

MOSFET – P-Channel

100 V

FQD8P10TM-F085

Description

These P-Channel enhancement mode power field effect transistors are produced using onsemi's proprietary, planar stripe, DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for low voltage applications such as audio amplifier, high efficiency switching DC/DC converters, and DC motor control.

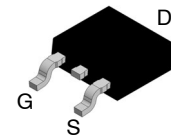
Features

- -6.6 A, -100 V, $R_{DS(on)} = 0.53 \Omega$ @ $V_{GS} = -10$ V
- Low Gate Charge (Typ. 12 nC)
- Low C_{rss} (Typ. 30 pF)
- Fast Switching
- 100% Avalanche Tested
- Improved dv/dt Capability
- Qualified to AEC-Q101
- RoHS Compliant

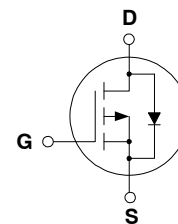
ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	-100	V
I_D	Drain Current – Continuous ($T_C = 25^\circ\text{C}$) – Continuous ($T_C = 100^\circ\text{C}$)	-6.6 -4.2	A
I_{DM}	Drain Current – Pulsed (Note 1)	-26.4	A
V_{GSS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	150	mJ
I_{AR}	Avalanche Current (Note 1)	-6.6	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	4.4	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	-6.0	V/ns
P_D	Power Dissipation ($T_A = 25^\circ\text{C}$)* Power Dissipation ($T_C = 25^\circ\text{C}$) – Derate above 25°C	2.5 44 0.35	W W W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

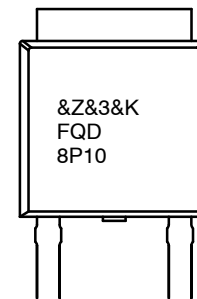
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



DPAK3
CASE 369AS



MARKING DIAGRAM



&Z = Assembly Code
 &3 = Date Code (Year and Week)
 &K = Lot Code
 FQD8P10 = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping [†]
FQD8P10TM-F085	DPAK3 (Pb-Free)	2,500 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, [BRD8011/D](http://www.onsemi.com/BRD8011/D).

FQD8P10TM-F085

THERMAL CHARACTERISTICS

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	–	2.84	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient*	–	50	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	–	110	°C/W

NOTE:

*When mounted on the minimum pad size recommended (PCB Mount)

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
--------	----------------	-----------------	-----	-----	-----	------

OFF CHARACTERISTICS

BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	–100	–	–	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = -250\text{ }\mu\text{A}$, Referenced to 25°C	–	–0.1	–	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}$	–	–	–1	μA
		$V_{DS} = -80\text{ V}, T_C = 125^\circ\text{C}$	–	–	–10	μA
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	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	–2.0	–	–4.0	V
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = -10\text{ V}, I_D = -3.3\text{ A}$	–	0.41	0.53	Ω
g_{FS}	Forward Transconductance	$V_{DS} = -40\text{ V}, I_D = -3.3\text{ A}$ (Note 4)	–	4.1	–	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	–	360	470	pF
C_{oss}	Output Capacitance		–	120	155	pF
C_{rss}	Reverse Transfer Capacitance		–	30	40	pF

SWITCHING CHARACTERISTICS

$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = -50\text{ V}, I_D = -8.0\text{ A}, R_G = 25\text{ }\Omega$ (Note 4, 5)	–	11	30	ns
t_r	Turn–On Rise Time		–	110	230	ns
$t_{d(off)}$	Turn–Off Delay Time		–	20	50	ns
t_f	Turn–Off Fall Time		–	35	80	ns
Q_g	Total Gate Charge	$V_{DS} = -80\text{ V}, I_D = -8.0\text{ A}, V_{GS} = -10\text{ V}$ (Note 4, 5)	–	12	15	nC
Q_{gs}	Gate–Source Charge		–	3.0	–	nC
Q_{gd}	Gate–Drain Charge		–	6.4	–	nC

DRAIN–SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

I _S	Maximum Continuous Drain–Source Diode Forward Current		–	–	–6.6	A
I _{SM}	Maximum Pulsed Drain–Source Diode Forward Current		–	–	–26.4	A
V _{SD}	Drain–Source Diode Forward Voltage	V _{GS} = 0 V, I _S = –6.6 A	–	–	–4.0	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = –8.0 A, dI _F / dt = 100 A/ μs (Note 4)	–	98	–	ns
Q _{rr}	Reverse Recovery Charge		–	0.35	–	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.

NOTES:

1. Repetitive Rating: Pulse–width limited by maximum junction temperature.
2. $L = 5.2\text{ mH}, I_{AS} = -6.6\text{ A}, V_{DD} = -25\text{ V}, R_G = 25\text{ }\Omega$, Starting $T_J = 25^\circ\text{C}$.
3. $I_{SD} \leq -8.0\text{ A}, di/dt \leq 300\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$.
4. Pulse Test : Pulse width $\leq 300\text{ }\mu\text{s}$, Duty cycle $\leq 2\%$.
5. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

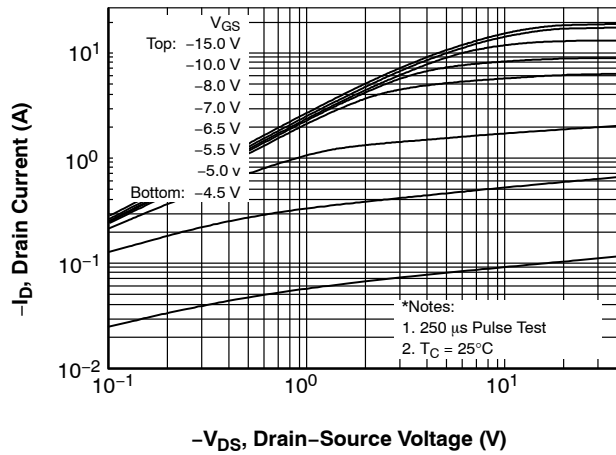


Figure 1. On-Region Characteristics

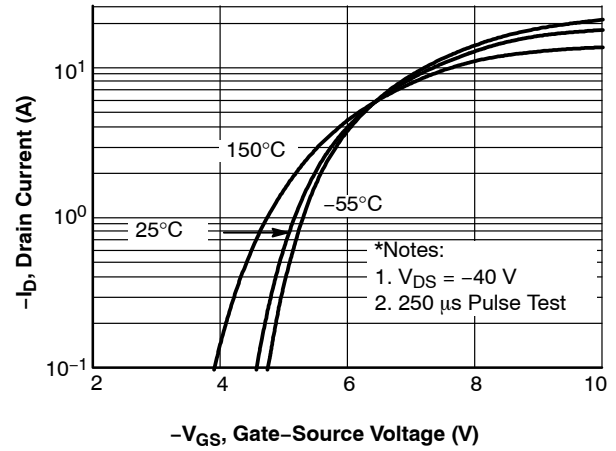


Figure 2. Transfer Characteristics

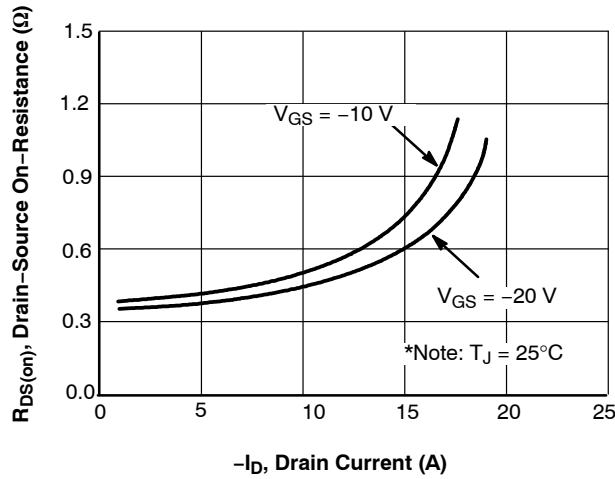


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

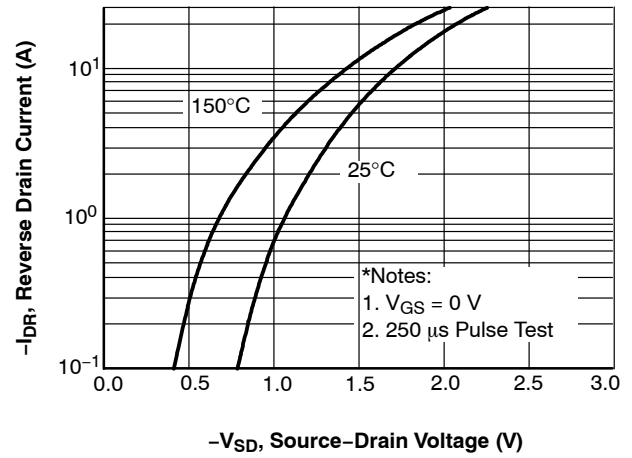


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

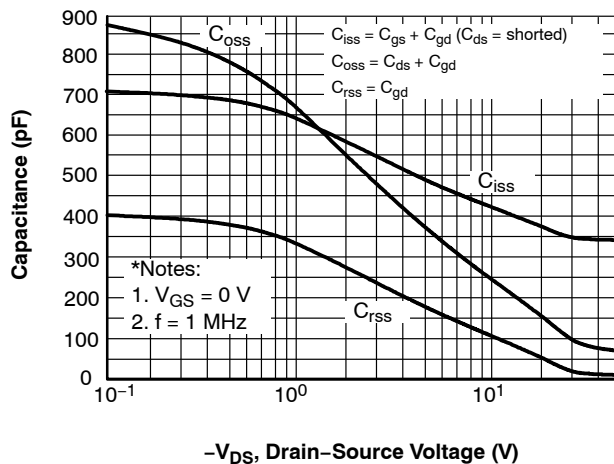


Figure 5. Capacitance Characteristics

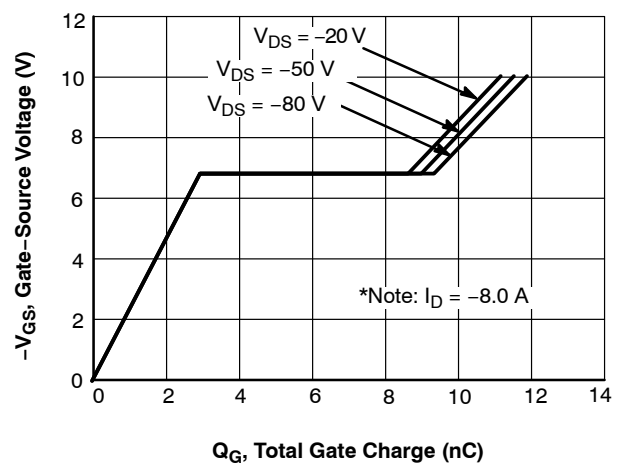


Figure 6. Gate Charge Characteristics

TYPICAL CHARACTERISTICS (continue)

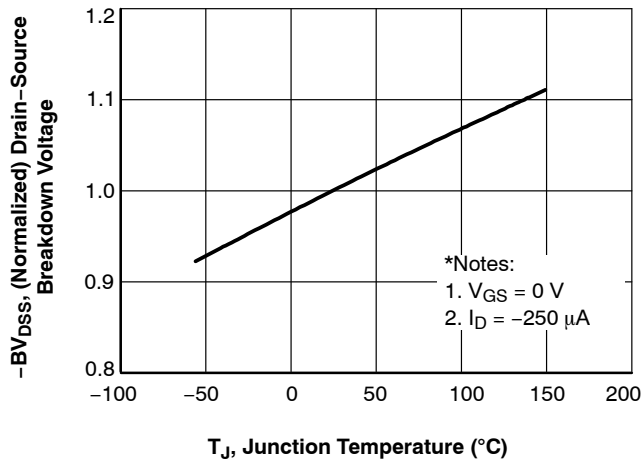


Figure 7. Breakdown Voltage Variation vs. Temperature

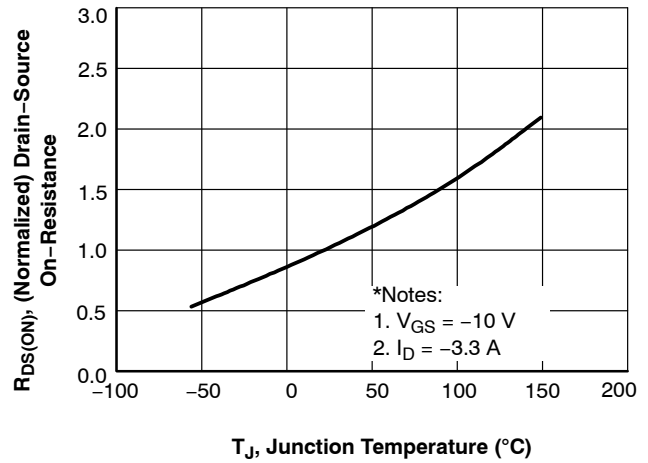


Figure 8. On-Resistance Variation vs. Temperature

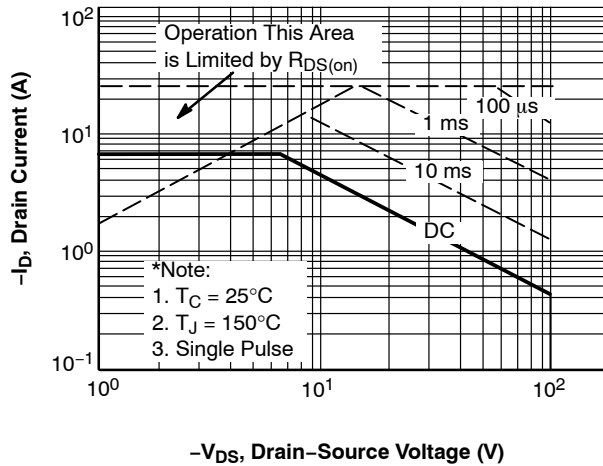


Figure 9. Maximum Safe Operating Area

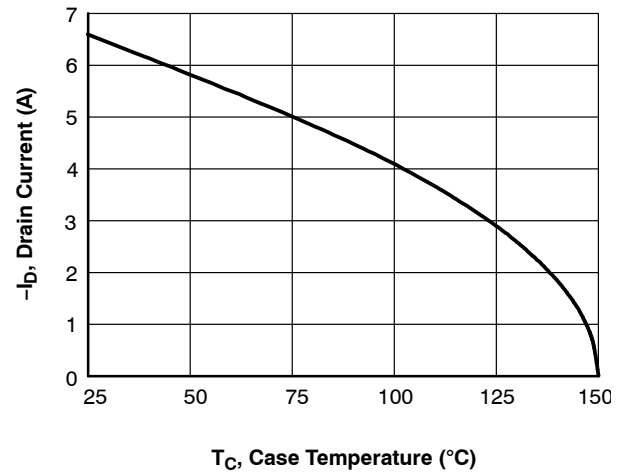


Figure 10. Maximum Drain Current vs. Case Temperature

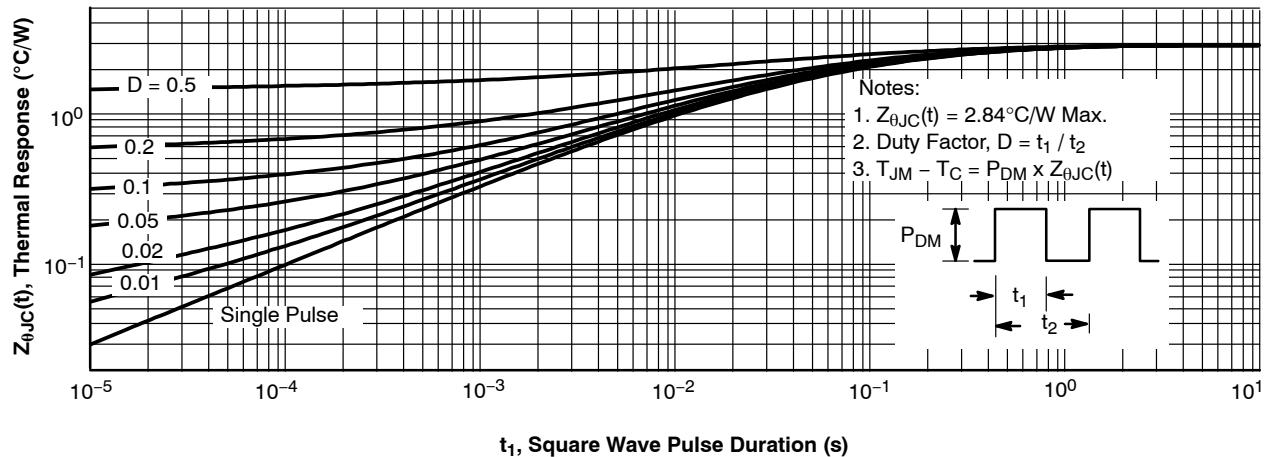


Figure 11. Transient Thermal Response Curve

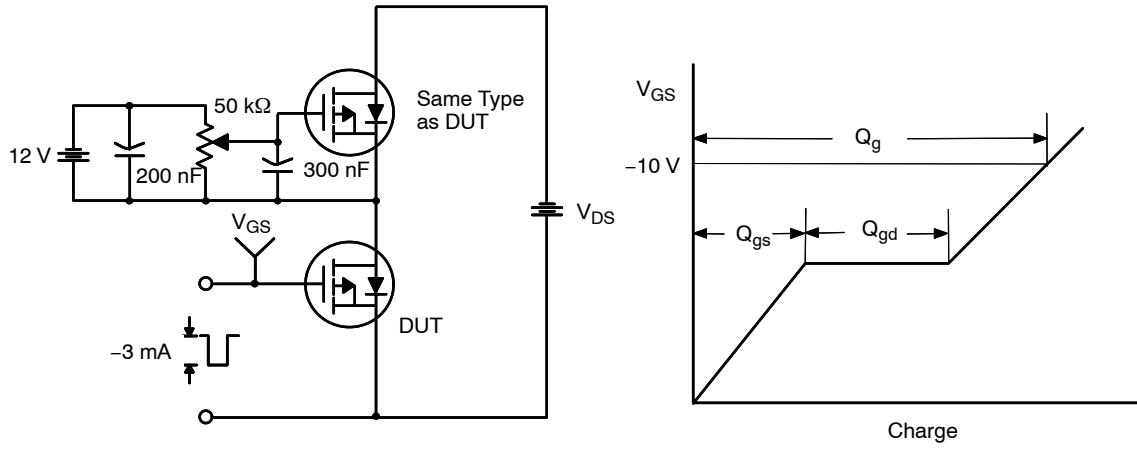


Figure 12. Gate Charge Test Circuit & Waveform

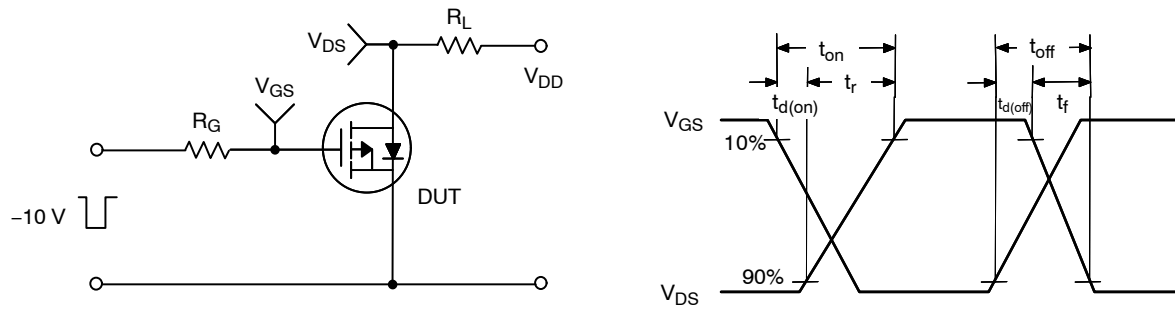


Figure 13. Resistive Switching Test Circuit & Waveforms

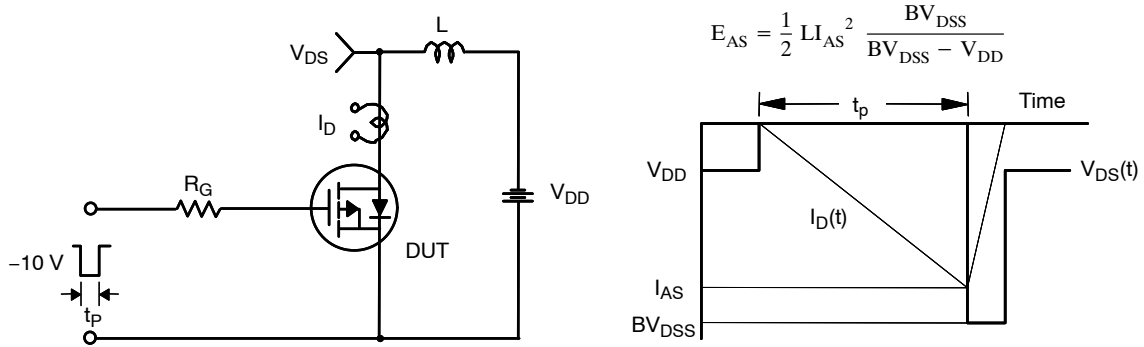


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

FQD8P10TM-F085

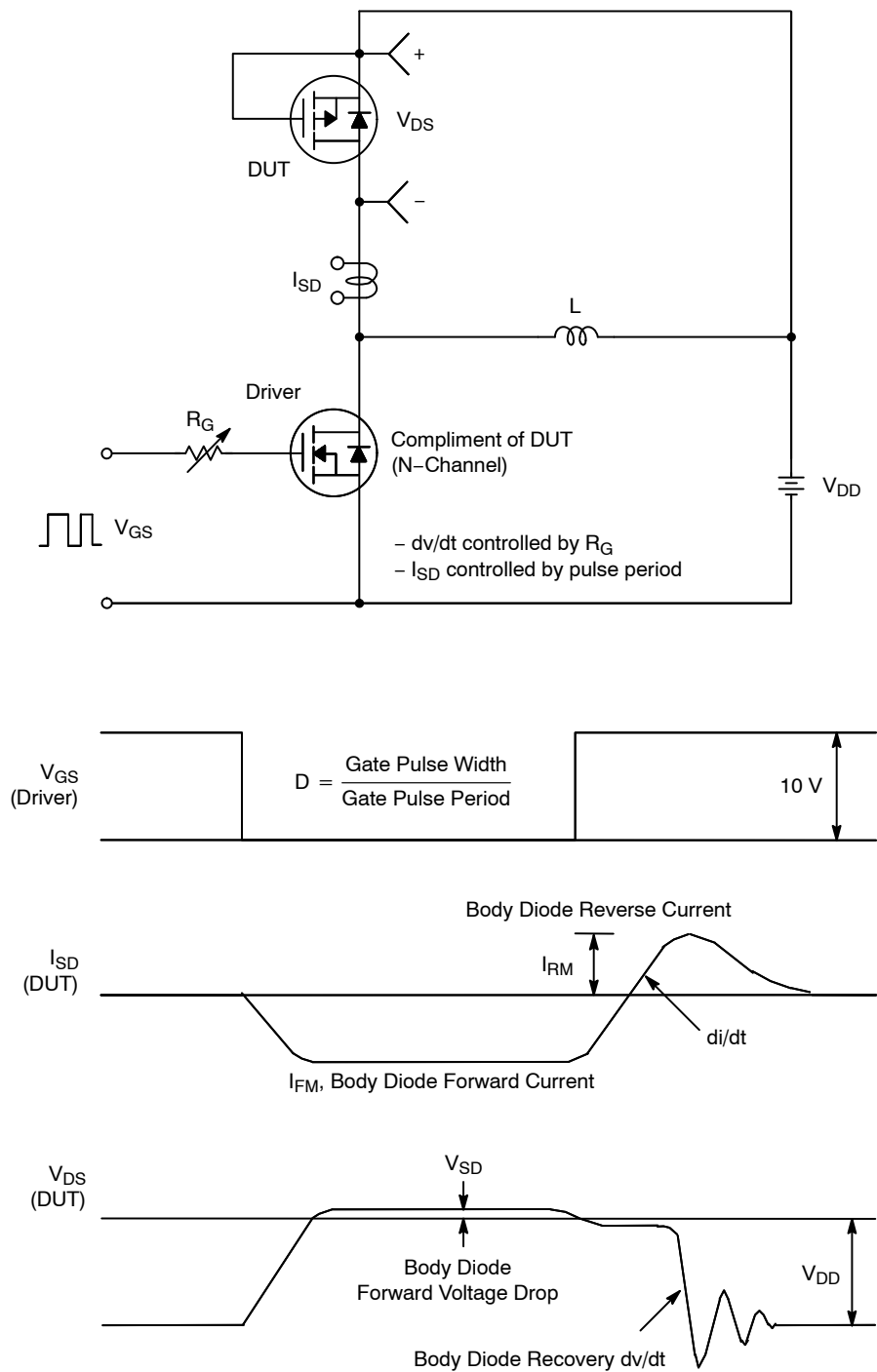
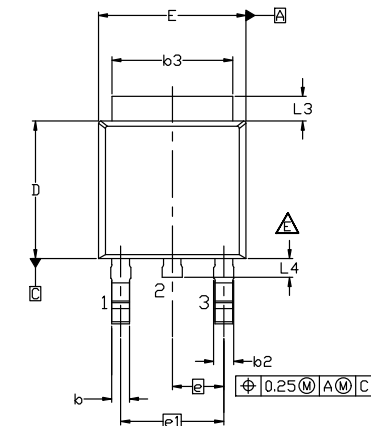


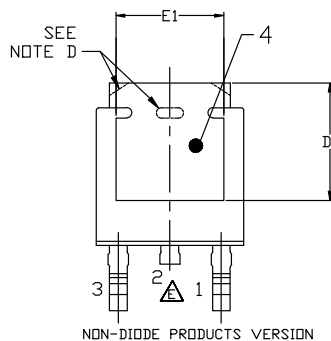
Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms


DPAK3 6.10x6.54x2.29, 4.57P
CASE 369AS
ISSUE B

DATE 20 DEC 2023



NON-DIODE PRODUCTS VERSION



NON-DIODE PRODUCTS VERSION



NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE F, VARIATION AA.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

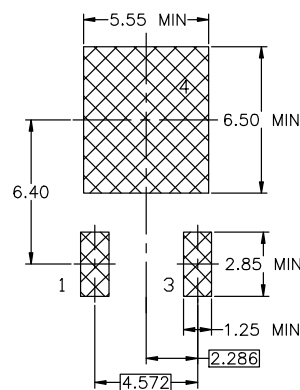
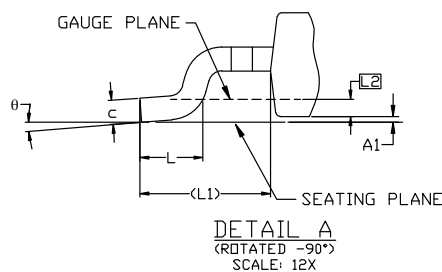
C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2018.

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.

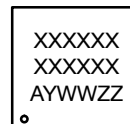
F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.

G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TD228P991X239-3N.


LAND PATTERN RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERM/D.

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°

GENERIC MARKING DIAGRAM*


*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.

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

DOCUMENT NUMBER:	98AON13810G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	DPAK3 6.10x6.54x2.29, 4.57P	PAGE 1 OF 1

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales