FAIRCHILD SEMICONDUCTOR®

November 2013

FDP030N06B_F102

N-Channel PowerTrench® MOSFET

60 V, 195 A, 3.1 mΩ

Features

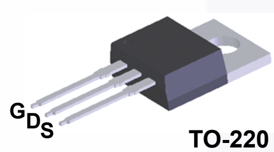
- $R_{DS(on)}$ = 2.67 mΩ (Typ.) @ V_{GS} = 10 V, I_D = 100 A
- Low FOM $R_{DS(on)} * Q_G$
- Low Reverse-Recovery Charge, Q_{rr} = 78 nC
- Soft Reverse-Recovery Body Diode
- Enables High Efficiency in Synchronous Rectification
- Fast Switching Speed
- 100% UIL Tested
- RoHS Compliant

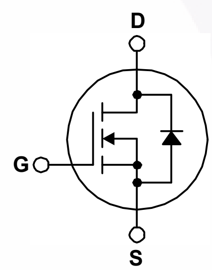
Description

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

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor Drives and Uninterruptible Power Supplies
- Renewable System





Absolute Maximum Ratings T_C = 25°C unless otherwise noted.

Symbol	Parameter		FDP030N06B_F102	Unit
V_{DSS}	Drain to Source Voltage		60	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	- Continuous (T_C = 25°C, Silicon Limited)	195*	A
		- Continuous (T_C = 100°C, Silicon Limited)	138*	
		- Continuous (T_C = 25°C, Package Limited)	120	
I_{DM}	Drain Current	- Pulsed (Note 1)	780	A
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		600	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		6.0	V/ns
P_D	Power Dissipation	(T_C = 25°C)	205	W
		- Derate Above 25°C	1.37	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	°C
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		300	°C

* Package limitation current is 120A.

Thermal Characteristics

Symbol	Parameter	FDP030N06B_F102	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.73	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDP030N06B_F102	FDP030N06B	TO-220	Tube	N/A	N/A	50 units

Electrical Characteristics T_C = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	60	-	-	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	-	0.03	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 48 V, V_{GS} = 0 V	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	2	-	4	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 100 A	-	2.67	3.1	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 100 A	-	206	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 30 V, V_{GS} = 0 V, f = 1 MHz	-	6035	8030	pF
C_{oss}	Output Capacitance		-	1685	2240	pF
C_{rss}	Reverse Transfer Capacitance		-	55	-	pF
$C_{oss(er)}$	Energy Related Output Capacitance	V_{DS} = 30 V, V_{GS} = 0 V	-	2619	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 30 V, I_D = 100 A, V_{GS} = 10 V (Note 4)	-	76	99	nC
Q_{gs}	Gate to Source Gate Charge		-	29	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	12	-	nC
$V_{plateau}$	Gate Plateau Volatge		-	5.2	-	V
Q_{oss}	Output Charge	V_{DS} = 30V, V_{GS} = 0V	-	92.4	-	nC
ESR	Equivalent Series Resistance (G-S)	f = 1 MHz	-	2.0	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30 V, I_D = 100 A, V_{GS} = 10 V, R_G = 4.7 Ω (Note 4)	-	32	74	ns
t_r	Turn-On Rise Time		-	33	76	ns
$t_{d(off)}$	Turn-Off Delay Time		-	56	122	ns
t_f	Turn-Off Fall Time		-	23	56	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	195*	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	780	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 100 A	-	-	1.25	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_{SD} = 100 A, dI_F/dt = 100A/μs	-	71	-	ns
Q_{rr}	Reverse Recovery Charge		-	78	-	nC

Notes:
1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. L = 3 mH, I_{AS} = 20 A, starting T_J = 25°C.
3. $I_{SD} \leq$ 100 A, di/dt $\leq$ 200 A/μs, $V_{DD} \leq BV_{DSS}$, starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

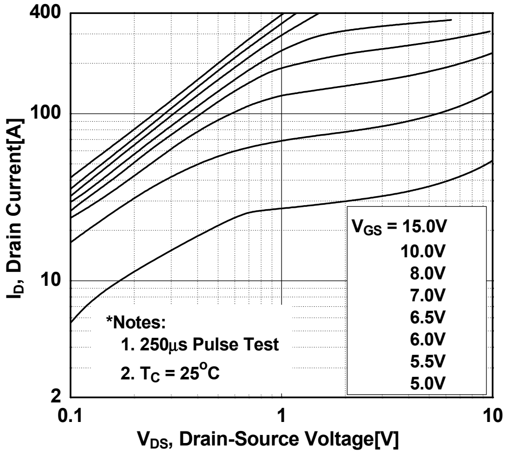


Figure 2. Transfer Characteristics

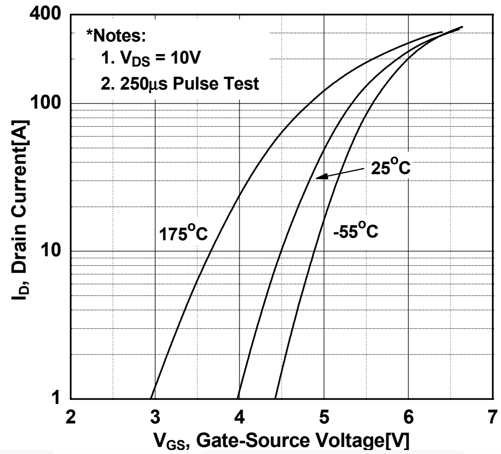


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

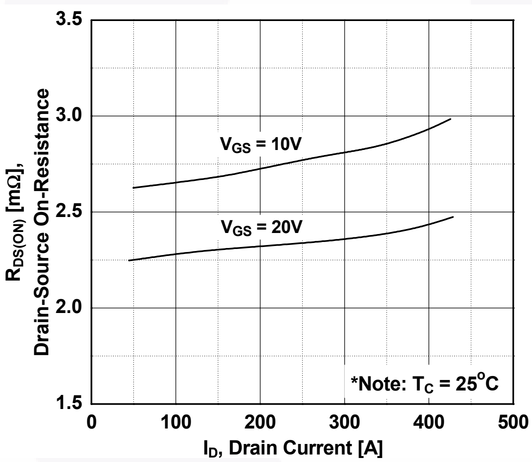


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

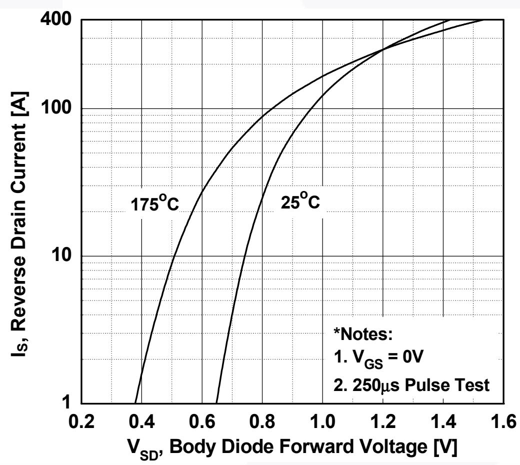


Figure 5. Capacitance Characteristics

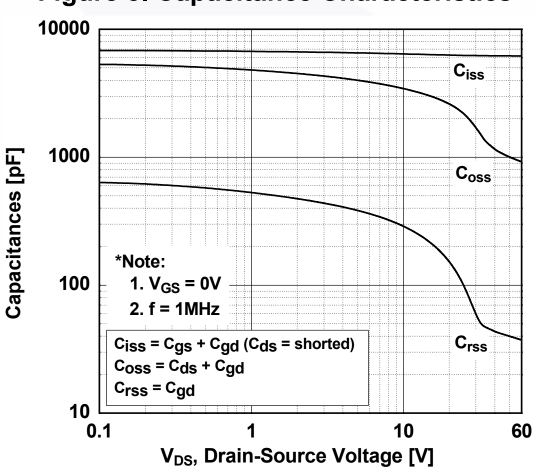
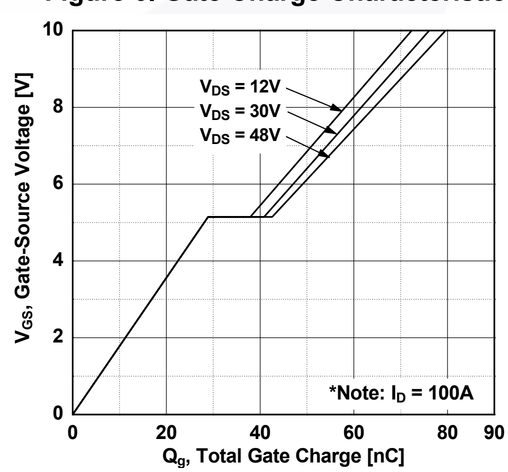


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

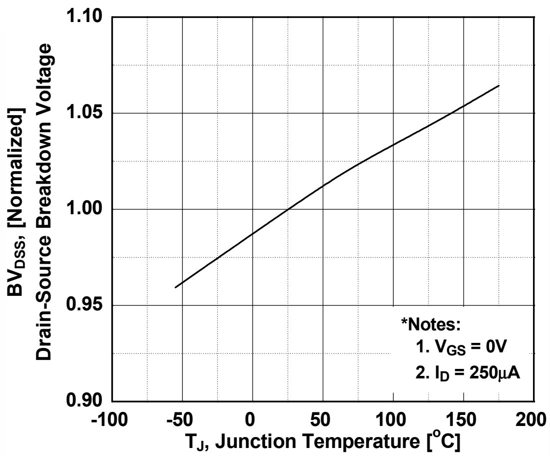


Figure 8. On-Resistance Variation vs. Temperature

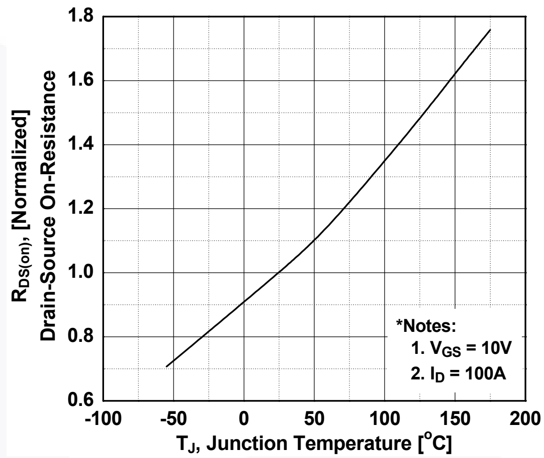


Figure 9. Maximum Safe Operating Area

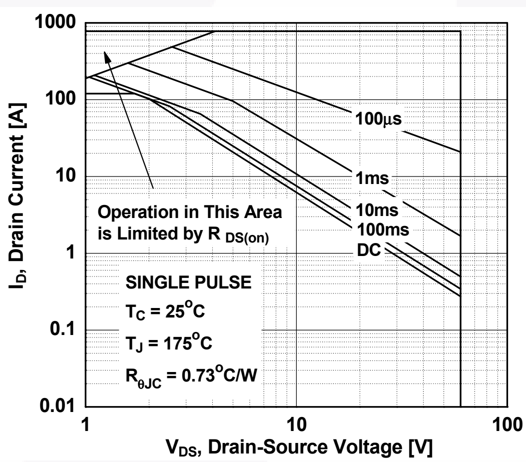


Figure 10. Maximum Drain Current vs. Case Temperature

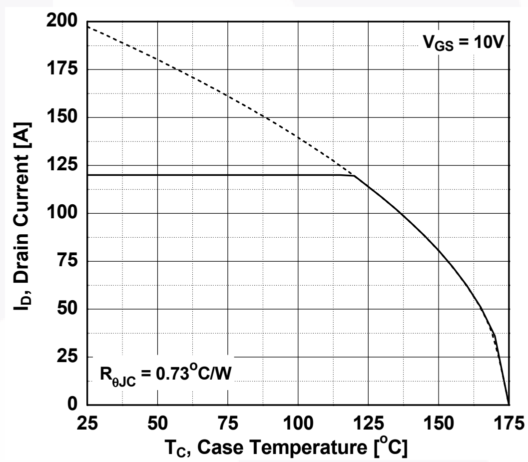


Figure 11. Eoss vs. Drain to Source Voltage

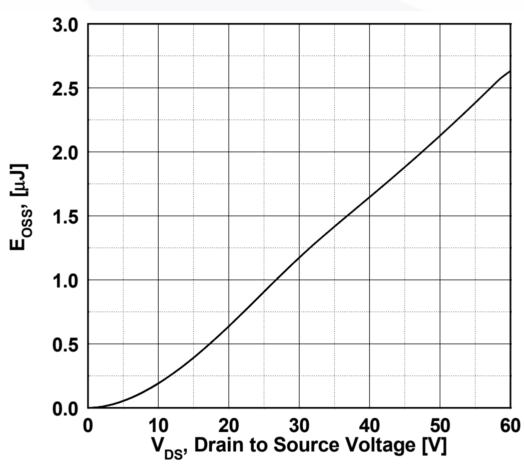
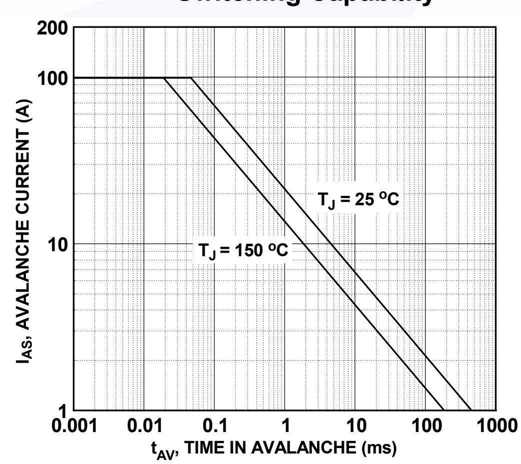
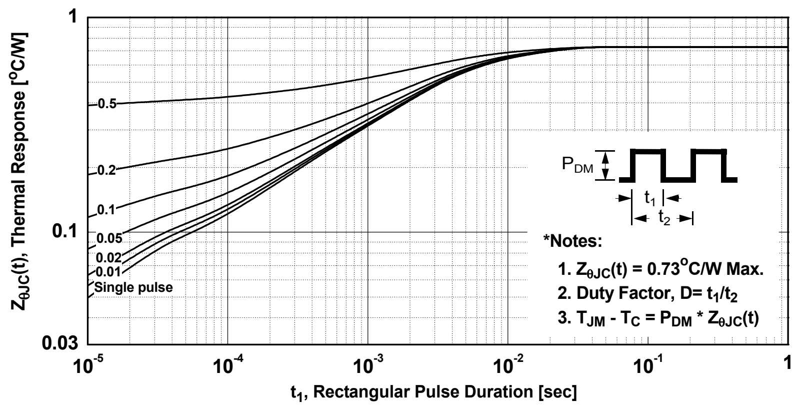


Figure 12. Unclamped Inductive Switching Capability



Typical Performance Characteristics (Continued)

Figure 13. Transient Thermal Response Curve



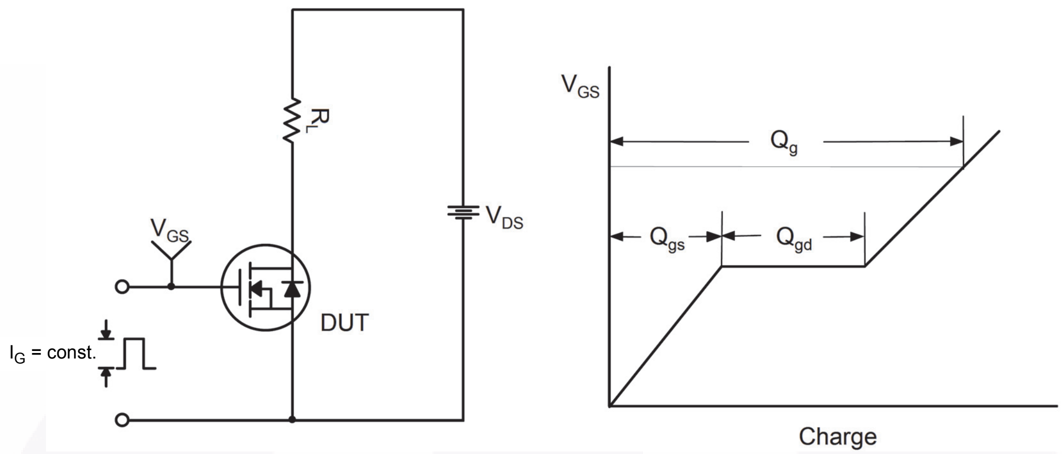


Figure 14. Gate Charge Test Circuit & Waveform

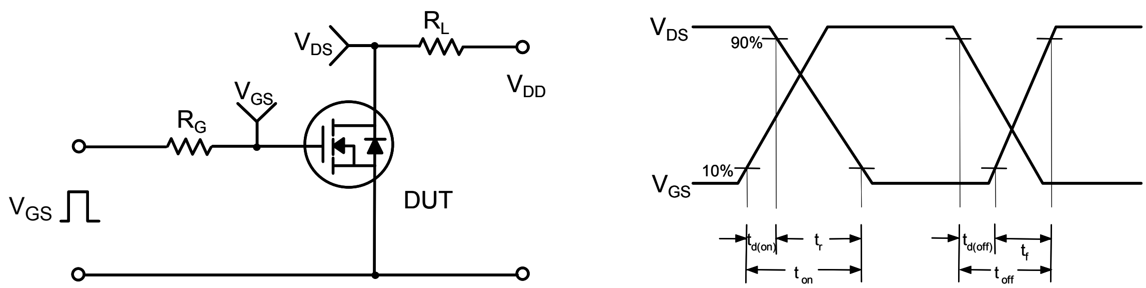


Figure 15. Resistive Switching Test Circuit & Waveforms

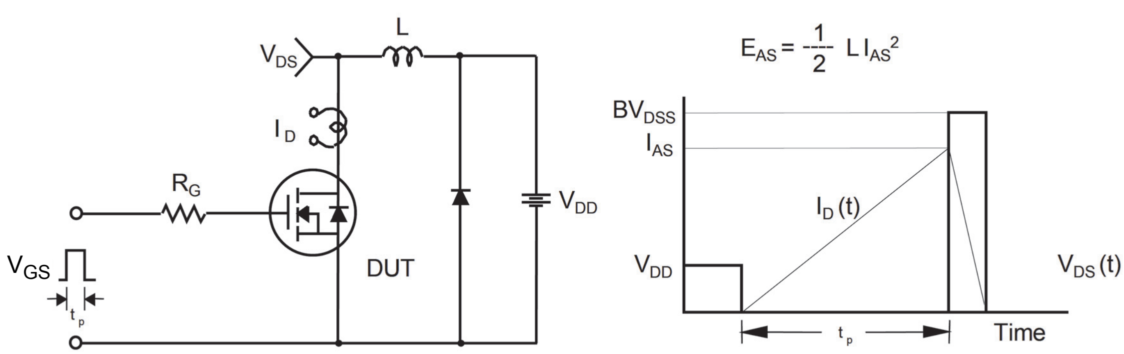


Figure 16. Unclamped Inductive Switching Test Circuit & Waveforms

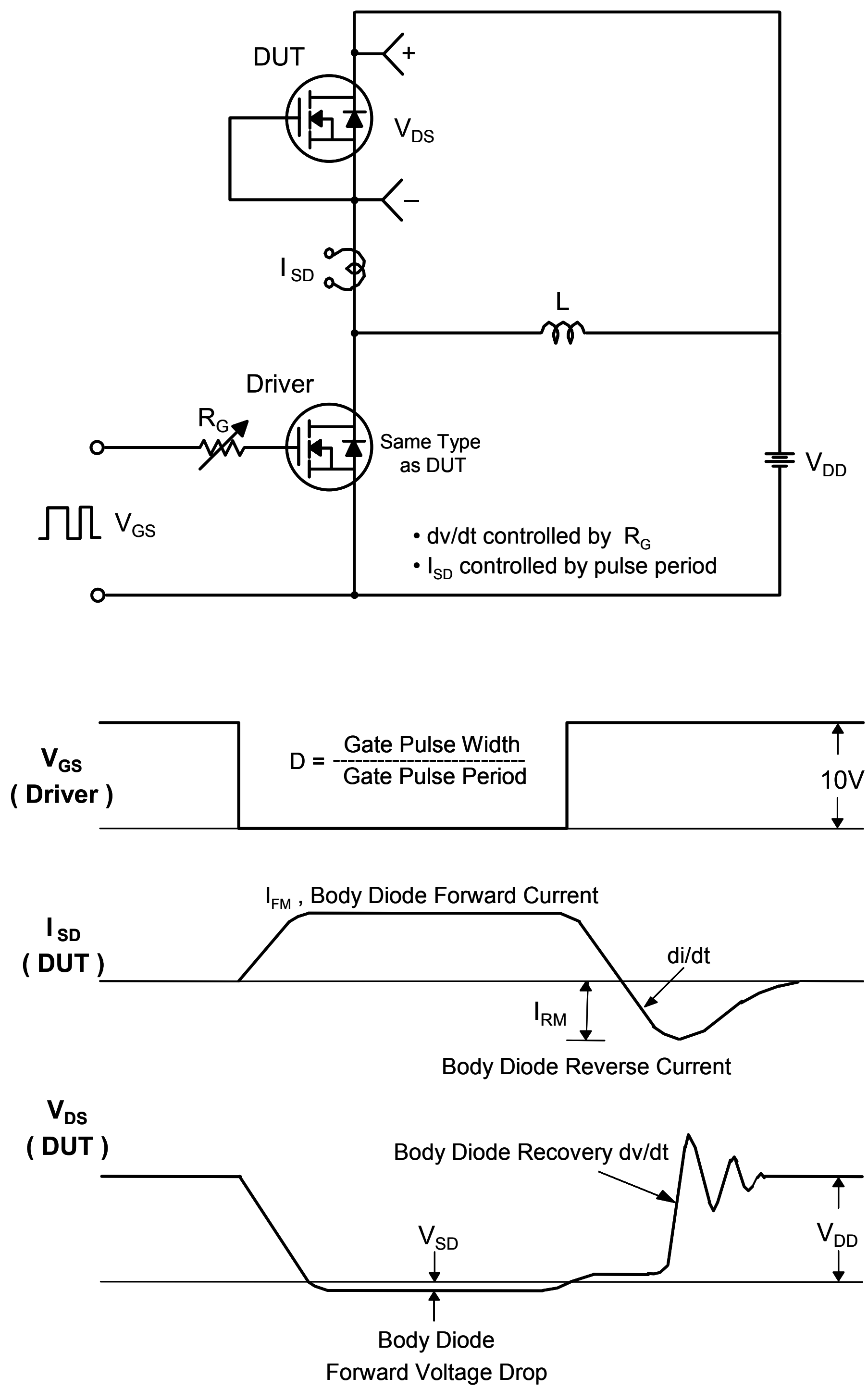


Figure 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

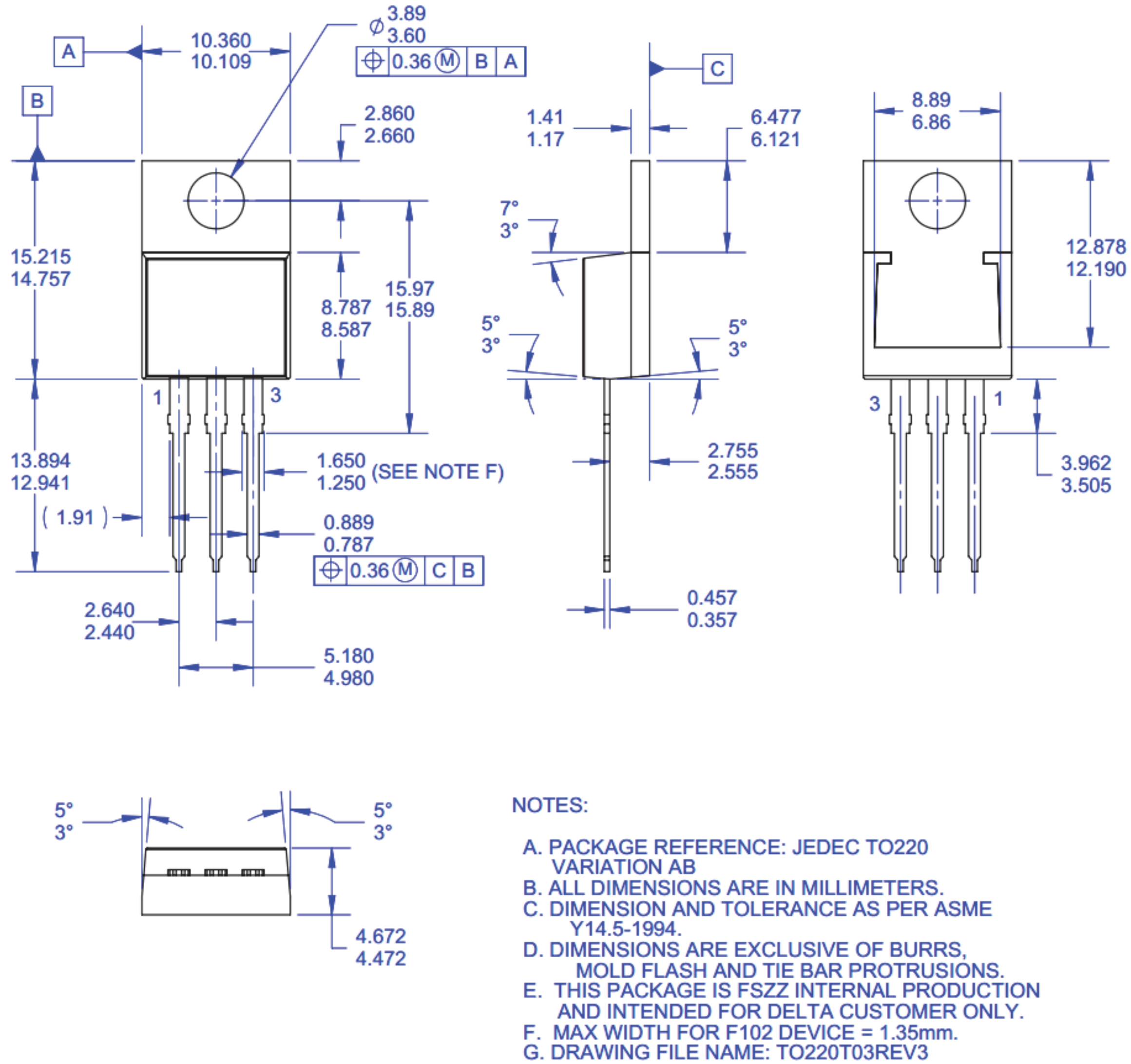


Figure 18. TO-220, Molded, 3-Lead, Jedec Variation AB (Delta)

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