

NTP75N06, NTB75N06

Power MOSFET

75 Amps, 60 Volts, 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.

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	75	Adc
– Continuous @ $T_A = 25^\circ\text{C}$	I_D	50	
– Continuous @ $T_A = 100^\circ\text{C}$	I_{DM}	225	Apk
– Single Pulse ($t_p \leq 10\text{ }\mu\text{s}$)			
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	214	W
Derate above 25°C		1.4	W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$		2.4	W
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to $+175$	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 50\text{ Vdc}$, $V_{GS} = 10\text{ Vdc}$, $L = 0.3\text{ mH}$ $I_{L(pk)} = 75\text{ A}$, $V_{DS} = 60\text{ Vdc}$)	E_{AS}	844	mJ
Thermal Resistance	$R_{\theta JC}$	0.7	$^\circ\text{C/W}$
– Junction-to-Case	$R_{\theta JA}$	62.5	
– Junction-to-Ambient			
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.



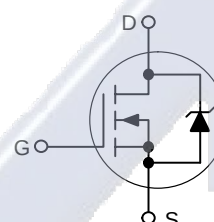
ON Semiconductor®

<http://onsemi.com>

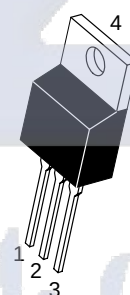
75 AMPERES, 60 VOLTS

$R_{DS(on)} = 9.5\text{ m}\Omega$

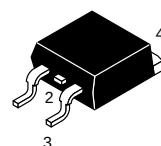
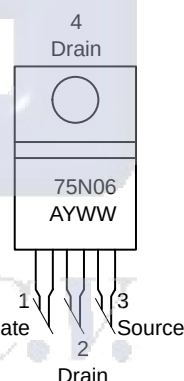
N-Channel



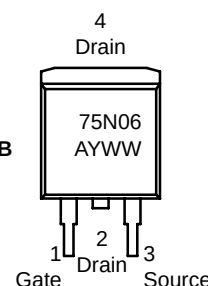
MARKING DIAGRAMS



TO-220
CASE 221A
STYLE 5



D²PAK
CASE 418B
STYLE 2



75N06 = Device Code
A = Assembly Location
Y = Year
WW = Work Week

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-to-Source Breakdown Voltage (Note 1) ($V_{GS} = 0\text{ Vdc}$, $I_D = 250\text{ }\mu\text{Adc}$)	$V_{(BR)DSS}$	60	71	–	Vdc
Temperature Coefficient (Positive)		–	73	–	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}	–	–	10 100	μAdc
Gate-Body Leakage Current ($V_{GS} = \pm 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	–	–	± 100	nAdc

ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage (Note 1) ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$)	$V_{GS(th)}$	2.0	2.8	4.0	Vdc
Threshold Temperature Coefficient (Negative)		–	8.0	–	mV/ $^\circ\text{C}$
Static Drain-to-Source On-Resistance (Note 1) ($V_{GS} = 10\text{ Vdc}$, $I_D = 37.5\text{ Adc}$)	$R_{DS(on)}$	–	8.2	9.5	m Ω
Static Drain-to-Source On-Voltage (Note 1) ($V_{GS} = 10\text{ Vdc}$, $I_D = 75\text{ Adc}$) ($V_{GS} = 10\text{ Vdc}$, $I_D = 37.5\text{ Adc}$, $T_J = 150^\circ\text{C}$)	$V_{DS(on)}$	–	0.72 0.63	0.86 –	Vdc
Forward Transconductance (Note 1) ($V_{DS} = 15\text{ Vdc}$, $I_D = 37.5\text{ Adc}$)	g_{FS}	–	40.2	–	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{iss}	–	3220	4510	pF
Output Capacitance		C_{oss}	–	1020	1430	
Transfer Capacitance		C_{rss}	–	234	330	

SWITCHING CHARACTERISTICS (Note 2)

Turn-On Delay Time	$(V_{DD} = 30\text{ Vdc}$, $I_D = 75\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$, $R_G = 9.1\text{ }\Omega$) (Note 1)	$t_{d(on)}$	–	16	25	ns
Rise Time		t_r	–	112	155	
Turn-Off Delay Time		$t_{d(off)}$	–	90	125	
Fall Time		t_f	–	100	140	
Gate Charge	$(V_{DS} = 48\text{ Vdc}$, $I_D = 75\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$) (Note 1)	Q_T	–	92	130	nC
		Q_1	–	14	–	
		Q_2	–	44	–	

SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	$(I_S = 75\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) (Note 1) $(I_S = 75\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 150^\circ\text{C}$)	V_{SD}	–	1.0 0.9	1.1 –	Vdc
Reverse Recovery Time	$(I_S = 75\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $di_S/dt = 100\text{ A}/\mu\text{s}$) (Note 1)	t_{rr}	–	77	–	ns
		t_a	–	49	–	
		t_b	–	28	–	
Reverse Recovery Stored Charge		Q_{RR}	–	0.16	–	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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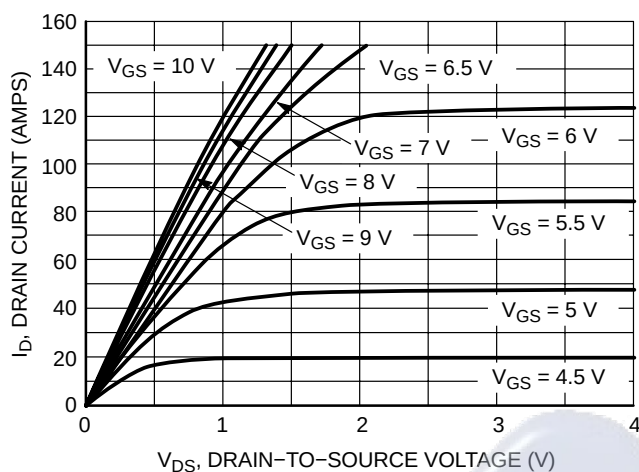


Figure 1. On-Region Characteristics

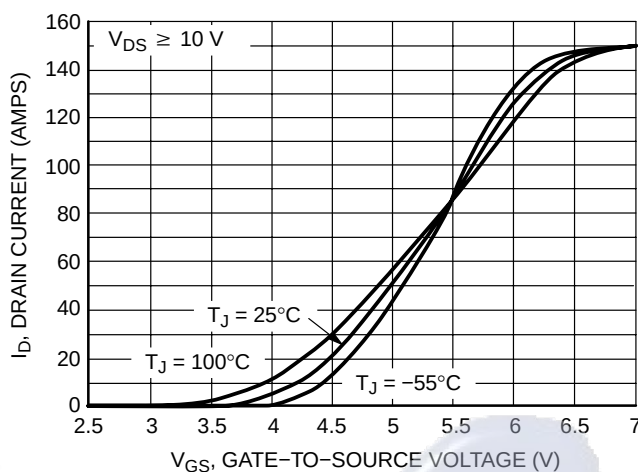


Figure 2. Transfer Characteristics

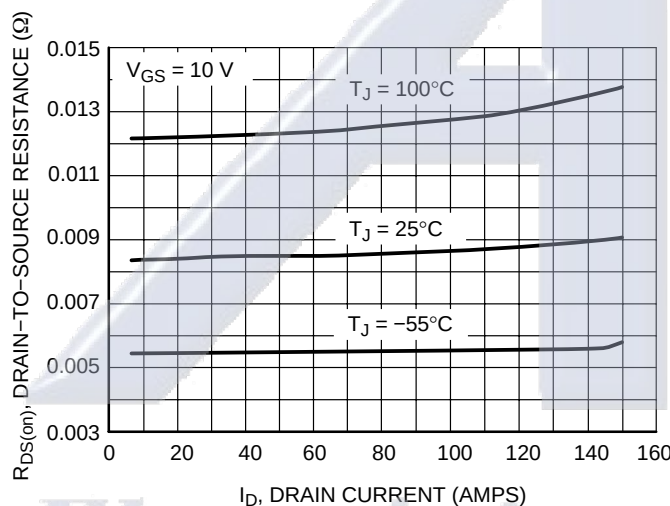


Figure 3. On-Resistance vs. Gate-to-Source Voltage

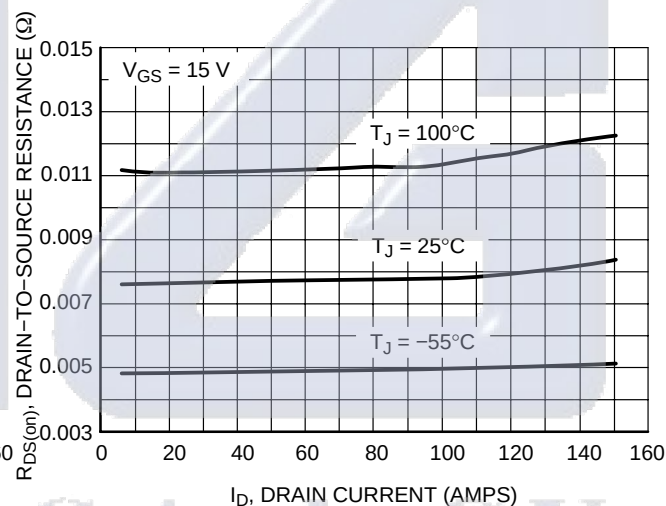


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

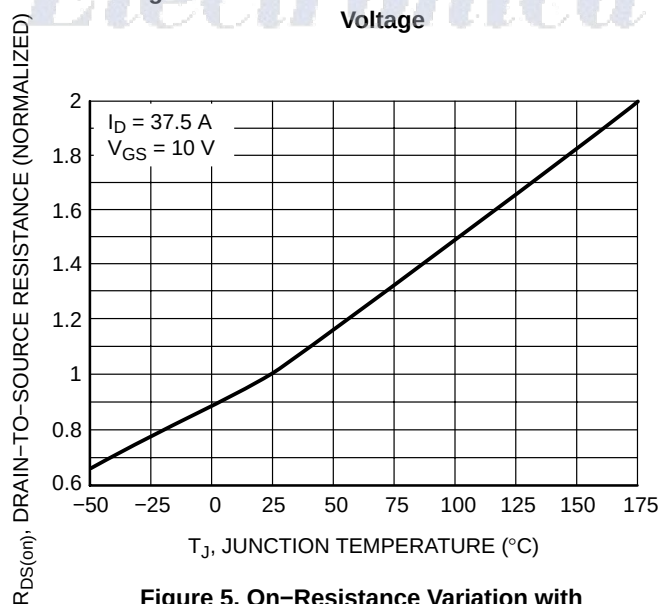


Figure 5. On-Resistance Variation with Temperature

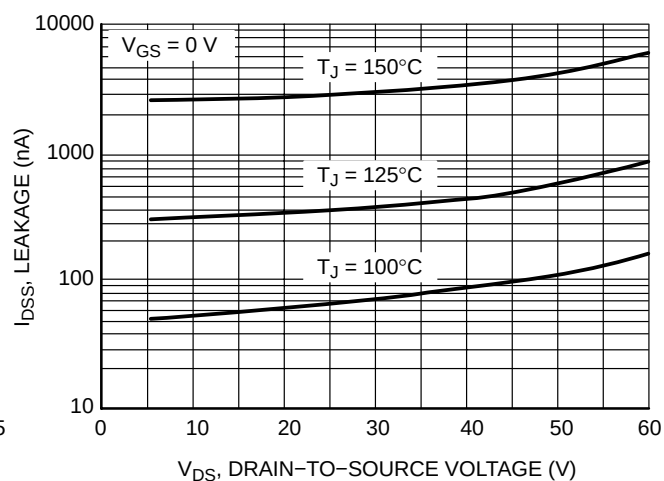


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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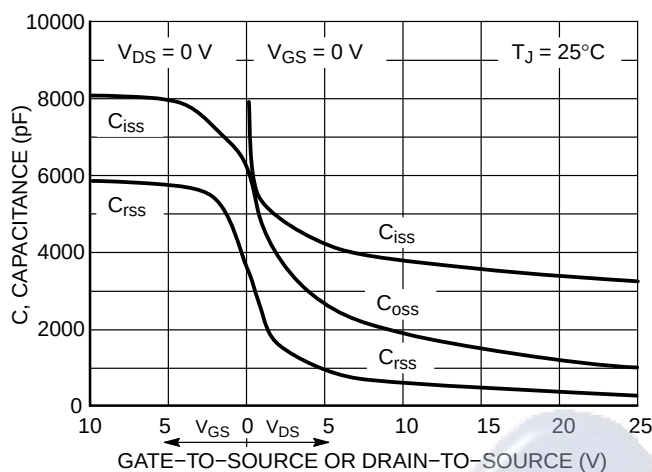


Figure 7. Capacitance Variation

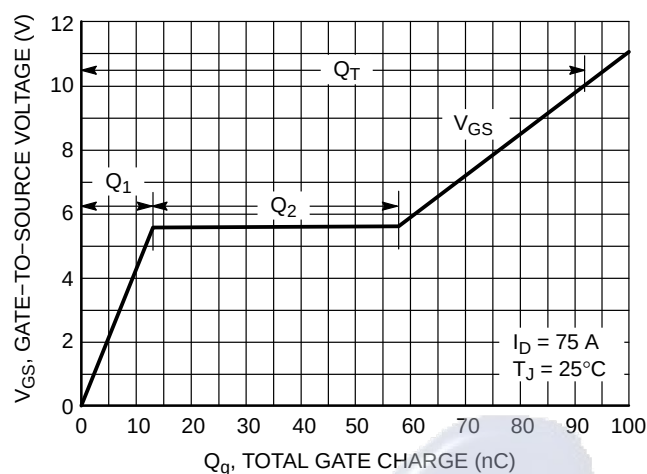


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

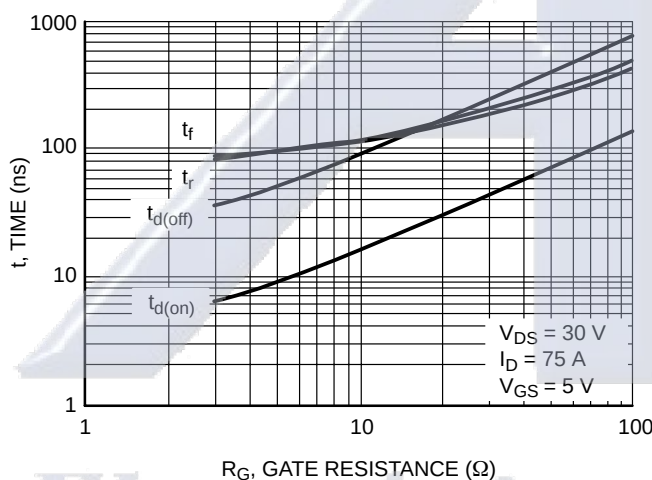


Figure 9. Resistive Switching Time Variations vs. Gate Resistance

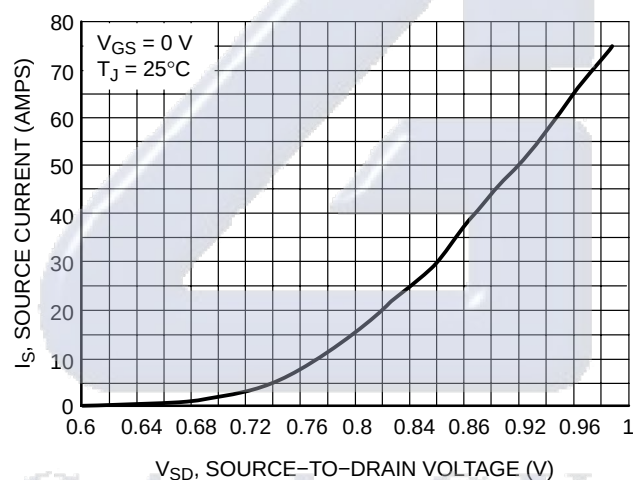


Figure 10. Diode Forward Voltage vs. Current

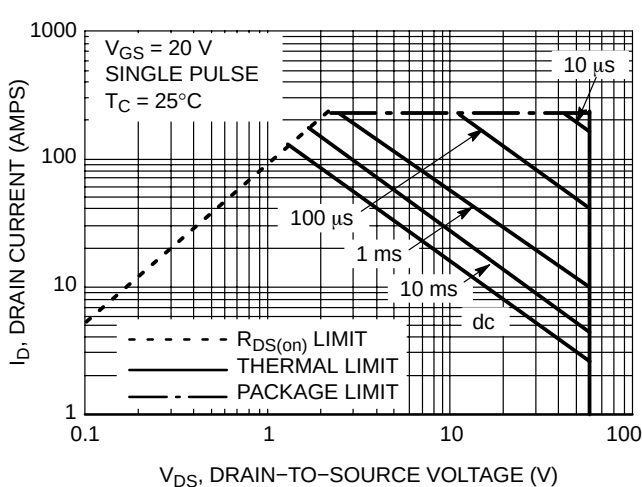


Figure 11. Maximum Rated Forward Biased Safe Operating Area

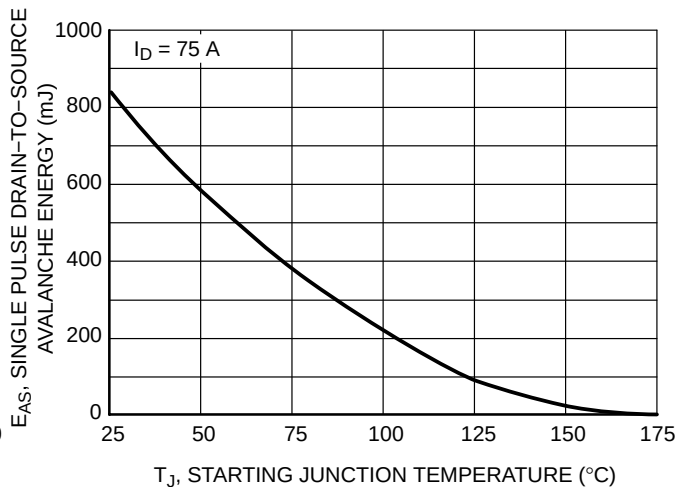


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

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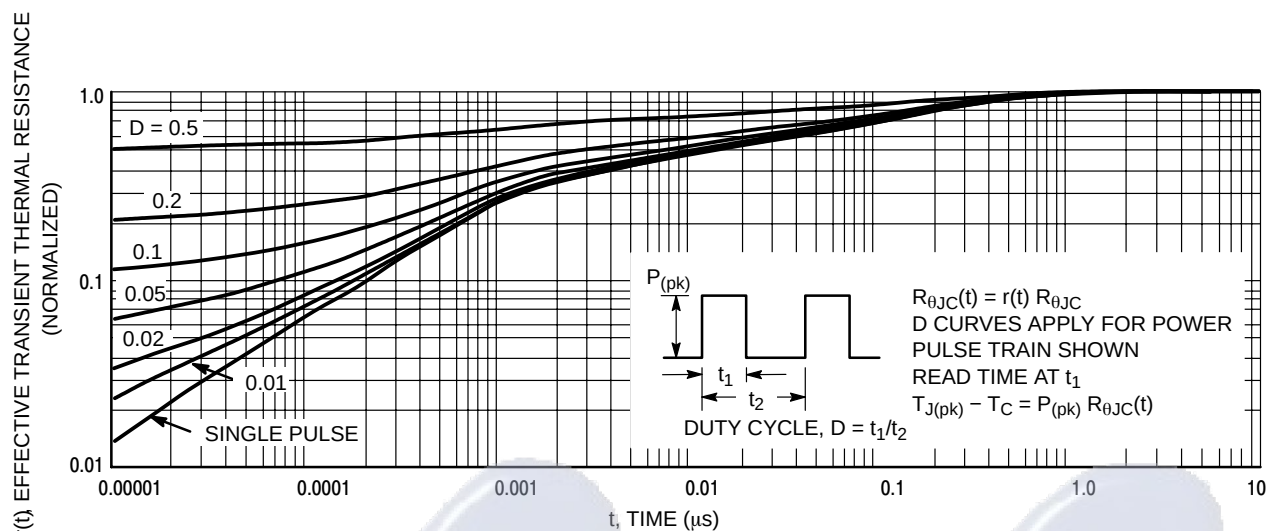


Figure 13. Thermal Response

ORDERING INFORMATION

Device	Package	Shipping [†]
NTP75N06	TO-220	50 Units/Rail
NTP75N06G	TO-220 (Pb-Free)	50 Units/Rail
NTB75N06	D ² PAK	50 Units/Rail
NTB75N06G	D ² PAK (Pb-Free)	50 Units/Rail
NTB75N06T4	D ² PAK	800 Tape & Reel
NTB75N06T4G	D ² PAK (Pb-Free)	800 Tape & Reel

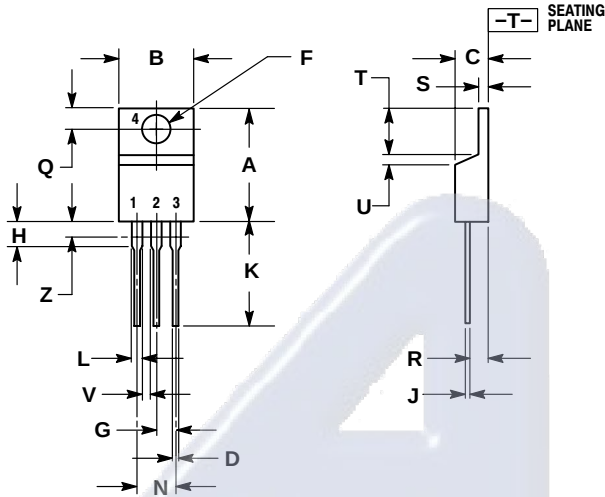
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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NTP75N06, NTB75N06

PACKAGE DIMENSIONS

TO-220
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

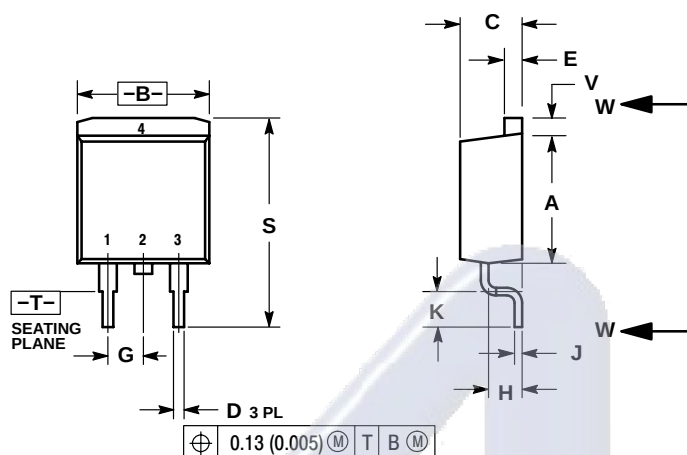
- STYLE 5:
- PIN 1. GATE
 - 2. DRAIN
 - 3. SOURCE
 - 4. DRAIN

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NTP75N06, NTB75N06

PACKAGE DIMENSIONS

D²PAK
CASE 418B-04
ISSUE J



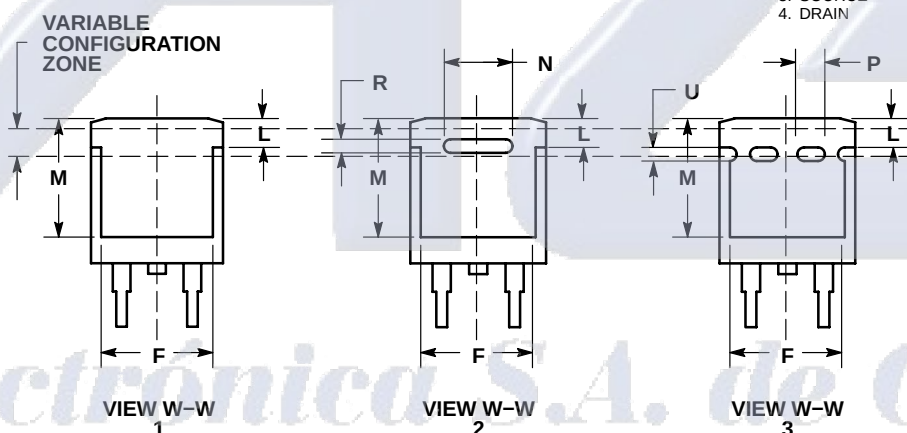
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418B-01 THRU 418B-03 OBSOLETE, NEW STANDARD 418B-04.

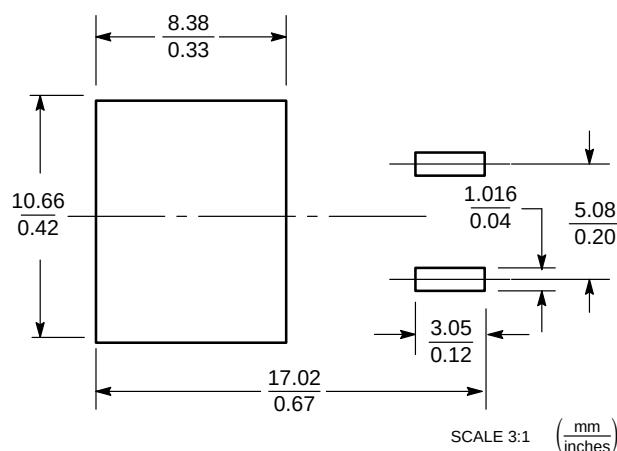
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
F	0.310	0.350	7.87	8.89
G	0.100	BSC	2.54	BSC
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
L	0.052	0.072	1.32	1.83
M	0.280	0.320	7.11	8.13
N	0.197	REF	5.00	REF
P	0.079	REF	2.00	REF
R	0.039	REF	0.99	REF
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

STYLE 2:

- PIN 1. GATE
- DRAIN
- SOURCE
- DRAIN



SOLDERING FOOTPRINT*



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

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