CE RADIO TEST REPORT

Equipment	:	**CC2651R3SIPA SimpleLink™ Multiprotocol 2.4-GHz Wireless System-in-Package Module with Integrated Antenna & 352-KB Memory**
Brand Name	:	**Texas Instruments**
Model Name	:	**CC2651R3SIPAT0MOUR**
Marketing Name	:	**CC2651R3SIPA SimpleLink™ Multiprotocol 2.4-GHz Wireless System-in-Package Module with Integrated Antenna & 352-KB Memory**
Applicant	:	**Texas Instruments Incorporated 12500 TI BLVD., Dallas, Texas, 75243**
Manufacturer	:	**Texas Instruments Incorporated 12500 TI BLVD., Dallas, Texas, 75243**
Standard	:	**ETSI EN 300 328 V2.2.2 (2019-07)**

The product was received on Apr. 26, 2022, and testing was performed from May 02, 2022 to Jun. 03, 2022. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ETSI EN 300 328 V2.2.2 (2019-07), and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory
No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issue Date
ER242614	01	Initial issue of report	Jul. 15, 2022

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	4.3.1.2 4.3.2.2	Maximum Transmit Power	PASS	-
3.2	4.3.2.3	Maximum Equivalent Isotropically Radiated Power (E.I.R.P.) Spectral Density	PASS	Only applicable for modulations other than FHSS
3.3	4.3.1.8 4.3.2.7	Occupied Channel Bandwidth	PASS	-
-	4.3.1.4 4.3.1.5	Frequency Hopping Requirements	Not Required	Only applicable for FHSS
3.4	4.3.1.9 4.3.2.8	Transmitter spurious emissions in OOB	PASS	-
3.5	4.3.1.10 4.3.2.9	Transmitter spurious emissions	PASS	6.26 dB under the limit at 12672.000 MHz for Bluetooth – LE Mode 6.20 dB under the limit at 12516.000 MHz for Zigbee Mode
4.1	4.3.1.11 4.3.2.10	Receiver spurious emissions	PASS	6.71 dB under the limit at 12585.500 MHz for Bluetooth – LE Mode 6.55 dB under the limit at 12667.750 MHz for Zigbee Mode
-	4.3.1.7 4.3.2.6	Adaptivity	Not Required	Only applicable for adaptive equipment Output Power >10dBm
4.2	4.3.1.12 4.3.2.11	Receiver Blocking	PASS	-

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	4.3.1.3 4.3.2.4	Duty cycle, Tx-Sequence, Tx-gap	Not Required	Only applicable for non-adaptive equipment Output Power >10dBm
-	4.3.1.6 4.3.2.5	Medium Utilisation (MU) factor	Not Required	
Note: Not required means after assessing, test items are not necessary to carry out.				

Declaration of Conformity:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results. 2. The measurement uncertainty please refer to this report "Uncertainty Evaluation".
Comments and Explanations:
The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Danny Lee

Report Producer: Ruby Zou

1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth LE (125 kbps, 500 kbps, 1Mbps, 2Mbps) and Zigbee (OQPSK DSSS1:8, 250 kbps)

Antenna Information				
	Brand	**Antenna Type**	**Model**	**2.4 GHz Gain**
1	Texas Instruments	Inverted F - PCB	Custom Antenna	3.3 dBi
2		CC2651R3SIPA integrated antenna – PCB	Custom Antenna	1.5 dBi
3	Ethertronics	Dipole	1000423	-0.6dBi
4	LSR	Rubber Whip / Dipole	001-0012	2dBi
5			080-0013	2dBi
6			080-0014	2dBi
7		PIFA	001-0016	2.5dBi
8			001-0021	2.5dBi
9	Laird	PCB	CAF94504	2dBi
10			CAF9405	2dBi
11	Pulse	Ceramic Chip	W3006	3.2dBi
12	ACX	Multilayer Chip	AT3216-BR2R7HAA	0.5dBi
13			AT312-T2R4PAA	1.5dBi
14	TDK	Multilayer Ceramic Chip Antenna	ANT016008LCD2442MA1	1.6dBi
15			ANT016008LCD2442MA2	2.5dBi
16	Mitsubishi Material	Chip Antenna	AM03DP-ST01	1.6dBi
17		Antenna Unit	UB18CP-100ST01	-1.0dBi
18	Taiyo Yuden	Chip Antenna / Helical Monopole	AF216M245001	1.5dBi
19		Chip Antenna /Monopole Type	AH212M245001	1.3dBi
20			AH316M245001	1.9dBi
21	Antenna Technology	Dipole	AA2402SPU	2.0dBi
22			AA2402RSPU	2.0dBi
23			AA2402A-UFLLP	2.0dBi
24			AA2402AU-UFLLP	2.0dBi

Antenna Information				
	Brand	Antenna Type	Model	2.4 GHz Gain
25	Staf	Mono-pole	1019-016	2.14dBi
26			1019-017	2.14dBi
27			1019-018	2.14dBi
28			1019-019	2.14dBi
29	Map Electronics	Rubber Whip	MEIWX-2411SAXX-2400	2.0dBi
30			MEIWX-2411RSXX-2400	2.0dBi
31			MEIWX-282XSAXX-2400	2.0dBi
32			MEIWX-282XRSXX-2400	2.0dBi
33			MEIWF-HP01RS2X-2400	2.0dBi
34	Yageo	Chip	ANT3216A063R2400A	1.69dBi
35	Mag Layers Scientific	Chip	LTA-3216-2G4S3-A1	1dBi
36			LTA-3216-2G4S3-A3	2dBi
37	Advantech	Rubber Whip / Dipole	AN2450-5706RS	2.38dBi
38			R-AN2400-5701RS	3.3dBi

Remark:
1. The EUT uses the PCB antenna from Texas Instruments (Antenna #2)
2. The EUT's information above is declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.2 Modification of EUT

No modifications made to the EUT during the testing.

1.3 Testing Facility

Test Site	Sporton International Inc. Wensan Laboratory			
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855			
Test Site No.	Sporton Site No.			
	TH08-HY	TH05-HY (CSE)	TH05-HY (Conducted)	05CH05-HY
Test Engineer	Louis Chung	Kai Liao	Kai Liao	Star Lo, Yien Chiang and Steven Shu
Temperature (℃)	24-26	21.9~24.8	21~25	20~23
Relative Humidity (%)	45-50	53.7~61.5	51~54	55~65

1.4 Applied Standards

According to the specifications declared by the manufacturer, the EUT must comply with the requirements of ETSI EN 300 328 V2.2.2 (2019-07).

Note: All test items were verified and recorded according to the standards and without any deviation during the test.

1.5 Test Condition

Normal Voltage	DC 3.3V
Normal Temperature	25℃
Extreme Temperature	-40℃ and 85℃

Note: The product operating temperature range per the manufacture is -40 ˚C to 105 ˚C.

Extreme temperature was performed between -40 ˚C and 85 ˚C due to test facility limitations.

This does not affect modular certification when the host is operating temperature above 85 ˚C because the output power would be slightly lower when operating at higher temperature range, therefore the tested temperature would represent the worst case and show the compliance.

2 Test Configuration of Equipment under Test

2.1 Descriptions of Test Mode

a. During testing, the interface cables and equipment positions were varied according to ETSI EN 300 328 V2.2.2 (2019-07).
b. The complete test system included EUT for RF test.
c. Preliminary tests were checked in different data rate and recorded worse in the following tables:

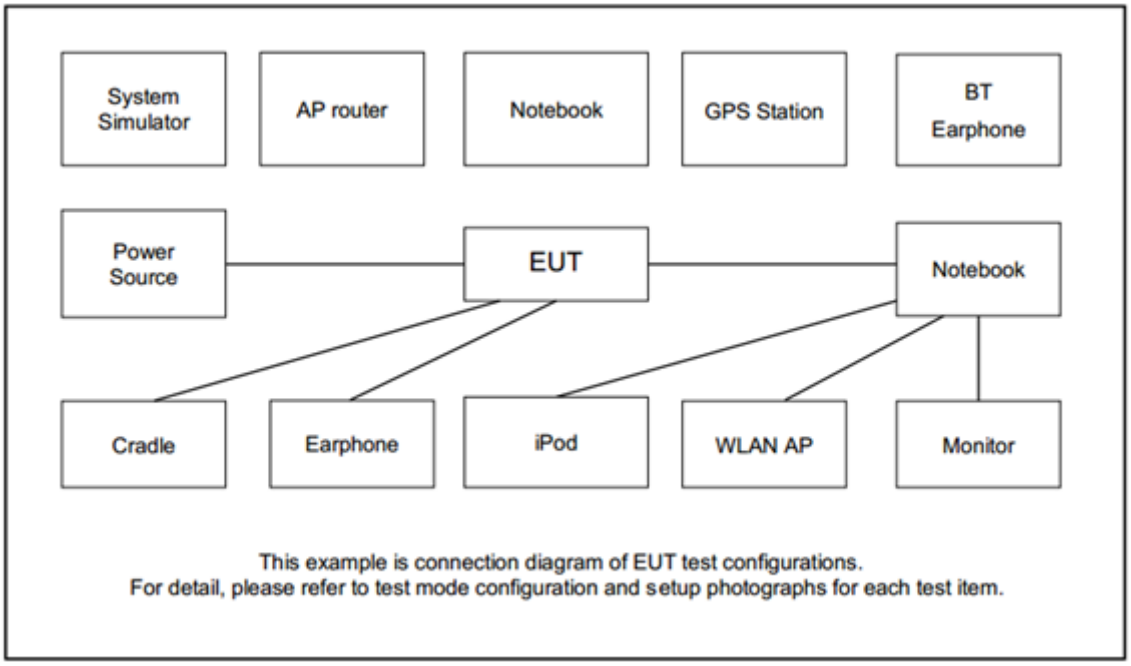
The following tables for radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

Test Modes			
RF	**Zigbee O-QPSK**	**Bluetooth – LE 1Mbps (GFSK)**	**Bluetooth – LE 2Mbps (GFSK)**
Tx	Zigbee CH11 (2405MHz) Zigbee CH26 (2480MHz)	CH00 (2402MHz) CH39 (2480MHz)	CH00 (2402MHz) CH39 (2480MHz)
Rx	Zigbee CH26 (2480MHz)	CH00 (2402MHz)	-

<CSE>

Test Modes			
RF	**Zigbee O-QPSK**	**Bluetooth – LE 1Mbps (GFSK)**	**Bluetooth – LE 2Mbps (GFSK)**
Tx	Zigbee CH11 (2405MHz) Zigbee CH26 (2480MHz)	CH00 (2402MHz) CH39 (2480MHz)	CH00 (2402MHz) CH39 (2480MHz)
Rx	Zigbee CH26 (2480MHz)	CH39 (2480MHz)	-

2.2 Connection Diagram of Test System



2.3 Supported Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Acer	P246	N/A	N/A	AC I/P: Shielded, 1.8m DC O/P: Unshielded, 1.2m

2.4 EUT Operation Test Setup

The RF utility, “SmartRF Studio 7” was installed in the notebook in order to make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

3 Transmitter Parameters

3.1 Maximum Transmit Power

3.1.1 Limit of Effective Isotropic Radiated Power

SUBCLAUSE 4.3.1.2.3 and 4.3.2.2.3	
TEST CONDITION	**LIMIT**
Normal and Extreme Temperature Conditions	20dBm (e.i.r.p)

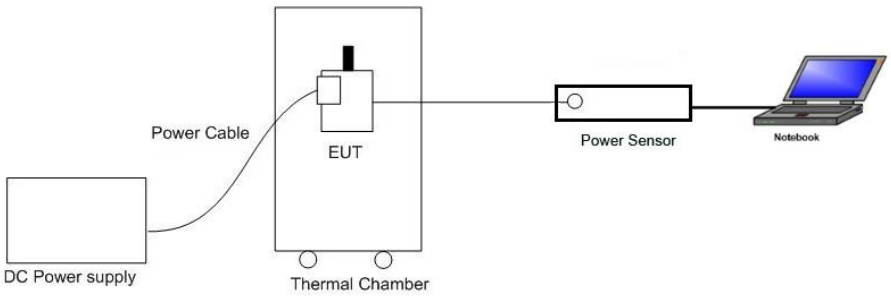
3.1.2 Measuring Instruments

Please refer to the measuring equipment list in the section 6 of this test report.

3.1.3 Test Procedure

1. The measurement procedure follows the clause 5.4.2.2.1 of the ETSI EN 300 328 V2.2.2 (2019-07).
2. Place the EUT in thermal chamber.
3. The EUT is connected to external power supply.
4. Setting thermal chamber temperature and power supply voltage at suitable values.
5. The EIRP = A+G+Y, where A is the power measured, G is the assembly gain of the individual antenna of the EUT in dBi and Y is the additional beamforming gain of the EUT in dB if applicable, here, Y=0.
6. The measurement duration is at least 1 second to ensure a minimum number of bursts (at least 10) are captured.

3.1.4 Test Setup



3.1.5 Test Results

Please refer to Appendix A.

3.2 Maximum Equivalent Isotropically Radiated Power (E.I.R.P.) Spectral Density

3.2.1 Limit of Maximum Power Spectral Density

SUBCLAUSE 4.3.2.3.3	
TEST CONDITION	**LIMIT**
Normal and Extreme Temperature Conditions	10dBm / MHz

Remark: Maximum spectral power density is not applicable to FHSS system device.

3.2.2 Measuring Instruments

Please refer to the measuring equipment list in the section 6 of this test report.

3.2.3 Test Procedure

1. The measurement procedure follows the clause 5.4.3.2.1 of the ETSI EN 300 328 V2.2.2 (2019-07).
2. These measurements shall only be performed at normal test conditions.
3. The measurement shall be repeated for the equipment being configured to operate at the lowest, the middle, and the highest frequency of the stated frequency range.
4. The test procedure shall be as follows:

   Step 1:

   Connect the EUT to the spectrum analyzer and use the following settings:

Start Frequency	2400MHz
Stop Frequency	2483.5MHz
Resolution BW	10kHz
Video BW	30kHz
Sweep Points	8350
Detector	RMS
Trace Mode	Max Hold
Sweep time	10 sec

   Step 2:

   Add up the values for amplitude (power) for all the samples in the file.

   Step 3:

   Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.) measured.

   Step 4:

   Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 5:

Shift the start point of the samples added up in step 4 by 1 sample and repeat the procedure in step 4 (i.e. sample #2 to #101).

Step 6:

Repeat step 5 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments.

From all the recorded results, the highest value is the maximum Power Spectral Density for the EUT. This value shall be recorded in the test report.

3.2.4 Test Setup

3.2.5 Test Results

Please refer to Appendix A.

3.3 Occupied Channel Bandwidth

3.3.1 Limit of Occupied Channel Bandwidth

Occupied Channel Bandwidth fall completely within 2.4 GHz – 2.4835 GHz

3.3.2 Measuring Instruments

Please refer to the measuring equipment list in the section 6 of this test report.

3.3.3 Test Procedure

1. The measurement procedure follows the clause 5.4.7.2.1 of the ETSI EN 300 328 V2.2.2 (2019-07).
2. The measurement shall be performed only on the lowest and the highest frequency within the stated frequency range.
3. The test procedure shall be as follows:

Step 1:

Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	Channel under test
Resolution BW	1 % of the span
Video BW	3 × RBW
Frequency Span	2 × Nominal Channel Bandwidth
Detector	RMS
Trace Mode	Max Hold
Sweep Time	1 s

Step 2:

Wait until the trace is completed.

Find the peak value of the trace and place the analyzer marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the EUT.

3.3.4 Test Setup

3.3.5 Test Results

Please refer to Appendix A.

3.4 Transmitter unwanted emissions in the out-of-band domain

3.4.1 Transmitter unwanted emissions in the out-of-band domain limit

out-of-band domain limit

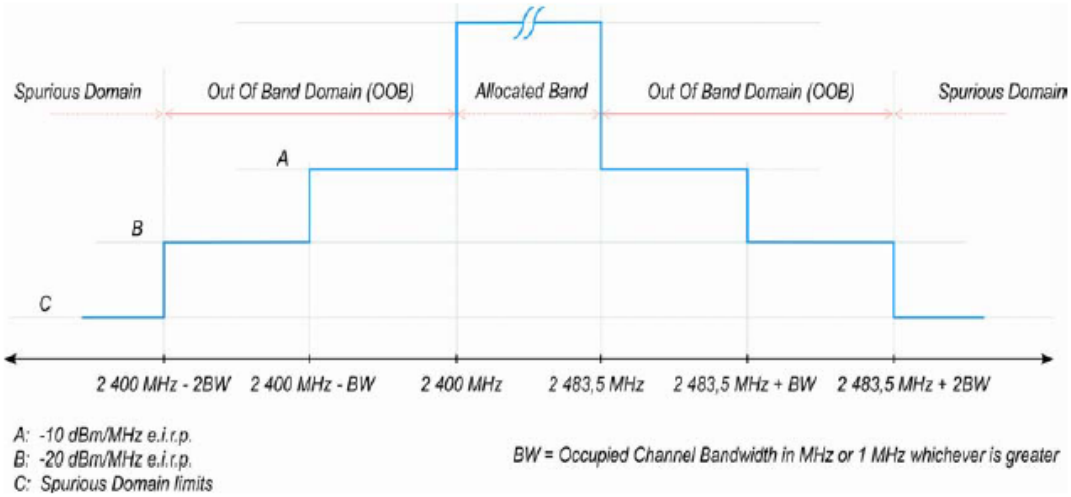


Figure 1: Transmit mask

3.4.2 Measuring Instruments

Please refer to the measuring equipment list in the section 6 of this test report.

3.4.3 Test Procedures

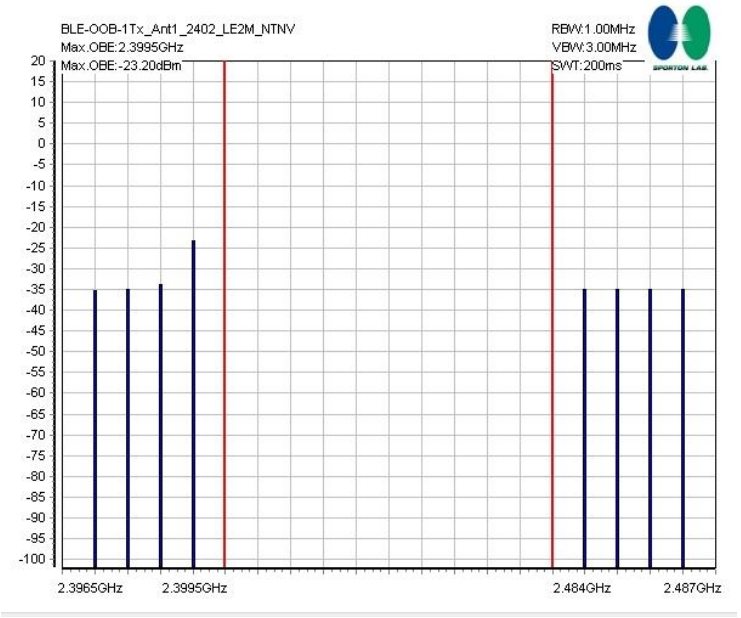
1. The measurement procedure follows the clause 5.4.8.2.1 of the ETSI EN 300 328 V2.2.2 (2019-07).
2. These measurements shall only be performed at normal test conditions.
3. For conducted measurements on devices with multiple transmit chains using the results for each of the transmit chains for the corresponding 1 MHz segments shall be added and compared with the transmit mask limit.

3.4.4 Test Setup

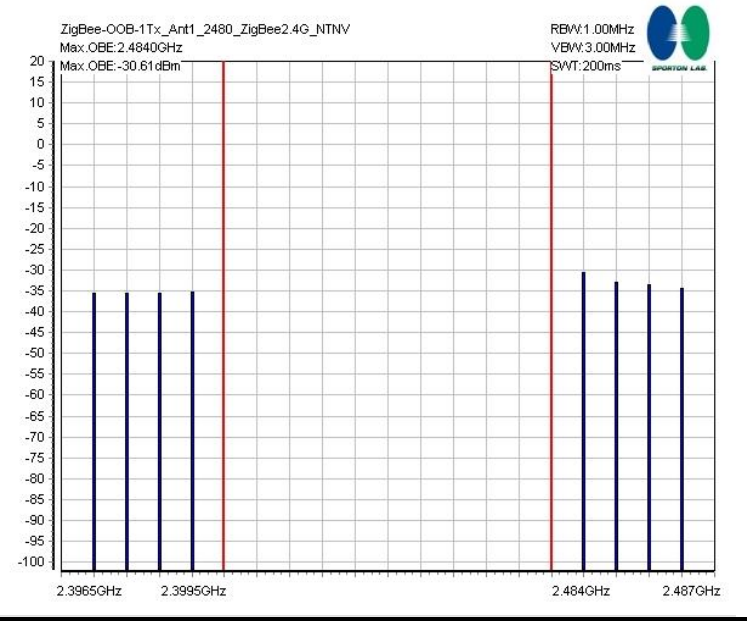
3.4.5 Test Results

Please refer to Appendix A.

Bluetooth – LE OOB worse case



Zigbee OOB worse case



3.5 Transmitter spurious emissions

3.5.1 Limit of Transmitter spurious emissions

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

SUBCLAUSE 4.3.1.10.3 and 4.3.2.9.3		
FREQUENCY RANGE	**MAXIMUM POWER**	**BANDWIDTH**
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 694 MHz	-54 dBm	100 kHz
694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

3.5.2 Measuring Instruments

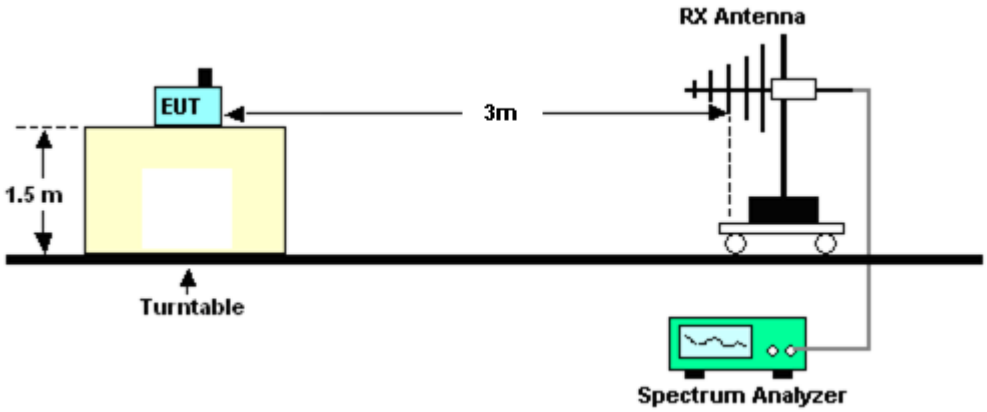
Please refer to the measuring equipment list in the section 6 of this test report.

3.5.3 Test Procedures

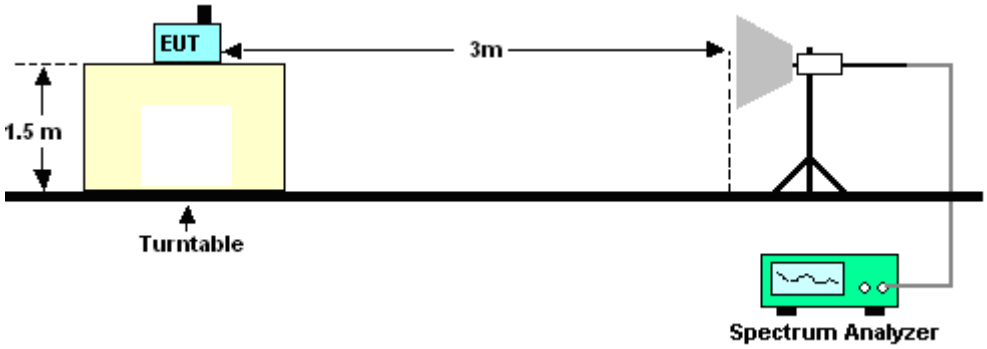
1. The measurement procedure follows the clause 5.4.9.2.2 of the ETSI EN 300 328 V2.2.2 (2019-07).
2. The EUT is placed on a turntable with 1.5m height.
3. The test distance between the receiving antenna and the EUT is 3 meter below 1GHz frequency range, and 3 meter which is in far field test condition for measured frequency above 1GHz, while the receiving (test) antenna is kept at 1.5 meter height.
4. Set EUT in continuous transmitting with maximum output power.
5. The table is rotated from 0 to 360 degree to search the highest radiated emission.
6. Repeating step 3 and 4 for each polarization and channel to find the worst emission level.
7. The results obtained are compared to the limits in order to prove compliance with the requirement.

3.5.4 Test Setup

<Below 1GHz>



<Above 1GHz>



3.5.5 Test Results

Please refer to Appendix B.

4 Receiver Parameters

4.1 Receiver spurious emissions

4.1.1 Limit of Receiver spurious emissions

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

SUBCLAUSE 4.3.1.11.3 and 4.3.2.10.3		
FREQUENCY RANGE	**MAXIMUM POWER**	**BANDWIDTH**
30 MHz to 1 GHz	-57 dBm	100kHz
1 GHz to 12,75 GHz	-47 dBm	1MHz

4.1.2 Measuring Instruments

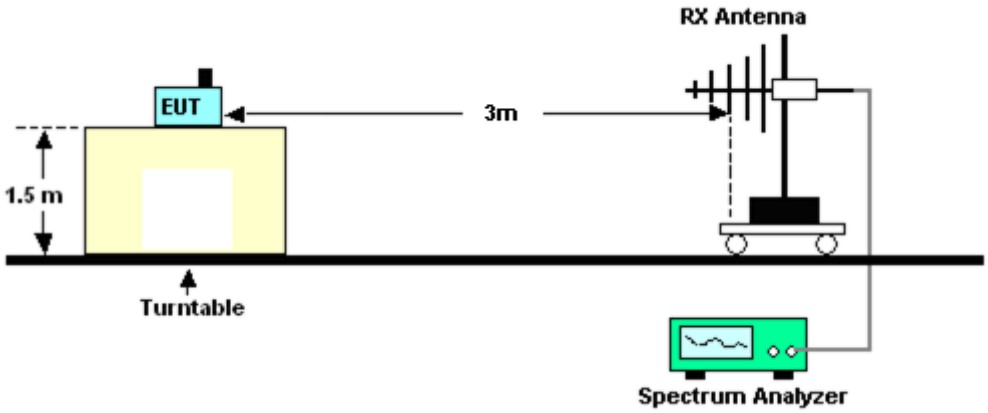
Please refer to the measuring equipment list in the section 6 of this test report.

4.1.3 Test Procedures

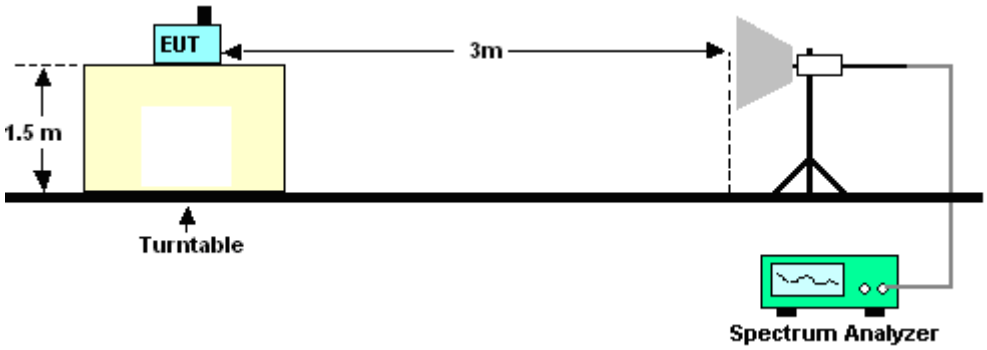
1. The measurement procedure follows the clause 5.4.10.2.2 of the ETSI EN 300 328 V2.2.2 (2019-07).
2. The EUT is placed on a turntable with 1.5m height.
3. The test distance between the receiving antenna and the EUT is 3 meter below 1GHz frequency range, and 3 meter which is in far field test condition for measured frequency above 1GHz, while the receiving (test) antenna is kept at 1.5 meter height.
4. Set EUT in receiving mode.
5. The table is rotated from 0 to 360 degree to search the highest radiated emission.
6. Repeating step 3 and 4 for each polarization and channel to find the worst emission level.
7. The results obtained are compared to the limits in order to prove compliance with the requirement.

4.1.4 Test Setup

<Below 1GHz>



<Above 1GHz>



4.1.5 Test Results

Please refer to Appendix B.

4.2 Receiver Blocking Test

4.2.1 Limit of Receiver Blocking Test

The minimum performance criterion shall be a PER less than or equal to 10%.

Receiver category 1

1. Adaptive equipment with maximum RF output power > 10dBm e.i.r.p.

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × $\log_{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × $\log_{10}$(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.

NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Receiver category 2

1. Non-adaptive equipment with MU 1% ~ 10%
2. Adaptive equipment with Maximum RF output power < 10dBm e.i.r.p.

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Receiver category 3

1. Non-adaptive equipment with MU < 1%
2. Adaptive equipment with Maximum RF output power < 0dBm e.i.r.p.

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative the test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

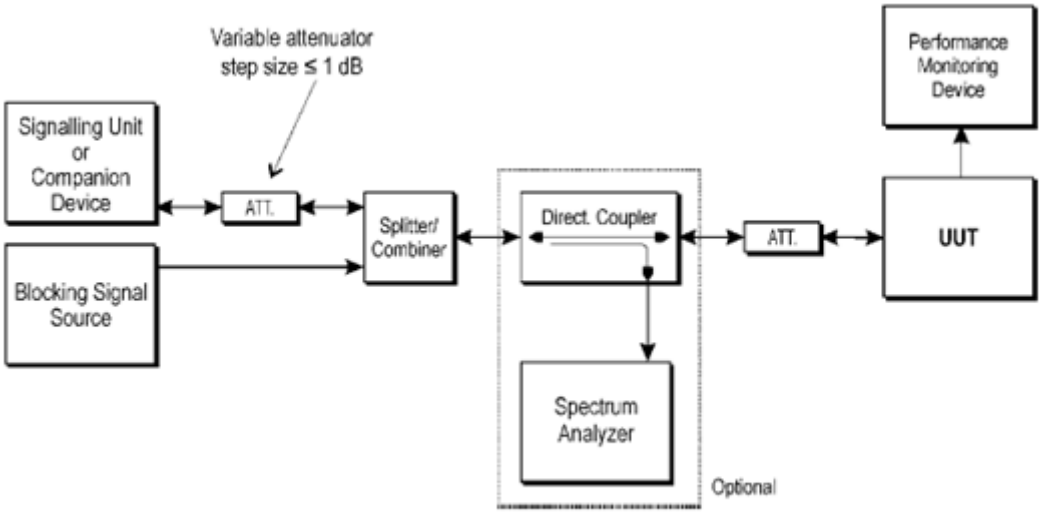
4.2.2 Measuring Instruments

Please refer to the measuring equipment list in the section 6 of this test report.

4.2.3 Test Procedures

1. The measurement procedure follows the clause 5.4.11.2.1 of the ETSI EN 300 328 V2.2.2 (2019-07).
2. For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.
3. For non-FHSS equipment, having more than one operating channel, the operating channels on which the testing has to be performed shall be selected as follows:
   For testing blocking frequencies less than 2400 MHz, the equipment shall operate on the lowest operating channel.
   For testing blocking frequencies greater than 2500 MHz, the equipment shall operate on the highest operating channel.
4. Both the wanted and blocking signals are adjusted by the in-band antenna gain.

4.2.4 Test Setup



Test Set-up for receiver blocking

4.2.5 Test Results of Receiver Blocking

Mode	Receiver category
BLE 1M	2
BLE 2M	2
Zigbee	2

Bluetooth BLE Channel 00				
Wanted signal From companion	Wanted signal to be tested (dBm)	Blocking signal Frequency(MHz)	Blocking signal Power(dBm)	PER (%)
(-139 dBm + 10 × log10(OCBW) + 10) or (-74 dBm + 10) whichever is less	-69 dBm (-139 dBm + 10 × log10(OCBW of 1MHz) + 10 = -69dBm < -64dBm)	2380	-34	0.22
		2300	-34	0.67

Bluetooth BLE Channel 39				
Wanted signal From companion	Wanted signal to be tested (dBm)	Blocking signal Frequency(MHz)	Blocking signal Power(dBm)	PER (%)
(-139 dBm + 10 × log10(OCBW) + 10) or (-74 dBm + 10) whichever is less	-69 dBm (-139 dBm + 10 × log10(OCBW of 1MHz) + 10 = -69dBm < -64dBm)	2504	-34	2.22
		2584	-34	1.56

Bluetooth BLE 2M Channel 00				
Wanted signal From companion	Wanted signal to be tested (dBm)	Blocking signal Frequency(MHz)	Blocking signal Power(dBm)	PER (%)
(-139 dBm + 10 × log10(OCBW) + 10) or (-74 dBm + 10) whichever is less	-65.99 dBm (-139 dBm + 10 × log10(OCBW of 2MHz) + 10 = -65.99dBm < -64dBm)	2380	-34	0.67
		2300	-34	0.67

Bluetooth BLE 2M Channel 39				
Wanted signal From companion	Wanted signal to be tested (dBm)	Blocking signal Frequency(MHz)	Blocking signal Power(dBm)	PER (%)
(-139 dBm + 10 × log10(OCBW) + 10) or (-74 dBm + 10) whichever is less	-65.99 dBm (-139 dBm + 10 × log10(OCBW of 2MHz) + 10 = -65.99dBm < -64dBm)	2504	-34	1.11
		2584	-34	0.22

Zigbee Channel 11				
Wanted signal From companion	Wanted signal to be tested (dBm)	Blocking signal Frequency(MHz)	Blocking signal Power(dBm)	PER (%)
(-139 dBm + 10 × log10(OCBW)+10) or -74 dBm+10 whichever is less	-64 dBm (-139 dBm + 10 × log10(OCBW of 5MHz) + 10 = -62.01dBm > -64dBm)	2380	-34	0
		2300	-34	0

Zigbee Channel 26				
Wanted signal From companion	Wanted signal to be tested (dBm)	Blocking signal Frequency(MHz)	Blocking signal Power(dBm)	PER (%)
(-139 dBm + 10 × log10(OCBW)+10) or -74 dBm+10 whichever is less	-64 dBm (-139 dBm + 10 × log10(OCBW of 5MHz) + 10 = -62.01dBm > -64dBm)	2504	-34	0
		2584	-34	0

5 Geo-location Capability

5.1 Geo-location

5.1.1 Definition and Requirement

Geo-location capability is a feature of the equipment to determine its geographical location with the purpose to configure itself according to the regulatory requirements applicable at the geographical location where it operates.

The geo-location capability may be present in the equipment or in an external device (temporary) associated with the equipment operating at the same geographical location during the initial power up of the equipment. The geographical location may also be available in equipment already installed and operating at the same geographical location.

The geographical location determined by the equipment shall not be accessible to the user.

5.1.2 Description

Manufacturer shall implement the requirement for marketing units when this function is supported.

6 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Sensor	DARE	RPR3006W	16I00054SNO 10 (NO:131)	10MHz~6GHz	Dec. 16, 2021	May 02, 2022~ May 04, 2022	Dec. 15, 2022	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz~40GHz	Aug. 30, 2021	May 02, 2022~ May 04, 2022	Aug. 29, 2022	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-40℃ ~90℃	Sep. 09, 2021	May 02, 2022~ May 04, 2022	Sep. 08, 2022	Conducted (TH05-HY)
Switch Control Mainframe	E-IUSTRUMENT	ETF-1405-0	EC1900067 (BOX7)	N/A	Aug. 12, 2021	May 02, 2022~ May 04, 2022	Aug. 11, 2022	Conducted (TH05-HY)
Spectrum Analyzer	ROHDE & SCHWARZ	FSV40	101565	10Hz~40GHz	Dec. 29, 2021	May 31, 2022~ Jun. 03, 2022	Dec. 28, 2022	CSE (TH05-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 10, 2022	May 31, 2022~ Jun. 03, 2022	Mar. 09, 2023	CSE (TH05-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 10, 2021	May 31, 2022~ Jun. 03, 2022	Dec. 09, 2022	CSE (TH05-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 21, 2022	May 31, 2022~ Jun. 03, 2022	Feb. 20, 2023	CSE (TH05-HY)
Filter	Wainwright	WLKS1200-12 SS	SN2	1.2GHz Low Pass Filter	Mar. 15, 2022	May 31, 2022~ Jun. 03, 2022	Mar. 14, 2023	CSE (TH05-HY)
Filter	Wainwright	WHKX12-2700 -3000-18000-6 0ST	SN2	3GHz High Pass Filter	Jul. 12, 2021	May 31, 2022~ Jun. 03, 2022	Jul. 11, 2022	CSE (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP7	101131	9kHz~7GHz	Aug. 19, 2021	May 16, 2022	Aug. 18, 2022	RX Blocking (TH08-HY)
Base Station	Rohde & Schwarz	CMW270	102370	N/A	Jul. 11, 2021	May 16, 2022	Jul. 10, 2022	RX Blocking (TH08-HY)
Base Station	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	Dec. 08, 2021	May 16, 2022	Dec. 07, 2022	RX Blocking (TH08-HY)
Bilog Antenna	Teseq GmbH	CBL6112D	35379	30MHz~2GHz	Oct. 09, 2021	May 06, 2022~ May 07, 2022	Oct. 08, 2022	Radiation (05CH05-HY)
Double Ridge Horn Antenna	ESCO	3117	00066583	1GHz~18GHz	Sep. 27, 2021	May 06, 2022~ May 07, 2022	Sep. 26, 2022	Radiation (05CH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV3044	101249	10Hz~44GHz	Dec. 16, 2021	May 06, 2022~ May 07, 2022	Dec. 15, 2022	Radiation (05CH05-HY)
Preamplifier	COM-POWER	PAM-103	18020178	1MHz-1GHz	Feb. 07, 2022	May 06, 2022~ May 07, 2022	Feb. 06, 2023	Radiation (05CH05-HY)
Preamplifier	EM Electronics	EM01G18G	060805	1GHz-18GHz	Jul. 26, 2021	May 06, 2022~ May 07, 2022	Jul. 25, 2022	Radiation (05CH05-HY)
Antenna Mast	ChainTek	MD-200	1308055	1m~4m	N/A	May 06, 2022~ May 07, 2022	N/A	Radiation (05CH05-HY)
Turn Table	EMEC	TT 2000	N/A	0-360 degree	N/A	May 06, 2022~ May 07, 2022	N/A	Radiation (05CH05-HY)
Test Software	Audix E3	6.2009-8-24	RK-000992	N/A	N/A	May 06, 2022~ May 07, 2022	N/A	Radiation (05CH05-HY)

Note: Test equipment calibration is traceable to the procedure of ISO17025.

7 Uncertainty Evaluation

Test Item	Uncertainty
Occupied Channel Bandwidth	±3.9*10^{-7} MHz
RF output power, conducted	±0.690 dB
Power density, conducted	±0.345 dB
Radiated emissions	±3.28 dB
Temperature	±0.694 °C
Humidity	±3.528 %
Time	±0.002 ms

Appendix A. Test Result of Conducted Test Items

Test Engineer	Kai Liao	Temperature	21~25	°C
Test Date	2022/05/02 ~ 2022/05/04	Relative Humidity	51~54	%

Report Number : ER242614

TEST RESULTS DATA
EIRP Power

Conducted Power (dBm)													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Temperature Normal		Extreme Temperature Low		Extreme Temperature High		Gain (dBi)	
					25 °C		-40 °C		85 °C			
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
BLE	1Mbps	1	0	2402	4.30	-	4.40	-	4.00	-	3.30	-
BLE	1Mbps	1	19	2440	4.40	-	4.50	-	4.00	-	3.30	-
BLE	1Mbps	1	39	2480	4.20	-	4.50	-	4.00	-	3.30	-
BLE	2Mbps	1	0	2402	4.30	-	4.40	-	4.00	-	3.30	-
BLE	2Mbps	1	19	2440	4.40	-	4.60	-	4.00	-	3.30	-
BLE	2Mbps	1	39	2480	4.20	-	4.50	-	4.00	-	3.30	-
Zigbee	250kbps	1	11	2405	4.30	-	4.40	-	3.90	-	3.30	-
Zigbee	250kbps	1	18	2440	4.40	-	4.50	-	3.90	-	3.30	-
Zigbee	250kbps	1	26	2480	4.20	-	4.50	-	3.90	-	3.30	-

EIRP Power (dBm)												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Temperature Normal		Extreme Temperature Low		Extreme Temperature High		Limit (dBm)	Pass/Fail
					25 °C		-40 °C		85 °C			
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2		
BLE	1Mbps	1	0	2402	7.60	-	7.70	-	7.30	-	20	Pass
BLE	1Mbps	1	19	2440	7.70	-	7.80	-	7.30	-	20	Pass
BLE	1Mbps	1	39	2480	7.50	-	7.80	-	7.30	-	20	Pass
BLE	2Mbps	1	0	2402	7.60	-	7.70	-	7.30	-	20	Pass
BLE	2Mbps	1	19	2440	7.70	-	7.90	-	7.30	-	20	Pass
BLE	2Mbps	1	39	2480	7.50	-	7.80	-	7.30	-	20	Pass
Zigbee	250kbps	1	11	2405	7.60	-	7.70	-	7.20	-	20	Pass
Zigbee	250kbps	1	18	2440	7.70	-	7.80	-	7.20	-	20	Pass
Zigbee	250kbps	1	26	2480	7.50	-	7.80	-	7.20	-	20	Pass

Report Number : ER242614

TEST RESULTS DATA
EIRP Power Density

Power Density								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	EIRP Power Density (dBm/MHz)		Limit (dBm /MHz)	Pass/Fail
					Ant 1	Ant 2		
BLE	1Mbps	1	0	2402	7.52	-	10	Pass
BLE	1Mbps	1	19	2440	7.61	-	10	Pass
BLE	1Mbps	1	39	2480	7.41	-	10	Pass
BLE	2Mbps	1	0	2402	6.48	-	10	Pass
BLE	2Mbps	1	19	2440	6.46	-	10	Pass
BLE	2Mbps	1	39	2480	6.31	-	10	Pass
Zigbee	250kbps	1	11	2405	5.69	-	10	Pass
Zigbee	250kbps	1	18	2440	5.82	-	10	Pass
Zigbee	250kbps	1	26	2480	5.54	-	10	Pass

Report Number : ER242614

TEST RESULTS DATA
99% Occupied Bandwidth

Occupied Bandwidth												
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	99% Occupied BW (MHz)		Freq. Low (MHz)		Freq. High (MHz)		Limit (Within operating Band)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2		
BLE	1Mbps	1	0	2402	1.09	-	2401.49	-	2402.58	-		Pass
BLE	1Mbps	1	39	2480	1.09	-	2479.49	-	2480.58	-		Pass
BLE	2Mbps	1	0	2402	2.06	-	2401.00	-	2403.06	-		Pass
BLE	2Mbps	1	39	2480	2.09	-	2478.99	-	2481.08	-		Pass
Zigbee	250kbps	1	11	2405	2.58	-	2403.75	-	2406.33	-		Pass
Zigbee	250kbps	1	26	2480	2.60	-	2478.74	-	2481.34	-		Pass

Report Number : ER242614

TEST RESULTS DATA
OOB Emission Level

Mod.	Data Rate	NTX	CH.	Freq. (MHz)	OOB Emission Worst Level (dBm/MHz)		Limit (dBm /MHz)	Pass/Fail
					Ant 1	Ant 2		
BLE	1Mbps	1	0	2402	-33.15	-	-10,-20	Pass
BLE	1Mbps	1	39	2480	-34.64	-	-10,-20	Pass
BLE	2Mbps	1	0	2402	-23.20	-	-10,-20	Pass
BLE	2Mbps	1	39	2480	-34.08	-	-10,-20	Pass
Zigbee	250kbps	1	11	2405	-33.63	-	-10,-20	Pass
Zigbee	250kbps	1	26	2480	-30.61	-	-10,-20	Pass

Appendix B. Radiated Spurious Emission Plots

BLE TX Cabinet Radiated Spurious Emission Plots

<1Mbps>

2.4GHz 2400~2483.5MHz

BLE

<table>
<tr><th>BLE</th><th colspan="2">2.4GHz 2400~2483.5MHz</th></tr>
<tr><th></th><th colspan="2">BLE CH00 2402MHz</th></tr>
<tr><th></th><th>Horizontal</th><th>Vertical</th></tr>
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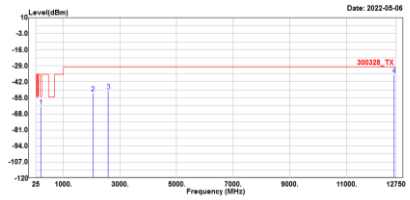

Site : 05CH05-HY
Condition: 300328_TX HORIZONTAL
Power : From System
Project : ER 242614
Mode : 1
Plane : X
<table>
<tr><th>Result</th><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit Line</th><th>Read Level</th><th>Factor</th><th>Pol/Phase</th></tr>
<tr><td></td><td>MHz</td><td>dBm</td><td>dB</td><td>dBm</td><td>dBm</td><td>dB</td><td></td></tr>
<tr><td>1</td><td>199.53</td><td>-62.01</td><td>-8.01</td><td>-54.00</td><td>-47.26</td><td>-14.75</td><td>HORIZONTAL</td></tr>
<tr><td>2</td><td>2042.00</td><td>-51.21</td><td>-21.21</td><td>-30.00</td><td>-59.04</td><td>7.83</td><td>HORIZONTAL</td></tr>
<tr><td>3</td><td>2578.00</td><td>-49.46</td><td>-19.46</td><td>-30.00</td><td>-58.94</td><td>9.48</td><td>HORIZONTAL</td></tr>
<tr><td>4 @</td><td>12672.00</td><td>-36.26</td><td>-6.26</td><td>-30.00</td><td>-65.02</td><td>28.76</td><td>HORIZONTAL</td></tr>
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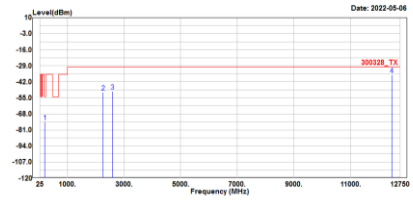

Site : 05CH05-HY
Condition: 300328_TX VERTICAL
Power : From System
Project : ER 242614
Mode : 1
Plane : X
<table>
<tr><th>Result</th><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit Line</th><th>Read Level</th><th>Factor</th><th>Pol/Phase</th></tr>
<tr><td></td><td>MHz</td><td>dBm</td><td>dB</td><td>dBm</td><td>dBm</td><td>dB</td><td></td></tr>
<tr><td>1</td><td>199.53</td><td>-74.48</td><td>-20.48</td><td>-54.00</td><td>-53.20</td><td>-21.28</td><td>VERTICAL</td></tr>
<tr><td>2</td><td>2256.00</td><td>-50.30</td><td>-20.30</td><td>-30.00</td><td>-58.76</td><td>8.46</td><td>VERTICAL</td></tr>
<tr><td>3</td><td>2592.00</td><td>-49.71</td><td>-19.71</td><td>-30.00</td><td>-58.92</td><td>9.21</td><td>VERTICAL</td></tr>
<tr><td>4 @</td><td>12447.75</td><td>-36.37</td><td>-6.37</td><td>-30.00</td><td>-64.53</td><td>28.16</td><td>VERTICAL</td></tr>
</table>
</td></tr>
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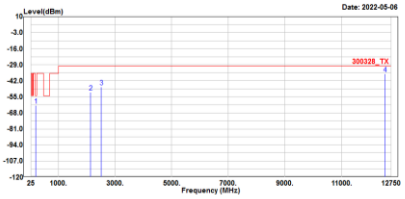
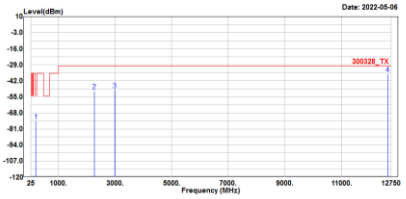
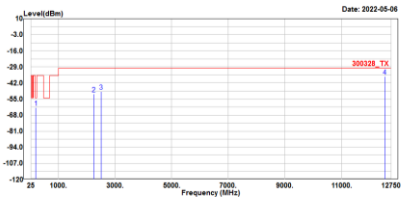
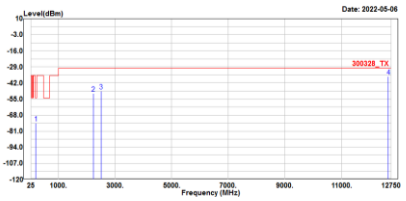
BLE	2.4GHz 2400~2483.5MHz	
	BLE CH39 2480MHz	
	Horizontal	Vertical
TX	 Site : 05CH05-HY Condition: 300328_TX HORIZONTAL Power : From System Project : ER 242614 Mode : 2 Plane : X Result / Freq / Level / Over Limit / Limit Line / Read Level / Factor / Pol/Phase MHz / dBm / dB / dBm / dBm / dB 1 199.53 -61.76 -7.76 -54.00 -47.01 -14.75 HORIZONTAL 2 2134.00 -51.26 -21.26 -30.00 -59.12 7.86 HORIZONTAL 3 2512.00 -46.99 -16.99 -30.00 -56.53 9.54 HORIZONTAL 4 @ 12525.75 -36.45 -6.45 -30.00 -64.98 28.53 HORIZONTAL	 Site : 05CH05-HY Condition: 300328_TX VERTICAL Power : From System Project : ER 242614 Mode : 2 Plane : X Result / Freq / Level / Over Limit / Limit Line / Read Level / Factor / Pol/Phase MHz / dBm / dB / dBm / dBm / dB 1 199.53 -74.32 -20.32 -54.00 -53.04 -21.28 VERTICAL 2 2262.00 -49.90 -19.90 -30.00 -58.37 8.47 VERTICAL 3 2984.00 -49.46 -19.46 -30.00 -59.79 10.33 VERTICAL 4 @ 12623.25 -36.31 -6.31 -30.00 -65.10 28.79 VERTICAL

<2Mbps>

2.4GHz 2400~2483.5MHz

BLE

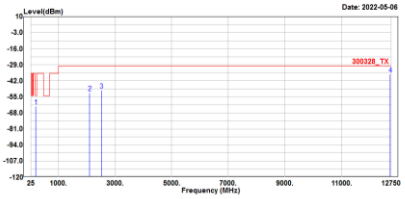
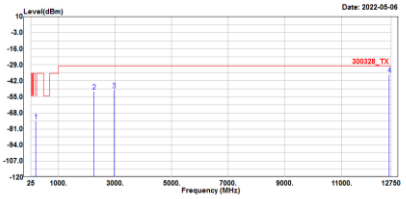
BLE	2.4GHz 2400~2483.5MHz	
	BLE CH00 2402MHz	
	Horizontal	Vertical
TX		

Site : 05CH05-HY
Condition: 300328_TX HORIZONTAL
Power : From System
Project : ER 242614
Mode : 3
Plane : X

Result	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	199.53	-61.67	-7.67	-54.00	-46.92	-14.75	HORIZONTAL
2	2246.00	-50.93	-20.93	-30.00	-58.82	7.89	HORIZONTAL
3	2506.00	-49.08	-19.08	-30.00	-58.64	9.56	HORIZONTAL
4 @	12516.00	-36.55	-6.55	-30.00	-65.07	28.52	HORIZONTAL

Site : 05CH05-HY
Condition: 300328_TX VERTICAL
Power : From System
Project : ER 242614
Mode : 3
Plane : X

Result	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	199.53	-74.51	-20.51	-54.00	-53.23	-21.28	VERTICAL
2	2232.00	-50.38	-20.38	-30.00	-58.80	8.42	VERTICAL
3	2506.00	-48.60	-18.60	-30.00	-58.02	9.42	VERTICAL
4 @	12652.50	-36.71	-6.71	-30.00	-65.55	28.84	VERTICAL

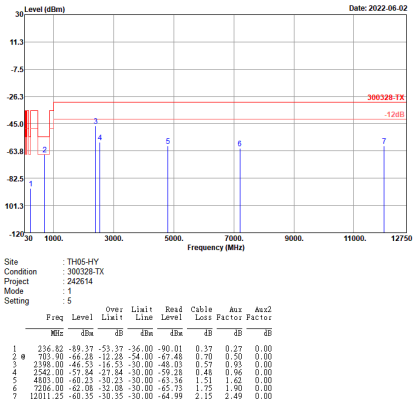
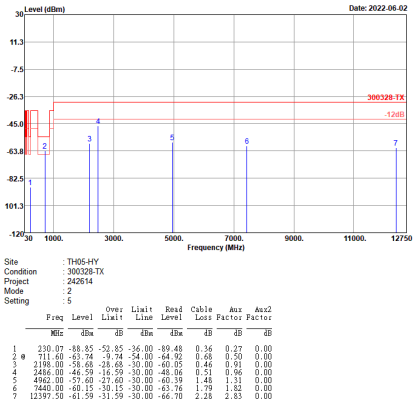
BLE	2.4GHz 2400~2483.5MHz	
	BLE CH39 2480MHz	
	Horizontal	Vertical
TX	 Site : 05CH05-HY Condition: 300328_TX HORIZONTAL Power : From System Project : ER 242614 Mode : 4 Plane : X Result / Freq / Level / Over Limit / Limit Line / Read Level / Factor / Pol/Phase MHz / dBm / dB / dBm / dBm / dB 1 199.53 -62.59 -8.59 -54.00 -47.84 -14.75 HORIZONTAL 2 2102.00 -51.49 -21.49 -30.00 -59.34 7.85 HORIZONTAL 3 2518.00 -49.84 -19.84 -30.00 -59.38 9.54 HORIZONTAL 4 @ 12720.75 -36.63 -6.63 -30.00 -65.46 28.83 HORIZONTAL	 Site : 05CH05-HY Condition: 300328_TX VERTICAL Power : From System Project : ER 242614 Mode : 4 Plane : X Result / Freq / Level / Over Limit / Limit Line / Read Level / Factor / Pol/Phase MHz / dBm / dB / dBm / dBm / dB 1 199.53 -74.24 -20.24 -54.00 -52.96 -21.28 VERTICAL 2 2258.00 -50.49 -20.49 -30.00 -58.95 8.46 VERTICAL 3 2966.00 -49.39 -19.39 -30.00 -59.63 10.24 VERTICAL 4 @ 12681.75 -36.69 -6.69 -30.00 -65.57 28.88 VERTICAL

BLE TX Conducted Spurious Emission Plots

<1Mbps>

2.4GHz 2400~2483.5MHz

BLE

BLE	2.4GHz 2400~2483.5MHz	
	BLE	
	CH00 2402MHz	CH39 2480MHz
TX		

Site : TH05-HY
Condition : 300328-TX
Project : 242614
Mode : 1
Setting : 5

	Freq	Level	Over Limit	Limit Line	Read Level	Cable Loss	Aux Factor	Aux2 Factor
	MHz	dBm	dB	dBm	dBm	dB	dB	dB
1	236.82	-89.37	-53.37	-36.00	-90.01	0.37	0.27	0.00
2 @	703.90	-66.28	-12.28	-54.00	-67.48	0.70	0.50	0.00
3	2198.00	-46.53	-16.53	-30.00	-48.03	0.57	0.93	0.00
4	2542.00	-57.84	-27.84	-30.00	-59.28	0.48	0.96	0.00
5	4803.00	-60.23	-30.23	-30.00	-63.36	1.51	1.62	0.00
6	7206.00	-62.08	-32.08	-30.00	-65.73	1.75	1.90	0.00
7	12011.25	-60.35	-30.35	-30.00	-64.99	2.15	2.49	0.00

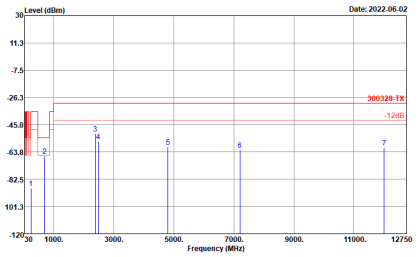
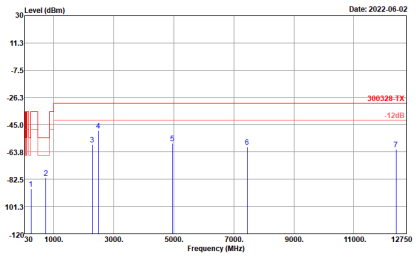
Site : TH05-HY
Condition : 300328-TX
Project : 242614
Mode : 2
Setting : 5

	Freq	Level	Over Limit	Limit Line	Read Level	Cable Loss	Aux Factor	Aux2 Factor
	MHz	dBm	dB	dBm	dBm	dB	dB	dB
1	230.07	-88.85	-52.85	-36.00	-89.48	0.36	0.27	0.00
2 @	711.60	-63.74	-9.74	-54.00	-64.92	0.68	0.50	0.00
3	2198.00	-58.68	-28.68	-30.00	-60.05	0.46	0.91	0.00
4	2486.00	-46.59	-16.59	-30.00	-48.06	0.51	0.96	0.00
5	4962.00	-57.60	-27.60	-30.00	-60.39	1.48	1.31	0.00
6	7440.00	-60.15	-30.15	-30.00	-63.76	1.79	1.82	0.00
7	12397.50	-61.59	-31.59	-30.00	-66.70	2.28	2.83	0.00

<2Mbps>

2.4GHz 2400~2483.5MHz

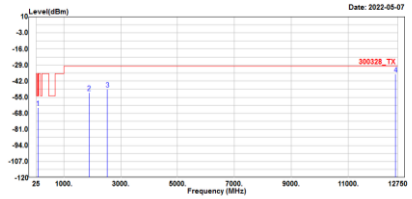
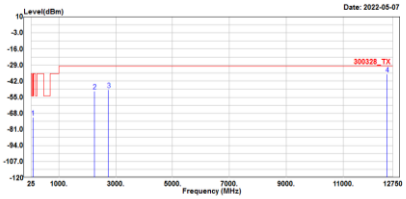
BLE

BLE	2.4GHz 2400~2483.5MHz	
	BLE	
	CH00 2402MHz	CH39 2480MHz
TX	 Site : TH05-HY Condition : 300328-TX Project : 242614 Mode : 3 Setting : 5 Freq Level Over Limit Limit Line Read Level Cable Loss Aux Factor Aux2 Factor MHz dBm dB dBm dBm dB dB dB 1 245.19 -88.60 -52.60 -36.00 -89.25 0.38 0.27 0.00 2 @ 704.60 -66.72 -12.72 -54.00 -67.92 0.70 0.50 0.00 3 2396.00 -51.13 -21.13 -30.00 -52.63 0.57 0.93 0.00 4 2488.00 -56.40 -26.40 -30.00 -57.87 0.51 0.96 0.00 5 4803.00 -60.33 -30.33 -30.00 -63.46 1.51 1.62 0.00 6 7209.00 -62.45 -32.45 -30.00 -66.10 1.75 1.90 0.00 7 12007.50 -60.85 -30.85 -30.00 -65.49 2.15 2.49 0.00	 Site : TH05-HY Condition : 300328-TX Project : 242614 Mode : 4 Setting : 5 Freq Level Over Limit Limit Line Read Level Cable Loss Aux Factor Aux2 Factor MHz dBm dB dBm dBm dB dB dB 1 243.64 -88.96 -52.98 -36.00 -89.62 0.37 0.27 0.00 2 745.90 -81.51 -27.51 -54.00 -82.64 0.68 0.45 0.00 3 2288.00 -58.51 -28.51 -30.00 -59.96 0.50 0.95 0.00 4 @ 2488.00 -48.85 -18.85 -30.00 -50.32 0.51 0.96 0.00 5 4959.00 -57.58 -27.58 -30.00 -60.17 1.48 1.31 0.00 6 7443.00 -60.24 -30.24 -30.00 -63.85 1.79 1.82 0.00 7 12397.50 -61.88 -31.88 -30.00 -66.99 2.28 2.83 0.00

Zigbee TX Cabinet Radiated Spurious Emission Plots

2.4GHz 2400~2483.5MHz

Zigbee

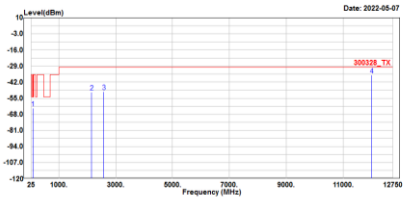
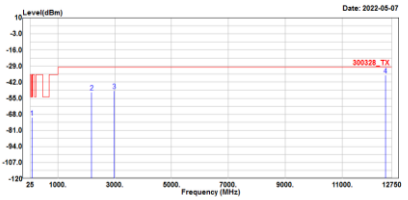
Zigbee	2.4GHz 2400~2483.5MHz	
	Zigbee CH11 2405MHz	
	Horizontal	Vertical
TX		

Site : 05CH05-HY
Condition: 300328_TX HORIZONTAL
Power : From System
Project : ER 242614
Mode : 5
Plane : X

Result	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	91.30	-63.42	-9.42	-54.00	-48.30	-15.12	HORIZONTAL
2	1886.00	-51.11	-21.11	-30.00	-58.38	7.27	HORIZONTAL
3	2530.00	-48.31	-18.31	-30.00	-57.84	9.53	HORIZONTAL
4 @	12662.25	-36.46	-6.46	-30.00	-65.20	28.74	HORIZONTAL

Site : 05CH05-HY
Condition: 300328_TX VERTICAL
Power : From System
Project : ER 242614
Mode : 5
Plane : X

Result	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	91.30	-71.44	-17.44	-54.00	-52.32	-19.12	VERTICAL
2	2260.00	-50.27	-20.27	-30.00	-58.74	8.47	VERTICAL
3	2756.00	-49.08	-19.08	-30.00	-58.30	9.22	VERTICAL
4 @	12545.25	-36.38	-6.38	-30.00	-65.04	28.66	VERTICAL

Zigbee	2.4GHz 2400~2483.5MHz	
	Zigbee CH26 2480MHz	
	Horizontal	Vertical
TX		

Site : 05CH05-HY
Condition: 300328_TX HORIZONTAL
Power : From System
Project : ER 242614
Mode : 6
Plane : X

Result	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	91.30	-62.85	-8.85	-54.00	-47.73	-15.12	HORIZONTAL
2	2158.00	-50.25	-20.25	-30.00	-58.12	7.87	HORIZONTAL
3	2582.00	-49.53	-19.53	-30.00	-59.00	9.47	HORIZONTAL
4 @	11999.25	-36.28	-6.28	-30.00	-61.64	25.36	HORIZONTAL

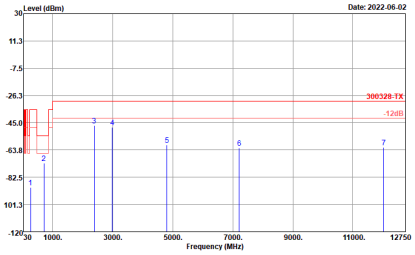
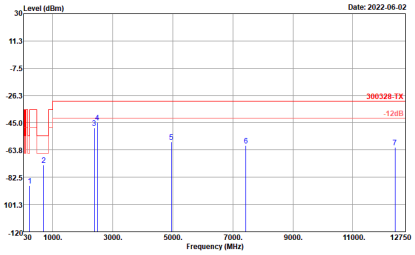
Site : 05CH05-HY
Condition: 300328_TX VERTICAL
Power : From System
Project : ER 242614
Mode : 6
Plane : X

Result	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	91.30	-70.64	-16.64	-54.00	-51.52	-19.12	VERTICAL
2	2186.00	-50.16	-20.16	-30.00	-58.49	8.33	VERTICAL
3	2988.00	-48.76	-18.76	-30.00	-59.12	10.36	VERTICAL
4 @	12516.00	-36.20	-6.20	-30.00	-64.82	28.62	VERTICAL

Zigbee TX Conducted Spurious Emission Plots

2.4GHz 2400~2483.5MHz

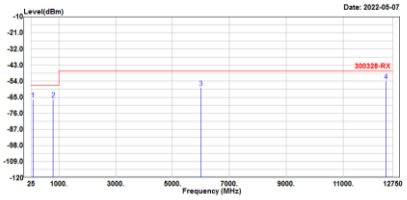
Zigbee

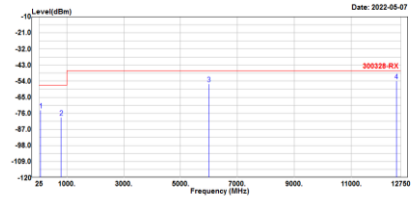
Zigbee	2.4GHz 2400~2483.5MHz	
	Zigbee	
	CH11 2405MHz	CH26 2480MHz
TX	 Site : TH05-HY Condition : 300328-TX Project : 242614 Mode : 5 Setting : 5 Freq Level Over Limit Limit Line Read Level Cable Loss Aux Factor Aux2 Factor MHz dBm dB dBm dBm dB dB dB 1 270.30 -89.32 -53.32 -36.00 -90.00 0.39 0.29 0.00 2 711.60 -72.65 -18.65 -54.00 -73.83 0.68 0.50 0.00 3 @ 2396.00 -46.87 -16.87 -30.00 -48.37 0.57 0.93 0.00 4 2983.00 -47.96 -17.96 -30.00 -49.70 0.63 1.09 0.00 5 4809.00 -60.28 -30.28 -30.00 -63.30 1.52 1.50 0.00 6 7218.00 -62.39 -32.39 -30.00 -66.04 1.75 1.90 0.00 7 12026.25 -62.08 -32.08 -30.00 -66.73 2.16 2.49 0.00	 Site : TH05-HY Condition : 300328-TX Project : 242614 Mode : 6 Setting : 5 Freq Level Over Limit Limit Line Read Level Cable Loss Aux Factor Aux2 Factor MHz dBm dB dBm dBm dB dB dB 1 240.06 -88.38 -52.38 -36.00 -89.02 0.37 0.27 0.00 2 707.40 -73.95 -19.95 -54.00 -75.14 0.69 0.50 0.00 3 2388.00 -48.43 -18.43 -30.00 -49.93 0.57 0.93 0.00 4 @ 2488.00 -44.75 -14.75 -30.00 -46.22 0.51 0.96 0.00 5 4962.00 -57.96 -27.96 -30.00 -60.75 1.48 1.31 0.00 6 7440.00 -60.55 -30.55 -30.00 -64.16 1.79 1.82 0.00 7 12397.50 -61.89 -31.89 -30.00 -67.00 2.28 2.83 0.00

BLE RX Cabinet Radiated Spurious Emission Plots

2.4GHz 2400~2483.5MHz

BLE

<table>
<tr><td>BLE</td><td colspan="2">2.4GHz 2400~2483.5MHz</td></tr>
<tr><td></td><td colspan="2">BLE CH00 2402MHz</td></tr>
<tr><td></td><td>Horizontal</td><td>Vertical</td></tr>
<tr><td>RX</td><td>


Site : 05CH05-HY
Condition: 300328-RX HORIZONTAL
Power : From System
Project : ER 242614
Mode : 7
Plane : X
<table>
<tr><th>Result</th><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit Line</th><th>Read Level</th><th>Factor</th><th>Pol/Phase</th></tr>
<tr><td></td><td>MHz</td><td>dBm</td><td>dB</td><td>dBm</td><td>dBm</td><td>dB</td><td></td></tr>
<tr><td>1</td><td>91.30</td><td>-66.42</td><td>-9.42</td><td>-57.00</td><td>-51.30</td><td>-15.12</td><td>HORIZONTAL</td></tr>
<tr><td>2</td><td>799.15</td><td>-66.35</td><td>-9.35</td><td>-57.00</td><td>-63.36</td><td>-2.99</td><td>HORIZONTAL</td></tr>
<tr><td>3</td><td>5993.75</td><td>-58.36</td><td>-11.36</td><td>-47.00</td><td>-53.17</td><td>-5.19</td><td>HORIZONTAL</td></tr>
<tr><td>4 @</td><td>12503.25</td><td>-53.84</td><td>-6.84</td><td>-47.00</td><td>-56.57</td><td>2.73</td><td>HORIZONTAL</td></tr>
</table>
</td><td>


Site : 05CH05-HY
Condition: 300328-RX VERTICAL
Power : From System
Project : ER 242614
Mode : 7
Plane : X
<table>
<tr><th>Result</th><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit Line</th><th>Read Level</th><th>Factor</th><th>Pol/Phase</th></tr>
<tr><td></td><td>MHz</td><td>dBm</td><td>dB</td><td>dBm</td><td>dBm</td><td>dB</td><td></td></tr>
<tr><td>1</td><td>78.63</td><td>-73.66</td><td>-16.66</td><td>-57.00</td><td>-51.72</td><td>-21.94</td><td>VERTICAL</td></tr>
<tr><td>2</td><td>799.15</td><td>-78.69</td><td>-21.69</td><td>-57.00</td><td>-68.56</td><td>-10.13</td><td>VERTICAL</td></tr>
<tr><td>3</td><td>5993.75</td><td>-55.69</td><td>-8.69</td><td>-47.00</td><td>-50.67</td><td>-5.02</td><td>VERTICAL</td></tr>
<tr><td>4 @</td><td>12585.50</td><td>-53.71</td><td>-6.71</td><td>-47.00</td><td>-56.43</td><td>2.72</td><td>VERTICAL</td></tr>
</table>
</td></tr>
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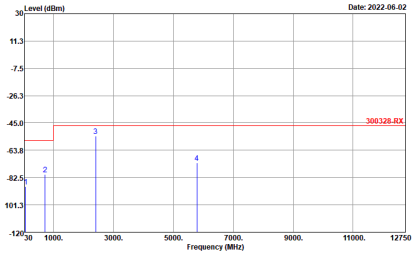
BLE RX Conducted Spurious Emission Plots

2.4GHz 2400~2483.5MHz

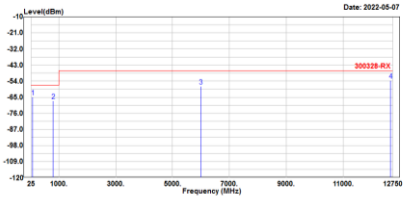
BLE

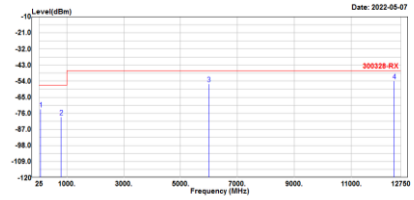
BLE	2.4GHz 2400~2483.5MHz	
	BLE	
	CH39 2480MHz	
RX	 Site : TH05-HY Condition : 300328-RX Project : 242614 Mode : 7 Setting : 5 Freq Level Over Limit Limit Line Read Level Cable Loss Ax Factor Aux2 Factor MHz dBm dB dBm dBm dB dB dB 1 76.17 -88.80 -31.80 -57.00 -89.06 0.00 0.26 0.00 2 720.70 -80.22 -23.22 -57.00 -80.69 0.00 0.47 0.00 3 @ 2414.00 -54.08 -7.08 -47.00 -54.76 0.00 0.68 0.00 4 5788.50 -72.46 -25.46 -47.00 -73.61 0.00 1.15 0.00	Left blank

Zigbee RX Cabinet Radiated Spurious Emission Plots

2.4GHz 2400~2483.5MHz

Zigbee

<table>
<tr><td>Zigbee</td><td colspan="2">2.4GHz 2400~2483.5MHz</td></tr>
<tr><td></td><td colspan="2">Zigbee CH26 2480MHz</td></tr>
<tr><td></td><td>Horizontal</td><td>Vertical</td></tr>
<tr><td>RX</td><td>


Site : 05CH05-HY
Condition: 300328-RX HORIZONTAL
Power : From System
Project : ER 242614
Mode : 8
Plane : X
<table>
<tr><th>Result</th><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit Line</th><th>Read Level</th><th>Factor</th><th>Pol/Phase</th></tr>
<tr><td></td><td>MHz</td><td>dBm</td><td>dB</td><td>dBm</td><td>dBm</td><td>dB</td><td></td></tr>
<tr><td>1</td><td>78.63</td><td>-64.88</td><td>-7.88</td><td>-57.00</td><td>-46.40</td><td>-18.48</td><td>HORIZONTAL</td></tr>
<tr><td>2</td><td>799.15</td><td>-67.40</td><td>-10.40</td><td>-57.00</td><td>-64.41</td><td>-2.99</td><td>HORIZONTAL</td></tr>
<tr><td>3</td><td>5993.75</td><td>-57.58</td><td>-10.58</td><td>-47.00</td><td>-52.39</td><td>-5.19</td><td>HORIZONTAL</td></tr>
<tr><td>4 @</td><td>12667.75</td><td>-53.55</td><td>-6.55</td><td>-47.00</td><td>-56.03</td><td>2.48</td><td>HORIZONTAL</td></tr>
</table>
</td><td>


Site : 05CH05-HY
Condition: 300328-RX VERTICAL
Power : From System
Project : ER 242614
Mode : 8
Plane : X
<table>
<tr><th>Result</th><th>Freq</th><th>Level</th><th>Over Limit</th><th>Limit Line</th><th>Read Level</th><th>Factor</th><th>Pol/Phase</th></tr>
<tr><td></td><td>MHz</td><td>dBm</td><td>dB</td><td>dBm</td><td>dBm</td><td>dB</td><td></td></tr>
<tr><td>1</td><td>78.63</td><td>-73.09</td><td>-16.09</td><td>-57.00</td><td>-51.15</td><td>-21.94</td><td>VERTICAL</td></tr>
<tr><td>2</td><td>799.15</td><td>-78.47</td><td>-21.47</td><td>-57.00</td><td>-68.34</td><td>-10.13</td><td>VERTICAL</td></tr>
<tr><td>3</td><td>5993.75</td><td>-55.96</td><td>-8.96</td><td>-47.00</td><td>-50.94</td><td>-5.02</td><td>VERTICAL</td></tr>
<tr><td>4 @</td><td>12515.00</td><td>-53.79</td><td>-6.79</td><td>-47.00</td><td>-56.61</td><td>2.82</td><td>VERTICAL</td></tr>
</table>
</td></tr>
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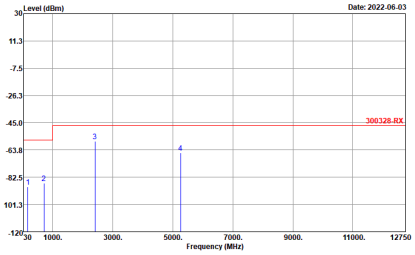
Zigbee RX Conducted Spurious Emission Plots

2.4GHz 2400~2483.5MHz

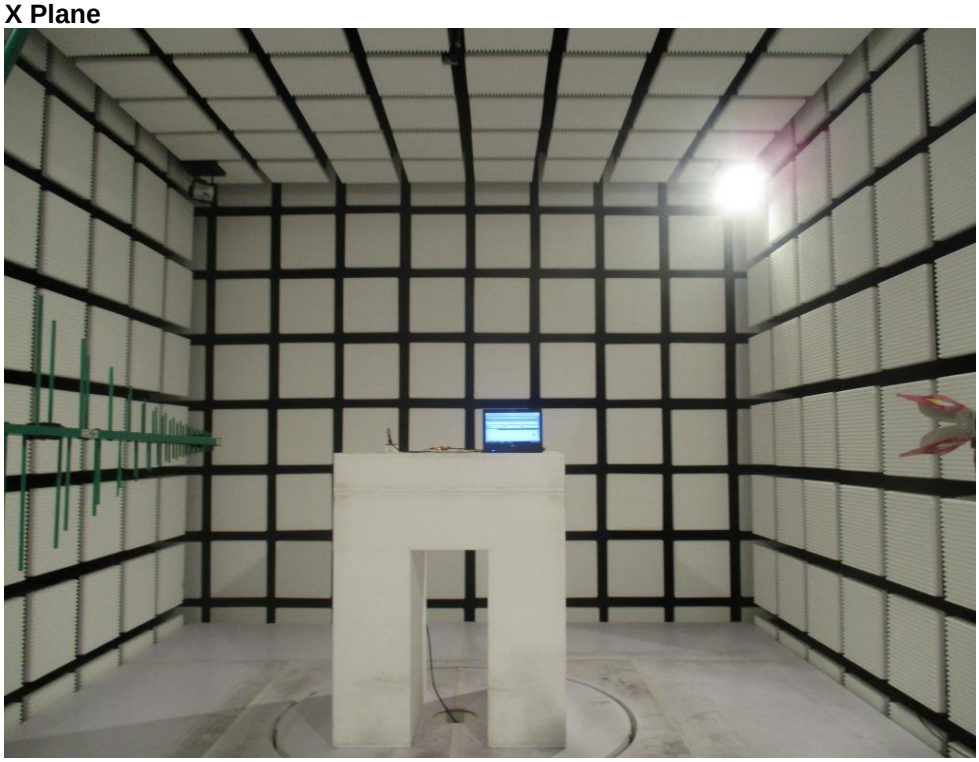
Zigbee

Zigbee	2.4GHz 2400~2483.5MHz	
	Zigbee	
	CH26 2480MHz	
RX	 Site : TH05-HY Condition : 300328-RX Project : 242614 Mode : 8 Setting : 5 Freq Level Limit Over Limit Line Read Level Cable Loss Aux Factor Aux2 Factor MHz dBm dB dBm dBm dB dB dB 1 176.34 -89.19 -32.19 -57.00 -89.44 0.00 0.25 0.00 2 715.80 -86.64 -29.64 -57.00 -87.14 0.00 0.50 0.00 3 @ 2412.00 -57.56 -10.56 -47.00 -58.60 0.00 1.04 0.00 4 5262.00 -65.84 -18.84 -47.00 -67.21 0.00 1.37 0.00	Left blank

Appendix C. Photographs of Test Configuration

<Radiated Emission>

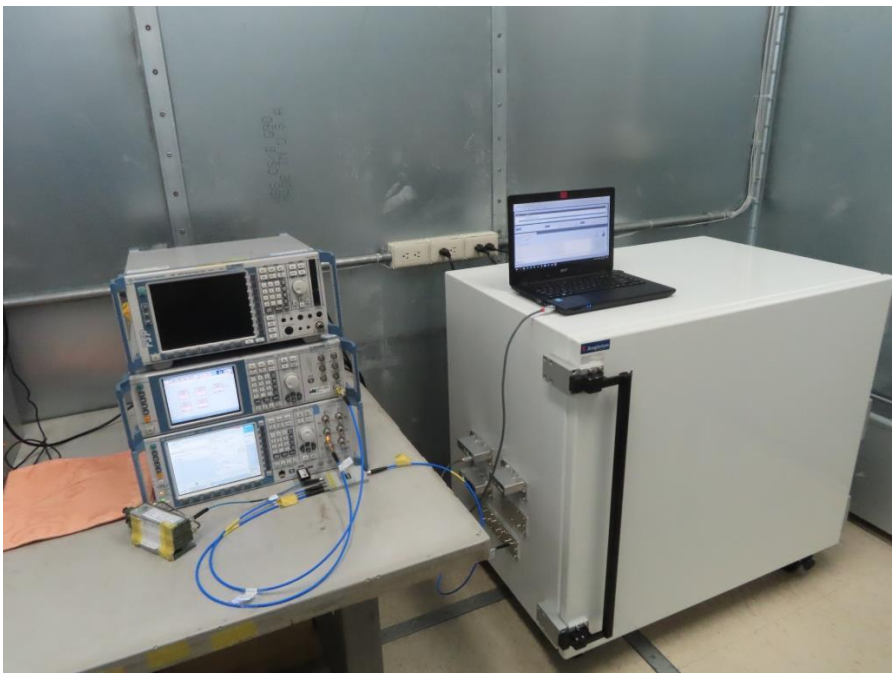
X Plane



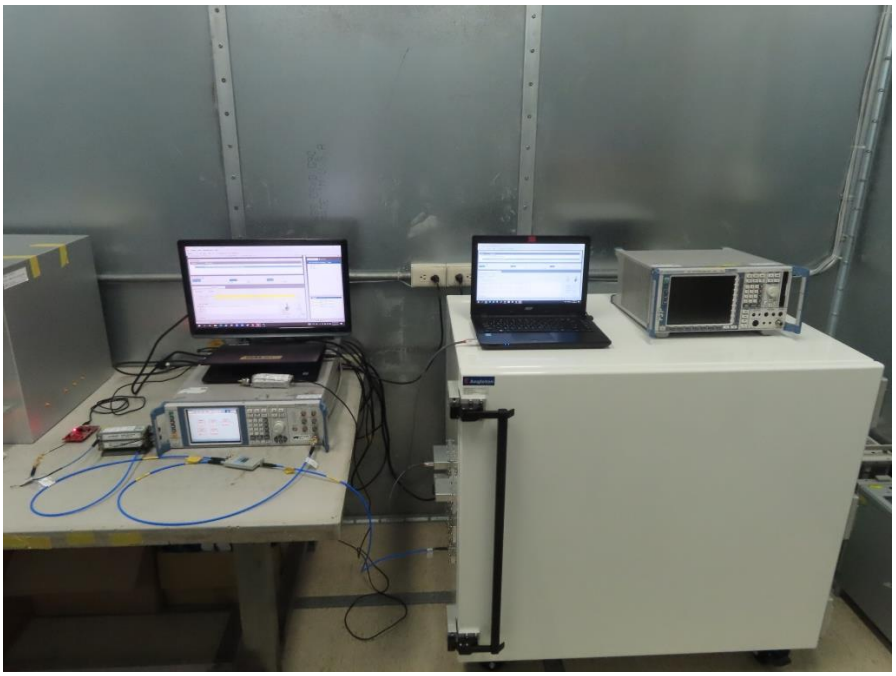
<Receiver Blocking>

Setup Photo

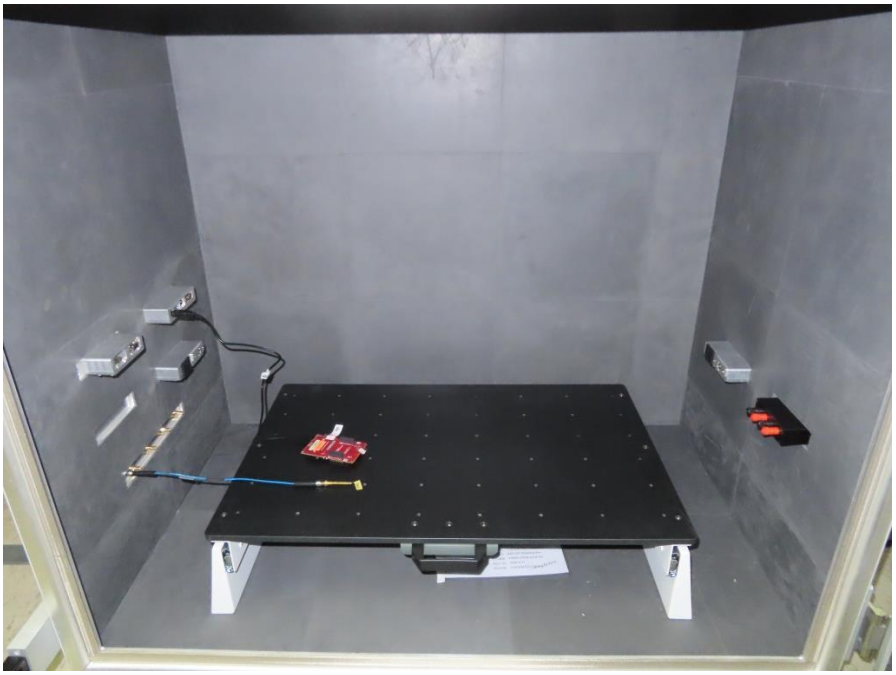
<Bluetooth-LE>



<Zigbee>



Near Photo (inside shielding room)



———THE END———