freescale Analog

Xtrinsic Magnetic Sensors

Xtrinsic MAG3110 Magnetometer

Highest resolution, low noise and ultra-small size

Overview

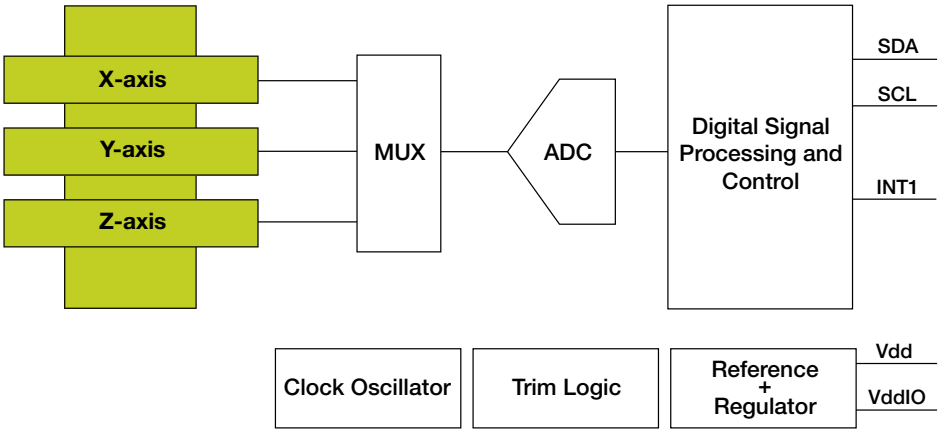
The MAG3110 3-axis magnetometer is the latest addition to Freescale's extensive family of inertial, pressure and touch sensors.

Freescale's MAG3110 magnetometer can measure magnetic fields in three dimensions with a wide dynamic range of +/-1000 µT. Flexible output data rate and oversampling options allow for noise as low as 0.25 µT and current consumption as low as 8.6 µA.

The combination of Freescale's Xtrinsic MAG3110 magnetometer, MMA8451Q accelerometer and advanced eCompass software enables a full tilt compensated electronic compass solution to be realized. When the eCompass subsystem is coupled with a GPS or other location-aware subsystem, direction dependent location based services can be enabled in end products.

The MAG3110 is ideally suited for smartphones, tablets and any portable devices requiring electronic compass capability.

Xtrinsic MAG3110 Magnetometer Block Diagram

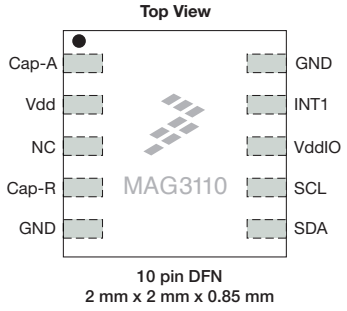


Target Applications

- Electronic compass (eCompass)
- Map orientation
- Location-based services
- GPS assist
- Remote controls/3D pointers
- 3D motion control and heading
- Navigation
- Smartphones
- Tablets
- Gaming
- User interface

Key Features

- 2 x 2 mm package
- Power as low as 24 uA
- 1.95 to 3.6 V operation
- Operating temperature range: –40 °C to +85 °C



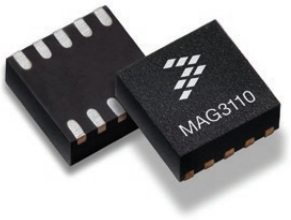
10 pin DFN
2 mm x 2 mm x 0.85 mm

Freescale MAG3110 Magnetometer Features and Benefits

Features	Specifications	Benefits
Wide dynamic range	+/- 1,000 µ	Provides flexibility in PCB placement within compact form factor devices that incorporate strong permanent magnets such as vibrator motors and speakers
Low noise	As low as 0.25 µT	Hardware based oversampling options enable high resolution heading determination without the need for host side sample averaging. User can optimize the power vs. noise trade-off in hardware.
Power consumption	17.2 µA at 1.25 Hz	Flexible low-power options for significant power savings in mobile applications. Current can be further reduced to 8.6 uA at sub 1 Hz ODRs
Digital output	I²C interface at 400 kHz	Works well with other sensors, MCUs and devices
Sample rate	80 Hz maximum	Wide signal bandwidth of up to 40 Hz
Supply voltage	1.95 to 3.6 V	Wide operating voltage to cover many applications
Operating temperature	–40 °C to +85 °C	Wide temperature range to cover many applications
High sensitivity over the full dynamic range	0.1 µT	Full heading resolution over the entire dynamic range
Small package	2 x 2 x 0.8 mm 10-pin uDFN	Excellent fit for ultra-compact mobile devices
Drivers available	Examples include Android™, WinCE, Windows® 7, Linux®	Operating system flexibility
Xtrinsic eCompass software		Floating point and integer code that supports all standards, including Android, Windows 8 and other operating systems
Xtrinsic calibration software		Full range of power and performance of floating point and integer four, seven and 10 element models

Freescale: A Leader in Sensing Solutions

Expanding on its more than 30-year heritage of sensor innovation, Freescale's Xtrinsic sensing solutions are designed with the right combination of high-performance sensing capability, processing capacity and customizable software to help deliver smart, differentiated sensing solutions. With Xtrinsic sensors, our vision is to offer a diverse and differentiated product portfolio to meet the expanding needs of the automotive, consumer and industrial segments. Xtrinsic solutions offer ideal blends of functionality and intelligence designed to help our customers differentiate and win in highly competitive markets.



Development Tools

Kit Number	Description
LFSTBEB3110	The LFSTBEB3110 contains two PCBs: MAG3110 magnetometer and MMA8451 accelerometer daughter card, and the sensor interface board. Customers can purchase the LFSTBUSB communication board separately.
RD4247MAG3110	The RD4247MAG3110 is a complete kit containing three PCBs: MAG3110 magnetometer and MMA8451 accelerometer daughter card, sensor interface board and LFSTBUSB communication board for running Freescale's Sensor Toolbox PC software.

Documentation

Document Number	Description
MAG3110	Product specifications data sheet
MAG3110UG	MMA8451Q Accelerometer and MAG3110 Magnetometer User Guide
AN4246	Calibrating an eCompass in the Presence of Hard and Soft Iron Interference
AN4247	Layout recommendations for PCBs using a magnetometer sensor
AN4248	Implementing a tilt-compensated eCompass using accelerometer and magnetometer sensors
AN4249	Accuracy of Angle Estimation in eCompass and 3D Pointer Applications

For more information visit freescale.com/magnetic

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