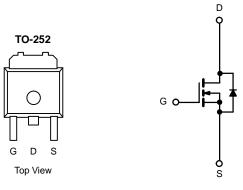


# 9N03-VB Datasheet N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY						
V <sub>DS</sub> (V)	$R_{DS(on)}(\Omega)$	I <sub>D</sub> (A) <sup>a, e</sup>	Q <sub>g</sub> (Typ)			
30	0.005 at V <sub>GS</sub> = 10 V	80	31 nC			
30	0.006 at V <sub>GS</sub> = 4.5 V	68	31110			



### **FEATURES**

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



#### **APPLICATIONS**

- OR-ing
- Server
- DC/DC

N-Channel MOSFET

Parameter		Symbol	Limit	Unit	
Drain-Source Voltage		V <sub>DS</sub>	30		
Gate-Source Voltage		V <sub>GS</sub>	± 20		
	T <sub>C</sub> = 25 °C		80		
Continuous Drain Current (T. – 175 °C)	T <sub>C</sub> = 70 °C		60	A	
Continuous Drain Current (T <sub>J</sub> = 175 °C)	T <sub>A</sub> = 25 °C	I <sub>D</sub>	25.8 <sup>b, c</sup>		
	T <sub>A</sub> = 70 °C		22 <sup>b, c</sup>		
Pulsed Drain Current		I <sub>DM</sub>	250		
Avalanche Current Pulse	L = 0.1 mH	I <sub>AS</sub>	39		
Single Pulse Avalanche Energy	L = 0.1 IIII	E <sub>AS</sub>	94.8	mJ	
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C	I.	90 <sup>a, e</sup>		
Continuous Source-Diam blode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	3.13 <sup>b, c</sup>	A	
	T <sub>C</sub> = 25 °C		205 <sup>a</sup>	w	
Maximum Power Dissipation	T <sub>C</sub> = 70 °C	ь	135		
	T <sub>A</sub> = 25 °C	P <sub>D</sub>	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 ≤ 10 sec	R <sub>thJA</sub>	32	40	°C/W	
Maximum Junction-to-Case	Steady State	R <sub>thJC</sub>	0.5	0.6	C/VV	

#### Notes:

- a. Based on T<sub>C</sub> = 25 °C.
  b. Surface mounted on 1" x 1" FR4 board.

- b. Striate informed on 1 X 1 114 board.
  c. t = 10 sec.
  d. Maximum under steady state conditions is 90 °C/W.
  e. Calculated based on maximum junction temperature. Package limitation current is 90 A.



Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Static					l	
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	30			V
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	J 250 \		35		
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	$I_{D} = 250  \mu A$		- 7.5		mV/°(
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1.0		2.5	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zana Oata Valtana Basis Oursest		$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$	= 0 V		1	
Zero Gate Voltage Drain Current	IDSS	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 ^{\circ}\text{C}$			10	μA
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	90			Α
		$V_{GS} = 10 \text{ V}, I_D = 38.8 \text{ A}$		0.005		Ω
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	$V_{GS} = 4.5 \text{ V}, I_D = 37 \text{ A}$		0.006		
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 38.8 A		160		S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>			2201		pF
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		525		
Reverse Transfer Capacitance	C <sub>rss</sub>			270		
Total Gate Charge	0	$V_{DS} = 15 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 38.8 \text{ A}$	61	61	107	nC
	$Q_g$			31.5	50	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 28.8 \text{ A}$		10		
Gate-Drain Charge	$Q_{gd}$			6		
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>	$V_{DD} = 15 \text{ V}, R_{L} = 0.625 \Omega$		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	
Fall Time	t <sub>f</sub>			10	15	no
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>	$I_D \cong 22.5 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$		55	83	
Fall Time	t <sub>f</sub>			12	18	
<b>Drain-Source Body Diode Characteristic</b>	cs					
Continuous Source-Drain Diode Current	I <sub>S</sub>	$T_C = 25  ^{\circ}C$			120	Α
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				120	
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>	$\eta_{\text{F}} = 20 \text{ A}, \text{ al/at} = 100 \text{ A/}\mu\text{s},  1_{\text{J}} = 25 ^{\circ}\text{C}$		27		
Reverse Recovery Rise Time				25		ns

#### Notes:

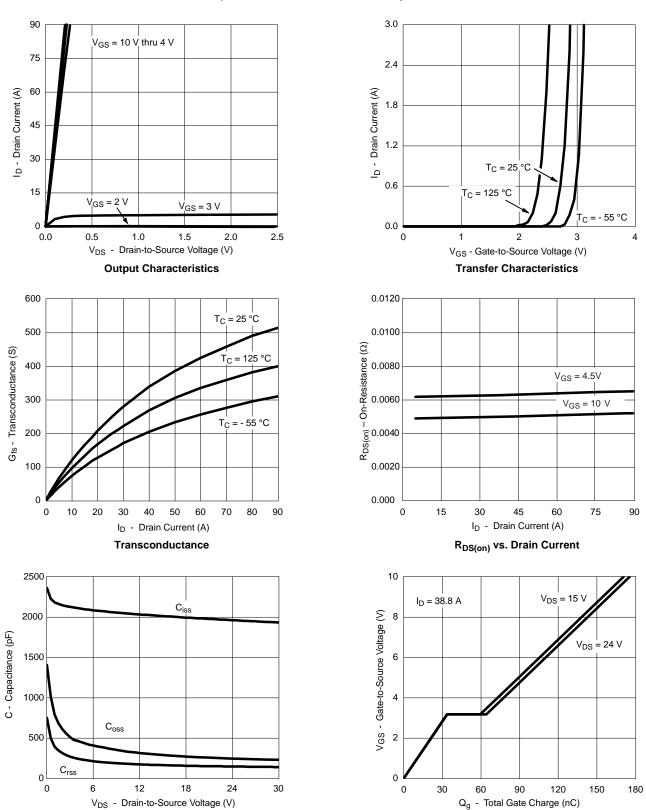
- a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

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)



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Capacitance

**Gate Charge** 



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



On-Resistance vs. Junction Temperature



 $R_{DS(on)}$  vs.  $V_{GS}$  vs. Temperature



Forward Diode Voltage vs. Temperature



Threshold Voltage



Safe Operating Area, Junction-to-Ambient



#### 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.

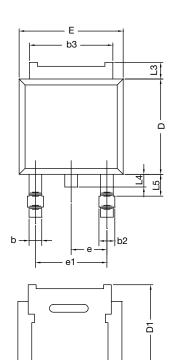


Normalized Thermal Transient Impedance, Junction-to-Case

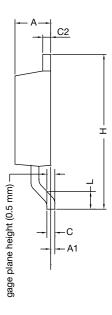
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## **TO-252AA CASE OUTLINE**



E1



	MILLIMETERS		MILLIMETERS INCH		HES	
DIM.	MIN.	MAX.	MIN.	MAX.		
А	2.18	2.38	0.086	0.094		
A1	-	0.127	-	0.005		
b	0.64	0.88	0.025	0.035		
b2	0.76	1.14	0.030	0.045		
b3	4.95	5.46	0.195	0.215		
С	0.46	0.61	0.018	0.024		
C2	0.46	0.89	0.018	0.035		
D	5.97	6.22	0.235	0.245		
D1	5.21	-	0.205	-		
Е	6.35	6.73	0.250	0.265		
E1	4.32	-	0.170	-		
Н	9.40	10.41	0.370	0.410		
е	2.28	BSC	0.090 BSC			
e1	4.56	BSC	0.180 BSC			
L	1.40	1.78	0.055	0.070		
L3	0.89	1.27	0.035	0.050		
L4	-	1.02	-	0.040		
L5	1.14	1.52	0.045	0.060		
ECN: X12-0247-Rev. M. 24-Dec-12						

#### DWG: 5347

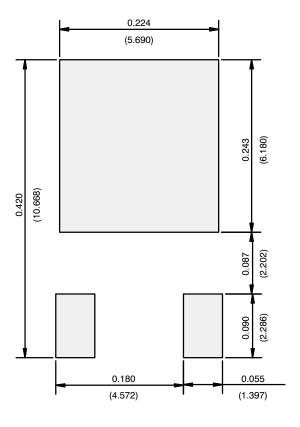
Note

• Dimension L3 is for reference only.

6 服务热线:400-655-8788



### RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads Dimensions in Inches/(mm)

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