

# NTD80N02G Datasheet

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DiGi Electronics Part Number	NTD80N02G-DG
Manufacturer	<a href="#">onsemi</a>
Manufacturer Product Number	NTD80N02G
Description	MOSFET N-CH 24V 80A DPAK
Detailed Description	N-Channel 24 V 80A (Tc) 75W (Tc) Surface Mount D PAK



Tel: +00 852-30501935

RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

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## Purchase and inquiry

Manufacturer Product Number:

NTD80N02G

Series:

-

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

24 V

Drive Voltage (Max Rds On, Min Rds On):

4.5V, 10V

Vgs(th) (Max) @ Id:

3V @ 250μA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

DPAK

Base Product Number:

NTD80

Manufacturer:

onsemi

Product Status:

Obsolete

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

80A (Tc)

Rds On (Max) @ Id, Vgs:

5.8mOhm @ 80A, 10V

Gate Charge (Qg) (Max) @ Vgs:

42 nC @ 4.5 V

Input Capacitance (Ciss) (Max) @ Vds:

2600 pF @ 20 V

Power Dissipation (Max):

75W (Tc)

Mounting Type:

Surface Mount

Package / Case:

TO-252-3, DPAK (2 Leads + Tab), SC-63

## Environmental & Export classification

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095



# ON Semiconductor

## Is Now

The logo for onsemi, featuring the word "onsemi" in a dark teal, lowercase, sans-serif font. The letter "i" is stylized with a white dot and a teal vertical bar. A small orange triangle is positioned above the top right of the "i". A trademark symbol (TM) is located to the right of the logo.

To learn more about onsemi™, please visit our website at  
[www.onsemi.com](http://www.onsemi.com)

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# NTD80N02

## Power MOSFET

### 24 V, 80 A, N-Channel DPAK

Designed for low voltage, high speed switching applications in power supplies, converters and power motor controls and bridge circuits.

#### Features

- These Devices are Pb-Free and are RoHS Compliant

#### Typical Applications

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

#### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V <sub>DSS</sub>	24	Vdc
Gate-to-Source Voltage - Continuous	V <sub>GS</sub>	±20	Vdc
Drain Current - Continuous @ T <sub>C</sub> = 25°C - Single Pulse (t <sub>p</sub> = 10 μs)	I <sub>D</sub> I <sub>DM</sub>	80* 200	Adc
Total Power Dissipation @ T <sub>C</sub> = 25°C	P <sub>D</sub>	75	Watts
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy - Starting T <sub>J</sub> = 25°C (V <sub>DD</sub> = 24 Vdc, V <sub>GS</sub> = 10 Vdc, I <sub>L</sub> = 17 Apk, L = 5.0 mH, R <sub>G</sub> = 25 Ω)	E <sub>AS</sub>	733	mJ
Thermal Resistance - Junction-to-Case - Junction-to-Ambient (Note 1) - Junction-to-Ambient (Note 2)	R <sub>θJC</sub> R <sub>θJA</sub> R <sub>θJA</sub>	1.65 67 120	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T <sub>L</sub>	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 in<sup>2</sup>).
2. When surface mounted to an FR4 board using the minimum recommended pad size, (Cu Area 0.412 in<sup>2</sup>).

\*Chip current capability limited by package.

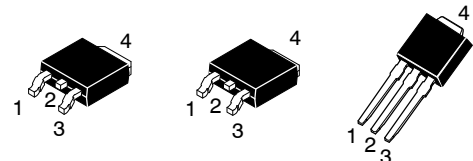
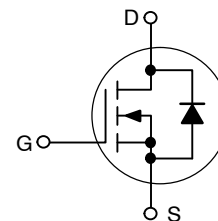


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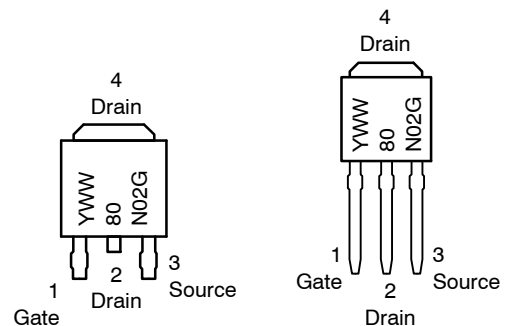
V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> TYP	I <sub>D</sub> MAX
24 V	5.0 mΩ	80 A

#### N-Channel



**CASE 369AA**    **CASE 369C**    **CASE 369D**  
**DPAK**            **DPAK**            **DPAK**  
**(Surface Mount)** **(Surface Mount)** **(Straight Lead)**  
**STYLE 2**            **STYLE 2**            **STYLE 2**

#### MARKING DIAGRAMS & PIN ASSIGNMENTS



80N02 = Device Code  
 Y = Year  
 WW = Work Week  
 G = Pb-Free Package

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

**NTD80N02****ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Drain-to-Source Breakdown Voltage (Note 3) ( $V_{GS} = 0\text{ Vdc}$ , $I_D = 250\ \mu\text{Adc}$ ) Positive Temperature Coefficient	$V_{(BR)DSS}$	24 –	27 25	– –	Vdc mV/°C
Zero Gate Voltage Drain Current ( $V_{GS} = 0\text{ Vdc}$ , $V_{DS} = 24\text{ Vdc}$ ) ( $V_{GS} = 0\text{ Vdc}$ , $V_{DS} = 24\text{ Vdc}$ , $T_J = 125^\circ\text{C}$ )	$I_{DSS}$	– –	– –	1.0 10	$\mu\text{Adc}$
Gate-Body Leakage Current ( $V_{GS} = \pm 20\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	–	–	$\pm 100$	nAdc

**ON CHARACTERISTICS** (Note 3)

Gate Threshold Voltage (Note 3) ( $V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{Adc}$ ) Negative Threshold Temperature Coefficient	$V_{GS(th)}$	1.0 –	1.9 –3.8	3.0 –	Vdc mV/°C
Static Drain-to-Source On-Resistance (Note 3) ( $V_{GS} = 10\text{ Vdc}$ , $I_D = 80\text{ Adc}$ ) ( $V_{GS} = 4.5\text{ Vdc}$ , $I_D = 40\text{ Adc}$ ) ( $V_{GS} = 10\text{ Vdc}$ , $I_D = 20\text{ Adc}$ ) ( $V_{GS} = 4.5\text{ Vdc}$ , $I_D = 20\text{ Adc}$ )	$R_{DS(on)}$	– – –	5.0 7.5 5.0 7.5	5.8 9.0 5.8 9.0	m $\Omega$
Forward Transconductance ( $V_{DS} = 15\text{ Vdc}$ , $I_D = 10\text{ Adc}$ ) (Note 3)	$g_{FS}$	–	20	–	Mhos

**DYNAMIC CHARACTERISTICS**

Input Capacitance	$(V_{DS} = 20\text{ Vdc}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz})$	$C_{iss}$	–	2250	2600	pF
Output Capacitance		$C_{oss}$	–	900	1100	
Transfer Capacitance		$C_{rss}$	–	400	525	

**SWITCHING CHARACTERISTICS** (Note 4)

Turn-On Delay Time	$(V_{GS} = 4.5\text{ Vdc}$ , $V_{DD} = 20\text{ Vdc}$ , $I_D = 20\text{ Adc}$ , $R_G = 2.5\ \Omega)$	$t_{d(on)}$	–	17	30	ns
Rise Time		$t_r$	–	67	125	
Turn-Off Delay Time		$t_{d(off)}$	–	28	45	
Fall Time		$t_f$	–	40	75	
Gate Charge	$(V_{GS} = 4.5\text{ Vdc}$ , $I_D = 20\text{ Adc}$ , $V_{DS} = 20\text{ Vdc})$ (Note 3)	$Q_T$	–	30	42	nC
		$Q_1$	–	7.0	12	
		$Q_2$	–	18	28	

**SOURCE-DRAIN DIODE CHARACTERISTICS**

Forward On-Voltage ( $I_S = 20\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ ) (Note 3) ( $I_S = 40\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ ) ( $I_S = 20\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ , $T_J = 150^\circ\text{C}$ )	$V_{SD}$	– – –	0.92 1.05 0.70	1.2 – –	Vdc	
Reverse Recovery Time	$(I_S = 20\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ , $di_S/dt = 100\text{ A}/\mu\text{s})$ (Note 3)	$t_{rr}$	–	38	52	ns
		$t_a$	–	20	–	
		$t_b$	–	18	–	
Reverse Recovery Stored Charge	$Q_{rr}$	–	0.038	–	$\mu\text{C}$	

3. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

4. Switching characteristics are independent of operating junction temperatures.

# NTD80N02

## TYPICAL CHARACTERISTICS

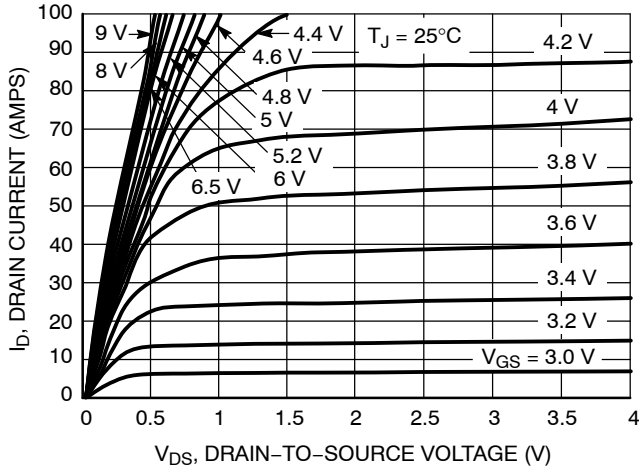


Figure 1. On-Region Characteristics

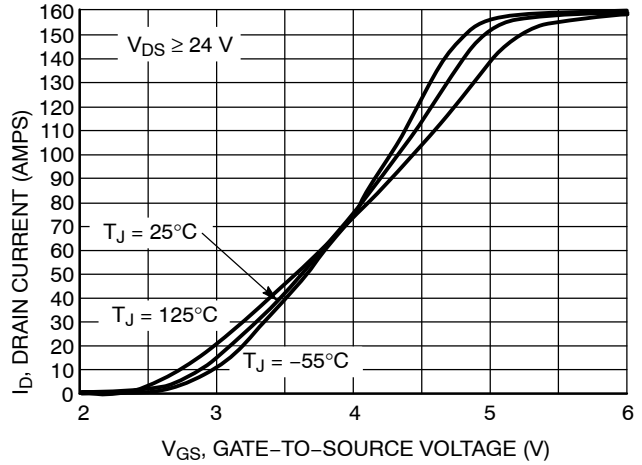


Figure 2. Transfer Characteristics

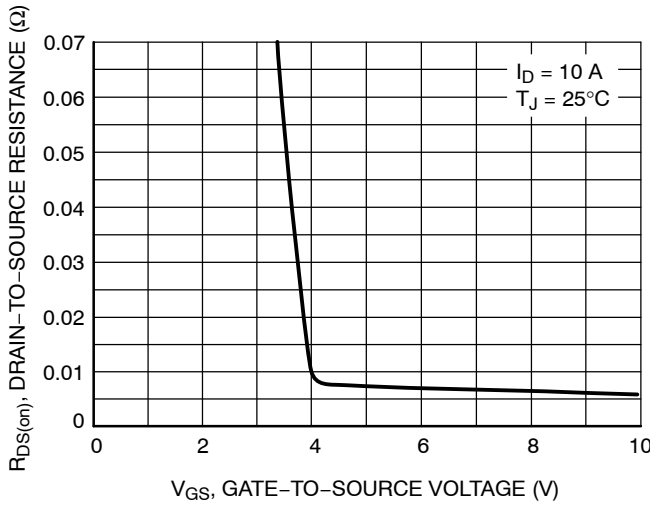


Figure 3. On-Resistance versus Gate-to-Source Voltage

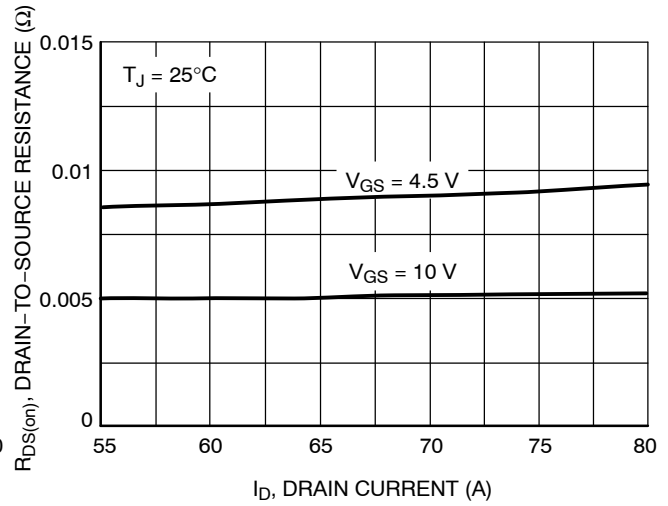


Figure 4. On-Resistance versus Drain Current and Gate Voltage

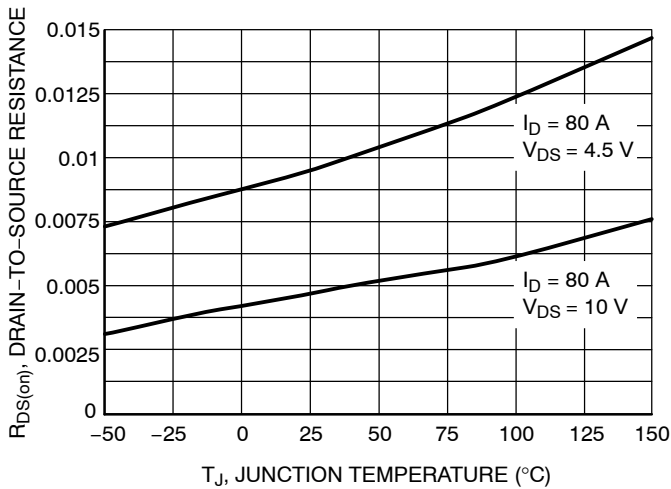


Figure 5. On-Resistance Variation with Temperature

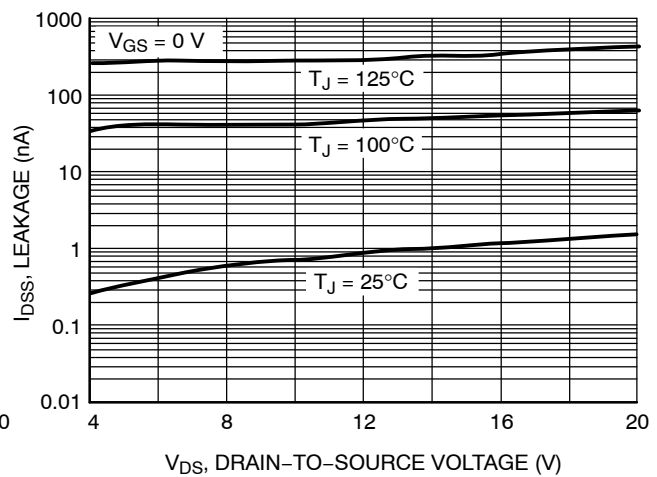


Figure 6. Drain-to-Source Leakage Current versus Voltage

# NTD80N02

## TYPICAL CHARACTERISTICS

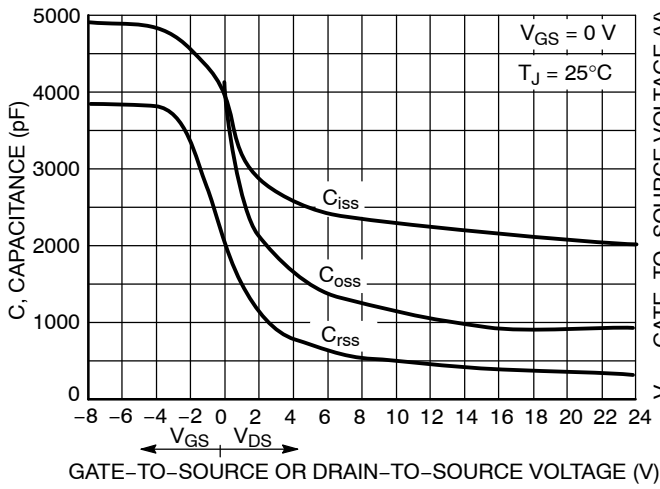


Figure 7. Capacitance Variation

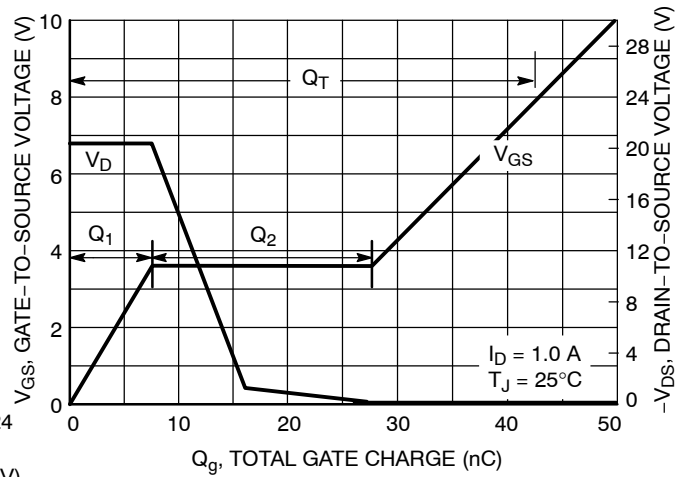


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

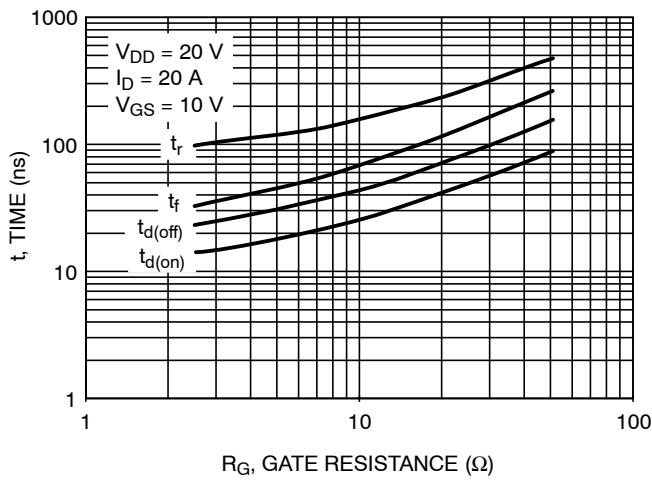


Figure 9. Resistive Switching Time Variation versus Gate Resistance

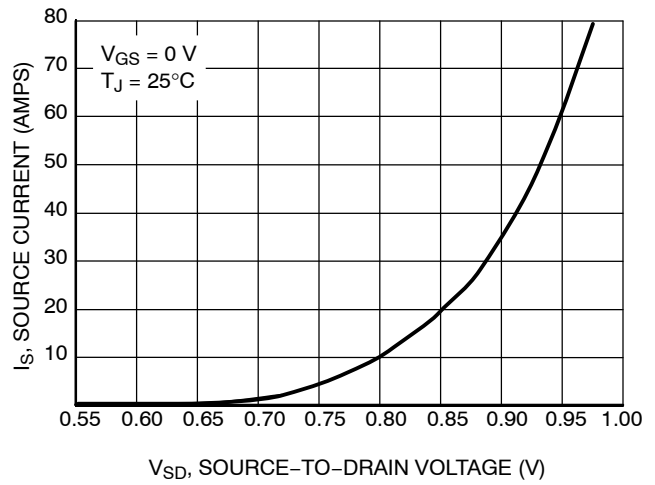
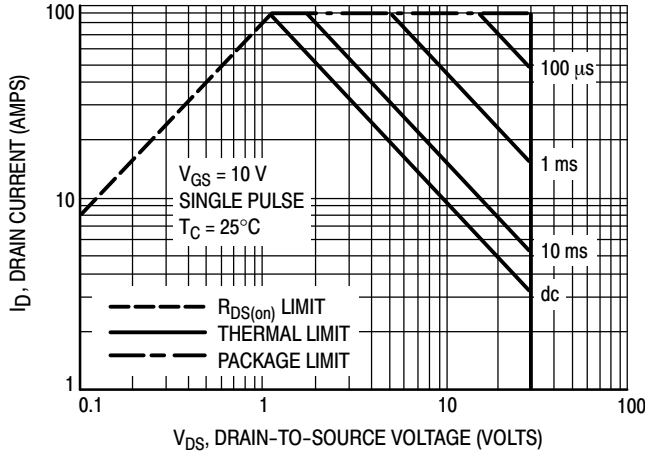


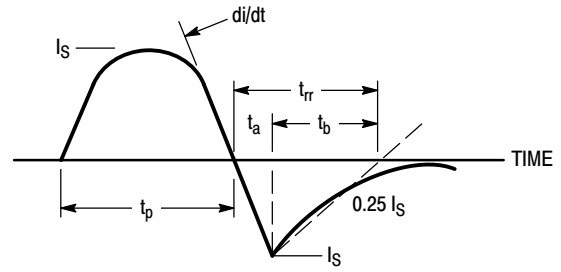
Figure 10. Diode Forward Voltage versus Current

# NTD80N02

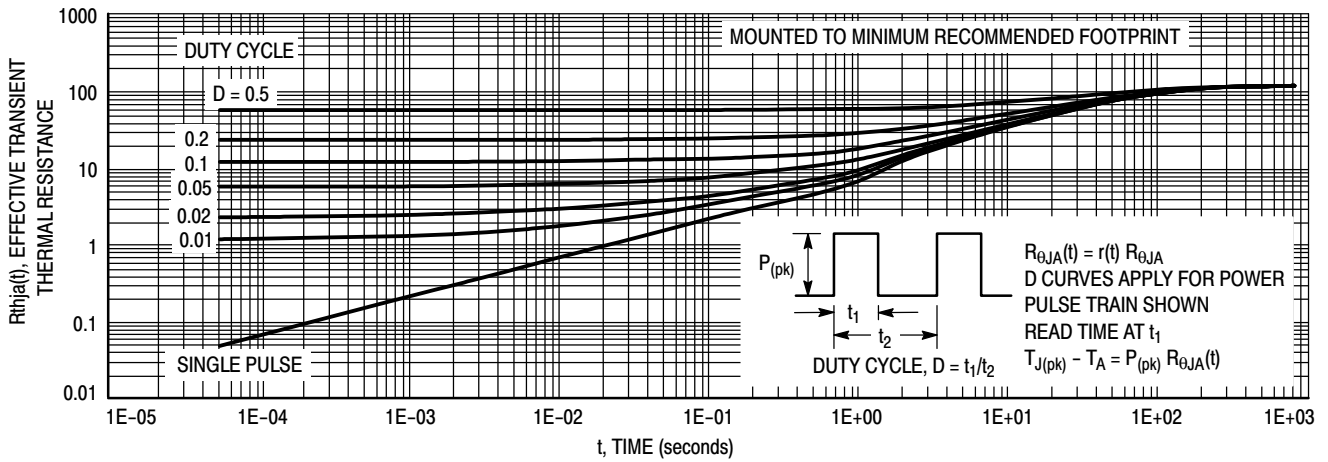
## TYPICAL CHARACTERISTICS



**Figure 11. Maximum Rated Forward Biased Safe Operating Area**



**Figure 12. Diode Reverse Recovery Waveform**



**Figure 13. Thermal Response - Various Duty Cycles**

### ORDERING INFORMATION

Order Number	Package	Shipping†
NTD80N02T4G	DPAK-3 (Pb-Free)	2500 / Tape & Reel
NTD80N02-1G	DPAK-3 Straight Lead (Pb-Free)	75 Units / Rail

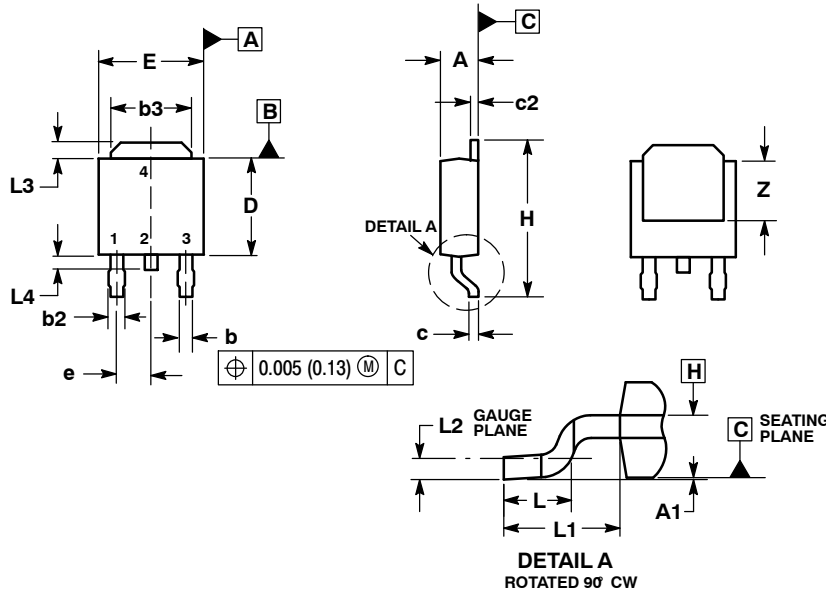
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



# NTD80N02

## PACKAGE DIMENSIONS

DPAK (SINGLE GAUGE)  
CASE 369AA-01  
ISSUE B

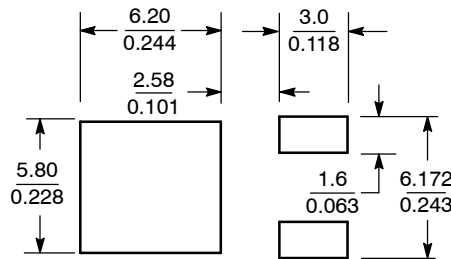


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.030	0.045	0.76	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.108 REF		2.74 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	---	0.040	---	1.01
Z	0.155	---	3.93	---

### SOLDERING FOOTPRINT\*



SCALE 3:1 (mm / inches)

STYLE 2:

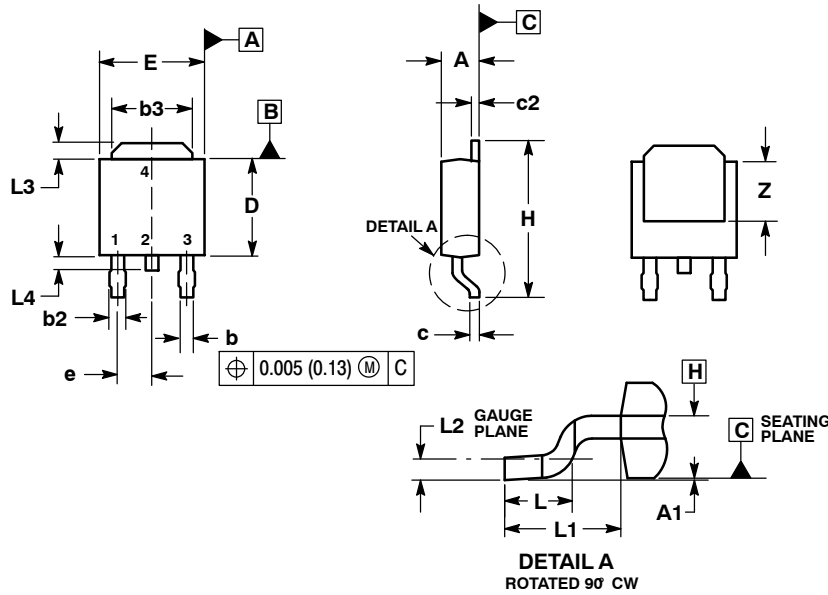
- PIN 1. GATE
- 2. DRAIN
- 3. SOURCE
- 4. DRAIN

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

**NTD80N02**

**PACKAGE DIMENSIONS**

**DPAK (SINGLE GAUGE)**  
CASE 369C-01  
ISSUE D



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.030	0.045	0.76	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.108 REF		2.74 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	---	0.040	---	1.01
Z	0.155	---	3.93	---

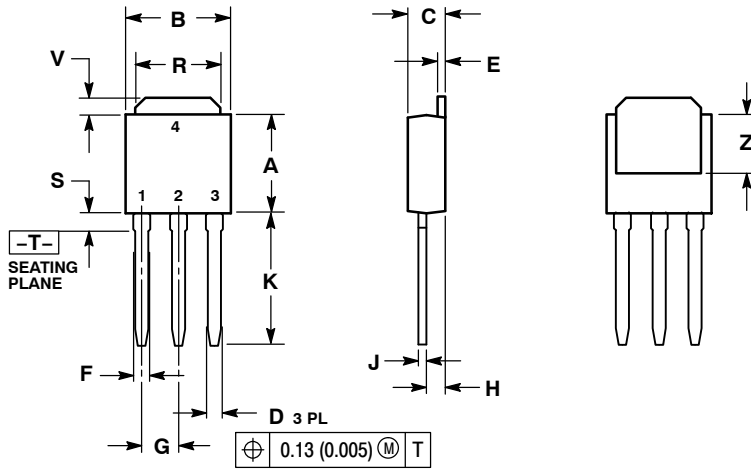
STYLE 2:

- PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

**NTD80N02**

**PACKAGE DIMENSIONS**

**DPAK**  
CASE 369D-01  
ISSUE B



- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.180	0.215	4.45	5.45
S	0.025	0.040	0.63	1.01
V	0.035	0.050	0.89	1.27
Z	0.155	---	3.93	---

- STYLE 2:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

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