# 7in1 Box Antenna

**Part Number**: LK1910101

**Description**: 7in1 box antenna

**Frequency**: 5G: 600-960MHz/1400-6000MHz

WiFi: 2400-2500MHz/5150-7125MHz GPS/GNSS:1559-1610MHz

**Size**: 159.5mm x 115mm x 22.55mm

**Features:**

- 4x4 MIMO 5G antenna, 2x2 MIMO WiFi antenna and 1 GPS/GNSS antenna
- Omni-directional radiation pattern
- Low Gain with high efficiency for easy certification
- IPX7
- Easy integration and flexible placement

**RoHS compliant**

**Revision: B**

**Mar 15, 2025**

# Contents

# 1.0 Product Description

The LK1910101 is a compact and low-profile 7-in-1 box antenna designed for demanding applications in transportation and telematics. This integrated solution seamlessly combines:

1. **4x4 MIMO 5G antenna** for high-speed cellular connectivity and enhanced performance in dense urban environments.
2. **2x2 MIMO WiFi antenna** supporting the latest Wi-Fi 7, 6E, Bluetooth, and all earlier Wi-Fi standards for reliable and high-bandwidth wireless connectivity.
3. **1 GPS/GNSS antenna** for positioning and navigation.

**Features:**

- Easy integration
- Low Gain for easy certification
- Omni-directional radiation pattern
- Low profile with flexible placement
- IPX7

**Applications:**

- Streaming
- Transportation
- Healthcare
- Smart homes
- Router

# 2.0 General Specification

## 5G Antenna 1

| DESCRIPTION | | RF PERFORMANCE | | | | |
|---|---|---|---|---|---|---|
| Frequency Range | | 600-960MHz | 1400-1550MHz | 1710-2690MHz | 3300-4200MHz | 4400-6000MHz |
| Return Loss (dB)/S11 | | < -4 | < -5 | | | |
| Average Efficiency (%) | in free space | >55 | >60 | >60 | >60 | >50 |
| | on metal plate | >30 | >35 | >55 | >55 | >55 |
| Peak Gain (dBi) | in free space | 2.1 | 4.5 | 4.3 | 4.8 | 4.8 |
| | on metal plate | 3.7 | 5.5 | 7.9 | 7.5 | 7.0 |
| Polarization | | Linear | | | | |
| Input Impedance | | 50 ohms | | | | |

## 5G Antenna 2

| DESCRIPTION | | RF PERFORMANCE | | | | |
|---|---|---|---|---|---|---|
| Frequency Range | | 600-960MHz | 1400-1550MHz | 1710-2690MHz | 3300-4200MHz | 4400-6000MHz |
| Return Loss (dB)/S11 | | < -4 | < -5 | | | |
| Average Efficiency (%) | in free space | >55 | >55 | >55 | >55 | >40 |
| | on metal plate | >30 | >30 | >50 | >50 | >35 |
| Peak Gain (dBi) | in free space | 4.0 | 3.2 | 3.5 | 4.0 | 2.5 |
| | on metal plate | 4.0 | 5.5 | 7.5 | 6.9 | 5.5 |
| Polarization | | Linear | | | | |
| Input Impedance | | 50 ohms | | | | |

## 5G Antenna 3

| DESCRIPTION | | RF PERFORMANCE | | | |
|---|---|---|---|---|---|
| Frequency Range | | 1400-1550 MHz | 1710-2690 MHz | 3300-4200 MHz | 4400-6000 MHz |
| Return Loss (dB)/S11 | | < -6 | | | |
| Average Efficiency (%) | in free space | >70 | >65 | >65 | >55 |
| | on metal plate | >50 | >45 | >65 | >50 |
| Peak Gain (dBi) | in free space | 5 | 5.3 | 5.7 | 5.5 |
| | on metal plate | 4.5 | 6.8 | 7.1 | 7.8 |
| Polarization | | Linear | | | |
| Input Impedance | | 50 ohms | | | |

## 5G Antenna 4

| DESCRIPTION | | RF PERFORMANCE | | | |
|---|---|---|---|---|---|
| Frequency Range | | 1400-1550MHz | 1710-2690MHz | 3300-4200MHz | 4400-6000MHz |
| Return Loss (dB)/S11 | | < -6 | | | |
| Average Efficiency (%) | in free space | >70 | >65 | >65 | >50 |
| | on metal plate | >45 | >50 | >65 | >45 |
| Peak Gain (dBi) | in free space | 5.4 | 5.1 | 5.2 | 5.4 |
| | on metal plate | 5.7 | 7.5 | 7.9 | 7.1 |
| Polarization | | Linear | | | |
| Input Impedance | | 50 ohms | | | |

## WiFi Antenna 1

| DESCRIPTION | | RF PERFORMANCE | | |
|---|---|---|---|---|
| Frequency Range | | 2400-2500MHz | 5150-5850MHz | 5925-7125MHz |
| Return Loss (dB)/S11 | | <-6 | | |
| Average Efficiency (%) | in free space | >60 | >60 | >55 |
| | on metal plate | >45 | >60 | >50 |
| Peak Gain (dBi) | in free space | 3.9 | 1.8 | 3.6 |
| | on metal plate | 5.8 | 6.9 | 6.4 |
| Polarization | | Linear | | |
| Input Impedance | | 50 ohms | | |

## WiFi Antenna 2

| Frequency Range | | 2400-2500MHz | 5150-5850MHz | 5925-7125MHz |
|---|---|---|---|---|
| Return Loss (dB)/S11 | | <-6 | | |
| Average Efficiency (%) | in free space | >60 | >50 | >50 |
| | on metal plate | >47 | >47 | >46 |
| Peak Gain (dBi) | in free space | 2.6 | 3.1 | 3.3 |
| | on metal plate | 5.9 | 6.0 | 5.1 |
| Polarization | | Linear | | |
| Input Impedance | | 50 ohms | | |

## GPS Antenna

| GPS/GNSS PASSIVE ANTENNA PERFORMANCE WITHOUT CABLE LOSS | | | | |
|---|---|---|---|---|
| **DESCRIPTION** | | **RF PERFORMANCE** | | |
| Frequency Range | | 1561.098±2.046 MHz | 1575.42±1.023 MHz | 1602±5 MHz |
| Return Loss (dB)/S11 | | <-8 | | |
| Average Efficiency (%) | in Free space | >55 | >45 | >55 |
| | on metal plate | >60 | >55 | >60 |
| Peak Gain (dBi) | in Free space | 3.1 | 0.3 | 2.7 |
| | on metal plate | 3.6 | 3.5 | 4.4 |
| Polarization | | RHCP | | |
| Input Impedance | | 50 ohms | | |
| **GPS/GNSS LNA ACTIVE CIRCUIT PERFORMANCE** | | | | |
| **DESCRIPTION** | | **RF PERFORMANCE** | | |
| Frequency Range | | 1561.098±2.046 MHz | 1575.42±1.023 MHz | 1602±5 MHz |
| DC Voltage | | 3-5.5V | | |
| Gain | | 28dB±3dB | | |
| VSWR | | ≤2.0 | | |
| Noise Figure | | ≤3.0dB | | |
| DC Current | | 9±3m A (at 3.0V) | | |

# 3.0 Mechanical and Environmental Specification

## 3.1 Product Dimension


Connector: SMA Male
Cable length and conntor are flexible to customize
Default cable types:
GPS: Φ2.8mm black
5G/WiFi: Φ5mm black

## 3.2 Environmental Specification

| Item | Test item | Test condition | Specifications |
|---|---|---|---|
| 1 | **Temperature Cycling Test** | -40˚C (30 minutes) to 85˚C (30 minutes) 100 cycles | 1. No apparent damage<br>2. Electrical properties within the test Spec. |
| 2 | **Low temperature test** | 85˚C; 85% RH for 96 hours | 1. No apparent damage<br>2. Electrical properties within the test Spec. |
| 3 | **High Temperature test** | 96 hours at -40˚C | 1. No apparent damage<br>2. Electrical properties within the test Spec. |
| 4 | **Salt Mist test** | Concentration: 5%±1<br>Spray time: 24 hours<br>Ambient Temperature: 35 ± 2°C` | 1. No apparent damage<br>2. Electrical properties within the test Spec. |
| 5 | **Random Vibration** | 40G at 200Hz 700,00 cycles for each axis. | 1. No apparent damage<br>2. Electrical properties within the test Spec. |

# 4.0 Website and Company Address

Website: www.leankon.com
Address: B1337 1F, Building 3, 5018 Hutai Road, Baoshan District, Shanghai China.

# 5.0 Revision History

| Revision | Date | Description | Issued by: |
|---|---|---|---|
| A | 2024-11-17 | Preliminary release | Tony Fu |
| B | 2025-03-15 | Initial release | Tony Fu |

NOTE:

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