

GT74LVC1G00

Single 2-Input Positive-NAND Gate

1 Features	2 Application
- Supports 5V V_{CC} operation - Inputs accept voltages to 5.5 V - Provides down translation to V_{CC} - Low power consumption, 10-μA Max I_{CC} - ± 24-mA output drive at 3.3 V - I_{off} supports live insertion, partial-power-down mode, and back drive protection	- AC receiver - Audio dock: portable - Blu-ray players and home theaters - Embedded PC - MP3 player/recorder (portable audio) - Personal digital assistant (PDA) - Power: telecom/server AC/DC supply: single controller: analog and digital - Solid state drive (SSD): client and enterprise - TV: LCD/digital and high-definition (HDTV) - Tablet: enterprise - Video analytics: server - Wireless headset, keyboard, and mouse

3 Description	Circuit Diagram
This single 2-input positive-NAND gate is designed for 1.65-V to 5.5-V V_{CC} operation. The GT74LVC1G00 performs the Boolean function $Y = \overline{A \times B}$ or $Y = \overline{A} + \overline{B}$ in positive logic. The CMOS device has high output drive while maintaining low static power dissipation over a broad V_{CC} operating range. This 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.	

4 Revision History

Revision	Date	Note
Rev. A1. 0	2023. 10. 23	Original Version
Rev. A1. 1	2023. 10. 23	1.Updated Package Qty 2.Added Tape and Reel Information 3. Added Application Note
Rev. A1. 2	2023. 12. 26	1. Added Marking 2. Added MSL
Rev. A1. 3	2024. 01. 26	Updated Part Name
Rev. A1. 4	2024. 08. 12	Updated the Format
Rev. A1. 5	2024. 12. 27	Updated the Indicators of I _{CC}

The latest datasheet version should be checked on the GTIC official website, as the company does not actively inform customers about updates to the datasheet.

5 Device Summary, Pin and Packages

Table. 5-1. Device Summary⁽¹⁾

Serial Name	Part Name	Package	Body Size (Nom)	Marking ⁽²⁾⁽⁴⁾	MSL ⁽³⁾	Package Qty
GT74LVC1G00	GT74LVC1G00S5	SOT23-5	2.90mm×1.60mm×1.10mm	1G00 XXXXX	3	Tape and Reel,3000
	GT74LVC1G00C5	SC70-5	2.10mm×1.25mm×1.00mm	1G00 XXXXX	3	Tape and Reel,3000

(1) For all available packages, please contact product sales.

(2) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) MSL, The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications.

(4) "XXXXX" in Marking will be appeared as the batch code.

5 Device Summary, Pin and Packages(Continued)

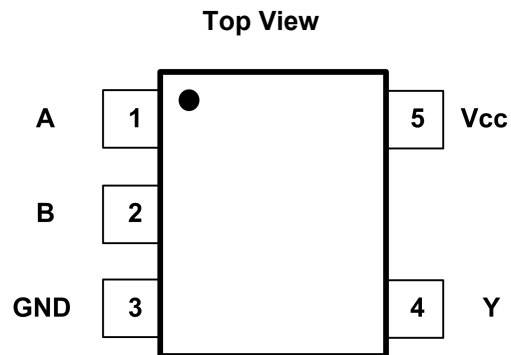


Fig.5-1. GT74LVC1G00: S5(SOT23-5) Package
GT74LVC1G00: C5(SC70-5) Package

Table. 5-2. Pin Definition

Pin		Type	Description
Name	S5 C5		
A	1	I	Data Input
B	2	I	Data Input
GND	3	-	Ground
Y	4	O	Data Output
V _{CC}	5	-	Supply Voltage

6 Voltage, Temperature, ESD and Thermal Ratings

6.1 Absolute Maximum Ratings⁽¹⁾

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 ⁽²⁾		-0.5	6.5	V
V _O	Voltage range applied to any output in the high or low state ⁽²⁾		-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			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.

6.2 ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic Discharge	Human-Body Model (HBM) ⁽¹⁾	8 K	V
		Charged-Device Model (CDM) ⁽²⁾	2 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.

6 Voltage, Temperature, ESD and Thermal Ratings(Continued)

6.3 Recommended Operating Conditions

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

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	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	
T_A	Operating Free-Air Temperature	-40	125	°C

6.4 Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
SOT23-5	250	81	°C/W
SC70-5	400	150	°C/W

7 Electrical Specifications⁽¹⁾

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

Parameter	Test Conditions	V _{CC}	–40°C to 85°C			–40°C to 125°C			Unit
			Min	Typ	Max	Min	Typ	Max	
V _{OH}	I _{OH} =–100 µA	1.65 V to 5.5 V	V _{CC} –0.1			V _{CC} –0.1			V
	I _{OH} =–4 mA	1.65 V	1.2			1.2			
	I _{OH} =–8 mA	2.3 V	1.9			1.9			
	I _{OH} =–16 mA	3 V	2.4			2.4			
	I _{OH} =–24 mA		2.3			2.3			
	I _{OH} =–32 mA	4.5 V	3.8			3.8			
V _{OL}	I _{OL} =100 µA	1.65 V to 5.5 V			0.1			0.1	V
	I _{OL} =4 mA	1.65 V			0.45			0.45	
	I _{OL} =8 mA	2.3 V			0.3			0.3	
	I _{OL} =16 mA	3 V			0.4			0.4	
	I _{OL} =24 mA				0.55			0.55	
	I _{OL} =32 mA	4.5 V			0.55			0.55	
I _I	A or B Inputs	V _I =5.5 V or GND			±5			±5	µA
I _{off}		V _I or V _O =5.5 V			±10			±10	µA
I _{CC}		V _I =5.5 V or GND, I _O =0		1	10		1	10	µA
ΔI _{CC}	One Input at V _{CC} –0.6 V, Other Inputs at V _{CC} or GND	3 V to 5.5 V			10			10	µA
C _i		V _I =V _{CC} or GND		5			5		pF

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

7 Electrical Specifications (Continued)

Switching Characteristics, CL=15 pF

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

Parameter	From (Input)	To (Output)	-40°C to 85°C								Unit
			V _{CC} =1.8 V ± 0.15 V		V _{CC} =2.5 V ± 0.2 V		V _{CC} =3.3 V ± 0.3 V		V _{CC} =5 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
tpd	A or B	Y	1.5	7.2	0.7	4.4	0.8	3.6	0.8	3.4	ns

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

Parameter	From (Input)	To (Output)	-40°C to 85°C								Unit
			V _{CC} =1.8 V ± 0.15 V		V _{CC} =2.5 V ± 0.2 V		V _{CC} =3.3 V ± 0.3 V		V _{CC} =5 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
tpd	A or B	Y	2.4	8	1.1	5.5	1	4.5	1	4	ns

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

Parameter	From (Input)	TO (Output)	-40°C to 125°C								Unit
			V _{CC} =1.8 V ± 0.15 V		V _{CC} =2.5 V ± 0.2 V		V _{CC} =3.3 V ± 0.3 V		V _{CC} =5 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
tpd	A or B	Y	2.4	10	1.1	7	1	6	1	5	ns

Operating Characteristics

T_A=25°C

	Parameter	Test Conditions	V _{CC} =1.8 V	V _{CC} =2.5 V	V _{CC} =3.3 V	V _{CC} =5 V	Unit
			Typ	Typ	Typ	Typ	
Cpd	Power Dissipation Capacitance	f=10 MHz	16	18	19	20	pF

8 Typical Characteristics

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

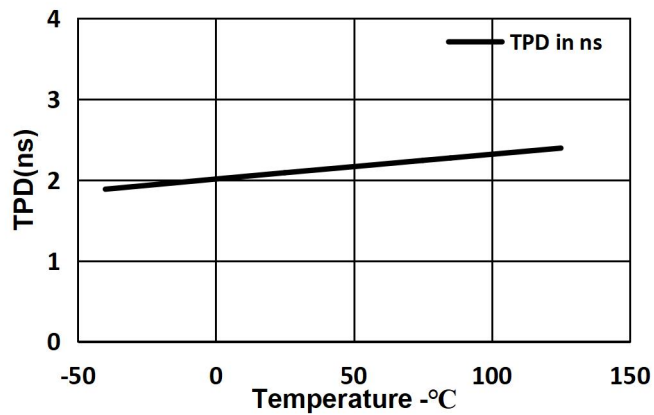


Fig.8-1. T_{PD} Across Temperature at 3.3 V V_{CC}

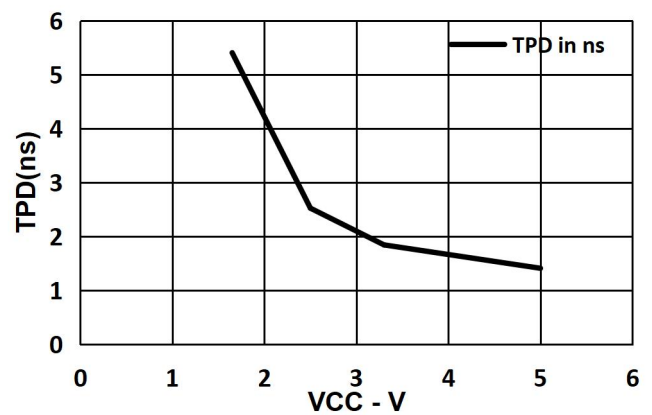
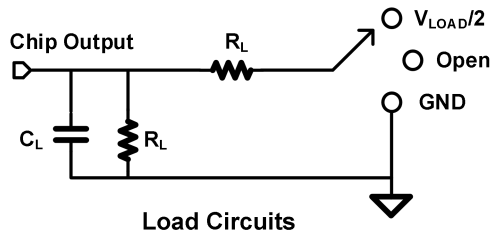


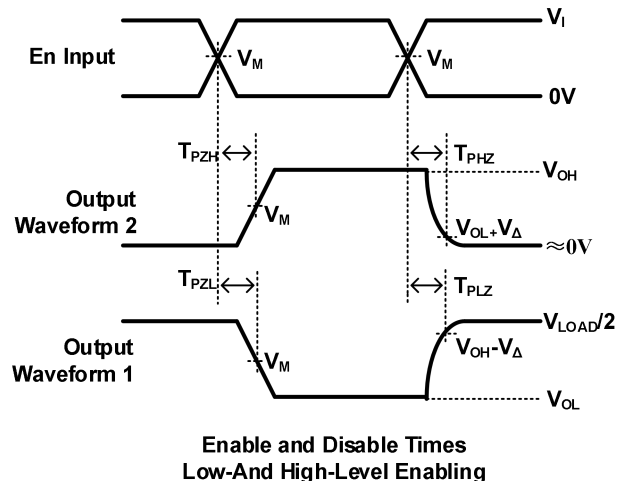
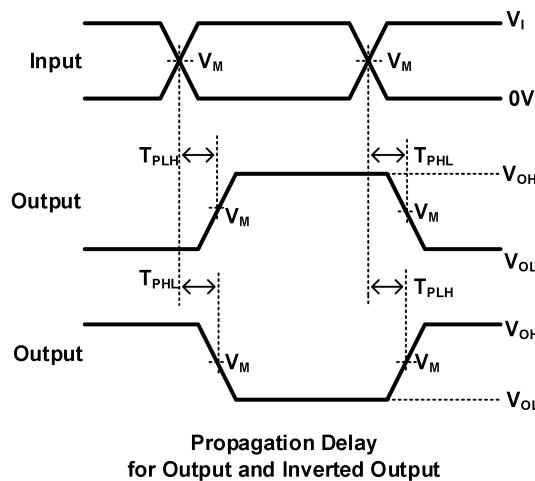
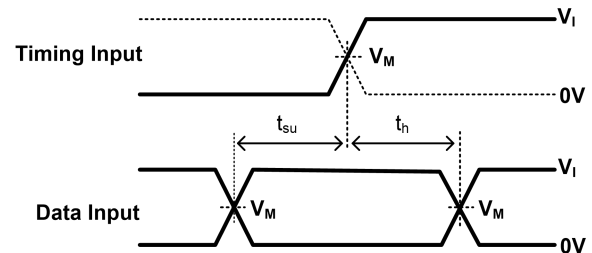
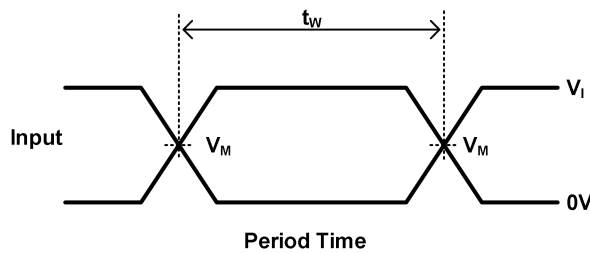
Fig.8-2. T_{PD} Across V_{CC} at 25°C

9 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_{Δ}
	V_i	T_r/T_f					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	1M Ω	0.15V
$2.5V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	1M Ω	0.15V
$3.3V \pm 0.15V$	3V	$\leq 2.5ns$	1.5V	6V	15pF	1M Ω	0.3V
$5V \pm 0.15V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	1M Ω	0.3V



Notes: A. C 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.

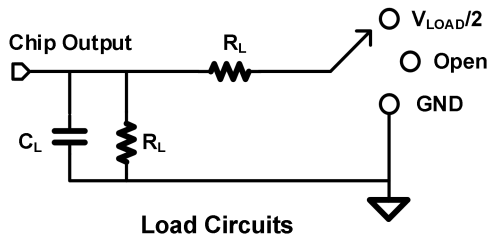
E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .

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

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

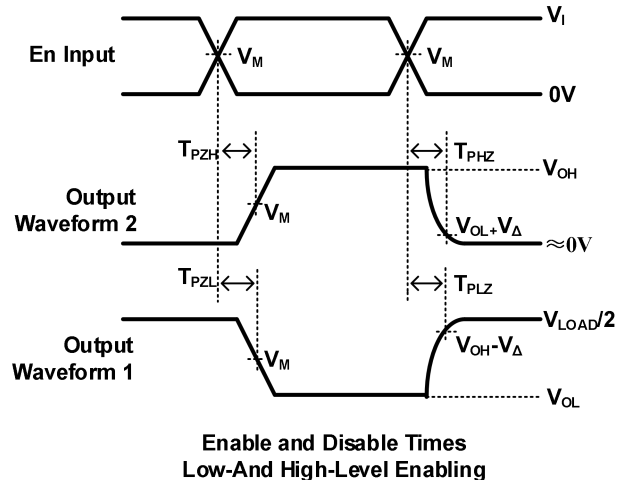
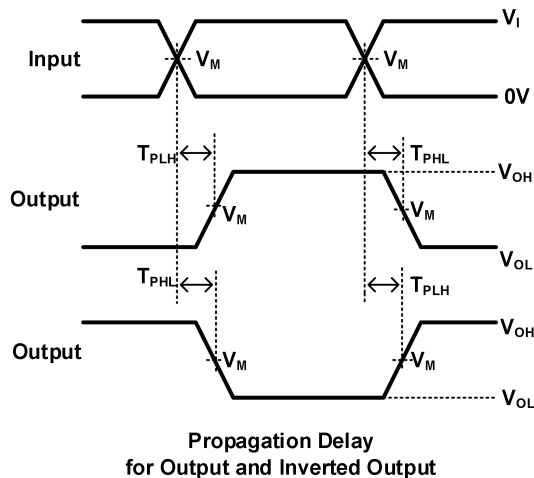
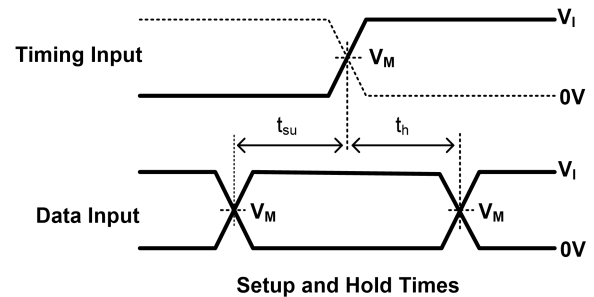
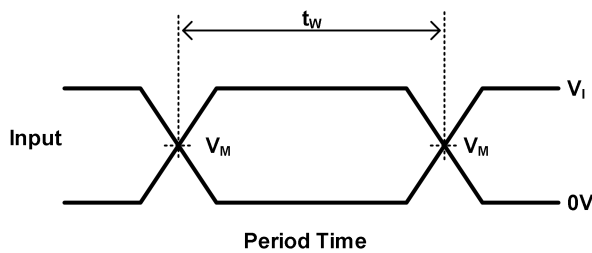
H. All parameters and waveforms are not applicable to all device.

9 Parameter Measurement Information (Continued)



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_{Δ}
	V_I	T_r/T_f					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1k 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



Notes: A. C 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.

10 Detailed Description

10.1 Overview

The GT74LVC1G00 device contains one 2 -input positive NAND gate device and performs the Boolean function $Y = \overline{A \times B}$ or $Y = \overline{A} + \overline{B}$. This device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current back flow through the device when it is powered down.

10.2 Functional Block Diagram



Fig.10-1.Functional Block Diagram

10.3 Feature Description

- Wide operating voltage range.
- Operates from 1.65 V to 5.5 V.
- Allows down voltage translation.
- Inputs accept voltages to 5.5 V.
- I_{off} feature allows voltages on the inputs and outputs, when V_{CC} is 0 V.

10.4 Device Functional Modes

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

11 Application note

11.1 Application Information

The GT74LVC1G00 is a high drive CMOS device that can be used for implementing NAND logic with high output drive, such as an LED application. It can produce 24 mA of drive current at 3.3 V making it Ideal for driving multiple outputs and good for high speed applications up to 100 MHz. The inputs are 5.5V tolerant allowing it to translate down to V_{CC} .

11.2 Typical Application

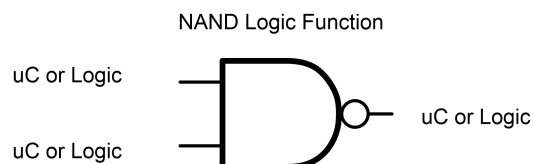


Fig.11-1. Typical Application

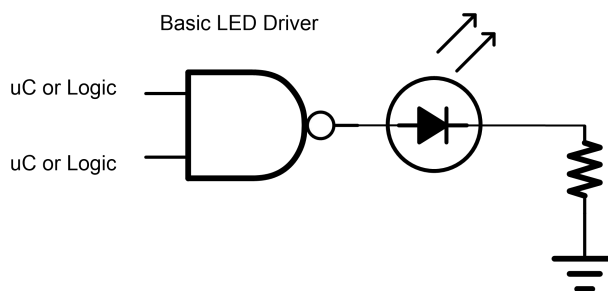
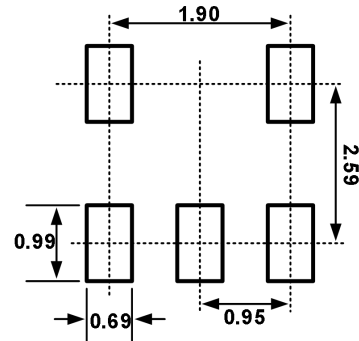
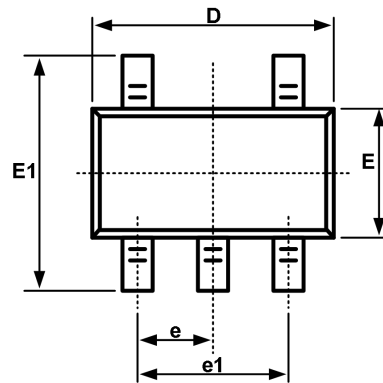


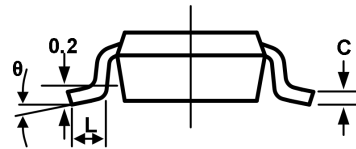
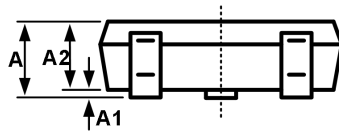
Fig.11-2. Typical Application

12 Package Outline Dimension

SOT23-5



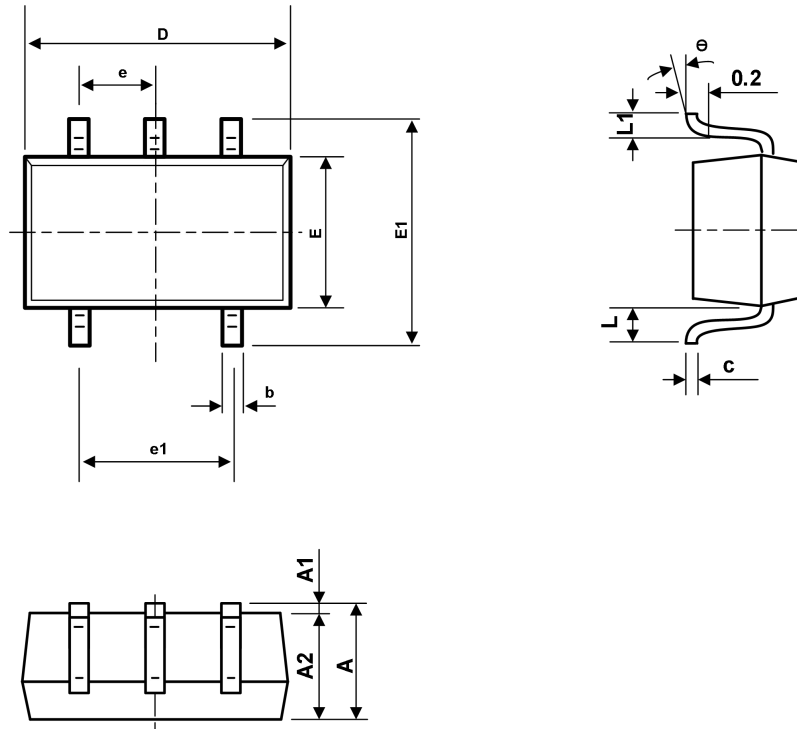
Recommended Land Pattern (Unit: mm)



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	0.950BSC		0.037BSC	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
L1	0.600REF		0.024REF	
θ	0°	8°	0°	8°

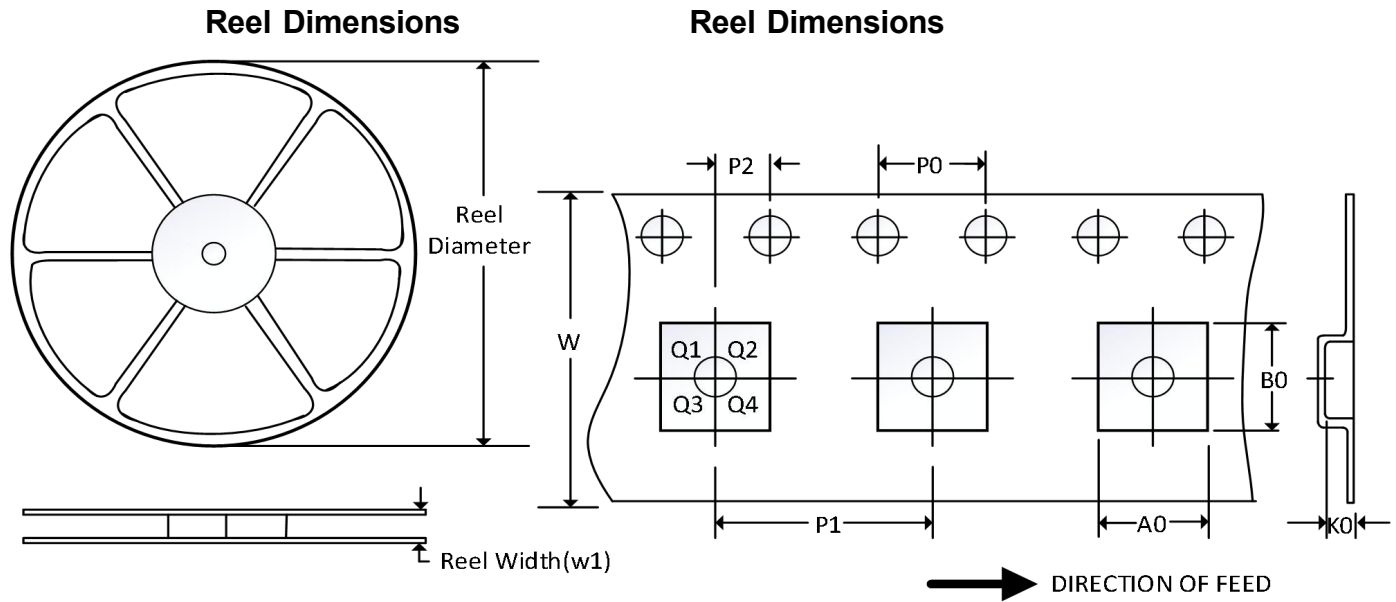
12 Package Outline Dimension(Continued)

SC70-5



Symbol	Dimension In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.110	0.175	0.004	0.007
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	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.525REF		0.021REF	
L1	0.260	0.460	0.010	0.018
theta	0°	8°	0°	8°

13 Tape and Reel Information



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 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
SC70-5	7"	9.5	2.25	2.55	1.20	4.0	4.0	2.0	8.0	Q3

NOTE:

1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.