TMAG5115 High-Speed, Low Jitter, Hall-Effect Latch

1 Features

- High-speed digital bipolar-latch Hall sensor
  - Low propagation delay: 5 µs
  - Low jitter: 5 µs
  - Bandwidth (BW): 60-kHz
- Supports a wide voltage range:
  - 2.5 V to 26 V
  - No external regulator required
- Fast power-on time: 62.5 µs
- High precision thresholds:
  - ±3 mT with ±1 mT maximum variation
  - ±1 mT with ±0.7 mT maximum variation
- Protection features:
  - Output short-circuit protection
  - Output current limitation
  - Overtemperature protection
- Open-drain output (15-mA sink)
- Wide operating temperature range:
  - –40°C to 125°C
- Small package and footprint:
  - Surface mount 3-pin SOT-23
    - 2.92 mm × 1.30 mm

2 Applications

- Cordless power tools
- Vacuum robot
- Computer fan
- Valve and solenoid status
- Industrial brushless DC motors

3 Description

The TMAG5115 device is a high performance Hall-effect latch sensor with fast propagation delay and low jitter. The device also has high sensitivity stability over temperature and offers integrated protection features designed for applications that require high RPM. The combination of low jitter and low propagation delay can help increase power efficiency and reduce parasitic system-level noise.

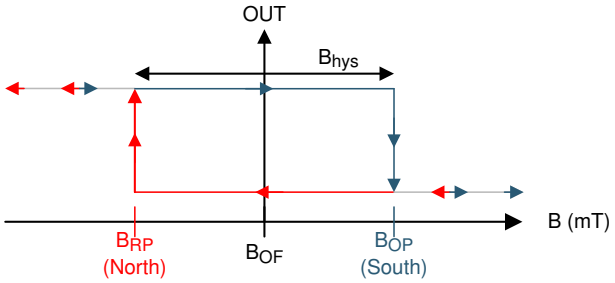
The device has an open-drain output stage with 15-mA current sink capability. The TMAG5115 wide operating voltage range of 2.5 V to 26 V is designed for a wide range of industrial and commercial applications. Internal protection functions are provided for output short-circuit, overcurrent, and overtemperature conditions.

The TMAG5115 is available in the industry standard SOT-23 package.

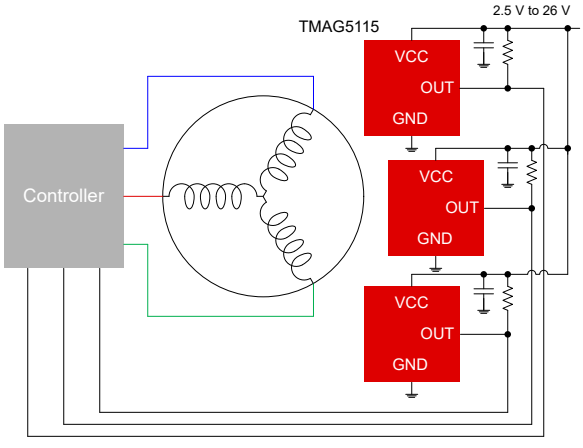
Package Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
TMAG5115	SOT-23 (3)	2.92 mm × 1.30 mm

(1) For all available packages, see the package option addendum at the end of the data sheet.



Output State



Simplified Application

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4 Revision History

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

Changes from Revision * (December 2022) to Revision A (February 2023)	Page
• Added TMAG5115A threshold to *Features* section	1
• Added *Device Comparison* table	3
• Added TMAG5115A magnetic specifications	5
• Added typical characteristic curves for TMAG5115A	6

5 Device Comparison

Table 5-1. Device Comparison

VERSION	TYPICAL THRESHOLD	TYPICAL HYSTERESIS	MAGNETIC RESPONSE	OUTPUT TYPE	SENSOR ORIENTATION	BANDWIDTH	PACKAGES AVAILABLE
TMAG5115A1C	3 mT	6 mT	Active Low	Open-drain	Z	60 kHz	SOT-23
TMAG5115B1C	1.8 mT	0.6 mT	Active Low	Open-drain	Z	60 kHz	SOT-23

6 Pin Configuration and Functions

For additional configuration information, see the *Mechanical, Packaging, and Orderable Information* section.

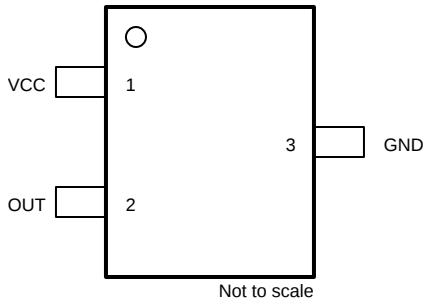


Figure 6-1. DBZ Package 3-Pin SOT-23 Top View

Table 6-1. Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
GND	3	GND	Ground pin
OUT	2	O	Hall sensor open-drain output. Requires a resistor pullup, typically 10 kΩ.
V_{CC}	1	P	Supply pin. 2.5 V to 26 V. TI recommends to use a minimum 0.01-µF capacitor.

7 Specifications

7.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

		MIN	MAX	UNIT
V_{CC}	Power supply voltage	–0.3	30	V
I_{SINK}	Output sink current		30	mA
Magnetic flux density, B_{MAX}		Unlimited	Unlimited	T
Junction temperature, T_J		–65	150	°C
Storage temperature, T_{stg}		–65	150	°C

(1) Operation outside the Absolute Maximum Ratings may cause permanent device damage. Absolute Maximum Ratings do not imply functional operation of the device at these or any other conditions beyond those listed under Recommended Operating Conditions. If used outside the Recommended Operating Conditions but within the Absolute Maximum Ratings, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.

7.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001(1)	±2000	V
		Charged device model (CDM), ANSI/ESDA/JEDEC JS-002(2)	±500	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

7.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

		MIN	MAX	UNIT
V_{CC}	Power supply voltage(1)	2.5	26	V
V_O	Output pin voltage	0	26	V
I_{SINK}	Output pin current sink	0	15	mA
T_A	Ambient temperature	–40	125	°C

(1) Operating outside the TMAG5115 Recommended Supply and Temperature Curve can cause the device to enter a thermal shutdown state.

7.4 Thermal Information

THERMAL METRIC(1)		TMAG5115 DBZ (SOT-23) 3 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	208.2	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	102.3	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	40.6	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	9.7	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	40.2	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	–	°C/W

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report.

7.5 Electrical Characteristics

over operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
POWER SUPPLY						
I_{CC}	Operating supply current	V_{CC} = 2.5 V to 26 V T_A = –40°C to 125°C		6	8	mA
t_{ON}	Power-on time			62.5		µs
P_{OS}	Power-on state	$V_{CC} > V_{CCmin}$ $t < t_{ON}$		High		
OUTPUT						
V_{OL}	Low-level output voltage	I_{OL} = 5 mA	0		0.7	V
I_{OH}	Output leakage current	V_{CC} = 2.5 V to 26 V		0.1	1	µA
I_{SC}	Output short-circuit current protection		15	25	80	mA
t_R	Output rise time	R_L = 10 kΩ C_L = 50 pF V_{CC} = 12 V		2		µs
t_F	Output fall time	R_L = 10 kΩ C_L = 50 pF V_{CC} = 12 V		2		µs
t_{PD}	Propagation delay time			5	6	µs
Jitter	Output jitter window	1-kHz triangle magnetic wave with peak value at ±8 mT		5		µs
Jitter	Output jitter window	1-kHz square magnetic wave with peak value at ±8 mT		0.2		µs
$Noise_{pp}$	Internal Noise			125	200	µT
T_{SHUT}	Junction temperature shutdown threshold		156	168	180	°C
T_{REC}	Junction temperature recovery threshold		131	143	155	°C
FREQUENCY RESPONSE						
f_{CHOP}	Chopping frequency	TMAG5115xx		1000		kHz
f_{BW}	Signal bandwidth	TMAG5115xx		60		kHz

7.6 Magnetic Characteristics

over operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
TMAG5115A						
B_{OP}	Magnetic field operating point	V_{CC} = 2.5 V to 26 V	0.2	1	1.7	mT
B_{RP}	Magnetic field release point		–1.7	–1	–0.2	mT
B_{HYS}	Magnetic hysteresis B_{OP} - B_{RP}		0.4	2	3.4	mT
TMAG5115B						
B_{OP}	Magnetic field operating point	V_{CC} = 2.5 V to 26 V	2	3	4	mT
B_{RP}	Magnetic field release point		–4	–3	–2	mT
B_{HYS}	Magnetic hysteresis B_{OP} - B_{RP}		4	6	8	mT

7.7 Typical Characteristics

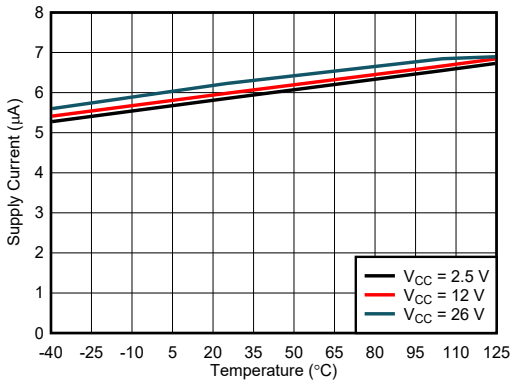
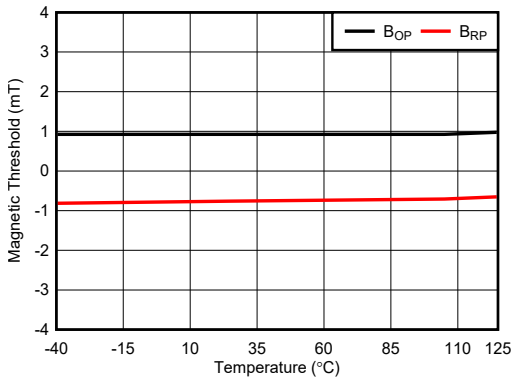
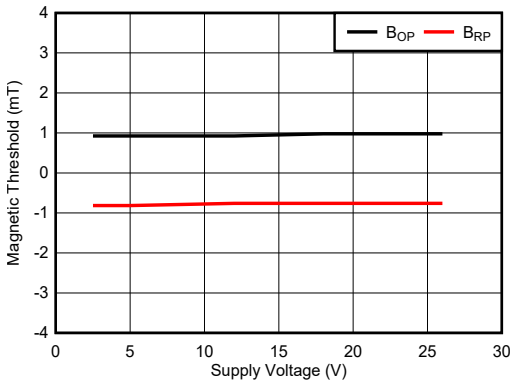


Figure 7-1. I_{CC} vs T_A



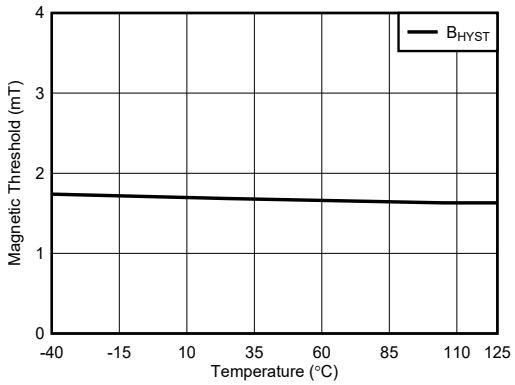
V_{CC} = 12 V

Figure 7-2. TMAG5115A B_{OP} and B_{RP} vs T_A



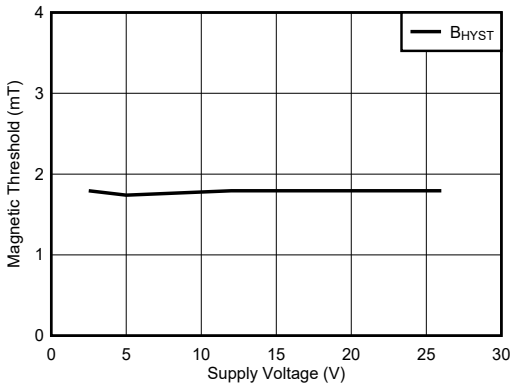
T_A = 25°C

Figure 7-3. TMAG5115A B_{OP} and B_{RP} vs V_{CC}



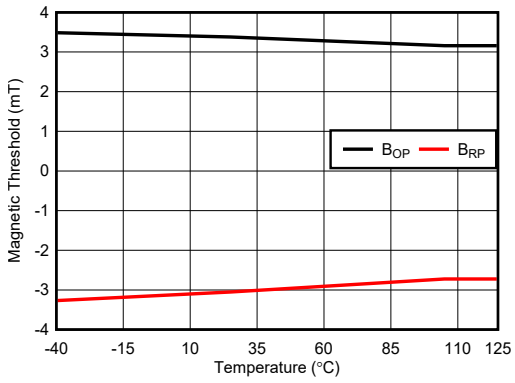
V_{CC} = 12 V

Figure 7-4. TMAG5115A B_{HYST} vs T_A



T_A = 25°C

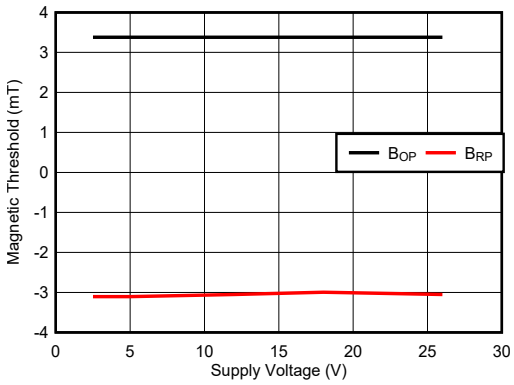
Figure 7-5. TMAG5115A B_{HYST} vs V_{CC}



V_{CC} = 12 V

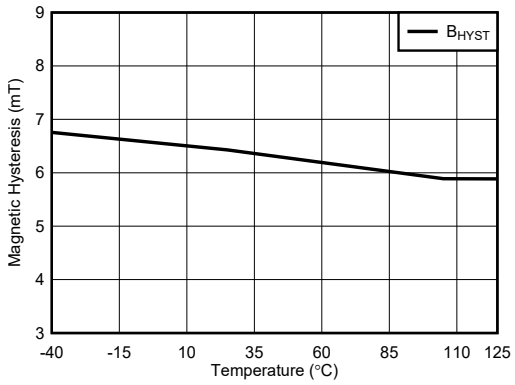
Figure 7-6. TMAG5115B B_{OP} and B_{RP} vs T_A

7.7 Typical Characteristics (continued)



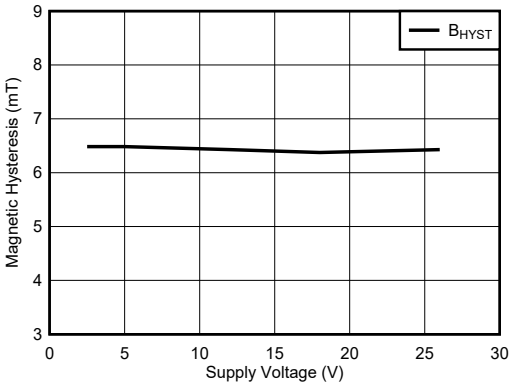
T_A = 25°C

Figure 7-7. TMAG5115B B_{OP} and B_{RP} vs V_{CC}



V_{CC} = 12 V

Figure 7-8. TMAG5115B B_{HYST} vs T_A



T_A = 25°C

Figure 7-9. TMAG5115B B_{HYST} vs V_{CC}

8 Detailed Description

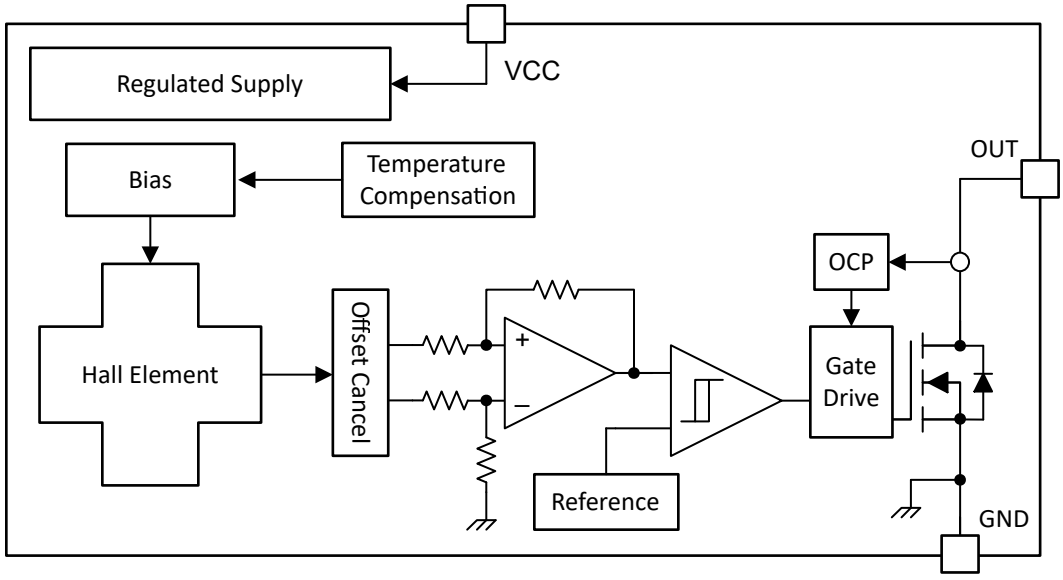
8.1 Overview

The TMAG5115 is a chopper-stabilized Hall sensor with a digital latched output for magnetic sensing applications. The TMAG5115 device can be powered with a supply voltage between 2.5 V and 26 V. The field polarity is defined as follows: a south pole near the marked side of the package is a positive magnetic field, and a north pole near the marked side of the package is a negative magnetic field.

The output state is dependent on the magnetic field perpendicular to the package. A south pole near the marked side of the package causes the output to pull low (operate point, B_{OP}), and a north pole near the marked side of the package causes the output to release (release point, B_{RP}). Hysteresis is included in between the operate point and the release point therefore magnetic-field noise does not accidentally trip the output.

An external pullup resistor is required on the OUT pin. The OUT pin can be pulled up to V_{CC} or to a different voltage supply to allow for easier interfacing with controller circuits.

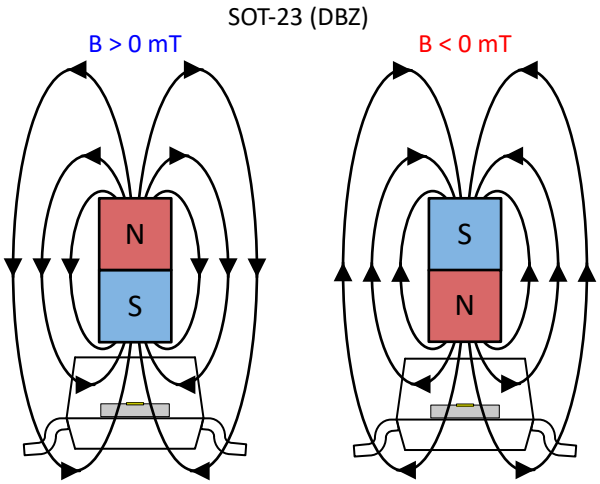
8.2 Functional Block Diagram



8.3 Feature Description

8.3.1 Field Direction Definition

Figure 8-1 shows the positive magnetic field defined as a south pole near the marked side of the package and the negative magnetic field defined as a north pole near the marked side of the package.



N = North pole, S = South pole

Figure 8-1. Field Direction Definition

8.3.2 Device Output

If the device is powered on with a magnetic field strength between B_{RP} and B_{OP}, then the device output is indeterminate and can either be Hi-Z or low. If the field strength is greater than B_{OP}, then the output is pulled low. If the field strength is less than B_{RP}, then the output is released.

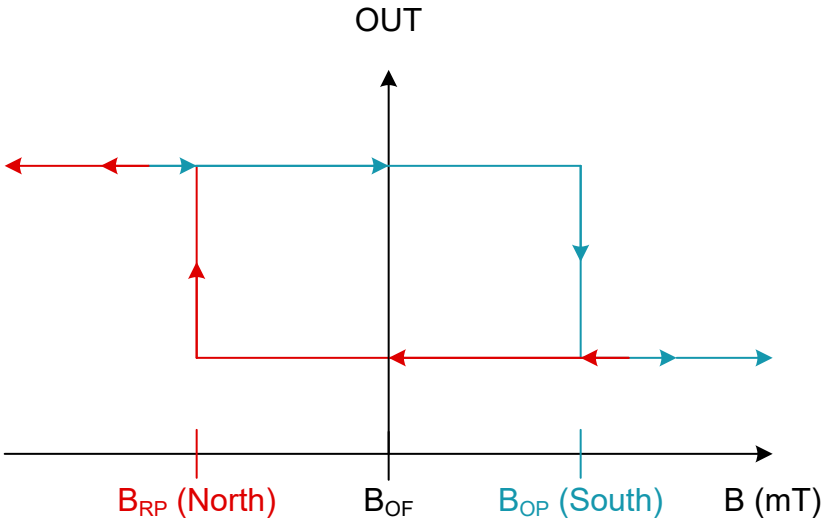


Figure 8-2. TMAG5115 B_{OP} > 0

8.3.3 Power-On Time

After applying V_{CC} to the TMAG5115, t_{on} must elapse before the OUT pin is valid. During the power-up sequence, the output is Hi-Z. A pulse as shown in Figure 8-3 and Figure 8-4 occurs at the end of t_{on}. This pulse can allow the host processor to determine when the TMAG5115 output is valid after start-up. In Case 1 (Figure 8-3) and Case 2 (Figure 8-4), the output is defined assuming a constant magnetic field B > B_{OP} and B < B_{RP}.

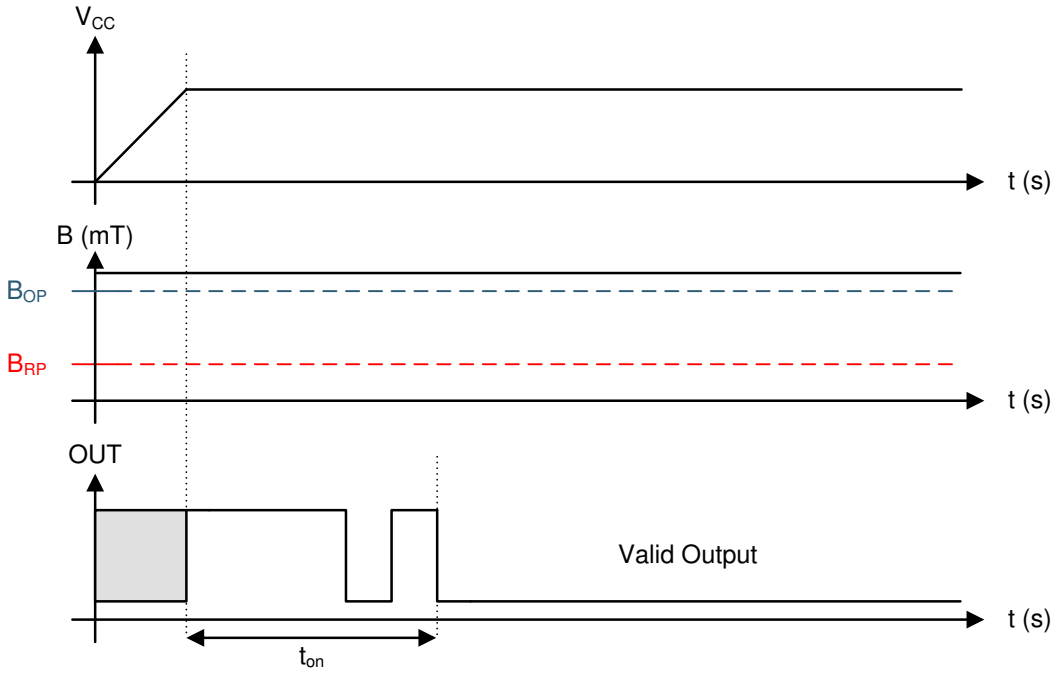


Figure 8-3. Case 1: Power On When B > B_{OP}

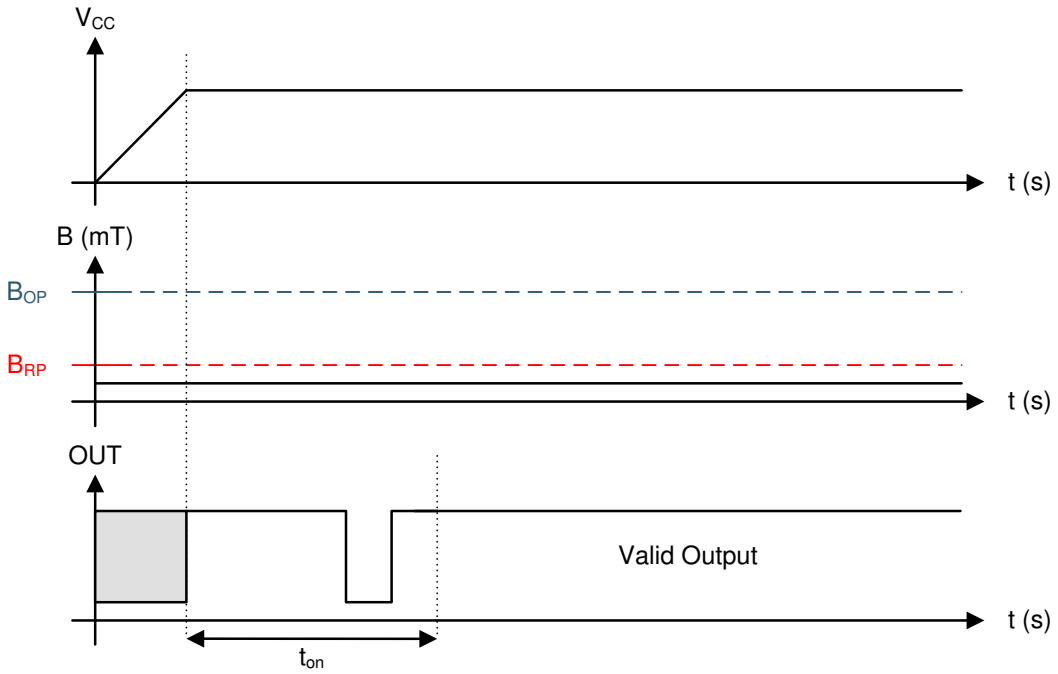


Figure 8-4. Case 2: Power On When B < B_{RP}

If the device is powered on with the magnetic field strength B_{RP} < B < B_{OP}, then the device output is indeterminate and can either be Hi-Z or pulled low. During the power-up sequence, the output is held Hi-Z until t_{on} has elapsed. At the end of t_{on}, a pulse is given on the OUT pin to indicate that t_{on} has elapsed. After t_{on}, if the magnetic field changes such that B_{OP} < B, the output is released. Case 3 (Figure 8-5) and Case 4 (Figure 8-6) show examples of this behavior.

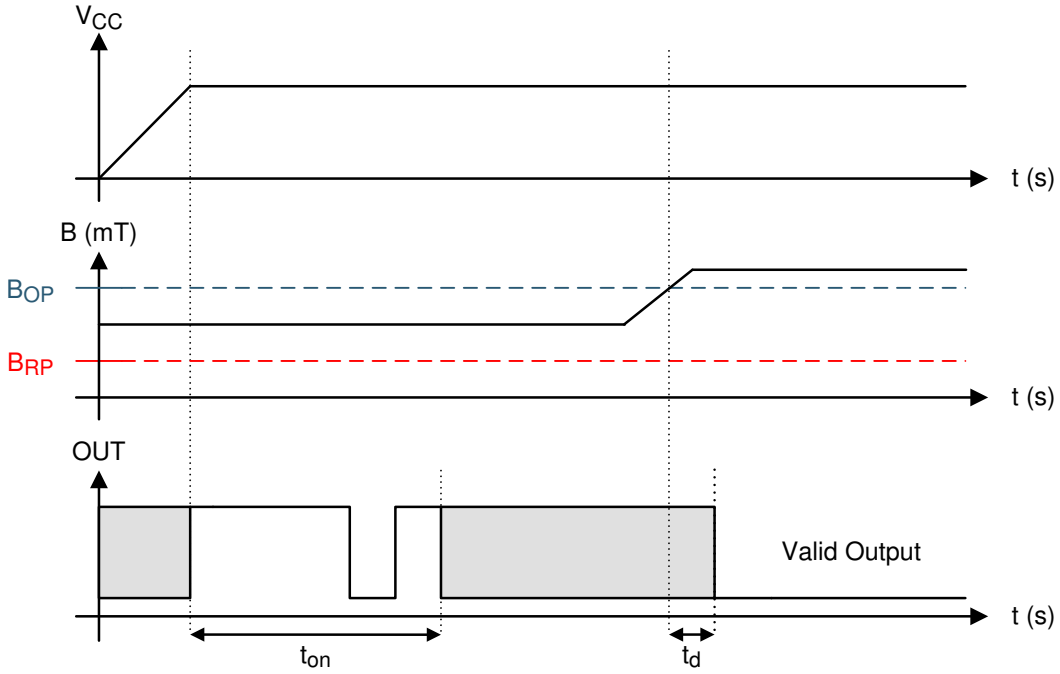


Figure 8-5. Case 3: Power On When B_{RP} < B < B_{OP}, Followed by B > B_{OP}

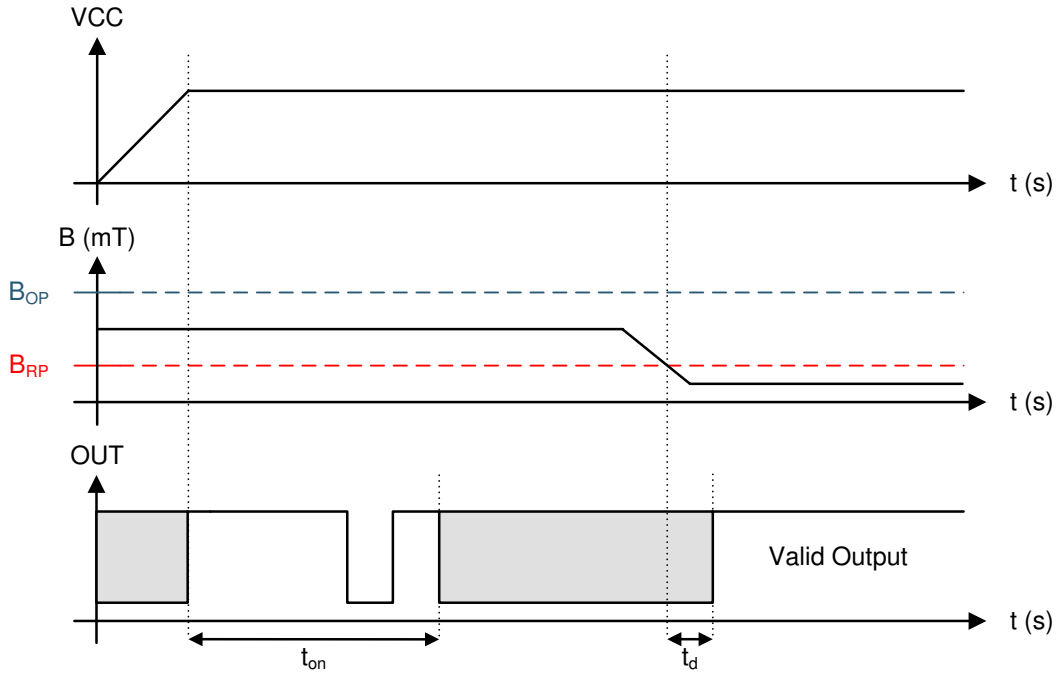


Figure 8-6. Case 4: Power On When B_{RP} < B < B_{OP}, Followed by B < B_{RP}

8.3.4 Output Stage

Figure 8-7 shows the TMAG5115 open-drain NMOS output structure, rated to sink up to 15 mA of current.

Note

V_{ref} is not restricted to V_{CC}. The allowable voltage range of this pin is specified in the *Recommended Operating Conditions*.

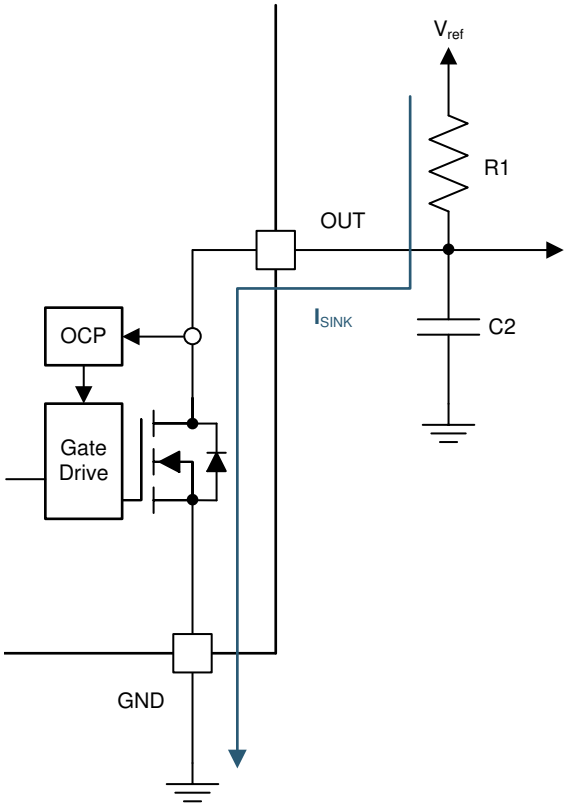


Figure 8-7. NMOS Open-Drain Output

Select a value for C2 based on the system bandwidth specifications as shown in Equation 1.

$$2 \times f_{BW}\ (\text{Hz}) < \frac{1}{2\pi \times R1 \times C2} \tag{1}$$

Most applications do not require this C2 filtering capacitor.

8.3.5 Protection Circuits

The TMAG5115 device is fully protected against overcurrent and overtemperature conditions. Table 8-1 lists a summary of the protection circuits.

Table 8-1. Protection Circuit Summary

FAULT	CONDITION	DEVICE	DESCRIPTION	RECOVERY
FET overload	$I_{SINK} \geq I_{SC}$	Operating	Output current is clamped to I_{SC}	$I_{SINK} < I_{SC}$
Overtemperature	$T_J \geq 156°C$	Operating	Device will shutdown until recovery temperature is reached	$T_J \leq 156°C$

8.3.5.1 Short-Circuit Protection

An analog current-limit circuit limits the current through the FET. The driver current is clamped to I_{SC}. During this clamping, the $r_{DS(on)}$ of the output FET is increased from the nominal value.

8.3.5.2 Overtemperature Protection

The TMAG5115 features overtemperature protection to prevent damage to the device and system in the case of runaway thermal heating. If the output is short-circuited, there will be greater power dissipation through the device causing the junction temperature to rise. If the temperature rises to above the limits specified in the *Electrical Characteristics* table, the device will enter a thermal shutdown and the OUT pin will turn to High-Z regardless of the current magnetic field detected.

The TMAG5115 thermal shutdown can be differentiated from normal operation by viewing the supply current into the device. While in thermal shutdown, the supply current is lower than normal operation.

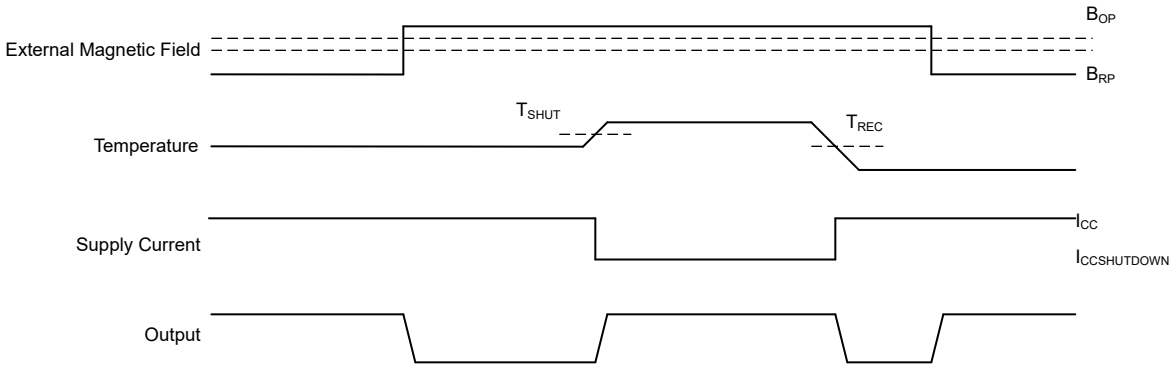


Figure 8-8. TMAG5115 Overtemperature Protection Diagram

The TMAG5115 can support a supply voltage of 2.5 V to 26 V. Higher temperature and supply conditions can increase the junction temperature of the device, however, which could exceed the thermal shutdown limit. This can cause a device shutdown. TI recommends to not exceed a temperature and supply combination shown in Figure 8-9.

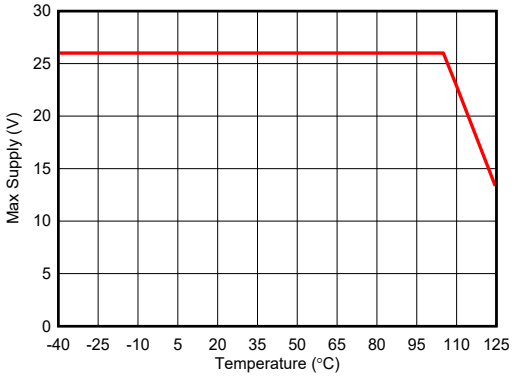


Figure 8-9. TMAG5115 Recommended Supply and Temperature Curve

8.4 Device Functional Modes

The TMAG5115 is active only when V_{CC} is between 2.5 V and 26 V and T_J is less than 156°C.

9 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

9.1 Application Information

The TMAG5115 is used in magnetic position sensing applications. The device features a high-speed architecture to facilitate more precise field measurement. With latching magnetic characteristics, the output is turned low or high respectively with a sufficiently strong south or north pole facing the package top side. When removing the magnetic field, the device keeps its previous state.

For reliable functionality, the magnet must apply a flux density at the sensor greater than the corresponding maximum B_{OP} or B_{RP} numbers specified in the *Magnetic Characteristics* table. Add additional margin to account for mechanical tolerance, temperature effects, and magnet variation.

9.2 Typical Applications

9.2.1 Standard Circuit

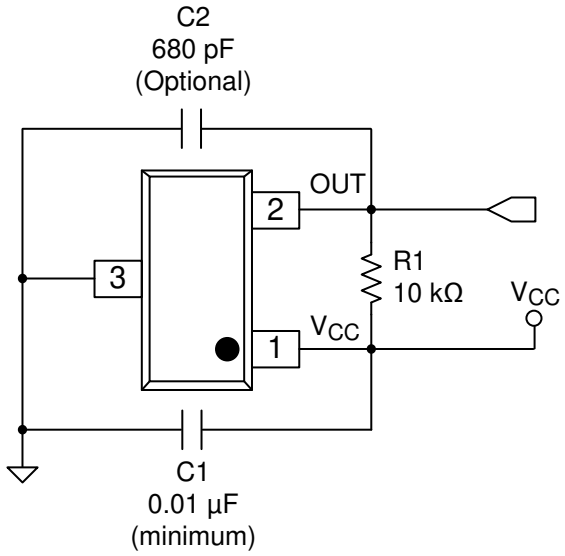


Figure 9-1. Typical Application Circuit

9.2.1.1 Design Requirements

For this design example, use the parameters listed in Table 9-1 as the input parameters.

Table 9-1. Design Parameters

DESIGN PARAMETER	REFERENCE	EXAMPLE VALUE
Supply voltage	V_{CC}	3.0 V to 3.6 V
System bandwidth	f_{BW}	10 kHz

9.2.1.2 Detailed Design Procedure

Table 9-2. External Components

COMPONENT	PIN 1	PIN 2	RECOMMENDED
C1	V_{CC}	GND	A 0.01-µF (minimum) ceramic capacitor rated for V_{CC}
C2	OUT	GND	**Optional**: Place a ceramic capacitor to GND
R1	OUT	REF(1)	Requires a resistor pullup

(1) REF is not a pin on the TMAG5115 device, but a REF supply-voltage pullup is required for the OUT pin. The OUT pin may be pulled up to V_{CC}.

9.2.1.2.1 Configuration Example

In a 3.3-V system, 3.0 V ≤ V_{ref} ≤ 3.6 V. Use Equation 2 to calculate the allowable range for R1.

$$\frac{V_{ref}\,\text{max}}{30\ \text{mA}} \le R1 \le \frac{V_{ref}\,\text{min}}{100\ \mu\text{A}} \tag{2}$$

For this design example, use Equation 3 to calculate the allowable range of R1.

$$\frac{3.4\ \text{V}}{30\ \text{mA}} \le R1 \le \frac{3.2\ \text{V}}{100\ \mu\text{A}} \tag{3}$$

Therefore:

$$120\ \Omega \le R1 \le 30\ \text{k}\Omega \tag{4}$$

After finding the allowable range of R1 (Equation 4), select a value between 500 Ω and 32 kΩ for R1.

Assuming a system bandwidth of 10 kHz, use Equation 5 to calculate the value of C2.

$$2 \times f_{BW}\ (\text{Hz}) < \frac{1}{2\pi \times R1 \times C2} \tag{5}$$

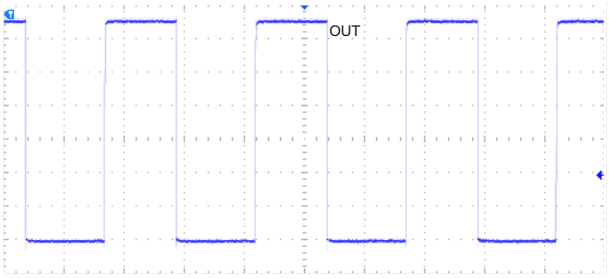
For this design example, use Equation 6 to calculate the value of C2.

$$2 \times 10\ \text{kHz} < \frac{1}{2\pi \times R1 \times C2} \tag{6}$$

An R1 value of 10 kΩ and a C2 value less than 820 pF satisfy the requirement for a 10-kHz system bandwidth.

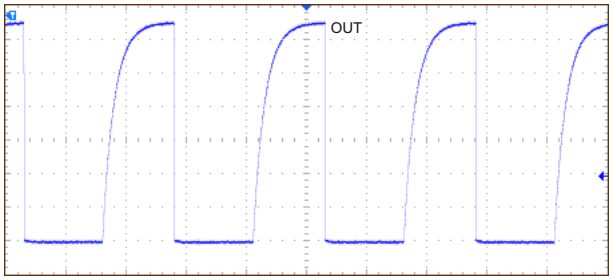
A selection of R1 = 10 kΩ and C2 = 680 pF would cause a low-pass filter with a corner frequency of 23.4 kHz.

9.2.1.3 Application Curves



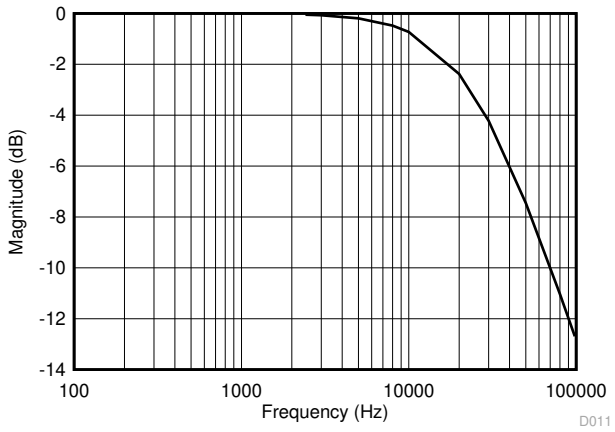
R1 = 10 kΩ pull-up No C2

Figure 9-2. 10-kHz Switching Magnetic Field



R1 = 10-kΩ pull-up C2 = 680 pF

Figure 9-3. 10-kHz Switching Magnetic Field



R1 = 10-kΩ pull-up C2 = 680 pF

Figure 9-4. Low-Pass Filtering

9.3 Power Supply Recommendations

The TMAG5115 device is designed to operate from an input voltage supply range between 2.5 V and 26 V. A recommended 0.1-µF ceramic capacitor rated for V_{CC} must be placed as close to the TMAG5115 as possible. Larger values of the bypass capacitor may be required to attenuate any significant high-frequency ripple and noise components generated by the power source. TI recommends limiting the supply voltage variation to less than 50 mV_{PP}.

9.4 Layout

9.4.1 Layout Guidelines

The bypass capacitor should be placed near the TMAG5115 device for efficient power delivery with minimal inductance. The external pullup resistor should be placed near the microcontroller input to provide the most stable voltage at the input; alternatively, an integrated pullup resistor within the GPIO of the microcontroller can be used.

Generally, using PCB copper planes underneath the TMAG5115 device has no effect on magnetic flux and does not interfere with device performance. This is because copper is not a ferromagnetic material. However, if nearby system components contain iron or nickel, they may redirect magnetic flux in unpredictable ways.

9.4.2 Layout Example

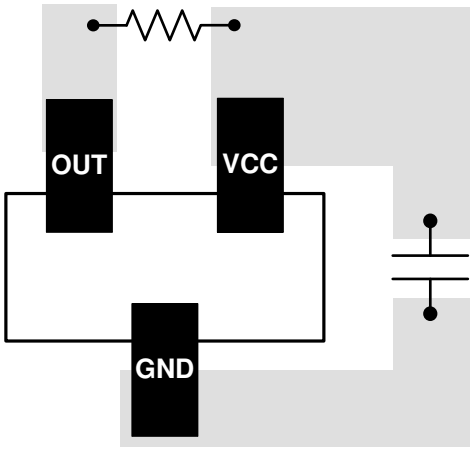


Figure 9-5. TMAG5115 Layout Example

10 Device and Documentation Support

10.1 Device Support

10.1.1 Hall Sensor Location

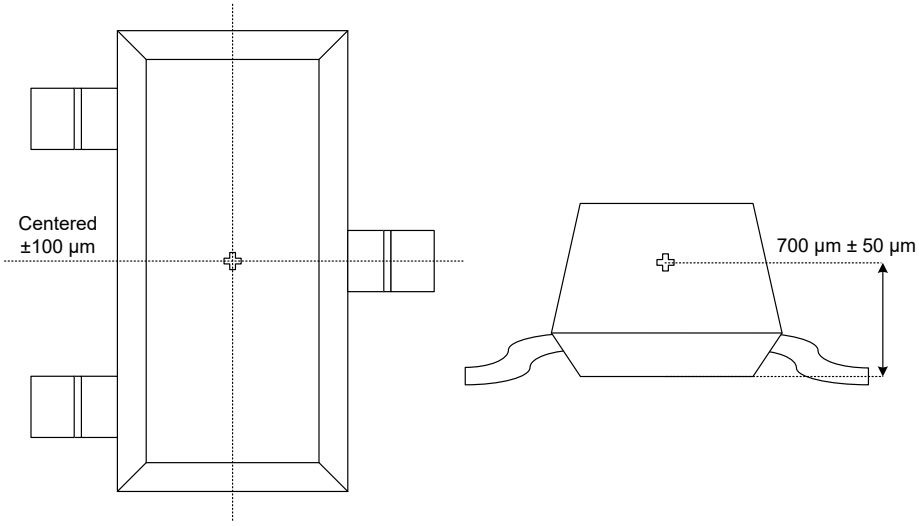


Figure 10-1. Hall Sensor Location (Not to Scale)

10.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

10.3 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

10.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

10.5 Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. Texas Instruments 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 very small parametric changes could cause the device not to meet its published specifications.

10.6 Glossary

TI Glossary	This glossary lists and explains terms, acronyms, and definitions.

11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TMAG5115A1CQDBZR	ACTIVE	SOT-23	DBZ	3	3000	RoHS & Green	SN	Level-1-260C-UNLIM	-40 to 125	15A1	Samples
TMAG5115B1CQDBZR	ACTIVE	SOT-23	DBZ	3	3000	RoHS & Green	SN	Level-1-260C-UNLIM	-40 to 125	15B1	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

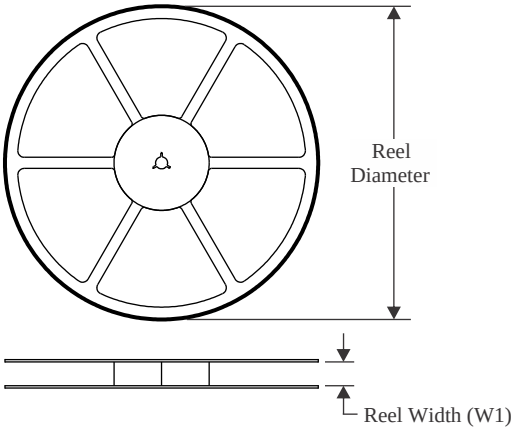
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

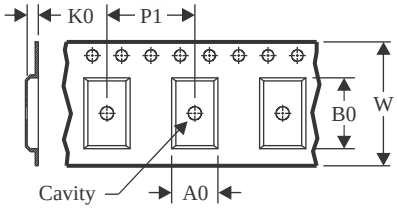
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

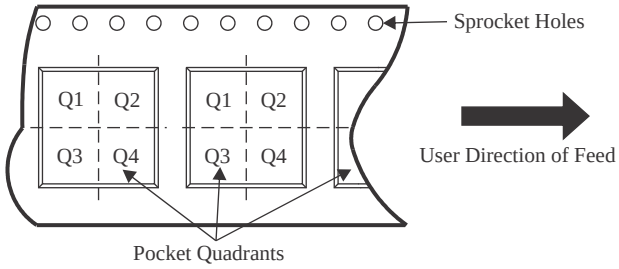


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

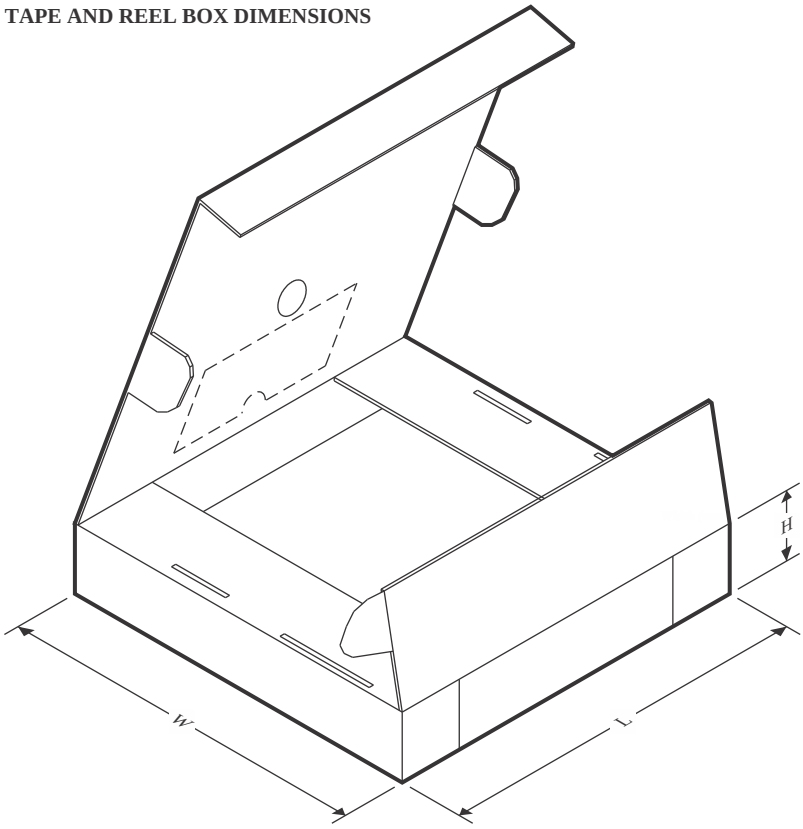
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TMAG5115A1CQDBZR	SOT-23	DBZ	3	3000	178.0	9.0	3.15	2.77	1.22	4.0	8.0	Q3
TMAG5115B1CQDBZR	SOT-23	DBZ	3	3000	178.0	9.0	3.15	2.77	1.22	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



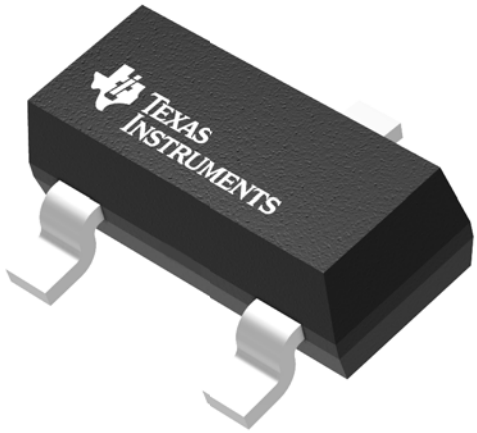
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TMAG5115A1CQDBZR	SOT-23	DBZ	3	3000	180.0	180.0	18.0
TMAG5115B1CQDBZR	SOT-23	DBZ	3	3000	180.0	180.0	18.0

GENERIC PACKAGE VIEW

DBZ 3 SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



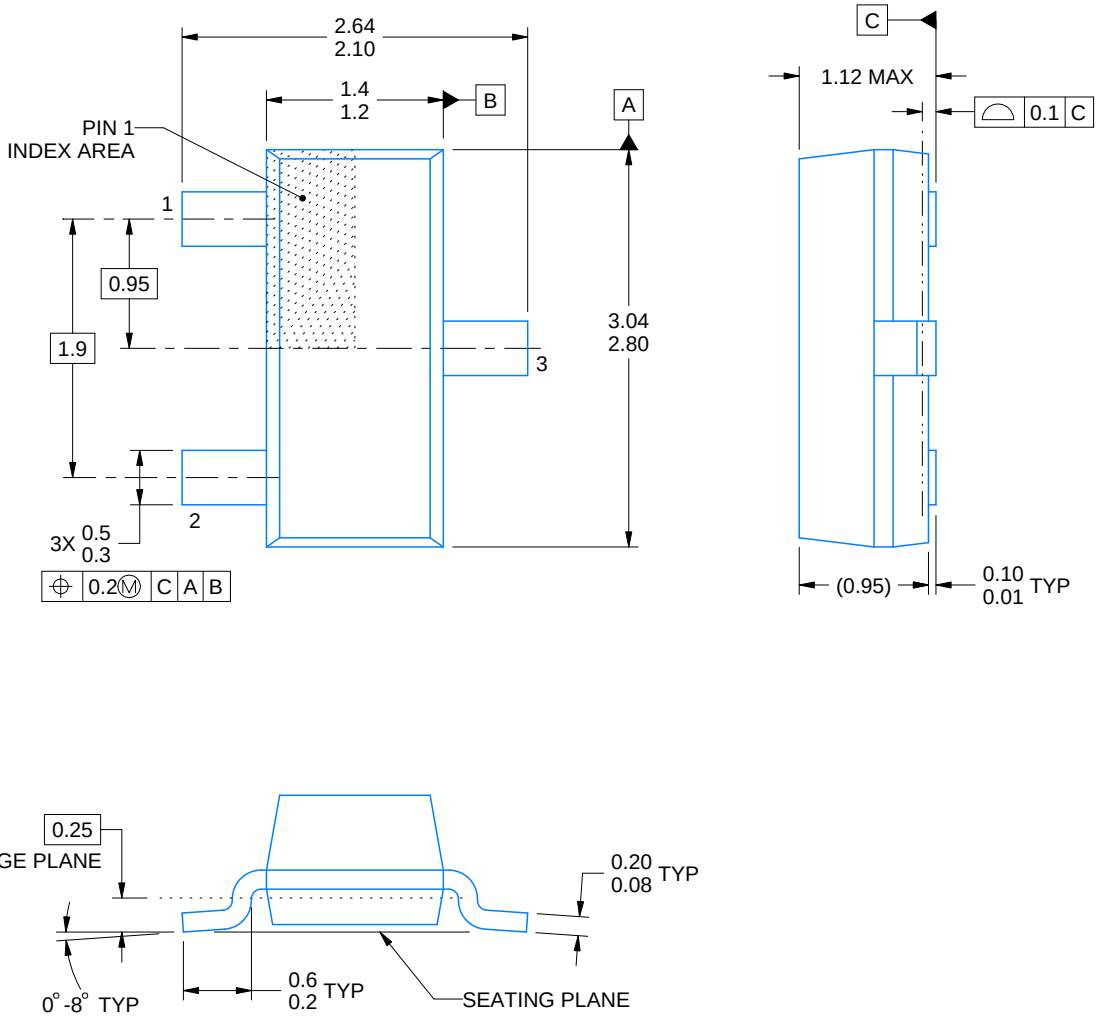
Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

PACKAGE OUTLINE

DBZ0003A

SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



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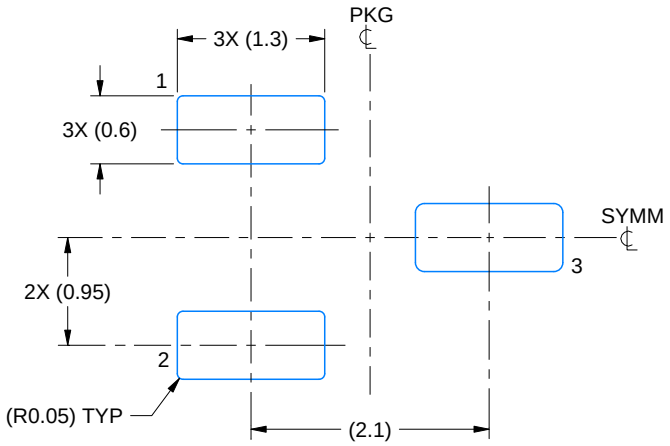
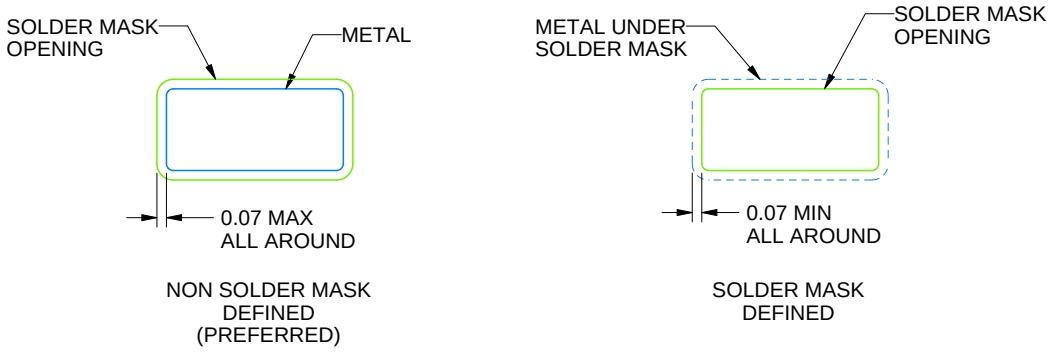
NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC registration TO-236, except minimum foot length.



LAND PATTERN EXAMPLE
SCALE:15X



SOLDER MASK DETAILS

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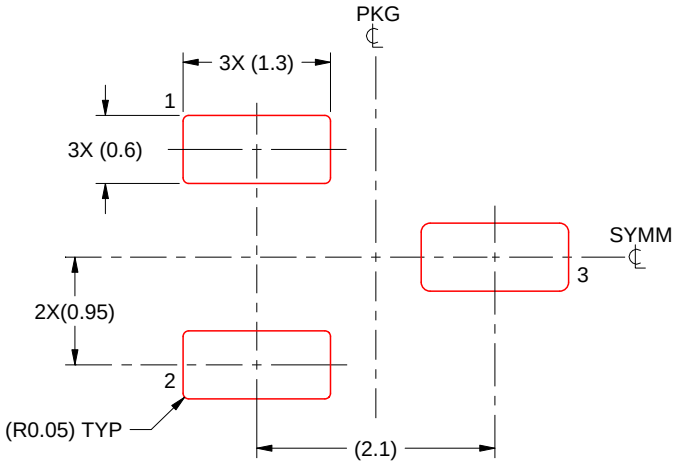
NOTES: (continued)

4. Publication IPC-7351 may have alternate designs.
5. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE
BASED ON 0.125 THICK STENCIL
SCALE:15X

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NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
7. Board assembly site may have different recommendations for stencil design.

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