

IRF634B/IRFS634B

250V N-Channel MOSFET

General Description

These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switching DC/DC converters and switch mode power supplies.

Features

- 8.1A, 250V, $R_{DS(on)} = 0.45\Omega @ V_{GS} = 10V$
- Low gate charge (typical 29 nC)
- Low C_{rss} (typical 20 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	IRF634B	IRFS634B	Units
V_{DSS}	Drain-Source Voltage	250		V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$)	8.1	8.1 *	A
		5.1	5.1 *	A
I_{DM}	Drain Current - Pulsed (Note 1)	32.4	32.4 *	A
V_{GSS}	Gate-Source Voltage	± 30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	200		mJ
I_{AR}	Avalanche Current (Note 1)	8.1		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	7.4		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5		V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	74	38	W
		0.59	0.3	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		$^\circ\text{C}$

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	IRF634B	IRFS634B	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case Max.	1.69	3.29	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Max.	62.5	62.5	$^\circ\text{C}/\text{W}$

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	250	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.27	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}$	--	--	10	μA
		$V_{DS} = 200\text{ V}, T_C = 125^\circ\text{C}$	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 4.05\text{ A}$	--	0.345	0.45	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 4.05\text{ A}$ (Note 4)	--	7.6	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	780	1000	pF
C_{oss}	Output Capacitance		--	95	125	pF
C_{riss}	Reverse Transfer Capacitance		--	20	25	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 125\text{ V}, I_D = 8.1\text{ A},$ $R_G = 25\ \Omega$	--	15	40	ns
t_r	Turn-On Rise Time		--	75	160	ns
$t_{d(off)}$	Turn-Off Delay Time		--	100	210	ns
t_f	Turn-Off Fall Time		(Note 4, 5)	--	65	140
Q_g	Total Gate Charge	$V_{DS} = 200\text{ V}, I_D = 8.1\text{ A},$ $V_{GS} = 10\text{ V}$	--	29	38	nC
Q_{gs}	Gate-Source Charge		--	4.2	--	nC
Q_{gd}	Gate-Drain Charge		(Note 4, 5)	--	14	--

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	8.1	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	32.4	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 8.1\text{ A}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 8.1\text{ A},$	--	170	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	0.91	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 4.9\text{ mH}, I_{AS} = 8.1\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 8.1\text{ A}, di/dt \leq 300\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, 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

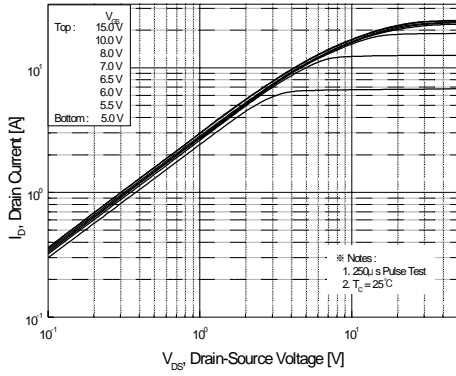


Figure 1. On-Region Characteristics

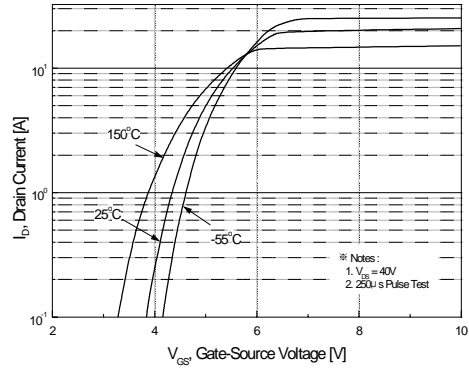


Figure 2. Transfer Characteristics

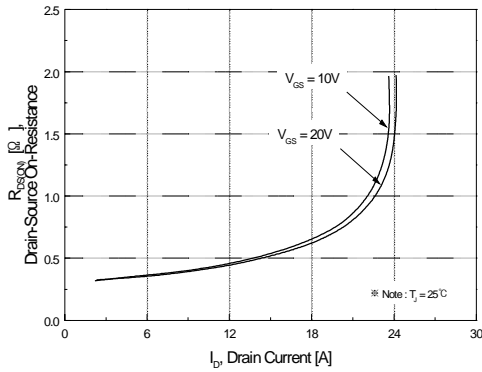


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

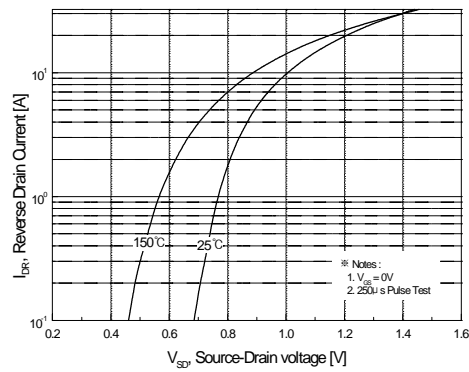


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

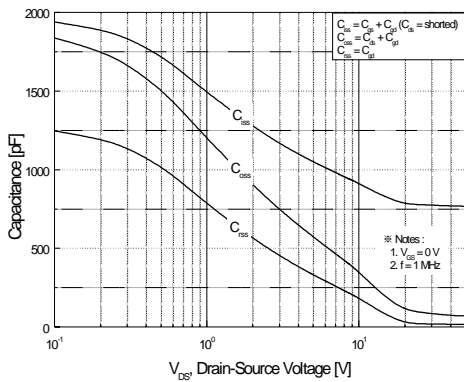


Figure 5. Capacitance Characteristics

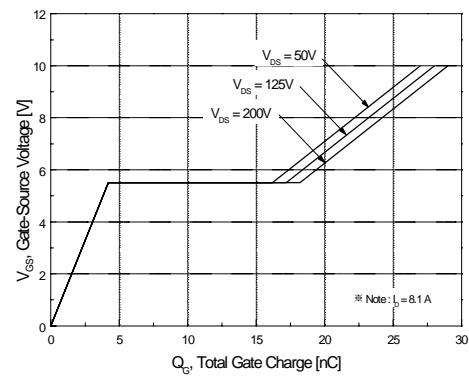


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

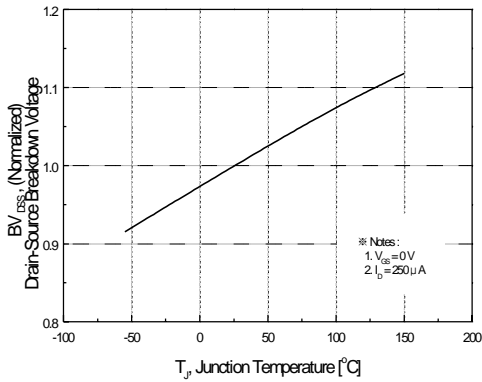


Figure 7. Breakdown Voltage Variation vs Temperature

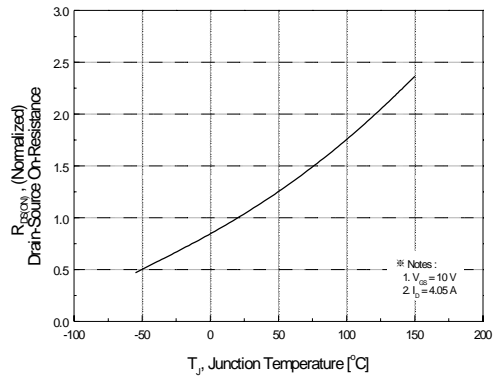


Figure 8. On-Resistance Variation vs Temperature

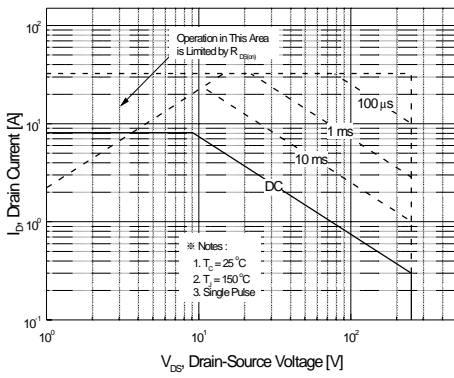


Figure 9-1. Maximum Safe Operating Area for IRF634B

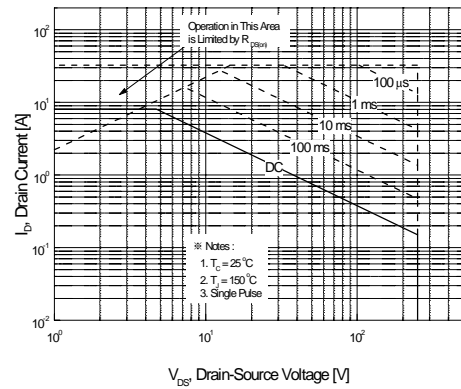


Figure 9-2. Maximum Safe Operating Area for IRFS634B

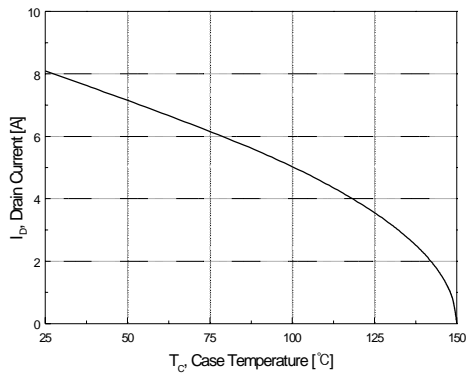


Figure 10. Maximum Drain Current vs Case Temperature

Typical Characteristics (Continued)

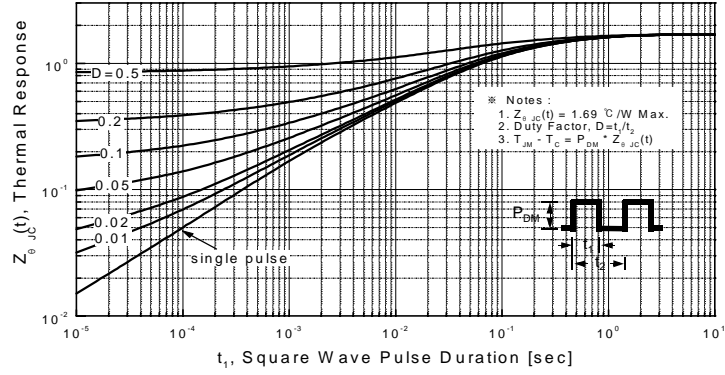


Figure 11-1. Transient Thermal Response Curve for IRF634B

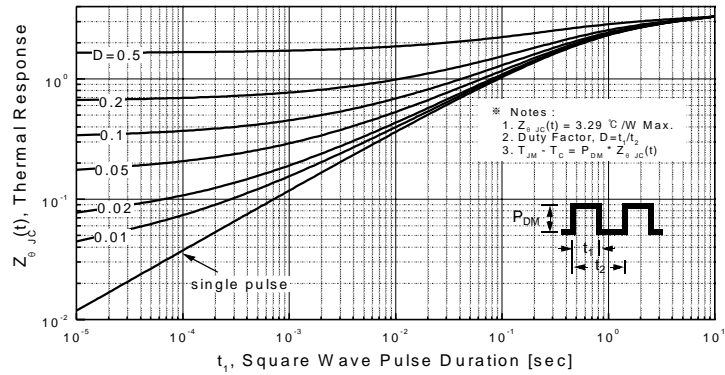


Figure 11-2. Transient Thermal Response Curve for IRFS634B

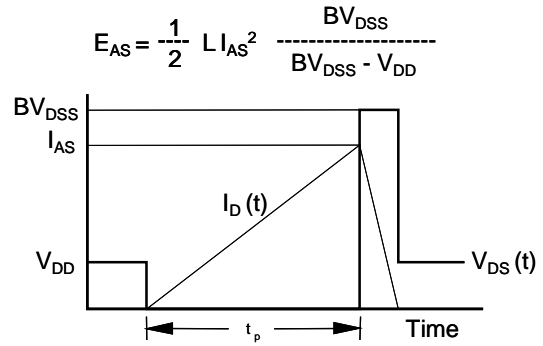
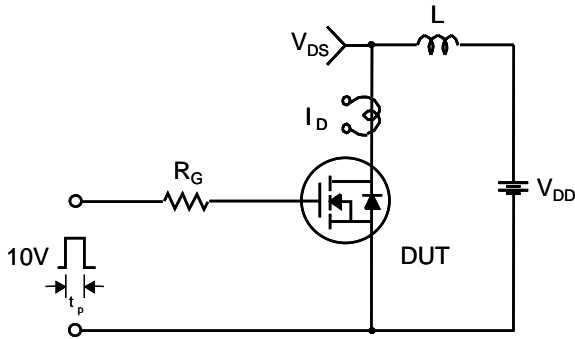
Gate Charge Test Circuit & Waveform



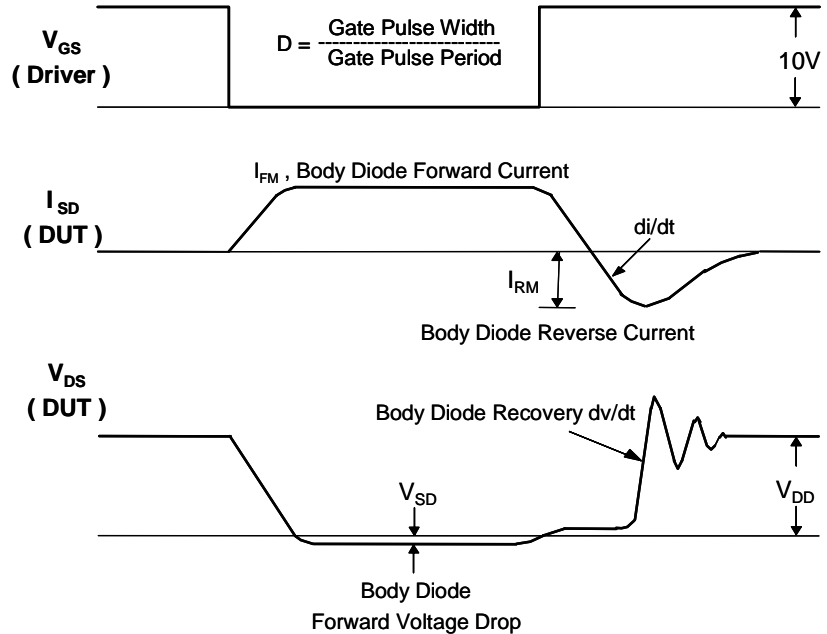
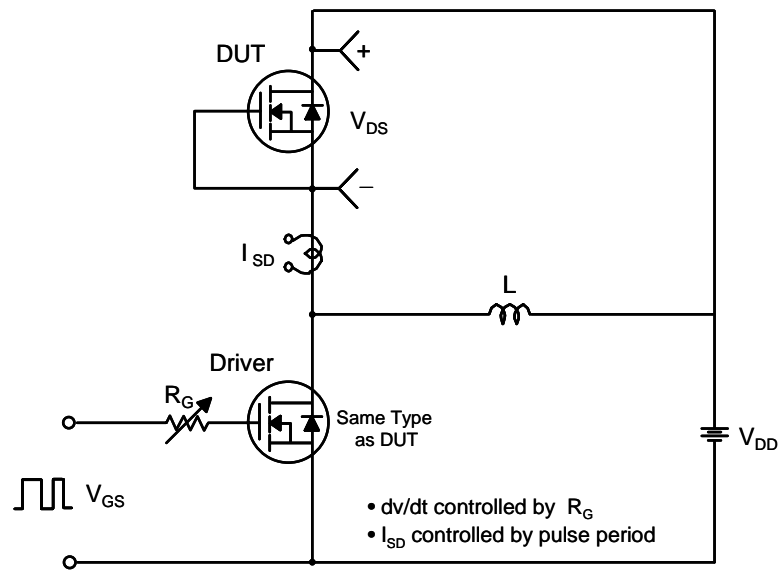
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

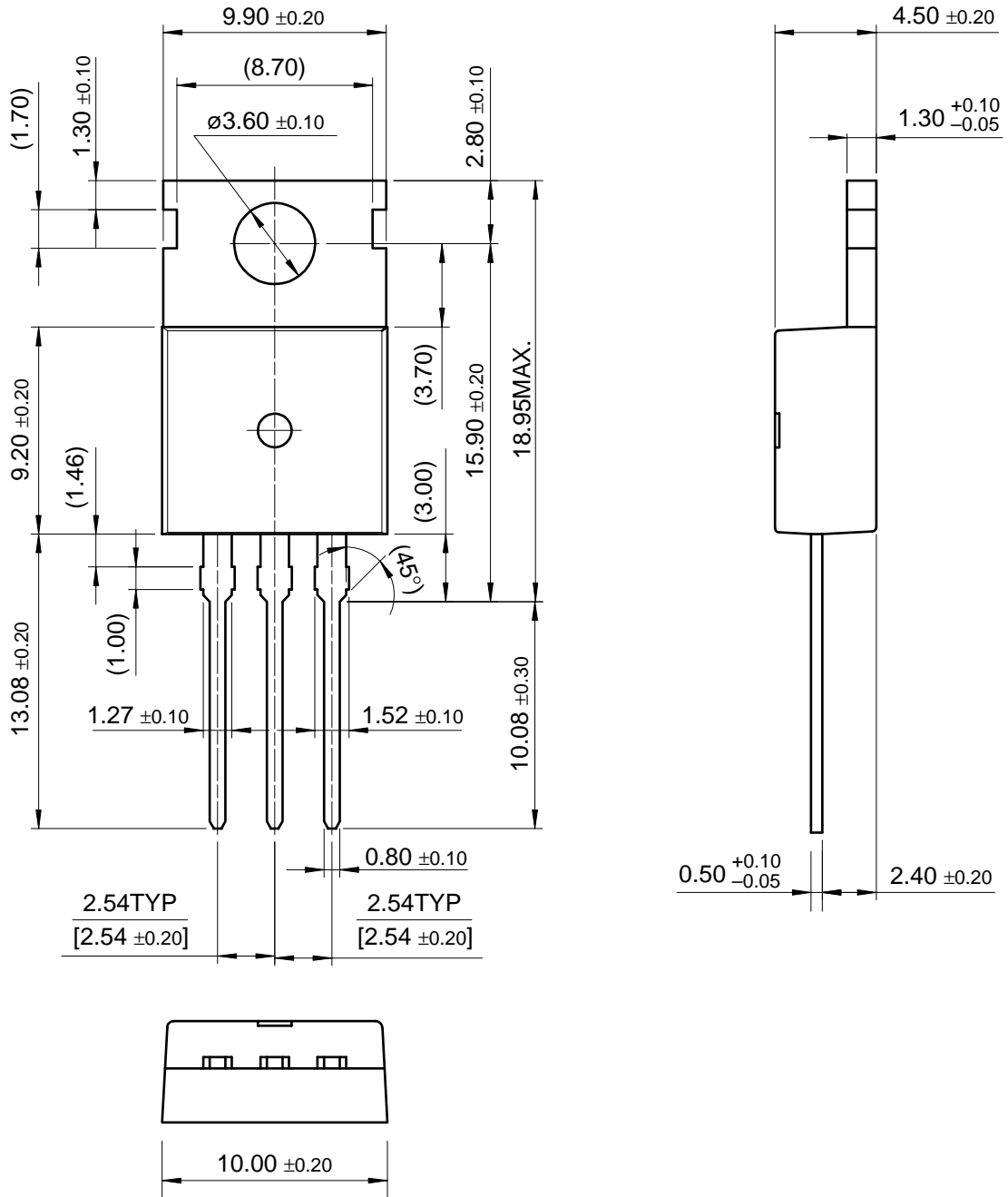


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimensions

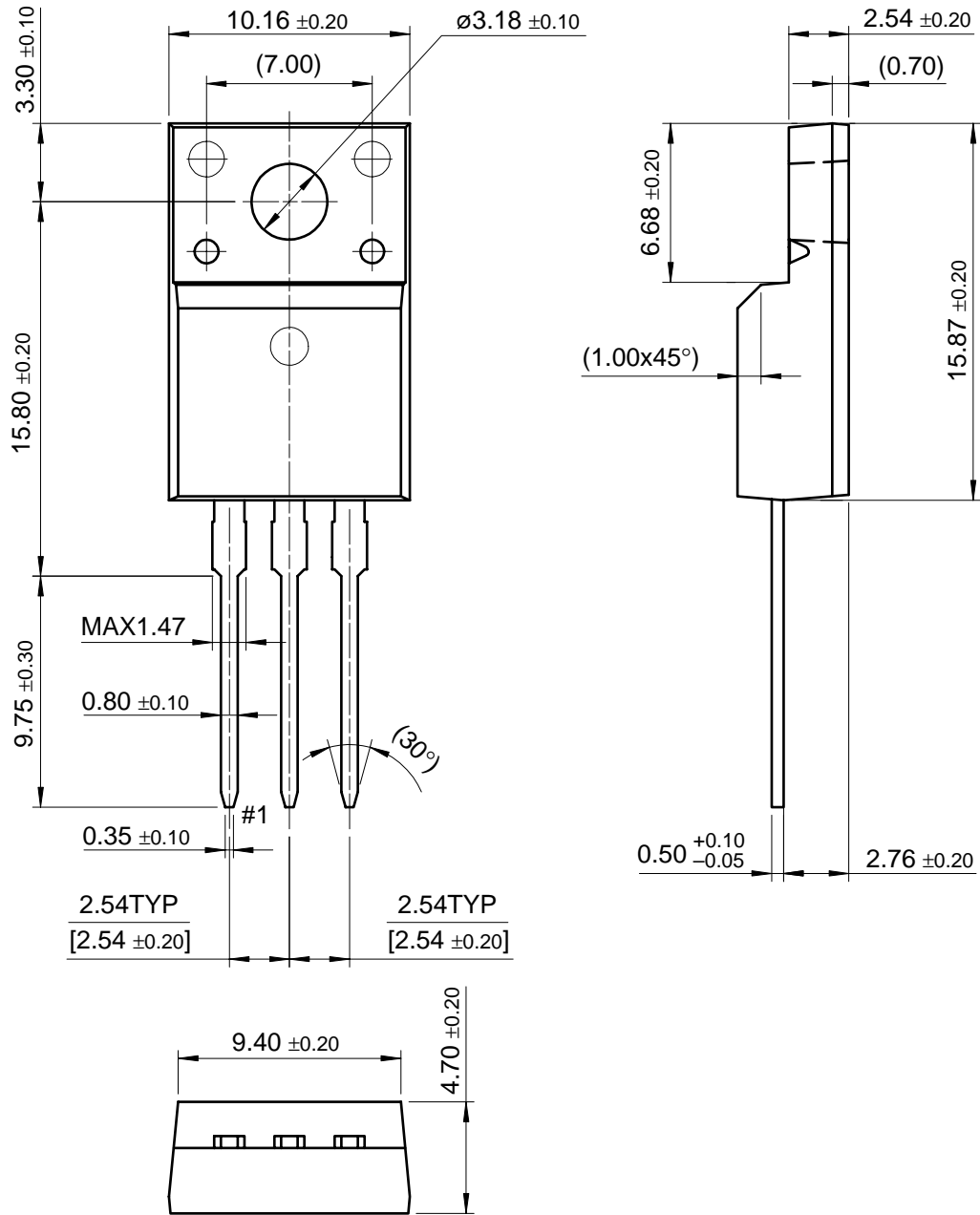
TO-220



Dimensions in Millimeters

Package Dimensions (Continued)

TO-220F



IRF634B/IRFS634B

Dimensions in Millimeters

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Definition of Terms

Datasheet Identification	Product Status	Definition
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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

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IRFS634B

250V N-Channel B-FET / Substitute of IRFS634 & IRFS634A

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General description

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Product status/pricing/packaging

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Product	Product status	Pb-free Status	Package type	Leads	Packing method	Package Marking Convention**
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IRFS634BT_FP001	Lifetime Buy		TO-220F	3	RAIL	Line 1: \$Y (Fairchild logo) &Z (Asm. Plant Code) &4 (4-Digit Date Code) Line 2: IRFS Line 3: 634B
IRFS634B_FP001	Not recommended for new designs		TO-220F	3	RAIL	Line 1: \$Y (Fairchild logo) &Z (Asm. Plant Code) &4 (4-Digit Date Code) Line 2: IRFS Line 3: 634B

 Indicates product with Pb-free second-level interconnect. For more information [click here](#).

Package marking information for product IRFS634B is available. [Click here for more information](#).

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Qualification Support

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Product
IRFS634BT_FP001
IRFS634B_FP001

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