



# PRODUCT SPECIFICATION

## TITLE

### Ultra Wideband PCB Antenna

## TABLE OF CONTENTS

- 1.0 SCOPE
- 2.0 PRODUCT DESCRIPTION
- 3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS
- 4.0 RATINGS
- 5.0 PERFORMANCE
- 6.0 TEST GROUPINGS
- 7.0 PACKING

|                      |                                                       |                                   |                              |
|----------------------|-------------------------------------------------------|-----------------------------------|------------------------------|
| REVISION:            | ECR/ECN INFORMATION:                                  | TITLE:                            | SHEET No.                    |
| <b>C</b>             | EC No: <b>ABU2016-0056</b><br>DATE: <b>2016-03-22</b> | <b>Ultra Wideband PCB Antenna</b> | <b>1 of 7</b>                |
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| <b>PS-146184-100</b> | <b>Liu Hai 2016-03-22</b>                             | <b>Ryan Liu 2016-03-22</b>        | <b>Welson Tan 2016-03-22</b> |



# PRODUCT SPECIFICATION

## Ultra Wideband PCB Antenna

### 1.0 SCOPE

This Product Specification covers the mechanical, electrical and environmental performances requirements and test methods for ultra wideband PCB antenna.

### 2.0 PRODUCT DESCRIPTION

#### 2.1 PRODUCT NAME AND SERIES NUMBER (S)

Product name: Ultra Wideband PCB Antenna 146184-0100

#### 2.2 Design and Construction

Antenna shall be of the design, construction and physical dimensions specified on the applicable sales drawing.

#### 2.3 Materials

- a) PCB: Refer to respective Molex sales or engineering drawings
- b) Plating: Refer to respective Molex sales or engineering drawings
- c) Cable Line: Refer to respective Molex sales or engineering drawings
- d) Connector: Refer to respective Molex sales or engineering drawings

### 3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

See drawings and other sections of this specification for the relevant reference documents. In cases where the specification differs from the drawings, the drawings take precedence.

### 4.0 RATINGS

#### 4.1 RF POWER

2 WATTS

#### 4.2 TEMPERATU

Operating: - 30°C to + 85°C  
Storage : - 40°C to + 95°C

#### 4.3 HUMIDITY

Operating : -30°Cto+85°C  
-30°Cto+50°C, 85%RH or less  
+50°Cto+85°C, 60%RH or less

Storage : -40°Cto+95°C  
-40°Cto+50°C, 85%RH or less  
+50°Cto+95°C, 60%RH or less

|                      |                                                       |                                   |                              |
|----------------------|-------------------------------------------------------|-----------------------------------|------------------------------|
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| <b>C</b>             | EC No: <b>ABU2016-0056</b><br>DATE: <b>2016-03-22</b> | <b>Ultra Wideband PCB Antenna</b> | <b>2 of 7</b>                |
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# PRODUCT SPECIFICATION

## 5.0 PERFORMANCE

### 5.1 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 50mm (1461840050)

| ITEM  | DESCRIPTION      | TEST CONDITION                                                                                                                | REQUIREMENT |
|-------|------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------|
| 5.1.1 | Frequency Range  | 3GHz~6GHz                                                                                                                     | 3GHz~6GHz   |
| 5.1.2 | Return Loss      | Antenna loaded on PC/ABS housing (thickness 1mm) with 100mm long,1.13mm diameter micro coaxial cable.<br>Measured by VNA5071C | < -6dB      |
| 5.1.3 | Peak Gain        | Measure antenna on recommended PC/ABS housing through OTA chamber                                                             | 4.7 dBi     |
| 5.1.4 | Total Efficiency | Measure antenna on recommended PC/ABS housing through OTA chamber                                                             | >74%        |
| 5.1.5 | Polarization     | Measure antenna through the OTA chamber                                                                                       | Linear      |
| 5.1.6 | Input Impedance  | Measure antenna on recommended PC/ABS housing through VNA E5071C                                                              | 50Ohms      |

### 5.2 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 100mm (1461840100)

| ITEM  | DESCRIPTION      | TEST CONDITION                                                                                                                | REQUIREMENT |
|-------|------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------|
| 5.2.1 | Frequency Range  | 3GHz~6GHz                                                                                                                     | 3GHz~6GHz   |
| 5.2.2 | Return Loss      | Antenna loaded on PC/ABS housing (thickness 1mm) with 100mm long,1.13mm diameter micro coaxial cable.<br>Measured by VNA5071C | < -6 dB     |
| 5.2.3 | Peak Gain        | Measure antenna on recommended PC/ABS housing through OTA chamber                                                             | 4.5 dBi     |
| 5.2.4 | Total Efficiency | Measure antenna on recommended PC/ABS housing through OTA chamber                                                             | >70%        |
| 5.2.5 | Polarization     | Measure antenna through the OTA chamber                                                                                       | Linear      |
| 5.2.6 | Input Impedance  | Measure antenna on recommended PC/ABS housing through VNA E5071C                                                              | 50Ohms      |

### 5.3 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 150mm (1461840150)

| ITEM  | DESCRIPTION      | TEST CONDITION                                                                                                                | REQUIREMENT |
|-------|------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------|
| 5.3.1 | Frequency Range  | 3GHz~6GHz                                                                                                                     | 3GHz~6GHz   |
| 5.3.2 | Return Loss      | Antenna loaded on PC/ABS housing (thickness 1mm) with 100mm long,1.13mm diameter micro coaxial cable.<br>Measured by VNA5071C | < -6 dB     |
| 5.3.3 | Peak Gain        | Measure antenna on recommended PC/ABS housing through OTA chamber                                                             | 4.3 dBi     |
| 5.3.4 | Total Efficiency | Measure antenna on recommended PC/ABS housing through OTA chamber                                                             | >66%        |
| 5.3.5 | Polarization     | Measure antenna through the OTA chamber                                                                                       | Linear      |
| 5.3.6 | Input Impedance  | Measure antenna on recommended PC/ABS housing through VNA E5071C                                                              | 50Ohms      |

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**Ultra Wideband PCB Antenna**

**3 of 7**

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# PRODUCT SPECIFICATION

## 5.4 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 200mm (1461840200)

| ITEM  | DESCRIPTION      | TEST CONDITION                                                                                                                 | REQUIREMENT |
|-------|------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------|
| 5.4.1 | Frequency Range  | 3GHz~6GHz                                                                                                                      | 3GHz~6GHz   |
| 5.4.2 | Return Loss      | Antenna loaded on PC/ABS housing (thickness 1mm) with 100mm long, 1.13mm diameter micro coaxial cable.<br>Measured by VNA5071C | < -6 dB     |
| 5.4.3 | Peak Gain        | Measure antenna on recommended PC/ABS housing through OTA chamber                                                              | 4 dBi       |
| 5.4.4 | Total Efficiency | Measure antenna on recommended PC/ABS housing through OTA chamber                                                              | >62%        |
| 5.4.5 | Polarization     | Measure antenna through the OTA chamber                                                                                        | Linear      |
| 5.4.6 | Input Impedance  | Measure antenna on recommended PC/ABS housing through VNA E5071C                                                               | 50Ohms      |

## 5.5 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 250mm (1461840250)

| ITEM  | DESCRIPTION      | TEST CONDITION                                                                                                                 | REQUIREMENT |
|-------|------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------|
| 5.5.1 | Frequency Range  | 3GHz~6GHz                                                                                                                      | 3GHz~6GHz   |
| 5.5.2 | Return Loss      | Antenna loaded on PC/ABS housing (thickness 1mm) with 100mm long, 1.13mm diameter micro coaxial cable.<br>Measured by VNA5071C | < -6 dB     |
| 5.5.3 | Peak Gain        | Measure antenna on recommended PC/ABS housing through OTA chamber                                                              | 3.8 dBi     |
| 5.5.4 | Total Efficiency | Measure antenna on recommended PC/ABS housing through OTA chamber                                                              | >58%        |
| 5.5.5 | Polarization     | Measure antenna through the OTA chamber                                                                                        | Linear      |
| 5.5.6 | Input Impedance  | Measure antenna on recommended PC/ABS housing through VNA E5071C                                                               | 50Ohms      |

## 5.6 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 300mm (1461840300)

| ITEM  | DESCRIPTION      | TEST CONDITION                                                                                                                 | REQUIREMENT |
|-------|------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------|
| 5.6.1 | Frequency Range  | 3GHz~6GHz                                                                                                                      | 3GHz~6GHz   |
| 5.6.2 | Return Loss      | Antenna loaded on PC/ABS housing (thickness 1mm) with 100mm long, 1.13mm diameter micro coaxial cable.<br>Measured by VNA5071C | < -6 dB     |
| 5.6.3 | Peak Gain        | Measure antenna on recommended PC/ABS housing through OTA chamber                                                              | 3.5 dBi     |
| 5.6.4 | Total Efficiency | Measure antenna on recommended PC/ABS housing through OTA chamber                                                              | >55%        |
| 5.6.5 | Polarization     | Measure antenna through the OTA chamber                                                                                        | Linear      |
| 5.6.6 | Input Impedance  | Measure antenna on recommended PC/ABS housing through VNA E5071C                                                               | 50Ohms      |

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**Ultra Wideband PCB Antenna**

**4 of 7**

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# PRODUCT SPECIFICATION

## 5.7 CABLE LOSS

| ITEM  | DESCRIPTION     | TEST CONDITION                 | REQUIREMENT |           |
|-------|-----------------|--------------------------------|-------------|-----------|
| 5.7.1 | Frequency Range | 3GHz~6GHz                      | 3GHz~5GHz   | 5GHz~6GHz |
| 5.7.2 | Attenuation     | 1m cable. Measured by VNA5071C | ≤4dB/m      | ≤5dB/m    |

## 5.8 CABLE LENGTH AFFECT THE ANTENNA PERFORMANCE

Balance antenna resonance is insensitive by cable's length, but the cable's loss will affect the total efficiency. Refer to 5.7

## 5.9 MECHANICAL REQUIREMENTS

| ITEM  | DESCRIPTION | TEST CONDITION                                                                                                         | REQUIREMENT     |
|-------|-------------|------------------------------------------------------------------------------------------------------------------------|-----------------|
| 5.9.1 | Pull test   | Test machine : Max intelligent load tester<br>Stick the flex antenna in a PC block, pull cable in horizontal direction | Pull force >18N |

## 5.10 RELIABILITY REQUIREMENTS

| ITEM   | DESCRIPTION   | TEST CONDITION                                                 | REQUIREMENT          |
|--------|---------------|----------------------------------------------------------------|----------------------|
| 5.10.1 | Cross section | Cross section on pad soldering area.<br>Check under microscope | No soldering problem |

|                      |                                                       |                                   |                              |
|----------------------|-------------------------------------------------------|-----------------------------------|------------------------------|
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| <b>C</b>             | EC No: <b>ABU2016-0056</b><br>DATE: <b>2016-03-22</b> | <b>Ultra Wideband PCB Antenna</b> | <b>5 of 7</b>                |
| DOCUMENT NUMBER:     | CREATED / REVISED BY:                                 | CHECKED BY:                       | APPROVED BY:                 |
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# PRODUCT SPECIFICATION

## 5.11 ENVIRONMENTAL REQUIREMENTS

| ITEM   | DESCRIPTION                   | TEST CONDITION                                                                                                                                                                                                                                                                                                                                                                                                                                                                | REQUIREMENT                                                                                              |
|--------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 5.11.1 | Temperature /Humidity cycling | Test condition:<br>1) The device under test is kept for 30 mins in an environment with a temperature of -40 °C.<br>2) Kept for 4 Hours in an environment with a temperature of 85 degrees and a relative humidity of 95%.<br>3) Kept for 2 Hours in an environment with a temperature of 125 degrees and a relative humidity of 95%.<br>4) The cycle is repeated until a total of 40 cycles have been completed. Hereafter the conditions are stabilized at room temperature. | 1) Parts should meet RF spec before and after test.<br>2) No cosmetic problem                            |
| 5.11.2 | Temperature Shock             | Test condition:<br>1) The device under test at -40 °C ↔ 125 °C by 100 cycles, Dwell of 30 mins, transition time between Dwell 30 secs (~ 61 mins / cycle ) and each item should be measured after exposing them in normal temperature and humidity for 24 h.                                                                                                                                                                                                                  | 1) Parts should meet RF spec before and after test.<br>2) No cosmetic problem                            |
| 5.11.3 | High Temperature              | Test condition:<br>1) Temperature:125°C, time:1008hours<br>2) There is no substantial obstruction to air flow across and around the samples, and the samples are not touching each other                                                                                                                                                                                                                                                                                      | Parts should meet RF spec before and after test.<br>No cosmetic problem                                  |
| 5.11.4 | Salt mist test                | Test condition:<br>1) The device under test is exposed to a spray of a 5% (by volume) resolution of NaCl in water for 2 hours. Thereafter the device under test is left for 1 week in room temperature at a relative humidity of 95%. The cycle is repeated until a total of 2 cycles have been completed. Here after the conditions are stabilized at room temperature.                                                                                                      | 1) Parts should meet RF spec before and after test.<br>2) No visible corrosion.<br>Discoloration accept. |

The meaning of text “**No Cosmetic Problem**” in the table above is:

- a. no soldering problem
- b. no adhesion problem of glue
- c. no peel off of plating

|                      |                                                       |                                   |                              |
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# PRODUCT SPECIFICATION

## 6.0 TEST GROUPINGS

| Test Item | Description                   | Group1 | Group2 | Group3 | Group4 | Group5 | Group6 |
|-----------|-------------------------------|--------|--------|--------|--------|--------|--------|
| 5.9.1     | Pull test                     | X      |        |        |        |        |        |
| 5.10.1    | Cross section                 |        | X      |        |        |        |        |
| 5.11.1    | Temperature /Humidity cycling |        |        | X      |        |        |        |
| 5.11.2    | Temperature Shock             |        |        |        | X      |        |        |
| 5.11.3    | High Temperature              |        |        |        |        | X      |        |
| 5.11.4    | Salt mist test                |        |        |        |        |        | X      |
|           | Sample Quantity               | 5      | 5      | 5      | 5      | 5      | 5      |

## 7.0 PACKAGING

Refer to the Molex related packaging drawings.

|                      |                                                       |                                   |                              |
|----------------------|-------------------------------------------------------|-----------------------------------|------------------------------|
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| <b>C</b>             | EC No: <b>ABU2016-0056</b><br>DATE: <b>2016-03-22</b> | <b>Ultra Wideband PCB Antenna</b> | <b>7 of 7</b>                |
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