



Please note that Cypress is an Infineon Technologies Company.

The document following this cover page is marked as “Cypress” document as this is the company that originally developed the product. Please note that Infineon will continue to offer the product to new and existing customers as part of the Infineon product portfolio.

Continuity of document content

The fact that Infineon offers the following product as part of the Infineon product portfolio does not lead to any changes to this document. Future revisions will occur when appropriate, and any changes will be set out on the document history page.

Continuity of ordering part numbers

Infineon continues to support existing part numbers. Please continue to use the ordering part numbers listed in the datasheet for ordering.



THIS SPEC IS OBSOLETE

Spec No: 002-04463

Spec Title: AN204463 - SK-FM4-216-Ethernet Wi-Fi Sample
Kit Setup Manual

Replaced by: NONE

SK-FM4-216-Ethernet Wi-Fi Sample Kit Setup Manual

Associated Part Family: **SK-FM4-216-ETHERNET Series, S6E2CC Series**

This application note gives information about the SK-FM4-216-Ethernet Wi-Fi Module sample kit.

Contents

1	Contents of the Wi-Fi Module Sample Kit	2	4.6	wifi_ap Command	13
1.1	Evaluation Boards	2	4.7	wifi_scan Command.....	13
1.2	Contents of the Software Development Kit (SDK).....	4	4.8	wifi_get_rssi Command.....	13
2	Features of the Wi-Fi Module Sample Kit	4	4.9	wifi_promisc Command.....	14
2.1	Features	4	4.10	wifi_simple_config Command	14
2.2	Hardware Block Diagram	5	4.11	wifi_wps Command.....	14
2.3	Software Block Diagram.....	5	4.12	wifi_sta_ap Command	14
3	How to Set Up the Wi-Fi Module Sample Kit	6	4.13	ttcp Command.....	14
3.1	Hardware Setup	6	4.14	ping Command.....	15
3.2	Software Setup.....	8	4.15	exit Command.....	15
3.3	Wi-Fi Connection.....	11	4.16	help Command.....	15
4	Wi-Fi Control and Commands.....	12	5	Sample Application.....	15
4.1	wifi_connect Command	12	5.1	Web Server Application	15
4.2	wifi_disconnect Command	12	5.2	DHCP Server/client.....	15
4.3	wifi_info Command.....	13	6	Additional Information.....	15
4.4	wifi_on Command.....	13		Document History Page	16
4.5	wifi_off Command.....	13		Worldwide Sales and Design Support	17

1 Contents of the Wi-Fi Module Sample Kit

The sample kit consists of evaluation boards and the software development kit (SDK).

- The evaluation boards are the Cypress SK-FM4-216-ETHERNET and the Realtek Wi-Fi board.
- The SDK is made up of both Cypress IP and Realtek IP. The SDK was created in an EWARM environment.

1.1 Evaluation Boards

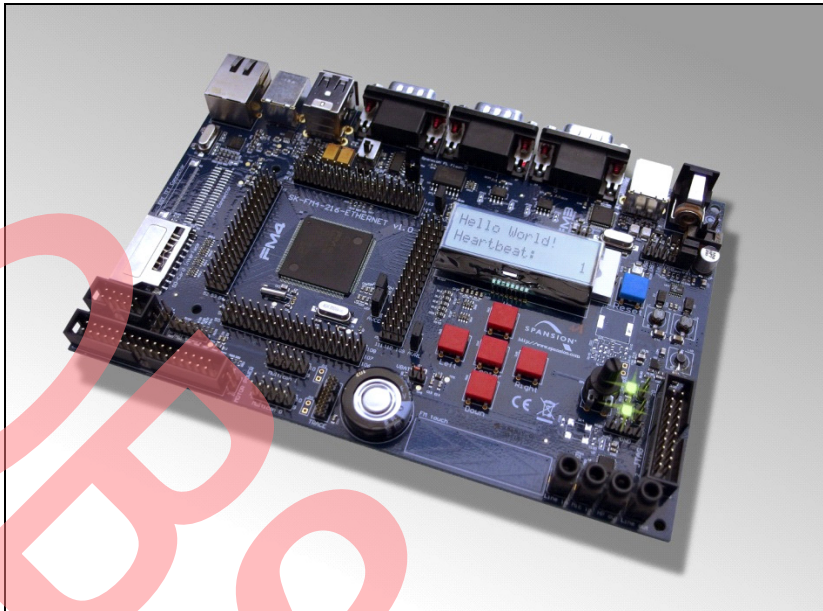
1.1.1 SK-FM4-216-ETHERNET

The SK-FM4-216-ETHERNET supplies an S6E2CCAL0A MCU to represent the S6E2C Series.

Please refer to the URL <http://www.cypress.com/documentation/development-kitsboards/fm4-216-ethernet-arm-cortex-m4-mcu-development-kit-ethernet-can#DOCUMENTATION> for detailed specification and functionality of the SK-FM4-216-ETHERNET SDK.

Also, please refer to the document S6ECC Series datasheet (Document number: [002-04980](#)) for detailed specification and functionality of the S6E2CCAL0A MCU.

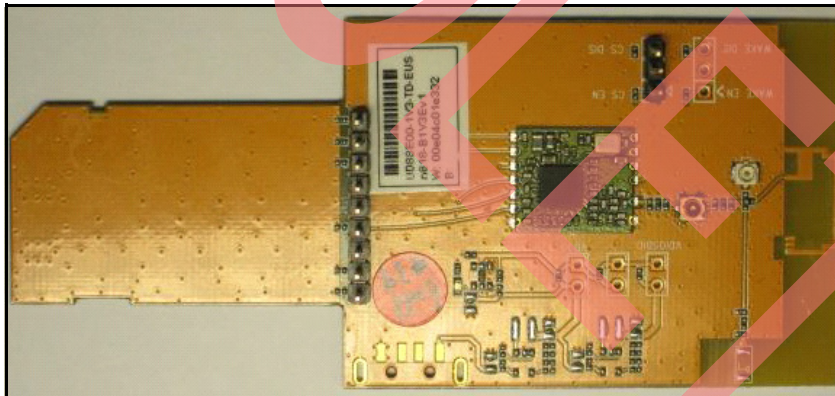
Figure 1. SK-FM4-216-ETHERNET



1.1.2 Wi-Fi Board

The Realtek Wi-Fi board using RTL8189EM is equipped with an SDIO/GSPI interface for MCU connectivity. Please refer to the RTL8189EM datasheet for the detailed specification and functionality of the RTL8189EM.

Figure 2. Realtek Wi-Fi Board with RTL8189EM



1.2 Contents of the Software Development Kit (SDK)

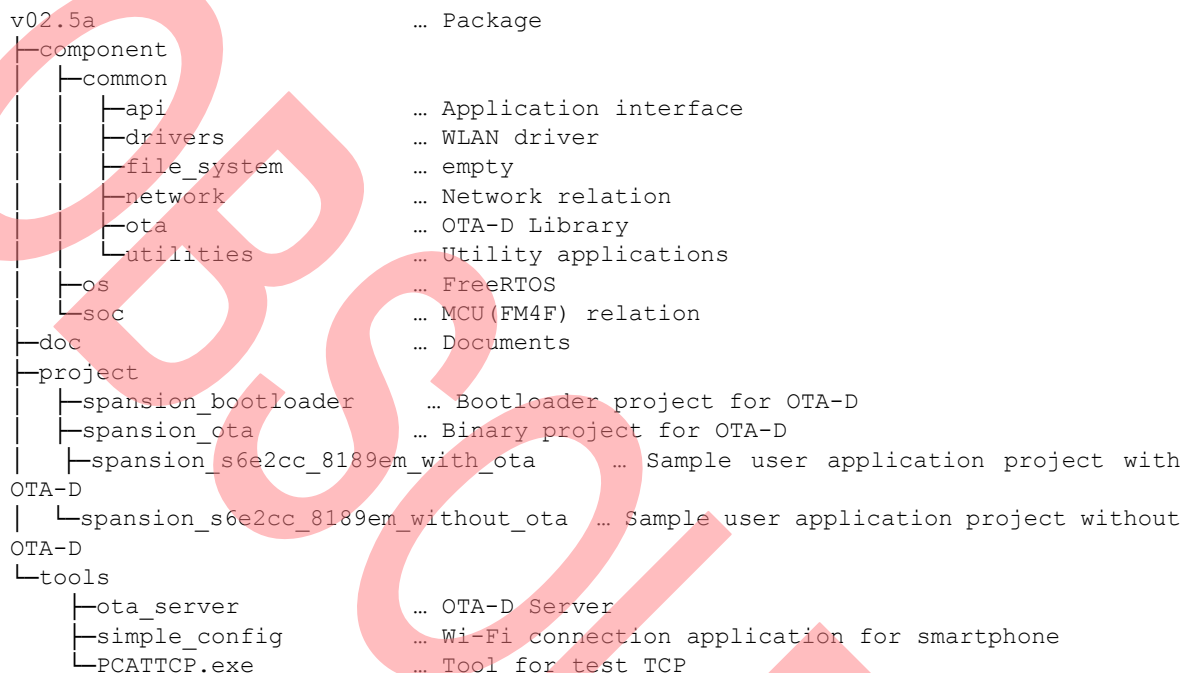
The SKD contains four projects. The basic project is `span_s6e2cc_8189em_without_ota`.

The other projects are used for using the Over the Air Dual Bank eFlash (OTA-D) function.

Note that this document explains only the setup of `span_s6e2cc_8189em_without_ota`.

If you want to know about the use of projects for OTA-D, please refer to the application note for OTA-D for the S6E2xC Series of MCUs (AN709-00008).

Figure 3. Basic Project Structure



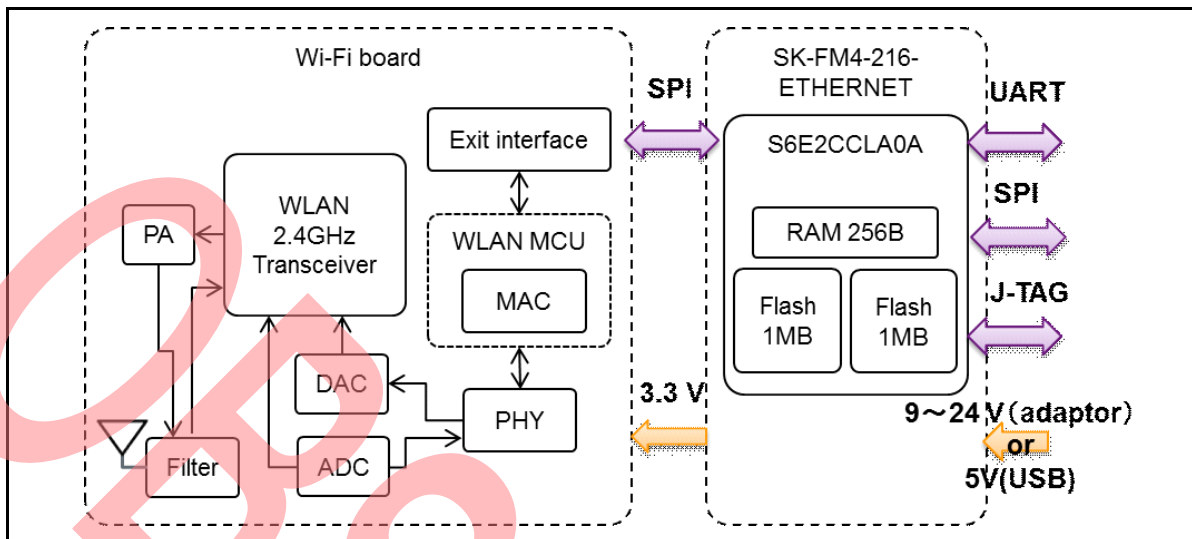
2 Features of the Wi-Fi Module Sample Kit

2.1 Features

- Wi-Fi chip — Realtek RTL8189EM 2.4 GHz IEEE 802.11b/g/n SISO
- MCU on the SK-FM4-216-ETHERNET — S6E2CCAL0A Cortex®-M4F 200 MHz embedded 256KB RAM, 2MB flash
- Interface — Serial (UART, I²C, SPI) , GPIOs, JTAGs
- Software
 - RTOS: FreeRTOS ver.7.4.0 as OSS
 - (AP)/(Station) dual mode
 - Built in Wi-Fi security support for WPA, WPA2
 - LwIP for TCP/IP stack for IPv4 ver.1.3.1 as OSS
 - Built-in DHCP server/client
 - PolarSSL for SSL client ver.1.3.3 as OSS
 - Enabled to build in application utilities
test TCP, Ping, Web server, Over The Air Dual Bank eFlash (OTA-D)

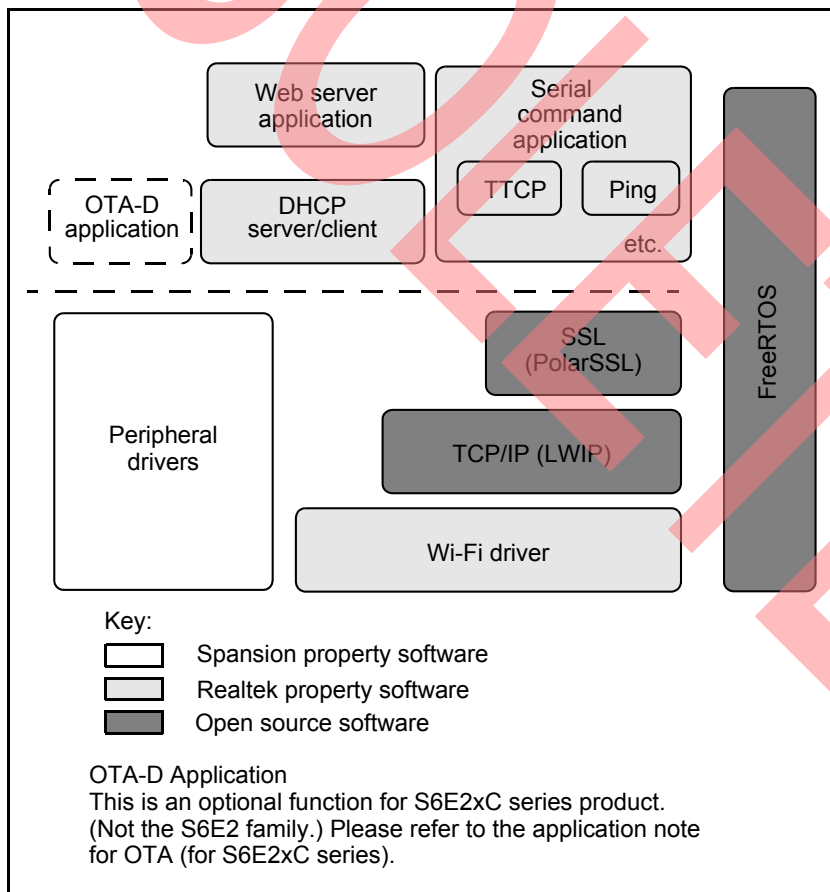
2.2 Hardware Block Diagram

Figure 4. Block Diagram of Sample Kit



2.3 Software Block Diagram

Figure 5. Software Stack



3 How to Set Up the Wi-Fi Module Sample Kit

This section contains two parts:

- Hardware setup: Connecting the SK-FM4-216-ETHERNET and the Wi-Fi board.
- Software setup: Installing the firmware without OTA-D to the flash of a microcontroller.

3.1 Hardware Setup

3.1.1 Operating Environment (for Reference)

IDE: EWARM ver 6.70

ICE: I-Jet, J-Link, and J-Link-Lite

Laptop:

- Windows 7
- 2.5 GHz of CPU clock
- 4.0 GB RAM

3.1.2 Hardware Connection

In this section, we explain how to connect the SK-FM4-216-ETHERNET to the Wi-Fi board.

1. Set the jumpers of the SK-FM4-216-ETHERNET to the default setting.
Please refer to the users guide for SK-FM4-216 Ethernet for details of the default settings.
2. Connect the SK-FM4-216-ETHERNET board to the Wi-Fi board through DuPont cables.

K-FM4-216-ETHERNET Pin	Pin Name	SPI Wi-Fi Module Pin
J5-127	SIRQ	1
—	NC	2
J4-97	MOSI	3
J4-108	GND	4
J5-109	VD33	5
J4-98	CLK	6
J5-136	GND	7
J4-96	MISO	8
J4-100	CS	9

3. Connect the USB port (X-2 of [Figure 6](#)) for virtual com port of the SK-FM4-216-ETHERNET to your laptop.
4. Configure the serial connection terminal emulator (Tera Term or Hyper-terminal) on your laptop with the following parameter.
 - Port: COMx
 - Bits: 115200
 - Data bits: 8
 - Parity Check: none
 - Stop: 1
 - Data flow control: none

Figure 6. Connectors of the SK-FM4-S16-ETHERNET

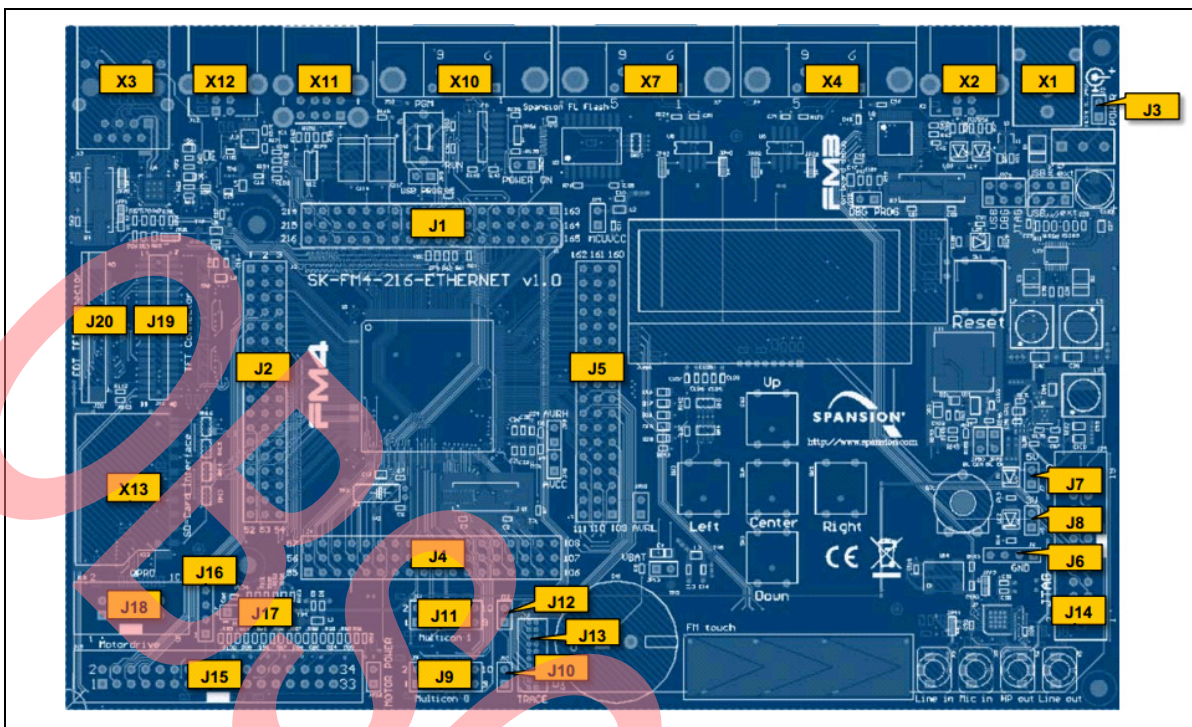
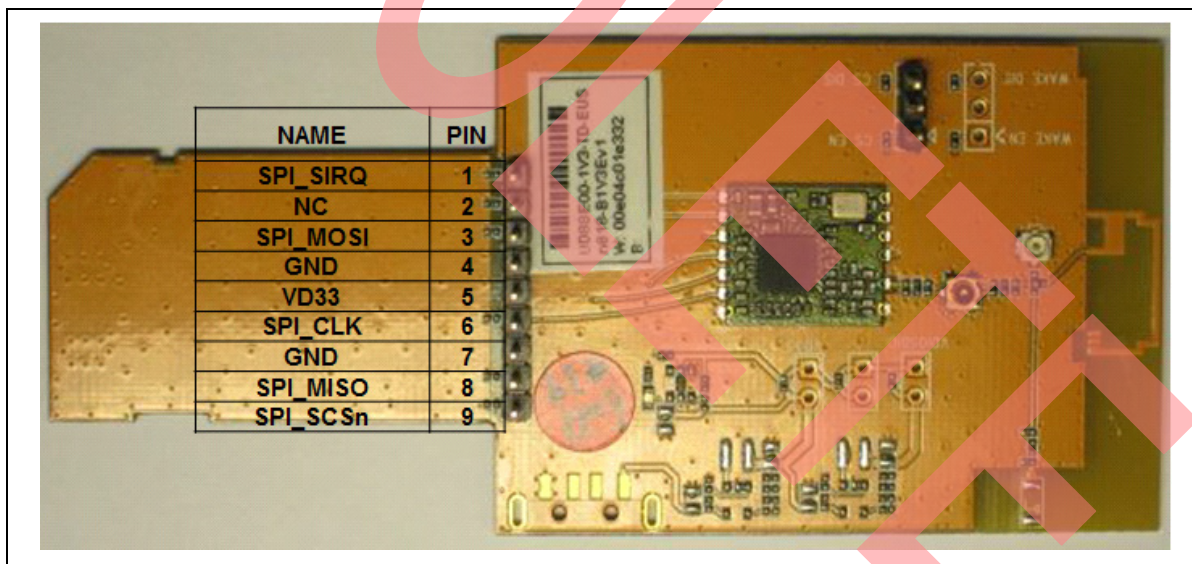


Figure 7. Connectors of the Wi-Fi Module



3.1.3 How to Turn on the Board

To turn on the Wi-Fi Module:

- SK-FM4-216-ETHERNET: power supplied by AC adapter, USB or JTAG.

Notes:

- There is the setting of jumpers at each kind of power supply.
- Please refer to the users guide for the SD-FM4-216-ETHERNET for jumper settings.

- Using the AC adapter
Supply voltage is 9–24 V.
Power switch is S2.

- Using USB
Connecting a USB cable to the X12 port. (Because the operation will become unstable, don't supply the power using the X2 port.)

Note:

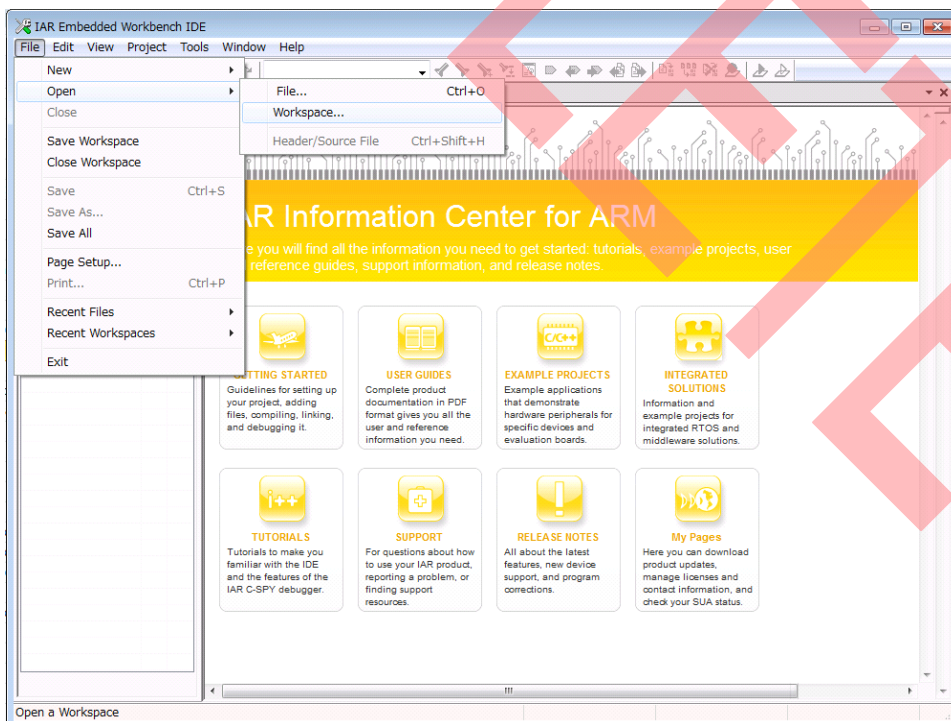
- Jumper settings are different at each connected port.
- JTAG
Ensure that the adapter is able to provide enough current for your application.
- Wi-Fi board: power supplied from the SK-FM4-216-ETHERNET via a DuPont cable.

3.2 Software Setup

In this section, we explain how to build and download the built code.

1. Open IAR Workbench.
2. To open project, [File] → [Open] → [Workspace].

Figure 8. Step 2 of Software Setup

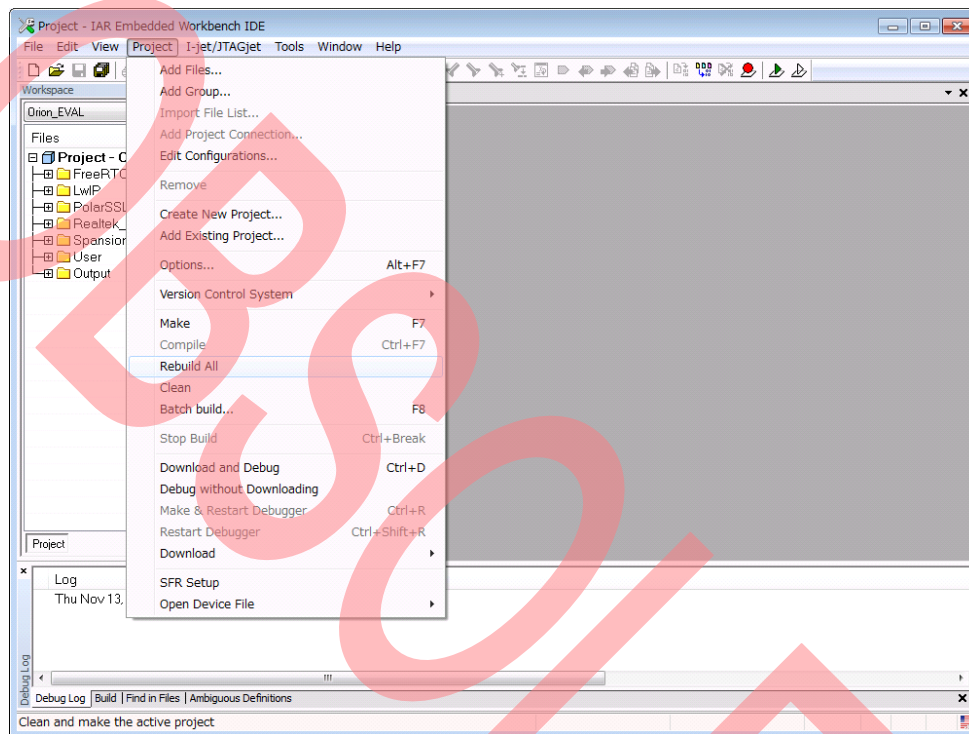


3. Select *Project.eww* in
project\spansion_s6e2cc_8189em_without_OTA-D\EWARM-RELEASE
4. To build the project, [Project] → [Rebuild All]

Note:

- Make sure the sample project built successfully without errors.

Figure 9. Step 4 of Software Setup

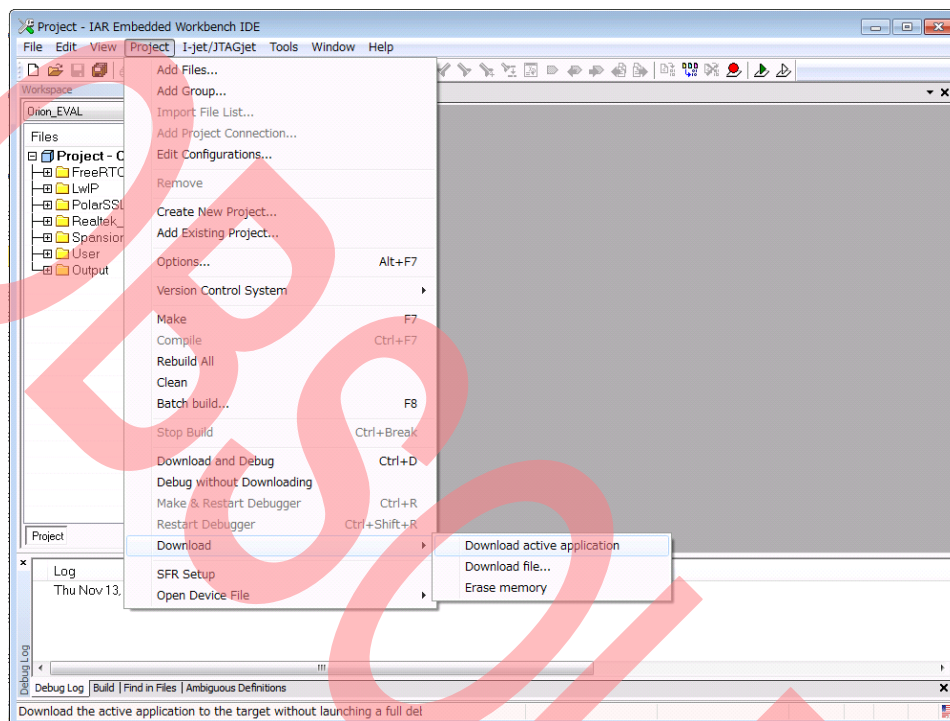


5. To download the built code, [Project] → [Download] → [Download active application]

Note:

- You can verify that the code successfully downloaded into the SK-FM4-216-ETHERNET board by checking the screen below.

Figure 10. Step 5 of Software Setup



3.3 Wi-Fi Connection

1. Reset the SK-FM4-216-ETHERNET.
Push the reset button
2. Confirm serial output from the K-FM4-216-ETHERNET.
Serial output is as follows if operating correctly.

Figure 11. Serial Output of Startup

```

-----
MB9B560R UART INIT
-----

Initializing WIFI ...
WIFI initialized

WIFI wlan0 Setting:
-----
MODE => AP
SSID => wlan_ap_ssid
CHANNEL => 6
SECURITY => OPEN
PASSWORD =>

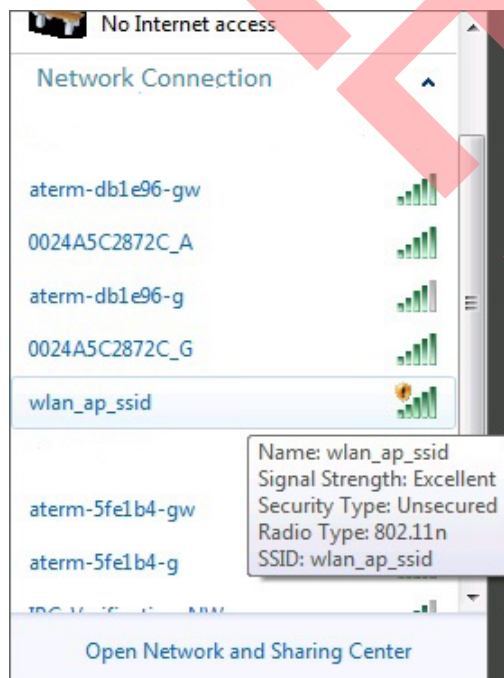
MAC => 00:e0:4c:01:f1:aa
IP => 192.168.1.1
[MEM] After WLAN Init, available heap 40896

Enter INTERACTIVE MODE
#
#

```

3. Connect to the Wi-Fi module sample kit from your laptop.
Default SSID of Wi-Fi module sample kit is wlan_ap_ssid.

Figure 12. Operation of Laptop



4 Wi-Fi Control and Commands

The kit provides commands to control Wi-Fi from your laptop with serial communication.

The following is the description of built-in commands.

Note:

- Please refer to 4.2 section of the document UM0005 Realtek wlan init and configuration for the detailed description of commands.

Table 1. Commands

Command	Note
wifi_connect	Connects to the access point.
wifi_disconnect	Disconnects from the access point.
wifi_info	Displays information about the Wi-Fi module.
wifi_on	Initializes the Wi-Fi driver.
wifi_off	Disables the Wi-Fi driver.
wifi_ap	Switches the Wi-Fi module from Station mode to AP mode.
wifi_scan	Displays the Wi-Fi (Network) scan results
wifi_get_rssi	Displays the received signal strength indicator value.
wifi_promisc	Displays result returned on the Promiscuous mode of the Wi-Fi driver.
wifi_simple_config	Connects with the Android or iOS device that is installed with the dedicated application.
wifi_wps	Shifts the Wi-Fi module to WPS Connecting mode.
wifi_sta_ap	Switches Wi-Fi module to Station mode and AP mode concurrently.
ttcp	Measures throughput.
Ping	Sends ping packets.
Exit	Closes the interface of serial commands.
Help	Displays usable commands.

4.1 wifi_connect Command

This command connects to the Wi-Fi network.

- Syntax — wifi_connect[SSID][WPA2/WEP -password][WEP-key-ID]
- Parameters
 - [SSID] : Connection target.
 - [WPA2/WEP-password]: Password of WPA2 or WEP.
 - [WEP-key-ID] : key ID for WEP.

If the WEP-key-ID parameter is omitted, the Wi-Fi module works in WPA2 security mode.

Also, if both the WEP-key-ID and WPA2/WEP-password are omitted, the Wi-Fi module works in open security mode.

4.2 wifi_disconnect Command

This command disconnects from the Wi-Fi network.

- Syntax — wifi_disconnect
- Parameters — Not required

4.3 **wifi_info Command**

This command displays the following status of the Wi-Fi driver.

- Wi-Fi setting status — Wi-Fi mode, SSID, Security mode, password, MAC, IP, GW address
- Wi-Fi running status — Free space of heap size, usage of the socket buffer, number of the using timer
- Syntax — `wifi_info`
- Parameters — Not required

4.4 **wifi_on Command**

This command initializes the Wi-Fi driver.

After the Wi-Fi driver is initialized, the Wi-Fi module will work in Station mode.

- Syntax — `wifi_on`
- Parameters — Not required

4.5 **wifi_off Command**

This command disables the Wi-Fi driver.

Also, this command triggers disconnection from a Wi-Fi network.

- Syntax — `wifi_off`
- Parameters — Not required

4.6 **wifi_ap Command**

This command switches the Wi-Fi module from Station mode to AP mode.

- Syntax — `wifi_ap [SSID] [Channel] [WPA2-password]`
- Parameters
 - [SSID] : SSID of AP mode.
 - [Channel] : Channel number is 1 to 13.
 - [WPA2-password]: Password for WPA2.

If the WPA2-password is set, the Wi-Fi module works in WPA2 security mode.

If the WPA2-password is omitted, Wi-Fi module works in open security mode.

4.7 **wifi_scan Command**

This command scans the AP list.

- Syntax — `wifi_scan [Buffer_length]`
- Parameters
 - [Buffer_length]: Buffer length for AP list.

Note:

- Default recommended value is 500.

4.8 **wifi_get_rssi Command**

This command gets the RSSI value from the Wi-Fi driver.

- Syntax — `wifi_get_rssi`
- Parameters — Not required

4.9 **wifi_promisc Command**

This command makes the Wi-Fi driver run in Promiscuous mode and gets the result of Promiscuous mode.

Promiscuous mode moves all channels (1 to 13) and gets promiscuous packets.

- Syntax — `wifi_promisc [Duration]`
- Parameters
 - `[Duration]`: Time stayed in each channel. [second]

4.10 **wifi_simple_config Command**

This command connects the android base dedicated application that is placed SimpleConfigApp.apk in tools/simple_config/Android.

Please refer to the document AN0011 Realtek WLAN Simple Configuration in /doc for using this application.

- Syntax — `wifi_simple_config [PIN-code]`
- Parameters
 - `[PIN-code]`: The dedicated application for android requires PIN-code. PIN-code is set on the Android application.

4.11 **wifi_wps Command**

This command initiates the connection for WPS.

- Syntax — `wifi_wps [Config_method]`
- Parameters
 - `[Config_method]`: Configurable method is pin or pbc.
 - pin: The connection by PIN-code.
 - pbc: The connection by push button.

4.12 **wifi_sta_ap Command**

This command switches the Wi-Fi module to Coexistent mode of Station and AP.

- Syntax — `wifi_sta_ap [SSID] [Channel] [WPA2-password]`
- Parameters
 - `[SSID]`: SSID of AP mode.
 - `[Channel]`: This channel number is used on AP mode of the Wi-Fi module.
 - `[WPA2-password]`: Password for WPA2.
 - If the WPA2-password is set, the Wi-Fi module works WPA2 security mode.
 - If the WPA2-password is omitted, the Wi-Fi module works open security mode.

4.13 **ttcp Command**

This command runs the throughput test for Rx/Tx.

- Syntax — `ttcp [Mode] [Size] [Count] [Dest_addr]`
- Parameters
 - `[Mode]` : ttcp running mode is r, t, rt, or tr
 - r: Reception mode.
 - t: Transmission mode.
 - rt and tr: Reception and Transmission mode at the same time.
 - `[Size]` : Sending packet size
 - `[Count]` : Count of sending packet
 - `[Dest_addr]`: Destination IP address for IPv4

Note:

- If mode is r, Count and Dest_addr parameters must be omitted.

4.14 ping Command

This command sends ping packets.

- Syntax — ping [Dest_addr] [Count]
- Parameters
 - [Dest_addr]: Destination IP address for IPv4
 - [Count] : Count of sending ping packet

Note:

- If the Count parameter is omitted, ping packet is sent five times.

4.15 exit Command

This closes the interface of serial commands.

- Syntax — exit
- Parameters — Not required

4.16 help Command

This command gets the usable command list.

- Syntax — help
- Parameters — Not required

5 Sample Application

5.1 Web Server Application

Please refer to the document UM0014 Realtek web server user guide for detailed description of commands.

5.2 DHCP Server/client

DHCP server and client are enabled at default setting of the sample kit.

If you want to disable the DHCP server and client, please refer to the document UM0005 Realtek wlan init and configuration.

6 Additional Information

For more information on Cypress products, please visit the following website:

<http://www.cypress.com/cypress-microcontrollers>

Document History Page

Document Title: AN204463 - SK-FM4-216-Ethernet Wi-Fi Sample Kit Setup Manual				
Document Number: 002-04463				
Rev.	ECN No.	Orig. of Change	Submission Date	Description of Change
**	–	YUIS	02/27/2015	Initial release
*A	5574326	WOFR	01/09/2017	Migrated Spansion document "AN709-00006_1v0-E" into Cypress template. Document Obsoleted.

OBSOLETE

Worldwide Sales and Design Support

Worldwide Sales and Design Support

Cypress maintains a worldwide network of offices, solution centers, manufacturers' representatives, and distributors. To find the office closest to you, visit us at [Cypress Locations](#).

Products

ARM® Cortex® Microcontrollers	cypress.com/arm
Automotive	cypress.com/automotive
Clocks & Buffers	cypress.com/clocks
Interface	cypress.com/interface
Internet of Things	cypress.com/iot
Memory	cypress.com/memory
Microcontrollers	cypress.com/mcu
PSoC	cypress.com/psoc
Power Management ICs	cypress.com/pmic
Touch Sensing	cypress.com/touch
USB Controllers	cypress.com/usb
Wireless Connectivity	cypress.com/wireless

PSoC® Solutions

[PSoC 1](#) | [PSoC 3](#) | [PSoC 4](#) | [PSoC 5LP](#)

Cypress Developer Community

[Forums](#) | [WICED IOT Forums](#) | [Projects](#) | [Video](#) | [Blogs](#) | [Training](#) | [Components](#)

Technical Support

cypress.com/support



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

Phone : 408-943-2600
Fax : 408-943-4730
Website : www.cypress.com

© Cypress Semiconductor Corporation, 2015-2017. This document is the property of Cypress Semiconductor Corporation and its subsidiaries, including Spansion LLC ("Cypress"). This document, including any software or firmware included or referenced in this document ("Software"), is owned by Cypress under the intellectual property laws and treaties of the United States and other countries worldwide. Cypress reserves all rights under such laws and treaties and does not, except as specifically stated in this paragraph, grant any license under its patents, copyrights, trademarks, or other intellectual property rights. If the Software is not accompanied by a license agreement and you do not otherwise have a written agreement with Cypress governing the use of the Software, then Cypress hereby grants you a personal, non-exclusive, nontransferable license (without the right to sublicense) (1) under its copyright rights in the Software (a) for Software provided in source code form, to modify and reproduce the Software solely for use with Cypress hardware products, only internally within your organization, and (b) to distribute the Software in binary code form externally to end users (either directly or indirectly through resellers and distributors), solely for use on Cypress hardware product units, and (2) under those claims of Cypress's patents that are infringed by the Software (as provided by Cypress, unmodified) to make, use, distribute, and import the Software solely for use with Cypress hardware products. Any other use, reproduction, modification, translation, or compilation of the Software is prohibited.

TO THE EXTENT PERMITTED BY APPLICABLE LAW, CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS DOCUMENT OR ANY SOFTWARE OR ACCOMPANYING HARDWARE, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. To the extent permitted by applicable law, Cypress reserves the right to make changes to this document without further notice. Cypress does not assume any liability arising out of the application or use of any product or circuit described in this document. Any information provided in this document, including any sample design information or programming code, is provided only for reference purposes. It is the responsibility of the user of this document to properly design, program, and test the functionality and safety of any application made of this information and any resulting product. Cypress products are not designed, intended, or authorized for use as critical components in systems designed or intended for the operation of weapons, weapons systems, nuclear installations, life-support devices or systems, other medical devices or systems (including resuscitation equipment and surgical implants), pollution control or hazardous substances management, or other uses where the failure of the device or system could cause personal injury, death, or property damage ("Unintended Uses"). A critical component is any component of a device or system whose failure to perform can be reasonably expected to cause the failure of the device or system, or to affect its safety or effectiveness. Cypress is not liable, in whole or in part, and you shall and hereby do release Cypress from any claim, damage, or other liability arising from or related to all Unintended Uses of Cypress products. You shall indemnify and hold Cypress harmless from and against all claims, costs, damages, and other liabilities, including claims for personal injury or death, arising from or related to any Unintended Uses of Cypress products.

Cypress, the Cypress logo, Spansion, the Spansion logo, and combinations thereof, WICED, PSoC, CapSense, EZ-USB, F-RAM, and Traveo are trademarks or registered trademarks of Cypress in the United States and other countries. For a more complete list of Cypress trademarks, visit cypress.com. Other names and brands may be claimed as property of their respective owners.