TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 22, 74, 80 and 90

TEST REPORT

For

Hytera Communications Corporation Limited

Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, 518057 China

FCC ID:YAMBD61XU1S

Report Type:	**Product Type:**
Original Report	DIGITAL PORTABLE RADIO

Report Number:	RDG210330015-00A
Report Date:	2021-05-25
Reviewed By:	Ivan Cao Assistant Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		DIGITAL PORTABLE RADIO
EUT Model:		BD615 U(1)
Multiple Models:		BD612 U(1), BD616 U(1), BD618 U(1)
Modulation Type:		FM/4FSK
Channel Spacing:		12.5 kHz/25kHz
Frequency Range:		400-470 MHz
Rated Output Power: (Conducted)		High Power Level: 4W Low Power Level: 1W
Rated Input Voltage:		DC 7.2V from battery
Adapter Information	**Model:**	HKA01212010-XQ
	Input:	100-240V 50/60Hz 0.5A
	Output:	12V 1A 12W
Serial Number:		RDG210330015-RF-S1
EUT Received Date:		2021.03.31
EUT Received Status:		Good

Note:
Note: The series product, models BD612 U(1), BD616 U(1), BD618 U(1) and BD615 U(1) are electrically identical, the model BD615 U(1) was fully tested. The differences between them please refer to the declaration letter for details.

Objective

This test report is prepared on behalf of *Hytera Communications Corporation Limited* in accordance with Part 2, and Part 22, 74, 80 and 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

Test Methodology

All tests and measurements indicated in this document were performed in accordance with:

the Code of federal Regulations Title 47, Part 2, Part 22, Part 74, Part 80 and Part 90

ANSI C63.26-2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

TIA-603-E-2016, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz ~ 1GHz:5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory was used.

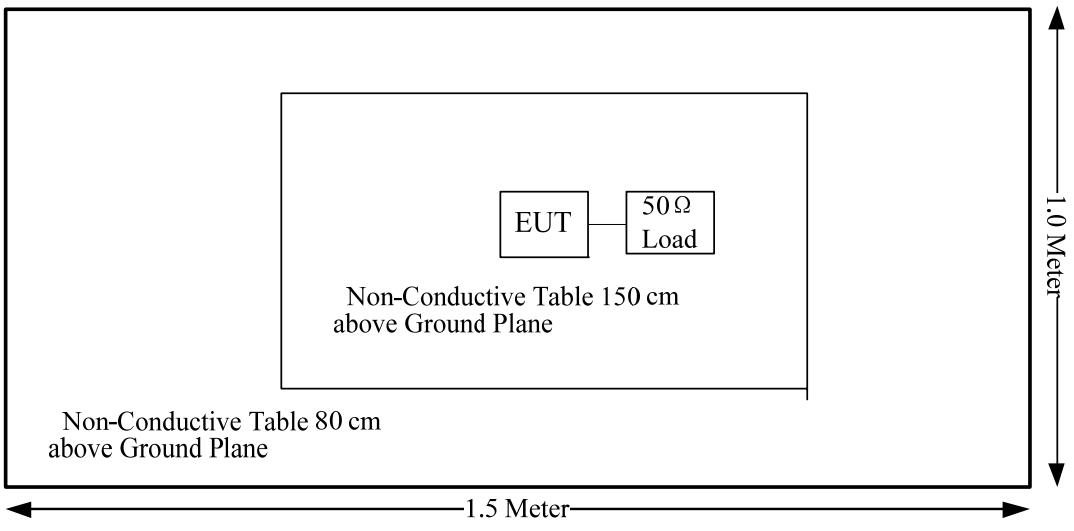
Equipment Modifications

No modification was made to the EUT tested.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
WEINSCHEL Corp	Load	50oml	50oml Load

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1310 & §2.1093	RF Exposure	Compliance
§2.1046; § 22.727; §80.215; §74.461; §90.205	RF Output Power	Compliance
§2.1047	Modulation Characteristic	Compliance
§2.1049;§22.357;§ 22.731; §74.462;§80.205; §80.207 §90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliance
§2.1051; §22.861; §74.462; §80.211;§90.210	Spurious Emission at Antenna Terminal	Compliance
§2.1053;§22.861; §74.462;§80.211;§90.210	Spurious Radiated Emissions	Compliance
§2.1055; § 22.355; §74.464; §80.209; §90.213	Frequency Stability	Compliance
§90.214	Transient Frequency Behavior	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated emissions below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-2	2020-08-25	2023-08-25
R&S	EMI Test Receiver	ESCI	100224	2020-09-12	2021-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2020-09-05	2021-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2020-09-05	2021-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2020-09-24	2021-09-24
Sonoma	Amplifier	310N	185914	2020-10-13	2021-10-13
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2020-09-05	2021-09-05
Agilent	Signal Generator	E8247C	MY43321350	2020-12-09	2021-12-08
Radiated emissions above 1GHz					
ETS-Lindgren	Horn Antenna	3115	9912-5985	2020-10-13	2023-10-12
R&S	Spectrum Analyzer	FSP 38	100478	2020-07-07	2021-07-07
HUBER+SUHNER	Coaxial Cable	SUCOFLEX 126EA	MY369/26/26EA	2020-09-25	2021-09-25
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2020-09-05	2021-09-05
Ouli	Band Rejector Filter	400-470M	087	2021-01-23	2022-01-23
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2020-09-05	2021-09-05
Agilent	Signal Generator	E8247C	MY43321350	2020-12-09	2021-12-08
RF Conducted Test					
R&S	EMI Test Receiver	ESR3	102453	2020-09-12	2021-09-12
Rohde & Schwarz	Spectrum Analyzer	FSEB	846321015	2021-04-25	2022-04-24
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201047	Each time	N/A
Weinschel	Coaxial Attenuators	53-20-34	LN749	Each time	N/A
HP	RF Communications Test Set	8920A	3438A05201	2020-07-07	2021-07-07
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2021-03-26	2022-03-26
UNI-T	Multimeter	UT39A	M130199938	2019-07-23	2021-07-23
Ouli	Band Rejector Filter	400-470M	087	2021-01-23	2022-01-23

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

FCC §1.1310 & §2.1093- RF Exposure

Applicable Standard

According to§15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Measurement Result

Result: Compliance. Please refer to the SAR report: RDG210330015-20A**.**

FCC §2.1046 & § 22.727 & §74.461 & §80.215& §90.205 - RF OUTPUT POWER

Applicable Standard

FCC §2.1046, § 22.727, §74.461, §80.215 and §90.205

Test Procedure

Conducted RF Output Power:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

R B/W	Video B/W
100 kHz	300 kHz

Test Data

Environmental Conditions

Temperature:	23.6~25.5℃
Relative Humidity:	52~69 %
ATM Pressure:	100.1~101.5 kPa
Tester:	Levi Shi
Test Date:	2021.04.27~2021.05.24

Test Mode: Transmitting

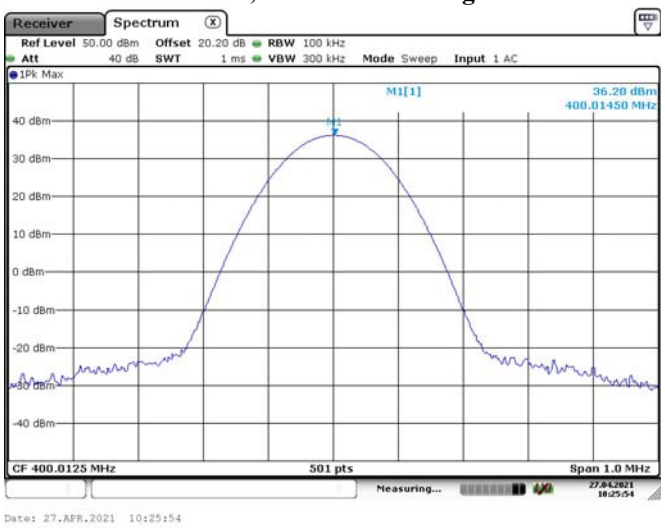
Test Result: Compliance. Please refer to following table.

Channel Separation	Test Modulation	Test Channel	Test Frequency (MHz)	Conducted Output Power (dBm)		Limit (dBm)		Note
				High Power Level	Low Power Level	High Power Level	Low Power Level	
12.5kHz	FM	Low	400.0125	36.20	30.49	36.81	30.79	For federal
		Middle	453.0125	36.70	29.38	36.81	30.79	FCC part 90
		High	469.9875	36.42	30.40	36.81	30.79	
		Additional	454.0125	36.70	29.73	36.81	30.79	FCC part 22
		Additional	455.0125	36.66	30.07	36.81	30.79	FCC part 74
	4FSK	Low	400.0125	36.17	30.38	36.81	30.79	For federal
		Middle	453.2125	36.72	29.42	36.81	30.79	FCC part 90
		High	469.9875	36.41	30.35	36.81	30.79	
		Additional	454.0125	36.65	30.17	36.81	30.79	FCC part 22
		Additional	455.0125	36.64	29.48	36.81	30.79	FCC part 74
25kHz	FM	Additional	454.0125	36.68	30.05	36.81	30.79	FCC part 22
		Additional	455.0125	36.66	30.11	36.81	30.79	FCC part 74
		Additional	459.9875	36.47	30.70	36.81	30.79	FCC part 80

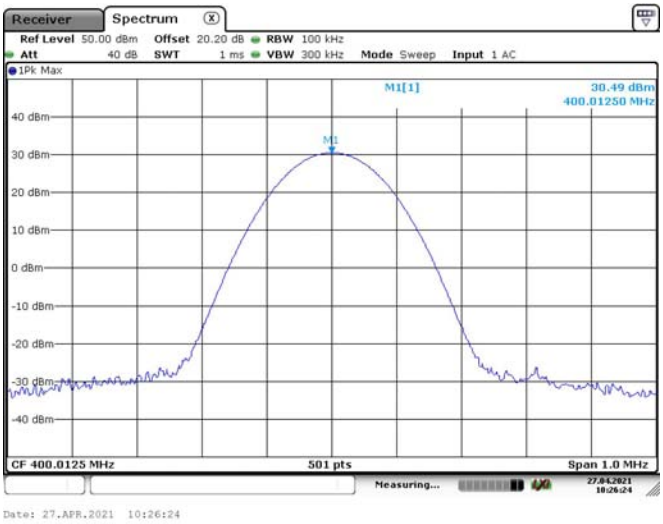
Note: The high rated power level is 4W(36dBm), and low rated power level is 1W(30dBm).
The output power shall not exceed by more than 20 percent the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

FM, 12.5kHz:

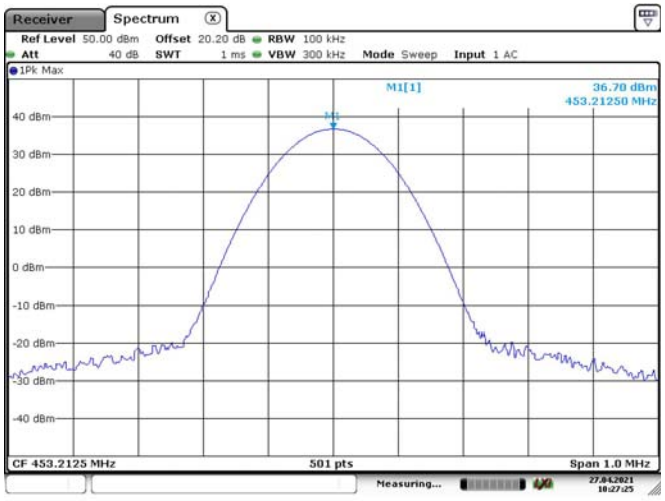
Low Channel, 400.0125 MHz High Power



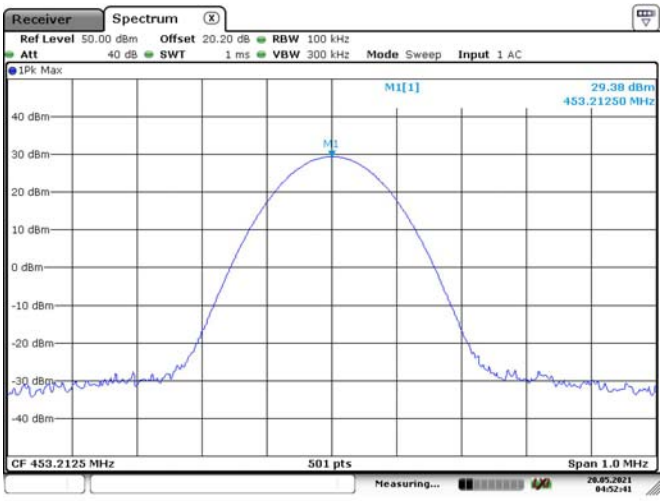
Low Channel,400.0125 MHz Low Power



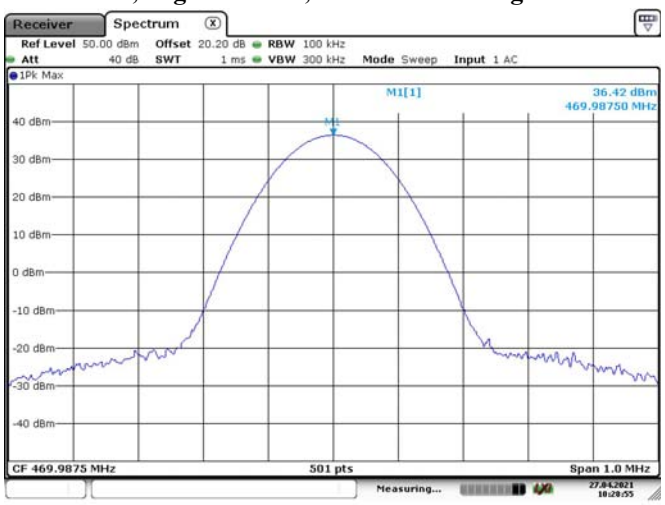
Part 90, Middle Channel,453.2125 MHz High Power



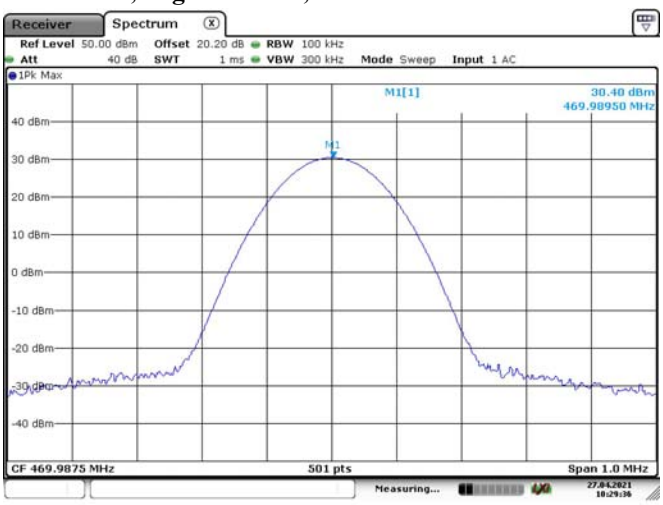
Part 90, Middle Channel,453.2125 MHz Low Power



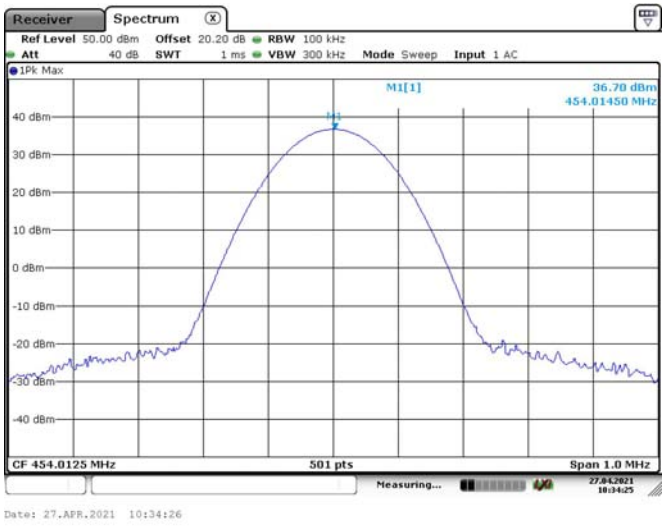
Part 90, High Channel, 469.9875MHz High Power



Part 90, High Channel, 469.9875 MHz Low Power



Additional, For Part 22, 454.0125 MHz High Power



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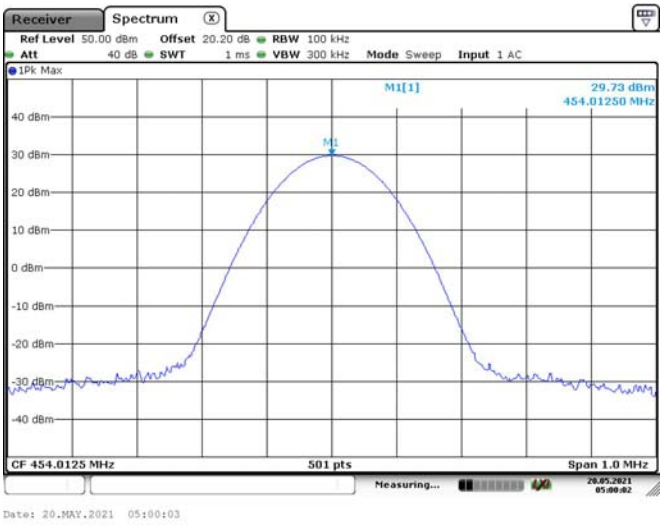
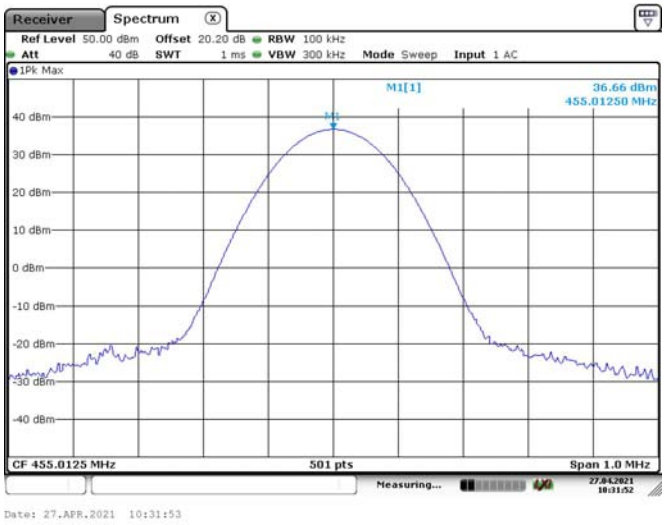


Additional, For Part 74, 455.0125 MHz High Power



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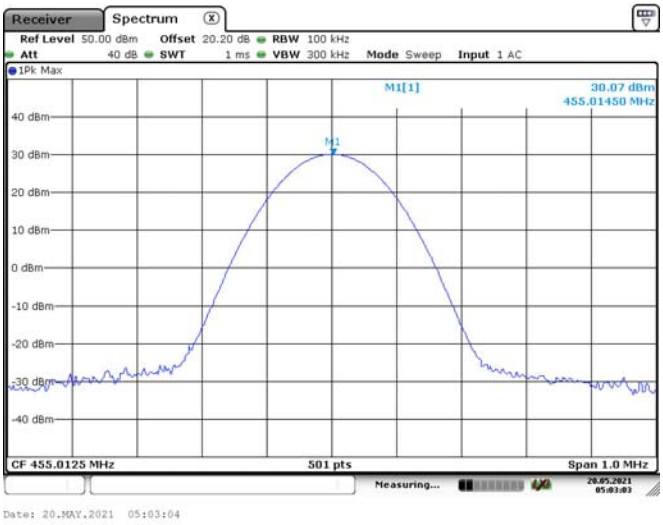
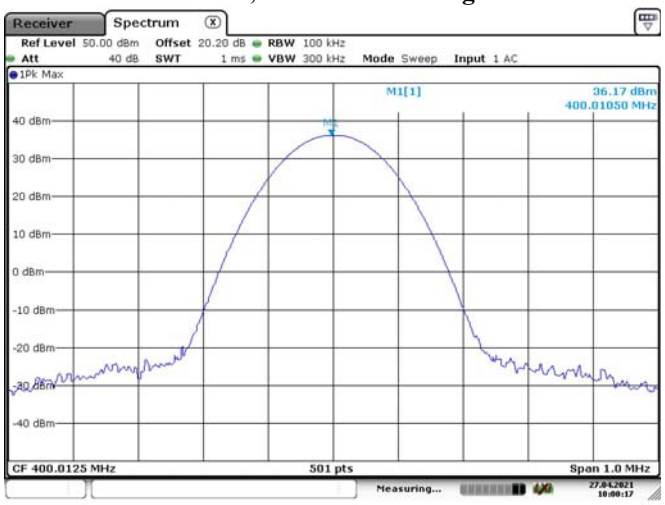
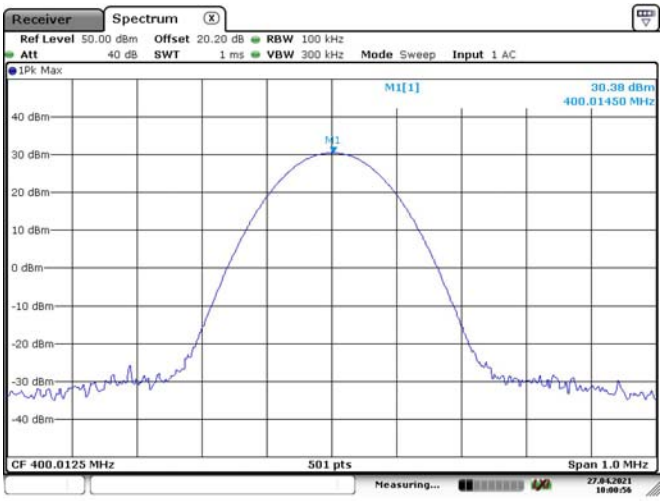


4FSK, 12.5kHz:

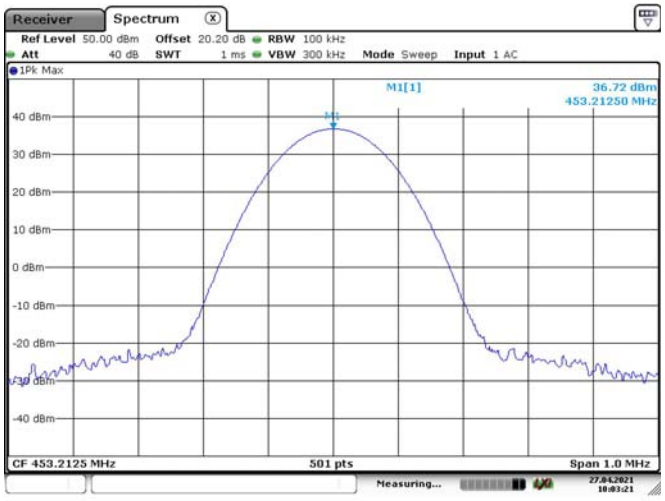
Low Channel, 400.0125 MHz High Power



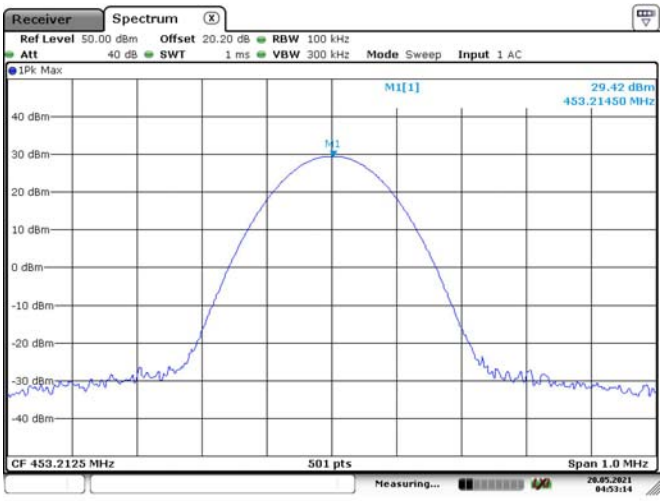
Low Channel,400.0125 MHz Low Power



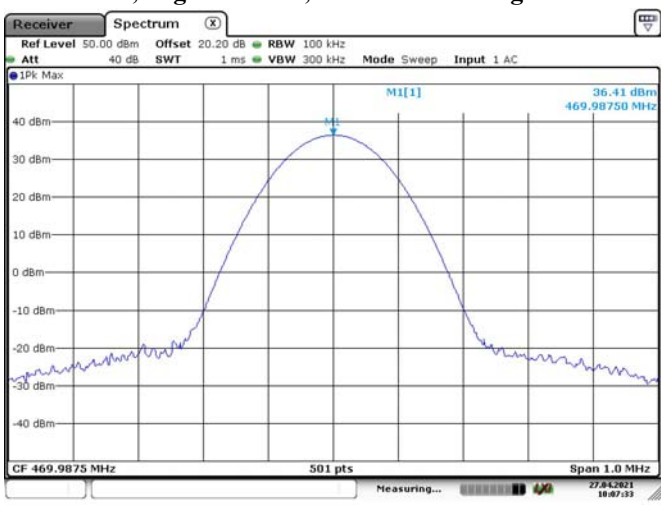
Part 90, Middle Channel,453.2125 MHz High Power



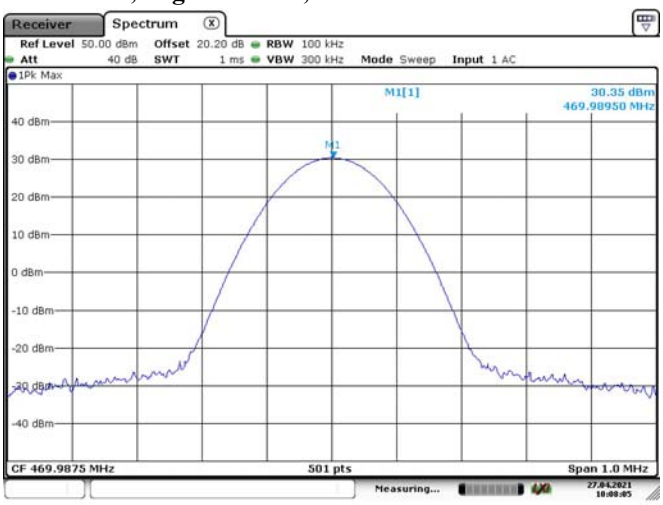
Part 90, Middle Channel,453.2125 MHz Low Power



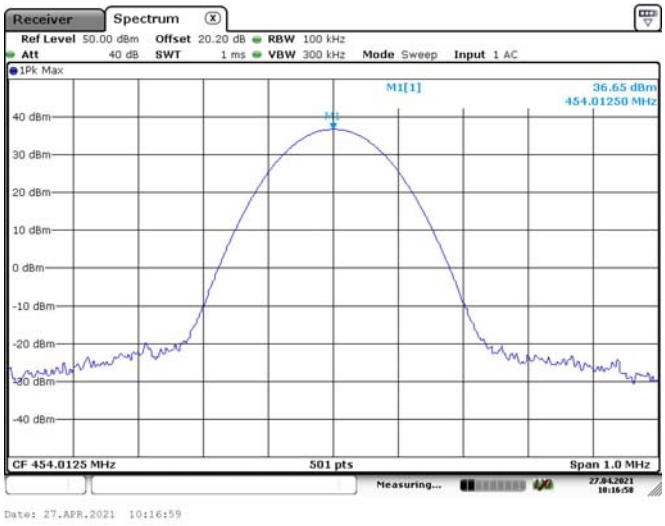
Part 90, High Channel, 469.9875MHz High Power



Part 90, High Channel, 469.9875 MHz Low Power



Additional, For Part 22, 454.0125 MHz High Power



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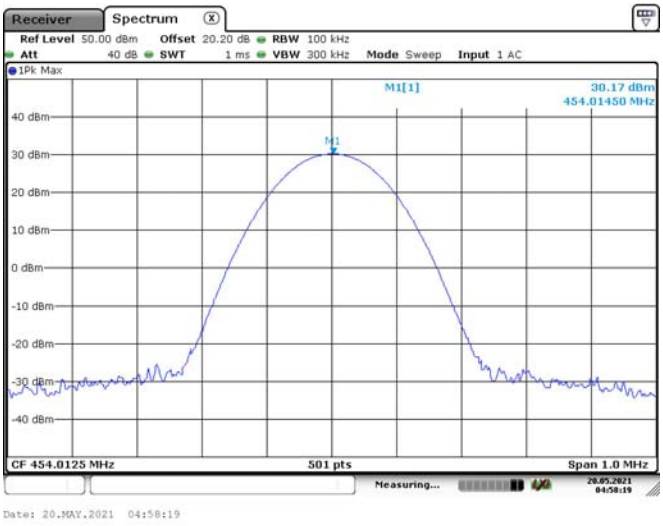

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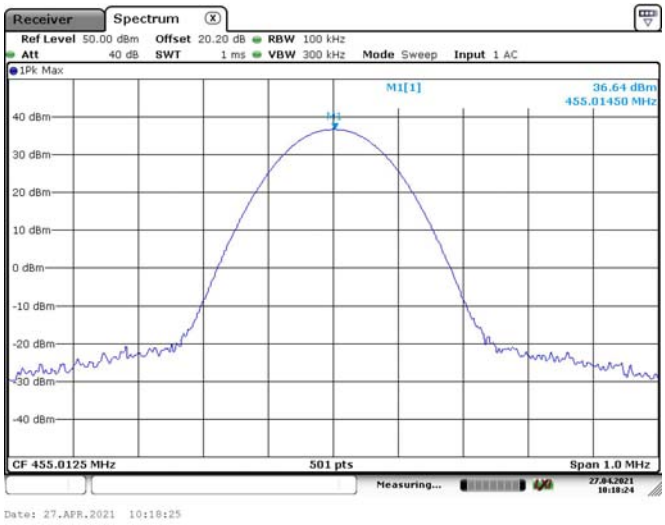

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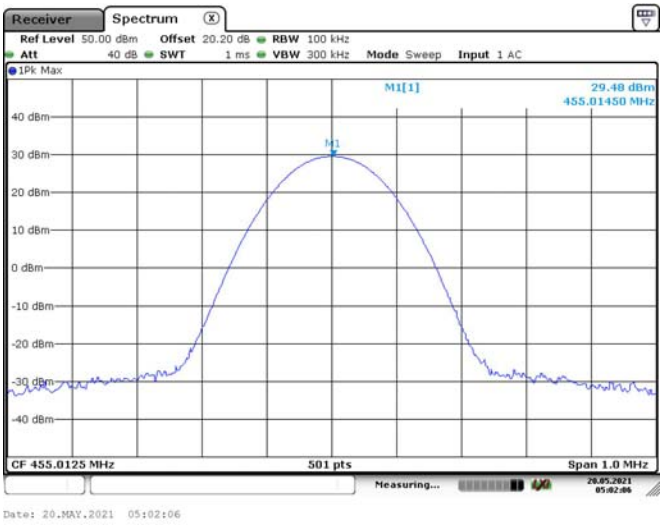
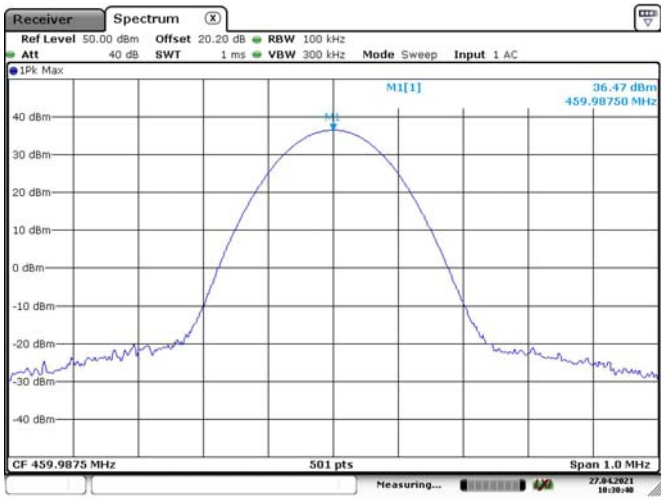
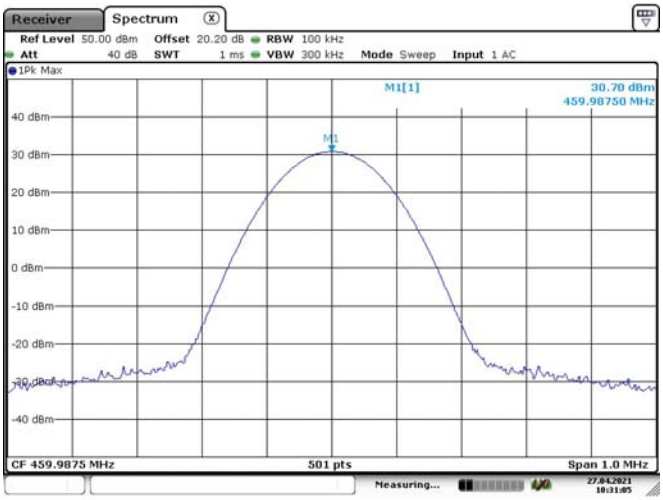


FM, 25kHz:

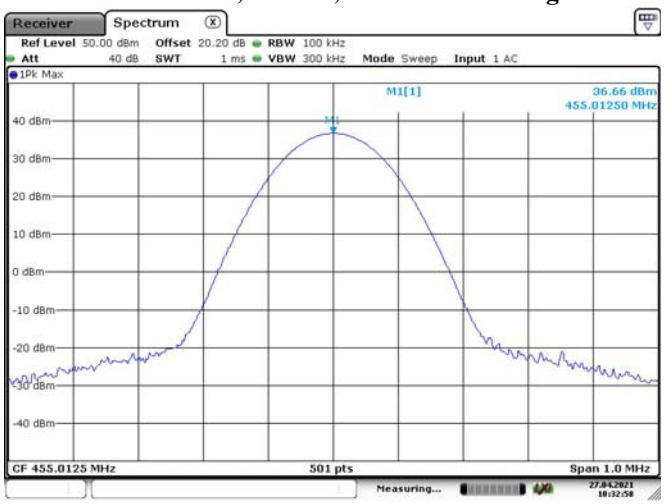
Additional Channel, Part 80, 459.9875 MHz High Power



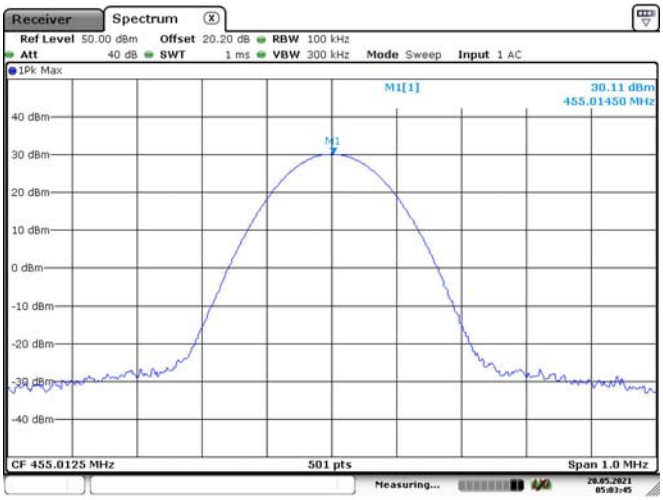
Additional Channel, Part 80, 459.9875 MHz Low Power



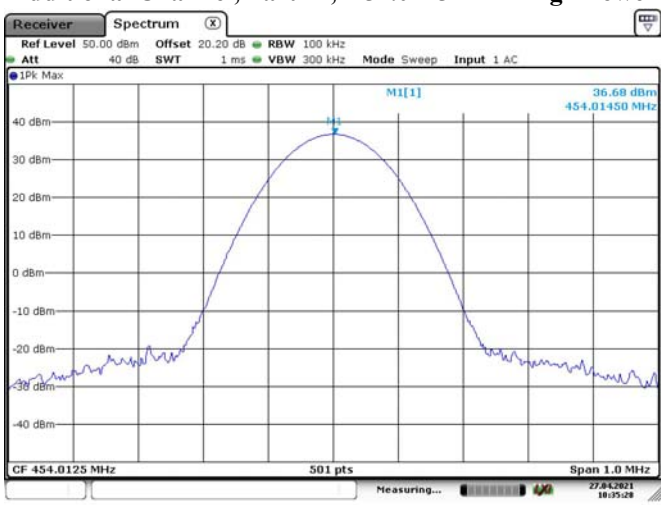
Additional Channel, Part 74, 455.0125 MHz High Power



Additional Channel, Part 74, 455.0125 MHz Low Power



Additional Channel, Part 22, 454.0125 MHz High Power



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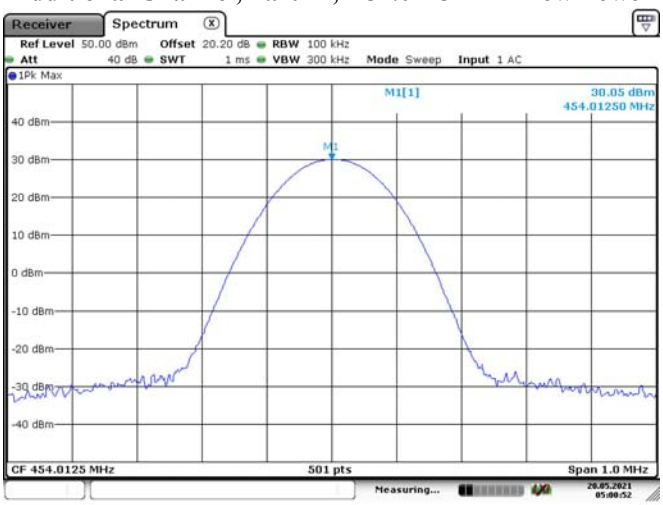


FCC §2.1047 - MODULATION CHARACTERISTIC

Applicable Standard

FCC §2.1047

(a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.
(b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

Test Procedure

Test Method: TIA-603-E 2.2.3

Test Data

Environmental Conditions

Temperature:	23.6~25.5℃
Relative Humidity:	52~69 %
ATM Pressure:	100.1~101.5 kPa
Tester:	Levi Shi
Test Date:	2021.04.27~2021.05.24

Test Mode: Transmitting

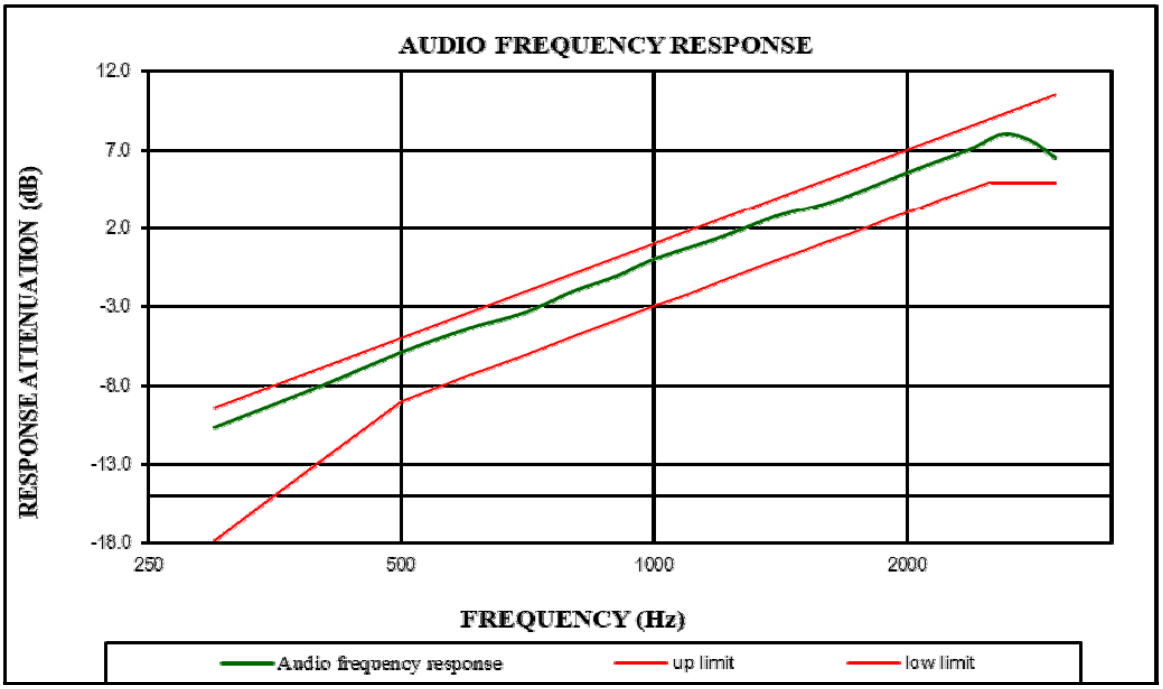
Test Result: Compliance. *please refer to the following tables.*

12.5kHz:

Audio Frequency Response – High Power

Carrier Frequency: 453.2125 MHz

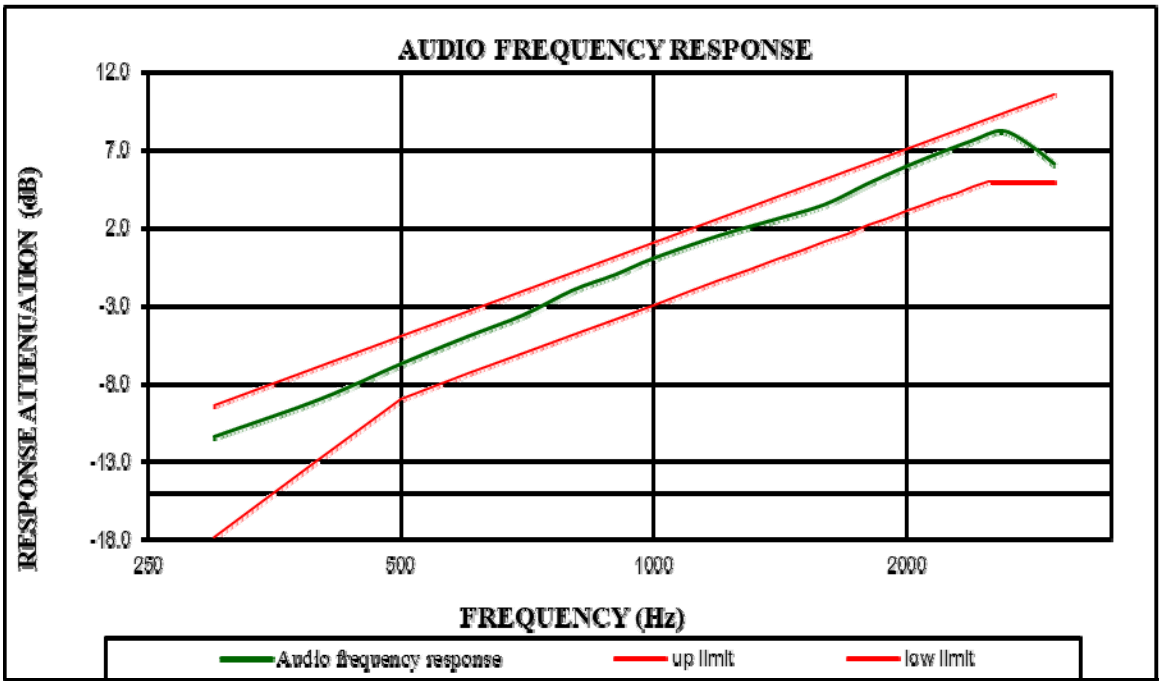
Modulation Frequency (Hz)	Response data (dB)
300	-10.66
400	-8.07
500	-5.91
600	-4.41
700	-3.41
800	-2.05
900	-1.09
1000	0.00
1200	1.40
1400	2.77
1600	3.56
1800	4.56
2000	5.55
2200	6.37
2400	7.14
2600	8.00
2800	7.61
3000	6.52



25 kHz:

Carrier Frequency: 459.9875 MHz

Modulation Frequency (Hz)	Response data (dB)
300	-11.43
400	-9.05
500	-6.77
600	-5.02
700	-3.63
800	-2.06
900	-1.05
1000	0.00
1200	1.48
1400	2.51
1600	3.45
1800	4.79
2000	5.89
2200	6.80
2400	7.56
2600	8.17
2800	7.30
3000	6.05

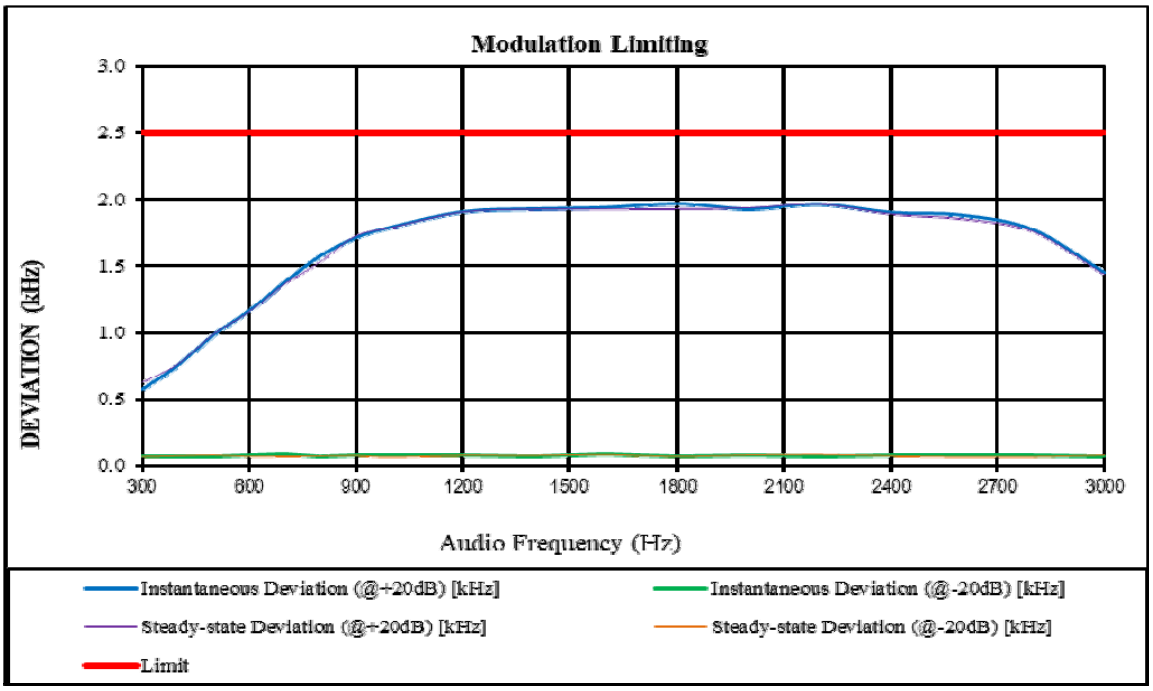


MODULATION LIMITING – High Power

12.5kHz

Carrier Frequency: 453.2125 MHz

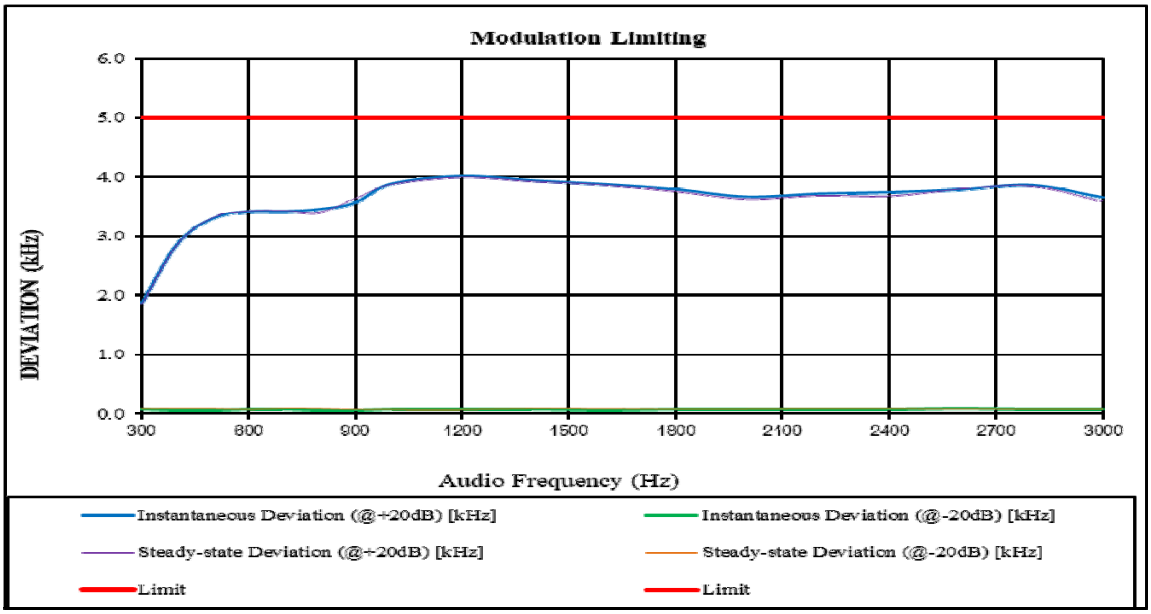
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit [KHz]
	Deviation (@+20dB) [KHz]	Deviation (@-20dB) [KHz]	Deviation (@+20dB) [KHz]	Deviation (@-20dB) [KHz]	
300	0.572	0.068	0.625	0.067	2.5
400	0.753	0.066	0.761	0.072	2.5
500	0.981	0.066	0.986	0.078	2.5
600	1.161	0.076	1.152	0.068	2.5
700	1.375	0.082	1.362	0.071	2.5
800	1.573	0.071	1.528	0.071	2.5
900	1.710	0.081	1.723	0.074	2.5
1000	1.790	0.079	1.786	0.066	2.5
1200	1.905	0.074	1.902	0.076	2.5
1400	1.927	0.072	1.924	0.075	2.5
1600	1.937	0.082	1.925	0.081	2.5
1800	1.966	0.072	1.928	0.068	2.5
2000	1.927	0.081	1.935	0.078	2.5
2200	1.963	0.069	1.962	0.082	2.5
2400	1.900	0.074	1.889	0.072	2.5
2600	1.880	0.076	1.853	0.066	2.5
2800	1.770	0.078	1.756	0.067	2.5
3000	1.450	0.068	1.435	0.077	2.5



25kHz:

Carrier Frequency: 459.9875 MHz

Audio Frequency (Hz)	Instantaneous		Steady-state		Limit [KHz]
	Deviation (@+20dB) [KHz]	Deviation (@-20dB) [KHz]	Deviation (@+20dB) [KHz]	Deviation (@-20dB) [KHz]	
300	1.856	0.077	1.834	0.080	5
400	2.864	0.057	2.853	0.083	5
500	3.299	0.055	3.312	0.083	5
600	3.411	0.073	3.415	0.068	5
700	3.413	0.064	3.425	0.085	5
800	3.450	0.059	3.400	0.082	5
900	3.560	0.060	3.630	0.068	5
1000	3.880	0.067	3.870	0.067	5
1200	4.015	0.068	3.996	0.067	5
1400	3.940	0.068	3.925	0.083	5
1600	3.875	0.062	3.864	0.081	5
1800	3.790	0.073	3.756	0.072	5
2000	3.661	0.071	3.624	0.074	5
2200	3.715	0.067	3.685	0.081	5
2400	3.740	0.072	3.675	0.080	5
2600	3.786	0.083	3.794	0.075	5
2800	3.860	0.074	3.846	0.073	5
3000	3.650	0.071	3.580	0.071	5

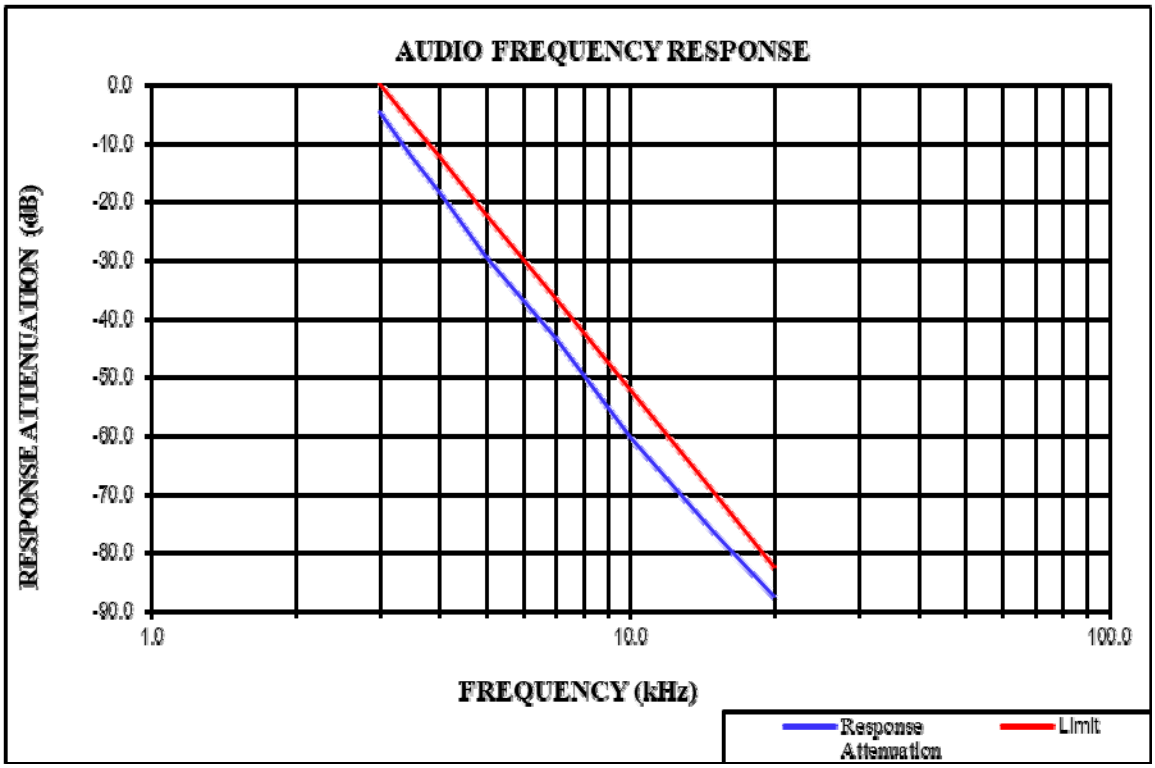


Audio Frequency Low Pass Filter Response – High Power

12.5kHz:

Carrier Frequency: 453.2125 MHz

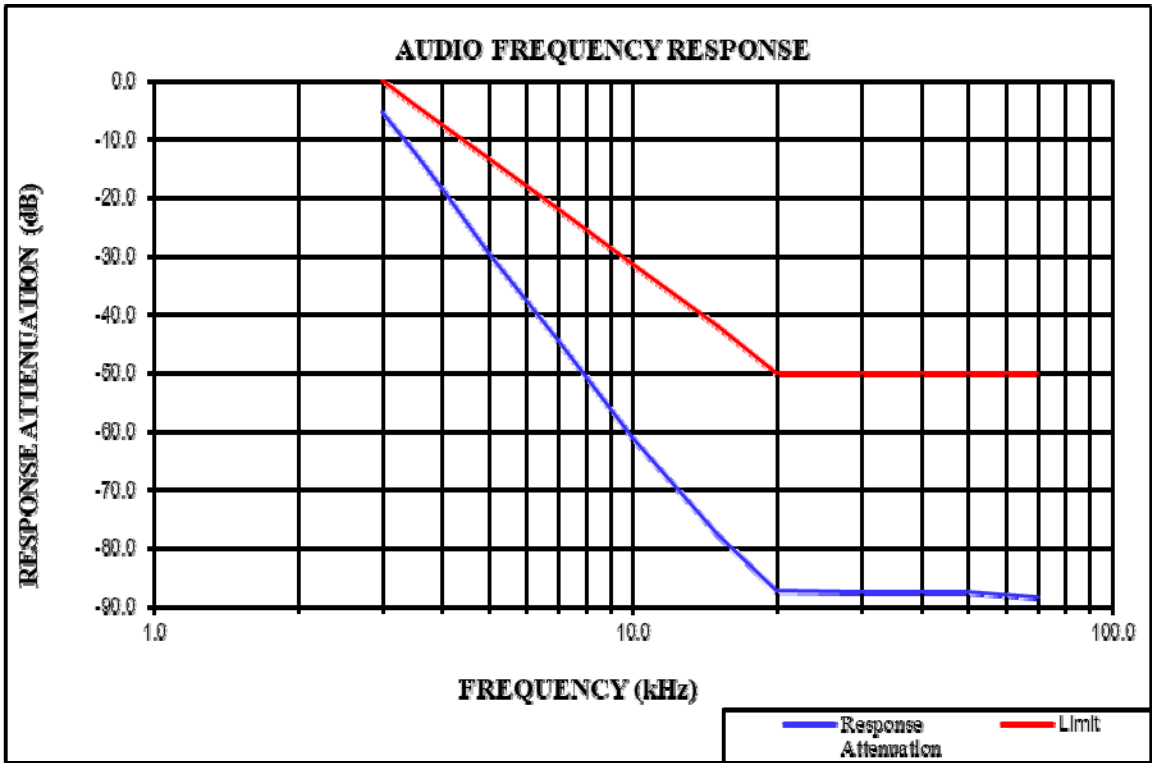
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
3.0	-4.8	0.0
3.5	-12.3	-6.7
4.0	-18.5	-12.5
5.0	-29.4	-22.2
7.0	-43.6	-36.8
10.0	-60.4	-52.3
15.0	-76.8	-69.9
20.0	-87.5	-82.5



25kHz:

Carrier Frequency: 459.9875 MHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
3.0	-5.4	0.0
3.5	-12.3	-4.0
4.0	-18.6	-7.5
5.0	-29.5	-13.3
7.0	-44.6	-22.1
10.0	-61.2	-31.4
15.0	-77.6	-41.9
20.0	-87.4	-50.0
30.0	-87.5	-50.0
50.0	-87.6	-50.0
70.0	-88.3	-50.0



FCC §2.1049 & §22.357 & § 22.731 & §74.462 & 80.205& §80.207& §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

Applicable Standard

FCC §2.1049, §22.357, § 22.731, §74.462, §80.205, §80.207,§90.209 and §90.210

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 100 Hz or 300 Hz and the spectrum was recorded in the frequency band ±50 kHz from the carrier frequency.

Test Data

Environmental Conditions

Temperature:	23.6~25.5℃
Relative Humidity:	52~69 %
ATM Pressure:	100.1~101.5 kPa
Tester:	Levi Shi
Test Date:	2021.04.27~2021.05.24

Test Mode: Transmitting

Test Result: Compliance. *Please refer to following table and plots.*

Test mode: transimitting

Test Mode	Test Channal	Test Frequency (MHz)	High Power Level		Low Power Level		Note
			99% Occupied Bandwidth (kHz)	26dB Emission Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	26dB Emission Bandwidth (kHz)	
FM 12.5kHz	Low	400.0125	5.288	10.256	5.288	10.256	For federal
	Middle	453.0125	5.288	10.256	5.288	10.256	FCC part 90
	High	469.9875	5.208	10.337	5.288	10.256	
	Additional	454.0125	5.288	10.256	5.208	10.337	FCC part 22
	Additional	455.0125	5.208	10.256	5.208	10.256	FCC part 74
4FSK 12.5kHz	Low	400.0125	7.532	9.776	7.292	9.455	For federal
	Middle	453.2125	7.051	9.135	7.452	9.135	FCC part 90
	High	469.9875	7.372	9.776	7.051	9.215	
	Additional	454.0125	7.292	9.776	6.891	9.455	FCC part 22
	Additional	455.0125	7.432	9.295	6.971	9.295	FCC part 74
FM 25kHz	Additional	454.0125	10.577	15.705	10.577	15.558	FCC part 22
	Additional	455.0125	10.577	15.705	10.577	15.705	FCC part 74
	Additional	459.9875	10.577	15.705	10.577	15.705	FCC part 80

Note: Emission bandwidth was based on calculation method instead of measurement.
Emission Designator
Per CFR 47 §2.201& §2.202, BW = 2M + 2D

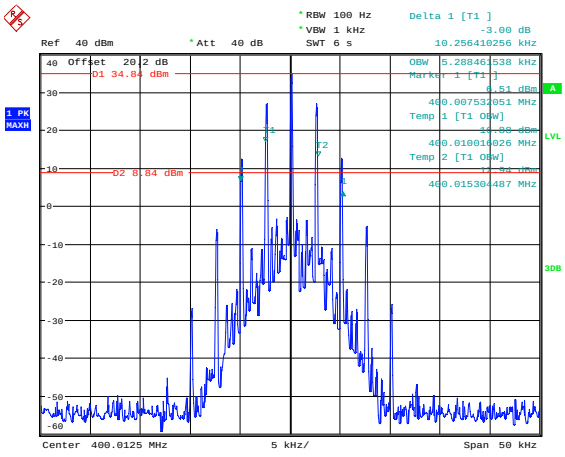
For FM Mode (Channel Spacing: 12.5 kHz)
Emission Designator 11K0F3E
In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.
BW = 2(M+D) = 2*(3.0 kHz + 2.5 kHz) = 11 kHz = 11K0
F3E portion of the designator represents an FM voice transmission
Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

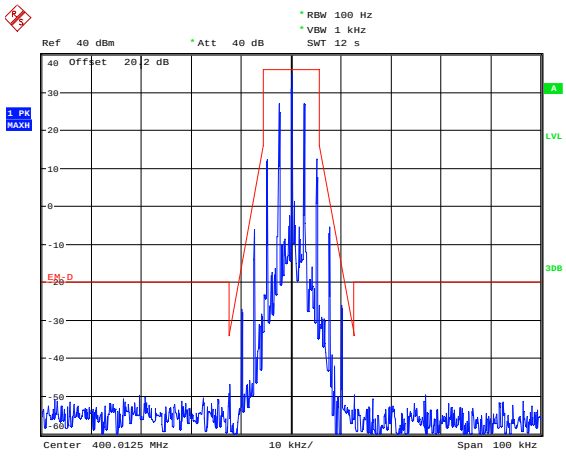
For FM Mode (Channel Spacing: 25 kHz)
Emission Designator 16K0F3E
In this case, the maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.
BW = 2(M+D) = 2*(3.0 kHz + 5.0 kHz) = 16 kHz =16K0
F3E portion of the designator represents an FM voice transmission
Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0F3E.

For Digital Mode (Channel Spacing: 12.5 kHz)
Emission Designator 7K60F1D and 7K60F1E
The 99% energy rule (title 47CFR 2.1049) was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 7.60 kHz. The emission mask was obtained from 47CFR 90.210(d).
F1D and F1E portion of the designator indicates digital information.
Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60F1D and 7K60F1E.

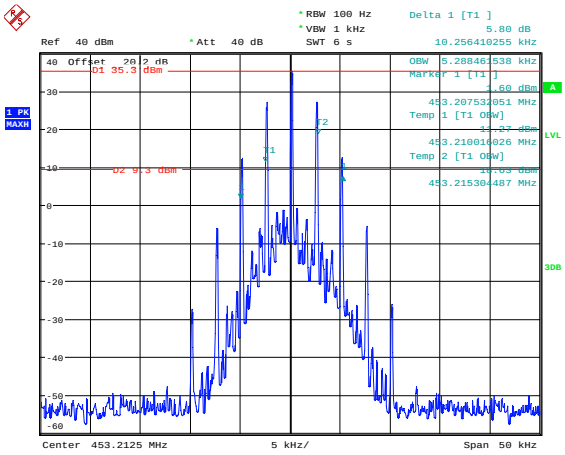
FM, 12.5kHz High Power:

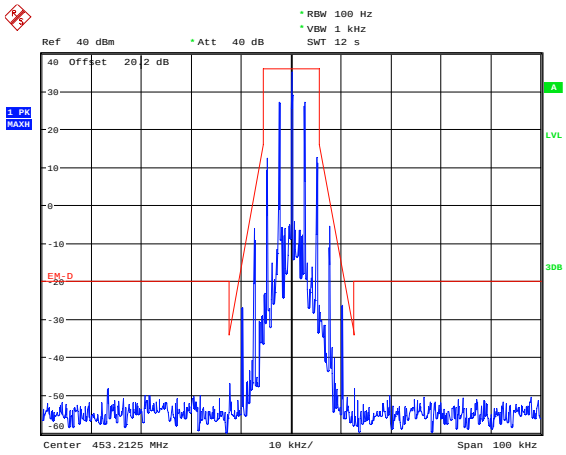
Low Channel



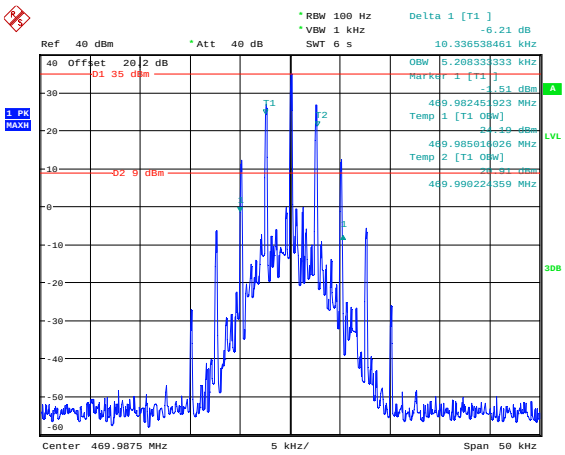


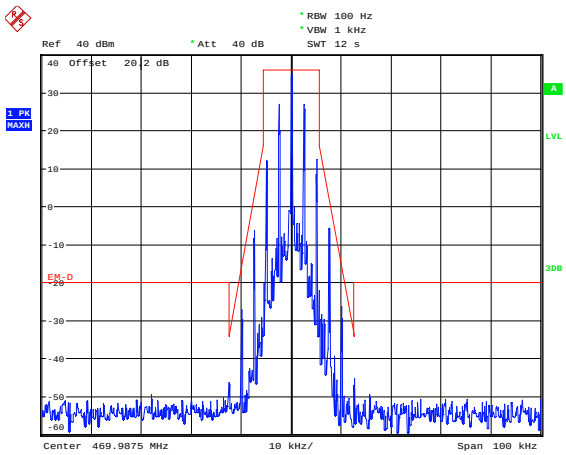
Middle Channel



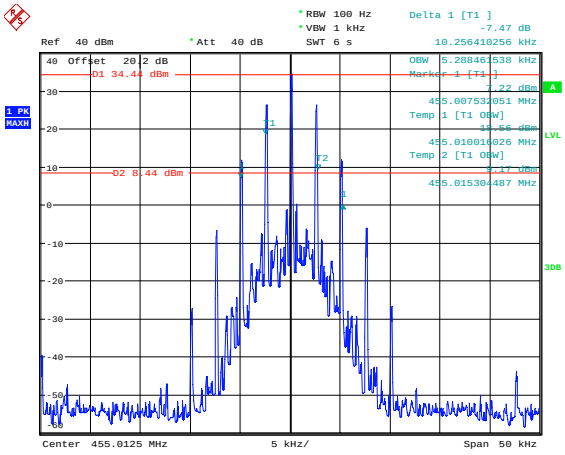


High Channel





Additional Channel Part 74, 455.0125 MHz



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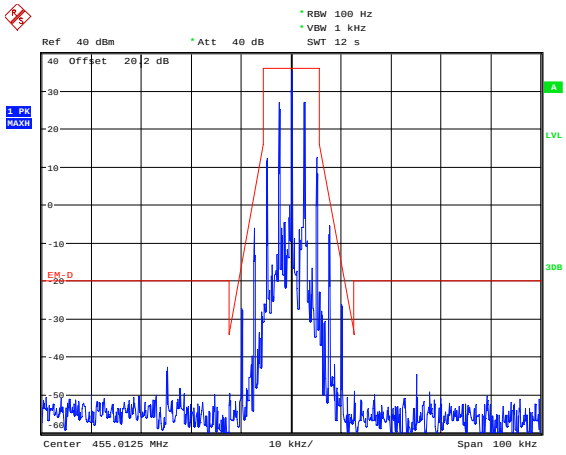

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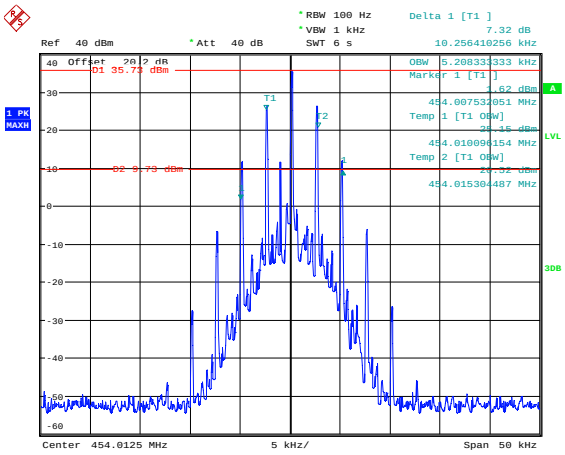
Additional Channel Part 22, 454.0125 MHz



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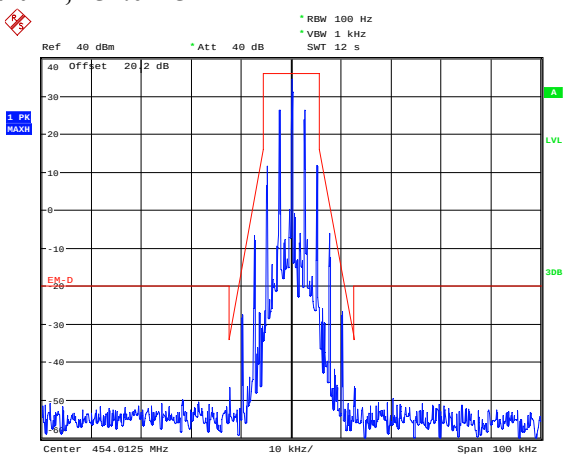
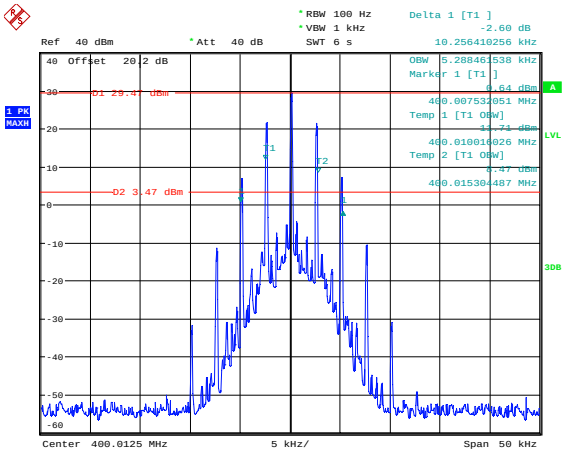
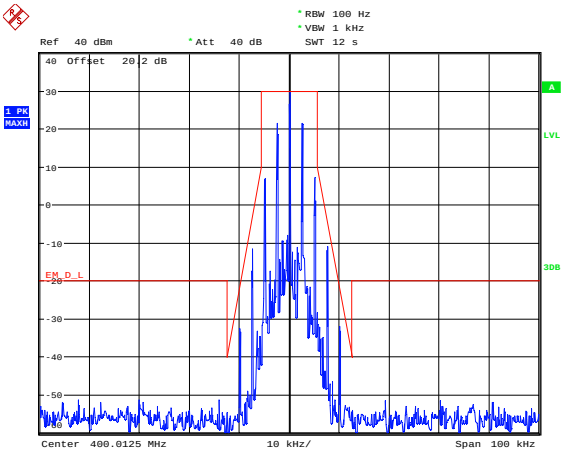


Date: 24.MAY.2021 15:11:32

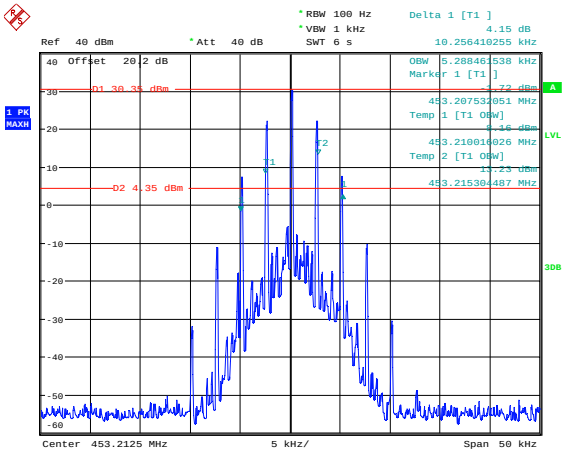
Low Power:

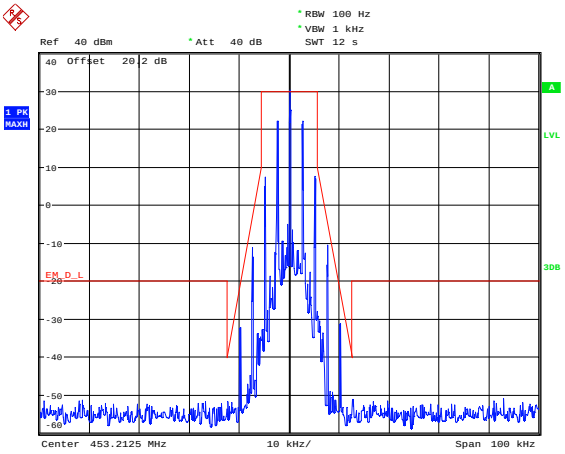
Low Channel



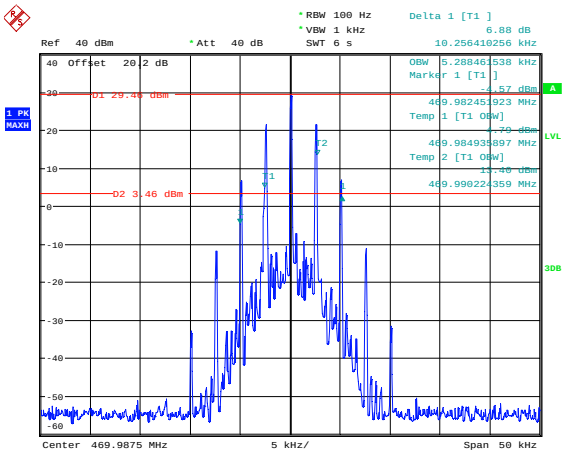


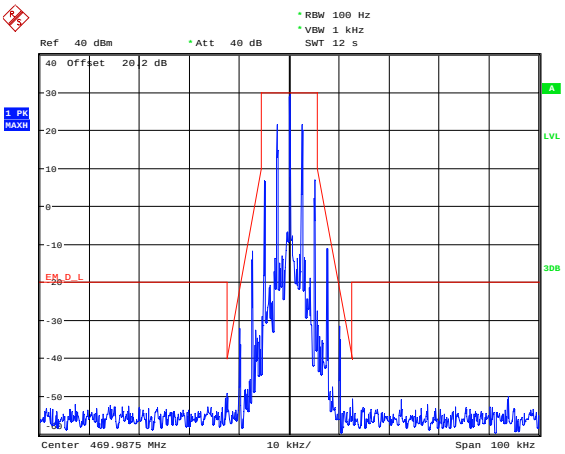
Middle Channel



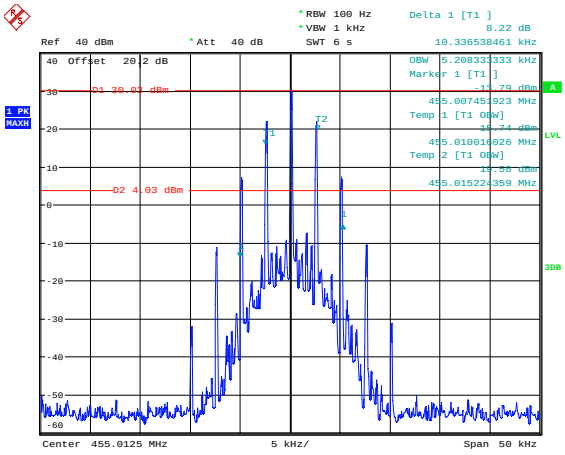


High Channel





Additional Channel Part 74, 455.0125 MHz



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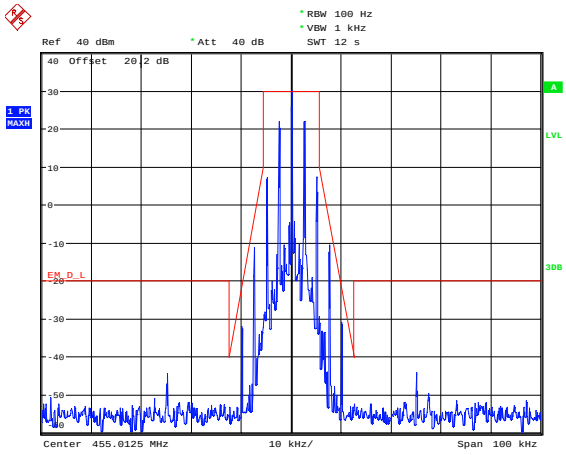
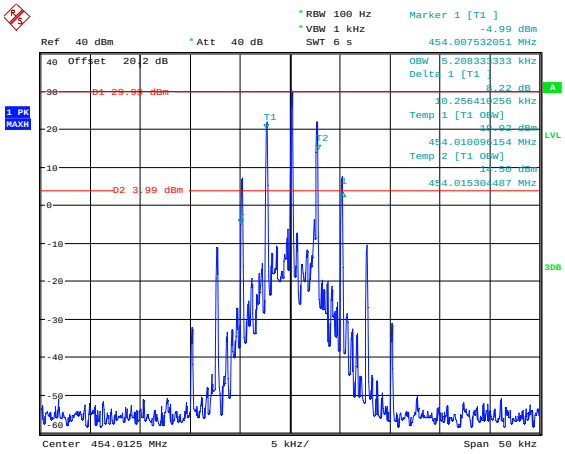
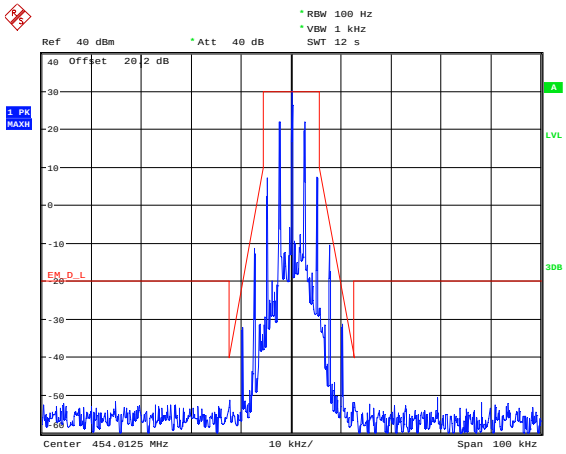


Date: 24.MAY.2021 14:41:44

Additional Channel Part 22, 454.0125 MHz



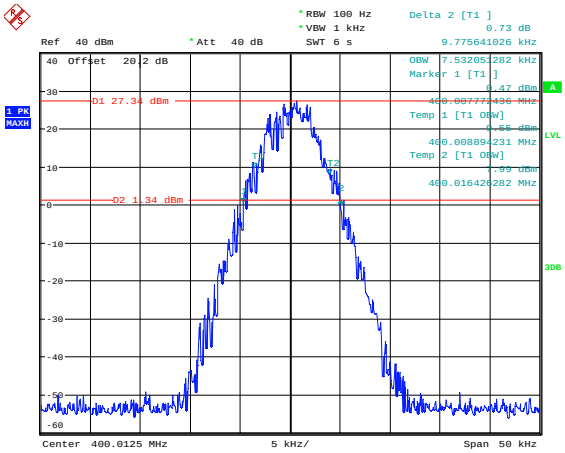
Date: 24.MAY.2021 15:07:24



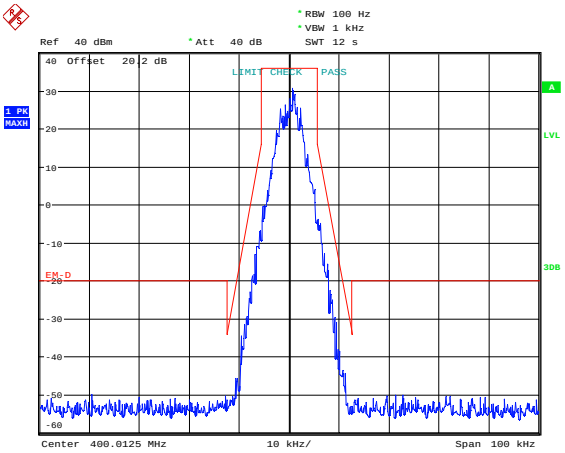
Date: 24.MAY.2021 15:10:00

4FSK, 12.5kHz High Power:

Low Channel

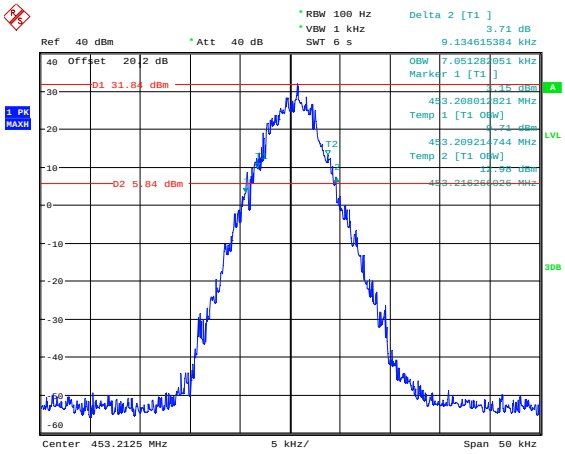


Date: 28.APR.2021 10:32:06

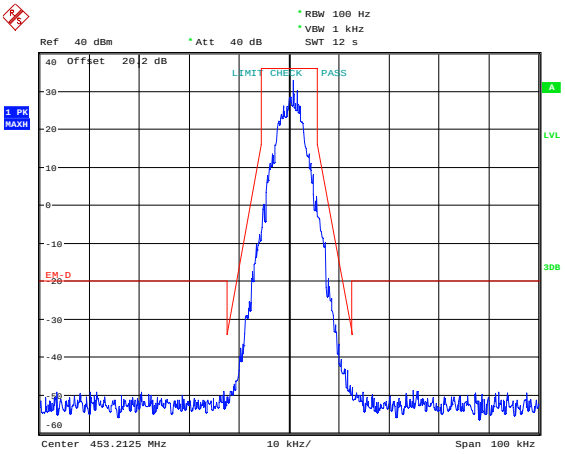


Date: 13.MAY.2021 13:44:47

Middle Channel

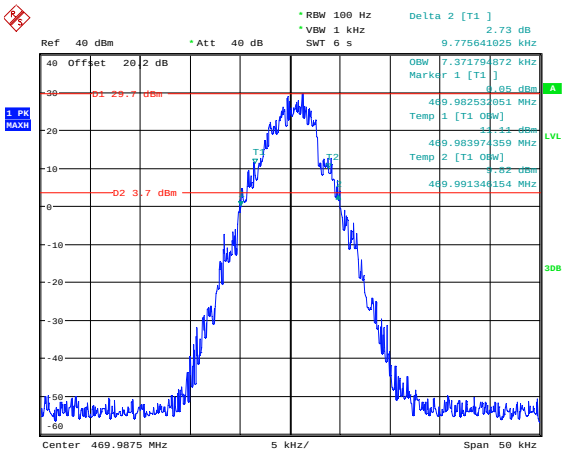


Date: 28.APR.2021 10:44:38

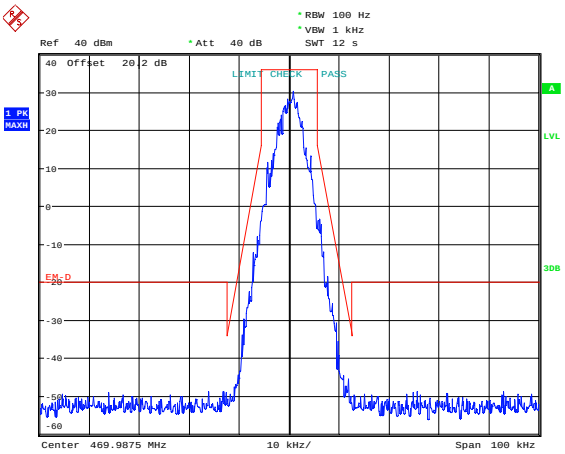


Date: 13.MAY.2021 13:54:10

High Channel

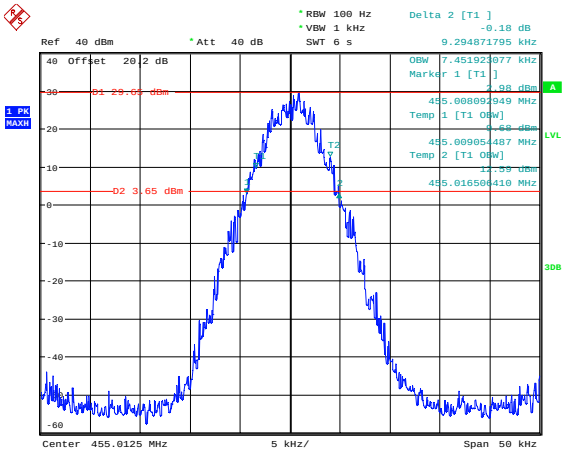


Date: 28.APR.2021 10:58:47

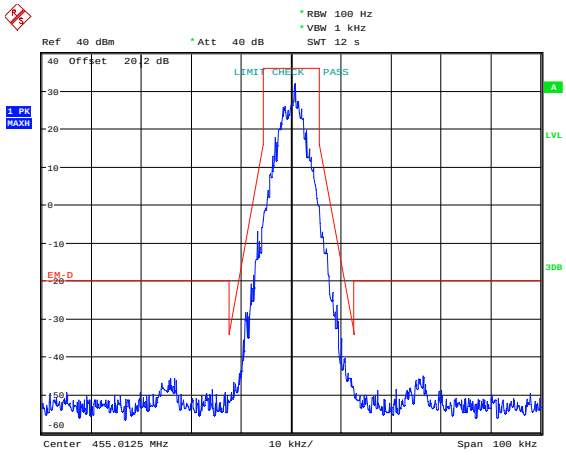


Date: 13.MAY.2021 14:00:56

Additional Channel Part 74, 455.0125 MHz

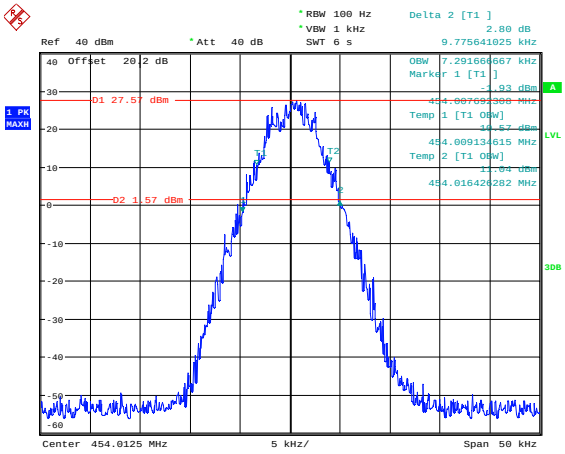


Date: 28.APR.2021 11:12:18

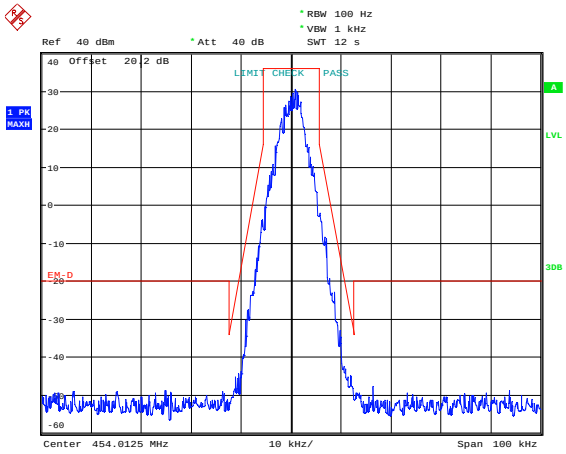


Date: 13.MAY.2021 14:14:17

Additional Channel Part 22, 454.0125 MHz



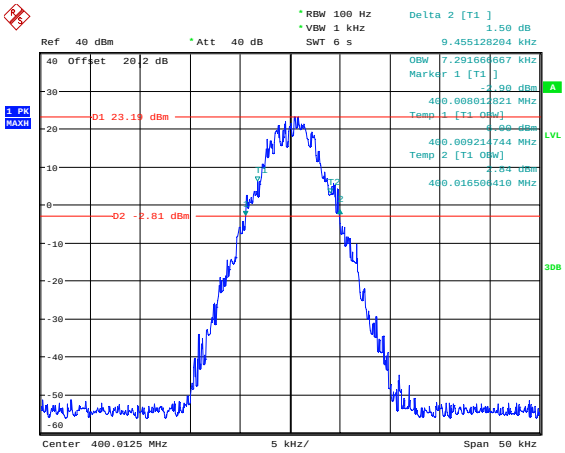
Date: 28.APR.2021 11:07:03



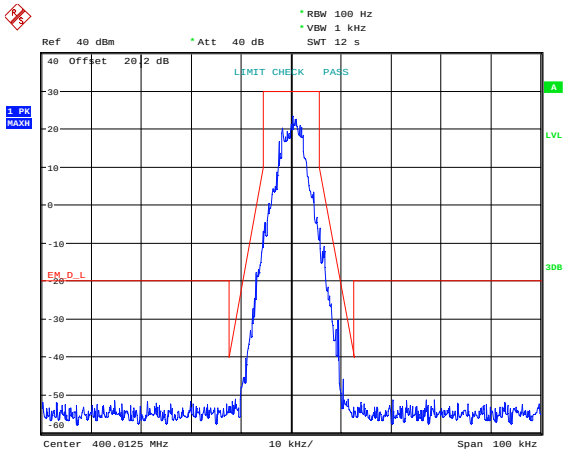
Date: 13.MAY.2021 14:10:13

Low Power:

Low Channel

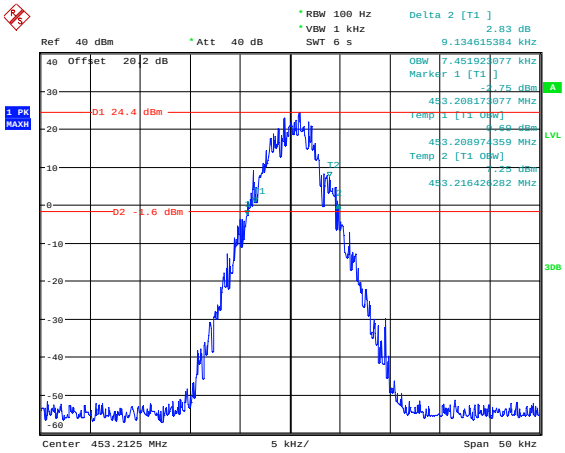


Date: 28.APR.2021 10:37:48

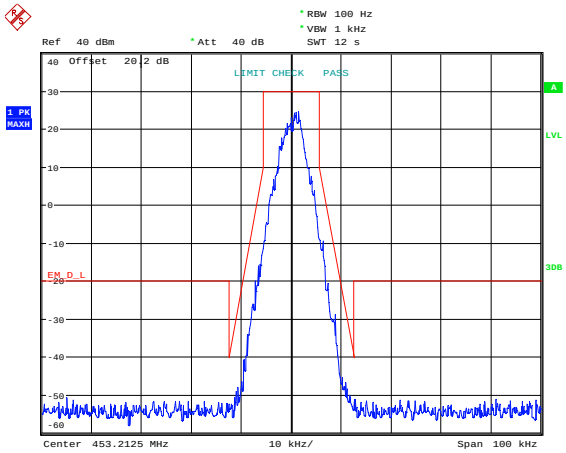


Date: 13.MAY.2021 13:47:42

Middle Channel

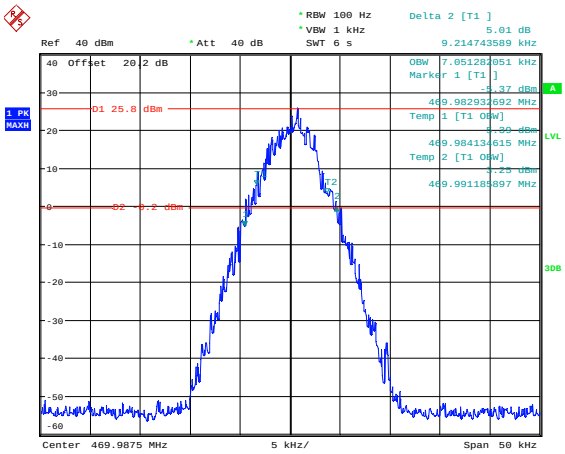


Date: 28.APR.2021 10:52:57



Date: 13.MAY.2021 13:50:59

High Channel



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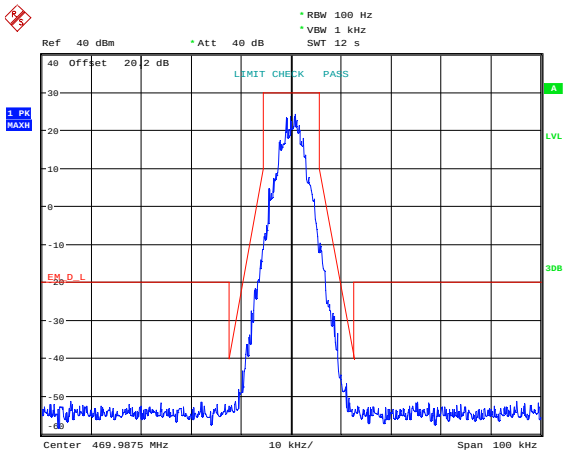
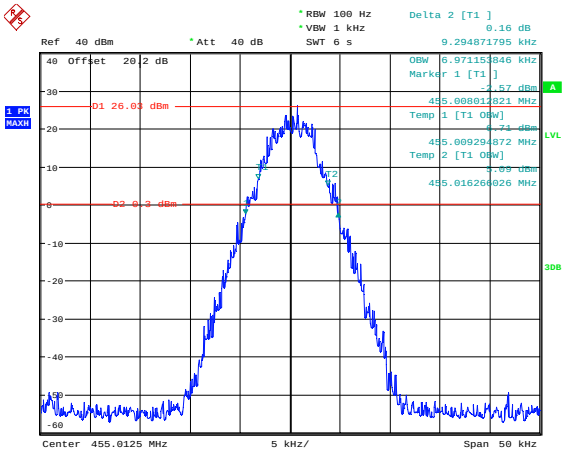
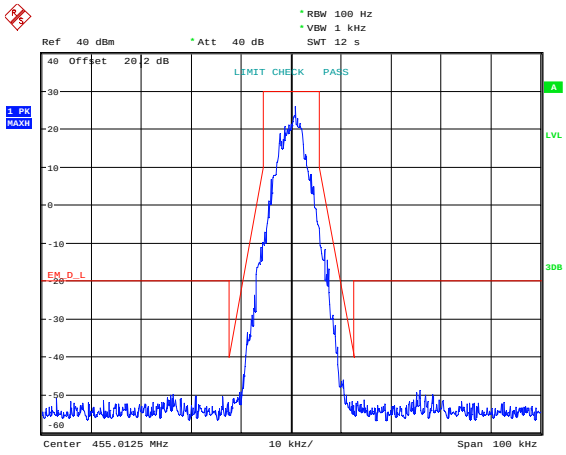


Date: 13.MAY.2021 14:03:45

Additional Channel Part 74, 455.0125 MHz

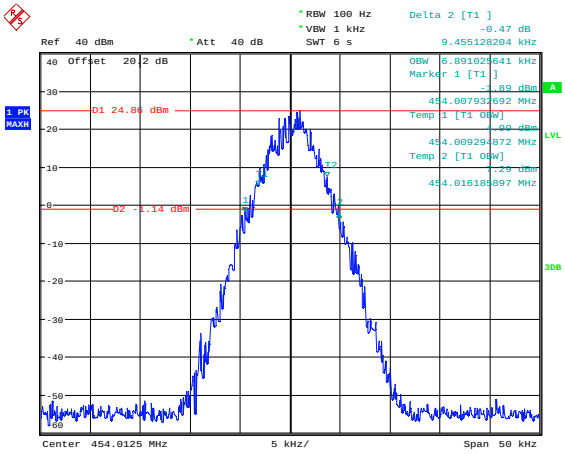


Date: 28.APR.2021 11:15:08

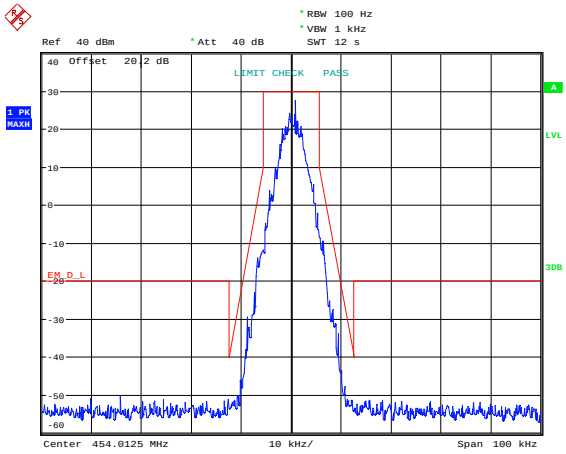


Date: 13.MAY.2021 14:17:07

Additional Channel Part 22, 454.0125 MHz



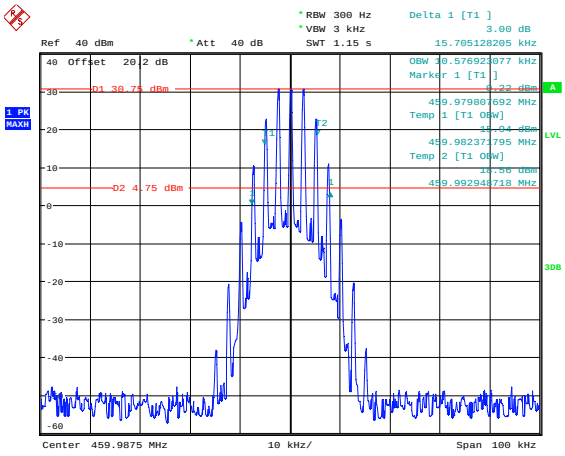
Date: 28.APR.2021 11:09:19

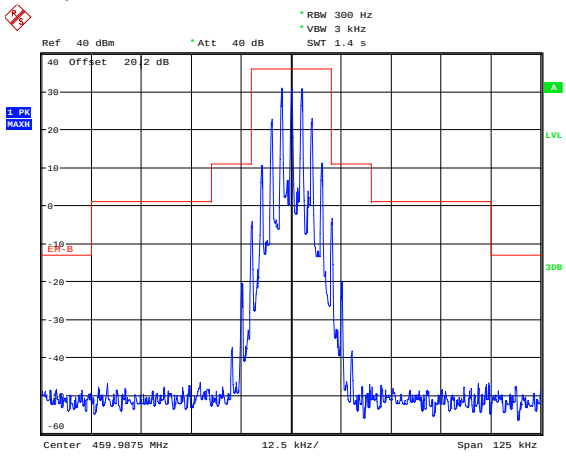


Date: 13.MAY.2021 14:07:41

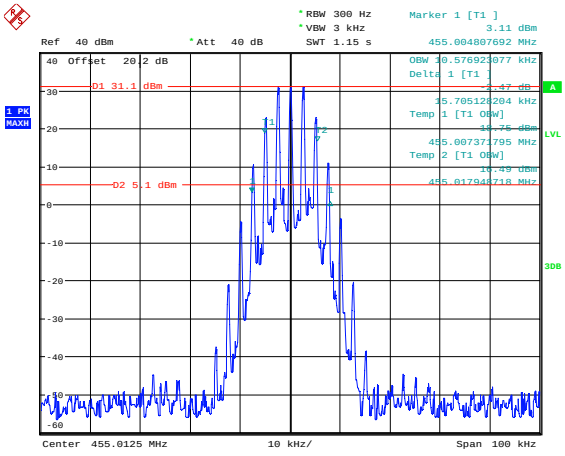
FM, 25 kHz, High Power:

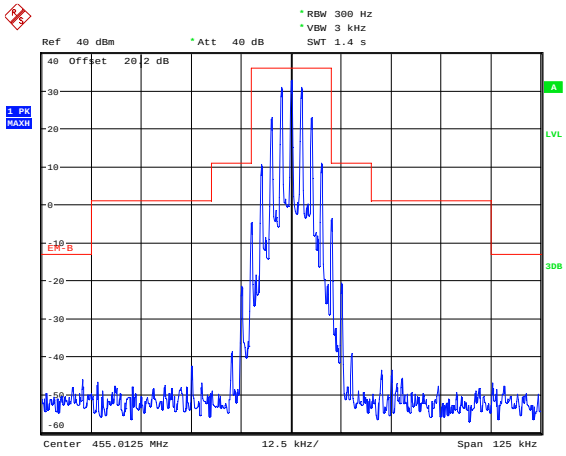
Additional Channel Part 80, 459.9875 MHz



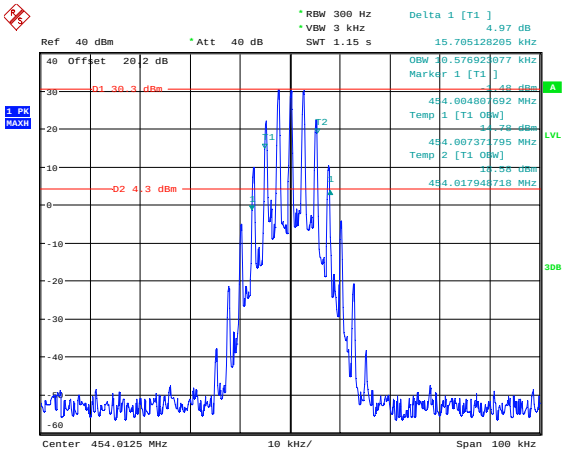


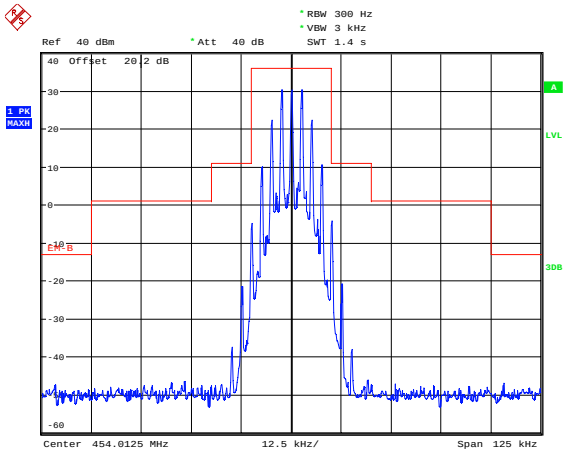
Additional Channel Part 74, 455.0125 MHz





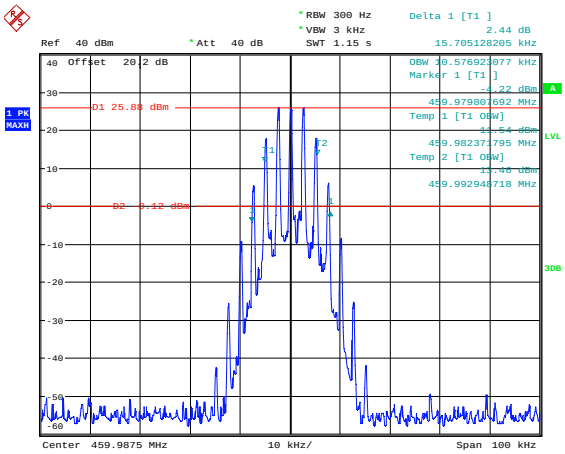
Additional Channel Part 22, 454.0125 MHz

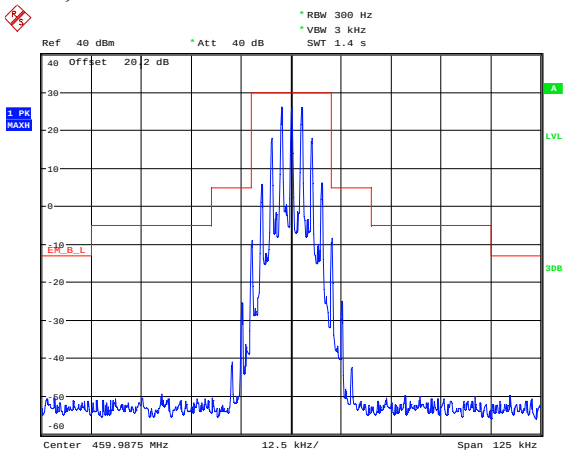




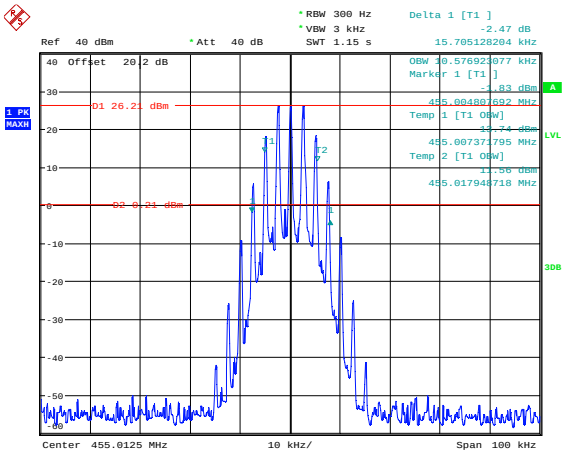
Low Power:

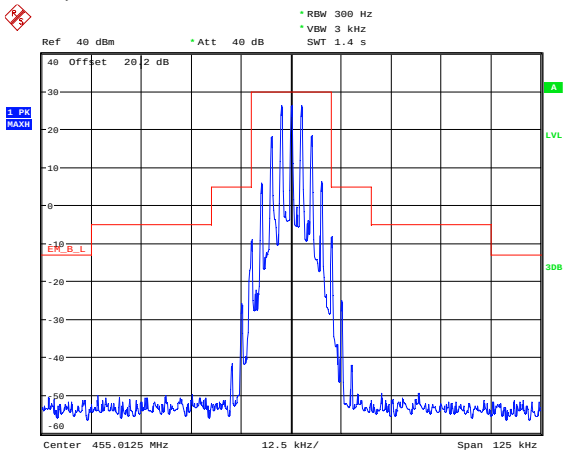
Additional Channel Part 80, 459.9875 MHz



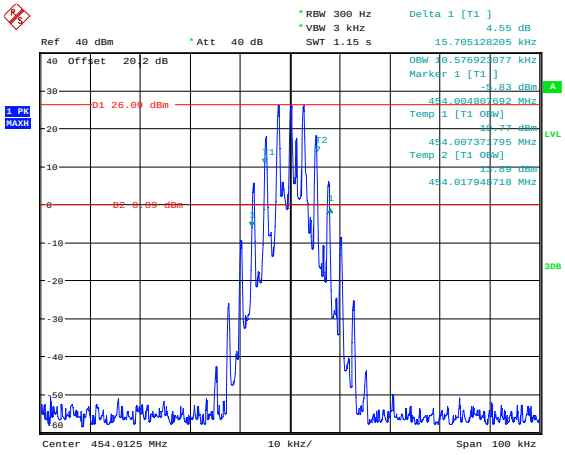


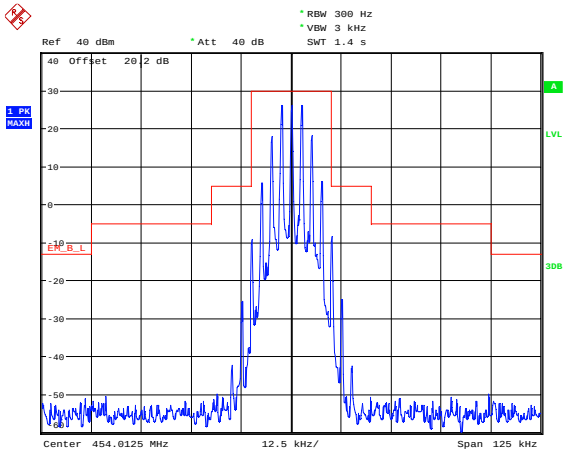
Additional Channel Part 74, 455.0125 MHz





Additional Channel Part 22, 454.0125 MHz





FCC §2.1051 & §22.861 & §74.462 & § 80.211 & §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

FCC §2.1051, §22.861, §74.462, §80.211, and §90.210

Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Data

Environmental Conditions

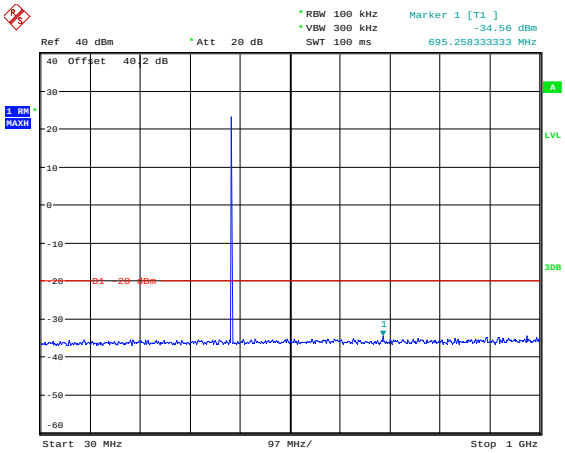
Temperature:	23.6~25.5℃
Relative Humidity:	52~69 %
ATM Pressure:	100.1~101.5 kPa
Tester:	Levi Shi
Test Date:	2021.04.27~2021.05.24

Test Mode: Transmitting

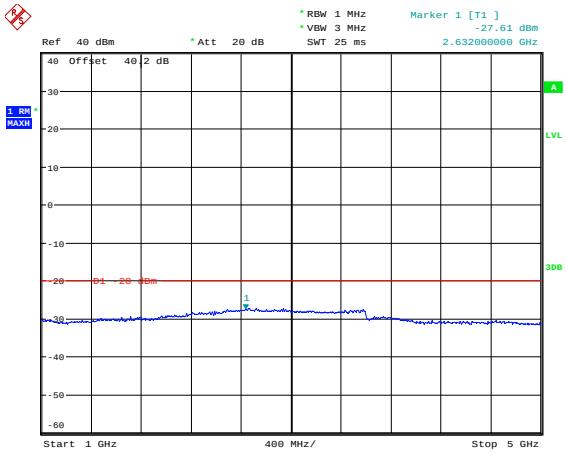
Test Result: Compliance. *Please refer to the following plots.*

FM, 12.5kHz:

Low Channel, 400.0125 MHz

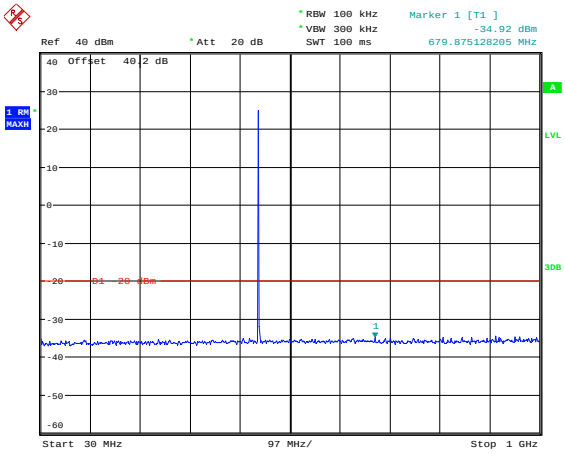


Date: 29.APR.2021 17:36:28

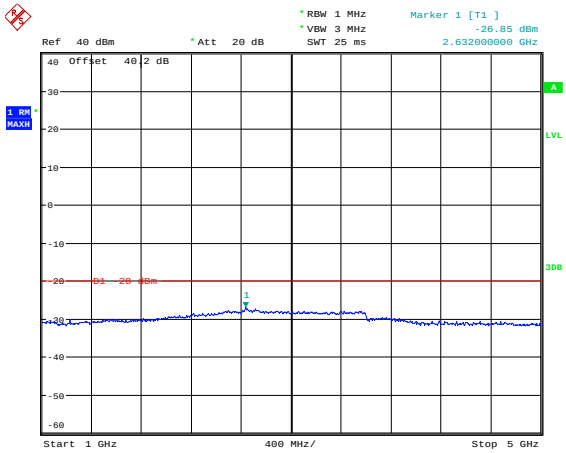


Date: 29.APR.2021 17:38:10

Middle Channel, 453.2125 MHz

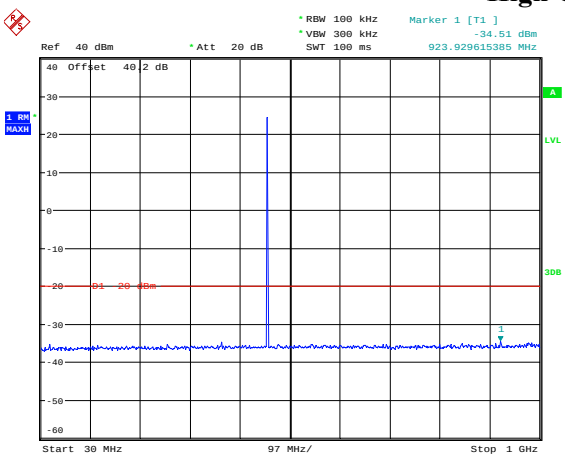


Date: 29.APR.2021 17:39:48

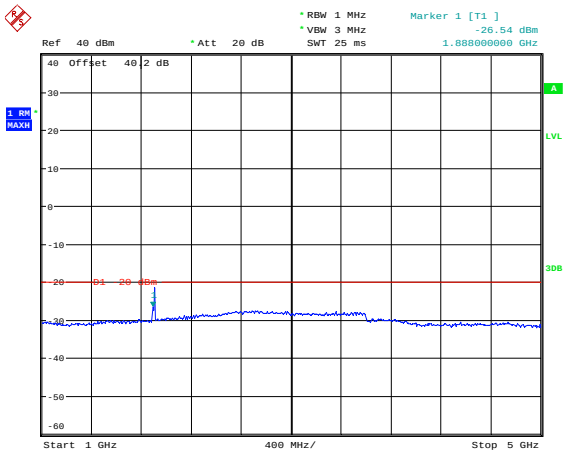


Date: 29.APR.2021 17:40:26

High Channel, 469.9875 MHz



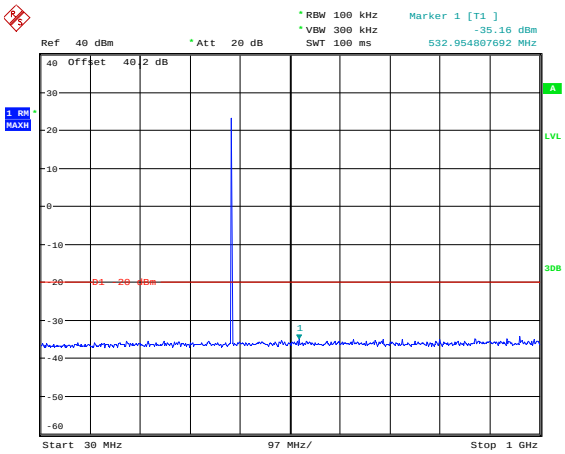
Date: 29.APR.2021 17:42:30



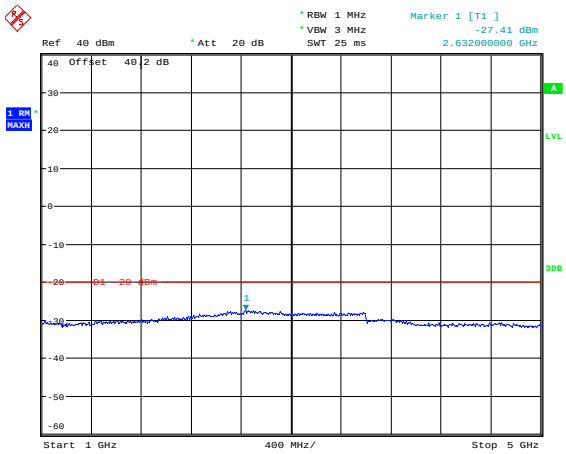
Date: 29.APR.2021 17:43:35

4FSK, 12.5kHz:

Low Channel, 400.0125 MHz

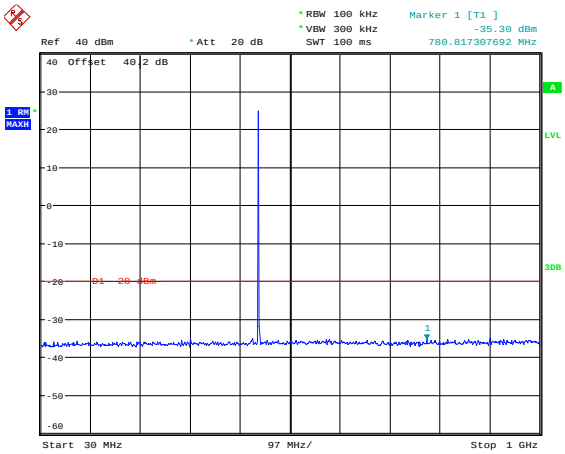


Date: 29.APR.2021 17:58:01

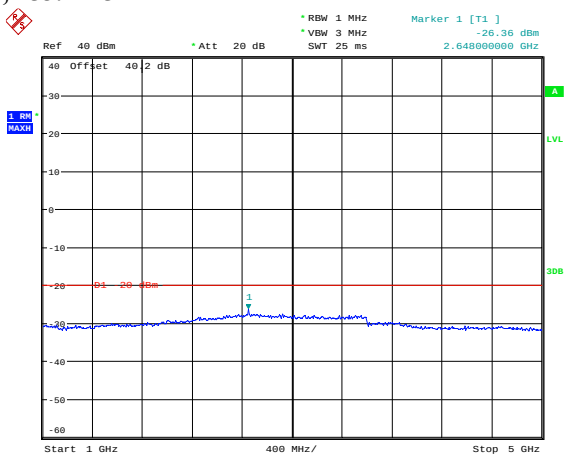


Date: 29.APR.2021 18:01:35

Middle Channel, 453.2125 MHz

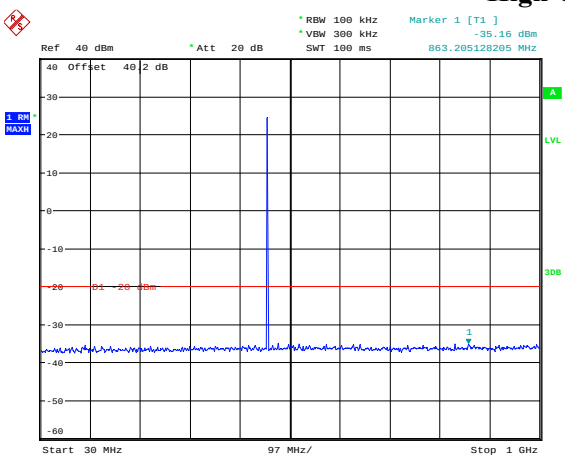


Date: 29.APR.2021 18:02:46

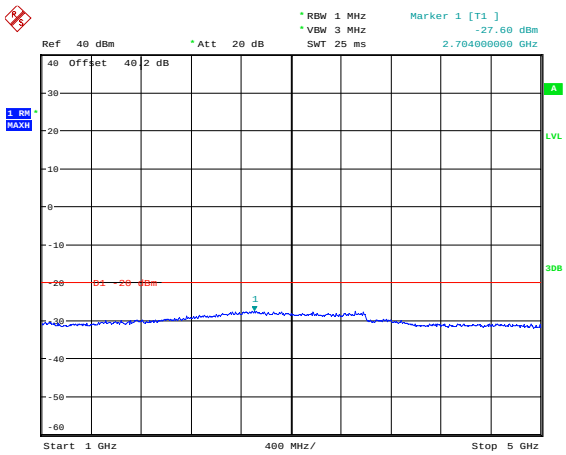


Date: 29.APR.2021 18:03:40

High Channel, 469.9875 MHz



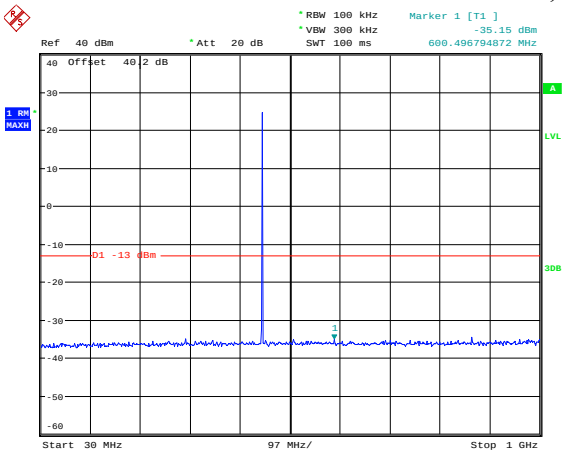
Date: 29.APR.2021 18:04:43



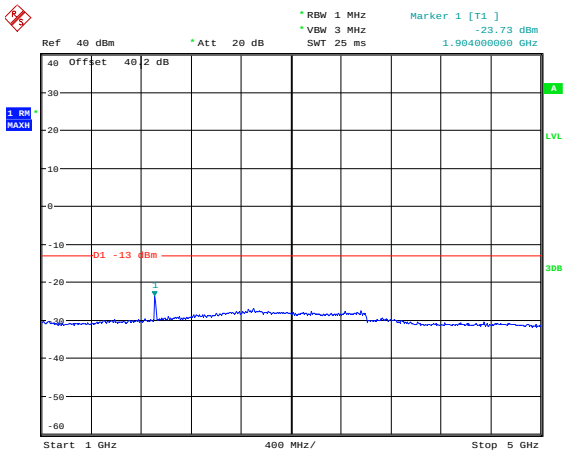
Date: 30.APR.2021 15:33:58

Part 80:

FM, 25kHz, 459.9875 MHz



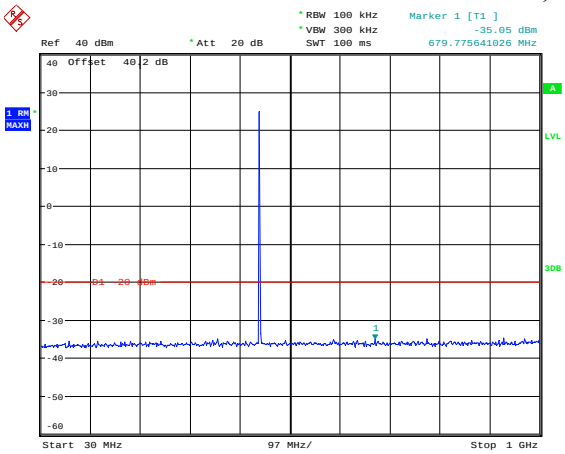
Date: 29.APR.2021 17:45:08



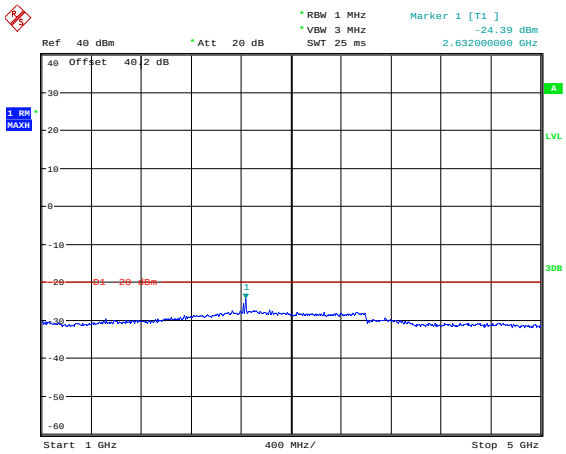
Date: 29.APR.2021 17:46:05

Part 74:

FM,12.5kHz, 455.0125 MHz

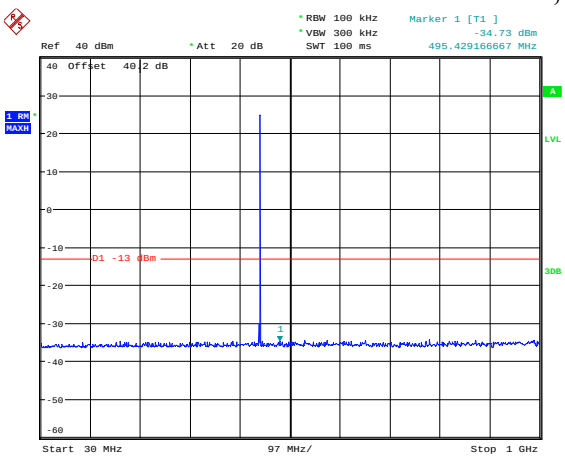


Date: 29.APR.2021 17:47:30

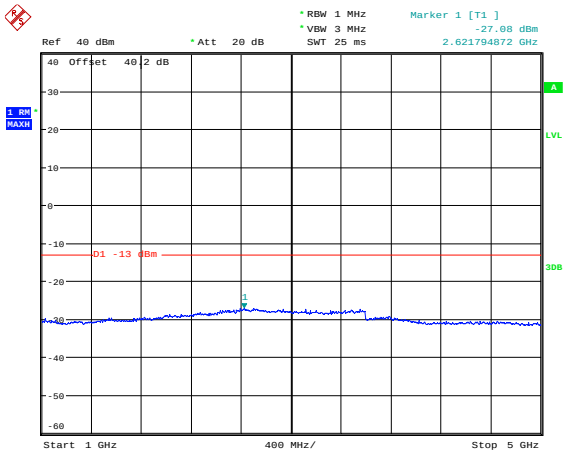


Date: 29.APR.2021 17:48:58

FM,25kHz, 455.0125 MHz

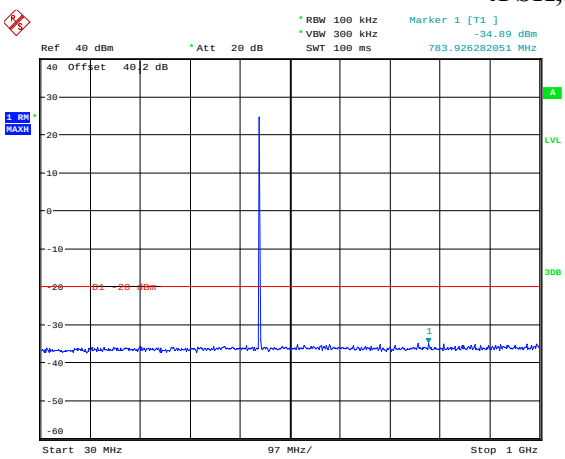


Date: 13.MAY.2021 10:13:57

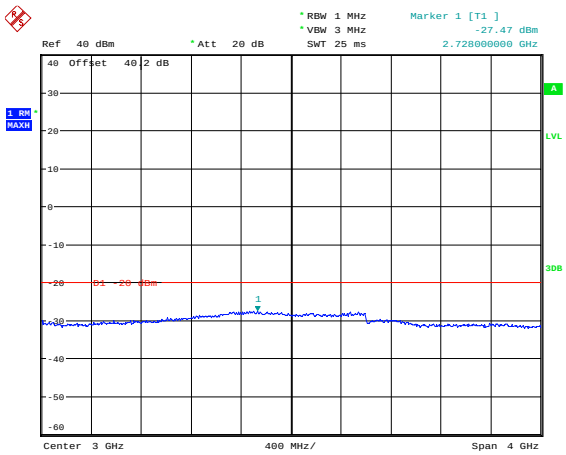


Date: 13.MAY.2021 10:15:05

4FSK,12.5kHz, 455.0125 MHz



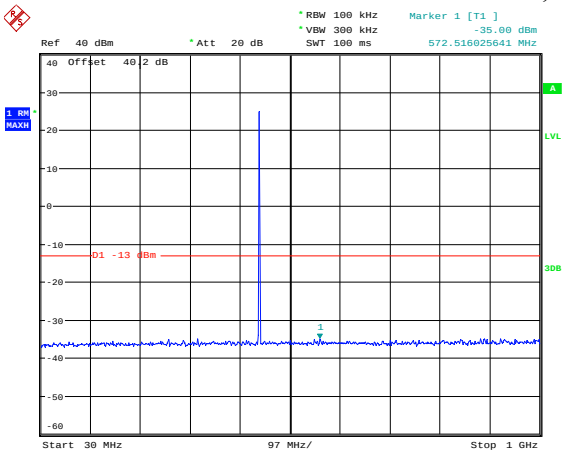
Date: 30.APR.2021 15:39:44



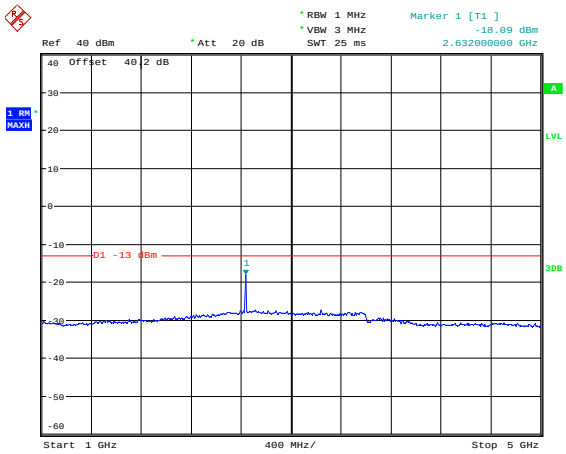
Date: 30.APR.2021 15:40:32

Part 22:

FM,12.5kHz, 454.0125 MHz

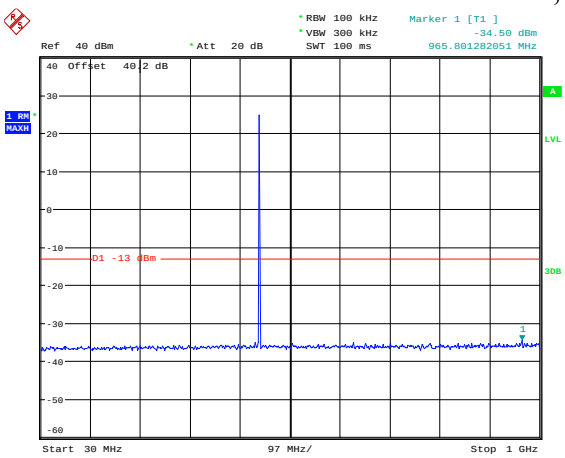


Date: 29.APR.2021 17:52:27

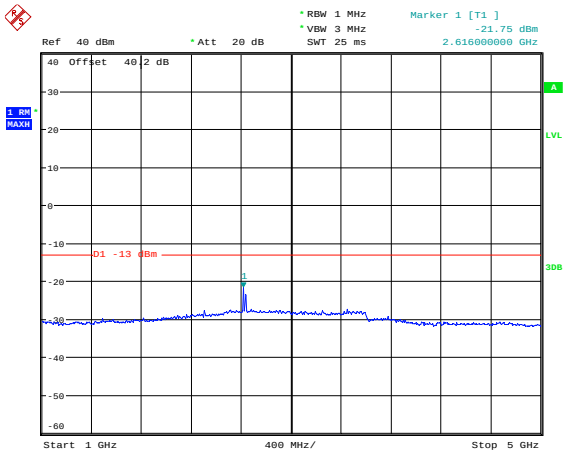


Date: 29.APR.2021 17:53:10

FM,25kHz, 454.0125 MHz

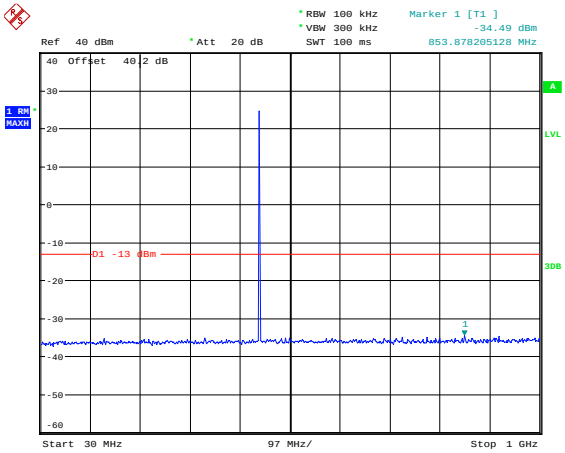


Date: 29.APR.2021 17:54:03

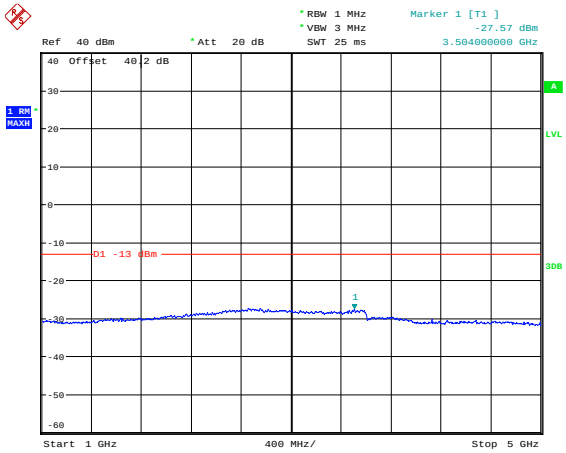


Date: 29.APR.2021 17:54:43

4FSK,12.5kHz, 454.0125 MHz



Date: 30.APR.2021 15:36:51



Date: 30.APR.2021 15:38:10

FCC §2.1053 & §22.861 & §74.462 &§80.211 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053, §22.861, §74.462, §80.211 and §90.210

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =10 1g (TXpwr in Watts/0.001)-the absolute level

Test Data

Environmental Conditions

Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	26.6 ℃	28.6℃
Relative Humidity:	46 %	50 %
ATM Pressure:	101.2 kPa	100.4kPa
Tester:	King Wang	Joker Chen
Test Date:	2021.05.22	2021.05.25

Test Mode: Transmitting

Test Result: Compliance. *Please refer to the following table.*

30MHz - 5GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
FM,Frequency: 400.0125MHz-12.5 kHz								
800.03	H	31.54	-66.99	0.00	0.49	-67.48	-20.00	47.48
800.03	V	44.54	-50.96	0.00	0.49	-51.45	-20.00	31.45
1200.04	H	38.85	-64.22	8.74	0.98	-56.46	-20.00	36.46
1200.04	V	37.12	-66.36	8.74	0.98	-58.60	-20.00	38.60
1600.05	H	38.20	-66.88	10.30	1.31	-57.89	-20.00	37.89
1600.05	V	37.12	-67.89	10.30	1.31	-58.90	-20.00	38.90
2000.06	H	36.85	-67.90	11.50	1.13	-57.53	-20.00	37.53
2000.06	V	38.10	-66.59	11.50	1.13	-56.22	-20.00	36.22
2400.08	H	37.36	-66.51	12.06	1.22	-55.67	-20.00	35.67
2400.08	V	38.36	-66.63	12.06	1.22	-55.79	-20.00	35.79
2800.09	H	38.12	-65.01	12.32	1.40	-54.09	-20.00	34.09
2800.09	V	36.87	-66.76	12.32	1.40	-55.84	-20.00	35.84
3200.10	H	37.80	-64.63	12.32	1.54	-53.85	-20.00	33.85
3200.10	V	36.55	-65.22	12.32	1.54	-54.44	-20.00	34.44
3600.11	H	37.10	-64.50	12.22	1.58	-53.86	-20.00	33.86
3600.11	V	35.80	-64.76	12.22	1.58	-54.12	-20.00	34.12
FM,Frequency: 453.2125MHz-12.5 kHz								
906.43	H	30.26	-65.11	0.00	0.51	-65.62	-20.00	45.62
906.43	V	45.62	-46.42	0.00	0.51	-46.93	-20.00	26.93
1359.64	H	37.69	-66.49	9.41	1.18	-58.26	-20.00	38.26
1359.64	V	38.06	-66.28	9.41	1.18	-58.05	-20.00	38.05
1812.85	H	37.67	-67.23	10.94	1.21	-57.50	-20.00	37.50
1812.85	V	37.03	-67.81	10.94	1.21	-58.08	-20.00	38.08
2266.06	H	35.97	-68.19	11.87	1.19	-57.51	-20.00	37.51
2266.06	V	37.36	-67.53	11.87	1.19	-56.85	-20.00	36.85
2719.28	H	36.14	-67.13	12.29	1.35	-56.19	-20.00	36.19
2719.28	V	37.18	-66.84	12.29	1.35	-55.90	-20.00	35.90
3172.49	H	36.20	-66.28	12.33	1.54	-55.49	-20.00	35.49
3172.49	V	37.42	-64.47	12.33	1.54	-53.68	-20.00	33.68
3625.70	H	35.81	-65.71	12.23	1.57	-55.05	-20.00	35.05
3625.70	V	35.83	-64.77	12.23	1.57	-54.11	-20.00	34.11
4078.91	H	35.13	-65.04	12.47	1.46	-54.03	-20.00	34.03
4078.91	V	34.69	-66.22	12.47	1.46	-55.21	-20.00	35.21

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
FM,Frequency: 469.9875MHz-12.5 kHz								
939.98	H	35.80	-58.38	0.00	0.51	-58.89	-20.00	38.89
939.98	V	45.68	-45.39	0.00	0.51	-45.90	-20.00	25.90
1409.96	H	39.40	-65.13	9.62	1.24	-56.75	-20.00	36.75
1409.96	V	38.64	-65.97	9.62	1.24	-57.59	-20.00	37.59
1879.95	H	40.12	-64.73	11.14	1.18	-54.77	-20.00	34.77
1879.95	V	38.10	-66.69	11.14	1.18	-56.73	-20.00	36.73
2349.94	H	37.33	-66.65	11.99	1.21	-55.87	-20.00	35.87
2349.94	V	38.12	-66.84	11.99	1.21	-56.06	-20.00	36.06
2819.93	H	39.10	-63.99	12.33	1.41	-53.07	-20.00	33.07
2819.93	V	37.10	-66.43	12.33	1.41	-55.51	-20.00	35.51
3289.91	H	38.87	-63.41	12.28	1.56	-52.69	-20.00	32.69
3289.91	V	37.12	-64.24	12.28	1.56	-53.52	-20.00	33.52
3759.90	H	38.66	-62.44	12.25	1.53	-51.72	-20.00	31.72
3759.90	V	37.10	-63.71	12.25	1.53	-52.99	-20.00	32.99
4229.89	H	38.20	-61.60	12.81	1.49	-50.28	-20.00	30.28
4229.89	V	36.87	-63.54	12.81	1.49	-52.22	-20.00	32.22

Part 80

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
FM, Frequency: 459.9875MHz-25 kHz								
919.98	H	33.13	-61.76	0.00	0.51	-62.27	-13.00	49.27
919.98	V	44.65	-47.00	0.00	0.51	-47.51	-13.00	34.51
1379.96	H	37.51	-66.81	9.50	1.20	-58.51	-13.00	45.51
1379.96	V	38.42	-66.03	9.50	1.20	-57.73	-13.00	44.73
1839.95	H	37.47	-67.41	11.02	1.20	-57.59	-13.00	44.59
1839.95	V	37.77	-67.05	11.02	1.20	-57.23	-13.00	44.23
2299.94	H	36.61	-67.48	11.92	1.20	-56.76	-13.00	43.76
2299.94	V	36.88	-68.04	11.92	1.20	-57.32	-13.00	44.32
2759.93	H	36.96	-66.24	12.30	1.38	-55.32	-13.00	42.32
2759.93	V	36.54	-67.28	12.30	1.38	-56.36	-13.00	43.36
3219.91	H	36.45	-65.95	12.31	1.55	-55.19	-13.00	42.19
3219.91	V	36.94	-64.74	12.31	1.55	-53.98	-13.00	40.98
3679.90	H	35.21	-66.14	12.24	1.55	-55.45	-13.00	42.45
3679.90	V	35.63	-65.05	12.24	1.55	-54.36	-13.00	41.36
4139.89	H	35.23	-64.79	12.61	1.48	-53.66	-13.00	40.66
4139.89	V	35.16	-65.55	12.61	1.48	-54.42	-13.00	41.42
4599.88	H	34.76	-64.04	13.32	1.52	-52.24	-13.00	39.24
4599.88	V	35.07	-63.95	13.32	1.52	-52.15	-13.00	39.15

Part 74

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
FM, Frequency: 455.0125MHz-12.5 kHz								
910.03	H	32.56	-62.69	0.00	0.51	-63.20	-20.00	43.20
910.03	V	43.50	-48.43	0.00	0.51	-48.94	-20.00	28.94
1365.04	H	36.99	-67.23	9.43	1.19	-58.99	-20.00	38.99
1365.04	V	38.29	-66.08	9.43	1.19	-57.84	-20.00	37.84
1820.05	H	36.74	-68.16	10.96	1.21	-58.41	-20.00	38.41
1820.05	V	36.80	-68.03	10.96	1.21	-58.28	-20.00	38.28
2275.06	H	36.35	-67.79	11.89	1.19	-57.09	-20.00	37.09
2275.06	V	36.85	-68.05	11.89	1.19	-57.35	-20.00	37.35
2730.08	H	36.43	-66.82	12.29	1.36	-55.89	-20.00	35.89
2730.08	V	36.32	-67.65	12.29	1.36	-56.72	-20.00	36.72
3185.09	H	35.47	-66.99	12.33	1.54	-56.20	-20.00	36.20
3185.09	V	36.18	-65.65	12.33	1.54	-54.86	-20.00	34.86
3640.10	H	35.04	-66.44	12.23	1.57	-55.78	-20.00	35.78
3640.10	V	36.50	-64.12	12.23	1.57	-53.46	-20.00	33.46
4095.11	H	35.12	-65.01	12.51	1.47	-53.97	-20.00	33.97
4095.11	V	36.32	-64.53	12.51	1.47	-53.49	-20.00	33.49
4550.13	H	35.03	-63.95	13.36	1.53	-52.12	-20.00	32.12
4550.13	V	36.07	-63.20	13.36	1.53	-51.37	-20.00	31.37
FM, Frequency: 455.0125MHz-25 kHz								
910.03	H	34.54	-60.71	0.00	0.51	-61.22	-13.00	48.22
910.03	V	44.65	-47.28	0.00	0.51	-47.79	-13.00	34.79
1365.04	H	36.78	-67.44	9.43	1.19	-59.20	-13.00	46.2
1365.04	V	38.63	-65.74	9.43	1.19	-57.50	-13.00	44.5
1820.05	H	36.52	-68.38	10.96	1.21	-58.63	-13.00	45.63
1820.05	V	36.69	-68.14	10.96	1.21	-58.39	-13.00	45.39
2275.06	H	36.47	-67.67	11.89	1.19	-56.97	-13.00	43.97
2275.06	V	36.96	-67.94	11.89	1.19	-57.24	-13.00	44.24
2730.08	H	36.33	-66.92	12.29	1.36	-55.99	-13.00	42.99
2730.08	V	36.45	-67.52	12.29	1.36	-56.59	-13.00	43.59
3185.09	H	35.32	-67.14	12.33	1.54	-56.35	-13.00	43.35
3185.09	V	36.46	-65.37	12.33	1.54	-54.58	-13.00	41.58
3640.10	H	34.69	-66.79	12.23	1.57	-56.13	-13.00	43.13
3640.10	V	35.57	-65.05	12.23	1.57	-54.39	-13.00	41.39
4095.11	H	35.23	-64.90	12.51	1.47	-53.86	-13.00	40.86
4095.11	V	36.14	-64.71	12.51	1.47	-53.67	-13.00	40.67
4550.13	H	35.36	-63.62	13.36	1.53	-51.79	-13.00	38.79
4550.13	V	36.47	-62.80	13.36	1.53	-50.97	-13.00	37.97

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
4FSK, Frequency: 455.0125MHz-12.5 kHz								
910.03	H	33.64	-61.61	0.00	0.51	-62.12	-20.00	42.12
910.03	V	45.90	-46.03	0.00	0.51	-46.54	-20.00	26.54
1365.04	H	36.98	-67.24	9.43	1.19	-59.00	-20.00	39.00
1365.04	V	37.86	-66.51	9.43	1.19	-58.27	-20.00	38.27
1820.05	H	37.36	-67.54	10.96	1.21	-57.79	-20.00	37.79
1820.05	V	37.43	-67.40	10.96	1.21	-57.65	-20.00	37.65
2275.06	H	36.74	-67.40	11.89	1.19	-56.70	-20.00	36.70
2275.06	V	36.82	-68.08	11.89	1.19	-57.38	-20.00	37.38
2730.08	H	36.56	-66.69	12.29	1.36	-55.76	-20.00	35.76
2730.08	V	36.64	-67.33	12.29	1.36	-56.40	-20.00	36.40
3185.09	H	36.43	-66.03	12.33	1.54	-55.24	-20.00	35.24
3185.09	V	36.72	-65.11	12.33	1.54	-54.32	-20.00	34.32
3640.10	H	35.68	-65.80	12.23	1.57	-55.14	-20.00	35.14
3640.10	V	35.47	-65.15	12.23	1.57	-54.49	-20.00	34.49
4095.11	H	35.55	-64.58	12.51	1.47	-53.54	-20.00	33.54
4095.11	V	35.26	-65.59	12.51	1.47	-54.55	-20.00	34.55
4550.13	H	34.97	-64.01	13.36	1.53	-52.18	-20.00	32.18
4550.13	V	35.13	-64.14	13.36	1.53	-52.31	-20.00	32.31

Part 22

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
FM,Frequency: 454.0125MHz-12.5 kHz								
908.03	H	32.60	-62.72	0.00	0.51	-63.23	-13.00	50.23
908.03	V	44.30	-47.69	0.00	0.51	-48.20	-13.00	35.2
1362.04	H	37.32	-66.88	9.42	1.18	-58.64	-13.00	45.64
1362.04	V	38.16	-66.19	9.42	1.18	-57.95	-13.00	44.95
1816.05	H	37.55	-67.35	10.95	1.21	-57.61	-13.00	44.61
1816.05	V	37.86	-66.98	10.95	1.21	-57.24	-13.00	44.24
2270.06	H	36.33	-67.83	11.88	1.19	-57.14	-13.00	44.14
2270.06	V	37.59	-67.31	11.88	1.19	-56.62	-13.00	43.62
2724.08	H	36.23	-67.03	12.29	1.36	-56.10	-13.00	43.1
2724.08	V	37.39	-66.60	12.29	1.36	-55.67	-13.00	42.67
3178.09	H	36.43	-66.04	12.33	1.54	-55.25	-13.00	42.25
3178.09	V	37.61	-64.26	12.33	1.54	-53.47	-13.00	40.47
3632.10	H	35.72	-65.78	12.23	1.57	-55.12	-13.00	42.12
3632.10	V	37.89	-62.72	12.23	1.57	-52.06	-13.00	39.06
4086.11	H	35.22	-64.93	12.49	1.47	-53.91	-13.00	40.91
4086.11	V	34.87	-66.01	12.49	1.47	-54.99	-13.00	41.99
4540.13	H	35.41	-63.60	13.37	1.53	-51.76	-13.00	38.76
4540.13	V	34.79	-64.52	13.37	1.53	-52.68	-13.00	39.68
FM, Frequency: 454.0125MHz-25 kHz								
908.03	H	32.18	-63.14	0.00	0.51	-63.65	-13.00	50.65
908.03	V	44.56	-47.43	0.00	0.51	-47.94	-13.00	34.94
1362.04	H	37.26	-66.94	9.42	1.18	-58.70	-13.00	45.7
1362.04	V	38.37	-65.98	9.42	1.18	-57.74	-13.00	44.74
1816.05	H	37.67	-67.23	10.95	1.21	-57.49	-13.00	44.49
1816.05	V	37.49	-67.35	10.95	1.21	-57.61	-13.00	44.61
2270.06	H	36.27	-67.89	11.88	1.19	-57.20	-13.00	44.2
2270.06	V	37.84	-67.06	11.88	1.19	-56.37	-13.00	43.37
2724.08	H	36.55	-66.71	12.29	1.36	-55.78	-13.00	42.78
2724.08	V	37.46	-66.53	12.29	1.36	-55.60	-13.00	42.6
3178.09	H	36.39	-66.08	12.33	1.54	-55.29	-13.00	42.29
3178.09	V	37.52	-64.35	12.33	1.54	-53.56	-13.00	40.56
3632.10	H	35.88	-65.62	12.23	1.57	-54.96	-13.00	41.96
3632.10	V	37.92	-62.69	12.23	1.57	-52.03	-13.00	39.03
4086.11	H	35.43	-64.72	12.49	1.47	-53.70	-13.00	40.7
4086.11	V	34.97	-65.91	12.49	1.47	-54.89	-13.00	41.89
4540.13	H	35.55	-63.46	13.37	1.53	-51.62	-13.00	38.62
4540.13	V	34.88	-64.43	13.37	1.53	-52.59	-13.00	39.59

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
4FSK,Frequency: 454.0125MHz-12.5 kHz								
908.03	H	31.98	-63.34	0.00	0.51	-63.85	-13.00	50.85
908.03	V	43.65	-48.34	0.00	0.51	-48.85	-13.00	35.85
1362.04	H	37.32	-66.88	9.42	1.18	-58.64	-13.00	45.64
1362.04	V	37.96	-66.39	9.42	1.18	-58.15	-13.00	45.15
1816.05	H	37.42	-67.48	10.95	1.21	-57.74	-13.00	44.74
1816.05	V	37.21	-67.63	10.95	1.21	-57.89	-13.00	44.89
2270.06	H	35.86	-68.30	11.88	1.19	-57.61	-13.00	44.61
2270.06	V	37.41	-67.49	11.88	1.19	-56.80	-13.00	43.80
2724.08	H	36.22	-67.04	12.29	1.36	-56.11	-13.00	43.11
2724.08	V	37.34	-66.65	12.29	1.36	-55.72	-13.00	42.72
3178.09	H	36.12	-66.35	12.33	1.54	-55.56	-13.00	42.56
3178.09	V	37.45	-64.42	12.33	1.54	-53.63	-13.00	40.63
3632.10	H	35.76	-65.74	12.23	1.57	-55.08	-13.00	42.08
3632.10	V	35.87	-64.74	12.23	1.57	-54.08	-13.00	41.08
4086.11	H	35.34	-64.81	12.49	1.47	-53.79	-13.00	40.79
4086.11	V	34.86	-66.02	12.49	1.47	-55.00	-13.00	42.00
4540.13	H	35.47	-63.54	13.37	1.53	-51.70	-13.00	38.70
4540.13	V	34.63	-64.68	13.37	1.53	-52.84	-13.00	39.84

Note 1:The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.
Note 2:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

FCC §2.1055 & § 22.355 & §74.464& §80.209 & §90.213 - FREQUENCY STABILITY

Applicable Standard

FCC §2.1055, § 22.355, §74.464, §80.209 and §90.213

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Test Data

Environmental Conditions

Temperature:	23.6~25.5℃
Relative Humidity:	52~69 %
ATM Pressure:	100.1~101.5 kPa
Tester:	Levi Shi
Test Date:	2021.04.27~2021.05.24

Test Mode: Transmitting

Test Result: Compliance. *Please refer to the following Tables.*

FCC Part 90:

FM,12.5kHz, Reference Frequency: 453.2125 MHz, Limit: ±2.5 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.2	453.2127937	0.65
-20		453.2127767	0.61
-10		453.2127498	0.55
0		453.2127920	0.64
10		453.2126649	0.36
20		453.2127000	0.44
30		453.2127806	0.62
40		453.2127725	0.60
50		453.2125924	0.20
20	8.4	453.2127666	0.59
20	6.4	453.2127771	0.61

4FSK, 12.5kHz, Reference Frequency: 453.2125MHz, Limit: ±2.5 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.2	453.2125087	0.02
-20		453.2125005	0.00
-10		453.2125087	0.02
0		453.2126225	0.27
10		453.2125317	0.07
20		453.2125317	0.07
30		453.2126163	0.26
40		453.2125370	0.08
50		453.2127668	0.59
20	8.4	453.2126931	0.43
20	6.4	453.2127604	0.57

FCC Part 80:

FM,25kHz, Reference Frequency: 459.9875MHz,Limit: ±5.0 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.2	459.987759	0.56
-20		459.987769	0.58
-10		459.987617	0.25
0		459.987519	0.04
10		459.987671	0.37
20		459.987700	0.43
30		459.987787	0.62
40		459.987525	0.05
50		459.987651	0.33
20	8.4	459.987789	0.63
20	6.4	459.987511	0.02

FCC Part 74:

FM, 12.5kHz, Reference Frequency: 455.0125 MHz, Limit: ±2.5 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.2	455.0126101	0.24
-20		455.0127806	0.62
-10		455.0126680	0.37
0		455.0125273	0.06
10		455.0125116	0.03
20		455.0126600	0.35
30		455.0125835	0.18
40		455.0125601	0.13
50		455.0126155	0.25
20	8.4	455.0126294	0.28
20	6.4	455.0126988	0.44

4FSK, 12.5kHz, Reference Frequency: 455.0125 MHz, Limit: ±2.5 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.2	455.0125923	0.20
-20		455.0127833	0.62
-10		455.0126655	0.36
0		455.0126826	0.40
10		455.0127695	0.59
20		455.0128950	0.87
30		455.0126095	0.24
40		455.0127683	0.59
50		455.0127573	0.57
20	8.4	455.0125006	0.00
20	6.4	455.0127337	0.51

FM, 25kHz, Reference Frequency: 455.0125 MHz, Limit: ±2.5 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.2	455.0127691	0.59
-20		455.0126676	0.37
-10		455.0126935	0.43
0		455.0125964	0.21
10		455.0127334	0.51
20		455.0126600	0.35
30		455.0127523	0.55
40		455.0125679	0.15
50		455.0125337	0.07
20	8.4	455.0126502	0.33
20	6.4	455.0126230	0.27

FCC Part 22:

FM, 12.5kHz, Reference Frequency: 454.0125MHz, Limit: ±5.0ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.2	454.0126780	0.39
-20		454.0127781	0.61
-10		454.0125299	0.07
0		454.0126514	0.33
10		454.0125614	0.14
20		454.0127000	0.44
30		454.0125714	0.16
40		454.0126912	0.42
50		454.0127440	0.54
20	8.4	454.0126486	0.33
20	6.4	454.0125198	0.04

4FSK,12.5kHz, Reference Frequency: 454.0125MHz, Limit: ±5.0ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.2	454.0127789	0.61
-20		454.0126192	0.26
-10		454.0127586	0.57
0		454.0127024	0.45
10		454.0126143	0.25
20		454.0128000	0.66
30		454.0126807	0.40
40		454.0127452	0.54
50		454.0125567	0.12
20	8.4	454.0127948	0.65
20	6.4	454.0126193	0.26

FM, 25kHz, Reference Frequency: 454.0125MHz, Limit: ±5.0 ppm			
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
-30	7.2	454.0125876	0.19
-20		454.0125478	0.11
-10		454.0126189	0.26
0		454.0125733	0.16
10		454.0125053	0.01
20		454.0127000	0.44
30		454.0127384	0.53
40		454.0125989	0.22
50		454.0127215	0.49
20	8.4	454.0126677	0.37
20	6.4	454.0126378	0.30

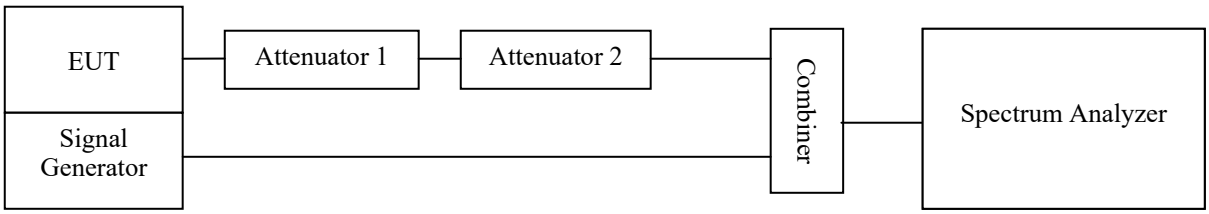
FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

Applicable Standard

Regulations: FCC §90.214

Test Procedure

a) Connect the EUT and test equipment as shown on the following block diagram.
b) Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
c) Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at ±12.5 kHz deviation and set its output level to -100dBm.
d) Turn on the transmitter.
e) Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as P_0.
f) Turn off the transmitter.
g) Adjust the RF level of the signal generator to provide RF power equal to P_0. This signal generator RF level shall be maintained throughout the rest of the measurement.
h) Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
i) Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at ±4 divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "tiger offset" to -10ms for turn on and -15ms for turn off.
j) Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be t_{on}. The trace should be maintained within the allowed divisions during the period t_1 and t_2.
k) Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period t_3.



Test Data

Environmental Conditions

Temperature:	23.6~25.5℃
Relative Humidity:	52~69 %
ATM Pressure:	100.1~101.5 kPa
Tester:	Levi Shi
Test Date:	2021.04.27~2021.05.24

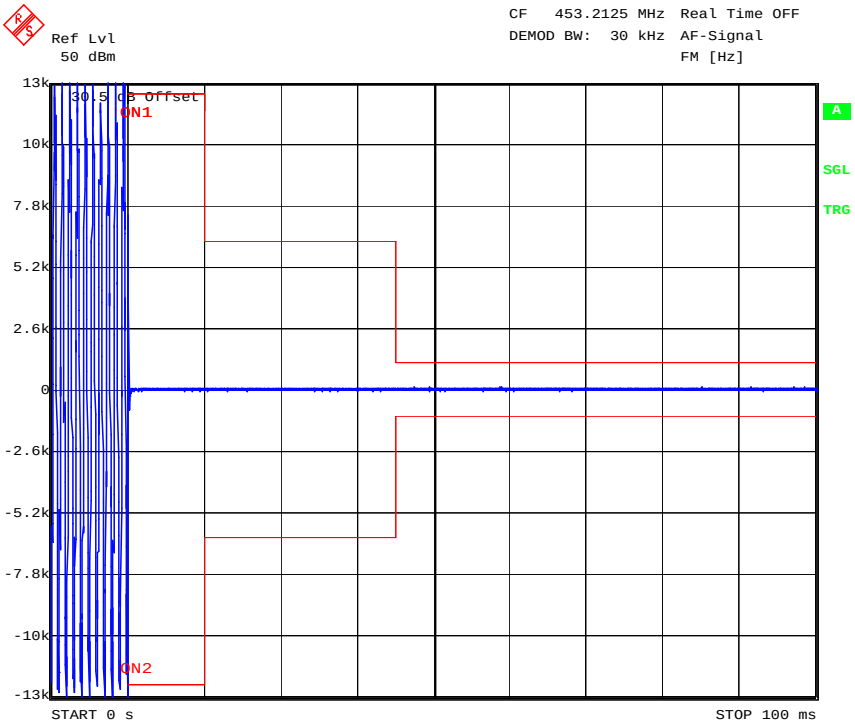
Test Mode: Transmitting

Test Result: Compliance. *Please refer to the following table and plots.*

Channel Spacing (kHz)	Transient Period (ms)	Transient Frequency	Result
12.5	<10(t_1)	±12.5 kHz	Pass
	<25(t_2)	±6.25 kHz	
	<10(t_3)	±12.5 kHz	

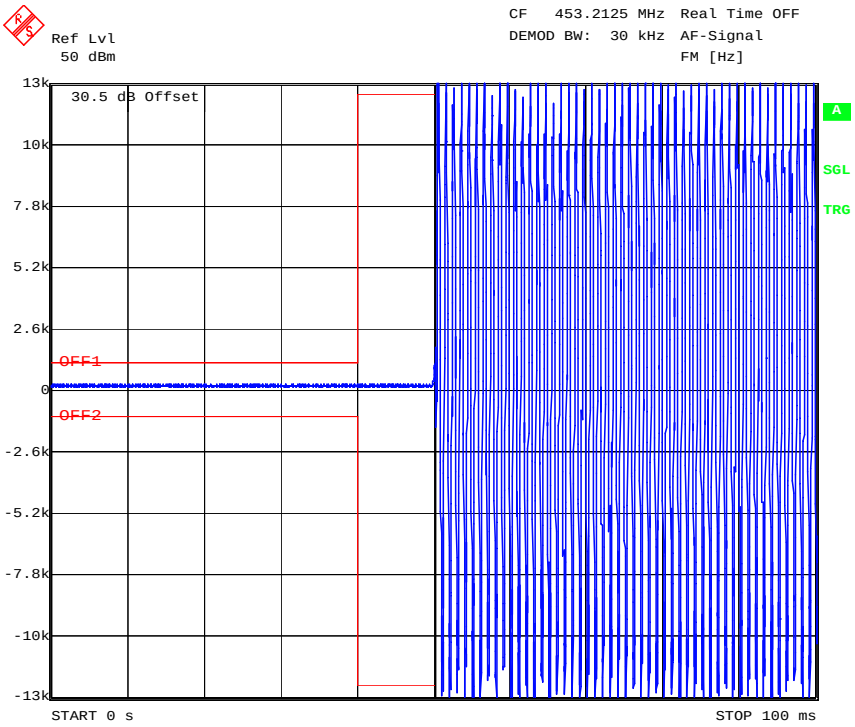
High Power Channel: 453.2125 MHz

Turn on



Date: 21.MAY.2021 14:09:09

Turn off



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******* END OF REPORT *******