

NTD80N02

Power MOSFET 80 Amps, 24 Volts

N-Channel DPAK

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

Features

- Pb-Free Package May be Available. The G-Suffix Denotes a Pb-Free Lead Finish

Typical Applications

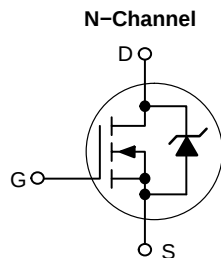
- Power Supplies
- Converters
- Power Motor Controls
- Bridge Circuits

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	24	Vdc
Gate-to-Source Voltage – Continuous	V_{GS}	± 20	Vdc
Drain Current – Continuous @ $T_C = 25^\circ\text{C}$ – Single Pulse ($t_p = 10 \mu\text{s}$)	I_D I_{DM}	80* 200	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	75	Watts
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 24 \text{ Vdc}$, $V_{GS} = 10 \text{ Vdc}$, $I_L = 17 \text{ Apk}$, $L = 5.0 \text{ mH}$, $R_G = 25 \Omega$)	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	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

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).

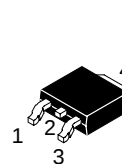
*Chip current capability limited by package.



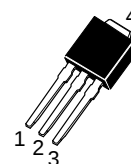
ON Semiconductor®

<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
24 V	5.0 m Ω	80 A

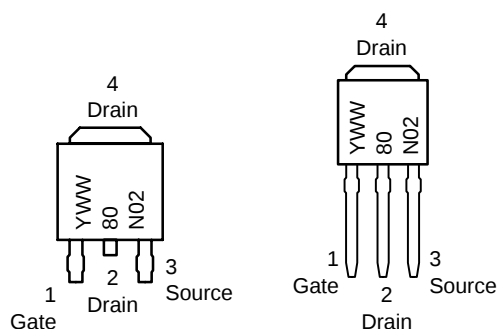


CASE 369AA
DPAK
(Bend Lead)
STYLE 2



CASE 369D
DPAK
(Straight Lead)
STYLE 2

MARKING DIAGRAMS & PIN ASSIGNMENTS



Y = Year
WW = Work Week
80N02 = Device Code

ORDERING INFORMATION

Device	Package	Shipping†
NTD80N02	DPAK	75 Units/Rail
NTD80N02T4	DPAK	2500 / Tape & Reel
NTD80N02T4G	DPAK Pb-Free	2500 / Tape & Reel
NTD80N02-1	DPAK Straight Lead	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

ELECTRICAL CHARACTERISTICS (T_J = 25°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 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} = ±20 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	(V _{DS} = 20 Vdc, V _{GS} = 0 V, f = 1.0 MHz)	C _{iss}	–	2250	–	pF
Output Capacitance		C _{oss}	–	900	–	
Transfer Capacitance		C _{rss}	–	400	–	

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	(V _{GS} = 4.5 Vdc, V _{DD} = 20 Vdc, I _D = 20 Adc, R _G = 2.5 Ω)	t _{d(on)}	–	17	–	ns
Rise Time		t _r	–	67	–	
Turn-Off Delay Time		t _{d(off)}	–	28	–	
Fall Time		t _f	–	40	–	
Gate Charge	(V _{GS} = 4.5 Vdc, I _D = 20 Adc, V _{DS} = 20 Vdc) (Note 3)	Q _T	–	30	–	nC
		Q ₁	–	7.0	–	
		Q ₂	–	18	–	

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 (I _S = 20 Adc, V _{GS} = 0 Vdc, di _S /dt = 100 A/μs) (Note 3)	t _{rr}	–	38	–	ns
	t _a	–	20	–	
	t _b	–	18	–	
Reverse Recovery Stored Charge	Q _{rr}	–	0.036	–	μC

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

4. Switching characteristics are independent of operating junction temperatures.

NTD80N02

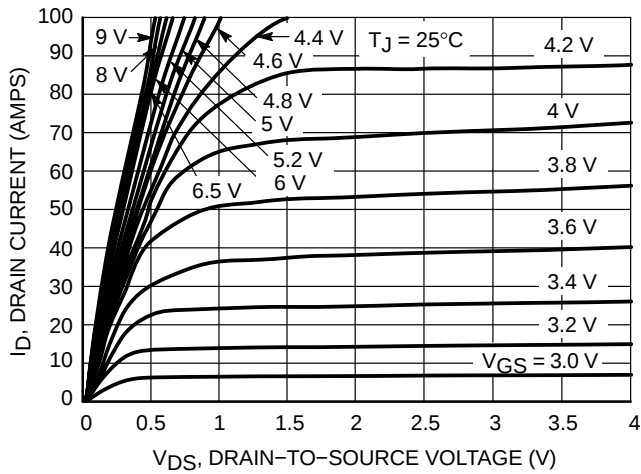


Figure 1. On-Region Characteristics

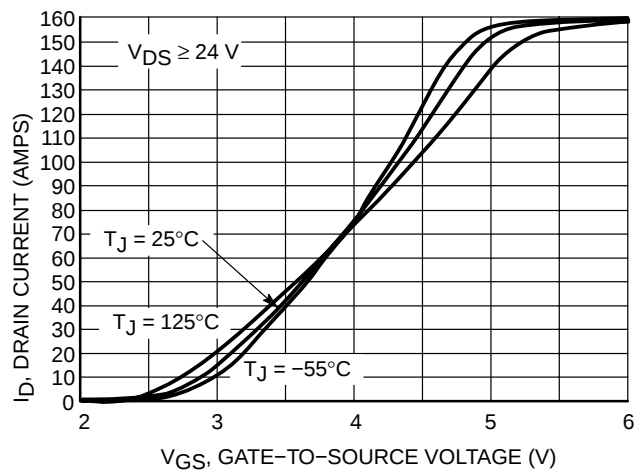


Figure 2. Transfer Characteristics

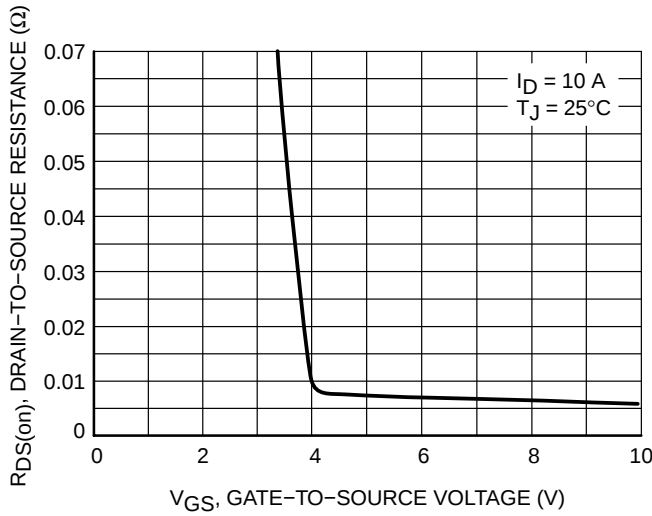


Figure 3. On-Resistance versus Gate-to-Source Voltage

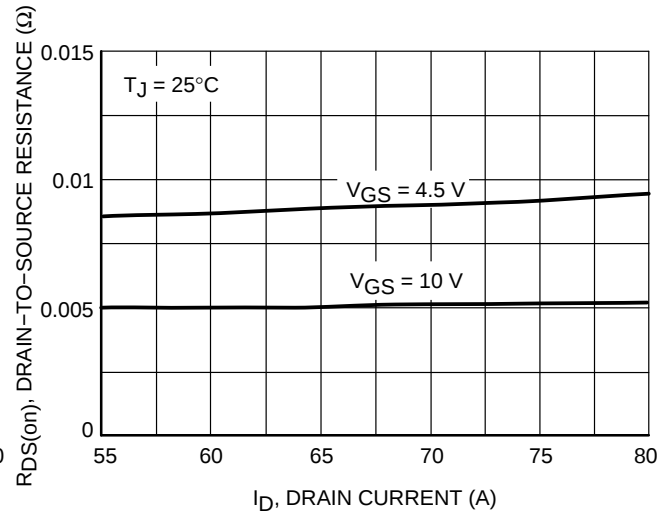


Figure 4. On-Resistance versus Drain Current and Gate Voltage

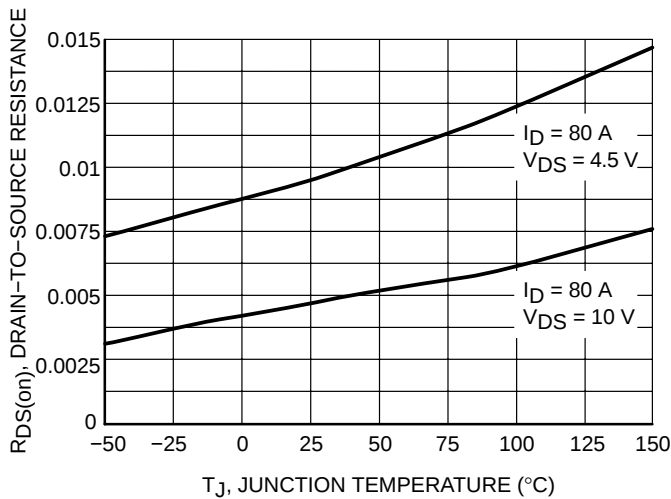


Figure 5. On-Resistance Variation with Temperature

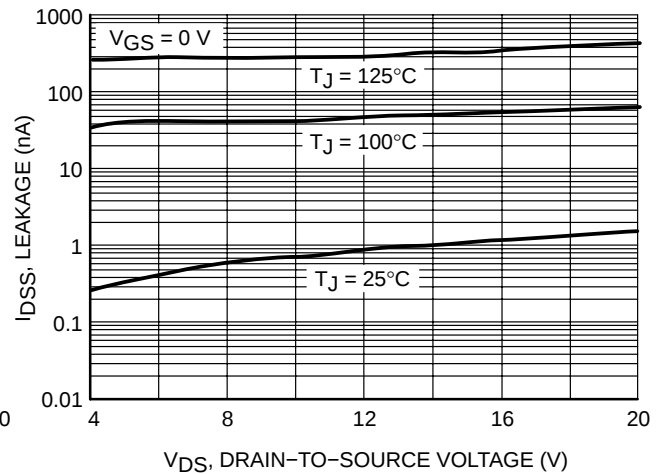


Figure 6. Drain-to-Source Leakage Current versus Voltage

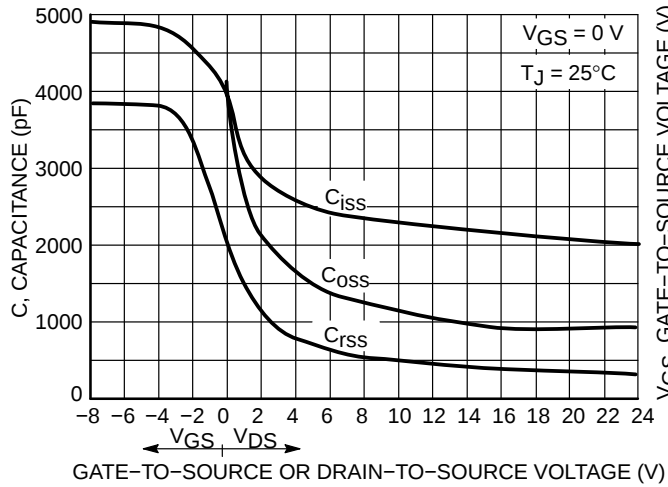


Figure 7. Capacitance Variation

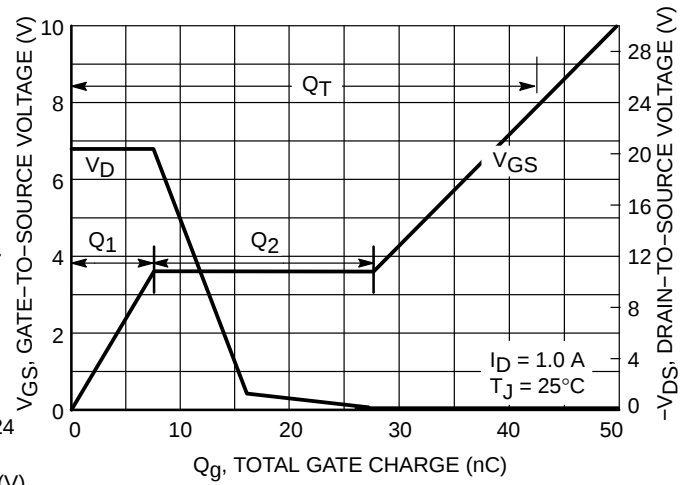


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

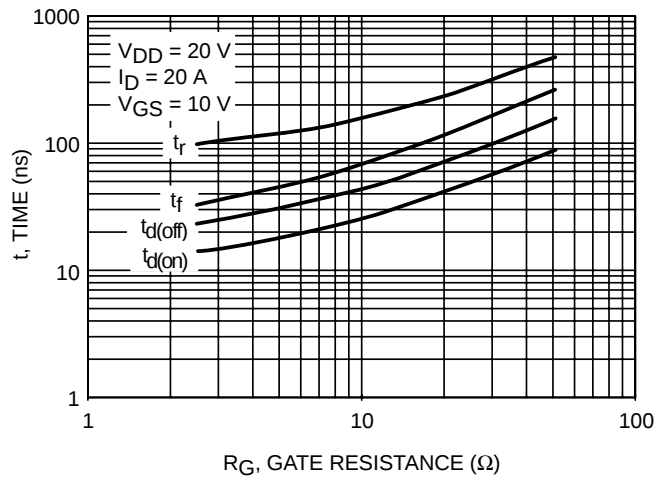


Figure 9. Resistive Switching Time Variation versus Gate Resistance

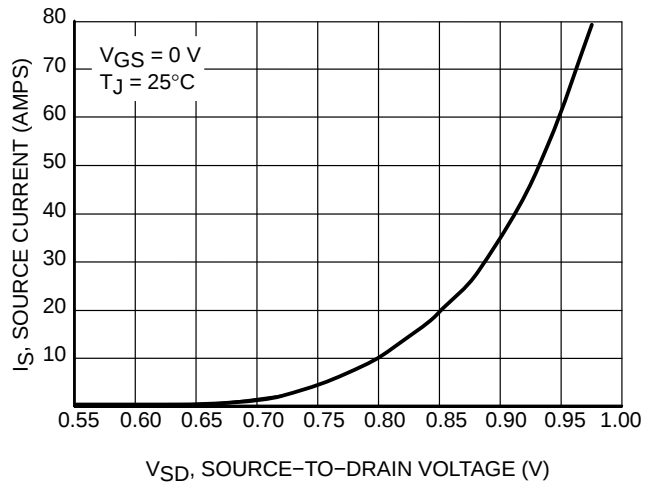


Figure 10. Diode Forward Voltage versus Current

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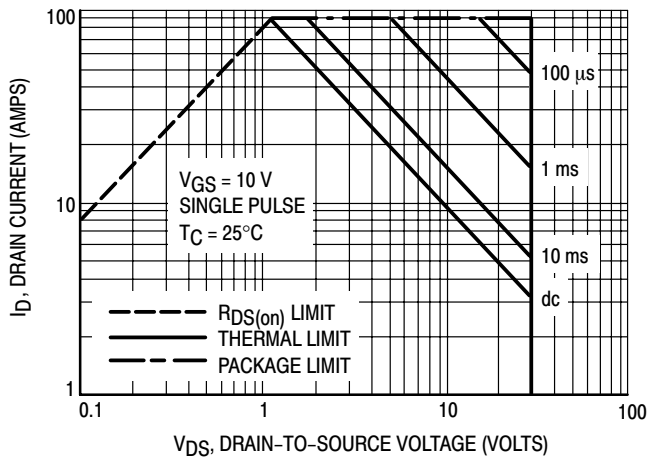


Figure 11. Maximum Rated Forward Biased Safe Operating Area

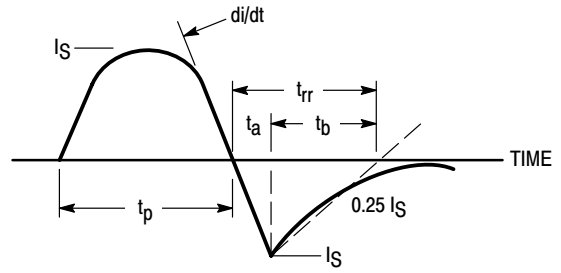


Figure 12. Diode Reverse Recovery Waveform

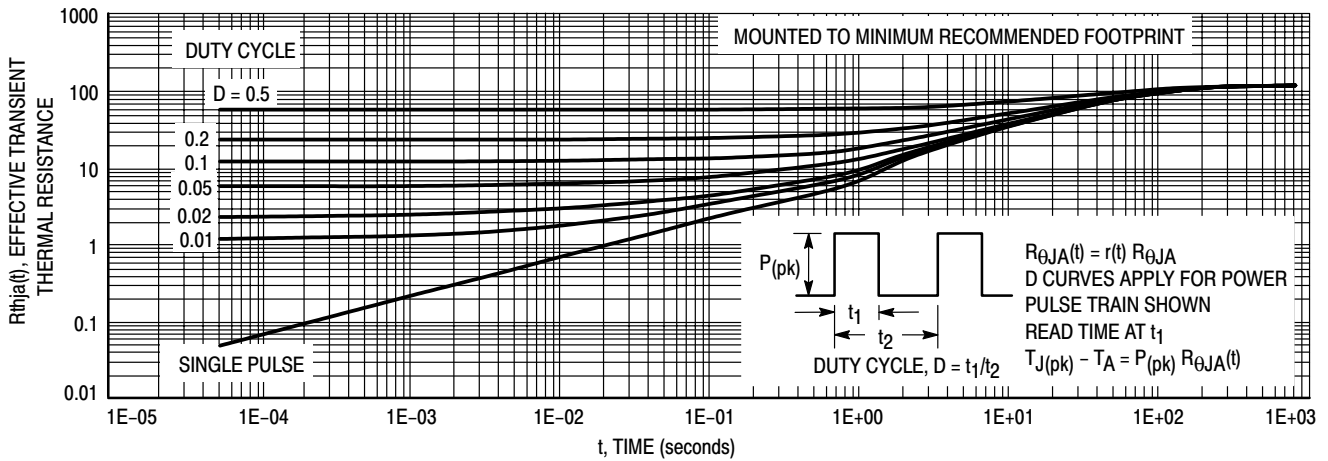
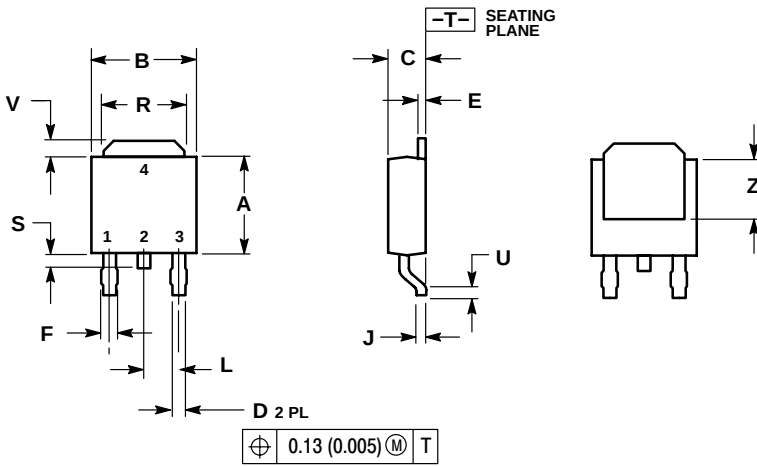


Figure 13. Thermal Response – Various Duty Cycles

NTD80N02

PACKAGE DIMENSIONS

DPAK
CASE 369AA-01
ISSUE O



- 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	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.025	0.035	0.63	0.88
E	0.018	0.024	0.46	0.61
F	0.033	0.045	0.83	1.14
J	0.018	0.023	0.46	0.58
L	0.090 BSC		2.29 BSC	
R	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	---	0.51	---
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

SOLDERING FOOTPRINT*

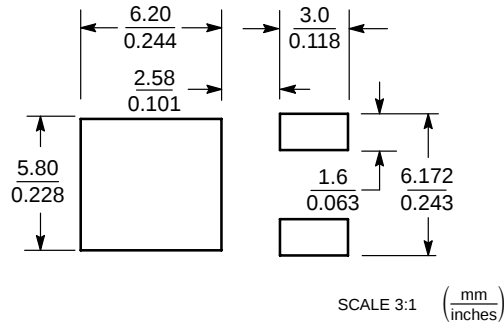
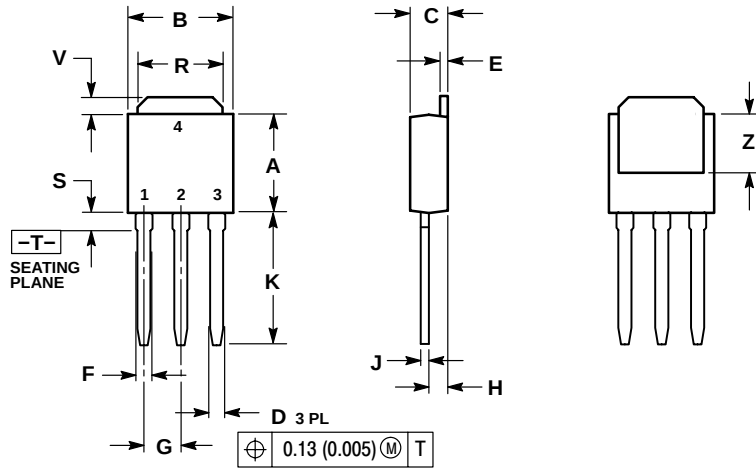


Figure 14. DPAK

*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

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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