STUDY | PCB DIMENSION (Length)

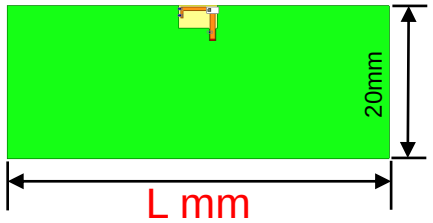
ANT162442ST-1000AM1

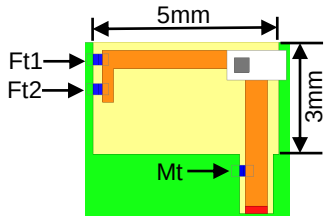
Dimensions (mm)

L	W	T
1.60	0.80	0.40
±0.10	±0.10	Max.

EVALUATION BOARD

Antenna Location: Center
Board size: L x 20 x 1 mm²
Antenna keep out area: 5 x 3 mm²

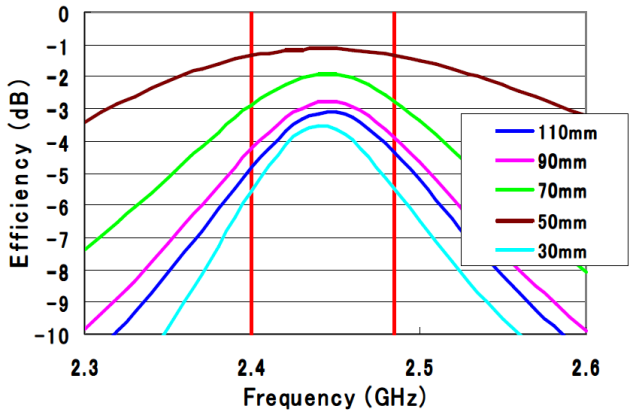


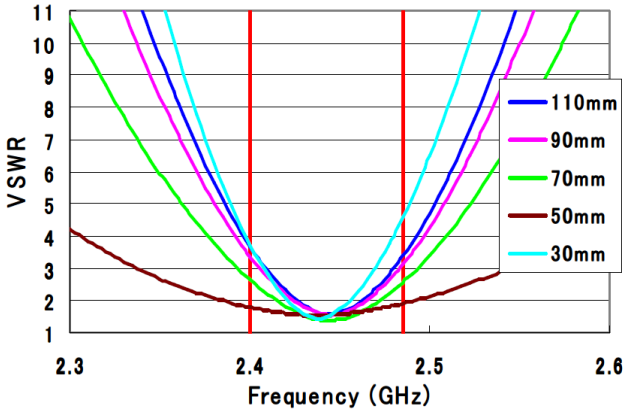


TUNING COMPONENTS

PCB Size	110mm	90mm	70mm	50mm	30mm
Ft1 (pF)	6	6	6	5	6
Ft2 (pF)	1.8	2	2	Blanck	1
Mt (pF)	0.5	0.6	0.8	1.6	0.2

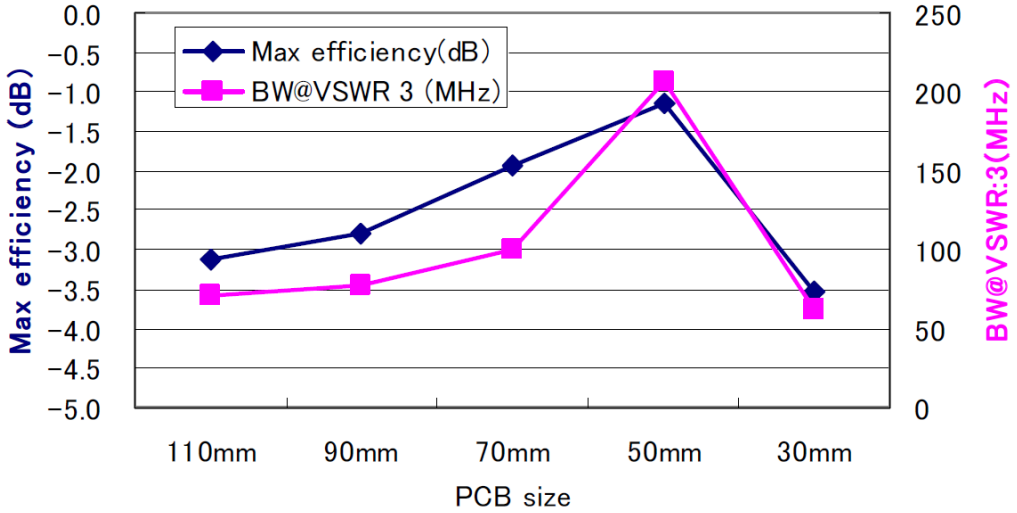
▶VSWR & EFFICIENCY (SIMULATION RESULTS)





Item	VSWR			Efficiency(dB)		
Frequency(GHz)	2.4	2.442	2.485	2.4	2.442	2.485
L=110mm	3.7	1.6	3.4	−4.81	−3.13	−4.34
L=90mm	3.4	1.6	3.1	−4.23	−2.80	−3.86
L=70mm	2.6	1.4	2.6	−2.87	−1.92	−2.74
L=50mm	1.8	1.6	1.9	−1.35	−1.14	−1.34
L=30mm	3.7	1.5	4.6	−5.54	−3.56	−5.46

MAX EFFICIENCY & BANDWIDTH (SIMULATION RESULTS)



PCB Size	110mm	90mm	70mm	50mm	30mm
Max efficiency(dB)	−3.1	−2.8	−1.9	−1.1	−3.5
BW@VSWR 3 (MHz)	70.9	77.8	100.4	206.8	61.7

TECHNICAL REMARKS

- For maximum efficiency with center mount antenna: length L = 50

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STUDY | GND CLEARANCE (Center of PCB)

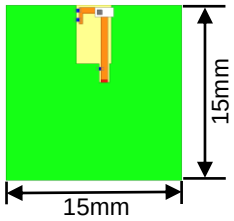
ANT162442ST-1000AM1

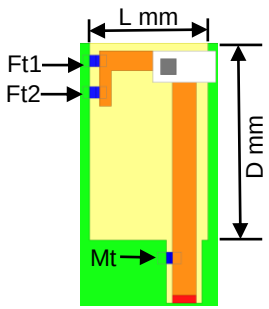
Dimensions (mm)

L	W	T
1.60	0.80	0.40
±0.10	±0.10	Max.

EVALUATION BOARD

Antenna Location: Center
Board size: 15 x 15 x 1 mm²
Antenna keep out area: L x D mm²



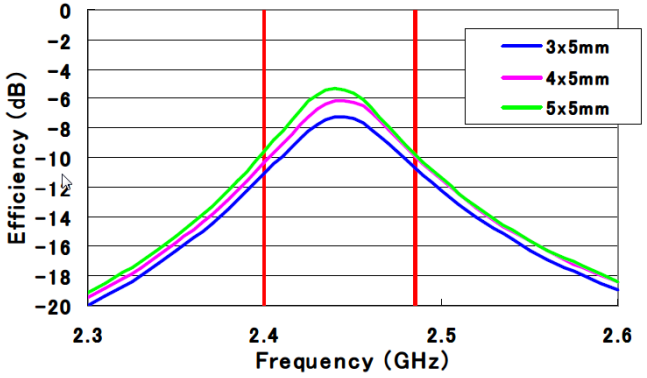


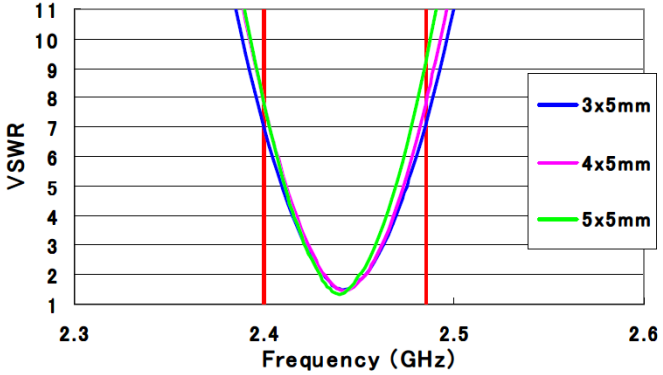
TUNING COMPONENTS & KEEPOUT AREA SIZE

GND Off size	3x5mm	4x5mm	5x5mm
Ft1 (pF)	10	2.7	1.6
Ft2 (pF)	7	Blank	Blank
Mt (nH)	2.5	3.2	3.5

GND off size	L(mm)	D(mm)
3x5mm	3	5
4x5mm	4	5
5x5mm	5	5

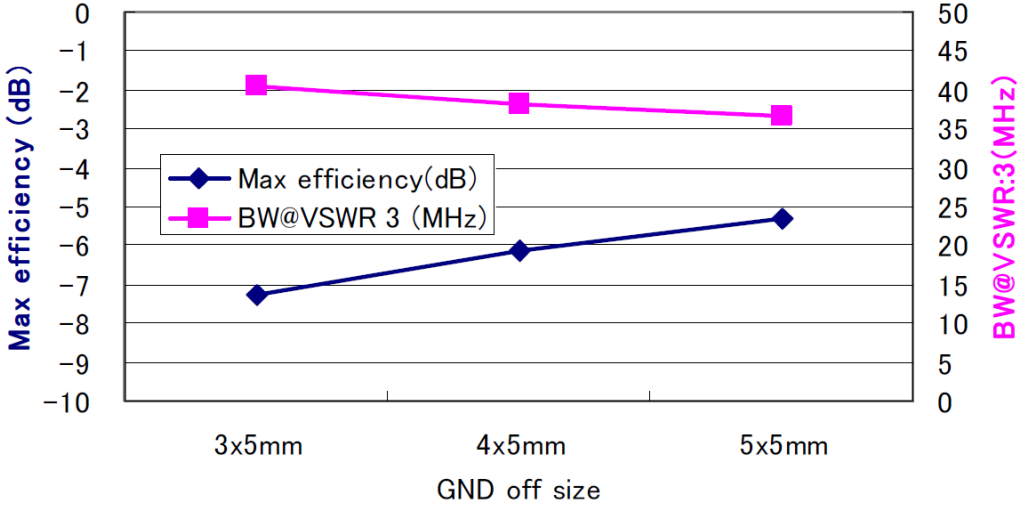
▶VSWR & EFFICIENCY (SIMULATION RESULTS)





Item	VSWR			Efficiency(dB)		
Frequency(GHz)	2.4	2.442	2.485	2.4	2.442	2.485
3x5mm	7.0	1.5	7.1	−11.06	−7.30	−10.62
4x5mm	7.8	1.4	7.8	−10.35	−6.15	−9.80
5x5mm	7.7	1.4	9.2	−9.59	−5.38	−9.71

MAX EFFICIENCY & BANDWIDTH (SIMULATION RESULTS)



GND Off size	3x5mm	4x5mm	5x5mm
Max efficiency(dB)	−7.3	−6.1	−5.3
BW@VSWR 3 (MHz)	40.5	38.1	36.5

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STUDY | GND CLEARANCE (Center of PCB)

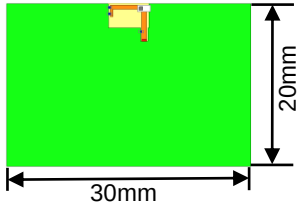
ANT162442ST-1000AM1

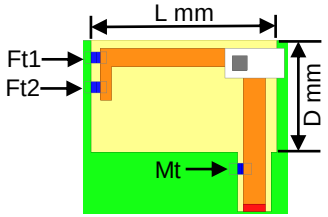
Dimensions (mm)

L	W	T
1.60 ±0.10	0.80 ±0.10	0.40 Max.

EVALUATION BOARD

Antenna Location: Center
Board size: 30 x 20 x 1 mm²
Antenna keep out area: L x D mm²



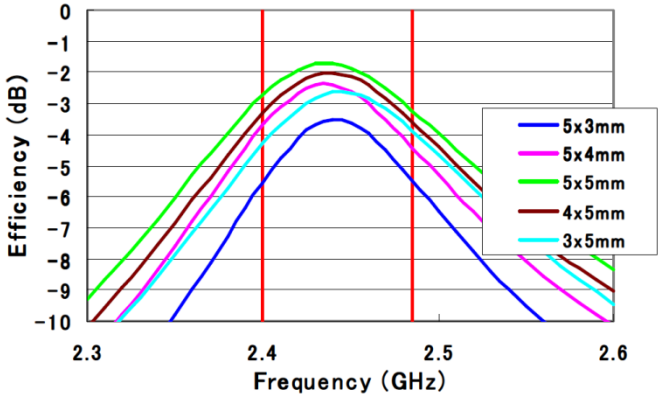


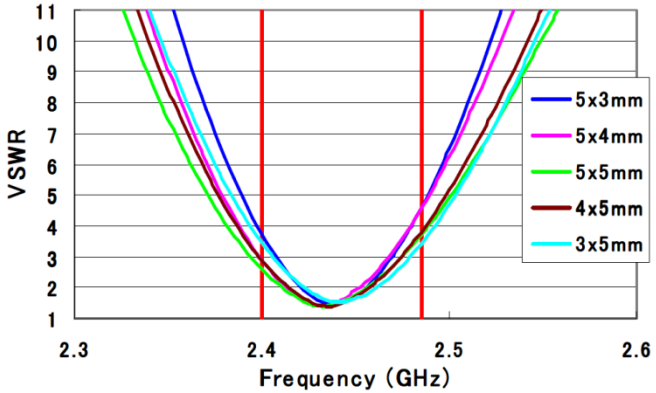
TUNING COMPONENTS & KEEPOUT AREA SIZE

GND Off size	5x3mm	5x4mm	5x5mm	4x5mm	3x5mm
Ft1 (pF)	6	2.4	1.4	2.4	8
Ft2 (pF)	1	Blank	Blank	Blank	Blank
Mt (pF)	0.2	Blank	Blank	Blank	Blank

GND off size	L(mm)	D(mm)
5x3mm	5	3
5x4mm	5	4
5x5mm	5	5
4x5mm	4	5
3x5mm	3	5

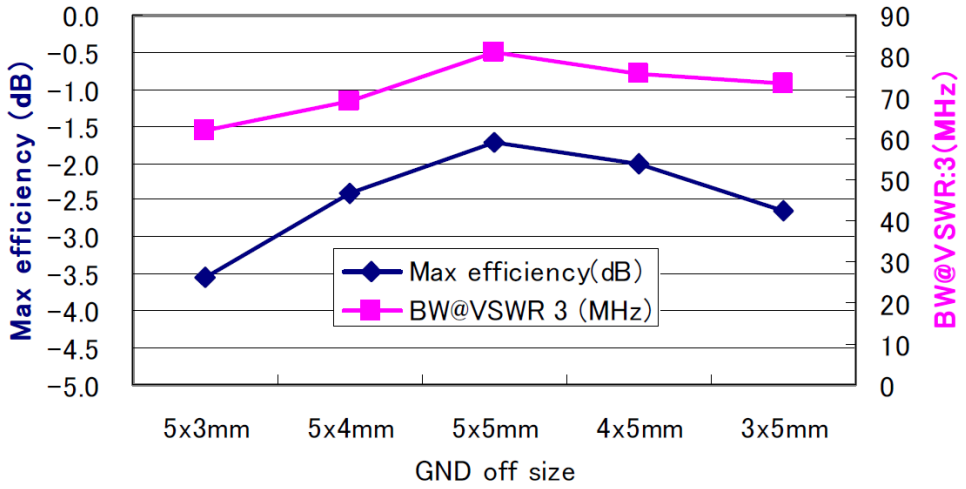
▶VSWR & EFFICIENCY (SIMULATION RESULTS)





Item	VSWR			Efficiency(dB)		
Frequency(GHz)	2.4	2.442	2.485	2.4	2.442	2.485
5x3mm	3.7	1.5	4.6	−5.54	−3.56	−5.46
5x4mm	2.9	1.6	4.6	−3.70	−2.45	−4.39
5x5mm	2.6	1.5	3.7	−2.72	−1.74	−3.21
4x5mm	2.9	1.5	3.8	−3.30	−2.05	−3.58
3x5mm	3.5	1.5	3.4	−4.30	−2.64	−3.84

MAX EFFICIENCY & BANDWIDTH (SIMULATION RESULTS)



GND Off size	5x3mm	5x4mm	5x5mm	4x5mm	3x5mm
Max efficiency(dB)	−3.5	−2.4	−1.7	−2.0	−2.6
BW@VSWR 3 (MHz)	61.7	68.8	80.8	75.7	73.2

TECHNICAL REMARKS

- D dimension has greater impact on performance than L dimension of the keepout area

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STUDY | ANTENNA LOCATION (110mm PCB)

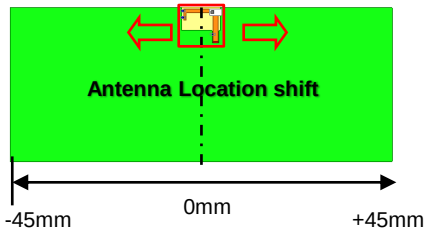
ANT162442ST-1000AM1

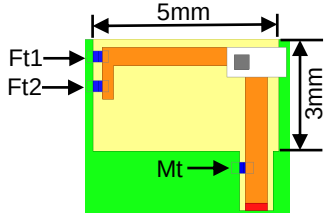
Dimensions (mm)

L	W	T
1.60	0.80	0.40
±0.10	±0.10	Max.

EVALUATION BOARD

Antenna Location: Center
Board size: 110 x 20 x 1 mm²
Antenna keep out area: 5 x 3 mm²

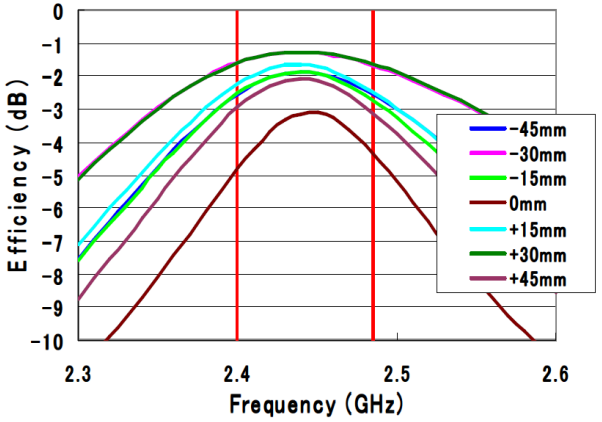


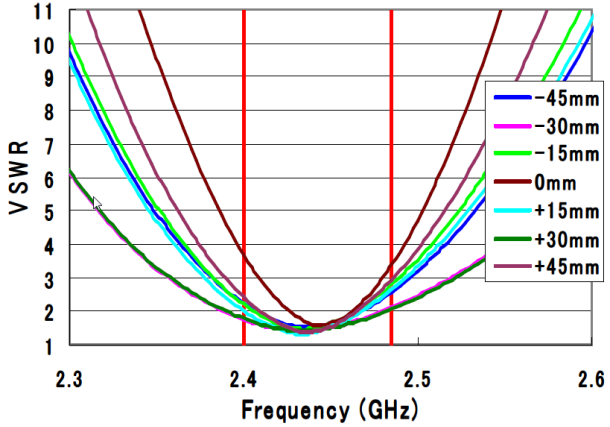


TUNING COMPONENTS

PCB Size	+45mm	+30mm	+15mm	0mm	−15mm	−30mm	−45mm
Ft1 (pF)	6	5.5	6	6	6	5.6	5.8
Ft2 (pF)	0.7	Blanck	1.1	1.8	1.1	Blanck	Blanck
Mt (pF)	0.7	1.3	0.9	0.5	0.9	1.3	1

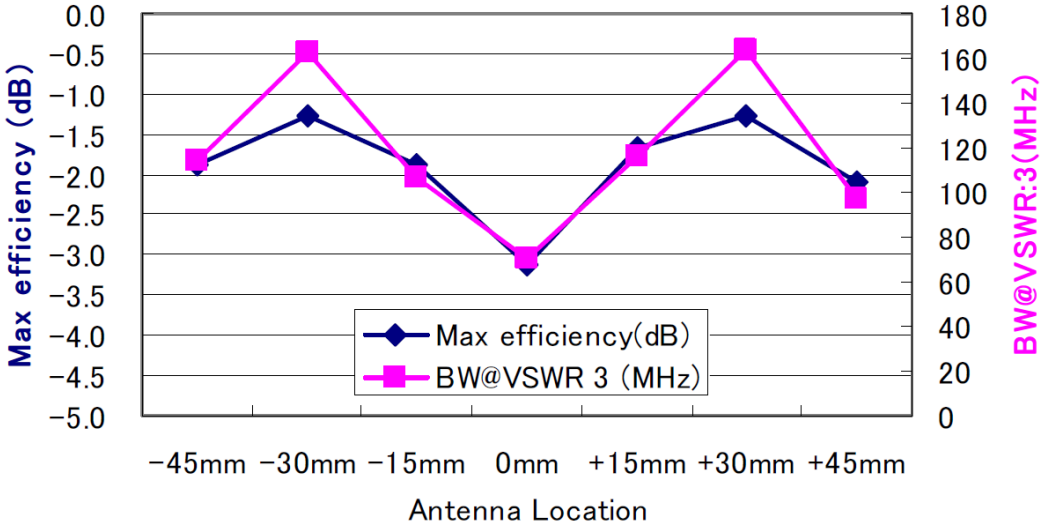
▶VSWR & EFFICIENCY (SIMULATION RESULTS)





Item	VSWR			Efficiency(dB)		
Frequency(GHz)	2.4	2.442	2.485	2.4	2.442	2.485
+45mm	2.2	1.5	2.6	−2.54	−1.88	−2.54
+30mm	1.8	1.5	2.1	−1.59	−1.28	−1.66
+15mm	2.2	1.5	2.8	−2.54	−1.89	−2.75
0mm	3.7	1.6	3.4	−4.81	−3.13	−4.34
−15mm	2.0	1.4	2.6	−2.23	−1.67	−2.48
−30mm	1.8	1.4	2.1	−1.61	−1.27	−1.63
−45mm	2.4	1.4	2.9	−2.96	−2.10	−3.12

MAX EFFICIENCY & BANDWIDTH (SIMULATION RESULTS)



PCB Size	−45mm	−30mm	−15mm	0mm	+15mm	+30mm	+45mm
Max efficiency(dB)	−1.9	−1.3	−1.9	−3.1	−1.7	−1.3	−2.1
BW@VSWR 3 (MHz)	114.1	162.9	107.0	70.9	115.9	164.1	96.8

TECHNICAL REMARKS

- For maximum efficiency with PCB length L = 110mm, antenna mounting location is recommended at ¼ of PCB length

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STUDY | ANTENNA LOCATION

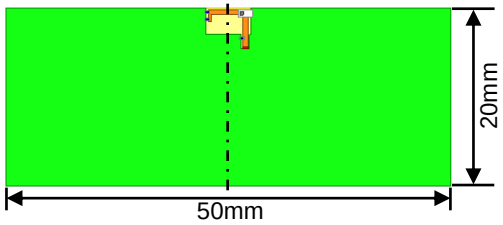
ANT162442ST-1000AM1

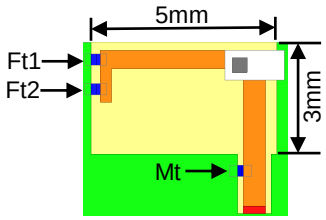
Dimensions (mm)

L	W	T
1.60	0.80	0.40
±0.10	±0.10	Max.

EVALUATION BOARD

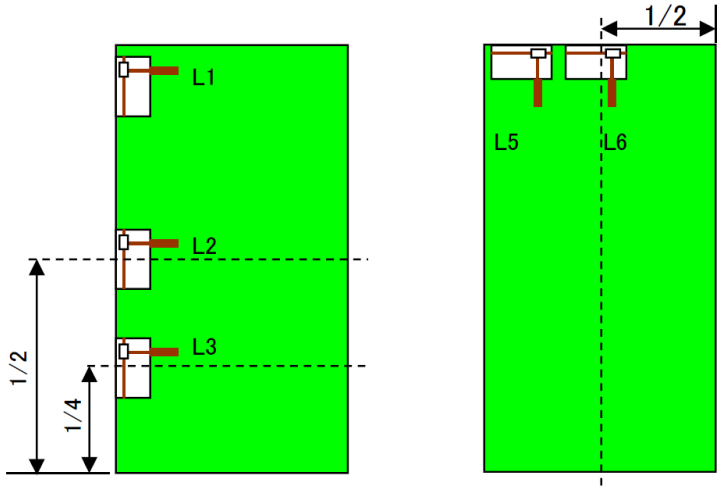
Antenna Location: Center
Board size: 50 x 20 x 1 mm^2
Antenna keep out area: 5 x 3 mm^2



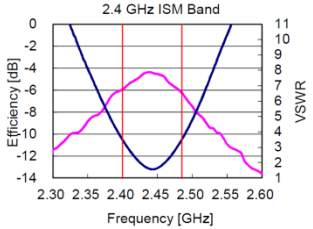


▶MEASUREMENT RESULTS

Antenna Locations

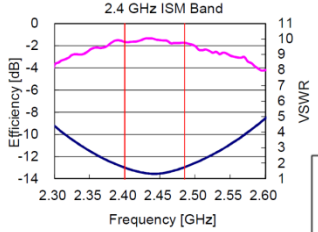


L1



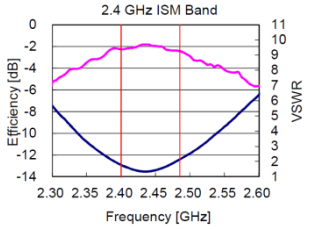
Matching Circuit
Ft1: 10 pF
Ft2: Blank

L2(Recommend)



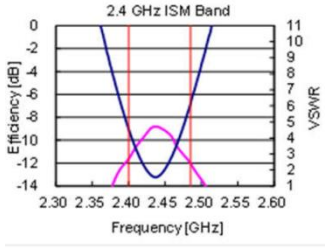
Matching Circuit
Ft1: 6.0 pF
Ft2: Blank

L3(Recommend)



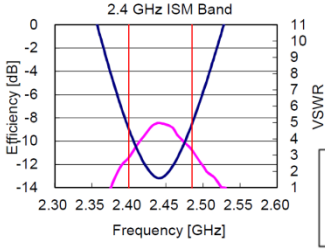
Matching Circuit
Ft1: 6.0 pF
Ft2: Blank

L5



Matching Circuit
Ft1: 8.2 pF
Ft2: Blank

L6



Matching Circuit
Ft1: 10 pF
Ft2: Blank

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SIMULATION STUDY | MATCHING & TUNING

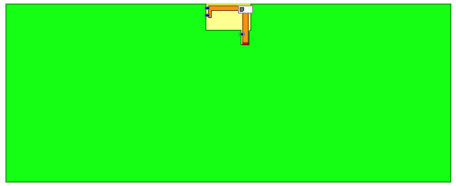
ANT162442ST-1000AM1

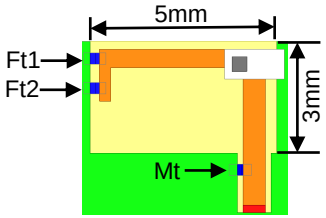
Dimensions (mm)

L	W	T
1.60	0.80	0.40
±0.10	±0.10	Max.

EVALUATION BOARD

Antenna Location: Center
Board size: 120 x 65 x 1 mm²
Antenna keep out area: 5 x 3 mm²

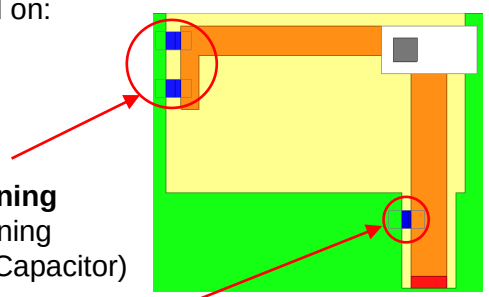




TECHNICAL REMARKS

Value of tuning components depend on:

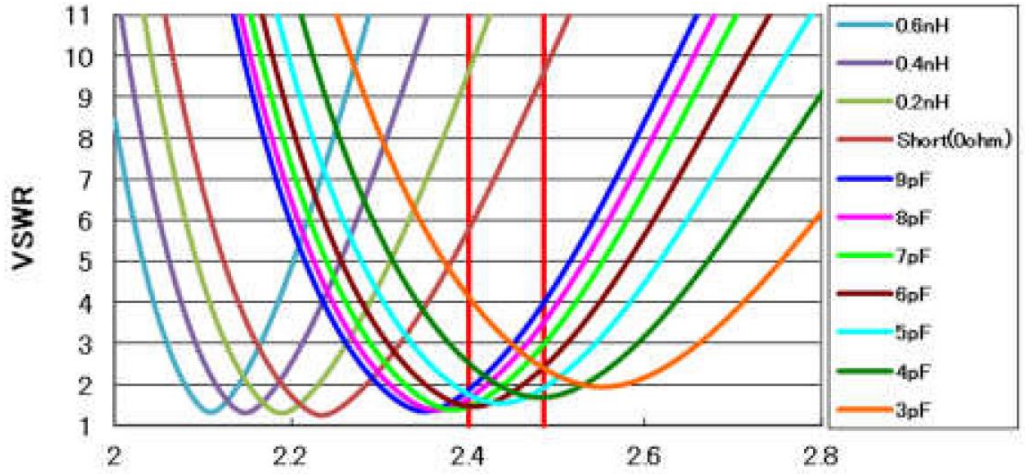
- PCB Size
- Antenna Location
- Other mechanical conditions



Frequency tuning
Matching Tuning
(Inductor or Capacitor)

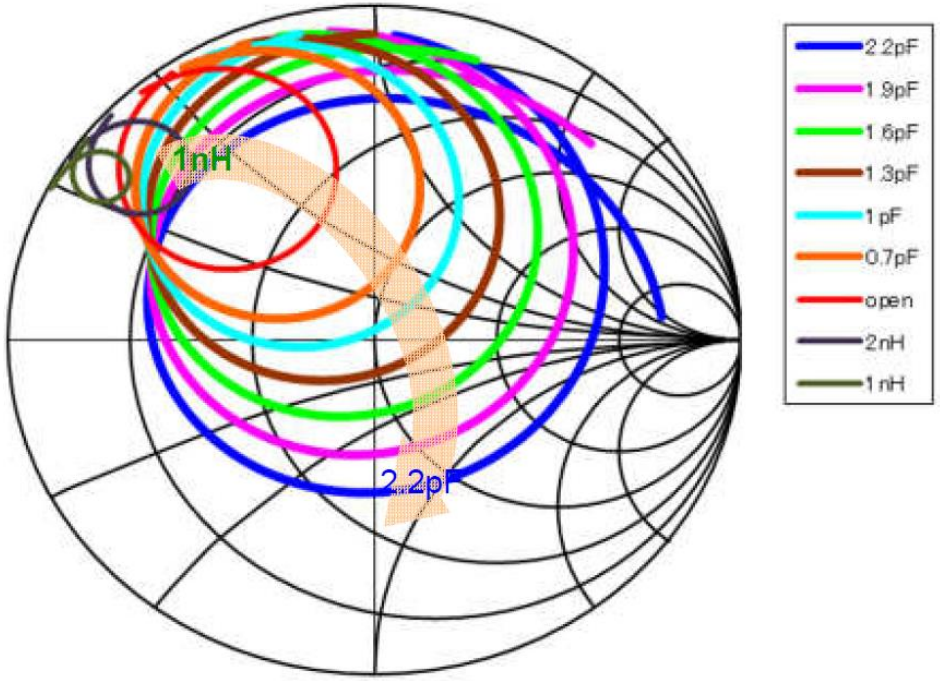
Impedance Tuning

▶FREQUENCY TUNING(SIMULATION RESULTS)



Frequency tuning value	0.6nH	0.4nH	0.2nH	short	9pF	8pF	7pF	6pF	5pF	4pF	3pF
Center Frequency(GHz)	2.112	2.152	2.194	2.242	2.357	2.370	2.388	2.410	2.440	2.485	2.555

IMPEDANCE MATCHING (SIMULATION RESULTS)



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