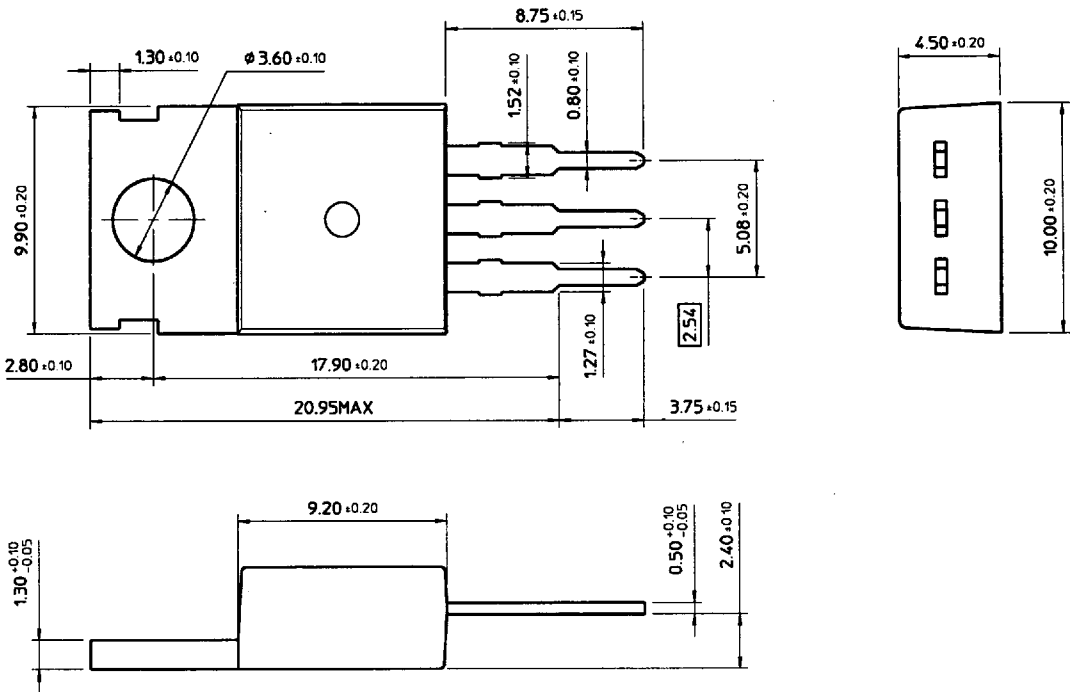
TO-220 (1)



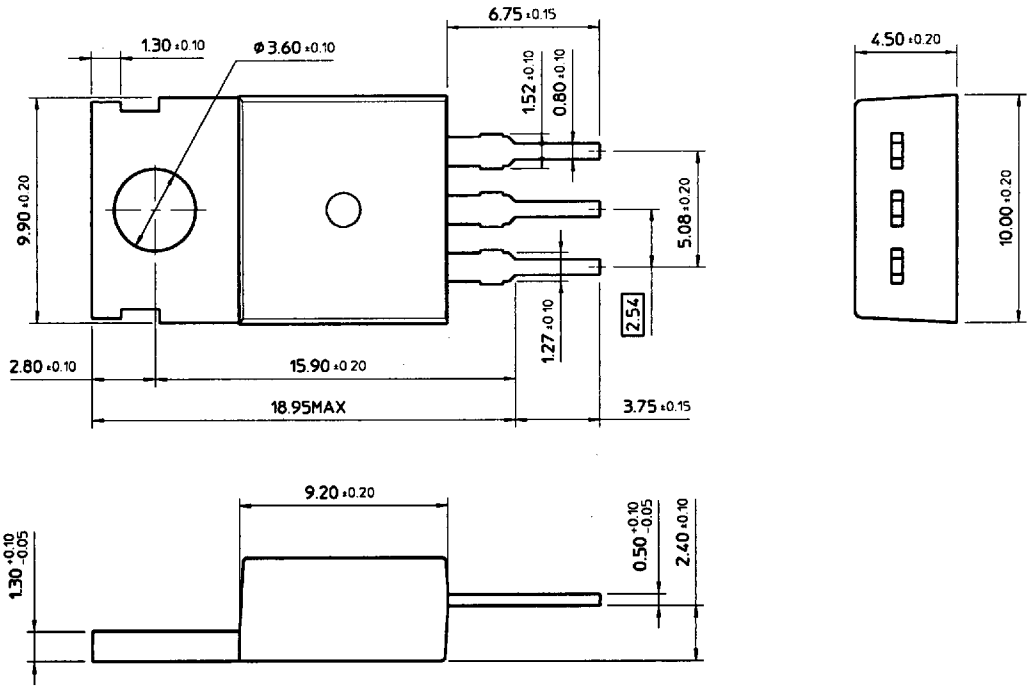
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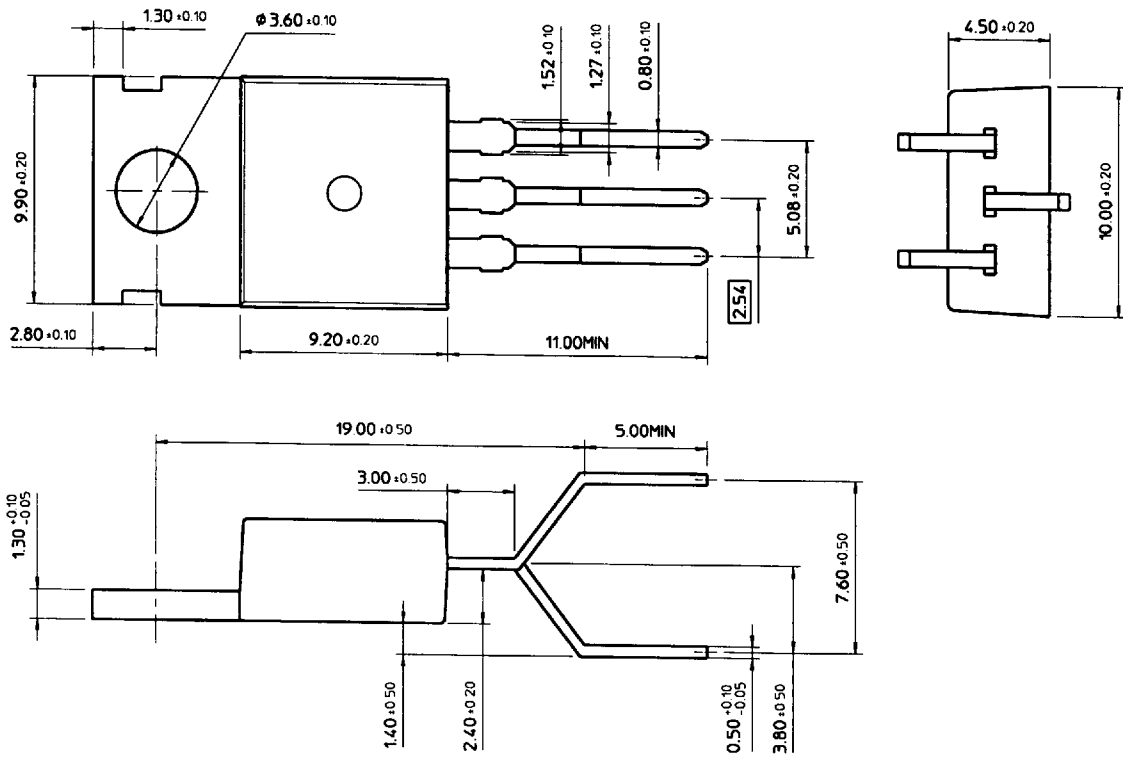
TO-220 (3)



TO-220 (4)



TO-220 (5)



NOTE