Datenblätter Gateways

WIRNETITSATION

PRODUCT DESCRIPTION

	Written by	Approved by	Validated by
Name	SNI	FLM	LGE
Entity	PRGM	DRD	Customer Services
Date	2020-07-22	2020-07-22	2020-07-28

HISTORY

Date	Modification	Author	Version
2019-07-04	Creation	FLM	0.1
2019-07-12	Minor update	FLM	1.0
2019-08-06	Minor update on paragraphs 3.1 & 3.3.1	FLM	1.1
2020-02-17	Minor update on paragraph 3.6, 3.8.2 & 4	FLM	1.2
2020-03-13	Dimensions on drawing	FLM	1.3
2020-05-14	Changes in paragraphs 3.3.3, 3.4.3, 3.7 Addition of new paragraph 4	FLM	1.4
2020-07-22	Detailed connection of external antennas	SNI	1.5
2020-07-28	Official version	SNI	2.0
2022-05-03	Changes in paragraphs 4.4	FLM	2.1

TABLE OF CONTENT

Figures

REFERENCE

Reference	Document / link	Description
[1]	https://lora-alliance.org/lorawan-for-developers	LoRaWAN™ Specification V1.0.3 2018 March 19th LoRaWAN™ 1.1 Regional Parameters Revision B, 2018 January
[2]	https://lora-alliance.org/lorawan-for-developers	
[3]	https://www.lora-alliance.org/For-Developers/LoRaWANDevelopers	LoRaWAN™ Regional Regulation Summary Version 1.5 draft 10 May 15th, 2018

GLOSSARY

Abbreviation	Description
BW	Band Width
CPU	Central Processing Unit
DDR	Double Data Rate
EDGE	Enhanced Data rates for GSM Evolution
EIRP	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
eMMC	Embedded Multi Media Card
FPGA	Field Programmable Gate Array
GMSK	Gaussian Minimum Shift Keying
GPRS	General Packet Radio Service
GSM	Global System for Mobile communication
HSPA	High Speed Packet Access
HTTP	HyperText Transfer Protocol
IC	Integrated Circuit or Industry Canada
IK	Mechanical Impact
IO	In / Out
IoT	Internet of Things
ISM	Industrial Scientific and Medical
KLK	KERLINK
LED	Light-Emitting Diode
LNA	Low Noise Amplifier
LoRa	Long Range

LTE	Long Term Evolution Machine to Machine Power Amplifier
M2M	Printed Circuit Board Packet Error Rate Power over Ethernet
PA	Random Access Memory Radio Frequency Received Signal
PCB	Strength Indicator Receive Surface Acoustic Wave Signal to
PER	Noise Ratio
PoE	Serial Peripheral Interface bus
RAM	Transmit
RF	Universal Mobile Telecommunications System
RSSI	Universal Serial Bus
RX	Wireless Wide Area Network
SAW	Third generation of mobile telecommunications technology
SNR	Fourth generation of mobile telecommunications technology
SPI	
TX	
UMTS	
USB	
WWAN	
3G	
4G	

1. Introduction

The Wirnet™ iStation gateway is part of the global Long Range Radio fixed network to provide M2M connectivity link between low power end-point and Internet Access.
The gateway architecture is specifically designed for the needs of outdoor environment.

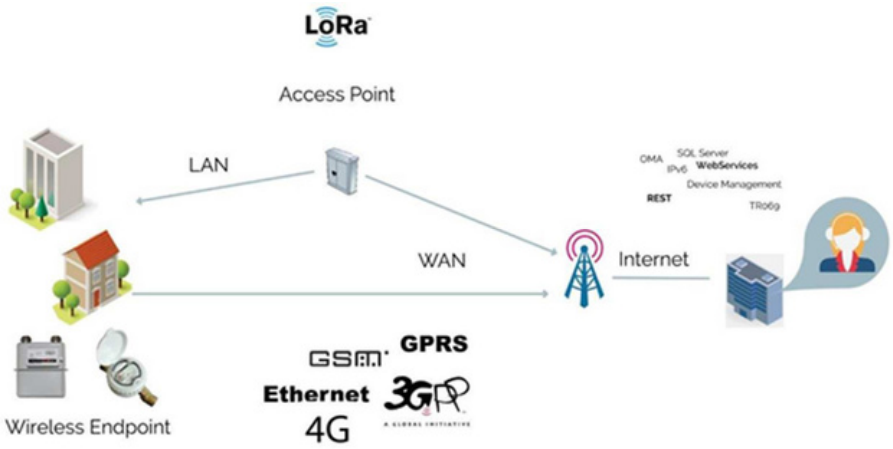


Figure 1: LoRa Network topology

The Wirnet™ iStation is based on “LoRa” technology provided by Semtech Company. It is compatible and interoperable with existing LoRa LPWAN.

This gateway is declined into three versions to cover different countries and areas around the world:

Geographical area	Wirnet iStation 868	Wirnet iStation 915	Wirnet iStation 923
	Europe, Russia Africa Middle East, India	North America Central America South America	Asia: Indonesia, Malaysia, Korea, Japan, Taiwan, Hong Kong, Thailand, Vietnam, Papua New Guinea, Singapore, Philippines Oceania: Australia, New Zealand Latin America: Brazil, Argentina, Colombia
ISM band	863 - 876MHz	902 - 928 MHz	915 - 928 MHz
Rx Band (DL)	863 - 873MHz	902 - 915 MHz	915 - 928 MHz
Tx band (UL)	863 - 873 MHz	922 - 928 MHz	915 - 928 MHz

Please check the appropriate version for the dedicated country. Contact KERLINK if required.
The present document addresses all the above Wirnet™ iStation versions.

2. Main functionalities

Here are the main functionalities of the Wirnet™ iStation product:

- LongRange support:
  - o Incorporate LoRa (TM) bidirectional communications technology:
    - RX: 863- 873MHz, TX: 863-873MHz (according to HW capabilities)
    - RX: 902-915MHz, TX: 922-928MHz (according to HW capabilities)
    - RX: 915-928 MHz, TX: 915-928MHz (according to HW capabilities)
  - o Emulates 49 LoRa demodulators over 9 channels + 1 x GFSK
- Embedded, remote and open low power communication station
- Open development framework based on standard Linux OS
- WWAN connectivity over Ethernet or LTE/HSPA/EDGE/GPRS
- USB host interface allowing local secured software upgrade
- Web local interface allowing configuration, diagnostic and maintenance
- Highly secured device relying on a hardware secure core
- Embedded Base Station Controller (BSC) agent relying on standard SNMP protocol:
  - o Alarm notifications
  - o Firmware upgrade
  - o File transfer
  - o Remote shell control
  - o Configuration
  - o Monitoring (platform statistics, RF statistics, RF spectrum analyzer...)

3. Hardware specifications

3.1 Block diagram

This product has the following specifications:

- High performance CPU:
  - o iMX6xxx (SoloX or UL), under Linux OS
  - o None volatile memory eMMC (8Go)
  - o Volatile memory DDR (256Mo)
- LoRa radio reference design:
  - o Semtech SX1301 + SX1257x2 + FPGA + EEPROM
  - o TX power 27dBm
  - o Outband radio sniffer
  - o RF external antenna via N connector or RF internal antenna
  - o 3 versions of radio filter:
    - 868 MHz
    - 915 MHz
    - 923 MHz
- 10/100 Base-T/TX Ethernet transceiver with RMII Interface
- Waterproof RJ45 access using a cable gland
- WWAN connectivity with worldwide LTE, UMTS/HSPA+ and GSM/GPRS/EDGE coverage
- Waterproof SIM access (mini-SIM format)
- GNSS receiver (GPS, GLONASS, QZSS & SBAS) with an embedded antenna
- Powered by POE or DC supply
- IHM: 1 green LED for power + 1 red LED for status + ON/OFF/RST button
- USB-C connectivity for firmware upgrade & debug
- Waterproof IHM access using an IP67 cap
- Earthing connection
- Six supercapacitors and the associated charging circuit, featuring a backup power system. Around 20 minutes charging time & up to one minute capacity to ensure safe power down.

The block diagram below depicts the HW architecture of the Wirnet™ iStation:

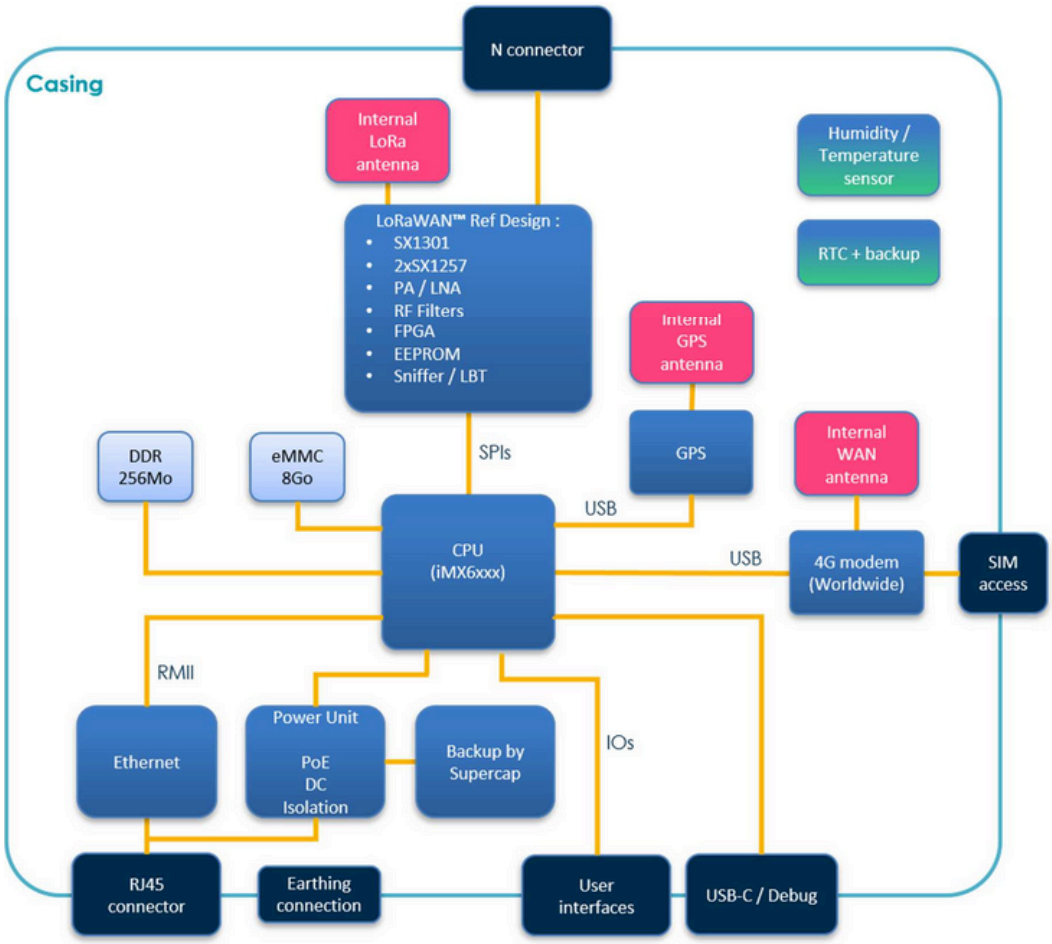


Figure 2: Hardware block diagram

3.2 Mechanical implementation

3.2.1 Casing

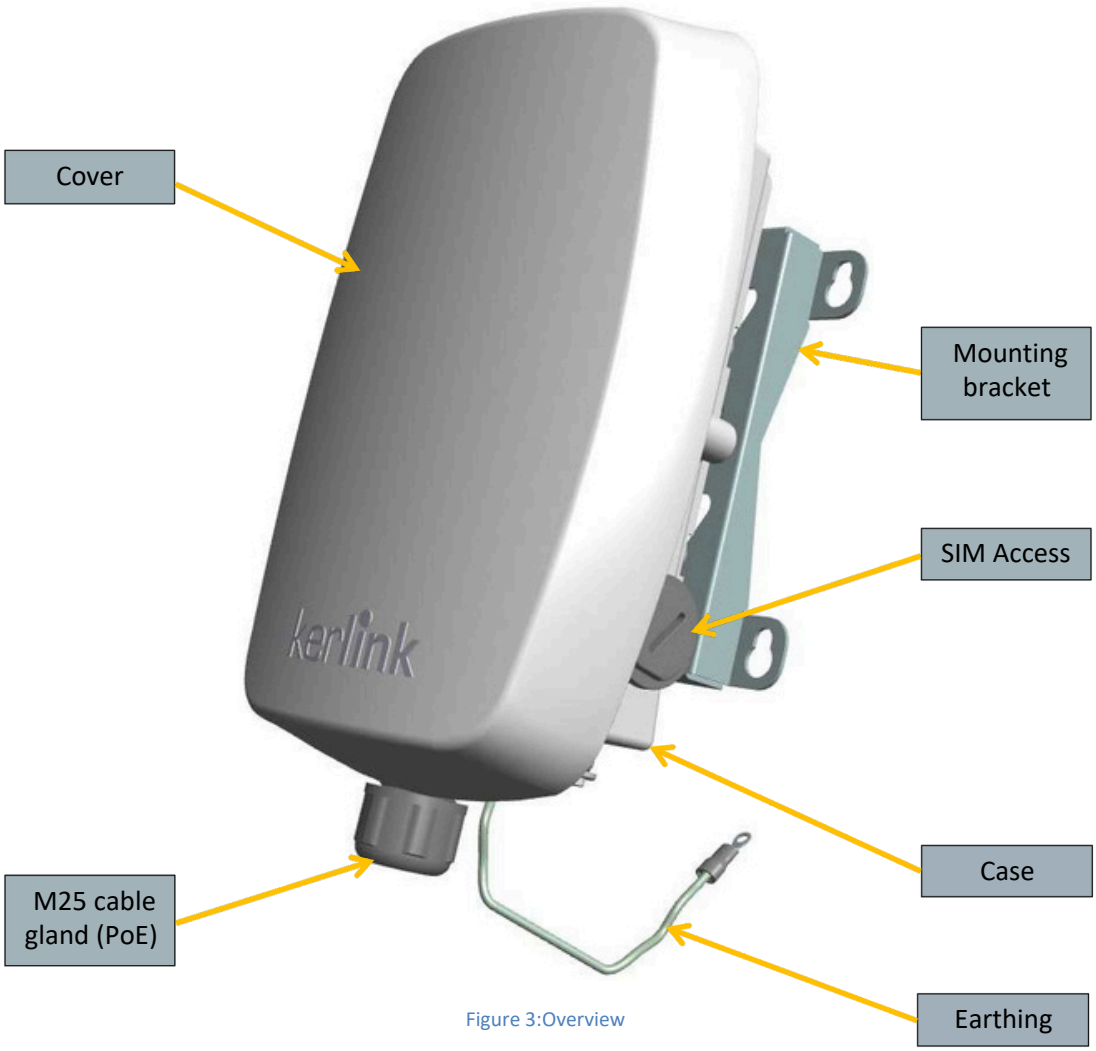


Figure 3:Overview

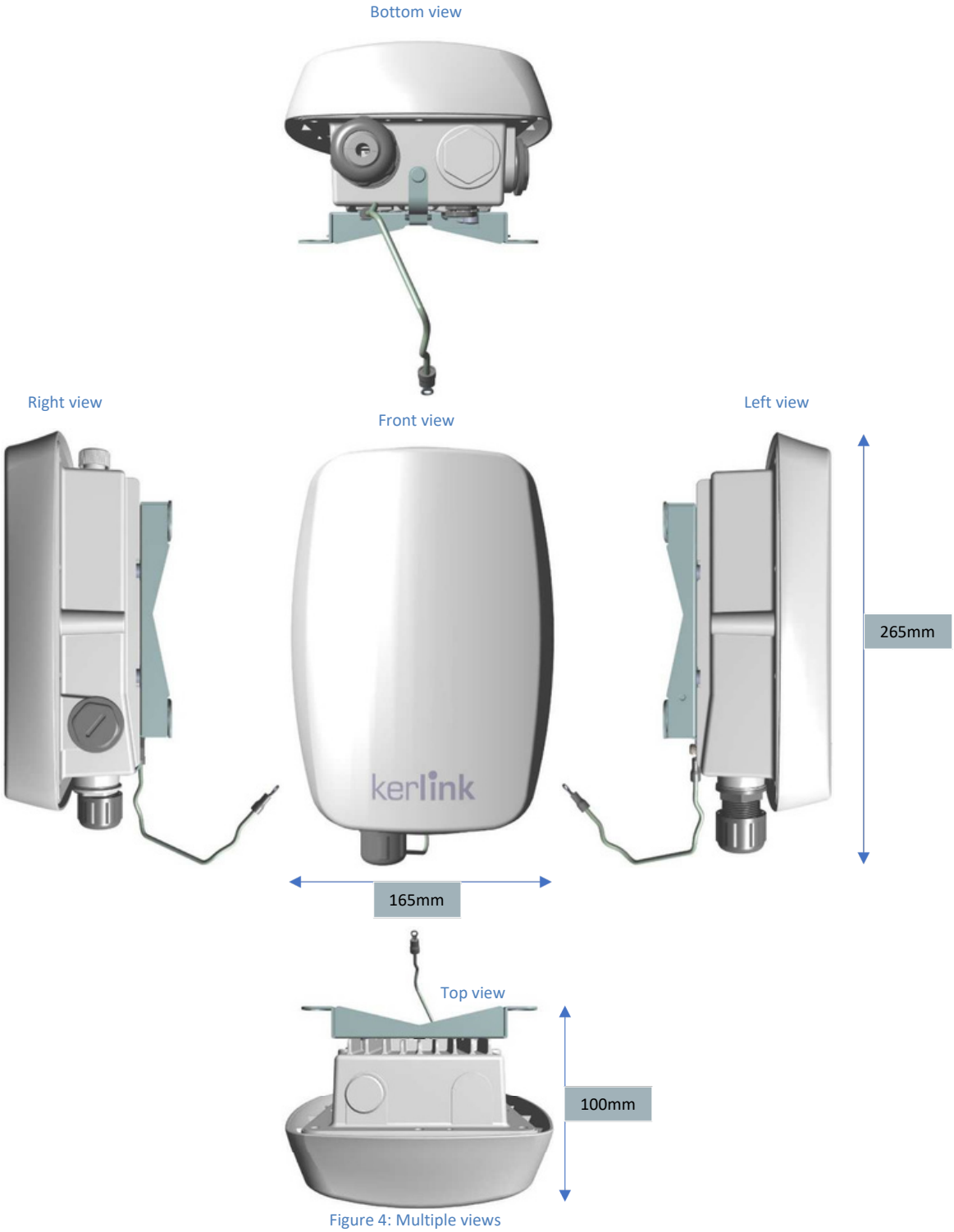


Figure 4: Multiple views

The main characteristics of the enclosure are detailed hereafter:

Description	Specification
Enclosure material	Case in Aluminium alloy
Gasket material	Cover in Polycarbonate
Mounting bracket	Silicone rubber with UL94-V0
Weight of mounting bracket	Fast slide-in mounting Stainless steel material
	220g
Dimensions without external LoRa antenna	265 x 165 x 100 mm
Gateway weight with his mounting bracket	1400g
Ingress protection	IP67
Humidity	95% non-condensing
Impact resistance	IK07 (for the cover part)
Flammability rating for cover	UL94-V0
Operating temperature range	-40°C to +60°C
Connectors	1 x N.f for external LoRa antenna 1 SIM connector (Mini-SIM Format) 1 x USB-C receptacle 1 x RJ45

3.2.2 Mounting bracket

The Wirnet™ iStation may be mounted on a wall using four oblong holes located on the mounting bracket.
The screws for mounting on a wall are not included, the maximum diameter of the screws is 6mm.

Also, gateway may be mounted on a tubular using the openings provided for this purpose on the mounting bracket.
The Stainless Steel Hose Clamp for mounting on a pole are not included. The width should not exceed 14mm.

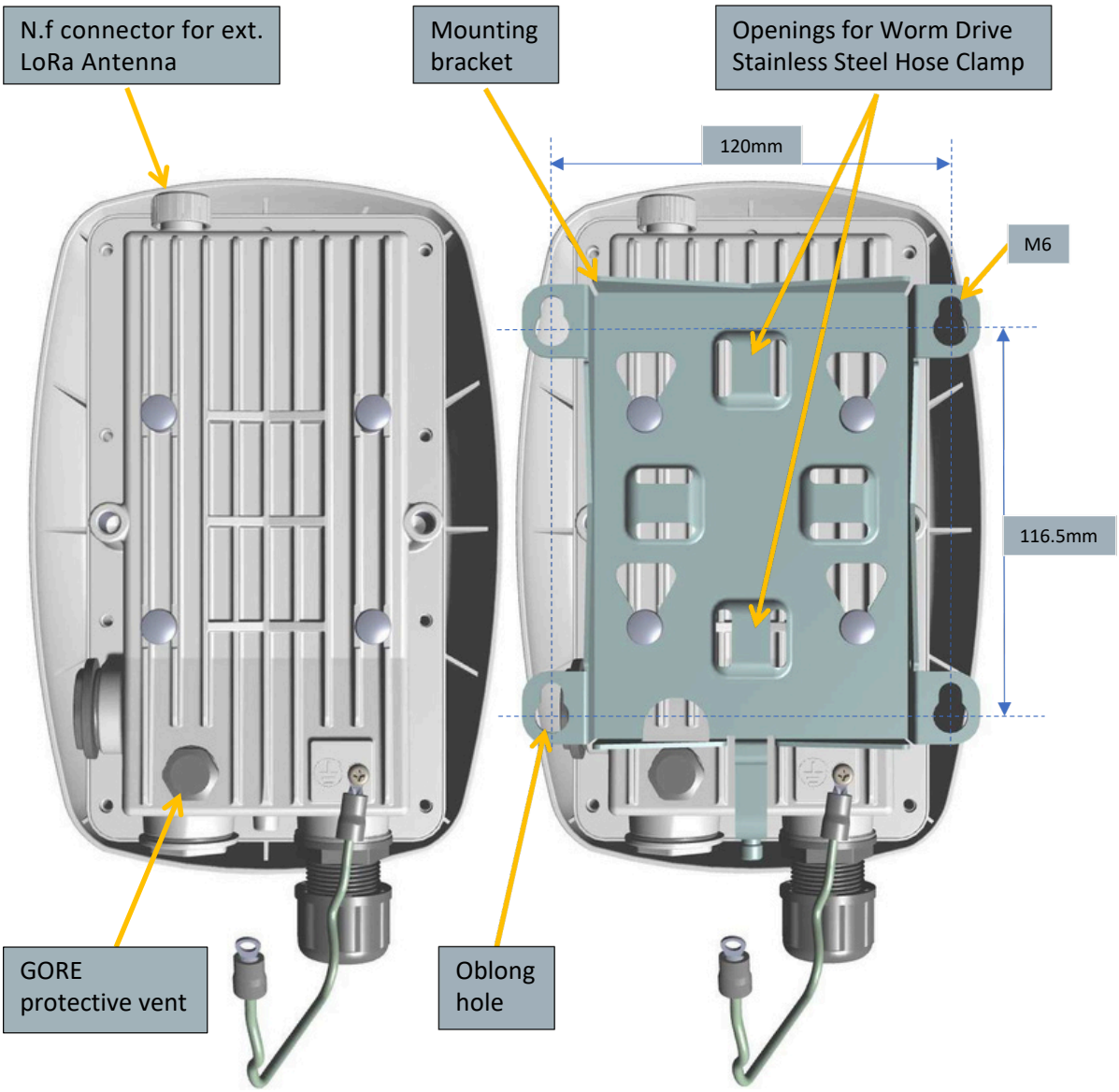


Figure 5: Rear view

3.2.3 Stickers

The Wirnet™ iStation own two stickers placed on one side of the gateway.
Stickers includes serial number, MAC address, electrical information and regulatory markings.

3.3 Power Supply

3.3.1 PoEinjectors

Wirnet™ iStation can be supplied by End-Span or Mid-Span PoE injectors.

- Endspan mode A (Data & Power are on 1/2, 3/6 pairs)
- Midspan mode B (Data is on 1/2, 3/6 pairs, Power is on 4/5, 7/8 pairs)

The Wirnet™ iStation is compatible with:

15.4W PoE injector (IEEE 802.3af)
30W PoE+ injector (IEEE 802.3at)
A 15.4W PoE injector is enough to supply the gateway.

PoE injector is an option. Contact KERLINK if required.

3.3.2 DC power supply

It is also possible to supply from DC power.
The input voltage range is 42 to 57VDC and power supply is isolated.
So, applications in +48VDC or -48VDC are possible with a RJ45 Female to 8 pins screw terminal block adapter or DIN Rail RJ45 to terminal block adapter.

For more details, contact KERLINK

The following drawing shows the supply input of the gateway:

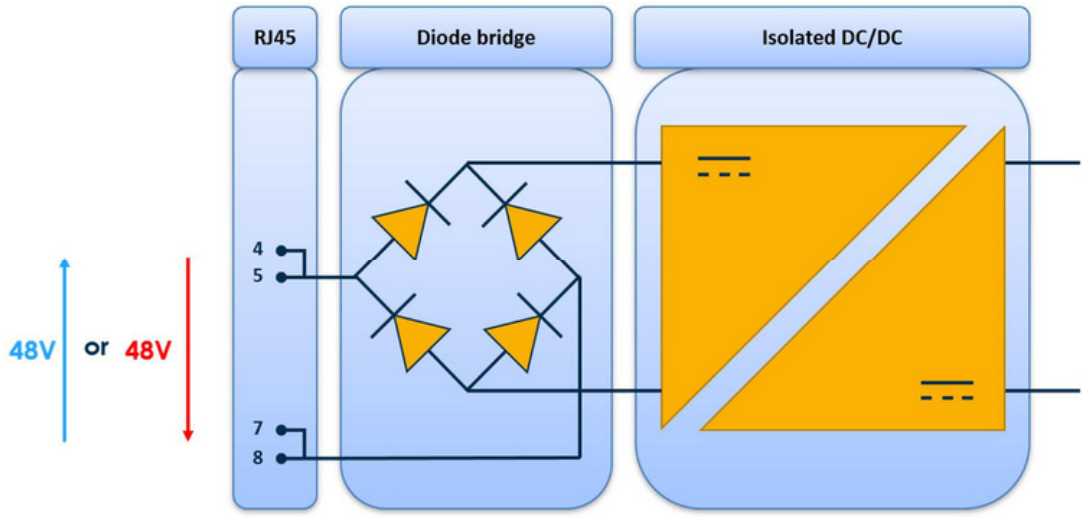


Figure 6: Internal diagram of supply input

3.3.3 Power consumption

The average power consumption under 48V is detailed hereafter:

Wirnet™ iStation	Power consumption
CPU block	1.48W avg 0.175W
Ethernet block	avg 0.161W avg
GPS block	1.7W avg 1.76W avg
WWAN block (25%Tx,75%Rx)	
Radio block in Rx mode (x8 demodulator on)	

The maximum input power under 48V is approximately 8W.

This includes CPU, ethernet enabled, GPS enabled, WWAN enabled and maximum RF power in Tx LoRa mode.

3.4 User interface

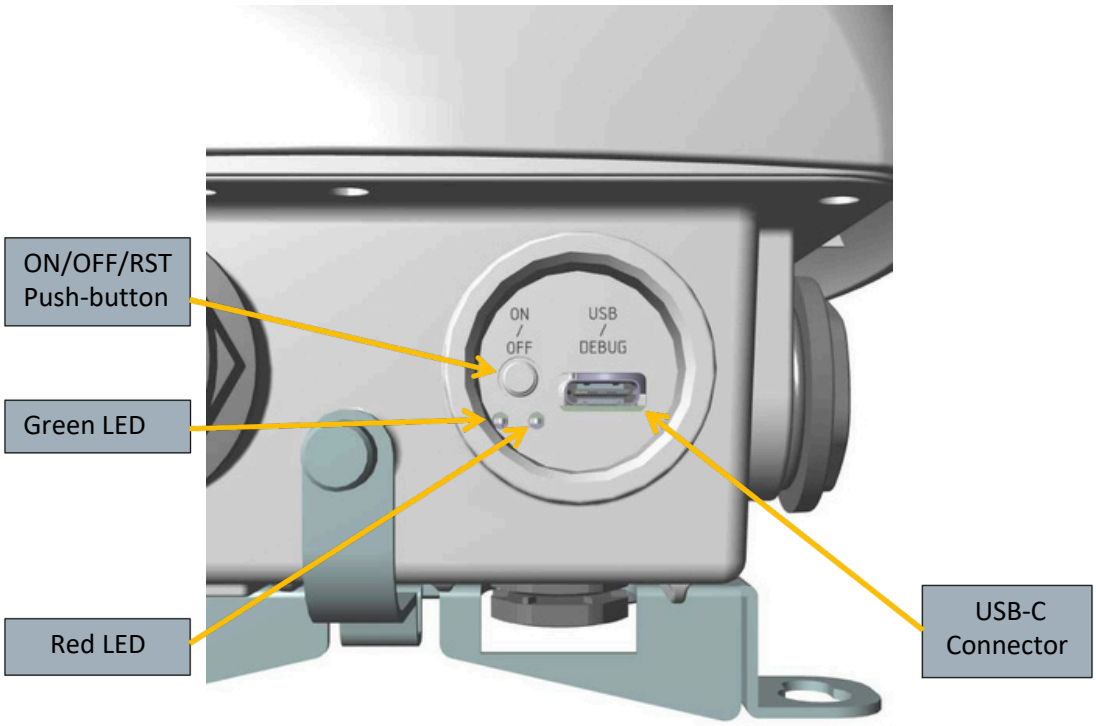


Figure 7: Bottom Interface

3.4.1 LEDs

Two LED indicators are available on the bottom of enclosure:

Item	Specification
LED 1: Power	Green if power supply is present otherwise light off
LED 2: Status	Red blinking during kernel boot & system boot Light off when boot is finished

3.4.2 Push-button

Apush-button is available on the bottom of enclosure.
The ON/OFF/RST button must be pressed during 1s to generate a SW reset of the product.
Along press for 5s turns off the gateway.

3.4.3 USB-C Connector

This connector allows to plug:

- a Kerlink debug probe to use debug mode
  Used by developers, UART allows communication with the OS, to verify log…)
  Contact KERLINK if required

- a simple USB mass-storage key to upgrade gateway

3.4.4 SIM access

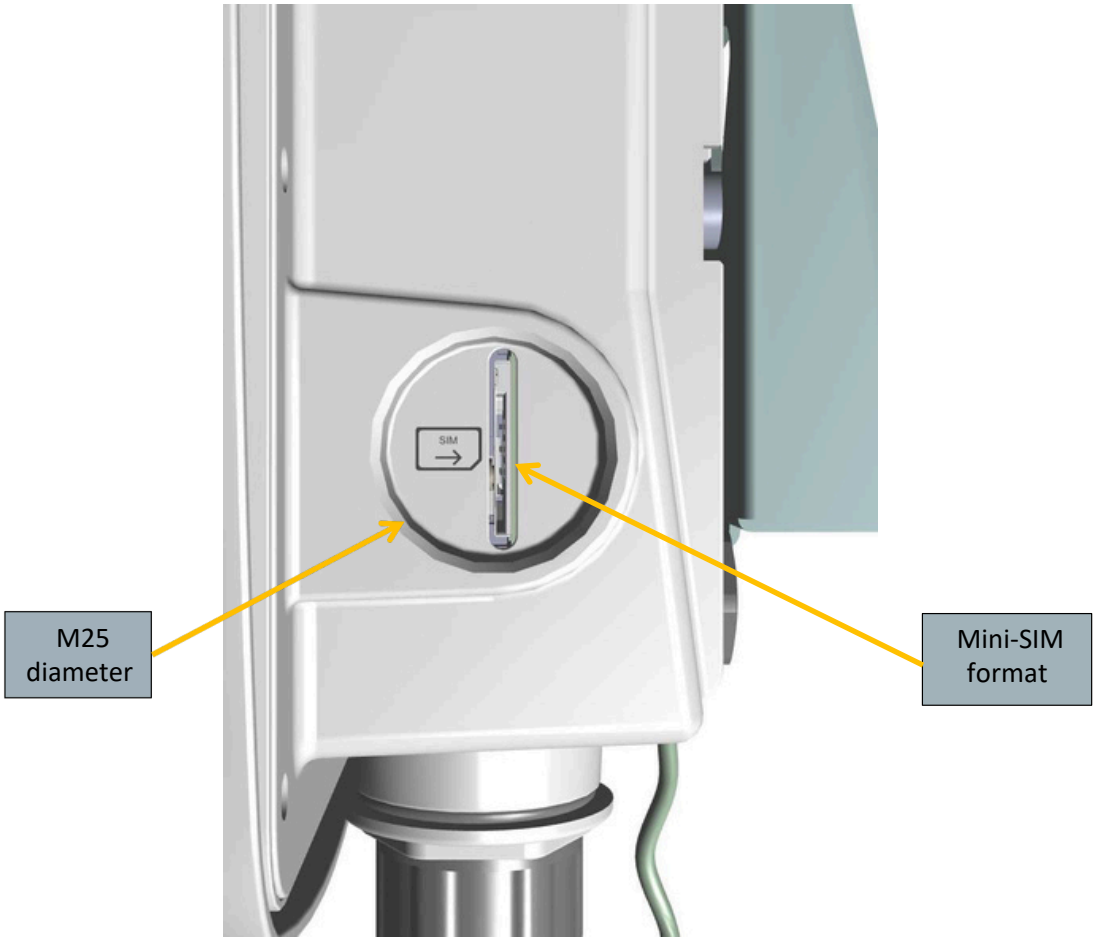


Figure 8: SIM Interface

3.5 Radio specifications

3.5.1 Mains characteristics

Feature	Description
LoRa demodulator	Based on SX1301 digital signal processing engine from Semtech Emulates 49 x LORA demodulators and 1 x (G)FSK demodulator per SX1301: • 8 x LoRa demodulator at dynamic data rate with 125KHz BW • 1 x LoRa demodulator at fixed data rate • 1 x (G) FSK demodulator Dynamic data-rate (DDR) adaptation Detect simultaneously 8 preambles corresponding to all data rates (Spreading Factor) at LoRa 125KHz BW 2MHz baseband BW
Transceiver	Based on Semtech SX1257 862MHz to 960MHz frequency range 250 kHz to 750KHz channel BW +8dBm typ. output power 10dB output power control range 128dBc/Hz Signal to Noise performance at 10MHz offset Receiver Noise Figure of 7 dB (External LNA Noise Figure of 0.7dB) -25dBm IIP3 at max gain Independent automatic gain control
Sniffer	Based on Semtech chipset 860MHz to 1020MHz frequency range FSK, GFSK, MSK, GMSK and OOK demodulator FSK Bit rates up to 300 kb/s Digital filtering, demodulation, AGC, AFC, synchronization and packet handling Accurate RSSI measurements through automatic gain calibration 115dB Dynamic Range RSSI +35dBm to +75dBm IIP2 depending on AGC configuration -18dBm to +20dBm IIP3 depending on AGC configuration 66 dB typ. CW interferer rejection at 1 MHz offset 79 dB typ. CW interferer rejection at 10 MHz offset Noise Figure of 0.7dB
External LNA	Gain 18dB at 900MHz 38dBm IIP3 at max gain Maximum input power: 10dBm
External PA	Maximum Output power: 27dBm Small signal gain: 32dB

3.5.2 Radio front-end block diagram

The following block diagram details the architecture of the radio front-end:

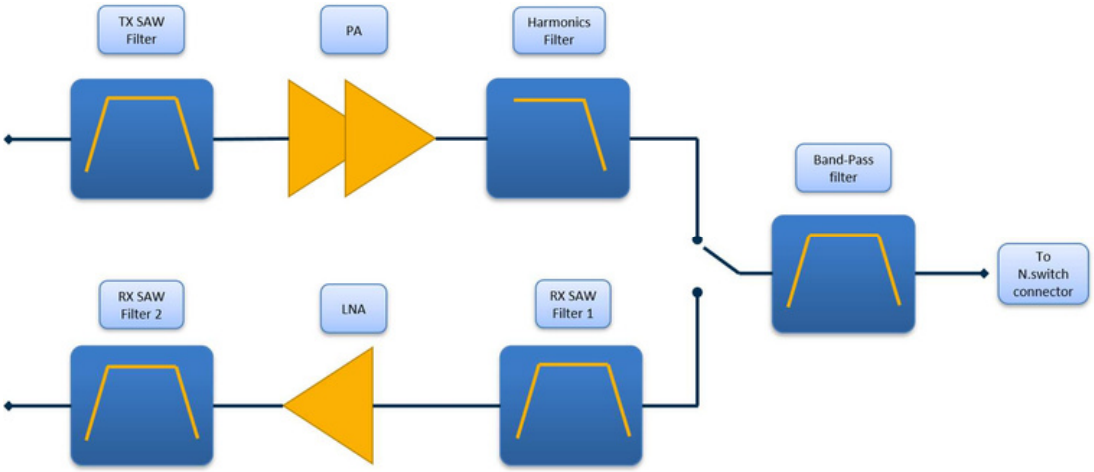


Figure 9: Front-end block diagram

The radio front-end integrates TX and RX paths.
Each path is detailed hereafter:

The radio front-end is derived in three different versions to cover the unlicensed bands:

- 868MHz (863-873MHz)
- 915MHz (Rx-Band: 902-915MHz / Tx-Band: 922-928MHz)
- 923MHz (Rx-Band: 915-928MHz / Tx-Band: 919-928MHz)

3.5.3 Modulationsand data rates

The Wirnet™ iStation supports the following modulation schemes:

SF	BW (KHz)	Data rate (kbps)
	500	21875
	500	12500
	500	7031
10	500	3906
11	500	2148
12	500	1172
	250	10938
	250	6250

	250	3516
10	250	1953
11	250	1074
12	250	586
	125	5469
	125	3125
	125	1758
10	125	977
11	125	537
12	125	293

Note: Payload may have to be adjusted to not overrule 400ms frame length, depending on the local regulations. In this case, SF11/125KHz and SF12/125KHz are not used.

3.5.4 OutputPower

The conducted output power can be adjusted from 0dBm to +27dBm.
This offers a wide range of adjustment to cover all specific countries EIRP requirements.
Antenna gain has to be considered to adjust the conducted output power to not overrule the max allowed EIRP.

Description	Specification
Conducted output power range	0dBm to +27dBm
Ripple in the band	+/- 2dB
Variation over temperature range (-40°C to +60°C)	+/- 3dB

3.5.5 Outof band emissions

Due to the very low noise transmitter, the Wirnet™ iStation is able to achieve excellent out of band emissions levels in the LTE, UMTS and GSM uplink or downlink bands.

The performances are summarized in the following table:

Version	LTE, UMTS or GSM band	Out of band emissions
868	E-GSM900 UL (880-915MHz)	-80dBm/100KHz
868	R-GSM900 UL (876-880MHz)	-60dBm/100KHz
868	LTE800 (832-860MHz)	-75dBm/100KHz
868	LTE800 (860-862MHz)	-70dBm/100KHz
915	GSM850 DL (869-894MHz)	-85dBm/100KHz
923	GSM900 UL(890-915MHz)	-85dBm/100KHz
923	GSM900 DL(935-960MHz)	-85dBm/100KHz

The performances detailed here are worst case i.e. when transmitting at maximum output power at the edge of the band.
Out of band emissions in other LTE, UMTS or GSM bands are not detailed but are obviously better.

3.5.6 Sensitivity

The sensitivity performance, depending on the version, at 10% PER, coding rate 4/5, preambule 8 symbols, 20 bytes payload is the following:

Mode	868MHz	915MHz	923MHz
SF7/125KHz	-127dBm	-127dBm	-126dBm
SF10/125KHz	-134dBm	-134dBm	-133dBm
SF12/125KHz	-141dBm	-141dBm	-140dBm
SF7/250KHz	-125dBm	-125dBm	-124dBm
SF12/250KHz	-135dBm	-135dBm	-134dBm
SF7/500KHz	-122dBm	-122dBm	-121dBm
SF12/500KHz	-134dBm	-134dBm	-133dBm

The sensitivity may vary over the frequency band and over temperature as follows:

Description	Specification
Sensitivity variation over the band	+/- 2dB
Sensitivity variation over temperature range (-40°C to +60°C)	+/- 1.5dB

3.5.7 Out of band blockers rejection

In the following tables, the out of band rejection is measured with a useful signal (LoRa) adjusted 3dB above the sensitivity. The blocker level (CW) is adjusted to reach 10% PER.
The level of the blockers is noticed in the table and also the difference (in dB) with the useful LoRa signal.

The useful signal is adjusted at 868.1MHz for a Wirnet iStation 868MHz.
The blockers rejections, at SF7 are the following:

Offset	SF7/125KHz
+/-2MHz	80dB
+/-10MHz	120dB

The useful signal is adjusted at 908MHz 1MHz for a Wirnet iStation 915MHz.
The blockers rejections, at SF10 are the following:

Offset	SF10/125KHz
+/-2MHz	90dB
+/-10MHz	120dB

The useful signal is adjusted at 923MHz for a Wirnet iStation 923MHz.
The blockers rejections, at SF12 are the following:

Offset	SF12/125KHz
+/-2MHz	90dB
+/-10MHz	120dB

3.6 WWAN capabilities

The bands and data rate supported by the Wirnet iStation are the following:

Technologies	Band	Data rate
LTE	Band 1 (2100) Band 2 (1900 PCS) Band 3 (1800+) Band 4 (1700/2100 AWS-1) Band 5 (850) Band 7 (2600) Band 8 (900) Band 12 (700 ac) Band 13 (700 c) Band 18 (800 Lower) Band 19 (800 Upper) Band 20 (800 DD) Band 25 (1900+) Band 26 (850+) Band 28 (700 APT)	• LTE FDD: o Max 150Mbps (DL) o Max 50Mbps (UL)
	Band 38 (TD 2600) Band 39 (TD 1900+) Band 40 (TD 2300) Band 41 (TD 2600+)	• LTE TDD: o Max 130Mbps (DL) o Max 35Mbps (UL)
WCDMA	Band 1 (2100) Band 2 (1900 PCS)	• DC-HSDPA: Max 42Mbps (DL) • HSUPA: Max 5.76Mbps (UL)

	Band 4 (1700/2100 AWS-1) Band 5 (850) Band 6 (850 Japan) Band 8 (900) Band 19 (800 Japan) B2 (1900 PCS) B3 (1800 DCS) B5 (850) B8 (900)	• WCDMA: o Max 384Kbps (DL) o Max 384Kbps (UL)
GSM		• EDGE: o Max 296Kbps (DL) • o Max 236.8Kbps (UL) GPRS: o Max 107Kbps (DL) o Max 85.6Kbps (UL)

3.7 External antenna

Itis possible to connect an external antenna.
Ifexternal antenna is mated on N connector, then the internal antenna is bypassed.
When external antenna is unmated on N connector, then RF signal passes through the internal antenna. It's a mechanical switch, no need to logically control.

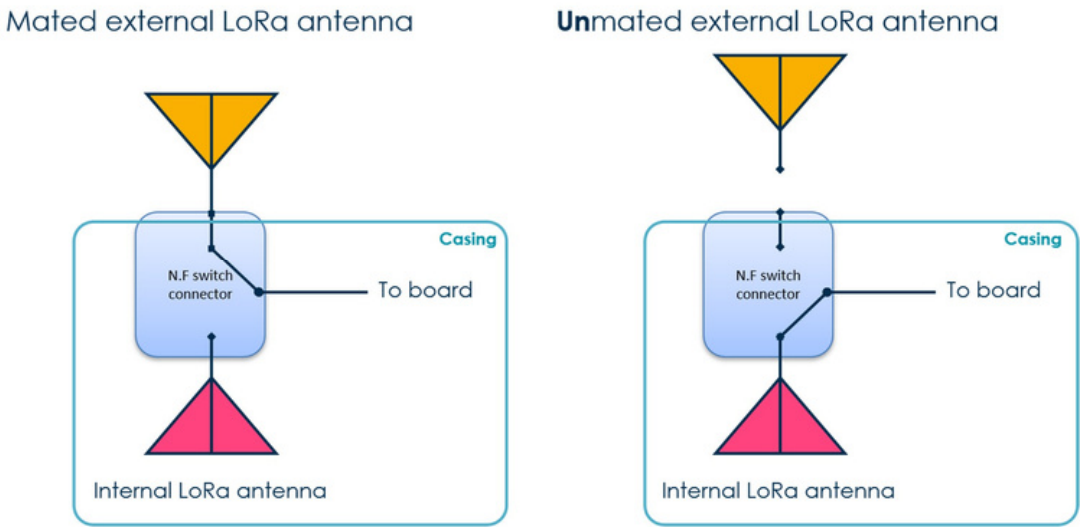


Figure 10: RF Switch circuit diagram

Also, an external cavity filter may be recommended with the presence of BTS.
It is connected between the external antenna and the gateway.
This filter is to avoid saturation and desensitization of the LoRa receiver due to co-located LTE800/LTE850 base stations for example.
Kerlink offers different technical solutions depending on the region.
Contact KERLINK if required

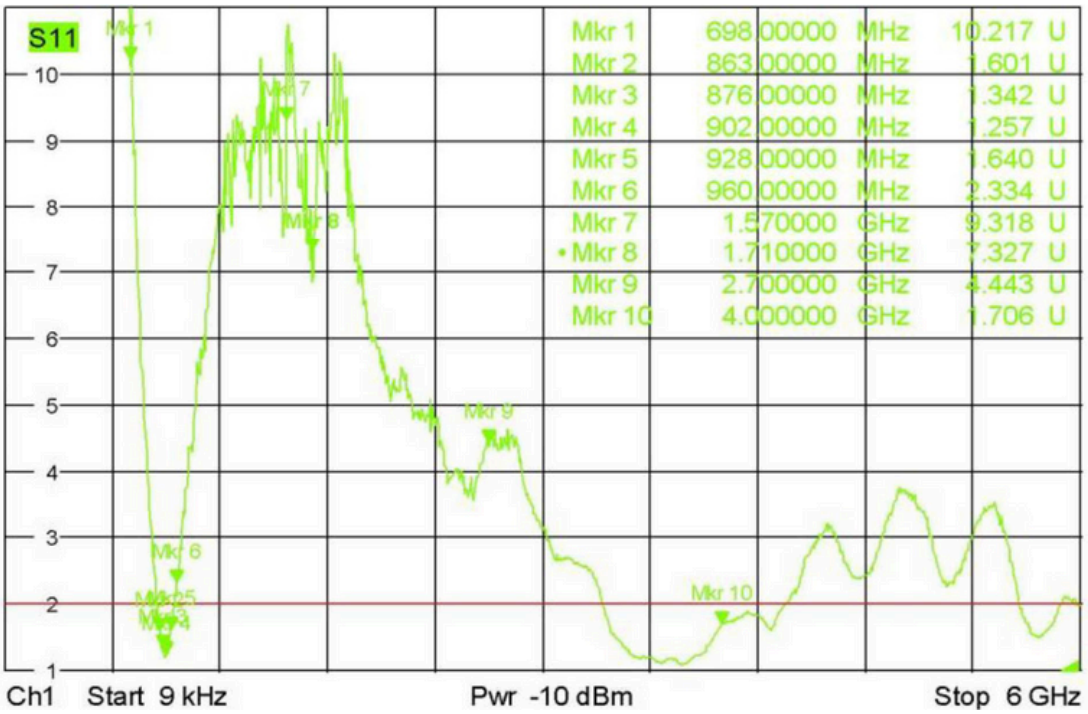
3.8 Internal antennas

3.8.1 Internal LoRa antenna

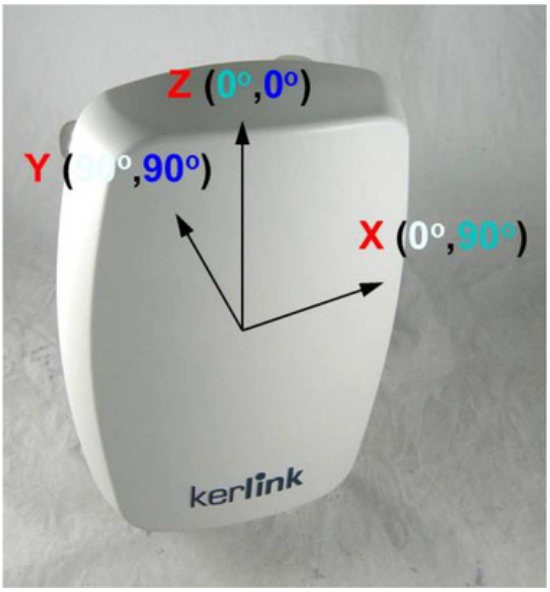
3.8.1.1 Specifications

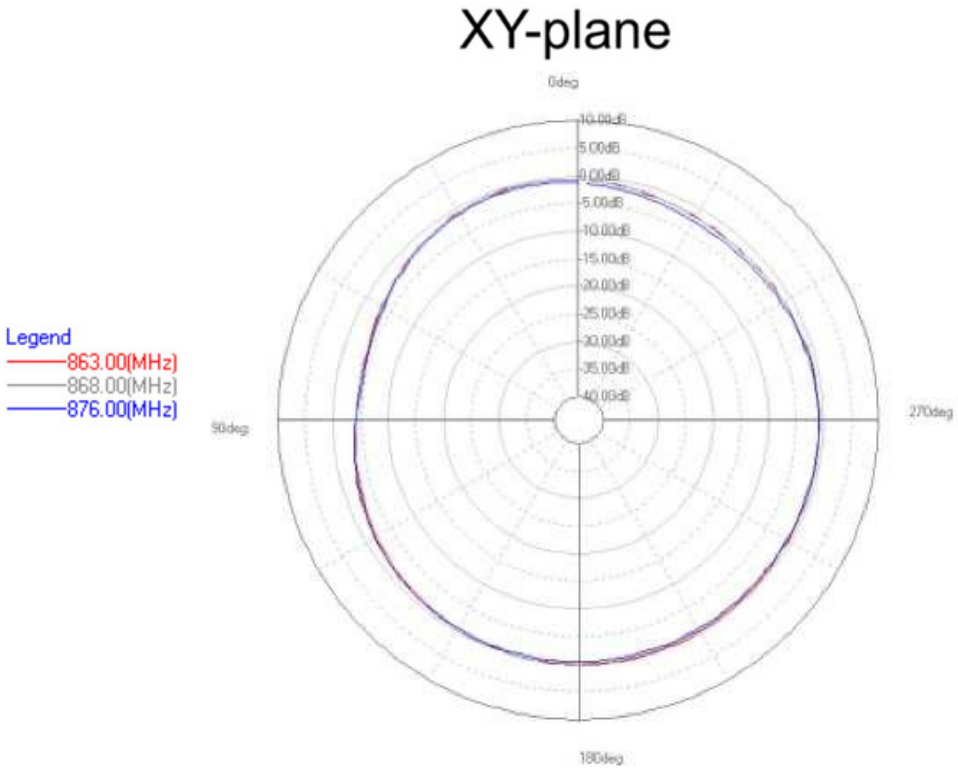
Item	Specification
Frequency range	863-928MHz
Max gain	2.6dBi
Avg gain	-1dBi
VSWR	<2:1
Impedance	50 ohms
Polarization	Vertical

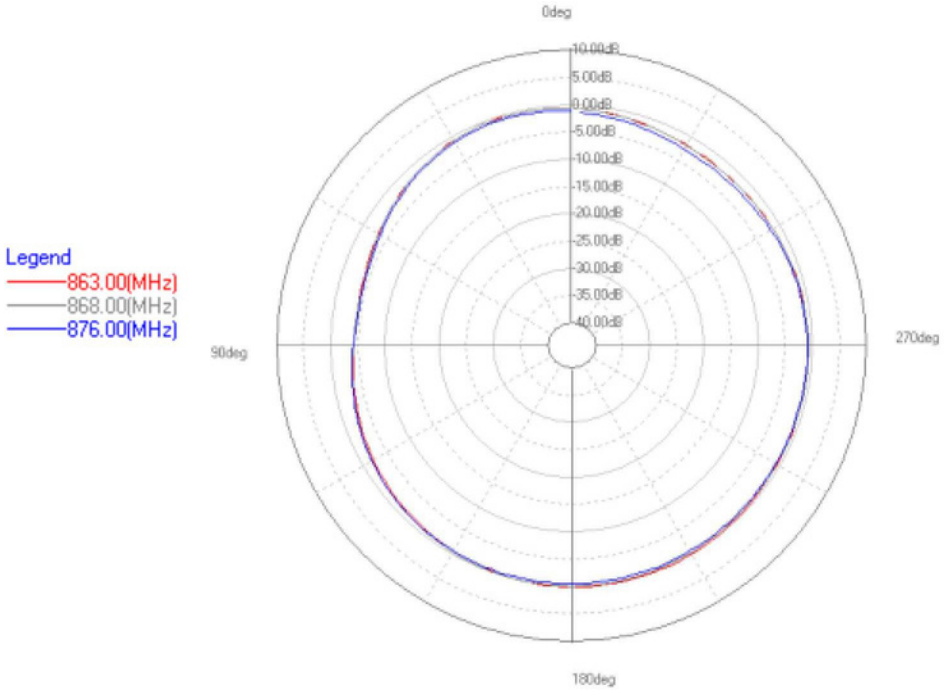
3.8.1.2 VSWR

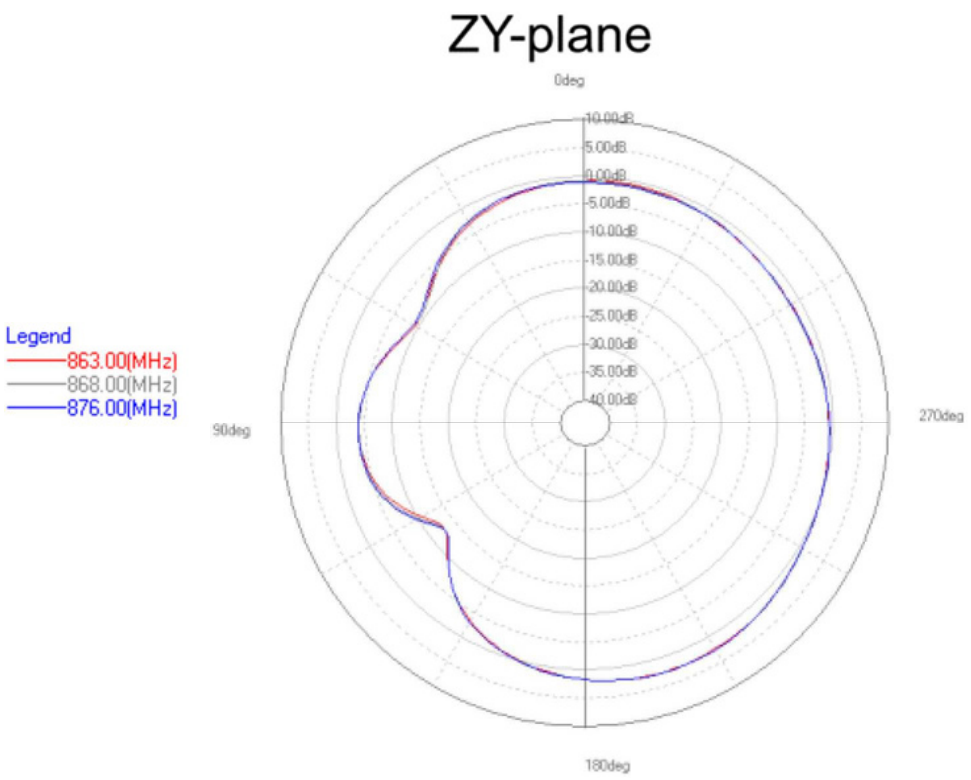


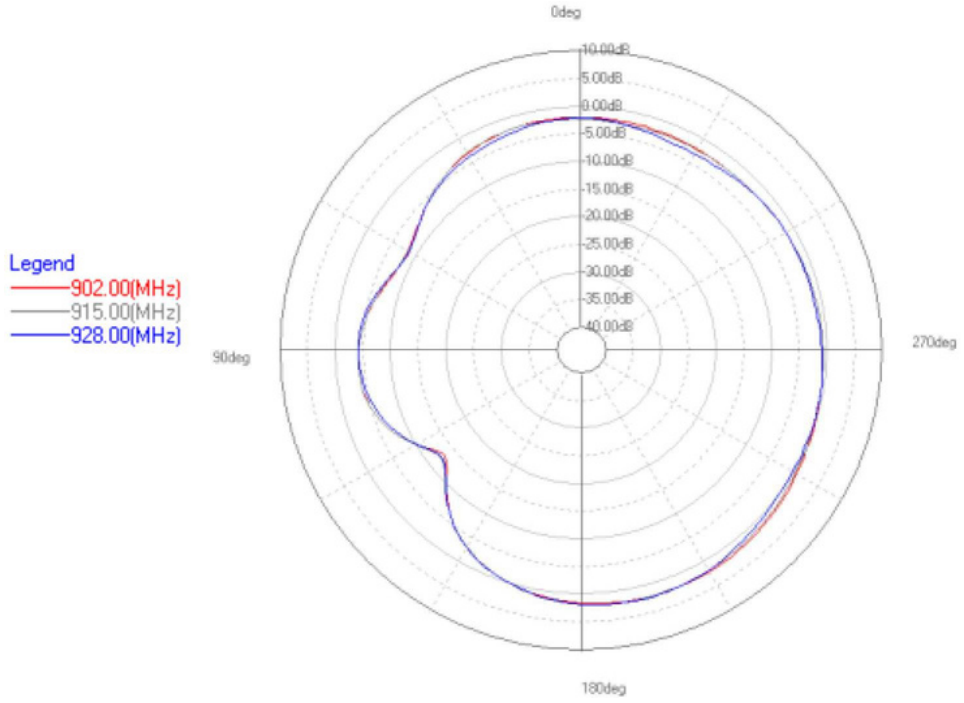
3.8.1.3 Radiation patterns




XY-plane
0deg
90deg
270deg
180deg
Legend
863.00(MHz)
868.00(MHz)
876.00(MHz)


0deg
90deg
270deg
180deg
Legend
863.00(MHz)
868.00(MHz)
876.00(MHz)


ZY-plane
0deg
10.00dB
5.00dB
0.00dB
-5.00dB
-10.00dB
-15.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB
-40.00dB
90deg
270deg
180deg
Legend
863.00(MHz)
868.00(MHz)
876.00(MHz)

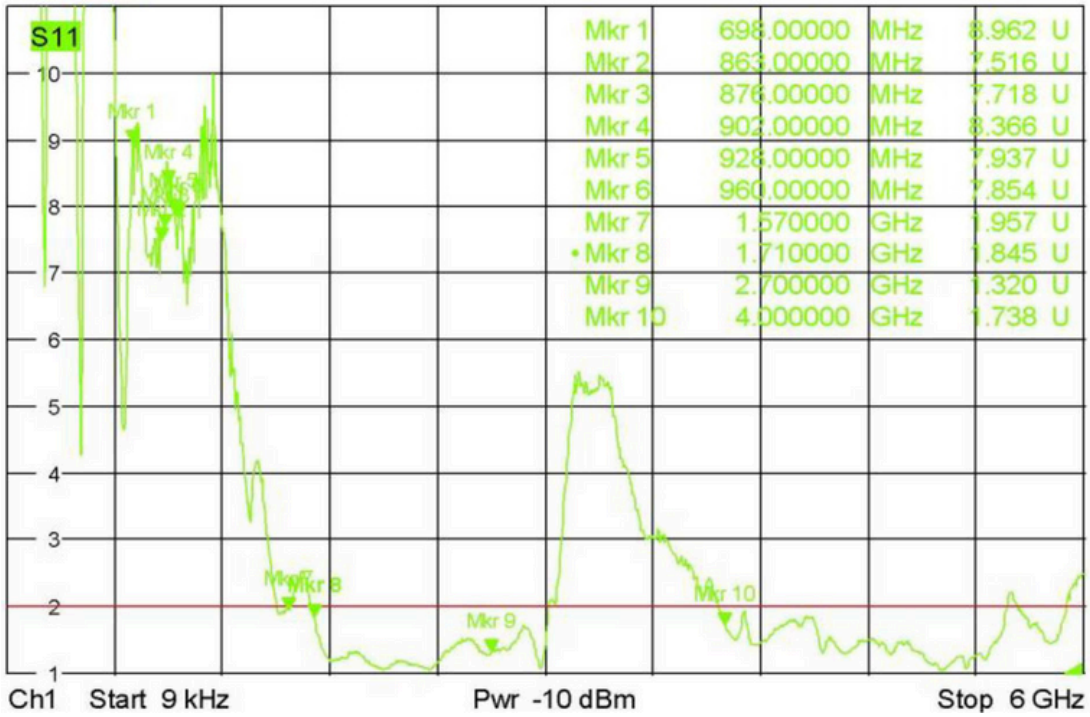

0deg
10.00dB
5.00dB
0.00dB
-5.00dB
-10.00dB
-15.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB
-40.00dB
90deg
270deg
180deg
Legend
902.00(MHz)
915.00(MHz)
928.00(MHz)

3.8.2 Internal WWAN antenna

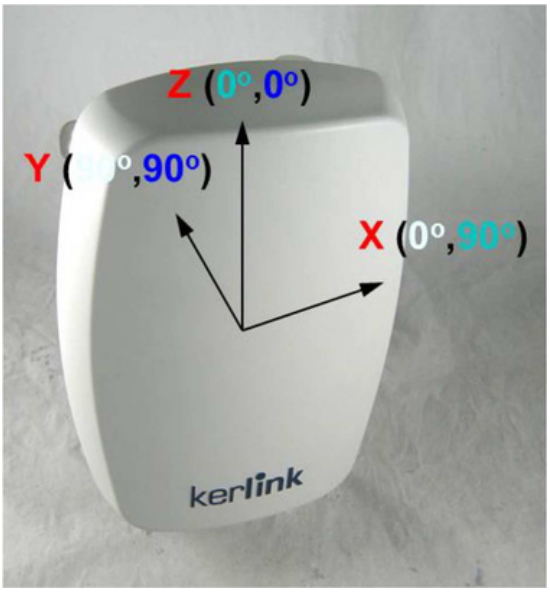
3.8.2.1 Specifications

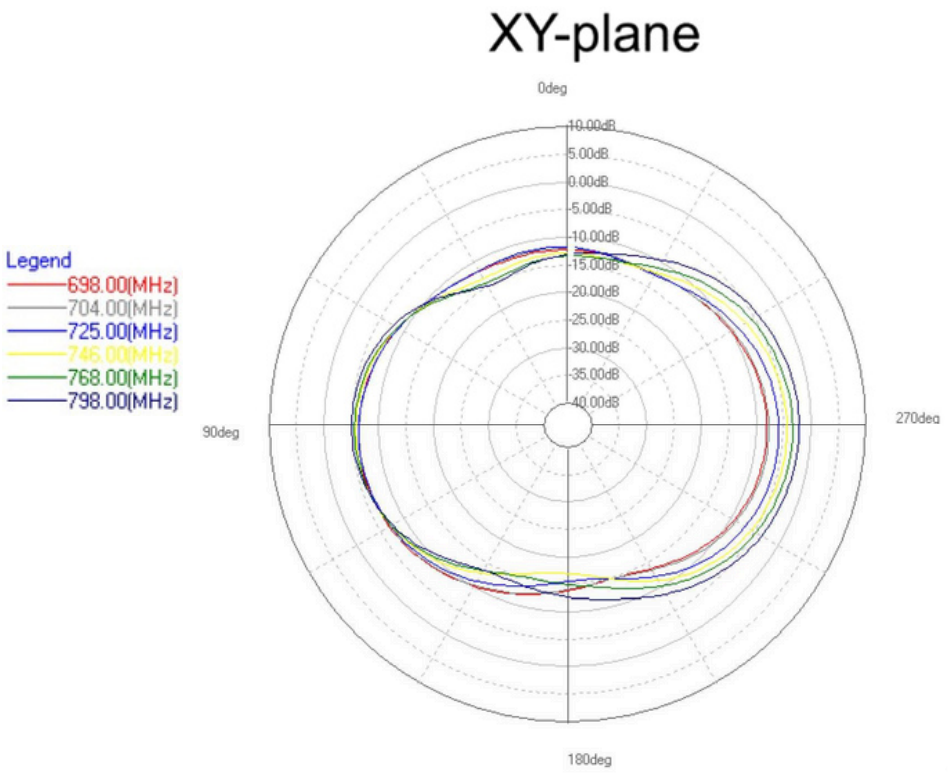
Item		Specification
Frequency range	Band 1	698-960MHz
	Band 2	1710-1785MHz
	Band 3	1785 -2170MHz
	Band 4	2300-2690MHz
Max gain	Band 1	-0.7dBi
	Band 2	5.0dBi
	Band 3	5.4dBi
	Band 4	6.9dBi
VSWR	Band 1	<9:1
	Band 2	<2:1
	Band 3	<2:1
	Band 4	<2:1
Impedance		50 ohms
Polarization		Vertical

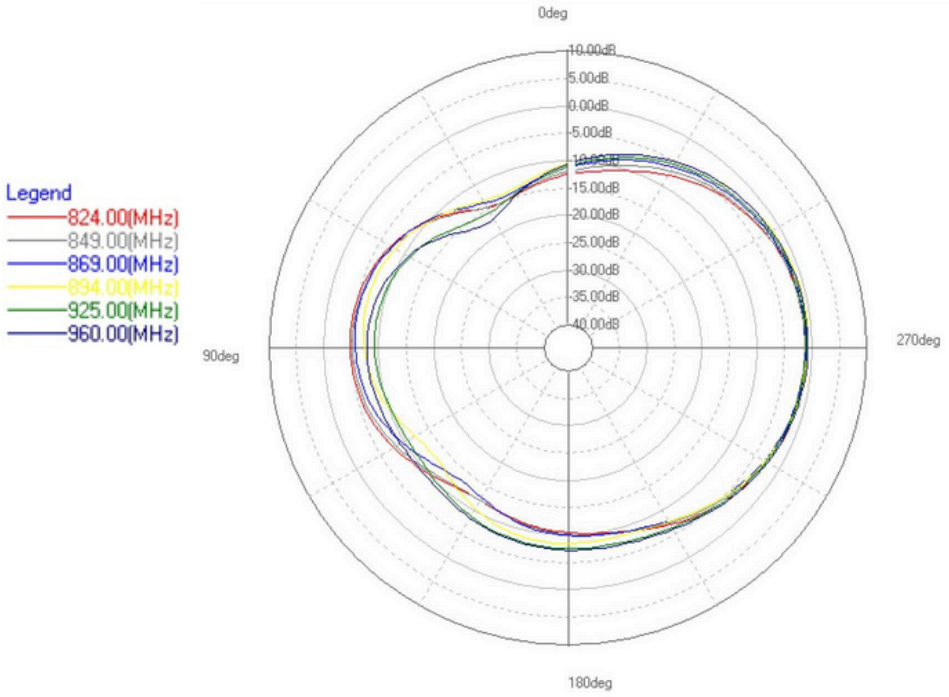
3.8.2.2 VSWR



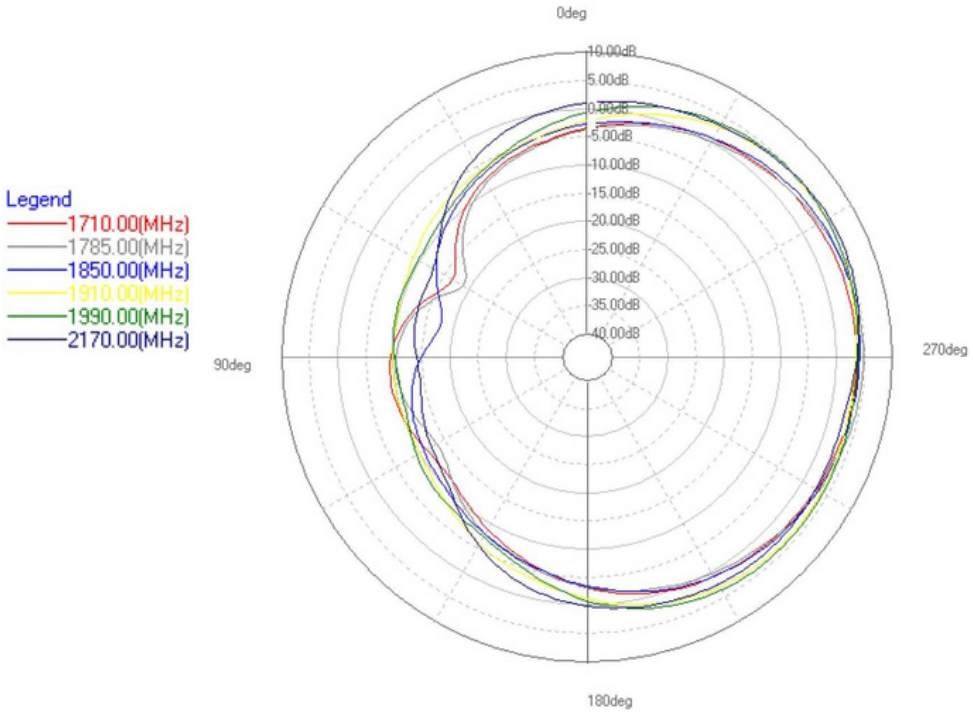
3.8.2.3 Radiation patterns

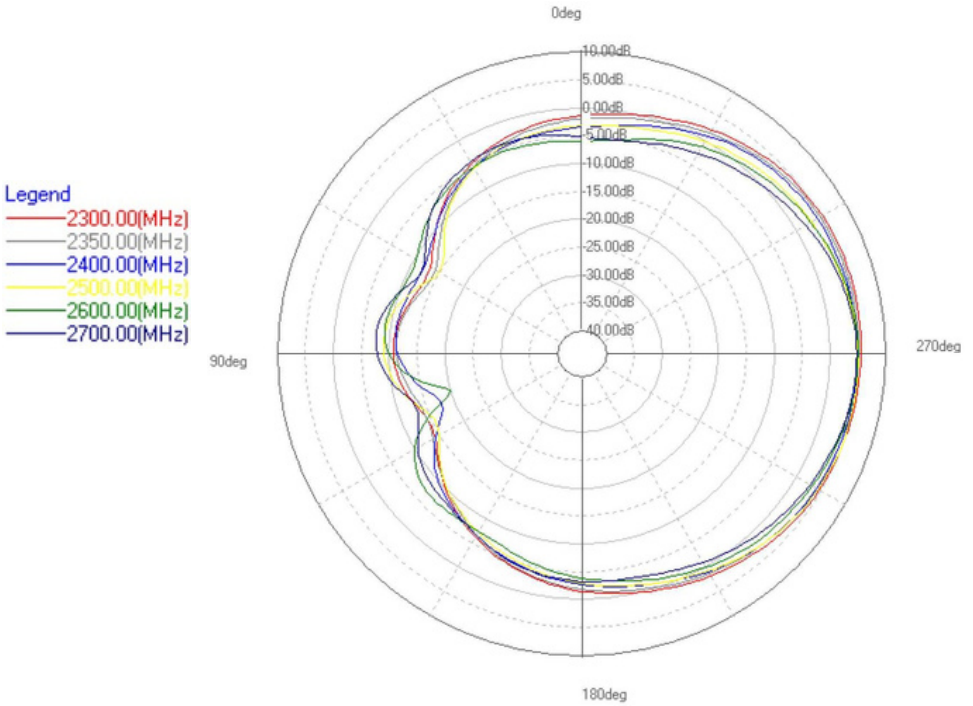


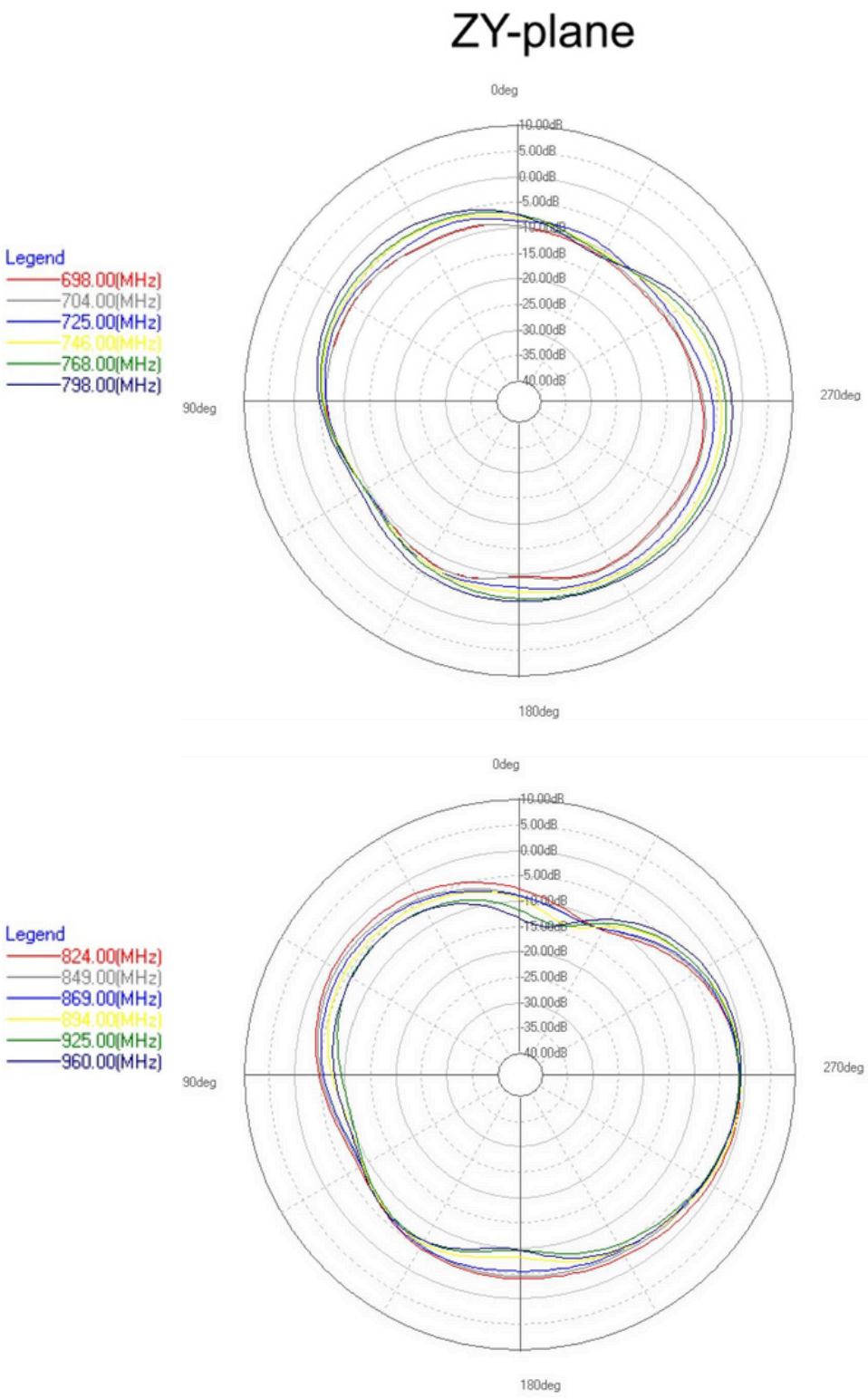

XY-plane
0deg
10.00dB
5.00dB
0.00dB
-5.00dB
-10.00dB
-15.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB
-40.00dB
90deg
270deg
180deg
Legend
698.00(MHz)
704.00(MHz)
725.00(MHz)
746.00(MHz)
768.00(MHz)
798.00(MHz)


0deg
10.00dB
5.00dB
0.00dB
-5.00dB
-15.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB
-40.00dB
90deg
270deg
180deg
Legend
824.00(MHz)
849.00(MHz)
869.00(MHz)
894.00(MHz)
925.00(MHz)
960.00(MHz)

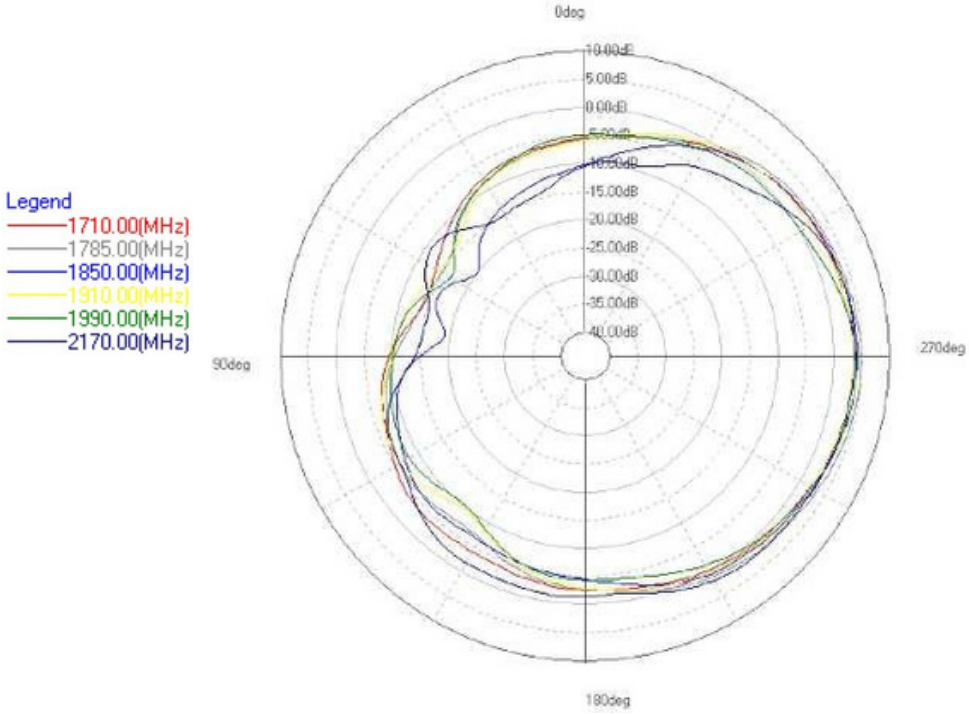
XY-plane

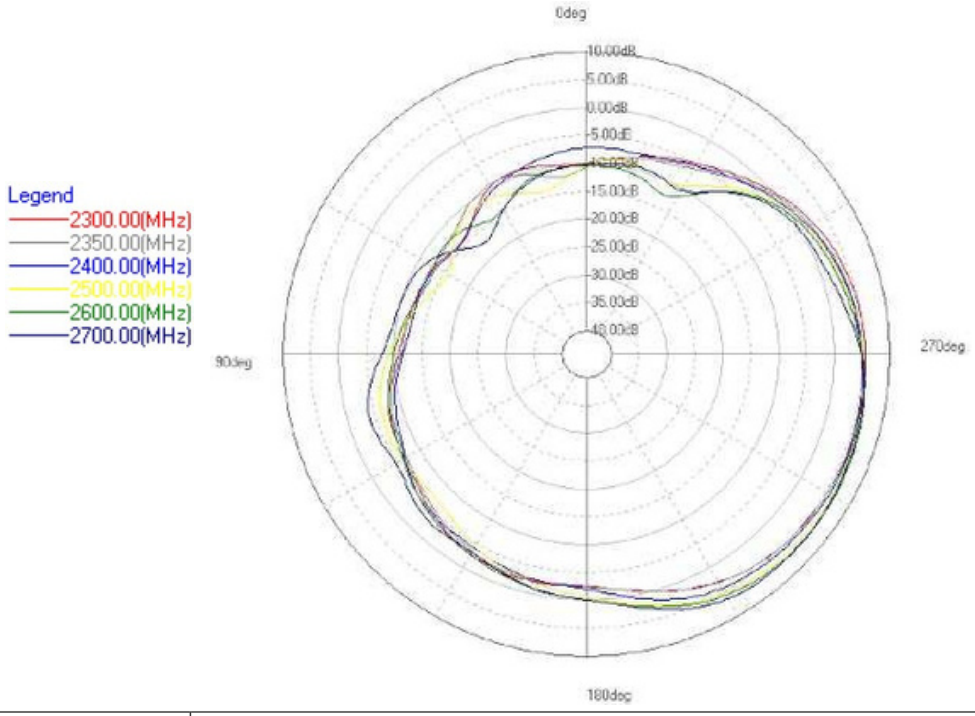

0deg
10.00dB
5.00dB
0.00dB
-5.00dB
-10.00dB
-15.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB
-40.00dB
90deg
270deg
180deg
Legend
1710.00(MHz)
1785.00(MHz)
1850.00(MHz)
1910.00(MHz)
1990.00(MHz)
2170.00(MHz)


0deg
10.00dB
5.00dB
0.00dB
-5.00dB
-10.00dB
-15.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB
-40.00dB
90deg
270deg
180deg
Legend
2300.00(MHz)
2350.00(MHz)
2400.00(MHz)
2500.00(MHz)
2600.00(MHz)
2700.00(MHz)


ZY-plane
0deg
10.00dB
5.00dB
0.00dB
-5.00dB
-15.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB
-40.00dB
Legend
698.00(MHz)
704.00(MHz)
725.00(MHz)
746.00(MHz)
768.00(MHz)
798.00(MHz)
90deg
270deg
180deg
0deg
10.00dB
5.00dB
0.00dB
-5.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB
-40.00dB
Legend
824.00(MHz)
849.00(MHz)
869.00(MHz)
894.00(MHz)
925.00(MHz)
960.00(MHz)
90deg
270deg
180deg

ZY-plane


Legend
1710.00(MHz)
1785.00(MHz)
1850.00(MHz)
1910.00(MHz)
1990.00(MHz)
2170.00(MHz)
0deg
90deg
270deg
180deg
10.00dB
5.00dB
0.00dB
-15.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB
-40.00dB


Legend
2300.00(MHz)
2350.00(MHz)
2400.00(MHz)
2500.00(MHz)
2600.00(MHz)
2700.00(MHz)
0deg
90deg
270deg
180deg
10.00dB
5.00dB
0.00dB
-5.00dB
-15.00dB
-20.00dB
-25.00dB
-30.00dB
-35.00dB

3.8.3 Internal GNSS Antenna

The specifications of the antenna are the following:

Item	Specification
Frequency range	1570-1610MHz
VSWR	<2.0:1
Impedance	50 ohms
Polarization	RHCP
Type	Passive

4. Installation recommendations

Note: In addition to the following chapters, Kerlink strongly recommends reading the following application notes:

- AN-KLK03355 - Improving radio coexistence performance of LoRaWAN gateways.pdf
- AN-KLK03357 - LoRaWAN gateways installation recommendations.pdf

Many notions are mentioned in those documents about cavity filters, LoRaWAN coexistence issues due to cellular networks, installation recommendations, lightning protections, etc…

4.1 RJ45 PoE cable

This cable is not provided with the Wirnet iStation.

KERLINK recommends using a PoE cable with the following characteristics:

Characteristics	Specification
Category	6 min
Shielding	STP (U/FTP) or SSTP (S/FTP)
U/V resistant	Yes
External jacket	Polyethylene for outdoor use
Maximum length	100 meters
Cable diameter	From 6.6mm to 8.8mm
Operating temperature range	Depending on the application

4.2 Ethernet connection

The seal of cable gland allows external cable diameter (cable and RJ45 connector) from 6.6mm to 8.6 mm. Position the different elements as show on the figure 11.
This before connecting the RJ45 of cable through the M25 of gateway.

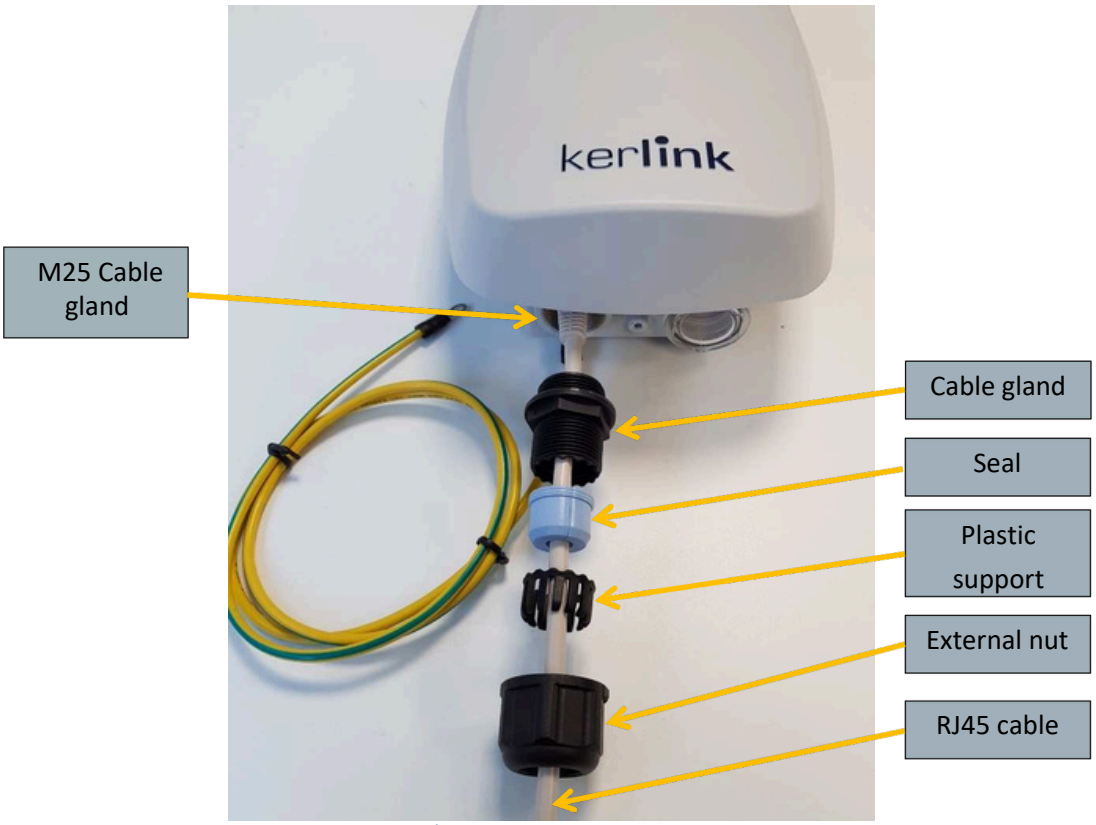


Figure 11: Ethernet connection on Wirnet iStation

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4.3 Earthing of the Wirnet iStation mounting kit

Kerlink provides a mounting kit as shown on the figure 12.
It is strongly recommended to earth for lightning immunity and electrical security.

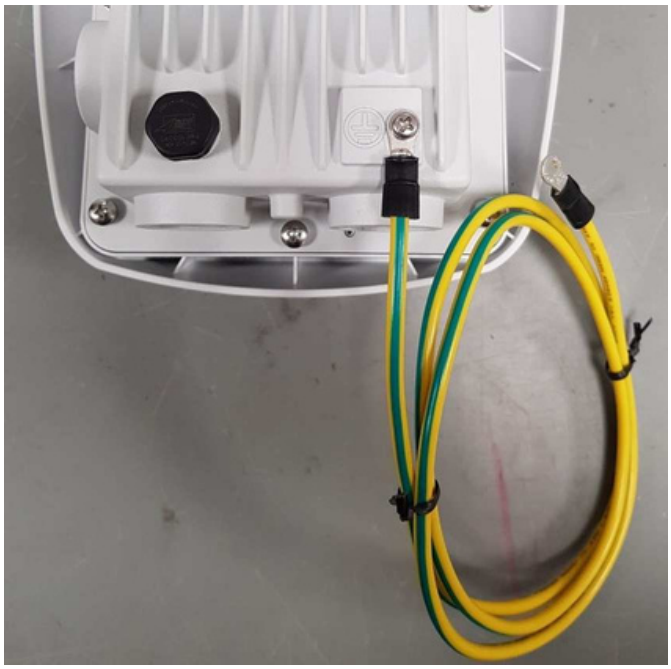
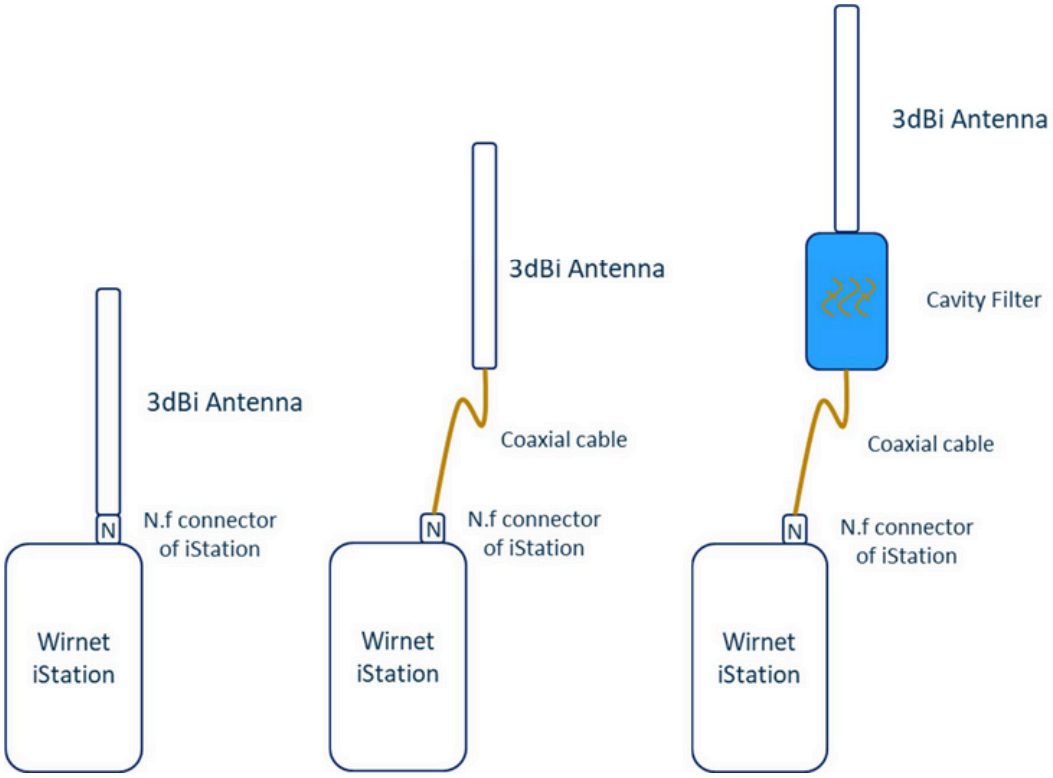


Figure 12: Earthing with mounting kit provided

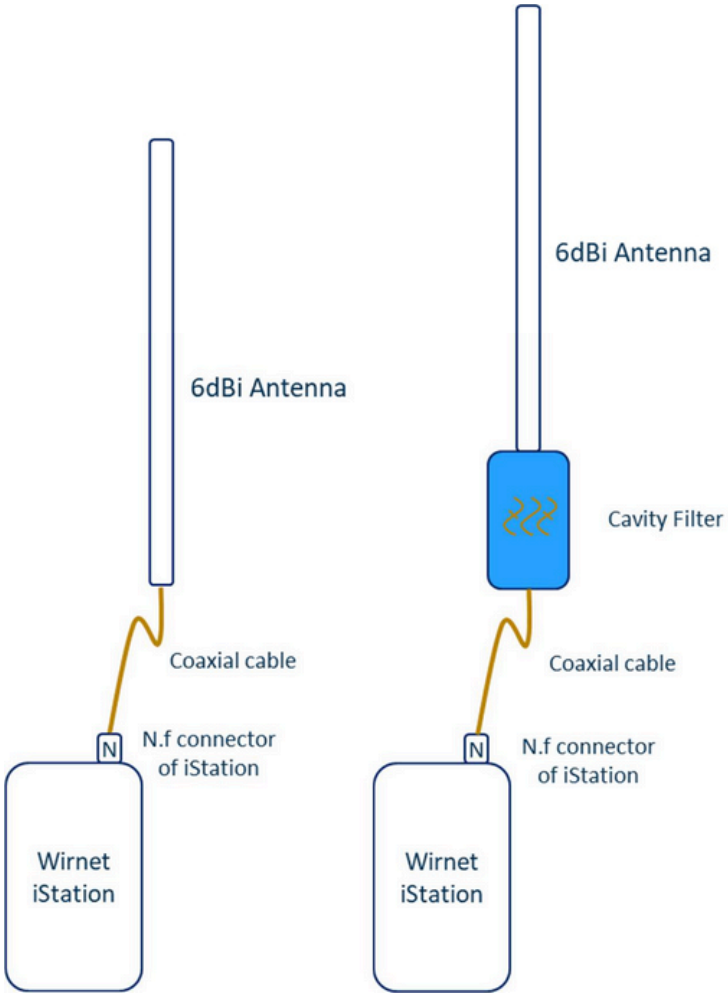
4.4 External antenna

To use an external antenna with or without any additional accessories (surge protection, cavity filter, …), please respect scrupulously the following diagrams:

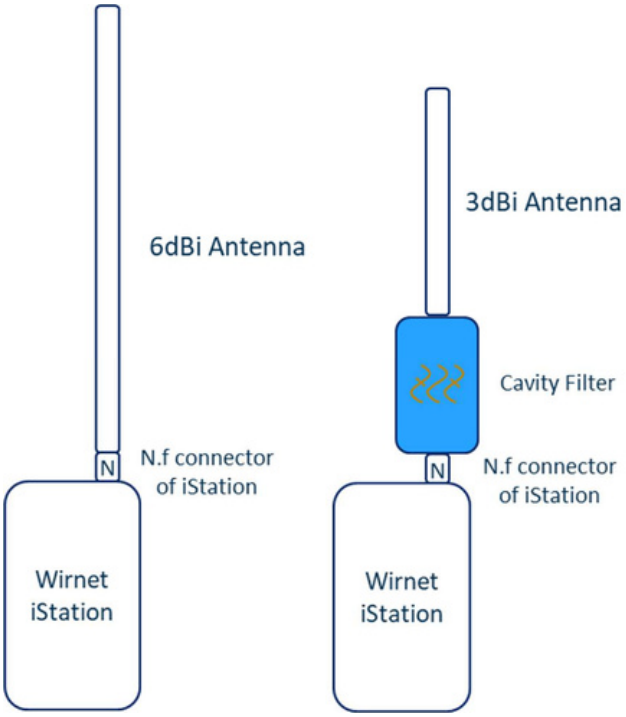


Additional technical information with the 3dBi antennas:
The 3dBi antenna should be less than 35cm

When using a 6dBi antenna or a cavity filter, it is mandatory to use a coaxial cable between both as shown in the picture below:



Therefore, the following two types of installation cannot be used.
Because this could cause a lever effect on the N.f Connector of iStation, which could cause the N.f connector to fail.



Individual parts (adapter, antenna, surge protection, …) are designed for manual clamping so as not to damage the connectors.

To finish, once the adapter is installed and the accessories are connected (external antenna / surge protection), be sure to apply the self-amalgamating industrial tape as shown in the picture below. This is simply an additional way to improve the durability of the RF connections against environmental aggression (moisture, pollution, etc.) and ensure their reliability overtime.

Figure 13: Self-amalgamating tape

5. Software specifications

Firmware provided by default on gateway is a GNU/Linux distribution named Keros (Kerlink Operating System).

At the time these lines are written, this operating system is based on Yocto Rocko 2.4 and Long-term Linux kernel 4.14.

This firmware is focused on main topics listed below:

- Stability: by providing a read-only base and handling recoveries if instability is
- detected (based on HW watchdog).
- Security: by supporting optional SecureBoot mechanism and by securing assets like VPN keys (thanks to Prove&CoreTM Secure Storage).
  Flexibility: by providing ways to handle various user configurations and/or applications.

Firmware is continuously improved to add new features, simplify usage and improved stability. Please refer to online software documentation for further details:
http://wikikerlink.fr/wirnet-productline

END OF DOCUMENT

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Wirnet™ iStation

LoRaWAN® Outdoor Gateway for the Internet of Things

The "Wirnet™ iStation" is the ideal gateway to support your smart city, smart industry or any other smart project, combining simplicity of installation, unique superior coverage and operational excellence.

Smart Cities | **Smart Industry** | **Smart Metering** | **Smart Agriculture & Environment**

Kerlink is certified ISO9001: 2015 by AFNOR certification. The Quality Management System gives high priority to Customer satisfaction and progress implementation.

Key Features

• **Outdoor LoRa® Gateway,** • Carrier grade casing (**IP67**) for industrial use, • Supported unlicensed bands : 863-874.4MHz (EMEA, India),
902-928MHz (North America), 915-928MHz (APAC, Latin America),

• Supported LoRaWAN® regional parameters: EU863-870, IN865-
867, RU864-870, US902-928, AU915-928, AS923, KR920-923,

• **8ch RX (125 kHz, multi Spreading Factor) + 1ch RX (250KHz or 500kHz, mono Spreading Factor) + 1ch RX (FSK) to get 10ch RX + 1ch TX,**

• Backhaul connectivity: 4G Worldwide module with 3G/2G fallback and Ethernet (RJ45),

• Power supply:
  — PoE (injector, switch, …), both Mode A and Mode B (802.3af specifications),
  — +/- 48VDC through RJ45 (isolated power),

• **Highly secured device relying on a Trustzone firmware**

Key Differentiators

High performance, reliability & robustness

• **Carrier grade design** with excellent heat dissipation
• Semtech Reference Design v1.5 components.

Security HW and SW architecture

• SecureBoot (Signed firmware),
• SecureStorage (keys and certificates in secured area) using ProvenCore™ solution,
• Secured links and backhaul protection (OpenVPN/IPsec),
• Reboot (watchdog) and recovery to previous Management config (or factory config if the boot issue is not fixed).

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LoRaWAN® Outdoor Gateway for the Internet of Things

Easy deployment

- No need to open the casing during installation (waterproof connectors for RJ45, SIM card…),
- Easy installation mounting kit,
- **Fully integrated and internal antennas** GPS, 4G, LoRa (peak gain=2,6dBi) : no external antenna installation required (external LoRa antenna 3dBi or 6dBi possible as an option),
- Easy access to connectivity:
  - — Ethernet 10/100 Mbps (RJ45),
  - — SIM card (mini-SIM format),
  - — Two LEDs controlled by SW (programmable):
    - 1 x green LED for power,
    - 1 x red LED for system status (update, boot behavior, LoRa status, backhaul…),
- USB (Type C) connector for debug probe,
- Multifunction button for On/Off/Reset/Factory reset,
- Simple and convenient configuration, management, control and update using the Kerlink Wanesy™ Management Center (Alarm notifications, firmware upgrade, platform statistics, RF statistics, RF spectrum analyzer...),
- Remotely configurable, manageable, via intuitive Web GUI,
- Remote access via SSH.

Technical Features

- Sniffer forLBT (Listen BeforeTalk),
- Built-in high rejection SAWfilters,
- Rx Sensitivity: -141 dBm (SF12),
- Conducted TX Power: configurable from 5dBm to 27 dBm,
- Range -40°C +60°C,
- Humidity: 95%,
- Size : 265 x 165 x 100 mm,
- Weight : 1,4kg (mounting kit included),
- Spectrum analysis compliant,
- Capacitor for clean shut down of applications in case of power failure,
- Casing: IP67 Alu (Back), Polycarbonate (Front), Inox (mounting kit),
- Surge protection of the RF LoRa link (option),
- CPU: ARM Cortex A9,
- DDRAM 256MB,
- 8GB eMMC (6GB availableforuser),

Software Features

- SameKerlink software onalli-Series (for infrastructure homogeneity and easy maintenance
- **Dynamic web interface (On-the fly modifications),**
- **Programmable Gateway:** Toolchain, libraries and header files for compilation of in-house SW, or extra packages additions,
- **Including:**

- Operating System: KerOS with embedded GNU/Linux based on Yocto 3.1 (dunfell) LTS and Kernel 5.4 LTS,
- Native Language Support: Python3.8, C/C++ and Shell,
- Included packages: SQlite (Database), Connman/Ofono, NTPd, lighttpd.

Added-Value Services for all gateways

- Lifetime Guarantee
- Access to KerlinkWiki
- Zero Touch Provisioning (ZTP) and Zero Touch Maintenance (ZTM)
- Access to embedded Chirpstack LNS

More options:

- **Maintain offer** : Priority support, Access to Wanesy Maganement Cockpit including inventory, Software packages management, remote reboot, alerting features
- **Operate offer** : SLAs, Network Operating Center, Pro-Active and preventive maintenance, Reports and recommendations for network optimization

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sales@kerlink.fr
+ 33 2 99 12 29 00
1 rue Jacqueline Auriol
35235 Thorigné-Fouillard
France

Thanks to their expertise and experience, Kerlink teams are fully mobilized to help you develop your business and reduce your operational and commercial risks. **Don't hesitate to contact us:**

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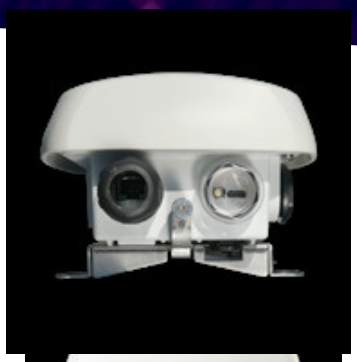
Wirnet™ iStation

LoRaWAN® Outdoor Gateway for the Internet of Things



265 MM

165 MM

100 MM

Certifications

868	915	923
• Europe	• USA • Canada	• Australia • New-Zealand • Japan • Singapore

Many other countries already planned,
(additional information on demand)

Wirnet™ iStation - Ordering references

ProductOrderingReferences

Reference	Designation	Description	ISM Frequencies
PDTIOT-ISS04	Wirnet iStation 868 MHz	8CH LoRa, 2G/3G/4G backhaul + ETH backhaul	863-874.4MHz
PDTIOT-ISS05	Wirnet iStation 915 MHz	8CH LoRa, 2G/3G/4G backhaul + ETH backhaul	902-928MHz
PDTIOT-ISS06	Wirnet iStation 923 MHz	8CH LoRa, 2G/3G/4G backhaul + ETH backhaul	915-928MHz

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Wirnet™ iStation

LoRaWAN® Outdoor Gateway for the Internet of Things

Common accessories for outdoor installation

KLK03524	Self-amalgamating tape - 3m	Mounting accessories for outdoor installation Mounting
KLK03540	Stainless Steel Hose clamp	accessories for outdoor installation DC/DC converter with USB-C
ACCIOT-POW01	DC/DC converter	output for solar panels installation

868 Accessory Ordering References

PoE INJECTOR		Description	Recommendation
KLK03525	POE Injector POE	PoE Injector 30 W indoor – 48V DC Input	
KLK03505	Injector In addition to	PoE Injector 30 W indoor - AC Input - EU	
KLK03554	KLK03505 POE Injector	AC Power supply cable for **UK(IEC-320-C13)**	
KLK03596		PoE Injector - 30 W Outdoor - AC Input	
EXTERNAL ANTENNA (optional)			
KLK03198	Antenna	Antenna Omnidir 868Mhz 3 dBi - N male	
ACCIOT-KAN01	Antenna	Antenna kit Omni 868 MHz 6 dBi	
(Outdoor) CAVITY FILTER			
KLK03410_01	Cavity filter 865-870 MHz Cavity filter	865-870 MHz, EU coexistence LTE800, RGSM	
KLK02523	865-867 MHz CAVITY FILTER 863-873	India	
KLK02916	MHz - OUTDOOR	EU coexistence high power emitters	Former ACCIOT-CAV04
SURGE PROTECTION			
KLK02817	Surge Protection for POE link - Outdoor	PoE Surge protection - Outdoor	Recommended
KLK02818	Surge Protection for POE link - Indoor	PoE Surge protection - Indoor	Recommended
KLK02900	Surge Protection for Lora link - Outdoor	RF coaxial Surge protection - Outdoor	Recommended
DEBUG			
ACCIOT-SDE01	Debug Probe	Universal Debug Probe	

915 Accessory Ordering References

PoE INJECTOR		Description	Recommendation
KLK03525	POE Injector	PoE Injector 30 W indoor – 48V DC Input	
KLK03505	POE Injector	PoE Injector 30 W indoor - AC Input - EU	
KLK03506	POE Injector	PoE Injector 30 W indoor - AC Input - US	
KLK03596	POE Injector	PoE Injector - 30 W Outdoor - AC Input	
EXTERNAL ANTENNA (optional)			
KLK03199	Antenna	Antenna Omnidir 915/923Mhz 3 dBi - N male	
ACCIOT-KAN02	Antenna	Antenna kit Omni 915/923 MHz 6 dBi	
ACCIOT-KAN03	Antenna + 1m cable + support included	Antenna kit Omni 915/923 Mhz 3 dBi	
SURGE PROTECTION			
KLK02817	Surge Protection for POE link - Outdoor	PoE Surge protection - Outdoor	Recommended
KLK02818	Surge Protection for POE link - Indoor	PoE Surge protection - Indoor	Recommended
KLK02900	Surge Protection for Lora link - Outdoor	RF coaxial Surge protection - Outdoor	Recommended
(Outdoor) CAVITY FILTER			
KLK02973	Cavity filter 902-928MHz	USA, Canada, Mexico	
KLK02909_01	CAVITY FILTER 920-928 MHz - OUTDOOR	USA, Canada, Mexico	Former ACCIOT-CAV03
DEBUG			
ACCIOT-SDE01	Debug Probe	Universal Debug Probe	

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LoRaWAN® Outdoor Gateway for the Internet of Things

923 Accessory Ordering References

PoE INJECTOR		Description	Recommendation
KLK03505	POE Injector In addition	PoE Injector 30 W indoor - AC Input - EU	
KLK03055	to KLK03505 In addition	AC Power supply cable fo**dapan(IEC-320-C13)**	
KLK03553	to KLK03505 POE	AC Power supply cable for **Australia (IEC-320-C13)**	
KLK03596	Injector	PoE Injector - 30 W Outdoor - AC Input	
EXTERNAL ANTENNA (optional)			
KLK03199	Antenna	Antenna Omnidir 915/923Mhz 3 dBi - N male	
ACCIOT-KAN02	Antenna	Antenna kit Omni 915/923 MHz 6 dBi	
ACCIOT-KAN03	Antenna + 1m cable + support included	Antenna kit Omni 915/923 Mhz 3 dBi	
SURGE PROTECTION			
KLK02817	Surge Protection for POE link - Outdoor	PoE Surge protection - Outdoor	Recommended
KLK02818	Surge Protection for POE link - Indoor	PoE Surge protection - Indoor	Recommended
KLK02900	Surge Protection for Lora link - Outdoor	RF coaxial Surge protection - Outdoor	Recommended
(Outdoor) CAVITY FILTER			
KLK02522	Cavity filter 920-925 MHz Cavity filter	South Korea, Singapore, HK, Taiwan, Thailand, Cambodia	
KLK02523	920-925 MHz Cavity filter 918-923 MHz	India, Irak, Jordania	
KLK02905	Cavity filter 915-920 MHz Cavity filter	Indonesia Malaysia, Vietnam, Mynanmar	
KLK02906	915-928 MHz CAVITY FILTER 920-928	Philippines, Israel, Cuba	
KLK03306_02	MHz - OUTDOOR	APAC, LATAM	
KLK02909_01		New-Zealand, Japan, Costa Rica, Venezuela (former ACCIOT-CAV03)	
DEBUG			
ACCIOT-SDE01	Debug Probe	Universal Debug Probe	

(Latest online doc version)

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Wirnet™ iStation

LoRaWAN®gatewayfortheInternet of Things

Quick Start Guide

Thank youfor choosing Kerlink.
We are proudtobe part of your project.

For ecological reasons, this guide has been printed on recycled paper

KLK03338_11
Kerlink internal use

1 Need help?

The Wirnet™ iStation is an outdoor LoRa Gateway for IoT chain. It is based on LoRa® technology provided by Semtech Company and is fully compatible and interoperable with existing LoRa LPWAN.

Upon specific configuration, it can be used as a Helium-network compatible hotspot to mine HNT. To do so, it needs to be clearly mentioned once ordered as it use a specific cryptographic private key, a dedicated software, and Helium miner. If you have any doubt, please check directly with your reseller to ensure it is Helium-network compatible. For Helium-network onboarding, please go through Helium application or use https://helium-onboarding.kerlink.com/

• To provide the most updated technical documentation, as well as considering and saving the environmental resources, Kerlink is providing preferably "Online documentation". You can then find up to date documentation directly within our website: https://www.kerlink.com/customer-support/

• For its direct customers, Kerlink is also providing a Wiki access where it can be found a comprehensive set of documents and technical information. It can be accessed here: http://wikikerlink.fr/
  - If you don't have yet your Wiki login/password, please request them to support@kerlink.com (note that the "Product ID" of one of your products will be required).
  - How to find the "Product ID"? Please look at the Wirnet iStation sticker placed on the right side of the case

• For indirect Kerlink customers (meaning if you purchase the product through a distributor), please contact them directly to access document information and support. If really needed, Kerlink can provide those documents through mail request.

• List of documents and information for self-help:
  - Setup of Wirnet™ iStation Gateway: Connection to the gateway, Firmware update, Packet Forwarder installation, Packet Forwarder configuration.
  - System Management: Connection, login and credentials, KerOS REST API, …
  - Network Management: Backhaul configuration, Firewall, IPsec / OpenVPN.
  - LoRa Features, KerOS customization, support and resources (FAQ, Troubleshoot the gateway …)

• Application Notes: (from end of November 2019) for questions related to generic engineering rules
  - AN-KLK03355 - Improving radio coexistence performance of LoRaWAN gateways
  - AN-KLK03356 - LoRaWAN gateways coverage optimization
  - AN-KLK03357 - LoRaWAN gateways installation recommendations
  - AN-KLK03358 - LoRaWAN gateways lightning protection

• For any Warranty or Maintenance related request (Trouble shooting, help …),
  - If purchased from a Distributor, please contact the distributor directly for Level1 support
  - If purchased from Kerlink directly, please open an “Assistance Request” via our ticketing tool called OTRS (Open-source Ticket Request System).
  - If you don’t have yet your OTRS login/password, please request them to support@Kerlink.com (note that the Product Id or any serial number of one of your products will be required).
  Access to Kerlink “Technical Support team” for Maintenance Services is conditioned to a valid Maintenance contract.

• For any other question related to our product, please contact our distributor or Kerlink sales@kerlink.com or + 33 2 99 12 29 00.

2 Manufacturer

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Tel.: +33 (0)2 99 12 29 00 – Fax: +33 (0) 2 99 12 29 11
www.kerlink.com

3 Safety

• Please, read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, or maintain it.
• The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

	• Refers to a critical situation. • In case of non-compliance, it may result in property damage
	• Refers to useful information during manipulations.

4 Package Contents

	• Only use the Wirnet™ iStation for its intended use "Normal conditions of use". • Maintenance and repair must be carried out by qualified personnel authorized by the manufacturer. • The enclosure of the Wirnet™ iStation must not be opened by CUSTOMER . • The Wirnet™ iStation should only be used with accessories or spare parts supplied by your reseller.

Kerlink Wirnet™ iStation

Assembly Parts:	Torque (N.m)	Screw P/N:	Torque (N.m)
1.M25 dust Cover (Clear)	0,7 N.m		
2.M25 dust Cover (Black)	0,7 N.m	Already mounted	
3.RF Switch Cap	Torque by hand		
4.Plastic Vent	0,5 N.m		
5. Cable Gland (Step1.)	1.1 N.m	Cable Gland (Step2)	1.1 N.m
6. Grounding Cable		P/N:R-14-0049 X1	0.9 N.m
7. Mounting			

Remarks:

- The Wirnet™ iStation may be mounted on a wall using four oblong holes located on the mounting bracket (hole spacing 120 mm in width and 116.5 mm in length).
- The Stainless-Steel Hose Clamp for mounting on a pole are not included, the width should not exceed 14mm.
- The screws for mounting on a wall are not included, the diameter of the screws must be 6mm.
- The covers must be screwed at their maximum to ensure watertightness (USIM and LED/buttons)

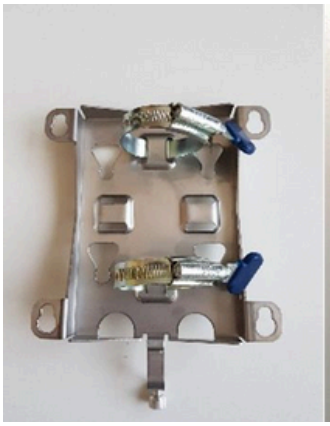
5 Markings

Symbol	Description	Symbol	Description
Wirnet iStation	Type of equipment		QR Code
42-57V 200mA	Power supply information	CE or other marking	CE marking indicating that the product complies with European directives or other marking marking depending on the country
Board ID	Serial number of board	RoHS COMPLIANT	Marking indicating that the product complies with RoHS directives
Product ID	Serial number of product		Do not dispose of with domestic waste
MAC ADDR	MAC address		Product must be installed on a non-flammable substrate (UL94V0). Refer to the installation instructions Refer to the installation instructions before powering up
IP 67	Indice of protection		

6 Installation of Wirnet™ iStation

6.1 Mounting of theenclosure

	When installing the product, the ground connection must always be made first.
	The Wirnet™ iStation enclosure can be mounted on a pole by strapping (see the following example), any concrete pedestal, concrete wall or any non-flammable surface (UL94-V0).



Gateway support
(Strapping not included)

Installation support on a pole with strapping

Mandatory ground connection on the Wirnet™ iStation

Installation the Wirnet™ iStation on the support

6.2 **Setting connections**

⚠	Before setting all connections, ensure that the power supply is not connected to the mains supply.

GNSS, 3G/4G and LoRa antenna are integrated. An external optional LoRa antenna can be added by opening the n°3 (please refer on the chart page 3) button and then screw the antenna directly or via a cable.



Once the Wirnet™ iStation is installed, you can select up to 2 technologies to set up the access to Internet for the data backhaul:

- Ethernet connection, requiring an Ethernet access through a dedicated RJ45 cable (not included)
- 3G/4G cellular connection, requiring an USIM (not included) and a data subscription (not included)

Note that both configurations can be used in parallel. For example, RJ45 Ethernet with a 3G / 4G link as a backup.

Ethernet connection **InsertSim**

Regarding the power supply, the following equipment can be used:

- End-Span or Mid-Span at least a 15W PoE (Power over Ethernet) (not included)

Information	The Ethernet cable is not provided and must consist of two RJ45 T 568A (or 568B) plugs on each side. KERLINK recommends using a cable with the following characteristics: • Category: 6A • Shielding: STP (U/FTP) or SSTP (S/FTP) • Section conductors: AWG26 • External jacket: LSZH or PUR • Maximum length: 100 meters • Cable gland 6.6-8.6mm. Operating temperature range: -40°C to +60°C Altitude max. < 2000m / hygrometry 95% non-condensing

6.3 **Assembly instruction for sealing the connectors**

	Pay attention to the gasket when screwing the 2 caps: if you screw too hard, it may twist. Here is an example of what is OK and what is not. If you use a torque wrench, the tightening torque should be 1.6 Nm max
	 
	To avoid environmental aggression (moisture, pollution, etc.) and ensure their reliability, be sure to apply the self-amalgamating tape on the N connector as show below: 

6.4 **Firstconnexion**

- A push-button is available on the bottom of enclosure.
- The ON/OFF/RST button must be pressed during 1s to generate a SW reset of the product.
- Note that a long press for 5s turns off the gateway.

Once the power is “ON”, please check the LED status and start the SW configuration. The iStation should power on, showing:

- a solid green LED (Power LED, under the power button),
- accompanied by a red LED (Status LED =operations status) starting solid, then blinking during bootup.

Gateway status	«Status LED» behaviour
Boot part 1	Fix on
Boot part 2	Heart beat
Boot part 3	Blink every second
Run time	Off
Power down sequence	Heartbeat
Restore backup	Blink / 2 seconds
Restore stock	Blink / 4 seconds

For more information on the « Quick start of Wirnet™ iStation Gateway, please consult the Kerlink Wiki:
http://wikikerlink.fr/wirnet-productline/doku.php?id=wiki:quickstart:quickstart_istation

6.5 **Firstconnexion**

The Wirnet product line embeds a web interface to allow to easily manage the gateways:

- Trigger software upgrade/update,
- Configure the backhaul connectivity,
- Trigger actions on the gateway: Turn-off, reboot, factory reset …

The generic syntax to access to this web interface is: http://klk-<type_GW>-<serial>/

This means for the Wirnet iStation: http://klk-wiis-03002e/

Note that if your computer is on the same local network, you can also directly use the IP address of your gateway in a browser to connect to the Web interface.
The default credentials are:

Login: admin
Password: pwd4admin

For security reasons, it is strongly recommended to change the default passwords.

7 Declaration of Conformity

7.1 Wirnet™iStation 868

Simplified EU Declaration of Conformity

Hereby, Kerlink, declares that the radio equipment type Wirnet™ iStation 868 follows Directive 2014/53/EU.

The full text of the EU Declaration of Conformity is available at the following internet address:

www.kerlink.com/customer-support/support-wirnet-istation/

In Europe, the Wirnet™ iStation 868 station must comply with the ERC 70-03 requirements regarding duty cycle and maximum EIRP. They are summarized in the following table

ERC 70-03	Frequency (MHz)	Power	Duty Cycle
h1.4	865-868	14dBm ERP	1%
h1.5	868-868,6	14dBm ERP	1%
h1.7	869,4-869,65	27dBm ERP	10%

Information	The power supply of the Wirnet™ iStation 868 must be a limited source of power. Note that: If the LoRa antenna is changed, the output power must be adjusted to consider the gain of the antenna in order to not overrule the ERC 70-03 recommendation. Some countries in Europe may have specific frequency ranges, EIRP and duty cycles regulations. Check the local regulations before installing and commissioning the Wirnet™ iStation 868. For other countries, outside Europe, check the frequency range, the maximum EIRP and duty cycle allowed.

UKCA Declaration of Conformity

Hereby Kerlink declares that your radio equipment Wirnet™ iStation 868 is in conformity with the following relevant legislation of United Kingdom:

UK SI 2017/1206 - Radio Equipment Regulations 2017

UK SI 2012/3032 - Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (RoHS2)

Information	The power supply of the Wirnet™ iStation 868 must be a limited source of power. Note that: If the LoRa antenna is changed, the output power must be adjusted to consider the gain of the antenna in order to not overrule local regulation. Some countries in Europe may have specific frequency ranges, EIRP and duty cycles regulations. Check the local regulations before installing and commissioning the Wirnet™ iStation 868. For other countries, outside Europe, check the frequency range, the maximum EIRP and duty cycle allowed.

7.2 **Wirnet™iStation 915**

The Wirnet™ iStation 915 follows both FCC and IC regulations. The associated FCC and IC identifiers of the Wirnet™ iStation 915 are:

Model: Wirnet™ iStation 915	Model: EG25G
FCC ID: 2AFYS-KLKWIIS915	Contains FCC ID: XMR201903EG25G
IC: 20637-KLKWIIS915	Contient IC: 10224A-201903EG25G

	The power supply of the Wirnet™ iStation 915 must be a limited source of power. Note that: Kerlink is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment. This device complies with Industry Canada's license-exempt RSSs. 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 of the device.
	Some conditions have to be respected to maintain the FCC and IC compliance of the devices in the USA and Canada. Please contact your reseller to have details. For other countries, check the specific regulations regarding maximum EIRP and duty cycle allowed.

	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 This radio transmitter 20637-KLKWIIS915 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device. Le présent émetteur radio 20637-KLKWIIS915 a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur. External antenna used: gain 3dBi or 6dBi, dipole, 50 Ω, vertical, omnidirectional

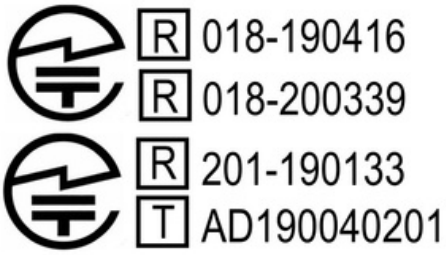
	This equipment complies with RSS102's and FCC radiation exposure limits set forth for an uncontrolled environment under the following conditions: 1.. This equipment should be installed and operated such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and user's/nearby person's body at all times. 2. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Cet équipement est conforme aux limites d'expositions de la CNR102 applicables pour un environnement non contrôlé aux conditions suivantes: 1. Cet équipement devra être installé et fonctionner de telle manière qu'une distance minimale de séparation de 20 cm soit maintenue entre la partie rayonnante (l'antenne) et l'utilisateur / les personnes à proximité à tout moment. 2 Cet émetteur ne doit pas être co-localisé ou opérer en conjonction avec toute autre antenne ou émetteur. This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: 1. This device may not cause interference. 2. This device must accept any interference, including interference that may cause undesired operation of the device. L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : 1. L'appareil ne doit pas produire de brouillage; 2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. This device must be professionally installed.

Country	Label, identification and comments
Mexico	Marca : Kerlink Modelo : Wirnet iStation 915 IFETEL : RTIKEWI21-1021 NOM NYCE

7.3 **Wirnet™iStation 923**

The Wirnet™ iStation 923 complies with the directive 2014/53/EU relating to radio equipment (RED) and is certified for the following countries:

Information	The power supply of the Wirnet™ iStation 923 must be a limited source of power. Kerlink is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

Country	Label, identification and comments
Australia New Zealand	
Argentina	
Brazil	 
Japan	 当該機器には電波法に基づく、技術基準適合証明等を受けた特定無線設備を装着している。 Thisequipmentcontainsspecifiedradioequipment that hasbeen certifiedtothe Technical Regulation Conformity Certification under the Radio Law

Indonesia	 
SouthKorea	**R-R-klk-WIIS923** 이 기기는 사용중 전파혼신 가능성이 있으며, 타 기기로부터 유해한 혼신을 받을수 있음 There is a possibility of radio interference during use of this device, and it may receive harmful interference from other devices
Malaysia	MCMC
Singapore	Complies with IMDA Standards DB106667

Thailand	Class B NBTC ID. B69026-20-3723 “เครื่องโทรคมนาคมและอุปกรณ์นี้ มีคุณสมบัติสอดคล้องตามมาตรฐานหรือข้อกำหนดทางเทคนิคของ กสทช.” (This telecommunication equipment conforms to the standard or technical requirements of NBTC) “เครื่องวิทยุคมนาคมนี้มีระดับการแผ่คลื่นแม่เหล็กไฟฟ้าสอดคล้องตามมาตรฐานความปลอดภัยต่อสุขภาพของมนุษย์จากการใช้เครื่องวิทยุคมนาคมที่คณะกรรมการกิจการโทรคมนาคมแห่งชาติประกาศกำหนด” (This radiocommunication equipment has the electromagnetic field strength in compliance with the Safety Standard for the Use of Radiocommunication Equipment on Human Health announced by the National Telecommunications Commission.) 

8 Disposal / recycling

	Do not dispose of the product with household waste. For proper disposal, contact a waste disposal company. The product packaging (cardboard and liners) can be removed with used paper.

9 Warranty

Contactyourreseller for warranty conditions of the Wirnet™ iStation.

	The Wirnet™ iStation is not warranted by Kerlink in case the enclosure is opened, modified, painted, branded out, outlined by CUSTOMER for any reason. Feel free to contact us for a guideline for the branding.

10 Accessories and Professional Services

Foradditionalinformation,onavailableaccessories and Professional Services please contact your reseller.

11 Give us your feedback

Your shopping and operational experiences are very important to us.
We would like to invite you to leave review on our products and services.
We will appreciate your time and efforts.
We would be very proud to get any photo of your gateway installation. Can you share them to dmk@kerlink.com

12 Find us in Social Media

Wewouldliketohear fromyou:any tips, any news to share?

@kerlink_news

Kerlink

Kerlink channel

We stay at your disposal for any help on your project.
Yours sincerely.

Kerlink Team

Notes :

(Latest online doc version)

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Wirnet™ iStation

AN – Solar panels installation through USB-C input of Wirnet™ iStation

Thank you for choosing Kerlink.

We are proud to be part of your project.

1 Introduction

Wirnet™ iStation installation using solar panels require to fully control power efficiency of every part of the chain. Indeed, when a DC input POE injector is used to power the product, both the efficiency of the POE injector and the efficiency of the internal product converter need to be considered to calculate the global power efficiency. As the standard POE voltage is quite high (around 50 VDC), power efficiency is low, at around 80% for both stages which bring to a global power efficiency at about 60%.

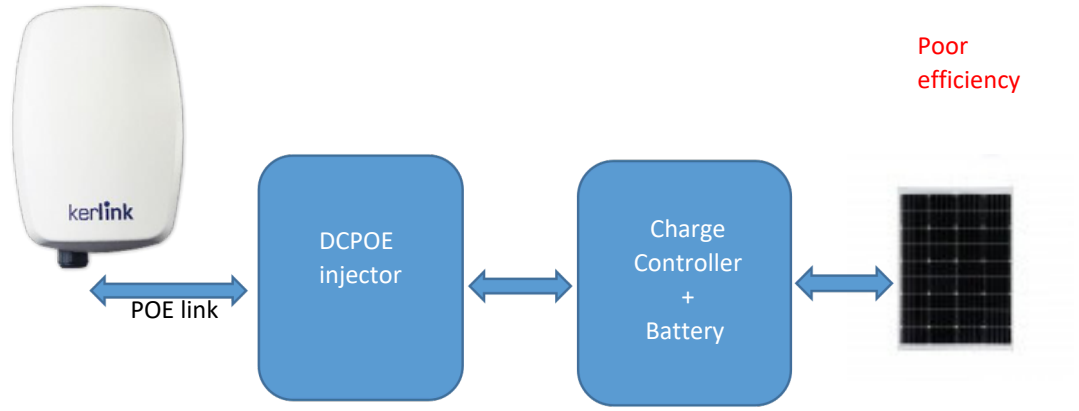
Working on a solution based on the USB-C to reduce the voltage input will improve the efficiency from 60% to more than 80%. Solar panels dimensions will also be reduced by the same percentage.
This Application Note gives information on the engineering rules when the customer wishes to connect a solar panel charge controller to USB-C of the Wirnet iStation.

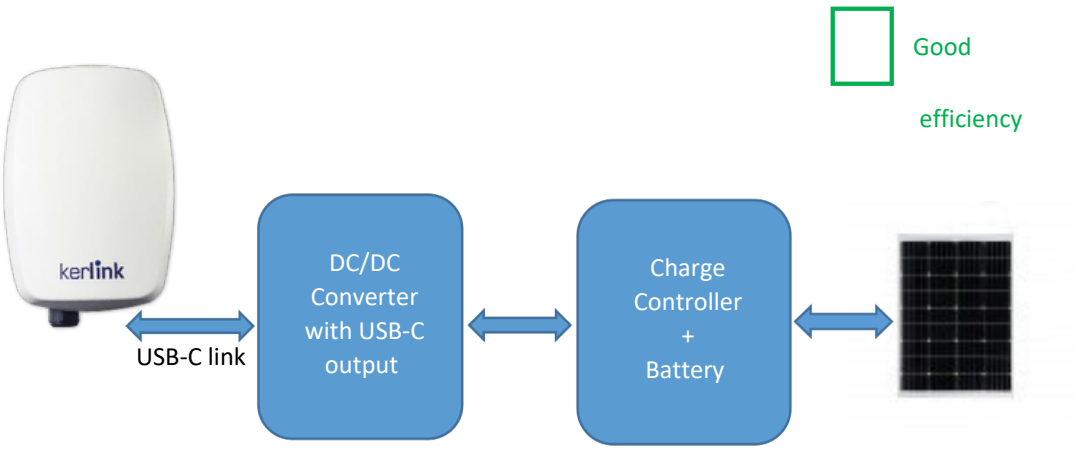
2 Wirnet™ iStation: USB-C input specifications

Specifications	
Absolute maximuminputvoltage rating	5.5V
Operating input voltage range	5.1V to5.5V

⚠	**Please strictly respect these recommendations to avoid any malfunction or loss of performance that may not be covered by the manufacturer warranty / extended warranty.**

3 Installation architectures





4 Accessory specifications: DC/DC converter with USB-C output

Kerlink provides the following accessory which is a voltage adapter to be positioned between the solar panel charge controller and the USB-C of the Wirnet iStation.

➔ The reference for this accessory is ACCIOT-POW01 (including DC/DC converter, a notice and a packaging).

Figure 1 : Packaging

Description	Specification
Input voltagerange	8-35VDC
Nominal output voltage	5.4V
Voltage regulation	<1%
Ripple (full load test)	<0.1V
Maximum output current	2A
Efficiency	80%
Cable length (USB-C side)	1m
Cable section (USB-C side)	AWG20 min
Cable external diameter (USB-C side)	6.6mm < Ø <8.6mm
Shielded (USB-C side)	yes
Cable UL rating (USB-C side)	UL 2725
Cables UL flammability classification	UL 94 V-0
Waterproof rating	IP67
Temperature range	-25 to +65°C

Figure 2: Specifications

5 Wirnet™ iStation: Power consumption

The average power consumption on the USB-C Input under 5V is detailed below:

Wirnet™ iStation	Power consumption
CPU block	1.25W avg
Ethernet block	0.150W avg
GPS block	0.135W avg
WWAN block (25%Tx,75%Rx)	1.45W avg
Radio block in Rx mode (x8 demodulator on)	1.5W avg
TOTAL	**4.485W avg**

Figure 3: Power consumption

Also, the maximum input power under 5V is approximately 7W. This includes CPU, ethernet enabled, GPS enabled, WWAN enabled and maximum RF power in Tx LoRa mode.

So, as the efficiency of the DC/DC converter is around 80%, make sure that the output power from the solar panel charge controller is sufficient.
To correctly size the solar panel and battery, here are the values to consider:

- **5.382W** in average on DC/DC converter input
- **8.4W** in max DC/DC converter input

6 Wirnet™ iStation: Connection with DC/DC converter

Figure 4: Swap of cap & gland

In the initial configuration (fig.4 on the left), the cable gland is screwed into the M25 hole on the left and the transparent cap in the right.

In the configuration where the ACCIOT-POW01 accessory is connected, the customer will have to swap the cable gland with the transparent cap as shown in fig.4 on the right.
Be careful to keep the waterproof protection!!!

Here are the specifications of USB-C plug:

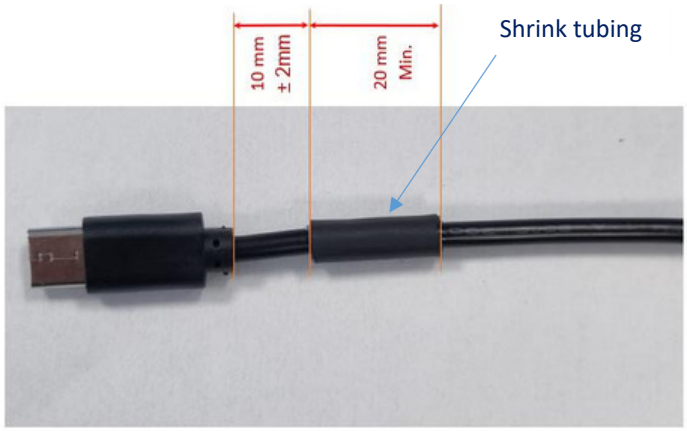


Figure 5: USB-C plug on the cable

To use this cable gland, the first step is to screw the first part tightly to the iStation so as not to twist the cable afterwards. Then, plug the cable.

Therefore, it will be necessary to position the blue gasket of the cable gland on the shrink tubing as shown on the following photo.

Figure 6: View of the blue gasket placed on the shrink tubing

The USB-C plug can then be connected to the USB-C receptacle of iStation, as shown below.

Figure 7: View of the cable plugged

Add the rubber and the cover.

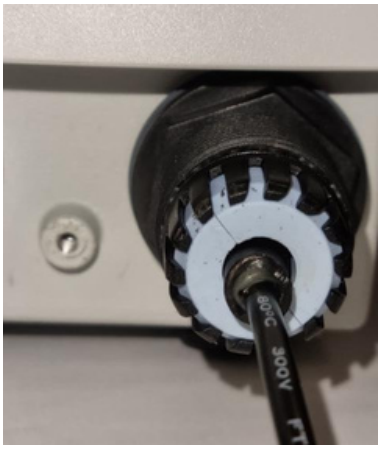


Figure 8: View of the rubber placement

Finally, screw the cover on tightly to ensure a good seal.

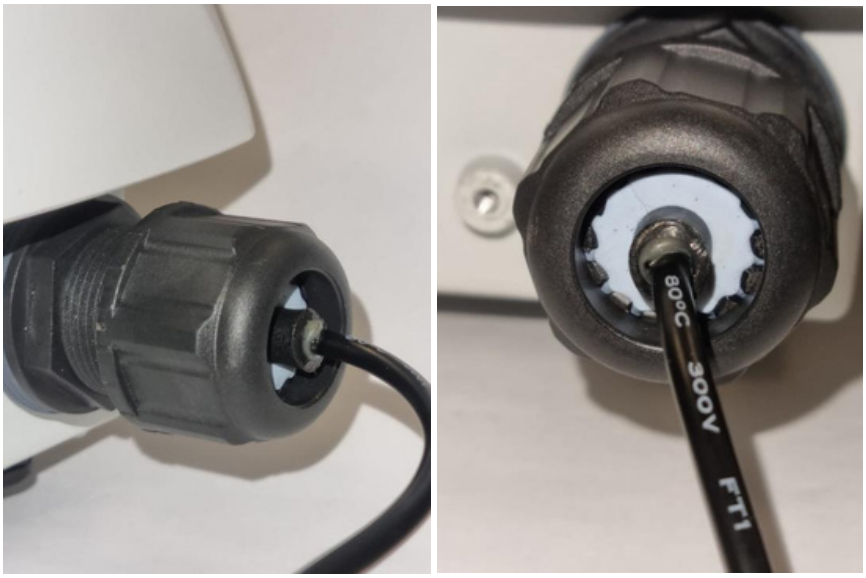


Figure 9: View of the cable gland placed

⚠	**Special attention on length and section must be taken into consideration regarding the cable used between the converter and the WirnetTM iStation USB-C input since acceptable drop voltage inside the cable is low.** **Please strictly respect these recommendations to avoid any malfunction or loss of performance that may not be covered by the manufacturer warranty / extended warranty.**

Any other question related to our product, please contact our distributors or Kerlink:
support@kerlink.fr / + 33 2 99 12 29 00.

We stay at your disposal for any help on your project.
Yours sincerely.
Kerlink

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Wirnet™ iBTS

LoRaWAN® OutdoorGateway for the Internet of Things

Standard Version

Compact Version

The “Wirnet™ iBTS” is the ideal gateway to support your smart city, smart building or every smart project as it combines both an excellent Outdoor coverage (more than 15km in direct line-of-sight and 2km in urban environment) and operational excellence.

Smart Cities

Smart Building

Smart Metering

Smart Agriculture & Environment

Kerlink is certified ISO9001: 2015 by AFNOR certification. The Quality Management System gives high priority to Customer satisfaction and progress implementation.

Key Features

• **Outdoor** LoRa® Gateway, • Supported unlicensed bands : 863-874.4MHz (EMEA, India),
902-928MHz (North America), 915-928MHz (APAC, Latin America),

• Supported LoRaWAN® regional parameters: EU863-870, IN865-
867, RU864-870, US902-928, AU915-928, AS923, KR920-923,

• **Modular configurations:**
- From single channel (1 LoRa RF modem) to 80 channels (4 LoRa RF modem),
- Single channel (1 LoRa RF modem) to 8 channels (4 LoRa RF modem),
- Possibility to support multiple unlicensed bands in a single gateway,

• Backhaul connectivity: Cellular 2G/3G/4G evolutive to 5G (mini-PCIe module), Ethernet 10/100 Mbps (RJ45),

• **Geolocation ready:** Using the fine timestamps on ALL the channels for improved geolocation services thanks to FPGA. Fully compliant with Semtech reference design v2. No proprietary locked solution; **Synchronization with GPS, combines RSSI and TDOA measurements.**

Key Differentiators

High performance, reliability & future-proof

• Semtech Reference Design v2,

• Built-in high rejection filters,

• LoRa-ETM Ready: Evolutive design using modem SDR (Software Design Radio) architecture.

Secure HW and SW architecture

• SecureBoot (Signed firmware),

• SecureStorage (keys and certificates in secured area) using ProvenCore™ solution,

• Secured links and backhaul protection (OpenVPN/IPsec),

• Reboot (watchdog) and recovery to previous Management config (or factory config if the boot issue is not fixed).

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Wirnet™ iBTS

LoRaWAN® OutdoorGateway for the Internet of Things

Zoom on "iBTS Standard" Version

• **Modular configuration:** - 1 x UC module, - **Select up to 2** x WAN modules (optional), - **Select up to 4** x LoRa® RF modem modules (16 channels each),
Each LoRa RF modem allows 16ch RX (125 kHz, multi Spreading Factor) + 2ch RX (250kHz or 500kHz, mono Spreading Factor) + 2ch FSK + 2ch TX (without antenna diversity) to get up to 80 ch RX (with 4 x LoRa RF modem), • Size: 295 x 317 x 125 mm (including mounting kit), • Ingress protection (IP66), • Weight:

- About 6,2Kg (including mounting kit) with 1 x LoRa RF modem,
- About 7,2Kg (including mounting kit) with 3 x LoRa RF modems.

Zoom on "iBTS Compact" Version

• **Compact configuration:**
- 1 x UC module,
- 1 x WAN module **(optional)**,
- 1 x LoRa® RF modem module (16 channels),
• **Size:** 357 x 189 x 150 mm (including mounting kit),
• Ingress protection (IP67),
• **Weight:** about 3Kg (includingmounting kit).

Technical Features

• SnifferforLBT (Listen BeforeTalk),
• Rx Sensitivity: -141 dBm (SF12),
• TX Conducted Power: configurable from 5dBm to 30dBm,
• Range -40°C +60°C, (for gateway only, without power supply),
• Humidity: 5% to 95%,
• Out-band radio scanners to monitor the entire band to detect real load of the band (Spectrum analysis compliant),
• Supercapacitors for clean shut down of applications in case of power failure,
• Power:
  - Power Over Ethernet **30W** for **Compact** version (accessory),
  - Power Over Ethernet **60W** for **Standard** version (accessory),
  - Power Over Ethernet 48V DC class 4 (accessory),
  - DC power supply (ex : solar panel use) : 11 to 56V DC (accessory),
  - Power control : ignition detection, software OFF switching, ON/OFF button.

Software Features

• **SameFW asWirnet™iStationand iFemtoCell:** same user experience, quicker integration,
• **Dynamic web interface (On-the fly modifications),**
• **Programmable Gateway:** Toolchain, libraries and header files for compilation of in-house SW, or extra packages additions,
• **Including:**
  - Operating System: KerOS with embedded GNU/Linux based on Yocto 2.4 and LTS kernel 4.14,
  - Native Language Support: Python2, C/C++ and Shell,
  - Included packages: SQlite (Database), Connman/ Ofono, NTPd, lighttpd.

Value-added Services

• **Free access to Kerlink Wiki for customers,** • Plug & Play installation (option), • Wirnet™ iBTS is part of the end-to-end LoRa® connectivity solution with Kerlink Wanesy™ Management Center, remote monitoring and Operations Management suite (option), • Maintenance Services (option), • **Kerlink Project Management:** a comprehensive service offering and a global network of specialist integrators to support your entire project.

Thanks to their expertise and experience, Kerlink teams are fully mobilized to help you develop your business and reduce your operational and commercial risks.

Don't hesitate to contact us:

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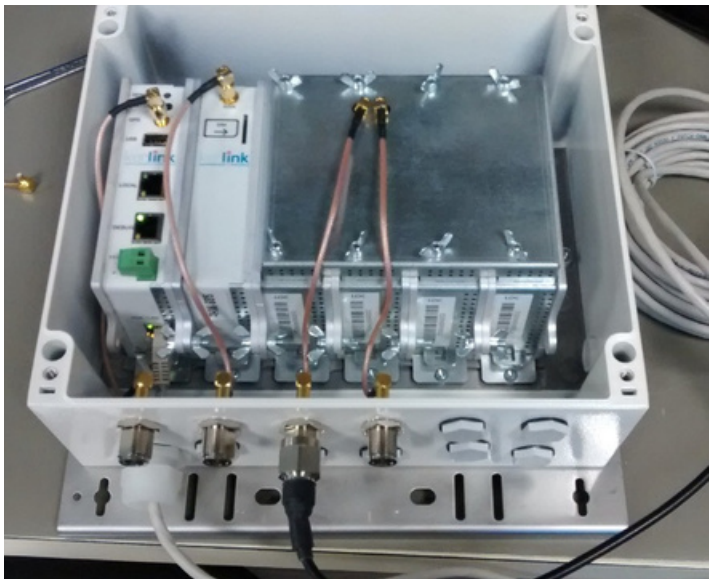
Wirnet™ iBTS

LoRaWAN® OutdoorGateway for the Internet of Things



Wirnet™ iBTS (standard)

Wirnet™ iBTS Compact

Wirnet™ iBTS Compact - Ordering references

Product Ordering References

Reference	Designation	Description	ISM Frequencies
PDTIOT-MCS01	16CH LoRa, ETH backhaul only	Wirnet iBTS Compact - 1LOC868-0W868-EU	863-874.4MHz
PDTIOT-MCS02	16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	Wirnet iBTS Compact - 1LOC868-1W868-EU	863-874.4MHz
PDTIOT-MCS18	16CH LoRa, Double 2G/3G/4G backhaul	Wirnet iBTS Compact 1LOC 1DW-EUEU	863-874.4MHz
PDTIOT-MCS11	16CH LoRa, ETH backhaul only	Wirnet iBTS Compact - 1LOC915-0W915-US	902-928MHz
PDTIOT-MCS12	16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	Wirnet iBTS Compact - 1LOC915-1W915-US	902-928MHz
PDTIOT-MCS19	16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	Wirnet iBTS Compact 1LOC923 1W915-US	915-928MHz
PDTIOT-MCS09	16CH LoRa, ETH backhaul only	Wirnet iBTS Compact - 1LOC923-0W923-EU	915-928MHz
PDTIOT-MCS10	16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	Wirnet iBTS Compact - 1LOC923-1W923-EU	915-928MHz
PDTIOT-MCS15	16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	Wirnet iBTS Compact - 1LOC923-1W923-AS	915-928MHz

868 Accessory Ordering References (Wirnet™ iBTS Compact)

		Description	Recommendation
POE INJECTOR			
KLK02681	POE Injector	PoE Injector 30 W indoor - AC Input - EU	
KLK02855	POE Injector	PoE Injector 30 W indoor - 48VDC Input	
KLK02953	POE Injector	PoE Injector 30W 55V Outdoor	
POWER SUPPLY			
KLK02898	Power Supply	40W - DC/DC CONVERTER - 48VDC Input	
EXTERNAL ANTENNA (optional)			
ACCIOT-KAN00	Antenna + 1m cable + support included	Antenna kit Omni 868 MHz 3 dBi Antenna kit Omni 868 MHz	
ACCIOT-KAN01	Antenna + 1m cable + support included	6 dBi Connectivity kit for antenna diversity (Antenna not	
ACCIOT-KAN06	Product Subpart	included)	
(Outdoor) CAVITY FILTER			
KLK02523	Cavity filter 865-867 MHz	India	
KLK02916	Cavity filter 868 MHz	863-873MHz - EU coexistence high power emitters	
KLK03410_01	Cavity filter 865-870 MHz	865-870 MHz, EU coexistence LTE800, RGSM	
SURGE PROTECTION			
KLK02817	Surge Protection for POE link - Outdoor	PoE Surge protection - outdoor	Recommended
KLK02818	Surge Protection for POE link - Indoor	PoE Surge protection - Indoor	Recommended
KLK02881	Surge Protection - DC Link – Indoor	DC Input	
KLK02900	Surge Protection for Lora link - Outdoor	RF coaxial Surge protection - outdoor	Recommended
DEBUG			
ACCWM2-SDE00	Debug Probe	Wirnet iBTS / Wirma Debug Probe	

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915 Accessory Ordering References (Wirnet™ iBTS Compact)

		Description	Recommendation
POE INJECTOR			
KLK02765	POE Injector	PoE Injector 30 W indoor - AC Input - US	
KLK02855	POE Injector	PoE Injector 30 W indoor - 48VDC Input	
KLK02953	POE Injector	PoE Injector 30W 55V Outdoor	
POWER SUPPLY			
KLK02898	Power Supply	40W - DC/DC CONVERTER - 48VDC Input	
EXTERNAL ANTENNA (optional)			
ACCIOT-KAN02	Antenna + 1m cable + support included	Antenna kit Omni 915/923 MHz 6 dBi	
ACCIOT-KAN03	Antenna + 1m cable + support included	Antenna kit Omni 915/923 Mhz 3 dBi	
ACCIOT-KAN06	Product Subpart	Connectivity kit for antenna diversity (Antenna not included)	
SURGE PROTECTION			
KLK02817	Surge Protection for POE link - Outdoor	PoE Surge protection - outdoor	
KLK02818	Surge Protection for POE link - Indoor	PoE Surge protection - Indoor	
KLK02881	Surge Protection - DC Link – Indoor	DC Input	
KLK02900	Surge Protection for Lora link - Outdoor	RF coaxial Surge protection - outdoor	
(Outdoor) CAVITY FILTER			
KLK02906	Cavity filter 915-920MHz	Philippines, Israel, Cuba	
KLK02973	Cavity filter 902-928MHz	USA, Canada, Mexico	
DEBUG			
ACCWM2-SDE00	Debug Probe	Wirnet iBTS / Wirma Debug Probe	

923 Accessory Ordering References (Wirnet™ iBTS Compact)

		Description	Recommendation
POE INJECTOR			
KLK02681	POE Injector	PoE Injector 30 W indoor - AC Input - EU	
KLK02855	POE Injector	PoE Injector 30 W indoor - 48VDC Input	
KLK02953	POE Injector	PoE Injector 30W 55V Outdoor	
POWER SUPPLY			
KLK02898	Power Supply	40W - DC/DC CONVERTER - 48VDC Input	
EXTERNAL ANTENNA (optional)			
ACCIOT-KAN02	Antenna + 1m cable + support included	Antenna kit Omni 915/923 MHz 6 dBi	
ACCIOT-KAN03	Antenna + 1m cable + support included	Antenna kit Omni 915/923 Mhz 3 dBi	
ACCIOT-KAN06	Product Subpart	Connectivity kit for antenna diversity (Antenna not included)	
SURGE PROTECTION			
KLK02817	Surge Protection for POE link - Outdoor	PoE Surge protection - outdoor	
KLK02818	Surge Protection for POE link - Indoor	PoE Surge protection - Indoor	
KLK02881	Surge Protection - DC Link – Indoor	DC Input	
KLK02900	Surge Protection for Lora link - Outdoor	RF coaxial Surge protection - outdoor	
(Outdoor) CAVITY FILTER			
KLK02522	Cavity filter 920-925 MHz	South Korea, Singapore, HK, Taiwan, Thailand, Cambodia	
KLK02905	Cavity filter 918-923 MHz	Indonesia Malaysia, Vietnam, Mynanmar	
KLK02909_01	Cavity filter 920-928 MHz	New-Zealand, Japan, Costa Rica, Venezuela	
KLK03306	Cavity filter 915-928 MHz	APAC, LATAM	
DEBUG			
ACCWM2-SDE00	Debug Probe	Wirnet iBTS / Wirma Debug Probe	

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LoRaWAN® OutdoorGateway for the Internet of Things

Wirnet™ iBTS Full - Ordering references

Product Ordering References

Reference	Designation	Description	ISM Frequencies
PDTIOT-MSS01	Wirnet iBTS - 1LOC868-0W868-EU	16CH LoRa, ETH backhaul only	863-874.4MHz
PDTIOT-MSS02	Wirnet iBTS - 1LOC868-1W868-EU	16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	863-874.4MHz
PDTIOT-MSS03	Wirnet iBTS - 3LOC868-0W868-EU	3x16CH LoRa, ETH backhaul only	863-874.4MHz
PDTIOT-MSS04	Wirnet iBTS - 3LOC868-1W868-EU	3x16CH LoRa, 2G/3G/4G backhaul	863-874.4MHz
PDTIOT-MSS05	Wirnet iBTS - 1B4LOC915-0W915-US	4x16CH LoRa, ETH backhaul only	902-928MHz
PDTIOT-MSS06	Wirnet iBTS - 1B4LOC915-1W915-US	4x16CH LoRa, 2G/3G/4G backhaul + ETH backhaul (Includes already ACCIOT-KAN05)	902-928MHz
PDTIOT-MSS07	Wirnet iBTS - 1B4LOC923-0W923-EU	4x16CH LoRa, ETH backhaul only	915-928MHz
PDTIOT-MSS08	Wirnet iBTS - 1B4LOC923-1W923-EU	4x16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	915-928MHz
PDTIOT-MSS11	Wirnet iBTS - 3LOC923-0W923-EU	3x16CH LoRa, ETH backhaul only	915-928MHz
PDTIOT-MSS12	Wirnet iBTS - 3LOC923-1W923-EU	3x16CH LoRa LOC, 2G/3G/4G backhaul + ETH backhaul	915-928MHz
PDTIOT-MSS13	Wirnet iBTS - 1LOC923-0W923-EU	16CH LoRa, ETH backhaul only	915-928MHz
PDTIOT-MSS14	Wirnet iBTS - 1LOC923-1W923-EU	16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	915-928MHz
PDTIOT-MSS16	Wirnet iBTS - 1LOC923-1W923-AS	16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	915-928MHz
PDTIOT-MSS17	Wirnet iBTS - 3LOC923-1W923-AS	3x16CH LoRa, 2G/3G/4G backhaul + ETH backhaul	915-928MHz

868 Accessory Ordering References (Wirnet™ iBTS Full)

POWER SUPPLY			
KL K02898	Power Supply	40W - DC/DC CONVERTER - 48VDC Input	16 CH only
KL K02882	Power Supply	60W - DC/DC CONVERTER 48VDC input	
KL K02953	POE Injector	PoE Injector 30W 55V Outdoor	

POE INJECTOR		Description	Recommendation
KLK02681	POE Injector	PoE Injector 30 W indoor - AC Input - EU	16 CH only
KL K02855	POE Injector	PoE Injector 30 W indoor - 48VDC Input	16 CH only
KL K02744	POE Injector	PoE Injector 60W EU Indoor	

EXTERNAL ANTENNA (optional)		
ACCIOT-KAN00	Antenna + 1m cable + support included	Antenna kit Omni 868 MHz 3 dBi Antenna kit Omni 868 MHz
ACCIOT-KAN01	Antenna + 1m cable + support included	6 dBi Kit WAN 700-2700 MHz 5dBi - 5m - N Male Connectivity
ACCIOT-KAN05	Antenna Product Subpart	kit for antenna diversity (Antenna not included)
ACCIOT-KAN06		

(Outdoor) CAVITY FILTER		
KL K02523 KL	Cavity filter 865-867 MHz	India
K02916 KL	Cavity filter 868 MHz	863-873MHz - EU coexistence high power emitters
K03410_01	Cavity filter 865-870 MHz	865-870 MHz, EU coexistence LTE800, RGSM

SURGE PROTECTION			
KL	Surge Protection for POE link - Outdoor	PoE Surge protection - Outdoor	Recommended
K02817	Surge Protection for POE link - Indoor	PoE Surge protection - Indoor	Recommended
KL	RF Surge Protection for GSM and GPS Link	RF Surge protection - LoRa	Recommended
K02818	Surge Protection - DC Link – Indoor	DC Input	
KL	Surge Protection for Lora link - Outdoor	RF coaxial Surge protection - Outdoor	Recommended
K02819			

DEBUG			
KL			
K02881 ACCWM2-SDE00	Debug Probe	Wirnet iBTS / Wirma Debug Probe	
KL			
K02900			

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915 Accessory Ordering References (Wirnet™ iBTS Full)

POWER SUPPLY		Description	Recommendation
KL K02898	Power Supply	40W - DC/DC CONVERTER - 48VDC Input	16 CH only
KL K02882	Power Supply	60W - DC/DC CONVERTER 48VDC input	

POE INJECTOR		Description	Recommendation
KLK02681	POE Injector	PoE Injector 30 W indoor - AC Input - EU	16 CH only
KL K02766	POE Injector	PoE Injector 60W US -Indoor	
KL K02953	POE Injector	PoE Injector 30W 55V Outdoor	
KL K02863	POE Injector	PoE Injector 48VDC 60W	

EXTERNAL ANTENNA (optional)			
ACCIOT-KAN02	Antenna + 1m cable + support included	Antenna kit Omni 915/923 MHz 6 dBi	
ACCIOT-KAN03	Antenna + 1m cable + support included	Antenna kit Omni 915/923 Mhz 3 dBi	
ACCIOT-KAN05	Antenna WAN + 5m cable + support included	Kit WAN 700-2700 MHz 5dBi - 5m - N Male	
ACCIOT-KAN06	Product Subpart	Connectivity kit for antenna diversity (Antenna not included)	

SURGE PROTECTION			
KL K02817	Surge Protection for POE link - Outdoor	PoE Surge protection - Outdoor	
KL K02818	Surge Protection for POE link - Indoor	PoE Surge protection - Indoor	
KL K02819	RF Surge Protection for GSM and GPS Link	RF Surge protection - LoRa	Recommended
	Surge Protection - DC Link – Indoor	DC Input	
	Surge Protection for Lora link - Outdoor	RF coaxial Surge protection - Outdoor	Recommended

(Outdoor) CAVITY FILTER			
KL K02881	Cavity filter 902-928MHz	USA, Canada, Mexico	
KL K02973	Cavity filter 915-920 MHz	Philippines, Israel, Cuba	
KL K02906			

DEBUG			
ACCWM2-SDE00	Debug Probe	Wirnet iBTS / Wirma Debug Probe	

923 Accessory Ordering References (Wirnet™ iBTS Full)

POWER SUPPLY		Description	
KL K02898	Power Supply	40W - DC/DC CONVERTER - 48VDC Input	16 CHonly
KL K02882	Power Supply	60W - DC/DC CONVERTER 48VDC input	
	POE Injector	PoE Injector 30W 55V Outdoor	

POE INJECTOR		Description	Recommendation
KL K02953 KL K02881	POE Injector	PoE Injector 30 W indoor - AC Input - EU	16 CH only
KL K02855	POE Injector	PoE Injector 30 W indoor - 48VDC Input	16 CH only
KL K02744	POE Injector	PoE Injector 60W EU Indoor	

EXTERNAL ANTENNA (optional)			
ACCIOT-KAN02	Antenna + 1m cable + support included	Antenna kit Omni 915/923 MHz 6 dBi	
ACCIOT-KAN03	Antenna + 1m cable + support included	Antenna kit Omni 915/923 Mhz 3 dBi	
ACCIOT-KAN05	Antenna WAN + 5m cable + support included	Kit WAN 700-2700 MHz 5dBi - 5m - N Male	
ACCIOT-KAN06	Product Subpart	Connectivity kit for antenna diversity (Antenna not included)	

SURGE PROTECTION			
KL K02817	Surge Protection for POE link - Outdoor	PoE Surge protection - Outdoor	Recommended
KL K02818	Surge Protection for POE link - Indoor	PoE Surge protection - Indoor	Recommended
KL K02819	RF Surge Protection for GSM and GPS Link	RF Surge protection - LoRa	Recommended
	Surge Protection - DC Link – Indoor	DC Input	
	Surge Protection for Lora link - Outdoor	RF coaxial Surge protection - Outdoor	Recommended

(Outdoor) CAVITY FILTER			
KL K02881 KL K02522	Cavity filter 920-925 MHz	South Korea, Singapore, HK, Taiwan, Thailand, Cambodia	
KL K02905 KL K03000	Cavity filter 918-923 MHz	Indonesia Malaysia, Vietnam, Mynanmar	
K02909_01	Cavity filter 920-928 MHz	New-Zealand, Japan, Costa Rica, Venezuela	
KL K03306	Cavity filter 915-928 MHz	APAC, LATAM	

DEBUG			
ACCWM2-SDE00	Debug Probe	Wirnet iBTS / Wirma Debug Probe	