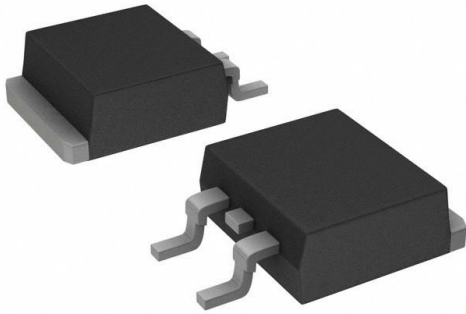


# FCB290N80 Datasheet

[www.digi-electronics.com](http://www.digi-electronics.com)



DiGi Electronics Part Number	FCB290N80-DG
Manufacturer	<a href="#">onsemi</a>
Manufacturer Product Number	FCB290N80
Description	MOSFET N-CH 800V 17A D2PAK
Detailed Description	N-Channel 800 V 17A (Tc) 212W (Tc) Surface Mount TO-263 (D2PAK)

<https://www.DiGi-Electronics.com>



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## Purchase and inquiry

Manufacturer Product Number:

FCB290N80

Series:

SuperFET® II

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

800 V

Drive Voltage (Max Rds On, Min Rds On):

10V

Vgs(th) (Max) @ Id:

4.5V @ 1.7mA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

TO-263 (D2PAK)

Base Product Number:

FCB290

Manufacturer:

onsemi

Product Status:

Not For New Designs

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

17A (Tc)

Rds On (Max) @ Id, Vgs:

290mOhm @ 8.5A, 10V

Gate Charge (Qg) (Max) @ Vgs:

75 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

3205 pF @ 100 V

Power Dissipation (Max):

212W (Tc)

Mounting Type:

Surface Mount

Package / Case:

TO-263-3, D2PAK (2 Leads + Tab), TO-263AB

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



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March 2015

## FCB290N80

### N-Channel SuperFET<sup>®</sup> II MOSFET

800 V, 17 A, 0.29  $\Omega$

#### Features

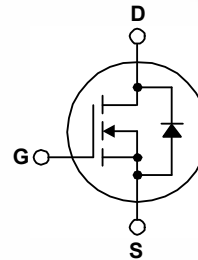
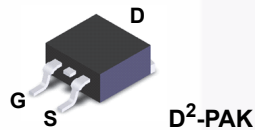
- $R_{DS(on)} = 0.259 \Omega$  (Typ.)
- Ultra Low Gate Charge (Typ.  $Q_g = 58$  nC)
- Low  $E_{oss}$  (Typ. 5.4  $\mu$ J @ 400V)
- Low Effective Output Capacitance (Typ.  $C_{oss(eff.)} = 240$  pF)
- 100% Avalanche Tested
- RoHS Compliant

#### Applications

- AC - DC Power Supply
- LED Lighting

#### Description

SuperFET<sup>®</sup> II MOSFET is Fairchild Semiconductor's brand-new high voltage super-junction (SJ) MOSFET family that is utilizing charge balance technology for outstanding low on-resistance and lower gate charge performance. This technology is tailored to minimize conduction loss, provide superior switching performance, dv/dt rate and higher avalanche energy. Consequently, SuperFET II MOSFET is very suitable for the switching power applications such as PFC, server/telecom power, FPD TV power, ATX power and industrial power applications.



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

Symbol	Parameter	FCB290N80	Unit
$V_{DSS}$	Drain to Source Voltage	800	V
$V_{GSS}$	Gate to Source Voltage	- DC	$\pm 20$
		- AC (f > 1 Hz)	$\pm 30$
$I_D$	Drain Current	- Continuous ( $T_C = 25^\circ\text{C}$ )	17
		- Continuous ( $T_C = 100^\circ\text{C}$ )	10.8
$I_{DM}$	Drain Current	- Pulsed (Note 1)	42
$E_{AS}$	Single Pulsed Avalanche Energy	(Note 2)	882
$I_{AR}$	Avalanche Current	(Note 1)	3.4
$E_{AR}$	Repetitive Avalanche Energy	(Note 1)	2.12
dv/dt	MOSFET dv/dt		100
	Peak Diode Recovery dv/dt	(Note 3)	20
$P_D$	Power Dissipation	( $T_C = 25^\circ\text{C}$ )	212
		- Derate Above $25^\circ\text{C}$	1.7
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
$T_L$	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

#### Thermal Characteristics

Symbol	Parameter	FCB290N80	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.59	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max.	62.5	
	Thermal Resistance, Junction to Ambient (1 in <sup>2</sup> Pad of 2-oz Copper), Max.	40	

## Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FCB290N80	FCB290N80	D <sup>2</sup> -PAK	Tape and Reel	330 mm	24 mm	800 units

## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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### Off Characteristics

$BV_{DSS}$	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}, T_J = 25^\circ\text{C}$	800	-	-	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 1\text{ mA}$ , Referenced to $25^\circ\text{C}$	-	0.85	-	V/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}$	-	-	25	$\mu\text{A}$
		$V_{DS} = 640\text{ V}, V_{GS} = 0\text{ V}, T_C = 125^\circ\text{C}$	-	-	250	$\mu\text{A}$
$I_{GSS}$	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	-	-	$\pm 10$	$\mu\text{A}$

### On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 1.7\text{ mA}$	2.5	-	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 8.5\text{ A}$	-	0.259	0.290	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 20\text{ V}, I_D = 8.5\text{ A}$	-	20	-	S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	2410	3205	pF
$C_{oss}$	Output Capacitance		-	75	100	pF
$C_{rss}$	Reverse Transfer Capacitance		-	0.36	-	pF
$C_{oss}$	Output Capacitance	$V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	35	-	pF
$C_{oss(eff.)}$	Effective Output Capacitance	$V_{DS} = 0\text{ V to } 480\text{ V}, V_{GS} = 0\text{ V}$	-	240	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	$V_{DS} = 640\text{ V}, I_D = 17\text{ A}, V_{GS} = 10\text{ V}$	-	58	75	nC
$Q_{gs}$	Gate to Source Gate Charge		-	11	-	nC
$Q_{gd}$	Gate to Drain "Miller" Charge		-	22	-	nC
ESR	Equivalent Series Resistance	$f = 1\text{ MHz}$	-	0.75	-	$\Omega$

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400\text{ V}, I_D = 17\text{ A}, V_{GS} = 10\text{ V}, R_g = 4.7\text{ }\Omega$	-	22	54	ns
$t_r$	Turn-On Rise Time		-	14	38	ns
$t_{d(off)}$	Turn-Off Delay Time		-	61	132	ns
$t_f$	Turn-Off Fall Time		(Note 4)	-	2.6	15

### Drain-Source Diode Characteristics

$I_S$	Maximum Continuous Drain to Source Diode Forward Current	-	-	17	A	
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current	-	-	42	A	
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_{SD} = 17\text{ A}$	-	-	1.2	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_{SD} = 17\text{ A}, di_F/dt = 100\text{ A}/\mu\text{s}$	-	511	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	12	-	$\mu\text{C}$

#### Notes:

1. Repetitive rating: pulse width limited by maximum junction temperature.
2.  $I_{AS} = 3.4\text{ A}, R_G = 25\text{ }\Omega$ , starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 17\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$ , starting  $T_J = 25^\circ\text{C}$
4. Essentially independent of operating temperature typical characteristic.

### Typical Performance Characteristics

Figure 1. On-Region Characteristics

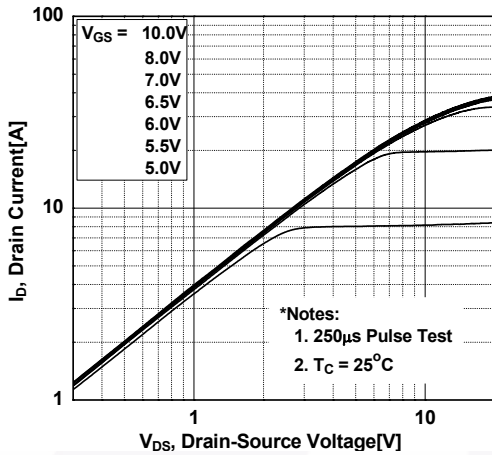


Figure 2. Transfer Characteristics

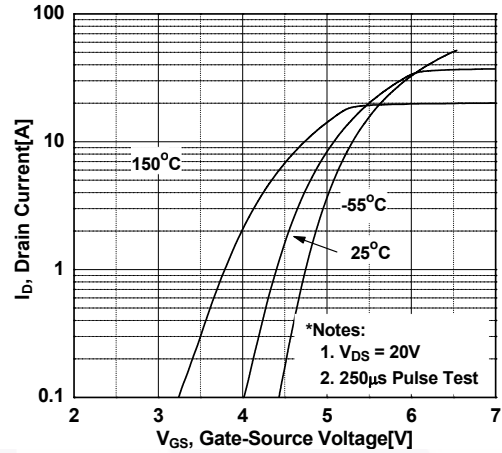


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

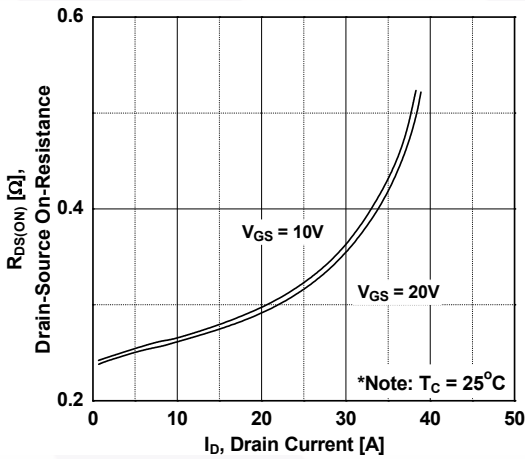


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

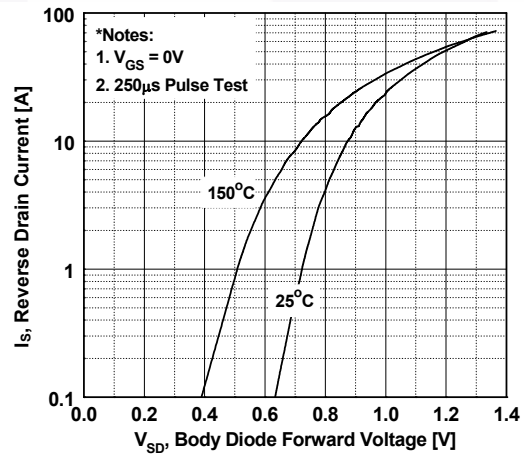


Figure 5. Capacitance Characteristics

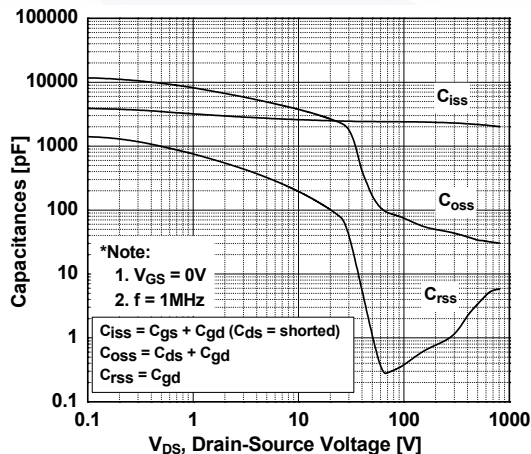
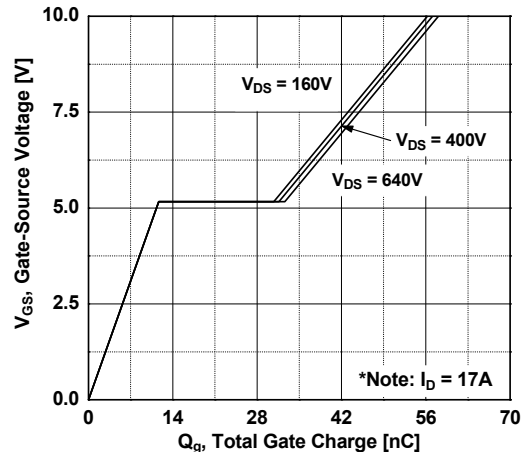


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

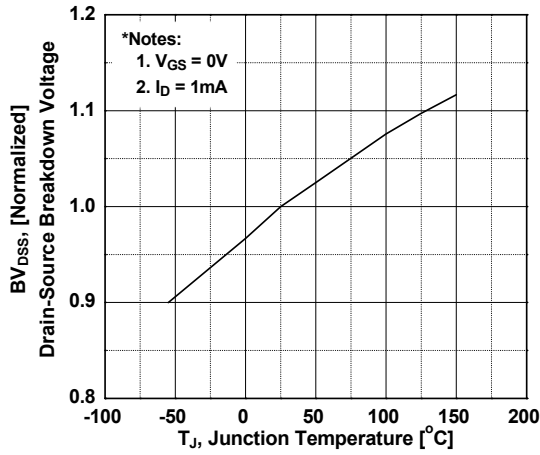


Figure 8. On-Resistance Variation vs. Temperature

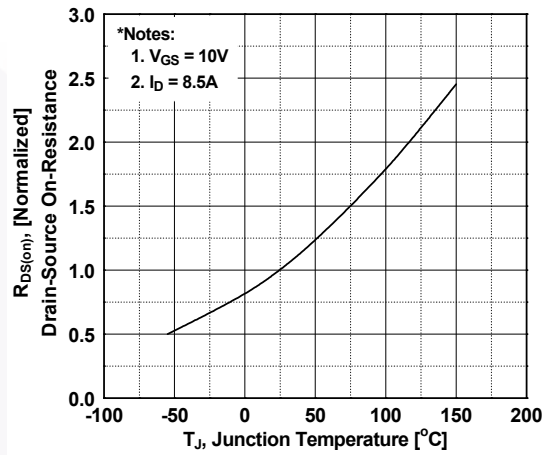


Figure 9. Maximum Safe Operating Area

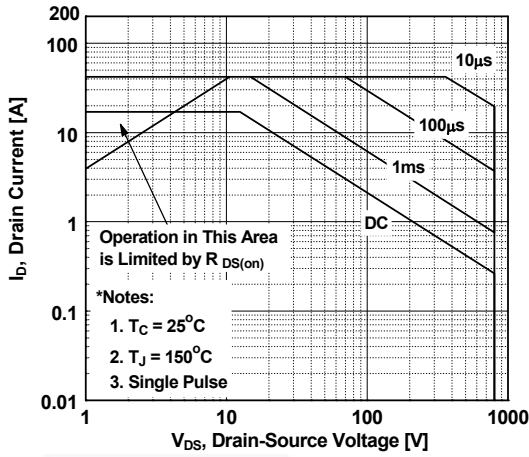


Figure 10. Maximum Drain Current vs. Case Temperature

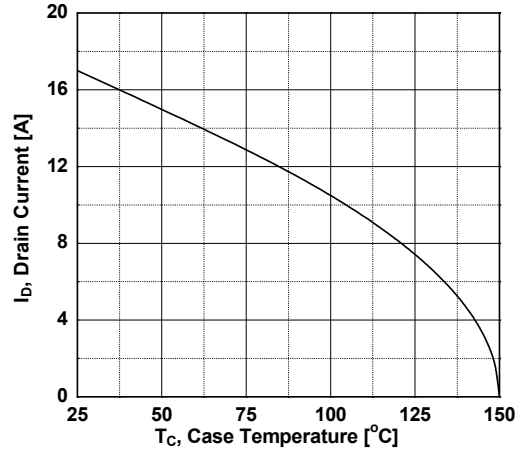
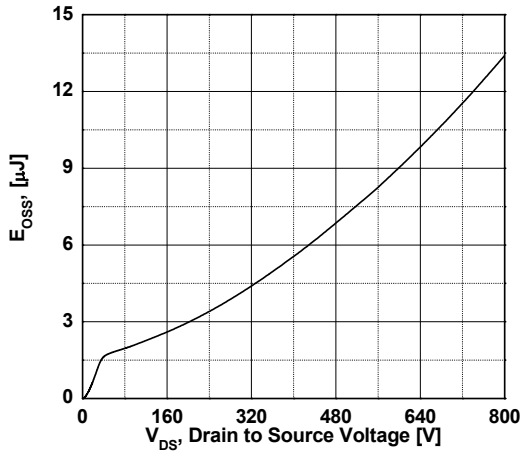
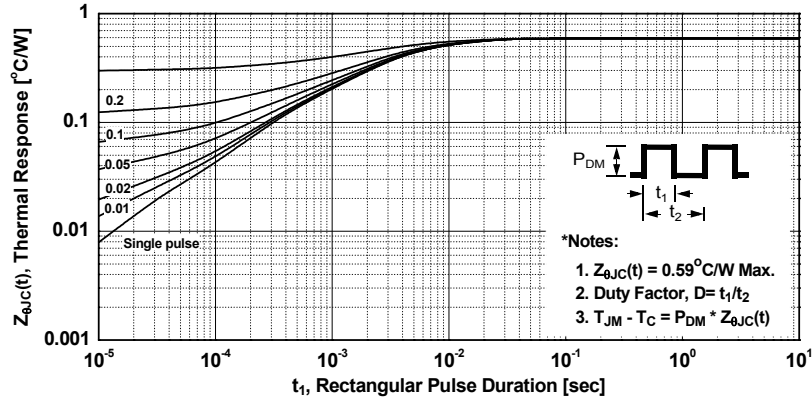


Figure 11. E\_oss vs. Drain to Source Voltage



Typical Performance Characteristics (Continued)

Figure 12. Transient Thermal Response Curve





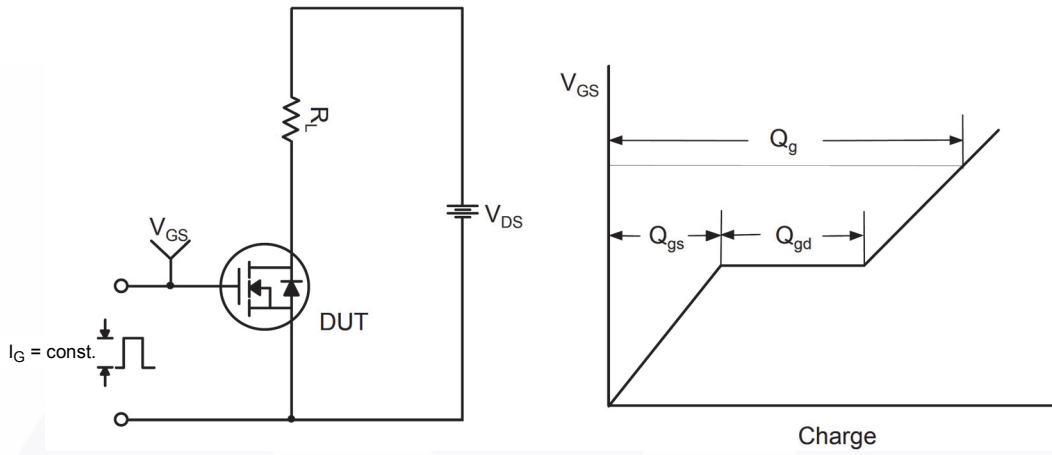


Figure 13. Gate Charge Test Circuit & Waveform

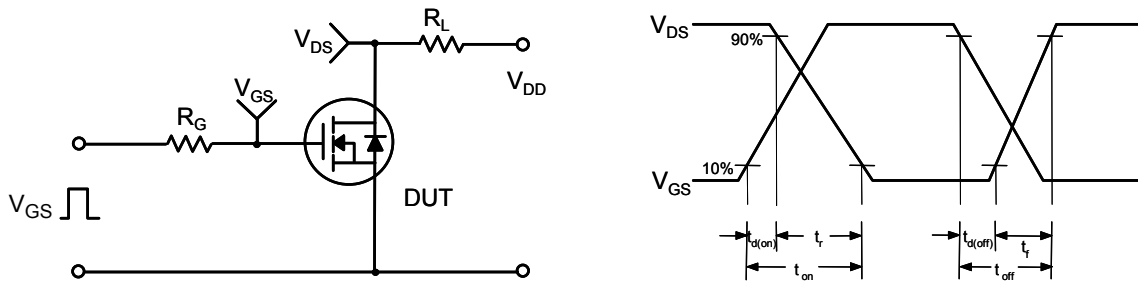


Figure 14. Resistive Switching Test Circuit & Waveforms

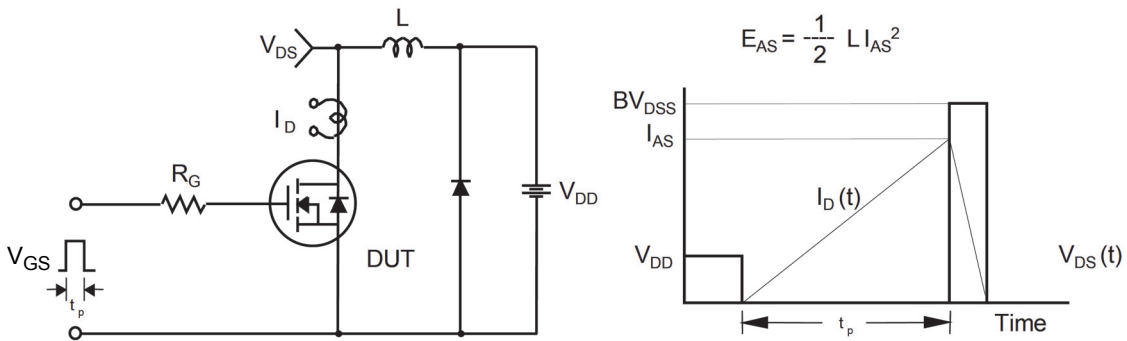


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

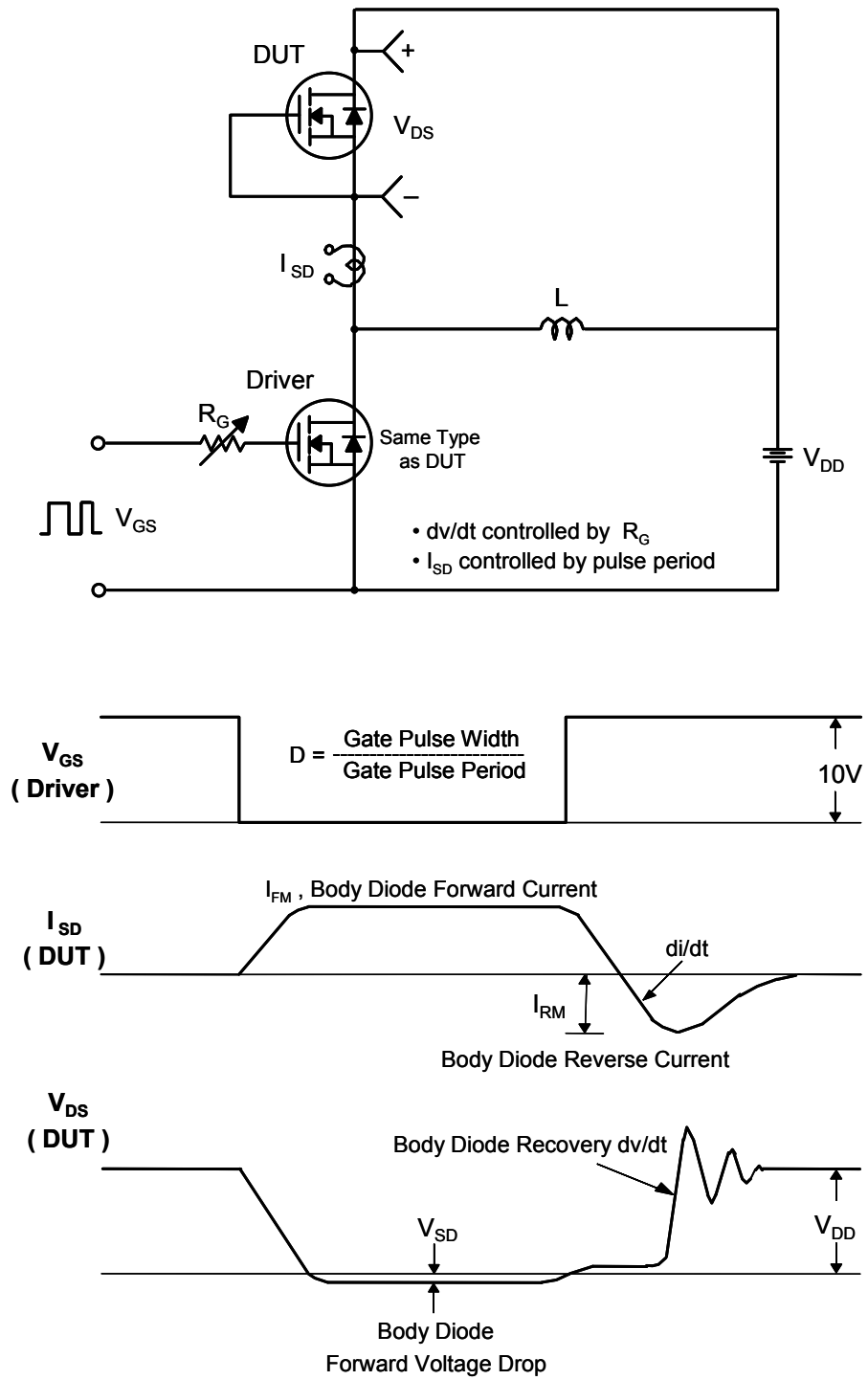
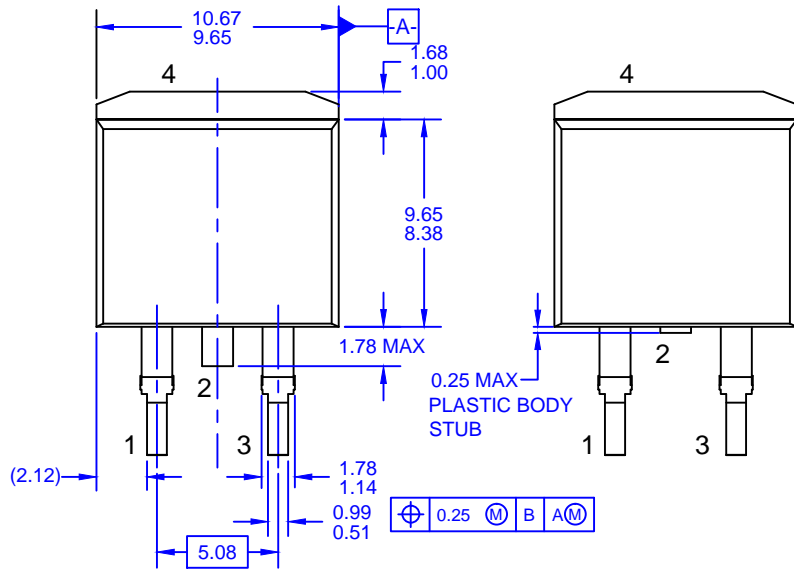
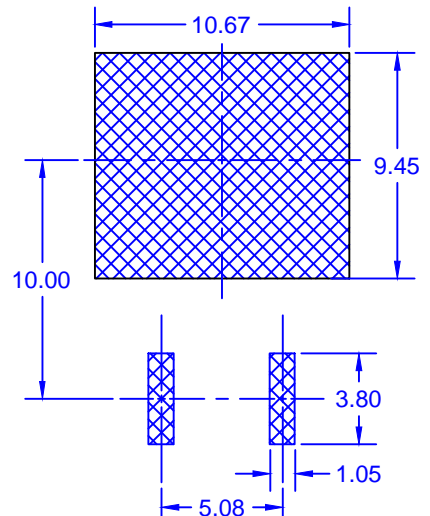


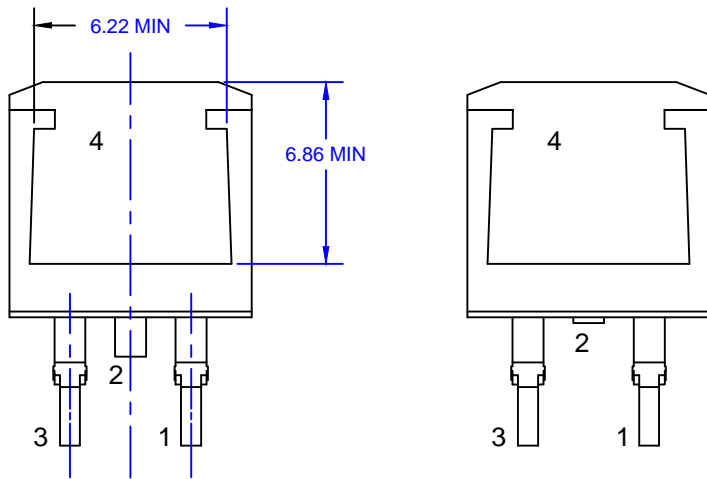
Figure 16. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms



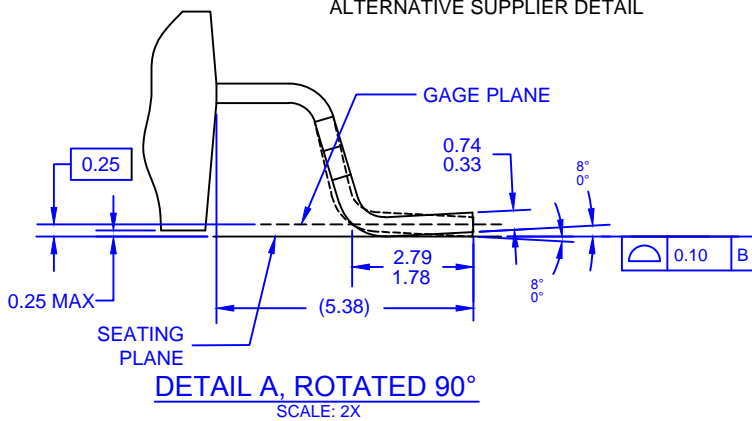
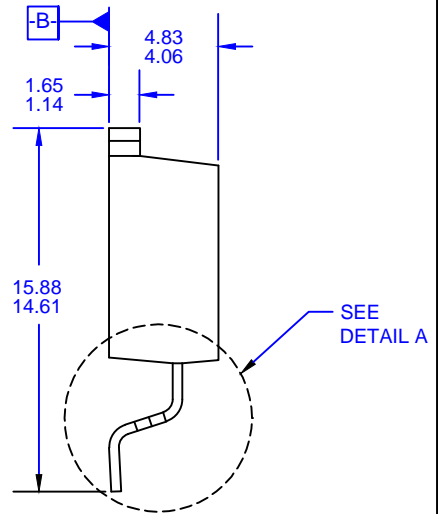
FRONT VIEW - DIODE PRODUCTS VERSION  
ALTERNATIVE SUPPLIER DETAIL



LAND PATTERN RECOMMENDATION  
UNLESS NOTED, ALL DIMS TYPICAL



BACK VIEW - DIODE PRODUCTS VERSION  
ALTERNATIVE SUPPLIER DETAIL




DETAIL A, ROTATED 90°  
SCALE: 2X

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
- F) FILENAME: TO263A02REV8



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