

NTD3055-150

Power MOSFET 9.0 A, 60 V

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 Packages are Available

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}	60	Vdc
Drain-to-Gate Voltage ($R_{GS} = 10\text{ M}\Omega$)	V_{DGR}	60	Vdc
Gate-to-Source Voltage	V_{GS}	± 20	Vdc
– Continuous	V_{GS}	± 30	
– Non-repetitive ($t_p \leq 10\text{ ms}$)			
Drain Current	I_D	9.0	Adc
– Continuous @ $T_A = 25^\circ\text{C}$	I_D	3.0	
– Continuous @ $T_A = 100^\circ\text{C}$	I_{DM}	27	Apk
– Single Pulse ($t_p \leq 10\text{ }\mu\text{s}$)			
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	28.8	W
Derate above 25°C		0.19	W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1)		2.1	W
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 2)		1.5	W
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 25\text{ Vdc}$, $V_{GS} = 10\text{ Vdc}$, $L = 1.0\text{ mH}$, $I_L(pk) = 7.75\text{ A}$, $V_{DS} = 60\text{ Vdc}$)	E_{AS}	30	mJ
Thermal Resistance	$R_{\theta JC}$	5.2	$^\circ\text{C/W}$
– Junction-to-Case	$R_{\theta JA}$	71.4	
– Junction-to-Ambient (Note 1)	$R_{\theta JA}$	100	
– Junction-to-Ambient (Note 2)			
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

- When surface mounted to an FR4 board using 0.5 sq in pad size.
- When surface mounted to an FR4 board using minimum recommended pad size.

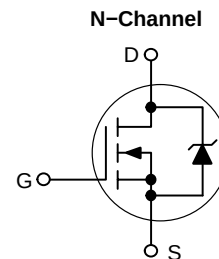


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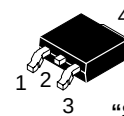
<http://onsemi.com>

9.0 AMPERES, 60 VOLTS

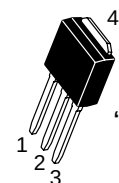
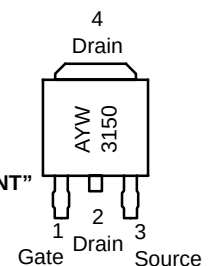
$R_{DS(on)} = 122\text{ m}\Omega$ (Typ)



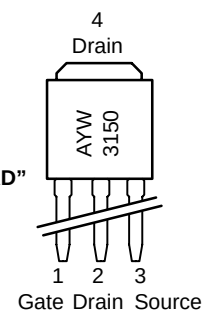
MARKING DIAGRAMS



DPK
CASE 369C
STYLE 2
"SURFACE MOUNT"



DPAK-3
CASE 369D
STYLE 2
"STRAIGHT LEAD"



3150 Device Code
A = Assembly Location
Y = Year
W = Work Week

ORDERING INFORMATION

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

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) ($V_{GS} = 0\text{ Vdc}$, $I_D = 250\text{ }\mu\text{Adc}$) Temperature Coefficient (Positive)	$V_{(BR)DSS}$	60 –	– 70.2	– –	Vdc mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current ($V_{DS} = 60\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 60\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 150^\circ\text{C}$)	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 (Note 3)

Gate Threshold Voltage (Note 3) ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$) Threshold Temperature Coefficient (Negative)	$V_{GS(th)}$	2.0 –	3.0 6.4	4.0 –	Vdc mV/ $^\circ\text{C}$
Static Drain-to-Source On-Resistance (Note 3) ($V_{GS} = 10\text{ Vdc}$, $I_D = 4.5\text{ Adc}$)	$R_{DS(on)}$	–	122	150	m Ω
Static Drain-to-Source On-Voltage (Note 3) ($V_{GS} = 10\text{ Vdc}$, $I_D = 9.0\text{ Adc}$) ($V_{GS} = 10\text{ Vdc}$, $I_D = 4.5\text{ Adc}$, $T_J = 150^\circ\text{C}$)	$V_{DS(on)}$	– –	1.4 1.1	1.9 –	Vdc
Forward Transconductance (Note 3) ($V_{DS} = 7.0\text{ Vdc}$, $I_D = 6.0\text{ Adc}$)	g_{FS}	–	5.4	–	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	($V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{iss}	–	200	280	pF
Output Capacitance		C_{oss}	–	70	100	
Transfer Capacitance		C_{rss}	–	26	40	

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	($V_{DD} = 48\text{ Vdc}$, $I_D = 9.0\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$, $R_G = 9.1\text{ }\Omega$) (Note 3)	$t_{d(on)}$	–	11.2	25	ns
Rise Time		t_r	–	37.1	80	
Turn-Off Delay Time		$t_{d(off)}$	–	12.2	25	
Fall Time		t_f	–	23	50	
Gate Charge	($V_{DS} = 48\text{ Vdc}$, $I_D = 9.0\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$) (Note 3)	Q_T	–	7.1	15	nC
		Q_1	–	1.7	–	
		Q_2	–	3.5	–	

SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	($I_S = 9.0\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) (Note 3) ($I_S = 19\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 150^\circ\text{C}$)	V_{SD}	– –	0.98 0.86	1.20 –	Vdc
Reverse Recovery Time	($I_S = 9.0\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $di_S/dt = 100\text{ A}/\mu\text{s}$) (Note 3)	t_{rr}	–	28.9	–	ns
		t_a	–	21.6	–	
		t_b	–	7.3	–	
Reverse Recovery Stored Charge		Q_{RR}	–	0.036	–	μC

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

4. Switching characteristics are independent of operating junction temperatures.

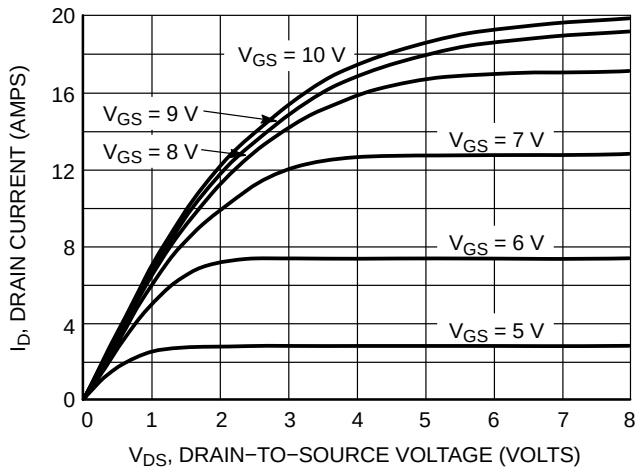


Figure 1. On-Region Characteristics

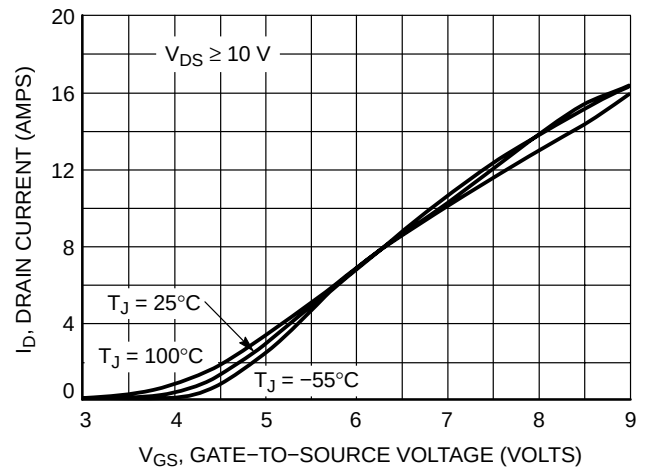


Figure 2. Transfer Characteristics

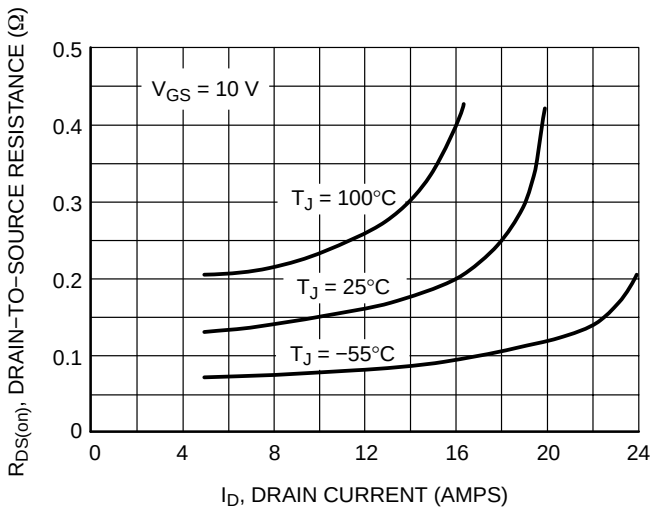


Figure 3. On-Resistance versus Gate-to-Source Voltage

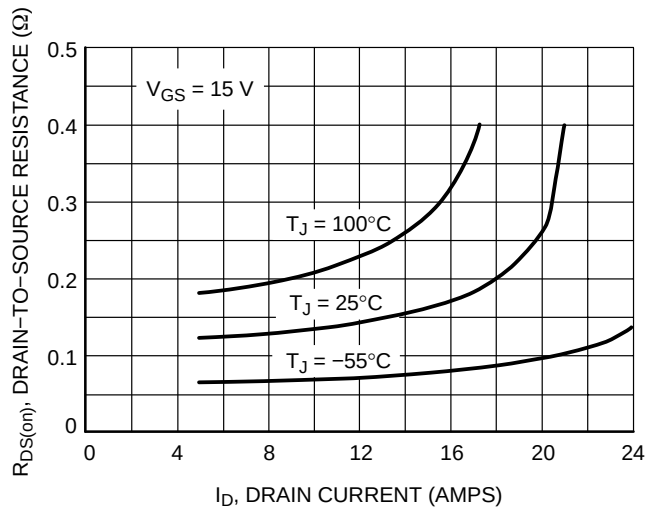


Figure 4. On-Resistance versus Drain Current and Gate Voltage

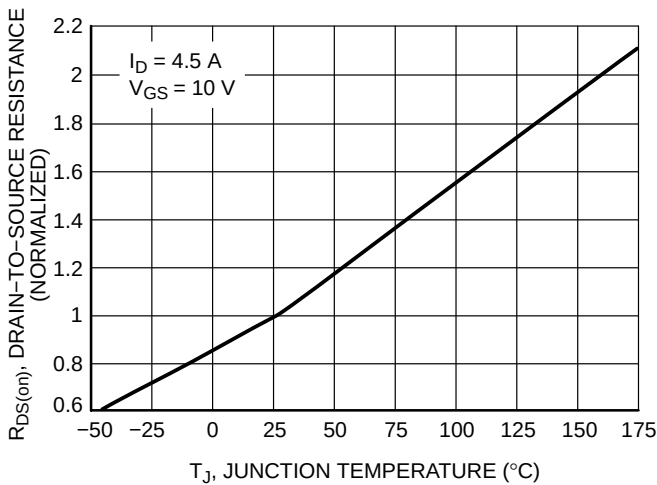


Figure 5. On-Resistance Variation with Temperature

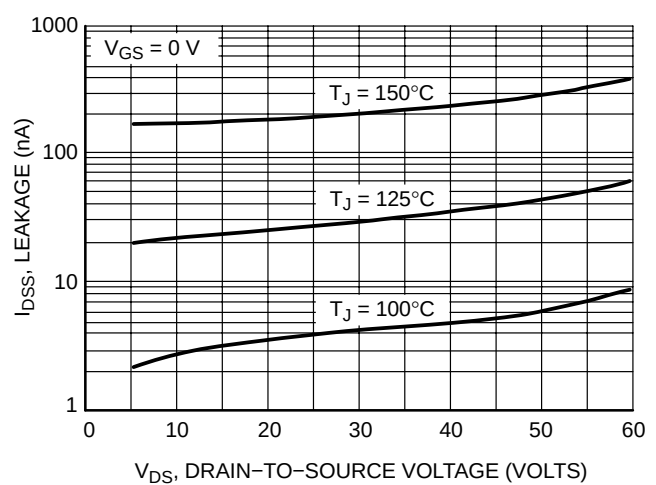


Figure 6. Drain-to-Source Leakage Current versus Voltage

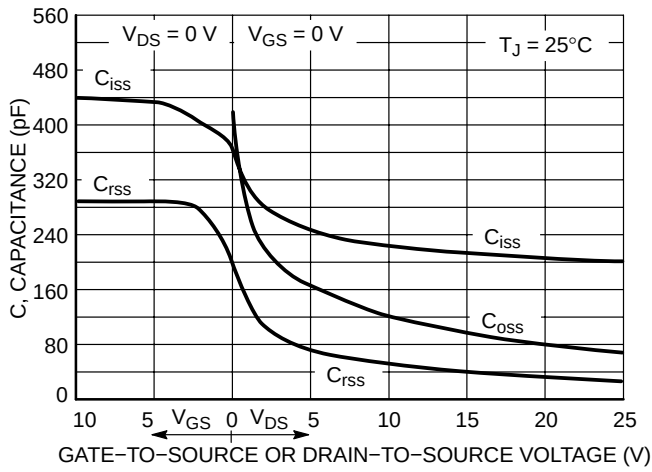


Figure 7. Capacitance Variation

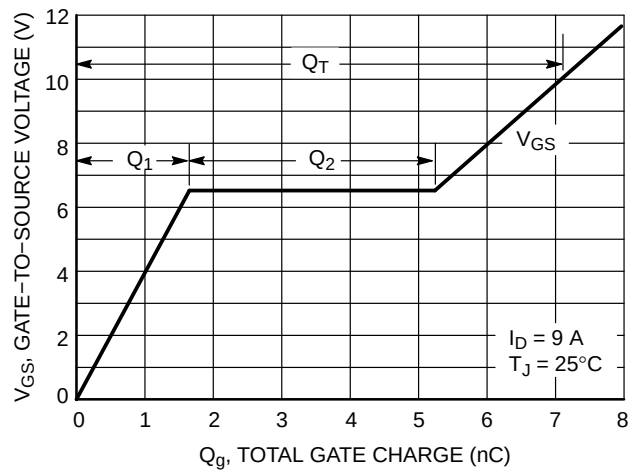


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

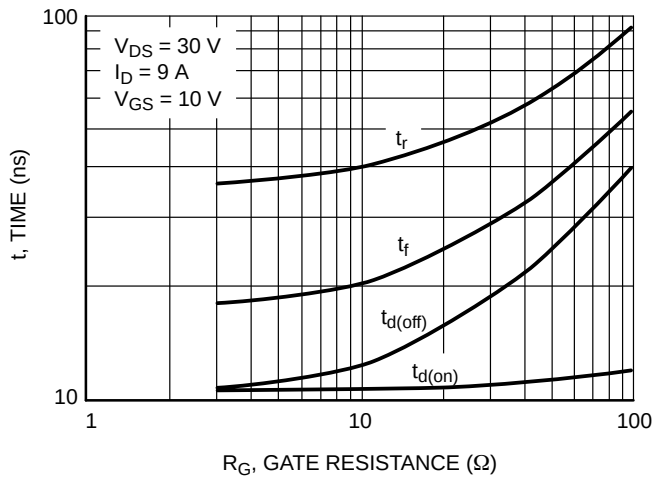


Figure 9. Resistive Switching Time Variation versus Gate Resistance

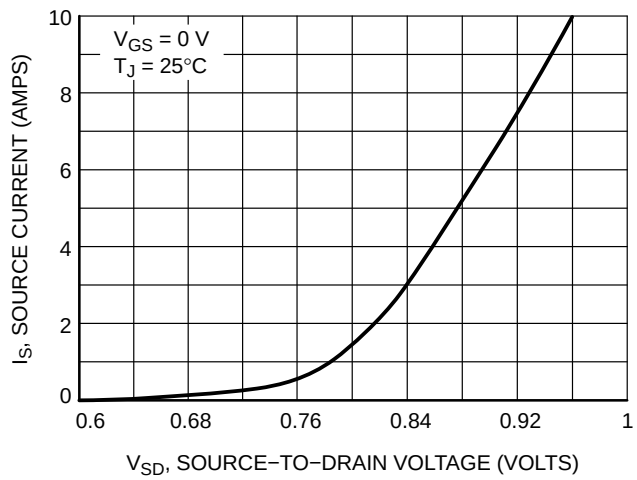


Figure 10. Diode Forward Voltage versus Current

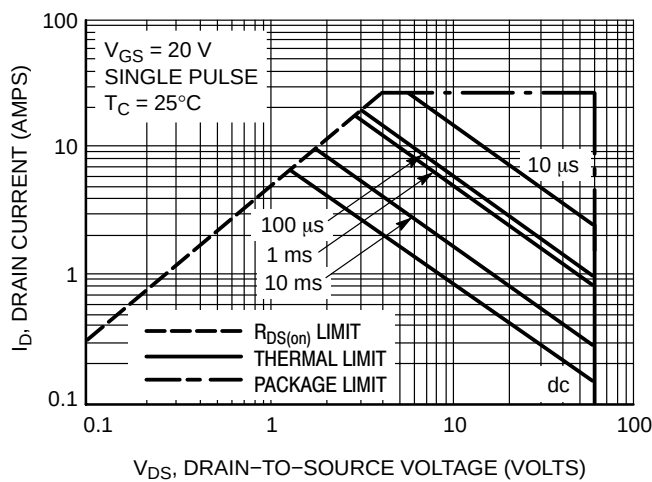


Figure 11. Maximum Rated Forward Biased Safe Operating Area

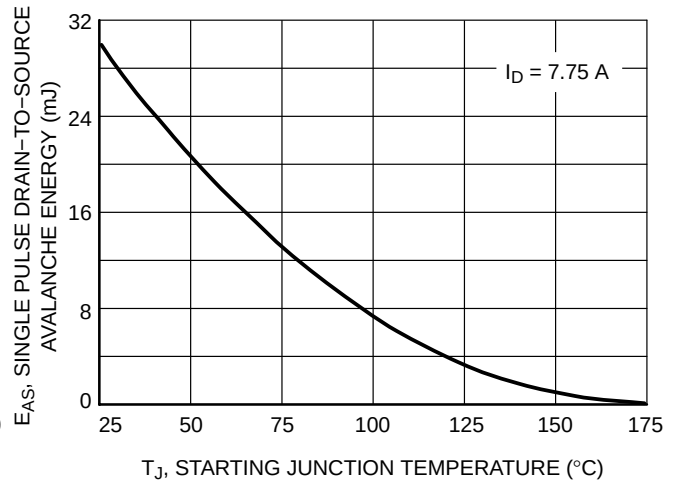


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

NTD3055-150

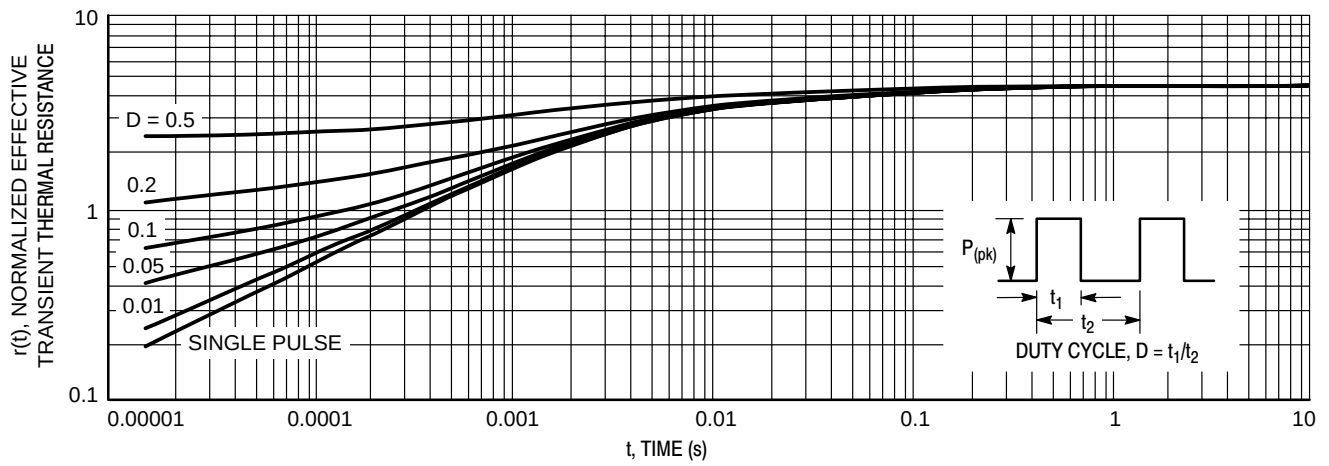


Figure 13. Thermal Response

ORDERING INFORMATION

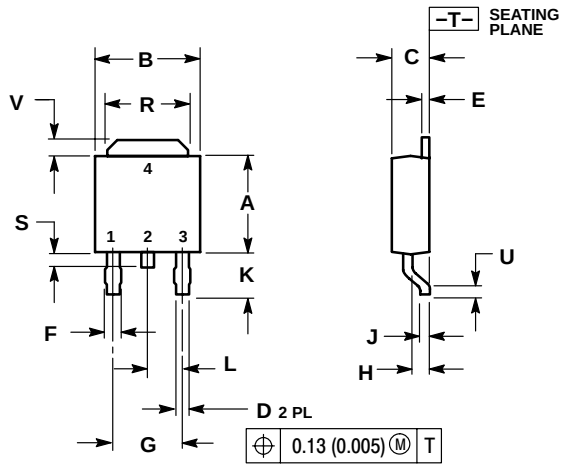
Device	Package	Shipping [†]
NTD3055-150	DPAK	75 Units/Rail
NTD3055-150G	DPAK (Pb-Free)	75 Units/Rail
NTD3055-150-1	DPAK-3	75 Units/Rail
NTD3055-150-1G	DPAK-3 (Pb-Free)	75 Units/Rail
NTD3055-150T4	DPAK	2500 Tape & Reel
NTD3055-150T4G	DPAK (Pb-Free)	2500 Tape & Reel

[†]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.

NTD3055-150

PACKAGE DIMENSIONS

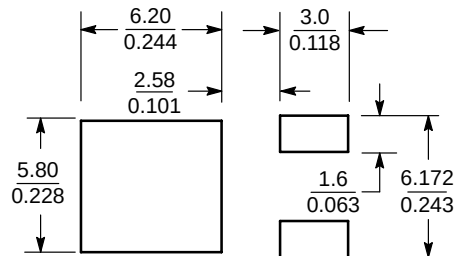
DPAK
CASE 369C-01
ISSUE O



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	0.027	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	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
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*



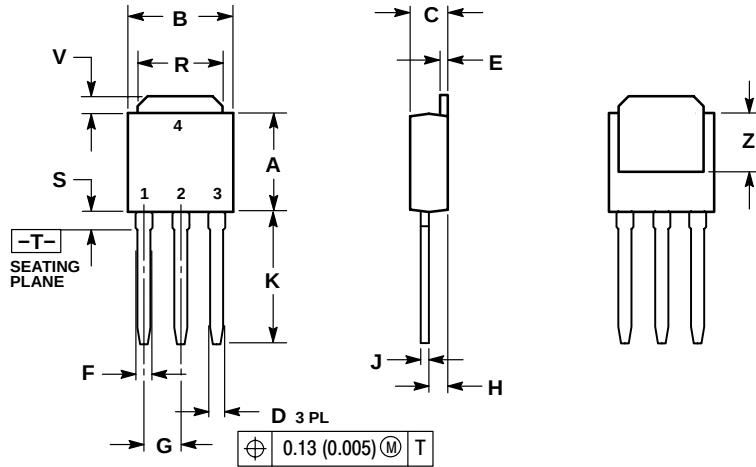
SCALE 3:1 (mm/inches)

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

NTD3055-150

PACKAGE DIMENSIONS

DPAK-3
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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