FAIRCHILD SEMICONDUCTOR®

October 2007

HUF75344A3

N-Channel UltraFET Power MOSFET

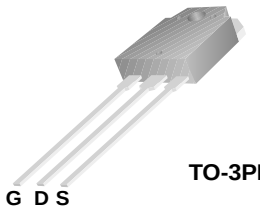
55V, 75A, 8mΩ

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.



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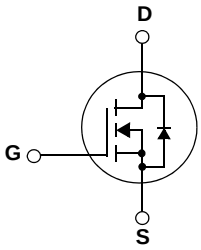


MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

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	μA
		$V_{DS} = 45V$, $V_{GS} = 0V$, $T_J = 150^oC$	-	-	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

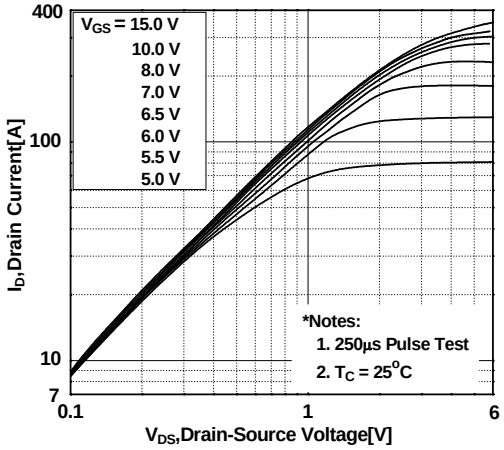


Figure 2. Transfer Characteristics

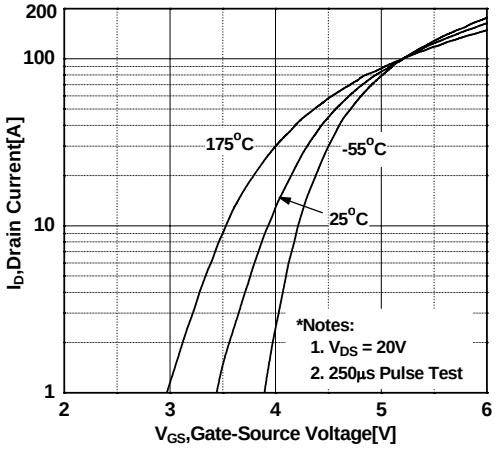


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

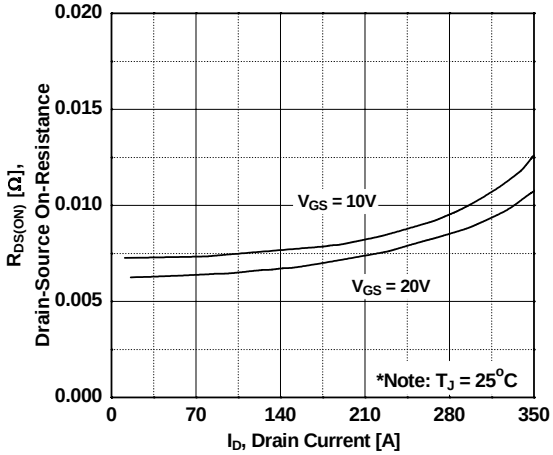


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

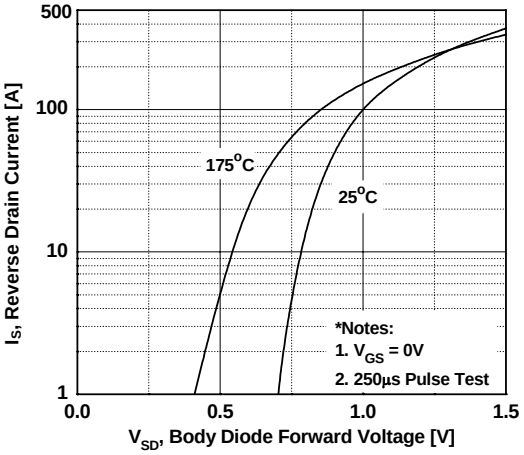


Figure 5. Capacitance Characteristics

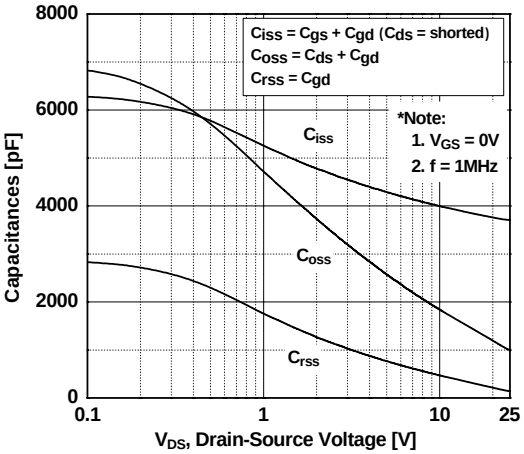
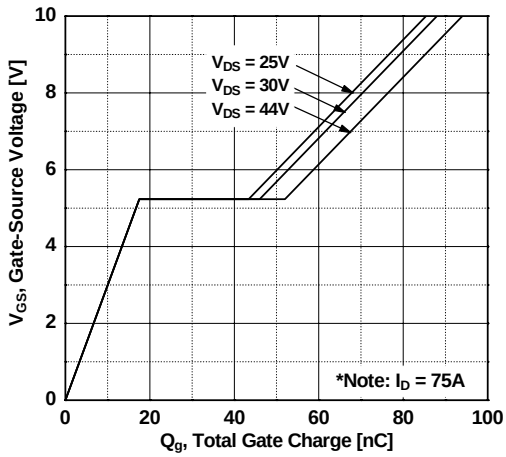


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

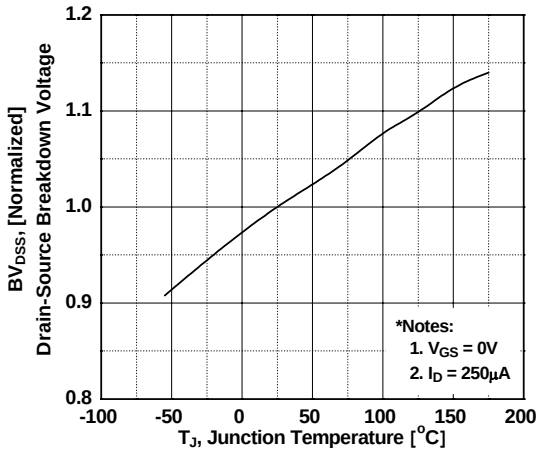


Figure 8. On-Resistance Variation vs. Temperature

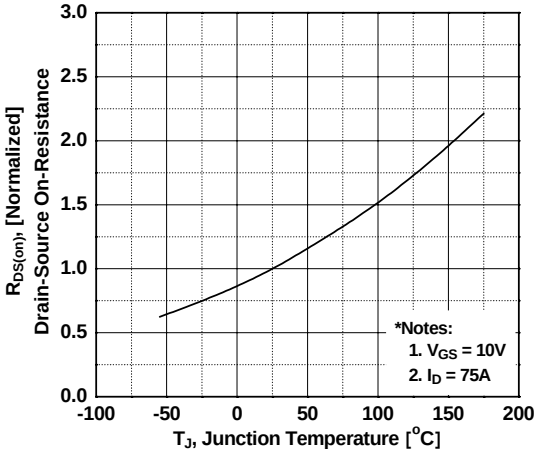


Figure 9. Maximum Safe Operating Area

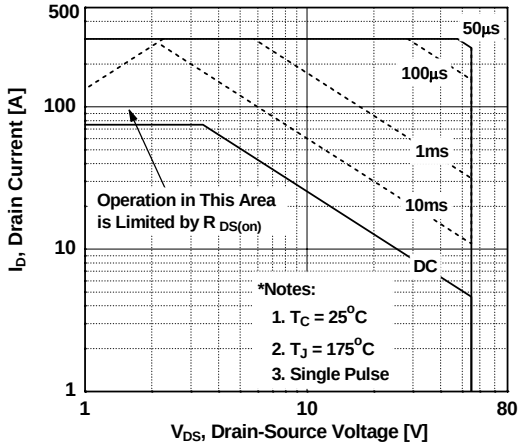


Figure 10. Maximum Drain Current vs. Case Temperature

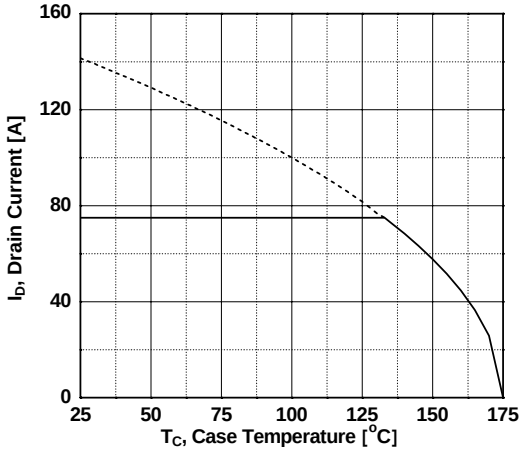
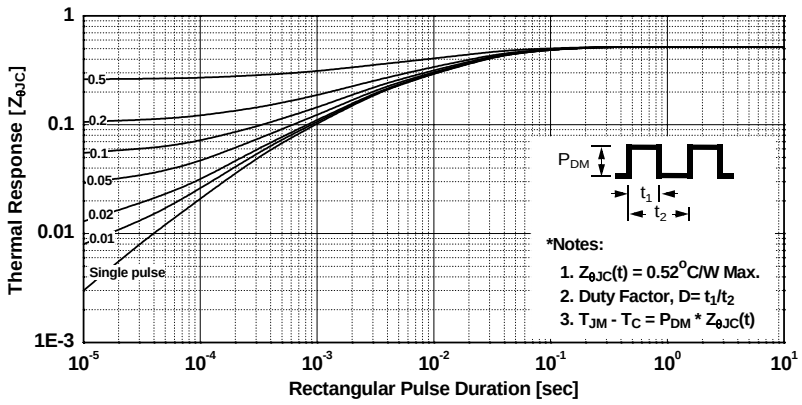
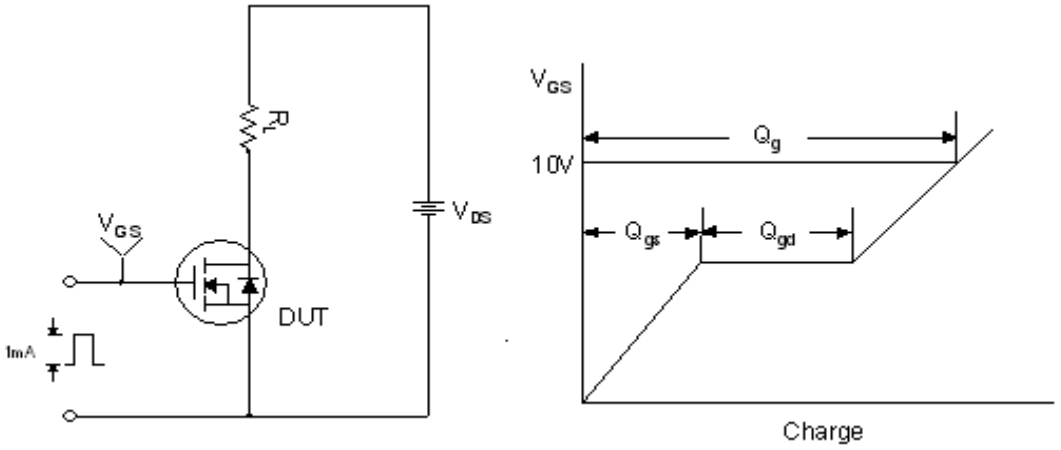


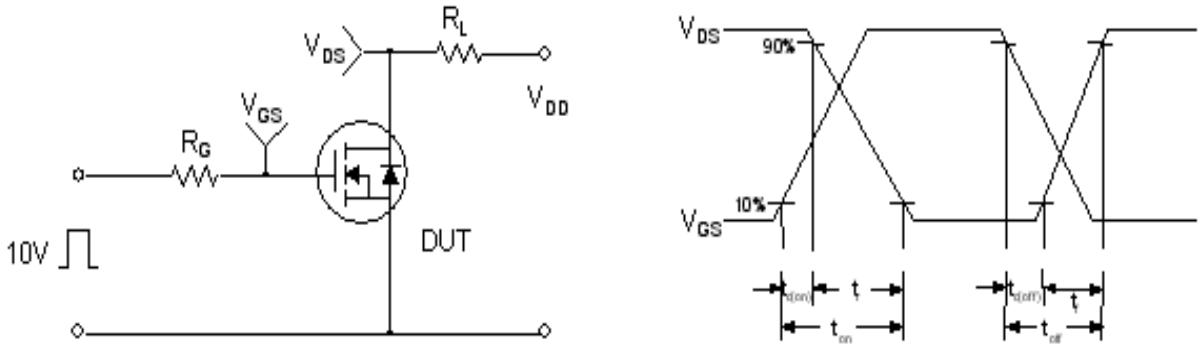
Figure 11. Transient Thermal Response Curve



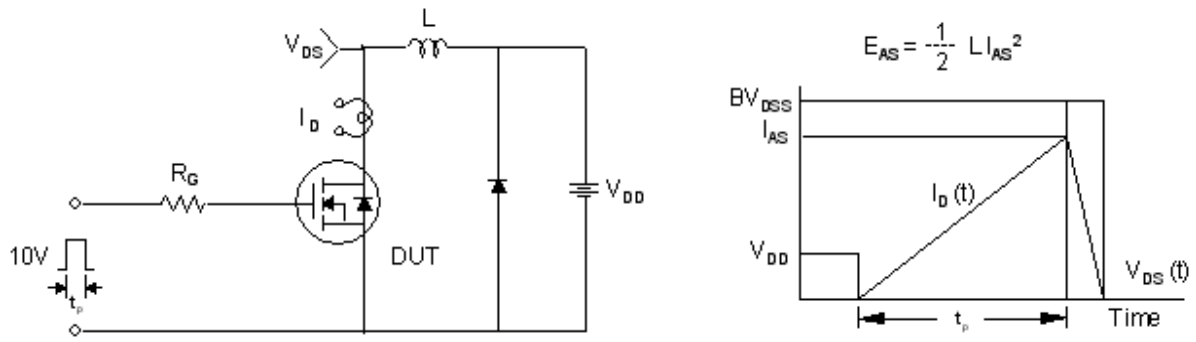
Gate Charge Test Circuit & Waveform



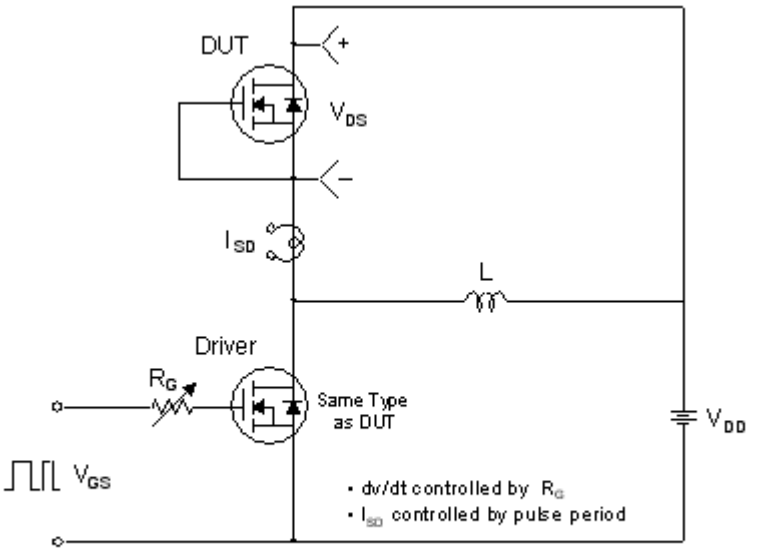
Resistive Switching Test Circuit & Waveforms

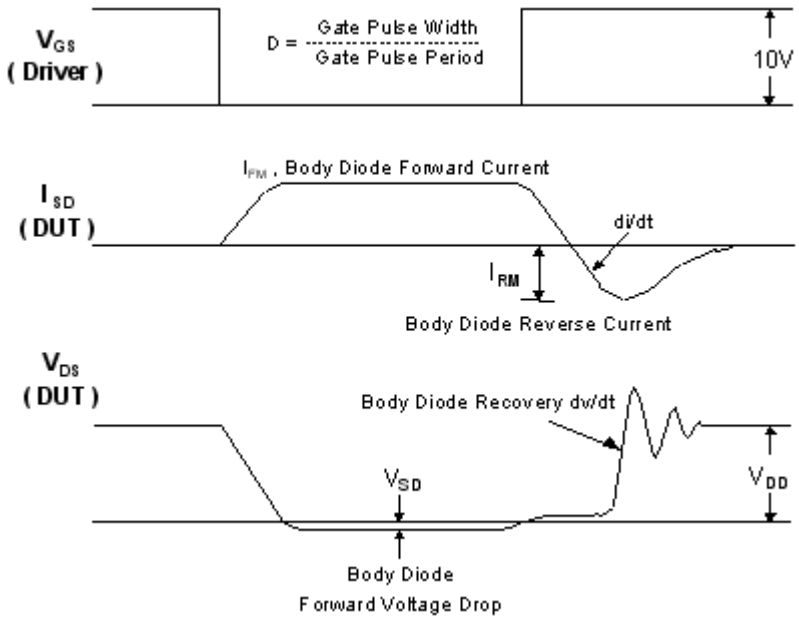


Unclamped Inductive Switching Test Circuit & Waveforms



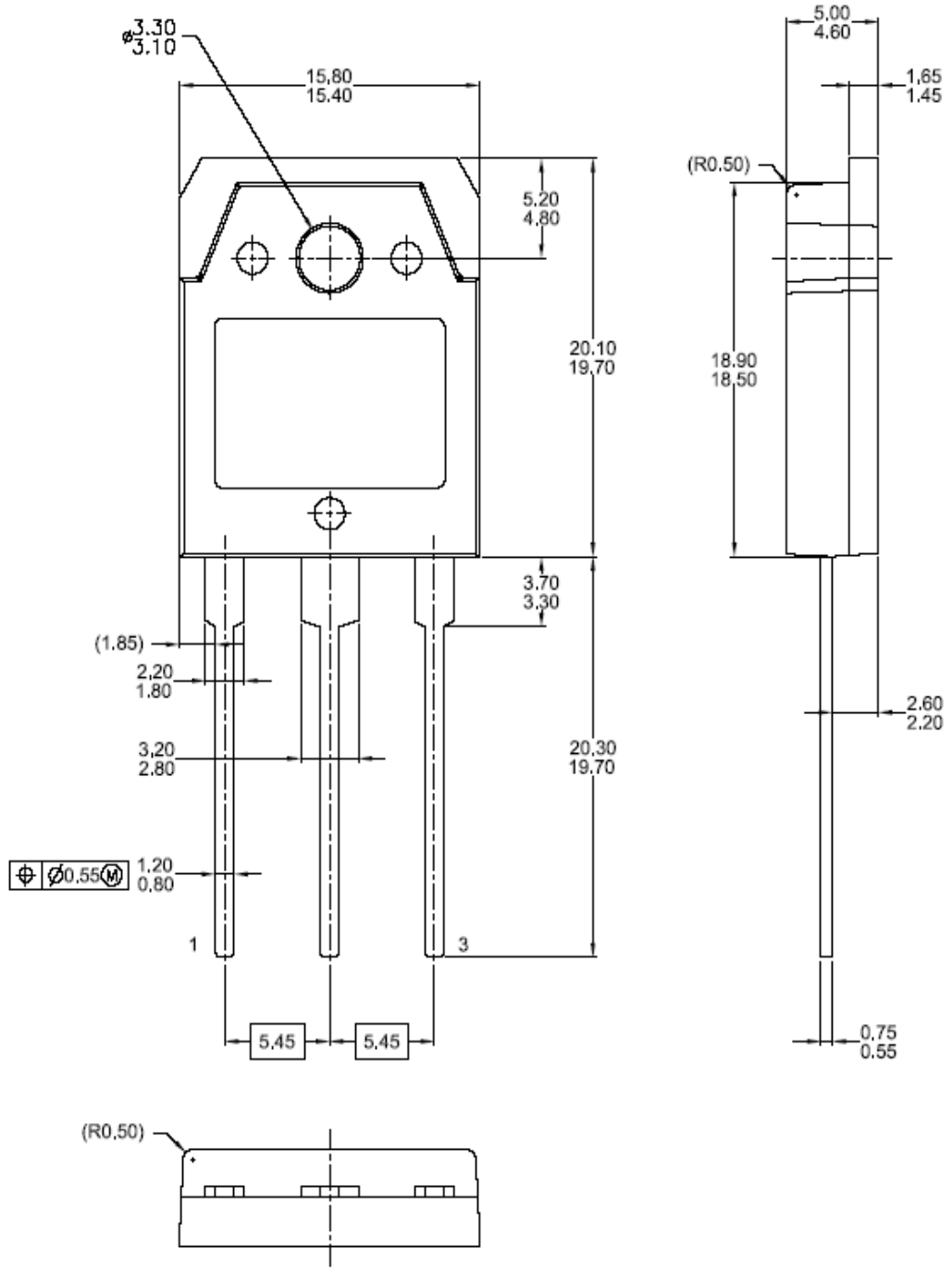
Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions

TO-3PN



Dimensions in Millimeters

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Rev. I31