

NTD3055-094

Advance Information Power MOSFET 12 Amps, 60 Volts N-Channel DPAK

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

Features

- Lower $R_{DS(on)}$
- Lower $V_{DS(on)}$
- Lower and Tighter V_{SD}
- Lower Diode Reverse Recovery Time
- Lower Reverse Recovery Stored Charge

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_{DSS}	60	Vdc
Drain-to-Gate Voltage ($R_{GS} = 10\text{ M}\Omega$)	V_{DGR}	60	Vdc
Gate-to-Source Voltage	V_{GS}		Vdc
– Continuous	V_{GS}	± 20	
– Non-Repetitive ($t_p \leq 10\text{ ms}$)	V_{GS}	± 30	
Drain Current	I_D		Adc
– Continuous @ $T_A = 25^\circ\text{C}$	I_D	12	
– Continuous @ $T_A = 100^\circ\text{C}$	I_D	10	
– Single Pulse ($t_p \leq 10\text{ }\mu\text{s}$)	I_{DM}	45	Apk
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	48	W
Derate above 25°C		0.32	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 $T_J = 25^\circ\text{C}$ ($V_{DD} = 25\text{ Vdc}$, $V_{GS} = 10\text{ Vdc}$, $L = 1.0\text{ mH}$ $I_{L(pk)} = 11\text{ A}$, $V_{DS} = 60\text{ Vdc}$)	E_{AS}	61	mJ
Thermal Resistance	$R_{\theta JC}$	3.13	$^\circ\text{C/W}$
– 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	$^\circ\text{C}$

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).

This document contains information on a new product. Specifications and information herein are subject to change without notice.



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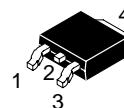
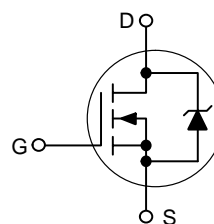
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12 AMPERES

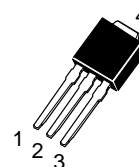
60 VOLTS

$R_{DS(on)} = 94\text{ m}\Omega$

N-Channel



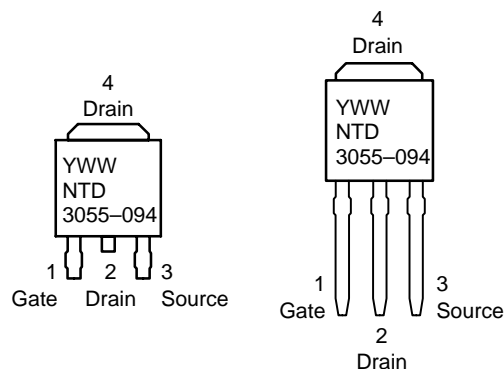
**CASE 369A
DPAK
(Bent Lead)
STYLE 2**



**CASE 369
DPAK
(Straight Lead)
STYLE 2**

NTD3055-094 = Device Code
Y = Year
WW = Work Week

MARKING DIAGRAMS & PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package	Shipping
NTD3055-094	DPAK	75 Units/Rail
NTD3055-094-1	DPAK Straight Lead	75 Units/Rail
NTD3055-094T4	DPAK	2500 Tape & Reel

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 –	68 54.4	– –	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 –	2.9 6.3	4.0 –	Vdc mV/ $^\circ\text{C}$
Static Drain-to-Source On-Resistance (Note 3.) ($V_{GS} = 10\text{ Vdc}$, $I_D = 6.0\text{ Adc}$)	$R_{DS(on)}$	–	84	94	mOhm
Static Drain-to-Source On-Voltage (Note 3.) ($V_{GS} = 10\text{ Vdc}$, $I_D = 12\text{ Adc}$) ($V_{GS} = 10\text{ Vdc}$, $I_D = 6.0\text{ Adc}$, $T_J = 150^\circ\text{C}$)	$V_{DS(on)}$	– –	0.85 0.77	1.35 –	Vdc
Forward Transconductance (Note 3.) ($V_{DS} = 7.0\text{ Vdc}$, $I_D = 6.0\text{ Adc}$)	g_{FS}	–	6.7	–	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{iss}	–	323	450	pF
Output Capacitance		C_{oss}	–	107	150	
Transfer Capacitance		C_{rss}	–	34	70	

SWITCHING CHARACTERISTICS (Note 4.)

Turn-On Delay Time	$(V_{DD} = 48\text{ Vdc}$, $I_D = 12\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$, $R_G = 9.1\text{ }\Omega$) (Note 3.)	$t_{d(on)}$	–	7.7	15	ns
Rise Time		t_r	–	32.3	70	
Turn-Off Delay Time		$t_{d(off)}$	–	25.2	50	
Fall Time		t_f	–	23.9	50	
Gate Charge	$(V_{DS} = 48\text{ Vdc}$, $I_D = 12\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$) (Note 3.)	Q_T	–	10.9	20	nC
		Q_1	–	3.1	–	
		Q_2	–	4.2	–	

SOURCE-DRAIN DIODE CHARACTERISTICS

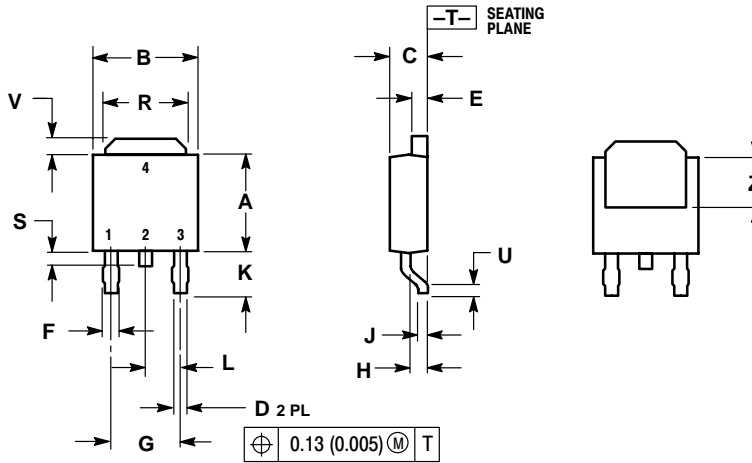
Forward On-Voltage	$(I_S = 12\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) (Note 3.) $(I_S = 12\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 150^\circ\text{C}$)	V_{SD}	– –	0.94 0.82	1.15 –	Vdc
Reverse Recovery Time	$(I_S = 12\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $di_S/dt = 100\text{ A}/\mu\text{s}$) (Note 3.)	t_{rr}	–	33.1	–	ns
		t_a	–	24	–	
		t_b	–	8.9	–	
Reverse Recovery Stored Charge		Q_{RR}	–	0.047	–	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.

PACKAGE DIMENSIONS

DPAK
CASE 369A-13
ISSUE AA

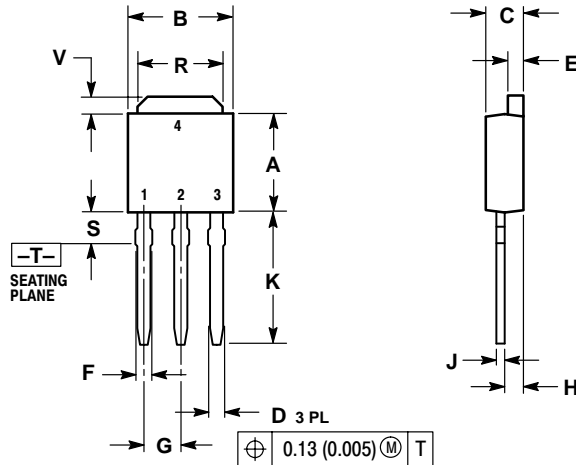


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	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	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
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	0.175	0.215	4.45	5.46
S	0.020	0.050	0.51	1.27
U	0.020	---	0.51	---
V	0.030	0.050	0.77	1.27
Z	0.138	---	3.51	---

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

DPAK
CASE 369-07
ISSUE M



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	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	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
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	0.175	0.215	4.45	5.46
S	0.050	0.090	1.27	2.28
V	0.030	0.050	0.77	1.27

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

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