

3D Magnetic Position Sensor IC

FEATURES AND BENEFITS

- 3D magnetic sensor enables flexible mechanical integration for contactless linear and rotary position applications
- Configurable signal path processing and on-chip angle calculation for accurate 360° and short stroke (<360°) rotary applications
- Multiple programmable linearization options for maximum measurement accuracy:
 - Piecewise-linear and binning modes
 - Up to 33-point fixed position
 - Up to 22-point programmable positions
- Ratiometric Analog, PWM, or SENT (SAE J2716) output formats
- Integrated IC diagnostics for high reliability
- Developed in accordance with ISO 26262 requirements for hardware product development for use in safety-critical applications
- Supports operation in harsh conditions, required for automotive and industrial applications
 - AEC-Q100 Grade 0 qualified
 - -40°C to 150°C temperature range
 - 4.5 to 5.5 V supply operating range
 - Over- and reverse-voltage protection
- Multiple package options available:
 - Single die surface mount (SOIC-8)
 - Dual (full redundant) stacked die surface mount (TSSOP-14)

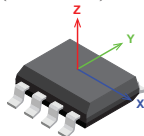


APPLICATIONS

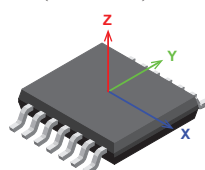
- Contact-less linear and rotary position sensor
- Throttle, valve, and cylinder position sensor
- Pedal position sensor
- Transmission position (fork/clutch, shifter, park lock)

PACKAGES

Single die SOIC-8
(OL suffix)



Dual die TSSOP-14
(LU suffix)



Not to scale

DESCRIPTION

The A31315 3DMAG™ position sensor is designed for on-axis and off-axis rotary as well as linear stroke position measurement in automotive, industrial, and consumer applications.

This sensor integrates vertical and planar Hall-effect elements with precision temperature-compensating circuitry to detect two out of three magnetic field components (X, Y, and Z). Using configurable signal processing, linearization, and angle calculation allows the A31315 to accurately resolve the absolute rotary (full 360° and short-stroke <360°) or linear position of a moving magnetic target.

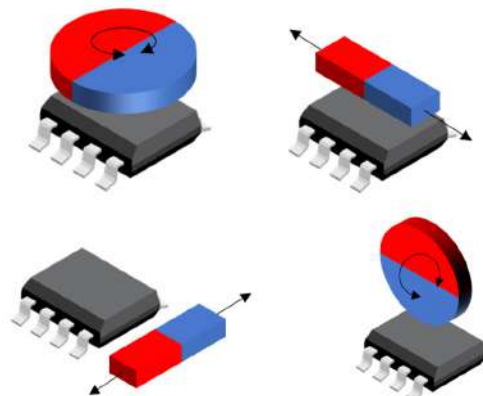
The A31315 features ratiometric analog, PWM, or SENT (SAE J2716) interface options to output the angle between the two factory-selected axes or the field from a single axis. In addition, the SENT interface provides the option to output the field measurement from both channels.

On-chip EEPROM technology, capable of supporting up to 100 write cycles, is integrated for flexible programming of configuration and calibration parameters and includes 92 bits provided for customer device identification purposes.

The A31315 contains on-chip diagnostic features required for high reliability automotive applications, including monitors of both internal and external fault conditions.

Developed in accordance with ISO 26262 as a hardware safety element out of context (SEooC) with ASIL B (single die) and ASIL D (dual die) capability for use in automotive safety-related systems when integrated and used in the manner prescribed in the applicable safety manual and datasheet.

The A31315 is available as a single die in the SOIC-8 package and stacked dual die in the TSSOP-14 package for applications that require full redundancy.



SELECTION GUIDE [1]

Part Number	Die Configuration and Package	Output Interface	Channel A	Channel B	Maximum Field (G)	Packing
A31315LOLATR-XZ-S-SE-10	Single Die SOIC-8	SENT (PWM) [2]	X	Z	1000	3,000 pieces per 13-in reel
A31315LOLATR-XY-S-SE-10			X	Y	1000	
A31315LOLATR-XZ-S-AR-10		Analog Ratiometric	X	Z	1000	
A31315LOLATR-XY-S-AR-10			X	Y	1000	
A31315LLUBTR-XZ-S-SE-10	Dual Stacked Die TSSOP-14	SENT (PWM) [2]	X	Z	1000	4,000 pieces per 13-in reel
A31315LLUBTR-XY-S-SE-10			X	Y	1000	
A31315LLUBTR-XZ-S-AR-10		Analog Ratiometric	X	Z	1000	
A31315LLUBTR-XY-S-AR-10			X	Y	1000	

[1] Contact Allegro for other axis and field range trim options.

[2] SENT interface is enabled by default. PWM is selectable through customer accessible registers.

Part Number Guide

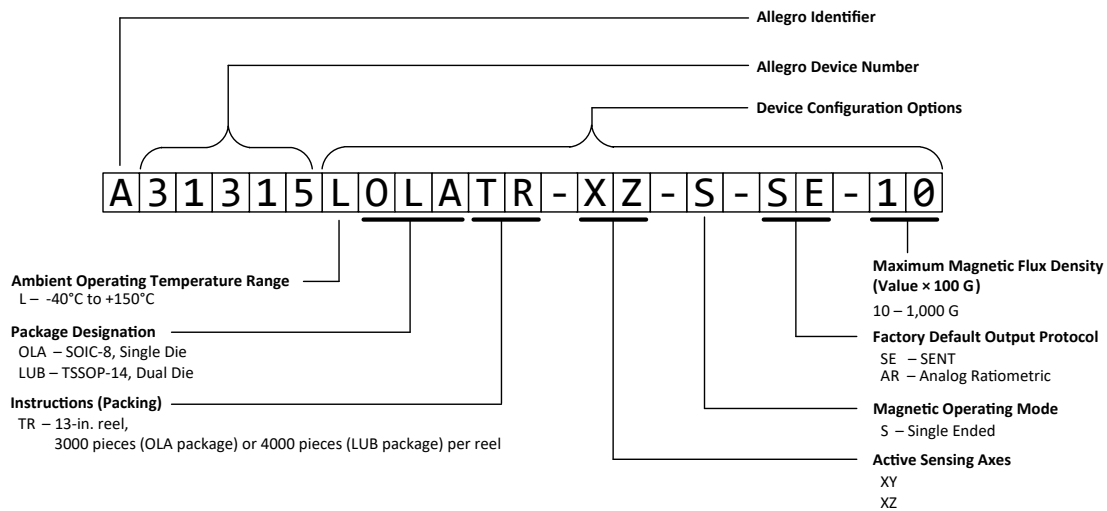


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ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Notes	Rating	Unit
Forward Supply Voltage	$V_{CC(ABSMAX)}$	Supply is clamped with 20 V limit to GND	18	V
Reverse Supply Voltage	$V_{RCC(ABSMAX)}$	Supply is clamped with -20 V limit to GND	-18	V
Forward $V_{OUT}-V_{CC}$ Voltage	$V_{OUT-CC(ABSMAX)}$	V_{OUT} is clamped with 20 V limit to V_{CC} ; Note: There is no reverse $V_{OUT}-V_{CC}$ clamp	18	V
Forward Output Voltage	$V_{OUT(ABSMAX)}$	Output is clamped with 20 V limit to GND	18	V
Reverse Output Voltage	$V_{ROUT(ABSMAX)}$	Output is clamped with -10 V limit to GND	-6	V
Forward Supply Current	I_{CC}		30	mA
Reverse Supply Current	I_{RCC}		-30	mA
Output Current Limit	$I_{OUT(SOURCE)}$	VOUT shorted to GND	30	mA
	$I_{OUT(SINK)}$	VCC shorted to VOUT	-30	mA
Extended Operating Ambient Temperature	$T_{A(EXT)}$	Device will work within this temperature range, but performance is not specified	-45 to 165	°C
Maximum Junction Temperature	$T_{J(MAX)}$		165	°C
Storage Temperature	T_{stg}		-65 to 165	°C

THERMAL CHARACTERISTICS: May require derating at maximum conditions; see application information

Characteristic	Symbol	Test Conditions*	Value	Unit
Package Thermal Resistance	$R_{\theta JA}$	SOIC-8	125	°C/W
		TSSOP-14	214	°C/W

*Additional thermal information available on the Allegro website.

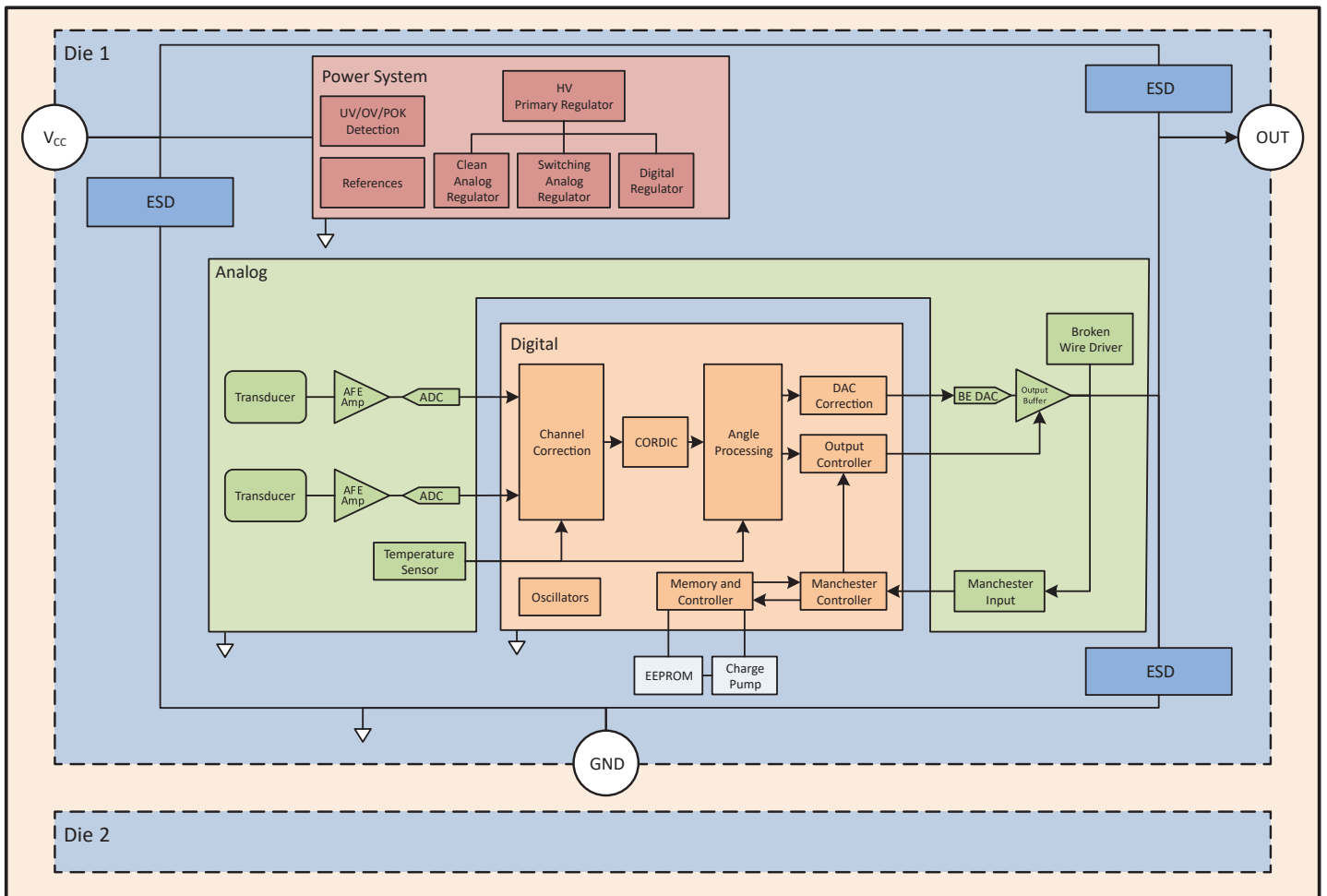


Figure 1: Functional Block Diagram

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