IRFP250B
200V N-Channel MOSFET

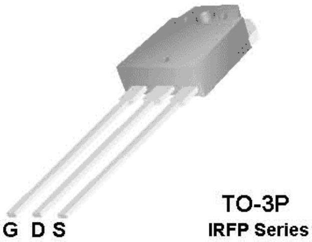
General Description

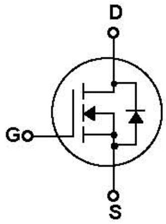
These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide in the avalanche and commutation mode. These devices are well suited for high efficiency switching DC/DC converters, switch mode power supplies, DC-AC converters for uninterrupted power supply and motor control.

Features

32A, 200V, $R_{DS(on)}$=0.085Ω@V_{GS}=10V
Low gate charge (typical 95nC)
Low Crss (typical 75pF)
Fast switching
100% avalanche tested
Improved dv/dt capability





Absolute Maximum Ratings Tc=25°C unless otherwise noted

Symbol	Parameter	IRF250B	Units
V_{DSS}	Drain-Source Voltage	200	V
I_D	Drain Current – Continuous (Tc=25°C)	32	A
	- Continuous (Tc=100°C)	20.3	A
I_{DM}	Drain Current –Pulse (Note 1)	128	A
V_{GSS}	Gate-Source Voltage	±30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	600	mJ
I_{AR}	Avalanche Current (Note 1)	32	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	20.4	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
P_D	Power Dissipation (Tc=25°C)	204	W
	- Derate above 25°C	1.63	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	0.61	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink	0.24	-	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	40	°C/W

Electrical Characteristics Tc=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	200	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D=250μA, Referenced to 25°C	-	0.2	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=200V, V_{GS}=0V	-	-	10	μA
		V_{DS}=160V, Tc=125℃	-	-	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS}=30V, V_{DS}=0V	-	-	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS}=-30V, V_{DS}=0V	-	-	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=16A	-	0.071	0.085	Ω
g_{FS}	Forward Transconductance	V_{DS}=40V, I_D=16A (Note4)	-	27	-	S
Dynamic Characteristics						
Ciss	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	2600	3400	pF
Coss	Output Capacitance		-	330	430	pF
Crss	Reverse Transfer Capacitance		-	75	100	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=100V, I_D=32A, R_G=25 Ω (Note 4,5)	-	30	70	ns
tr	Turn-On Rise Time		-	240	490	ns
$t_{d(off)}$	Turn-Off Delay Time		-	295	600	ns
tf	Turn-Off Fall Time		-	195	400	ns
Qg	Total Gate Charge	V_{DS}=160V, I_D=32A, V_{GS}=10V (Note 4,5)	-	95	123	nC
Qgs	Gate-Source Charge		-	13	-	nC
Qgd	Gated-Drain Charge		-	43	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Is	Maximum Continuous Drain-Source Diode Forward Current		-	-	32	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	-	128	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS}=0V, I_S=32A	-	-	1.5	V
trr	Reverse Recovery Time	V_{GS}=0V, I_S=32A dIF/dt=100A/μs (Note 4)	-	220	-	ns
Qrr	Reverse Recovery Charge		-	1.89	-	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=0.88mH, I_{AS}=32A, V_{DD}=50V, R_G=25 Ω, Starting T_J=25°C
3. I_{SD}≤32A, di/dt≤300A/μs, V_{DD}≤BV_{DSS}, Starting T_J=25°C
4. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤2%
5. Essentially independent of operating temperature

Typical Characteristics

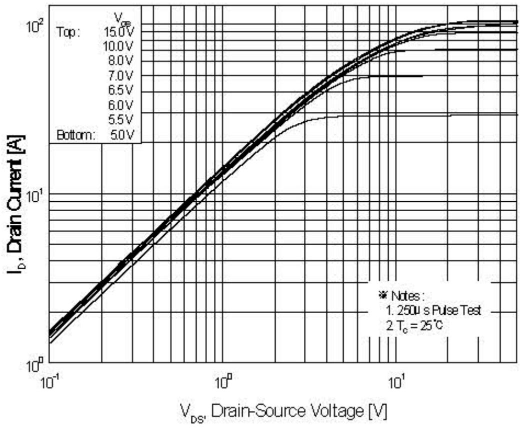


Figure 1. On-Region Characteristics

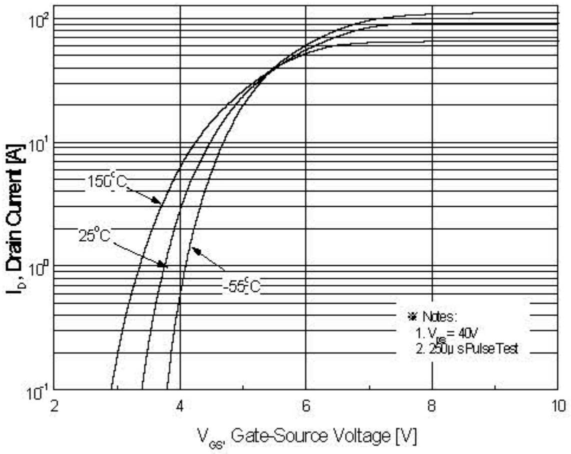


Figure 2. Transfer Characteristics

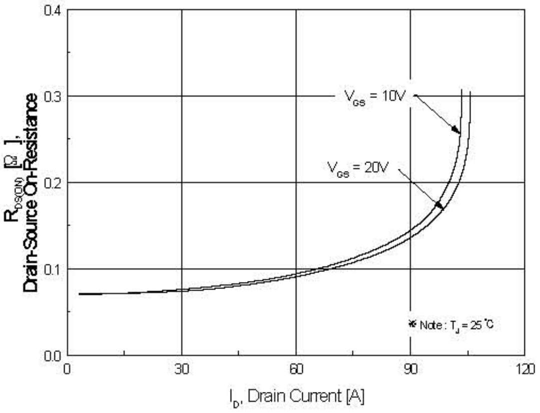


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

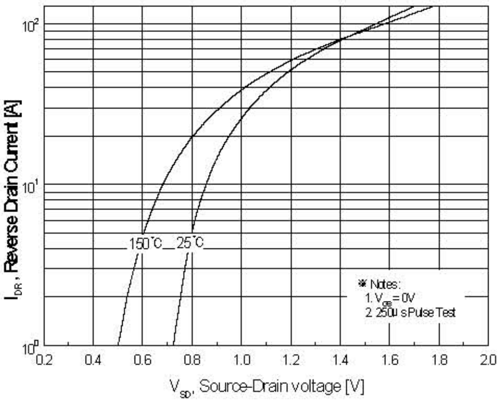


Figure 4. Body Diode Forward Voltage Variation with Source Current And Temperature

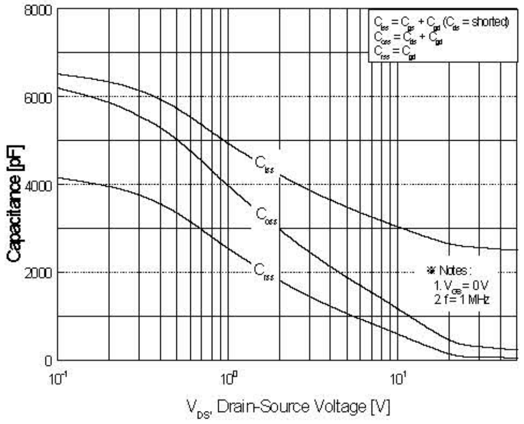


Figure 5. Capacitance Characteristics

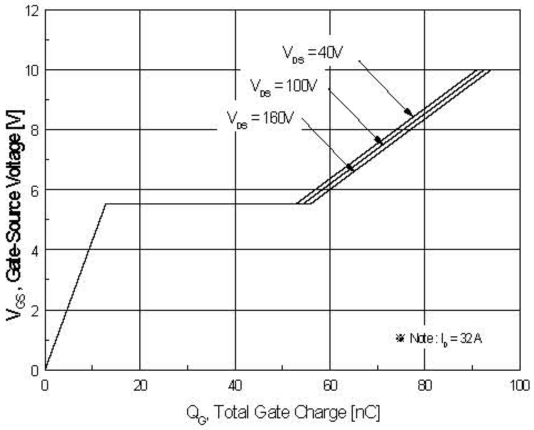


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

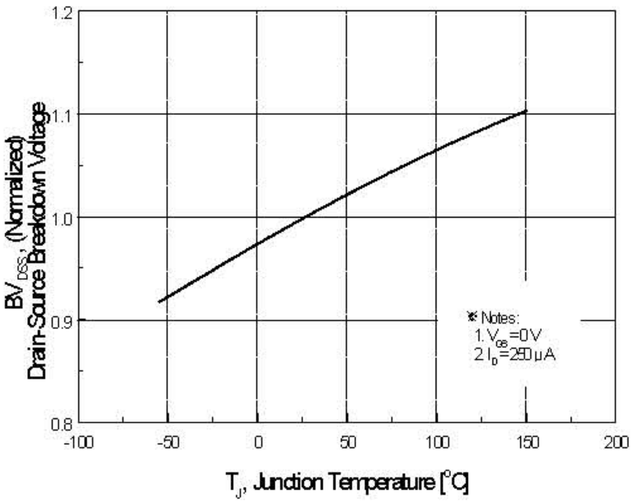


Figure 7. Breakdown Voltage Variation Vs Temperature

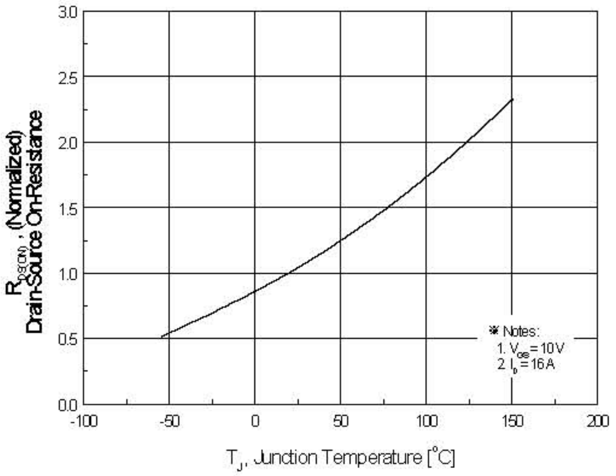


Figure 8. On-Resistance Variation Vs Temperature

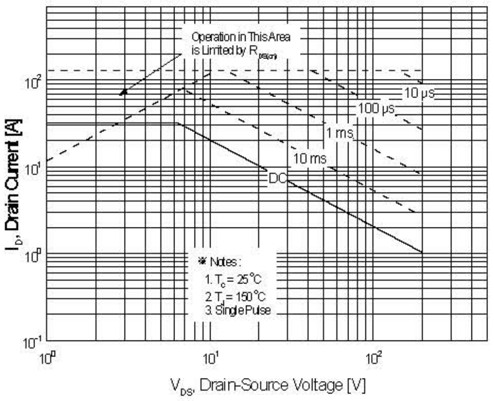


Figure 9. Maximum Safe Operating Area

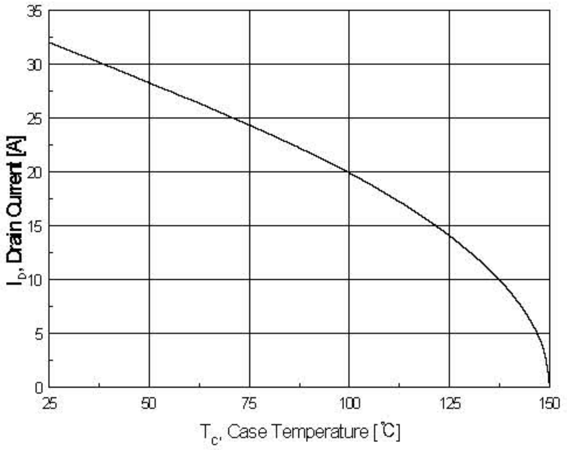


Figure 10. Maximum Drain Current Vs Case Temperature

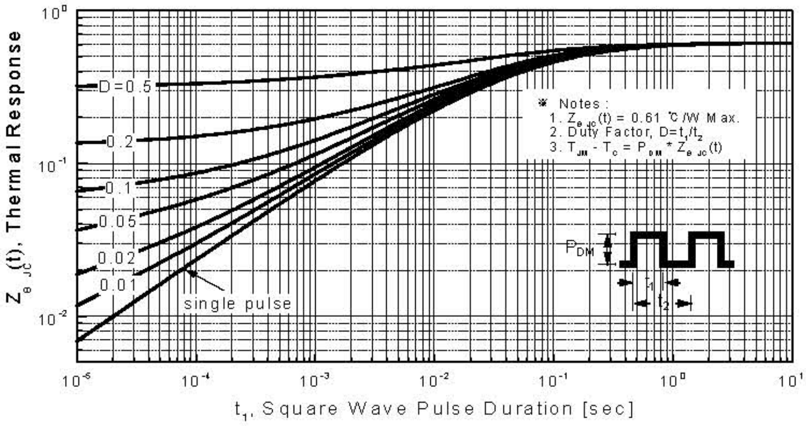
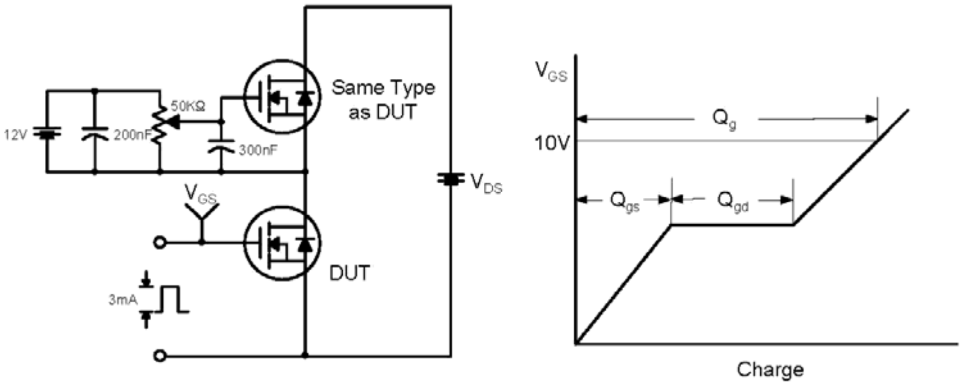
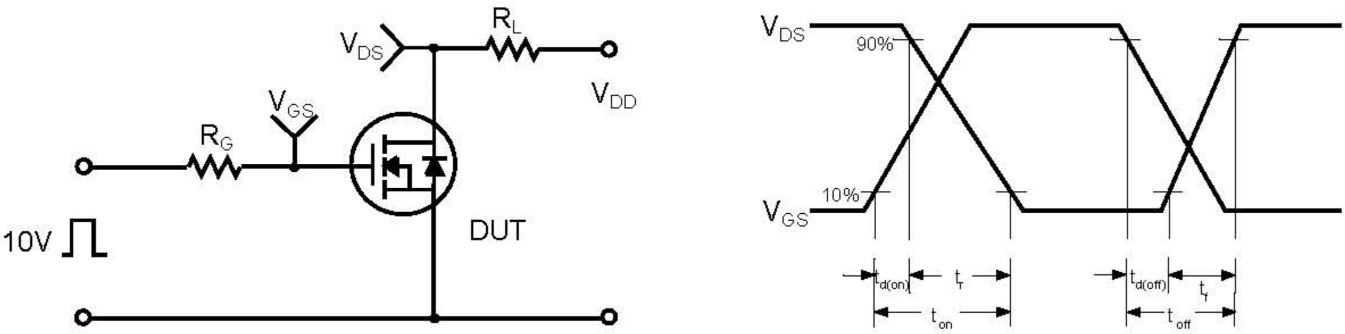


Figure 11. Transient Thermal Response Curve

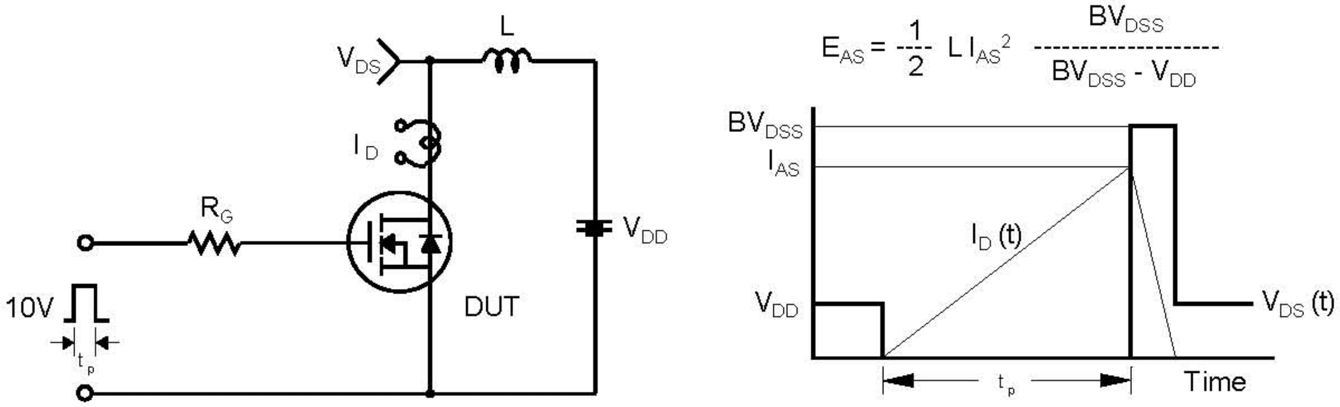
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

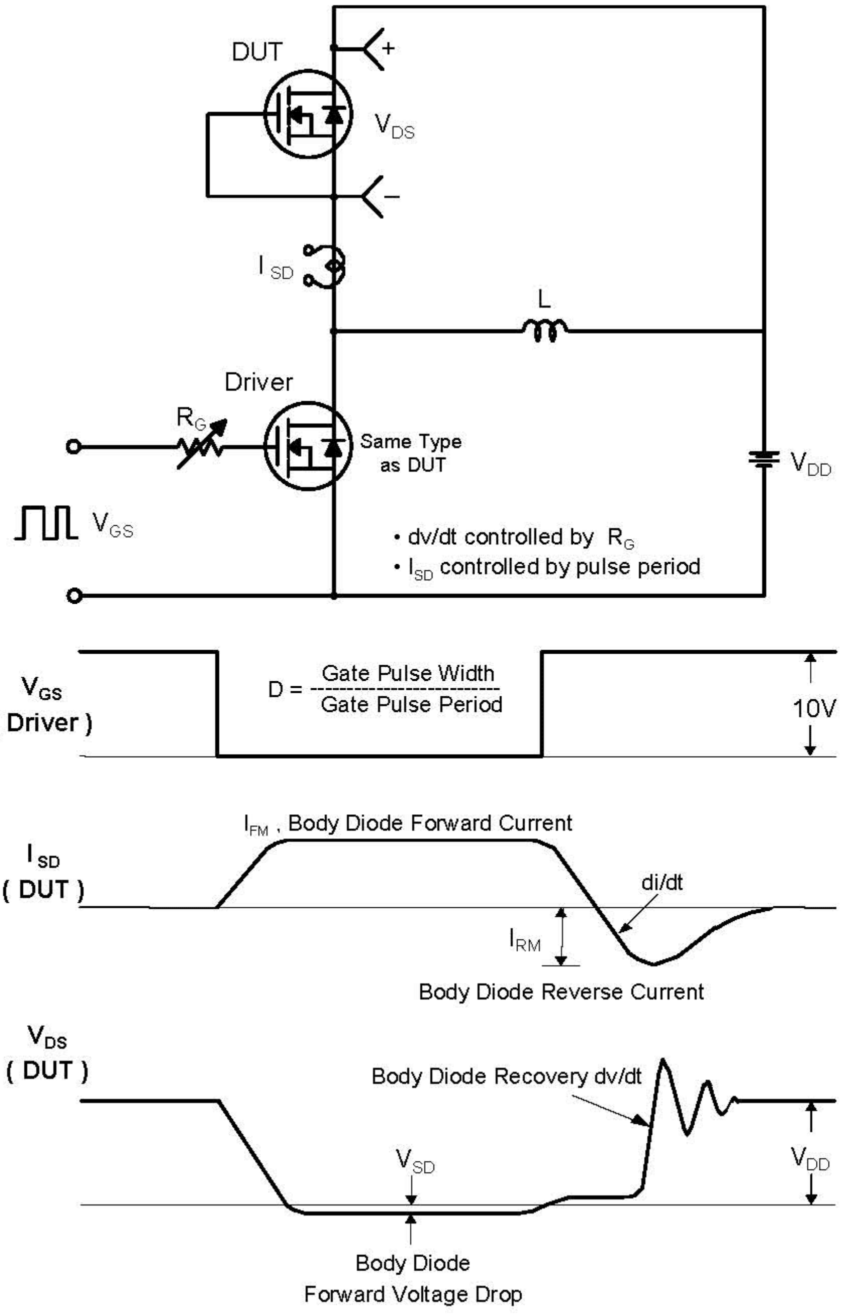


Unclamped Inductive Switching Test Circuit & Waveforms

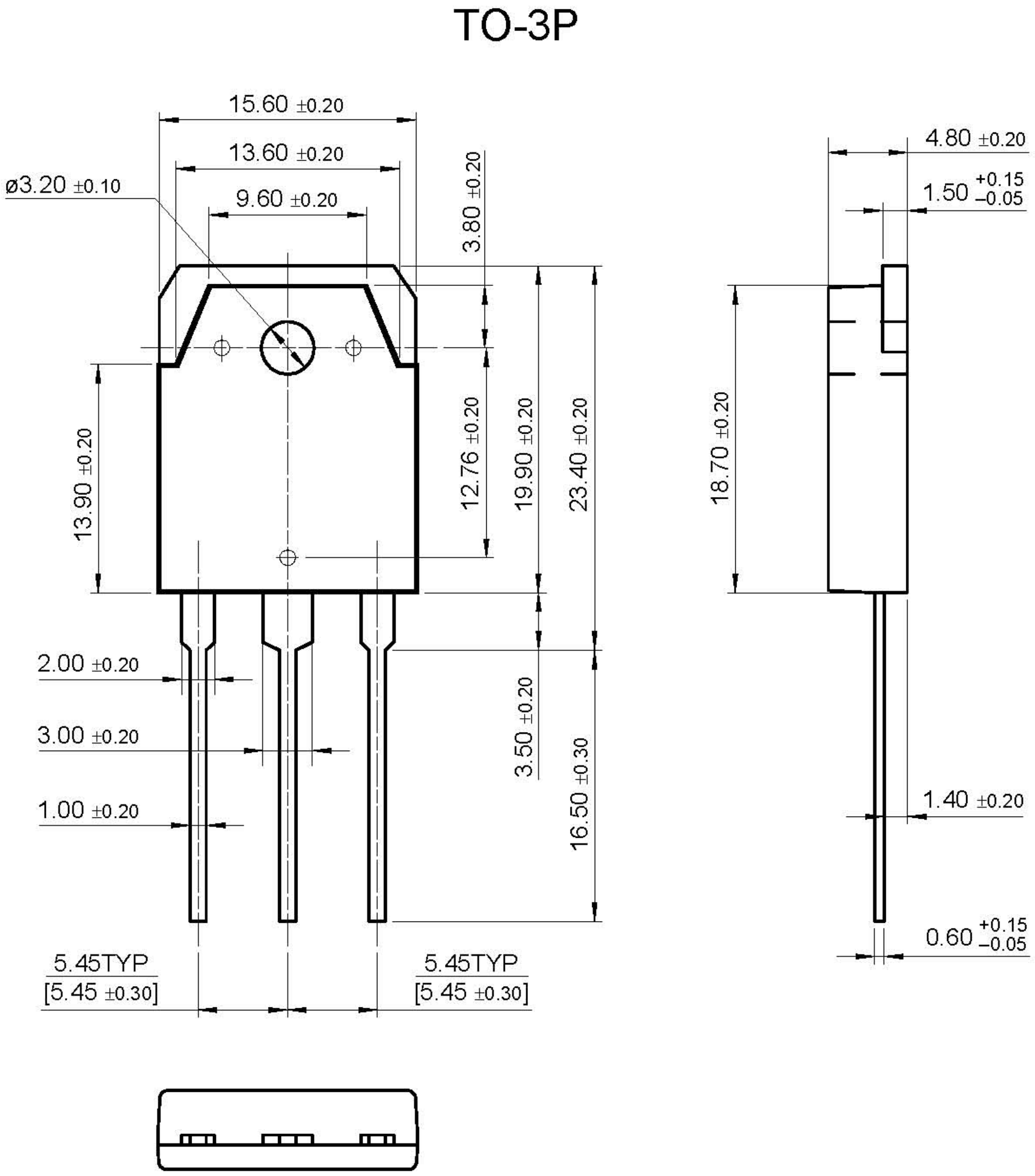


$$E_{AS} = \frac{1}{2} L I_{AS}^2 \; \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimensions



Dimensions in Millimeters