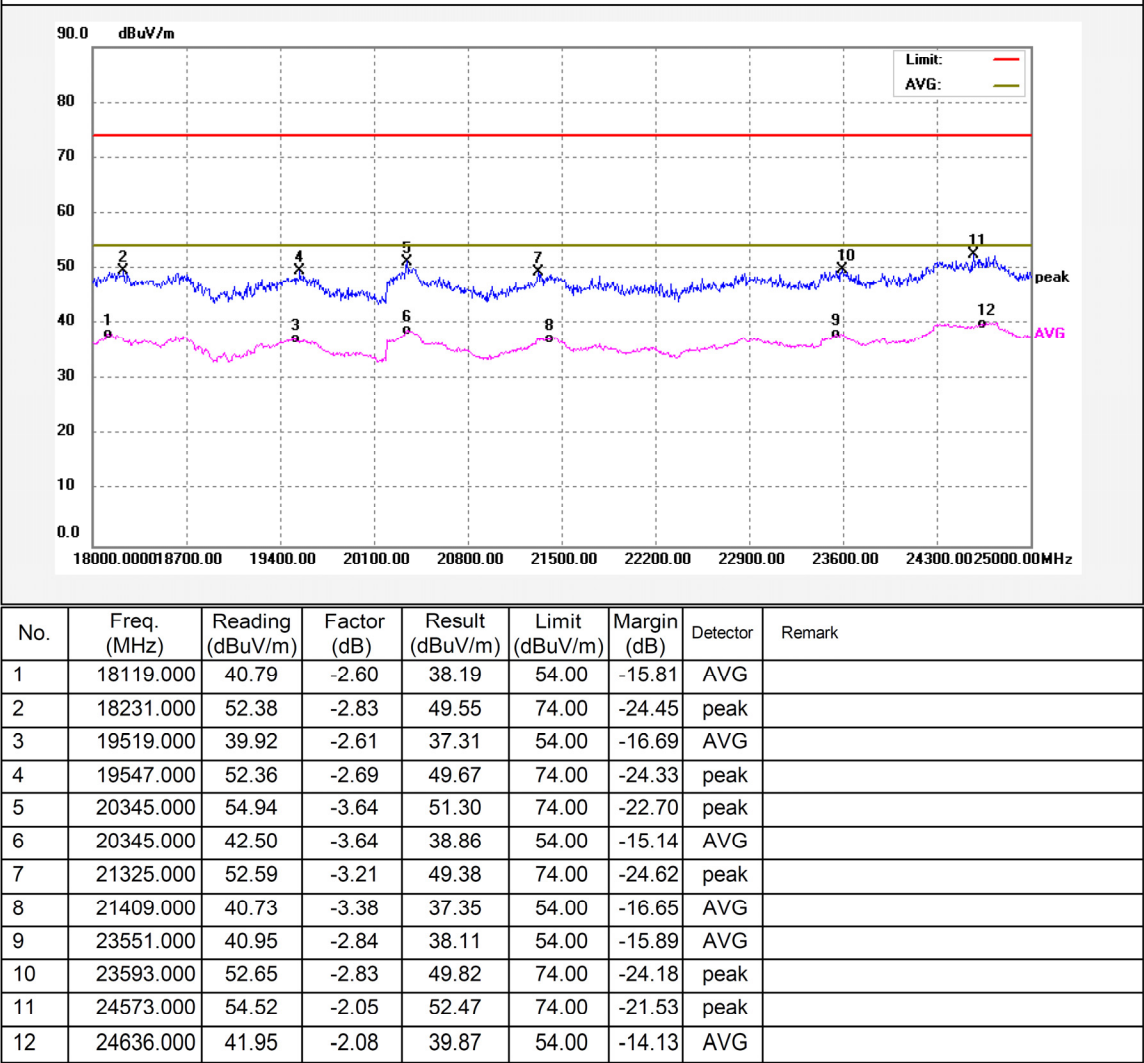
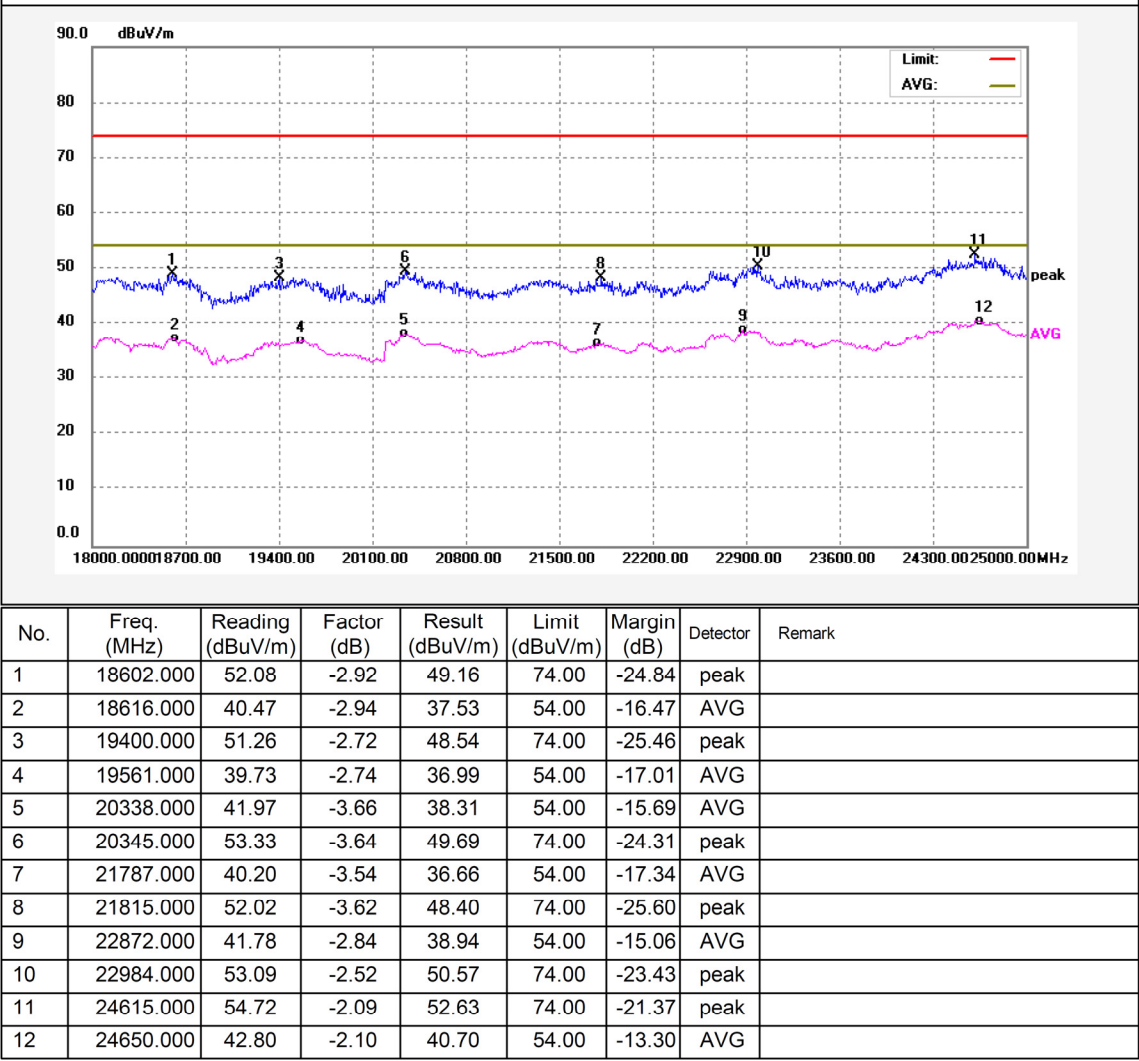


Antenna Polarization: Vertical

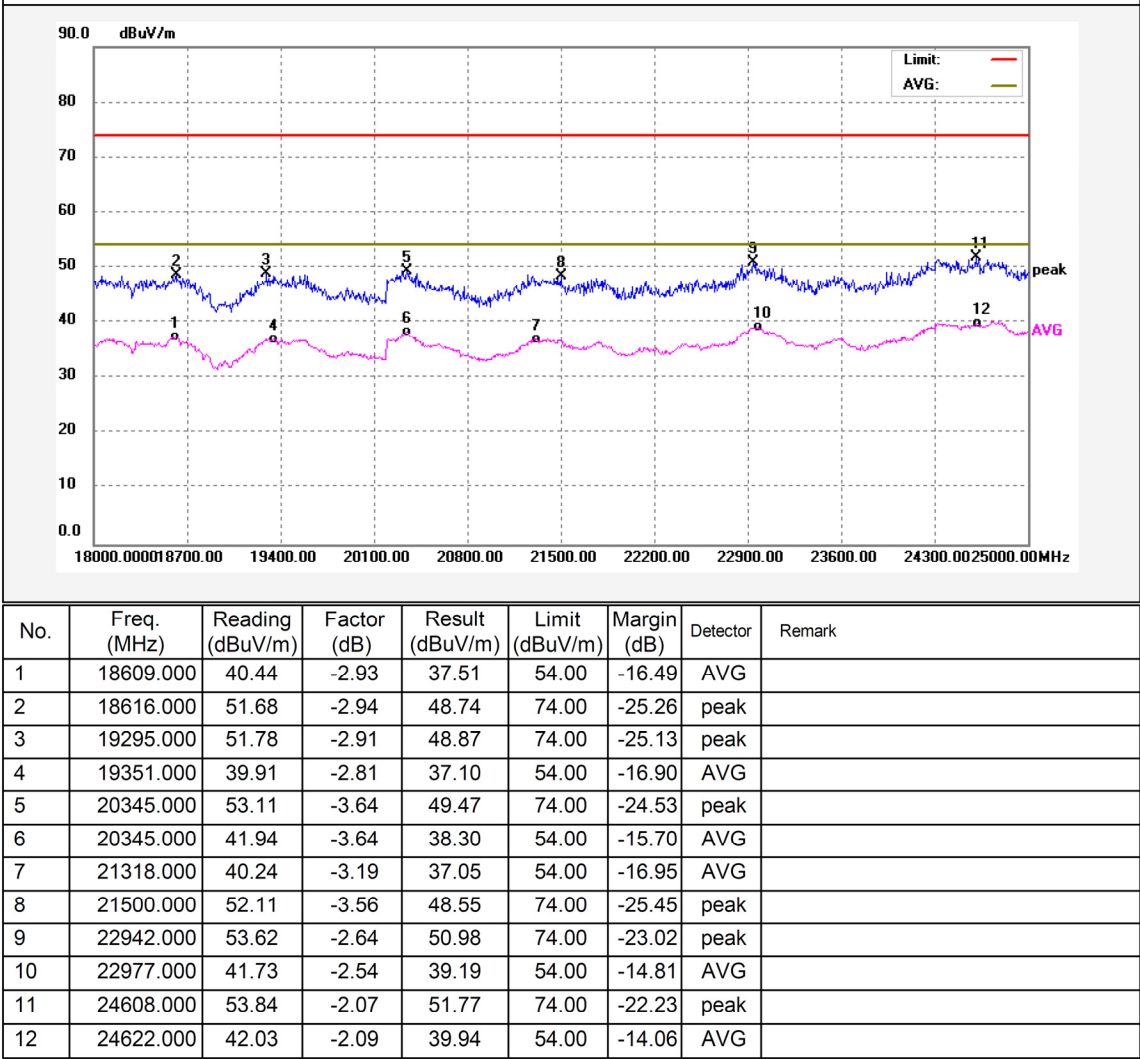


High-2480:

Antenna Polarization: Horizontal



Antenna Polarization: Vertical



9 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10-2020

Test Result: PASS

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer:

Below 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

Above 30MHz:

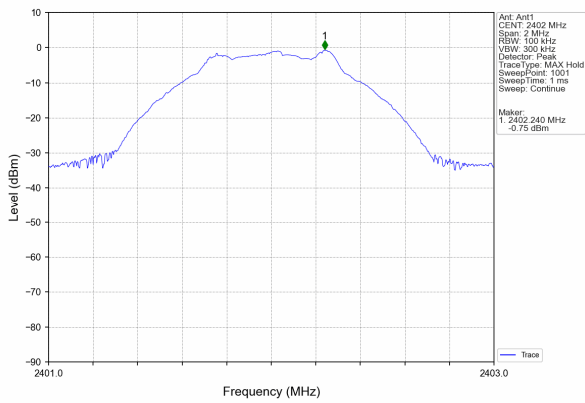
RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

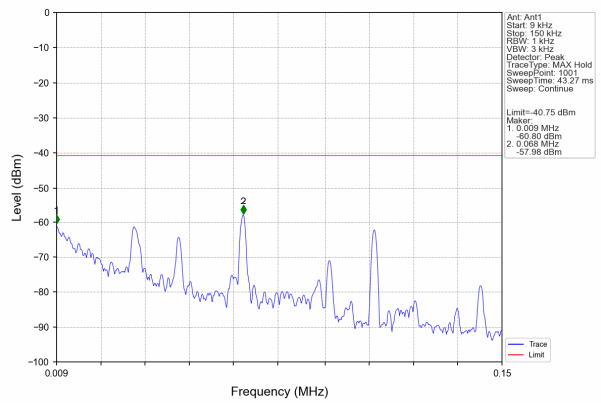
9.2 Test Result

GFSK (LE 1M)_channel 0

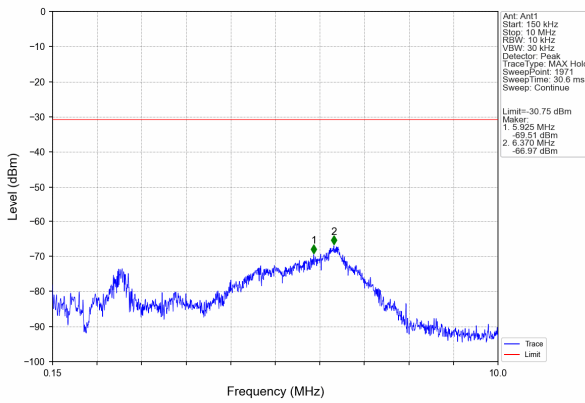
Ref



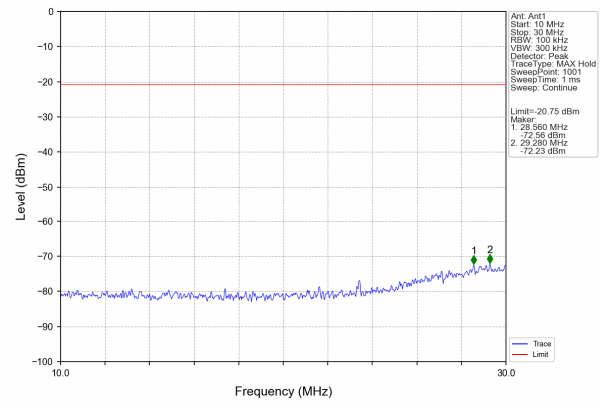
9kHz-150kHz



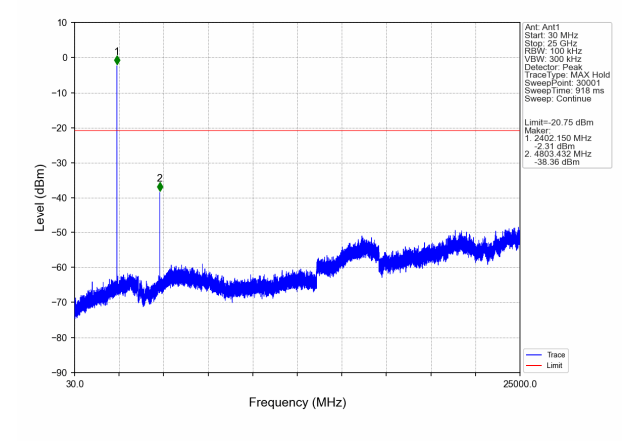
150kHz-10MHz



10MHz-30MHz

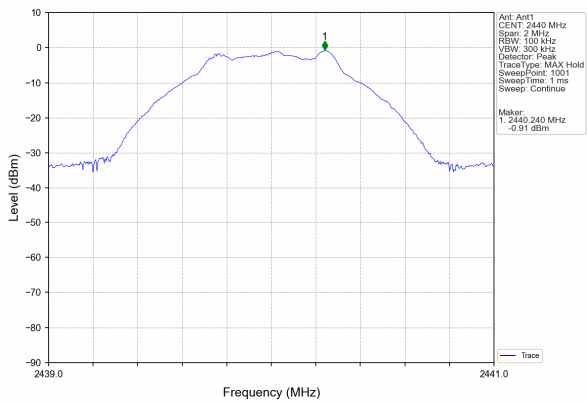


30MHz-25GHz

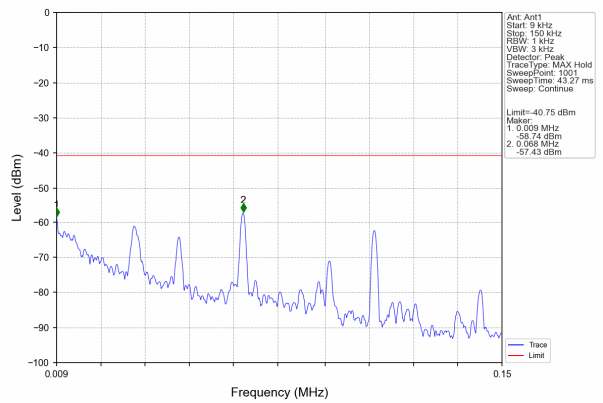


GFSK (LE 1M)_channel 19

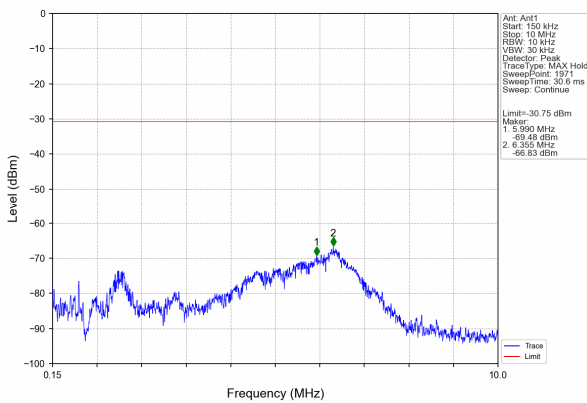
Ref



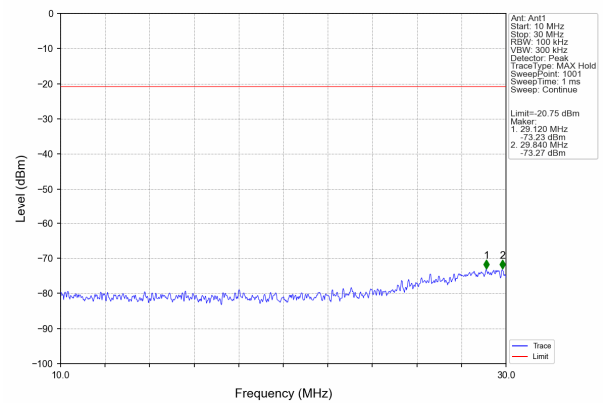
9kHz-150kHz



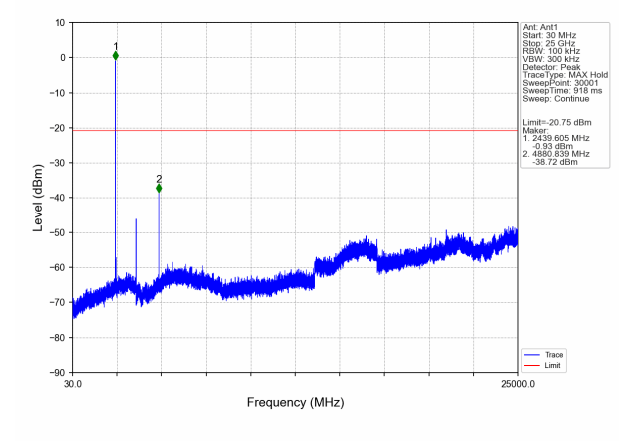
150kHz-10MHz



10MHz-30MHz

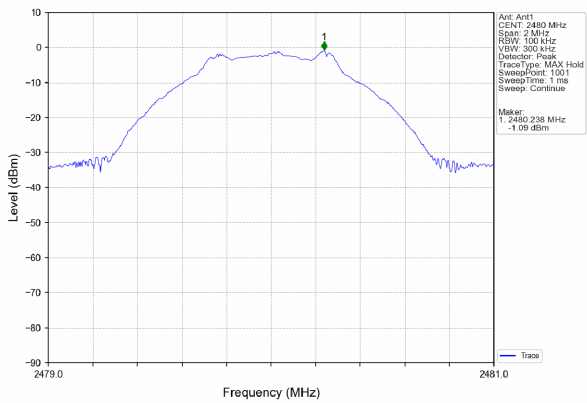


30MHz-25GHz

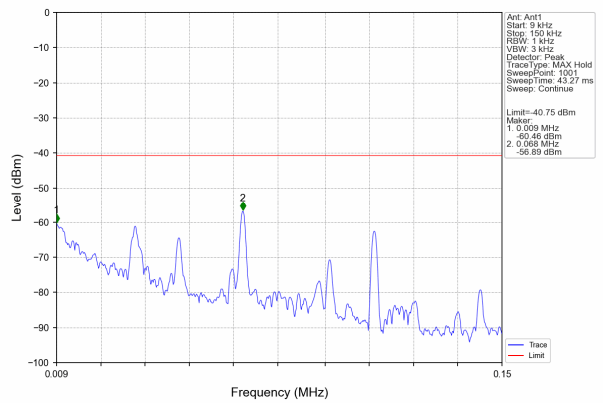


GFSK (LE 1M)_channel 39

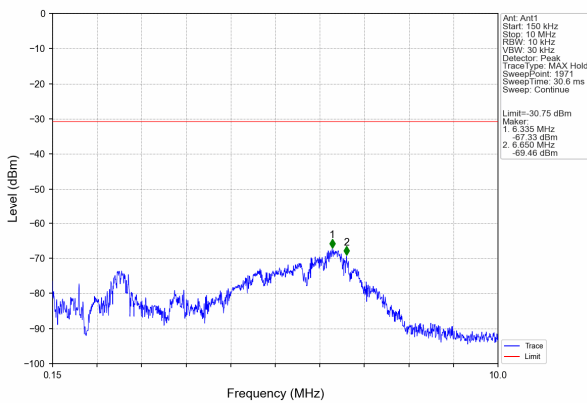
Ref



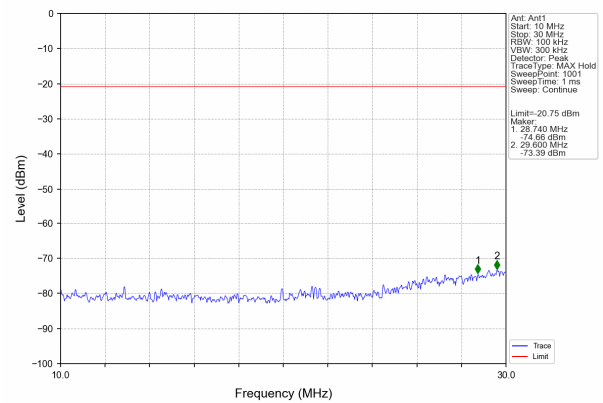
9kHz-150kHz



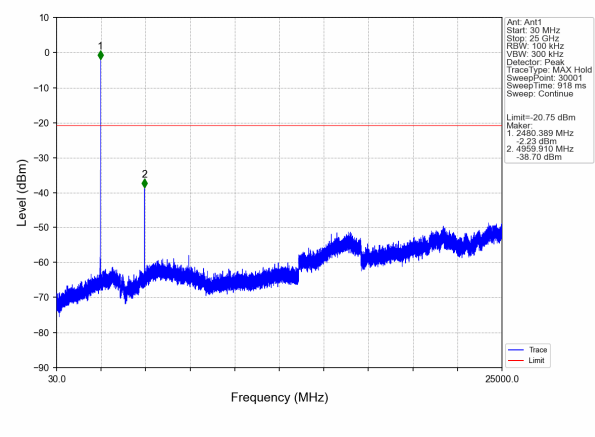
150kHz-10MHz



10MHz-30MHz

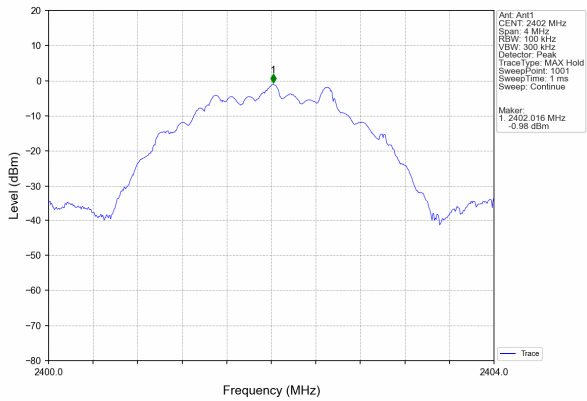


30MHz-25GHz

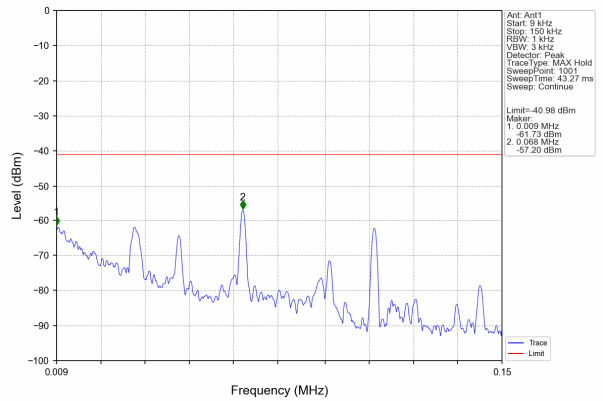


GFSK (LE 2M)_channel 0

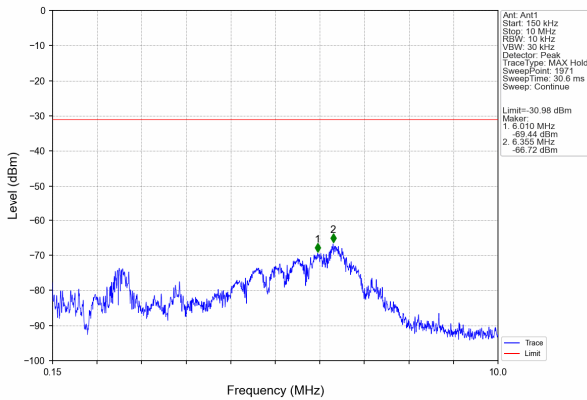
Ref



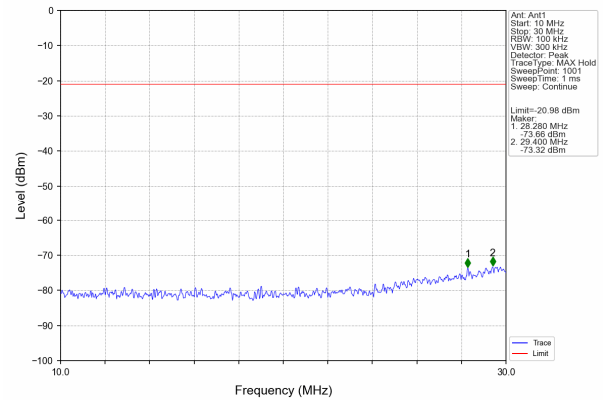
9kHz-150kHz



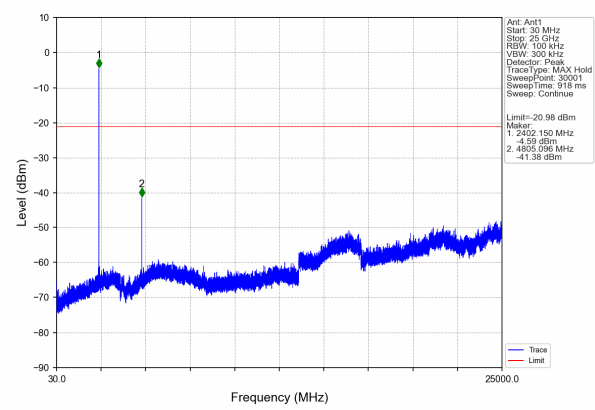
150kHz-10MHz



10MHz-30MHz

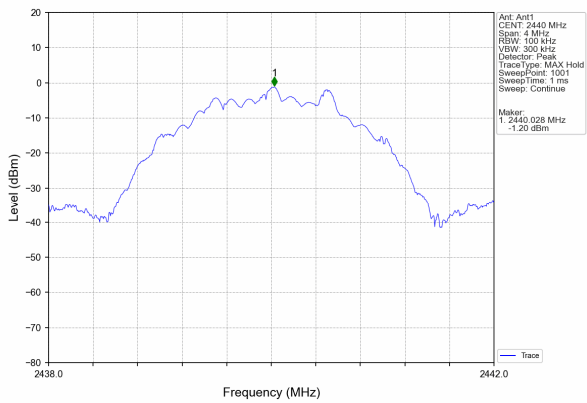


30MHz-25GHz

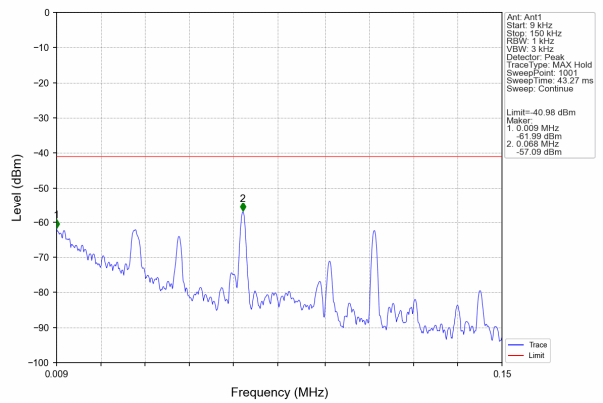


GFSK (LE 2M)_channel 19

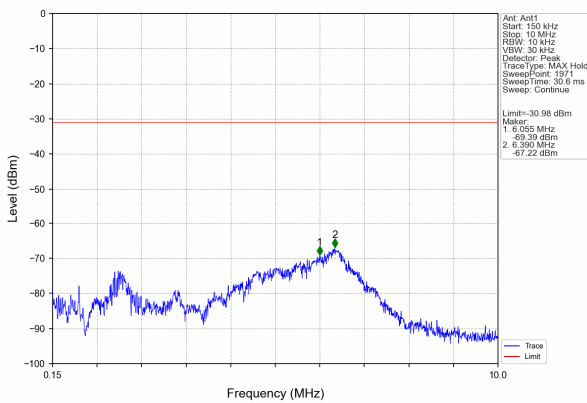
Ref



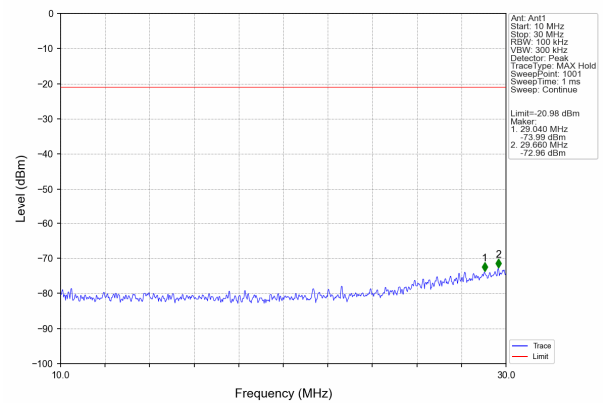
9kHz-150kHz



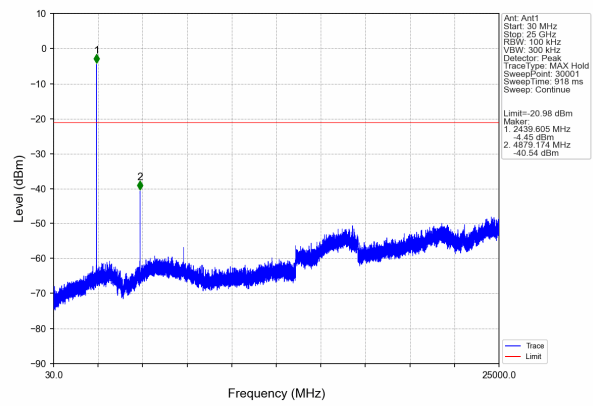
150kHz-10MHz



10MHz-30MHz

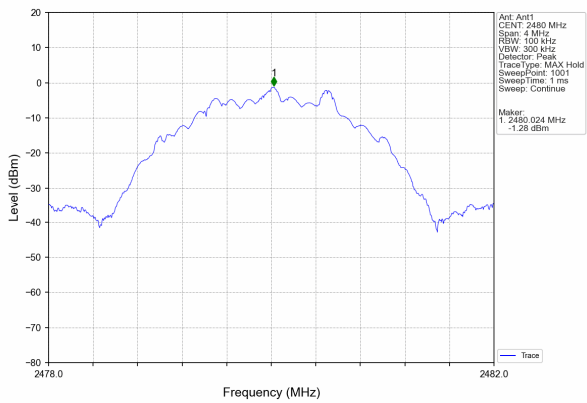


30MHz-25GHz

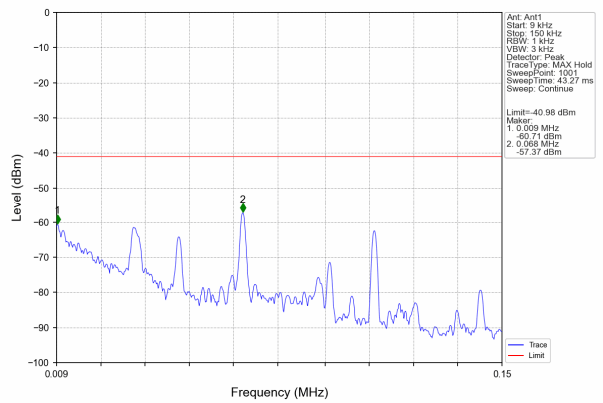


GFSK (LE 2M)_channel 39

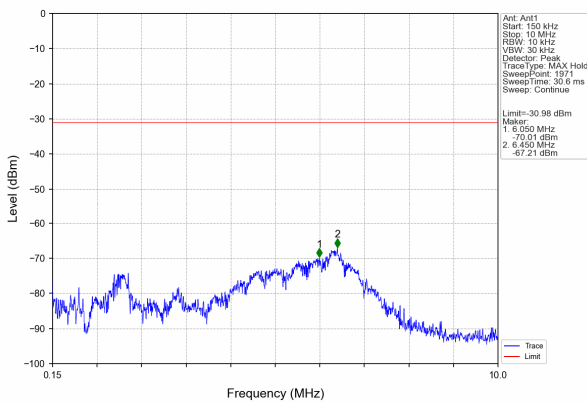
Ref



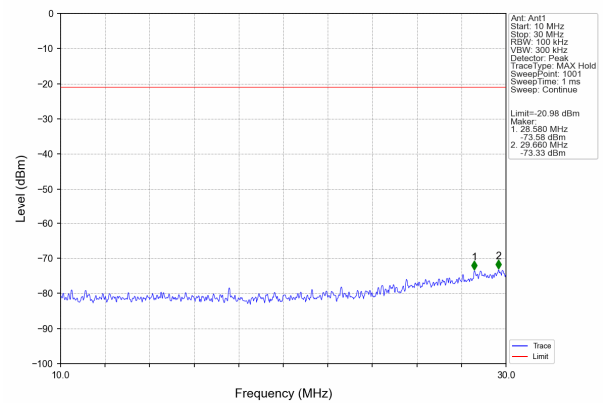
9kHz-150kHz



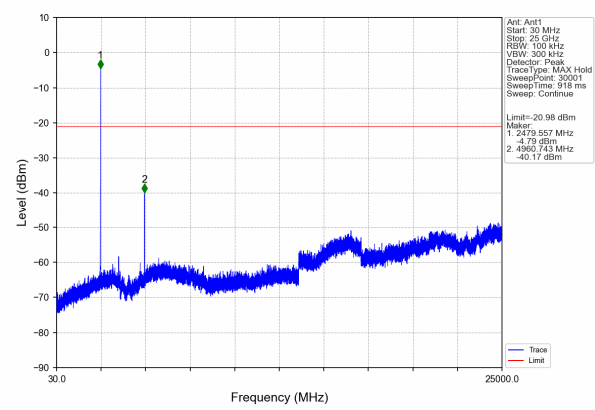
150kHz-10MHz



10MHz-30MHz



30MHz-25GHz



10 Band Edge Measurement

Test Requirement: FCC 47CFR Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019

Regulation 15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. 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)).

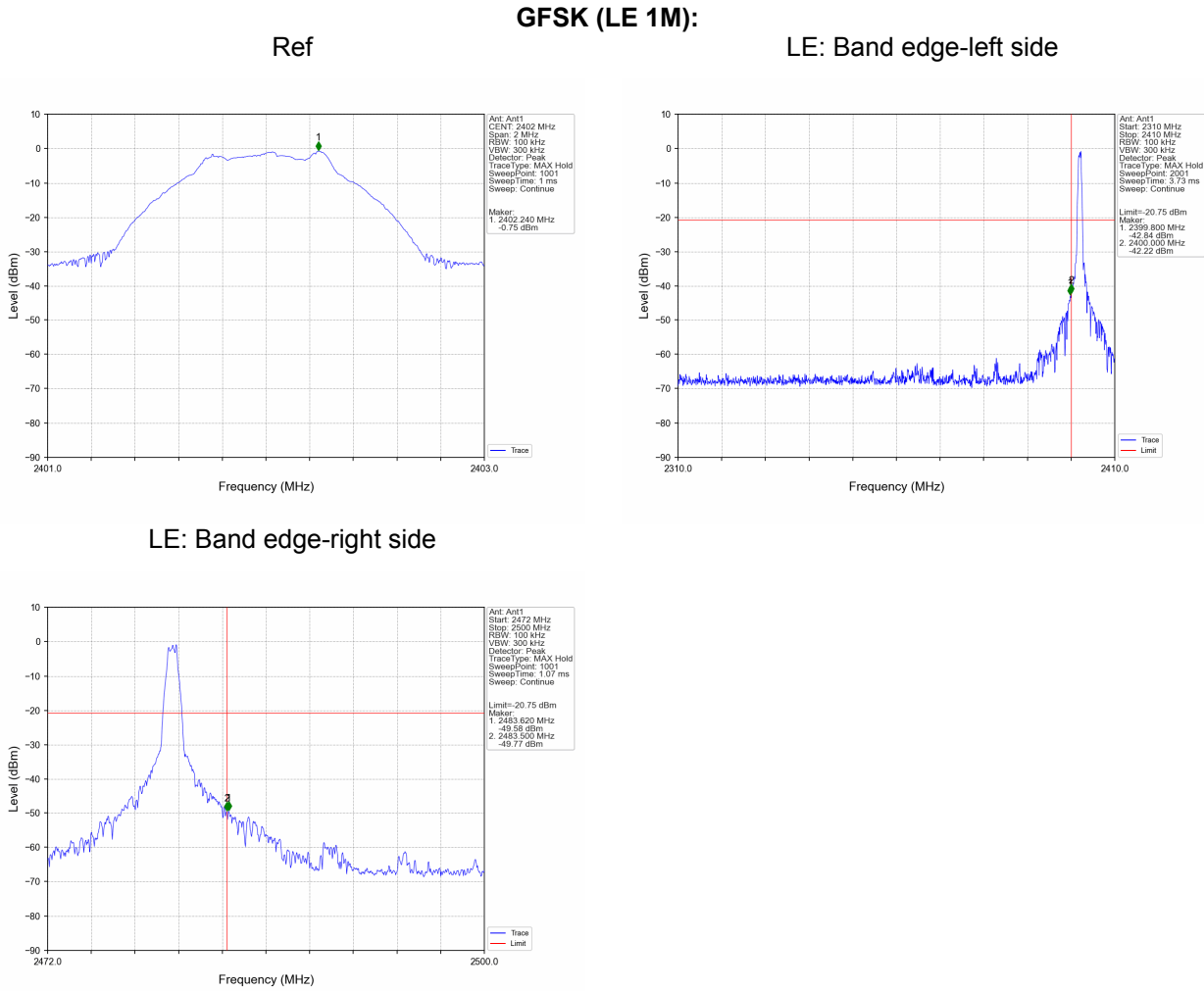
Test Mode: Transmitting

10.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

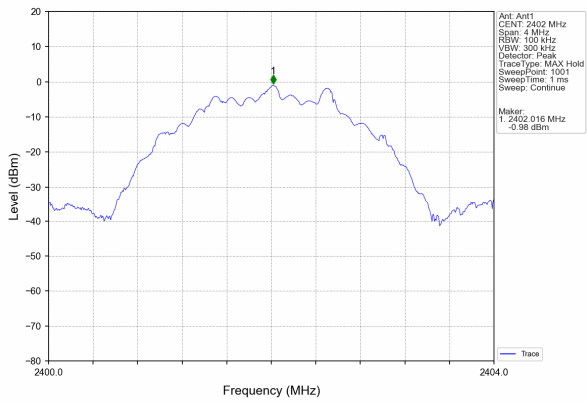
10.2 Test Result

Test result plots shown as follows:

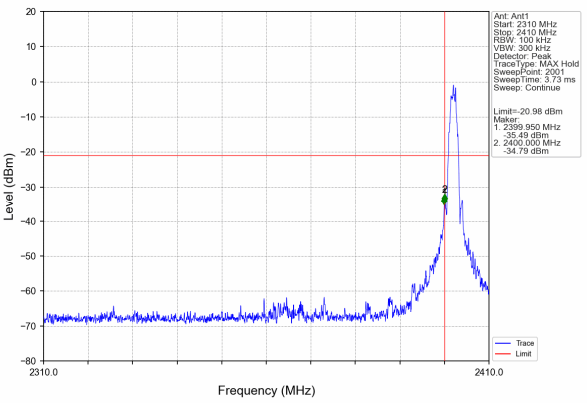


GFSK (LE 2M):

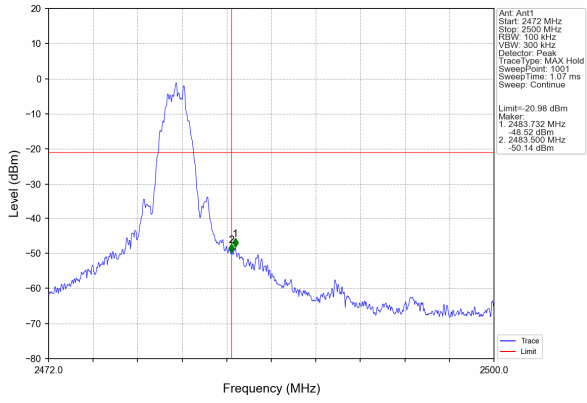
Ref



LE: Band edge-left side



LE: Band edge-right side



11 6 dB Bandwidth Measurement

Test Requirement: FCC 47CFR Part 15 Section 15.247
 Test Method: ANSI C63.10-2020
 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
 Test Limit: §15.247(a)(2)
 Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
 Test Mode: Transmitting

11.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. 6dB Bandwidth Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

11.2 Test Result

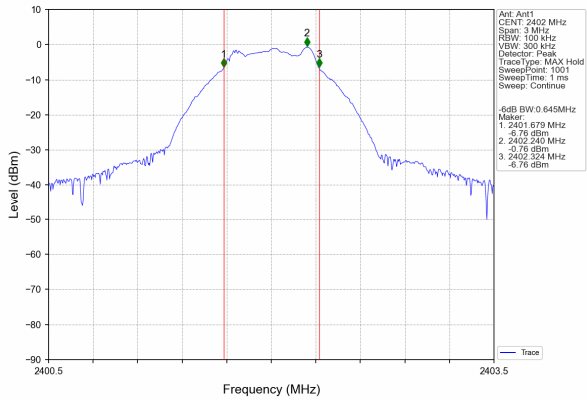
Operation mode	Test Channel	6dB Bandwidth (MHz)
GFSK (LE 1M)	Channel 0	0.645
	Channel 19	0.645
	Channel 39	0.646
GFSK (LE 2M)	Channel 0	1.162
	Channel 19	1.147
	Channel 39	1.152

Note: please refer to next page for test plot.

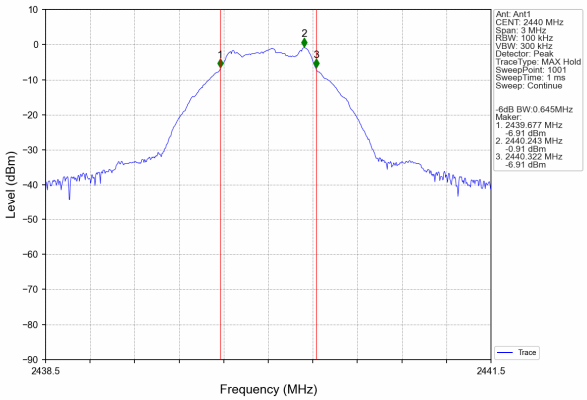
Test result plot:

GFSK (LE 1M):

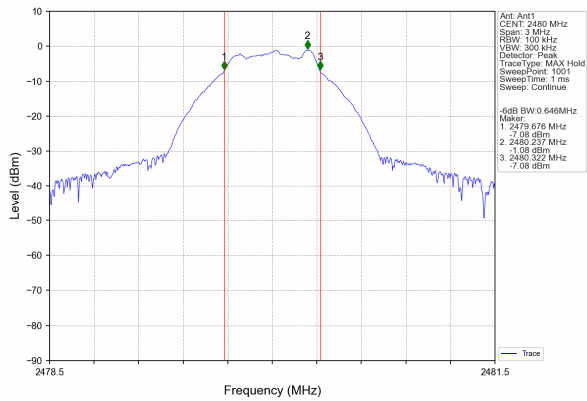
Mode: TX GFSK channel 0



Mode: TX GFSK channel 19

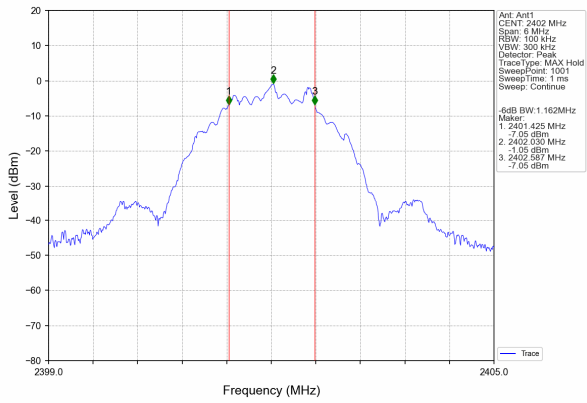


Mode: TX GFSK channel 39

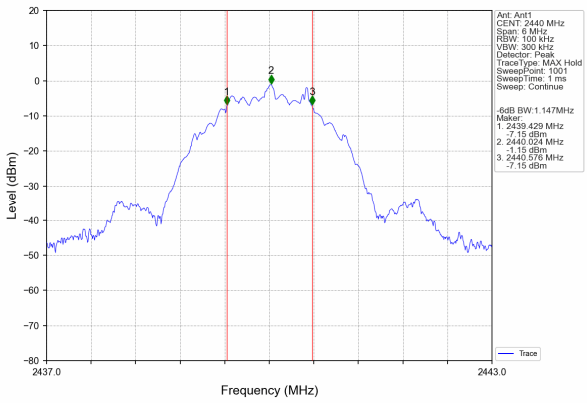


GFSK (LE 2M):

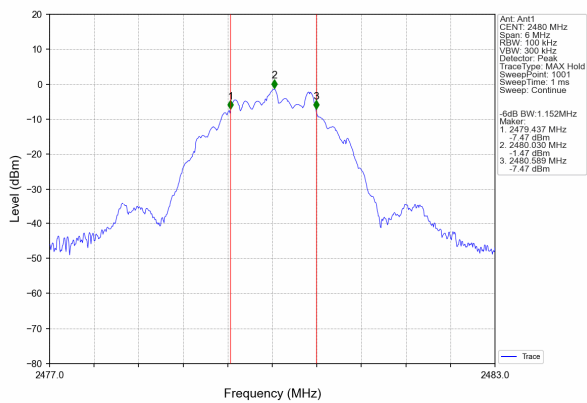
Mode: TX GFSK channel 0



Mode: TX GFSK channel 19



Mode: TX GFSK channel 39



12 Maximum Peak Output Power

Test Requirement:	FCC 47CFR Part 15 Section 15.247
Test Method:	ANSI C63.10-2020 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
Test Limit:	§15.247(b) The maximum peak conducted output power of the intentional radiator shall not exceed 1W.
Test Mode:	Transmitting

12.1 Test Procedure

According to KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019

Section 8.3.1.1 RBW $\geq$ DTS bandwidth

Subclause 11.9.1.1 of ANSI C63.10 is applicable.

Section 8.3.1.2 Integrated band power method

For measuring the output power of a device transmitting a wide-band noise-like signal where the peak power amplitude is a statistical parameter, the preferred methodology is to use an integrated average power measurement, as described in 8.3.2. The peak integrated band power method of 11.9.1 in ANSI C63.10 is not applicable.

Subclause 11.9.2 of ANSI C63.10 is applicable.

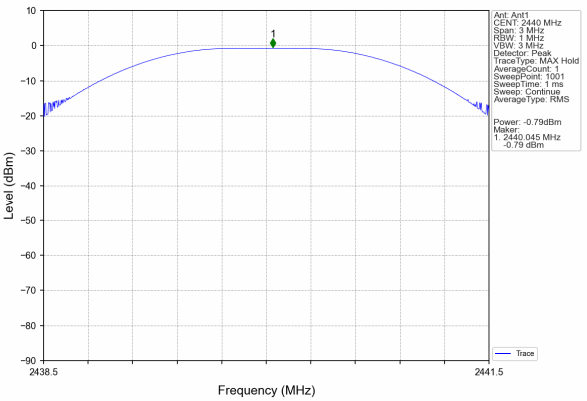
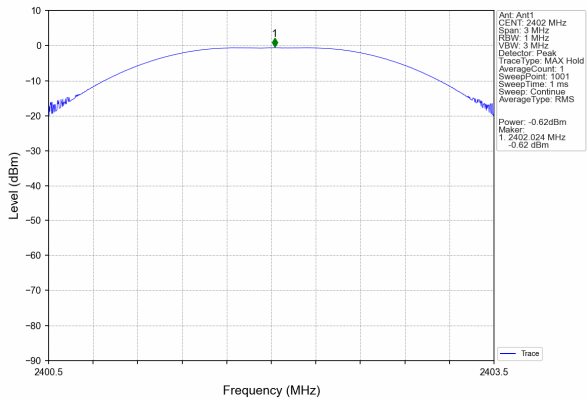
12.2 Test Result

Operation mode	Channel Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
GFSK (LE 1M)	Low-2402	-0.62	1W/30dBm
	Middle-2440	-0.79	1W/30dBm
	High-2480	-0.91	1W/30dBm
GFSK (LE 2M)	Low-2402	-0.62	1W/30dBm
	Middle-2440	-0.76	1W/30dBm
	High-2480	-0.91	1W/30dBm

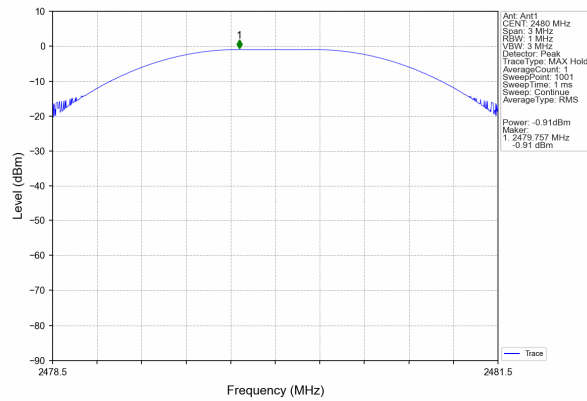
Test Plot
GFSK (LE 1M):

Mode: TX GFSK channel 0

Mode: TX GFSK channel 19

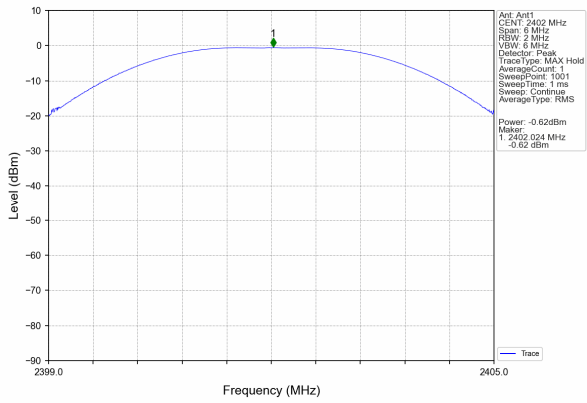


Mode: TX GFSK channel 39

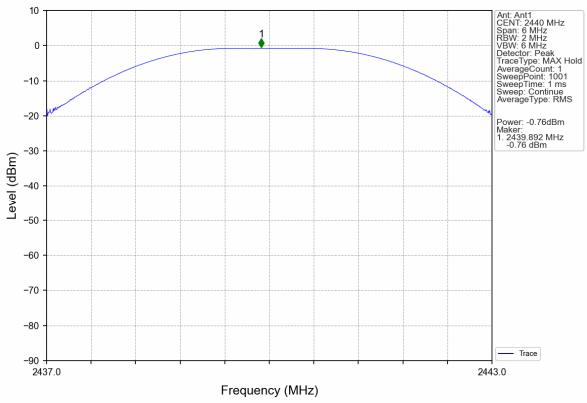


GFSK (LE 2M):

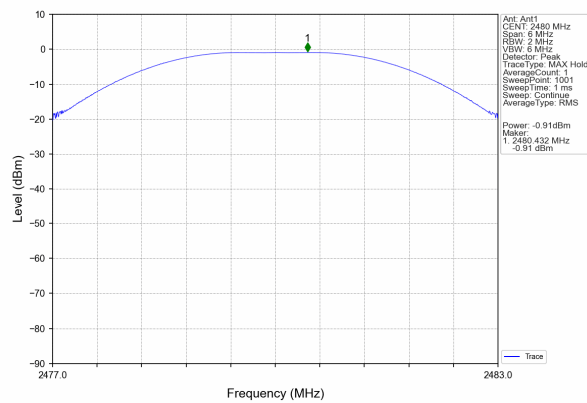
Mode: TX GFSK channel 0



Mode: TX GFSK channel 19



Mode: TX GFSK channel 39



13 Power Spectral Density

Test Requirement:	FCC 47CFR Part 15 Section 15.247
Test Method:	ANSI C63.10-2020 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
Test Limit:	§15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
Test Mode:	Transmitting

13.1 Test Procedure

According to KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 section 8.4

Subclause 11.10 of ANSI C63.10 is applicable.

Choose the test procedure according to the product type

Peak PSD

Subclause 11.10.2 of ANSI C63.10 is applicable.

AVG PSD

Subclause 11.10.3/4/5/6/7/8 of ANSI C63.10 is applicable.

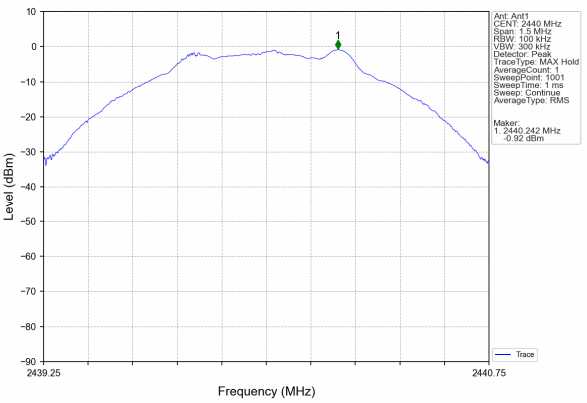
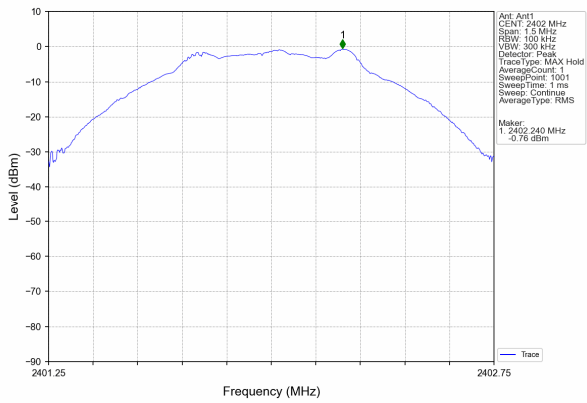
13.2 Test Result

Operation mode	Channel Frequency (MHz)	Power Spectral (dBm per 100kHz)	Power Spectral (dBm per 3kHz)	Limit
GFSK (LE 1M)	Low-2402	-0.76	-15.99	8dBm per 3kHz
	Middle-2440	-0.92	-16.15	8dBm per 3kHz
	High-2480	-1.08	-16.31	8dBm per 3kHz
GFSK (LE 2M)	Low-2402	-0.97	-16.20	8dBm per 3kHz
	Middle-2440	-1.12	-16.35	8dBm per 3kHz
	High-2480	-1.46	-16.69	8dBm per 3kHz

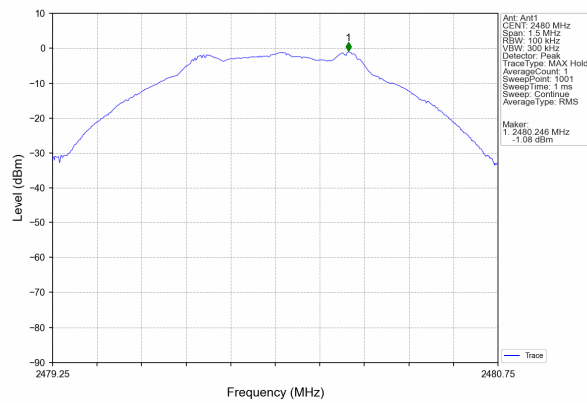
Test Plot
GFSK (LE 1M):

Mode: TX GFSK channel 0

Mode: TX GFSK channel 19

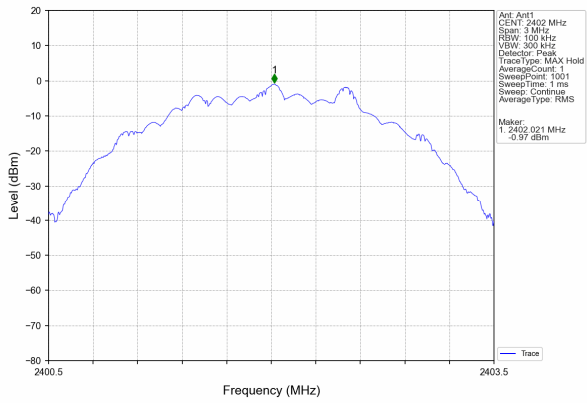


Mode: TX GFSK channel 39

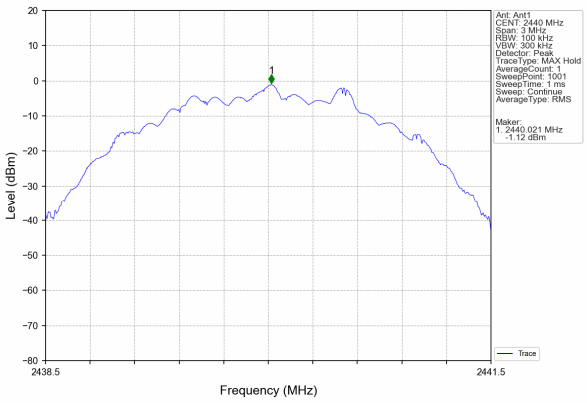


GFSK (LE 2M):

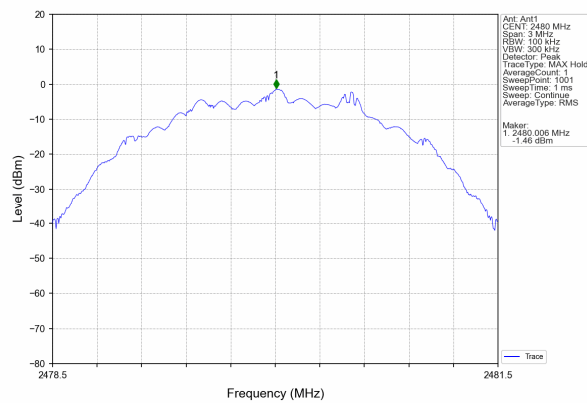
Mode: TX GFSK channel 0



Mode: TX GFSK channel 19



Mode: TX GFSK channel 39



14 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has a Ceramic Antenna fulfil the requirement of this section.

Note: Please refer to EUT photos for more details.

15 RF Exposure

Note: Please refer to RF Exposure Report: WTF26D09262957W003.

16 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-Cerelax-Pro-Photos.

=====End of Report=====