FCC PART 15C TEST REPORT FOR CERTIFICATION

On Behalf of

Planet Computers Limited

COSMO

COSMO COMMUNICATOR VE

FCC ID: 2AO7Q-COSMOVE

Prepared for : Planet Computers Limited
Suite #9, 56 Sloane Square, London, SW1W 8AX, United Kingdom

Prepared By : Audix Technology (Shenzhen) Co., Ltd.
No. 6, Kefeng Road, Science & Technology Park,
Nanshan District , Shenzhen, Guangdong, China

Tel: (0755) 26639496

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Appendix A. Photograph of Test
Appendix B. Photo of the EUT

TEST REPORT CERTIFICATION

Applicant	:	Planet Computers Limited
Manufacturer	:	Planet Computers Limited
Product	:	COSMO
FCC ID	:	2AO7Q-COSMOVE
		(A) Model No. : COSMO COMMUNICATOR VE
		(B) 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 : Jul.19~Sep.04, 2019 Report of date: Nov.13, 2019

Prepared by : Monica Liu
Monica Liu / 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	Planet Computers Limited Suite #9, 56 Sloane Square, London, SW1W 8AX, United Kingdom
Manufacturer	Planet Computers Limited Suite #9, 56 Sloane Square, London, SW1W 8AX, United Kingdom
Factory	Shenzhen Eastaeon Technology Limited Company 4F, B block, Kingdee Software Park, 2 Keji South 12 Road, Nanshan District, Shenzhen
Product	COSMO
Model No.	COSMO COMMUNICATOR VE
FCC ID	2AO7Q-COSMOVE
Power Adapter	Manufacturer: SHENZHEN TIANYIN ELECTRONICS CO., LTD. Model: TPA-10120125UU-MTK Input: 100-240V~, 50/60Hz, 0.6A Output: 5V, 2A / 7V, 1.67A / 9V, 1.67A / 12V, 1.25A
Rechargeable Li-ion Battery	Manufacturer: Shenzhen 3sun Electronics Co., Ltd.; M/N: Gemini Standard Battery; Rating Voltage: 3.85V; Capacity: 4220mAh; Charge Voltage: 4.4V.
USB Cable	Shielded, Detachable, 0.8m
Sample Type	Prototype production
Date of Receipt	Jul.12, 2019
Date of Test	Jul.19~Sep.04, 2019

2.2. Feature of Equipment Under Test

Product Feature & Specification		
Product	COSMO	
Model No.	COSMO COMMUNICATOR VE	
Radio	IEEE802.11 a/b/g/n/ac; Bluetooth V3.0+EDR; Bluetooth V4.0; NFC	
Power Source	☒ Commercial Power	AC 100 ~ 240V, 0.6A
	☒ External Power Source	DC 5/7/9/12V, 2/1.67/1.67/1.25A
	☒ Lithium battery	DC 3.85V, 4220mAh
	☐ UM battery	DC V
NFC		
Frequency Range	13.56MHz	
Type of Modulation	ASK	
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	
2.4GHz Wi-Fi		
Support Modes	802.11b/g/n20/n40	
Frequency Range	2412-2462MHz	
Type of Modulation	802.11b(DSSS): CCK, QPSK, BPSK; 802.11g/n(OFDM): 64QAM,16QAM, QPSK, BPSK	
Data Rate	802.11b: 11/5.5/2/1 Mbps; 802.11g: 54/48/36/24/18/12/9/6 Mbps; 802.11n: up to 150Mbps	
Channel Separation	5MHz	
5GHz Wi-Fi		
Support Modes	802.11a/n20/n40/ac20/ac40/ac80	
Frequency Range	5180-5240MHz, 5260-5320MHz, 5500-5700MHz, 5745-5825MHz	
Type of Modulation	802.11a/ac/n (OFDM): QPSK, BPSK, 16QAM, 64QAM,256QAM	
Data Rate	802.11a: 54/48/36/24/18/12/9/6 Mbps; 802.11n up to 150 Mbps; 802.11ac: up to 400Mbps	
Channel Separation	5MHz	
Type of Product	Slave device without Radar detection	
Transmit Power Control	No Support	

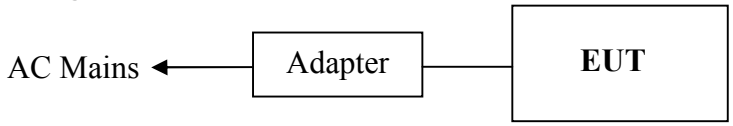
Antenna System

NFC	
Type of Antenna	FPC Antenna
Antenna number	1
Antenna Peak Gain	0dBi
Bluetooth	
Type of Antenna	MONOPOLE Antenna
Antenna number	1
Antenna Peak Gain	-0.1dBi
Wi-Fi	
Type of Antenna	MONOPOLE Antenna
Antenna number	1
Antenna Peak Gain	DTS Band (2400-2483.5MHz) Peak Gain: -0.1dBi U-NII-1 Band(5150-5250MHz) Peak Gain: 0.6dBi U-NII-2A Band(5250-5350MHz) Peak Gain: 0.6dBi U-NII-2C Band(5470-5725MHz) Peak Gain: 0.4dBi U-NII-3 Band (5725-5850MHz) Peak Gain: 0.3dBi

2.3. Tested Supporting System Details

[None]

2.4. Block Diagram of connection between EUT and simulators



(EUT: COSMO)

2.5. Test information

A special software(The developer mode that comes with the device) 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	9.210	7.817
	DH3		
	DH5		
π/4DQPSK	2-DH1	6.475	5.324
	2-DH3		
	2-DH5		
8DPSK	3-DH1	9.119	6.902
	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%

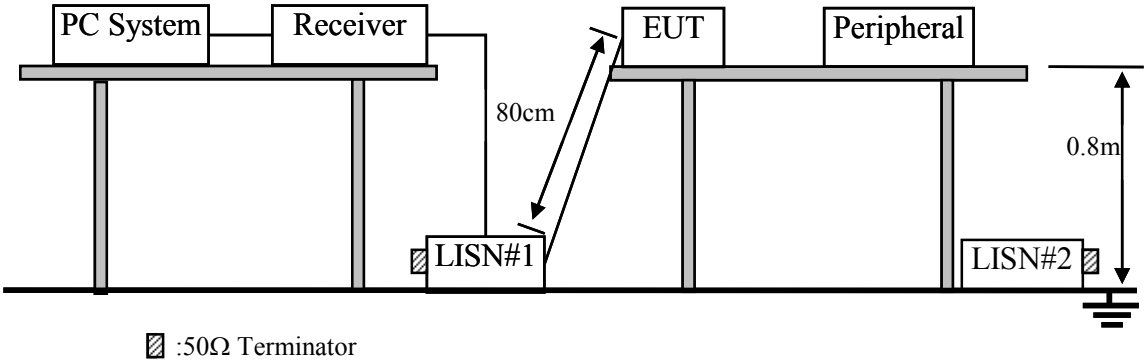
Note: EMI uncertainty is evaluated by CISPR16-4-2.
The value of measurement uncertainty of EMI is less than U_{CISPR}.
The value is not calculated in the test results.

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. COSMO (EUT)

Model No. : COSMO COMMUNICATOR VE
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

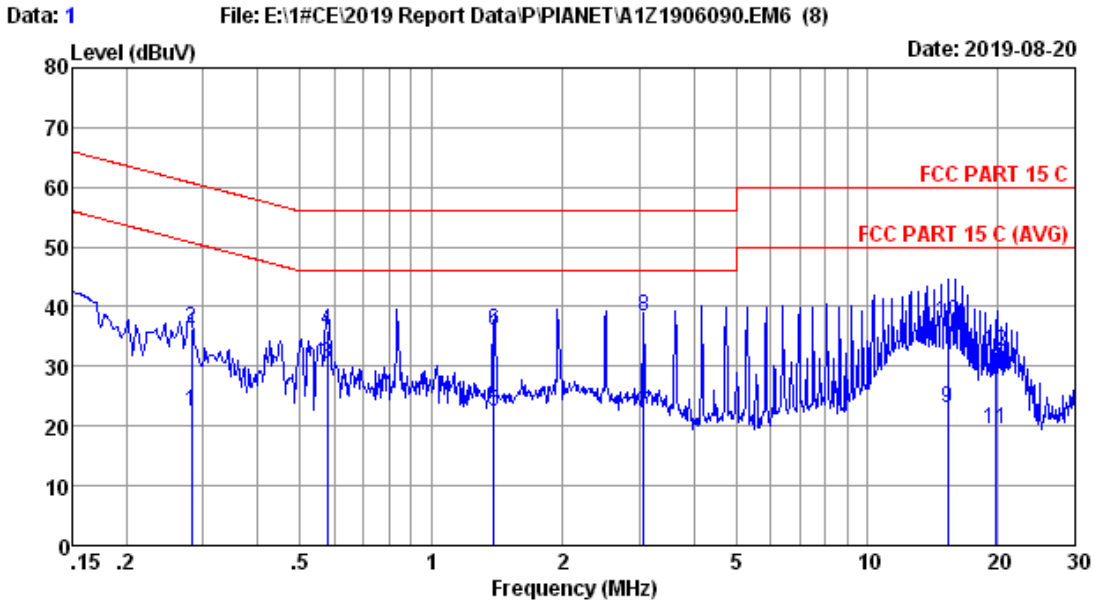
The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power Via AC unit connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs).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

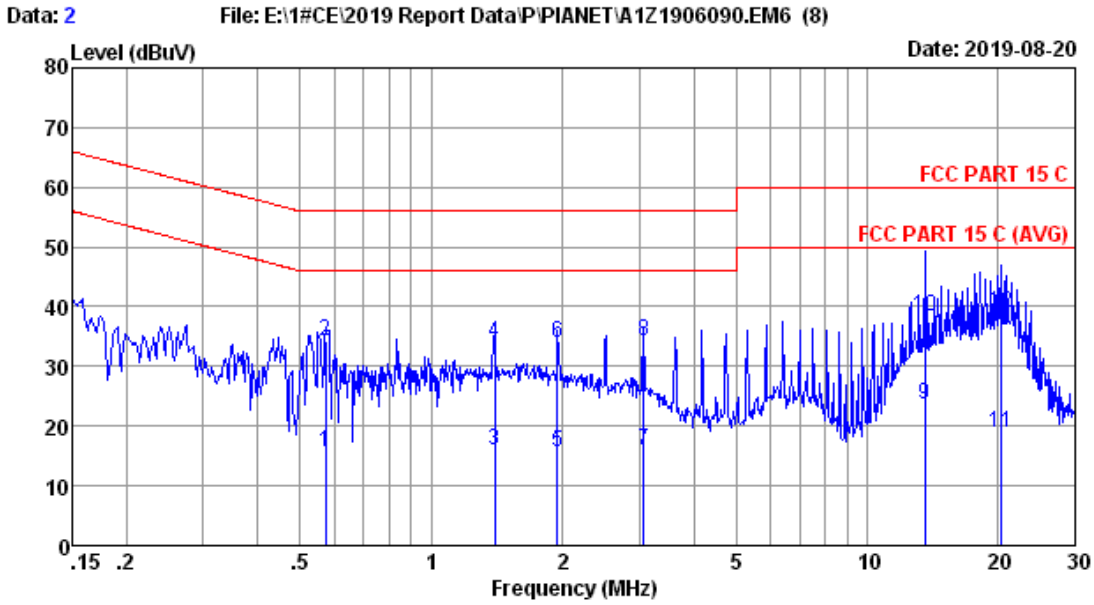


Site no :1# Conduction
Dis./Lisn :2018 ENV216-N
Limit :FCC PART 15 C
Env./Ins. :Temp:23.8*C Humi:55%
Power rating : AC 120V/60Hz
Test Mode : BT3.0

Data No :1
LISN phase:
Engineer :Evan

No	Freq (MHz)	LISN Factor (dB)	Cable loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.282	9.40	0.03	13.10	22.53	50.76	28.23	Average
2	0.282	9.40	0.03	27.00	36.43	60.76	24.33	QP
3	0.578	9.40	0.02	20.90	30.32	46.00	15.68	Average
4	0.578	9.40	0.02	26.50	35.92	56.00	20.08	QP
5	1.394	9.40	0.03	12.90	22.33	46.00	23.67	Average
6	1.394	9.40	0.03	26.50	35.93	56.00	20.07	QP
7	3.070	9.45	0.05	12.70	22.20	46.00	23.80	Average
8	3.070	9.45	0.05	28.80	38.30	56.00	17.70	QP
9	15.330	9.61	0.13	13.39	23.13	50.00	26.87	Average
10	15.330	9.61	0.13	27.89	37.63	60.00	22.37	QP
11	19.802	9.70	0.15	9.49	19.34	50.00	30.66	Average
12	19.802	9.70	0.15	22.49	32.34	60.00	27.66	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-L
Limit :FCC PART 15 C
Env./Ins. :Temp:23.8*C Humi:55%
Power rating : AC 120V/60Hz
Test Mode : BT3.0

Data No :2
LISN phase:
Engineer :Evan

No	Freq (MHz)	LISN Factor (dB)	Cable loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.573	9.40	0.02	6.29	15.71	46.00	30.29	Average
2	0.573	9.40	0.02	24.82	34.24	56.00	21.76	QP
3	1.396	9.44	0.03	6.59	16.06	46.00	29.94	Average
4	1.396	9.44	0.03	24.43	33.90	56.00	22.10	QP
5	1.949	9.49	0.04	6.23	15.76	46.00	30.24	Average
6	1.949	9.49	0.04	24.40	33.93	56.00	22.07	QP
7	3.074	9.50	0.05	6.48	16.03	46.00	29.97	Average
8	3.074	9.50	0.05	24.62	34.17	56.00	21.83	QP
9	13.562	9.57	0.12	13.80	23.49	50.00	26.51	Average
10	13.562	9.57	0.12	28.60	38.29	60.00	21.71	QP
11	20.366	9.60	0.15	9.20	18.95	50.00	31.05	Average
12	20.366	9.60	0.15	29.10	38.85	60.00	21.15	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

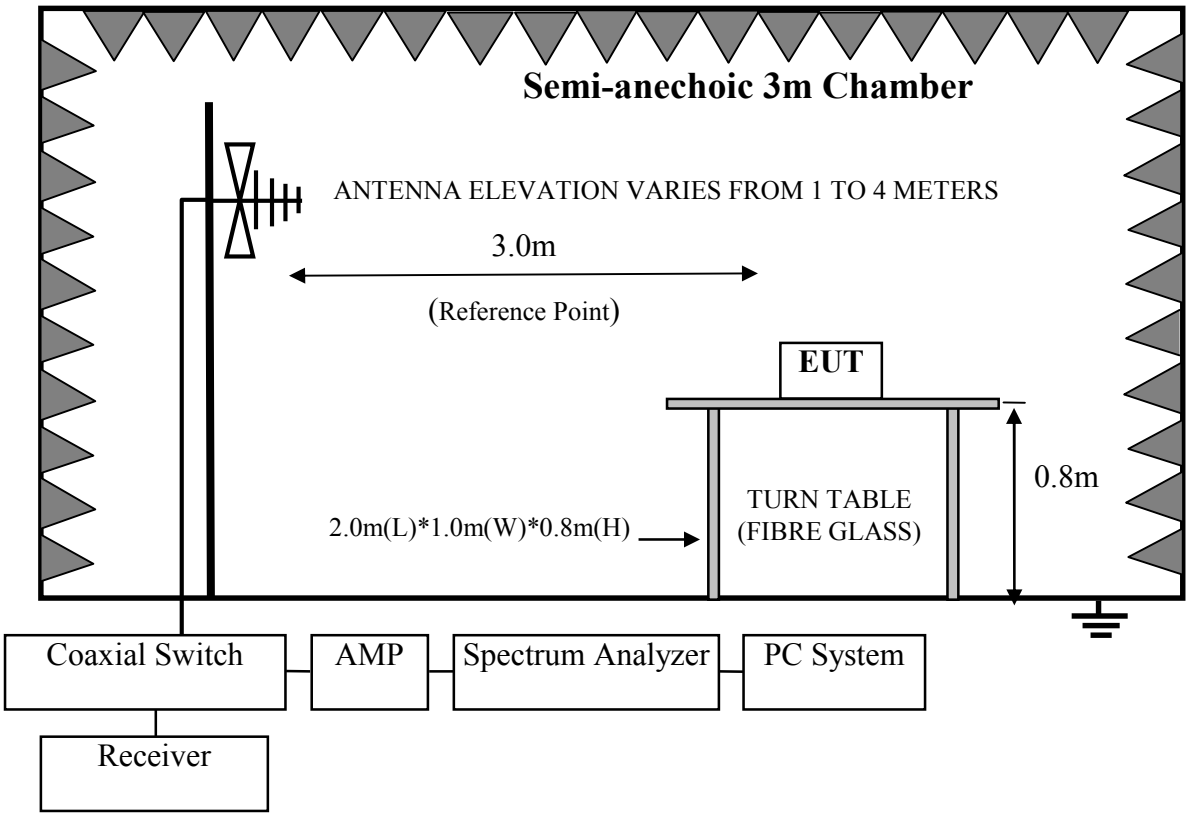
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber(NSA)	AUDIX	N/A	N/A	May.10,19	1 Year
2.	3#Chamber(SE)	AUDIX	N/A	N/A	May.17,18	3 Year
3.	Signal Analyzer	Rohde & Schwarz	FSV30	104050	Apr.14,19	1 Year
4.	EMI Test Receiver	Rohde & Schwarz	ESR7	101547	Apr.14,19	1 Year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

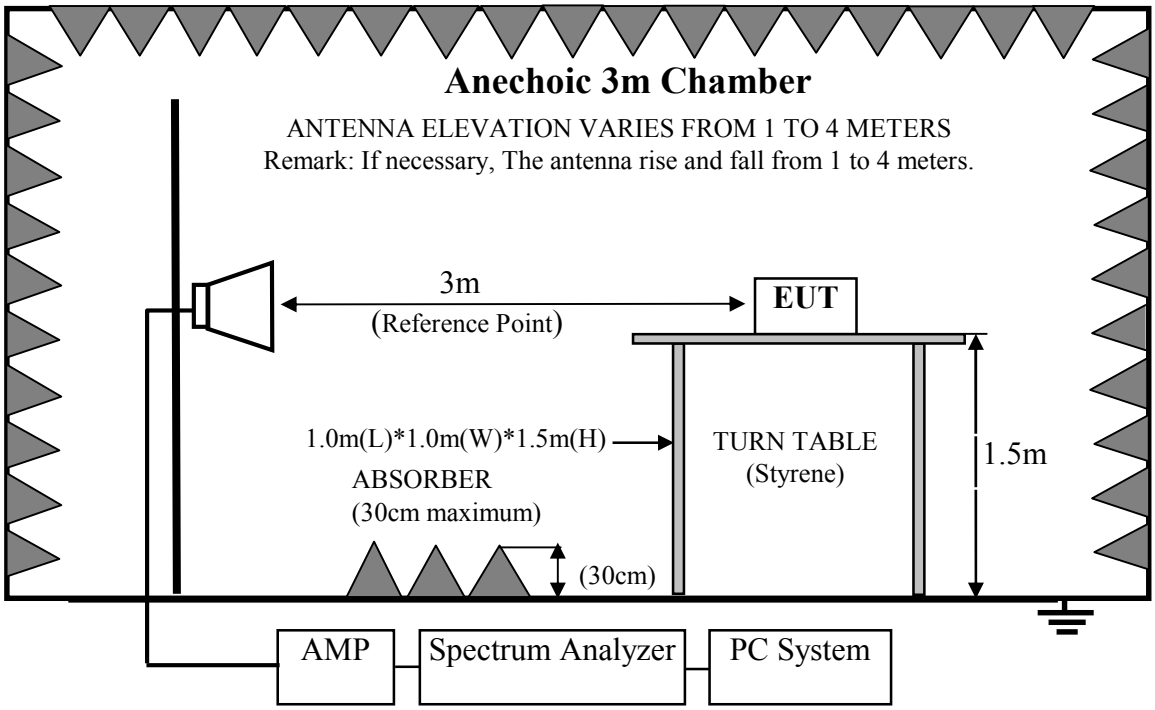
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber(Svswr)	AUDIX	N/A	N/A	Apr.18,19	1 Year
2.	3#Chamber(SE)	AUDIX	N/A	N/A	May.17,18	3 Year
3.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
4.	Horn Antenna	ETS	3115	9510-4580	Dec.13,18	1 Year
5.	Horn Antenna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

Model No. : COSMO COMMUNICATOR VE

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.

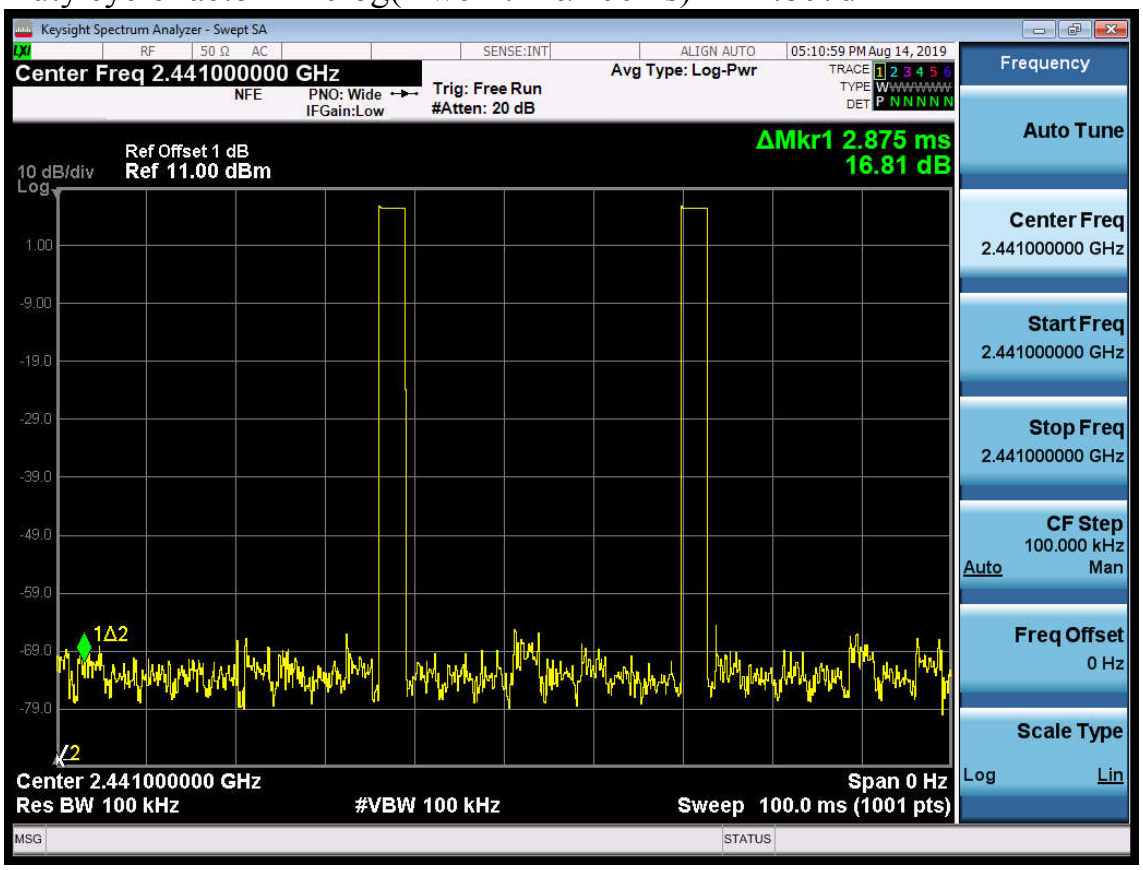
The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

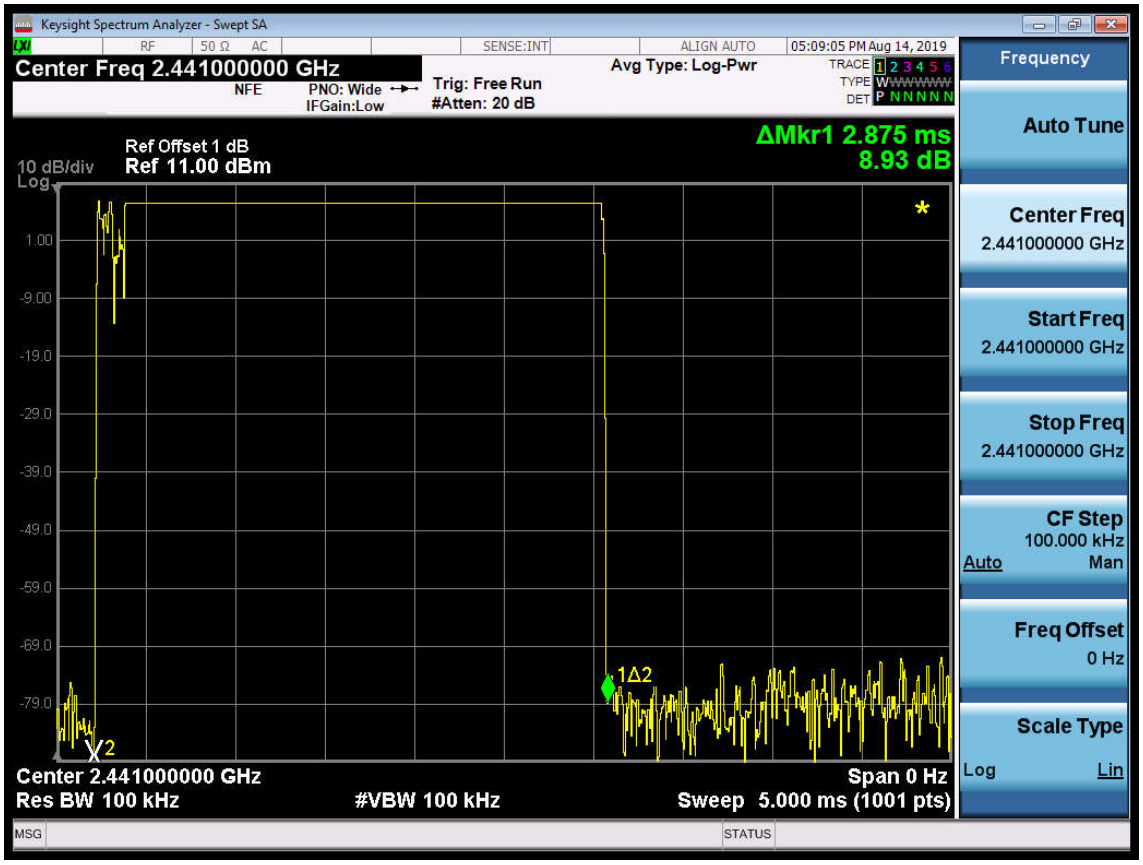
4.7. Radiated Emission Test Results

PASS.

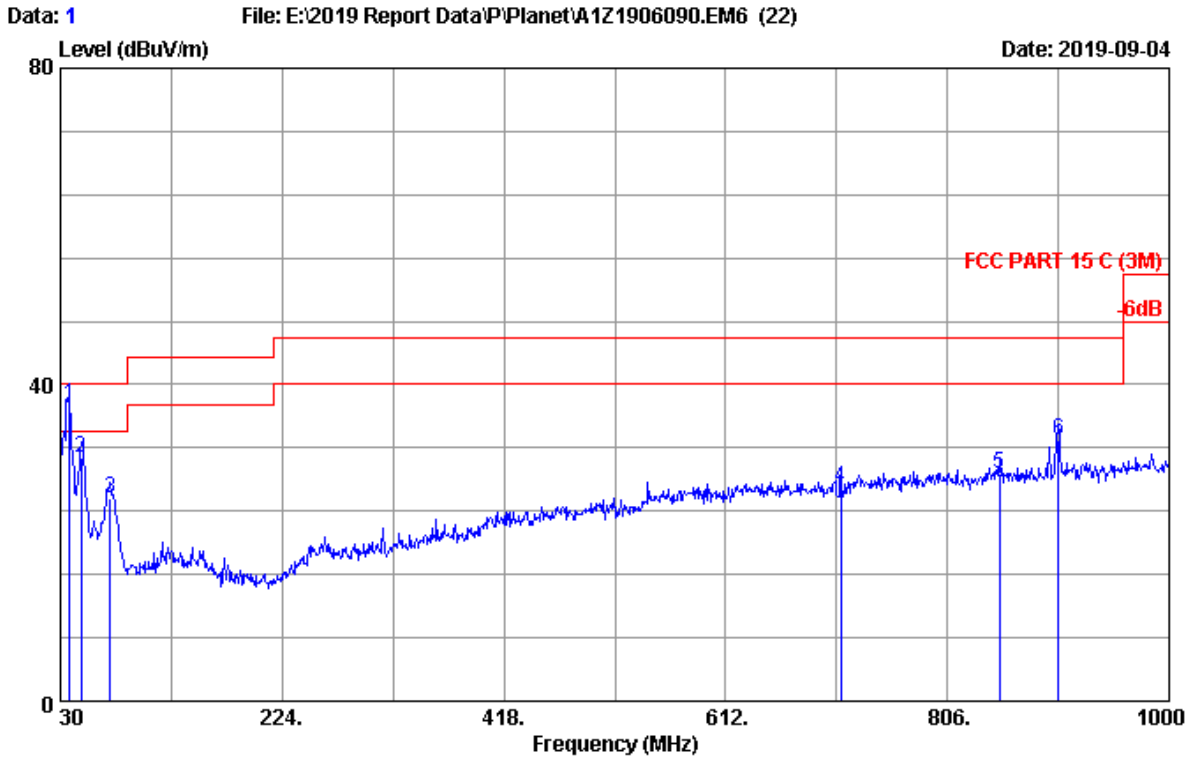
All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.
Note 1: The duty cycle factor for calculate average level is -24.807dB, and average limit is 20dB below peak limit, so if peak measured level comply with average limit, the average level was deemed to comply with average limit.
Note 2: The emissions (9kHz~30MHz) is more than 20dB below the limit, so there is not reported.

Duty cycle factor = 20log(Dwell time/100ms)= -24.807dB





Frequency: 30MHz~1GHz

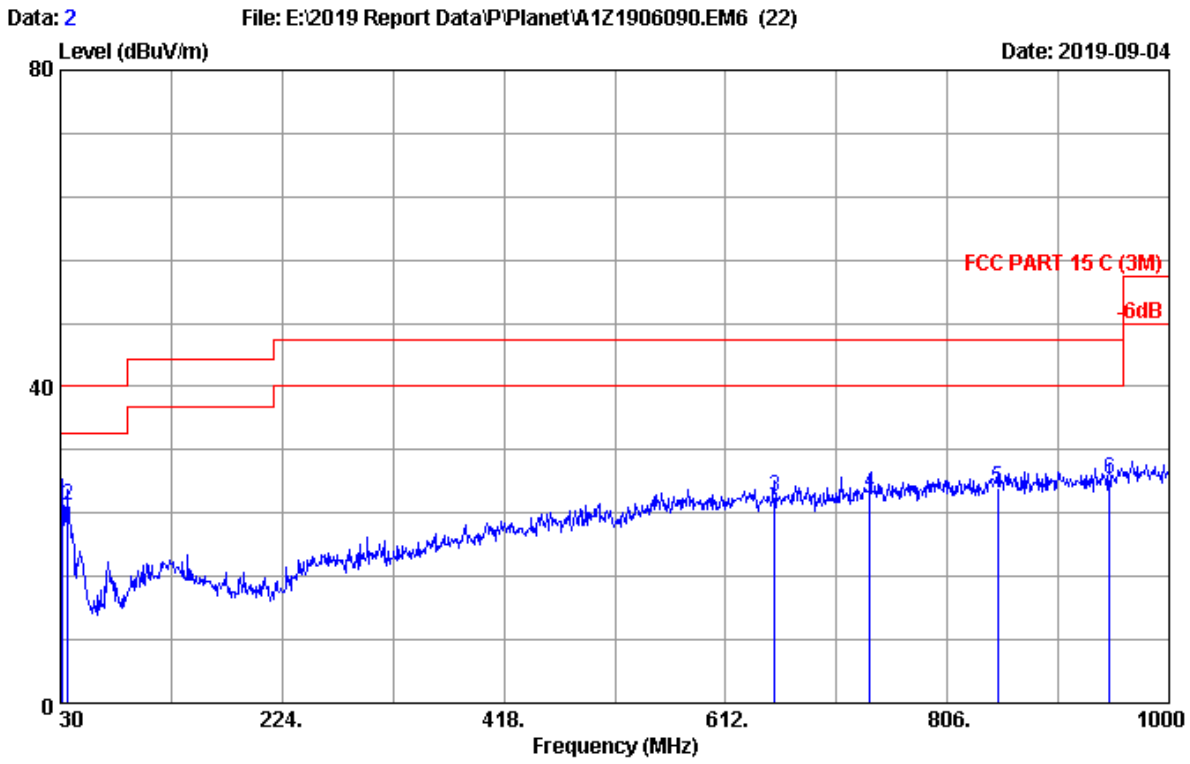


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 CBL6112D-35375
Limit : FCC PART 15 C (3M)
Env. / Ins. : 23.4*C/54%
Power rating : AC 120V/60Hz
Test Mode : BT3.0

Data no. : 1
Ant. pol. : VERTICAL
Engineer : Hogen

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	37.760	20.30	0.58	16.62	37.50	40.00	2.50	QP
2	48.430	15.80	0.66	14.21	30.67	40.00	9.33	QP
3	73.650	13.10	0.83	11.74	25.67	40.00	14.33	QP
4	712.880	25.16	2.89	-0.99	27.06	46.00	18.94	QP
5	851.590	26.67	3.22	-1.14	28.75	46.00	17.25	QP
6	903.000	26.70	3.33	2.96	32.99	46.00	13.01	QP

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



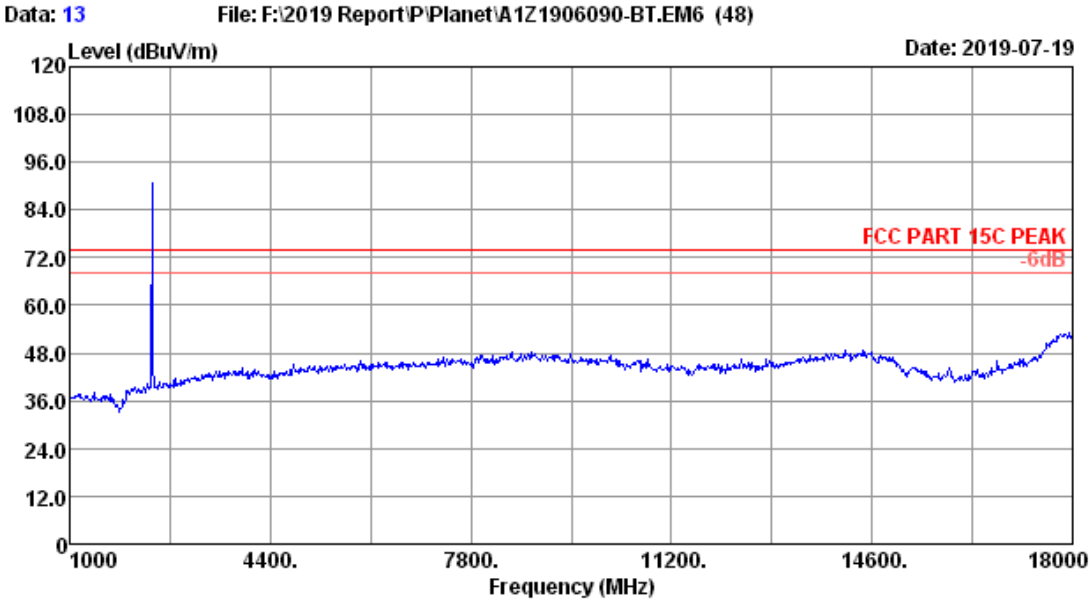
Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 CBL6112D-35375
Limit : FCC PART 15 C (3M)
Env. / Ins. : 23.4*C/54%
Power rating : AC 120V/60Hz
Test Mode : BT3.0

Data no. : 2
Ant. pol. : HORIZONTAL
Engineer : Hogen

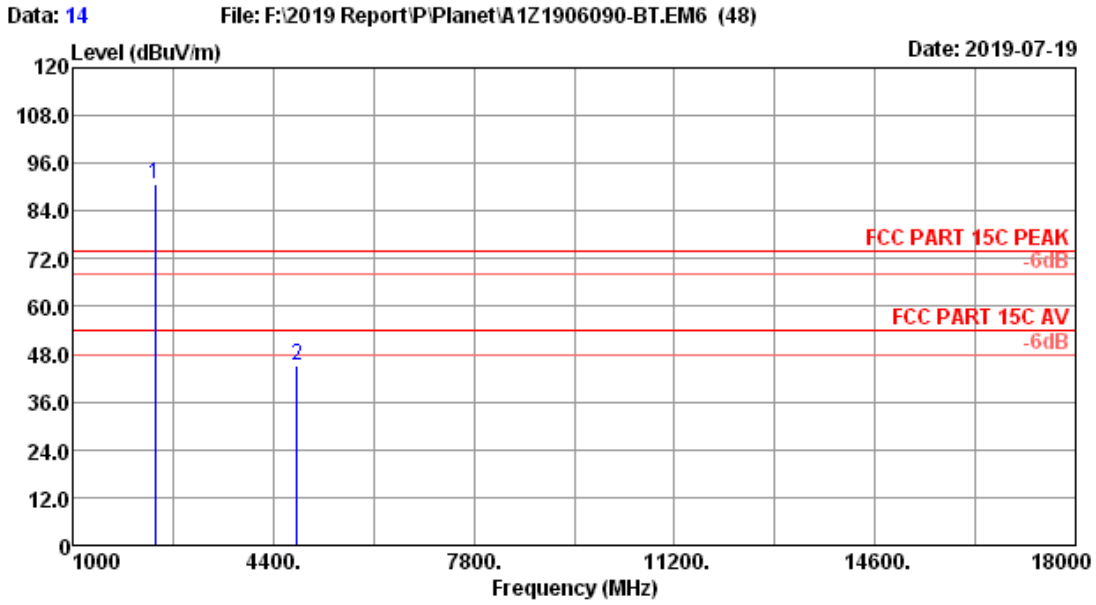
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	31.940	23.50	0.54	1.54	25.58	40.00	14.42	QP
2	36.790	20.70	0.58	3.73	25.01	40.00	14.99	QP
3	654.680	25.30	2.75	-1.96	26.09	46.00	19.91	QP
4	738.100	26.06	2.96	-2.58	26.44	46.00	19.56	QP
5	849.650	26.70	3.22	-2.73	27.19	46.00	18.81	QP
6	947.620	26.92	3.47	-2.13	28.26	46.00	17.74	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.	: 13
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Garry
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 GFSK 2402MHz Tx Mode		

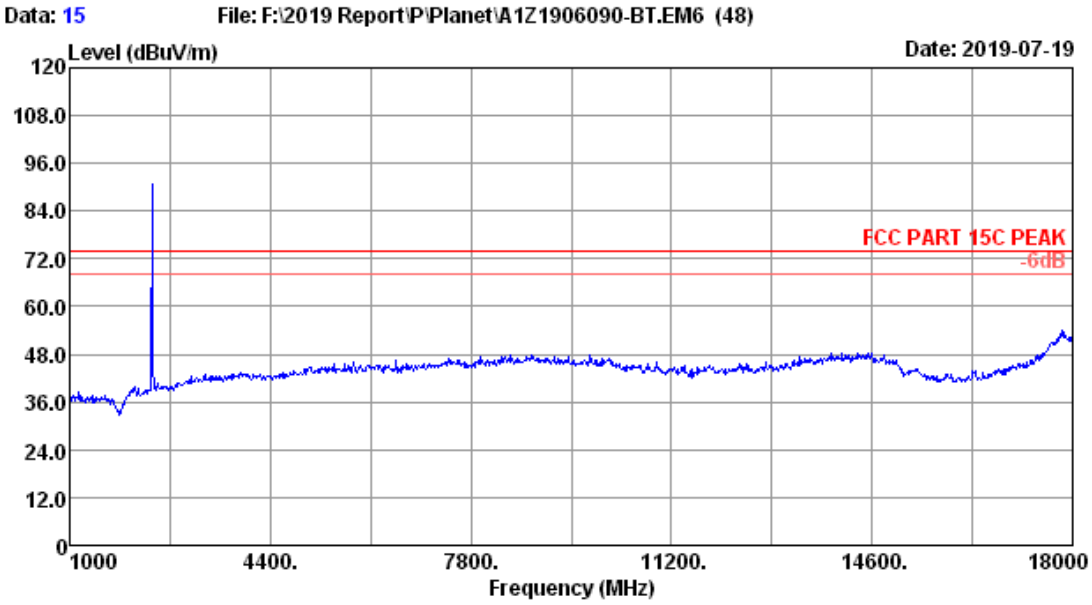


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2402MHz Tx Mode

Data no. : 14
Ant. pol. : VERTICAL
Pre :
Engineer : Garry

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	97.15	90.69	74.00	-16.69	Peak
2	4804.00	32.10	1.24	34.36	46.04	45.02	74.00	28.98	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                  Data no.   : 15
Dis. / Ant.   : 3m   2018 3115-4580          Ant. pol.  : HORIZONTAL
Limit         : FCC PART 15C PEAK            Pre        :
Env. / Ins.   : 23.4*C/52.9%                 Engineer   : Garry
Power rating  : AC120V/60Hz
Test Mode     : BT3.0 GFSK 2402MHz Tx Mode
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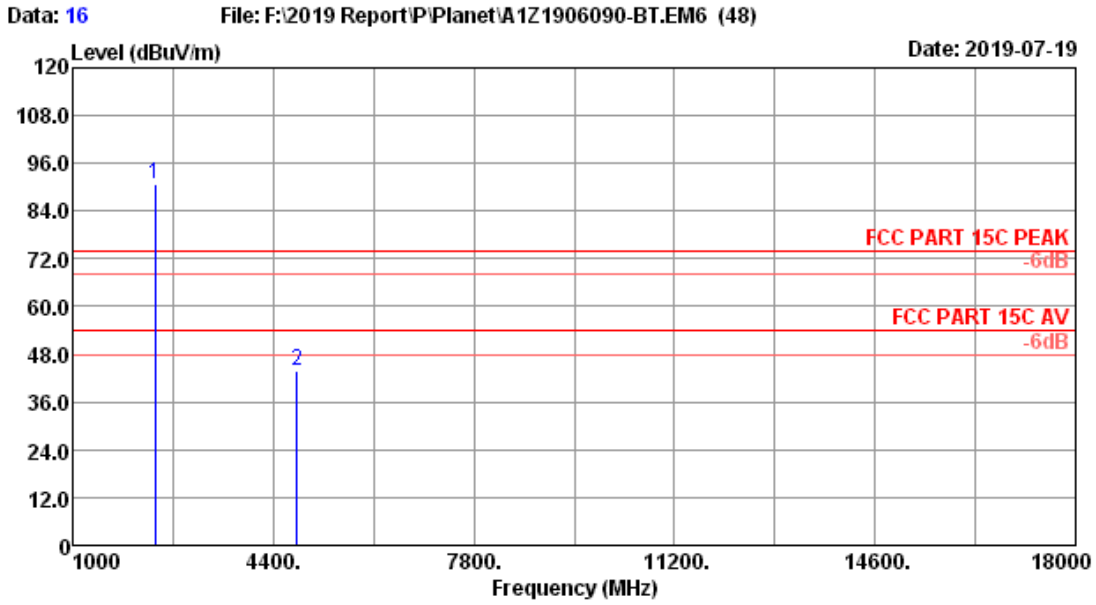
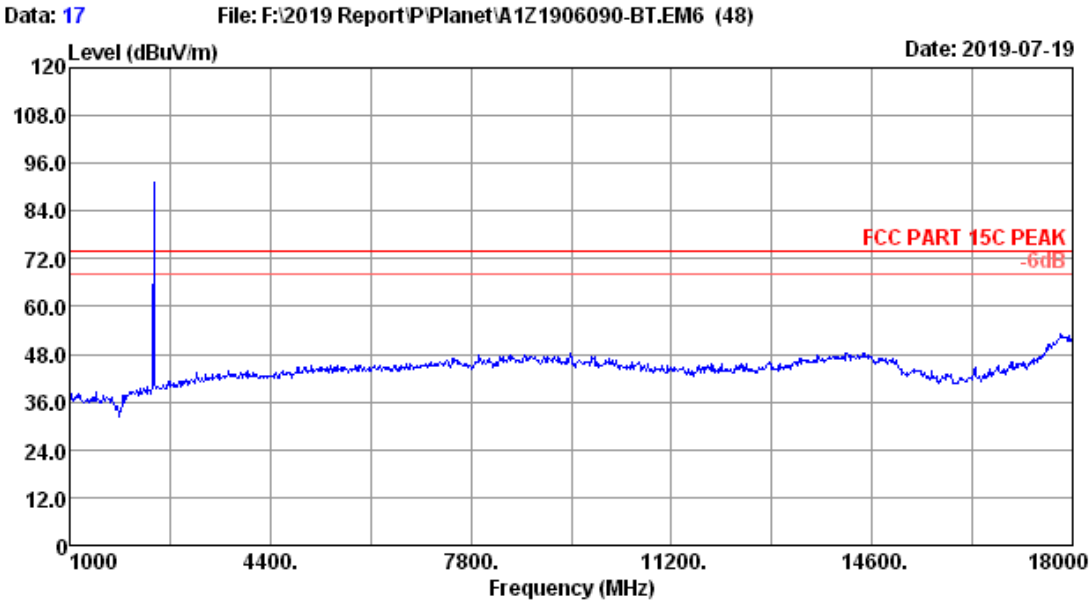


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2402MHz Tx Mode

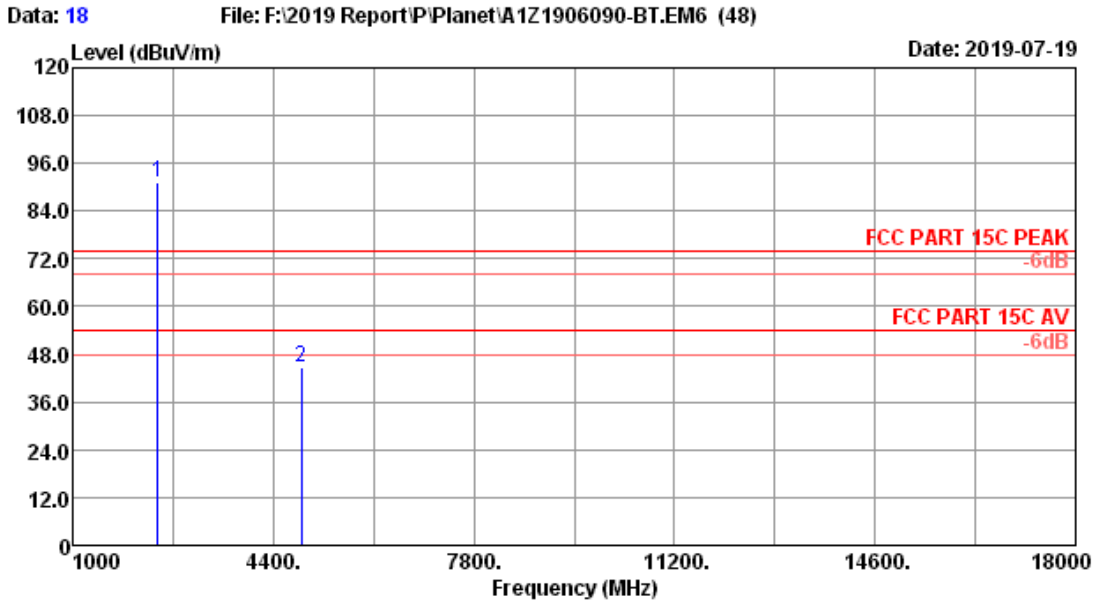
Data no. : 16
Ant. pol. : HORIZONTAL
Pre :
Engineer : Garry

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	97.44	90.98	74.00	-16.98	Peak
2	4804.00	32.10	1.24	34.36	44.93	43.91	74.00	30.09	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.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Garry
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 GFSK 2441MHz Tx Mode		

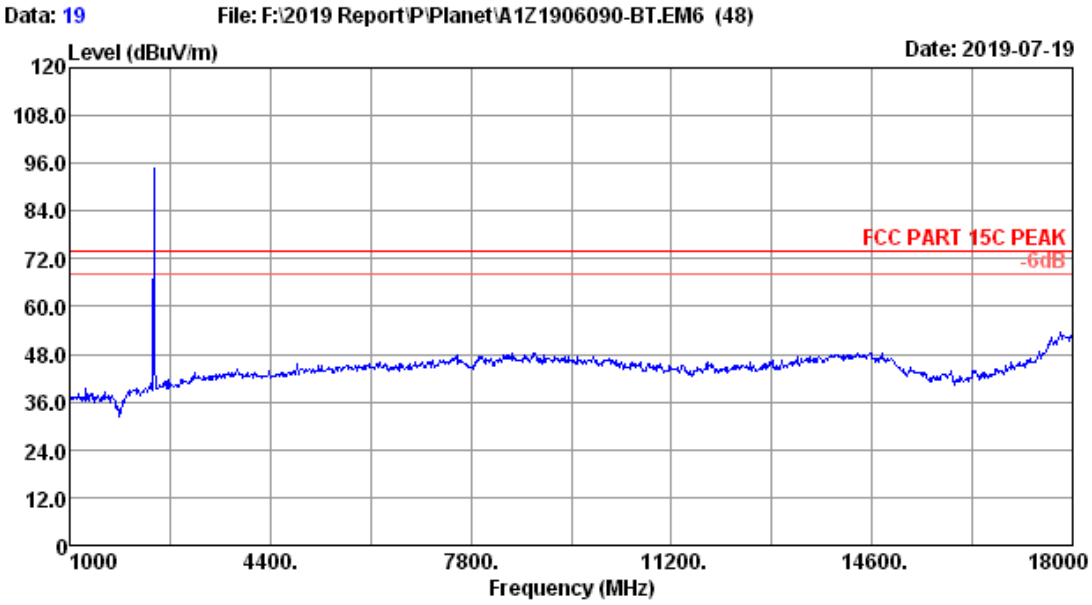


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2441MHz Tx Mode

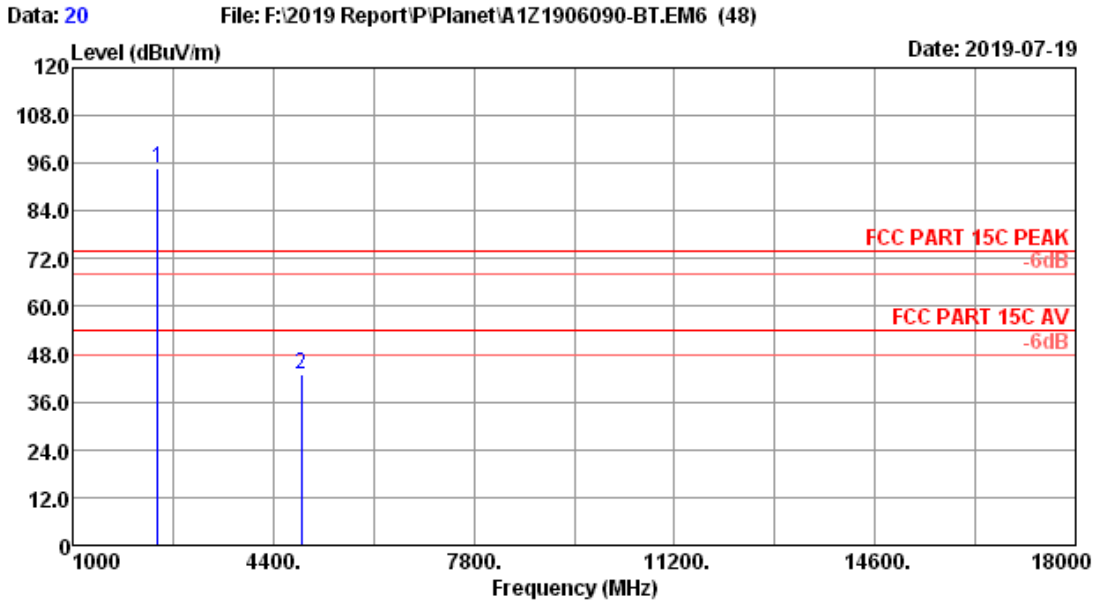
Data no. : 18
Ant. pol. : VERTICAL
Pre :
Engineer : Garry

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	97.46	91.19	74.00	-17.19	Peak
2	4882.00	32.25	1.25	34.38	45.55	44.67	74.00	29.33	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.	: 19
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Garry
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 GFSK 2441MHz Tx Mode		



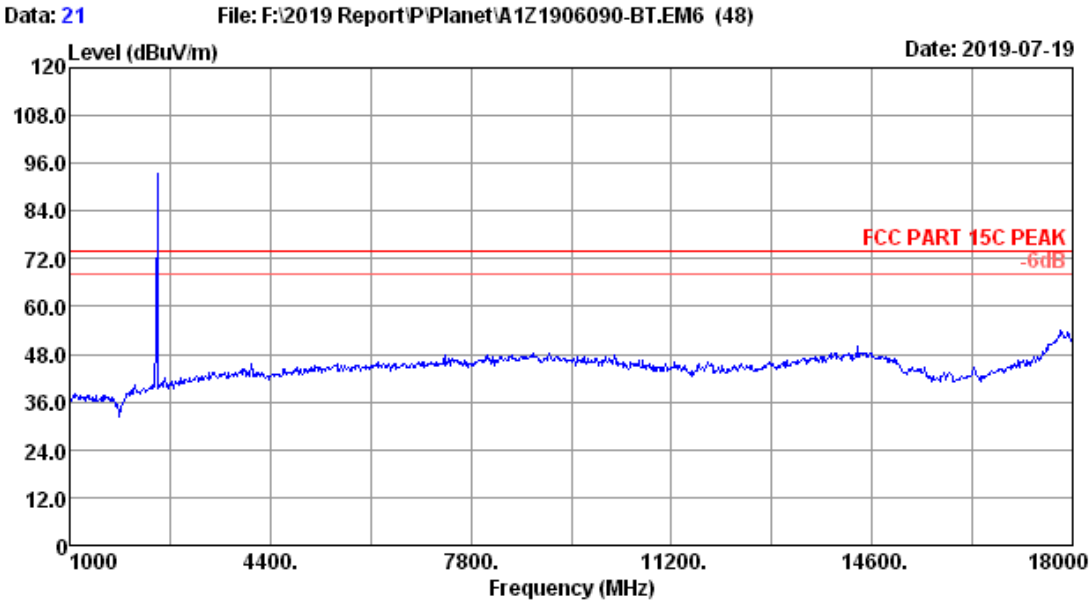
Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2441MHz Tx Mode

Data no. : 20
Ant. pol. : HORIZONTAL
Pre :
Engineer : Garry

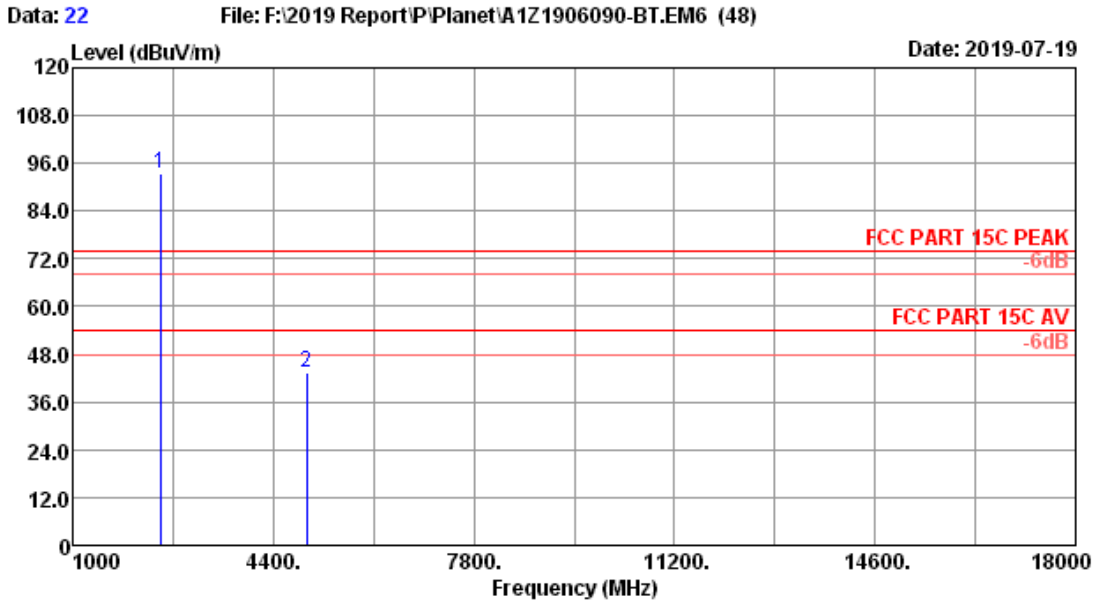
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.00	27.87	0.88	35.02	101.08	94.81	74.00	-20.81	Peak
2	4882.00	32.25	1.25	34.38	43.80	42.92	74.00	31.08	Peak

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.

Frequency（MHz）	Peak level（dBuv/m）	Duty cycle factor (dB)	AV level (dBuv/m)	Limit(dBuv/m)	Conclusion
2441.00	94.81	-24.807	70.003	94	Pass



Site no.	: 3m Chamber	Data no.	: 21
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Garry
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 GFSK 2480MHz Tx Mode		

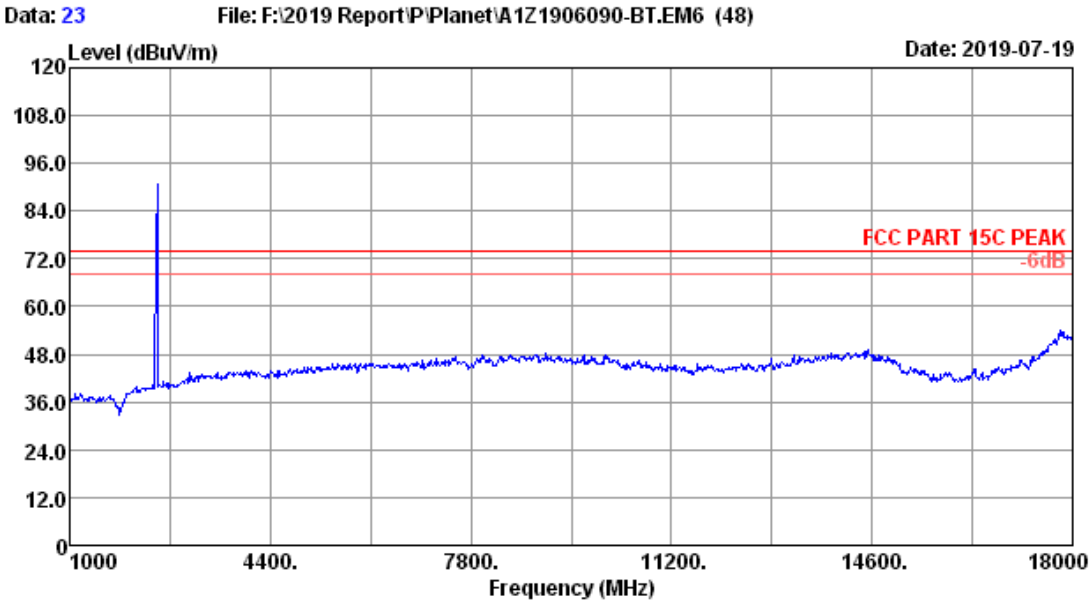


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2480MHz Tx Mode

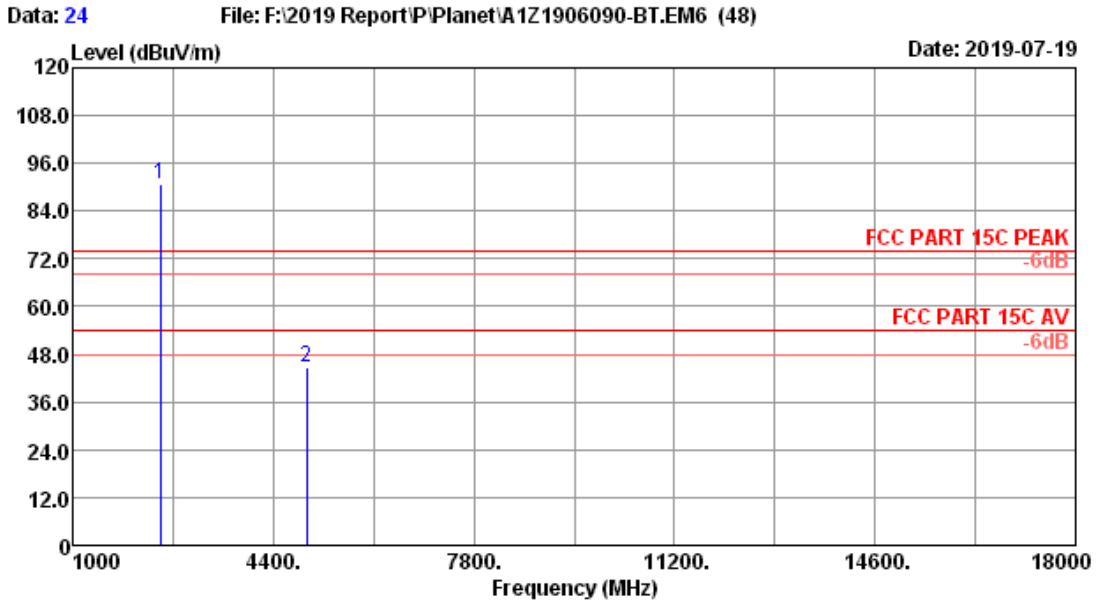
Data no. : 22
Ant. pol. : HORIZONTAL
Pre :
Engineer : Garry

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	99.59	93.45	74.00	-19.45	Peak
2	4960.00	32.43	1.27	34.39	44.16	43.47	74.00	30.53	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.



Site no.	: 3m Chamber	Data no.	: 23
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Garry
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 GFSK 2480MHz Tx Mode		

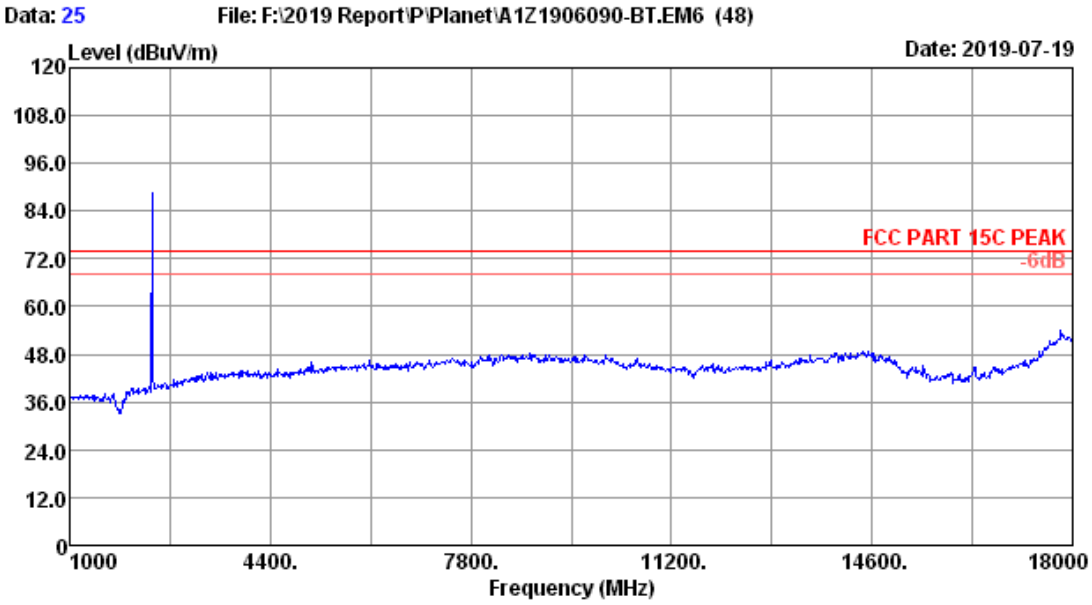


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 GFSK 2480MHz Tx Mode

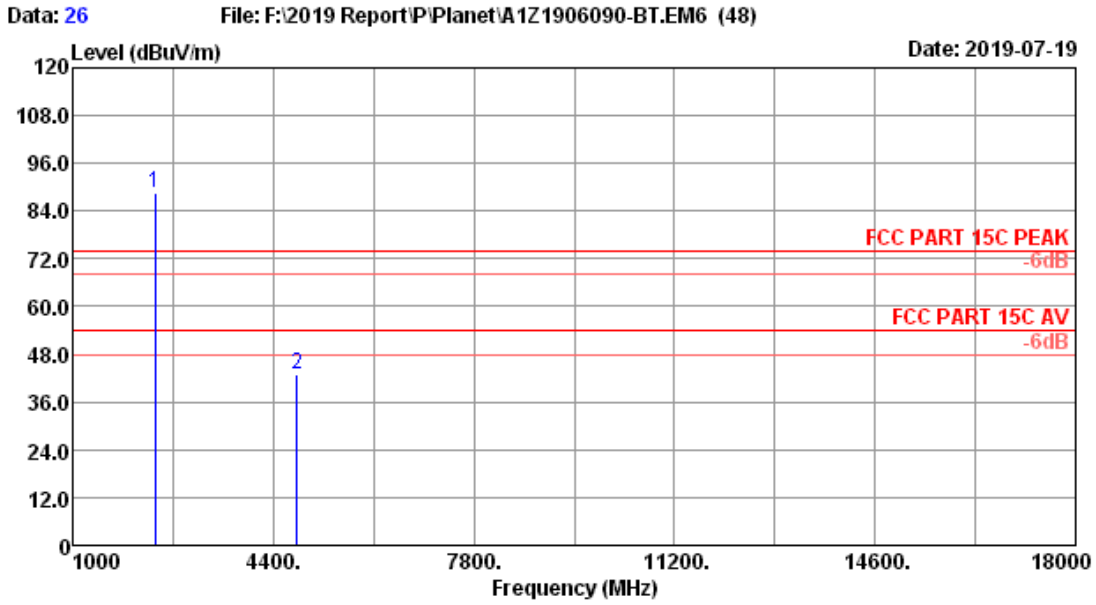
Data no. : 24
Ant. pol. : VERTICAL
Pre :
Engineer : Garry

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	96.86	90.72	74.00	-16.72	Peak
2	4960.00	32.43	1.27	34.39	45.40	44.71	74.00	29.29	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.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Garry
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 8-DPSK 2402MHz Tx Mode		

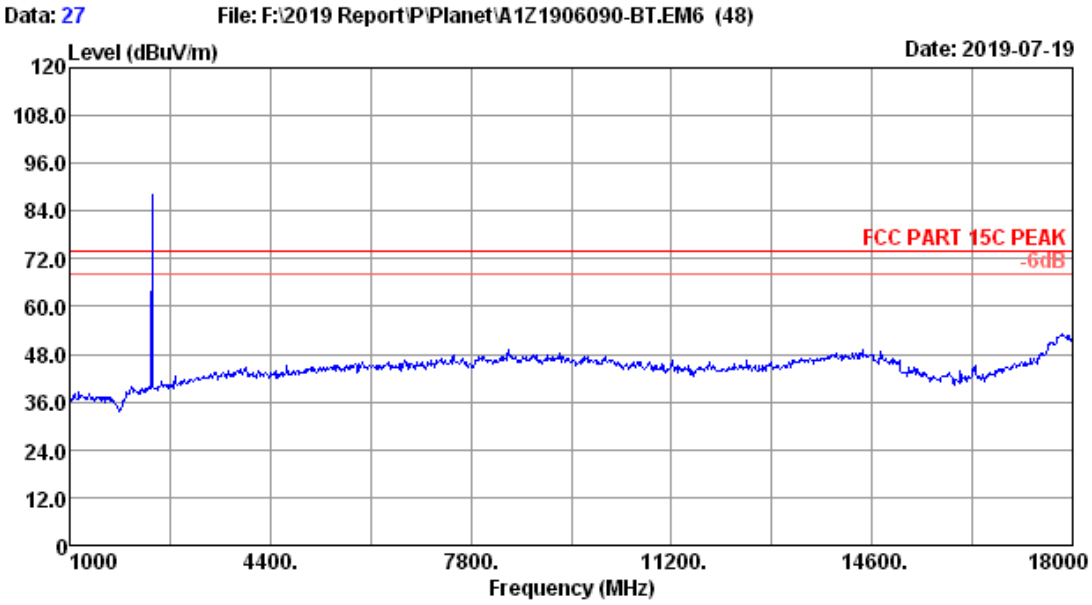


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2402MHz Tx Mode

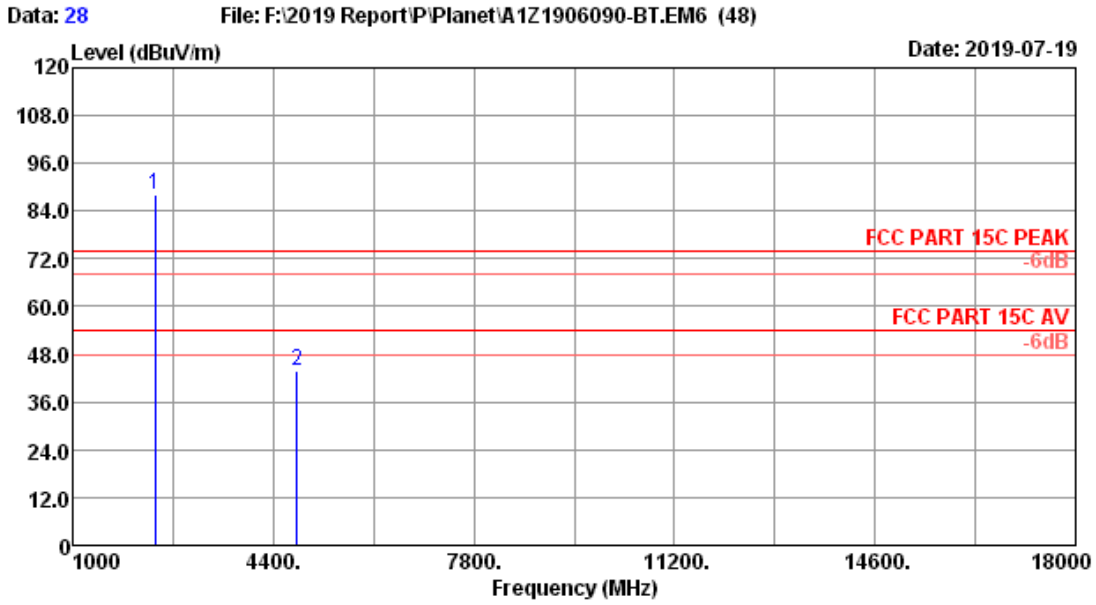
Data no. : 26
Ant. pol. : HORIZONTAL
Pre :
Engineer : Garry

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	94.96	88.50	74.00	-14.50	Peak
2	4804.00	32.10	1.24	34.36	44.03	43.01	74.00	30.99	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	: Garry
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 8-DPSK 2402MHz Tx Mode		

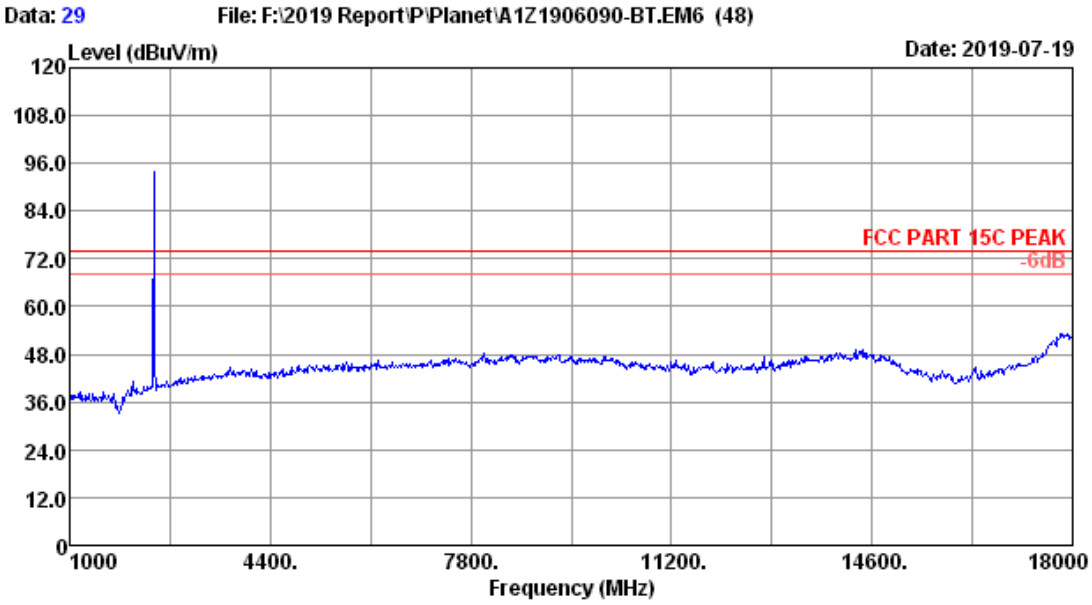


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2402MHz Tx Mode

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

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	94.42	87.96	74.00	-13.96	Peak
2	4804.00	32.10	1.24	34.36	45.06	44.04	74.00	29.96	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.

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Site no.      : 3m Chamber                  Data no.   : 29
Dis. / Ant.   : 3m   2018 3115-4580          Ant. pol.  : HORIZONTAL
Limit         : FCC PART 15C PEAK            Pre        :
Env. / Ins.   : 23.4*C/52.9%                 Engineer   : Garry
Power rating  : AC120V/60Hz
Test Mode     : BT3.0 8-DPSK 2441MHz Tx Mode
```
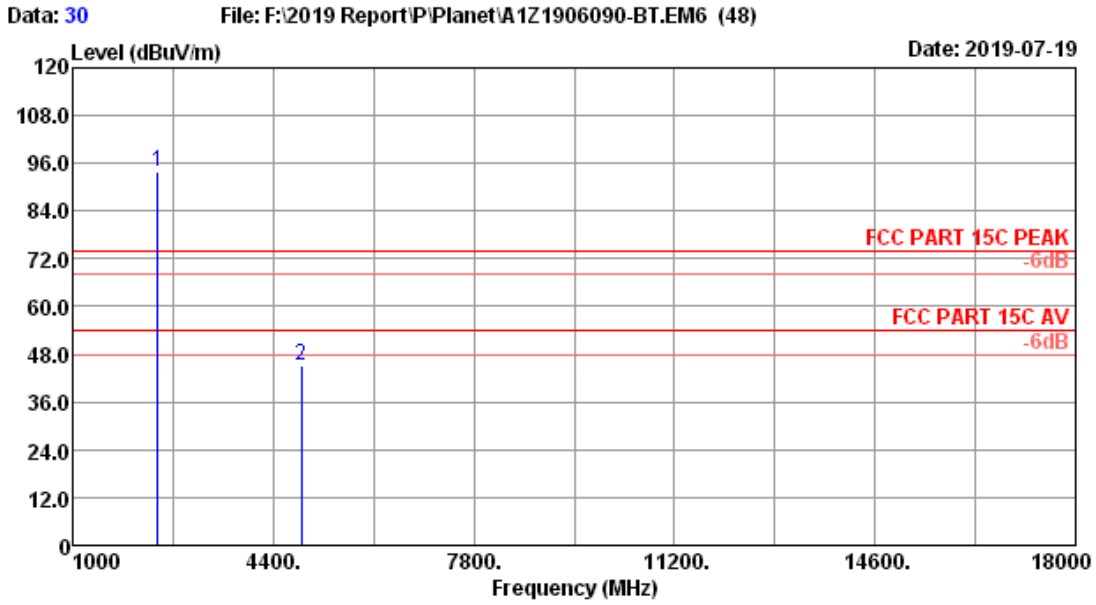
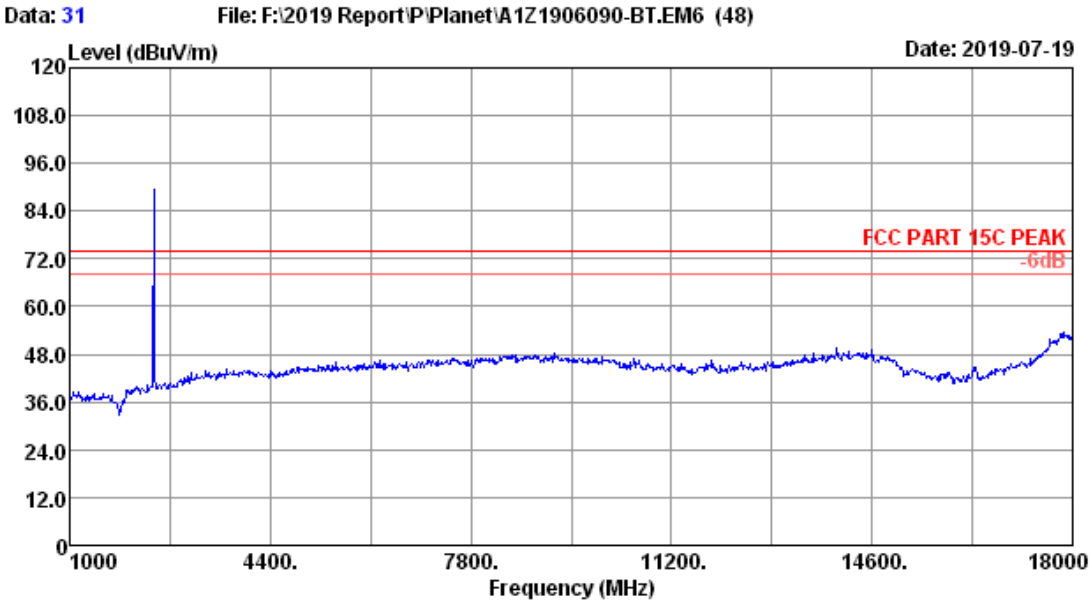



Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2441MHz Tx Mode

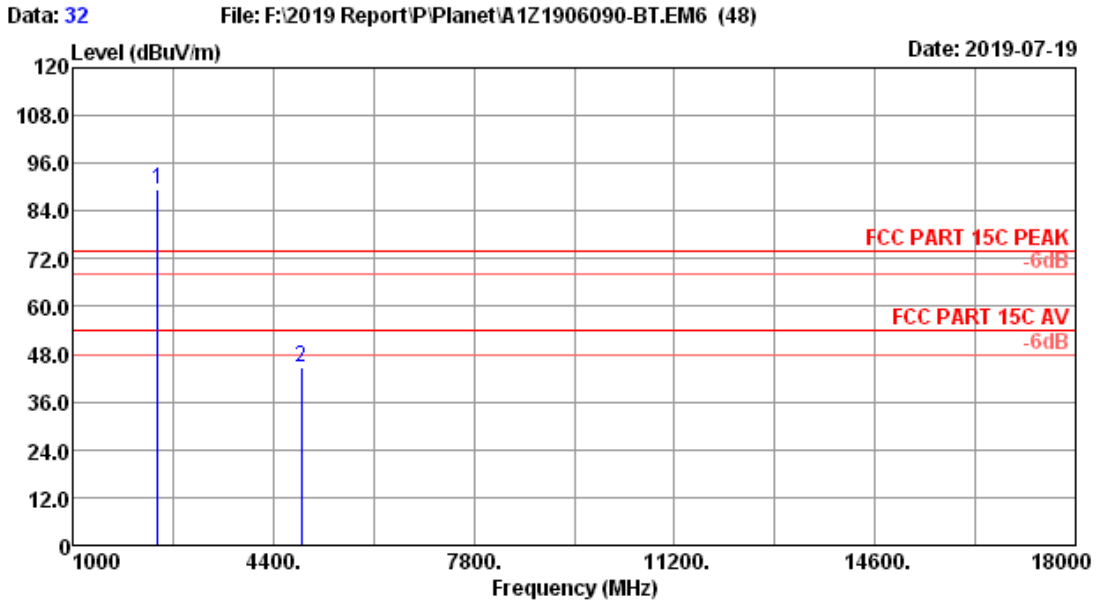
Data no. : 30
Ant. pol. : HORIZONTAL
Pre :
Engineer : Garry

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	100.02	93.75	74.00	-19.75	Peak
2	4882.00	32.25	1.25	34.38	45.87	44.99	74.00	29.01	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.	: 31
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Garry
Power rating	: AC120V/60Hz		
Test Mode	: BT3.0 8-DPSK 2441MHz Tx Mode		

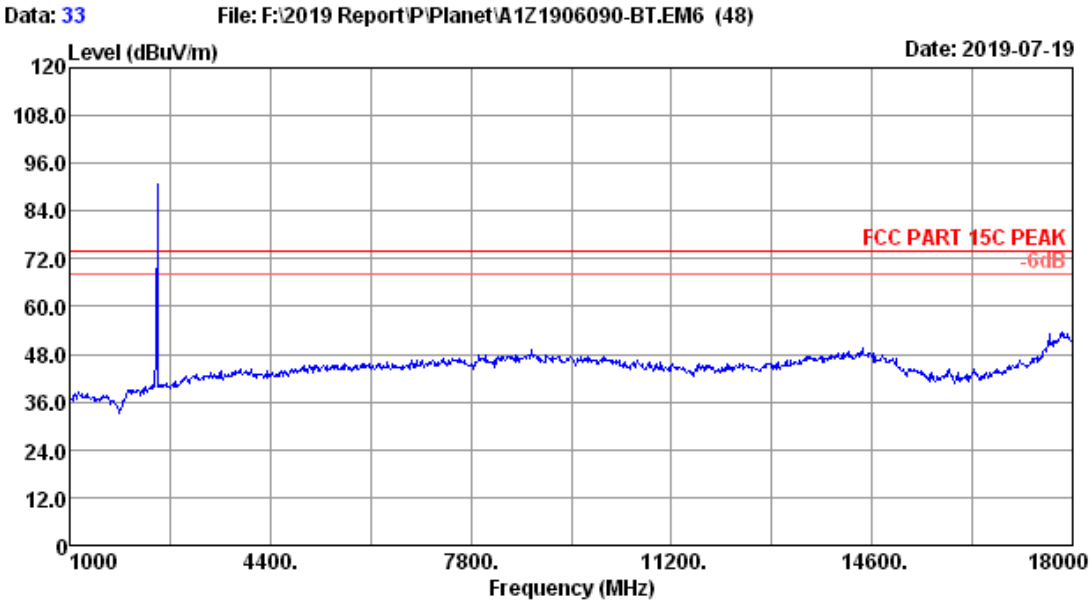


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2441MHz Tx Mode

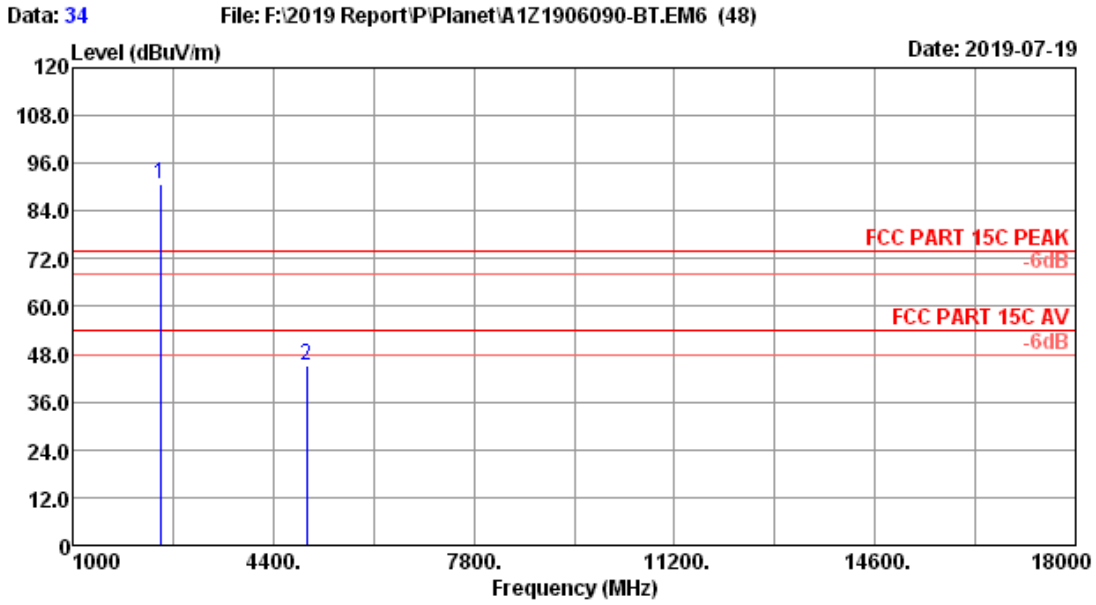
Data no. : 32
Ant. pol. : VERTICAL
Pre :
Engineer : Garry

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	95.65	89.38	74.00	-15.38	Peak
2	4882.00	32.25	1.25	34.38	45.52	44.64	74.00	29.36	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   : Garry
Power rating  : AC120V/60Hz
Test Mode     : BT3.0 8-DPSK 2480MHz Tx Mode
```

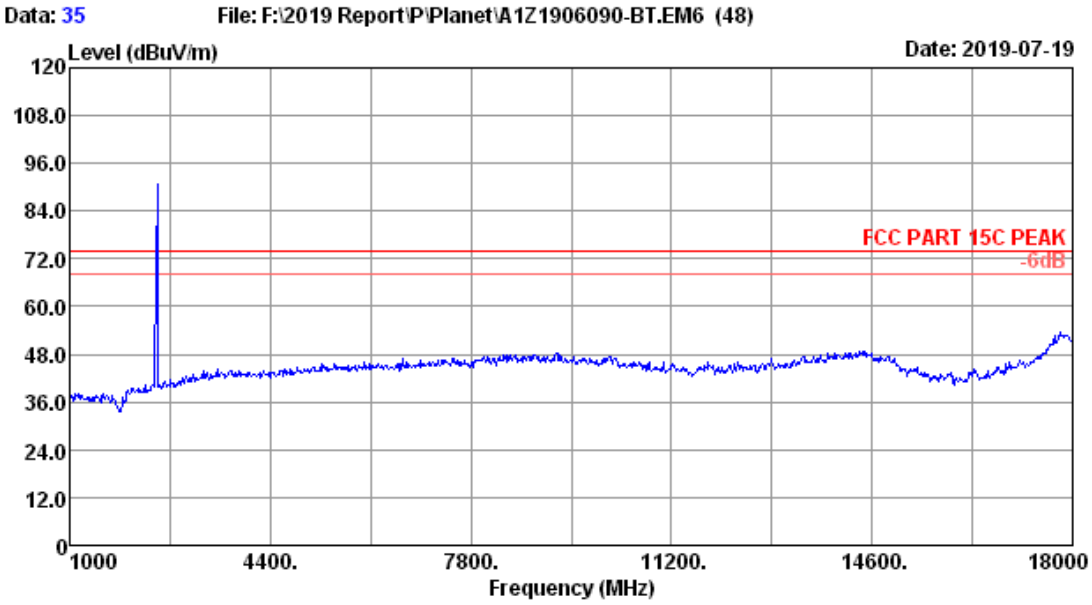


Site no. : 3m Chamber
Dis. / Ant. : 3m 2018 3115-4580
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.4*C/52.9%
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2480MHz Tx Mode

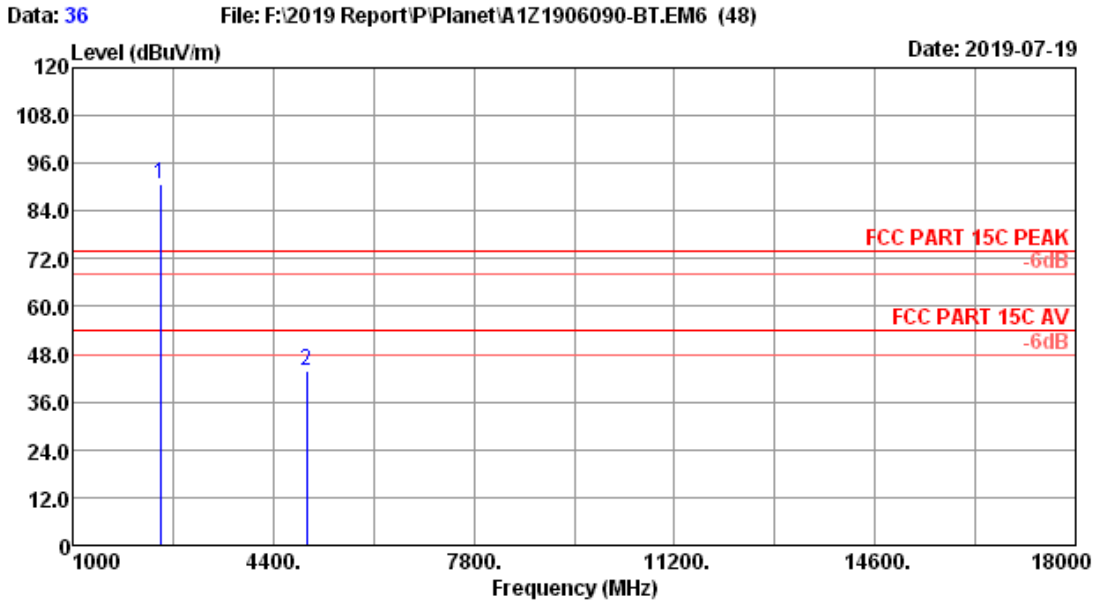
Data no. : 34
Ant. pol. : VERTICAL
Pre :
Engineer : Garry

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	97.01	90.87	74.00	-16.87	Peak
2	4960.00	32.43	1.27	34.39	45.80	45.11	74.00	28.89	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.	: 35
Dis. / Ant.	: 3m 2018 3115-4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15C PEAK	Pre	:
Env. / Ins.	: 23.4*C/52.9%	Engineer	: Garry
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%
Power rating : AC120V/60Hz
Test Mode : BT3.0 8-DPSK 2480MHz Tx Mode

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

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	96.98	90.84	74.00	-16.84	Peak
2	4960.00	32.43	1.27	34.39	44.31	43.62	74.00	30.38	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.

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

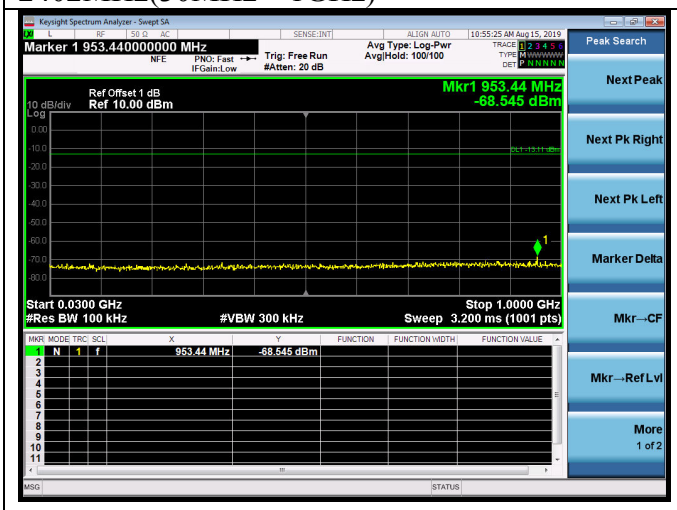
PASS (The testing data was attached in the next pages.)

EUT: COSMO		
M/N: COSMO COMMUNICATOR VE		
Test date: 2019-08-15	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Garry	Test site: RF site	Temperature:22.8±0.6 ℃

Hopping off

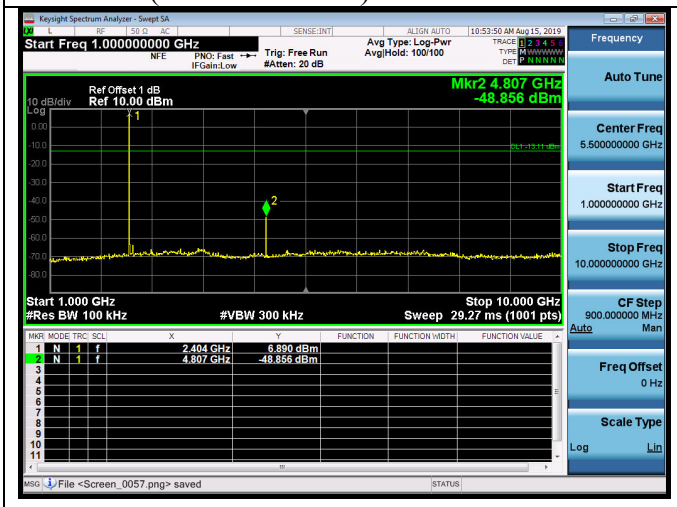
GFSK

2402MHz(30MHz – 1GHz)

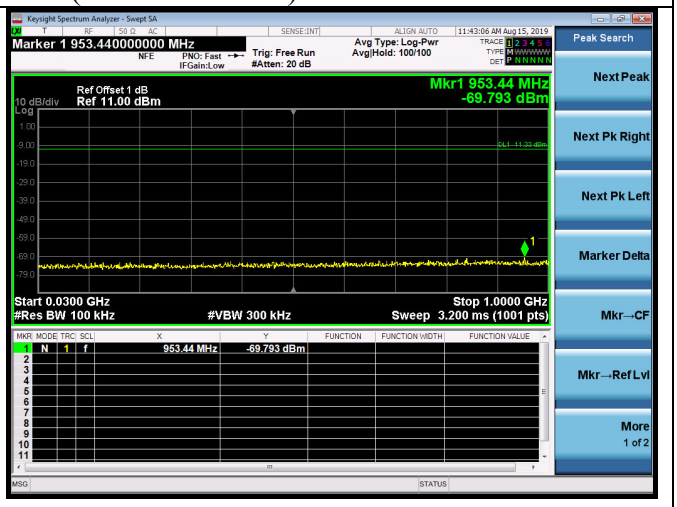


2402MHz(10GHz – 26GHz)

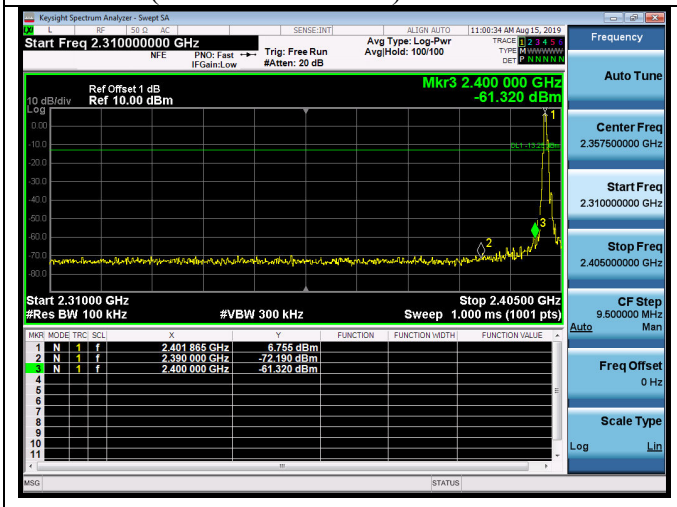
2402MHz(1GHz – 10GHz)



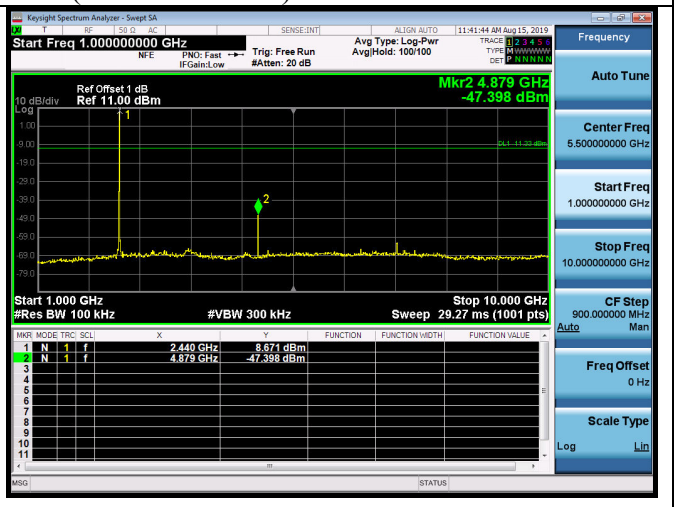
2441(30MHz – 1GHz)



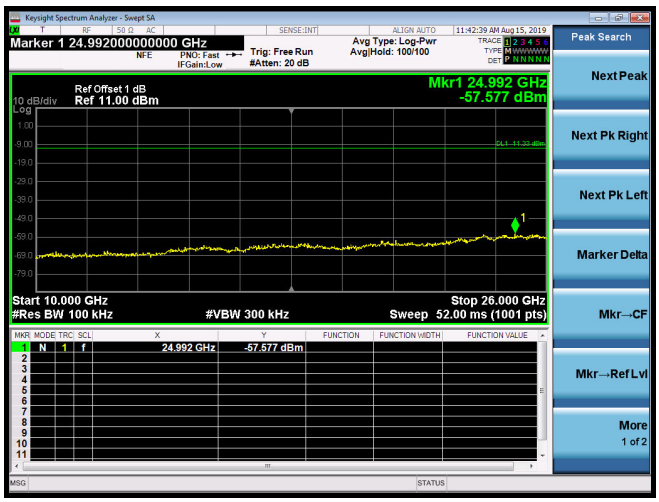
2402MHz(2.3GHz – 2.4GHz)



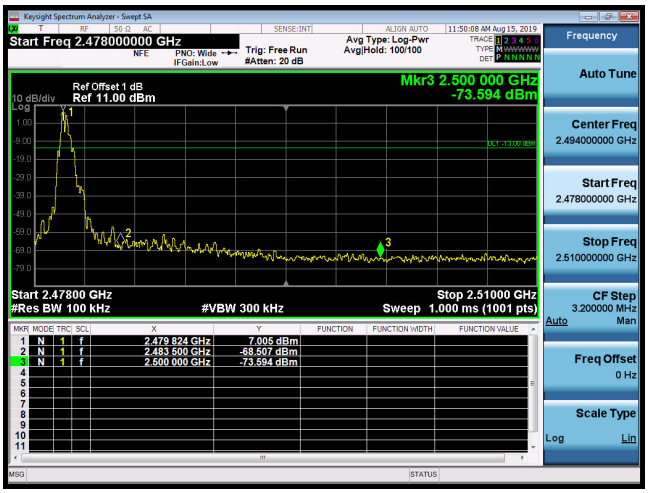
2441(1GHz – 10GHz)



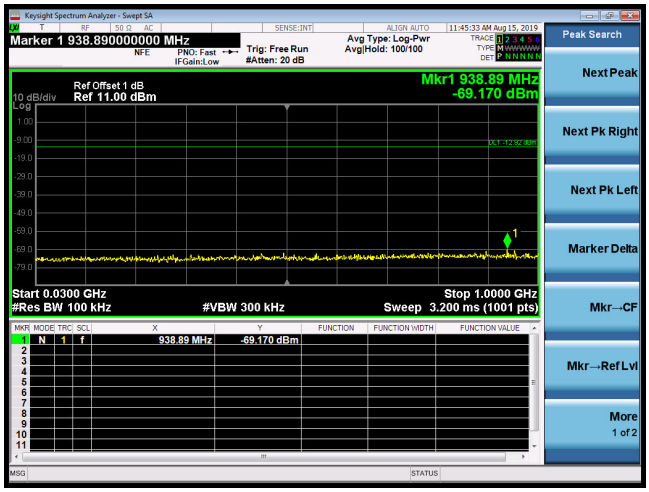
2441(10GHz – 26GHz)



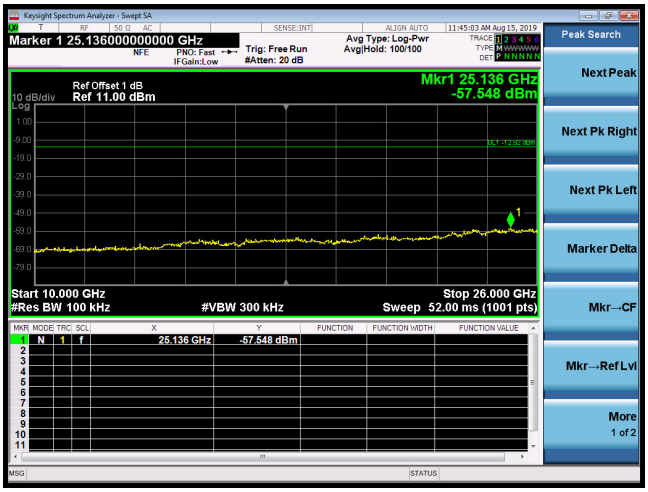
2480MHz(2.4GHz – 2.5GHz)



2480MHz(30MHz – 1GHz)

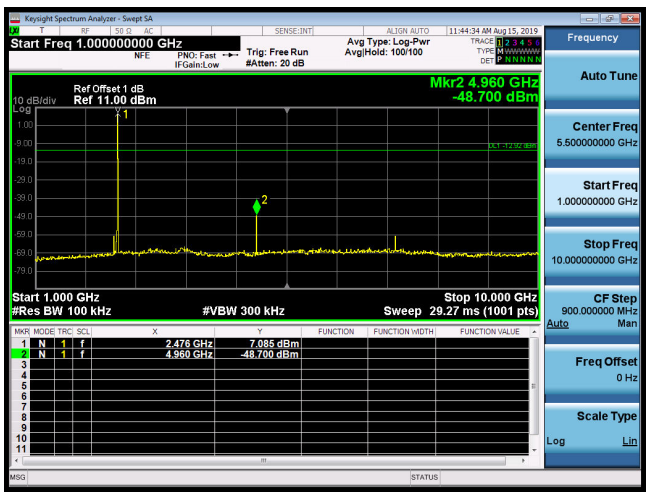


2480MHz(10GHz – 26GHz)

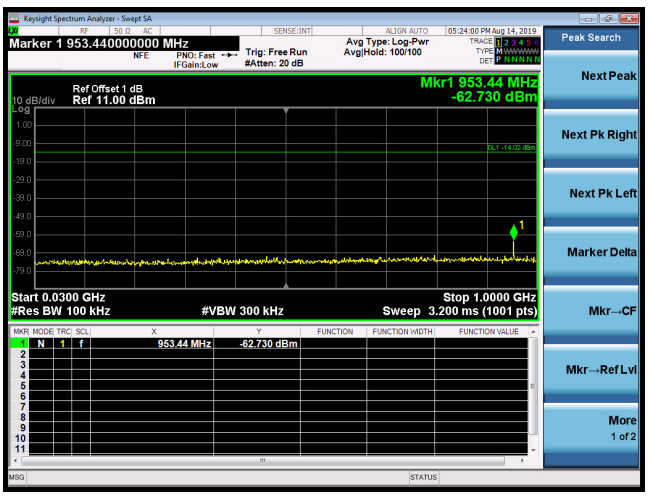


8-DPSK

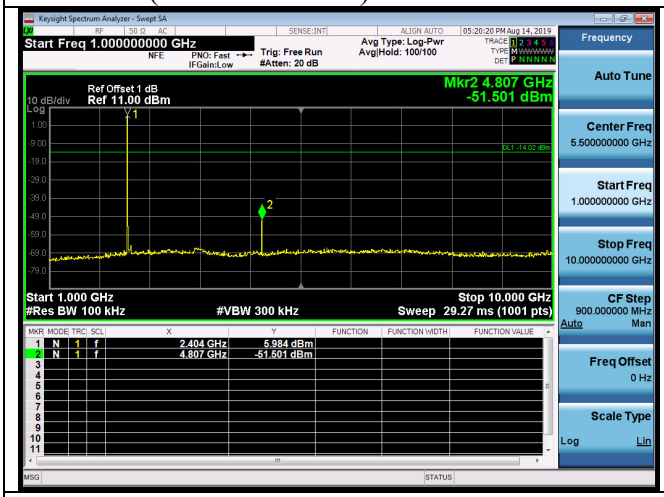
2480MHz(1GHz – 10GHz)



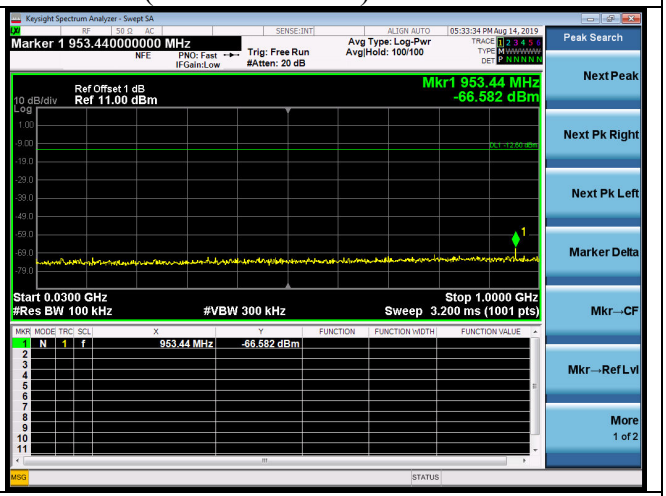
2402MHz(30MHz – 1GHz)



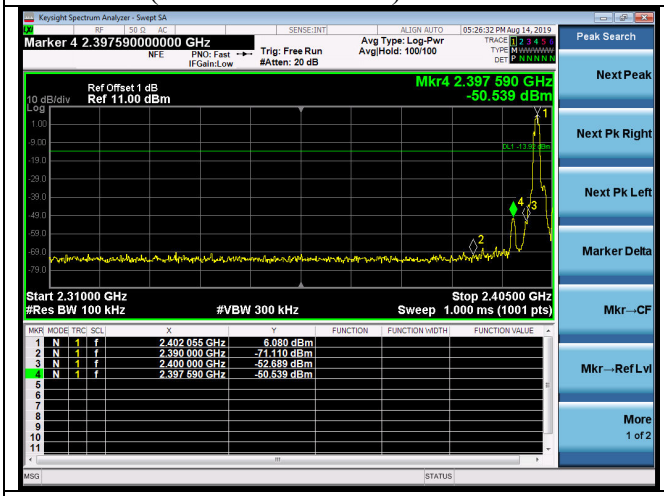
2402MHz(1GHz – 10GHz)



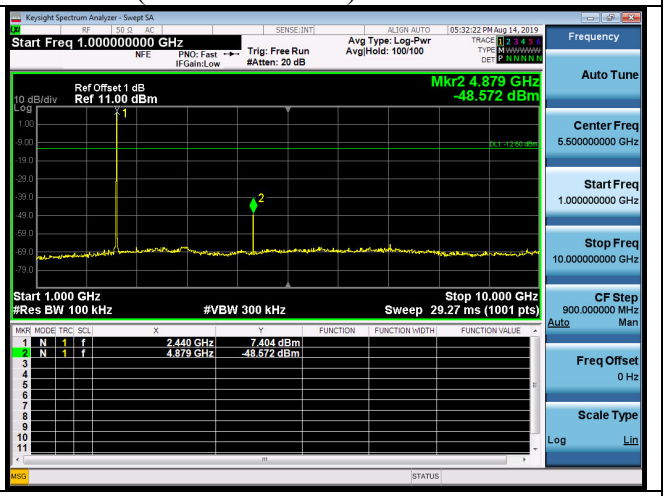
2441MHz (30MHz – 1GHz)



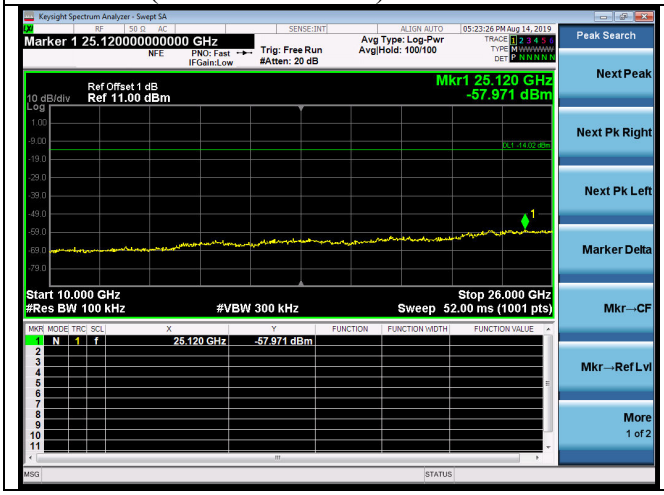
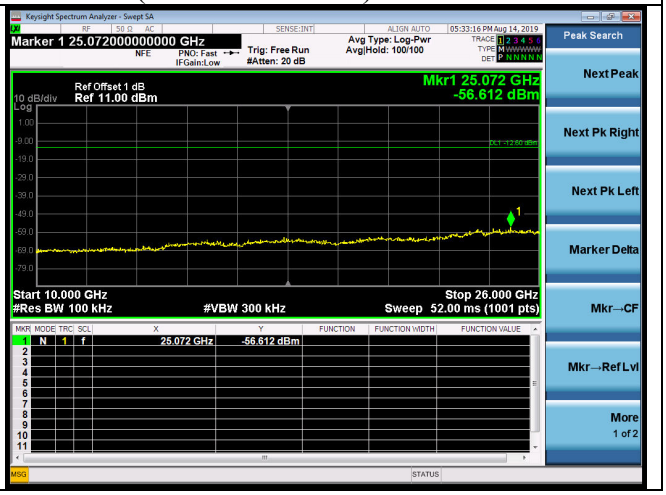
2402MHz(2.3GHz – 2.4GHz)



2441MHz(1GHz – 10GHz)



2402MHz(10GHz – 26GHz)



2441MHz(10GHz – 26GHz)