

Spec for SL800EU

LoRaWAN Vibration Sensor



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1. General Information

SL800EU is long range low power vibration sensor based on Semtech SX1262, which is standard LoRaWAN Class A compatible and is widely adopted in equipment monitoring. **1.1 Main features:**

G Sensor

Type-C for Local Configuration

Internal Battery Up to 10 Years

LoRa SX1262, Long Range Low Power

LoRaWAN Class A Compatible



Type-C for Local Configuration

1.2 Details:



Parameter	Feature
CPU	M0+
Wireless	LoRaWAN(SX1262)
Encryption	AES128 Optional
Power	Built-in Li-battery (Changeable, and No Recharge)
Communication	Half duplex
Sensing Method	G sensor
Power Capacity	4500mAh
Lifespan	Up to 10 Years, Data Uploading for Every 10 mins
Data Speed	300bps-62.5k bps
Size	102mm*60mm*25mm
TX Power	22dBm Max
RX Sensitivity	-140 dBm
Frequency	CN 470MHz~510MHz EU 868MHz US 915MHz

1.3 Size: 102mm*60mm*25mm









Lay the product flat on the tableHang on the wallFor the G sensor, you can attach to equipment with magnet as below:



2. User Guide

Make sure antenna is installed before turn on the device.

2.1 Turn on/off the device

When you get the device, it is off. Just press the button for 5 seconds and you can turn on the device. When you turn on the device, there are 4 led on the top, all led will twinkle from left to right. If you turn off the device, press the button for 5 seconds and all led will twinkle from right to left, after turn off the device, no data collecting and uploading.





2.2 Data uploading by press the button

When turn on the device, normally the sensor will read data and upload every 10 mins, if you want to send data immediately, you can just press the button for 1 second, and sensor will read and upload data. While press the button, 4 led will be green at the beginning, and then TX led on the device will be green while sending data as below:



2.3 Led display on the device

4 led on top of the device, and they are POWER/TX/RX and SENSOR from left to right as below. POWER is the battery level, normally when you turn on the device, 4 led will be green which means the battery level is 100%. If only 3 led are green which means the battery is 75% left. There is low battery alert and POWER will be red while low battery level.

TX and RX means sensor is sending or receiving data.

Sensor is green means sensor is reading and uploading data, if sensor is red, that means sensor is not working, please kindly check if the sensor is will connected.



2.4 USB-C Port

There is one USB-C port as below, which is for power on and config, connect device to laptop with a USB-C cable, and you can config the device, make sure to install USB



driver and here is the link for driver: <u>http://doc.rejeee.com/web/#/29?page_id=190</u>



Type-C for Local Configuration

3. Data Uploading

When turn on the device, it will send data immediately, also you can press the button for 1 seconds, then the device will also send data. Normally when you get the device from factory, the reset time for data sending is every 10 mins, and if you want to change the time, you can connect the device to computer for config, later there is instruction about the time configuration.

4. Connect to LoRaWAN Network

LoRaWAN Network Structure



SL800EU vibration sensor is based on standard LoRaWAN Class A, so you can connect to any LoRaWAN network through OTAA.

On the back of device, you can find information as below, with this information, you can connect to any LoRaWAN server.



Device EUI:	CACBB80100002296
APP EUI:	CACBB8000000001
APP Key:	1122334455667788 9900AABBCCDDEEFF

Here below take TTN as an example about how to connect the device to TTN server:

From The LoRaWAN Device Repository Manually
Frequency plan 🗇 *
Europe 863-870 MHz (SF12 for RX2)
LoRaWAN version ⑦*
MAC V1.0.3
Regional Parameters version ⑦*
PHY V1.0.3 REV A
Show advanced activation, LoRaWAN class and cluster settings A
Activation mode ⑦*
 Over the air activation (OTAA)
Activation by personalization (ABP)
O Define multicast group (ABP & Multicast)
Additional LoRaWAN class capabilities 🗇
None (class A only)
Network defaults (?)
Use network's default MAC settings
Use network's default MAC settings
Image: Work of a later settings Use network's default MAC settings Cluster settings (*) Use external LoRaWAN backend servers
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Vise network's default MAC settings Cluster settings ⑦ Use external LoRaWAN backend servers DevEUI ⑦* ⑦ Generate 0/50 used AppEUI ⑦* Fill with zeros AppKey ⑦* ····································
View Not Version S O Use network's default MAC settings Cluster settings ⑦ Use external LoRaWAN backend servers DevEUI ⑦* Fill with zeros AppKey ⑦* End device ID ⑦* my-new-device This value is automatically prefilled using the DevEUI After registration I view registered end device

And here is the data decoder for TTN platform, just copy the information as below:



```
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```

```
1. function decodeUplink(input) {
2. var obj = {};
3. var warnings = [];
4. var len = input.bytes?input.bytes.length:0;
5. var offset = 0;
6. var dtype;
7.
8. offset++;
9. /**
10. * data of voltage level, voltage level is from0-31, 31 means 100%
   power;
11. */
12. obj.level = (input.bytes[offset++]&0x1F);
13. /**
14. * Data of voltage, the value is 100mV, if data is 33, that means
   voltage is 3300mV.
15. */
16. obj.vol = (input.bytes[offset++]);
17. do {
18. dtype = input.bytes[offset++];
19. /**
20. * dtype: Sensor type:
21. */
22. if(0x01 == dtype){
23. /**
24. * dtype 01: Vibration sensor data
25. evt: Event: 1: Vibration, 0: No vibration
26. acceX: X-axis acceleration
27. acceY: Y-axis acceleration
28. acceZ: Z-axis acceleration
29. angle: Rotation angle
30. */
31. obj.evt = input.bytes[offset++];
32. obj.acceX = (((input.bytes[offset] & 0x80 ? input.bytes[offset] -
   0x100 : input.bytes[offset]) << 8) + input.bytes[offset+1])</pre>
33. offset += 2;
34. obj.acceY = (((input.bytes[offset] & 0x80 ? input.bytes[offset] -
   0x100 : input.bytes[offset]) << 8) + input.bytes[offset+1])</pre>
35. offset += 2;
36. obj.acceZ = (((input.bytes[offset] & 0x80 ? input.bytes[offset] -
   0x100 : input.bytes[offset]) << 8) + input.bytes[offset+1])</pre>
37. offset += 2;
38. obj.angle = input.bytes[offset++];
39. } else if(0x04 == dtype){
```



```
40.
41. /**
42. * dtype 04: Temperature sensor data
43. temperature: Temperature value
44. */
45. obj.temperature = (((input.bytes[offset] & 0x80 ?
   input.bytes[offset] - 0x100 : input.bytes[offset]) << 8) +</pre>
   input.bytes[offset+1]) / 10;
46. offset += 2;
47. if (obj.temperature < -10) {
48. warnings.push("it's cold");
49. }
50. } else if(0x05 == dtype){
51. /**
52. * dtype 05: Humidity sensor data
53. humidity: Humidity percentage, magnified 100 times
54. */
55. obj.humidity = input.bytes[offset++];
56. } else if(0x06 == dtype) {
57. /**
58. * dtype 06: 02 sensor data
59. oxygen: O2 concentration, magnified 100 times
60. */
61. obj.oxygen = input.bytes[offset++];
62. } else if(0x30 == dtype) {
63. /**
64. * dtype 06: Other gas sensor data, like CO2, SF etc.
65. volume: Other gas concentration, magnified 100 times
66. */
67. var 1 = input.bytes[offset++];
68. var gastype = input.bytes[offset++];
69. obj.volume = ((input.bytes[offset] << 24) +
   (input.bytes[offset+1] << 16) + (input.bytes[offset+2] << 8) +</pre>
   input.bytes[offset+3])/100;
70. offset += 4;
71. if (obj.volume < 0) {
72. warnings.push("it's invalid");
73. }
74. }
75.len = len - offset;
76. } while(len > 0)
77.
78. return {
79. data: obj,
```



	• La	st seen 6 days ago	↑ 1 ↓ n/a	_		
	o	verview Live data	Messaging	Location	Payload formatters	Caiming
Uplink	Downlink					
Setup						
Formatter type			· •			
Formatter para	meter*					
1 <i>functi</i> 2 <i>retu</i> 3 da	<pre>on decodeUplink(input rn { ta: { bytes: input.bytes</pre>	copy here	e			

5. Wireless LoraWAN Sensor Data Format

Picture as below, FRMPayload is sensor data.

PHYPayload:

MHDR	MACPayload	MIC
	or	
MHDR	Join-Request	MIC
	or	
MHDR	Join-Response	MIC

MACPayload:

FHDR	FPort	FRMPayload
Figure	MAC payload	structure

FRMPayload=	MIC		
Data 1		Data N	4 Bytes



MHDR	FHDR	FPort	Type+Value	Type+Value	Type+Value	
			N Bytes	N Bytes	N Bytes	

6. Sensor Data Definition

Device Info(0x00)

Туре	Value									
1 Byte	2 Bytes									
Status	Version	Level	Reserve							
	3bit	5bit	1 Byte							
0x00	000 х хххх уууууу	000 x xxxx ууууууу								
	First 3 is version, l	First 3 is version, last 5 is battery level from 0-31, 0 means there is								
	no power, and 31	means 100% battery	ν.							

G sensor(0x01)

Туре							
1 Byte	length	length X 2Bytes					
	1 Byte	Y 2Bytes	1 Byte				
		Z 2Bytes					
0x01	0x00 Regular	High in front, low in back, int_ 16 signed					
	0x01 Vibration	number					
		e.g 0050 0020 0030					
		is X=80; Y=32; Z=48					

For Example:

FRM Payload is 00 3F 24 01 00 0040 0080 FC40 00 00 is device information 3F (binary is 0011 1111b)version 1 and level 31 24 is for reserve 01 is vibrating 00 regular status 0040 is X=64mg 0080 is Y= 128mg FC40 is Z= -960mg

00 is reserve

7. Local Configuration:

Note: Factory reset data uploading is every 10 mins, customers can change data uploading frequency as below:

Connect sensor with a USB-C cable to computer for local configuration, through local



configuration, you can change the packet frequency. Download config tool here: http://doc.rejeee.com/web/#/29?page_id=203 unpack the document as below:



Double click ConfigTool.exe to the page below, this is the factory default parameters, and you can change each one to connect to other network, but normally customer only need to change data uploading period.



Parameters interpretation

LFT: Data uplink period

LCP: Sensor sample period

RXW: Preheat period for Gas Sensor, unit is seconds

Calibration: Gas Sensor calibration value, unit is 0.01

Following below steps to change packet uploading period:

- 1. Refresh
- 2. Open the serial port



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SenceMode Help SenceMode Help SerialPort : ■ USE	nfig Tool 3-SERIAL CH340 (CON	1 (12) V Refresh	Baudrate : 9600 V	arity :	8N1 V ØC	pen			-	- ×
COM	12 - USB-SERIAL CH	840 (CO)				·				
Device InformCOM	1 - ELTIMA Virtual Se	erial Ports(Blue is Ofte	en)						AT Interactive message	
ReadConfig	2 - ELTIVIA Virtual Se	and pontateConfig								
3 DevAddr:	??	ParamMode :	00 - Simple ~]	NetMode :	00 - Fix	~			
Version(ATI):	??	UpPeriod(LFT) :	0		SamplePeriod(LCP) :		0	sec		
NetMode:	??	Frequency(TX) :	433.00	Mhz	Frequency(RX) :		433.00	Mhz		
LCP:	??	DVM.		1	C-libertion .					
LFT:	??		0		Calibration :		0			
TFREQ:	??	AES Key(Hex) :	000000000000000000000000000000000000000	000000	00					
RFREQ:	??		Set AES Cle	ar AES	Clear LCP	R	eset			
SpreadingFactor:	??									
SyncWord:	??									
SEQ/IP:	?? ??									
AES:	??									
IQ Inverted:	?? ??									
LowDataRate:	??									
Preamble:	??									
Bandwidth:	??									
FNB:	??									
Power:	??									
Modulation:	??									
CodeRate:	??									
CRC:	??									

3. Read current configuration

4 LoRa Device Concerning SenceMode Help	onfig Tool													
SerialPort : CON	112 - USB-SERIAL CH	340 (🗸 🛛 Refresh	Baudrate :	115200	P	arity :	8N1 ~	<i>»</i> c	lose					Config Read Su
Device Information	n	Settings(Blue is Ofter	n)									AT	Interactive	message
🤹 ReadConfig		📙 UpdateConfig): (++++	
DevAddr:	260B4B49	ParamMode :	00 - Simple		~		NetMoo	de :	01 - Hop	~		<: k	>: +++	
Version(ATI):	1,1004	UpPeriod(LFT) :			600		SamplePeriod(L0	CP) :		600	sec	×: >:	AT+CFG?	
NetMode:	Node to Gateway	Frequency(TX) :			60 1	Mhz	Frequency/R	x 1 -		050 525	Mhz	<: <:	NET: TFREQ:	Node to Gateway 868100kHz
LCP:	600	frequency(iv).		0	08.1		riequency(it			809.525		<: 2	RFREQ: POW-	869525kHz
LFT:	600	RXW :			32		Calibratio	on :		0		K:	B¥:	125kHz
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RFREQ:	869525kHz		Set AES	s	Clea	ar AES	Clear	LCP	Reset			<: Z	CR:	4/5
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SyncWord:	0x12											<:	PREM:	8,10
	orrorr											<: 2	FIX: CRC:	0,0 OM
SEQ/IP:	OFFOFF											K:	TIQ:	OFF
AES:	ON											<:	RIQ:	ON
IO Inverted:	OFFON											<:	SEQ:	OFF
												8	IP: APS:	OFF
LowDataKate:	0,0											K:	ACK:	OFF
Preamble:	8,10											< :	LDR:	0, 0
Bandwidth:	125kHz											< :	LCP:	600
												8	LFT: RVW-	6UU 22
FNB:	0x84											K:	FNB:	0x84
Power:	22dBm											<:	TYPE:	0x04
Modulation:	LORA											<:	CALIB:	0
												[2:]	AT+ADDR?	

4. Update the date uploading period for LCP and LFT.

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🍓 LoRa Device Co	onfig Tool									- D >		
<u>S</u> enceMode <u>H</u> elp												
SerialPort : CON	112 - USB-SERIAL CH	1340 (🗸 🛛 Refresh	Baudrate : 115200	~ Parity	: 8N1 🗸 🤞	Close				Config Read Succe		
Device Information	1	Settings(Blue is Ofter	n)						AT Interactive	message		
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NetMode:	Node to Gateway	oprenou(21).		1200	sumpler enou(cer,		7 1200		NET:	Node to Gateway		
LCP:	600	Frequency(TX) :		868.1 Mh	z Frequency(RX)	:	869.525	Mhz	RFREQ:	869525kHz		
LFT:	600	RXW :		32	Calibrati	1	0		: POW: : BW:	22dBn 125kHz		
TFREQ:	868100kHz	AES Key(Hex) :	000000000000000000000000000000000000000	000000000000000000000000000000000000000	000				TSF:	12		
RFREO:	869525kHz		0.1150					<	C RSP:	4/5		
SpreadingEactor:	12.12	/	Set AES	elear AE	S Clear LC	Kese	et	4	MODE:	LORA 0w12		
SuncWords	0-12							X	PREM:	8, 10		
Syneword.	OFFOFF								C FIX:	0, 0 0W		
SEQ/IP:	OFFOFF							k	TIQ:	OFF		
AES:	ON	4 you d	can change s	some par	ametsers val	ue as neede	a	4	RIQ:	ON		
IQ Inverted:	OFF <mark>ON</mark>								C SEQ:	OFF		
LowDataRate:	0,0							<	AES:	ON		
Preamble:	8.10								C ACK:	OFF		
Des de l'alde	1051-01-							<	LDR:	600		
bandwidth:	120KHZ							<	: LFT:	600		
FNB:	0x84								EXW:	32		
Power:	22dBm							k	TYPE:	0x04		
Modulation	LORA							<	CALIB:	0		

5. Update config, and when configuration update successfully, close the config tool, and local configuration has been finished.

Settings(Blue is Ofte	n)		AT Interactive message			
UpdateConfig				>	AT+LCP=04	30
ParamMode :	00 - Simple 🗸	NetMode :	01 - Hop 🗸 🗸	sec C C C C C C C C C	AT+LFT=04H OK	30
UpPeriod(LFT) :	1200	SamplePeriod(LCP) :	1200		: AT+CFG? : NET: : TFREQ: : TFREQ: : POW: : BW: : TSF: : CR: : MODE: : SYNC: : SYNC: : PREM: : FIX: : CRC: : TIQ: : RIQ: : REQ: : LCP: LCP: LCP: LCP: : LCP: : RW: : FNE: : RVE: : RV	Node to Gateway 868100kHz 869525kHz
Frequency(TX) :	868.1	Mhz Frequency(RX) :	869.525			
RXW :	32	Calibration :	0			22dBm 125kHz
AES Key(Hex) :	00000000000000000000000000000000000000	INFIG_UPDATE_OK	X Reset			125kHz 12 12 4/5 LORA 0x12 8,10 0,0 OFF OFF OFF 0FF 0FF 0FF 0FF 0F
				<	: CALIB:	0

8. Shipping list

LoRaWAN vibration sensor*1 Mounting brackets*1 LoRaWAN antenna*1