



APPLICATION SPECIFICATION

TITLE

MOLEX WIFI/BT ANTENNA_HINGED

TABLE OF CONTENTS

1.0 SCOPE

2.0 PRODUCT DESCRIPTION

3.0 APPLICABLE DOCUMENTS

4.0 ANTENNA PERFORMANCE

5.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

PENDING
APPROVAL

Manufacturer: Molex, LLC

Address: 2222 Wellington Ct Lisle, IL 60532, USA

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
A	EC No: 627922 DATE: 2019/10/19	Molex WiFi/BT Antenna Hinged Application Specification	1 of 12
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2144150001	Liu Hai 2019/10/19	Cooper Zhou 2019/10/19	Andy Zhang 2019/10/19



APPLICATION SPECIFICATION

MOLEX WIFI/BT ANTENNA HINGED

1.0 SCOPE

This specification describes the antenna application and surrounding. The information in this document is for reference and benchmark purposes only. The user is responsible for validating antenna RF performance based on the user's actual implementation.

Antenna illustrations in this document are generic representations. They are not intended to be an image of any antenna listed in the scope.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

Product name: Molex WiFi/BT Antenna Hinged

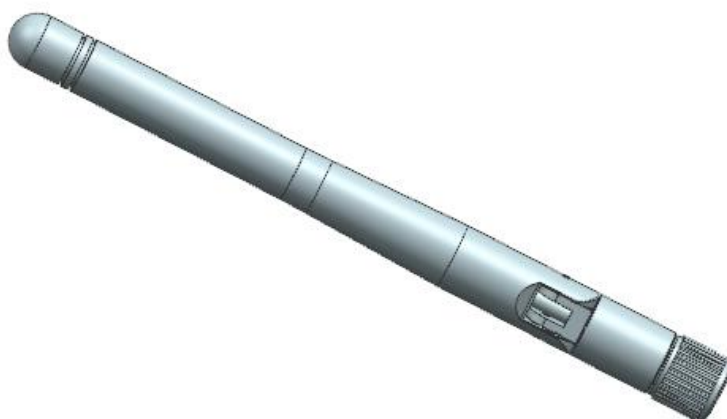
Series Number: 214415

2.2 DESCRIPTION

214415 is external antenna being designed to cover Wifi\BT working frequencies in the 2400-2500MHz spectrum. The joint hinge of the antenna allows 90°rotating on vertical plane, and the SMA-J connector allows 180°rotating on horizontal plane.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-2144150001 for full information.



2144150001 Molex WiFi/BT Antenna Hinged 3D VIEW

PENDING
APPROVAL

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
A	EC No: 627922 DATE: 2019/10/19	Molex WiFi/BT Antenna Hinged Application Specification	2 of 12
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2144150001	Liu Hai 2019/10/19	Cooper Zhou 2019/10/19	Andy Zhang 2019/10/19

3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing (SD)	SD-2144150001	Mechanical Dimension of the product
Product Specification (PS)	PS-2144150001	Product Specification
Packing Drawing (PK)	PK-2128600001	Product packaging specifications

4.0 ANTENNA PERFORMANCE

4.1 RF TEST CONDITIONS

All measurements are done of the antenna mounted on a 100mm*100mm ground PCB with VNA Agilent E5071C and Over-The-Air (OTA) chamber for the part No.214415 series.

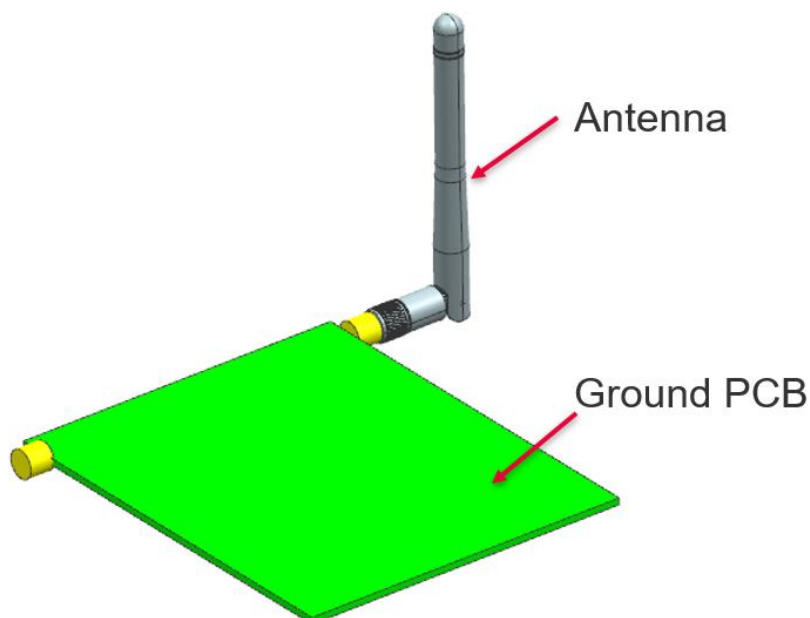
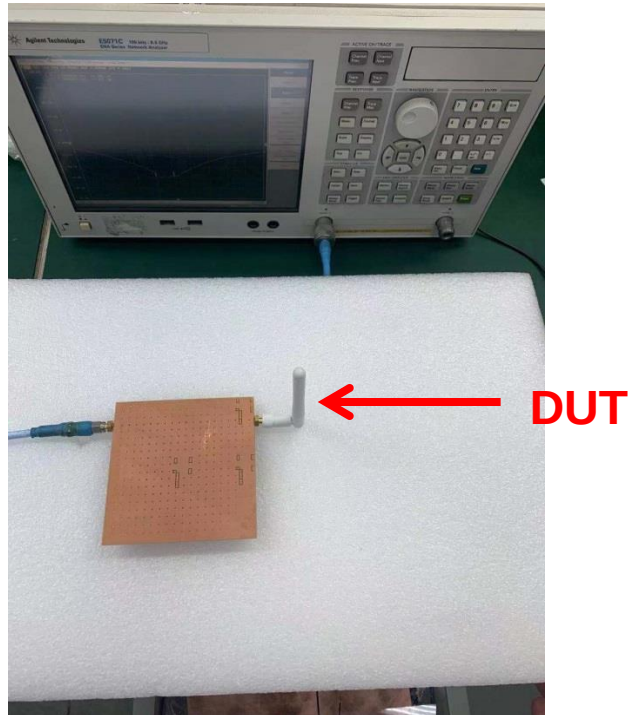


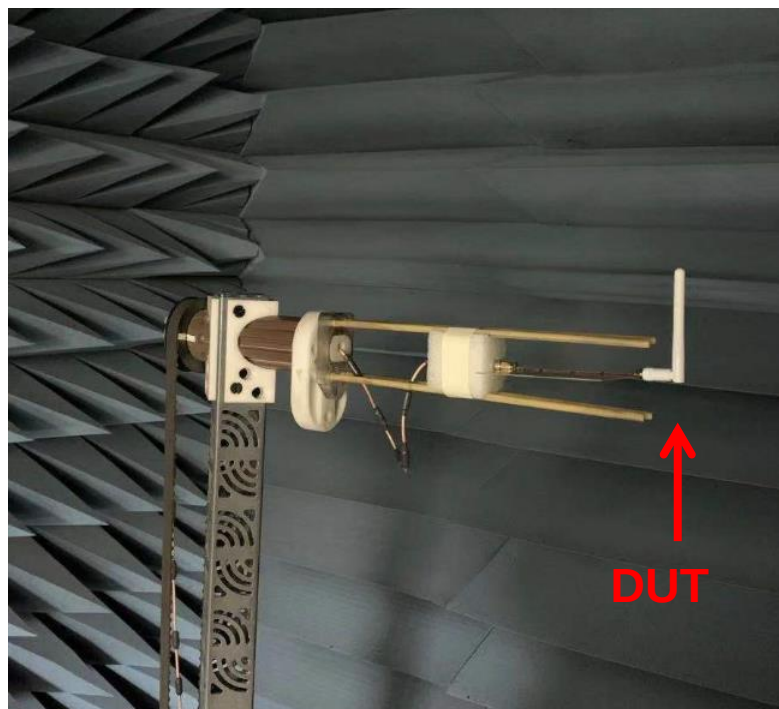
FIGURE4.1.1 ANTENNA MOUNTED ON A 100MM*100MM GROUND PCB

PENDING
APPROVAL

REVISION: A	ECR/ECN INFORMATION: EC No: 627922 DATE: 2019/10/19	TITLE: Molex WiFi/BT Antenna Hinged Application Specification	SHEET No. 3 of 12
DOCUMENT NUMBER: AS-2144150001	CREATED / REVISED BY: Liu Hai 2019/10/19	CHECKED BY: Cooper Zhou 2019/10/19	APPROVED BY: Andy Zhang 2019/10/19



**FIGURE4.1.2 ANTENNA MOUNTED ON 100MM*100MM GROUND PCB
TESTED WITH VNA E5071C**



**FIGURE4.1.3 ANTENNA MOUNTED ON 100MM*100MM GROUND PCB
TESTED IN OTA CHAMBER**

REVISION: A	ECR/ECN INFORMATION: EC No: 627922 DATE: 2019/10/19	TITLE: Molex WiFi/BT Antenna Hinged Application Specification	SHEET No. 4 of 12
DOCUMENT NUMBER: AS-2144150001	CREATED / REVISED BY: Liu Hai 2019/10/19	CHECKED BY: Cooper Zhou 2019/10/19	APPROVED BY: Andy Zhang 2019/10/19



APPLICATION SPECIFICATION

4.2 ANTENNA PERFORMANCE

Description	Equipment	Requirement
Frequency Range	VNA E5071C	2.4-2.5GHz
Return Loss	VNA E5071C	<-10 dB
Peak Gain (Max)	OTA Chamber	5.3dBi
Average Total Efficiency	OTA Chamber	>80%
Polarization	OTA Chamber	Linear
Input Impedance	VNA E5071C	50 ohms

Note that the above antenna performance is measured with just the antenna mounted on a PCB to simulate a free-space condition. When implement into the system, the resonant frequency might be off-tune due to the loading of surrounding components especially metal plane. This off-tune can be compensated through matching. Although module manufacturers specify a peak gain limit, it is based on free-space conditions. The peak gain will be degraded by 1 to 2dB in the actual implementation as the radiation pattern will change due to the surrounding components. As such, during selection of antenna, you can select one with high peak gain to compensate for the loss. Molex can offer assistant to choose the best location and best tuning in-order to meet this peak gain requirement.

PENDING
APPROVAL

REVISION: A	ECR/ECN INFORMATION: EC No: 627922 DATE: 2019/10/19	TITLE: Molex WiFi/BT Antenna Hinged Application Specification	SHEET No. 5 of 12
DOCUMENT NUMBER: AS-2144150001	CREATED / REVISED BY: Liu Hai 2019/10/19	CHECKED BY: Cooper Zhou 2019/10/19	APPROVED BY: Andy Zhang 2019/10/19

4.3 RETURN LOSS PLOT

All measurements in this document are done by installing the antenna on 100mm*100mm ground PCB.

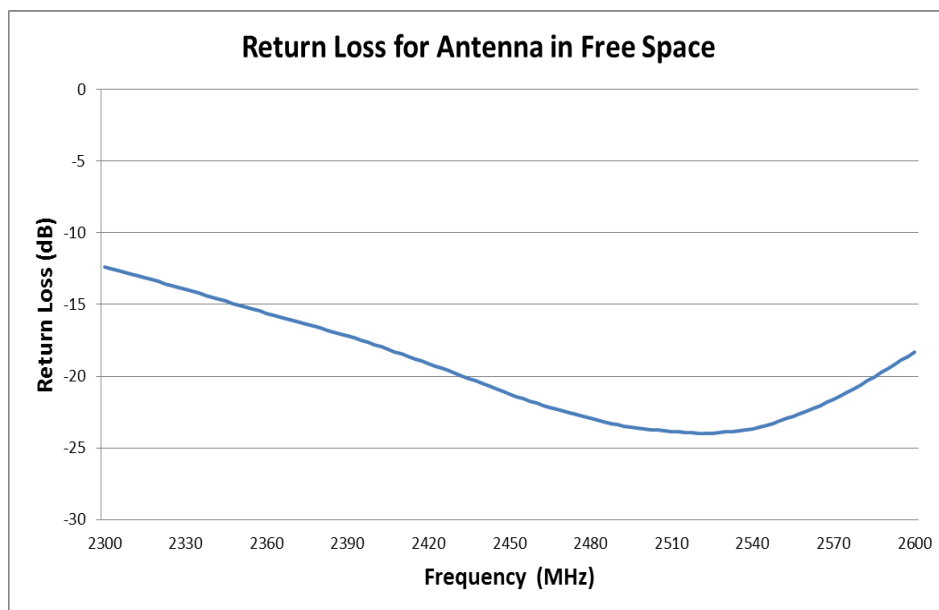


FIGURE 4.3 RETURN LOSS OF ANTENNA IN FREE SPACE

4.4 EFFICIENCY PLOT

All measurements in this document are done by installing the antenna on 100mm*100mm ground PCB.

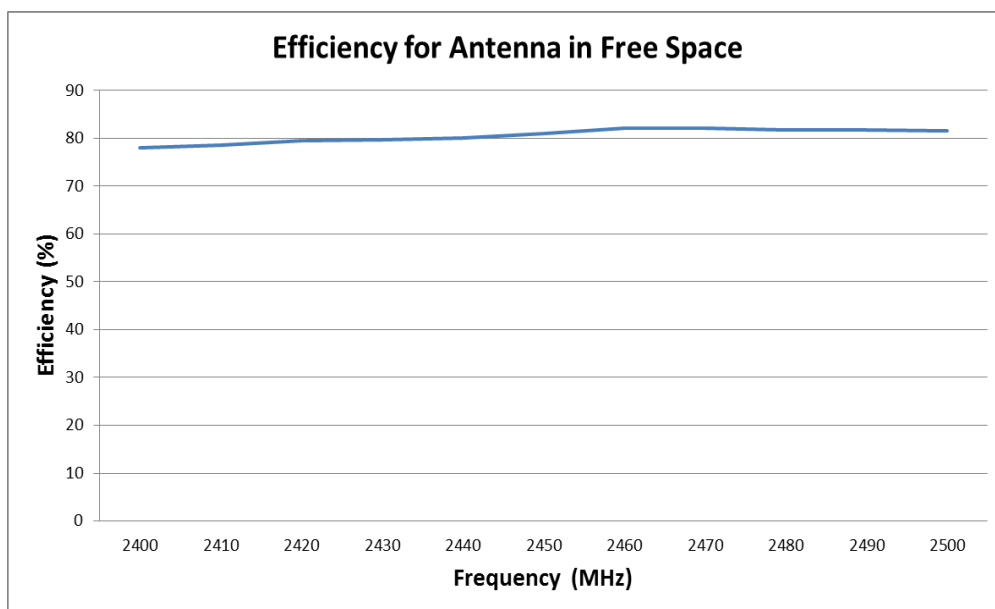


FIGURE 4.4 EFFICIENCY OF ANTENNA IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
A	EC No: 627922 DATE: 2019/10/19	Molex WiFi/BT Antenna Hinged Application Specification	6 of 12
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2144150001	Liu Hai 2019/10/19	Cooper Zhou 2019/10/19	Andy Zhang 2019/10/19

4.5 2D/3D RADIATION PATTERN

All measurements in this document are done by installing the antenna on 100mm*100mm ground PCB.

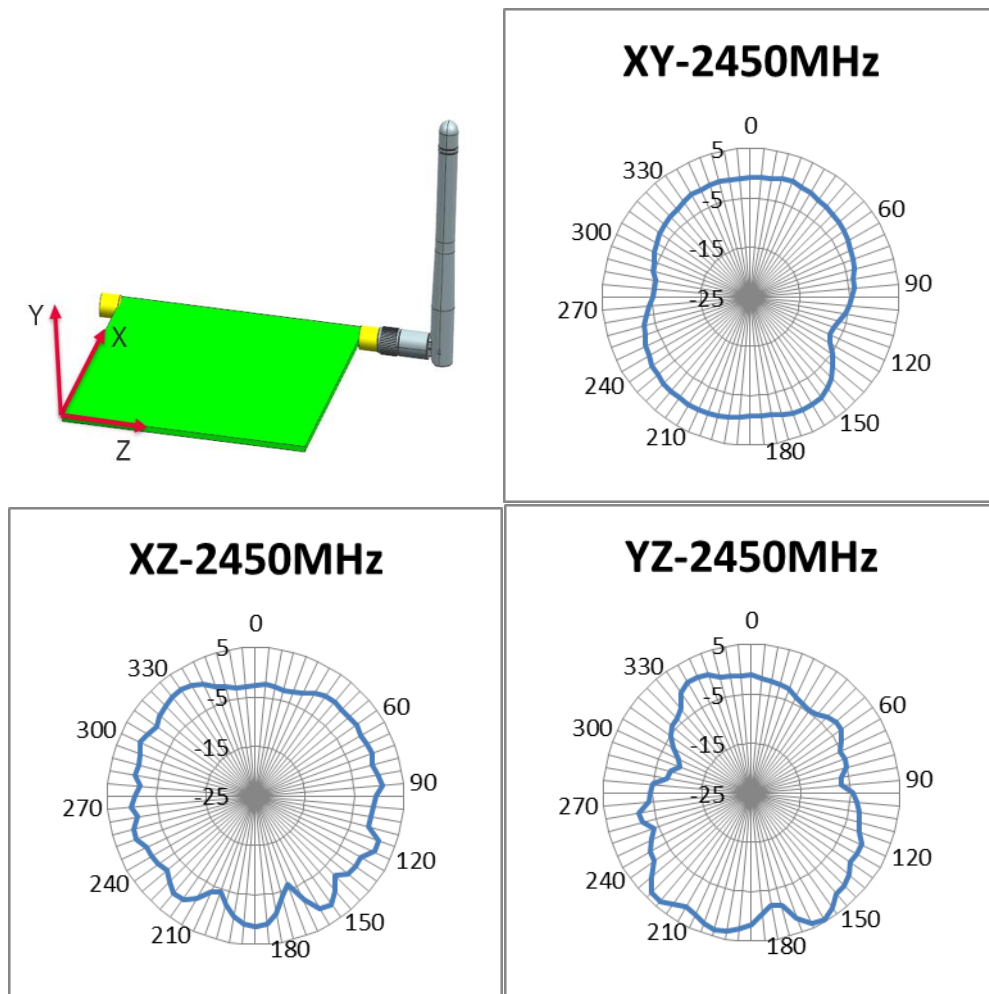


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 2450MHZ IN FREE SPACE

PENDING
APPROVAL

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
A	EC No: 627922 DATE: 2019/10/19	Molex WiFi/BT Antenna Hinged Application Specification	7 of 12
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2144150001	Liu Hai 2019/10/19	Cooper Zhou 2019/10/19	Andy Zhang 2019/10/19

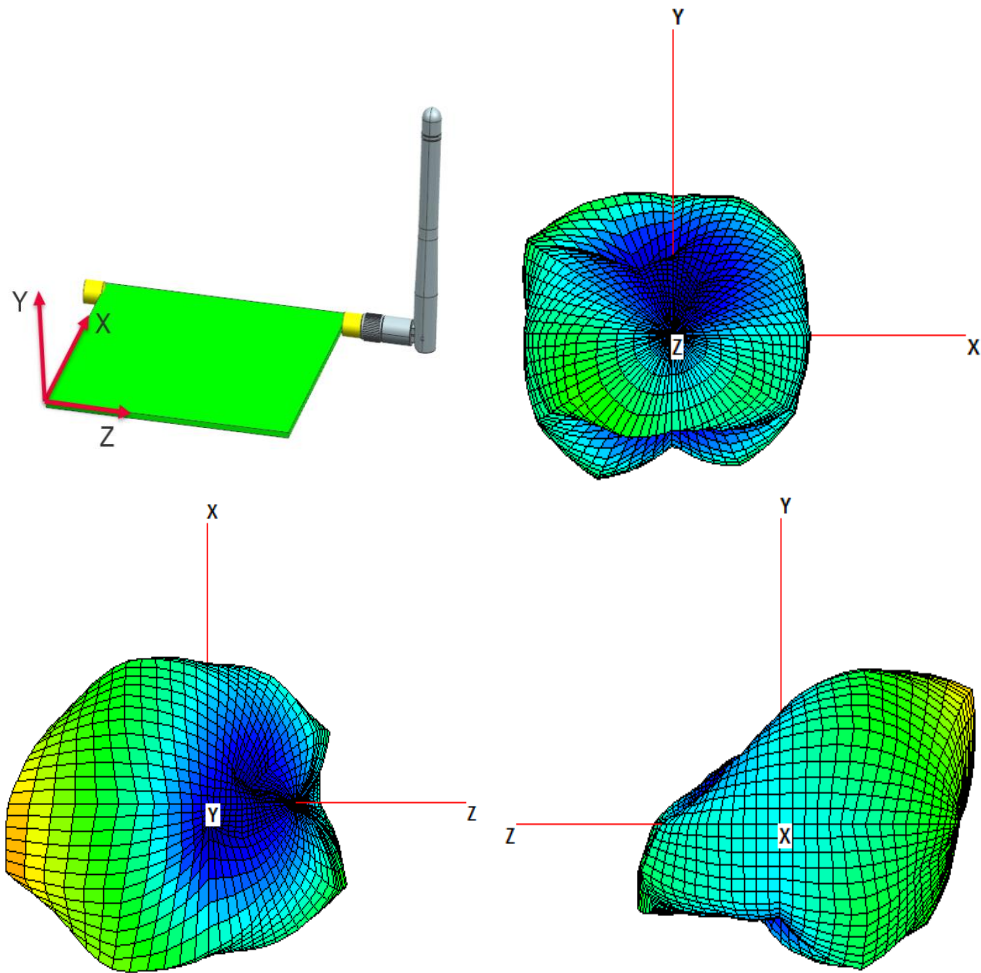


FIGURE 4.5.2 3D RADIATION PATTERN OF ANTENNA AT 2450MHZ IN FREE SPACE

PENDING
APPROVAL

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
A	EC No: 627922 DATE: 2019/10/19	Molex WiFi/BT Antenna Hinged Application Specification	8 of 12
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2144150001	Liu Hai 2019/10/19	Cooper Zhou 2019/10/19	Andy Zhang 2019/10/19

5.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

5.1 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT STATES

Four states for antenna have been evaluated and these states are shown in figure 5.1.0. The ground size is 100mm*100mm. The performance of antenna installed on ground PCB is better than that without ground PCB. The reference state with antenna mounted on ground PCB and bending 90 degree is recommended, which is a generally used state.

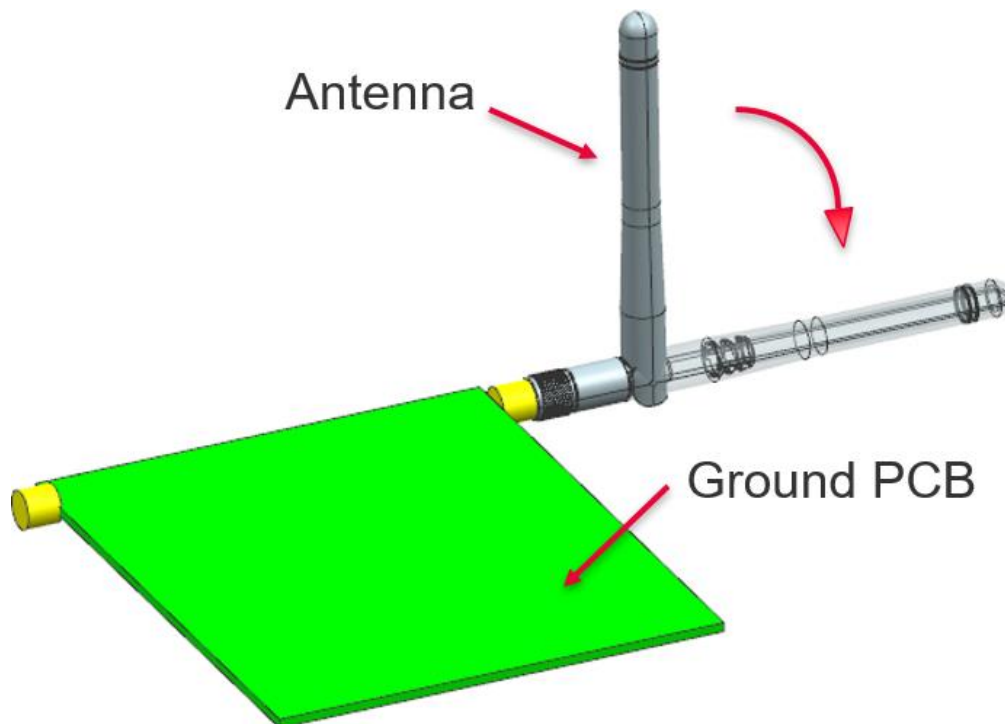


FIGURE 5.1.0 FOUR STATES FOR ANTENNA

Ground PCB Size: 100mm*100mm;

Reference state: Antenna mounted on ground PCB with bending 90 degree;

State 2: Antenna mounted on ground PCB without bending;

State 3: Single antenna without bending (without ground PCB);

State 4: Single antenna with bending 90 degree (without ground PCB).

PENDING
APPROVAL

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
A	EC No: 627922 DATE: 2019/10/19	Molex WiFi/BT Antenna Hinged Application Specification	9 of 12
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2144150001	Liu Hai 2019/10/19	Cooper Zhou 2019/10/19	Andy Zhang 2019/10/19

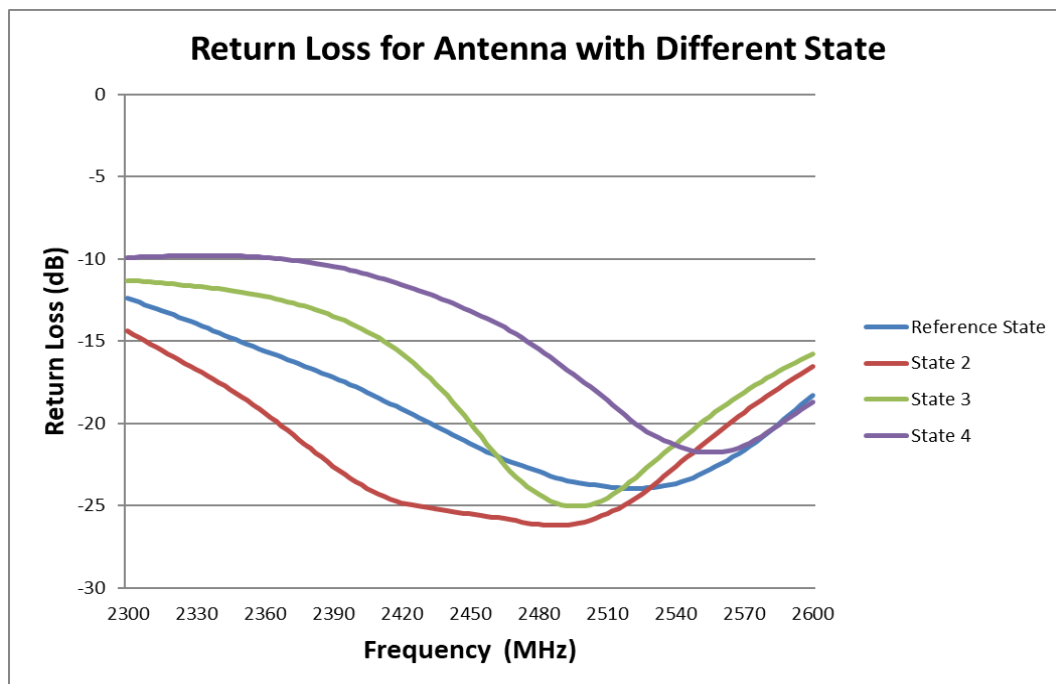


FIGURE 5.1.1 RETURN LOSS OF ANTENNA WITH DIFFERENT STATE

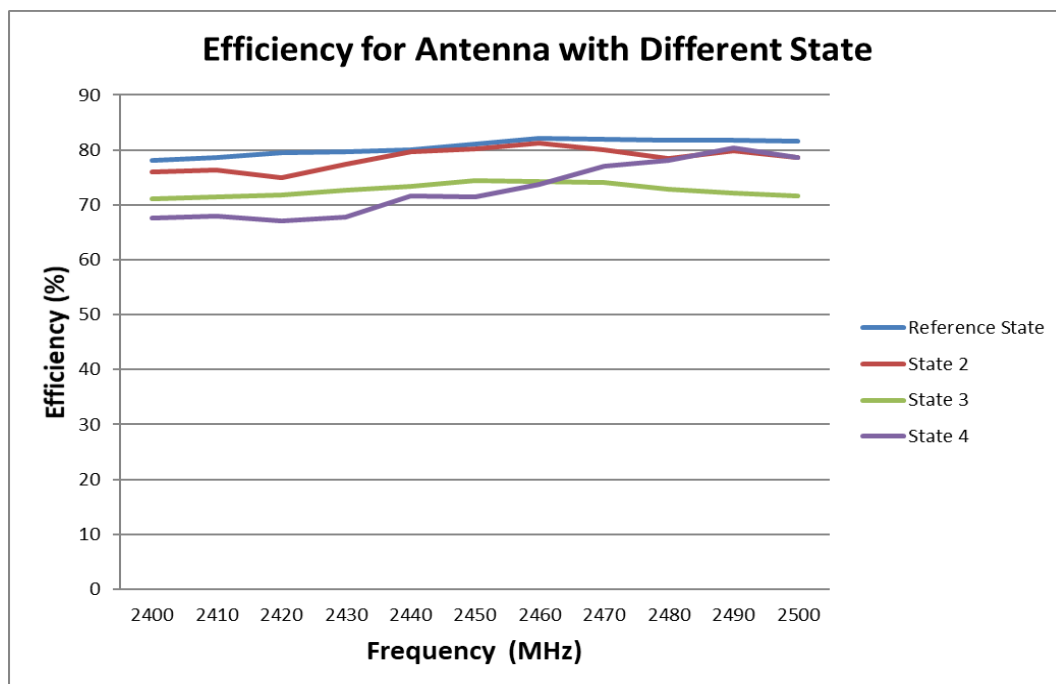
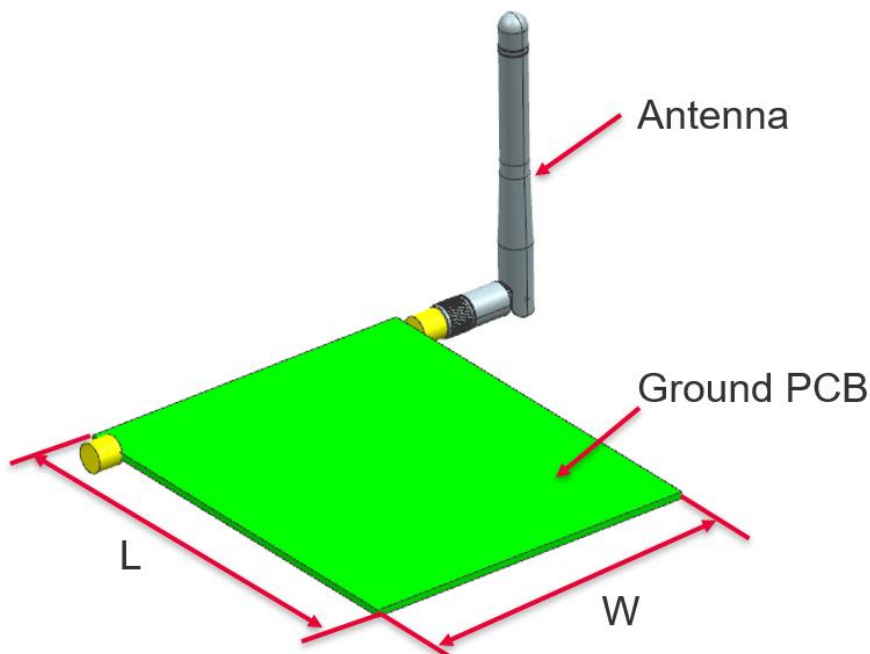


FIGURE 5.1.2 EFFICIENCY OF ANTENNA WITH DIFFERENT STATE

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
A	EC No: 627922 DATE: 2019/10/19	Molex WiFi/BT Antenna Hinged Application Specification	10 of 12
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2144150001	Liu Hai 2019/10/19	Cooper Zhou 2019/10/19	Andy Zhang 2019/10/19

5.2 ANTENNA RF PERFORMANCE AS A FUNCTION WITH DIFFERENT GROUND SIZE

Five different ground size have been evaluated and the size are shown in figure 5.2.0. The change of ground size has little effect on the antenna performance, the minimum ground size is suggested to be 100*100mm.



L*W (50*50、70*70、100*100、120*120、150*150)

FIGURE 5.2.0 FIVE DIFFERENT GROUND SIZE

PENDING
APPROVAL

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
A	EC No: 627922 DATE: 2019/10/19	Molex WiFi/BT Antenna Hinged Application Specification	11 of 12
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2144150001	Liu Hai 2019/10/19	Cooper Zhou 2019/10/19	Andy Zhang 2019/10/19



APPLICATION SPECIFICATION

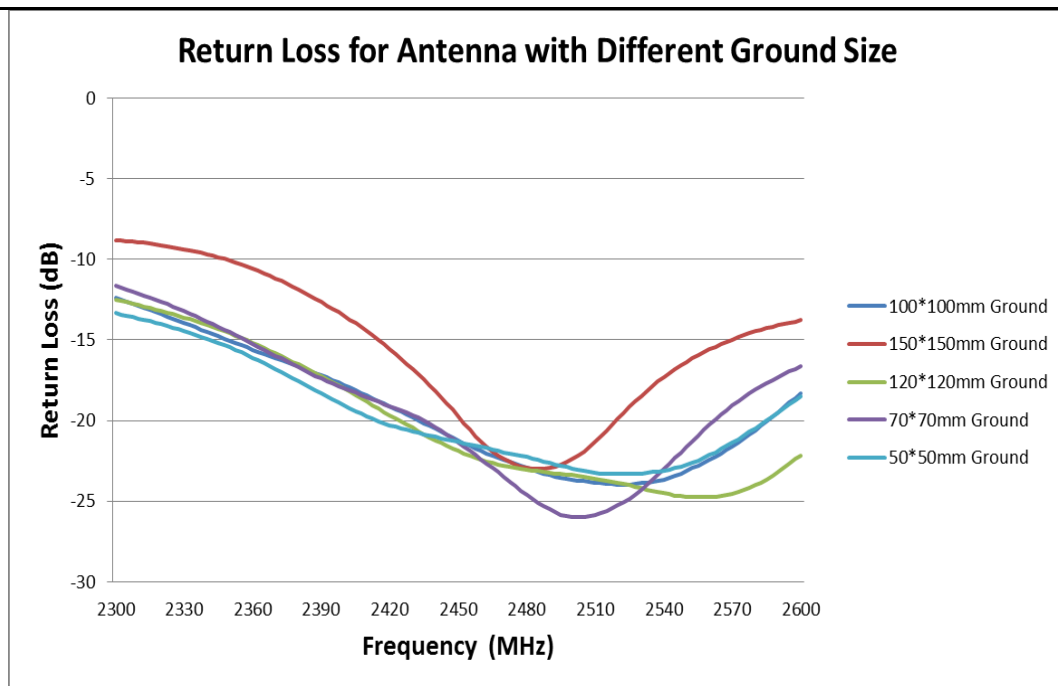


FIGURE 5.2.1 RETURN LOSS OF ANTENNA WITH DIFFERENT GROUND SIZE

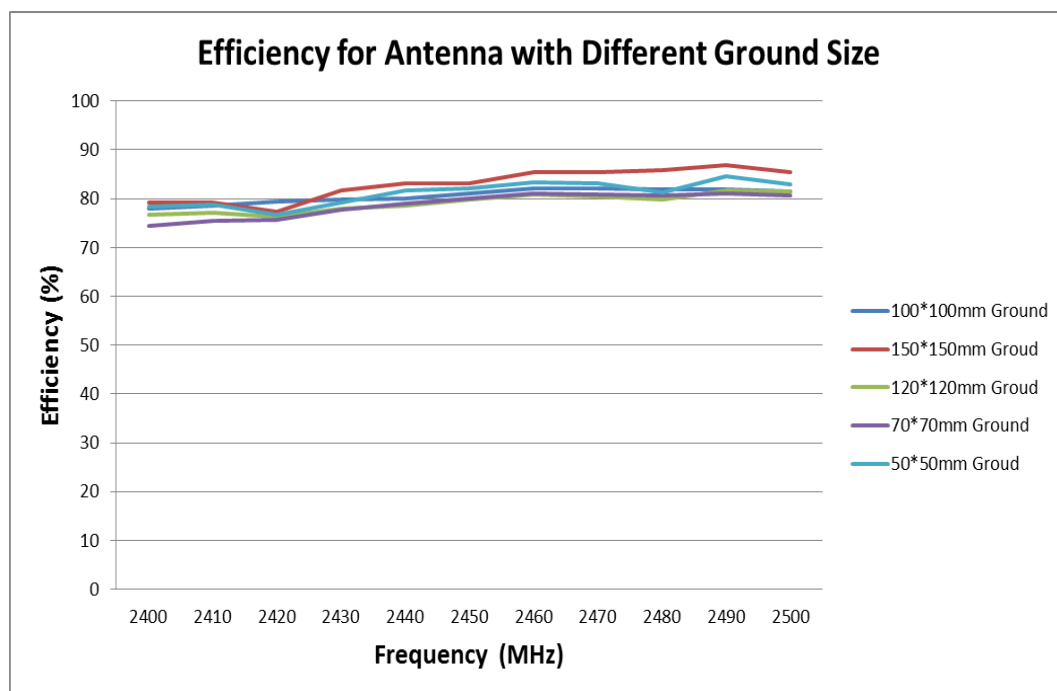


FIGURE 5.2.2 EFFICIENCY OF ANTENNA WITH DIFFERENT GROUND SIZE

Change History

Revision Number	Revision Date	Description	Pages Changed
A	2019/10/19	First Release	NA

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
A	EC No: 627922 DATE: 2019/10/19	Molex WiFi/BT Antenna Hinged Application Specification	12 of 12
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2144150001	Liu Hai 2019/10/19	Cooper Zhou 2019/10/19	Andy Zhang 2019/10/19