VCS2381/VCS2382/VCS2383 AMR Low Power 360 Degree Omni-Polar Switch Sensor

GENERAL DESCRIPTION

The VCS2381, VCS2382 and VCS2383 are ultra-low power magnetic switch sensors. These devices integrate Anisotropic Magneto-Resistive (AMR) sensor and CMOS signal conditioning circuitry in a small package. CMOS signal conditioning circuitry provides precise control of the Bop/Brp offset voltage compensation circuit and push-pull output within industrial operating temperature range (-40℃ to +125℃), and also provides a wide voltage operating range (2.0V to 5.5V) with low power consumption of Nanoampere level. The low power switches are designed for use in handheld devices or battery powered applications. The two-dimensional magnetic switches can detect the magnetic field of 360 degrees in any direction in the chip plane. Without the magnet being installed in a specific direction, these devices can greatly simplify the installation requirements and improve the system redundancy. Taking advantage of the high sensitivity of AMR, these switches combine low power consumption, small size, and excellent temperature characteristics, making them the first choice for low power, high-performance applications.

The VCS2381, VCS2382 and VCS2383 are available in a Green SOT-23-3 package.

FEATURES

- **Wide Voltage Range: 2.0V to 5.5V**
- **Anisotropic Magneto-Resistive (AMR) Technology**
- **Two-Dimensional 360 Degree Magnetic Field Induction**
- **Omni-Polar Switch**
- **Ultra-Low Power Consumption (0.2μA)**
- **Sampling Frequency (15Hz)**
- **High Sensitivity, Multiple Switching Options:**
  - **VCS2381: Bop = ±7Gs, Brp = ±5Gs**
  - **VCS2382: Bop = ±15Gs, Brp = ±12Gs**
  - **VCS2383: Bop = ±10Gs, Brp = ±8Gs**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green SOT-23-3 Package**

APPLICATIONS

Fire Doors, Electronic Seals

Smart Door Locks

Smart Meters

Non-Contact Switch: Smoke Detectors, Electronic Price Tags, etc.

TYPICAL APPLICATION

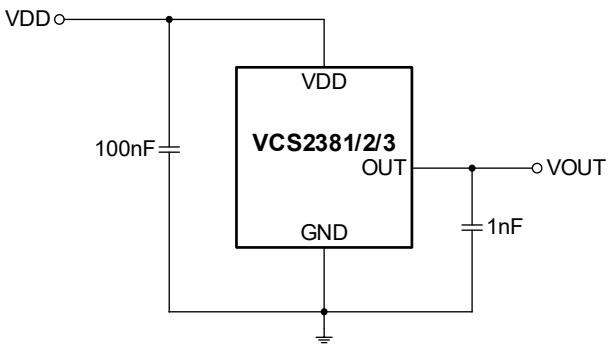


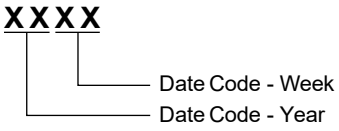
Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
VCS2381	SOT-23-3	-40℃ to +125℃	VCS2381S	2381S XXXX	Tape and Reel, 3000
VCS2382	SOT-23-3	-40℃ to +125℃	VCS2382S	2382S XXXX	Tape and Reel, 3000
VCS2383	SOT-23-3	-40℃ to +125℃	VCS2383S	2383S XXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXX = Date Code.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{DD} 6V
Reverse Supply Voltage, V_{RDD} 0.3V
Output Current, $I_{OUTSINK}$ 20mA
Junction Temperature ..... +150℃
Storage Temperature Range ..... -50℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility (1) (2)
HBM ..... ±4000V
CDM ..... ±2000V

NOTES:

1. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.

2. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range ..... -40℃ to +125℃

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

ESD SENSITIVITY CAUTION

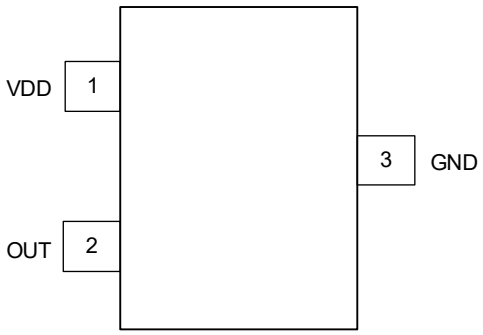
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION

(TOP VIEW)



SOT-23-3

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	VDD	Supply.
2	OUT	Output.
3	GND	Ground.

ELECTRICAL CHARACTERISTICS

(V_{DD} = 2.0V to 5.5V, T_A = -40℃ to +125℃, typical values are measured at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Specifications						
Supply Voltage	V_{DD}		2	3.3	5.5	V
Average Current	I_W	V_{DD} = 3.3V		0.2	0.7	μA
Operating Frequency	f_W	V_{DD} = 2.0V to 5.5V		15		Hz
High-Level Output Voltage	V_{OH}	Load current = 10mA, V_{DD} = 3.3V	V_{DD} - 0.2		V_{DD}	V
Low-Level Output Voltage	V_{OL}	Load current = 10mA, V_{DD} = 3.3V	0		0.1	V
Setup Time	t_{PO}			3.5		ms
Sleep Time	t_{SLP}			66.7		ms
VCS2381 Magnetic Properties (T_A = +25℃, V_{DD} = 2.0V to 5.5V)						
Operating Point	Bop		±3	±7	±22	Gs
Release Point	Brp		±1	±5	±18	Gs
Hysteresis	Bhys		1	2	10	Gs
VCS2382 Magnetic Properties (T_A = +25℃, V_{DD} = 2.0V to 5.5V)						
Operating Point	Bop		±5	±15	±35	Gs
Release Point	Brp		±2	±12	±25	Gs
Hysteresis	Bhys		1	3	12	Gs
VCS2383 Magnetic Properties (T_A = +25℃, V_{DD} = 2.0V to 5.5V)						
Operating Point	Bop		±3	±10	±22	Gs
Release Point	Brp		±1	±8	±18	Gs
Hysteresis	Bhys		1	2	10	Gs

FUNCTIONAL BLOCK DIAGRAM

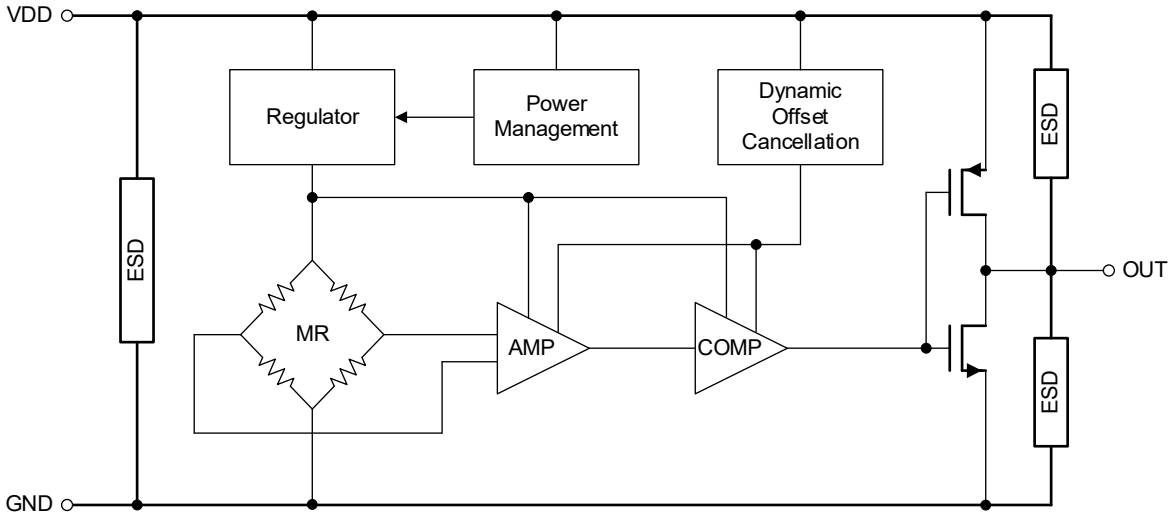


Figure 2. Circuit Block Diagram

DETAILED DESCRIPTION

Sensing Direction

The VCS2381, VCS2382 and VCS2383 are two-dimensional magnetic field sensing switches, which can sense 360 degrees of magnetic field in any direction in the chip plane.

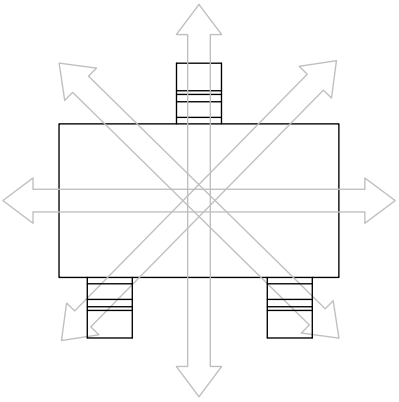


Figure 3. Sensing Direction

Switch Characteristics

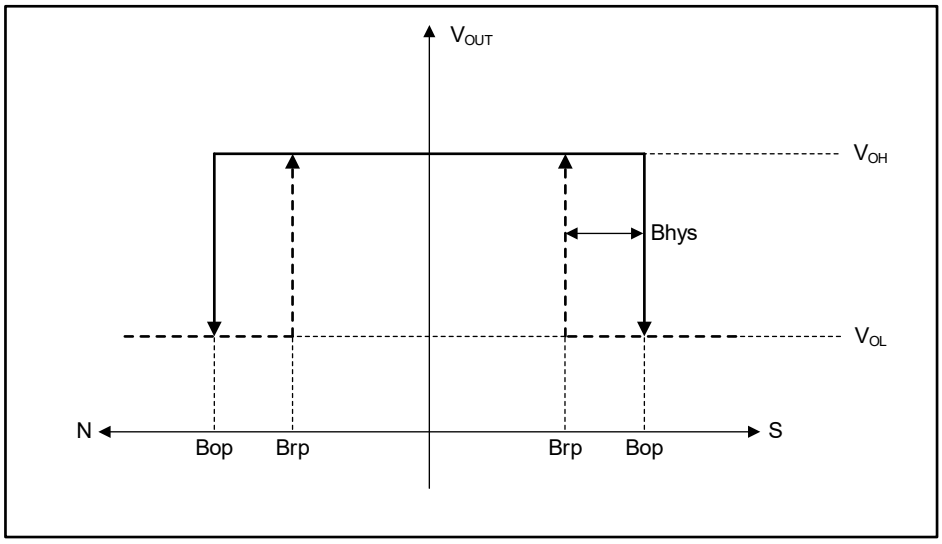


Figure 4. Switch Characteristics

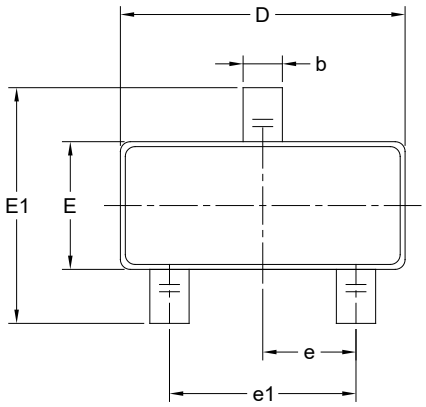
REVISION HISTORY

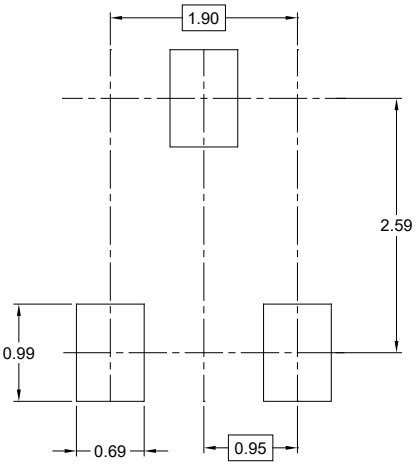
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original to REV.A (SEPTEMBER 2025)	Page
Changed from product preview to production data	All

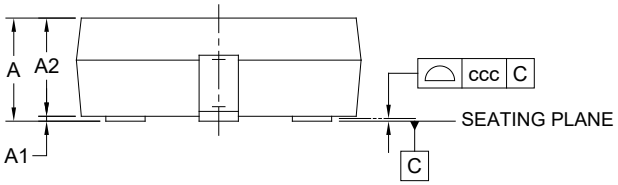
PACKAGE OUTLINE DIMENSIONS

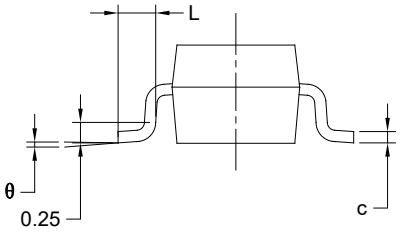
SOT-23-3





RECOMMENDED LAND PATTERN (Unit: mm)



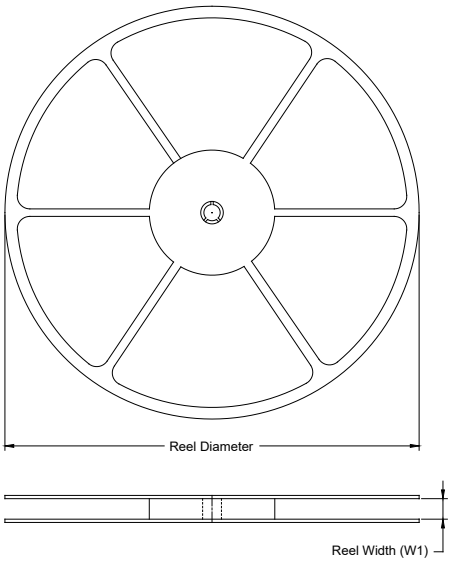


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.450
A1	0.000	-	0.150
A2	0.900	-	1.300
b	0.300	-	0.500
c	0.080	-	0.220
D	2.750	-	3.050
E	1.450	-	1.750
E1	2.600	-	3.000
e	0.950 BSC		
e1	1.900 BSC		
L	0.300	-	0.600
θ	0°	-	8°
ccc	0.100		

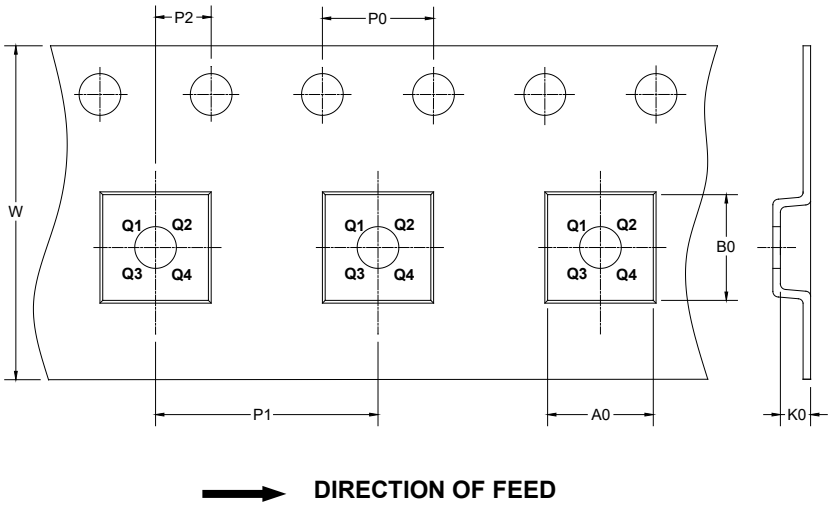
NOTES:
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-178.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



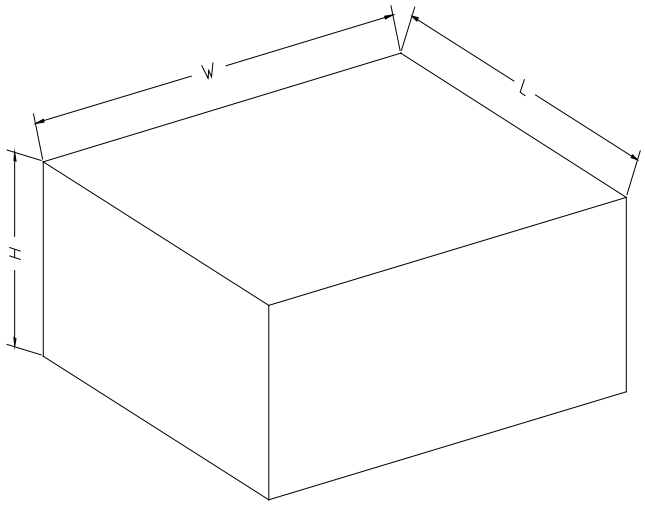
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT-23-3	7"	9.5	3.18	3.28	1.32	4.0	4.0	2.0	8.0	Q3

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002