FAIRCHILD SEMICONDUCTOR®

May 2008

FDP3205

N-Channel PowerTrench® MOSFET

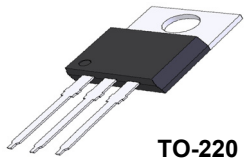
55V, 100A, 7.5mΩ

Features

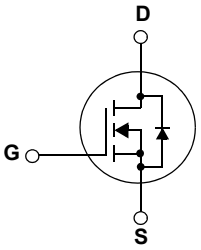
- $R_{DS(on)}$ = 6.1mΩ (Typ.)@ V_{GS} = 10V, I_D = 59A
- High performance trench technology for extermly low $R_{DS(on)}$
- High power and current handing capability
- RoHS compliant

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.



TO-220
FDP Series



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DSS}	Drain to Source Voltage			55	V
V_{GSS}	Gate to Source Voltage			±20	V
I_D	Drain Current	-Continuous (T_C = 25°C)	(Note 1)	100	A
I_{DM}	Drain Current	- Pulsed		390	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	365	mJ
P_D	Power Dissipation	(T_C = 25°C)		150	W
		- Derate above 25°C		1.0	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range			-55 to +175	°C

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

Package Marking and Ordering Information $T_C = 25^oC$ unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP3205	FDP3205	TO-220	-	-	50units

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu A$, $V_{GS} = 0V$, $T_J = 25^oC$	55	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 44V$, $V_{GS} = 0V$	-	-	25	μA
		$V_{DS} = 44V$, $T_C = 150^oC$	-	-	250	
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20V$, $V_{DS} = 0V$	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu A$	3.5	-	5.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10V$, $I_D = 59A$	-	6.1	7.5	mΩ
		$V_{GS} = 10V$, $I_D = 59A$, $T_J = 175^oC$	-	12	-	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25V$, $V_{GS} = 0V$, f = 1MHz	-	5810	7730	pF
C_{oss}	Output Capacitance		-	460	610	pF
C_{rss}	Reverse Transfer Capacitance		-	230	345	pF
R_G	Gate Resistance	$V_{GS} = 0V$, f = 1MHz	3	4	5	Ω
$Q_{g(tot)}$	Total Gate Charge at 10V	$V_{GS} = 0V$ to 10V; $V_{DS} = 44V$, $I_D = 59A$, $I_g = 1mA$	-	93	120	nC
$Q_{g(th)}$	Threshold Gate Charge	$V_{GS} = 0V$ to 2V; $V_{DS} = 44V$, $I_D = 59A$, $I_g = 1mA$	-	25.5	33	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DS} = 44V$, $I_D = 59A$, $I_g = 1mA$	-	35	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau	$V_{DS} = 44V$, $I_D = 59A$, $I_g = 1mA$		9.5	-	nC
Q_{gd}	Gate to Drain “Miller” Charge	$V_{DS} = 44V$, $I_D = 59A$, $I_g = 1mA$	-	32	-	nC
Switching Characteristics						
t_{ON}	Turn-On Time	$V_{DD} = 28V$, $I_D = 59A$, $V_{GS} = 10V$, $R_{GEN} = 2.5\Omega$	-	170	350	ns
$t_{d(on)}$	Turn-On Delay Time		-	23	56	ns
t_r	Turn-On Rise Time		-	147	305	ns
$t_{d(off)}$	Turn-Off Delay Time		-	42	94	ns
t_f	Turn-Off Fall Time		-	18	46	ns
t_{OFF}	Turn-Off Time		-	60	130	ns
Drain-Source Diode Characteristics						
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0V$, $I_{SD} = 59A$	-	-	1.3	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0V$, $I_{SD} = 59A$, $dI_F/dt = 100A/\mu s$	-	43.3	-	ns
Q_{rr}	Reverse Recovery Charge		-	70.8	-	nC

Notes:
1: Calculated continuous current based on maximum allowable junction temperature. Package limited to 75A continuous, see Figure 9.
2: L = 0.21mH, $I_{AS} = 59A$, $V_{DD} = 50V$, $V_{GS} = 10V$, $R_G = 25\Omega$, Starting $T_J = 25^oC$

Typical Performance Characteristics

Figure 1. On-Region Characteristics

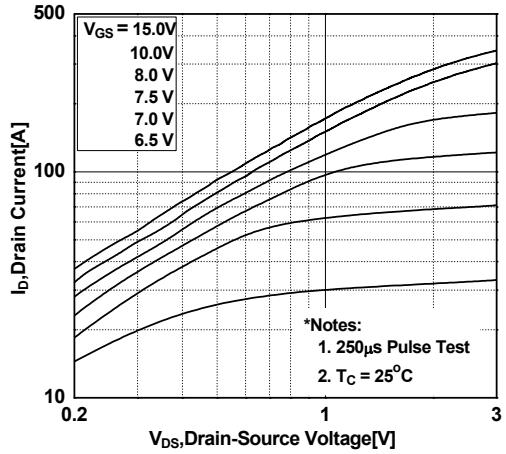


Figure 2. Transfer Characteristics

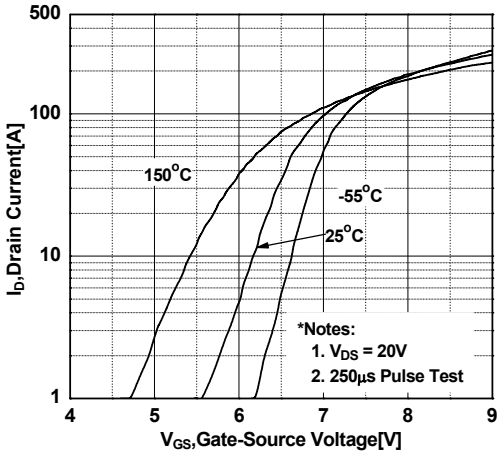


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

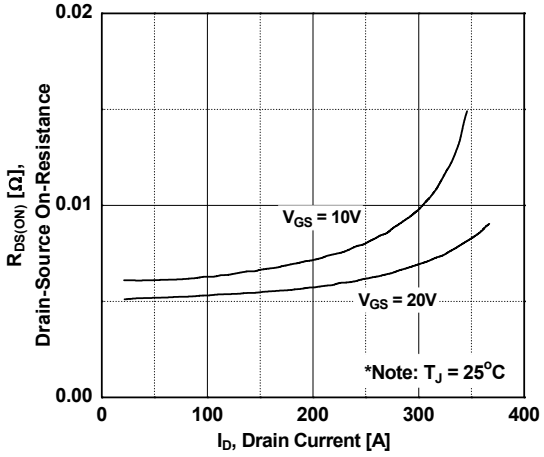


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

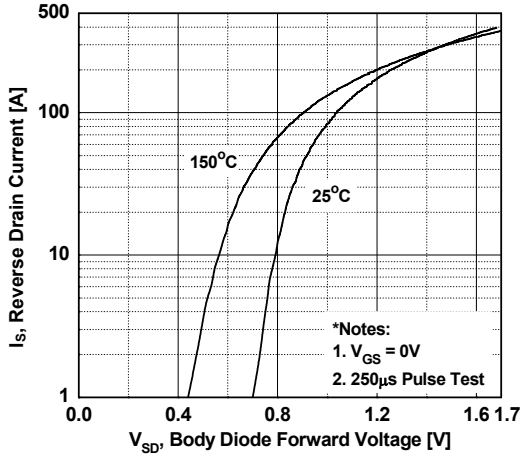


Figure 5. Capacitance Characteristics

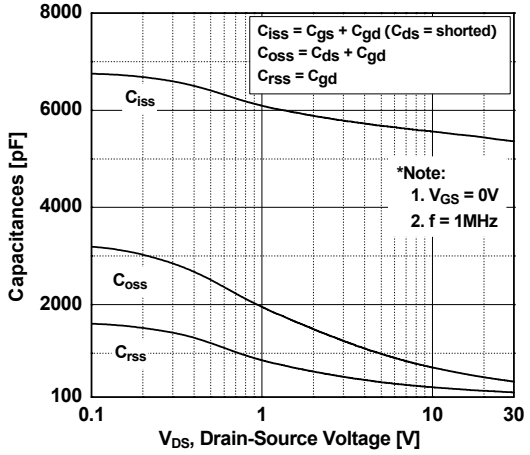
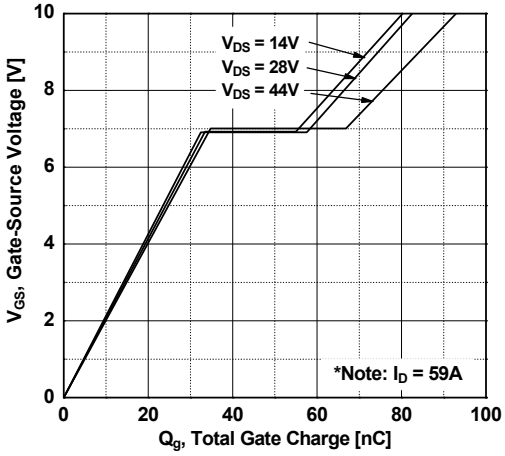


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

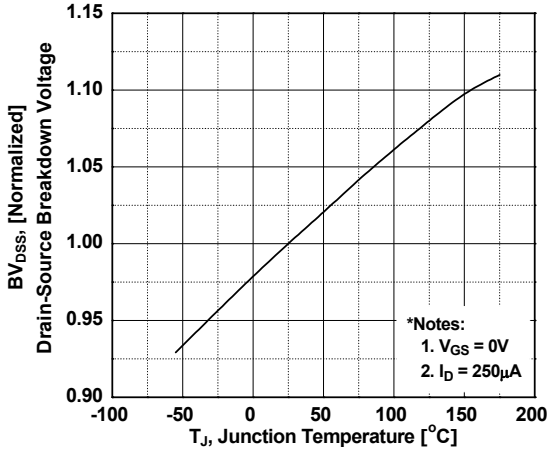


Figure 8. On-Resistance Variation vs. Temperature

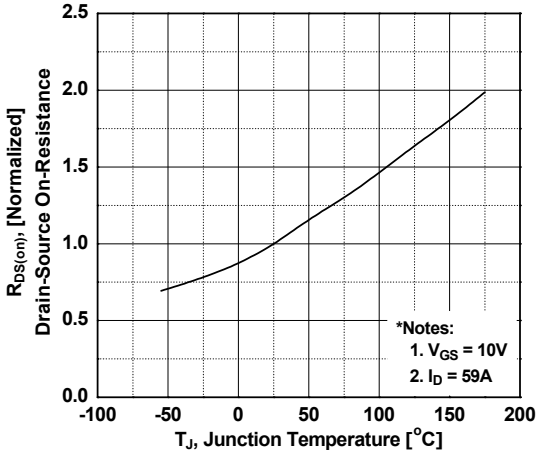


Figure 9. Maximum Safe Operating Area

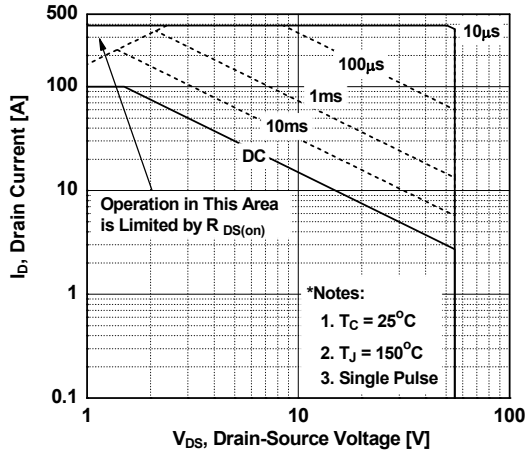


Figure 10. Maximum Drain Current vs. Case Temperature

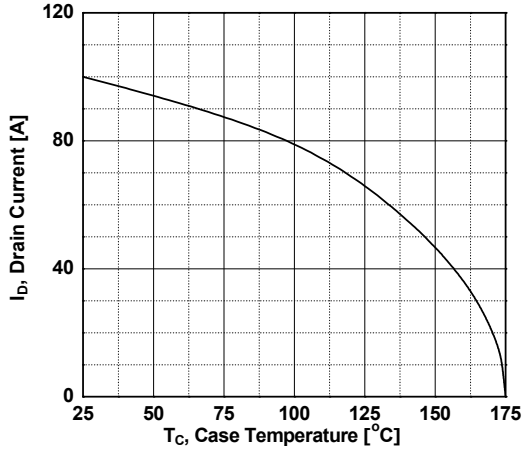
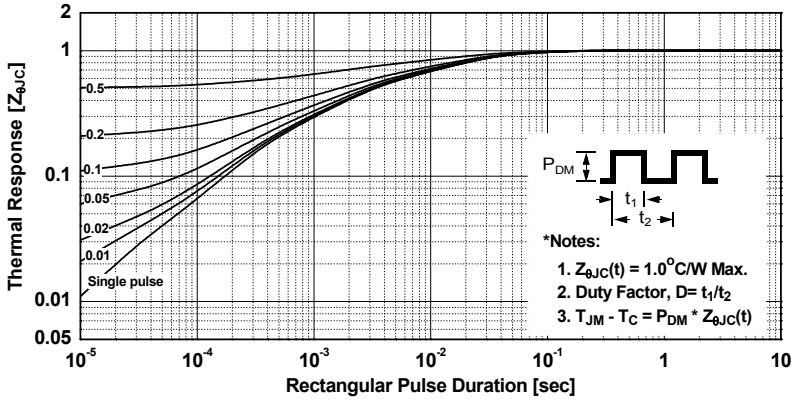
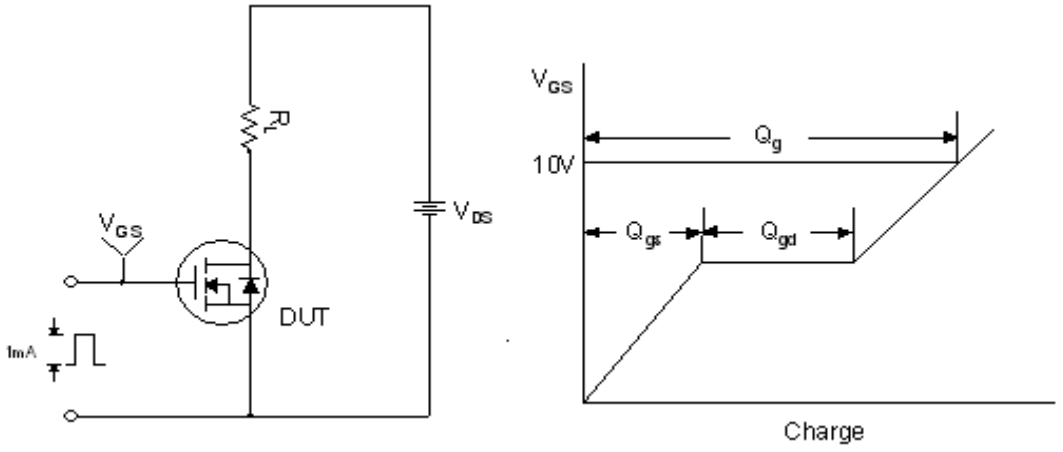


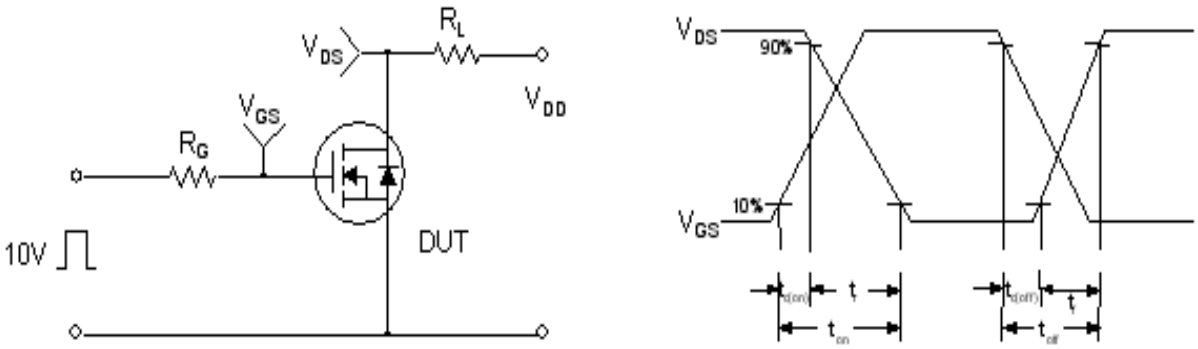
Figure 11. Transient Thermal Response Curve



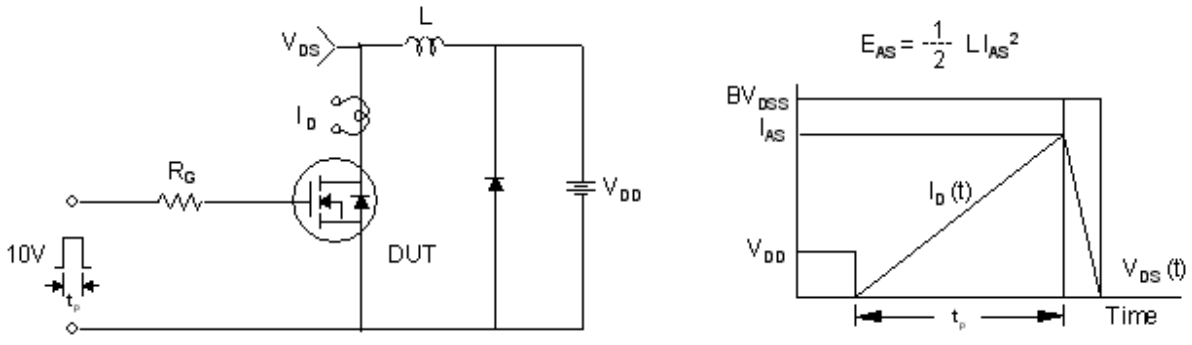
Gate Charge Test Circuit & Waveform



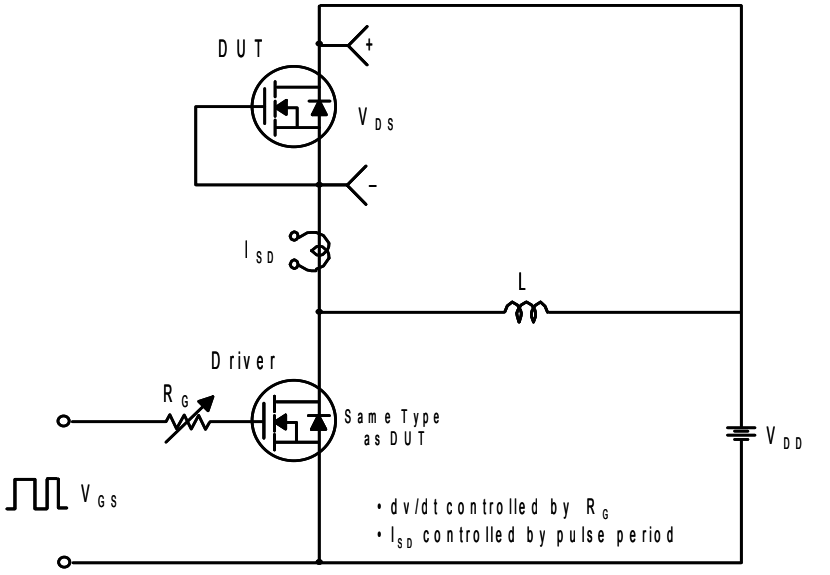
Resistive Switching Test Circuit & Waveforms

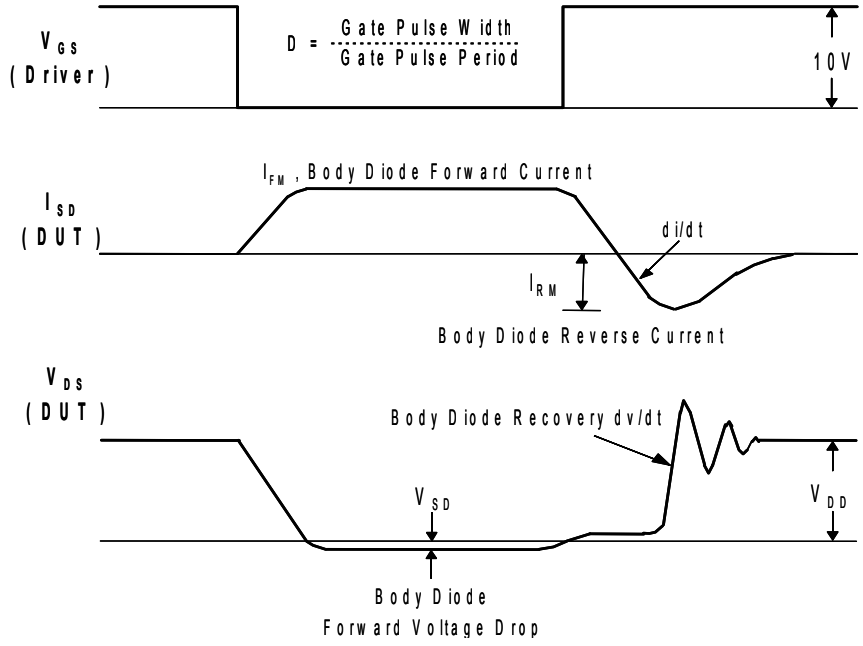


Unclamped Inductive Switching Test Circuit & Waveforms



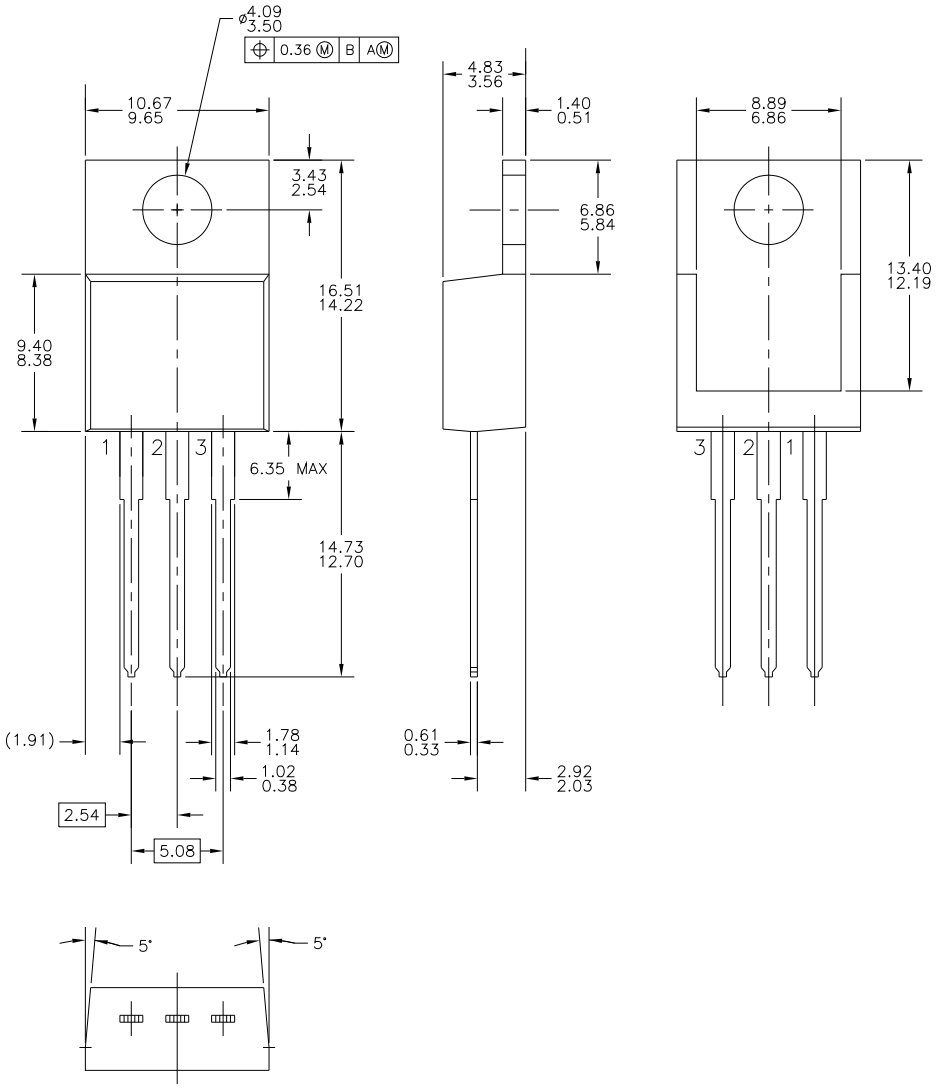
Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions

TO-220



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FPS™
F-PFS™
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