

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.

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 ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	25	Vdc
Gate-to-Source Voltage - Continuous	V_{GS}	± 20	Vdc
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$, Limited by Chip - Continuous @ $T_A = 25^\circ\text{C}$, Limited by Package - Single Pulse ($t_p = 10 \mu\text{s}$)	I_D I_{D1} I_{DM}	23 6.0 60	A
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	TBD	W
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
Thermal Resistance - Junction-to-Case - Junction-to-Ambient (Note 1) - Junction-to-Ambient (Note 2)	$R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	TBD	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

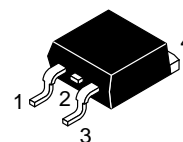
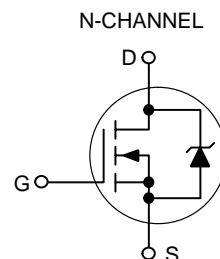
1. When surface mounted to an FR4 board using 1" pad size, (Cu Area 1.127 in²).
2. When surface mounted to an FR4 board using minimum recommended pad size, (Cu Area 0.412 in²).



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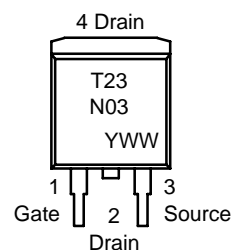
<http://onsemi.com>

23 AMPERES, 25 VOLTS
 $R_{DS(on)} = 32 \text{ m}\Omega$ (Typ)



D²PAK
CASE 418B
STYLE 2

MARKING DIAGRAM & PIN ASSIGNMENTS



T23N03 = Specific Device Code
Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
NTB23N03R	D ² PAK	50 Units/Rail
NTB23N03RT4	D ² PAK	800/Tape & Reel

NTB23N03R

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Characteristics	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (Note 3) ($V_{GS} = 0\text{ Vdc}$, $I_D = 250\text{ }\mu\text{Adc}$) Temperature Coefficient (Positive)	$V_{(br)DSS}$	25 -	28 -	- -	Vdc mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current ($V_{DS} = 20\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 20\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 150^\circ\text{C}$)	I_{DSS}	- -	- -	1.0 10	μAdc
Gate-Body Leakage Current ($V_{GS} = \pm 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	-	-	± 100	nAdc

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage (Note 3) ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$) Threshold Temperature Coefficient (Negative)	$V_{GS(th)}$	1.0 -	1.8 -	2.0 -	Vdc mV/ $^\circ\text{C}$
Static Drain-to-Source On-Resistance (Note 3) ($V_{GS} = 4.5\text{ Vdc}$, $I_D = 6\text{ Adc}$) ($V_{GS} = 10\text{ Vdc}$, $I_D = 6\text{ Adc}$)	$R_{DS(on)}$	- -	50.3 32.3	60 45	m Ω
Forward Transconductance (Note 3) ($V_{DS} = 10\text{ Vdc}$, $I_D = 6\text{ Adc}$)	g_{FS}	-	14	-	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 20\text{ Vdc}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$)	C_{iss}	-	225	-	pF
Output Capacitance		C_{oss}	-	108	-	
Transfer Capacitance		C_{rss}	-	48	-	

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$(V_{GS} = 10\text{ Vdc}$, $V_{DD} = 10\text{ Vdc}$, $I_D = 6\text{ Adc}$, $R_G = 3\text{ }\Omega$)	$t_{d(on)}$	-	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	$(V_{GS} = 4.5\text{ Vdc}$, $I_D = 6\text{ Adc}$, $V_{DS} = 10\text{ Vdc}$) (Note 3)	Q_T	-	3.76	-	nC
		Q_1	-	1.7	-	
		Q_2	-	1.6	-	

SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	$(I_S = 6\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) (Note 3) $(I_S = 6\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	V_{SD}	- -	0.87 0.74	1.2 -	Vdc
Reverse Recovery Time	$(I_S = 6\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $dI_S/dt = 100\text{ A}/\mu\text{s}$) (Note 3)	t_{rr}	-	8.7	-	ns
		t_a	-	5.2	-	
		t_b	-	3.5	-	
Reverse Recovery Stored Charge		Q_{RR}	-	0.003	-	μC

3. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

4. Switching characteristics are independent of operating junction temperatures.

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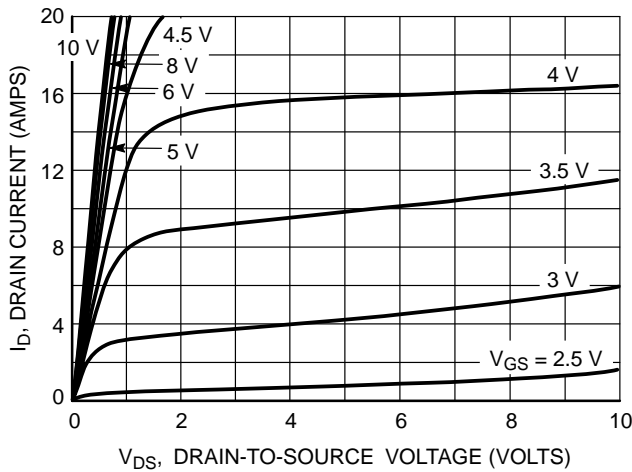


Figure 1. On-Region Characteristics

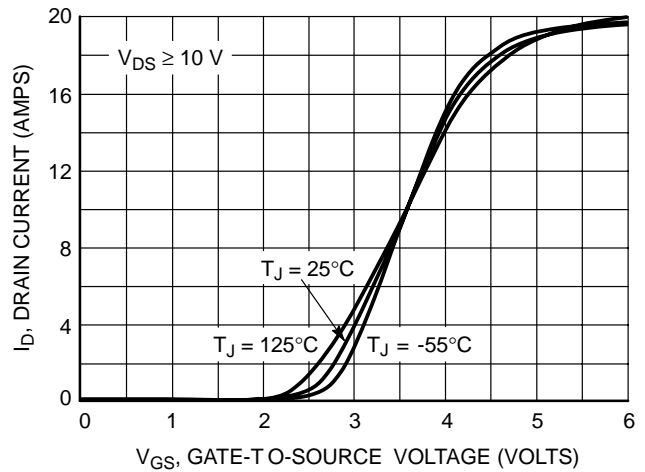


Figure 2. Transfer Characteristics

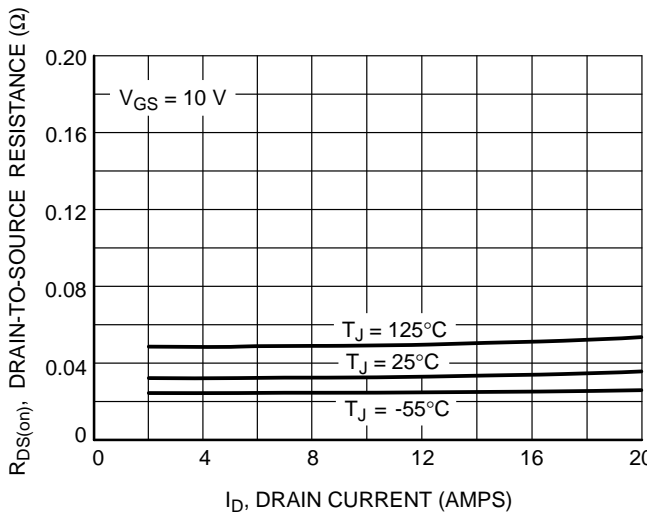


Figure 3. On-Resistance versus Drain Current and Temperature

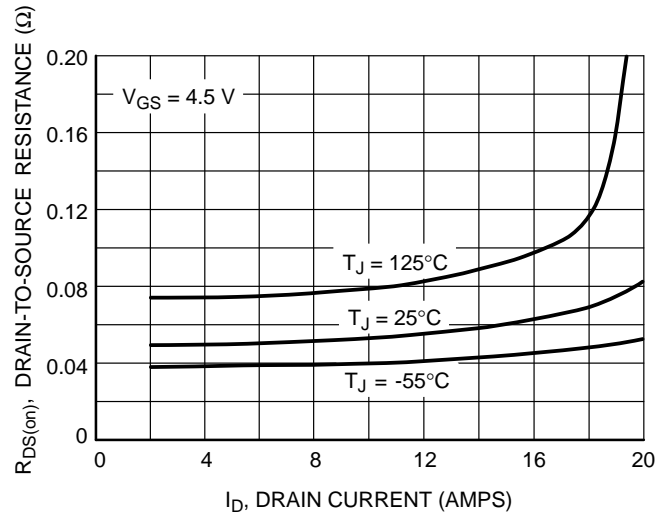


Figure 4. On-Resistance versus Drain Current and Temperature

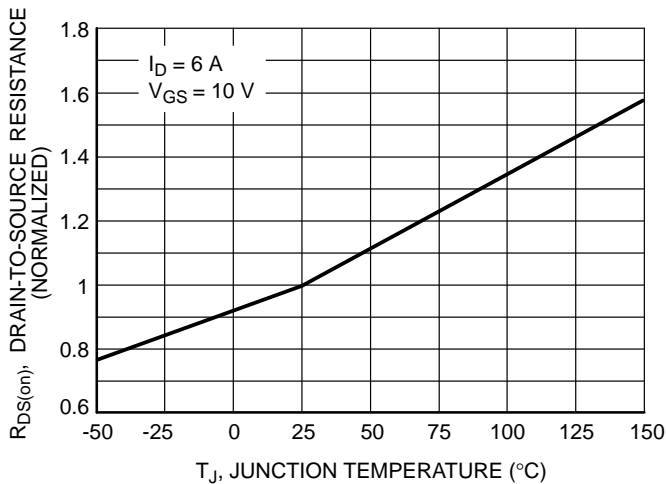


Figure 5. On-Resistance Variation with Temperature

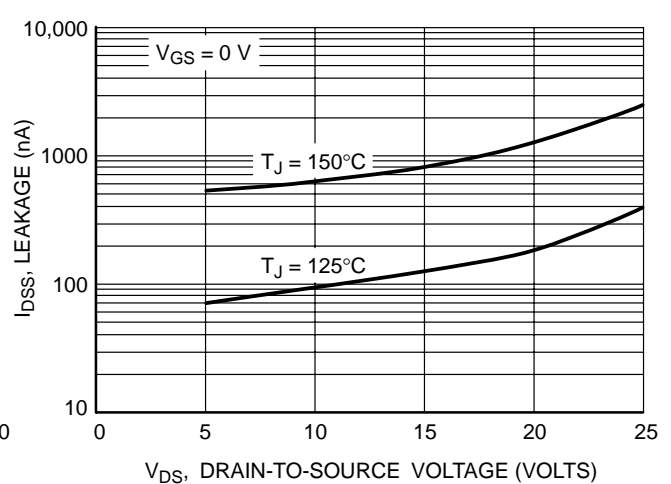


Figure 6. Drain-to-Source Leakage Current versus Voltage

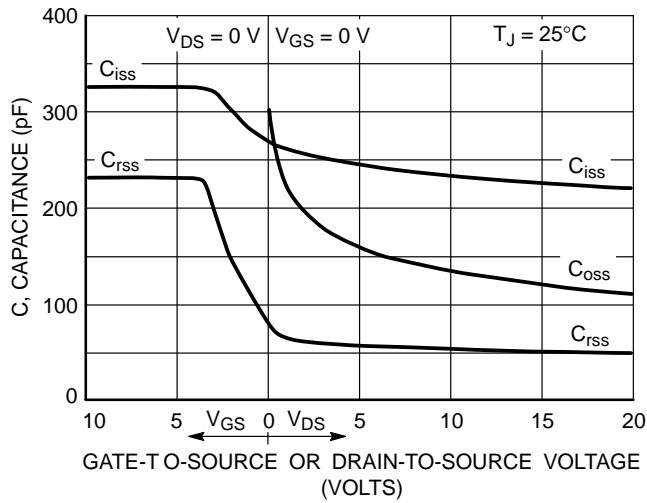


Figure 7. Capacitance Variation

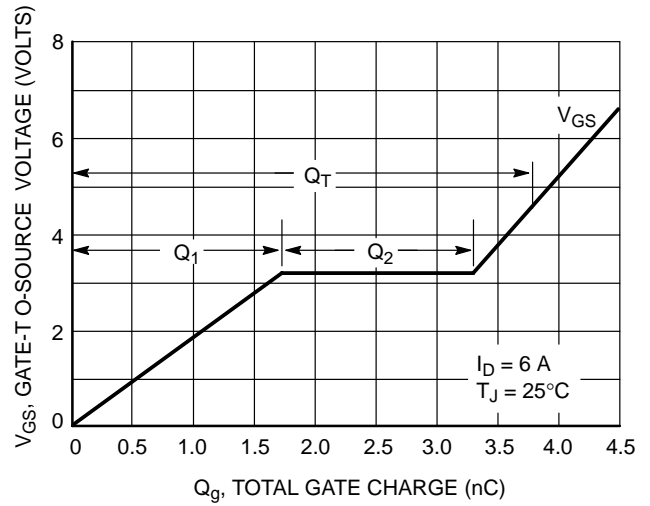


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

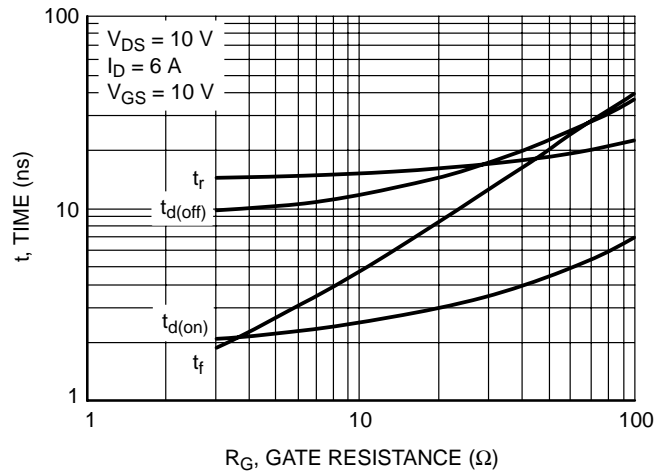


Figure 9. Resistive Switching Time Variation versus Gate Resistance

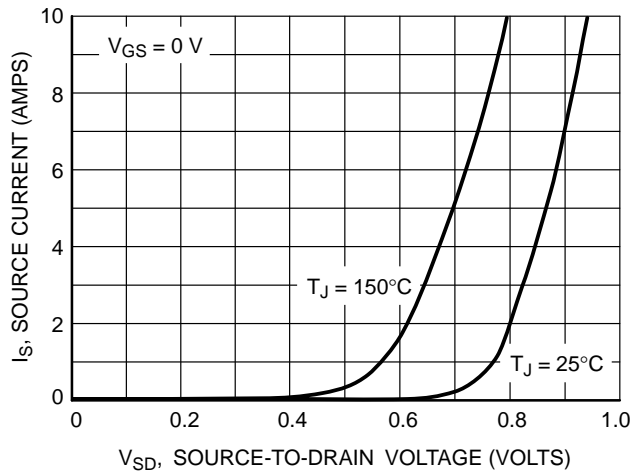
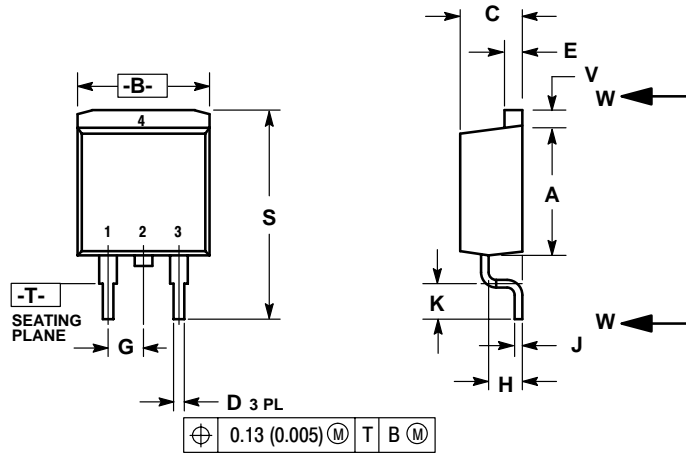


Figure 10. Diode Forward Voltage versus Current

NTB23N03R

PACKAGE DIMENSIONS

D²PAK
CASE 418B-04
ISSUE H



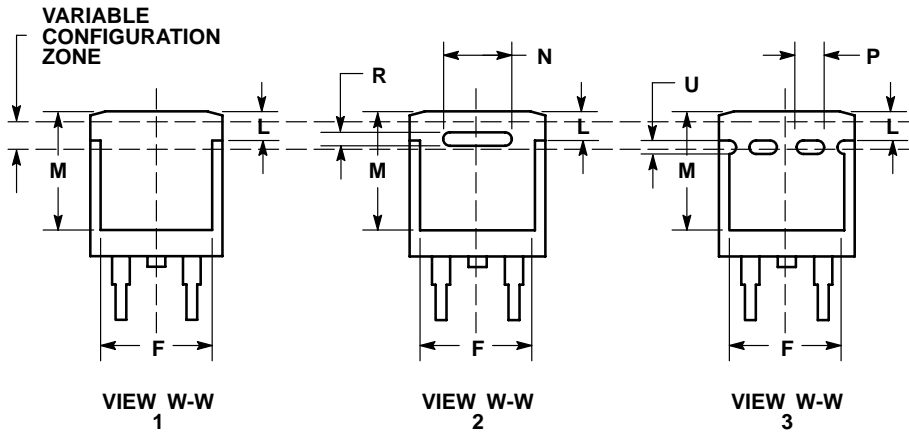
NOTES:

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

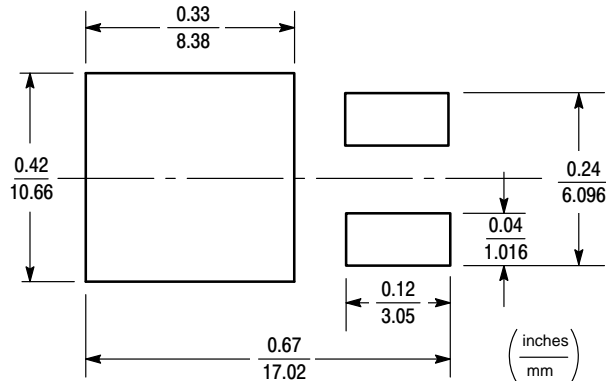
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
F	0.310	0.350	7.87	8.89
G	0.100 BSC		2.54 BSC	
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
L	0.052	0.072	1.32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



RECOMMENDED FOOTPRINT



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