**SQL-RV-1.8 motor and controller performance**

Travel Range 6 mm (9mm long version)

Housing Dimensions 2.8 x 2.8 x 6 mm

Motor Body Dimensions 1.8 x 1.8 x 6 mm

Resolution 0.5 μm

Stall Force (at 3.3V input) 30 gram force (0.3 N)

Speed (at 15 gram force load) > 7 mm/s

Input Power (stopped) OFF POWER HOLD (0 mW)

Input Power to motor driver (moving) \* < 340 mW (NSD-2101 direct drive)

Input Power to controller components (idle) < 1mW MC-33DB-RV (daughter board)    
  ~ 330 mW MC-33MB (mother board)

Lifetime (load-dependent)\*\* > 1 million cycles

Operating Temperature -30 to +80°C

Storage Temperature -40 to +85°C

Shock Resistance (motor only - zero mass load) 2500 Gs

Cable/Connector Flex circuit

Motor Controller (see below) MC-3300-RV, NSD-2101

Operating Frequency ~ 171 KHz

Weight   0.16 grams

**Motor Driver and Development Platform**

**NSD-2101 piezo motor driver IC**

The NSD-2101 piezo motor driver is only 1.8 x 1.8 mm in wafer-level form (BGA package). It converts 2.3 to 5.5 VDC battery input directly to high frequency AC power to control the SQL-RV SQUIGGLE motor. Custom designed to drive the SQUIGGLE RV multi-layer motor, the NSD-2101 provides advanced proprietary features such as frequency tracking and hybrid speed control to optimize motor performance while minimizing power consumption over a broad range of operating and environmental conditions. NSD-2101 accepts commands from your system processor over a digital I2C serial interface.

### MC-3300 motor controller

The MC-3300-RV is a full-function motor controller useful for system evaluation and development. Connect it to a PC via via the USB interface and use the New Scale Pathway Software (included) for evaluation and embedded system development.

 The MC-3300-RV accepts position input from New Scale's NSE-5310 position sensors or from other digital or analog position sensors. for closed-loop system control.

 The MC-3300-RV mother board includes the processor, 12-bit A/D converter for analog position feedback, digital differential quadrature feedback, I2C feedback for NSE-5310 position sensors, and a USB interface. The MC-33DB-RV daughter board contains two motor driver ASICs.

# NSE-5310 miniature position sensor technology

The NSE-5310 is a magnetic sensor array with integrated on-chip digital encoder, which transforms a magnetic sine wave into a direct digital position output. With 0.5 micron resolution and size as small as 3.9 x 2.5 mm, it is a robust, cost-effective alternative to miniature optical encoders for non-contact position sensing.

On-chip encoding provides direct digital output using standard I2C protocol, eliminating the need for external pulse counters. Efficient control system communications allows up to two position sensors on a single I2C bus.

The highest-resolution magnetic encoder available, the NSE-5310 position sensor is insensitive to light, shock, vibration, and high-particulate environments. It features low sensitivity to external magnetic fields and can be used as a linear encoder or off-axis rotary encoder.

## TRACKER mini position sensor benefits

* **Smallest size**Chip-scale packaging as small as 2.5 x 3.9 mm   
  Wafer level chip scale packaging available
* **Accurate, non-contact sensing** 0.5 µm resolution  
   better than 2 µm repeatability
* **Complete system on a chip**sensing and encoding integrated in one ingeniously small package
* **Direct digital output (I2C)**eliminates need for external pulse counters
* **Robust**insensitive to light, shock, vibration and particulates; less stringent mounting alignment
* **Absolute performance**zero reference: automatic gain & offset correction
* Long **travel**8 mm travel with standard 11 mm linear magnet

## Sensor operation

The NSE-5310 position sensor integrates a sensor array and encoder on an SOIC. A linear array of eight Hall effect sensors on the chip measures the spatially varying magnetic field produced by moving a multi-pole magnetic strip above the sensor.

 The magnetic field generates internal sinusoidal and phase-shifted sinusoidal signals. These signals are filtered and transformed into angular and magnitude values, representing the absolute linear position of a 2 mm long magnetic encoder strip pole pair. The position information is read via an I2C interface.

 Automatic gain control (AGC) adjusts for DC bias in the magnetic field and provides a large dynamic input range of the magnetic field for higher immunity to external magnetic fields. It also provides an absolute magnitude of the magnetic field intensity, which can be used to detect the end of the magnetic strip and thereby serve as a built-in zero reference.