

## 90N03S-VB Datasheet N-Channel 30-V (D-S) MOSFET

D

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N-Channel MOSFET

GO

PRODUCT SUMMARY					
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ)		
30	0.0023 at V <sub>GS</sub> = 10 V	150	82 nC		
30	0.0032 at V <sub>GS</sub> = 4.5 V	120	02 HC		



#### **FEATURES**

- Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS Tested
- Compliant to RoHS Directive 2011/65/EU

#### **APPLICATIONS**

- OR-ing •
- Server •
- DC/DC •

Parameter	Symbol	Limit	Unit		
Drain-Source Voltage	V <sub>DS</sub>	30	V		
Gate-Source Voltage		V <sub>GS</sub>		± 20	
	T <sub>C</sub> = 25 °C		150	A	
Continuous Drain Current (T <sub>J</sub> = 175 °C)	T <sub>C</sub> = 70 °C		120		
	T <sub>A</sub> = 25 °C	I <sub>D</sub>	35.8 <sup>b, c</sup>		
	T <sub>A</sub> = 70 °C		27 <sup>b, c</sup>		
Pulsed Drain Current		I <sub>DM</sub>	500		
Avalanche Current Pulse	L = 0.1 mH	I <sub>AS</sub>	39		
Single Pulse Avalanche Energy		E <sub>AS</sub>	94.8	mJ	
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C	1-	90 <sup>a, e</sup>	Α	
Continuous Source-Drain Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	3.13 <sup>b, c</sup>		
	T <sub>C</sub> = 25 °C		250 <sup>a</sup>	W	
Maximum Dawar Dissinction	T <sub>C</sub> = 70 °C	P <sub>D</sub>	175		
Maximum Power Dissipation	T <sub>A</sub> = 25 °C	٢D	3.75 <sup>b, c</sup>		
	T <sub>A</sub> = 70 °C		2.63 <sup>b, c</sup>		
Operating Junction and Storage Temperature Ra	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 175	°C		

THERMAL RESISTANCE RATINGS							
Parameter		Symbol	Тур.	Max.	Unit		
Maximum Junction-to-Ambient <sup>b, d</sup>	$t \le 10 \text{ sec}$	R <sub>thJA</sub>	32	40	°C/W		
Maximum Junction-to-Case	Steady State	R <sub>thJC</sub>	0.5	0.6	C/W		

Notes:

a. Based on  $T_C = 25$  °C. b. Surface mounted on 1" x 1" FR4 board. c. t = 10 sec.

d. Maximum under steady state conditions is 90 °C/W.

<b>SPECIFICATIONS</b> ( $T_J = 25 \text{ °C}$ , Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static	Cymbol			Typ.	Max.	Onic	
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 µA	30			V	
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$			35			
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = 250 μA		- 7.5		mV/°C	
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_{D} = 250 \ \mu A$	1.5		2.5	V	
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 20 V$	-		± 100	nA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			1		
		$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 55 \text{ °C}$			10	μA	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 V, V_{GS} = 10 V$	90			А	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 38.8 A	0.0023				
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 37 A	-	0.0032		Ω	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 38.8 A		160		S	
Dynamic <sup>b</sup>						<u>.</u>	
Input Capacitance	C <sub>iss</sub>			6201		pF	
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, \text{ f} = 1 \text{ MHz}$		1725			
Reverse Transfer Capacitance	C <sub>rss</sub>			970			
Total Gate Charge	Qg	$V_{DS}$ = 15 V, $V_{GS}$ = 10 V, $I_{D}$ = 38.8 A		171	257	nC	
				81.5	123		
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS}$ = 15 V, $V_{GS}$ = 4.5 V, $I_{D}$ = 28.8 A		34			
Gate-Drain Charge	Q <sub>gd</sub>			29			
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1.4	2.1	Ω	
Turn-On Delay Time	t <sub>d(on)</sub>			18	27		
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 0.625 $\Omega$		11	17	]	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ 24 A, $V_{GEN}$ = 10 V, $R_g$ = 1 $\Omega$		70	105	1	
Fall Time	t <sub>f</sub>			10	15		
Turn-On Delay Time	t <sub>d(on)</sub>			55	83	- ns - -	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 0.67 $\Omega$		180	270		
Turn-Off Delay Time	t <sub>d(off)</sub>	$\text{I}_\text{D}\cong\text{22.5}$ A, $\text{V}_\text{GEN}$ = 4.5 V, $\text{R}_\text{g}$ = 1 $\Omega$		55	83		
Fall Time	t <sub>f</sub>			12	18		
Drain-Source Body Diode Characteristic	s						
Continuous Source-Drain Diode Current	۱ <sub>S</sub>	$T_{\rm C} = 25 \ ^{\circ}{\rm C}$			120	Δ	
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				120	A	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 22 A		0.8	1.2	V	
Body Diode Reverse Recovery Time	t <sub>rr</sub>			52	78	ns	
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> = 20 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C		70.2	105	nC	
Reverse Recovery Fall Time	t <sub>a</sub>	$r_F = 20 \text{ A}, \text{ u/ul} = 100 \text{ A/µs}, r_J = 25 ^{\circ}\text{C}$		27			
Reverse Recovery Rise Time	t <sub>b</sub>			25		ns	

Notes:

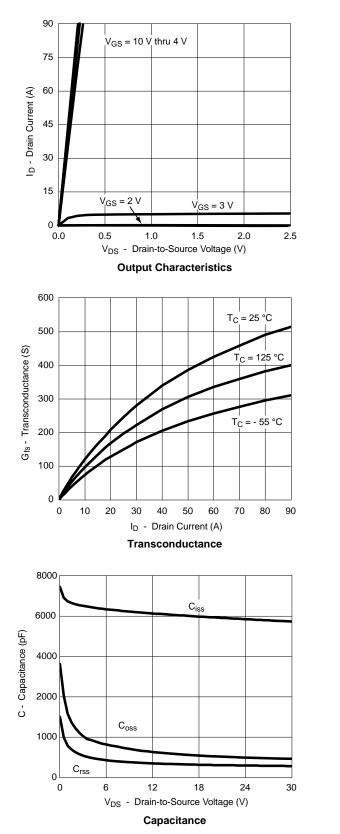
a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2$  %.

b. Guaranteed by design, not subject to production testing.

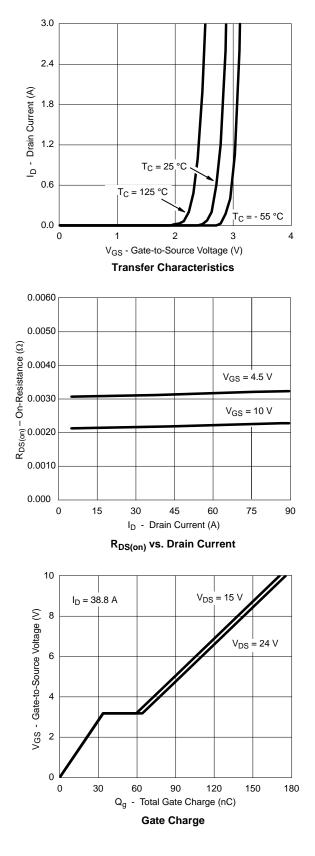
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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#### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)





T<sub>J</sub> = 25<sup>'</sup> °C

0.8

125 150

175

1

0.6

I<sub>D</sub> = 250 μA

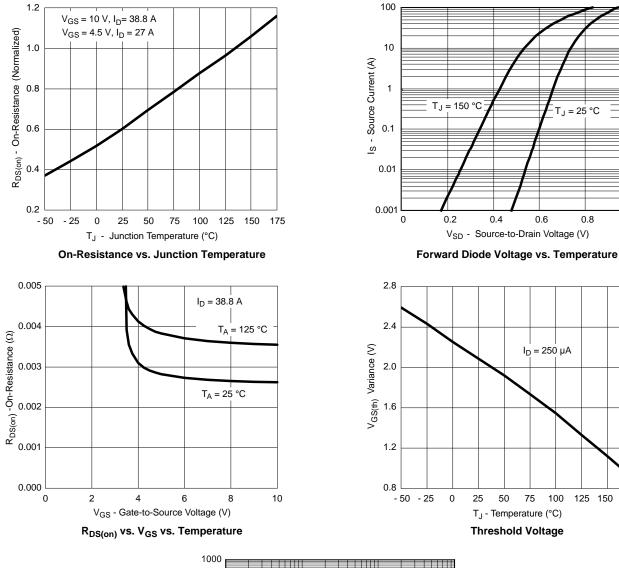
0.4

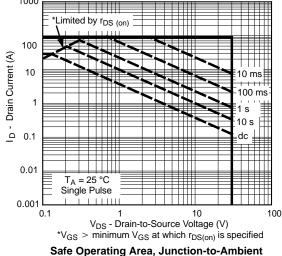
25 50 75 100

T<sub>J</sub> - Temperature (°C)

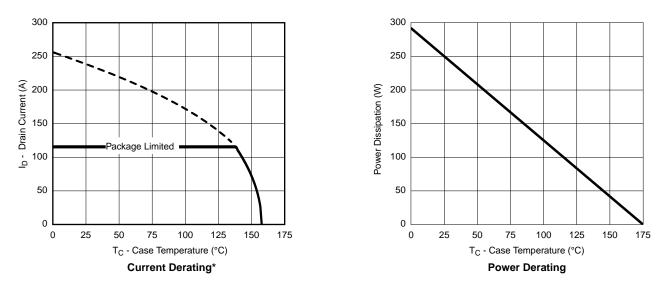
**Threshold Voltage** 











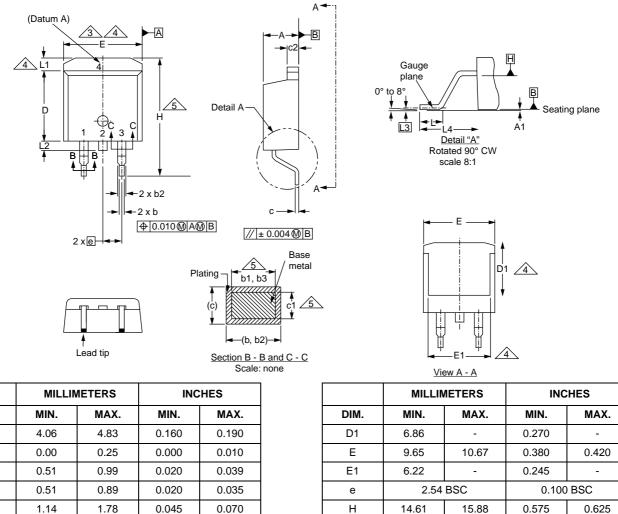
#### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

\*The power dissipation  $P_D$  is based on  $T_{J(max)} = 175$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.





#### **TO-263AB (HIGH VOLTAGE)**



DWG:	5970

DIM.

А

A1

b

b1

b2

b3

с

c1

c2

D

#### Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.

1.73

0.74

0.58

1.65

9.65

0.045

0.015

0.015

0.045

0.330

0.068

0.029

0.023

0.065

0.380

2. Dimensions are shown in millimeters (inches).

1.14

0.38

0.38

1.14

8.38

ECN: S-82110-Rev. A, 15-Sep-08

3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.

L

L1

L2

L3

L4

1.78

-

-

4.78

2.79

1.65

1.78

5.28

0.25 BSC

0.070

-

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0.188

0.010 BSC

0.110

0.066

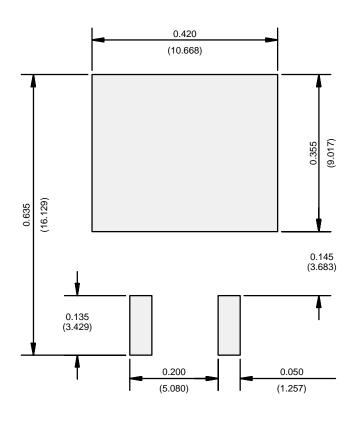
0.070

0.208

- 4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
- 5. Dimension b1 and c1 apply to base metal only.
- 6. Datum A and B to be determined at datum plane H.
- 7. Outline conforms to JEDEC outline to TO-263AB.



### **RECOMMENDED MINIMUM PADS FOR D<sup>2</sup>PAK: 3-Lead**



Recommended Minimum Pads Dimensions in Inches/(mm)



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