

Single 2-Input Positive-OR Gate

Features

- Wide Supply Voltage Range: 1.65 V to 5.5 V
- CMOS Low Power Consumption
- Inputs Accept Voltages to 5.5 V
- I_{OFF} Supports Partial Power-Down-Mode Operation
- $t_{pd} = 3.5$ ns at 3.3 V
- High Output Drive: ± 24 mA at $V_{CC} = 3.0$ V
- Operating Temperature Range:
-40 °C to 125 °C

Applications

AV Receiver
Personal Navigation Device (GPS)
Digital Picture Frame (DPF)
Portable Media Player
High-Speed Data Acquisition and Generation
SSD: Internal and External
Wireless Headset, Keyboard, Mouse, and Repeater

General Description

AWS74LVC1G32 is a single 2-input positive-OR gate. The device accepts any supply voltage from 1.65 V to 5.5 V. The function of AWS74LVC1G32 is $Y = A + B$.

The CMOS device has high output drive while maintaining low static power dissipation over a broad V_{CC} operating range.

The AWS74LVC1G32 is fully specified for partial power-down applications using off output current (I_{OFF}). When the device is powered down, the output is disabled, and the current backflow can be prevented from passing through the device.

Device Information

PART NUMBER	PACKAGE	BODY SIZE (NOM)
AWS74LVC1G32A	SOT23-5L	1.626mm*2.926mm
AWS74LVC1G32	SOT353-5L	1.26mm*2.07mm

Typical Application Circuit

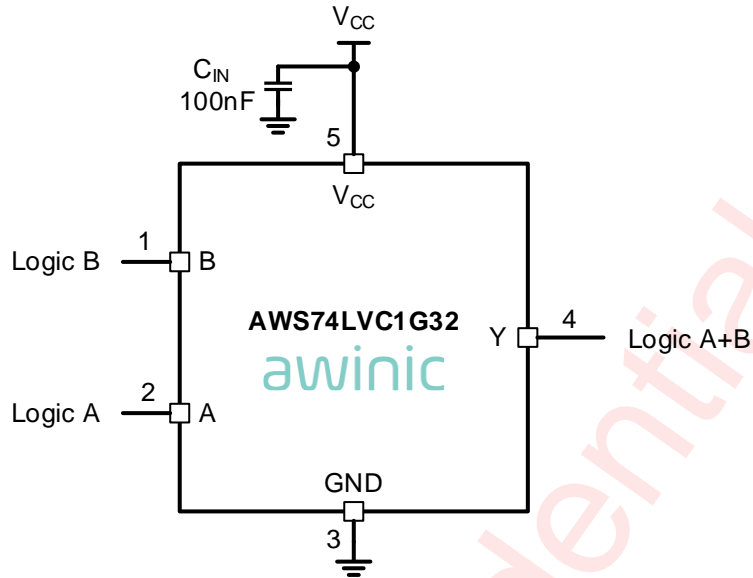
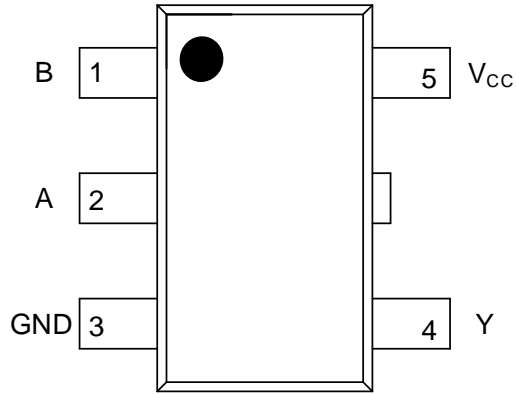


Figure 1 Typical Application

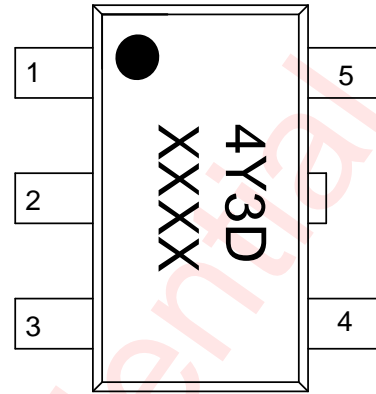
Pin Configuration And Top Mark

SOT353 - 5L

AWS74LVC1G32STR
(Top View)



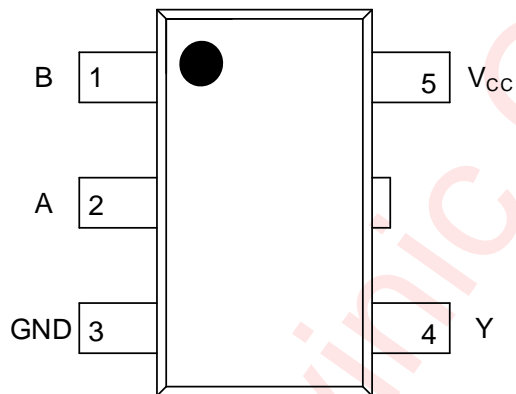
AWS74LVC1G32STR Marking
(Top View)



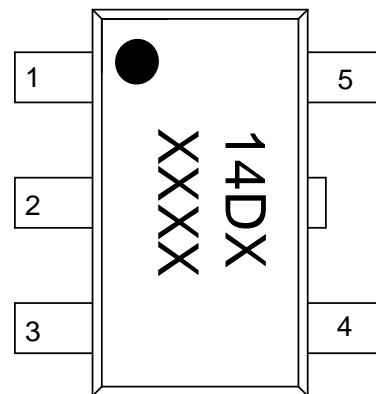
4Y3D - AWS74LVC1G32STR
XXXX - Production Tracing Code

SOT23 - 5L

AWS74LVC1G32ASTR
(Top View)



AWS74LVC1G32ASTR Marking
(Top View)



14DX - AWS74LVC1G32ASTR
XXXX - Production Tracing Code

Figure2 Pin Configuration

Pin Definition

No.	NAME	DESCRIPTION
1	B	Data input B
2	A	Data input A
3	GND	Ground
4	Y	Data output
5	V _{CC}	Supply voltage

Pin Functions

Input A	Input B	Output Y
L	L	L
L	H	H
H	L	H
H	H	H

H = HIGH Logic Level

L = LOW Logic Level

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Functional Block Diagram

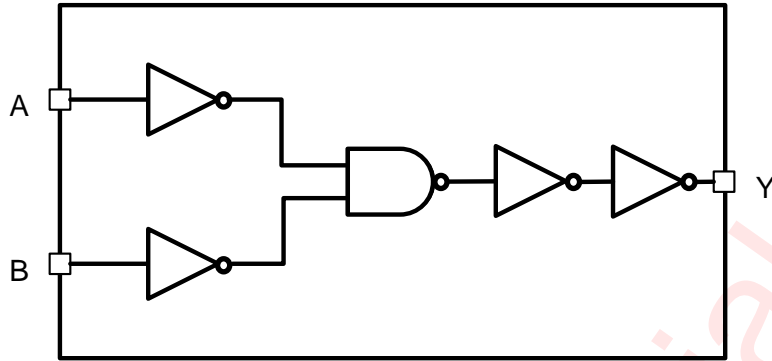


Figure 3 Functional Block Diagram

Ordering Information

Part Number	Temperature	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AWS74LVC1G32STR	-40 °C ~ 125 °C	SOT353 – 5L	4Y3D	MSL1	ROHS+HF	3000 units/ Tape and Reel
AWS74LVC1G32ASTR	-40 °C ~ 125 °C	SOT23 – 5L	14DX	MSL1	ROHS+HF	3000 units/ Tape and Reel

Absolute Maximum Ratings^(NOTE1)

PARAMETERS		RANGE
Supply voltage range V_{CC} ^(NOTE 1)		-0.5 V to 6.5 V
Input voltage range ^(NOTE 1)		-0.5 V to 6.5 V
Output voltage range ^(NOTE 1) , Active mode		-0.5 V to $V_{CC} + 0.5$ V
Output voltage range ^(NOTE 1) , Power-down mode, $V_{CC} = 0$ V		-0.5 V to 6.5 V
Input clamp current, I_{IK}	$V_I < 0$	-50 mA
Output clamp current, I_{OK}	$V_O < 0$	-50 mA
Output current, I_O	$V_O = 0$ V to V_{CC}	± 50 mA
Maximum operating junction temperature T_{JMAX}		150 °C
Storage temperature T_{STG}		-65 °C to 150 °C
Lead temperature (soldering 10 seconds)		260 °C
ESD		
HBM (All pins, per ESDA/JEDEC JS-001-2023) ^(NOTE 2)		± 4 kV
CDM (All pins, per ESDA/JEDEC JS-002-2022)		± 1.5 kV
Latch-Up		
Test condition: JESD78F		+IT: 400 mA -IT: -400 mA

NOTE1: Conditions out of those ranges listed in "absolute maximum ratings" may cause permanent damages to the device. In spite of the limits above, functional operation conditions of the device should be within the ranges listed in "recommended operating conditions". Exposure to absolute-maximum-rated conditions for prolonged periods may affect device reliability.

NOTE2: The human body model is a 100 pF capacitor discharged through a 1.5 k Ω resistor into each pin.

Recommended Operating Conditions

Symbol	Parameter	Conditions	MIN	MAX	Unit
V_{CC}	Supply voltage	Operating	1.65	5.5	V
		Data retention only	1.5		V
V_{IH}	High-level input voltage	$V_{CC} = 1.65$ V to 1.95 V	$0.65 \times V_{CC}$		V
		$V_{CC} = 2.3$ V to 2.7 V	1.7		
		$V_{CC} = 3$ V to 3.6 V	2		
		$V_{CC} = 4.5$ V to 5.5 V	$0.7 \times V_{CC}$		
V_{IL}	Low-level input voltage	$V_{CC} = 1.65$ V to 1.95 V		$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3$ V to 2.7 V		0.7	

Symbol	Parameter	Conditions	MIN	MAX	Unit
		$V_{CC} = 3\text{ V to }3.6\text{ V}$		0.8	
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$		$0.3 \times V_{CC}$	
V_I	Input voltage ^(NOTE 1)		0	5.5	V
V_O	Output voltage	Active mode	0	V_{CC}	V
		Power-Down Mode, $V_{CC} = 0\text{ V}$	0	5.5	V
I_{OH}	High-level output current	$V_{CC} = 1.65\text{ V}$		-4	mA
		$V_{CC} = 2.3\text{ V}$		-8	
		$V_{CC} = 3\text{ V}$		-16	
				-24	
		$V_{CC} = 4.5\text{ V}$		-32	
I_{OL}	Low-level output current	$V_{CC} = 1.65\text{ V}$		4	mA
		$V_{CC} = 2.3\text{ V}$		8	
		$V_{CC} = 3\text{ V}$		16	
				24	
		$V_{CC} = 4.5\text{ V}$		32	
$\Delta t/\Delta v$	Input transition rise or fall rate	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}, 2.5\text{ V} \pm 0.2\text{ V}$		20	ns/V
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		10	
		$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$		5	
T_A	Operating free-air temperature T_A		-40	125	°C

NOTE1: All unused data inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

Electrical Characteristics

DC Electrical Characteristics

Typical values are measured at $V_{CC} = 3.3\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$. Full = $-40\text{ }^\circ\text{C} \sim 125\text{ }^\circ\text{C}$ (unless otherwise noted)

PARAMETER		TEST CONDITION	TEMP	MIN	TYP	MAX	UNIT
V_{OH}	HIGH-level output voltage	$I_o = -100\ \mu\text{A}$, $V_{CC} = 1.65\text{ V to } 5.5\text{ V}$	25 °C		$V_{CC} - 0.002$		V
			Full	$V_{CC} - 0.1$			
		$I_o = -4\text{ mA}$, $V_{CC} = 1.65\text{ V}$	25 °C		1.58		
			Full	1.2			
		$I_o = -8\text{ mA}$, $V_{CC} = 2.3\text{ V}$	25 °C		2.20		
			Full	1.9			
		$I_o = -16\text{ mA}$, $V_{CC} = 3.0\text{ V}$	25 °C		2.85		
			Full	2.4			
$I_o = -24\text{ mA}$, $V_{CC} = 3.0\text{ V}$	25 °C		2.77				
	Full	2.3					
V_{OL}	LOW-level output voltage	$I_o = 100\ \mu\text{A}$, $V_{CC} = 1.65\text{ V to } 5.5\text{ V}$	25 °C		0.002		V
			Full			0.1	
		$I_o = 4\text{ mA}$, $V_{CC} = 1.65\text{ V}$	25 °C		0.07		
			Full			0.45	
		$I_o = 8\text{ mA}$, $V_{CC} = 2.3\text{ V}$	25 °C		0.12		
			Full			0.3	
		$I_o = 16\text{ mA}$, $V_{CC} = 3.0\text{ V}$	25 °C		0.20		
			Full			0.4	
$I_o = 24\text{ mA}$, $V_{CC} = 3.0\text{ V}$	25 °C		0.31				
	Full			0.55			
$I_o = 32\text{ mA}$, $V_{CC} = 4.5\text{ V}$	25 °C		0.36				
	Full			0.55			
I_I	Input leakage current	A or B inputs, $V_I = 5.5\text{ V or GND}$, $V_{CC} = 0\text{ V to } 5.5\text{ V}$	25 °C			± 1	μA
			Full			± 5	
I_{OFF}	Power-off leakage current	V_I or $V_O = 5.5\text{ V}$, $V_{CC} = 0\text{ V}$	25 °C		± 0.03	± 1	μA
			Full			± 8	
I_{CC}	Supply current	$V_I = 5.5\text{ V or GND}$, $V_{CC} = 1.65\text{ V to } 5.5\text{ V}$, $I_o = 0\text{ A}$	25 °C		0.03	1	μA
			Full			8	
ΔI_{CC}	Additional supply current	One input at $V_{CC} - 0.6\text{ V}$, Other inputs at V_{CC} or GND , $V_{CC} = 3\text{ V to } 5.5\text{ V}$	25 °C		20		μA
			Full			500	
C_I	Input Capacitance	$V_{CC} = 3.3\text{ V}$, $V_I = V_{CC}$ or GND	25 °C		4		pF

Switching Characteristics

T_A = 25 °C for typical values, Full = -40 °C ~ 125 °C (unless otherwise noted)

PARAMETERS		TEST CONDITION	TEMP	MIN ⁽¹⁾	TYP ⁽²⁾	MAX ⁽¹⁾	UNIT	
t _{pd} ⁽³⁾	Propagation delay	V _{CC} = 1.8 V ± 0.15 V, C _L =30 pF, R _L =1 kΩ	25 °C		4.8		ns	
			Full	1.0		11		
		V _{CC} = 2.5 V ± 0.2 V, C _L =30 pF, R _L =500 Ω	25 °C		3.5			
			Full	0.5		7.0		
		V _{CC} = 2.7 V, C _L =50 pF, R _L =500 Ω	25 °C		3.9			
			Full	0.5		7.0		
V _{CC} = 3.3 V ± 0.3 V, C _L =50 pF, R _L =500 Ω	25 °C		3.5					
	Full	0.5		6.0				
V _{CC} = 5 V ± 0.5 V, C _L =50 pF, R _L =500 Ω	25 °C		3.3					
	Full	0.5		6.0				
C _{pd} ⁽⁴⁾	Power dissipation capacitance	V _{CC} = 1.8 V	f = 10 MHz	25 °C		16	pF	
				V _{CC} = 2.5 V	25 °C			18
				V _{CC} = 3.3 V	25 °C			21
				V _{CC} = 5.0 V	25 °C			27

NOTES:

1. Specified by design and characterization.
2. Typical value set by testing.
3. t_{pd} is the same as t_{PLH} and t_{PHL}.
4. C_{pd} is used to determine the dynamic power dissipation (Pd in μW).

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

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.

Σ(C_L × V_{CC}² × f_o) = Sum of outputs.

Test Information

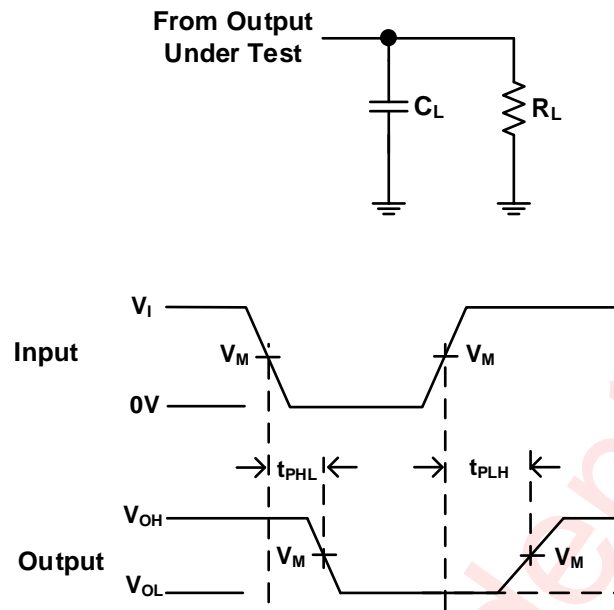


Figure 4 Load Circuit and Propagation Delay Measurement

1. The following table gives the test condition under different supply voltage:

V_{CC}	INPUTS		V_M	C_L	R_L
	V_I	t_r/t_f			
$1.8\text{ V} \pm 0.15\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	30 pF	1 k Ω
$2.5\text{ V} \pm 0.2\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	30 pF	500 Ω
2.7 V	V_{CC}	$\leq 2.5\text{ ns}$	1.5 V	50 pF	500 Ω
$3.3\text{ V} \pm 0.3\text{ V}$	3 V	$\leq 2.5\text{ ns}$	1.5 V	50 pF	500 Ω
$5\text{ V} \pm 0.5\text{ V}$	V_{CC}	$\leq 2.5\text{ ns}$	$V_{CC}/2$	50 pF	500 Ω

2. Load capacitance including probe and jig capacitance.

3. t_{PHL} and t_{PLH} are measured at V_M .

4. t_{PHL} and t_{PLH} are same as t_{pd} .

Detailed Functional Description

AWS74LVC1G32 is a 2-input positive OR gate. The device accepts any supply voltage from 1.65 V to 5.5 V. The function of AWS74LVC1G32 is $Y = A + B$.

The AWS74LVC1G32 is fully specified for partial power-down applications using off output current (I_{OFF}). The I_{OFF} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

Functional Modes

Input A	Input B	Output Y
L	L	L
H	L	H
L	H	H
H	H	H

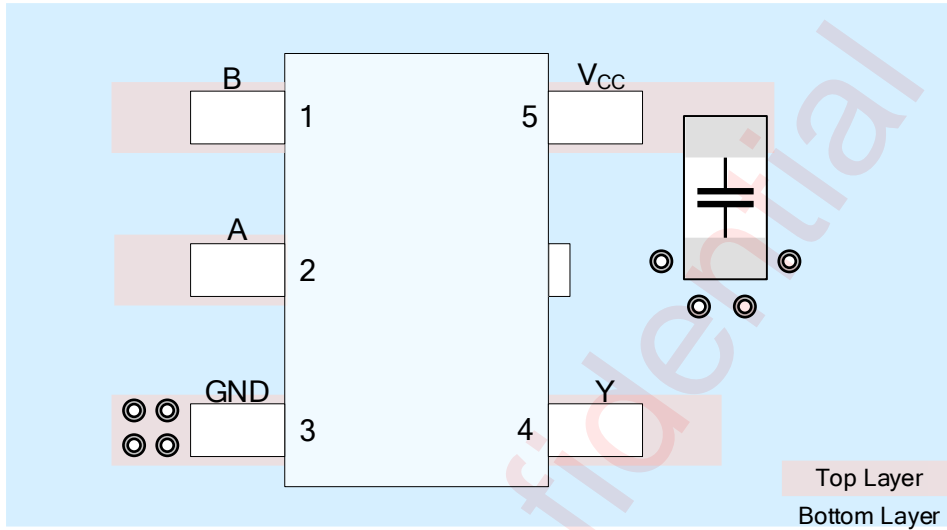
H = HIGH Logic Level

L = LOW Logic Level

PCB Layout Consideration

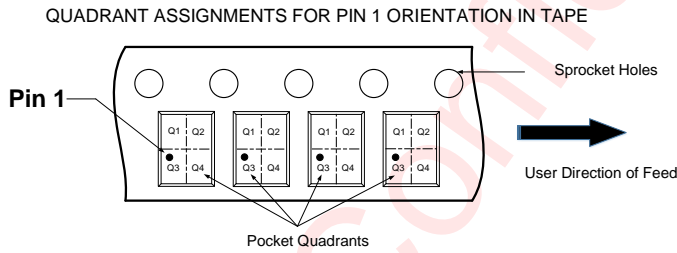
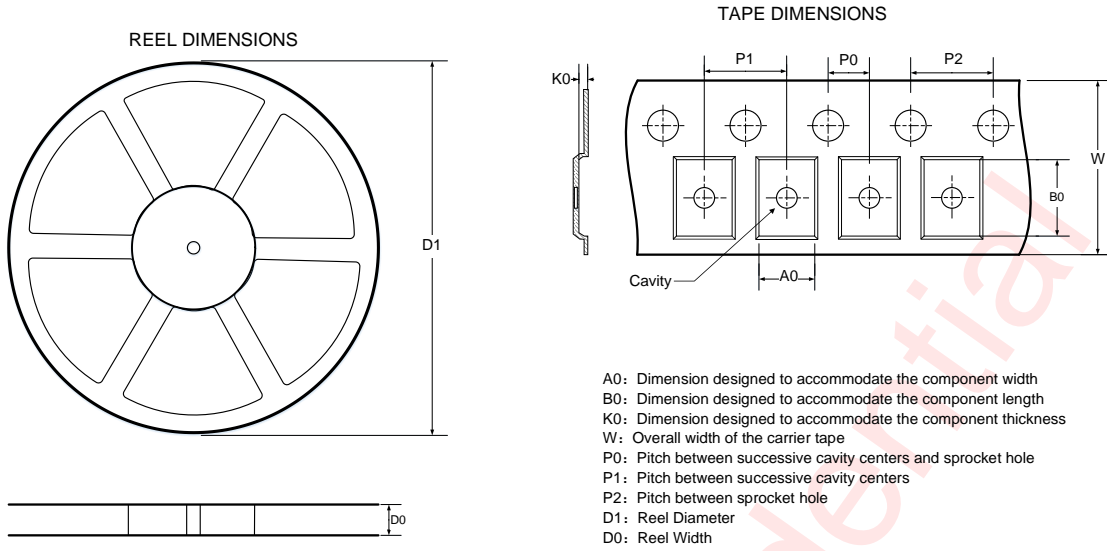
To obtain the optimal performance of AWS74LVC1G32, PCB layout should be considered carefully. Here are some guidelines:

1. We recommend adding a 0.1 μF bypass capacitor to prevent power disturbance. The C_{IN} should be placed as close to the V_{CC} pin as possible.



Tape And Reel Information

SOT353 - 5L



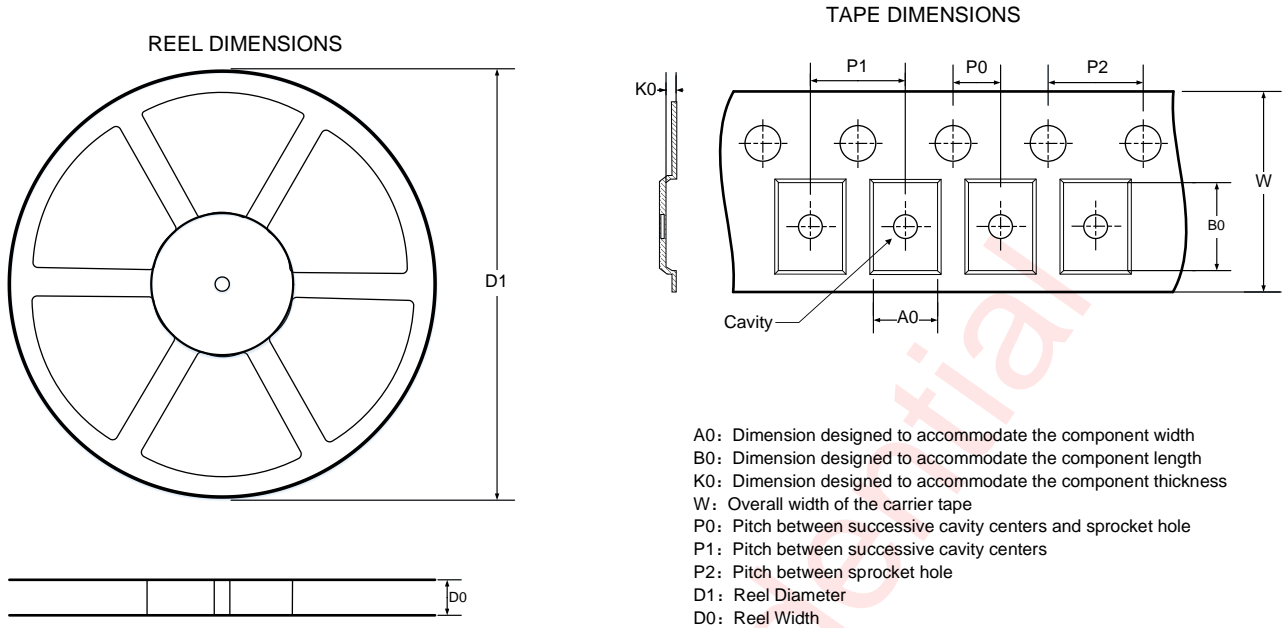
Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION

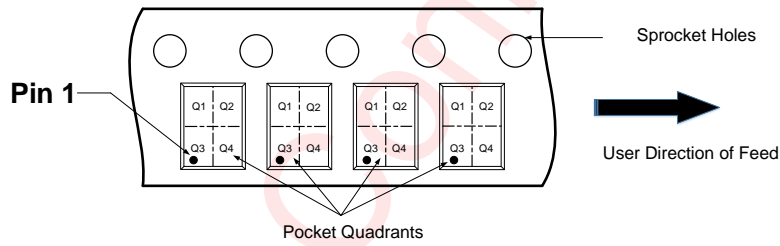
D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
178.0	8.40	2.40	2.55	1.20	2.00	4.00	4.00	8.00	Q3

All dimensions are nominal

SOT23 – 5L



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



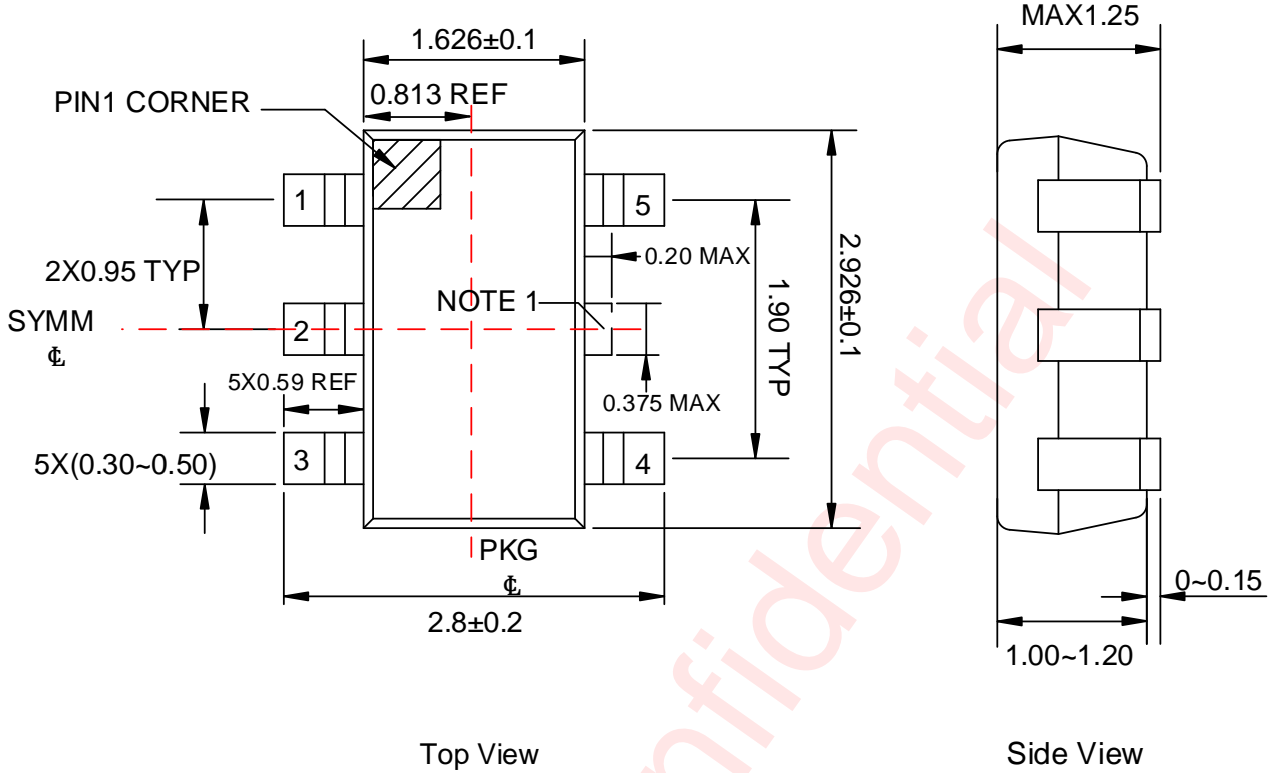
Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION

D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
178.00	8.40	3.30	3.20	1.40	2.00	4.00	4.00	8.00	Q3

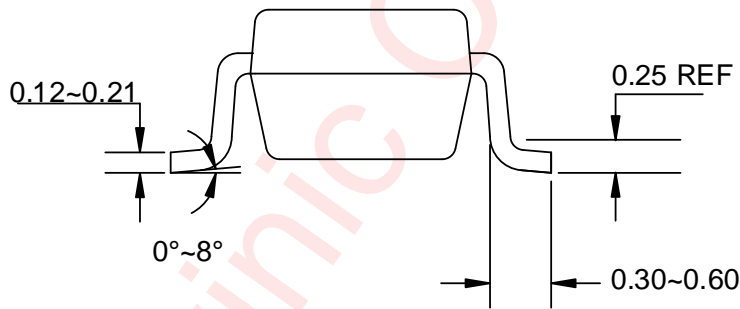
All dimensions are nominal

SOT23 – 5L



Top View

Side View



Side View

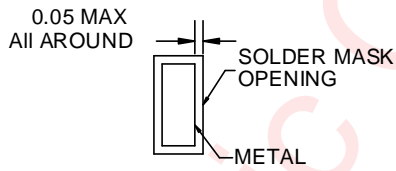
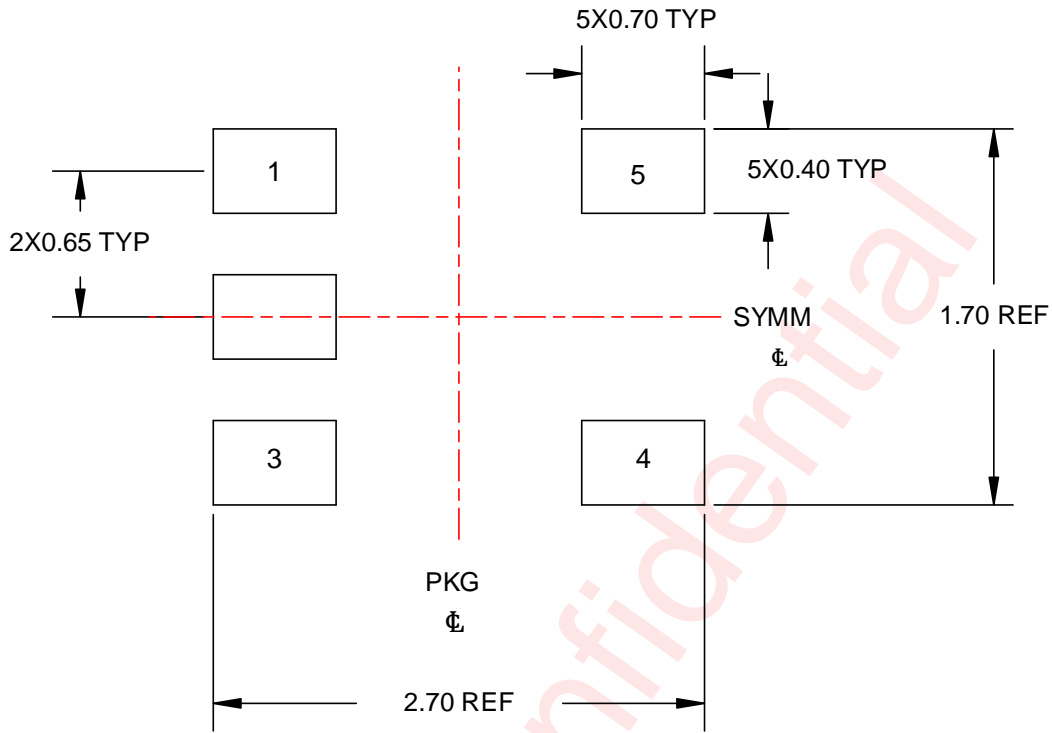
Unit: mm

NOTE:

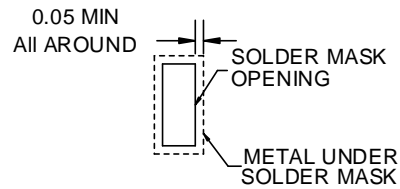
1. Support pin may differ or may not be present.

Land Pattern Data

SOT353 – 5L



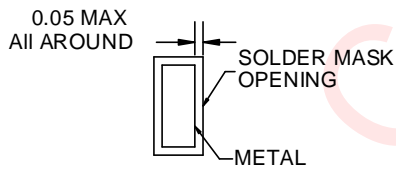
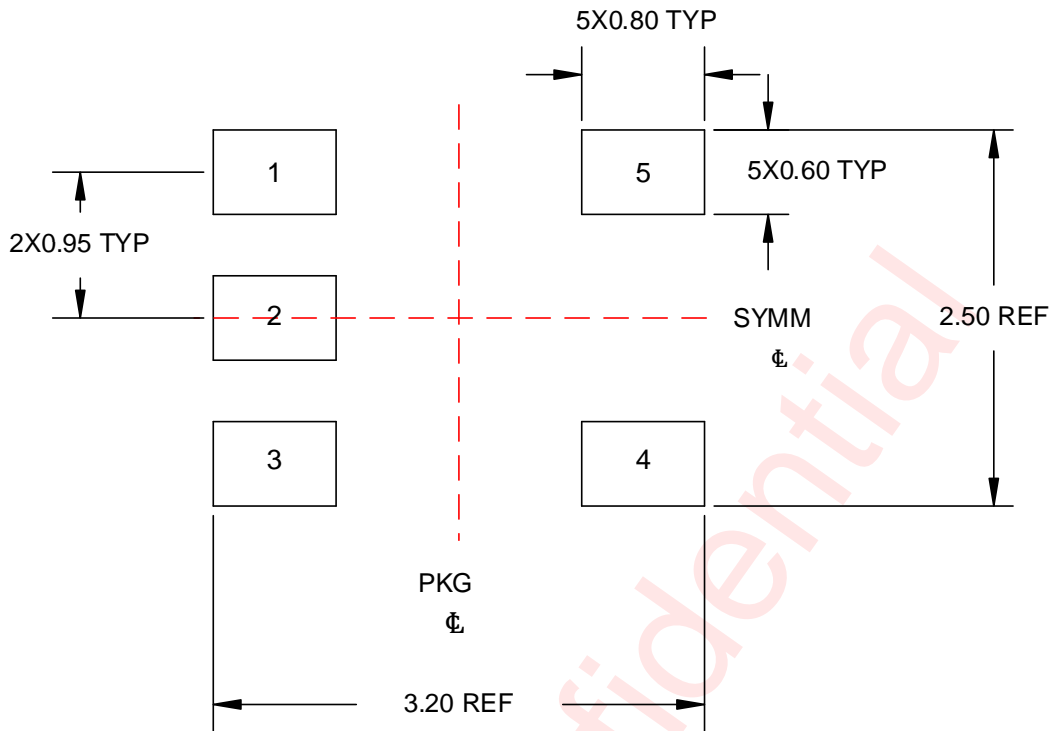
NON SOLDER MASK DEFINED



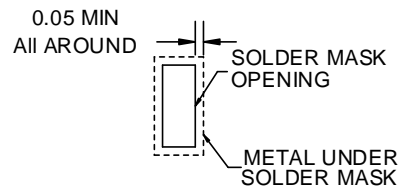
SOLDER MASK DEFINED

Unit: mm

SOT23 – 5L



NON SOLDER MASK DEFINED



SOLDER MASK DEFINED

Unit: mm

Revision History

Version	Date	Change Record
V1.0	Dec. 2024	Officially released
V1.1	May 2025	<ol style="list-style-type: none">1. Added SOT 23 - 5L pin configuration to <i>Pin Configuration And Top Mark.</i> (P3)2. Added SOT 23 - 5L information table to <i>Ordering Information.</i> (P5)3. Added SOT 23 - 5L information to <i>Tape And Reel Information.</i> (P14)4. Added SOT 23 - 5L information to <i>Package Description.</i> (P16)5. Added SOT 23 - 5L information to <i>Land Pattern Data.</i> (P18)

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