Radio Spectrum

TEST REPORT

Report No. : **171000078TWN-001**
Model No. : **SC-302M**
Issued Date : **Nov. 10, 2017**

Applicant: **SINBON Electronics Co., Ltd.**
4F-13, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, New Taipei City, Taiwan

Test Method/ Standard: **47 CFR FCC Part 15.247 & ANSI C63.10 2013**
KDB 558074 D01 v04
KDB 662911 D01 v02r01

Test Site: **960839**

Test By: **Intertek Testing Services Taiwan Ltd.**
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Testing Laboratory
0597

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Revision History

Report No.	Issue Date	Revision Summary
171000078TWN-001	Nov. 10, 2017	Original report

Table of Contents

Summary of Test Data

Test Requirement	Applicable Rule (Section 15.247)	Result
Minimum 6 dB Bandwidth	15.247(a)(2)	Pass
Maximum Peak Conducted Output Power	15.247(b)(3)	Pass
Power Spectral Density	15.247(e)	Pass
Emissions In Non-Restricted Frequency Bands	15.247(d)	Pass
Emissions In Restricted Frequency Bands (Radiated emission measurements)	15.247(d), 15.205, 15.209	Pass
Emission On The Band Edge	15.247(d), 15.205	Pass
AC Power Line Conducted Emission	15.207	N/A
Antenna Requirement	15.203	Pass

1. General information

1.1. Identification of the EUT

Product:	Solar Optimizer +
Model No.:	SC-302M
Operating Frequency:	2405~2475MHz
Channel Number:	15 channels
Access scheme:	DSSS
Modulation	OQPSK
Rated Power:	3.3 VDC
Power Cord:	N/A
Sample Received:	Workable
Test Date(s):	Nov. 01, 2017 ~ Nov. 07, 2017

Note 1: The test report only allows to be revised within three years from its original issued date unless further standard or the requirement was noticed.
Note 2: When determining the test conclusion, the Measurement Uncertainty of test has been considered.
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1.2. Description of the EUT

Modulation mode	Transmit path	
	Chain 0 / Main	Chain 1 / AUX
Zigbee	V	X

1.3. Antenna description

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

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Antenna Gain : 2 dBi
Antenna Type : Dipole Antenna
Connector Type : I-pex

1.4. Operation mode

The EUT was supplied with DC 3.3 V from Power Supply.

TX mode: EUT use 「PuTTY.exe」 entering test mode , and Touchscreen to change different channel.

X axis

Y axis

After verifying two axes, we found the maximum electromagnetic field was occurred at Y axis. The final test data was executed under this configuration.

With individual verifying, the maximum output power were found out Zigbee mode the final tests were executed under these conditions recorded in this report individually.

1.5. Applied test modes and channels

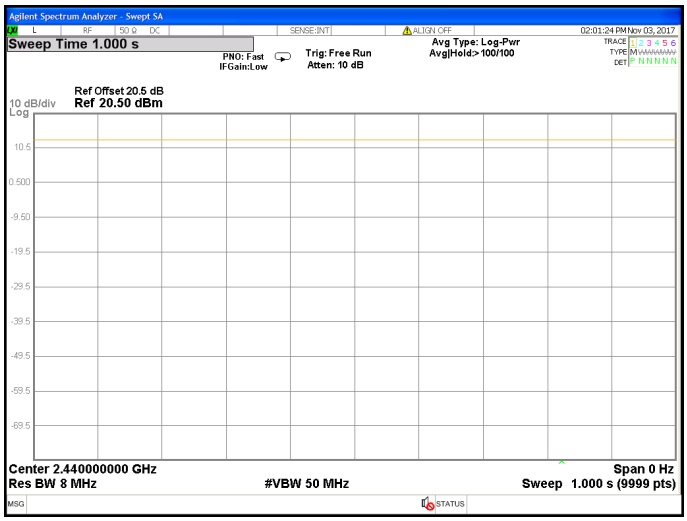
Test items	Mode	Data Rate (bps)	Channel	Antenna
Maximum Conducted Output Power	Zigbee	-	11,18,25	Chain0
Power Spectrum Density	Zigbee	-	11,18,25	Chain0
Emission BW	Zigbee	-	11,18,25	Chain0
Radiated spurious Emission	Worse Case			
Emissions In Restricted Frequency Bands (Radiated emission measurements)	Zigbee	-	11,18,25	Chain0
Emission on The Band Edge	Zigbee	-	11,18,25	Chain0
AC Line Conducted Emission	Normal Link			

1.6. Power setting of test software

Channels & power setting software provided by the client was used to change the operating channels as well as the output power level and is going to be installed in the final end product.

Mode	Chain	Channel	Frequency (MHz)	Signal on time(s)	Total signal transmit time(s)	Duty cycle	Duty Cycle factor
Zigbee	Chain 0	Mid	2440	1.00	1.00	1.00	0.00

Chain 0: Ducty Cycle @ Duty Cylce Mode



1.7. Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	IBM	1860	L3WM776	USB unshielded 1 meter × 1
Power Supply	Twintex	TP-1603C	N/A	N/A

2. Minimum 6 dB Bandwidth

2.1. Instrument Setting

Spectrum Parameter	Setting
Detector	Peak
RBW	100kHz
VBW	≧3 x RBW
Sweep	Auto couple
Trace	Allow the trace to stabilize.
Span	Between two times and five times the occupied bandwidth
Attenuation	Auto

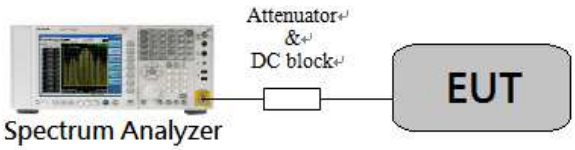
2.2. Test Procedure

Step 1 The transmitter output was connected to the spectrum analyzer.

Step 2 Test was performed in accordance with clause 8.1 option1 of KDB 558074 D01.

Step 3 Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

2.3. Test Diagram



2.4. Limit

The minimum 6 dB bandwidth shall be at least 500 kHz.

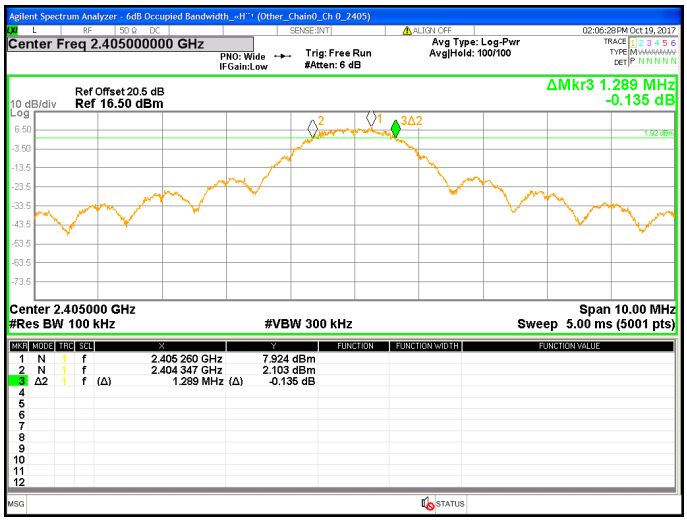
2.5. Operating Environment Condition

Temperature (℃) :	25
Relative Humidity (%) :	50
Atmospheric Pressure (hPa) :	1008
Test Date :	2017/10/19~2017/11/3

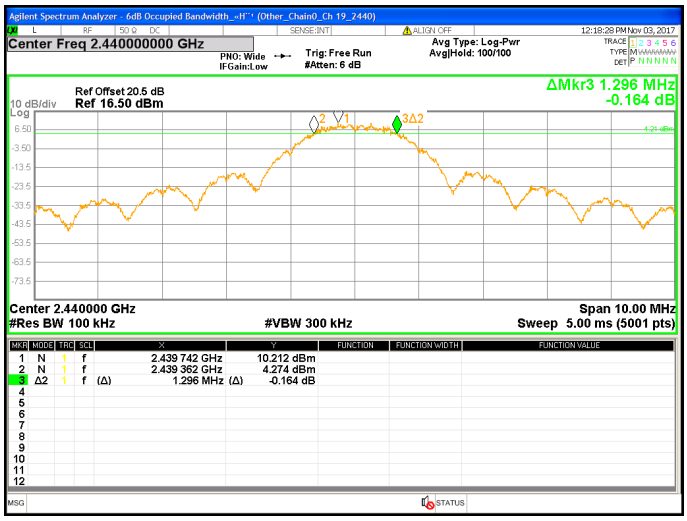
2.6. Test Results

Mode	Chain	Channel	Frequency (MHz)	6dB BW(MHz)	Limit(MHz)
Zigbee	Chain0	Low	2405	1.289	>0.5
Zigbee	Chain0	Mid	2440	1.296	>0.5
Zigbee	Chain0	High	2475	1.518	>0.5

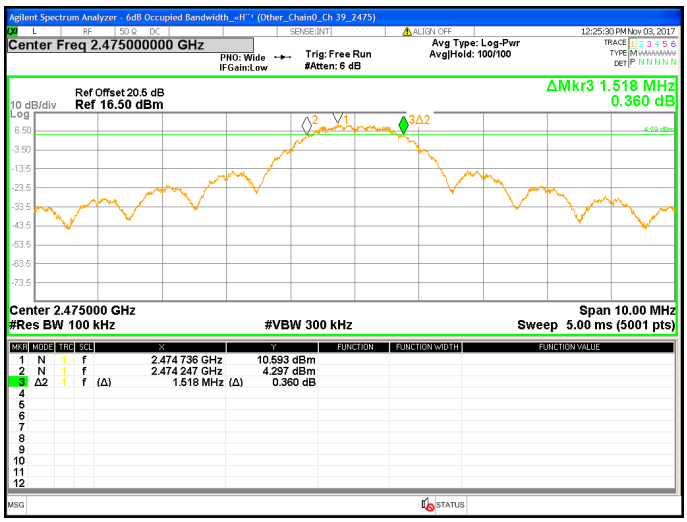
Chain0 : 6dB Bandwidth @ Zigbee mode Ch Low



Chain0 : 6dB Bandwidth @ Zigbee mode Ch Mid



Chain0 : 6dB Bandwidth @ Zigbee mode Ch High



3. Maximum Peak Conducted Output Power

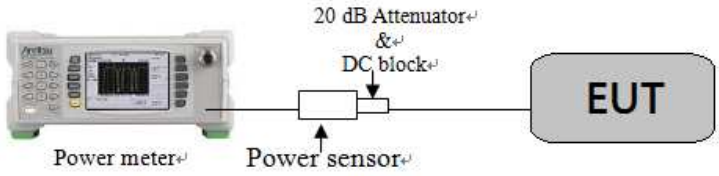
3.1. Instrument Setting

Power Meter Parameter	Setting
Bandwidth	65MHz bandwidth is greater than the EUT emission bandwidth
Detector	Peak & Average

3.2. Test Procedure

Test procedures refer to clause 9.1.3 peak power meter method and clause 9.2.3.2 measurement using a gated RF average power meter of KDB 558074 D01.

3.3. Test Diagram



3.4. Limit

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt (30dBm)

3.5. Operating Environment Condition

Temperature (℃) :	25
Relative Humidity (%) :	50
Atmospheric Pressure (hPa) :	1008
Test Date :	2017/11/7

3.6. Test Results

Mode	Chain	Channel	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
Zigbee	Chain0	Low	13.14	30.00	-16.86
Zigbee	Chain0	Mid	13.53	30.00	-16.47
Zigbee	Chain0	High	12.92	30.00	-17.08

4. Power Spectral Density

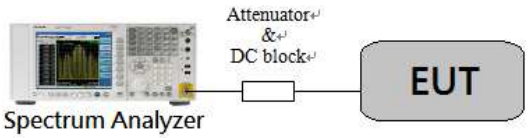
4.1. Instrument Setting

Spectrum Function	Setting
Detector	Peak
RBW	≧3 kHz
VBW	≧3 x RBW
Sweep	Auto couple
Trace	Max hold
Span	1.5 times x 6dB bandwidth
Attenuation	Auto

4.2. Test Procedure

Step 1 Test procedure refer to clause 10.2 method PKPSD (peak PSD) of KDB 558074 D01.
Step 2 Using the maximum conducted output power in the fundamental emission demonstrates compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
Step 3 Use the peak marker function to determine the maximum amplitude level within the RBW.

4.3. Test Diagram



4.4. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

4.5. Operating Environment Condition

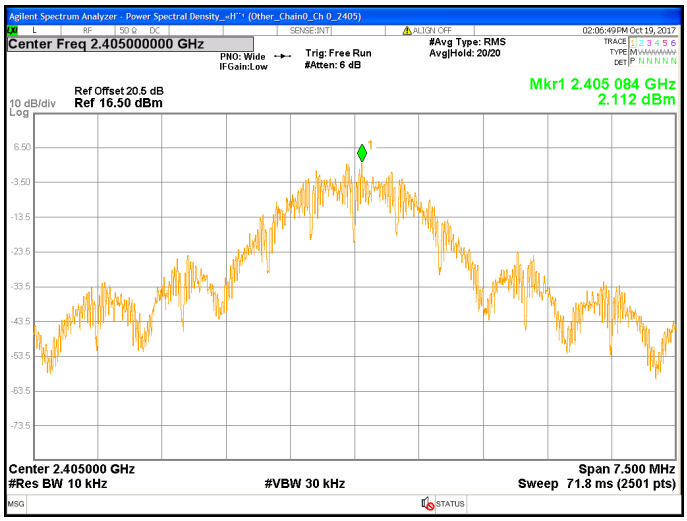
Temperature (℃) : 25
Relative Humidity (%) : 50
Atmospheric Pressure (hPa) : 1008
Test Date : 2017/10/19~2017/11/3

4.6. Test Results

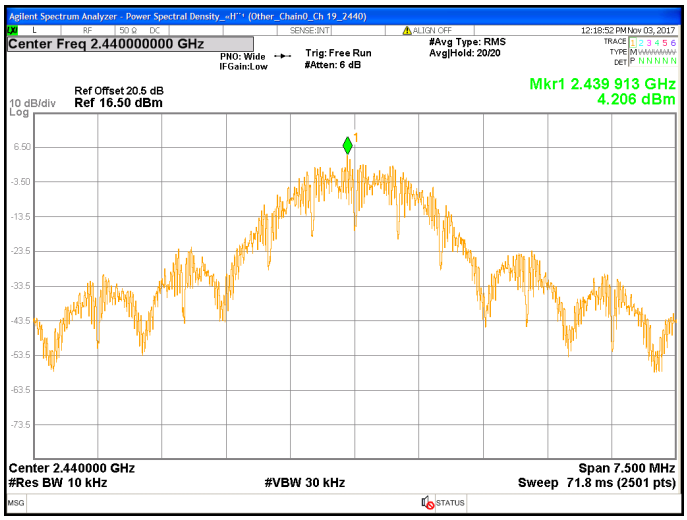
Note1: RBW Correction = 10*log(10kHz/3kHz) = 5.229
Note2: PSD in 3kHz = PSD in 10kHz – RBW Correction

Mode	Chain	Channel	Frequency (MHz)	PSD (dBm) @10kHz	Correction Factor(dB)	PSD(dBm) @3kHz	Limit (dBm)	Margin (dB)
Zigbee	Chain0	Low	2405	2.11	5.23	-3.12	8	-11.12
Zigbee	Chain0	Mid	2440	4.21	5.23	-1.02	8	-9.02
Zigbee	Chain0	High	2475	3.42	5.23	-1.81	8	-9.81

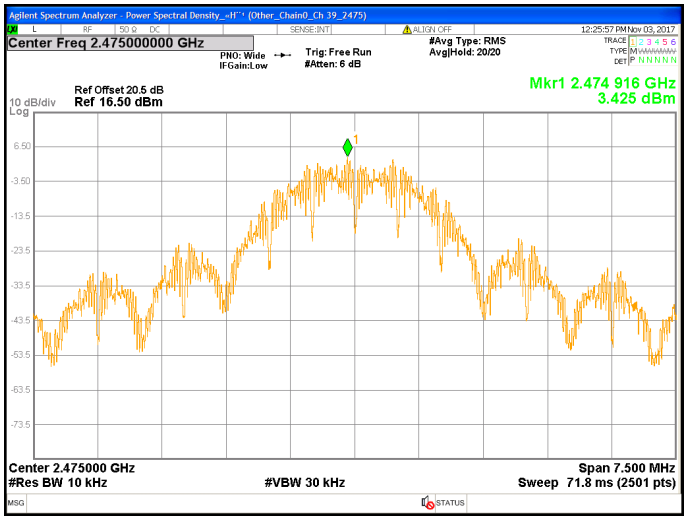
Chain0 : Power Spectral Density @ Zigbee mode Ch Low



Chain0 : Power Spectral Density @ Zigbee mode Ch Mid



Chain0 : Power Spectral Density @ Zigbee mode Ch High



5. Emissions in Non-Restricted Frequency Bands

5.1. Instruments Setting

Spectrum Function	Setting (Reference Level)	Setting (Emission Level)
Detector	Peak	Peak
RBW	≧100 kHz	≧100 kHz
VBW	≧3 x RBW	≧3 x RBW
Sweep	Auto couple	Auto couple
Trace	Max hold	Max hold
Span	≧1.5 time 6dB bandwidth	
Attenuation	Auto	Auto

5.2. Test Procedure

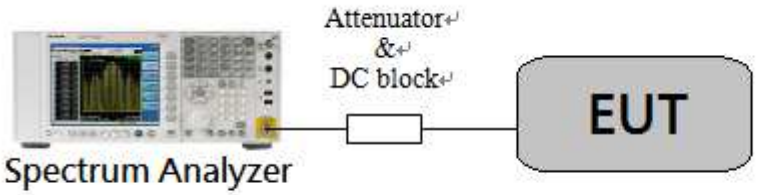
Step 1 The procedure was used in antenna-port conducted and connected to the spectrum analyzer.

Step 2 Set instrument center frequency to center frequency.

Step 3 Use the parameter configured in clause 5.1 to measure.

Step 4 Use the peak marker function to determine the maximum amplitude level.

5.3. Test Diagram



5.4. Limit

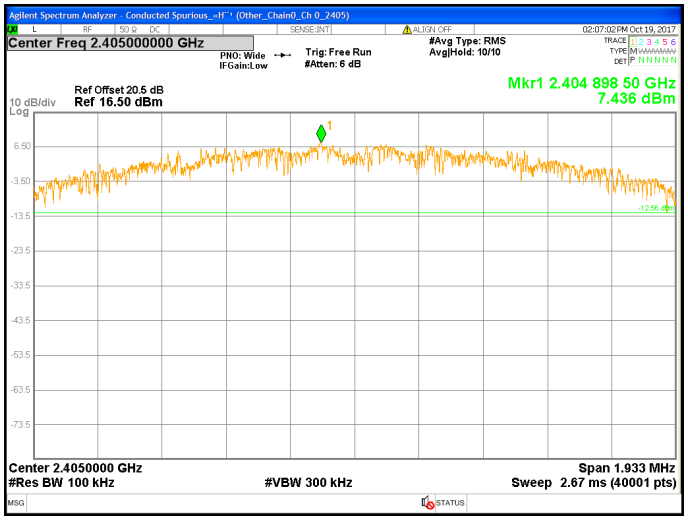
The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz

5.5. Operating Environment Condition

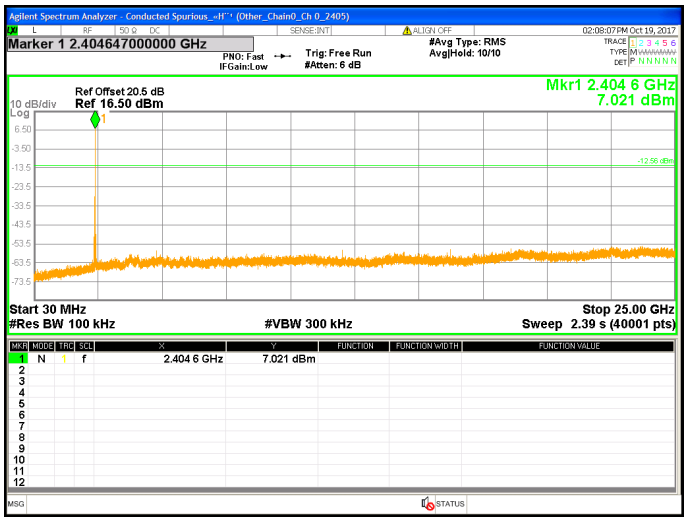
Temperature (℃) :	25
Relative Humidity (%) :	50
Atmospheric Pressure (hPa) :	1008
Test Date :	2017/10/19~2017/11/3

5.6. Test Results

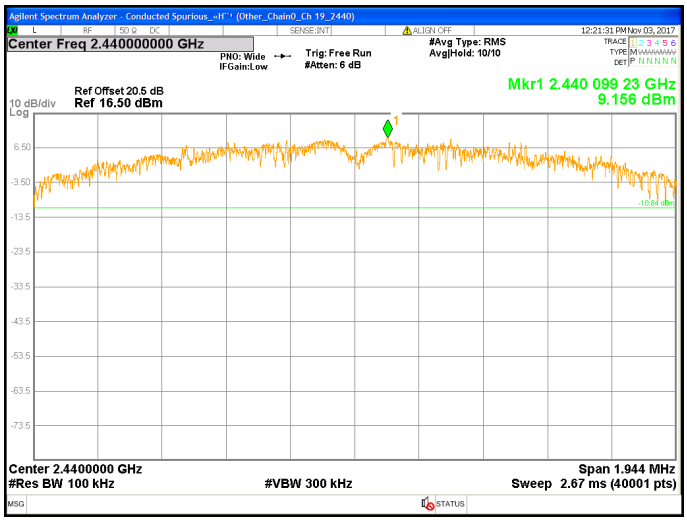
Chain0 : Conducted Spurious @ Zigbee mode Ch Low



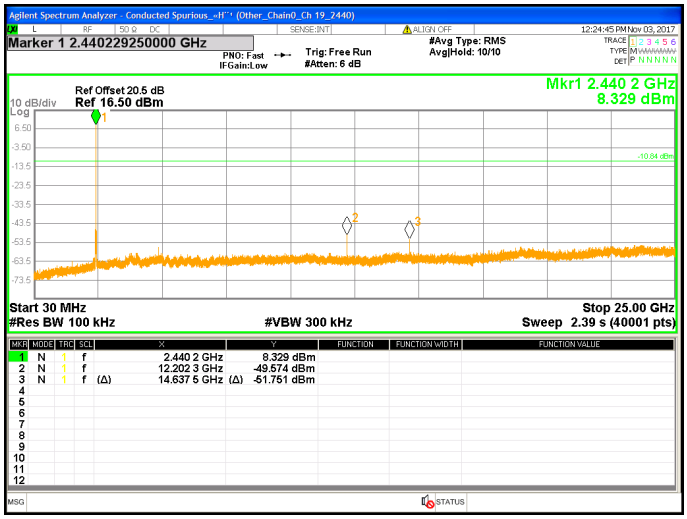
Chain0 : Conducted Spurious @ Zigbee mode Ch Low



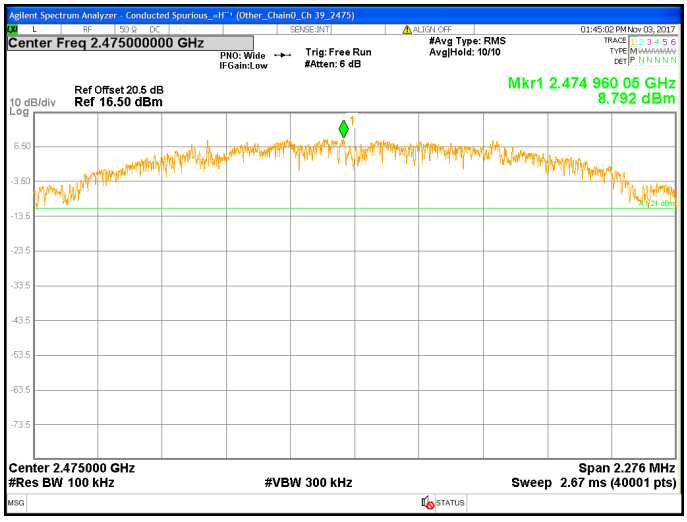
Chain0 : Conducted Spurious @ Zigbee mode Ch Mid



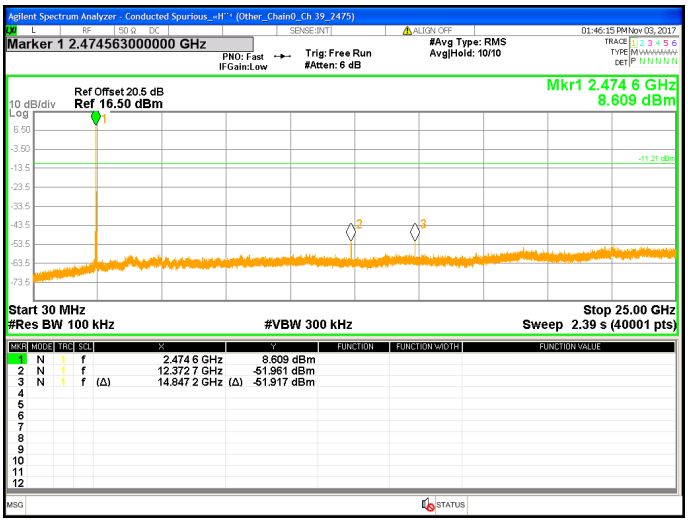
Chain0 : Conducted Spurious @ Zigbee mode Ch Mid



Chain0 : Conducted Spurious @ Zigbee mode Ch High



Chain0 : Conducted Spurious @ Zigbee mode Ch High



6. Emissions in Restricted Frequency Bands (Radiated emission measurements)

6.1. Instrument Setting

Receiver Function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak and Average
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz	1MHz
VBW	≧3 x RBW	3MHz
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation	Auto	Auto

6.2. Test Procedure

Step 1 Configure the EUT according to ANSI C63.10:2013. The EUT was placed on the top of the turntable 0.8 meter (below 1GHz) and 1.5 meter (above 1GHz) above ground. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.

Step 2 Power on the EUT and all the companion devices. The turntable was rotated by 360 degree to find the position of the maximum emission level.

Step 3 The height of the receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of the both horizontal and vertical polarization.

Step 4 If find the frequencies above the limit or below within 3dB, the antenna tower was scan (from 1m to 4m) and then the turntable was rotated to find the maximum reading.

Step 5 Set the test-receiver system to peak or CISPR quasi-peak detector with specified bandwidth under maximum hold mode.

Step 6 For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for reading in spectrum analyzer.
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

Step 7 If the emissions level of the EUT in peak mode was 3dB lower than the average limit specified then testing will be stopped and peak values of the EUT will be reported.

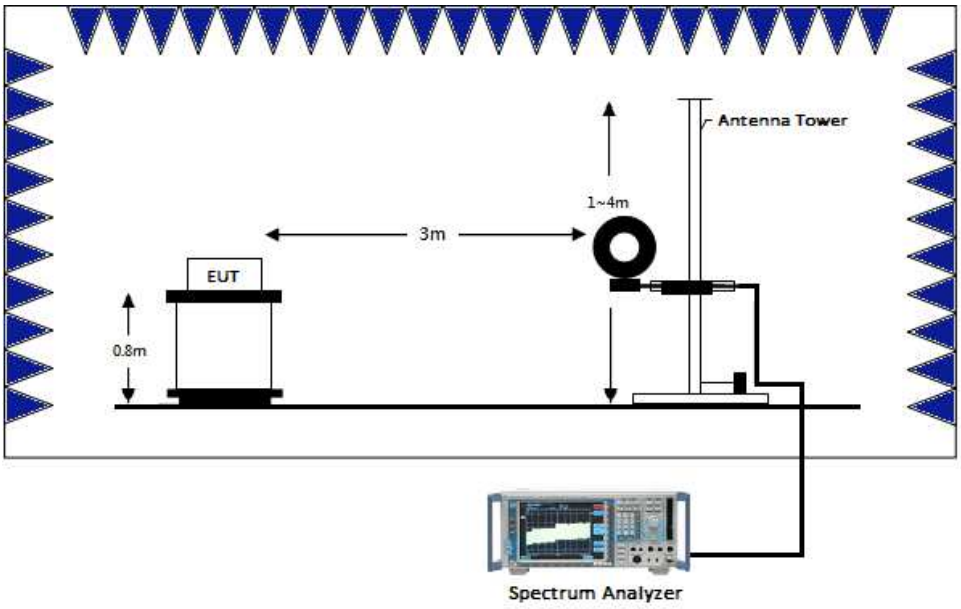
Otherwise, the emissions which do not have 3dB margin will be measured using the quasi-peak method for below 1GHz.

Step 8 For testing above 1GHz, The emissions level of the EUT in peak mode was lower than average limit, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.

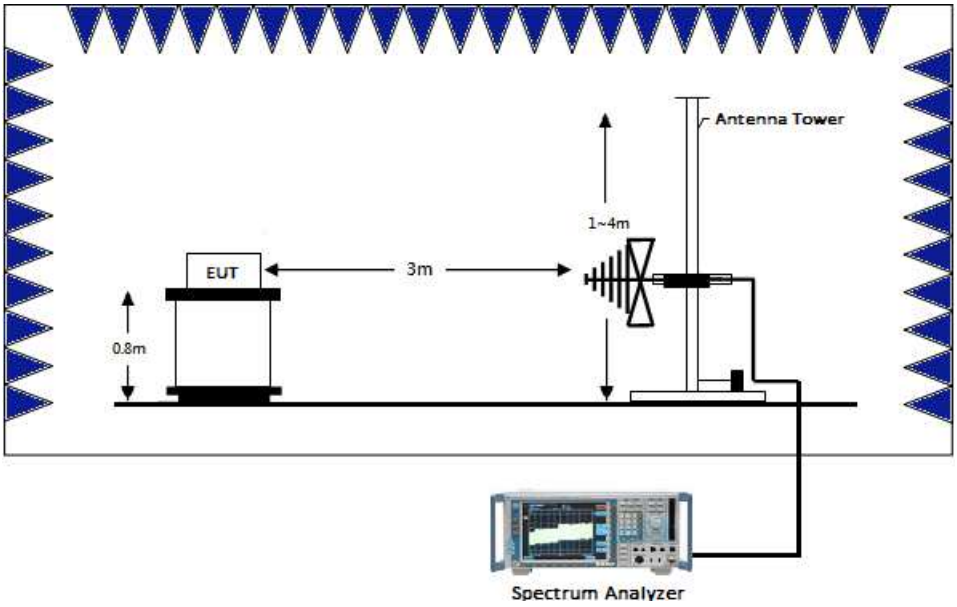
Step 9 In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be quasi-peak measured by receiver.

6.3. Test Diagram

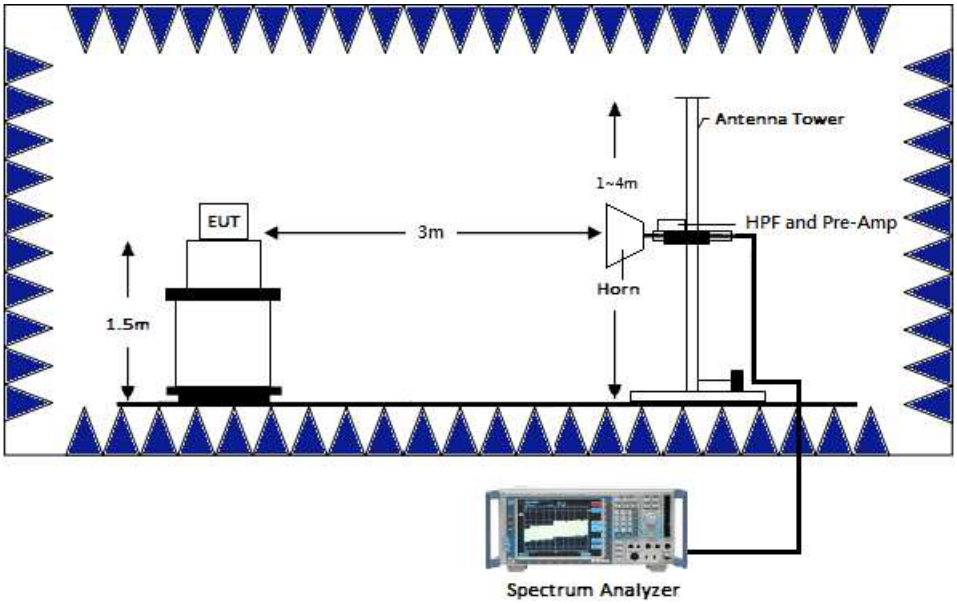
6.3.1. Radiated emission from 9kHz to 30MHz uses Loop Antenna:



6.3.2. Radiated emission below 1GHz using Bilog Antenna



6.3.3. Radiated emission above 1GHz using Horn Antenna



6.4. Limit

Frequency(MHz)	Field Strength(uV/m)	Measurement distance(m)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

6.5. Operating Environment Condition

Temperature (℃) : 25
Relative Humidity (%) : 50
Atmospheric Pressure (hPa) : 1008
Test Date : 2017/11/1~2017/11/7

6.6. Test Result

6.6.1. Measurement results: frequencies 9kHz to 30MHz

The test was performed on EUT under Zigbee continuously transmitting mode. The worst case occurred at channel low.

Mode	Channel	Detector	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV/m)	Limit (dBµV/m)	Margin (dB)
Zigbee	Low	QP	0.02	20.26	22.94	43.21	121.58	-78.37
Zigbee	Low	QP	0.03	20.2	22.03	42.23	118.06	-75.83
Zigbee	Low	QP	0.05	19.63	24.54	44.17	113.62	-69.45
Zigbee	Low	QP	0.07	19.47	25.83	45.29	110.7	-65.41
Zigbee	Low	QP	0.09	19.13	24.57	43.7	108.52	-64.82
Zigbee	Low	QP	0.13	19.05	21.2	40.26	105.33	-65.07
Zigbee	Low	QP	0.15	19.05	28.87	47.92	104.08	-56.16
Zigbee	Low	QP	0.45	19.01	23.28	42.29	94.54	-52.25
Zigbee	Low	QP	0.63	19.12	20.72	39.84	71.62	-31.78
Zigbee	Low	QP	1.11	19.23	15.85	35.08	66.7	-31.62
Zigbee	Low	QP	1.76	19.1	15.81	34.91	69.54	-34.63
Zigbee	Low	QP	2.12	19.03	15.47	34.49	69.54	-35.05

Remark: Corr. Factor = Antenna Factor + Cable Loss

6.6.2 Measurement results: frequencies below 1 GHz

The test was performed on EUT under Zigbee continuously transmitting mode. The worst case occurred at channel low.

Mode	Channel	Ant Polarity	Detector	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Corrected Reading (dBuV/m)	Limit (dBμV/m)	Margin (dB)
Zigbee	Low	H	QP	41.64	20.16	1.24	21.4	40	-18.6
Zigbee	Low	H	QP	142.52	20.37	0.64	21.02	43.5	-22.48
Zigbee	Low	H	QP	280.26	21.32	0.62	21.94	46	-24.06
Zigbee	Low	H	QP	441.28	25.6	1.03	26.63	46	-19.37
Zigbee	Low	H	QP	586.78	28.86	1.36	30.21	46	-15.79
Zigbee	Low	H	QP	730.34	31.21	3.42	34.63	46	-11.37
Zigbee	Low	V	QP	78.5	16.43	2.23	18.65	40	-21.35
Zigbee	Low	V	QP	146.4	20.46	0.19	20.65	43.5	-22.85
Zigbee	Low	V	QP	317.12	22.19	0.24	22.43	46	-23.57
Zigbee	Low	V	QP	396.66	24.24	0.76	25	46	-21
Zigbee	Low	V	QP	569.32	28.48	0.51	29	46	-17
Zigbee	Low	V	QP	730.34	31.21	2.43	33.63	46	-12.37

Remark: Corr. Factor = Antenna Factor + Cable Loss

6.6.2. Measurement results: frequency above 1GHz to 25GHz

Mode	Ch	Ant Polarity	Detector	Freq. (MHz)	Preamp (dB)	Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Zigbee	Low	H	PK	2372	39.01	35.03	16.06	51.1	74	-22.9
Zigbee	Low	H	PK	2440	39.12	35.07	18.3	53.37	74	-20.63
Zigbee	Low	H	PK	4810	40.05	1.97	37.33	39.3	74	-34.7
Zigbee	Low	H	PK	7215	38.17	9.86	33.81	43.67	74	-30.33
Zigbee	Low	H	PK	9620	38.2	14.69	33.99	48.68	74	-25.32
Zigbee	Low	H	PK	12025	38.75	18.81	30.8	49.61	74	-24.39
Zigbee	Low	H	PK	14430	38.5	22.95	26.61	49.56	74	-24.44
Zigbee	Low	H	PK	16835	37.75	22.17	26.43	48.59	74	-25.41
Zigbee	Low	V	PK	1064	39.17	29.08	17.49	46.57	74	-27.43
Zigbee	Low	V	PK	1112	39.13	29.16	15.8	44.97	74	-29.03
Zigbee	Low	V	PK	1292	38.98	29.45	14.44	43.89	74	-30.11
Zigbee	Low	V	PK	1324	38.95	29.5	16.15	45.65	74	-28.35
Zigbee	Low	V	PK	4810	40.05	1.97	38.34	40.31	74	-33.69
Zigbee	Low	V	PK	7215	38.17	9.86	32.36	42.23	74	-31.77
Zigbee	Low	V	PK	9615	38.19	14.68	36.22	50.9	74	-23.1
Zigbee	Low	V	PK	12025	38.75	18.81	34.81	53.62	74	-20.38
Zigbee	Low	V	PK	14430	38.5	22.95	30.37	53.32	74	-20.68
Zigbee	Low	V	PK	16835	37.75	22.17	23.36	45.53	74	-28.47
Zigbee	Mid	H	PK	2476	39.18	35.09	12.99	48.08	74	-25.92
Zigbee	Mid	H	PK	4880	39.93	2.32	37.35	39.67	74	-34.33
Zigbee	Mid	H	PK	7320	38.06	10.33	33.27	43.6	74	-30.4
Zigbee	Mid	H	PK	9760	38.39	14.93	32.24	47.17	74	-26.83
Zigbee	Mid	H	PK	12200	38.59	18.8	28.21	47.01	74	-26.99
Zigbee	Mid	H	PK	14640	38.52	22.64	27.58	50.21	74	-23.79
Zigbee	Mid	H	PK	17080	37.82	23.37	25.42	48.79	74	-25.21
Zigbee	Mid	V	PK	1100	39.14	29.14	15.52	44.66	74	-29.34
Zigbee	Mid	V	PK	1328	38.95	29.51	15.8	45.31	74	-28.69
Zigbee	Mid	V	PK	2408	39.07	35.05	21.21	56.26	74	-17.74
Zigbee	Mid	V	AV	2408	39.07	35.05	18.4	53.45	54	-0.55
Zigbee	Mid	V	PK	2472	39.17	35.09	21.03	56.11	74	-17.89
Zigbee	Mid	V	AV	2472	39.17	35.09	17.58	52.67	54	-1.33
Zigbee	Mid	V	PK	4880	39.93	2.32	39.43	41.75	74	-32.25
Zigbee	Mid	V	PK	7320	38.06	10.33	37.31	47.64	74	-26.36
Zigbee	Mid	V	PK	9760	38.39	14.93	38.21	53.13	74	-20.87
Zigbee	Mid	V	PK	12200	38.59	18.8	34.85	53.65	74	-20.35
Zigbee	Mid	V	PK	14640	38.52	22.64	29.82	52.46	74	-21.54
Zigbee	Mid	V	PK	17080	37.82	23.37	26.61	49.98	74	-24.02

Mode	Ch	Ant Polarity	Detector	Freq. (MHz)	Preamp (dB)	Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Zigbee	High	H	PK	2443	39.13	35.07	12.97	48.04	74	-25.96
Zigbee	High	H	PK	2508	39.23	35.13	13.47	48.6	74	-25.4
Zigbee	High	H	PK	4950	39.81	2.66	37.04	39.7	74	-34.3
Zigbee	High	H	PK	7425	37.95	10.79	36.66	47.45	74	-26.55
Zigbee	High	H	PK	9900	38.58	15.16	35.86	51.03	74	-22.97
Zigbee	High	H	PK	12375	38.43	18.79	27.92	46.71	74	-27.29
Zigbee	High	H	PK	14850	38.52	21.92	26.37	48.29	74	-25.71
Zigbee	High	H	PK	17325	37.96	24.74	26.39	51.13	74	-22.87
Zigbee	High	V	PK	2443	39.13	35.07	21	56.07	74	-17.93
Zigbee	High	V	AV	2443	39.13	35.07	18.07	53.14	54	-0.86
Zigbee	High	V	PK	2508	39.23	35.13	20.69	55.82	74	-18.18
Zigbee	High	V	AV	2508	39.23	35.13	17.47	52.6	54	-1.4
Zigbee	High	V	PK	4950	39.81	2.66	41.02	43.68	74	-30.32
Zigbee	High	V	PK	7425	37.95	10.79	39.38	50.17	74	-23.83
Zigbee	High	V	PK	9900	38.58	15.16	38.03	53.19	74	-20.81
Zigbee	High	V	PK	12375	38.43	18.79	34.3	53.09	74	-20.91
Zigbee	High	V	PK	14850	38.52	21.92	32.35	54.27	74	-19.73
Zigbee	High	V	AV	14850	38.52	21.92	22.95	44.87	54	-9.13
Zigbee	High	V	PK	17325	37.96	24.74	26.33	51.07	74	-22.93

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

7. Emission on Band Edge

7.1. Instrument Setting

Spectrum Function	Setting
Detector	Peak and Average
RBW	1MHz
VBW	3MHz
Sweep	Auto couple
Restrict bands	2310 MHz ~ 2390 MHz 2483.5 MHz ~ 2500 MHz
Attenuation	Auto

7.2. Test Procedure

The test procedure is the same as Emissions in Restricted Frequency Bands (Radiated emission measurements).

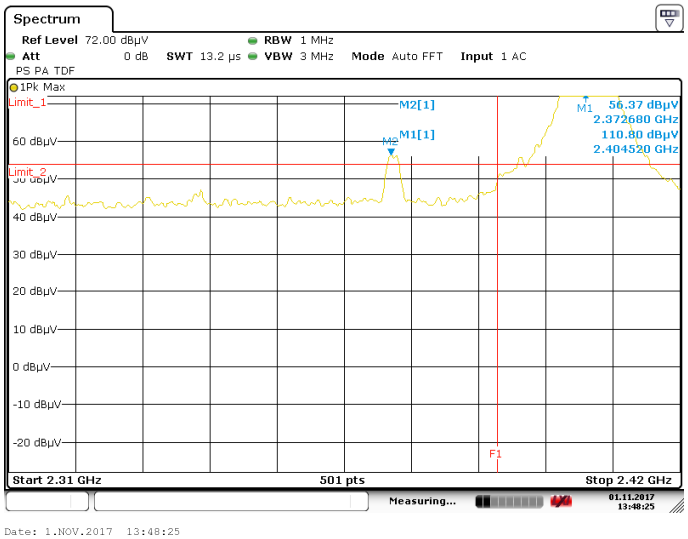
7.3. Operating Environment Condition

Temperature (℃) : 25
Relative Humidity (%) : 50
Atmospheric Pressure (hPa) : 1008
Test Date : 2017/11/1~2017/11/6

7.4. Test Results

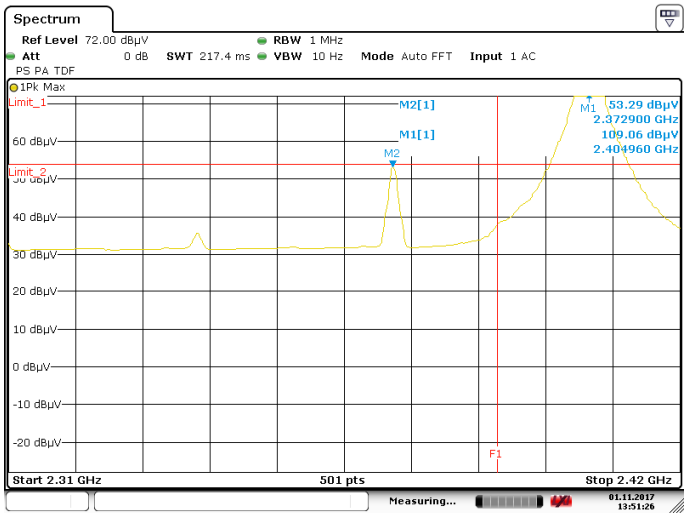
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
Zigbee	2372.68	PK	V	35.03	21.34	56.37	74	-17.63	2310~2390
	2372.90	AV	V	34.45	18.84	53.29	54	-0.71	
	2483.50	PK	V	35.10	22.21	57.31	74	-16.69	2483.5~2500
	2483.50	AV	V	35.10	10.77	45.87	54	-8.13	

Chain0 : Restricted Band Bandedge @ Zigbee Mode Channel Low PK



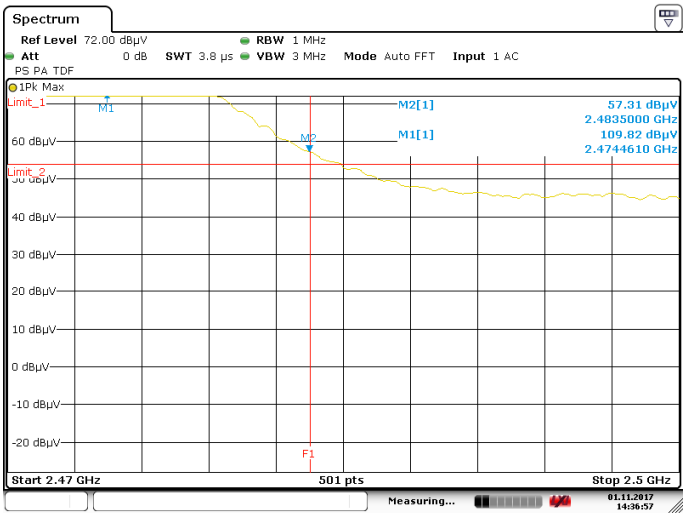
Date: 1.NOV.2017 13:48:25

Chain0 : Restricted Band Bandedge @ Zigbee Mode Channel Low AV



Date: 1.NOV.2017 13:51:26

Chain0 : Restricted Band Bandedge @ Zigbee Mode Channel High PK



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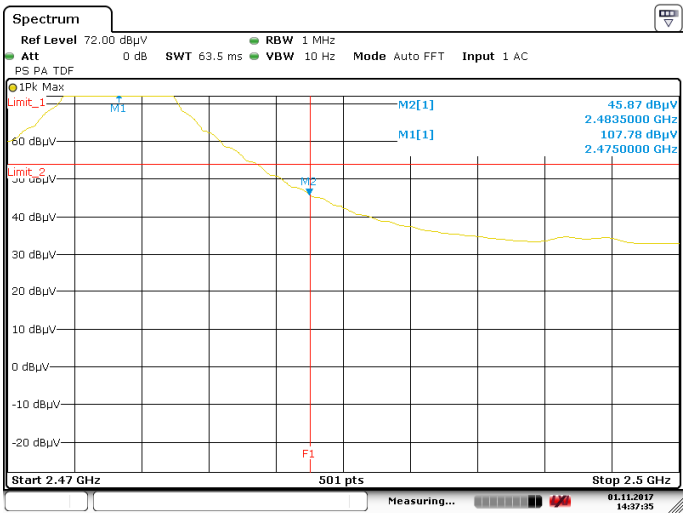
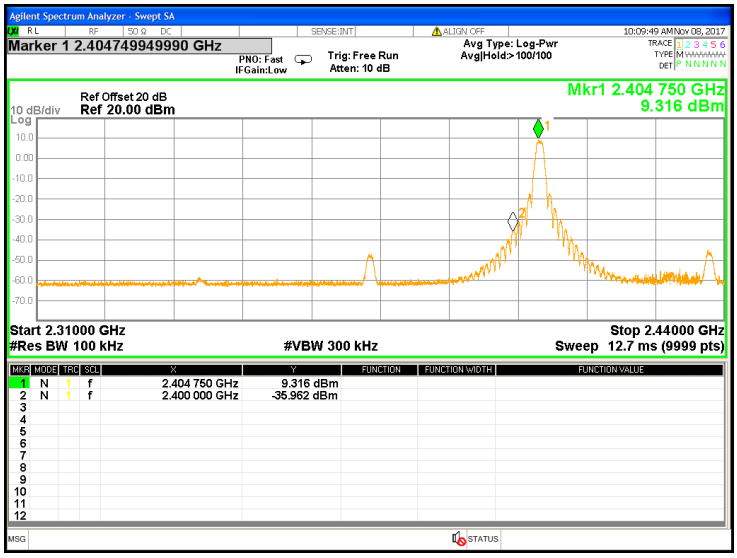
Chain0 : Restricted Band Bandedge @ Zigbee Mode Channel High AV

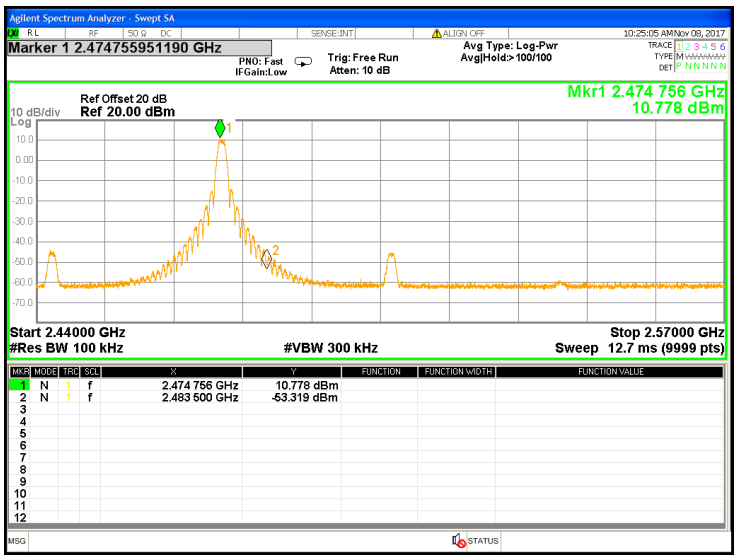


Date: 1.NOV.2017 14:37:35

Zigbee : Authorized Band Bandedge @ Channel Low Mode



Zigbee : Authorized Band Bandedge @ Channel High Mode



8. AC Power Line Conducted Emission

Since the EUT is not connected to AC source, therefore, the test can be waived.

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2016/11/30	2017/11/29
Spectrum Analyzer	Rohde & Schwarz	FSP30	100245	2017/02/15	2018/02/14
Horn Antenna (1-18G)	SHWARZBECK	BBHA 9120 D	9120D-456	2017/02/18	2018/02/17
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2017/09/04	2020/09/02
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2017/04/05	2018/04/04
Pre-Amplifier	AML	AML0120L3401	0419-114	2017/05/22	2018/05/21
Power Meter	Anritsu	ML2495A	0844001	2016/11/09	2017/11/08
Power Sensor	Anritsu	MA2411B	0738452	2016/11/09	2017/11/08
Signal Analyzer	Agilent	N9030A	MY51380492	2017/08/29	2018/08/28
966-2(A) Cable 9kHz~26.5GHz	SUHNER	SMA / EX 100	N/A	2017/08/15	2018/08/14
966-2(B) Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 104P	CB0005	2017/08/15	2018/08/14
RF Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 102	CB0006	2017/05/04	2018/05/03
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2017/03/29	2018/03/28
High Pass Filter	Wainwright	WHKX3.0/ 18G-12SS	N/A	2017/06/02	2018/06/01
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2017/03/30	2018/03/29

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of *k*=2.

Item	Uncertainty
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.14 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.22 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.64 dB
Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.68 dB
Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	2.68 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.54 dB
Emission on the Band Edge Test	3.64 dB
Minimum 6dB Bandwidth	0.85 dB
Maximum Conducted Output Power	0.42 dB
Power Spectral Density	0.85 dB
Emissions In Non-Restricted Frequency Bands	0.85 dB
AC Power Line Conducted Emission	2.48 dB