

NTP30N06L, NTB30N06L

Power MOSFET 30 Amps, 60 Volts, Logic Level N-Channel TO-220 and D²PAK

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

Typical Applications

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

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V _{DSS}	60	Vdc
Drain-to-Gate Voltage (R _{GS} = 10 MΩ)	V _{DGR}	60	Vdc
Gate-to-Source Voltage	V _{GS}	±15	Vdc
– Continuous	V _{GS}	±20	Vdc
– Non-Repetitive (t _p ≤ 10 ms)			
Drain Current	I _D	30	Adc
– Continuous @ T _A = 25°C	I _D	15	Adc
– Continuous @ T _A = 100°C	I _{DM}	90	Apk
– Single Pulse (t _p ≤ 10 μs)			
Total Power Dissipation @ T _A = 25°C	P _D	88.2	W
Derate above 25°C		0.59	W/°C
Operating and Storage Temperature Range	T _J , T _{stg}	–55 to +175	°C
Single Pulse Drain-to-Source Avalanche Energy – Starting T _J = 25°C (V _{DD} = 50 Vdc, V _{GS} = 5.0 Vdc, L = 0.3 mH I _{L(pk)} = 26 A, V _{DS} = 60 Vdc)	E _{AS}	101	mJ
Thermal Resistance	R _{θJC}	1.7	°C/W
– Junction-to-Case			
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T _L	260	°C



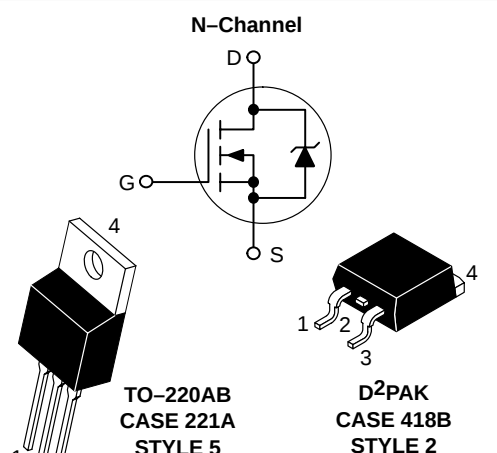
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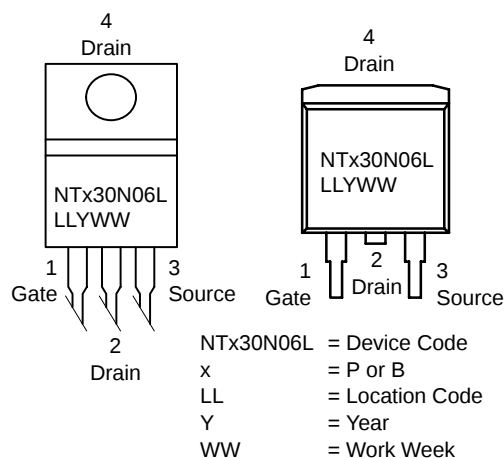
30 AMPERES

60 VOLTS

R_{DS(on)} = 46 mΩ



MARKING DIAGRAMS & PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package	Shipping
NTP30N06L	TO-220AB	50 Units/Rail
NTB30N06L	D ² PAK	50 Units/Rail
NTB30N06LT4	D ² PAK	800/Tape & Reel

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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 1.) ($V_{GS} = 0\text{ Vdc}$, $I_D = 250\text{ }\mu\text{Adc}$) Temperature Coefficient (Positive)	$V_{(BR)DSS}$	60 –	71.8 69	– –	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 ($V_{GS} = \pm 15\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	–	–	± 100	nAdc

ON CHARACTERISTICS (Note 1.)

Gate Threshold Voltage (Note 1.) ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$) Threshold Temperature Coefficient (Negative)	$V_{GS(th)}$	1.0 –	1.7 4.8	2.0 –	Vdc mV/ $^\circ\text{C}$
Static Drain-to-Source On-Resistance (Note 1.) ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 15\text{ Adc}$)	$R_{DS(on)}$	–	38	46	m Ω
Static Drain-to-Source On-Voltage (Note 1.) ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 30\text{ Adc}$) ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 15\text{ Adc}$, $T_J = 150^\circ\text{C}$)	$V_{DS(on)}$	– –	1.3 1.06	1.7 –	Vdc
Forward Transconductance (Note 1.) ($V_{DS} = 7.0\text{ Vdc}$, $I_D = 15\text{ Adc}$)	g_{FS}	–	21	–	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{iss}	–	810	1150	pF
Output Capacitance		C_{oss}	–	260	370	
Transfer Capacitance		C_{rss}	–	80	115	

SWITCHING CHARACTERISTICS (Note 2.)

Turn-On Delay Time	$(V_{DD} = 30\text{ Vdc}$, $I_D = 30\text{ Adc}$, $V_{GS} = 5.0\text{ Vdc}$, $R_G = 9.1\text{ }\Omega$) (Note 1.)	$t_{d(on)}$	–	10	20	ns
Rise Time		t_r	–	200	400	
Turn-Off Delay Time		$t_{d(off)}$	–	15.6	30	
Fall Time		t_f	–	62	120	
Gate Charge	$(V_{DS} = 48\text{ Vdc}$, $I_D = 30\text{ Adc}$, $V_{GS} = 5.0\text{ Vdc}$) (Note 1.)	Q_T	–	16	32	nC
		Q_1	–	3.9	–	
		Q_2	–	10	–	

SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	$(I_S = 30\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) (Note 1.) $(I_S = 30\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 150^\circ\text{C}$)	V_{SD}	– –	1.01 1.03	1.2 –	Vdc
Reverse Recovery Time	$(I_S = 30\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $di_S/dt = 100\text{ A}/\mu\text{s}$) (Note 1.)	t_{rr}	–	50	–	ns
		t_a	–	32	–	
		t_b	–	17	–	
Reverse Recovery Stored Charge		Q_{RR}	–	0.082	–	μC

1. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.
2. Switching characteristics are independent of operating junction temperatures.

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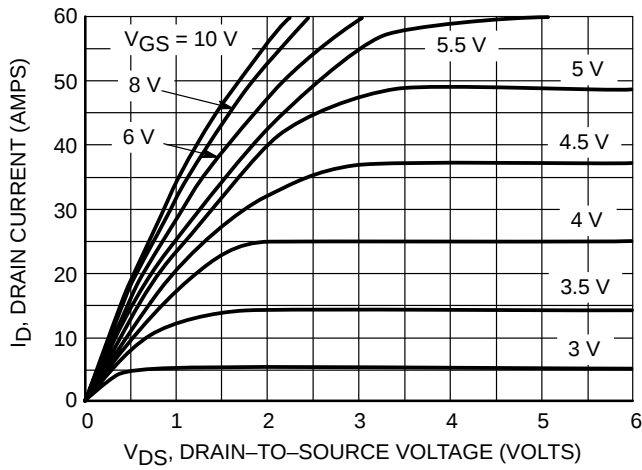


Figure 1. On-Region Characteristics

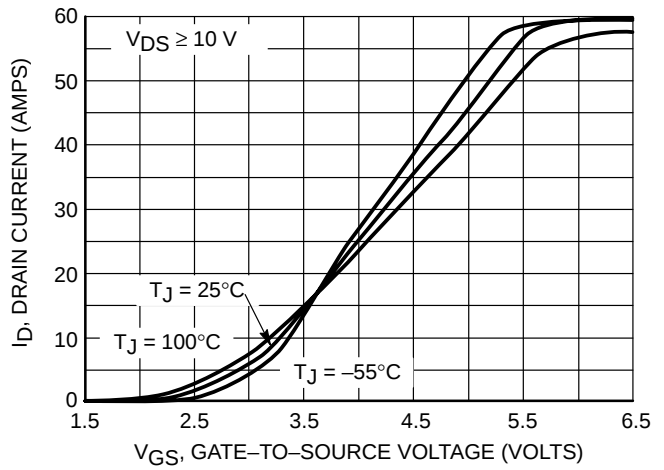


Figure 2. Transfer Characteristics

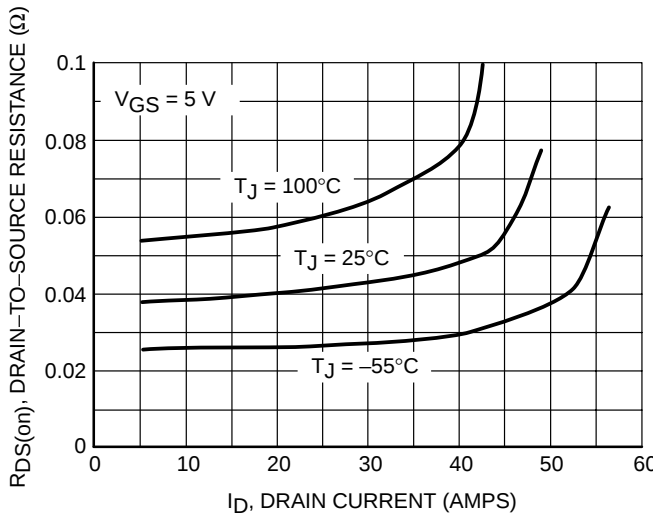


Figure 3. On-Resistance versus Gate-to-Source Voltage

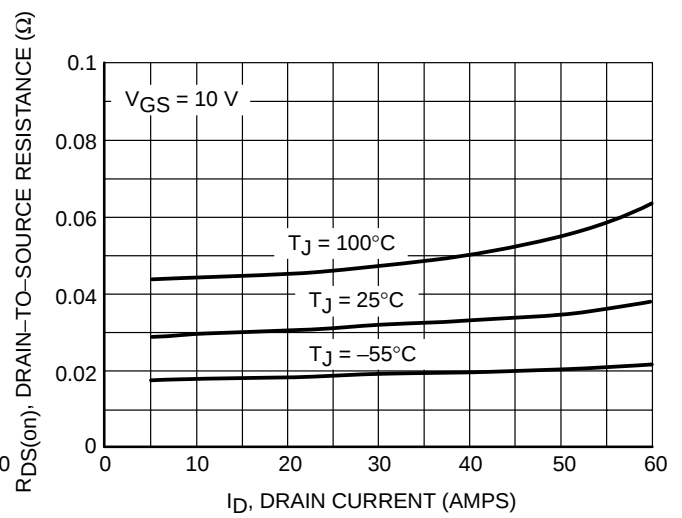


Figure 4. On-Resistance versus Drain Current and Gate Voltage

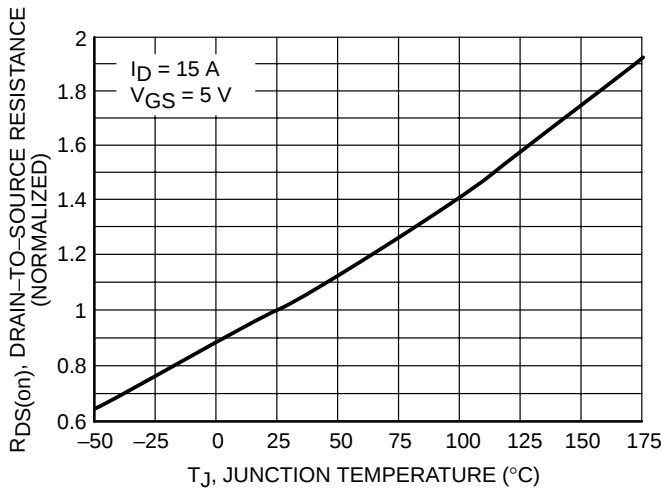


Figure 5. On-Resistance Variation with Temperature

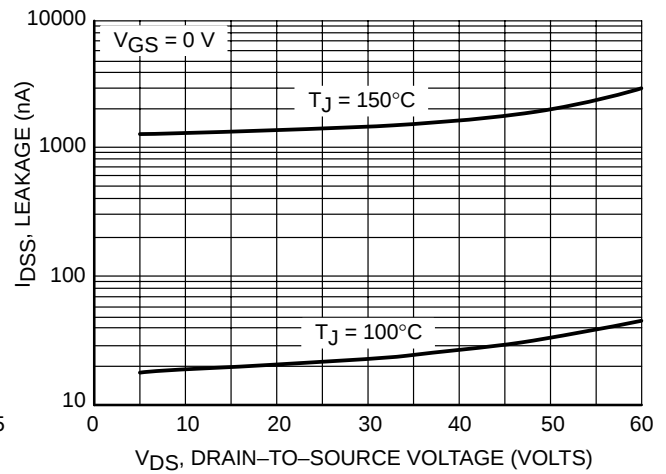


Figure 6. Drain-to-Source Leakage Current versus Voltage

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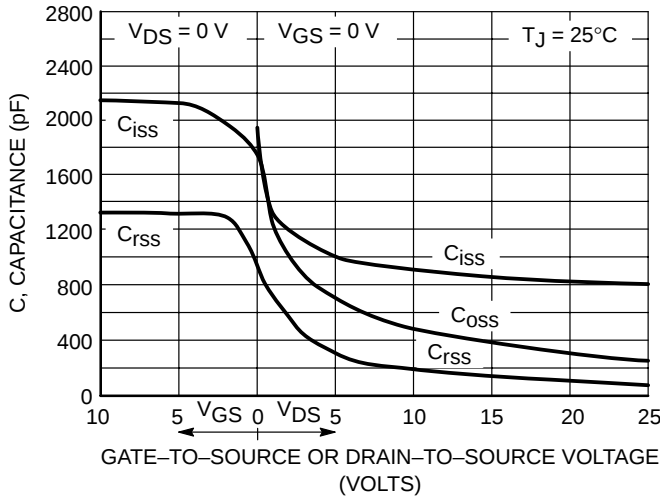


Figure 7. Capacitance Variation

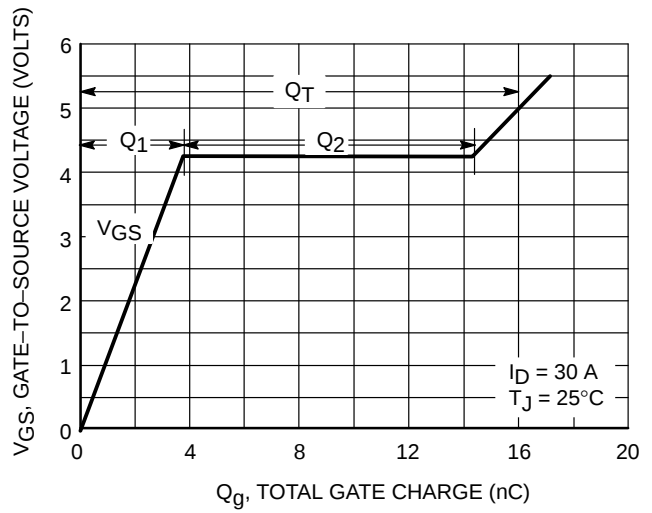


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

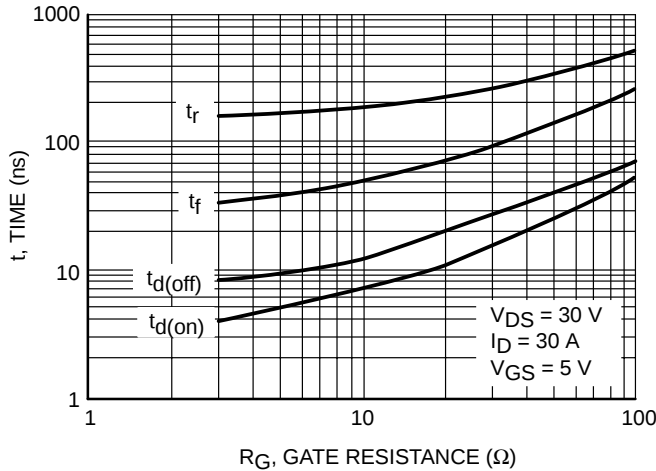


Figure 9. Resistive Switching Time Variation versus Gate Resistance

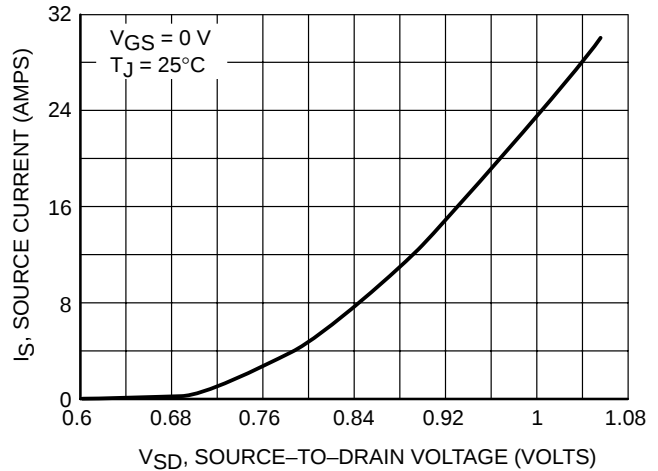


Figure 10. Diode Forward Voltage versus Current

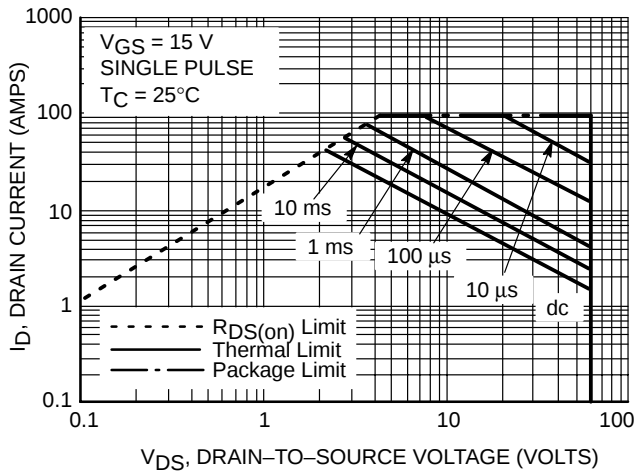


Figure 11. Maximum Rated Forward Biased Safe Operating Area

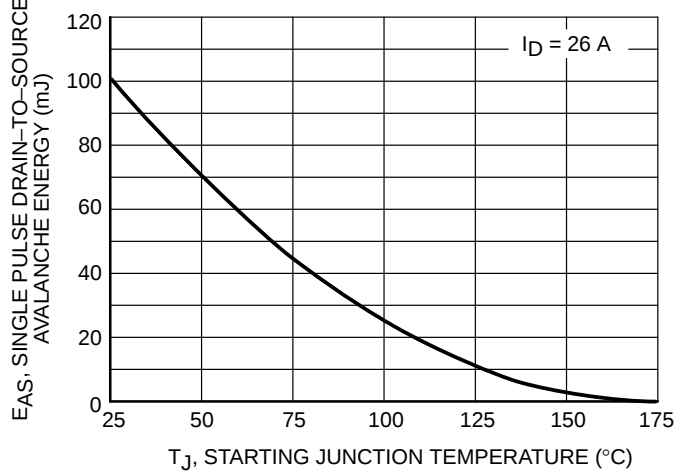


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

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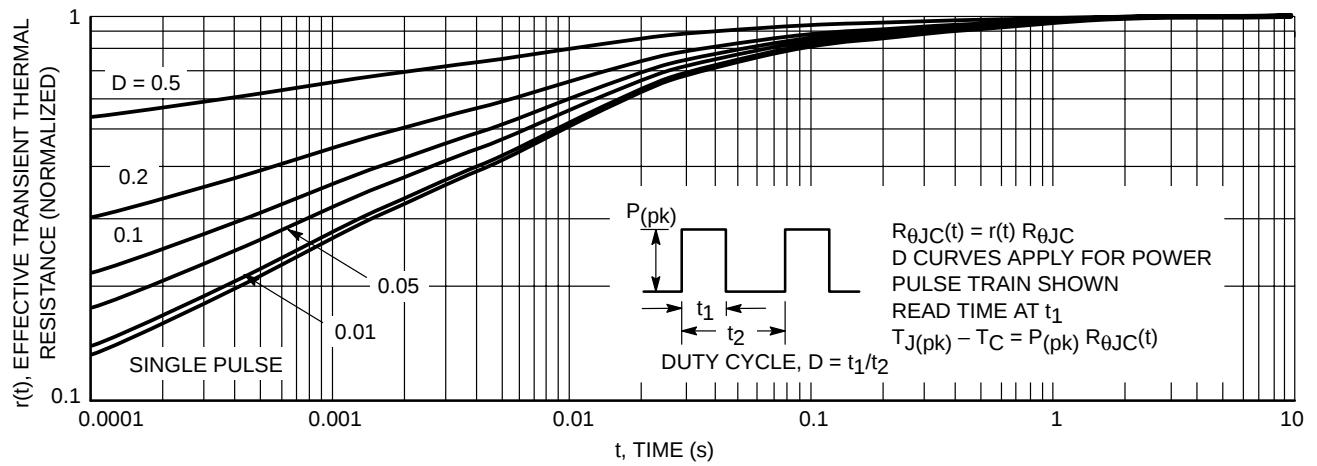


Figure 13. Thermal Response

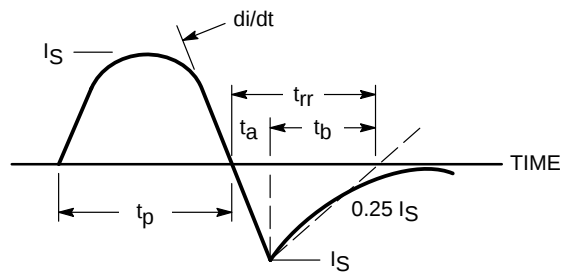
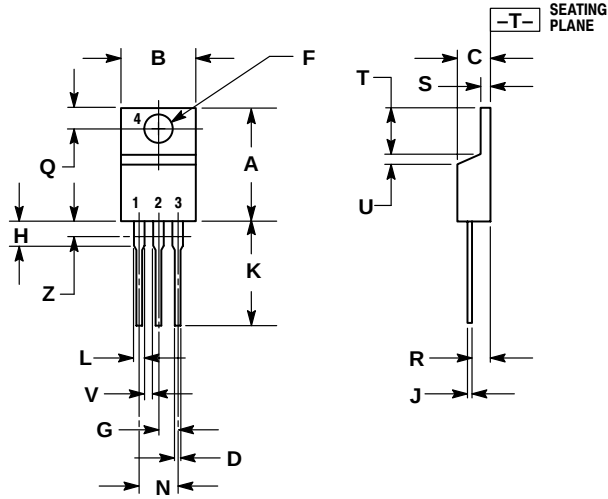


Figure 14. Diode Reverse Recovery Waveform

NTP30N06L, NTB30N06L

PACKAGE DIMENSIONS

TO-220 THREE-LEAD
TO-220AB
CASE 221A-09
ISSUE AA



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

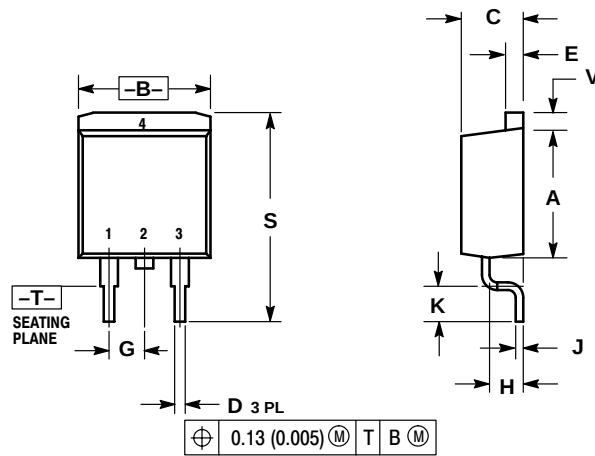
STYLE 5:

- PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

NTP30N06L, NTB30N06L

PACKAGE DIMENSIONS

D²PAK
CASE 418B-03
ISSUE D



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
G	0.100 BSC		2.54 BSC	
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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