NTD80N02 Datasheet

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https://www.DiGi-Electronics.com

DiGi Electronics Part Number	NTD80N02-DG
Manufacturer	onsemi
Manufacturer Product Number	NTD80N02
Description	MOSFET N-CH 24V 80A DPAK
Detailed Description	N-Channel 24 V 80A (Tc) 75W (Tc) Surface Mount DPAK

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
NTD80N02	onsemi
Series:	Product Status:
-	Obsolete
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
24 V	80A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
4.5V, 10V	5.8mOhm @ 80A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
3V @ 250µA	42 nC @ 4.5 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	2600 pF @ 20 V
FET Feature:	Power Dissipation (Max):
-	75W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Surface Mount
Supplier Device Package:	Package / Case:
DPAK	TO-252-3, DPAK (2 Leads + Tab), SC-63
Base Product Number:	
NTD80	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
RoHS non-compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

ON Semiconductor

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www.onsemi.com

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

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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D 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

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

Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	24	Vdc
Gate−to−Source Voltage – Continuous	V_{GS}	±20	Vdc
Drain Current – Continuous @ T_C = 25°C – Single Pulse (t_p = 10 μs)	I_D I_{DM}	80* 200	Adc
Total Power Dissipation @ T_C = 25°C	P_D	75	Watts
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to 150	°C
Single Pulse Drain−to−Source Avalanche Energy – Starting T_J = 25°C (V_{DD} = 24 Vdc, V_{GS} = 10 Vdc, I_L = 17 Apk, L = 5.0 mH, R_G = 25 Ω)	E_{AS}	733	mJ
Thermal Resistance – Junction−to−Case – Junction−to−Ambient (Note 1) – Junction−to−Ambient (Note 2)	$R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	1.65 67 120	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	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).

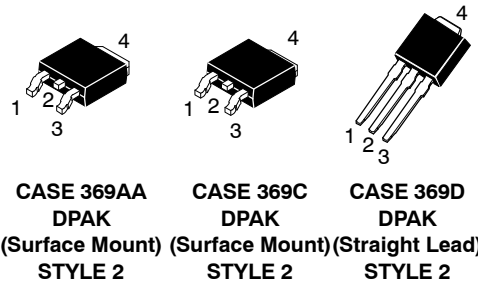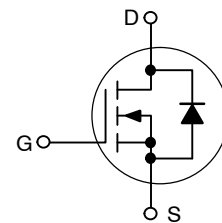*Chip current capability limited by package.

MARKING DIAGRAMS & PIN ASSIGNMENTS
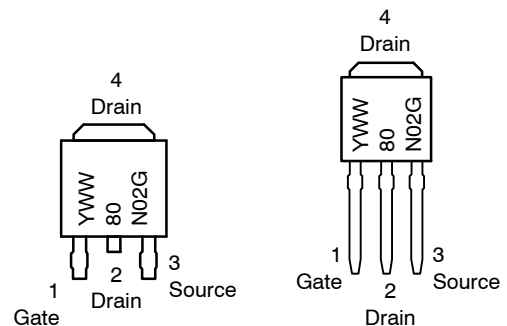

80N02	= Device Code
Y	= Year
WW	= Work Week
G	= Pb−Free Package

ORDERING INFORMATION

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

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ELECTRICAL CHARACTERISTICS ($T_J = 25°C$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain−to−Source Breakdown Voltage (Note 3) ($V_{GS} = 0$ Vdc, $I_D = 250$ μAdc) Positive Temperature Coefficient	$V_{(BR)DSS}$	24 −	27 25	− −	Vdc mV/°C
Zero Gate Voltage Drain Current ($V_{GS} = 0$ Vdc, $V_{DS} = 24$ Vdc) ($V_{GS} = 0$ Vdc, $V_{DS} = 24$ Vdc, $T_J = 125°C$)	I_{DSS}	 − −	 − −	 1.0 10	μAdc
Gate−Body Leakage Current ($V_{GS} = \pm20$ Vdc, $V_{DS} = 0$ Vdc)	I_{GSS}	−	−	±100	nAdc
ON CHARACTERISTICS (Note 3)					
Gate Threshold Voltage (Note 3) ($V_{DS} = V_{GS}$, $I_D = 250$ μAdc) 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) ($V_{GS} = 10$ Vdc, $I_D = 80$ Adc) ($V_{GS} = 4.5$ Vdc, $I_D = 40$ Adc) ($V_{GS} = 10$ Vdc, $I_D = 20$ Adc) ($V_{GS} = 4.5$ Vdc, $I_D = 20$ Adc)	$R_{DS(on)}$	 − − − 	 5.0 7.5 5.0 7.5	 5.8 9.0 5.8 9.0	mΩ
Forward Transconductance ($V_{DS} = 15$ Vdc, $I_D = 10$ Adc) (Note 3)	g_{FS}	−	20	−	Mhos
DYNAMIC CHARACTERISTICS					
Input Capacitance	C_{iss}	−	2250	2600	pF
Output Capacitance	C_{oss}	−	900	1100	
Transfer Capacitance	C_{rss}	−	400	525	

For Dynamic Characteristics: ($V_{DS} = 20$ Vdc, $V_{GS} = 0$ V, $f = 1.0$ MHz)

Characteristic	Symbol	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS (Note 4)					
Turn−On Delay Time	$t_{d(on)}$	−	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	Q_T	−	30	42	nC
	$Q1$	−	7.0	12	
	$Q2$	−	18	28	

Switching conditions: ($V_{GS} = 4.5$ Vdc, $V_{DD} = 20$ Vdc, $I_D = 20$ Adc, $R_G = 2.5$ Ω)

Gate Charge conditions: ($V_{GS} = 4.5$ Vdc, $I_D = 20$ Adc, $V_{DS} = 20$ Vdc) (Note 3)

Characteristic	Symbol	Min	Typ	Max	Unit
SOURCE−DRAIN DIODE CHARACTERISTICS					
Forward On−Voltage ($I_S = 20$ Adc, $V_{GS} = 0$ Vdc) (Note 3) ($I_S = 40$ Adc, $V_{GS} = 0$ Vdc) ($I_S = 20$ Adc, $V_{GS} = 0$ Vdc, $T_J = 150°C$)	V_{SD}	 − − −	 0.92 1.05 0.70	 1.2 − −	Vdc
Reverse Recovery Time	t_{rr}	−	38	52	ns
	t_a	−	20	−	
	t_b	−	18	−	
Reverse Recovery Stored Charge	Q_{rr}	−	0.038	−	μC

Reverse Recovery conditions: ($I_S = 20$ Adc, $V_{GS} = 0$ Vdc, $dI_S/dt = 100$ A/μs) (Note 3)

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

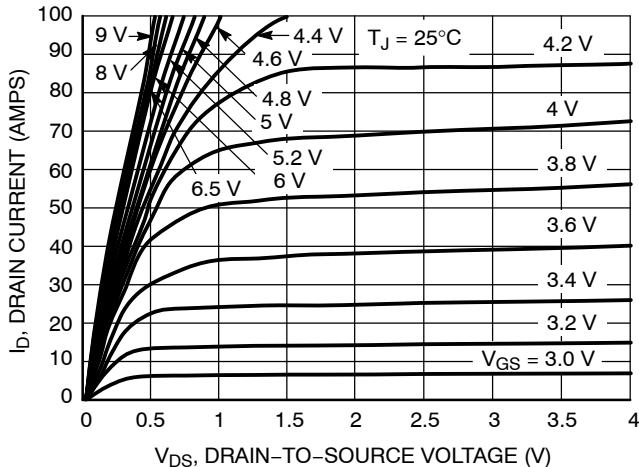# NTD80N02

TYPICAL CHARACTERISTICS
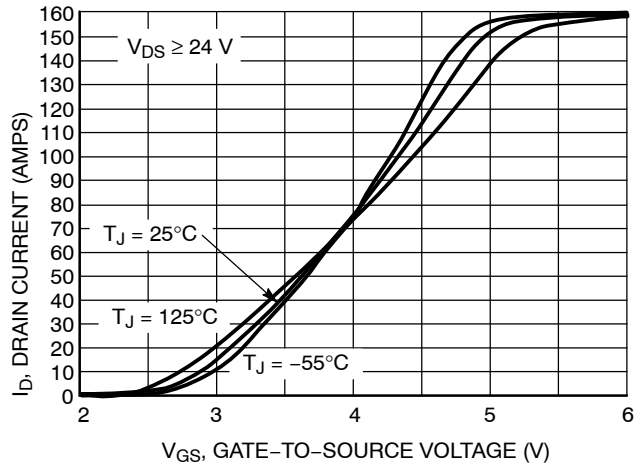

Figure 1. On−Region Characteristics
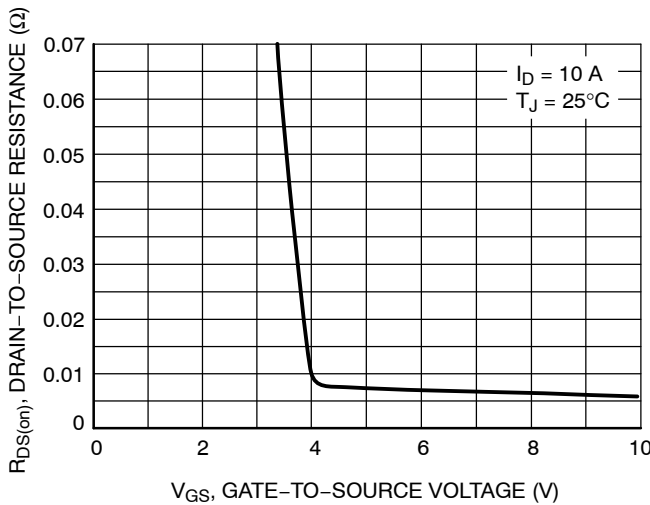

Figure 2. Transfer Characteristics

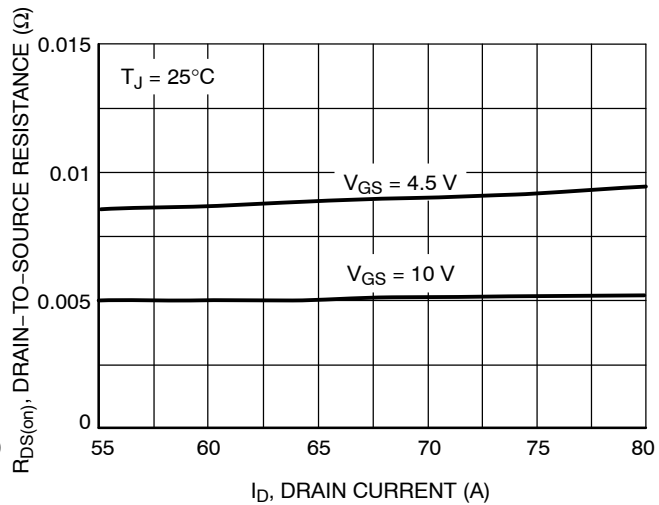Figure 3. On−Resistance versus
Gate−To−Source Voltage

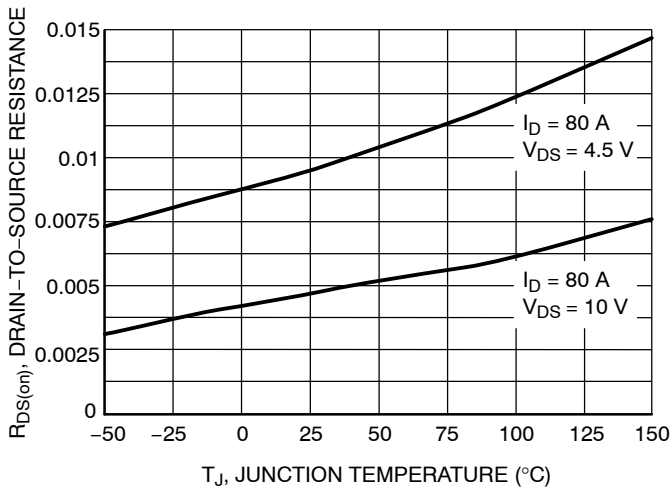Figure 4. On−Resistance versus Drain Current
and Gate Voltage

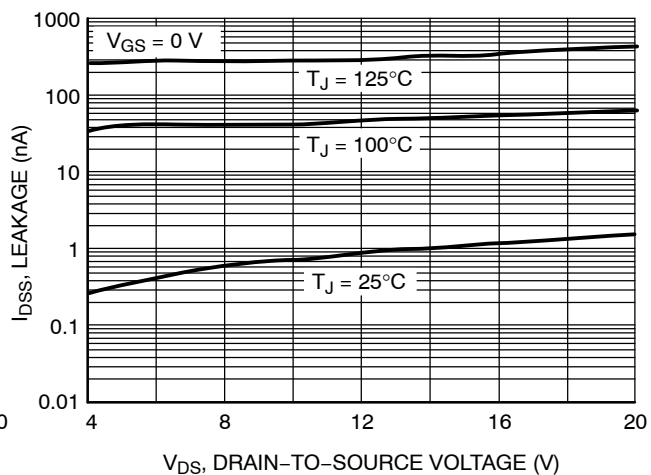Figure 5. On−Resistance Variation with
Temperature

Figure 6. Drain−To−Source Leakage
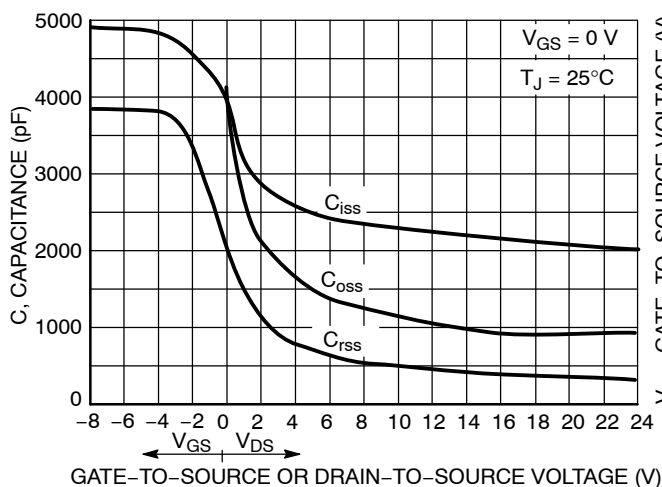Current versus Voltage

NTD80N02

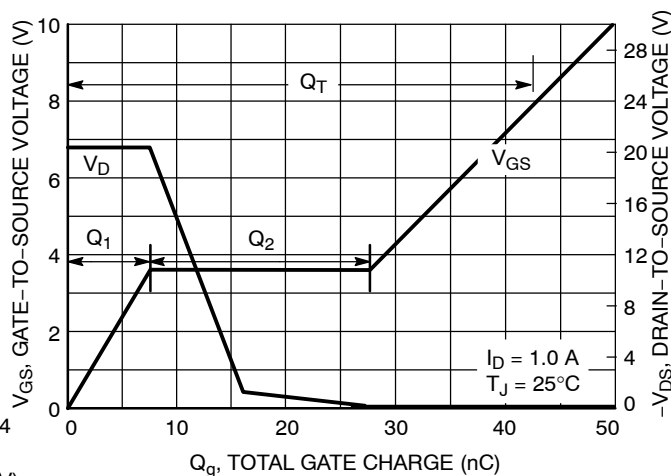## TYPICAL CHARACTERISTICS

Figure 7. Capacitance Variation

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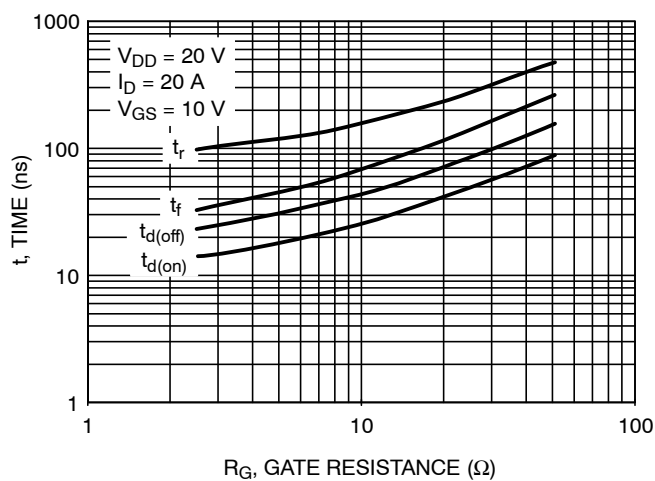Drain–to–Source Voltage versus Total Charge**

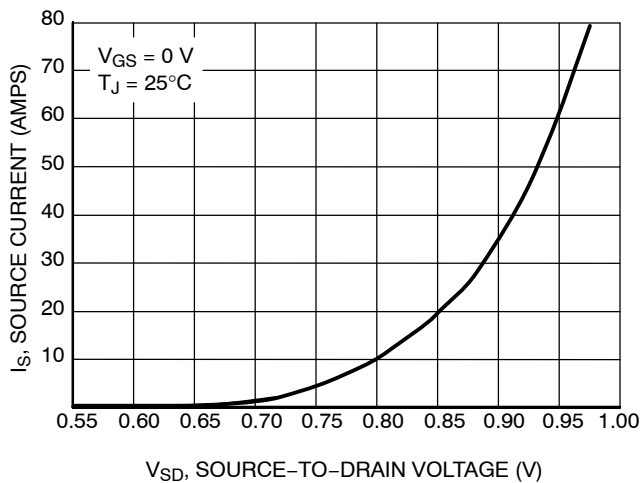**Figure 9. Resistive Switching Time Variation
versus Gate Resistance**

**Figure 10. Diode Forward Voltage versus
Current**

NTD80N02
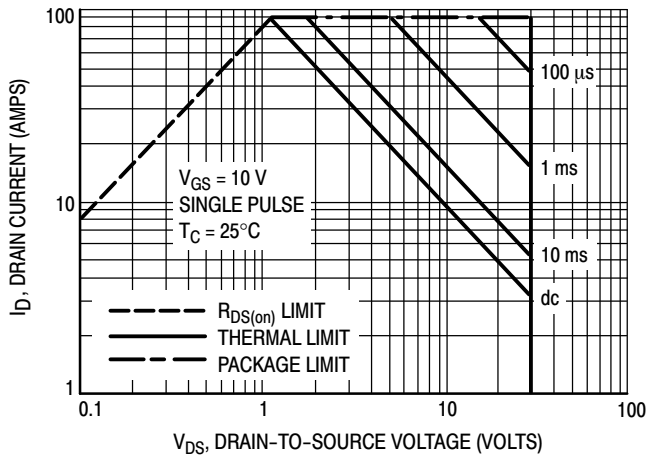
TYPICAL CHARACTERISTICS

Figure 11. Maximum Rated Forward Biased Safe Operating Area
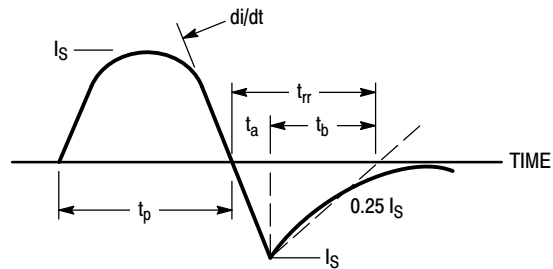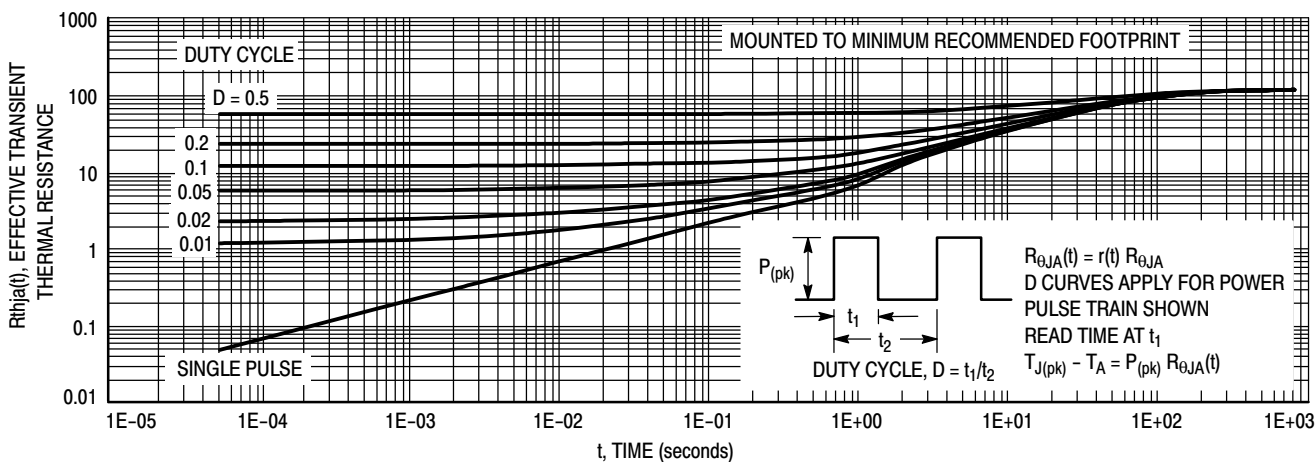

Figure 12. Diode Reverse Recovery Waveform

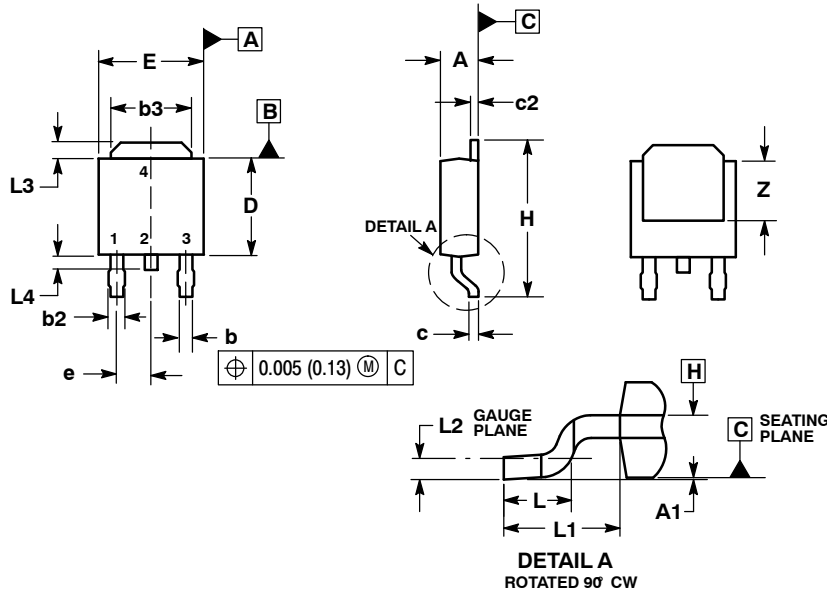**Figure 13. Thermal Response – Various Duty Cycles**

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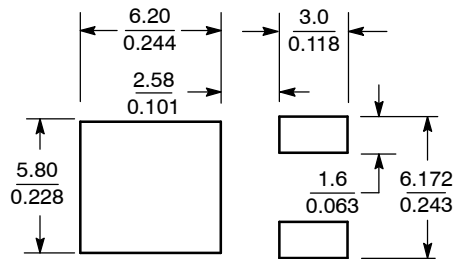
DPAK (SINGLE GAUGE)
CASE 369AA–01
ISSUE B

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	---

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

DETAIL A
ROTATED 90° CW

SOLDERING FOOTPRINT*

SCALE 3:1 $\left(\dfrac{mm}{inches}\right)$

*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.
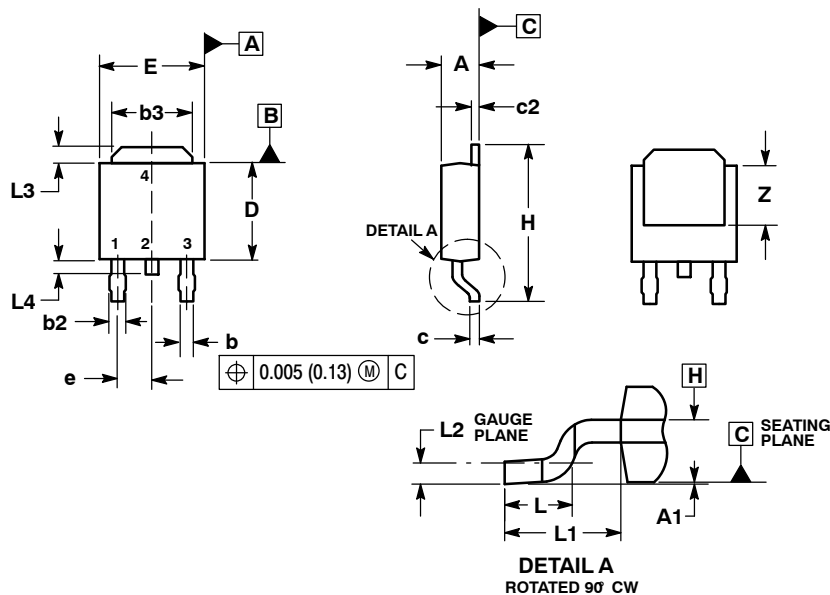
NTD80N02

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

DETAIL A
ROTATED 90° CW

NTD80N02

PACKAGE DIMENSIONS

DPAK
CASE 369D–01
ISSUE B
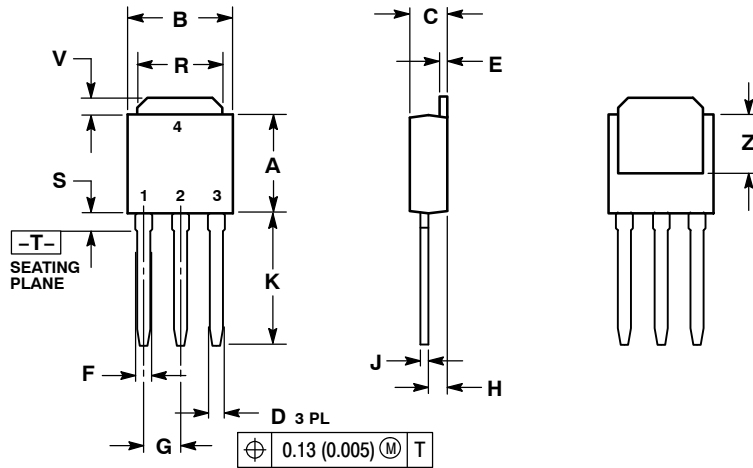
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

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

PUBLICATION ORDERING INFORMATION

OUR CERTIFICATE

DiGi provide top-quality products and perfect service for customer worldwide through standardization, technological innovation and continuous improvement. DiGi through third-party certification, we striciy control the quality of products and services. Welcome your RFQ to Email: Info@DiGi-Electronics.com