NTD5413N

Power MOSFET

30 Amps, 60 Volts Single N−Channel DPAK

Features

- Low $R_{DS(on)}$
- High Current Capability
- Avalanche Energy Specified
- These are Pb−Free Devices

Applications

- LED Lighting and LED Backlight Drivers
- DC−DC Converters
- DC Motor Drivers
- Switch Mode Power Supplies
- Power Supplies Secondary Side Synchronous Rectification

MAXIMUM RATINGS (T_J = 25°C Unless otherwise specified)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	60	V
Gate−to−Source Voltage − Continuous			V_{GS}	±20	V
Gate−to−Source Voltage − Nonrepetitive (T_P < 10 μs)			V_{GS}	±30	V
Continuous Drain Current $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	I_D	30	A
		T_C = 100°C		23	
Power Dissipation $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	P_D	68	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	84	A
Operating and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	30	A
Single Pulse Drain−to−Source Avalanche Energy − Starting T_J = 25°C (V_{DD} = 50 V_{dc}, V_{GS} = 10 V, $I_{L(pk)}$ = 30 A, L = 0.3 mH, R_G = 25 Ω)			E_{AS}	135	mJ
Lead Temperature for Soldering Purposes, 1/8″ from Case for 10 Seconds			T_L	260	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Case (Drain) Steady State (Note 1)	$R_{\theta JC}$	2.2	°C/W
	$R_{\theta JA}$	58.5	

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.

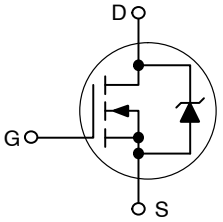
1. Surface mounted on FR4 board using 1 sq in pad size, (Cu Area 1.127 sq in [1 oz] including traces).

ON Semiconductor®

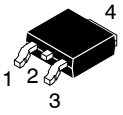
http://onsemi.com

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX (Note 1)
60 V	26 mΩ @ 10 V	30 A

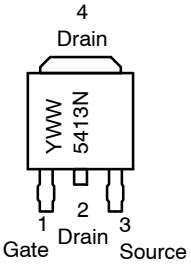
N−Channel



MARKING DIAGRAM



DPAK
CASE 369AA
STYLE 2



5413N = Device Code
Y = Year
WW = Work Week
G = Pb−Free Device

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

© Semiconductor Components Industries, LLC, 2008

ELECTRICAL CHARACTERISTICS (T_J = 25°C Unless otherwise specified)

Characteristics	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{DS} = 0 V, I_D = 250 μA		60			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				67.5		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 60 V	T_J = 25°C			1.0	μA
			T_J = 150°C			50	
Gate−Body Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±100	nA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = 250 μA		2.0	3.4	4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(th)}/T_J$				7.9		mV/°C
Drain−to−Source On−Voltage	$V_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A			0.37	0.52	V
		V_{GS} = 10 V, I_D = 20 A, 150°C			0.86		
Drain−to−Source On−Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A			18.5	26	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 15 V, I_D = 20 A			36		S
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz			1160	1725	pF
Output Capacitance	C_{oss}				240		
Transfer Capacitance	C_{rss}				100		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 48 V, I_D = 20 A			35	46	nC
Threshold Gate Charge	$Q_{G(TH)}$				1.4		
Gate−to−Source Charge	Q_{GS}				6.5		
Gate−to−Drain Charge	Q_{GD}				16.1		
SWITCHING CHARACTERISTICS, V_{GS} = 10 V (Note 3)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = 10 V, V_{DD} = 48 V, I_D = 20 A, R_G = 2.5 Ω			11		ns
Rise Time	t_r				20		
Turn−Off Delay Time	$t_{d(off)}$				28		
Fall Time	t_f				8.0		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage (Note 2)	V_{SD}	V_{GS} = 0 V, I_S = 20 A	T_J = 25°C		0.87	1.2	V
			T_J = 125°C		0.8		
Reverse Recovery Time	t_{rr}	I_S = 20 A_{dc}, V_{GS} = 0 V_{dc}, dI_S/dt = 100 A/μs			52		ns
Charge Time	t_a				37		
Discharge Time	t_b				15		
Reverse Recovery Stored Charge	Q_{RR}				105.7		nC

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

ORDERING INFORMATION

Device	Package	Shipping†
NTD5413NT4G	DPAK (Pb−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 Specifications Brochure, BRD8011/D.

TYPICAL PERFORMANCE CURVES

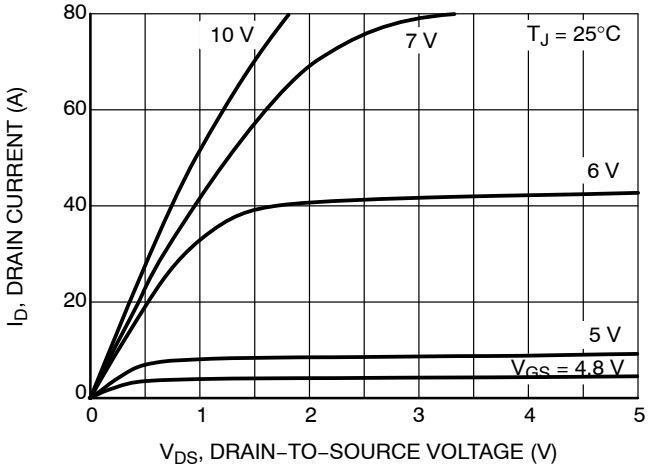


Figure 1. On−Region Characteristics

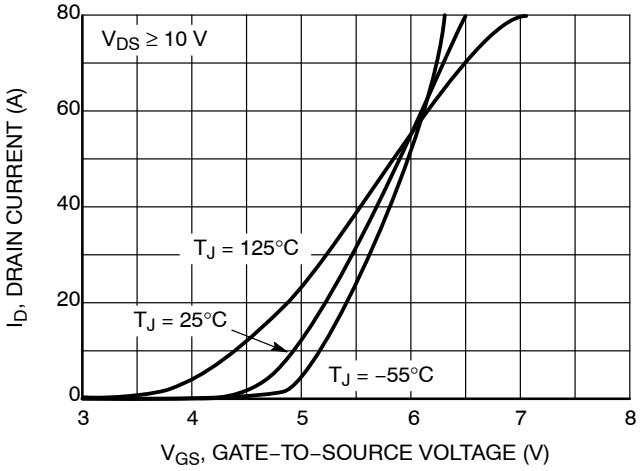


Figure 2. Transfer Characteristics

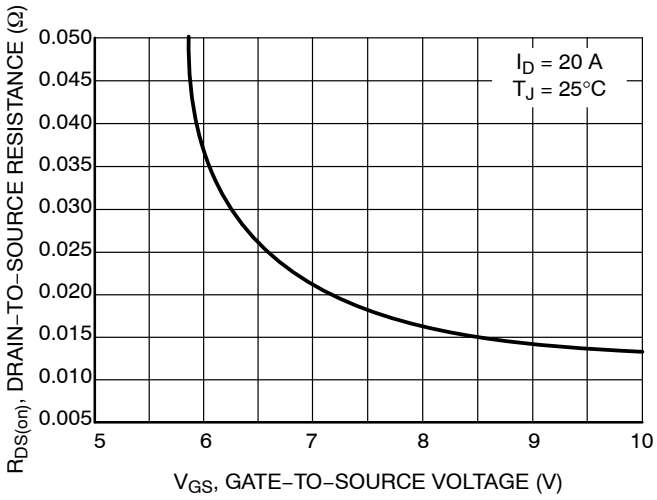


Figure 3. On−Resistance vs. Gate−to−Source Voltage

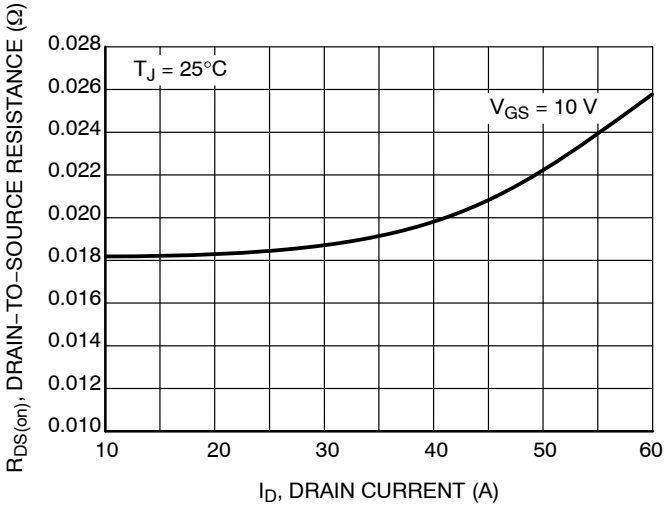


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

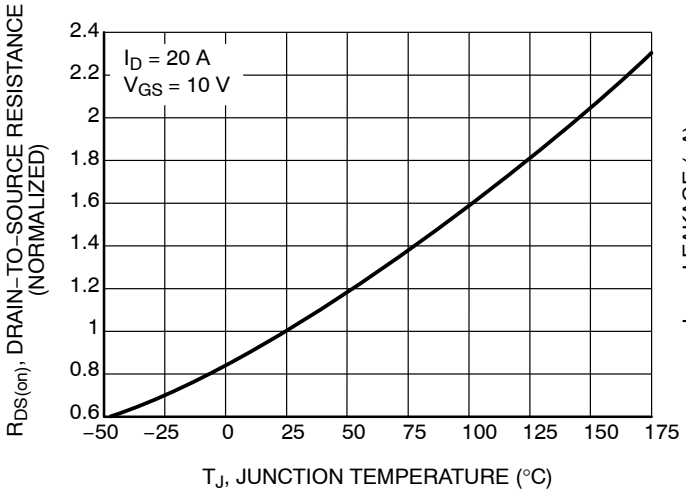


Figure 5. On−Resistance Variation with Temperature

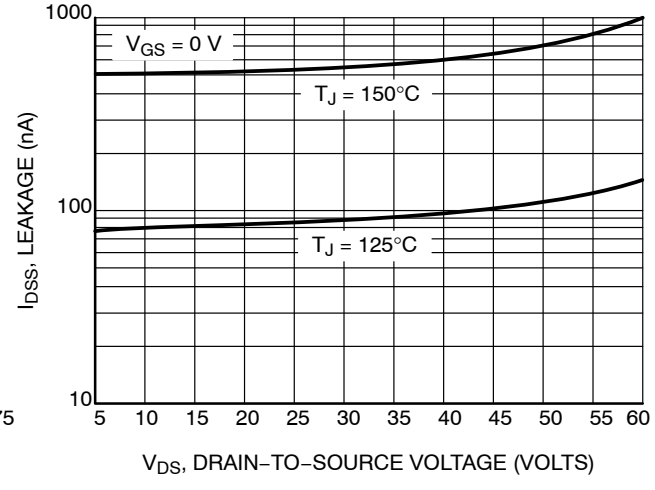


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES

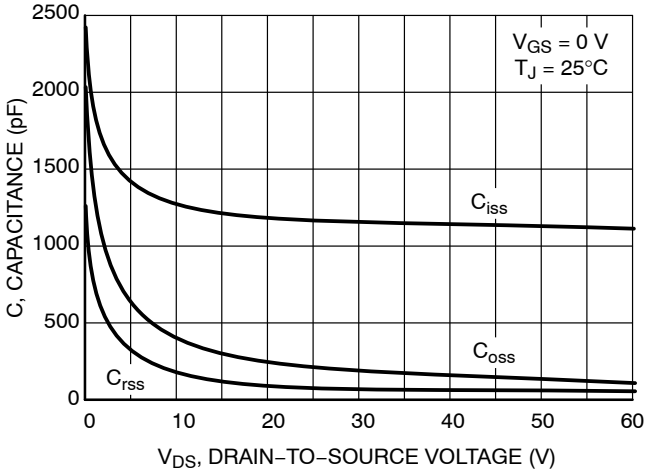


Figure 7. Capacitance Variation

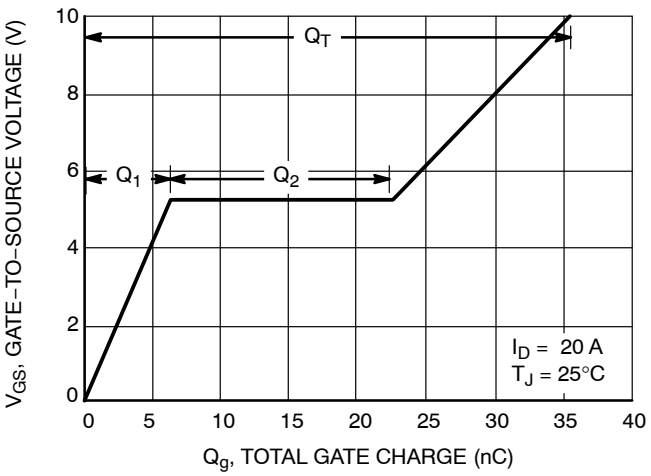


Figure 8. Gate−to−Source Voltage vs. Total Charge

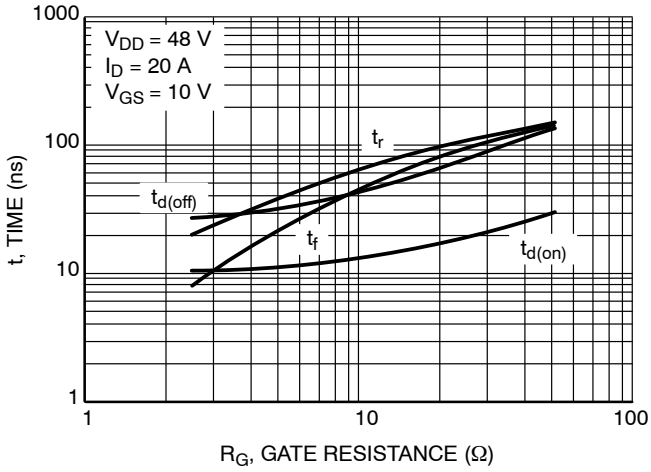


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

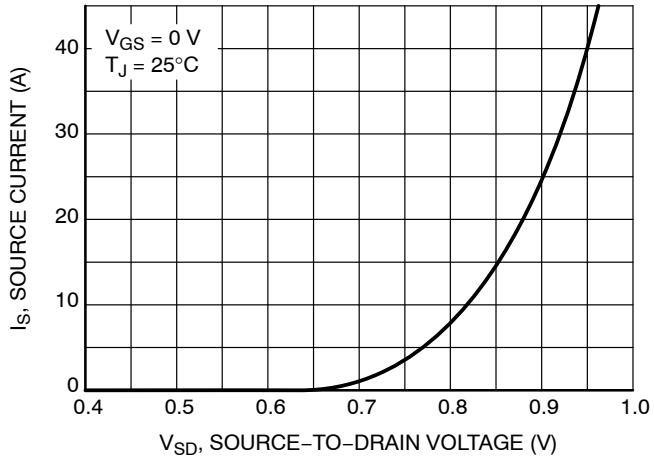


Figure 10. Diode Forward Voltage vs. Current

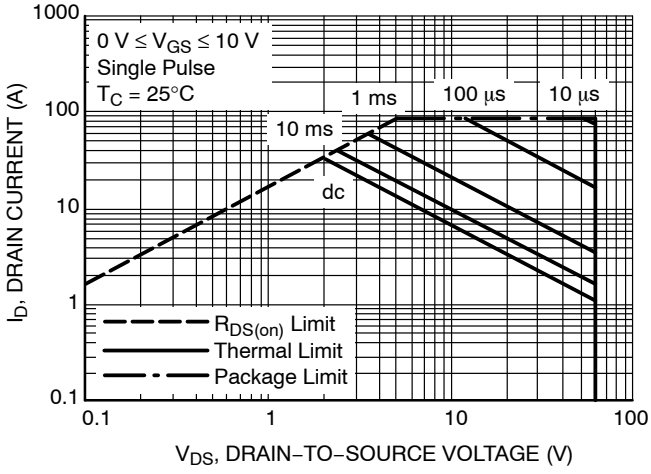


Figure 11. Maximum Rated Forward Biased Safe Operating Area

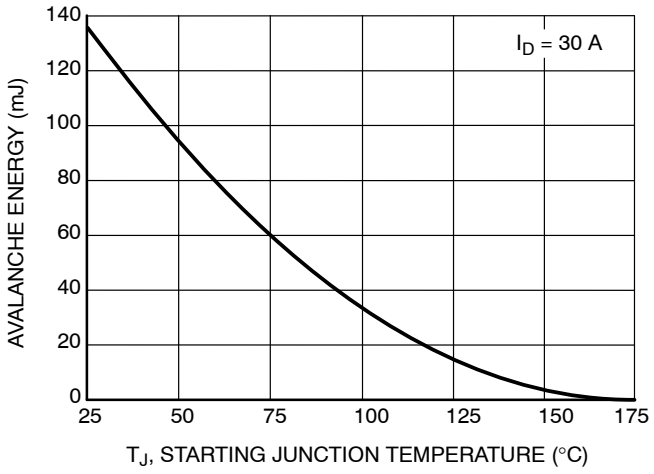


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

TYPICAL PERFORMANCE CURVES

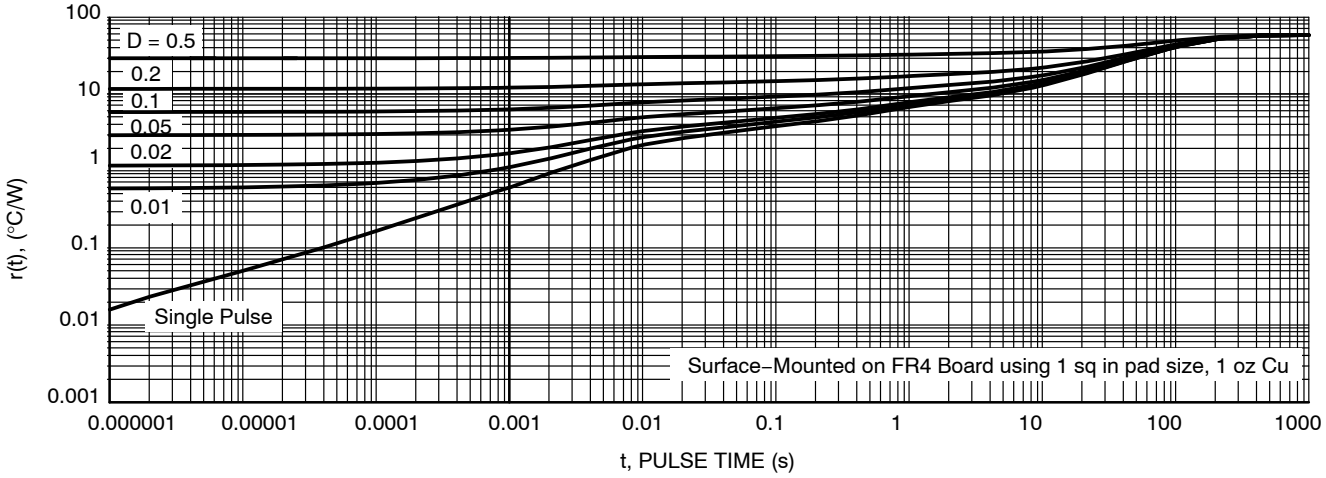
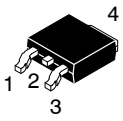


Figure 13. Thermal Response



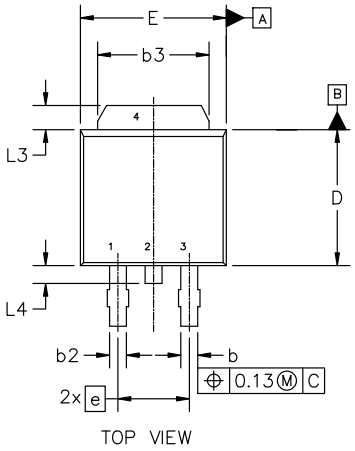
SCALE 1:1

DPAK−3 6.10x6.54x2.28, 2.29P
CASE 369AA
ISSUE C

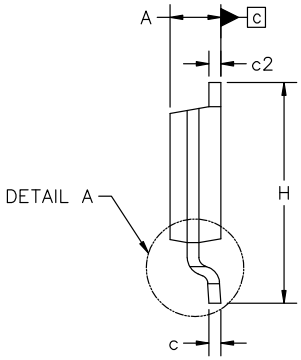
DATE 14 MAY 2026

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.18	2.28	2.38
A1	0.00	−−−	0.13
b	0.63	0.76	0.89
b2	0.76	0.95	1.14
b3	4.57	5.02	5.46
c	0.46	0.54	0.61
c2	0.46	0.54	0.61
D	5.97	6.10	6.22
E	6.35	6.54	6.73
e	2.29 BSC		
H	9.40	9.91	10.41
L	1.40	1.59	1.78
L1	2.74 REF		
L2	0.51 BSC		
L3	0.89	−−−	1.27
L4	−−−	−−−	1.01
Z	3.93	−−−	−−−

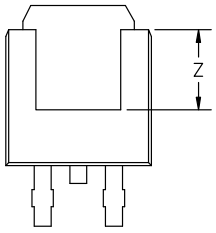
NOTES
1. DIMENSION AND TOLERANCING PER ASME Y14.5 2018
2. CONTROLLING DIMENSION: MILLIMETERS
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION b3, L3, AND Z
4. DIMENSION D AND E DO NOT INCLUDED MOLD FLASH, PROTRUSION, OR BURRS.
5. DIMENSION D AND E ARE DETERMINED AT OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H



TOP VIEW

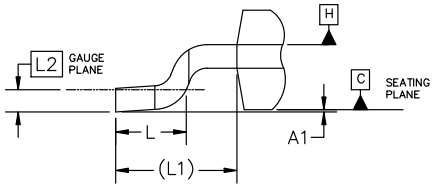


SIDE VIEW

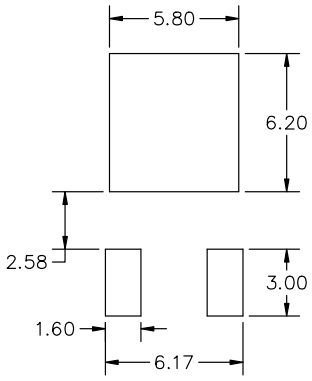


TOP VIEW

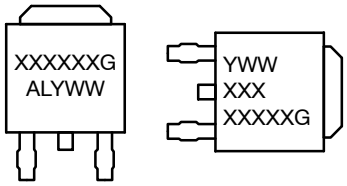
RECOMMENDED
MOUNTING FOOTPRINT



DETAIL A
ROTATED 90° CW



GENERIC
MARKING DIAGRAM*



IC **Discrete**

XXXXXX	= Device Code
A	= Assembly Location
L	= Wafer Lot
Y	= Year
WW	= Work Week
G	= Pb−Free Package

*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.

DOCUMENT NUMBER:	**98AON13126D**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**DPAK−3 6.10x6.54x2.28, 2.29P**	**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.

© Semiconductor Components Industries, LLC, 2010

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