TEST REPORT

of

Australian/New Zealand Standard AS/NZS 4268:2017

Product :	**Bluetooth 5.0 Module**
Brand:	**Fanstel**
Model:	**BT840X, BT840XE**
Model Difference:	**Please see page 5 model summaries table**
Applicant:	**Fanstel Corporation, Taipei**
Address:	**10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan**

Test Performed by:
International Standards Laboratory Corp.
<LT Lab.>
*Site Registration No.
BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-4;
*Address:
No. 120, Lane 180, Hsin Ho Rd.,
Lung-Tan Dist., Tao Yuan City 325, Taiwan
*Tel : 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-19LR022ANZ**

Issue Date : **2019/06/27**

VERIFICATION OF COMPLIANCE

Applicant:	Fanstel Corporation, Taipei
Product Description:	Bluetooth 5.0 Module
Brand Name:	Fanstel
Model No.:	BT840X, BT840XE
Model Difference:	Please see page 5 model summaries table
Date of test:	2019/06/12 ~ 2019/06/25
Date of EUT Received:	2019/06/11

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
AS/NZS 4268:2017, Row 59 Row 21	Complied

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By: Weitin Chen ***Date:*** 2019/06/27

Weitin Chen / Senior Engineer

Prepared By: Elisa Chen ***Date:*** 2019/06/27

Elisa Chen / Senior Engineer

Approved By: Jerry Liu ***Date:*** 2019/06/27

Jerry Liu / Technical Manager

Version

Version No.	Date	Description
00	2019/06/27	Initial creation of document

Table of Contents

1 Description of Equipment Under Test (EUT)

General:

Product Name:	Bluetooth 5.0 Module
Brand Name:	Fanstel
Model Name:	BT840X, BT840XE
Model Difference:	Please see model summaries table below
Type of Equipment:	Embed Modular
Temperature Range:	-40°C to +85°C
Simultaneous transmissions:	Yes
Geo-location capability:	No
Power Supply	5Vdc

Model Summaries

module	BT840X	BT840XE
SoC	nRF52840-QIAA	nRF52840-QIAA
Size	15x20.8x1.9mm	15x20.8x1.9mm
BT Antenna	PCB trace	PA + u.FL
32.768 sleep crystal	Integrated	Integrated
BT range,1 Mbps, LMPI		
BT range, 1Mbps, 1.52m		
BT range, 125 Kbps, LMPI.		
BT range, 125 kBps, 1.52m		
Availability	Sample	Sample

BT BLE:

Bluetooth Version	BT 5.0 (GFSK)
Frequency Range	2402 – 2480MHz
Channel number	40 channels
Modulation type	GFSK
Transmit Power (EIRP)	16.07dBm
Dwell Time	N/A
Operating Mode	Point-to-Point
Adaptive/ Non-Adaptive	Non-Adaptive
LBT (Listen Before Talk)	Yes
	■ Adaptive Frequency Hopping using LBT based DAA ☐ Adaptive Frequency Hopping using other forms of DAA (non-LBT based) ☐ Short Control Signaling Transmissions
Occupied Channel Bandwidth	Within 2400-2483.5MHz
Duty Cycle	N/A
Antenna Beam forming	No
Antenna Designation:	Type: PCB Antenna, BT840X : 0.87 dBi Type: Dipole Antenna,BT840XE : 0 dBi

This test report applies for Bluetooth BLE.

Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

2 Description of Test Modes and Test Condition

The EUT has been tested under Operating and standby condition. And used to control the EUT for staying in continuous transmitting and receiving mode is programmed. Channel lower, mid and higher of Bluetooth BLE modes were chosen for testing.

Normal test conditions:

Temperature : + 15℃ to 35 ℃
Relative humidity: 20 % to 75 %
3.7Vdc Voltage

Extreme Temperatures

For test at extreme temperatures, measurements shall be in accordance with the procedures specified in section 5.3 of AS/NZS 4268 at upper value of +55 degree and at a lower value of -10 degree.

Extreme Test Source Voltages

Low voltage is 3.33Vdc and 4.07Vdc for high voltage nominal voltage 3.7Vdc

3 General Description of Apply Standards

The EUT According to the Specifications, it must comply with the requirements of the following standards:

AS/NZS 4268:2017, – Radio equipment and systems – Short range devices – Limits and methods of measurement.

Row 59: Digital modulation transmitters
Row 21: All transmitters

EN 300 440 V1.6.1 – Part 1: Technical characteristics and test method.

4 Test Facility

International Standards Laboratory Corp.
<LT Lab.>
No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

A fully anechoic chamber was used for the radiated spurious emissions test.

TAF Accreditation Lab. Lab number: 0997

NEMKO Laboratory Authorization No.: ELA 113B

5 Support Equipment

Fig. 5-1 Configuration of Tested System

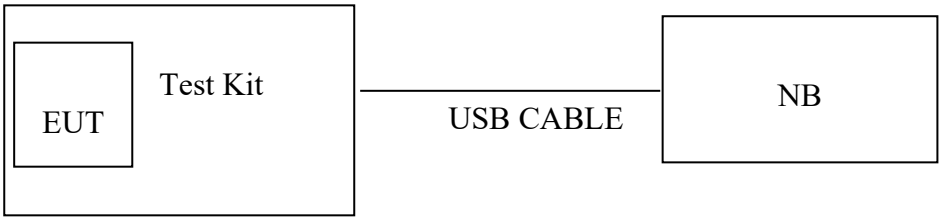


Table 5-1 Equipment Used in Tested System

Item	Equipment	Mrf/Brand	Model name	Series No	Data Cable	Power Cable
1	Notebook	Lenovo	X220i	N/A	N/A	Non-shielded
2	Test Kit	N/A	N/A	N/A	N/A	N/A

6 Maximum EIRP Measurement

6.1. Limit:

4W(36dBm) for Row 59

10W(20dBm) for Row 21

According to AS/NZS 4268:2017, Table 1, row 59: Digital modulation transmitters

According to AS/NZS 4268:2017, Table 1, row 21: All transmitters

6.2. Measurement Equipment Used:

Conducted Emission Test Site					
Equipment Type	**Manufacturer**	**Model Number**	**Serial Number**	**Last Cal.**	**Cal. Due.**
Power Sensor 06	DARE	RPR3006W	13I00030SNO33	01/11/2019	01/10/2020
Power Sensor 07	DARE	RPR3006W	13I00030SNO34	01/11/2019	01/10/2020
Temperature Chamber	KSON	THS-B4H100	2287	02/19/2019	02/18/2020
DC Power supply	ABM	8185D	N/A	01/10/2019	01/09/2020
AC Power supply	EXTECH	CFC105W	NA	12/25/2018	12/24/2019
Attenuator	Woken	Watt-65m3502	11051601	NA	NA
Splitter	MCLI	PS4-199	12465	12/26/2017	12/25/2019
Spectrum analyzer	keysight	N9010A	MY56070257	10/15/2018	10/14/2019
Spectrum analyzer	R&S	FSP40	100143	01/10/2019	01/09/2020
Test Sofware	DARE	Radimation Ver:2013.1.23	NA	NA	NA

6.3. Test Setup:

6.4. Test Procedure:

Refer to ETSI EN 300 440-1 V1.6.1, clause 7.1.

Refer to ETSI EN 300 328 V2.1.1,

See Sub-Clause 5.3.2.1 of ETSI EN 300 328 for the test conditions

See Sub-Clause 5.3.2.2.1.1 of ETSI EN 300 328 for conducted method.

6.5. Measurement Result: Refer to next page for the details.

6.5.1. Test Results:

Example Calculation:
Pburst values (A) = Reading + Cable Loss
RF output power (P) = A+G+Y

Ambient temperature: 25℃ Relative humidity: 60% Test Date: 2019/06/20

Test Mode: BT BLE

Pburst values (value "A" in dBm)	
antenna assembly gain "G" in dBi	0.87 dBi
beamforming gain "Y" in dB	0.00 dB
Cable Loss=	21.00 dB

TEST CONDITIONS		TRANSMITTER POWER (dBm)		
		Lowest Frequency	Middle Frequency	Highest Frequency
Temp -40 °C	Vmin 4.5 V	P 14.47 dBm	P 16.07 dBm	P 15.37 dBm
		A 13.60 dBm	A 15.20 dBm	A 14.50 dBm
		Reading -7.4 dBm	Reading -5.8 dBm	Reading -6.5 dBm
	Vmax 5.5 V	P 14.47 dBm	P 15.17 dBm	P 15.37 dBm
		A 13.60 dBm	A 14.30 dBm	A 14.50 dBm
		Reading -7.4 dBm	Reading -6.7 dBm	Reading -6.5 dBm
Temp 25 °C	Vnom 5 V	P 6.57 dBm	P 8.27 dBm	P 7.67 dBm
		A 5.70 dBm	A 7.40 dBm	A 6.80 dBm
		Reading -15.3 dBm	Reading -13.6 dBm	Reading -14.2 dBm
Temp 80 °C	Vmin 4.5 V	P 6.57 dBm	P 8.17 dBm	P 7.87 dBm
		A 5.70 dBm	A 7.30 dBm	A 7.00 dBm
		Reading -15.3 dBm	Reading -13.7 dBm	Reading -14 dBm
	Vmax 5.5 V	P 6.67 dBm	P 8.27 dBm	P 7.77 dBm
		A 5.80 dBm	A 7.40 dBm	A 6.90 dBm
		Reading -15.2 dBm	Reading -13.6 dBm	Reading -14.1 dBm
Limit(P)		36dBm		
Measurement uncertainty		+ 0.28dB / - 0.30dB		

7 Transmitter Spurious Emissions Measurement

7.1. Limit:

According to AS/NZS 4268:2017, Table 1, row 59: Digital modulation transmitters

According to AS/NZS 4268:2017, Table 1, row 21: All transmitters

7.2. Measurement Equipment Used:

Refer to section 6.2 of present report.

7.3. Test Setup:

Refer to section 6.3 of present report.

7.4. Test Procedure:

Refer to ETSI EN 300 440-1 V1.6.1, clause 7.3.

7.5. Measurement Result:

Refer to next page for the details.

7.5.1. Test Results: (Radiated)

Ambient temperature: 25 ℃ Relative humidity: 60 % Test Date: 2019/06/18

Test Mode: Bluetooth BLE mode, TX CH Low (model: 840X)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	84.32	-53.14	1.00	-52.14	-40.00	-12.14	VERTICAL
2	191.99	-63.83	2.23	-61.60	-40.00	-21.60	VERTICAL
3	504.33	-74.50	8.95	-65.55	-40.00	-25.55	VERTICAL
4	614.91	-75.28	10.73	-64.55	-40.00	-24.55	VERTICAL
5	742.95	-79.01	13.73	-65.28	-40.00	-25.28	VERTICAL
6	813.76	-75.68	13.83	-61.85	-40.00	-21.85	VERTICAL
7	1553.00	-64.00	2.18	-61.82	-40.00	-21.82	VERTICAL
8	4804.00	-72.98	15.71	-57.27	-40.00	-17.27	VERTICAL
1	84.32	-53.47	0.37	-53.10	-40.00	-13.10	HORIZONTAL
2	191.99	-58.51	1.70	-56.81	-40.00	-16.81	HORIZONTAL
3	594.54	-75.46	11.10	-64.36	-40.00	-24.36	HORIZONTAL
4	665.35	-76.71	11.93	-64.78	-40.00	-24.78	HORIZONTAL
5	740.04	-77.17	13.94	-63.23	-40.00	-23.23	HORIZONTAL
6	813.76	-77.41	14.39	-63.02	-40.00	-23.02	HORIZONTAL
7	1441.00	-63.79	2.16	-61.63	-40.00	-21.63	HORIZONTAL
8	4804.00	-73.89	15.63	-58.26	-40.00	-18.26	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

Ambient temperature: 25 ℃ Relative humidity: 60 % Test Date: 2019/06/18

Test Mode: Bluetooth BLE mode, TX CH Mid (model: 840X)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	84.32	-52.09	1.00	-51.09	-40.00	-11.09	VERTICAL
2	191.99	-64.04	2.23	-61.81	-40.00	-21.81	VERTICAL
3	515.97	-75.01	8.94	-66.07	-40.00	-26.07	VERTICAL
4	591.63	-75.16	9.94	-65.22	-40.00	-25.22	VERTICAL
5	742.95	-79.79	13.73	-66.06	-40.00	-26.06	VERTICAL
6	816.67	-77.89	13.92	-63.97	-40.00	-23.97	VERTICAL
7	1560.00	-64.79	2.22	-62.57	-40.00	-22.57	VERTICAL
8	4884.00	-73.89	16.07	-57.82	-40.00	-17.82	VERTICAL
1	84.32	-45.88	0.37	-45.51	-40.00	-5.51	HORIZONTAL
2	191.99	-58.06	1.70	-56.36	-40.00	-16.36	HORIZONTAL
3	591.63	-77.29	11.04	-66.25	-40.00	-26.25	HORIZONTAL
4	668.26	-77.51	11.98	-65.53	-40.00	-25.53	HORIZONTAL
5	740.04	-78.71	13.94	-64.77	-40.00	-24.77	HORIZONTAL
6	816.67	-78.63	14.44	-64.19	-40.00	-24.19	HORIZONTAL
7	1994.00	-65.53	4.75	-60.78	-40.00	-20.78	HORIZONTAL
8	4884.00	-72.65	15.90	-56.75	-40.00	-16.75	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

Ambient temperature: 25 ℃ Relative humidity: 60 % Test Date: 2019/06/18

Test Mode: Bluetooth BLE mode, TX CH High (model: 840X)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	84.32	-48.82	1.00	-47.82	-40.00	-7.82	VERTICAL
2	191.99	-62.96	2.23	-60.73	-40.00	-20.73	VERTICAL
3	480.08	-72.63	8.99	-63.64	-40.00	-23.64	VERTICAL
4	591.63	-73.03	9.94	-63.09	-40.00	-23.09	VERTICAL
5	741.01	-79.94	13.74	-66.20	-40.00	-26.20	VERTICAL
6	813.76	-75.66	13.83	-61.83	-40.00	-21.83	VERTICAL
7	1994.00	-62.97	4.60	-58.37	-40.00	-18.37	VERTICAL
8	4960.00	-72.95	16.40	-56.55	-40.00	-16.55	VERTICAL
1	84.32	-50.82	0.37	-50.45	-40.00	-10.45	HORIZONTAL
2	191.99	-57.59	1.70	-55.89	-40.00	-15.89	HORIZONTAL
3	594.54	-78.33	11.10	-67.23	-40.00	-27.23	HORIZONTAL
4	665.35	-78.47	11.93	-66.54	-40.00	-26.54	HORIZONTAL
5	742.95	-79.10	14.04	-65.06	-40.00	-25.06	HORIZONTAL
6	816.67	-76.84	14.44	-62.40	-40.00	-22.40	HORIZONTAL
7	1994.00	-63.65	4.75	-58.90	-40.00	-18.90	HORIZONTAL
8	4960.00	-72.92	16.15	-56.77	-40.00	-16.77	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

Ambient temperature: 25 ℃ Relative humidity: 60 % Test Date: 2019/06/18

Test Mode: Bluetooth BLE mode, TX CH Low (model: 840XE)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	84.32	-55.46	1.00	-54.46	-40.00	-14.46	VERTICAL
2	191.99	-63.63	2.23	-61.40	-40.00	-21.40	VERTICAL
3	336.52	-65.10	5.18	-59.92	-40.00	-19.92	VERTICAL
4	592.60	-74.52	9.96	-64.56	-40.00	-24.56	VERTICAL
5	747.80	-77.61	13.72	-63.89	-40.00	-23.89	VERTICAL
6	813.76	-74.95	13.83	-61.12	-40.00	-21.12	VERTICAL
7	1994.00	-64.97	4.60	-60.37	-40.00	-20.37	VERTICAL
8	4804.00	-73.15	15.71	-57.44	-40.00	-17.44	VERTICAL
1	84.32	-54.68	0.37	-54.31	-40.00	-14.31	HORIZONTAL
2	191.99	-60.17	1.70	-58.47	-40.00	-18.47	HORIZONTAL
3	594.54	-77.43	11.10	-66.33	-40.00	-26.33	HORIZONTAL
4	701.24	-81.68	12.57	-69.11	-40.00	-29.11	HORIZONTAL
5	796.30	-81.02	14.17	-66.85	-40.00	-26.85	HORIZONTAL
6	860.32	-79.10	15.13	-63.97	-40.00	-23.97	HORIZONTAL
7	1343.00	-64.56	1.89	-62.67	-40.00	-22.67	HORIZONTAL
8	4804.00	-72.62	15.63	-56.99	-40.00	-16.99	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

Ambient temperature: 25 ℃ Relative humidity: 60 % Test Date: 2019/06/18

Test Mode: Bluetooth BLE mode, TX CH Mid (model: 840XE)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	84.32	-51.48	1.00	-50.48	-40.00	-10.48	VERTICAL
2	191.99	-63.69	2.23	-61.46	-40.00	-21.46	VERTICAL
3	526.64	-75.17	8.93	-66.24	-40.00	-26.24	VERTICAL
4	593.57	-75.50	9.99	-65.51	-40.00	-25.51	VERTICAL
5	718.70	-82.01	13.82	-68.19	-40.00	-28.19	VERTICAL
6	740.04	-79.19	13.74	-65.45	-40.00	-25.45	VERTICAL
7	1994.00	-60.82	4.60	-56.22	-40.00	-16.22	VERTICAL
8	4884.00	-74.01	16.07	-57.94	-40.00	-17.94	VERTICAL
1	84.32	-51.02	0.37	-50.65	-40.00	-10.65	HORIZONTAL
2	191.99	-58.91	1.70	-57.21	-40.00	-17.21	HORIZONTAL
3	504.33	-73.97	8.57	-65.40	-40.00	-25.40	HORIZONTAL
4	644.98	-81.38	11.61	-69.77	-40.00	-29.77	HORIZONTAL
5	740.04	-76.04	13.94	-62.10	-40.00	-22.10	HORIZONTAL
6	815.70	-78.29	14.42	-63.87	-40.00	-23.87	HORIZONTAL
7	1994.00	-64.90	4.75	-60.15	-40.00	-20.15	HORIZONTAL
8	4884.00	-73.81	15.90	-57.91	-40.00	-17.91	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

Ambient temperature: 25 ℃ Relative humidity: 60 % Test Date: 2019/06/18

Test Mode: Bluetooth BLE mode, TX CH High (model: 840XE)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	84.32	-50.09	1.00	-49.09	-40.00	-9.09	VERTICAL
2	516.94	-75.30	8.94	-66.36	-40.00	-26.36	VERTICAL
3	606.18	-73.59	10.39	-63.20	-40.00	-23.20	VERTICAL
4	620.73	-77.53	10.96	-66.57	-40.00	-26.57	VERTICAL
5	715.79	-80.36	13.83	-66.53	-40.00	-26.53	VERTICAL
6	813.76	-74.49	13.83	-60.66	-40.00	-20.66	VERTICAL
7	1994.00	-58.24	4.60	-53.64	-40.00	-13.64	VERTICAL
8	4960.00	-72.44	16.40	-56.04	-40.00	-16.04	VERTICAL
1	84.32	-49.47	0.37	-49.10	-40.00	-9.10	HORIZONTAL
2	191.99	-58.55	1.70	-56.85	-40.00	-16.85	HORIZONTAL
3	526.64	-75.52	9.30	-66.22	-40.00	-26.22	HORIZONTAL
4	668.26	-77.57	11.98	-65.59	-40.00	-25.59	HORIZONTAL
5	742.95	-78.75	14.04	-64.71	-40.00	-24.71	HORIZONTAL
6	816.67	-77.68	14.44	-63.24	-40.00	-23.24	HORIZONTAL
7	1994.00	-64.28	4.75	-59.53	-40.00	-19.53	HORIZONTAL
8	4960.00	-73.49	16.15	-57.34	-40.00	-17.34	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

8 Emission Bandwidth Measurement

8.1. Limit:

99% power emission bandwidth shall within 2400MHz and 2483.5MHz.

According to AS/NZS 4268:2017, section 6.5.

8.2. Measurement Equipment Used:

Refer to section 6.2 of present report.

8.3. Test Setup:

Refer to section 6.3 of present report.

8.4. Test Procedure:

Refer to section 6.5 of AS/NZS 4268 for the details.

8.5. Measurement Result:

Ambient temperature: 25 ℃ Relative humidity: 60 % Test Date: 2019/06/18

	Channel	Measured Frequency (MHz)	Limit (MHz)
BT BLE	Lower Frequency	2401.45	≥ 2400.00
	Upper Frequency	2480.516	≤ 2483.50

9 Operating Frequencies Measurement

9.1. Limit:

2400MHz and 2483.5MHz.

According to AS/NZS 4268:2017 section 6.6.

9.2. Measurement Equipment Used:

Refer to section 6.2 of present report.

9.3. Test Setup:

Refer to section 6.3 of present report.

9.4. Test Procedure:

Refer to ETSI EN 300 440-1 V1.6.1, clause 7.2.2 and 7.2.3.

Refer to ETSI EN 300 328 V2.1.1, clause 4.3.2.7

9.5. Measurement Result:

Test Results: BT BLE mode

Ambient temperature: 25 ℃ Relative humidity: 60% Test Date: 2019/06/18

antenna assembly gain "G" in dBi	0.87	dBi
beamforming gain "Y" in dB	0.00	dB
Cable Loss=	21.00	dB

TEST CONDITIONS				FREQUENCY (MHz)	
				Lowest	Highest
Temp -40 °C	V_{min}	4.50	V	2402.0380	2480.0210
	V_{max}	5.50	V	2402.0370	2481.0200
Temp 25 °C	V_{nom}	5.00	V	2402.0380	2482.0230
Temp 80 °C	V_{min}	4.50	V	2402.0360	2483.0230
	V_{max}	5.50	V	2402.0370	2484.0190
Measured frequencies (lowest and highest)				f_L = 2402.0360 MHz	fH= 2484.0190 MHz
Limit				2400.0000 MHz	2483.5000 MHz
Measurement Uncertainty				+/- 120kHz	

10 Receiver Emissions Measurement

10.1. Limit:

According to section 7.2 of AS/NZS 4268:2017

25MHz to 1 GHz 2.0 nW ERP (-57 dBm).

1GHz to 40 GHz 20nW ERP (-47 dBm).

10.2. Measurement Equipment Used:

Refer to section 6.2 of present report.

10.3. Test Setup:

Refer to section 6.3 of present report.

10.4. Test Procedure:

Refer to ETSI EN 300 440-1 V1.6.1, clause 8.4.

10.5. Measurement Result:

Ambient temperature: 25℃ Relative humidity: 60% Test Date: 2019/06/18

Test Mode: BT BLE mode, RX CH Low (Model: BT840X)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	108.57	-60.66	0.79	-59.87	-57.00	-2.87	VERTICAL
2	216.24	-61.48	2.73	-58.75	-57.00	-1.75	VERTICAL
3	332.64	-64.40	5.09	-59.31	-57.00	-2.31	VERTICAL
4	468.44	-70.65	9.01	-61.64	-57.00	-4.64	VERTICAL
5	591.63	-74.70	9.94	-64.76	-57.00	-7.76	VERTICAL
6	813.76	-77.63	13.83	-63.80	-57.00	-6.80	VERTICAL
7	3779.00	-71.65	11.08	-60.57	-47.00	-13.57	VERTICAL
8	6201.00	-73.71	19.01	-54.70	-47.00	-7.70	VERTICAL
1	108.57	-60.31	1.29	-59.02	-57.00	-2.02	HORIZONTAL
2	191.99	-62.61	1.70	-60.91	-57.00	-3.91	HORIZONTAL
3	336.52	-63.55	4.81	-58.74	-57.00	-1.74	HORIZONTAL
4	455.83	-74.50	8.36	-66.14	-57.00	-9.14	HORIZONTAL
5	532.46	-76.01	9.49	-66.52	-57.00	-9.52	HORIZONTAL
6	740.04	-79.57	13.94	-65.63	-57.00	-8.63	HORIZONTAL
7	3856.00	-70.87	11.80	-59.07	-47.00	-12.07	HORIZONTAL
8	6425.00	-73.60	23.17	-50.43	-47.00	-3.43	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

Ambient temperature: 25℃ Relative humidity: 60% Test Date: 2019/06/18

Test Mode: BT BLE mode, RX CH Mid (Model: 840X)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	84.32	-59.31	1.00	-58.31	-57.00	-1.31	VERTICAL
2	191.99	-63.73	2.23	-61.50	-57.00	-4.50	VERTICAL
3	280.26	-65.27	4.49	-60.78	-57.00	-3.78	VERTICAL
4	336.52	-65.72	5.18	-60.54	-57.00	-3.54	VERTICAL
5	455.83	-75.01	9.04	-65.97	-57.00	-8.97	VERTICAL
6	591.63	-74.08	9.94	-64.14	-57.00	-7.14	VERTICAL
7	3660.00	-72.59	10.35	-62.24	-47.00	-15.24	VERTICAL
8	6222.00	-73.42	19.05	-54.37	-47.00	-7.37	VERTICAL
1	84.32	-59.77	0.37	-59.40	-57.00	-2.40	HORIZONTAL
2	216.24	-61.02	2.41	-58.61	-57.00	-1.61	HORIZONTAL
3	336.52	-63.83	4.81	-59.02	-57.00	-2.02	HORIZONTAL
4	533.43	-73.59	9.52	-64.07	-57.00	-7.07	HORIZONTAL
5	740.04	-78.17	13.94	-64.23	-57.00	-7.23	HORIZONTAL
6	816.67	-75.76	14.44	-61.32	-57.00	-4.32	HORIZONTAL
7	2967.00	-70.59	7.30	-63.29	-47.00	-16.29	HORIZONTAL
8	5543.00	-71.93	17.45	-54.48	-47.00	-7.48	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

Ambient temperature: 25℃ Relative humidity: 60% Test Date: 2019/06/18

Test Mode: BT BLE mode, RX CH High (Model: BT840XE)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	35.82	-65.10	6.41	-58.69	-57.00	-1.69	VERTICAL
2	84.32	-60.76	1.00	-59.76	-57.00	-2.76	VERTICAL
3	336.52	-65.37	5.18	-60.19	-57.00	-3.19	VERTICAL
4	601.33	-74.83	10.19	-64.64	-57.00	-7.64	VERTICAL
5	742.95	-80.29	13.73	-66.56	-57.00	-9.56	VERTICAL
6	816.67	-77.57	13.92	-63.65	-57.00	-6.65	VERTICAL
7	1994.00	-65.05	4.60	-60.45	-47.00	-13.45	VERTICAL
8	5403.00	-72.56	17.59	-54.97	-47.00	-7.97	VERTICAL
1	32.91	-69.12	9.65	-59.47	-57.00	-2.47	HORIZONTAL
2	108.57	-60.74	1.29	-59.45	-57.00	-2.45	HORIZONTAL
3	216.24	-61.13	2.41	-58.72	-57.00	-1.72	HORIZONTAL
4	336.52	-63.83	4.81	-59.02	-57.00	-2.02	HORIZONTAL
5	593.57	-78.29	11.08	-67.21	-57.00	-10.21	HORIZONTAL
6	740.04	-78.53	13.94	-64.59	-57.00	-7.59	HORIZONTAL
7	1483.00	-66.37	2.28	-64.09	-47.00	-17.09	HORIZONTAL
8	5263.00	-73.20	16.82	-56.38	-47.00	-9.38	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

Ambient temperature: 25℃ Relative humidity: 60% Test Date: 2019/06/18

Test Mode: BT BLE mode, RX CH Low (Model: 840XE)

No	Freq MHz	Reading dBm	Aux dB	Level dBm	Limit dBm	Margin dB	Pol V/H
1	84.32	-60.76	1.00	-59.76	-57.00	-2.76	VERTICAL
2	216.24	-62.07	2.73	-59.34	-57.00	-2.34	VERTICAL
3	336.52	-64.83	5.18	-59.65	-57.00	-2.65	VERTICAL
4	740.04	-78.37	13.74	-64.63	-57.00	-7.63	VERTICAL
5	816.67	-76.43	13.92	-62.51	-57.00	-5.51	VERTICAL
6	947.62	-77.60	17.65	-59.95	-57.00	-2.95	VERTICAL
7	1973.00	-67.43	4.50	-62.93	-47.00	-15.93	VERTICAL
8	4941.00	-73.10	16.32	-56.78	-47.00	-9.78	VERTICAL
1	191.99	-60.79	1.70	-59.09	-57.00	-2.09	HORIZONTAL
2	246.31	-63.57	4.38	-59.19	-57.00	-2.19	HORIZONTAL
3	519.85	-73.55	9.08	-64.47	-57.00	-7.47	HORIZONTAL
4	665.35	-78.42	11.93	-66.49	-57.00	-9.49	HORIZONTAL
5	742.95	-77.87	14.04	-63.83	-57.00	-6.83	HORIZONTAL
6	816.67	-76.97	14.44	-62.53	-57.00	-5.53	HORIZONTAL
7	4605.00	-71.88	14.95	-56.93	-47.00	-9.93	HORIZONTAL
8	6530.00	-74.03	23.84	-50.19	-47.00	-3.19	HORIZONTAL

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 26GHz: 4.45dB

Remark:

1. The emission behaviors belong to narrowband spurious emission.
2. Remark " --- " means that the emission level is too low to be measured
3. The result basic equation calculation is as follows:
4. ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dB/dBi) – Cable loss (dB)
5. Measurement Range upto 40GHz.

11 Radiated Peak Power Spectral Density Measurement

11.1. Limit:

According to AS/NZS 4268:2017, Table 1, Note 2.

The radiated peak power spectral density in any 3kHz is limited to 25mW per 3kHz.

11.2. Measurement Equipment Used:

Refer to section 11.2.

11.3. Test Setup:

Refer to section 11.3.

11.4. Test Procedure:

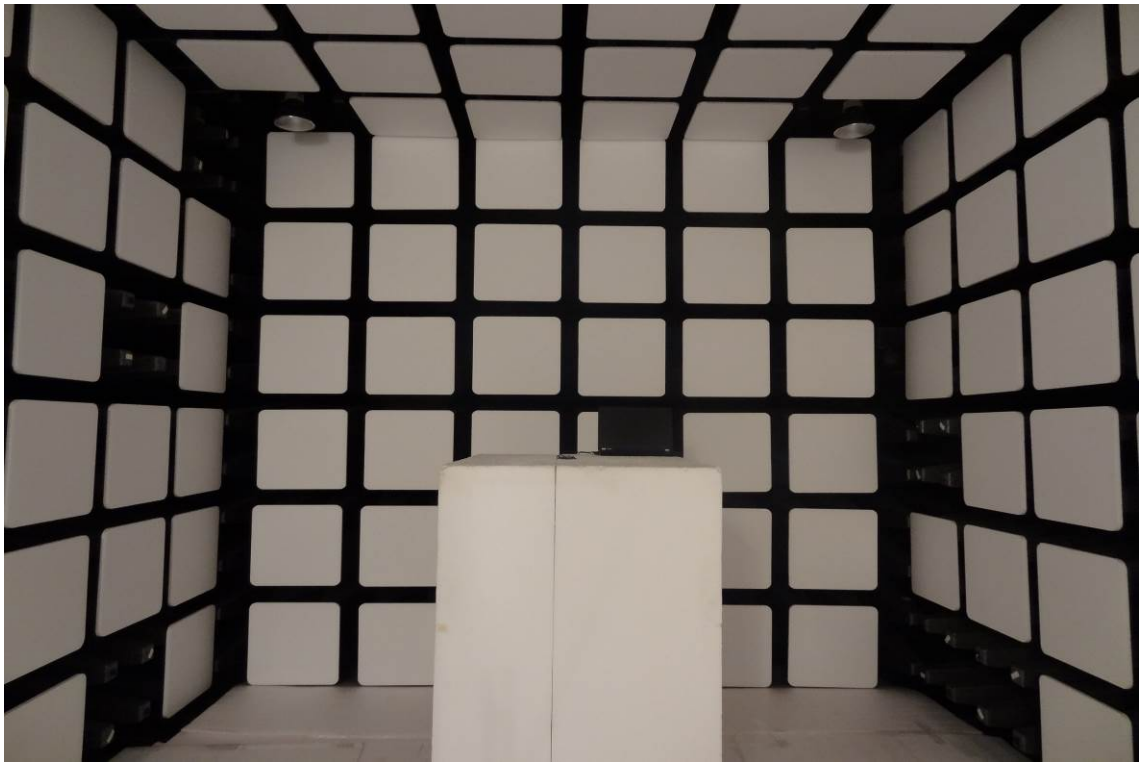
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 1.5MHz, Sweep=100s, Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

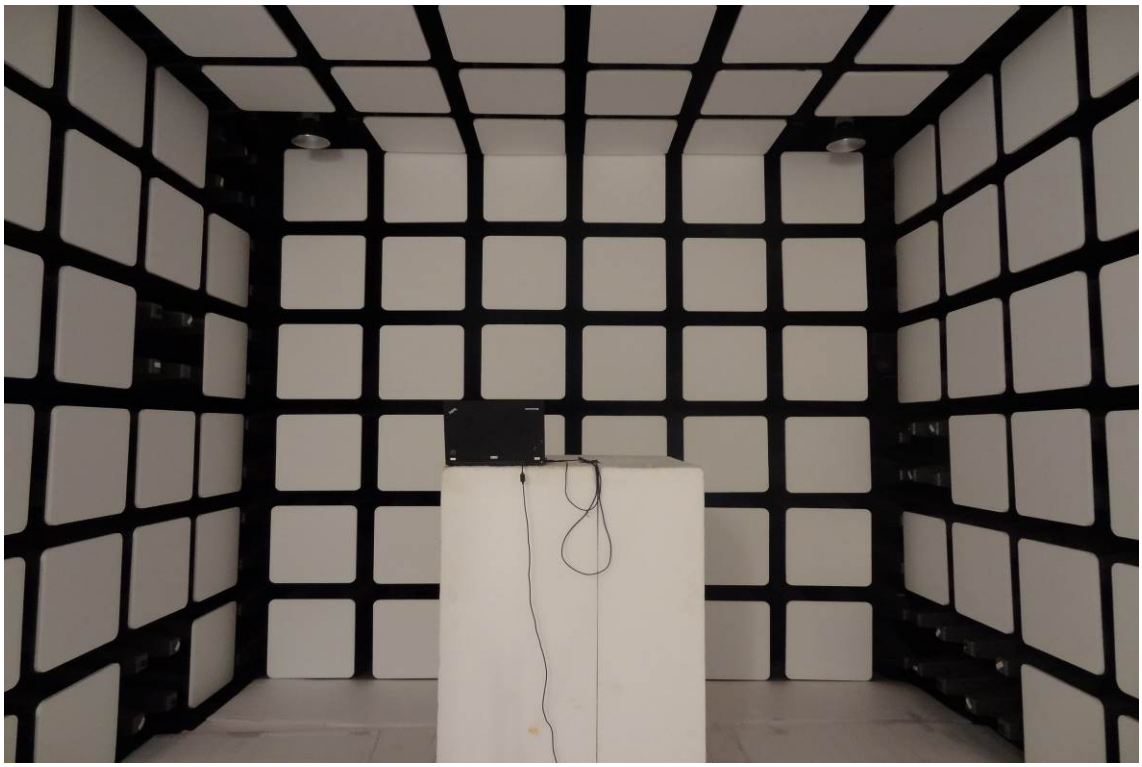
11.5. Measurement Result:

BT BLE mode

Frequency	Power Density	Maximum Limit
MHz	Level (dBm)/3kHz	(dBm)
Low	7.64	13.97
Mid	7.36	13.97
High	7.46	13.97

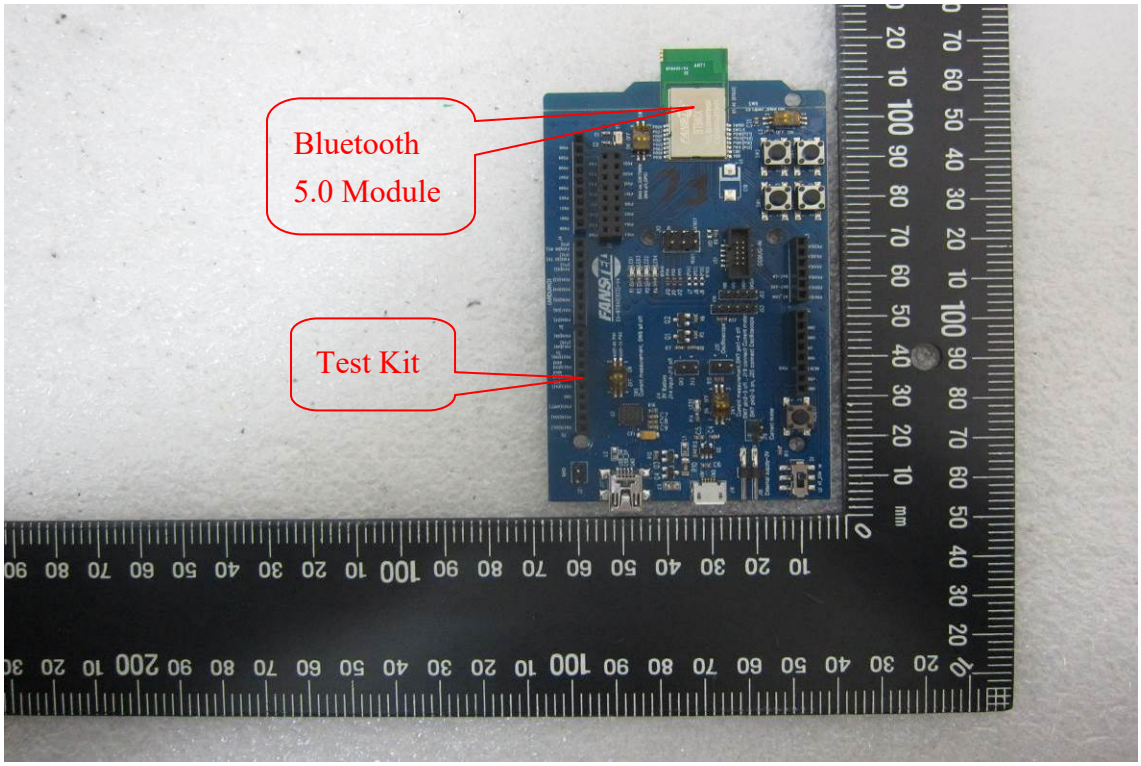
Appendix 1
Photographs of Test Setup



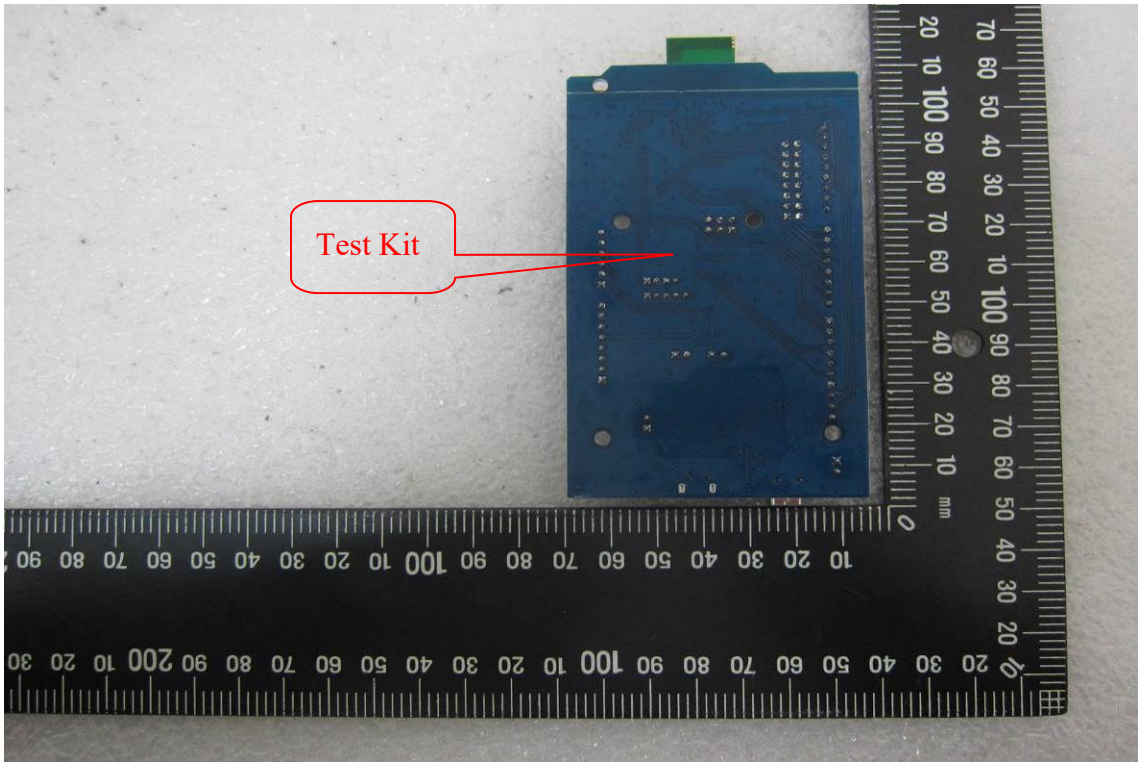


Appendix 2
Photographs of EUT

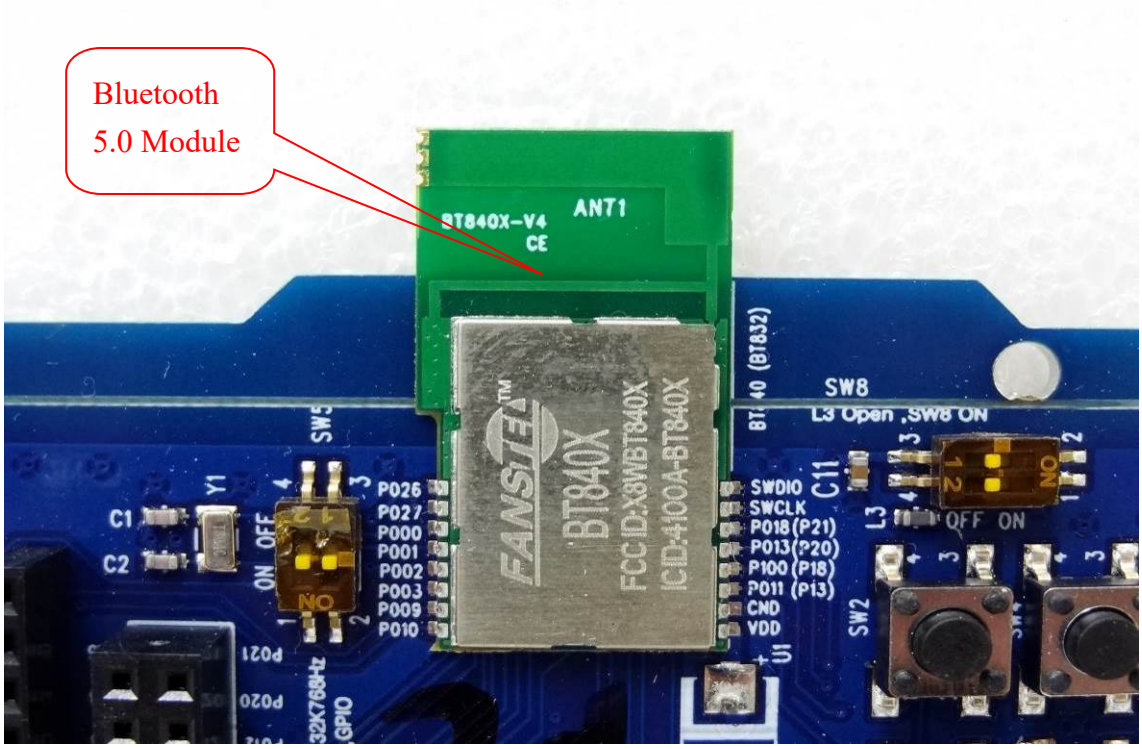
EUT 1



EUT 2



EUT 3 BT840X



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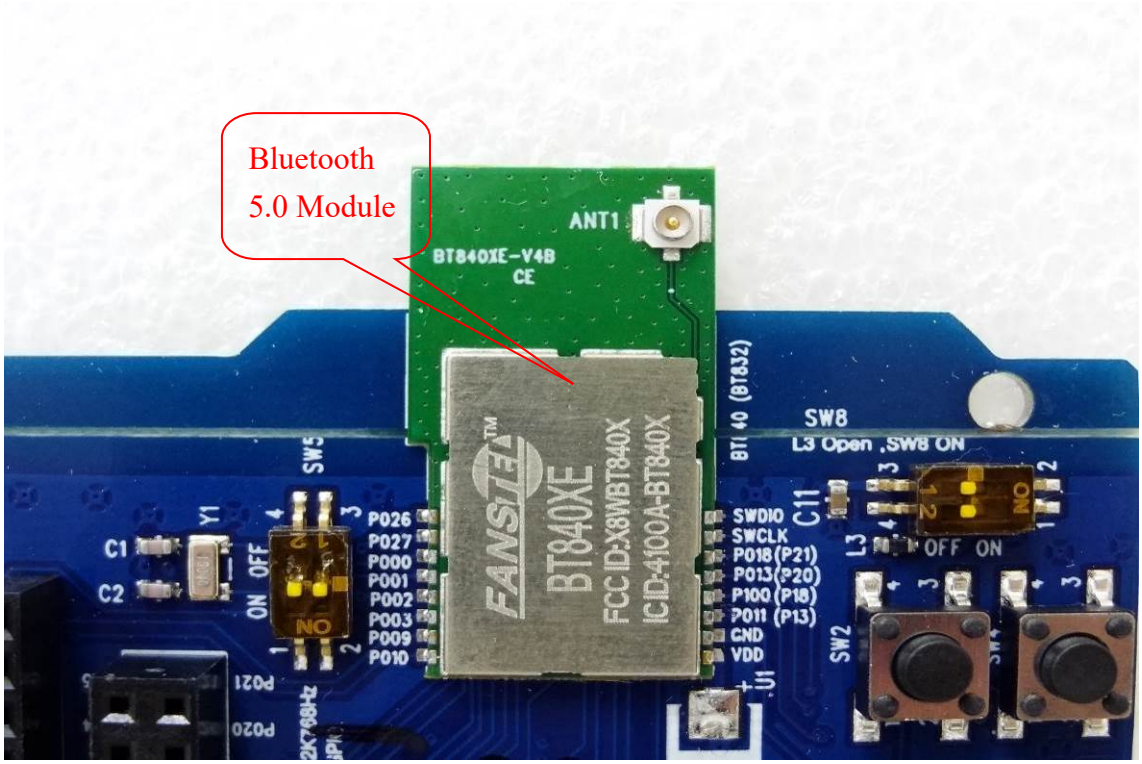
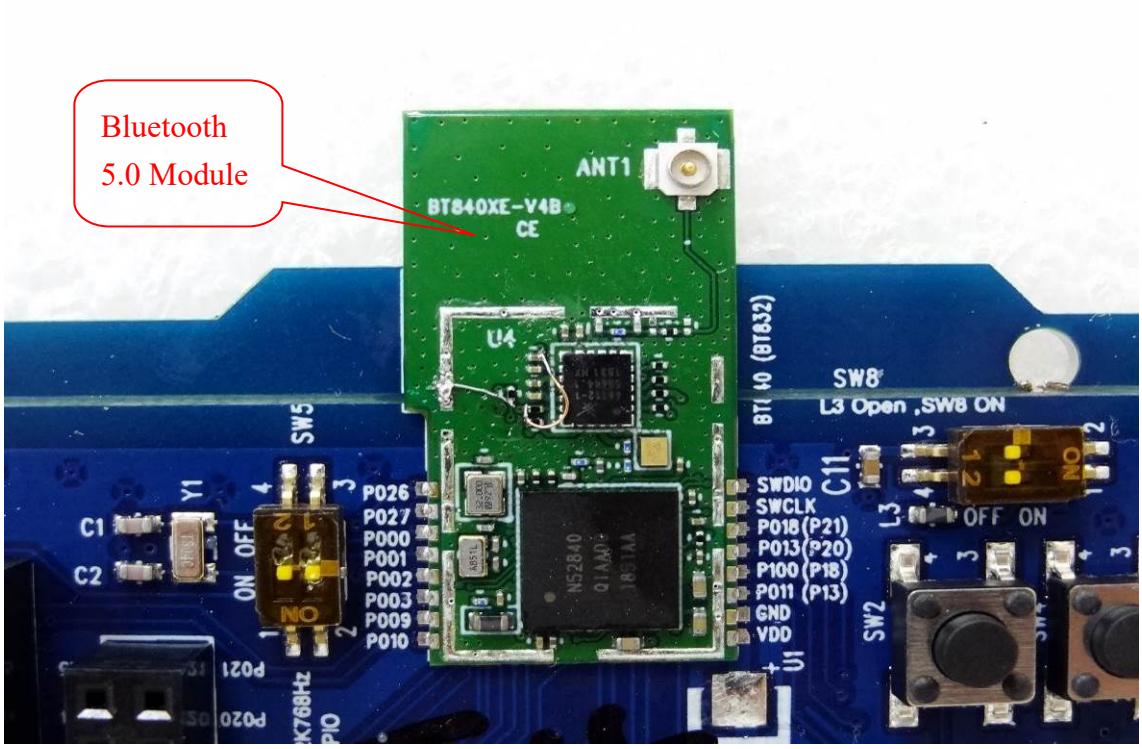


EUT 5 BT840XE



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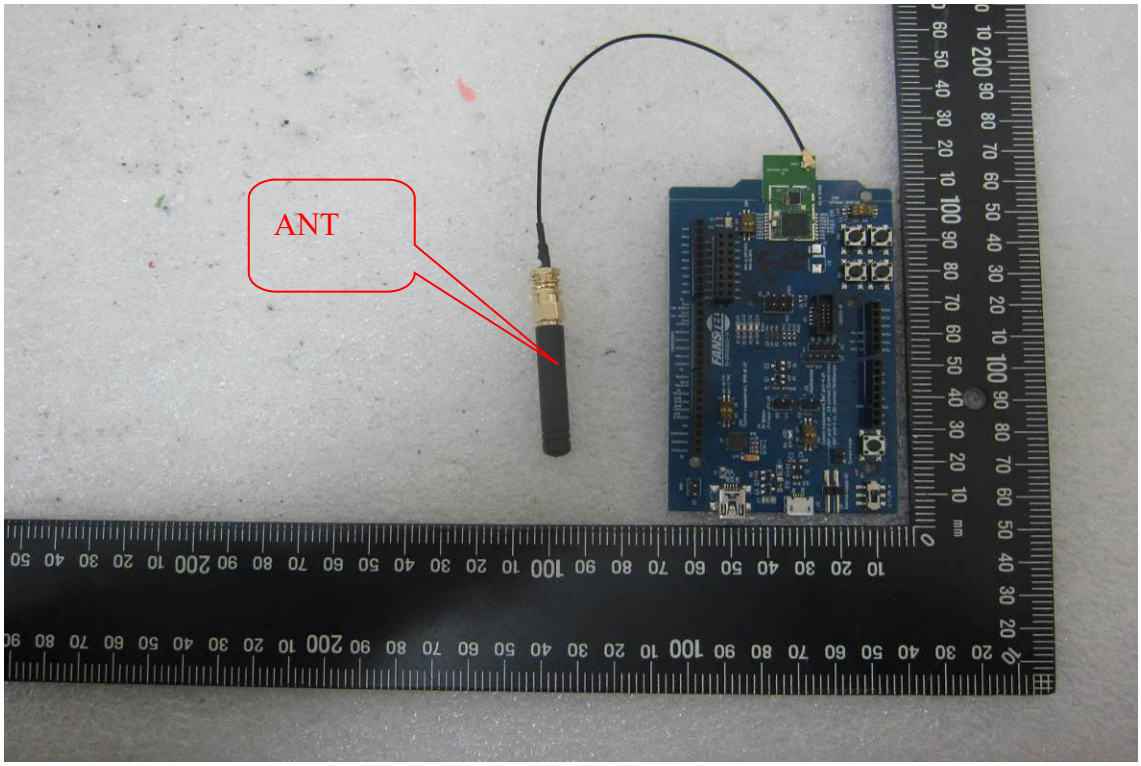
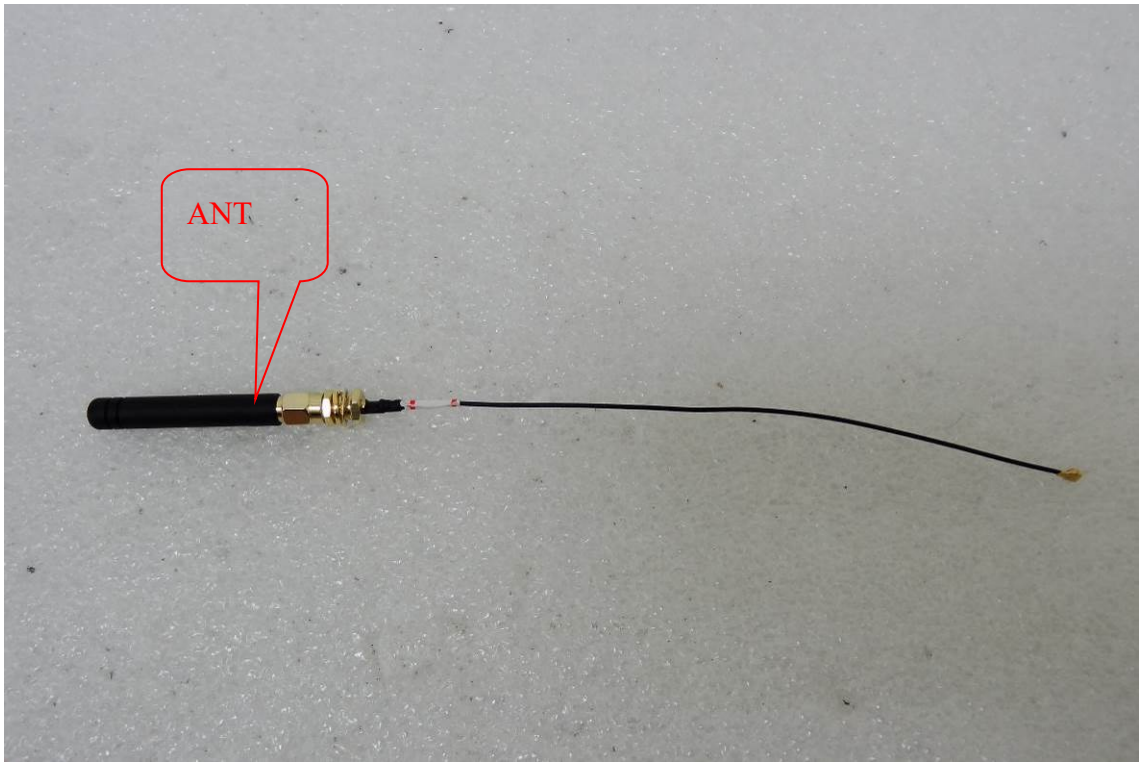
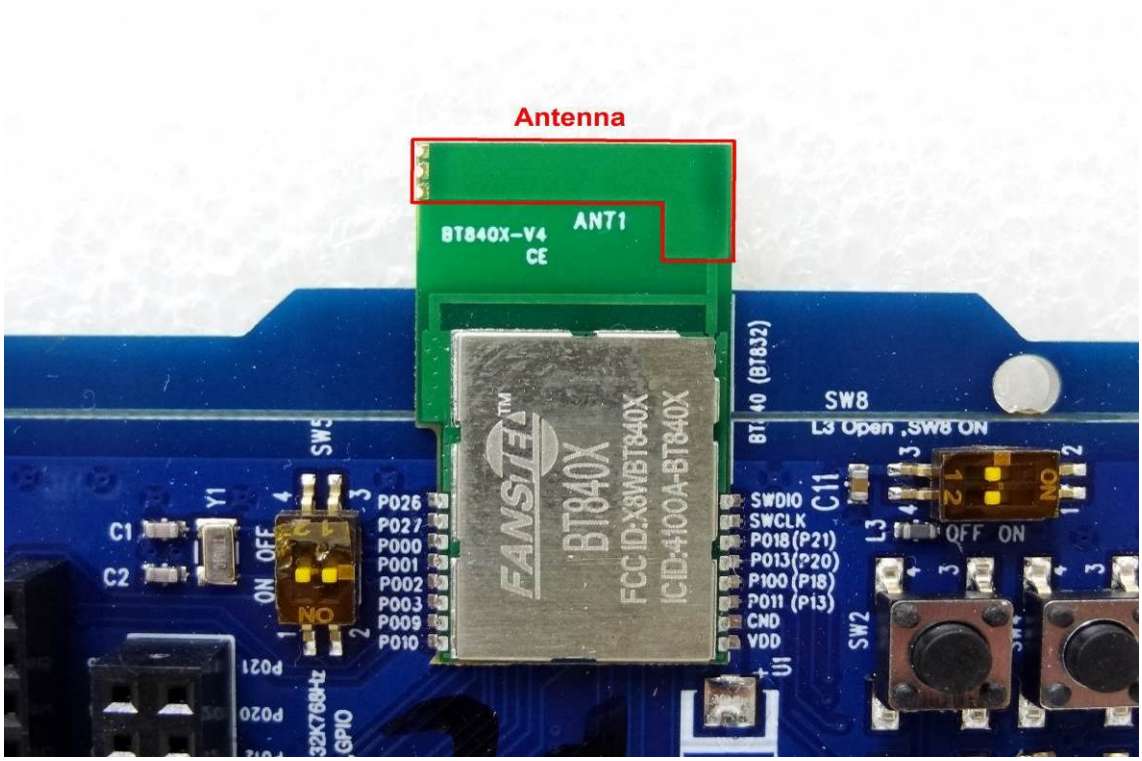


EUT 7 BT840XE



EUT 8 BT840X



~ End of Report ~