MGM240S22A and BGM220S22A Integral Antenna Data Sheet

This document provides the specification of the integral antenna designed in the Bluetooth Low Energy (LE) and 802.15.4 wireless radio modules with model names of MGM240S22A and BGM240S22A and brand name of Silicon Labs.

This is a ground loop type antenna realized by a PCB trace design.

Contents

1. Overview

The integral antenna of the MGM240S22A and BGM240S22A modules is a partitioned ground loop type antenna realized by a PCB trace design. It is an embedded chip antenna replacement. The portion of the antenna contained within these radio modules is comprised of traces, discrete chip components, and their distributed parasitic within a controlled substrate. This antenna relies on an external loop trace which is printed onto the host or application board and the GND plane of that host board. See the user manual / datasheet of the modules (Chapter 7, "Design Guidelines") for detailed requirements. A chip capacitor, in series with the antenna loop trace, connects to the GND plane on the host board. The embedded antenna is not commercially available: it is only intended for use as the self-contained integral antenna for the radio modules mentioned above.

2. Antenna specification

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Antenna frequency range	F_{RANGE}		2400	—	2483.5	MHz
Antenna Gain	G_{MAX}	Maximum relative to isotropic	—	—	1.48	dBi
Antenna Efficiency	Efficiency		-2.5	—	-1.36	dB
Reference impedance	Z		—	50	—	Ω
Dielectric Constant Host Board	DI_{CONST}		—	4.3	—	
Trace Thickness	$T_{THICKNESS}$		—	47	—	um
VSWR	VSWR	Maximum	—	—	2:1	

Note: This antenna meets the specifications in the table above if the host board is designed so that it takes into account the guidance and constraints stipulated in the user manual / datasheet of the modules, following in particular the design guidelines section for host boards.

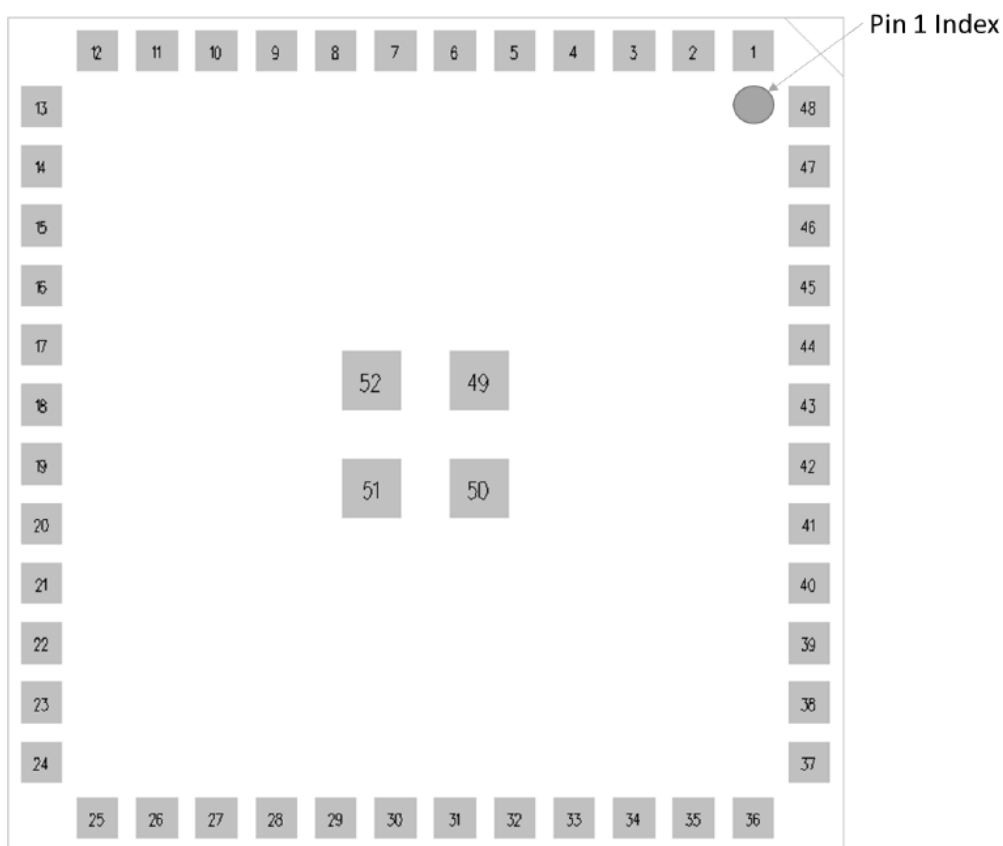# 3. Details of the antenna pins of the modules

Figure 1: Pin numbering of the MGM240S22A and BGM240S22A

The table below denotes the names and descriptions given to the integral antenna-relevant pins:

Pin Name	No.	Description
DNC	1	Do Not connect
ANT OUT	2	Integral Ant Out
DNC	3	Do Not connect
DNC	4	Do Not connect
ANT IN	5	Integral Ant In
2G4IO	6	RF IN/OUT
GND	7,12,25,29,48,49,50,51,52	Ground

4. Gain, Efficiency and Radiation patterns

Peak Gain (dBi), max 1.48dBi
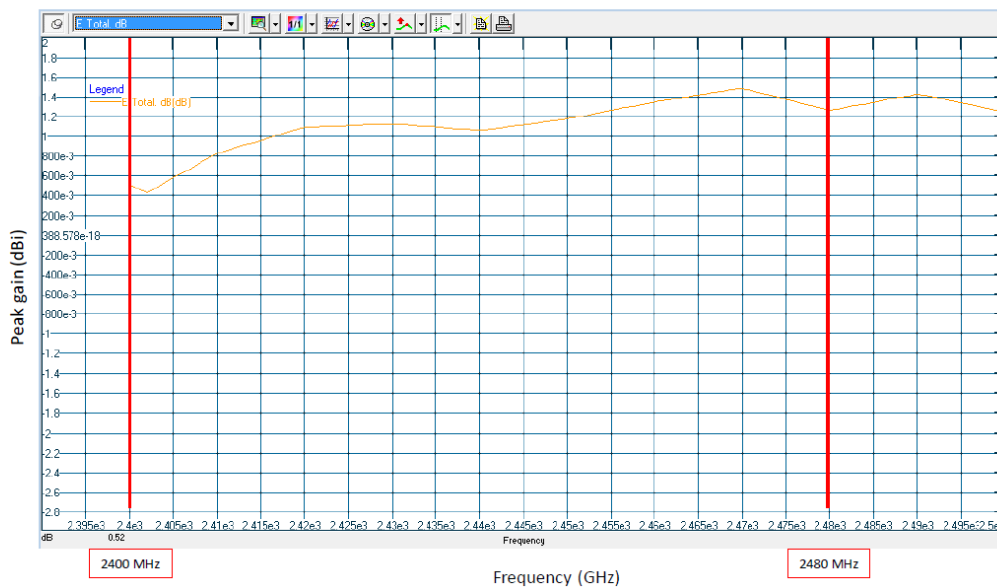
Figure 2: Integral Antenna Gain
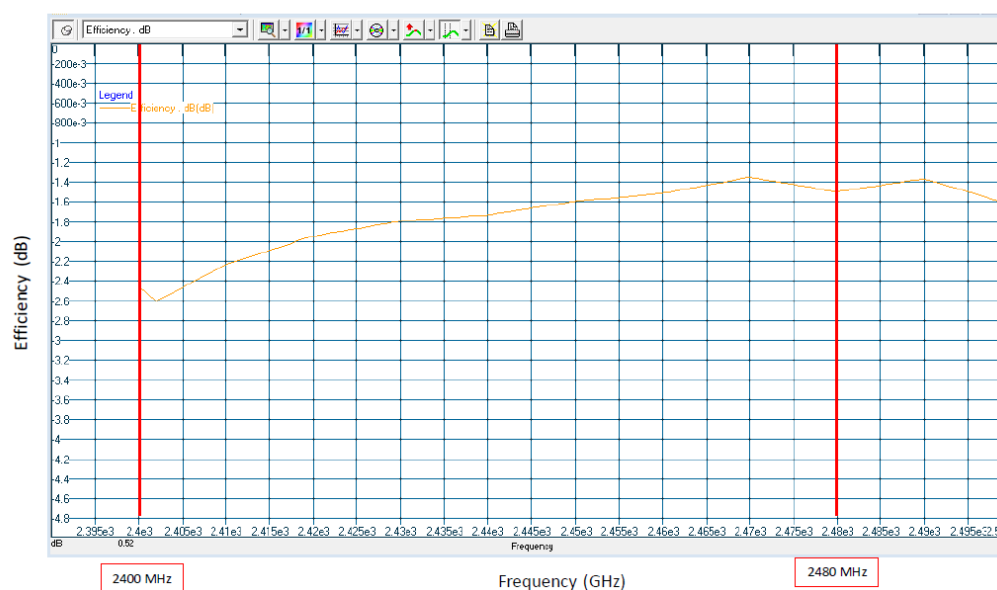
Efficiency (dB), max -1.36dB

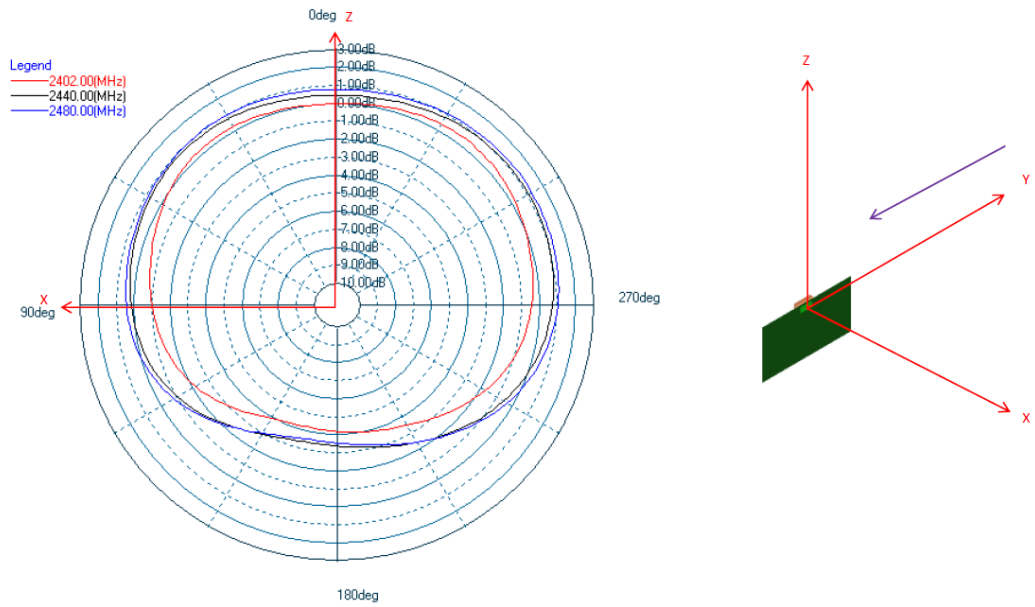Figure 3: Integral Antenna Efficiency

Phi0 Gain cut (dBi)

Figure 4: Integral Antenna Radiation Pattern Phi 0°

Phi90 Gain cut

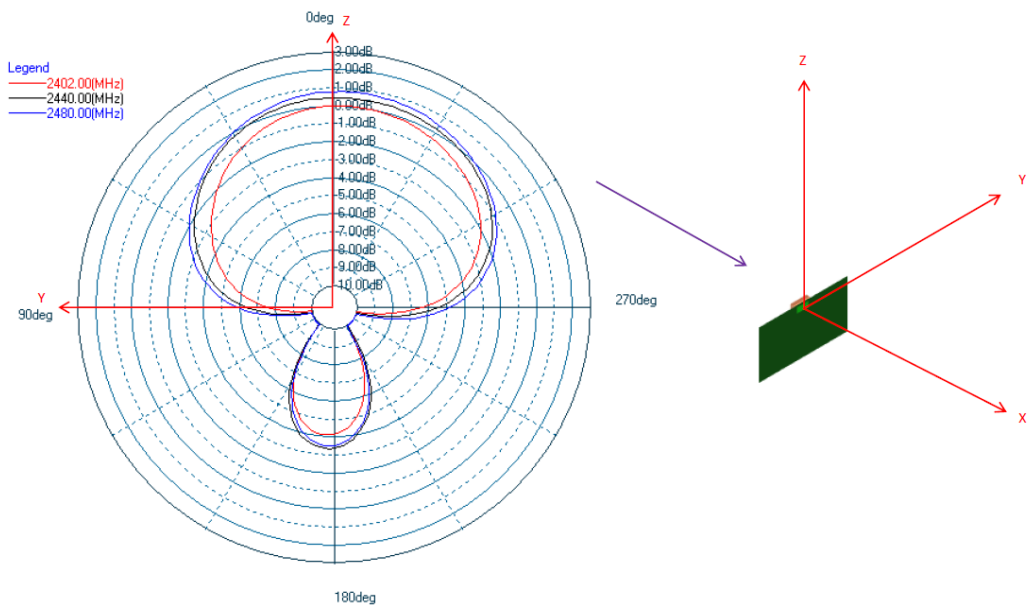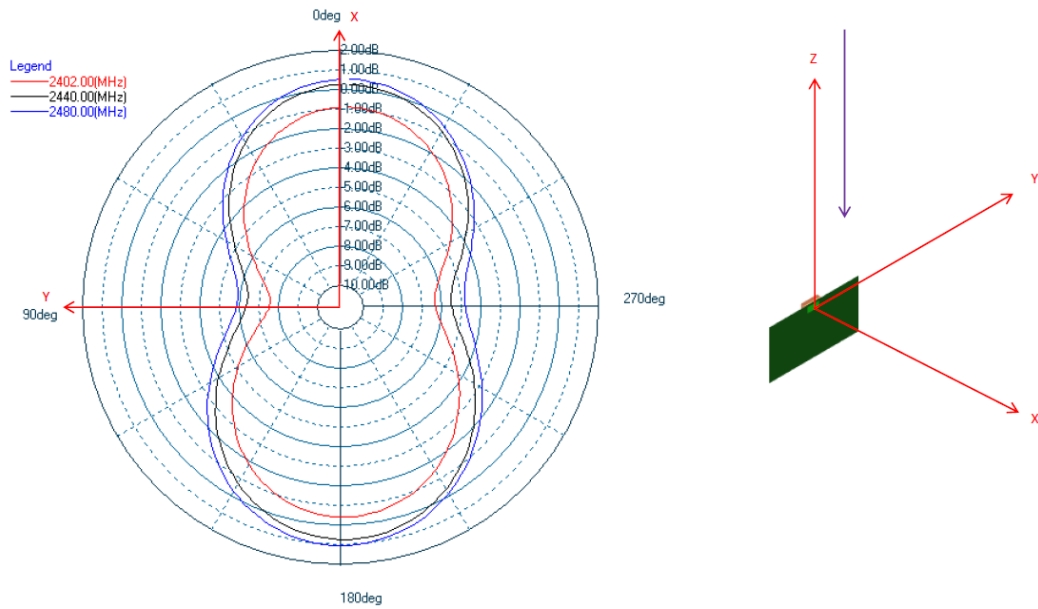Figure 5: Integral Antenna Radiation Pattern Phi 90°

Theta90 Gain cut

Figure 6: Integral Antenna Radiation Pattern Theta 90°