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SM1211 RF Module

User's Guide

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1   Introduction

The purpose of this tool is to provide a development platform of the SX1211. User can build his application prototype by simply connecting the module to his target microcontroller and start developing his application software. The SM1211 module integrates the SX1211 reference design (chip + external components) plus miscellaneous useful connectors.

Note that this module is also used for the SX1211 Starter Kit.

2   Getting Started

As illustrated in figure below, the SM1211 integrates several parts:

- ◆ **Ref design**: This section includes the chip but also all the external components in an optimized BOM and form factor. When user wants to incorporate the SX1211 on his PCB, it is strongly recommended that this reference design (i.e. schematics, placement, layout, BOM, etc...) is copied "as is" in final application board to guarantee optimum performance and lowest development time and design effort.

- ◆ **uC connector**: to connect the RF chip's control lines to the uC. (Cf SX1211 datasheet for uC connections guidelines).

- ◆ **SMA connector**: SMA Cable or antenna connection. Each board is delivered with its ¼ wave SMA antenna.

- ◆ **VDD jumper**: to monitor current consumption and/or apply independent power supply to the module. When VDD jumper is on, RF module's power supply should be supplied on the uC connector.
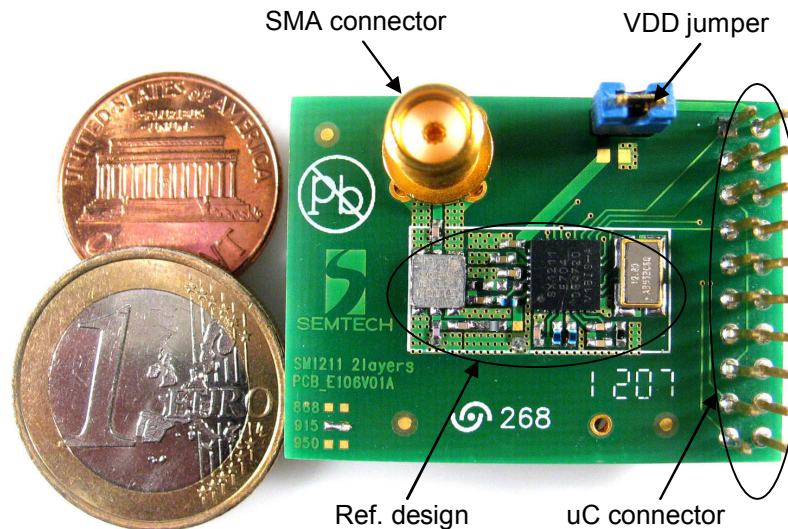

Figure 1: SM1211 Overview (top view)

Software drivers are available in the API TN8000.18 on Semtech's website. These are implemented on Semtech's XE8000 microcontrollers but are written in C and hence easily portable to other targets.
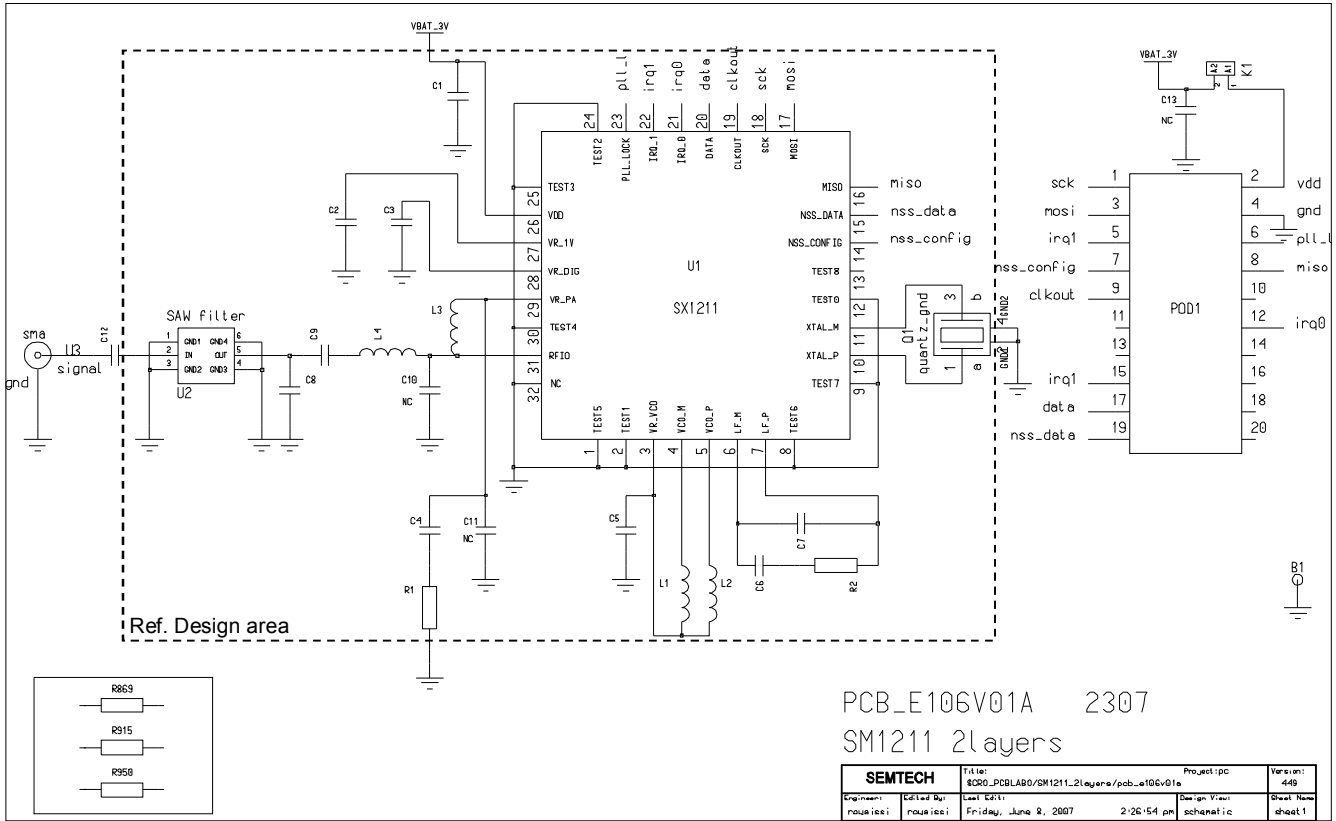
3 Schematics

Figure 2: SM1211 Schematics

C12 is a DC blocker protection for the SAW filter. It has been added for debug/dev purposes, it is not needed for direct antenna connection.
Please note that C10 and C11 are not used.

4 Layout

As illustrated in figures below, the layout has the following characteristics:
- ✓ very compact ref design (9x19mm) => can be easily inserted even on very small PCBs
- ✓ standard PCB technology (2 layers, 1.6mm, std vias & clearance) => low cost
- ✓ performance quasi insensitive to dielectric thickness => quasi zero effort portability to other PCB technology (thickness, # of layers, etc...)

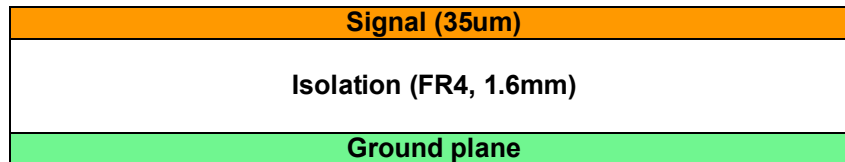The layers description is illustrated in figure below.

Figure 3: SM1211 Layers Description (cut view)

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The layout itself is illustrated in figure below. Please contact Semtech for gerber files.
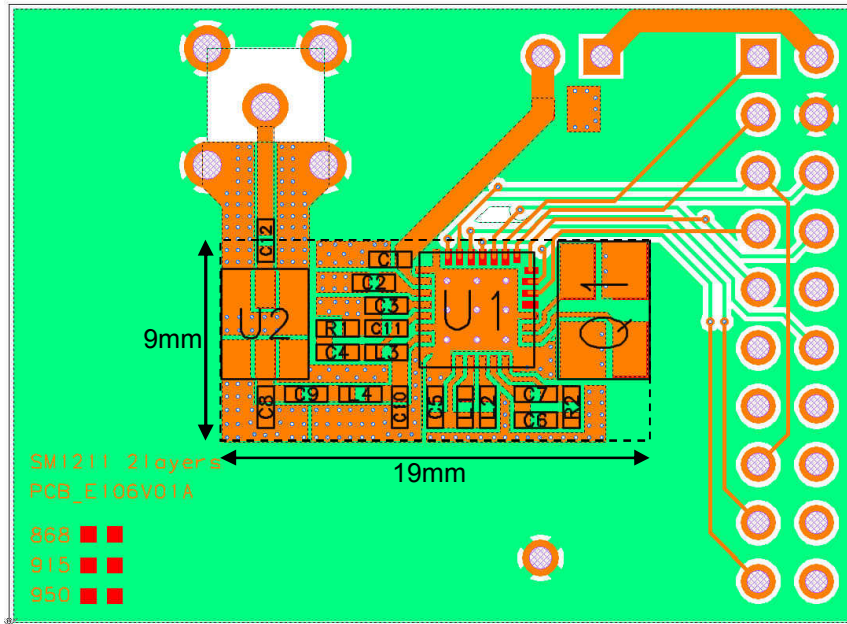
Figure 4: SM1211 Layout (top view)

5 BOM

Ref	Value		Tol (+/-)	Techno	Size	Comment
	868MHz	**915MHz**				
U1	SX1211		-	Transceiver IC	TQFN-32	-
U2	869MHz	915MHz	-	SAW Filter	3.8*3.8mm	Part# Temex S142/S110
Q1	12.8MHz		15ppm at 25°C 20ppm over -40/+85°C 2ppm/year max.	AT-cut	5.0*3.2mm	Fundamental, Cload=15pF Part# Siward SX5032
R1	1Ω		1%	-	0402	PA regulator
R2	6.8kΩ		1%	-	0402	Loop filter
C1	1uF		15%	X5R	0402	VDD decoupling
C2	1uF		15%	X5R	0402	Top regulator decoupling
C3	220nF		10%	X7R	0402	Digital regulator decoupling
C4	47nF		10%	X7R	0402	PA regulator decoupling
C5	100nF		10%	X7R	0402	VCO regulator decoupling
C6	10nF		10%	X7R	0402	Loop Filter
C7	680pF		10%	X7R	0402	Loop Filter
C8	1.8pF		0.25pF	NPO	0402	Matching
C9	22pF		5%	NPO	0402	DC block and L4 adjust
L1, L2	8.2nH	6.8nH	0.2nH	Wire wound	0402	VCO tank inductors
L3	100nH		5%	Wire wound	0402	PA Choke
L4	8.2nH		5%	Multilayer	0402	Matching
C10,C11	NC		-	-	0402	-
C12*	47pF		5%	NPO	0402	DC block

*Not part of the ref. design (not required for direct antenna connection).

Figure 5: SM1211 BOM

6 References

➢ [1] SX1211 Datasheet
➢ [2] TN8000.18 API

Contact Information

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