

Description

BRIDGE.AI is an advanced LoRaWAN sensor for displacement, vibration monitoring of bridges, buildings and industrial structures.. **BRIDGE.AI** sensor embedded with integrated advanced intelligent (AI) computational algorithm enables reliable capability of the measurements. The data transmitted from the sensor based on LoRaWAN Internet of things network. **BRIDGE.AI** is powered with D-cell batteries and able to operate up to 5 years depending on the configuration.



Applications

- Bridge and structural health monitoring
- Parking structure and heavy vehicle load monitoring
- Heavy vehicle and mobile equipment condition monitoring
- Industrial asset and machine structure monitoring
- Factory automation and Industry 4.0 applications
- Construction site and temporary structure monitoring
- Scaffolding and Temporary Structure Safety Monitoring

Product features

- LoRaWAN communication
- Computational AI algorithm
- Displacement sensor
- Vibration measurements
- Configuration over the air
- Robust enclosure (IP67/IP68)
- Auto self-calibration

Sensing characteristics

Temperature measurement (internal)	Accuracy 0.5C
Accelerometer (3-axis)	+/- 2, 4, 8, 16G
Battery voltage	device supply voltage monitoring
Displacement	calculated structural or object displacement in mm

X-axis Parameters

XP1_fr	first dominant local peak frequency on X-axis (Hz)
XP1_mg	amplitude of first dominant peak on X-axis (mg)
XP2_fr	second dominant local peak frequency on X-axis (Hz)
XP2_mg	amplitude of second dominant peak on X-axis (mg)
X_Crest	crest factor on X-axis, calculated as ratio of peak to RMS value
X_High_Fr_E	vibration energy in corresponding frequency of the band on X-axis
X_Low_Fr_E	vibration energy in corresponding frequency of the band on X-axis

Y-axis Parameters

YP1_fr	first dominant local peak frequency on Y-axis (Hz)
YP1_mg	amplitude of first dominant peak on Y-axis (mg)
YP2_fr	second dominant local peak frequency on Y-axis (Hz)
YP2_mg	amplitude of second dominant peak on Y-axis (mg)
Y_Crest	crest factor on Y-axis, calculated as ratio of peak to RMS value

Y_High_Fr_E	vibration energy in corresponding frequency of the band on Y-axis
Y_Low_Fr_E	vibration energy in corresponding frequency of the band on Y-axis
Z-axis Parameters	
ZP1_fr	first dominant local peak frequency on Z-axis (Hz)
ZP1_mg	amplitude of first dominant peak on Z-axis (mg)
ZP2_fr	second dominant local peak frequency on Z-axis (Hz)
ZP2_mg	amplitude of second dominant peak on Z-axis (mg)
Z_Crest	crest factor on Z-axis, calculated as ratio of peak to RMS value
Z_High_Fr_E	vibration energy in corresponding frequency of the band on Z-axis
Z_Low_Fr_E	vibration energy in corresponding frequency of the band on Z-axis
Mechanical specification	
IP rating	IP67/IP68 optional
Dimensions	157 x 93 x 38 mm
Enclosure	Plastic ASA
Storage Temperature	-30 to 70 °C
Sensor Power Supply	
Battery Type and voltage	2 x 3.6 V D-Cell Lithium Battery
Expected Battery Life	Up to 5 years (Depending on configurations and environment)
Radio / Wireless specification	
Wireless Technology	LoRaWAN® 1.0.3
Wireless Security	End-to-End encryption (AES-CTR), Data Integrity Protection (AES-CMAC)
LoRaWAN Device Type	Class A End-device
Supported LoRaWAN® features	Default - OTAA , Optional - ABP, ADR, Adaptive Channel Setup
Supported LoRaWAN® regions	EU863 – 870 Optional: US902 – 928, EU863 – 870, AU915 – 928, EU433, RU864, IN865
TX Power	14dBm±1dBm (Region specific)
Rx Sensitivity	-132 dBm (LoRa, Spreading Factor=12, Bit Rate=293bps) -118 dBm (FSK, Frequency deviation=5kHz, Bit Rate=1.2kbps)
Link Budget	137 dB (SF7) to 151 dB (SF12)
Communication range	10 km (line-of-sight, actual transmission distance depends on the environment)
Sensor specification	
Supported displacement sensors	Elastic semiconductor type or classic Cylindrical type
Supported external sensors	Sensors with 4-20mA current output Sensors with 0-10V voltage output
Displacement accuracy	with elastic sensor: 0.5%
Displacement resolution	0.01%
Elastic displacement sensor options	50mm / 100mm (Optional: 5mm / 20mm /250 mm)
Cylindrical displacement sensor options	Optional

Sensor dimensions:

