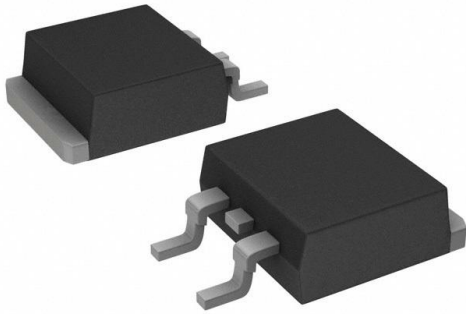


# FQB34N20TM-AM002 Datasheet

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DiGi Electronics Part Number	FQB34N20TM-AM002-DG
Manufacturer	<a href="#">onsemi</a>
Manufacturer Product Number	FQB34N20TM-AM002
Description	MOSFET N-CH 200V 31A D2PAK
Detailed Description	N-Channel 200 V 31A (Tc) 3.13W (Ta), 180W (Tc) Surface Mount TO-263 (D2PAK)



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## Purchase and inquiry

Manufacturer Product Number:

FQB34N20TM-AM002

Series:

QFET®

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

200 V

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

10V

Vgs(th) (Max) @ Id:

5V @ 250µA

Vgs (Max):

±30V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

TO-263 (D2PAK)

Base Product Number:

FQB34N20

Manufacturer:

onsemi

Product Status:

Obsolete

Technology:

MOSFET (Metal Oxide)

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

31A (Tc)

Rds On (Max) @ Id, Vgs:

75mOhm @ 15.5A, 10V

Gate Charge (Qg) (Max) @ Vgs:

78 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

3100 pF @ 25 V

Power Dissipation (Max):

3.13W (Ta), 180W (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



# ON Semiconductor

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The logo for onsemi, featuring the word "onsemi" in a dark teal, lowercase, sans-serif font. The letter "i" is stylized with a white dot and a teal vertical bar. A small orange triangle is positioned above the top right of the "i". A trademark symbol (TM) is located to the right of the logo.

To learn more about onsemi™, please visit our website at  
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ON Semiconductor®

# FQB34N20

## N-Channel QFET® MOSFET

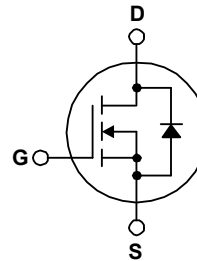
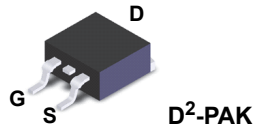
200 V, 31 A, 75 mΩ

### Description

This N-Channel enhancement mode power MOSFET is produced using ON Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, active power factor correction (PFC), and electronic lamp ballasts.

### Features

- 31 A, 200 V,  $R_{DS(on)} = 75 \text{ m}\Omega$  (Max.) @  $V_{GS} = 10 \text{ V}$ ,  $I_D = 15.5 \text{ A}$
- Low Gate Charge (Typ. 60 nC)
- Low Crss (Typ. 55 pF)
- 100% Avalanche Tested
- RoHS Compliant



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

Symbol	Parameter	FQB34N20TM_AM002	Unit
$V_{DSS}$	Drain-Source Voltage	200	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ )	31	A
	- Continuous ( $T_C = 100^\circ\text{C}$ )	20	A
$I_{DM}$	Drain Current - Pulsed (Note 1)	124	A
$V_{GSS}$	Gate-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	640	mJ
$I_{AR}$	Avalanche Current (Note 1)	31	A
$E_{AR}$	Repetitive Avalanche Energy (Note 1)	18	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
$P_D$	Power Dissipation ( $T_A = 25^\circ\text{C}$ ) *	3.13	W
	Power Dissipation ( $T_C = 25^\circ\text{C}$ )	180	W
	- Derate above $25^\circ\text{C}$	1.43	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 purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	FQB34N20TM_AM002	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.7	$^\circ\text{C/W}$
$R_{\theta JA}$	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

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FQB34N20	FQB34N20TM-AM002	D2-PAK	330mm	24mm	800

## 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-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	200	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$	--	0.2	--	V/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
		$V_{DS} = 160\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

### On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 15.5\text{ A}$	--	0.06	0.075	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 15.5\text{ A}$	--	25	--	S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	2400	3100	pF
$C_{oss}$	Output Capacitance		--	430	560	pF
$C_{rss}$	Reverse Transfer Capacitance		--	55	70	pF

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100\text{ V}, I_D = 34\text{ A},$ $R_G = 25\ \Omega$	--	40	90	ns
$t_r$	Turn-On Rise Time		--	280	570	ns
$t_{d(off)}$	Turn-Off Delay Time		--	125	260	ns
$t_f$	Turn-Off Fall Time		(Note 4)	--	115	240
$Q_g$	Total Gate Charge	$V_{DS} = 160\text{ V}, I_D = 34\text{ A},$ $V_{GS} = 10\text{ V}$	--	60	78	nC
$Q_{gs}$	Gate-Source Charge		--	17	--	nC
$Q_{gd}$	Gate-Drain Charge		(Note 4)	--	27	--

### Drain-Source Diode Characteristics and Maximum Ratings

$I_S$	Maximum Continuous Drain-Source Diode Forward Current	--	--	31	A	
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current	--	--	124	A	
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 31\text{ A}$	--	--	1.5	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 34\text{ A},$ $di_F / dt = 100\text{ A}/\mu\text{s}$	--	150	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	0.95	--	$\mu\text{C}$

#### Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $L = 1.0\text{mH}, I_{AS} = 31\text{A}, V_{DD} = 50\text{V}, R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 34\text{A}, di/dt \leq 300\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$
4. Essentially independent of operating temperature

### Typical Characteristics

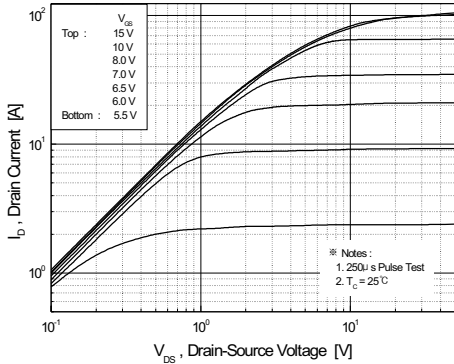


Figure 1. On-Region Characteristics

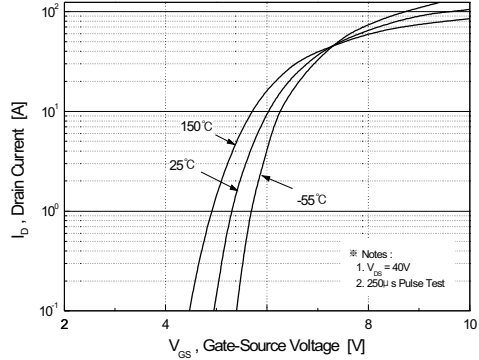


Figure 2. Transfer Characteristics

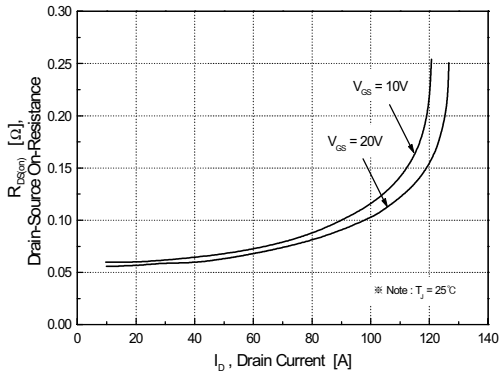


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

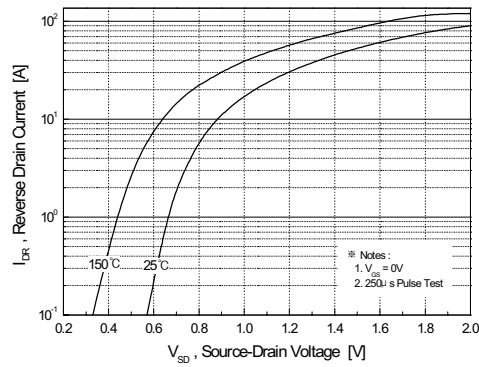


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

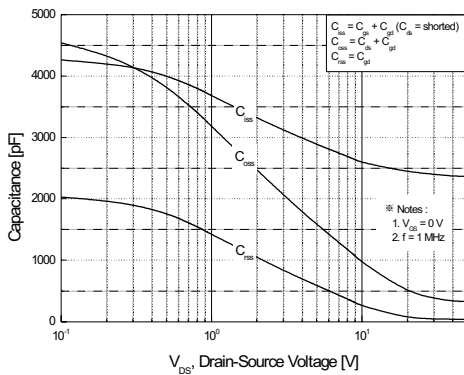


Figure 5. Capacitance Characteristics

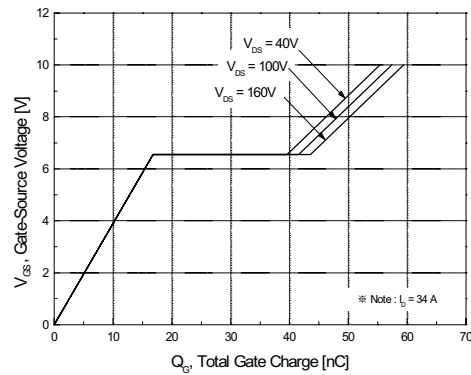
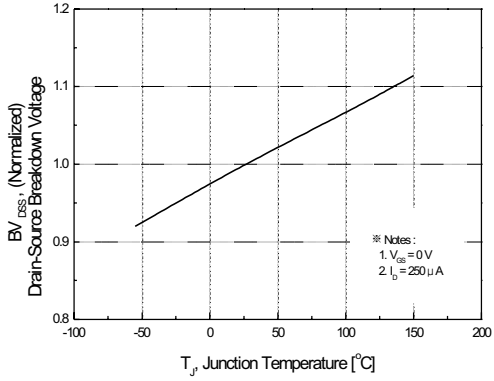
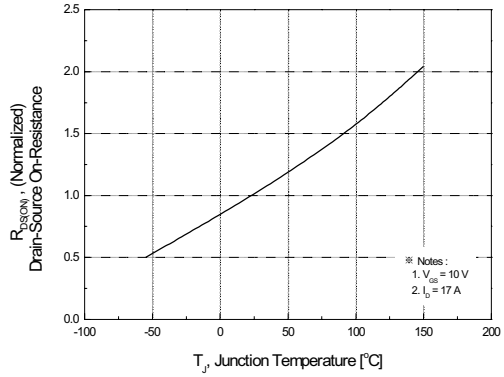


Figure 6. Gate Charge Characteristics

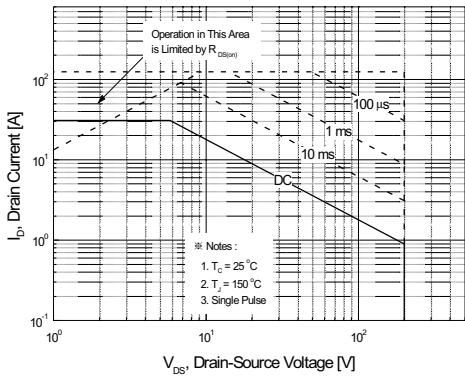
**Typical Characteristics** (Continued)



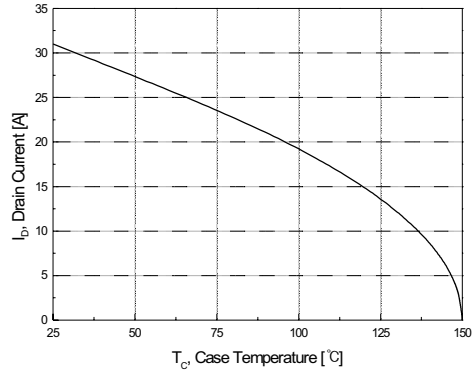
**Figure 7. Breakdown Voltage Variation vs. Temperature**



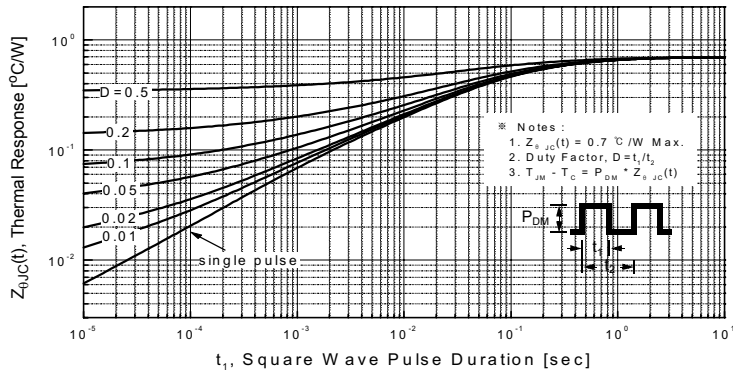
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**

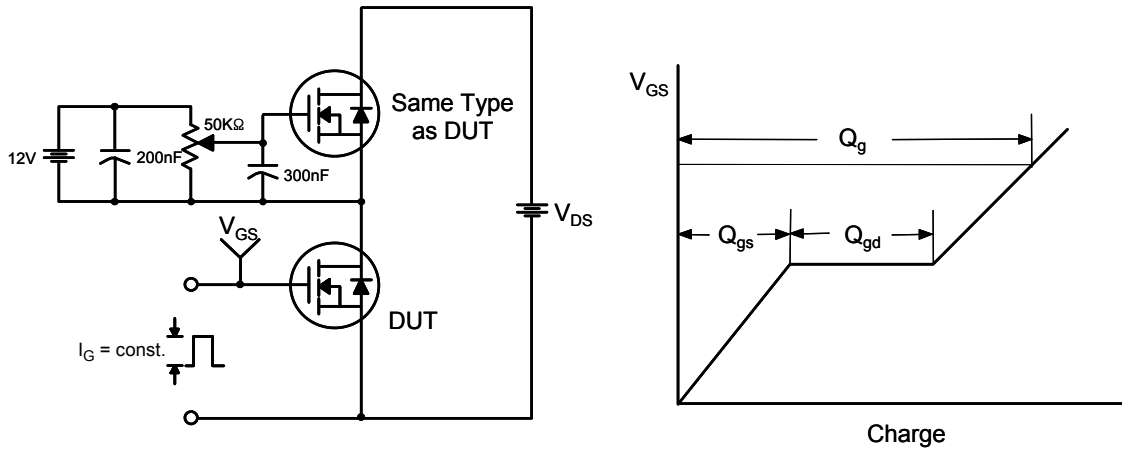


**Figure 10. Maximum Drain Current vs. Case Temperature**

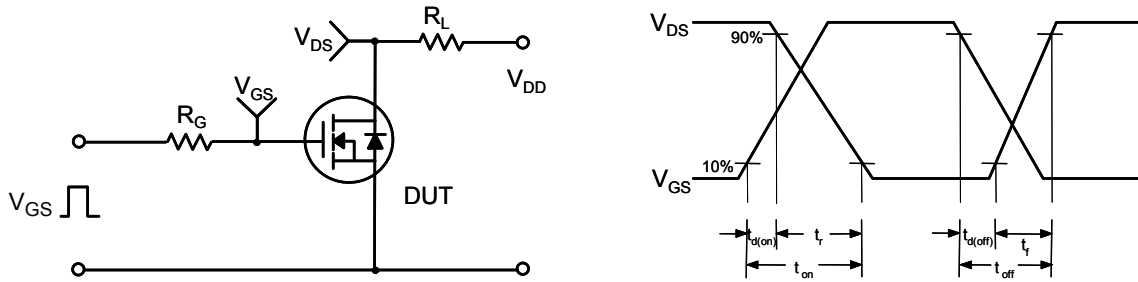


**Figure 11. Transient Thermal Response Curve**

**Figure 12. Gate Charge Test Circuit & Waveform**



**Figure 13. Resistive Switching Test Circuit & Waveforms**



**Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms**

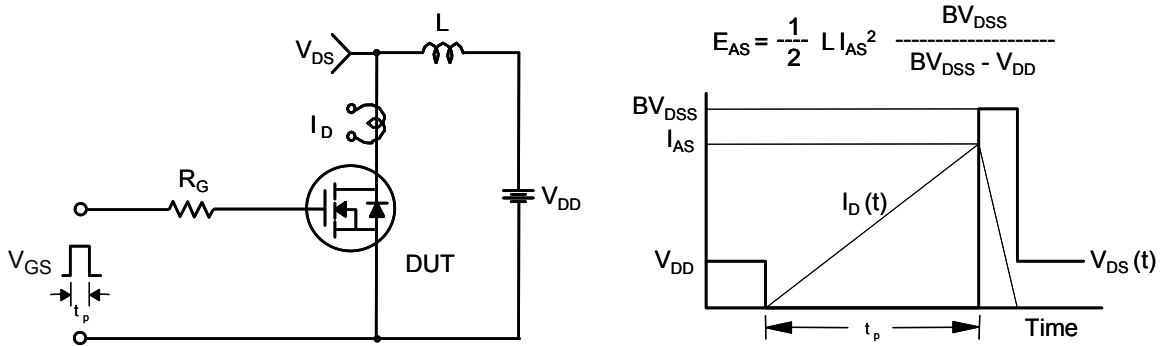
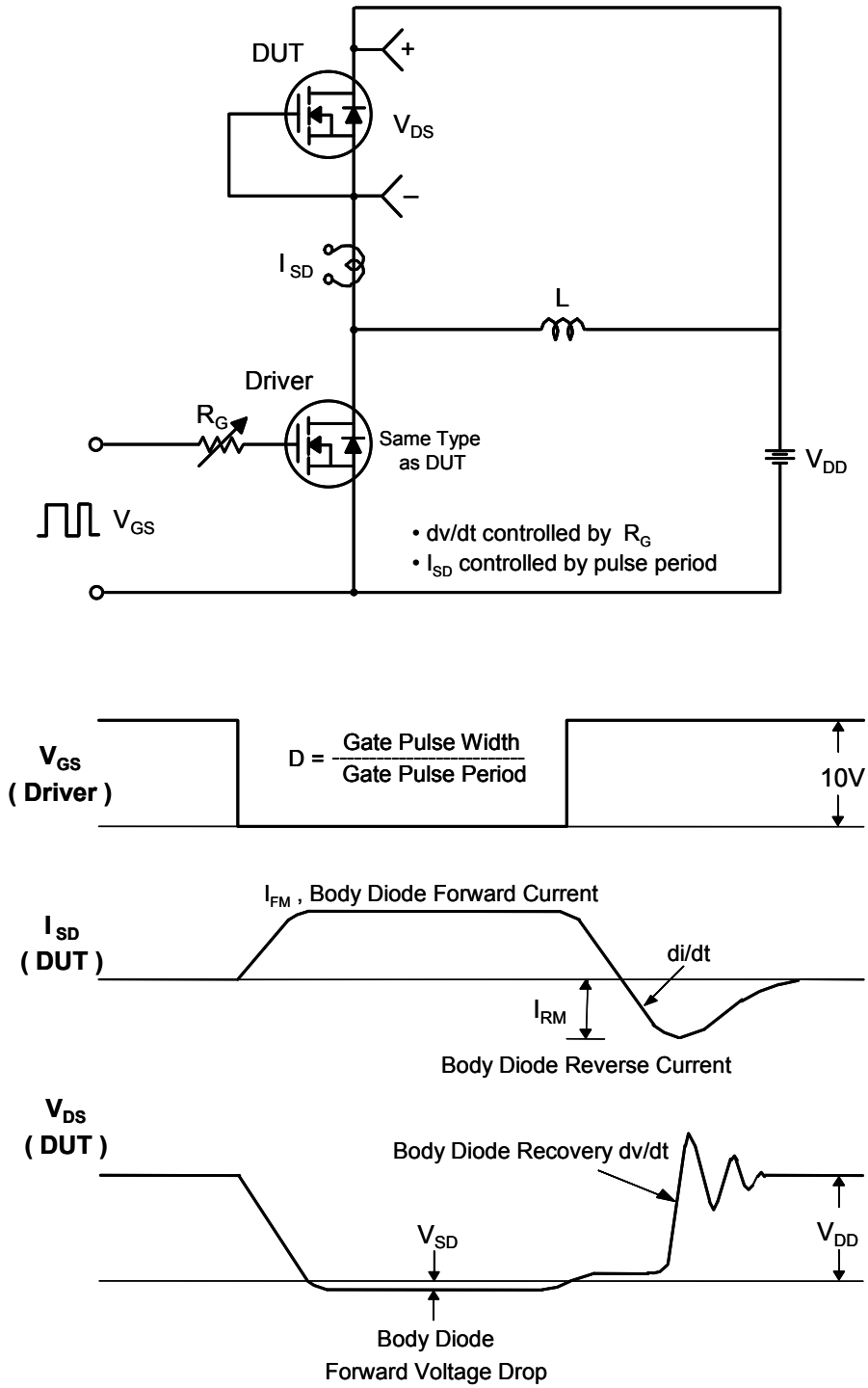




Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

TO-263 2L (D<sup>2</sup>PAK)

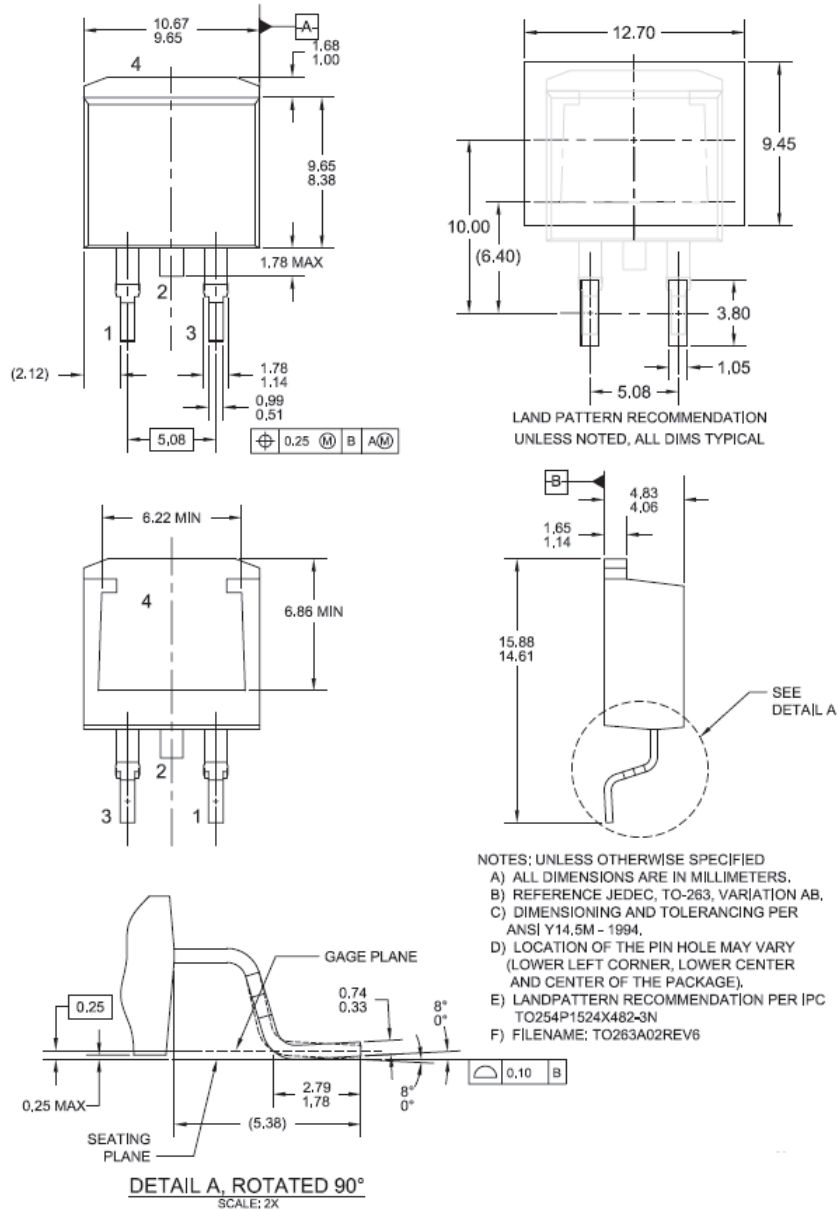



Figure 16. 2LD,TO263, Surface Mount

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Dimension in Millimeters

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