

QRA07011 Datasheet

2.4/5/6 GHz Compund-loop Triband Antenna

Applications

- Wi-Fi IoT modules
- Routers

Features

- Excellent omni-directional radiation patterns
- Very compact form factor
- Standard low-cost FR4 material

Key Specifications

- Average efficiency
 - 53.3% (2.4 GHz)
 - 76.4% (5 GHz)
 - 73.0% (6 GHz)
- Peak gain
 - 4.40 dBi (2.4 GHz)
 - 3.98 dBi (5 GHz)
 - 3.96 dBi (6 GHz)

Overview

The QuantalRF QRA07011 is a compact, high-efficiency PCB antenna for dual-band Wi-Fi 4, Wi-Fi 5, Wi-Fi 6 and Wi-Fi 7. The base design which is specified in this data sheet can be customized to specific use cases and applications to ensure that all customer demands are met. The QRA07011 provides superior efficiency compared to other antennas of similar size which can be utilized for longer range and/or reduced power consumption.

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1 Antenna Specifications

1.1 Electrical Specifications

Table 1: General specifications

Parameter	Specification
Frequency range	2400 – 2500 MHz, 5150 – 5850 MHz, 5950 MHz – 7150 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omnidirectional

Table 2: Detailed specifications

Parameter	2400 – 2500 MHz	5150 – 5850 MHz	5950 – 7150 MHz
Maximum VSWR	1.56	1.56	1.98
Minimum return loss (dB)	13.1	13.2	9.6
Average efficiency (%)	53.3	76.4	73.0
Average gain (dBi)	-2.73	-1.17	-1.37
Maximum peak gain (dBi)	4.40	3.98	3.96

1.2 Mechanical and Environmental Specifications

Parameter	Specification
Antenna dimensions	7.5 mm x 11.5 mm
Antenna type	Integrated on PCB
Material	FR4 ($\epsilon_r = 4.4$, $\tan\delta = 0.02$)
Operating temperature	-40C to +85C
Storage temperature	-40C to +85C

2 Antenna Performance

2.1 VSWR

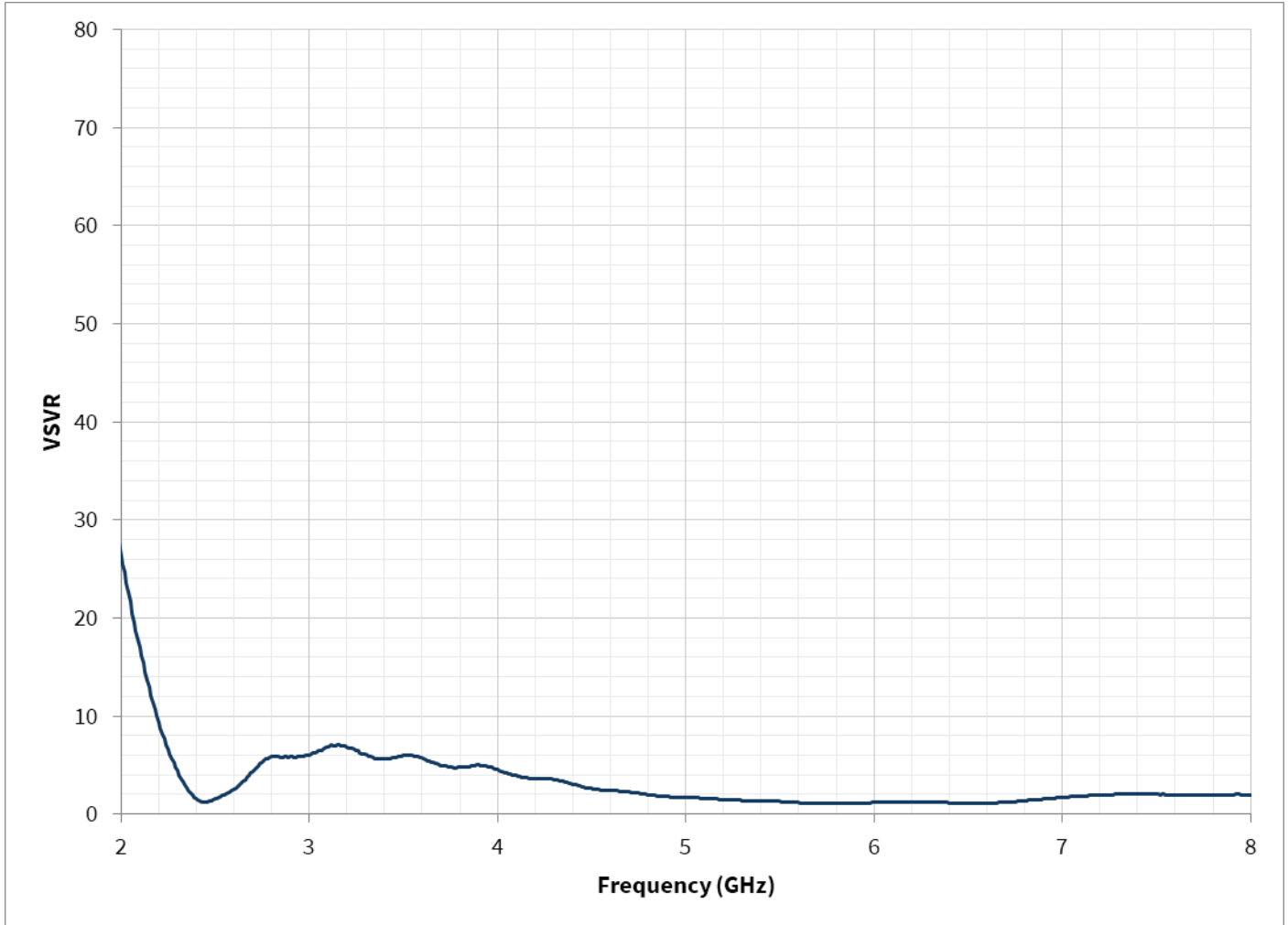


Table 3: 2.4 GHz VSWR

Frequency (MHz)	2400	2420	2440	2460	2480
VSWR	1.57	1.31	1.19	1.24	1.39

Table 4: 5 GHz VSWR

Frequency (MHz)	5150	5200	5250	5300	5350
VSWR	1.56	1.49	1.44	1.39	1.37
Frequency (MHz)	5400	5450	5500	5550	5600
VSWR	1.34	1.33	1.29	1.23	1.17
Frequency (MHz)	5650	5700	5750	5800	5850
VSWR	1.12	1.09	1.08	1.07	1.06

Table 5: 6 GHz VSWR

Frequency (MHz)	5950	6050	6150	6250	6350
VSWR	1.12	1.22	1.25	1.22	1.19
Frequency (MHz)	6450	6550	6650	6750	6850
VSWR	1.12	1.05	1.16	1.28	1.44
Frequency (MHz)	6950	7050	7150		
VSWR	1.62	1.79	1.90		

2.2 Return loss

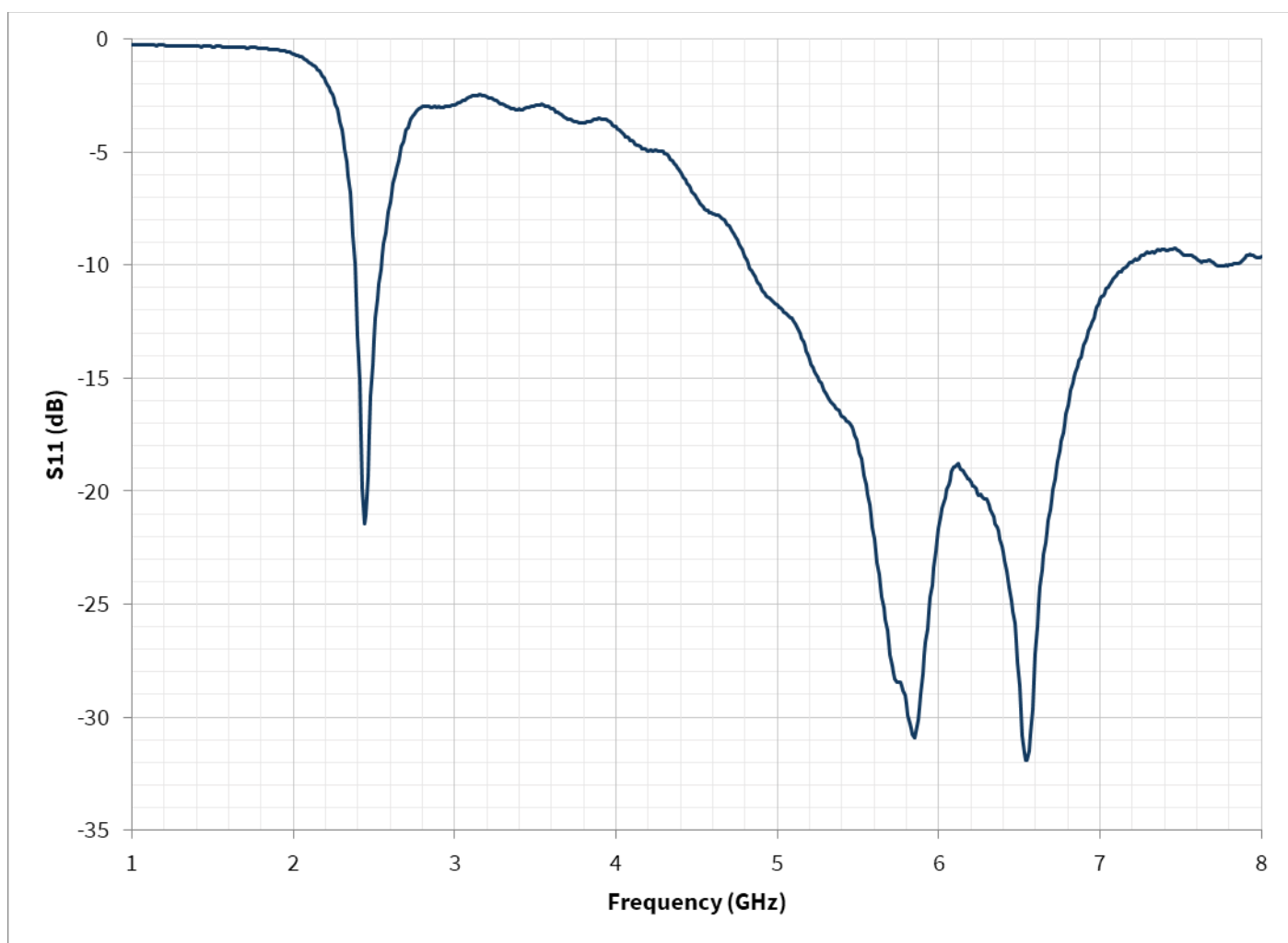


Table 6: 2.4 GHz Return loss (dB)

Frequency (MHz)	2400	2420	2440	2460	2480
Return loss (dB)	13.1	17.4	21.4	19.4	15.8

Table 7: 5 GHz Return loss (dB)

Frequency (MHz)	5150	5200	5250	5300	5350
Return loss (dB)	13.2	14.2	15.0	15.7	16.2
Frequency (MHz)	5400	5450	5500	5550	5600
Return loss (dB)	16.7	17.0	18.0	19.7	22.1
Frequency (MHz)	5650	5700	5750	5800	5850
Return loss (dB)	24.7	27.2	28.4	29.4	30.9

Table 8: 6 GHz Return loss (dB)

Frequency (MHz)	5950	6050	6150	6250	6350
VSWR	24.7	19.9	19.1	20.2	21.4
Frequency (MHz)	6450	6550	6650	6750	6850
VSWR	24.8	31.9	22.8	18.2	14.8
Frequency (MHz)	6950	7050	7150		
VSWR	12.6	11.0	10.1		

2.3 Efficiency

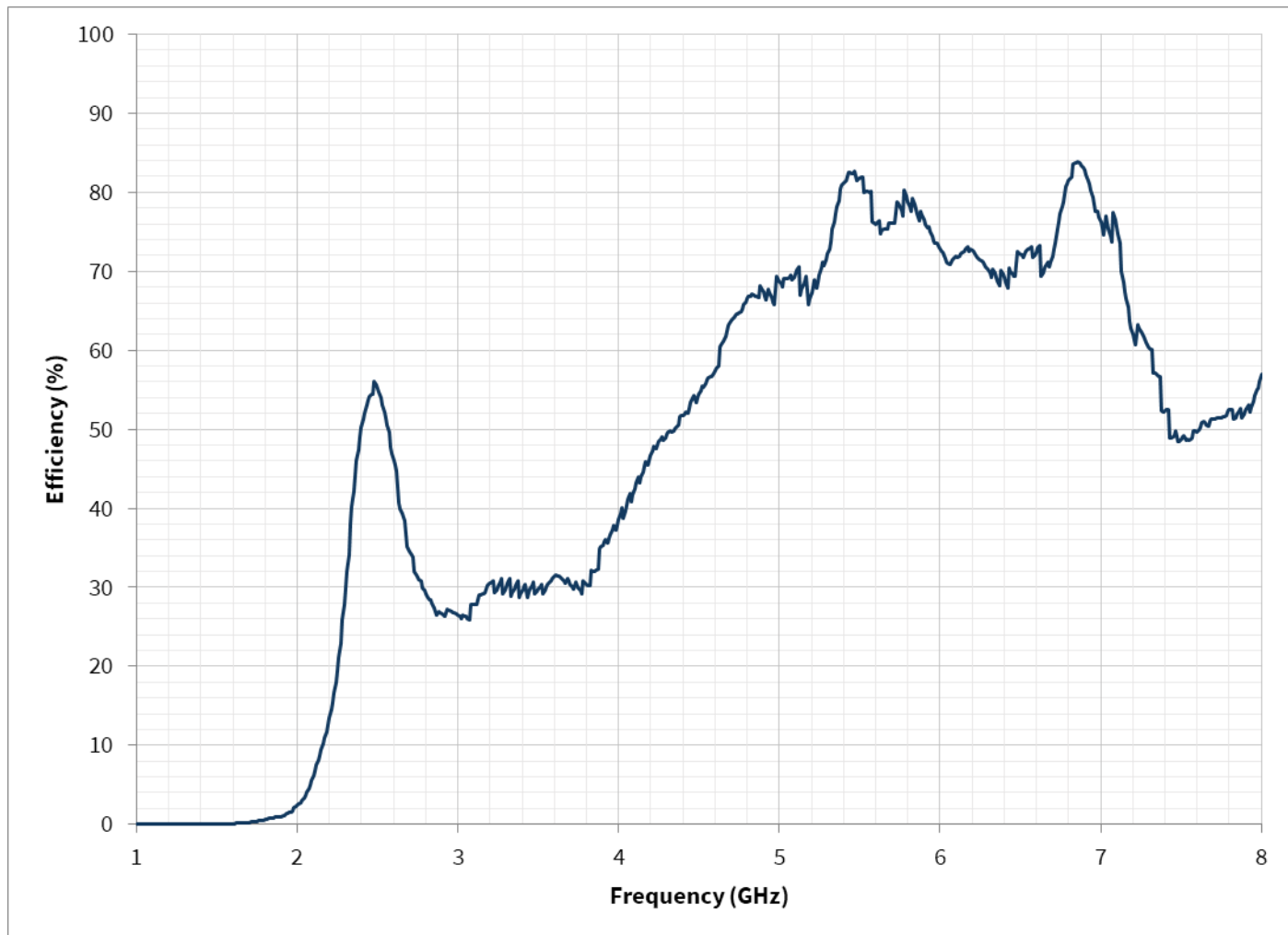


Table 9: 2.4 GHz Efficiency (%)

Frequency (MHz)	2400	2420	2440	2460	2480
Efficiency (%)	50.3	52.0	53.7	54.4	56.1

Table 10: 5 GHz Efficiency (%)

Frequency (MHz)	5150	5200	5250	5300	5350
Efficiency (%)	68.3	67.2	69.5	72.1	77.2
Frequency (MHz)	5400	5450	5500	5550	5600
Efficiency (%)	82.4	82.4	81.8	80.1	76.0
Frequency (MHz)	5650	5700	5750	5800	5850
Efficiency (%)	75.4	76.1	78.3	78.8	77.8

Table 11: 6 GHz Efficiency (%)

Frequency (MHz)	5950	6050	6150	6250	6350
Efficiency (%)	74.4	71.0	72.6	71.4	69.2
Frequency (MHz)	6450	6550	6650	6750	6850
Efficiency (%)	69.6	72.9	70.4	77.2	83.8
Frequency (MHz)	6950	7050	7150		
Efficiency (%)	79.4	75.4	67.5		

2.4 Average gain

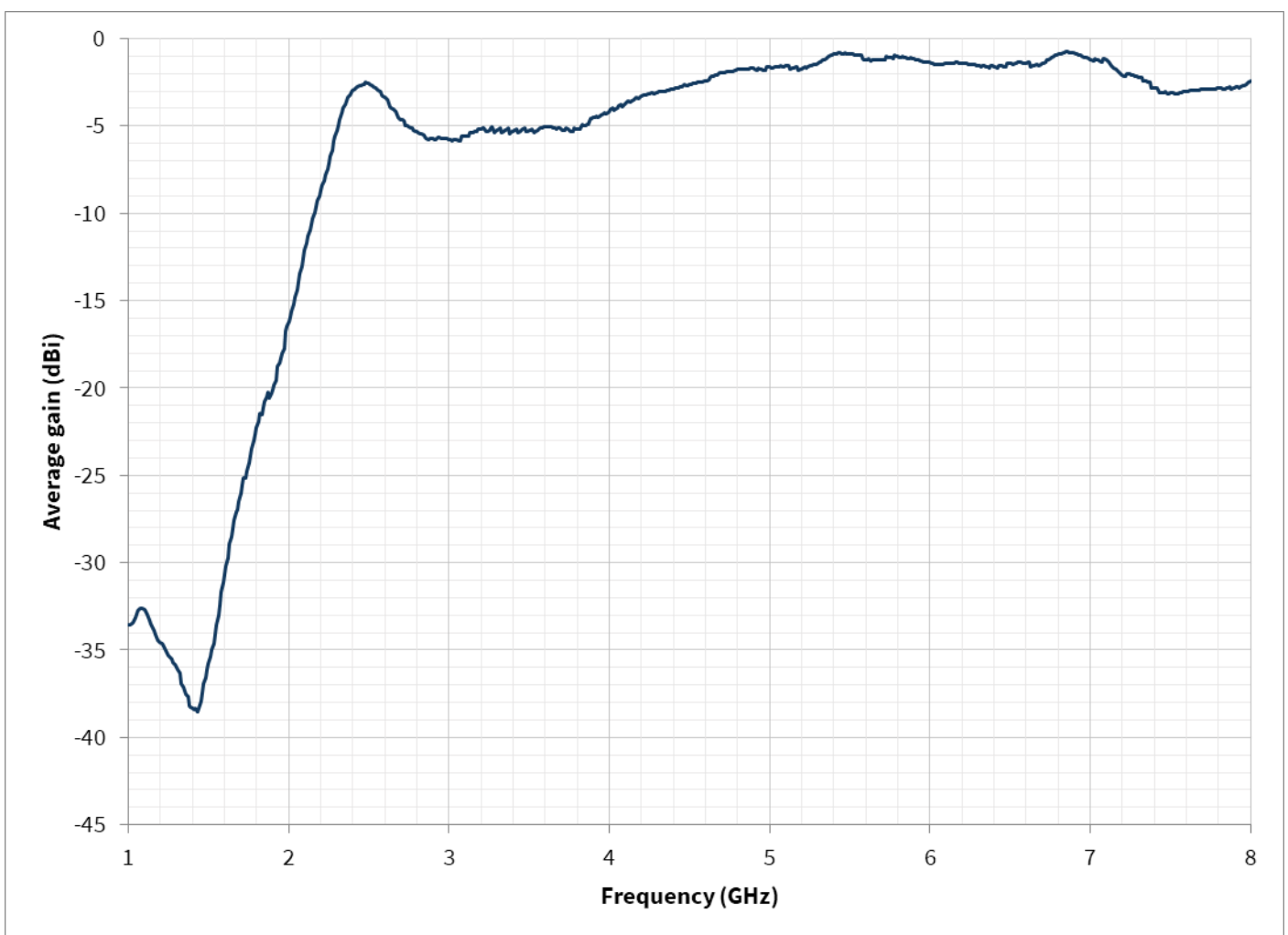


Table 12: 2.4 GHz Average gain (dBi)

Frequency (MHz)	2400	2420	2440	2460	2480
Average gain (dBi)	-2.98	-2.84	-2.70	-2.65	-2.51

Table 13: 5 GHz Average gain (dBi)

Frequency (MHz)	5150	5200	5250	5300	5350
Average gain (dBi)	-1.66	-1.72	-1.57	-1.42	-1.12
Frequency (MHz)	5400	5450	5500	5550	5600
Average gain (dBi)	-0.90	-0.84	-0.87	-0.97	-1.19
Frequency (MHz)	5650	5700	5750	5800	5850
Average gain (dBi)	-1.23	-1.18	-1.06	-1.03	-1.09

Table 14: 6 GHz Average gain (dBi)

Frequency (MHz)	5950	6050	6150	6250	6350
Average gain (dBi)	-1.29	-1.48	-1.39	-1.46	-1.60
Frequency (MHz)	6450	6550	6650	6750	6850
Average gain (dBi)	-1.57	-1.37	-1.53	-1.12	-0.77
Frequency (MHz)	6950	7050	7150		
Average gain (dBi)	-1.00	-1.23	-1.71		

2.5 Peak gain

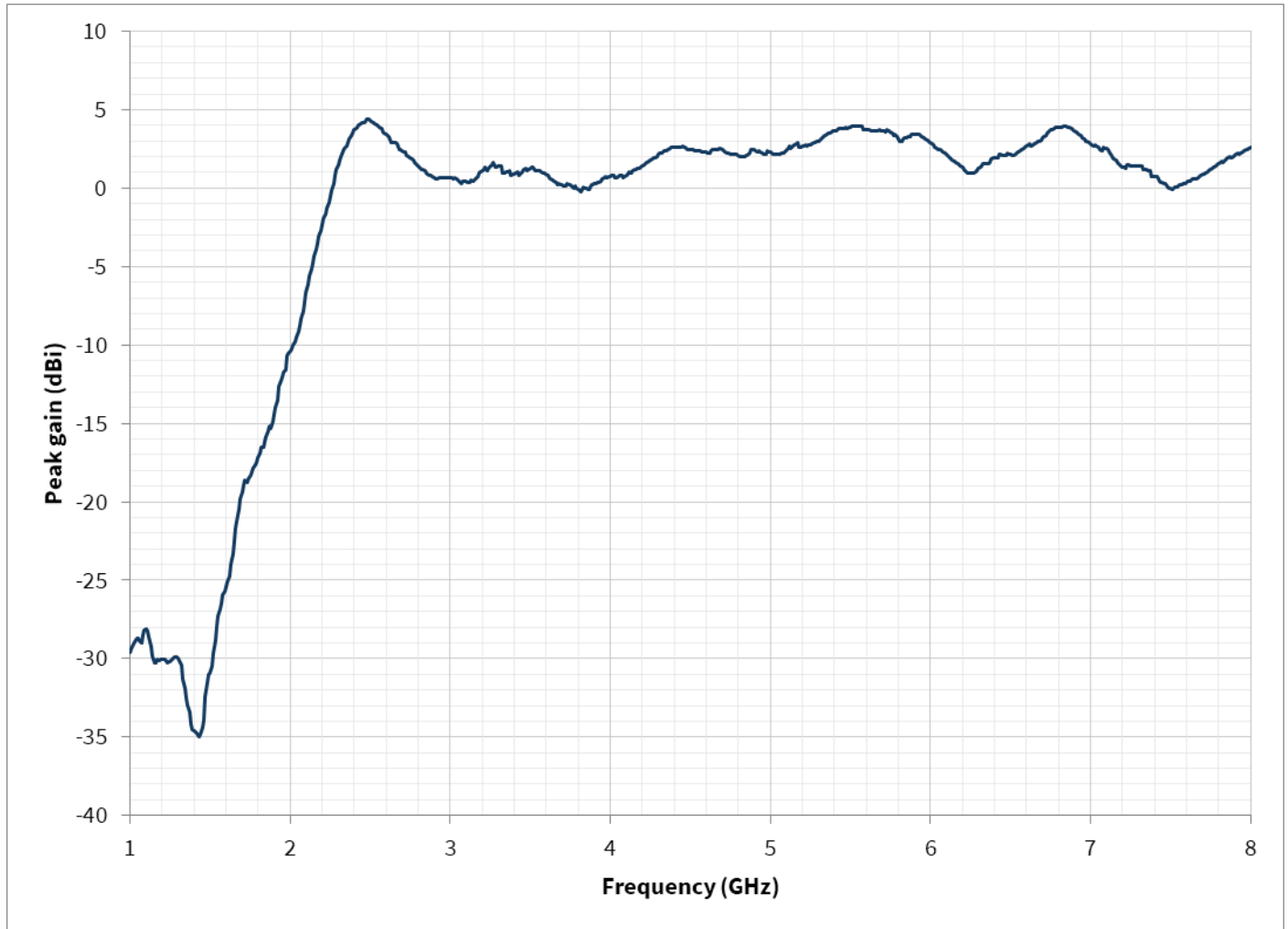


Table 15: 2.4 GHz Peak gain (dBi)

Frequency (MHz)	2400	2420	2440	2460	2480
Peak gain (dBi)	3.69	3.90	4.07	4.29	4.40

Table 16: 5 GHz Peak gain (dBi)

Frequency (MHz)	5150	5200	5250	5300	5350
Peak gain (dBi)	2.78	2.65	2.79	3.99	3.41
Frequency (MHz)	5400	5450	5500	5550	5600
Peak gain (dBi)	3.65	3.81	3.89	3.96	3.70
Frequency (MHz)	5650	5700	5750	5800	5850
Peak gain (dBi)	3.67	3.66	3.58	3.11	3.21

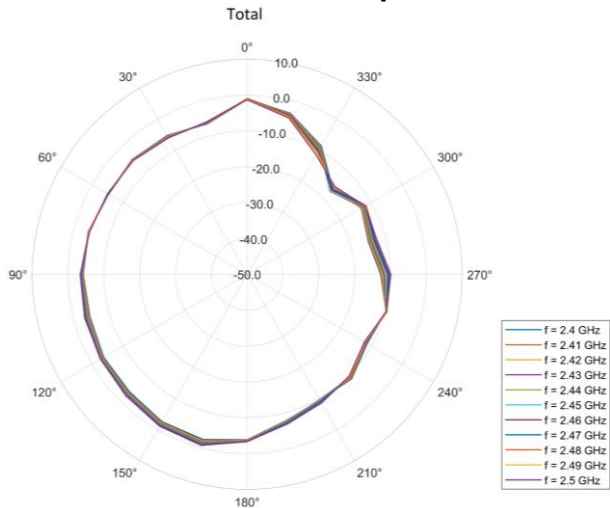
Table 17: 6 GHz Peak gain (dBi)

Frequency (MHz)	5950	6050	6150	6250	6350
Peak gain (dBi)	3.26	2.48	1.70	0.97	1.56
Frequency (MHz)	6450	6550	6650	6750	6850
Peak gain (dBi)	2.10	2.31	2.80	3.69	3,93
Frequency (MHz)	6950	7050	7150		
Peak gain (dBi)	3.21	2.57	1.85		

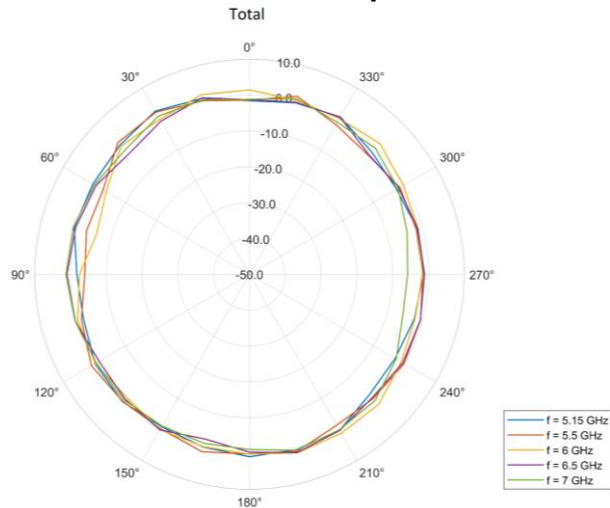
2.6 2D Radiation patterns

2.6.1 Azimuth plane

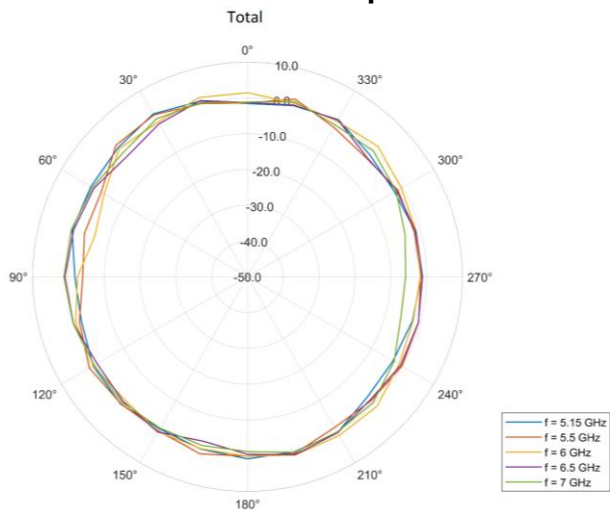
2.4 GHz azimuth plane



5 GHz azimuth plane

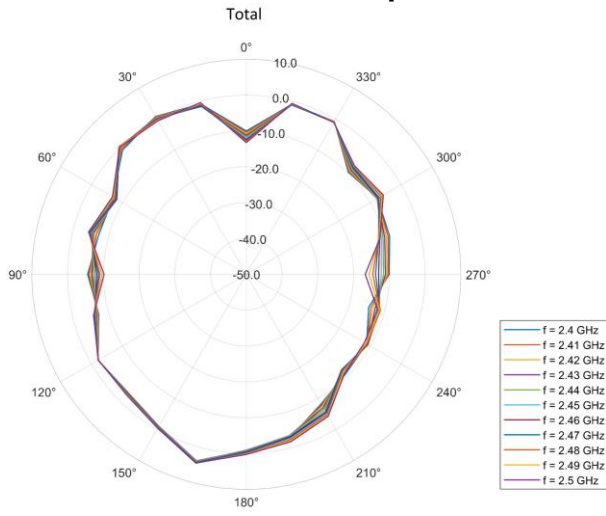


6 GHz azimuth plane

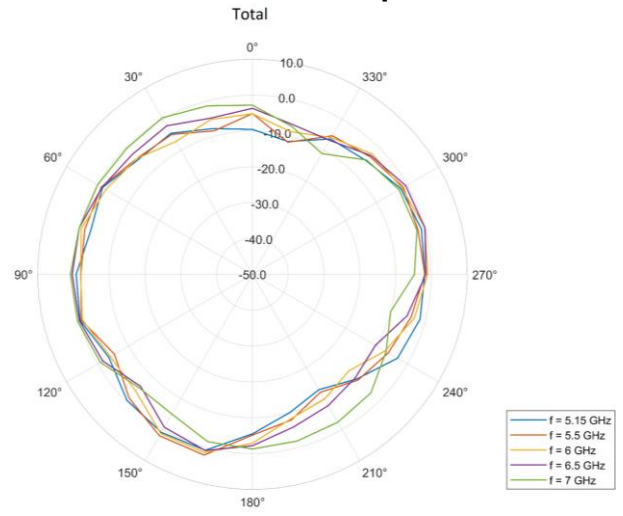


2.6.2 Elevation plane

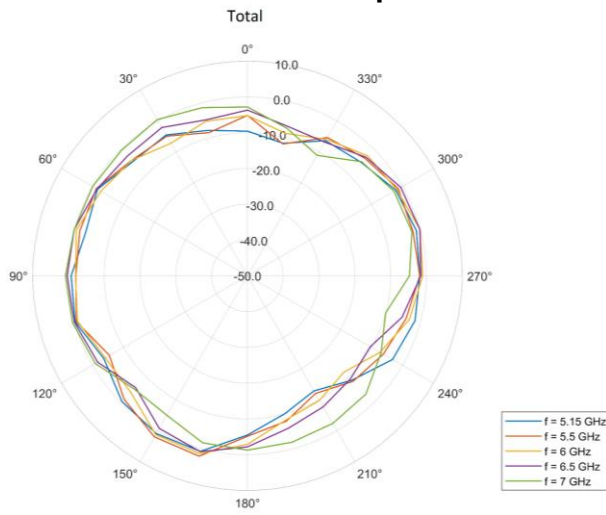
2.4 GHz elevation plane



5 GHz elevation plane



6 GHz elevation plane



RoHS Compliance

The part is compliant with the 2011/65/EU RoHS directive, as amended by Directive 2015/863/EU.

Contact Information

For the latest specifications, additional product information and support:

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Learn more at [quantalrf.com](https://www.quantalrf.com)

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