

# **AN1286: RS9116W BT Regulatory Test Application Note**

Version 1.2

10/21/2020

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## 1 About

This document provides information on the BT PER command sequences using the WiSeConnect Module.

## 2 Introduction

This document details the procedure, steps, and requirements for the Bluetooth/Bluetooth LE PER mode of WiSeConnect, and the commands supported by using a UART interface in AT command mode. It also describes Bluetooth / Bluetooth LE PER mode using the SAPIs. The DUT uses the UART interface for communicating with the Master (External Application such as Docklight) for configuring the Wireless System and for logging the Wireless performance.

**Note:** This example is applicable to WiSeConnect™. The feature(s) used in this example may or may not be available on your part number. Refer to the product data sheet, available at our [Technical Resource Search](#) site, to verify the features available.

## 3 Prerequisites

### 3.1 Hardware and Software Requirements

1. Windows PC.
2. Download the Tera-term application using URL: <https://ttssh2.osdn.jp/index.html.en>

### 3.2 Hardware Setup

Connect the USB cable to the UART port of the EVK and connect the other end to the PC. Now the PC will detect the module as a UART device.

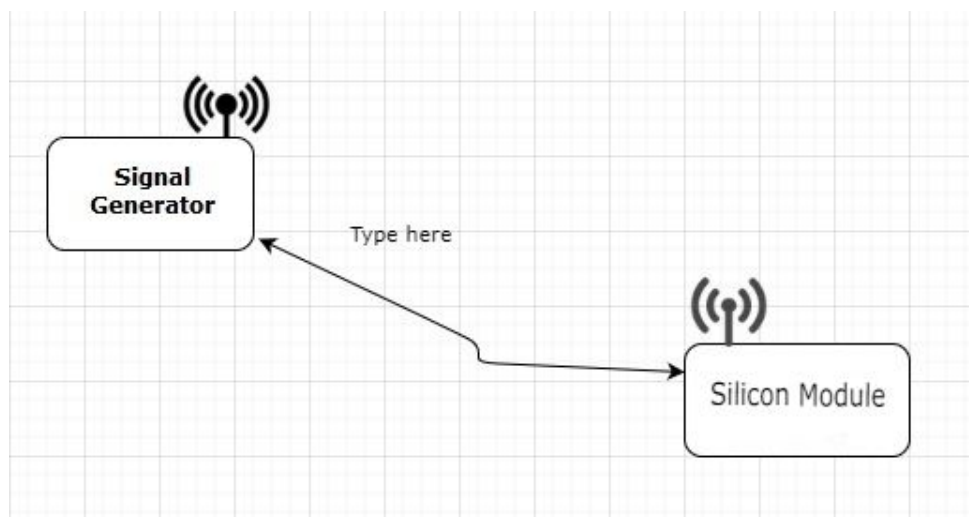
## 4 Terminology

1. EVK - Evaluation Kit

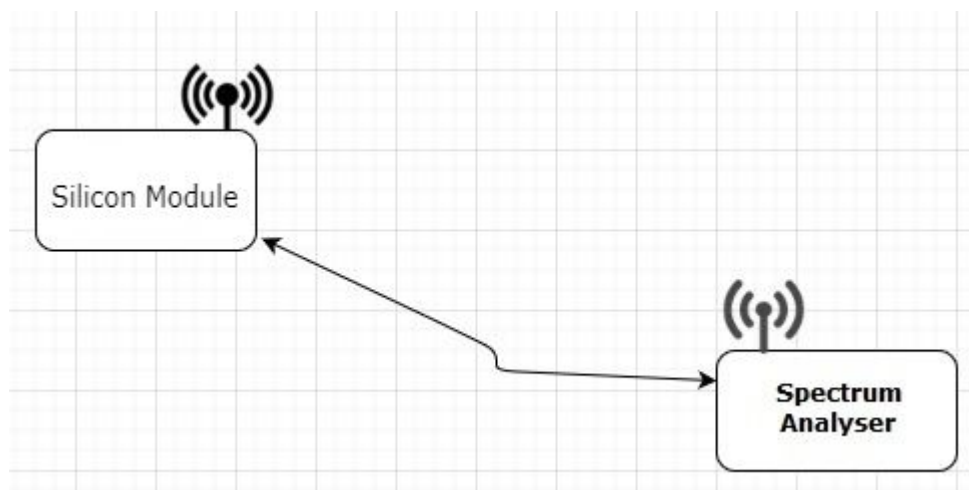
## 5 BT PER Mode

### 5.1 Block Diagram:

#### Rx Block Diagram:



#### Tx Block Diagram:



### 5.2 PER Commands to be Used

#### 5.2.1 For Bluetooth

##### 5.2.1.1 Start

This command enables the Master to start the BT-Classic transmit with the transmit variables and the wireless features provided through this command.

#### BT transmit cmd

```
at+rsibt_bredrtransmit=<enable/disable>,<device_address>,<pkt_len>,<pkt_type>,<BR/EDR_mode>,<rx_channel_num>,<tx_channel_num>,<link_type>,<scrambler_seed>,<hopping_type>,<antenna_sel>,<pll_mode>,<rf_type>,<rf_chain>,<payload_type>,<tx_power_index>,<tx_mode>,<inter_packet_gap>,<num_of_packets>\r\n
```

#### Parameters

Parameter	Value
Enable/disable	1- enable

Parameter	Value
	0- disable
Device_address	It is a 48-bit address in hexadecimal format, e.g., 0x000012345678 access_addr_lsb = 0x12345678 access_addr_msb = 0x0000
pkt_type	Type of the packet to be transmitted, as per the Bluetooth standard. 3: BT_DM1_PKT_TYPE 4: BT_DH1_PKT_TYPE 10: BT_DM3_PKT_TYPE 11: BT_DH3_PKT_TYPE 14: BT_DM5_PKT_TYPE 15: BT_DH5_PKT_TYPE 4: BT_2DH1_PKT_TYPE 10: BT_2DH3_PKT_TYPE 14: BT_2DH5_PKT_TYPE 8: BT_3DH1_PKT_TYPE 11: BT_3DH3_PKT_TYPE 15: BT_3DH5_PKT_TYPE 5: BT_HV1_PKT_TYPE 6: BT_HV2_PKT_TYPE 7: BT_HV3_PKT_TYPE 8: BT_DV_PKT_TYPE 7: BT_EV3_PKT_TYPE 6: BT_2EV3_PKT_TYPE 7: BT_3EV3_PKT_TYPE 12: BT_EV4_PKT_TYPE 12: BT_2EV5_PKT_TYPE 13: BT_EV5_PKT_TYPE 13: BT_3EV5_PKT_TYPE
pkt_length	Length of the packet, in bytes, to be transmitted. 17 :BT_DM1_PAYLOAD_MAX_LEN 121 :BT_DM3_PAYLOAD_MAX_LEN 224 :BT_DM5_PAYLOAD_MAX_LEN 27 :BT_DH1_PAYLOAD_MAX_LEN 183 :BT_DH3_PAYLOAD_MAX_LEN 339 :BT_DH5_PAYLOAD_MAX_LEN 54 :BT_2DH1_PAYLOAD_MAX_LEN 367 :BT_2DH3_PAYLOAD_MAX_LEN 679 :BT_2DH5_PAYLOAD_MAX_LEN 83 :BT_3DH1_PAYLOAD_MAX_LEN 552 :BT_3DH3_PAYLOAD_MAX_LEN



Parameter	Value
	1021 :BT_3DH5_PAYLOAD_MAX_LEN 10 :BT_HV1_VOICE_PAYLOAD_LEN 20 :BT_HV2_VOICE_PAYLOAD_LEN 30 :BT_HV3_VOICE_PAYLOAD_LEN 30 :BT_EV3_VOICE_PAYLOAD_LEN 60 :BT_2EV3_VOICE_PAYLOAD_LEN 90 :BT_3EV3_VOICE_PAYLOAD_LEN 120 :BT_EV4_VOICE_PAYLOAD_LEN 180 :BT_EV5_VOICE_PAYLOAD_LEN 360 :BT_2EV5_VOICE_PAYLOAD_LEN 540 :BT_3EV5_VOICE_PAYLOAD_LEN
br_edr_mode	1 : basic rate 2/3 : enhanced_rate
rx_channel_index	Receive channel index, as per the Bluetooth standard.i.e, 0 to 78
tx_channel_index	Transmit channel index, as per the Bluetooth standard. i.e, 0 to 78
link_type	0 : sco 1 : acl 2 : esco
scrambler_seed	Initial seed to be used for whitening. It should be set to '0' in order to disable whitening.
no_of_packets	Number of packets to be transmitted. It is valid only when the <tx_mode> is set to Burst mode
payload_type	Type of payload to be transmitted 0 : Payload consists of all zeros 1 : Payload consists of all 0xFF's 2 : Payload consists of all 0x55's 3 : Payload consists of all 0xF0's 4 : Payload consists of PN9 sequence.
tx_power	Transmit power value should be between 0 and 18
tx_mode	0 : Burst mode 1 : Continuous mode
hopping type	0 : no hopping 1 : fixed hopping 2 : random hopping
ant_sel	2 : onchip antenna 3 : u.f.l
inter_pkt_gap	Number of slots to be skipped between two packets
pll_mode	0 : PLL_MODE0 1 : PLL_MODE1 2 : PLL_MODE2
rf_type	0 : External RF

Parameter	Value
	1 : Internal RF
rf_chain	0 : WLAN_HP_CHAIN 1 : WLAN_LP_CHAIN 2 : BT_HP_CHAIN 3 : BT_LP_CHAIN

Example command: `at+rsibt_bredrtransmit=1,11-11-11-11-11-11,339,15,3,10,10,1,0,0,3,0,1,3,1,31,0,0,0\r\n`

#### 5.2.1.2 Stop

This command enables the Master to stop the BT-Classic transmit operation.

#### BT Stop cmd

```
at+rsibt_bredrtransmit=0\r\n
```

#### Receive

This command enables the Master to receive the BT-Classic transmit operation.

#### BT Receive cmd

```
at+rsibt_bredrreceive=<enable/disable>,<device_address>,<pkt_len>,<pkt_type>,<BR/EDR_mode>,<rx_channel_num>,<tx_channel_num>,<link_type>,<scrambler_seed>,<hopping_type>,<antenna_sel>,<pll_mode>,<rf_type>,<rf_chain>,<loop_back_mode>\r\n
```

#### Parameters:

Parameters	Value
enable/disable	1 -enable 0-disable
device_address	It is a 48-bit address in hexadecimal format, e.g.,0x000012345678
pkt_type	Type of the packet to be transmitted, as per the Bluetooth standard.
pkt_length	Length of the packet, in bytes, to be transmitted.
br_edr_mode	1 : basic rate 2 or 3 : enhanced_rate
rx_channel_index	Receive channel index, as per the Bluetooth standard.i.e, 0 to 78
tx_channel_index	Transmit channel index, as per the Bluetooth standard. i.e, 0 to 78
link_type	0 : sco 1 : acl 2 : esco
scrambler_seed	Initial seed to be used for whitening. It should be set to '0' in order to disable whitening.
hopping type	0 : no hopping 1 : fixed hopping 2 : random hopping
ant_sel	2 : onchip antenna

Parameters	Value
	3 : u.f.l
pll_mode	0 : PLL_MODE0 1 : PLL_MODE1 2 : PLL_MODE2
rf_type	0 : External RF 1 : Internal RF
rf_chain	0 : WLAN_HP_CHAIN 1 : WLAN_LP_CHAIN 2 : BT_HP_CHAIN 3 : BT_LP_CHAIN
loop_back_mode	0 : Disable 1 : Enable

Example :at+rsibt\_bredrrreceive=1,11-11-11-11-11-11,339,15,3,10,10,1,0,0,3,0,1,3,0\r\n

### Statistics

This command enables the Master to get the performance statistics(Packet Contents) from the Wireless system so that the Master can compute BER over the received packets.

The stats command will return the statistics like CRC pass count, CRC fail count, RSSI value.

### Stats command:

```
at+rsibt_perstats\r\n
```

### For Bluetooth LE

### Start cmd:

```
at+rsibt_bletransmit=<enable/disable>,<access_addr>,<ble_rate>,<rx_channel_num>,<tx_channel_num>,<scrambler_seed>,<le_channel_type>,<hopping_type>,<antenna_sel>,<pll_mode>,<rf_type>,<rf_chain>,<pkt_len>,<payload_type>,<tx_power_index>,<tx_mode>,<inter_packet_gap>,<num_of_packets>\r\n
```

### Description:

access_addr	It is a 32-bit address in Hex format (Access address of BLE PER packet : 0x71764129)
phy_rate:	Indicates the rate of transmission 1 : LE_1Mbps 2 : LE_2Mbps 4 : LR_125Kbps 8 : LR_500Kbps
rx_chnl_num	Receive channel index, as per the Bluetooth standard.i.e, 0 to 39
tx_chnl_num	Transmit channel index, as per the Bluetooth standard. i.e, 0 to 39.
scrambler_seed	Initial seed to be used for whitening. It should be set to '0' in order to disable whitening.
le_chnl_type	0 : Advertising channel

	1 : Data channel
freq_hop_en	0 : No hopping 1 : Fixed hopping 2 : Random hopping
ant_sel	2 : On-chip antenna 3 : u.f.l antenna
pll_mode	0 : PLL_MODE0 1 : PLL_MODE1 2 : PLL_MODE2
rf_type	0 : External RF 1 : Internal RF
rf_chain	0 : WLAN_HP_CHAIN 1 : WLAN_LP_CHAIN 2 : BT_HP_CHAIN 3 : BT_LP_CHAIN
pkt_len	Length of the packet, in bytes, to be transmitted. Max pkt_len to be transmitted is 240
payload_type	Type of payload to be transmitted 0 : PRBS9 Sequence 1 : 0x0F 2 : 0x55 3 : PBRs15 sequence 4 : 0xFF 5 : 0x00 6 : 0xF0 7 : 0xA0
tx_power	Transmit power value should be transmitted. BLE-LP Chain, 1 - 31 - 0DBM Mode, BLE-LP Chain, 33-63 - 10DBM Mode. BLE-LP Chain tx_power value 0 and 32 are invalid.
transmit_mode	0 : Burst mode 1 : Continuous mode
inter_pkt_gap	The number of slots to be skipped between two packets - Each slot will be 1250usec.
no_of_packets	Number of packets to be transmitted. It is valid only when the <tx_mode> is set to Burst mode.

Example: at+rsibt\_bletransmit=1,71764129,1,10,10,0,1,0,3,0,1,3,240,1,31,0,0,0\r\n

### Stop cmd

at+rsibt\_bletransmit=0\r\n

### BLE Receive cmd

at+rsibt\_blereceive=<enable/disable>,<access\_addr>,<ble\_rate>,<rx\_channel\_num>,<tx\_channel\_num>,<scrambler\_seed>,<le\_channel\_type>,<hopping\_type>,<antenna\_sel>,<pll\_mode>,<rf\_type>,<rf\_chain>,<ext\_data\_len\_ind>,<loop\_back\_mode>,<duty\_cycling>\r\n

## Parameters

Parameters	Value
access_addr	It is a 32-bit address in hexadecimal format, e.g.,00112233
phy_rate	Indicates the rate at which BLE transmits 1 : 1Mbps 2 : 2Mbps 4 : Long Range(LR)
rx_chnl_num	Receive channel index, as per the Bluetooth standard.i.e, 0 to 39
tx_chnl_num	Transmit channel index, as per the Bluetooth standard. i.e, 0 to 39
scrambler_seed	Initial seed to be used for whitening. It should be set to '0' in order to disable whitening
le_chnl_type	0 : Advertising channel 1 : Data channel
freq_hop_en	0 : No hopping 1 : Fixed hopping 2 : Random hopping
ant_sel	2 : On-chip antenna 3 : u.f.l antenna
pll_mode	0 : PLL_MODE0 1 : PLL_MODE1 2 : PLL_MODE2
rf_type	0 : External RF 1 : Internal RF
rf_chain	0 : WLAN_HP_CHAIN 1 : WLAN_LP_CHAIN 2 : BT_HP_CHAIN 3 : BT_LP_CHAIN
ext_data_len_indication	0 : Disable(<=37 Bytes) 1 : Enable(<=240 Bytes)
loop_back_mode	0 : Disable 1 : Enable
duty_cycling	BIT(7) - BLE-4X Mode BIT(0) - Duty Cycling Mode

### 5.3 Bluetooth / Bluetooth LE PER mode execution

Refer the **Appendix C\_Running Tera Term Scripts** section for usage of Tera-term to run the scripts in the **UG453: RS9116W EVK User's Guide** from <https://docs.silabs.com/rs9116>.

## 5.4 Bluetooth/Bluetooth LE PER Test Using SAPIs

For Bluetooth per mode, bt\_per application is present in release path  
RS9116.NB0.WC.GENR.OSI.x.x.x\host\sapis\examples\bt\bt\_per.

For Bluetooth LE per mode, ble\_per application is present in release path  
RS9116\RS9116.NB0.WC.GENR.OSI.x.x.x\host\sapis\examples\ble\ble\_per.

The above example applications will work for both Tx and Rx.

To define which transmission mode the module has to work. Configure the below MACRO for transmit or receive.

For Bluetooth LE:

```
#define RSI_CONFIG_PER_MODE      RSI_BLE_PER_TRANSMIT_MODE
#define RSI_CONFIG_PER_MODE      RSI_BLE_PER_RECEIVE_MODE
```

For BT:

```
#define RSI_CONFIG_PER_MODE      RSI_BT_PER_TRANSMIT_MODE
#define RSI_CONFIG_PER_MODE      RSI_BT_PER_RECEIVE_MODE
```

The above-mentioned command parameters are the same for SAPI mode, they can be configured as per customer requirement.

## 5.5 Expected Results

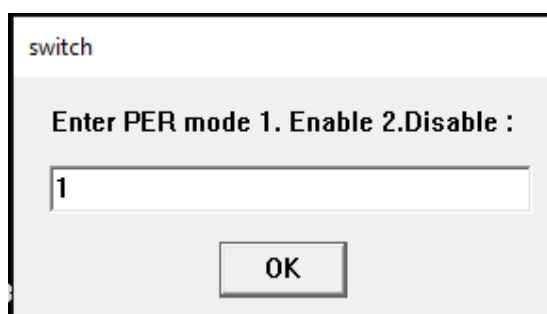
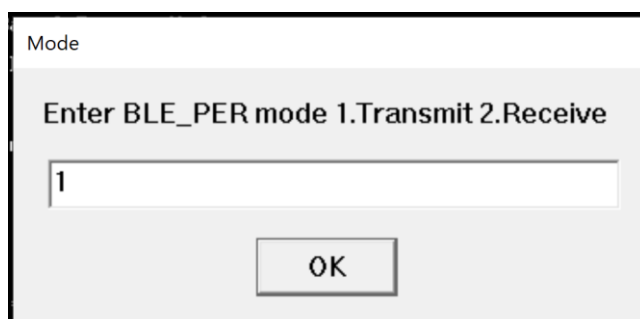
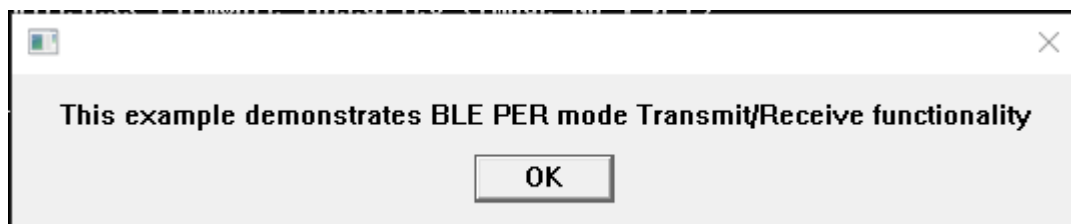
### 5.5.1 Bluetooth LE Sequence

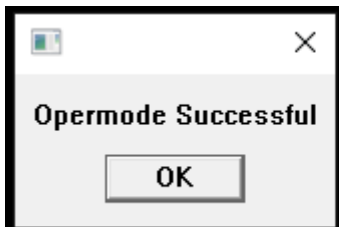
5.5.1.1 For 0dBm PER transmit:

Note: The images which are referred below are of TTL Script which is mentioned in APPENDIX section.

at+rsi\_opermode=851968,0,1,2147483648,2150629376,3221225472,0,376012800,2048<CR><LF>

at+rsibt\_bletransmit=1,71764129,1,0,0,0,1,0,2,0,1,3,240,1,31,0,0,0<CR><LF>





address

Enter device\_address:

OK

phy\_rate

Enter phy/ble rate:

OK

rx\_no

Enter rx\_channel\_no:

OK

tx\_no

Enter tx\_channel\_no:

OK

seed

Enter the Scrambler\_seed as 5 in Continuous Wave mode, Please enter 0 in other modes:

OK

ltype

Enter le\_channel\_type:

1

OK

hp\_type

Enter hoping\_type:

0

OK

ant\_type

Enter Antenna selection type:

2

OK

pll

Enter pll\_mode:

0

OK

rf

Enter rf\_type:

1

OK

rc

Enter rf\_chain:

3

OK



length

Enter the packet length:

OK

pt

Enter payload\_type:

OK

ti

Enter tx\_power\_index:

OK

tm

Enter tx\_mode:

OK

no\_pkt

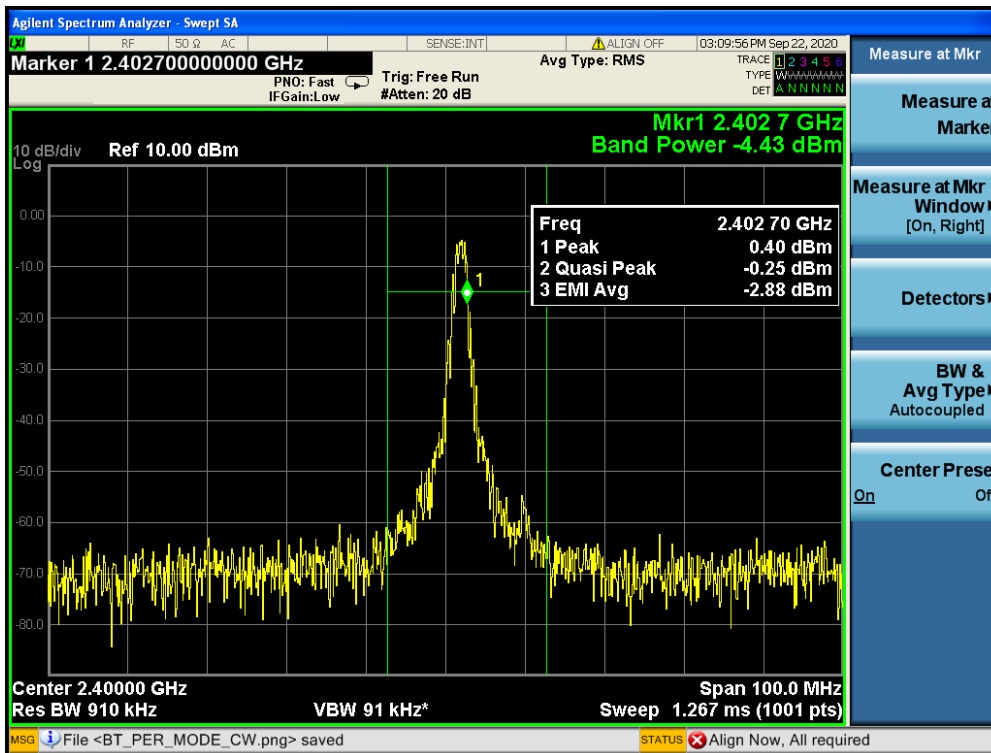
Enter number\_of\_packets, this parameter valid only tx\_mode is (Burst mode) otherwise give input as 0(Zero):

OK

Choice

Enter CW\_mode 1.Enable 2.Disable :

OK



NOTE: The values taken in the picture are not done in idle environment. The values are taken including the cable losses, attenuator losses, etc.

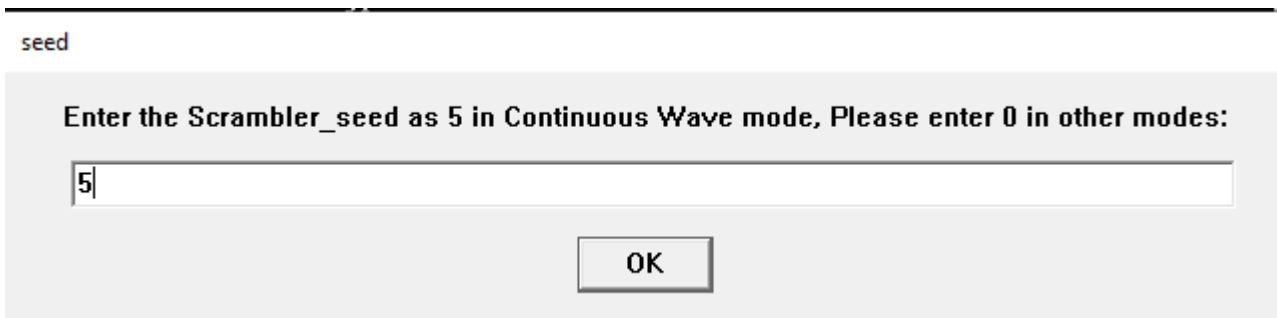
#### CW Mode:

```
at+rsi_opermode=851968,0,1,2147483648,2150629376,3221225472,0,376012800,2048<CR><LF>
```

```
at+rsibt_bletransmit=1,71764129,1,0,0,5,1,0,2,0,1,2,240,0,64,1,0,0<CR><LF>
```

```
at+rsibt_percwmode=1<CR><LF>
```

→ To run the BLE\_CW mode all the parameters you need to enter as mentioned step by step procedure in above method. But "Scrambler\_seed" parameter you need to give input as 5.



→ After "Scrambler\_seed" parameter script will ask all the inputs as mentioned in above BLE\_Trasmit method, you need to enter .

→ All the necessary inputs are completed , final input will ask for "Continuous Wave" selection you need to enter 2.Like as below pic.

Choice

Enter CW\_mode 1.Enable 2.Disable :

1

OK

COM4:115200baud - Tera Term VT

File Edit Setup Control Window Help

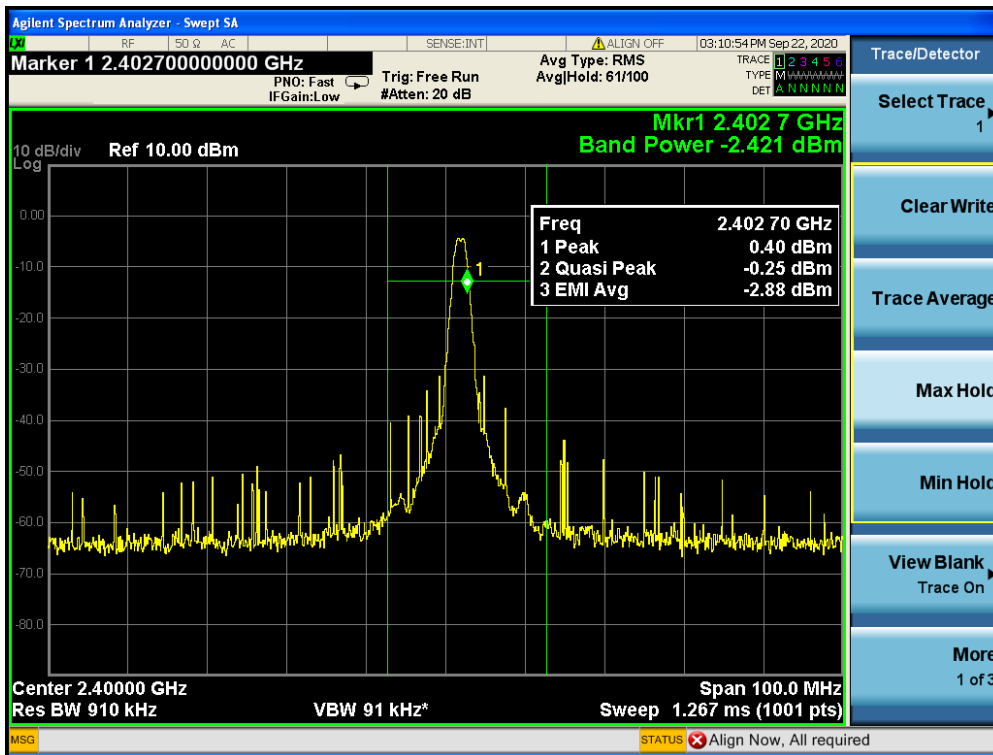
Z JTAG Selection  
11  
Loading...  
Loading Done  
at+rsi\_opermode=851968,0,1,2147483648,2150629376,3221225472,0,376012800,2048  
OK  
bt\_loaded  
at+rsibt\_bletransmit=1,71764129,1,0,0,5,1,0,2,0,1,3,240,1,31,0,0,0  
OK  
at+rsibt\_percwmode=1  
OK

BLE CW mode Executed Successful  
OK

COM4:115200baud - Tera Term VT

File Edit Setup Control Window Help

Z JTAG Selection  
11  
Loading...  
Loading Done  
at+rsi\_opermode=851968,0,1,2147483648,2150629376,3221225472,0,376012800,2048  
OK  
bt\_loaded  
at+rsibt\_bletransmit=1,71764129,1,0,0,5,1,0,2,0,1,3,240,1,31,0,0,0  
OK  
at+rsibt\_percwmode=1  
OK



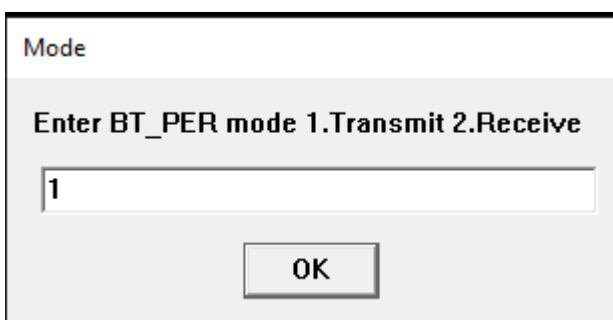
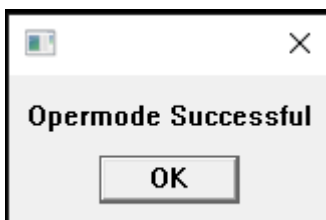
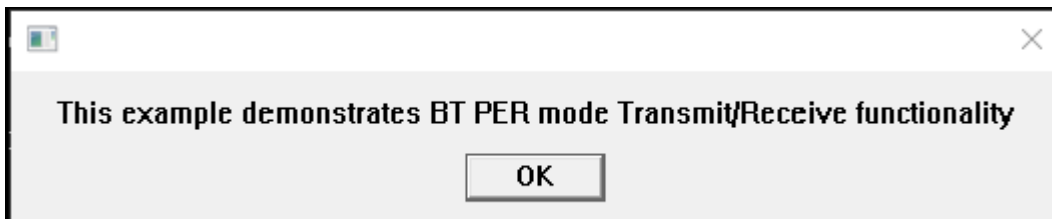
## 5.5.2 Bluetooth Sequence

### 5.5.2.1 For 0dBm PER transmit:

Note: The images which are referred below are of TTL Script which is mentioned in APPENDIX section.

```
at+rsi_opermode=327680,0,1,2147483648,2150629376,1073741824<CR><LF>
```

```
at+rsibt_bredrtransmit=1,00-00-00-00-00-00,15,1,1,1,1,0,0,2,0,1,2,0,0,1,0,0<CR><LF>
```



switch

Enter PER mode 1.Enable 2.Disable :

OK

address

Enter BT address:

OK

length

Enter packet length:

OK

packet\_type

Enter packet type:

OK

bt\_mode

Enter the mode BR/EDR\_mode:

OK

rx\_no

Enter rx\_channel\_no:

OK

tx\_no

Enter tx\_channel\_no:

OK

ltype

Enter link type:

OK

seed

Enter the Scrambler\_seed as 5 in Continuous Wave mode, Please enter 0 in Burst mode:

OK

hp\_type

Enter hoping\_type:

OK

ant\_type

Enter antenna\_sel\_type:

OK

pll

Enter pll\_mode:

OK

rf

Enter rf\_type:

OK

rc

Enter rf\_chain:

OK

pt

Enter payload\_type:

OK

ti

Enter tx\_power\_index:

OK

tm

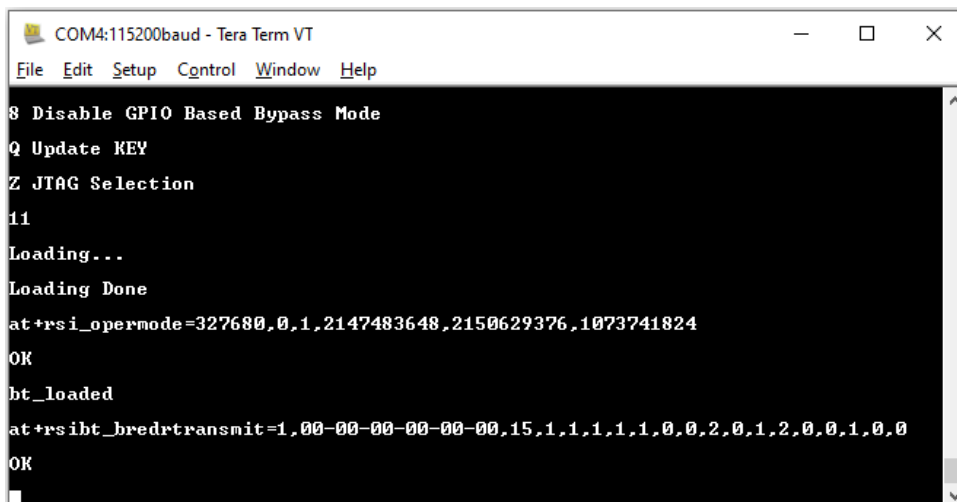
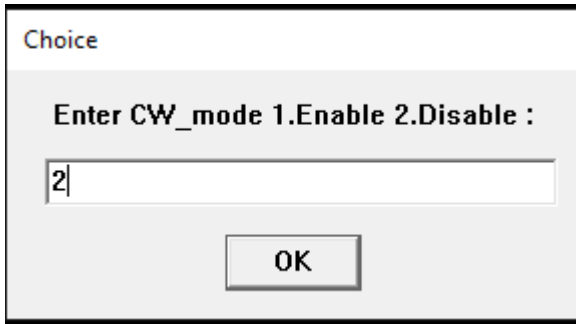
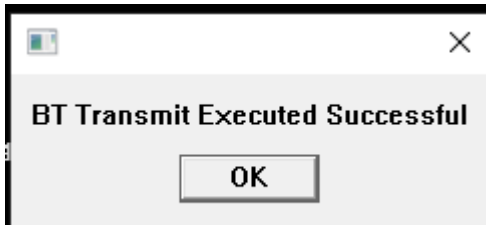
Enter tx\_mode:

OK

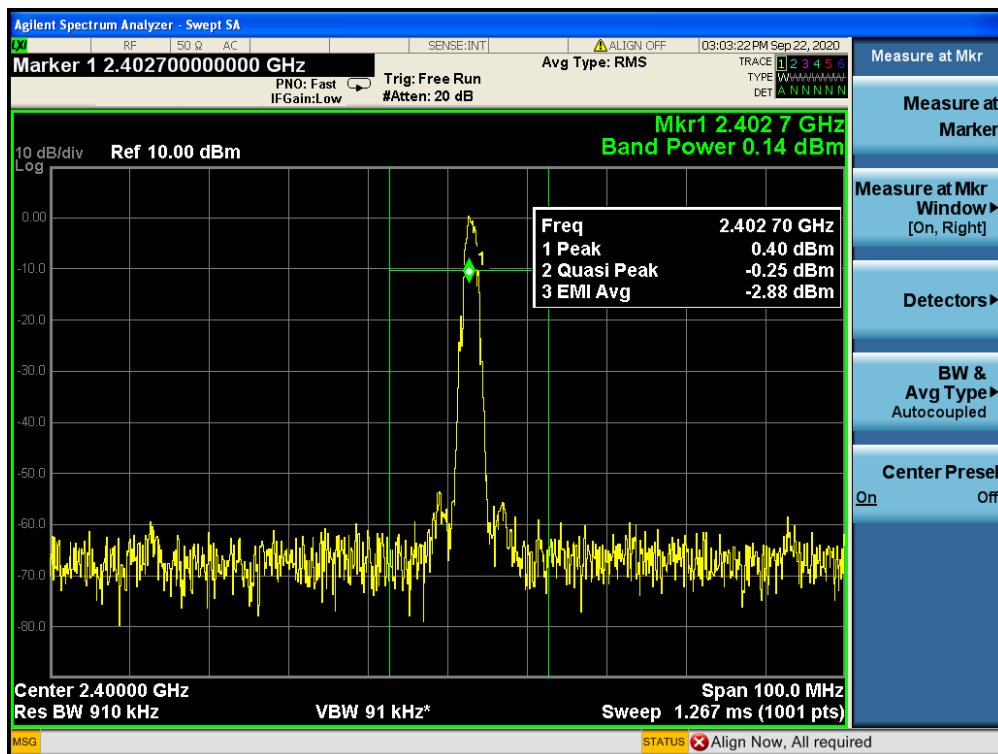
no\_pkt

Enter number\_of\_packets, this parameter valid only tx\_mode is (Burst mode) otherwise give input as 0(Zero):

OK







#### CW\_mode :-

at+rsi\_opermode=327680,0,1,2147483648,2150629376,1073741824<CR><LF>

at+rsibt\_bredtrtransmit=1,00-00-00-00-00-00,15,1,1,1,1,1,5,0,2,0,1,2,0,0,1,0,0<CR><LF>

at+rsibt\_percwmode=1<CR><LF>

→ To run the BT\_CW mode all the parameters you need enter as mentioned step by step procedure in above method. But "Scrambler\_seed" parameter you need to give input as 5.

seed

Enter the Scrambler\_seed as 5 in Continuous Wave mode, Please enter 0 in other modes:

OK

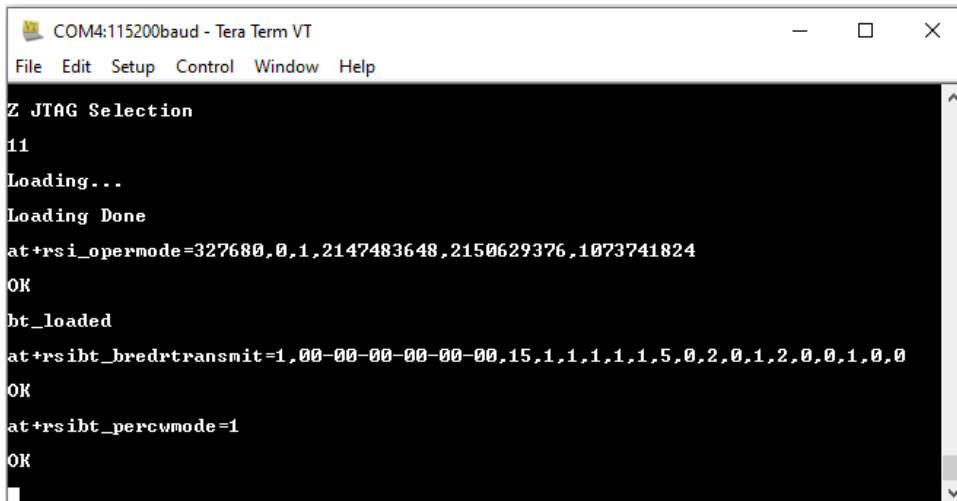
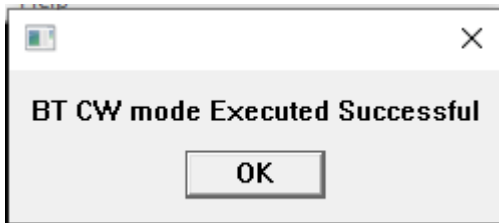
→ After "Scrambler\_seed" parameter script will ask all the inputs as mentioned in above BT\_Trasmit method, you need to enter .

→ All the necessary inputs are completed , final input will ask for "Continuous Wave" selection you need to enter 2.Like as below pic.

Choice

Enter CW\_mode 1.Enable 2.Disable :

OK



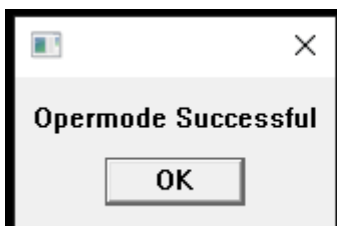
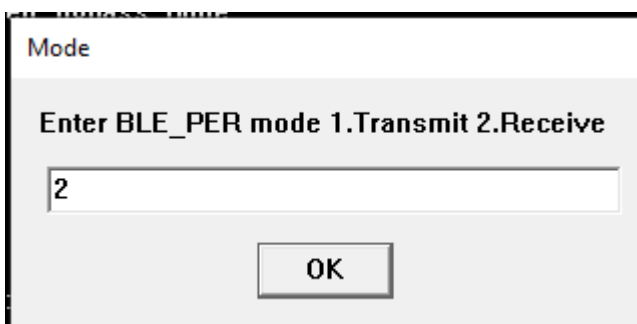
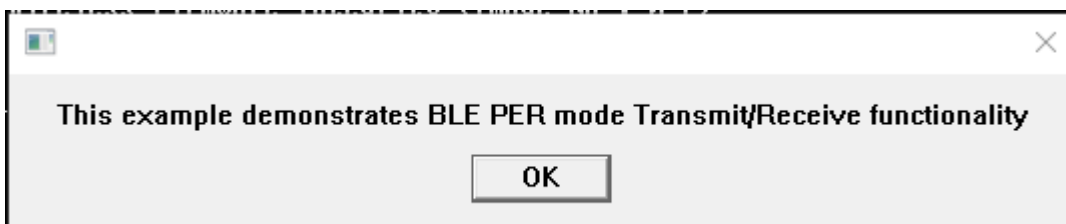
For PER receive:

This is the scenario need to run B/W the modules

at+rsi\_opermode=851968,0,1,2147483648,2150629376,3221225472,0,376012800,2048<CR><LF>

at+rsibt\_bletransmit=1,71764129,1,0,0,0,1,0,2,0,1,2,240,1,0<CR><LF>

at+rsibt\_perstats<CR><LF>



switch

Enter PER mode 1. Enable 2.Disable :

OK

phy\_rate

Enter phy/ble rate:

OK

rx\_no

Enter rx\_channel\_no:

OK

tx\_no

Enter tx\_channel\_no:

OK

seed

Enter the Scrambler\_seed as 5 in Continuous Wave mode, Please enter 0 in Burst mode:

OK

ltype

Enter le\_channel\_type:

OK

hp\_type

Enter hoping\_type:

OK

ant\_type

Enter Antenna selection type:

OK

pll

Enter pll\_mode:

OK

rf

Enter rf\_type:

OK

rc

Enter rf\_chain:

OK

extend\_ind

Enter Extnd\_data\_length\_ind:

OK

lb

Enter loop\_back\_mode:

OK

dc

Enter duty\_cycling [power\_save\_options]:

OK

```
COM4:115200baud - Tera Term VT
File Edit Setup Control Window Help
8 Disable GPIO Based Bypass Mode
Q Update KEY
Z JTAG Selection
11
Loading...
Loading Done
at+rsi_opermode=851968,0,1,2147483648,2150629376,3221225472,0,376012800,2048
OK
bt_loaded
at+rsibt_blereceive=1,71764129,1,0,0,0,1,0,2,0,1,2,240,1,0
OK

```

BLE Receive Executed Successful

OK

```
COM4:115200baud - Tera Term VT
File Edit Setup Control Window Help
Z JTAG Selection
11
Loading...
Loading Done
at+rsi_opermode=851968,0,1,2147483648,2150629376,1073741824,0,376012800,2048
OK
bt_loaded
at+rsibt_blereceive=1,71764129,1,0,0,0,1,0,2,0,1,2,240,1,0
OK
at+rsibt_perstats
OK n

```

PER Stats command executed successfully

OK

--> For BT\_Receive also need to run the BT\_PER script and select the Receive. Exactly same as BLE\_Receive above mentioned method .

### For PER stats:

At Transmitter side:

at+rsi\_opermode=327680,0,1,2147483648,2150629376,1073741824<CR><LF>

at+rsibt\_bredtransmit=1,11-11-11-11-11-11,15,1,1,1,1,0,0,2,0,1,2,0,0,1,0,0<CR><LF>

At receiver side:

at+rsi\_opermode=327680,0,1,2147483648,2150629376,1073741824<CR><LF>

at+rsibt\_bredreceive=1,11-11-11-11-11-11,15,1,1,1,1,0,0,2,0,1,2,0<CR><LF>

at+rsibt\_perstats<CR><LF>

## 6 Summary

This detailed procedure has been performed with minimal traffic and performed using the internal RF of the evaluation kit. The module is connected to the spectrum analyzer( Used for measuring the DUT) using a cable and connected directly and hence losses will be present. By using the above commands user can test the Module in PER and CW mode.

## 7 References

Refer to [RS9116W BLE AT Command Programming Reference Manual](https://docs.silabs.com/rs9116) from <https://docs.silabs.com/rs9116>

Refer to [RS9116W BT Classic AT Command Programming Reference Manual](https://docs.silabs.com/rs9116) from <https://docs.silabs.com/rs9116>



## 8 Troubleshooting

1. If the UART port is not detected by the PC, please reset the module and try again.
2. For better values, please use a thick cable to avoid any losses.
3. After every iteration of measuring with the spectrum analyzer, make sure the module has been properly reset. Either use the button provided on the module or re-connect the module to the PC.

## 9 Appendix A: Running Tera Term Scripts

- 1) Here is the script code for BLE\_PER Transmit & Receive. If we run the script it will ask the pop-up for Transmit/Receive, Based on the selection mode it will ask inputs.

```
TRUE = 1
FALSE = 0

message = 'This example demonstrates BLE PER mode Transmit/Receive functionality'
messagebox message ''

send '|'
wait 'U'
sendln 'U'
mpause 200
sendln '1'
wait 'Loading Done'
message = 'Firmware Loading Done Successfully'
messagebox message ''

sendln 'at+rsi_opermode=851968,0,1,2147483648,2150629376,3221225472,0,376012800,2048'
wait 'OK' ; 'bt_loaded' 'ERROR'
if result == 2 then
    goto error
else
    messagebox 'Opermode Successful' ''
endif

inputbox 'Enter BLE_PER mode 1.Transmit 2.Receive ' 'Mode'
Mode = inputstr

strcmpare Mode '1'
if result=0 then
    inputbox 'Enter PER mode 1. Enable 2.Disable :' 'switch'
    switch = inputstr
    inputbox 'Enter device_address:' 'address'
    address = inputstr
    inputbox 'Enter phy/ble rate:' 'phy_rate'
    phy_rate = inputstr
    inputbox 'Enter rx_channel_no:' 'rx_no'
    rx_no = inputstr
    inputbox 'Enter tx_channel_no:' 'tx_no'
    tx_no = inputstr
    inputbox 'Enter the Scrambler_seed as 5 in Continuous Wave mode, Please enter 0 in other modes:'
    'seed'
    seed = inputstr
    inputbox 'Enter le_channel_type:' 'ltype'
    ltype = inputstr
    inputbox 'Enter hoping_type:' 'hp_type'
    hp_type = inputstr
    inputbox 'Enter Antenna selection type:' 'ant_type'
    ant_type = inputstr
    inputbox 'Enter pll_mode:' 'pll'
    pll = inputstr
    inputbox 'Enter rf_type:' 'rf'
    rf = inputstr
    inputbox 'Enter rf_chain:' 'rc'
    rc = inputstr
    inputbox 'Enter the packet length:' 'length'
    length = inputstr
    inputbox 'Enter payload_type:' 'pt'
    pt = inputstr
    inputbox 'Enter tx_power_index:' 'ti'
    ti = inputstr
    inputbox 'Enter tx_mode:' 'tm'
    tm = inputstr
    inputbox 'Enter number_of_packets, this parameter valid only tx_mode is (Burst mode) otherwise give
    input as 0(Zero):' 'no_pkt'
    no_pkt = inputstr

    sendln
    'at+rsibt_bletransmit='switch','address','phy_rate','rx_no','tx_no','seed','ltype','hp_type','ant_type'
```

```

,'pll','rf','rc','length','pt','ti','tm',0,'no_pkt''
wait 'OK' 'ERROR'
if result == 2 then
    goto error
else
    messagebox 'BLE Transmit Executed Successful' ''
    inputbox 'Enter CW_mode 1.Enable 2.Disable :' 'Choice'
    Choice = inputstr
    strcmpare Choice '1'
    if result=0 then
        sendln 'at+rsibt_percwmode=1'
        wait 'OK' 'ERROR'
        if result == 2 then
            goto error
        else
            messagebox 'BLE CW mode Executed Successful' ''
        endif
    endif
    strcmpare Choice '2'
    if result=0 then
        messagebox 'CW mode not enabled ' ''
    endif
endif
endif
strcmpare Mode '2'
if result=0 then
    inputbox 'Enter PER mode 1. Enable 2.Disable :' 'switch'
    switch = inputstr
    inputbox 'Enter device_address:' 'address'
    address = inputstr
    inputbox 'Enter phy/ble rate:' 'phy_rate'
    phy_rate = inputstr
    inputbox 'Enter rx_channel_no:' 'rx_no'
    rx_no = inputstr
    inputbox 'Enter tx_channel_no:' 'tx_no'
    tx_no = inputstr
    inputbox 'Enter the Scrambler_seed as 5 in Continuous Wave mode, Please enter 0 in Burst mode:'
'seed'
    seed = inputstr
    inputbox 'Enter le_channel_type:' 'ltype'
    ltype = inputstr
    inputbox 'Enter hoping_type:' 'hp_type'
    hp_type = inputstr
    inputbox 'Enter Antenna selection type:' 'ant_type'
    ant_type = inputstr
    inputbox 'Enter pll_mode:' 'pll'
    pll = inputstr
    inputbox 'Enter rf_type:' 'rf'
    rf = inputstr
    inputbox 'Enter rf_chain:' 'rc'
    rc = inputstr
    inputbox 'Enter Extnd_data_length_ind:' 'extend_ind'
    extend_ind = inputstr
    inputbox 'Enter loop_back_mode:' 'lb'
    lb = inputstr
    inputbox 'Enter duty_cycling (power_save_options):' 'dc'
    dc = inputstr

    sendln
'at+rsibt_blereceive='switch','address','phy_rate','rx_no','tx_no','seed','ltype','hp_type','ant_type',
'pll','rf','rc','extend_ind','lb','dc''
    wait 'OK' 'ERROR'
    if result == 2 then
        goto error
    else
        messagebox 'BLE Receive Executed Successful' ''
    endif

    sendln 'at+rsibt_perstats'
    wait 'OK' 'ERROR'

```

```

        if result == 2 then
            goto error
        else
            messagebox 'PER Stats command executed successfully' ''
        endif
    endif
endif

goto endscrip

:error
messagebox 'An error occurred, Please check your configuration and try again' 'ERROR'

:endscrip
end

```

2) Here is the script code for BT\_PER Transmit & Receive. If we run the script it will ask the pop-up for Transmit/Receive, Based on the selection mode it will ask inputs.

```

TRUE = 1
FALSE = 0

message = 'This example demonstrates BT PER mode Transmit/Receive functionality'
messagebox message ''

send '|'
wait 'U'
sendln 'U'
mpause 200
sendln '1'
wait 'Loading Done'
message = 'Firmware Loading Done Successfully'
messagebox message ''

sendln 'at+rsi_opermode=327680,0,1,2147483648,2150629376,1073741824'
wait 'OK' ; 'bt_loaded' 'ERROR'
if result == 2 then
    goto error
else
    messagebox 'Opermode Successful' ''
endif

inputbox 'Enter BT_PER mode 1.Transmit 2.Receive ' 'Mode'
Mode = inputstr

strcmpare Mode '1'
if result=0 then
    inputbox 'Enter PER mode 1.Enable 2.Disable :' 'switch'
    switch = inputstr
    inputbox 'Enter BT address:' 'address'
    address = inputstr
    inputbox 'Enter packet length:' 'length'
    length = inputstr
    inputbox 'Enter packet type:' 'packet_type'
    packet_type = inputstr
    inputbox 'Enter the mode BR/EDR_mode:' 'bt_mode'
    bt_mode = inputstr
    inputbox 'Enter rx_channel_no:' 'rx_no'
    rx_no = inputstr
    inputbox 'Enter tx_channel_no:' 'tx_no'
    tx_no = inputstr
    inputbox 'Enter link type:' 'ltype'
    ltype = inputstr
    inputbox 'Enter the Scrambler_seed as 5 in Continuous Wave mode, Please enter 0 in Burst mode:'
'seed'
    seed = inputstr
    inputbox 'Enter hoping_type:' 'hp_type'
    hp_type = inputstr
    inputbox 'Enter antenna_sel_type:' 'ant_type'
    ant_type = inputstr
    inputbox 'Enter pll_mode:' 'pll'
    pll = inputstr
    inputbox 'Enter rf_type:' 'rf'

```

```

rf = inputstr
inputbox 'Enter rf_chain:' 'rc'
rc = inputstr
inputbox 'Enter payload_type:' 'pt'
pt = inputstr
inputbox 'Enter tx_power_index:' 'ti'
ti = inputstr
inputbox 'Enter tx_mode:' 'tm'
tm = inputstr
inputbox 'Enter number_of_packets, this parameter valid only tx_mode is (Burst mode) otherwise
give input as 0(Zero):' 'no_pkt'
no_pkt = inputstr

sendln
'at+rsibt_bredrtransmit='switch','address','length','packet_type','bt_mode','rx_no','tx_no','ltype','se
ed','hp_type','ant_type','pll','rf','rc','pt','ti','tm',0,'no_pkt'
wait 'OK' 'ERROR'
if result == 2 then
    goto error
else
    messagebox 'BT Transmit Executed Successful' ''
    inputbox 'Enter CW_mode 1.Enable 2.Disable :' 'Choice'
    Choice = inputstr
    strcmpare Choice '1'
    if result=0 then
        sendln 'at+rsibt_percwmode=1'
        wait 'OK' 'ERROR'
        if result == 2 then
            goto error
        else
            messagebox 'BT CW mode Executed Successful' ''
        endif
    endif
    strcmpare Choice '2'
    if result=0 then
        messagebox 'CW mode not enabled ' ''
    endif
endif
endif

strcmpare Mode '2'
if result=0 then
    inputbox 'Enter PER mode 1.Enable 2.Disable :' 'switch'
    switch = inputstr
    inputbox 'Enter device_address:' 'address'
    address = inputstr
    inputbox 'Enter packet length:' 'length'
    length = inputstr
    inputbox 'Enter packet type:' 'packet_type'
    packet_type = inputstr
    inputbox 'Enter the mode BR/EDR_mode:' 'bt_mode'
    bt_mode = inputstr
    inputbox 'Enter rx_channel_no:' 'rx_no'
    rx_no = inputstr
    inputbox 'Enter tx_channel_no:' 'tx_no'
    tx_no = inputstr
    inputbox 'Enter link type:' 'ltype'
    ltype = inputstr
    inputbox 'Enter the Scrambler_seed as 5 in Continuous Wave mode, Please enter 0 in Burst mode:'
'seed'
    seed = inputstr
    inputbox 'Enter hoping_type:' 'hp_type'
    hp_type = inputstr
    inputbox 'Enter antenna_sel_type:' 'ant_type'
    ant_type = inputstr
    inputbox 'Enter pll_mode:' 'pll'
    pll = inputstr
    inputbox 'Enter rf_type:' 'rf'
    rf = inputstr
    inputbox 'Enter rf_chain:' 'rc'
    rc = inputstr

```

```
inputbox 'Enter loop_back_mode:' 'lb'
lb = inputstr

sendln
'at+rsibt_bredrrreceive='switch','address','length','packet_type','bt_mode','rx_no','tx_no','ltype','see
d','hp_type','ant_type','pll','rf','rc','lb''
wait 'OK' 'ERROR'
if result == 2 then
    goto error
else
    messagebox 'BT Receive Executed Successful' ''
endif

sendln 'at+rsibt_perstats'
wait 'OK' 'ERROR'
if result == 2 then
    goto error
else
    messagebox 'PER Stats command executed successfully' ''
endif
endif

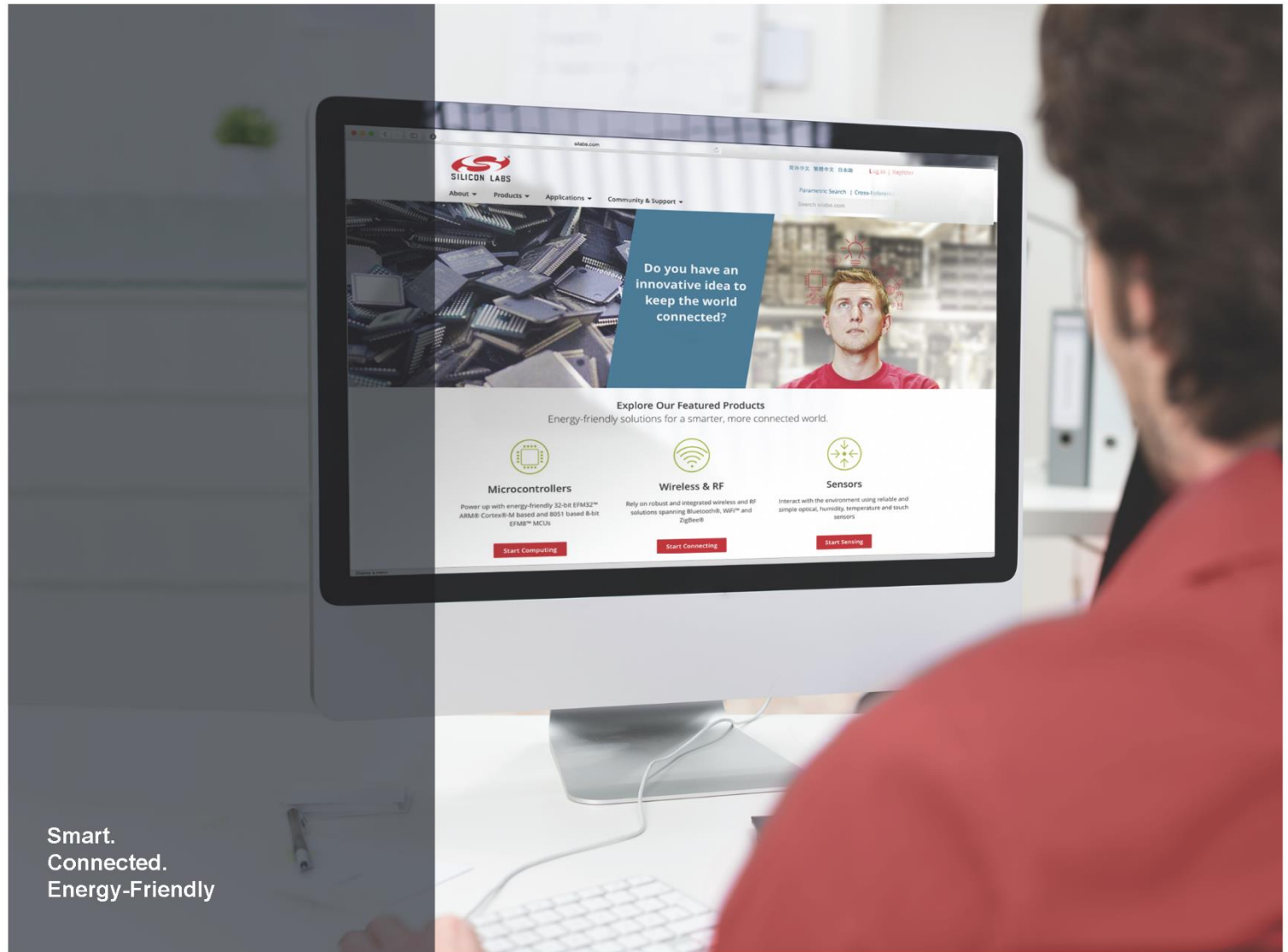
goto endscrip

:error
messagebox 'An error occurred, Please check your configuration and try again' 'ERROR'

:endscrip
end
```

## 10 Revision History

Revision No.	Version No	Date	Changes
1	1.1	May, 2020	Initial version
2	1.2	Oct, 2020	<ol style="list-style-type: none"><li>1. Updated the command sequences based on latest PRM updates</li><li>2. Added TTL Images.</li><li>3. Added APPENDIX Section with the TTL Script used for this APP notes</li><li>4. Updated links and document names</li></ol>



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