BT/BT5.0应用测试方案的介绍
BT Standard and Measurement

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筑波科技简介

成立於 2000 總部設於 新竹 服務據點 新竹 & 蘇州, 深圳	員工數110 +Employees (行銷&業務,技術&工程,行政, LTE, IoT, Bio...)

主力提供RF -ATE 及客制化測試系統
(Value Added, Turnkey Solutions (1000+ SW application Tools for Mfgrs)

WiFi /BT/ LTE (市場領導供應商)	Semicon/T&M (DC to THz) 3D IC test	IoT/Sensors (Apple/Google)	NB-IoT/e-MTC (NB-LTE)

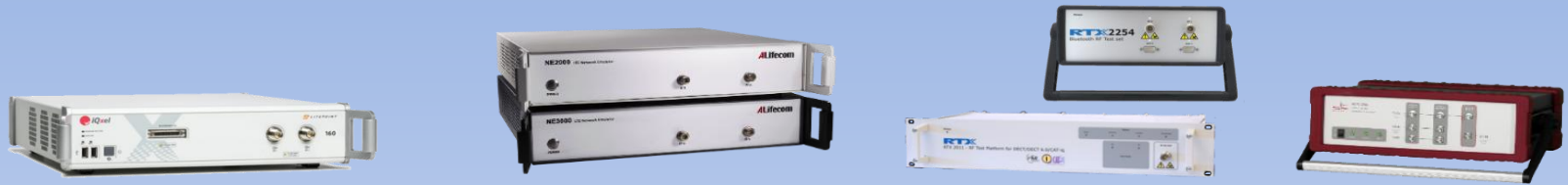|	
QCA/BCM/MTK/Intel/TI/CSR/NXP TSMC/ Realtek / ASE/ Hisilicon / …. Apple/Google/Cisco/ Netgear /TCL Microsoft/Murata/Huawei/Lenovo…	Eq. Buy/Rental 租 & 買 Lease to Own-期租&購買 (1st TW Rental Certification in CN) (30+ world class test partners/AH .)

筑波提供两岸三地技术支持服务

ACE Solution is a Taiwan based company,and one famous test brand to provide customers reliable total solutions of RF test from IC-design to end product.

苏州办公室
TEL: +86-512-89188620

新竹办公室(总部)
TEL: +886-3-5525633

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一个中心
两个基本点
全方位服务客户

產品線橫跨 (DC To Thz)
Wi−Fi, LTE, NFC, THz, Noise…Wilder (HDMI)

筑波提供整套无线通讯测试方案

Agilent
R&S
Anritsu
Sprient
Tektronix

RF cable
Connector
Attenuator
DC Block
Absorber
Thermal Material

Instrument Rental

Fixture
Shielding Box
Auto Hander

RF/EMC Accessory

Total Solution

Test Set

Instrument Agency

LITEPOINT
Ananpico
Noisecom
Miropross
Ladybug
Giga-tronics
Tabor
RTX
VDI

•5
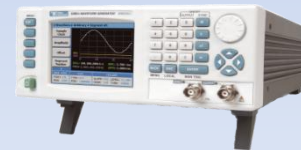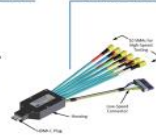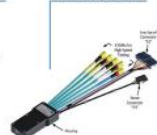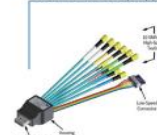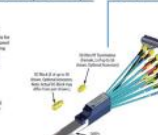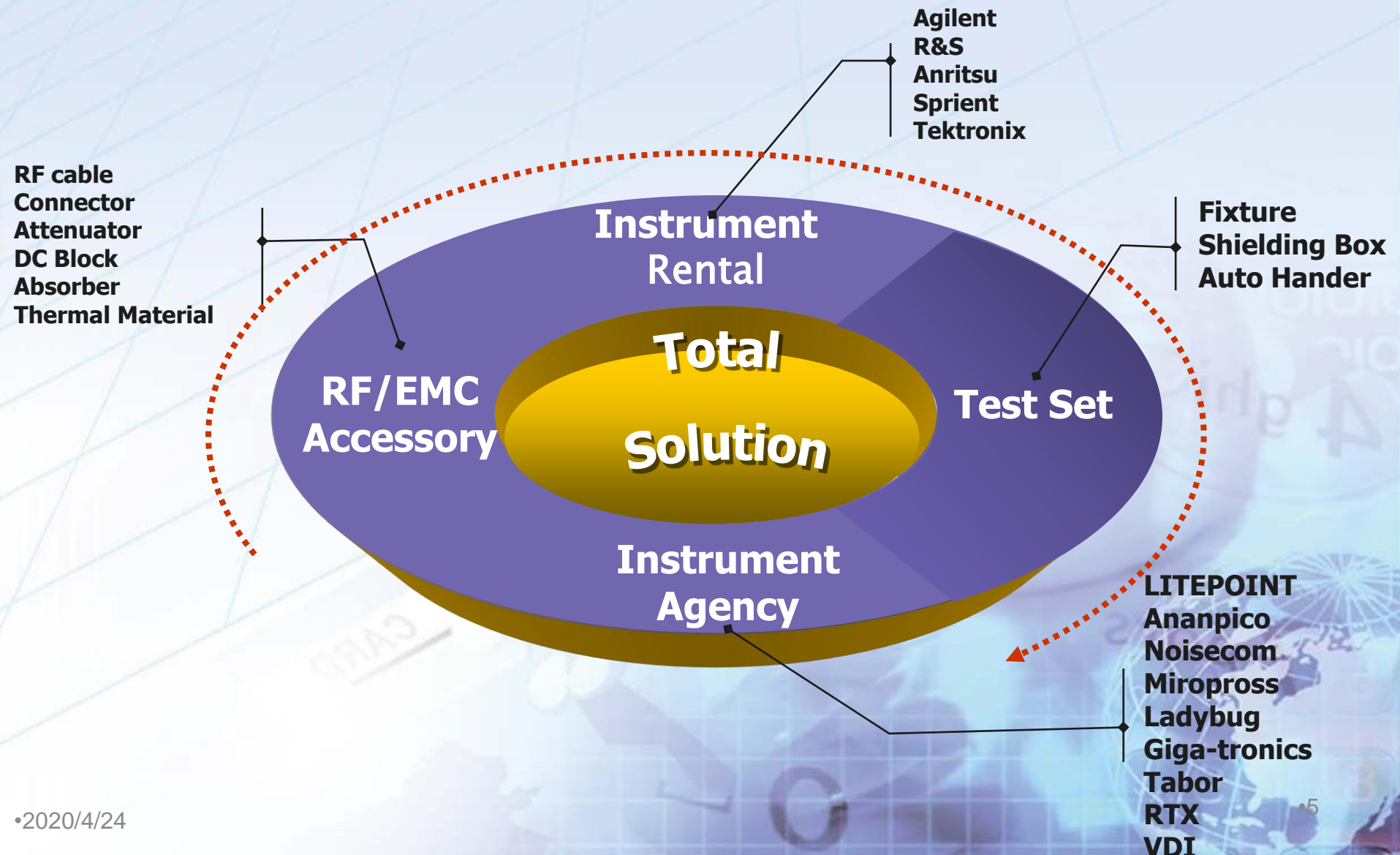
BLE模块研发及生产整合测试方案推荐

应用场景	模组研发	模组产线	整机客户端
品牌&型号	Litepoint IQxel-WS	Litepoint IQxel-WS or RTX2254	Litepoint Iqxel-WS
设备图片			
测试项目	Tx：功率、频偏、调制信号 Rx：丢包率、灵敏度 其他客制化项目：扫描、MAC写入等定制项目可整合于自动化软件		
测试特点	支持多种RF协议测试 如BT+wifi+zigbee 可测试调制信号 频谱功能（6GHz） 并支持BT5.0	多端口测试，IQxel-智可支持多达四端口平行测试并且支持BT5.0	支持BT advanced (Nordic官方推荐)

筑波科技额外支持项目：
1、提供特优品质RF配件（RF线材、转接头、天线盘）；
2、客制化产测软件；
3、设备操作及BT协议培训；
4、支援产线架设及咨询服务。

产品形态	模组（PCBA）		整机
应用场景	研发端	产线端	成品组装
测试目的	验证产品& 调制方式	保证一致性 /多端口	验证成品性能
测试项目	• Calibration (Optional) – Frequency offset • Verify – Tx Verify – EVM Avg & Peak – Omega – Power – Frequency Error – Rx Verify – BER/PER – RSSI • Assembled performance	– Tx Verify – Power – Frequency Error – Modulation（ IQxel-M ONLY） – Rx Verify – BER/PER – RSSI	– Tx Verify – Power – delta F1 – delta F2 – Min Deviation – Frequency – Adjacent Channel Power – Advertising Packet Period – Rx Verify – BER/PER – RSSI
推荐方案	**IQxel-WS**	**IQxel-WS** **or** **RTX2254**	**IQxel-WS** **BT Advance**

研发测试蓝牙板阶解决方案示意图

RF Cable 1

RF Cable 2

手动定频测试　　自动扫频测试

RJ-45 Cable

SPI-to-USB Cable
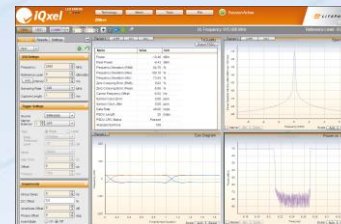
- 测试参数及结果呈现
- *Calibration*
  - *Frequency offset*
- *Verify*
  - *Tx Verify*
    - *EVM Avg & Peak*
    - *Omega*
    - *Power*
    - *Frequency Error*
  - *Rx Verify*
    - *BER(Classic)/PER(BLE)*

项次	清单
1	Litepoint 讯号采集核心 (IQxel-WS)
2	蓝牙产测软件
3	屏蔽箱
4	高频配件 1. N转SMA转接头：A3NSAMF N to SMA connector *1 2. 高频射频线120cm：A02SAMSAM120 RF cable 120cm *1 3. 高频射频线60cm + 顶针：B85NMNM60 RF cable 60cm *1 + IPEX Cable*1

蓝牙板阶产线测方案示意图

BT CSR/QCC高中低频自动测试

USB-to-SPI Cable
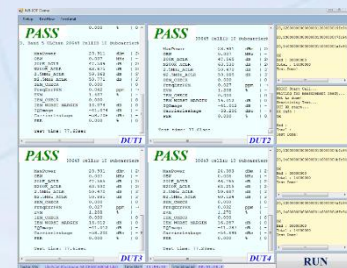
USB-to-SPI Cable

RF Cable 1 RF Cable 2

RJ-45
Cable

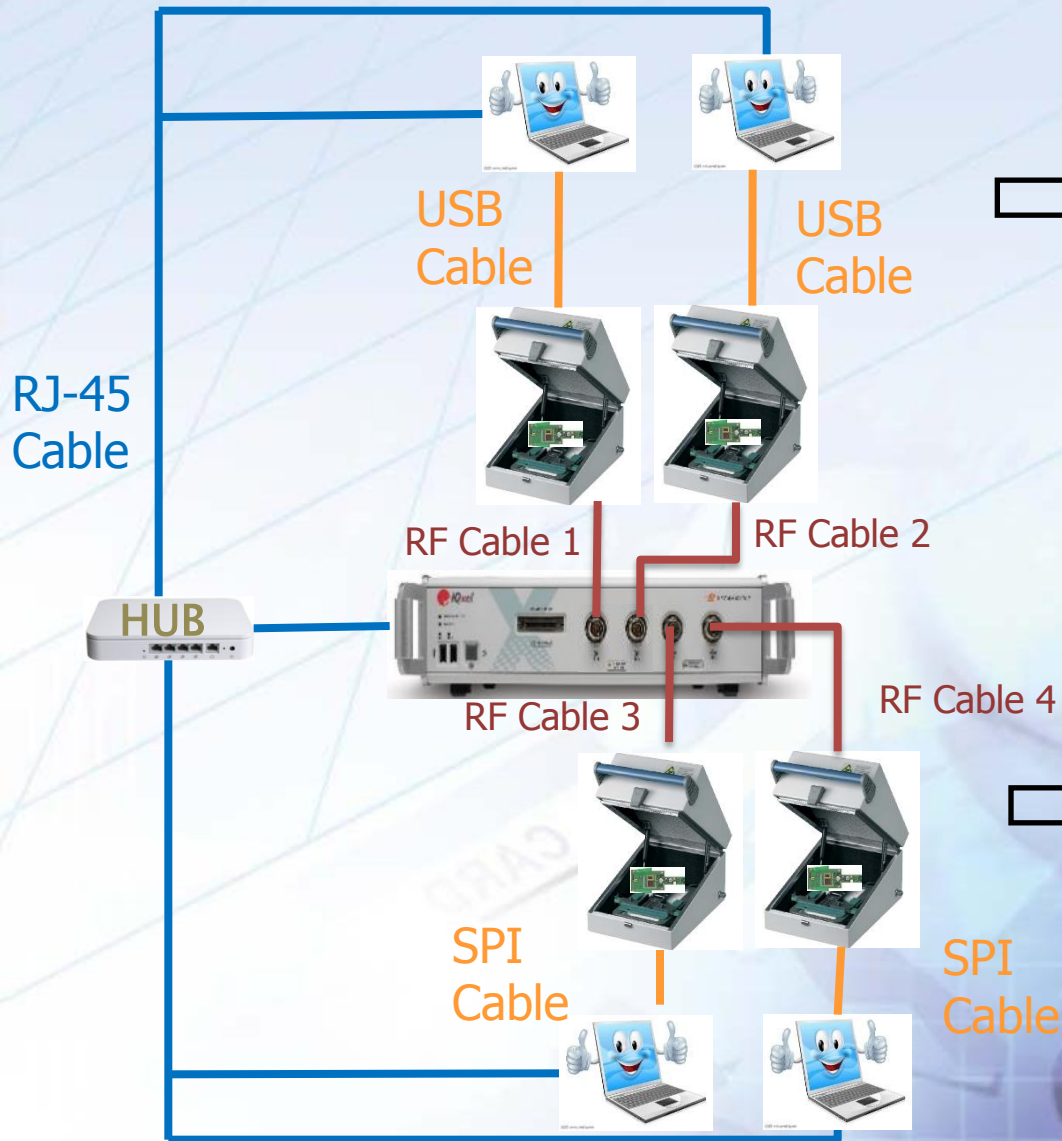RF Cable 3 RF Cable 4

USB-to-SPI Cable

USB-to-SPI Cable

- 测试参数及结果呈现
- *Calibration*
  - *Frequency offset*
- *Verify*
  - *Tx Verify*
    - **EVM Avg & Peak**
    - **Omega**
    - **Power**
    - **Frequency Error**
  - **Rx Verify**
    - *BER(Classic)/PER(BLE)*

CSR BC8675	1 DUT	2 DUT	4 DUT
實際測試時間 (秒)	16	18	20
單片測試時間 (秒)	16	9	5

Wifi+BT产线功率及板阶验证方案示意图

Wifi 高中低频自动测试

- 测试参数及结果呈现
  - **Tx Verify**
    - *EVM*
    - **Power**
  - **Rx Verify**
    - *PER*

BT 高中低频自动测试

- 测试参数及结果呈现
- *Calibration*
  - *Frequency offset*
- *Verify*
  - *Tx Verify*
    - *EVM Avg & Peak*
    - **Omega**
    - **Power**
    - **Frequency Error**
  - **Rx Verify**
    - *BER(Classic)/PER(BLE)*
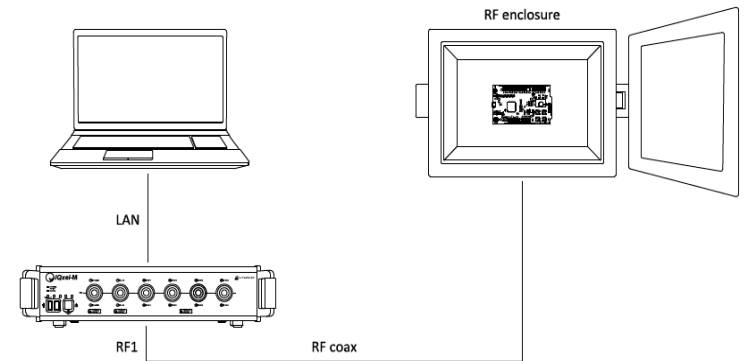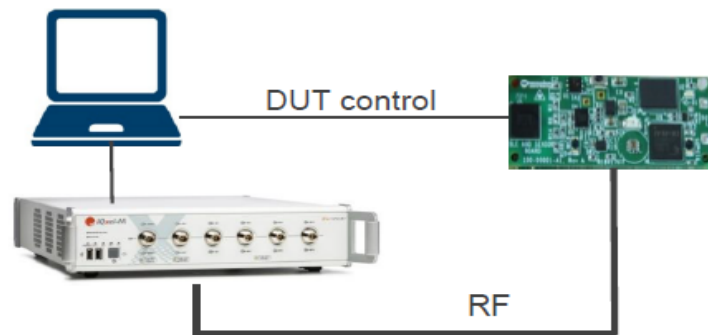
Direct Mode & BT Advanced

Figure 1: LitePoint Bluetooth Advanced solution

Direct Test Mode

- Designed for chipset specific non-signaling test and includes IQfact+ package for BT Smart device

- Ideal for PCB-level production testing

BT Advanced

- Designed for OTA device testing for any BLE beacon or peripheral device
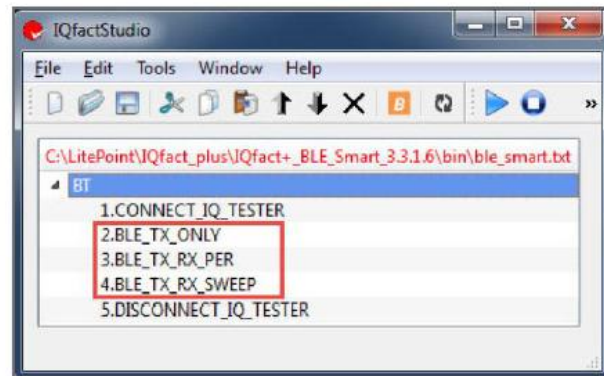
- Ideal for final product testing

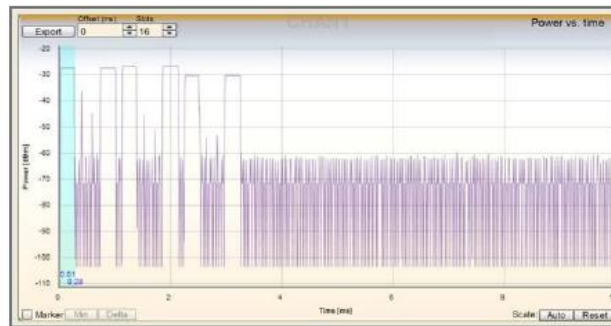**IQxel-M supports both methods, and is field upgradeable**

- **Transmitter Tests**
  - Power (Min, Max, Average)
  - Delta F1
  - Delta F2
  - Minimum Deviation
  - Frequency Drift
  - Frequency Offset
  - Adjacent Channel Power
  - Advertising Packet Period

- **Receiver Tests**
  - Packet Error Rate (PER)
  - Sensitivity

		Test Case	Anritsu MT8852B	LitePoint Tester		Remark
			Combi Test	IQsignal GUI	API	
Transmitter Tests	Basic Data Rate	5.1.3 TRM/CA/01/C (Output Power) at NOC & EOC	○	○	○	
		5.1.4 TRM/CA/02/C (Power Density) at NOC & EOC		○	○	
		5.1.5 TRM/CA/03/C (Power Control) at NOC	○	○	○	
		5.1.6 TRM/CA/04/C (TX Output Spectrum – Frequency range) at NOC & EOC		○	○	
		5.1.7 TRM/CA/05/C (TX Output Spectrum – 20 dB Bandwidth) at NOC & EOC		○	○	
		5.1.8 TRM/CA/06/C (TX Output Spectrum – Adjacent channel power) at NOC & EOC		○	○	
		5.1.9 TRM/CA/07/C (Modulation Characteristics) at NOC & EOC	○	○	○	
		5.1.10 TRM/CA/08/C (Initial Carrier Frequency Tolerance) at NOC & EOC	○	○	○	
		5.1.11 TRM/CA/09/C (Carrier Frequency Drift) at NOC & EOC	○	○	○	
	Enhance Data Rate	5.1.12 TRM/CA/10/C (EDR Relative Transmit Power) at NOC & EOC	○	○	○	
		5.1.13 TRM/CA/11/C (EDR Carrier Frequency Stability and Modulation Accuracy) at NOC & EOC	○	○	○	
		5.1.14 TRM/CA/12/C (EDR Differential Phase Encoding) at NOC	○	○	○	
		5.1.15 TRM/CA/13/C (EDR In-band Spurious Emissions) at NOC & EOC		○	○	
	BT 3.0	5.1.16 TRM/CA/14/C (Enhanced power control) at NOC	○	○	○	
Receiver Tests	Basic Data Rate	5.1.17 RCV/CA/01/C (Sensitivity – single slot packets) at NOC & EOC	○	○	○	
		5.1.18 RCV/CA/02/C (Sensitivity - multi-slot packets) at NOC & EOC	○	○	○	
		5.1.19 RCV/CA/03/C (C/I performance) at NOC		◎	◎	Requires external equipment (SG)
		5.1.20 RCV/CA/04/C (Blocking performance) at NOC		◎	◎	Requires external equipment (SG)
		5.1.21 RCV/CA/05/C (Intermodulation Performance) at NOC		◎	◎	Requires external equipment (SG*2)
		5.1.22 RCV/CA/06/C (Maximum Input Level) at NOC	○	○	○	
	Enhance Data Rate	5.1.23 RCV/CA/07/C (EDR Sensitivity) at NOC & EOC	○	○	○	
		5.1.24 RCV/CA/08/C (EDR BER Floor Performance) at NOC	○			
		5.1.25 TP/RCV/CA/09/C (EDR C/I Performance)		◎	◎	Requires external equipment (SG)
		5.1.26 RCV/CA/10/C (EDR Maximum Input Level) at NOC	○	○	○	
Transmitter Tests	Bluetooth Low Energy	6.2.1 TRM-LE/CA/01/C (Output power at NOC)	○	○	○	
		6.2.2 TRM-LE/CA/02/C (Output power at EOC)				
		6.2.3 TRM-LE/CA/03/C (In-band emissions at NOC)		○	○	
		6.2.4 TRM-LE/CA/04/C (In-band emissions at EOC)				
		6.2.5 TRM-LE/CA/05/C (Modulation characteristics) at NOC	○	○	○	
		6.2.6 TRM-LE/CA/06/C (Carrier frequency offset and drift at NOC)	○	○	○	
		6.2.7 TRM-LE/CA/07/C (Carrier frequency offset and drift at EOC)				
Receiver Tests		6.3.1 RCV-LE/CA/01/C (Receiver sensitivity at NOC)	○	○	○	
		6.3.2 RCV-LE/CA/02/C (Receiver sensitivity at EOC)				
		6.3.3 RCV-LE/CA/03/C(C/I and receiver selectivity performance) at NOC		◎	◎	Requires external equipment (SG)
		6.3.4 RCV-LE/CA/04/C (Blocking performance) at NOC		◎	◎	Requires external equipment (SG)
		6.3.5 RCV-LE/CA/05/C (Intermodulation performance) at NOC		◎	◎	Requires external equipment (SG*2)
		6.3.6 RCV-LE/CA/06/C (Maximum input signal level) at NOC	○	○	○	
		6.3.7 RCV-LE/CA/07/C (PER Report Integrity)at NOC	○	○	○	

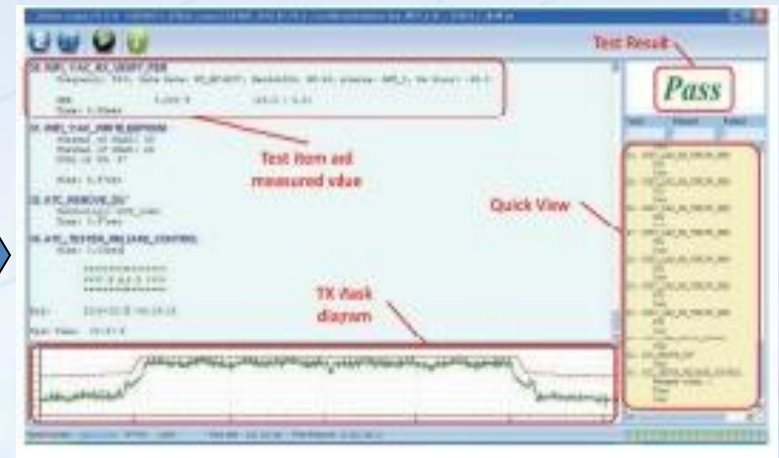NOC : This test case must be performed at normal test condition.
NOC & EOC : This test case must be performed at normal and extreme test conditions.

Customizable Software Support

Software Structure
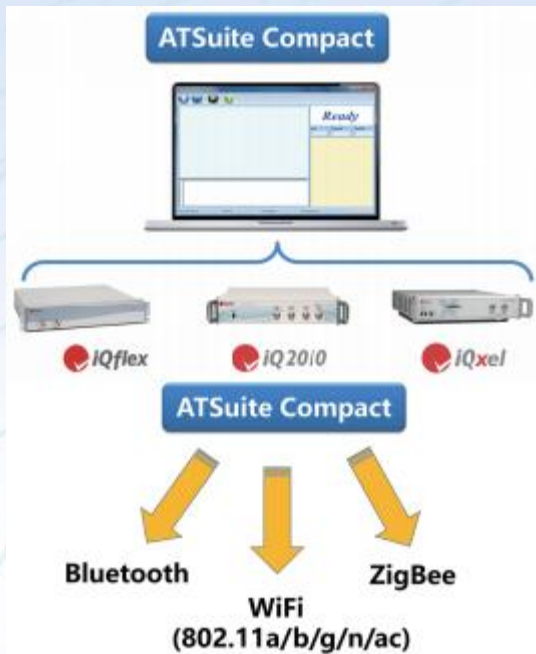
Interface & Results

Functions & Items

- Crystal Calibration (Frequency Offset Calibration)
- Tx Power Calibration (Followed Chipset Algorithm)
- Tx Power/ EVM/ Freq. Error/ Mask Verification
- Rx Max/ Min Sensitivity Sweep
- Rx Max/ Min PER Verification
- EEPROM Writing/ Logging
- Additional Features Supported Based Upon Chipset
- Customization Features Depend on Request (Option)

Customization(Option)

- Error Code Control
- Launch - Start
- DUT Auto Disable/ Enable
  (for Client Card Products)
- Advanced Log File Management
- Auto Load Image File for DUT
- Special Measurement Data Format
- Special Support Shop Floor System

Chipsets Supported

WiFi/ Bluetooth	ZigBee
Broadcom	FreeScale
Celeno	GreenPeak
CSR	NXP (Jennic)
Lantiq/ Metalink	Silicon Labs (Ember)
Marvell	ST
Mediatek/ Ralink	Telink
Qualcomm Atheros	TI (Chipcon)
Quantenna	UBEC
Realtek	FreeScale
TI	GreenPeak

Full Chipset Coverage

Reference Site

我们推荐的测试方案及优势

方案一： **Litepoint 1拖4 平行测试 IQxel-智，满足研发debug 及生产测试**

品牌&型号	Litepoint （IQxel–智）
设备图片	
应用场景及支援技术	a. RD、PL 端 b. BT(1.0~5.0) c. WIFI 11ac 80 MHz d. Upgrade ZigBee
测试特点	1. 支持多种RF协议测试如BT+wifi+zigbee 可测试调制信号频谱功能（6GHz） 并支持BT5.0 2. 多端口测试，IQxel–智可支持多达四端口平行测试 3. 整机BLE 测试， 支持BT advanced (Nordic官方推荐)
测试项目	Tx：功率、频偏、调制信号 Rx：丢包率、灵敏度 其他客制化项目：扫描、MAC写入等定制项目可整合于自动化软件

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4、支援产线架设及咨询服务。

FEEDBACK