

# **RS9113 WiseConnect BT/BT- LE PER Usage Guide**

**Version 1.7.9  
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## 1 Bluetooth Performance Test AT Command Usage

### 1.1 Opermode:

To validate BT/BT-LE PER mode use below operating modes.

- For BT - 327680,0,1,0
- For BLE – 851968,0,1,0

**Note:**

Please use the same BT folder structure format for BLE because PER is common for both BT and BLE, but needs to take care the Opermode in configuration file.

**NOTE:** In context of binary mode we don't have any separate BT/BLE PER commands to perform.

### 1.2 BT Transmit Tests

This test allows the configuration of the following parameters and starts the transmission of packets.

- PER enable/disable bit
- Device Address
- Packet Type
- Packet Length
- Link Type
- BR/EDR Mode
- Receive Channel Index
- Transmit Channel Index
- Scrambler Seed
- Number of Packets
- Payload Type
- Classic/LE Mode
- LE Channel Type
- Transmit Power
- Transmit Mode
- Hopping Type
- Antenna Select

#### Command Usage

The command usage is explained below.

```
at+rsibt_pertransmit=<per_enable/disablebit>,<dev_addr>,<pkt_type>,<pkt_length>,<link_type>,<br_edr_mode>,<rx_channel_index>,<tx_channel_index>,<scrambler_seed>,<no_of_packets>,<payload_type>,<classic_le_mode>,<le_channel_type>,<tx_power>,<tx_mode>,<hopping_type>,<ant_sel>
```

<per\_enable/disablebit>:used to set per mode

1-enable per mode.

2-disable per mode.

<dev\_addr>: Device address. It is a 48-bit address in hexadecimal format, e.g., 00-23-A7-01-02-03.

<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.

<link\_type>: Link Type – ACL, SCO, eSCO. Valid only in the Classic mode and invalid in LE mode.

'0' – SCO

'1' – ACL

'2' – eSCO

<br\_edr\_mode>: Decides whether the transmission has to happen in Basic Rate or Enhanced Data Rate in Classic mode. It is invalid in LE mode.

'1' – Basic data Rate (1Mbps)

'2' or '3' – Enhanced Data Rate(2 Mbps or 3 Mbps)

<rx\_channel\_index>: Receive channel index, as per the Bluetooth standard.

<tx\_channel\_index>: Transmit channel index, as per the Bluetooth standard.

<scrambler\_seed>: Initial seed to be used for whitening. It should be set to '0' 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 (0).

<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.

<classic\_le\_mode>: Choose between Bluetooth Classic and LE modes for the packet transmission.

'1' – Classic mode

'2' – LE Mode

<le\_channel\_type>: Channel type in LE mode. It is invalid in Classic mode

'0' – Advertising channel

'1' – Data channel

<tx\_power>: Transmit power (in dBm) to be used by the module. The value should be between 0 and 18.

<tx\_mode>: Choose between Burst and Continuous modes of transmission.

'0' – Burst mode

'1' – Continuous mode

<hopping\_type>: Choose the hopping pattern.

- '0' – No hopping
- '1' – Fixed hopping
- '2' – Random hopping

<ant\_sel>: Select one of the two RF ports. For the modules without integrated antenna, it is used to select between pins RF\_OUT\_1 and RF\_OUT\_2. For the modules with integrated antenna and U.FL connector, it is used to select between the two.

- '2' – RF\_OUT\_2/Antenna
- '3' – RF\_OUT\_1/U.FL

**Note:**

1. After the transmission starts, the following command can be given to stop the transmission.  
at+rsibt\_pertransmit=0
2. In binary mode issue the per\_transmit command with 'enable' variable as '0'

**Example:**

at+rsibt\_pertransmit=1,00-23-a7-01-02-03,0,20,0,1,37,37,0,0,1,2,0,10,0,0,3

The above command starts transmitting ACL packets in burst mode with no hopping at 1 Mbps with the following configuration in LE mode.

Per enable -1  
Device address – 00-23-A7-01-02-03  
Packet type – 0  
Packet length – 20 bytes  
Link type – 0  
BR/EDR mode – 1 (Basic data Rate with 1Mbps)  
Rx channel index – 37(Advertising Channel)  
Tx channel index – 37(Advertising Channel)  
Scrambler seed – 0 (Disable whitening)  
No of packets – 0(Since tx\_mode is burst)  
Payload type – 1(Payload consists of all 0xFF's)  
Classic/LE mode – 2(LE mode)  
LE channel type – 0(Advertising Channel)  
Tx power – 10(10dBm)  
Tx mode – 0(Burst mode)  
Hopping type – 0(no hopping)  
Antenna select – 2(RF\_OUT\_2/Antenna)

Refer to the table below for more details.

Standard Packet	pkt_type	br_edr_mode	classic/le Mode	Packet Length	Link type
DM1	3	1	1	0-17	1
DH1	4	1	1	0-27	1

DH3	11	1	1	0-183	1
DM3	10	1	1	0-121	1
DH5	15	1	1	0-339	1
DM5	14	1	1	0-224	1
2-DH1	4	2	1	0-54	1
2-DH3	10	2	1	0-367	1
2-DH5	14	2	1	0-679	1
3-DH1	8	3	1	0-83	1
3-DH3	11	3	1	0-552	1
3-DH5	15	3	1	0-1021	1
Any Value	Any Value	1	2	0-37	Any Value

**Table 1: BT Packet lengths**

**Binary Command Index:** 0x0098

**Binary Structure format:**

```
typedef union {
    struct {
        UINT08 type;
        UINT08 enable;
        UINT08 bt_addr[6];
        UINT08 pkt_type;
        UINT08 pkt_length[2];
        UINT08 link_type;
        UINT08 edr_ind;
        UINT08 rx_channel;
        UINT08 tx_channel;
        UINT08 scrambled_seed ;
        UINT32 num_pkts;
        UINT08 payload_type;
        UINT08 protocol_mode;
        UINT08 le_channel;
```

```
UINT08 tx_power_index ;  
UINT08 tx_mode;  
UINT08 frequency_hop;  
UINT08 ant_sel;  
}PerTransmitFrameSnd;  
UINT08 uPerTransmitBuf[27];  
} RSI_BT_CMD_PER_TRANSMIT;
```

**Note:**

In binary structure, 'type' variable should be always value '4'. This is not configurable.

### 1.3 BT Receive Tests

This test, allows the configuration of the parameters below.

- Per mode enable /disable bit
- Device Address
- Link Type
- Packet Type
- Packet Length
- Scrambler Seed
- BR/EDR Mode
- Receive Channel Index
- Transmit Channel Index
- Classic/LE Mode
- LE Channel Type
- Hopping Type
- Antenna Select

#### Command Usage

The "bt\_receive" command usage is explained below.

```
at+rsibt_perreceive=<perenable/disable>,<dev_addr>,<link_type>,<  
pkt_type>,<pkt_length>,<scrambler_seed>,<br_edr_mode>,<rx_channe  
l_index>,<tx_channel_index>,<classic_le_mode>,<le_channel_type>,<  
hopping_type>,<ant_sel>
```

Parameters for the "bt\_receive" command have the same definition as the ones for the "bt\_transmit" command.

**Note:**

1. After the reception starts using bt\_receive, the following command can be given to stop the reception.

2. In binary mode issue the `per_receive` command with 'enable' variable as '0'

```
at+rsibt_perreceive=0
```

**Example:**

```
at+rsibt_perreceive=1,00-23-a7-01-02-03,0,0,20,0,1,37,37,2,0,0,2
```

The above command starts receiving ACL packets with no hopping at 1 Mbps with the following configuration in BT-LE mode.

Per enable-1

Device address – 00-23-A7-01-02-03

Link type – 0

Packet type – 0

Packet length – 20 bytes

Scrambler seed – 0(Disable whitening)

BR/EDR mode – 1 (Basic data Rate with 1 Mbps)

Rx channel index – 37(Advertising Channel)

Tx channel index – 37(Advertising Channel)

Classic/LE mode – 2(LE mode)

LE channel type – 0 (Advertising Channel)

Hopping type – 0(no hopping)

Antenna select – 2(RF\_OUT\_2/Antenna)

**Binary Command Index:** 0x0099

**Binary Command Structure:**

```
typedef union {  
    struct {  
        UINT08 type;  
        UINT08 enable;  
        UINT08 bt_addr[6];  
        UINT08 link_type;  
        UINT08 pkt_type;  
        UINT16 pkt_length;  
        UINT08 scrambled_seed ;  
        UINT08 edr_ind;  
        UINT08 rx_channel;  
        UINT08 tx_channel;  
        UINT08 protocol_mode;  
        UINT08 le_channel;  
        UINT08 frequency_hop;  
        UINT08 ant_sel;  
    }PerReceiveFrameSnd;  
    UINT08 uPerReceiveBuf[20];  
} RSI_BT_CMD_PER_RECEIVE;
```

**Note:**

In binary structure, 'type' variable should be always value '5'. This is not configurable.

## 1.4 BT STATS TEST

The stats command usage is explained below.

```
at+rsibt_perstats
```

This command gives the following stats after running the receive test.

crc\_pass: The number of CRC passed packets received

crc\_fail: The number of CRC failed packets received

rss: The RSSI value of the last received packet

**Binary Command Index:** 0x009A

**Binary Structure Format:**

```
typedef union {  
    struct {  
        UINT08 type;  
        UINT08 enable;  
    } PerStatsFrameSnd;  
    UINT08 uPerStatsBuf[2];  
} RSI_BT_CMD_PER_STATS;
```

**Binary Response structure Format:**

```
typedef struct {  
    UINT16 crc_fail;  
    UINT16 crc_pass;  
    UINT8 RSSI;  
} RSI_BT_RESP_PER_STATS;
```

**Note:**

1. For continuously getting the stats repeatedly give the stats command.
2. In binary structure, 'type' variable should be always value '8'. This is not configurable.

#### 1.4.1.1 Continuous Wave Transmit Mode

This command is used to configure the device to transmit a continuous wave. The following parameters can be configured.

1. Channel Index
2. Start/Stop
3. Antenna Select

**Command Usage**

The command usage is explained below.

```
at+rsibt_percwmode=<channel_index>,<start/stop>,<ant_sel>
```

<channel\_index>: Channel index, as per the Bluetooth standard.

<start/stop>: Start or Stop the Continuous Wave mode transmission.

- '0' – start the cw mode transmission
- '2' – stop the cw mode transmission

<ant\_sel>: Select one of the two RF ports. For the modules without integrated antenna, it is used to select between pins RF\_OUT\_1 and RF\_OUT\_2. For the modules with integrated antenna and U.FL connector, it is used to select between the two.



- '2' – RF\_OUT\_1/U.FL
- '3' – RF\_OUT\_2/Antenna

**Example**

```
at+rsibt_percwmode=10,0,3
```

The above command starts continuous wave transmission with the following configuration

Channel index – 10

Start - 0 (starts the transmission)

Antennal Select – 3(RF\_OUT\_2/Antenna)

**Binary Command Index:** 0x009B

**Binary Structure Format:**

```
typedef union {  
    struct {  
        UINT08 type;  
        UINT08 channel;  
        UINT08 cw_mode;  
        UINT08 cw_type;  
        UINT08 ant_sel;  
    }PerCwFrameSnd;  
    UINT08 uPerCwBuf[5];  
} RSI_BT_CMD_PER_CW_MODE;
```

## 1.5 AFH\_MAP

**Description:**

This command mode is used to configure the following parameters..

**Command Usage**

```
at+rsibt_afhmap=<startingchannel>,<endingchannel>
```

**Parameters**

<startchannel>: This parameter indicates the starting channel index, as per the Bluetooth standard. The range is from 0 to 78.

<endchannel>: This parameter indicates the ending channel index, as per the Bluetooth standard. The range is from 0 to 78.

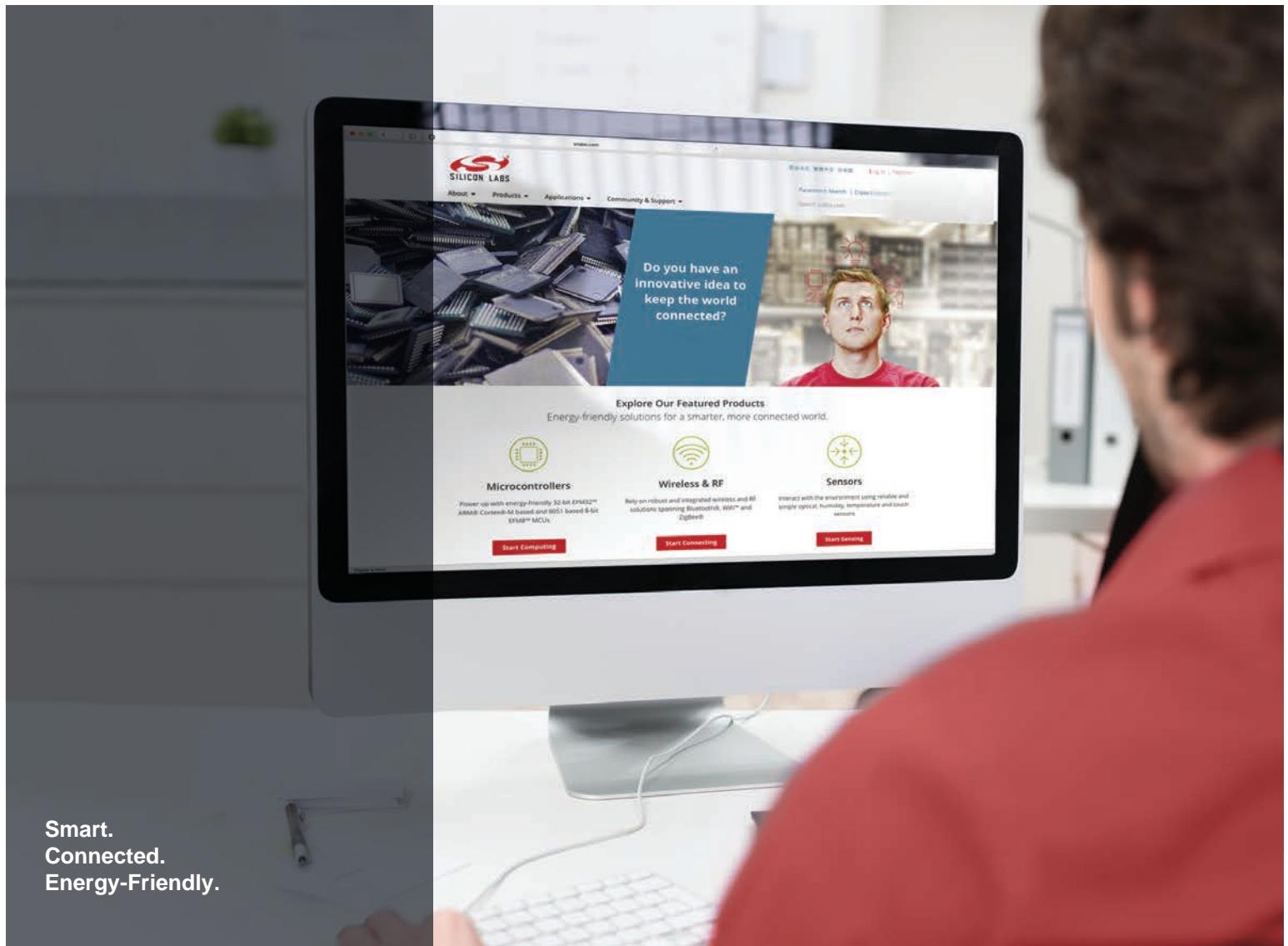
**Example**

```
at+rsibt_afhmap=12,30
```

**Note:**

In binary mode, this support is not present.





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