

# NTD32N06L

## Power MOSFET 32 Amps, 60 Volts, Logic Level N-Channel DPAK

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

### Features

- Smaller Package than MTB30N06VL
- Lower  $R_{DS(on)}$
- Lower  $V_{DS(on)}$
- Lower Total Gate Charge
- 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	$V_{GS}$	$\pm 15$	Vdc
– Continuous	$V_{GS}$	$\pm 20$	
– Non-Repetitive ( $t_p \leq 10\text{ ms}$ )			
Drain Current			
– Continuous @ $T_A = 25^\circ\text{C}$	$I_D$	32	A dc
– Continuous @ $T_A = 100^\circ\text{C}$	$I_D$	22	
– Single Pulse ( $t_p \leq 10\text{ }\mu\text{s}$ )	$I_{DM}$	90	A pk
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	93.75	W
Derate above $25^\circ\text{C}$		0.625	W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1.)		2.88	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 $T_J = 25^\circ\text{C}$ (Note 3.) ( $V_{DD} = 50\text{ Vdc}$ , $V_{GS} = 5\text{ Vdc}$ , $L = 1.0\text{ mH}$ , $I_{L(pk)} = 25\text{ A}$ , $V_{DS} = 60\text{ Vdc}$ , $R_G = 25\text{ }\Omega$ )	$E_{AS}$	313	mJ
Thermal Resistance			$^\circ\text{C/W}$
– Junction-to-Case	$R_{\theta JC}$	1.6	
– Junction-to-Ambient (Note 1.)	$R_{\theta JA}$	52	
– Junction-to-Ambient (Note 2.)	$R_{\theta JA}$	100	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	$T_L$	260	$^\circ\text{C}$

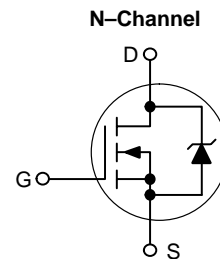
1. When surface mounted to an FR4 board using 1" pad size, (Cu Area 1.127 in<sup>2</sup>).
2. When surface mounted to an FR4 board using minimum recommended pad size, (Cu Area 0.412 in<sup>2</sup>).
3. Repetitive rating; pulse width limited by maximum junction temperature.



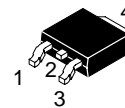
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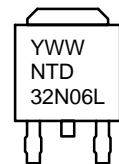
**32 AMPERES**  
**60 VOLTS**  
 $R_{DS(on)} = 28\text{ m}\Omega$



### MARKING DIAGRAM

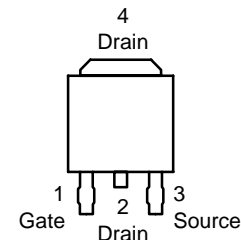


CASE 369A  
DPAK  
STYLE 2



NTD32N06L = Device Code  
Y = Year  
WW = Work Week  
T = MOSFET

### PIN ASSIGNMENT



### ORDERING INFORMATION

Device	Package	Shipping
NTD32N06L	DPAK	75 Units/Rail
NTD32N06L-1	DPAK	75 Units/Rail
NTD32N06LT4	DPAK	2500 Tape & Reel

# NTD32N06L

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Drain-to-Source Breakdown Voltage (Note 1) (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 250 μAdc) Temperature Coefficient (Positive)	V <sub>(BR)DSS</sub>	60 –	70 62	– –	Vdc mV/°C
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 60 Vdc, V <sub>GS</sub> = 0 Vdc) (V <sub>DS</sub> = 60 Vdc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 150°C)	I <sub>DSS</sub>	– –	– –	1.0 10	μAdc
Gate-Body Leakage Current (V <sub>GS</sub> = ±15 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	–	–	±100	nAdc

## ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage (Note 1) (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μAdc) Threshold Temperature Coefficient (Negative)	V <sub>GS(th)</sub>	1.0 –	1.7 4.8	2.0 –	Vdc mV/°C
Static Drain-to-Source On-Resistance (Note 1) (V <sub>GS</sub> = 5 Vdc, I <sub>D</sub> = 16 Adc)	R <sub>DS(on)</sub>	–	23.7	28	mΩ
Static Drain-to-Source On-Resistance (Note 1) (V <sub>GS</sub> = 5 Vdc, I <sub>D</sub> = 20 Adc) (V <sub>GS</sub> = 5 Vdc, I <sub>D</sub> = 32 Adc) (V <sub>GS</sub> = 5 Vdc, I <sub>D</sub> = 16 Adc, T <sub>J</sub> = 150°C)	V <sub>DS(on)</sub>	– – –	0.48 0.78 0.61	0.67 – –	Vdc
Forward Transconductance (Note 1) (V <sub>DS</sub> = 6 Vdc, I <sub>D</sub> = 16 Adc)	g <sub>FS</sub>	–	27	–	mhos

## DYNAMIC CHARACTERISTICS

Input Capacitance	(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0 Vdc, f = 1.0 MHz)	C <sub>iss</sub>	–	1214	1700	pF
Output Capacitance		C <sub>oss</sub>	–	343	480	
Transfer Capacitance		C <sub>rss</sub>	–	87	180	

## SWITCHING CHARACTERISTICS (Note 2)

Turn-On Delay Time	(V <sub>DD</sub> = 30 Vdc, I <sub>D</sub> = 32 Adc, V <sub>GS</sub> = 5 Vdc, R <sub>G</sub> = 9.1 Ω) (Note 1)	t <sub>d(on)</sub>	–	12.8	30	ns
Rise Time		t <sub>r</sub>	–	221	450	
Turn-Off Delay Time		t <sub>d(off)</sub>	–	37	80	
Fall Time		t <sub>f</sub>	–	128	260	
Gate Charge	(V <sub>DS</sub> = 48 Vdc, I <sub>D</sub> = 32 Adc, V <sub>GS</sub> = 5 Vdc) (Note 1)	Q <sub>T</sub>	–	23	50	nC
		Q <sub>1</sub>	–	4.5	–	
		Q <sub>2</sub>	–	14	–	

## SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	(I <sub>S</sub> = 20 Adc, V <sub>GS</sub> = 0 Vdc) (Note 1) (I <sub>S</sub> = 32 Adc, V <sub>GS</sub> = 0 Vdc) (Note 1) (I <sub>S</sub> = 20 Adc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 150°C)	V <sub>SD</sub>	– – –	0.89 0.95 0.74	1.0 – –	Vdc
Reverse Recovery Time	(I <sub>S</sub> = 32 Adc, V <sub>GS</sub> = 0 Vdc, di/dt = 100 A/μs) (Note 1)	t <sub>rr</sub>	–	56	–	ns
		t <sub>a</sub>	–	31	–	
		t <sub>b</sub>	–	25	–	
Reverse Recovery Stored Charge		Q <sub>RR</sub>	–	0.093	–	μC

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

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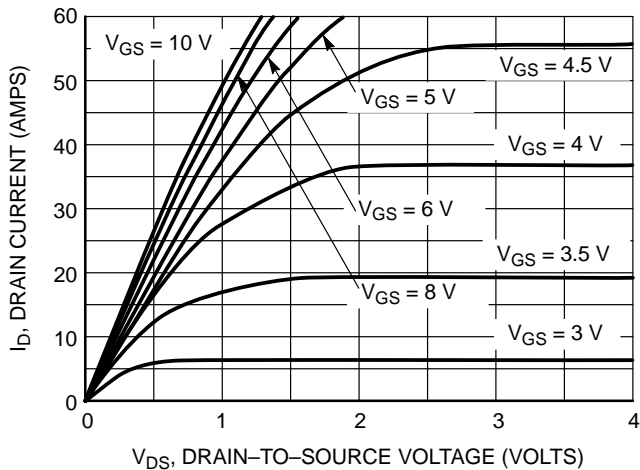


Figure 1. On-Region Characteristics

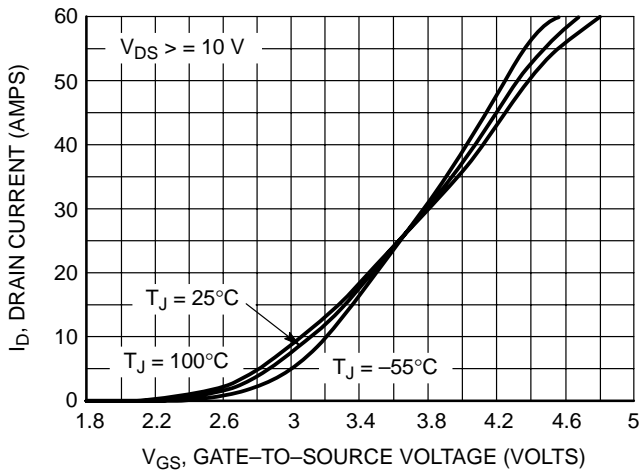


Figure 2. Transfer Characteristics

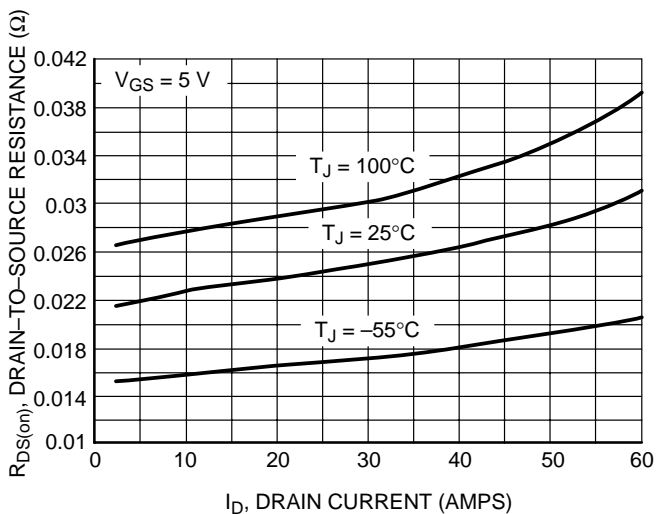


Figure 3. On-Resistance vs. Drain Current

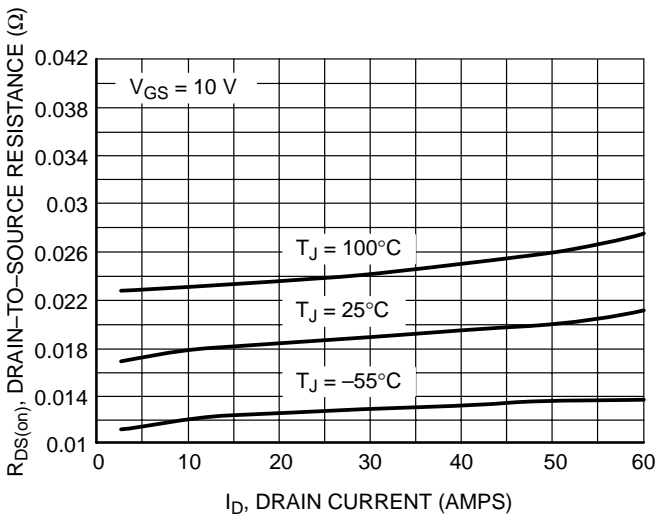


Figure 4. On-Resistance vs. Drain Current

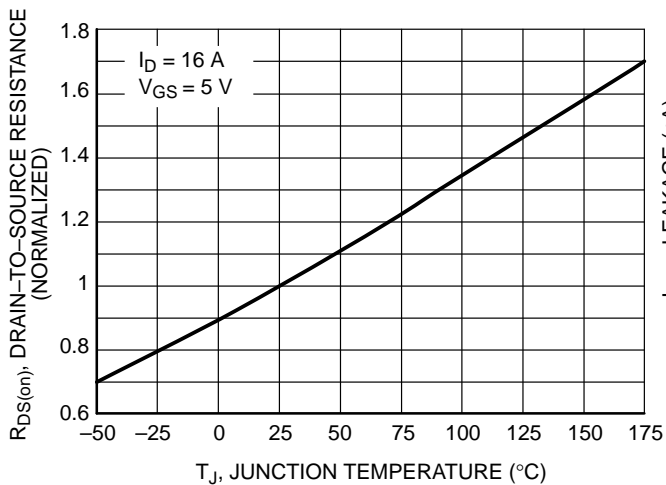


Figure 5. On-Resistance Variation with Temperature

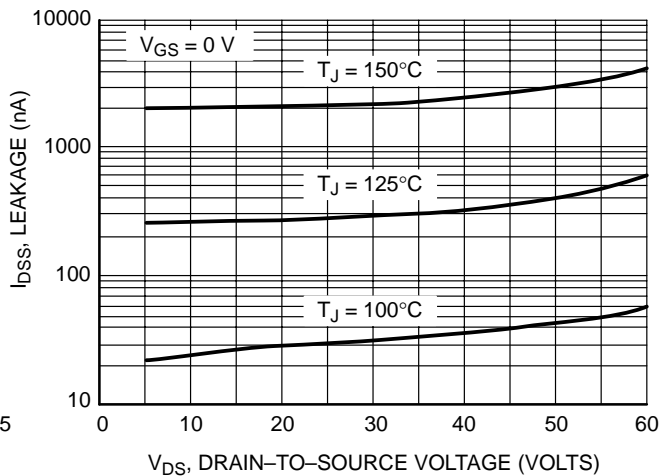
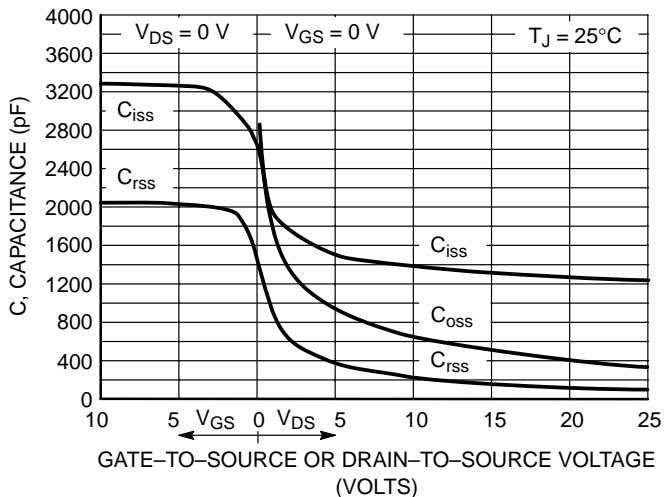
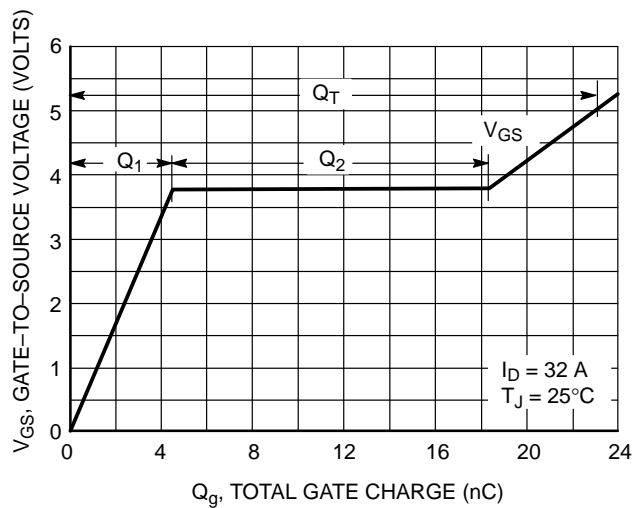


Figure 6. Drain-to-Source Leakage Current vs. Voltage

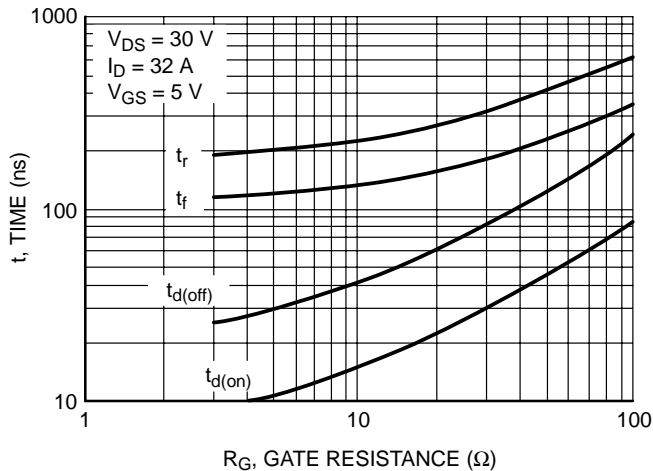
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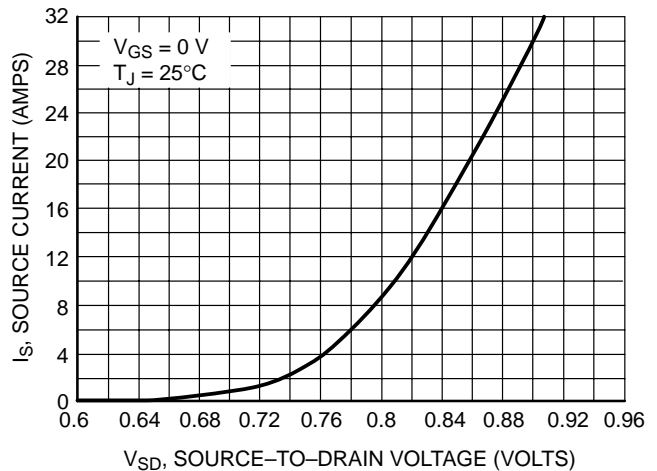
**Figure 7. Capacitance Variation**



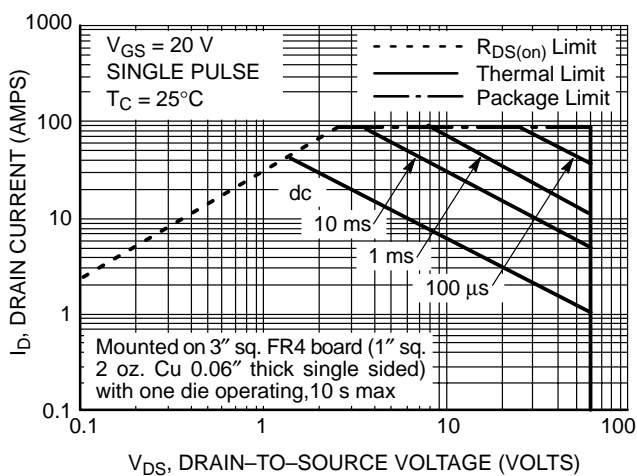
**Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge**



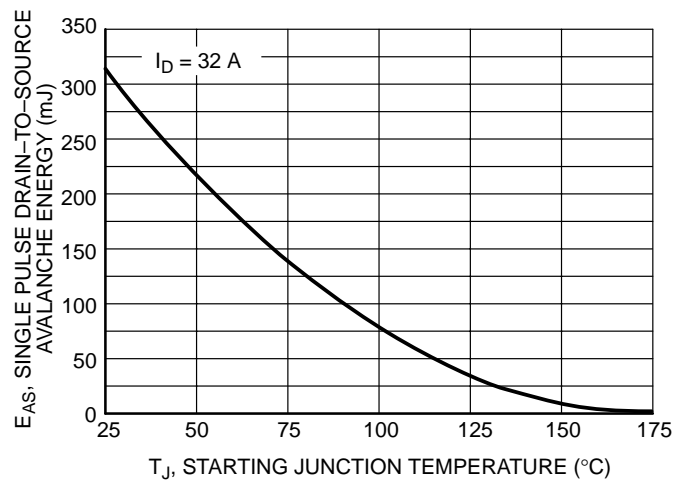
**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**



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



**Figure 11. Maximum Rated Forward Biased Safe Operating Area**



**Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature**

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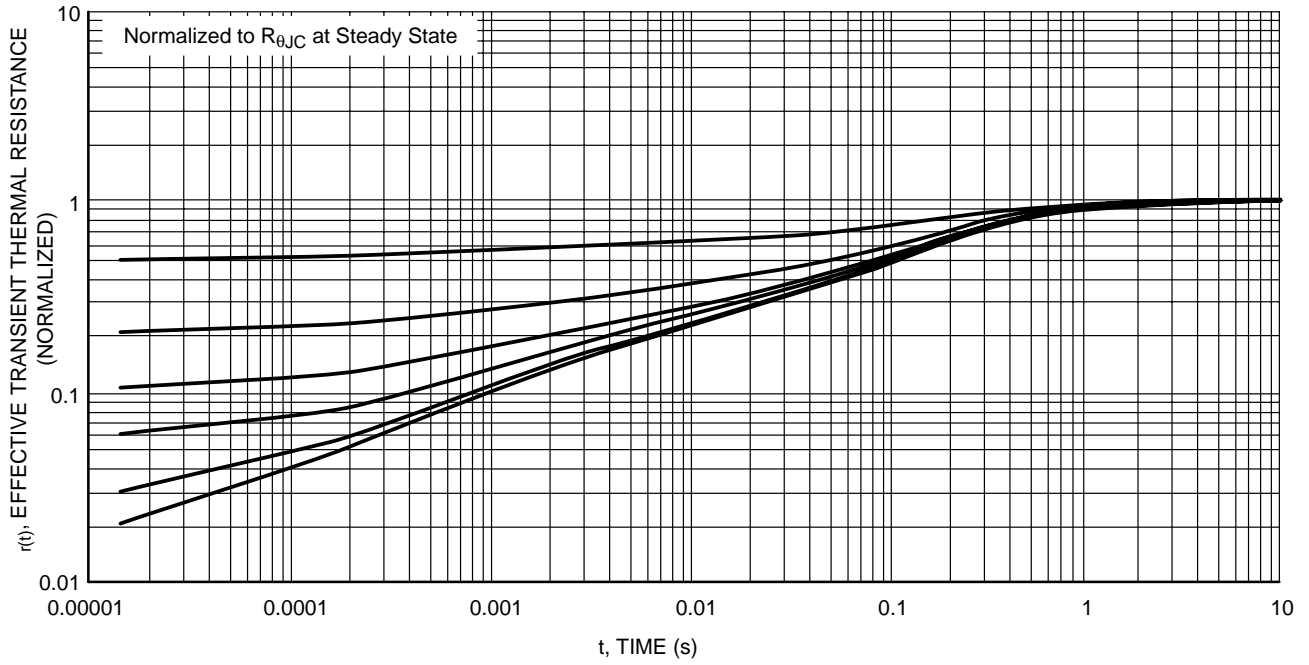


Figure 13. Thermal Response

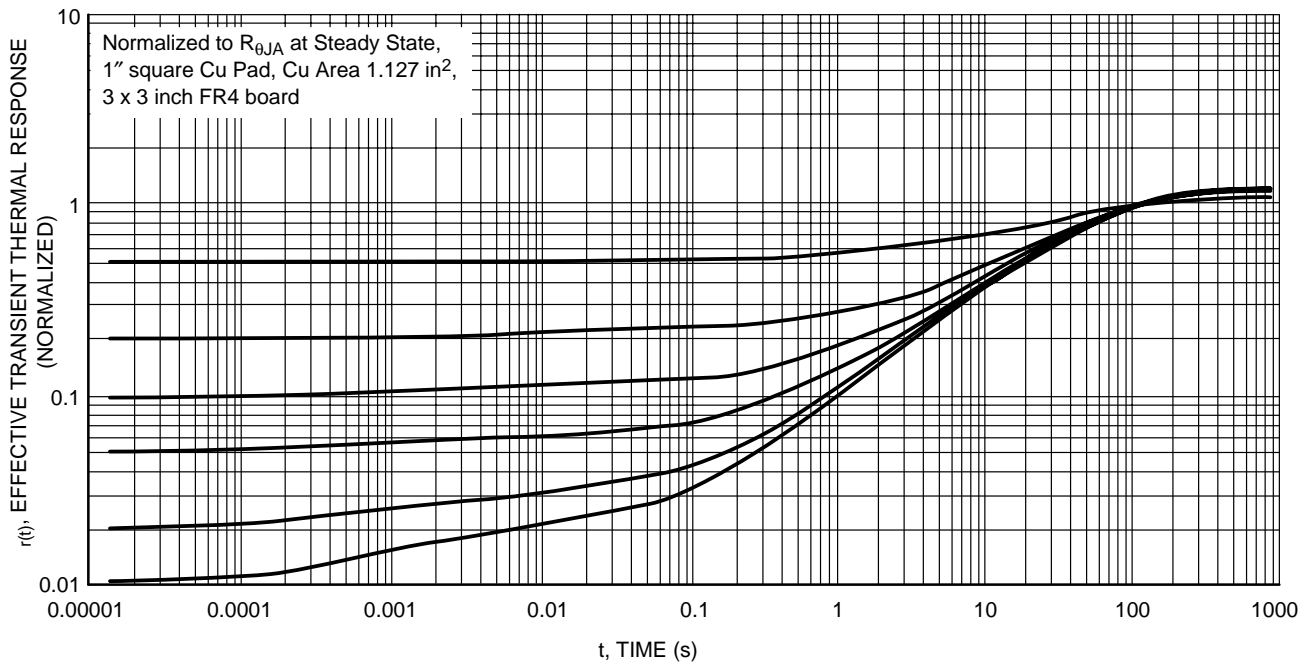
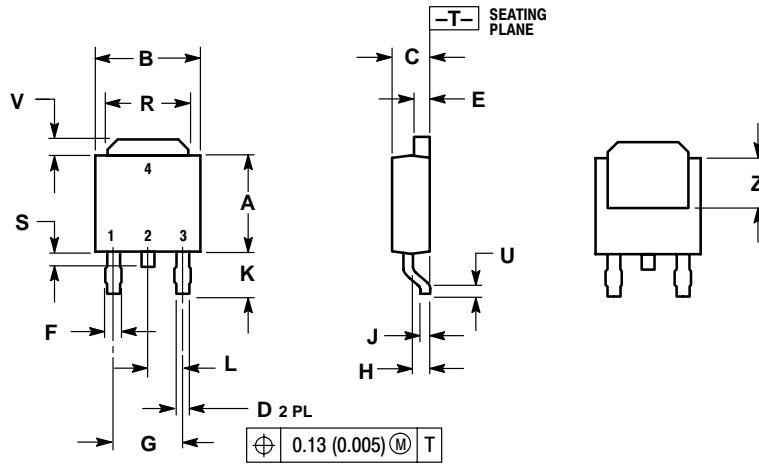


Figure 14. Thermal Response

# NTD32N06L

## PACKAGE DIMENSIONS

DPAK  
CASE 369A-13  
ISSUE AB




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	----

**Notes**

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