

# NTP75N03-06, NTB75N03-06

## Power MOSFET 75 Amps, 30 Volts N-Channel TO-220 and D<sup>2</sup>PAK

This 10 V<sub>GS</sub> gate drive vertical Power MOSFET is a general purpose part that provides the “best of design” available today in a low cost power package. Avalanche energy issues make this part an ideal design in. The drain-to-source diode has a ideal fast but soft recovery.

### Features

- Ultra-Low R<sub>DS(on)</sub>, Single Base, Advanced Technology
- SPICE Parameters Available
- Diode is Characterized for Use in Bridge Circuits
- I<sub>DSS</sub> and V<sub>DS(on)</sub> Specified at Elevated Temperatures
- High Avalanche Energy Specified
- ESD JEDAC Rated HBM Class 1, MM Class B, CDM Class 0

### Typical Applications

- Power Supplies
- Inductive Loads
- PWM Motor Controls
- Replaces MTP1306 and MTB1306 in Many Applications

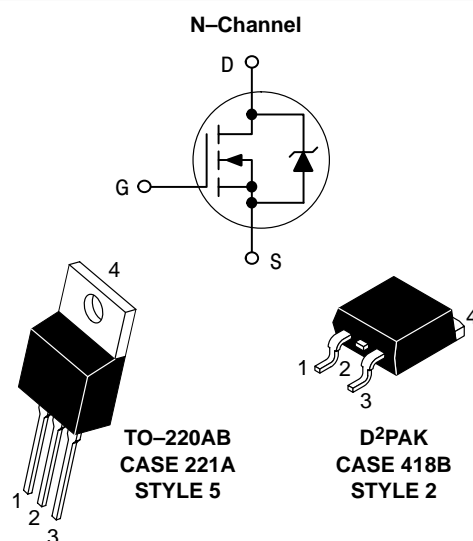


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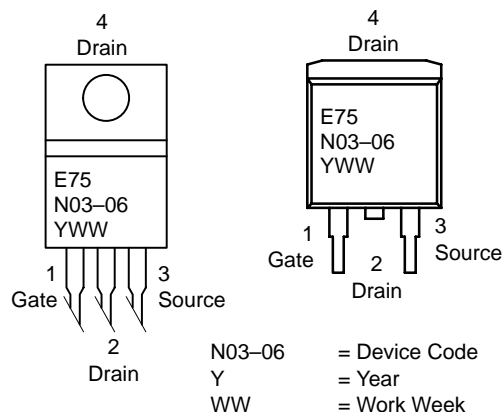
<http://onsemi.com>

**75 AMPERES  
30 VOLTS**

**R<sub>DS(on)</sub> = 6.5 mΩ**



### MARKING DIAGRAMS & PIN ASSIGNMENTS



### ORDERING INFORMATION

Device	Package	Shipping
NTP75N03-06	TO-220	50 Units/Rail
NTB75N03-06	D2PAK	50 Units/Rail
NTB75N03-06T4	D2PAK	800/Tape & Reel

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V <sub>DSS</sub>	30	Vdc
Drain-to-Gate Voltage (R <sub>GS</sub> = 10 MΩ)	V <sub>DGB</sub>	30	Vdc
Gate-to-Source Voltage – Continuous	V <sub>GS</sub>	±20	Vdc
Non-repetitive (tp ≤ 10 ms)	V <sub>GS</sub>	±24	Vdc
Drain Current – Continuous @ T <sub>A</sub> = 25°C – Continuous @ T <sub>A</sub> = 100°C – Single Pulse (tp ≤ 10 μs)	I <sub>D</sub> I <sub>D</sub> I <sub>DM</sub>	75 59 225	Adc Adc Apk
Total Power Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C Total Power Dissipation @ T <sub>A</sub> = 25°C (Note 1)	P <sub>D</sub>	150 1.0 2.5	W W/°C W
Operating and Storage Temperature Range	T <sub>J</sub> and T <sub>stg</sub>	–55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy – Starting T <sub>J</sub> = 25°C (V <sub>DD</sub> = 38 Vdc, V <sub>GS</sub> = 10 Vdc, L = 1 mH, I <sub>L(pk)</sub> = 55 A, V <sub>DS</sub> = 40 Vdc)	E <sub>AS</sub>	1500	mJ
Thermal Resistance – Junction-to-Case – Junction-to-Ambient – Junction-to-Ambient (Note 1)	R <sub>θJC</sub> R <sub>θJA</sub> R <sub>θJA</sub>	1.0 62.5 50	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T <sub>L</sub>	260	°C

1. When surface mounted to an FR4 board using the minimum recommended pad size.

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

Characteristic	Symbol	Min	Typ.	Max	Unit
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### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (Note 2) (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 250 μAdc) Temperature Coefficient (Negative)	V <sub>(BR)DSS</sub>	30	— -57	— —	Vdc mV°C
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 30 Vdc, V <sub>GS</sub> = 0 Vdc) (V <sub>DS</sub> = 30 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> = ±20 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	—	—	±100	nAdc

### ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage (Note 2) (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 —	1.6 -6	2.0 —	Vdc mV°C
Static Drain-to-Source On-Resistance (Note 2) (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 37.5 Adc)	R <sub>DS(on)</sub>	—	5.3	6.5	mΩ
Static Drain-to-Source On Resistance (Note 2) (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 75 Adc) (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 37.5 Adc, T <sub>J</sub> = 125°C)	V <sub>DS(on)</sub>	— —	0.53 0.35	0.68 0.50	Vdc
Forward Transconductance (Notes 2 & 4) (V <sub>DS</sub> = 3 Vdc, I <sub>D</sub> = 20 Adc)	g <sub>FS</sub>	—	58	—	Mhos

### DYNAMIC CHARACTERISTICS (Note 4)

Input Capacitance	(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0, f = 1.0 MHz)	C <sub>iss</sub>	—	4398	5635	pF
Output Capacitance		C <sub>oss</sub>	—	1160	1894	
Transfer Capacitance		C <sub>rss</sub>	—	317	430	

### SWITCHING CHARACTERISTICS (Notes 3 & 4)

Turn-On Delay Time	(V <sub>GS</sub> = 5.0 Vdc, V <sub>DD</sub> = 20 Vdc, I <sub>D</sub> = 75 Adc, R <sub>G</sub> = 4.7 Ω) (Note 2)	t <sub>d(on)</sub>	—	16	30	ns
Rise Time		t <sub>r</sub>	—	130	200	
Turn-Off Delay Time		t <sub>d(off)</sub>	—	65	110	
Fall Time		t <sub>f</sub>	—	105	175	
Gate Charge	(V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 75 Adc, V <sub>DS</sub> = 24 Vdc) (Note 2)	Q <sub>T</sub>	—	52	122	nC
		Q <sub>1</sub>	—	6.6	28	
		Q <sub>2</sub>	—	28	66	

### SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On—Voltage	(I <sub>S</sub> = 75 Adc, V <sub>GS</sub> = 0 Vdc) (I <sub>S</sub> = 75 Adc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 125°C) (Note 2)	V <sub>SD</sub>	— —	1.19 1.09	1.25 —	Vdc
Reverse Recovery Time (Note 4)	(I <sub>S</sub> = 75 Adc, V <sub>GS</sub> = 0 Vdc di <sub>S</sub> /dt = 100 A/μs) (Note 2)	t <sub>rr</sub>	—	37	—	ns
		t <sub>a</sub>	—	20	—	
Reverse Recovery Stored Charge (Note 4)		t <sub>b</sub>	—	17	—	μC
		Q <sub>RR</sub>	—	0.023	—	

- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperatures.
- From characterization test data.

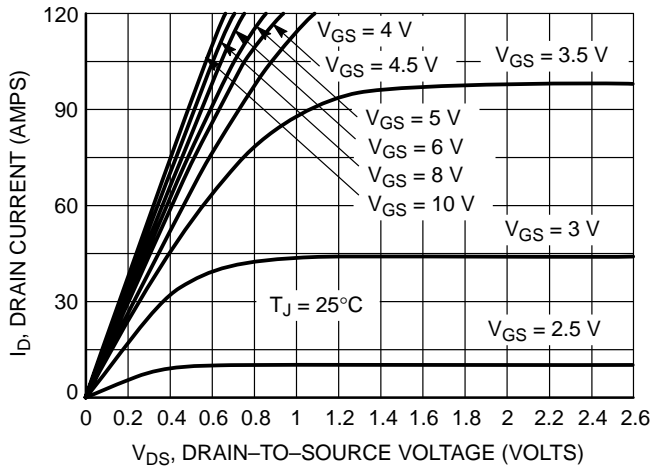


Figure 1. On-Region Characteristics

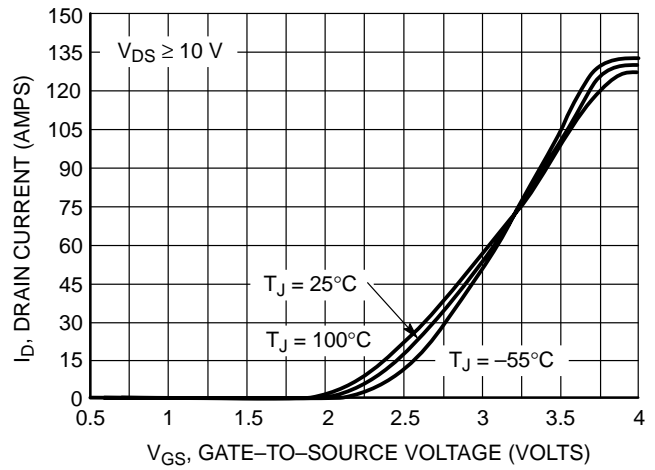


Figure 2. Transfer Characteristics

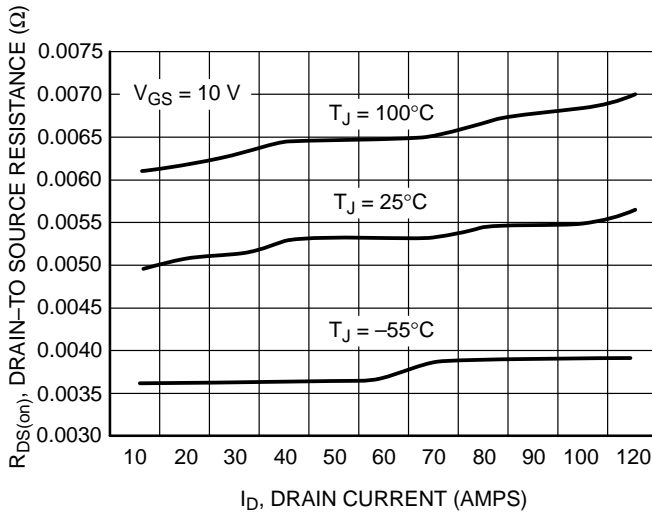


Figure 3. On-Resistance vs. Drain Current and Temperature

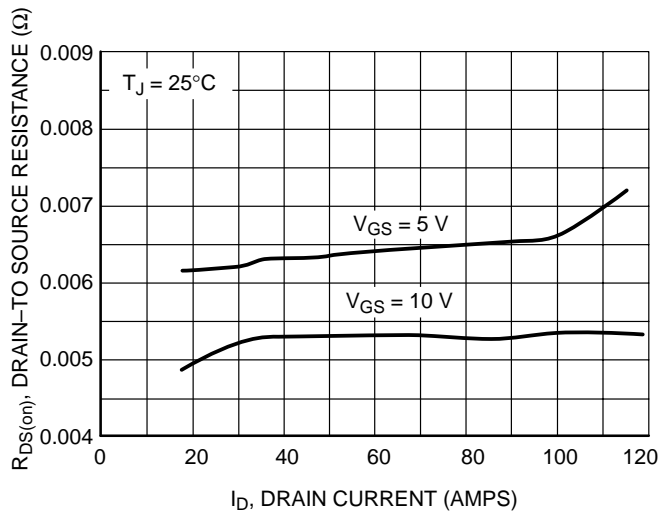


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

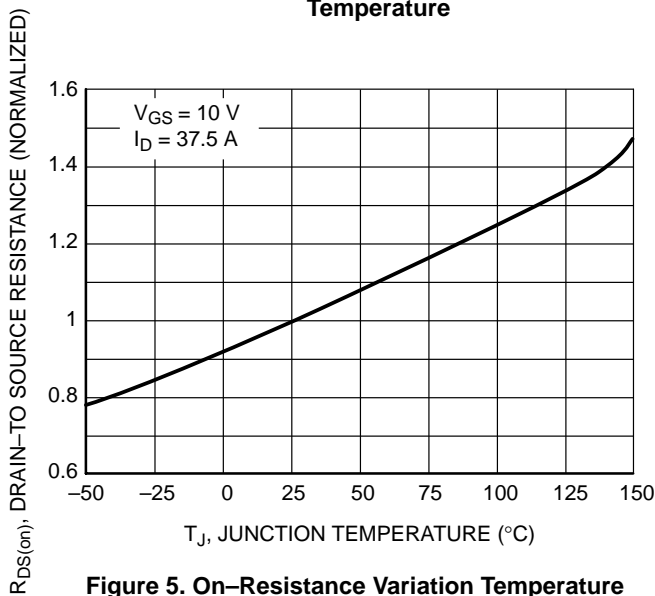


Figure 5. On-Resistance Variation Temperature

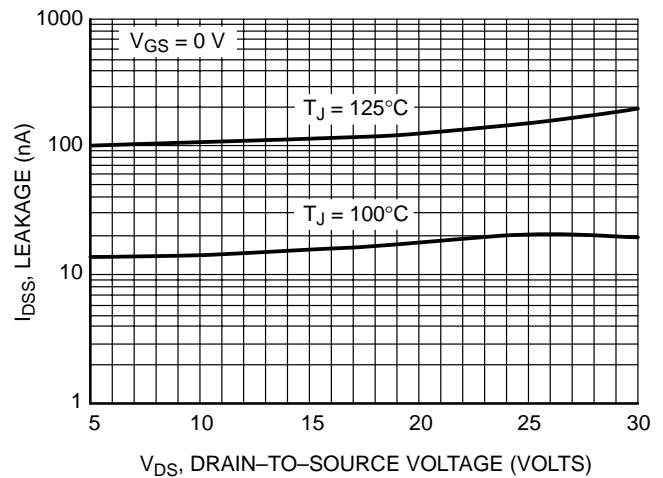
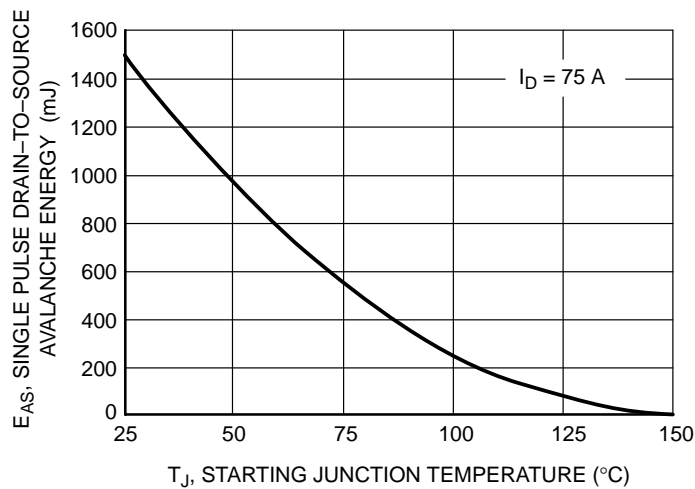
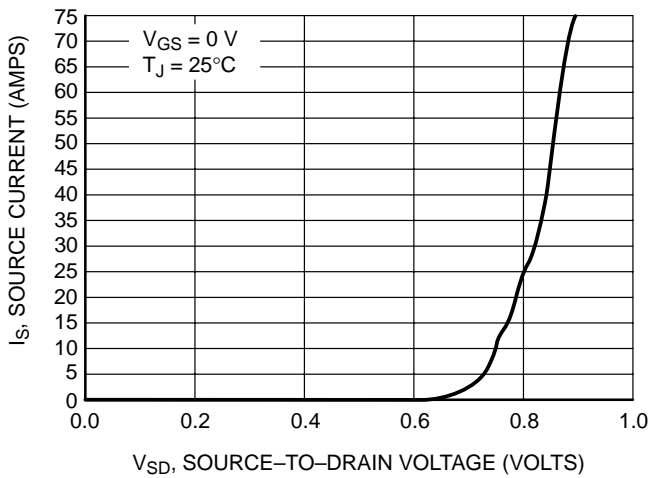
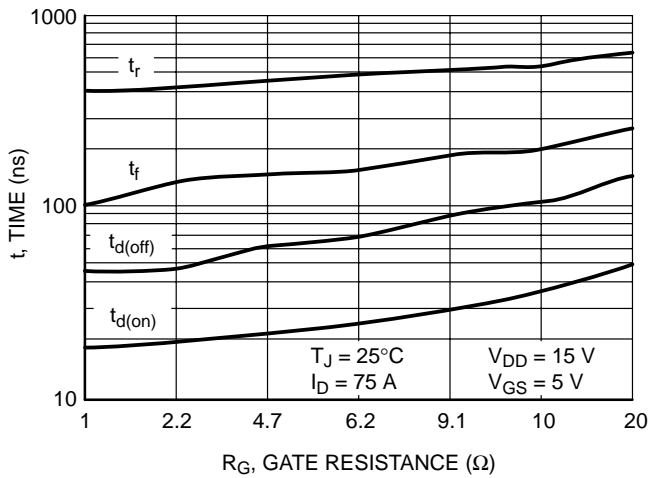
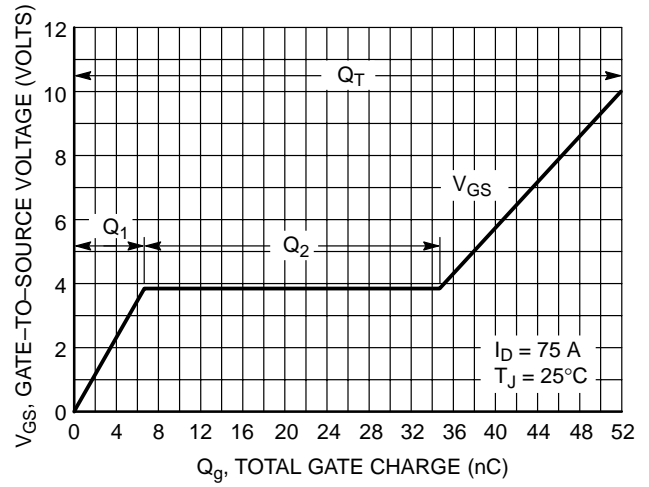
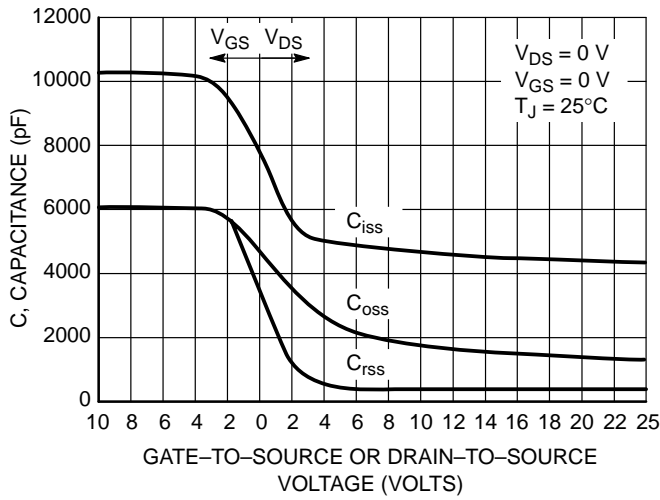
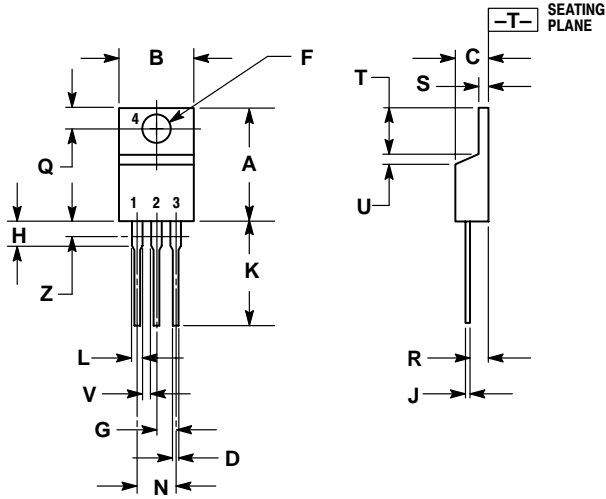


Figure 6. Drain-to-Source Leakage Current vs. Voltage



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

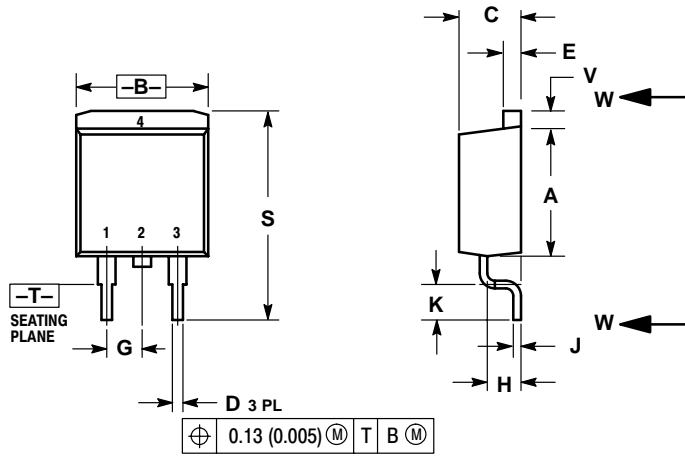
STYLE 5:

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

# NTP75N03-06, NTB75N03-06

## PACKAGE DIMENSIONS

**D<sup>2</sup>PAK**  
CASE 418B-04  
ISSUE G




### 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

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