

# NGRM2050US0R433G3TRF

433/450/470 MHz ISM Chip Antenna



## Features

- Stable and reliable performance
- FR4 Material: Monopole
- Low Profile, Compact Size
- RoHs Complaint



## Applications

- Smart meters
- Wireless alarm and security system
- Industrial monitoring and control
- Machine to machine data communication
- 433/450/470 MHz ISM Band applications
- LTE band 31
- LPD433

## Specifications

Electrical			
Frequency Range	433.05 ~ 434.79 MHz	450 ~ 470 MHz	470 ~ 510 MHz
Center Frequency	433 MHz	460 MHz	490 MHz
Peak Gain (Typ.)	-0.2 dBi		
Efficiency (Typ.)	32%	35%	34%
V.S.W.R	2 Max.	2.5 Max.	2.5 Max.
Maximum Input Power:	2 W		
Polarization	Linear		
Impedance	50Ω		
Environmental			
Operating Temperature	-40°C~+125°C		
Storage Temperature	-5°C~+40°C -40°C~+85°C : After mounting on PCB		
Relative Humidity	10% to 70% : Operating & Storage after mounting on PCB 20% to 70% : Storage		
Shelf Life	1 year		
RoHs Compliant	Yes		

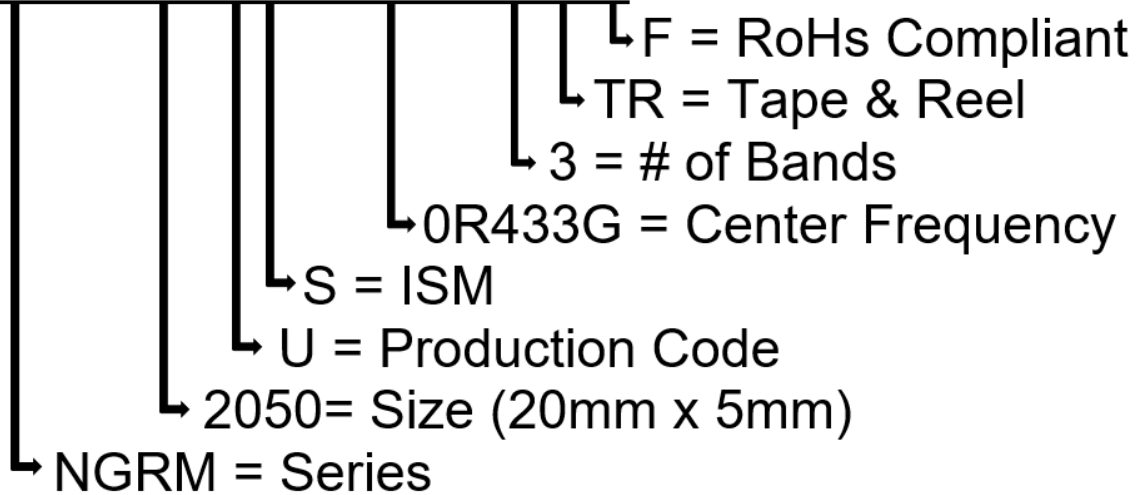
# NGRM2050US0R433G3TRF

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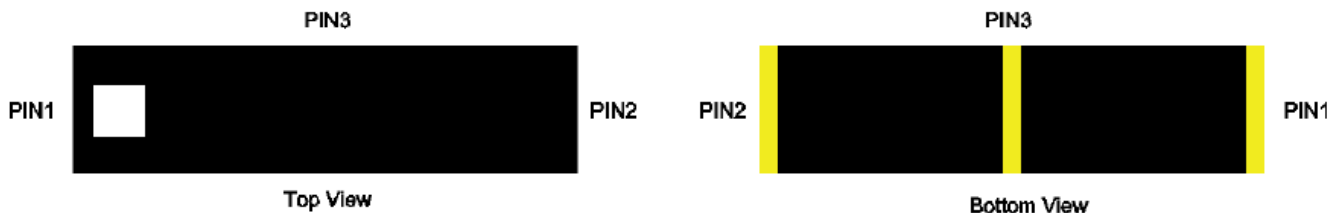


## Part Number Breakdown

NGRM2050US0R433G3TRF



## Pin Definition



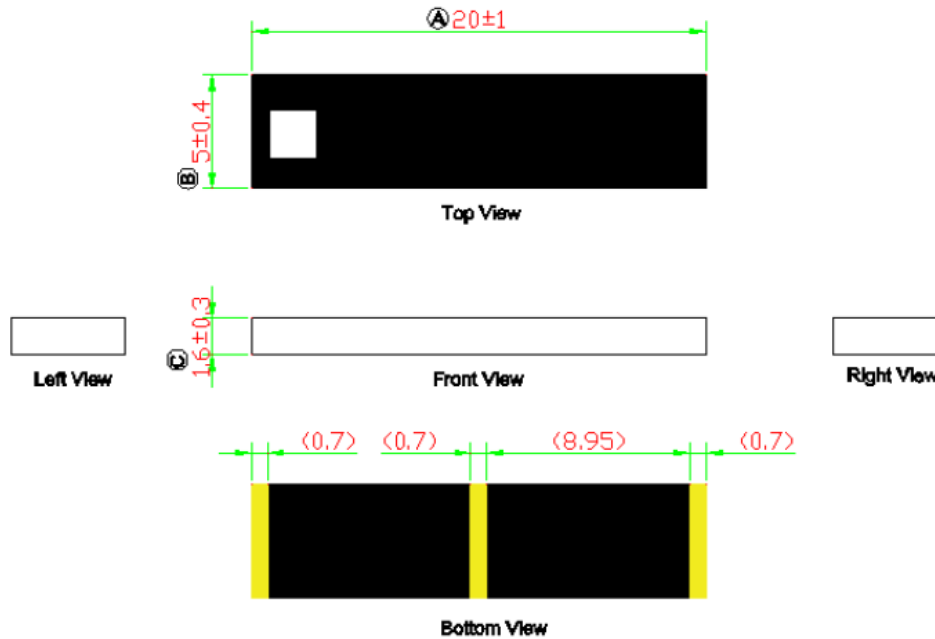
PIN	1	2 ~3
Soldering Pad	Signal	N/C

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## Dimension Drawing



### NOTE:

1. All materials are RoHS 2.0 compliant.
2. "A~C" Critical Dimensions.
3. "( )" Reference Dimensions.

## Dimensions (mm) & Mechanical

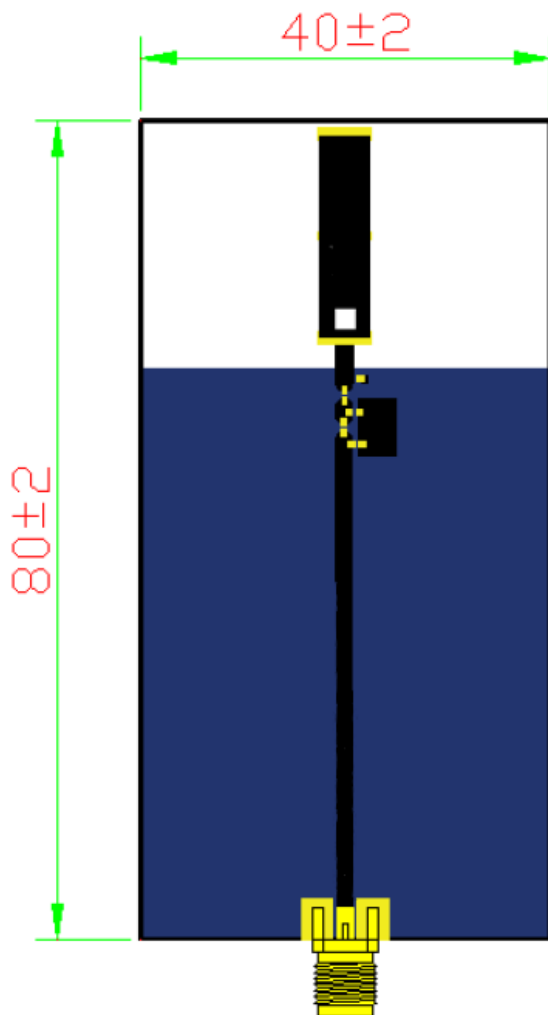
Body Length (A)	$20 \pm 1.0$
Width (B)	$5 \pm 0.4$
Thickness (C)	$1.6 \pm 0.3$
Connection Type	SMT
Evaluation Board	55.75 mm x 40 mm
Material	FR4

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## Evaluation Board



unit : mm

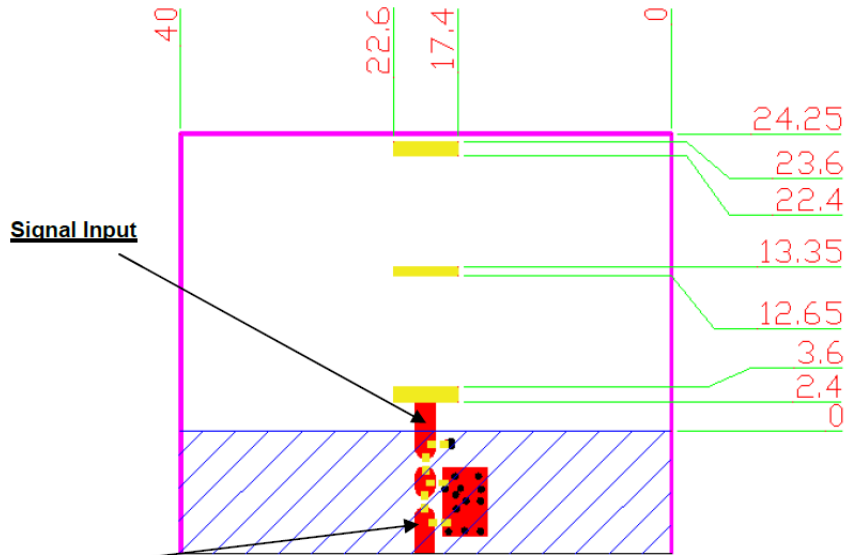
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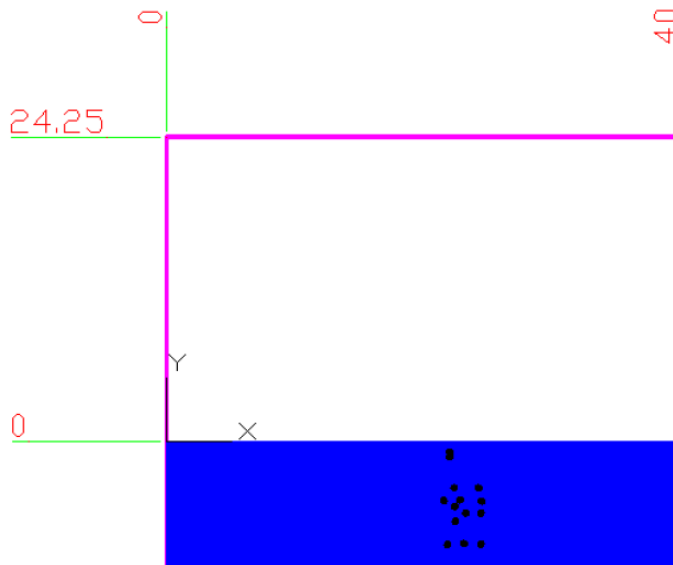


## Solder Land Pattern

The gold areas represent the solder land pattern. Any recommendations on the matching circuit will be provided according to the customer's installation conditions.



Transmission Line with 50Ω Impedance Characteristic Top View



Bottom View

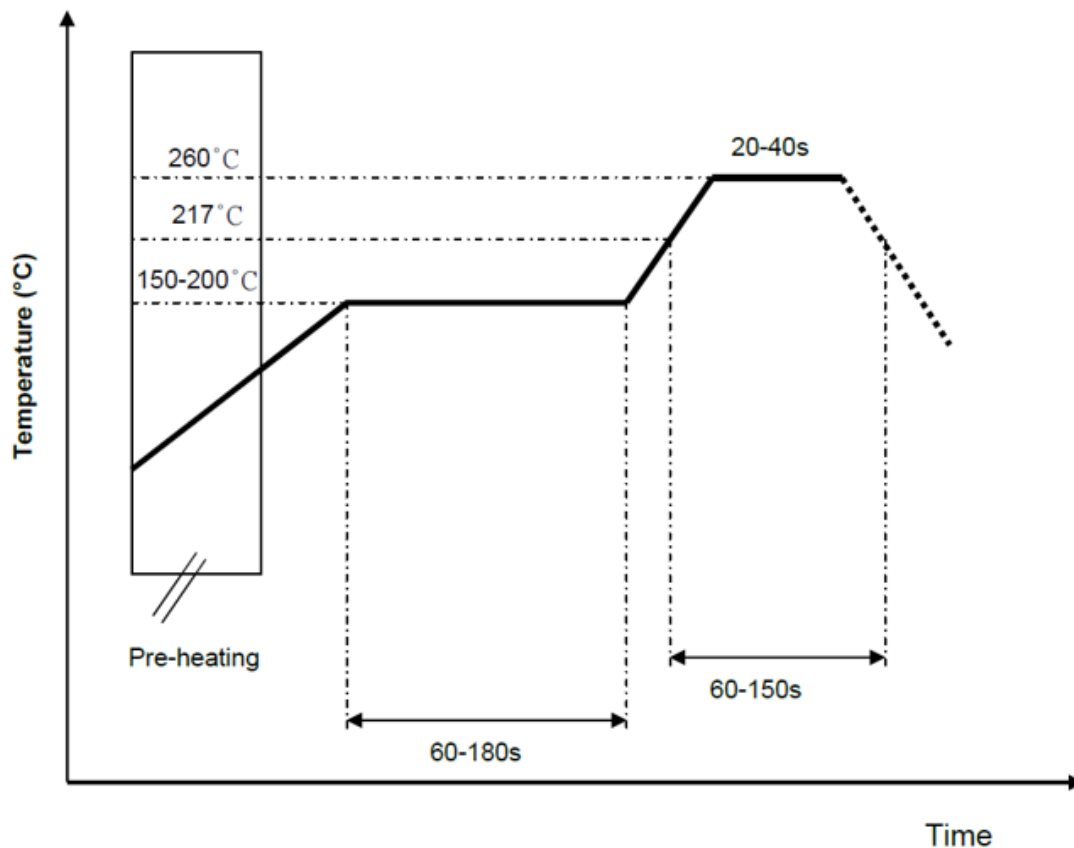
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## Soldering Conditions

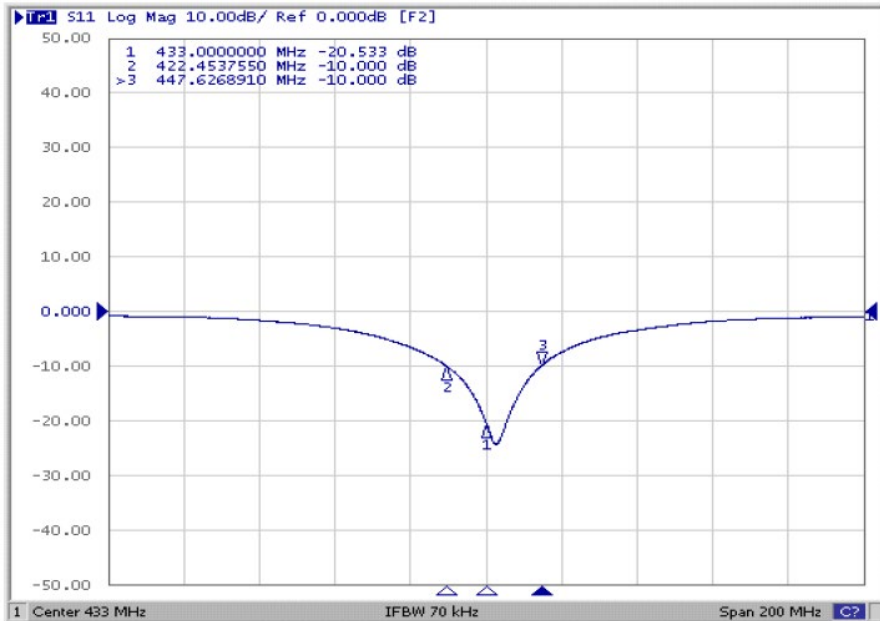
### Soldering Profile Limits



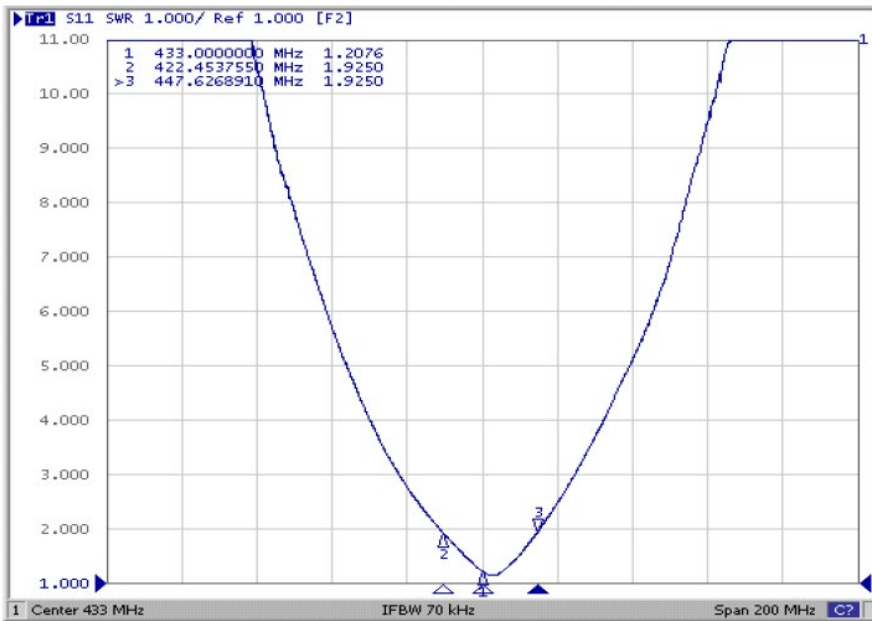


### 433 MHz

### Return Loss (S<sub>11</sub>)



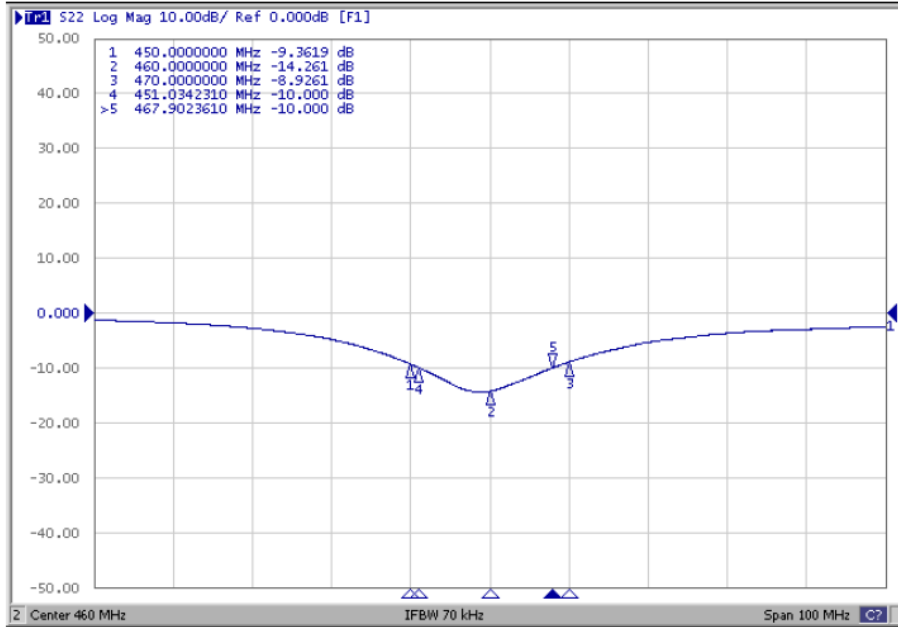
### VSWR (S<sub>11</sub>)



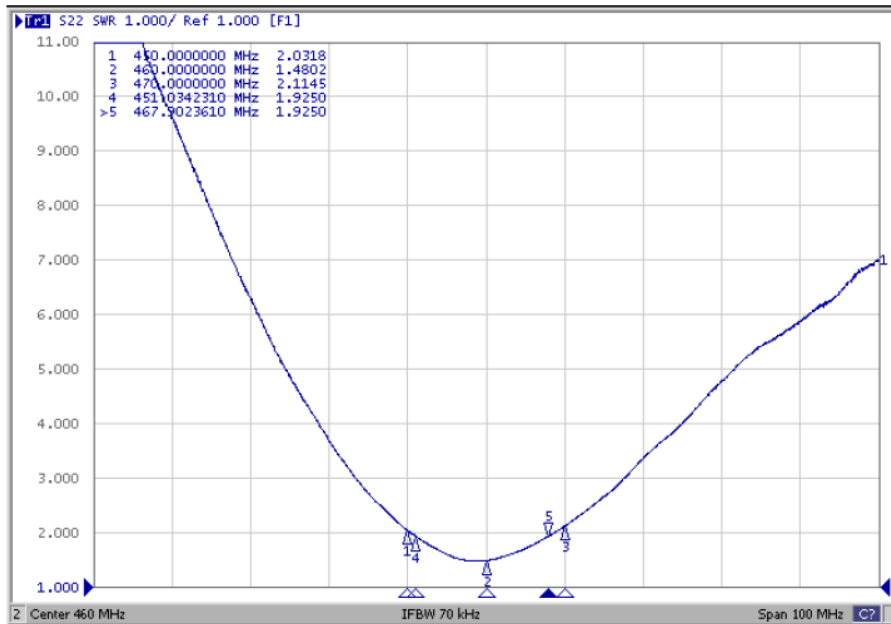


### 450 MHz

### Return Loss ( $S_{11}$ )



### VSWR ( $S_{11}$ )

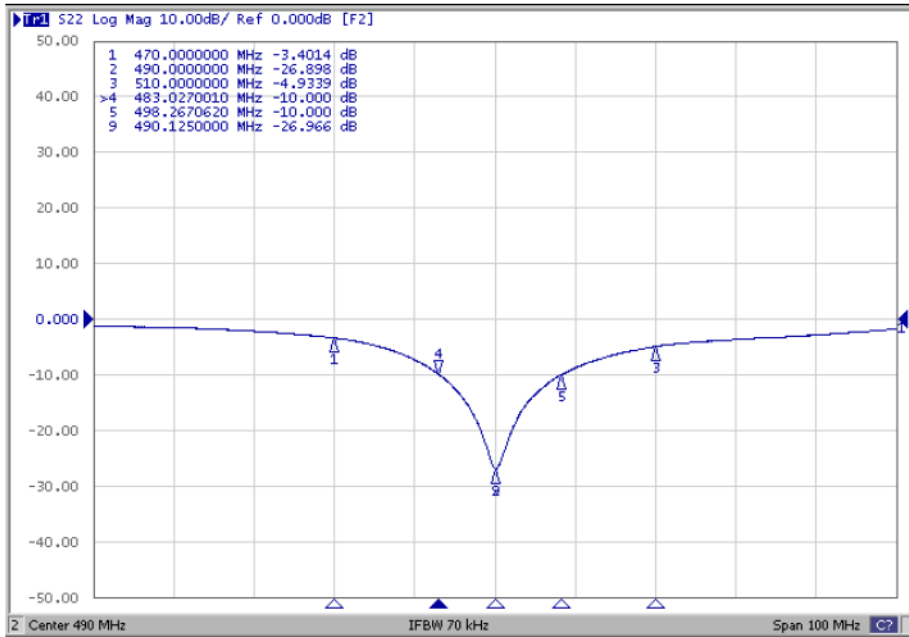




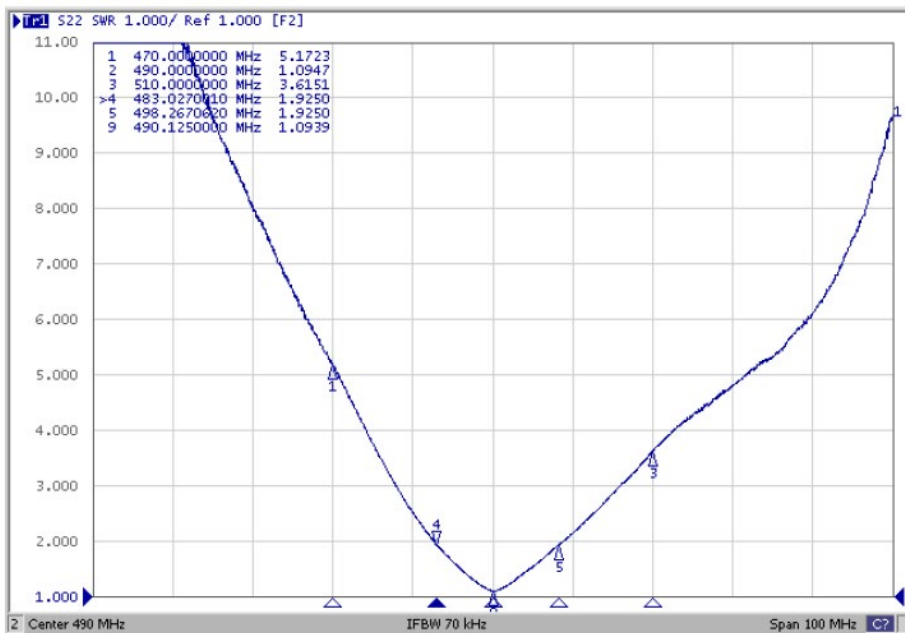


### 470 MHz

### Return Loss ( $S_{11}$ )



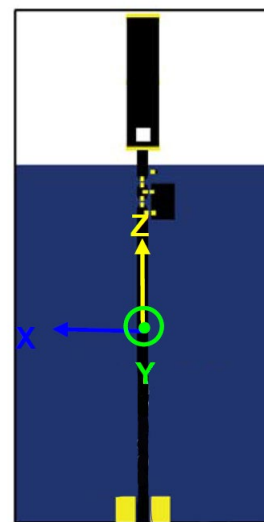
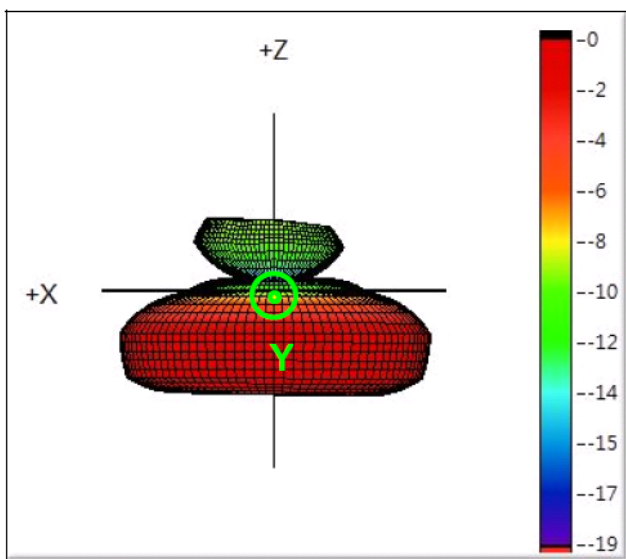
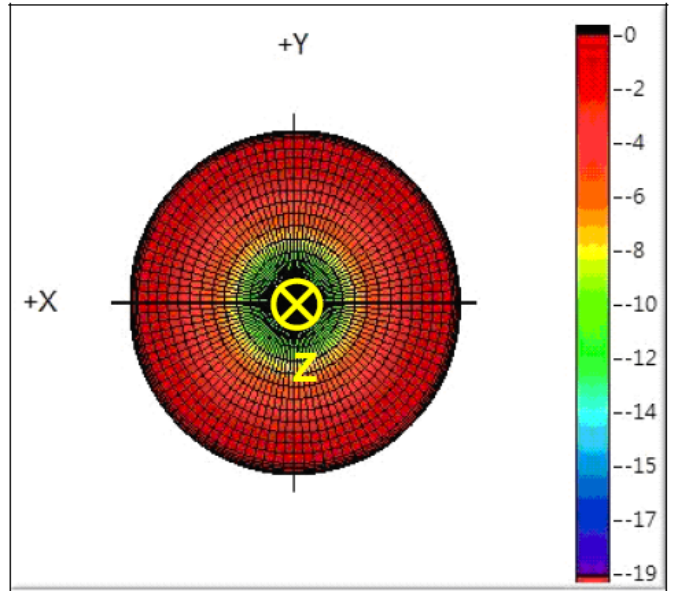
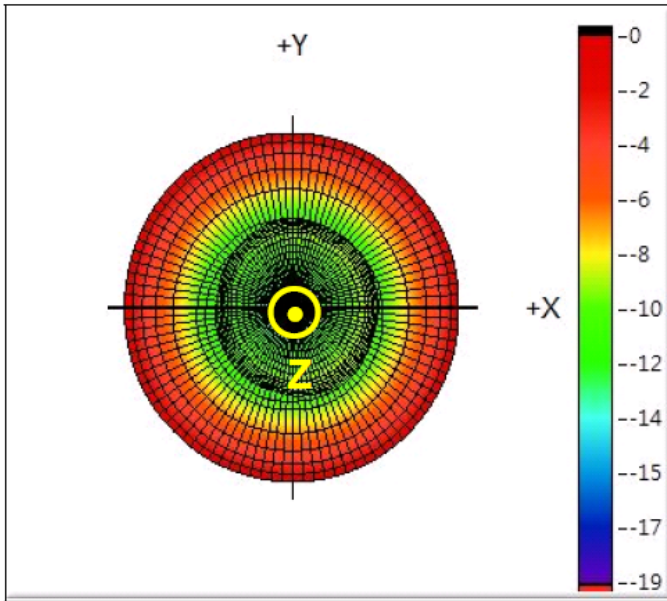
### VSWR ( $S_{11}$ )



### Radiation Patterns:

#### 3D Radiation Gain Patterns

433.05 ~ 434.79 MHz Band @ 433 MHz (unit: dBi)



# NGRM2050US0R433G3TRF

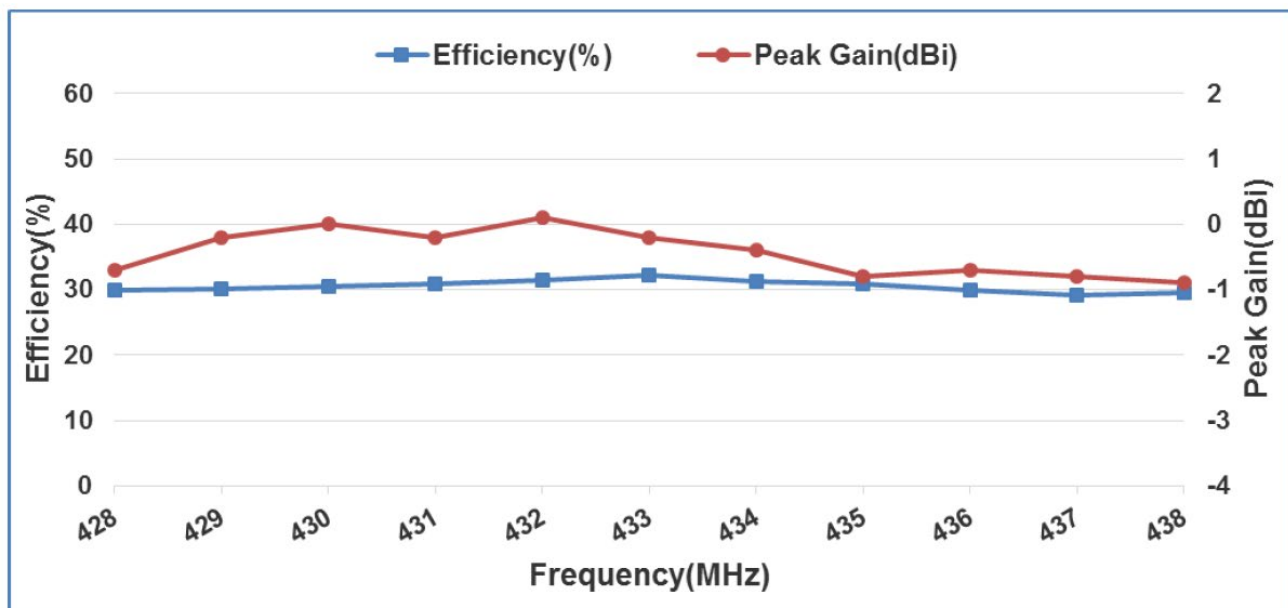
433/450/470 MHz ISM Chip Antenna



## Efficiency Table

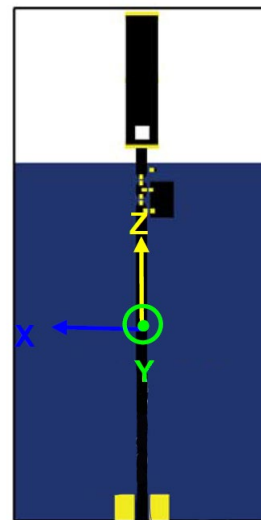
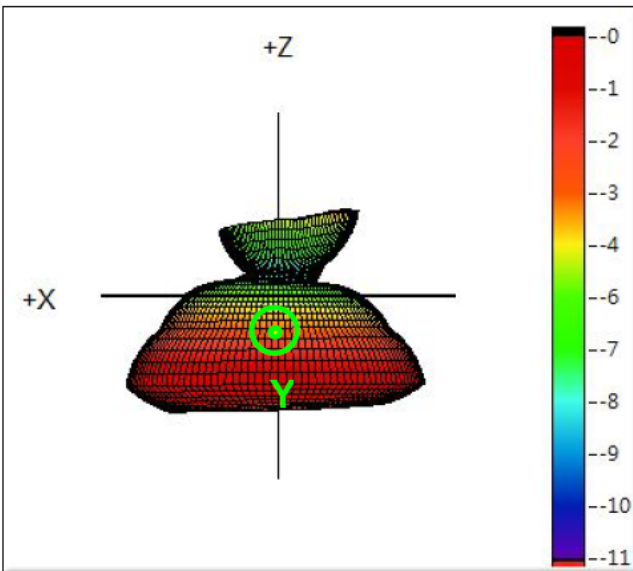
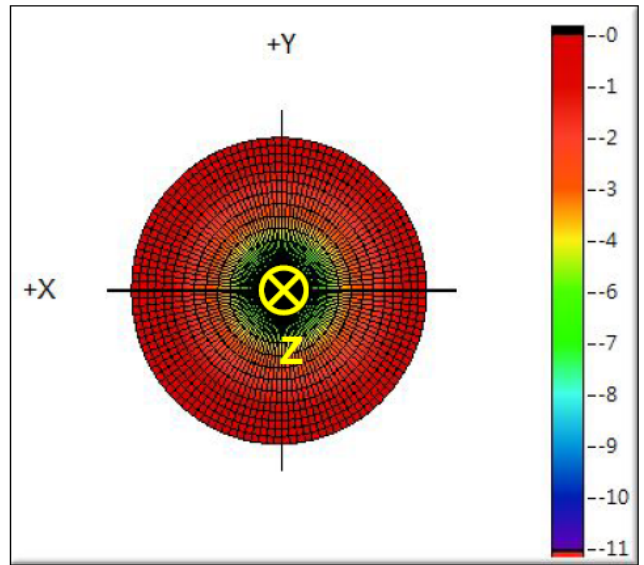
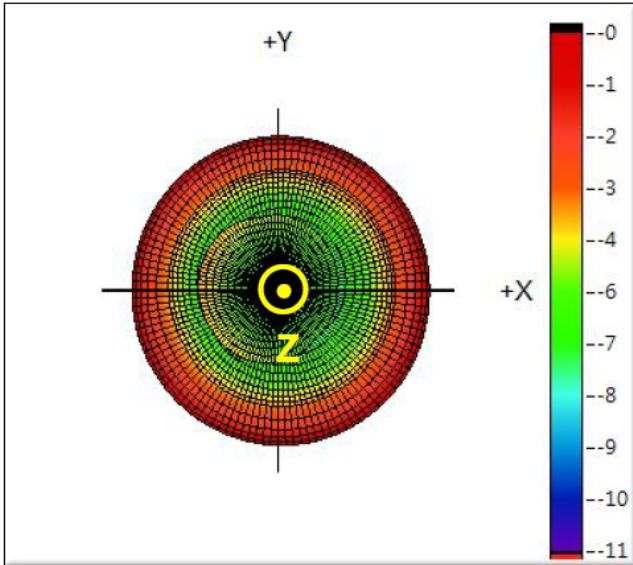
Frequency (MHz)	428	429	430	431	432	433	434	435	436	437	438
Efficiency (dB)	-5.2	-5.2	-5.1	-5.1	-5.0	-4.9	-5.1	-5.1	-5.2	-5.3	-5.3
Efficiency (%)	29.9	30.2	30.6	30.9	31.4	32.2	31.2	30.8	29.9	29.2	29.5
Peak Gain (dBi)	-0.7	-0.2	0.0	-0.2	0.1	-0.2	-0.4	-0.8	-0.7	-0.8	-0.9

## Efficiency vs. Frequency



### 3D Radiation Gain Patterns

450 ~ 470 MHz Band @ 433 MHz (unit: dBi)

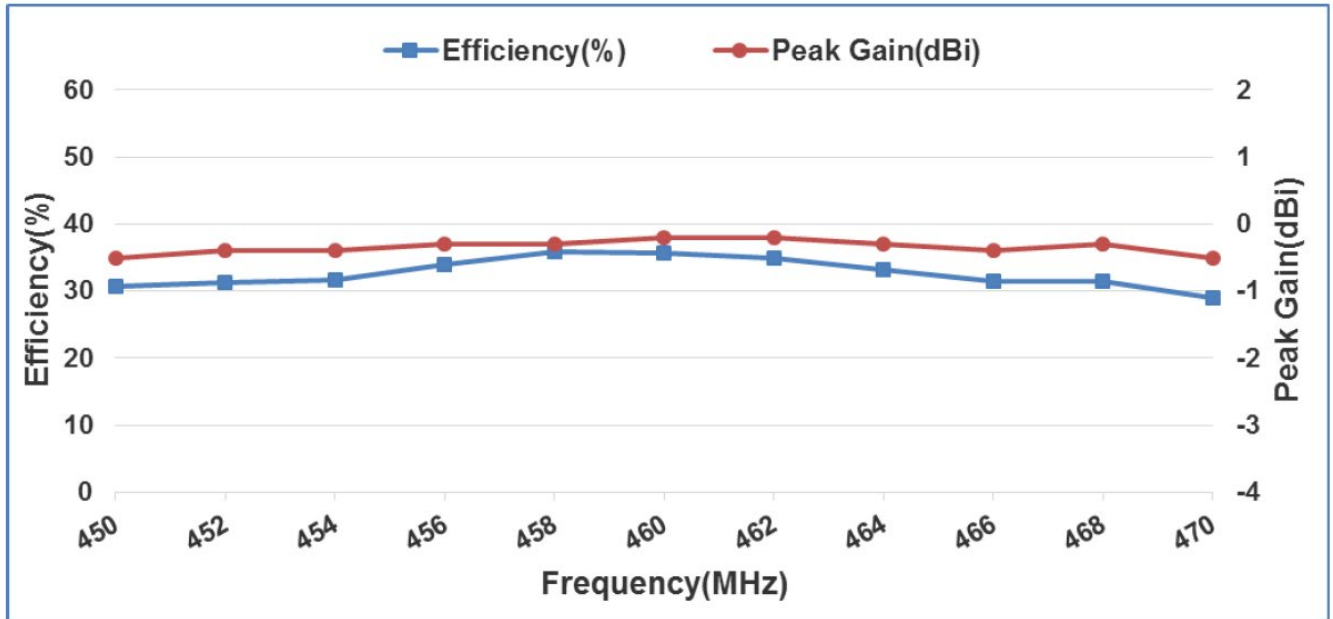




### Efficiency Table

Frequency (MHz)	450	452	454	456	458	460	462	464	466	468	470
Efficiency (dB)	-5.1	-5.1	-5.0	-4.7	-4.5	-4.5	-4.6	-4.8	-5.0	-5.0	-5.4
Efficiency (%)	30.7	31.2	31.6	34.0	35.8	35.6	34.9	33.1	31.4	31.4	29.0
Peak Gain (dBi)	-0.5	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.3	-0.4	-0.3	-0.5

### Efficiency vs. Frequency



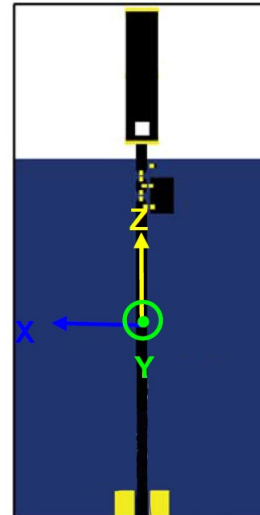
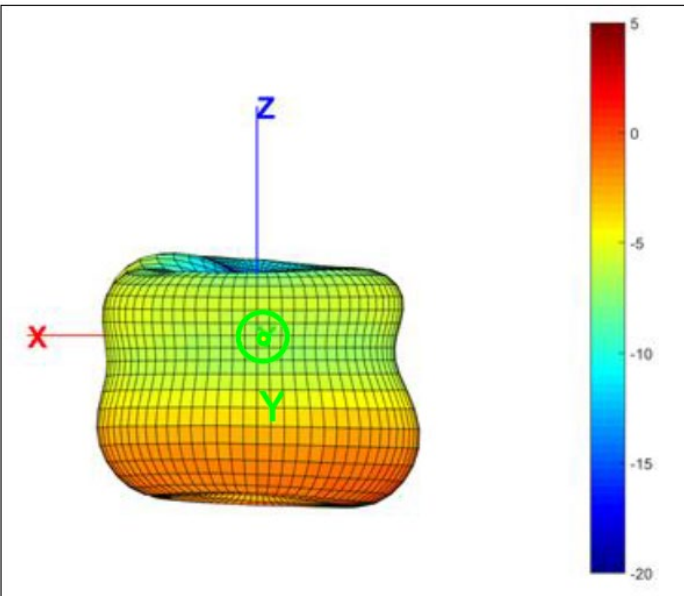
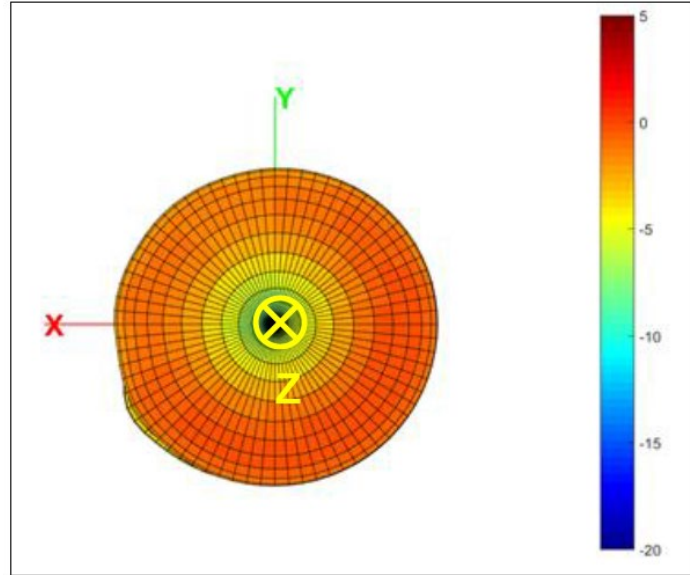
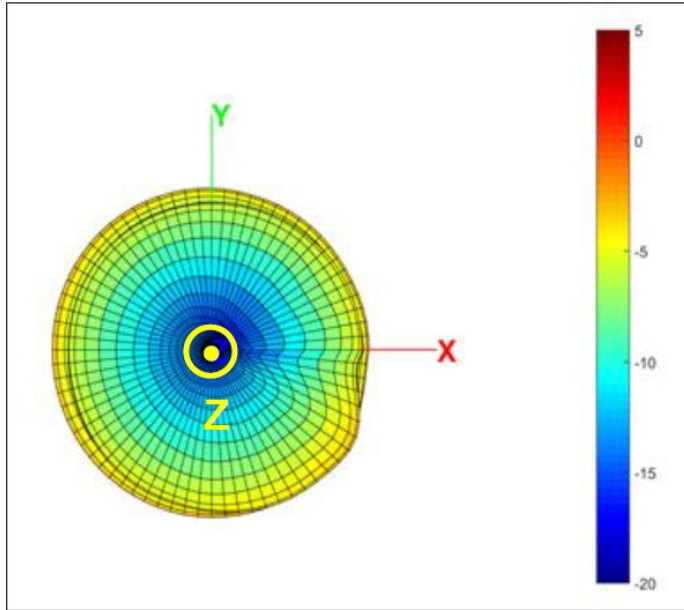
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## 3D Radiation Gain Patterns

450 ~ 470 MHz Band @ 433 MHz (unit: dBi)





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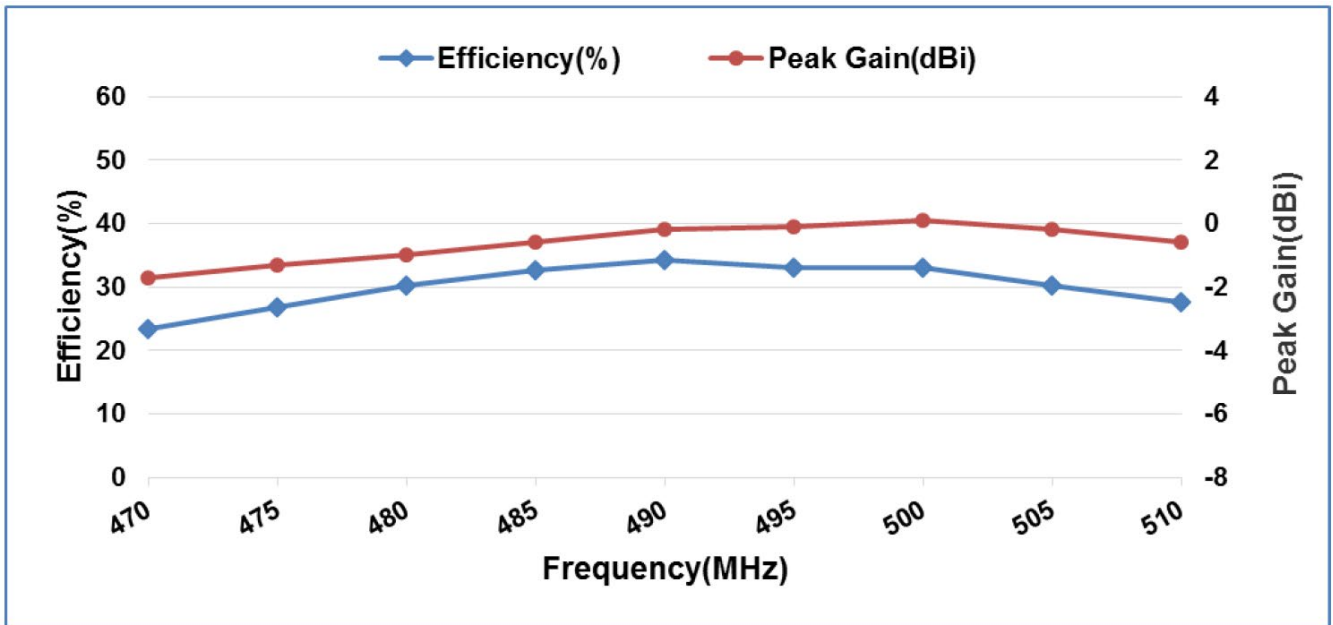
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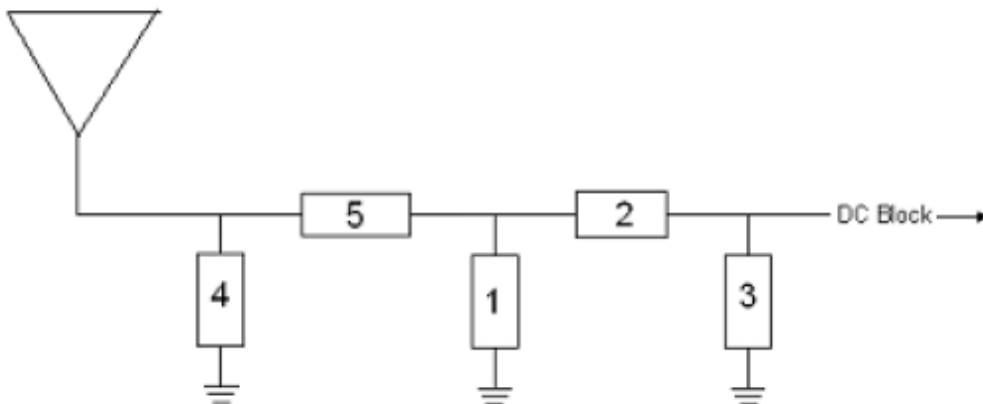
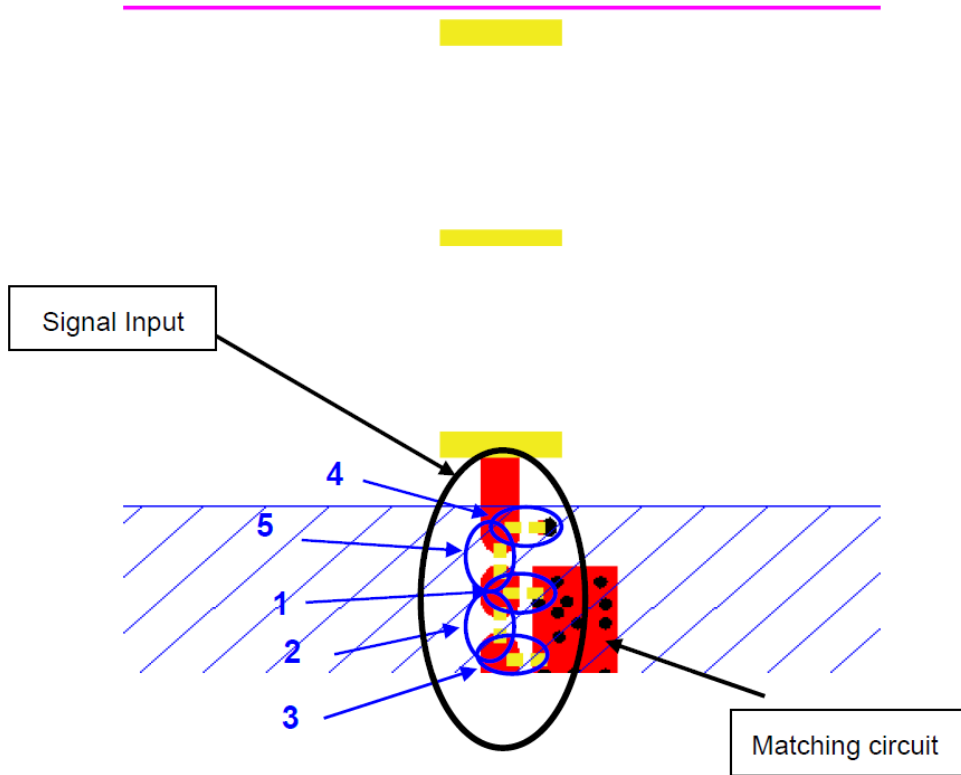
## Efficiency Table

Frequency (MHz)	470	475	480	485	490	495	500	505	510
Efficiency (dB)	-6.3	-5.7	-5.2	-4.9	-4.7	-4.8	-4.8	-5.2	-5.6
Efficiency (%)	23.5	26.8	30.3	32.6	34.3	33.0	33.1	30.3	27.6
Peak Gain (dBi)	-1.7	-1.3	-1.0	-0.6	-0.2	-0.1	0.1	-0.2	-0.6

## Efficiency vs. Frequency



### Frequency Tuning & Matching Circuit





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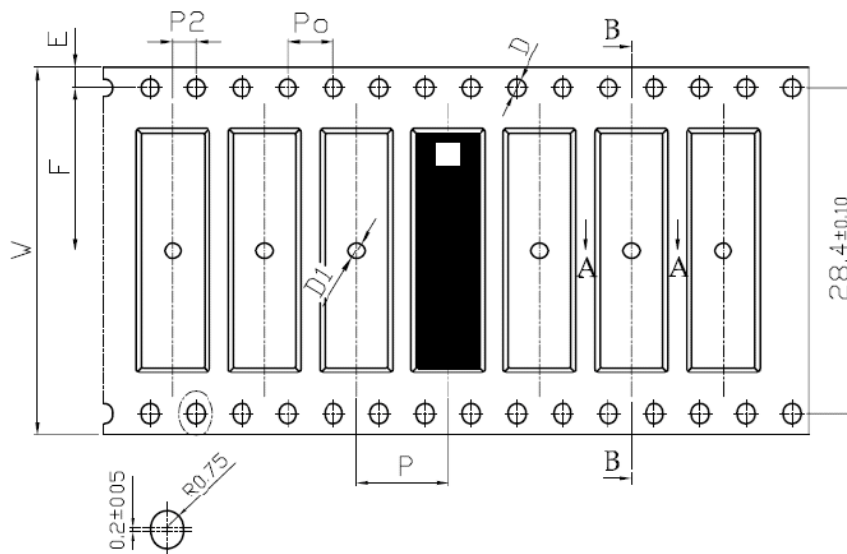
## System Matching Circuit Component

Location	Description	Tolerance	NIC Part Number
1 & 3	N/A	-	-
2	0Ω, (0402)	-	<a href="#">NRC04Z0TRF</a>
4	0.4pF, (0402)	±0.05	<a href="#">NMC-Q0402NPO0R4A50TRPF</a>
5	56nH, (0402)	±3%	<a href="#">NIN-SK56NHTR340F</a>

### Packing

- (1) Quantity/Reel: 2500 pcs/Reel
- (2) Plastic tape: Black Conductive Polystyrene.

### Tape Drawing



### Tape Dimensions (unit: mm)

Feature	Specifications	Tolerances
W	32.00	±0.30
P	8.00	±0.10
E	1.75	±0.10
F	14.20	±0.10
P2	2.00	±0.10
D	1.50	+0.10 -0.00
D1	1.50	±0.10
Po	4.00	±0.10
10Po	40.00	±0.20