InnoComm Mobile Technology Corp.

TEST REPORT

REPORT NUMBER
191000317TWN-001

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PAGES
59

DOCUMENT CONTROL NUMBER

Radio Spectrum
TEST REPORT

Applicant:	**InnoComm Mobile Technology Corp.** **3F, No.6, Hsin Ann Rd., Hsinchu Science Park, Hsinchu 30078, Taiwan**
Product:	**SOM module**
Model No.:	**SB30**
Brand Name:	**InnoComm**
FCC ID:	**YAISB30**
Test Method/ Standard:	**47 CFR FCC Part 15.247 & ANSI C63.10 2013** **KDB 558074 D01 v05r02**
Test By:	**Intertek Testing Services Taiwan Ltd.,** **Hsinchu Laboratory** **No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,** **Shiang-Shan District, Hsinchu City, Taiwan**

Testing Laboratory
0597

Prepared and Checked by:

John Cheng
Engineer

Approved by:

Durant Wei
Engineer

Revision History

Report No.	Issue Date	Revision Summary
191000317TWN-001	Dec. 05, 2019	Original report

Table of Contents

Summary of Test Data

Test Requirement	Applicable Rule (Section 15.247)	Result
20dB Bandwidth Test	15.247(a)(1)	Pass
Carrier Frequency Separation Test	15.247(a)(1)	Pass
Number of Hopping Frequencies Test	15.247(a)(1)	Pass
Time of Occupancy (Dwell Time) Test	15.247(a)(1)(iii)	Pass
Maximum Output Power Test	15.247(b)	Pass
RF Antenna Conducted Spurious Test	15.247(d)	Pass
Radiated Spurious Emission Test	15.205, 15.209	Pass
Emission on the Band Edge Test	15.247(d)	Pass
AC Power Line Conducted Emission Test	15.207	Pass
Antenna Requirement	15.203	Pass

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.
Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	SOM module
Model No.:	SB30
Operating Frequency:	2402 MHz ~ 2480 MHz
Channel Number:	79 channels
Frequency of Each Channel:	2402+1 k, k＝0 ~ 78
Access scheme:	GFSK, π/4DQSP, 8DPSK
Rated Power:	DC 2.7V ~ 5.5V
Power Cord:	N/A
Sample receiving date:	Oct. 16, 2019
Sample condition:	Workable
Test Date(s):	Oct. 18, 2019 ~ Nov. 28, 2019

1.2 Antenna description

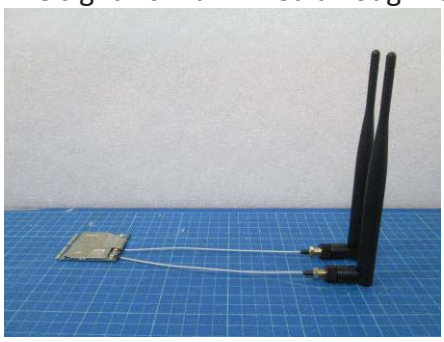
Antenna Gain : 5 dBi / 2 dBi
Antenna Type : Dipole antenna
Connector Type : I-Pex

1.3 Operation mode

The EUT was supplied with DC 5 V from Carrier Board (Test voltage: 120Vac, 60Hz).

Connected to Notebook via USB Cable, executing “CMD” and enter command to select different frequency and modulation.

The signal is maximized through rotation and placement in the two orthogonal axes.



X axis

Y axis

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

1.4 Peripherals equipment

No.	Model no.	Specification
Adapter	EA10681G-120	I/P: 100-240V~, 2.0A, 50-60Hz O/P: 12V, 4.16A

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	HP	HP ProBook 440 G3	5CD8021S9H	Micro USB Cable 0.8 meter × 1
Carrier Board	InnoComm	SB30 carrier Board	N/A	N/A

2. 20dB Bandwidth Test

2.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

The 20dB bandwidth per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set≧ 1% of 20dB Bandwidth, the video bandwidth ≧ RBW, and the SPAN may equal to approximately 2 to 3 times the 20dB bandwidth. The test was performed at 3 channels (lowest, middle and highest channel). The maximum 20dB modulation bandwidth is in the following Table.

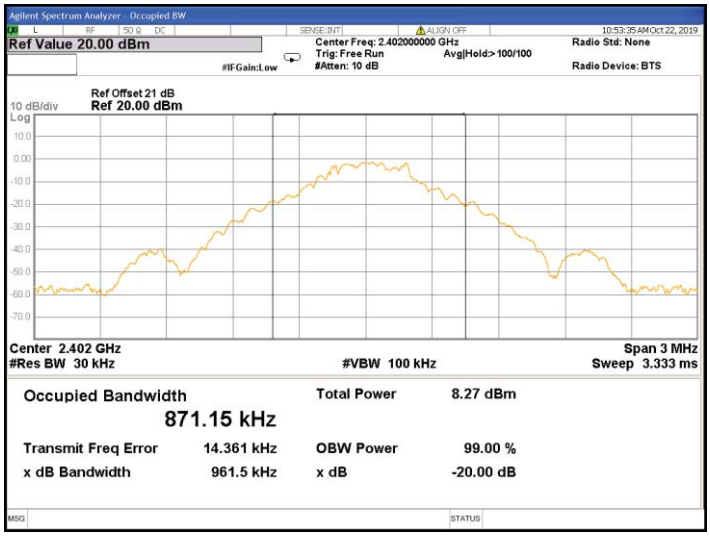
2.2 Operating Environment Condition

Temperature (℃) :	24
Relative Humidity (%) :	57

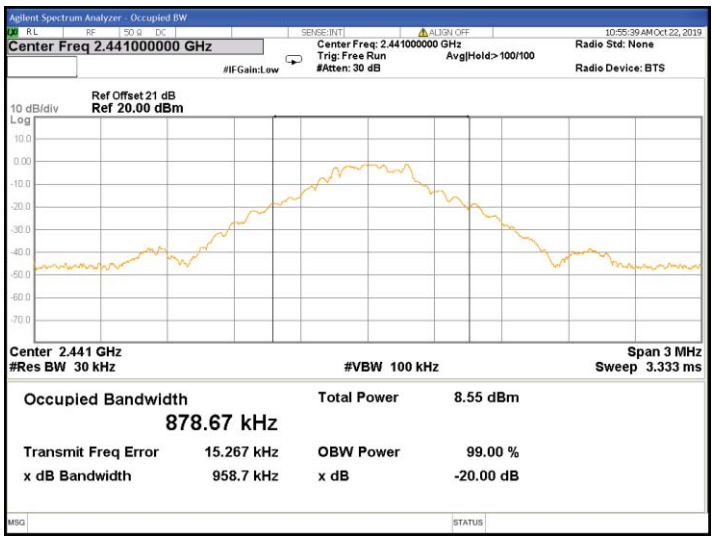
2.3 Test Results

Mode	Channel	Frequency (MHz)	20dB Bandwidth (MHz)
DH5	0	2402	0.962
	39	2441	0.959
	78	2480	0.960
2DH5	0	2402	1.290
	39	2441	1.290
	78	2480	1.291
3DH5	0	2402	1.300
	39	2441	1.296
	78	2480	1.295

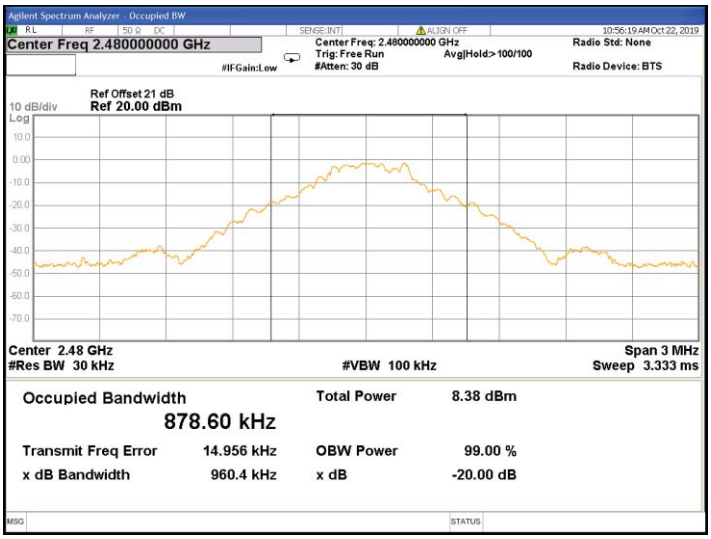
Chain0 : 20dB Occupied Bandwidth @ DH5 Ch 0



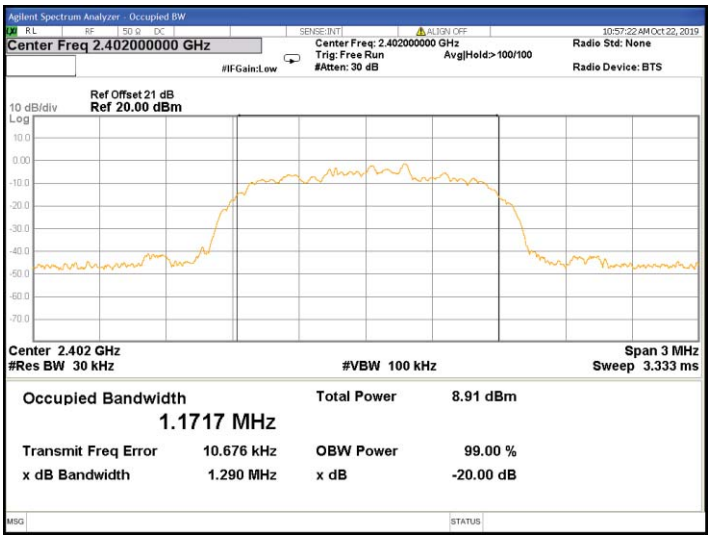
Chain0 : 20dB Occupied Bandwidth @ DH5 Ch 39



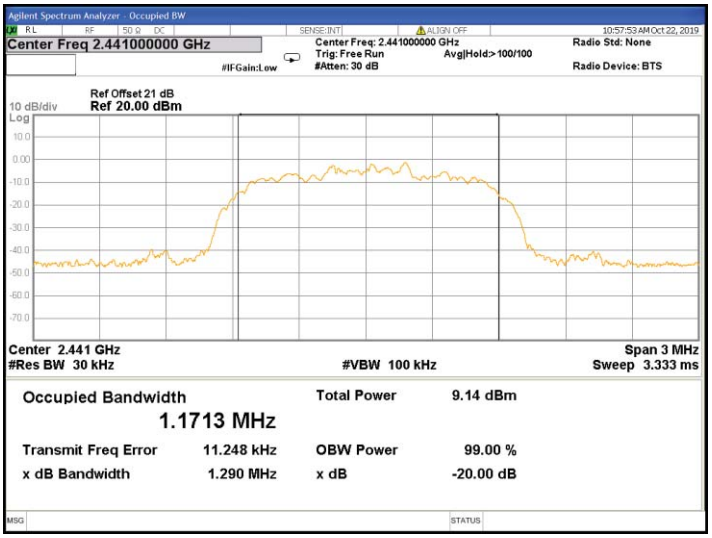
Chain0 : 20dB Occupied Bandwidth @ DH5 Ch 78



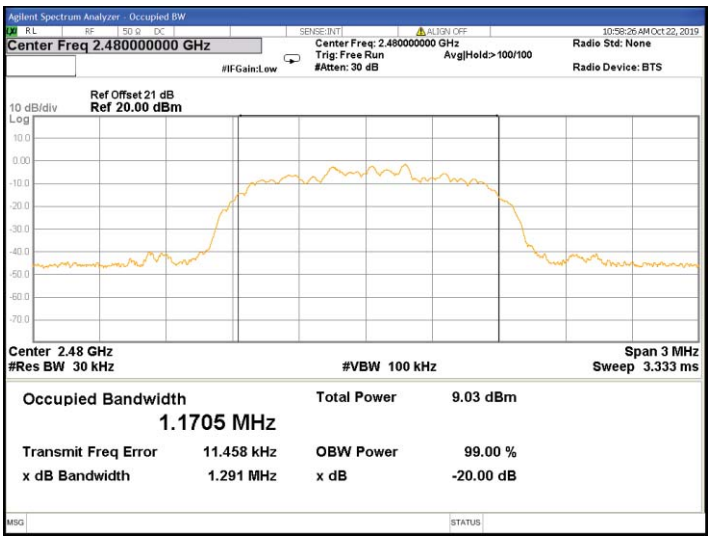
Chain0 : 20dB Occupied Bandwidth @ 2DH5 Ch 0



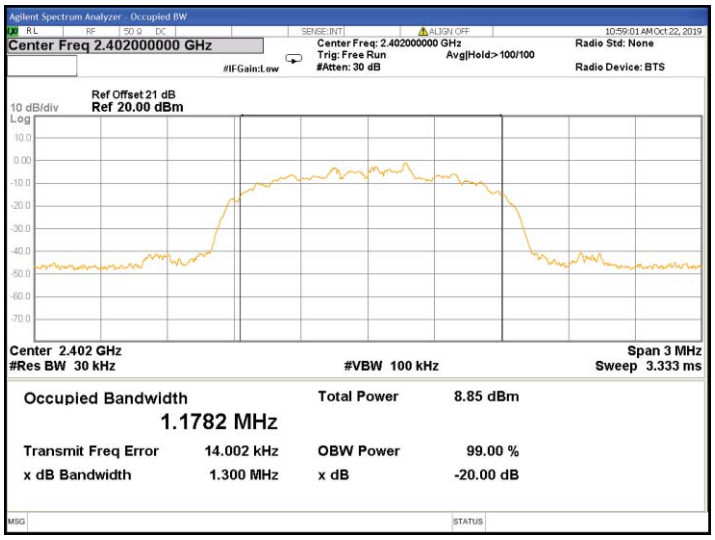
Chain0 : 20dB Occupied Bandwidth @ 2DH5 Ch 39



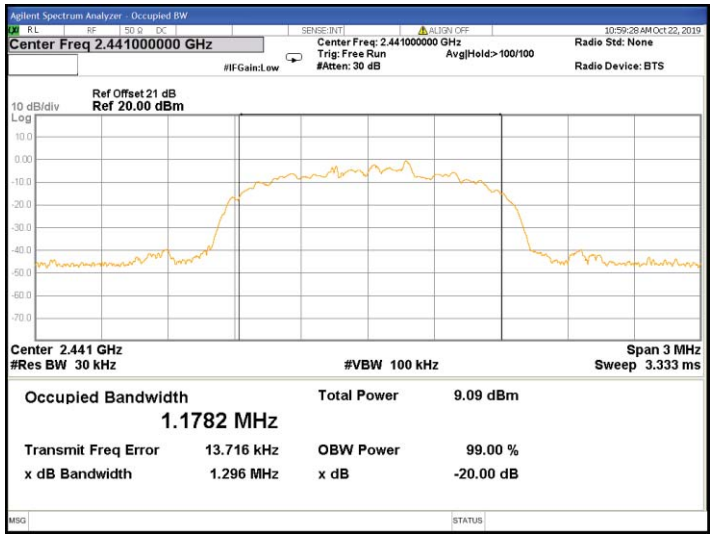
Chain0 : 20dB Occupied Bandwidth @ 2DH5 Ch 78



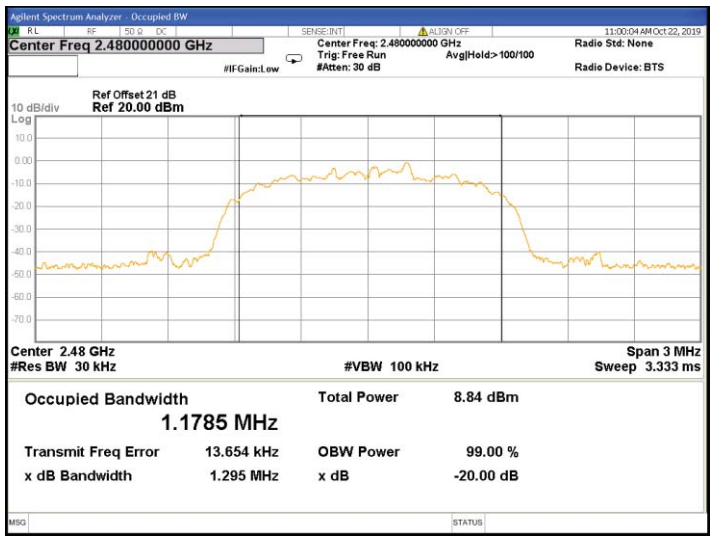
Chain0 : 20dB Occupied Bandwidth @ 3DH5 Ch 0



Chain0 : 20dB Occupied Bandwidth @ 3DH5 Ch 39



Chain0 : 20dB Occupied Bandwidth @ 3DH5 Ch 78



3. Carrier Frequency Separation Test

3.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.
The carrier frequency separation per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at ≧ 1% of the span, the video bandwidth ≧ RBW, and the SPAN was wide enough to capture the peaks of two adjacent channels. The carrier frequency separation result is in the following Table.

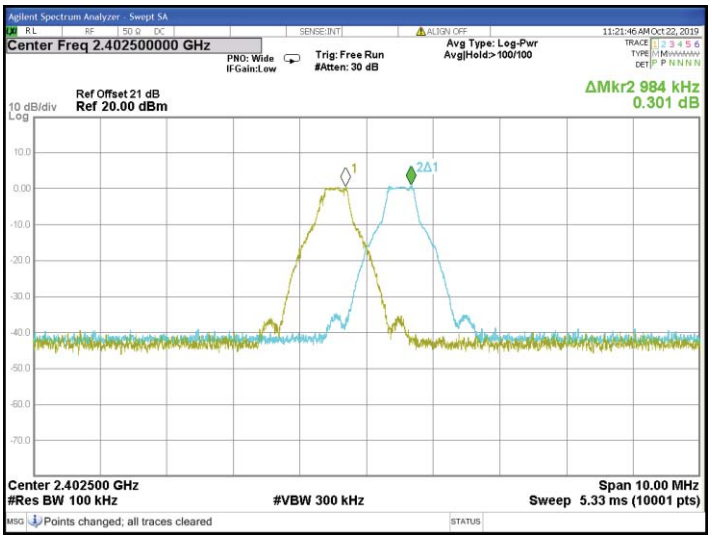
3.2 Operating Environment Condition

Temperature (℃) :	24
Relative Humidity (%) :	57

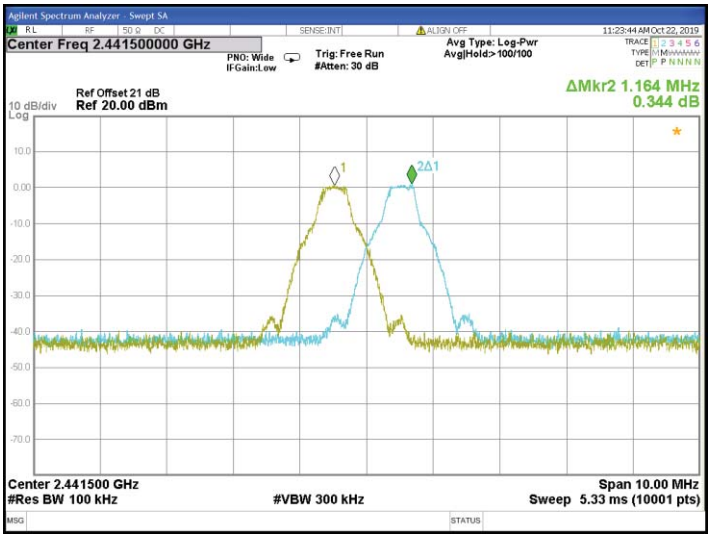
3.3 Test Results

Mode	Channel	Frequency (MHz)	Adjacent channel separation (MHz)	Limit (MHz)
DH5	0	2402	0.984	0.641
	39	2441	1.164	0.639
	78	2480	1.090	0.640
2DH5	0	2402	1.233	0.860
	39	2441	1.303	0.860
	78	2480	1.001	0.861
3DH5	0	2402	0.997	0.867
	39	2441	1.018	0.864
	78	2480	1.089	0.863

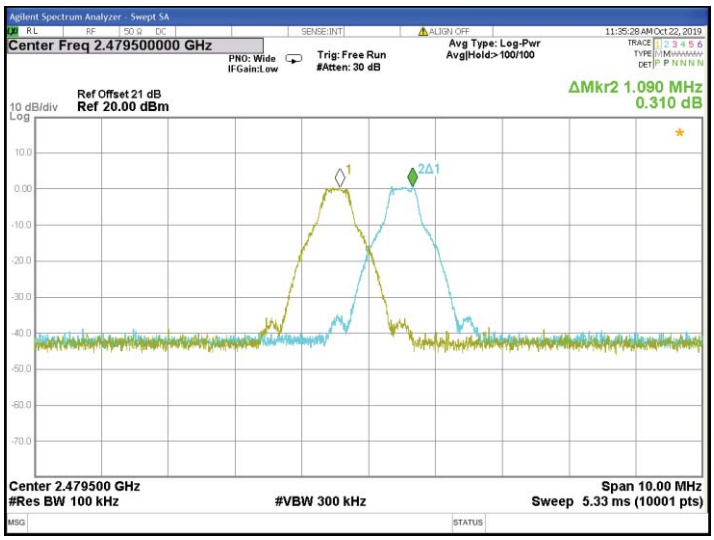
Chain0 : Carrier Frequency Separation @ DH5 Ch 0



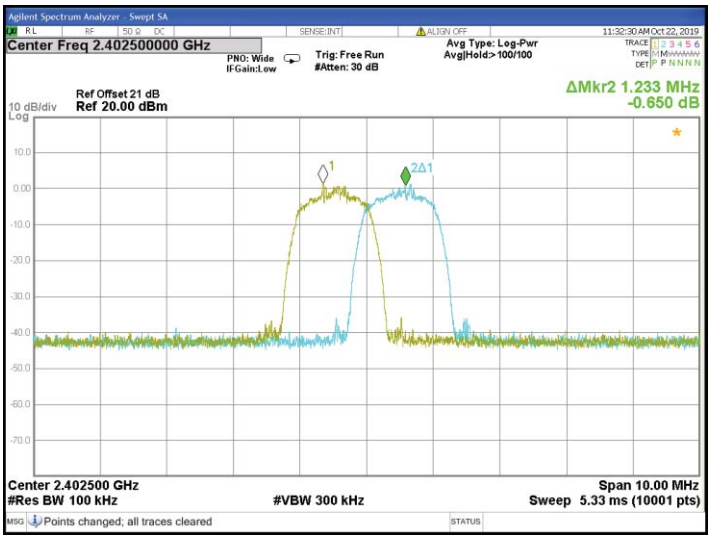
Chain0 : Carrier Frequency Separation @ DH5 Ch 39



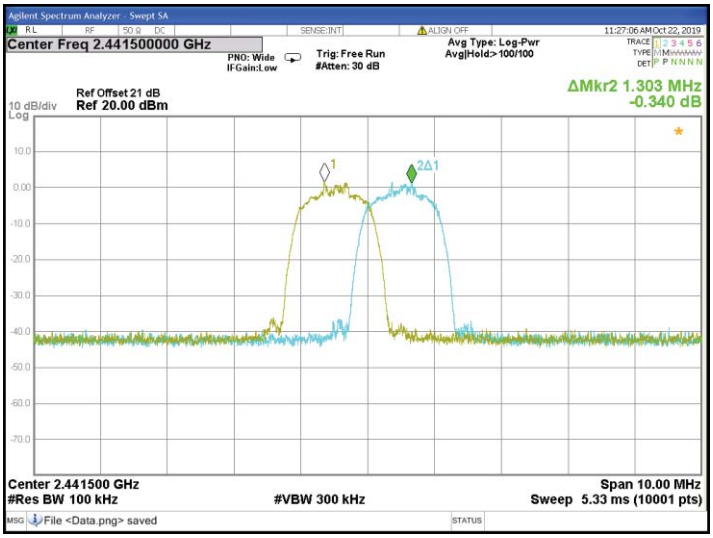
Chain0 : Carrier Frequency Separation @ DH5 Ch 78



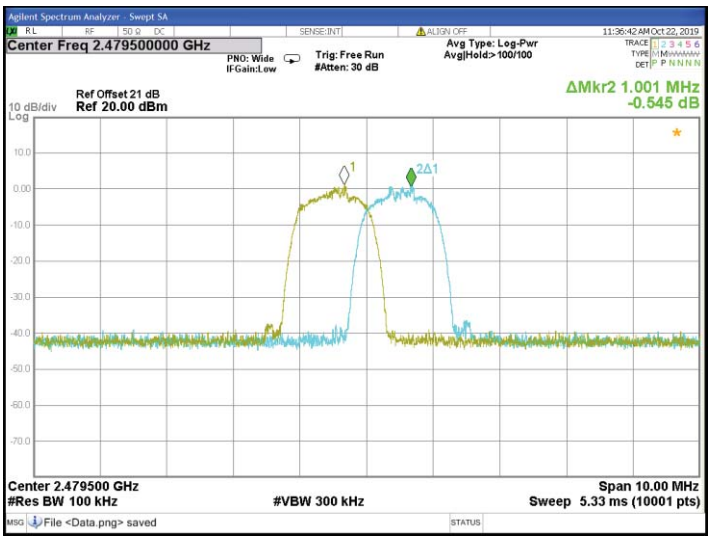
Chain0 : Carrier Frequency Separation @ 2DH5 Ch 0



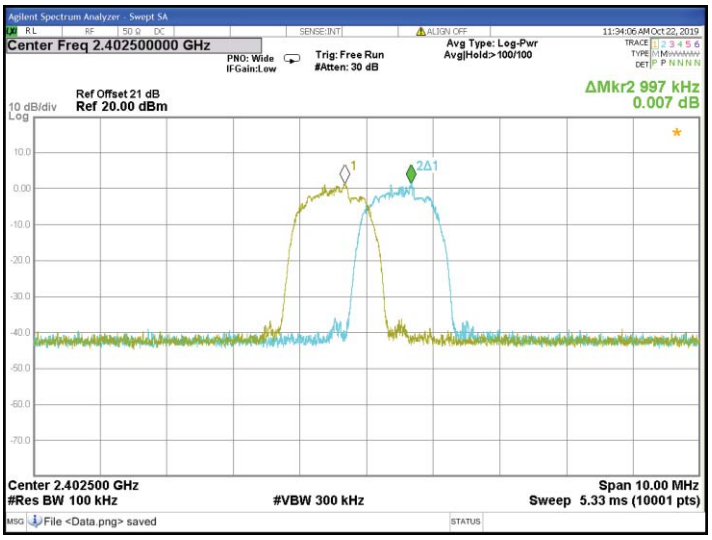
Chain0 : Carrier Frequency Separation @ 2DH5 Ch 39



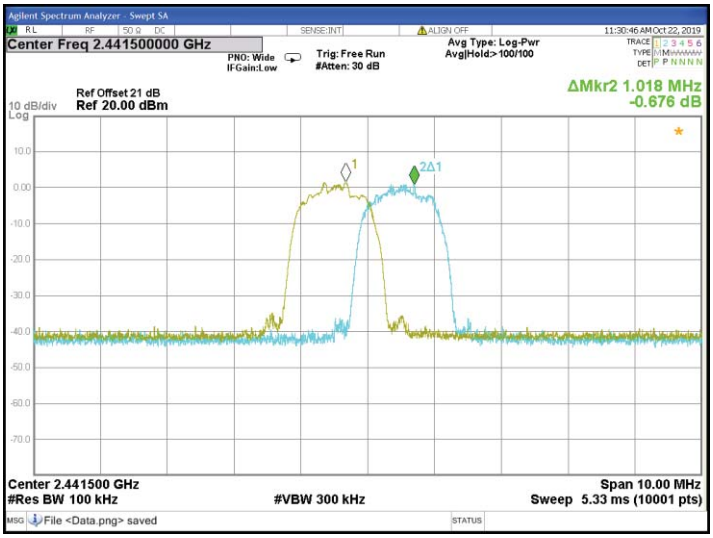
Chain0 : Carrier Frequency Separation @ 2DH5 Ch 78



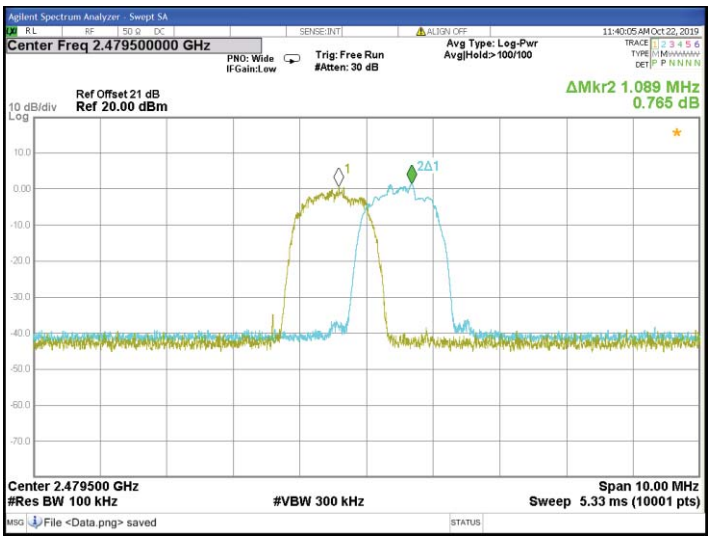
Chain0 : Carrier Frequency Separation @ 3DH5 Ch 0



Chain0 : Carrier Frequency Separation @ 3DH5 Ch 39



Chain0 : Carrier Frequency Separation @ 3DH5 Ch 78



4. Number of Hopping Frequencies Test

4.1 Test Setup & Procedure

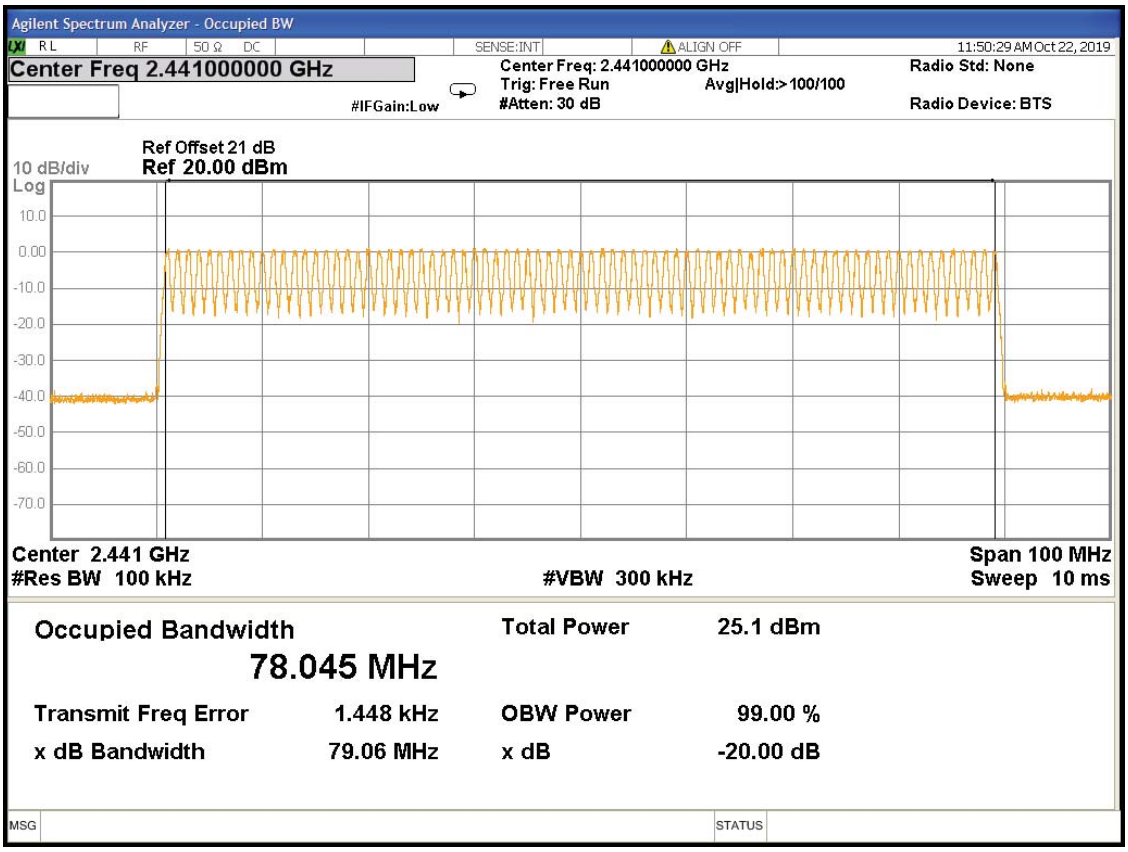
The test procedure was according to FCC measurement guidelines DA 00-705.
The number of hopping frequencies per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at ≧ 1% of the span, the video bandwidth ≧ RBW, and the SPAN was the frequency band of operation. The carrier frequency separation result is in the following Table.

4.2 Operating Environment Condition

Temperature (℃) :	24
Relative Humidity (%) :	57

4.3 Test Results

Frequency Range (MHz)	Hopping Channels
2402~2480	79


Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω DC
SENSE:INT
ALIGN OFF
11:50:29 AM Oct 22, 2019
Center Freq 2.441000000 GHz
Center Freq: 2.441000000 GHz
Trig: Free Run
Avg|Hold:>100/100
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Ref Offset 21 dB
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 2.441 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 100 MHz
Sweep 10 ms
Occupied Bandwidth
78.045 MHz
Total Power
25.1 dBm
Transmit Freq Error
1.448 kHz
OBW Power
99.00 %
x dB Bandwidth
79.06 MHz
x dB
-20.00 dB
MSG
STATUS

5. Time of Occupancy (Dwell Time)

5.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.
The time of occupancy (dwell time) per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth ≧ RBW, and the zero span function of spectrum analyzer was enable. The EUT has its hopping function enable.

5.2 Operating Environment Condition

Temperature (℃) :	24
Relative Humidity (%) :	57

5.3 Test Results

The total sweep time is 0.4×79 Channels =31.6 seconds
Due to the number of hops in the 31.6s sweep, we determined to reduce the sweep time to 5s, count the number of hops and multiply by 6.32. The total number of hops will be multiplied by the measured time of one pulse.

Mode	Packet type	Pulse duration (ms)	Measure time (s)	Dwell time (s)	Limit (s)	Test Results
GFSK	DH1	0.383	31.6	0.122	0.4	Pass
	DH3	1.637	31.6	0.262	0.4	Pass
	DH5	2.878	31.6	0.307	0.4	Pass
π/4-DPSK	2DH1	0.388	31.6	0.124	0.4	Pass
	2DH3	1.641	31.6	0.263	0.4	Pass
	2DH5	2.882	31.6	0.307	0.4	Pass
8-DPSK	3DH1	0.388	31.6	0.124	0.4	Pass
	3DH3	1.641	31.6	0.263	0.4	Pass
	3DH5	2.885	31.6	0.308	0.4	Pass

Note: (1) Dwell time = 1600 ÷ (79 × N) × Pulse duration × Measure time
(2) DH1, N=2
DH3, N=4
DH5, N=6

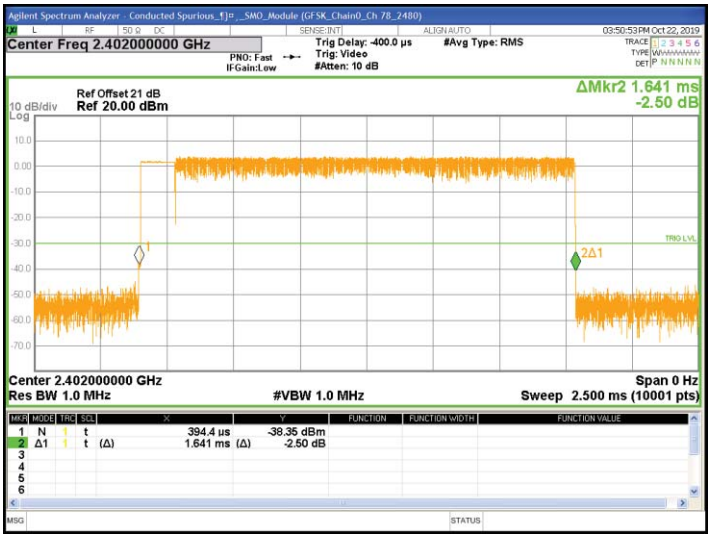
Chain0 : Dwell Time @ DH1 Ch 0

Chain0 : Dwell Time @ DH3 Ch 0

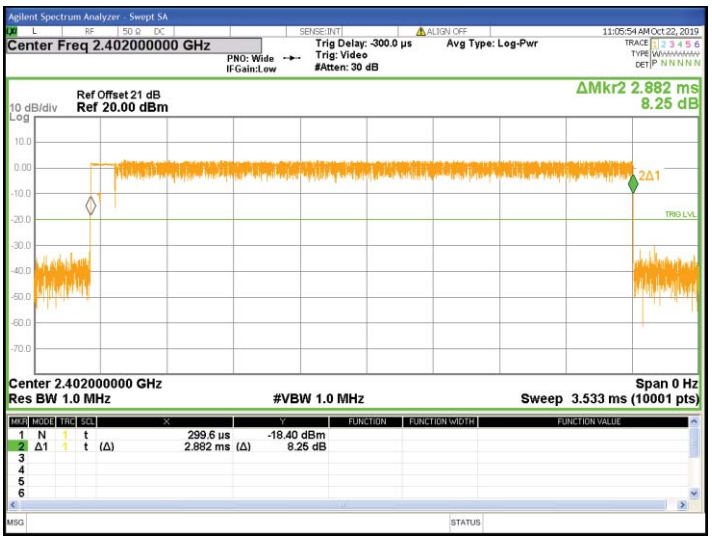
Chain0 : Dwell Time @ DH5 Ch 0

Chain0 : Dwell Time @ 2DH1 Ch 0

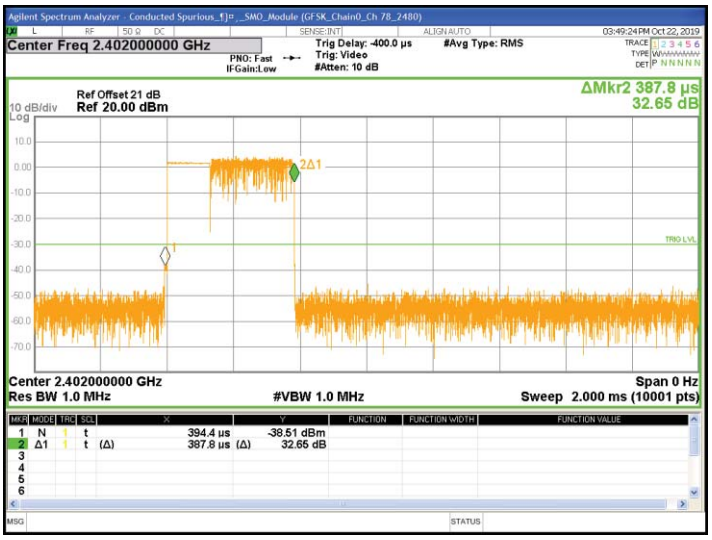
Chain0 : Dwell Time @ 2DH3 Ch 0



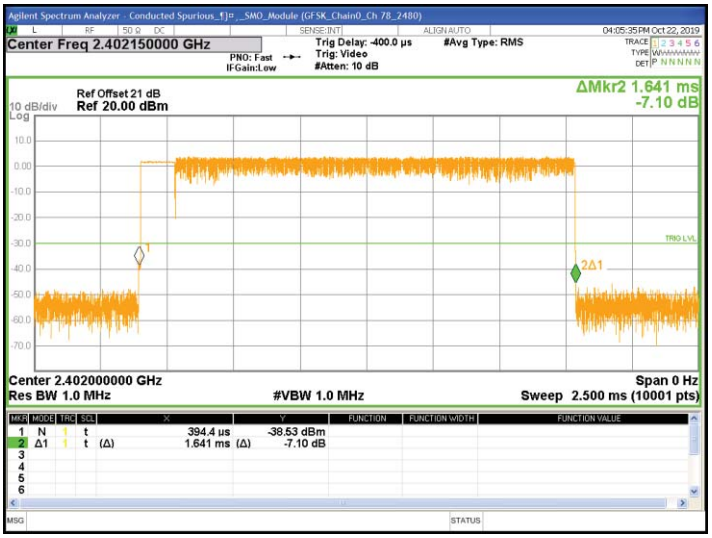
Chain0 : Dwell Time @ 2DH5 Ch 0



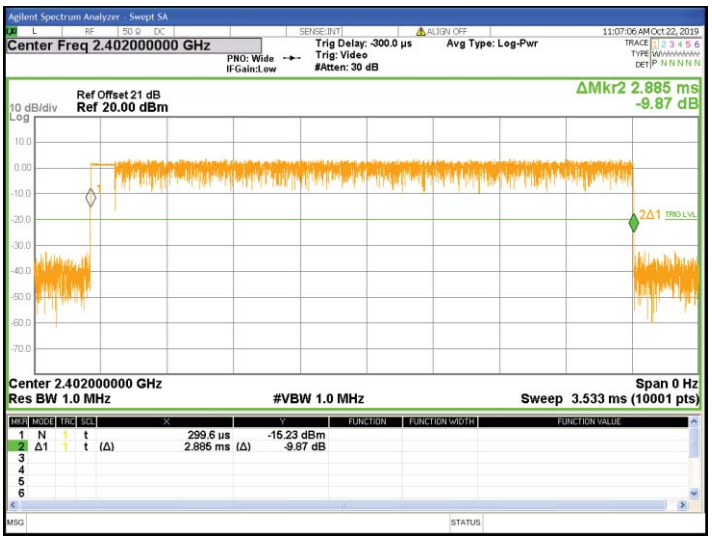
Chain0 : Dwell Time @ 3DH1 Ch 0



Chain0 : Dwell Time @ 3DH3 Ch 0



Chain0 : Dwell Time @ 3DH5 Ch 0



5. Maximum Output Power Test

5.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.
The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to peak power meter via power sensor. Power was read directly and cable loss correction (2 dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

5.2 Operating Environment Condition

Temperature (℃) :	24
Relative Humidity (%) :	57

5.3 Test Results

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximun power (PK) (dBm)	Maximun power (PK) (mW)	Limit (dBm)	Margin (dB)
DH5	0	2402	-0.27	0.94	1.49	1.41	30	-28.51
	39	2441	-0.13	0.97	1.41	1.38	30	-28.59
	78	2480	-0.23	0.95	1.40	1.38	30	-28.60
2DH5	0	2402	-0.15	0.97	2.76	1.89	30	-27.24
	39	2441	-0.10	0.98	3.13	2.06	30	-26.87
	78	2480	-0.15	0.97	2.89	1.95	30	-27.11
3DH5	0	2402	-0.19	0.96	2.78	1.90	30	-27.22
	39	2441	-0.06	0.99	3.21	2.09	30	-26.79
	78	2480	-0.15	0.97	3.05	2.02	30	-26.95

5. RF Antenna Conducted Spurious Test

5.1 Test Setup & Procedure

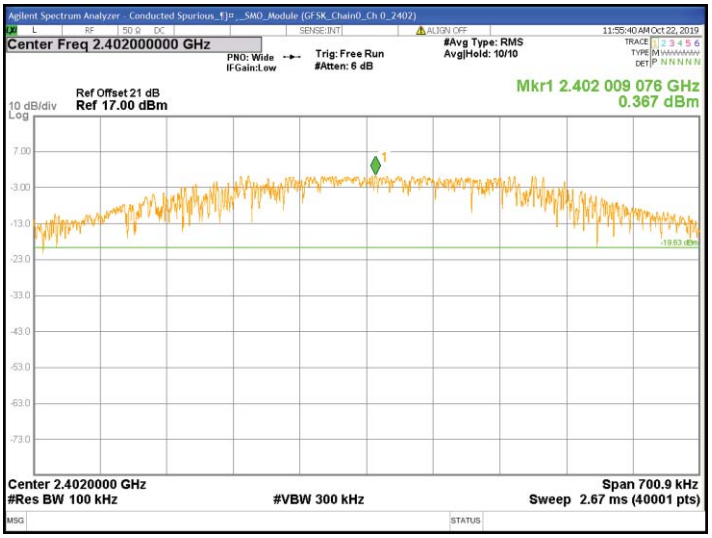
The test procedure was according to FCC measurement guidelines DA 00-705.
The measurements were performed from 30MHz to 25GHz RF antenna conducted per FCC 15.247 (c) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz.
Harmonics and spurious noise must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

5.2 Operating Environment Condition

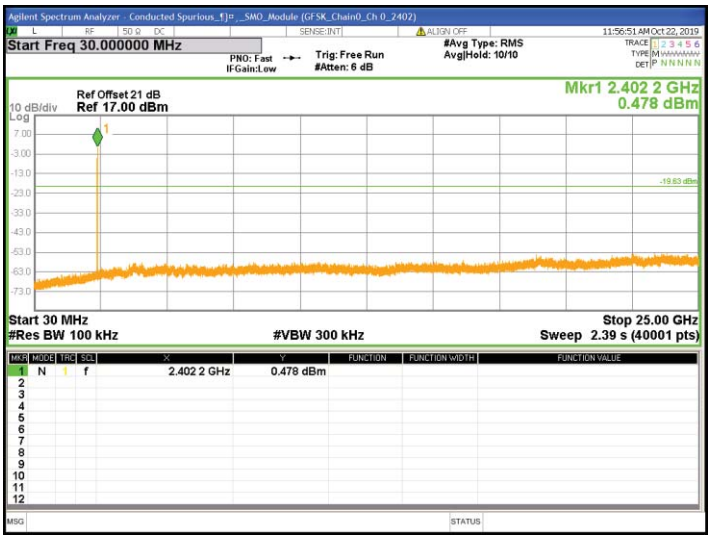
Temperature (℃) :	24
Relative Humidity (%) :	57

5.3 Test Results

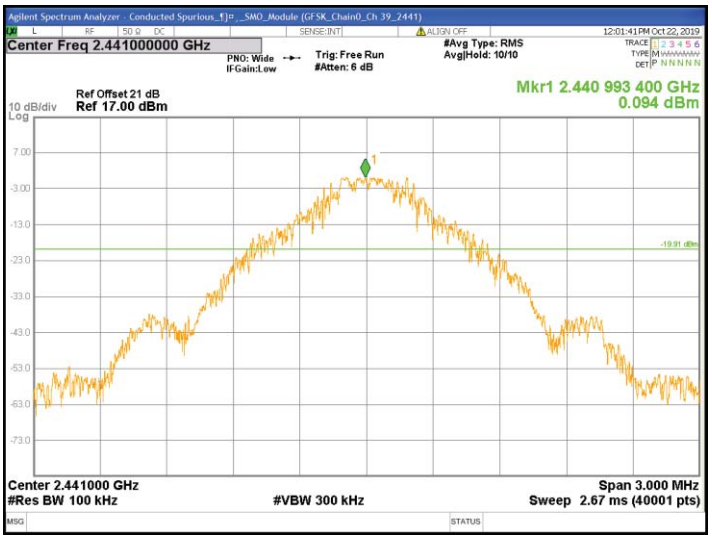
Chain0 : Conducted Spurious @ DH5 Ch 0



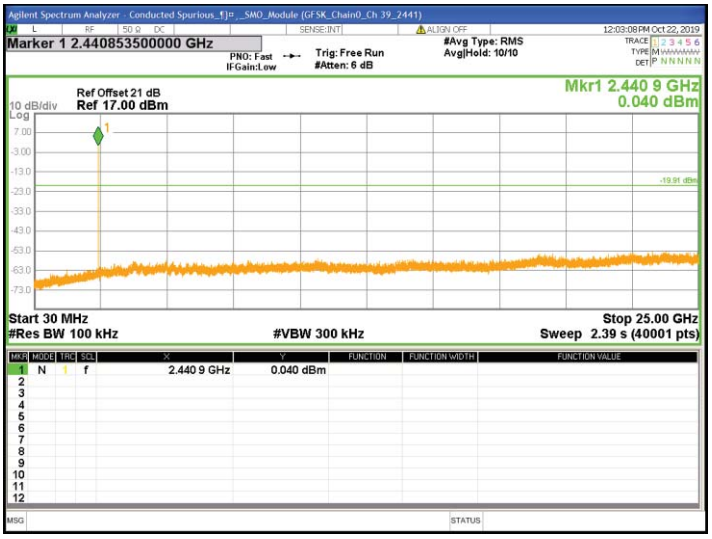
Chain0 : Conducted Spurious @ DH5 Ch 0



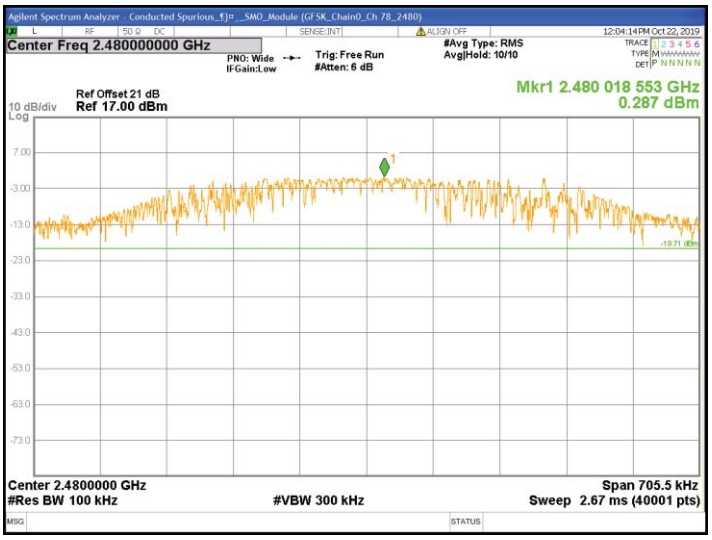
Chain0 : Conducted Spurious @ DH5 Ch 39



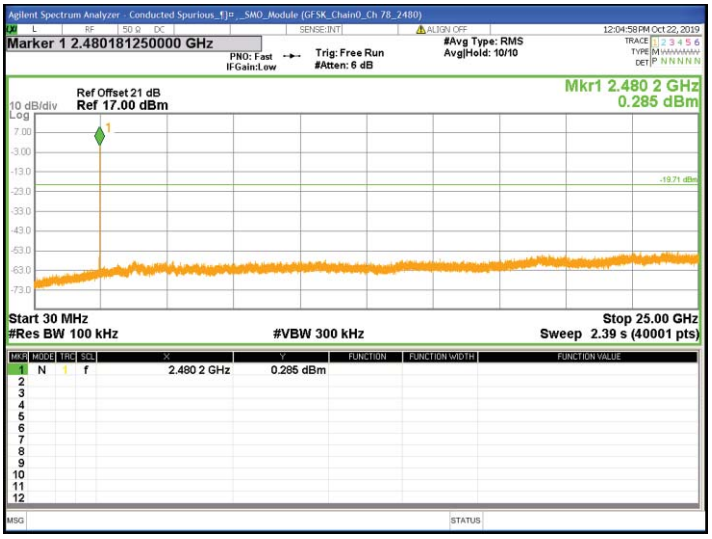
Chain0 : Conducted Spurious @ DH5 Ch 39



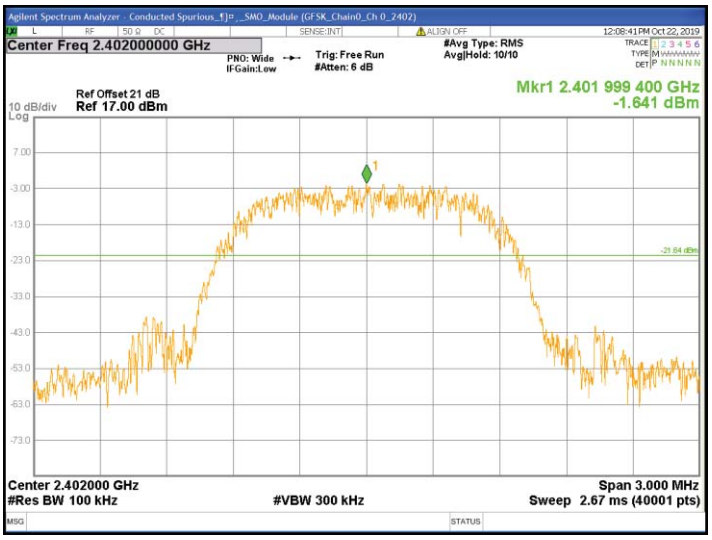
Chain0 : Conducted Spurious @ DH5 Ch 78



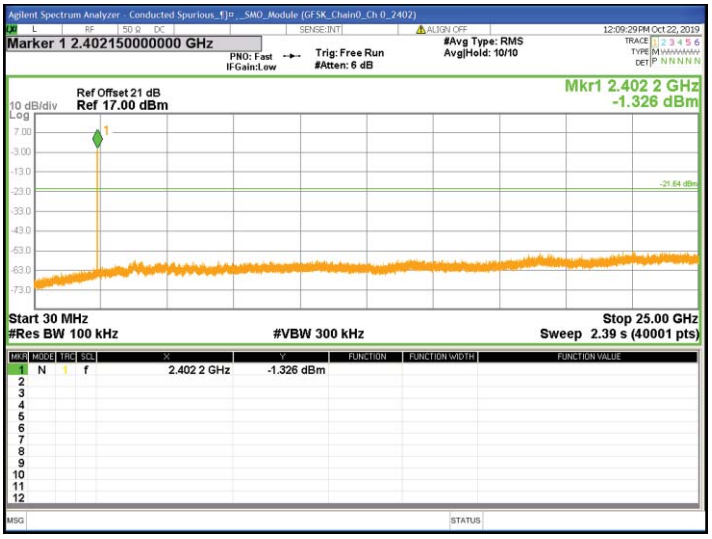
Chain0 : Conducted Spurious @ DH5 Ch 78



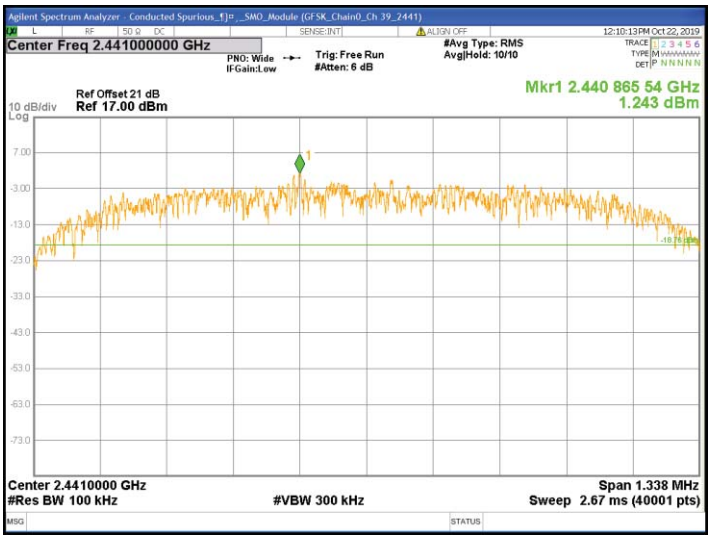
Chain0 : Conducted Spurious @ 2DH5 Ch 0



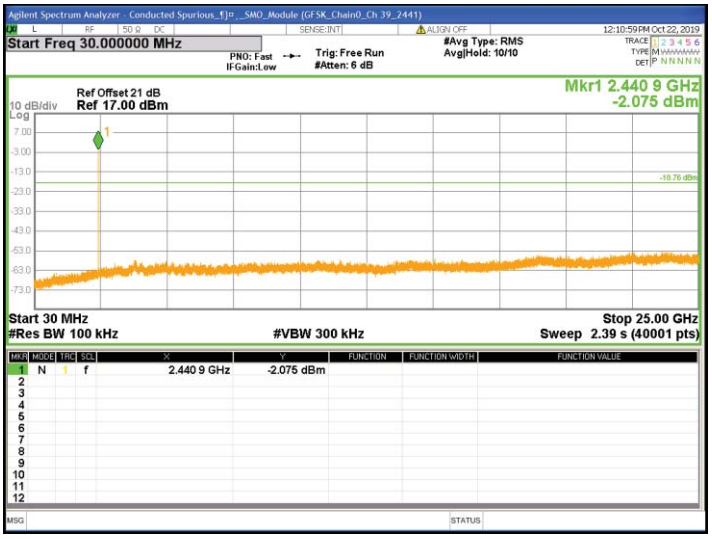
Chain0 : Conducted Spurious @ 2DH5 Ch 0



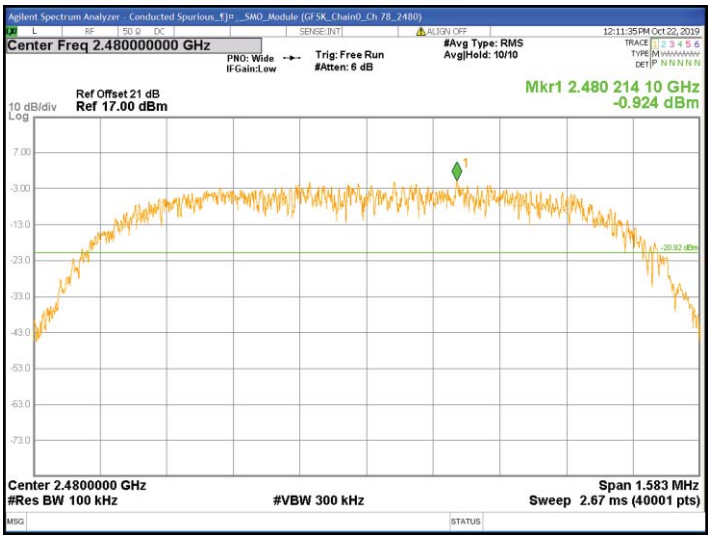
Chain0 : Conducted Spurious @ 2DH5 Ch 39



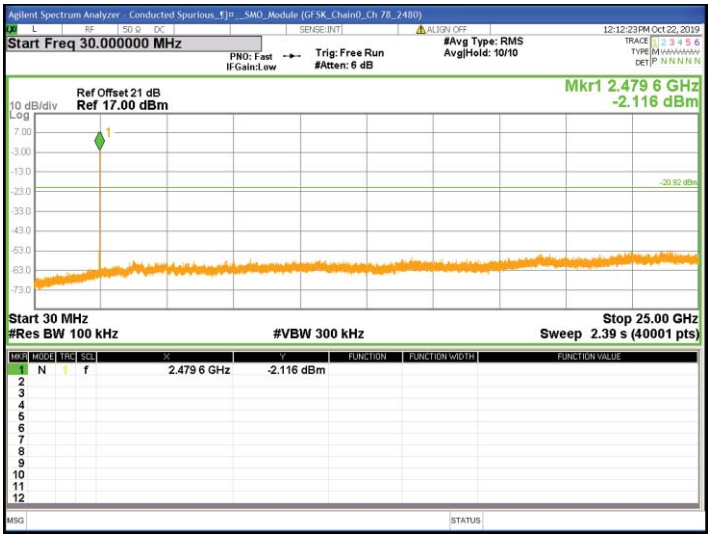
Chain0 : Conducted Spurious @ 2DH5 Ch 39



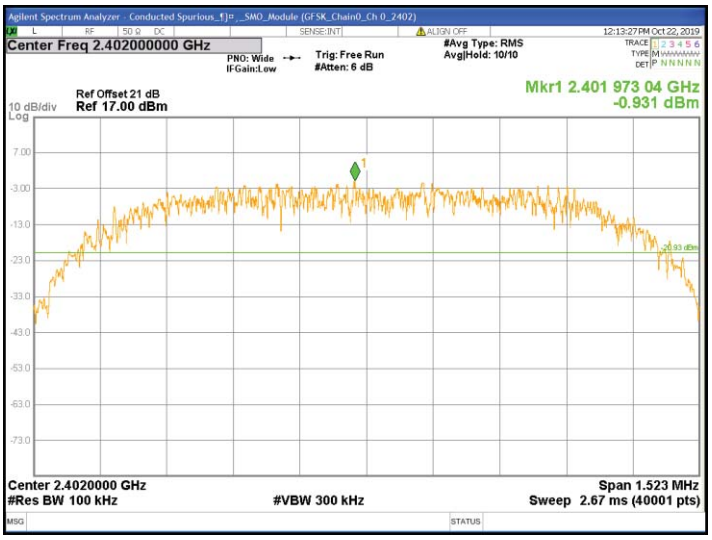
Chain0 : Conducted Spurious @ 2DH5 Ch 78



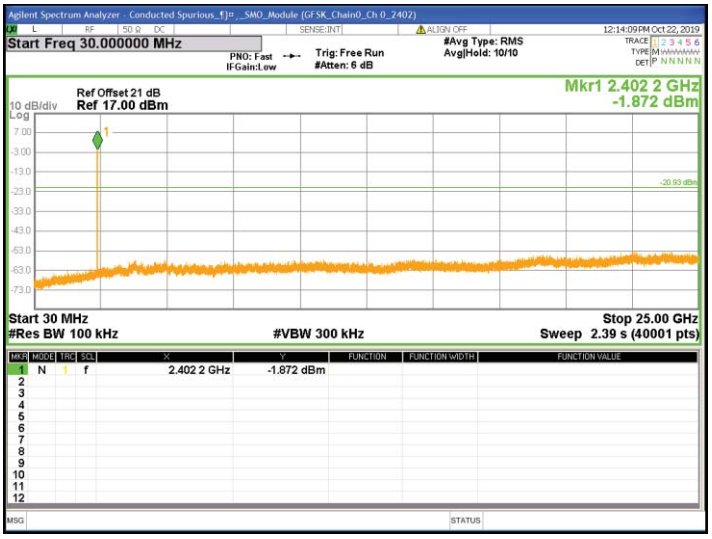
Chain0 : Conducted Spurious @ 2DH5 Ch 78



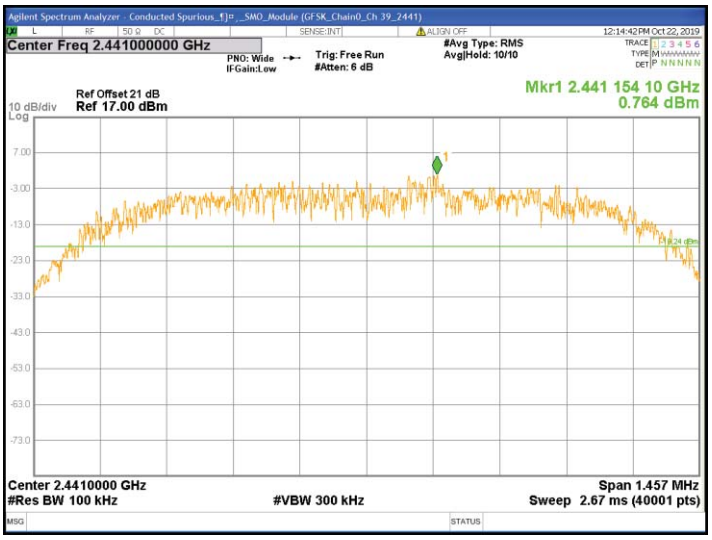
Chain0 : Conducted Spurious @ 3DH5 Ch 0



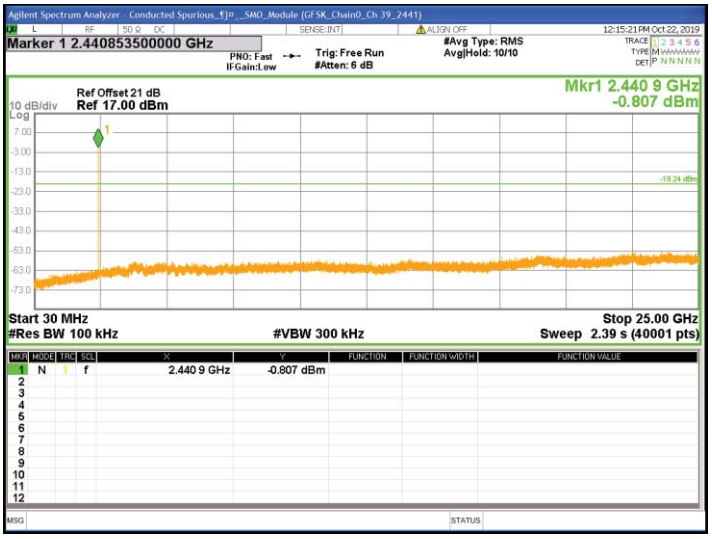
Chain0 : Conducted Spurious @ 3DH5 Ch 0



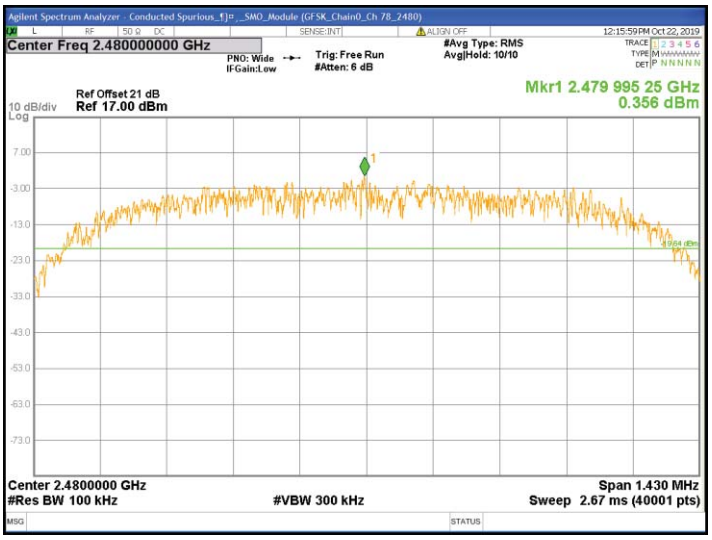
Chain0 : Conducted Spurious @ 3DH5 Ch 39



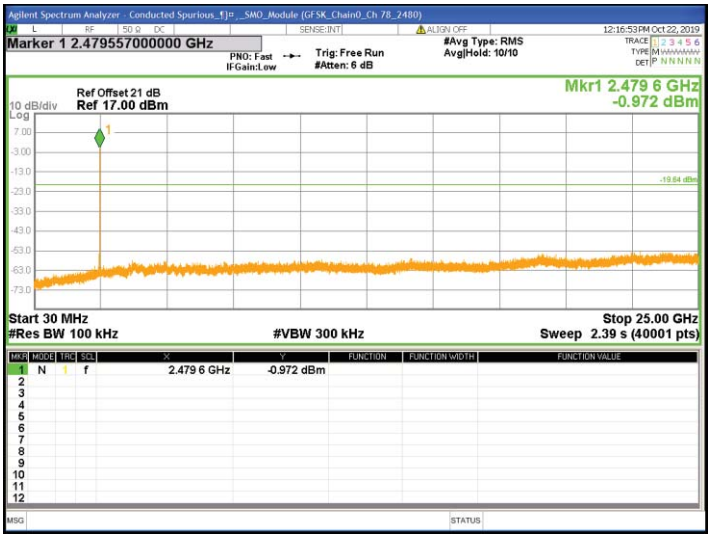
Chain0 : Conducted Spurious @ 3DH5 Ch 39



Chain0 : Conducted Spurious @ 3DH5 Ch 78



Chain0 : Conducted Spurious @ 3DH5 Ch 78



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

6.1 Instrument Setting

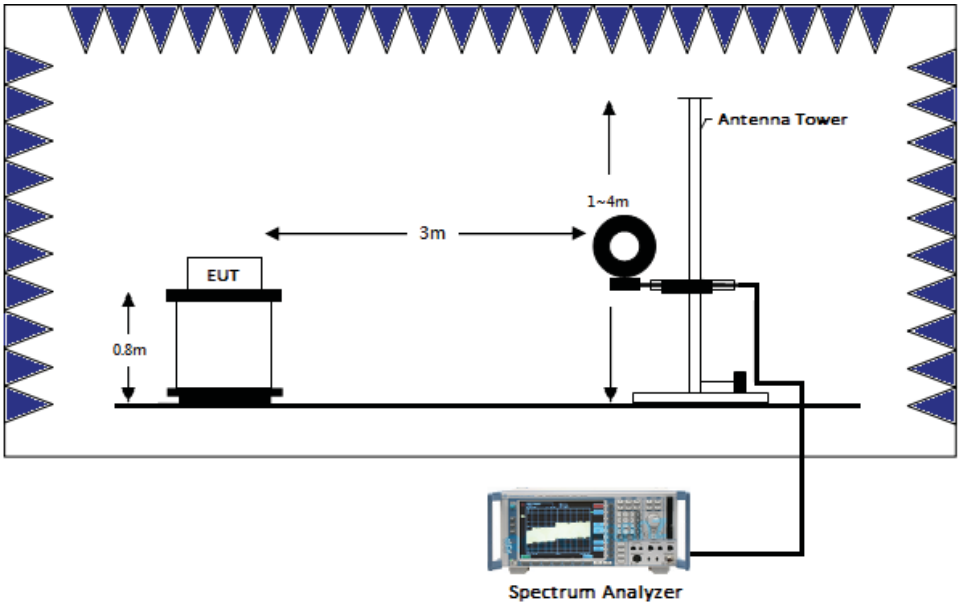
Receiver Function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak and Average
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz	1MHz
VBW	≧3 x RBW	3MHz
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation	Auto	Auto

6.2 Test Procedure

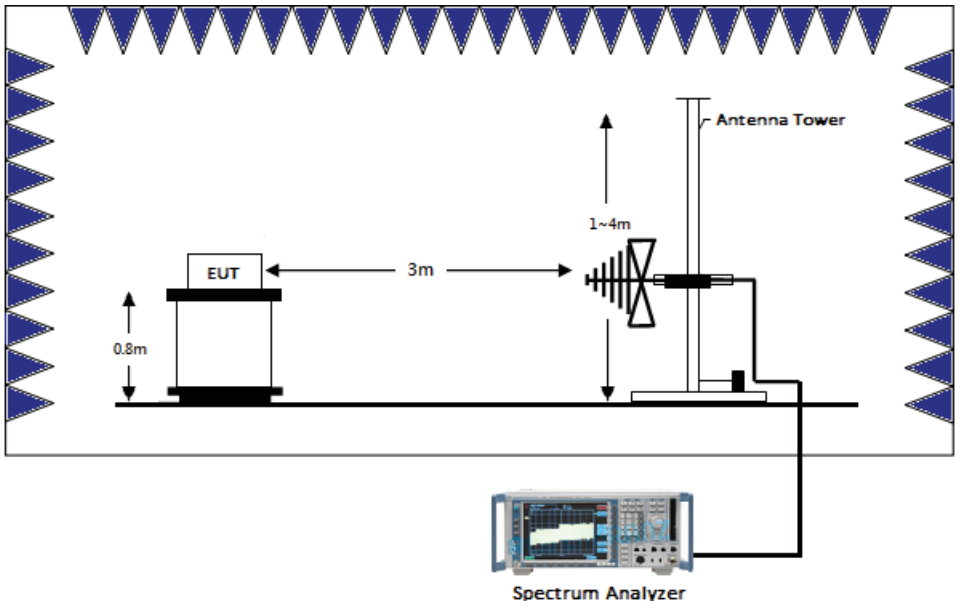
Step 1	Configure the EUT according to ANSI C63.10:2013. The EUT was placed on the top of the turntable 0.8 meter (below 1GHz) and 1.5 meter (above 1GHz) above ground. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.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

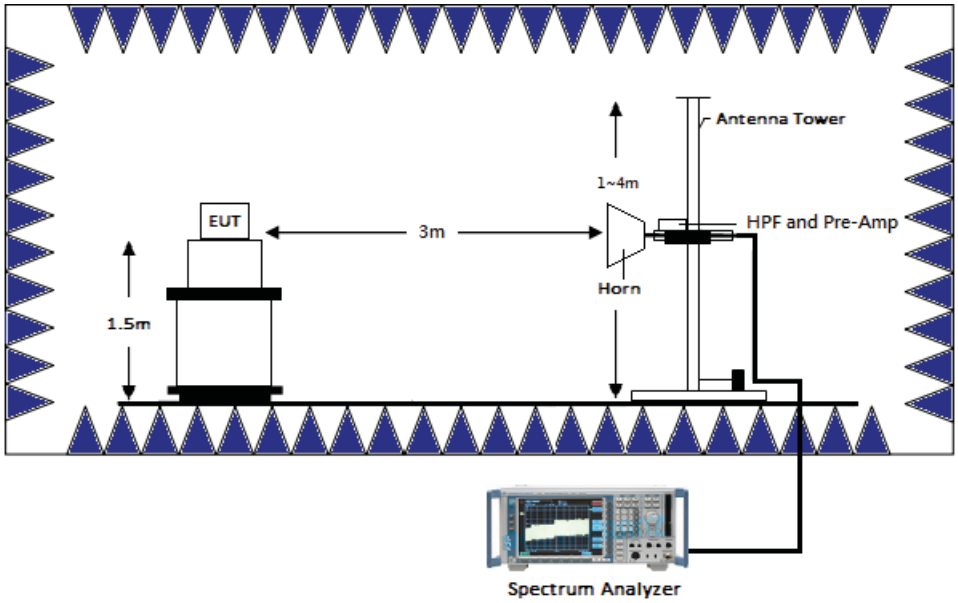
6.3.1 Radiated emission from 9kHz to 30MHz uses Loop Antenna:



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 (℃) :	22
Relative Humidity (%) :	51

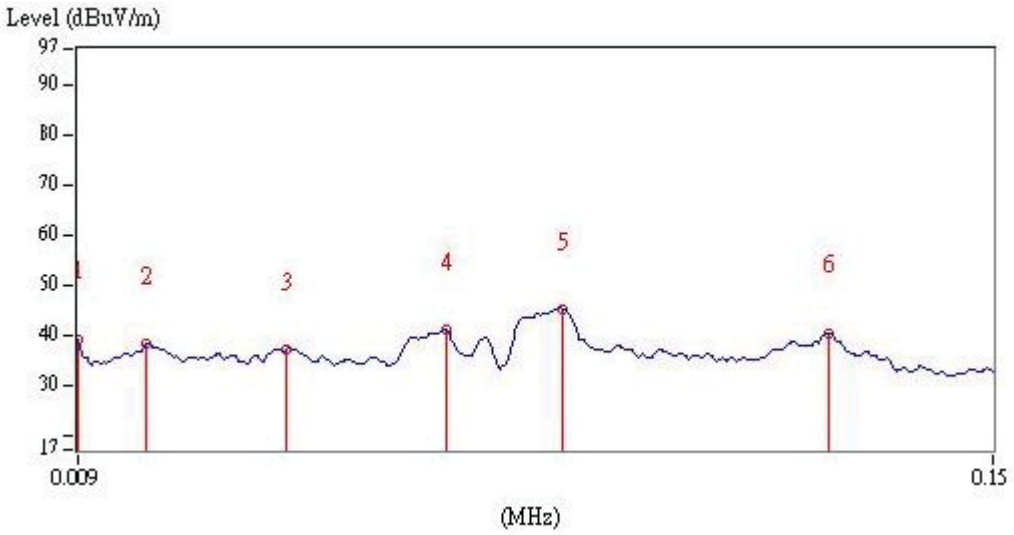
6.6 Test Result

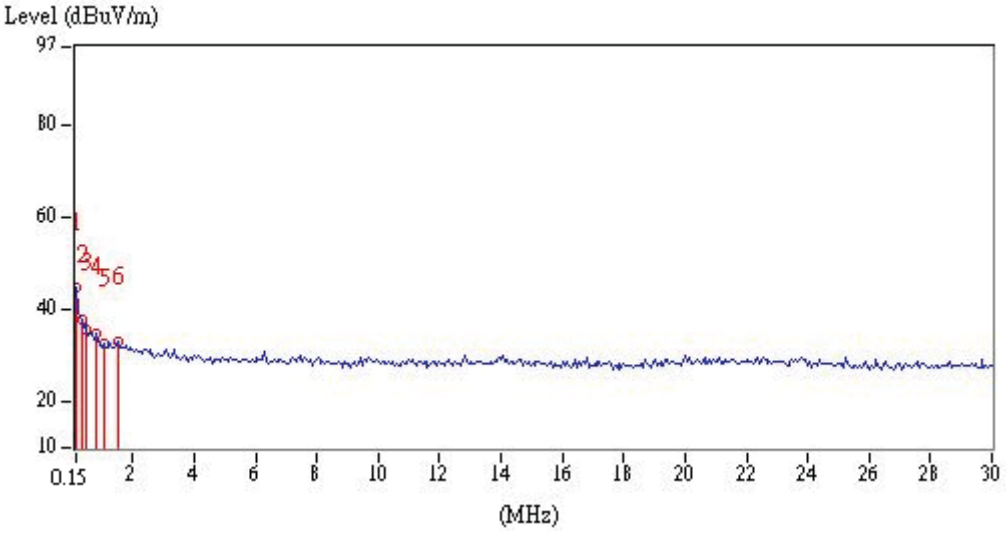
6.6.1 Measurement results: frequencies 9kHz to 30MHz

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 2DH5 Ch 39.

Ant Polarity	Frequency (MHz)	Detector	Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dB)
Perpendicular	0.01	AV	18.38	20.73	39.11	127.60	-88.49
Perpendicular	0.02	AV	18.77	19.34	38.11	121.58	-83.47
Perpendicular	0.04	AV	18.87	18.08	36.95	115.56	-78.61
Perpendicular	0.07	AV	18.57	22.34	40.91	110.70	-69.79
Perpendicular	0.08	AV	18.43	26.52	44.95	109.54	-64.59
Perpendicular	0.12	AV	18.32	21.95	40.27	106.02	-65.75
Perpendicular	0.15	AV	18.34	26.35	44.69	104.08	-59.39
Perpendicular	0.33	AV	18.44	19.23	37.67	97.23	-59.56
Perpendicular	0.51	QP	18.54	17.19	35.73	73.45	-37.72
Perpendicular	0.81	QP	18.73	16.13	34.86	69.43	-34.57
Perpendicular	1.05	QP	18.86	13.68	32.54	67.18	-34.64
Perpendicular	1.52	QP	18.89	14.05	32.94	63.97	-31.03

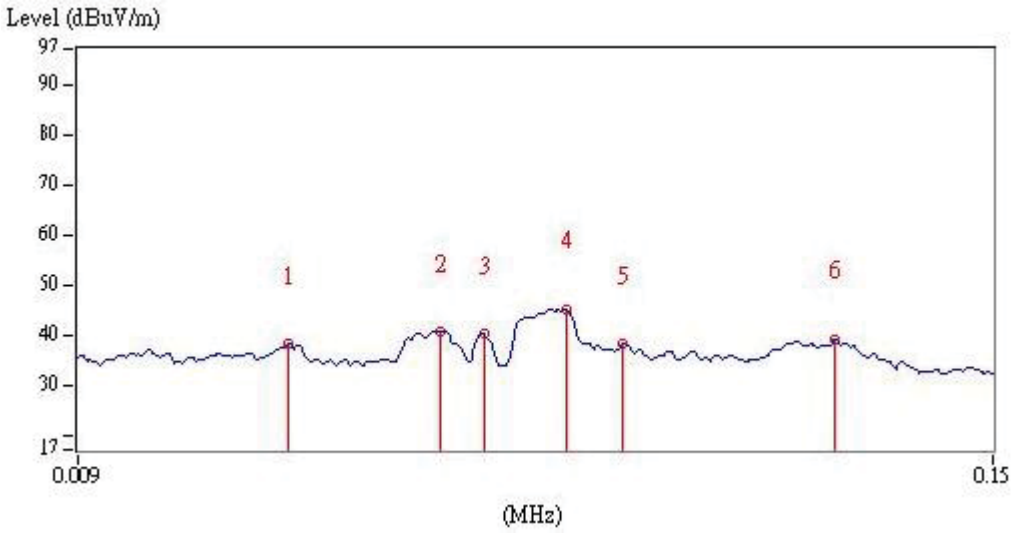
Remark: Corr. Factor = Antenna Factor + Cable Loss

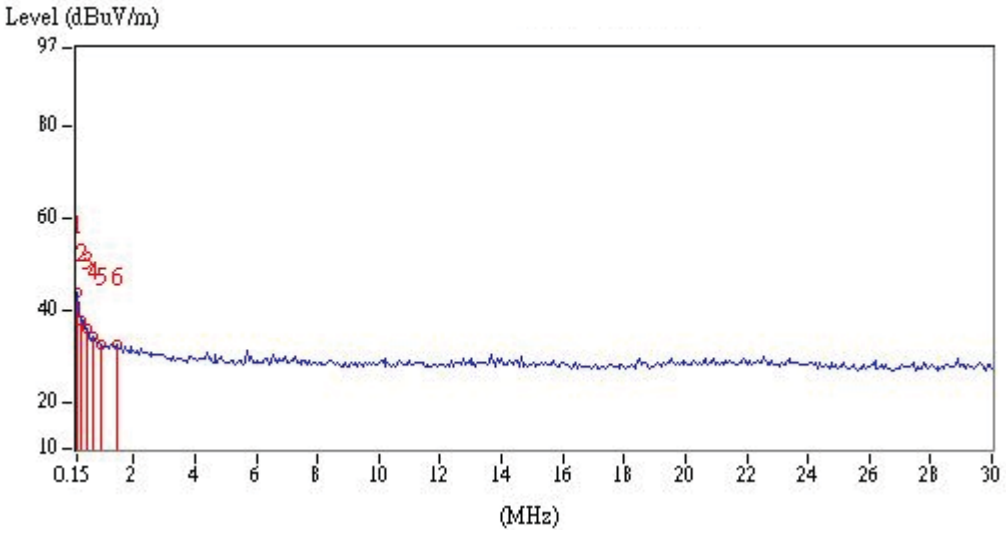

Level (dBuV/m)
97
90
80
70
60
50
40
30
17
1
2
3
4
5
6
0.009
0.15
(MHz)


Level (dBuV/m)
97
80
60
40
20
10
1
2
3
4
5
6
0.15
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
(MHz)

Ant Polarity	Frequency (MHz)	Detector	Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dB)
Parallel	0.04	AV	18.86	19.23	38.09	115.56	-77.47
Parallel	0.06	AV	18.58	22.00	40.58	112.04	-71.46
Parallel	0.07	AV	18.53	21.49	40.02	110.70	-70.68
Parallel	0.08	AV	18.43	26.62	45.05	109.54	-64.49
Parallel	0.09	AV	18.36	19.67	38.03	108.52	-70.49
Parallel	0.13	AV	18.33	20.70	39.03	105.33	-66.30
Parallel	0.15	AV	18.34	25.70	44.04	104.08	-60.04
Parallel	0.27	AV	18.40	19.65	38.05	98.98	-60.93
Parallel	0.45	AV	18.50	17.75	36.25	94.54	-58.29
Parallel	0.69	QP	18.66	15.56	34.22	70.83	-36.61
Parallel	0.93	QP	18.82	13.94	32.76	68.23	-35.47
Parallel	1.46	QP	18.89	13.91	32.80	64.32	-31.52

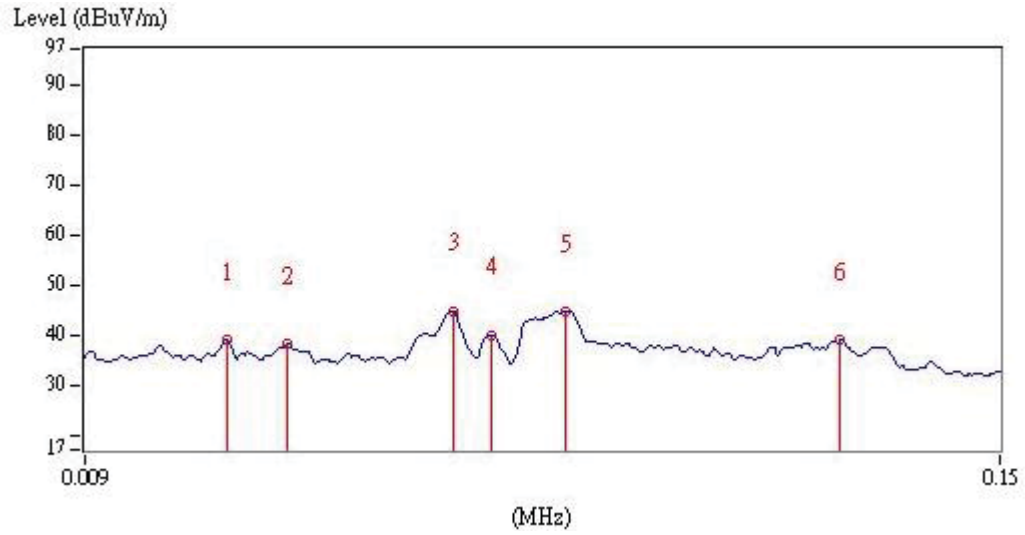
Remark: Corr. Factor = Antenna Factor + Cable Loss

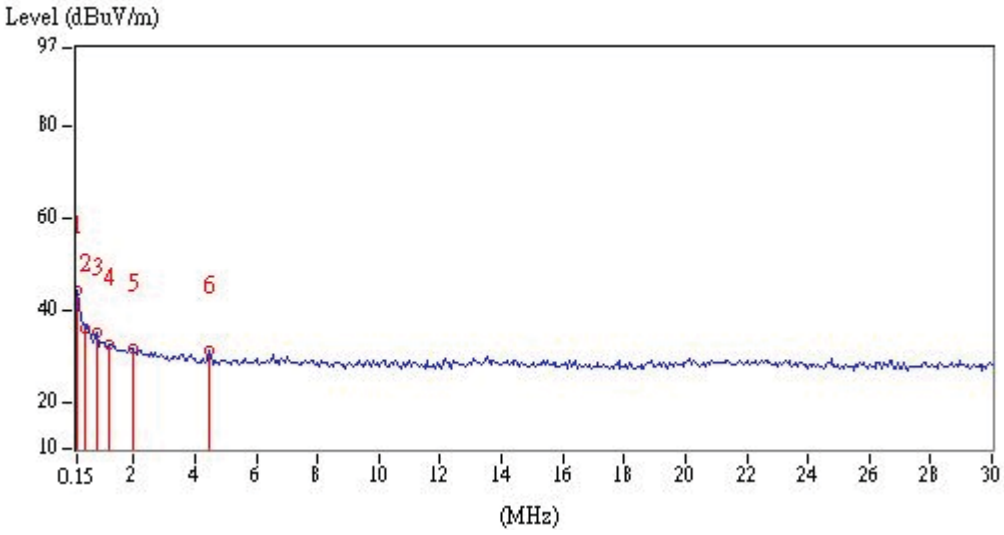

Level (dBuV/m)
97
90
80
70
60
50
40
30
17
1
2
3
4
5
6
0.009
0.15
(MHz)


Level (dBuV/m)
97
80
60
40
20
10
1
2
3
4
5
6
0.15
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
(MHz)

Ant Polarity	Frequency (MHz)	Detector	Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dB)
Ground-parallel	0.03	AV	19.07	19.85	38.92	118.06	-79.14
Ground-parallel	0.04	AV	18.89	19.15	38.04	115.56	-77.52
Ground-parallel	0.07	AV	18.57	26.15	44.72	110.70	-65.98
Ground-parallel	0.07	AV	18.53	21.39	39.92	110.70	-70.78
Ground-parallel	0.08	AV	18.44	26.08	44.52	109.54	-65.02
Ground-parallel	0.13	AV	18.33	20.55	38.88	105.33	-66.45
Ground-parallel	0.15	AV	18.34	25.86	44.20	104.08	-59.88
Ground-parallel	0.39	AV	18.47	17.55	36.02	95.78	-59.76
Ground-parallel	0.81	QP	18.73	16.33	35.06	69.43	-34.37
Ground-parallel	1.16	QP	18.87	13.93	32.80	66.32	-33.52
Ground-parallel	2.00	QP	18.92	12.69	31.61	69.54	-37.93
Ground-parallel	4.45	QP	19.29	11.82	31.11	69.54	-38.43

Remark: Corr. Factor = Antenna Factor + Cable Loss


Level (dBuV/m)
97
90
80
70
60
50
40
30
17
1
2
3
4
5
6
0.009
0.15
(MHz)

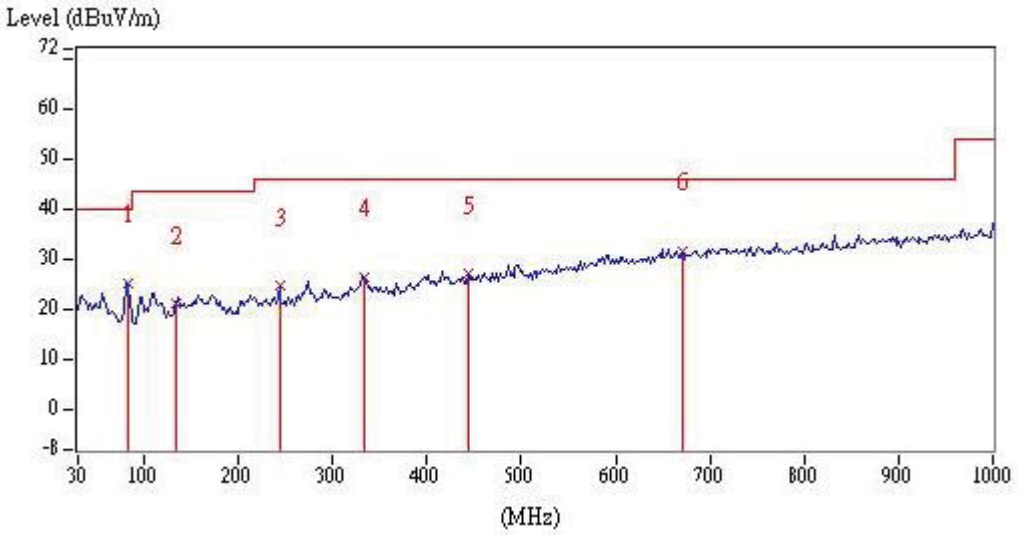

Level (dBuV/m)
97
80
60
40
20
10
1
2
3
4
5
6
0.15
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
(MHz)

6.6.2 Measurement results: frequencies below 1 GHz

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 2DH5 Ch 39.

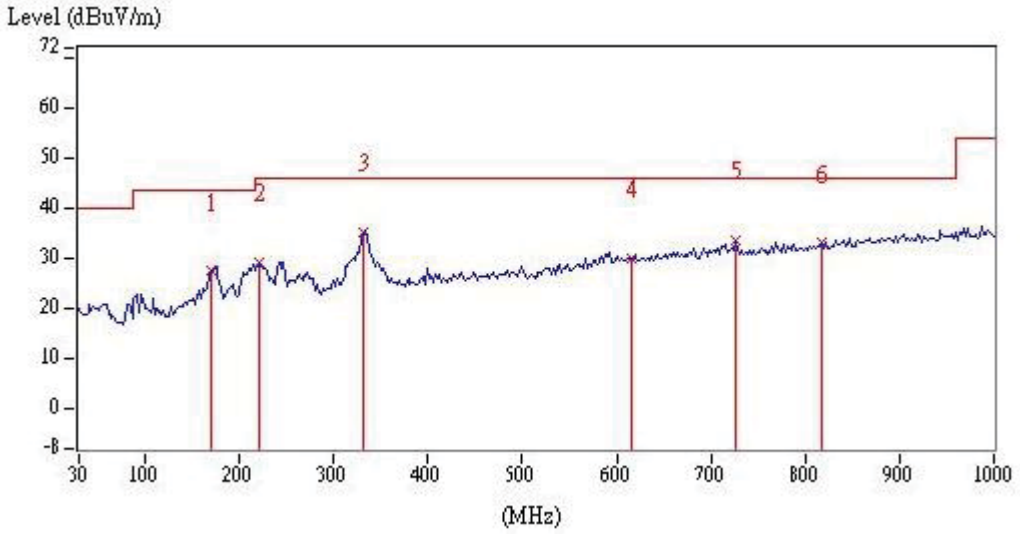
EUT: SB30

Ant Polarity	Frequency (MHz)	Detector	Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dB)
Vertical	82.38	QP	15.77	9.56	25.33	40.00	-14.67
Vertical	134.76	QP	19.39	1.71	21.10	43.50	-22.40
Vertical	243.40	QP	20.50	4.24	24.74	46.00	-21.26
Vertical	334.58	QP	22.56	4.04	26.60	46.00	-19.40
Vertical	443.22	QP	25.41	1.63	27.04	46.00	-18.96
Vertical	670.20	QP	29.54	2.23	31.77	46.00	-14.23



Ant Polarity	Frequency (MHz)	Detector	Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3m (dBµV/m)	Margin (dB)
Horizontal	169.68	QP	20.24	7.32	27.56	43.50	-15.94
Horizontal	222.06	QP	19.33	9.94	29.27	46.00	-16.73
Horizontal	330.70	QP	22.46	12.87	35.33	46.00	-10.67
Horizontal	615.88	QP	28.84	1.34	30.18	46.00	-15.82
Horizontal	726.46	QP	30.41	3.32	33.73	46.00	-12.27
Horizontal	817.64	QP	31.70	1.42	33.12	46.00	-12.88

Remark: Corr. Factor = Antenna Factor + Cable Loss



6.6.3 Measurement results: frequency above 1GHz to 25GHz

EUT: SB30

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)
DH5_Ch0	4804	PK	V	8.62	32.08	40.70	74.00	-33.30
	4804	PK	H	8.62	31.23	39.85	74.00	-34.15
DH5_Ch39	4260	PK	V	5.96	35.92	41.88	74.00	-32.12
	4882	PK	V	8.99	30.01	39.00	74.00	-35.00
	4882	PK	H	8.99	29.33	38.32	74.00	-35.68
DH5_Ch78	4260	PK	V	5.96	37.87	43.83	74.00	-30.17
	4960	PK	V	9.37	29.91	39.28	74.00	-34.72
	4960	PK	H	9.37	29.21	38.58	74.00	-35.42
2DH5_Ch0	4260	PK	V	5.96	39.44	45.40	74.00	-28.60
	4804	PK	V	8.62	30.14	38.76	74.00	-35.24
	4804	PK	H	8.62	30.56	39.18	74.00	-34.82
2DH5_Ch39	4245	PK	V	5.89	37.95	43.84	74.00	-30.16
	4882	PK	V	8.99	29.45	38.44	74.00	-35.56
	4882	PK	H	8.99	29.11	38.10	74.00	-35.90
2DH5_Ch78	4960	PK	V	5.96	33.55	39.51	74.00	-34.49
	4960	PK	V	9.37	29.48	38.85	74.00	-35.15
	4960	PK	H	9.37	29.00	38.37	74.00	-35.63
3DH5_Ch0	4804	PK	V	5.89	34.39	40.28	74.00	-33.72
	4804	PK	V	8.62	30.50	39.12	74.00	-34.88
	4804	PK	H	8.62	30.24	38.86	74.00	-35.14
3DH5_Ch39	3990	PK	V	4.67	40.69	45.36	74.00	-28.64
	4882	PK	V	8.99	29.30	38.29	74.00	-35.71
	4882	PK	H	8.99	29.11	38.10	74.00	-35.90
3DH5_Ch78	4960	PK	V	9.37	30.05	39.42	74.00	-34.58
	4960	PK	H	9.37	28.92	38.29	74.00	-35.71

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 (%) :	56

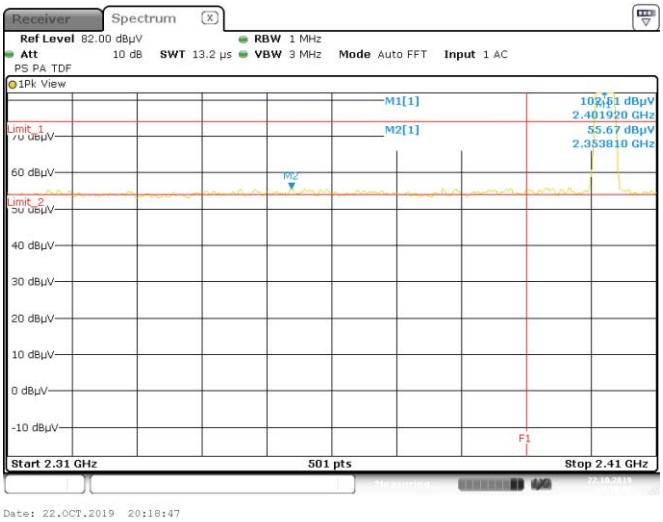
7.4 Test Results

EUT: SB30

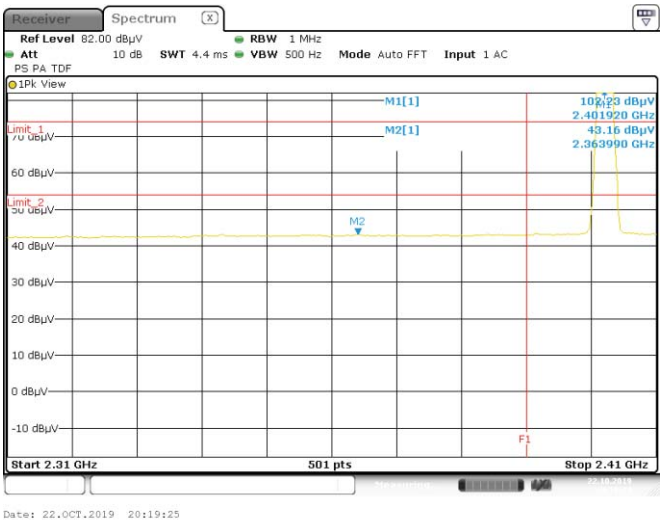
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
DH5	2353.81	PK	V	34.42	21.25	55.67	74	-18.33	2310~2390
	2363.99	AV	V	34.46	8.70	43.16	54	-10.84	
	2483.50	PK	V	34.93	21.50	56.43	74	-17.57	2483.5~2500
	2484.66	AV	V	34.93	8.78	43.71	54	-10.29	
2DH5	2360.40	PK	V	34.45	20.55	55.00	74	-19.00	2310~2390
	2384.35	AV	V	34.54	8.53	43.06	54	-10.94	
	2483.50	PK	V	34.93	21.53	56.45	74	-17.55	2483.5~2500
	2483.50	AV	V	34.93	8.93	43.85	54	-10.15	
3DH5	2354.21	PK	V	34.42	21.02	55.44	74	-18.56	2310~2390
	2390.00	AV	V	34.56	8.53	43.10	54	-10.90	
	2496.53	PK	V	34.98	21.49	56.47	74	-17.53	2483.5~2500
	2484.01	AV	V	34.93	8.95	43.88	54	-10.12	

Remark: Correction Factor = Antenna Factor + Cable Loss

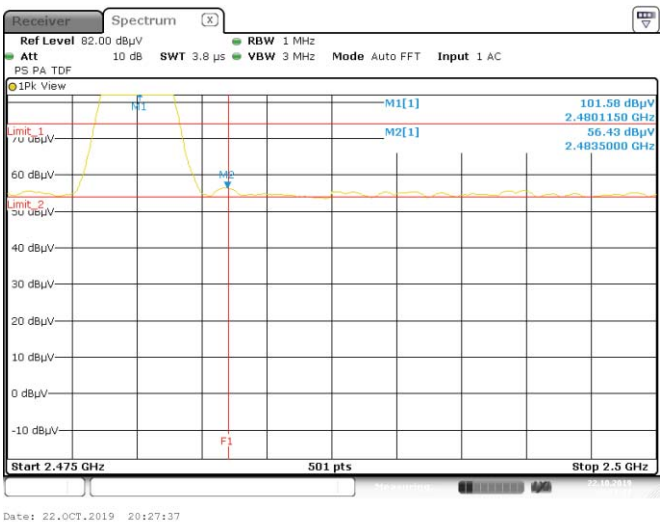
Chain0 : Restricted Band Bandedge @ DH5 Mode Ch0 PK



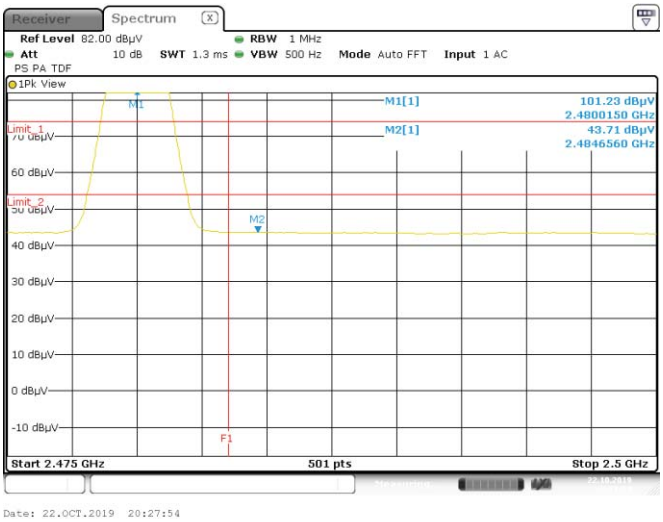
Chain0 : Restricted Band Bandedge @ DH5 Mode Ch0 AV



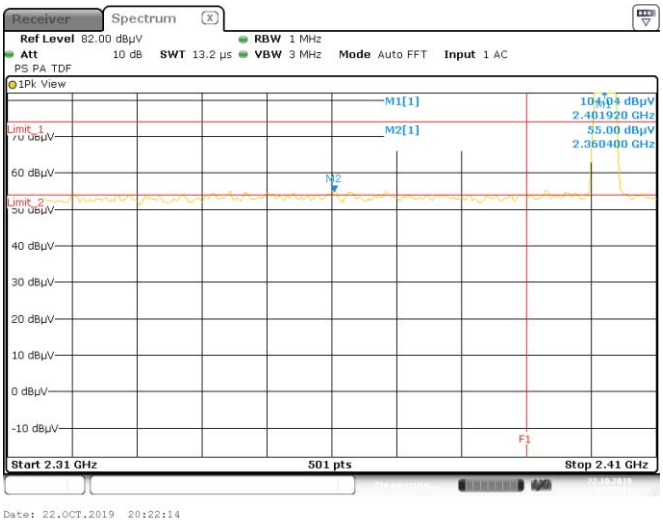
Chain0 : Restricted Band Bandedge @ DH5 Mode Ch78 PK



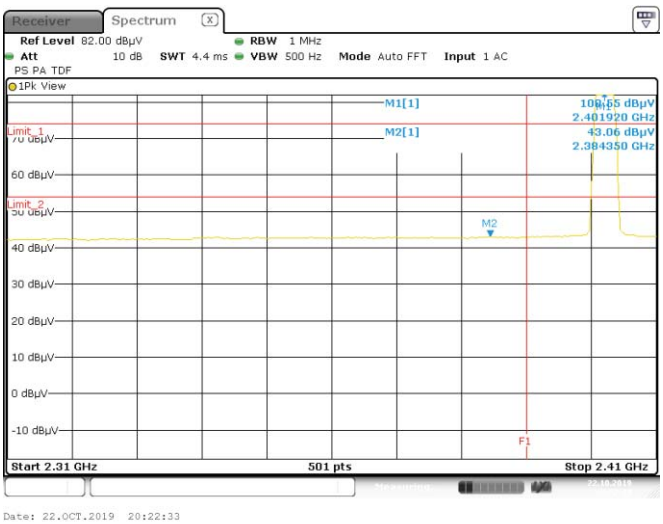
Chain0 : Restricted Band Bandedge @ DH5 Mode Ch78 AV



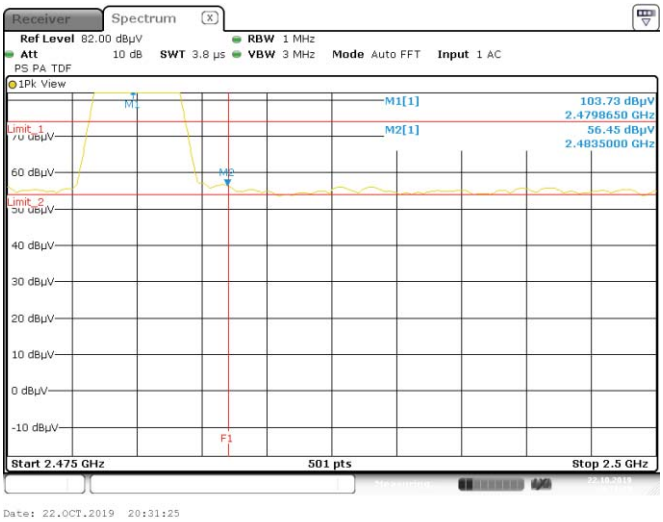
Chain0 : Restricted Band Bandedge @ 2DH5 Mode Ch0 PK



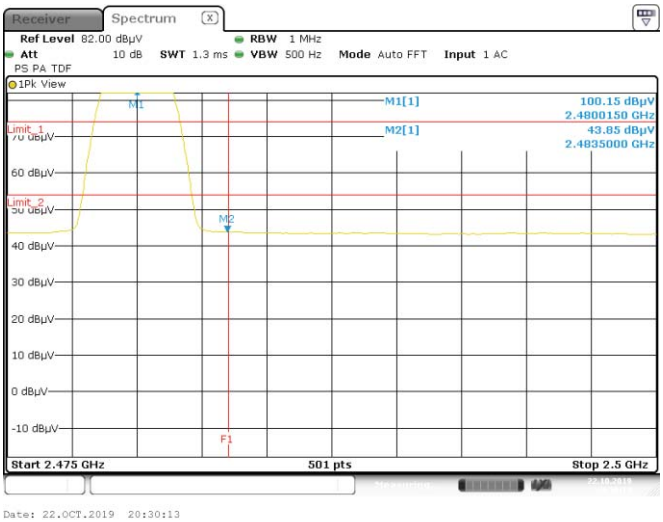
Chain0 : Restricted Band Bandedge @ 2DH5 Mode Ch0 AV



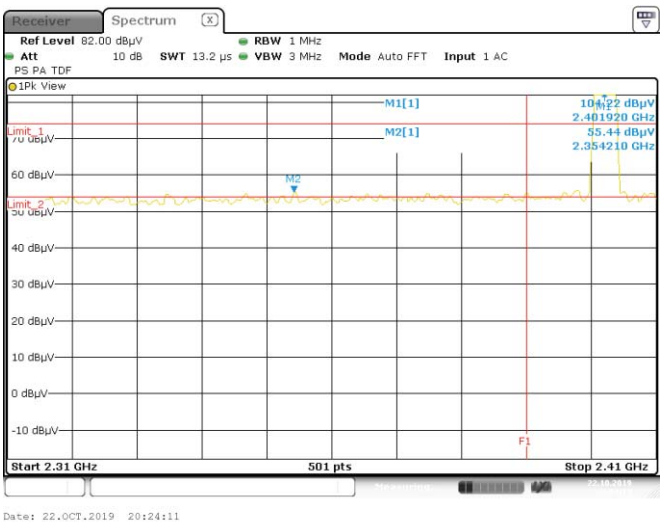
Chain0 : Restricted Band Bandedge @ 2DH5 Mode Ch78 PK



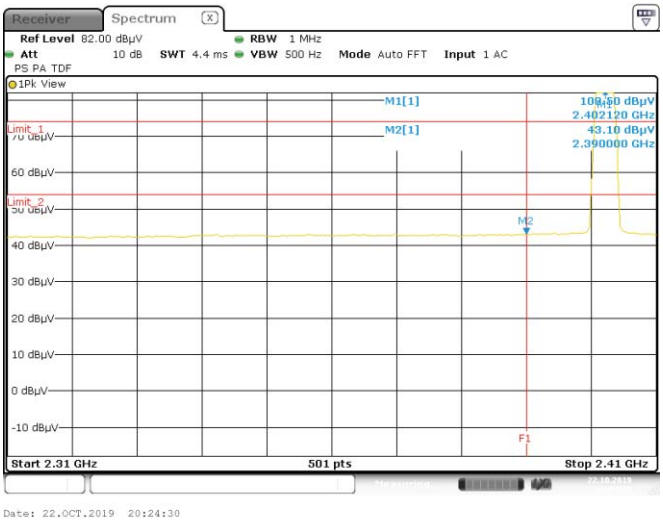
Chain0 : Restricted Band Bandedge @ 2DH5 Mode Ch78 AV



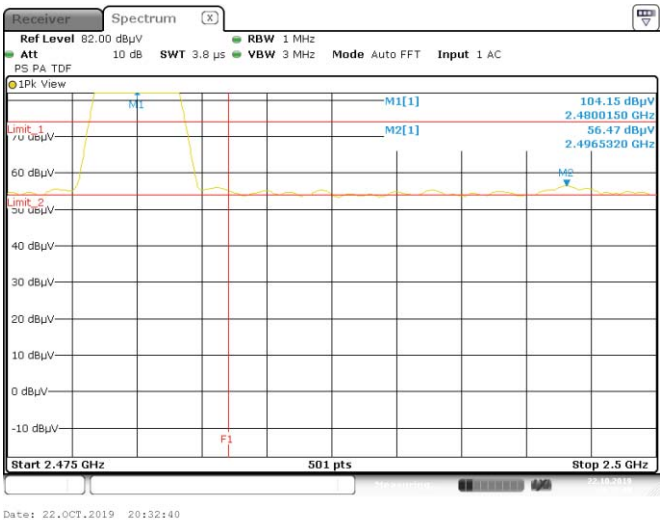
Chain0 : Restricted Band Bandedge @ 3DH5 Mode Ch0 PK



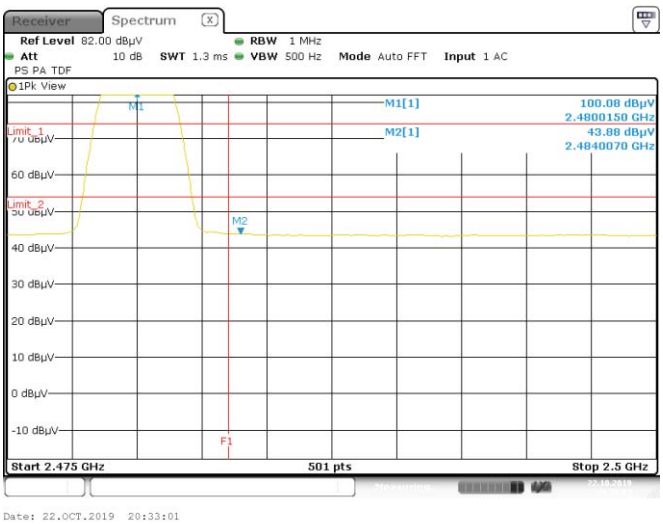
Chain0 : Restricted Band Bandedge @ 3DH5 Mode Ch0 AV



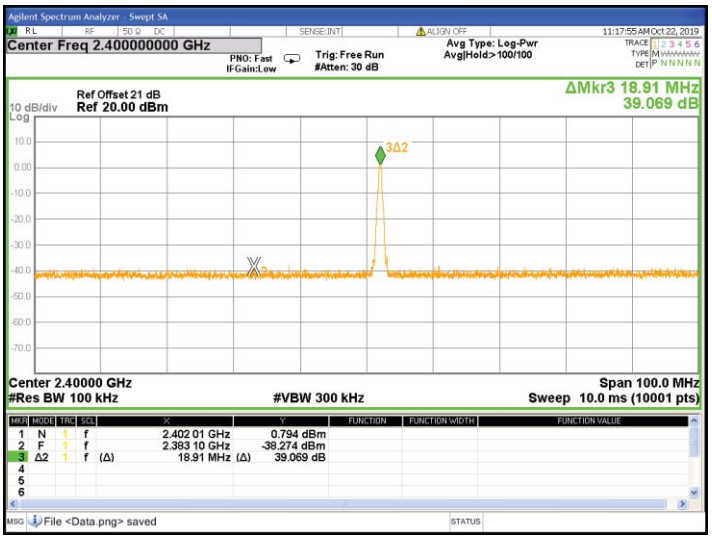
Chain0 : Restricted Band Bandedge @ 3DH5 Mode Ch78 PK



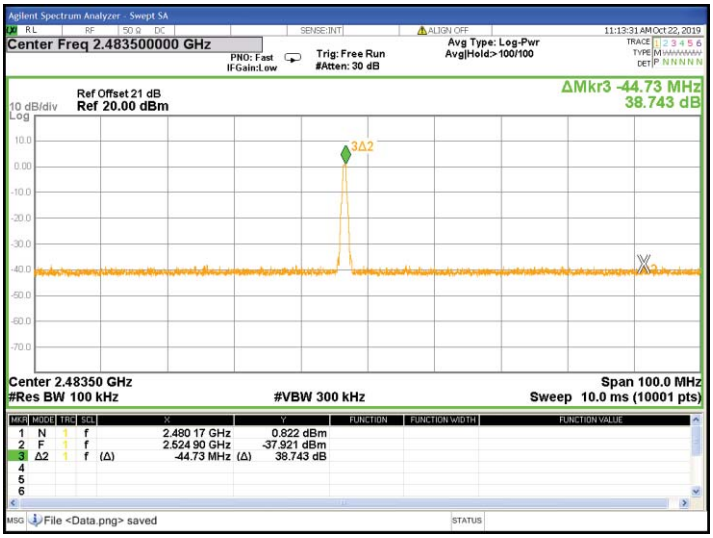
Chain0 : Restricted Band Bandedge @ 3DH5 Mode Ch78 AV



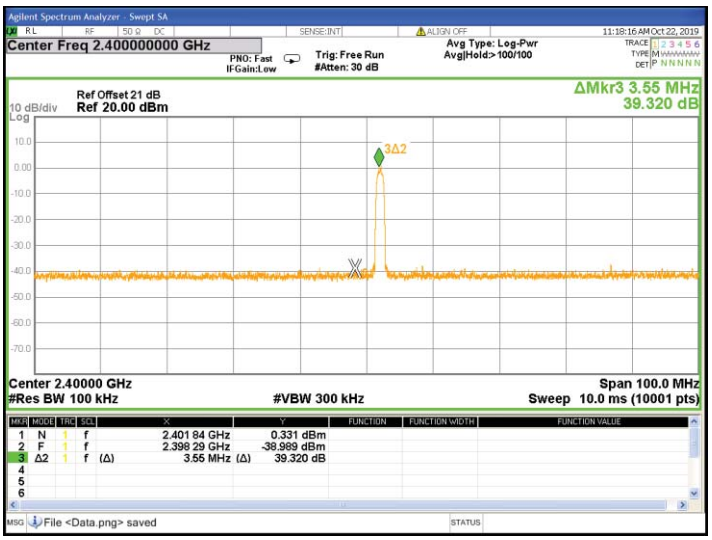
Chain0 : Authorized Band Bandedge @ DH5 Mode Ch0



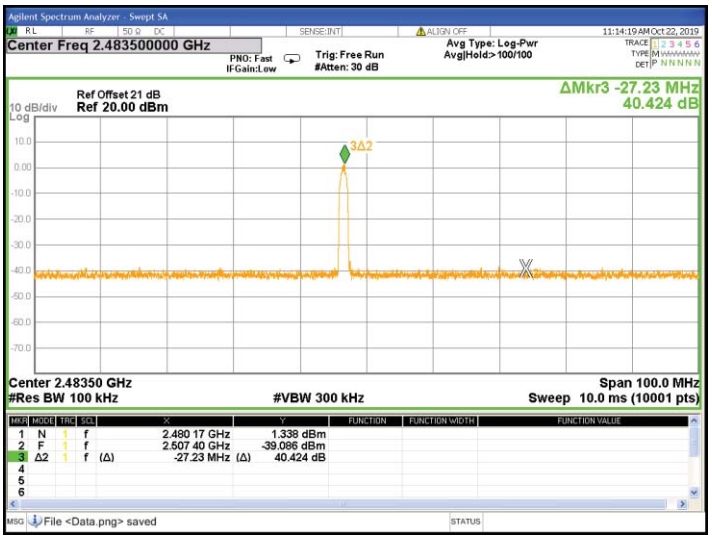
Chain0 : Authorized Band Bandedge @ DH5 Mode Ch78



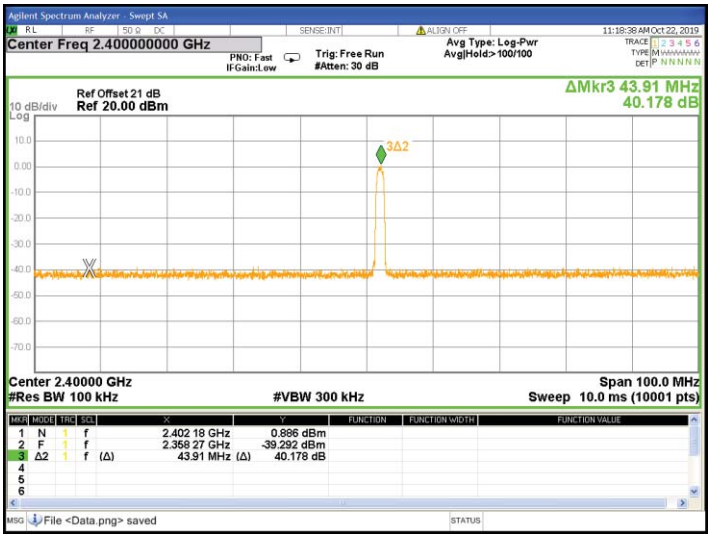
Chain0 : Authorized Band Bandedge @ 2DH5 Mode Ch0



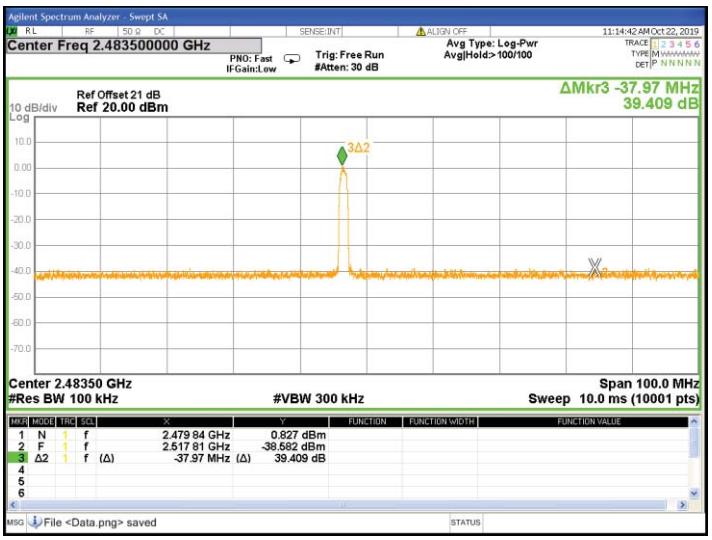
Chain0 : Authorized Band Bandedge @ 2DH5 Mode Ch78



Chain0 : Authorized Band Bandedge @ 3DH5 Mode Ch0



Chain0 : Authorized Band Bandedge @ 3DH5 Mode Ch78



8. AC Power Line Conducted Emission

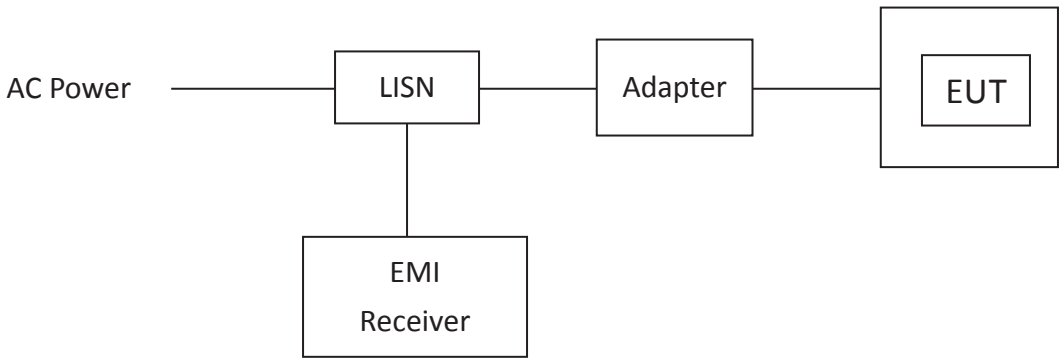
8.1 Measuring instrument setting

Receiver Function	Setting
Detector	QP
Start frequency	0.15MHz
Stop frequency	30MHz
IF bandwidth	9 kHz
Attenuation	10dB

8.2 Test Procedure

Step 1	Configure the EUT according to ANSI C63.10:2013. The EUT or host of EHT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
Step 2	Connect EUT or host of EUT to the power mains through a line impedance stabilization network.
Step 3	All the companion devices are connected to the other LISN. The LISN should provide 50Uh/50ohms coupling impedance.
Step 4	The frequency range from 150 kHz to 30MHz was searched.
Step 5	Set the test-receiver system to peak detector and specified bandwidth with maximum hold mode.
Step 6	The measurement has to be done between each power line and ground at the power terminal.

8.3 Test Diagram



8.4 Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56	56 – 46
0.50~5.00	56	46
5.00~30.0	60	50

8.5 Operating Environment Condition

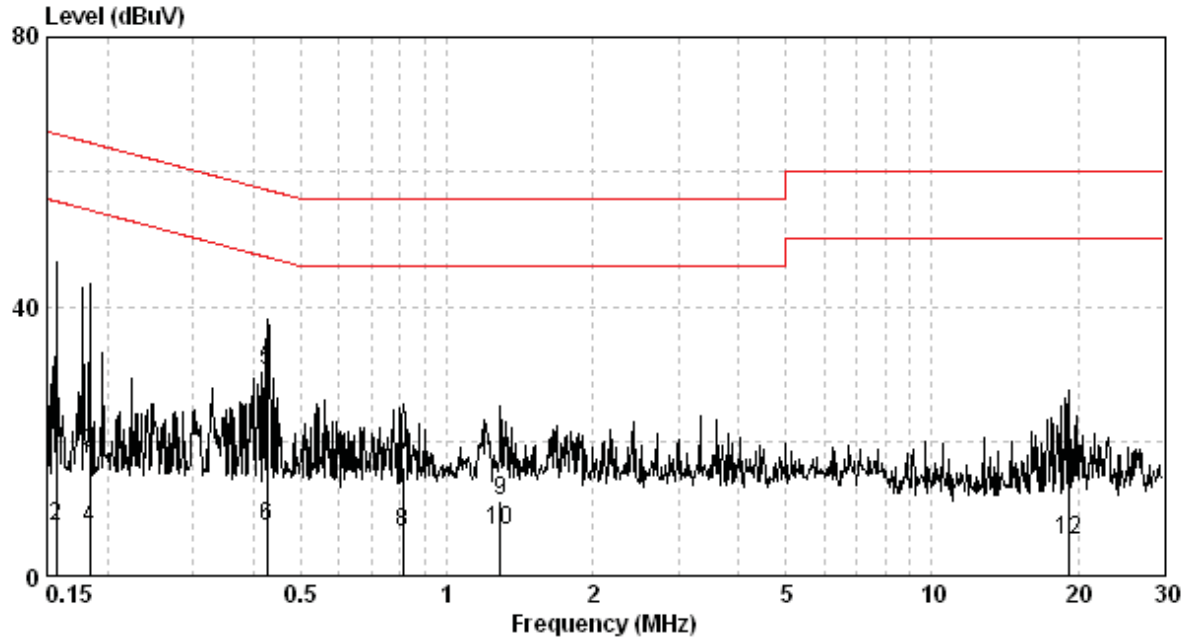
Temperature (℃) :	22
Relative Humidity (%) :	55
Atmospheric Pressure (hPa) :	1009

8.6 Test Results

Phase: Live Line
Model No.: SB30
Test Condition: Tx mode

Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB) QP	Margin (dB) AV
0.156	9.70	14.45	24.15	65.65	-2.24	7.46	55.65	-41.49	-48.18
0.183	9.69	8.43	18.13	64.33	-2.78	6.92	54.33	-46.20	-47.41
0.426	9.70	20.80	30.50	57.33	-2.46	7.24	47.33	-26.84	-40.09
0.813	9.72	6.26	15.98	56.00	-3.41	6.31	46.00	-40.02	-39.69
1.289	9.74	1.54	11.28	56.00	-3.14	6.60	46.00	-44.72	-39.40
19.224	9.83	5.77	15.60	60.00	-4.43	5.40	50.00	-44.40	-44.60

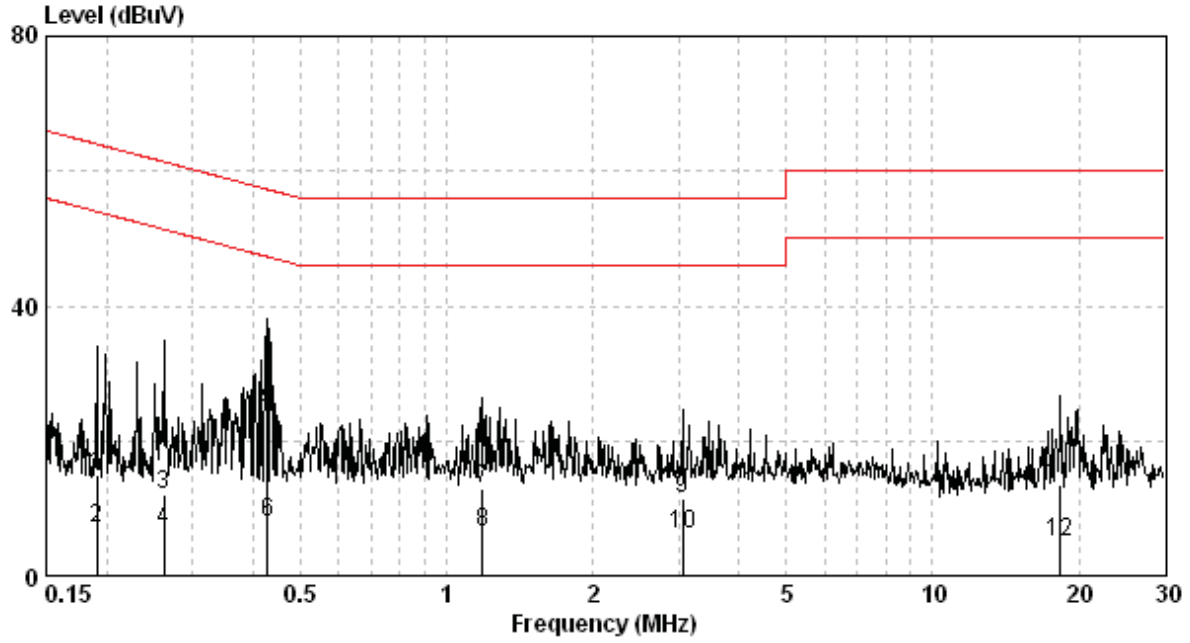
Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral Line
Model No.: SB30
Test Condition: Tx mode

Frequency (MHz)	Corr. Factor (dB)	Reading QP (dBuV)	Level QP (dBuV)	Limit QP (dBuV)	Reading AV (dBuV)	Level AV (dBuV)	Limit AV (dBuV)	Margin (dB) QP	Margin (dB) AV
0.190	9.71	5.12	14.83	64.02	-2.61	7.10	54.02	-49.19	-46.92
0.262	9.71	2.36	12.07	61.38	-2.98	6.72	51.38	-49.31	-44.66
0.428	9.71	15.01	24.72	57.29	-1.67	8.04	47.29	-32.57	-39.24
1.184	9.75	3.01	12.75	56.00	-3.33	6.42	46.00	-43.25	-39.58
3.058	9.80	1.66	11.45	56.00	-3.61	6.18	46.00	-44.55	-39.82
18.328	9.91	3.69	13.60	60.00	-4.92	4.99	50.00	-46.40	-45.01

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBuV) = Corr. Factor (dB) + Reading (dBuV)
3. Margin (dB) = Level (dBuV) – Limit (dBuV)



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	2018/11/14	2019/11/13
Signal Analyzer	Agilent	N9030A	MY51380492	2019/08/21	2020/08/19
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2019/04/19	2020/04/17
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2019/06/05	2020/06/03
Horn Antenna	SHWARZBECK	BBHA 9120 D	9120D-456	2019/02/01	2020/01/31
Power Meter	Anritsu	ML2495A	0844001	2019/10/23	2020/10/21
Power Sensor	Anritsu	MA2411B	0738452	2019/10/23	2020/10/21
966-2(A) Cable	SUHNER	SMA / EX 100	N/A	2019/08/19	2020/08/17
966-2(B) Cable	SUHNER	SUCOFLEX 104P	CB0005	2019/08/19	2020/08/17
RF Cable	SUHNER	SUCOFLEX 102	CB0006	2019/05/02	2020/04/30
Hight Pass Filter	Wainwright	WHKX3.0/18G-12 SS	N/A	2019/05/30	2020/05/28
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2019/02/23	2020/02/22

Note: No Calibration Required (NCR)

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Receiver	R&S	ESCI	100059	2018/11/07	2019/11/06
Two-Line V-Network	R&S	ENV216	101159	2019/06/12	2020/06/10
Two-Line -V-Network	R&S	ESH3-Z5	825562/003	2019/08/27	2020/08/25
CON-1 Shielded Room	N/A	N/A	N/A	NCR	NCR
CON-1 Cable	SUHNER	SUCOFLEX-104	26438414	2019/05/02	2020/04/30
Test software	Audix	e3	4.20040112L	NCR	NCR

Note: No Calibration Required (NCR).

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	4.90 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	4.89 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	4.29 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	4.29 dB
Vertically polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.45 dB
Horizontally polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.45 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.32 dB
Emission on the Band Edge Test	4.29 dB
Minimum 6 dB Bandwidth	7.69 %
Maximum Peak Conducted Output Power	0.37 dB
Power Spectral Density	1.15 dB
Emissions In Non-Restricted Frequency Bands	1.15 dB
AC Power Line Conducted Emission	2.52 dB