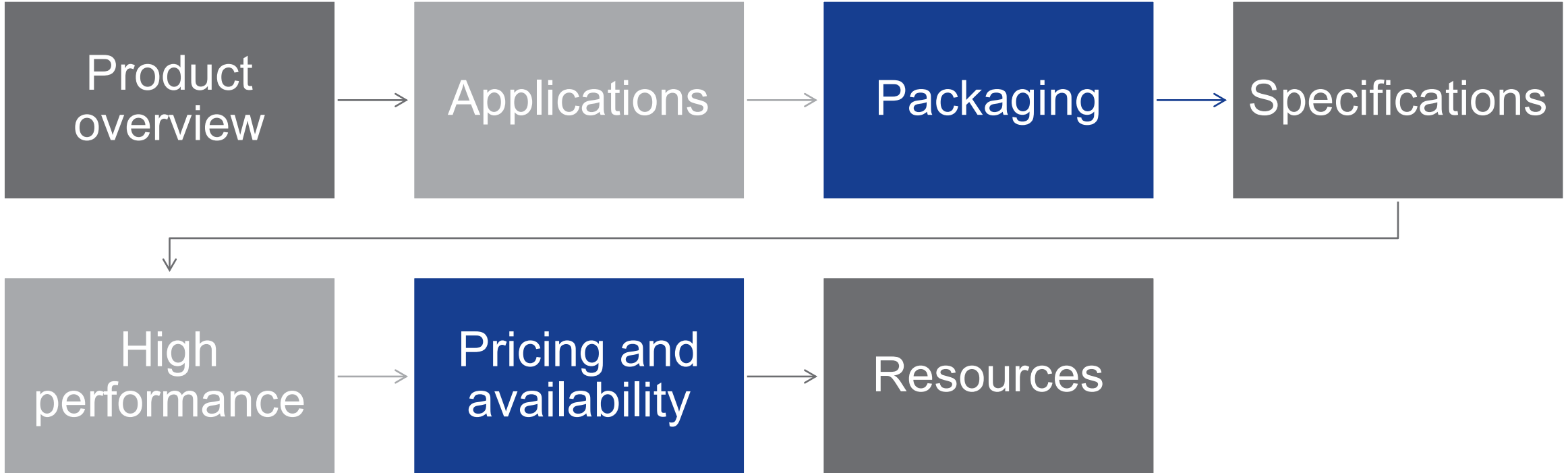


LOW POWER EMBEDDED ACCELEROMETERS

LVEP050-TO5 AND LVEP100-TO5 NEW PRODUCT INTRODUCTION



PRODUCT INTRODUCTION OUTLINE



LVEP ULTRA LOW POWER EMBEDDED ACCELEROMETERS

THE LVEP-TO5 IS A HIGH-PERFORMANCE PIEZOELECTRIC ACCELEROMETER DESIGNED FOR ULTRA-LOW POWER CONSUMPTION AND EASY INTEGRATION INTO WIRELESS VIBRATION SENSORS AND OTHER BATTERY-POWERED APPLICATIONS.

- **Easy integration**
 - TO-5 standard transistor packaging for easy integration
 - Hermetically sealed
 - Small, lightweight
- **Ultra-low power consumption**
 - 180 μ W power consumption
 - 60 μ A very low current draw for battery-powered applications
 - Operates down to 3 VDC
 - Fast BOV settling time, typically 350 μ s
- **High-performance**
 - High sensitivity for better resolution, more detailed vibration data
 - \pm 5% sensitivity tolerance
 - Low noise: 12 μ g/ $\sqrt{\text{Hz}}$ at 100 Hz (700 μ g broadband)

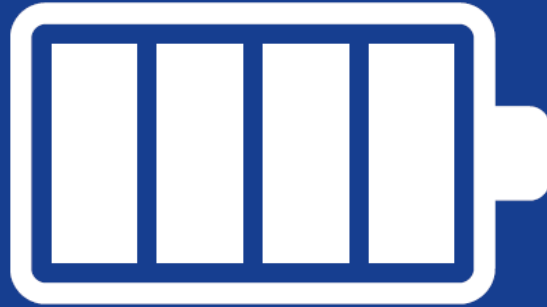
50 mV/g and 100 mV/g models



APPLICATIONS



WIRELESS
SENSORS



BATTERY POWERED AND
ENERGY HARVESTING

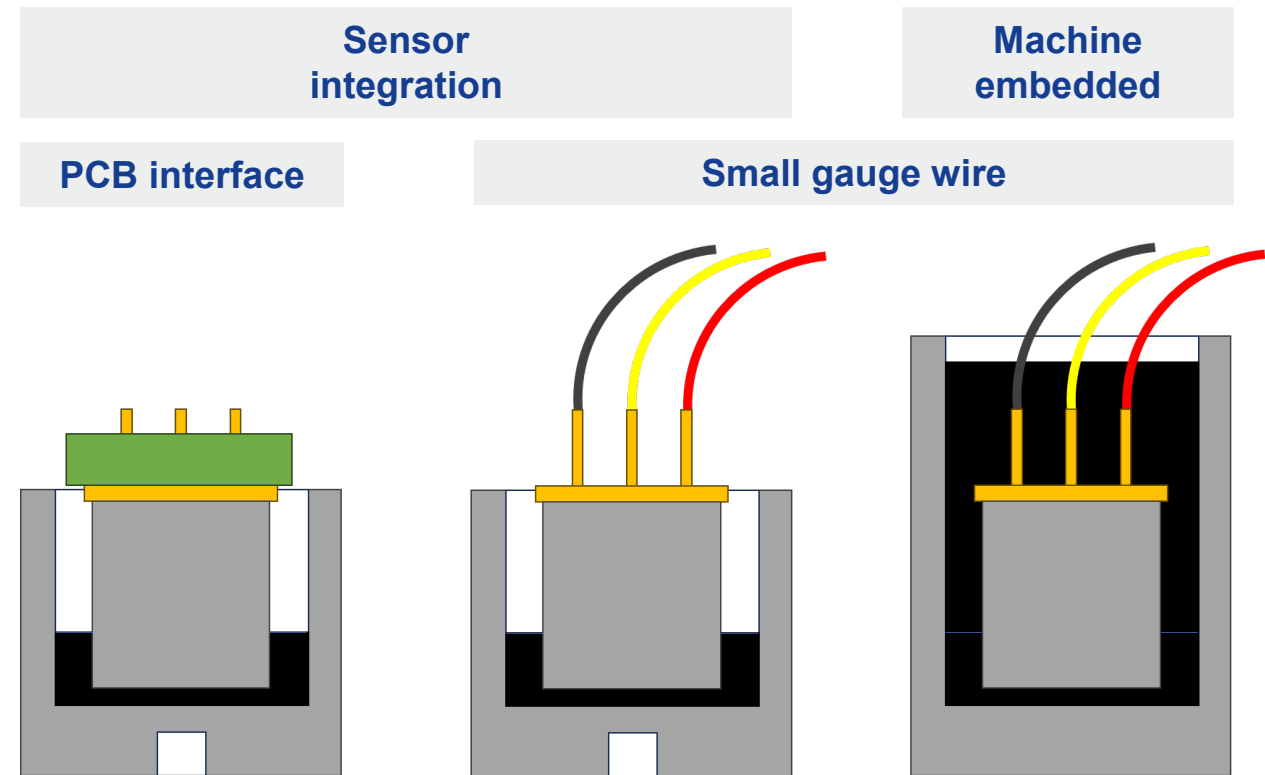


INTEGRATED MACHINERY
HEALTH MONITORING

BENEFITS OF TO-5 PACKAGING

EASY INTEGRATION INTO FINAL DESIGN

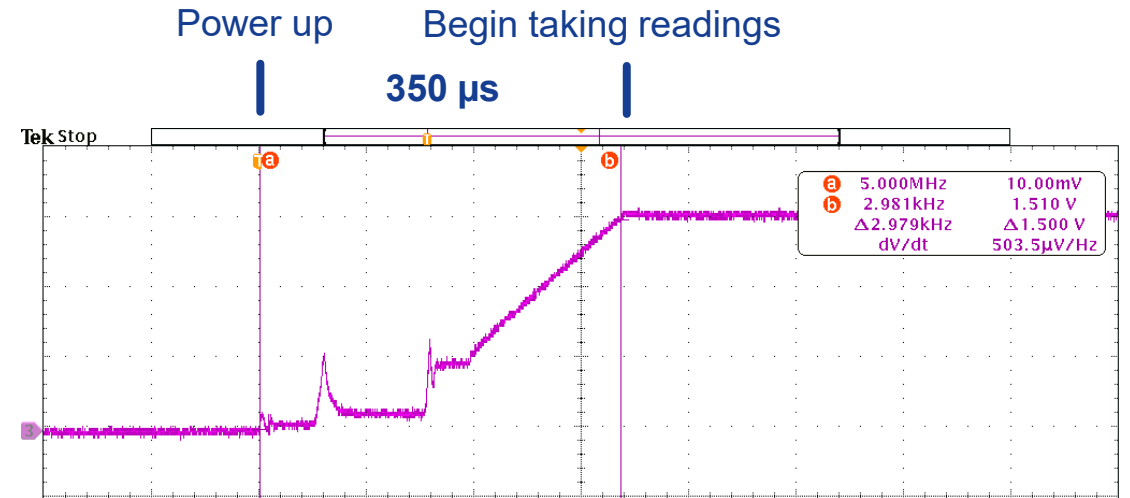
- Good vibration coupling from cannister base into vibration pellet
- Lightweight to preserve usable measurement bandwidth
- Hermetic sealing to prevent contaminants and moisture from entering the sensor, to ensure stable measurements over a long operational lifetime
- Small size enables three-axis sensor designs



ULTRA LOW POWER CONSUMPTION

TAKE MORE MEASUREMENTS USING LESS BATTERY

- 180 μW power consumption
- 60 μA very low current draw
 - 0 μA current draw in power-down mode
- Operates down to 3 VDC
- Ready to take measurements in 350 μs of power-up
- Use power only when taking a measurement




BATTERY OPERATION TIME PER MEASUREMENT

THE IMPORTANCE OF SETTLING TIME

	Wilcoxon LVEP low voltage accelerometer	Example X low voltage accelerometer	Example Y low voltage accelerometer	Traditional industrial accelerometer
Turn on/settling time	350 μ s <1 ms	1 second 1000 ms	3 seconds 3000 ms	5-7 seconds 7000 ms
Sampling time	300 ms	300 ms	300 ms	300 ms
Transmission time	40 ms	40 ms	40 ms	40 ms
Total battery time	341 ms	1340 ms	3340 ms	7340 ms
		3.9X battery	9.5X battery	21X battery


SPECIFICATIONS



Ultra low power embedded accelerometer LVEP050-TO5

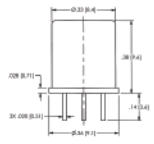
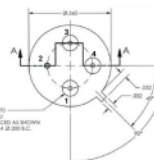
SPECIFICATIONS

Sensitivity, ±5%, 25°C	50 mV/g
Acceleration range	25 g peak
Amplitude nonlinearity	1%
Frequency response, nominal ¹ :	
±5%	3 - 5,000 Hz
±10%	2 - 7,000 Hz
±3 dB	1 - 11,000 Hz
Resonance frequency	17 kHz
Transverse sensitivity, max	5% of axial
Sensitivity variation with temp:	
-25°C	+5%
+120°C	-15%
Power requirement:	
Voltage source	3.0 - 5.5 VDC
Quiescent current, nominal	60 µA
Electrical noise, nominal, equiv. g:	
Broadband 2.5 Hz to 25 kHz	700 µg
Spectral	
10 Hz	35 µg ¹ /Hz
100 Hz	12 µg ¹ /Hz
1,000 Hz	8 µg ¹ /Hz
Output impedance, max	1,000 Ω
Bias output voltage, settling time ² , 25°C	<10 ms
Including temp effects	1.5 VDC ±5%
Grounding	none: pellet case must be isolated from mounting surface
Electromagnetic sensitivity, equiv. g. max	200 µg/gauss
Sensing element design	PZT, shear
Sealing	hermetic
Weight	3.2 grams
Case material	304L stainless steel
Header material	Kovar
Mounting	epoxy; pellet must be isolated from mounting surface or TO5 4-pin mount




Key features

- 180 µW power consumption
- Fast BOV settling time of <10 ms
- Standardized TO5 semiconductor package

Connections	
Function	Pin
common	1
case	2
output	3
power	4



Notes: ¹ Frequency response when epoxy mounted using flat shield surface.
² Based on BOV within 10% of nominal BOV at 25°C.

Accessories supplied: calibration data


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99443 Rev.A1 06/23

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Ultra low power embedded accelerometer LVEP100-TO5

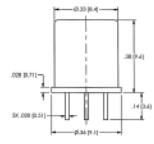
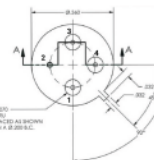
SPECIFICATIONS

Sensitivity, ±5%, 25°C	100 mV/g
Acceleration range	14 g peak
Amplitude nonlinearity	1%
Frequency response, nominal ¹ :	
±5%	6 - 5,000 Hz
±10%	4 - 7,000 Hz
±3 dB	2 - 11,000 Hz
Resonance frequency	17 kHz
Transverse sensitivity, max	5% of axial
Sensitivity variation with temp:	
-25°C	+5%
+120°C	-15%
Power requirement:	
Voltage source	3.0 - 5.5 VDC
Quiescent current, nominal	60 µA
Electrical noise, nominal, equiv. g:	
Broadband 2.5 Hz to 25 kHz	600 µg
Spectral	
10 Hz	24 µg ¹ /Hz
100 Hz	8 µg ¹ /Hz
1,000 Hz	4 µg ¹ /Hz
Output impedance, max	1,000 Ω
Bias output voltage, settling time ² , 25°C	<10 ms
Including temp effects	1.5 VDC ±5%
Grounding	none: pellet case must be isolated from mounting surface
Electromagnetic sensitivity, equiv. g. max	200 µg/gauss
Sensing element design	PZT, shear
Sealing	hermetic
Weight	3.2 grams
Case material	304L stainless steel
Header material	Kovar
Mounting	epoxy; pellet must be isolated from mounting surface or TO5 4-pin mount




Key features

- 180 µW power consumption
- Fast BOV settling time of <10 ms
- Standardized TO5 semiconductor package

Connections	
Function	Pin
common	1
case	2
output	3
power	4



Notes: ¹ Frequency response when epoxy mounted using flat shield surface.
² Based on BOV within 10% of nominal BOV at 25°C.

Accessories supplied: calibration data

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KEY SPECIFICATIONS

LVEP050-TO5

- **Sensitivity:** 50 mV/g, $\pm 5\%$
- **Acceleration range:** 25 g
- **Frequency response:**

$\pm 5\%$	3 - 5,000 Hz
$\pm 10\%$	2 - 7,000 Hz
± 3 dB	1 - 12,500 Hz
- **Resonance frequency:** 17 kHz
- **Electrical noise:**
 - Broadband 2.5 Hz to 25 kHz 700 μg
 - Spectral

10 Hz	35 $\mu\text{g}/\sqrt{\text{Hz}}$
100 Hz	12 $\mu\text{g}/\sqrt{\text{Hz}}$
1,000 Hz	6 $\mu\text{g}/\sqrt{\text{Hz}}$

LVEP100-TO5

- **Sensitivity:** 100 mV/g, $\pm 5\%$
- **Acceleration range:** 14 g
- **Frequency response:**

$\pm 5\%$	6 - 5,000 Hz
$\pm 10\%$	4 - 7,000 Hz
± 3 dB	2 - 12,500 Hz
- **Resonance frequency:** 17 kHz
- **Electrical noise:**
 - Broadband 2.5 Hz to 25 kHz 600 μg
 - Spectral

10 Hz	24 $\mu\text{g}/\sqrt{\text{Hz}}$
100 Hz	8 $\mu\text{g}/\sqrt{\text{Hz}}$
1,000 Hz	4 $\mu\text{g}/\sqrt{\text{Hz}}$

EMBEDDABLE DESIGN

Ultra-low power consumption

- **Power consumption:** 180 μ W
 - Very low for battery-powered applications
 - **Voltage source:** 3.0 - 5.5 VDC
 - **Current draw:** 60 μ A
 - **Power-down mode:** 0 μ A
- **BOV settling time:** 350 μ s
 - To take more measurements using less battery

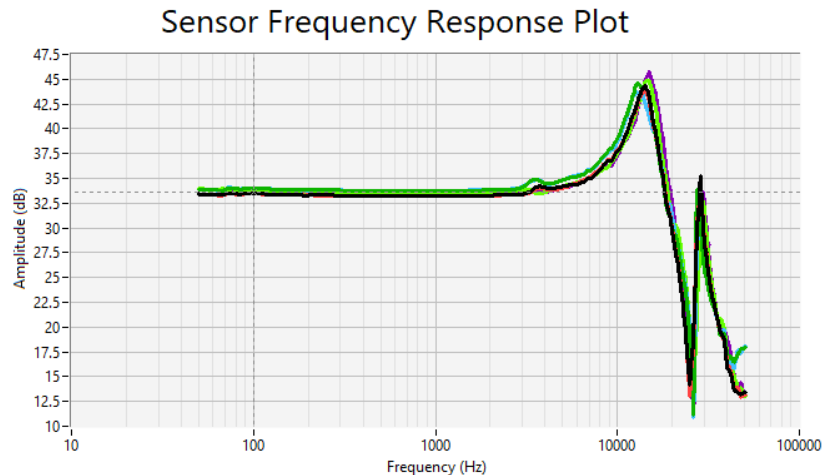
Other key features

- **Weight:** 3.2 grams
- **Size:** 0.36" (9.2mm) diameter, .38" (9.6mm) height
 - TO-5 standard transistor packaging for easy integration
- **Connector:** TO-5 4-pin
- **Sealing:** hermetic
- **Case material:** 304L stainless steel
- **Header material:** Kovar

PERFORMANCE MATCHING AN INDUSTRIAL ACCELEROMETER

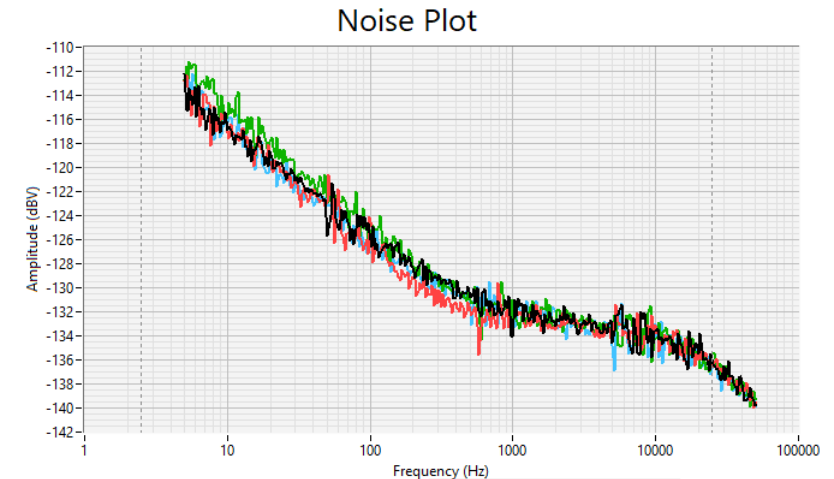
Wide bandwidth and flat response

- Reliable measurements above 6kHz to detect bearing issues earlier
- Flat response, no filtering required for sensor-induced in-band resonances
- $\pm 5\%$ sensitivity tolerance for minimal measurement variation between sensors



Low noise and high dynamic range

- Detect bearing and gearing issues earlier
- See what's happening below the noise floor of non-piezo-based sensing technologies



EVOLUTION

To scale



	786A	LPA100T	LVEP	LVEP-TO5
Form factor	Industrial sensor package limits mounting and configuration	Industrial sensor package limits mounting and configuration	Embeddable, small, not standardize transistor package	TO-5 package is small and standardized for embedding
Cost	Cost includes sensing functionality plus housing	Cost includes sensing functionality plus housing	Costs less than fully packaged sensor	More affordable sensing element
Temperature sensor	X	✓	✓	X
Low-power	X	✓	✓	✓

RESOURCES

- Product presentation
- [Infographic](#)
- [LVEP050-TO5 specifications](#)
- [LVEP100-TO5 specifications](#)
- [LVEP050-TO5 product page](#)
- [LVEP100-TO5 product page](#)
- Design guide – coming
- Evaluation demo kit – coming