

## FDA2712

### N-Channel UltraFET Trench MOSFET 250V, 64A, 34mΩ

#### Features

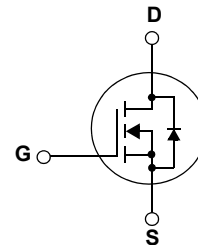
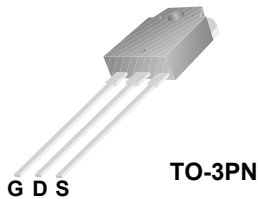
- $R_{DS(on)} = 29.2m\Omega @ V_{GS} = 10V, I_D = 40A$
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low  $R_{DS(on)}$
- High power and current handling capability
- RoHS compliant

#### Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

#### Applications

- PDP application



#### MOSFET Maximum Ratings

Symbol	Parameter	Ratings	Units	
$V_{DSS}$	Drain to Source Voltage	250	V	
$V_{GSS}$	Gate to Source Voltage	±30	V	
$I_D$	Drain Current	-Continuous ( $T_C = 25^\circ C$ )	A	
		-Continuous ( $T_C = 100^\circ C$ )		64
$I_{DM}$	Drain Current	- Pulsed (Note 1)	240	A
$E_{AS}$	Single Pulsed Avalanche Energy	(Note 2)	245	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$	(Note 3)	4.5	V/ns
$P_D$	Power Dissipation	( $T_C = 25^\circ C$ )	357	W
		- Derate above $25^\circ C$	2.85	W/°C
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	°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	0.35	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	40	

**Package Marking and Ordering Information**  $T_C = 25^\circ\text{C}$  unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDA2712	FDA2712	TO-3PN	N/A	N/A	30

**Electrical Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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**Off Characteristics**

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}, T_J = 25^\circ\text{C}$	250	-	-	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$ , Referenced to $25^\circ\text{C}$	-	0.2	-	$\text{V}/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 250\text{V}$ $V_{GS} = 0\text{V}$ $T_J = 125^\circ\text{C}$	-	-	1	$\mu\text{A}$
$I_{GSS}$	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	$\pm 100$	nA

**On Characteristics**

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	3.0	3.9	5.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 40\text{A}$	-	29.2	34	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 40\text{A}$ (Note 4)	-	43	-	S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$	-	7650	10175	pF
$C_{oss}$	Output Capacitance		-	550	735	pF
$C_{rss}$	Reverse Transfer Capacitance		-	105	155	pF
$Q_g$	Total Gate Charge at 10V	$V_{DS} = 125\text{V}, I_D = 80\text{A}$ $V_{GS} = 10\text{V}$ (Note 4, 5)	-	99	129	nC
$Q_{gs}$	Gate to Source Gate Charge		-	46	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge		-	21	-	nC

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 125\text{V}, I_D = 80\text{A}$ $V_{GS} = 10\text{V}, R_{GEN} = 25\Omega$ (Note 4, 5)	-	128	266	ns
$t_r$	Turn-On Rise Time		-	371	751	ns
$t_{d(off)}$	Turn-Off Delay Time		-	143	295	ns
$t_f$	Turn-Off Fall Time		-	210	429	ns

**Drain-Source Diode Characteristics**

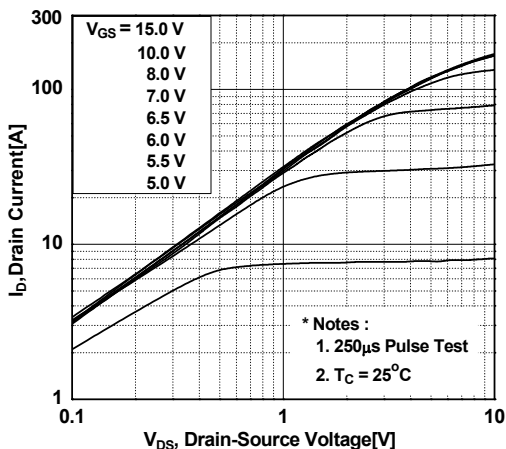
$I_S$	Maximum Continuous Drain to Source Diode Forward Current	-	-	80	A	
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current	-	-	240	A	
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_{SD} = 80\text{A}$	-	-	1.2	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{V}, I_{SD} = 80\text{A}$	-	175	-	ns
$Q_{rr}$	Reverse Recovery Charge	$di_F/dt = 100\text{A}/\mu\text{s}$ (Note 4)	-	1.17	-	$\mu\text{C}$

**Notes:**

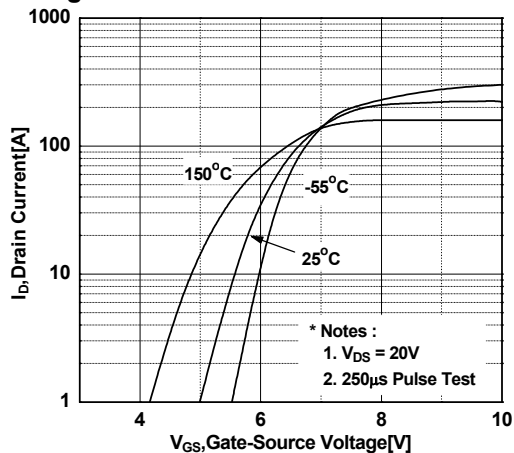
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L = 1\text{mH}, I_{AS} = 22.2\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 80\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$
4. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

## Typical Performance Characteristics

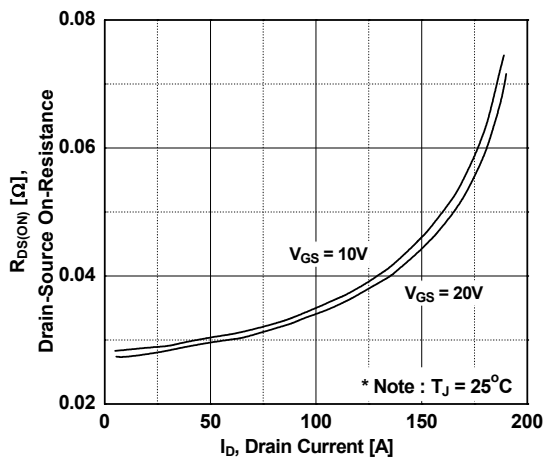
**Figure 1. On-Region Characteristics**



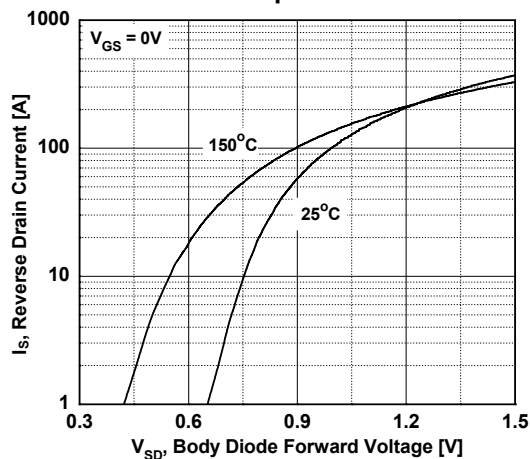
**Figure 2. Transfer Characteristics**



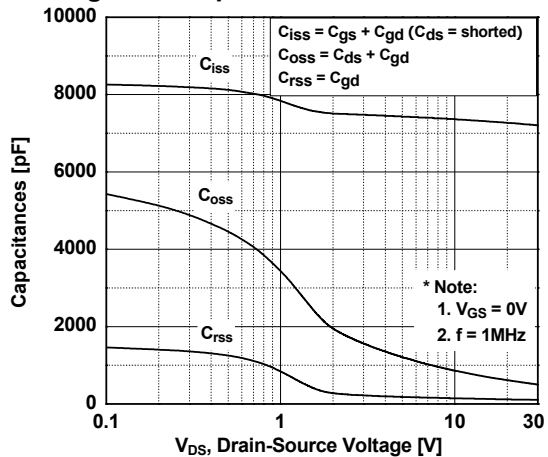
**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**



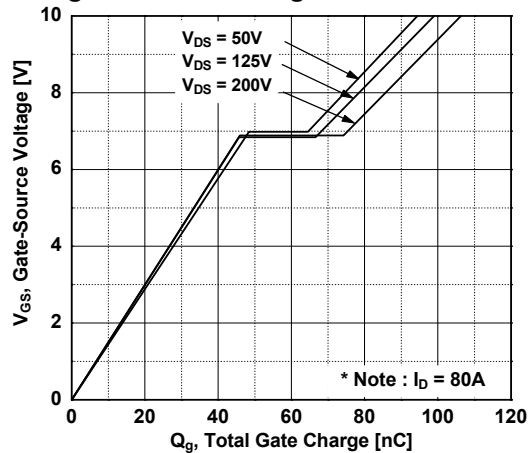
**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**



**Figure 5. Capacitance Characteristics**



**Figure 6. Gate Charge Characteristics**



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

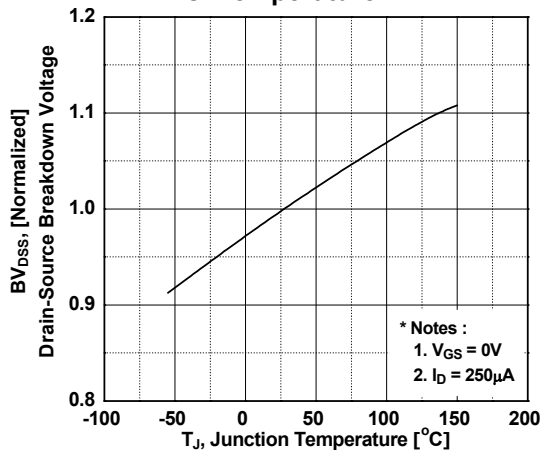


Figure 8. On-Resistance Variation vs. Temperature

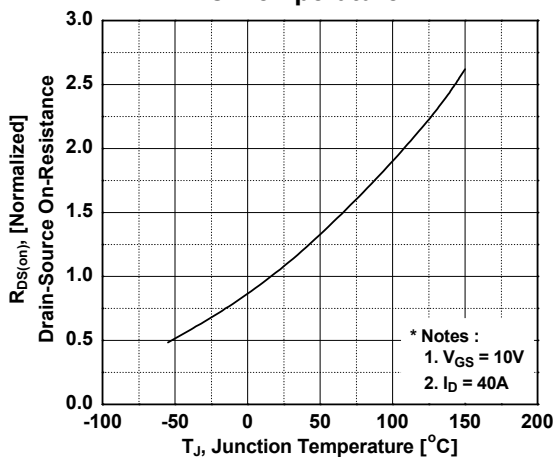


Figure 9. Maximum Safe Operating Area

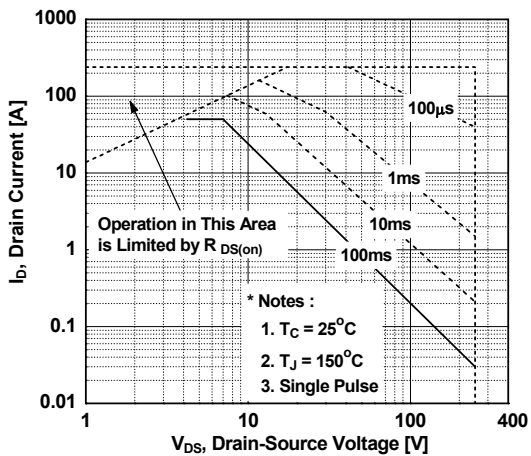


Figure 10. Maximum Drain Current vs. Case Temperature

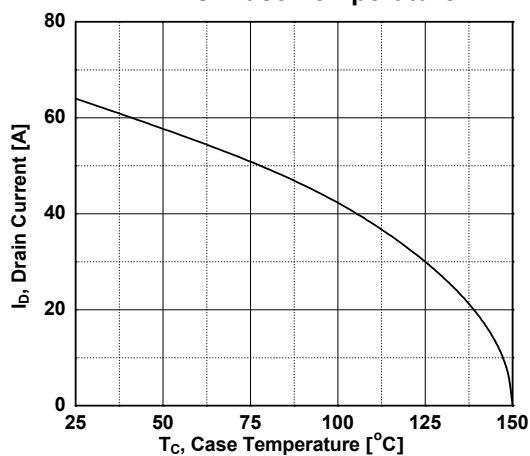
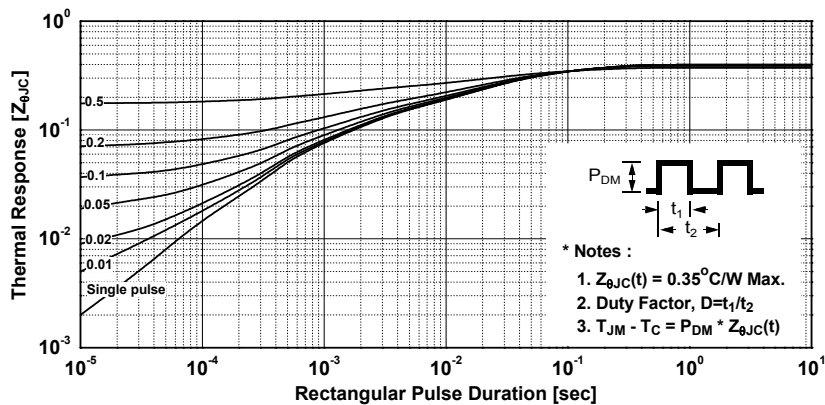
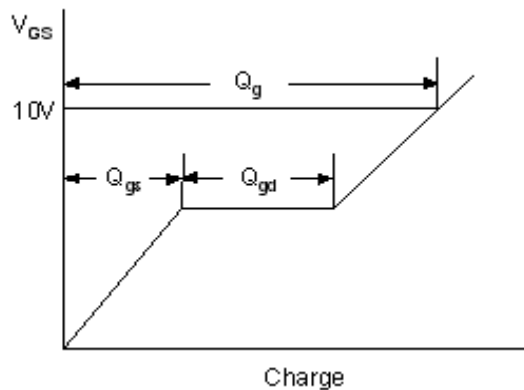
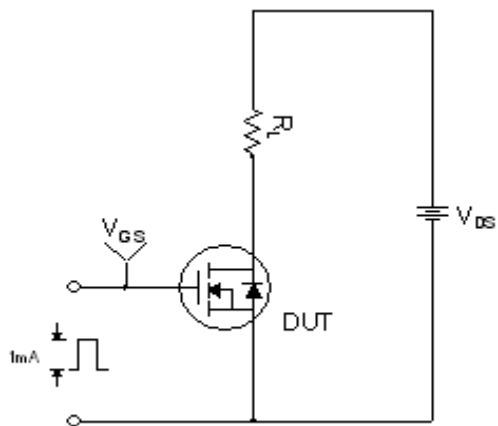


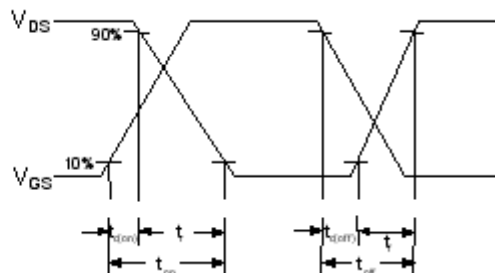
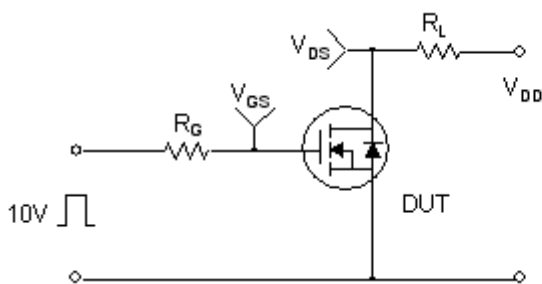
Figure 11. Transient Thermal Response Curve



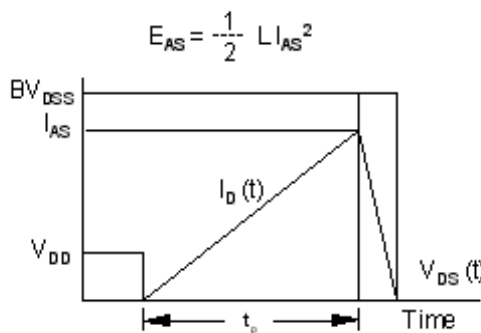
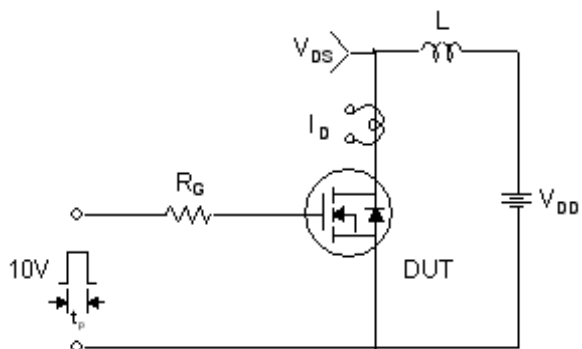
**Gate Charge Test Circuit & Waveform**



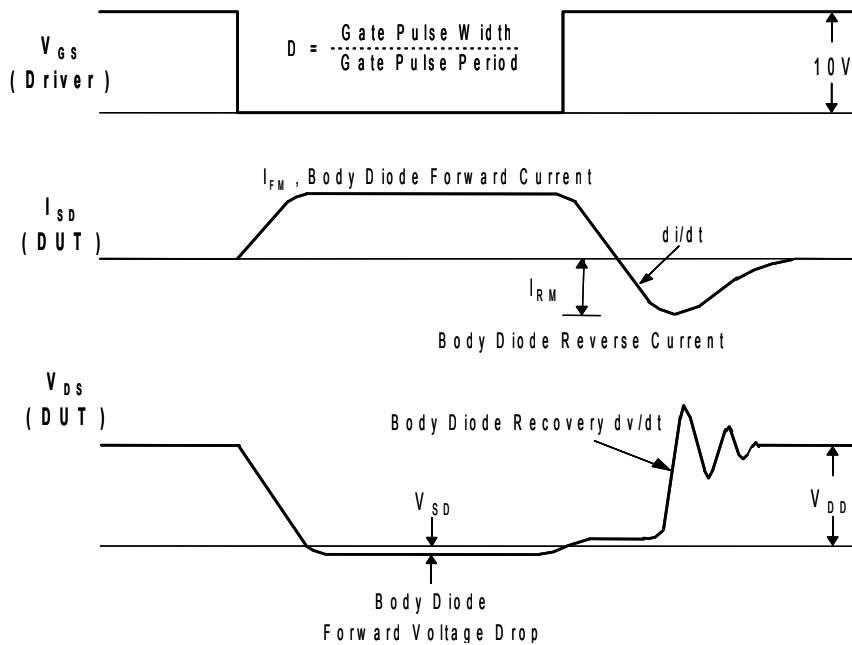
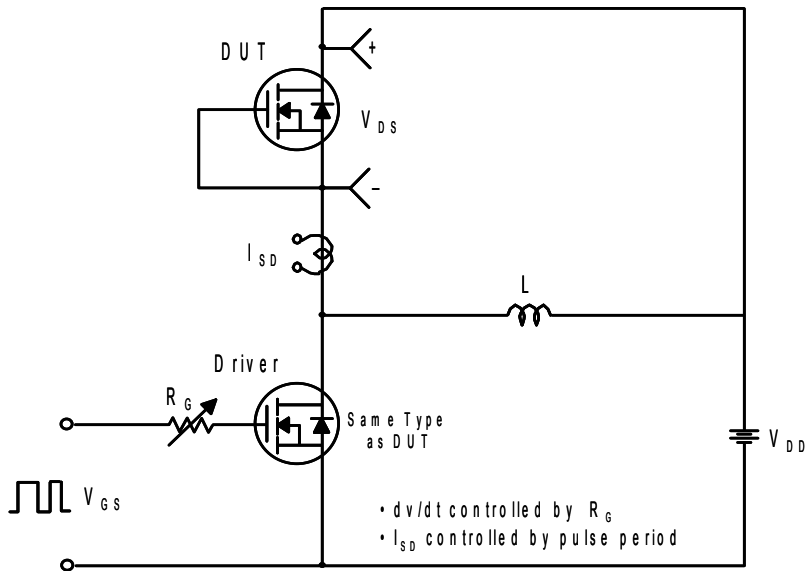
**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**

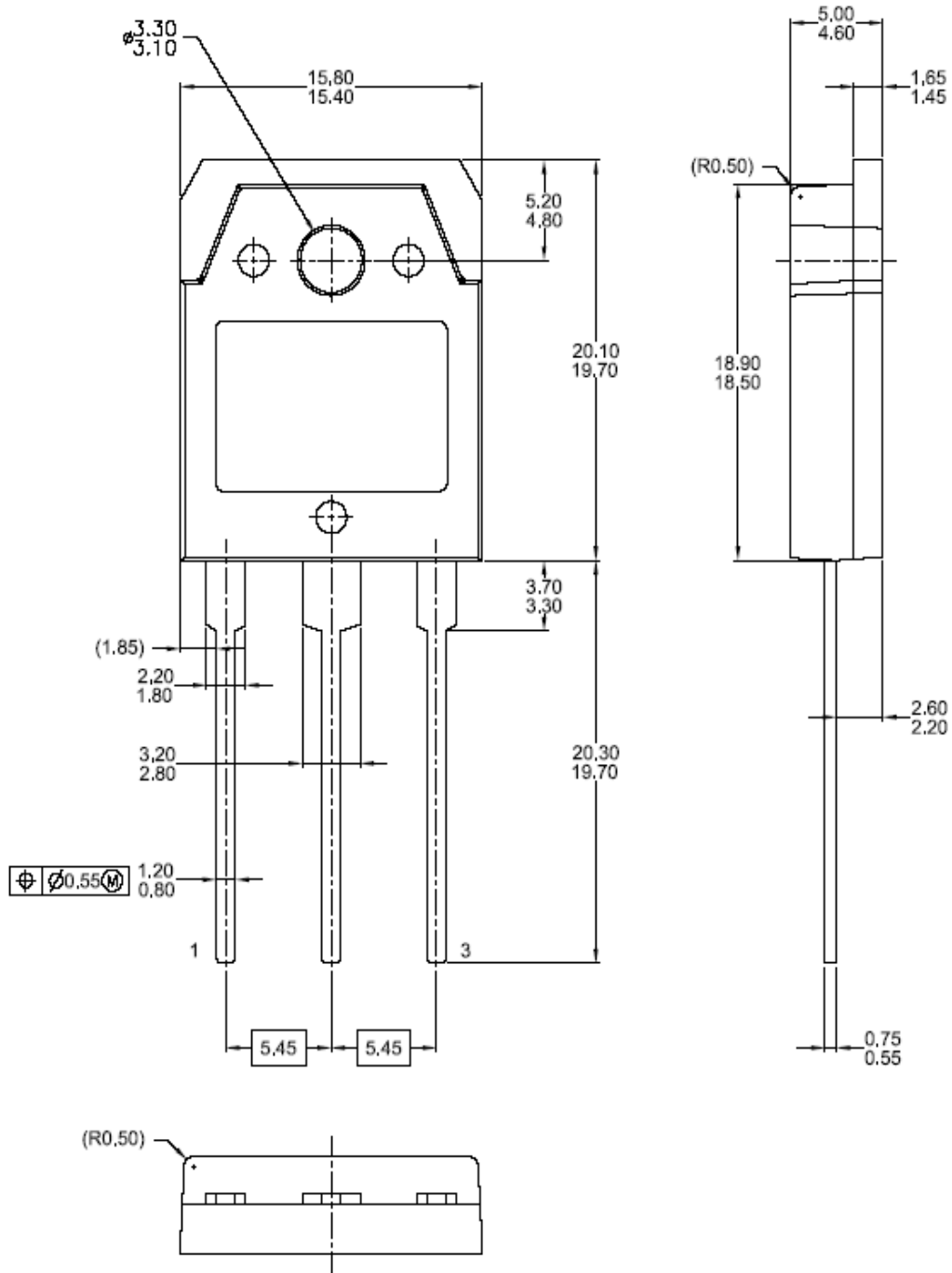


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions


TO-3PN





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Rev. I25