[MOSFET](#) – N-Channel, QFET

100 V, 15.6 A, 100 mΩ

FQD19N10L

V_{DSS}	$R_{DS(on)}$ MAX	I_D MAX
100 V	100 mΩ @ 10 V	15.6 A

Description

This N–Channel enhancement mode power MOSFET is produced using **onsemi**'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, audio amplifier, DC motor control, and variable switching power applications.

Features

- 15.6 A, 100 V, $R_{DS(on)}$ = 100 mΩ (Max.) @ V_{GS} = 10 V
- Low Gate Charge (Typ. 14 nC)
- Low Crss (Typ. 35 pF)
- 100% Avalanche Tested

DPAK3 (TO–252 3 LD)
CASE 369AS

MARKING DIAGRAM

&Z&3&K
FQD
19N10L

&Z	= Assembly Plant Code
&3	= 3–Digit Date Code
&K	= 2–Digits Lot Run Traceability Code
FQD19N10L	= Device Code
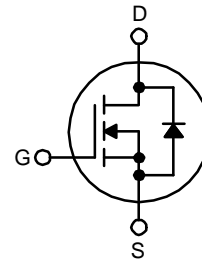
N–Channel MOSFET

ORDERING INFORMATION

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise noted)

Symbol	Parameter		Ratings	Unit
V_{DSS}	Drain–Source Voltage		100	V
I_D	Drain Current	– Continuous (T_C = 25°C)	15.6	A
		– Continuous (T_C = 100°C)	9.8	A
I_{DM}	Drain Current	– Pulsed (Note 1)	62.4	A
V_{GSS}	Gate–Source Voltage		±20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)		220	mJ
I_{AR}	Avalanche Current (Note 1)		15.6	A
E_{AR}	Repetitive Avalanche Energy (Note 1)		5.0	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		6.0	V/ns
P_D	Power Dissipation (T_A = 25°C) *		2.5	W
	Power Dissipation (T_C = 25°C)		50	W
	– Derate Above 25°C		0.4	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		–55 to +150	°C
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		300	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
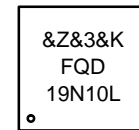
THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance Junction to Case, Max.	2.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Minimum Pad of 2–oz Copper), Max.	110	
	Thermal Resistance, Junction to Ambient (*1 in^2 Pad of 2–oz Copper), Max.	50	

FQD19N10L

ELECTRICAL CHARACTERISTICS ($T_C = 25°C$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0$ V, $I_D = 250$ µA	100	–	–	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250$ µA, Referenced to 25°C	–	0.09	–	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 100$ V, $V_{GS} = 0$ V	–	–	1	µA
		$V_{DS} = 80$ V, $T_C = 125°C$	–	–	10	µA
I_{GSSF}	Gate–Body Leakage Current, Forward	$V_{GS} = 20$ V, $V_{DS} = 0$ V	–	–	100	nA
I_{GSSR}	Gate–Body Leakage Current, Reverse	$V_{GS} = -20$ V, $V_{DS} = 0$ V	–	–	–100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250$ µA	1.0	–	2.0	V
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = 10$ V, $I_D = 7.8$ A $V_{GS} = 5$ V, $I_D = 7.8$ A	– –	0.074 0.082	0.10 0.11	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 30$ V, $I_D = 7.8$ A	–	14	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	$V_{DS} = 25$ V, $V_{GS} = 0$ V, f = 1.0 MHz	–	670	870	pF
C_{oss}	Output Capacitance		–	160	210	pF
C_{rss}	Reverse Transfer Capacitance		–	35	45	pF
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = 50$ V, $I_D = 19$ A, $R_G = 25$ Ω (Note 4)	–	14	38	ns
t_r	Turn–On Rise Time		–	410	830	ns
$t_{d(off)}$	Turn–Off Delay Time		–	20	50	ns
t_f	Turn–Off Fall Time		–	140	290	ns
Q_g	Total Gate Charge	$V_{DS} = 80$ V, $I_D = 19$ A, $V_{GS} = 5$ V (Note 4)	–	14	18	nC
Q_{gs}	Gate–Source Charge		–	2.9	–	nC
Q_{gd}	Gate–Drain Charge		–	9.2	–	nC
DRAIN–SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I_S	Maximum Continuous Drain–Source Diode Forward Current		–	–	15.6	A
I_{SM}	Maximum Pulsed Drain–Source Diode Forward Current		–	–	62.4	A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0$ V, $I_S = 15.6$ A	–	–	1.5	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0$ V, $I_S = 19$ A, $dI_F / dt = 100$ A/µs	–	80	–	ns
Q_{rr}	Reverse Recovery Charge		–	0.195	–	µC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
1. Repetitive rating: pulse–width limited by maximum junction temperature.
2. L = 1.35 mH, $I_{AS} = 15.6$ A, $V_{DD} = 25$ V, $R_G = 25$ Ω, starting $T_J = 25°C$.
3. $I_{SD} \leq 19$ A, di/dt ≤ 300 A/µs, $V_{DD} \leq BV_{DSS}$, starting $T_J = 25°C$.
4. Essentially independent of operating temperature.
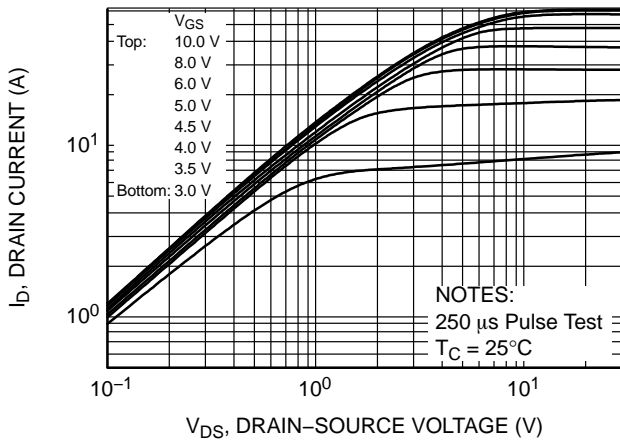
FQD19N10L

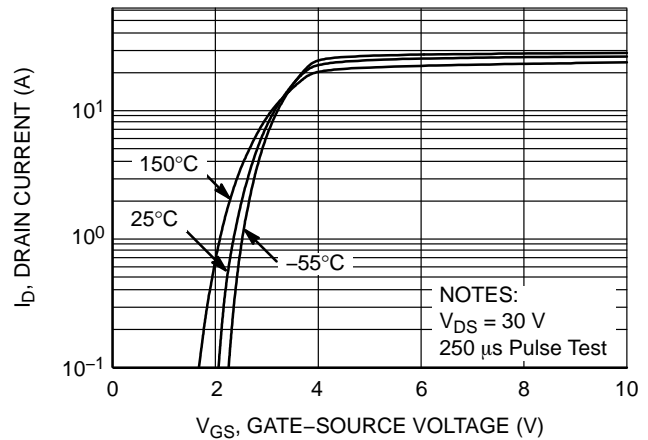## TYPICAL CHARACTERISTICS

Figure 1. On–Region Characteristics

VGS
Top: 10.0 V
8.0 V
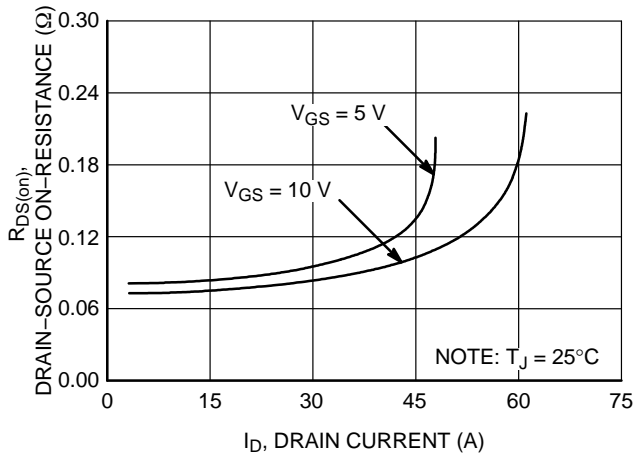6.0 V
5.0 V
4.5 V
4.0 V
3.5 V
Bottom: 3.0 V

NOTES:
250 μs Pulse Test
T_C = 25°C

Figure 2. Transfer Characteristics

150°C
25°C
−55°C

NOTES:
V_{DS} = 30 V
250 μs Pulse Test

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

V_{GS} = 5 V
V_{GS} = 10 V

NOTE: T_J = 25°C
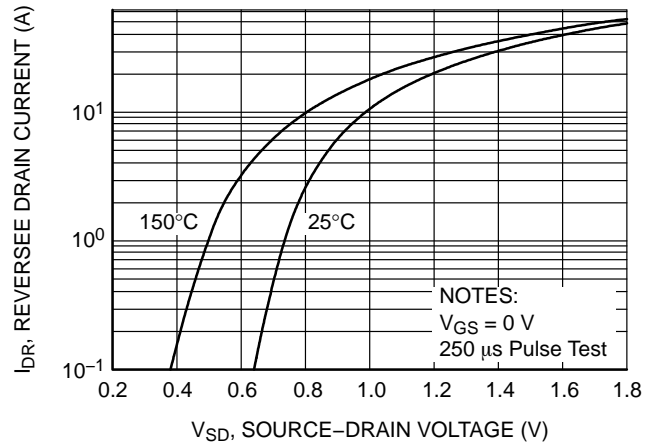
Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

150°C
25°C

NOTES:
V_{GS} = 0 V
250 μs Pulse Test
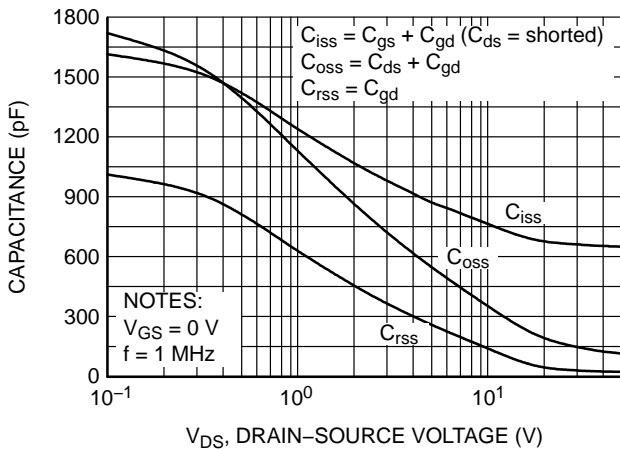
Figure 5. Capacitance Characteristics

$C_{iss} = C_{gs} + C_{gd}$ (C_{ds} = shorted)
$C_{oss} = C_{ds} + C_{gd}$
$C_{rss} = C_{gd}$

C_{iss}
C_{oss}
C_{rss}

NOTES:
V_{GS} = 0 V
f = 1 MHz
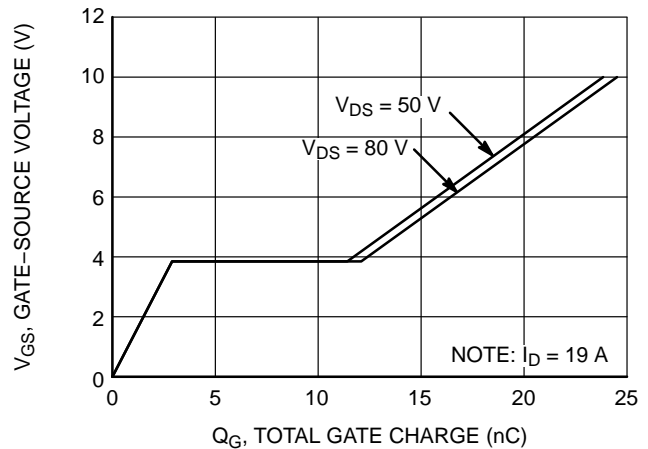
Figure 6. Gate Charge Characteristics

V_{DS} = 50 V
V_{DS} = 80 V

NOTE: I_D = 19 A

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Figure 7. Breakdown Voltage Variation vs. Temperature
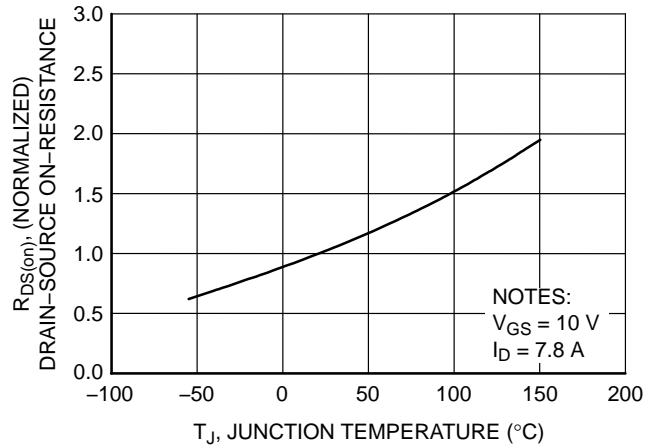
Figure 8. On–Resistance Variation vs. Temperature
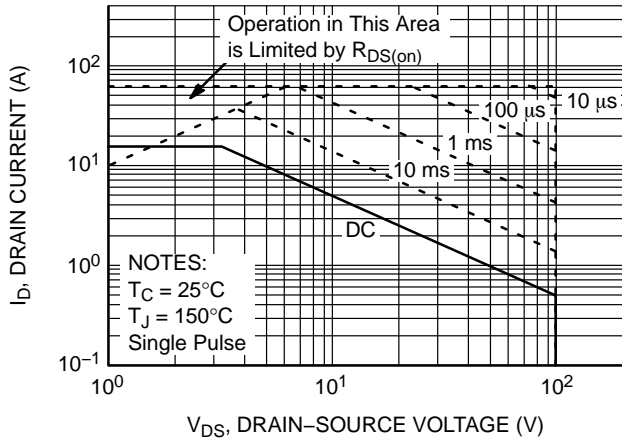
Figure 9. Maximum Safe Operating Area
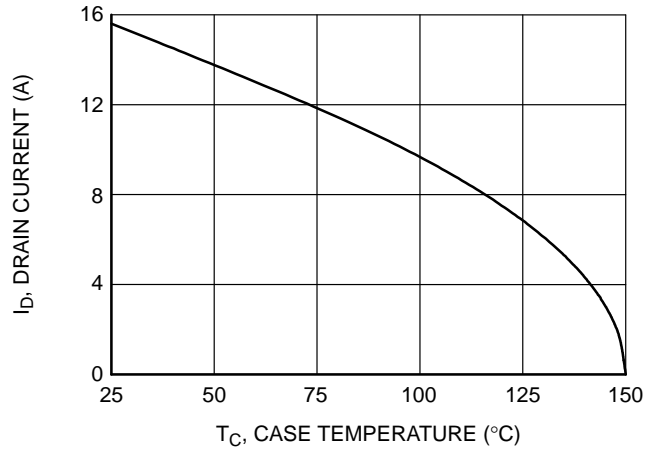
Figure 10. Maximum Drain Current vs. Case Temperature
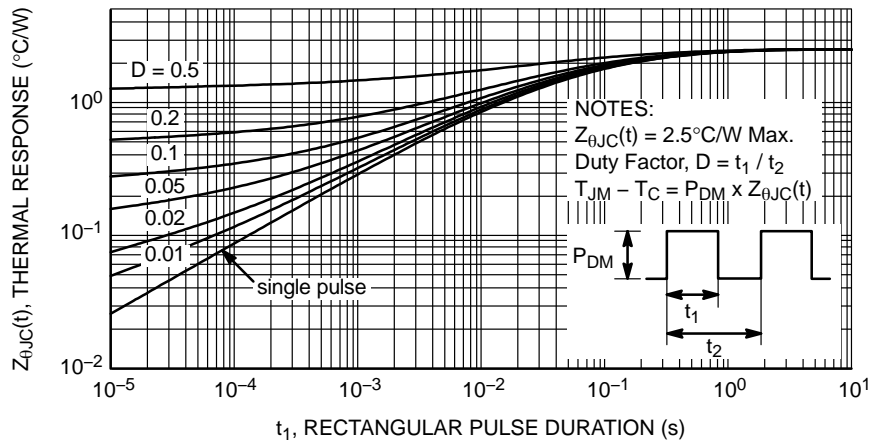
Figure 11. Transient Thermal Response Curve
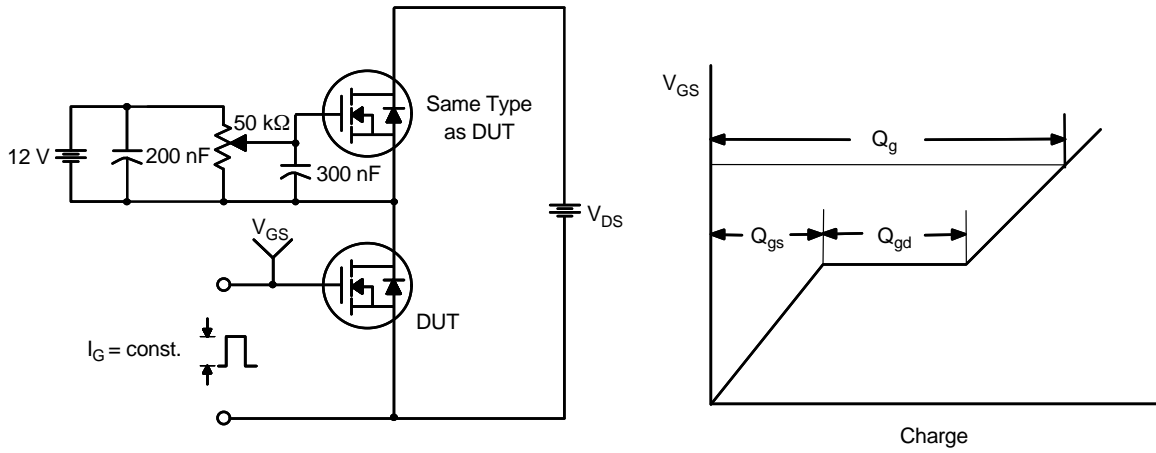
Figure 12. Gate Charge Test Circuit & Waveform
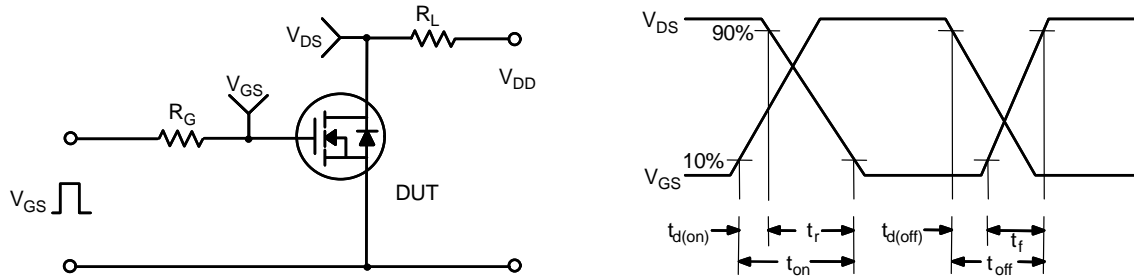
Figure 13. Resistive Switching Test Circuit & Waveforms

$$E_{AS} = \frac{1}{2} LI_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$
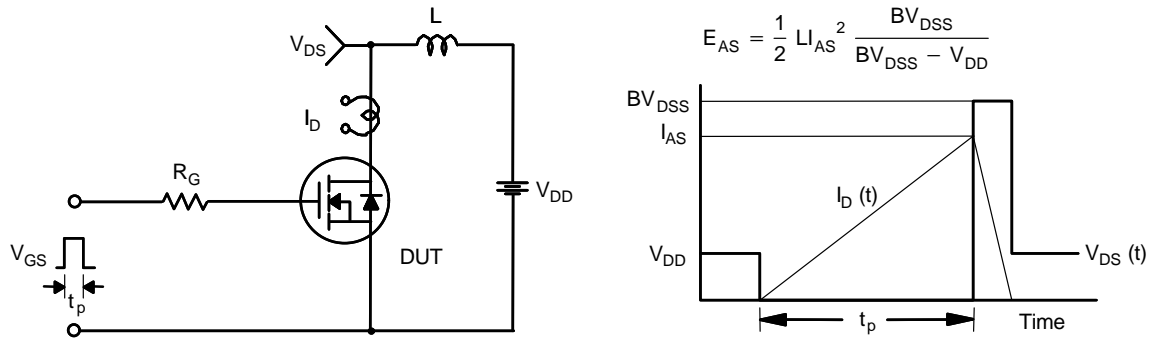
Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms
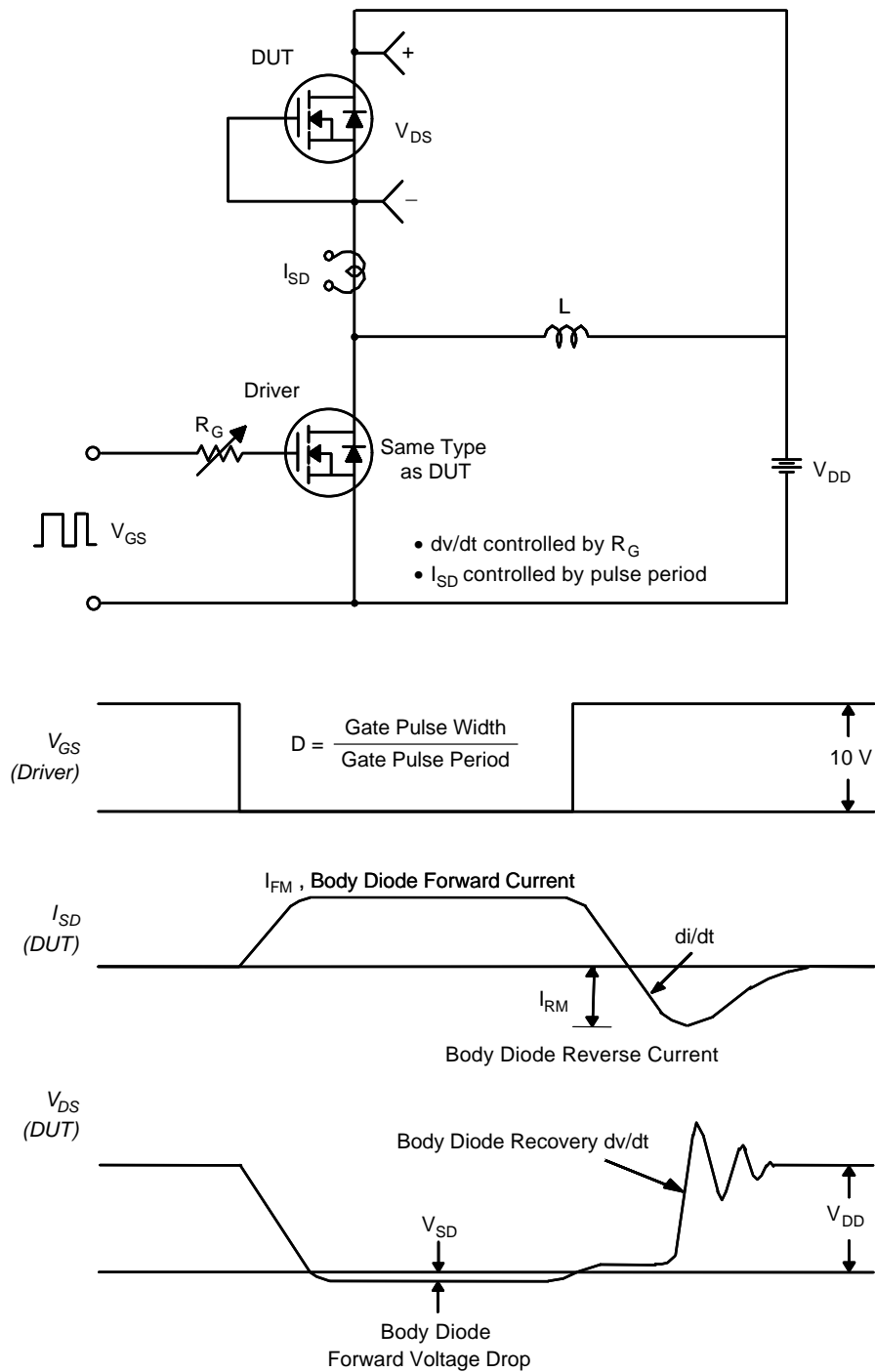
Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Reel Size	Tape Width	Shipping†
FQD19N10LTM	FQD19N10L	DPAK3 (TO−252 3 LD)	330 mm	16 mm	2500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.
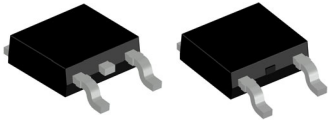
DPAK3 6.10x6.54x2.29, 4.57P
CASE 369AS
ISSUE B

DATE 20 DEC 2023
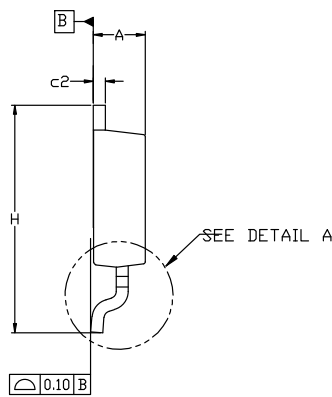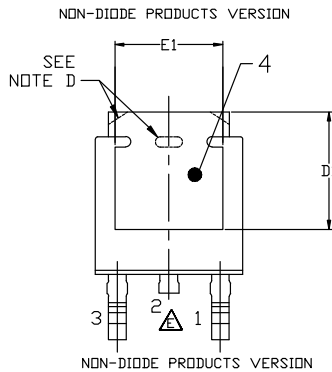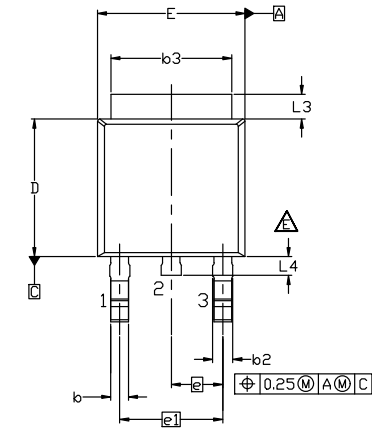
NOTES: UNLESS OTHERWISE SPECIFIED
A) THIS PACKAGE CONFORMS TO JEDEC, TO−252, ISSUE F, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M−2018.
D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.
⚠E) FOR DIODE PRODUCTS, L4 IS 0.25 MM MAX PLASTIC BODY STUB WITHOUT CENTER LEAD.
F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239−3N.

NON-DIODE PRODUCTS VERSION

⊕ 0.25 Ⓜ A Ⓜ C

GAUGE PLANE

DETAIL A
(ROTATED −90°)
SCALE: 12X

SEATING PLANE

SEE NOTE D

NON-DIODE PRODUCTS VERSION

SEE DETAIL A

⌒ 0.10 B

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.18	2.29	2.39
A1	0.00	–	0.127
b	0.64	0.77	0.89
b2	0.76	0.95	1.14
b3	5.21	5.34	5.46
c	0.45	0.53	0.61
c2	0.45	0.52	0.58
D	5.97	6.10	6.22
D1	5.21	---	---
E	6.35	6.54	6.73
E1	4.32	---	---
e	2.286 BSC		
e1	4.572 BSC		
H	9.40	9.91	10.41
L	1.40	1.59	1.78
L1	2.90 REF		
L2	0.51 BSC		
L3	0.89	1.08	1.27
L4	---	---	1.02
θ	0°	---	10°

LAND PATTERN RECOMMENDATION
5.55 MIN
6.50 MIN
6.40
2.85 MIN
1.25 MIN
2.286
4.572

*FOR ADDITIONAL INFORMATION ON OUR PB−FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

GENERIC MARKING DIAGRAM*

XXXXXX
XXXXXX
AYWWZZ
○

XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

DOCUMENT NUMBER:	98AON13810G		
DESCRIPTION:	DPAK3 6.10x6.54x2.29, 4.57P		PAGE 1 OF 1

ADDITIONAL INFORMATION

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