RS14100 EVK Demo Guide

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About this Document

The RS14100 EVK can be used for evaluation and development purposes. The exact requirements and getting started steps depend on the intended purpose.

1 Getting Started with Evaluation

The evaluation setup uses a Redpine supplied demo application firmware to enable a variety of operating and test modes commonly used in the evaluation. The demo application uses the built-in web server within the WiSeMCU module and provides an intuitive user interface to facilitate evaluation scenarios without writing any code.

1.1 Requirements

Hardware

1. A Micro USB cable (included with the kit)
2. A Wi-Fi access point
3. A USB power supply or a Windows PC with at least one USB connector
4. A desktop PC, Smartphone or Tablet with wired or wireless connectivity

Software

1. Internet browser: The demo web server is tested with following browsers - Internet Explorer (version 11, 2013 or above), Chrome (32.0.1700 or above) and Firefox (24 or above)
2. The INF file that enables communication over USB-CDC
3. Optional: Serial terminal application (e.g.Tera Term)

1.2 Setup

1. EVK board is shipped with the demo application firmware flashed into the RS14100 WiSeMCU. If you have reprogrammed the WiSeMCU, you will need to reflash the demo application. See **"Programming the Demo Application Firmware"** section.

1.3 Procedure

1. Connect the EVK board to a USB host/power supply using the POWER (J23) connector. Make sure the Power LED is ON. If this is the first time you are executing the demo application or the board was not provisioned in the past, the board would be operating in Wi-Fi Soft Access Point mode.
2. Configure a smartphone, tablet or PC to connect to the Wi-Fi access point named **"RS14100_EVK_XX:YY:ZZ"** (where XX:YY:ZZ are the last three parameters of the Wi-Fi MAC address).
3. After successful connection to the EVK Soft AP, use the Internet browser of your choice to visit http://192.168.7.1.
4. Select WIFI PROVISIONING option in order to complete the Wi-Fi provisioning. Wi-Fi provisioning is required if you want the board connected to your infrastructure Access Point. You do not need to provision the board in order to execute various operating modes. Refresh the page to confirm that the demo is executing one of the operating modes.
5. If the webpage displays "Restart the Board page" or indicate as "Board has entered into the Wrong State", cycle the board power and reconnect to the board Soft AP in order to continue with the demo.
6. Use your wireless-enabled device to scan for and connect to the SSID "RS14100_EVK_XX:YY:ZZ". Once successfully connected, check the gateway IP address under wireless settings of the device in order to determine the IP address of the board if it has been provisioned.
7. You are now ready to evaluate various modes and parameters. The demo application provides a self-explanatory user interface to guide through various operation modes and evaluation scenarios, including Wi-Fi Provisioning, Concurrent Mode, Throughput Test, Wi-Fi Direct, WPS and so on.

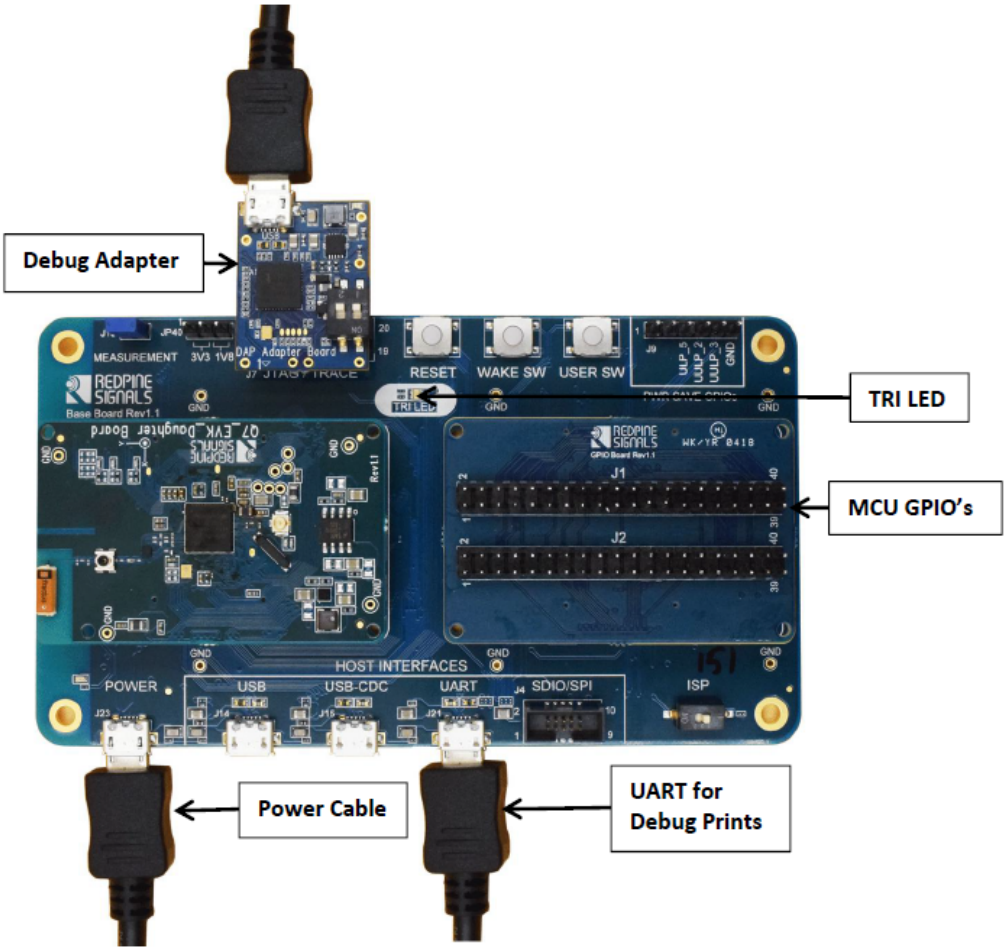

Figure 1: Board

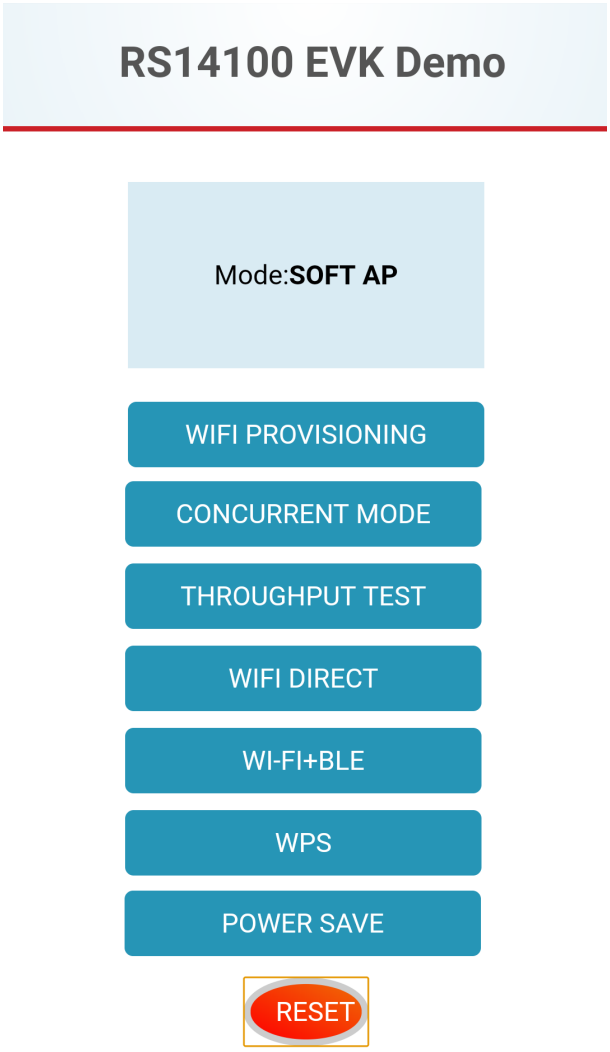

Figure 2: Demo Application

2 Programming the Demo Application Firmware

1. Remove the board power and switch the ISP button to ON.
2. Connect the USB cable to USB-CDC (install windows driver available in WiSeMCU_Package\Utils\usb_cdc folder to enumerate RSI WSC Virtual Com Port) and then connect the USB cable to POWER in order to power the board.
3. Open TeraTerm (you can download TeraTerm from http://gensho.ftp.acc.umu.se/mirror/osdn.net/ttssh2/68719/teraterm-4.97.exe) or any Kermit application on Windows or Linux and connect to COM port as shown in Figure 3.
4. In open terminal send "|", the board responds with "U". Then enter "U" which responds with BOOTLOADER options as shown in Figure 4.
5. Enter "4" to update M4 Image and then enter "1" to update the image.
6. When finished, navigate to **File->Transfer->Kermit->Send** and select RS14100_EVK_DEMO.bin from WiSeMCU_Package\Examples\EVK_Demo folder. It takes some time to update the firmware. Once the process is completed a pop-up message saying **"Upgradation Successful"** will be displayed on the screen.
7. When finished, remove the POWER USB to power off the board, remove the USB-CDC cable and lastly, switch off the ISP.
8. Power up the board and continue to verify the Demo by following the steps as mentioned above.

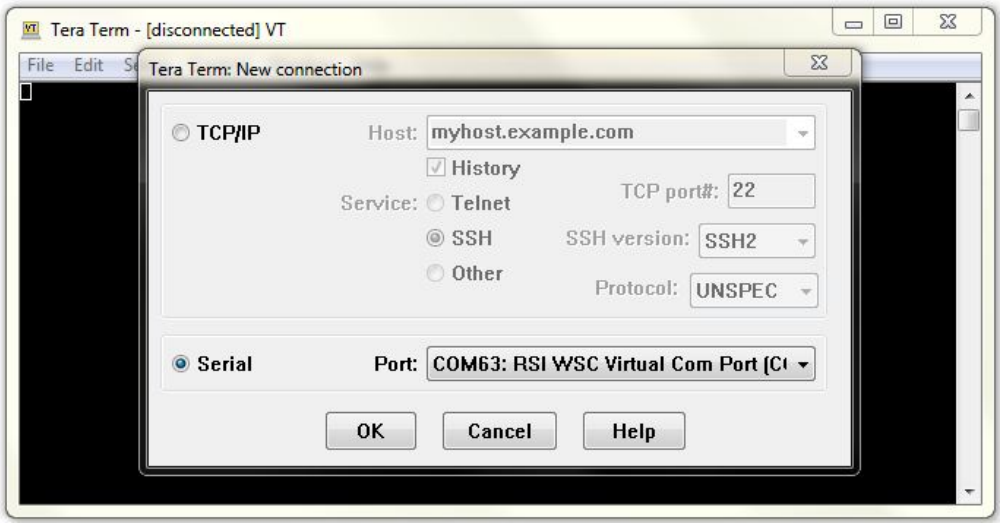

Figure 3: USB CDC Serial Selection

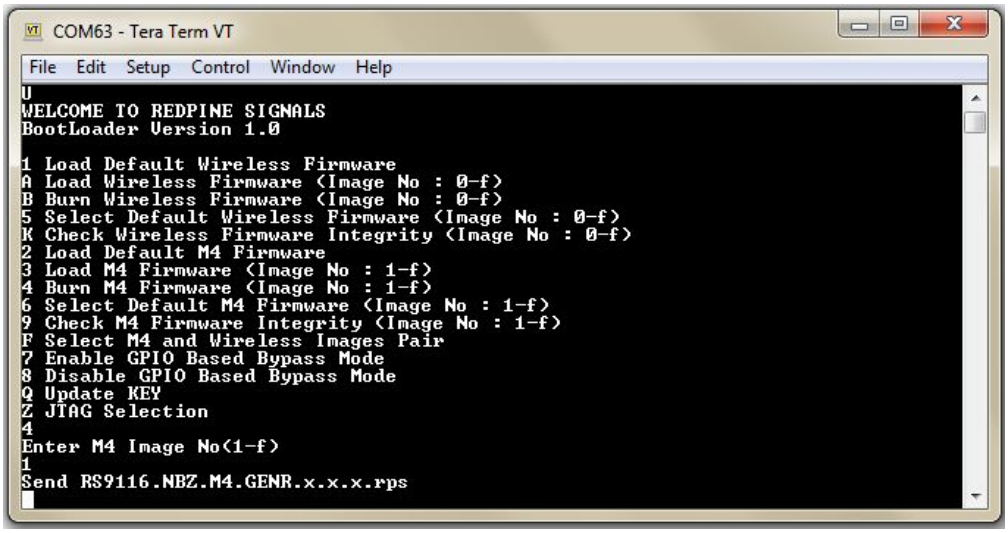

Figure 4: BOOT_PRINTS

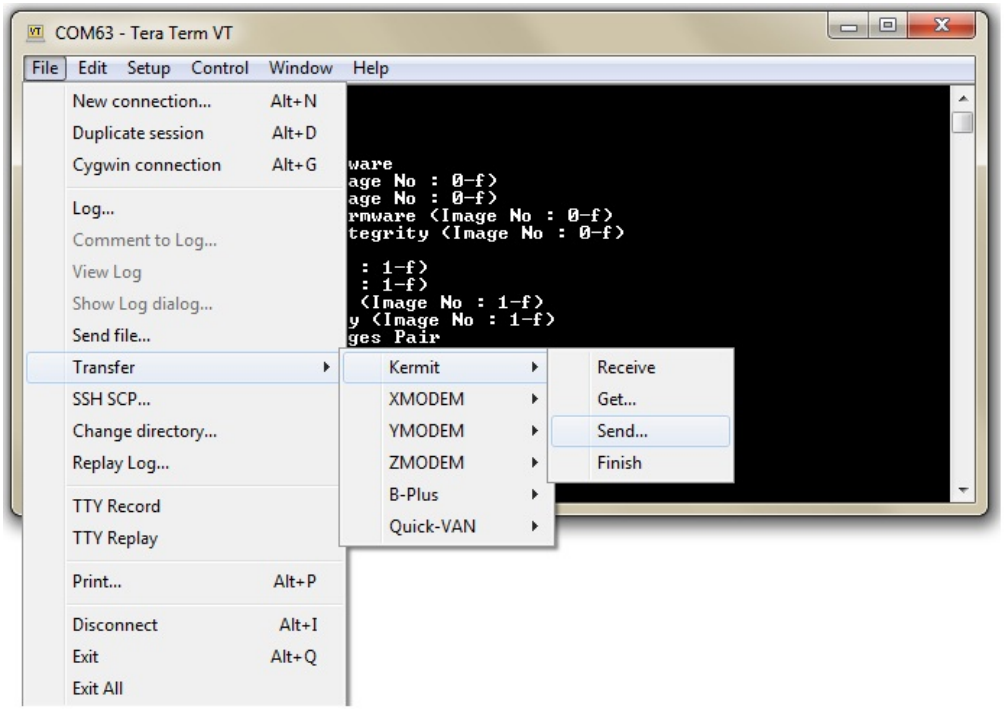

Figure 5: Kermit Send

3 Getting Started with Application Development

3.1 Requirements

Hardware

1. A micro USB cable (included with the kit)
2. A Wi-Fi access point
3. A desktop PC with Windows or Linux OS; at least one available USB port and network connectivity

Software

1. Any one of the following IDEs - Keil MDK (version 4 & above) or IAR Embedded Workbench version (7.2 & above). Note that Redpine has not tested other versions. Refer to IDE vendor documentation to install and configure the respective IDE.
2. Redpine Wireless Software Package - see **References** section in order to learn how to download the package.

Setup

1. Install one of the supported IDEs. Refer to the IDE vendor's documentation in order to verify all the components of IDE are working.

3.2 Procedure

1. Connect the CMSIS DAP adapter to EVK board JTAG TRACE(J7) connector, then connect to DAP adapter and EVK to the PC using USB cables included with kit. The Power LED should light up on DAP adapter and EVK board.
2. Run or extend any of the examples available in **WiSeMCU_Package\Examples\Reference_Projects** on Redpine’s document portal. Use the example guide in the respective folder for more information.

4 Error_Codes

Error Codes (in hexadecimal format)	Description
0x0002	Scan command issued while module is already associated with an Access Point
0x0003	No AP found
0x0004	Wrong PSK is issued while the module client tries to join an Access Point with WEP security enabled
0x0005	Invalid band
0x0006	Association not done or in unassociated state
0x0008	Deauthentication received from AP
0x0009	Failed to associate to Access Point during “Join”
0x000A	Invalid channel
0x000E	1) Authentication failure during “Join” 2) Unable to find AP during join which was found during scan.
0x000F	Missed beacon from AP during join
0x0013	Non-existent MAC address supplied in “Disassociate” command
0x0014	Wi-Fi Direct or EAP configuration is not done
0x0015	Memory allocation failed or Store configuration check sum failed
0x0016	Information is wrong or insufficient in Join command
0x0018	Push button command given before the expiry of previous push button command.
0x0019	1) Access Point not found 2) Rejoin failure
0x001A	Frequency not supported
0x001C	EAP configuration failed
0x001D	P2P configuration failed
0x001E	Unable to start Group Owner negotiation
0x0020	Unable to join
0x0021	Command given in incorrect state
0x0022	Query GO parameters issued in incorrect operating mode
0x0023	Unable to form Access Point
0x0024	Wrong Scan input parameters supplied to “Scan” command
0x0025	Command issued during re-join in progress
0x0026	Wrong parameters the command request

0x0028	PSK length less than 8 bytes or more than 63 bytes
0x0029	Failed to clear or to set the Enterprise Certificate (Set Certificate)
0x002A	Group Owner negotiation failed in Wi-Fi Direct mode
0x002B	Association between nodes failed in Wi-Fi Direct mode/ WPS Failed due to timeout
0x002C	If a command is issued by the Host when the module is internally executing auto-join or auto-create
0x002D	WEP key is of wrong length
0x002E	ICMP request timeout error
0x002F	ICMP data size exceeds maximum limit
0x0030	Send data packet exceeded the limit or length that is mentioned
0x0031	ARP Cache entry not found
0x0032	UART command timeout happened
0x0033	Fixed data rate is not supported by connecting AP.
0x0037	Wrong WPS PIN
0x0038	Wrong WPS PIN length
0x0039	Wrong PMK length
0x003a	SSID not present for PMK generation
0x003b	SSID incorrect for PMK generation(more than 34 bytes)
0x003C	Band not supported
0x003D	User store configuration invalid length
0x003E	Error in length of the command(Excceds number of characters is mentioned in the PRM).
0x003F	Data packet dropped
0x0040	WEP key not given
0x0041	Wrong PSK length
0x0042	PSK or PMK not given
0x0043	Security mode given in join command is invalid
0x0044	Beacon misscount reaches max beacon miss count(Deauth due to beacon miss)
0x0045	Deauth received from supplicant
0x0046	Deauth received from AP after channel switching
0x0047	Synchronization missed
0x0048	Authentication timeout occurred
0x0049	Association timeout
0x004A	BG scan in given channels is not allowed

0x004B	Scanned SSID and SSID given in Join are not matching
0x004C	Given number of clients exceeded max number of stations supported
0x004D	Given HT capabilities are not supported
0x004E	Uart Flow control not supported
0x004F	ZB/BT/BLE packet received and protocol is not enabled.
0x0050	Parameters error
0x0051	Invalid RF current mode
0x0052	Power save support is not present for a given interface.
0x0053	Concurrent AP in connected state
0x0054	Connected AP or Station channel mismatch
0x0055	IAP co processor error
0x0056	WPS not supported in current operating mode
0x0057	Concurrent AP has not same channel as connected station channel
0x0058	PBC session overlap error
0x005A	4/4 confirmation of 4 way handshake failed
0X005C	Concurrent mode, both AP and Client should UP, to enable configuration
0x005B	MAC address not present in MAC based join
0x005D	Config-Value is not with in the range
0x005E	Invalid configuration type is given
0x0074	Feature not enabled
0x00B1	Memory Error: No memory available.
0x00B2	Invalid characters in JSON object
0x00B3	Update Commands: No such key found.
0x00B4	No such file found: Re-check filename
0x00B5	No corresponding webpage exists with same filename
0x00B6	Space unavailable for new file.
0x00C1	Invalid input data, Re-check filename, lengths etc
0x00C2	Space unavailable for new file
0x00C3	Existing file overwrite: Exceeds size of previous file. Use erase and try again
0x00C4	No such file found. Re-check filename.
0x00C5	Memory Error: No memory available.
0x00C6	Received more webpage data than the total length initially specified.
0x00C7	Error in set region command

0x00C8	Webpage current chunk length is incorrect
0x00CA	Error in Ap set region command
0X00CB	Error in AP set region command parameters
0x00CC	Region code not supported
0x00CD	Error in extracting country region from beacon
0x00CE	Module does not have selected region support
0x00D1	SSL Context Create Failed.
0x00D2	SSL Handshake Failed. Socket will be closed.
0x00D3	SSL Max sockets reached. Or FTP client is not connected
0x00D4	Cipher set failure
0x00F1	HTTP credentials maximum length exceeded.
0x0100	SNMP internal error.
0x0104	SNMP invalid IP protocol error
0xBB01	No data received or receive time out.
0xBB0A	Invalid SNTP server address
0xBB0B	SNTP client not started
0xBB10	SNTP server not available, Client will not get any time update service from current server
0xBB15	SNTP server authentication failed
0xBB0E	Internal error.
0xBB16	Entry not found for multicast IP address
0xBB17	No more entries found for multicast
0xBB21	IP address error
0xBB22	Socket already bound.
0xBB23	Port not available.
0xBB27	Socket is not created
0xBB29	ICMP request failed
0xBB33	Maximum listen sockets reached.
0xBB34	DHCP duplicate listen
0xBB35	Port Not in close state.
0xBB36	Socket is closed or in process of closing
0xBB37	Process in progress
0xBB38	Trying to connect non-existenting TCP server socket/ Coneection got terminated by the server.

0xBB3E	Error in length of the command(Excceds number of characters is mentioned in the PRM).
0xBB42	Socket is still bound
0xBB45	No free port
0xBB46	Invalid port
0xBB4B	Feature not supported
0xBB50	Socket is not in connected state. Disconnected from server. In case of FTP, user need to give destroy command after receiving this error
0xBB87	POP3 session creation failed/ POP3 session got terminated
0xBB9C	DHCPv6 Handshake failure
0xBB9D	DHCP invalid IP response
0xBBA0	SMTP Authentication error
0xBBA1	No DNS server was specified, SMTP over size mail data
0xBBA2	SMTP invalid server reply
0xBBA3	DNS query failed, SMTP internal error
0xBBA4	Bad DNS address, SMTP server error code received
0xBBA5	SMTP invalid parameters
0xBBA6	SMTP packet allocation failed
0xBBA7	SMTP GREET reply failed
0xBBA8	Parameter error, SMTP Hello reply error
0xBBA9	SMTP mail reply error
0xBBAA	SMTP RCPT reply error
0xBBAB 0xBBA1	Empty DNS server list, SMTP message reply errorNo DNS server was specified
0xBBAC 0xBBA3	SMTP data reply errorDNS query failed.
0xBBAD 0xBBA4	SMTP authentication reply errorBad DNS address
0xBBAE 0xBBA8	SMTP server error replyParameter error
0xBBAF 0xBBAB	DNS duplicate entry.Empty DNS server list.
0xBBB1 0xBBAF	SMTP oversize server replyDNS duplicate entry.
0xBBB2	SMTP client not initialized
0xBBB3	DNS IPv6 not suported
0xBBC5	Invalid mail index for POP3 mail retrieve command
0xBBD2	SSL handshake failed
0xBBD3	FTP client is not connected or disconnected with the FTP server
0xBBD4	FTP client is not disconnected

0xBBD5	FTP file is not opened or SSL ERROR - RX length exceeded
0xBBD6	SSL handshake timeout or FTP file is not closed
0xBBD9	Expected 1XX response from FTP server but not received
0xBBDA	Expected 2XX response from FTP server but not received
0xBBDB	Expected 22X response from FTP server but not received
0xBBDC	Expected 23X response from FTP server but not received
0xBBDD	Expected 3XX response from FTP server but not received
0xBBDE	Expected 33X response from FTP server but not received
0xBBE1	HTTP Timeout
0xBBE2	HTTP Failed
0xBBE7	HTTP Timeout for HTTP PUT client or HTTP End of content data
0xBBEB	Authentication Error
0xBBED	Invalid packet length, content length and received data length is mismatching
0xBBEF	Server responds before HTTP client request is complete
0xBBF0	HTTP/HTTPS password is too long
0xBBFF	POP3 error for invalid mail index
0XFFFF	Listening TCP socket in module is not connected to the remote peer, or the LTCP socket is not yet opened in the module
0xFFFB	Cannot create IP in same interface in concurrent mode
0xFFFE	Sockets not available. The error comes if the Host tries to open more than 10 sockets
0xFFFC	IP configuration failed
0xFFF7	Byte stuffing error in AT mode
0xFFF8	1) Invalid command (e.g. parameters insufficient or invalid in the command). Invalid operation (e.g. power save command with the same mode given twice, accessing wrong socket, creating more than allowed sockets)
0XFFFA	2) TCP socket is not connected
0xFFC5	Station count exceeded max station supported
0xFFC4	Unable to send tcp data
0xFFBC	Socket buffer too small
0xFFBB	Invalid content in the DNS response to the DNS Resolution query
0xFFBA	DNS Class error in the response to the DNS Resolution query
0xFFB8	DNS count error in the response to the DNS Resolution query
0xFFB7	DNS Return Code error in the response to the DNS Resolution query

0xFFB6	DNS Opcode error in the response to the DNS Resolution query
0xFFB5	DNS ID mismatch between DNS Resolution request and response
0xFFAB	Invalid input to the DNS Resolution query
0xFF42	DNS response was timed out
0xFFA1	ARP request failure
0xFF9D	DHCP lease time expired
0xFF9C	DHCP handshake failure
0xFF88	This error is issued when Websocket creation failed
0xFF87	This error is issued when module tried to connect to a non-existent TCP server socket on the remote side
0xFF86	This error is issued when tried to close non-existent socket. or invalid socket descriptor
0xFF85	Invalid socket parameters
0xFF82	Feature not supported
0xFF81	Socket already open
0xFF80	Attempt to open more than the maximum allowed number of sockets
0XFF7E	Data length exceeds mss.
0xFF74	Feature not enabled
0xFF73	DHCP server not set in AP mode
0xFF71	Error in AP set region command parameters
0xFF70	SSL not supported
0xFF6F	JSON not supported
0xFF6E	Invalid operating mode
0xFF6D	Invalid socket configuration parameters
0xFF6C	Web socket creation timeout
0xFF6B	Parameter maximum allowed value is exceeded
0xFF6A	Socket read timeout
0xFF69	Invalid command in sequence
0xFF42	DNS response timed out
0xFF41	HTTP socket creation failed
0xFF40	TCP socket close command is issued before getting the response of the previous close command
0xFF36	Wait On Host feature not enabled

0xFF35	Store configuration checksum validation failed
0xFF33	TCP keep alive timed out
0xFF2D	TCP ACK failed for TCP SYN-ACK
0xFF2C	Memory limit exceeded in a given operating mode
0xFF2A	Memory limit exceeded in operating mode during auto join/create
0xFF2B	MDNSD command not supported
0xCC2F	PUF Operation is blocked
0xCC31	PUF Activation code invalid
0xCC32	PUF input parameters invalid
0xCC33	PUF in error state
0XCC34	PUF Operation not allowed
0XCC35	PUF operation Failed

5 Procedure to Measure Power numbers on EVK.

5.1 Requirements

Hardware

1. Power meter with two pin connector
2. WiFi Access point

Software

1. Keil IDE

5.2 Procedure

WiFi power numbers

1. Remove the jumper from the J19 connector (MEASUREMENT) then connect the Power meter across the pins as shown the Figure 6.
2. Find the Keil applications from <WiSeMCU release package>/Examples/Reference_Projects/ Wireless_Projects/Keil_Power_numbers, open the multi project named "keil_wisemcu_power_measurment.uvmpw"

- **Stand-By**
    a. open the rsi_wlan_standby.c from example section of project change the "SSID", if access point is password protected add type of protection in "SECURITY_TYPE", update the "PSK"
    b. build and debug the project which will show the pattern of sleep and wake-up measure the average power for 5-10 seconds.
- **Active Numbers**
    a. build and debug all the applications other than Standby, which are per-configured with settings, and measure the average power.

MCU power numbers

1. Find the Keil applications from <WiSeMCU release package>/Examples/Reference_Projects/ Peripheral_Projects/
2. Run the projects related to power numbers (power_transistion, PS2_Retention, Ps2_sleep, PS4_Retention, Ps4_sleep).
   Note: each example has it's own Readme please refer to get more details

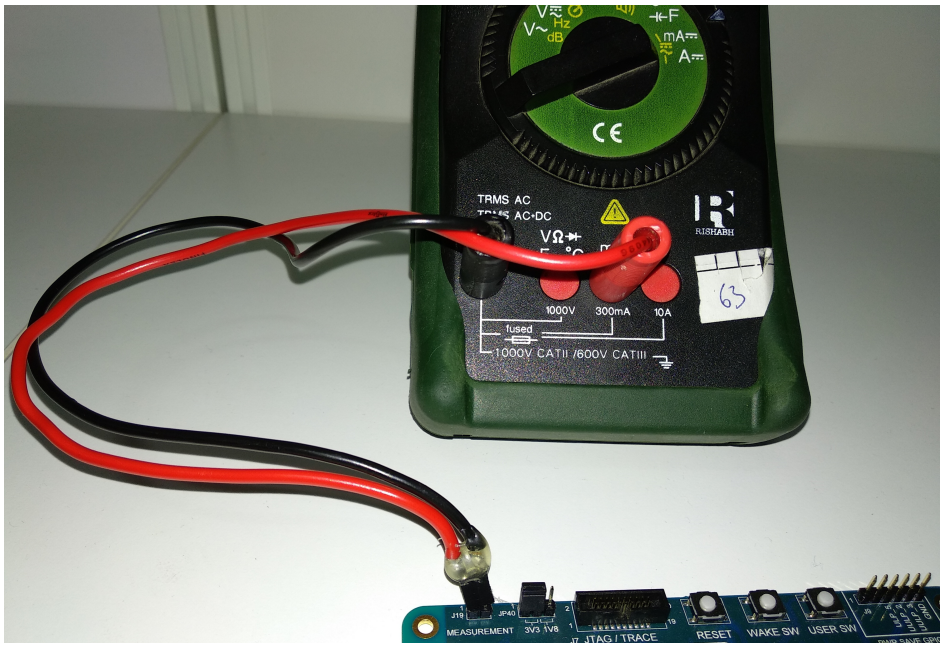

Figure 6: Power Measurement