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[NTD4302T4G](#)

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NTD4302

Power MOSFET 68 A, 30 V, N-Channel DPAK/IPAK

Features

- Ultra Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Logic Level Gate Drive
- Diode Exhibits High Speed, Soft Recovery
- Avalanche Energy Specified
- I_{DSS} Specified at Elevated Temperature
- DPAK Mounting Information Provided
- These Devices are Pb-Free and are RoHS Compliant

Applications

- DC-DC Converters
- Low Voltage Motor Control
- Power Management in Portable and Battery Powered Products: i.e., Computers, Printers, Cellular and Cordless Telephones, and PCMCIA Cards

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	30	Vdc
Gate-to-Source Voltage - Continuous	V_{GS}	± 20	Vdc
Thermal Resistance - Junction-to-Case	$R_{\theta JC}$	1.65	$^\circ\text{C}/\text{W}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	75	W
Continuous Drain Current @ $T_C = 25^\circ\text{C}$ (Note 4)	I_D	68	A
Continuous Drain Current @ $T_C = 100^\circ\text{C}$	I_{D1}	43	A
Thermal Resistance - Junction-to-Ambient (Note 2)	$R_{\theta JA}$	67	$^\circ\text{C}/\text{W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	1.87	W
Continuous Drain Current @ $T_A = 25^\circ\text{C}$	I_D	11.3	A
Continuous Drain Current @ $T_A = 100^\circ\text{C}$	I_{D1}	7.1	A
Pulsed Drain Current (Note 3)	I_{DM}	36	A
Thermal Resistance - Junction-to-Ambient (Note 1)	$R_{\theta JA}$	120	$^\circ\text{C}/\text{W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	1.04	W
Continuous Drain Current @ $T_A = 25^\circ\text{C}$	I_D	8.4	A
Continuous Drain Current @ $T_A = 100^\circ\text{C}$	I_{D1}	5.3	A
Pulsed Drain Current (Note 3)	I_{DM}	28	A
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy - Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 30\text{ Vdc}$, $V_{GS} = 10\text{ Vdc}$, Peak $I_L = 17\text{ Apk}$, $L = 5.0\text{ mH}$, $R_G = 25\ \Omega$)	E_{AS}	722	mJ
Maximum Lead Temperature for Soldering Purposes, 1/8 in from case for 10 seconds	T_L	260	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

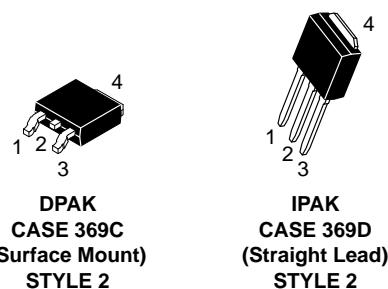
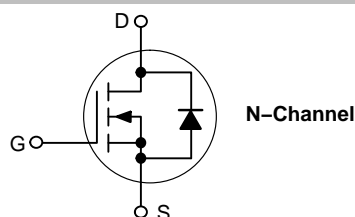
1. When surface mounted to an FR4 board using the minimum recommended pad size.
2. When surface mounted to an FR4 board using 0.5 sq. in. drain pad size.
3. Pulse Test: Pulse Width = 300 μs , Duty Cycle = 2%.
4. Current Limited by Internal Lead Wires.



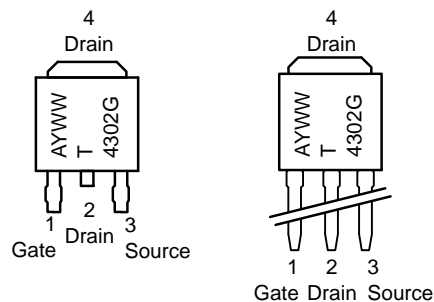
ON Semiconductor®

<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
30 V	7.8 m Ω @ 10 V	68 A



MARKING DIAGRAMS & PIN ASSIGNMENTS



A = Assembly Location*
 Y = Year
 WW = Work Week
 T4302 = Device Code
 G = Pb-Free Package

* The Assembly Location code (A) is front side optional. In cases where the Assembly Location is stamped in the package, the front side assembly code may be blank.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain–Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 250\ \mu\text{A}$)	$V_{(BR)DSS}$	30	–	–	Vdc
Positive Temperature Coefficient		–	25	–	$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current ($V_{GS} = 0\text{ Vdc}$, $V_{DS} = 30\text{ Vdc}$, $T_J = 25^\circ\text{C}$) ($V_{GS} = 0\text{ Vdc}$, $V_{DS} = 30\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	I_{DSS}	–	–	1.0 10	μAdc
Gate–Body Leakage Current ($V_{GS} = \pm 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	–	–	± 100	nAdc

ON CHARACTERISTICS

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{Adc}$)	$V_{GS(th)}$	1.0	1.9	3.0	Vdc
Negative Temperature Coefficient		–	–3.8	–	
Static Drain–Source On–State Resistance ($V_{GS} = 10\text{ Vdc}$, $I_D = 20\text{ Adc}$) ($V_{GS} = 10\text{ Vdc}$, $I_D = 10\text{ Adc}$) ($V_{GS} = 4.5\text{ Vdc}$, $I_D = 5.0\text{ Adc}$)	$R_{DS(on)}$	–	0.0078 0.0078 0.010	0.010 0.010 0.013	Ω
Forward Transconductance ($V_{DS} = 15\text{ Vdc}$, $I_D = 10\text{ Adc}$)	gFS	–	20	–	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 24\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{iss}	–	2050	2400	pF
Output Capacitance		C_{oss}	–	640	800	
Reverse Transfer Capacitance		C_{rss}	–	225	310	

SWITCHING CHARACTERISTICS (Note 6)

Turn–On Delay Time	$(V_{DD} = 25\text{ Vdc}$, $I_D = 1.0\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$, $R_G = 6.0\ \Omega$)	$t_{d(on)}$	–	11	20	ns
Rise Time		t_r	–	15	25	
Turn–Off Delay Time		$t_{d(off)}$	–	85	130	
Fall Time		t_f	–	55	90	
Turn–On Delay Time	$(V_{DD} = 25\text{ Vdc}$, $I_D = 1.0\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$, $R_G = 2.5\ \Omega$)	$t_{d(on)}$	–	11	20	ns
Rise Time		t_r	–	13	20	
Turn–Off Delay Time		$t_{d(off)}$	–	55	90	
Fall Time		t_f	–	40	75	
Turn–On Delay Time	$(V_{DD} = 24\text{ Vdc}$, $I_D = 20\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$, $R_G = 2.5\ \Omega$)	$t_{d(on)}$	–	15	–	ns
Rise Time		t_r	–	25	–	
Turn–Off Delay Time		$t_{d(off)}$	–	40	–	
Fall Time		t_f	–	58	–	
Gate Charge	$(V_{DS} = 24\text{ Vdc}$, $I_D = 2.0\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$)	Q_T	–	55	80	nC
		$Q_{gs} (Q1)$	–	5.5	–	
		$Q_{gd} (Q2)$	–	15	–	

BODY–DRAIN DIODE RATINGS (Note 5)

Diode Forward On–Voltage ($I_S = 2.3\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) ($I_S = 20\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) ($I_S = 2.3\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	V_{SD}	–	0.75 0.90 0.65	1.0 – –	Vdc	
Reverse Recovery Time	$(I_S = 2.3\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $dI_S/dt = 100\text{ A}/\mu\text{s}$)	t_{rr}	–	39	65	ns
		t_a	–	20	–	
		t_b	–	19	–	
Reverse Recovery Stored Charge	Q_{rr}	–	0.043	–	μC	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

5. Indicates Pulse Test: Pulse Width = 300 μsec max, Duty Cycle $\leq 2\%$.

6. Switching characteristics are independent of operating junction temperature.

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TYPICAL CHARACTERISTICS

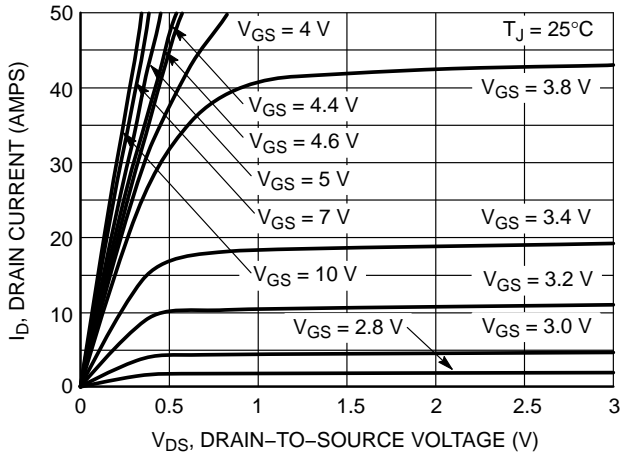


Figure 1. On-Region Characteristics

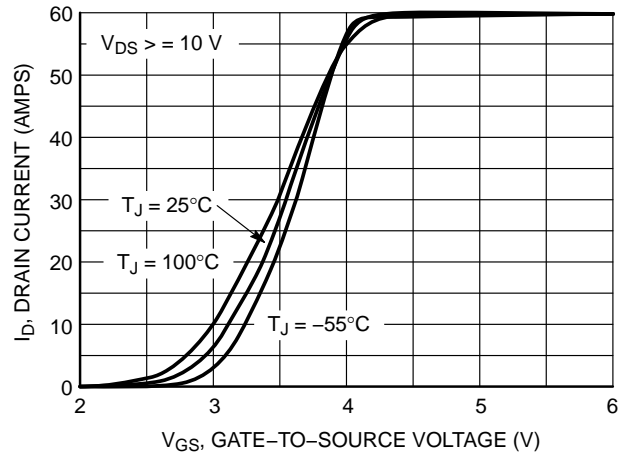


Figure 2. Transfer Characteristics

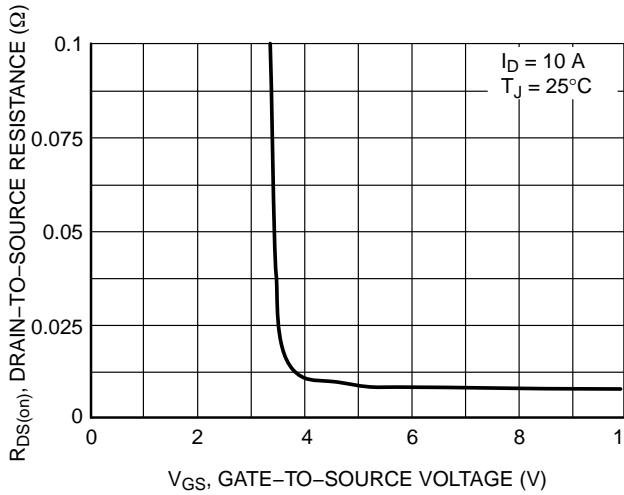


Figure 3. On-Resistance vs. Gate-to-Source Voltage

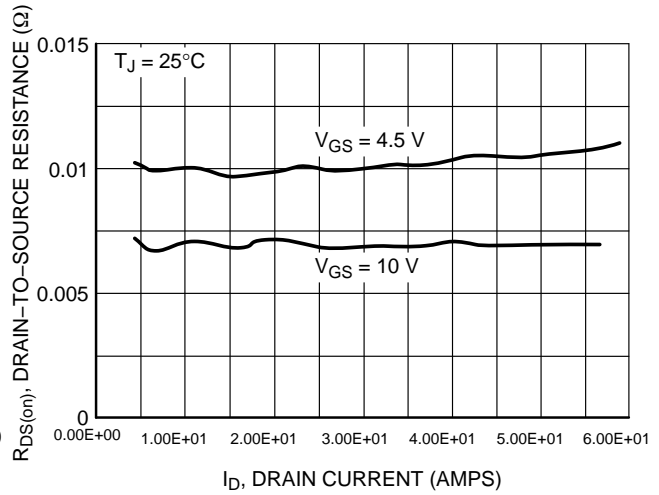


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

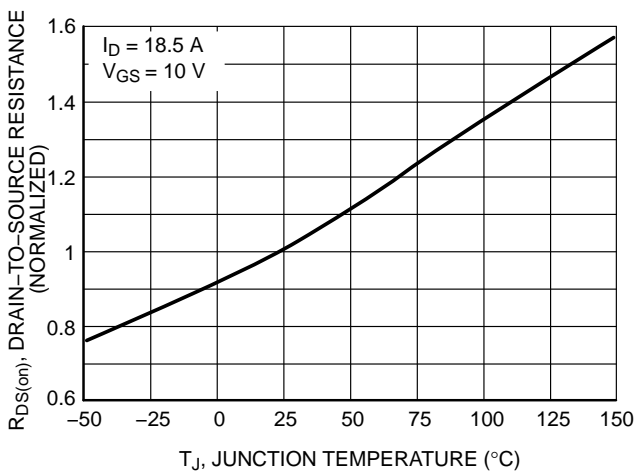


Figure 5. On-Resistance Variation with Temperature

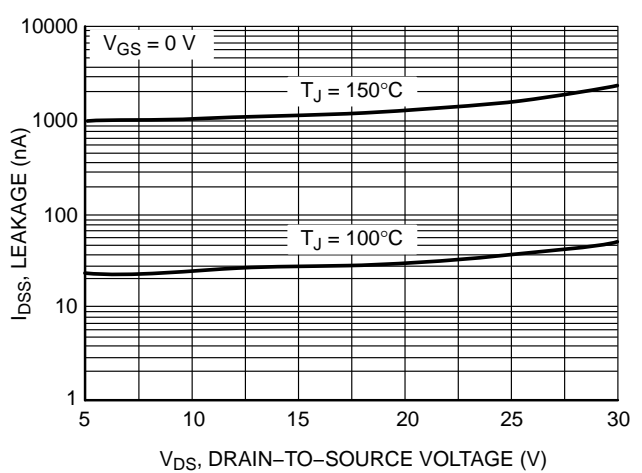


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL CHARACTERISTICS

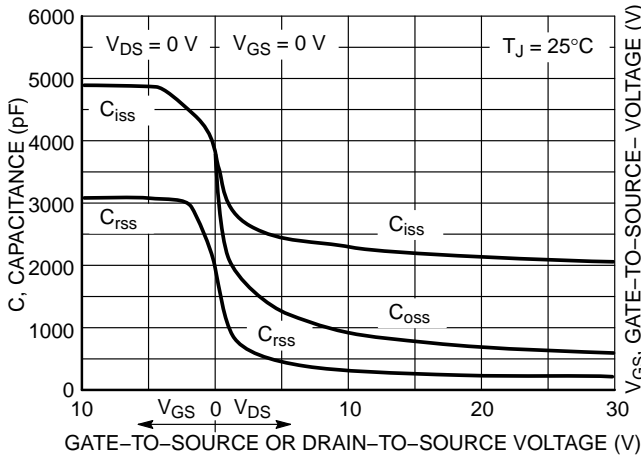


Figure 7. Capacitance Variation

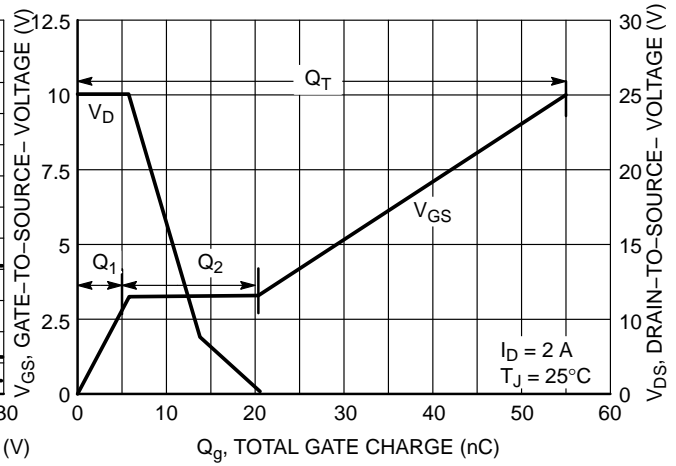


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

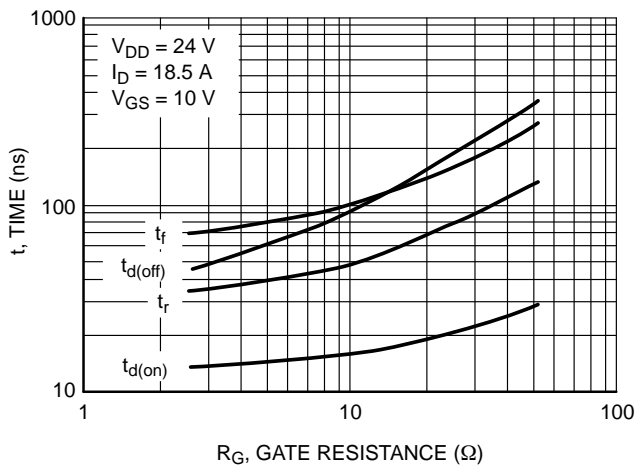


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

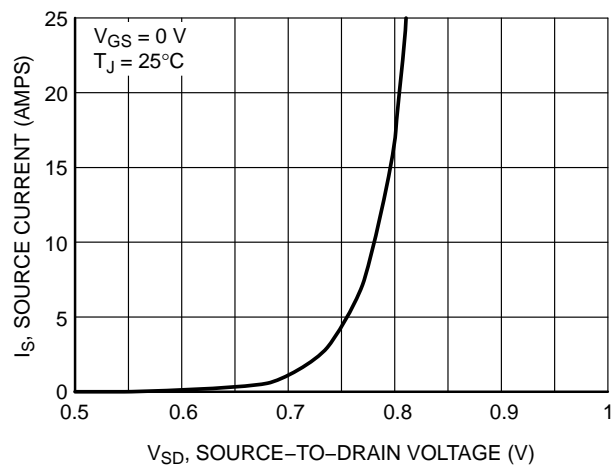


Figure 10. Diode Forward Voltage vs. Current

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TYPICAL CHARACTERISTICS

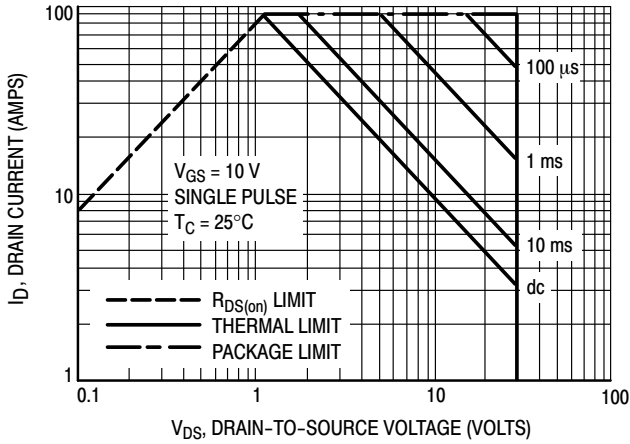


Figure 11. Maximum Rated Forward Biased Safe Operating Area

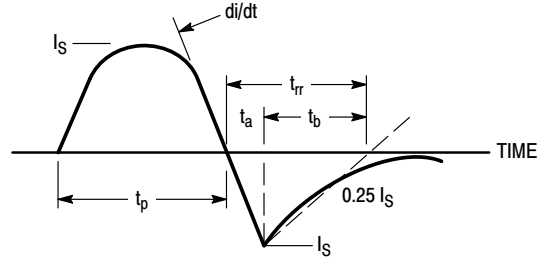


Figure 12. Diode Reverse Recovery Waveform

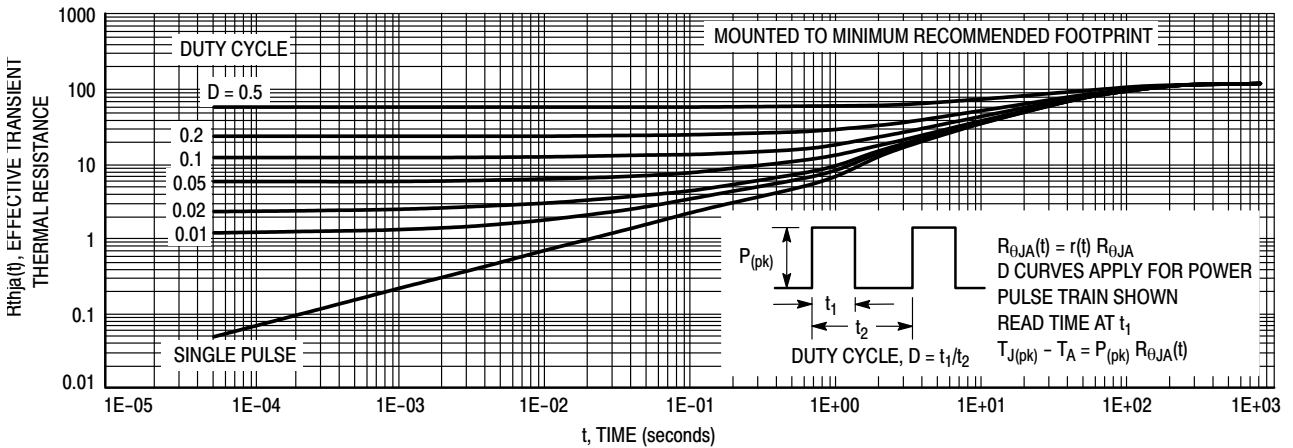


Figure 13. Thermal Response - Various Duty Cycles

ORDERING INFORMATION

Device	Package Type	Package	Shipping†
NTD4302G	DPAK	369C (Pb-Free)	75 Units / Rail
NTD4302-1G	IPAK	369D (Pb-Free)	75 Units / Rail
NTD4302T4G	DPAK	369C (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.

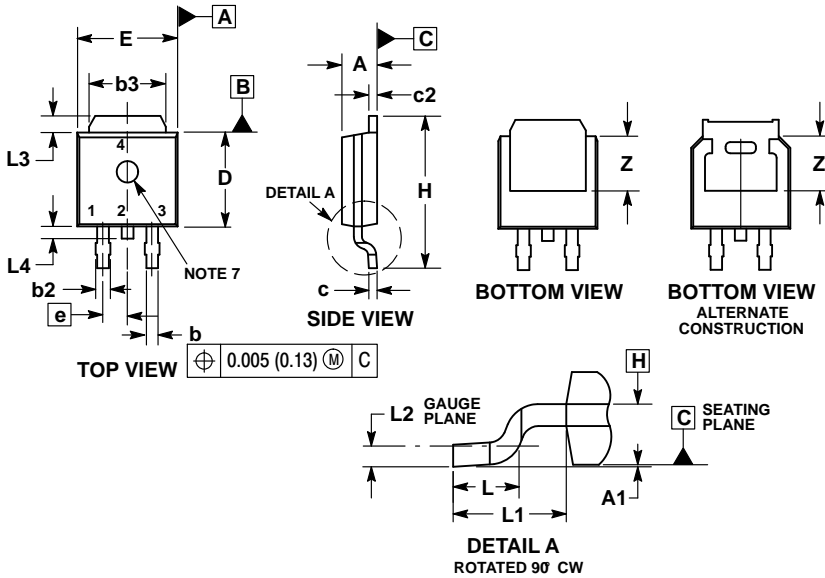
NTD4302

PACKAGE DIMENSIONS

DPAK (SINGLE GAUGE)

CASE 369C

ISSUE E



NOTES:

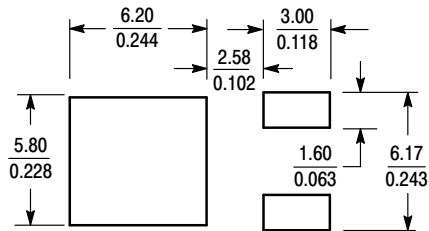
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
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.
7. OPTIONAL MOLD FEATURE.

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	0.028	0.045	0.72	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	0.114 REF		2.90 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

SOLDERING FOOTPRINT*



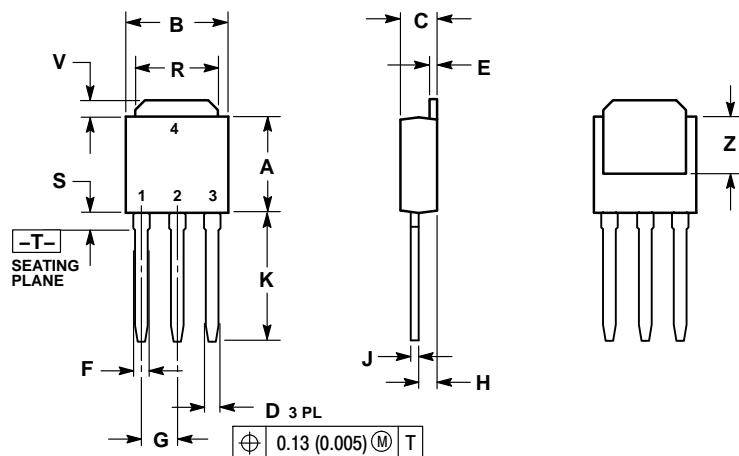
SCALE 3:1 (mm/inches)

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

NTD4302

PACKAGE DIMENSIONS

IPAK
CASE 369D
ISSUE C




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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