

# OPL1000

ULTRA-LOW POWER 2.4GHZ WI-FI + BLUETOOTH SMART SOC

## OPL1000 RF Test tool with Litepoint

## 安裝說明



OPULINKS

<http://www.opulinks.com/>

Copyright © 2017-2018, Opulinks. All Rights Reserved.

OPL1000-rf-test-tool-high-level-designed-guide

Date	Version	Contents Updated
2019-01-02	0.1	Draft version
2019-07-19	0.2	Modify tool download path

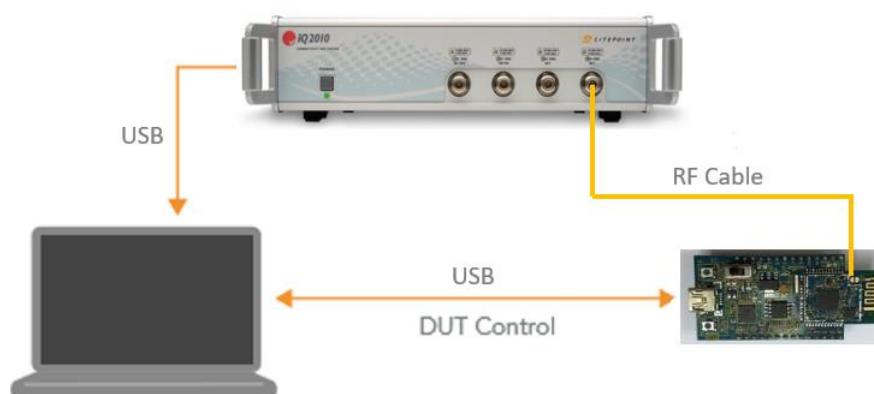
## 1. 介紹

### 1.1. 文檔應用範圍

本文檔介紹了 OPL1000 RF Test tool 安裝說明。

### 1.2. 測試環境

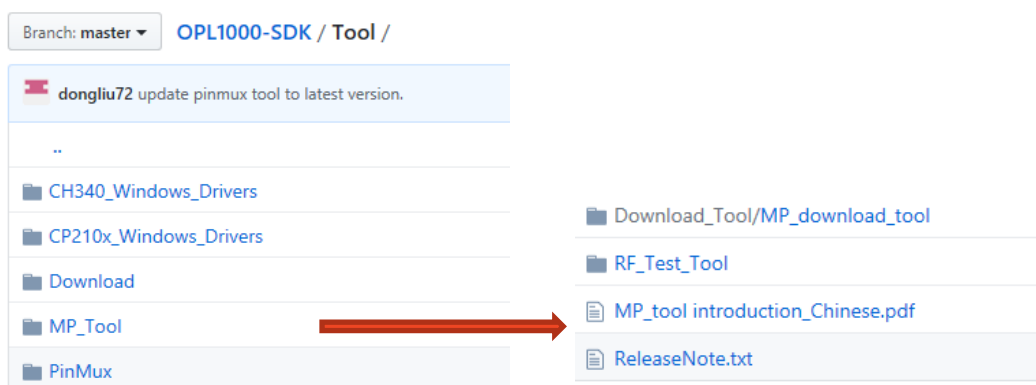
1. 測試電腦(Win 7 OS 系統)
2. Litepoint IQ2010 (連接 RF2)
3. 待測物
4. RF Cable
5. USB 線材



## 2. RF TEST TOOL 安裝流程

Figure 1: Tool 路徑

[https://github.com/Opulinks-Tech/OPL1000-SDK/tree/master/Tool/MP\\_Tool](https://github.com/Opulinks-Tech/OPL1000-SDK/tree/master/Tool/MP_Tool)



1. 下載 RF\_Test\_Tool
2. 執行 RF\_Test\_Tool\IQ2010\_RF\_Test.exe 進行測試

## 3. 設定檔說明(CONFIG.INI)

```
//==path loss==
WiFi_path_loss=0.8, 0.8, 0.8
BLE_path_loss=0.8, 0.8, 0.8
WiFi_High_Power_Tx_Test_Enable = 1
WiFi_Low_Power_Tx_Test_Enable = 1
BLE_High_Power_Tx_Test_Enable = 0
BLE_Low_Power_Tx_Test_Enable = 1
WiFi_Rx_Test_Enable = 1
BLE_Rx_Test_Enable = 1
//=====MAC Setting=====
MAC_Input=1
Write_MAC_Enable=0
//==WiFi Tx=====
WiFi_CH_START = 1
WiFi_CH_STOP = 13
WiFi_CH_STEP = 6
WiFi_rate_start = 3
WiFi_rate_stop = 3
WiFi_rate_step = 1
//=====WiFi Tx Limit=====
WiFi_low_target_power=-5.0
WiFi_high_target_power=10.0
WiFi_Tx_ULimit=2.0,2.0,2.0,2.0
WiFi_Tx_LLimit=-2.0,-2.0,-2.0,-2.0
WiFi_EVM_ULimit=-10.0,-10.0,-10.0,-10.0
WiFi_FreqErr_Limit=20.0
WiFi_Clk_ULimit=99.0
WiFi_Clk_LLimit=-99.0
WiFi_IQamp_ULimit=99.0
WiFi_IQamp_LLimit=-99.0
WiFi_IQPhase_ULimit=99.0
WiFi_IQPhase_LLimit=-99.0
WiFi_RmsPhase_ULimit=99.0
WiFi_RmsPhase_LLimit=-99.0
//==WiFi Rx=====
WiFi_frame_no = 1000
WiFi_Rx_rate_start = 3
WiFi_Rx_rate_stop = 3
WiFi_Rx_rate_step = 1
WiFi_Wrfinmax = -15
WiFi_Wrfinmin = -70
WiFi_Wrfinstep = 55
WiFi_CH_List = 1,7,13
//==BLE Tx=====
BLE_start_freq = 2402
BLE_stop_freq = 2480
BLE_step = 38
//=====BLE Tx Limit=====
BLE_low_target_power=0.0
BLE_high_target_power=10.0
BLE_Tx_power_ULimit =2
BLE_Tx_power_LLimit =-2
BLE_Init_Freq_Err_Limit=75
BLE_Delta_F1_Avg_ULimit=275
BLE_Delta_F1_Avg_LLimit=225
BLE_Delta_F2_Avg_ULimit=500
BLE_Delta_F2_Avg_LLimit=180
BLE_Delta_F2_Max_ULimit=500
BLE_Delta_F2_Max_LLimit=185
BLE_Fn_Max_Limit=150
BLE_Delta_F0Fn_Max_Limit=50
BLE_F1F0_Delta_Limit=20
BLE_Delta_FnFn_5Max_Limit=20
```

1. Cable loss
2. MAC Configuration
3. Enable/Disable Test items

### WiFi Tx Config items:

1. Config wanted Channels for tests
2. Config wanted Rate for test
3. Enable/Disable High/Low Power Mode Test

### WiFi Tx Criteria setting

### WIFI Rx Config items:

1. Config wanted Channels for tests
2. Config RX power
3. Enable/Disable WiFi Rx Test

### BLE Tx Config items:

1. Config wanted Channels for tests
2. Enable/Disable High/Low Power Mode Test
3. BLE Tx Criteria setting

```
//==BLE Rx=====
BLE_frame_no = 1000
BLE_start_freq = 2402
BLE_stop_freq = 2480
BLE_step = 38
BLE_rate_start = 5
BLE_rate_stop = 5
BLE_rate_step = 1
BLE_rfinmax = -15
BLE_rfinmin = -70
BLE_rfinstep = 55

-
//=====
StopWhenFail=0
ISN_Length = 6
COMNUM = 1
//=====
XTAL_CHK = 0
XTAL_Spec = 16
OTA_CHK = 0
```

BLE Rx Config items:

1. Config wanted Channels for tests
2. Config RX power
3. Enable/Disable BLE Rx Test

Other Config items:

1. Enable/Disable XTAL Check and Spec
2. Enable/Disable OTA Check
3. StopWhenFail
4. COMNUM(depends on tool)

## 4. 執行畫面

```
=> Enter PCB No.
*****
# Welcome to RF test Tool !      Ver:1.0#
*****

=>IQ2810 Module import....
Init LitePoint library ok..
Connect to IQ done..
Try to get tester token...
Obtain IQ Control Done...
=>Module import complete...

=>Init Serial Port .....
Available COM port:
['COM3', '']
-----Com port select:-----
COM3 is opened
=>Init done

***Starting All in one test!

=> Starting BLE Low Power mode TX Test!

=====
index: 0 freq: 2402
Channel:0, Freq:2402
Start DUT Tx Testing: Channel:2402...
leDeltaF2Max => 235824.544
leDeltaF2Avg => 256851.312
leIsCrcOk => 1.000
=====
Tx Power          = 1.02 dBm ( -2.00,  2.00) -----> PASS
Tx Init Freq Err  = 16.52 kHz ( -75.00,  75.00) -----> PASS
Tx Delta F1 Avg   = 268.30 kHz ( 225.00, 275.00) -----> PASS
Tx Delta F2 Avg   = 256.85 kHz ( 180.00, 500.00) -----> PASS
Tx Delta F2 Max   = 235.82 kHz ( 185.00, 500.00) -----> PASS
Tx F0Fn Max       = 16.60 kHz ( -150.00, 150.00) -----> PASS
Tx F0Fn Max       = 3.98 kHz (  0.00,  50.00) -----> PASS
Tx F1F0 Delta     = 1.82 kHz ( 20.00,  8.00) -----> PASS
Tx F0Fn SMax      = 4.29 kHz (  0.00, 20.00) -----> PASS

=====
index: 19 freq: 2440
Channel:19, Freq:2440
Start DUT Tx Testing: Channel:2440...
P_pk_each_burst_dBm => 1.285
leFreqOffset => 15988.099
leDeltaF1Avg => 269538.533
lePduLength => 37.000
leIsCrcOk => 1.000
=====
index: 19 freq: 2440
Channel:19, Freq:2440
Start DUT Tx Testing: Channel:2440...
leDeltaF2Max => 239490.472
leDeltaF2Avg => 270607.359
=====
Tx Delta F2 Avg   = 238.40 kHz ( 180.00, 500.00) -----> PASS
Tx Delta F2 Max   = 248.73 kHz ( 185.00, 500.00) -----> PASS
Tx F0Fn Max       = 18.65 kHz ( -150.00, 150.00) -----> PASS
Tx F0Fn Max       = 5.92 kHz (  0.00,  90.00) -----> PASS
Tx F1F0 Delta     = 1.62 kHz ( 20.00,  8.00) -----> PASS
Tx F0Fn SMax      = 4.96 kHz (  0.00, 20.00) -----> PASS

BLE Low Power mode Test complete!!
BLE Low Power mode Tx Test elapsed time:15.017999857s
-> Starting to Write MAC!

Wrt WiFi MAC:BC:8B:2B:00:00:12
ret for wrt WiFi MAC:OK: 0000

ret for wrt BLE init:OK

Wrt BLE MAC:BC:8B:2B:00:00:12
ret for wrt BLE MAC:OK

Rd WiFi MAC:BC:8B:2B:00:00:12
ret for wrt BLE init:OK

Rd BLE MAC:BC:8B:2B:00:00:12

*****
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
*****
```

## 5. LOG FORMAT

```
=====
# Welcome to RF test Tool !      Ver:1.0#
# DUT SN: XXX
=====
=>IQ2010 Module import.....
=>Module import complete...
***Starting All in one test!
=====
=> Starting BLE Rx mode!
=====
index:  0, freq:2402.00, RFin:-70.00, Waveform:LETestRun6a.mod
=====
Total: 1011.0
Demod_OK: 1009.0
PER(%): 0.2
PASS
=====
index:  0, freq:2402.00, RFin:-15.00, Waveform:LETestRun6a.mod
=====
Total: 1012.0
Demod_OK: 1011.0
PER(%): 0.1
PASS
=====
index: 19, freq:2440.00, RFin:-70.00, Waveform:LETestRun6a.mod
=====
Total: 1011.0
Demod_OK: 1009.0
PER(%): 0.2
PASS
=====
```

Log Header

TE Initialization

Rx Measurements



```
=====
index:38, freq:2478.00
=====
```

```
Tx  Power          =  0.36 dBm (  -2.00,   2.00) ----->  PASS
Tx  Init Freq Err  = 12.02 kHz ( -75.00,  75.00) ----->  PASS
Tx  Delta F1 Avg   = 267.99 kHz ( 225.00, 275.00) ----->  PASS
Tx  Delta F2 Avg   = 281.61 kHz ( 180.00, 500.00) ----->  PASS
Tx  Delta F2 Max   = 236.34 kHz ( 185.00, 500.00) ----->  PASS
Tx  Fn Max         = 14.65 kHz (-150.00, 150.00) ----->  PASS
Tx  F0Fn Max       =  4.71 kHz (   0.00,  50.00) ----->  PASS
Tx  F1F0 Delta     =  5.58 kHz (   0.00,  20.00) ----->  PASS
Tx  FnFn SMax      =  4.06 kHz (   0.00,  20.00) ----->  PASS
```

Tx Measurements

```
BLE Low Power mode Test complete!!
BLE Low Power mode Tx Test elapsed time:14.2359998226
```

```
==> Starting To Write MAC!
```

```
***Start to Write MAC!
```

```
Wrt WiFi MAC->8c:88:2b:00:00:09
Wrt BLE MAC->09:00:00:2B:88:8C
Rd WiFi MAC->"8c:88:2b:00:00:09"
```

Write MAC

```
Rd BLE MAC->"09:00:00:2B:88:8C"
```

```
#####
##                                     ##
##          #####    ##    #####    #####    ##
##          ##    ##    ##    ##    ##    ##    ##
##          ##    ##    ##    ##    ##          ##
##          #####    ##    ##    #####    #####    ##
##          ##          #####          ##          ##
##          ##          ##    ##    ##    ##    ##
##          ##          ##    ##    #####    #####    ##
##                                     ##
#####
```

```
Test complete!!
elapsed time:202.927000046
Total Result: PASS
```

Total Time and Result

## 6. 注意事項

---

1. 新的 FW 在 RF 测试前，Test tool 会从 Init mode 切到 MP mode 然后将 device reset 才会开始测试
2. 目前 Test tool 已经把线损加上，需要校一下线损
3. Rx 测试需要在屏蔽箱做测试良率才会高
4. 依据产品的需求调整 Tx power 的上下限