

MOSFET – P-Channel, POWERTRENCH®

-40 V, -14 A, 44 mΩ

FDD4243, FDD4243-G

General Description

This P-Channel MOSFET has been produced using onsemi's proprietary POWERTRENCH technology to deliver low $R_{DS(on)}$ and optimized B_{vds} capability to offer superior performance benefit in the applications.

Features

- Max $R_{DS(on)}$ = 44 mΩ at $V_{GS} = -10$ V, $I_D = -6.7$ A
- Max $R_{DS(on)}$ = 64 mΩ at $V_{GS} = -4.5$ V, $I_D = -5.5$ A
- High Performance Trench Technology for Extremely Low $r_{DS(on)}$
- Pb-Free, Halide Free and RoHS Compliant

ABSOLUTE MAXIMUM RATINGS

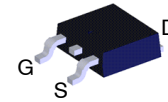
$T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Ratings	Unit
V_{DS}	Drain to Source Voltage	-40	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current – Continuous (Package Limited) $T_C = 25^\circ\text{C}$ – Continuous (Silicon Limited) $T_C = 25^\circ\text{C}$ (Note 1) – Continuous $T_A = 25^\circ\text{C}$ (Note 1a) – Pulsed	-14 -24 -6.7 -60	A
E_{AS}	Single Pulse Avalanche Energy (Note 3)	84	
P_D	Power dissipation – $T_C = 25^\circ\text{C}$ – (Note 1a)	42 3	W
T_J , T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

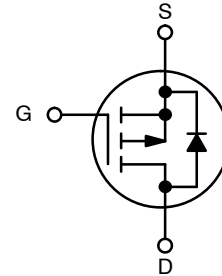
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.0	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	40	$^\circ\text{C/W}$

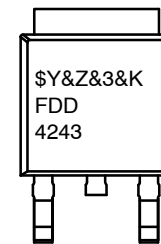


DPAK3 (TO-252 3 LD)
CASE 369AS



P-Channel MOSFET

MARKING DIAGRAM



FDD4243 = Specific Device Code
 \$Y = onsemi Logo
 &Z = Assembly Plant Code
 &3 = 3-Digit Date Code
 &K = 2-Digits Lot Run Traceability Code

ORDERING INFORMATION

Device	Package	Shipping†
FDD4243	DPAK3 (TO-252 3LD) (Pb-Free/ Halide Free)	2500 / Tape & Reel
FDD4243-G	DPAK3 (TO-252 3LD) (Pb-Free/ Halide Free)	2500 / 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.

FDD4243, FDD4243-G

ELECTRICAL CHARACTERISTICS $T_J = 25^\circ\text{C}$ unless otherwise noted.

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

OFF CHARACTERISTICS

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = -250\ \mu\text{A}$, $V_{GS} = 0\ \text{V}$	-40	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$, Referenced to 25°C	-	-32	-	mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -32\ \text{V}$, $V_{GS} = 0\ \text{V}$ $V_{DS} = -32\ \text{V}$, $V_{GS} = 0\ \text{V}$, $T_J = 125^\circ\text{C}$	-	-	-1 -100	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\ \text{V}$, $V_{DS} = 0\ \text{V}$	-	-	± 100	nA

ON CHARACTERISTICS (Note 2)

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = -250\ \mu\text{A}$	-1.4	-1.6	-3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$, Referenced to 25°C	-	4.7	-	mV/ $^\circ\text{C}$
$R_{DS(on)}$	Drain to Source On Resistance	$I_D = -6.7\ \text{A}$, $V_{GS} = -10\ \text{V}$,	-	36	44	m Ω
		$I_D = -5.5\ \text{A}$, $V_{GS} = -4.5\ \text{V}$	-	48	64	
		$I_D = -6.7\ \text{A}$, $V_{GS} = -10\ \text{V}$, $T_J = 125^\circ\text{C}$	-	53	69	
g_{FS}	Forward Transconductance	$V_{DS} = -5\ \text{V}$, $I_D = -6.7\ \text{A}$	-	16	-	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = -20\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1.0\ \text{MHz}$	-	1165	1550	pF
C_{oss}	Output Capacitance		-	165	220	
C_{rss}	Reverse Transfer Capacitance		-	90	135	
R_g	Gate Resistance	$f = 1\ \text{MHz}$	-	4	-	Ω

SWITCHING CHARACTERISTICS (Note 2)

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -20\ \text{V}$, $I_D = -6.7\ \text{A}$, $V_{GS} = -10\ \text{V}$, $R_{GEN} = 6\ \Omega$	-	6	12	ns
t_r	Rise Time		-	15	26	ns
$t_{d(off)}$	Turn-Off Delay Time		-	22	35	ns
t_f	Fall Time		-	7	14	ns
$Q_{g(TOT)}$	Total Gate Charge at 10 V	$V_{DS} = -20\ \text{V}$, $I_D = -6.7\ \text{A}$, $V_{GS} = -10\ \text{V}$	-	21	29	nC
Q_{gs}	Gate to Source Gate Charge		-	3.4	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	4	-	nC

DRAIN-SOURCE DIODE CHARACTERISTICS

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\ \text{V}$, $I_S = -6.7\ \text{A}$ (Note 2)	-	0.86	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = -6.7\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$	-	29	43	ns
Q_{rr}	Reverse Recovery Charge		-	30	44	nC

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.

- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.
 - $40^\circ\text{C}/\text{W}$ when mounted on a $1\ \text{in}^2$ pad of 2 oz copper.
 - $96^\circ\text{C}/\text{W}$ when mounted on a minimum pad.
- Pulse Test: Pulse Width $< 300\ \mu\text{s}$, Duty Cycle $< 2.0\%$
- Starting $T_J = 25^\circ\text{C}$, $L = 3\ \text{mH}$, $I_{AS} = 7.5\ \text{A}$, $V_{DD} = 40\ \text{V}$, $V_{GS} = 10\ \text{V}$

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

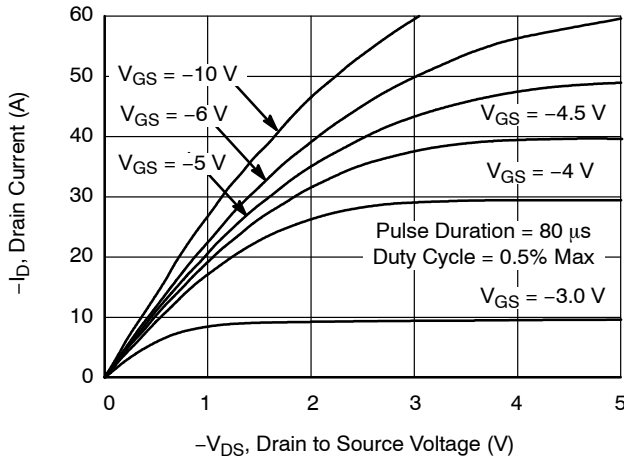


Figure 1. On Region Characteristics

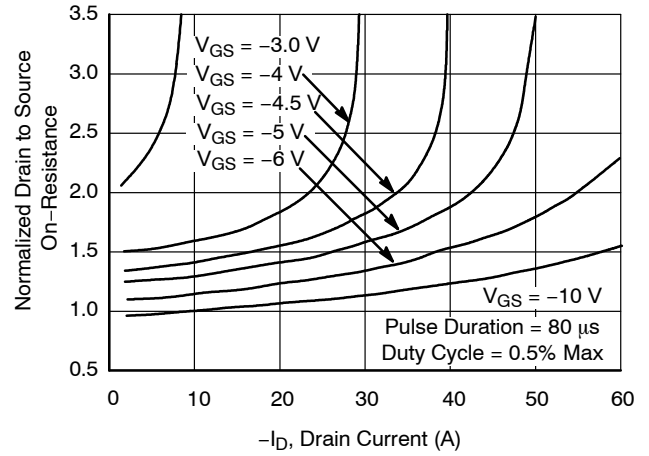


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

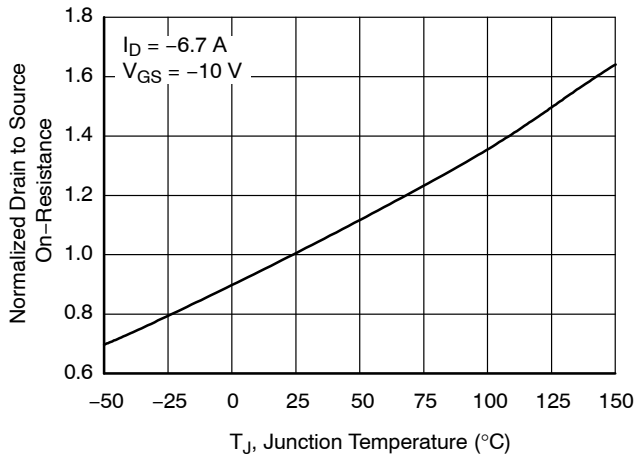


Figure 3. Normalized On-Resistance vs. Junction Temperature

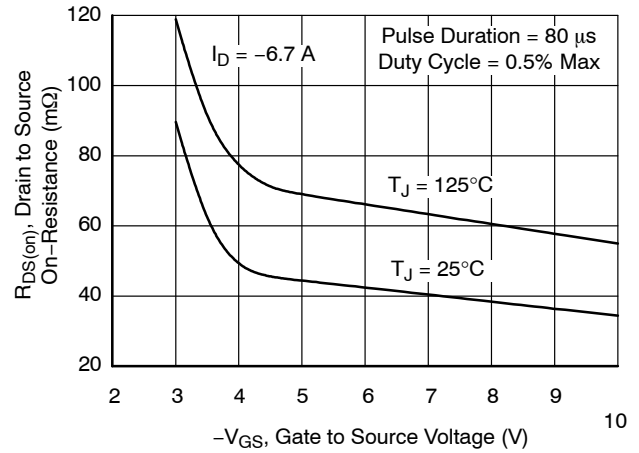


Figure 4. On-Resistance vs. Gate to Source Voltage

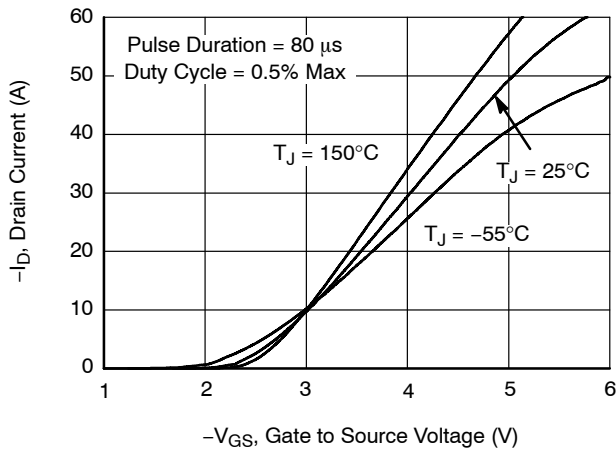


Figure 5. Transfer Characteristics

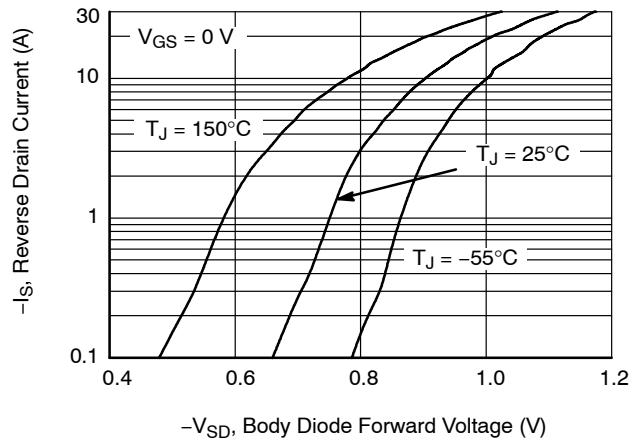


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted) (continued)

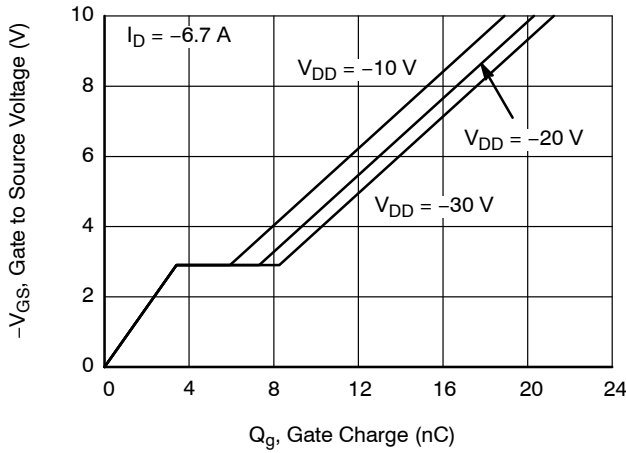


Figure 7. Gate Charge Characteristics

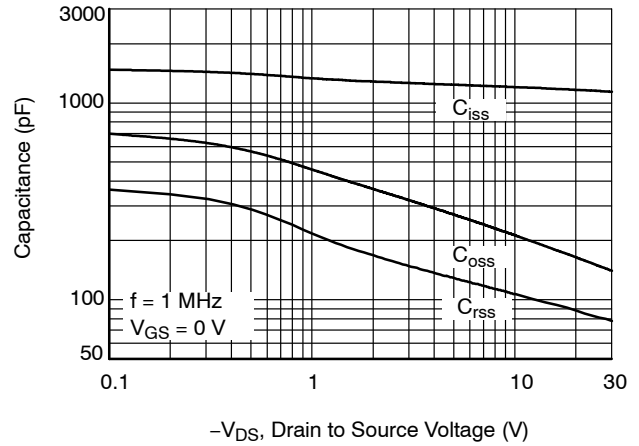


Figure 8. Capacitance vs. Drain to Source Voltage

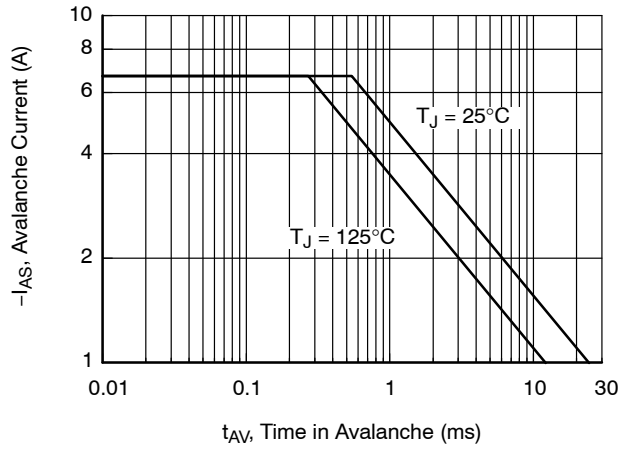


Figure 9. Unclamped Inductive Switching Capability

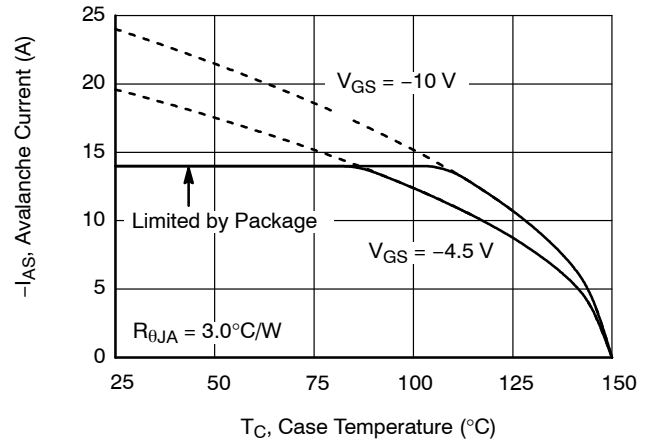


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

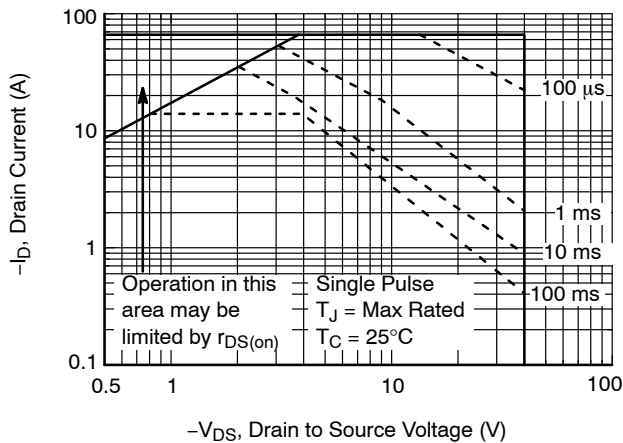


Figure 11. Forward Bias Safe Operating Area

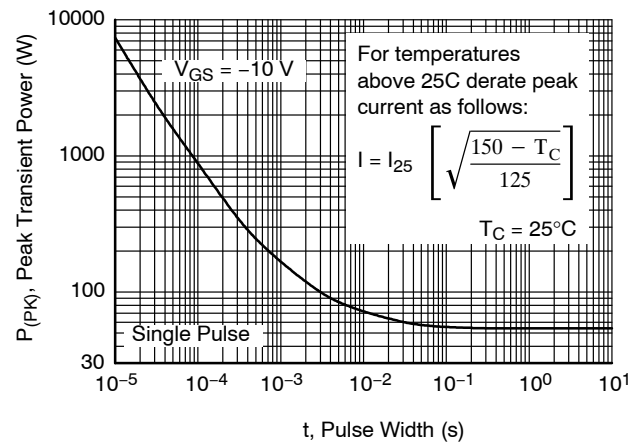


Figure 12. Single Pulse Maximum Power Dissipation

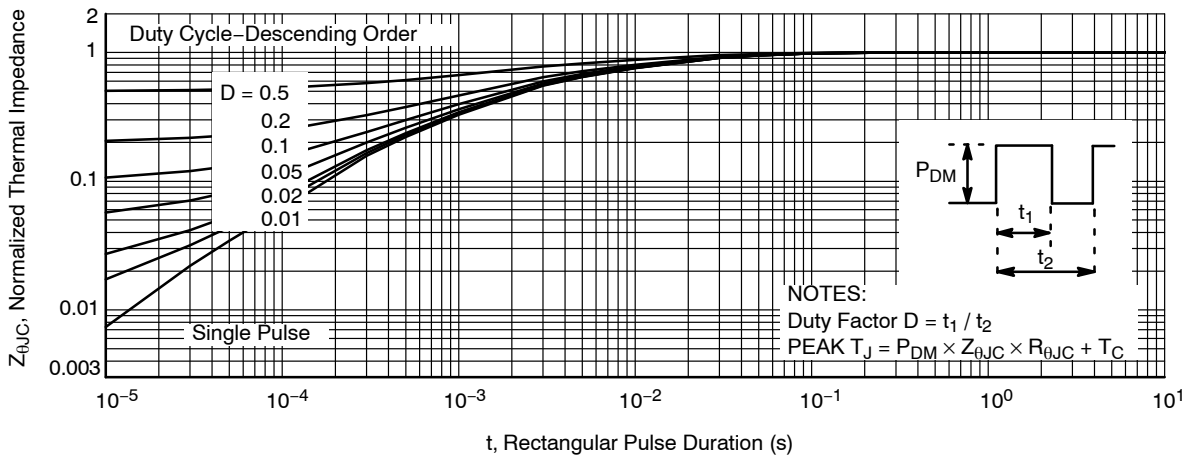
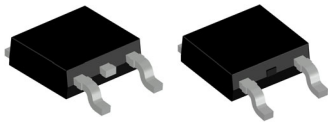
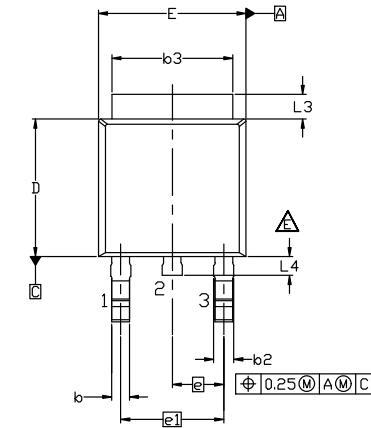
TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted) (continued)

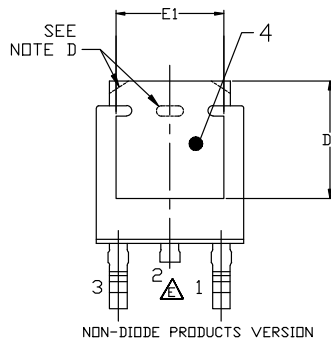
Figure 13. Transient Thermal Response Curve


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

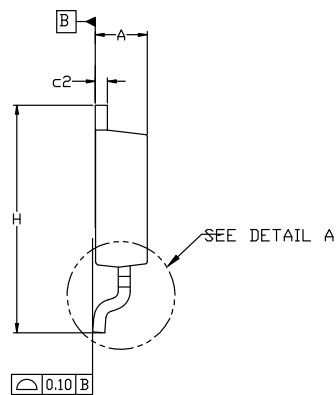
DATE 20 DEC 2023



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.

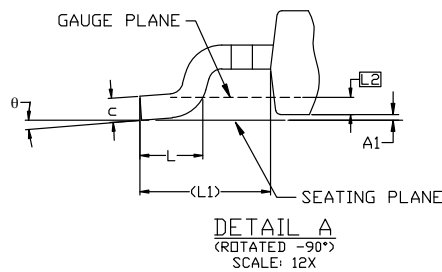
C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2018.

D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.

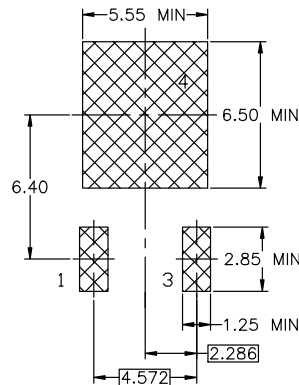
E) FOR DIODE PRODUCTS, L4 IS 0.25 MM MAX PLASTIC BODY STUB WITHOUT CENTER LEAD.

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

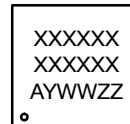
G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TD228P991X239-3N.



DIM	MILLIMETERS		
	MIN.	NDM.	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

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

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