## Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|
| FQA11N90C | FQA11N90C | TO-3P | -- | -- | 30 |
| FQA11N90C | FQA11N90C_F109 | TO-3PN | -- | -- | 30 |

## Electrical Characteristics

$T_C$ = 25°C unless otherwise noted

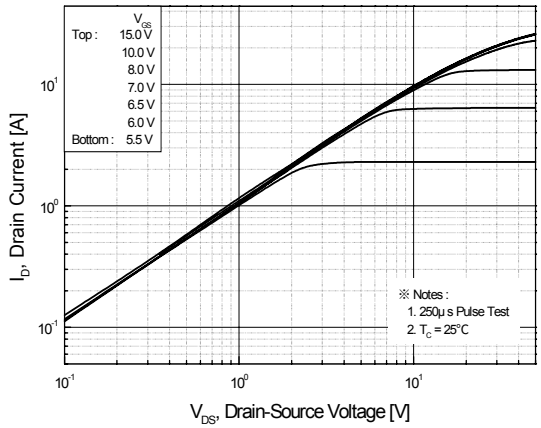
| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 μA | 900 | -- | -- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D$ = 250 μA, Referenced to 25°C | -- | 1.02 | -- | 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, $I_D$ = 5.5 A | -- | 1.12 | 1.4 | Ω |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 50 V, $I_D$ = 5.5 A (Note 4) | -- | 9.0 | -- | S |
| Dynamic Characteristics | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1.0 MHz | -- | 2530 | 3290 | pF |
| $C_{oss}$ | Output Capacitance | | -- | 215 | 280 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 23 | 30 | pF |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = 450 V, $I_D$ = 11.0A, $R_G$ = 25 Ω (Note 4, 5) | -- | 60 | 130 | ns |
| $t_r$ | Turn-On Rise Time | | -- | 130 | 270 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 130 | 270 | ns |
| $t_f$ | Turn-Off Fall Time | | -- | 85 | 180 | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = 720 V, $I_D$ = 11.0A, $V_{GS}$ = 10 V (Note 4, 5) | -- | 60 | 80 | nC |
| $Q_{gs}$ | Gate-Source Charge | | -- | 13 | -- | nC |
| $Q_{gd}$ | Gate-Drain Charge | | -- | 25 | -- | nC |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| $I_S$ | Maximum Continuous Drain-Source Diode Forward Current | | -- | -- | 11.0 | A |
| $I_{SM}$ | Maximum Pulsed Drain-Source Diode Forward Current | | -- | -- | 44.0 | A |
| $V_{SD}$ | Drain-Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ =11.0 A | -- | -- | 1.4 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$ = 0 V, $I_S$ = 11.0 A, $dI_F$ / dt = 100 A/μs (Note 4) | -- | 1000 | -- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | -- | 17.0 | -- | μC |

**NOTES:**

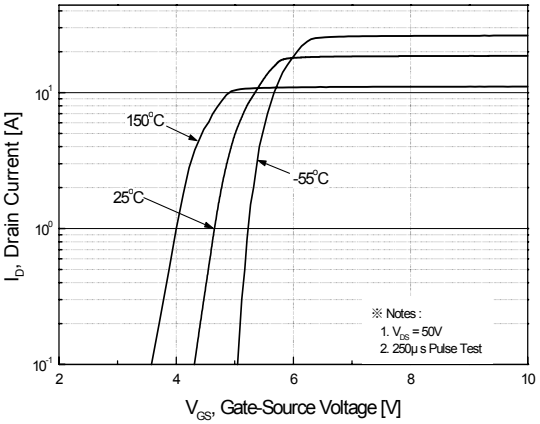
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 15mH, $I_{AS}$ =11.0A, $V_{DD}$ = 50V, $R_G$ = 25 Ω, Starting $T_J$ = 25°C
3. $I_{SD}$ ≤ 11.0A, di/dt ≤200A/μs, $V_{DD}$ ≤ $BV_{DSS}$, Starting $T_J$ = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

## Typical Performance Characteristics

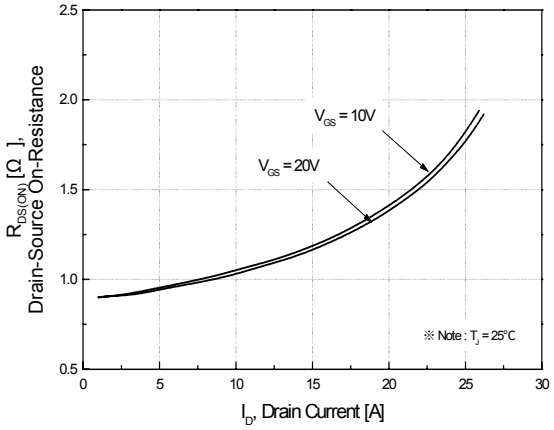
### Figure 1. On-Region Characteristics



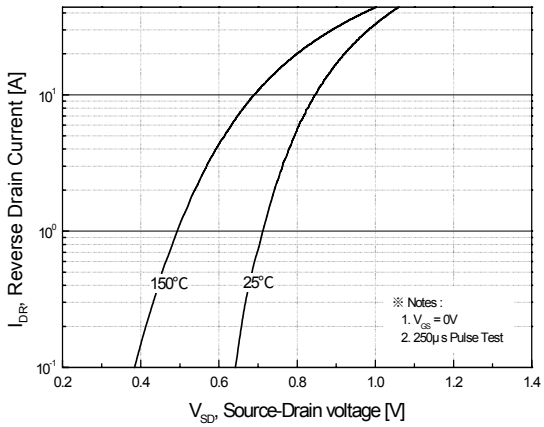

### Figure 2. Transfer Characteristics



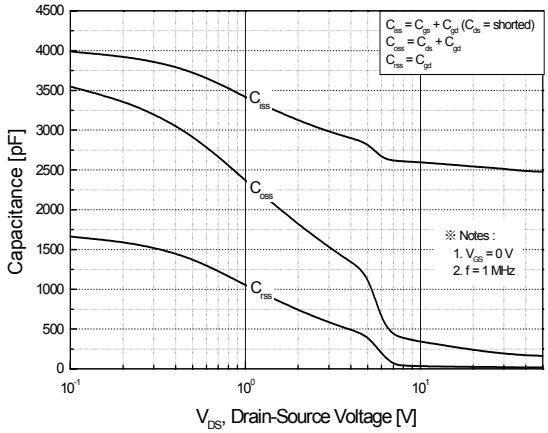

### Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage



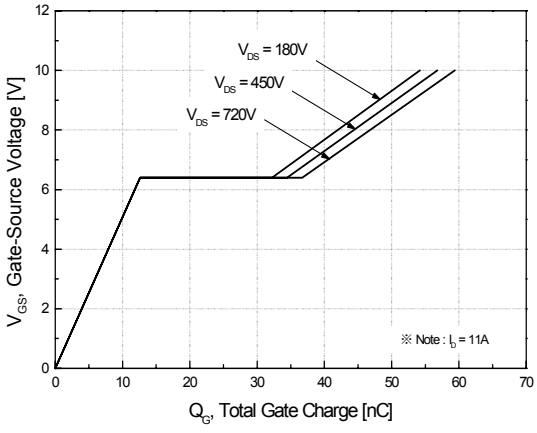

### Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue




### Figure 5. Capacitance Characteristics




### Figure 6. Gate Charge Characteristics



## Typical Performance Characteristics (Continued)

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

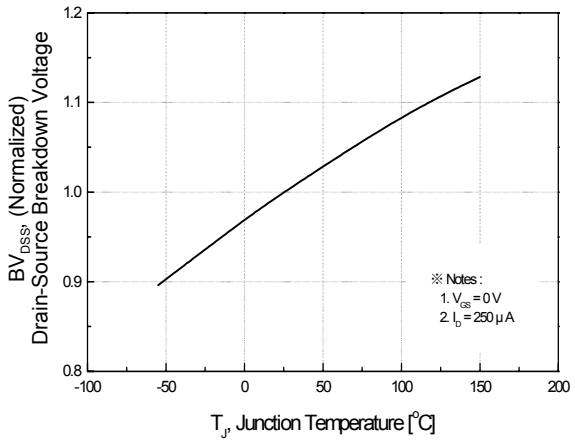



**Figure 8. On-Resistance Variation vs. Temperature**

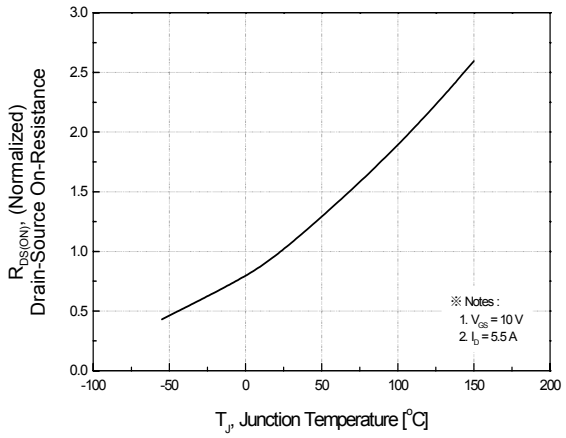



**Figure 9. Maximum Safe Operating Area**

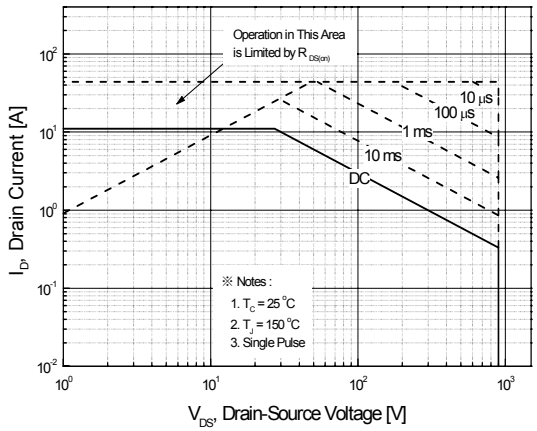



**Figure 10. Maximum Drain Current vs. Case Temperature**

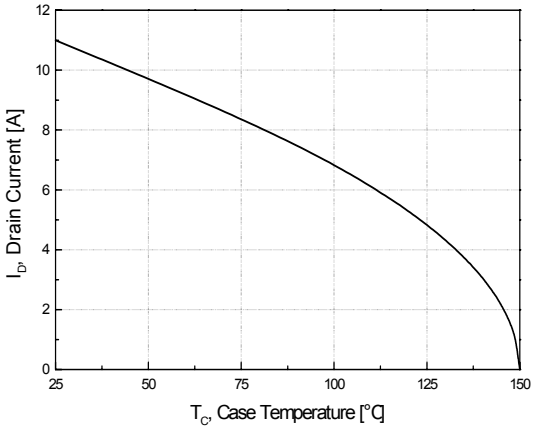
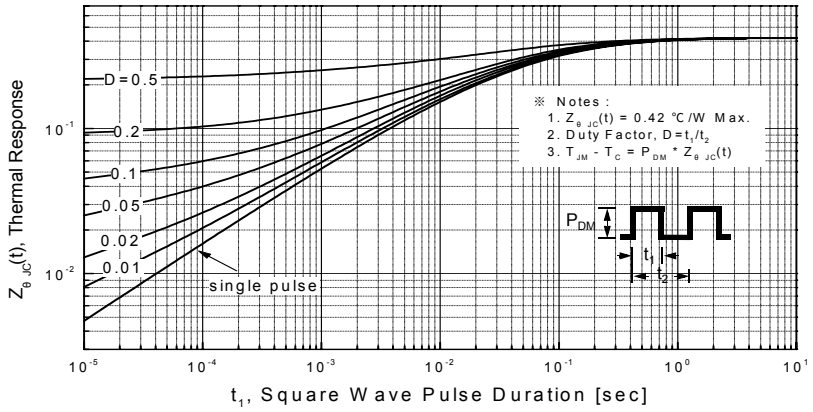
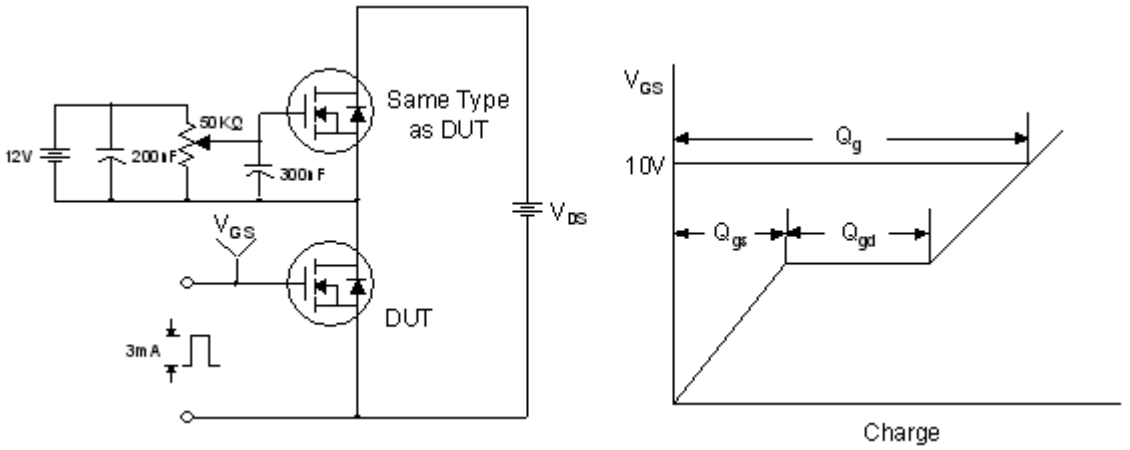


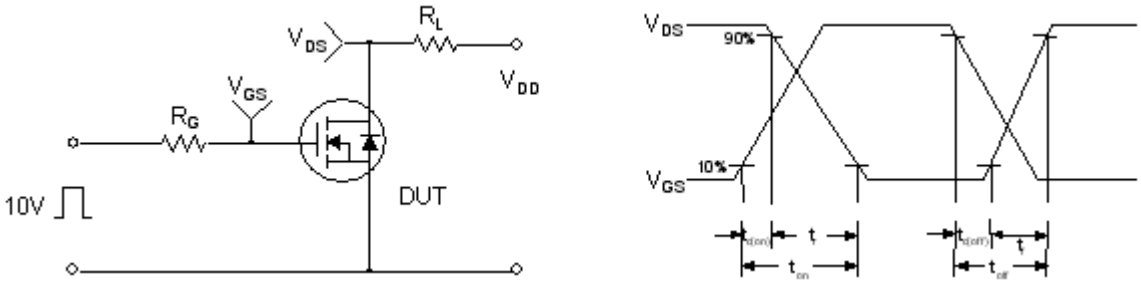

**Figure 11. Transient Thermal Response Curve**



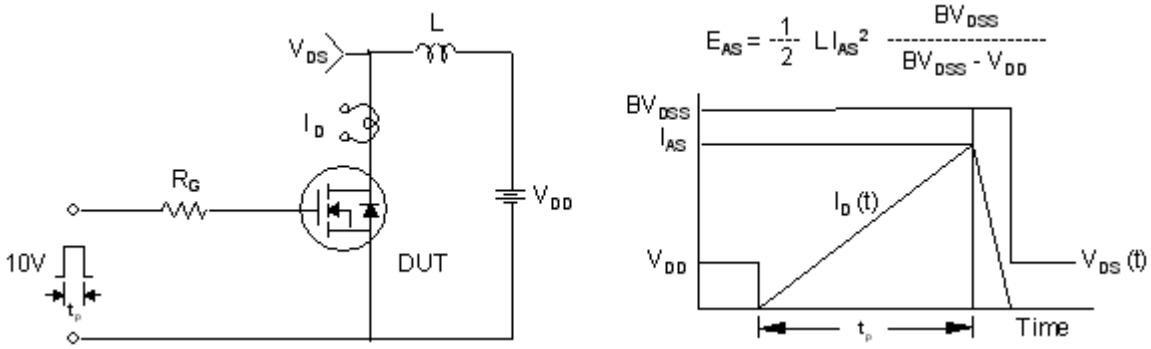
**Gate Charge Test Circuit & Waveform**



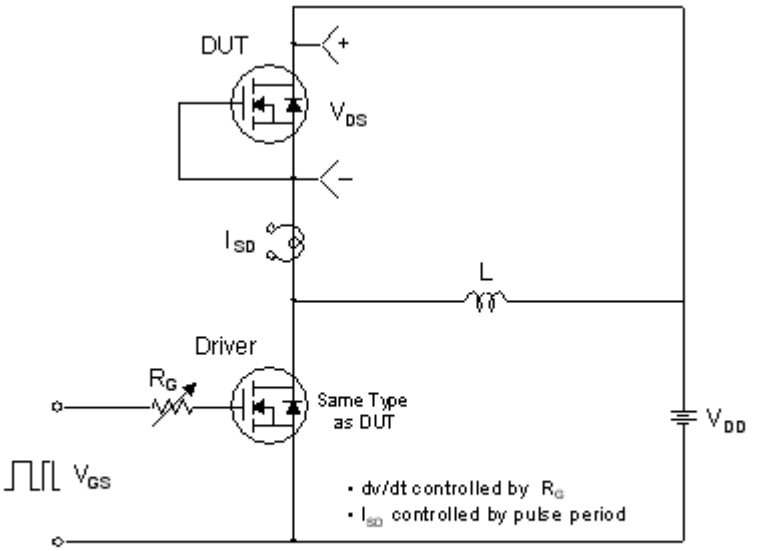

**Resistive Switching Test Circuit & Waveforms**

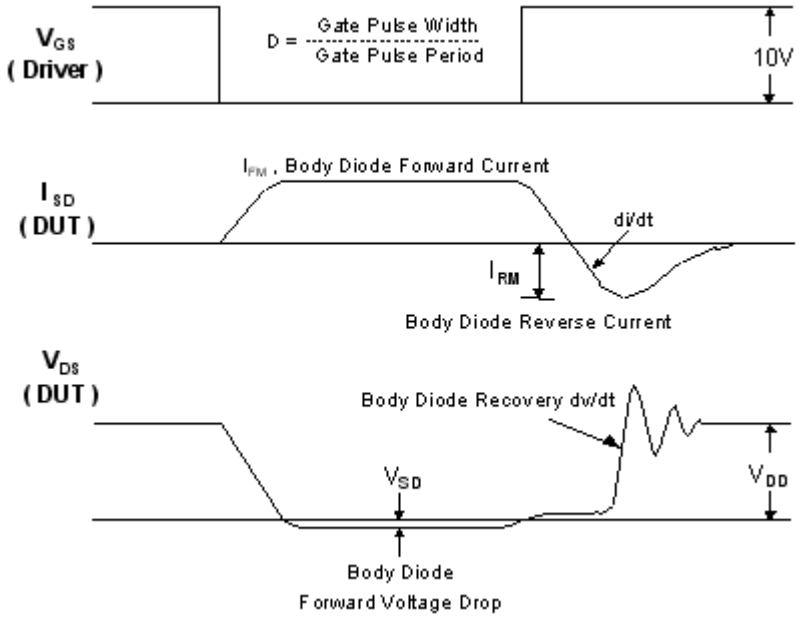



**Unclamped Inductive Switching Test Circuit & Waveforms**



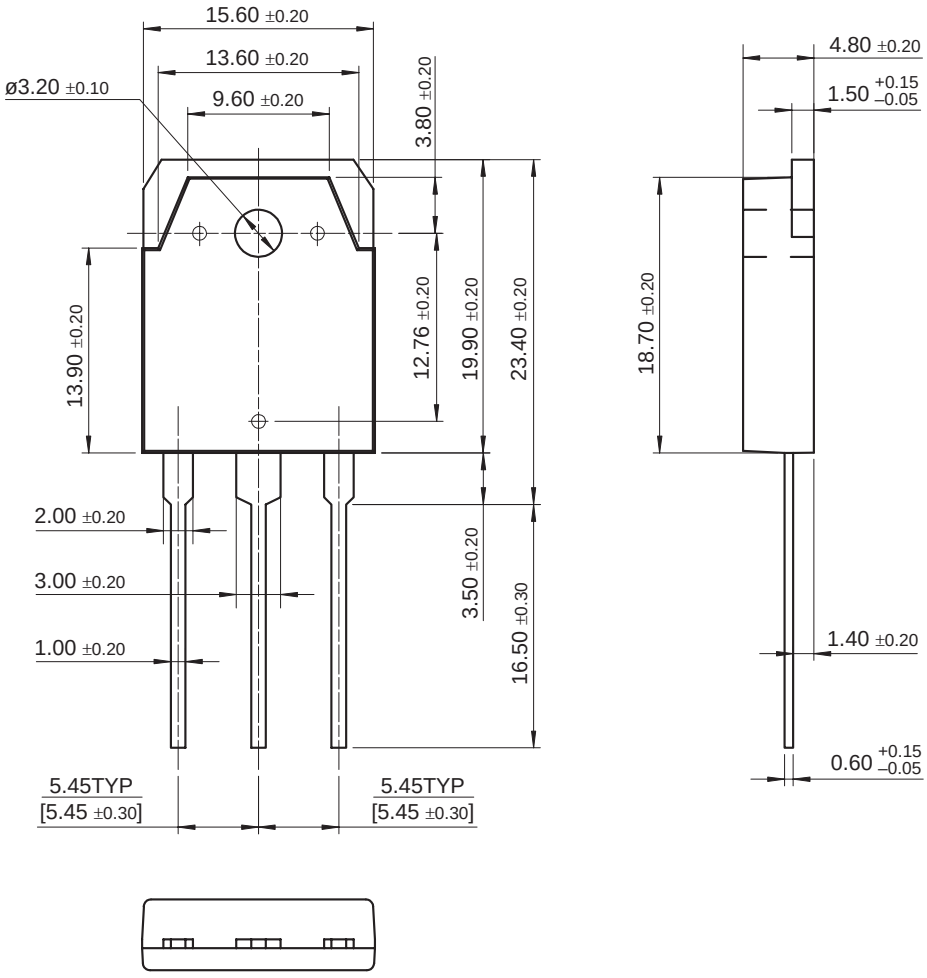
**Peak Diode Recovery dv/dt Test Circuit & Waveforms**



## Mechanical Dimensions

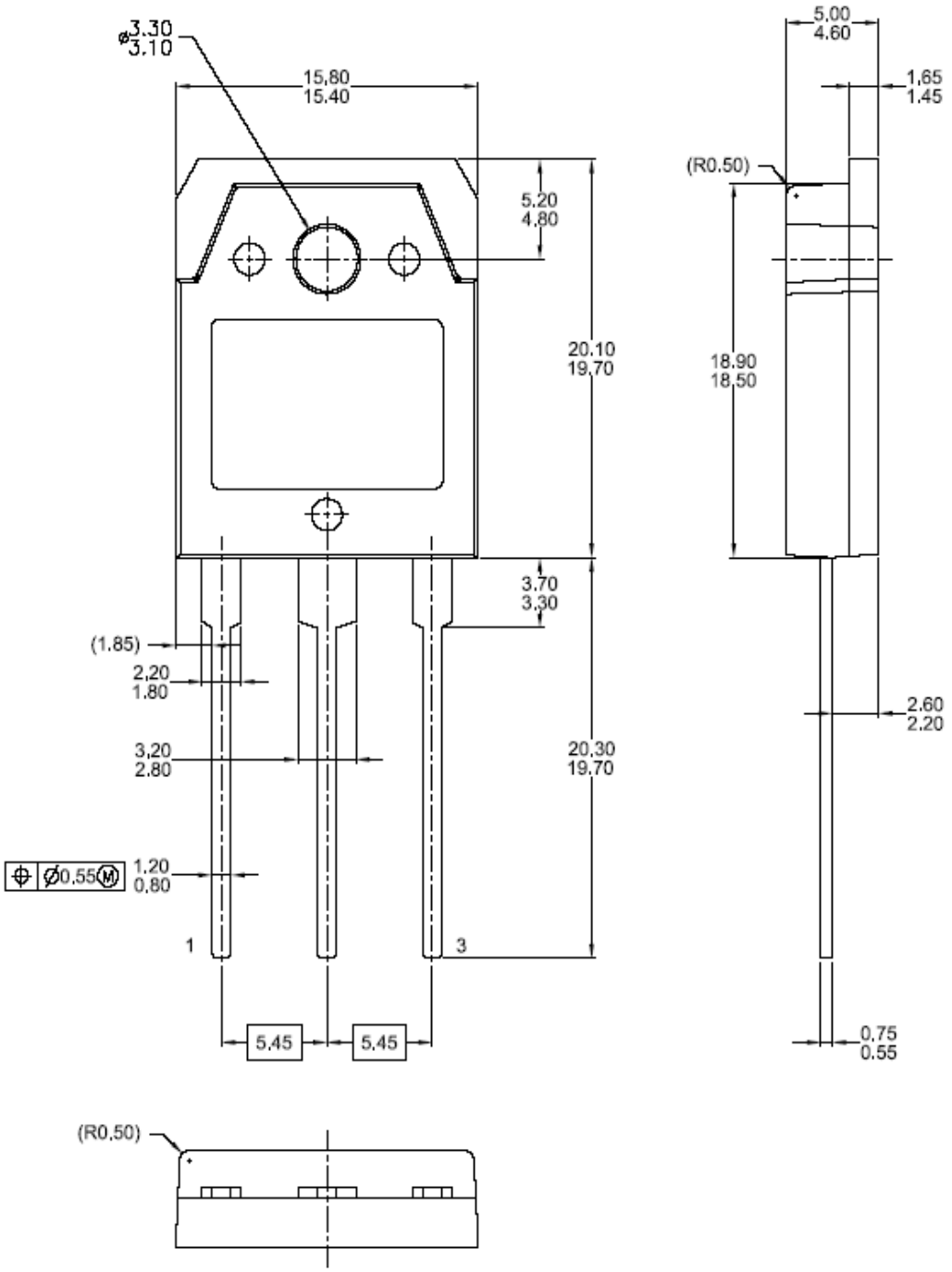
TO-3P




Dimensions in Millimeters

## Mechanical Dimensions (Continued)

# TO-3PN




Dimensions in Millimeters

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