

NDD04N50Z

N-Channel Power MOSFET 500 V, 2.7 Ω

Features

- Low ON Resistance
- Low Gate Charge
- ESD Diode-Protected Gate
- 100% Avalanche Tested
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	500	V
Continuous Drain Current $R_{\theta JC}$	I_D	3.0	A
Continuous Drain Current $R_{\theta JC}, T_A = 100^\circ\text{C}$	I_D	1.9	A
Pulsed Drain Current, $V_{GS} @ 10\text{ V}$	I_{DM}	12	A
Power Dissipation $R_{\theta JC}$	P_D	61	W
Gate-to-Source Voltage	V_{GS}	± 30	V
Single Pulse Avalanche Energy, $I_D = 3.4\text{ A}$	E_{AS}	120	mJ
ESD (HBM) (JESD22-A114)	V_{esd}	2800	V
Peak Diode Recovery	dv/dt	4.5 (Note 1)	V/ns
Continuous Source Current (Body Diode)	I_S	3.4	A
Maximum Temperature for Soldering Leads	T_L	260	$^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$

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.

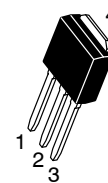
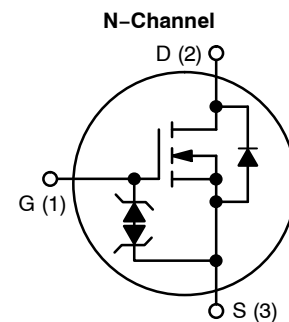
1. $I_D \leq 3.4\text{ A}$, $di/dt \leq 200\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, $T_J \leq 150^\circ\text{C}$.



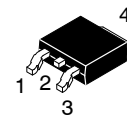
ON Semiconductor[®]

<http://onsemi.com>

V_{DSS}	$R_{DS(on)} (MAX) @ 1.5\text{ A}$
500 V	2.7 Ω



**IPAK
CASE 369D
STYLE 2**



**DPAK
CASE 369AA
STYLE 2**

MARKING AND ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

NDD04N50Z

THERMAL RESISTANCE

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{\theta JC}$	2.0	°C/W
Junction-to-Ambient Steady State	(Note 3) $R_{\theta JA}$ (Note 2) $R_{\theta JA-1}$	40 80	

- Insertion mounted
- Surface mounted on FR4 board using 1" sq. pad size, (Cu area = 1.127 in sq [2 oz] including traces).

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

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

OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	500			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C , $I_D = 1\text{ mA}$		0.6		V/°C
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	25°C		1.0	μA
			150°C		50	
Gate-to-Source Forward Leakage	I_{GSS}	$V_{GS} = \pm 20\text{ V}$			±10	μA

ON CHARACTERISTICS (Note 4)

Static Drain-to-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 1.5\text{ A}$		2.3	2.7	Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 50\text{ }\mu\text{A}$	3.0		4.5	V
Forward Transconductance	g_{FS}	$V_{DS} = 15\text{ V}, I_D = 1.5\text{ A}$		2.1		S

DYNAMIC CHARACTERISTICS

Input Capacitance (Note 5)	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	246	308	370	pF
Output Capacitance (Note 5)	C_{oss}		33	43	53	
Reverse Transfer Capacitance (Note 5)	C_{rss}		7.0	9.0	11	
Total Gate Charge (Note 5)	Q_g	$V_{DD} = 250\text{ V}, I_D = 3.4\text{ A},$ $V_{GS} = 10\text{ V}$	6.0	12	18	nC
Gate-to-Source Charge (Note 5)	Q_{gs}		1.3	2.6	4.0	
Gate-to-Drain ("Miller") Charge (Note 5)	Q_{gd}		3.5	6.1	7.0	
Plateau Voltage	V_{GP}		6.6			V
Gate Resistance	R_g		1.8	5.4	16.2	Ω

RESISTIVE SWITCHING CHARACTERISTICS

Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250\text{ V}, I_D = 3.4\text{ A},$ $V_{GS} = 10\text{ V}, R_G = 5\text{ }\Omega$		9.0		ns
Rise Time	t_r			9.0		
Turn-Off Delay Time	$t_{d(off)}$			16		
Fall Time	t_f			10		

SOURCE-DRAIN DIODE CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Diode Forward Voltage	V_{SD}	$I_S = 3.4\text{ A}, V_{GS} = 0\text{ V}$			1.6	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0\text{ V}, V_{DD} = 30\text{ V}$ $I_S = 3.4\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		240		ns
Reverse Recovery Charge	Q_{rr}			0.9		μC

- Pulse Width $\leq 380\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.
- Guaranteed by design.

NDD04N50Z

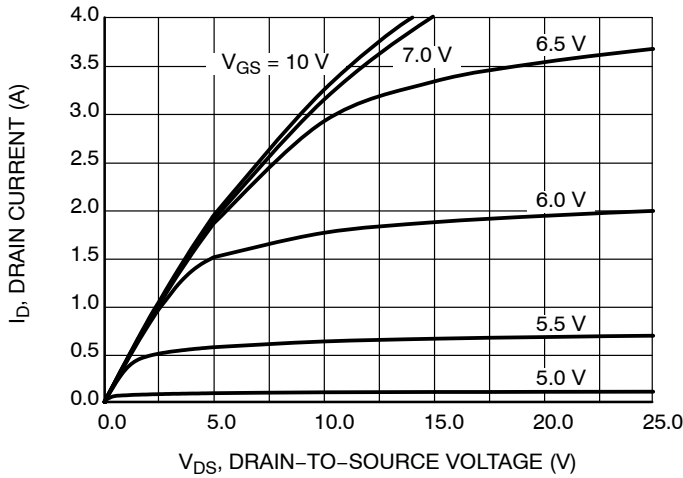


Figure 1. On-Region Characteristics

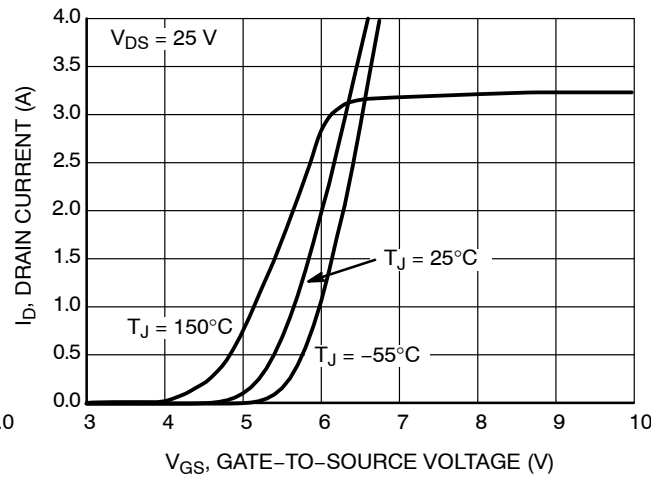


Figure 2. Transfer Characteristics

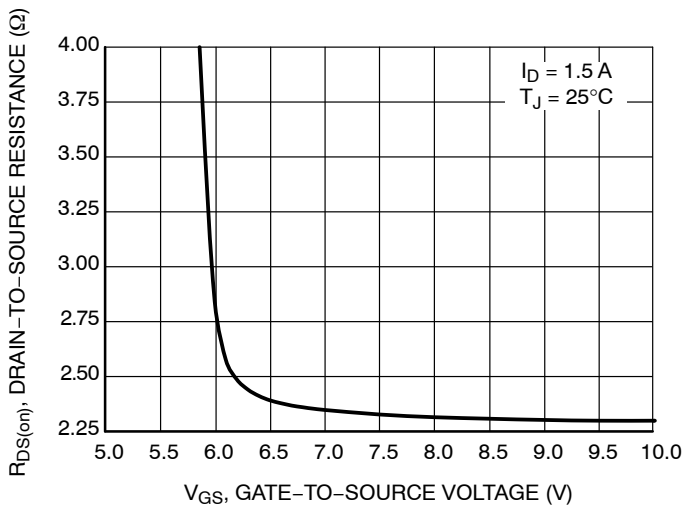


Figure 3. On-Region versus Gate-to-Source Voltage

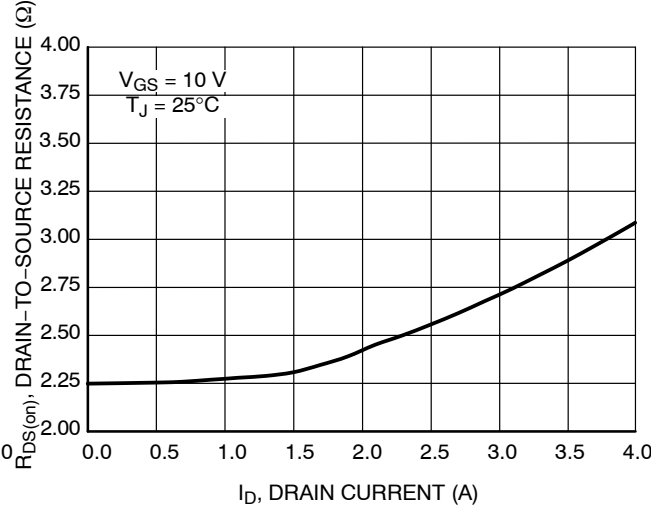


Figure 4. On-Resistance versus Drain Current and Gate Voltage

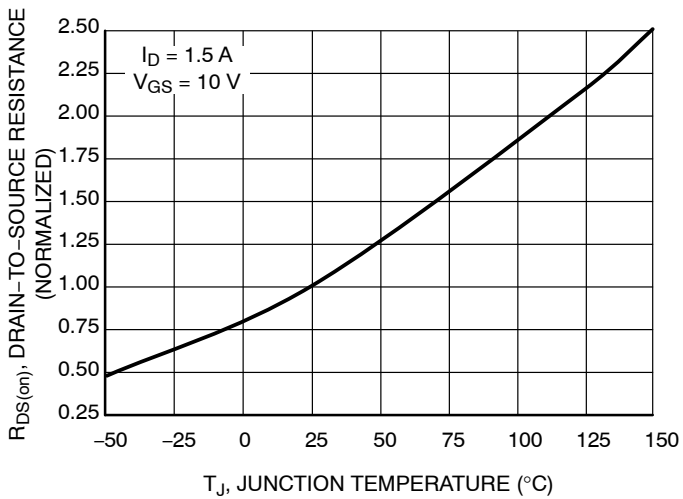


Figure 5. On-Resistance Variation with Temperature

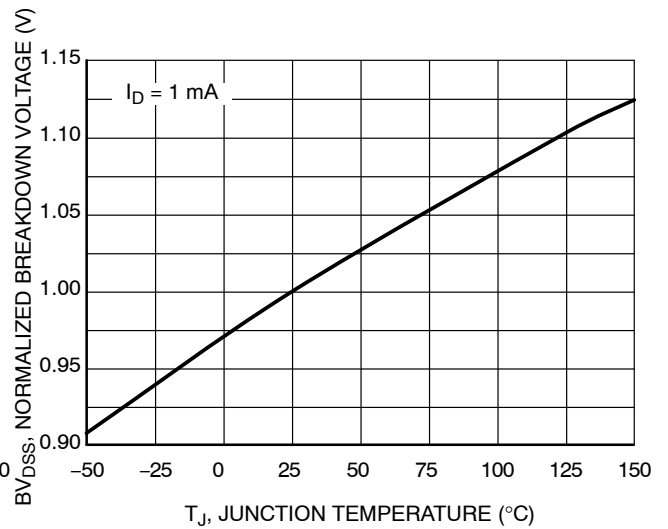


Figure 6. BV_{DSS} Variation with Temperature

NDD04N50Z

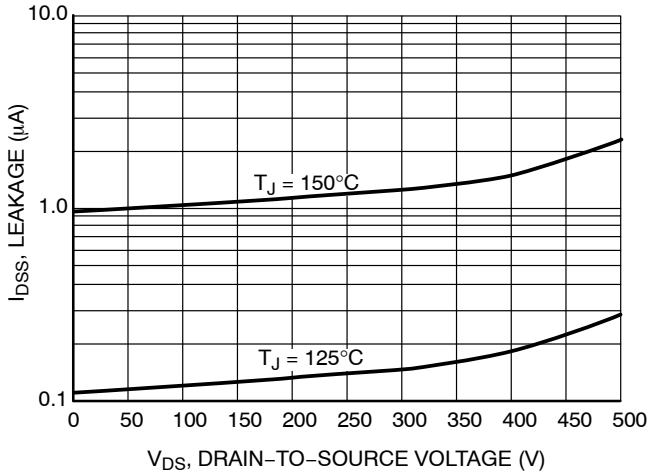


Figure 7. Drain-to-Source Leakage Current versus Voltage

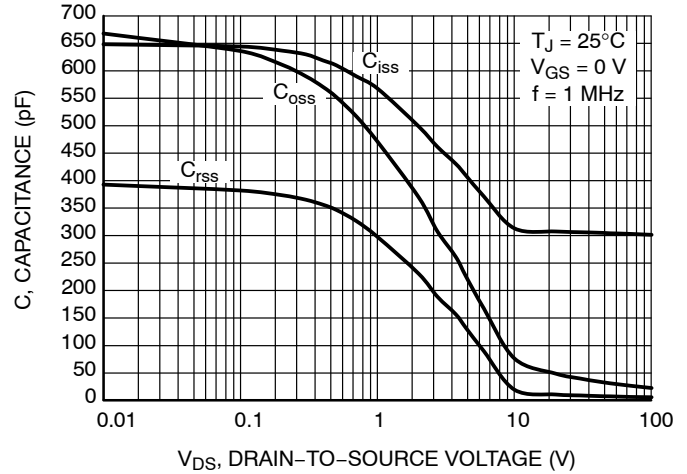


Figure 8. Capacitance Variation

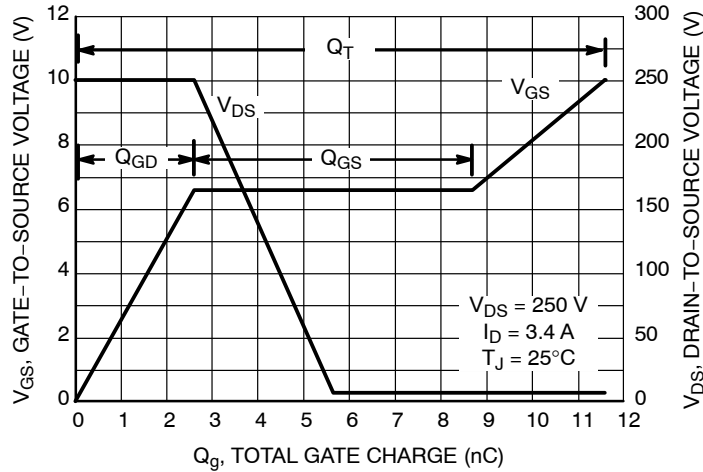


Figure 9. Gate-to-Source Voltage and Drain-to-Source Voltage versus Total Charge

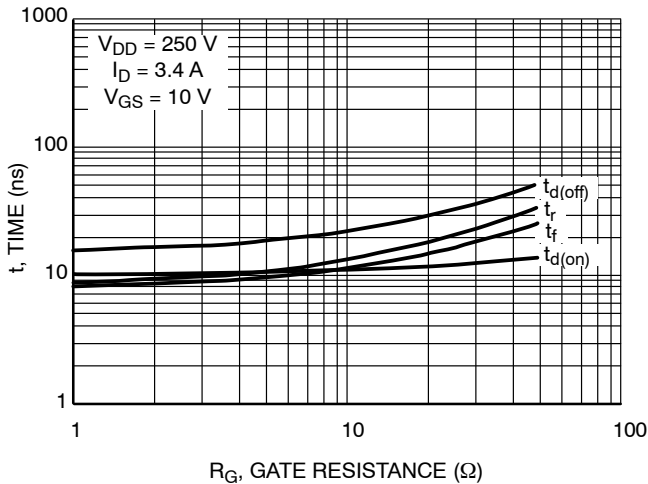


Figure 10. Resistive Switching Time Variation versus Gate Resistance

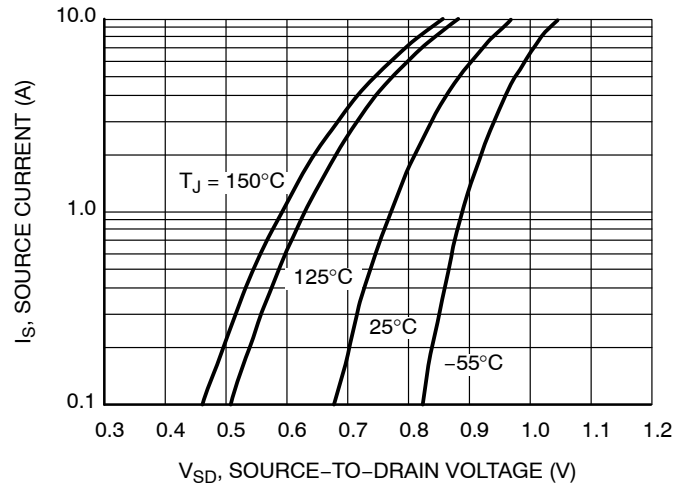


Figure 11. Diode Forward Voltage versus Current

NDD04N50Z

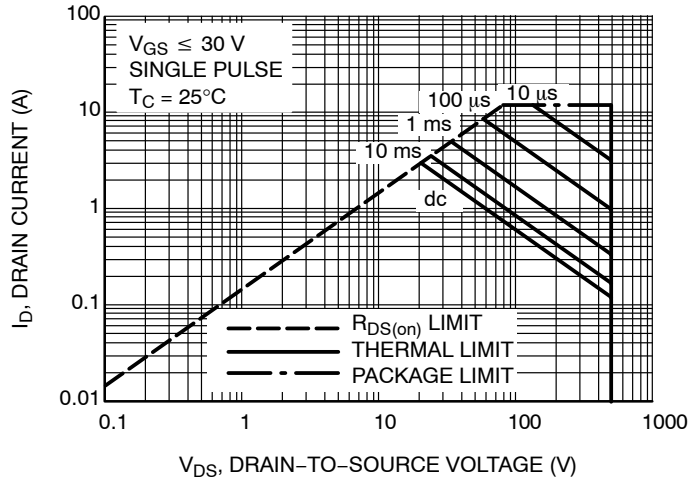


Figure 12. Maximum Rated Forward Biased Safe Operating Area NDD04N50Z

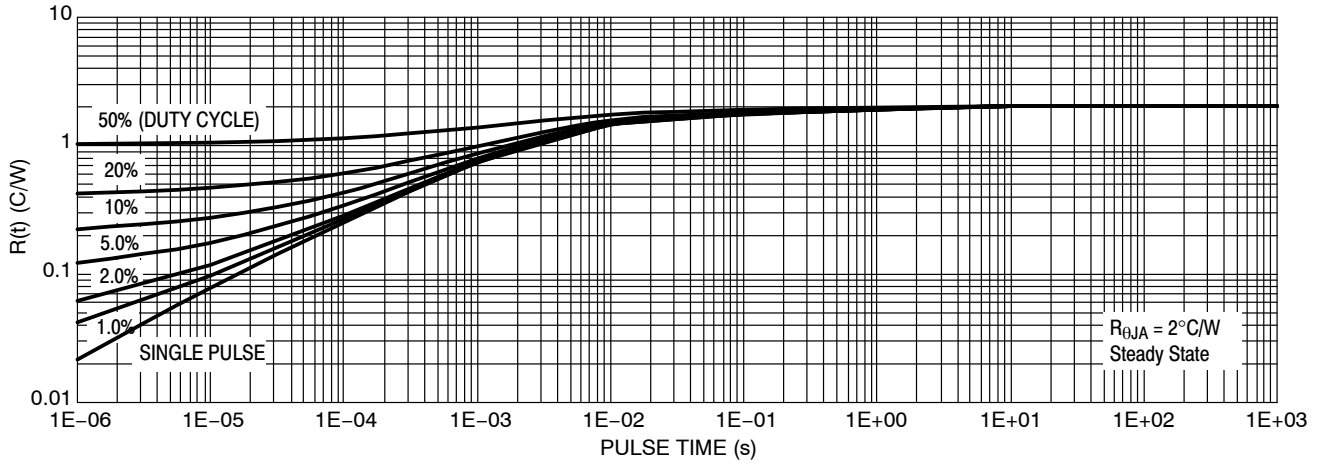


Figure 13. Thermal Impedance (Junction-to-Case) for NDD04N50Z

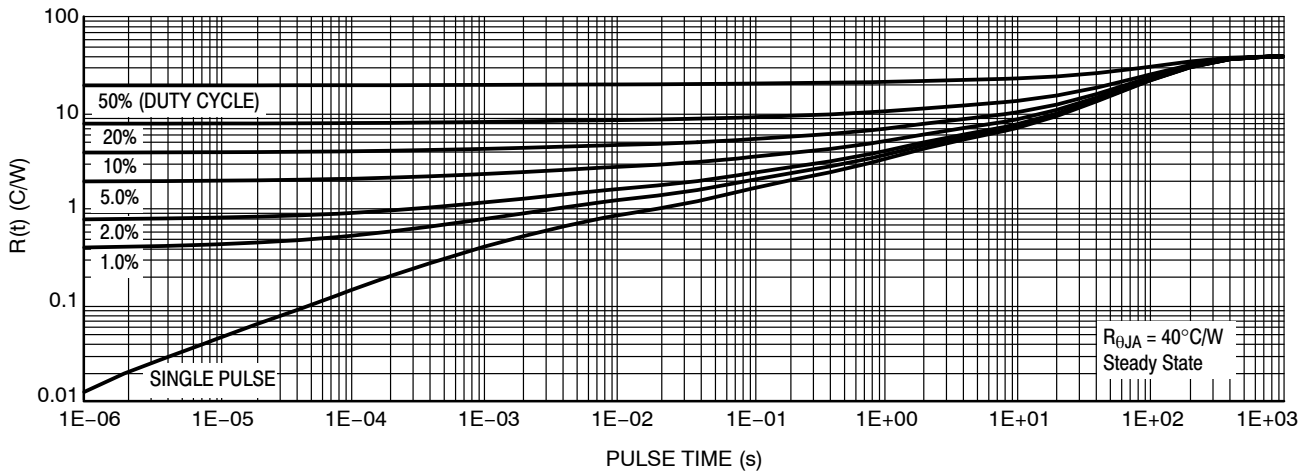


Figure 14. Thermal Impedance (Junction-to-Ambient) for NDD04N50Z

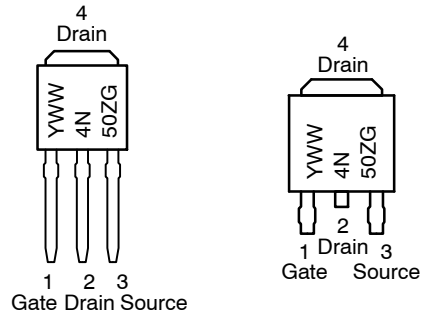
NDD04N50Z

ORDERING INFORMATION

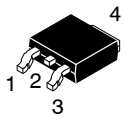
Order Number	Package	Shipping†
NDD04N50Z-1G	IPAK (Pb-Free)	75 Units / Rail
NDD04N50ZT4G	DPAK (Pb-Free)	2500 / Tape & Reel

†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.

MARKING DIAGRAMS



- A = Location Code
- Y = Year
- WW = Work Week
- G = Pb-Free Package



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

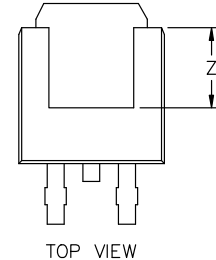
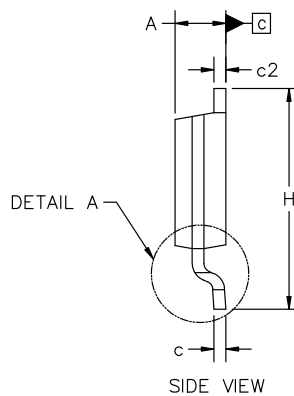
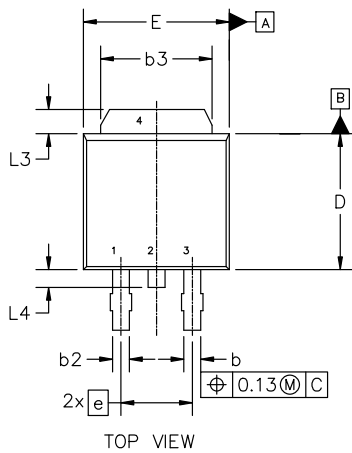
DATE 14 MAY 2026

SCALE 1:1

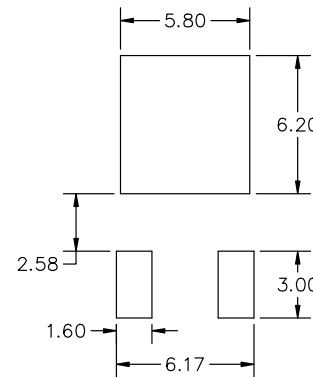
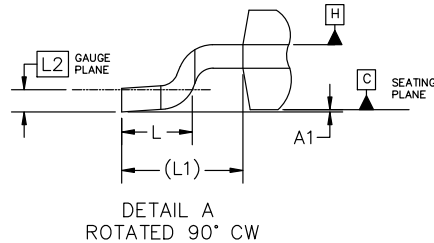
NOTES

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

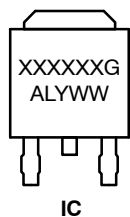
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.18	2.28	2.38
A1	0.00	---	0.13
b	0.63	0.76	0.89
b2	0.76	0.95	1.14
b3	4.57	5.02	5.46
c	0.46	0.54	0.61
c2	0.46	0.54	0.61
D	5.97	6.10	6.22
E	6.35	6.54	6.73
e	2.29 BSC		
H	9.40	9.91	10.41
L	1.40	1.59	1.78
L1	2.74 REF		
L2	0.51 BSC		
L3	0.89	---	1.27
L4	---	---	1.01
Z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



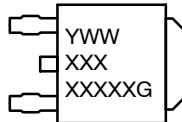
RECOMMENDED MOUNTING FOOTPRINT



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. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.

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.

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