FCC PART 15C TEST REPORT FOR CERTIFICATION

On Behalf of

Amino Communications Ltd

IPTV STB/PVR

Kamai 7XM; Amulet 7XM
Kamai 7Xzzzzzzzz; Amulet 7Xzzzzzzzz
(Where zzzzzzzz can be combination of a~z, A~Z, 0~9, "-", "/", or blank)

FCC ID: XVG500102MC20

Prepared for : Amino Communications Ltd
1010 Cambourne Business Park Cambourne CAMBRIDGE
CB23 6DP UNITED KINGDOM

Prepared By : Audix Technology (Shenzhen) Co., Ltd.
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Report Number	:	ACS-F19173
Date of Test	:	Sep.18~25,2019 & Nov.12,2019
Date of Report	:	Nov.15,2019

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TEST REPORT CERTIFICATION

Applicant	:	Amino Communications Ltd
Product	:	IPTV STB/PVR
FCC ID	:	XVG500102MC20
Model No.	:	Kamai 7XM; Amulet 7XM; Kamai 7Xzzzzzzzz; Amulet 7Xzzzzzzzz (Where zzzzzzzz can be combination of a~z, A~Z, 0~9, "-", "/", or blank)
Serial No.	:	N/A
Test Voltage	:	AC 120V/60Hz

Tested for comply with:
FCC CFR47 Part 15 Subpart C

Test procedure used:
ANSI C63.10: 2013

The device described above is tested by AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. to confirm comply with all the FCC Part 15 Subpart C requirements. The test results are contained in this test report and AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. is assumed full responsibility for the accuracy and completeness of these tests. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements. This report contains data that are not covered by the NVLAP accreditation.

This Report is made under FCC Part 2.1074. No modifications were required during testing to bring this product into compliance.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : Sep.18~25,2019 & Nov.12,2019 Report of date: Nov.15,2019

Prepared by : Brave Zhang / Assistant Reviewed by : Sunny Lu / Deputy Manager

AUDIX® 信華科技（深圳）有限公司
Audix Technology (Shenzhen) Co., Ltd.
EMC 部門報告專用章
Stamp only for EMC Dept. Report
Signature: David Jin

Approved & Authorized Signer : David Jin / Manager

1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT has been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	**Standard**	**Results**
Power Line Conducted Emission Test	FCC Part 15: 15.207 ANSI C63.10 2013	PASS
Radiated Emission Test	FCC Part 15 15.209 FCC Part 15 15.205 FCC Part 15 15.247(d) ANSI C63.10 2013	PASS
Conducted Spurious Emissions	FCC Part 15: 15.247(d) ANSI C63.10 2013	PASS
Carrier Frequency Separation Test	FCC Part 15: 15.247(a)(1) ANSI C63.10 2013	PASS
20dB Bandwidth Test	FCC Part 15: 15.215 ANSI C63.10 2013	PASS
Number Of Hopping Frequency Test	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 2013	PASS
Dwell Time Test	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 2013	PASS
Maximum Peak Output Power Test	FCC Part 15 15.247(b)(1) ANSI C63.10 2013	PASS
Band Edge Compliance Test	FCC Part 15 15.247(d) ANSI C63.10 2013	PASS

2. GENERAL INFORMATION

2.1. Description of Equipment Under Test

Applicant	Amino Communications Ltd
Address	1010 Cambourne Business Park Cambourne CAMBRIDGE CB23 6DP UNITED KINGDOM
Product	IPTV STB/PVR
Model No.	Kamai 7XM; Amulet 7XM; Kamai 7Xzzzzzzzz; Amulet 7Xzzzzzzzz (Where zzzzzzzz can be combination of a~z, A~Z, 0~9, "-", "/", or blank)
Test Model	Amulet 7XM
FCC ID	XVG500102MC20
Power Adapter	Manufacturer: MOSO; Model: MSA-C2000IS12.0-24Y-US Input: 100-240V~ 50/60Hz 0.7A Output: DC 12V, 2A
Sample Type	Prototype production
Date of Receipt	Sep.11,2019
Date of Test	Sep.18~25,2019 & Nov.12,2019
Remark: Based on differences among the models (referring the statement letter for details), AC conducted emission and Below 1GHz radiated emissions were tested respectively for each model, only worst-case data reported.	

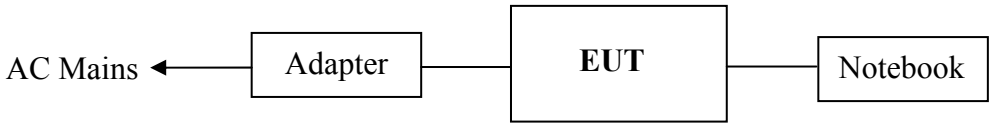
2.2. Feature of Equipment Under Test

Product Feature & Specification		
Product	IPTV STB/PVR	
Model No.	Kamai 7XM; Amulet 7XM; Kamai 7Xzzzzzzzz; Amulet 7Xzzzzzzzz	
	(Where zzzzzzzz can be combination of a~z, A~Z, 0~9, "-", "/", or blank)	
Radio	Bluetooth V3.0+EDR; Bluetooth V4.0	
Power Source	☒ Commercial Power	AC 100 ~ 240V, 0.7A
	☒ External Power Source	DC 12V, 2A
	☐ Lithium battery	DC V, mAh
	☐ UM battery	DC V
Bluetooth		
Bluetooth Version	V4.0 dual mode	
Frequency Range	2402-2480MHz	
Type of Modulation	GFSK, π/4DQPSK, 8DPSK	
Data Rate	1Mbps, 2Mbps, 3Mbps	
Quantity of Channels	79/40	
Channel Separation	1MHz/2MHz	
Antenna System		
Type of Antenna	PCB Antenna	
Antenna Peak Gain	1.4dBi	

2.3. Tested Supporting System Details

No.	Description	ACS No.	Manufacturer	Model	Serial Number
1.	Notebook	N/A	DELL	PP09S	N/A
		Power Cord: Unshielded, Detachabled, 1.8m Power Adapter: Manufacturer: DELL, M/N: LA65NS1-00 Cable: Unshielded, Detachabled, 4.0m(Bond one ferrite core)			

2.4. Block Diagram of connection between EUT and simulators



(EUT: IPTV STB/PVR)

2.5. Test information

A special software was used to control EUT work in continuous TX mode

Tested mode, Packet Type, peak output power information			
Mode	Packet Type	Output power(dBm) P max	Output Power(dBm) P low
GFSK	DH1	7.559	6.650
	DH3		
	DH5		
π/4DQPSK	2-DH1	5.748	5.163
	2-DH3		
	2-DH5		
8DPSK	3-DH1	7.109	5.941
	3-DH3		
	3-DH5		

π/4DQPSK mode has been verified to have the lowest power, so the final test were performed with GFSK and 8DPSK mode, the worse-case packet type were:
GFSK Mode: DH5
8DPSK Mode: 3DH5

Item		Modulation	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge	GFSK	1Mbps	00/78
		8-DPSK	3Mbps	00/78
	Radiated Spurious Emission	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
Conducted Test Case	20dB Bandwidth	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
	Carrier Frequency Separation	GFSK	1Mbps	39
		8-DPSK	3Mbps	39
	Time of Occupancy	GFSK	1Mbps	39
		8-DPSK	3Mbps	39
	Number of Hopping Channels	GFSK	1Mbps	39
		8-DPSK	3Mbps	39
	Maximum Peak Output Power	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78
	Band Edges	GFSK	1Mbps	00/78
		8-DPSK	3Mbps	00/78
	Spurious Emission	GFSK	1Mbps	00/39/78
		8-DPSK	3Mbps	00/39/78

2.6. Test Facility

Site Description

Name of Firm	:	Audix Technology (Shenzhen) Co., Ltd. No. 6, Kefeng Road, Science & Technology Park, Nanshan District , Shenzhen, Guangdong, China
EMC Lab.	:	Certificated by Industry Canada Registration Number: IC 5183A-1 Valid Date: May.07, 2020
	:	Certificated by DAkkS, Germany Registration No: D-PL-12151-01-00 Valid Date: Dec.07, 2021
	:	Accredited by NVLAP, USA NVLAP Code: 200372-0 Valid Date: Mar.31, 2020
	:	Certificated by FCC USA. Designation No.: CN5022 Valid Date: Mar.31, 2020

2.7. Measurement Uncertainty (95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Conduction emission test in No. 1 Conduction	2.6dB(150KHz to 30MHz)
Uncertainty for Radiation Emission test in 3m chamber	3.6dB(30~200MHz, Polarization: H)
	4.0dB(30~200MHz, Polarization: V)
	3.6dB(200M~1GHz, Polarization: H)
	3.8dB(200M~1GHz, Polarization: V)
Uncertainty for Radiation Emission test in 3m chamber(1GHz-25GHz)	4.6dB(1~6GHz, Distance: 3m)
	4.6dB(6~25GHz, Distance: 3m)
Uncertainty for Radiated Spurious Emission test in RF chamber	3.7dB(30MHz~1000MHz)
	3.3dB(1~26.5GHz)
Uncertainty for Conduction Spurious emission test	2.0dB
Uncertainty for Output power test	0.8dB
Uncertainty for Bandwidth test	83kHz
Uncertainty for DC power test	0.1%
Uncertainty for test site temperature and humidity	0.6℃
	3%

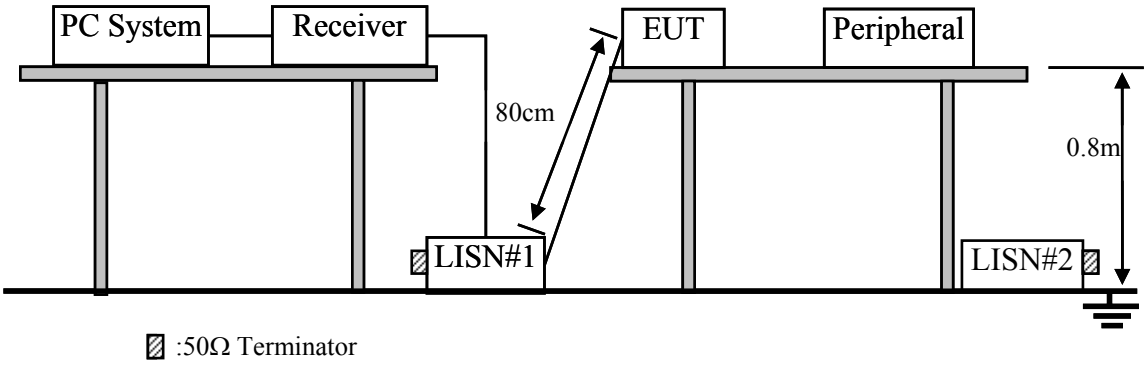
Note: EMI uncertainty is evaluated by CISPR16-4-2.
The value of measurement uncertainty of EMI is less than U_{CISPR}.
The value is not calculated in the test results.

3. POWER LINE CONDUCTED EMISSION TEST

3.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	1# Shielding Room	AUDIX	N/A	N/A	May.17,18	3 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100842	Apr.14,19	1 Year
3.	L.I.S.N.#1	Rohde & Schwarz	ENV216	102160	Dec.01,18	1 Year
4.	L.I.S.N.#2	Kyoritsu	K NW-403D	8-1750-2	Apr.18,19	1 Year
5.	Terminator	Hubersuhner	50Ω	No.1	Apr.14,19	1 Year
6.	Terminator	Hubersuhner	50Ω	No.2	Apr.14,19	1 Year
7.	RF Cable	Fujikura	RG55/U	No.1	Apr.13,19	1 Year
8.	Test Software	AUDIX	e3	6.100913a	N/A	N/A
Note: N/A means Not applicable.						

3.2.Block Diagram of Test Setup



3.3.Power Line Conducted Emission Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.4.Configuration of EUT on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4.1. IPTV STB/PVR (EUT)

Model No. : Amulet 7XM
Serial No. : N/A

3.4.2. Support Equipment: As Tested Supporting System Details, in Section 2.2.

3.5.Operating Condition of EUT

3.5.1. Setup the EUT and simulator as shown as Section 3.2.

3.5.2. Turn on the power of all equipments.

3.5.3. PC run test software to control EUT work in Tx mode.

3.6.Test Procedure

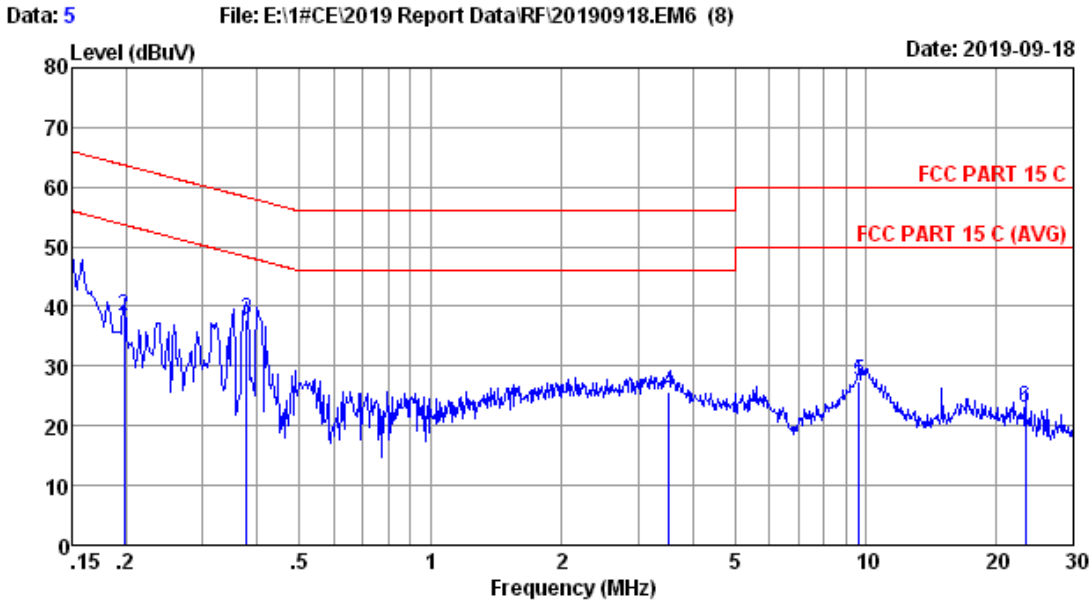
The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power Via AC unit connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs). The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.

The bandwidth of test receiver (R & S ESCI) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.7.Power Line Conducted Emission Test Results

PASS. **(**All emissions not reported below are too low against the prescribed limits.)

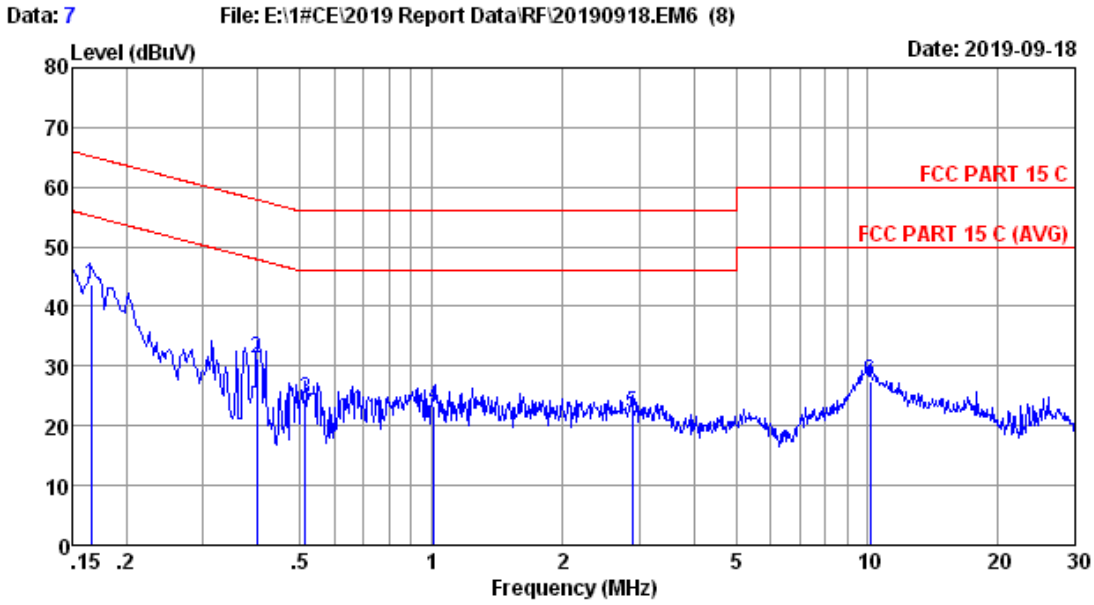


Site no :1# Conduction
Dis./Lisn :2018 ENV216-L
Limit :FCC PART 15 C
Env./Ins. :Temp:23.8*C Humi:55%
EUT :
Power Rating :AC 120V/60Hz
Test Mode :BT 3.0

Data No :5
LISN phase:
Engineer :Cote

No	Freq (MHz)	LISN Factor (dB)	Cable loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.150	9.40	0.03	36.21	45.64	66.00	20.36	QP
2	0.198	9.40	0.03	28.88	38.31	63.71	25.40	QP
3	0.377	9.40	0.02	28.24	37.66	58.34	20.68	QP
4	3.528	9.50	0.06	16.06	25.62	56.00	30.38	QP
5	9.654	9.50	0.10	17.98	27.58	60.00	32.42	QP
6	23.263	9.60	0.16	13.14	22.90	60.00	37.10	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
2.If the average limit is met when using a quasi-peak detector. the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



Site no :1# Conduction
Dis./Lisn :2018 ENV216-N
Limit :FCC PART 15 C
Env./Ins. :Temp:23.8*C Humi:55%
EUT :
Power Rating :AC 120V/60Hz
Test Mode :BT 3.0

Data No :7
LISN phase:
Engineer :Cote

No	Freq (MHz)	LISN Factor (dB)	Cable loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.166	9.40	0.03	34.24	43.67	65.16	21.49	QP
2	0.398	9.40	0.02	21.92	31.34	57.90	26.56	QP
3	0.513	9.40	0.02	14.94	24.36	56.00	31.64	QP
4	1.016	9.40	0.03	14.03	23.46	56.00	32.54	QP
5	2.884	9.44	0.05	12.62	22.11	56.00	33.89	QP
6	10.179	9.50	0.10	17.76	27.36	60.00	32.64	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
2.If the average limit is met when using a quasi-peak detector. the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

4. RADIATED EMISSION MEASUREMENT

4.1.Test Equipment

Frequency range: 30~1000MHz

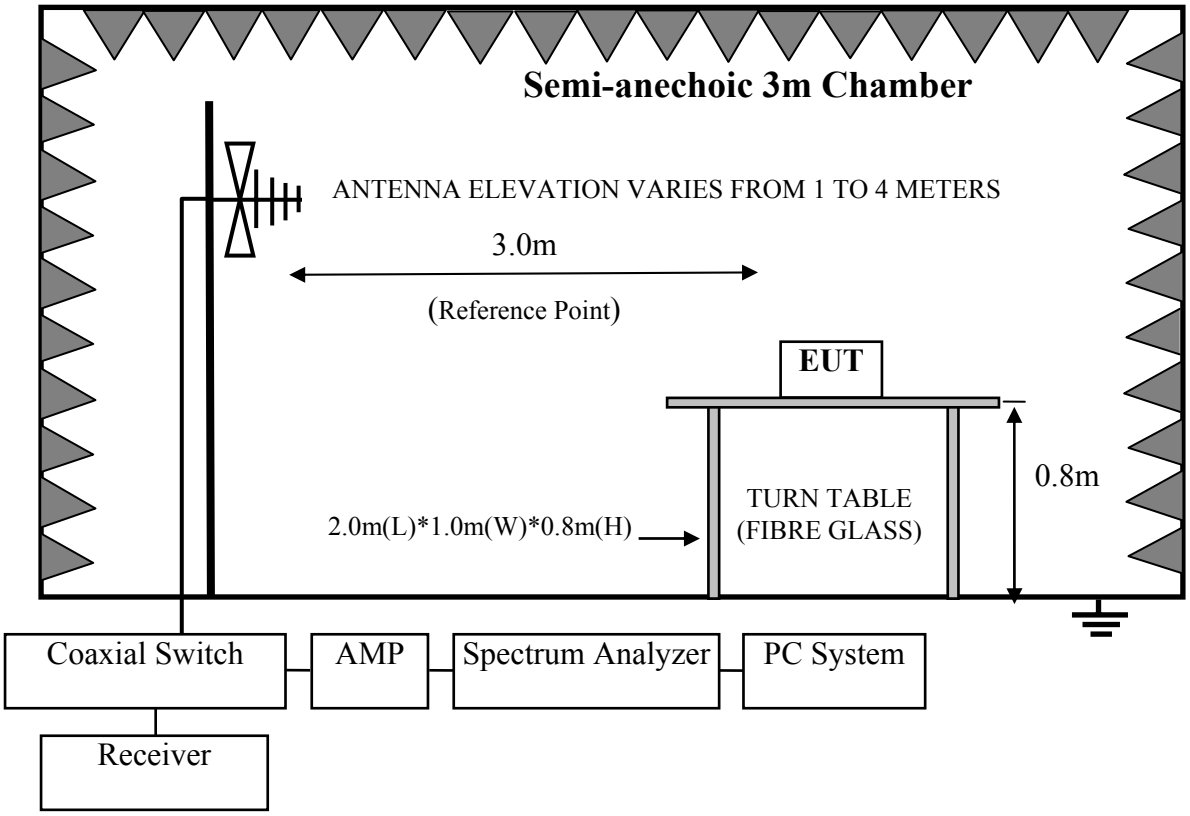
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber(NSA)	AUDIX	N/A	N/A	May.10,19	1 Year
2.	3#Chamber(SE)	AUDIX	N/A	N/A	May.17,18	3 Year
3.	Signal Analyzer	Rohde & Schwarz	FSV30	104050	Apr.14,19	1 Year
4.	EMI Test Receiver	Rohde & Schwarz	ESR7	101547	Apr.14,19	1 Year
5.	Amplifier	HP	8447D	2648A04738	Apr.14,19	1 Year
6.	Bi log Antenna	TESEQ	CBL6112D	35375	Nov.21,18	1 Year
7.	Loop Antenna	Chase	HLA6120	1062	Apr.18,19	1 Year
8.	NSA Cable	HUBER+SUHNER	CFD400NL-LW	No.3	Dec.01,18	1 Year
9.	Coaxial Switch	Anritsu	MP59B	6201397222	Apr.14,19	1 Year
10.	Test Software	AUDIX	e3	6.2009-5-21a(n)	N/A	N/A
Note: N/A means Not applicable.						

Frequency range: above 1000MHz

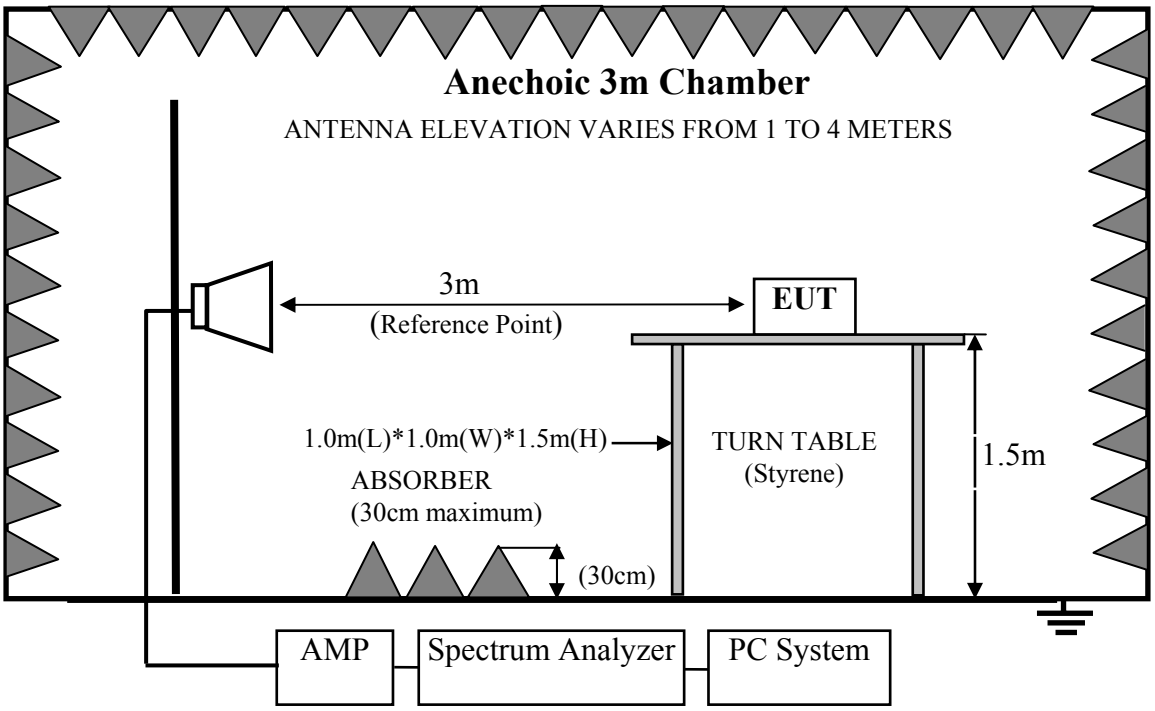
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber(Svswr)	AUDIX	N/A	N/A	Apr.18,19	1 Year
2.	3#Chamber(SE)	AUDIX	N/A	N/A	May.17,18	3 Year
3.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
4.	Horn Antenna	ETS	3115	9510-4580	Dec.13,18	1 Year
5.	Horn Antenna	ETS	3116	00060089	Dec.13,18	1 Year
6.	Amplifier	HP	8449B	3008A00863	Apr.23,19	1 Year
7.	Amplifier	EMCI	EMC184040SE	980507	Jun.30,19	1 Year
8.	RF Cable	EMCI	EMC102-KM-KM-3500	170702	May.13,19	1 Year
9.	RF Cable	N/A	N/A	No.7	Oct.14,18	1 Year
10.	Test Software	AUDIX	e3	6.2009-5-21a(n)	N/A	N/A
Note: N/A means Not applicable.						

4.2.Block Diagram of Test Setup

For frequency range 30MHz-1000MHz



For frequency range 1GHz-25GHz



4.3.Radiated Emission Limit Standard:

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000MHz	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark： (1) Emission level dBμV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

(4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.4.EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.4.1. IPTV STB/PVR (EUT)

Model No. : Amulet 7XM
Serial No. : N/A

4.5.Operating Condition of EUT

4.5.1. Setup the EUT and simulator as shown as Section 4.2.

4.5.2. Turn on the power of all equipments.

4.5.3. Let EUT work in Tx mode.

4.6.Test Procedure

Frequency below 30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground for frequency 30MHz~1000MHz, 1.5 meter high above ground for frequency above 1GHz and put the absorbing with 2.4m(L)*2.4m(W)*0.3m(H) on the ground . The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it.EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna for frequency 30MHz~1000MHz, and the Horm antenna is used as receiving antenna for frequency above 1GHz. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10-2013 on radiated emission Test.

This test was performed with EUT in X, Y, Z position, and the worse case was found when EUT in X position as the test photo indicated.

The bandwidth of the EMI test receiver (R&S ESR7) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's RBW is set at 1MHz and VBW is set at 3MHz for peak emissions measurement above 1GHz

This device is pulse Modulated, a duty cycle factor was used to calculated average level based measured peak level.

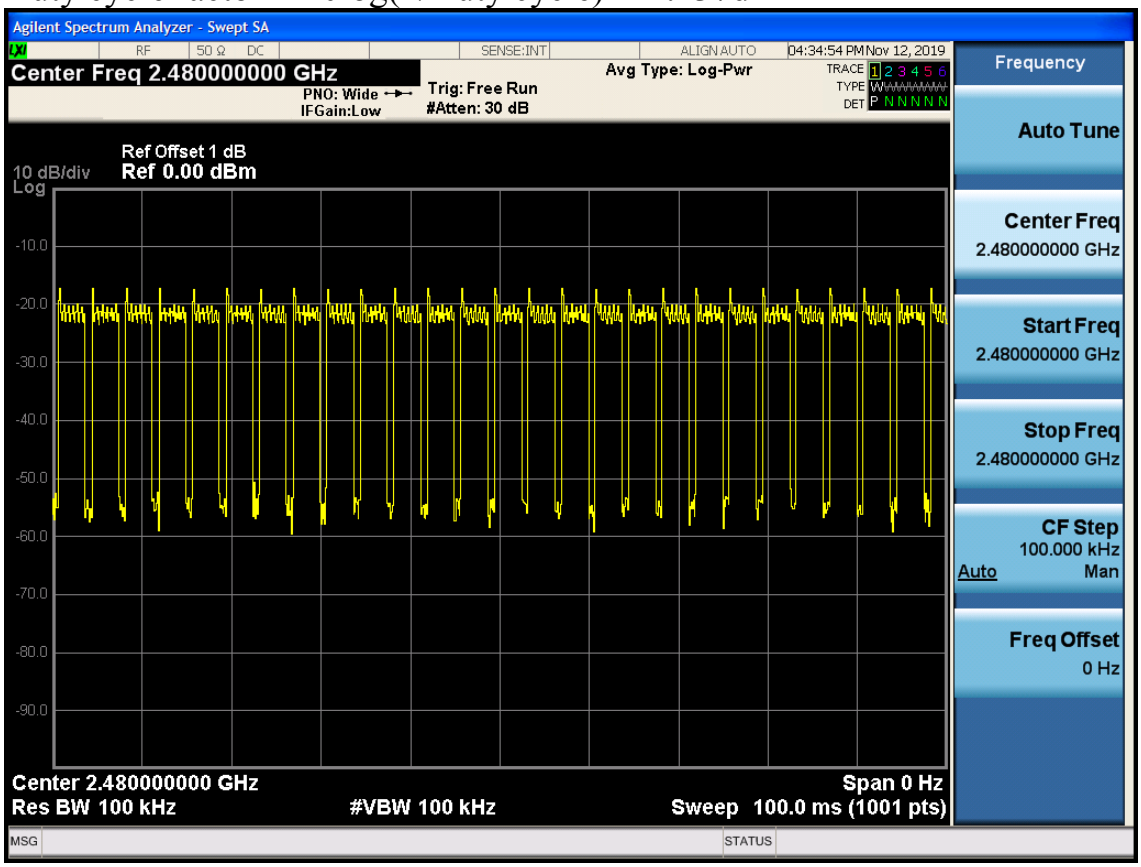
The frequency range from 30MHz to 10th harmonic (25GHz) is checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

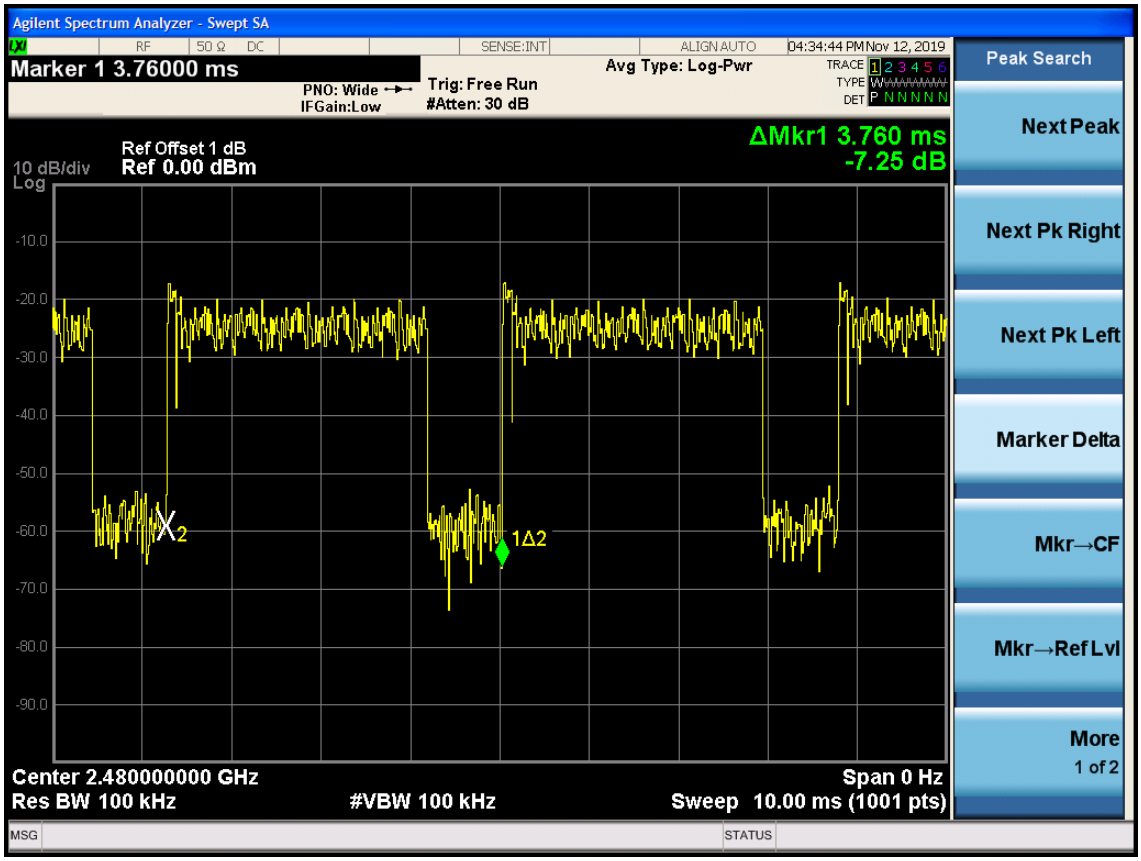
4.7. Radiated Emission Test Results

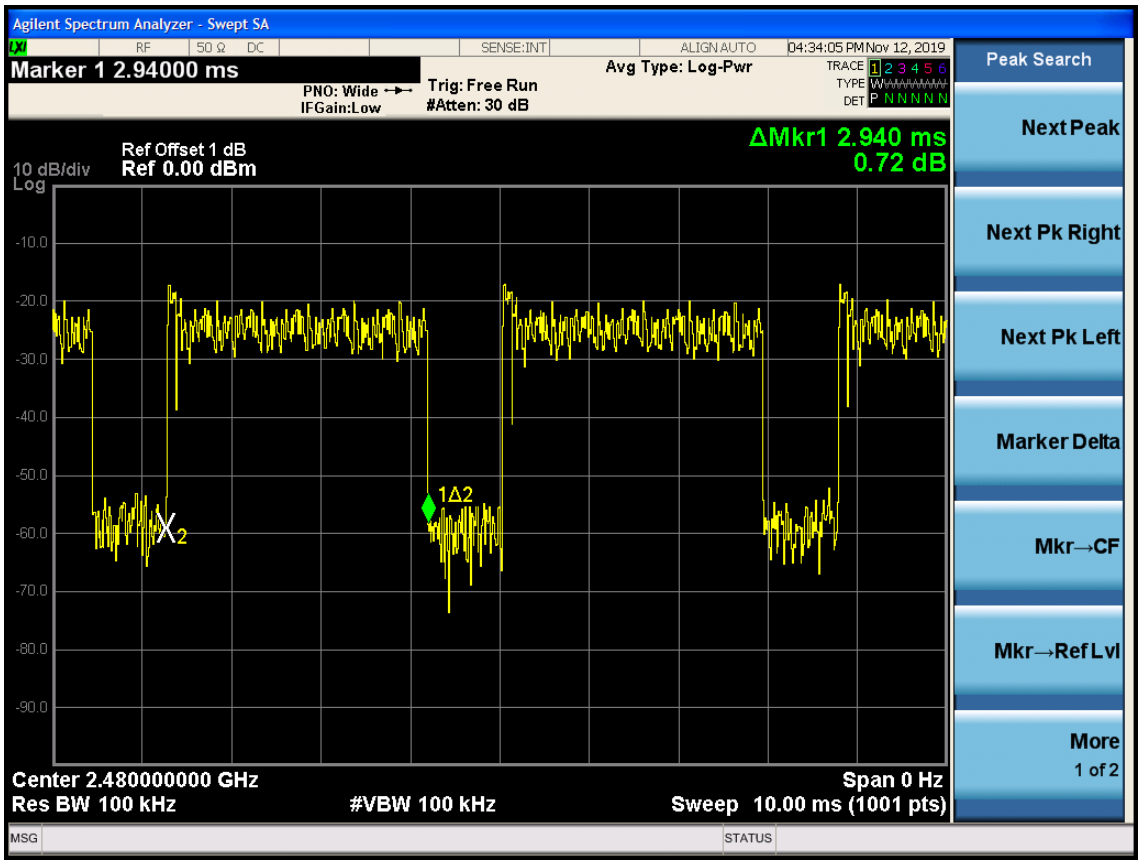
PASS.

All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.
Note 1: The duty cycle factor for calculate average level is -2.137dB, and average limit is 20dB below peak limit, so if peak measured level comply with average limit, the average level was deemed to comply with average limit.
Note 2: The emissions (9kHz~30MHz) not reported for there is no emission be found.

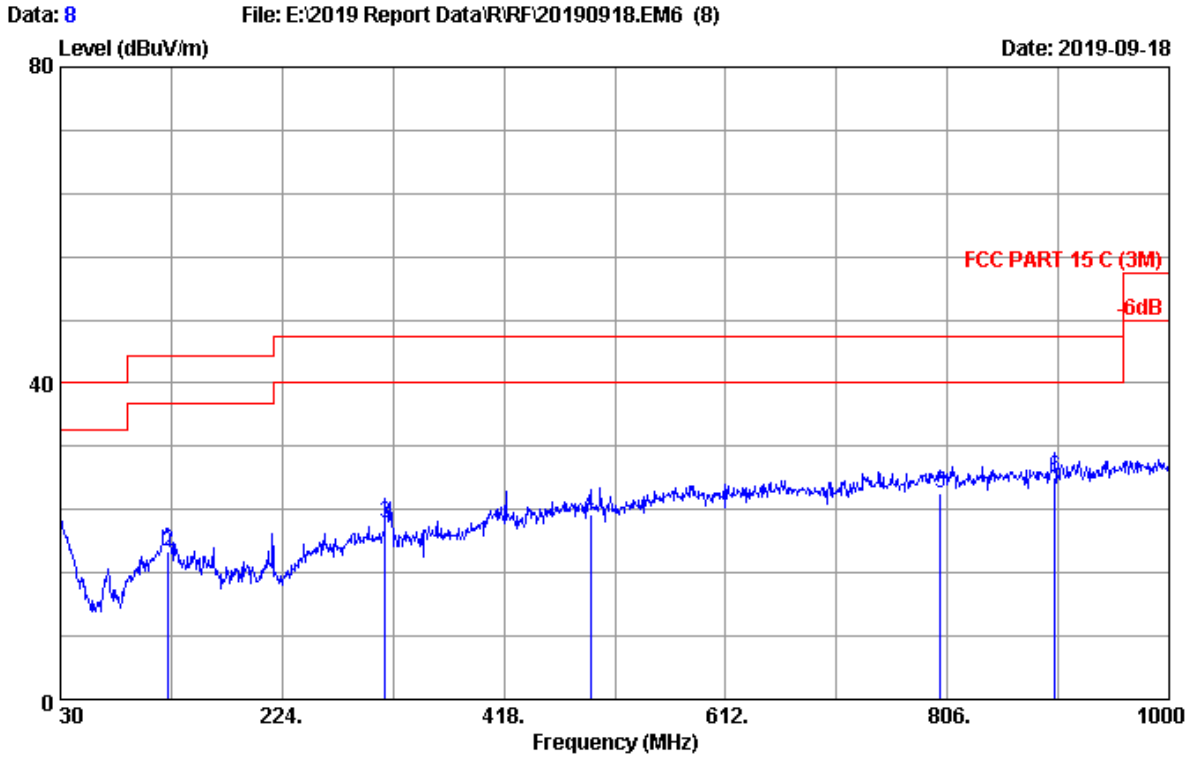
Duty cycle factor = 20log(1/Duty cycle)= -2.137dB






Agilent Spectrum Analyzer - Swept SA
RF
50 Ω DC
SENSE:INT
ALIGN AUTO
04:34:05 PM Nov 12, 2019
Marker 1 2.94000 ms
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE
DET P N N N N N
Ref Offset 1 dB
10 dB/div
Ref 0.00 dBm
Log
ΔMkr1 2.940 ms
0.72 dB
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
1Δ2
Center 2.480000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 10.00 ms (1001 pts)
MSG
STATUS
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Frequency: 30MHz~1GHz

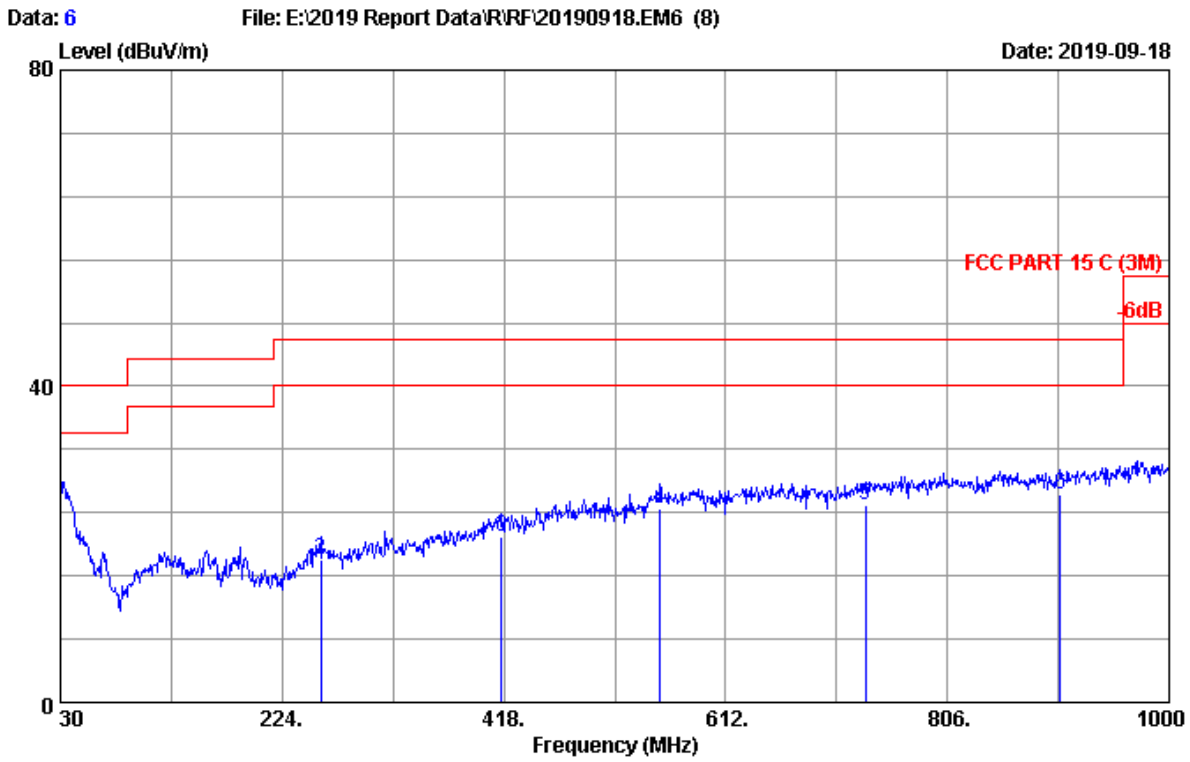


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 CBL6112D-35375
Limit : FCC PART 15 C (3M)
Env. / Ins. : 23.4*C/54%
EUT :
Power rating : AC 120V/60Hz
Test Mode : BT3.0

Data no. : 8
Ant. pol. : HORIZONTAL
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	30.000	24.70	0.53	-5.26	19.97	40.00	20.03	QP
2	124.090	18.60	1.08	-0.99	18.69	43.50	24.81	QP
3	314.210	19.60	1.79	0.97	22.36	46.00	23.64	QP
4	493.660	23.76	2.30	-2.56	23.50	46.00	22.50	QP
5	800.180	26.50	3.12	-3.63	25.99	46.00	20.01	QP
6	900.090	26.70	3.32	-1.89	28.13	46.00	17.87	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



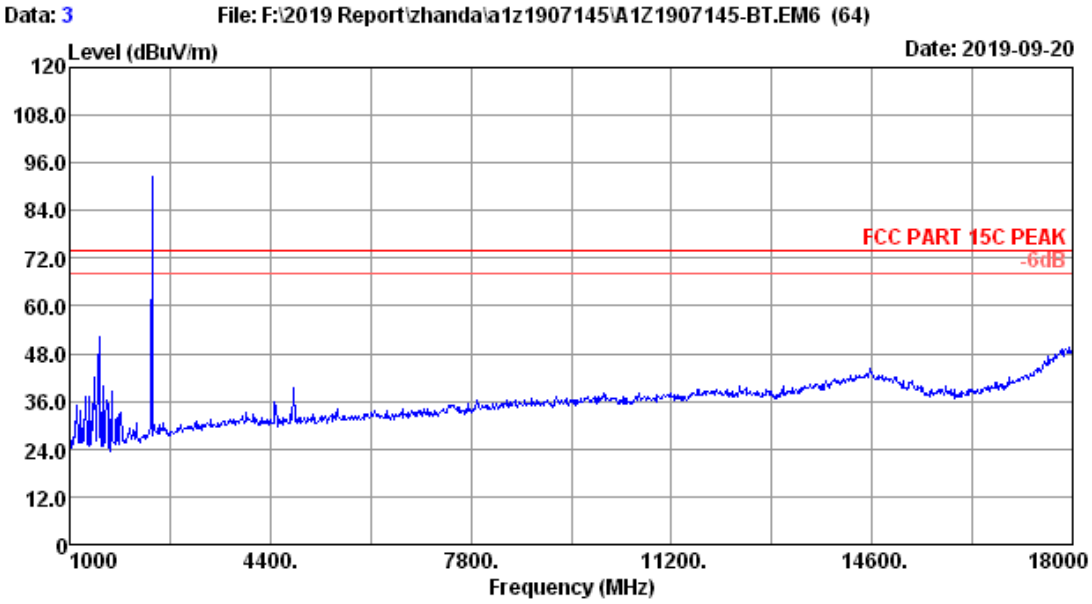
Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 CBL6112D-35375
Limit : FCC PART 15 C (3M)
Env. / Ins. : 23.4*C/54%
EUT :
Power rating : AC 120V/60Hz
Test Mode : BT3.0

Data no. : 6
Ant. pol. : VERTICAL
Engineer : Cote

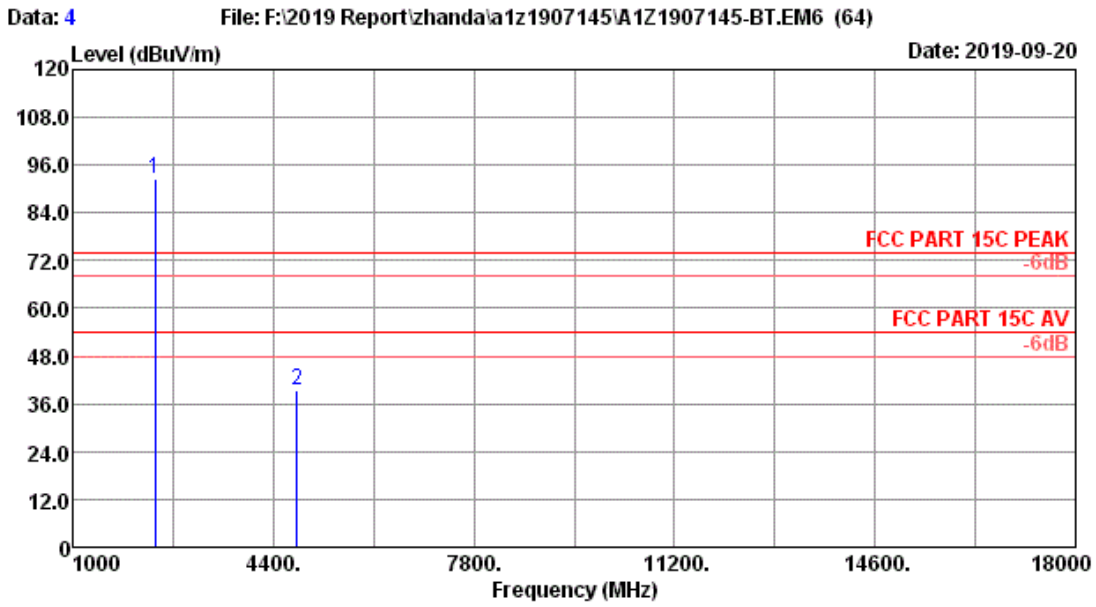
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	30.000	24.70	0.53	-0.09	25.14	40.00	14.86	QP
2	257.950	19.88	1.60	-3.52	17.96	46.00	28.04	QP
3	416.060	22.60	2.06	-3.80	20.86	46.00	25.14	QP
4	554.770	25.10	2.48	-3.05	24.53	46.00	21.47	QP
5	734.220	25.94	2.95	-3.97	24.92	46.00	21.08	QP
6	904.940	26.70	3.34	-3.64	26.40	46.00	19.60	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Frequency: 1GHz~18GHz




```
Site no.      : 3m Chamber                  Data no.   : 3
Dis. / Ant.   : 3m   2018 3115-4580          Ant. pol.  : HORIZONTAL
Limit         : FCC PART 15C PEAK            Pre        :
Env. / Ins.   : 23.4*C/52.9%                 Engineer   : Cote
EUT           :
Power rating  : AC120V/60Hz
Test Mode     : BT3.0      GFSK     2402MHz Tx Mode
```

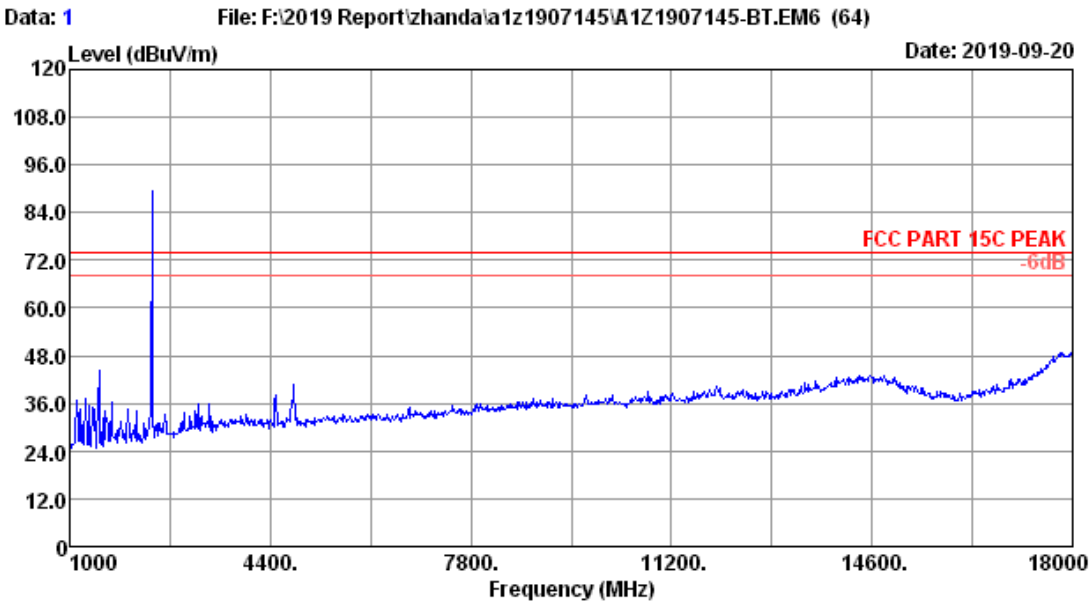


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2402MHz Tx Mode

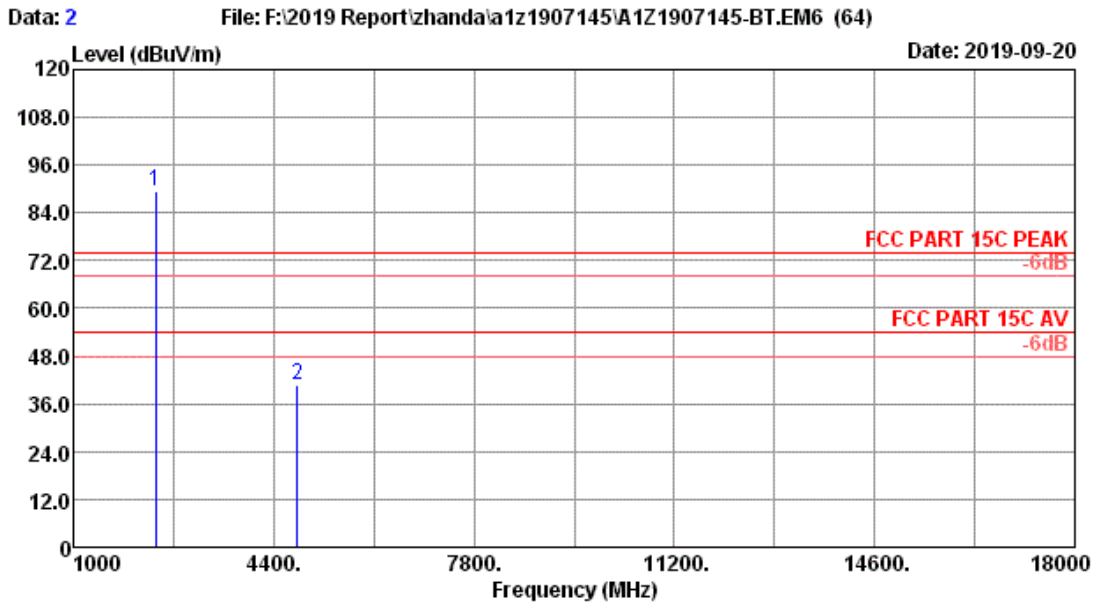
Data no. : 4
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.71	0.87	35.04	98.79	92.33	74.00	-18.33	Peak
2	4804.00	32.10	1.24	34.36	40.28	39.26	74.00	34.74	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no.	: 3m Chamber	Data no.	: 1
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Cote
EUT	:		
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 GFSK 2402MHz Tx Mode		

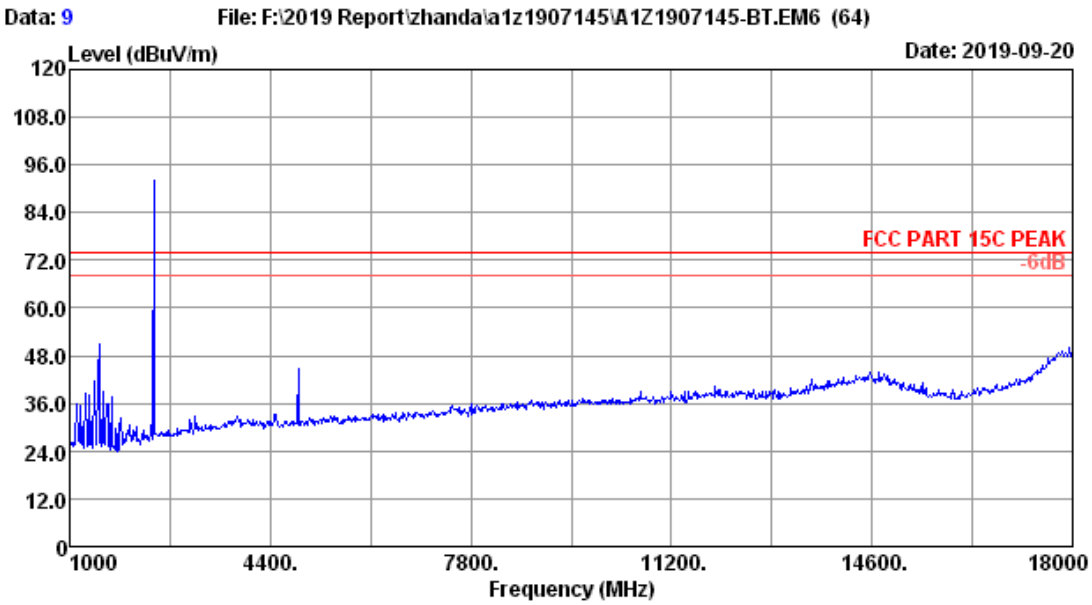


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2402MHz Tx Mode

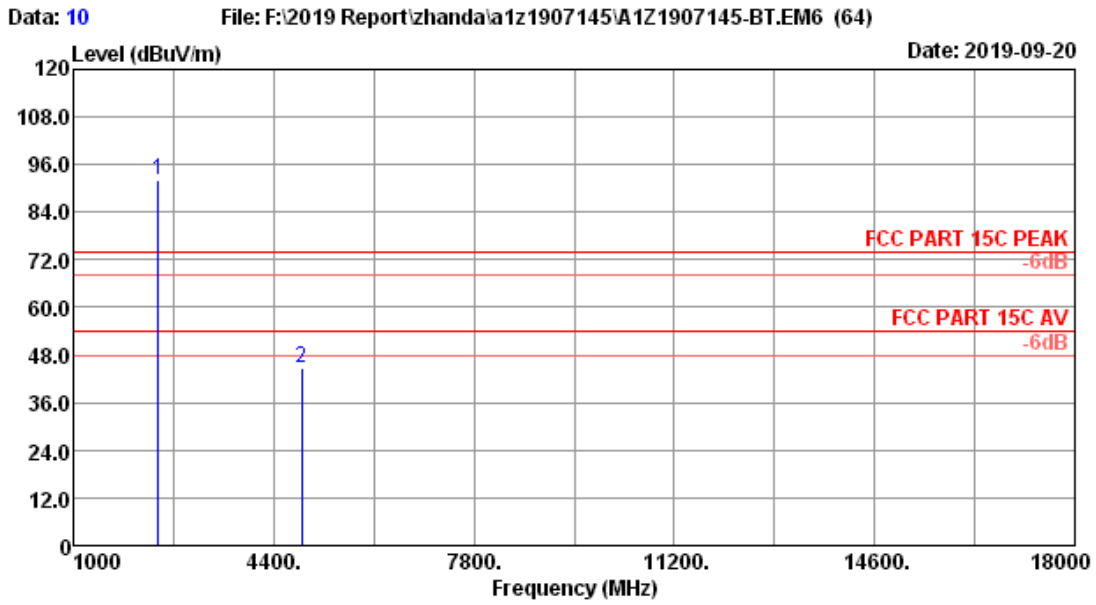
Data no. : 2
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.71	0.87	35.04	95.91	89.45	74.00	-15.45	Peak
2	4804.00	32.10	1.24	34.36	41.76	40.74	74.00	33.26	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.




```
Site no.      : 3m Chamber                  Data no.   : 9
Dis. / Ant.   : 3m   2018 3115-4580          Ant. pol.  : HORIZONTAL
Limit         : FCC PART 15C PEAK            Pre        :
Env. / Ins.   : 23.4*C/52.9%                 Engineer   : Cote
EUT           :
Power rating  : AC120V/60Hz
Test Mode     : BT3.0      GFSK     2441MHz Tx Mode
```

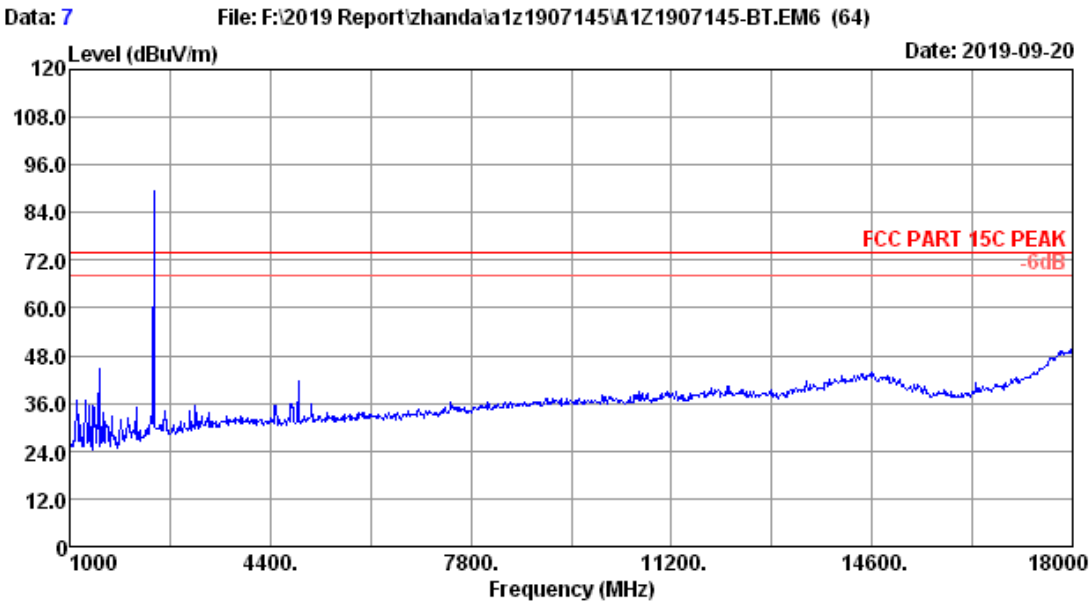


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2441MHz Tx Mode

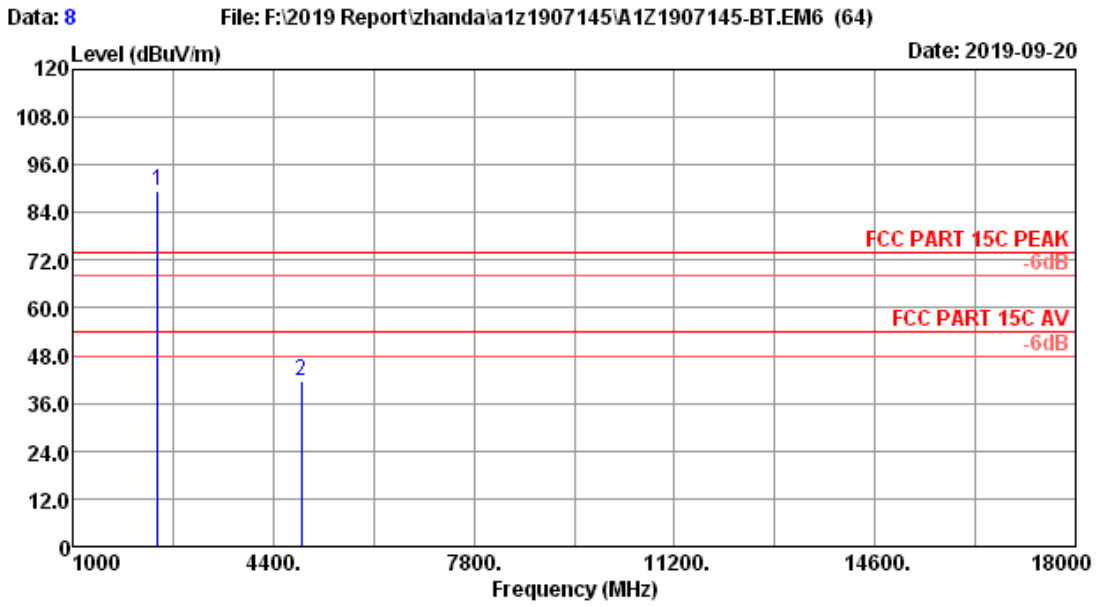
Data no. : 10
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.87	0.88	35.02	98.39	92.12	74.00	-18.12	Peak
2	4882.00	32.25	1.25	34.38	45.77	44.89	74.00	29.11	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.




```
Site no.      : 3m Chamber                  Data no.   : 7
Dis. / Ant.   : 3m   2018 3115-4580          Ant. pol.  : VERTICAL
Limit         : FCC PART 15C PEAK            Pre        :
Env. / Ins.   : 23.4*C/52.9%                 Engineer   : Cote
EUT           :
Power rating  : AC120V/60Hz
Test Mode     : BT3.0     GFSK      2441MHz Tx Mode
```

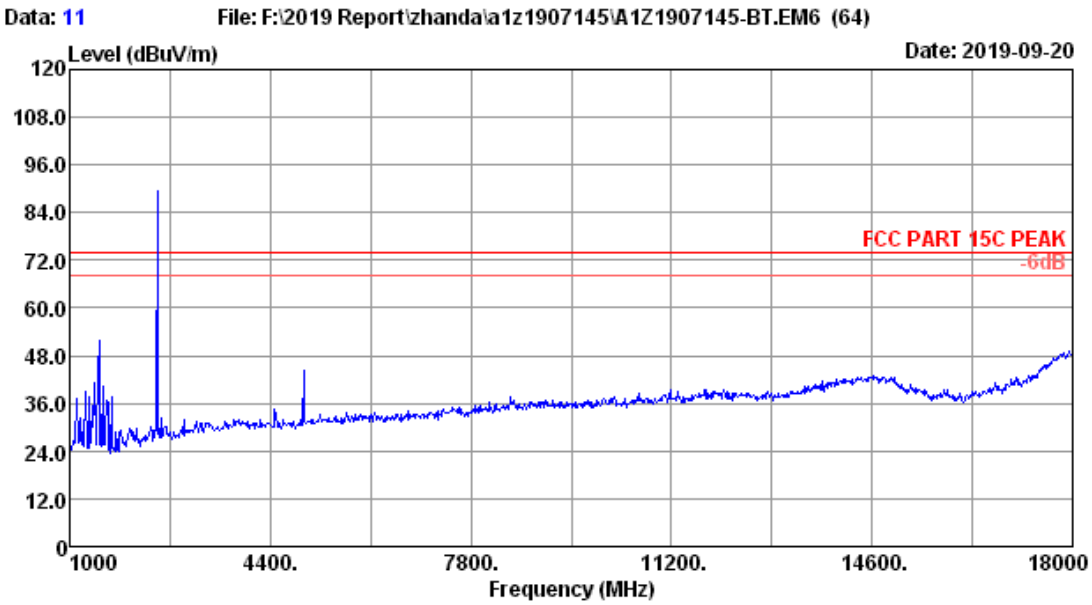


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2441MHz Tx Mode

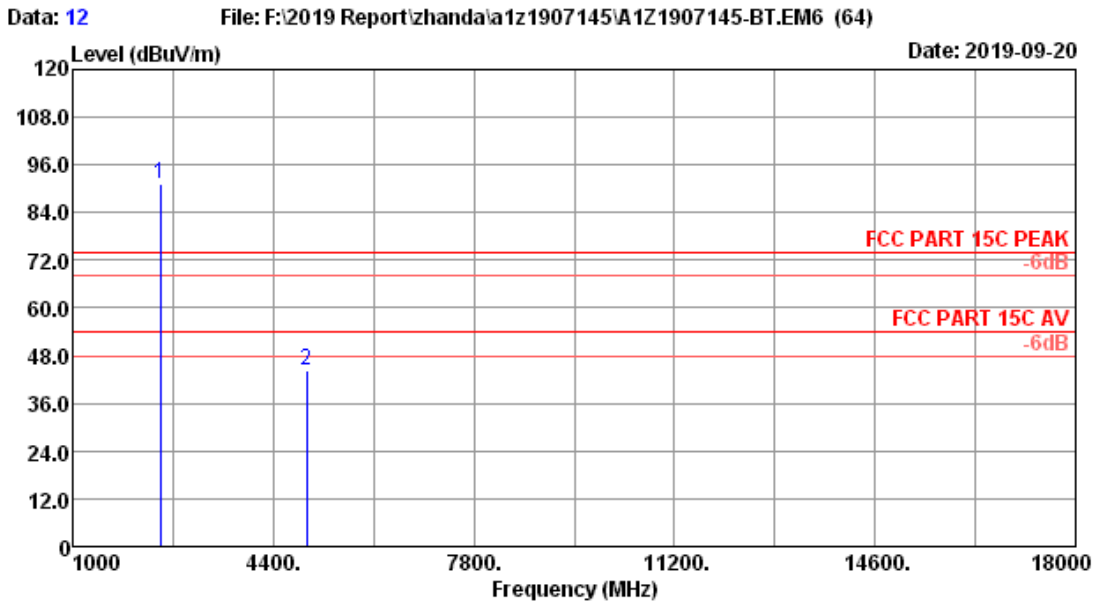
Data no. : 8
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.87	0.88	35.02	95.63	89.36	74.00	-15.36	Peak
2	4882.00	32.25	1.25	34.38	42.39	41.51	74.00	32.49	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.




```
Site no.      : 3m Chamber                  Data no.   : 11
Dis. / Ant.   : 3m   2018 3115-4580          Ant. pol.  : HORIZONTAL
Limit         : FCC PART 15C PEAK            Pre        :
Env. / Ins.   : 23.4*C/52.9%                 Engineer   : Cote
EUT           :
Power rating  : AC120V/60Hz
Test Mode     : BT3.0      GFSK     2480MHz Tx Mode
```

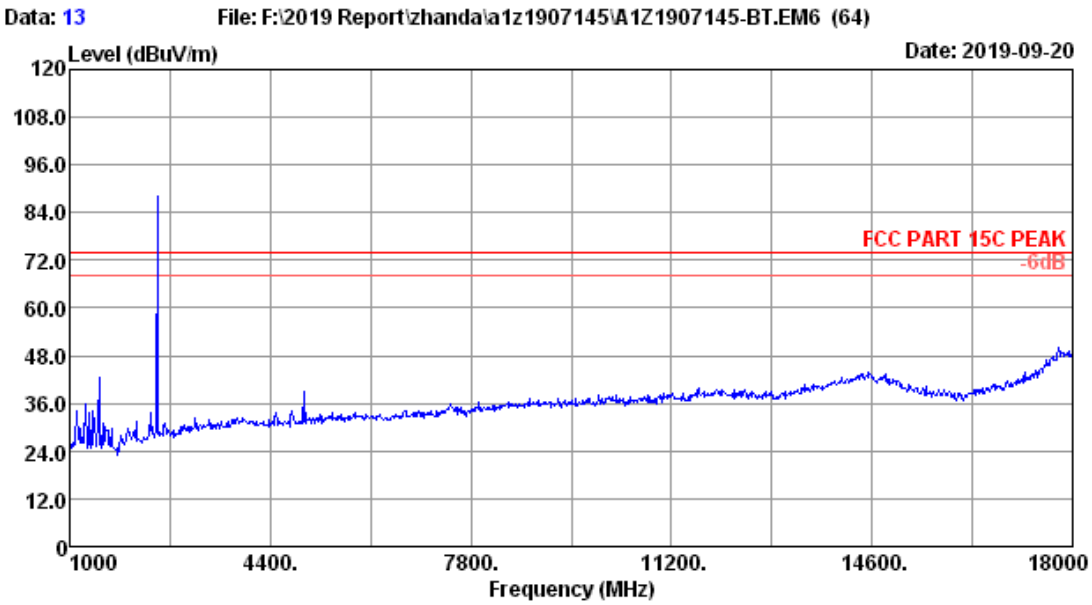


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2480MHz Tx Mode

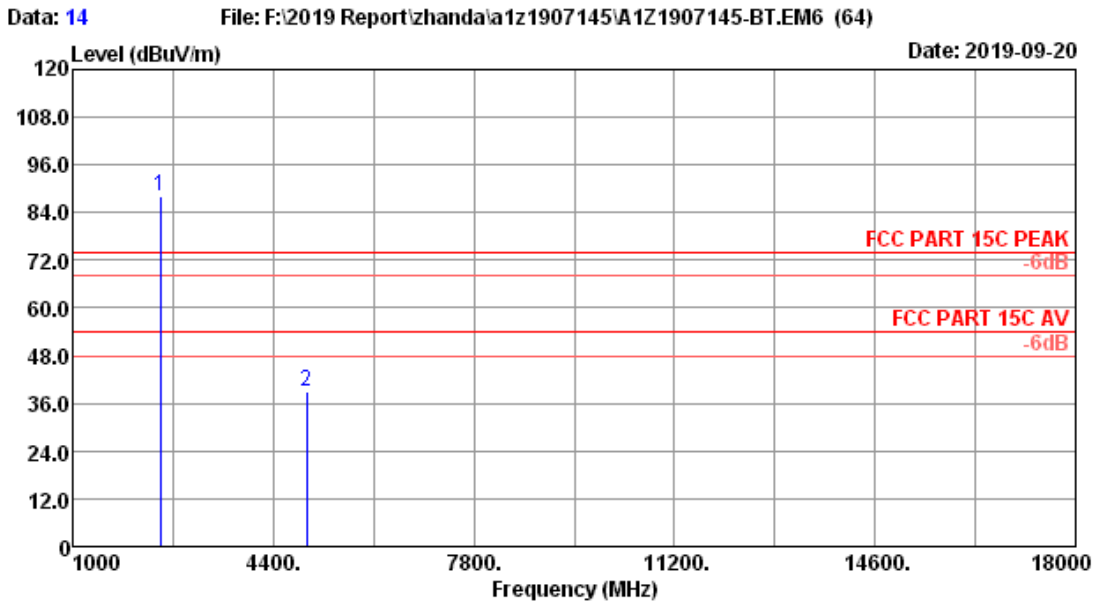
Data no. : 12
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.98	0.89	35.01	97.20	91.06	74.00	-17.06	Peak
2	4960.00	32.43	1.27	34.39	44.95	44.26	74.00	29.74	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



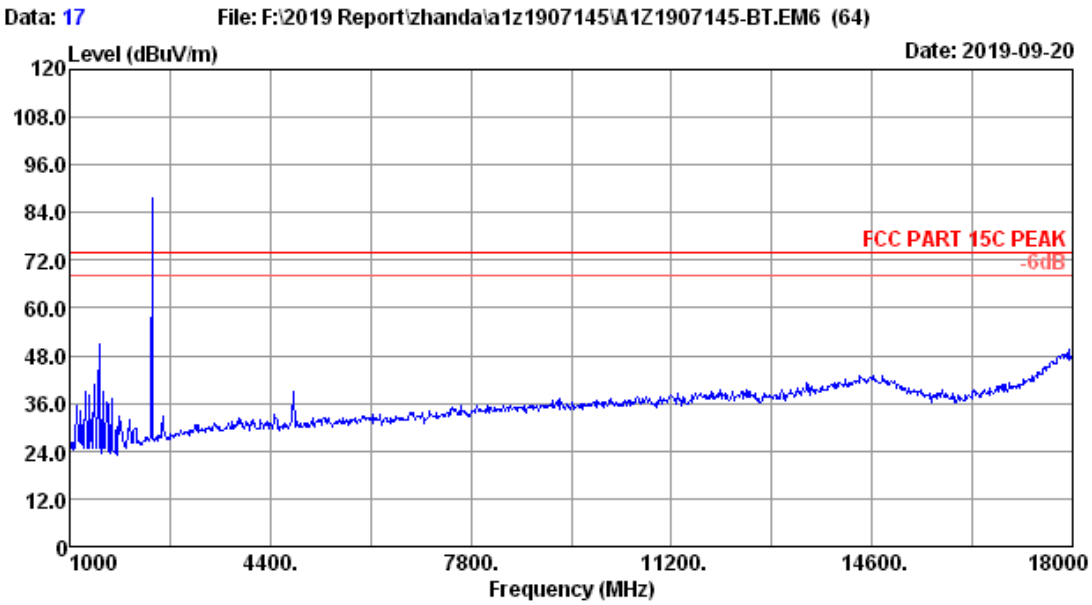

```
Site no.      : 3m Chamber                  Data no.   : 13
Dis. / Ant.   : 3m   2018 3115-4580          Ant. pol.  : VERTICAL
Limit         : FCC PART 15C PEAK            Pre        :
Env. / Ins.   : 23.4*C/52.9%                 Engineer   : Cote
EUT           :
Power rating  : AC120V/60Hz
Test Mode     : BT3.0       GFSK    2480MHz Tx Mode
```



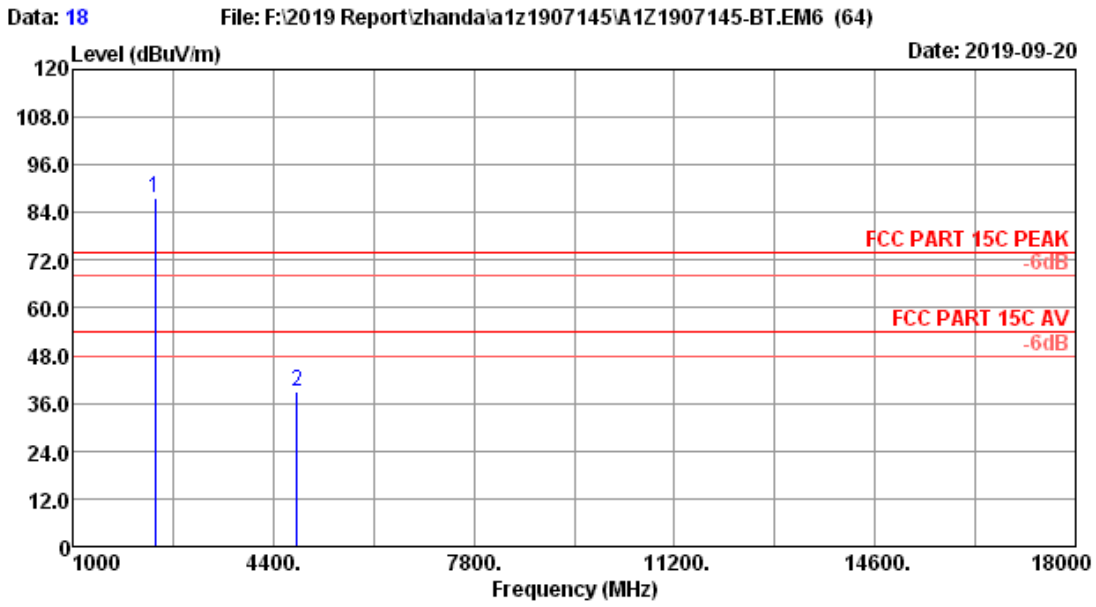
Site no. : 3m Chamber Data no. : 14
Dis. / Ant. : 3m 2018 3115-4580 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre :
Env. / Ins. : 23.4*C/52.9% Engineer : Cote
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.98	0.89	35.01	94.15	88.01	74.00	-14.01	Peak
2	4960.00	32.43	1.27	34.39	39.46	38.77	74.00	35.23	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no.	: 3m Chamber	Data no.	: 17
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Cote
EUT	:		
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 8-DPSK 2402MHz Tx Mode		

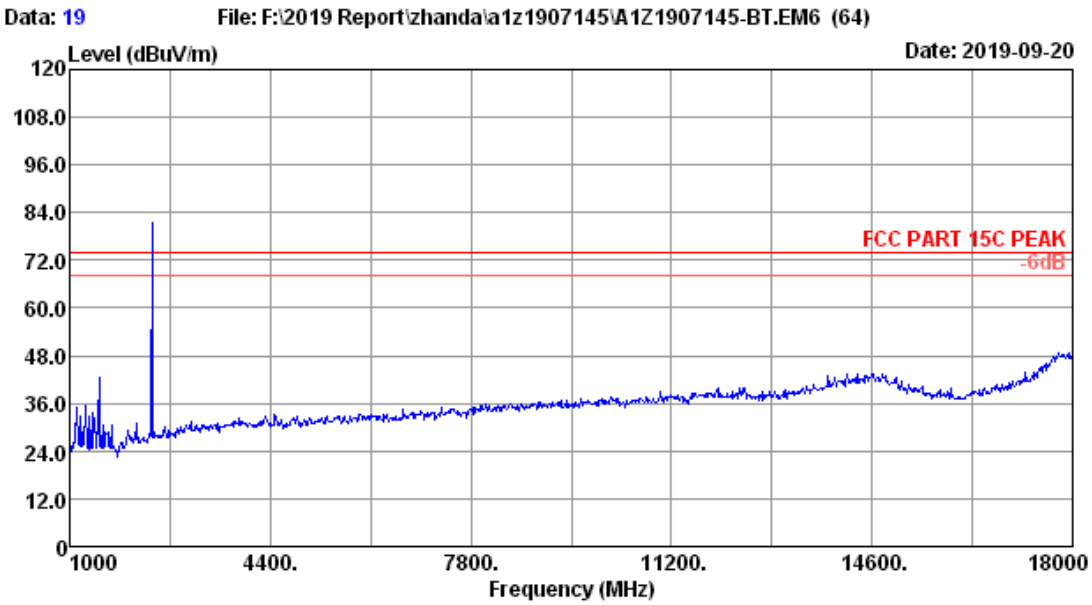


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2402MHz Tx Mode

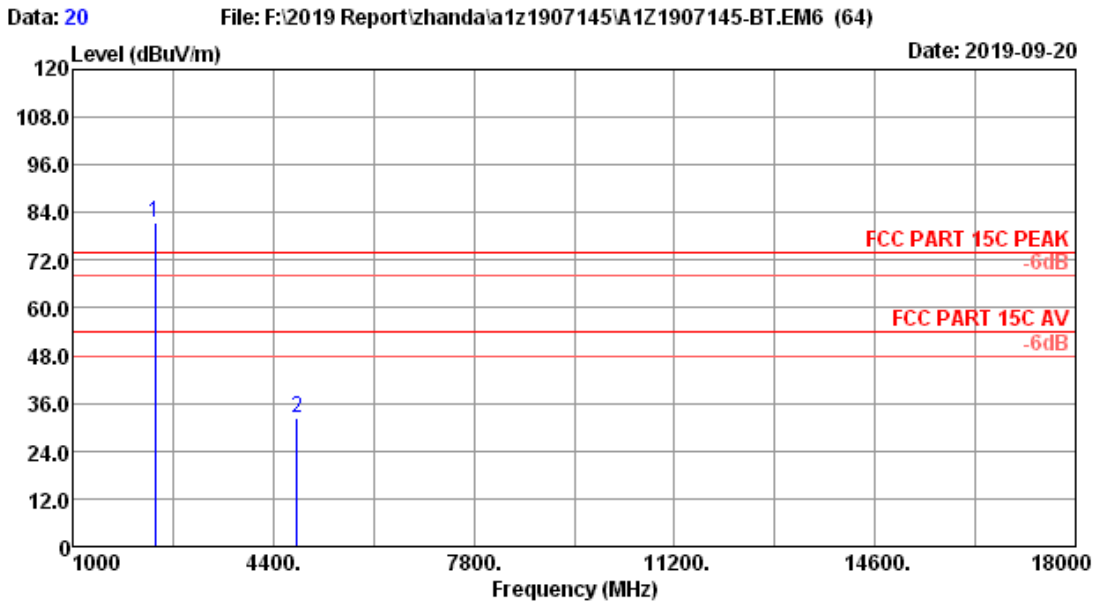
Data no. : 18
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.71	0.87	35.04	94.17	87.71	74.00	-13.71	Peak
2	4804.00	32.10	1.24	34.36	40.18	39.16	74.00	34.84	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 19
Dis. / Ant. : 3m 2018 3115-4580 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre :
Env. / Ins. : 23.4*C/52.9% Engineer : Cote
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2402MHz Tx Mode

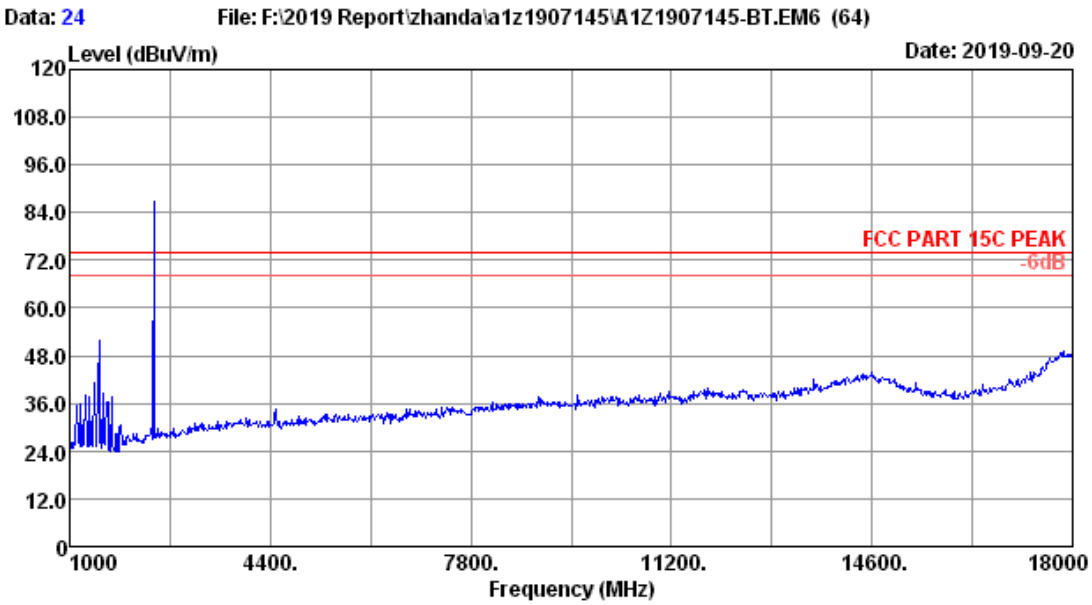


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2402MHz Tx Mode

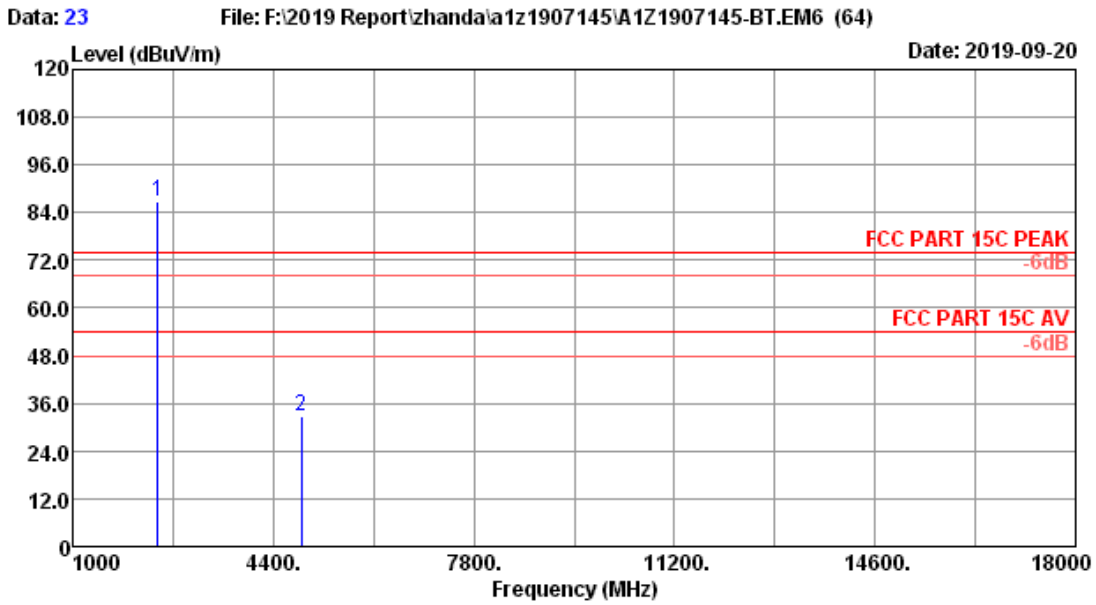
Data no. : 20
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.71	0.87	35.04	87.77	81.31	74.00	-7.31	Peak
2	4804.00	32.10	1.24	34.36	33.30	32.28	74.00	41.72	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no.	: 3m Chamber	Data no.	: 24
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Cote
EUT	:		
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 8-DPSK 2441MHz Tx Mode		

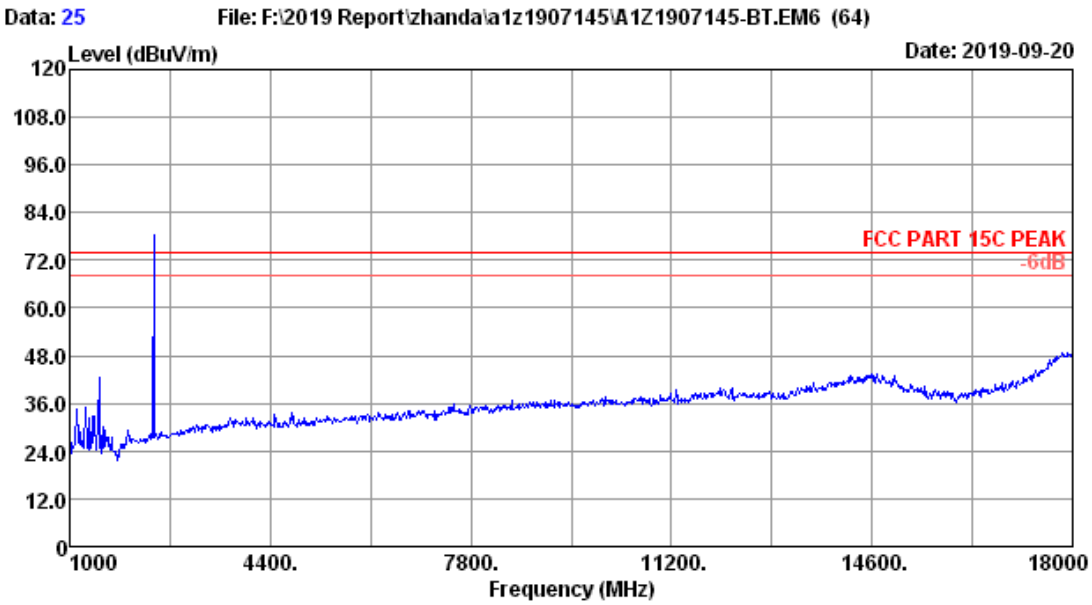


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2441MHz Tx Mode

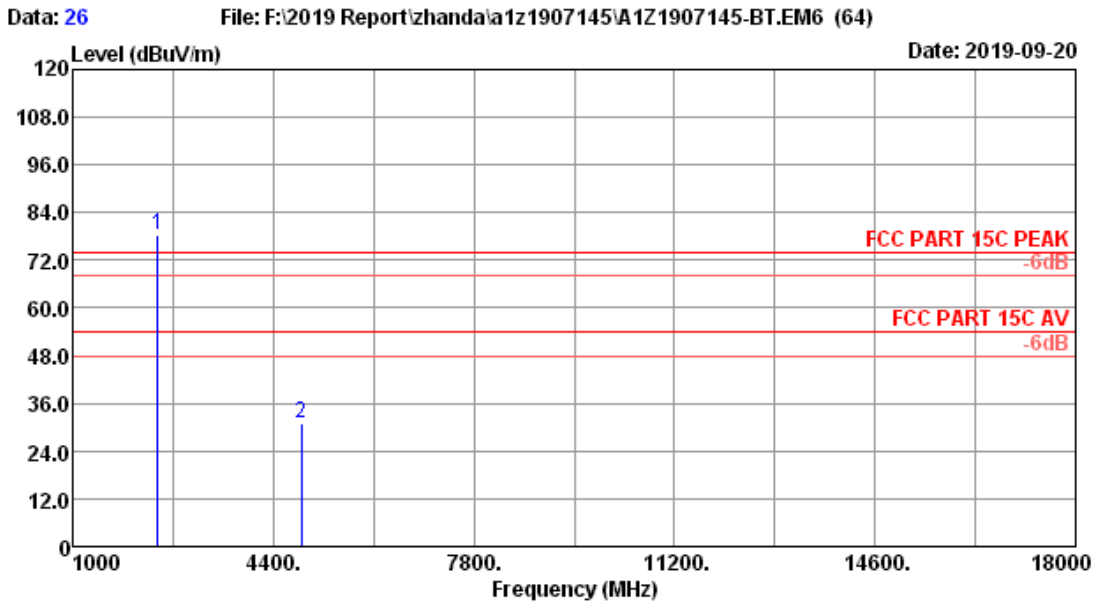
Data no. : 23
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.87	0.88	35.02	93.07	86.80	74.00	-12.80	Peak
2	4882.00	32.25	1.25	34.38	33.55	32.67	74.00	41.33	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no.	: 3m Chamber	Data no.	: 25
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Cote
EUT	:		
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 8-DPSK 2441MHz Tx Mode		

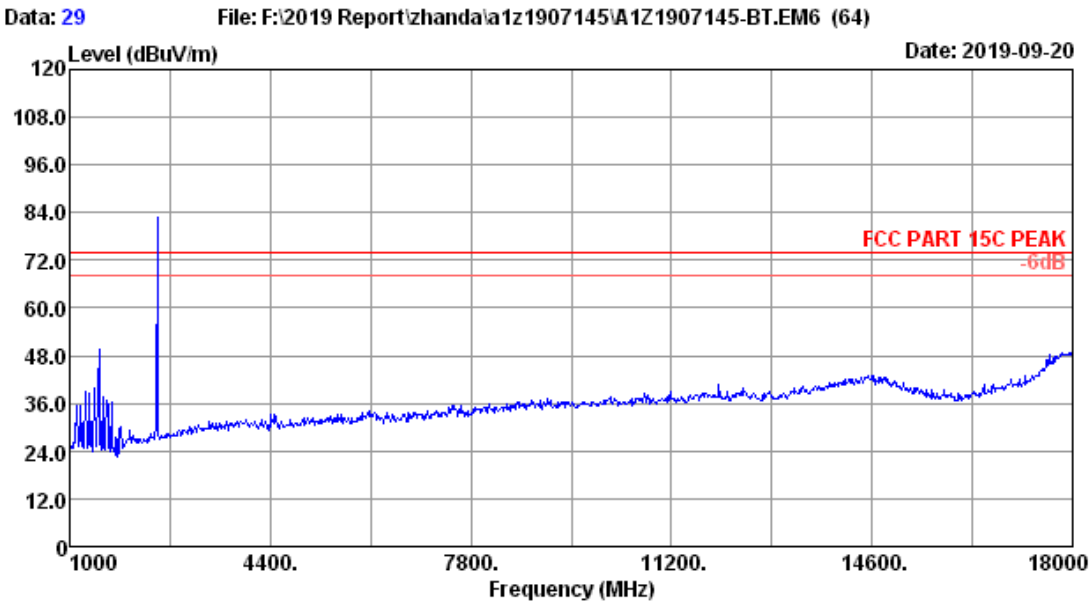


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2441MHz Tx Mode

Data no. : 26
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

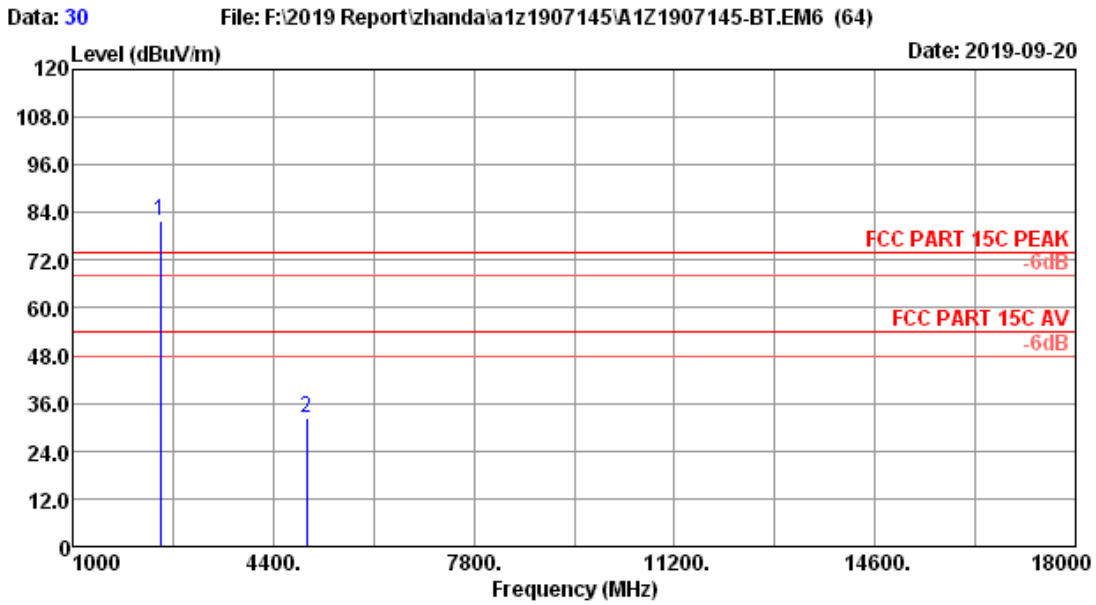
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.87	0.88	35.02	84.60	78.33	74.00	-4.33	Peak
2	4882.00	32.25	1.25	34.38	31.90	31.02	74.00	42.98	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2480MHz Tx Mode

Data no. : 29
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

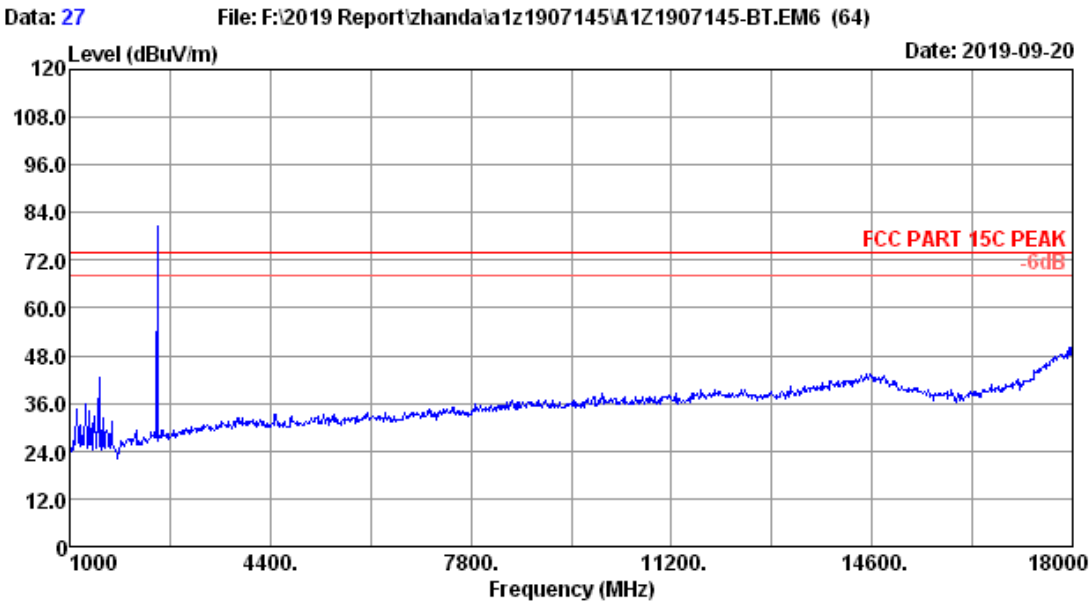


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2480MHz Tx Mode

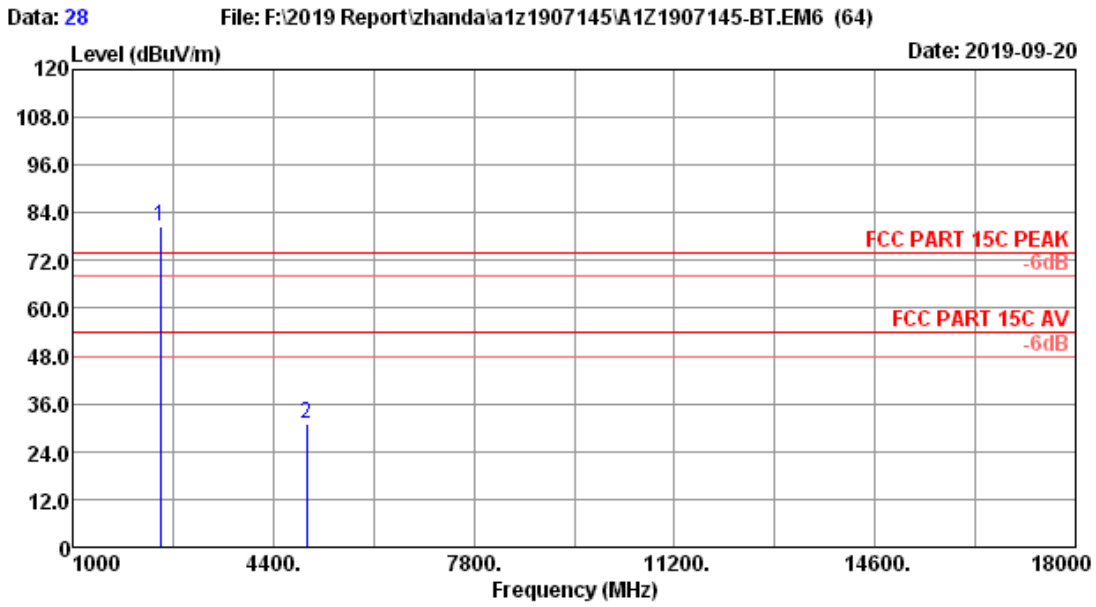
Data no. : 30
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.98	0.89	35.01	88.27	82.13	74.00	-8.13	Peak
2	4960.00	32.43	1.27	34.39	32.98	32.29	74.00	41.71	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.




```
Site no.      : 3m Chamber                  Data no.   : 27
Dis. / Ant.   : 3m   2018 3115-4580          Ant. pol.  : VERTICAL
Limit         : FCC PART 15C PEAK            Pre        :
Env. / Ins.   : 23.4*C/52.9%                 Engineer   : Cote
EUT           :
Power rating  : AC120V/60Hz
Test Mode     : BT3.0  8-DPSK     2480MHz Tx Mode
```



Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2480MHz Tx Mode

Data no. : 28
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.00	27.98	0.89	35.01	86.70	80.56	74.00	-6.56	Peak
2	4960.00	32.43	1.27	34.39	31.79	31.10	74.00	42.90	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

5. CONDUCTED SPURIOUS EMISSIONS

5.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	Attenuator	Agilent	8491B	MY39262165	Oct.14,18	1 Year
3.	RF Cable	EMCI	EMC102-KM-KM 3500	170702	May.13,19	1 Year

5.2.Block Diagram of Test Setup

5.3.Limit

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

5.4.Test Procedure

Use the test method descried in ANSI C63.10 clause 7.8.8:
The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz and measure all the emissions With peak detector.

Note: The cable loss and attenuator loss were offset into spectrum analyzer as an amplitude offset.

5.5.Test result

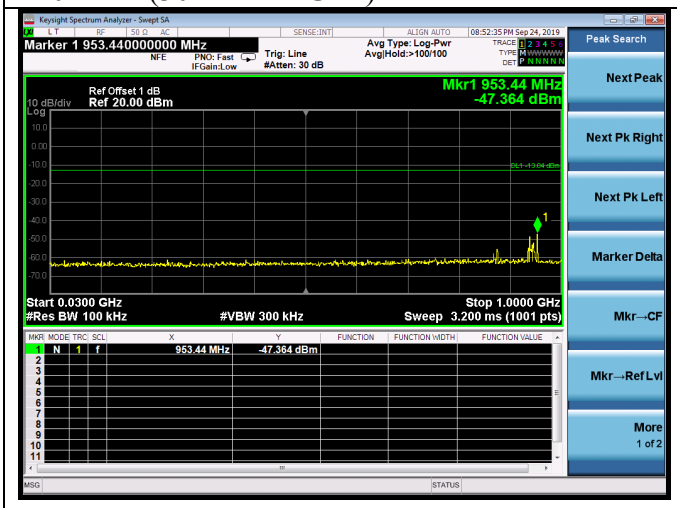
PASS (The testing data was attached in the next pages.)

EUT: IPTV STB/PVR		
M/N: Amulet 7XM		
Test date: 2019-09-24	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Cote	Test site: RF site	Temperature:22.8±0.6 ℃

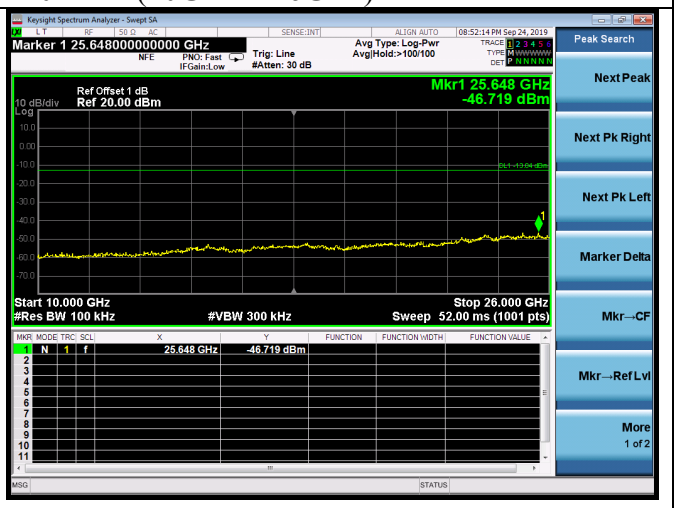
Hopping off

GFSK

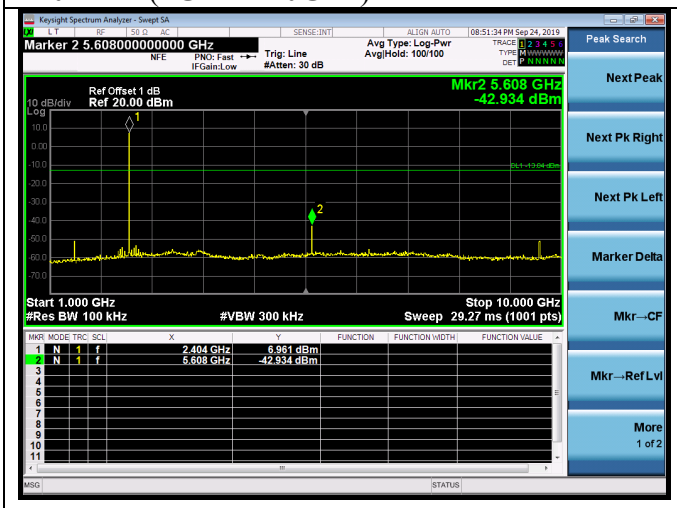
2402MHz(30MHz – 1GHz)



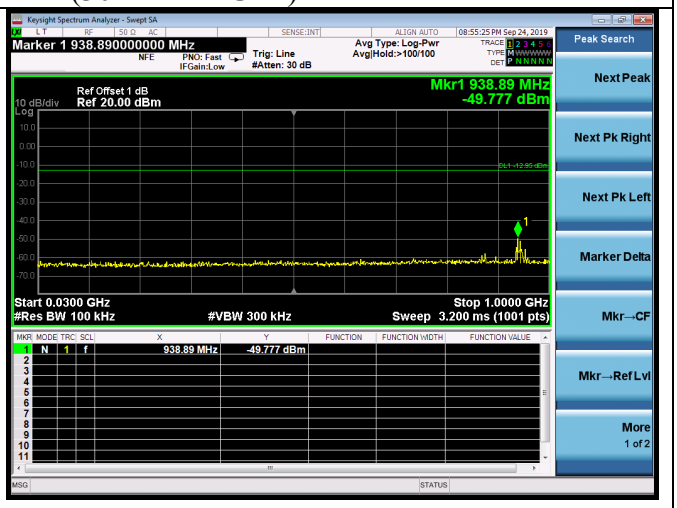
2402MHz(10GHz – 26GHz)



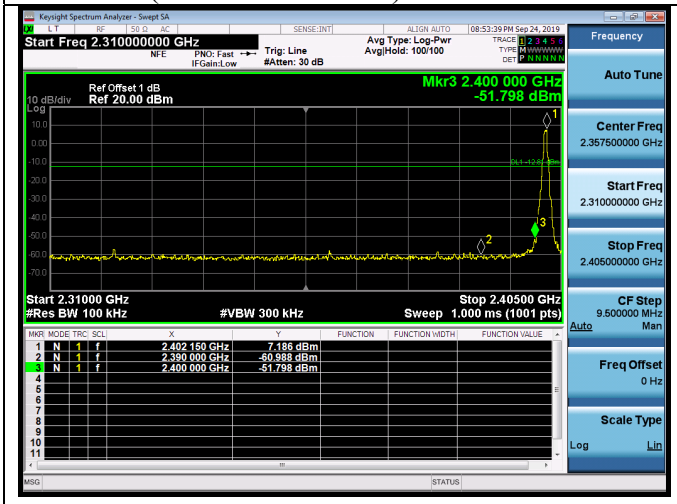
2402MHz(1GHz – 10GHz)



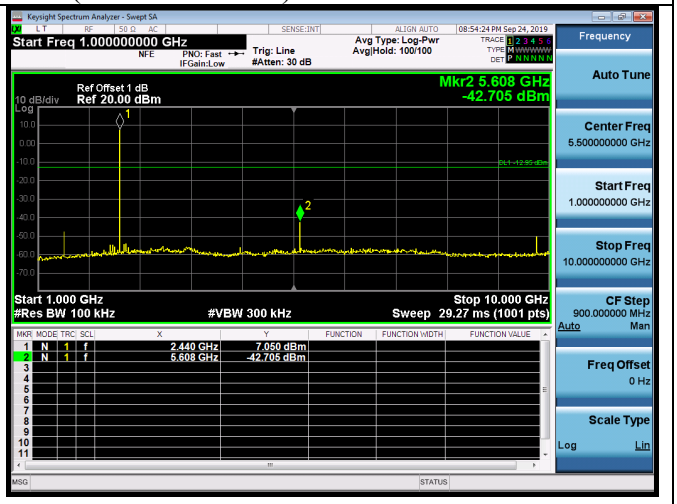
2441(30MHz – 1GHz)



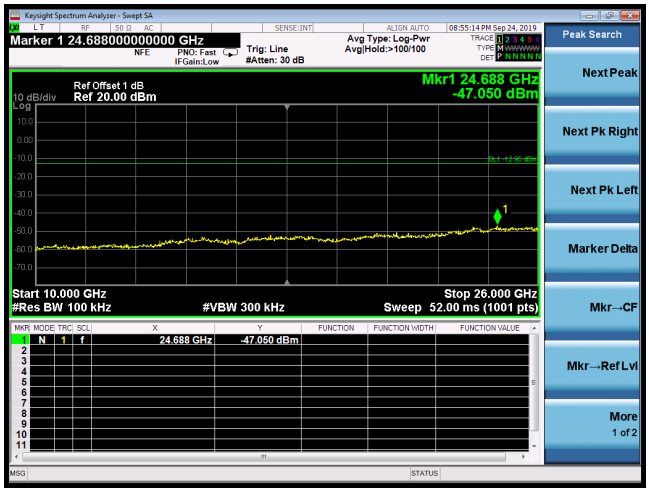
2402MHz(2.3GHz – 2.4GHz)



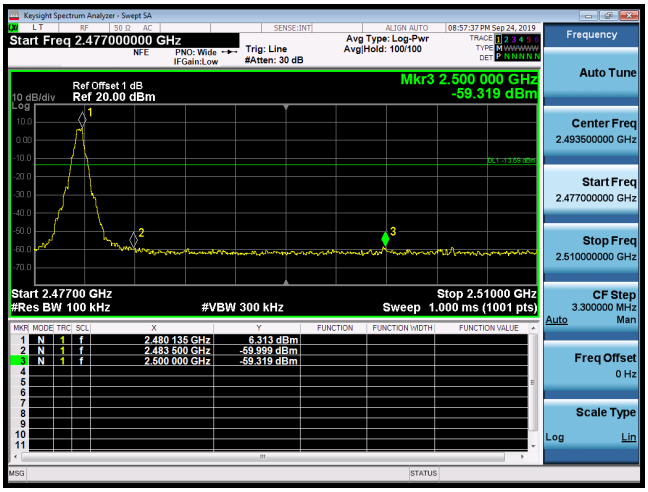
2441(1GHz – 10GHz)



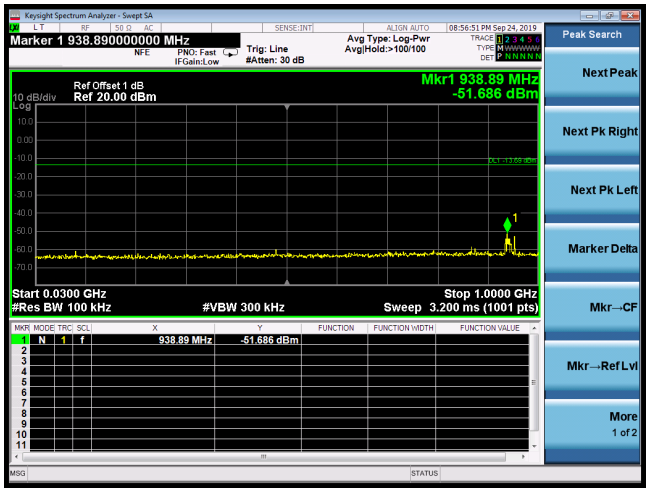
2441(10GHz – 26GHz)



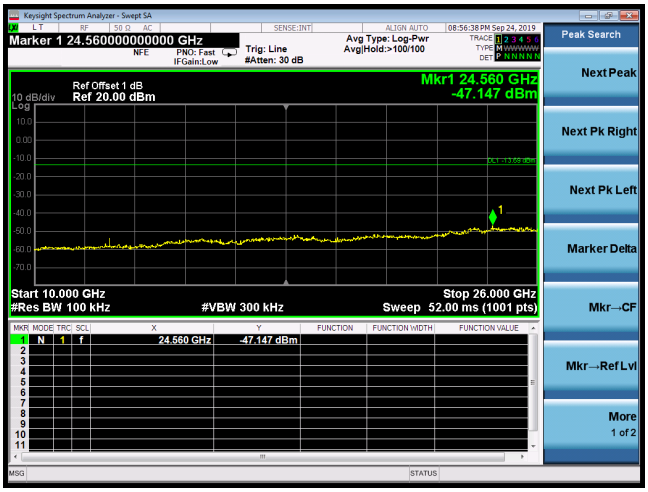
2480MHz(2.4GHz – 2.5GHz)



2480MHz(30MHz – 1GHz)

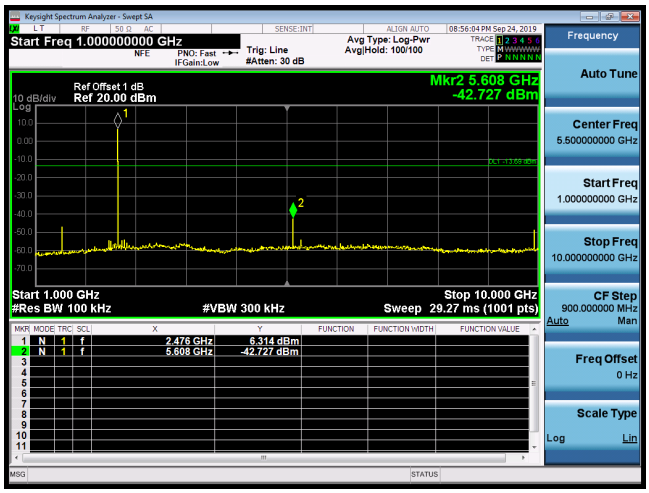


2480MHz(10GHz – 26GHz)

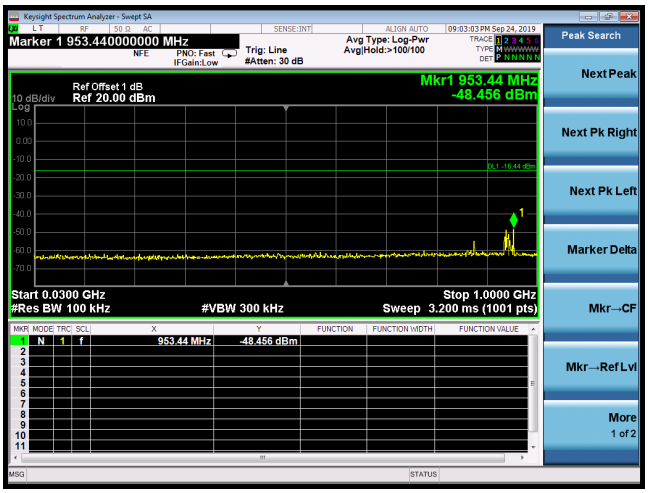


8-DPSK

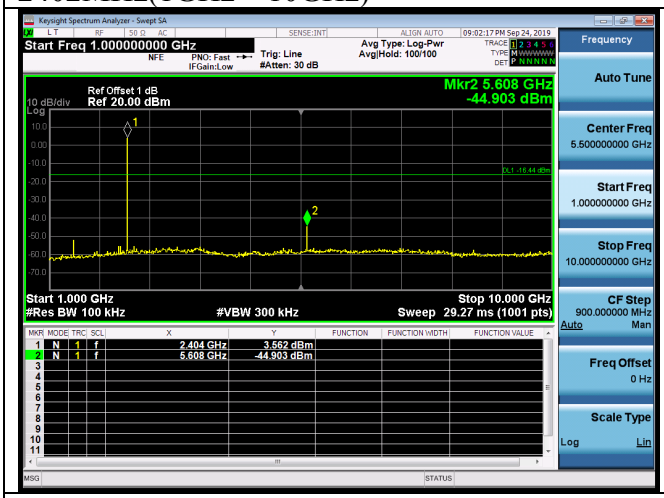
2480MHz(1GHz – 10GHz)



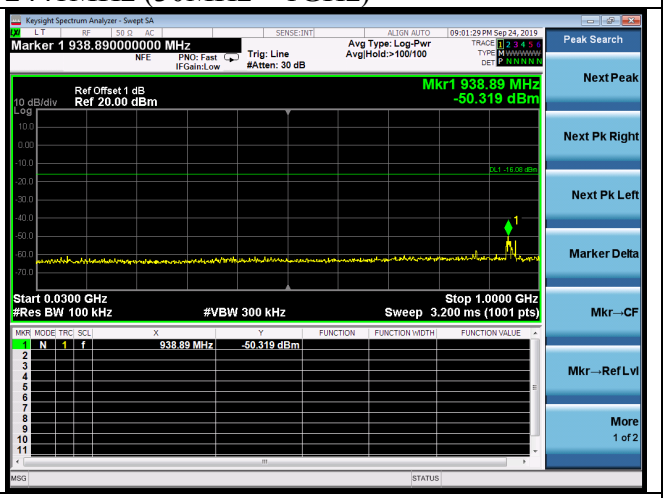
2402MHz(30MHz – 1GHz)



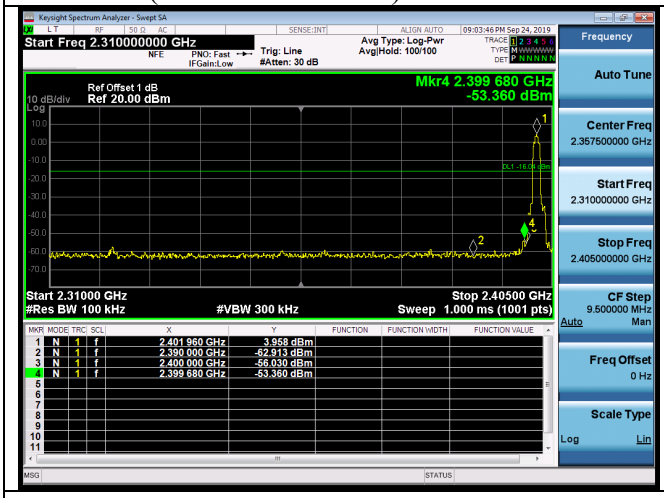
2402MHz(1GHz – 10GHz)



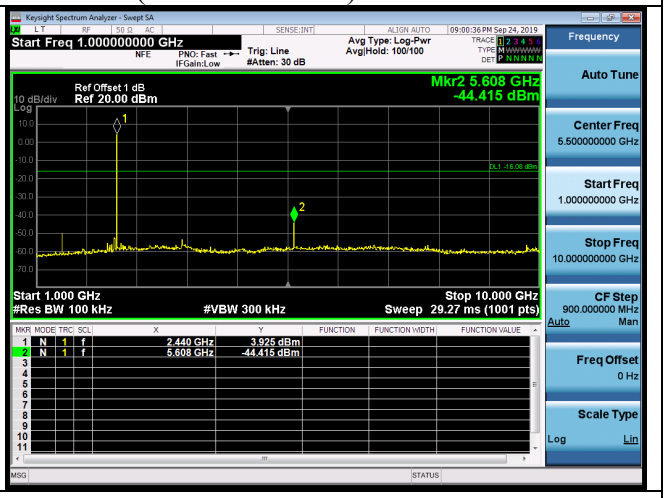
2441MHz (30MHz – 1GHz)



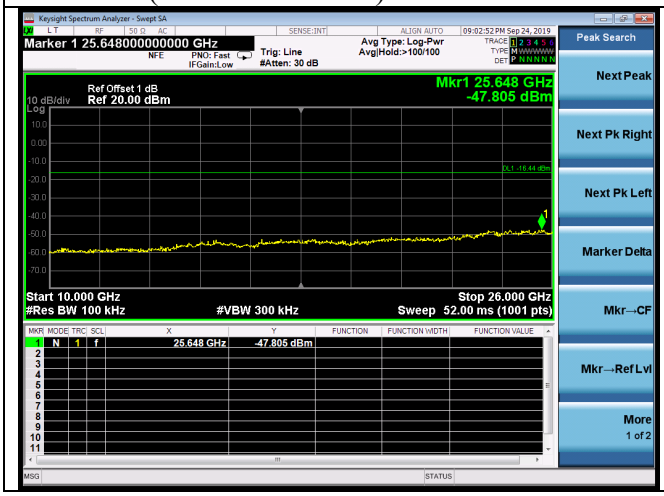
2402MHz(2.3GHz – 2.4GHz)



2441MHz(1GHz – 10GHz)

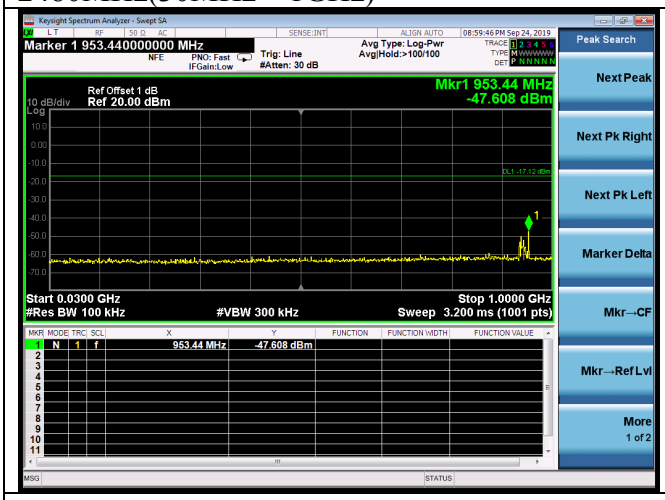


2402MHz(10GHz – 26GHz)



2441MHz(10GHz – 26GHz)

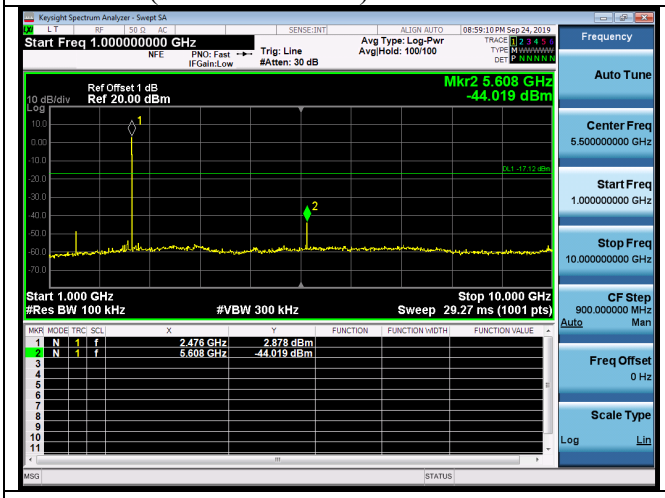
2480MHz(30MHz – 1GHz)



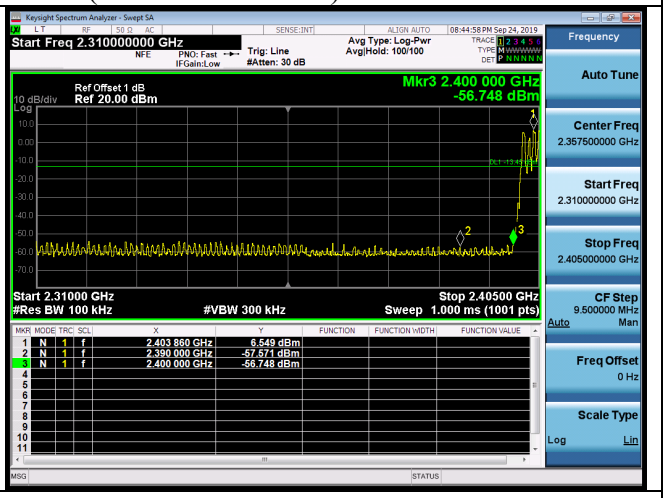
2480MHz(10GHz – 26GHz)

Hopping on

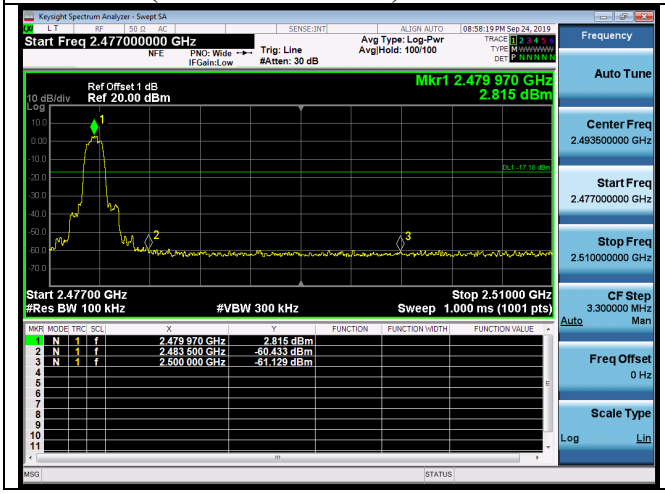
2480MHz(1GHz – 10GHz)



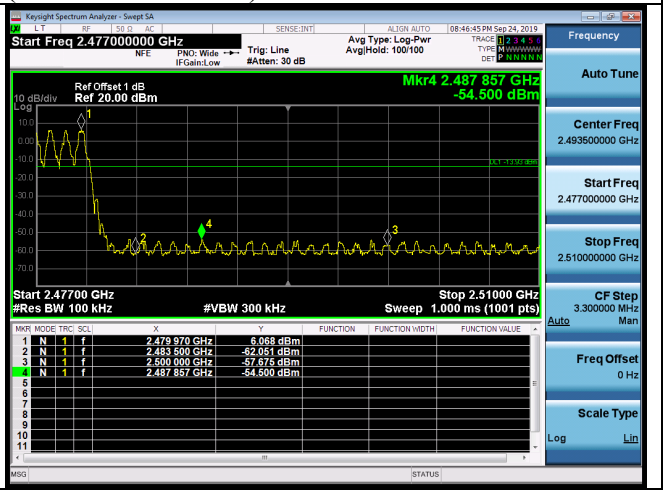
GFSK(2.3GHz – 2.4GHz)

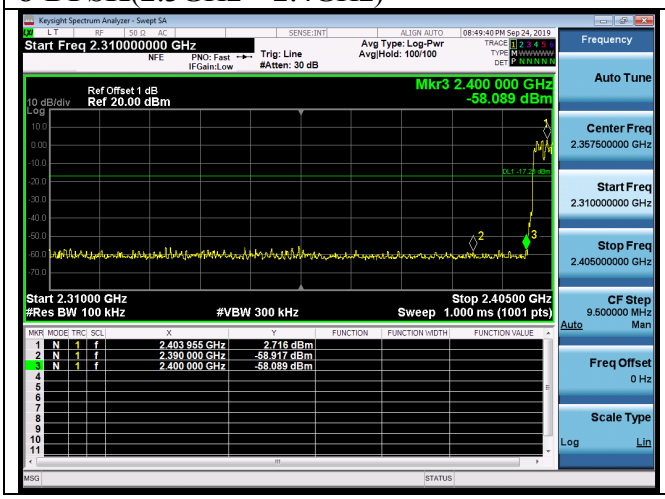
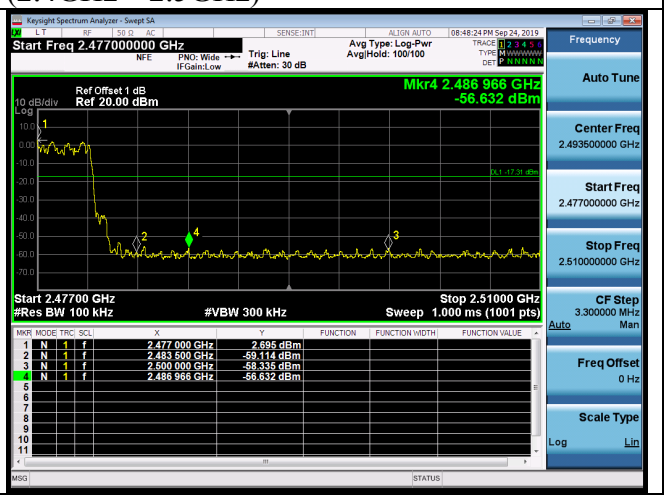


2480MHz(2.4GHz – 2.5GHz)



(2.4GHz – 2.5GHz)



8-DPSK(2.3GHz – 2.4GHz)	(2.4GHz – 2.5GHz)
	

6. 20 DB BANDWIDTH TEST

6.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	Attenuator	Agilent	8491B	MY39262165	Oct.14,18	1 Year
3.	RF Cable	EMCI	EMC102-KM-KM 3500	170702	May.13,19	1 Year

6.2.Block Diagram of Test Setup

6.3.Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

6.4.Test Procedure

Use the test method descried in ANSI C63.10 clause 7.8.7:
1. Connect the antenna port of the EUT to the spectrum analyzer.
2. Let the EUT transmit at Low/ Mid/ High channel with test software.
3. Setting of SA is following as: RBW: 30kHz / VBW: 100kHz
   Sweep Mode: Continuous sweep
   Detect mode: Positive peak
   Trace mode: Max hold.
4. Use the occupied bandwidth function of the SA measure the 20dB bandwidth directly.

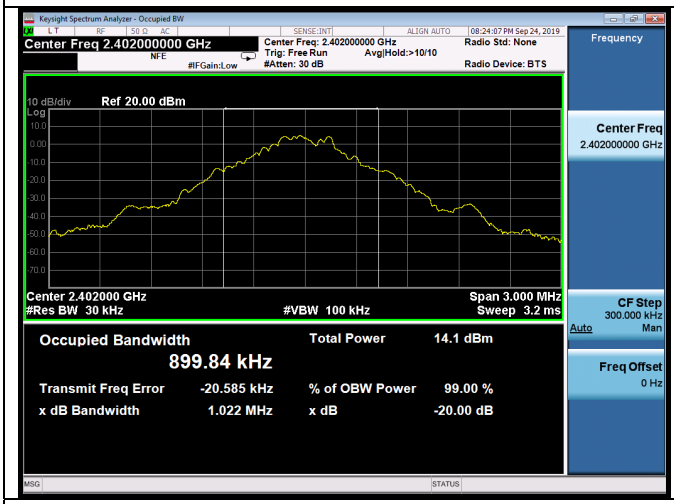
6.5.Test Results

EUT: IPTV STB/PVR		
M/N: Amulet 7XM		
Test date: 2019-09-24	Pressure: 102.3±1.0 kpa	Humidity: 53.6±3.0%
Tested by: Cote	Test site: RF site	Temperature: 25.5±0.6℃

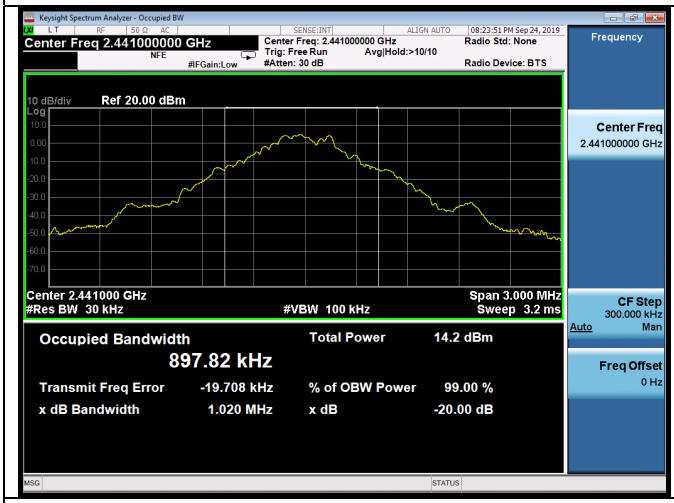
Test Mode	Frequency (MHz)	20dB bandwidth (KHz)	Limit (KHz)
GFSK	2402	1022	N/A
	2441	1020	N/A
	2480	1021	N/A
8-DPSK	2402	1317	N/A
	2441	1311	N/A
	2480	1318	N/A
Conclusion：PASS			

GFSK

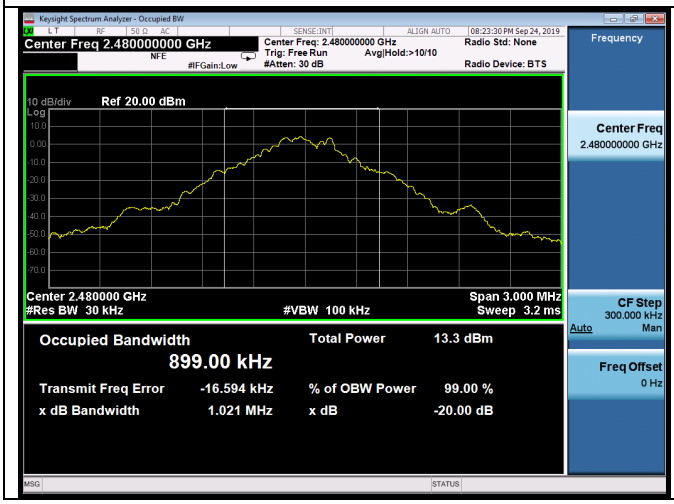
2402MHz



2441MHz

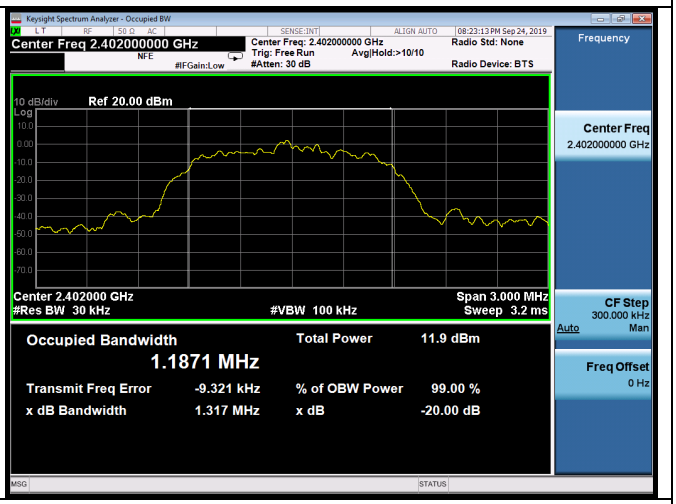


2480MHz

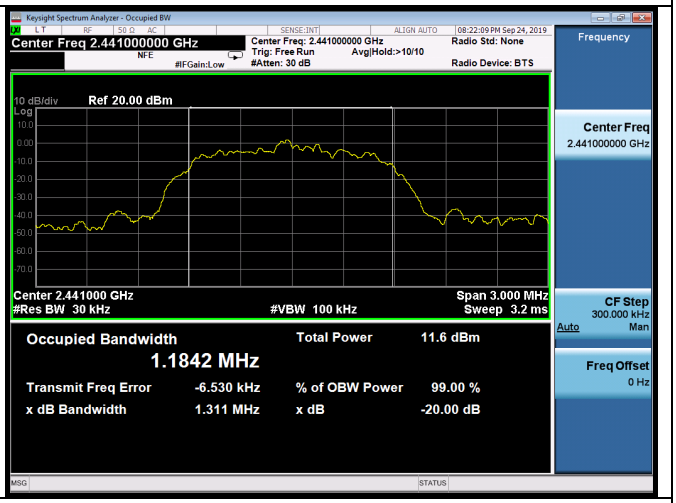


8-DPSK

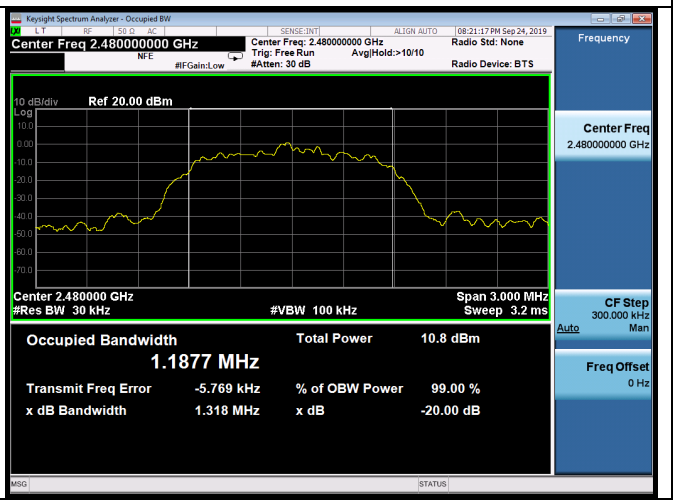
2402MHz



2441MHz



2480MHz

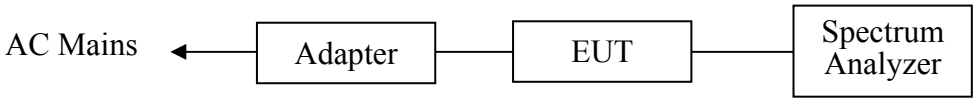


7. CARRIER FREQUENCY SEPARATION TEST

7.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	RF Cable	EMCI	EMC102-KM-KM 3500	170702	May.13,19	1 Year

7.2.Block Diagram of Test Setup



7.3.Limit

Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

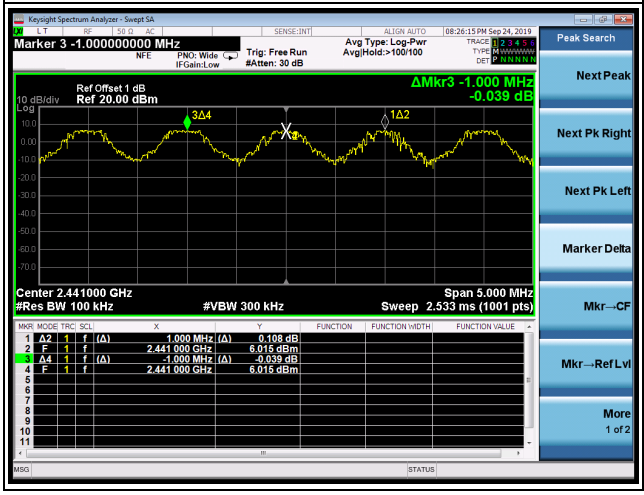
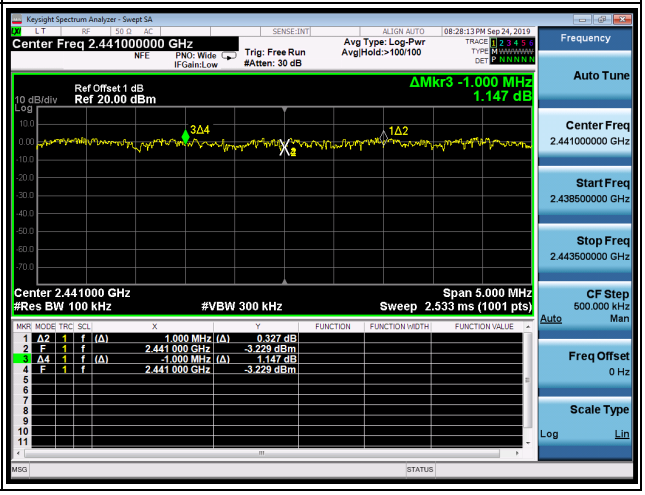
7.4.Test Procedure

Use the test method descried in ANSI C63.10 clause 7.8.2:
1. Connect the antenna port of the EUT to the Spectrum analyzer.
2. Let the EUT transmit at Low/ Mid/ High channel.
3. Setting of SA is following as: RBW: 100kHz / VBW: 300kHz.Span: 3MHz
4. Use the mark Delta function of the SA measure out the channel separation.

7.5.Test Results.

EUT: IPTV STB/PVR		
M/N: Amulet 7XM		
Test date: 2019-09-24	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Cote	Test site: RF site	Temperature:22.8±0.6 ℃

Test Mode	Channel separation	Limit(KHz)	Conclusion
GFSK	1.0MHz	681.333	PASS
8-DPSK	1.0MHz	878.667	PASS

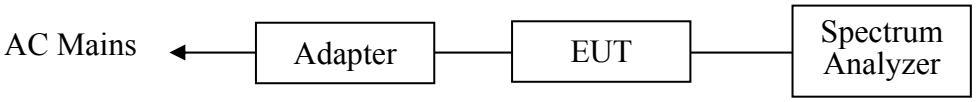
GFSK	8-DPSK
	

8. NUMBER OF HOPPING FREQUENCY TEST

8.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	RF Cable	EMCI	EMC102-KM-KM 3500	170702	May.13,19	1 Year

8.2.Block Diagram of Test Setup



8.3.Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

8.4.Test Procedure

Use the test method descried in ANSI C63.10 clause 7.8.3:

1. Connect the antenna of the EUT to Spectrum analyzer and let the EUT working at hopping mode.
2. Setting of SA is following as: RBW: 100kHz / VBW: 300kHz ,
   Start frequency: 2390MHz
   Stop frequency: 2483.5MHz

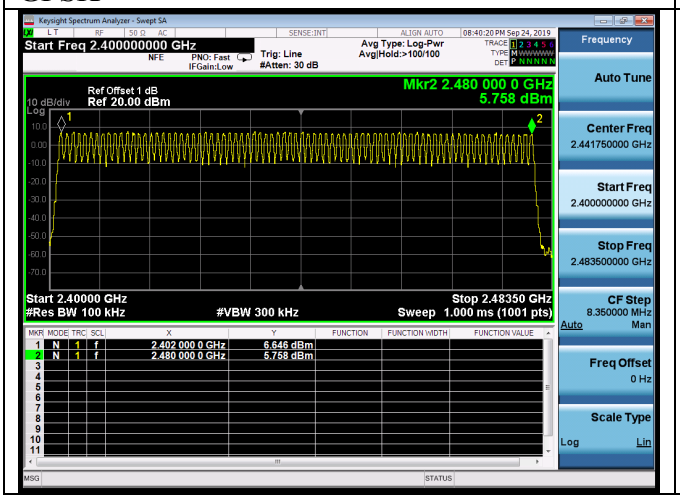
And waiting for the hopping trace until stability, count out the number of the hopping.

8.5.Test Results

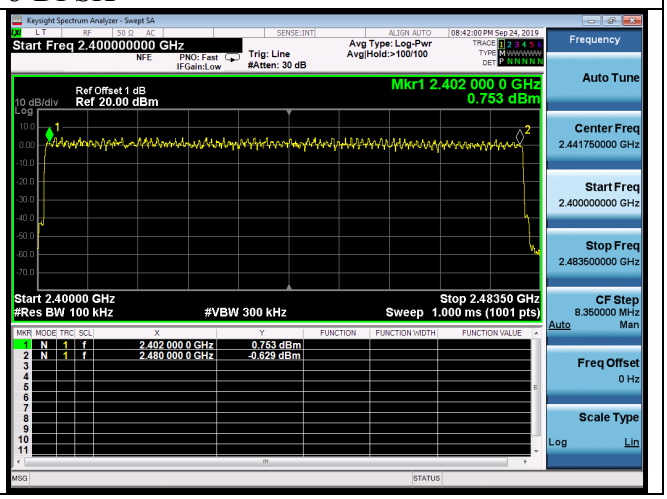
EUT: IPTV STB/PVR		
M/N: Amulet 7XM		
Test date: 2019-09-24	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Cote	Test site: RF site	Temperature:22.8±0.6℃

Test Mode	Number of channel	Limit	Conclusion
GFSK	79	>=15	PASS
8-DPSK	79	>=15	PASS

GFSK



8-DPSK

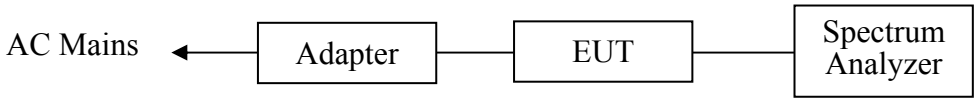


9. DWELL TIME

9.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	RF Cable	EMCI	EMC102-KM-KM 3500	170702	May.13,19	1 Year

9.2.Block Diagram of Test Setup



9.3.Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

9.4.Test Procedure

Use the test method descried in ANSI C63.10 clause 7.8.4:

1. Connect the antenna of the EUT to Spectrum analyzer and let the EUT working at hopping mode.
2. Setting of SA is following as:
   RBW: 100kHz / VBW: 300kHz
   Sweep Mode: Single
   Detect mode: Positive peak
   Trace mode: Auto
   Span: 0Hz
   Sweep time: 5s and big enough to measure one hopping signal
3. Use below formula calculate the Dwell time
   Dwell time=Hopping number per second*0.4*channel number*Pulse bandwidth per hopping.

9.5.Test Results

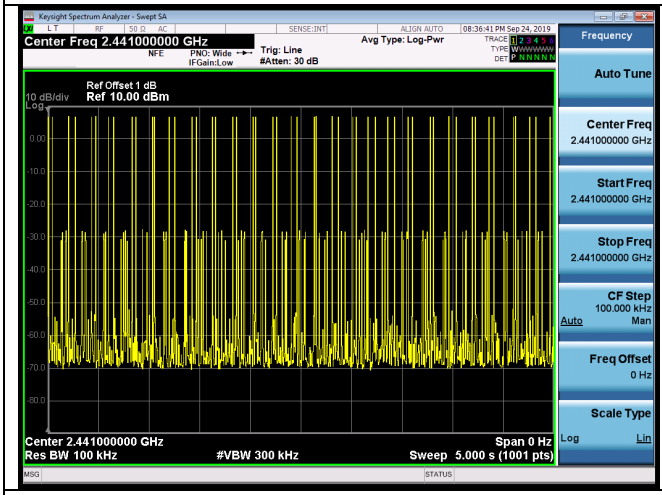
EUT: IPTV STB/PVR		
M/N: Amulet 7XM		
Test date: 2019-09-24	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Cote	Test site: RF site	Temperature:22.8±0.6 ℃

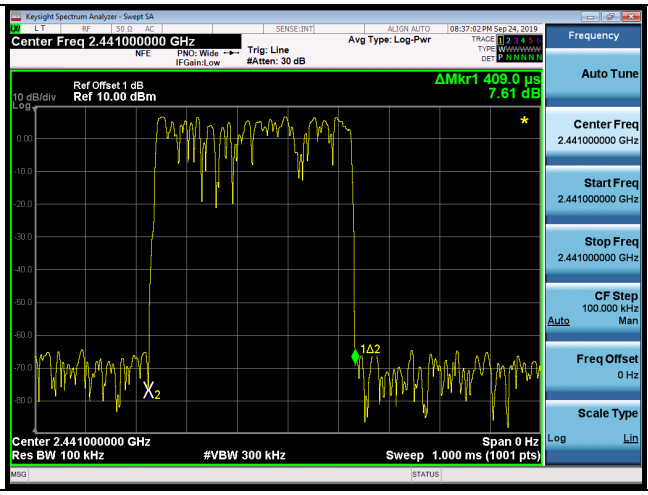
Mode		dwell time	Limit	Conclusion
GFSK	DH1	51 hops/5s*0.4*79chanels* 0.409 ms =131.829ms	≦400ms	PASS
	DH3	25 hops/5s*0.4*79chanels* 1.680 ms =265.440ms	≦400ms	PASS
	DH5	12 hops/5s*0.4*79chanels* 2.935 ms =222.590ms	≦400ms	PASS
8-DPSK	3-DH1	51 hops/5s*0.4*79chanels* 0.423 ms =136.341ms	≦400ms	PASS
	3-DH3	24 hops/5s*0.4*79chanels* 1.677 ms =254.367ms	≦400ms	PASS
	3-DH5	11 hops/5s*0.4*79chanels* 2.945 ms =204.736ms	≦400ms	PASS

Note: All the lower levels were signaled from receiver and should not be considered in here.

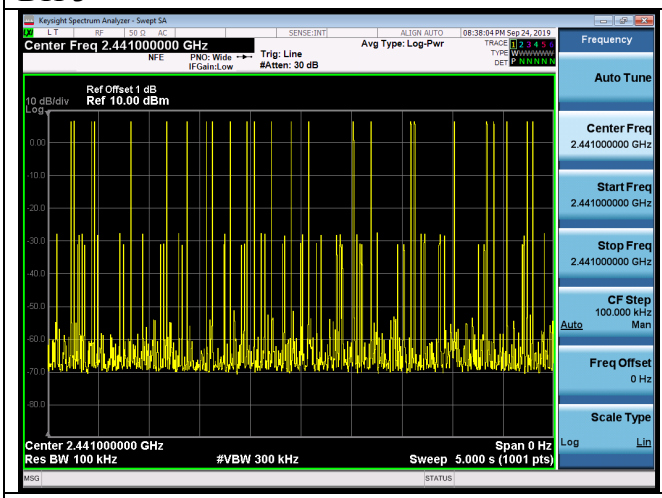
GFSK

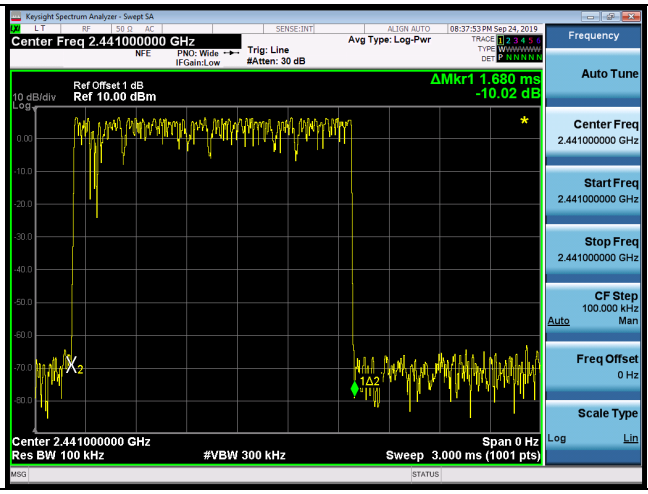
DH 1



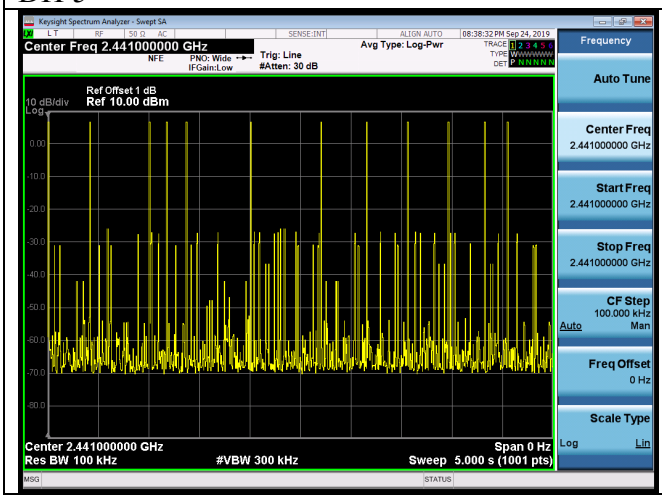


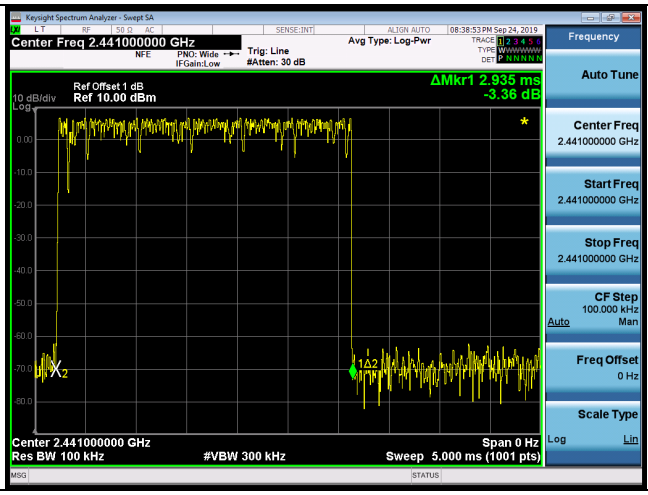
DH 3





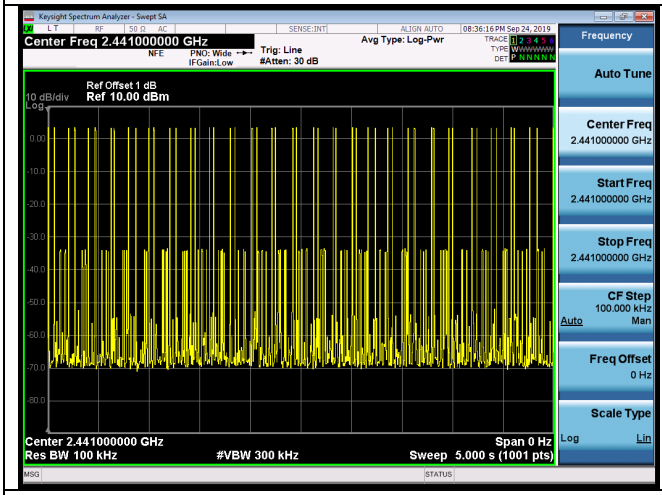
DH 5

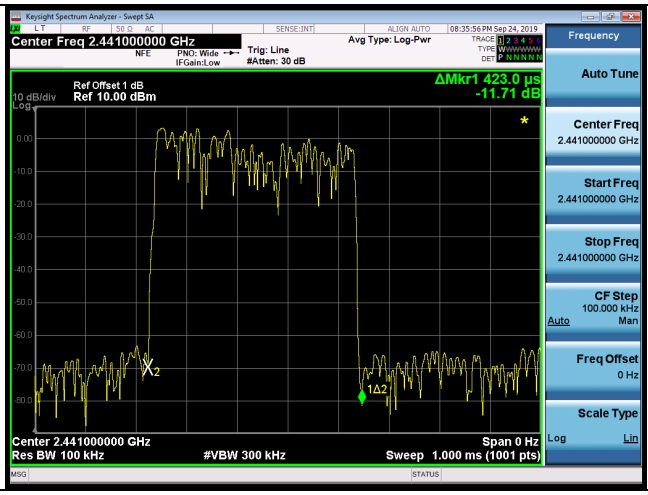




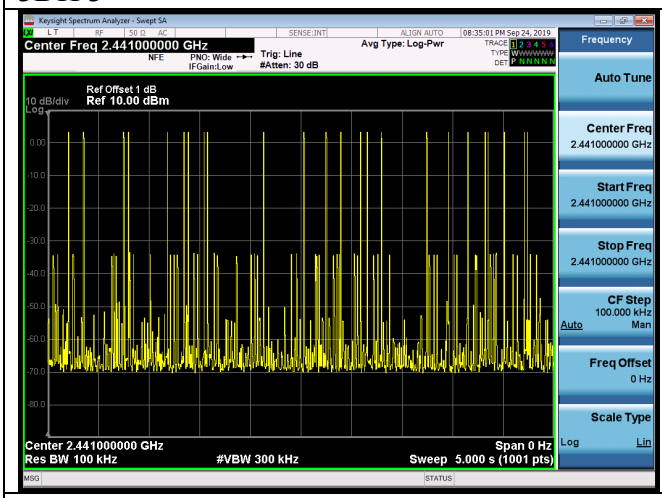
8-DPSK

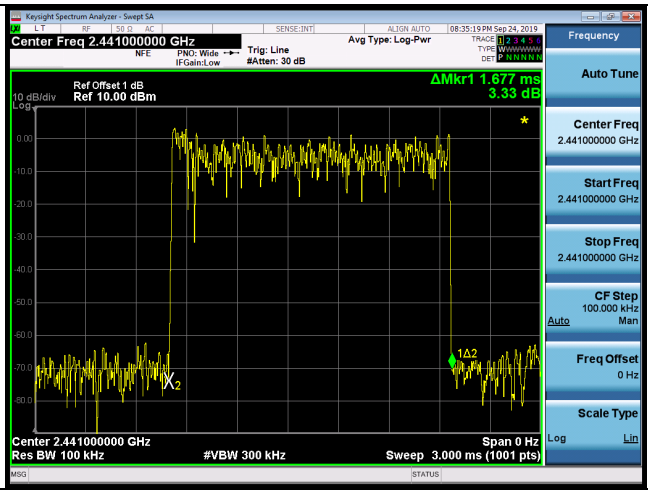
3DH 1



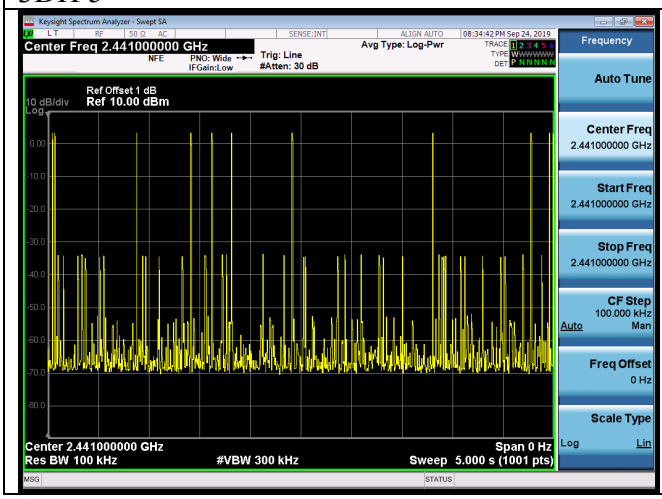


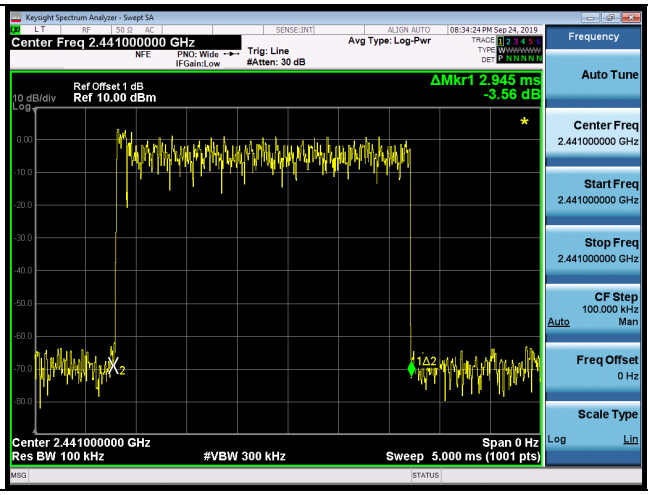
3DH 3





3DH 5





10. MAXIMUM PEAK OUTPUT POWER TEST

10.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	Power meter	Anritsu	ML2487A	6K00002472	Oct.14,18	1 Year
3.	Power sensor	Anritsu	MA2491A	033005	Oct.13,18	1 Year
4.	Attenuator	Agilent	8491B	MY39262165	Oct.14,18	1 Year
5.	RF Cable	EMCI	EMC102-KM-KM 3500	170702	May.13,19	1 Year

10.2. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

10.3. Test Procedure

Use the test method descried in ANSI C63.10 clause 7.8.5:
Connected the EUT's antenna port to Power Sensor, and use power meter to test peak output power directly.

10.4. Test Results

EUT: IPTV STB/PVR		
M/N: Amulet 7XM		
Test date: 2019-09-25	Pressure: 102.3±1.0 kpa	Humidity: 53.6±3.0%
Tested by: Cote	Test site: RF site	Temperature: 25.5±0.6℃

Test Mode	Frequency	Peak output Power (dBm)	Limit (dBm)
GFSK	2402	7.530	21
	2441	7.559	21
	2480	6.650	21
8-DPSK	2402	7.109	21
	2441	7.010	21
	2480	5.941	21
Conclusion: PASS			

11.BAND EDGE COMPLIANCE TEST

11.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	Amplifier	HP	8449B	3008A02495	Apr.23,19	1 Year
3.	Horn Antenna	ETS	3115	9607-4580	Dec.13,18	1 Year
4.	RF Cable	EMCI	EMC102-KM-KM 3500	170702	May.13,19	1 Year

11.2.Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

11.3.Test Produce

Use the test method descried in ANSI C63.10 clause 7.8.6:
For upper band emissions that are up to two bandwidths(2MHz) away (2483.5MHz to 2485.5MHz）from the band-edge use below produce:

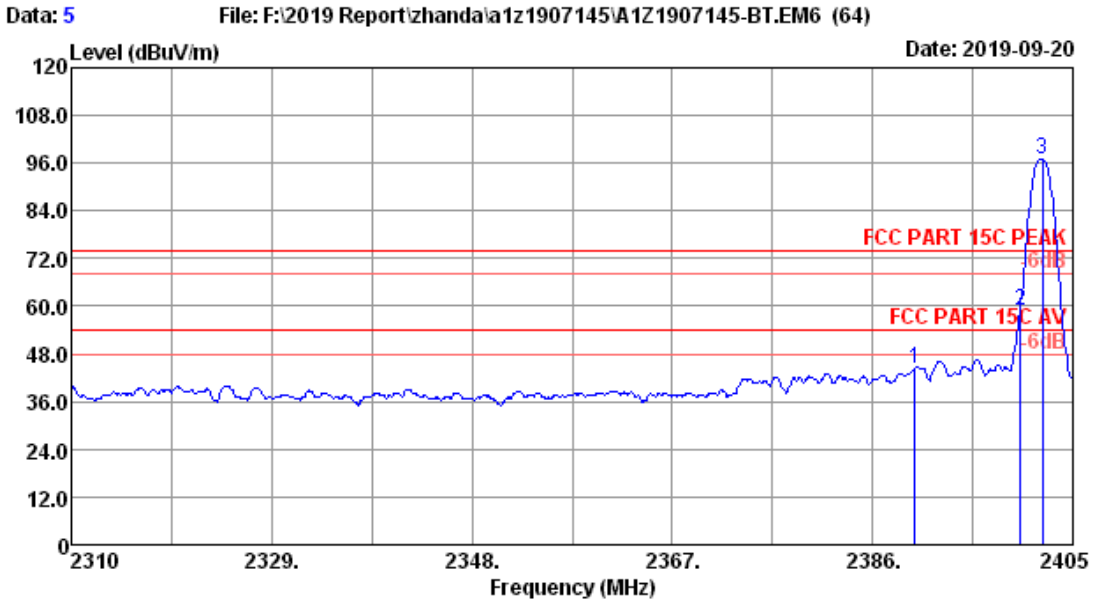
1. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 100KHz and with a video bandwidth 300KHz. Record the peak levels of the fundamental emission and the relevant band-edge emission, Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.
2. Subtract the delta measured in step (1) from the maximum field strengths measured in clause 4 .The resultant field strengths are then used to determine band-edge compliance as required by Section 15.205

For emissions above two bandwidths away from the band-edge use below produce:

1. The EUT is placed on a insulating material (up to 12mm thick) worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
   (a) PEAK: RBW=1MHz ;VBW=3MHz, PK detector, Sweep=AUTO
   (b) This is pulse Modulation device a duty cycle factor was used to calculate average level based measured peak level.

11.4.Test Results

Pass (The testing data was attached in the next pages.)
Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

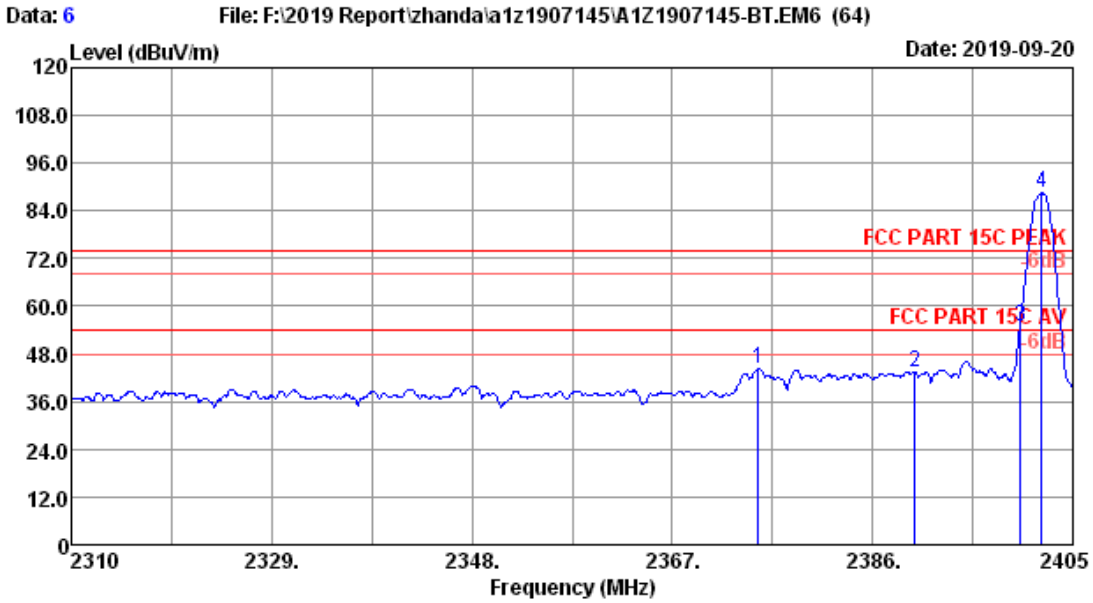


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2402MHz Tx Mode

Data no. : 5
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.71	0.87	35.04	50.65	44.19	74.00	29.81	Peak
2	2400.00	27.71	0.87	35.04	65.35	58.89	74.00	15.11	Peak
3	2402.15	27.71	0.87	35.04	103.33	96.87	74.00	-22.87	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

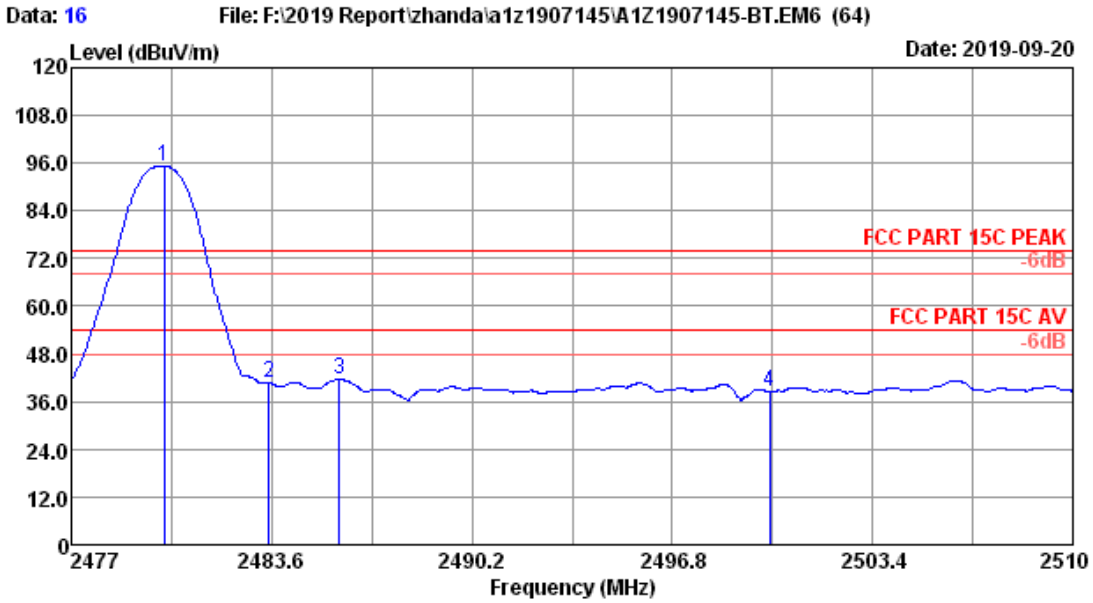


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2402MHz Tx Mode

Data no. : 6
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2375.17	27.62	0.87	35.05	50.91	44.35	74.00	29.65	Peak
2	2390.00	27.71	0.87	35.04	49.99	43.53	74.00	30.47	Peak
3	2400.00	27.71	0.87	35.04	61.55	55.09	74.00	18.91	Peak
4	2402.06	27.71	0.87	35.04	94.91	88.45	74.00	-14.45	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

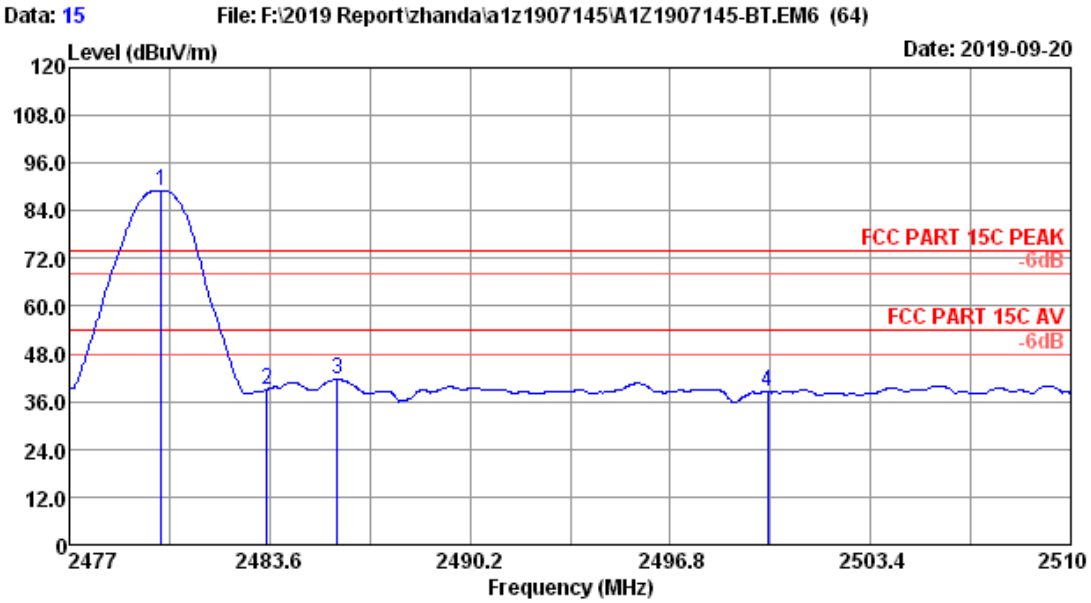


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2480MHz Tx Mode

Data no. : 16
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.07	27.98	0.89	35.01	101.28	95.14	74.00	-21.14	Peak
2	2483.50	27.98	0.89	35.01	46.96	40.82	74.00	33.18	Peak
3	2485.84	27.98	0.89	35.01	47.73	41.59	74.00	32.41	Peak
4	2500.00	28.03	0.89	35.00	44.64	38.56	74.00	35.44	Peak

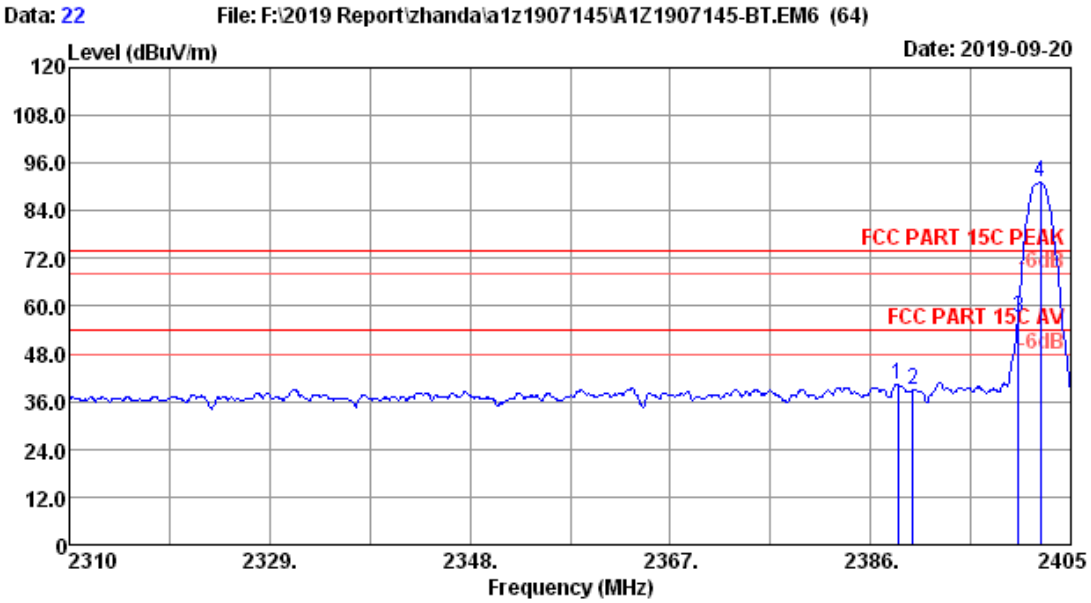
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 15
Dis. / Ant. : 3m 2018 3115-4580 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK Pre :
Env. / Ins. : 23.4*C/52.9% Engineer : Cote
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2480MHz Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.04	27.98	0.89	35.01	95.25	89.11	74.00	-15.11	Peak
2	2483.50	27.98	0.89	35.01	45.17	39.03	74.00	34.97	Peak
3	2485.84	27.98	0.89	35.01	47.73	41.59	74.00	32.41	Peak
4	2500.00	28.03	0.89	35.00	44.63	38.55	74.00	35.45	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

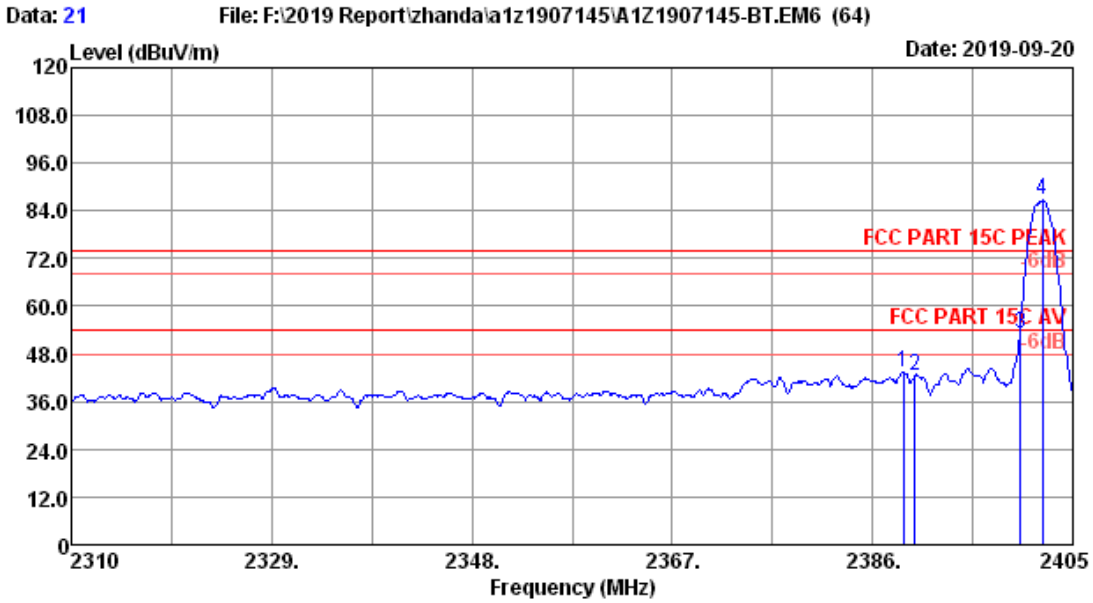


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2402MHz Tx Mode

Data no. : 22
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2388.57	27.71	0.87	35.04	46.91	40.45	74.00	33.55	Peak
2	2390.00	27.71	0.87	35.04	45.32	38.86	74.00	35.14	Peak
3	2400.00	27.71	0.87	35.04	63.42	56.96	74.00	17.04	Peak
4	2402.15	27.71	0.87	35.04	97.84	91.38	74.00	-17.38	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

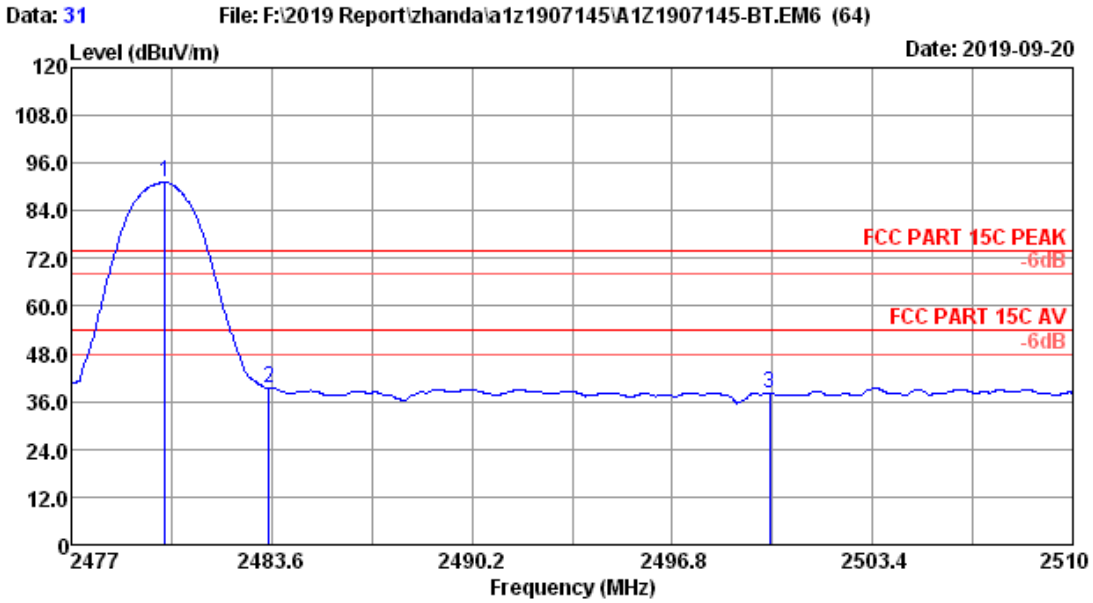


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2402MHz Tx Mode

Data no. : 21
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2388.95	27.71	0.87	35.04	50.00	43.54	74.00	30.46	Peak
2	2390.00	27.71	0.87	35.04	48.82	42.36	74.00	31.64	Peak
3	2400.00	27.71	0.87	35.04	59.81	53.35	74.00	20.65	Peak
4	2402.15	27.71	0.87	35.04	93.08	86.62	74.00	-12.62	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

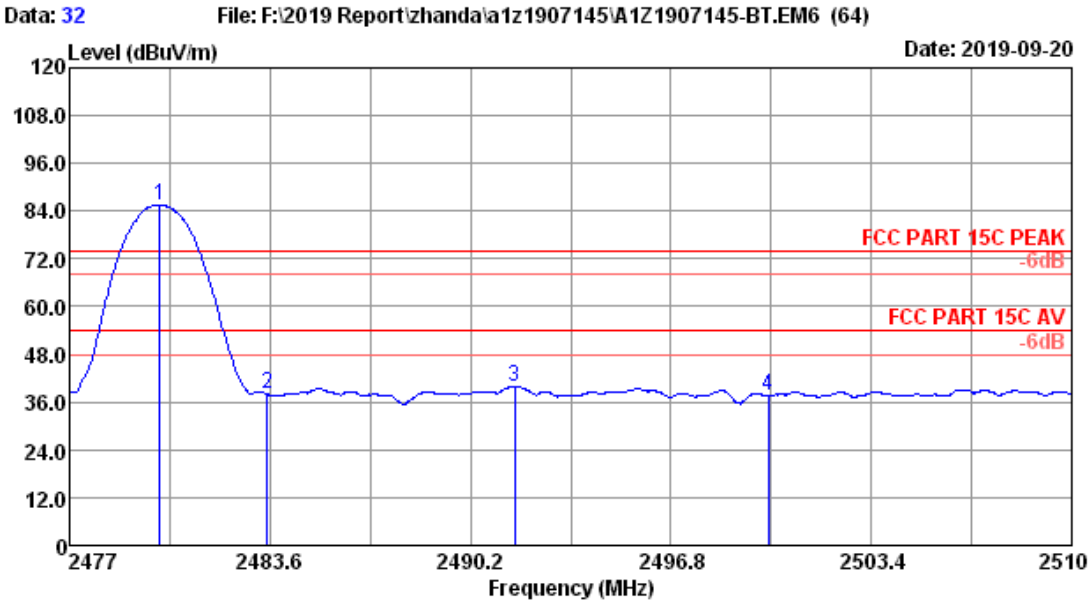


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2480MHz Tx Mode

Data no. : 31
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.10	27.98	0.89	35.01	97.31	91.17	74.00	-17.17	Peak
2	2483.50	27.98	0.89	35.01	45.58	39.44	74.00	34.56	Peak
3	2500.00	28.03	0.89	35.00	44.23	38.15	74.00	35.85	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2480MHz Tx Mode

Data no. : 32
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.97	27.98	0.89	35.01	91.57	85.43	74.00	-11.43	Peak
2	2483.50	27.98	0.89	35.01	44.21	38.07	74.00	35.93	Peak
3	2491.65	28.03	0.89	35.00	45.92	39.84	74.00	34.16	Peak
4	2500.00	28.03	0.89	35.00	43.55	37.47	74.00	36.53	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

12. ANTENNA REQUIREMENT

12.1. Standard Applicable

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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

12.2. Antenna Connected Construction

The antennas used for this product are PCB antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 1.4dBi.

13. DEVIATION TO TEST SPECIFICATIONS

[NONE]

THE END