

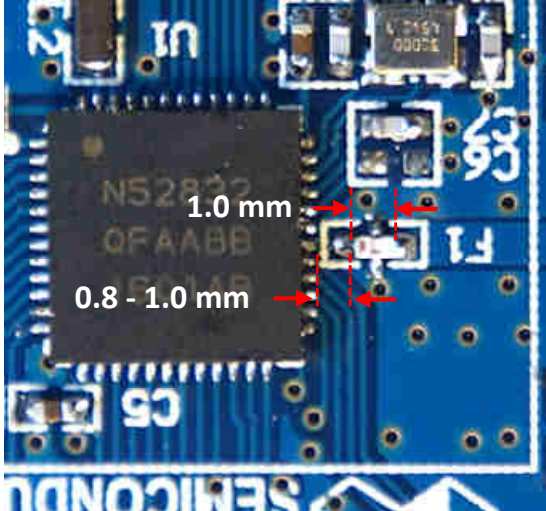
High Frequency Ceramic Solutions

Application Note: AN050

8/29/2016

G.Kuo/M.Carmona/I.Johnson

Application Note for Nordic Semiconductor's nRF52 Series Integrated RF Front End Solution Using Johanson's 1.0x0.5mm Impedance Matched Filter (BPF)



Abstract

The nRF52832 SoC is a powerful, highly flexible ultra-low power multiprotocol SoC ideally suited for Bluetooth® Smart ANT and 2.4GHz ultra low-power wireless applications. The nRF52832 SoC is built around a 32-bit ARM® Cortex™-M4F CPU with 512kB + 64kB RAM. The embedded 2.4GHz transceiver supports Bluetooth Smart, ANT and proprietary 2.4 GHz protocol stack. It is on air compatible with the nRF51 Series, nRF24L and nRF24AP Series products from Nordic Semiconductor.

This application note describes the implementation, active measurements, schematics, and design files when pairing Johanson Technology Inc.'s 2450FM07A0029 impedance matched filter with Nordic Semiconductor's nRF52832 QFN package integrated chip. For further layout or application assistance contact our RF technical support team.

Introduction

In partnership with Nordic Semiconductor, Johanson Technology Inc. has developed a miniature 4-pin EIA 0402 (1.0mmx0.5mmx0.38mm) ceramic passive filter that provides the following:

- Consolidates Nordic Semiconductor's reference discrete LC filter into a single, 0402 sized component
- Complex impedance matched specifically to the nRF52 series single ended antenna output

This front-end filter reduces implementation size area by using smaller effective PCB real estate usage. Also, it reduces component count, increases performance consistency (100% RF tested).

Design/layout files

www.johansontechnology.com/nordic

Technical Support

<http://www.johansontechnology.com/ask-a-question>



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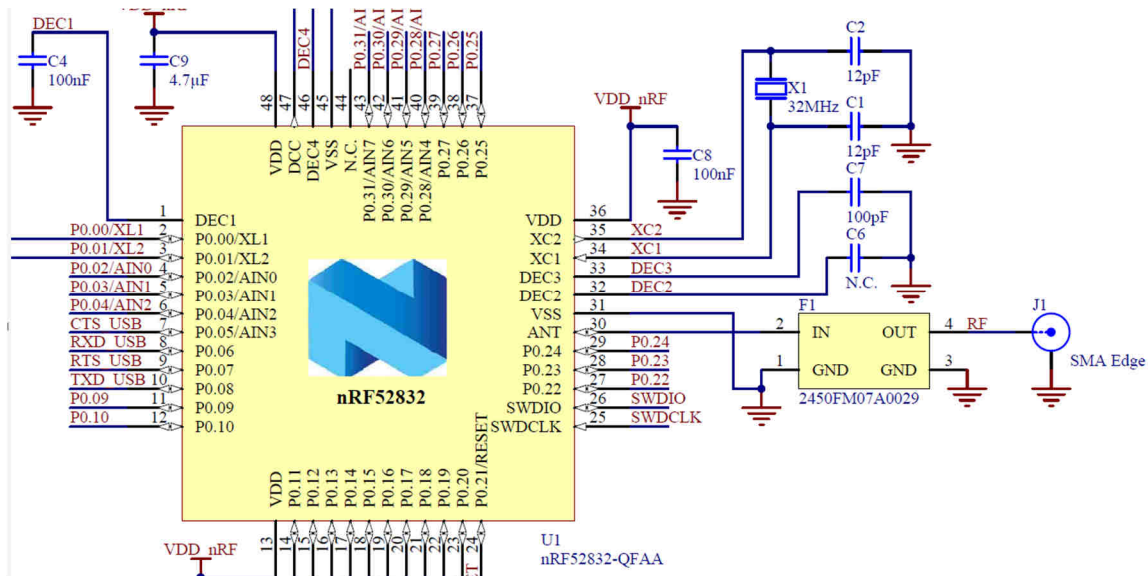
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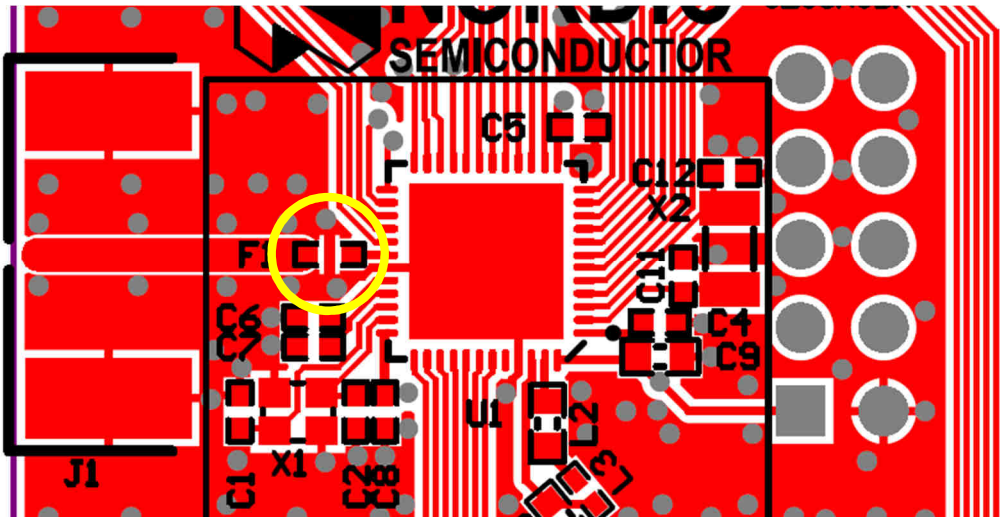
G.Kuo/M.Carmona/I.Johnson

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Schematic nRF52832 with impedance-matched filter 2450FM07A0029



PCB Layout Reference nRF52832 & Impedance Matched Filter 2450FM07A0029



2450FM07A0029 PCB Footprint

For more schematic examples, download the layout files, BOM, etc. go to: www.johansontechnology.com/nordic

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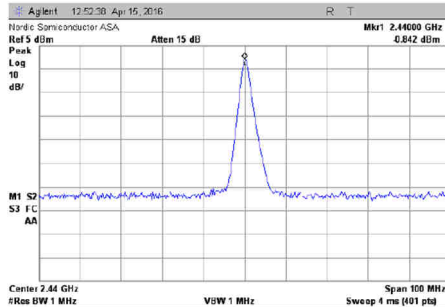
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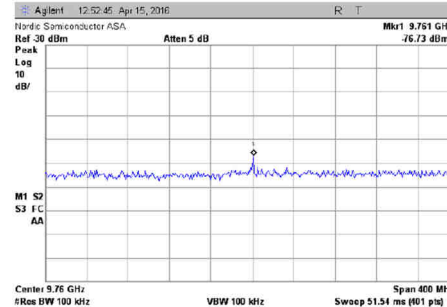
Application Note for Nordic Semiconductor's nRF52 Series Integrated RF Front End Solution Using Johanson's 1.0x0.5mm Impedance Matched Filter (BPF)

Conductive Measurements of nRF52832 + 2450FM07A0029 on Reference Design PCB

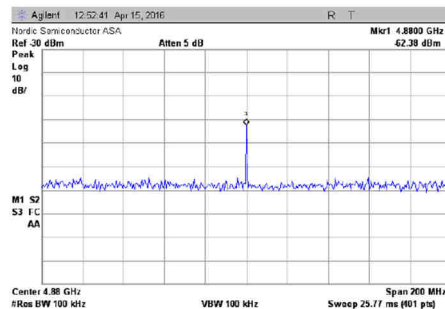
0dBm, 2440MHz (Mid)



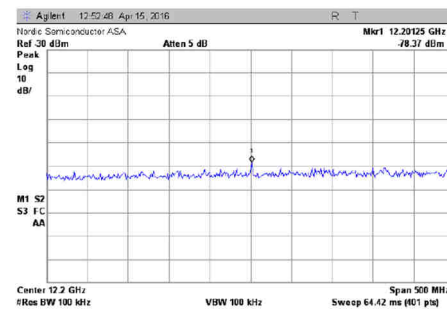
Mid 0dBm Fundamental



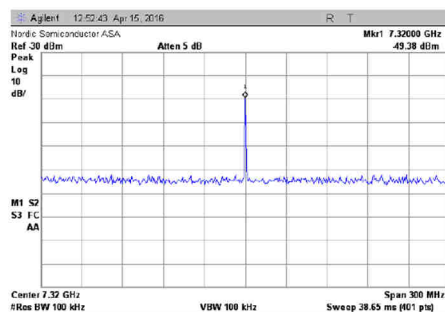
Mid 0dBm 4th harmonic



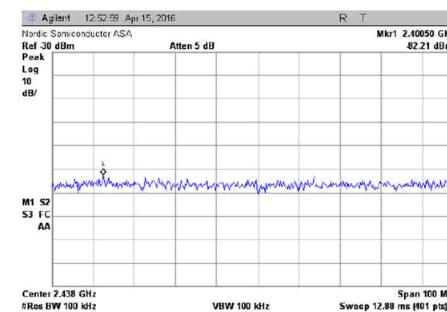
Mid 0dBm 2nd harmonic



Mid 0dBm 5th harmonic



Mid 0dBm 3rd harmonic



Mid 0dBm Local Oscillator

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Application Note: AN050

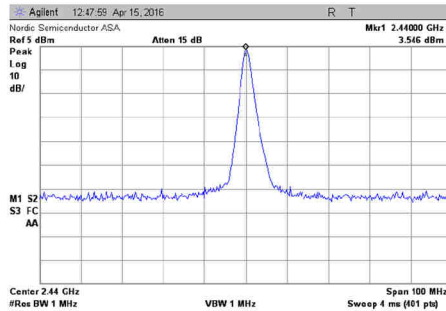
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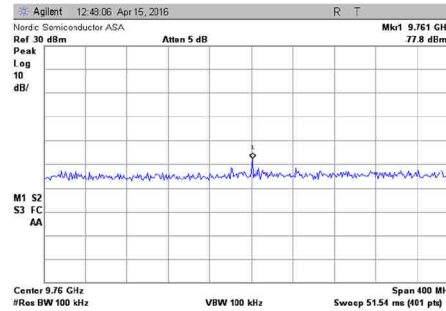
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Conductive Measurements of nRF52832 + 2450FM07A0029 on Reference Design PCB

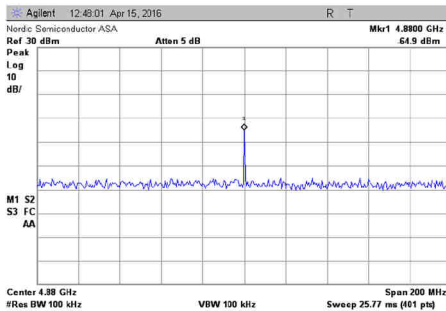
+4dBm, 2440MHz (Mid)



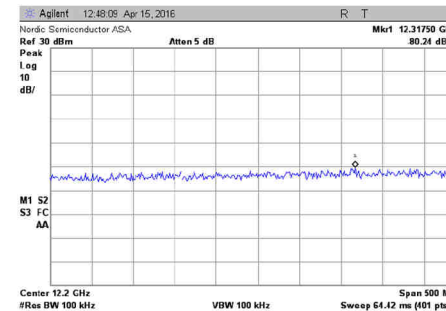
Mid +4dBm Fundamental



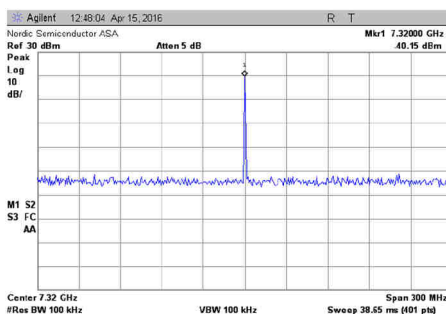
Mid +4dBm 4th harmonic



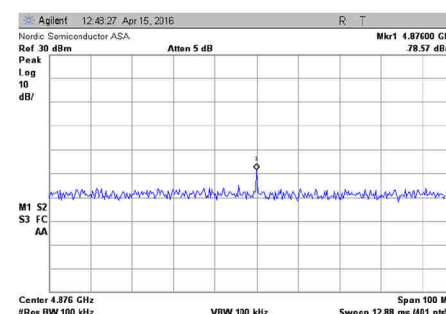
Mid +4dBm 2nd harmonic



Mid +4dBm 5th harmonic



Mid +4dBm 3rd harmonic



Mid +4dBm 2X(Local Oscillator)

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High Frequency Ceramic Solutions

Application Note: AN020

8/29/2016

M.Carmona/I.Johnson

Application Note for Nordic Semiconductor's nRF52 Series Integrated RF Front End Solution Using Johanson's 1.0x0.5mm Impedance Matched Filter (BPF)

Conductive Measurements of nRF52832 + 2450FM07A0029 on Reference Design PCB

+4 dBm Setting		nRF52832-QFAABB
Board identifier	Board 1	
	Frequency	2450FM07A0029
Fundamental	2,402.00	3.52
2nd harmonic	4,804.00	-72.52
3rd harmonic	7,206.00	-40.84
4th harmonic	9,608.00	-76.89
5th harmonic	12,010.00	-80.63
LO	2,747.43	-82.45
LO/2	1,373.71	-84.12
2LO	5,494.86	-77.08
Fundamental Hi	2,480.00	3.63
2nd harmonic	4,960.00	-66.14
3rd harmonic	7,440.00	-41.55
4th harmonic	9,920.00	-80.79
5th harmonic	12,400.00	-80.05
LO	2,836.57	-82.52
LO/2	1,418.29	-82.97
2LO	5,673.14	-78.56
Fundamental Mi	2,440.00	3.55
2nd harmonic	4,880.00	-64.90
3rd harmonic	7,320.00	-40.15
4th harmonic	9,760.00	-77.80
5th harmonic	12,200.00	-80.24
LO	2,790.86	-83.06
LO/2	1,395.43	-84.05
2LO	5,581.71	-78.57

0 dBm Setting		nRF52832-QFAABB
Board identifier	Board 1	
	Frequency	2450FM07A0029
Fundamental	2,402.00	-0.97
2nd harmonic	4,804.00	-64.70
3rd harmonic	7,206.00	-48.85
4th harmonic	9,608.00	-78.05
5th harmonic	12,010.00	-80.59
LO	2,747.43	-82.59
LO/2	1,373.71	-83.67
2LO	5,494.86	-77.41
Fundamental Hi	2,480.00	-0.84
2nd harmonic	4,960.00	-60.93
3rd harmonic	7,440.00	-49.71
4th harmonic	9,920.00	-80.08
5th harmonic	12,400.00	-80.07
LO	2,836.57	-82.44
LO/2	1,418.29	-83.79
2LO	5,673.14	-77.11
Fundamental Mi	2,440.00	-0.84
2nd harmonic	4,880.00	-62.38
3rd harmonic	7,320.00	-49.38
4th harmonic	9,760.00	-76.73
5th harmonic	12,200.00	-78.37
LO	2,790.86	-82.22
LO/2	1,395.43	-83.90
2LO	5,581.71	-78.91

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