FAIRCHILD SEMICONDUCTOR®

October 2007

# HUF75344A3

## N-Channel UltraFET Power MOSFET

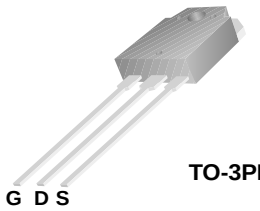
**55V, 75A, 8mΩ**

### Features

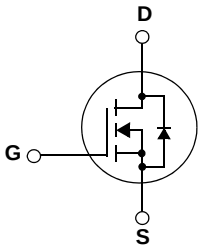
- $R_{DS(on)}$ = 6.5mΩ ( Typ.)@ $V_{GS}$ = 10V, $I_D$ = 75A
- RoHS compliant

### Description

- This N-channel power MOSFET is produced using Fairchild Semiconductor's innovative UltraFET process. This advanced process technology achieves the lowest possible on-resistance per silicon area, resulting in outstanding performance. This device is capable of withstanding high energy in the avalanche mode and the diode exhibits very low reverse recovery time and stored change. It was designed for use in applications where power efficiency is important, such as switching regulators, switching converters, motro drives, relay drivers, low-voltage bus switches, and power management in portable and battery-operated products.




**TO-3PN**




## MOSFET Maximum Ratings $T_C$ = 25°C unless otherwise noted

| Symbol | Parameter | | Ratings | Units |
|---|---|---|---|---|
| $V_{DSS}$ | Drain to Source Voltage | | 55 | V |
| $V_{GSS}$ | Gate to Source Voltage | | ±20 | V |
| $I_D$ | Drain Current | -Continuous ($T_C$ = 130°C) | 75 | A |
| $I_{DM}$ | Drain Current | - Pulsed | 300 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy | (Note 1) | 1153 | mJ |
| $P_D$ | Power Dissipation | ($T_C$ = 25°C) | 288.5 | W |
| | | - Derate above 25°C | 1.92 | W/°C |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | | -55 to +175 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds | | 300 | °C |

## Thermal Characteristics

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 0.52 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 40 | |

## Package Marking and Ordering Information $T_C = 25^oC$ unless otherwise noted

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|
| HUF75344A3 | HUF75344A3 | TO-3PN | - | - | 30 |

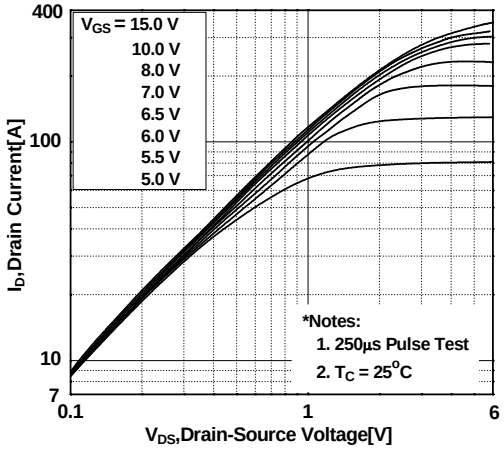
## Electrical Characteristics

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain to Source Breakdown Voltage | $I_D = 250\mu A$, $V_{GS} = 0V$, $T_J = 25^oC$ | 55 | - | - | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\mu A$, Referenced to $25^oC$ | - | 0.07 | - | $V/^oC$ |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS} = 50V$, $V_{GS} = 0V$ | - | - | 1 | $\mu A$ |
| | | $V_{DS} = 45V$, $V_{GS} = 0V$, $T_J = 150^oC$ | - | - | 250 | |
| $I_{GSS}$ | Gate to Body Leakage Current | $V_{GS} = \pm 20V$, $V_{DS} = 0V$ | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}$, $I_D = 250\mu A$ | 2 | - | 4 | V |
| $R_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS} = 10V$, $I_D = 75A$ | - | 6.5 | 8.0 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS} = 25V$, $V_{GS} = 0V$, f = 1MHz | - | 3650 | 4855 | pF |
| $C_{oss}$ | Output Capacitance | | - | 980 | 1305 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 135 | 205 | pF |
| $Q_{g(tot)}$ | Total Gate Charge at 20V | $V_{GS} = 0V$ to 20V; $V_{DS} = 30V$, $I_D = 75A$, $I_g = 1mA$ | - | 160 | 208 | nC |
| $Q_{g(10)}$ | Total Gate Charge at 10V | $V_{GS} = 0V$ to 10V; $V_{DS} = 30V$, $I_D = 75A$, $I_g = 1mA$ | - | 86 | 112 | nC |
| $Q_{g(th)}$ | Threshold Gate Charge | $V_{GS} = 0V$ to 2V; $V_{DS} = 30V$, $I_D = 75A$, $I_g = 1mA$ | | 7 | 9 | nC |
| $Q_{gs}$ | Gate to Source Gate Charge | $V_{DS} = 30V$, $I_D = 75A$, $I_g = 1mA$ | - | 17 | - | nC |
| $Q_{gd}$ | Gate to Drain “Miller” Charge | $V_{DS} = 30V$, $I_D = 75A$, $I_g = 1mA$ | - | 28 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{ON}$ | Turn-On Time | $V_{DD} = 30V$, $I_D = 75A$, $V_{GS} = 10V$, $R_{GEN} = 3\Omega$ | - | 146 | 310 | ns |
| $t_{d(on)}$ | Turn-On Delay Time | | - | 19 | 48 | ns |
| $t_r$ | Turn-On Rise Time | | - | 126 | 262 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 61 | 130 | ns |
| $t_f$ | Turn-Off Fall Time | | - | 20 | 48 | ns |
| $t_{OFF}$ | Turn-Off Time | | - | 80 | 178 | ns |
| **Drain-Source Diode Characteristics** | | | | | | |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS} = 0V$, $I_{SD} = 75A$ | - | - | 1.25 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS} = 0V$, $I_{SD} = 75A$, $dI_F/dt = 100A/\mu s$ | - | 79 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 270 | - | nC |

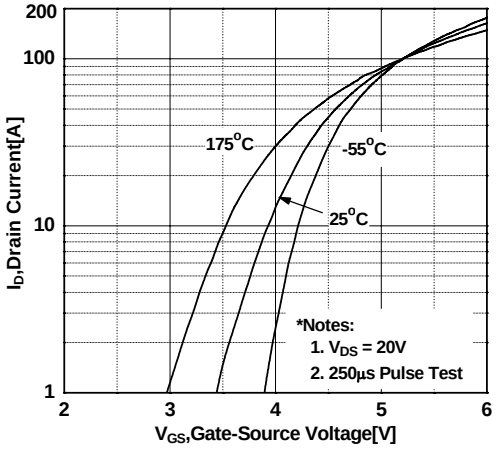
**Notes:**
1: L = 0.41mH, $I_{AS} = 75A$, $V_{DD} = 50V$, $V_{GS} = 10V$, $R_G = 25\Omega$, Starting $T_J = 25^oC$

## Typical Performance Characteristics

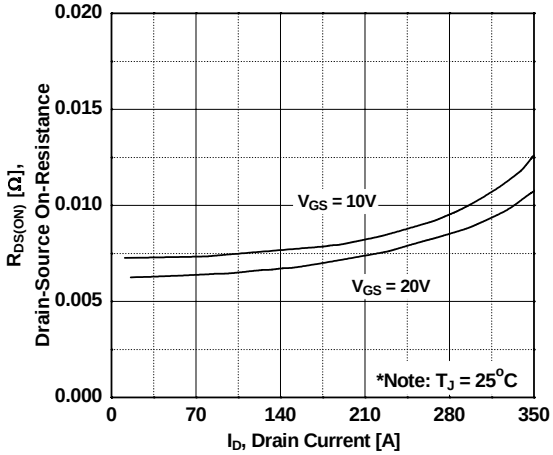
### Figure 1. On-Region Characteristics



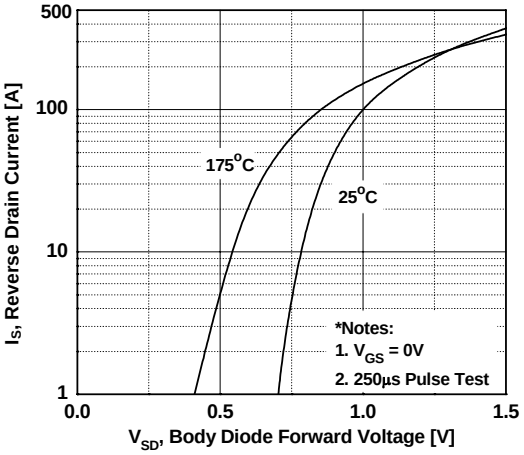

### Figure 2. Transfer Characteristics



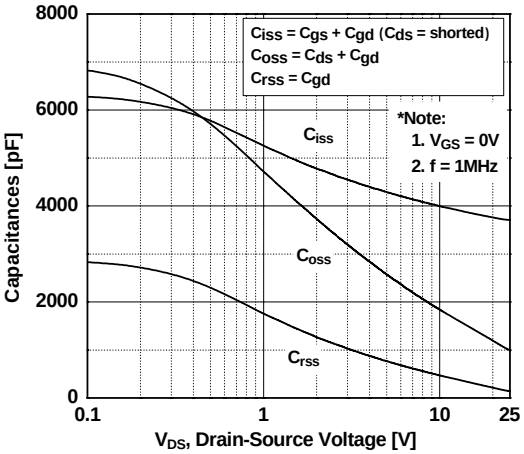

### Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage



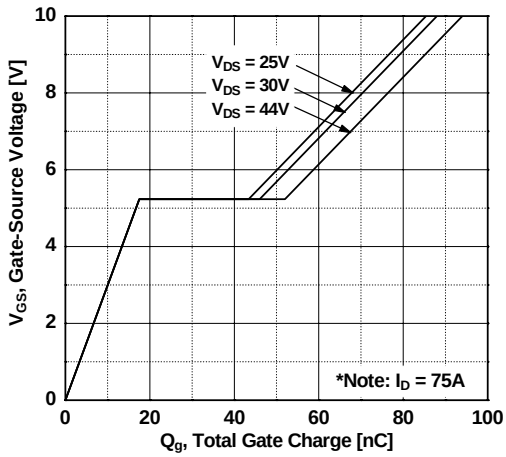

### Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature




### Figure 5. Capacitance Characteristics




### Figure 6. Gate Charge Characteristics



## Typical Performance Characteristics (Continued)

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

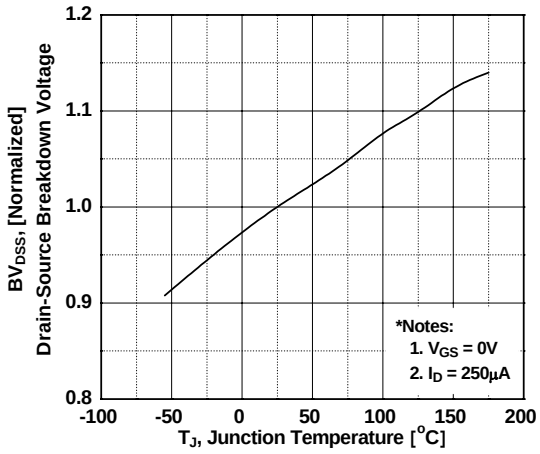



**Figure 8. On-Resistance Variation vs. Temperature**

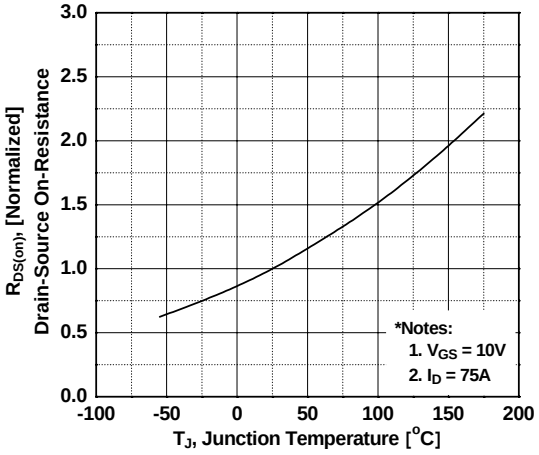



**Figure 9. Maximum Safe Operating Area**

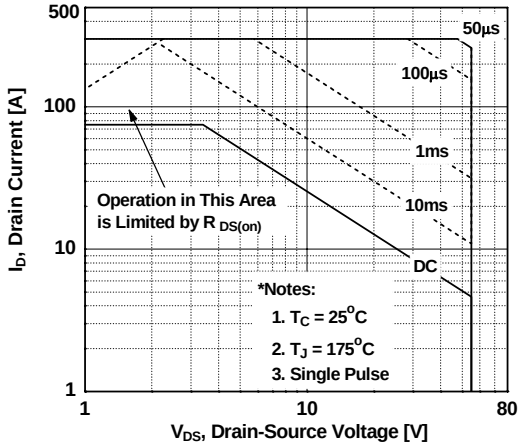



**Figure 10. Maximum Drain Current vs. Case Temperature**

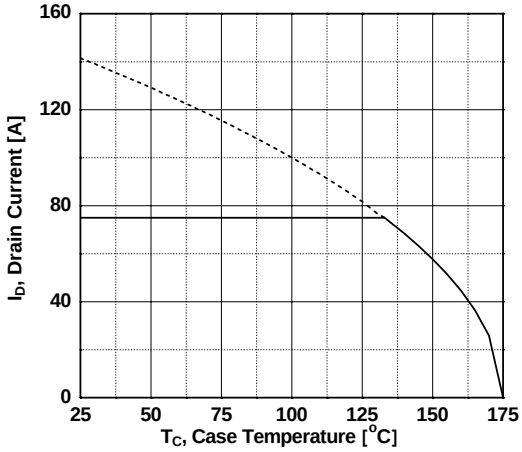
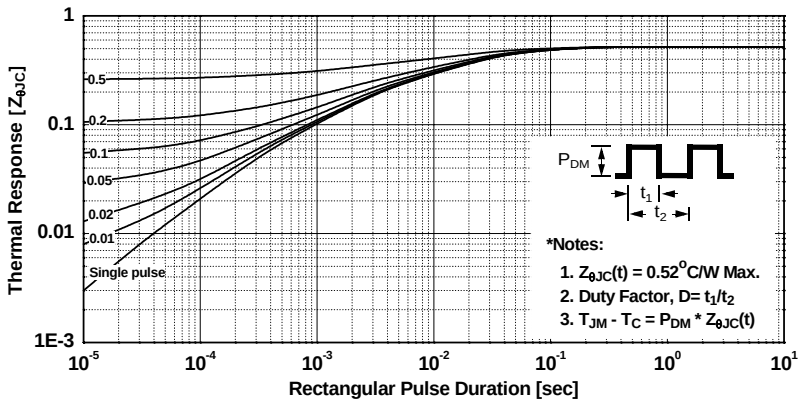
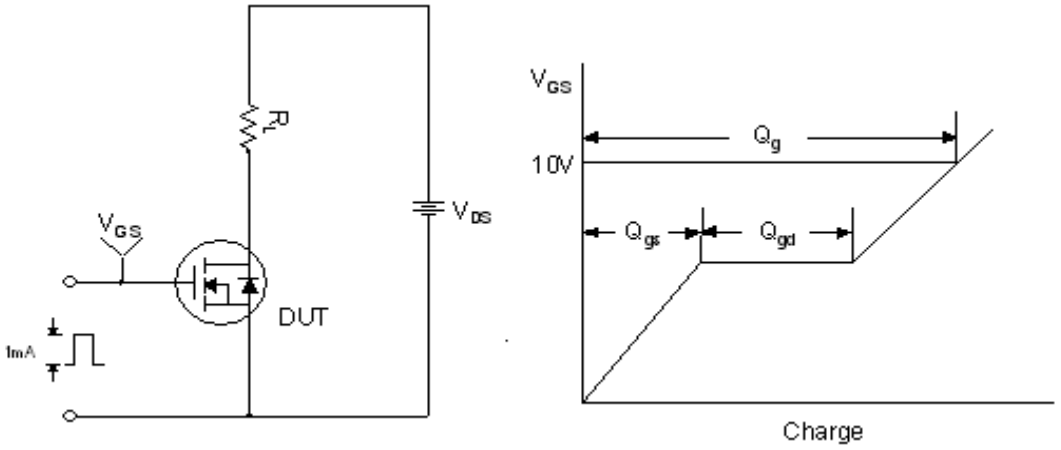


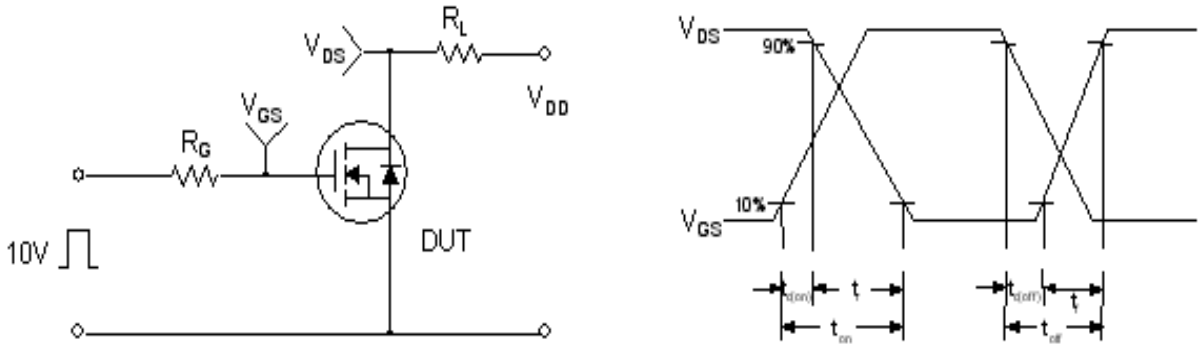

**Figure 11. Transient Thermal Response Curve**



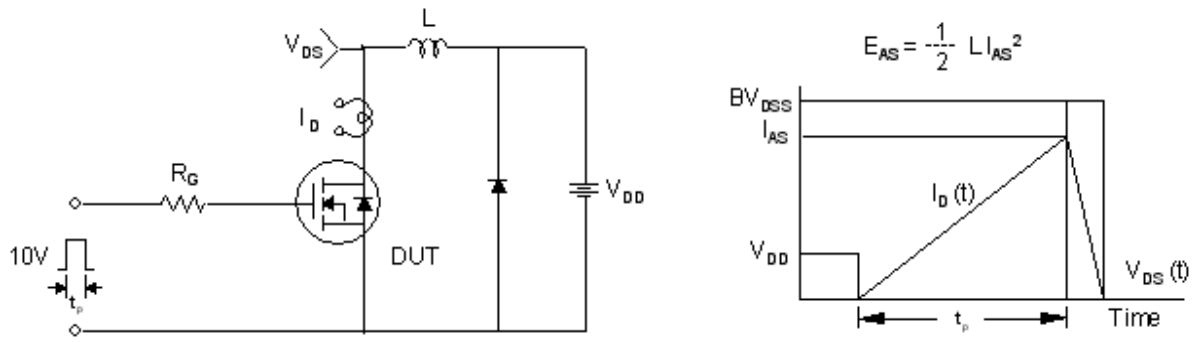
**Gate Charge Test Circuit & Waveform**



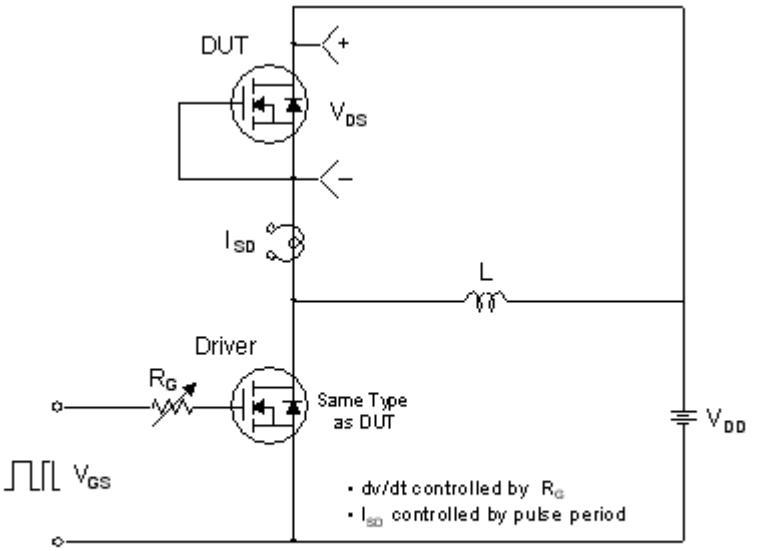

**Resistive Switching Test Circuit & Waveforms**

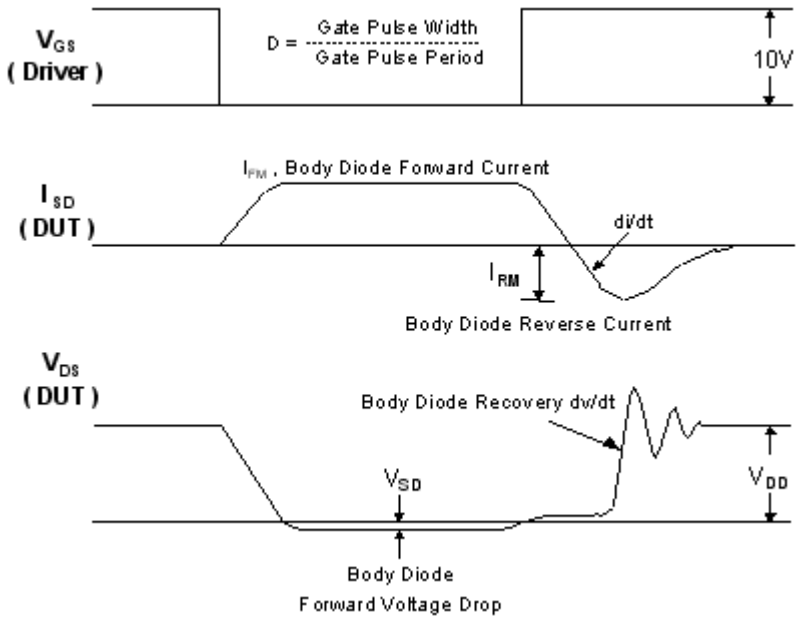



**Unclamped Inductive Switching Test Circuit & Waveforms**



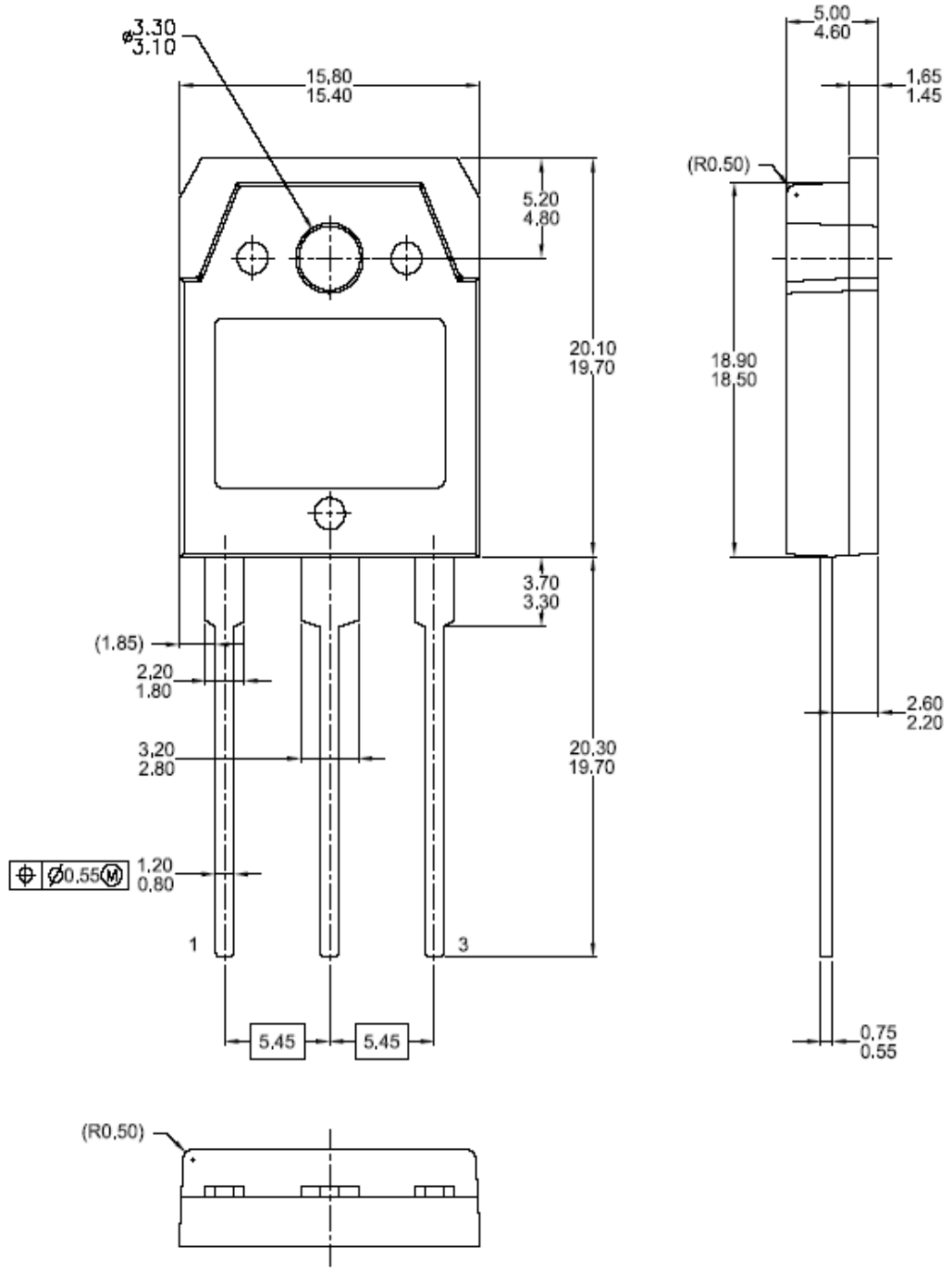
**Peak Diode Recovery dv/dt Test Circuit & Waveforms**



## Mechanical Dimensions

# TO-3PN




Dimensions in Millimeters

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