

Specifications

Customer's Part Number:	M3K-NODE
MOONS' Part Number:	4696355000166
Model:	MSPN120175
P/N:	A8624

CUSTOMER'S APPROVAL STAMP

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Please sign back after your approval. The specifications will come into force when we receive purchase order.

DWG.	CHK.	STANDARD	APPD.

1 DESCRIPTIONS

Wireless Node Controller for Stadium is mounted on the spine-4-con board in the lamp pole.

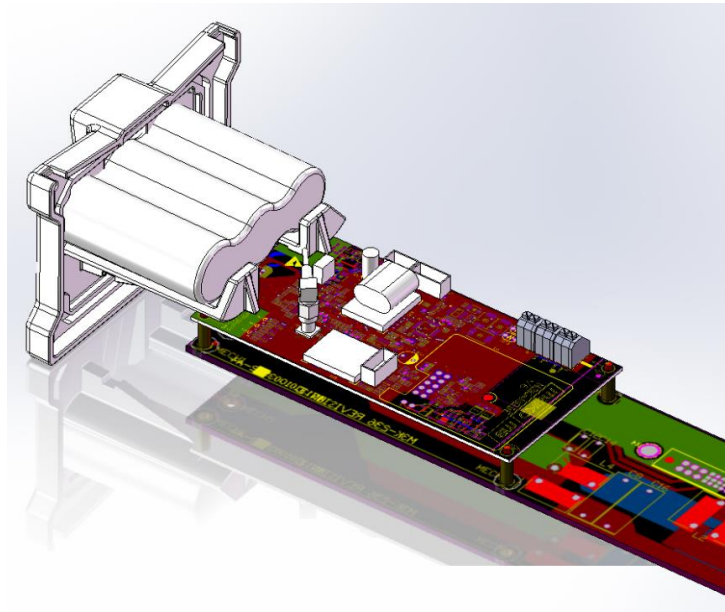
It communicates with the gateway through a WPAN (SUBG band).

It communicates with the LED drivers through the RS485 interface.

It also has an SPD detection interface (Digital input) .

Input low voltage detection.

Provides multiple fault protections.



According to the shape provided by the customer

1.1 FEATURES

- Input voltage:8.0-16.7VDC.
- 500V input surge protection.
- Input overvoltage alarm.
- Power consumption: < 2W.
- Wireless communication: IEEE 802.15.4-915MHz.
- RS485 communication: 115200bps.
- DMX/RDM IN/OUT:250kbps
- Surge sensor digital input.
- Daisy chain LED drive access detection.
- Firmware upgrade: OTA.
- Embedded communication encryption mechanism
- Input power-down detection.
- Provides multiple fault protections.
- Meet DLC certification.
- Radio frequency certification: FCC
- Safety certification: included in the whole lamp certification.
- Warranty: 5years.

2 CHARACTERISTICS

2.1 ELECTRICAL CHARACTERISTICS

At 20 °C, 50% RH, 100Kpa conditions.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage	Operating voltage	8.0	12.0	16.7	VDC
Input overvoltage protection voltage	Stop working, no damage	16.7	18.0	250	VDC
Over voltage alarm		14.5	16.0	18.0	VDC
Low voltage alarm	Alarm voltage	8.0	9.6	10.0	VDC
	Recovery voltage	11.8	12	18.0	VDC
Power consumption		0.2	/	2.0	W
RS485 voltage		-3.3	/	+3.3	V
RS485 current	P to N short	/	/	70	mA
RS485 Baud rate		/	115200	/	bps
DMX voltage		-3.3	/	+3.3	V
DMX current	P to N short	/	/	70	mA
DMX Baud rate		/	250	/	Kbps
VMOV sensor	Surge sensor	5	/	30	VDC
VDAD	Daisy chain LED drive access detection	0	/	3.3	VDC
Vdisable	Disable output PIN	0	/	3.3	VDC
RF band	915M	904	915	926	MHz
RF receiver sensitivity		-100	/	/	dBm
RF transmitter power		/	/	10	dBm
RF transmission distance	Within visual distance	/	/	200	m

2.2 OPERATING CONDITIONS

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating temperature		-40	/	+70	°C
Storage temperature	Indoor dry, well-ventilated place	-40	/	+85	°C
Relative humidity	No frost	10	/	95	%
Vibration		/	/	1	G
Warranty		/	5	/	Years
Ingress protection	Not Installed	/	IP00	/	
Flammability		UL94-V0			

2.3 EMC

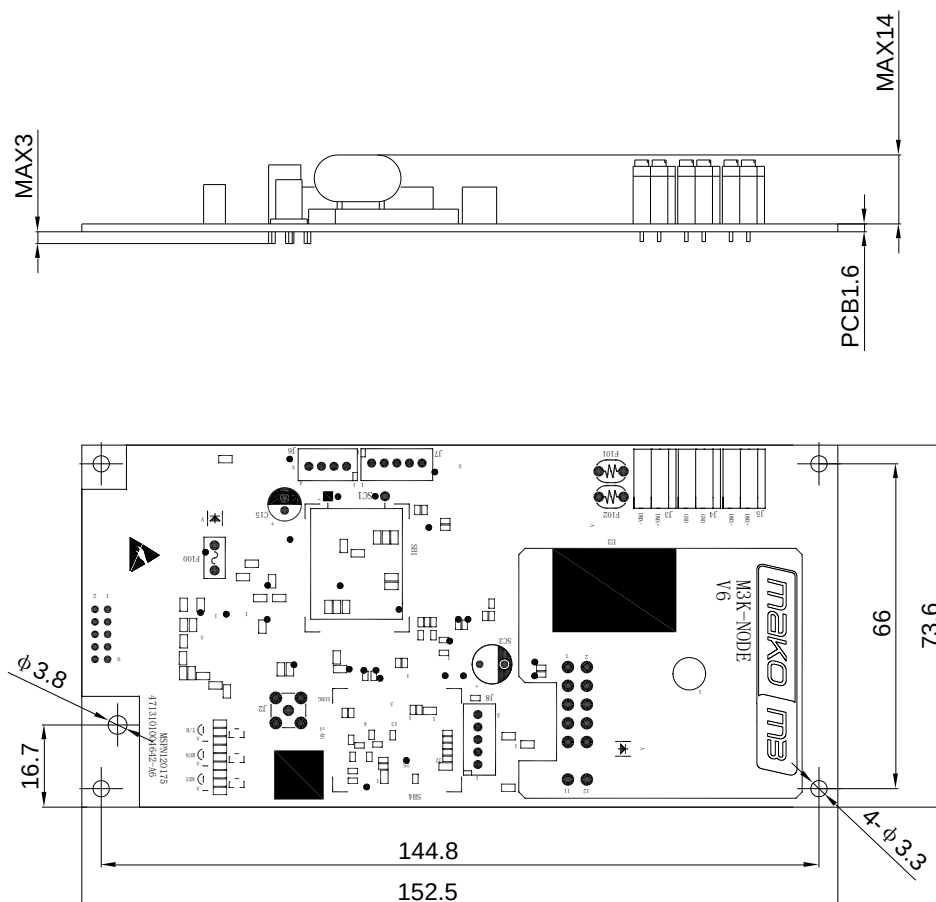
TYPE	Standard	Test level
Electrostatic discharge immunity	IEC61000-4-2	Level 2
RFEMS	IEC61000-4-3	Level 2
Electrical fast transient burst immunity	IEC61000-4-4	Level 4
Surge immunity	IEC61000-4-5 Surge waveform 10/1000us	500V
Conducted disturbances induced by RF field immunity	IEC61000-4-6	Level 3
Power frequency magnetic field immunity	IEC61000-4-8	Level 3

2.4 CERTIFICATION

TYPE	Standard
Electromagnetic interference characteristics certification	North America: FCC 15C(915M WPAN) FCC ID: 2BRS4-PN120175

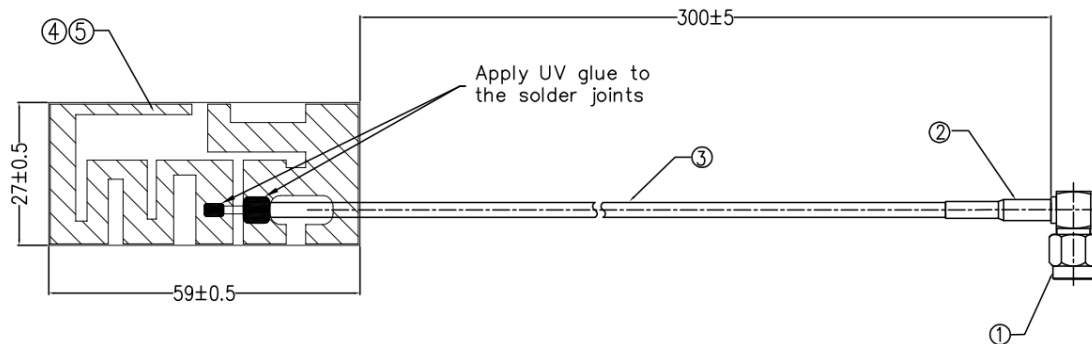
3 MECHANICAL DATA

3.1 DIMENSIONS



According to the shape provided by the customer

3.2 ANTENNA

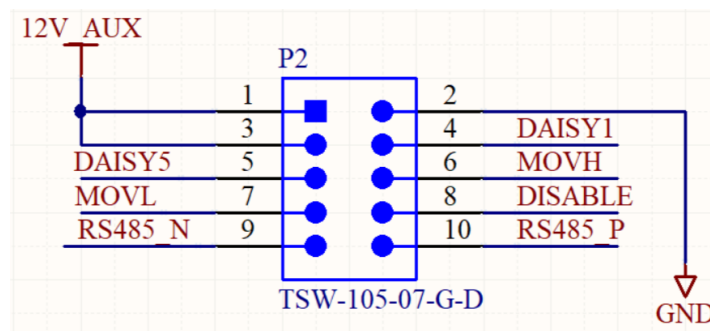


3M VHB 5952 tape was attached to the back of the antenna, and the tape thickness was 1.1mm.

It can maintain 20N pull force after tolerating hot and cold restarts.

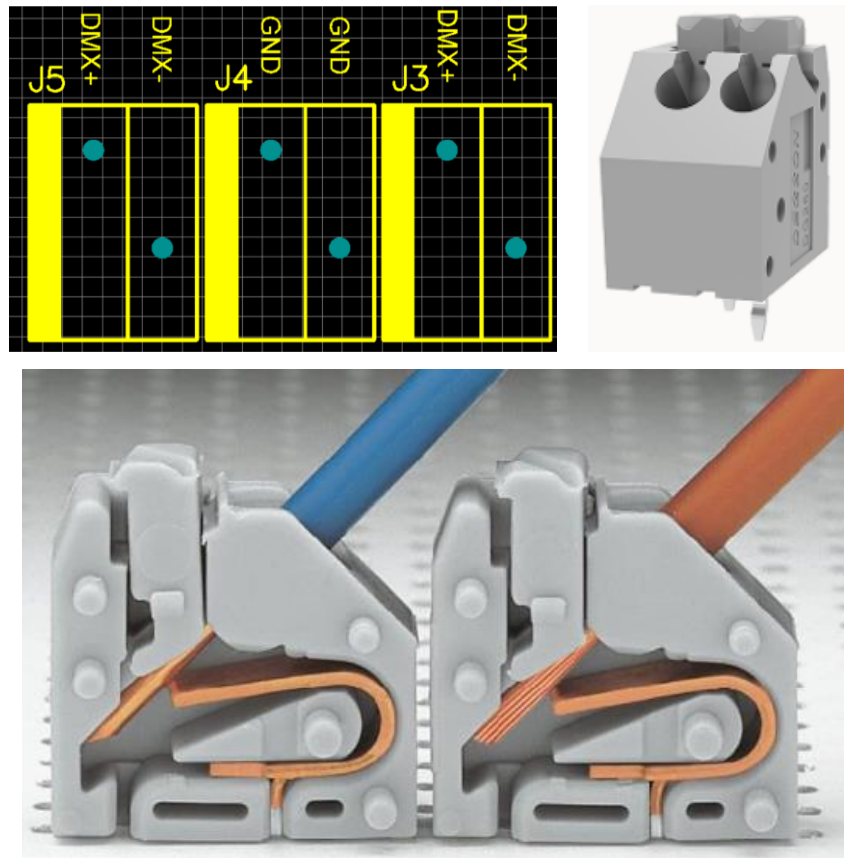
4 INTERFACES

4.1 TO LED DRIVERS



Connector	Name	Description
P2-1	12V AUX	Power supply input
P2-2	OUTRET	Signal grounding
P2-3	12V AUX	Power supply input
P2-4	DAISY1	Access detection input
P2-5	DAISY5	Access detection output
P2-6	MOVH	Surge sensor output
P2-7	MOVL	Surge sensor input
P2-8	DISABLE	LED driver output enabled
P2-9	RS485 N	LED driver control RS485 N
P2-10	RS485 P	LED driver control RS485 P

4.2 TO DMX BUS



- PUSH-IN connection technology, fast wiring;
- 45 °connection.

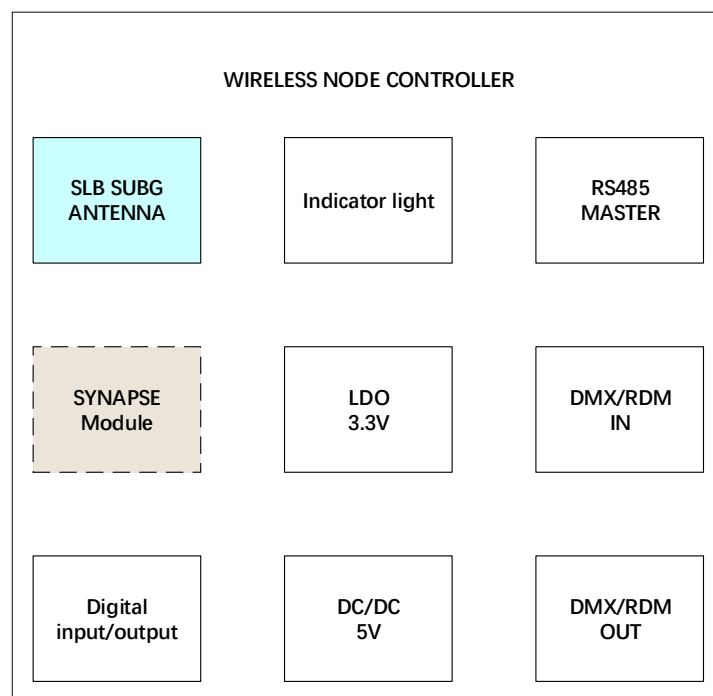
Connector	Name	Description
J3-1	DMXIN+	Reserved DMX IN P
J3-2	DMXIN-	Reserved DMX IN N
J4-1	GND	Signal grounding
J4-2	GND	Signal grounding
J5-1	DMXOUT+	Reserved DMX OUT P
J5-2	DMXOUT-	Reserved DMX OUT N

4.3 TO ANTENNA



J2 is equipped with a PCB antenna with SMA interface. (See Section 3.2.)

5 FUNCTION DESCRIPTIONS



5.1 WPAN MODULE

- Communicate with the Gateway. Transfer various instructions, such as: light switch command, dimming command, upload power metering data and so on.
- Wireless communication: IEEE 802.15.4-915MHz.
- The WPAN antenna are monopole antenna.
- Embedded communication encryption mechanism.
- The device will automatically join the network if there exists a nearby gateway that allows joining.

5.2 RS485 for LED Drivers

- Used to communicate with the LED driver.
- Follow the protocols provided by M3.
- The RS485 signal is based on the 3.3V level.
- Communication rate: 115200bps.
- The firmware of the LED drivers can be upgraded through this interface.

5.3 DMX/RDM

- Receive the control signal from the console and forward it to MCU.
- It conforms to DMX512 standard and can upload data.
- The DMX/RDM signal is based on the 3.3V level.
- Communication rate: 250kbps.

5.4 DIGITAL INPUT/OUTPUT

- 2PIN for detection sensors of surge suppressors.
- According to the gateway instructions 1PIN for LED Drivers enable:
Enable LED drivers, the output is 0V (The output is fixed to 0V according to customer requirements.)
Disable LED drivers, the output is 3.3V.

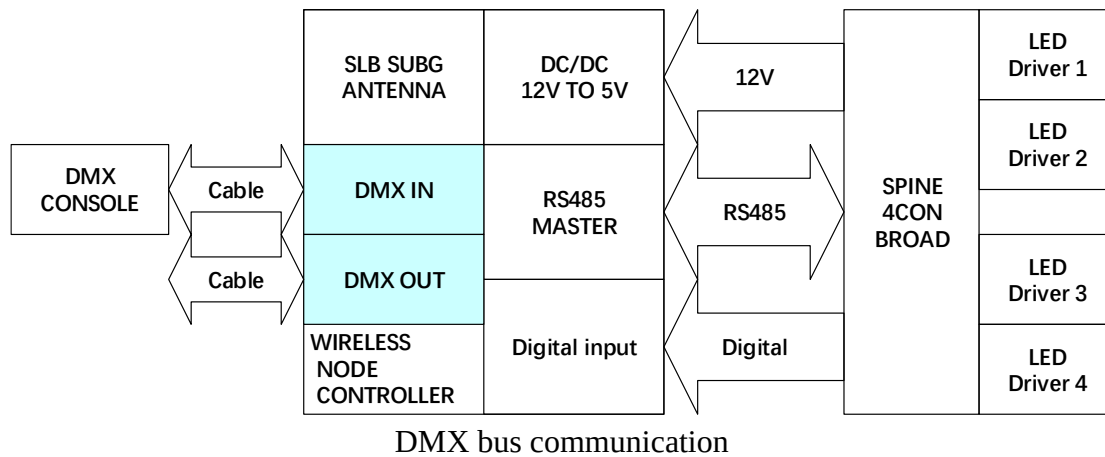
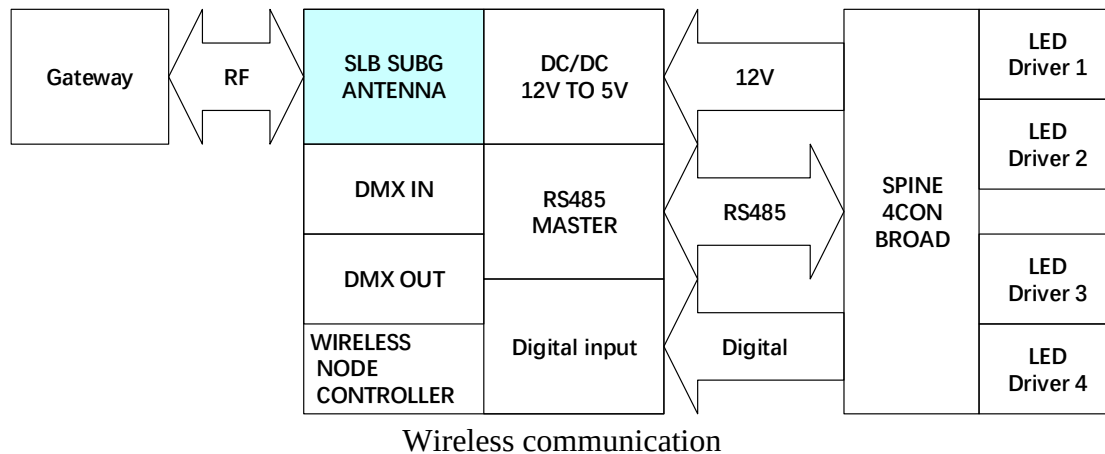
5.5 FAILURE MODE

- **Input overvoltage:** If the 12VAUX input voltage exceeds 16.7V and below 250V, the device will stop working and send an alarm, but it will not damage the device.
- **Input low voltage:** If the 12V AUX input voltage is lower than 10V and higher than 8V, it will generate alarm signal. When the input voltage returns to 12V, the alarm is cancelled.
If the 12V AUX input voltage is below 8V, the device will stop working.
- **Power outage recovery:** The equipment stops working because of power failure, low voltage and high voltage. After the equipment is restored to power supply, it will resume the final setting and continue to work.
- **SPD fault:** When SPD damage is detected, the device actively sends alarm information to the gateway.

5.6 SYNAPSE module

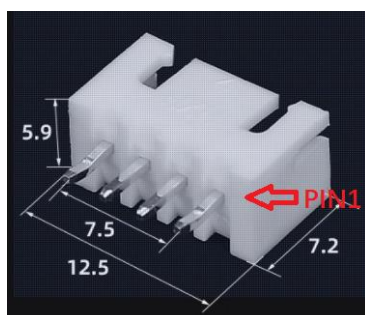
- The Dimming module is reserved for receiving dimming instructions from the SYNAPSE gateway.
- Send instructions to the MCU using the DALI bus or 0-10V.

6 APPLICATIONS



6.1 FIELD COMMISSIONING INTERFACE

- It is used to test whether the product is running normally before customer installation.
- The user can check the signal strength of the RF communication with the gateway in the field debugging.



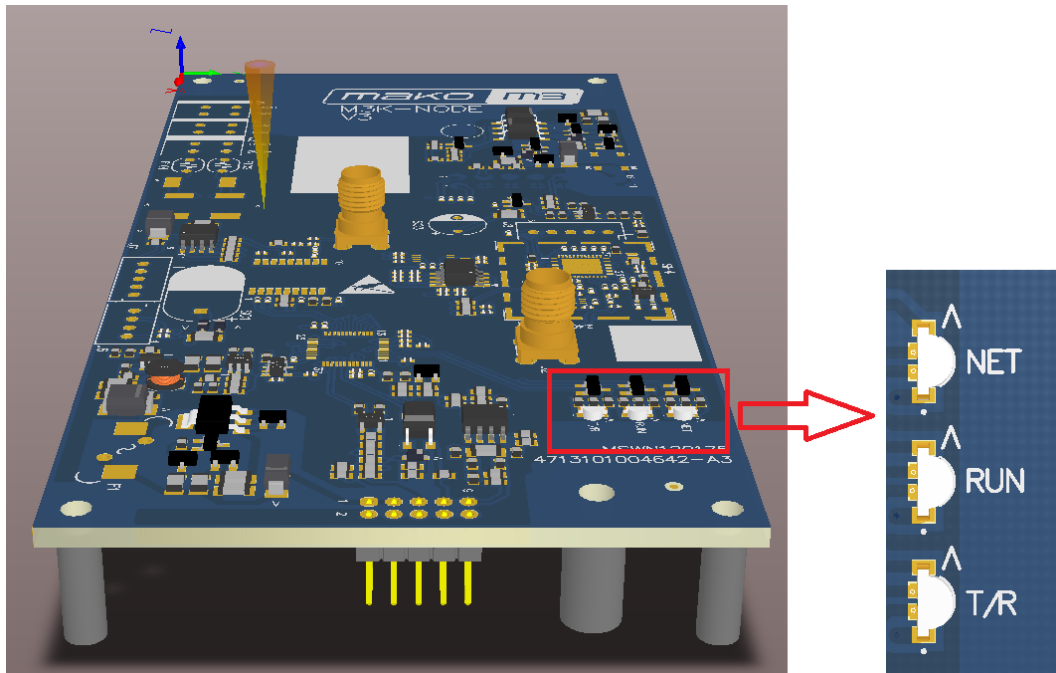
On board interface



Debug tools connected to your computer

Connector	Name	Description
J6-1	3.3VDC	Power supply input
J6-2	TX	Debug signal output
J6-3	GND	Signal grounding
J6-4	RX	Debug signal input

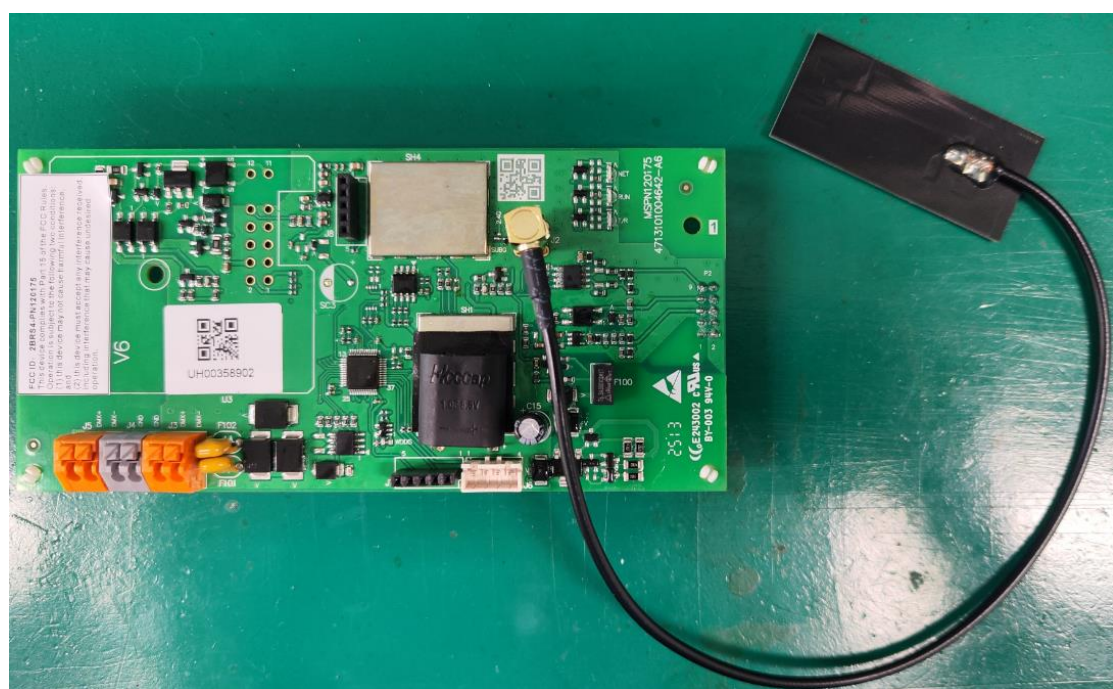
6.2 INDICATOR LIGHTS



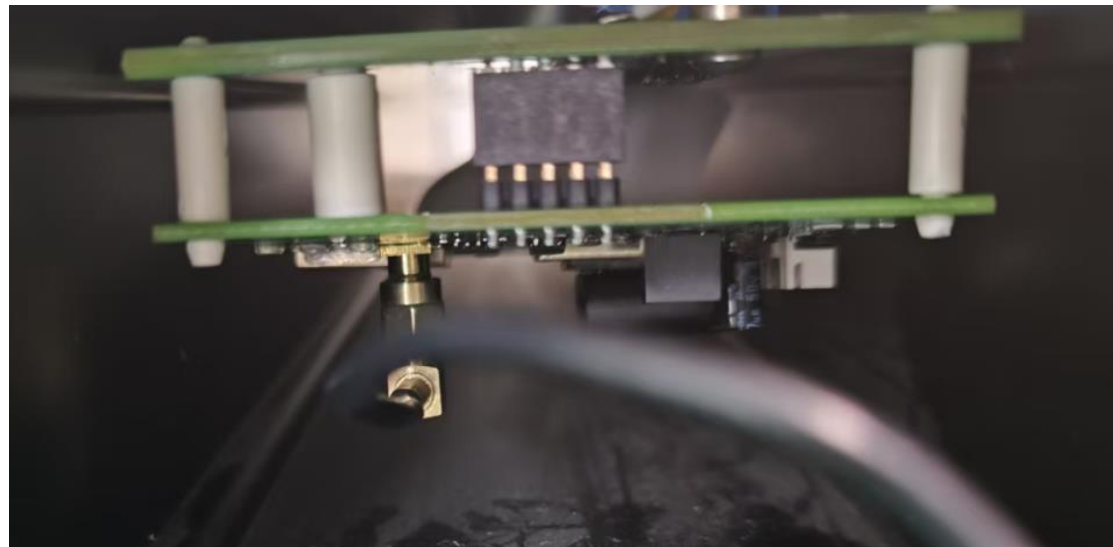
Use side glowing leds for easy viewing when mounted inside the SPINE

Name	Color	Status	Indicate
RUN	GREEN	ON	Work well
		Flash	CH1/CH2 LED driver Communication failure
		OFF	Communication failure/ Node failure
T/R	RED	ON	Work well
		Flash	CH3/CH4 LED driver Communication failure
		OFF	Communication failure/ Node failure
NET	BLUE	ON	Work well
		Flash	Trying to join the network
		OFF	Communication failure/ Node failure

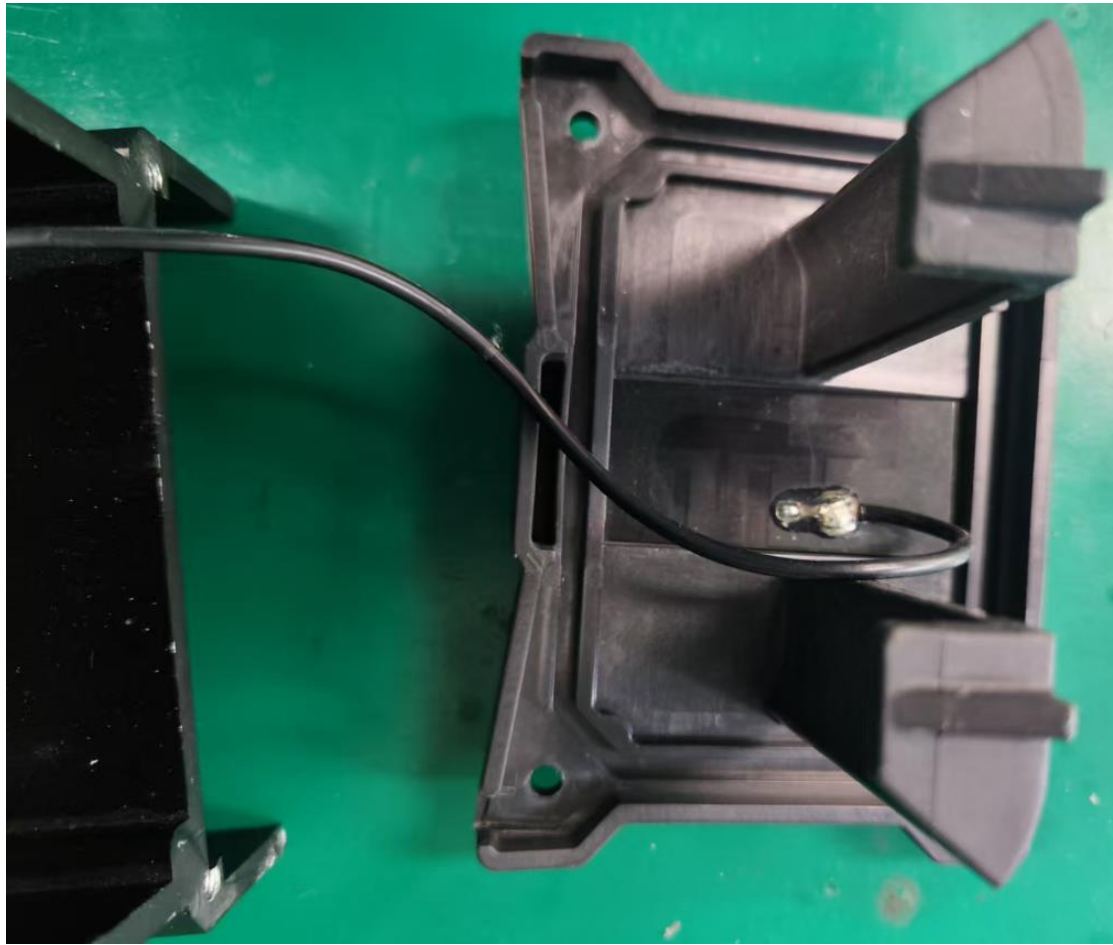
7 INSTALLATION GUIDE



Install the antenna on J2 and tighten it.



Install the Node Controller into the SPIN.



Stick the tape on the back of the antenna onto the inner cover of the SPIN.



Place the upper cover over the top of the SPIN and secure it with screws.



In order to prevent non-professionals from coming into contact and to achieve a better remote communication effect, the SPIN must be installed at a height of more than 3 meters.

8 ORDERING

DESCRIPTION	ORDERING CODE
MSPN120175 Wireless Node Controller for sports	4696355000166

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FCC Statement

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 equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation.
- Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

2.2

This module has been assessed against the following FCC rule parts: CFR 47 FCC Part 15 C (15.247). It is applicable to the modular transmitter

2.3

This radio transmitter 2BRS4-PN120175 has been approved by Federal Communications Commission 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.

The concrete contents to check are the following three points.

- 1) Maximum antenna gains are shown in item 2.7 below.
- 2) Should be installed so that the end user cannot modify the antenna
- 3) Feed line should be designed in 50ohm

Fine-tuning of return loss etc. can be performed using a matching network.
The antenna shall not be accessible for modification or change by the end user.

2.4

The module complies with FCC Part 15.247 and apply for Single module approval.

2.5

Trace antenna designs: Not applicable, the antenna conector for this module are integrated into the module. Use of external antennas or antennas integrated into the host circuit board are not an option.

2.6

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2.7

The following antennas have been certified for use with this module.
Only antennas of the same type with equal or lower gain may also be used with this module.
Other types of antennas and/or higher gain antennas may require the additional authorization for operation. The installer should use unique antenna connector and 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. The manufacturer of module will inform installer to meet with the FCC part 15.203 in the warning part.
Antenna Specification list below:

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	902-928	PCB Antenna	4.39

2.8

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as “Contains FCC ID: 2BRS4-PN120175” ; any similar wording that expresses the same meaning may be used.

2.9

Testing of the host product with all the transmitters installed – referred to as the composite investigation test- is recommended, to verify that the host product meets all the applicable FCC rules. The radio spectrum is to be investigated with all the transmitters in the final host product functioning to determine that no emissions exceed the highest limit permitted for any one individual transmitter as required by Section 2.947(f). The host manufacturer is responsible to ensure that when their product operates as intended it does not have any emissions present that are out of compliance that were not present when the transmitters were tested individually.

If the modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration.

2.10

Any company of the host device which install this modular should perform the test of radiated & conducted emission and spurious emission etc. according to FCC Part 15C: 15.247 and 15.209 & 15.207,15B class B requirement, only if the test result comply with FCC part 15C: 15.247 and 15.209 & 15.207,15B class B requirement. Then the host can be sold legally.

The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

2.11

The host manufacturer is recommended to use FCC KDB 996369 D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

2.12

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

Notice to OEM integrator

Must use the device only in host devices that meet the FCC RF exposure category of mobile, which means the device is installed and used at distances of at least 20cm from persons.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The end user manual shall include FCC Part 15 compliance statements related to the transmitter as show in this manual.

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B. Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

The use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer’ s instruction manual.

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

Must have on the host device a label showing Contains FCC ID: 2BRS4-PN120175

Both FCC ID and IC ID are not to be placed on the host at the same time and only hosts going into the US can use the FCC ID

Professional Installation Instructions

The device must be professionally installed. Installation must be controlled and requires special training.

The intended use is generally not for the general public. It is generally for industry/commercial use.

The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required. The user has no access to the connector.

Must use the same type of antenna with lower or equal gain to the listing antenna as follows:

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	902-928	PCB Antenna	4.39