

Installation Manual for

RAK72xx Lightning Protection

WisDevice RAK72xx Series

Industrial Gateway

Version V1.5 | September 2019

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6 PAGES

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1. Outdoor Surge Protection System

1.1 Antenna Grounding

RAKwireless recommends a lightning arrester to be installed on all the antenna N-Type terminals (LoRa, LTE, Wi-Fi and GPS). It is recommended to use a 10 AWG or better grounding wire to connect the arrester to the tower mounted LoRa antenna. The arrestors have to be Female to Male type in order to fit the antenna and housing connectors. Make sure you use a 10 AWG or better wire to connect the screw terminals of the arrestors to the grounding rail mounted on the building wall (grounding bar in case of field deployment as in the following picture).



GPS Lightning Arrester



LoRa Lightning Arrester

1.2 Gateway Grounding

Additionally, it is recommended to use another 10 AWG or better grounding wire to connect the screw terminal on the bottom right side of the Gateway casing to the grounding rail (bar). This can be seen circled in blue in the first image to the right of the GPS Lightning Arrester.

Note: No additional protection for the Ethernet cabling is required at the Gateway side. There is a surge protection system built-in (GDT + Anti-surge resistor).

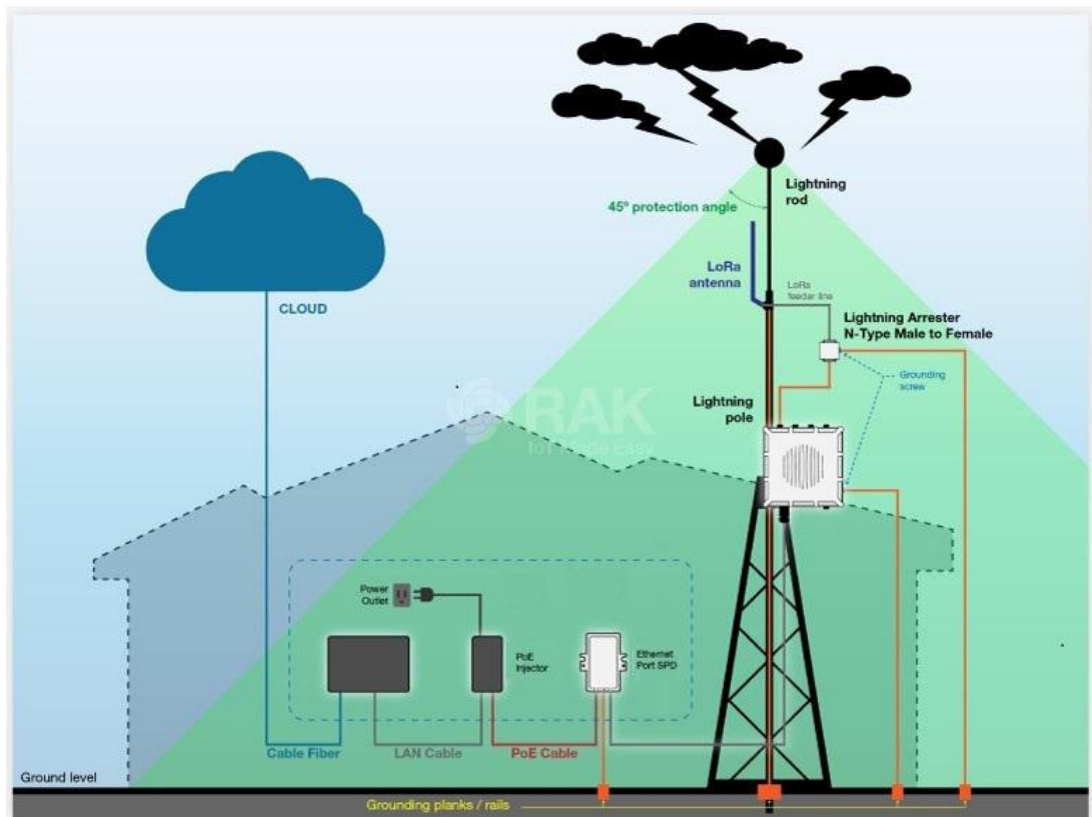


2. Indoor Surge Protection System

For the purpose of protecting the indoor equipment and circuitry connected to the LoRa Gateway you need to install an Ethernet port SPD lightning arrester. It should be positioned along the cabling connecting the Gateway to the PoE injector. Make sure you connect its grounding wire terminal to an appropriate building grounding point. Thus, your PoE injector and network switch/router should be surge protected.

Please refer to the images in the diagram below for the Outdoor and Indoor portion of the surge protection system. Should you fail to adhere to the recommendations in this document RAKwireless carries no responsibility for any damage your equipment incurs due to lightning strike!

Note: Make sure to provide all the grounding points for the antennas (GPS arrester is of a different class as seen below), gateway housing, and Ethernet SPD. Additionally, make sure you have a well-grounded pole with a lightning rod for the LoRa Antenna. The lightning rod should be high enough that all the equipment falls below the 45-degree angle as seen in the picture.



3. Recommended Equipment

3.1 Lightning Arrestor for the LoRa, LTE and Wi-Fi Antennas



This is a surge protective device for securing transceivers against over-voltage and surge current induced by bolts of lightning.

RAKwireless recommends installing lightning arrestor on all N-type antenna terminals including LoRa, LTE, and 2.4G Wi-Fi antennas.

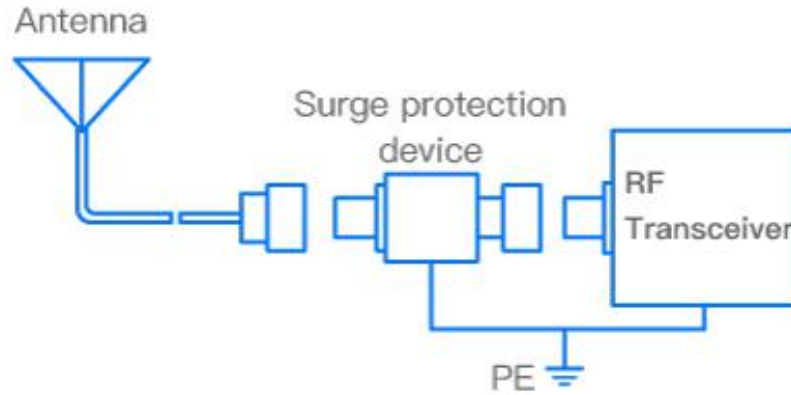


1. Electrical parameters

Parameter	Value	Remarks
Frequency range	DC ~ 2700MHz	
SPD type	Switch type	
Connector	N-F/M	
Impedance	50Ω	
Maximum transmission power	≤200W	
DC operating voltage	600V±25%	90V : LA-GT2700 DN1-1 230V : LA-GT2700 DN1-2 300V : LA-GT2700 DN1-3 470V : LA-GT2700 DN1-4 600V : LA-GT2700 DN1-5
VSWR	DC-2000MHz : ≤1.2 Other Frequencies : ≤1.25	
Insertion loss	DC-2000MHz : ≤0.2dB Other Frequencies : ≤0.3dB	
Nominal discharge current I_n	10kA	8/20μs
Maximum discharge current I_{max}	20kA	8/20μs
Voltage Protection Level U_p	≤1200V	
Degree of ingressive protection	IP67	GB 4208
Mounting	N-F end through wall fixed	
Grounding	N-F end through wall fixed or grounded terminal grounding	
Weight	≤180g	



2. Installation diagram



3. Packaging

Product Weight: Approximately 180g

Product Dimension: 68mm x 21mm

4. RAK Store Link

<https://store.rakwireless.com/products/lightning-arrestor>

3.2 Lightning Arrestor for GPS Antenna



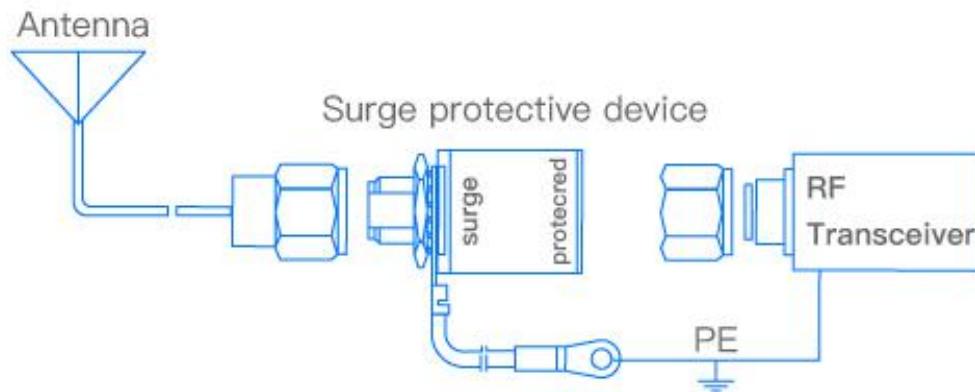
This lightning arrestor connects between the antenna and GPS receiver. A surge protection device for securing transceivers against transients, over-voltage, and surge currents induced by bolts of lightning.

By adopting a high pass filter, this product can effectively suppress the low-frequency interference induced by lightning while letting through the GPS signal with low insertion loss. A transient suppression device (TSD) and a gas discharge tube (GDT) is adopted for the protection of the DC feed circuit.

**1. Parameters**

Parameter	Value	Remarks
Impedance	50Ω	
Frequency range	1500MHz ~ 1650MHz	
VSWR	≤1.2	
Insertion loss	≤0.3dB	
RF power	< 50W	
DC feed voltage	6V	
DC feed current	500mA	
Nominal discharge current	10kA	8/20μs
Maximum discharge current	20kA	8/20μs
Limiting voltage	≤15V	10kA , 8/20us
Degree of ingressive protection	IP65	GB4208
Connector	Surge side : N connector , Female; Protected side: N connector, Male	
Grounding wire	Yellow-green dual color wire of 10AWG	
Grounding connection	Pressed connection by N type nut	
Weight	≤200g	

2. Installation diagram



3. Packaging

Product Weight: Approximately 200g

Product Dimension: 89mm x 30mm

4. RAK Store Link

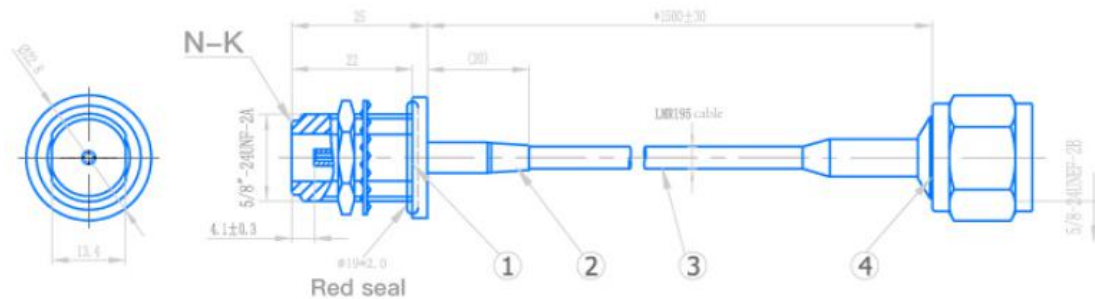
<https://store.rakwireless.com/products/lightning-arrestor-for-gps-antenna>

3.3 Antenna Feeder Line

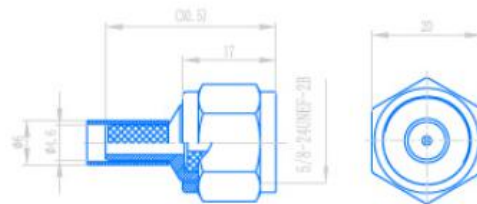


Antenna Feeder Line for RAK7249. This antenna feeder line is an NJ-NF adapter cable with a length of 1.5m. It is an RG8 coaxial cable with N-type connector as the antenna feeder.

1. Specifications



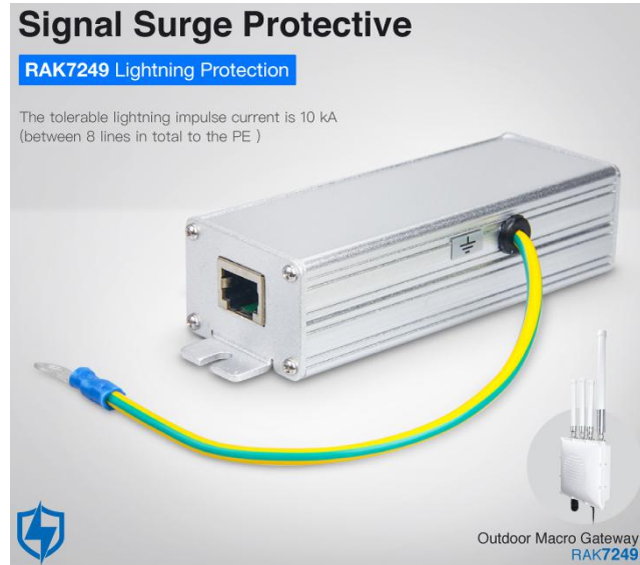
- ① NF connector assembly
- ② Heat shrinkable tube
- ③ Coaxial
- ④ NJ connector assembly



2. RAK Store Link

<https://store.rakwireless.com/products/antenna-feeder-line>

3.4 Signal Surge Protective



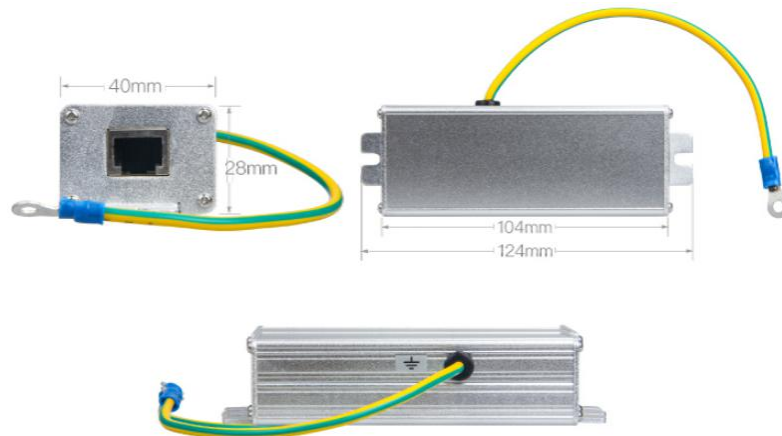
This surge protective device is suitable for Category 6 cable or Class E cable for protection of equipment from surge and over-voltage induced by lightning or produced in the inner systems.

It is widely used in office and industry network wiring projects for telecommunication applications, such as Gigabit Ethernet, ATM, ISDN and VoIP systems.

High performance chips with smallest parasitic capacitance are adopted in the product, line protection for all the 8 lines, fast response (making it suitable choice for protection of lightning effect).

Multiple stage protection structure provides good protection against lightning effect. The tolerable lightning impulse current is 10 kA (between the 8 lines in total to the PE).

1. Overview



2. Electrical parameters

Item	Parameters
Protection Modes	L-L/L- PE
Maximum Continuous Operating Voltage U_c	5V
Rated Operating Current	100mA
Tolerable Impulse I_n	L- L: 3kA L-PE: 3kA
Maximum Discharge Current I_{max}	L (8 Wires in Total) - PE: 10 kA
Voltage Protection Class	L-l: $\leq 40V$ L-pe: $\leq 600V$
Response Time	1ns
Maximum Data Rate	1000mbps
Connector	RJ45
Line Number Assignment	1/2,3/6 ,4/5,7/8
Degree of Ingressive Protection	IP20
Operating Environment	Ambient Temperature: $-40^{\circ}C \sim +85^{\circ}C$ Relative Humidity: 5%-95% Air Pressure: 70kPa~106kPa
Storage Environment	Storage Temperature: $-40^{\circ}C \sim +85^{\circ}C$ Relative Humidity: 5%-95% Storage Time Limit: One Year

3. RAK Store Link

<https://store.rakwireless.com/products/signal-surge-protective>

4. Revision History

Revision	Description	Date
1.0	Initial version	2019-04-19
1.1	Lightning rod, GPS Arrester added	2019-04-22
1.2	Rod guarding angle and wire type change.	2019-04-23
1.3	Fixing of minor typos	2019-05-14
1.4	Add the detailed specifications and Signal Surge Protective	2019-09-24
1.5	Corrections to the System Image and some minor adjustments to formatting	2019-09-26

5. Document Summary

Prepared by	Checked by:	Approved by:
Vladislav & Todor	Vladislav	



About RAKwireless:

RAKwireless is the pioneer in providing innovative and diverse cellular and LoRa connectivity solutions for IoT edge devices. It's easy and modular design can be used in different IoT applications and accelerate time-to-market.

For more information, please visit RAKwireless website at www.rakwireless.com.