AN214872

Failsafe Over-the-Air Update

Associated Part Family: CYW20734

This document describes Failsafe over-the-air (OTA) functionality and implementation. It is intended for engineers and developers who are working with the CYW20734 Cypress chip.

1 About This Document

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
BCM20734	CYW20734

1.2 Acronyms and Abbreviations

In most cases, acronyms and abbreviations are defined on first use. For a more complete list of acronyms and other terms used in Cypress documents, go to: http://www.cypress.com/glossary.

1.3 References

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

Document (or Item) Name		Number	Source
Cypress Items			
[1]	*CYW20734 Single-Chip Bluetooth Transceiver for Wireless Input Devices Data Sheet*	20734-DS1xx-R	Cypress Developer Community
[2]	*Over-the-Air throughput Classic Test Setup Application Note*	20734-AN3xx-R	Cypress Developer Community

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/).

3 Failsafe Overview

When the OTA update is complete the dynamic offset in the static section[1] must be updated to reflect the new dynamic offset. This is problematic because the static section can get corrupted if power goes out in middle of serial flash write transaction.

The solution is to create a failsafe section that contains a second, dynamic[2], section offset (DS2) and a magic number. If the magic number is valid, then the second dynamic section offset is the valid offset. If the magic number is not valid, then the original dynamic section offset in the static section is used.

The 8-byte magic number is located at 0x1FF4–0x1FFB (Table 1 and Figure 1 on page 3).

The 4-byte DS2 offset is located at 0x1FFC–0x1FFF (Table 1 and Figure 1 on page 3).

The magic number is **0xAA, 0x55, 0xF0, 0x0F, 0x68, 0xE5, 0x97, 0xD2**. If it is valid, then the 4-byte DS2 offset is valid.

When it is time to update the failsafe section offset, both DS1 and DS2 have valid firmware. However, if the failsafe section becomes corrupt while updating the DS2 offset, the valid DS1 firmware boots because the magic number is not valid.

4 Required Changes to Support Failsafe

4.1 Prerequisites

Wire-update is required to download the firmware to the chip.

4.2 Procedure

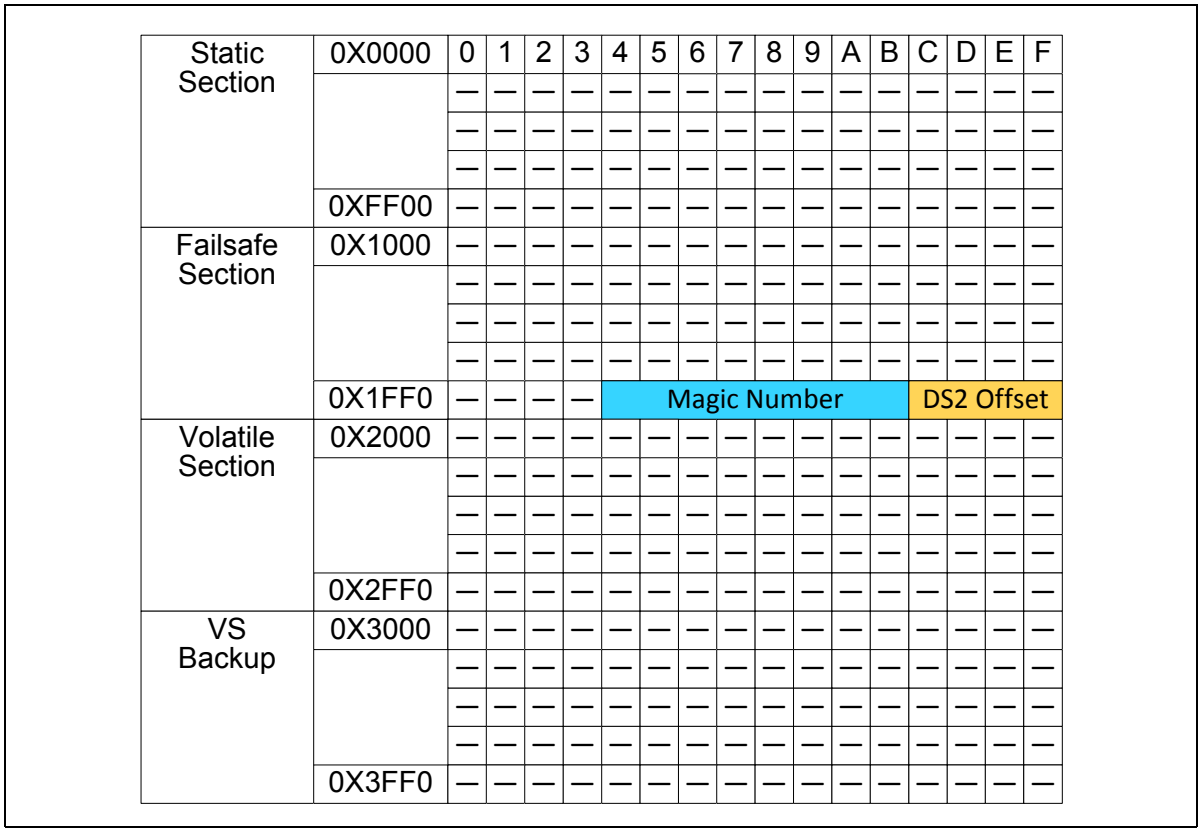
1. Read the magic number and verify that is correct (Read Magic 0x1FF4–0x1FFB).
   a. If the magic number is valid (0xAA, 0x55, 0xF0, 0x0F, 0x68, 0xE5, 0x97, 0xD2), then DS2 is valid: update DS1.
      If the magic number is *not* valid, update DS2.
2. Update DS2
   a. Download the code to DS2 and verify that it is correct.
   b. Erase the 4 KB sector in the failsafe section.
   c. Write the 4-byte DS2 offset to location 0x1FFC.
   d. Write the 8-byte magic number to location 0x1FF4.
3. Update DS1:
   a. Download the code to DS1 and verify that it is correct.
   b. Erase the 4 KB sector in the failsafe section.

Table 1. Memory Map

Section	Location		
Static	0x0000–0x0FFF		
Failsafe	0x1000–0x1FFF		
		Magic Number OFFSET	0x1FF4–0x1FFB
		Valid Magic Number values	0xAA, 0x55, 0xF0, 0x0F, 0x68, 0xE5, 0x97, 0xD2 (stored as a BYTE array)
		DS2 OFFSET	0x1FFC–0x1FFF (U16 little endian)
Volatile	0x2000–0x2FFF		
Volatile (back up)	0x3000–0x3FFF		

1. The static section contains information such as the Bluetooth device address and the location of the dynamic section.
2. The dynamic section is primarily for configuration data, application software, and software patches.

Figure 1. Memory Map



Document History Page

Document Title: AN214872 - Failsafe Over-the-Air Update Document Number: 002-14872				
Rev.	**ECN No.**	**Orig. of Change**	**Submission Date**	**Description of Change**
**	-	-	04/17/2015	Initial release
*A	5450716	UTSV	09/27/2016	Updated to Cypress template Added Cypress part numbering scheme
*B	5882487	AESATMP9	09/13/2017	Updated logo and copyright.

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Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709

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