

This IC, developed by CMOS technology, is a high-accuracy hall effect latch IC that operates with a high-sensitivity, a high-speed detection and low current consumption.

The output voltage changes when this IC detects the intensity level of magnetic flux density and a polarity change. Using the S-5725 Series with a magnet makes it possible to detect the rotation status in various devices.

High-density mounting is possible by using the small SOT-23-3 or the super-small SNT-4A packages.

Due to its high-accuracy magnetic characteristics, this IC can make operation's dispersion in the system combined with magnet smaller.

ABLIC Inc. offers a "magnetic simulation service" that provides the ideal combination of magnets and our Hall effect ICs for customer systems. Our magnetic simulation service will reduce prototype production, development period and development costs. In addition, it will contribute to optimization of parts to realize high cost performance.

For more information regarding our magnetic simulation service, contact our sales representatives.

■ Features

- | | |
|--|---|
| • Pole detection: | Bipolar latch |
| • Output logic*1: | V _{OUT} = "L" at S pole detection |
| | V _{OUT} = "H" at S pole detection |
| • Output form*1: | Nch open-drain output, CMOS output |
| • Magnetic sensitivity*1: | B _{OP} = 0.8 mT typ. |
| | B _{OP} = 1.8 mT typ. |
| | B _{OP} = 3.0 mT typ. |
| | B _{OP} = 7.0 mT typ. |
| • Operating cycle (current consumption)*1: | t _{CYCLE} = 50 μs (I _{DD} = 1400.0 μA) typ. |
| | t _{CYCLE} = 1.25 ms (I _{DD} = 60.0 μA) typ. |
| | t _{CYCLE} = 6.05 ms (I _{DD} = 13.0 μA) typ. |
| • Power supply voltage range: | V _{DD} = 2.7 V to 5.5 V |
| • Operation temperature range: | T _a = -40°C to +85°C |
| • Built-in power-down circuit: | Extends battery life (only SNT-4A) |
| • Lead-free (Sn 100%), halogen-free | |

*1. The option can be selected.

■ Applications

- Plaything, portable game
- Home appliance
- Housing equipment
- Industrial equipment

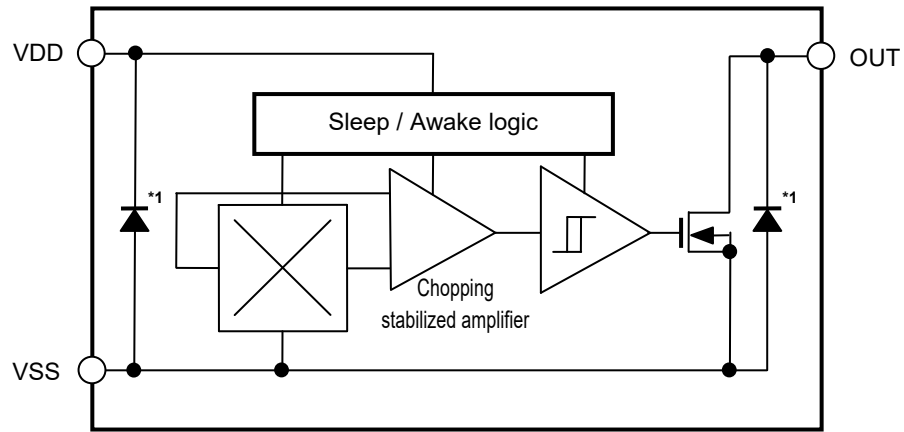
■ Packages

- SOT-23-3
- SNT-4A

■ Block Diagrams

1. Nch open-drain output product

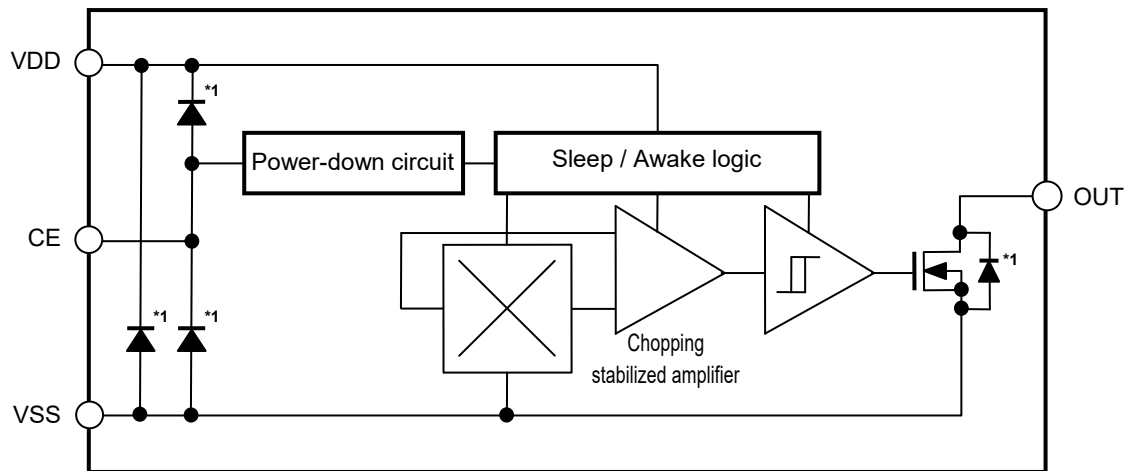
1.1 Product without power-down function



*1. Parasitic diode

Figure 1

1.2 Product with power-down function (SNT-4A)

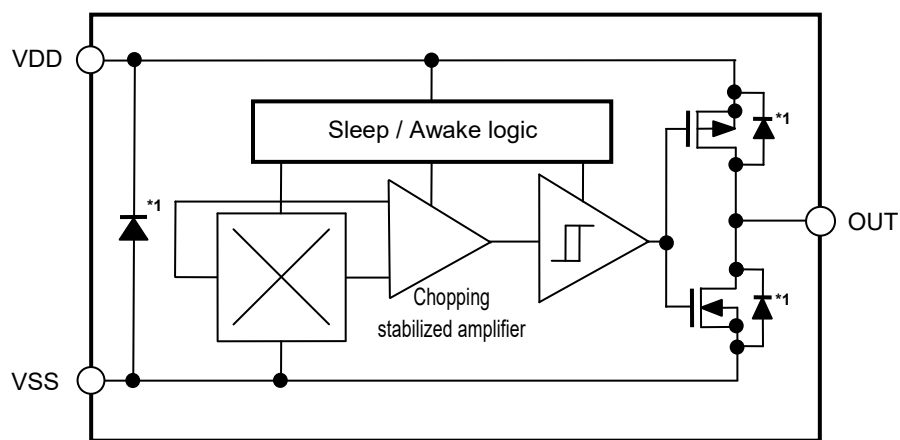


*1. Parasitic diode

Figure 2

2. CMOS output product

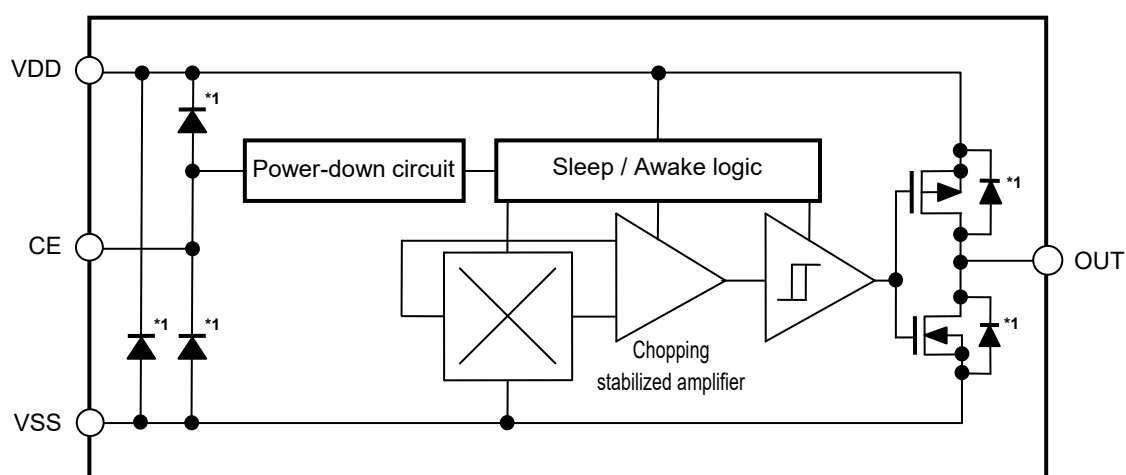
2.1 Product without power-down function



*1. Parasitic diode

Figure 3

2.2 Product with power-down function (SNT-4A)

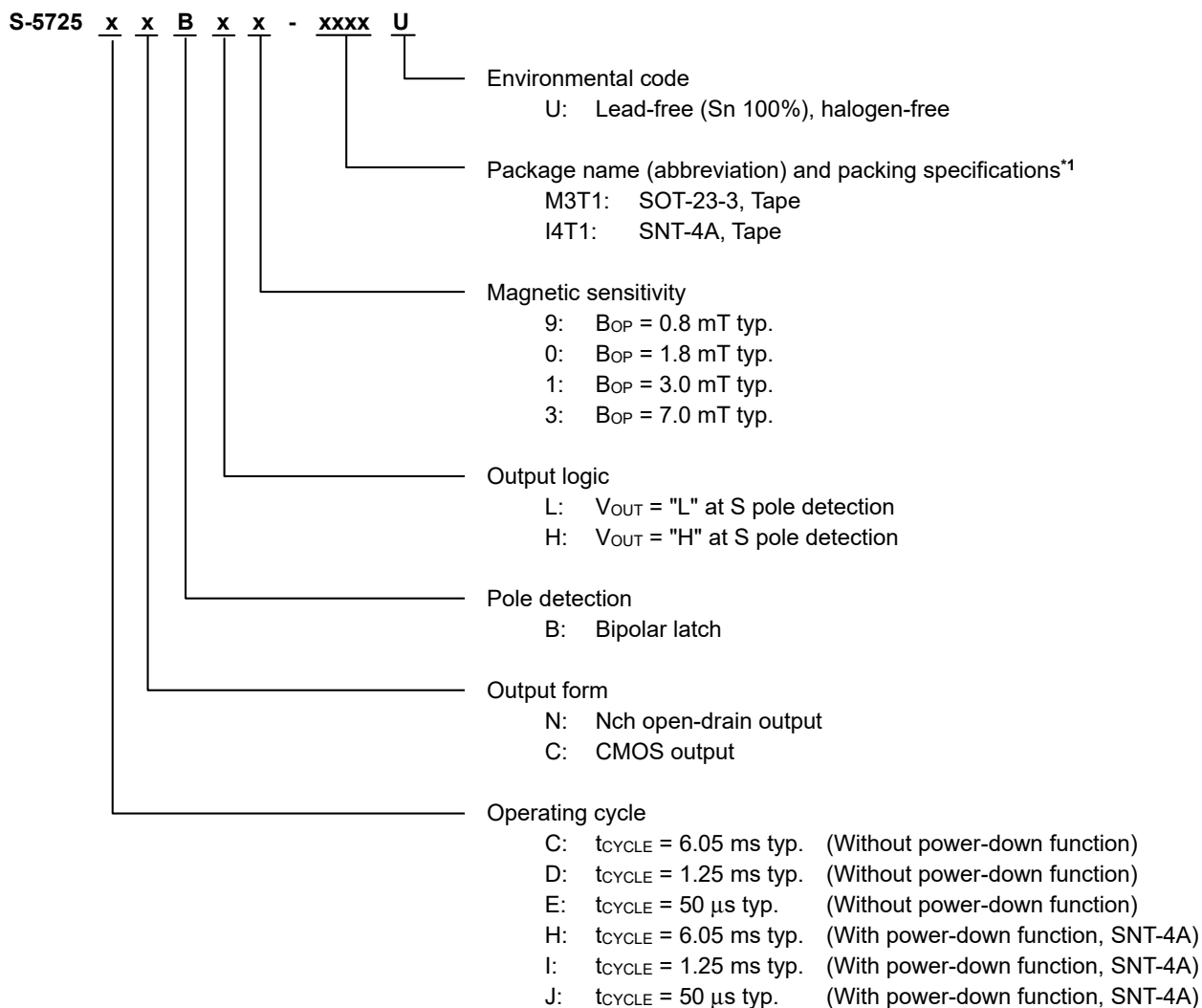


*1. Parasitic diode

Figure 4

Product Name Structure

1. Product name



*1. Refer to the tape drawing.

2. Packages

Table 1 Package Drawing Codes

Package Name	Dimension	Tape	Reel	Land
SOT-23-3	MP003-C-P-SD	MP003-C-C-SD	MP003-Z-R-SD	—
SNT-4A	PF004-A-P-SD	PF004-A-C-SD	PF004-A-R-SD	PF004-A-L-SD

3. Product name list

3.1 SOT-23-3

3.1.1 Nch open-drain output product

Table 2

Product Name	Operating Cycle (t_{CYCLE})	Power-down Function	Output Form	Pole Detection	Output logic	Magnetic Sensitivity (B_{OP})
S-5725CNBL9-M3T1U	6.05 ms typ.	Unavailable	Nch open-drain output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	0.8 mT typ.
S-5725CNBL0-M3T1U	6.05 ms typ.	Unavailable	Nch open-drain output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	1.8 mT typ.
S-5725CNBL1-M3T1U	6.05 ms typ.	Unavailable	Nch open-drain output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	3.0 mT typ.
S-5725DNBL1-M3T1U	1.25 ms typ.	Unavailable	Nch open-drain output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	3.0 mT typ.
S-5725ENBL9-M3T1U	50 μ s typ.	Unavailable	Nch open-drain output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	0.8 mT typ.
S-5725ENBL0-M3T1U	50 μ s typ.	Unavailable	Nch open-drain output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	1.8 mT typ.
S-5725ENBL1-M3T1U	50 μ s typ.	Unavailable	Nch open-drain output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	3.0 mT typ.
S-5725ENBH1-M3T1U	50 μ s typ.	Unavailable	Nch open-drain output	Bipolar latch	$V_{OUT} = "H"$ at S pole detection	3.0 mT typ.

Remark Please contact our sales representatives for products other than the above.

3.1.2 CMOS output product

Table 3

Product Name	Operating Cycle (t_{CYCLE})	Power-down Function	Output Form	Pole Detection	Output logic	Magnetic Sensitivity (B_{OP})
S-5725CCBL9-M3T1U	6.05 ms typ.	Unavailable	CMOS output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	0.8 mT typ.
S-5725CCBL0-M3T1U	6.05 ms typ.	Unavailable	CMOS output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	1.8 mT typ.
S-5725CCBL1-M3T1U	6.05 ms typ.	Unavailable	CMOS output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	3.0 mT typ.
S-5725DCBL1-M3T1U	1.25 ms typ.	Unavailable	CMOS output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	3.0 mT typ.
S-5725ECBL9-M3T1U	50 μ s typ.	Unavailable	CMOS output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	0.8 mT typ.
S-5725ECBL0-M3T1U	50 μ s typ.	Unavailable	CMOS output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	1.8 mT typ.
S-5725ECBL1-M3T1U	50 μ s typ.	Unavailable	CMOS output	Bipolar latch	$V_{OUT} = "L"$ at S pole detection	3.0 mT typ.
S-5725ECBH0-M3T1U	50 μ s typ.	Unavailable	CMOS output	Bipolar latch	$V_{OUT} = "H"$ at S pole detection	1.8 mT typ.
S-5725ECBH1-M3T1U	50 μ s typ.	Unavailable	CMOS output	Bipolar latch	$V_{OUT} = "H"$ at S pole detection	3.0 mT typ.

Remark Please contact our sales representatives for products other than the above.

3.2 SNT-4A

3.2.1 Nch open-drain output product

Table 4

Product Name	Operating Cycle (t_{CYCLE})	Power-down Function	Output Form	Pole Detection	Output logic	Magnetic Sensitivity (B_{OP})
S-5725ENBH3-I4T1U	50 μs typ.	Unavailable	Nch open-drain output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	7.0 mT typ.
S-5725HNBH0-I4T1U	6.05 ms typ.	Available	Nch open-drain output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	1.8 mT typ.
S-5725INBH0-I4T1U	1.25 ms typ.	Available	Nch open-drain output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	1.8 mT typ.
S-5725JNBH0-I4T1U	50 μs typ.	Available	Nch open-drain output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	1.8 mT typ.

Remark Please contact our sales representatives for products other than the above.

3.2.2 CMOS output product

Table 5

Product Name	Operating Cycle (t_{CYCLE})	Power-down Function	Output Form	Pole Detection	Output logic	Magnetic Sensitivity (B_{OP})
S-5725CCBL1-I4T1U	6.05 ms typ.	Unavailable	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"L"}$ at S pole detection	3.0 mT typ.
S-5725ECBL9-I4T1U	50 μs typ.	Unavailable	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"L"}$ at S pole detection	0.8 mT typ.
S-5725ECBL0-I4T1U	50 μs typ.	Unavailable	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"L"}$ at S pole detection	1.8 mT typ.
S-5725ECBL1-I4T1U	50 μs typ.	Unavailable	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"L"}$ at S pole detection	3.0 mT typ.
S-5725ECBH0-I4T1U	50 μs typ.	Unavailable	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	1.8 mT typ.
S-5725HCBH0-I4T1U	6.05 ms typ.	Available	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	1.8 mT typ.
S-5725HCBH1-I4T1U	6.05 ms typ.	Available	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	3.0 mT typ.
S-5725ICBH0-I4T1U	1.25 ms typ.	Available	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	1.8 mT typ.
S-5725ICBH1-I4T1U	1.25 ms typ.	Available	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	3.0 mT typ.
S-5725JCBH0-I4T1U	50 μs typ.	Available	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	1.8 mT typ.
S-5725JCBH1-I4T1U	50 μs typ.	Available	CMOS output	Bipolar latch	$V_{\text{OUT}} = \text{"H"}$ at S pole detection	3.0 mT typ.

Remark Please contact our sales representatives for products other than the above.

■ Pin Configurations

1. SOT-23-3

Top view

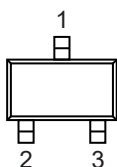


Figure 5

Table 6

Pin No.	Symbol	Pin Description
1	VSS	GND pin
2	VDD	Power supply pin
3	OUT	Output pin

2. SNT-4A

Top view

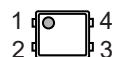


Figure 6

Table 7

Pin No.	Symbol	Description
1	VDD	Power supply pin
2	VSS	GND pin
3	CE	Enabling pin "H": Enables operation "L": Power-down
4	OUT	Output pin

■ Absolute Maximum Ratings

Table 8

(Ta = +25°C unless otherwise specified)

Item		Symbol	Absolute Maximum Rating	Unit
Power supply voltage		V _{DD}	V _{SS} – 0.3 to V _{SS} + 7.0	V
Input voltage		V _{CE}	V _{SS} – 0.3 to V _{DD} + 0.3	V
Output current		I _{OUT}	±2.0	mA
Output voltage	Nch open-drain output product	V _{OUT}	V _{SS} – 0.3 to V _{SS} + 7.0	V
	CMOS output product		V _{SS} – 0.3 to V _{DD} + 0.3	V
Operation ambient temperature		T _{opr}	–40 to +85	°C
Storage temperature		T _{stg}	–40 to +125	°C

Caution The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

■ Thermal Resistance Value

Table 9

Item	Symbol	Condition		Min.	Typ.	Max.	Unit
Junction-to-ambient thermal resistance*1	θ_{JA}	SOT-23-3	Board A	—	200	—	°C/W
			Board B	—	165	—	°C/W
			Board C	—	—	—	°C/W
			Board D	—	—	—	°C/W
			Board E	—	—	—	°C/W
		SNT-4A	Board A	—	300	—	°C/W
			Board B	—	242	—	°C/W
			Board C	—	—	—	°C/W
			Board D	—	—	—	°C/W
			Board E	—	—	—	°C/W

*1. Test environment: compliance with JEDEC STANDARD JESD51-2A

Remark Refer to "■ Power Dissipation" and "Test Board" for details.

■ Electrical Characteristics

1. Product without power-down function

1.1 S-5725CxBxx

Table 10

(Ta = +25°C, V_{DD} = 5.0 V, V_{SS} = 0 V unless otherwise specified)

Item	Symbol	Condition		Min.	Typ.	Max.	Unit	Test Circuit
Power supply voltage	V _{DD}	—		2.7	5.0	5.5	V	—
Current consumption	I _{DD}	Average value		—	13.0	20.0	μA	1
Output voltage	V _{OUT}	Nch open-drain output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
		CMOS output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
			Output transistor Pch, I _{OUT} = -2 mA	V _{DD} - 0.4	—	—	V	3
Leakage current	I _{LEAK}	Nch open-drain output product Output transistor Nch, V _{OUT} = 5.5 V		—	—	1	μA	4
Awake mode time	t _{AW}	—		—	0.05	—	ms	—
Sleep mode time	t _{SL}	—		—	6.00	—	ms	—
Operating cycle	t _{CYCLE}	t _{AW} + t _{SL}		—	6.05	12.00	ms	—

1.2 S-5725DxBxx

Table 11

(Ta = +25°C, V_{DD} = 5.0 V, V_{SS} = 0 V unless otherwise specified)

Item	Symbol	Condition		Min.	Typ.	Max.	Unit	Test Circuit
Power supply voltage	V _{DD}	—		2.7	5.0	5.5	V	—
Current consumption	I _{DD}	Average value		—	60.0	90.0	μA	1
Output voltage	V _{OUT}	Nch open-drain output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
		CMOS output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
			Output transistor Pch, I _{OUT} = -2 mA	V _{DD} - 0.4	—	—	V	3
Leakage current	I _{LEAK}	Nch open-drain output product Output transistor Nch, V _{OUT} = 5.5 V		—	—	1	μA	4
Awake mode time	t _{AW}	—		—	0.05	—	ms	—
Sleep mode time	t _{SL}	—		—	1.20	—	ms	—
Operating cycle	t _{CYCLE}	t _{AW} + t _{SL}		—	1.25	2.50	ms	—

1.3 S-5725ExBxx

Table 12

(Ta = +25°C, V_{DD} = 5.0 V, V_{SS} = 0 V unless otherwise specified)

Item	Symbol	Condition		Min.	Typ.	Max.	Unit	Test Circuit
Power supply voltage	V _{DD}	—		2.7	5.0	5.5	V	—
Current consumption	I _{DD}	Average value		—	1400.0	2000.0	μA	1
Output voltage	V _{OUT}	Nch open-drain output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
		CMOS output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
			Output transistor Pch, I _{OUT} = -2 mA	V _{DD} - 0.4	—	—	V	3
Leakage current	I _{LEAK}	Nch open-drain output product Output transistor Nch, V _{OUT} = 5.5 V		—	—	1	μA	4
Awake mode time	t _{AW}	—		—	50	—	μs	—
Sleep mode time	t _{SL}	—		—	0	—	μs	—
Operating cycle	t _{CYCLE}	t _{AW} + t _{SL}		—	50	100	μs	—

2. Product with power-down function (SNT-4A)

2.1 S-5725HxBxx

Table 13

(Ta = +25°C, V_{DD} = 5.0 V, V_{SS} = 0 V unless otherwise specified)

Item	Symbol	Condition		Min.	Typ.	Max.	Unit	Test Circuit
Power supply voltage	V _{DD}	—		2.7	5.0	5.5	V	—
Current consumption	I _{DD}	Average value		—	13.0	20.0	μA	1
Current consumption during power-down	I _{DD2}	V _{CE} = V _{SS}		—	—	1	μA	6
Output voltage	V _{OUT}	Nch open-drain output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
		CMOS output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
			Output transistor Pch, I _{OUT} = -2 mA	V _{DD} - 0.4	—	—	V	3
Leakage current	I _{LEAK}	Nch open-drain output product Output transistor Nch, V _{OUT} = 5.5 V		—	—	1	μA	4
Awake mode time	t _{AW}	—		—	0.05	—	ms	—
Sleep mode time	t _{SL}	—		—	6.00	—	ms	—
Operating cycle	t _{CYCLE}	t _{AW} + t _{SL}		—	6.05	12.00	ms	—
Enabling pin input voltage "L"	V _{CEL}	—		—	—	V _{DD} × 0.3	V	—
Enabling pin input voltage "H"	V _{CEH}	—		V _{DD} × 0.7	—	—	V	—
Enabling pin input current "L"	I _{CEL}	V _{DD} = 5.0 V, V _{CE} = 0 V		-1	—	1	μA	7
Enabling pin input current "H"	I _{CEH}	V _{DD} = 5.0 V, V _{CE} = 5.0 V		-1	—	1	μA	8
Power-down transition time	t _{OFF}	—		—	—	100	μs	—
Enable transition time	t _{ON}	—		—	—	100	μs	—
Output logic update time after inputting "H" to enabling pin	t _{OE}	—		—	—	200	μs	—

2.2 S-5725IxBxx

Table 14

(Ta = +25°C, V_{DD} = 5.0 V, V_{SS} = 0 V unless otherwise specified)

Item	Symbol	Condition		Min.	Typ.	Max.	Unit	Test Circuit
Power supply voltage	V _{DD}	—		2.7	5.0	5.5	V	—
Current consumption	I _{DD}	Average value		—	60.0	90.0	μA	1
Current consumption during power-down	I _{DD2}	V _{CE} = V _{SS}		—	—	1	μA	6
Output voltage	V _{OUT}	Nch open-drain output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
		CMOS output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
			Output transistor Pch, I _{OUT} = −2 mA	V _{DD} − 0.4	—	—	V	3
Leakage current	I _{LEAK}	Nch open-drain output product Output transistor Nch, V _{OUT} = 5.5 V		—	—	1	μA	4
Awake mode time	t _{AW}	—		—	0.05	—	ms	—
Sleep mode time	t _{SL}	—		—	1.20	—	ms	—
Operating cycle	t _{CYCLE}	t _{AW} + t _{SL}		—	1.25	2.50	ms	—
Enabling pin input voltage "L"	V _{CEL}	—		—	—	V _{DD} × 0.3	V	—
Enabling pin input voltage "H"	V _{CEH}	—		V _{DD} × 0.7	—	—	V	—
Enabling pin input current "L"	I _{CEL}	V _{DD} = 5.0 V, V _{CE} = 0 V		−1	—	1	μA	7
Enabling pin input current "H"	I _{CEH}	V _{DD} = 5.0 V, V _{CE} = 5.0 V		−1	—	1	μA	8
Power-down transition time	t _{OFF}	—		—	—	100	μs	—
Enable transition time	t _{ON}	—		—	—	100	μs	—
Output logic update time after inputting "H" to enabling pin	t _{OE}	—		—	—	200	μs	—

2.3 S-5725JxBxx

Table 15

(Ta = +25°C, V_{DD} = 5.0 V, V_{SS} = 0 V unless otherwise specified)

Item	Symbol	Condition		Min.	Typ.	Max.	Unit	Test Circuit
Power supply voltage	V _{DD}	—		2.7	5.0	5.5	V	—
Current consumption	I _{DD}	Average value		—	1400.0	2000.0	μA	1
Current consumption during power-down	I _{DD2}	V _{CE} = V _{SS}		—	—	1	μA	6
Output voltage	V _{OUT}	Nch open-drain output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
		CMOS output product	Output transistor Nch, I _{OUT} = 2 mA	—	—	0.4	V	2
			Output transistor Pch, I _{OUT} = -2 mA	V _{DD} - 0.4	—	—	V	3
Leakage current	I _{LEAK}	Nch open-drain output product Output transistor Nch, V _{OUT} = 5.5 V		—	—	1	μA	4
Awake mode time	t _{AW}	—		—	50	—	μs	—
Sleep mode time	t _{SL}	—		—	0	—	μs	—
Operating cycle	t _{CYCLE}	t _{AW} + t _{SL}		—	50	100	μs	—
Enabling pin input voltage "L"	V _{CEL}	—		—	—	V _{DD} × 0.3	V	—
Enabling pin input voltage "H"	V _{CEH}	—		V _{DD} × 0.7	—	—	V	—
Enabling pin input current "L"	I _{CEL}	V _{DD} = 5.0 V, V _{CE} = 0 V		-1	—	1	μA	7
Enabling pin input current "H"	I _{CEH}	V _{DD} = 5.0 V, V _{CE} = 5.0 V		-1	—	1	μA	8
Power-down transition time	t _{OFF}	—		—	—	100	μs	—
Enable transition time	t _{ON}	—		—	—	100	μs	—
Output logic update time after inputting "H" to enabling pin	t _{OE}	—		—	—	200	μs	—

■ Magnetic Characteristics

1. Product with $B_{OP} = 0.8 \text{ mT typ.}$

Table 16

($T_a = +25^\circ\text{C}$, $V_{DD} = 5.0 \text{ V}$, $V_{SS} = 0 \text{ V}$ unless otherwise specified)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Test Circuit
Operation point*1	S pole	B_{OP}	–	0.1	0.8	1.5	mT
Release point*2	N pole	B_{RP}	–	–1.5	–0.8	–0.1	mT
Hysteresis width*3	B_{HYS}	$B_{HYS} = B_{OP} - B_{RP}$	–	1.6	–	mT	5

2. Product with $B_{OP} = 1.8 \text{ mT typ.}$

Table 17

($T_a = +25^\circ\text{C}$, $V_{DD} = 5.0 \text{ V}$, $V_{SS} = 0 \text{ V}$ unless otherwise specified)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Test Circuit
Operation point*1	S pole	B_{OP}	–	0.9	1.8	2.7	mT
Release point*2	N pole	B_{RP}	–	–2.7	–1.8	–0.9	mT
Hysteresis width*3	B_{HYS}	$B_{HYS} = B_{OP} - B_{RP}$	–	3.6	–	mT	5

3. Product with $B_{OP} = 3.0 \text{ mT typ.}$

Table 18

($T_a = +25^\circ\text{C}$, $V_{DD} = 5.0 \text{ V}$, $V_{SS} = 0 \text{ V}$ unless otherwise specified)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Test Circuit
Operation point*1	S pole	B_{OP}	–	1.4	3.0	4.0	mT
Release point*2	N pole	B_{RP}	–	–4.0	–3.0	–1.4	mT
Hysteresis width*3	B_{HYS}	$B_{HYS} = B_{OP} - B_{RP}$	–	6.0	–	mT	5

4. Product with $B_{OP} = 7.0 \text{ mT typ.}$

Table 19

($T_a = +25^\circ\text{C}$, $V_{DD} = 5.0 \text{ V}$, $V_{SS} = 0 \text{ V}$ unless otherwise specified)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Test Circuit
Operation point*1	S pole	B_{OP}	–	5.0	7.0	8.5	mT
Release point*2	N pole	B_{RP}	–	–8.5	–7.0	–5.0	mT
Hysteresis width*3	B_{HYS}	$B_{HYS} = B_{OP} - B_{RP}$	–	14.0	–	mT	5

***1. B_{OP} : Operation point**

B_{OP} is the value of magnetic flux density when the output voltage (V_{OUT}) changes after the magnetic flux density applied to this IC by the magnet (S pole) is increased (by moving the magnet closer).

V_{OUT} retains the status until a magnetic flux density of the N pole higher than B_{RP} is applied.

***2. B_{RP} : Release point**

B_{RP} is the value of magnetic flux density when the output voltage (V_{OUT}) changes after the magnetic flux density applied to this IC by the magnet (N pole) is increased (by moving the magnet closer).

V_{OUT} retains the status until a magnetic flux density of the S pole higher than B_{OP} is applied.

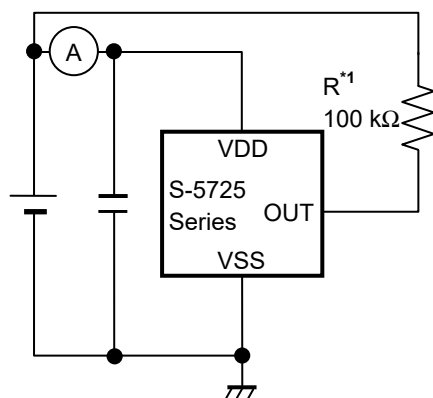
***3. B_{HYS} : Hysteresis width**

B_{HYS} is the difference between B_{OP} and B_{RP} .

Remark The unit of magnetic density mT can be converted by using the formula $1 \text{ mT} = 10 \text{ Gauss}$.

■ Test Circuits

1. Product without power-down function



*1. Resistor (R) is unnecessary for the CMOS output product.

Figure 7 Test Circuit 1

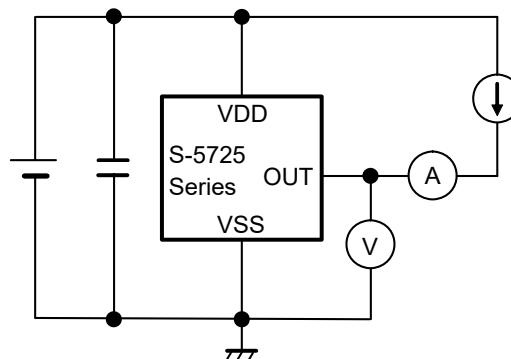


Figure 8 Test Circuit 2

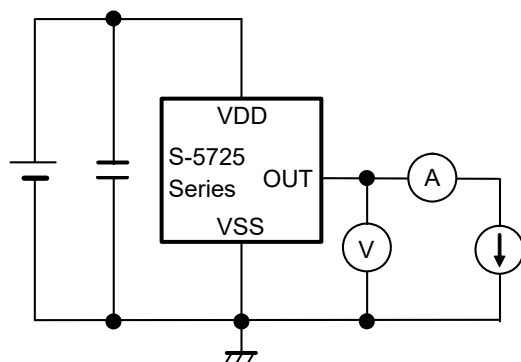


Figure 9 Test Circuit 3

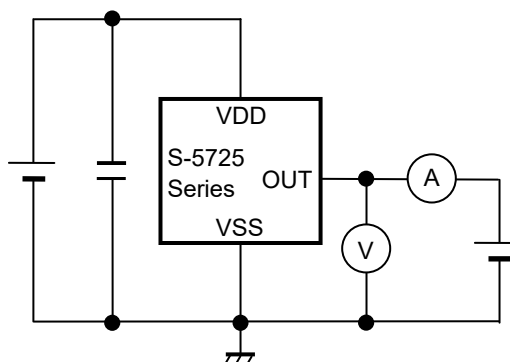
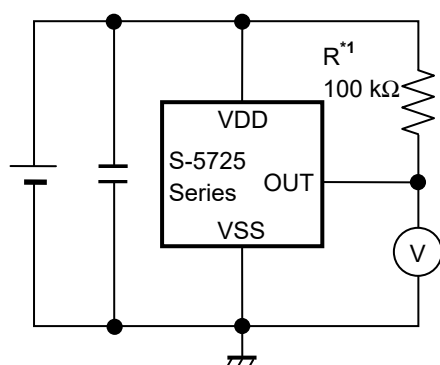


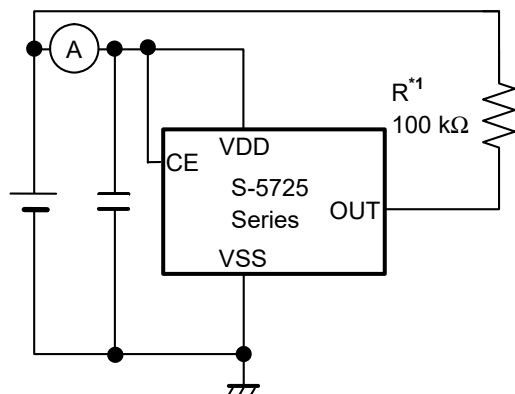
Figure 10 Test Circuit 4



*1. Resistor (R) is unnecessary for the CMOS output product.

Figure 11 Test Circuit 5

2. Product with power-down function (SNT-4A)



*1. Resistor (R) is unnecessary for the CMOS output product.

Figure 12 Test Circuit 1

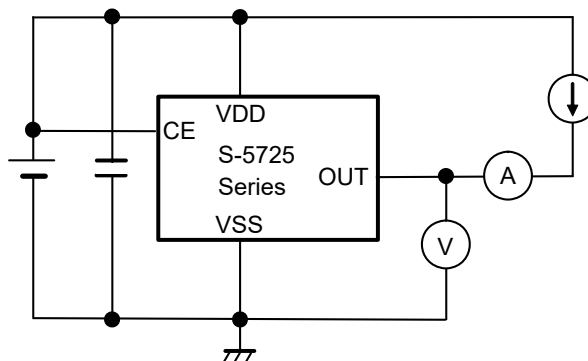


Figure 13 Test Circuit 2

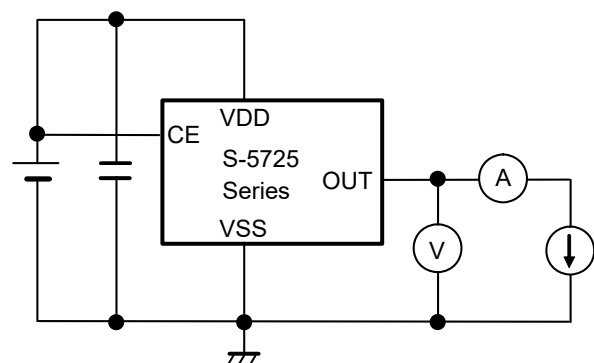


Figure 14 Test Circuit 3

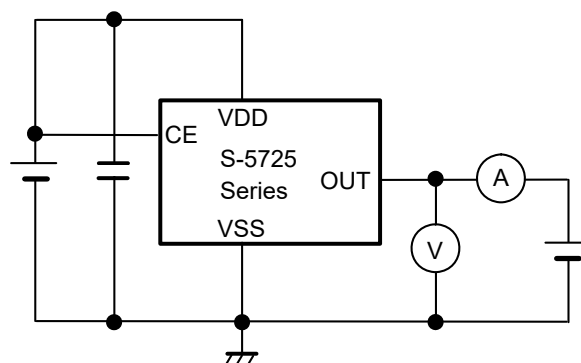
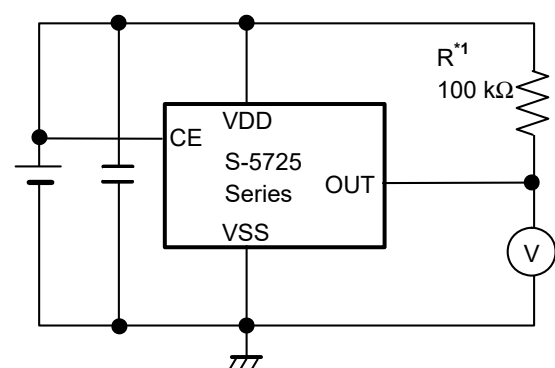
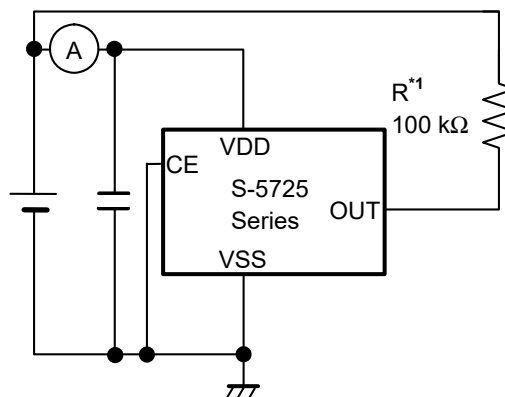


Figure 15 Test Circuit 4



*1. Resistor (R) is unnecessary for the CMOS output product.

Figure 16 Test Circuit 5



*1. Resistor (R) is unnecessary for the CMOS output product.

Figure 17 Test Circuit 6

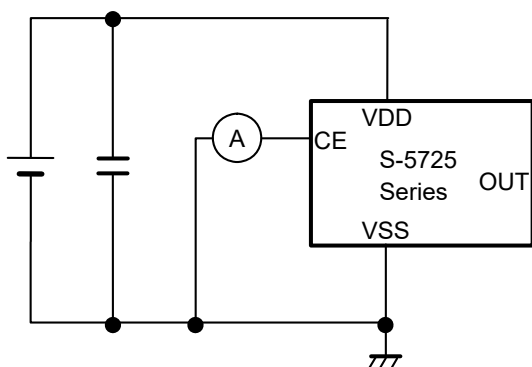


Figure 18 Test Circuit 7

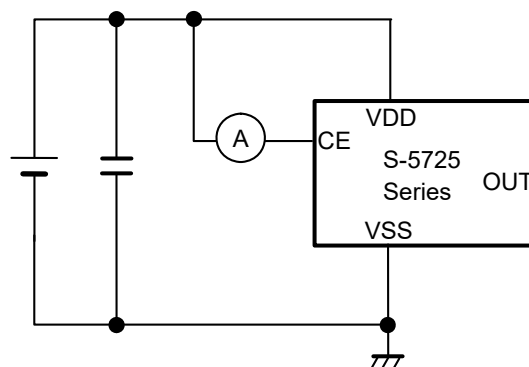
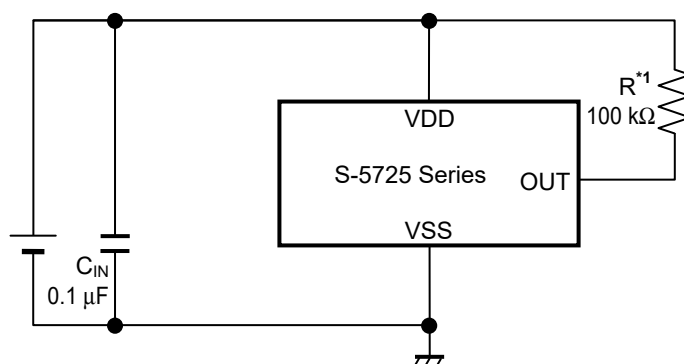


Figure 19 Test Circuit 8

■ Standard Circuits

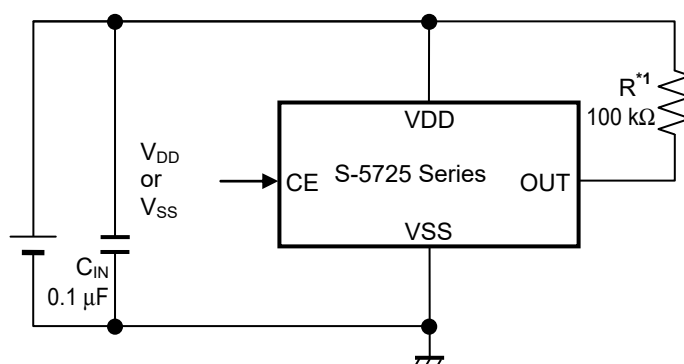
1. Product without power-down function



*1. Resistor (R) is unnecessary for the CMOS output product.

Figure 20

2. Product with power-down function (SNT-4A)



*1. Resistor (R) is unnecessary for the CMOS output product.

Figure 21

Caution The above connection diagram and constant will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constant.

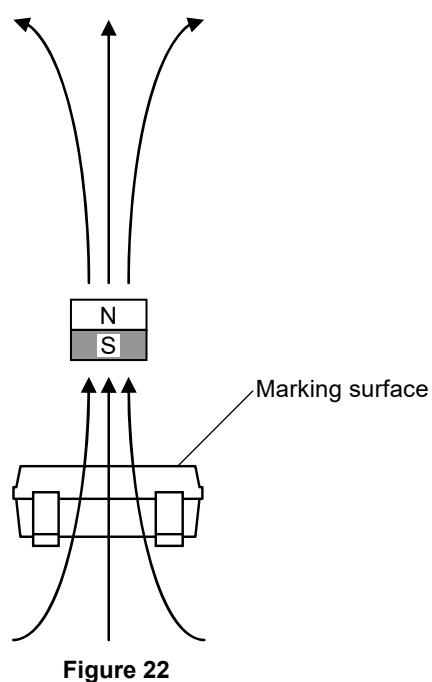
■ Operation

1. Direction of applied magnetic flux

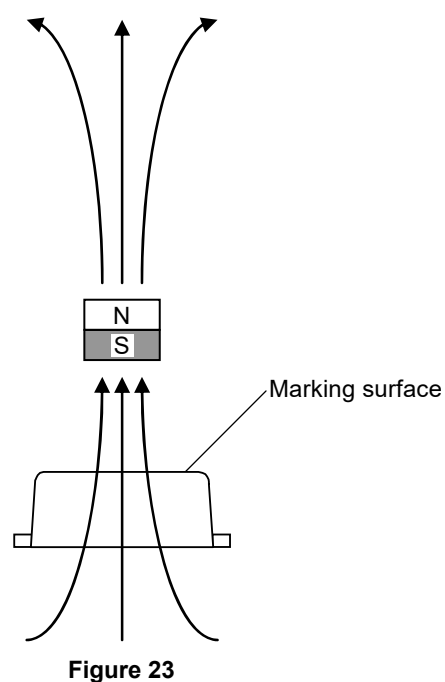
This IC detects the magnetic flux density which is vertical to the marking surface.

Figure 22 and **Figure 23** show the direction in which magnetic flux is being applied.

1.1 SOT-23-3



1.2 SNT-4A



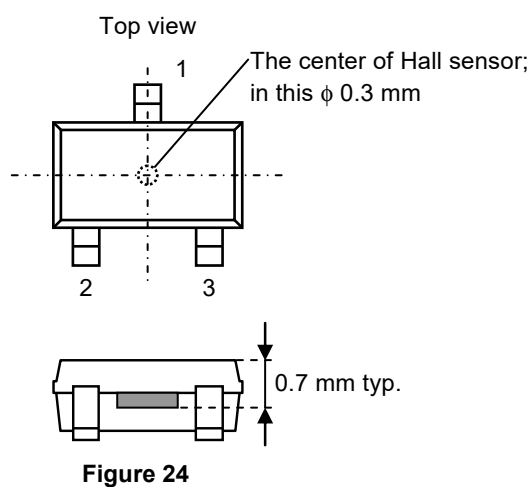
2. Position of Hall sensor

Figure 24 and **Figure 25** show the position of Hall sensor.

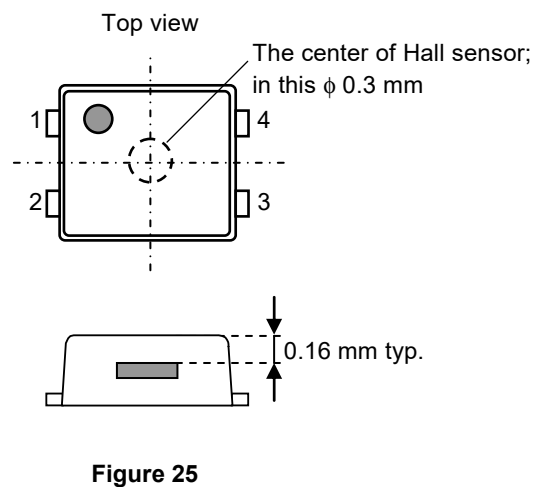
The center of this Hall sensor is located in the area indicated by a circle, which is in the center of a package as described below.

The following also shows the distance (typ. value) between the marking surface and the chip surface of a package.

2.1 SOT-23-3



2.2 SNT-4A



3. Basic operation

This IC changes the output voltage (V_{OUT}) according to the level of the magnetic flux density and a polarity change (N pole or S pole) applied by a magnet.

Definition of the magnetic field is performed every operating cycle indicated in "■ Electrical Characteristics".

3.1 Product with $V_{OUT} = "L"$ at S pole detection

When the magnetic flux density of the S pole perpendicular to the marking surface exceeds the operation point (B_{OP}) after the S pole of a magnet is moved closer to the marking surface of this IC, V_{OUT} changes from "H" to "L". When the N pole of a magnet is moved closer to the marking surface of this IC and the magnetic flux density of the N pole is higher than the release point (B_{RP}), V_{OUT} changes from "L" to "H". In case of $B_{RP} < B < B_{OP}$, V_{OUT} retains the status.

Figure 26 shows the relationship between the magnetic flux density and V_{OUT} .

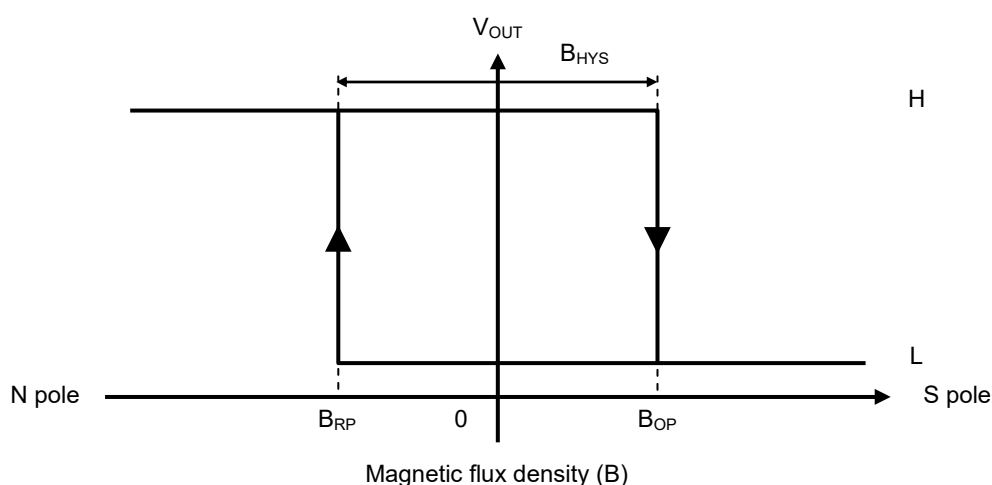


Figure 26

3.2 Product with $V_{OUT} = "H"$ at S pole detection

When the magnetic flux density of the S pole perpendicular to the marking surface exceeds B_{OP} after the S pole of a magnet is moved closer to the marking surface of this IC, V_{OUT} changes from "L" to "H". When the N pole of a magnet is moved closer to the marking surface of this IC and the magnetic flux density of the N pole is higher than B_{RP} , V_{OUT} changes from "H" to "L". In case of $B_{RP} < B < B_{OP}$, V_{OUT} retains the status.

Figure 27 shows the relationship between the magnetic flux density and V_{OUT} .

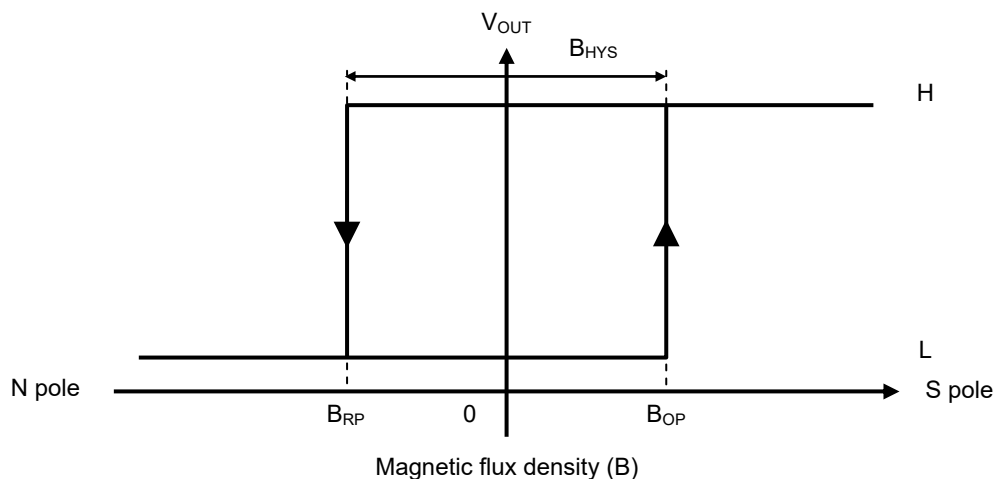


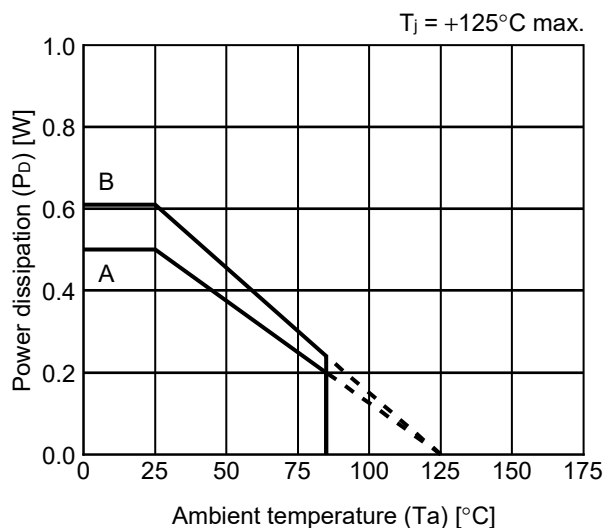
Figure 27

■ Precautions

- If the impedance of the power supply is high, the IC may malfunction due to a supply voltage drop caused by feed-through current. Take care with the pattern wiring to ensure that the impedance of the power supply is low.
- Note that the IC may malfunction if the power supply voltage rapidly changes.
- Do not apply an electrostatic discharge to this IC that exceeds the performance ratings of the built-in electrostatic protection circuit.
- Large stress on this IC may affect the magnetic characteristics. Avoid large stress which is caused by bend and distortion during mounting the IC on a board or handle after mounting.
- ABLIC Inc. claims no responsibility for any disputes arising out of or in connection with any infringement by products including this IC of patents owned by a third party.

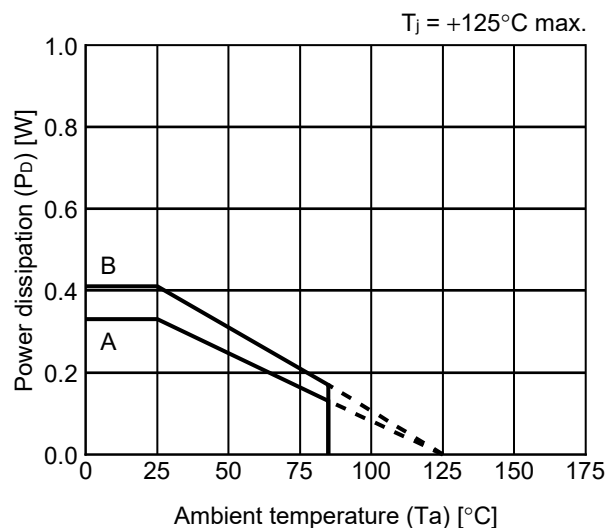
■ **Power Dissipation**

SOT-23-3



Board	Power Dissipation (P_D)
A	0.50 W
B	0.61 W
C	—
D	—
E	—

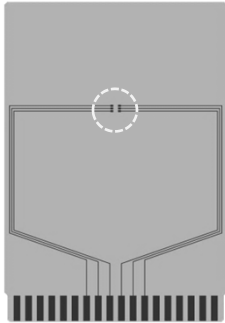
SNT-4A



Board	Power Dissipation (P_D)
A	0.33 W
B	0.41 W
C	—
D	—
E	—

SOT-23-3/3S/5/6 Test Board

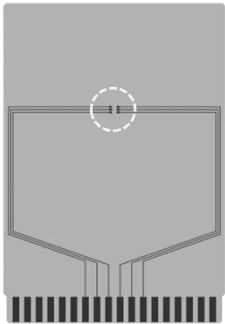
(1) Board A



 IC Mount Area

Item		Specification
Size [mm]		114.3 x 76.2 x t1.6
Material		FR-4
Number of copper foil layer		2
Copper foil layer [mm]	1	Land pattern and wiring for testing: t0.070
	2	-
	3	-
	4	74.2 x 74.2 x t0.070
Thermal via		-

(2) Board B

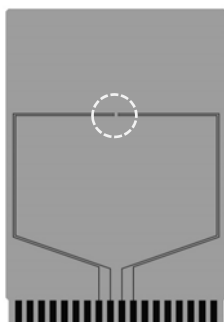


Item		Specification
Size [mm]		114.3 x 76.2 x t1.6
Material		FR-4
Number of copper foil layer		4
Copper foil layer [mm]	1	Land pattern and wiring for testing: t0.070
	2	74.2 x 74.2 x t0.035
	3	74.2 x 74.2 x t0.035
	4	74.2 x 74.2 x t0.070
Thermal via		-

No. SOT23x-A-Board-SD-2.0

SNT-4A Test Board

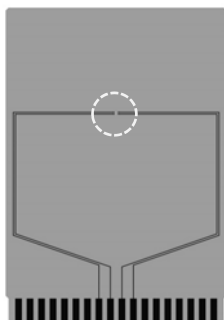
(1) Board A



 IC Mount Area

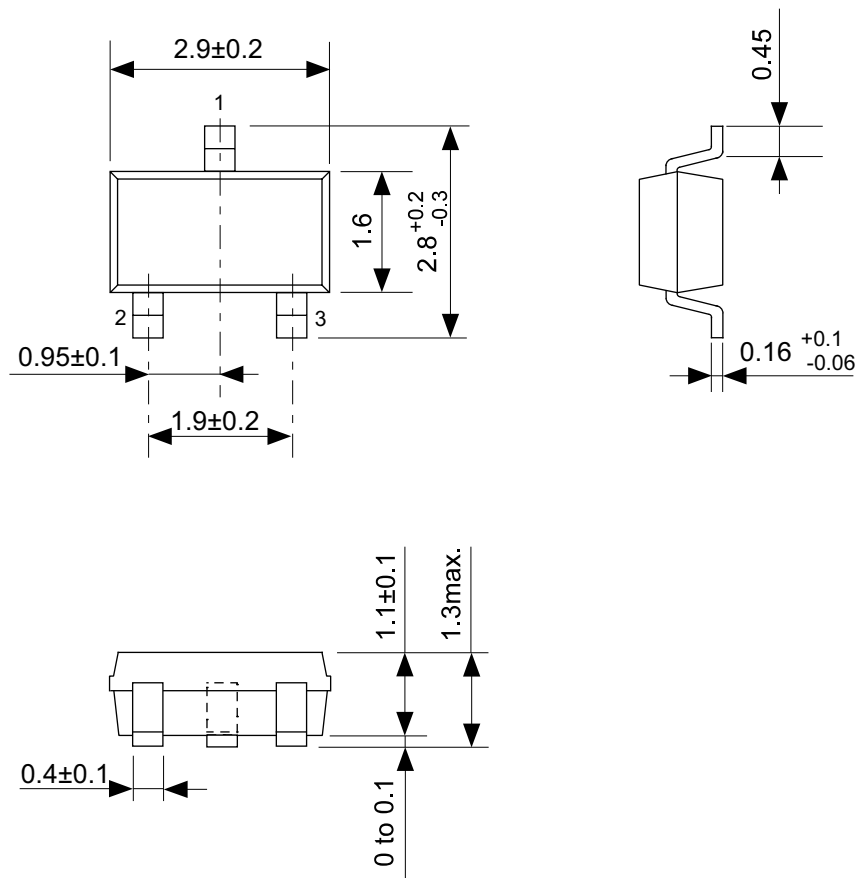
Item		Specification
Size [mm]		114.3 x 76.2 x t1.6
Material		FR-4
Number of copper foil layer		2
Copper foil layer [mm]	1	Land pattern and wiring for testing: t0.070
	2	-
	3	-
	4	74.2 x 74.2 x t0.070
Thermal via		-

(2) Board B



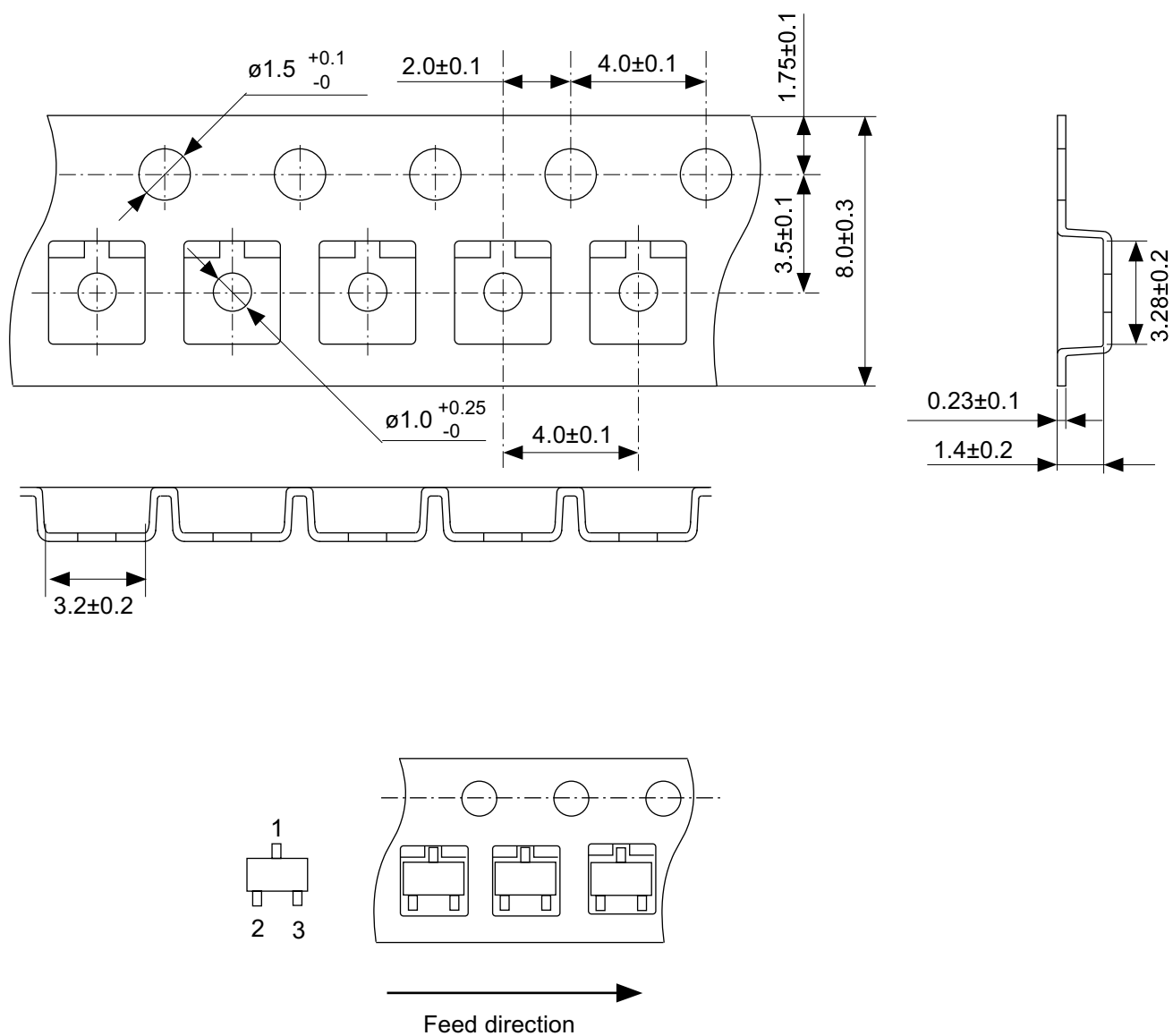
Item		Specification
Size [mm]		114.3 x 76.2 x t1.6
Material		FR-4
Number of copper foil layer		4
Copper foil layer [mm]	1	Land pattern and wiring for testing: t0.070
	2	74.2 x 74.2 x t0.035
	3	74.2 x 74.2 x t0.035
	4	74.2 x 74.2 x t0.070
Thermal via		-

No. SNT4A-A-Board-SD-1.0



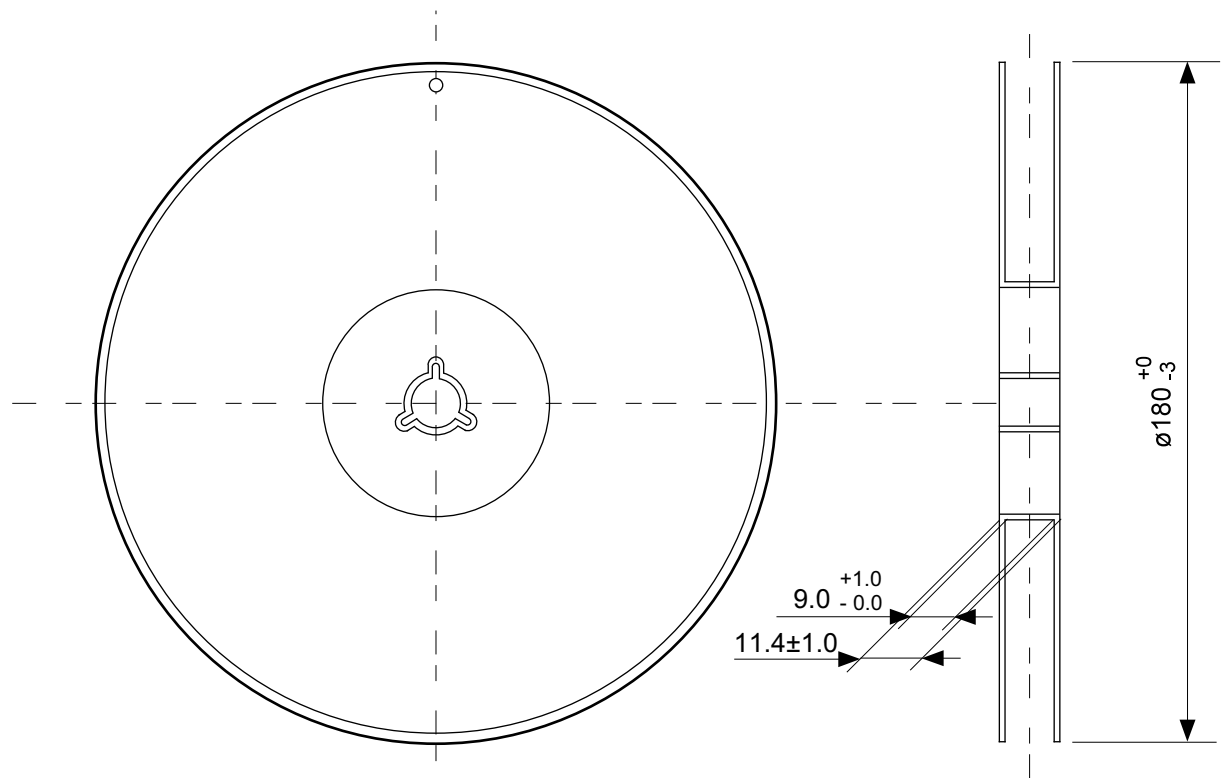
No. MP003-C-P-SD-1.1

TITLE	SOT233-C-PKG Dimensions
No.	MP003-C-P-SD-1.1
ANGLE	
UNIT	mm
ABLIC Inc.	

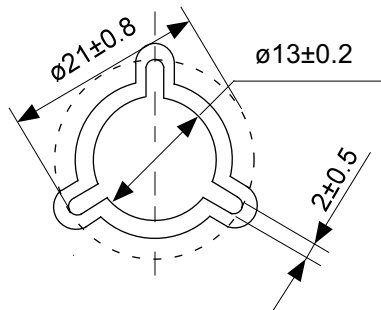


No. MP003-C-C-SD-2.0

TITLE	SOT233-C-Carrier Tape
No.	MP003-C-C-SD-2.0
ANGLE	
UNIT	mm
ABLIC Inc.	

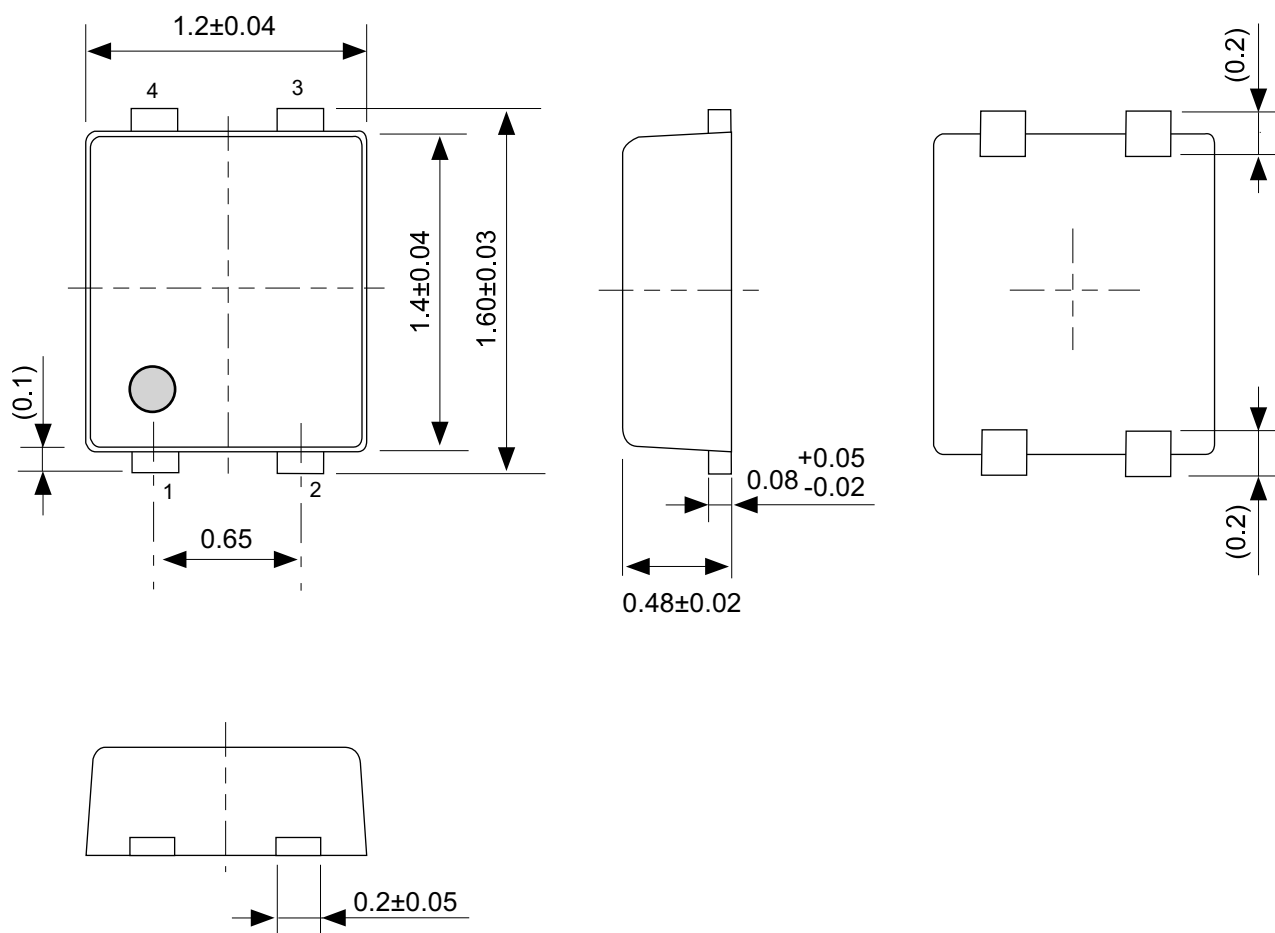


Enlarged drawing in the central part



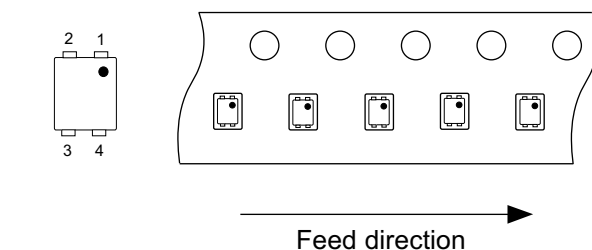
No. MP003-Z-R-SD-2.0

TITLE	SOT233-C-Reel		
No.	MP003-Z-R-SD-2.0		
ANGLE		QTY.	3,000
UNIT	mm		
ABLIC Inc.			

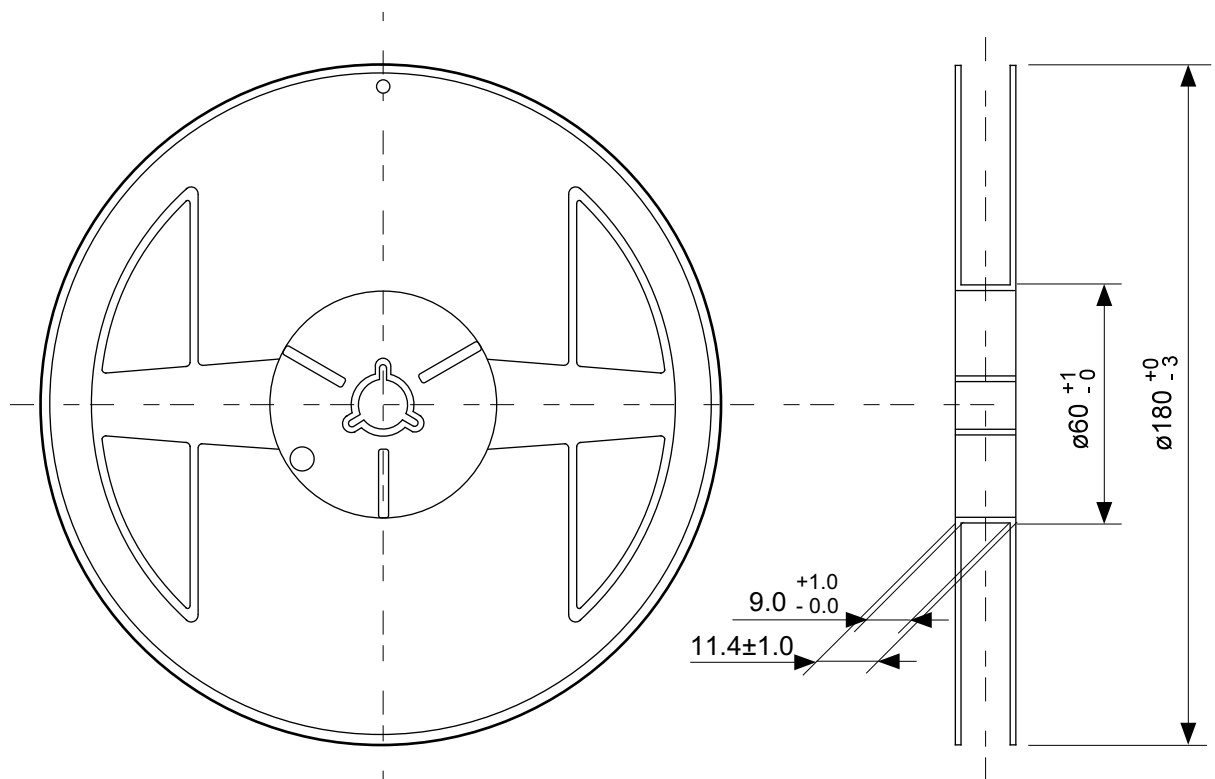


No. PF004-A-P-SD-6.0

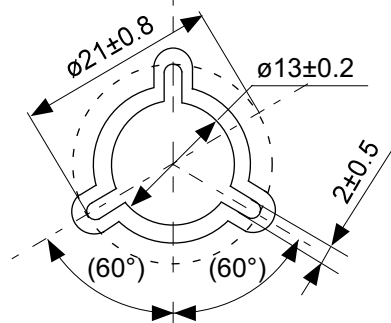
TITLE	SNT-4A-A-PKG Dimensions
No.	PF004-A-P-SD-6.0
ANGLE	
UNIT	mm
ABLIC Inc.	



TITLE	SNT-4A-A-Carrier Tape
No.	PF004-A-C-SD-2.0
ANGLE	
UNIT	mm
ABLIC Inc.	

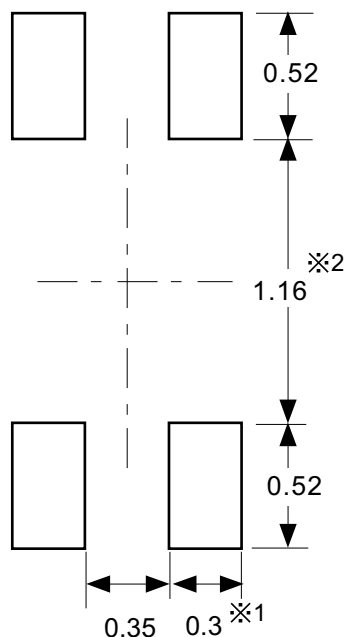


Enlarged drawing in the central part



No. PF004-A-R-SD-2.0

TITLE	SNT-4A-A-Reel		
No.	PF004-A-R-SD-2.0		
ANGLE		QTY.	5,000
UNIT	mm		
ABLIC Inc.			



※1. ランドパターンの幅に注意してください (0.25 mm min. / 0.30 mm typ.).

※2. パッケージ中央にランドパターンを広げないでください (1.10 mm ~ 1.20 mm)。

- 注意
1. パッケージのモールド樹脂下にシルク印刷やハンダ印刷などしないでください。
 2. パッケージ下の配線上のソルダーレジストなどの厚みをランドパターン表面から0.03 mm以下にしてください。
 3. マスク開口サイズと開口位置はランドパターンと合わせてください。
 4. 詳細は“SNTパッケージ活用の手引き”を参照してください。

※1. Pay attention to the land pattern width (0.25 mm min. / 0.30 mm typ.).

※2. Do not widen the land pattern to the center of the package (1.10 mm to 1.20 mm).

Caution 1. Do not do silkscreen printing and solder printing under the mold resin of the package.

2. The thickness of the solder resist on the wire pattern under the package should be 0.03 mm or less from the land pattern surface.

3. Match the mask aperture size and aperture position with the land pattern.

4. Refer to "SNT Package User's Guide" for details.

※1. 请注意焊盘模式的宽度 (0.25 mm min. / 0.30 mm typ.).

※2. 请勿向封装中间扩展焊盘模式 (1.10 mm ~ 1.20 mm)。

注意 1. 请勿在树脂型封装的下面印刷丝网、焊锡。

2. 在封装下、布线上的阻焊膜厚度 (从焊盘模式表面起) 请控制在 0.03 mm 以下。

3. 钢网的开口尺寸和开口位置请与焊盘模式对齐。

4. 详细内容请参阅 "SNT 封装的应用指南"。

No. PF004-A-L-SD-4.1

TITLE	SNT-4A-A -Land Recommendation
No.	PF004-A-L-SD-4.1
ANGLE	
UNIT	mm
ABLIC Inc.	

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2.4-2019.07