ON Semiconductor

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NTP75N06, NTB75N06, NTBV75N06

Power MOSFET

75 Amps, 60 Volts, N−Channel TO−220 and D^{2}PAK

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

Features

- These Devices are Pb−Free and are RoHS Compliant
- NTBV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable

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 − Continuous − Non−Repetitive ($t_p \le 10$ ms)	 V_{GS} V_{GS}	 ±20 ±30	Vdc
Drain Current − Continuous @ T_A = 25°C − Continuous @ T_A = 100°C − Single Pulse ($t_p \le 10$ μs)	 I_D I_D I_{DM}	 75 50 225	 Adc Apk
Total Power Dissipation @ T_A = 25°C Derate above 25°C Total Power Dissipation @ T_A = 25°C	P_D	214 1.4 2.4	W W/°C W
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} = 10 Vdc, L = 0.3 mH $I_{L(pk)}$ = 75 A, V_{DS} = 60 Vdc)	E_{AS}	844	mJ
Thermal Resistance − Junction−to−Case − Junction−to−Ambient	 $R_{\theta JC}$ $R_{\theta JA}$	 0.7 62.5	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

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.

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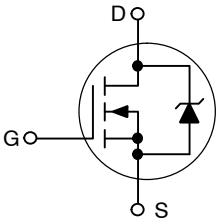
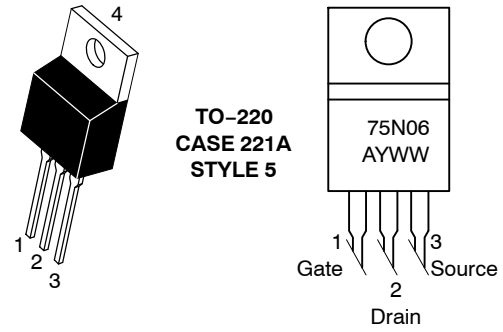
75 AMPERES, 60 VOLTS
$R_{DS(on)}$ = 9.5 mΩ

N−Channel



MARKING DIAGRAMS



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°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage (Note 1) (V_{GS} = 0 Vdc, I_D = 250 μAdc) Temperature Coefficient (Positive)		$V_{(BR)DSS}$	 60 –	 71 73	 – –	Vdc mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 60 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 60 Vdc, V_{GS} = 0 Vdc, T_J = 150°C)		I_{DSS}	 – –	 – –	 10 100	μAdc
Gate−Body Leakage Current (V_{GS} = ±20 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	±100	nAdc
ON CHARACTERISTICS (Note 1)						
Gate Threshold Voltage (Note 1) (V_{DS} = V_{GS}, I_D = 250 μAdc) Threshold Temperature Coefficient (Negative)		$V_{GS(th)}$	 2.0 –	 2.8 8.0	 4.0 –	Vdc mV/°C
Static Drain−to−Source On−Resistance (Note 1) (V_{GS} = 10 Vdc, I_D = 37.5 Adc)		$R_{DS(on)}$	 –	 8.2	 9.5	mΩ
Static Drain−to−Source On−Voltage (Note 1) (V_{GS} = 10 Vdc, I_D = 75 Adc) (V_{GS} = 10 Vdc, I_D = 37.5 Adc, T_J = 150°C)		$V_{DS(on)}$	 – –	 0.72 0.63	 0.86 –	Vdc
Forward Transconductance (Note 1) (V_{DS} = 15 Vdc, I_D = 37.5 Adc)		g_{FS}	–	40.2	–	mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 25 Vdc, V_{GS} = 0 Vdc, f = 1.0 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 Vdc, I_D = 75 Adc, V_{GS} = 10 Vdc, R_G = 9.1 Ω) (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 Vdc, I_D = 75 Adc, V_{GS} = 10 Vdc) (Note 1)	Q_T	–	92	130	nC
		Q_1	–	14	–	
		Q_2	–	44	–	
SOURCE−DRAIN DIODE CHARACTERISTICS						
Forward On−Voltage	(I_S = 75 Adc, V_{GS} = 0 Vdc) (Note 1) (I_S = 75 Adc, V_{GS} = 0 Vdc, T_J = 150°C)	V_{SD}	 – –	 1.0 0.9	 1.1 –	Vdc
Reverse Recovery Time	(I_S = 75 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs) (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 ≤ 300 μs, Duty Cycle ≤ 2%.
2. Switching characteristics are independent of operating junction temperatures.

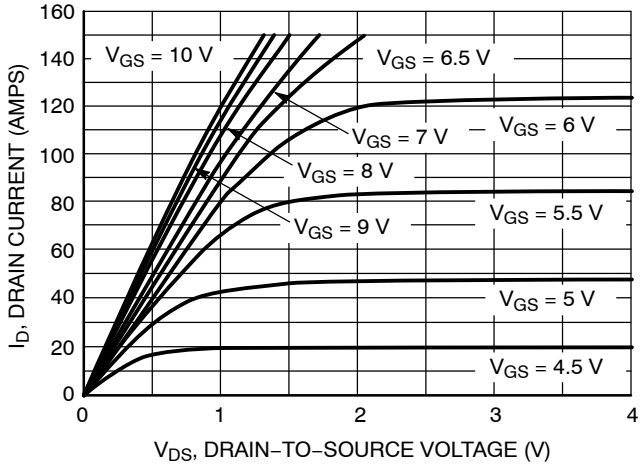


Figure 1. On−Region Characteristics

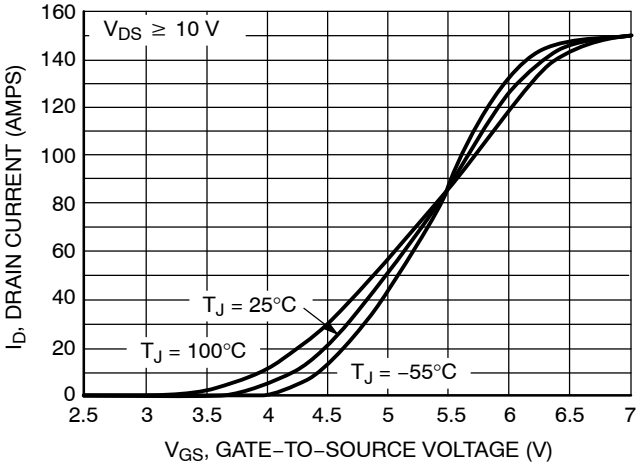


Figure 2. Transfer Characteristics

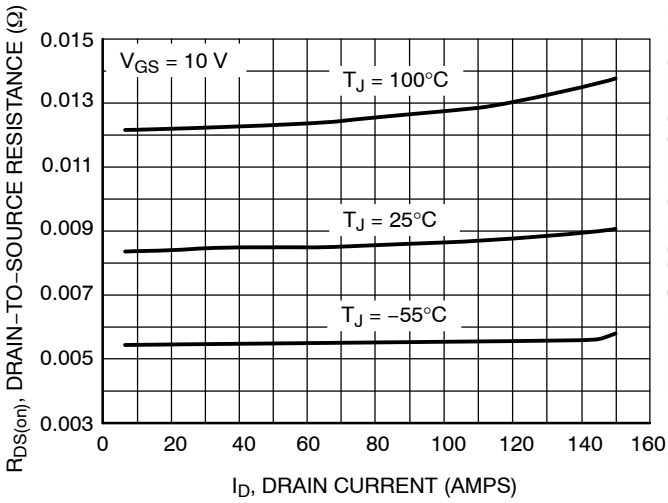


Figure 3. On−Resistance vs. Gate−to−Source Voltage

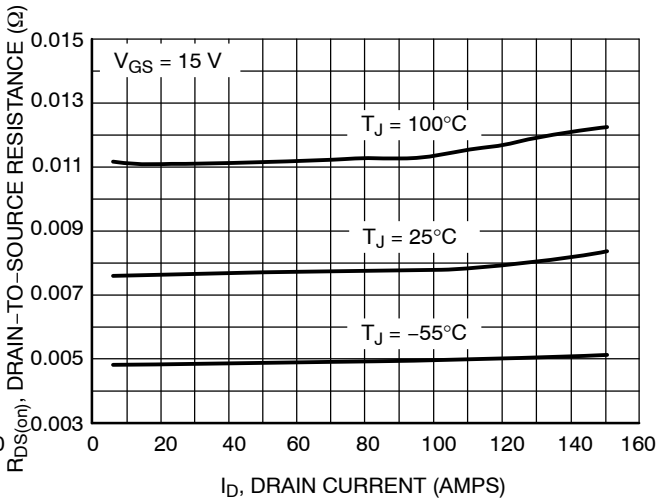


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

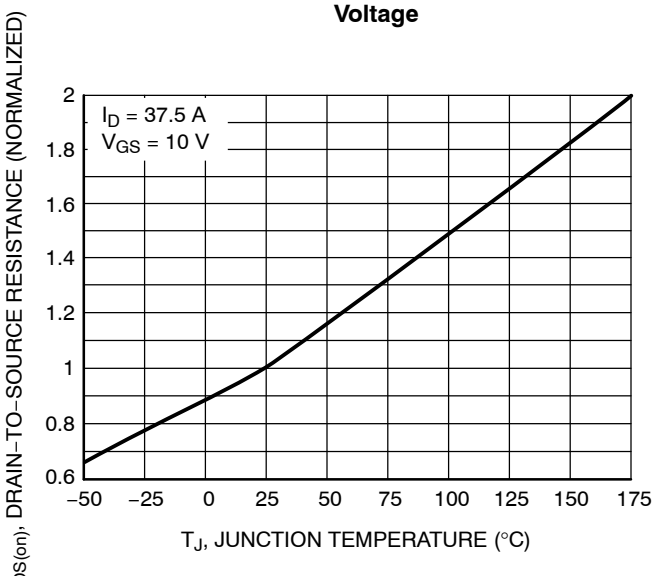


Figure 5. On−Resistance Variation with Temperature

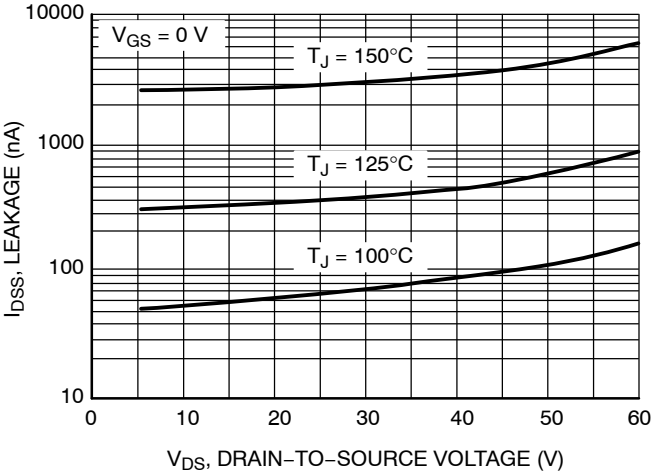


Figure 6. Drain−to−Source Leakage Current vs. Voltage

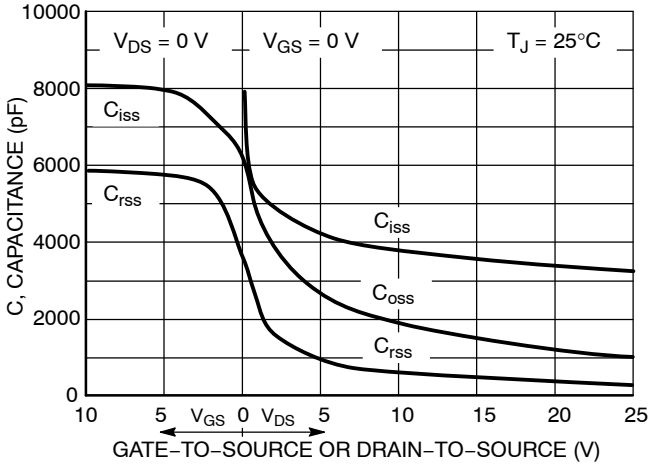


Figure 7. Capacitance Variation

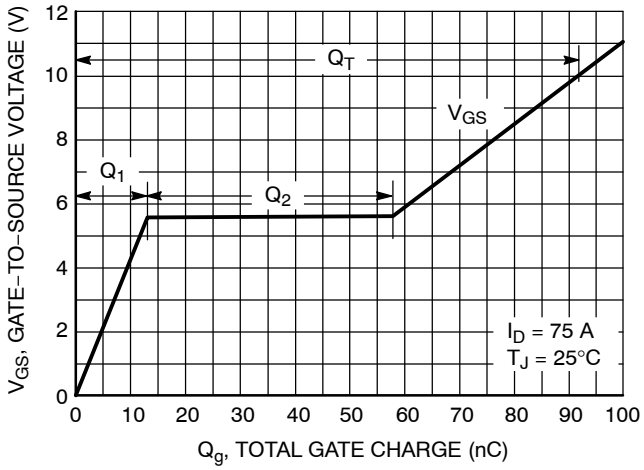


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

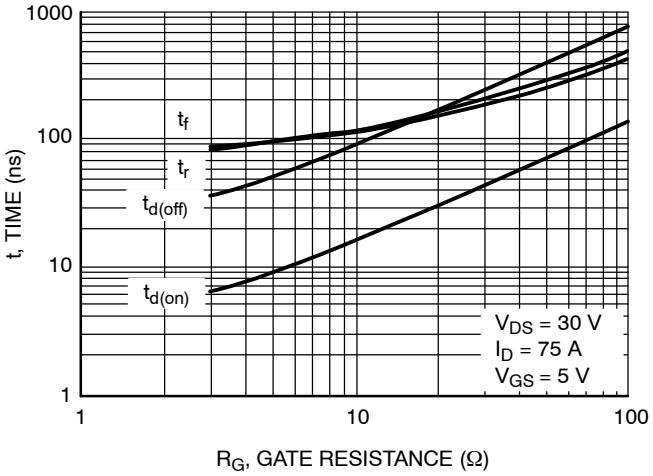


Figure 9. Resistive Switching Time Variations vs. Gate Resistance

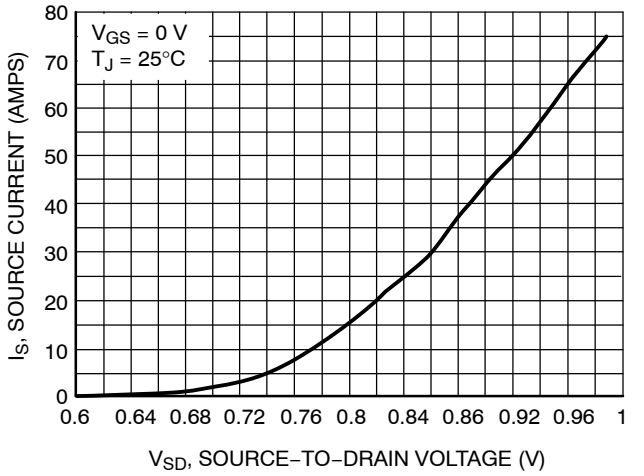


Figure 10. Diode Forward Voltage vs. Current

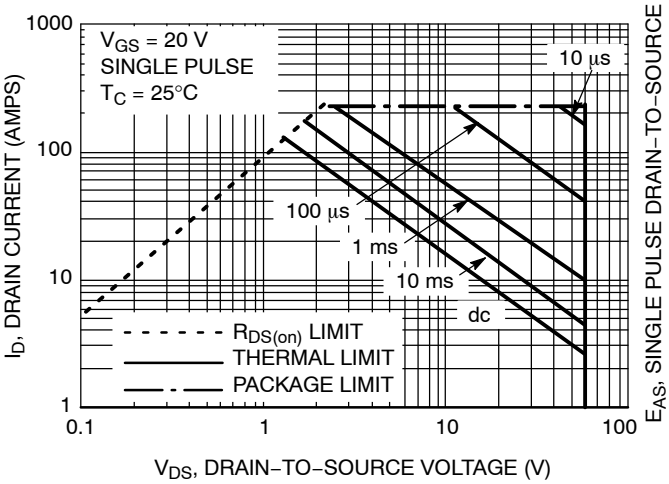


Figure 11. Maximum Rated Forward Biased Safe Operating Area

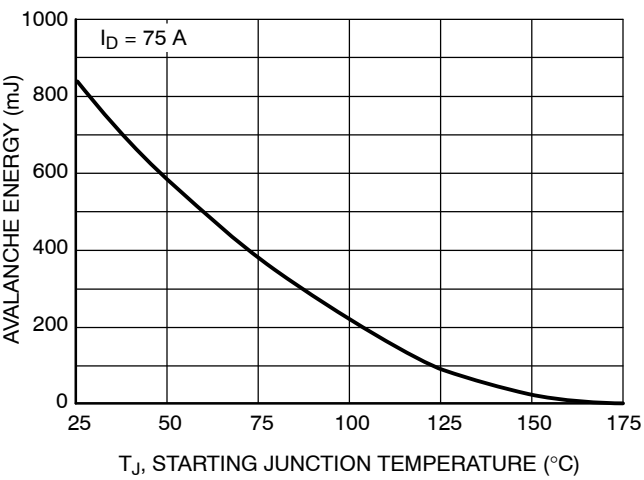


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

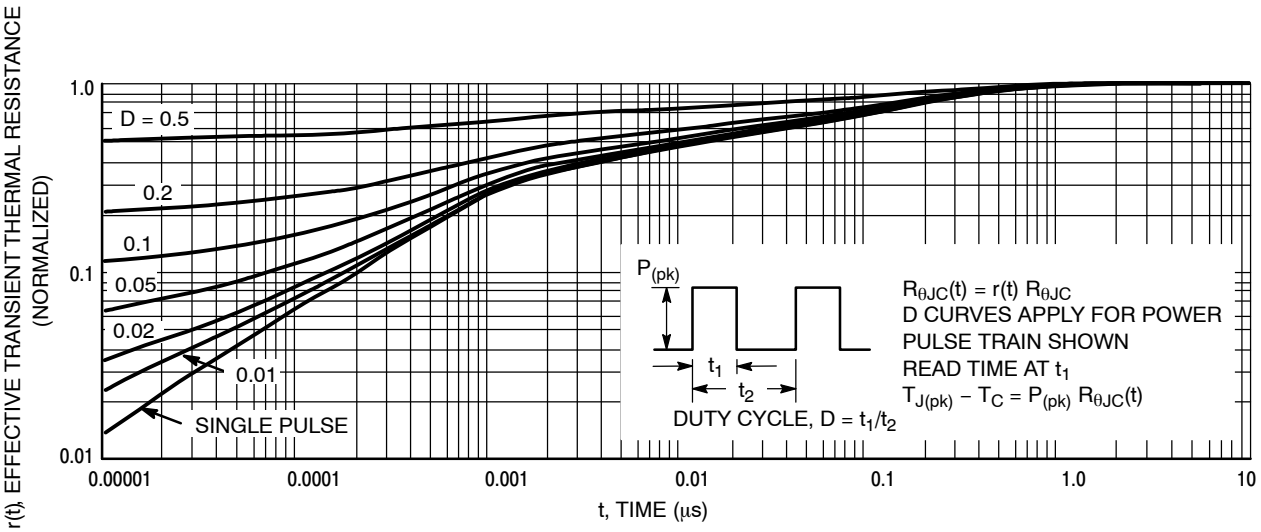


Figure 13. Thermal Response

ORDERING INFORMATION

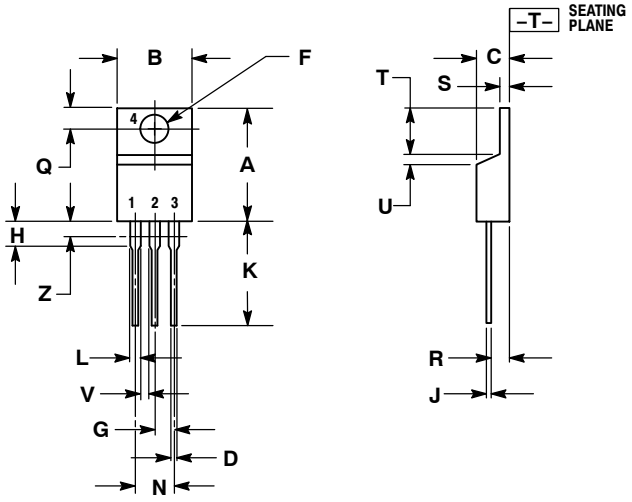
Device	Package	Shipping†
NTP75N06G	TO−220 (Pb−Free)	50 Units/Rail
NTB75N06G	D²PAK (Pb−Free)	50 Units/Rail
NTB75N06T4G	D²PAK (Pb−Free)	800 Tape & Reel
NTBV75N06T4G*	D²PAK (Pb−Free)	800 Tape & Reel

†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.

*NTBV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

PACKAGE DIMENSIONS

TO−220
CASE 221A−09
ISSUE AG



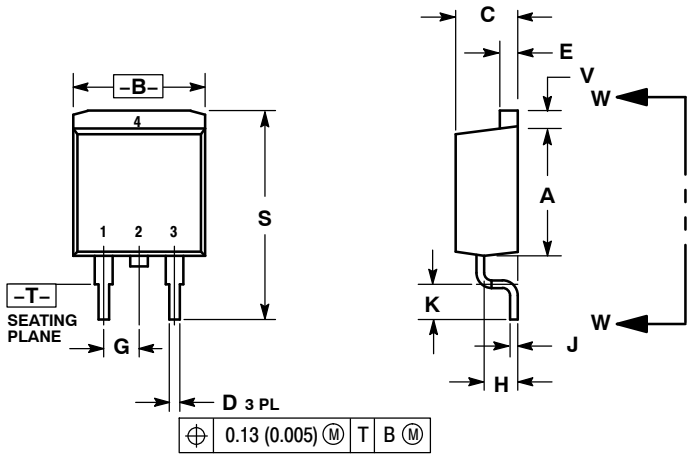
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

	INCHES		MILLIMETERS	
DIM	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	0.036	0.64	0.91
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.025	0.36	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

PACKAGE DIMENSIONS

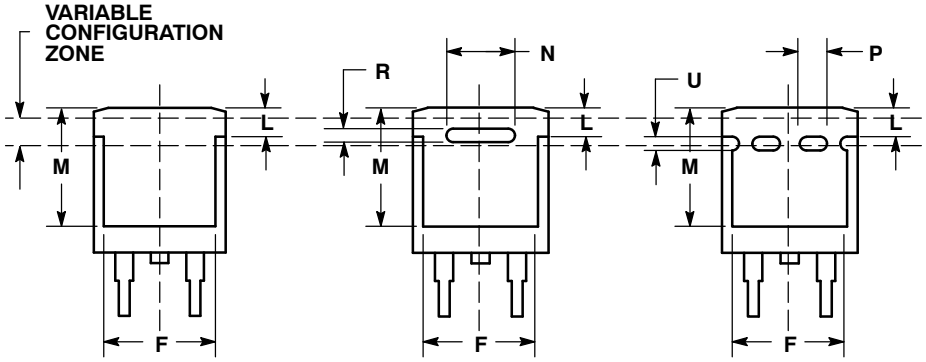
D²PAK
CASE 418B–04
ISSUE K



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.

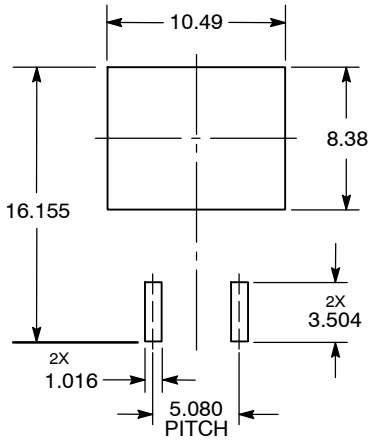
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
F	0.310	0.350	7.87	8.89
G	0.100 BSC		2.54 BSC	
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
L	0.052	0.072	1.32	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



VIEW W–W 1 | VIEW W–W 2 | VIEW W–W 3

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*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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