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# FDP2614

## N-Channel PowerTrench<sup>®</sup> MOSFET 200 V, 62 A, 27 mΩ

### Features

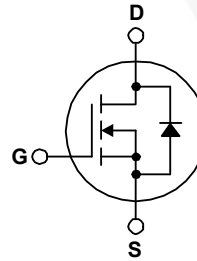
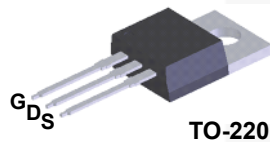
- $R_{DS(on)} = 22.9 \text{ m}\Omega$  (Typ.) @  $V_{GS} = 10 \text{ V}$ ,  $I_D = 31 \text{ A}$
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench technology for Extremely Low  $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

### General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench<sup>®</sup> process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

### Applications

- Consumer Appliances
- Synchronous Rectification
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies



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

Symbol	Parameter	FDP2614	Unit
$V_{DS}$	Drain-Source Voltage	200	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ ) - Continuous ( $T_C = 100^\circ\text{C}$ )	62 39.3	A A
$I_{DM}$	Drain Current - Pulsed (Note 1)	see Figure 9	A
$E_{AS}$	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 ( $T_C = 25^\circ\text{C}$ ) - Derate above $25^\circ\text{C}$	260 2.1	W 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 Purpose, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	FDP2614	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.48	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	$^\circ\text{C}/\text{W}$

## Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP2614	FDP2614	TO-220	Tube	N/A	50 units

## Electrical Characteristics T<sub>C</sub> = 25°C unless otherwise noted

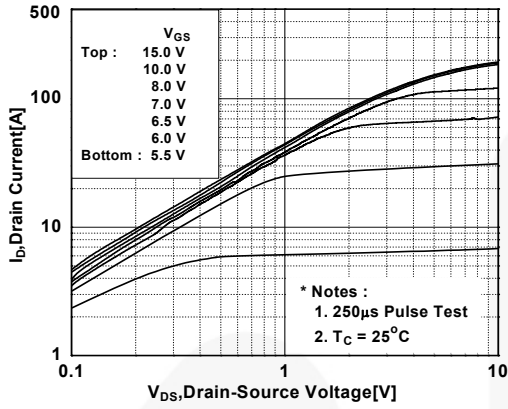
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA, T <sub>J</sub> = 25°C	200	--	--	V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250μA, Referenced to 25°C	--	0.2	--	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 200V, V <sub>GS</sub> = 0V V <sub>DS</sub> = 200V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C	--	--	10 500	μA μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 30V, V <sub>DS</sub> = 0V	--	--	100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -30V, V <sub>DS</sub> = 0V	--	--	-100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	3.0	4.0	5.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 31A	--	22.9	27	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 10V, I <sub>D</sub> = 31A	--	72	--	S
<b>Dynamic Characteristics</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V f = 1.0MHz	--	5435	7230	pF
C <sub>OSS</sub>	Output Capacitance		--	505	675	pF
C <sub>RSS</sub>	Reverse Transfer Capacitance		--	110	165	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 100V, I <sub>D</sub> = 62A V <sub>GS</sub> = 10V, R <sub>GEN</sub> = 25Ω (Note 4)	--	77	165	ns
t <sub>r</sub>	Turn-On Rise Time		--	284	560	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	103	220	ns
t <sub>f</sub>	Turn-Off Fall Time		--	162	335	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 100V, I <sub>D</sub> = 62A V <sub>GS</sub> = 10V (Note 4)	--	76	99	nC
Q <sub>gs</sub>	Gate-Source Charge		--	35	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	18	--	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		--	--	62	A
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current		--	--	186	A
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 62A	--	--	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0V, I <sub>S</sub> = 62A di/dt = 100A/μs	--	145	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	0.81	--	μC

### Notes:

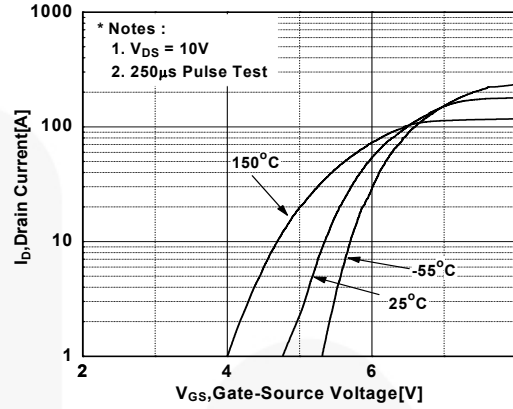
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 1mH, I<sub>AS</sub> = 17A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C
3. I<sub>SD</sub> ≤ 62A, di/dt ≤ 100A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C
4. Essentially Independent of Operating Temperature Typical Characteristics

## Typical Performance Characteristics

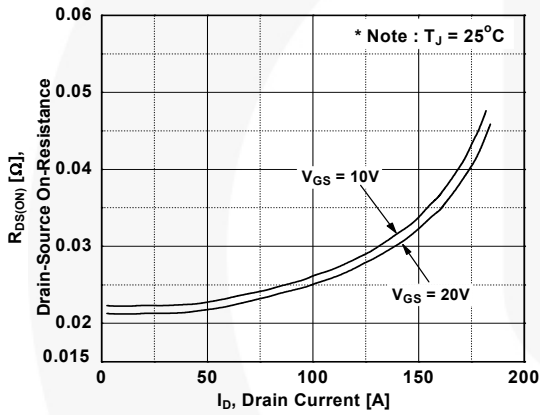
**Figure 1. On-Region Characteristics**



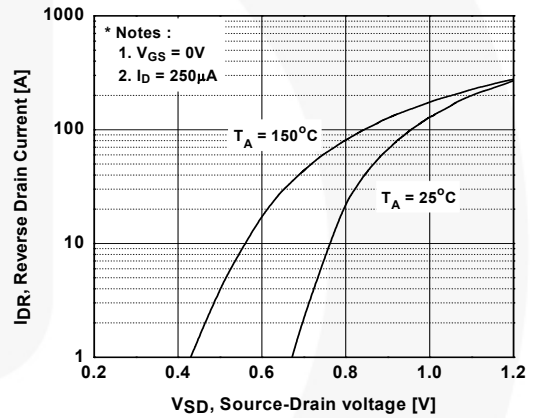
**Figure 2. Transfer Characteristics**



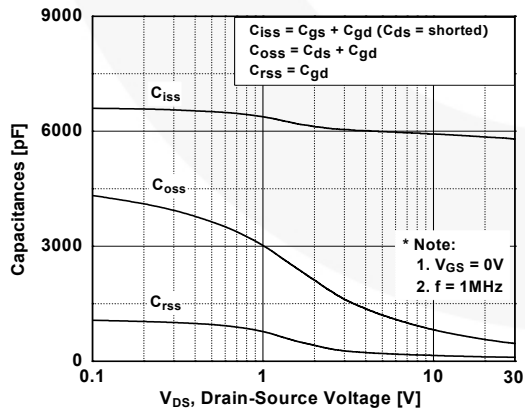
**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**



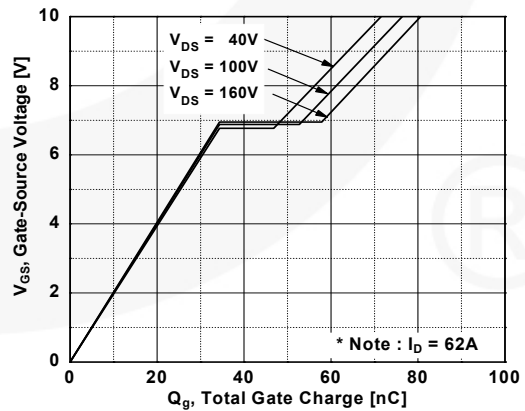
**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**



**Figure 5. Capacitance Characteristics**

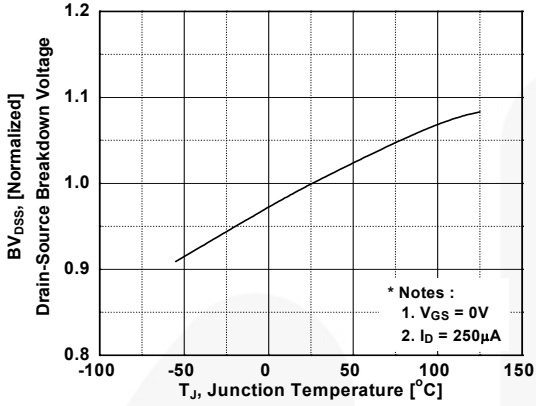


**Figure 6. Gate Charge Characteristics**

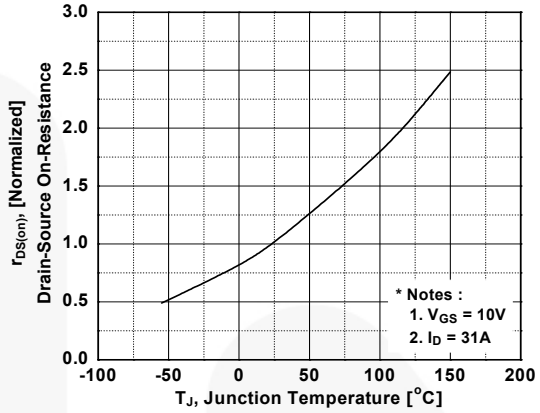


**Typical Performance Characteristics** (Continued)

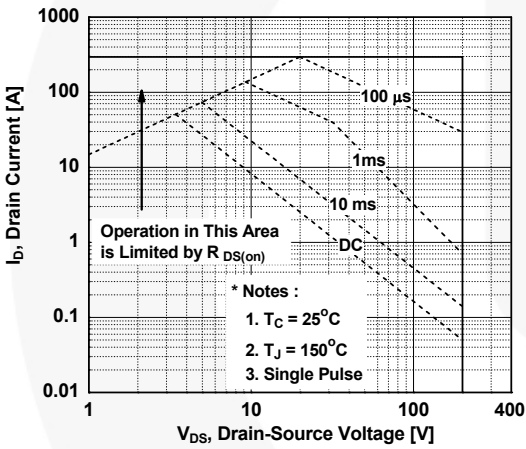
**Figure 7. Breakdown Voltage Variation vs. Temperature**



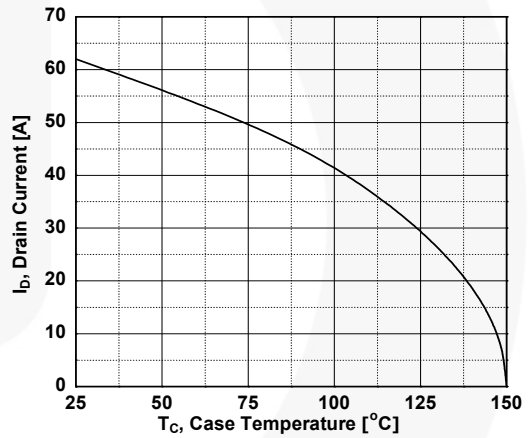
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**



**Figure 10. Maximum Drain Current vs. Case Temperature**



**Figure 11. Transient Thermal Response Curve**

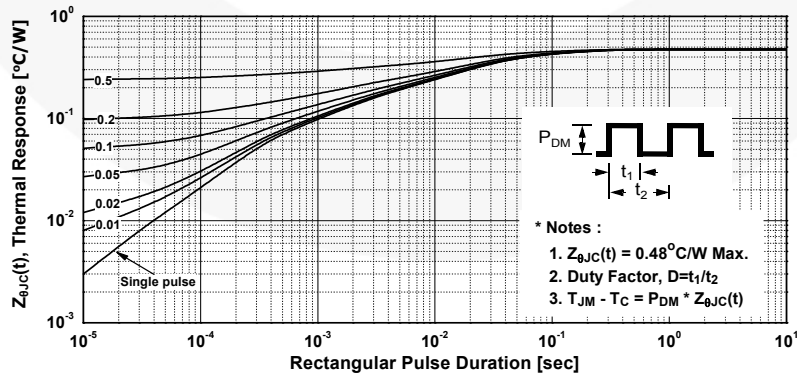


Figure 12. Gate Charge Test Circuit & Waveform

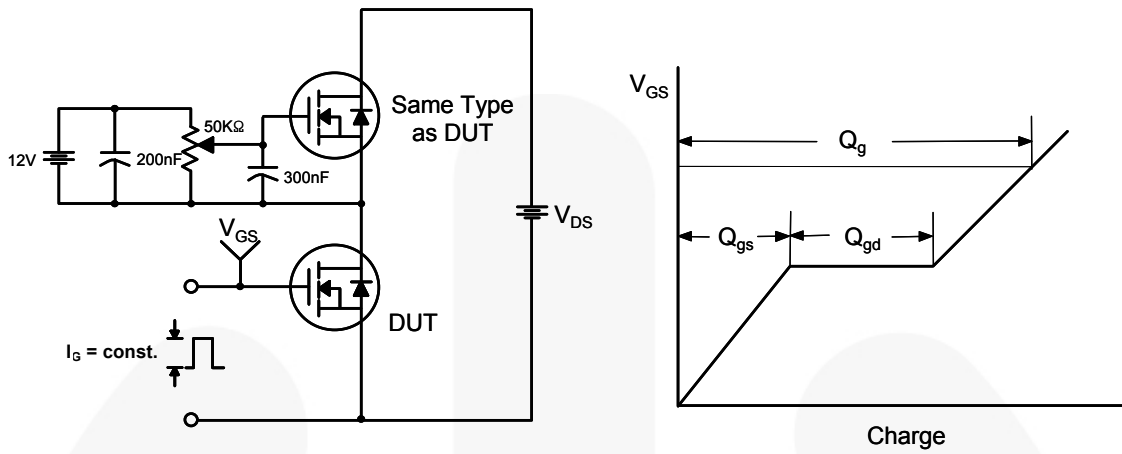


Figure 13. Resistive Switching Test Circuit & Waveforms

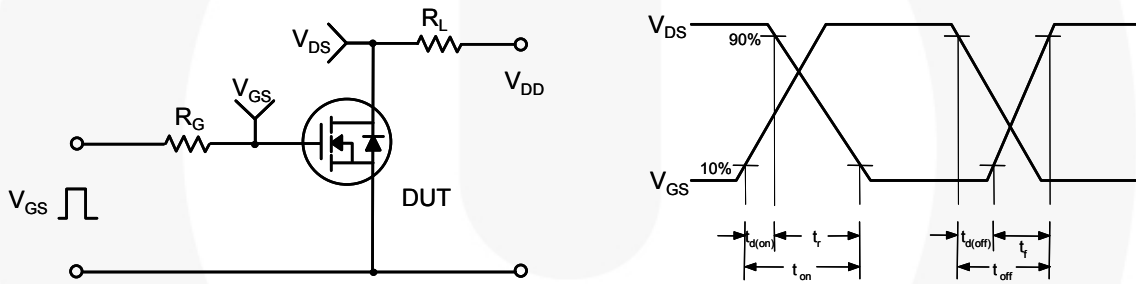


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

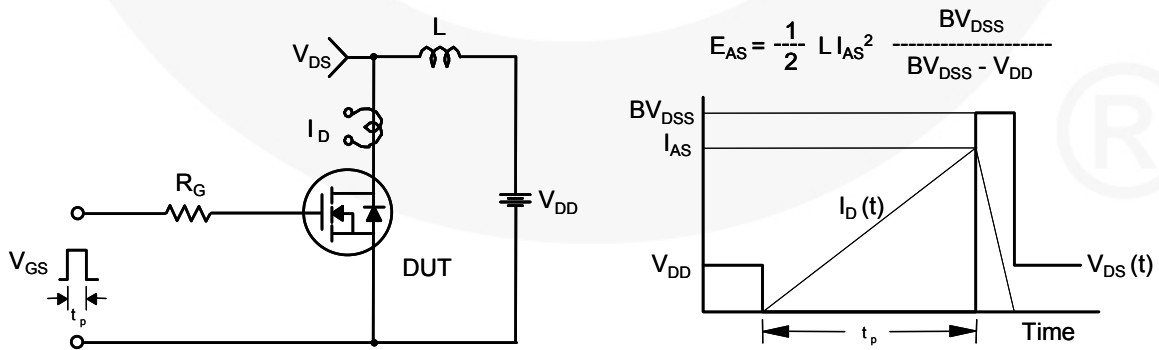
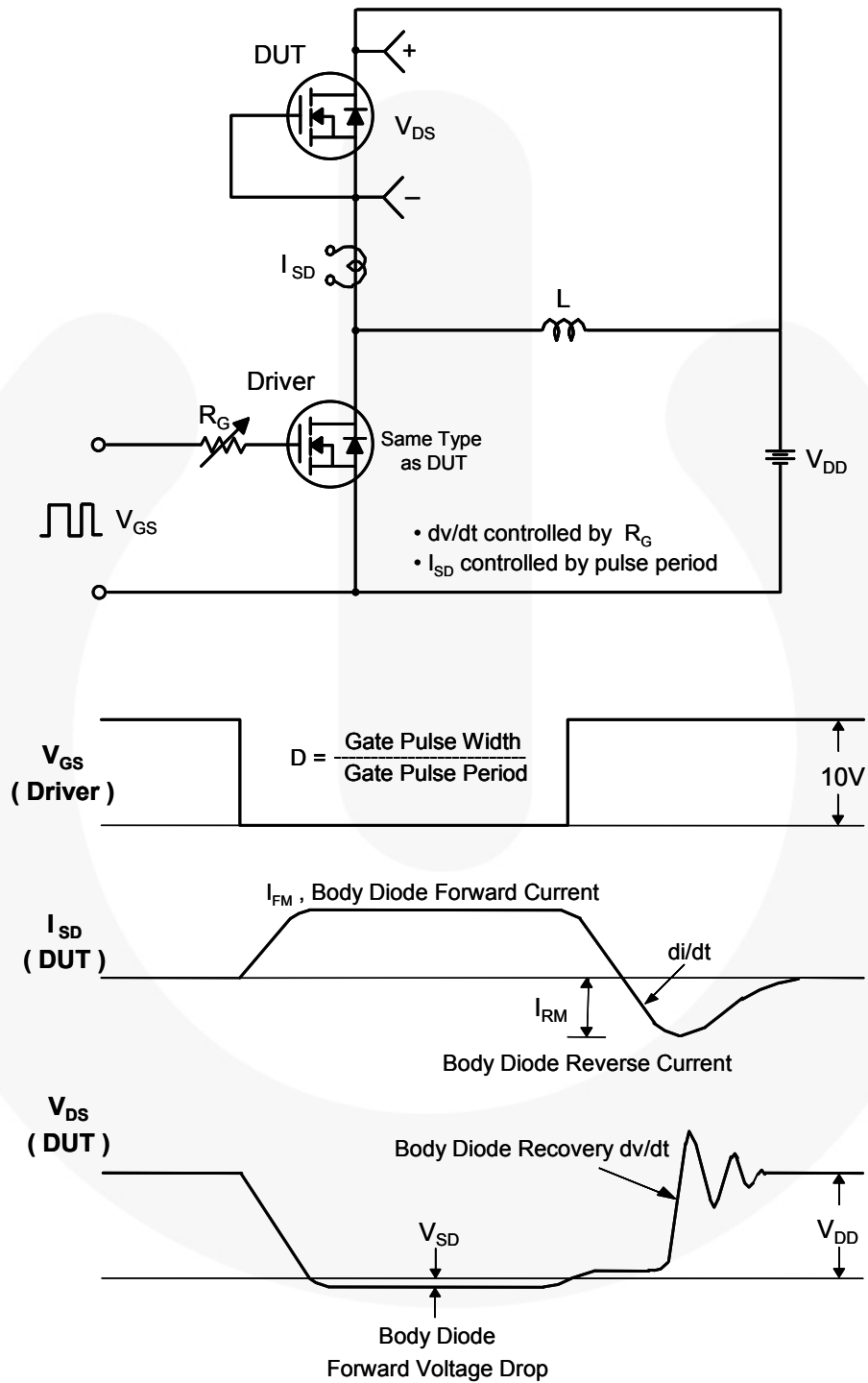
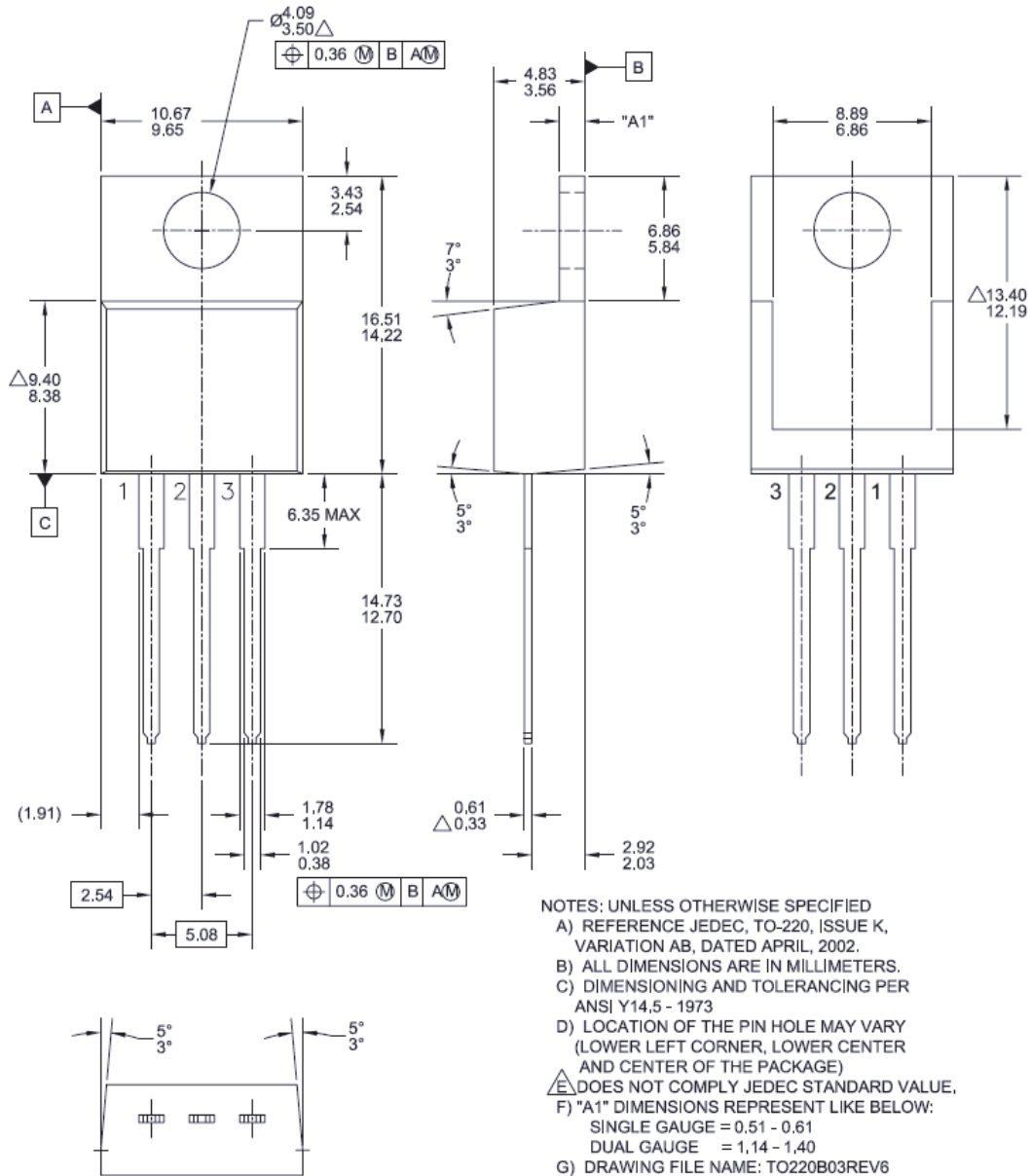


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



## Mechanical Dimensions

### TO-220 3L



**Figure 16. TO-220, Molded, 3Lead, Jeduc Variation AB**

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Dimension in Millimeters





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| BitSiC™                  | Global Power ResourceSM                         | Programmable Active Droop™ | TinyBoost®       |
| Build it Now™            | GreenBridge™                                    | QFET®                      | TinyBuck®        |
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