

FDA2712

N-Channel UltraFET Trench MOSFET

250V, 64A, 34mΩ

Features

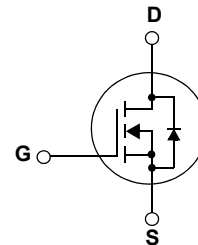
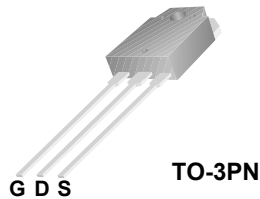
- $R_{DS(on)} = 29.2m\Omega @ V_{GS} = 10V, I_D = 40A$
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low $R_{DS(on)}$
- High power and current handling capability
- RoHS compliant

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 ($T_C = 25^\circ C$)	64
		-Continuous ($T_C = 100^\circ C$)	44
I_{DM}	Drain Current	- Pulsed (Note 1)	240
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	245
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5
P_D	Power Dissipation	($T_C = 25^\circ C$)	357
		- Derate above $25^\circ C$	2.85
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.35	$^\circ C/W$
$R_{\theta JA}$	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°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	μA
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$	-	-	± 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 Ω
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	-	μC

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

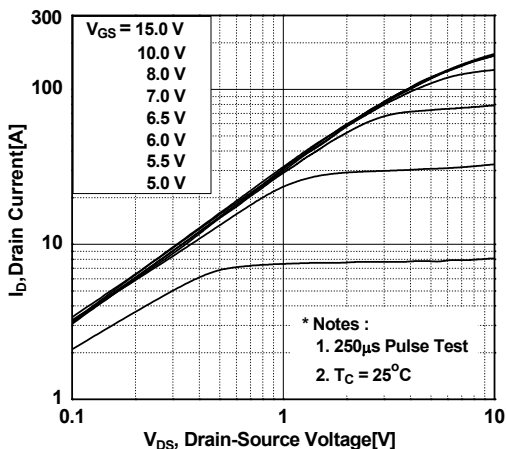


Figure 2. Transfer Characteristics

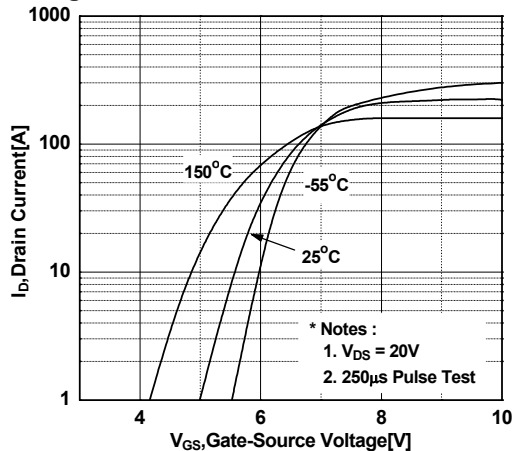


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

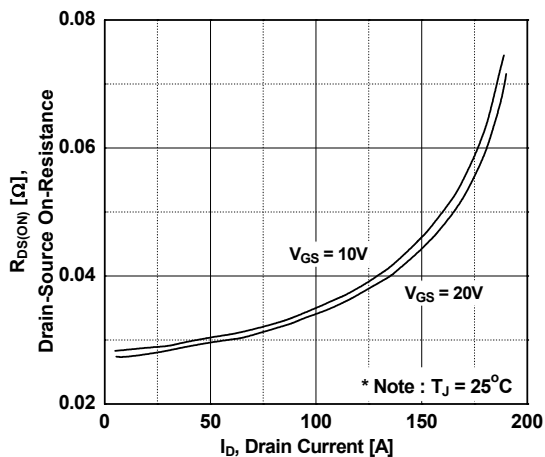


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

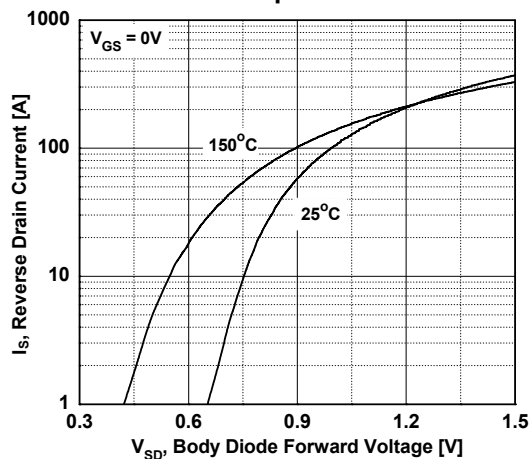


Figure 5. Capacitance Characteristics

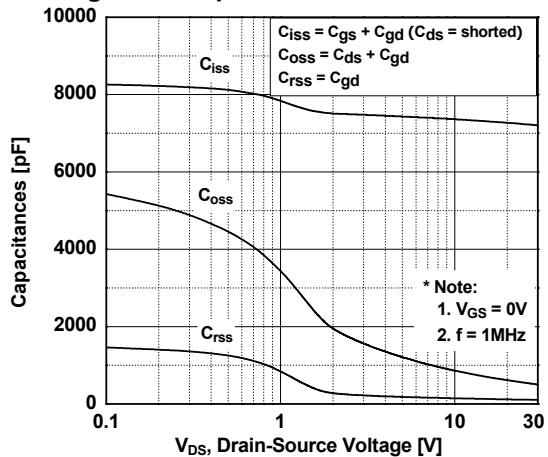
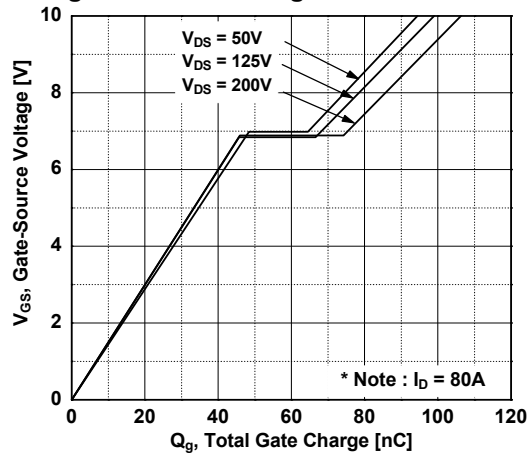


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

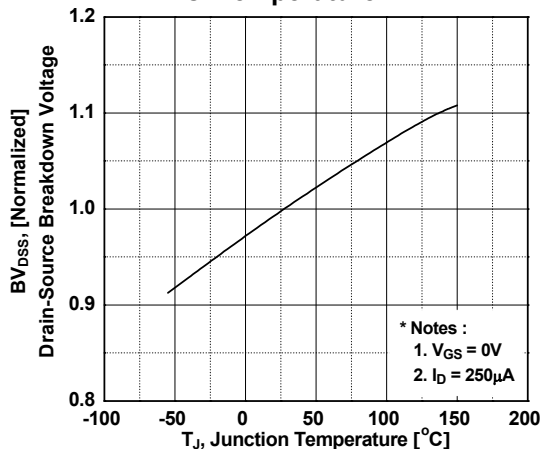


Figure 8. On-Resistance Variation vs. Temperature

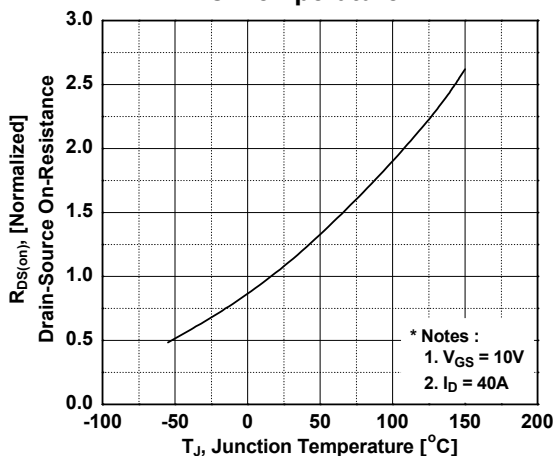


Figure 9. Maximum Safe Operating Area

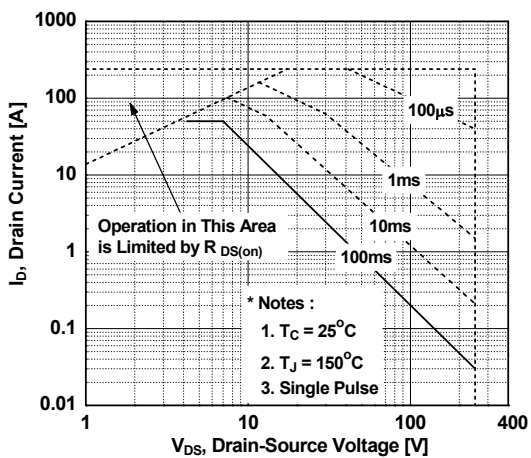


Figure 10. Maximum Drain Current vs. Case Temperature

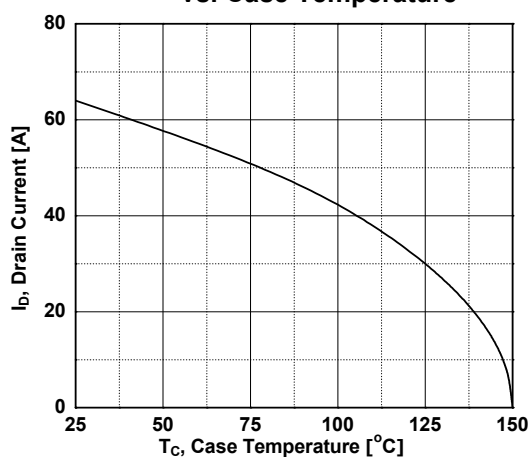
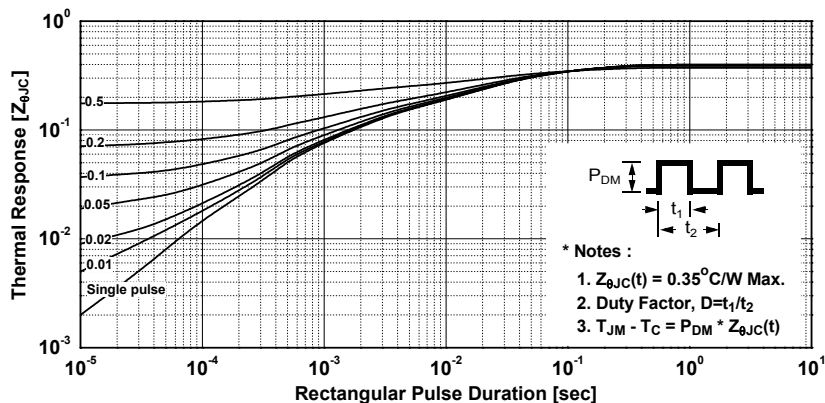
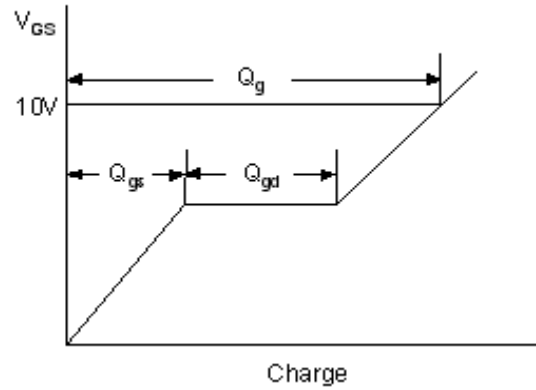
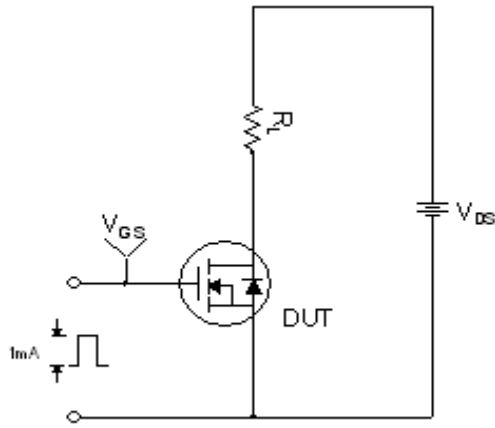


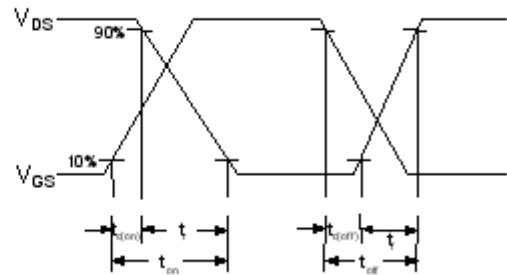
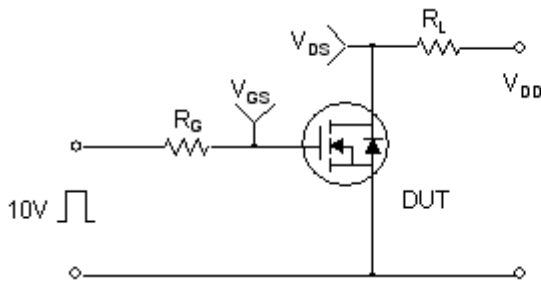
Figure 11. Transient Thermal Response Curve



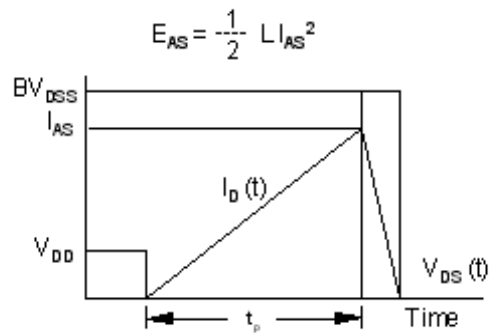
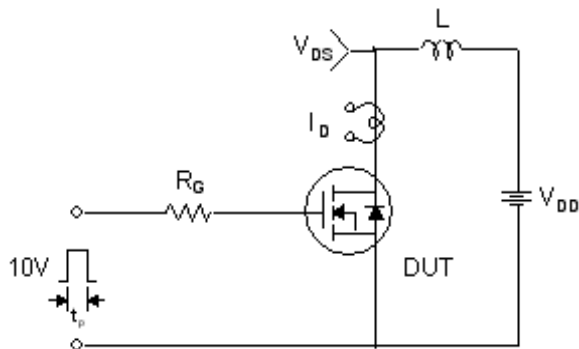
Gate Charge Test Circuit & Waveform



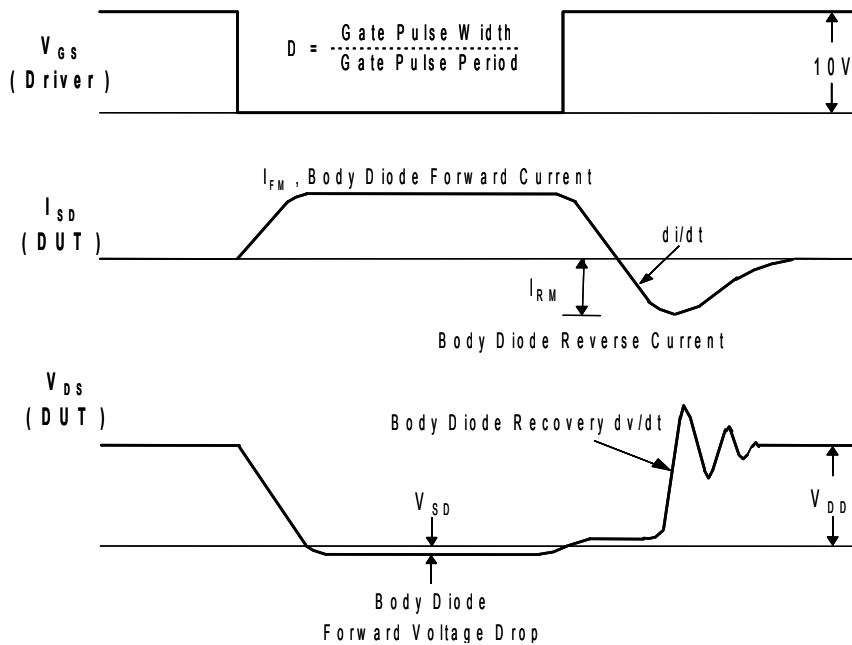
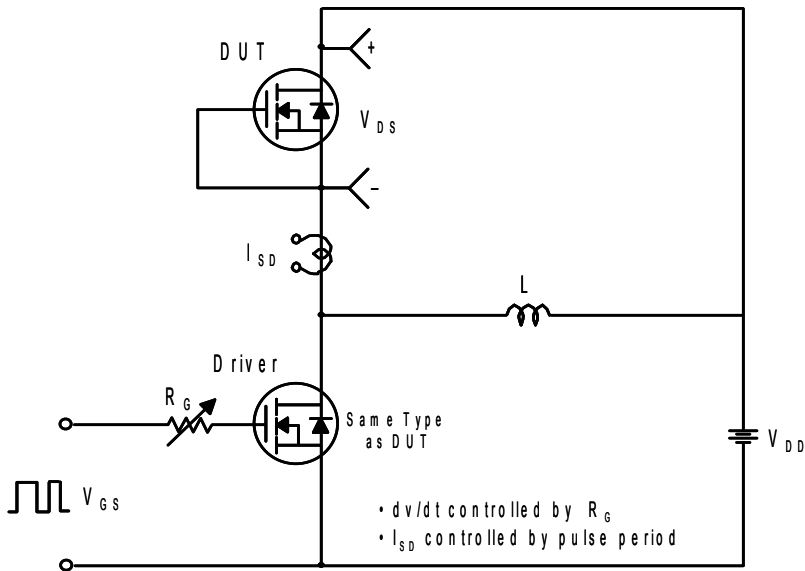
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

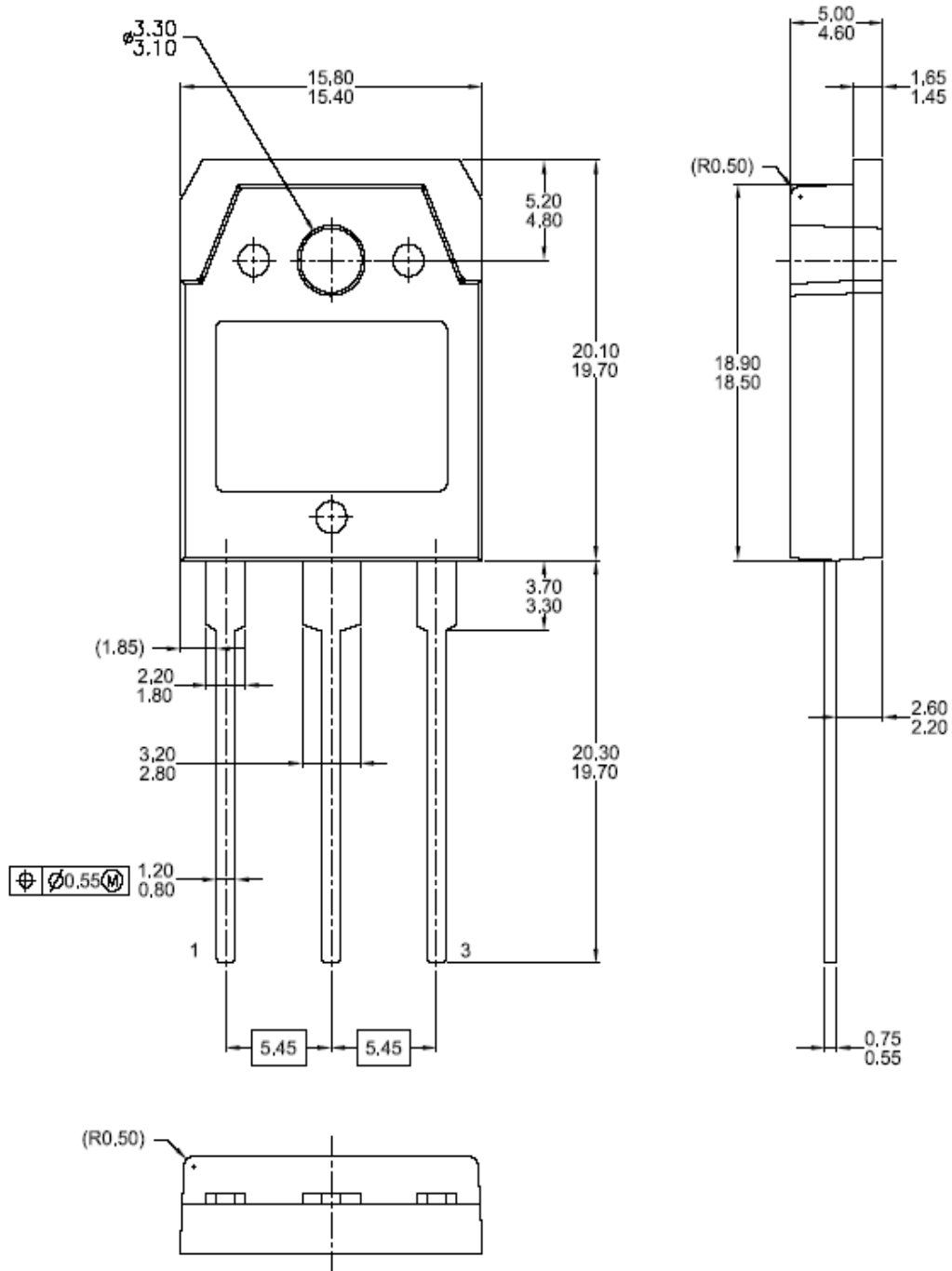


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

TO-3PN




FDA2712 N-Channel UltraFET Trench MOSFET



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