

## SPECIFICATION

- Part No.** : **HA.21.A**
- Description** : 2dBi 868MHz  
Embedded Helical Monopole Antenna
- Features** : Quarter-wave Monopole Type Helical Antenna  
868 MHz ISM Band  
Omni-Directional  
2dBi peak gain and 70% efficiency  
Direct mounted on board design  
Mechanically sturdy in a compact size  
Dimensions: 11mm, Ø10.25mm  
RoHS compliant



## 1. Introduction

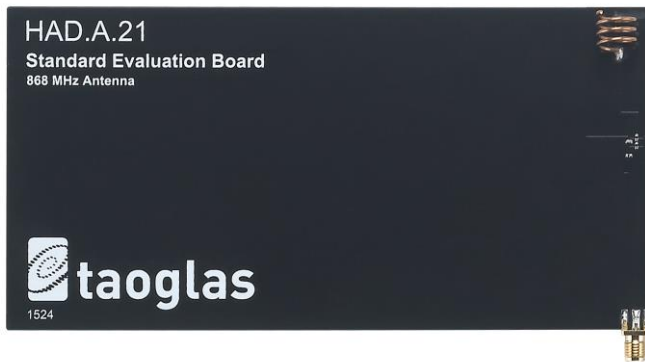
The HA.21.A is an ISM 868MHz quarter-wave monopole helical antenna. Small and compact, yet stable, this helical coil antenna is ideal for typical 868MHz applications such as:

- Smart Metering
- Smart security systems
- Remote asset monitoring and other wireless communication devices.

The helical coil antenna offers industry leading 70% efficiency at 868MHz on a 126.8 x 80.1mm ground plane, with matching components (orthogonally mounted to ground plane, see HAD.B.21 performance). Made of copper alloy, the helical coil is mechanically sturdy. It can be easily mounted on the surface by soldering. Since it is a monopole design, it must be connected to the main-board device ground-plane to radiate efficiently.

Taoglas has two models of evaluation boards, HAD.A.21 and HAD.B.21, to show performance when the antenna is parallel mounted, or orthogonally mounted to the ground plane.

Small embedded antennas can easily detune or lose efficiency on different board and in different device environments. Taoglas offers a testing and tuning service for custom antennas, subject to NRE and MOQ. Please contact your regional Taoglas office for support.

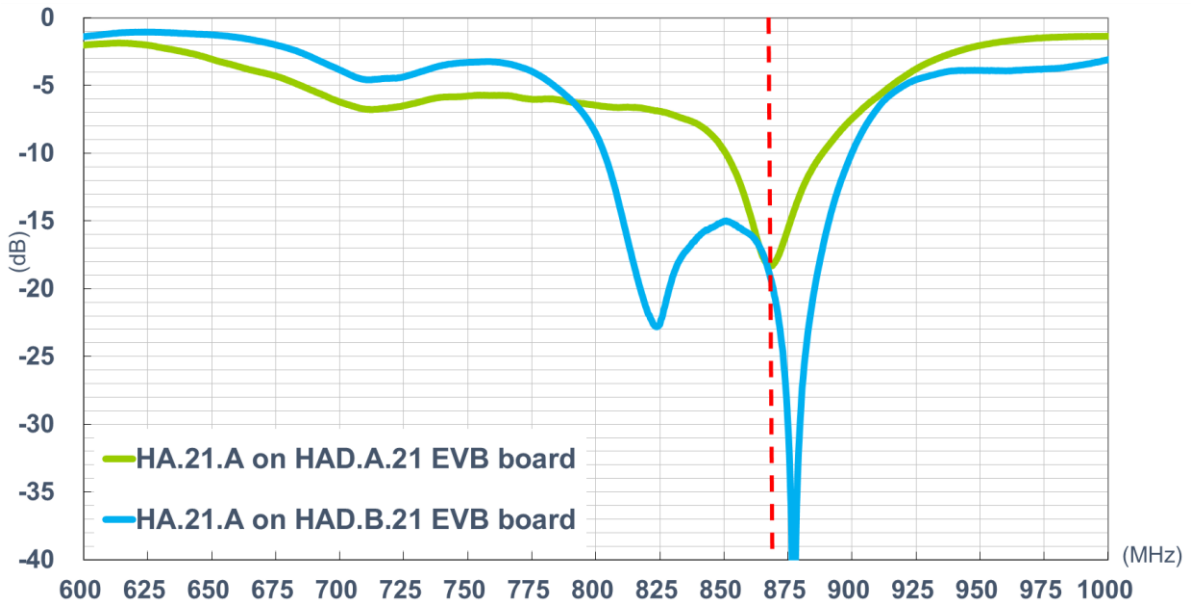


## 2. Specification

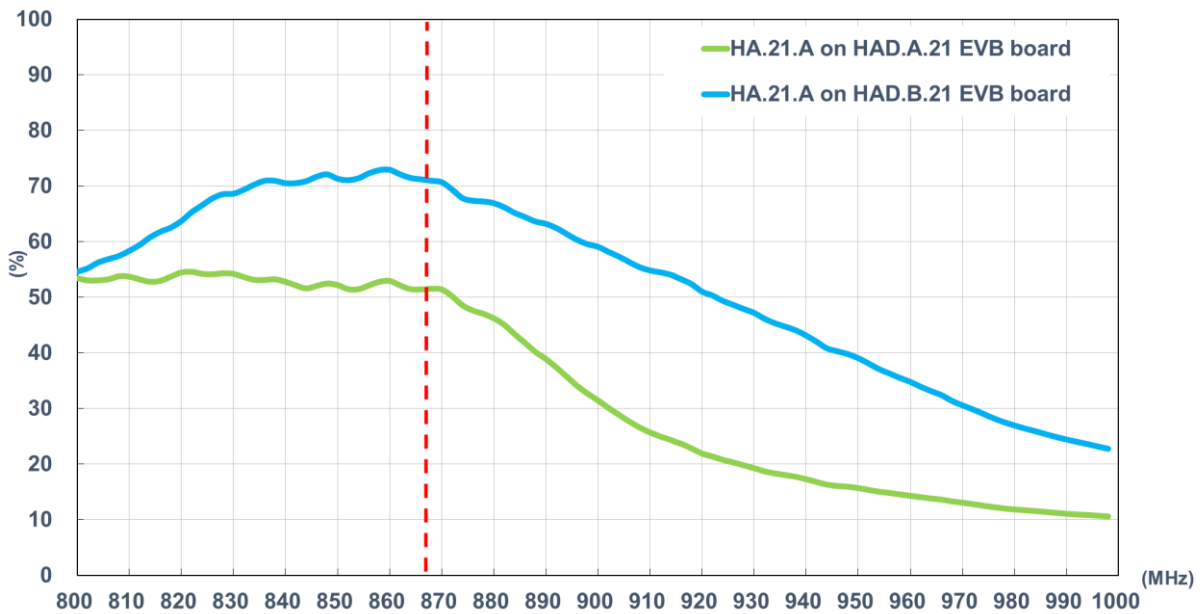
ELECTRICAL						
Application Bands	ISM 868MHz					
Mounting Direction	HAD.A.21			HAD.B.21		
Frequency (MHz)	850	868	880	850	868	880
Return Loss (dB)	<-10					
Peak Gain (dBi)	0.76	0.77	0.27	1.79	1.83	1.64
Average Gain (dBi)	-2.82	-2.87	-3.35	-1.42	-1.49	-1.74
Efficiency (%)	52.21	51.52	46.22	72.10	70.95	66.92
Polarization	Linear					
Impedance	50 ohms					
MECHANICAL						
Helical Coil Dimension	L: 11mm, Ø10.25mm					
Weight (g)	0.7					
ENVIRONMENTAL						
Operation Temperature	-40°C to 85°C					
Humidity	Non-condensing 65°C 95% RH					

### 3. Antenna Characteristics

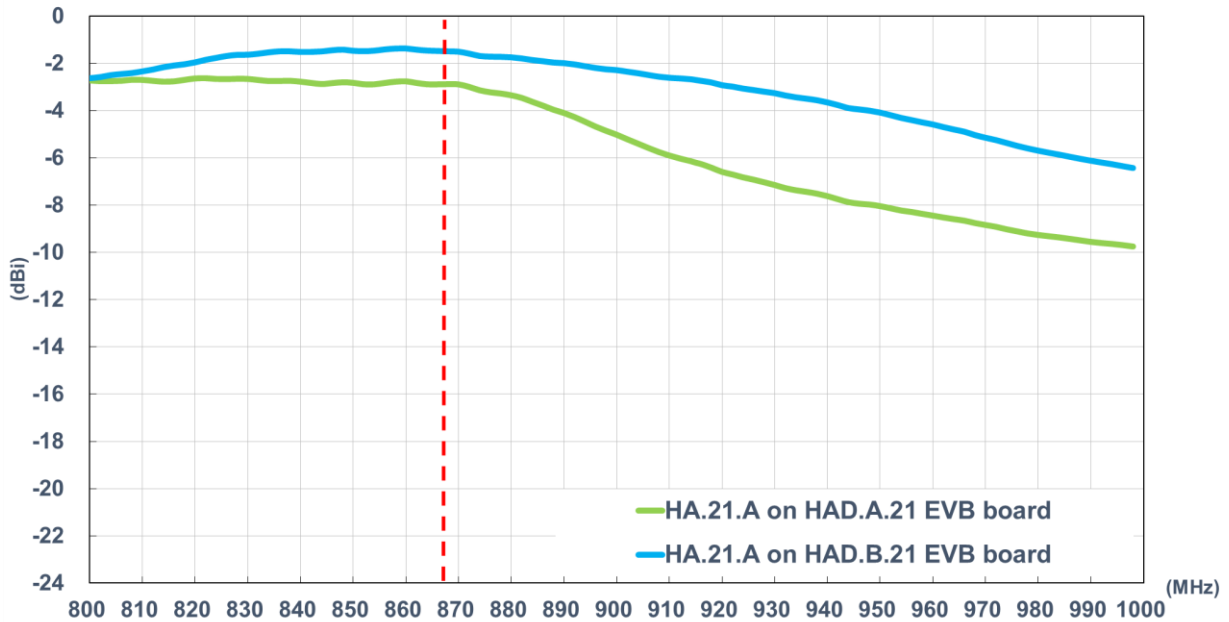
#### 3.1 Return Loss



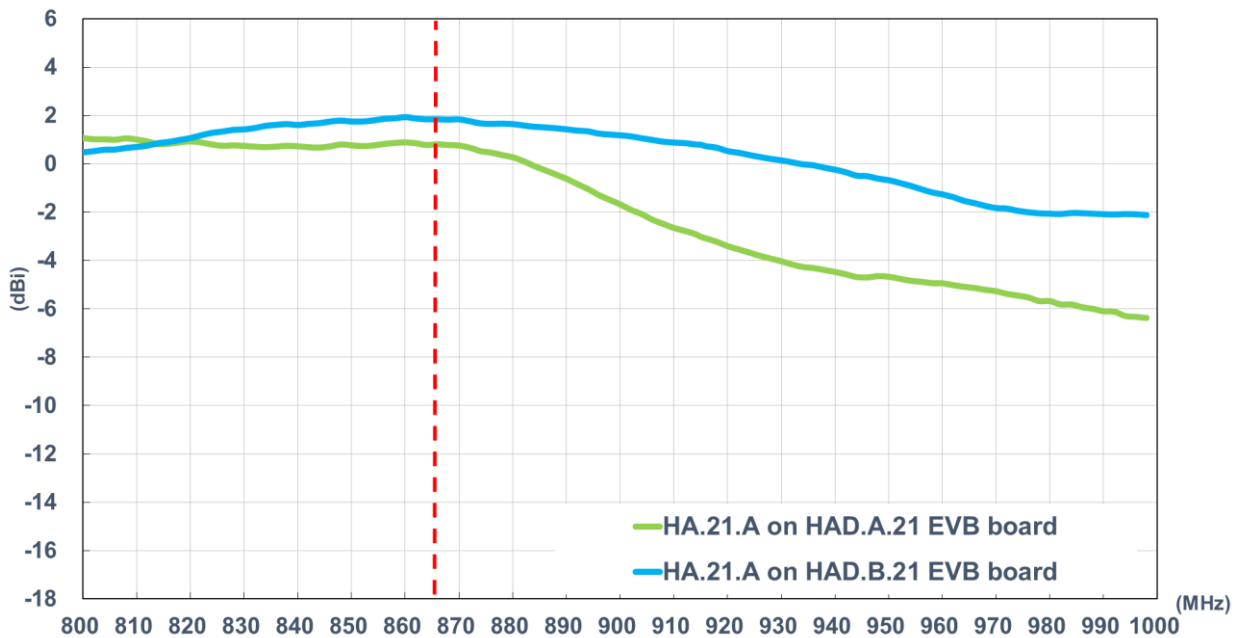
#### 3.2 Efficiency



### 3.3 Average Gain



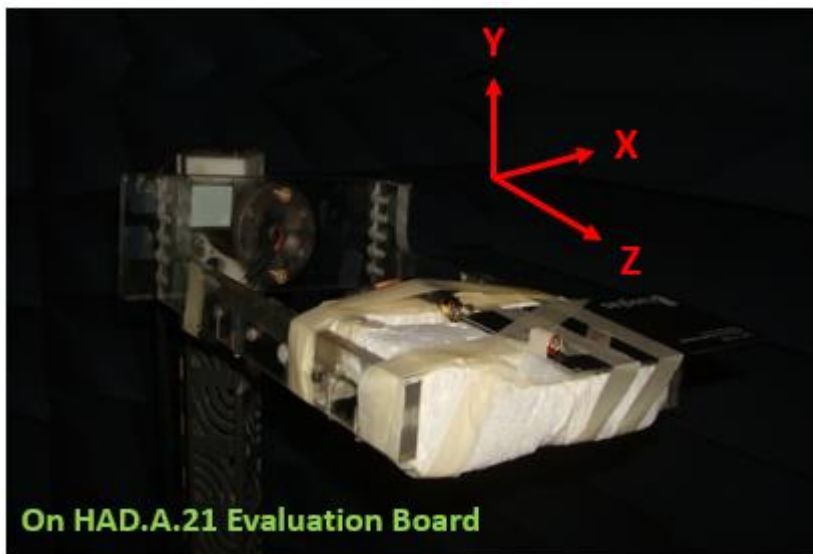
### 3.4 Peak Gain



## 4. Antenna Radiation Pattern

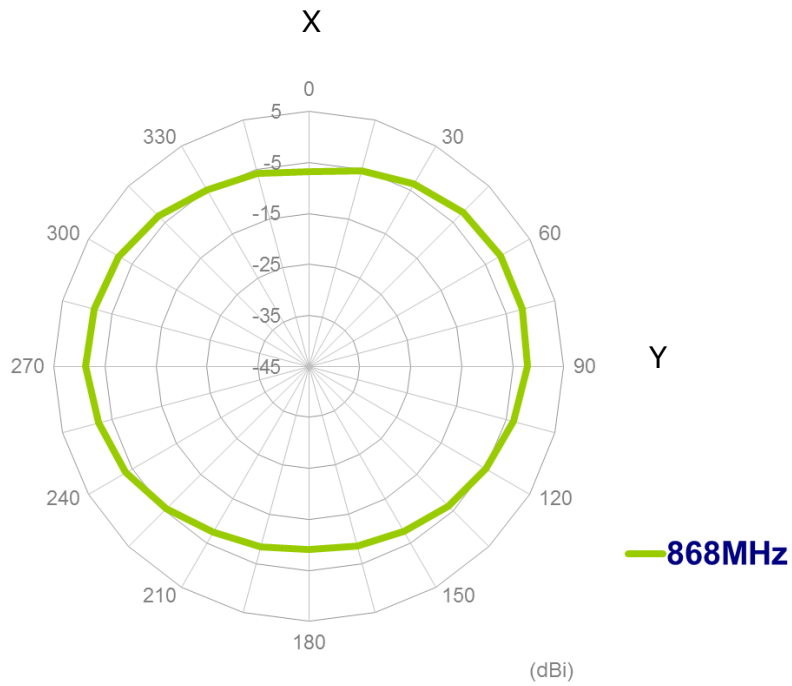
### 4.1. Measurement Setup

The HA.21 antenna is tested on HAD.A.21 and HAD.B.21 in a CTIA certified ETS-Lindgren Anechoic Chamber. The test setup is shown below.

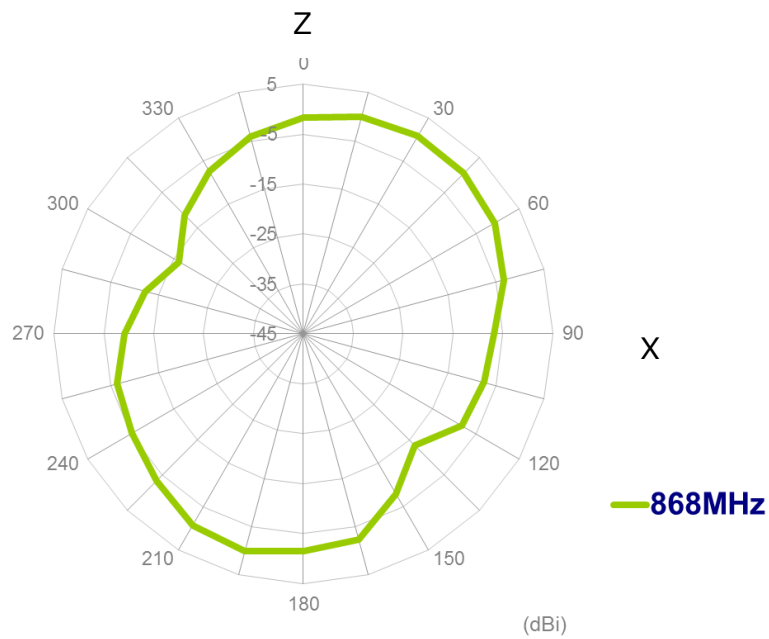


## 4.2. 2D Radiation Pattern

- On HAD.A.21  
XY Plane

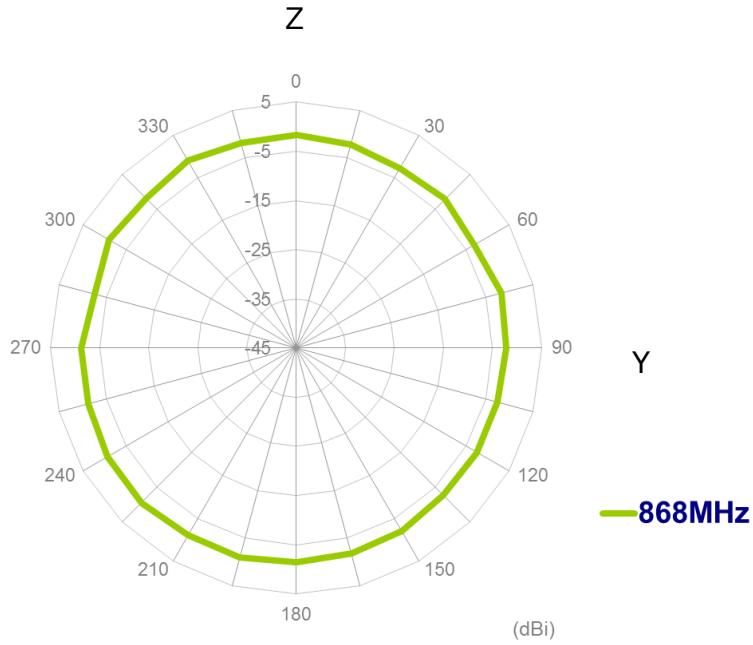


- XZ Plane



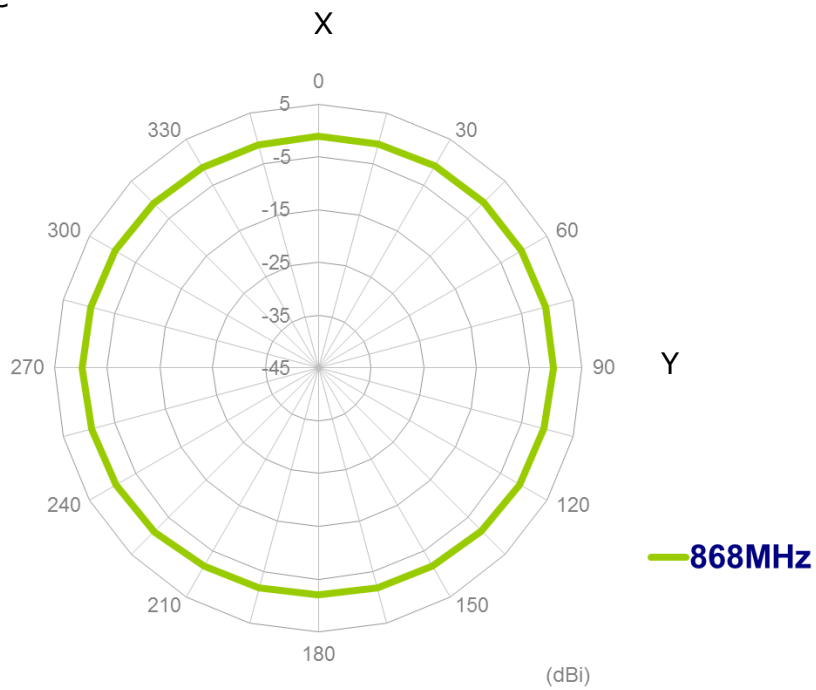


YZ Plane

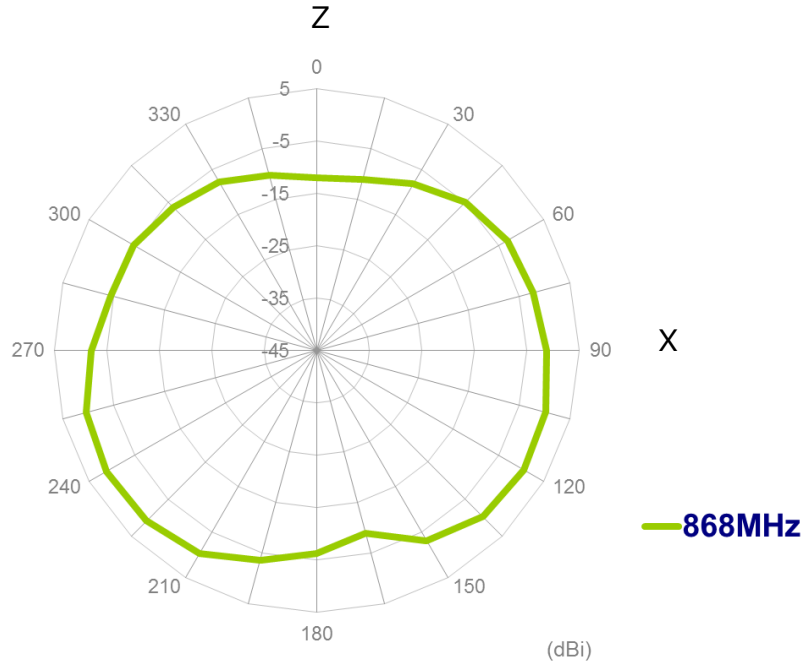


- On HAD.B.21

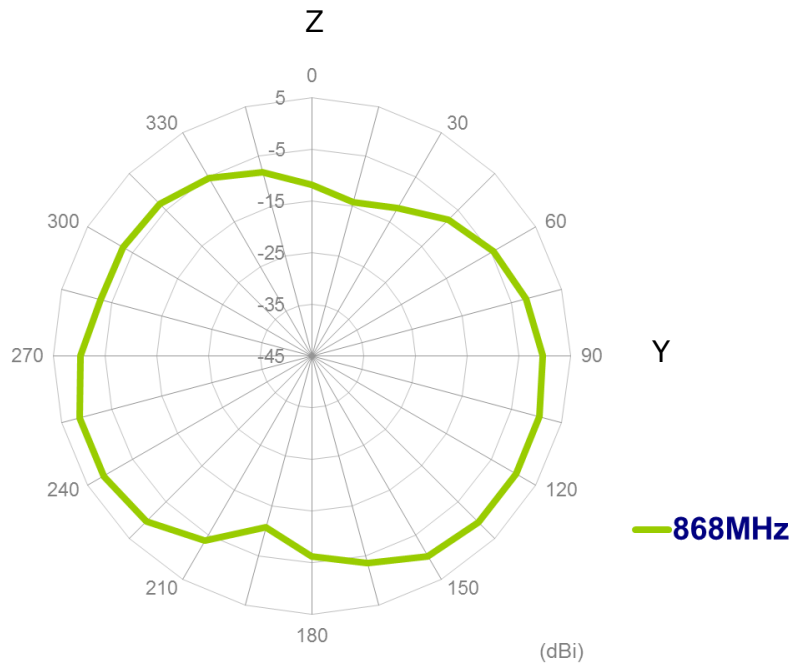
- XY Plane



- XZ Plane



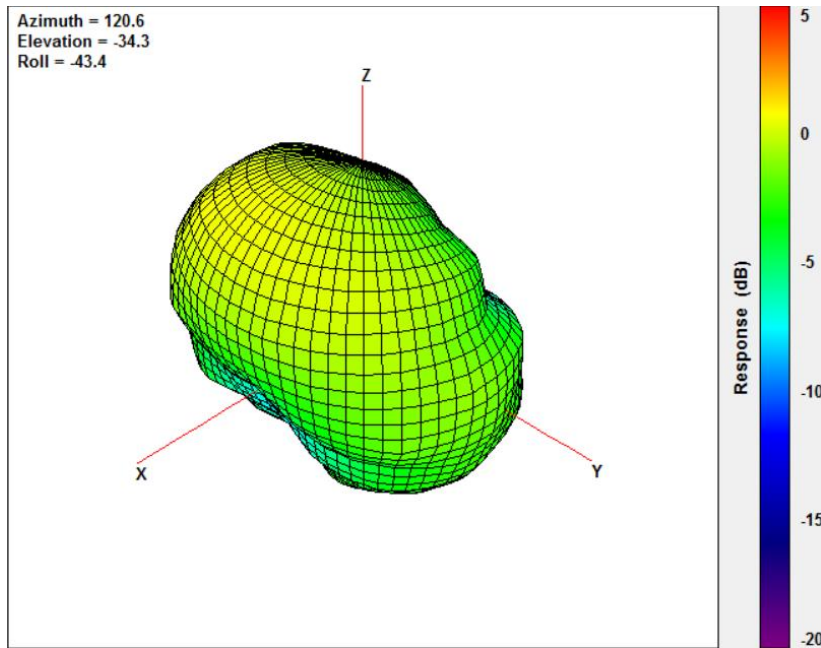
- YZ Plane



### 4.3. 3D Radiation Pattern

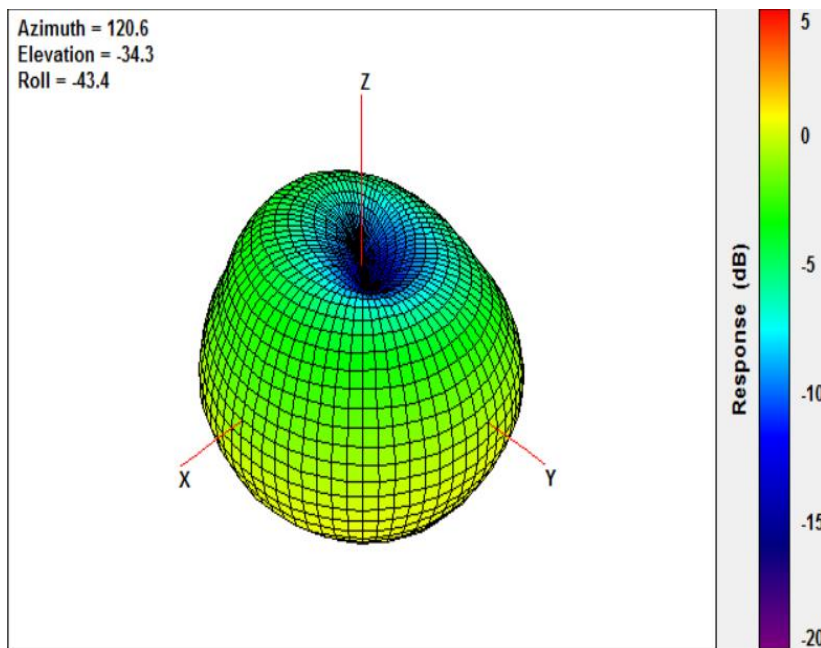
- On HAD.A.21

@868MHz



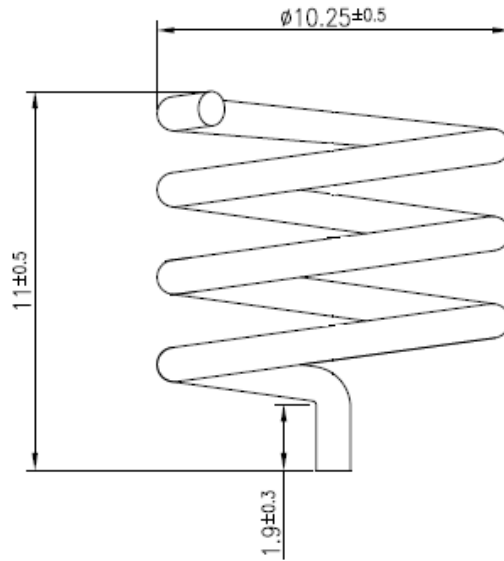
- On HAD.B.21

@868MHz



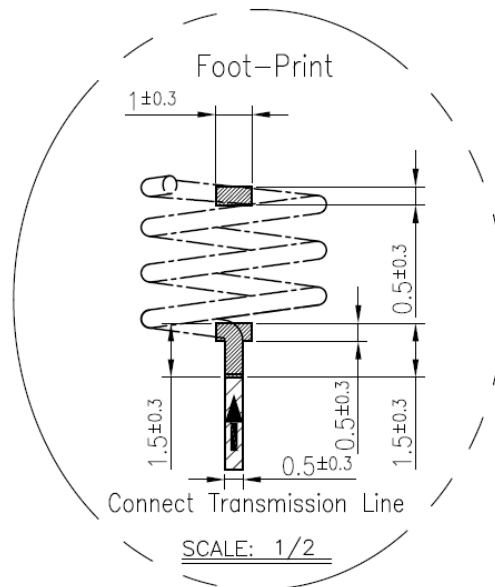
# 5. Mechanical Drawing

## 5.1 HA.21.A Antenna

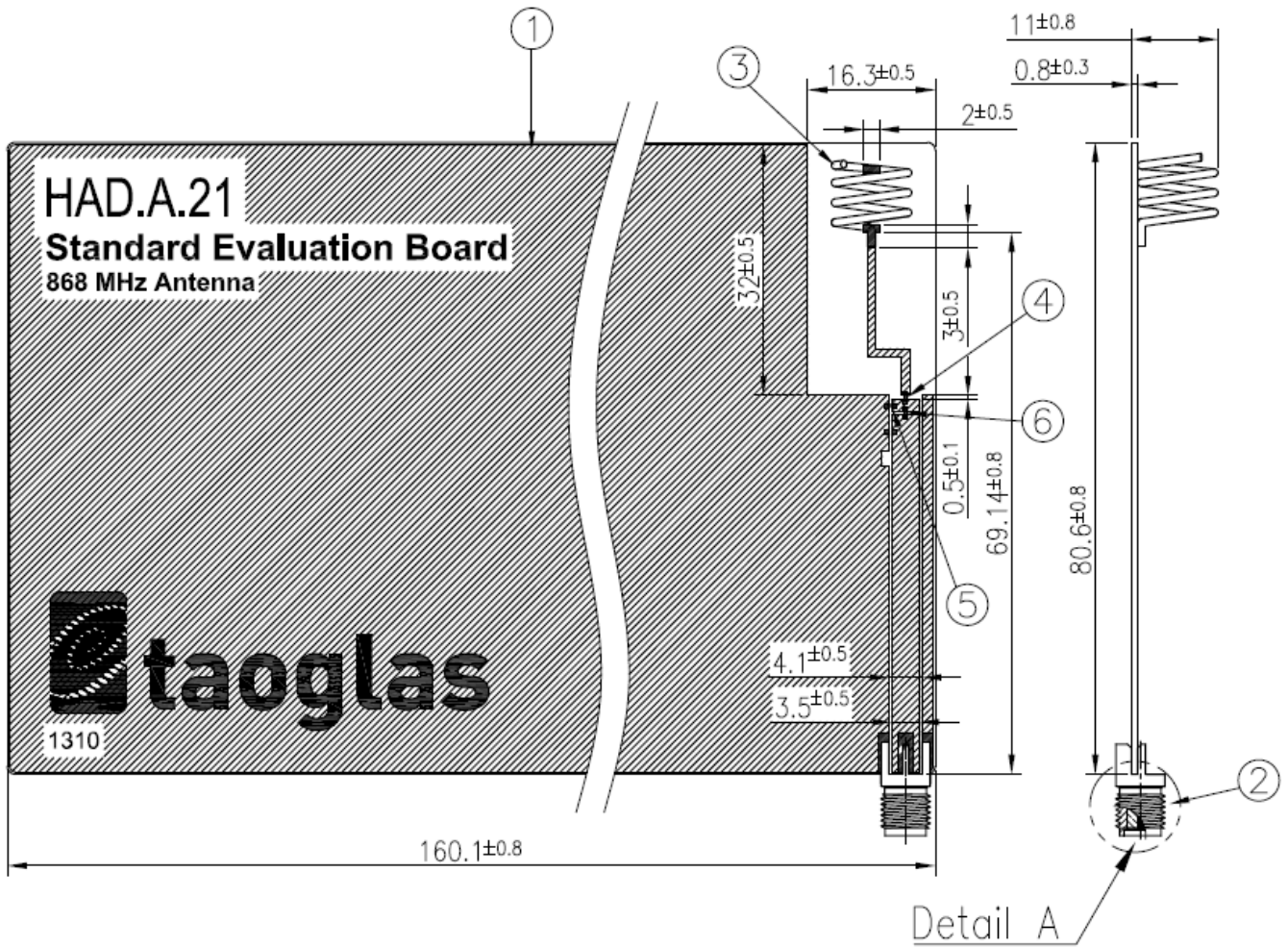


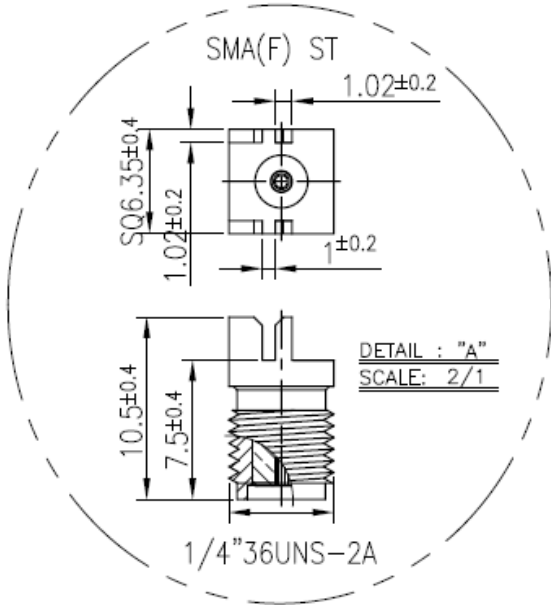
Unit: mm

### Foot-Print



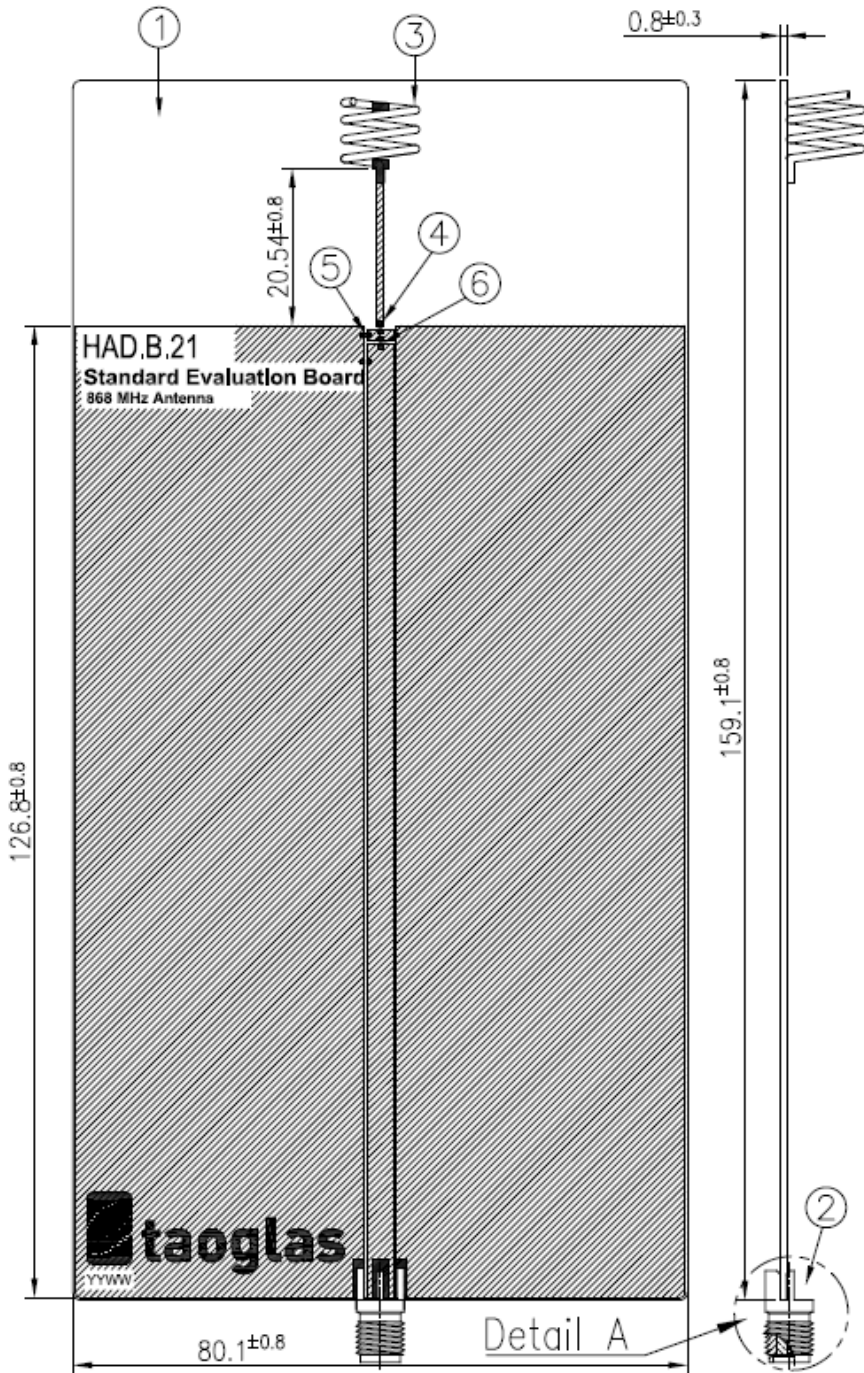
## 5.2 HAD.A.21 Evaluation Board





	Name	Material	Finish	QTY
1	HAD.A.21 EVB PCB	Composite	Black	1
2	SMA(F)ST	Brass	Gold	1
3	HA.21 Helical Antenna	C5191W-H	Clear	1
4	Lumped Component	Ceramic	N/A	1
5	Lumped Component	Ceramic	N/A	1
6	Lumped Component	Ceramic	N/A	1

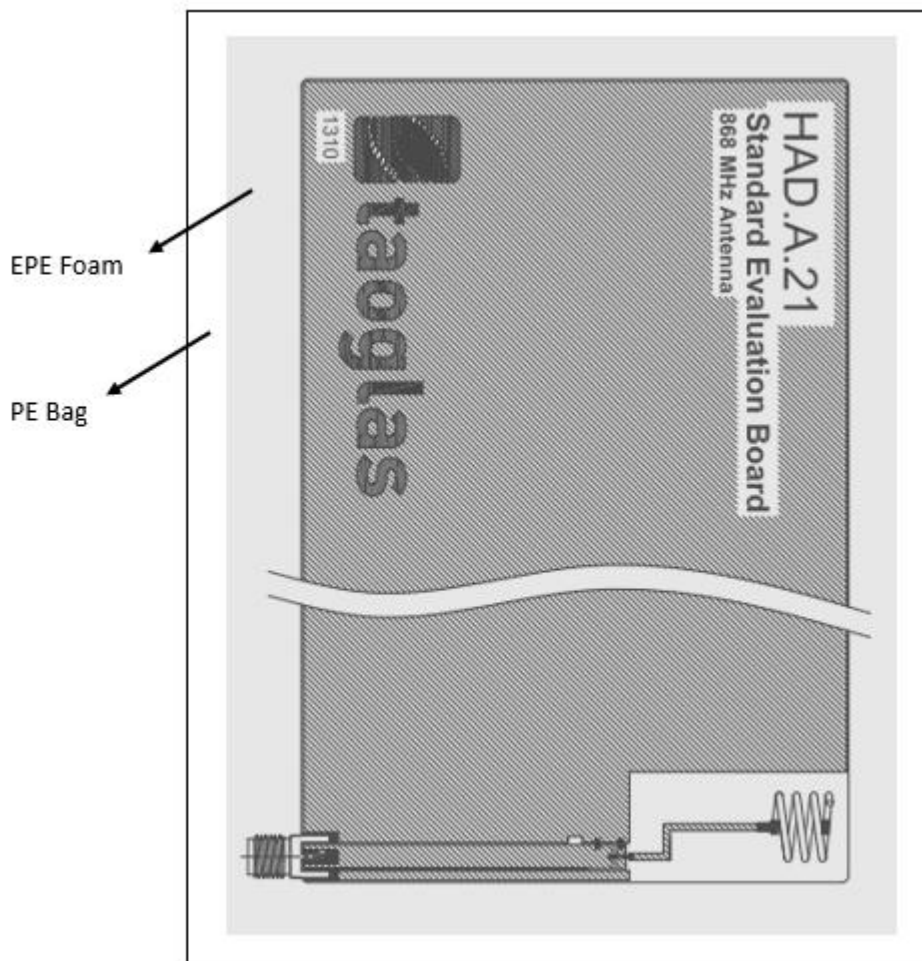
### 5.3 HAD.B.21 Evaluation Board



Unit: mm

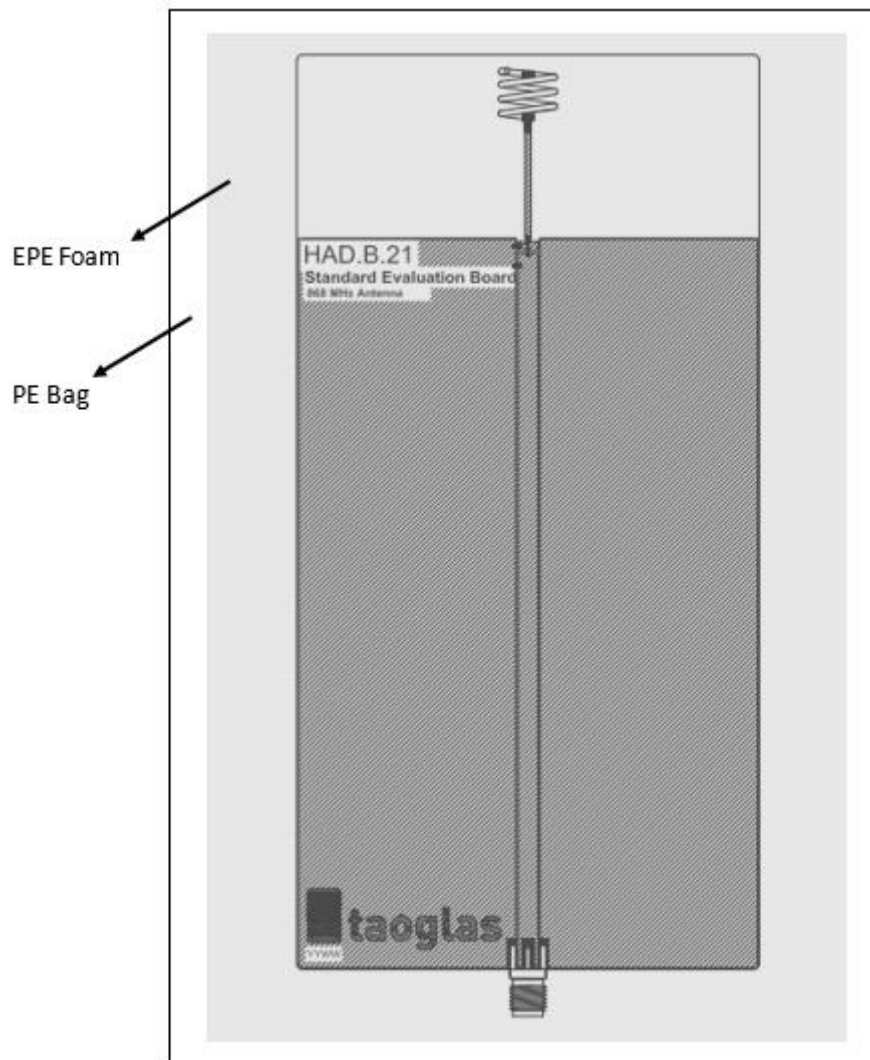
## 6. Packaging

### 6.1. HAD.A.21



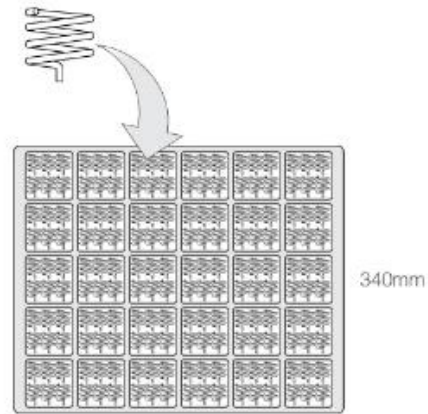


## 6.2. HAD.B.21

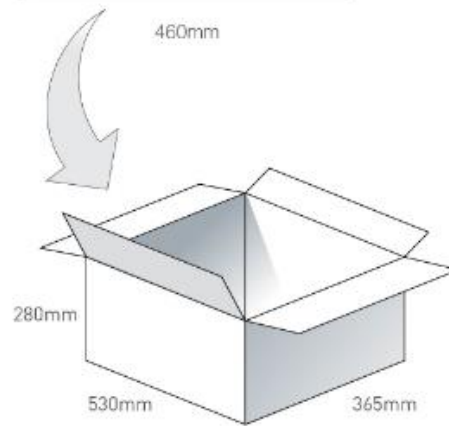


### 6.3. HA.21.A

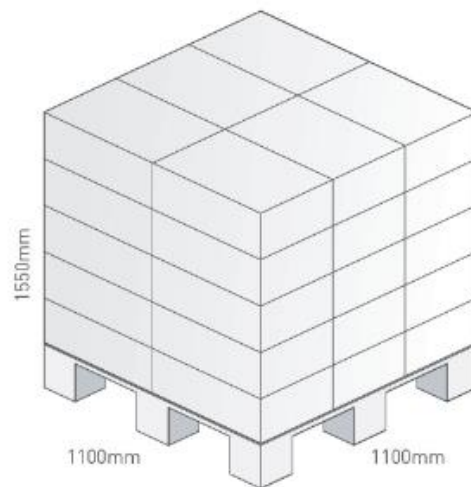
180 pcs HA.21.A per tray  
 Tray Dimensions - 460x340mm  
 Weight - 223g



30 trays / 5400 pcs HA.21.A per carton  
 Carton dimensions - 530x365x280mm  
 Weight - 8Kg



Pallet Dimensions 1100\*1100\*1550mm  
 30 Cartons per Pallet  
 6 Cartons per layer  
 5 Layers



## 7. Antenna Application Note

### 7.1 Matching Circuit for Different Ground Lengths

#### 7.1.1 HAD.A.21 EVB Board

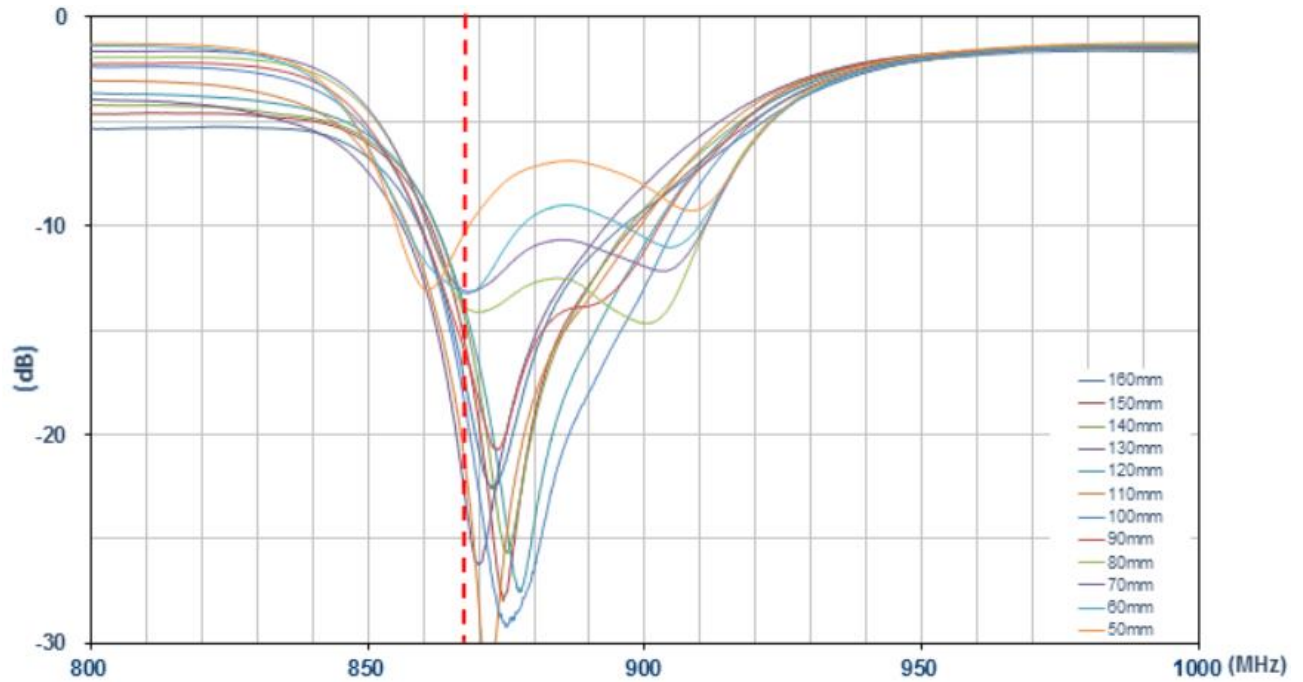
HAD.A.21	Ceramic 4	Ceramic 5	Ceramic 6
160mm	0 ohm	2.2pF	0 ohm
150mm	0 ohm	2.2pF	0 ohm
140mm	0 ohm	2.2pF	0 ohm
130mm	0 ohm	2.2pF	0 ohm
120mm	0 ohm	2.2pF	0 ohm
110mm	0 ohm	2.4pF	0 ohm
100mm	0 ohm	2.4pF	0 ohm
90mm	0 ohm	2.4pF	0 ohm
80mm	0 ohm	2.4pF	0 ohm
70mm	0 ohm	2.4pF	1nH
60mm	0 ohm	2.4pF	1nH
50mm	0 ohm	2.4pF	1nH

#### 7.1.2 HAD.B.21 EVB Board

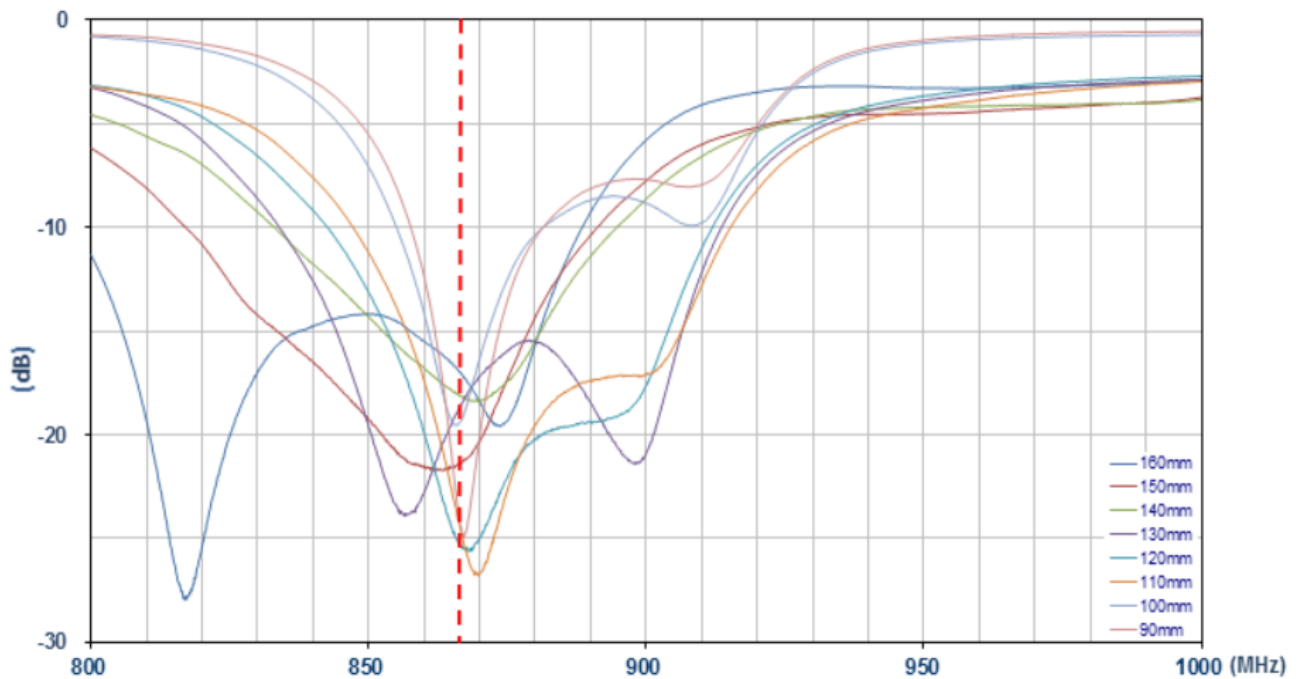
HAD.B.21	Ceramic 4	Ceramic 5	Ceramic 6
160mm	0 ohm	2.2pF	5.6nH
150mm	0 ohm	2.2pF	9.1nH
140mm	0 ohm	2.2pF	9.1nH
130mm	0 ohm	3.3pF	10nH
120mm	0 ohm	3.6pF	10nH
110mm	0 ohm	open	2.2pF
100mm	0 ohm	open	2.2pF
90mm	0 ohm	open	2.2pF

## 7.2 Return loss

### 7.2.1 HAD.A.21 EVB board

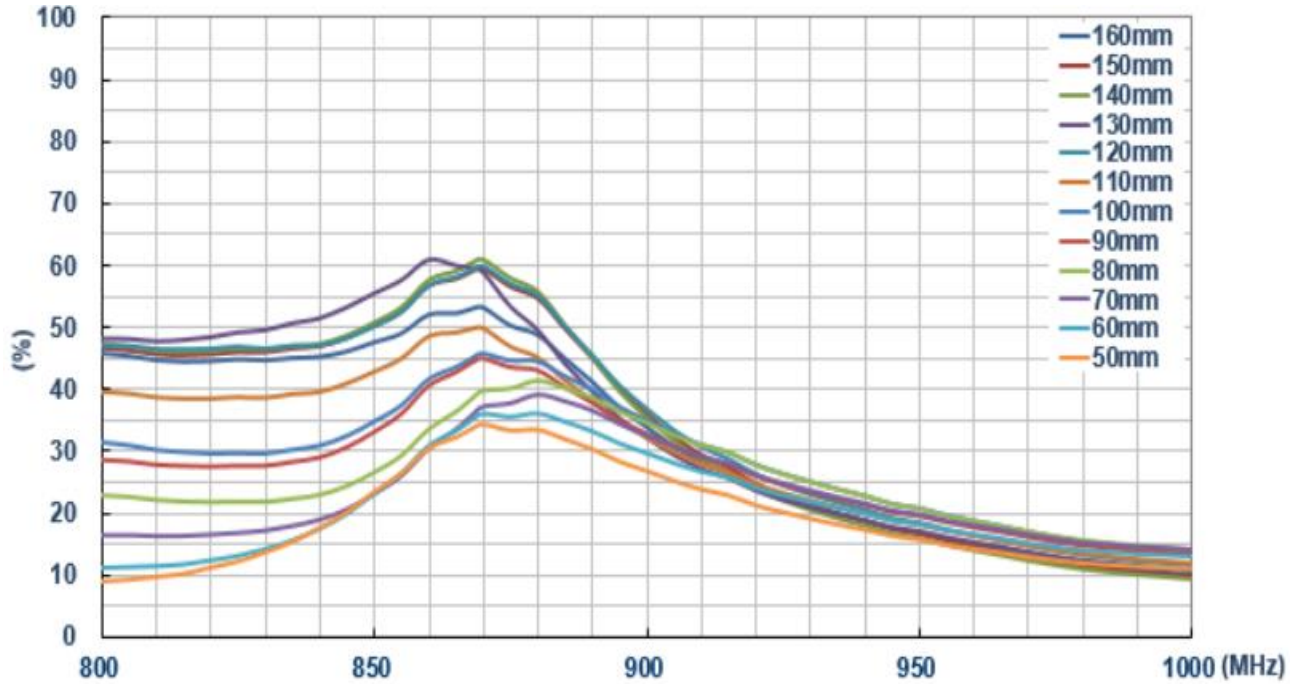


### 7.2.2 HAD.B.21 EVB board

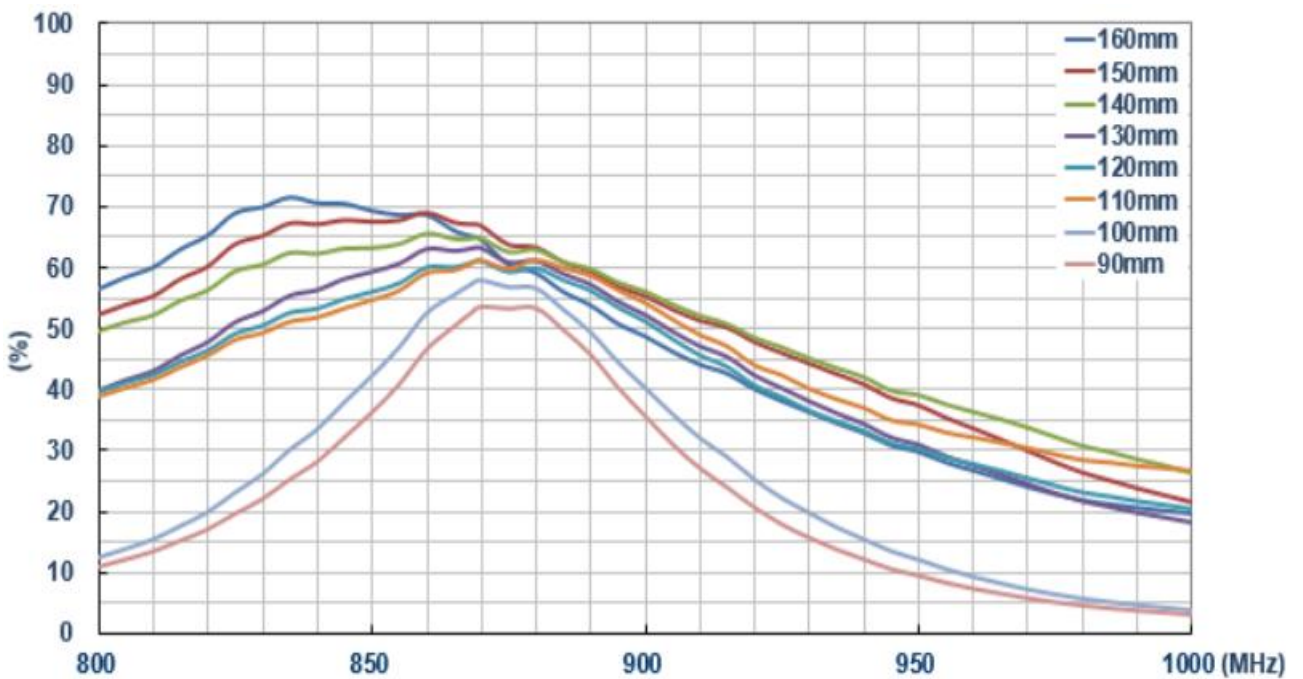


## 7.3 Efficiency

### 7.3.1 HAD.A.21 EVB Board (Different Ground Length)

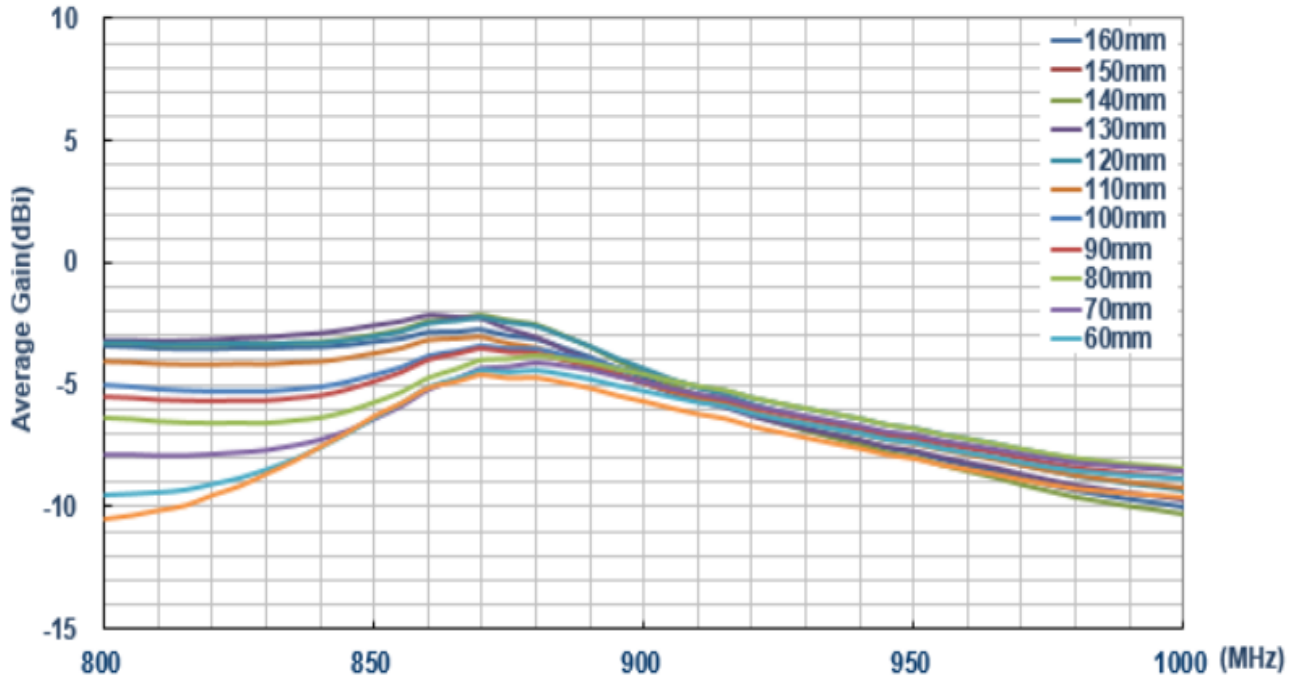


### 7.3.2 HAD.B.21 EVB Board (Different Ground Length)

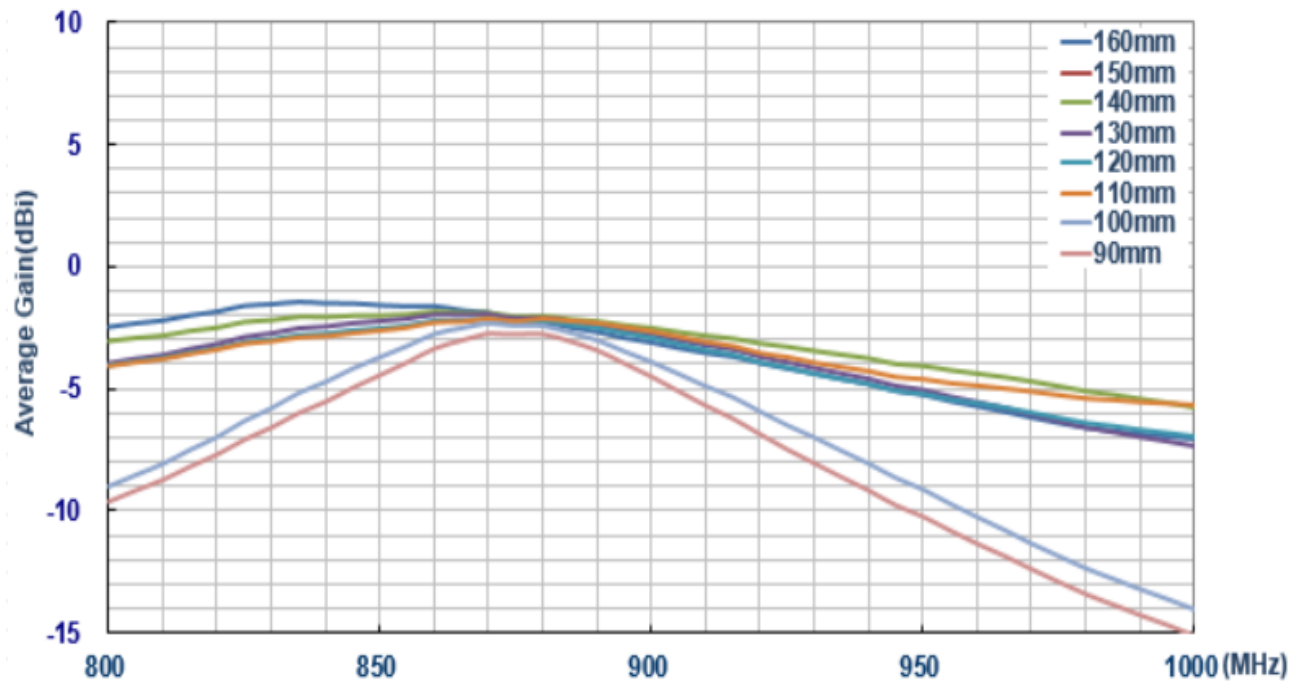


## 7.4 Average Gain

### 7.4.1 HAD.A.21 EVB Board (Different Ground Length)

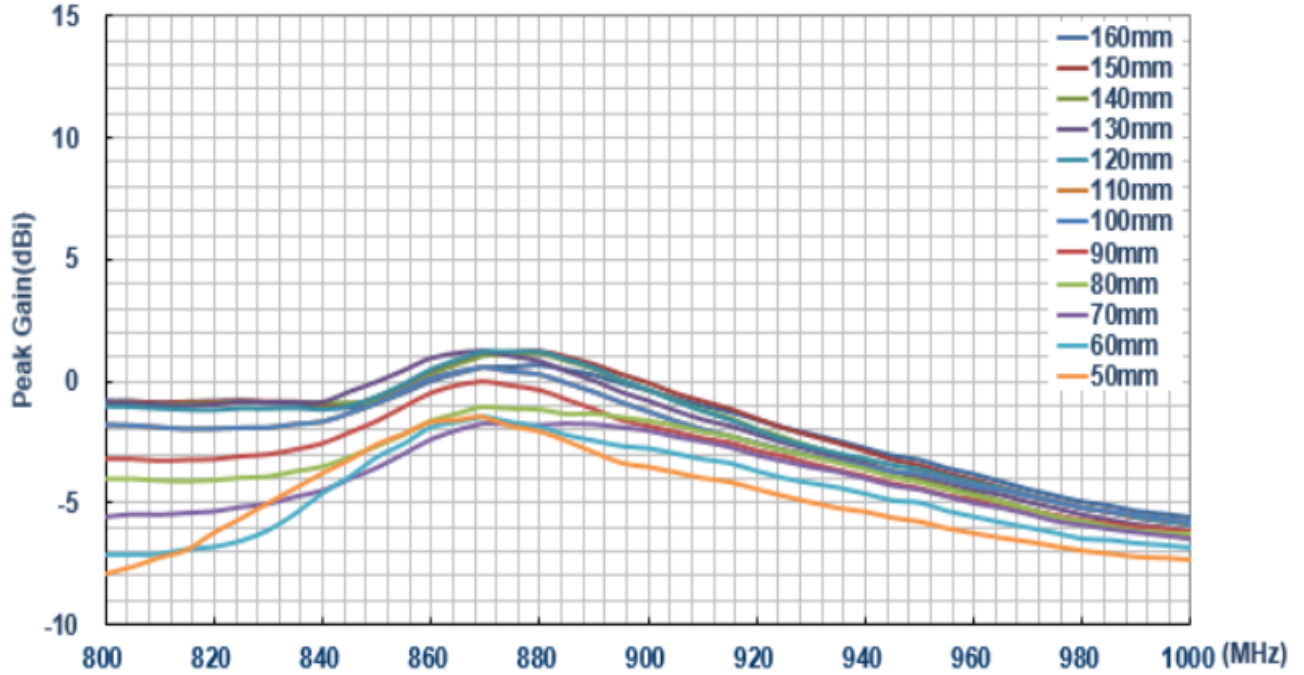


### 7.4.2 HAD.B.21 EVB Board (Different Ground Length)

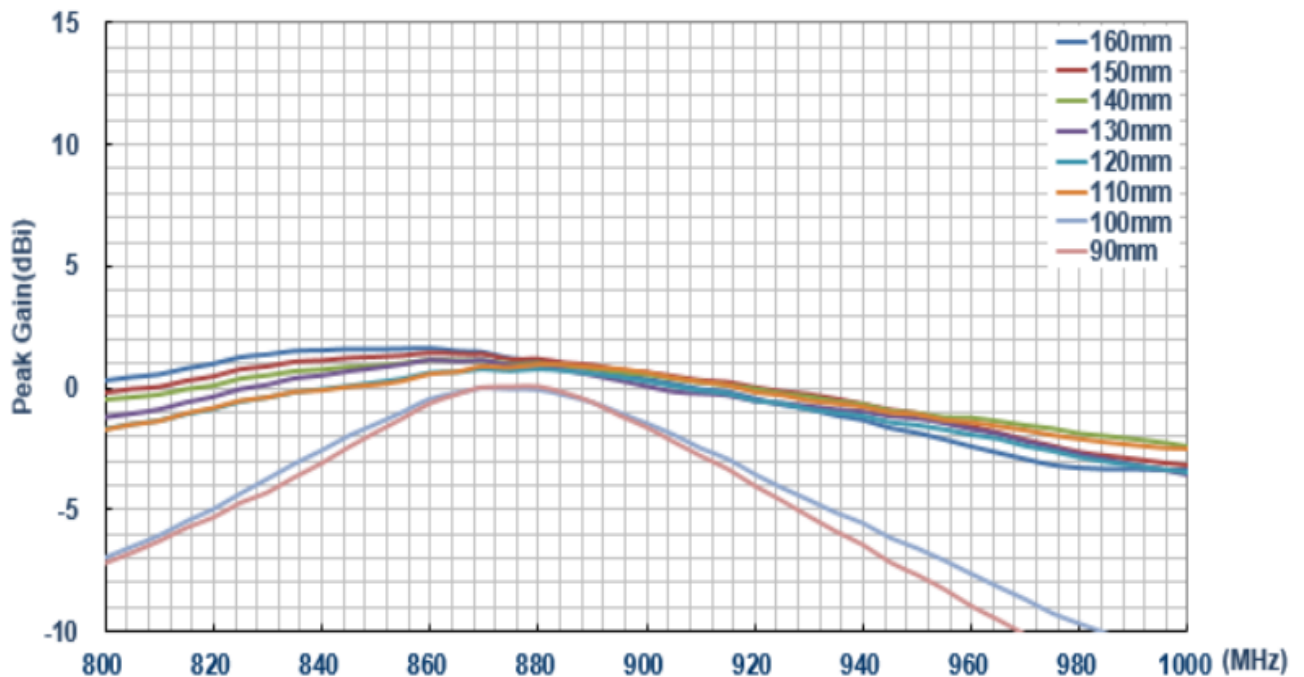


## 7.5 Peak Gain

### 7.5.1 HAD.A.21 EVB Board (Different Ground Length)



### 7.5.2 HAD.B.21 EVB Board (Different Ground Length)



## 7.6 Antenna Performance Table

ELECTRICAL						
Application Bands	ISM 868MHz					
Mounting Direction	HAD.A.21			HAD.B.21		
Frequency (MHz)	850	868	880	850	868	880
Efficiency						
Ground plane length 160mm	47.48	52.89	48.66	69.27	65.15	59.04
Ground plane length 150mm	50.33	59.00	54.64	67.34	66.93	63.18
Ground plane length 140mm	50.73	60.42	55.73	63.08	64.60	62.80
Ground plane length 130mm	55.38	59.44	49.44	59.41	63.21	61.23
Ground plane length 120mm	50.02	59.18	54.98	55.94	60.70	59.82
Ground plane length 110mm	42.92	49.87	45.21	54.65	60.55	61.17
Ground plane length 100mm	34.92	45.20	44.64	42.34	57.28	56.70
Ground plane length 90mm	32.98	44.25	42.92	36.15	52.23	53.23
Ground plane length 80mm	26.56	38.42	41.24	X	X	X
Ground plane length 70mm	23.03	35.84	39.12	X	X	X
Ground plane length 60mm	23.07	35.06	36.05	X	X	X
Ground plane length 50mm	23.46	33.66	33.44	X	X	X
Average Gain(dBi)						
Ground plane length 160mm	-3.23	-2.77	-3.12	-1.59	-1.86	-2.28
Ground plane length 150mm	-2.98	-2.29	-2.62	-1.71	-1.74	-1.99
Ground plane length 140mm	-2.94	-2.19	-2.53	-2.00	-1.90	-2.01
Ground plane length 130mm	-2.56	-2.26	-3.05	-2.26	-1.99	-2.13
Ground plane length 120mm	-3.00	-2.28	-2.59	-2.52	-2.17	-2.23
Ground plane length 110mm	-3.67	-3.02	-3.44	-2.62	-2.18	-2.13
Ground plane length 100mm	-4.56	-3.45	-3.50	-3.73	-2.42	-2.46
Ground plane length 90mm	-4.81	-3.54	-3.67	-4.41	-2.81	-2.73
Ground plane length 80mm	-5.75	-4.15	-3.84	X	X	X
Ground plane length 70mm	-6.37	-4.46	-4.07	X	X	X
Ground plane length 60mm	-6.36	-4.55	-4.43	X	X	X
Ground plane length 50mm	-6.29	-4.73	-4.75	X	X	X



Peak Gain(dBi)						
Ground plane length 160mm	-0.87	0.51	0.69	1.54	1.45	1.08
Ground plane length 150mm	-0.67	1.01	1.22	1.28	1.39	1.19
Ground plane length 140mm	-0.83	0.88	1.08	0.88	1.10	0.99
Ground plane length 130mm	-0.03	1.22	0.82	0.83	1.14	0.93
Ground plane length 120mm	-0.64	1.09	1.17	0.19	0.69	0.73
Ground plane length 110mm	-0.89	0.55	0.31	0.10	0.79	0.92
Ground plane length 100mm	-1.48	0.07	-0.04	-1.48	-0.06	-0.06
Ground plane length 90mm	-1.64	-0.08	-0.38	-1.85	-0.09	0.03
Ground plane length 80mm	-2.65	-1.10	-1.13	X	X	X
Ground plane length 70mm	-3.56	-1.82	-1.80	X	X	X
Ground plane length 60mm	-3.13	-1.55	-1.89	X	X	X
Ground plane length 50mm	-2.57	-1.46	-2.04	X	X	X



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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