SiW917Y1GA Integral Antenna Data Sheet

This document provides the specification of the integral antenna designed in the Wi-Fi 802.11b/g/n/ax and *Bluetooth* Low Energy (LE) combo wireless radio modules with model name of *SiW917Y1GA* and brand name of *SILICON LABS*.

Antenna type: PCB Trace.

Manufacturer: Silicon Laboratories Finland Oy
Address: Alberga Business Park, Bertel Jungin aukio 3, 02600 Espoo, Finland - Web: https://www.silabs.com/

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1. Overview

The integral antenna of the SiW917Y1GA radio modules is a ground loop PCB trace type.

The part which is integral to the module acts as the 2.4GHz resonator, and it is comprised of traces, discrete chip components, and their distributed parasitic, within a controlled substrate.

This antenna relies on an external loop trace, acting as the reflector being designed in host board, and on the ground plane of such host board. See the user manual / datasheet for the detailed requirements concerning the host part.

The chip capacitors, in series with the antenna loop trace, connects to the GND plane of the host board.

The embedded antenna is not commercially available: it is only intended for use as the self-contained integral antenna of the radio module.

Similarly to the module, the integral antenna itself is identified as follows:

Model name: SiW917Y1GA
Brand name: SILICON LABS
Manufacturer: Silicon Laboratories Finland Oy (address: Alberga Business Park, Bertel Jungin aukio 3, 02600 Espoo, Finland)

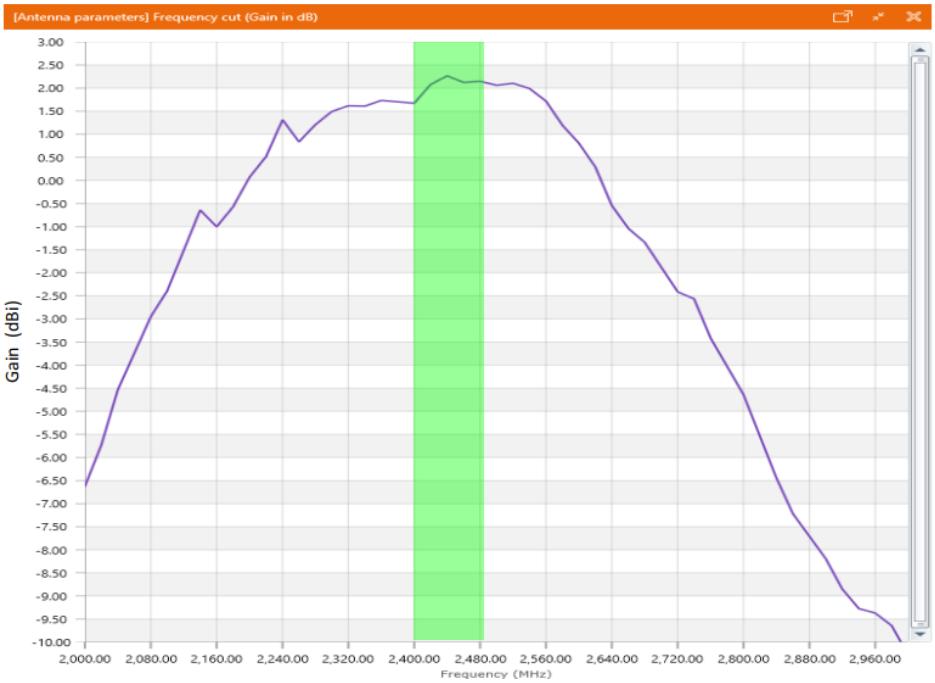
2. Antenna specification

Parameter	Min	Typ	Max	Unit
Frequency Range of Operation	2400	-	2484	MHz
Peak Gain (Relative to Isotropic)	-	-	+2.26	dBi
Efficiency	-1.06	-	-0.73	dB
VSWR	-	-	2:1	-
Reference Impedance	-	50	-	Ω
Half-power Beamwidth	73.4	-	274.0	Deg
Trace Thickness	-	35	-	µm
Trace Length	-	14	-	mm
Trace Width	-	0.5	-	mm

Table 1: Antenna Specification

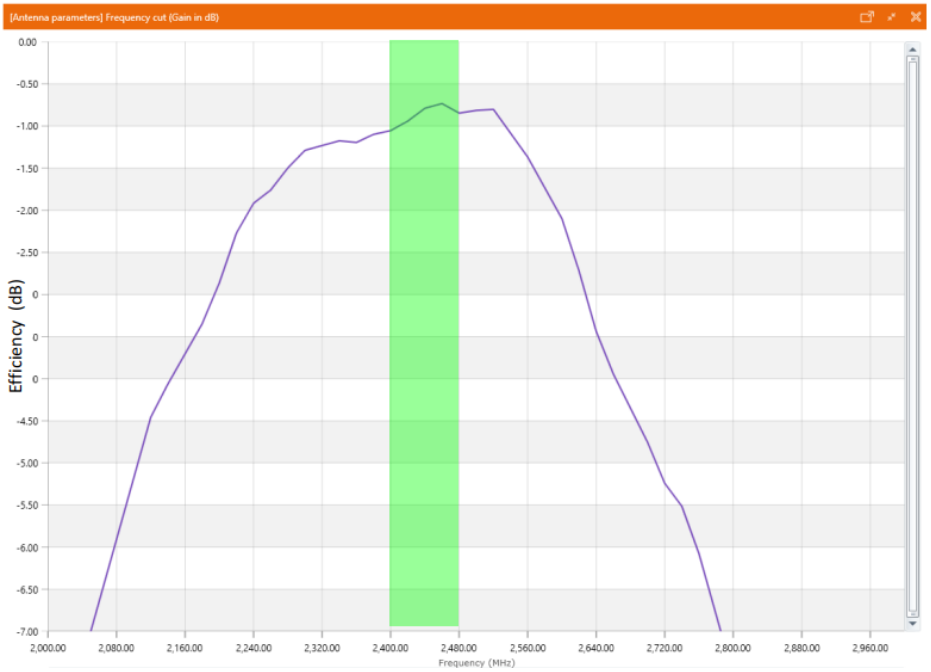
Note: This integral antenna meets the specifications in the table above if the host board is designed so that it takes into account the design guidelines and the integration constraints stipulated in the module's user manual / datasheet.

3. Gain, Efficiency and Radiation patterns



Frequency (MHz)	Gain (dB)	
2300	1.49	
2320	1.62	
2340	1.61	
2360	1.73	
2380	1.72	
2400	1.67	
2420	2.08	
2440	2.26	PEAK
2460	2.12	
2480	2.15	
2500	2.06	
2520	2.1	
2540	1.99	
2560	1.72	
2580	1.19	
2600	0.8	
2620	0.29	
2640	-0.54	
2660	-1.04	
2680	-1.34	
2700	-1.92	

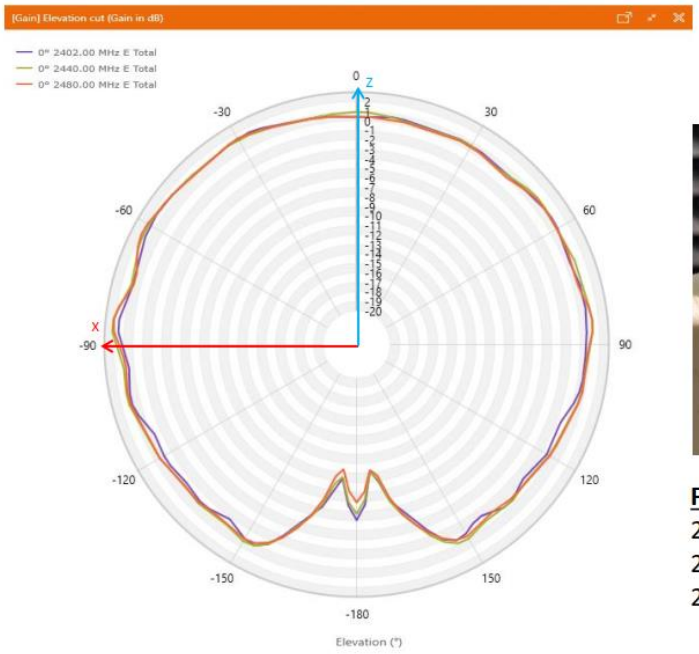
Figure 1: Integral Antenna Gain

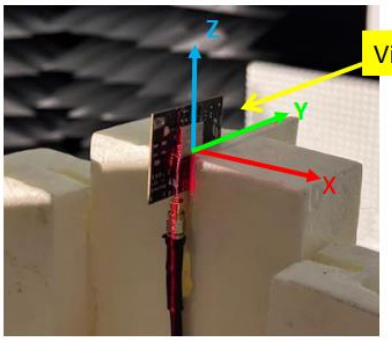


Frequency (MHz)	Efficiency (dB)	
2300	-1.29	
2320	-1.23	
2340	-1.18	
2360	-1.2	
2380	-1.1	
2400	-1.06	MIN
2420	-0.94	
2440	-0.79	
2460	-0.73	MAX
2480	-0.85	
2500	-0.82	
2520	-0.8	
2540	-1.07	
2560	-1.37	
2580	-1.72	
2600	-2.1	
2620	-2.72	
2640	-3.44	
2660	-3.94	
2680	-4.35	
2700	-4.76	

Figure 2: Integral Antenna Efficiency

Phi0 Gain cut (dBi)

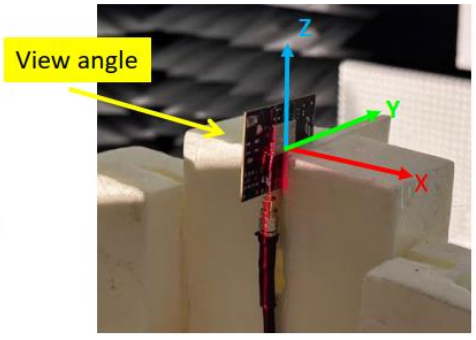




Frequency	3dB beam width
2402MHz	269.6 deg
2440MHz	227.4 deg
2480MHz	274.0 deg

Figure 3: Integral Antenna Radiation Pattern Phi 0°

Phi90 Gain cut



Frequency	3dB beam width
2402MHz	140.9 deg
2440MHz	133.7 deg
2480MHz	150.0 deg

Figure 4: Integral Antenna Radiation Pattern Phi 90°

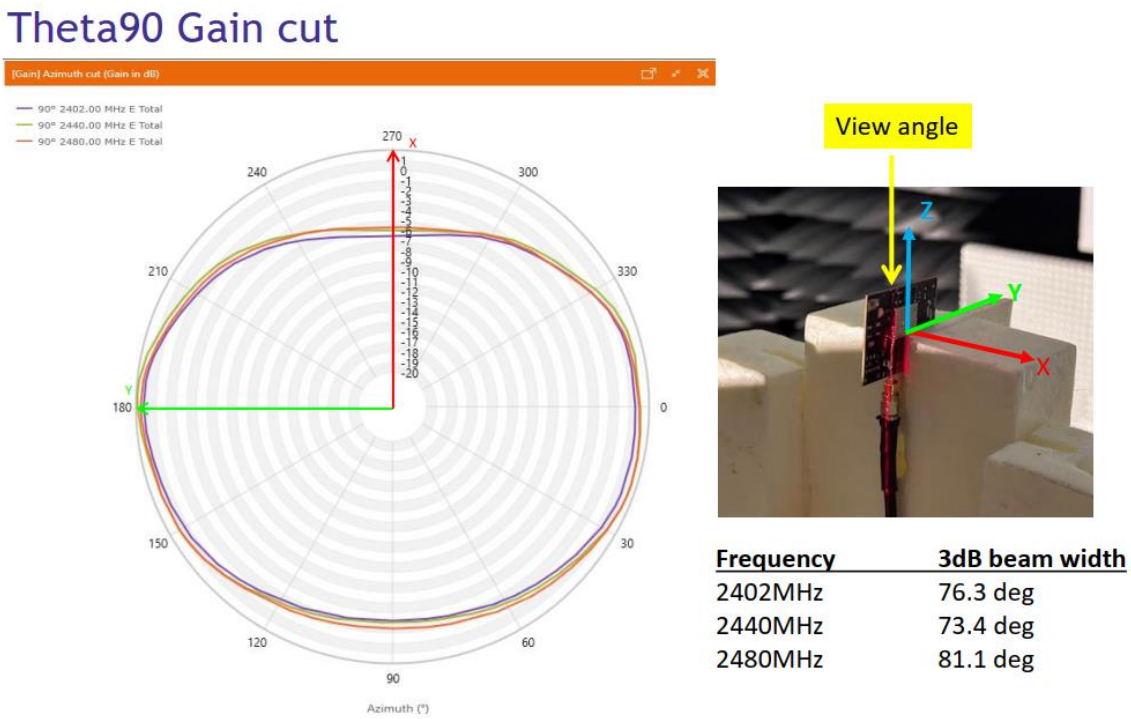


Figure 5: Integral Antenna Radiation Pattern Theta 90°

3.1 Note on the peak gain, efficiency, and radiation patterns (gain cuts)

Figures 1 to 5 depict measurements performed on manufacturer's behalf by a third-party independent lab, as follows:

Name: Sasken Finland Oy (part of Sasken Technologies Ltd.)
Address: Vissavedentie 1, FI-69600 Kaustinen, Finland (Web: https://www.sasken.com/fi/)

Testing Date / Operator: December 11, 2023 / Aki Myllymäki

Test equipment:
- Model name / description: Satimo SG64 / Multi-probe system for the most accurate solution in testing antennas and wireless devices, particularly developed to measure stand-alone antennas or antennas integrated in subsystems
- Manufacturer: Satimo (part of Microwave Vision Group)
- Software name and version: WaveStudio v22.4.2
- Configuration: Probe Array Controller (PAC) for passive measurements
- Calibration date: December 11, 2023 / Validity: 1 year / Sasken internal calibration check
  August 23, 2022 / Validity: 2 years / Full system calibration
- Calibration info: Reference point: end of antenna feed cable on antenna mast
  Reference antenna: Dual-Ridge Horn antenna SH400/S#0040, 0.4-6GHz

Note 1: Additional details of the test setup and measurements are in the separate report by the independent lab, which can be provided upon request.

Note 2: The third-party's report refers to the module as having the preliminary model name of SiWx917AC1. However, the actual model name was changed at a later time to be formally SiW917Y1GA. Similarly, figure 6 in this document shows a preliminary engineering sample, with no model name, only ordering code.

4. Picture and Dimensions

Figure 6: Photo of the antenna realized on the SiW917Y1GA module. It consists of a PCB antenna trace and 7 ceramic capacitors (C2, C7, C11, C13, C15, C20 and C21).

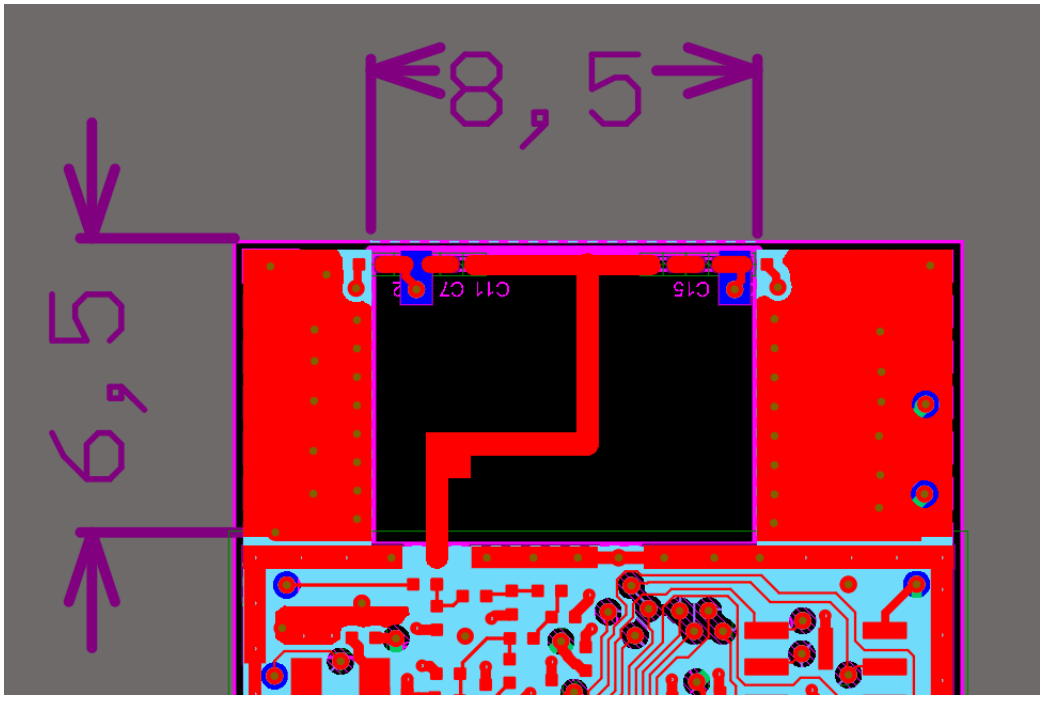


Figure 7: Dimensions of the PCB antenna trace realized on the SiW917Y1GA module.