## Electrical Characteristics

$T_C$ = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 900 | -- | -- | V |
| $\Delta BV_{DSS}$ / $\Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D$ = 250 µA, Referenced to 25°C | -- | 0.96 | -- | V/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 900 V, $V_{GS}$ = 0 V | -- | -- | 10 | µA |
| | | $V_{DS}$ = 720 V, $T_C$ = 125°C | -- | -- | 100 | µA |
| $I_{GSSF}$ | Gate-Body Leakage Current, Forward | $V_{GS}$ = 30 V, $V_{DS}$ = 0 V | -- | -- | 100 | nA |
| $I_{GSSR}$ | Gate-Body Leakage Current, Reverse | $V_{GS}$ = -30 V, $V_{DS}$ = 0 V | -- | -- | -100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 3.0 | -- | 5.0 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS}$ = 10 V, $I_D$ = 2.9 A | -- | 1.5 | 1.9 | Ω |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 50 V, $I_D$ = 2.9 A (Note 4) | -- | 6.3 | -- | S |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1.0 MHz | -- | 1440 | 1880 | pF |
| $C_{oss}$ | Output Capacitance | | -- | 140 | 185 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 17 | 23 | pF |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = 450 V, $I_D$ = 5.8 A, $R_G$ = 25 Ω (Note 4, 5) | -- | 35 | 80 | ns |
| $t_r$ | Turn-On Rise Time | | -- | 80 | 170 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 95 | 200 | ns |
| $t_f$ | Turn-Off Fall Time | | -- | 55 | 120 | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = 720 V, $I_D$ = 5.8 A, $V_{GS}$ = 10 V (Note 4, 5) | -- | 40 | 52 | nC |
| $Q_{gs}$ | Gate-Source Charge | | -- | 8.5 | -- | nC |
| $Q_{gd}$ | Gate-Drain Charge | | -- | 20 | -- | nC |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain-Source Diode Forward Current | | -- | -- | 5.8 | A |
| $I_{SM}$ | Maximum Pulsed Drain-Source Diode Forward Current | | -- | -- | 23.2 | A |
| $V_{SD}$ | Drain-Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = 5.8 A | -- | -- | 1.4 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$ = 0 V, $I_S$ = 5.8 A, $dI_F$ / dt = 100 A/µs (Note 4) | -- | 400 | -- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | -- | 4.3 | -- | µC |

**Notes:**
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 40mH, $I_{AS}$ = 5.8A, $V_{DD}$ = 50V, $R_G$ = 25 Ω, Starting $T_J$ = 25°C
3. $I_{SD}$ ≤ 5.8A, 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

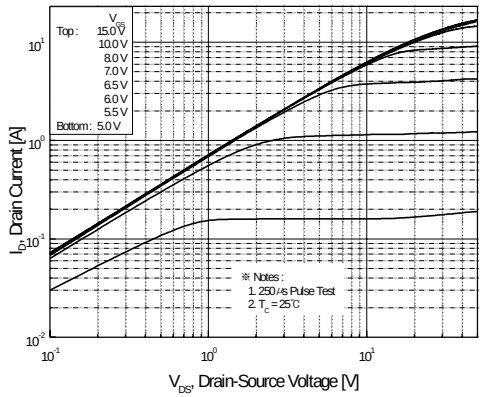



**Figure 1. On-Region Characteristics**

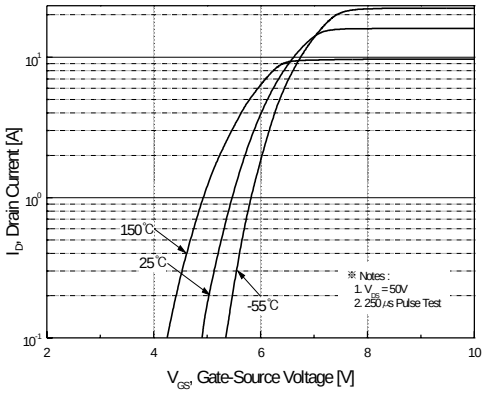



**Figure 2. Transfer Characteristics**

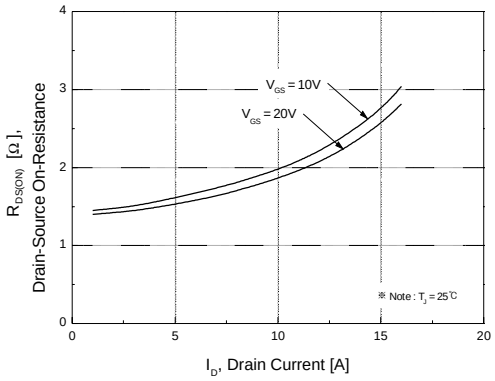



**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**

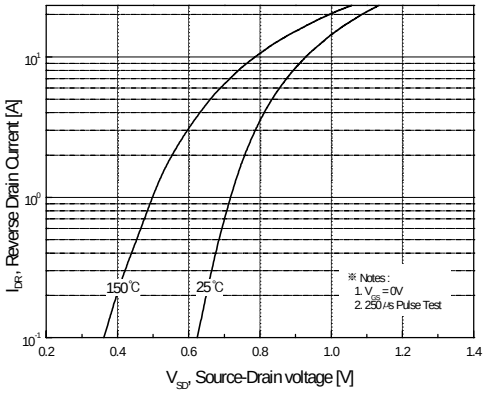



**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**

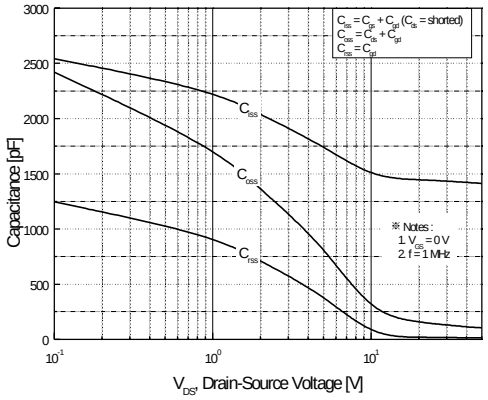



**Figure 5. Capacitance Characteristics**

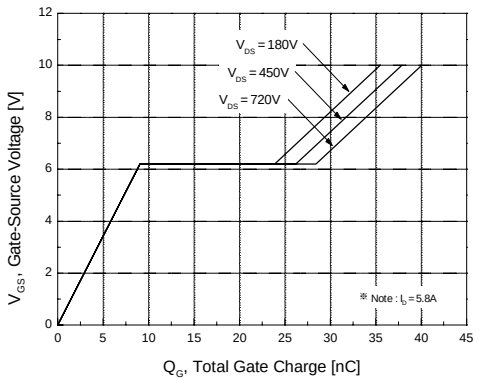



**Figure 6. Gate Charge Characteristics**

## Typical Characteristics (Continued)

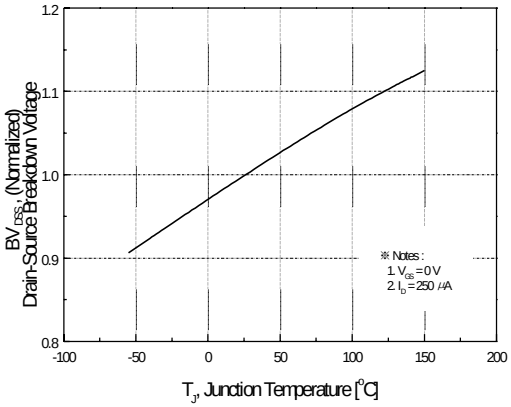



**Figure 7. Breakdown Voltage Variation vs. Temperature**

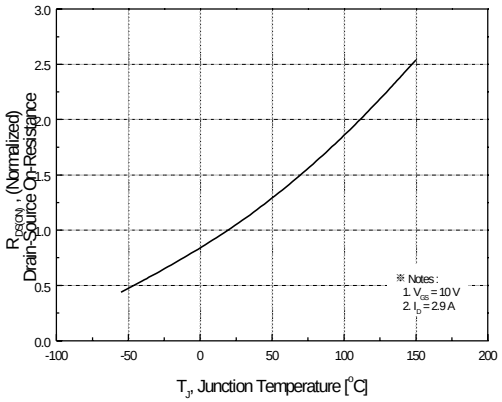



**Figure 8. On-Resistance Variation vs. Temperature**

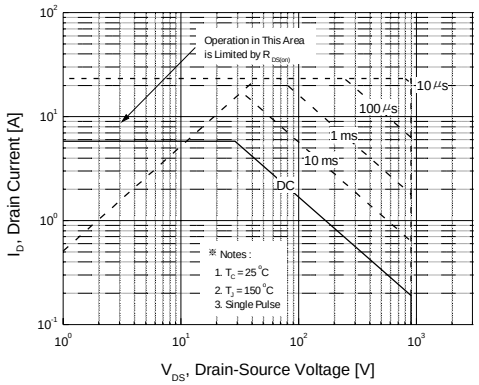



**Figure 9. Maximum Safe Operating Area**

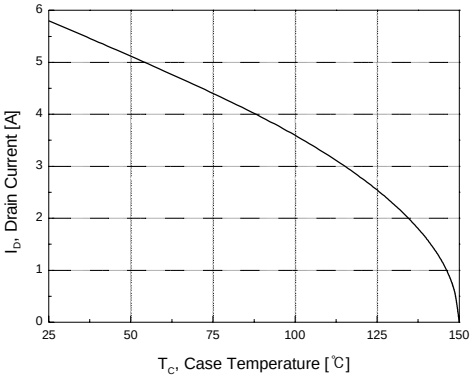



**Figure 10. Maximum Drain Current vs. Case Temperature**

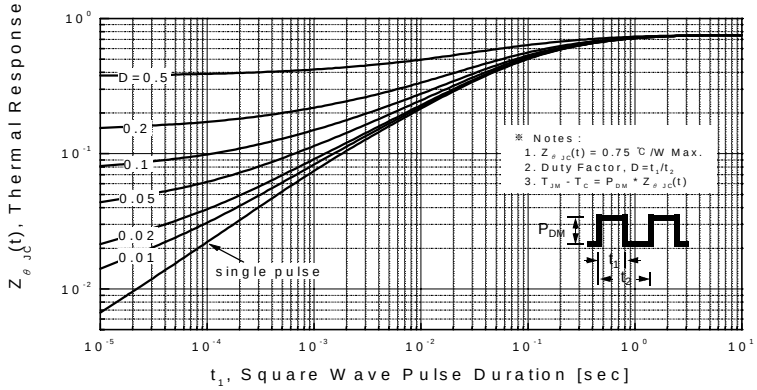
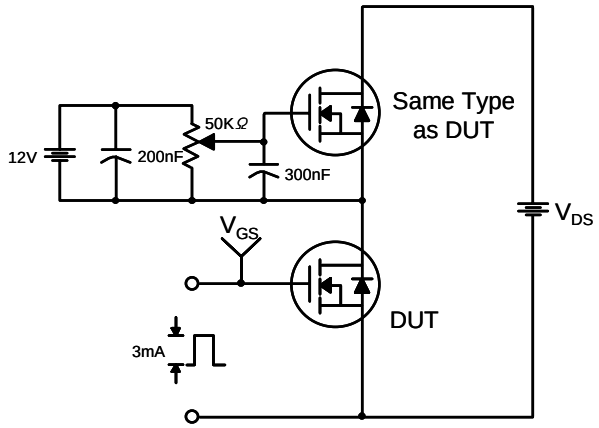
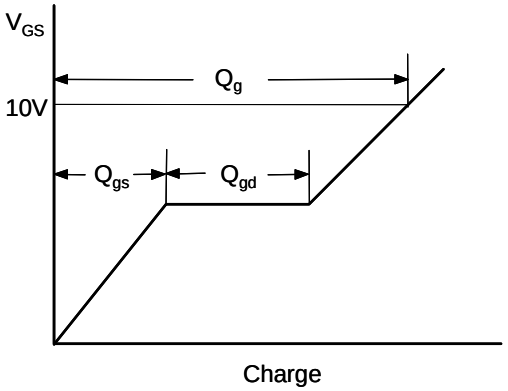


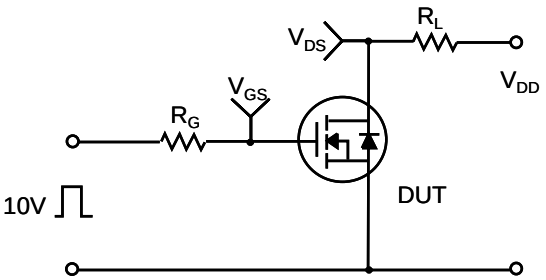

**Figure 11. Transient Thermal Response Curve**

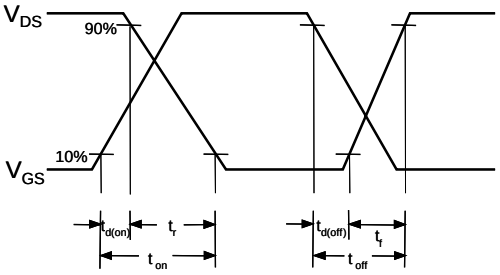
## Gate Charge Test Circuit & Waveform



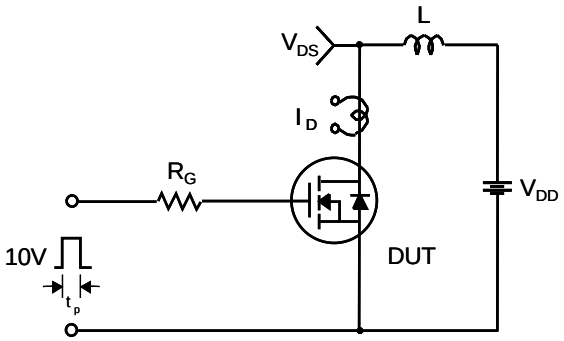




## Resistive Switching Test Circuit & Waveforms

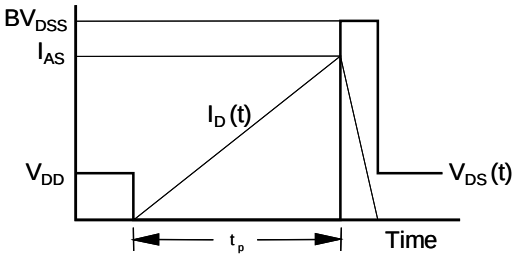


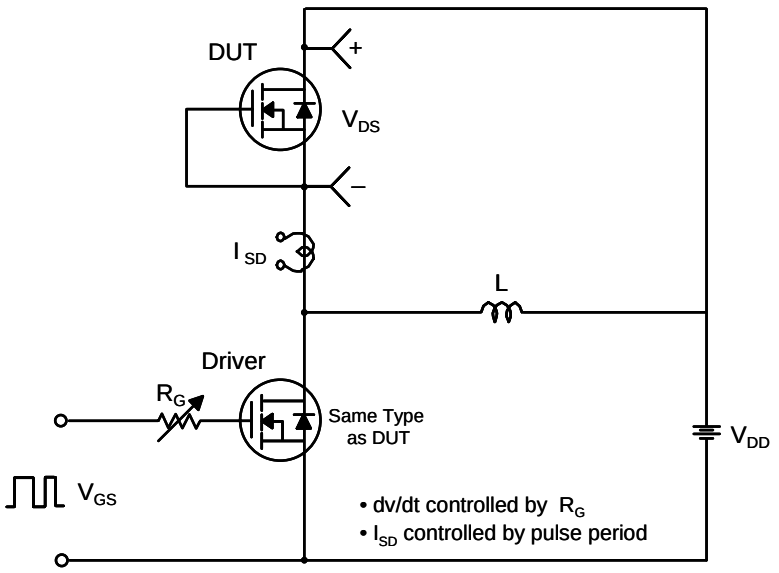

## Unclamped Inductive Switching Test Circuit & Waveforms

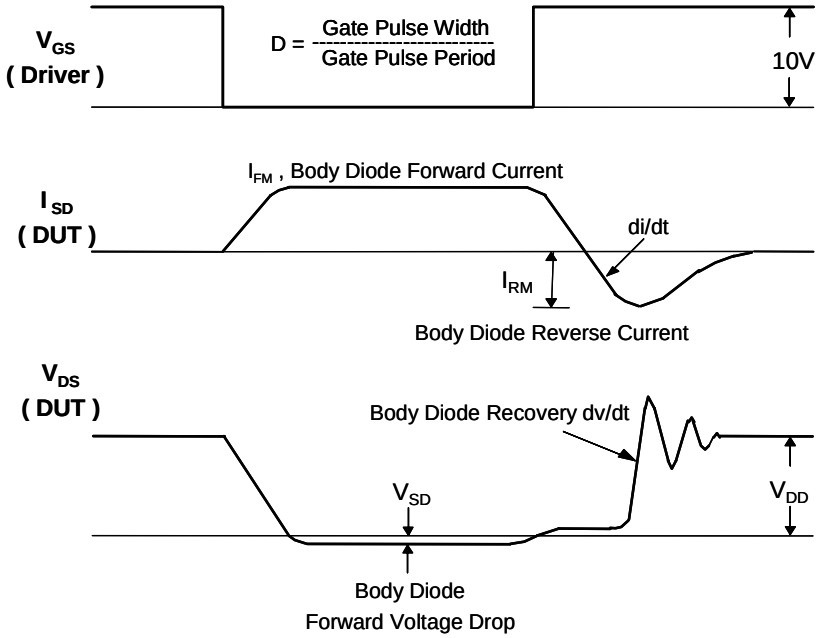



$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



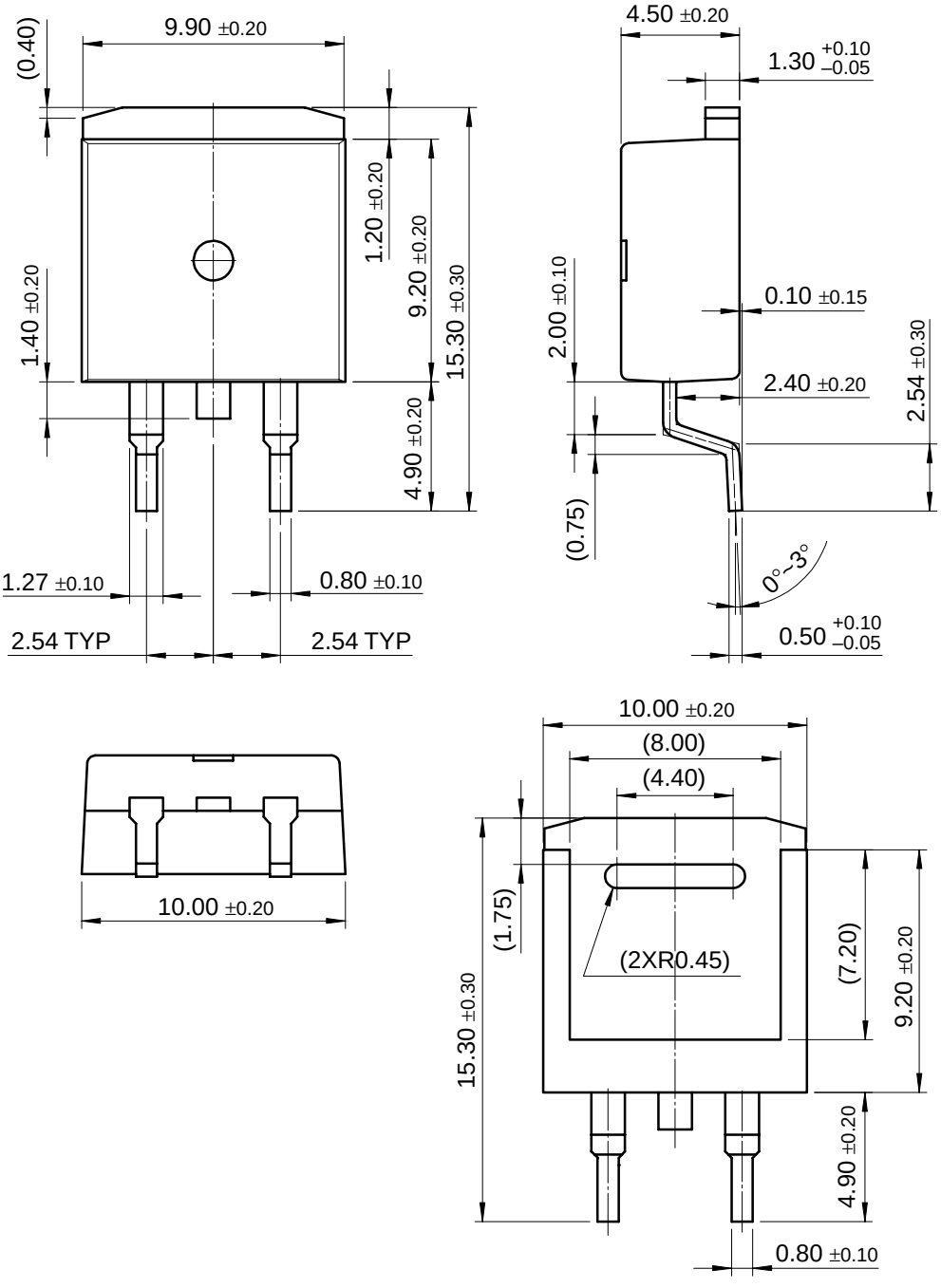
## Peak Diode Recovery dv/dt Test Circuit & Waveforms



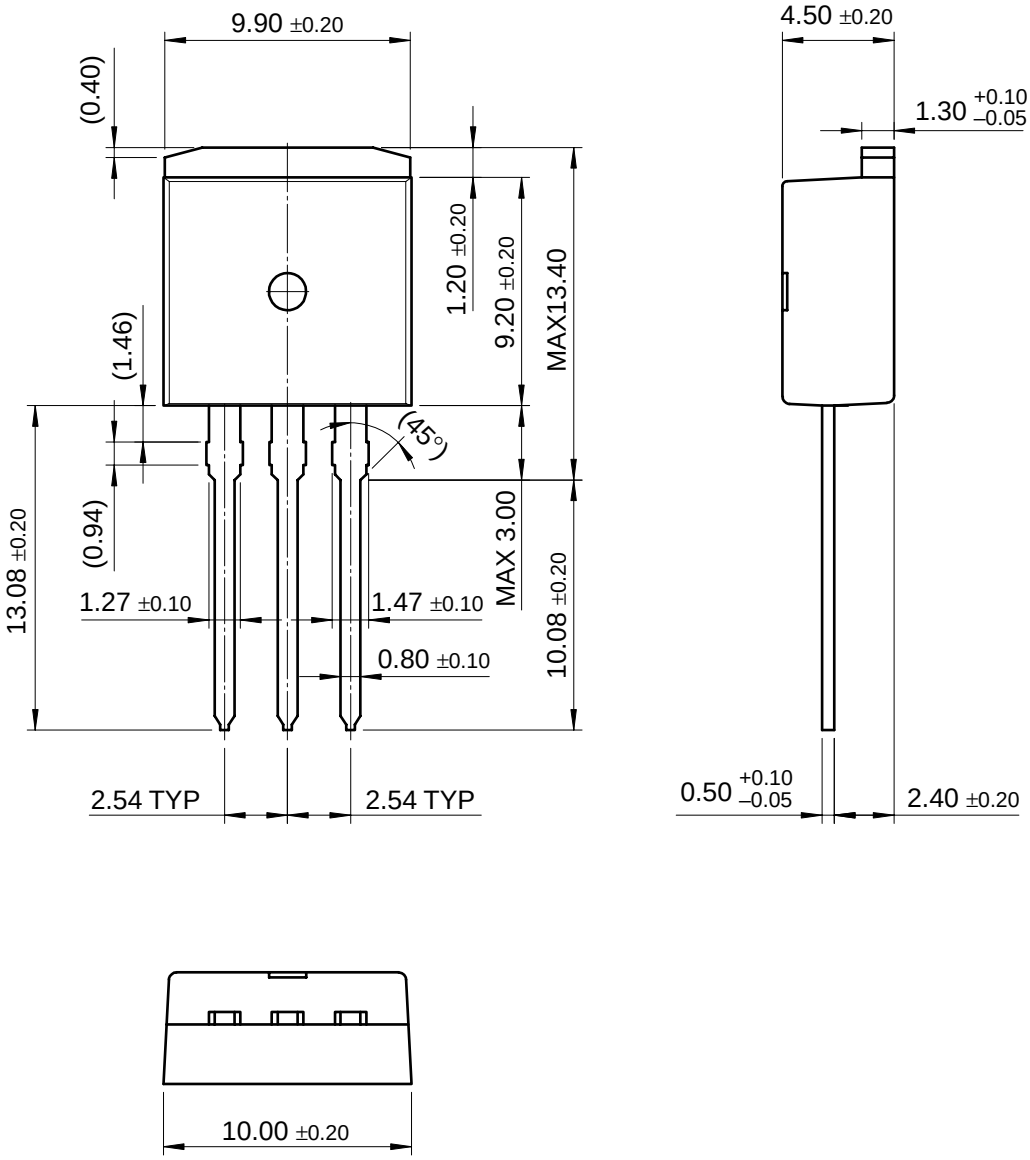
## Package Dimensions

# $D^2PAK$



## Package Dimensions (Continued)

# $I^2PAK$



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