WiFi Dual Band Ceramic Chip Antenna
Model: AA077
TELA chip antenna
Product Number: H2U84W1H1S0300

REFERENCE SPECIFICATION
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1 Introduction

Unictron’s AA077 ceramic chip antenna is designed for Wi-Fi CERTIFIED ac applications, covering both 2400~2484 MHz & 5150~5850 MHz frequency bands. Fabricated with proprietary design and processes, AA077 shows excellent performance and is fully compatible with SMT processes which can decrease the assembly cost and improve device’s quality and consistency.

Features

* Stable and reliable performances in both 2.4 and 5 GHz bands
* Low profile and compact size
* RoHS compliance
* SMT processes compatible

Applications

* Wi-Fi CERTIFIED ac applications
* Wireless communication devices when IEEE802.11 a/b/g/n/ac functions are needed.
* IoT applications
* Wireless PCMCIA cards or USB dongles
# 2 Electrical Characteristics

## 2.1 Table with electrical properties:

**Electrical Table (2400~2500 MHz Band)**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Specifications</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outline Dimensions</td>
<td>3.2x1.6x0.5</td>
<td>mm</td>
</tr>
<tr>
<td>Ground Plane Dimensions</td>
<td>80x40</td>
<td>mm</td>
</tr>
<tr>
<td>Working Frequency</td>
<td>2400~2500</td>
<td>MHz</td>
</tr>
<tr>
<td>VSWR (@center frequency)*</td>
<td>2 Max.</td>
<td></td>
</tr>
<tr>
<td>Characteristic Impedance</td>
<td>50</td>
<td>Ω</td>
</tr>
<tr>
<td>Polarization</td>
<td>Linear Polarization</td>
<td></td>
</tr>
<tr>
<td>Peak Gain ( @2442MHz)</td>
<td>1.4 (typical)</td>
<td>dBi</td>
</tr>
<tr>
<td>Efficiency</td>
<td>76 (typical)</td>
<td>%</td>
</tr>
</tbody>
</table>

* Center frequency means the frequency with the lowest value in return loss of the chip antenna on the evaluation board.

**Electrical Table (5150~5850 MHz Band)**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Specifications</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outline Dimensions</td>
<td>3.2x1.6x0.5</td>
<td>mm</td>
</tr>
<tr>
<td>Ground Plane</td>
<td>80x40</td>
<td>mm</td>
</tr>
<tr>
<td>Working Frequency</td>
<td>5150~5850</td>
<td>MHz</td>
</tr>
<tr>
<td>VSWR (@center frequency)*</td>
<td>2 Max.</td>
<td></td>
</tr>
<tr>
<td>Characteristic Impedance</td>
<td>50</td>
<td>Ω</td>
</tr>
<tr>
<td>Polarization</td>
<td>Linear Polarization</td>
<td></td>
</tr>
<tr>
<td>Peak Gain ( @5500MHz)</td>
<td>2.3 (typical)</td>
<td>dBi</td>
</tr>
<tr>
<td>Efficiency</td>
<td>67 (typical)</td>
<td>%</td>
</tr>
</tbody>
</table>

* Center frequency means the frequency with the lowest value in return loss of the chip antenna on the evaluation board.
2.2 Return Loss ($S_{11}$)

2.3 VSWR ($S_{11}$)
2.4 Efficiency Table

**2400~2500 MHz**

<table>
<thead>
<tr>
<th>Frequency(MHz)</th>
<th>2400</th>
<th>2412</th>
<th>2417</th>
<th>2422</th>
<th>2427</th>
<th>2432</th>
<th>2437</th>
<th>2442</th>
<th>2447</th>
<th>2452</th>
<th>2457</th>
<th>2462</th>
<th>2467</th>
<th>2472</th>
<th>2484</th>
<th>2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency(dB)</td>
<td>-1.7</td>
<td>-1.4</td>
<td>-1.2</td>
<td>-1.0</td>
<td>-1.0</td>
<td>-1.1</td>
<td>-1.1</td>
<td>-1.2</td>
<td>-1.1</td>
<td>-1.1</td>
<td>-1.0</td>
<td>-1.0</td>
<td>-1.1</td>
<td>-1.5</td>
<td>-1.8</td>
<td></td>
</tr>
<tr>
<td>Efficiency(%)</td>
<td>67.9</td>
<td>73.2</td>
<td>76.1</td>
<td>78.7</td>
<td>79.9</td>
<td>78.8</td>
<td>77.4</td>
<td>76.8</td>
<td>76.8</td>
<td>77.2</td>
<td>78.1</td>
<td>79.3</td>
<td>79.2</td>
<td>78.1</td>
<td>71.5</td>
<td>65.5</td>
</tr>
<tr>
<td>Peak Gain(dBi)</td>
<td>0.8</td>
<td>1.2</td>
<td>1.3</td>
<td>1.4</td>
<td>1.4</td>
<td>1.3</td>
<td>1.4</td>
<td>1.5</td>
<td>1.5</td>
<td>1.4</td>
<td>1.5</td>
<td>1.4</td>
<td>1.3</td>
<td>1.2</td>
<td>0.8</td>
<td></td>
</tr>
</tbody>
</table>

**5150~5850 MHz**

<table>
<thead>
<tr>
<th>Frequency(MHz)</th>
<th>5150</th>
<th>5200</th>
<th>5250</th>
<th>5300</th>
<th>5350</th>
<th>5400</th>
<th>5450</th>
<th>5500</th>
<th>5550</th>
<th>5600</th>
<th>5650</th>
<th>5700</th>
<th>5750</th>
<th>5800</th>
<th>5850</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency(dB)</td>
<td>-1.5</td>
<td>-1.4</td>
<td>-1.8</td>
<td>-1.5</td>
<td>-1.4</td>
<td>-1.8</td>
<td>-2.0</td>
<td>-1.6</td>
<td>-1.7</td>
<td>-1.6</td>
<td>-1.4</td>
<td>-1.6</td>
<td>-1.8</td>
<td>-1.5</td>
<td>-1.9</td>
</tr>
<tr>
<td>Efficiency(%)</td>
<td>71.5</td>
<td>71.9</td>
<td>65.7</td>
<td>71.6</td>
<td>71.9</td>
<td>65.8</td>
<td>63.2</td>
<td>69.9</td>
<td>67.3</td>
<td>69.6</td>
<td>71.7</td>
<td>68.9</td>
<td>66.6</td>
<td>70.1</td>
<td>64.6</td>
</tr>
<tr>
<td>Gain(dBi)</td>
<td>2.2</td>
<td>2.3</td>
<td>2.0</td>
<td>2.3</td>
<td>2.1</td>
<td>2.1</td>
<td>2.0</td>
<td>2.4</td>
<td>2.3</td>
<td>2.8</td>
<td>2.9</td>
<td>2.6</td>
<td>2.5</td>
<td>2.6</td>
<td>2.2</td>
</tr>
</tbody>
</table>
2.5 Efficiency vs. Frequency

2400~2500 MHz

![Graph showing Efficiency (%) and Peak Gain (dBi) vs. Frequency (MHz) for 2400~2500 MHz range.]

5150~5850 MHz

![Graph showing Efficiency (%) and Peak Gain (dBi) vs. Frequency (MHz) for 5150~5850 MHz range.]

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Introduction

Electrical Characteristics

Radiation Pattern

Layout

Tuning

Packing

Notes
2.6 Radiation Pattern (with 80x40mm² Evaluation Board)

3D Gain Pattern @ 2442 MHz (unit: dBi)
3D Gain Pattern @ 5150 MHz (unit: dBi)
3D Gain Pattern @ 5500 MHz (unit: dBi)
3D Gain Pattern @ 5850 MHz (unit: dBi)
3 Layout

3.1 Antenna Dimensions

PIN Definitions

<table>
<thead>
<tr>
<th>Item</th>
<th>PIN1</th>
<th>PIN2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal</td>
<td>Signal</td>
<td>Tuning/Ground</td>
</tr>
</tbody>
</table>
3.2 Evaluation Board with Antenna

Unit: mm

3.3 Solder Land Pattern

For solder land pattern, please contact Unictron representative at e-sales@unictron.com for layout details and more technical information.
4 Frequency tuning

Regarding the frequency tuning, please contact Unictron representative at e-sales@unictron.com for layout details and more technical information.

With the following recommended values of matching and tuning components, the center frequencies will be about 2442 MHz for lower band & 5500 MHz for higher band at our standard 80x40 mm² evaluation board. However, these are typical reference values which may need to be changed when circuit boards or part vendors are different.

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Vendor</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/A</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>1 nH, (0402)</td>
<td>DARFON</td>
<td>±0.3 nH</td>
</tr>
<tr>
<td>3</td>
<td>0.2 pF, (0402)</td>
<td>DARFON</td>
<td>±0.05 pF</td>
</tr>
<tr>
<td>4</td>
<td>22 pF, (0402)</td>
<td>DARFON</td>
<td>±5%</td>
</tr>
<tr>
<td>5</td>
<td>Fine tuning element</td>
<td>DARFON</td>
<td>±0.05 pF</td>
</tr>
<tr>
<td>6</td>
<td>Fine tuning element</td>
<td>DARFON</td>
<td>±0.05 pF</td>
</tr>
</tbody>
</table>
5 Packing

1. Quantity/Reel: 5000 pcs/Reel
2. Plastic tape:

a) Tape drawing:

b) Tape dimensions (unit: mm)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
<th>Tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>12.00</td>
<td>±0.30</td>
</tr>
<tr>
<td>P</td>
<td>4.00</td>
<td>±0.10</td>
</tr>
<tr>
<td>E</td>
<td>1.75</td>
<td>±0.10</td>
</tr>
<tr>
<td>F</td>
<td>5.50</td>
<td>±0.10</td>
</tr>
<tr>
<td>P2</td>
<td>2.00</td>
<td>±0.10</td>
</tr>
<tr>
<td>D</td>
<td>1.50</td>
<td>+0.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.00</td>
</tr>
<tr>
<td>Po</td>
<td>4.00</td>
<td>±0.10</td>
</tr>
<tr>
<td>10Po</td>
<td>40.00</td>
<td>±0.20</td>
</tr>
</tbody>
</table>

c) Reel drawing
d) Drawing of small size carton in developed view

![Small Size Carton Diagram](image)

e) Drawing of middle size carton in developed view

![Middle Size Carton Diagram](image)
f) Drawing of large size carton in developed view

g) Picture of a label

h) Reel with the label
5.1 Packing process

i) Small size carton with label

j) Middle size carton with label

1 reel includes max 5000 pieces chip antennas

1 small size carton includes max 2 reels

1 middle size carton includes max 5pcs of small cartons

1 large size carton includes max 2 pcs of middle size cartons
6 Notes

6.1 Typical Soldering Profile for Lead-free Process

![Graph showing typical soldering profile](image)

- Temperature: 260°C
- Time: 20-40s
- Pre-heating: 150-200°C
- Time: 60-180s
- Time: 60-150s

Temperature (°C) vs. Time (s)
6.2 Operating and storage conditions:

**Operating:**
- Maximum Input Power: 2W
- Operating Temperature: -40 C to 85 C

**Storage:**
- Storage Temperature: -5C to 40 C
- Relative Humidity: 20% to 70%
- Shelf Life: 1 year

6.3 Installation guide:

Request Unictron’s application notes “General guidelines for the installation of Unictron’s chip antennas” for further information at e-sales@unictron.com.

6.4 Reminders for users of Unictron’s AA077 ceramic chip antennas

6.4.1 This chip antenna is made of ceramic materials which are relatively more rigid and brittle compared to printed circuit board materials. Bending of circuit board at the locations where chip antenna is mounted may cause the cracking of solder joints or antenna itself.

6.4.2 Punching/cutting of the break-off tab of PCB panel may cause severe bending of the circuit board which may result in cracking of solder joints or chip antenna itself. Therefore break-off tab shall be located away from the installation site of chip antenna.

6.4.3 Be cautious when ultrasonic welding process needs to be used near the locations where chip antennas are installed. Strong ultrasonic vibration may cause the cracking of chip antenna solder joints.
Presented data were measured on reference PCB (ground) as shown in this specification. When the antenna placement or size of the PCB is changed, antenna performance and values of matching components may differ from data shown here.

Information presented in this Reference Specification is believed to be correct as of the date of publishing. Unictron Technologies Corporation reserves the rights to change the Reference Specification without notice due to technical improvements, etc. Please consult with Unictron’s engineering team about the latest information before using this product. Per request, we may provide advice and assistance in implementing this antenna to a customer’s device by simulation or real measurement of the interested device in our testing facilities.

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