Bluetooth® Qualification TEST REPORT

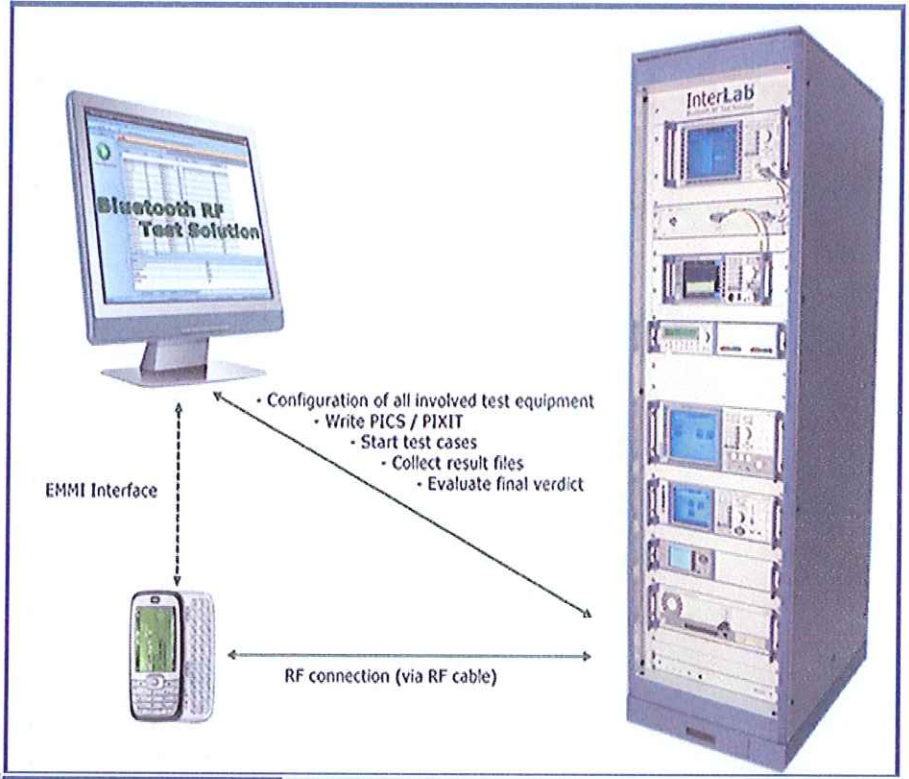
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

SI-BLE-02 BLE Module

ISSUED TO
Signle Technologies co., ltd.

#704A, 2nd Bldg, Stars Landmark Square Heng Jiang Xia, Chang Ping Town, Dong Guan City, Guang Dong Province, China



Tested by: Zou Liu
Zou Liu
(Engineer)
Date Dec. 24, 2015

Approved by:
Wei Yanquan
(Chief Engineer)
Date Dec. 24, 2015

Report No.:	BL-SZ15B0169-801
EUT Type:	SI-BLE-02 BLE Module
Model Name:	SI-BLE-02
Brand Name:	N/A
Test Conclusion:	Pass
Test Date:	Dec. 18, 2015
Date of Issue:	Dec. 24, 2015

Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong, P. R. China 518055
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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Dec. 24, 2015	Initial Issue

TABLE OF CONTENTS

1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6683 3402
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location 1	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L6791. The laboratory has passed the accreditation by International Accreditation Service (IAS). The accreditation number is TL-588. The laboratory has passed the accreditation by Bluetooth SIG for BQTF.
Description	All measurement facilities used to collect the measurement data are located at Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.

1.3 Test Environment

Ambient Pressure	100 to 102 KPa
Ambient Temperature	19 to 25 °C
Ambient Relative Humidity	45 to 55 %

1.4 Announce

(1) The test report reference to the report template version v5.0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

(7) Bluetooth is a Trademark owned by Bluetooth SIG, Inc. and licensed to Shenzhen BALUN Technology Co., Ltd.

2 PRODUCT INFORMATION

2.1 Applicant

Applicant	Signle Technologies co., ltd.
Address	#704A, 2nd Bidg, Stars Landmark Square Heng Jiang Xia, Chang Ping Town, Dong Guan City, Guang Dong Province, China

2.2 Manufacturer

Manufacturer	Signle Technologies co., ltd.
Address	#704A, 2nd Bidg, Stars Landmark Square Heng Jiang Xia, Chang Ping Town, Dong Guan City, Guang Dong Province, China

2.3 General Description for Equipment under Test (EUT)

Bluetooth Core Specification Version	Bluetooth Core Version 4.0
Product Type	End Product
Model Name	SI-BLE-02
Hardware Version	V2
Software Version	V20151022
Brief Description	This is a Bluetooth module.

2.4 Technical Information

CORE PROTOCOLS			
Protocol / Profile			Reference
☐	RF	Radio	Vol 2, Part A
☐	BB	Baseband	Vol 2, Part B
☐	LMP	Link Manager	Vol 2, Part C
☐	80211PAL	802.11 Protocol Adaptation Layer	Vol 5, Part A
☐	80211 MAC-PHY	802.11 MAC/PHY	IEEE 802.11-2007
☐	HCI	Host Controller Interface	Vol 2, Part E
☐	AMPHCI	AMP Host Controller Interface	Vol 5, Part A
☒	L2CAP	Logical Link Control and Adaptation Protocol	Vol 3, Part A
☐	A2MP	AMP Manager Protocol	Vol 3, Part E
☐	SDP	Service Discovery Protocol	Vol 3, Part B
☒	GAP	Generic Access Profile	Vol 3, Part C
☒	LL	Link Layer	Vol 6, Part B
☒	RFPHY	RF PHY	Vol 6, Part A
☐	4.0HCI	4.0 Host Controller Interface	Vol 3, Part E
☒	GATT	Generic Attribute Profile	Vol 3, Part G
☒	ATT	Attribute Protocol	Vol 3, Part H
☒	SM	Security Manager Protocol	Vol 3, Part F

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Description	Document Version
1	TCRL	TCRL 2015-1
3	BLE RF PHY Test Specification	RF-PHY.TS.4.2.1

3.2 Summary of Test Results

Test Item	Test Verdict	Note
RF-PHY	PASS	See details in Section 5

4 GENERAL TEST CONFIGURATIONS

4.1 Test Condition

Environment Parameter	Selected Values During Tests	
	Temperature	Voltage
Normal Temperature, Normal Voltage (NTNV)	Ambient	DC 3.0 V
High Temperature, High Voltage (HTHV)	+70 °C	DC 3.6 V
Low Temperature, High Voltage (LTHV)	-20 °C	DC 3.6 V
High Temperature, Low Voltage (HTLV)	+70 °C	DC 2.0 V
Low Temperature, Low Voltage (LTLV)	-20 °C	DC 2.0 V

4.2 Test Equipment List

4.2.1 RF Test System

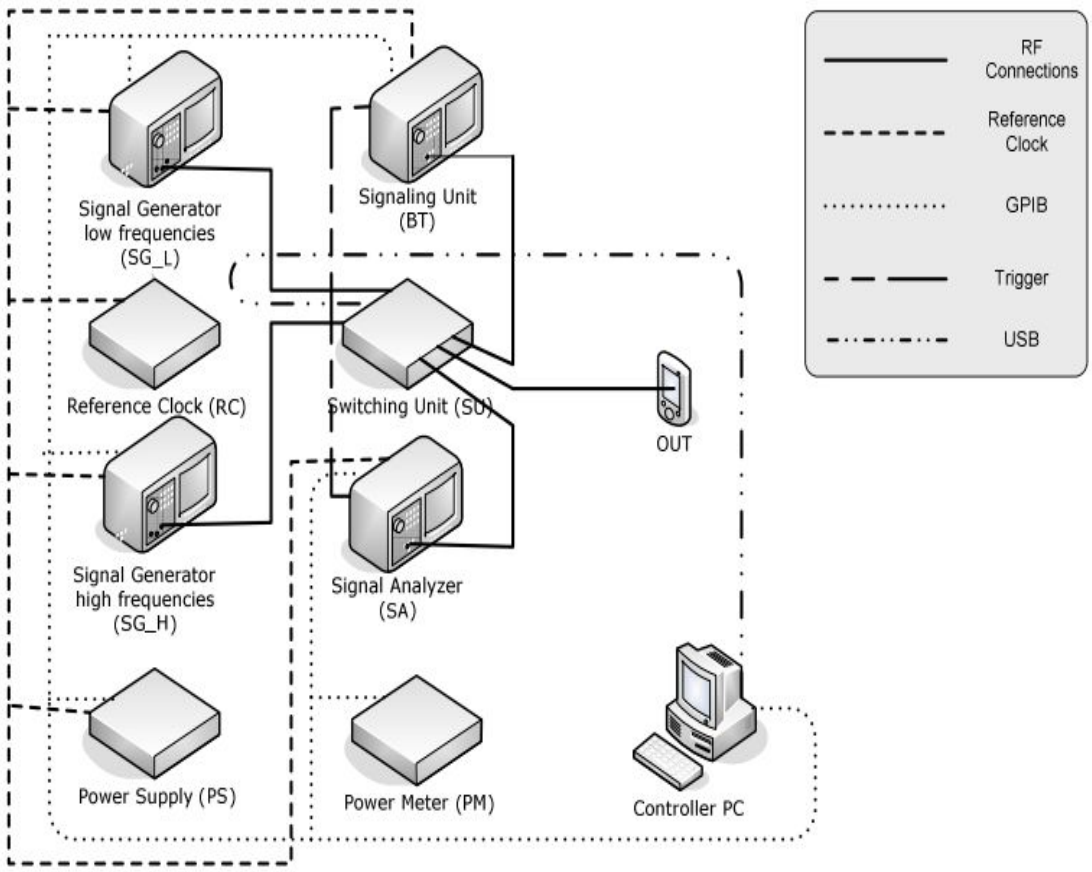
InterLab Bluetooth RF Test Solution (InterLab BRTS)				
Equipment Name	Type	Serial No.	Manufacturer	Cal. Due Date
Power Sensor	NRP-Z21	103971	R&S	2016-07-20
Bluetooth Signaling Unit	CBT	101005	R&S	2016-07-16
Power Supply	HMP2020	018141664	R&S	2016-07-05
Frequency Signal Analyzer	FSL3	103640/003	R&S	2016-07-15
Vector Signal Generator	SMJ100A	1403.4507k02 /101859	R&S	2016-07-15
Signal Generator	SMF100A	1167.0000k02 /104260	R&S	2016-07-15
Switching Unit	TCOT	--	7Layers	--
Test Engine Software	SW ver. 3.2.3p3	--	7Layers	--
Climate chamber				
Climate Chamber	NTH64-40A	1310	AHK	2016-08-06

4.2.2 Profile Test System

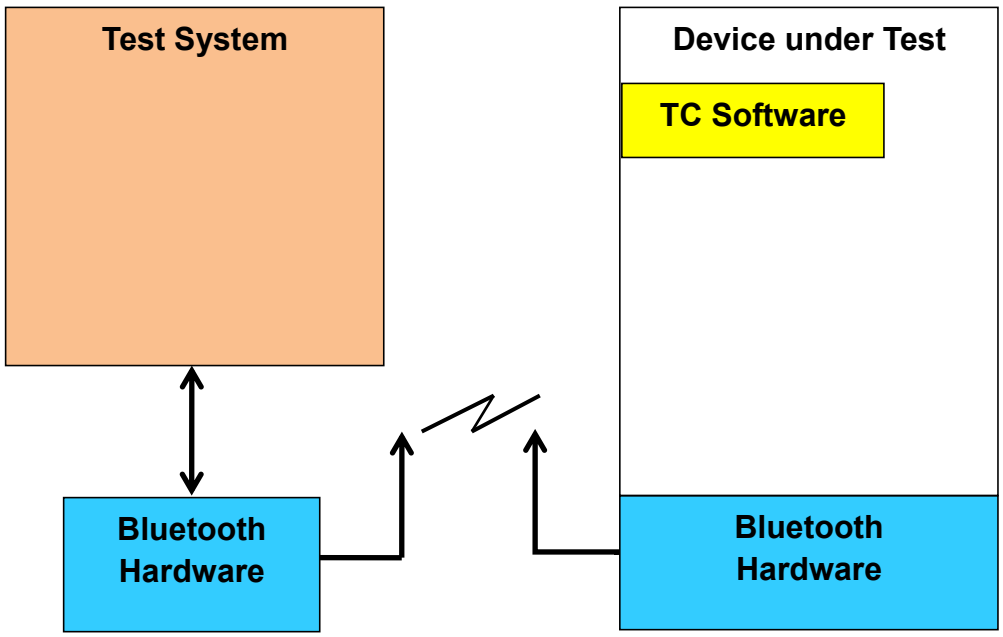
Equipment Name	Type	Serial No.	Manufacturer	Cal. Date	Cal. Due
Profile Tuning Suite	N/A	N/A	Bluetooth SIG	N/A	N/A
PTS Dongle	N/A	N/A	Bluetooth SIG	N/A	N/A

4.3 Test Setup

4.3.1 RF Test System



4.3.2 Profile Test System



5 RF-PHY CONFORMANCE TEST RESULTS

5.1 RF-PHY ICS /IXIT (Bluetooth Low Energy)

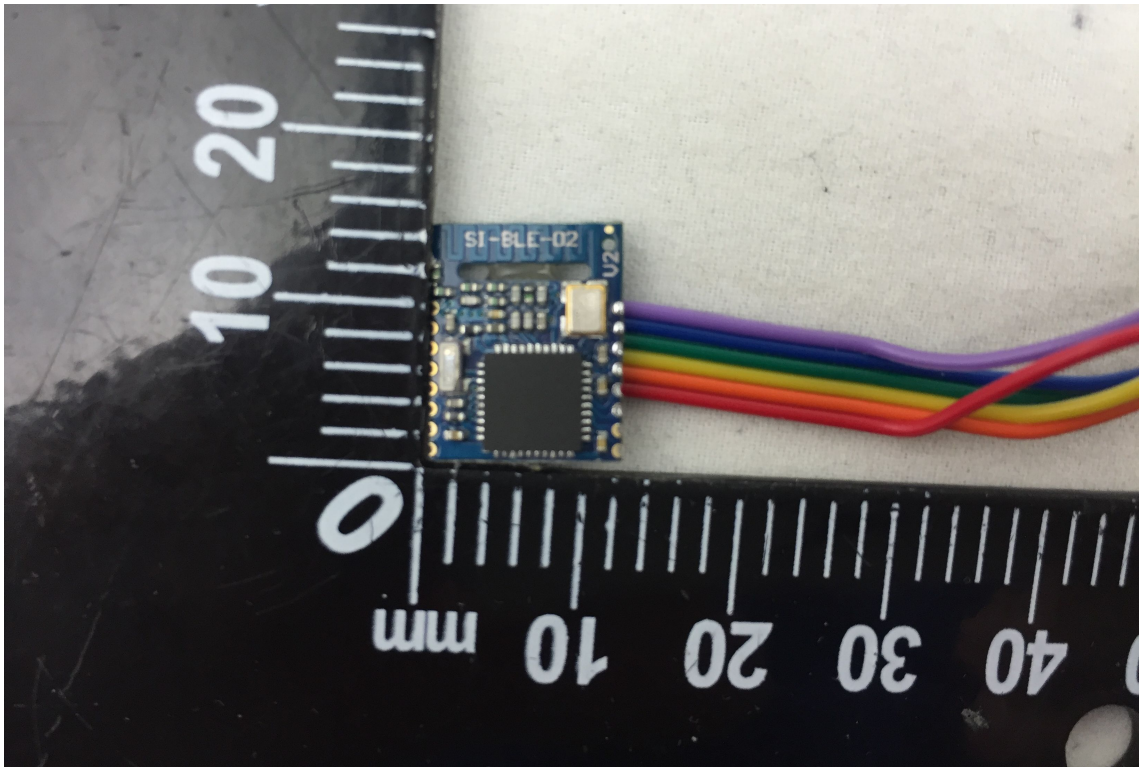
Bluetooth LE RF-PHY Capabilities				
Item	Capability	System Spec Reference	Status	Support [Yes] or [No]
1	LE Transmitter (Non-connectable, Broadcaster)	RF, 3	C.1	NO
2	LE Receiver (Non-connectable, Observer)	RF, 3	C.1	NO
3	LE Transceiver (Connectable, Peripheral/Central)	RF, 3	C.1	YES
4	HCI Test Interface	RF, 3	C.1	NO
5	UART Test Interface	RF, 3.3	C.1	YES
C.1: At least one of the capabilities shall be supported.				

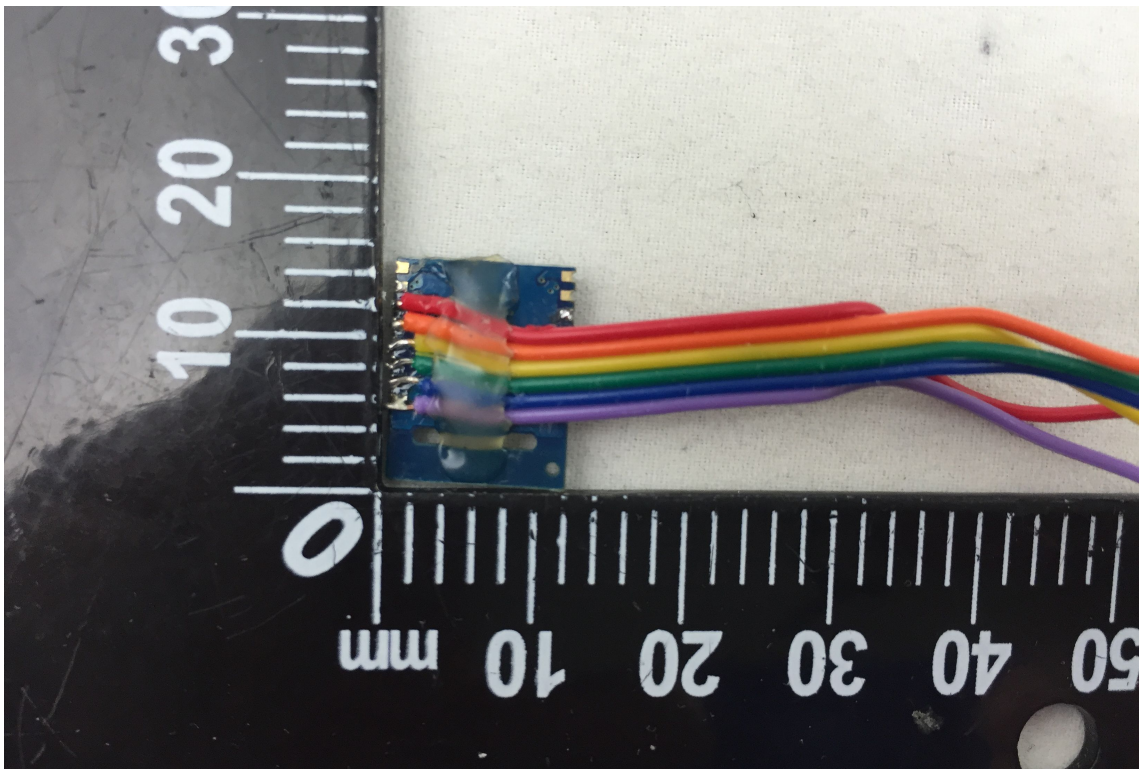
RF-PHY PIXIT				
PIXIT Reference	Identifier	Sub-Identifier (Optional)	Value	Units
RF-PHY:P1:1	In-band Image frequency	Low frequency	0	MHz
RF-PHY:P1:2		Middle frequency	0	MHz
RF-PHY:P1:3		High frequency	0	MHz
RF-PHY:P2:1	Value n for Intermodulation test	Low frequency	5	Integer
RF-PHY:P2:2		Middle frequency	5	Integer
RF-PHY:P2:3		High frequency	5	Integer
RF-PHY:P3	Type of power source	--	DC	--
RF-PHY:P4.1	Power source voltage	Nominal (NOC)	3.0	V
RF-PHY:P5:1	Operating temperature	Nominal (NOC)	25	°C
RF-PHY:P5:2		Maximum (EOC)	+70	°C
RF-PHY:P5:3		Minimum (EOC)	-20	°C
RF-PHY:P6:1	Air humidity range (relative)	Maximum (EOC)	95	%
RF-PHY:P6:2		Minimum (EOC)	40	%
RF-PHY:P6:3		Air humidity level for NOC/EOC tests	40 to 95	%
RF-PHY:P7:1	Test interface implementation	HCI or 2-wire UART	HCI	--
RF-PHY:P7:2		Data Rate	115200	bps
RF: P10	Antenna gain	--	0	dBi

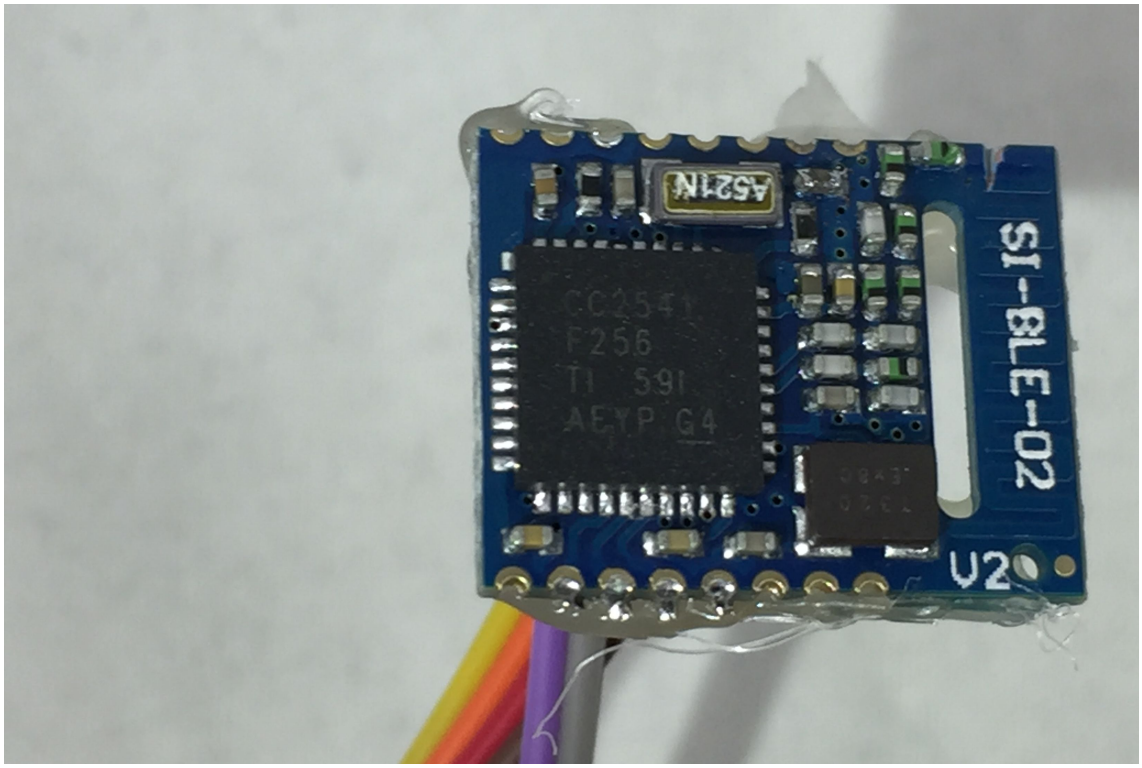
5.2 Test Results List

Bluetooth Low Energy					
NO.	TC. Identifier	Description	Cat.	Verdict	Test Condition
1	TRM-LE/CA/01/C	Output power at NOC	A	Pass	NTNV
2	TRM-LE/CA/02/C	Output power at EOC	B	Pass	HTHV, HTLV, LTHV, LTLV
3	TRM-LE/CA/03/C	In-band emissions at NOC	A	Pass	NTNV
4	TRM-LE/CA/04/C	In-band emissions at EOC	B	Pass	HTHV, HTLV, LTHV, LTLV
5	TRM-LE/CA/05/C	Modulation characteristics	A	Pass	NTNV
6	TRM-LE/CA/06/C	Carrier frequency offset and drift at NOC	A	Pass	NTNV
7	TRM-LE/CA/07/C	Carrier frequency offset and drift at EOC	B	Pass	HTHV, HTLV, LTHV, LTLV
8	RCV-LE /CA/01/C	Receiver sensitivity at NOC	A	Pass	NTNV
9	RCV-LE/CA/02/C	Receiver sensitivity at EOC	B	Pass	HTHV, HTLV, LTHV, LTLV
10	RCV-LE/CA/03/C	C/I and receiver selectivity performance	A	Pass	NTNV
11	RCV-LE/CA/04/C	Blocking performance	B	Pass	NTNV
12	RCV-LE/CA/05/C	Intermodulation performance	A	Pass	NTNV
13	RCV-LE/CA/06/C	Maximum input signal level	A	Pass	NTNV
14	RCV-LE/CA/07/C	PER Report Integrity	B	Pass	NTNV

ANNEX A EUT PHOTOS







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