

■ PRODUCT CHARACTERISTICS

| | |
|--------------------------------|-------|
| VDSS | 650V |
| $R_{DS(on)max}(@V_{GS} = 10V)$ | 0.18Ω |
| Qg@type | 30nC |
| ID | 20A |

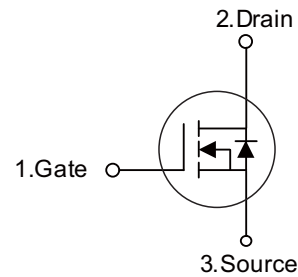
■ APPLICATIONS

- * Power factor correction
- * Switched mode power supplies
- * Uninterruptible power supply

■ FEATURES

- * low $R_{DS(on)}$
- * low gate charge
- * RoHS compliant

Symbol



■ ORDER INFORMATION

| Order codes | | Package | Packing |
|--------------|-------------|---------|----------------|
| Halogen-Free | Halogen | | |
| N/A | MOT65R180HF | TO-220F | 50 pieces/Tube |
| N/A | MOT65R180A | TO-220 | 50 pieces/Tube |

■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^{\circ}C$ unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|--|----------------|-------------|-------------|
| Drain-Source Voltage | V_{DS} | 650 | V |
| Continuous drain current ($T_C = 25^{\circ}C$) | I_D | 20 | A |
| Pulsed drain current | I_{DM} | 60 | A |
| Gate-Source voltage | V_{GS} | ± 30 | V |
| Avalanche energy, single pulse | E_{AS} | 600 | mJ |
| Avalanche current, repetitive | I_{AR} | 20 | A |
| Power Dissipation ($T_C = 25^{\circ}C$) | TO-220 | 90 | W |
| | TO-220F | 31.8 | W |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^{\circ}C$ |
| Continuous diode forward current | I_S | 20 | A |
| Diode pulse current | $I_{S,pulse}$ | 60 | A |

■ THERMAL CHARACTERISTICS

| Parameter | Symbol | Value | Unit | |
|---|---------|-----------------|------|---------------|
| Thermal Resistance, Junction-to-Case | TO-220F | $R_{\theta JC}$ | 4.2 | $^{\circ}C/W$ |
| | TO-220 | $R_{\theta JC}$ | 0.86 | $^{\circ}C/W$ |
| Thermal Resistance, Junction-to-Ambient | TO-220F | $R_{\theta JA}$ | 88 | $^{\circ}C/W$ |
| | TO-220 | $R_{\theta JA}$ | 118 | $^{\circ}C/W$ |

■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|--------------------------------------|---------------|--|-----|------|------|---------------|
| Static characteristics | | | | | | |
| Drain-source breakdown voltage | BV_{DSS} | $V_{GS}=0\text{ V}, I_D=0.25\text{ mA}$ | 650 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=0.25\text{ mA}$ | 2.5 | 3.5 | 4.5 | V |
| Drain cut-off current | I_{DSS} | $V_{DS}=650\text{ V}, V_{GS}=0\text{ V},$ $T_J = 125^\circ\text{C}$ | - | - | 1 | μA |
| | | | - | 10 | - | μA |
| Gate leakage current, Forward | I_{GSSF} | $V_{GS}=30\text{ V}, V_{DS}=0\text{ V}$ | - | - | 100 | nA |
| Gate leakage current, Reverse | I_{GSSR} | $V_{GS}=-30\text{ V}, V_{DS}=0\text{ V}$ | - | - | -100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=10\text{ V}, I_D=10\text{ A}$ $T_J = 150^\circ\text{C}$ | - | 0.15 | 0.18 | Ω |
| | | | - | 0.4 | - | Ω |
| Gate resistance | R_G | $f=1\text{ MHz}, \text{open drain}$ | - | 4.5 | - | Ω |
| Dynamic characteristics | | | | | | |
| Input capacitance | C_{iss} | $V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$ | - | 2637 | - | pF |
| Output capacitance | C_{oss} | | - | 1250 | - | pF |
| Reverse transfer capacitance | C_{rss} | | - | 17 | - | pF |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 300\text{ V}, I_D = 10\text{ A}$ $R_G = 10\Omega, V_{GS}=15\text{ V}$ | - | 23.4 | - | ns |
| Rise time | t_r | | - | 33 | - | ns |
| Turn-off delay time | $t_{d(off)}$ | | - | 121 | - | ns |
| Fall time | t_f | | - | 7.5 | - | ns |
| Gate charge characteristics | | | | | | |
| Gate to source charge | Q_{gs} | $V_{DD}=520\text{ V}, I_D=10\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$ | - | 8 | - | nC |
| Gate to drain charge | Q_{gd} | | - | 10 | - | nC |
| Gate charge total | Q_g | | - | 30 | - | nC |
| Gate plateau voltage | $V_{plateau}$ | | - | 5 | - | V |
| Reverse diode characteristics | | | | | | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=10\text{ A}$ | - | - | 1.2 | V |
| Reverse recovery time | t_{rr} | $V_R=50\text{ V}, I_F=10\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$ | - | 285 | - | ns |
| Reverse recovery charge | Q_{rr} | | - | 4.1 | - | μC |
| Peak reverse recovery current | I_{rrm} | | - | 28.4 | - | A |

■ ELECTRICAL CHARACTERISTICS DIAGRAMS

Figure 1. On-Region Characteristics

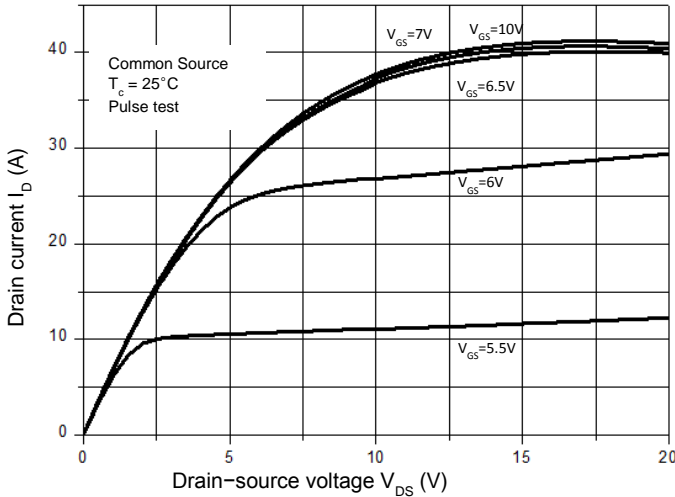


Figure 2. Transfer Characteristics

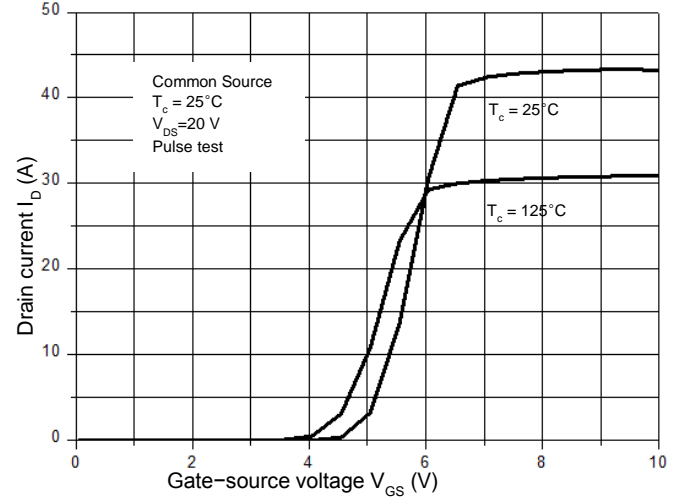


Figure 3. On-Resistance Variation vs. Drain Current

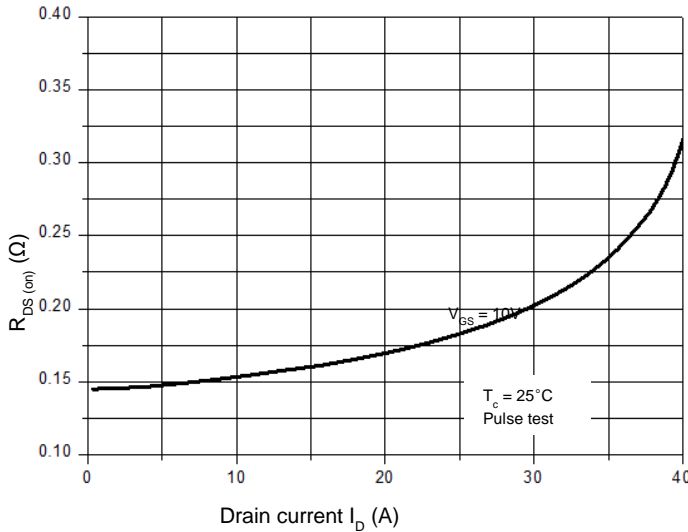


Figure 4. Threshold Voltage vs. Temperature

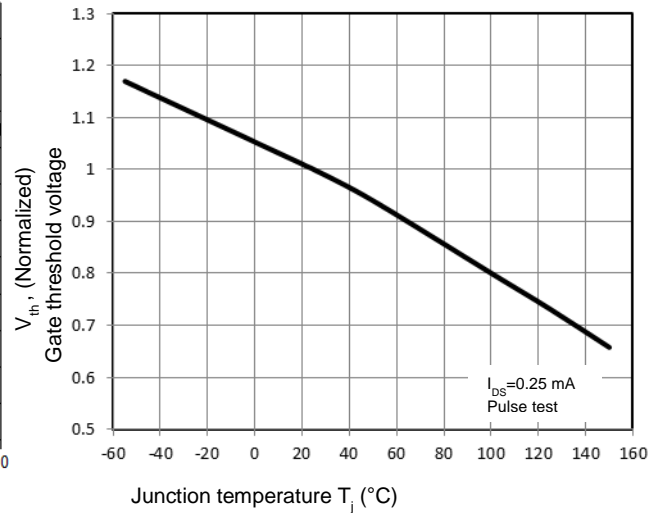


Figure 5. Breakdown Voltage vs. Temperature

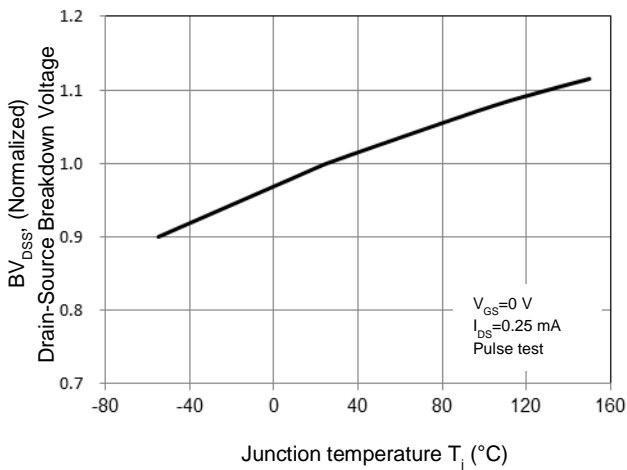
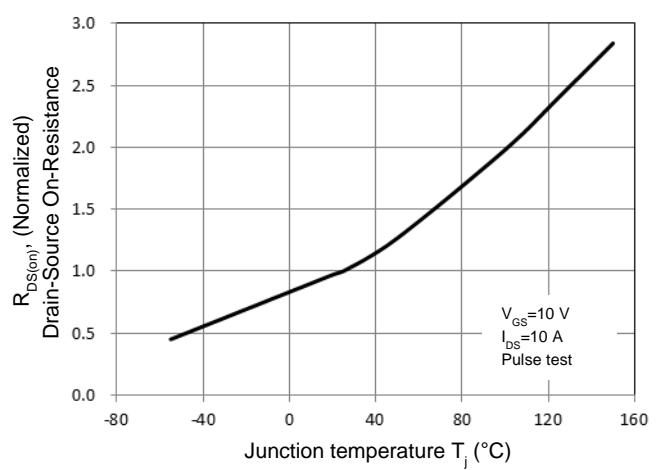


Figure 6. On-Resistance vs. Temperature



ELECTRICAL CHARACTERISTICS DIAGRAMS(Cont.)

Figure 7. Capacitance Characteristics

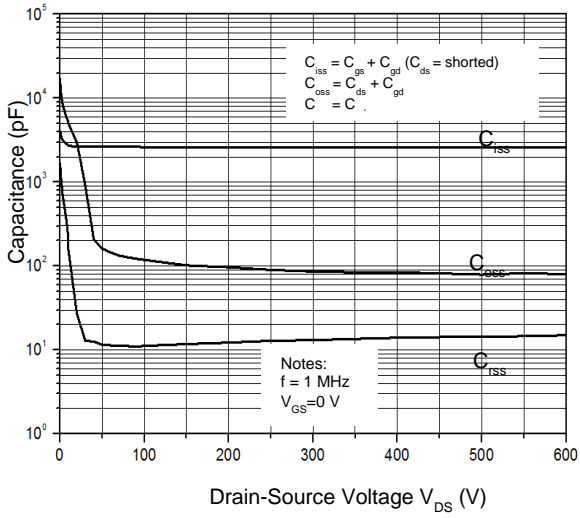


Figure 8. Gate Charge Characterist

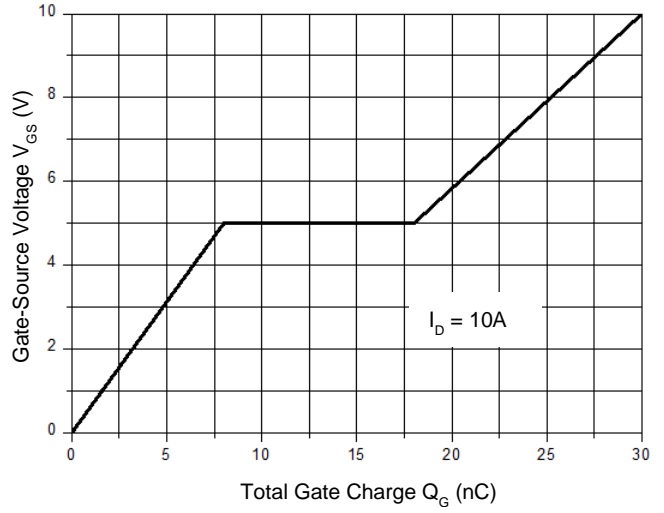


Figure 9 Maximum Safe Operating Area

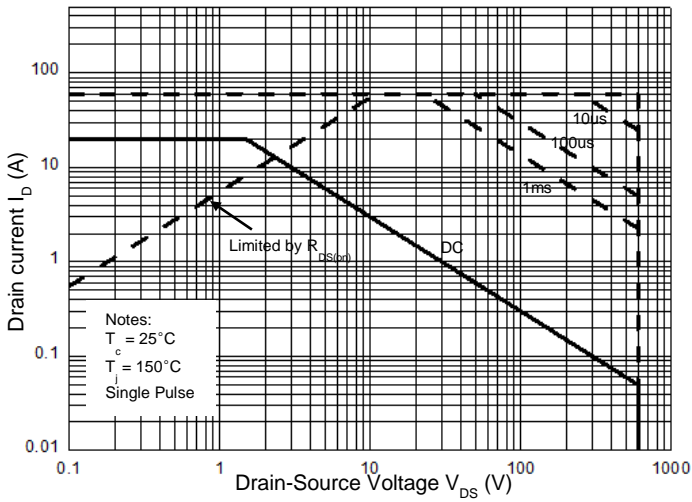
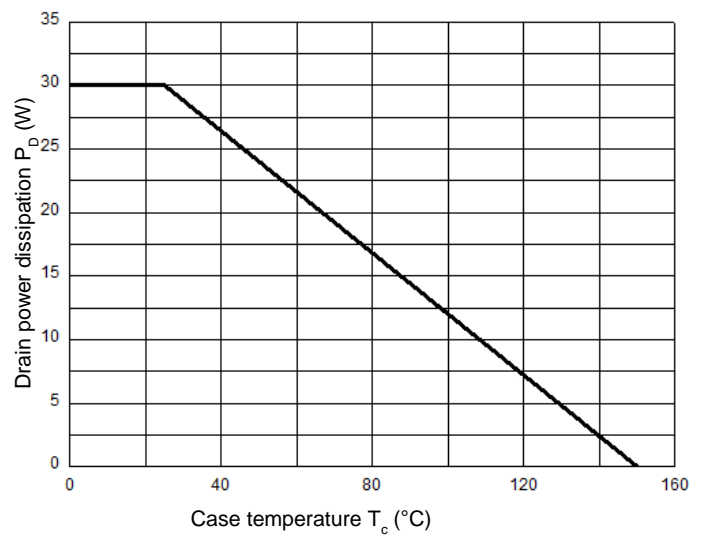
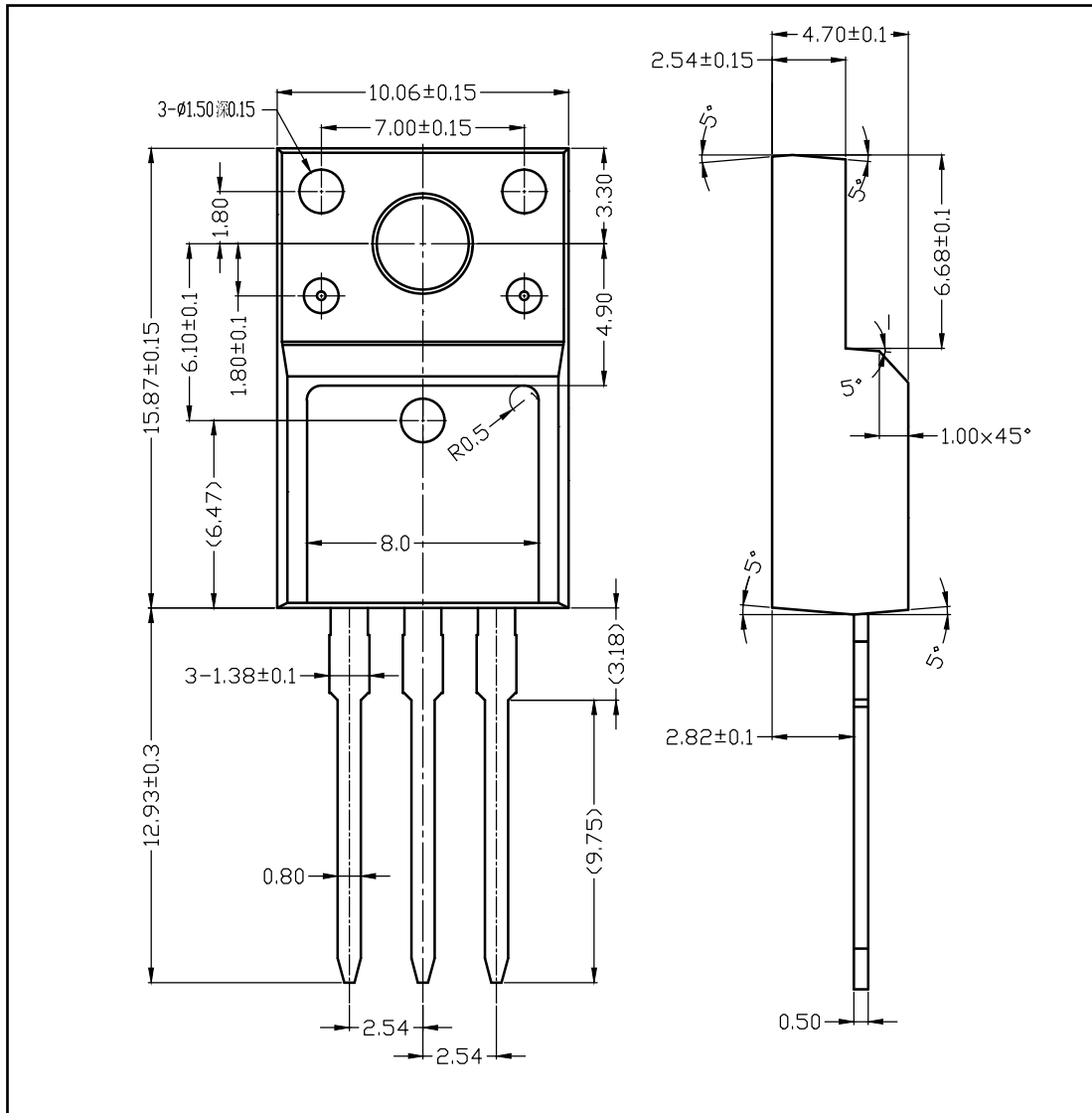


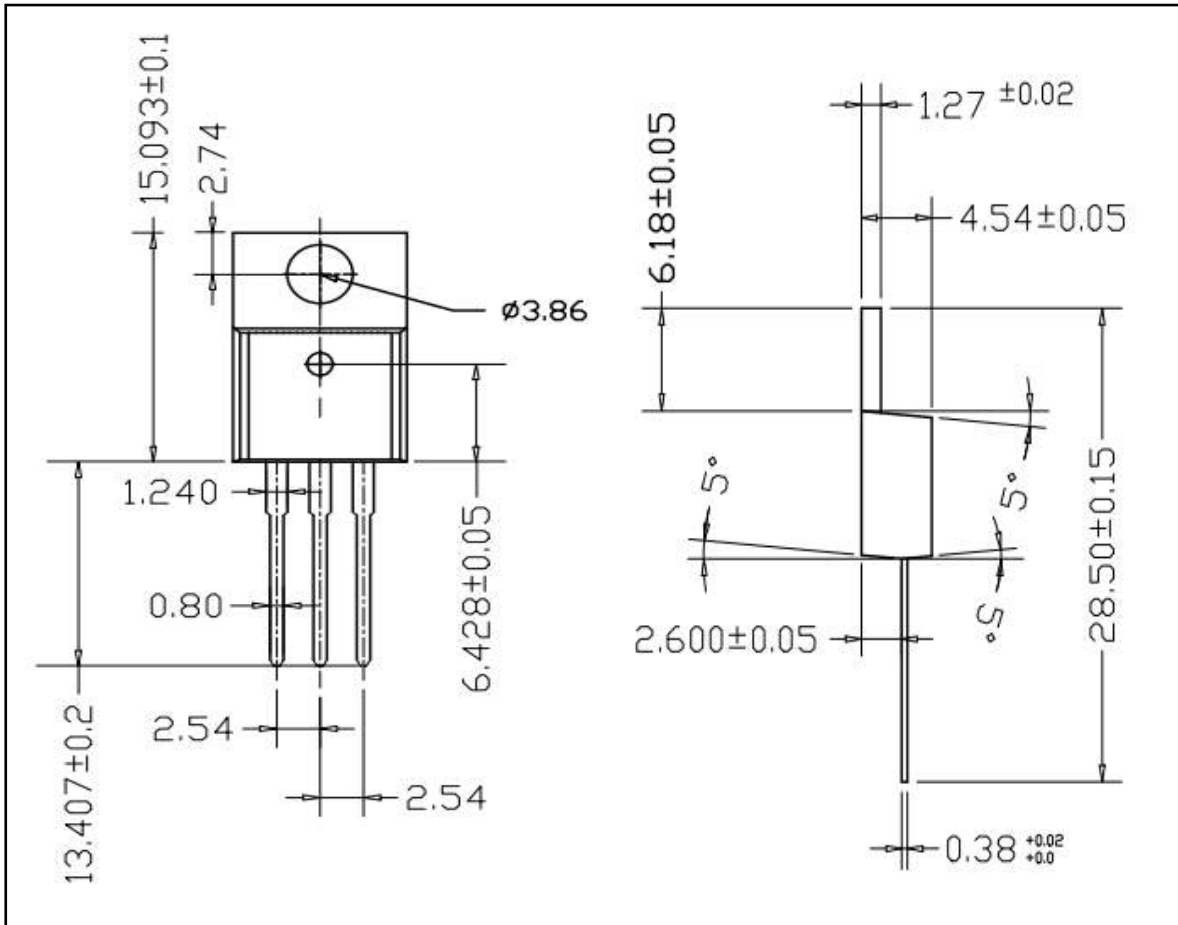
Figure 10 Power Dissipation vs. Temperature



■ TO-220F-3L PACKAGE OUTLINE DIMENSIONS



■ TO-220-3L PACKAGE OUTLINE DIMENSIONS



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