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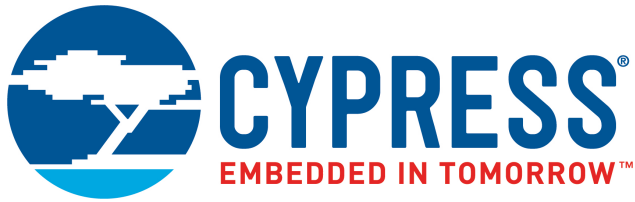
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THIS SPEC IS OBSOLETE

Spec No: 002-14848

Spec Title: AN214848 - CYW43XX: FM RECEIVER TRACE ROUTING
GUIDELINES

Replaced by: None

CYW43XX: FM Receiver Trace Routing Guidelines

Associated Part Family: CYW43XX

This document provides board trace-routing guidelines for the FM receiver RF trace that connects the CYW43XX to a headset connector. It is intended for design engineers doing CYW43XX-based board layouts.

1 Introduction

This document provides board trace-routing guidelines for the FM receiver RF trace that connects the CYW43XX to a headset connector. It is intended for design engineers doing CYW43XX-based board layouts.

This document is specific to the trace routing of the FM receiver RF trace on the following devices:

- CYW4324x
- CYW4334
- CYW43341

For all other trace routing guidelines particular to a given device, refer to the schematic and layout guidelines for that device.

To optimize FM receiver performance on a CYW43XX-based board and to minimize any negative effects of received FM signals on other board functions, the RF input trace to the FM receiver must be routed according to a specific set of layout guidelines. This document contains the layout guidelines, an example schematic that applies the guidelines, and a few layout examples showing routing practices to be avoided.

Note: Throughout the document, the FM receiver RF input is referred to as the FM RX input. For the CYW4334 the FM RX input pin is labeled FM_RF.

1.1 Cypress Part Numbering Scheme

Cypress is converting the acquired IoT part numbers from Broadcom to the Cypress part numbering scheme. Due to this conversion, there is no change in form, fit, or function as a result of offering the device with Cypress part number marking. The table provides Cypress ordering part number that matches an existing IoT part number

Table 1. Mapping Table for Part Number between Broadcom and Cypress

Broadcom Part Number	Cypress Part Number
BCM4324	CYW4324x
BCM4334	CYW4334
BCM43341	CYW43341

2 IoT Resources

Cypress provides a wealth of data at <http://www.cypress.com/internet-things-iot> to help you to select the right IoT device for your design, and quickly and effectively integrate the device into your design. Cypress provides customer access to a wide range of information, including technical documentation, schematic diagrams, product bill of materials, PCB layout information, and software updates. Customers can acquire technical documentation and software from the Cypress Support Community website (<http://community.cypress.com/>).

2.1 Acronyms and Abbreviations

In most cases, acronyms and abbreviations are defined on first use.

For a comprehensive list of acronyms and other terms used in Cypress documents, go to <http://www.cypress.com/glossary>.

3 Layout Guidelines

Follow these guidelines to optimize FM receiver performance:

- Isolate the FM RX input trace from other signals by routing grounds above and below it.

Note: FM receive sensitivity is -110 dBm, so FM RX input trace isolation is very important.

- Use ground vias to isolate the FM RX input trace from signals routed in parallel with it.
- Avoid crossing the FM RX input trace with power supplies, clocks, and digital lines. This includes avoiding parallel routing between the FM RX input trace and the various types of signals just listed. See Figure 2 on page 4, which shows an example where an FM RX input trace is routed parallel to a power trace and the two traces overlap.
- Route the FM RX input trace near the edge of the PCB.
- Keep the FM RX input trace length to less than 4 cm, if possible.
- Avoid placing USB converter chips near the FM RX input trace.
- Avoid placing touchscreen controllers and related devices near FM receiver circuitry and the FM RX input trace.
- Minimize capacitance on the FM RX input trace. This includes pulling back the grounds used to isolate the FM RX input trace using pullbacks that are twice the width of the FM RX input trace.
- Isolate I²S traces from power supply traces, such as the power supply traces of FM and Bluetooth circuits.

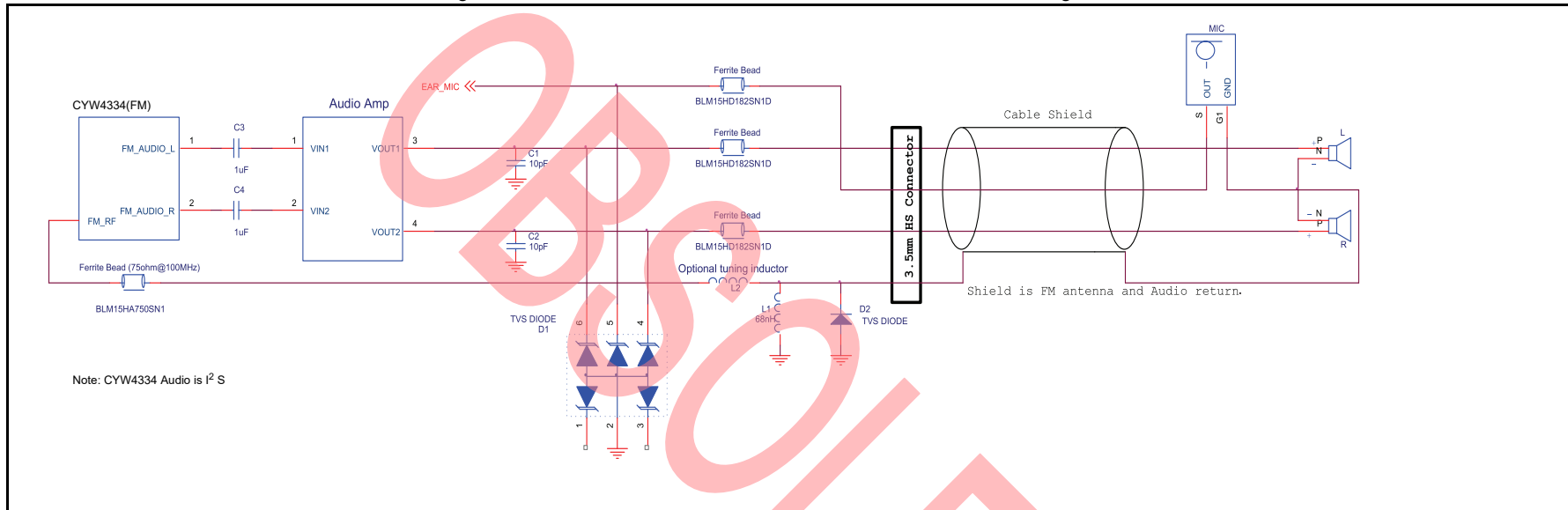
Note: I²S clock spurs will degrade FM receiver performance.

- Isolate I²S traces from UART traces so that noise associated with the UART lines does not get picked up while recording FM.

4 Recommended Configuration

Figure 1 shows a recommended FM receiver and audio configuration for a board based on the CYW4334

Figure 1: Recommended CYW4334 FM Receiver and Audio Configuration



Note: In the recommended configuration, the shield of the cable that runs from the 3.5 mm headset connector is the FM antenna. Testing has shown that using the shield as the FM antenna works well and antenna matching is easy.

Table 2 provides component and parameter values associated with items in Figure 1.

Table 2. Recommended Values and Descriptions

Component or Parameter	Relevant Values	Description
FM RX input	~2 k Ω (impedance)	Impedance between FM_RF (the FM RX input pin in Figure 1) and ground.
L1	47–180 nH (inductance) 0.5 Ω (dynamic self-resistance)	Antenna tuning inductor.
L2	0 Ω (initial board designs)	Optional antenna tuning inductor. It may be required on some boards.
D1	<2 pF (capacitance)	ESD protection diode.
Ferrite bead at FM RX input	75 Ω	Required to pass ESD testing at 15 kV.
Ferrite beads elsewhere	1.8 k Ω (typical)	Used to minimize FM signal leakage to the audio section.

5 Routing Practices to Avoid

Figure 2 shows a routing example where an FM RX trace overlaps a power trace.

Figure 2. FM RX and Power Trace Routed with a Parallel Overlap

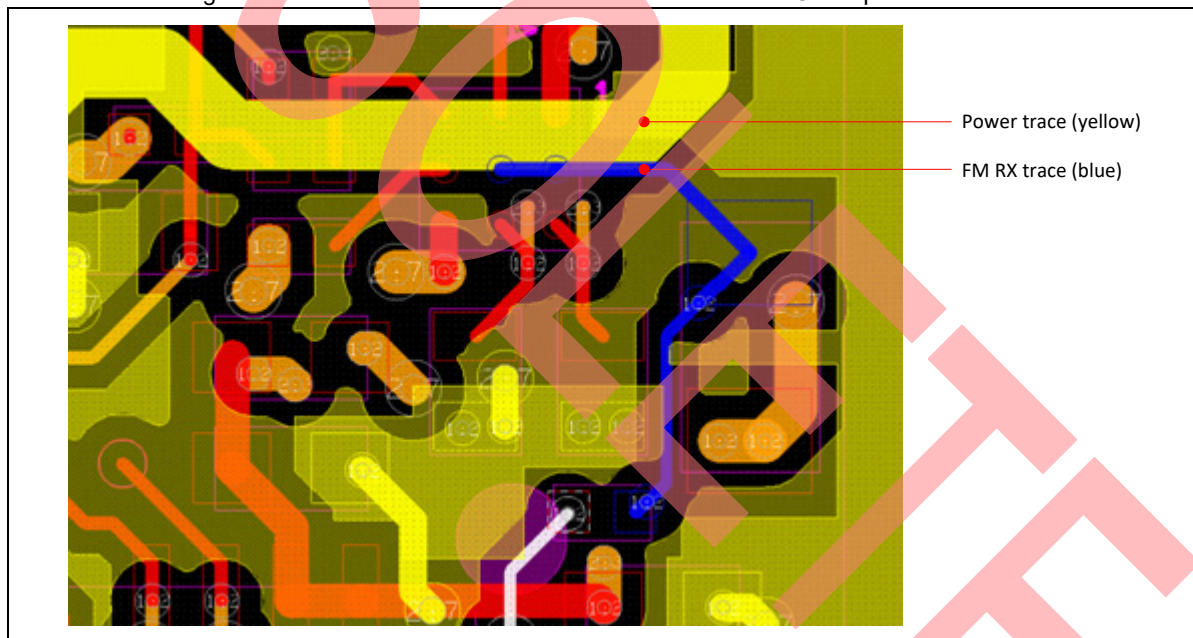
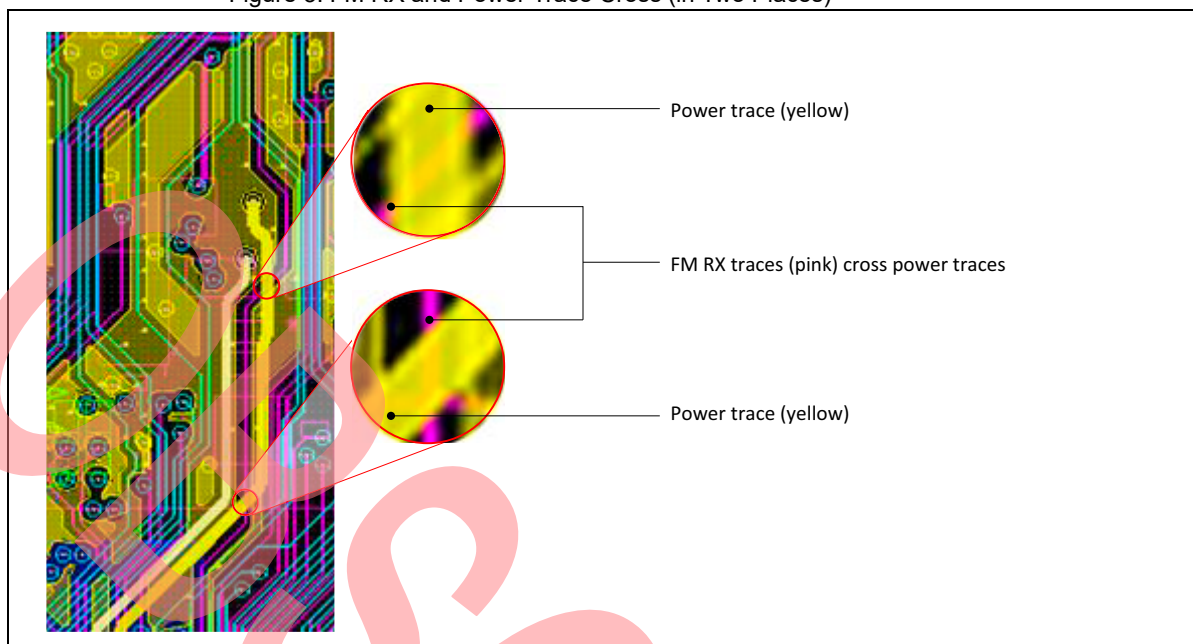


Figure 3 shows a routing example where an FM RX trace crosses a power trace in two places.

Figure 3. FM RX and Power Trace Cross (in Two Places)



6

References

The references in this section may be used in conjunction with this document.

Cypress provides customer access to technical documentation and software through its Customer Support Portal (CSP) and Downloads and Support site.

For Cypress documents, replace the "xx" in the document number with the largest number available in the repository to ensure that you have the most current version of the document.

Document (or Item) Name	Number	Source
PCB Layout Guidelines and Component Selection for Optimized PMU Performance, Application Note	4334-AN2xx-R	Cypress CSP

Document History Page

Document Title: AN214848 - CYW43XX: FM Receiver Trace Routing Guidelines				
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**	—	—	08/02/2012	43XX-AN1500-R: Initial release.
*A	5464468	UTSV	11/18/2016	Updated to Cypress template.
*B	5813083	AESATP12	07/14/2017	Updated Cypress Logo and Copyright.
*C	6630604	SELE	07/19/2019	Obsolete document. Completing Sunset Review.

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