

1. SC14CVMDECT_SFxx_DB Reference Design Antenna Productsheet

Dialog Semiconductor BV has developed a Reference Design with the SC14CVMDECT_SFxx module. To support FAD (e.g. for FP operation), this Reference Design includes a printed antenna pattern. This document describes this antenna design.

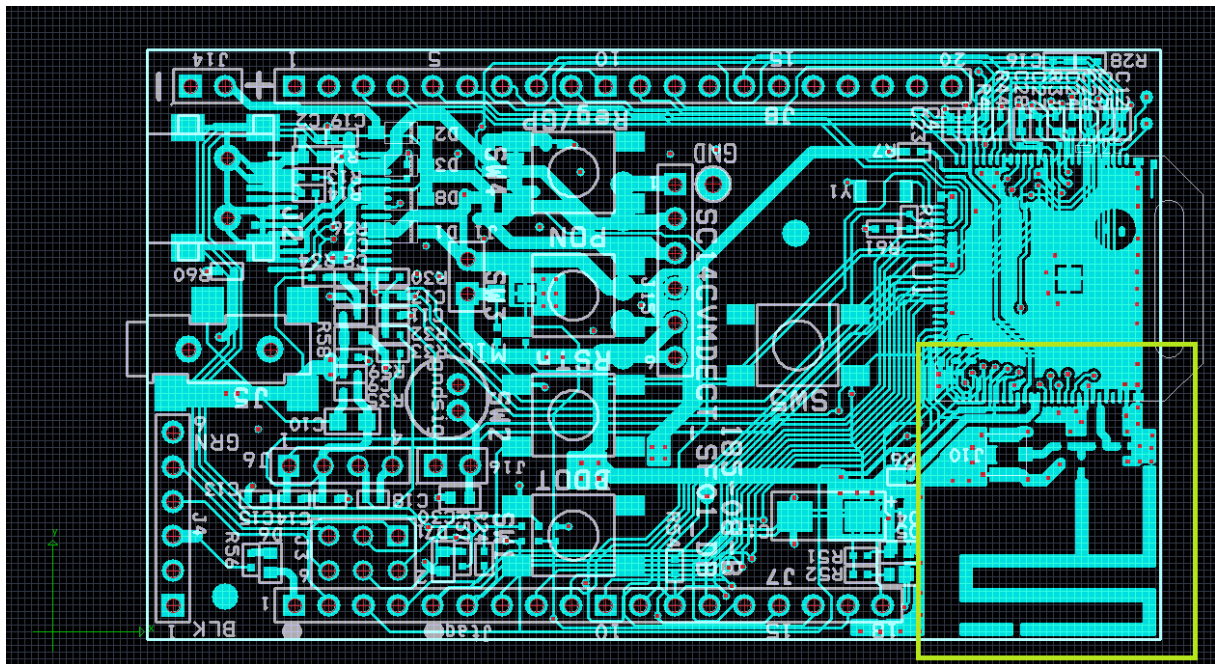
The Printed Antenna Design supports the normal DECT frequency band. It also provides for an option to support the lower frequency KDECT frequency band by placing a 0402 100pF capacitor across a gap that is part of the design.

1.1 Quick Specification Sheet

Parameter	Value	Condition
Frequency of Operation (nominal)	1820MHz - 2000MHz	S11 < -10dB
Frequency of Operation (KDECT option)	1680MHz - 1860MHz	S11 < -10dB
Antenna Type	Printed F Antenna	
#layers of antenna design	1	
Antenna Physical Area	12.0mm x 17.5mm	To groundplane edges
Maximum Antenna Gain	1.2 +/- 0.5 dBi	

2. Description

The Printed Antenna Design portion of the SC14CVMDECT_SFxx_DB Reference Design is shown in the lower right corner, identified by the green rectangle:



2.1.1 Design Parameters

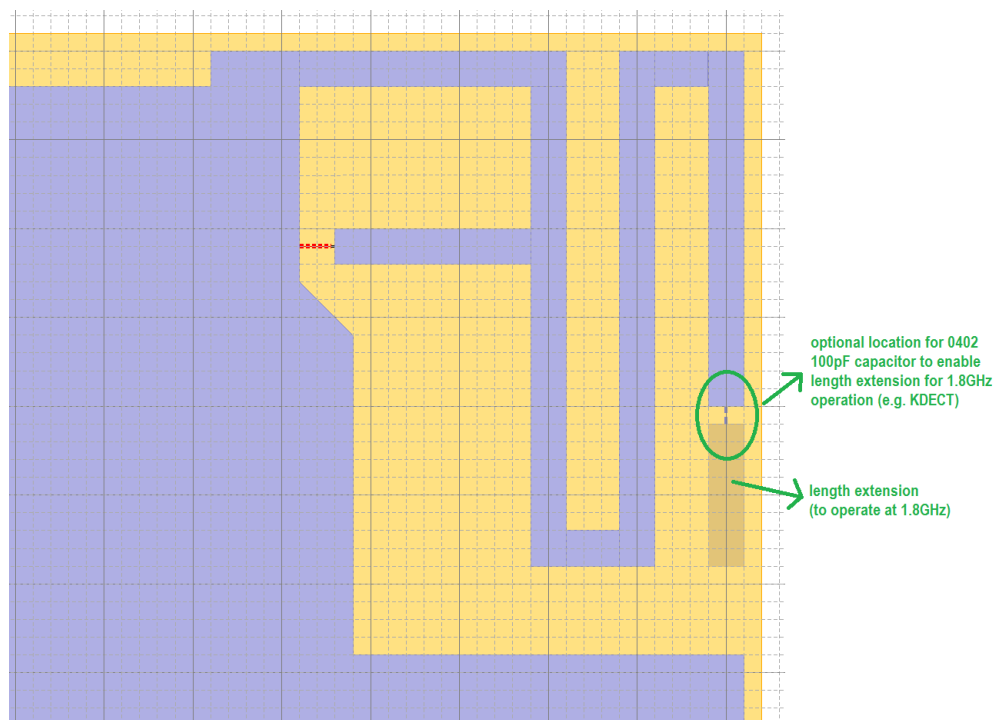
The Printed Antenna Design has been developed and tested using the below depicted PCB layer stackup:

4 Layer STD Build 1.55mm 0.062"		
copper - 1	18µm	½oz
Prepreg 7628	180µm	7mil
Prepreg 7628	180µm	7mil
copper - 2	35µm	1oz
Core	710µm	27.95mil
copper - 3	35µm	1oz
Prepreg 7628	180µm	7mil
Prepreg 7628	180µm	7mil
copper - 4	18µm	½oz

The same PCB layer stackup should be used when using this design to ensure compliance with specifications.

2.1.2 Physical Design Details

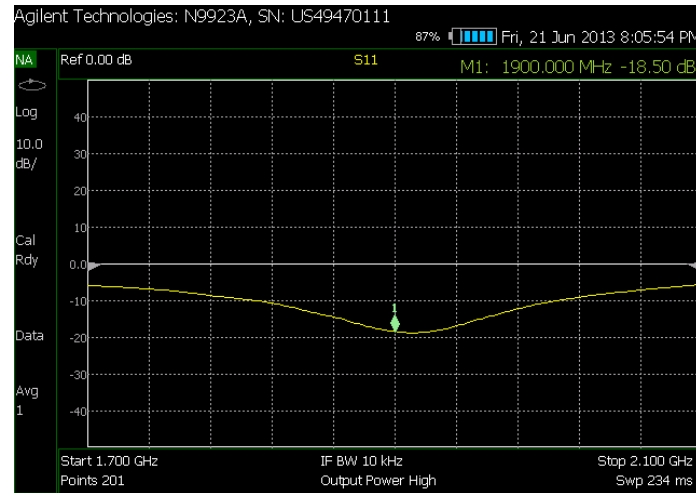
Here below the physical design details are depicted:



The visible grid is 0.5mm. Besides the antenna structure itself, it is critical to maintain the exact same groundplane outline and spacing with respect to the antenna structure to ensure compliance with specifications.

2.2 Frequency Bandwidth

The operational frequency bandwidth ($S_{11} < -10\text{dB}$) has been measured using a calibrated Agilent N9923A and found to be 1820MHz – 2000MHz, as shown in the below measurement plot:



2.3 Maximum Antenna Gain

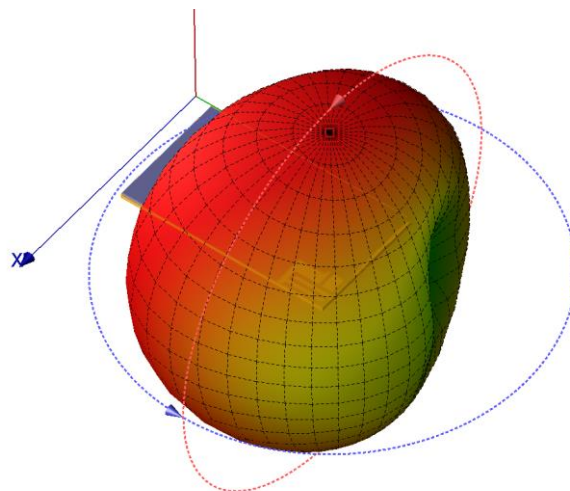
The maximum antenna gain has been measured by using an EMCO 3115 reference antenna and comparing the maximum antenna gain of the SC14CVMDECT_SFxx_DB printed antenna design against a known¹ 0dBi peak gain antenna.

Next to this, measurement results have been correlated with the simulated peak antenna gain (taking into account additional connection losses).

The maximum antenna gain was found to be 1.2 +/- 0.5dBi

2.4 Radiation Pattern

An indicative plot of the antenna's radiation pattern is shown here below (from simulation):

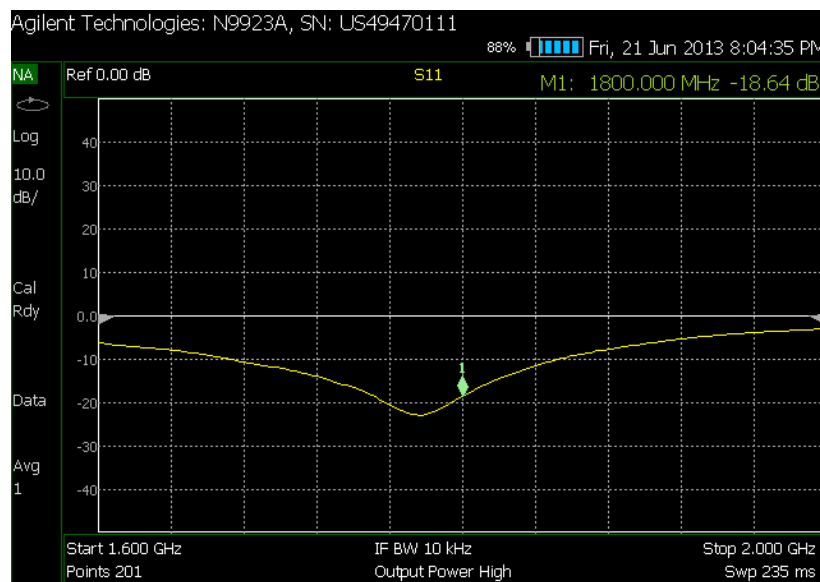


¹ This was measured at Nemko's laboratory.

2.5 Printed Antenna Design operating at 1.8GHz (KDECT)

For KDECT operation, the frequency band is centered around 1.8GHz, whereas the default printed antenna design configuration is designed to be centered around 1.9GHz. The printed antenna design holds a provision for this shift in operating frequency. Please refer to the figure in section 2.1.2. If a 100pF capacitor (0402 footprint) is placed across the gap indicated by the green ellipse indicated in figure 2, then effectively the antenna length is increased resulting in a resonant frequency of 1.8GHz (without the 100pF 0402 component, the antenna's resonant frequency remains at 1.9GHz for other DECT operation). No other tuning components are required.

The S11 plot (measured on the actual SC14CVMDECT_SFxx_DB Reference Design HW) with the printed antenna design configured in KDECT mode (i.e. with 100pF 0402 component placed across the length extension gap) is depicted in the following picture:



2.6 Tuning Components

The antenna design characteristics have been validated without the use of any additional tuning components.

2.7 DC Impedance

As may be clear from the picture in section 2.1.2, the antenna will exhibit a short (0 Ohm impedance) at DC. Therefore, it is advisable to use a coupling capacitor (e.g. 100pF).

Detailed drawing information and/or gerber files can be obtained through your Dialog Semiconductor BV support contact window.