NTB23N03R

Power MOSFET
23 Amps, 25 Volts
N−Channel 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

- Planar HD3e Process for Fast Switching Performance
- Low $R_{DS(on)}$ to Minimize Conduction Loss
- Low C_{iss} to Minimize Driver Loss
- Low Gate Charge
- Optimized for High Side Switching Requirements in High−Efficiency DC−DC Converters

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

Parameter	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	25	Vdc
Gate−to−Source Voltage − Continuous	V_{GS}	±20	Vdc
Drain Current − Continuous @ T_A = 25°C, Limited by Chip − Continuous @ T_A = 25°C, Limited by Package − Single Pulse (t_p = 10 μs)	 I_D I_D I_{DM}	 23 6.0 60	A
Total Power Dissipation @ T_A = 25°C	P_D	37.5	W
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to 150	°C
Thermal Resistance − Junction−to−Case	$R_{\theta JC}$	3.3	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°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.

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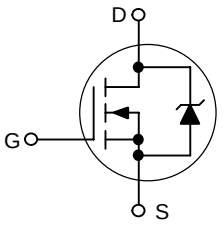
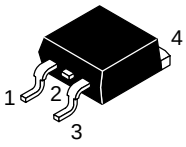
23 AMPERES, 25 VOLTS
$R_{DS(on)}$ = 32 mΩ (Typ)

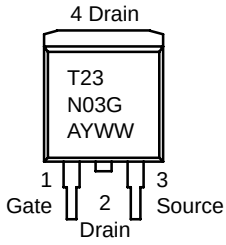
N−CHANNEL



MARKING DIAGRAM & PIN ASSIGNMENTS



D²PAK
CASE 418B
STYLE 2



T23N03 = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

ORDERING INFORMATION

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

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

Characteristics	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)	$V(br)_{DSS}$	 25 –	 28 –	 – –	Vdc mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 20 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 20 Vdc, V_{GS} = 0 Vdc, T_J = 150°C)	I_{DSS}	 – –	 – –	 1.0 10	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)	$V_{GS(th)}$	 1.0 –	 1.8 –	 2.0 –	Vdc mV/°C
Static Drain−to−Source On−Resistance (Note 1) (V_{GS} = 4.5 Vdc, I_D = 6 Adc) (V_{GS} = 10 Vdc, I_D = 6 Adc)	$R_{DS(on)}$	 – –	 50.3 32.3	 60 45	mΩ
Forward Transconductance (Note 1) (V_{DS} = 10 Vdc, I_D = 6 Adc)	g_{FS}	–	14	–	Mhos
DYNAMIC CHARACTERISTICS					
Input Capacitance	(V_{DS} = 20 Vdc, V_{GS} = 0 V, f = 1 MHz)	C_{iss}	–	225	–	pF
Output Capacitance		C_{oss}	–	108	–	
Transfer Capacitance		C_{rss}	–	48	–	
SWITCHING CHARACTERISTICS (Note 2)					
Turn−On Delay Time	(V_{GS} = 10 Vdc, V_{DD} = 10 Vdc, I_D = 6 Adc, R_G = 3 Ω)	$t_{d(on)}$	–	2.0	–	ns
Rise Time		t_r	–	14.9	–	
Turn−Off Delay Time		$t_{d(off)}$	–	9.9	–	
Fall Time		t_f	–	2.0	–	
Gate Charge	(V_{GS} = 4.5 Vdc, I_D = 6 Adc, V_{DS} = 10 Vdc) (Note 1)	Q_T	–	3.76	–	nC
		Q_1	–	1.7	–	
		Q_2	–	1.6	–	
SOURCE−DRAIN DIODE CHARACTERISTICS					
Forward On−Voltage	(I_S = 6 Adc, V_{GS} = 0 Vdc) (Note 1) (I_S = 6 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	 – –	 0.87 0.74	 1.2 –	Vdc
Reverse Recovery Time	(I_S = 6 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs) (Note 1)	t_{rr}	–	8.7	–	ns
		t_a	–	5.2	–	
		t_b	–	3.5	–	
Reverse Recovery Stored Charge		Q_{RR}	–	0.003	–	μC

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. Switching characteristics are independent of operating junction temperatures.

ORDERING INFORMATION

Device	Package	Shipping†
NTB23N03R	D^2PAK	50 Units / Rail
NTB23N03RG	D^2PAK (Pb−Free)	50 Units / Rail
NTB23N03RT4	D^2PAK	800 Units / Tape & Reel
NTB23N03RT4G	D^2PAK (Pb−Free)	800 Units / 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.

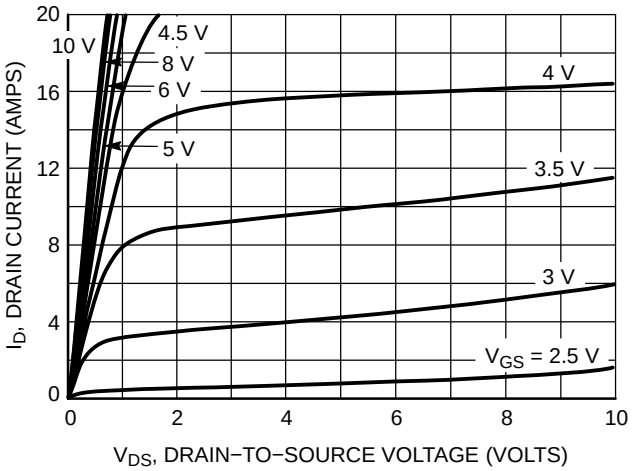


Figure 1. On−Region Characteristics

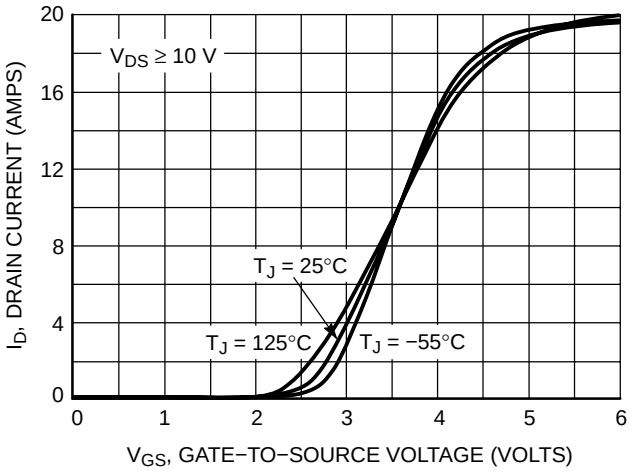


Figure 2. Transfer Characteristics

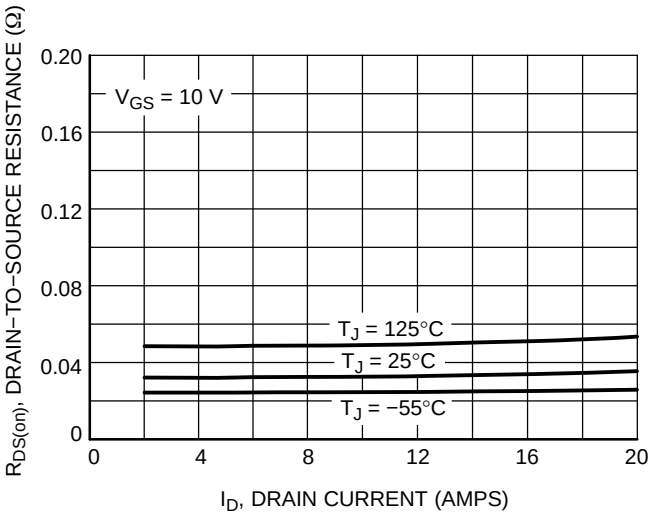


Figure 3. On−Resistance versus Drain Current and Temperature

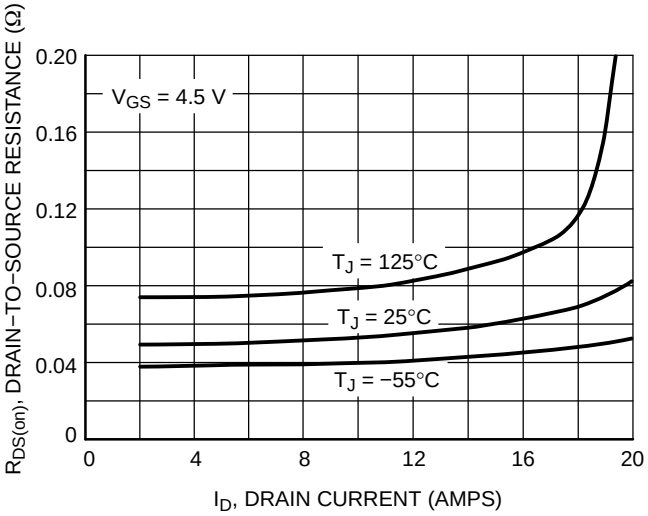


Figure 4. On−Resistance versus Drain Current and Temperature

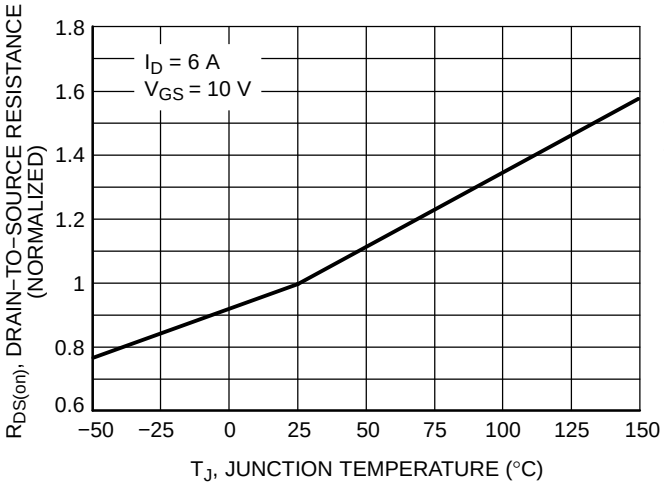


Figure 5. On−Resistance Variation with Temperature

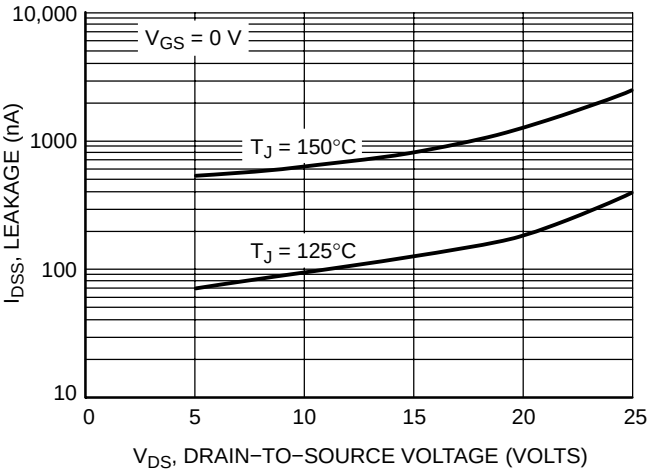


Figure 6. Drain−to−Source Leakage Current versus Voltage

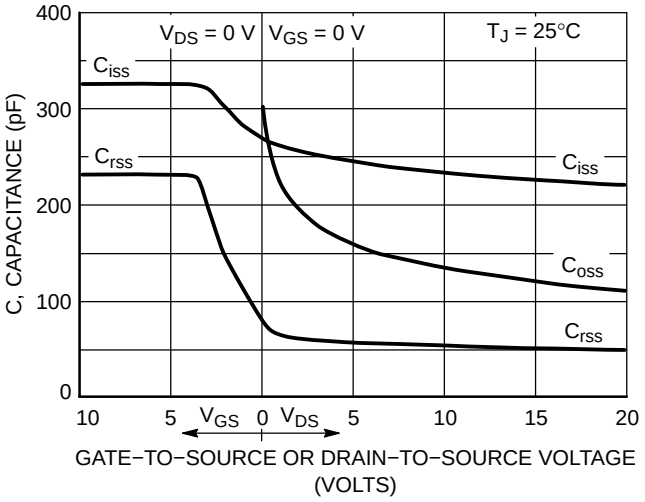


Figure 7. Capacitance Variation

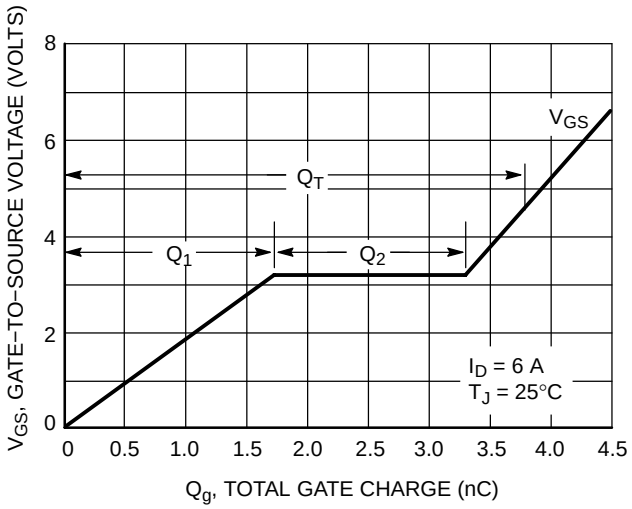


Figure 8. Gate−to−Source and Drain−to−Source Voltage versus Total Charge

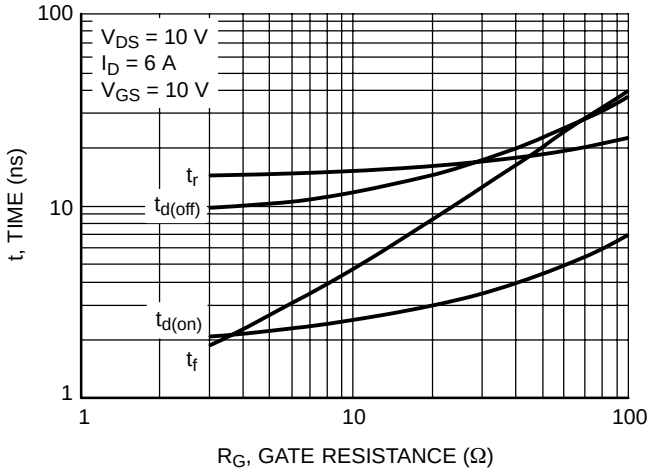


Figure 9. Resistive Switching Time Variation versus Gate Resistance

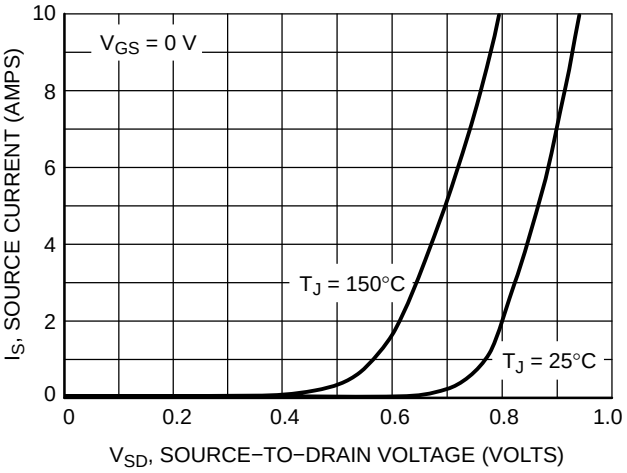
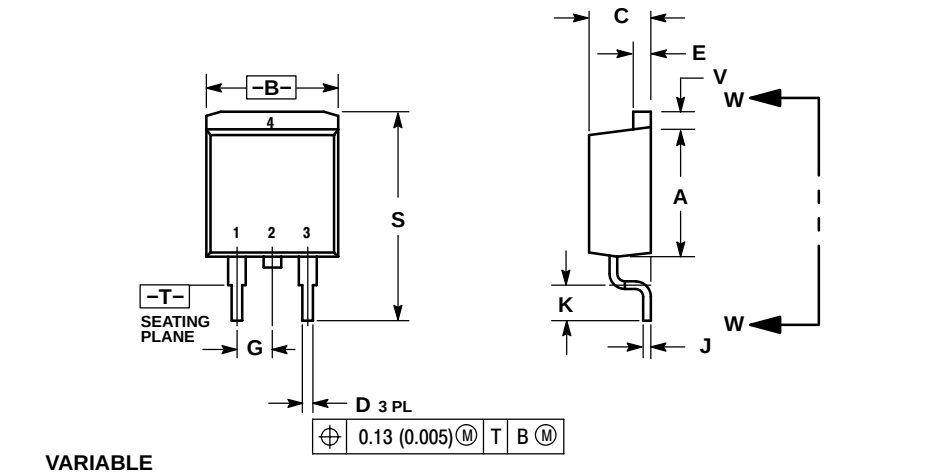


Figure 10. Diode Forward Voltage versus Current

PACKAGE DIMENSIONS

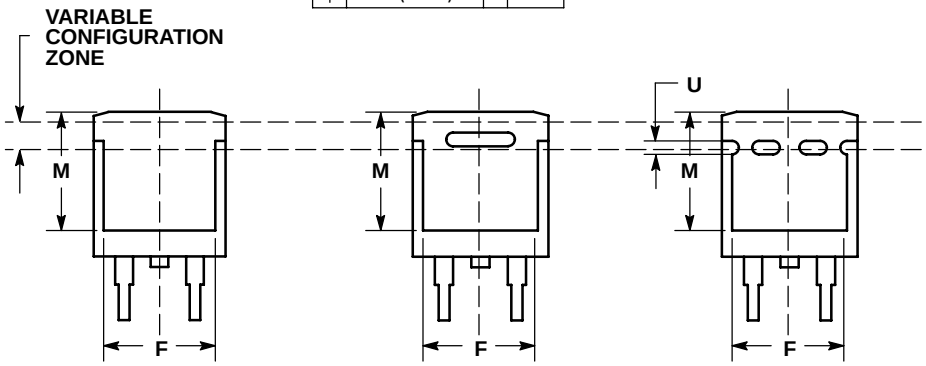
D²PAK
CASE 418AA−01
ISSUE O



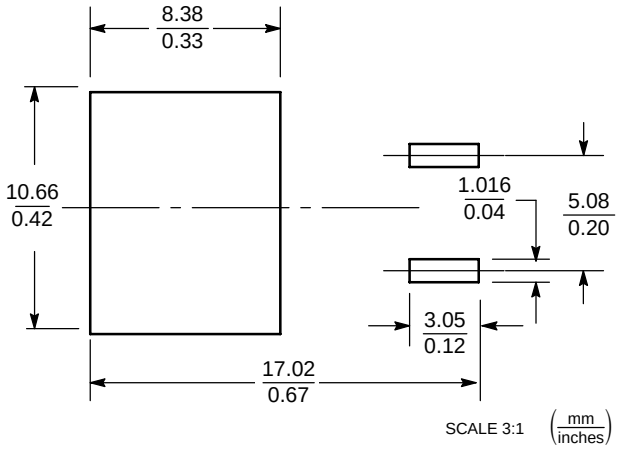
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	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	0.036	0.51	0.92
E	0.045	0.055	1.14	1.40
F	0.310	−−−	7.87	−−−
G	0.100 BSC		2.54 BSC	
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
M	0.280	−−−	7.11	−−−
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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082−1312 USA
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