



November 2007

FDP2614

200V N-Channel PowerTrench MOSFET

General Description

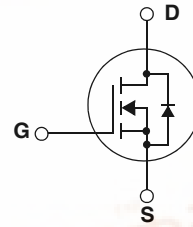
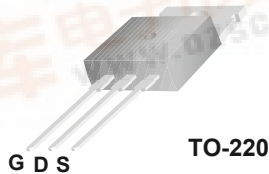
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Description

- 62A, 200V, $R_{DS(on)} = 22.9m\Omega @ V_{GS} = 10V$
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low $R_{DS(on)}$
- High power and current handling capability
- RoHS compliant

Application

- PDP application



Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
V_{DS}	Drain-Source Voltage	200	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current	- Continuous ($T_C = 25^\circ C$) - Continuous ($T_C = 100^\circ C$)	A A
I_{DM}	Drain Current - Pulsed	(Note 1)	see Figure 9
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	145 mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5 V/ns
P_D	Power Dissipation	($T_C = 25^\circ C$) - Derate above $25^\circ C$	260 W 2.1 W/ $^\circ C$
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	Min.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.48	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	62.5	$^\circ C/W$

FDP2614 200V N-Channel PowerTrench MOSFET



Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP2614	FDP2614	TO-220	-	-	50

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA, T _J = 25°C	200	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	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 V _{DS} = 200V, V _{GS} = 0V, T _J = 125°C	--	--	10 500	μA 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	3.0	4.0	5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 31A	--	22.9	27	mΩ
g _{FS}	Forward Transconductance	V _{DS} = 10V, I _D = 31A (Note 4)	--	72	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V f = 1.0MHz	--	5435	7230	pF
C _{oss}	Output Capacitance		--	505	675	pF
C _{rss}	Reverse Transfer Capacitance		--	110	165	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 100V, I _D = 62A V _{GS} = 10V, R _{GEN} = 25Ω (Note 4, 5)	--	77	165	ns
t _r	Turn-On Rise Time		--	284	560	ns
t _{d(off)}	Turn-Off Delay Time		--	103	220	ns
t _f	Turn-Off Fall Time		--	162	335	ns
Q _g	Total Gate Charge	V _{DS} = 100V, I _D = 62A V _{GS} = 10V (Note 4, 5)	--	76	99	nC
Q _{gs}	Gate-Source Charge		--	35	--	nC
Q _{gd}	Gate-Drain Charge		--	18	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	62	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	186	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0V, I _S = 62A	--	--	1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _S = 62A	--	145	--	ns
Q _{rr}	Reverse Recovery Charge	dI _F /dt = 100A/μs (Note 4)	--	0.81	--	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 1mH, I_{AS} = 17A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 62A, di/dt ≤ 100A/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

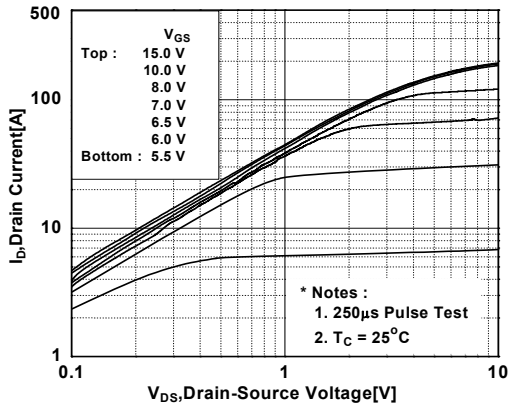


Figure 2. Transfer Characteristics

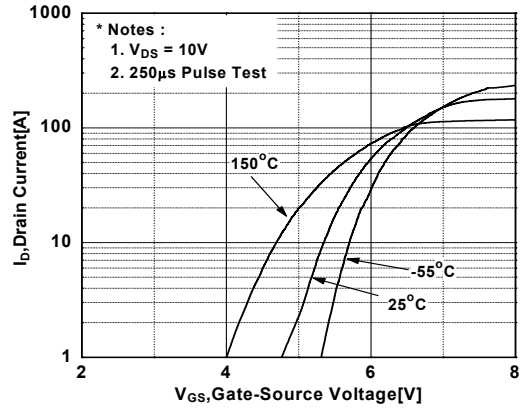


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

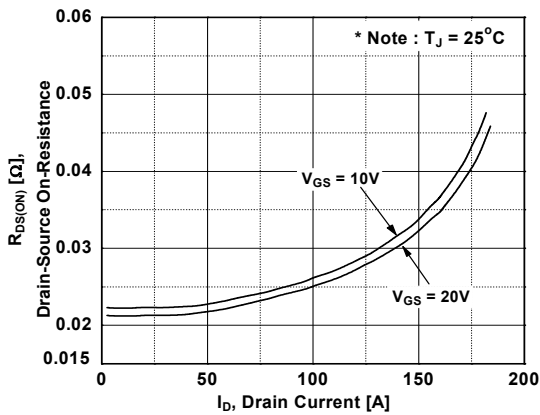


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

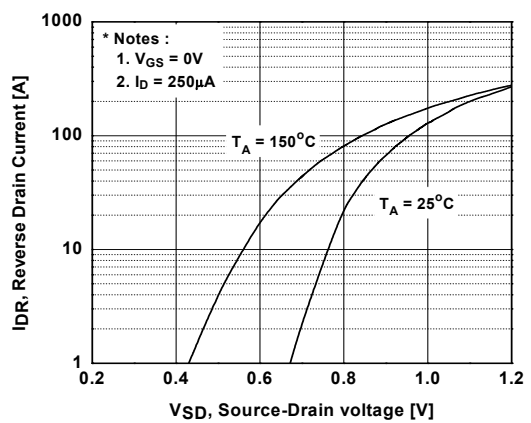


Figure 5. Capacitance Characteristics

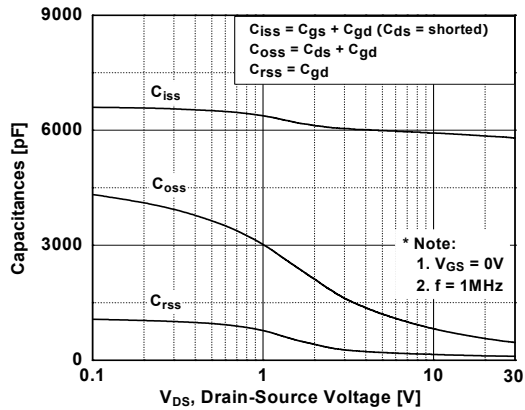


Figure 6. Gate Charge Characteristics

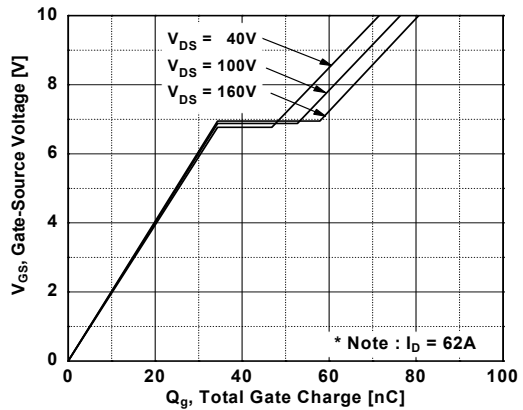


Figure 7. Breakdown Voltage Variation vs. Temperature

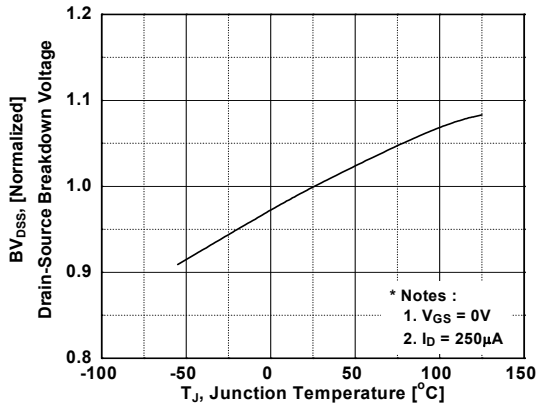


Figure 8. On-Resistance Variation vs. Temperature

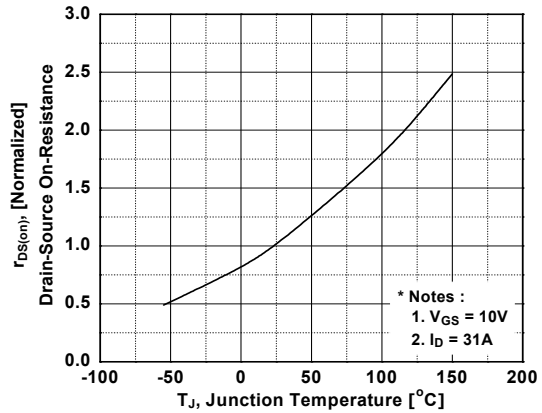


Figure 9. Maximum Safe Operating Area

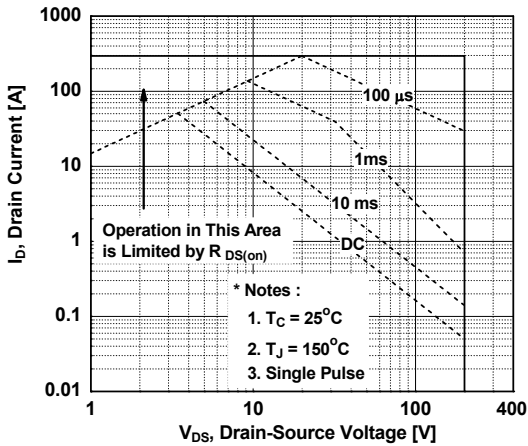


Figure 10. Maximum Drain Current vs. Case-Temperature

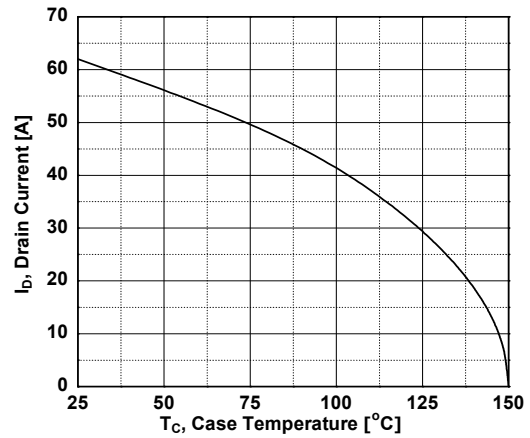
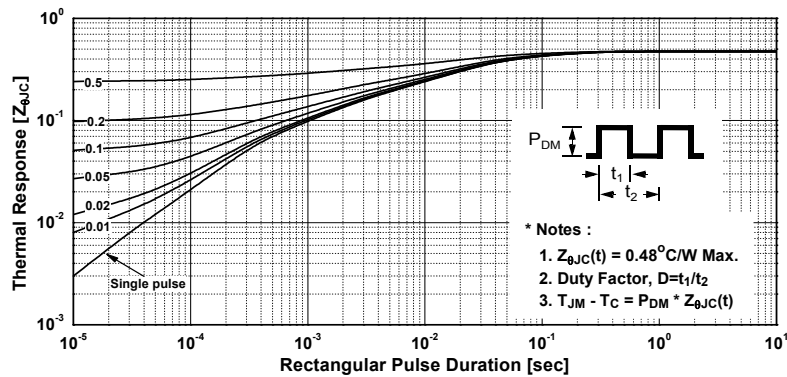
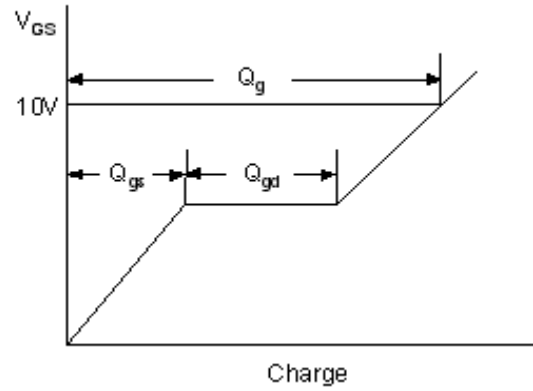
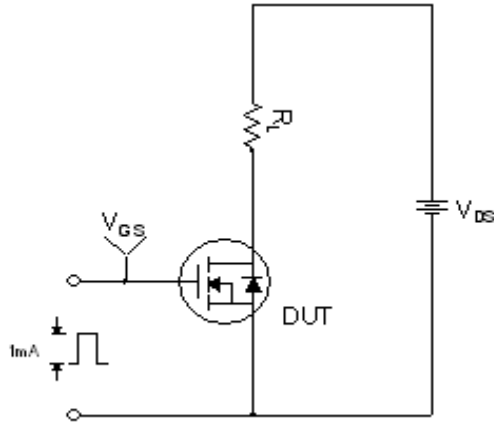


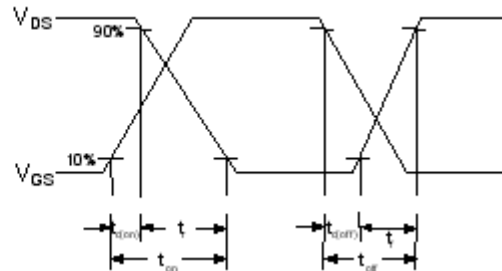
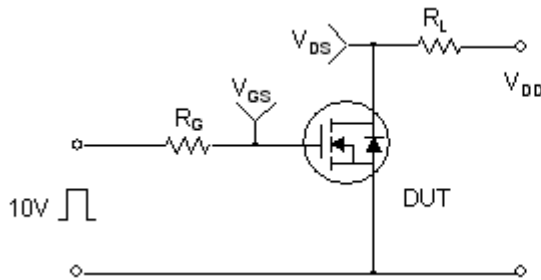
Figure 11. Transient Thermal Response Curve



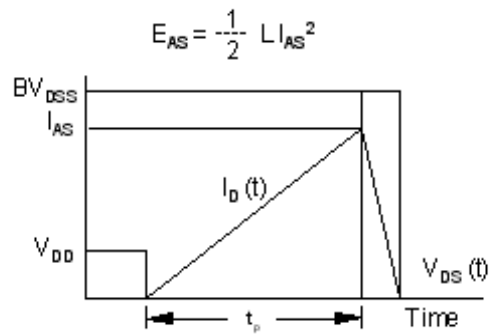
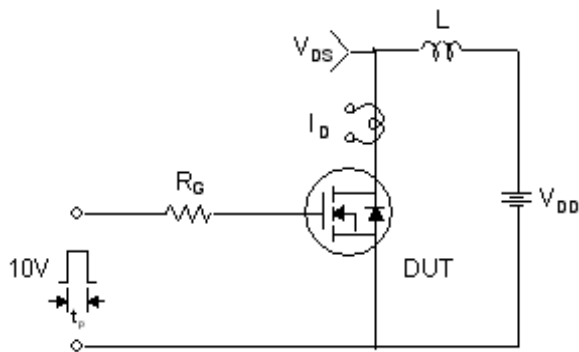
Gate Charge Test Circuit & Waveform



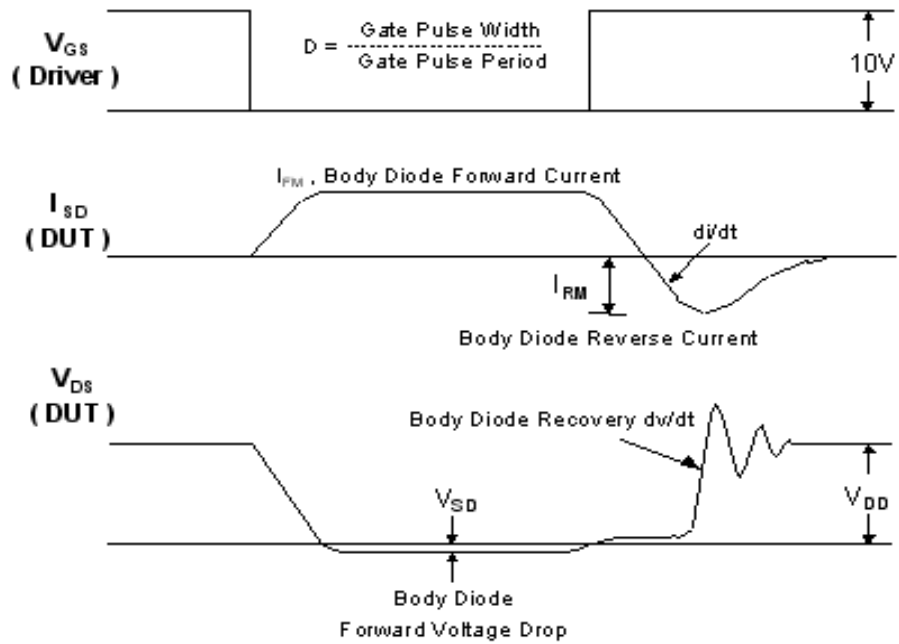
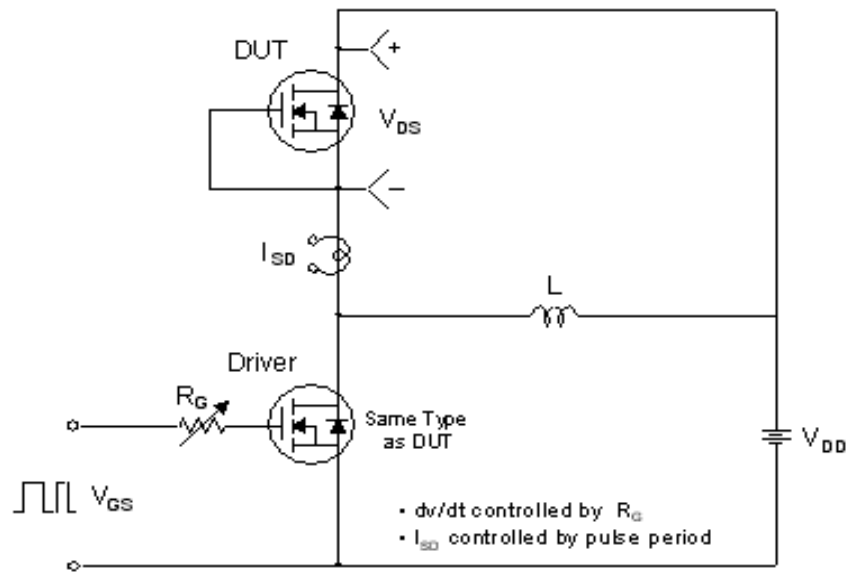
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

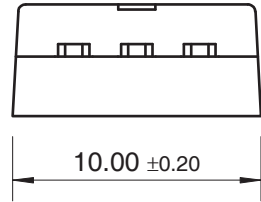
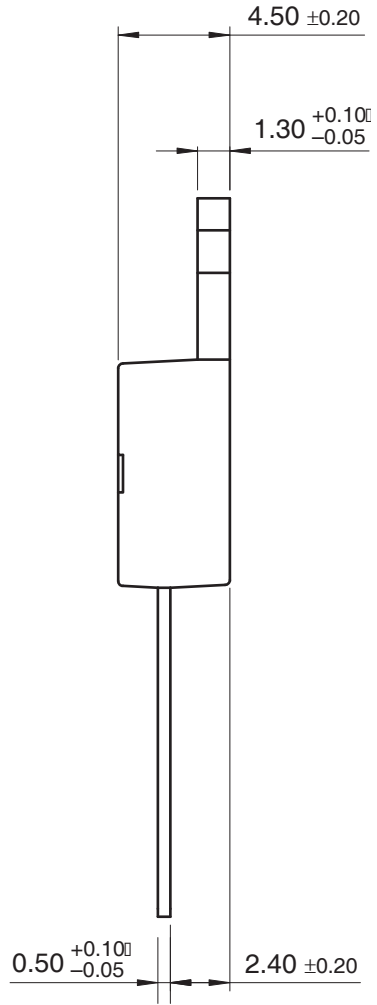
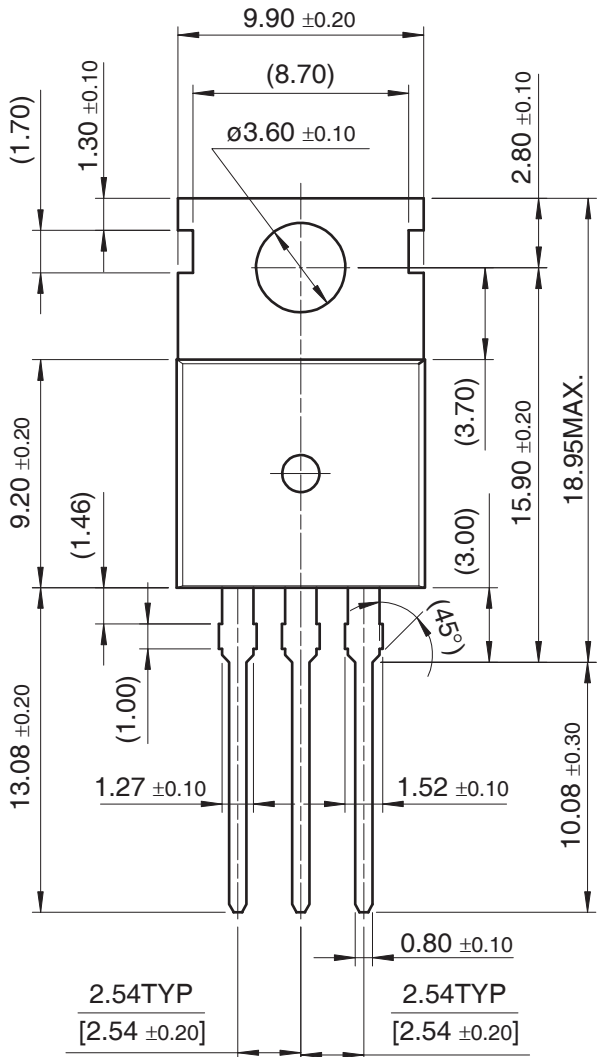


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions


TO-220





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