

NTB25P06, NVB25P06

MOSFET – P-Channel, D²PAK -60 V, -27.5 A

Designed for low voltage, high speed switching applications and to withstand high energy in the avalanche and commutation modes.

Features

- AEC Q101 Qualified – NVB25P06
- These Devices are Pb-Free and are RoHS Compliant

Typical Applications

- PWM Motor Controls
- Power Supplies
- Converters
- Bridge Circuits

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V _{DSS}	-60	V
Gate-to-Source Voltage	V _{GS}	± 15	V
– Continuous	V _{GS}	± 15	V
– Non-Repetitive (t _p ≤ 10 μs)	V _{GSM}	± 20	V _{pk}
Drain Current	I _D	27.5	A
– Continuous @ T _A = 25°C	I _{DM}	80	A _{pk}
– Single Pulse (t _p ≤ 10 μs)			
Total Power Dissipation @ T _A = 25°C	P _D	120	W
Operating and Storage Temperature Range	T _J , T _{stg}	-55 to +175	°C
Single Pulse Drain-to-Source Avalanche Energy – Starting T _J = 25°C (V _{DD} = 25 V, V _{GS} = 10 V, I _{L(pk)} = 20 A, L = 3 mH, R _G = 25 Ω)	E _{AS}	600	mJ
Thermal Resistance			°C/W
– Junction-to-Case	R _{θJC}	1.25	
– Junction-to-Ambient (Note 1)	R _{θJA}	46.8	
– Junction-to-Ambient (Note 2)	R _{θJA}	63.2	
Maximum Lead Temperature for Soldering Purposes, (1/8" from case for 10 s)	T _L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

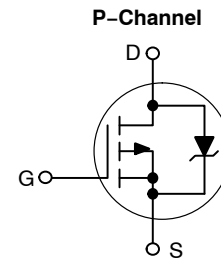
1. When surface mounted to an FR4 board using 1" pad size (Cu Area 1.127 in²).
2. When surface mounted to an FR4 board using the minimum recommended pad size (Cu Area 0.412 in²).



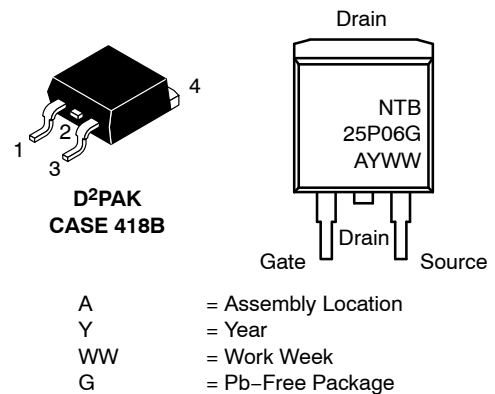
ON Semiconductor®

<http://onsemi.com>

V _{(BR)DSS}	R _{DS(on)} TYP	I _D MAX
-60 V	65 mΩ @ -10 V	-27.5 A



MARKING DIAGRAM & PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping†
NTB25P06T4G	D ² PAK (Pb-Free)	800 / Tape & Reel
NVB25P06T4G	D ² PAK (Pb-Free)	800 / 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.

NTB25P06, NVB25P06

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-to-Source Breakdown Voltage (Note 3) (V _{GS} = 0 V, I _D = -250 μA) (Positive Temperature Coefficient)	V _{(BR)DSS}	-60 -	- 64	- -	V mV/°C
Zero Gate Voltage Drain Current (V _{GS} = 0 V, V _{DS} = -60 V, T _J = 25°C) (V _{GS} = 0 V, V _{DS} = -60 V, T _J = 150°C)	I _{DSS}	- -	- -	-10 -100	μA
Gate-Body Leakage Current (V _{GS} = ±15 V, V _{DS} = 0 V)	I _{GSS}	-	-	±100	nA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = -250 μA) (Negative Threshold Temperature Coefficient)	V _{GS(th)}	-2.0 -	-2.8 6.2	-4.0 -	V mV/°C
Static Drain-Source On-State Resistance (V _{GS} = -10 V, I _D = -12.5 A) (V _{GS} = -10 V, I _D = -25 A)	R _{DS(on)}	- -	0.065 0.070	0.075 0.082	Ω
Forward Transconductance (V _{DS} = -10 V, I _D = -12.5 A)	g _{FS}	-	13	-	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	(V _{DS} = -25 V, V _{GS} = 0 V, F = 1.0 MHz)	C _{iss}	-	1200	1680	pF
Output Capacitance		C _{oss}	-	345	480	
Reverse Transfer Capacitance		C _{rss}	-	90	180	

SWITCHING CHARACTERISTICS (Notes 3 & 4)

Turn-On Delay Time	(V _{DD} = -30 V, I _D = -25 A, V _{GS} = -10 V R _G = 9.1 Ω)	t _{d(on)}	-	14	24	ns
Rise Time		t _r	-	72	118	ns
Turn-Off Delay Time		t _{d(off)}	-	43	68	ns
Fall Time		t _f	-	190	320	ns
Gate Charge	(V _{DS} = -48 V, I _D = -25 A, V _{GS} = -10 V)	Q _T	-	33	50	nC
		Q ₁	-	6.5	-	
		Q ₂	-	15	-	

BODY-DRAIN DIODE RATINGS (Note 3)

Diode Forward On-Voltage (I _S = -25 A, V _{GS} = 0 V) (I _S = -25 A, V _{GS} = 0 V, T _J = 150°C)	V _{SD}	- -	-1.8 -1.4	-2.5 -	V
Reverse Recovery Time	t _{rr}	-	70	-	ns
	t _a	-	50	-	
	t _b	-	20	-	
Reverse Recovery Stored Charge	Q _{RR}	-	0.2	-	μC

3. Indicates Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

4. Switching characteristics are independent of operating junction temperatures.

NTB25P06, NVB25P06

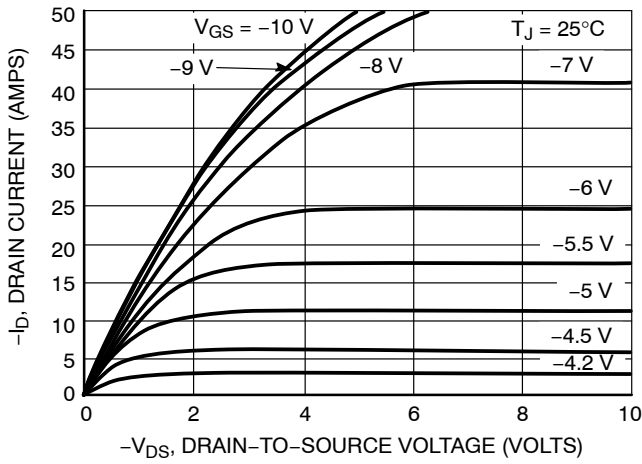


Figure 1. On-Region Characteristics

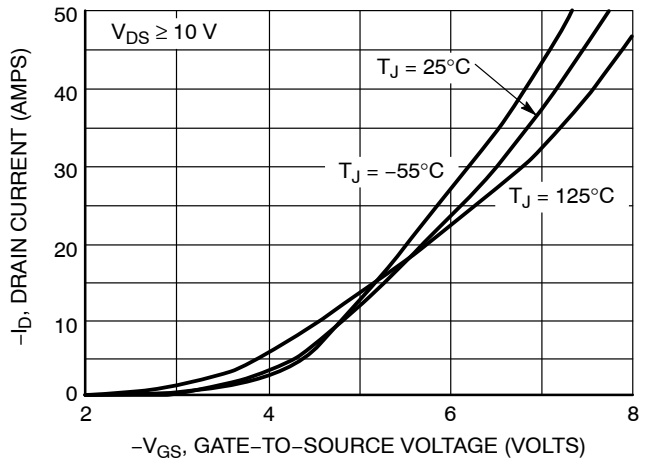


Figure 2. Transfer Characteristics

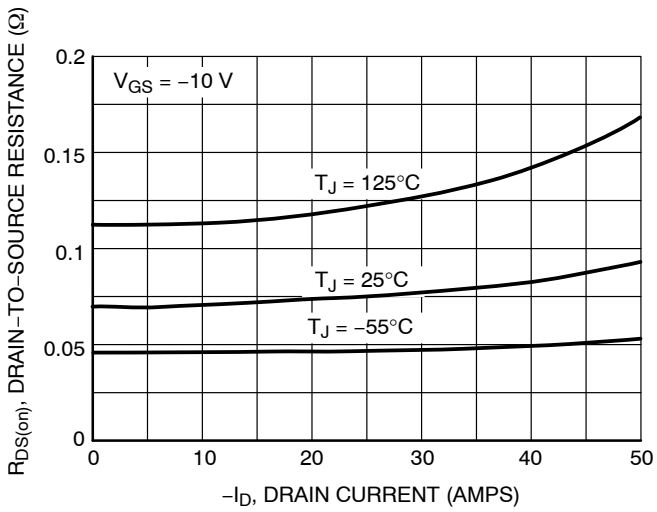


Figure 3. On-Resistance vs. Drain Current and Temperature

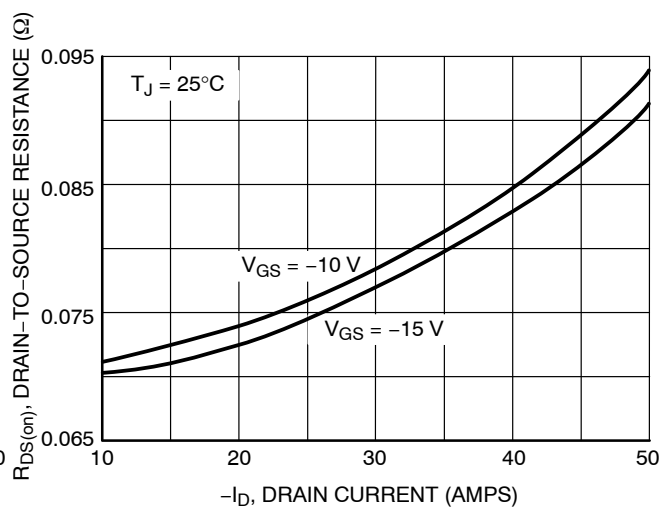


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

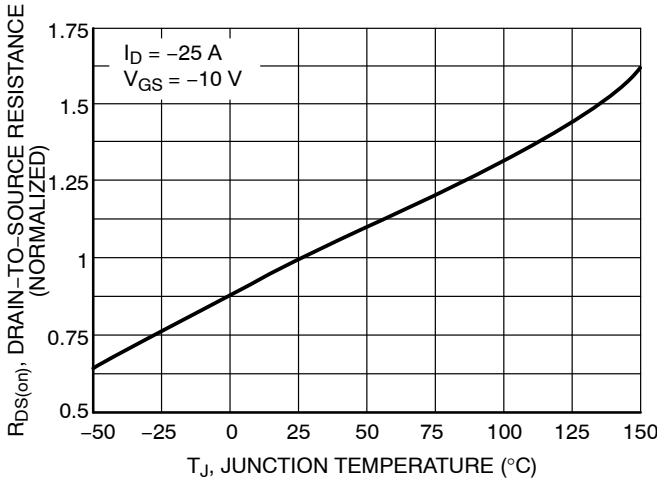


Figure 5. On-Resistance Variation with Temperature

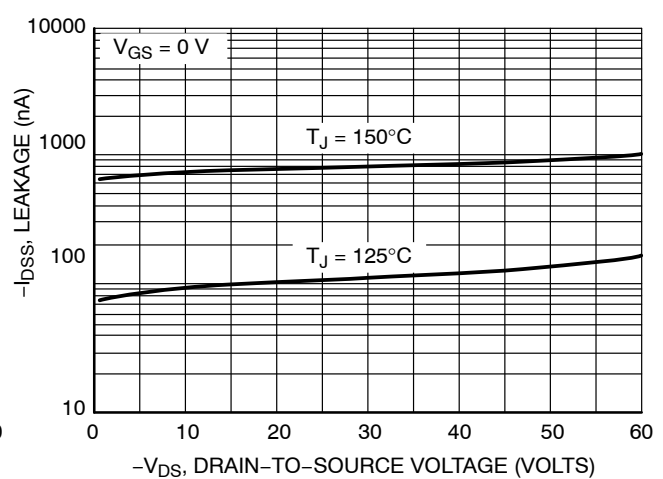


Figure 6. Drain-to-Source Leakage Current vs. Voltage

NTB25P06, NVB25P06

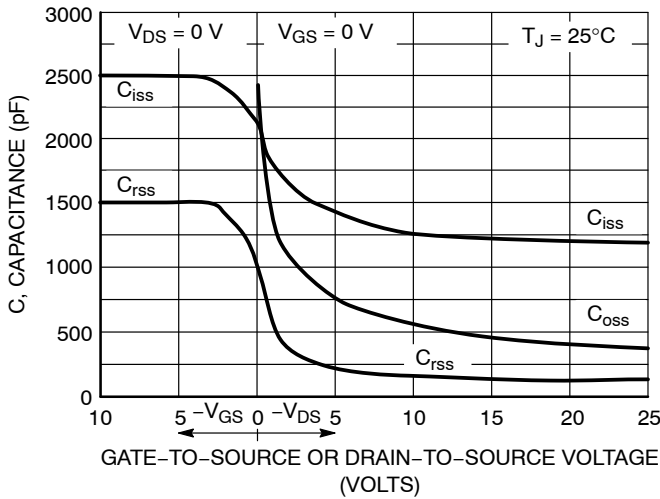


Figure 7. Capacitance Variation

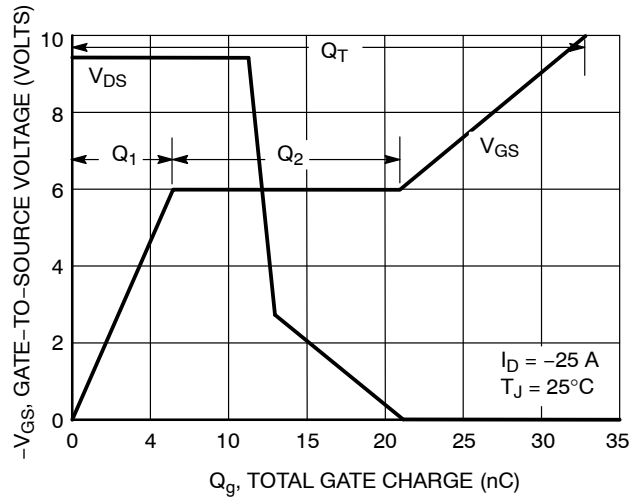


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

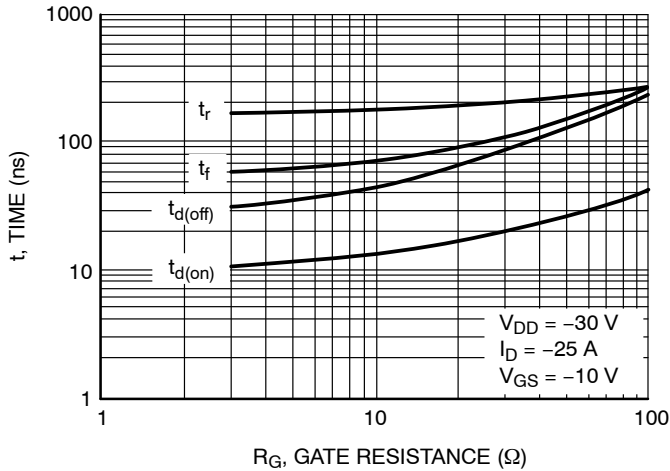


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

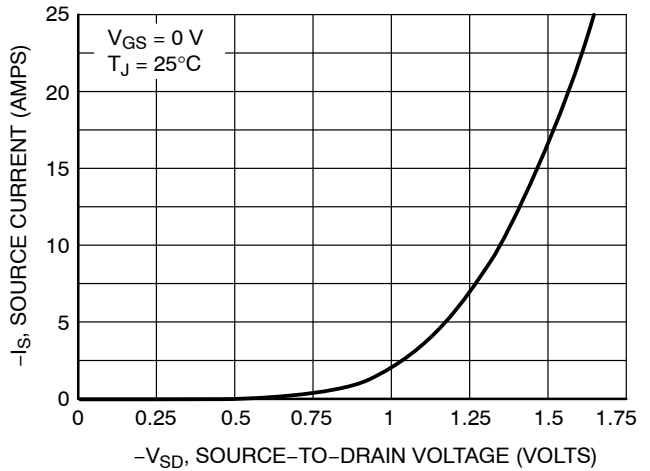


Figure 10. Diode Forward Voltage vs. Current

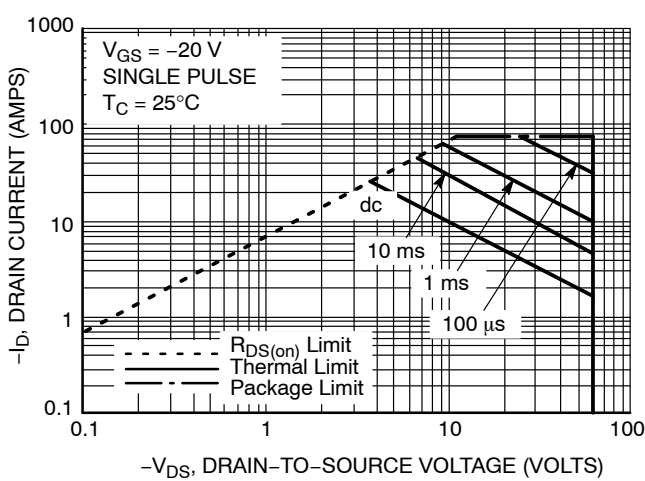


Figure 11. Maximum Rated Forward Biased Safe Operating Area

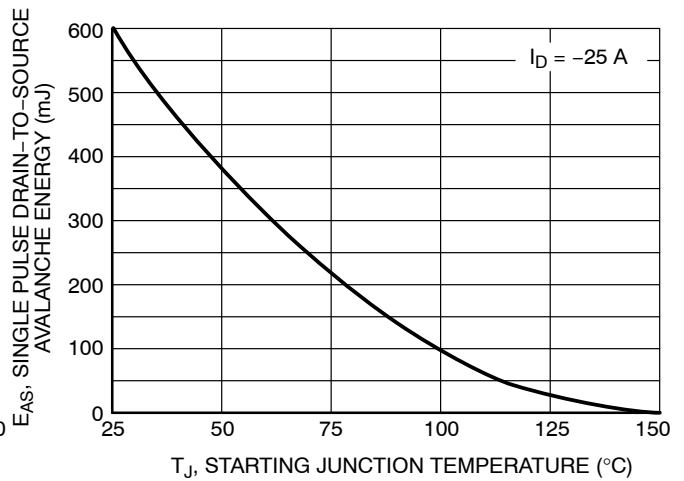


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

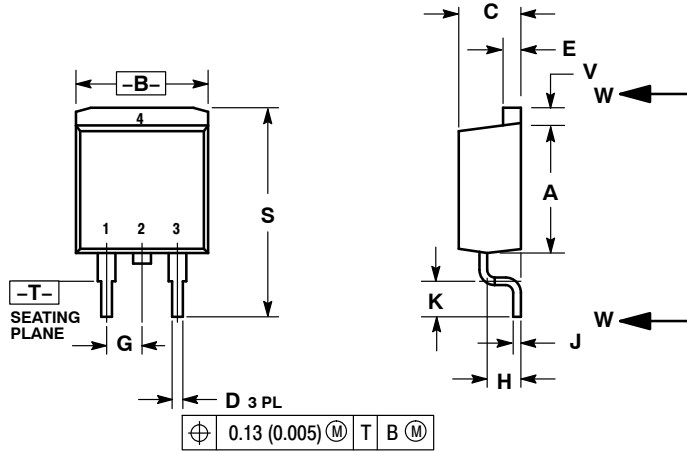
ON Semiconductor®



D²PAK 3
CASE 418B-04
ISSUE L

DATE 17 FEB 2015

SCALE 1:1

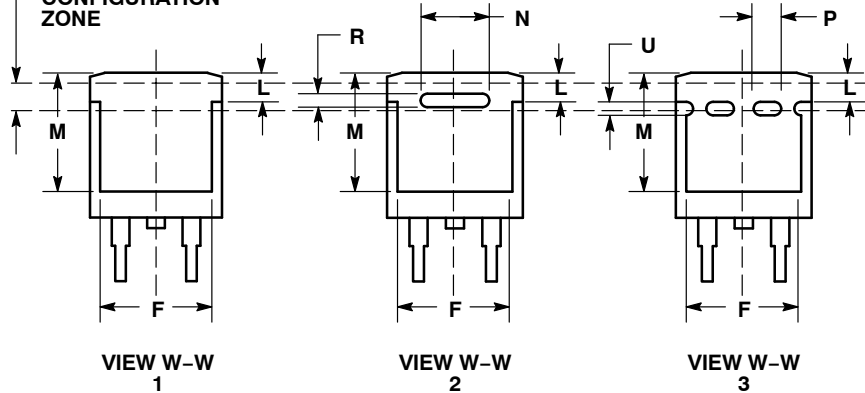


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418B-01 THRU 418B-03 OBSOLETE, NEW STANDARD 418B-04.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
F	0.310	0.350	7.87	8.89
G	0.100	BSC	2.54	BSC
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
L	0.052	0.072	1.32	1.83
M	0.280	0.320	7.11	8.13
N	0.197	REF	5.00	REF
P	0.079	REF	2.00	REF
R	0.039	REF	0.99	REF
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

VARIABLE CONFIGURATION ZONE



- | | | | | | |
|--|---|---|--|---|--|
| STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR | STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN | STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE | STYLE 4:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR | STYLE 5:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE | STYLE 6:
PIN 1. NO CONNECT
2. CATHODE
3. ANODE
4. CATHODE |
|--|---|---|--|---|--|

MARKING INFORMATION AND FOOTPRINT ON PAGE 2

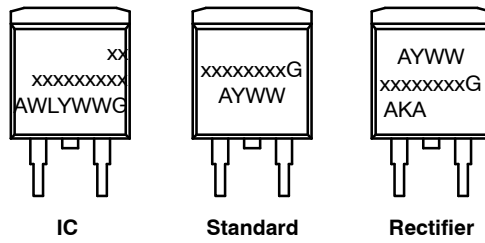
DOCUMENT NUMBER:	98ASB42761B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	D²PAK 3	PAGE 1 OF 2

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

D²PAK 3
CASE 418B-04
ISSUE L

DATE 17 FEB 2015

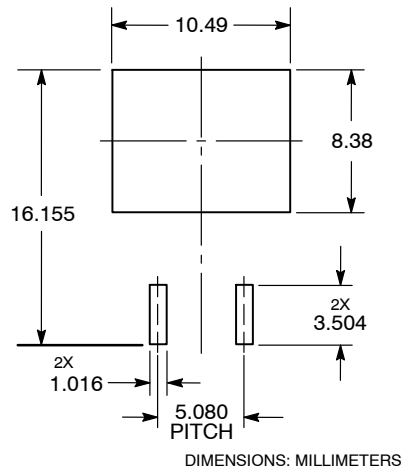
**GENERIC
MARKING DIAGRAM***



- xx = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- Y = Year
- WW = Work Week
- G = Pb-Free Package
- AKA = Polarity Indicator

*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.

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

DOCUMENT NUMBER:	98ASB42761B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	D²PAK 3	PAGE 2 OF 2

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor 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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative