FCC 47 CFR PART 15 SUBPART C AND ANSI C63.10: 2013

TEST REPORT

For

INSTALLATION MIXER

Model: MZ-123BT

Brand: TASCAM

Issued for

TEAC CORPORATION

1-47 Ochiai, Tama-shi, Tokyo 206-8530,Japan

Issued by

Compliance Certification Services Inc.
Tainan Lab.
No.8, Jiucengling, Xinhua Dist.,
Tainan City, Taiwan

Issued Date: March 01, 2023

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REVISION HISTORY

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	March 01, 2023	Initial Issue	ALL	Gina Lin

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1. TEST REPORT CERTIFICATION

Applicant	:	**TEAC CORPORATION** 1-47 Ochiai, Tama-shi, Tokyo 206-8530,Japan
Manufacturer	:	**1.Ya Horng Electronic Co., Ltd** No. 35, Shalun, Jon Sha Village, Anding Dist., Tainan City 745, Taiwan **2. Ya Horng（Dongguan）Electronic Co.,Ltd.** Room 201, Building #9, No.84 Gaoyu South Road, Tangxia Town,Dong Guan, Guangdong, China
Equipment Under Test	:	INSTALLATION MIXER
Model Number	:	MZ-123BT
Brand Name	:	TASCAM
Date of Test	:	December 27, 2022 ~ January 06, 2023

APPLICABLE STANDARD	
STANDARD	**TEST RESULT**
FCC Part 15 Subpart C AND ANSI C63.10: 2013	No non-compliance noted

Statements of Conformity
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

Approved by:

John Chen
Supervisor

2. TEST RESULT SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.247(a)	9.1	6dB BANDWIDTH	Pass
15.247(b)	9.2	MAXIMUM PEAK OUTPUT POWER	Pass
-	9.3	DUTY CYCLE	-
15.247(e)	9.4	POWER SPECTRAL DENSITY	Pass
15.247(d)	9.5	CONDUCTED SPURIOUS EMISSION	Pass
15.209(a)	9.6	RADIATED EMISSIONS	Pass
15.207(a)	9.7	POWERLINE CONDUCTED EMISSIONS	Pass
15.203	10	ANTENNA REQUIREMENT	Pass

3. EUT DESCRIPTION

3.1 DESCRIPTION OF EUT & POWER

Product Name	INSTALLATION MIXER
Model Number	MZ-123BT
Brand Name	TASCAM
Received Date	December 22, 2022
Reported Date	January 30, 2023
Operating Frequency Range	GFSK(5.1) Mode：2402MHz~2480MHz
Transmit Power	GFSK(4.0) Mode：3.21dBm (2.093mW) GFSK(5.1) Mode：3.24dBm (2.107mW)
Channel Spacing	GFSK(5.1) Mode：2 MHz
Channel Number	GFSK(5.1) Mode：40 Channels
Transmit Data Rate	GFSK(4.0) Mode：1 Mbps GFSK(5.1) Mode：2 Mbps
Type of Modulation	GFSK
Antenna Type	Manufacturer: BRITO TECHNOLOGY Type: Dipole Antenna Model: WF1DI-2AB(C) Gain: 2.0 dBi
Power Source	AC 100-240V, 50/60Hz
Firmware Version	PC18M001
Software Version	N/A

REMARK:
1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **XEG-MZ123BT-Q** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
3. For more details, please refer to the user manual.

4. DESCRIPTION OF TEST MODES

The EUT is a INSTALLATION MIXER.

The RF Chip is manufactured by BRITO TECHNOLOGY

The antenna peak gain 2.0 dBi (highest gain) were chosen for full testing.

GFSK(5.1) mode

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2402
Middle	2442
High	2480

GFSK(5.1) mode: 1Mbps long data rates (worst case) were chosen for full testing.

5. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 and FCC CFR 47 15.207, 15.209 and 15.247 and KdB 558074.

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.8, Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

☒ No. 168, Ln. 523, Sec. 3, Zhongzheng Rd., Rende Dist., Tainan City 717, Taiwan (R.O.C.)

The sites are constructed in conformance with the requirements of ANSI C63.7:1992, ANSI C63.10: 2013 and CISPR Publication 22.

6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

6.3 LABORATORY ACCREDITATIONS LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW1109).

6.4 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan	TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada (ISED#: 2324H)
Germany	TUV NORD
Taiwan	BSMI
USA	FCC

6.5 MEASUREMENT EQUIPMENT USED

For §9.7

Chamber 1166 Room (Radiation Test)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Active Loop Antenna	ETS-LINDREN	6502	8905-2356	08/29/2022	08/28/2023
Attenuator	MCL	BW-S15W5	0535	01/28/2022	01/27/2023
Band Reject Filter	MICRO-TRONICS	HPM13525	006	01/28/2022	01/27/2023
Band Reject Filter	MICRO-TRONICS	HP50107-01	001	01/28/2022	01/27/2023
Bilog Antenna With 6dB Attenuator	SUNOL SCIENCES & EMCI	JB1 & N-6-06	A021306 & AT-N0682	10/11/2022	10/10/2023
Cable	EMCI	EM102-KMKM	CB1166-01	06/20/2022	06/19/2023
Double Ridged Guide Horn Antenna	ETS-LINDGREN	3116	00078900	03/18/2022	03/17/2023
EMI Test Receiver	R&S	ESCI 7	100856	06/21/2022	06/20/2023
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	08/11/2022	08/10/2023
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-788(98006)	04/19/2022	04/18/2023
Notch Filter	MICRO-TRONICS	BRM50702-01	018	01/28/2022	01/27/2023
Pre-Amplifier	EMCI	EMC012645	980098	01/28/2022	01/27/2023
Pre-Amplifier	Com-Power	PAM-840A	461378	06/28/2022	06/27/2023
Software	Excel(ccs-o6-2020 v1.1)，e3(v6.101222)				

For §9.1~9.6

Chamber 1166 Room (Conducted Test)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	08/11/2022	08/10/2023
SMA Cable+10dB Attenuator	CCS	SMA+10dB ATT	SMA/10dB	01/28/2022	01/27/2023
Software	Excel(ccs-o6-2020 v1.1)				

For §9.8

Conducted Emission room #1					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
BNC Coaxial Cable	CCS	BNC50	11	01/20/2022	01/19/2023
EMI Test Receiver	R&S	ESCS30	100348	12/09/2022	12/08/2023
LISN	FCC	FCC-LISN-50-32-2	08009	07/15/2022	07/14/2023
LISN	SCHWARZBECK	NNLK8130	8130124	01/14/2022	01/13/2023
Pulse Limiter	R&S	ESH3-Z2	100116	01/20/2022	01/19/2023
Test S/W	e3(v6.101222)				

7. CALIBRATION AND UNCERTAINTY

7.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

7.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

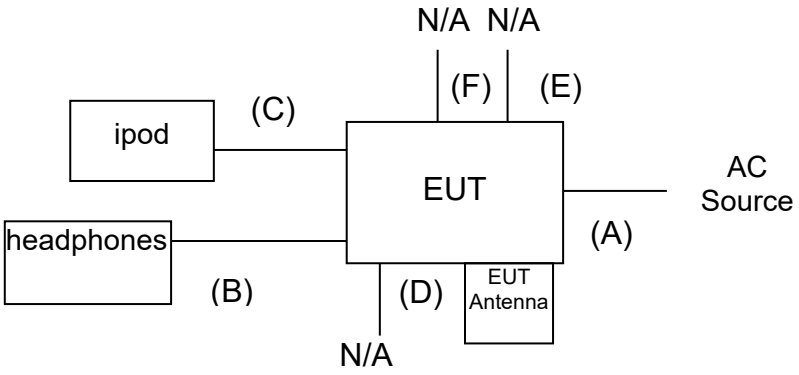
PARAMETER	UNCERTAINTY
Radiated Emission, 9kHz~30MHz Test Site : CB1166	±2.7dB
Radiated Emission, 30 MHz ~1GHz Test Site : CB1166	±3.76dB
Radiated Emission, 1GHz ~18GHz Test Site : CB1166	±4.43dB
Radiated Emission, 18GH~26.5GHz Test Site : CB1166	±4.79dB
Radiated Emission, 26.5GH~40GHz Test Site : CB1166	±4.72dB
Power Line Conducted Emission, 9kHz~30MHz	±1.83dB
Band Width	0.025%
Peak Output Power MU	±1.9dB
Band Edge MU	±0.264dBuV
Channel Separation MU	±361.69Hz
Duty Cycle MU	±0.2%
Frequency Stability MU	±0.493Hz
Temperature	±0.5
Humidity	±3%

This measurement uncertainty is confidence of approximately 95%, k=2

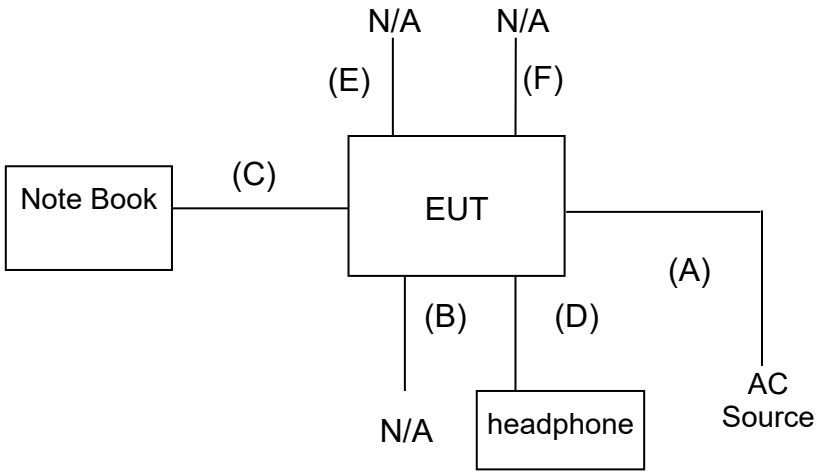
8. SETUP OF EQUIPMENT UNDER TEST

8.1 SETUP CONFIGURATION OF EUT

EMI



RF



8.2 SUPPORT EQUIPMENT

For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	headphone	audio-technica	ATH-250AV	N/A	N/A
2	ipod	apple	A1199	N/A	N/A

No.	Signal cable description	
A	AC Power Cable	Unshielded, 2.0m, 1 pcs.
B	Audio	Shielded, 3.2m, 1 pcs.
C	Audio	Shielded, 0.5m, 1 pcs.
D	Audio	Shielded, 2.5m, 1 pcs.
E	Audio	Shielded, 1.2m, 8 pcs.
F	Audio	Shielded, 1.0m, 2 pcs.

For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Power cable
1	headphone	audio-technica	ATH-250AV	N/A	N/A
2	Note Book	Acer	Z5WE1	N/A	Unshielded, 1.8m 1 pcs with 1 core

No.	Signal cable description	
A	AC Power Cable	Unshielded, 2.0m, 1 pcs.
B	Audio	Shielded, 3.2m, 1 pcs.
C	USB	Unshielded, 1.8m, 1 pcs.
D	Audio	Unshielded, 3.2m, 1 pcs.
E	Audio	Shielded, 1.2m, 8 pcs.
F	Audio	Shielded, 1.0m, 2 pcs.

Note:

1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3) shd. = shielded; unshd. = unshielded

8.3 EUT OPERATING CONDITION

RF Setup

1. Set up all computers like the setup diagram.
2. The “Blue Test 3.3.9” software was used for testing
3.Choose Transport “DEBUG” and Device “USB DBG(100)”

BT1.0、3.0

TX Mode:

TXDATA1

GFSK(DH1):

CFG PKT > Packet Size 27

Power(Atn,Mag,Exp) > 2,5,0

GFSK(DH3):

CFG PKT > Packet Size 183

Power(Atn,Mag,Exp) > 2,5,0

GFSK(DH5):

CFG PKT > Packet Size 339

Power(Atn,Mag,Exp) > 2,5,0

8-DPSK(3DH1):

CFG PKT > Packet Size 83

Power(Atn,Mag,Exp) > 2,5,0

8-DPSK(3DH3):

CFG PKT > Packet Size 552

Power(Atn,Mag,Exp) > 2,5,0

8-DPSK(3DH5):

CFG PKT > Packet Size 1021

Power(Atn,Mag,Exp) > 2,5,0

RX Mode:

RXDATA1

BT4.0、5.0

TX Mode:

BLE TEST TX
Channel > 0 (0-39)
Length > 37
Bit pattern > Pseudo-rdm 9
PHY > 1M (2M)

RX Mode:

BLE TEST RX
Channel > 0 (0-39)
PHY > 1M (2M)

4. All of the function are under run.
5. Start test.

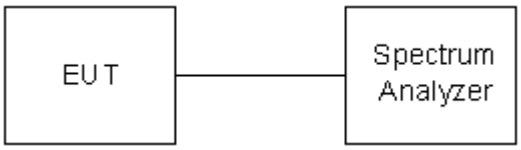
9. APPLICABLE LIMITS AND TEST RESULTS

9.1 6dB BANDWIDTH

LIMIT

§ 15.207(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

TEST SETUP



TEST PROCEDURE

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 x RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST RESULTS

No non-compliance noted.

Model Name	MZ-123BT	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/12/27

GFSK(4.0) mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	725.00	500	PASS
Middle	2442	720.00	500	PASS
High	2480	715.00	500	PASS

NOTE : 1. At finial test to get the worst-case emission at1Mbps long.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

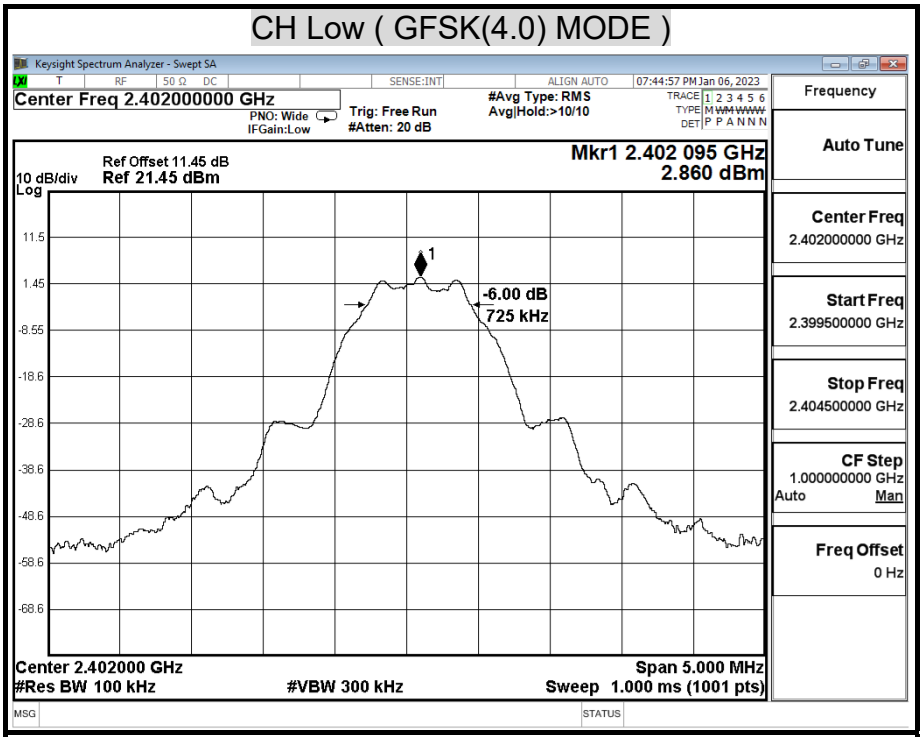
GFSK(5.1) mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	1280.00	500	PASS
Middle	2442	1270.00	500	PASS
High	2480	1275.00	500	PASS

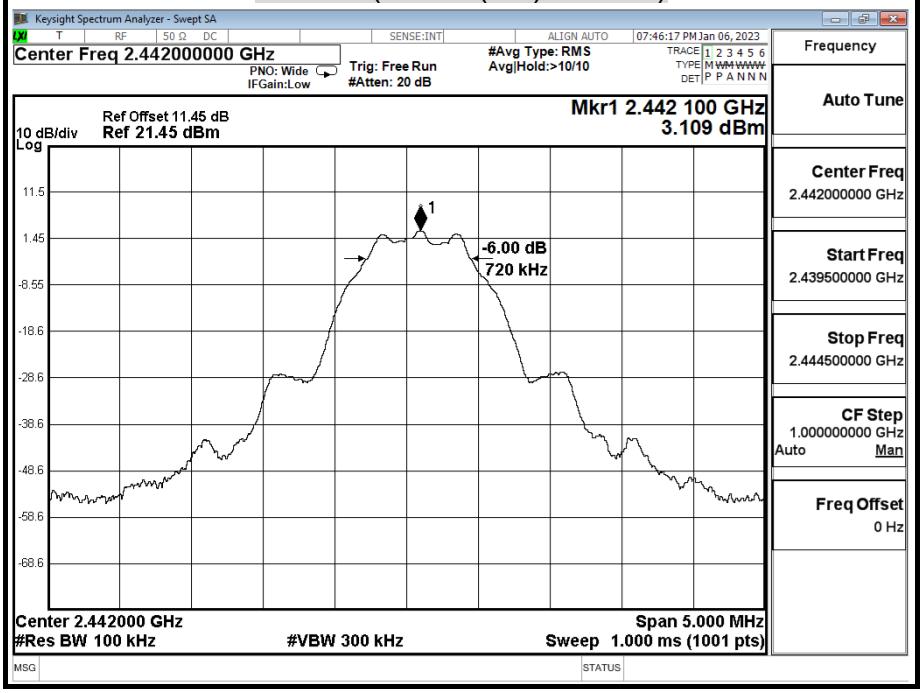
NOTE : 1. At finial test to get the worst-case emission at1Mbps long.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

6dB BANDWIDTH (GFSK(4.0) MODE)

CH Low (GFSK(4.0) MODE)



CH Mid (GFSK(4.0) MODE)



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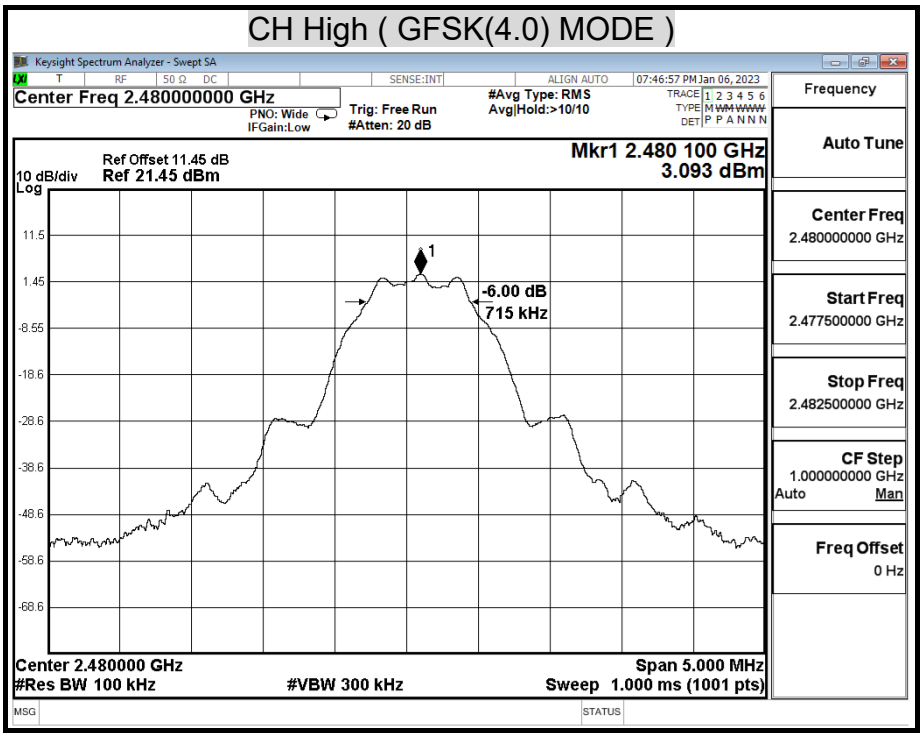
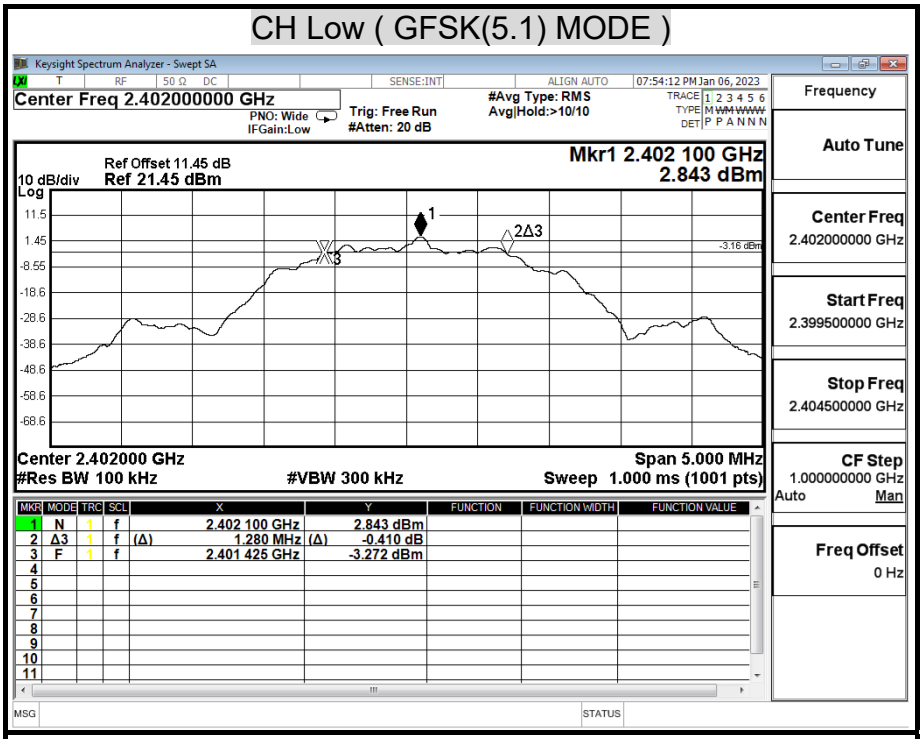
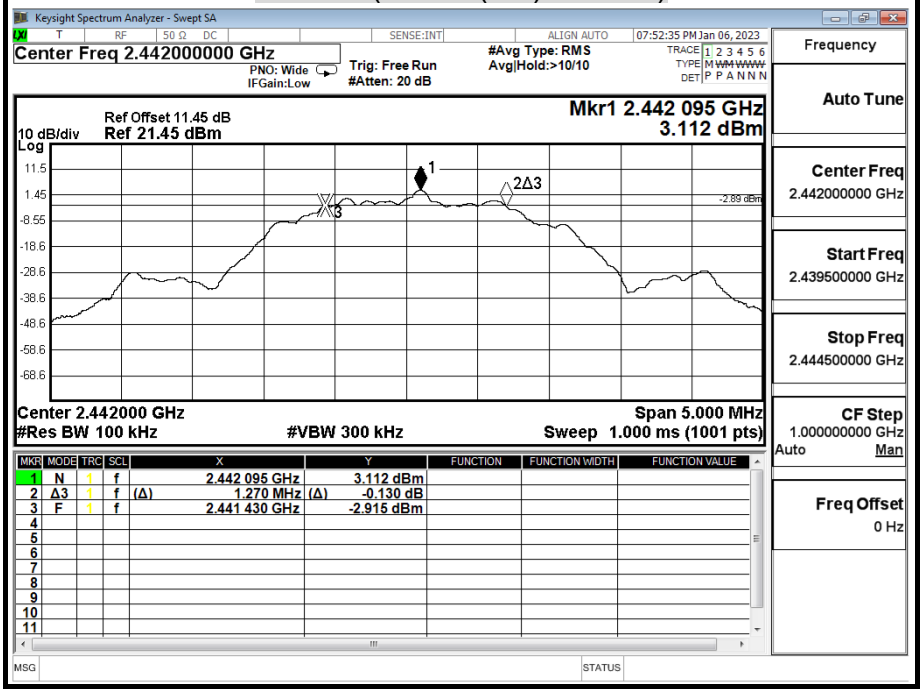


6dB BANDWIDTH (GFSK(5.1) MODE)

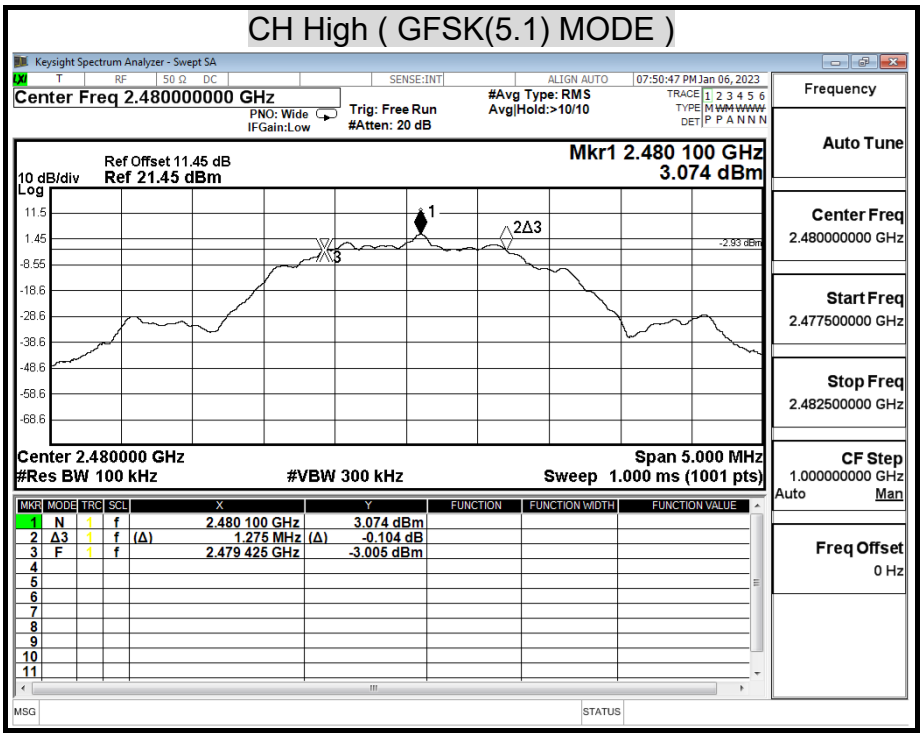
CH Low (GFSK(5.1) MODE)



CH Mid (GFSK(5.1) MODE)



CH High (GFSK(5.1) MODE)



9.2 MAXIMUM PEAK OUTPUT POWER

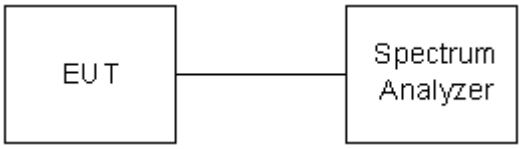
LIMIT

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :

§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

§ 15.247(b) (4) Except as shown in paragraphs (c) of this section , if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST SETUP



TEST PROCEDURE

The tests were performed in accordance with KDB 558074 9.1.1

9.2.1 Measurement Procedure PK2:

Peak Power set:
1. Set the RBW = 1 MHz.
2. Set the VBW ≥ [3 × RBW].
3. Set the span ≥ [1.5 × DTS bandwidth].
4. Detector = peak.
5. Sweep time = auto couple.
6.Trace mode = max hold.
7. Allow trace to fully stabilize.
8.Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

Average Power

Connect the EUT to power meter, set the center frequency of the power meter to the channel center frequency.

Average power set:

1.Measure the duty cycle D of the transmitter output signal
2. Set span to at least 1.5 times the OBW.
3.Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
4. Set VBW ≥ [3 × RBW].
5. Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
6.Manually set sweep time ≥ [10 × (number of points in sweep) × (total ON/OFF period of the transmitted signal)].
7. Set detector = RMS (power averaging).
8. Perform a single sweep.
9.Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW.
10. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

TEST RESULTS

No non-compliance noted.

Model Name	MZ-123BT	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/12/27

GFSK(4.0) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	2.96	30.00	PASS
Middle	2442	3.21	30.00	PASS
High	2480	3.18	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.45dB was entered as an offset in the power meter to allow for direct reading of power.

GFSK(5.1) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	2.99	30.00	PASS
Middle	2442	3.24	30.00	PASS
High	2480	3.23	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 2Mbps long.
2. The cable assembly insertion loss of 11.45dB was entered as an offset in the power meter to allow for direct reading of power.

Average Power Data

Model Name	MZ-123BT	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/12/27

GFSK(4.0) mode

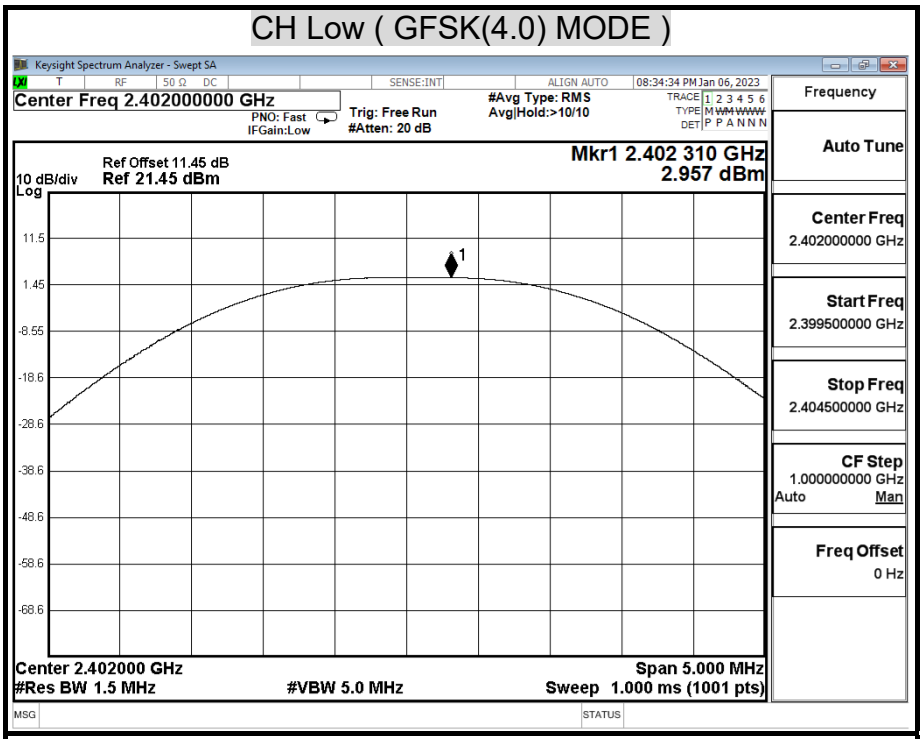
Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	2.55
Middle	2442	2.79
High	2480	2.79

GFSK(5.1) mode

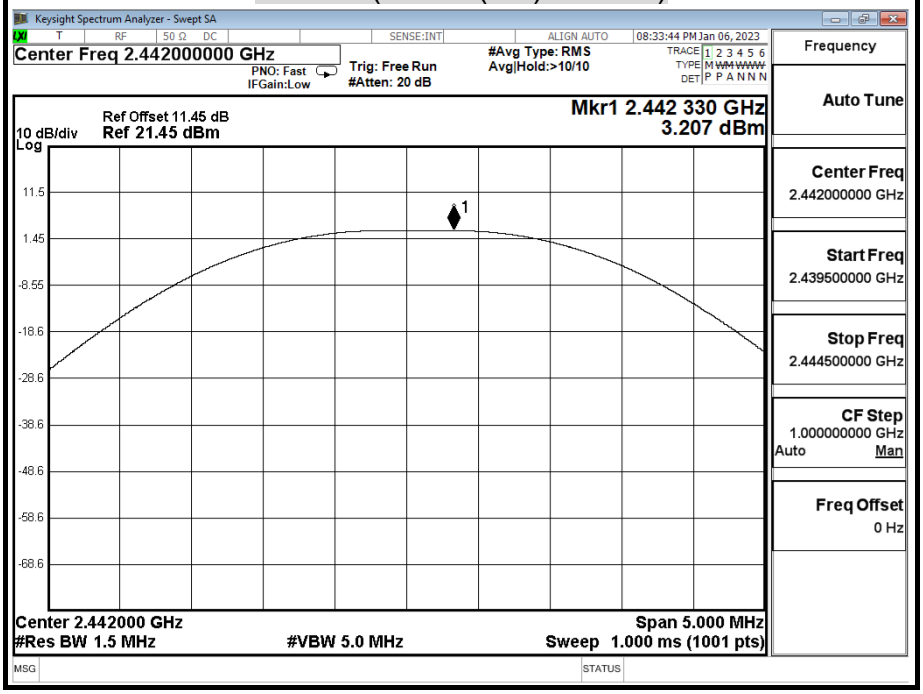
Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	2.40
Middle	2442	2.66
High	2480	2.63

MAXIMUM PEAK OUTPUT POWER (GFSK(4.0) MODE)

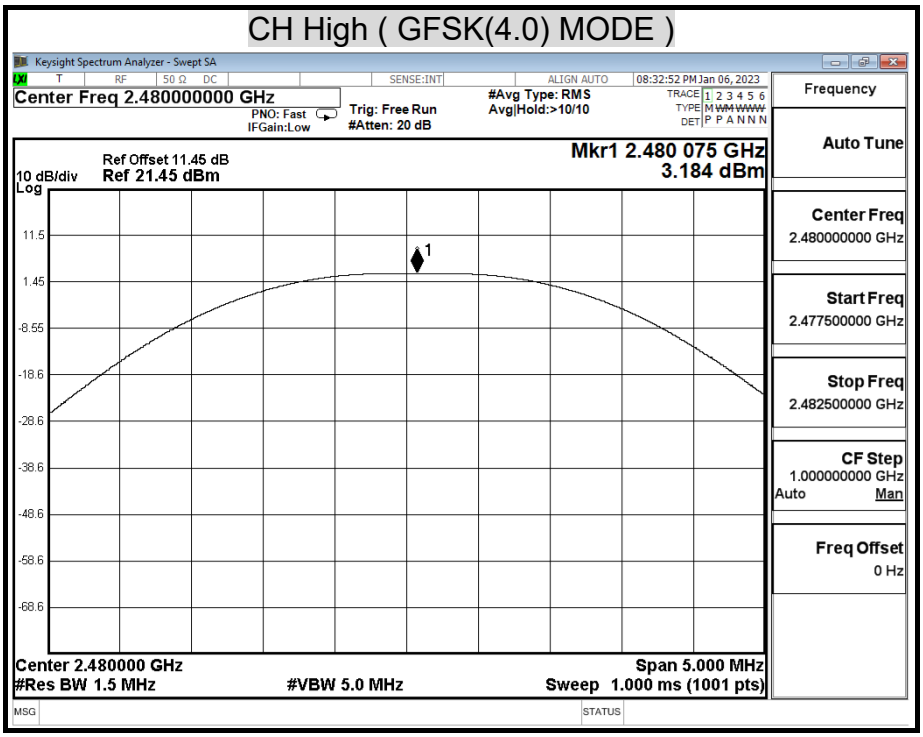
CH Low (GFSK(4.0) MODE)



CH Mid (GFSK(4.0) MODE)

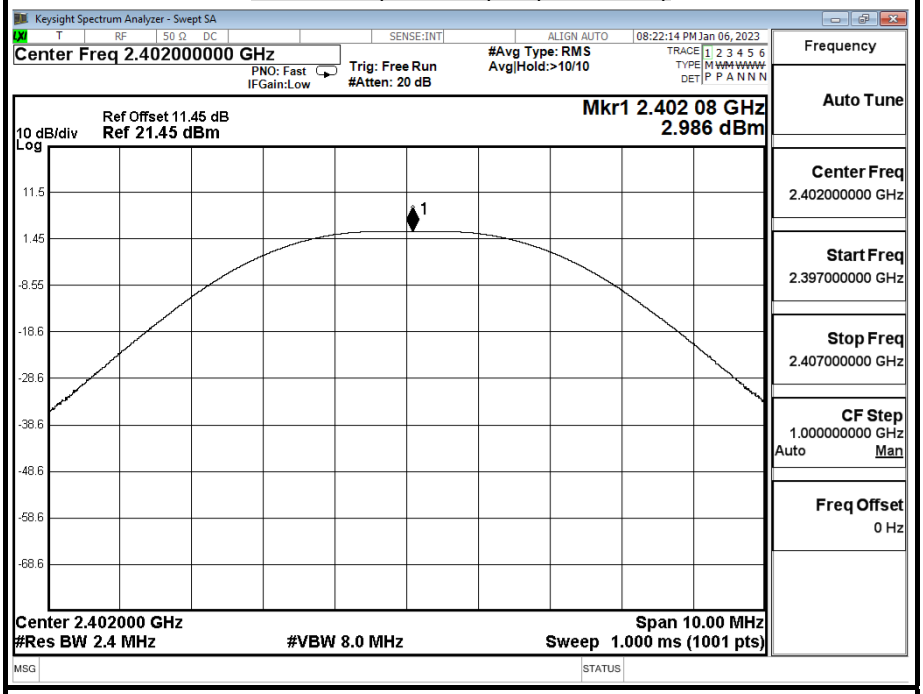


CH High (GFSK(4.0) MODE)

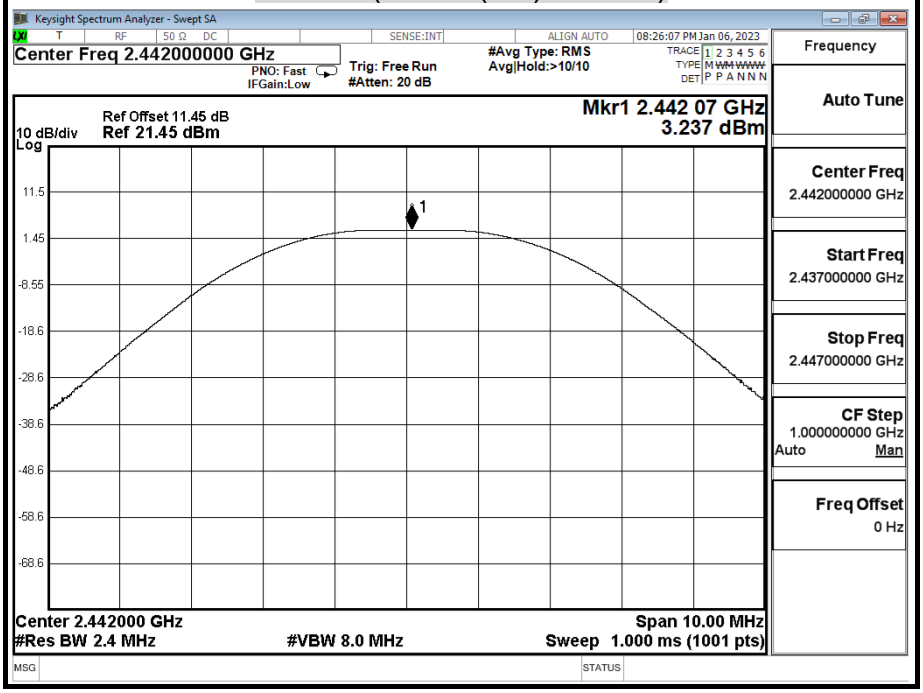


MAXIMUM PEAK OUTPUT POWER (GFSK(5.1) MODE)

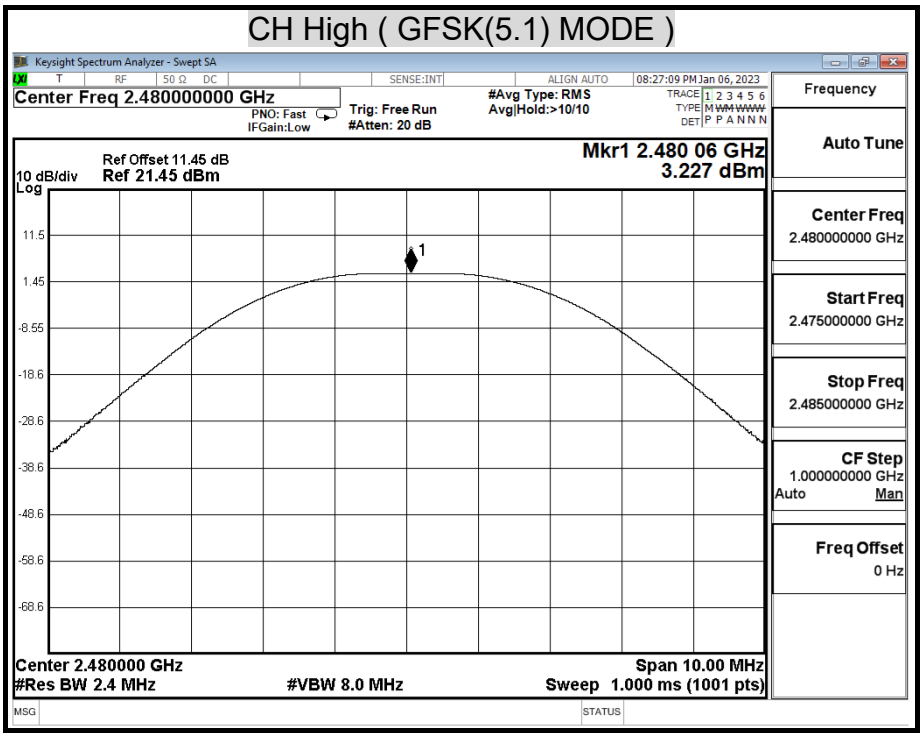
CH Low (GFSK(5.1) MODE)



CH Mid (GFSK(5.1) MODE)

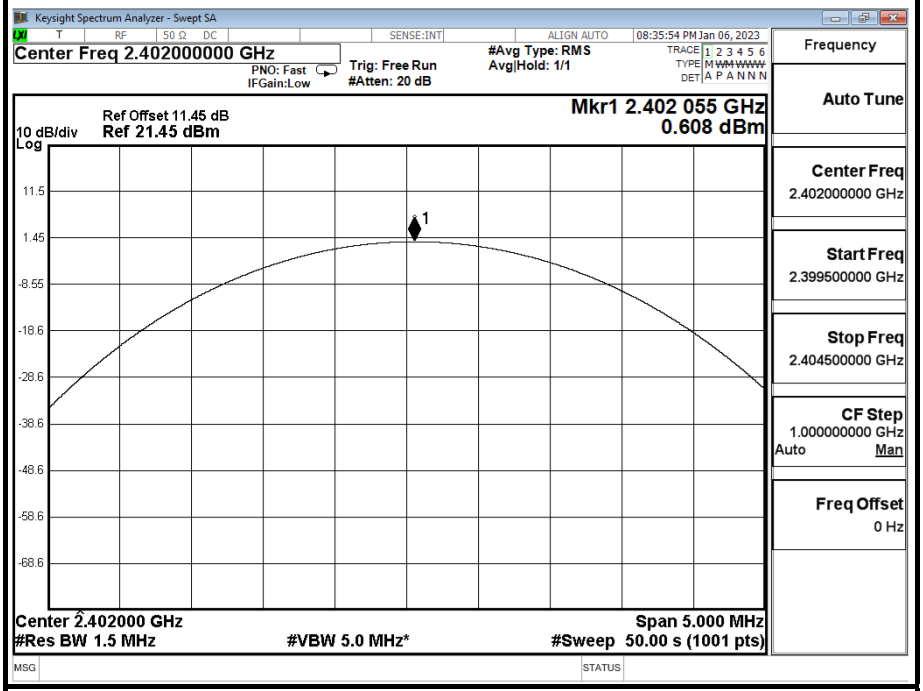


CH High (GFSK(5.1) MODE)

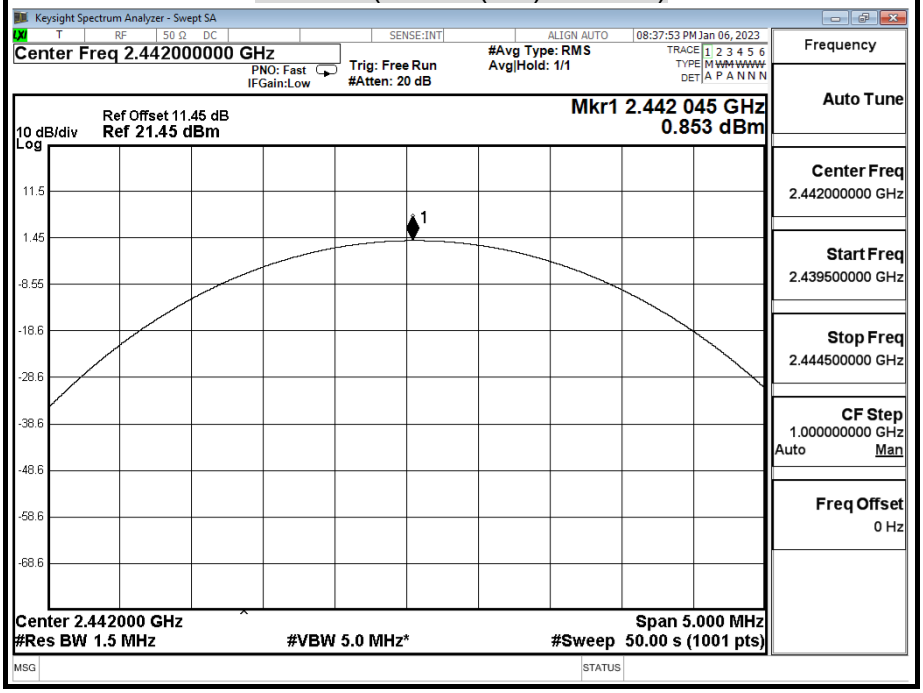


MAXIMUM AVERAGE OUTPUT POWER (GFSK(4.0) MODE)

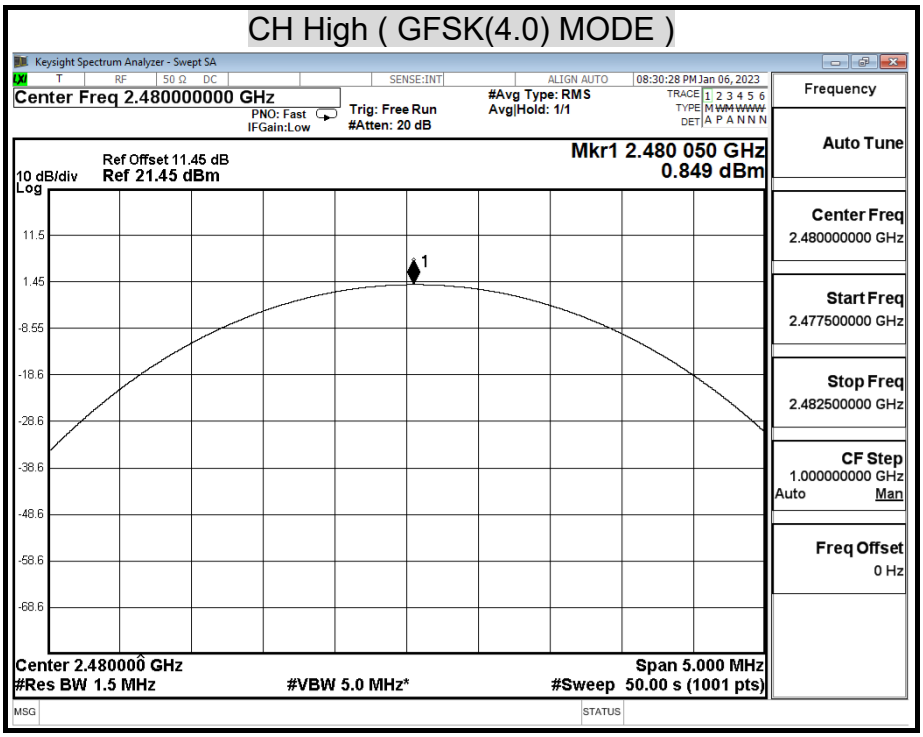
CH Low (GFSK(4.0) MODE)



CH Mid (GFSK(4.0) MODE)

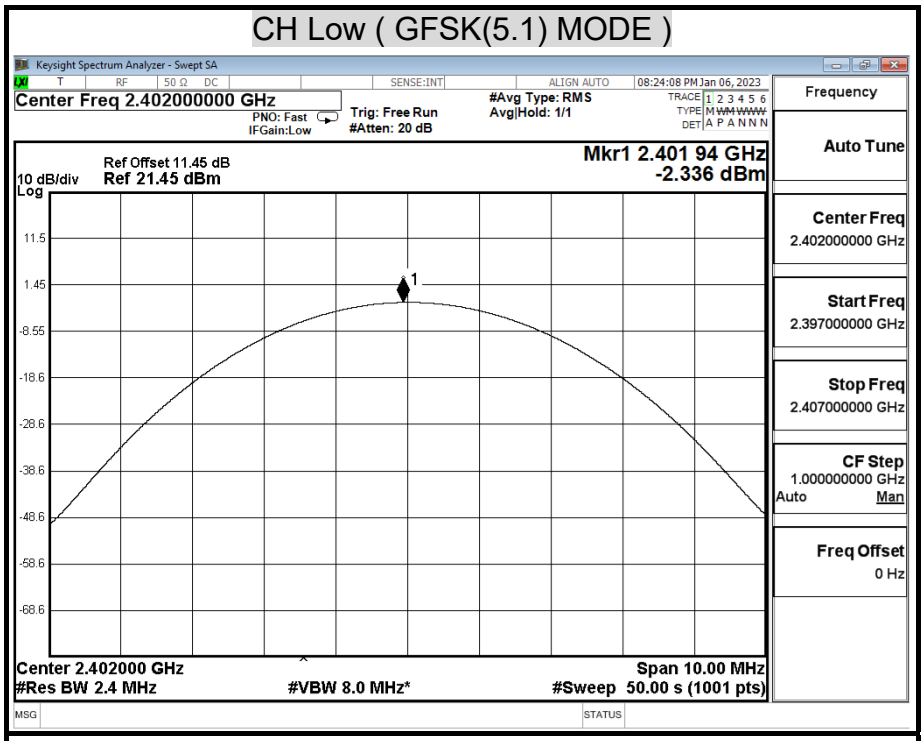


CH High (GFSK(4.0) MODE)

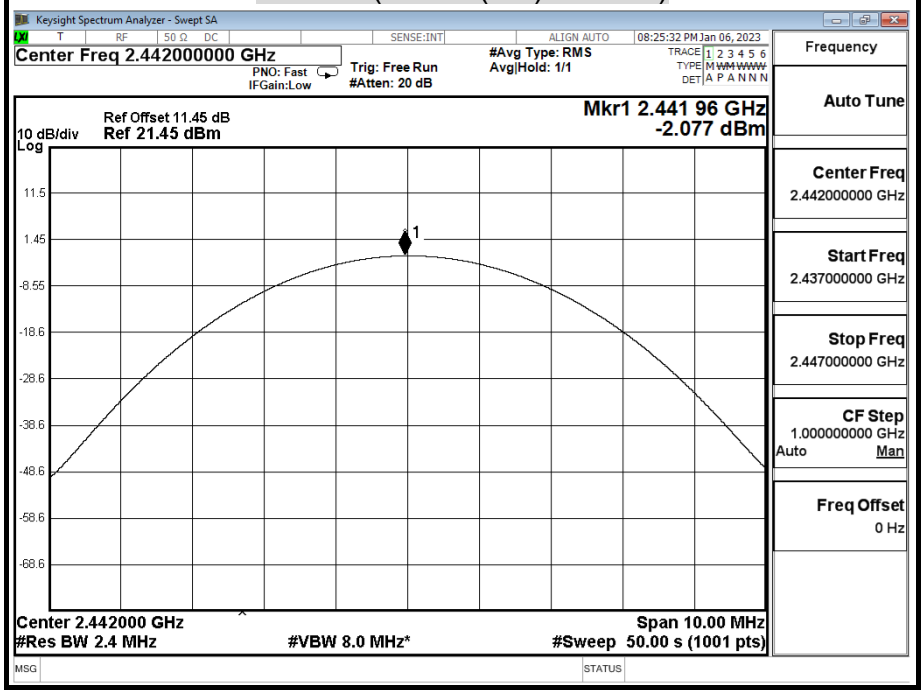


MAXIMUM AVERAGE OUTPUT POWER (GFSK(5.1) MODE)

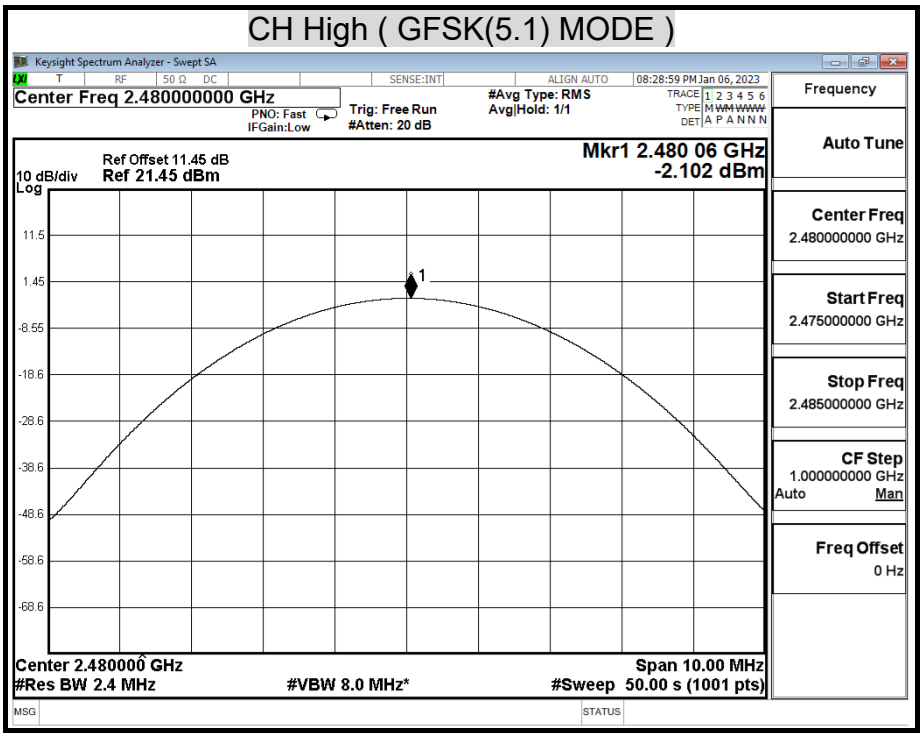
CH Low (GFSK(5.1) MODE)



CH Mid (GFSK(5.1) MODE)



CH High (GFSK(5.1) MODE)

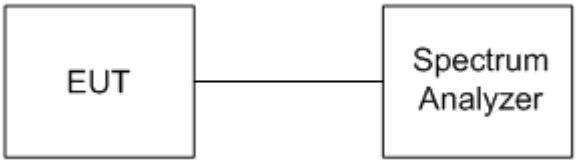


9.3 DUTY CYCLE

LIMIT

Nil (No dedicated limit specified in the Rules)

TEST SETUP



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

TEST RESULTS

No non-compliance noted.

Model Name	MZ-123BT	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/12/27

GFSK(5.1) Mode

	us	Times	Ton Time(us)	Total Ton time(ms)
Ton1	400.000	1	400	
Ton2		0	0	
Ton3			0	0.4
Tp				0.625

Ton	0.4
Tp(Ton+Toff)	0.625
Duty Cycle	0.64
Duty Factor	1.938

GFSK(5.1) Mode

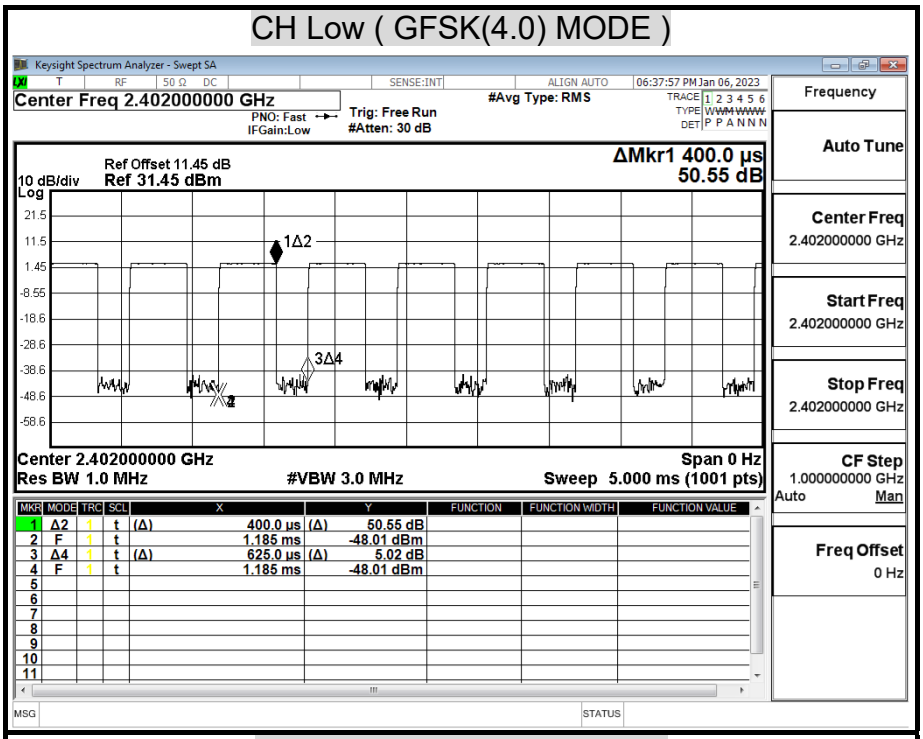
	us	Times	Ton Time(us)	Total Ton time(ms)
Ton1	210.000	1	210	
Ton2		0	0	
Ton3			0	0.21
Tp				0.625

Ton	0.21
Tp(Ton+Toff)	0.625
Duty Cycle	0.34
Duty Factor	4.737

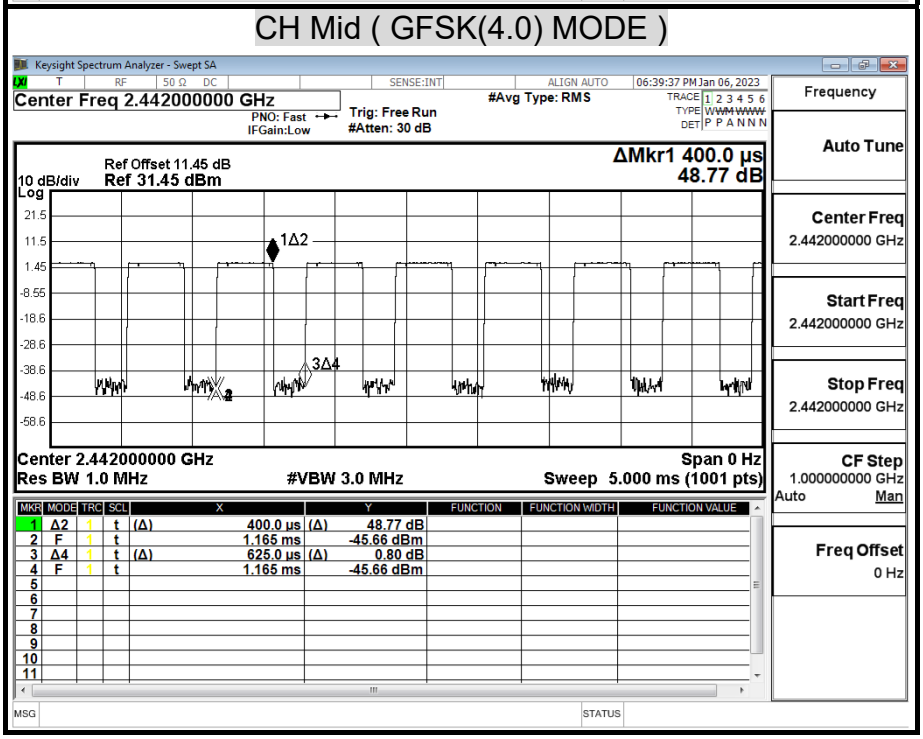
TEST PLOT

Duty Cycle

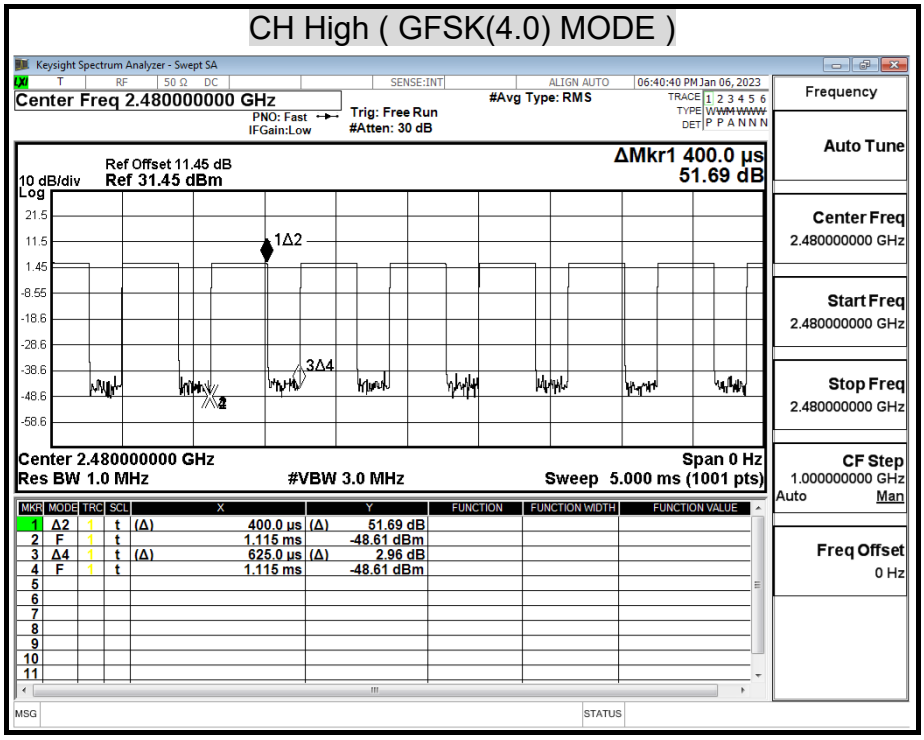
CH Low (GFSK(4.0) MODE)



CH Mid (GFSK(4.0) MODE)

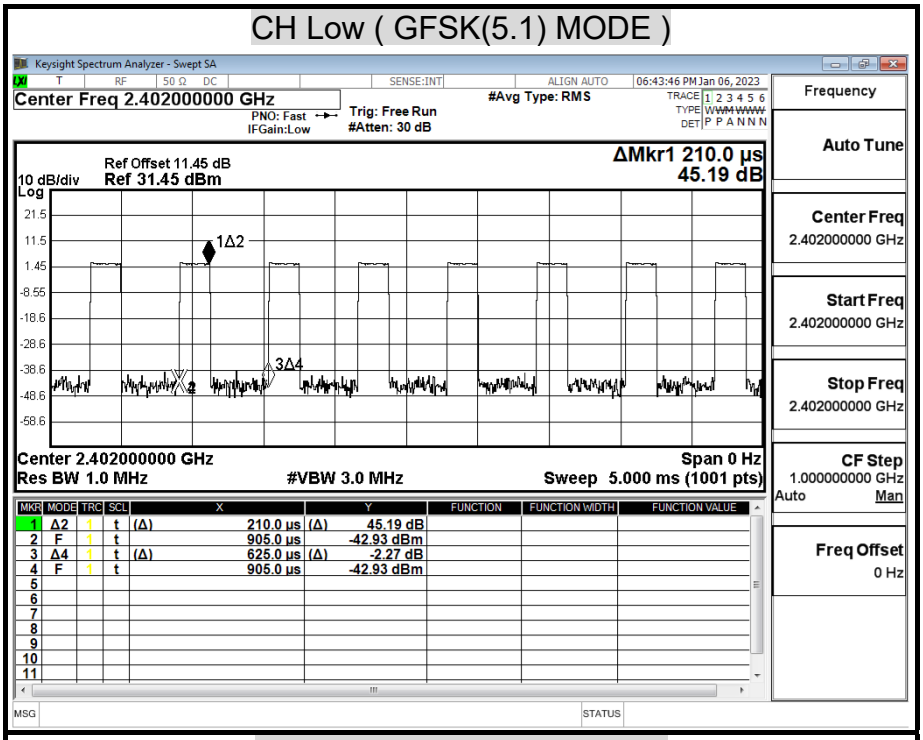


CH High (GFSK(4.0) MODE)

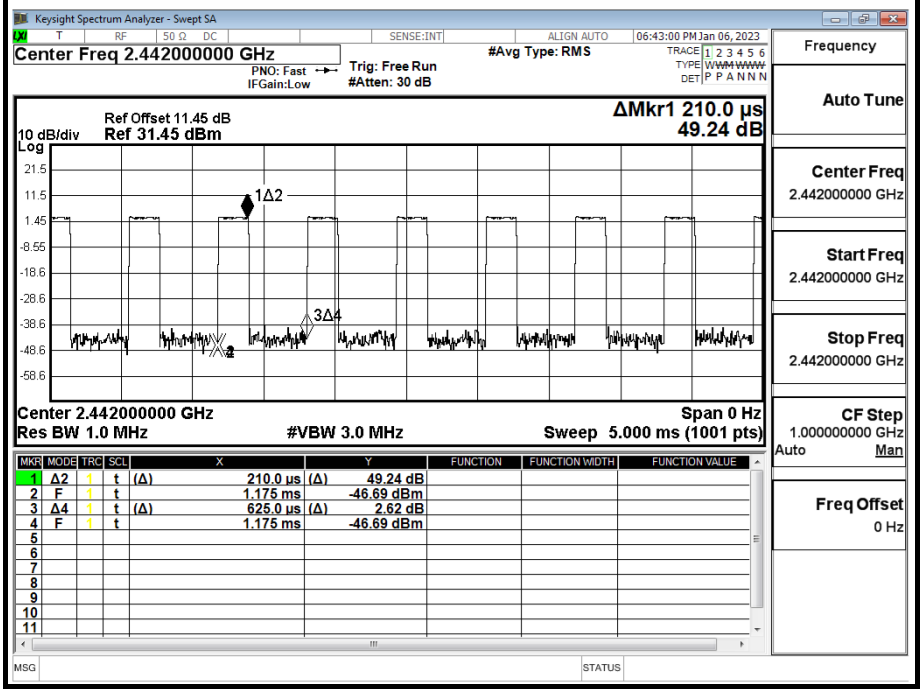


Duty Cycle

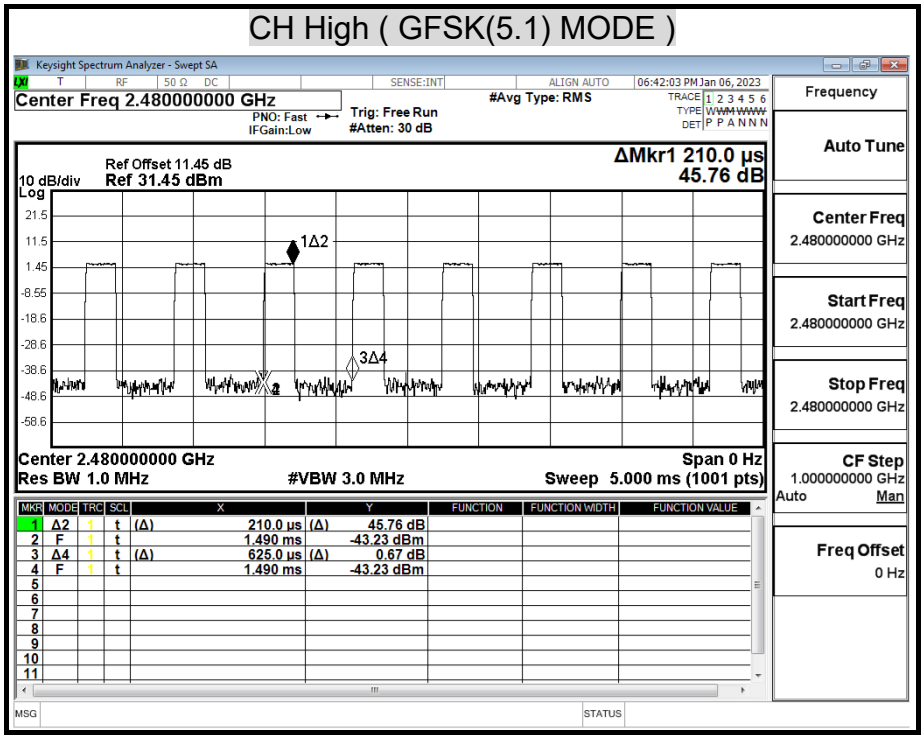
CH Low (GFSK(5.1) MODE)



CH Mid (GFSK(5.1) MODE)



CH High (GFSK(5.1) MODE)

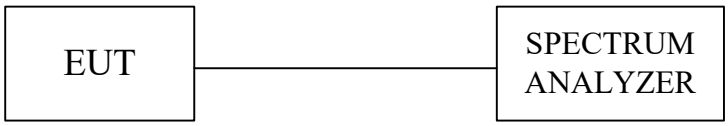


9.4 POWER SPECTRAL DENSITY

LIMIT

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

TEST SETUP



TEST PROCEDURE

The tests were performed in accordance with 558074 D01 15.247 Meas Guidance v05

10.2 Method PKPSD (peak PSD):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST RESULTS

No non-compliance noted.

Model Name	MZ-123BT	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/12/27

GFSK(4.0) mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Result
Low	2402	-12.12	8.00	-20.12	PASS
Middle	2442	-11.89	8.00	-19.89	PASS
High	2480	-11.92	8.00	-19.92	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.45dB was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

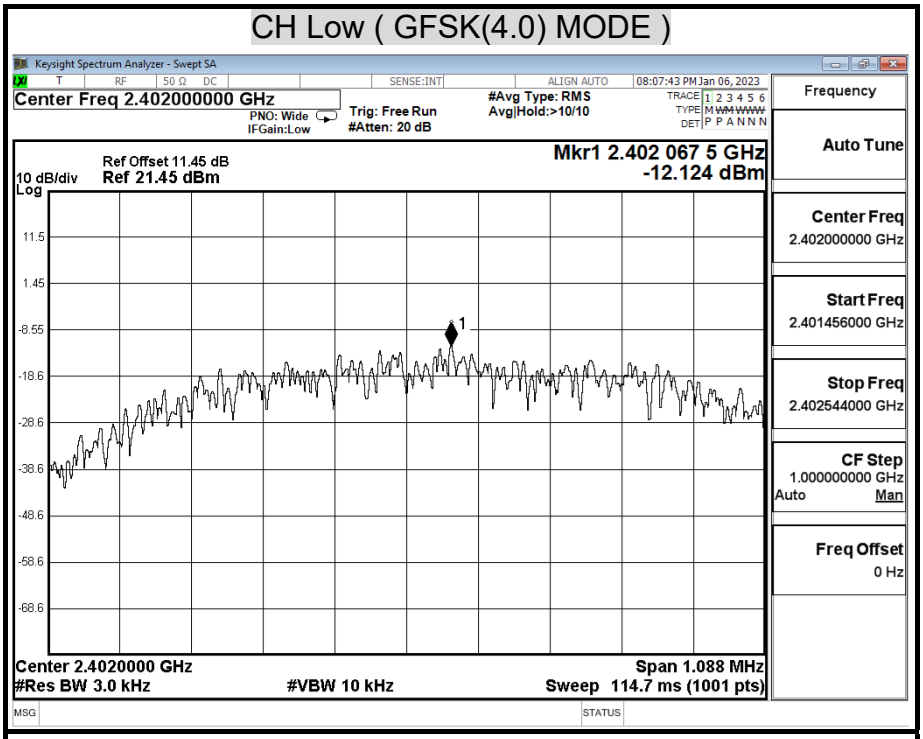
GFSK(5.1) mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Result
Low	2402	-14.83	8.00	-22.83	PASS
Middle	2442	-14.64	8.00	-22.64	PASS
High	2480	-11.85	8.00	-19.85	PASS

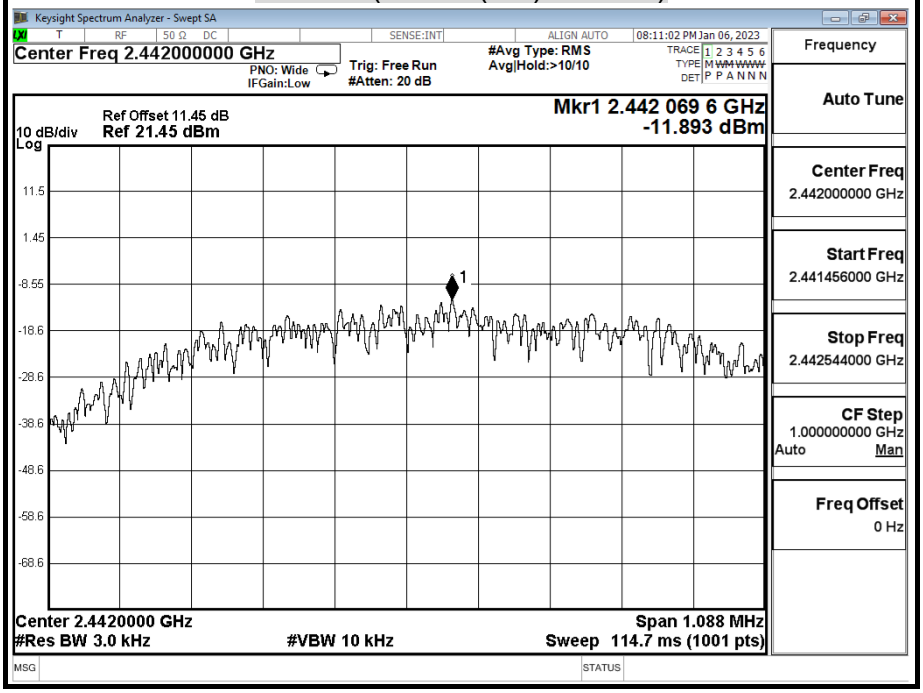
NOTE : 1. At finial test to get the worst-case emission at 2Mbps long.
2. The cable assembly insertion loss of 11.45dB was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

POWER SPECTRAL DENSITY (GFSK(4.0) MODE)

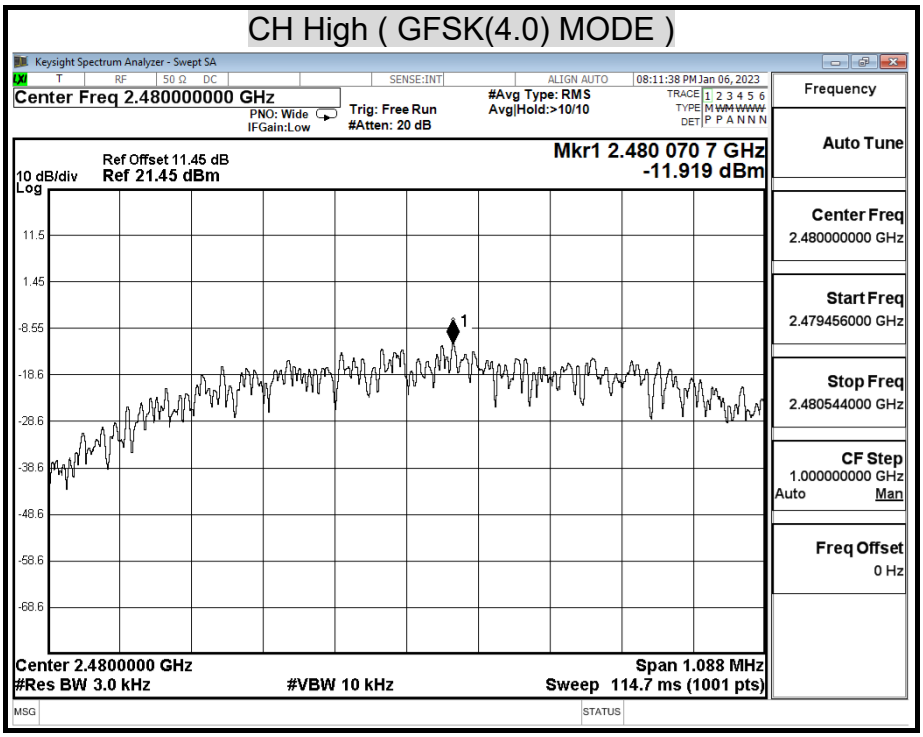
CH Low (GFSK(4.0) MODE)



CH Mid (GFSK(4.0) MODE)

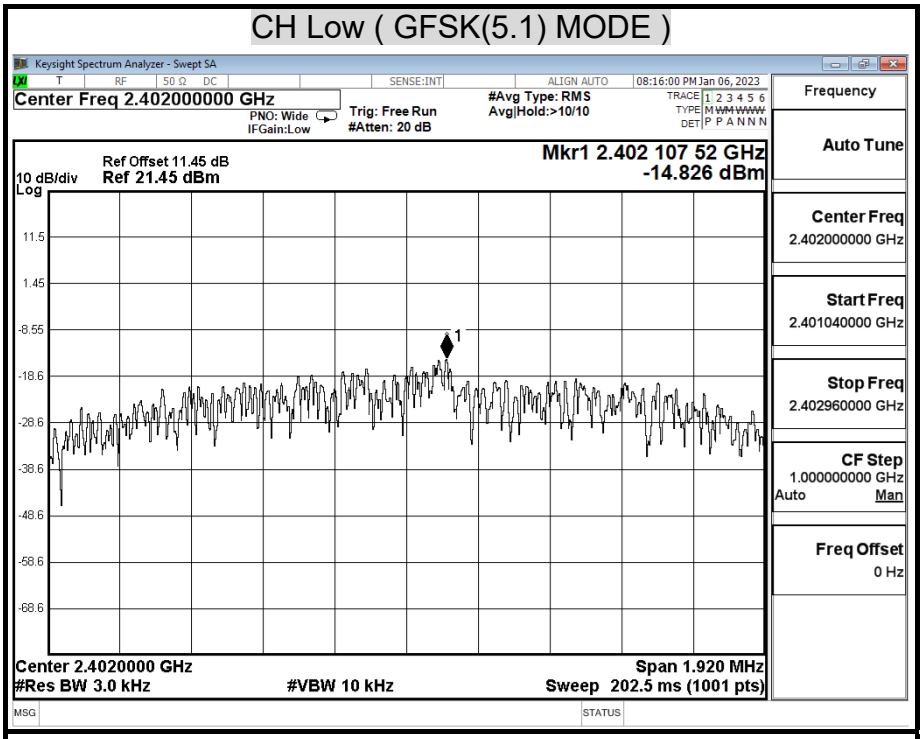


CH High (GFSK(4.0) MODE)

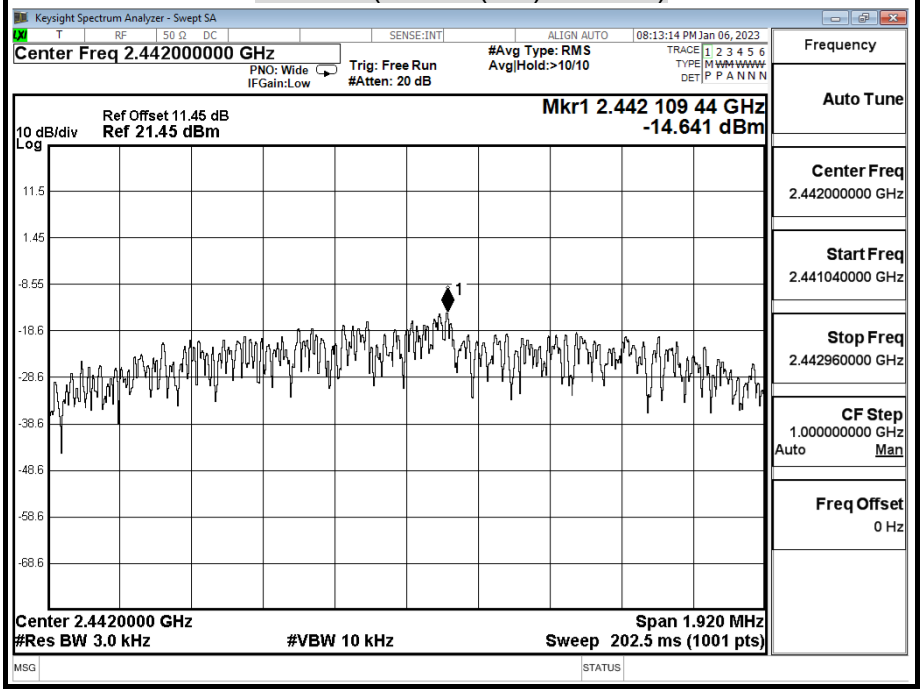


POWER SPECTRAL DENSITY (GFSK(5.1) MODE)

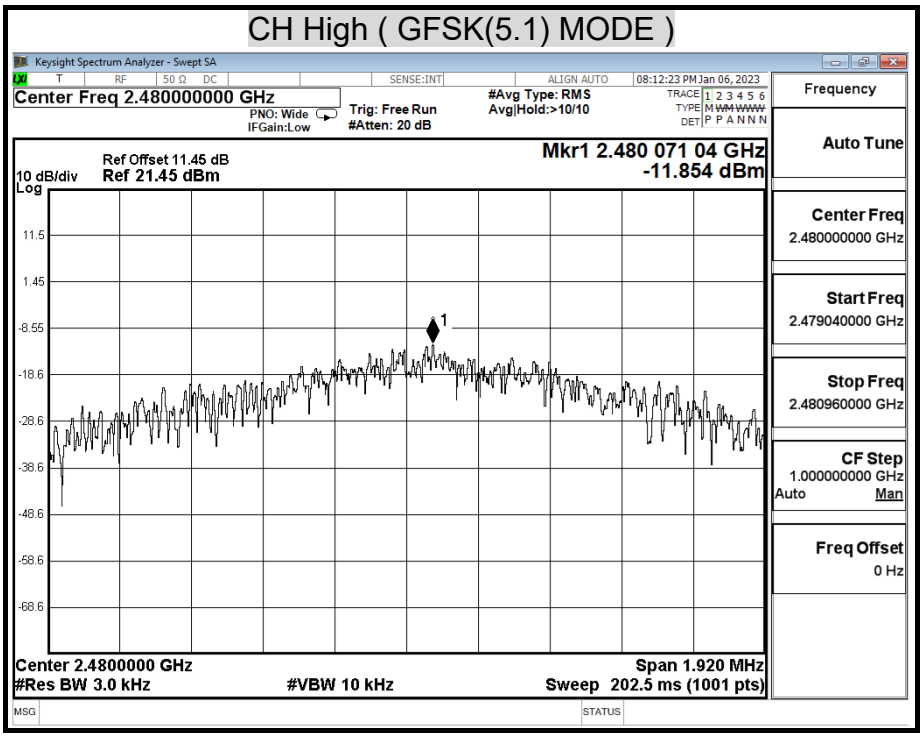
CH Low (GFSK(5.1) MODE)



CH Mid (GFSK(5.1) MODE)



CH High (GFSK(5.1) MODE)

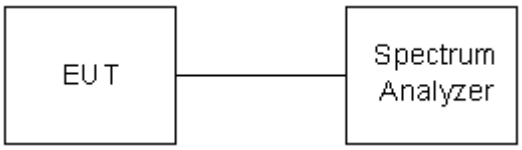


9.5 CONDUCTED SPURIOUS EMISSION

LIMITS

§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the and that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100kHz，the video bandwidth is set to 300kHz.
The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

TEST RESULTS

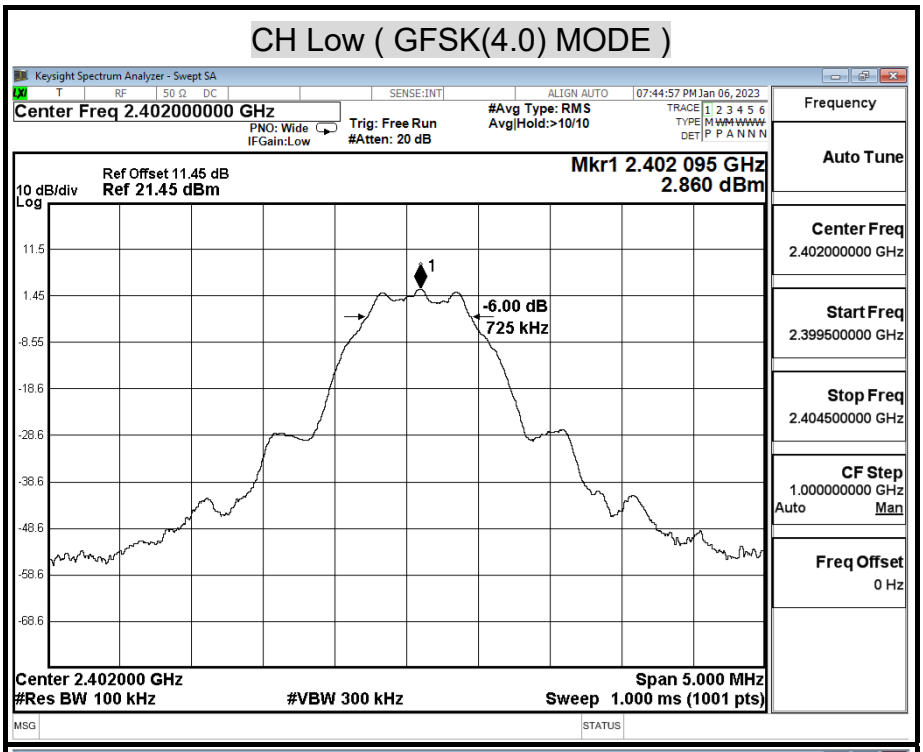
No non-compliance noted.

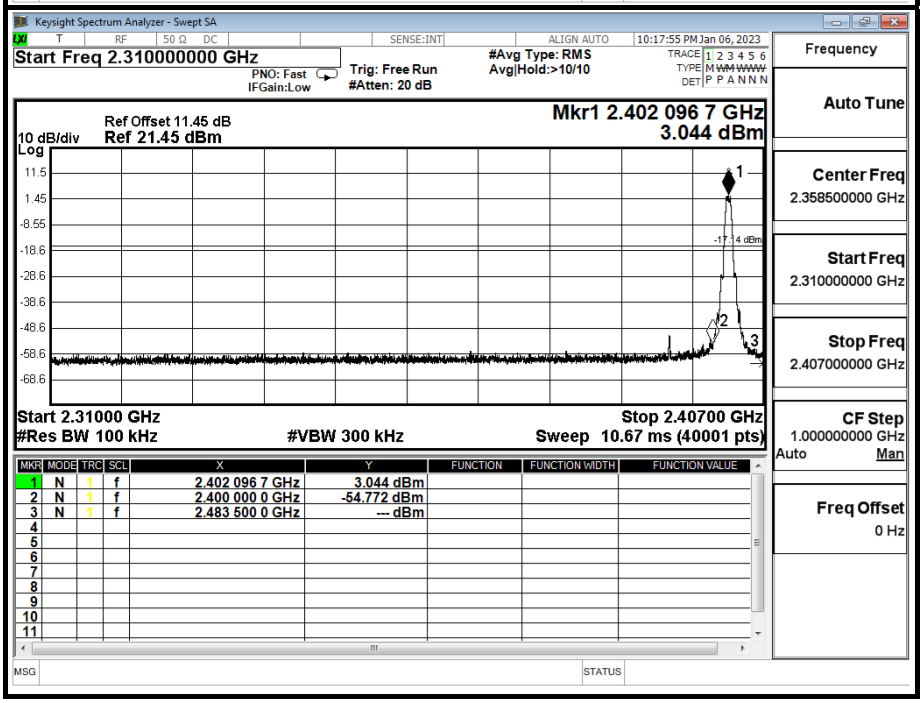
TEST DATA

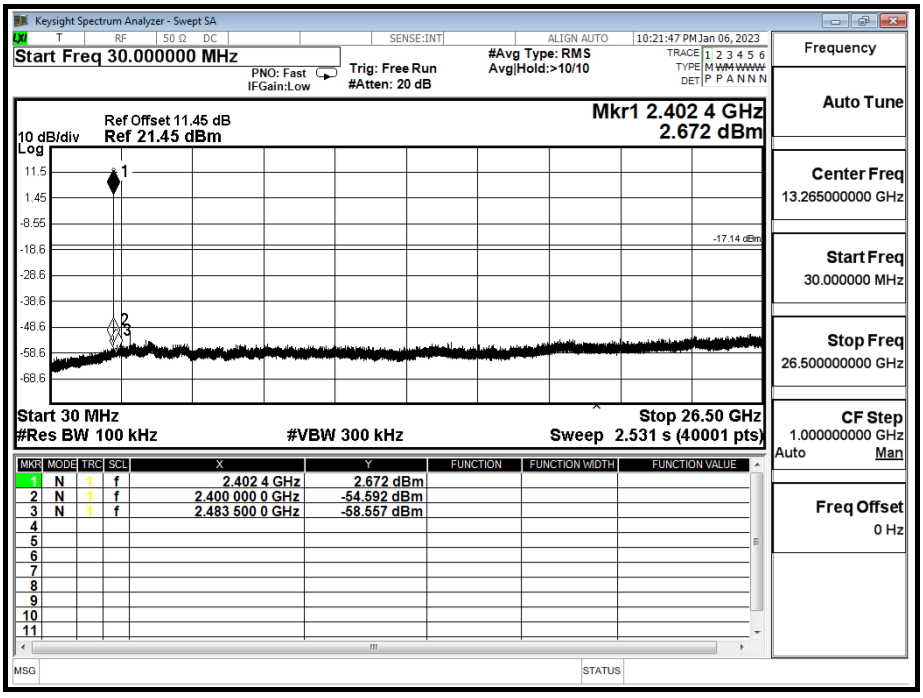
Model Name	MZ-123BT	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/12/27

OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

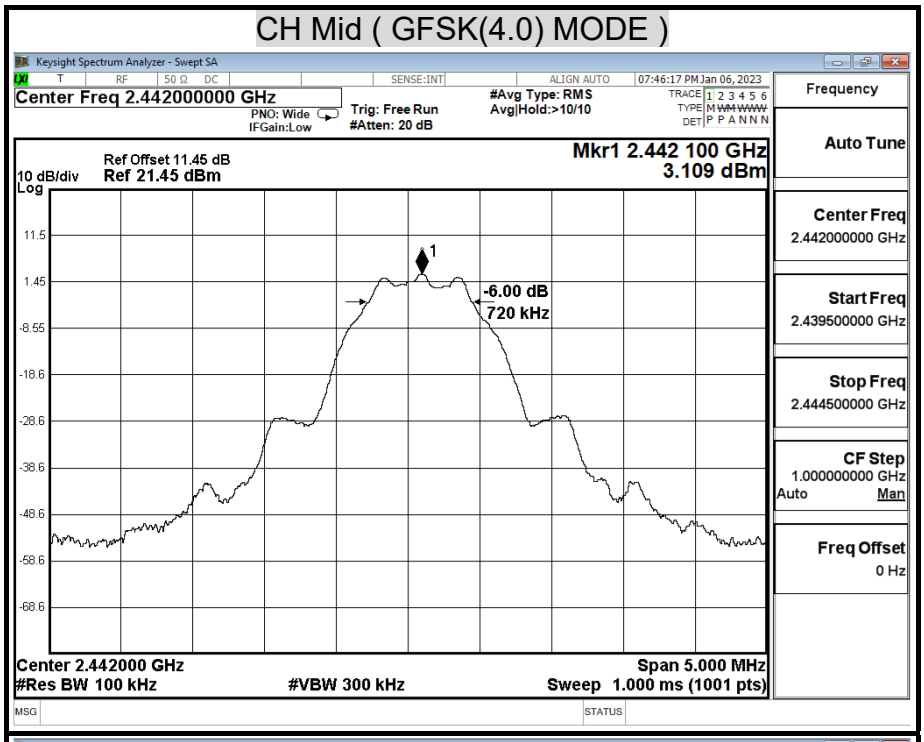
CH Low (GFSK(4.0) MODE)

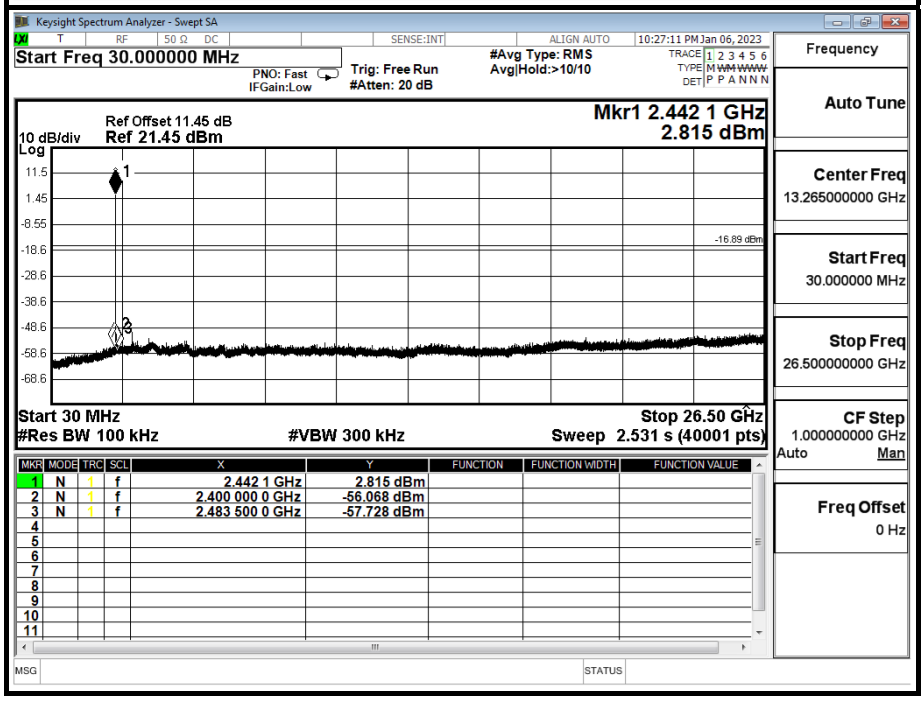






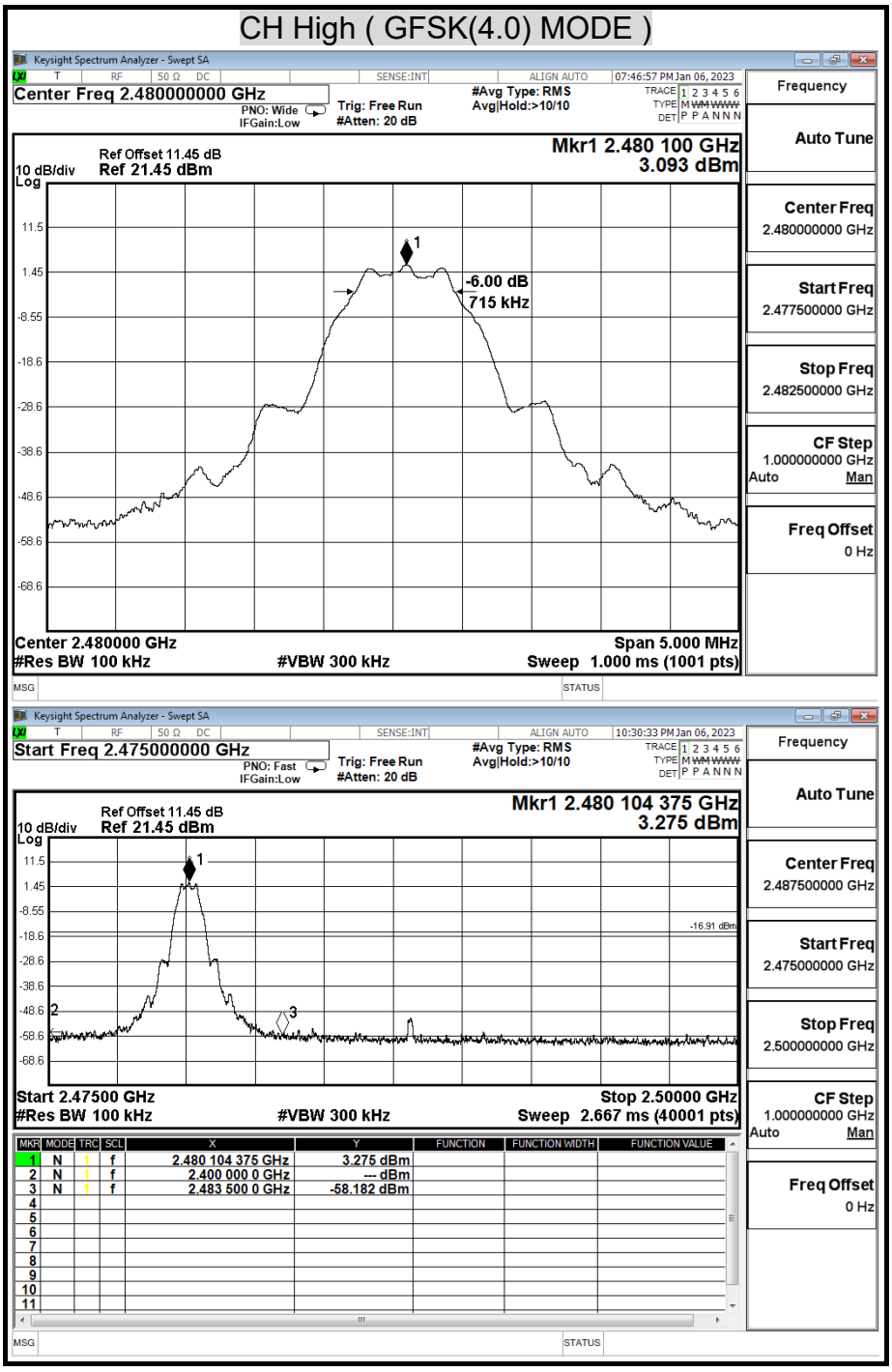
CH Mid (GFSK(4.0) MODE)

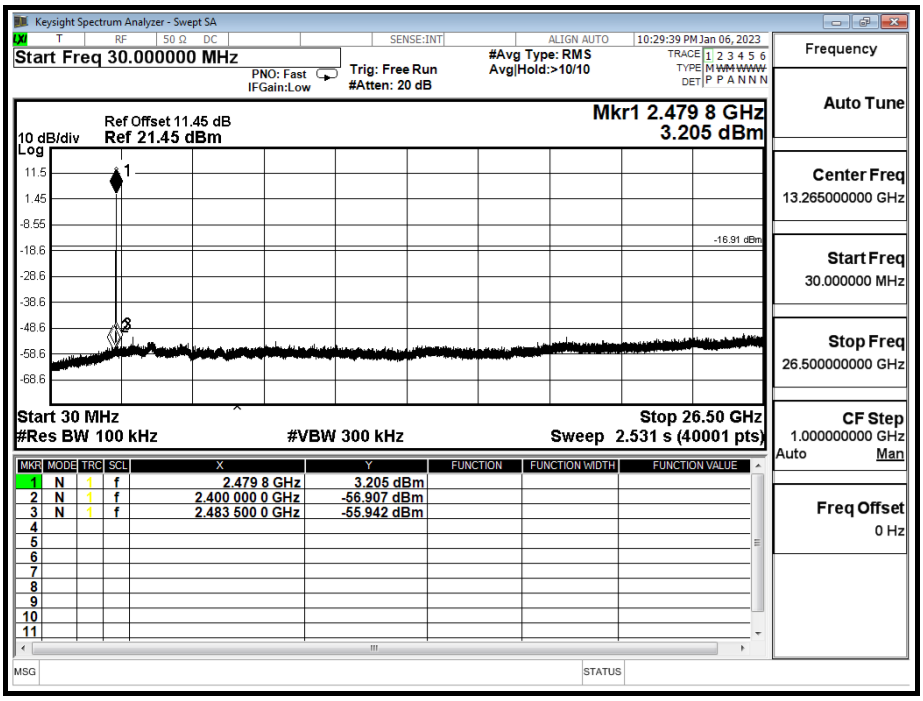




MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.442 1 GHz	2.815 dBm			
2	N	1	f	2.400 000 0 GHz	-56.068 dBm			
3	N	1	f	2.483 500 0 GHz	-57.728 dBm			
4								
5								
6								
7								
8								
9								
10								
11								

CH High (GFSK(4.0) MODE)

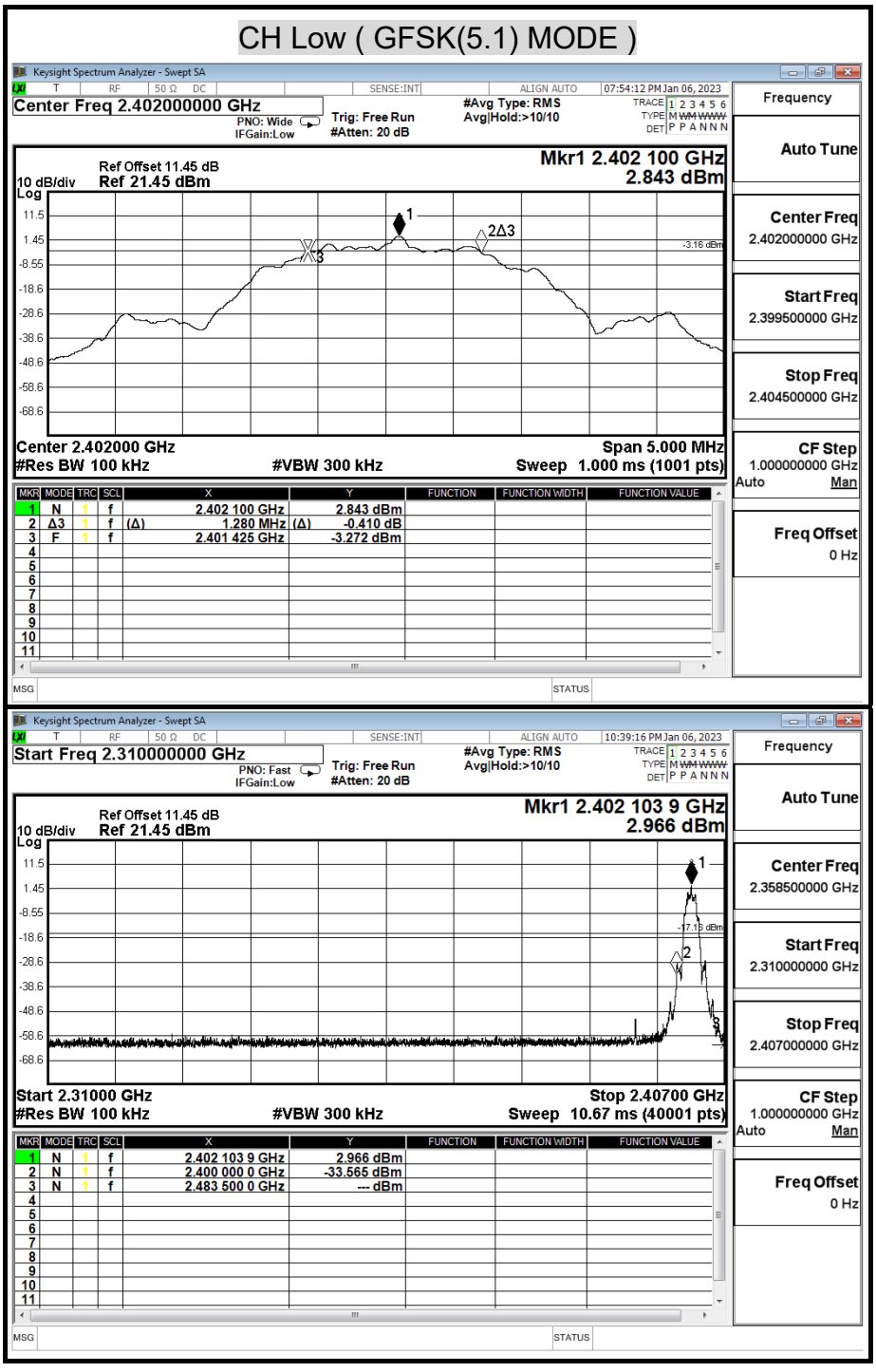


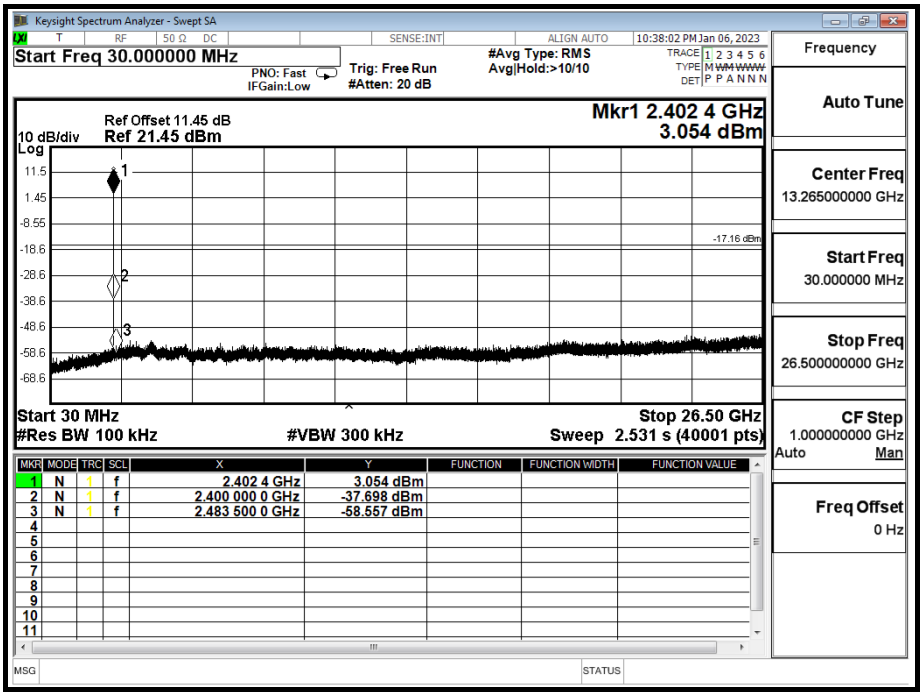


Model Name	MZ-123BT	Test By	Peter Chu
Temp & Humidity	21.5°C, 45%	Test Date	2022/12/27

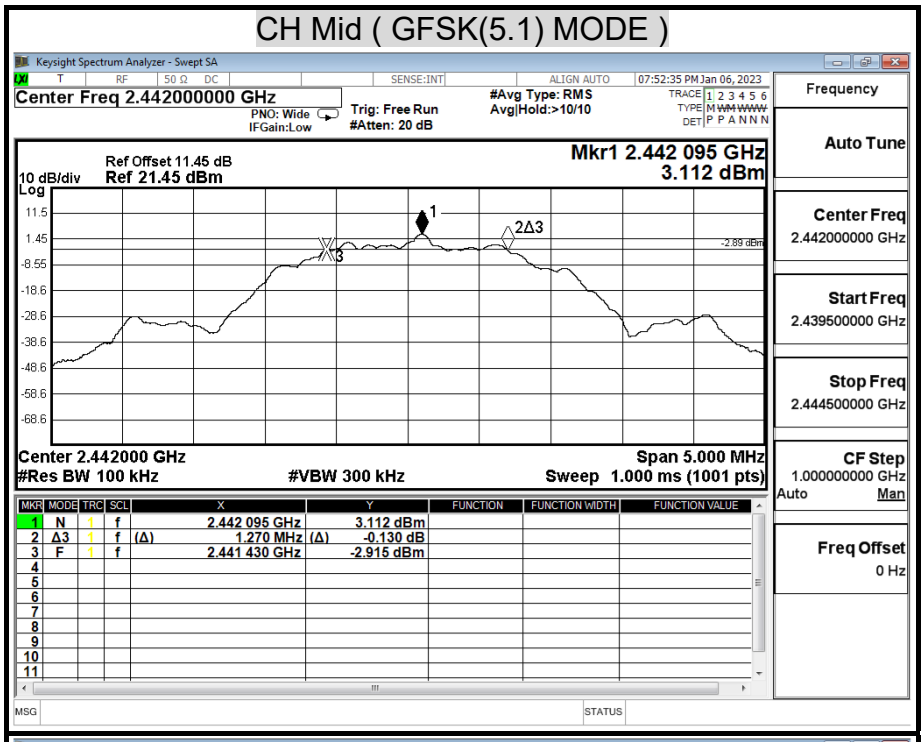
OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

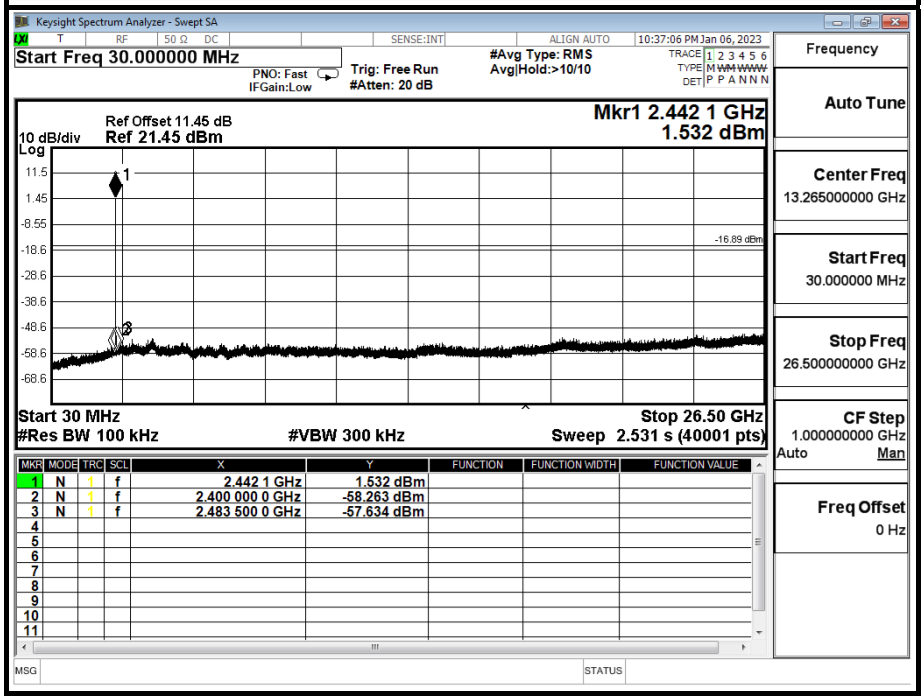
CH Low (GFSK(5.1) MODE)



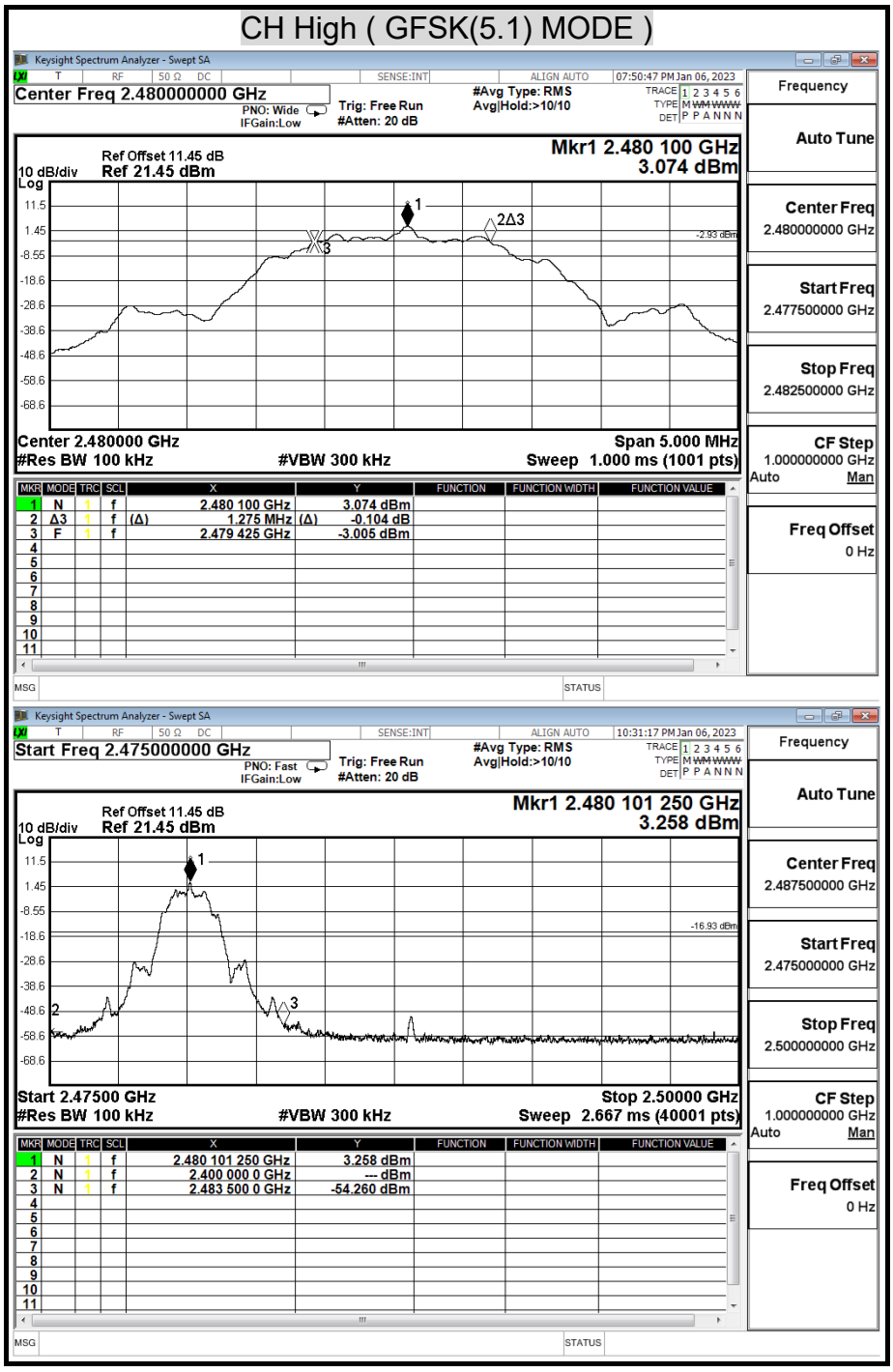


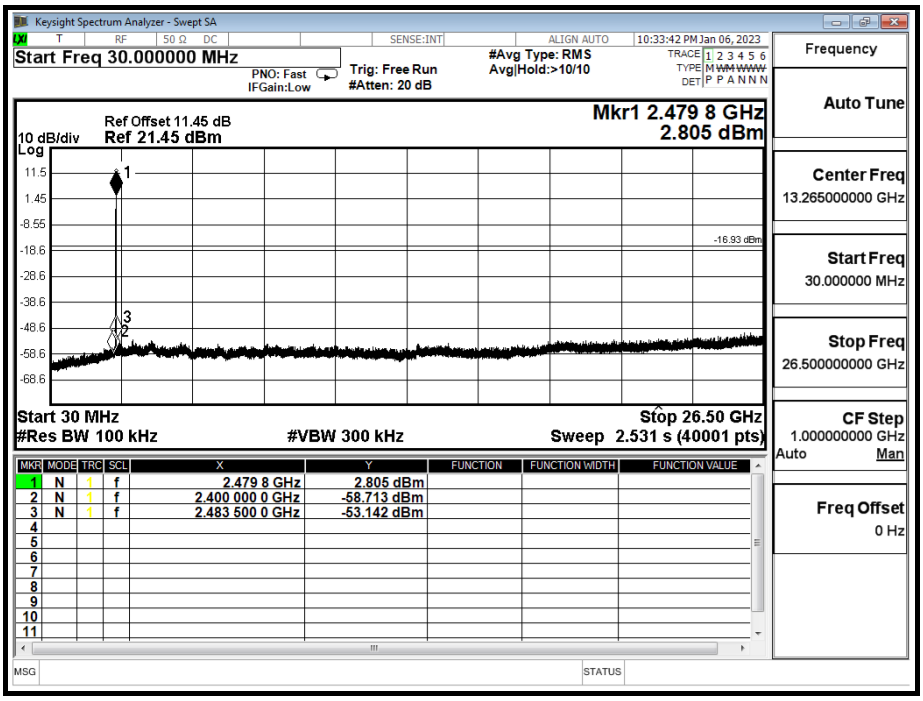
CH Mid (GFSK(5.1) MODE)





CH High (GFSK(5.1) MODE)





9.6 RADIATED EMISSIONS

9.6.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

LIMITS

§ 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§ 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

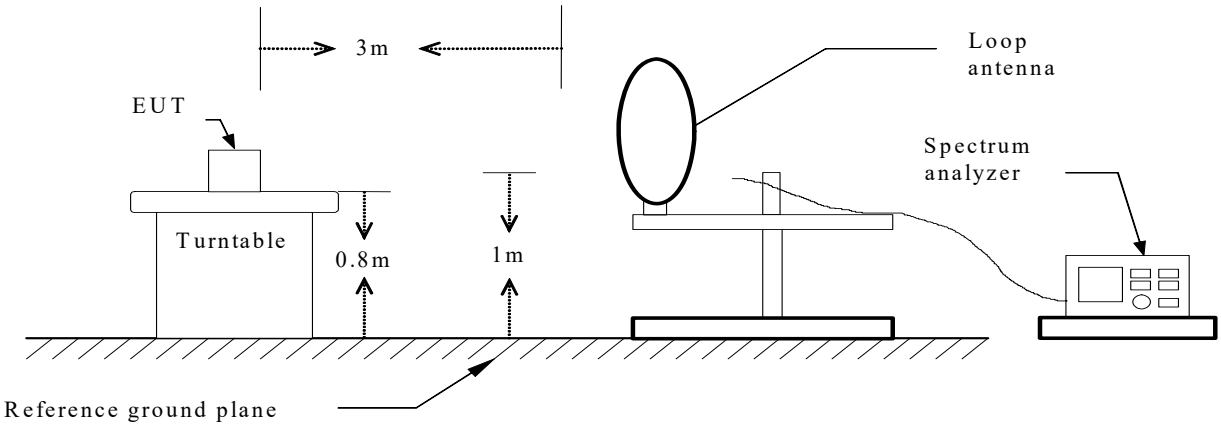
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

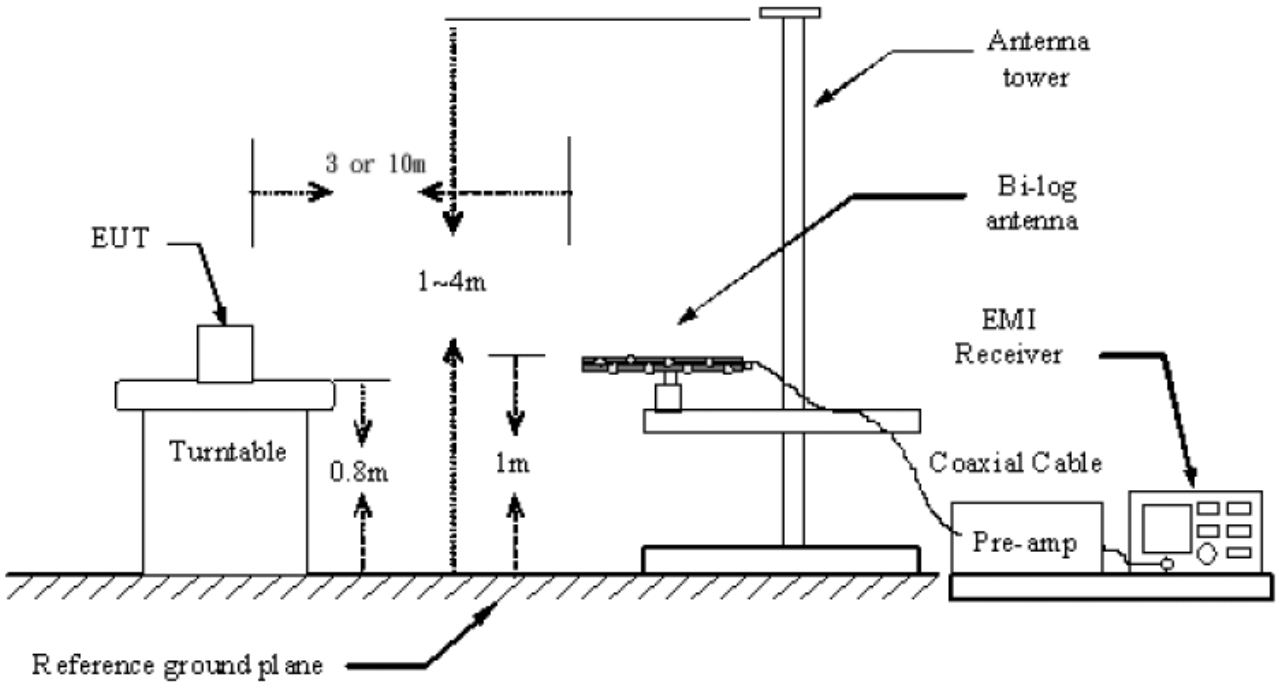
TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from below 1GHz.

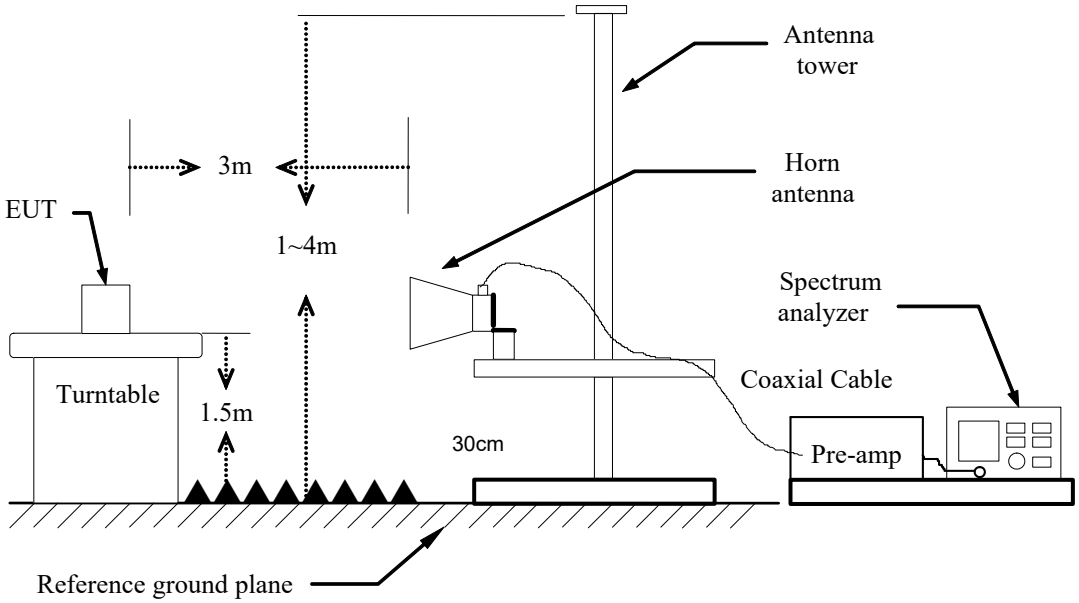
9kHz ~ 30MHz



30MHz ~ 1GHz



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8/1.5 meters above the ground at a 3 meter chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The spectrum analyzer was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

g. The tests were performed in accordance with 558074 D01 15.247 Meas Guidance v05

NOTE：

1. The resolution bandwidth and video bandwidth of test receiver is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth of test spectrum analyzer is 1MHz，the video bandwidth is 3MHz and detector is Peak for Peak detection and frequency above 1GHz.

3. The resolution bandwidth of test spectrum analyzer is 1 MHz and the video bandwidth is more than 1/T for Average detection (AV) at frequency above 1GHz.

4. No emission is found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)

TEST RESULTS

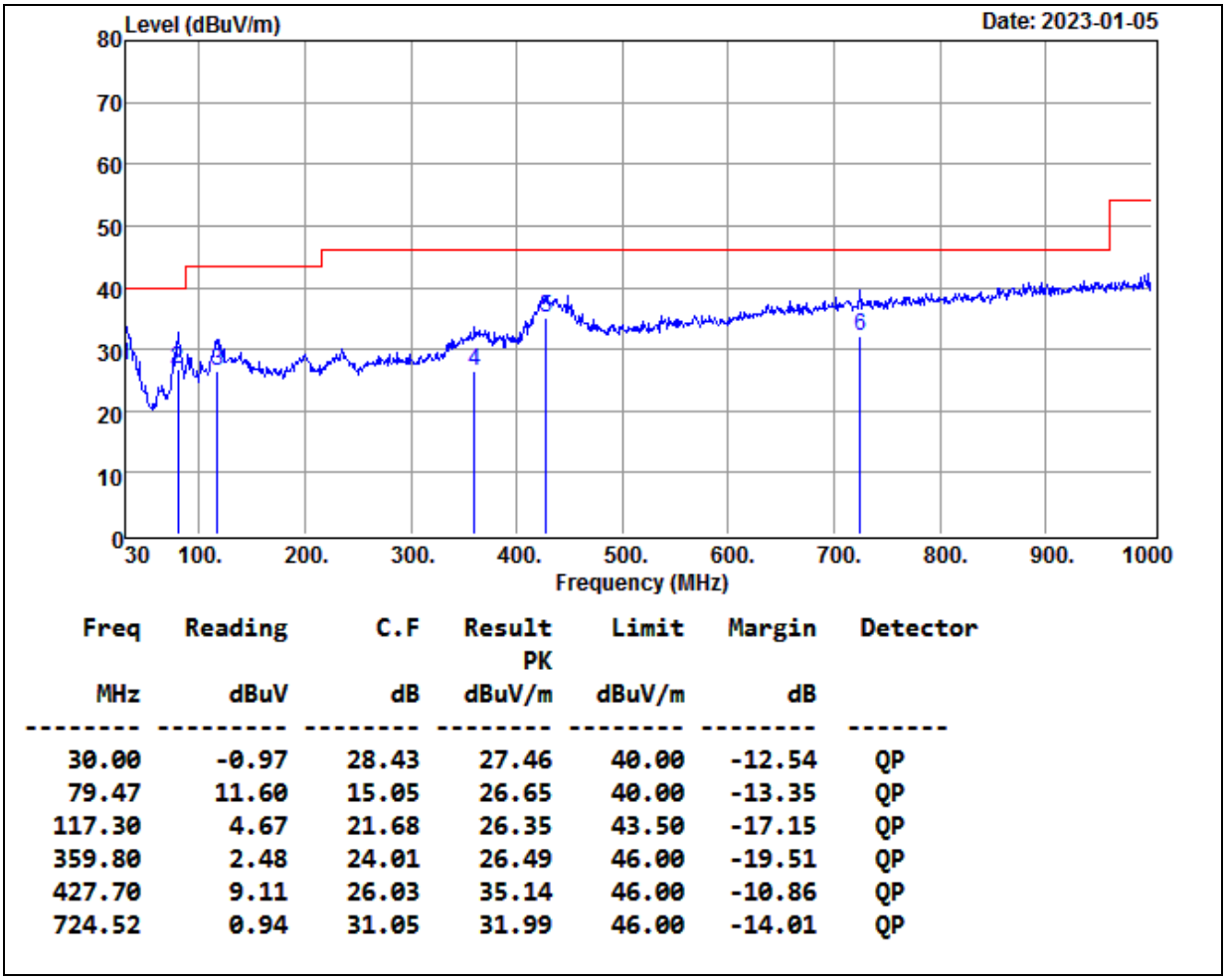
No non-compliance noted.

9.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

Test Voltage: AC 120V, 60Hz

Product Name	INSTALLATION MIXER	Test Date	2023/01/05
Model Name	MZ-123BT	Test By	Peter Chu
Test Mode	TX	Temp & Humidity	23.4°C, 50%

Vertical

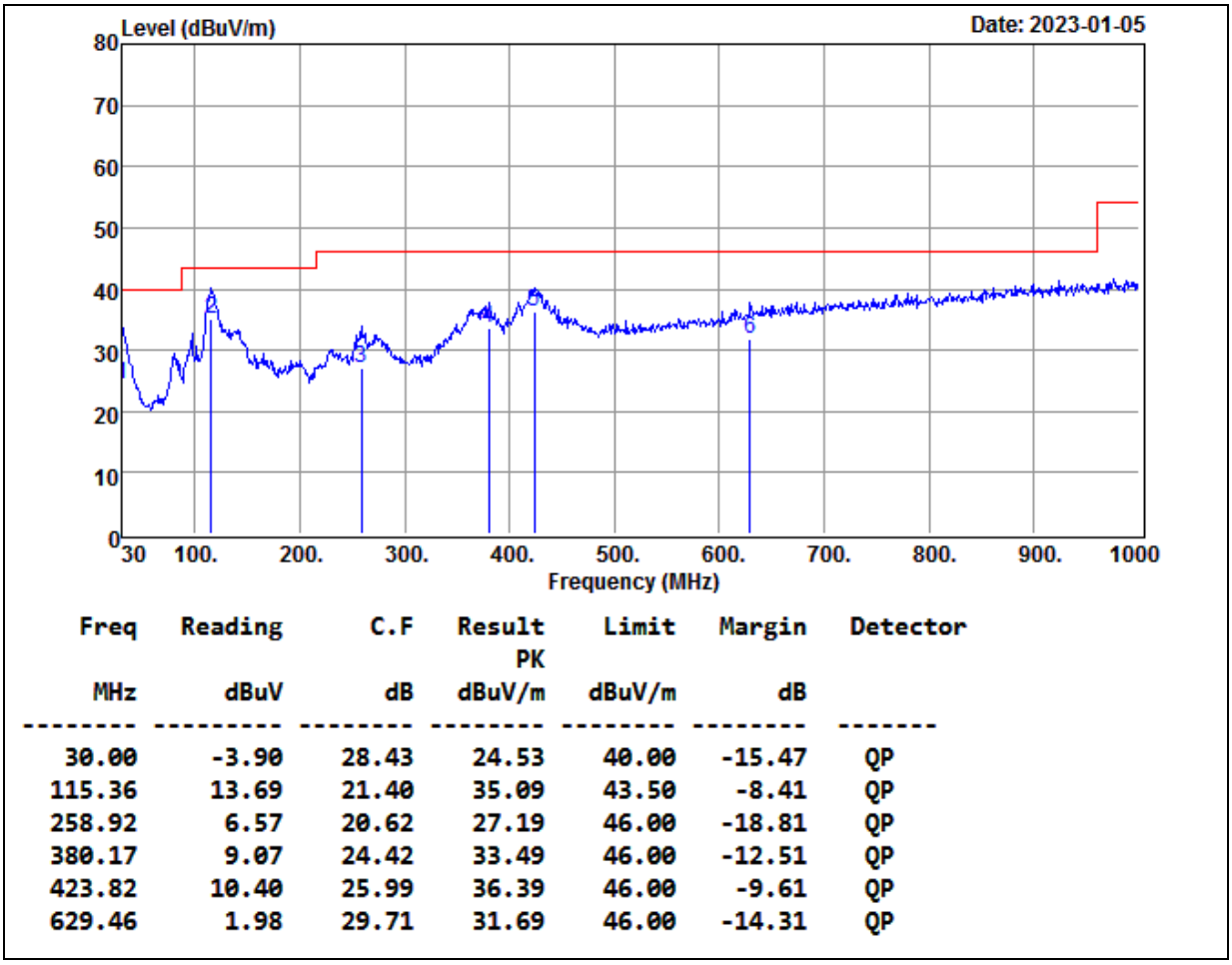


Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
30.00	-0.97	28.43	27.46	40.00	-12.54	QP
79.47	11.60	15.05	26.65	40.00	-13.35	QP
117.30	4.67	21.68	26.35	43.50	-17.15	QP
359.80	2.48	24.01	26.49	46.00	-19.51	QP
427.70	9.11	26.03	35.14	46.00	-10.86	QP
724.52	0.94	31.05	31.99	46.00	-14.01	QP

Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

Product Name	INSTALLATION MIXER	Test Date	2023/01/05
Model Name	MZ-123BT	Test By	Peter Chu
Test Mode	TX	Temp & Humidity	23.4°C, 50%

Horizontal



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
30.00	-3.90	28.43	24.53	40.00	-15.47	QP
115.36	13.69	21.40	35.09	43.50	-8.41	QP
258.92	6.57	20.62	27.19	46.00	-18.81	QP
380.17	9.07	24.42	33.49	46.00	-12.51	QP
423.82	10.40	25.99	36.39	46.00	-9.61	QP
629.46	1.98	29.71	31.69	46.00	-14.31	QP

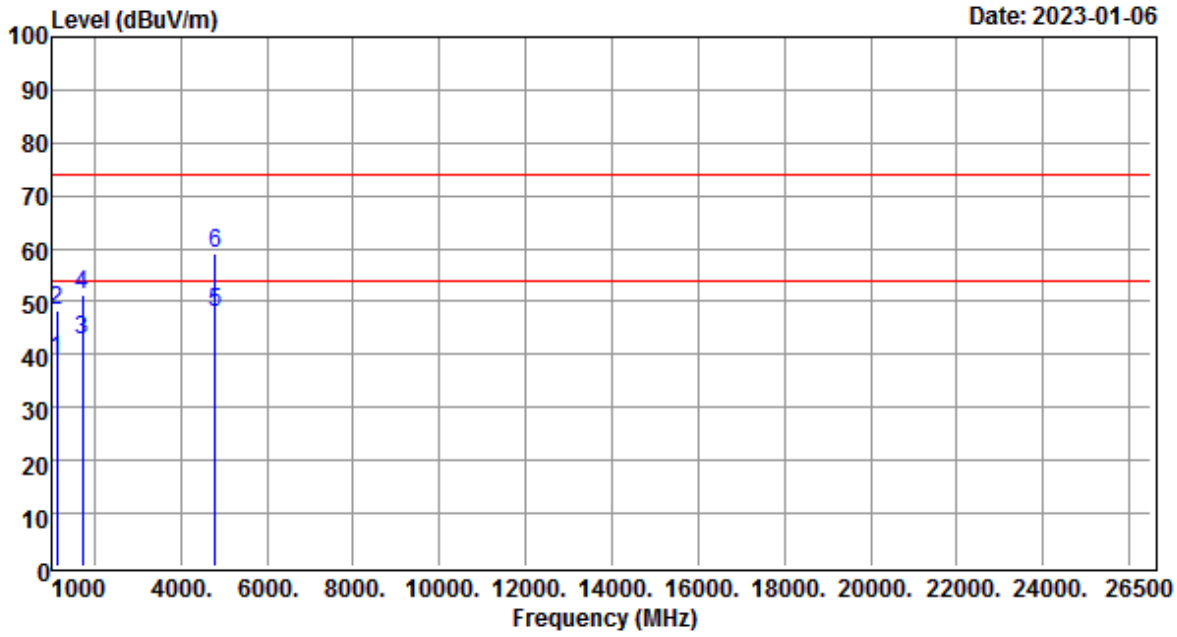
Note: 1. QP= Quasi-peak Reading.
2. The other emission levels were very low against the limit

9.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

Test Voltage: AC 120V, 60Hz

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Low)	TEMP& Humidity	21.4°C, 45%

Horizontal



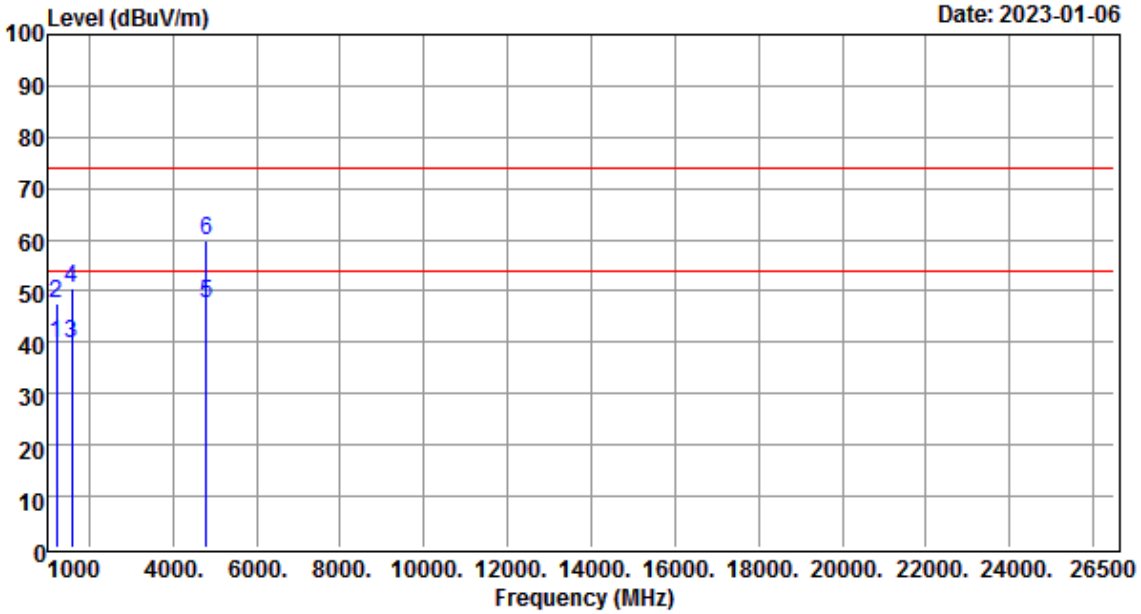
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1127.42	52.36	-13.19	39.17	54.00	-14.83	Average
1127.42	61.43	-13.19	48.24	74.00	-25.76	Peak
1729.50	53.63	-10.77	42.86	54.00	-11.14	Average
1729.50	61.94	-10.77	51.17	74.00	-22.83	Peak
4803.30	45.97	1.94	47.91	54.00	-6.09	Average
4803.30	57.16	1.94	59.10	74.00	-14.90	Peak

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Low)	TEMP& Humidity	21.4°C, 45%

Vertical



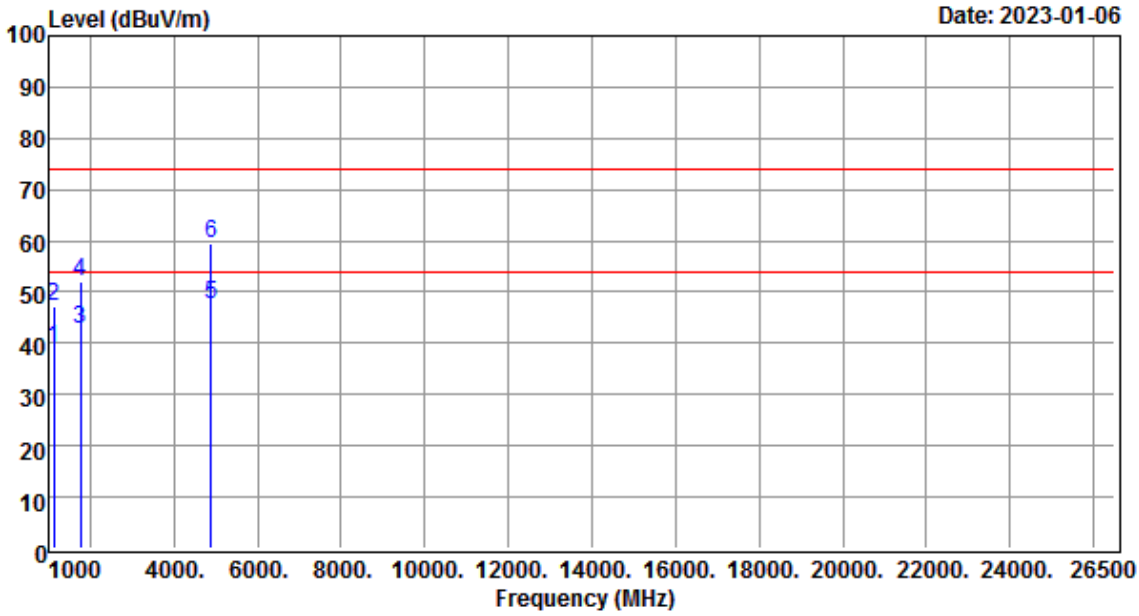
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1211.15	52.71	-13.08	39.63	54.00	-14.37	Average
1211.15	60.59	-13.08	47.51	74.00	-26.49	Peak
1586.47	51.33	-11.52	39.81	54.00	-14.19	Average
1586.47	62.05	-11.52	50.53	74.00	-23.47	Peak
4804.51	45.78	1.94	47.72	54.00	-6.28	Average
4804.51	57.79	1.94	59.73	74.00	-14.27	Peak

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz,A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Middle)	TEMP& Humidity	21.4°C, 45%

Horizontal



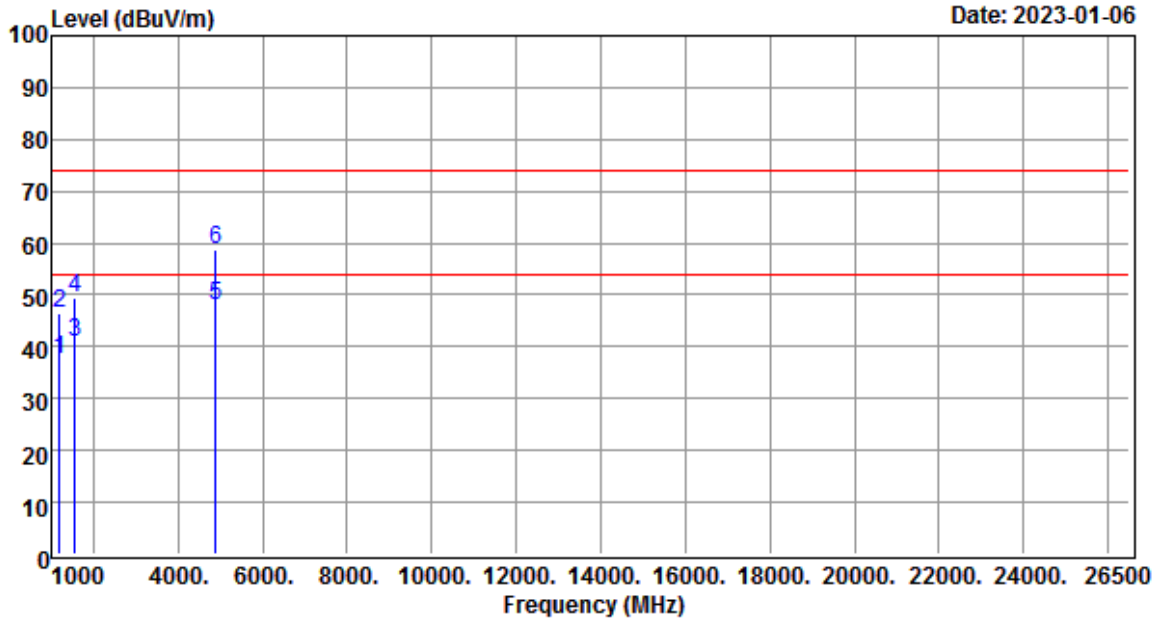
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1121.45	52.43	-13.27	39.16	54.00	-14.84	Average
1121.45	60.62	-13.27	47.35	74.00	-26.65	Peak
1752.71	53.40	-10.64	42.76	54.00	-11.24	Average
1752.71	62.82	-10.64	52.18	74.00	-21.82	Peak
4884.69	45.27	2.15	47.42	54.00	-6.58	Average
4884.69	57.23	2.15	59.38	74.00	-14.62	Peak

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Middle)	TEMP& Humidity	21.4°C, 45%

Vertical



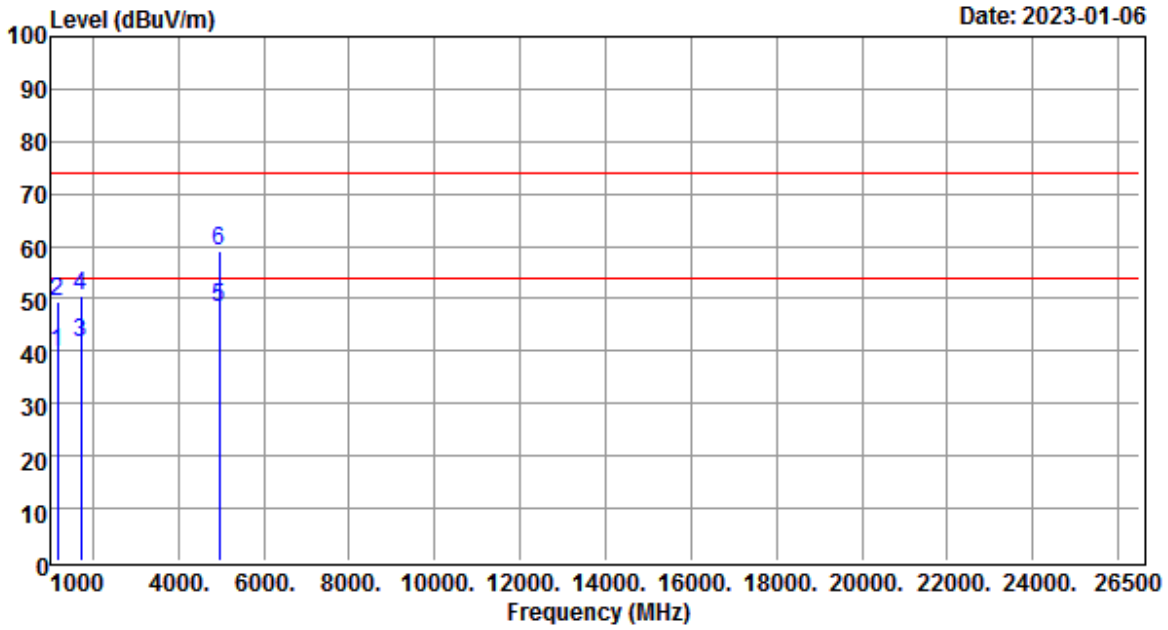
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1203.55	50.64	-13.14	37.50	54.00	-16.50	Average
1203.55	59.44	-13.14	46.30	74.00	-27.70	Peak
1566.88	52.50	-11.69	40.81	54.00	-13.19	Average
1566.88	61.07	-11.69	49.38	74.00	-24.62	Peak
4884.73	45.62	2.15	47.77	54.00	-6.23	Average
4884.73	56.43	2.15	58.58	74.00	-15.42	Peak

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH High)	TEMP& Humidity	21.4°C, 45%

Horizontal



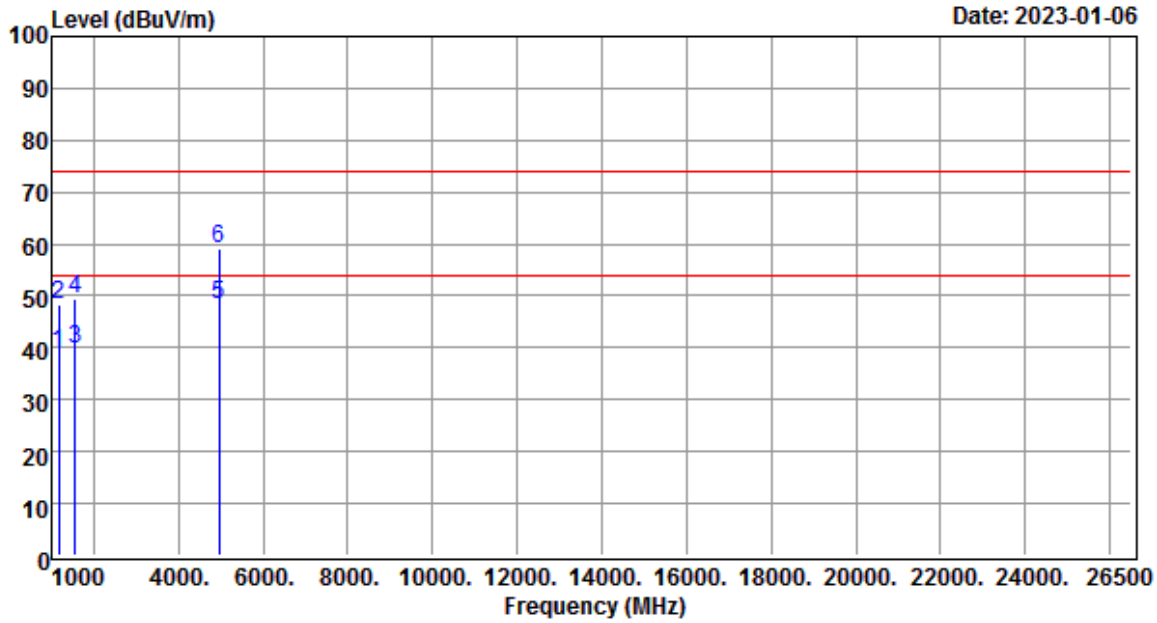
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1161.82	52.70	-12.95	39.75	54.00	-14.25	Average
1161.82	62.39	-12.95	49.44	74.00	-24.56	Peak
1728.77	52.45	-10.77	41.68	54.00	-12.32	Average
1728.77	61.34	-10.77	50.57	74.00	-23.43	Peak
4959.34	45.79	2.51	48.30	54.00	-5.70	Average
4959.34	56.74	2.51	59.25	74.00	-14.75	Peak

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH High)	TEMP& Humidity	21.4°C, 45%

Vertical



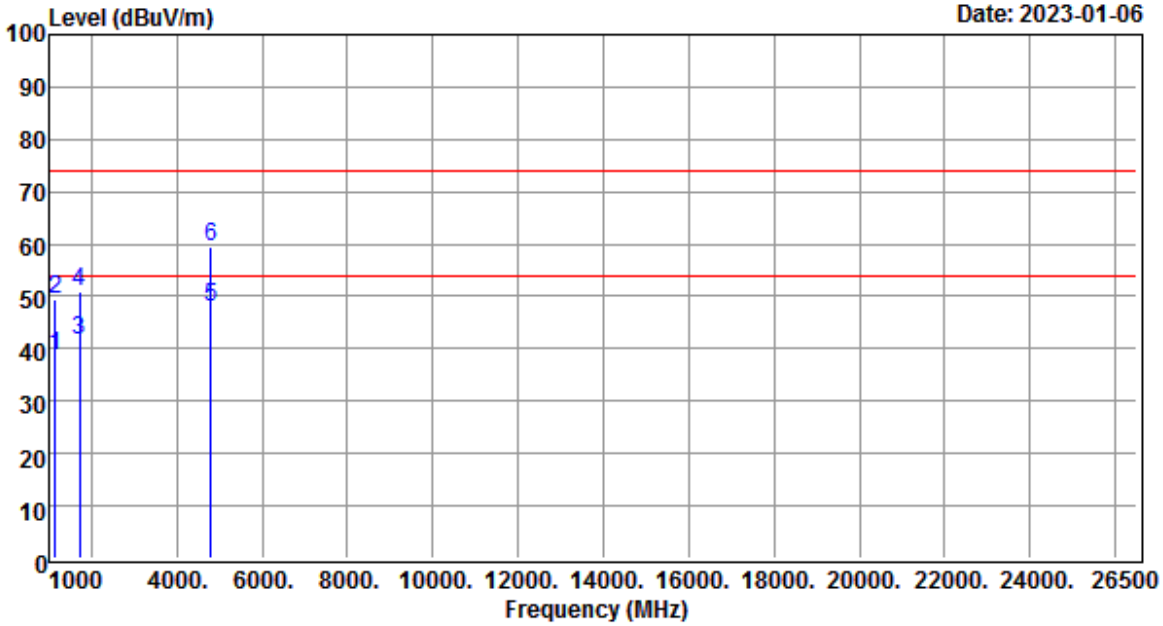
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1172.09	52.08	-13.01	39.07	54.00	-14.93	Average
1172.09	61.45	-13.01	48.44	74.00	-25.56	Peak
1557.24	51.73	-11.78	39.95	54.00	-14.05	Average
1557.24	61.31	-11.78	49.53	74.00	-24.47	Peak
4959.07	45.77	2.50	48.27	54.00	-5.73	Average
4959.07	56.79	2.50	59.29	74.00	-14.71	Peak

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(5.1) TX (CH Low)	TEMP& Humidity	21.4°C, 45%

Horizontal



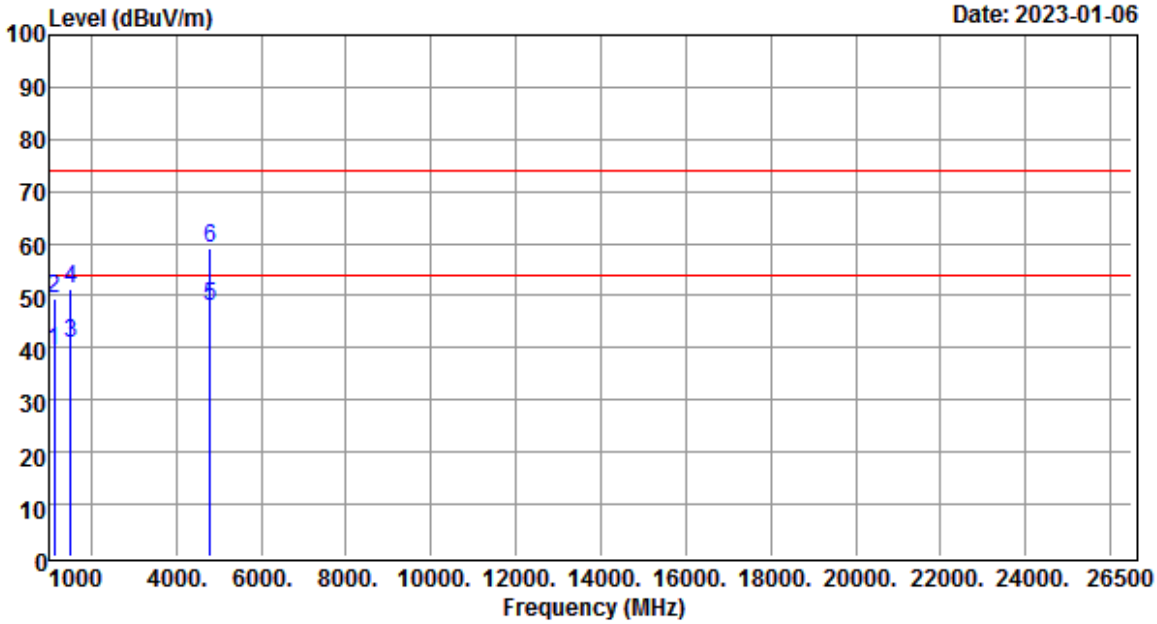
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1153.42	51.73	-12.92	38.81	54.00	-15.19	Average
1153.42	62.43	-12.92	49.51	74.00	-24.49	Peak
1729.34	52.46	-10.77	41.69	54.00	-12.31	Average
1729.34	61.53	-10.77	50.76	74.00	-23.24	Peak
4804.88	46.15	1.94	48.09	54.00	-5.91	Average
4804.88	57.58	1.94	59.52	74.00	-14.48	Peak

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(5.1) TX (CH Low)	TEMP& Humidity	21.4°C, 45%

Vertical



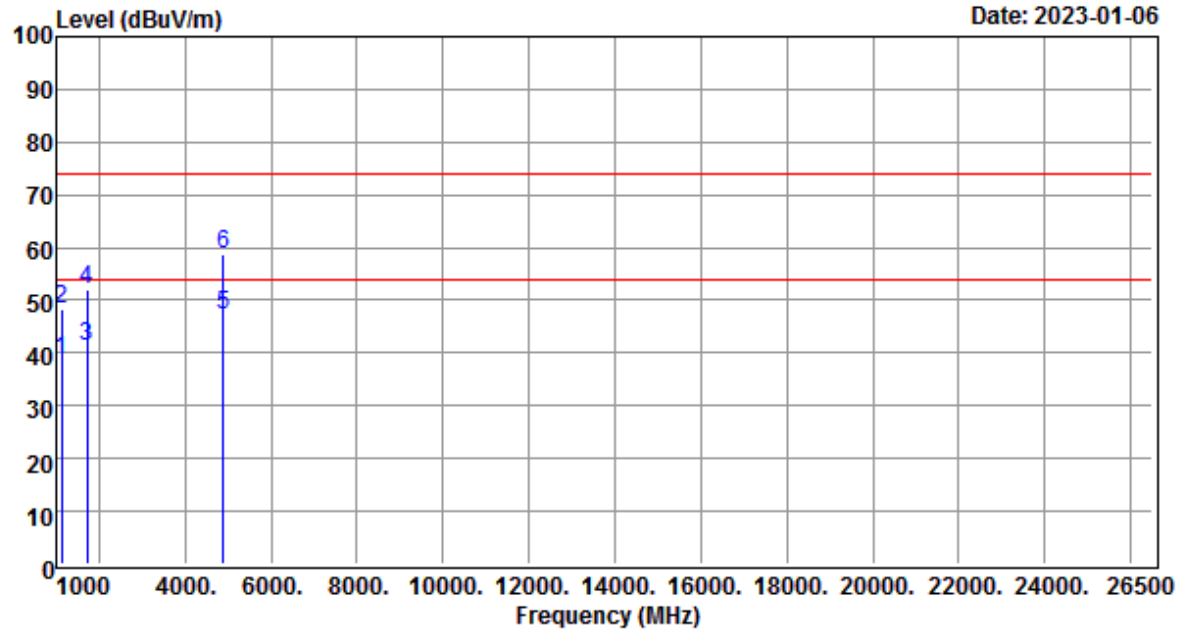
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1129.81	52.42	-13.16	39.26	54.00	-14.74	Average
1129.81	62.43	-13.16	49.27	74.00	-24.73	Peak
1523.61	52.58	-11.86	40.72	54.00	-13.28	Average
1523.61	63.28	-11.86	51.42	74.00	-22.58	Peak
4804.67	46.10	1.94	48.04	54.00	-5.96	Average
4804.67	57.29	1.94	59.23	74.00	-14.77	Peak

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(5.1) TX (CH Middle)	TEMP& Humidity	21.4°C, 45%

Horizontal



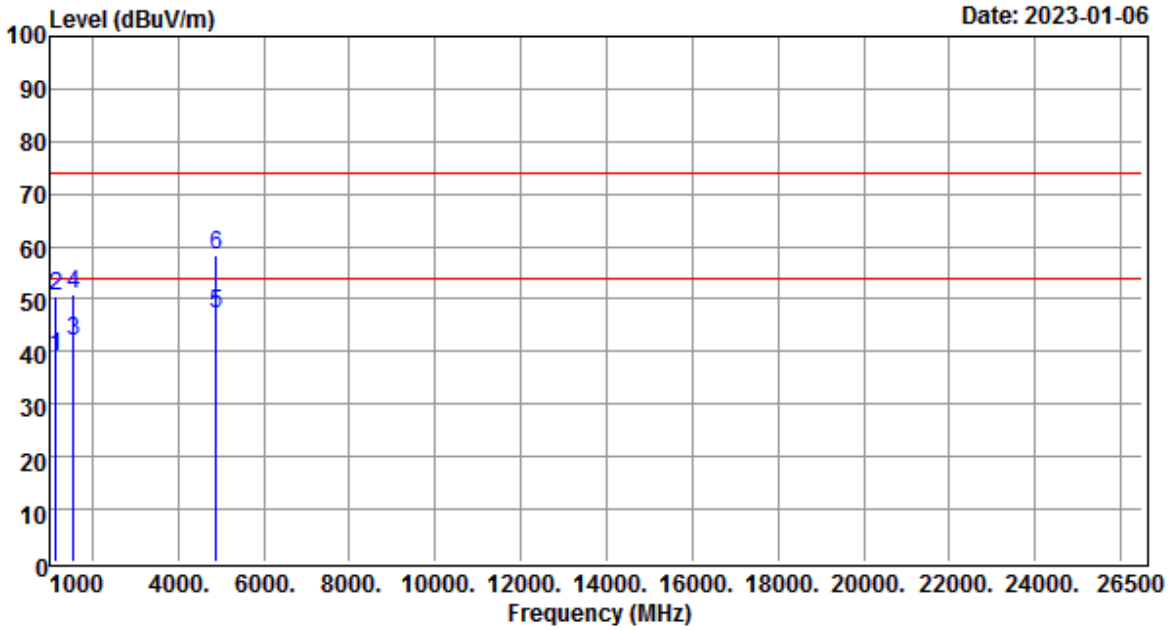
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1133.75	51.93	-13.11	38.82	54.00	-15.18	Average
1133.75	61.43	-13.11	48.32	74.00	-25.68	Peak
1722.37	52.19	-10.81	41.38	54.00	-12.62	Average
1722.37	62.70	-10.81	51.89	74.00	-22.11	Peak
4884.38	45.20	2.15	47.35	54.00	-6.65	Average
4884.38	56.44	2.15	58.59	74.00	-15.41	Peak

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(5.1) TX (CH Middle)	TEMP& Humidity	21.4°C, 45%

Vertical



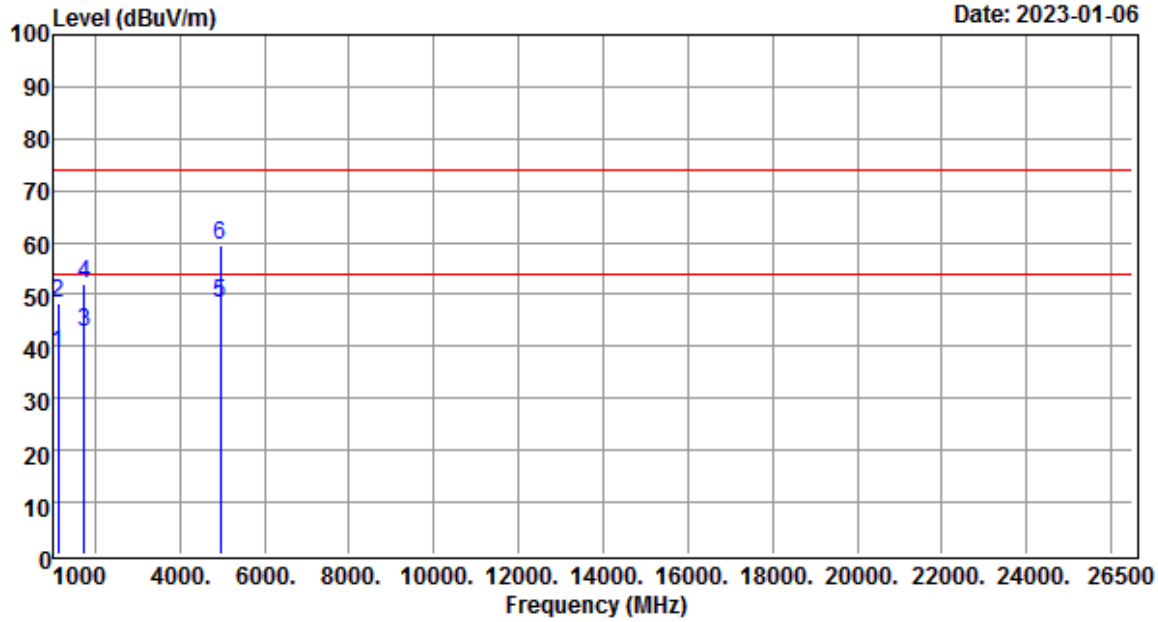
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1153.45	51.94	-12.92	39.02	54.00	-14.98	Average
1153.45	63.45	-12.92	50.53	74.00	-23.47	Peak
1562.97	53.66	-11.73	41.93	54.00	-12.07	Average
1562.97	62.83	-11.73	51.10	74.00	-22.90	Peak
4884.34	45.23	2.15	47.38	54.00	-6.62	Average
4884.34	56.32	2.15	58.47	74.00	-15.53	Peak

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(5.1) TX (CH High)	TEMP& Humidity	21.4°C, 45%

Horizontal



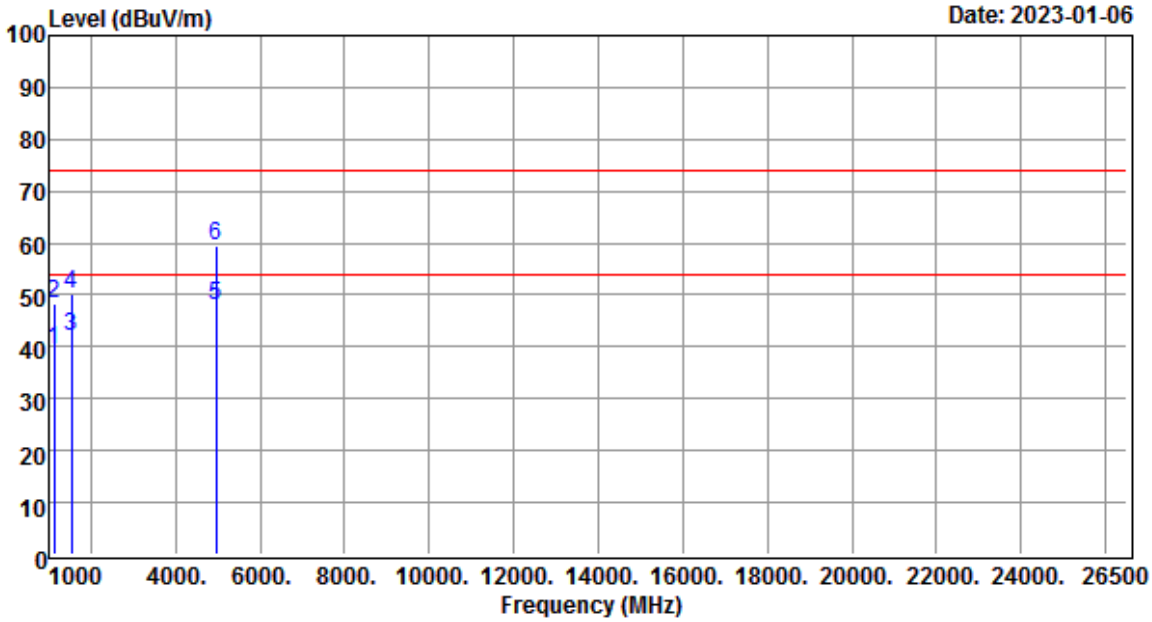
Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1125.28	52.03	-13.22	38.81	54.00	-15.19	Average
1125.28	61.45	-13.22	48.23	74.00	-25.77	Peak
1732.86	53.55	-10.75	42.80	54.00	-11.20	Average
1732.86	62.78	-10.75	52.03	74.00	-21.97	Peak
4959.70	45.63	2.52	48.15	54.00	-5.85	Average
4959.70	56.82	2.52	59.34	74.00	-14.66	Peak

Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

Product Name	INSTALLATION MIXER	Test Date	2023/01/06
Model	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(5.1) TX (CH High)	TEMP& Humidity	21.4°C, 45%

Vertical



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1129.06	52.53	-13.17	39.36	54.00	-14.64	Average
1129.06	61.59	-13.17	48.42	74.00	-25.58	Peak
1537.67	53.68	-11.85	41.83	54.00	-12.17	Average
1537.67	62.06	-11.85	50.21	74.00	-23.79	Peak
4959.39	45.50	2.51	48.01	54.00	-5.99	Average
4959.39	56.89	2.51	59.40	74.00	-14.60	Peak

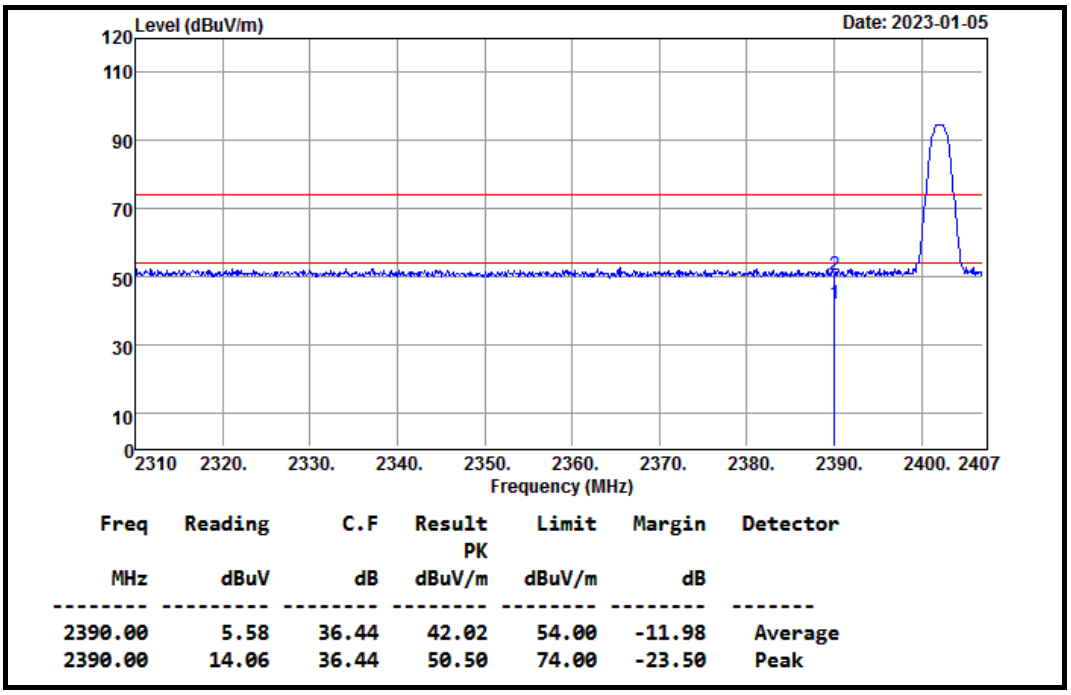
Remark:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=3MHz, A(Average): RBW=1MHz, VBW≧1/T
3. The result basic equation calculation is as follow:
   Level = Reading + AF + Cable – Preamp + Filter, Margin = Level-Limit
4. The other emission levels were 10dB below the limit
5. The test distance is 3m.
6. *=Restricted bands of operation

9.6.4 RESTRICTED BAND EDGES

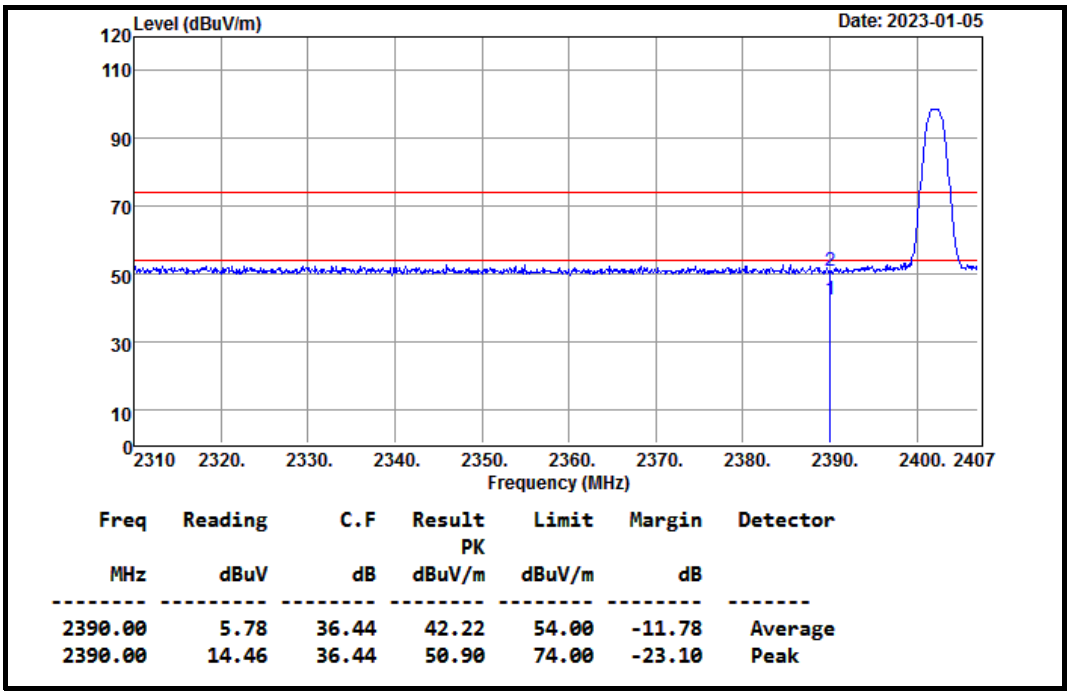
Product Name	INSTALLATION MIXER	Test Date	2023/01/05
Model Name	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH Low)	Temp & Humidity	23.4°C, 50%

Horizontal



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
2390.00	5.58	36.44	42.02	54.00	-11.98	Average
2390.00	14.06	36.44	50.50	74.00	-23.50	Peak

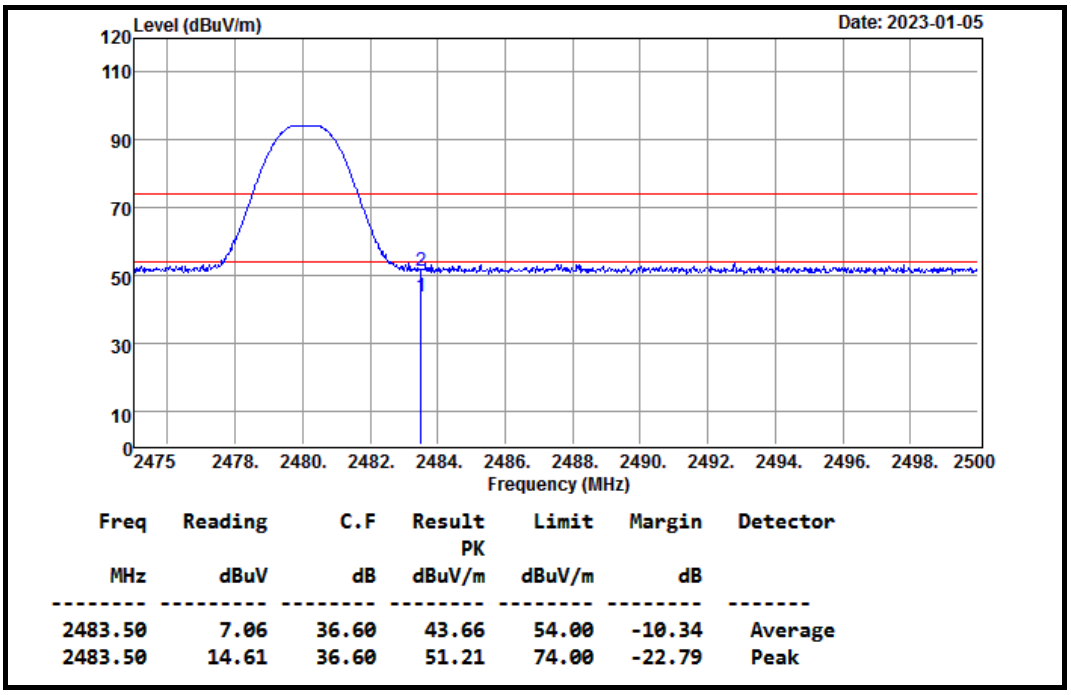
Vertical



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
2390.00	5.78	36.44	42.22	54.00	-11.78	Average
2390.00	14.46	36.44	50.90	74.00	-23.10	Peak

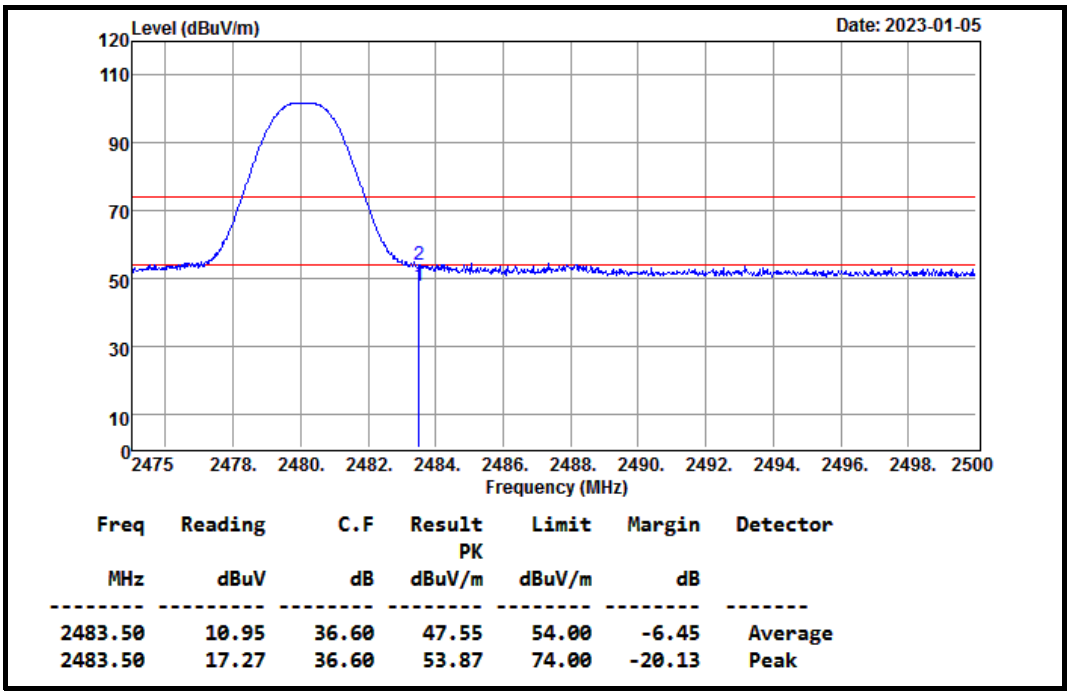
Product Name	INSTALLATION MIXER	Test Date	2023/01/05
Model Name	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(4.0) TX (CH High)	Temp & Humidity	23.4°C, 50%

Horizontal



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
2483.50	7.06	36.60	43.66	54.00	-10.34	Average
2483.50	14.61	36.60	51.21	74.00	-22.79	Peak

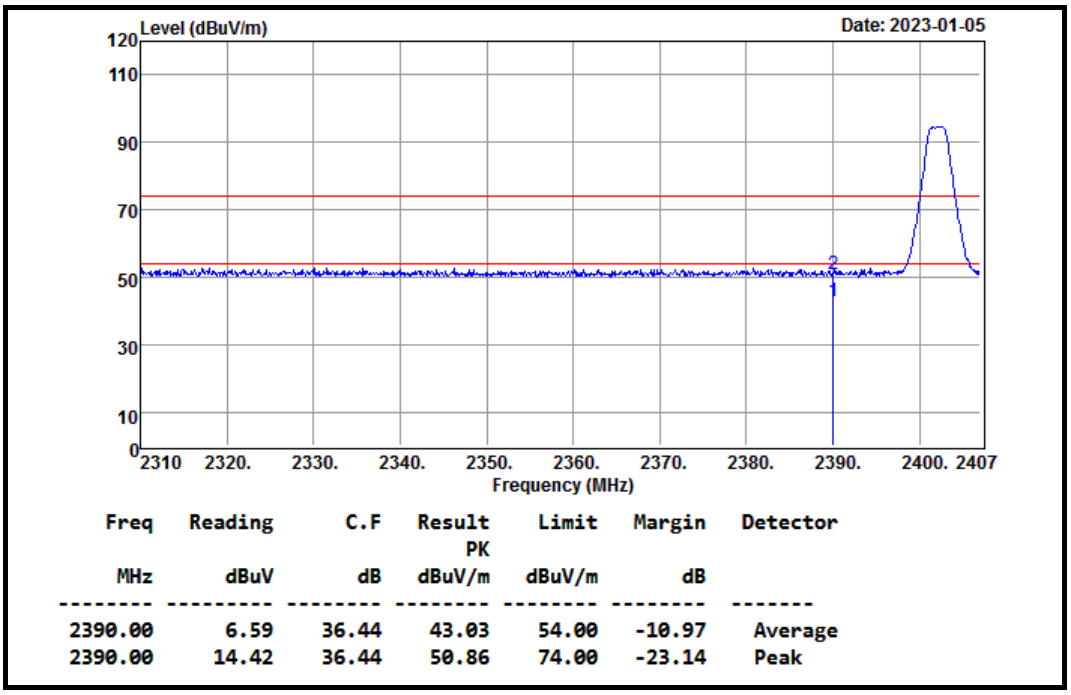
Vertical



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
2483.50	10.95	36.60	47.55	54.00	-6.45	Average
2483.50	17.27	36.60	53.87	74.00	-20.13	Peak

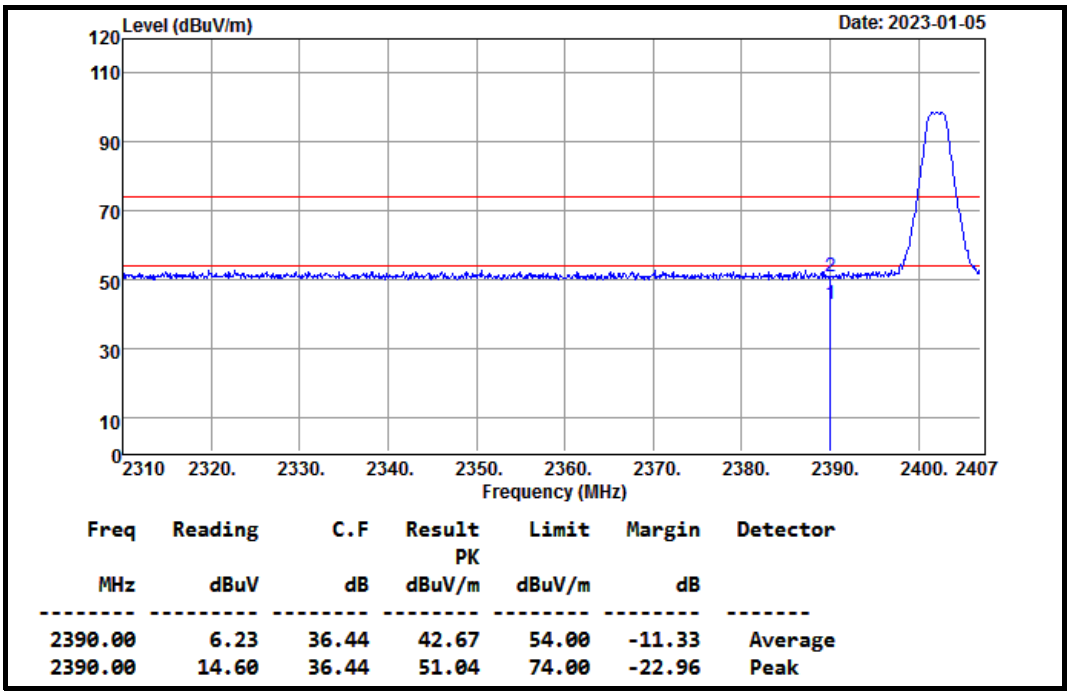
Product Name	INSTALLATION MIXER	Test Date	2023/01/05
Model Name	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(5.1) TX (CH Low)	Temp & Humidity	23.4°C, 50%

Horizontal



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
2390.00	6.59	36.44	43.03	54.00	-10.97	Average
2390.00	14.42	36.44	50.86	74.00	-23.14	Peak

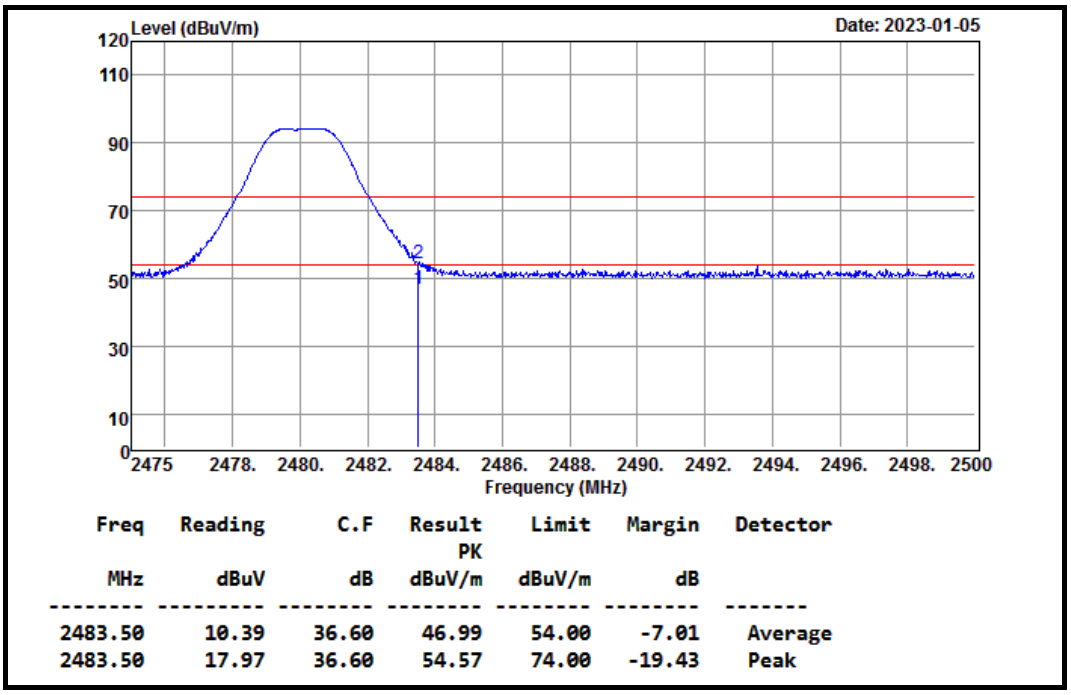
Vertical



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
2390.00	6.23	36.44	42.67	54.00	-11.33	Average
2390.00	14.60	36.44	51.04	74.00	-22.96	Peak

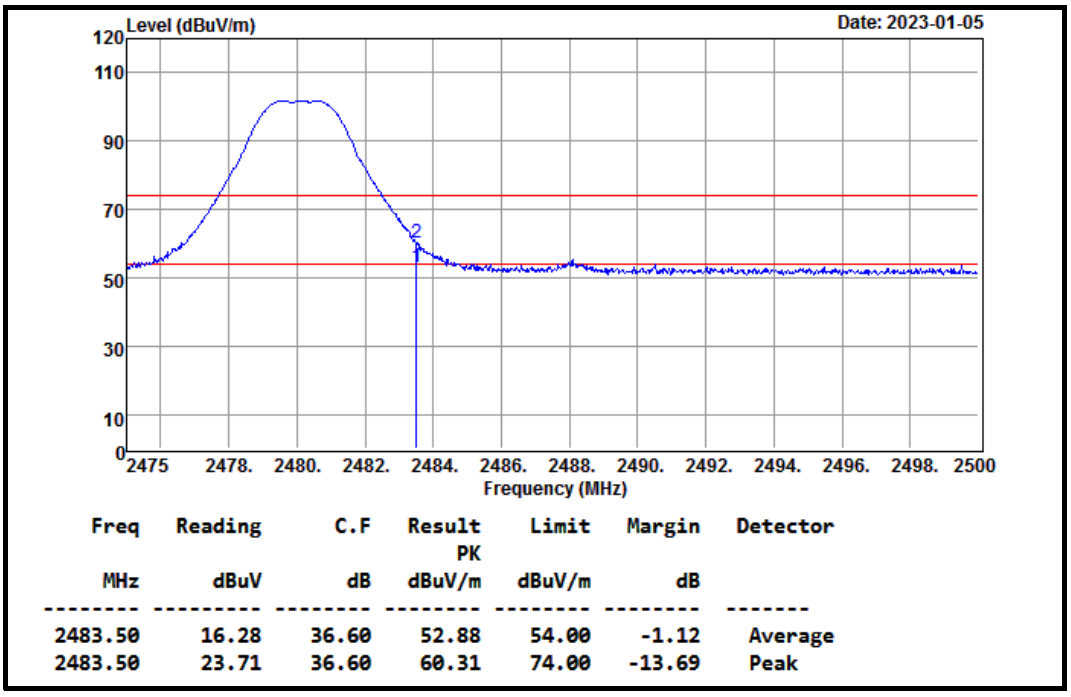
Product Name	INSTALLATION MIXER	Test Date	2023/01/05
Model Name	MZ-123BT	Test By	Peter Chu
Test Mode	GFSK(5.1) TX (CH High)	Temp & Humidity	23.4°C, 50%

Horizontal



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
2483.50	10.39	36.60	46.99	54.00	-7.01	Average
2483.50	17.97	36.60	54.57	74.00	-19.43	Peak

Vertical



Freq	Reading	C.F	Result PK	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
2483.50	16.28	36.60	52.88	54.00	-1.12	Average
2483.50	23.71	36.60	60.31	74.00	-13.69	Peak

9.7 POWERLINE CONDUCTED EMISSIONS

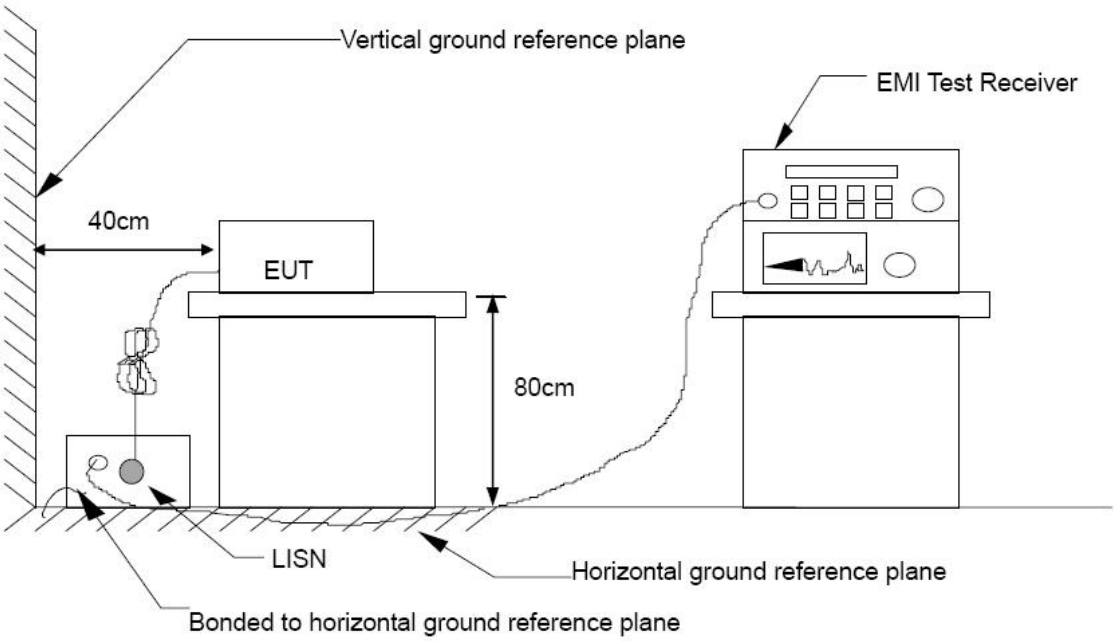
LIMITS

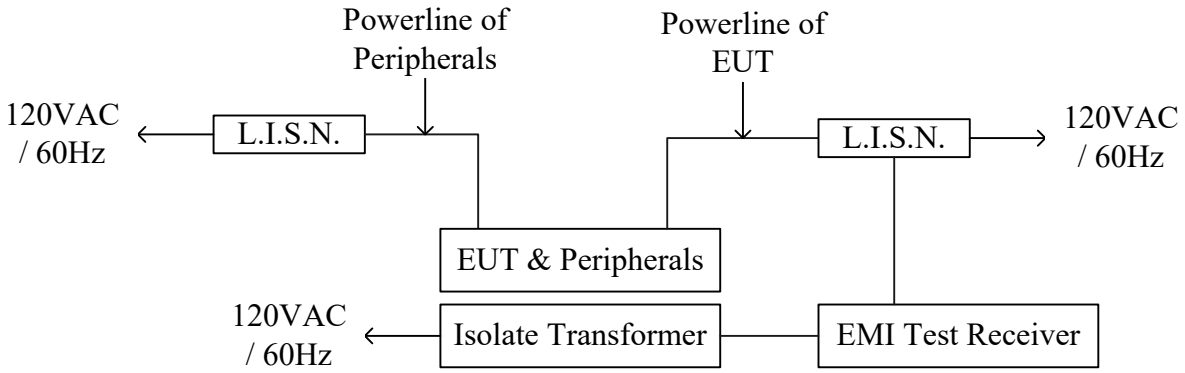
§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dBμv)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

TEST SETUP





TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.10.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.

TEST RESULTS

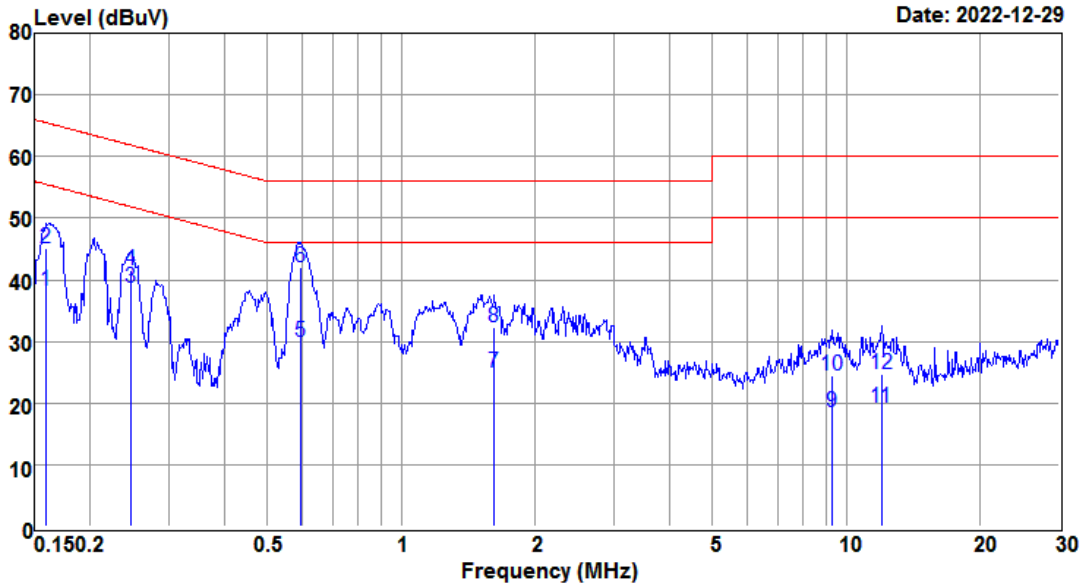
No non-compliance noted.

Test Voltage: AC 120V, 60Hz

Model No.	MZ-123BT	**Test Mode**	Aux in
Environmental Conditions	25℃, 56% RH	**Resolution Bandwidth**	9 kHz
Tested by	Jeremy Zhong		

LINE

(The chart below shows the highest readings taken from the final data.)

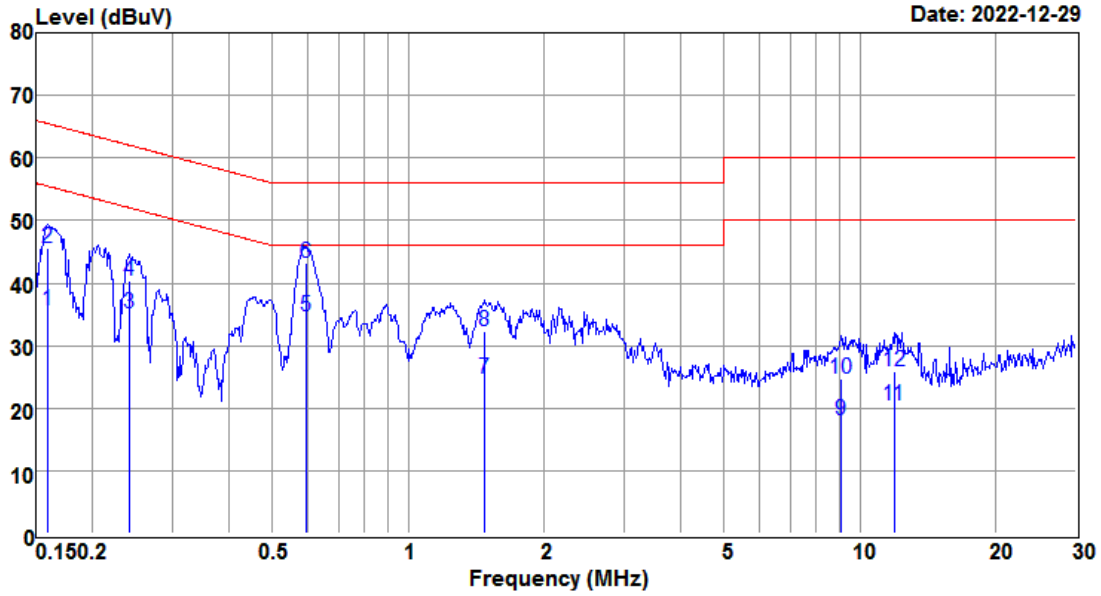


Freq	Reading Level	C.F	Result	Limit	Over Limit	Detector
MHz	dBuV	dB	dBuV	dBuV	dB	
0.159	27.98	10.22	38.20	55.52	-17.32	Average
0.159	34.85	10.22	45.07	65.52	-20.45	QP
0.247	28.44	10.22	38.66	51.86	-13.20	Average
0.247	31.23	10.22	41.45	61.86	-20.41	QP
0.595	19.78	10.23	30.01	46.00	-15.99	Average
0.595	31.90	10.23	42.13	56.00	-13.87	QP
1.619	14.55	10.33	24.88	46.00	-21.12	Average
1.619	21.91	10.33	32.24	56.00	-23.76	QP
9.302	6.82	11.79	18.61	50.00	-31.39	Average
9.302	12.58	11.79	24.37	60.00	-35.63	QP
11.996	6.79	12.45	19.24	50.00	-30.76	Average
11.996	12.16	12.45	24.61	60.00	-35.39	QP

Model No.	MZ-123BT	Test Mode	Aux in
Environmental Conditions	25℃, 56% RH	Resolution Bandwidth	9 kHz
Tested by	Jeremy Zhong		

NEUTRAL

(The chart below shows the highest readings taken from the final data.)



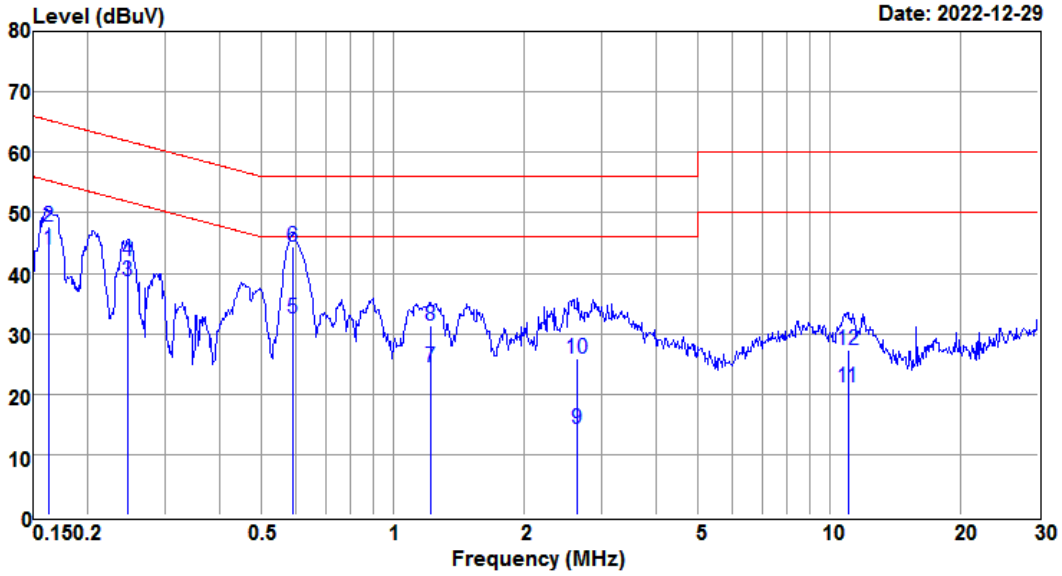
Freq	Reading Level	C.F	Result	Limit	Over Limit	Detector
MHz	dBuV	dB	dBuV	dBuV	dB	
0.160	25.38	10.22	35.60	55.47	-19.87	Average
0.160	35.27	10.22	45.49	65.47	-19.98	QP
0.242	25.01	10.22	35.23	52.04	-16.81	Average
0.242	30.12	10.22	40.34	62.04	-21.70	QP
0.595	24.51	10.24	34.75	46.00	-11.25	Average
0.595	32.90	10.24	43.14	56.00	-12.86	QP
1.480	14.33	10.31	24.64	46.00	-21.36	Average
1.480	22.03	10.31	32.34	56.00	-23.66	QP
9.059	6.02	11.92	17.94	50.00	-32.06	Average
9.059	12.83	11.92	24.75	60.00	-35.25	QP
11.870	7.79	12.63	20.42	50.00	-29.58	Average
11.870	13.20	12.63	25.83	60.00	-34.17	QP

Test Voltage: AC 120V, 60Hz

Model No.	MZ-123BT	**Test Mode**	Bluetooth
Environmental Conditions	25℃, 56% RH	**Resolution Bandwidth**	9 kHz
Tested by	Jeremy Zhong		

LINE

(The chart below shows the highest readings taken from the final data.)

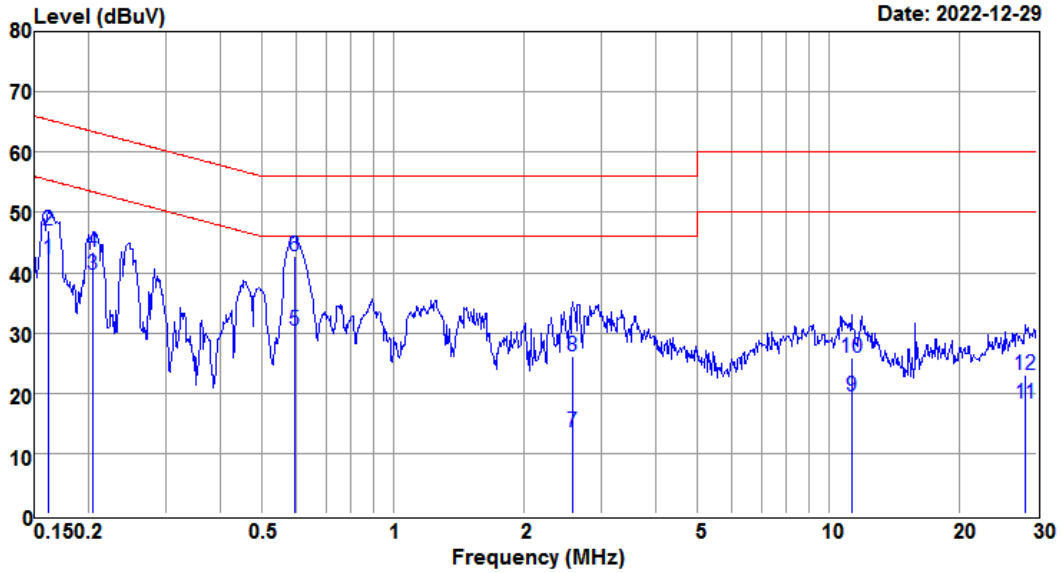


Freq	Reading Level	C.F	Result	Limit	Over Limit	Detector
MHz	dBuV	dB	dBuV	dBuV	dB	
0.163	33.76	10.22	43.98	55.30	-11.32	Average
0.163	37.44	10.22	47.66	65.30	-17.64	QP
0.247	28.44	10.22	38.66	51.86	-13.20	Average
0.247	31.82	10.22	42.04	61.86	-19.82	QP
0.589	22.30	10.23	32.53	46.00	-13.47	Average
0.589	34.06	10.23	44.29	56.00	-11.71	QP
1.223	14.09	10.29	24.38	46.00	-21.62	Average
1.223	21.17	10.29	31.46	56.00	-24.54	QP
2.650	3.81	10.45	14.26	46.00	-31.74	Average
2.650	15.34	10.45	25.79	56.00	-30.21	QP
11.021	9.05	12.20	21.25	50.00	-28.75	Average
11.021	15.15	12.20	27.35	60.00	-32.65	QP

Model No.	MZ-123BT	Test Mode	Bluetooth
Environmental Conditions	25℃, 56% RH	Resolution Bandwidth	9 kHz
Tested by	Jeremy Zhong		

NEUTRAL

(The chart below shows the highest readings taken from the final data.)



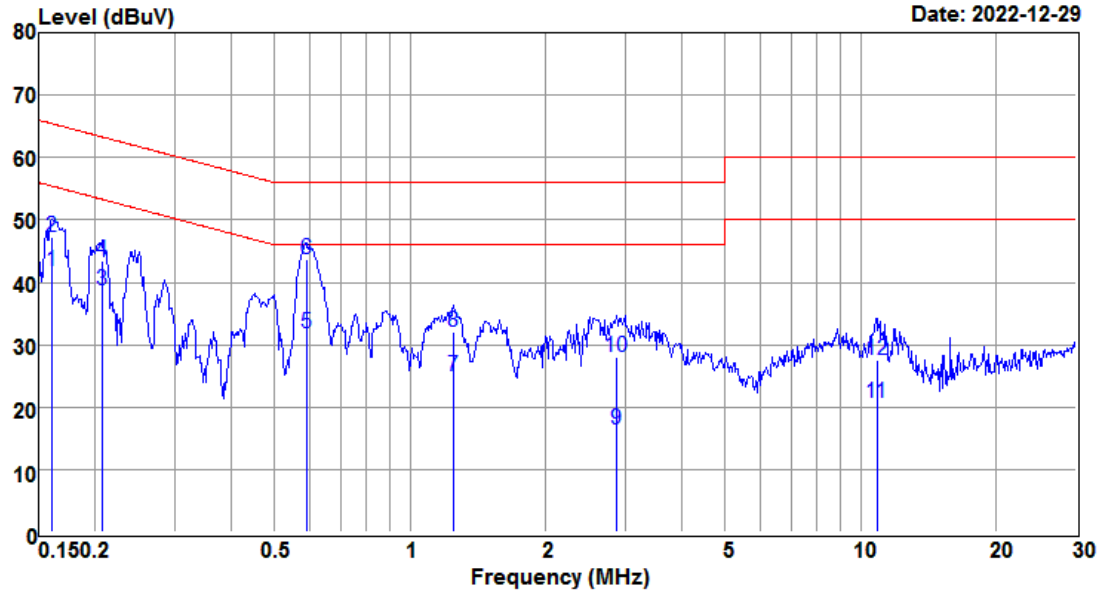
Freq	Reading Level	C.F	Result	Limit	Over Limit	Detector
MHz	dBuV	dB	dBuV	dBuV	dB	
0.162	31.94	10.22	42.16	55.38	-13.22	Average
0.162	36.77	10.22	46.99	65.38	-18.39	QP
0.204	29.45	10.22	39.67	53.45	-13.78	Average
0.204	33.35	10.22	43.57	63.45	-19.88	QP
0.595	20.22	10.24	30.46	46.00	-15.54	Average
0.595	32.56	10.24	42.80	56.00	-13.20	QP
2.581	3.02	10.45	13.47	46.00	-32.53	Average
2.581	15.74	10.45	26.19	56.00	-29.81	QP
11.257	6.90	12.48	19.38	50.00	-30.62	Average
11.257	13.37	12.48	25.85	60.00	-34.15	QP
28.302	1.74	16.54	18.28	50.00	-31.72	Average
28.302	6.61	16.54	23.15	60.00	-36.85	QP

Test Voltage: AC 120V, 60Hz

Model No.	MZ-123BT	**Test Mode**	Line input
Environmental Conditions	25℃, 56% RH	**Resolution Bandwidth**	9 kHz
Tested by	Jeremy Zhong		

LINE

(The chart below shows the highest readings taken from the final data.)

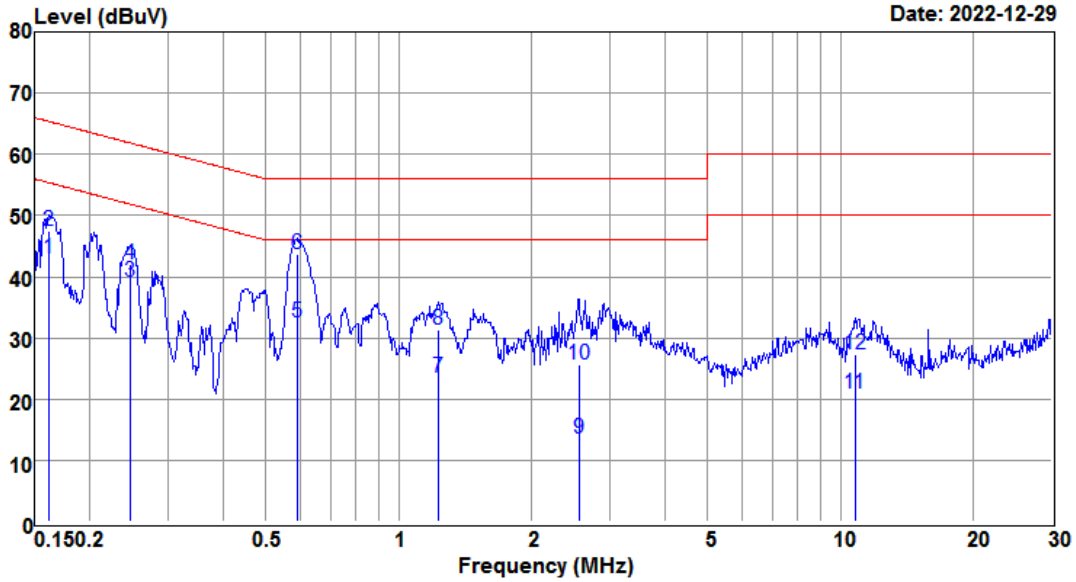


Freq	Reading Level	C.F	Result	Limit	Over Limit	Detector
MHz	dBuV	dB	dBuV	dBuV	dB	
0.161	31.54	10.22	41.76	55.43	-13.67	Average
0.161	36.97	10.22	47.19	65.43	-18.24	QP
0.207	28.49	10.22	38.71	53.32	-14.61	Average
0.207	33.23	10.22	43.45	63.32	-19.87	QP
0.589	21.57	10.23	31.80	46.00	-14.20	Average
0.589	33.55	10.23	43.78	56.00	-12.22	QP
1.249	14.70	10.29	24.99	46.00	-21.01	Average
1.249	21.68	10.29	31.97	56.00	-24.03	QP
2.869	5.81	10.48	16.29	46.00	-29.71	Average
2.869	17.64	10.48	28.12	56.00	-27.88	QP
10.847	8.41	12.15	20.56	50.00	-29.44	Average
10.847	15.40	12.15	27.55	60.00	-32.45	QP

Model No.	MZ-123BT	Test Mode	Line input
Environmental Conditions	25℃, 56% RH	Resolution Bandwidth	9 kHz
Tested by	Jeremy Zhong		

NEUTRAL

(The chart below shows the highest readings taken from the final data.)



Freq MHz	Reading Level dBuV	C.F dB	Result dBuV	Limit dBuV	Over Limit dB	Detector
0.162	32.85	10.22	43.07	55.38	-12.31	Average
0.162	37.32	10.22	47.54	65.38	-17.84	QP
0.247	28.86	10.22	39.08	51.86	-12.78	Average
0.247	31.70	10.22	41.92	61.86	-19.94	QP
0.589	22.30	10.24	32.54	46.00	-13.46	Average
0.589	33.49	10.24	43.73	56.00	-12.27	QP
1.229	13.10	10.30	23.40	46.00	-22.60	Average
1.229	20.95	10.30	31.25	56.00	-24.75	QP
2.554	2.99	10.44	13.43	46.00	-32.57	Average
2.554	15.16	10.44	25.60	56.00	-30.40	QP
10.790	8.61	12.36	20.97	50.00	-29.03	Average
10.790	14.88	12.36	27.24	60.00	-32.76	QP

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

Manufacturer: BRITO TECHNOLOGY
Type: Dipole Antenna
Model: WF1DI-2AB(C)
Gain: 2.0 dBi

=== END of Report ===