

# 2Dex™ Hall sensors

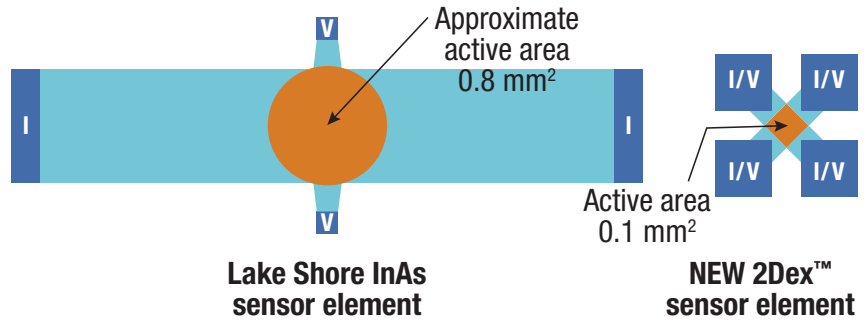
2-dimensional electron gas (2DEG) Hall effect magnetic sensors, providing several feature improvements over previous generation sensors.

## Easily calculate magnetic field values with highly linear Hall voltage

Compared to other sensor technology, 2Dex sensors exhibit significantly less linearity error. This makes the conversions of Hall voltage to field values using simple sensitivity values much more viable.

### Smaller active areas

2Dex Hall sensors have significantly smaller active areas than previous generation products. This results in improved spatial resolution and reduced signal averaging, useful when measuring fields close to a source where field gradients can be extreme.



### Better 3-axis measurements

2Dex 3-axis magnetic sensors have been designed to maximize orthogonality between x, y, and z sensor elements, resulting in more accurate vector magnitude measurements when field direction is unknown or changing.

### Predictable, flexible, and fast

Many magnetic sensors rely on auxiliary measurement conditioning circuitry, resulting in restrictions on the sensor's range, resolution, and accuracy. 2Dex Hall sensors use a very simple Hall structure without the need for auxiliary conditioning circuits. Sensor performance is achieved through meticulous manufacturing and testing of each sensor. This results in the predictability and repeatability of more complex circuits with the flexibility of a simple Hall element.

Flexibility examples include:

<p>Sensitivity (measurement resolution) can be increased by supplying higher than nominal current to the sensor</p>	<p>Increased resilience to high levels of magnetic field, radiation, or temperature than traditional sensors</p>	<p>Select different excitation methods, trading accuracy for complexity (voltage, DC current, reversing current, current spinning)</p>	<p>Continue to operate reliably even in the world's most powerful magnet systems</p>	<p>Faster response than many IC-based sensors — important when detecting or measuring pulses and AC signals</p>
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## Suitable for extreme environments

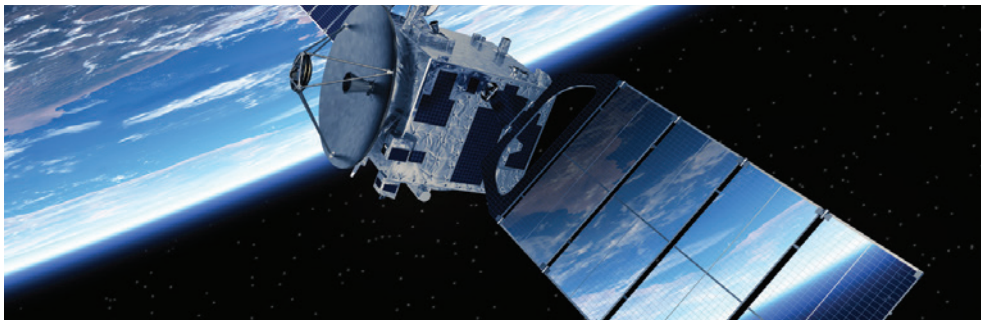
### Temperature

Materials in 2Dex sensors have been selected to work at both cryogenic and elevated temperatures, resulting in sensors with extremely wide operating temperature ranges. These sensors have also been characterized over their full operating temperature range for variables such as sensitivity, resistance, offset voltages, and quantum oscillations. This



provides sensors with predictable behavior for various scenarios, and when they are paired with an F71 or F41 teslameter, automatic compensation for these variables result in highly accurate measurements—even in extreme environments.

### Radiation



The 2DEG material used in these sensors is inherently resilient to radiation—so much so that the same material used in 2Dex sensors has been used in satellite solar panels.

### Vacuum

(New package coming soon) Based on the popular SD package for cryogenic temperature sensors, the hermetic construction of the SH package makes it suitable for extreme research environments, including UHV scenarios.

# 2Dex™ Hall sensors

## Electrical performance

### Drive current

Nominal: 1 mA

Maximum for accurate measurements: 5 mA\*

Maximum to avoid possible sensor damage: 10 mA\*

\*This value may vary depending on the thermal environment around the sensor and the temperature compensation approach.

### Hall voltage

Sensitivity (Hall voltage vs field value)	2X-250	2X-251
Nominal sensitivity (S) at 1 mA drive current	$51.5 \pm 1$ mV/T	$51.5 \pm 0.5$ mV/T
Drive current normalized sensitivity (SA)	$51.5 \pm 1$ V/T/A	$51.5 \pm 0.5$ V/T/A
Temperature coefficient of sensitivity (-20 to 80 °C)	0.03%/°C	0.03%/°C
Maximum linearity error (to 1 T)	$\pm 0.75\%$	$\pm 0.25\%$
Maximum linearity error (to 3 T)	$\pm 1\%$	$\pm 0.5\%$

Offset voltage (output voltage at zero field)	2X-250	2X-251
Zero field offset at 1 mA drive current	$\pm 100$ $\mu$ V	$\pm 25$ $\mu$ V
Drive current normalized zero field offset	$\pm 100$ mV/A	$\pm 25$ mV/A
Effective zero field offset	$\pm 2$ mT (20 G)	$\pm 0.5$ mT (5 G)

### Resistance

Sensor resistance at 23 °C:  $800 \pm 100$   $\Omega$

Typical temperature coefficient of resistance: 1.1%/°C

## Ordering information

### Standard performance

Part number  
2X-250-FT  
2X-250-FA  
2X-250-AI  
2X-250-3D

### Plug-and-play

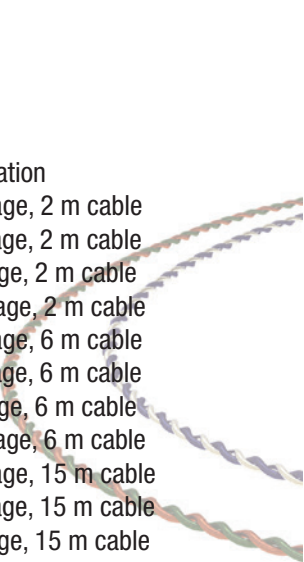
Part number  
2X-250-FT-1CBL-2  
2X-250-FA-1CBL-2  
2X-250-AI-1CBL-2  
2X-250-3D-3CBL-2  
2X-250-FT-1CBL-6  
2X-250-FA-1CBL-6  
2X-250-AI-1CBL-6  
2X-250-3D-3CBL-6  
2X-250-FT-1CBL-15  
2X-250-FA-1CBL-15  
2X-250-AI-1CBL-15  
2X-250-3D-3CBL-15

### Configuration

FT package, 2 m cable  
FA package, 2 m cable  
AI package, 2 m cable  
3D package, 2 m cable  
FT package, 6 m cable  
FA package, 6 m cable  
AI package, 6 m cable  
3D package, 6 m cable  
FT package, 15 m cable  
FA package, 15 m cable  
AI package, 15 m cable  
3D package, 15 m cable

### High performance

Part number  
2X-251-FT  
2X-251-FA  
2X-251-AI



# 2Dex™ Hall sensors

## Simplify setup with plug-and-play sensor options

Interested in using a 2Dex Hall sensor, but not interested in the time, effort, or uncertainty of building your own measurement circuit or apparatus? Plug-and-play sensors connect directly to the F71/F41 teslameters. This offers the installation flexibility of a Hall sensor with the measurement simplicity and performance of a teslameter/probe combination.



## Multiple package types

Due to the directional nature of magnetic fields, the positioning and orientation of the sensor are critical for accurate measurements. 2Dex sensors are offered in a range of package types to simplify the process of mounting a sensor in just the right location.

