APPLICATION SPECIFICATION

2.4/5GHZ STAND ALONE ANTENNA (35.9MM*15.9MM)

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.

All measurements are done of the antenna mounted on a PC/ABS material block of 1mm thickness with VNA Agilent 5071C and OTA chamber. All measurements are done with the part no.47950-0011 with a cable length of 100mm.

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

A. DEFINITIONS OF TERMS

The overall antenna size is 35.9mm × 15.9mm (figure 1).

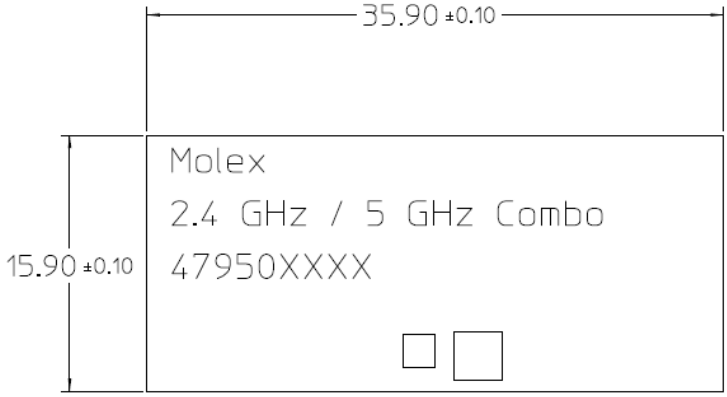


Figure1 Dimension view of the 2.4/5GHz Stand Alone Antenna

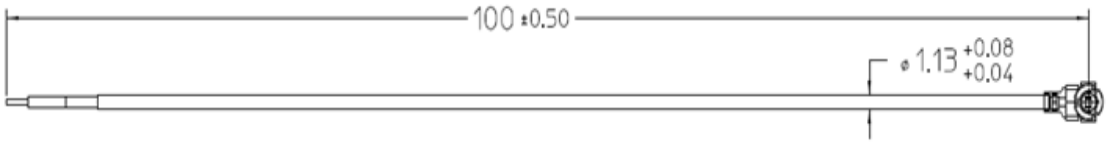


Figure2 Dimension view of 2.4/5GHz Stand Alone Antenna Cable

B. RF PERFORMANCE OF ANTENNA LOADED WITH PC/ABS MATERIAL BLOCK OF 1MM THICKNESS IN FREE SPACE

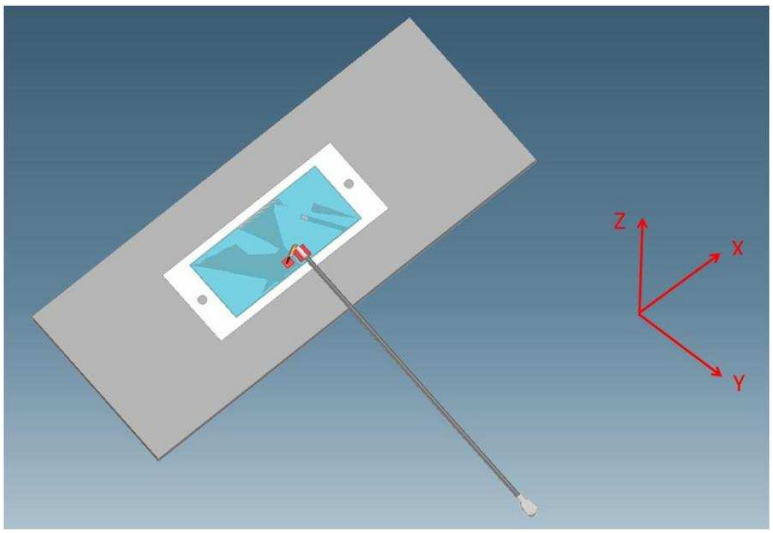


Figure3 Antenna Loaded With PC/ABS Block of 1mm Thickness

DESCRIPTION	TEST CONDITION	REQUIREMENT	
Frequency Range	2.3GHz~5.85GHz	2.4GHz~2.5GHz	4.8GHz~6.0GHz
Return Loss	Antenna loaded with PC/ABS block (thickness 1mm). 100mm, 1.13mm diameter micro coax cable feed. Measured by VNA5071C	< -10 dB	
Peak Gain	Measure antenna on recommended PC/ABS block through OTA chamber	2.6 dBi	4.4 dBi
Total Efficiency	Measure antenna on recommended PC/ABS block through OTA chamber	>80%	>75%
Polarization	Measure antenna on recommended PC/ABS block through OTA chamber	Linear	
Input Impedance	Measure antenna on recommended PC/ABS block through OTA chamber	50Ohms	

3.0 REFERENCE DOCUMENTS

- Engineering Drawing – AS-47950-0011

- Product Specification – PS-47950-0011

- Packaging Information – Refer to the Molex related packaging drawings.

4.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

4.0.1 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT DISTANCE TO HORIZONTAL GROUND

3 ground locations have been evaluated with different distances from the antenna, and these locations are shown in figure 4. The antenna return loss and total efficiency can't meet the specification at 2.4GHz on location 2. Therefore the ground distance in this configuration is recommended to be at least 15mm from the antenna to meet the return loss and total efficiency antenna specification.

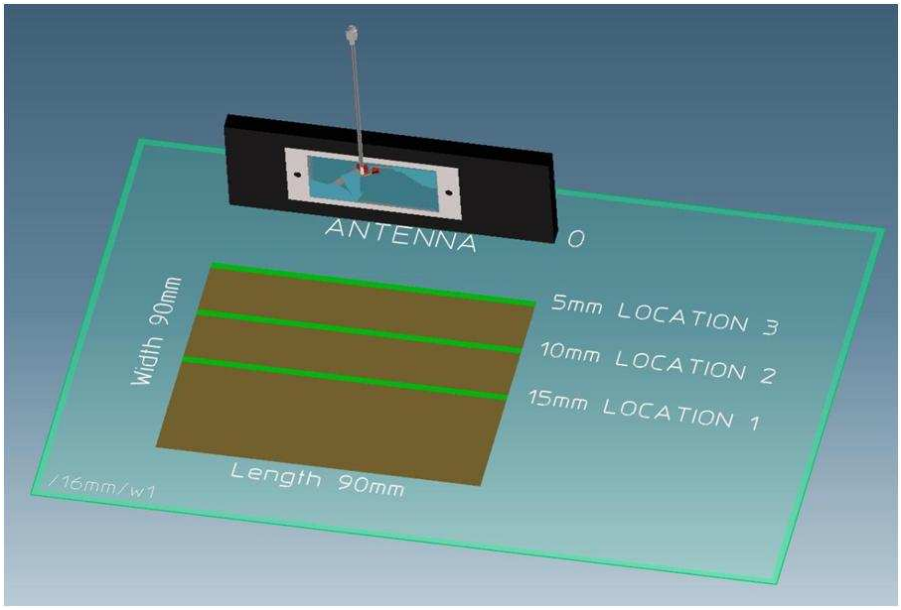
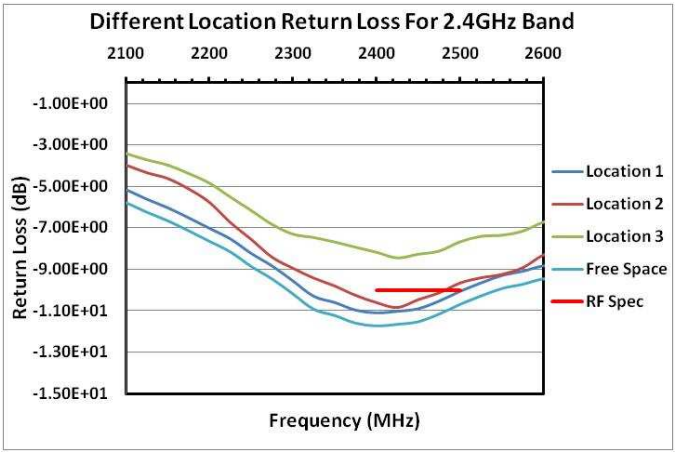


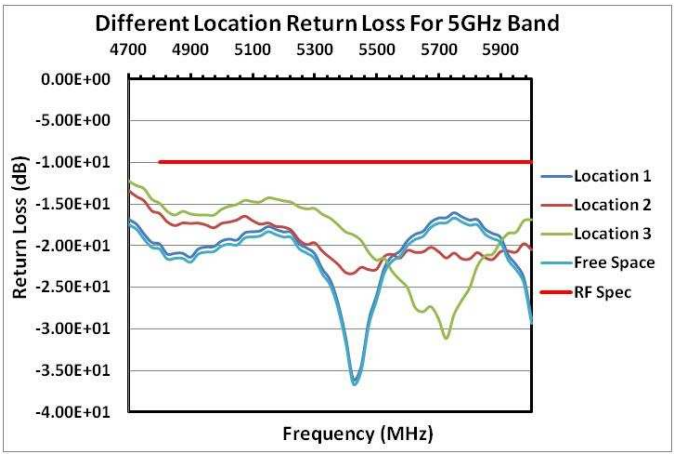
Figure 4 Antenna VS Horizontal Ground

APPLICATION SPECIFICATION

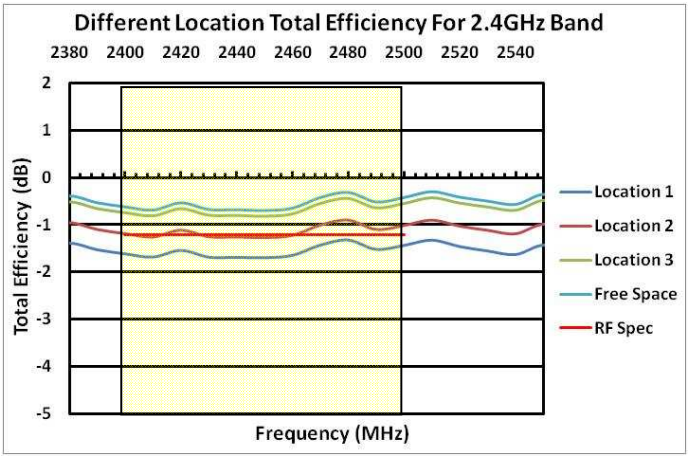
Ground Area: 90mm*90mm

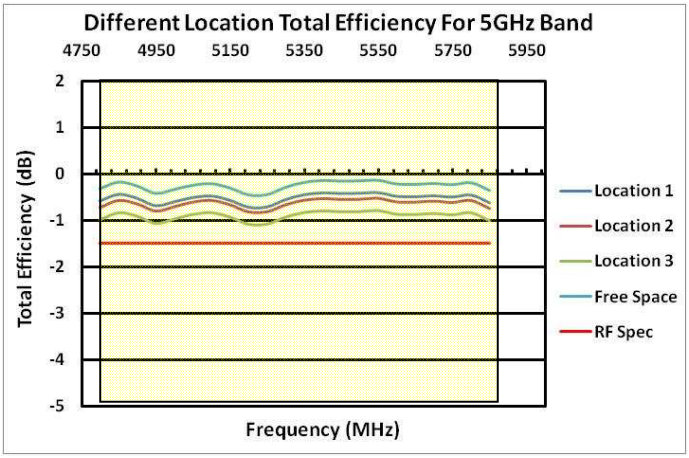
Location 1: Distance between antenna and ground is about 15mm.
Location 2: Distance between antenna and ground is about 10mm.
Location 3: Distance between antenna and ground is about 5mm.





RETURN LOSS PLOT





TOTAL EFFICIENCY PLOT

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AS-47950-011	**Serena.Zhang**	**Amos Cheah**	**Welson Tan**

4.0.2 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT DISTANCE TO VERTICAL GROUND

3 ground locations have been evaluated with different distances from the antenna, and these locations are show in figure 5. The antenna did not meet the return loss and efficiency specification at 2.4GHz band at location 2. Therefore the ground distance in this configuration is recommended to be at least 28mm from the antenna to meet the return loss and total efficiency antenna specification.

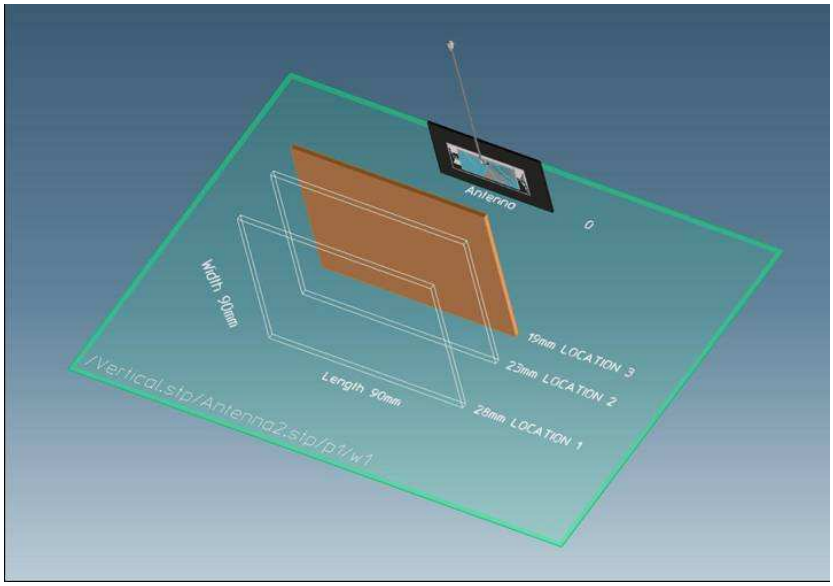
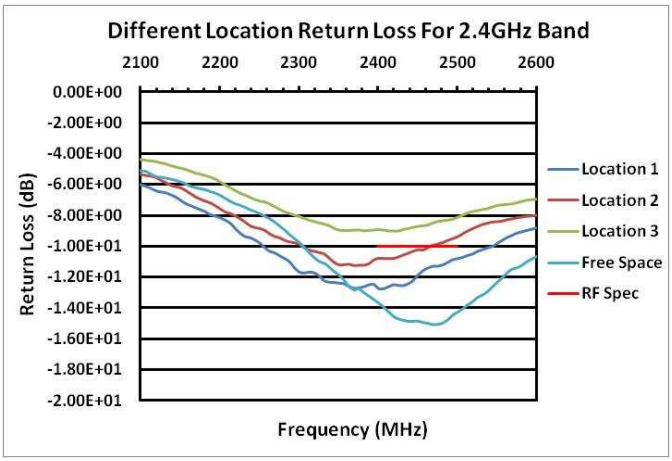
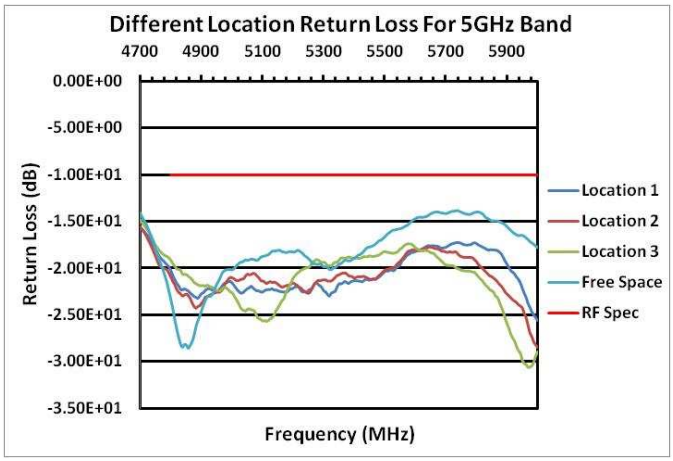


Figure5 Antenna VS Vertical Ground

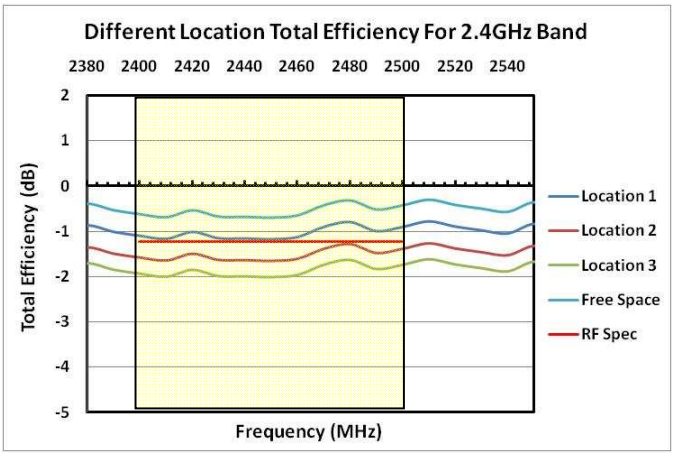
Ground Area: 90mm*90mm

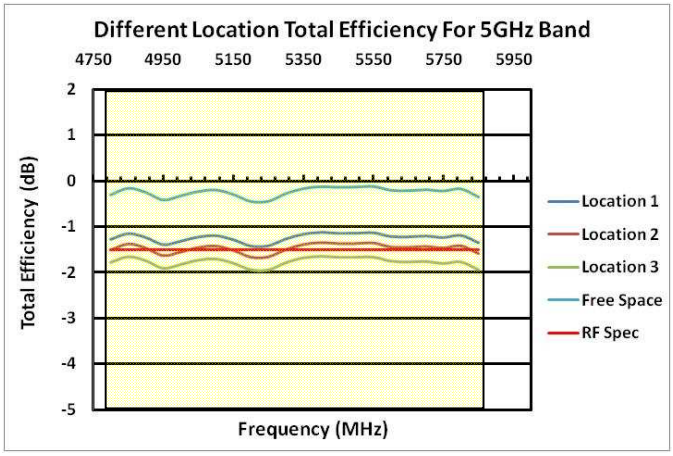
Location 1: Distance between antenna and ground is about 28mm.
Location 2: Distance between antenna and ground is about 23mm.
Location 3: Distance between antenna and ground is about 19mm.





RETURN LOSS PLOT





TOTAL EFFICIENCY PLOT

To meet the antenna return loss and total antenna efficiency specification at location 2, the ground need to move back by 7mm. See figure 6.

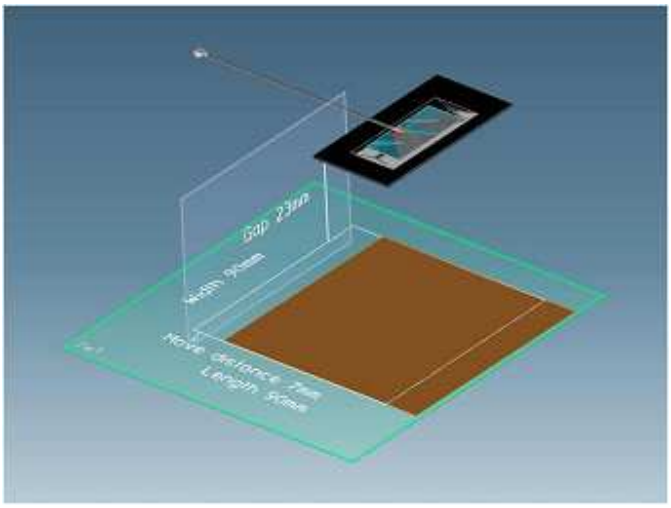


Figure6 Antenna VS Vertical Lower Ground

4.0.3 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT DISTANCE TO GROUND IN THE SAME PLANE AS THE ANTENNA

3 ground locations have been evaluated with different distances from the antenna, and these locations are show in figure7. The antenna did not meet the return loss and efficiency specification at 2.4GHz band at location 2. Therefore the ground distance in this configuration is recommended to be at least 6mm from the antenna to meet the return loss and total efficiency antenna specification.

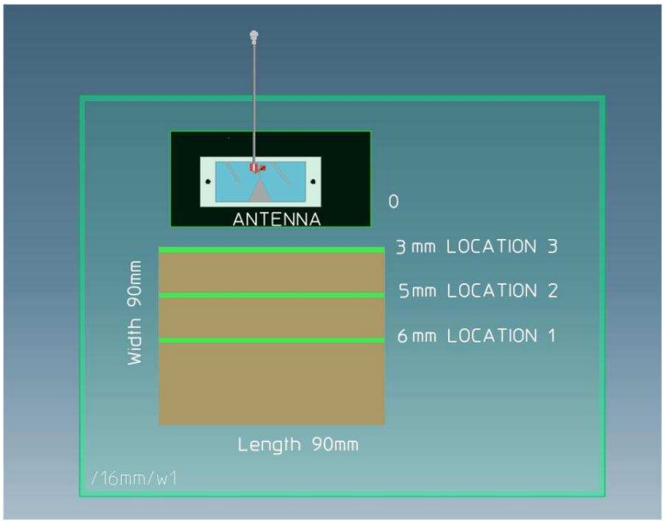
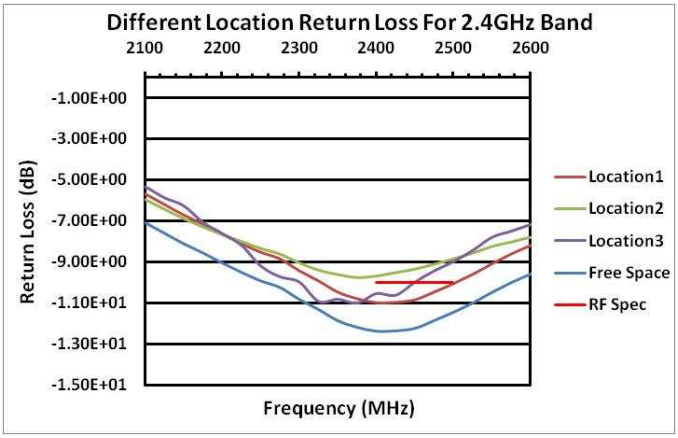
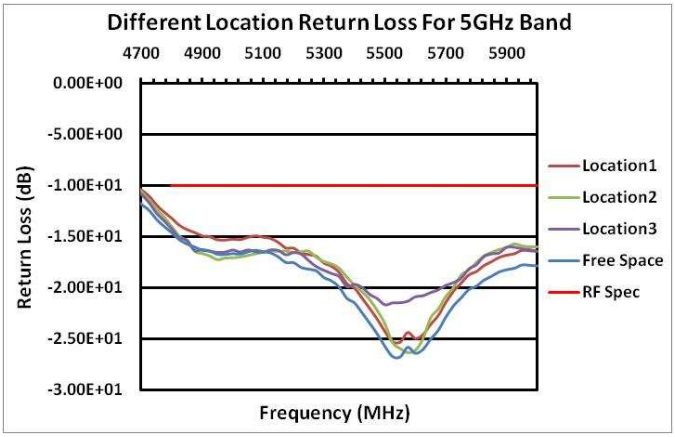


Figure7 Antenna VS Same Plane Ground

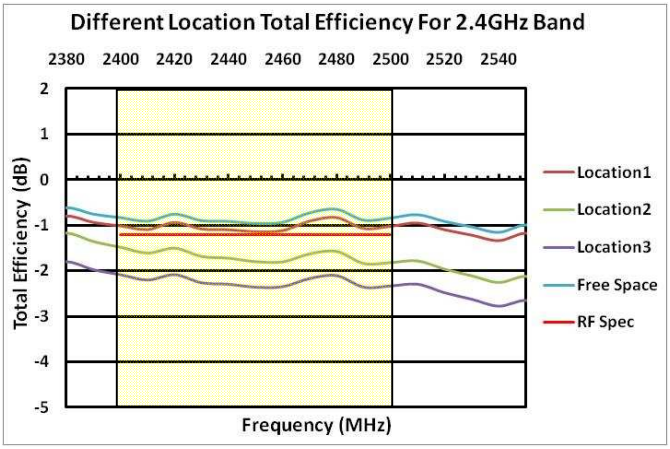
Ground Area: 90mm*90mm

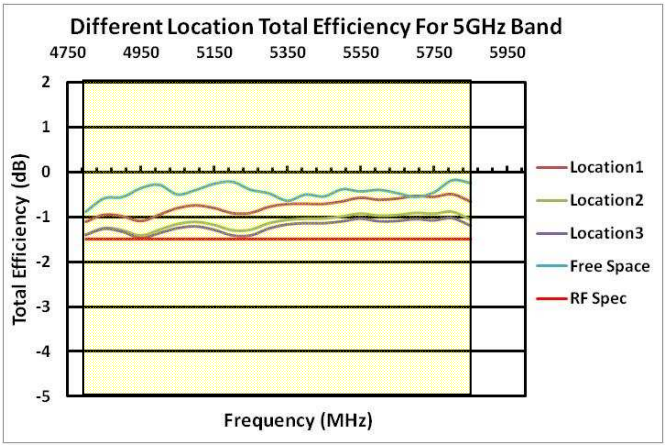
Location 1: Distance between antenna and ground is about 6mm.
Location 2: Distance between antenna and ground is about 5mm.
Location 3: Distance between antenna and ground is about 3mm.





RETURN LOSS PLOT





TOTAL EFFICIENCY PLOT

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5.0 ANTENNA ASSEMBLY RECOMMENDATION

During the assembly of the antenna in device, the cable needs to be position away from the antenna flex and away from any ground. The antenna cable should not go close to the antenna flex and any ground plan. The antenna cable that is near to the antenna flex or ground plan or both will decrease the antenna total efficiency and shift the antenna resonance lower. Figure 8 shows the example of recommended assembly method and Figure 9 and 10 shows the example of not recommended assembly method.

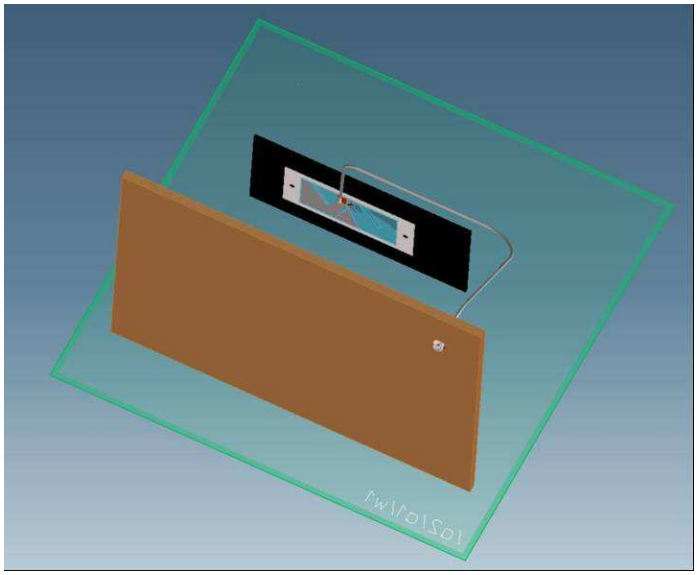

Figure8 Recommended assembly method

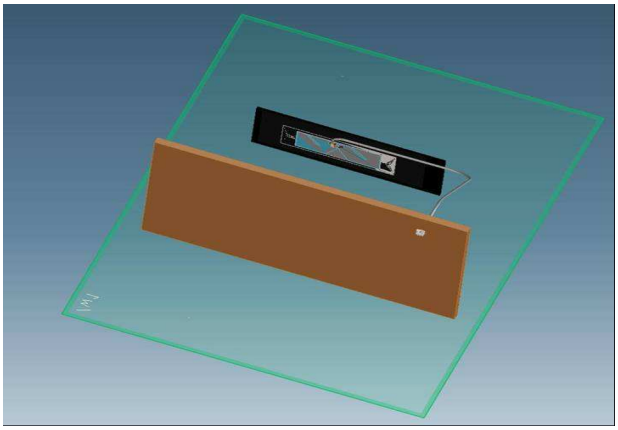

Figure9 Cable close to antenna

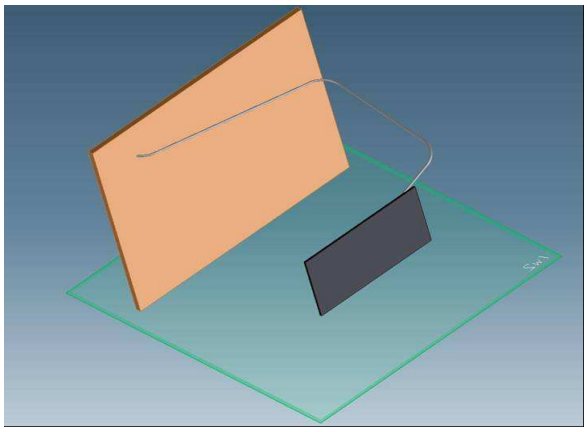

Figure10 Cable close to ground