

# LoRa Concentrator Module

## Linxdot LM-1000

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### Overview

LM-1000 is a LoRa concentrator card with mini-PCIe form factor based on SX1302, which enables an easy integration into an existing router or other network equipment with LoRa Gateway capabilities. It can be used in any embedded platform offering a free mini-PCIe slot with SPI or USB connection. Furthermore, ZOE-M8Q GPS chip is integrated on board.

LM-1000 is a complete and cost efficient LoRa gateway solution offering up to 10 programmable parallel demodulation paths which are 8xSF5-SF12 LoRa demodulators, 8xSF5-SF10 LoRa demodulators, 125 /250 / 500 kHz LoRa demodulator and (G)FSK demodulator. It can detect at any time, any packet in a combination of 8 different spreading factors(SF5 to SF12) and 10 channels, and demodulate up to 16 packets at any time. It targets smart metering fixed networks and Internet-of-Things (IoT) applications, covering up to 500 nodes per square kilometer in an

### Main features

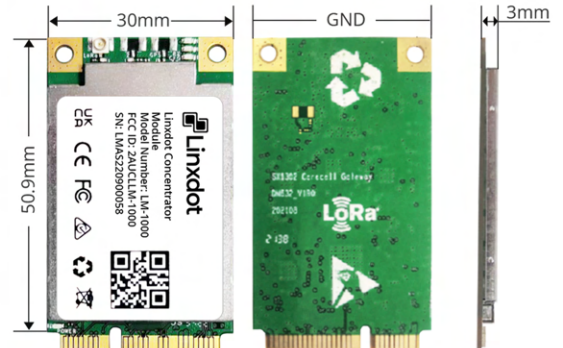
- Compatible with Mini PCI-e Edition specification with heat sink.
- SX1302 base band processor emulates 8 x8 channel LoRa packet detectors, 8 x SF5-SF12 LoRa demodulators, 8 x SF5-SF10 LoRa demodulators, one 125 /250 / 500 kHz high-speed LoRa demodulator and one (G)FSK demodulator .
- Optional built-in extra MCU to convert SPI interface of SX1302 to USB2. 0.
- Voltage of Mini PCI-e is 3.3 V, compatible with 3G/LTE card of Mini PCI-e type.
- Tx power up to 27dBm, Rx sensitivity down to -139dBm@SF12, BW 125 kHz.
- Supports latest LoRaWAN 1.0.2 protocol.
- Supports global license-free frequency band (EU868, US915, AS923, AU915, KR920, IN865 and AS920).
- Supports optional SPI or USB interfaces.
- Built-in ZOE-M8Q GPS module.
- Optional LBT (Listen-Before-Talk) function.

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### Pin configuration

| Item          | Pin(s)   | Item            | Pin(s) |
|---------------|--|-----------------|--------|
| <b>GND</b>    | 4, 9, 15, 18, 21, 26, 27, 29, 34, 35, 37, 40, 43, 50 | <b>USB_D+</b>   | 38     |
| <b>3.3V</b>   | 2, 24, 39, 41, 52                                    | <b>SPI_SCK</b>  | 45     |
| <b>1PPS</b>   | 19   | <b>SPI_MISO</b> | 47     |
| <b>RESET</b>  | 22   | <b>SPI_MOSI</b> | 49     |
| <b>USB_D-</b> | 36   | <b>SPI_CSN</b>  | 51     |



### Specifications

|                            |  |
|----------------------------|--|
| <b>LoRa Module</b>         | SX1302 base band processor emulates 8x8 channel                            |
| <b>Frequency</b>           | EU868, US915, AS923, AU915, KR920, IN865 and AS920                         |
| <b>LoRaWAN Version</b>     | LoRaWAN V1.0.2   |
| <b>Range</b>               | Urban: 2~4km<br>Suburb: 5~10km, Open Area: 15km                            |
| <b>Node Numbers</b>        | 500 nodes/km2  |
| <b>TX Power</b>            | 27dBm (Max)  |
| <b>RX Sensitivity</b>      | -139dBm@SF12, BW 125 kHz   |
| <b>Power Supply</b>        | DC 3.3V  |
| <b>Hardware Interface</b>  | Mini-PCIE  |
| <b>Software Interface</b>  | Supports optional SPI or USB interfaces                                    |
| <b>USB</b>                 | Optional built-in extra MCU to convert SPI interface of SX1302 to USB2. 0. |
| <b>Antenna Interface</b>   | 1* UFL connectors for LoRa   |
| <b>Power Consumption</b>   | TX (Max): 513mA<br>RX (Max): 101 mA  |
| <b>Working Environment</b> | Indoor/Outdoor   |
| <b>Dimensions</b>          | Dimension (L x W x H): 50.9 x 30 x 3mm<br>Weight: 7.5g                     |
| <b>Temperature Range</b>   | Storage Temperature: 40°C ~ +85°C<br>Operation Temperature: 40°C ~ +85°C   |
| <b>Compliance</b>          | FCC, CE, UKCA, RCM   |

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### FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247  
External Antenna with gain 2dBi(LoRa)

#### FCC Regulatory Compliance:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) this device may not cause harmful interference, and  
(2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

time. It targets smart metering fixed networks

If power exceeds the limit and the distance(Over 20cm distance in actual use between the device and user) is compliance with the requirement

#### RF Exposure Compliance:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

#### Notice to OEM integrator

If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. The end product shall have the words "Contains Transmitter Module FCC ID: 2AUCLLM-1000".

The device must be professionally installed.

The intended use is generally not for the general public. It is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required. The user has no access to the connector.

Installation must be controlled. Installation requires special training.

Any company of the host device which installs this modular with unlimited modular approval should perform the test of radiated & conducted emission and spurious emission, etc. according to FCC part 15C: 15.247 , 15B Class B requirement, only if the tests result comply with FCC part 15C: 15.247 , 15B Class B requirement, then the host can be sole legally.

When the module is installed inside another device, the user manual of the host contain below 1) This device may not cause harmful interference.

2) This device must accept any interference received, including interference that may cause undesired operation.

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### UKCA Statement

Operating Temperature: -15°C to 40°C

This device in compliance with the essential requirements and other relevant provisions of UK Radio Equipment Regulations (SI 2017/1206); UK Electrical Equipment (Safety) Regulations (SI 2016/1101); and UK Electromagnetic Compatibility Regulations (SI 2016/1091). All essential radio test suites have been carried out.

This product is a fixed location. To comply with RF exposure requirements, a minimum separation distance of 20cm must be maintained between the user's body and the device. Third-party belt-clips, holsters, and similar accessories used by this device should not contain any metallic components. Body-worn accessories that do not meet these requirements may not comply with RF exposure requirements and should be avoided. Use only the supplied or an approved antenna.

This device in compliance with the essential requirements and other relevant provisions of UKCA. All essential radio test suites have been carried out.

1. Adapter shall be installed near the equipment and shall be easily accessible.
2. The plug considered as disconnect device of adapter.

Operation Frequency: 864.1MHz, 864.3MHz, 864.5MHz, 868.1MHz, 868.3MHz, 868.5MHz LoRa: 0.0085W

Manufacturer: FX Technology Limited

Address: 2 Stone Buildings, Lincoln's Inn, London, WC2A 3TH United Kingdom E-mail: support@fxtec.com

# LoRa Concentrator Module

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### DECLARATION OF CONFORMITY

I hereby declare that the product

Product: Linxdot Concentrator Module  
Model No.: LM-1000  
Trade mark: Linxdot  
Hardware Version:DM632\_VIR0  
Software Version:1.0

(Name of product, type or model, batch or serial number)

satisfies all the technical regulations applicable to the product within the scope of UK Radio Equipment Regulations (SI 2017/1206); UK Electrical Equipment (Safety) Regulations (SI 2016/1101); and UK Electromagnetic Compatibility Regulations (SI 2016/1091) and declare that the same application has not been lodged with any other UK Approved Body.

BS EN IEC 62311:2020  
EN IEC62368:2020+A11:2020  
BS EN IEC62368-1:2020+A11:2020  
Final draft ETSI EN 301 489-3 V2.2.0(2021-11)  
ETSI EN 301 489-1 V2.2.3(2019-11)  
ETSI EN 300 220-1 V3.1.1(2017-02)  
ETSI EN 300 220-2 V3.2.1(2018-06)

(Title(s) of regulations, standards, etc.)

**All essential radio test suites have been carried out.**

**NOTIFIED BODY:** MiCOM Labs Inc

- **Address:**

575 Boulder Court,  
Pleasanton, California 94566  
USA  
Identification Number: AB2280

**MANUFACTURER or AUTHORISED REPRESENTATIVE:**

- **Address:**

FX Technology Limited  
2 Stone Buildings, Lincoln's Inn, London, WC2A 3TH United Kingdom

This declaration is issued under the sole responsibility of the manufacturer and, if applicable, his authorised representative.

**Point of contact:**

Liangchen Chen/+44-8081001800/+44-8081001800  
(Name, telephone and fax number)

2022-10-20

(Place, date of issue)



(Signature)

Liangchen Chen/Manager

(Name and title in block letters)