

Low Sensitivity Micropower Unipolar Hall-effect Switch

Features

- Low sensitive unipolar operation
- Micropower operation Typ 0.8 μ A
(average : $V_{DD}=1.8V$)
- Ultra small package:
FCDFN 0.8mmX0.8mm-4L
- On board voltage regulator for 1.6V to 5.5V range
- Magnetic threshold options:
Bop= \pm 63Gs, Brp= \pm 54Gs
- Wide operating temperature range:
-40 $^{\circ}$ C to 85 $^{\circ}$ C

Applications

- Smartphone.
- Notebook computer.
- Handheld gaming consoles.
- Bluetooth headset.
- DV.
- Contact-less switch, Level, proximity and position switches in consumer products.

General Description

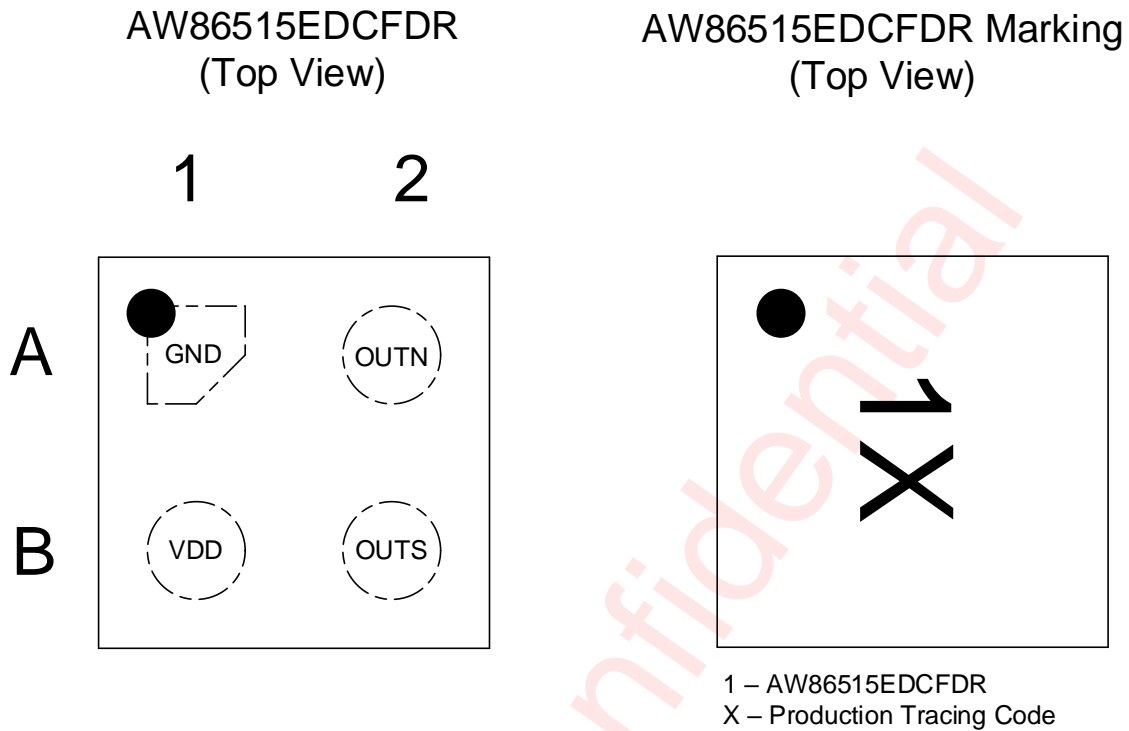
AW86515EDCFDR is a high-sensitivity micropower unipolar Hall effect switch IC with internal pull up and pull down capability. AW86515EDCFDR uses a hibernating clocking system to reduce power consumption, which the total power consumption in normal operation is typically 0.8 μ A with a 1.8V power source. Mainly designed for portable devices such as laptop computer, smartphone and bluetooth headset etc. The supply range of AW86515EDCFDR is 1.6V to 5.5V to support portable equipment.

The OUTN is activity with a north pole of sufficient magnetic field strength. When the magnetic flux density perpendicular to the package is large than operate point(BopN) , the output will be turned on (pulled down) and hold until B is lower than release point (BrpN). The OUTS is activity with a south pole of sufficient magnetic field strength. When the magnetic flux density perpendicular to the package is large than operate point(BopS) , the output will be turned on (pulled low) and held until B is lower than release point (BrpS).

Typical Application Circuit



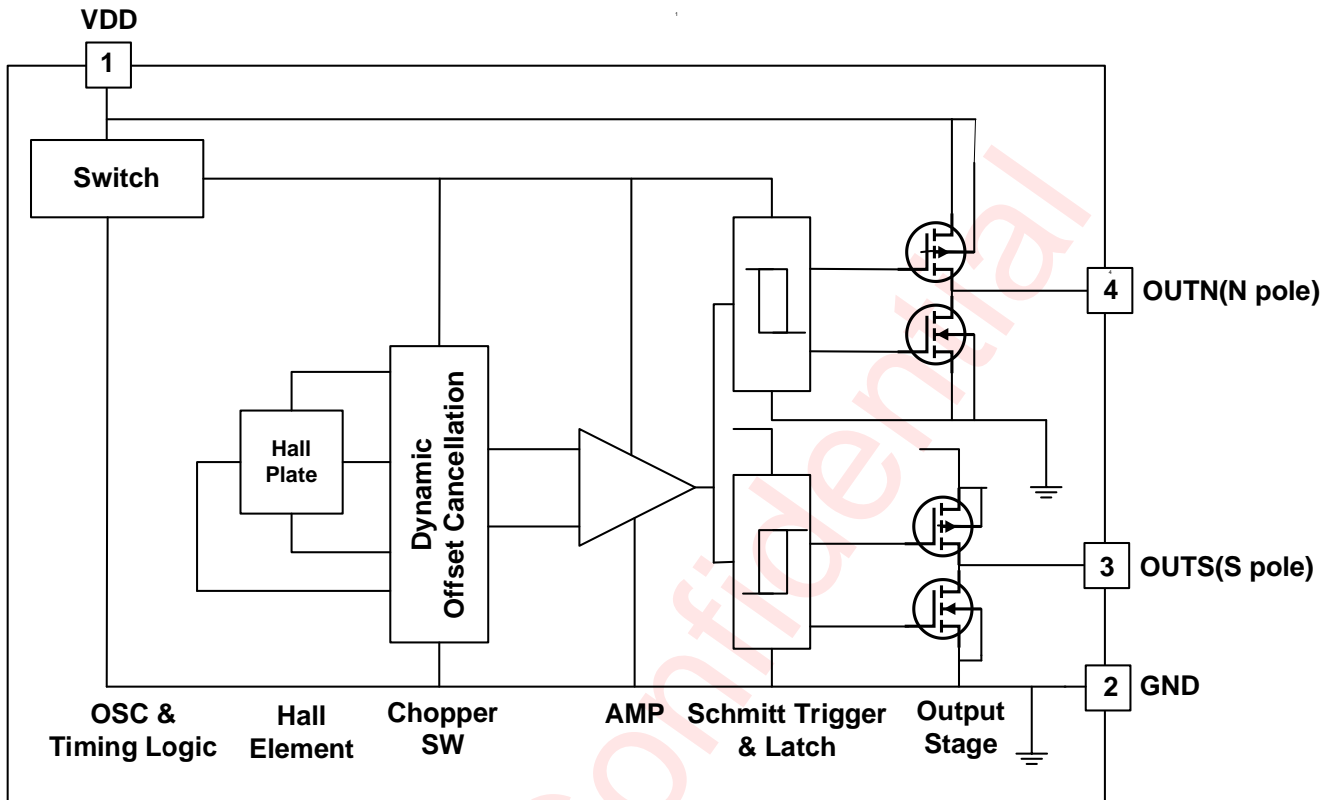
Pin Configuration And Top Mark



Pin Definition

NO.	Name	Description
A1	GND	Ground
A2	OUTN	N pole detection output
B1	VDD	Power Supply
B2	OUTS	S pole detection output

Functional Block Diagram



Ordering Information

Part Number	Temperature	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AW86515EDCFDR	-40°C~85°C	FCDFN 0.8mmX0.8mm-4L	1	MSL1	ROHS+HF	4500 units/ Tape and Reel

Absolute Maximum Ratings (Note1)

PARAMETERS	RANGE
Supply Voltage	-0.3V to 6V
Supply Current	4mA
Output Voltage	-0.4V to $V_{DD}+0.4V$
Output Current	4mA
Operating Ambient Temperature T_A	-40°C to 85°C
Storage Temperature T_{STG}	-65°C to 150°C
Junction temperature T_J	-50°C to 165°C
Magnetic Flux	No limit
Lead temperature (soldering 10 seconds)	260°C
ESD Rating ^(Note 2 3)	
Human Body Model (HMB) ESD capability	±6kV
Charged-device model (CDM) ESD capability	±1.5kV
Latch-up	
Test Condition: JESD78E	+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 test method: ESDA/JEDEC JS -001-2017.

Note3: Charge Device Model test method: ESDA/JEDEC JS-002-2018.

Electrical Characteristics

$V_{DD} = 3.3V$, $T_A = 25^\circ C$ for typical values (unless otherwise noted)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{DD}	Supply Voltage	Operating, $T_J < 165^\circ C$	1.6	-	5.5	V
$I_{DD}(\text{awake})$ (Note1)	Supply Current	During awake period, $T_A = 25^\circ C$, $V_{DD} = 3.3V$	-	0.95	1.3	mA
$I_{DD}(\text{sleep})$		During sleep period, $T_A = 25^\circ C$, $V_{DD} = 3.3V$	-	0.43	0.8	μA
$I_{DD}(\text{avg})$ (Note1)	Average supply current	$T_A = 25^\circ C$, $V_{DD} = 1.8V$, $f_S = 20Hz$	-	0.8	-	μA
		$T_A = 25^\circ C$, $V_{DD} = 3.3V$, $f_S = 20Hz$	-	-	1.7	μA
V_{OL}	Output low voltage(on)	$I_{OUT} = 1\text{ mA}$	-	0.1	0.2	V
V_{OH}	Output high voltage(off)	$I_{OUT} = -1mA$	$V_{DD} - 0.2$	$V_{DD} - 0.1$	-	V
T_{awake} (Note1)	Awake time	(Note)	-	40	60	μs
T_{period}	Period	$f_S = 20Hz$ (sampling rate)		50	75	ms
D.C.	Duty cycle	-	-	0.08	-	%
f_C	Chopping Frequency	-	-	500	-	kHz
I_{OFF} (Note1)	Output Leakage Current	$V_{OUT} = 5.5\text{ V}$; Switch state=off	-	-	0.1	μA

Note1: Minimum and/or maximum limit is guaranteed by design and by statistical analysis of device characterization data. The specification is not guaranteed by production testing.

Magnetic Characteristics

 $T_A=25^{\circ}\text{C}$, $V_{DD}=3.3\text{V}$ for typical values (unless otherwise noted)

(1mT = 10Gauss)

Symbol	Characteristics	Test condition	Min	Typ	Max	Unit
Bops (south pole to part marking side)	Operation Point	$T_A = 25^{\circ}\text{C}, V_{DD}=3.3\text{V}$	-	63	74	Gauss
Bopn (north pole to part marking side)		$T_A = 25^{\circ}\text{C}, V_{DD}=3.3\text{V}$	-74	-63	-	
Brps (south pole to part marking side)	Release Point	$T_A = 25^{\circ}\text{C}, V_{DD}=3.3\text{V}$	43	54	-	
Brpn (north pole to part marking side)		$T_A = 25^{\circ}\text{C}, V_{DD}=3.3\text{V}$	-	-54	-43	
Bhy ($ \text{Bopx} - \text{Brpx} $)	Hysteresis	$T_A = -40^{\circ}\text{C}$ to 85°C $V_{DD} = 1.6\text{V} \sim 5.5\text{V}$	-	9	-	

Typical Characteristics

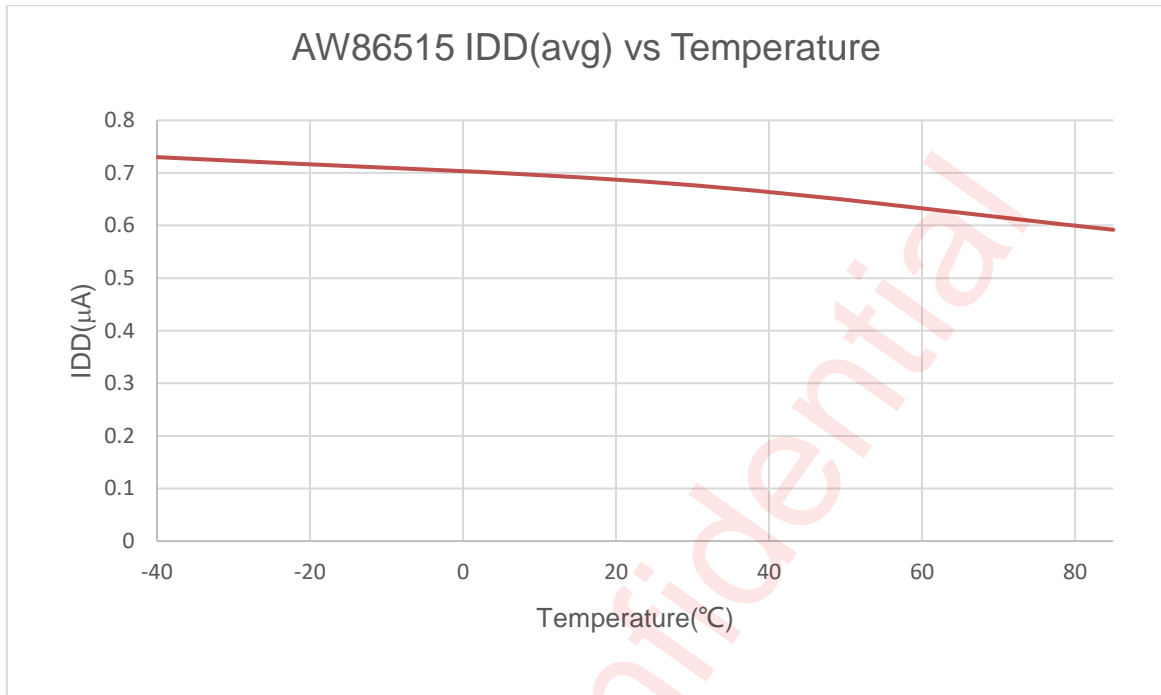


Figure 1 Ambient Temperature T_a [°C] I_{DD} vs. T_a (VDD=1.8V)

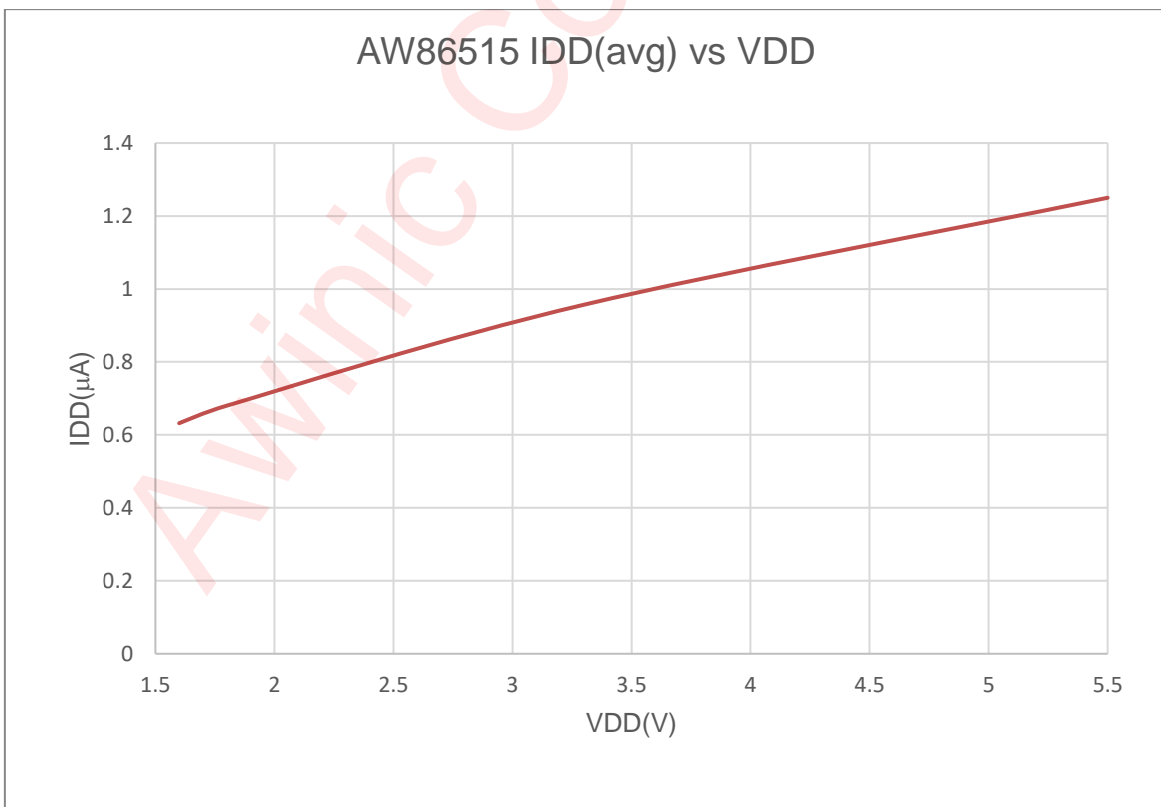


Figure 2 Average Supply Current vs. Supply Voltage ($T_a=25^\circ\text{C}$)

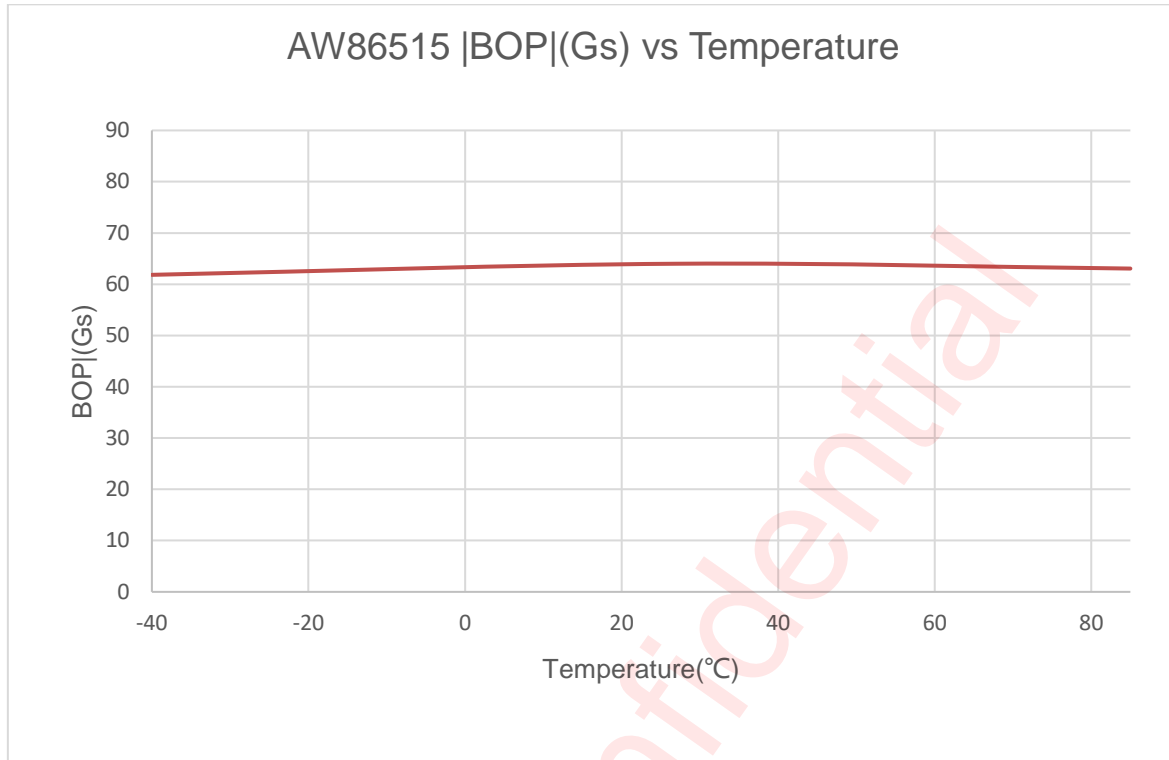


Figure 3 Ambient Temperature T_a [°C] |Bop| vs. T_a ($V_{DD}=3.3V$)

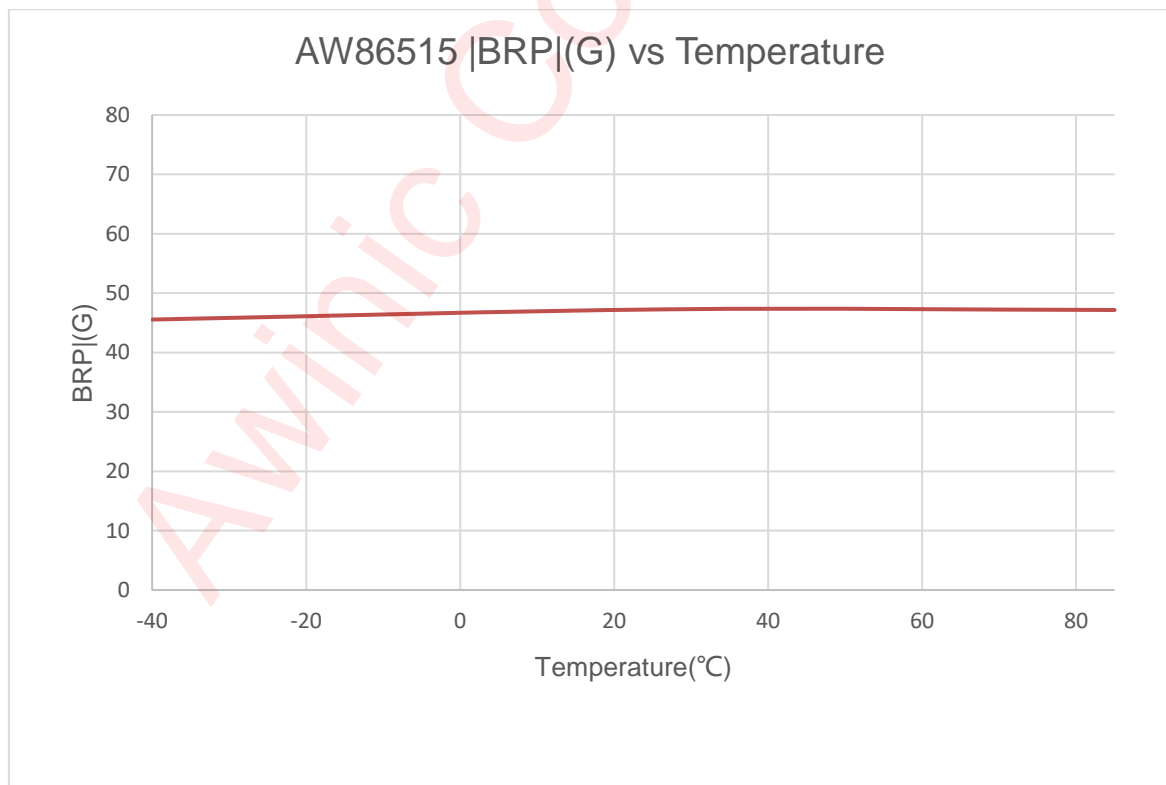
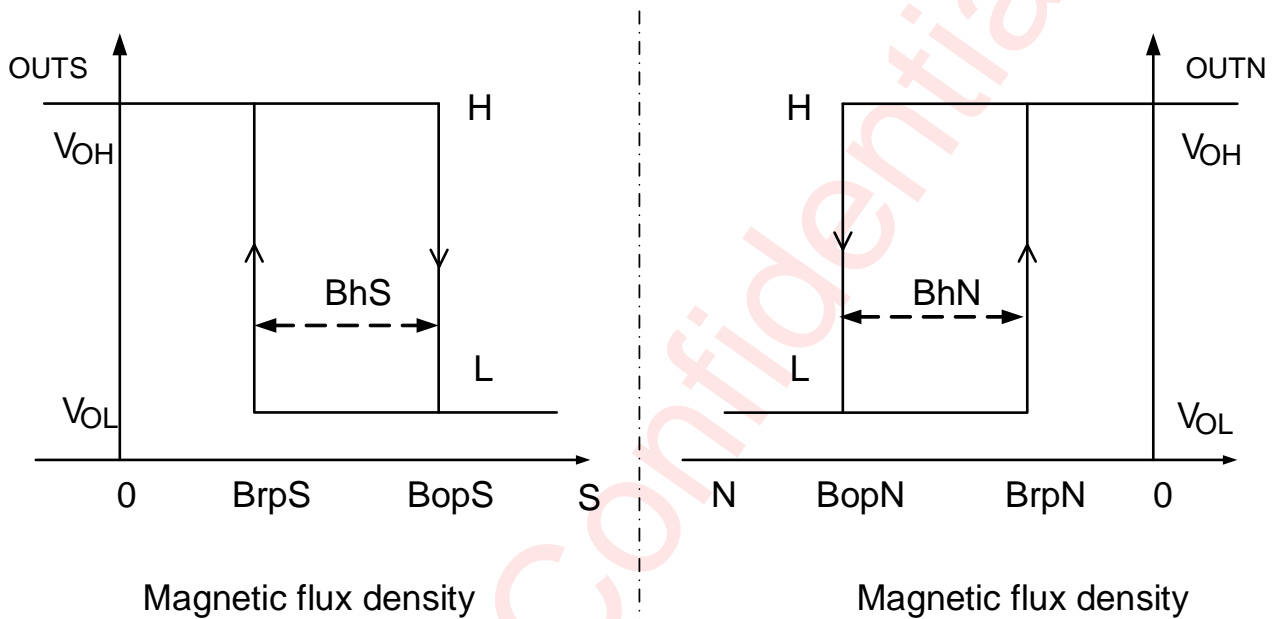


Figure 4 Ambient Temperature T_a [°C] |Brp| vs. T_a ($V_{DD}=3.3V$)

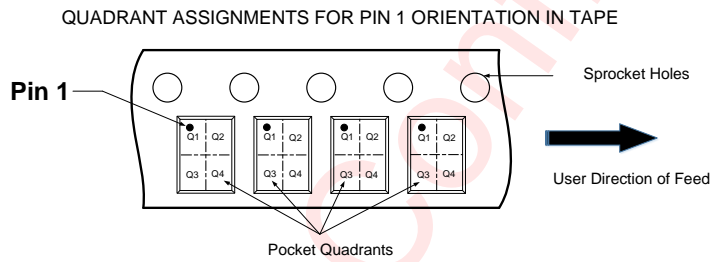
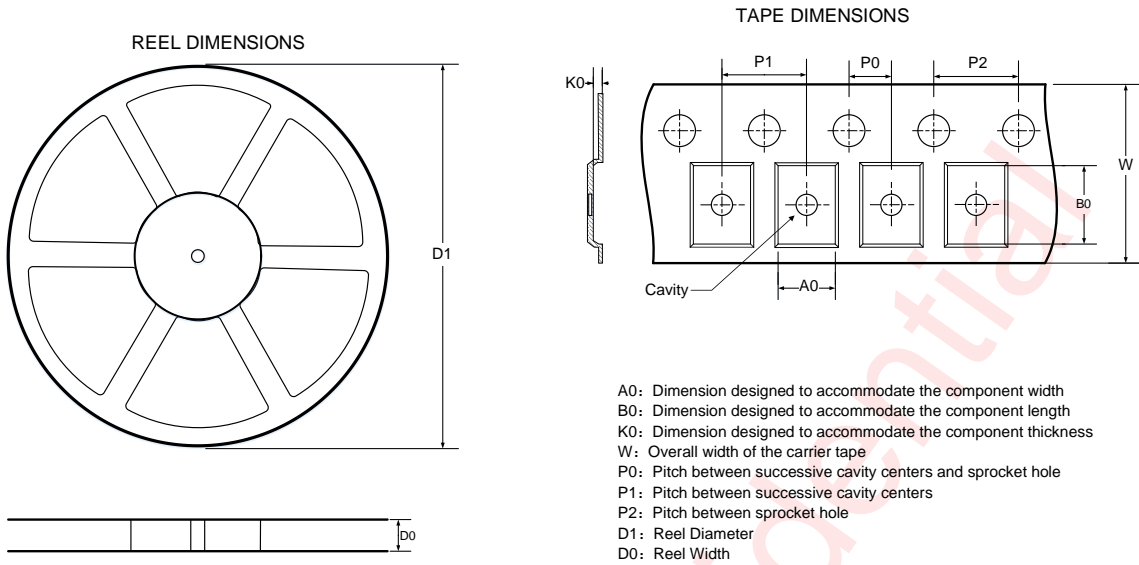
Detailed Functional Description

Magnetic Response

The OUTN is activity with a north pole of sufficient magnetic field strength. When the magnetic flux density perpendicular to the package is larger than operate point (B_{opN}), the OUTN will be turned on (pulled low) and held until B is lower than release point (B_{rpN}). The OUTS is activity with a south pole of sufficient magnetic field strength. When the magnetic flux density perpendicular to the package is larger than operate point (B_{opS}), the OUTS will be turned on (pulled low) and held until B is lower than release point (B_{rpS}).



Tape And Reel Information



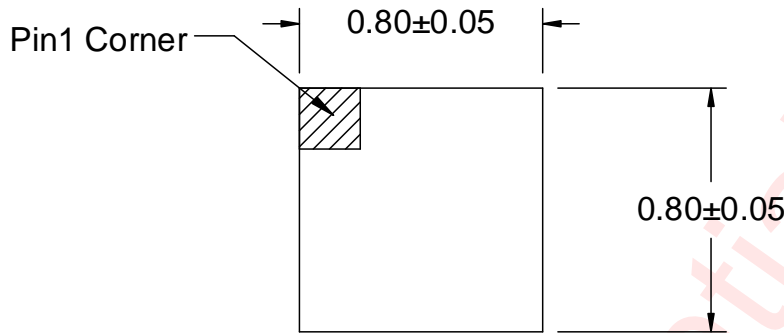
Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION

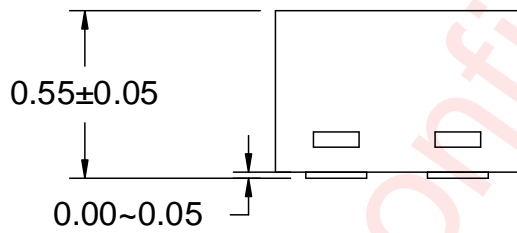
D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
178.0	8.40	0.91	0.91	0.66	2.00	4.00	4.00	8.00	Q1

All dimensions are nominal

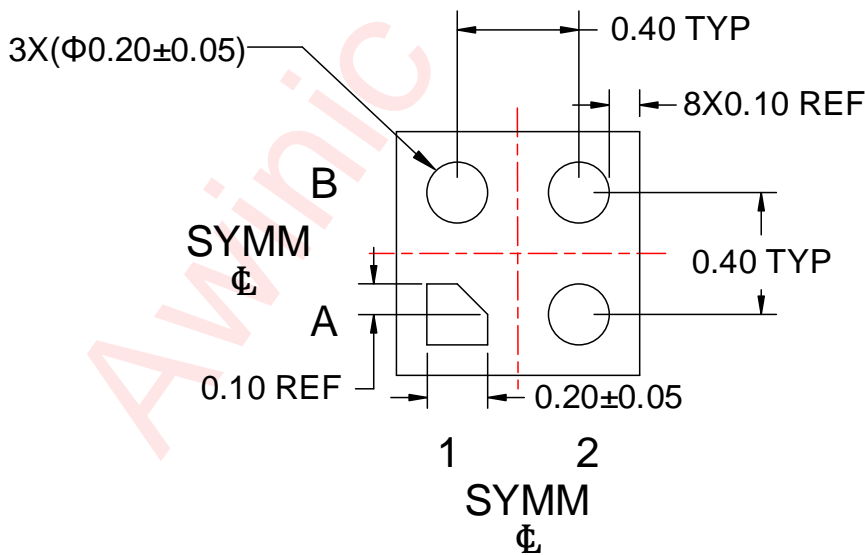
Package Description



TOP VIEW



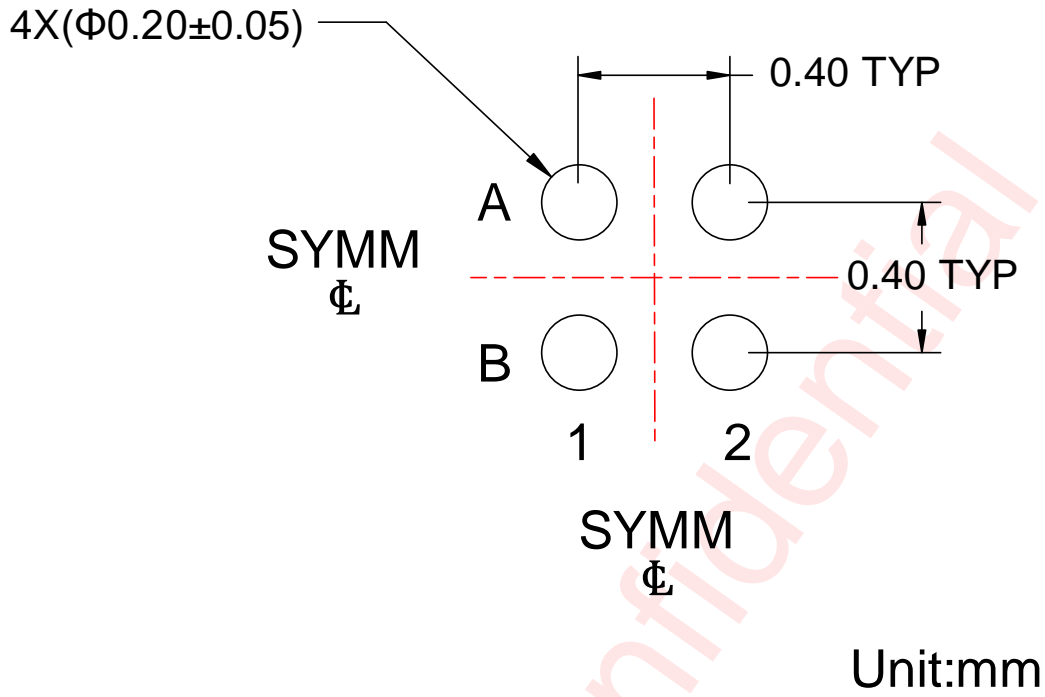
SIDE VIEW



BOTTOM VIEW

Unit:mm

Land Pattern Data



Revision History

Version	Date	Change Record
V1.0	Jun. 2025	Officially released

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