74LVC1G32Q
Single 2-Input OR Gate

GENERAL DESCRIPTION

The 74LVC1G32Q is a single 2-input OR function gate that is designed for 1.65V to 5.5V V_{CC} operation. The inputs from 3.3V or 5V device make this device to operate as a translator in a mixed 3.3V and 5V system environment. All of the inputs support Schmitt trigger action, allowing slower input rise and fall time for the device.

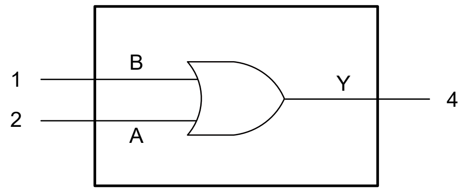
For partial power-down applications using I_{OFF}, this device is extremely suitable. When the device is powered down, the damaging current backflow will be prevented from passing through the device.

This device is AEC-Q100 qualified (Automotive Electronics Council Standard Q100 Grade 1) and the use of this device is suitable for automotive applications.

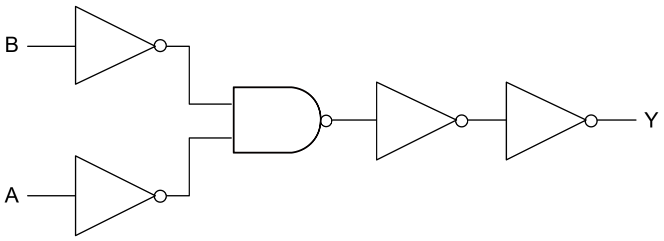
FEATURES

- **AEC-Q100 (Grade 1) Qualified for Automotive Applications**
  T_A = -40℃ to +125℃
- **Wide Supply Voltage Range: 1.65V to 5.5V**
- **Inputs Accept Voltages up to 5.5V**
- **+24mA/-24mA Output Current at V_{CC} = 3.0V**
- **CMOS Low Power Consumption**
- **High Noise Immunity**
- **Direct Interface with TTL Levels**
- **Complies with JEDEC Standards:**
  - **JESD8-7 (1.65V to 1.95V)**
  - **JESD8-5 (2.3V to 2.7V)**
  - **JESD8-B/JESD36 (2.7V to 3.6V)**
- **Latch-up Performance Exceeds 250mA**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green SC70-5 Package**

LOGIC SYMBOL



LOGIC DIAGRAM



FUNCTION TABLE

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

H = High Voltage Level
L = Low Voltage Level

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74LVC1G32Q	SC70-5	-40℃ to +125℃	74LVC1G32QC5G/TR	G6QXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code.

YYY X X
- X — Date Code - Week
- X — Date Code - Year
- YYY — Serial Number

Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS (1)

Supply Voltage Range, V_{CC} .... -0.5V to 6.5V
Input Voltage Range, V_I (2) .... -0.5V to 6.5V
Input Clamp Current, I_{IK} (V_I < 0V) ....-50mA
Output Clamp Current, I_{OK} (V_O > V_{CC} or V_O < 0V)....... ±50mA
Output Voltage, V_O
Active Mode ....-0.5V to V_{CC} + 0.5V
Power-Down Mode (V_{CC} = 0V)........................ -0.5V to 6.5V
Output Current, I_O (V_O = 0V to V_{CC})
Output in High-State ....-50mA
Output in Low-State 50mA
Supply Current, I_{CC} .... ±100mA
Ground Current, I_{GND}...-100 mA
Junction Temperature (3)...+150℃
Storage Temperature Range ....-65℃ to +150℃
Lead Temperature (Soldering, 10s)............................+260℃
ESD Susceptibility
HBM..7000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{CC} ....1.65V to 5.5V
Input Voltage Range, V_I...0V to 5.5V
Output Voltage Range, V_O
Active Mode .... 0V to V_{CC}
Power-Down Mode (V_{CC} = 0V).............................0V to 5.5V
Input Transition Rise and Fall Rate, Δt/ΔV
V_{CC} = 1.65V to 2.7V .... 20ns/V (MAX)
V_{CC} = 2.7V to 5.5V .... 10ns/V (MAX)
Operating Temperature Range.....................-40℃ to +125℃

OVERSTRESS CAUTION

1. Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

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

3. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

ESD SENSITIVITY CAUTION

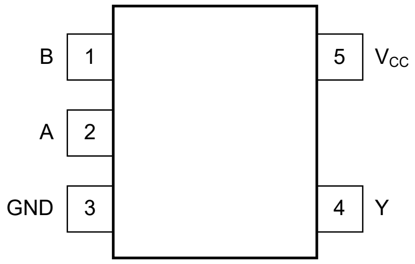
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION

(TOP VIEW)



SC70-5

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	B	Data Input.
2	A	Data Input.
3	GND	Ground.
4	Y	Data Output.
5	V_{CC}	Supply Voltage.

ELECTRICAL CHARACTERISTICS

(Full = -40℃ to +125℃, all typical values are measured at V_{CC} = 3.3V and T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
High-Level Input Voltage	V_{IH}	V_{CC} = 1.65V to 1.95V		Full	0.65 × V_{CC}			V
		V_{CC} = 2.3V to 2.7V		Full	1.7			
		V_{CC} = 2.7V to 3.6V		Full	2.0			
		V_{CC} = 4.5V to 5.5V		Full	0.7 × V_{CC}			
Low-Level Input Voltage	V_{IL}	V_{CC} = 1.65V to 1.95V		Full			0.35 × V_{CC}	V
		V_{CC} = 2.3V to 2.7V		Full			0.7	
		V_{CC} = 2.7V to 3.6V		Full			0.8	
		V_{CC} = 4.5V to 5.5V		Full			0.3 × V_{CC}	
High-Level Output Voltage	V_{OH}	V_I = V_{IH} or V_{IL}	I_O = -100μA, V_{CC} = 1.65V to 5.5V	Full	V_{CC} - 0.05			V
			I_O = -4mA, V_{CC} = 1.65V	Full	1.4			
			I_O = -8mA, V_{CC} = 2.3V	Full	2.0			
			I_O = -12mA, V_{CC} = 2.7V	Full	2.3			
			I_O = -24mA, V_{CC} = 3.0V	Full	2.5			
			I_O = -32mA, V_{CC} = 4.5V	Full	4.0			
Low-Level Output Voltage	V_{OL}	V_I = V_{IH} or V_{IL}	I_O = 100μA, V_{CC} = 1.65V to 5.5V	Full			0.10	V
			I_O = 4mA, V_{CC} = 1.65V	Full			0.30	
			I_O = 8mA, V_{CC} = 2.3V	Full			0.30	
			I_O = 12mA, V_{CC} = 2.7V	Full			0.35	
			I_O = 24mA, V_{CC} = 3.0V	Full			0.55	
			I_O = 32mA, V_{CC} = 4.5V	Full			0.55	
Input Leakage Current	I_I	V_I = 5.5V or GND, V_{CC} = 0V to 5.5V		Full		±0.01	±1	μA
Power-Off Leakage Current	I_{OFF}	V_{CC} = 0V, V_I or V_O = 5.5V		Full		±0.01	2	μA
Supply Current	I_{CC}	V_I = 5.5V or GND, I_O = 0A, V_{CC} = 1.65V to 5.5V		Full		0.01	2	μA
Additional Supply Current	ΔI_{CC}	Per Pin, V_{CC} = 2.3V to 5.5V, V_I = V_{CC} - 0.6V, I_O = 0A		Full		0.05	5	μA
Input Capacitance	C_I	V_{CC} = 3.3V, V_I = GND to V_{CC}		Full		6.5		pF

DYNAMIC CHARACTERISTICS

(For test circuit, see Figure 1, for waveforms see Figure 2. All typical values are measured at T_A = +25℃ and V_{CC} = 1.8V, 2.5V, 2.7V, 3.3V and 5.0V respectively, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN [1]	TYP	MAX [2]	UNITS
Propagation Delay [2]	t_{PD}	A, B to Y, see Figure 2	V_{CC} = 1.65V to 1.95V	Full	1.0	7.9	13.0	ns
			V_{CC} = 2.3V to 2.7V	Full	0.5	4.3	7.0	
			V_{CC} = 2.7V	Full	0.5	3.7	7.0	
			V_{CC} = 3.0V to 3.6V	Full	0.5	3.4	6.0	
			V_{CC} = 4.5V to 5.5V	Full	0.1	3.7	6.0	
Power Dissipation Capacitance [3]	C_{PD}	V_I = GND to V_{CC}, V_{CC} = 3.3V		+25℃		17		pF

NOTES:

1. Specified by design and characterization; not production tested.
2. t_{PD} is the same as t_{PLH} and t_{PHL}.
3. C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$

where:

f_i = Input frequency in MHz.

f_o = Output frequency in MHz.

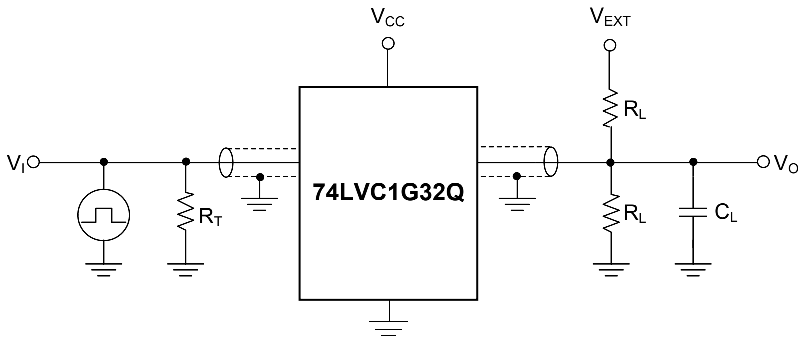
C_L = Output load capacitance in pF.

V_{CC} = Supply voltage in Volts.

N = Number of inputs switching.

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = Sum of outputs.

TEST CIRCUIT



Test conditions are given in Table 1.

Definitions for test circuit:

R_L: Load resistance.

C_L: Load capacitance (includes jig and probe).

R_T: Termination resistance (equals to output impedance Z_O of the pulse generator).

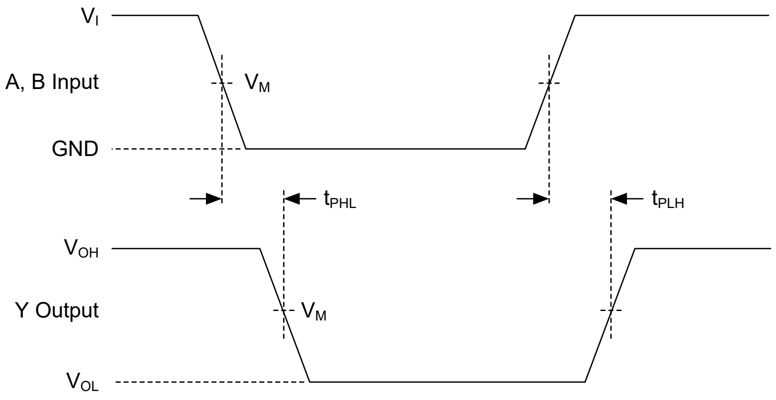
V_{EXT}: External voltage used to measure switching time.

Figure 1. Test Circuit for Measuring Switching Times

Table 1. Test Conditions

SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}
V_{CC}	V_I	$t_R = t_F$	C_L	R_L	t_{PLH}, t_{PHL}
1.65V to 1.95V	V_{CC}	≤ 2.0ns	30pF	1kΩ	Open
2.3V to 2.7V	V_{CC}	≤ 2.0ns	30pF	500Ω	Open
2.7V	2.7V	≤ 2.5ns	50pF	500Ω	Open
3.0V to 3.6V	2.7V	≤ 2.5ns	50pF	500Ω	Open
4.5V to 5.5V	V_{CC}	≤ 2.5ns	50pF	500Ω	Open

WAVEFORMS



Test conditions are given in Table 1.

Measurement points are given in Table 2.

Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure 2. Input A, B to Output Y Propagation Delays

Table 2. Measurement Points

SUPPLY VOLTAGE	INPUT	OUTPUT
V_{CC}	V_M (1)	V_M
1.65V to 1.95V	0.5 × V_{CC}	0.5 × V_{CC}
2.3V to 2.7V	0.5 × V_{CC}	0.5 × V_{CC}
2.7V	1.5V	1.5V
3.0V to 3.6V	1.5V	1.5V
4.5V to 5.5V	0.5 × V_{CC}	0.5 × V_{CC}

NOTE:

1. The measurement points should be V_{IH} or V_{IL} when the input rising or falling time exceeds 2.5ns.

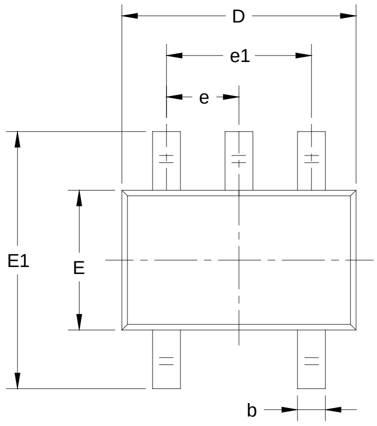
REVISION HISTORY

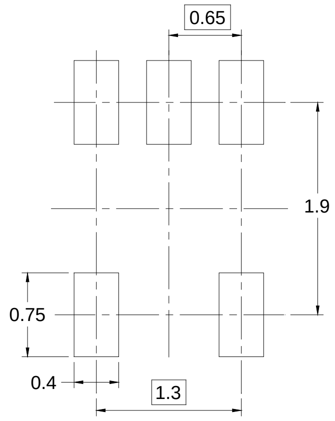
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (JUNE 2022) to REV.A	Page
Changed from product preview to production data	All

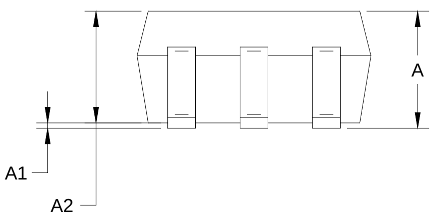
PACKAGE OUTLINE DIMENSIONS

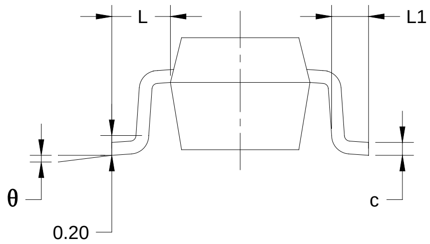
SC70-5





RECOMMENDED LAND PATTERN (Unit: mm)



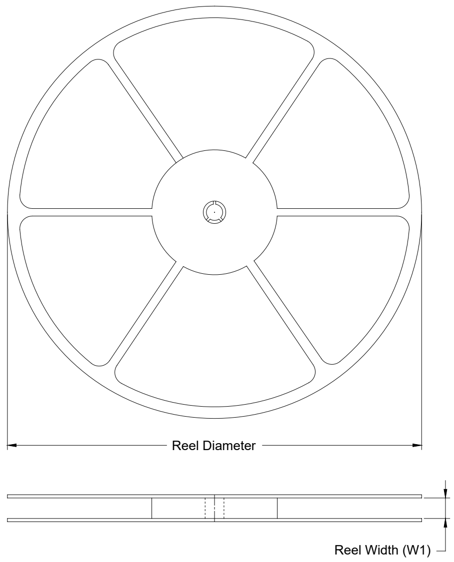


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

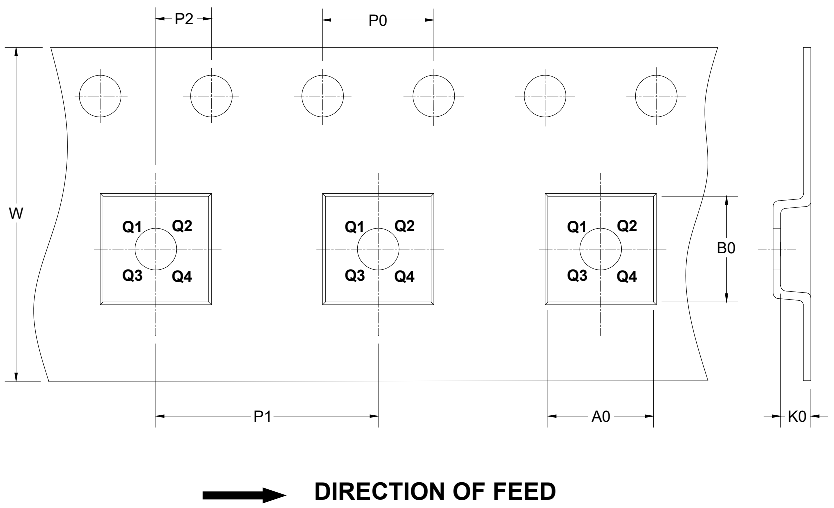
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



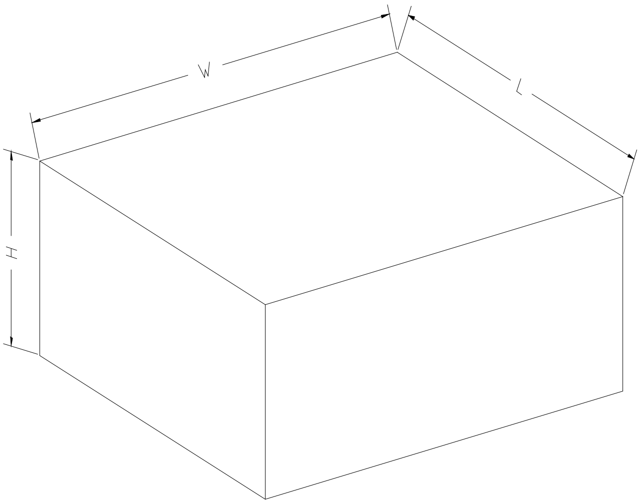
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SC70-5	7″	9.5	2.25	2.55	1.20	4.0	4.0	2.0	8.0	Q3

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002