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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

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April 2015

FDB110N15A

N-Channel PowerTrench® MOSFET

150 V, 92 A, 11 mΩ

Features

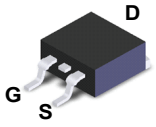
- $R_{DS(on)}$ = 9.25 mΩ (Typ.) @ V_{GS} = 10 V, I_D = 92 A
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

Description

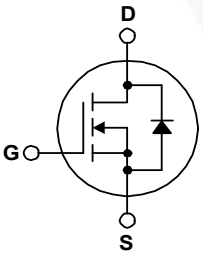
This N-Channel MOSFET is produced using Fairchild Semiconductor's advance PowerTrench® process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- Motor drives and Uninterruptible Power Supplies
- Micro Solar Inverter



D^2-PAK



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

Symbol	Parameter		FDB110N15A	Unit
V_{DSS}	Drain to Source Voltage		150	V
V_{GSS}	Gate to Source Voltage	- DC	±20	V
		- AC (f > 1 Hz)	±30	
I_D	Drain Current	- Continuous (T_C = 25°C)	92	A
		- Continuous (T_C = 100°C)	65	
I_{DM}	Drain Current	- Pulsed (Note 1)	369	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	365	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	6	V/ns
P_D	Power Dissipation	(T_C = 25°C)	234	W
		- Derate Above 25°C	1.56	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

Thermal Characteristics

Symbol	Parameter	FDB110N15A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.64	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

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Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDB110N15A	FDB110N15A	D^2-PAK	Tape and Reel	330 mm	24 mm	800 units

Electrical Characteristics $T_C = 25^oC$ 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	150	-	-	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	-	0.09	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 120 V, V_{GS} = 0 V	-	-	1	μA
		V_{DS} = 120 V, T_C = 150°C	-	-	500	
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	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 92 A	-	9.25	11.0	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 92 A	-	118	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 75 V, V_{GS} = 0 V, f = 1 MHz	-	3390	4510	pF
C_{oss}	Output Capacitance		-	334	445	pF
C_{rss}	Reverse Transfer Capacitance		-	14	-	pF
C_{oss}(er)	Engry Releted Output Capacitance	V_{DS} = 75 V, I_D = 92 A	-	583	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{GS} = 10 V, V_{DS} = 75 V, I_D = 92 A (Note 4)	-	47	61	nC
Q_{gs}	Gate to Source Gate Charge		-	16	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	7.9	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	9.7	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 75 V, I_D = 92 A, V_{GS} = 10 V, R_G = 4.7 Ω (Note 4)	-	25	60	ns
t_r	Turn-On Rise Time		-	26	62	ns
$t_{d(off)}$	Turn-Off Delay Time		-	46	102	ns
t_f	Turn-Off Fall Time		-	14	38	ns
ESR	Equivalent Series Resistance (G-S)	f = 1 MHz	-	2.5	-	Ω
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	92	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	369	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 92 A	-	-	1.25	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_{SD} = 92 A, V_{DD} = 75 V, dI_F/dt = 100 A/μs	-	89	-	ns
Q_{rr}	Reverse Recovery Charge		-	255	-	nC

Notes:

1. Repetitive rating: pulse width-limited by maximum junction temperature.
2. L = 3 mH, I_{AS} = 15.6 A, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 92 A, di/dt ≤ 200 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.

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Typical Performance Characteristics

Figure 1. On-Region Characteristics

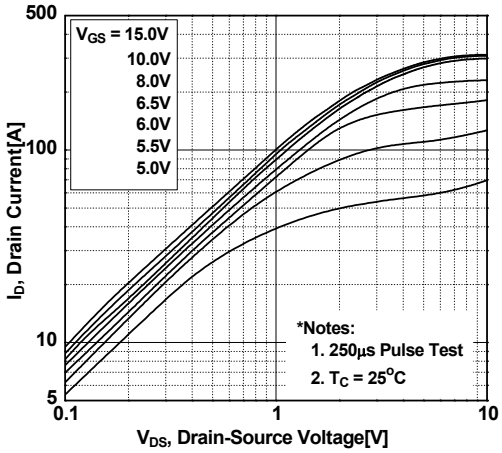


Figure 2. Transfer Characteristics

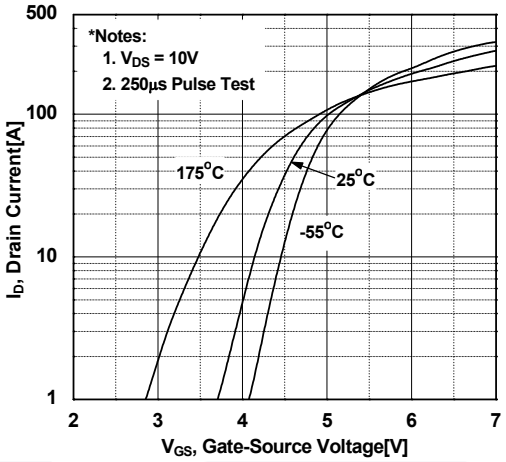


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

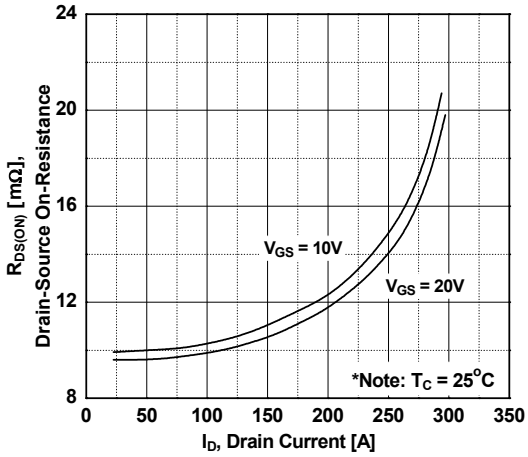


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

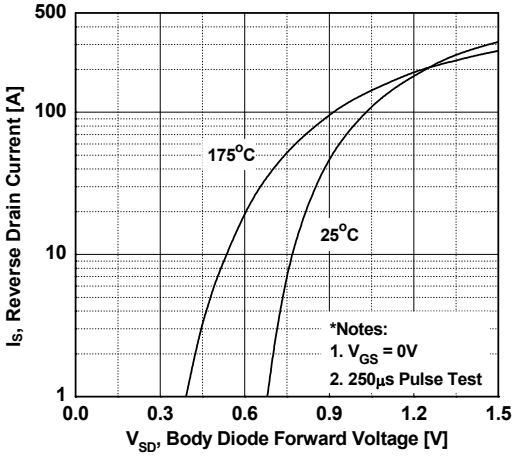


Figure 5. Capacitance Characteristics

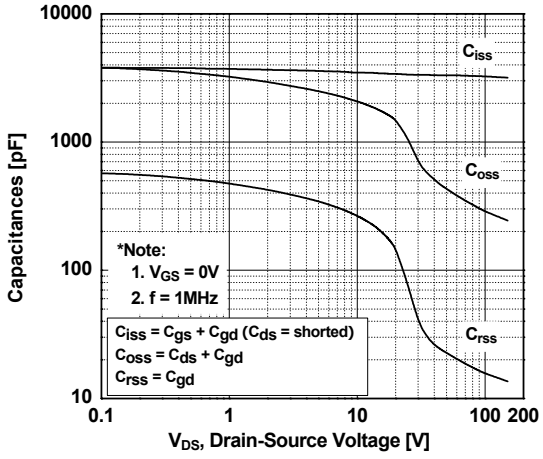
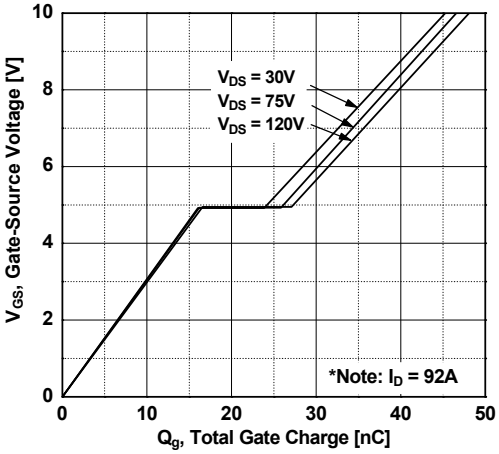


Figure 6. Gate Charge Characteristics



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Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

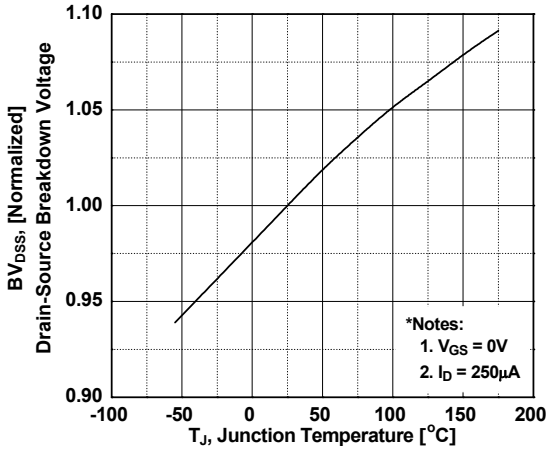


Figure 8. On-Resistance Variation vs. Temperature

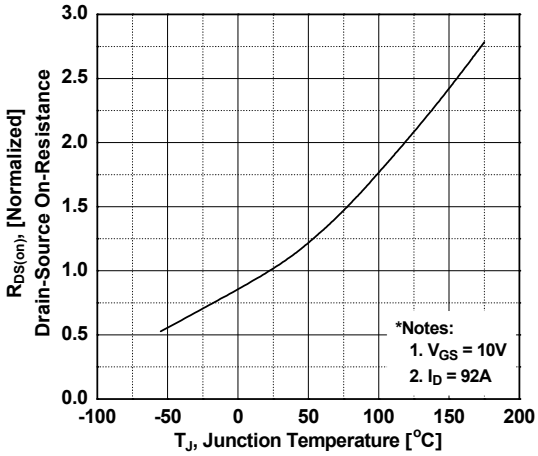


Figure 9. Maximum Safe Operating Area

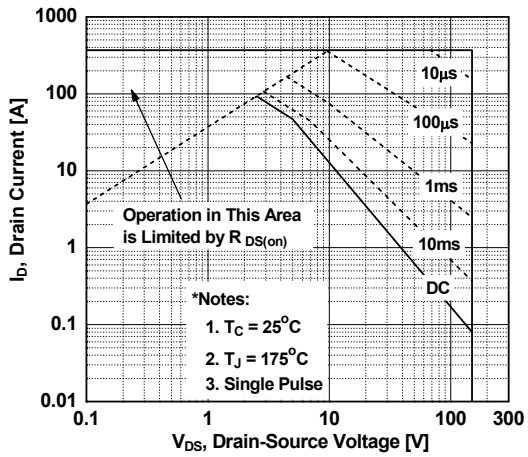


Figure 10. Maximum Drain Current vs. Case Temperature

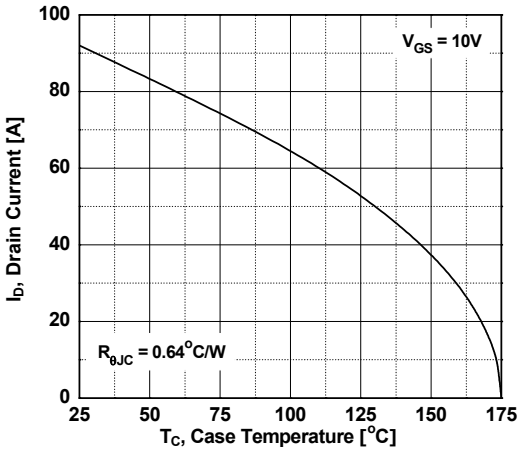
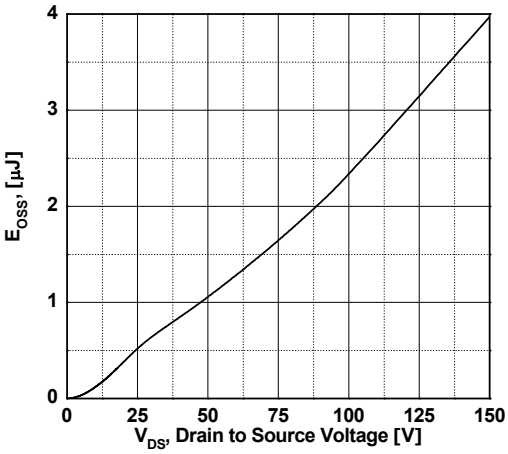


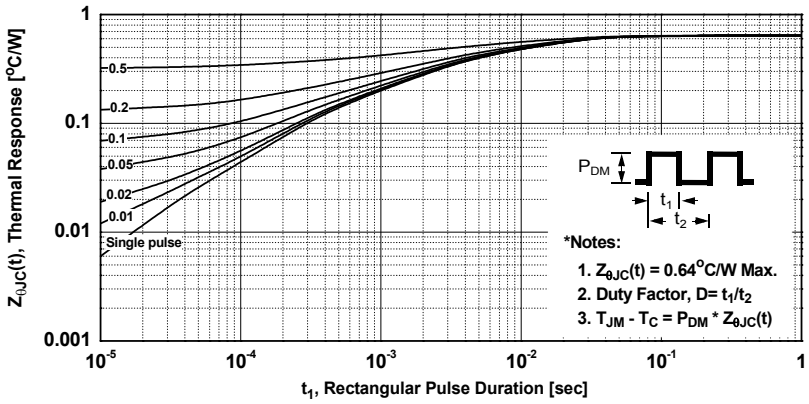
Figure 11. Eoss vs. Drain to Source Voltage



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Typical Performance Characteristics (Continued)

Figure 12. Transient Thermal Response Curve



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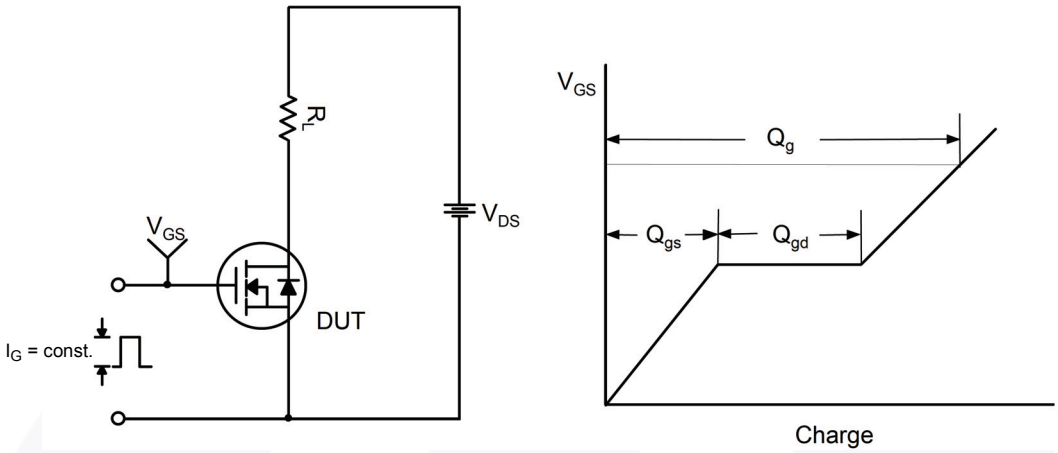


Figure 13. Gate Charge Test Circuit & Waveform

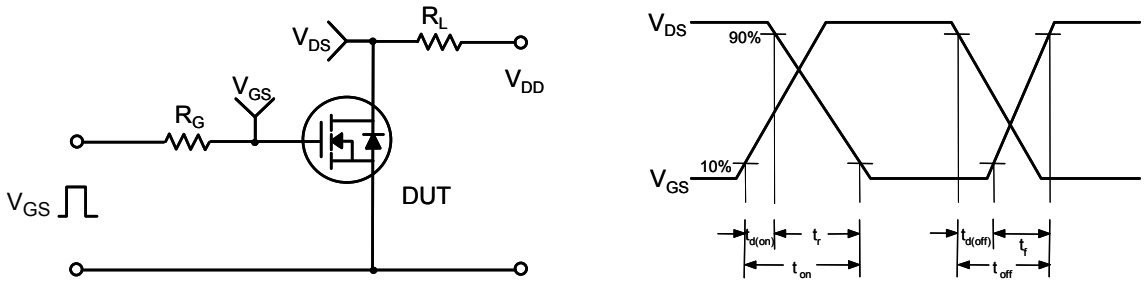


Figure 14. Resistive Switching Test Circuit & Waveforms

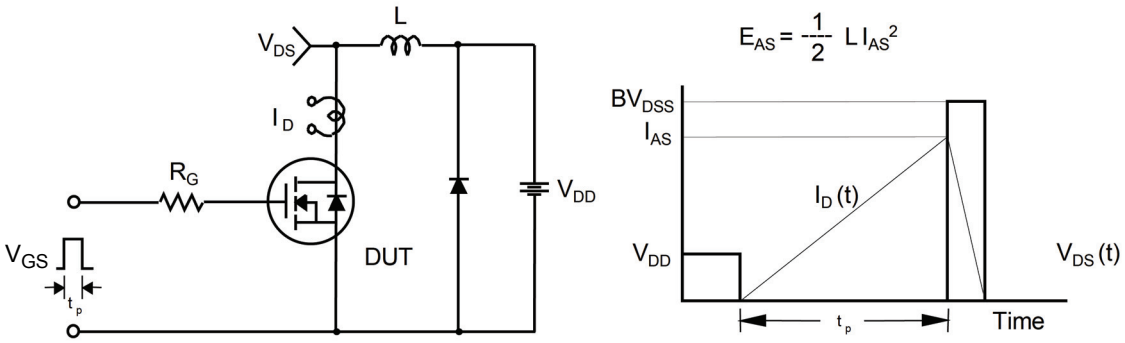


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

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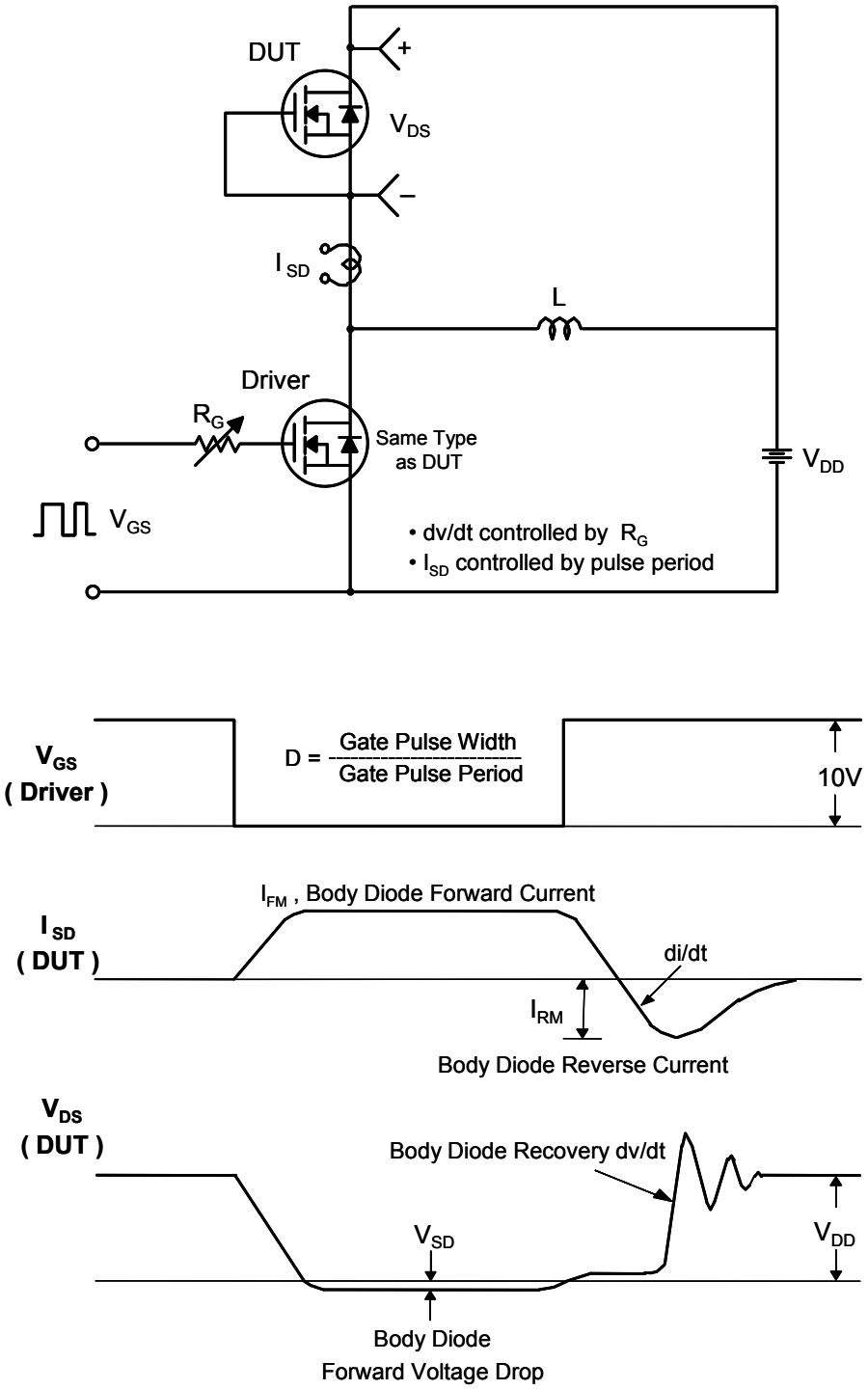
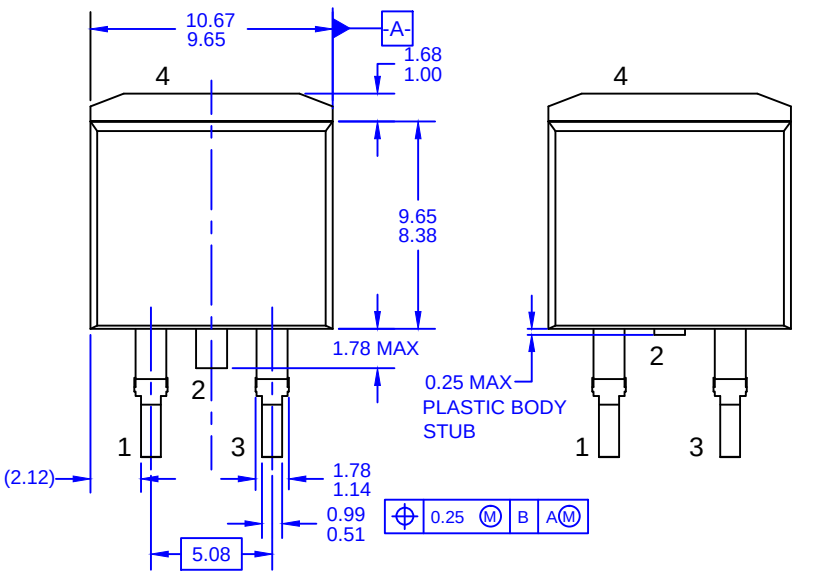
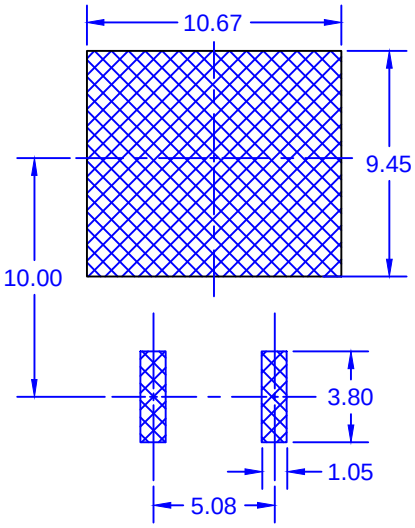


Figure 16. Peak Diode Recovery dv/dt Test Circuit & Waveforms

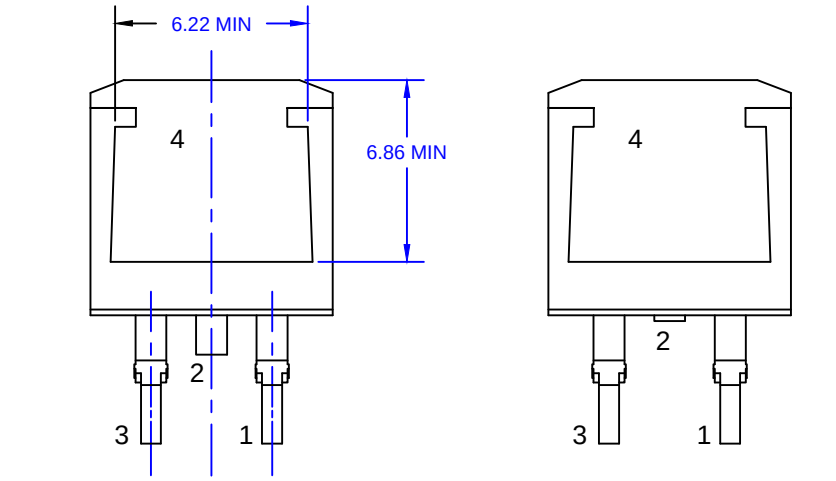
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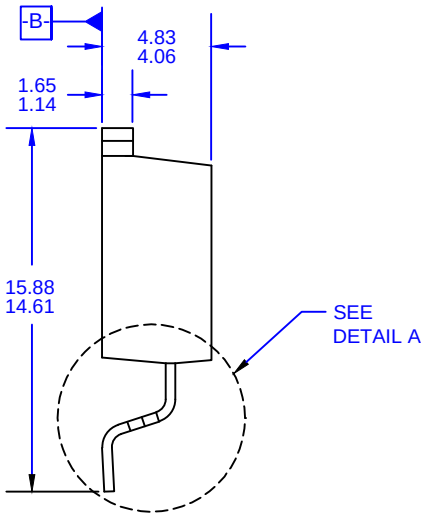
FRONT VIEW - DIODE PRODUCTS VERSION
ALTERNATIVE SUPPLIER DETAIL



LAND PATTERN RECOMMENDATION
UNLESS NOTED, ALL DIMS TYPICAL

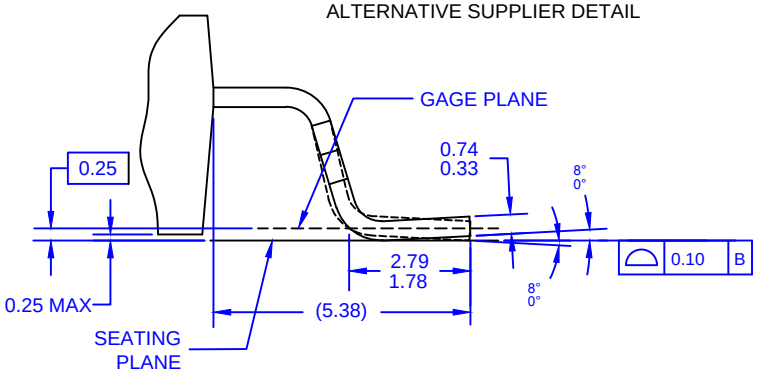


BACK VIEW - DIODE PRODUCTS VERSION
ALTERNATIVE SUPPLIER DETAIL



NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.
B) REFERENCE JEDEC, TO-263, VARIATION AB.
C) DIMENSIONING AND TOLERANCING PER DIMENSIONING AND TOLERANCING PER ASME Y14.5 - 2009.
D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE).
E) LANDPATTERN RECOMMENDATION PER IPC TO254P1524X482-3N
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DETAIL A, ROTATED 90°
SCALE: 2X

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