



Smart angle
magnetic sensor

Magnetic Rotary Encoder Reference Design: RD-KL46Z-MRE

TARGET APPLICATIONS

- ▶ Smart Home, constrained industrial environments
- ▶ Gaming, motion control, head-mounted displays, wearable electronics
- ▶ Navigation, eCompass, IoT (Internet of Things) sensor data management

The magnetic rotary encoder (MRE) reference design is a smart integrated system for angle measurement. It is composed of a FXOS8700 magnetometer, a Kinetis KL46Z microcontroller built on the ARM® Cortex® M0+ processor and a diametrically magnetized magnet.

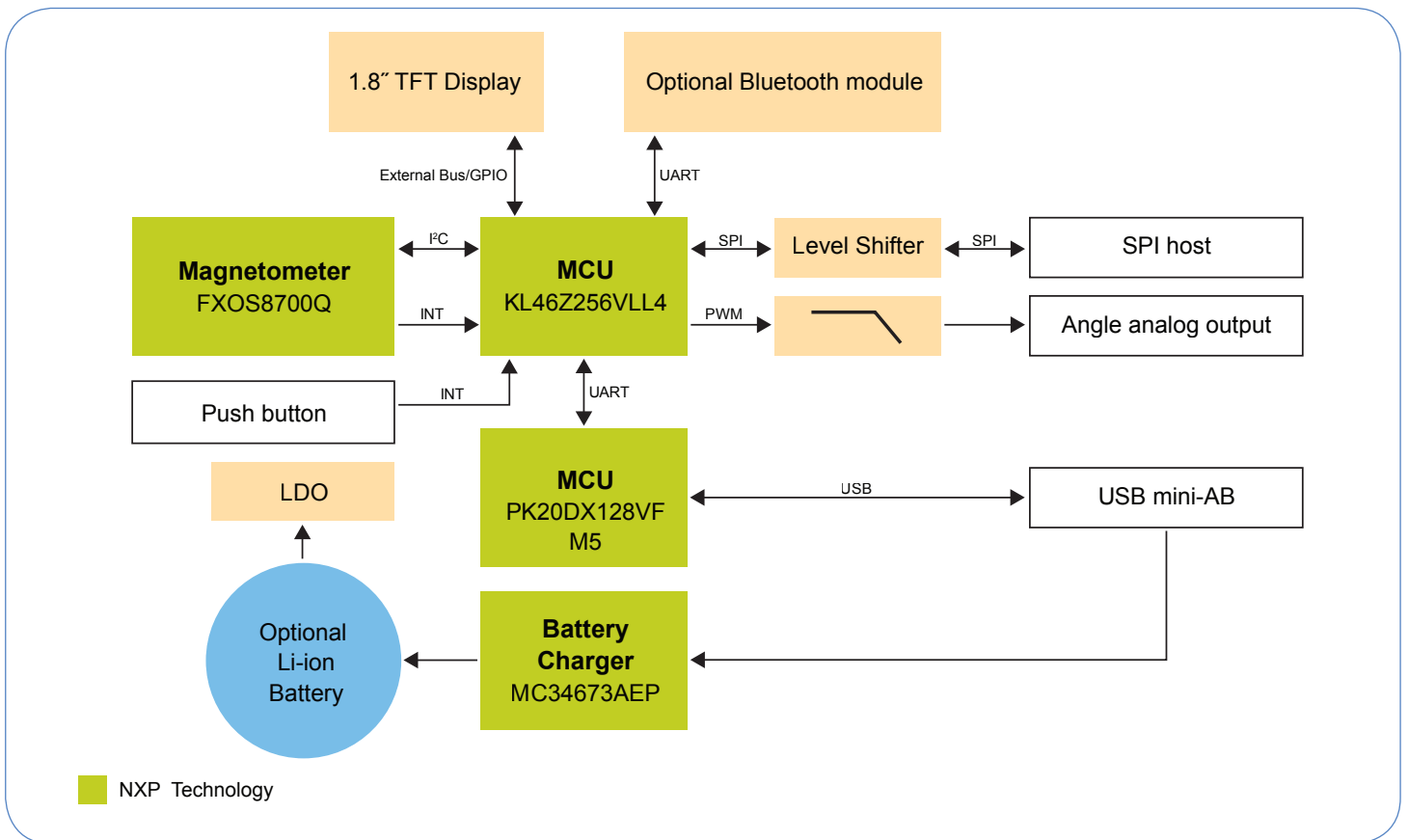
The magnetic rotary encoder position sensor detects the absolute angular orientation of an on-axis 2-pole magnet. The absolute angular position can be displayed on different outputs as PWM, SPI, or read directly through the interface (LCD screen or on the Graphical User Interface charts). This technology can be employed in high-accuracy angle position detection and motor control (low rpm) (BLDC motors). All rotary magnetic position sensors can replace both absolute and incremental optical sensors, other magnetic and inductive technologies, potentiometers and magnetic switches.

FEATURES AND BENEFITS

- ▶ Plug and play
- ▶ Self-calibration
- ▶ Angle sensor
- ▶ Contactless potentiometer
- ▶ Flexible (air gap, location, magnetic field strength)
- ▶ PWM angle output
- ▶ SPI interface
- ▶ 3-axis magnetometer
- ▶ ARM® Cortex-M0+ core KL46Z MCU



MAGNETIC ROTARY ENCODER REFERENCE DESIGN BLOCK DIAGRAM



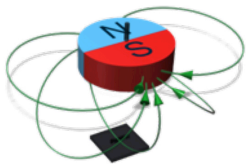
Magnetic Angle Sensor

How does it work?

The magnetic rotary encoder is very simple. In fact, the application needs only two components to work: a diametrically magnetized magnet to generate a magnetic field and a magnetometer to measure it.



The magnet is placed just over the magnetometer and the magnet position is calculated through a simple trigonometric equation.



However, when implemented, the physical elements disrupt the magnetic field and bring angular position errors.

The NXP magnetic rotary encoder evaluation board includes a self-calibration algorithm to correct the angle error and offer the best accuracy possible.

The MRE evaluation board has several calibration benefits:

- ▶ Wireless or contactless angle sensor to simplify mechanical placement and avoid mechanical wear
- ▶ A flexible air gap between the magnet and the sensor (200 to 600 uT acceptance)
- ▶ Self-calibration algorithm for precision enhancement