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.
No. 6, Kefeng Road, Science & Technology Park,
Nanshan District , Shenzhen, Guangdong, China

Tel: (0755) 26639496

Report Number	:	ACS-F19174
Date of Test	:	Sep.18~Oct.09,2019
Date of Report	:	Oct.31,2019

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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;
KDB 558074 D01v05r02

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~Oct.09,2019 Report of date: Oct.31,2019

Prepared by : Brave Zhang / Assistant

Reviewed by : Sunny Lu/ Deputy Manager

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

Approved & Authorized Signer : Signature: David Jin
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)(2) ANSI C63.10 : 2013	N/A
6dB Bandwidth Test	FCC Part 15: 15.247(b)(3) ANSI C63.10 : 2013	PASS
Maximum Peak Output Power Test	FCC Part 15: 15.247(d) ANSI C63.10 : 2013	PASS
Band Edge Compliance Test	FCC Part 15: 15.247(e) ANSI C63.10 : 2013	PASS
Power Spectral Density Test	FCC Part 15: 15.207 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~Oct.09,2019
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.	

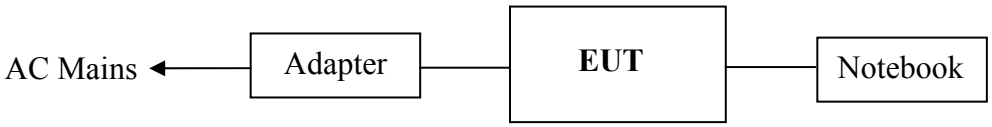
2.2.Feature of Equipment Under Test

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 (GFSK modulation), and select test channel.

Tested mode, channel, and data rate information			
Mode	data rate (Mbps)	Channel	Frequency (MHz)
Tx Mode GFSK modulation	1	Low :CH 0	2402
	1	Middle: CH19	2440
	1	High: CH39	2480

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%

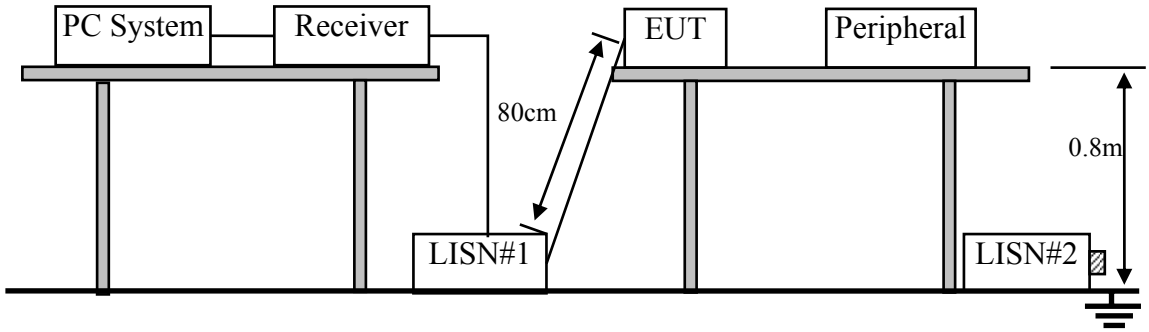
Note: EMI uncertainty is evaluated by CISPR16-4-2.
The value of measurement uncertainty of EMI is less than U_{CISPR}.
The value is not calculated in the test results.

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 Number : Amulet 7XM
Serial Number : 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 BT 4.0 Tx mode.

3.6. Test Procedure

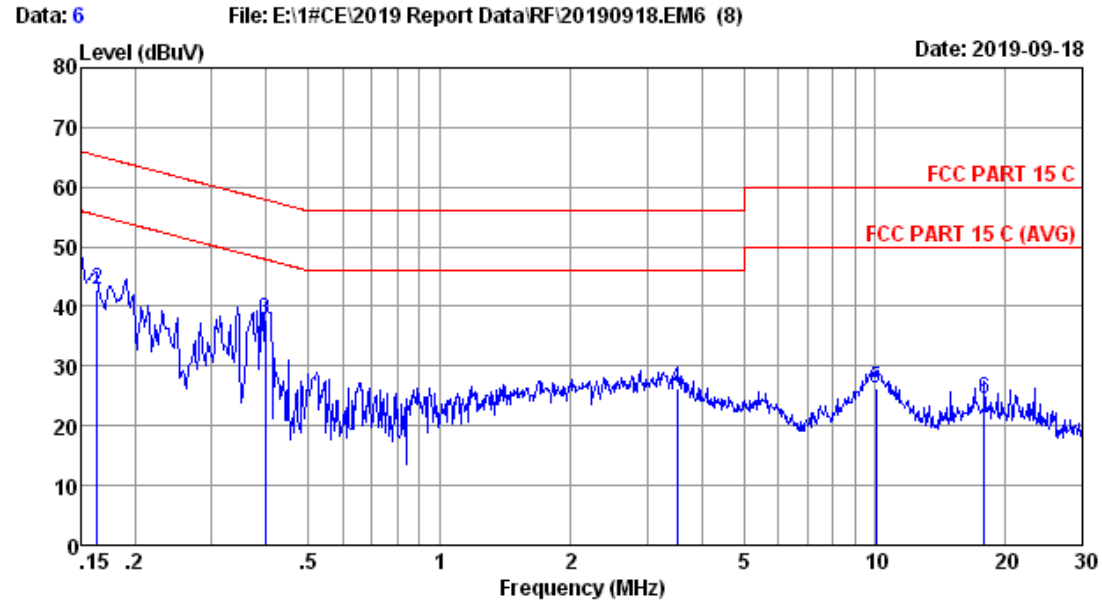
The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power Via AC unit connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs). 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

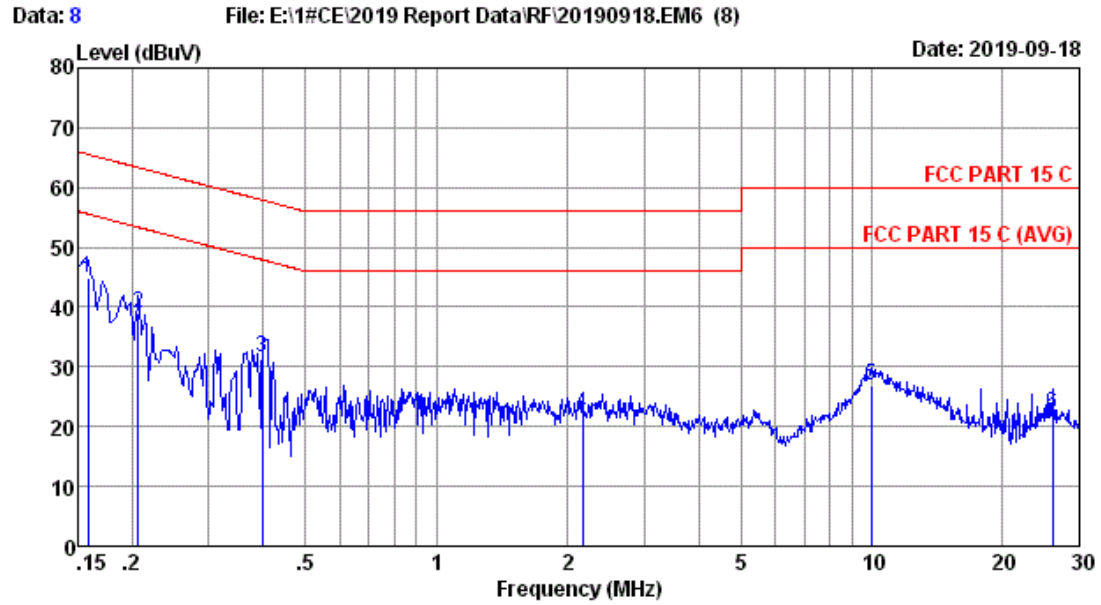
PASS. **(**All emissions not reported below are too low against the prescribed limits.)



Site no :1# Conduction
Data No :6
Dis./Lisn :2018 ENV216-L
LISN phase:
Limit :FCC PART 15 C
Env./Ins. :Temp:23.8*C Humi:55%
Engineer :Cote
EUT :
Power Rating :AC 120V/60Hz
Test Mode :BLE

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	36.32	45.75	66.00	20.25	QP
2	0.163	9.40	0.03	33.34	42.77	65.30	22.53	QP
3	0.398	9.40	0.02	28.43	37.85	57.90	20.05	QP
4	3.509	9.50	0.05	16.59	26.14	56.00	29.86	QP
5	10.072	9.50	0.10	16.64	26.24	60.00	33.76	QP
6	17.849	9.60	0.14	14.81	24.55	60.00	35.45	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
Data No :8
Dis./Lisn :2018 ENV216-N
LISN phase:
Limit :FCC PART 15 C
Env./Ins. :Temp:23.8*C Humi:55%
Engineer :Cote
EUT :
Power Rating :AC 120V/60Hz
Test Mode :BLE

No	Freq (MHz)	LISN Factor (dB)	Cable loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.158	9.40	0.03	35.31	44.74	65.56	20.82	QP
2	0.206	9.40	0.03	29.62	39.05	63.36	24.31	QP
3	0.398	9.40	0.02	22.30	31.72	57.90	26.18	QP
4	2.167	9.50	0.04	12.64	22.18	56.00	33.82	QP
5	9.966	9.50	0.10	17.14	26.74	60.00	33.26	QP
6	26.001	9.60	0.16	12.50	22.26	60.00	37.74	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

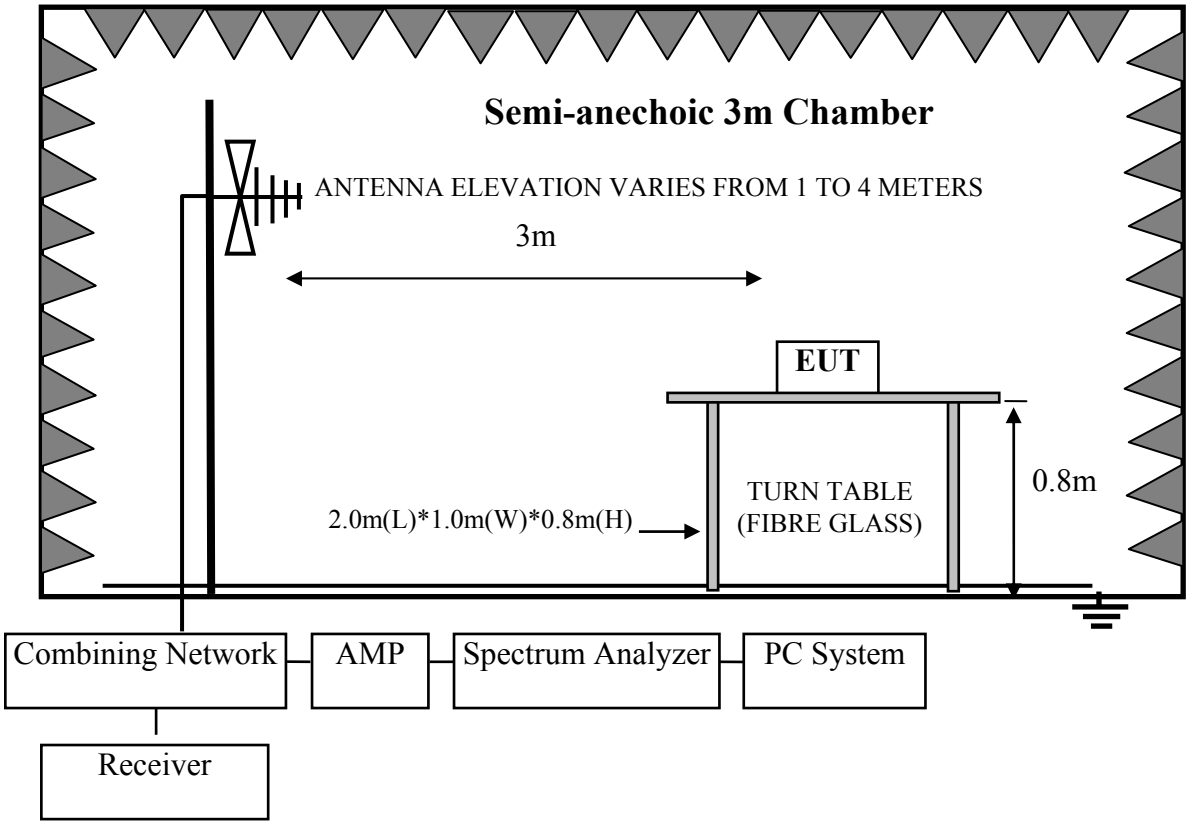
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber(NSA)	AUDIX	N/A	N/A	May.10,19	1 Year
2.	3#Chamber(SE)	AUDIX	N/A	N/A	May.17,18	3 Year
3.	Signal Analyzer	Rohde & Schwarz	FSV30	104050	Apr.14,19	1 Year
4.	EMI Test Receiver	Rohde & Schwarz	ESR7	101547	Apr.14,19	1 Year
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

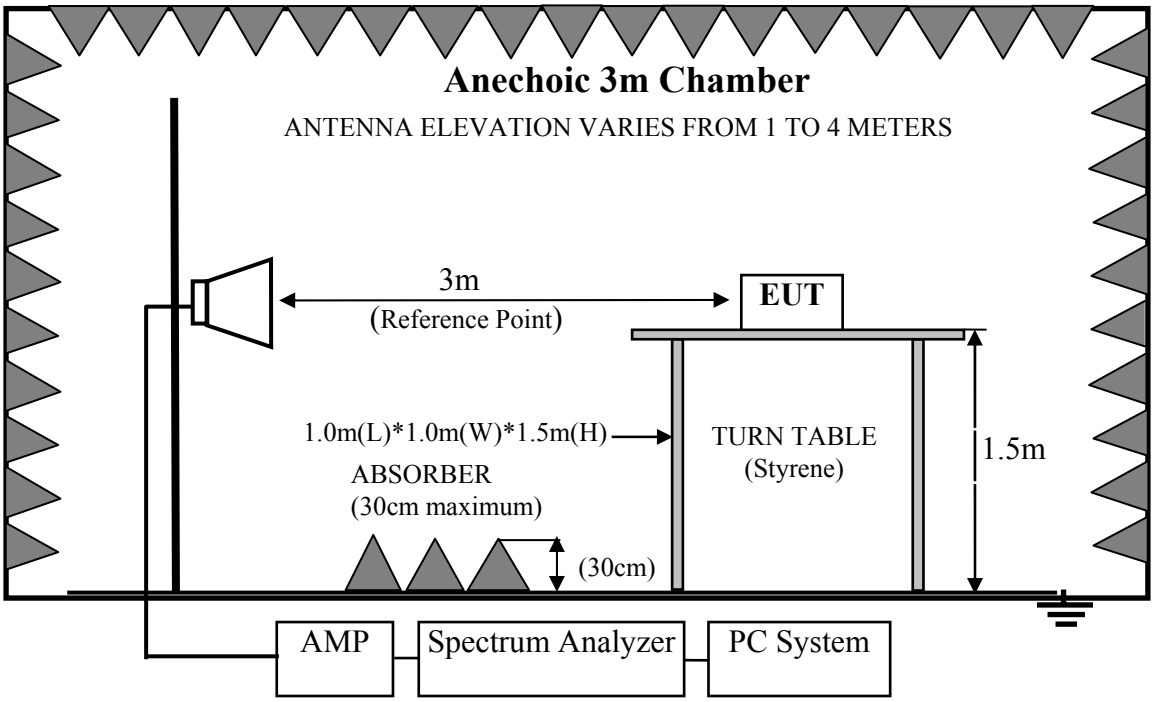
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber(Svswr)	AUDIX	N/A	N/A	Apr.18,19	1 Year
2.	3#Chamber(SE)	AUDIX	N/A	N/A	May.17,18	3 Year
3.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
4.	Horn Antenna	ETS	3115	9510-4580	Dec.13,18	1 Year
5.	Horn Antenna	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 Number : Amulet 7XM

Serial Number : 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 BT 4.2 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) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

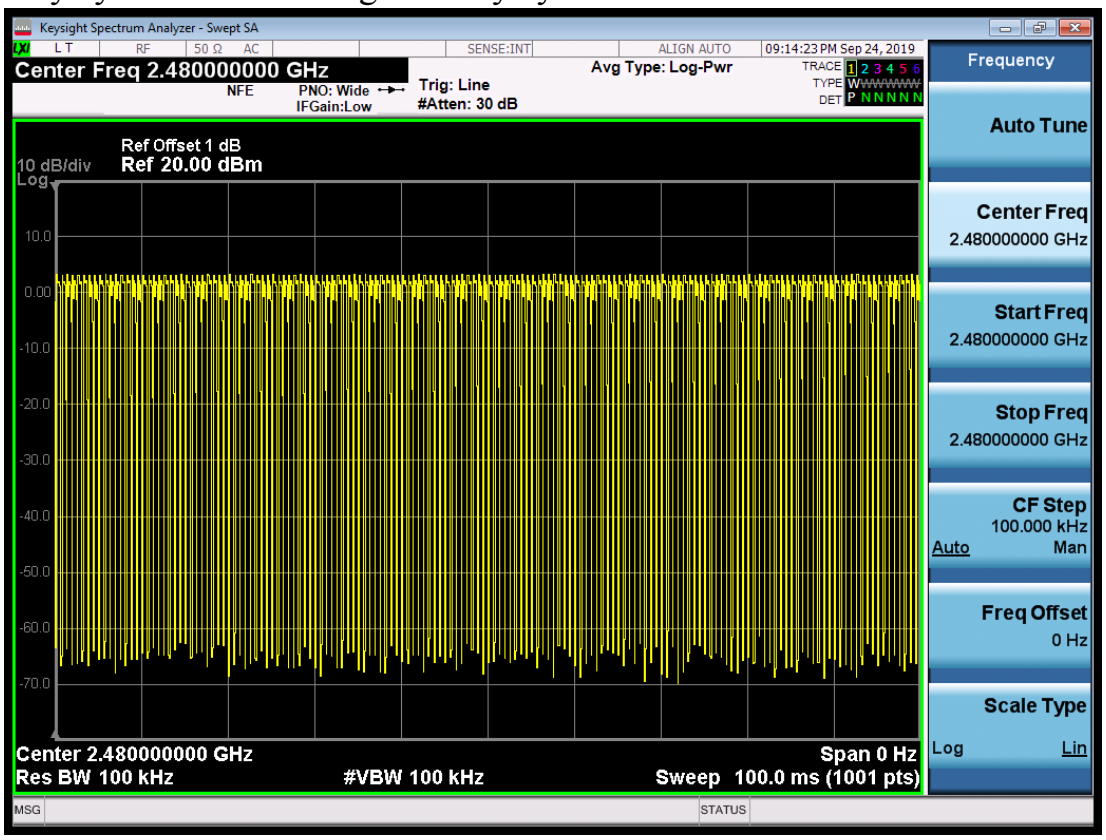
4.7. Radiated Emission Test Results

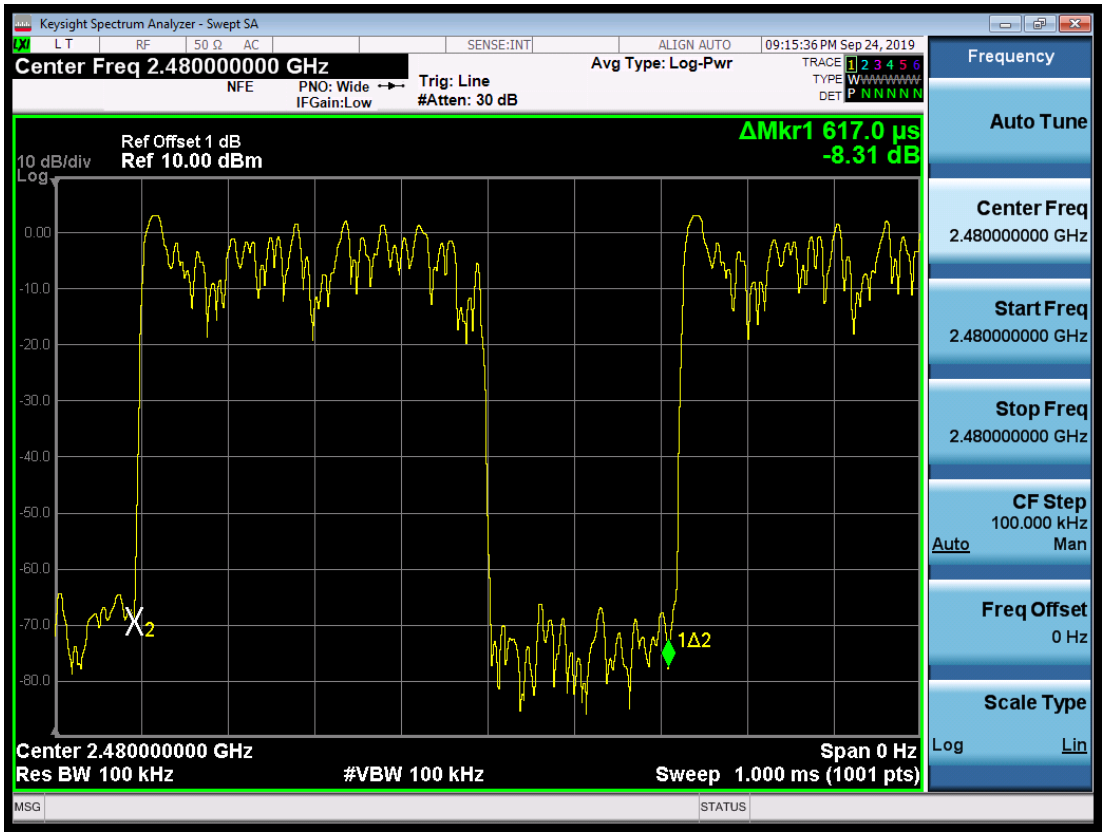
PASS.

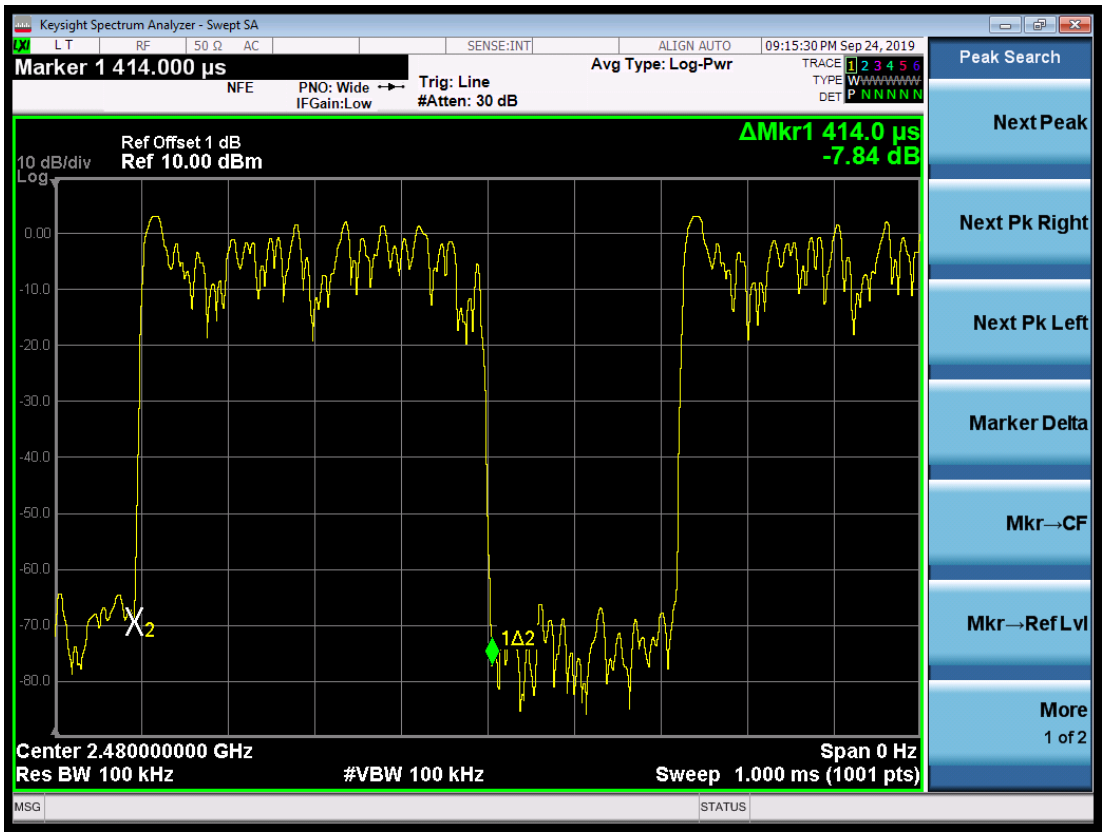
All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.

Note: The duty cycle factor for calculate average level is 3.466dB, 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.

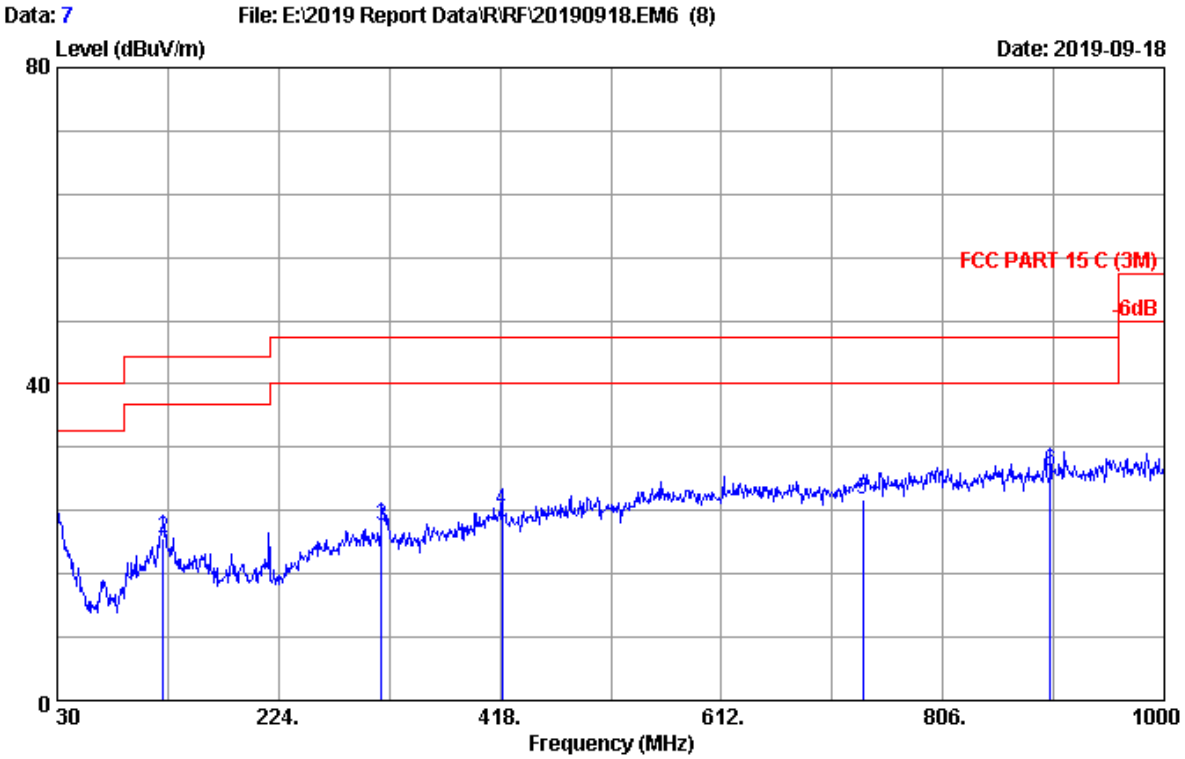
Duty cycle factor = 20log（1/duty cycle）=3.466dB




Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
NFE
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 30 dB
Avg Type: Log-Pwr
09:15:36 PM Sep 24, 2019
Ref Offset 1 dB
10 dB/div
Ref 10.00 dBm
ΔMkr1 617.0 µs
-8.31 dB
Center 2.480000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
CF Step
100.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin


Keysight Spectrum Analyzer - Swept SA
Marker 1 414.000 µs
NFE
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 30 dB
Avg Type: Log-Pwr
09:15:30 PM Sep 24, 2019
Ref Offset 1 dB
10 dB/div
Ref 10.00 dBm
ΔMkr1 414.0 µs
-7.84 dB
Center 2.480000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 1.000 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Frequency: 30MHz~1GHz

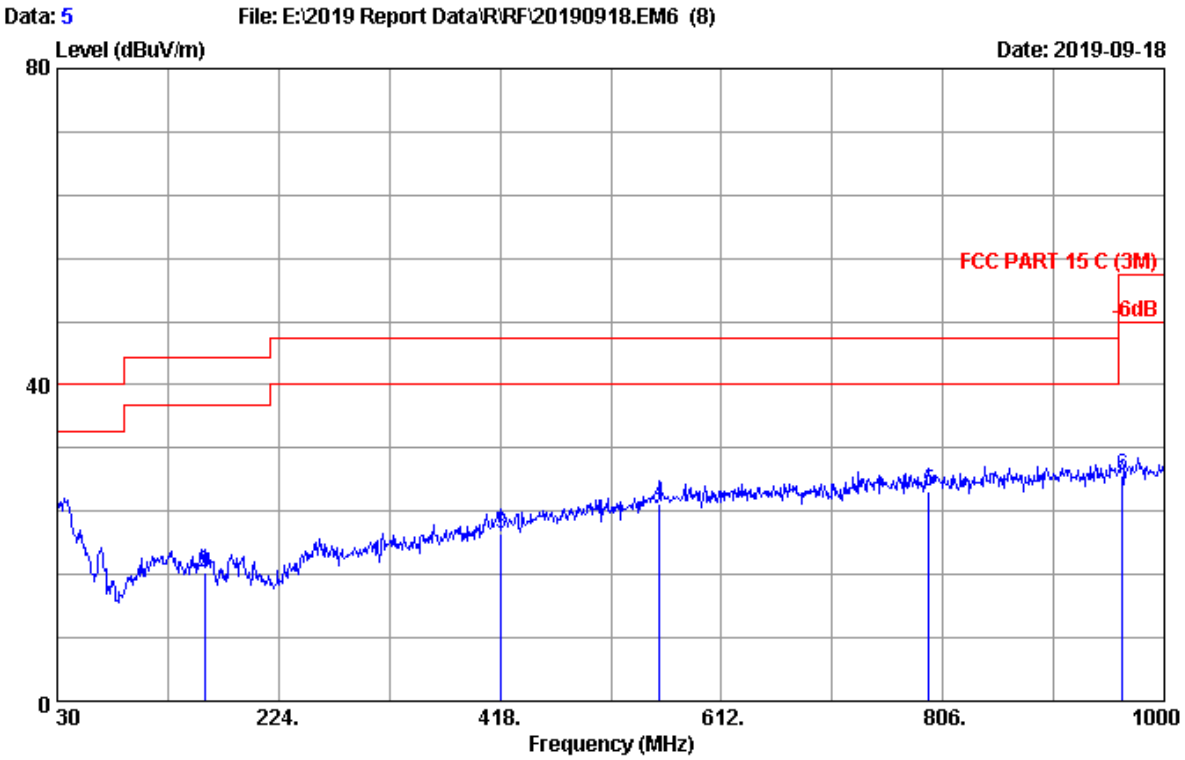


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 CBL6112D-35375
Limit : FCC PART 15 C (3M)
Env. / Ins. : 23.4*C/54%
EUT :
Power rating : AC 120V/60Hz
Test Mode : BLE

Data no. : 7
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	-3.09	22.14	40.00	17.86	QP
2	123.120	18.50	1.08	0.89	20.47	43.50	23.03	QP
3	314.210	19.60	1.79	0.67	22.06	46.00	23.94	QP
4	419.940	22.60	2.07	-0.59	24.08	46.00	21.92	QP
5	736.160	26.02	2.95	-3.49	25.48	46.00	20.52	QP
6	900.090	26.70	3.32	-1.04	28.98	46.00	17.02	QP

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

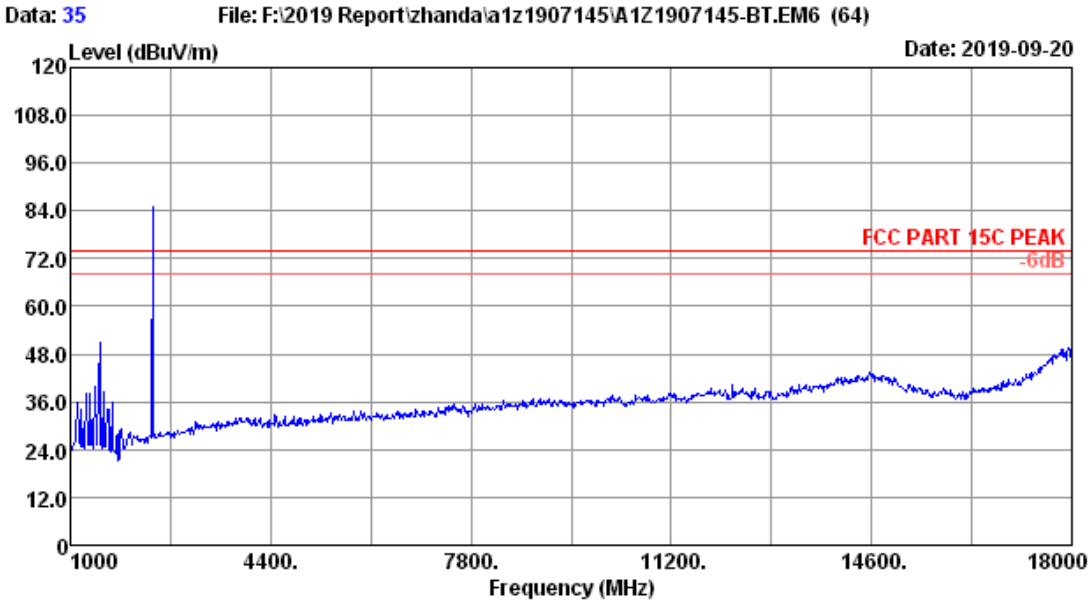


Site no. : 3m Chamber
Data no. : 5
Dis. / Ant. : 3m 2018 CBL6112D-35375
Ant. pol. : VERTICAL
Limit : FCC PART 15 C (3M)
Env. / Ins. : 23.4*C/54%
Engineer : Cote
EUT :
Power rating : AC 120V/60Hz
Test Mode : BLE

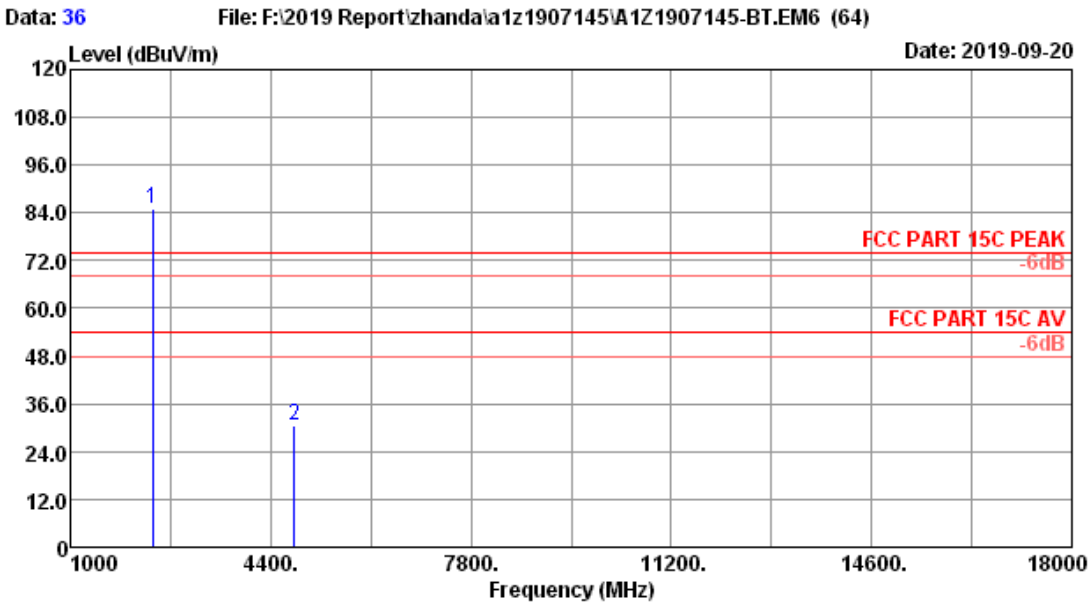
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	30.000	24.70	0.53	-2.29	22.94	40.00	17.06	QP
2	159.010	16.50	1.22	-1.48	16.24	43.50	27.26	QP
3	418.970	22.60	2.07	-3.42	21.25	46.00	24.75	QP
4	557.680	25.10	2.49	-2.64	24.95	46.00	21.05	QP
5	793.390	26.32	3.10	-2.92	26.50	46.00	19.50	QP
6	963.140	27.46	3.52	-2.45	28.53	54.00	25.47	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.	: 35
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	: BLE 2402MHz Tx Mode		

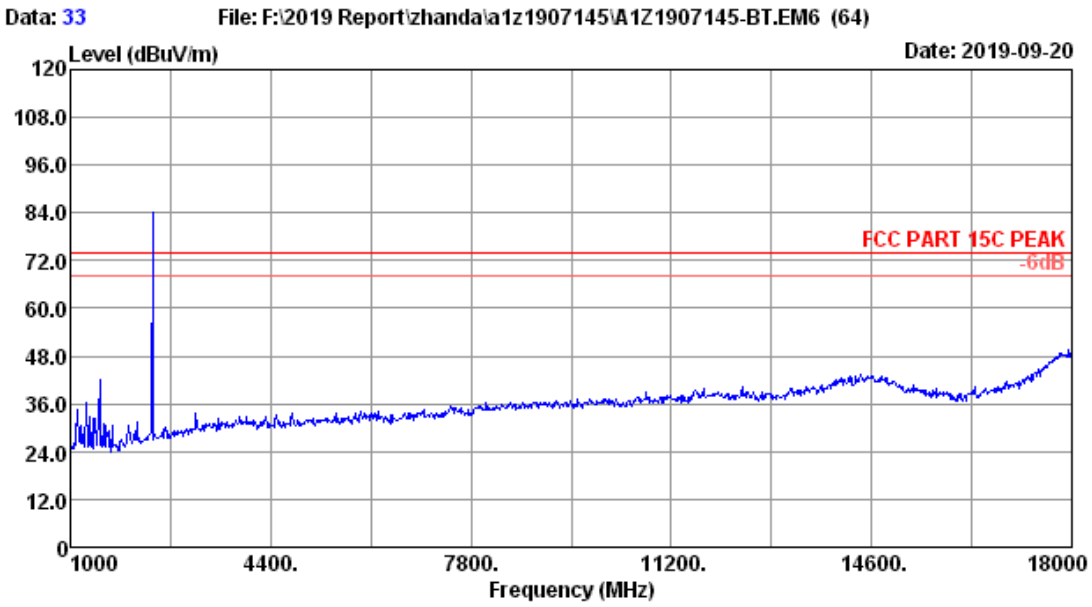


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BLE 2402MHz Tx Mode

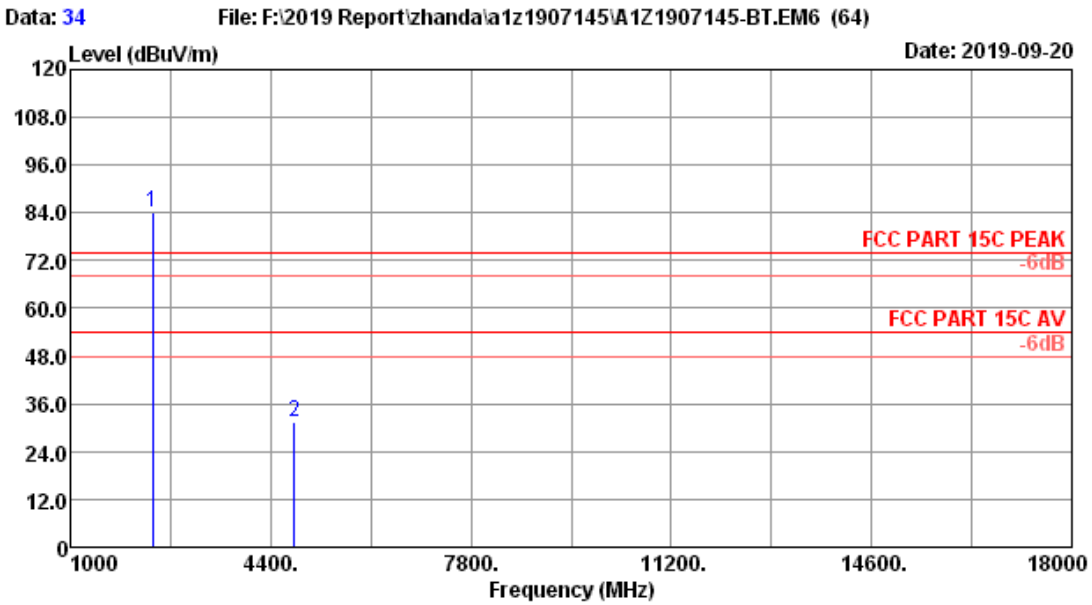
Data no. : 36
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

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	91.58	85.12	74.00	-11.12	Peak
2	4804.00	32.10	1.24	34.36	31.38	30.36	74.00	43.64	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.	: 33
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	: BLE 2402MHz Tx Mode		

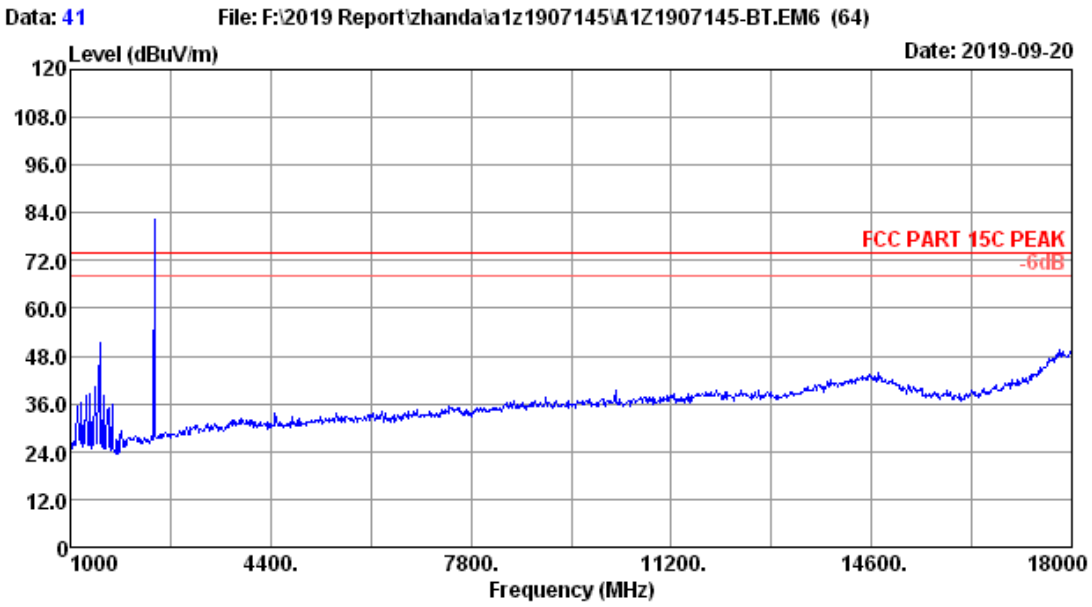


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BLE 2402MHz Tx Mode

Data no. : 34
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

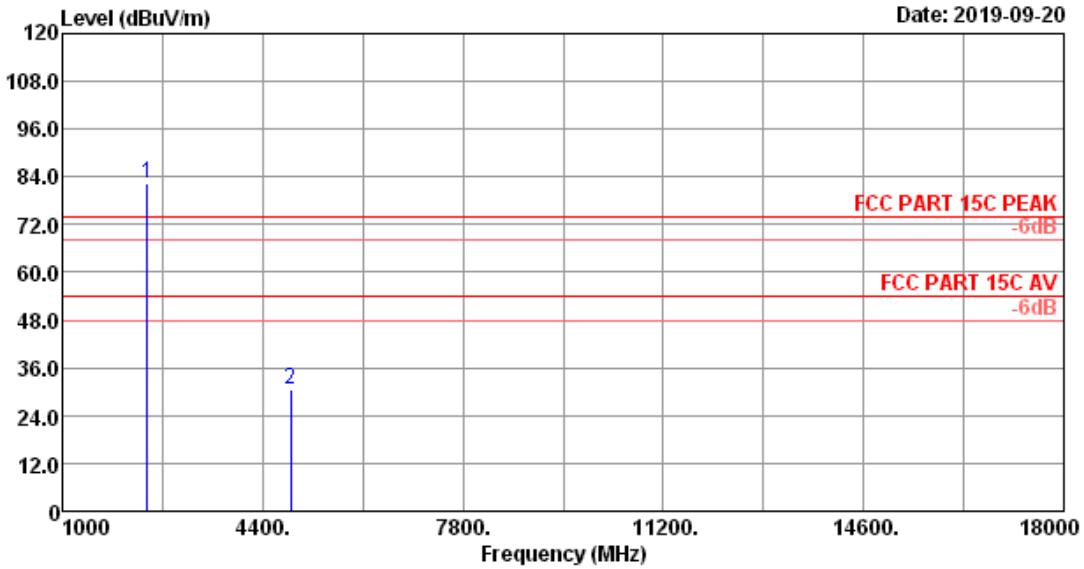
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.00	27.71	0.87	35.04	90.67	84.21	74.00	-10.21	Peak
2	4804.00	32.10	1.24	34.36	32.68	31.66	74.00	42.34	Peak

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.	: 41
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	: BLE 2440MHz Tx Mode		

Data: 42 File: F:\2019 Report\zhanda\a1z1907145\A1Z1907145-BT.EM6 (64)

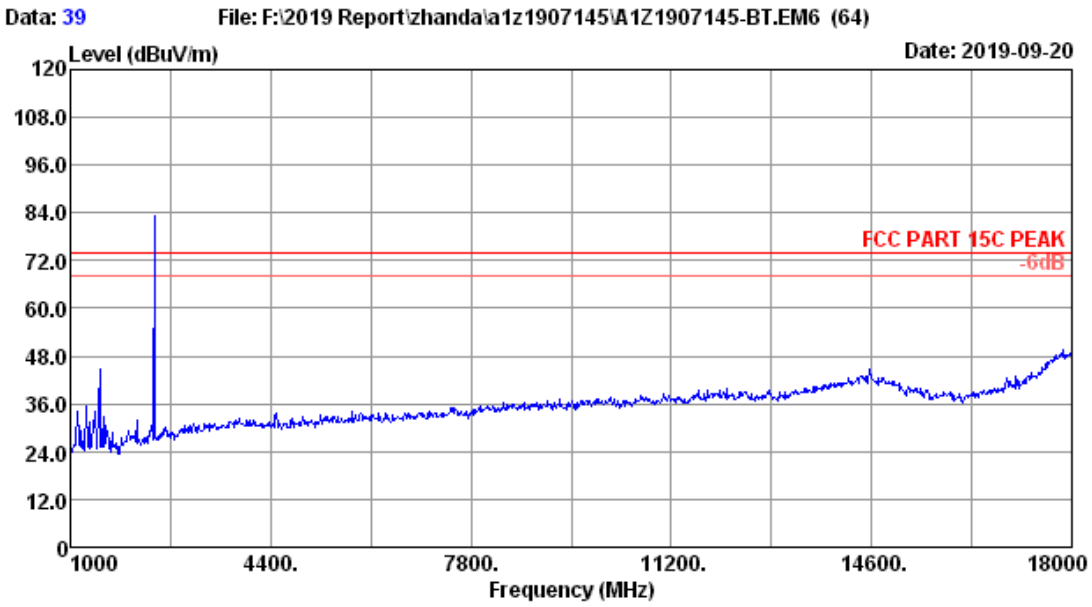


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BLE 2440MHz Tx Mode

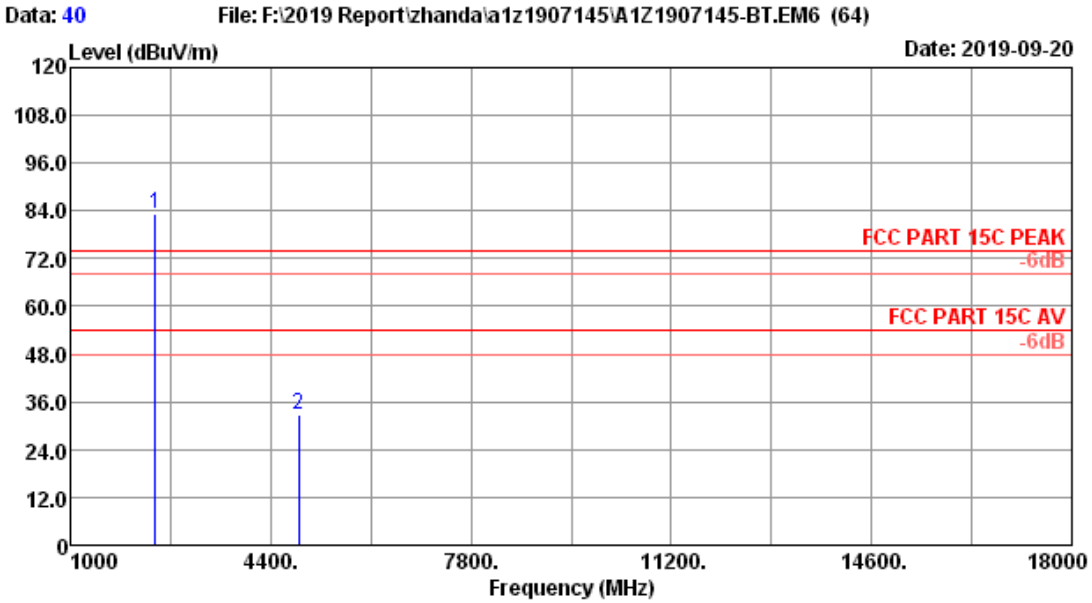
Data no. : 42
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

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	2440.00	27.87	0.88	35.02	88.81	82.54	74.00	-8.54	Peak
2	4880.00	32.25	1.25	34.38	31.51	30.63	74.00	43.37	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.	: 39
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	: BLE 2440MHz Tx Mode		

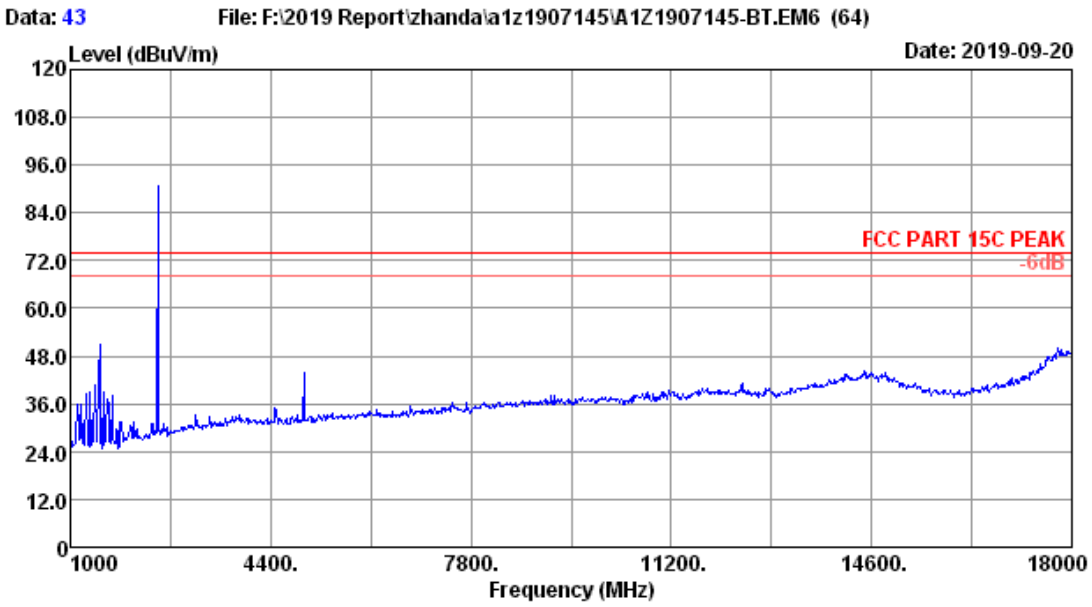


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BLE 2440MHz Tx Mode

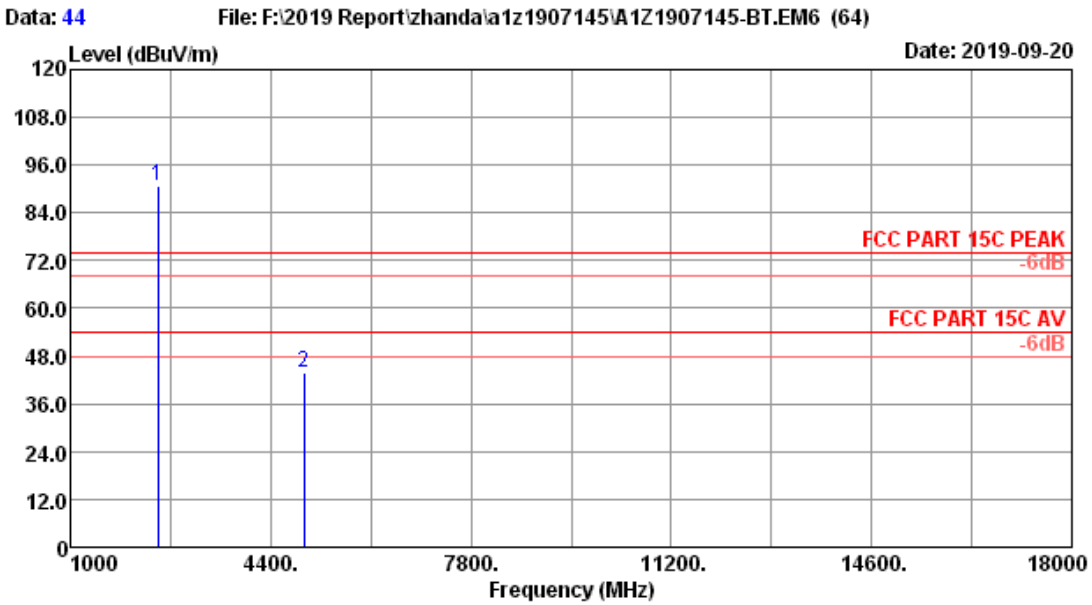
Data no. : 40
Ant. pol. : VERTICAL
Pre :
Engineer : Cote

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	2440.00	27.87	0.88	35.02	89.57	83.30	74.00	-9.30	Peak
2	4880.00	32.25	1.25	34.38	33.60	32.72	74.00	41.28	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.	: 43
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	: BLE 2480MHz Tx Mode		

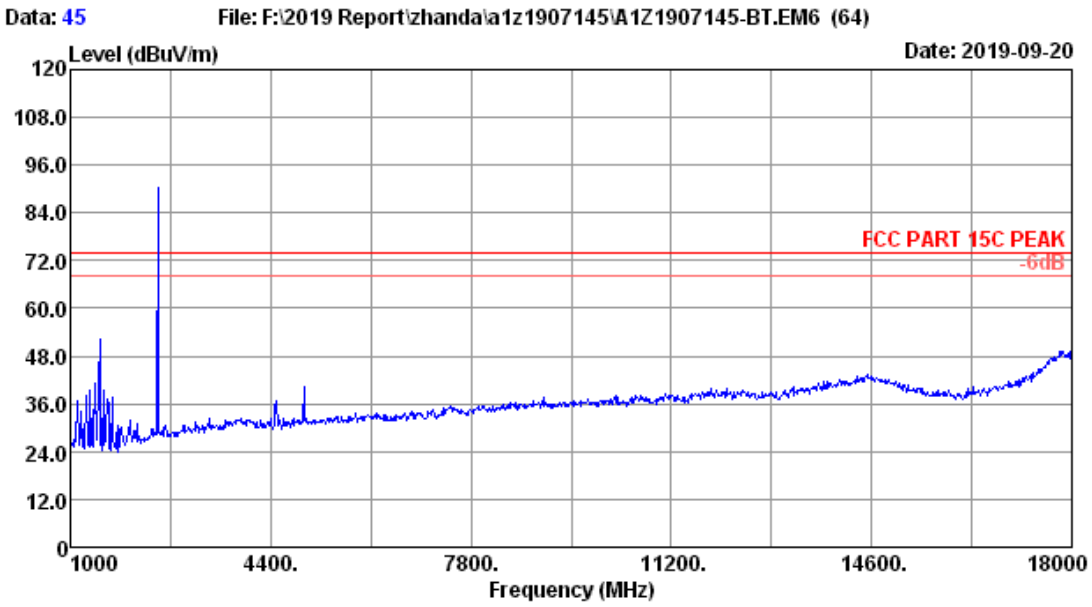


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BLE 2480MHz Tx Mode

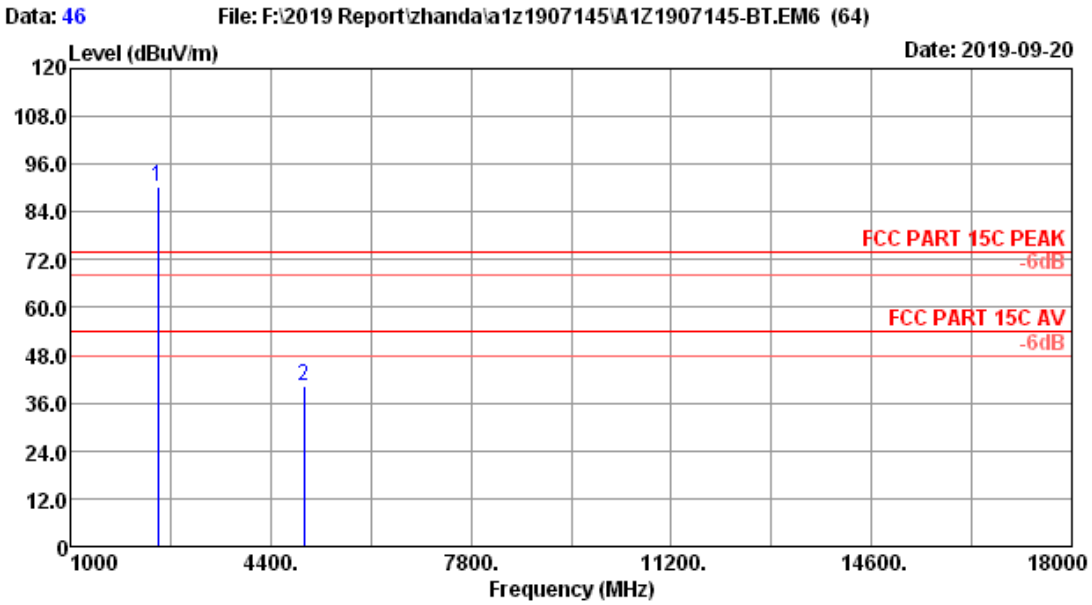
Data no. : 44
Ant. pol. : HORIZONTAL
Pre :
Engineer : Cote

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	97.07	90.93	74.00	-16.93	Peak
2	4960.00	32.43	1.27	34.39	44.34	43.65	74.00	30.35	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.	: 45
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	: BLE 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 : BLE 2480MHz Tx Mode

Data no. : 46
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	96.28	90.14	74.00	-16.14	Peak
2	4960.00	32.43	1.27	34.39	41.02	40.33	74.00	33.67	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

Please reference to section 2.4.

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:
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.

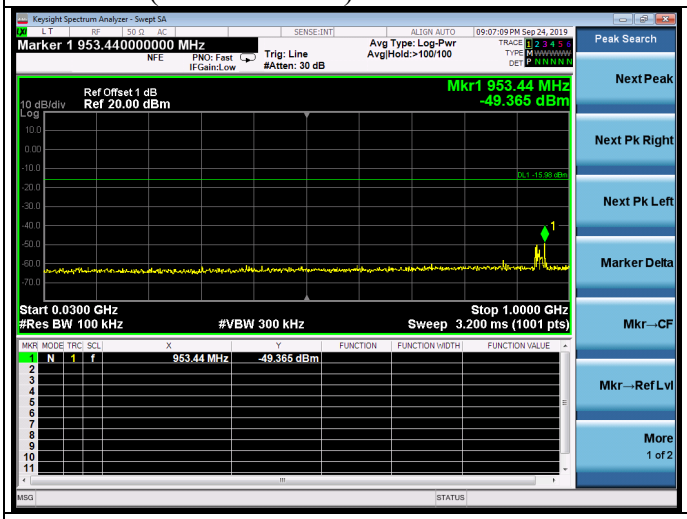
5.5. Test result

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

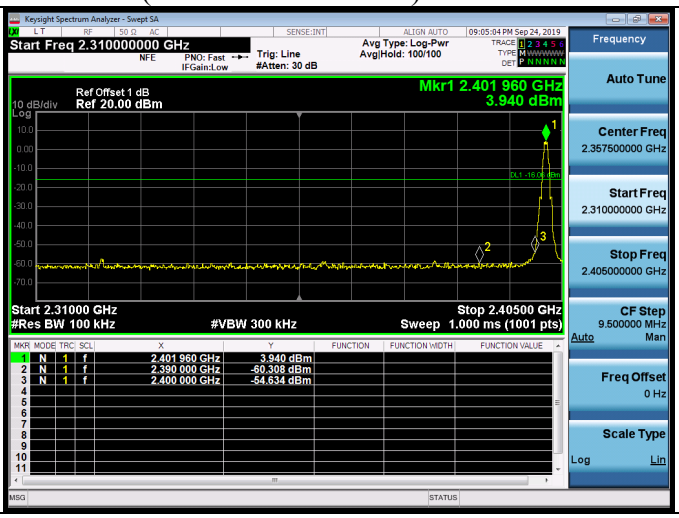
EUT: IPTV STB/PVR		
M/N: Amulet 7XM		
Test date: 2019-09-24	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Cote	Test site: RF site	Temperature:22.8±0.6 ℃

GFSK

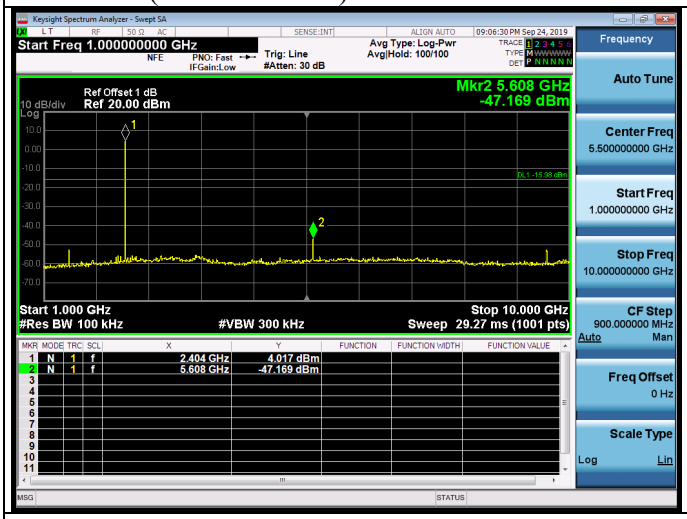
2402MHz(30MHz-1GHz)



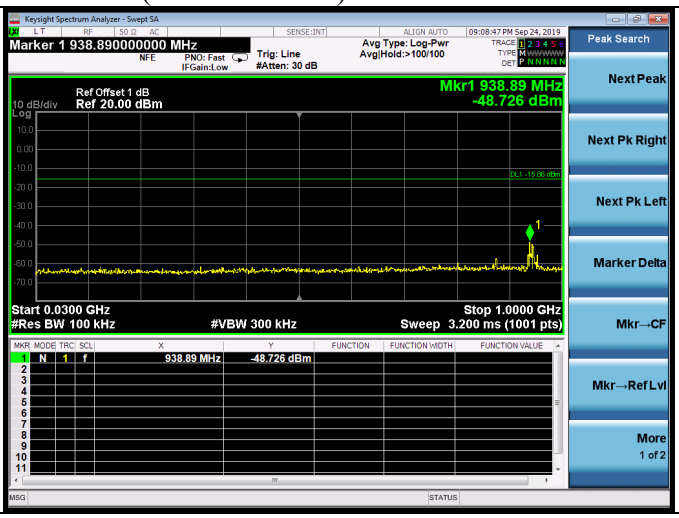
2402MHz(2.31GHz-2.405GHz)



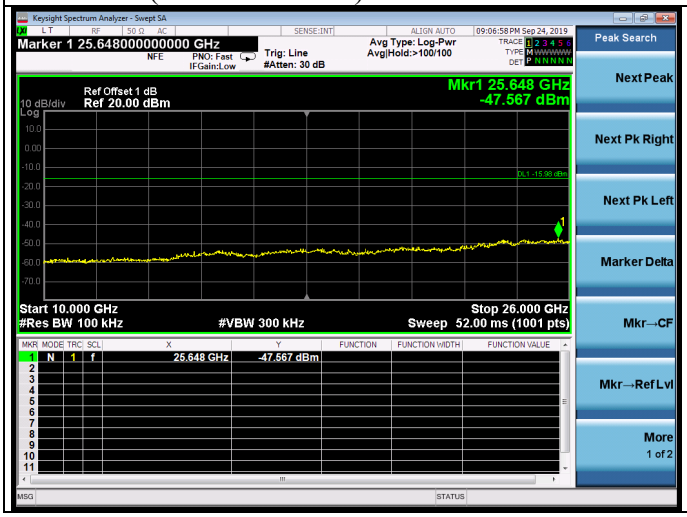
2402MHz(1GHz-10GHz)



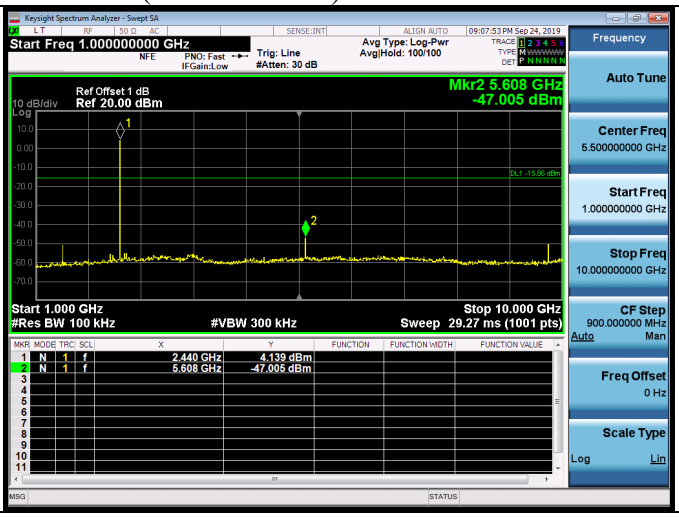
2440MHz(30MHz-1GHz)



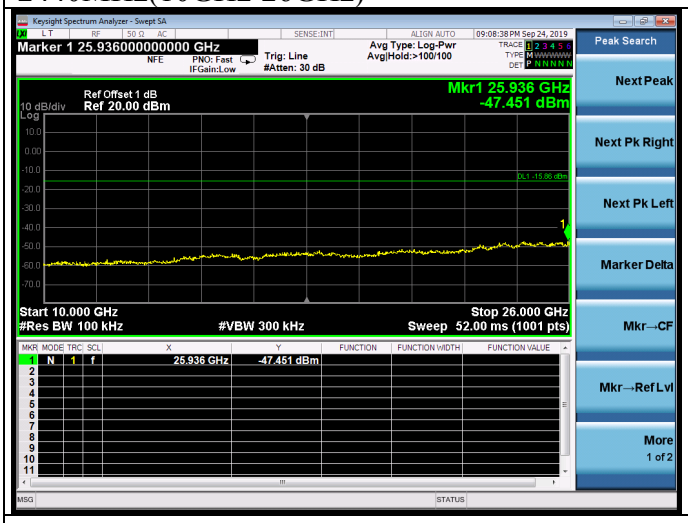
2402MHz(10GHz-26GHz)



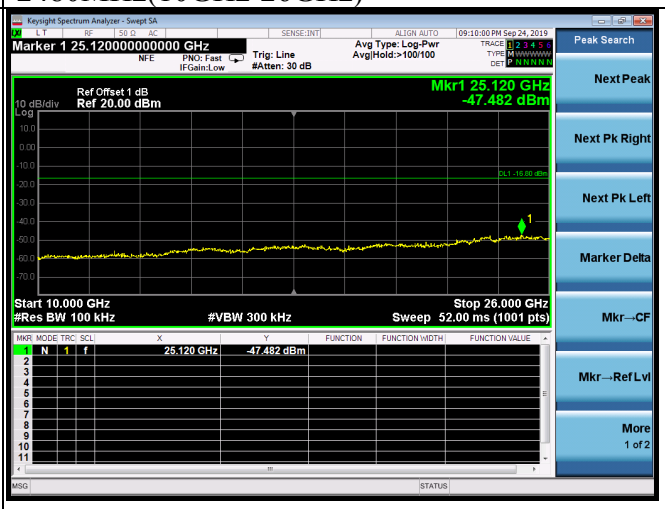
2440MHz(1GHz-10GHz)



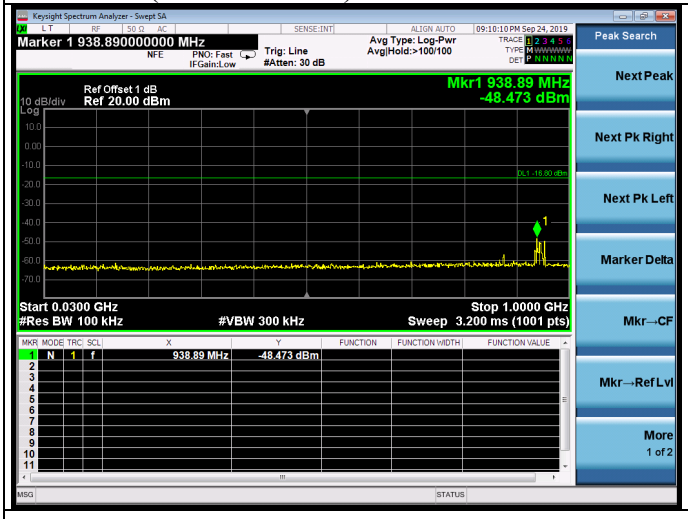
2440MHz(10GHz-26GHz)



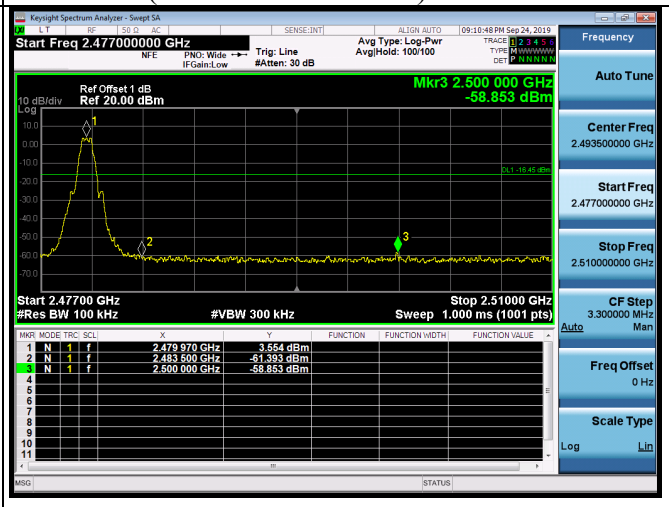
2480MHz(10GHz-26GHz)



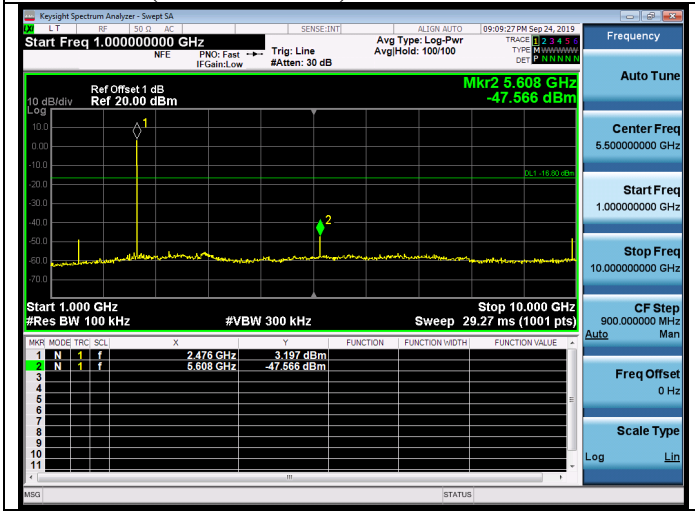
2480MHz(30MHz-1GHz)



2480MHz(2.477GHz-2.51GHz)



2480MHz(1GHz-10GHz)



6. 6DB 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

Please reference to section 2.4.

6.3. Limit

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

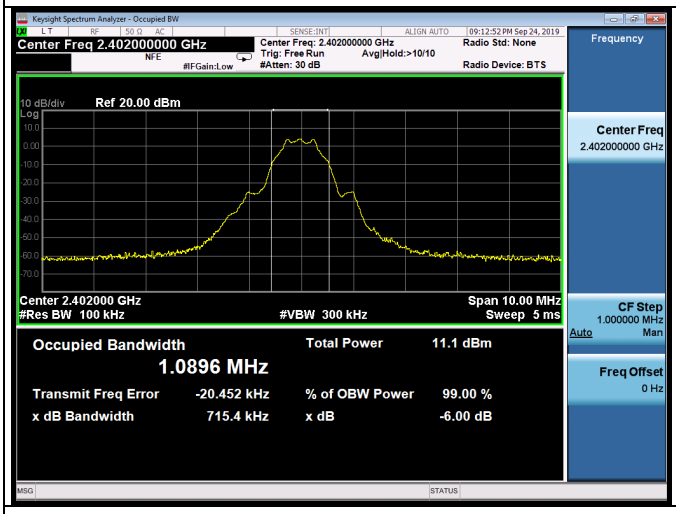
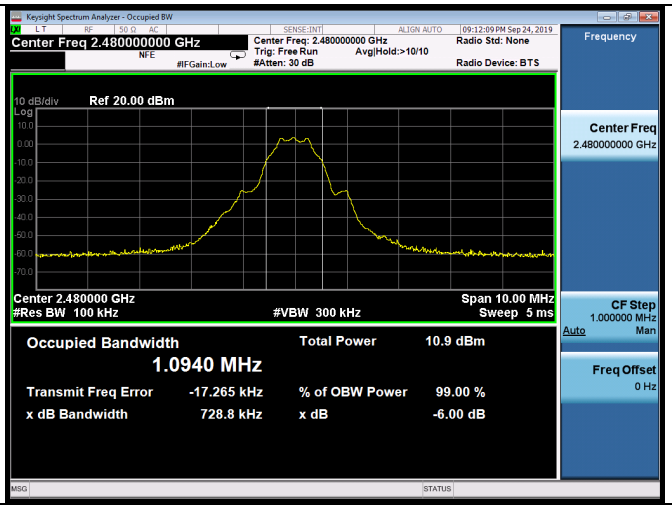
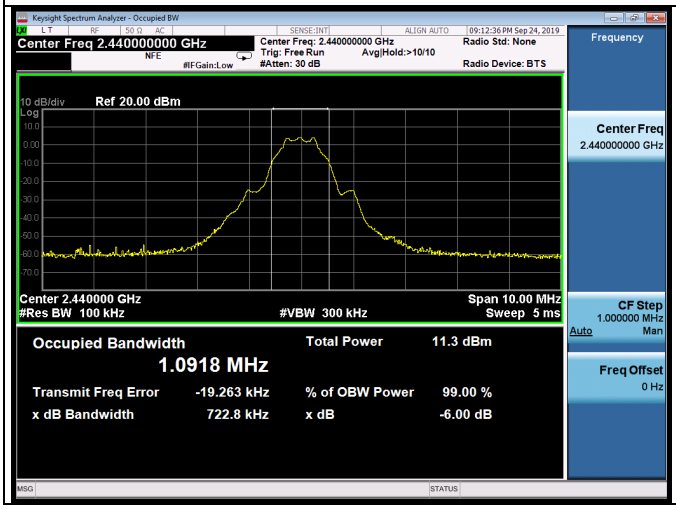
6.4. Test Procedure

Use the test method descried in ANSI C63.10 clause 11.8.2:
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥6 dB.

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)	6 dB bandwidth (kHz)	Limit (KHz)
GFSK	2402	715.4	≧500
	2440	722.8	≧500
	2480	728.8	≧500
Conclusion：PASS			

GFSK	
2402MHz	2480MHz
	
2440MHz	
	

7. MAXIMUM PEAK OUTPUT POWER 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.	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

7.2. Limit

For systems using digital modulation in the 2400—2483.5MHz, The Peak out put Power shall not exceed 1W(30dBm).

7.3. Test Procedure

Use the test method descried in ANSI C63.10 clause 11.9.1.3:
Connected the EUT's antenna port to Power Sensor, and use power meter to test peak output power.

7.4. 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 (MHz)	Peak output Power （dBm）	Limit (dBm)
GFSK	2402	4.648	30
	2440	4.781	30
	2480	4.278	30
Conclusion: PASS			

8. BAND EDGE COMPLIANCE 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.	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

8.2. 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.

8.3. Test Produce

Use the test method descried in ANSI C63.10 clause 6.10:

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

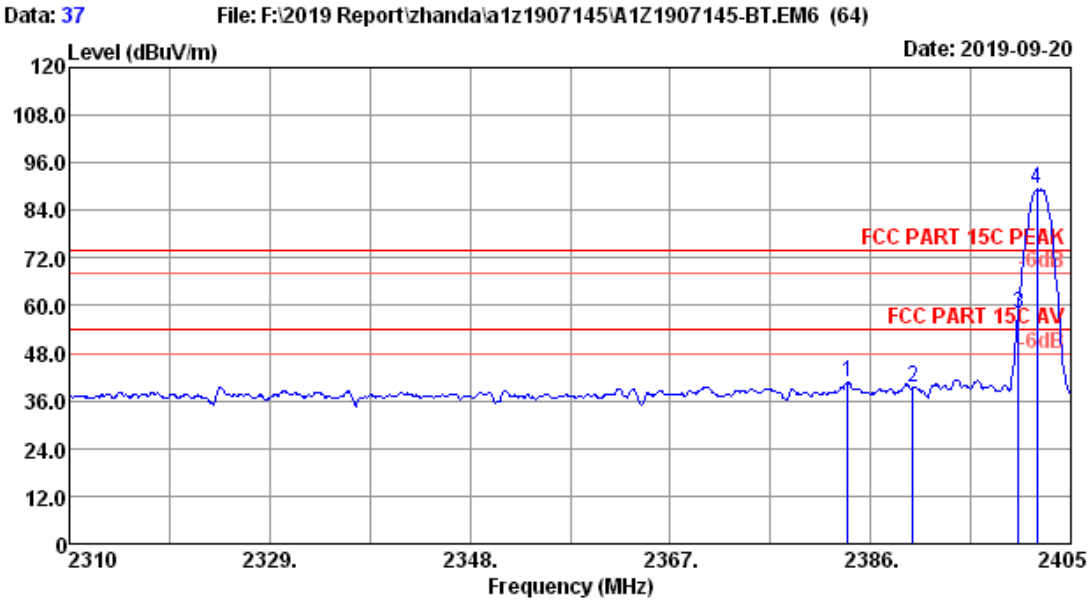
For emissions above two bandwidths away from the band-edge use below produce:

1. The EUT is placed on a turntable, which is 0.8m above the ground plane and 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.

8.4. Test Results

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

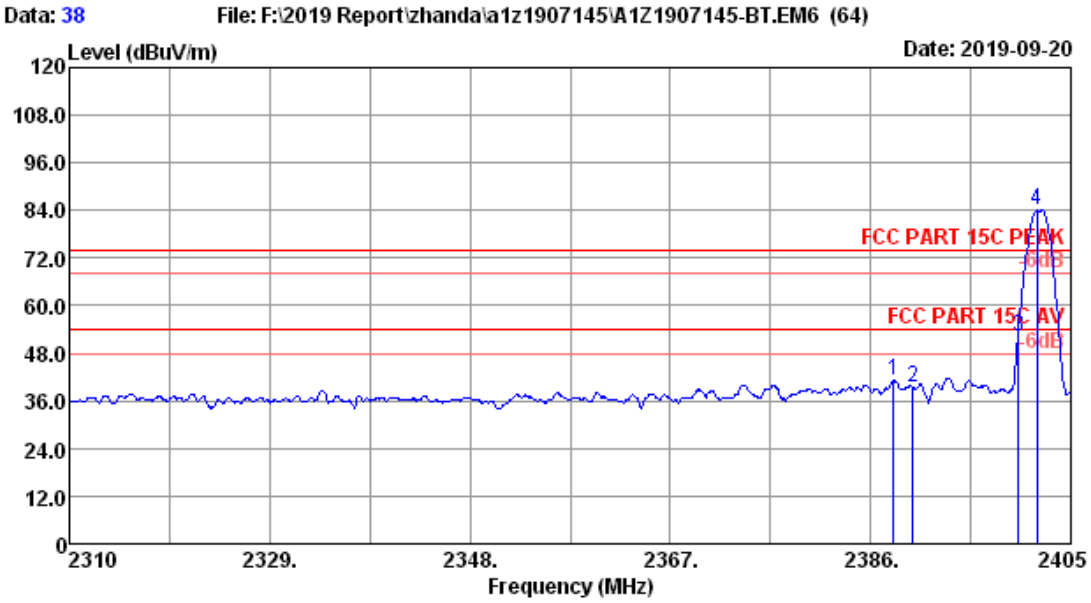
Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.



Site no. : 3m Chamber Data no. : 37
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 : BLE 2402MHz 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	2383.82	27.62	0.87	35.05	47.16	40.60	74.00	33.40	Peak
2	2390.00	27.71	0.87	35.04	45.83	39.37	74.00	34.63	Peak
3	2400.00	27.71	0.87	35.04	64.39	57.93	74.00	16.07	Peak
4	2401.77	27.71	0.87	35.04	95.76	89.30	74.00	-15.30	Peak

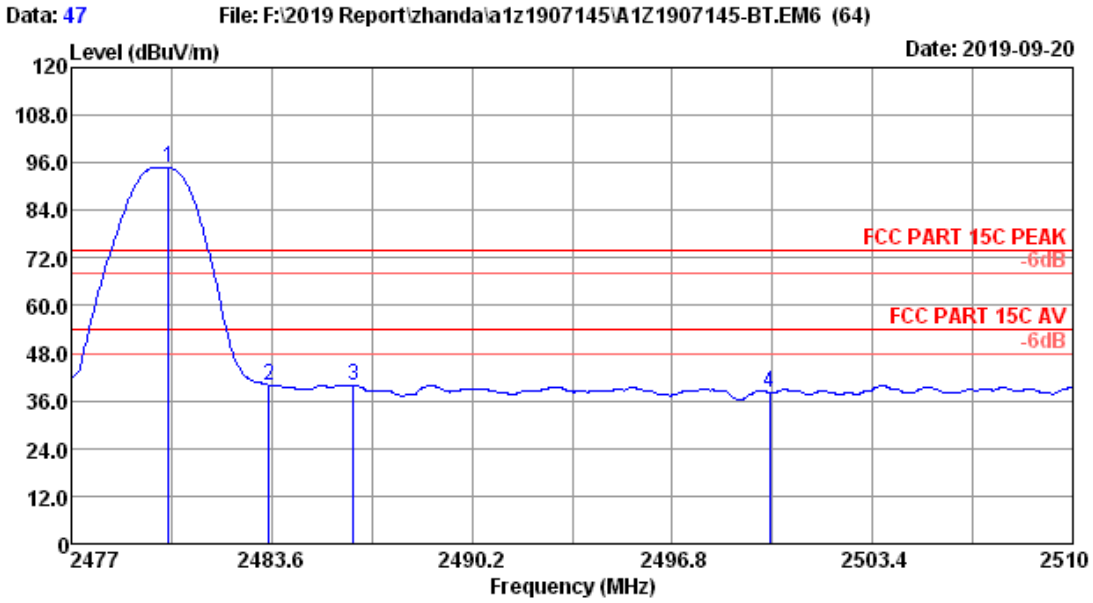
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 38
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 : BLE 2402MHz 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	2388.19	27.71	0.87	35.04	47.50	41.04	74.00	32.96	Peak
2	2390.00	27.71	0.87	35.04	45.89	39.43	74.00	34.57	Peak
3	2400.00	27.71	0.87	35.04	58.80	52.34	74.00	21.66	Peak
4	2401.77	27.71	0.87	35.04	90.43	83.97	74.00	-9.97	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.

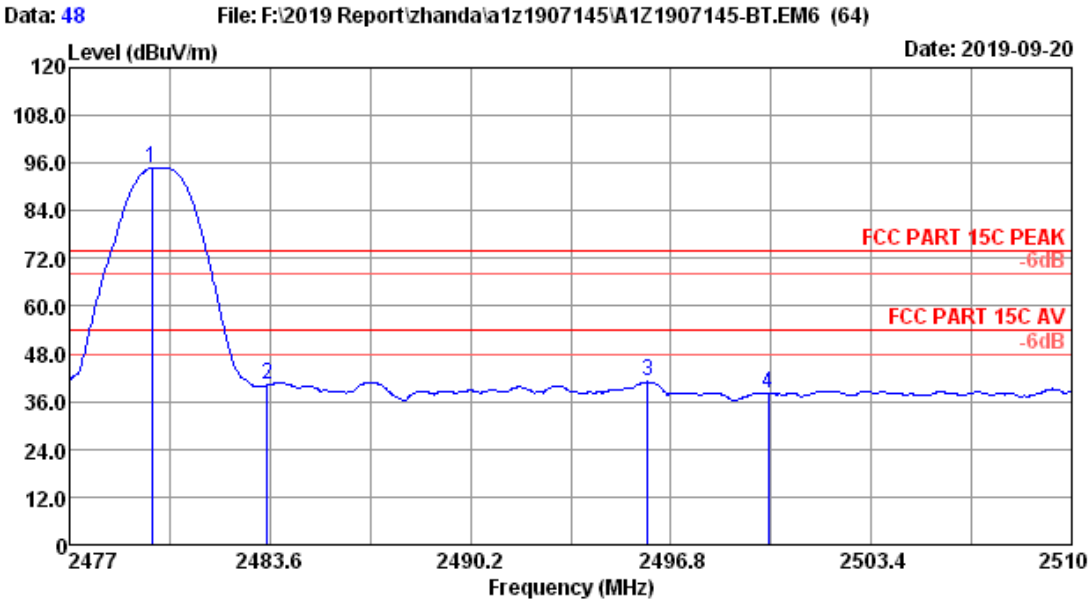


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
EUT :
Power rating : AC120V/60Hz
Test Mode : BLE 2480MHz Tx Mode

Data no. : 47
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	2480.20	27.98	0.89	35.01	100.86	94.72	74.00	-20.72	Peak
2	2483.50	27.98	0.89	35.01	45.96	39.82	74.00	34.18	Peak
3	2486.31	27.98	0.89	35.01	46.09	39.95	74.00	34.05	Peak
4	2500.00	28.03	0.89	35.00	44.15	38.07	74.00	35.93	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. : 48
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 : BLE 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	2479.71	27.98	0.89	35.01	100.92	94.78	74.00	-20.78	Peak
2	2483.50	27.98	0.89	35.01	46.27	40.13	74.00	33.87	Peak
3	2496.04	28.03	0.89	35.00	47.04	40.96	74.00	33.04	Peak
4	2500.00	28.03	0.89	35.00	44.03	37.95	74.00	36.05	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.

9. POWER SPECTRAL DENSITY TEST

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.	Attenuator	Agilent	8491B	MY39262165	Oct.14,18	1 Year
3.	RF Cable	Mini-Circuits	CBL-1M-SMSM+	No.4	Oct.14,18	1 Year

9.2. Block Diagram of Test Setup

Please reference to section 2.4.

9.3. Limit

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

9.4. Test Procedure

Use the test method descried in ANSI C63.10 clause 11.10.2:

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

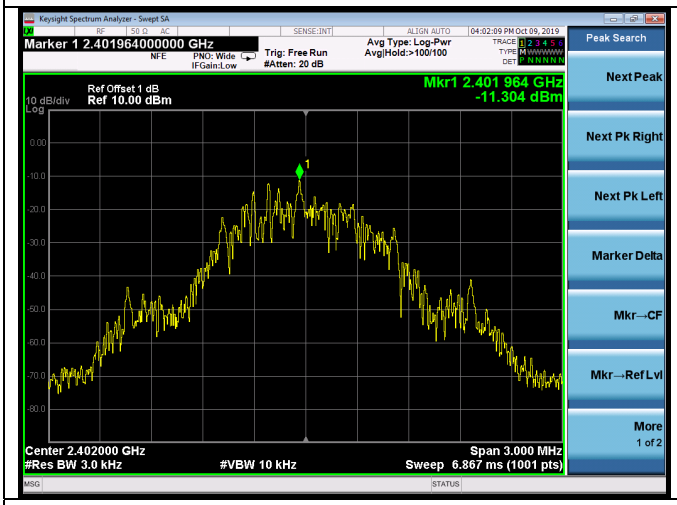
9.5. Test Results

EUT: IPTV STB/PVR		
M/N: Amulet 7XM		
Test date: 2019-10-09	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)	Power density (dBm/3KHz)	Limit (dBm/3KHz)
GFSK	2402	-11.304	8
	2440	-11.016	8
	2480	-13.538	8
Conclusion：PASS			

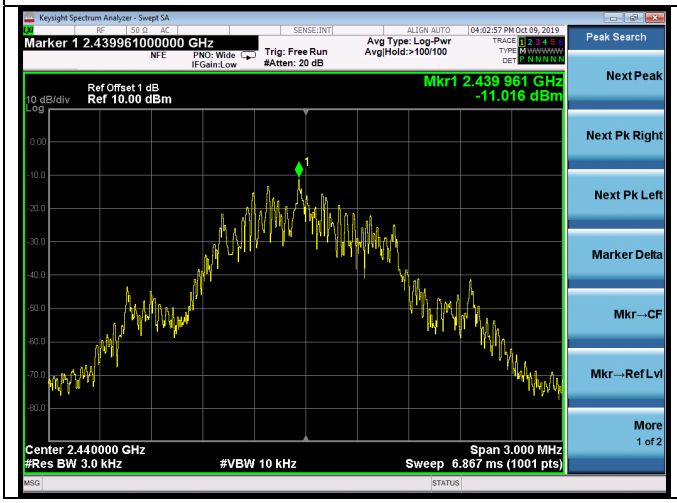
GFSK

2402MHz



2480MHz

2440MHz



10. ANTENNA REQUIREMENT

10.1. 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.

10.2. 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.

11. DEVIATION TO TEST SPECIFICATIONS

[NONE]

THE END