

General Description

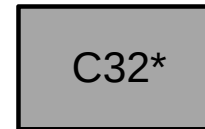
This single 2-input positive- OR gate is designed for 1.65-V to 5.5-V V_{CC} operation. The SN74LVC1G32DBVR performs the Boolean function, $Y=A+B$ or $Y=\overline{\overline{A} \cdot \overline{B}}$ in positive logic. The CMOS device has high output drive while maintaining low static power dissipation over a broad V_{CC} operating range. The SN74LVC1G32DBVR device is available in a variety of packages.

Features

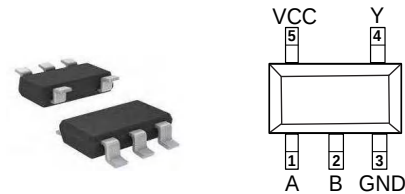
- Operate from 1.65 V to 5.5 V
- Supports 5-V V_{CC} operation
- Specified from -40°C to 125°C
- Provides down translation to V_{CC}
- Max t_{pd} of 3.8 ns at 3.3 V
- ± 24 -mA output drive at 3.3 V

Applications

- Personal navigation device (GPS)
- AV receiver
- High-speed data acquisition and generation
- SSD: internal and external
- Digital picture frame (DPF)
- TV: LCD/digital and high-definition (HDTV)



SOT23-5



Functional Block Diagram



Pin Functions

Pin		Type	Description
Name	SOT23-5		
A	1	I	Data Input
B	2	I	Data Input
GND	3	-	Ground
Y	4	O	Data Output
V_{CC}	5	-	Supply Voltage

Absolute Maximum Ratings

Parameters			Min	Max.	Unit
V _{CC}	Supply voltage range		-0.5	6.5	V
V _I	Input voltage range		-0.5	6.5	V
V _O	Voltage range applied to any output in the high-impedance or power-off state		-0.5	6.5	V
V _O	Voltage range applied to any output in the high or low state		-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
T _J	Junction temperature under bias		-55	150	°C
T _{stg}	Storage temperature range		-55	150	°C

(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 negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

ESD Ratings

ESD			Value	Unit
$V(\text{ESD})$	Electrostatic Discharge	Human-Body Model (HBM) ⁽¹⁾	8 K	V
		Charged-Device Model (CDM) ⁽²⁾	1.5 K	V

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

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
SOT23-5	250	81	$^{\circ}\text{C/W}$

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter		Min	Max	Units
V_{CC}	Supply Voltage	Operating	1.65	5.5	V
V_{IH}	High-Level Input Voltage	$V_{CC}=1.65V$ to $1.95V$	$0.65 \times V_{CC}$		V
		$V_{CC}=2.3V$ to $2.7V$	1.7		
		$V_{CC}=3V$ to $3.6V$	2		
		$V_{CC}=4.5V$ to $5.5V$	$0.7 \times V_{CC}$		
V_{IL}	Low-Level Input Voltage	$V_{CC}=1.65V$ to $1.95V$		$0.35 \times V_{CC}$	V
		$V_{CC}=2.3V$ to $2.7V$		0.7	
		$V_{CC}=3V$ to $3.6V$		0.8	
		$V_{CC}=4.5V$ to $5.5V$		$0.3 \times V_{CC}$	
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage		0	V_{CC}	V
I_{OH}	High-Level Output Current	$V_{CC}=1.65V$		-4	mA
		$V_{CC}=2.3V$		-8	
		$V_{CC}=3V$		-16	
				-24	
		$V_{CC}=4.5V$		-32	
I_{OL}	Low-Level Output Current	$V_{CC}=1.65V$		4	mA
		$V_{CC}=2.3V$		8	
		$V_{CC}=3V$		16	
				24	
		$V_{CC}=4.5V$		32	
$\Delta t/\Delta v$	Input Transition Rise or Fall Rate	$V_{CC}=1.8V \pm 0.15V, 2.5V \pm 0.2V$		20	ns/V
		$V_{CC}=3.3V \pm 0.3V$		10	
		$V_{CC}=5V \pm 0.5V$		5	
TA	Operating Free-air Temperature	All Other Packages	-40	125	°C

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

Electrical Characteristics (T_J=25°C unless otherwise specified)

V_{CC}=1.65V to 5.5V, FULL=−40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)

Parameter	Symbol	Test Conditions	V _{CC}	TA	Min	Typ	Max	Units
Output								
Output High Voltage	V _{OH}	I _{OH} =−100μA	1.65V to 5.5V	FULL	V _{CC} −0.1			V
		I _{OH} =−4mA	1.65V	FULL	1.2			V
		I _{OH} =−8mA	2.3V	FULL	1.9			V
		I _{OH} =−16mA	3V	FULL	2.4			V
		I _{OH} =−24mA		FULL	2.3			V
		I _{OH} =−32mA	4.5V	FULL	3.8			V
Output Low Voltage	V _{OL}	I _{OL} =100μA	1.65V to 5.5V	FULL			0.1	V
		I _{OL} =4mA	1.65V	FULL			0.45	V
		I _{OL} =8mA	2.3V	FULL			0.3	V
		I _{OL} =16mA	3V	FULL			0.4	V
		I _{OL} =24mA		FULL			0.65	V
		I _{OL} =32mA	4.5V	FULL			0.65	V
Off-State Current	I _{off}	V _I or V _O =5.5V	0V	FULL			±25	μA
Input								
Input Leakage Current	I _I	V _I =5.5V or GND	0V to 5.5V	FULL			±5	μA
Input Capacitance	C _I	V _I =V _{CC} or GND	3.3V	FULL		4		pF
Power Supply								
Power Supply Range	V _{CC}		1.65V to 5.5V	FULL	1.65		5.5	V
Power Supply Current	I _{CC}	V _I =V _{CC} or GND, I _O =0	5.5V	FULL			10	μA
Delta Power Current	ΔI _{CC}	One Input at V _{CC} −0.6V, Other Inputs at V _{CC} or GND	3V to 5.5V	FULL			500	μA

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

Switching Characteristics

Over recommended operating free-air temperature range, C_L=30pF or 50 pF (unless otherwise noted)

Parameter	From(Input)	To(Output)	−40°C to +125°C								Units
			V _{CC} =1.8V±0.15V		V _{CC} =2.5V±0.2V		V _{CC} =3.3V±0.3V		V _{CC} =5V±0.5V		
			Min	Max	Min	Max	Min	Max	Min	Max	
t _{pd}	A or B	Y	1	9	1	3.8	1	3.8	1	3.3	ns

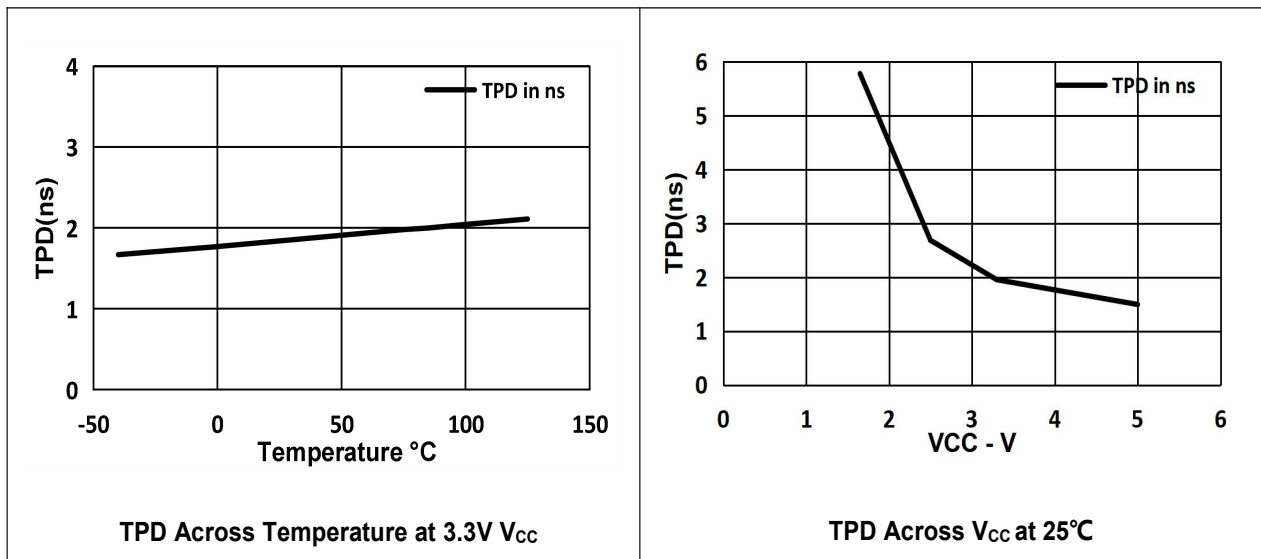
Operating Characteristics

TA=−40°C to +125°C

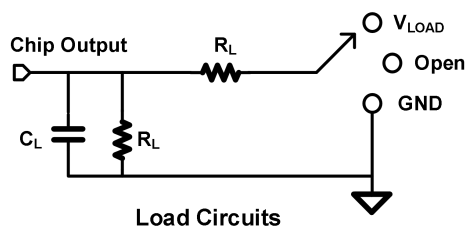
Parameter		Test Conditions	V _{CC} =1.8V	V _{CC} =2.5V	V _{CC} =3.3V	V _{CC} =5V	Units
			Typ	Typ	Typ	Typ	
C _{pd}	Power Dissipation Capacitance	f=10Mhz	23	23	23	29	pF

RATING AND CHARACTERISTIC CURVES

$V_{CC}=1.65V$ or $5.5V$, FULL= $-40^{\circ}C$ to $+125^{\circ}C$. Typical values are at $T_A=+25^{\circ}C$ (unless otherwise noted)



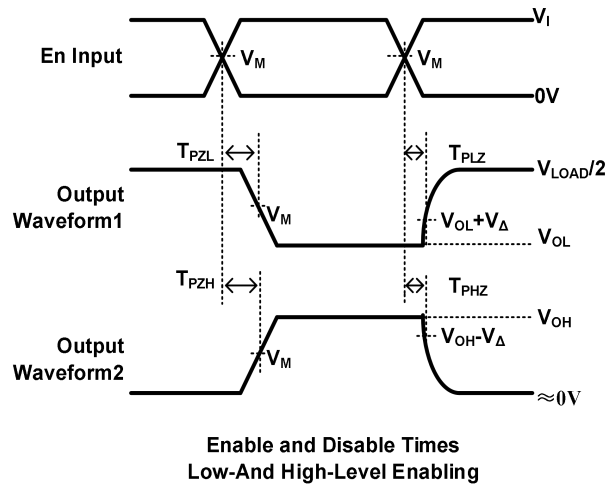
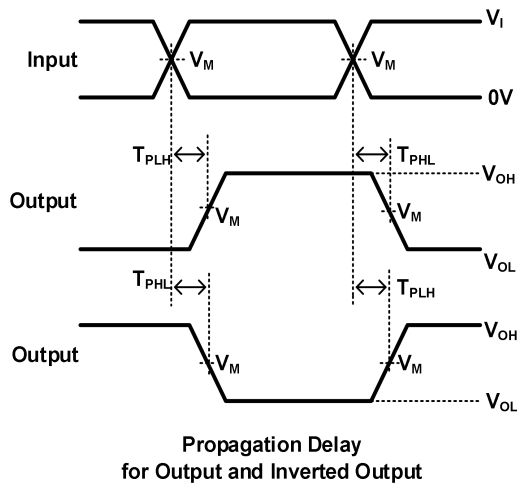
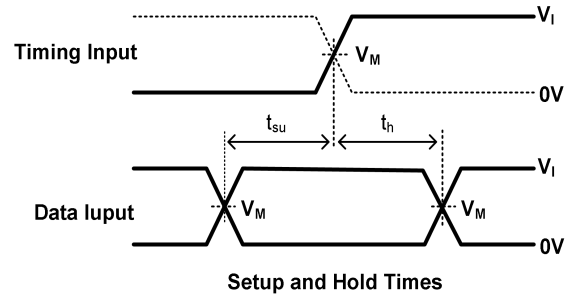
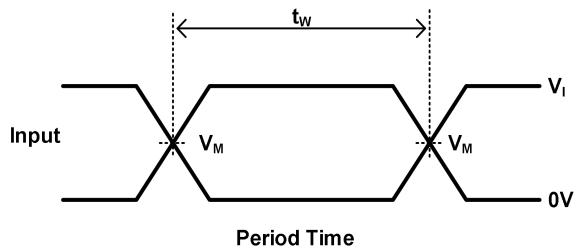
Parameter Measurement Information



TEST	S1
T_{PHL}/T_{PLH}	OPEN
T_{PLZ}/T_{PZL}	V_{LOAD}
T_{PHZ}/T_{PZH}	GND

V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_A
	V_I	T_r/T_f					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 Ω	0.15V
$2.5V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 Ω	0.15V
$3.3V \pm 0.15V$	3V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω	0.3V
$5V \pm 0.15V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 Ω	0.3V

Parameter Measurement Information



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, $Z = 50$.

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} .

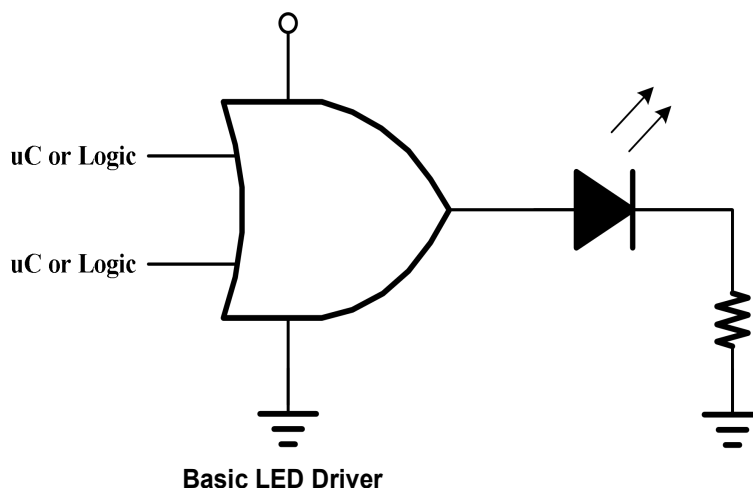
F. t_{PZL} and t_{PZH} are the same as t_{en} .

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

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

Application Note

The SN74LVC1G32DBVR is a high drive CMOS device that can be used for implement OR logic with a high output drive, such as an LED application. It can produce 24-mA of drive current at 3.3V making it Ideal for driving multiple outputs and good for high speed applications up to 100Mhz. The inputs are 5 V-tolerant allowing translation down to V_{CC} .



This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads, so routing and load conditions should be considered to prevent ringing.

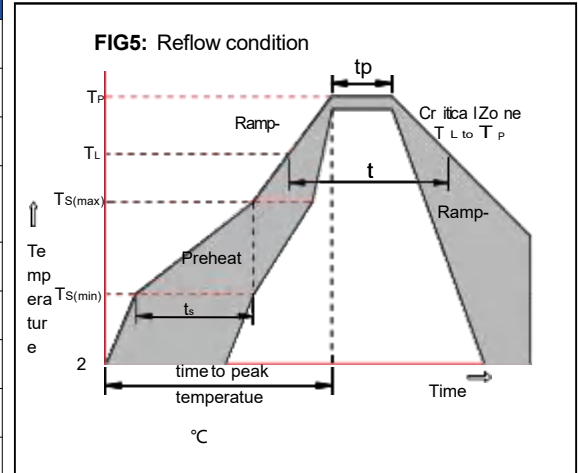
Each VCC pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1- μ F capacitor is recommended. If there are multiple VCC pins, then a 0.01- μ F or 0.022- μ F capacitor is recommended for each power pin. It is ok to parallel multiple bypass capacitors to reject different frequencies of noise. A 0.1- μ F and 1- μ F capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

Device Functional Modes

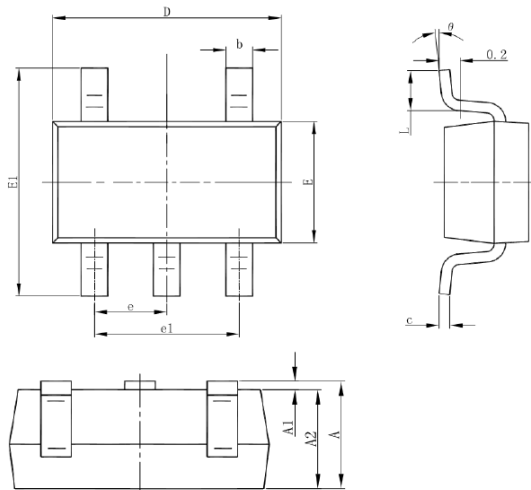
Inputs		Output
A	B	Y
H	X	H
X	H	H
L	L	L

Soldering parameters

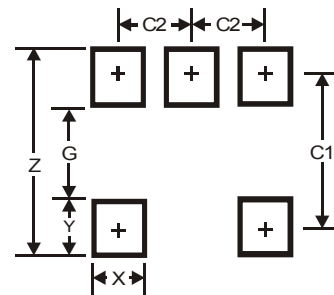
Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150 °C
	-Temperature Max($T_{s(max)}$)	+200 °C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3 °C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3 °C/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217 °C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_P)		+260(+0/-5) °C
Time within 5 °C of actual Peak Temp (t_P)		30 secs. Max
Ramp-down Rate		6 °C/sec. Max
Time 25 °C to Peak Temp (T_P)		8 min. Max
Do not exceed		+260 °C



Package Dimensions & Suggested Pad Layout



SOT-23-5L

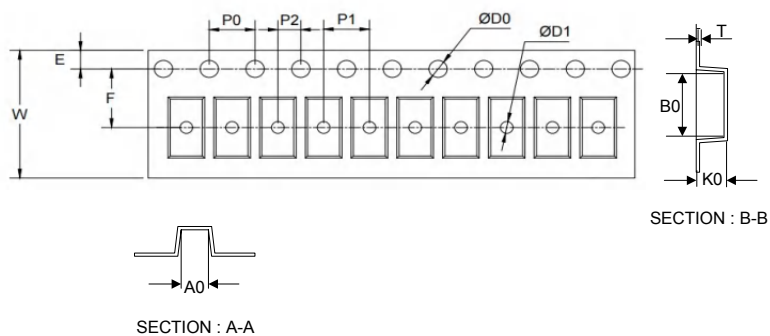


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
theta	0°	8°	0°	8°

Dimensions	Value (in mm)
Z	3.50
G	1.30
X	0.60
Y	1.10
C1	2.40
C2	0.95

Tape & reel specification

Tape



Symbol	Dimension (mm)
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P0	4.00±0.20
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P1	4.00±0.20
----	-----------

P2	2.00±0.20
----	-----------

D0	1.55±0.20
----	-----------

D1	1.20±0.20
----	-----------

E	1.55±0.20
---	-----------

F	3.60±0.20
---	-----------

W	8.00±0.20
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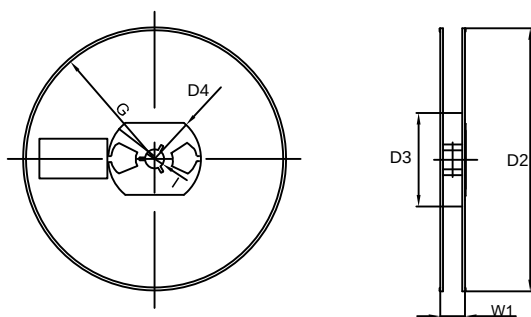
A0	3.80±0.20
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B0	3.50±0.20
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K0	1.55±0.20
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T	0.25±0.15
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7" Reel



D2	178.0±5.0
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D3	55Min.
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D4	R24.0±3.0
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G	R82.0±3.0
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I	13.0±2.0
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W1	11.0±3.0
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Quantity: 3000PCS