SNA2G08 Dual 2-Input Positive-AND Gate

Features

- Operating Voltage Range: 1.65V to 5.5V
- Low Power Consumption: 1μA (Max)
- Operating Temperature Range: -40°C to +125°C
- Inputs Accept Voltage to 5.5V
- High Output Drive: ±24mA at V_{CC}=3.0V
- Packages: MSOP-8

Applications

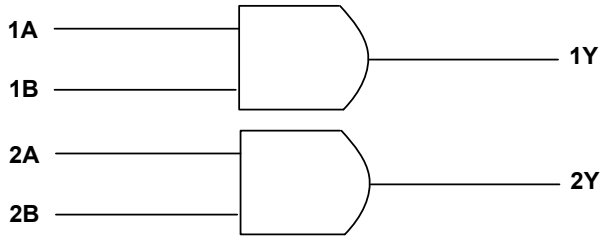
- Active Noise Elimination
- Bar Code Scanner
- Blood Pressure Monitor
- CPAP Machine
- Fingerprint identification
- Network attached storage (NAS)
- Private Branch Exchange (PBX)
- IP Phone: Wired and Wireless

General Description

The SNA2G08 Dual 2-input positive-AND gate is designed for 1.65V to 5.5V V_{CC} operation.

The SNA2G08 device performs the Boolean function Y=A • B or Y= $\overline{\overline{A}+\overline{B}}$ in positive logic. The device is fully specified for partial-power-down applications using Ioff. The Ioff circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

Simplified Schematic



Ordering Information

Part Number	V_{OUT} (V)	Package	Ordering Number	Packing Option
SNA2G08	XX	MSOP-8	SNA2G08Q00CM8	Tape and Reel, 4000

[1] XX indicates 0.8V~5.0V. For example, 33 means product outputs 3.3V.

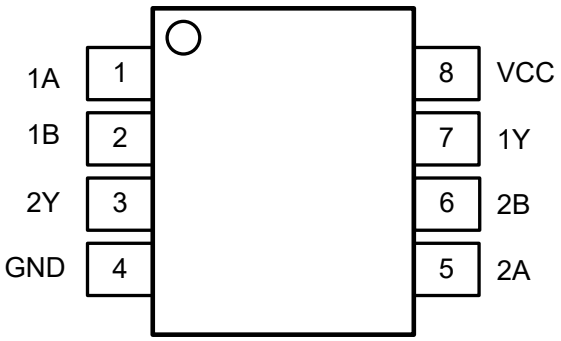
Function Table

Inputs		Output
A	B	Y
H	H	H
L	H	L
H	L	L
L	L	L

Y=A • B, H=HIGH Logic Level, L=LOW Logic Level.

Contents

1 Pin Description



MSOP-8

Pin MSOP-8	Name	I/O TYPE	Function
1/5	A	I	A input
2/6	B	I	B input
4	GND	P	Ground pin
3/7	Y	O	Y output
8	VCC	P	Power pin

2 Specifications

2.1 Absolute Maximum Ratings

Over operating ambient temperature range (unless otherwise noted)[1][2].

Parameter		Symbol	Min	Max	Unit
Supply voltage range		V_{CC}	-0.5	6.5	V
Input voltage range [2]		V_I	-0.5	6.5	V
Voltage range applied to any output in the high-impedance or power-off state [2]		V_O	-0.5	6.5	V
Voltage range applied to any output in the high or low state [2][3]		V_O	-0.5	V_{CC}+0.5	V
Input clamp current	V_I<0	I_{IK}		-50	mA
Output clamp current	V_O<0	I_{OK}		-50	mA
Continuous output current		I_O		±50	mA
Continuous current through V_{CC} or GND				±100	mA
Junction Temperature		T_J	-65	150	°C
Storage Temperature Range		T_{STG}	-65	150	°C

Note:

[1] Stresses greater than 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 under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability;

[2] The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

[3] The value of V_{CC} is provided in the Recommended Operating Conditions table.

2.2 ESD Ratings

Parameter	Symbol		Value	Unit
Electrostatic discharge	V_{ESD}	Human-body model (HBM)	±8000	V
		Machine model (MM)	±500	

2.3 Thermal Information

Thermal Metric	Symbol	MSOP-8	Unit
Junction-to-ambient thermal resistance	$R_{\theta JA}$	165	°C/W
Junction-to-case (top) thermal resistance	$R_{\theta JC(top)}$	53	°C/W
Junction-to-board thermal resistance	$R_{\theta JB}$	87	°C/W
Junction-to-top characterization parameter	ψ_{JT}	4.9	°C/W
Junction-to-board characterization parameter	ψ_{JB}	85	°C/W
Junction-to-case (bottom) thermal resistance	$R_{\theta JC(bot)}$	N/A	°C/W

2.4 Recommanded Operating Range

Over operating ambient temperature range (unless otherwise noted).

Parameter	Symbol	Conditions	Min	Max	Unit
Supply voltage	V_{CC}	Operating	1.65	5.5	V
		Data retention only	1.5	5.5	
High-level input voltage	V_{IH}	V_{CC}=1.65V to 1.95V	0.65 x V_{CC}		V
		V_{CC}=2.3V to 2.7V	1.7		
		V_{CC}=3V to 3.6V	2.2		
		V_{CC}=4.5V to 5.5V	0.7 x V_{CC}		
Low-level input voltage	V_{IL}	V_{CC}=1.65V to 1.95V		0.15 x V_{CC}	V
		V_{CC}=2.3V to 2.7V		0.3	
		V_{CC}=3V to 3.6V		0.4	
		V_{CC}=4.5V to 5.5V		0.15 x V_{CC}	
Input voltage	V_I		0	5.5	V
Output voltage	V_O		0	V_{CC}	V
Input transition rise or fall	t_r,t_f	V_{CC}=1.8V± 0.15V,2.5V ± 0.2V		20	ns/V
		V_{CC}=3.3V± 0.3V		10	
		V_{CC}=5V± 0.5V		5	
Operating temperature	T_A		-40	+125	°C

2.5 Electrical Characteristics

Parameter		Conditions	Temp	Min	Typ	Max	Unit
V_{OH}		I_{OH}=–100μA ,V_{CC}=1.65V to 5.5V	Full	V_{CC}-0.1			V
		I_{OH}=–4mA ,V_{CC}=1.65V		1.2			
		I_{OH}=–8mA ,V_{CC}=2.3V		1.9			
		I_{OH}=–16mA ,V_{CC}=3V		2.4			
		I_{OH}=–24mA ,V_{CC}=3V		2.3			
		I_{OH}=–32mA ,V_{CC}=4.5V		3.8			
V_{OL}		I_{OL}=100μA, V_{CC}=1.65V to 5.5V	Full			0.1	V
		I_{OL}=4mA , V_{CC}=1.65V				0.45	
		I_{OH}=8mA ,V_{CC}=2.3V				0.3	
		I_{OH}=16mA ,V_{CC}=3V				0.4	
		I_{OH}=24mA ,V_{CC}=3V				0.55	
		I_{OH}=32mA ,V_{CC}=4.5V				0.55	
I_I	A or B inputs	V_I=5.5V or GND,V_{CC}=0V to 5.5V	+25°C		±0.1	±1	μA
			Full			±5	
I_{off}		V_I or V_O=5.5V,V_{CC}=0V	+25°C		±0.1	±1	μA
			Full			±10	
I_{CC}		V_I=5.5V or GND,I_O=0, V_{CC}=1.65V to 5.5V	+25°C		0.1	1	μA
			Full			10	
ΔICC		One input at V_{CC}-0.6V, Other inputs at V_{CC} or GND, V_{CC}=1.65V to 5.5V	Full			500	μA

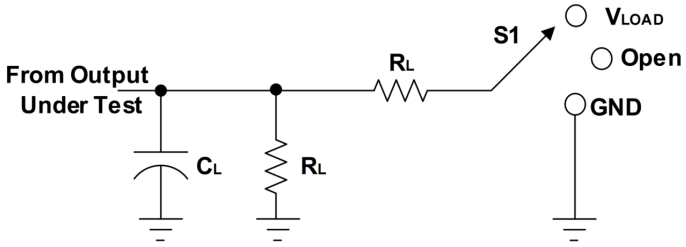
2.6 Switching Characteristics

Over recommended operating free-air temperature range (-40°C to 125°C, unless otherwise noted.)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Propagation Delay	t_{pd}	V_{CC}=1.8V±0.15V	C_L=30pF, R_L=1kΩ		11.6		ns
		V_{CC}=2.5V±0.2V	C_L=30pF, R_L=500Ω		6.6		ns
		V_{CC}=3.3V±0.3V	C_L=50pF, R_L=500Ω		5.4		ns
		V_{CC}=5V±0.5V	C_L=50pF, R_L=500Ω		4.3		ns
Input Capacitance	C_i	V_{CC}=0V			4		pF
Power dissipation capacitance	C_{pd}	V_{CC}=3.3V	f=10MHz		26		pF
		V_{CC}=5V			31		pF

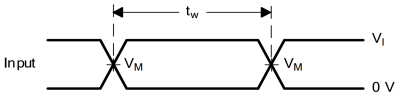
Note: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

3 Parameter Measurement Information

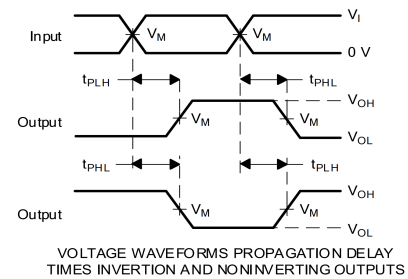


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

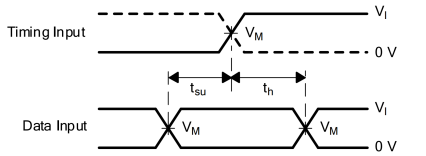
V_{CC}	INPUTS		V_M	V_{LOAD}	C_L		R_L		V_Δ
	V_I	T_r/T_f							
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	2 X V_{CC}	15pF	30pF	1MΩ	1kΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 X V_{CC}	15pF	30pF	1MΩ	500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	15pF	50pF	1MΩ	500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 X V_{CC}	15pF	50pF	1MΩ	500Ω	0.3V



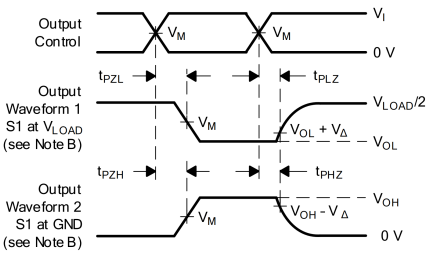
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS PROPAGATION DELAY
TIMES INVERTION AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS ENABLE AND DISABLE
TIMES LOW-AND HIGH-LEVEL ENABLING

Note:

[1] C_L includes probe and jig capacitance.

[2] Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.
Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.

[3] All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50Ω.

[4] The outputs are measured one at a time, with one transition per measurement.

[5] t_{PLZ} and t_{PHZ} are the same as t_{dis}.

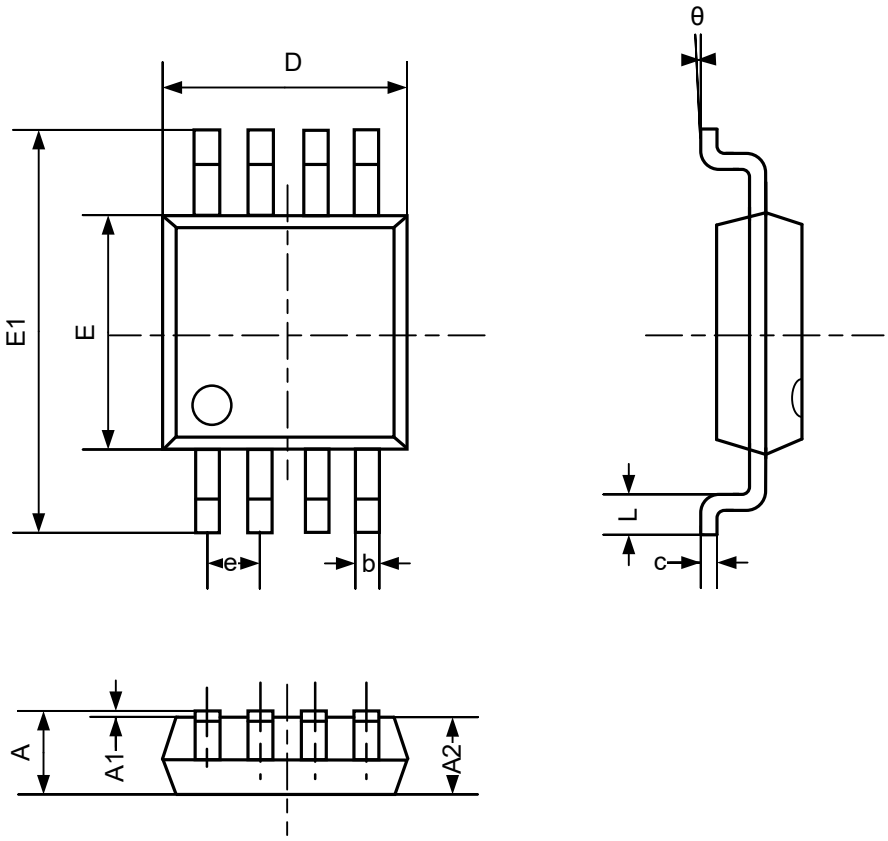
[6] t_{PZL} and t_{PZH} are the same as t_{en}.

[7] t_{PLH} and t_{PHL} are the same as t_{pd}.

[8] All parameters and waveforms are not applicable to all devices.

4 Package Outline

4.1 MSOP-8



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650 BSC		0.026 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

5 Revision History

Version	Date	Description
0.1	2022/10/31	Initial release
0.2	2023/04/19	Update some specification informations