

Antenna Datasheet

Product OC: YFBC001WWA

Version: 2.0

Date: 2025-07-07

Status: Released

Product Name: Wi-Fi SMT Mount Ceramic Chip Loop Embedded Antenna

Key Features:

Frequency band: 2400–2500 MHz, 5150–5850 MHz, 5925–7125 MHz

V2X: 5850–5925 MHz

Peak efficiency: 67.18 %

Dimensions: 1.6 × 0.8 × 0.4 mm

RoHS and REACH Compliant

Overview

Quectel YFBC001WWA is a compact form factor SMT mount ceramic chip antenna for Wi-Fi applications. Due to the dimensions of $1.6 \times 0.8 \times 0.4$ mm, it is designed for very small space requirements for Wi-Fi, WLAN, BT, Zigbee and 802.11 terminals. YFBC001WWA is a ground-dependent loop antenna, uses main PCB as its ground plane. It is delivered on tape and reel.

YFBC001WWA is a ceramic chip antenna, which can be mounted on terminals with super compact space requirement. Despite of this small factor, it has up to 67.18% efficiency in working bands. This antenna is developed on a 60×50 mm evaluation board. If the devices have different ground sizes, matching circuit can be used to tune the resonant frequency correctly. We also offer gerber file, 2D & 3D documents for PCB layout.

YFBC001WWA allows high efficiency, stable signal transmission and reception for Wi-Fi working bands in 2400–2500 MHz & 5150–5850 MHz & 5925–7125 MHz & 5850–5925 MHz. This product is RoHS & REACH compliant.

Typical applications include:

- Hand-held devices
- Bluetooth earphone systems
- Hand-held devices when Bluetooth/Wi-Fi functions are needed, e.g., Smart phone.
- IEEE802.11 b/g/n
- ZigBee
- Wireless PCMCIA cards or USB dongle

Quectel provides comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs. We have regional R & D centers to offer quick response to meet your requirements. Please contact our sales & FAEs if you have any requests.

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1 Specification

Test Condition: On 50 mm × 60 mm EVB

1.1. Electrical

| Electrical | | |
|-------------------|------------------|---|
| Frequency Range | Wi-Fi | 2400–2500 MHz, 5150–5850 MHz, 5925–7125 MHz |
| | V2X | 5850–5925 MHz |
| Impedance | 50 Ω | |
| Polarization | Linear | |
| Radiation Pattern | Omni-directional | |

1.1.1. Wi-Fi

| Specification | Band | Wi-Fi 2G | Wi-Fi 5G | Wi-Fi 6G |
|-----------------------|-----------|-----------|-----------|-----------|
| | | 2400–2500 | 5150–5850 | 5925–7125 |
| Max. VSWR | | 2.8 | 2.3 | 3.8 |
| Max. Return Loss (dB) | | -6.6 | -8.1 | -4.7 |
| AVG Eff. (%) | | 49.6 | 58.2 | 48.2 |
| AVG Gain (dB) | | -3.1 | -2.4 | -3.3 |
| Max. Peak Gain (dBi) | | -0.3 | 2.3 | 1.5 |
| VSWR | ≤ 3.8 | | | |
| Return Loss | ≤ -4.7 dB | | | |
| Peak Gain | ≤ 2.3 dBi | | | |

1.1.2. V2X

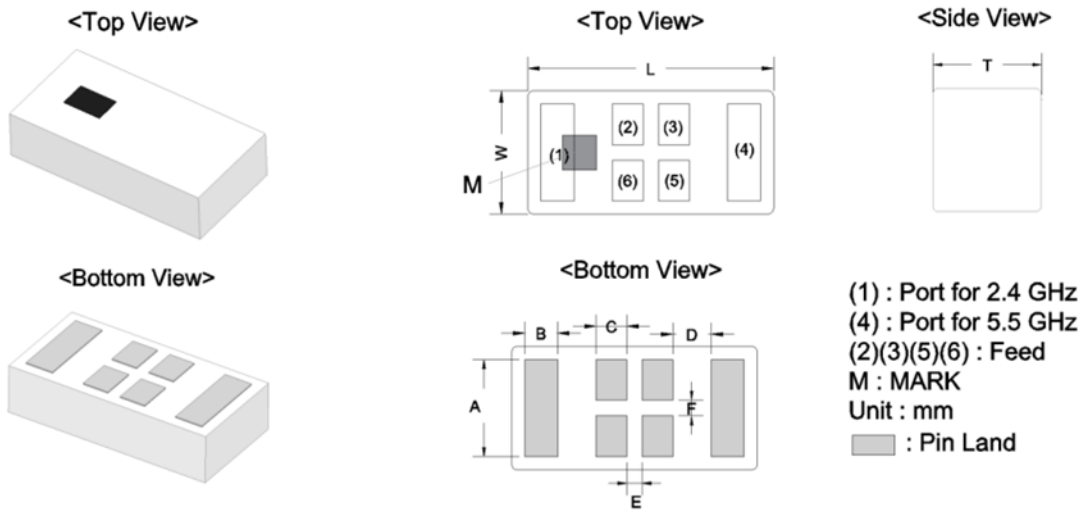
| Specification | Band | Band | V2X |
|----------------------|------|-------------|-----------|
| | | Freq. (MHz) | 5850–5925 |
| Max. VSWR | | | 2.3 |
| Max. Return Loss(dB) | | | -8.2 |
| AVG Eff. (%) | | | 52.0 |
| AVG AVG Gain (dB) | | | -2.8 |
| Max. Peak Gain (dBi) | | | 0.9 |
| VSWR | | ≤ 2.3 | |
| Return Loss | | ≤ -8.2 dB | |
| Peak Gain | | ≤ 0.9 dBi | |

1.2. Mechanical & Environmental

| Mechanical | |
|--------------------------|-------------------------|
| Antenna Size | 1.6 × 0.8 × 0.4 mm |
| Antenna Material & Color | Ceramic & Natural Color |
| Antenna Weight | Typ. 0.00209 g |
| Mounting Type | SMD |
| Recommended EVB Size | 60 × 50 × 1.0 mm |
| Environmental | |
| Operation Temperature | -40 °C to +95 °C |
| Storage Temperature | -40 °C to +85 °C |
| RoHS and REACH Compliant | Yes |

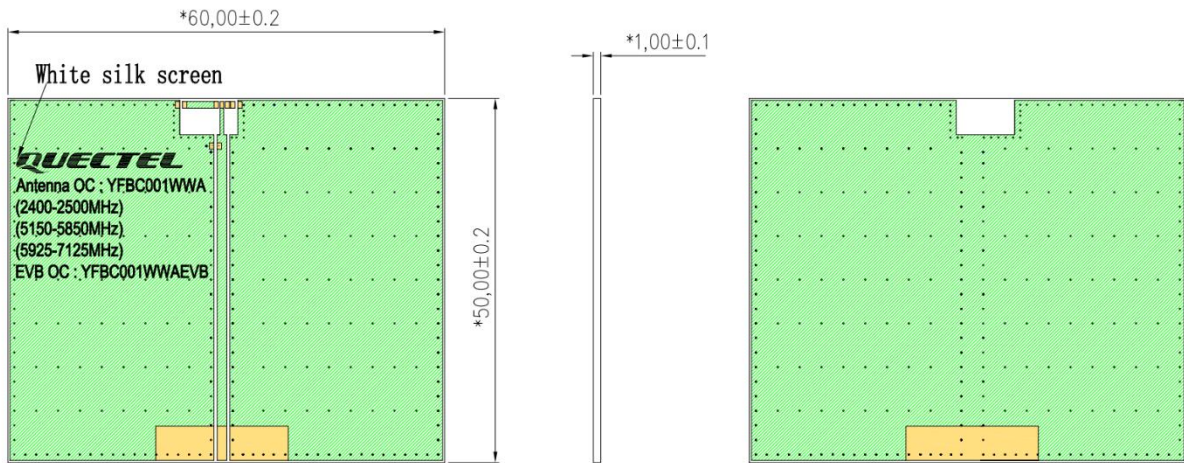
2 Drawing

2.1. Antenna



| MARK | L | W | T | A | B | C | D | E | F |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Dimensions | 1.60 | 0.80 | 0.40 | 0.63 | 0.215 | 0.20 | 0.25 | 0.10 | 0.10 |
| (mm) | ± 0.10 | ± 0.10 | ± 0.10 | ± 0.10 | ± 0.10 | ± 0.10 | ± 0.10 | ± 0.10 | ± 0.10 |

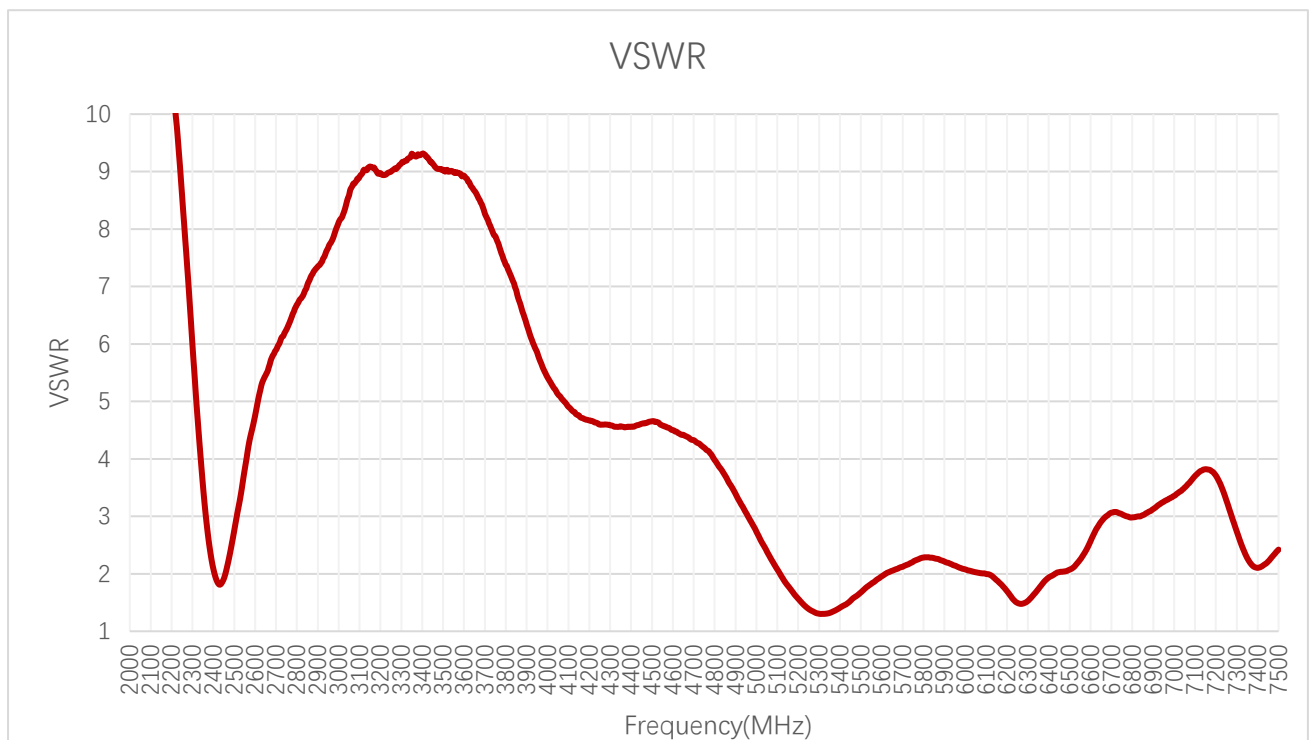
2.2. EVB



3 Detailed Performance

3.1. S-Parameter Test

3.1.1. VSWR



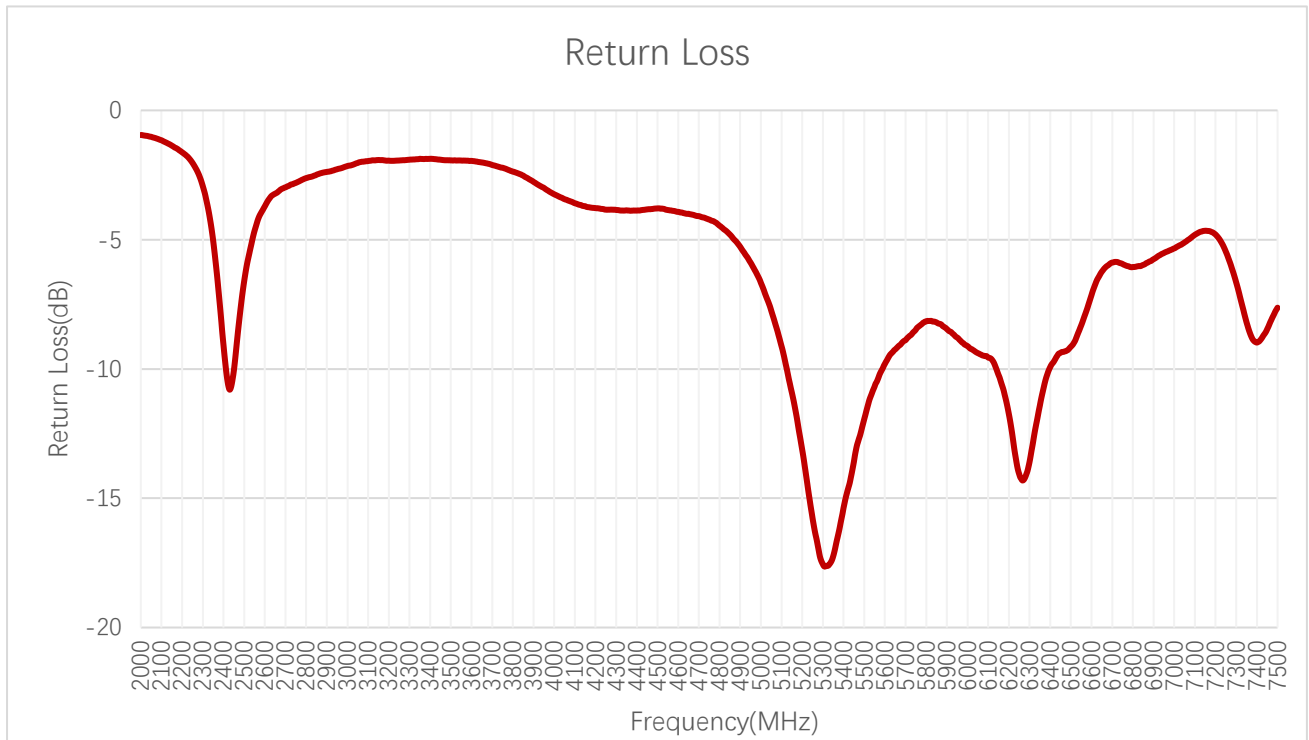
VSWR

| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5925 | 6725 | 7125 |
|-----------------|------|------|------|------|------|------|------|------|------|
| VSWR | 2.1 | 1.9 | 2.8 | 1.8 | 1.7 | 2.3 | 2.2 | 3.1 | 3.8 |

VSWR – V2X

| Frequency (MHz) | 5860 | 5880 | 5900 |
|-----------------|------|------|------|
| VSWR | 2.3 | 2.2 | 2.2 |

3.1.2. Return Loss



Return Loss (dB)

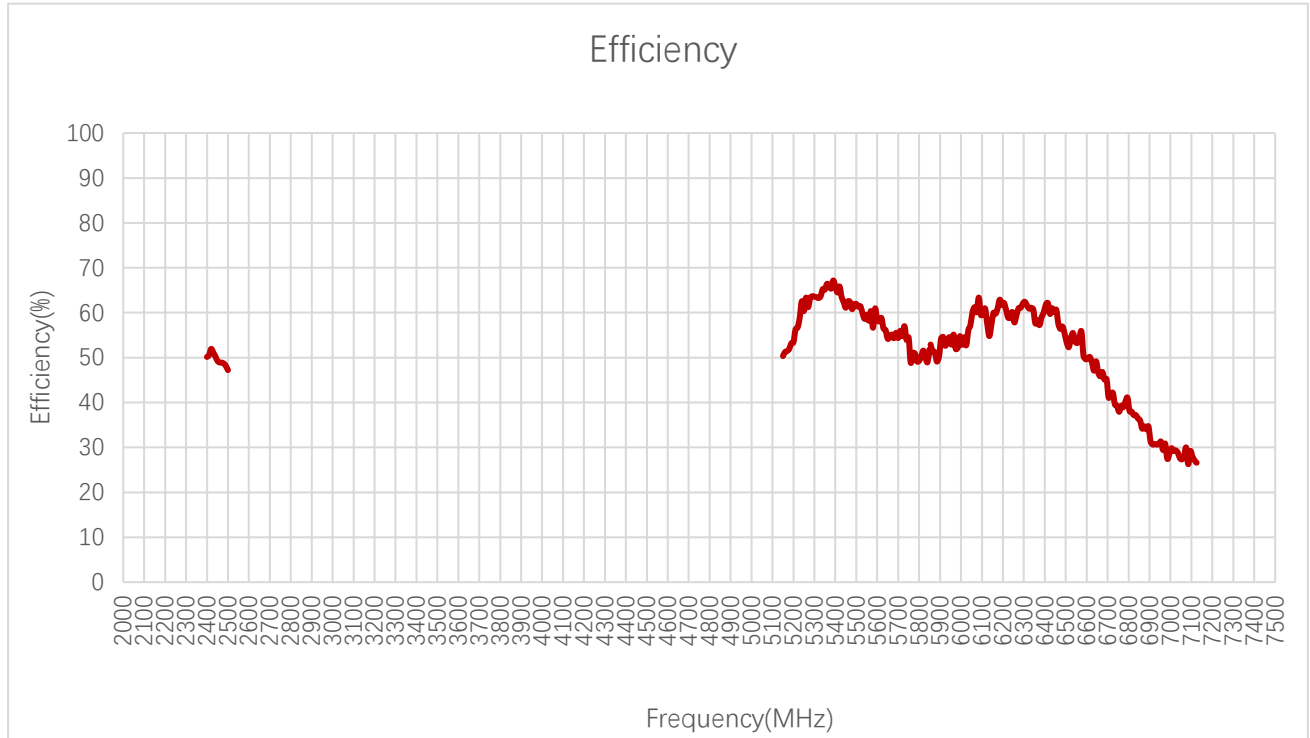
| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5925 | 6725 | 7125 |
|------------------|------|-------|------|-------|-------|------|------|------|------|
| Return Loss (dB) | -9.1 | -10.1 | -6.6 | -10.9 | -11.9 | -8.2 | -8.6 | -5.9 | -4.7 |

Return Loss (dB) – V2X

| Frequency (MHz) | 5860 | 5880 | 5900 |
|------------------|------|------|------|
| Return Loss (dB) | -8.2 | -8.4 | -8.5 |

3.2. Radiation Performance Test

3.2.1. Efficiency



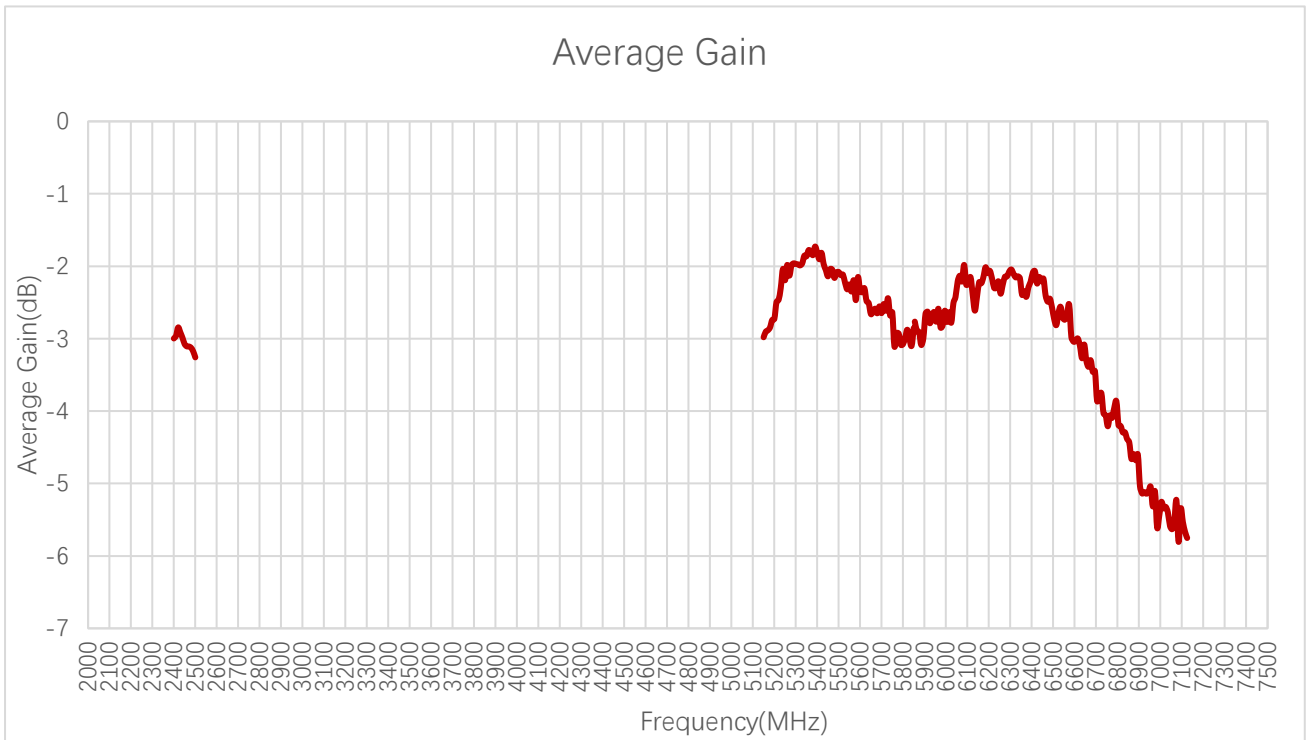
Efficiency (%)

| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5925 | 6725 | 7125 |
|-----------------|------|------|------|------|------|------|------|------|------|
| Efficiency (%) | 50.2 | 49.3 | 47.2 | 50.3 | 62.0 | 51.8 | 52.7 | 42.2 | 26.6 |

Efficiency (%) – V2X

| Frequency (MHz) | 5860 | 5880 | 5900 |
|-----------------|------|------|------|
| Efficiency (%) | 52.9 | 51.2 | 50.3 |

3.2.2. Average Gain



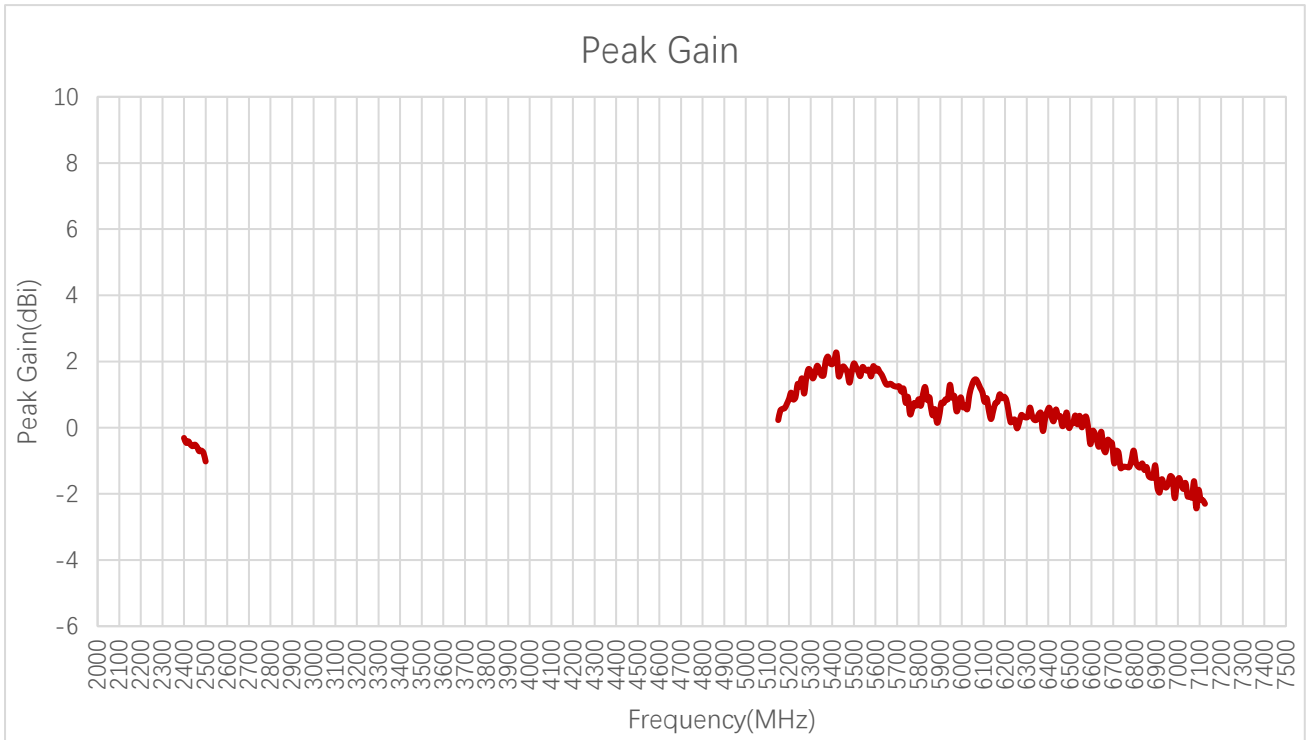
Average Gain (dB)

| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5925 | 6725 | 7125 |
|-------------------|------|------|------|------|------|------|------|------|------|
| Average Gain (dB) | -3.0 | -3.1 | -3.3 | -3.0 | -2.1 | -2.9 | -2.8 | -3.8 | -5.8 |

Average Gain (dB) – V2X

| Frequency (MHz) | 5860 | 5880 | 5900 |
|-------------------|------|------|------|
| Average Gain (dB) | -2.8 | -2.9 | -3.0 |

3.2.3. Peak Gain



Peak Gain (dBi)

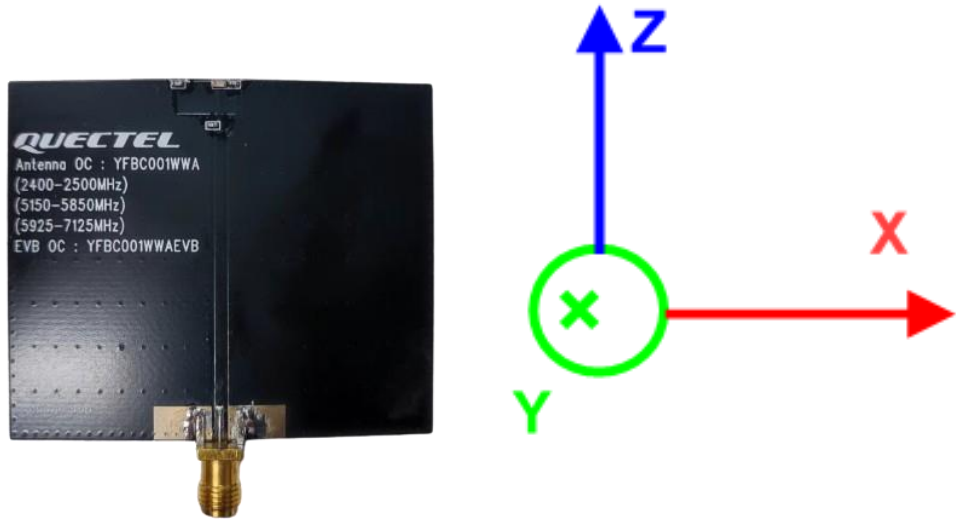
| Frequency (MHz) | 2400 | 2450 | 2500 | 5150 | 5500 | 5850 | 5925 | 6725 | 7125 |
|-----------------|------|------|------|------|------|------|------|------|------|
| Peak Gain (dBi) | -0.3 | -0.5 | -1.0 | 0.2 | 1.9 | 0.9 | 0.9 | -0.8 | -2.3 |

Peak Gain (dBi) – V2X

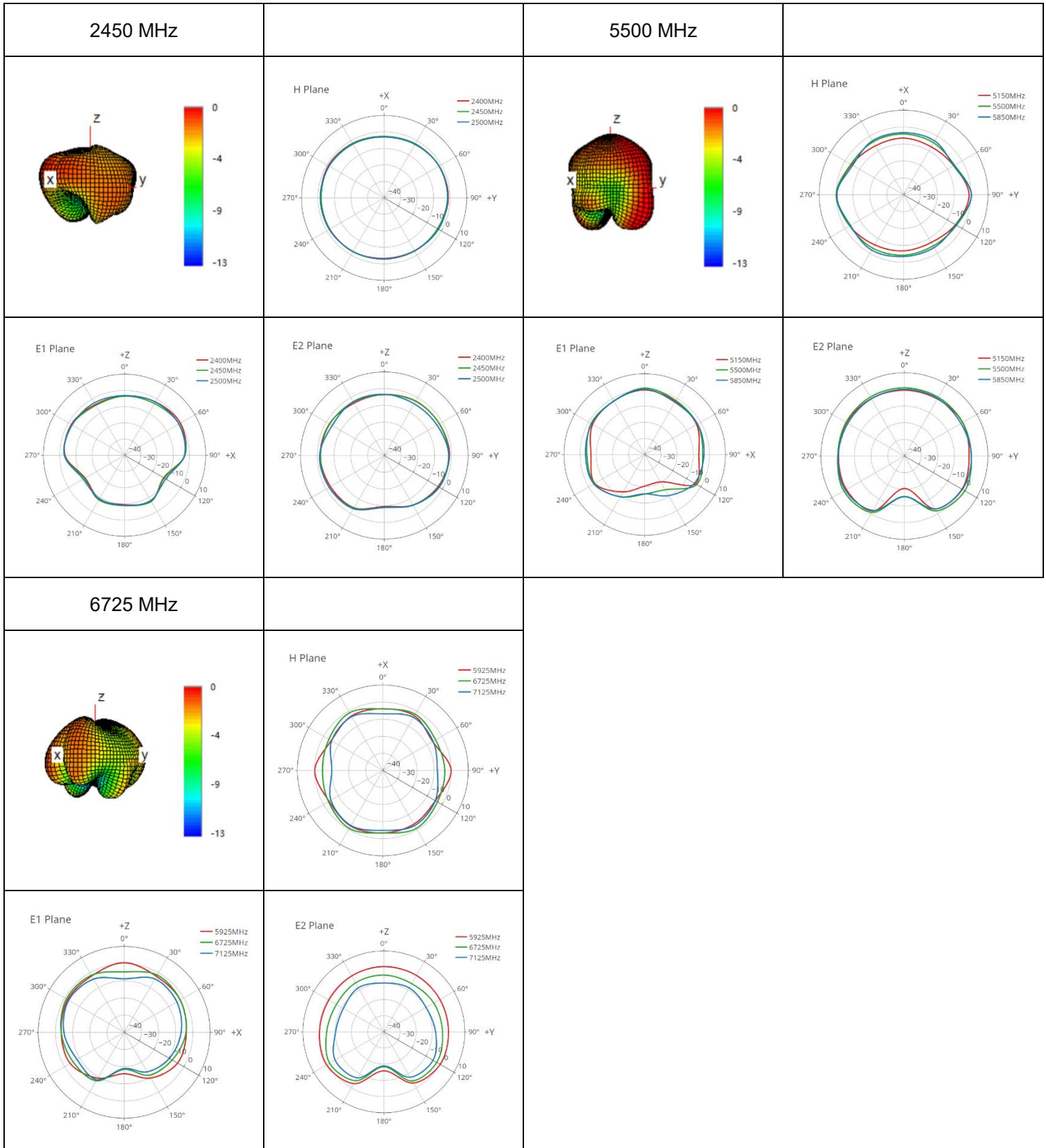
| Frequency (MHz) | 5860 | 5880 | 5900 |
|-----------------|------|------|------|
| Peak Gain (dBi) | 0.7 | 0.6 | 0.4 |

3.2.4. 3D & 2D Radiation Pattern

- Test Condition: On 50 mm × 60 mm EVB
- Test Chamber: GL-G-1

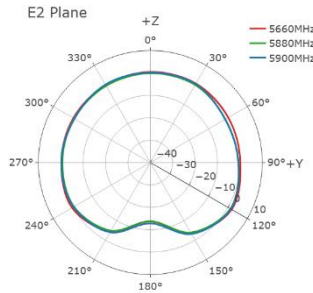
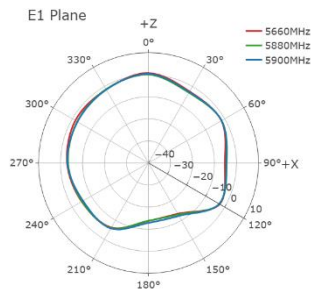
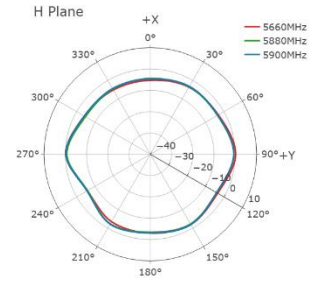
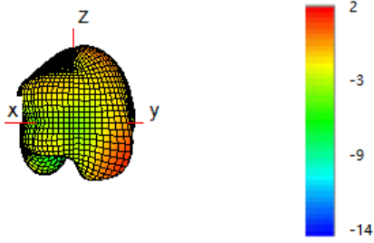


● Wi-Fi



● V2X

5880 MHz



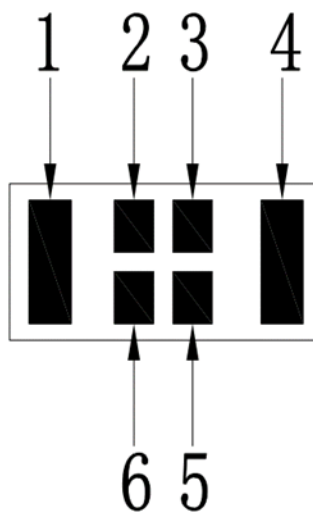
4 Schematic Symbol and Pin Definition

- The pin assignment for the antenna is as follows.
- The circuit symbol for the antenna is shown below. The antenna has 6 pins, six of which work. All other pins are for mechanical strength.

| Pin | Description |
|------------|----------------|
| 2, 3, 5, 6 | Feed |
| 1, 4 | Antenna Tuning |



Top



Bottom

5 Transmission Line

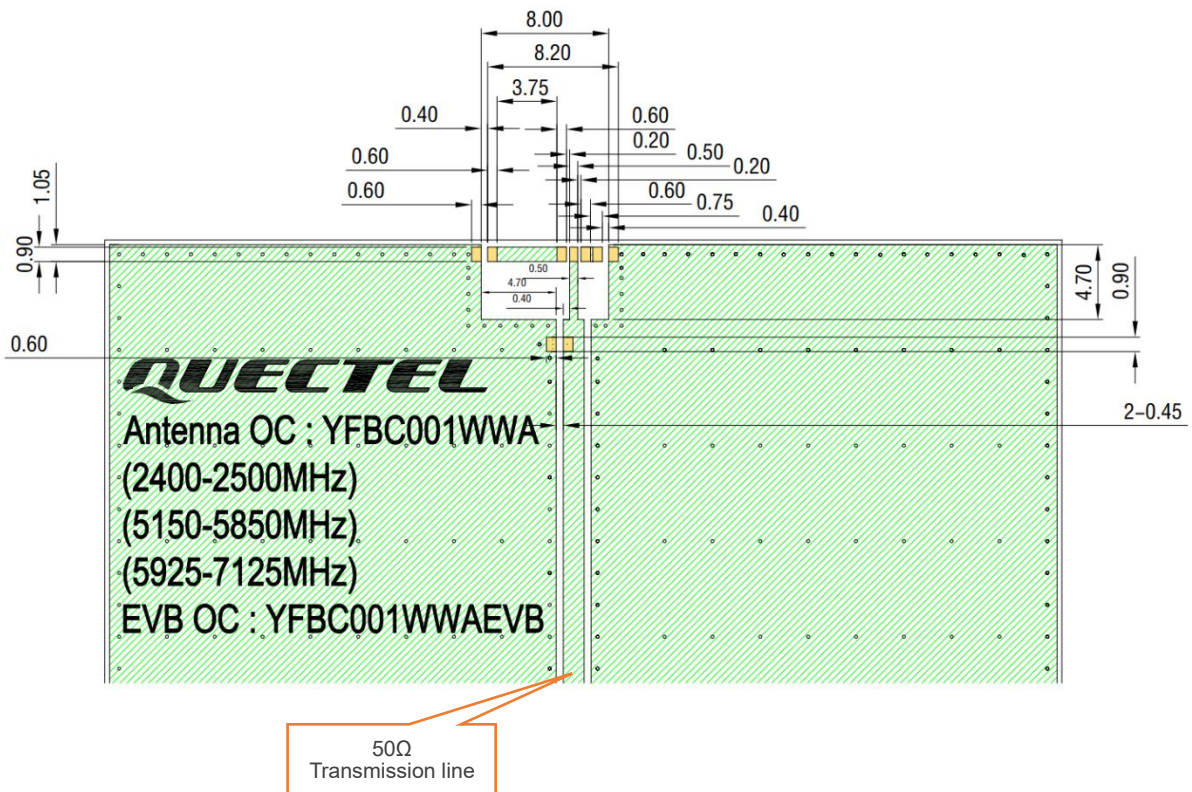
The characteristic impedance of all transmission lines shall be designed as 50 Ω .

- The length of the transmission lines should be kept as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50 Ω .

Once the material for the PCB has been chosen (PCB thickness and dielectric constant), a coplanar transmission line can easily be designed using any of the commercial software packages for transmission line design. For the chosen PCB thickness, copper thickness and substrate dielectric constant, the program will calculate the appropriate transmission line width and gaps on either side of the track so the characteristic impedance of the coplanar transmission is 50 Ω .

6 Recommended PCB Layout

The host PCB must be designed using the PCB footprint shown with the correct clearances. An example of the PCB layout shows the antenna footprint. Please note this clearance area is critical to the performance of the antenna and must be applied through all layers of the PCB.



All dimensions in (mm)

7 Matching Circuit

Demo Board Top View

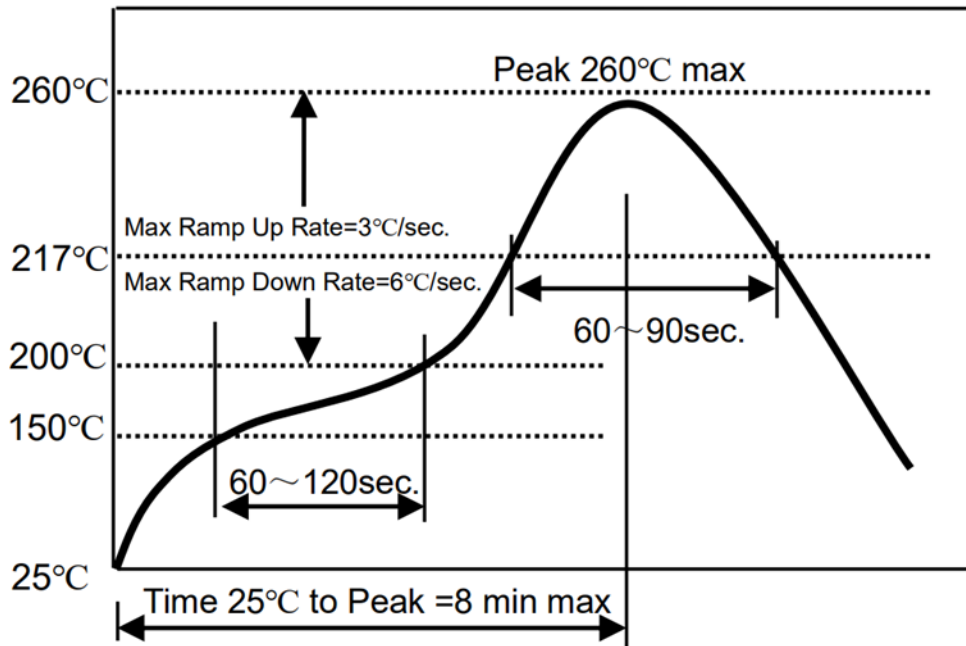


| | P1 | P2 | P3 |
|------------------|----------|----------|---------|
| Default Matching | 1.5 pF | 0.1 pF | 1.0 nH |
| Tolerance | ±0.25 pF | ±0.05 pF | ±0.1 nH |

8 Soldering Temperature

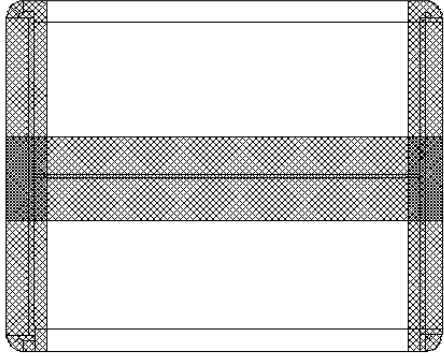
| Phase | Profile Features | PB-Free Assembly |
|-----------|--|--|
| RAMP-UP | Avg. Ramp-up Rate (T _{smax} to T _p) | 3 °C/second (Max.) |
| PREHEAT | Temperature Min (T _{smin}) Temperature Max (T _{smax}) Time (t _{smin} to t _{smax}) | 150 °C 200 °C 120 seconds (Max.) |
| REFLOW | Temperature (TL) Total Time above TL (tl) | 217 °C 90 seconds (Max.) |
| PEAK | Temperature (T _p) | 260 °C |
| RAMP-DOWN | Rate | 6 °C/second (Max.) |

9 Reflow Profile



10 Packaging

| Step | Packaging Picture / 2D Picture | Description |
|------|--------------------------------|---|
| 1 | | Reel |
| 2 | | (4000 Antenna Products / Reel) One inner box contains 10 volumes. |
| 3 | | (6 Inner Boxes / Carton Box) (240000 Antennas / Carton Box) Estimated quantity Products that cannot fill the entire carton box are packed in a suitable size carton box. <u>Carton Size:</u> <u>L × W × H = 390 × 370 × 190 mm</u> |
| 4 | | Position for Attaching Labels ① Carton Label ② Quality Label |

| | | |
|-------------|---|--|
| <p>5</p> |  | <p>Sealing Cartons H-shaped sealing cartons</p> |
| <p>Note</p> | <p>The initial packaging method described above is for reference only, and the final actual packaging method shall be subject to the actual shipping packaging.</p> | |

Contact Us

At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

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Email: info@quectel.com

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Revision History

| Version | Date | Author | Note |
|---------|------------|--|---|
| - | 2024-06-17 | Sly LIU/ Lucky FENG/ David LIU/ Rainey LIAO | Creation of the document |
| 1.0 | 2024-06-17 | Sly LIU/ Lucky FENG/ David LIU/ Rainey LIAO | First official release |
| 2.0 | 2025-07-07 | Mayes LI/ Lucky FENG | Numerous changes were made to this document. It should be read in its entirety. |

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