

TEST REPORT

Reference No. : WTD20S03009585W
FCC ID..... : 2AVYZINNRRZBM11
Applicant..... : Innr Lighting BV
Address : Heuvellaan 50, 1217 JN, Hilversum, Netherlands
Manufacturer : Innr Lighting BV
Address : Heuvellaan 50, 1217 JN, Hilversum, Netherlands
Factory : Kentle Technology Ltd
Address : 2nd Industrial Area, Tiantou Village, Hengli Town, Dongguan City
523460, Guangdong, China
Product..... : Innr ZigBee Module, US variant
Model(s)..... : Innr ZB Mod v1.1 US
Standards..... : FCC CFR47 Part 15 C Section 15.247: 2019
Date of Receipt sample..... : 2020-03-12
Date of Test..... : 2020-04-01 to 2020-04-16
Date of Issue : 2020-04-20
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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2 Revision History

Test report #	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD20S03009585W	2020-03-12	2020-04-01 to 2020-04-16	2020-04-20	original	-	Valid

3 General Information

3.1 General Description of E.U.T

Product:	Innr ZigBee Module, US variant
Model(s):	Innr ZB Mod v1.1 US
Operation Frequency:	2405-2480MHz
Antenna installation:	Integrated Antenna
Antenna Gain:	1.6dBi
Type of modulation:	Zigbee: O-QPSK

3.2 Details of E.U.T

Ratings:	DC 2.0V to 3.6V
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3.3 Channel List

Zigbee:

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2405	1	2410	2	2415	3	2420
4	2425	5	2430	6	2435	7	2440
8	2445	9	2450	10	2455	11	2460
12	2465	13	2470	14	2475	15	2480

3.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	Zigbee	250kbps	0/7/15	TX
Power Spectral Density	Zigbee	250kbps	0/7/15	TX
Frequency Range	Zigbee	250kbps	0/7/15	TX
Transmitter Spurious Emissions	Zigbee	250kbps	0/7/15	TX

Note :Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product.

4 Equipment Used during Test

4.1 Equipments List

Conducted Emissions Test Site						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMI Test Receiver	R&S	ESCI	101155	2019-09-17	2020-09-16
2	LISN	SCHWARZBECK	NSLK 8128	8128-259	2019-09-17	2020-09-16
3	Limiter	CYBERTEK	EM5010	261115-001-0024	2019-09-17	2020-09-16
4	Cable	Laplace	RF300	-	2019-09-17	2020-09-16
3m Semi-anechoic Chamber for Radiation Emissions Test site						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP30	100091	2019-04-19	2020-04-18
2	Amplifier	Agilent	8447D	2944A10178	2019-04-19	2020-04-18
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2019-04-28	2020-04-27
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2019-09-17	2020-09-16
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2019-09-17	2020-09-16
6	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2019-04-19	2020-04-18
7	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2019-04-19	2020-04-18
8	Broad-band Horn Antenna	SCHWARZBECK	BBV 9721	100472	2019-09-17	2020-09-16
9	Spectrum Analyzer	R&S	FSP40	100501	2019-09-17	2020-09-16
10	Coaxial Cable	ZT40-2.92J-2.92J-2.0M	10MHz-40GHz	17100919	2019-09-17	2020-09-16
3m Semi-anechoic Chamber for Radiation Emissions Test site						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2019-04-20	2020-04-19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2019-05-24	2020-05-23
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2019-04-28	2020-04-27
4	Amplifier	ANRITSU	MH648A	M43381	2019-04-19	2020-04-18
5	Cable	HUBER+SUHNER	CBL2	525178	2019-04-20	2020-04-19

RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2019-04-19	2020-04-18
2.	Spectrum Analyzer	R&S	FSP40	100501	2019-09-17	2020-09-16
3.	Spectrum Analyzer	R&S	FSL6	100959	2019-09-17	2020-09-16
4.	Coaxial Cable (10Hz-30GHz)	/	/	/	2019-09-17	2020-09-16
5.	Antenna Connector*	/	/	/	2019-09-17	2020-09-16
***: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.						

4.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)

4.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TEST CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave, Tianhe District, Guangzhou, Guangdong, China.

4.4 Test Facility

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.
ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A

5 Test Summary

Test Items	Test Requirement	Result
Spurious Radiated Emissions	15.247 15.205(a) 15.209(a)	C
Conducted Emissions	15.207(a)	C
Bandwidth	15.247(a)(2)	C
Maximum Peak Output Power	15.247(b)(3),(4)	C
Power Spectral Density	15.247(e)	C
Band Edge	15.247(d)	C
Antenna Requirement	15.203	C
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	C
Note: C=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

6 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.10:2013
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

6.1 E.U.T. Operation

Operating Environment :

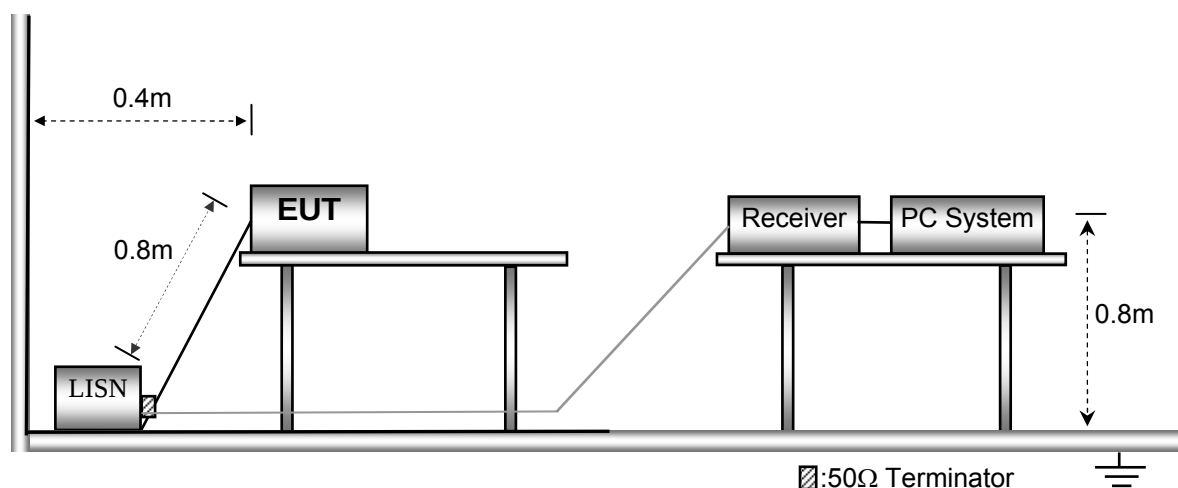
Temperature:	21.5 °C
Humidity:	51.9 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation: Transmitting mode

The test was performed in Transmitting mode, Only the worst case Low channel mode were record in the report.

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.4: 2014..



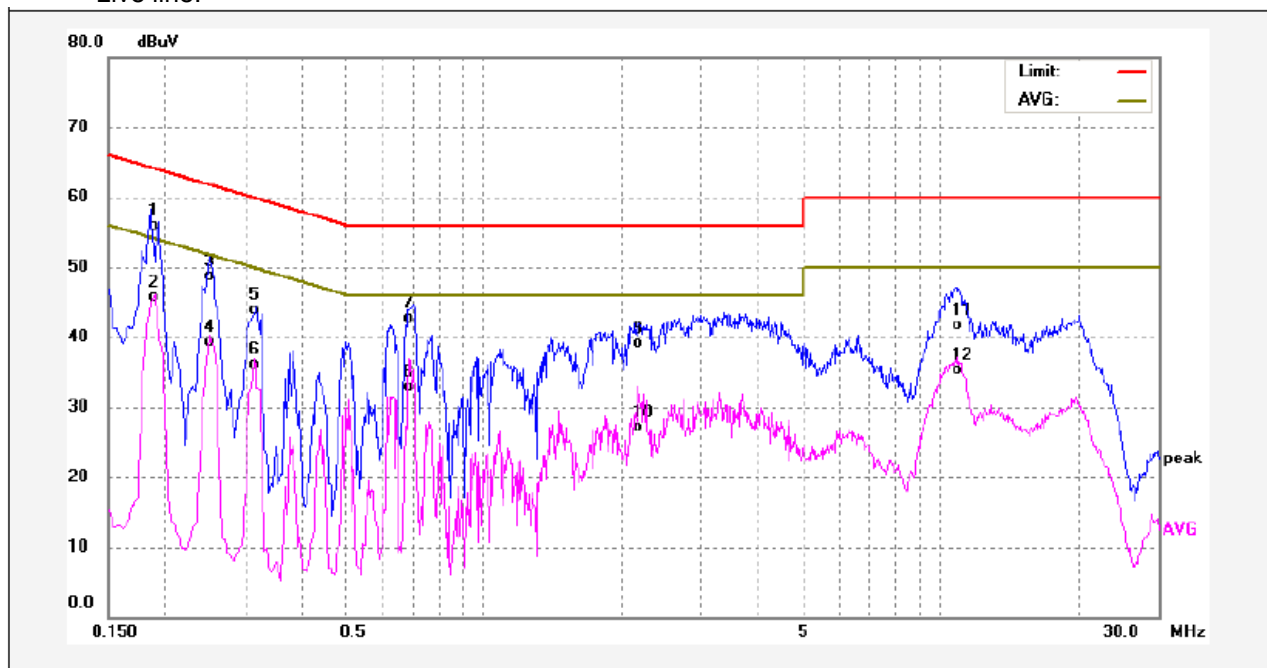
6.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.4 Conducted Emission Test Result

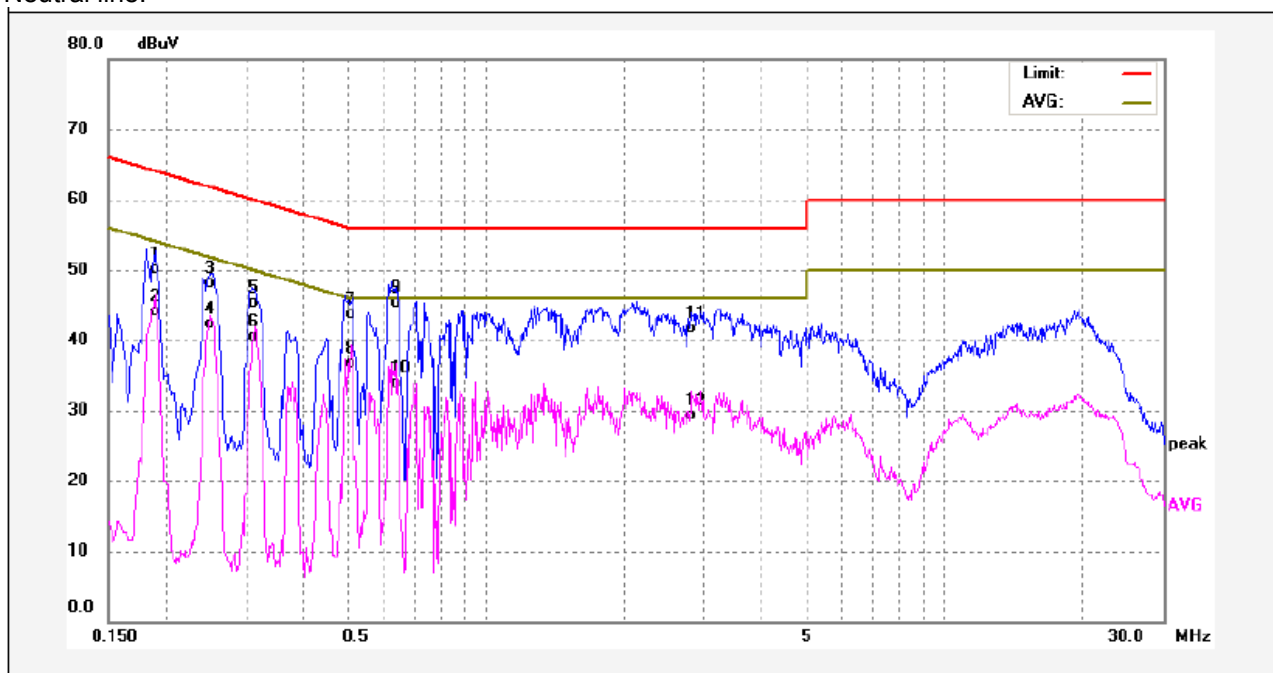
An initial pre-scan was performed on the live and neutral lines.

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1900	46.06	9.77	55.83	64.03	-8.20	QP	
2	0.1900	35.85	9.77	45.62	54.03	-8.41	AVG	
3	0.2500	38.87	9.76	48.63	61.75	-13.12	QP	
4	0.2500	29.48	9.76	39.24	51.75	-12.51	AVG	
5	0.3140	34.00	9.81	43.81	59.86	-16.05	QP	
6	0.3140	26.38	9.81	36.19	49.86	-13.67	AVG	
7	0.6860	32.92	9.83	42.75	56.00	-13.25	QP	
8	0.6860	23.10	9.83	32.93	46.00	-13.07	AVG	
9	2.1820	29.12	9.95	39.07	56.00	-16.93	QP	
10	2.1820	17.23	9.95	27.18	46.00	-18.82	AVG	
11	10.9379	31.56	10.08	41.64	60.00	-18.36	QP	
12	10.9379	25.21	10.08	35.29	50.00	-14.71	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1900	40.42	9.77	50.19	64.03	-13.84	QP	
2	0.1900	34.25	9.77	44.02	54.03	-10.01	AVG	
3	0.2500	38.42	9.76	48.18	61.75	-13.57	QP	
4	0.2500	32.49	9.76	42.25	51.75	-9.50	AVG	
5	0.3140	35.40	9.81	45.21	59.86	-14.65	QP	
6	0.3140	30.62	9.81	40.43	49.86	-9.43	AVG	
7	0.5100	33.91	9.81	43.72	56.00	-12.28	QP	
8	0.5100	26.81	9.81	36.62	46.00	-9.38	AVG	
9	0.6340	35.52	9.84	45.36	56.00	-10.64	QP	
10	0.6340	24.05	9.84	33.89	46.00	-12.11	AVG	
11	2.8100	31.82	9.94	41.76	56.00	-14.24	QP	
12	2.8100	19.41	9.94	29.35	46.00	-16.65	AVG	

7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment:

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

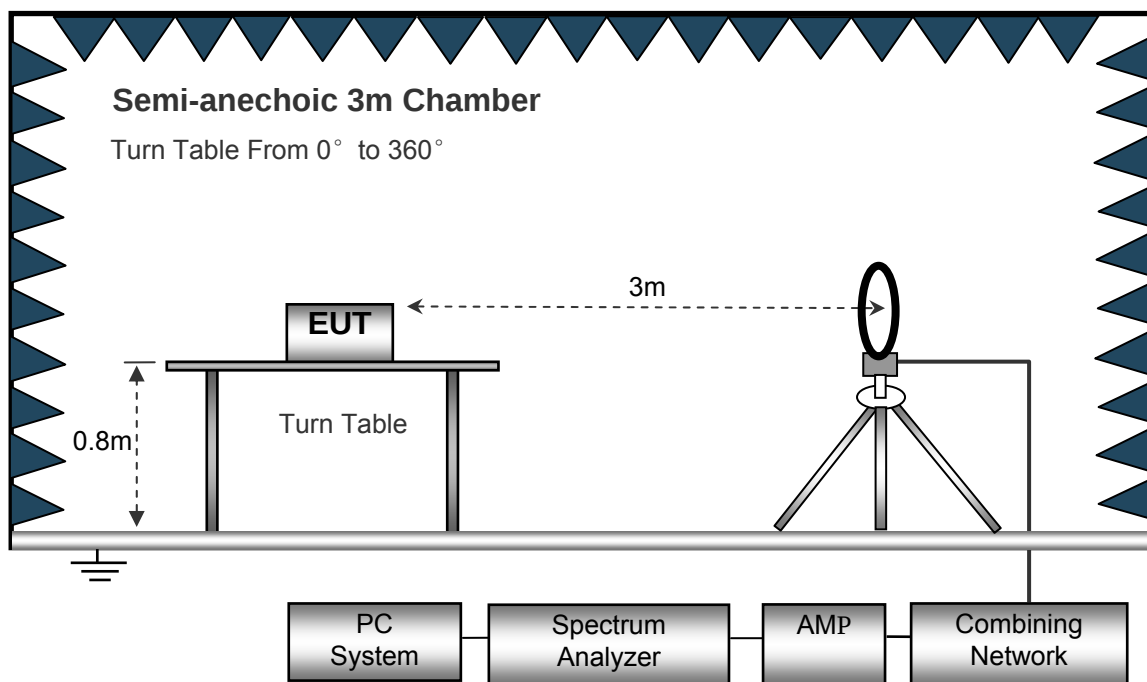
EUT Operation:

The test was performed in transmitting mode, the test data were shown in the report.

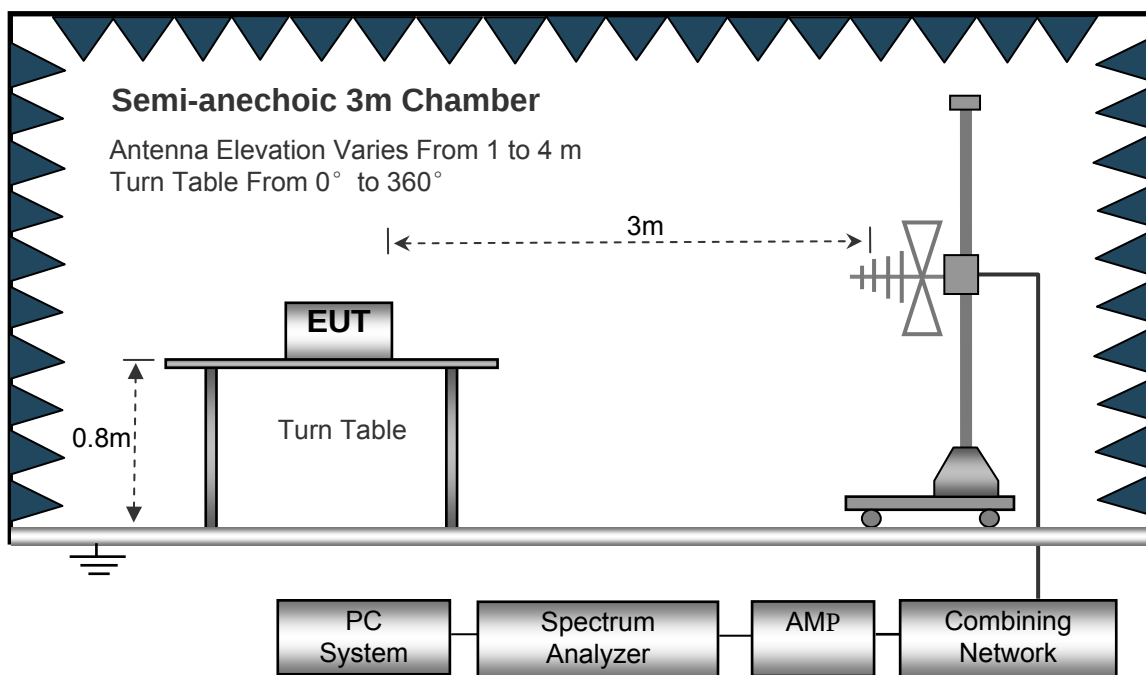
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

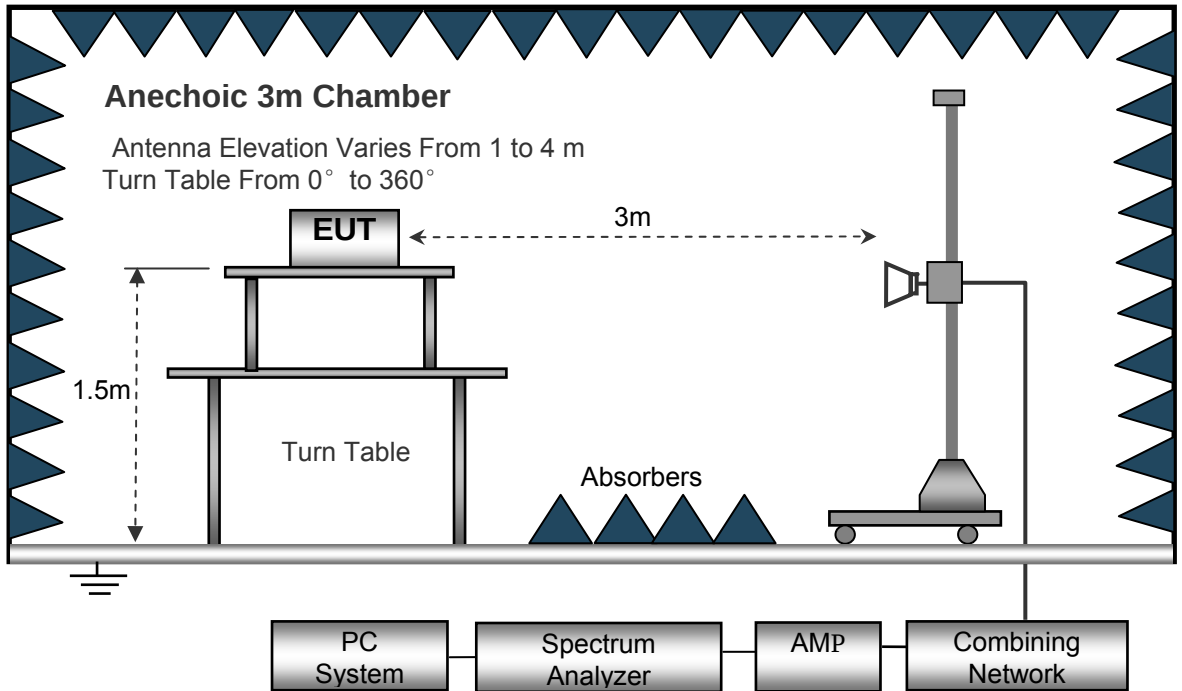
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
IF Bandwidth.....10kHz
Video Bandwidth.....10kHz
Resolution Bandwidth.....10kHz

30MHz ~ 1GHz

Sweep Speed Auto
DetectorPK
Resolution Bandwidth.....100kHz
Video Bandwidth.....300kHz

Above 1GHz

Sweep Speed Auto
DetectorPK
Resolution Bandwidth.....1MHz
Video Bandwidth.....3MHz
DetectorAve.
Resolution Bandwidth.....1MHz
Video Bandwidth.....10Hz

7.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane;
For above 1GHz, the EUT is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. A 2.4GHz high -pass filter is used during radiated emissions above 1GHz measurement.

7.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

7.6 Summary of Test Results

Test Frequency: 9 KHz~30 MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel 2405MHz									
903.31	29.13	QP	37	1.3	H	-3.09	26.04	46.00	-24.01
903.31	30.72	QP	26	1.0	V	-3.09	27.63	46.00	-18.37
4810.00	55.80	PK	314	1.6	V	-1.06	54.74	74.00	-19.26
4810.00	47.55	Ave	314	1.6	V	-1.06	46.49	54.00	-7.51
7215.00	44.94	PK	203	1.1	H	1.33	46.27	74.00	-27.73
7215.00	38.07	Ave	203	1.1	H	1.33	39.40	54.00	-14.60
2313.34	46.99	PK	262	1.2	V	-13.19	33.80	74.00	-40.20
2313.34	39.99	Ave	262	1.2	V	-13.19	26.80	54.00	-27.20
2355.90	43.22	PK	227	1.0	H	-13.14	30.08	74.00	-43.92
2355.90	38.50	Ave	227	1.0	H	-13.14	25.36	54.00	-28.64
2496.21	44.72	PK	283	1.5	V	-13.08	31.64	74.00	-42.36
2496.21	38.52	Ave	283	1.5	V	-13.08	25.44	54.00	-28.56

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
Middle Channel 2440MHz									
903.31	28.69	QP	261	1.9	H	-3.09	25.60	46.00	-20.40
903.31	30.36	QP	67	1.4	V	-3.09	27.27	46.00	-18.73
4880.00	54.71	PK	126	1.3	V	-0.62	54.09	74.00	-19.91
4880.00	47.53	Ave	126	1.3	V	-0.62	46.91	54.00	-7.09
7320.00	44.15	PK	294	1.8	H	2.21	46.36	74.00	-27.64
7320.00	36.95	Ave	294	1.8	H	2.21	39.16	54.00	-14.84
2325.94	45.39	PK	222	1.1	V	-13.19	32.20	74.00	-41.80
2325.94	39.49	Ave	222	1.1	V	-13.19	26.30	54.00	-27.70
2375.36	42.28	PK	314	1.6	H	-13.14	29.14	74.00	-44.86
2375.36	38.41	Ave	314	1.6	H	-13.14	25.27	54.00	-28.73
2493.16	43.61	PK	66	1.4	V	-13.08	30.53	74.00	-43.47
2493.16	37.43	Ave	66	1.4	V	-13.08	24.35	54.00	-29.65

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
High Channel 2480MHz									
903.31	27.51	QP	245	1.9	H	-13.35	25.60	46.00	-21.58
903.31	28.79	QP	336	1.5	V	-13.35	27.27	46.00	-20.30
4960.00	56.62	PK	20	1.4	V	-0.24	56.38	74.00	-17.62
4960.00	47.64	Ave	20	1.4	V	-0.24	47.40	54.00	-6.60
7440.00	44.14	PK	170	1.6	H	2.84	46.98	74.00	-27.02
7440.00	40.76	Ave	170	1.6	H	2.84	43.60	54.00	-10.40
2323.03	45.49	PK	311	1.4	V	-13.19	32.30	74.00	-41.70
2323.03	38.72	Ave	311	1.4	V	-13.19	25.53	54.00	-28.47
2385.05	42.75	PK	214	1.9	H	-13.14	29.61	74.00	-44.39
2385.05	37.50	Ave	214	1.9	H	-13.14	24.36	54.00	-29.64
2484.28	44.05	PK	286	1.1	V	-13.08	30.97	74.00	-43.03
2484.28	38.95	Ave	286	1.1	V	-13.08	25.87	54.00	-28.13

Test Frequency: 18GHz~25GHz

The measurements were more than 20 dB below the limit and not recorded.

8 Band Edge Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting

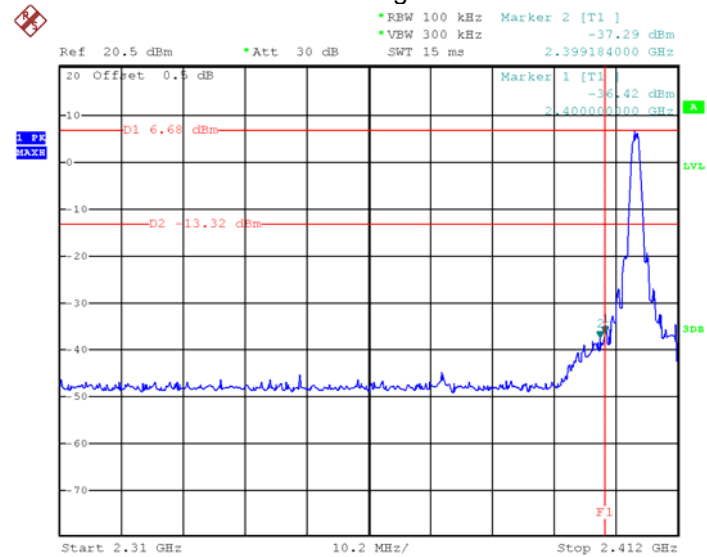
8.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

8.2 Test Result

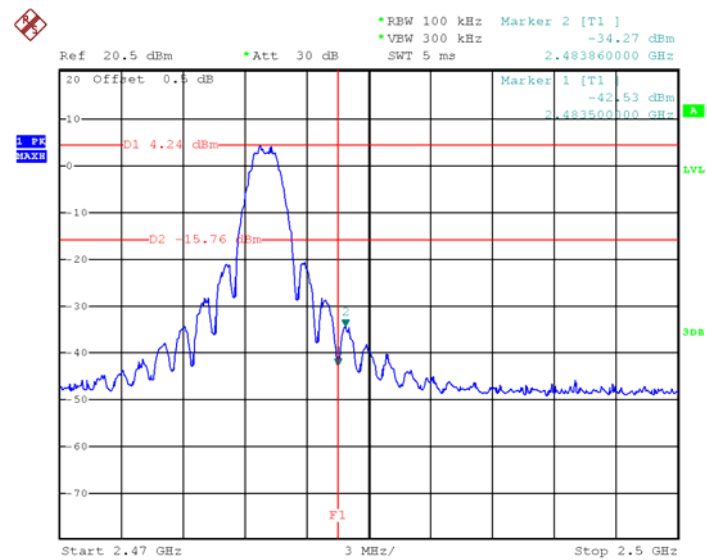
Test result plots shown as follows:

Band edge-left side



Date: 15.APR.2020 04:27:48

Band edge-right side



Date: 15.APR.2020 04:36:31

9 Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

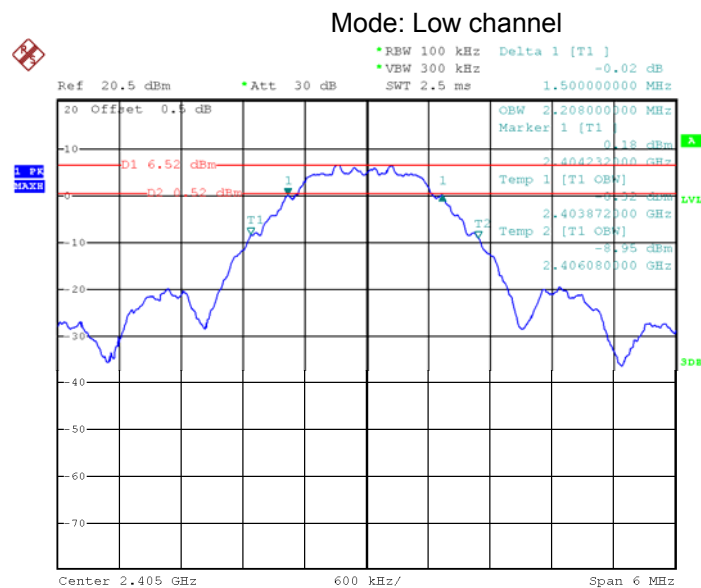
558074 D01 15.247 Meas Guidance v05r02

9.1 Test Procedure

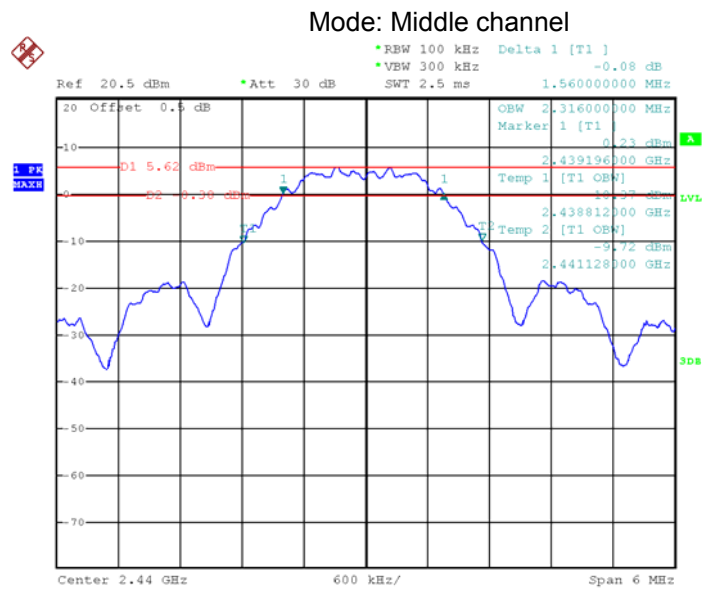
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

9.2 Test Result

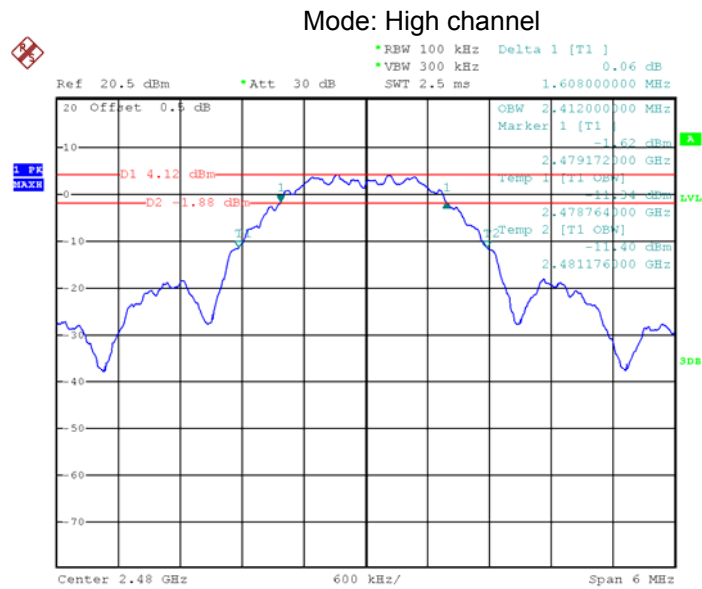
Operation mode	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low channel	1.500	2.208
Middle channel	1.560	2.316
High channel	1.608	2.412



Date: 15.APR.2020 04:25:19



Date: 15.APR.2020 04:14:31



Date: 15.APR.2020 04:16:47

10 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

558074 D01 15.247 Meas Guidance v05r02

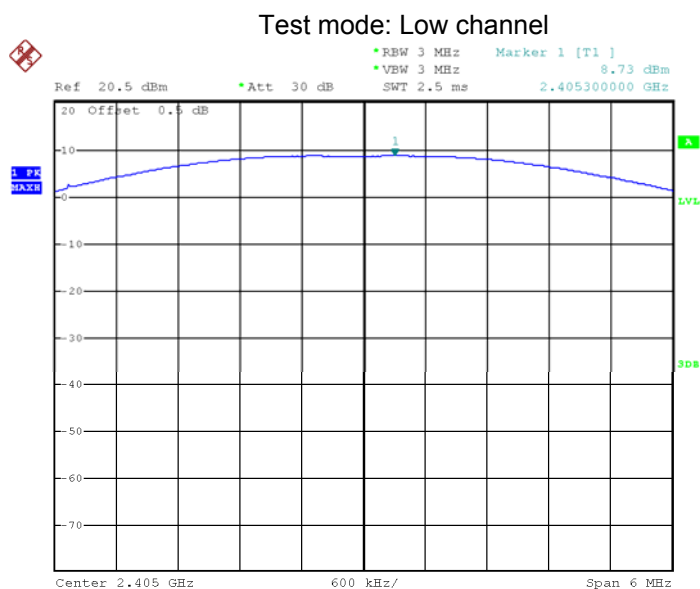
10.1 Test Procedure

558074 D01 15.247 Meas Guidance v05r02

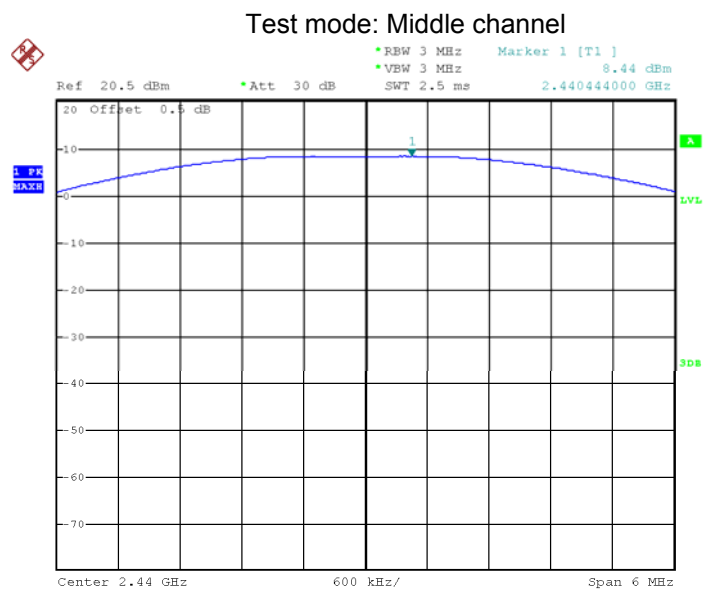
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

10.2 Test Result

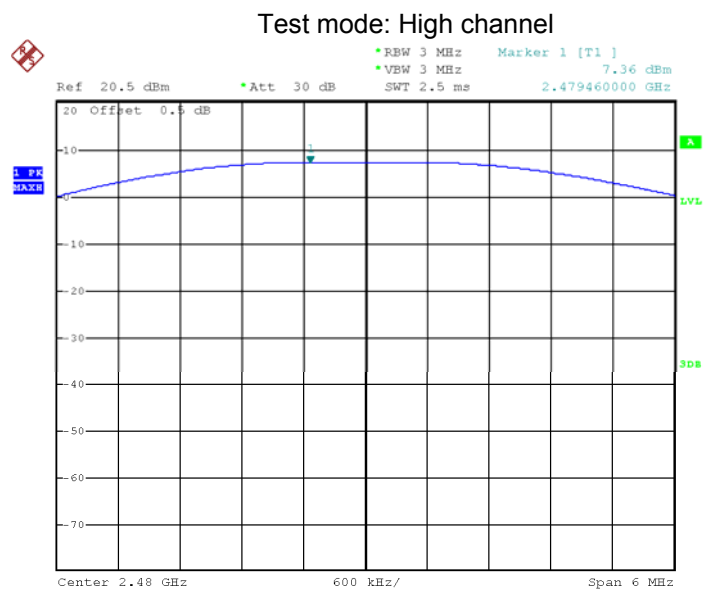
Maximum Peak Output Power (dBm)		
Low channel	Middle channel	High channel
8.73	8.44	7.36
Limit: 1W/30dBm		



Date: 15.APR.2020 04:23:27



Date: 15.APR.2020 04:12:18



Date: 15.APR.2020 04:20:22

11 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 15.247 Meas Guidance v05r02

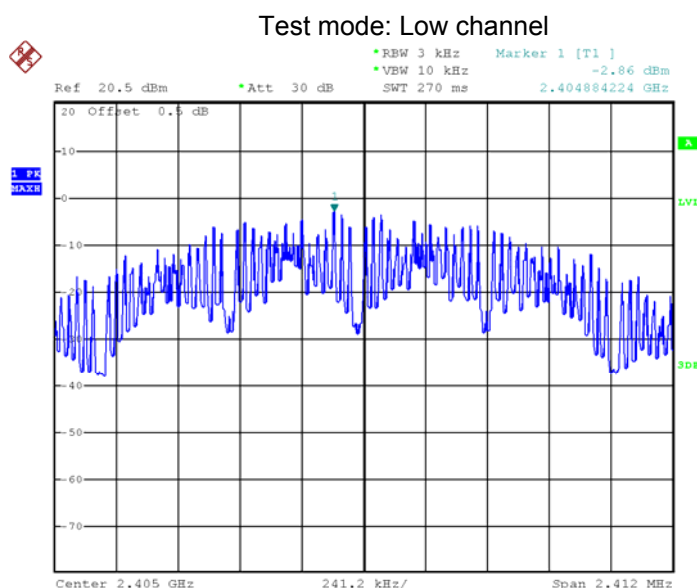
11.1 Test Procedure

558074 D01 15.247 Meas Guidance v05r02

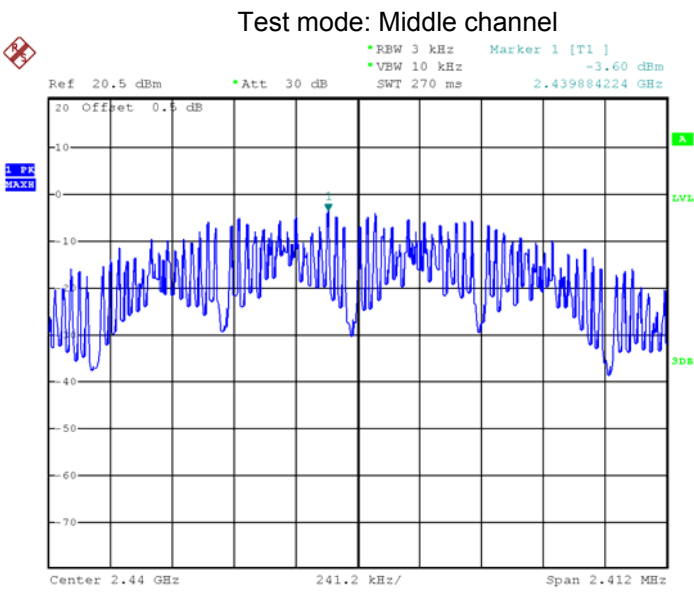
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section
Submit this plot.

11.2 Test Result

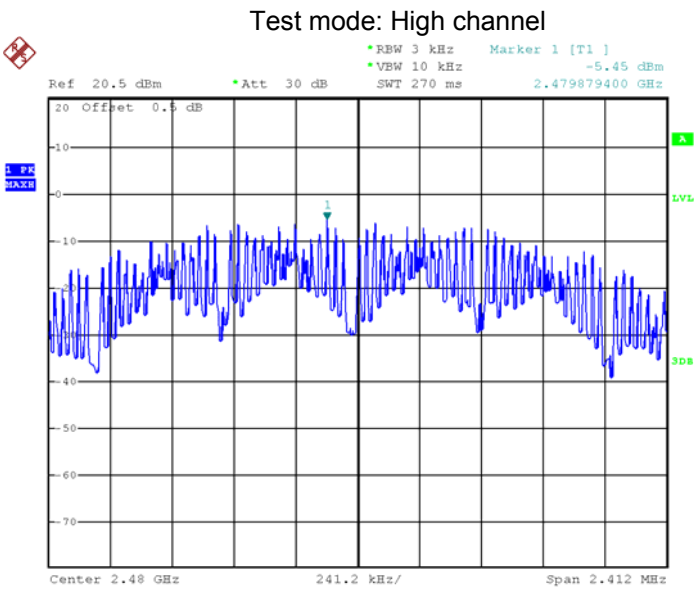
Power Spectral Density(dBm)		
Low channel	Middle channel	High channel
-2.86	-3.60	-5.45
Limit: 8dBm per 3kHz		



Date: 16.APR.2020 04:44:22



Date: 16.APR.2020 04:43:19



Date: 16.APR.2020 04:45:35

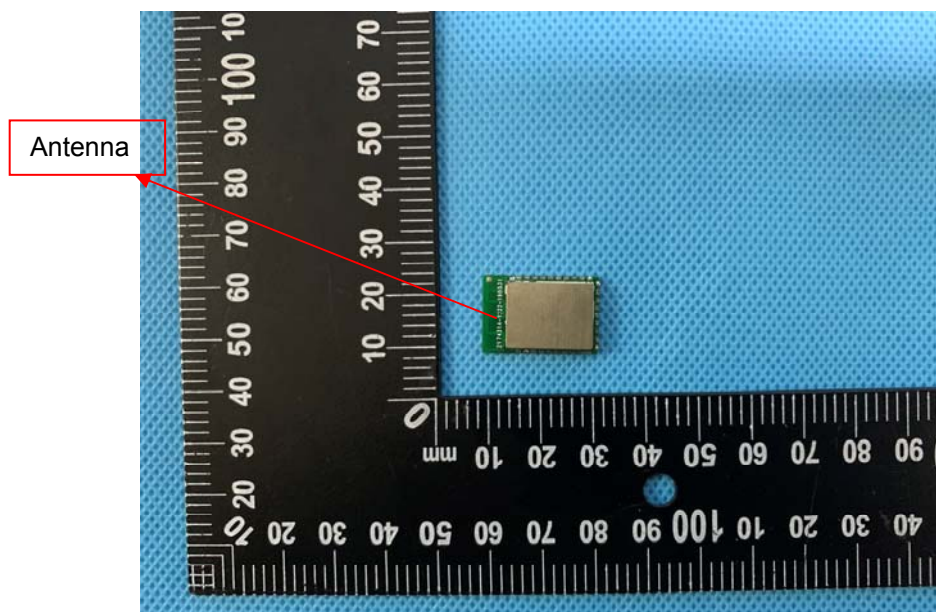
12 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Result:

The EUT have one Integrated Antenna, meets the requirements of FCC 15.203.



13 RF Exposure

Test Requirement: FCC Part 1.1307

Test Method: FCC Part 2.1091

13.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

13.2 Evaluation Result

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Output Power (dBm)	Output Power (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
1.6	1.45	8.73	7.46	0.0022	1

Result: Compliance

No SAR measurement is required.

14 Photographs – Test Setup Photos

Note: Refer to the file Innr ZB Mod v1.1 US_Test Setup Photos.

15 Photographs - Constructional Details

15.1 External Photos

Note: Refer to the file Innr ZB Mod v1.1 US_External Photos.

15.2 Internal Photos

Note: Refer to the file Innr ZB Mod v1.1 US_Internal Photos.

=====End of Report=====