Quadruple 2-Input Positive-AND Gate

Description

The FLG4G08 quadruple 2-input positive-AND gate is designed for 1.65V to 5.5V V_{CC} operation.

The FLG4G08 device performs the Boolean function $Y = A \bullet B$ or $Y = \overline{\overline{A} + \overline{B}}$ in positive logic. The device is fully specified for partial-power-down applications using I_{off}. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

The FLG4G08 is available in Green SOP14, TSSOP14 packages. It operates over an ambient temperature range of -40°C to 125°C.

Features

- Operating Voltage Range:1.65V to 5.5V
- Low Power Consumption:1μA (Max)
- Operating Temperature Range: -40°C to +125°C
- Input accept Voltage to 5.5V
- High Output Drive: ±24mA at V_{CC}=3.0V
- ESD Protection Exceeds JESD 22
  - 4000-V Human-Body Model
  - 200-V Machine Model (A115)
  - 1000-V Charged-Device Model (JS-002)
- PACKAGES: SOP14, TSSOP14

Applications

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

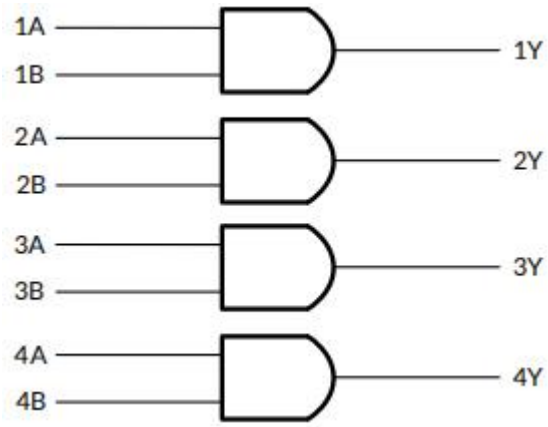
Order information (1)

Mode	Package	Specified Temperature range	Ordering Number	Packing Option
FLG4G08	SOP14	-40℃ to +125℃	FLG4G08YSOP14G/TR	Tape and Reel,4000
	TSSOP14	-40℃ to +125℃	FLG4G08YTSSOP14G/TR	Tape and Reel,4000

Note:

(1) This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document.

LOGIC SYMBOL



Function Table

INPUTS		OUTPUT
A	B	Y
H	H	H
L	H	L
H	L	L
L	L	L

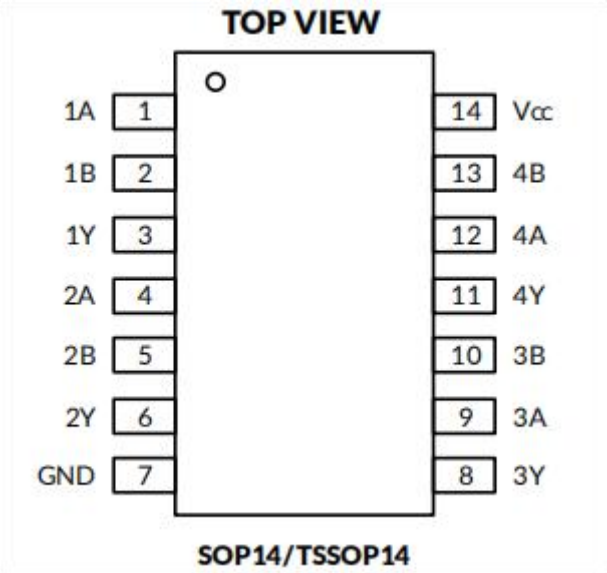
Note:

H=High Voltage Level

L=Low Voltage Level

$Y = A \bullet B$

Pin Configuration



Pin Description

Pin SOP14/TSSOP14	Name	I/O Type (1)	Function
1	1A	I	Channel 1 logic input
2	1B	I	Channel 1 logic input
3	1Y	O	Logic level output1
4	2A	I	Channel 2 logic input
5	2B	I	Channel 2 logic input
6	2Y	O	Logic level output2
7	GND	-	Ground
8	3Y	O	Logic level output3
9	3A	I	Channel 3 logic input
10	3B	I	Channel 3 logic input
11	4Y	O	Logic level output4
12	4A	I	Channel 4 logic input
13	4B	I	Channel 4 logic input
14	Vcc	P	Power Supply

Note:

I=input, O=output,P=Power.

Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) (1) (2)

			Min	Max	Unit
V_{CC}	Supply voltage range		-0.5	6.5	V
V_I	Input voltage range (2)		-0.5	6.5	V
V_O	Voltage range applied to any output in the high-impedance or power-off state(2)		-0.5	6.5	V
V_O	Voltage range applied to any output in the high or low state (2)(3)		-0.5	V_{CC}+0.5	V
I_{IK}	Input clamp current	V_I<0		-50	mA
I_{OK}	Output clamp current	V_O<0		-50	mA
I_O	Continuous output current			±50	mA
	Continuous current through V_{CC} or GND			±100	mA
θ_{JA}	Package thermal impedance (4)	SOP14		134	°C/W
		TSSOP14		152	
T_J	Junction temperature (5)		-65	150	°C
T_{stg}	Storage temperature		-65	150	°C

Note:

(1) 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 under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions 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.

(4) The package thermal impedance is calculated in accordance with JESD-51.

(5) The maximum power dissipation is a function of $T_{J(MAX)}$, $R_{\theta JA}$, and T_A. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} - T_A) / R_{\theta JA}$. All numbers apply for packages soldered directly onto a PCB.

ESD Ratings

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

			Value	Unit
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)), per ANSI/ESDA/JEDEC JS-001(1)	±4000	V
		Charged device model (CDM)	±1000	V
		Machine model (MM))	±200	V

Note:

(1) JEDEC document JEP155 states that 500 V HBM allows safe manufacturing with a standard ESD control process.

ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Recommanded Operating Range

over recommended operating free-air temperature range (TYP values are at T_A = +25°C, unless otherwise noted.) (1)

Parameter	Symbol	Test 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	0.65xV_{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	0.7xV_{CC}		
Low-level input voltage	V_{IL}	V_{CC}=1.65V to 1.95V		0.15xV_{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		0.15xV_{CC}	
Input voltage	V_I		0	5.5	V
Output voltage	V_O		0	V_{CC}	V
Input transition rise or fall	tr, tf	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

Note: (1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

Electrical Characteristics

● DC Characteristics

over recommended operating free-air temperature range (TYP values are at T_A = +25°C, unless otherwise noted.) (1)

Parameter		Test Conditions	V_{CC}	Temp	Min(2)	Typ(3)	Max(2)	Unit
V_{OH}		I_{OH} = -100μA	1.65V to 5.5V	Full	V_{CC}-0.1			V
		I_{OH} = -4mA	1.65V		1.2			
		I_{OH} = -8mA	2.3V		1.9			
		I_{OH} = -16mA	3V		2.4			
		I_{OH} = -24mA			2.3			
		I_{OH} = -32mA	4.5V		3.8			
V_{OL}		I_{OL} = 100μA	1.65V to 5.5V	Full			0.1	V
		I_{OL} = 4mA	1.65V				0.45	
		I_{OL} = 8mA	2.3V				0.3	
		I_{OL} = 16mA	3V				0.4	
		I_{OL} = 24mA					0.55	
		I_{OL} = 32mA	4.5V				0.55	
II	A or B inputs	V_I=5.5V or GND	0V to 5.5V	+25°C		±0.1	±1	μA
				Full			±5	
Ioff		V_I or V_O=5.5V	0	+25°C		±0.1	±1	μA
				Full			±10	
I_{CC}		V_I=5.5V or GND, I_O=0	1.65V to 5.5V	+25°C		0.1	1	μA
				Full			10	
ΔI_{CC}		One input at V_{CC}-0.6V, Other inputs at V_{CC} or GND	3V to 5.5V	Full			500	μA

Note:

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

(2) Limits are 100% production tested at 25°C. Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.

(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

● AC Characteristics

over recommended operating free-air temperature range (TYP values are at T_A = +25°C, unless otherwise noted.) (1)

Parameter	Symbol	Test Conditions		Min(2)	Typ(3)	Max(2)	Unit
Propagation Delay	t_{pd}	V_{CC}=1.8V±0.15V	C_L=30pF, R_L=1kΩ		11.2		ns
		V_{CC}=2.5V±0.2V	C_L=30pF, R_L=500Ω		6.5		
		V_{CC}=3.3V±0.3V	C_L=50pF, R_L=500Ω		5.4		
		V_{CC}=5V±0.5 V	C_L=50pF, R_L=500Ω		4.3		
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		

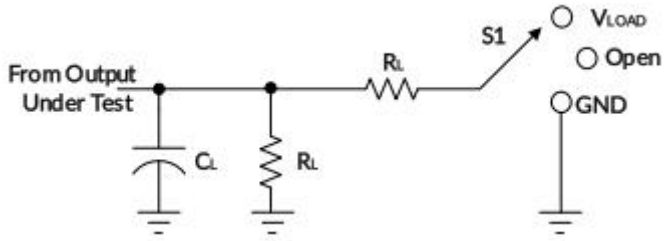
Note:

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

(2) This parameter is ensured by design and/or characterization and is not tested in production.

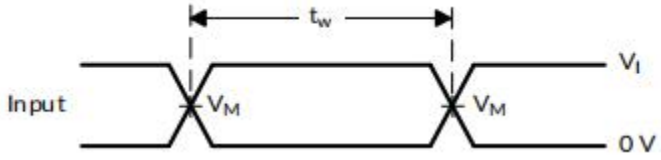
(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

Parameter Measurement Information

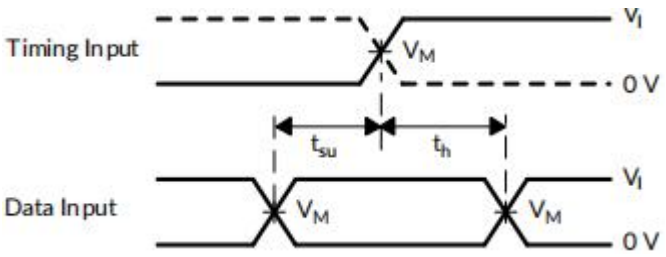


Test	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

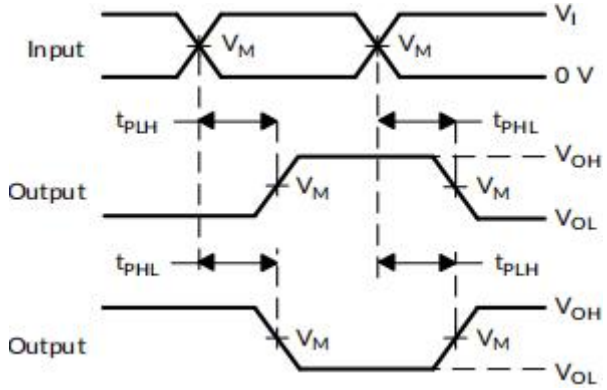
V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_Δ
	VI	tr/tf					
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	30pF	1kΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	30pF	500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 x V_{CC}	50pF	500Ω	0.3V



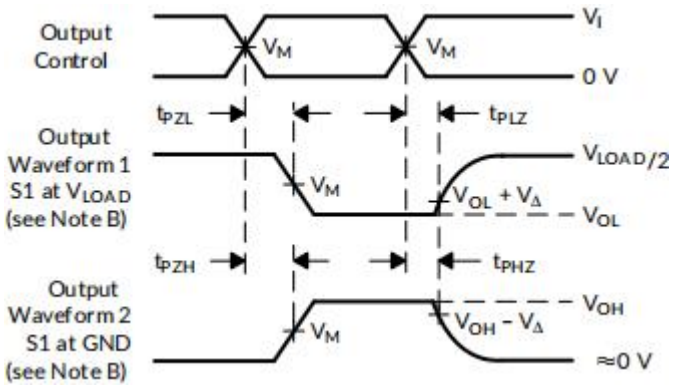
Voltage Waveforms Pulse Duration



Voltage Waveforms Setup And Hold Times



Voltage Waveforms Propagation Delay Times Invertion And Noninverting Outputs



Voltage Waveforms Enable And Disable Times Low-And High-Level Enabling

Notes:

A. C_L includes probe and jig capacitance.

B. 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.

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

D. The outputs are measured one at a time, with one transition per measurement.

E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.

F. t_{PZL} and t_{PZH} are the same as t_{en}.

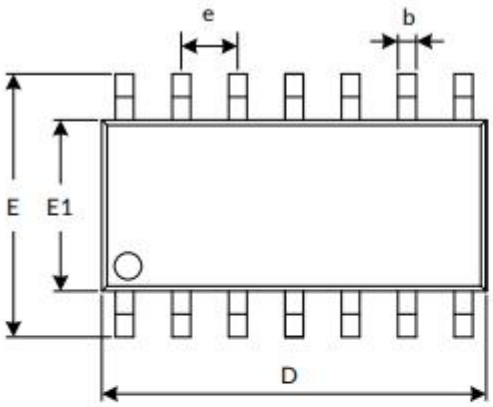
G. t_{PLH} and t_{PHL} are the same as t_{pd}.

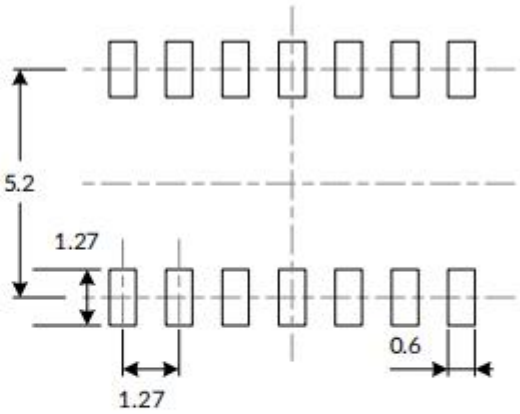
H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

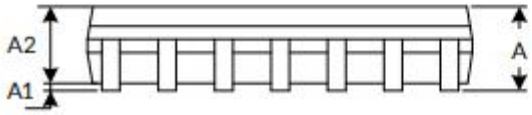
Package Outline Dimensions(All dimensions in mm.)

Package Type: SOP14 (3)





RECOMMENDED LAND PATTERN (Unit: mm)

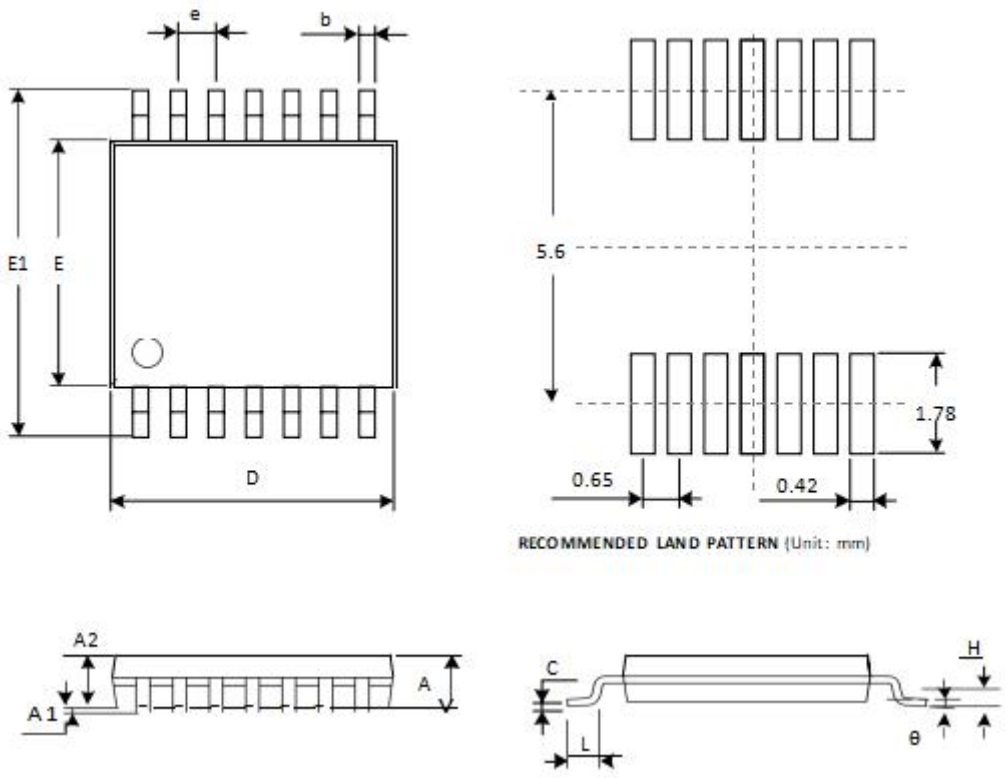


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A (1)	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D (1)	8.450	8.850	0.333	0.348
e	1.270(BSC) (2)		0.050(BSC) (2)	
E	5.800	6.200	0.228	0.244
E1 (1)	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Note:

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

Package Type: TSSOP14 (3)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A (1)		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D (1)	4.860	5.100	0.191	0.201
E (1)	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650(BSC) (2)		0.026(BSC) (2)	
L	0.500	0.700	0.020	0.028
H	0.25(TYP)		0.01(TYP)	
θ	1°	7°	1°	7°

Note:

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

Important Notice And Disclaimer

- We reserves the right to change the instruction manual without prior notice.
- Any semiconductor product has a certain possibility of failure or malfunction under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design and overall manufacturing to avoid potential failure risks that may cause personal injury or property damage.
- The improvement of product quality is endless, our company will be dedicated to provide customers with better products.