

NTB5426N, NTP5426N

Power MOSFET 120 Amps, 60 Volts N-Channel D²PAK, TO-220



ON Semiconductor®

Features

- Low $R_{DS(on)}$
- High Current Capability
- Avalanche Energy Specified
- These are Pb-Free Devices

Applications

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

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ Unless otherwise specified)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DS}	60	V
Gate-to-Source Voltage – Continuous			V_{GS}	± 20	V
Gate-to-Source Voltage – Nonrepetitive ($T_P < 10 \mu\text{s}$)			V_{GS}	30	V
Continuous Drain Current $R_{\theta JC}$ (Note 1)	Steady State	$T_C = 25^\circ\text{C}$	I_D	120	A
		$T_C = 100^\circ\text{C}$		85	
Power Dissipation $R_{\theta JC}$ (Note 1)	Steady State	$T_C = 25^\circ\text{C}$	P_D	215	W
Pulsed Drain Current	$t_p = 10 \mu\text{s}$		I_{DM}	260	A
Operating and Storage Temperature Range			T_J, T_{stg}	-55 to +175	$^\circ\text{C}$
Source Current (Body Diode)			I_S	60	A
Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 50 \text{ V}_{dc}, V_{GS} = 10 \text{ V}_{dc}, I_{L(pk)} = 70 \text{ A}, L = 0.3 \text{ mH}, R_G = 25 \Omega$)			E_{AS}	735	mJ
Lead Temperature for Soldering Purposes, 1/8" from Case for 10 Seconds			T_L	260	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

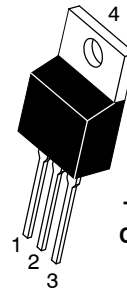
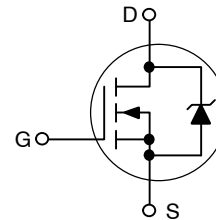
Parameter	Symbol	Max	Unit
Junction-to-Case (Drain) Steady State (Note 1)	$R_{\theta JC}$	0.7	$^\circ\text{C/W}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

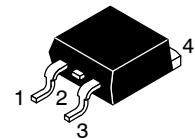
1. Surface mounted on FR4 board using 1 sq in pad size, (Cu Area 1.127 sq in [1 oz] including traces).

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$ (Note 1)
60 V	6.0 m Ω @ 10 V	120 A

N-Channel

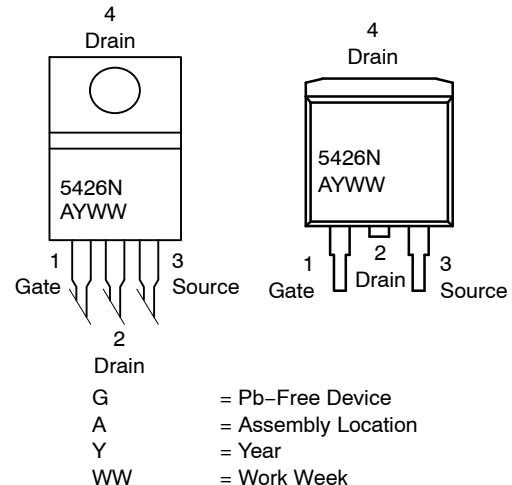


TO-220AB
CASE 221A
STYLE 5



D²PAK
CASE 418B
STYLE 2

MARKING DIAGRAMS & PIN ASSIGNMENTS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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ELECTRICAL CHARACTERISTICS (T_J = 25°C Unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{DS} = 0 V, I _D = 250 μA	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			64		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V V _{DS} = 60 V	T _J = 25°C		1.0	μA
			T _J = 150°C		25	
Gate-Body Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = 250 μA	2.0	3.1	4.0	V
Negative Threshold Temperature Coefficient	V _{GS(th)} /T _J			9.2		mV/°C
Drain-to-Source On Voltage	V _{DS(on)}	V _{GS} = 10 V, I _D = 60 A		0.3	0.36	V
		V _{GS} = 10 V, I _D = 60 A, 150°C		0.6		
Static Drain-to-Source On-Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 60 A		4.9	6.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} = 15 V, I _D = 20 A		65		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz		5800		pF
Output Capacitance	C _{oss}			1000		
Transfer Capacitance	C _{rss}			370		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 48 V, I _D = 60 A		150	170	nC
Threshold Gate Charge	Q _{G(TH)}			6.0		
Gate-to-Source Charge	Q _{GS}			28		
Gate-to-Drain Charge	Q _{GD}			67		

SWITCHING CHARACTERISTICS, V_{GS} = 10 V (Note 3)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 10 V, V _{DD} = 48 V, I _D = 60 A, R _G = 3.0 Ω		15		ns
Rise Time	t _r			100		
Turn-Off Delay Time	t _{d(off)}			105		
Fall Time	t _f			95		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V I _S = 60 A	T _J = 25°C	0.88	1.1	V _{dc}
			T _J = 100°C	0.78		
Reverse Recovery Time	t _{rr}	I _S = 60 A _{dc} , V _{GS} = 0 V _{dc} , di _S /dt = 100 A/μs		75		ns
Charge Time	t _a			50		
Discharge Time	t _b			25		
Reverse Recovery Stored Charge	Q _{RR}			235		

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

3. Switching characteristics are independent of operating junction temperatures.

ORDERING INFORMATION

Device	Package	Shipping [†]
NTP5426N	TO-220AB (Pb-Free)	50 Units / Rail
NTB5426NT4G	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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TYPICAL CHARACTERISTICS

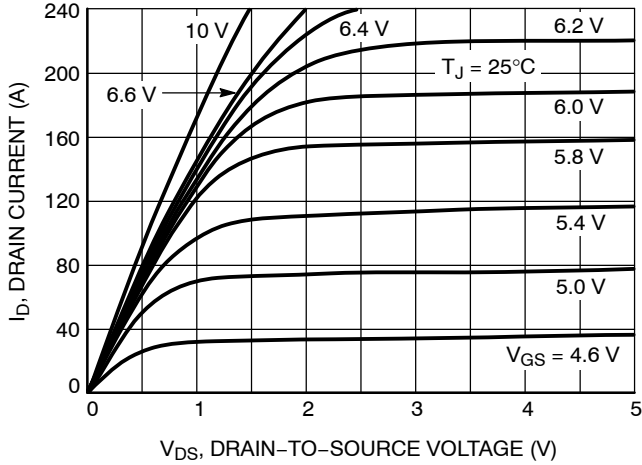


Figure 1. On-Region Characteristics

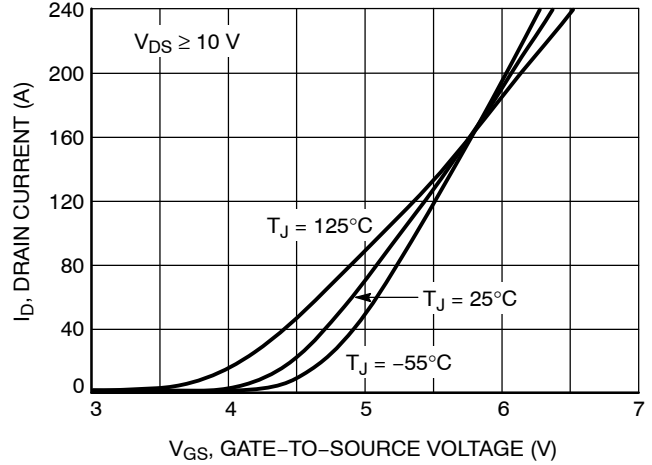


Figure 2. Transfer Characteristics

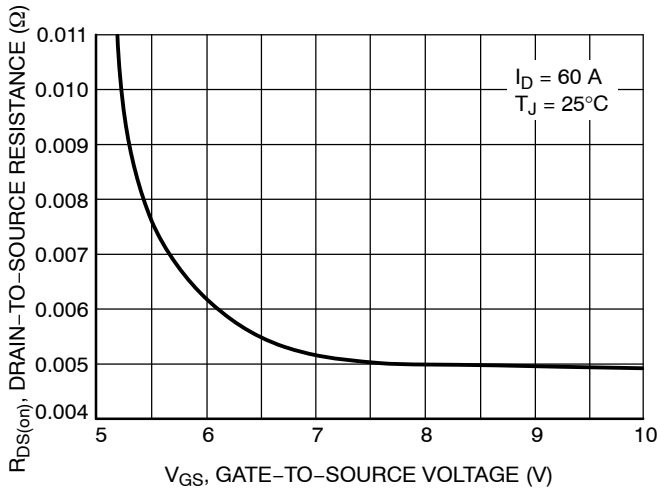


Figure 3. On-Resistance vs. Gate Voltage

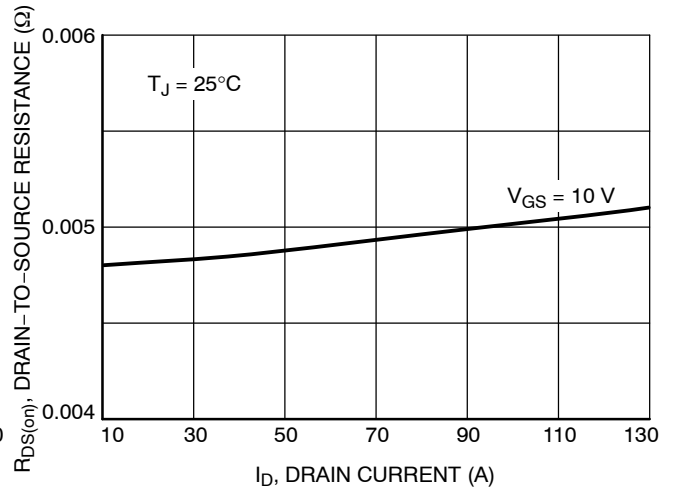


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

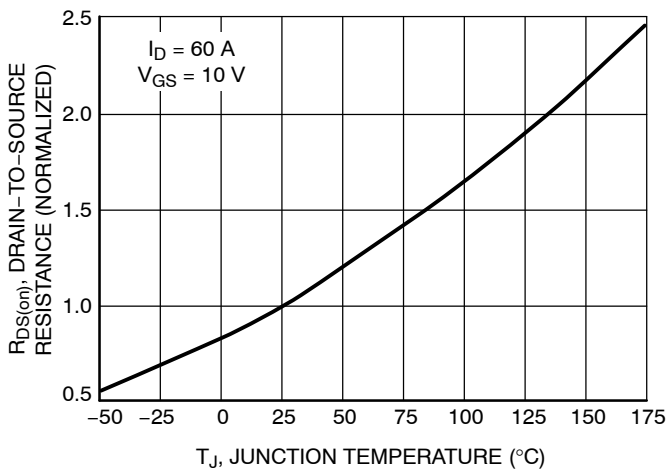


Figure 5. On-Resistance Variation with Temperature

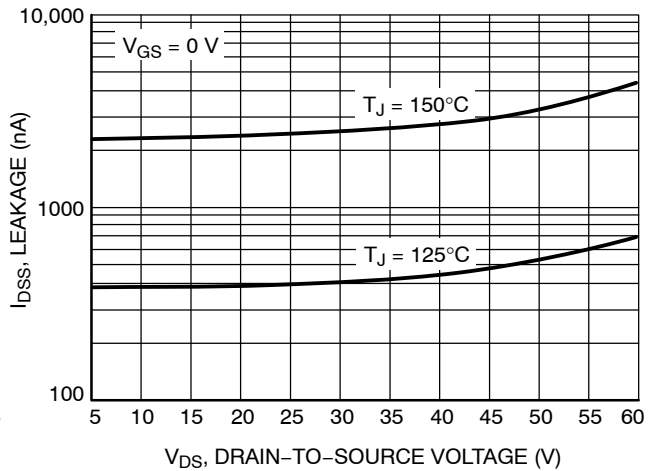


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL CHARACTERISTICS

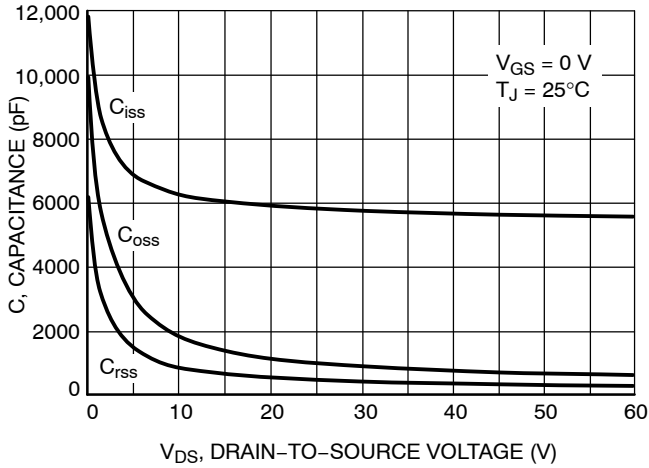


Figure 7. Capacitance Variation

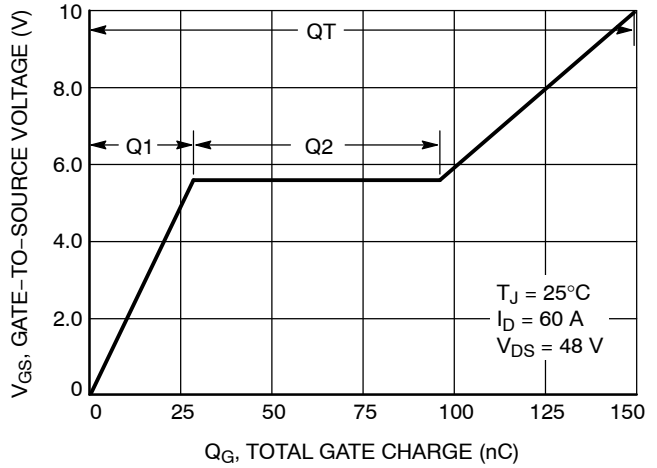


Figure 8. Gate-to-Source Voltage vs. Total Charge

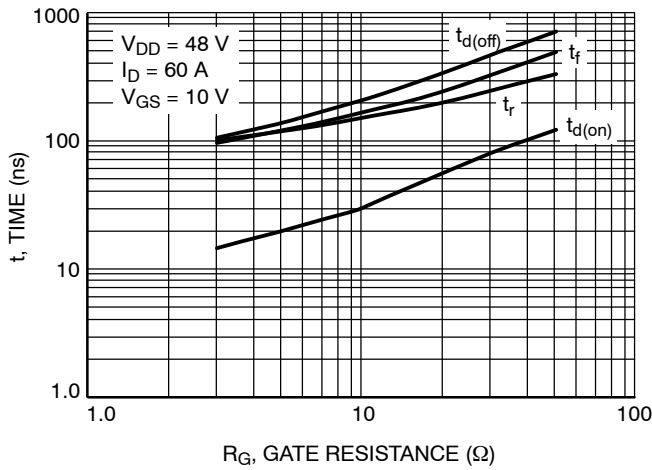


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

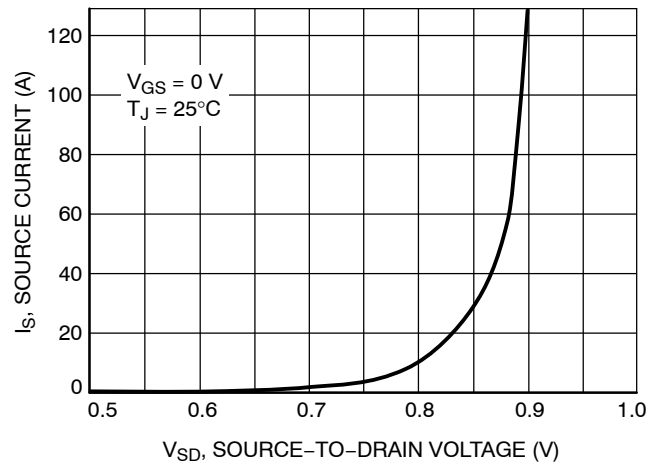


Figure 10. Diode Forward Voltage vs. Current

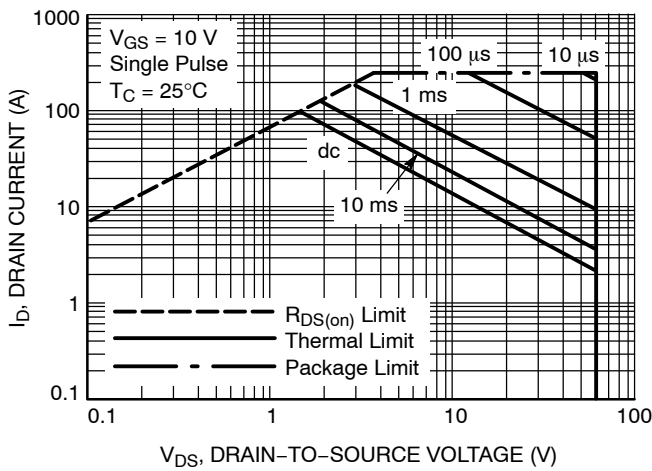


Figure 11. Maximum Rated Forward Biased Safe Operating Area

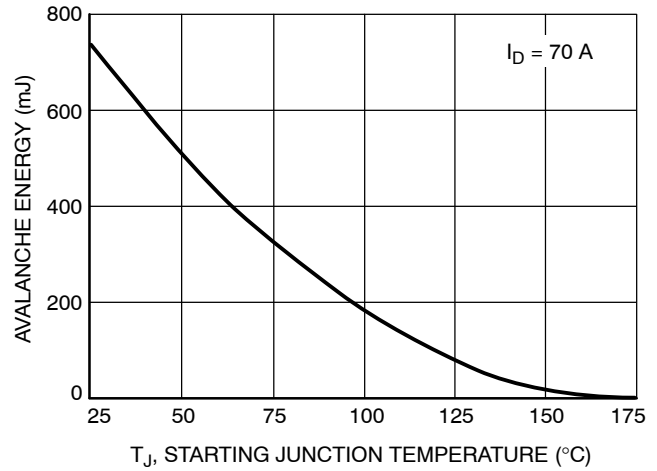


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

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TYPICAL CHARACTERISTICS

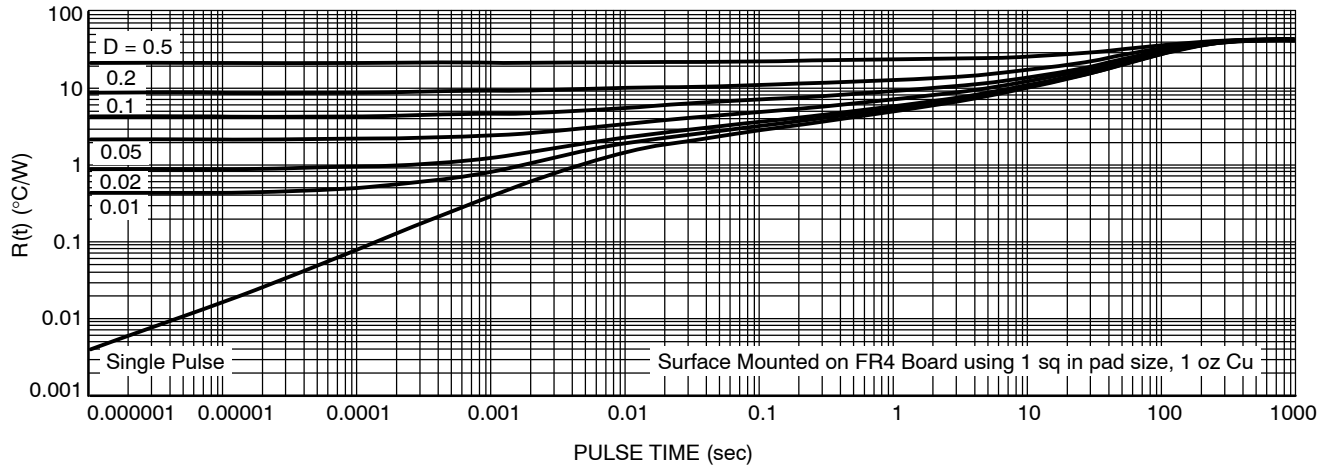
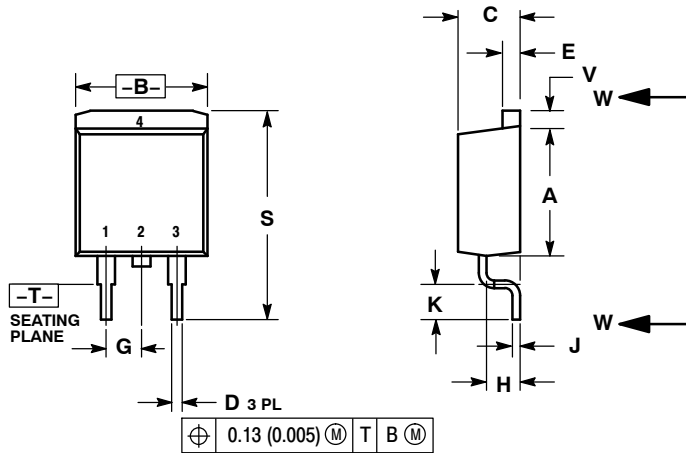


Figure 13. Thermal Response

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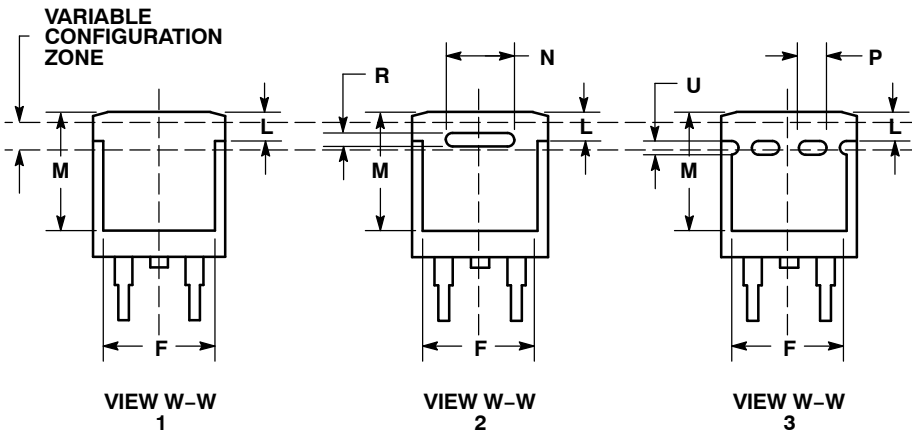
PACKAGE DIMENSIONS

D²PAK
CASE 418B-04
ISSUE J



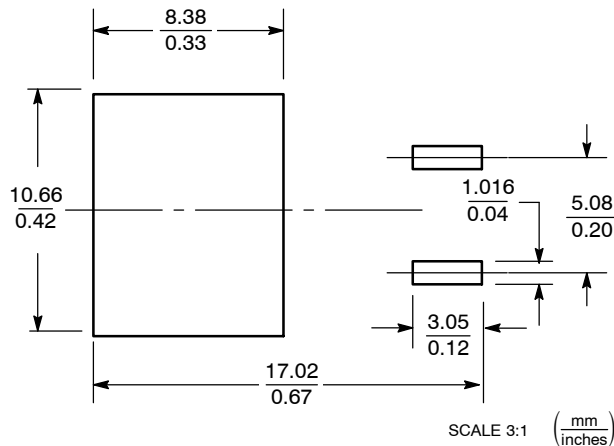
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. 418B-01 THRU 418B-03 OBSOLETE, NEW STANDARD 418B-04.

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
2. DRAIN
3. SOURCE
4. DRAIN

SOLDERING FOOTPRINT*

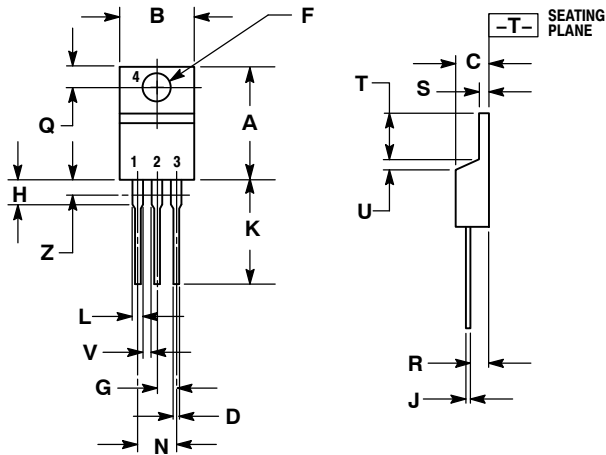


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NTB5426N, NTP5426N

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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