

Low-Power Single 2-Input AND Gate

Features

- Wide Supply Voltage Range: 0.8V to 3.6V
- Low Static Power Consumption ($I_{CC} = 0.1\mu A$)
- Low Input Capacitance ($C_i = 2pF$)
- I_{OFF} Supports Partial Power-Down-Mode Operation
- $t_{pd} = 4.3ns$ at 3.3 V
- 3.6-V I/O Tolerant to Support Mixed-Mode Signal Operations
- Suitable for Point-to-Point Applications
- WBSOT23-5L

Applications

Desktop PCs and Notebooks
CD/DVD ROM
HDTV
DVR
Barcode Scanner
Blood Pressure Monitor
CPAP Machine
E-Book
Fingerprint Biometrics

General Description

AWS74AUP1G08 is a single 2-input AND gate. The device accepts any supply voltage from 0.8V to 3.6V. The function of AWS74AUP1G08 is $Y = A \cdot B$.

The AWS74AUP1G08 is fully specified for partial power-down applications using off output current (I_{OFF}). The outputs for this device enter a high-impedance state when the device is powered down, preventing any damaging backflow current through the device.

AWS74AUP1G08 has extremely low power consumption in the full voltage range. AWS74AUP1G08 is developed for portable products to reduce system power consumption and extend battery operation time.

Typical Application Circuit

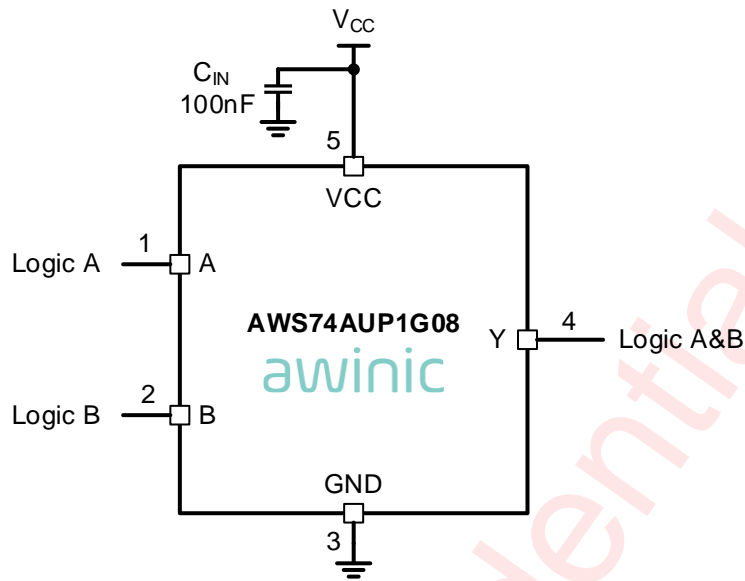
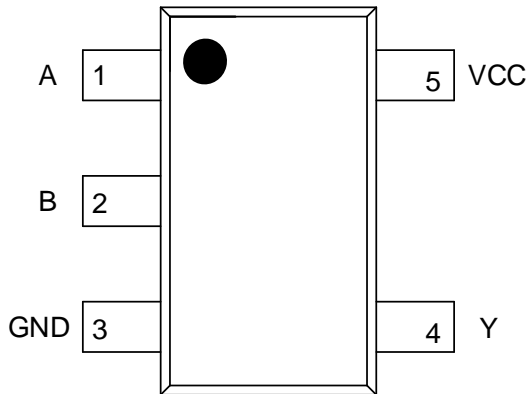


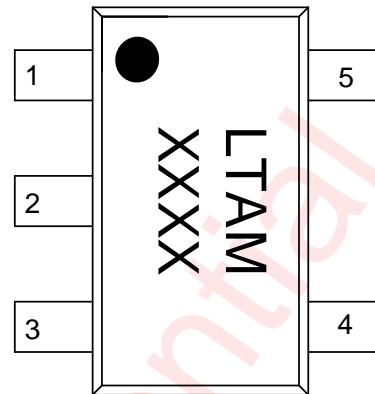
Figure 1 AND Function Application

Pin Configuration And Top Mark

AWS74AUP1G08STR
(Top View)



AWS74AUP1G08STR Marking
(Top View)



LTAM - AWS74AUP1G08STR
XXXX - Production Tracing Code

Pin Definition

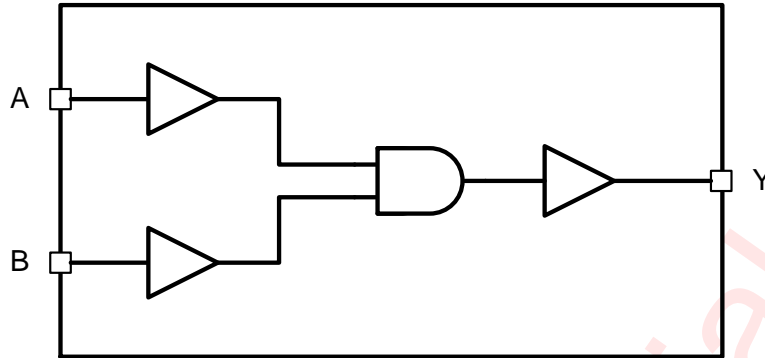
No.	NAME	DESCRIPTION
1	A	Data input A
2	B	Data input B ⁽¹⁾
3	GND	Ground
4	Y	Data output
5	VCC	Supply voltage

(1) Data input A and Data input B are exactly the same.

Pin Functions

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

Functional Block Diagram



Typical Application Circuits

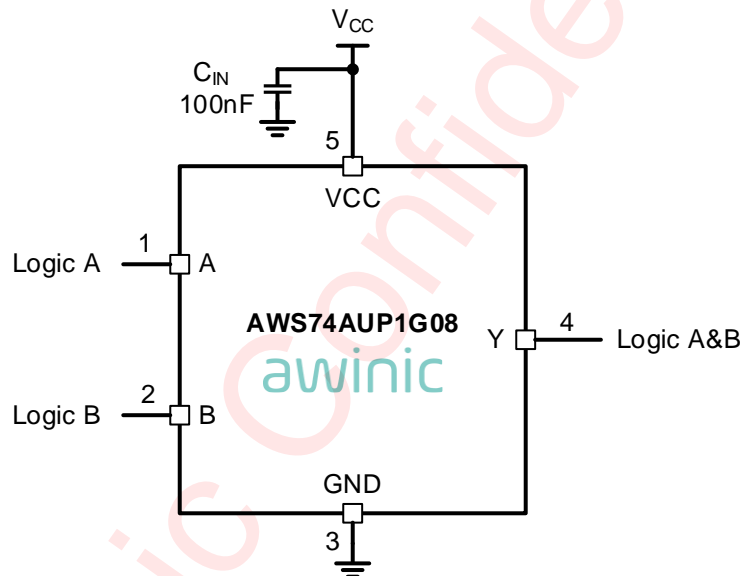


Figure 4 AWS74AUP1G08 Application circuit

Ordering Information

Part Number	Temperature	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AWS74AUP1G08STR	-40°C~125°C	WBSOT23-5L	LTAM	MSL3	ROHS+HF	3000 units/ Tape and Reel

Absolute Maximum Ratings^(NOTE1)

PARAMETERS		RANGE
Supply voltage range V_{CC}		-0.3V to 4.6V
Input voltage range		-0.3V to 4.6V
Output voltage range		-0.3V to 4.6V
Input clamp current, I_{IK}	$V_I < 0$	$\pm 50\text{mA}$
Output clamp current, I_{OK}	$V_O < 0$	$\pm 50\text{mA}$
Output current, I_O	$V_O = 0\text{V to } 4.6\text{V}$	50mA
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-001-2017) ^(NOTE 2)		$\pm 2\text{kV}$
CDM (All pins, per ESDA/JEDEC JS -002-2018)		$\pm 1.5\text{kV}$
Latch-Up		
Test condition: JEDEC78E		+IT: 200mA -IT: -200mA

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 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 100pF capacitor discharged through a 1.5k Ω resistor into each pin.

Recommended Operating Conditions

Symbol	Parameter	Conditions	Min.	Max.	Unit
V_{CC}	Supply voltage		0.8	3.6	V
V_I	Input voltage ^(NOTE1)		0	3.6	V
V_O	Output voltage		0	3.6	V
$\Delta t/\Delta V$	Input transition rise or fall rate	$V_{CCI} = 0.8\text{V to } 2.7\text{V}$		20	ns/V
		$V_{CCI} = 3.0\text{V to } 3.6\text{V}$		10	ns/V
T_A	Operating free-air temperature T_A		-40	125	°C

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

Electrical Characteristics

DC ELECTRICAL CHARACTERISTICS

$T_A=25^{\circ}\text{C}$ for typical values (unless otherwise noted)

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT	
I_{CC}	VCC supply current	$V_I=0\text{V}$ or 3.6V , $I_O=0\text{A}$; $V_{CC}=0.8\text{V}$ to 3.6V ; $T_A=25^{\circ}\text{C}$		0.1	0.5	μA	
		$V_I=0\text{V}$ or 3.6V , $I_O=0\text{A}$; $V_{CC}=0.8\text{V}$ to 3.6V ; $T_A=-40\sim 125^{\circ}\text{C}$			10		
ΔI_{CC}	Additional supply current	$V_I=V_{CC}-0.3\text{V}$, $I_O=0\text{A}$; $V_{CC}=0.8\text{V}$ to 3.6V ; $T_A=25^{\circ}\text{C}$		0.8	2	μA	
		$V_I=V_{CC}-0.3\text{V}$, $I_O=0\text{A}$; $V_{CC}=0.8\text{V}$ to 3.6V ; $T_A=-40\sim 125^{\circ}\text{C}$			20		
I_i	Input leakage current	$V_I=0\text{V}$ or 3.6V ; $V_{CC}=0.8\text{V}$ to 3.6V ; $T_A=25^{\circ}\text{C}$		0.05	1	μA	
		$V_I=0\text{V}$ or 3.6V ; $V_{CC}=0.8\text{V}$ to 3.6V ; $T_A=-40\sim 125^{\circ}\text{C}$			1		
I_{OFF}	Power off leakage current	V_I or $V_O=3.6\text{V}$; $V_{CC}=0\text{V}$; $T_A=25^{\circ}\text{C}$		0.02	0.5	μA	
		V_I or $V_O=3.6\text{V}$; $V_{CC}=0\text{V}$; $T_A=-40\sim 125^{\circ}\text{C}$			2		
ΔI_{OFF}	Additional Power off leakage current	V_I or $V_O=3.6\text{V}$; $V_{CC}=0.2\text{V}$; $T_A=25^{\circ}\text{C}$		0.4	1	μA	
		V_I or $V_O=3.6\text{V}$; $V_{CC}=0.2\text{V}$; $T_A=-40\sim 125^{\circ}\text{C}$			30		
V_{IH}	High-level input voltage	$V_{CC}=0.8\text{V}$	$0.7V_{CC}$			V	
		$V_{CC}=1.1\text{V}$ to 1.95V	$0.65V_{CC}$				
		$V_{CC}=2.3\text{V}$ to 2.7V	1.6				
		$V_{CC}=3.0\text{V}$ to 3.6V	2				
V_{IL}	Low-level input voltage	$V_{CC}=0.8\text{V}$			$0.3V_{CC}$	V	
		$V_{CC}=1.1\text{V}$ to 1.95V			$0.35V_{CC}$		
		$V_{CC}=2.3\text{V}$ to 2.7V			0.7		
		$V_{CC}=3.0\text{V}$ to 3.6V			0.9		
V_{OH}	High-level output voltage	$V_I=V_{IL}$ or V_{IH}	$I_O=-100\mu\text{A}$; $V_{CC}=0.8\text{V}$ to 3.6V	$V_{CC}-0.1$			V
			$I_O=-3\text{mA}$; $V_{CC}=1.1\text{V}$	0.85			
			$I_O=-6\text{mA}$; $V_{CC}=1.4\text{V}$	1.05			
			$I_O=-8\text{mA}$; $V_{CC}=1.65\text{V}$	1.2			
			$I_O=-9\text{mA}$; $V_{CC}=2.3\text{V}$	1.75			
			$I_O=-12\text{mA}$; $V_{CC}=3.0\text{V}$	2.3			

PARAMETER		TEST CONDITION		MIN	TYP	MAX	UNIT
V _{OL}	Low-level output voltage	V _I =V _{IL} or V _{IH}	I _O = 100μA; V _{CC} =0.8V to 3.6V			0.1	V
			I _O = 3mA; V _{CC} =1.1V			0.25	
			I _O = 6mA; V _{CC} =1.4V			0.35	
			I _O = 8mA; V _{CC} =1.65V			0.45	
			I _O = 9mA; V _{CC} =2.3V			0.55	
			I _O = 12mA; V _{CC} =3.0V			0.7	
C _I ⁽¹⁾	Input capacitance	V _I =0V or 3.3V, V _{CC} =3.3V			2.0		pF
C _O	Output capacitance	V _O =GND, V _{CC} =0V			4.0		pF

(1) Typical value set by simulation only.

SWITCHING CHARACTERISTICS

T_A=25°C for typical values (unless otherwise noted)

PARAMETERS	TEST CONDITION	V _{CC}						UNIT	
		0.8V	1.2V	1.5V	1.8V	2.5V	3.3V		
		TYP	TYP	TYP	TYP	TYP	TYP		
t _{pd} ⁽¹⁾	Propagation delay	C _L =5pF	25	11.1	8.5	6.6	5.1	4.3	ns
		C _L =10pF	26.8	11.4	8.6	6.9	5.3	4.5	
		C _L =15pF	27.9	11.9	9.1	7.1	5.4	4.6	
		C _L =30pF	29.1	12.6	9.5	7.4	5.7	4.8	

(1) Typical values are measured at V_{CC}=0.8V, 1.2V, 1.8V, 2.5V and 3.3V respectively.

Typical Characteristics

TEST INFORMATION

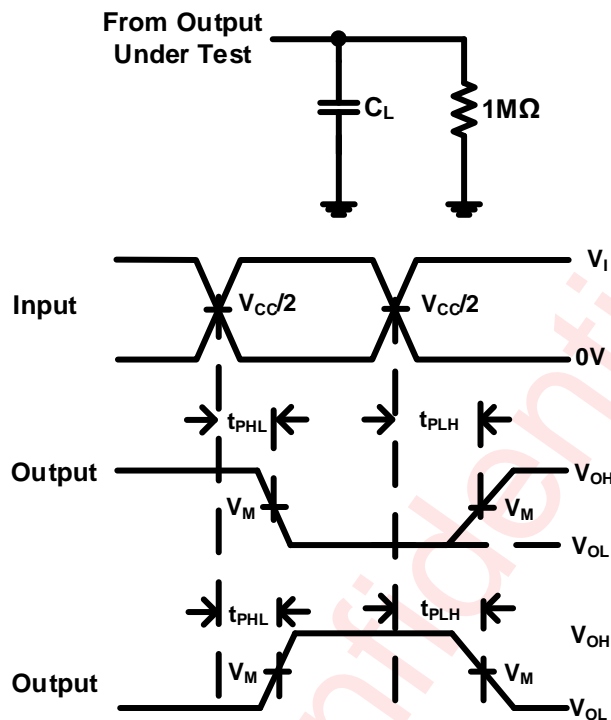


Figure 5 Load Circuit and Propagation Delay Measurement

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

V_{CC}	V_I	V_M	C_L
0.8V	V_{CC}	$V_{CC}/2$	5pF, 10pF, 15pF, 30pF
1.1V to 1.3V	V_{CC}	$V_{CC}/2$	5pF, 10pF, 15pF, 30pF
1.4V to 1.6V	V_{CC}	$V_{CC}/2$	5pF, 10pF, 15pF, 30pF
1.65V to 1.95V	V_{CC}	$V_{CC}/2$	5pF, 10pF, 15pF, 30pF
2.3V to 2.7V	V_{CC}	$V_{CC}/2$	5pF, 10pF, 15pF, 30pF
3.0V to 3.6V	V_{CC}	$V_{CC}/2$	5pF, 10pF, 15pF, 30pF

2. Load capacitance including probe and jig capacitance.

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

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

Detailed Functional Description

AWS74AUP1G08 is a single 2-input AND gate. The device accepts any supply voltage from 0.8V to 3.6V. The function of AWS74AUP1G08 is $Y = A \cdot B$.

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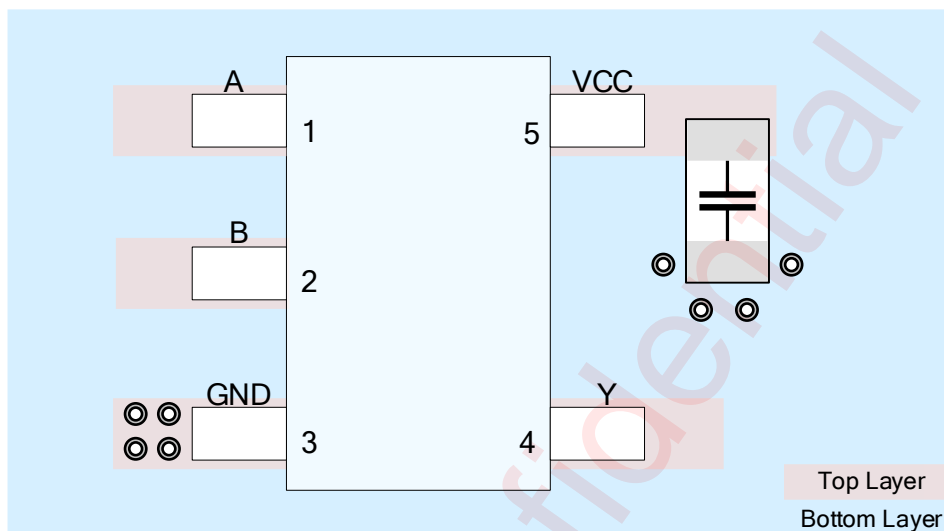
Functional Modes

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

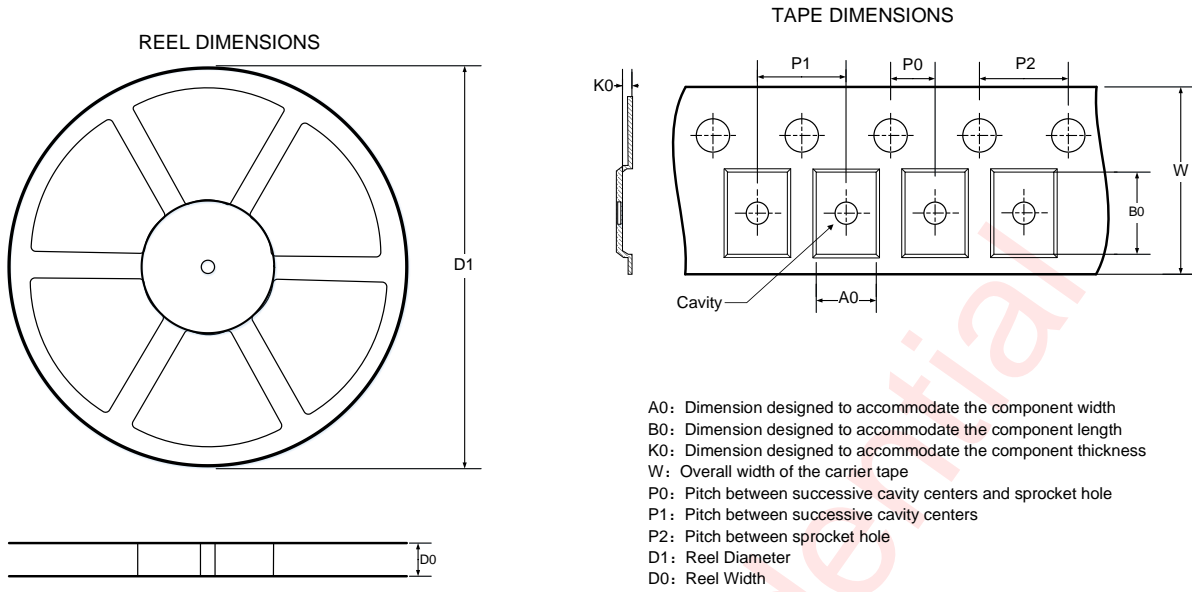
PCB Layout Consideration

To obtain the optimal performance of AWS74AUP1G08, PCB layout should be considered carefully. Here are some guidelines:

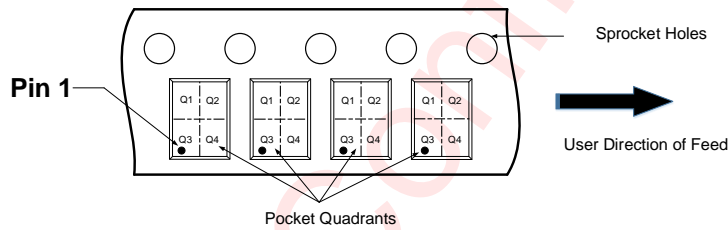
1. We recommend adding a 0.1 μ F bypass capacitor to prevent power disturbance. The C_{IN} should be placed as close to the VCC pin as possible.



Tape And Reel Information



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



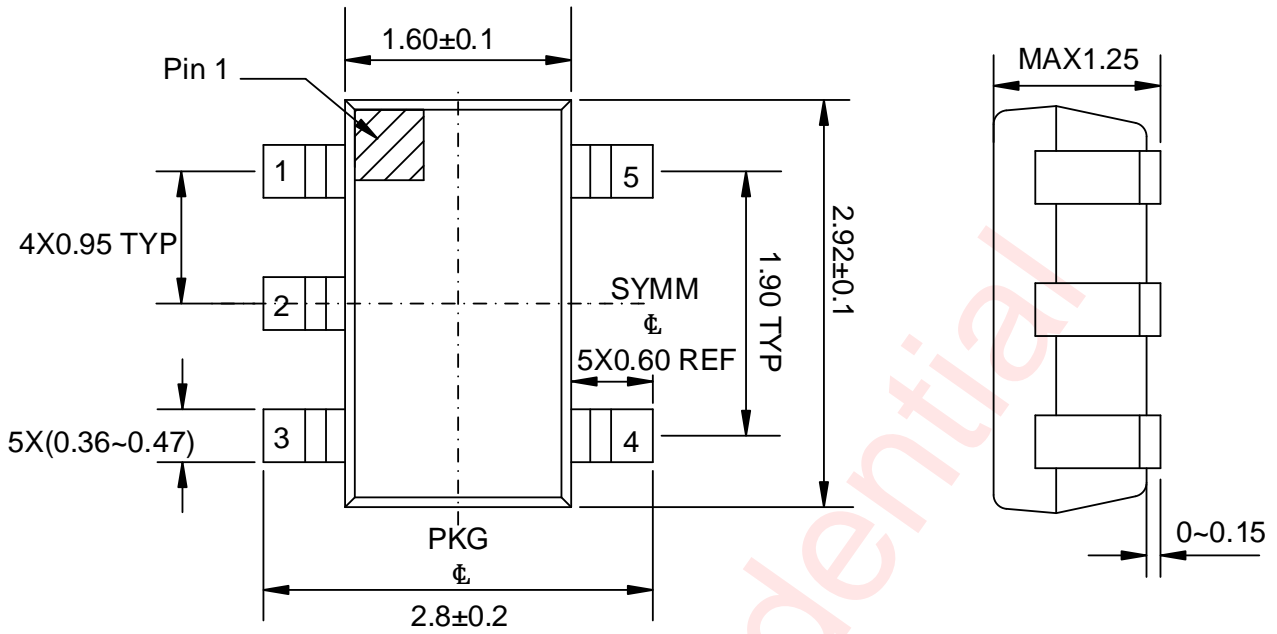
Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION

D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
180	8.6	3.26	3.3	1.4	2	4	4	8	Q3

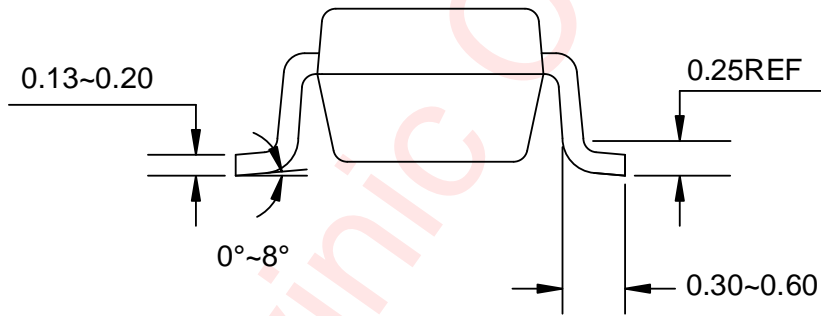
All dimensions are nominal

Package Description



Top View

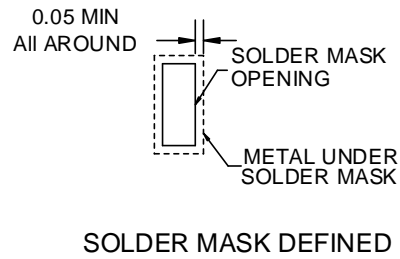
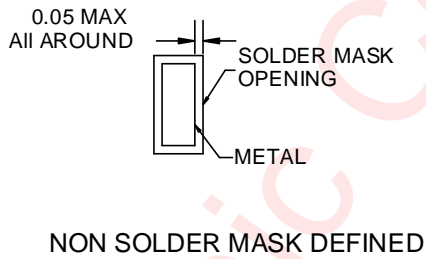
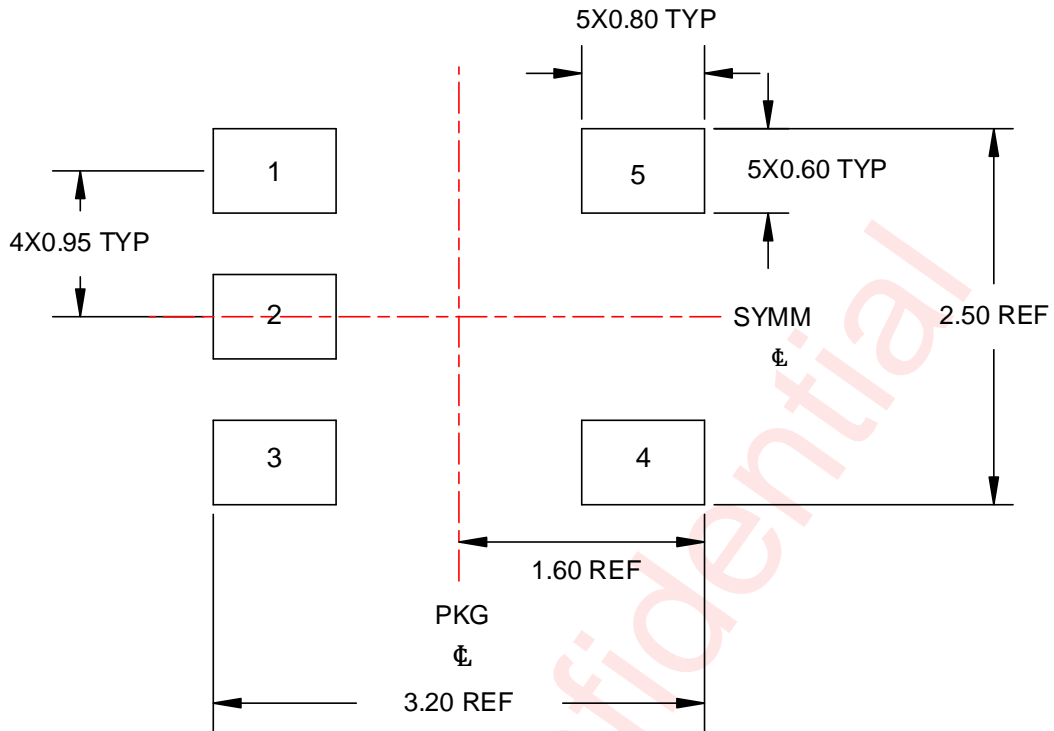
Side View



Side View

Unit: mm

Land Pattern Data



Unit: mm

Revision History

Version	Date	Change Record
V1.0	Sept. 2023	Officially released

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