

FQB45N15V2/FQI45N15V2

150V N-Channel MOSFET

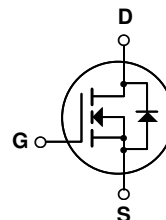
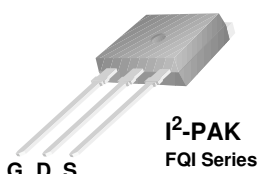
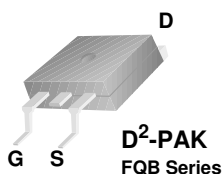
General Description

These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar stripe, 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 DC to DC converters, synchronous rectification, and other applications lowest Rds(on) is required.

Features

- 45A, 150V, $R_{DS(on)} = 0.04\Omega @ V_{GS} = 10V$
- Low gate charge (typical 72 nC)
- Low Crss (typical 135 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	FQB45N15V2/FQI45N15V2	Units
V _{DSS}	Drain-Source Voltage	150	V
I _D	Drain Current - Continuous (T _C = 25°C) - Continuous (T _C = 100°C)	45	A
		31	A
I _{DM}	Drain Current - Pulsed (Note 1)	180	A
V _{GSS}	Gate-Source Voltage	± 30	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	1124	mJ
I _{AR}	Avalanche Current (Note 1)	45	A
E _{AR}	Repetitive Avalanche Energy (Note 1)	22	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5	V/ns
P _D	Power Dissipation (T _C = 25°C) - Derate above 25°C	220	W
		1.47	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +175	°C
T _L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

Thermal Characteristics * When mounted on the minimum pad size recommended (PCB Mount)

Symbol	Parameter	Typ	Max	Units
R _{θJC}	Thermal Resistance, Junction-to-Case	--	0.68	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient *	--	40	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	--	62.5	°C/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	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	150	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.21	--	V/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 150\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 120\text{ V}, T_C = 150^\circ\text{C}$	--	--	10	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	$V_{GS} = 10\text{ V}, I_D = 22.5\text{ A}$	--	0.034	0.04	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 22.5\text{ A}$ (Note 4)	--	40	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	2330	3030	pF
C_{oss}	Output Capacitance		--	510	670	pF
C_{riss}	Reverse Transfer Capacitance		--	135	176	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 75\text{ V}, I_D = 45\text{ A},$ $R_G = 25\ \Omega$	--	22	54	ns
t_r	Turn-On Rise Time		--	232	474	ns
$t_{d(off)}$	Turn-Off Delay Time		--	224	458	ns
t_f	Turn-Off Fall Time		(Note 4, 5)	--	246	502
Q_g	Total Gate Charge	$V_{DS} = 120\text{ V}, I_D = 45\text{ A},$ $V_{GS} = 10\text{ V}$	--	72	94	nC
Q_{gs}	Gate-Source Charge		--	13	--	nC
Q_{gd}	Gate-Drain Charge		(Note 4, 5)	--	31	--

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	45	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	180	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 45\text{ A}$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 45\text{ A},$	--	176	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	1.19	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 0.74\text{ mH}, I_{AS} = 45\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 45\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, 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

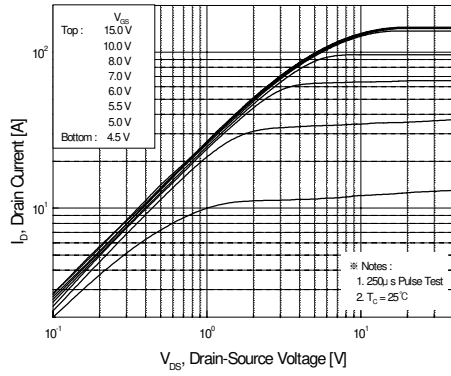


Figure 1. On-Region Characteristics

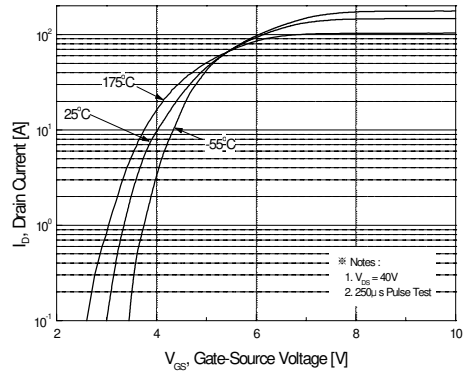


Figure 2. Transfer Characteristics

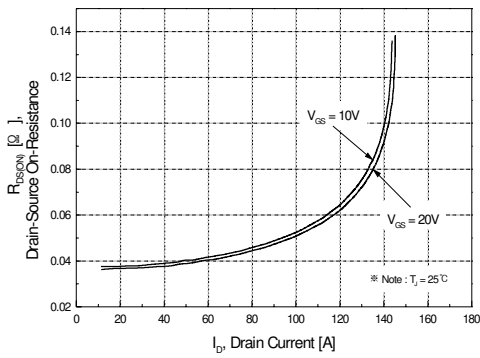


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

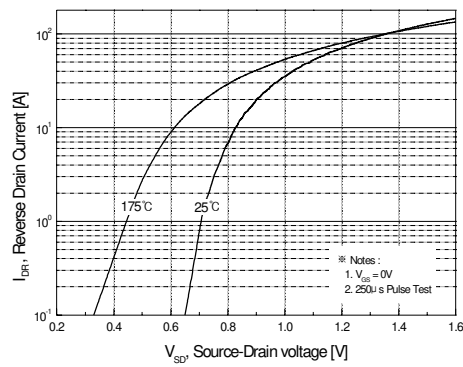


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

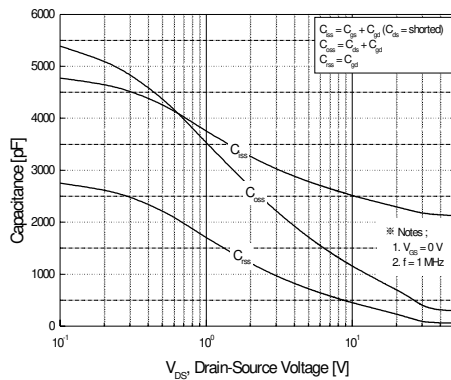


Figure 5. Capacitance Characteristics

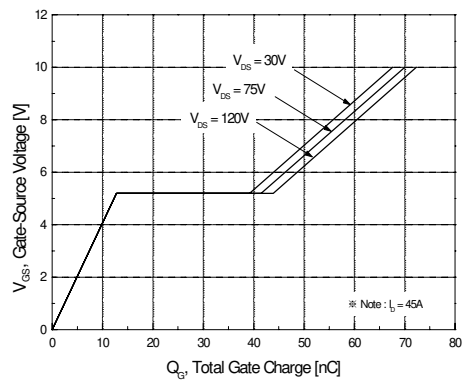


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

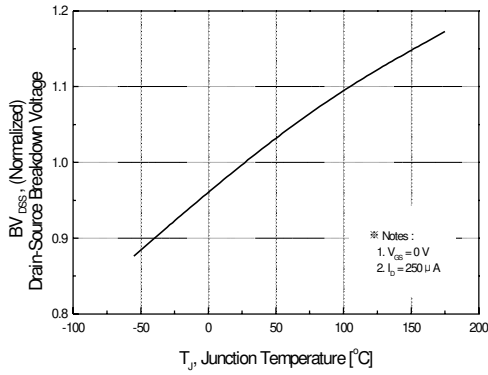


Figure 7. Breakdown Voltage Variation vs Temperature

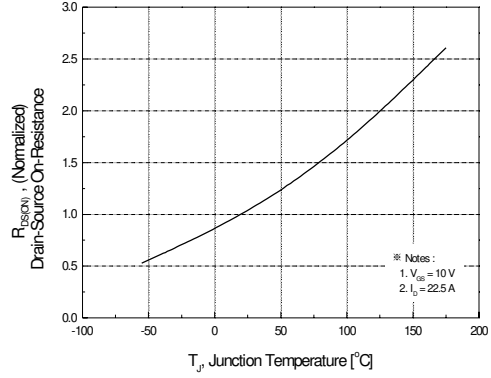


Figure 8. On-Resistance Variation vs Temperature

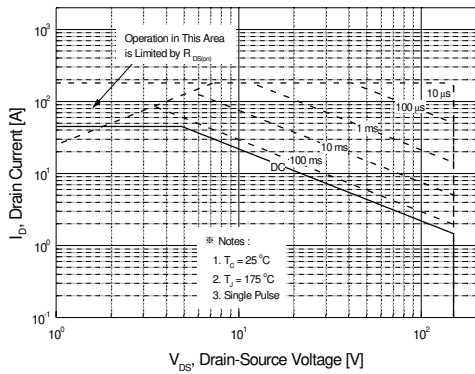


Figure 9. Maximum Safe Operating Area

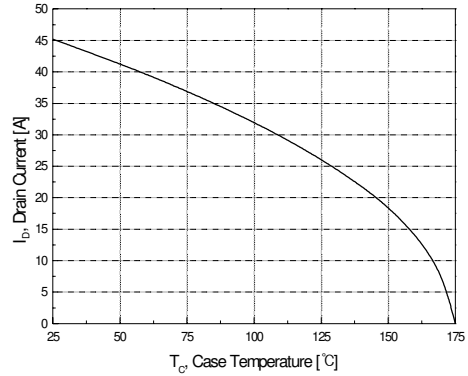


Figure 10. Maximum Drain Current vs Case Temperature

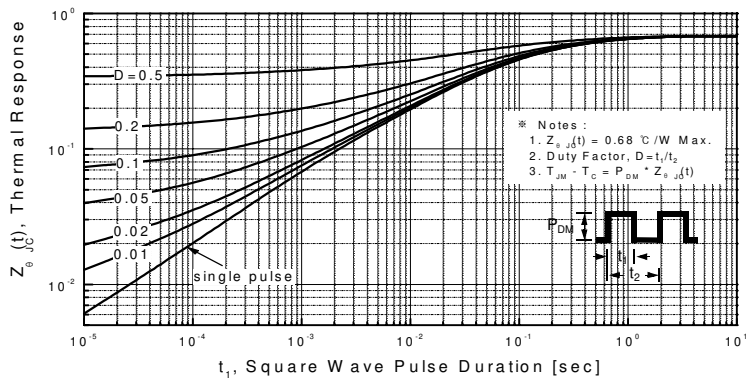
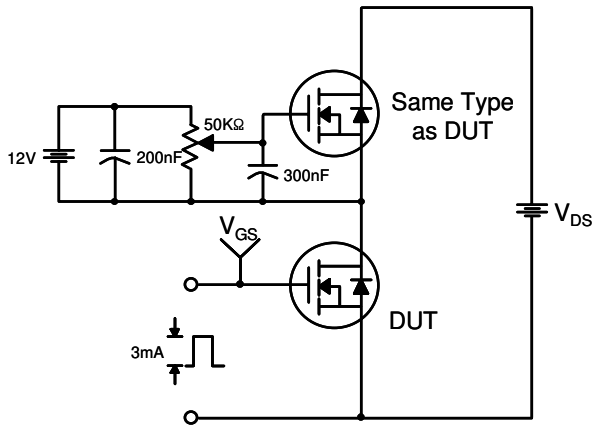


Figure 11. Transient Thermal Response Curve

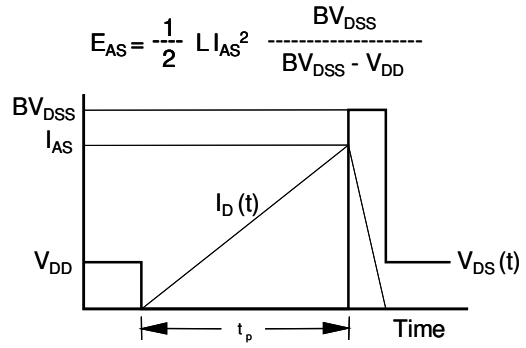
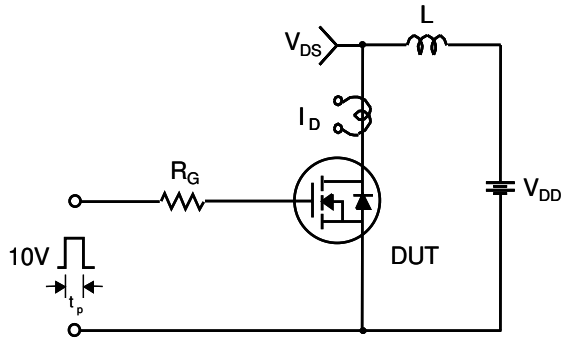
Gate Charge Test Circuit & Waveform



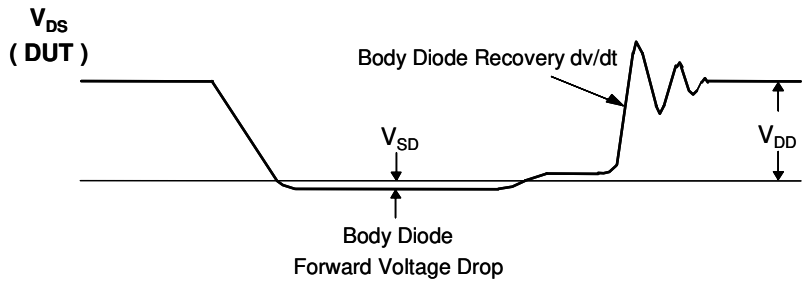
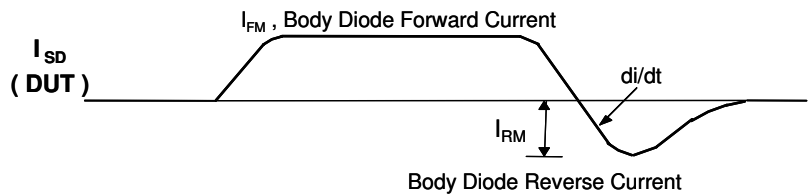
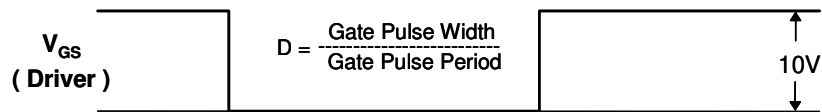
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

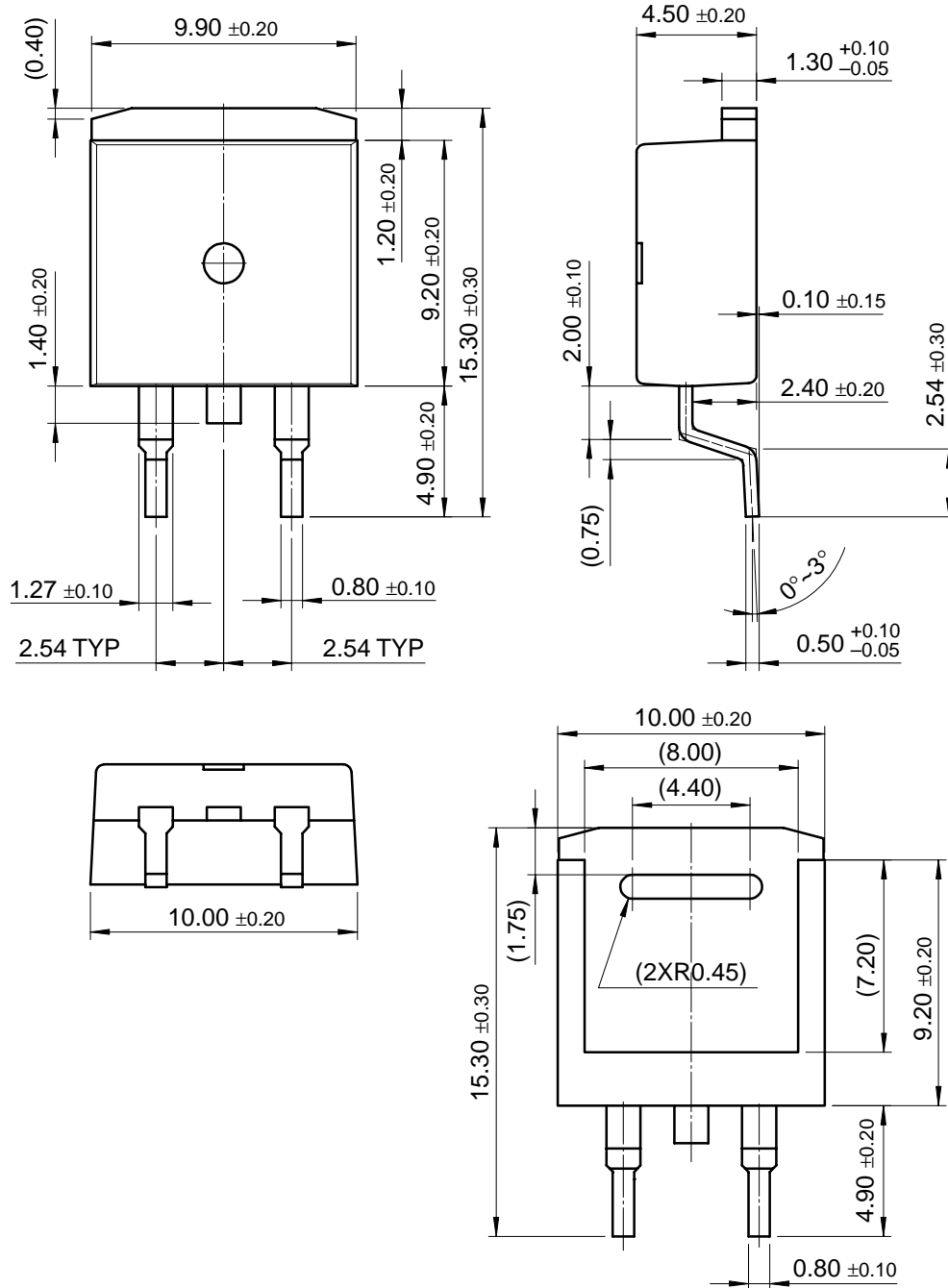


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimensions

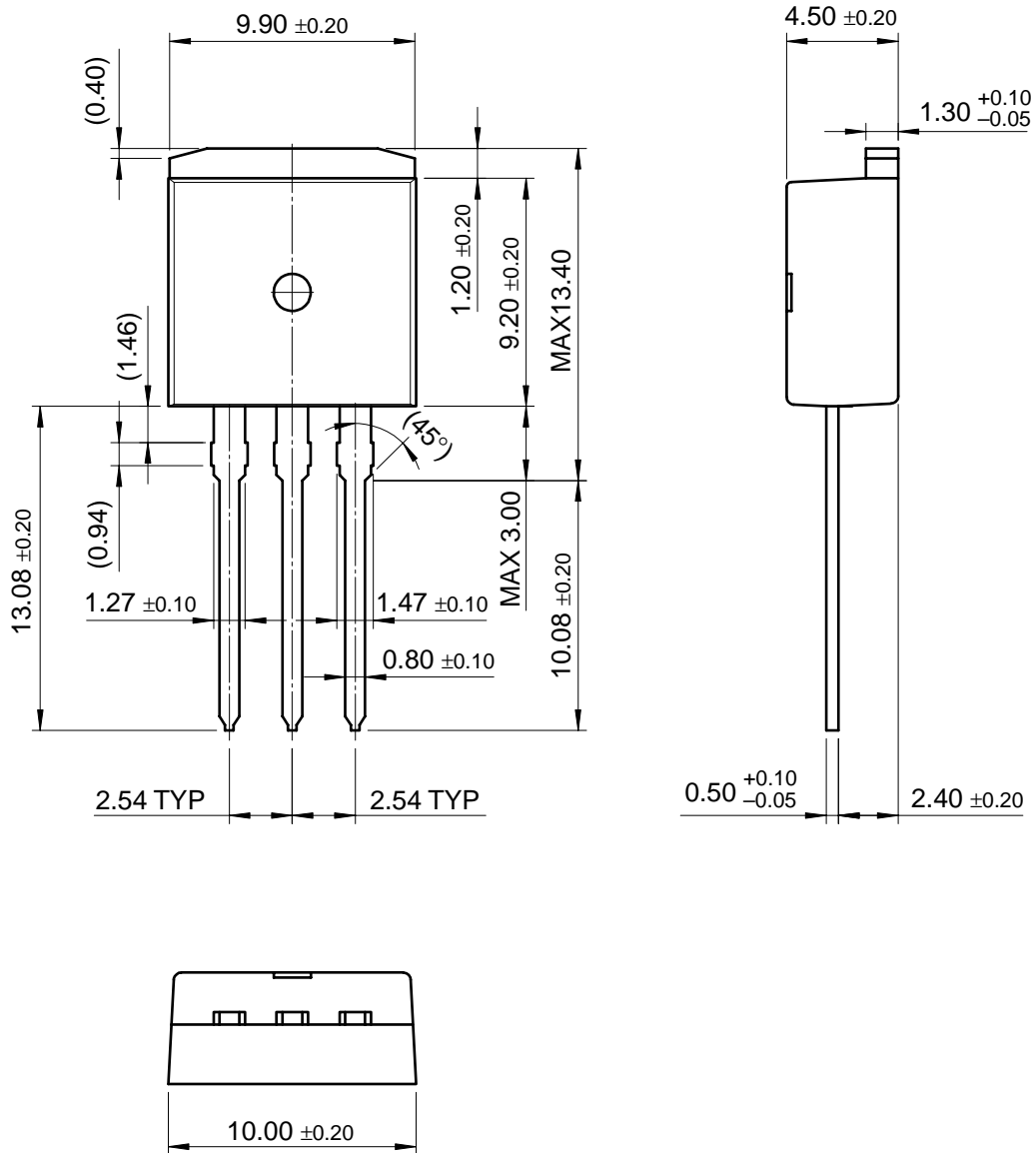
D²-PAK



Dimensions in Millimeters

Package Dimensions (Continued)

I²-PAK



FOB45N15V2/FQI45N15V2

Dimensions in Millimeters

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Definition of Terms

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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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FQB45N15V2

150V N-Channel Advanced QFET V2 series

Contents

- [General description](#)
- [Features](#)
- [Product status/pricing/packaging](#)
- [Order Samples](#)
- [Qualification Support](#)

General description

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[back to top](#)

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[back to top](#)

Product status/pricing/packaging

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Product	Product status	Pb-free Status	Pricing*	Package type	Leads	Packing method
FQB45N15V2TM	Full Production	 Full Production	\$2.14	TO-263(D2PAK)	2	TAPE REEL

* Fairchild 1,000 piece Budgetary Pricing

** A sample button will appear if the part is available through Fairchild's on-line samples program. If there is no sample button, please contact a [Fairchild distributor](#) to obtain samples



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

[back to top](#)

Qualification Support

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Product
FQB45N15V2TM

[back to top](#)

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