



中认信通

CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)



TEST REPORT

Applicant: Hytera Communications Corporation Limited

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

FCC ID: YAMHR65XU1

Product Name: Digital Repeater

Model Number: HR962 U1, HR965 U1, HR966 U1, HR968 U1,
HR969 U1, HR652 U1, HR655 U1, HR656 U1,
HR658 U1, HR659 U1

Standard(s): FCC PART 22, 74, 80 and 90
ANSI C63.26-2015
TIA-603-E-2016

The above equipment has been tested and found compliance with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: CR21100111-00A

Date Of Issue: 2022-01-13

Reviewed By: Sun Zhong

Sun Zhong

Title: Manager

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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang 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. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

Declarations

China Certification ICT Co., Ltd (Dongguan) 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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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	Digital Repeater
EUT Model:	HR962 U1
Multiple Models:	HR652 U1, HR655 U1, HR656 U1, HR658 U1, HR659 U1, HR965 U1, HR966 U1, HR968 U1, HR969 U1
Operation Frequency:	400-470 MHz
Modulation Type:	FM, 4FSK
Channel Spacing:	12.5 kHz / 25 kHz
Rated Output Power: (Conducted)	Configuration 1: High Power Level: 10W, Low Power Level: 1W Configuration 2: High Power Level: 25W, Low Power Level: 1W Note: Applicant declared that, RF circuit of two configurations is the same, so select configuration 2 for low power level test.
Rated Input Voltage:	DC 12V-16.8V Typical: DC 14.4V
Serial Number:	Configuration 1(10W): CR21100111-RF -S1 Configuration 2(25W): CR21100111-RF -S2
EUT Received Date:	2021.10.27
EUT Received Status:	Good
Note: The Multiple models are identical with Test model, please refer to the declaration letter for more detail, which was provided by manufacturer.	

Accessory Information:

Accessory Description	Manufacturer	Model	Parameters
/	/	/	/

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition:

EUT Operation Mode:	The system was configured for testing in Engineering Mode, which was provided by the manufacturer.
Equipment Modifications:	No
EUT Exercise Software:	No

1.2.2 Support Equipment List and Details

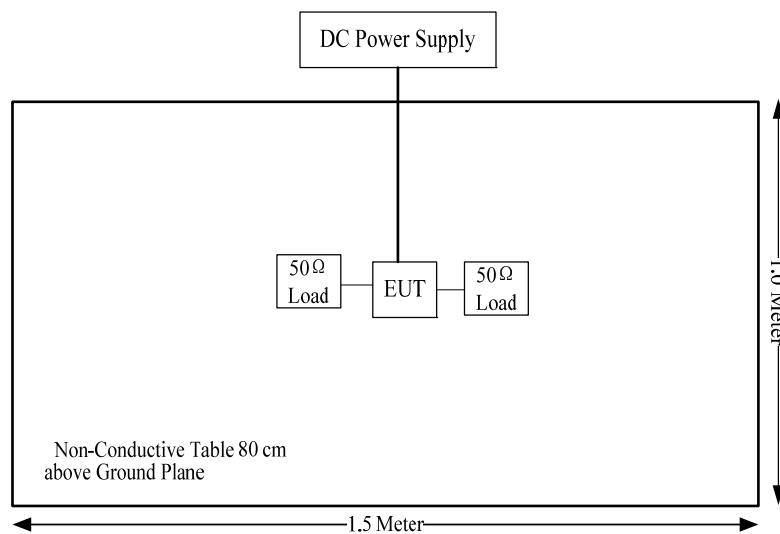
Manufacturer	Description	Model	Serial Number
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386
BEW	Coaxial Terminal*2	CT300W-N-N	/

1.2.3 Support Cable List and Details

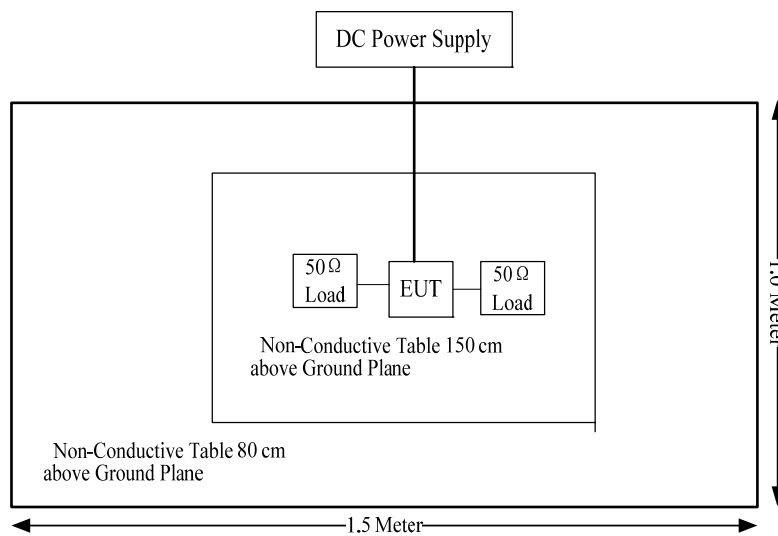
Cable Description	Shielding Cable	Ferrite Core	Length (m)	From Port	To
Coaxial Cable	Yes	No	0.5	EUT	Terminal 1
Coaxial Cable	Yes	No	1	EUT	Terminal 2
DC Cable	No	No	3	DC Power Supply	EUT

1.2.4 Block Diagram of Test Setup

RE Below 1GHz



RE Above 1GHz



1.3 Measurement Uncertainty

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.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	$\pm 5\%$
RF output power, conducted	$\pm 0.61\text{dB}$
Unwanted Emissions, radiated	30MHz ~ 1GHz: 5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	$\pm 1.5\text{dB}$
Temperature	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
Duty Cycle	1%

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§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

3. REQUIREMENTS AND TEST PROCEDURES

3.1 RF OUTPUT POWER

3.1.1 Applicable Standard

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

3.1.2 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

3.2 MODULATION CHARACTERISTIC:

3.2.1 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.

3.2.2 Test Procedure

Test Method: TIA-603-E 2.2.3

3.3 OCCUPIED BANDWIDTH & EMISSION MASK:

3.3.1 Applicable Standard

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

3.3.2 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.

3.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS:

3.4.1 Applicable Standard

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

3.4.2 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.

3.5 RADIATED SPURIOUS EMISSIONS:

3.5.1 Applicable Standard

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

3.5.2 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 lg (TXpwr in Watts/0.001)-the absolute level

3.6 FREQUENCY STABILITY:

3.6.1 Applicable Standard

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

3.6.2 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.

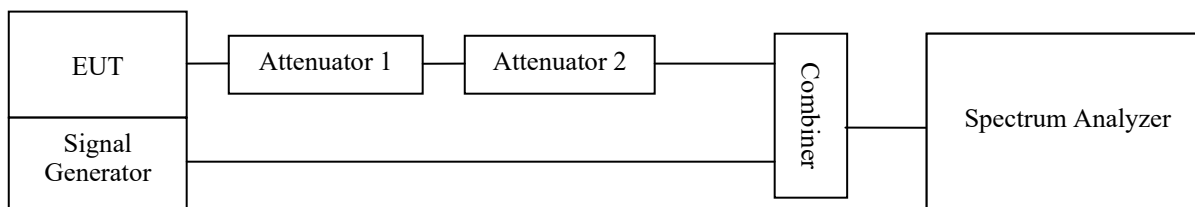
3.7 TRANSIENT FREQUENCY BEHAVIOR

3.7.1 Applicable Standard

Regulations: FCC §90.214

3.7.2 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 “trigger 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 .



4. Test DATA AND RESULTS

4.1 RF OUTPUT POWER

Serial Number:	1W: CR21100111-RF-S2 10W: CR21100111-RF-S1 25W: CR21100111-RF-S2	Test Date:	2021-11-19~2021-12-20
Test Site:	RF	Test Mode:	Transmitting
Tester:	Rinka Li	Test Result:	Pass

Environmental Conditions:					
Temperature: (°C)	22.6~26.2	Relative Humidity: (%)	34~66	ATM Pressure: (kPa)	100.7~101.9

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Signal Analyzer	FSIQ26	831929/006	2021-07-22	2022-07-21
YINSAIGE	Coaxial Cable	LMR300	NJ0100001	2021-08-08	2022-08-07
YINSAIGE	Coaxial Cable	LMR300	NJ0100002	2021-08-08	2022-08-07
Weinschel	Coaxial Attenuators	53-20-34	LN751	2021-08-08	2022-08-07
UNI-T	Multimeter	UT39A+	C210582554	2021-09-30	2022-09-29
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A

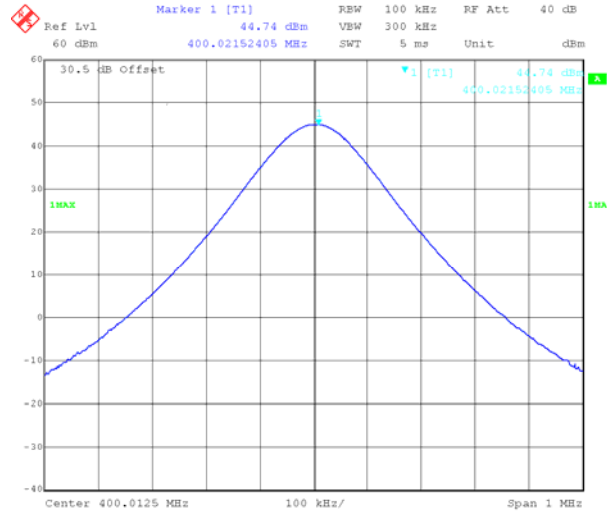
* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Channel Separation	Test Modulation	Test Channel	Test Frequency (MHz)	Conducted Output Power (dBm)			Limit (dBm)			Note
				High Power Level	Middle Power Level	Low Power Level	High Power Level	Middle Power Level	Low Power Level	
12.5kHz	FM	Low	400.0125	44.74	40.00	29.89	44.77	40.79	30.79	Part 90
		Middle	453.2125	44.53	39.59	29.15	44.77	40.79	30.79	
		High	469.9875	44.57	39.85	29.45	44.77	40.79	30.79	
		Additional	455.0125	44.75	39.61	29.18	44.77	40.79	30.79	Part 74
		Additional	454.0125	44.69	39.58	29.15	44.77	40.79	30.79	Part 22
	4FSK	Low	400.0125	44.68	39.99	29.87	44.77	40.79	30.79	Part 90
		Middle	453.2125	44.61	39.63	29.15	44.77	40.79	30.79	
		High	469.9875	44.52	39.87	29.46	44.77	40.79	30.79	
		Additional	455.0125	44.61	39.63	29.19	44.77	40.79	30.79	Part 74
		Additional	454.0125	44.61	39.62	29.14	44.77	40.79	30.79	Part 22
25kHz	FM	Additional	455.0125	44.63	39.63	29.17	44.77	40.79	30.79	Part 74
		Additional	454.0125	44.63	39.62	29.15	44.77	40.79	30.79	Part 22
		Additional	459.9875	44.29	39.73	29.34	44.77	40.79	30.79	Part 80

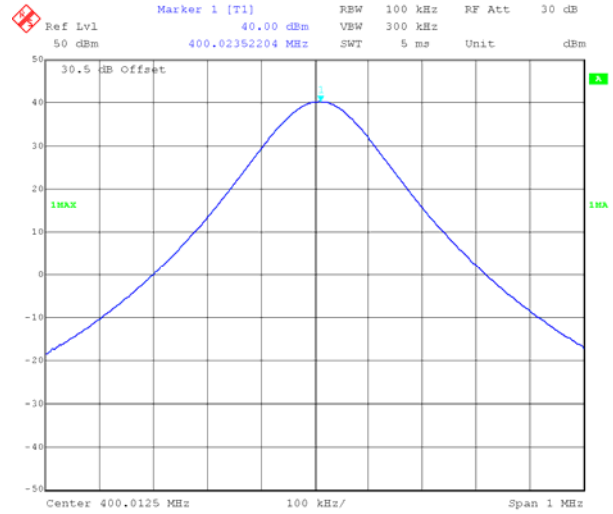
Note:

The high rated power level is 25W(44dBm), middle power level is 10W(40dBm), and low rated power level is 1W(30dBm).

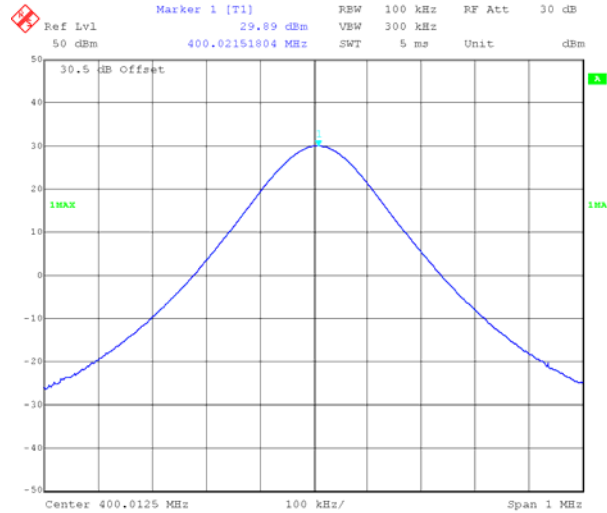
The output power shall not exceed by more than 20 percent the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

FM, 12.5kHz:**Low Channel, 400.0125 MHz High Power**

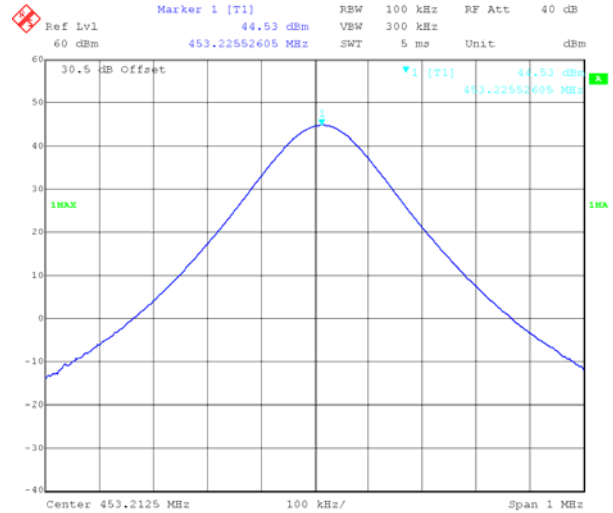
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Low Channel, 400.0125 MHz Middle Power

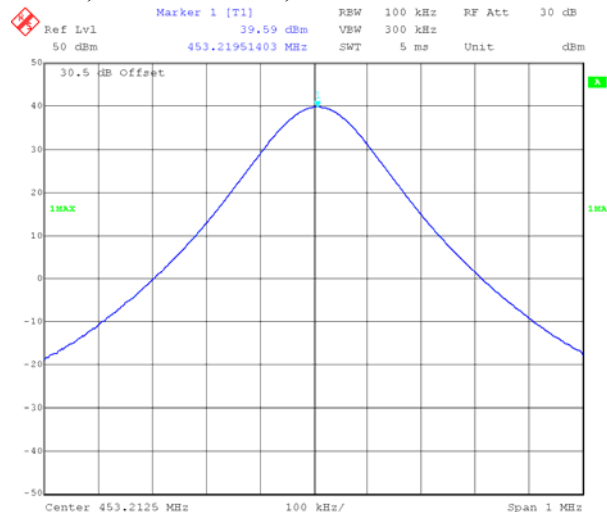
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Low Channel, 400.0125 MHz Low Power

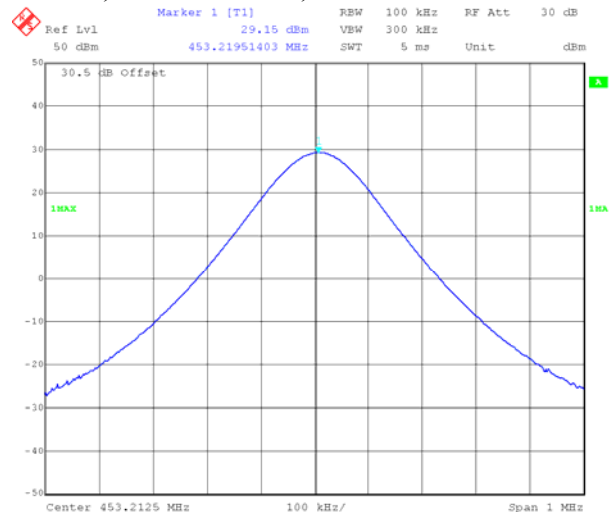
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Part 90, Middle Channel, 453.2125 MHz High Power

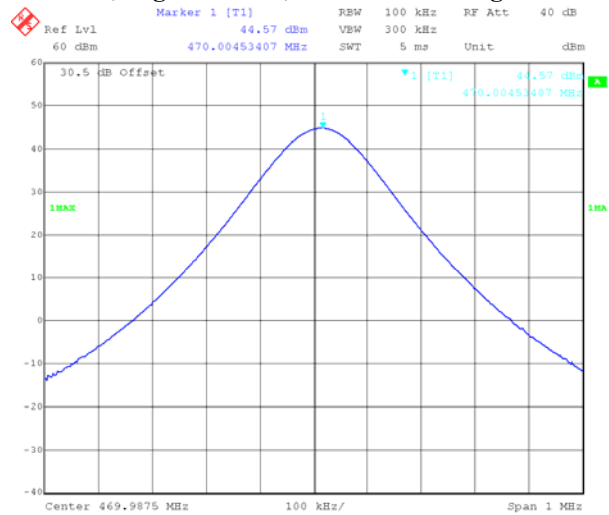
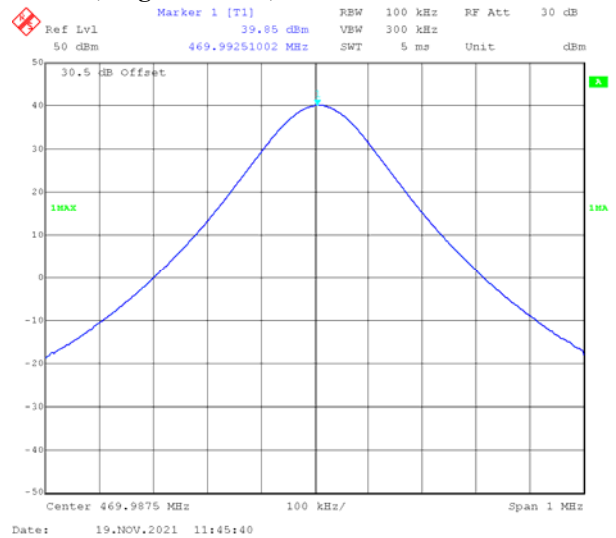
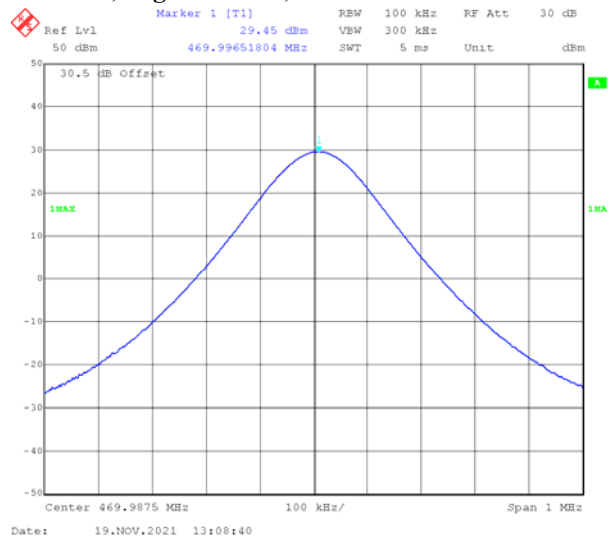
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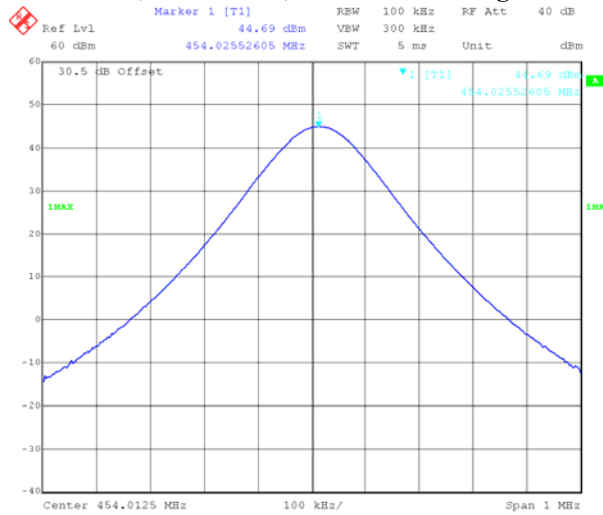
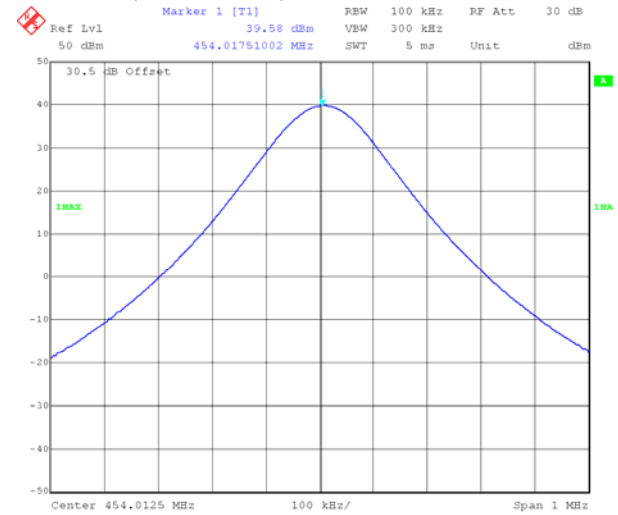
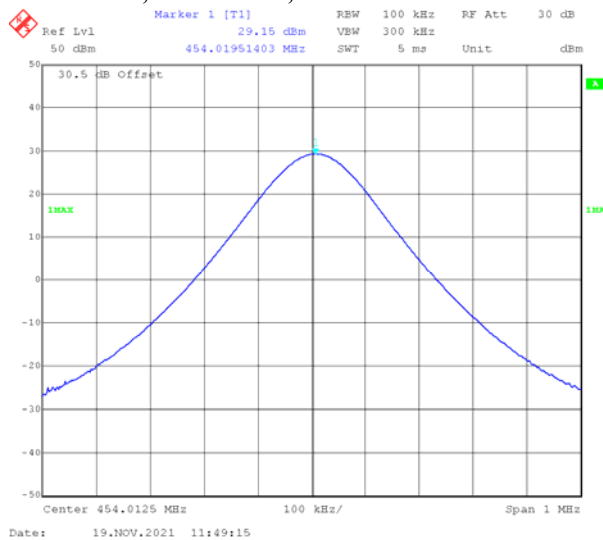
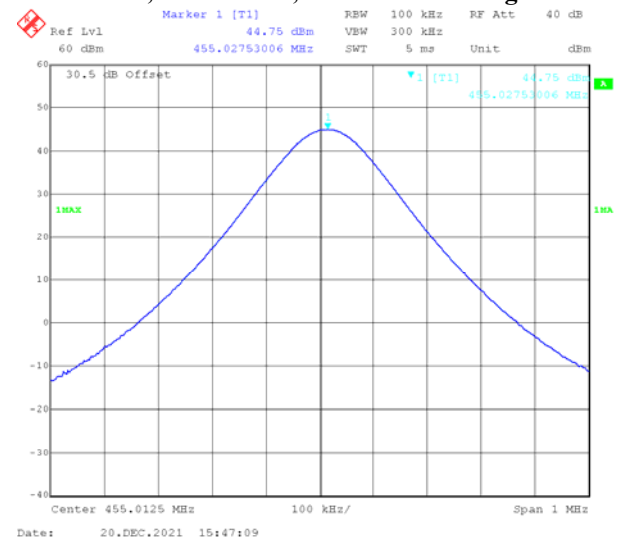
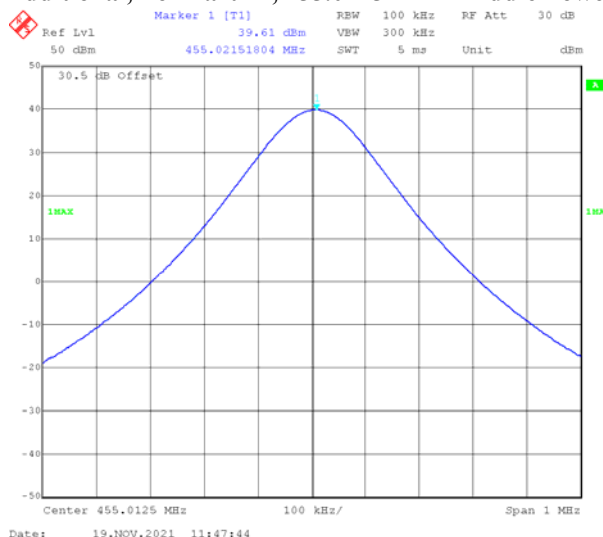
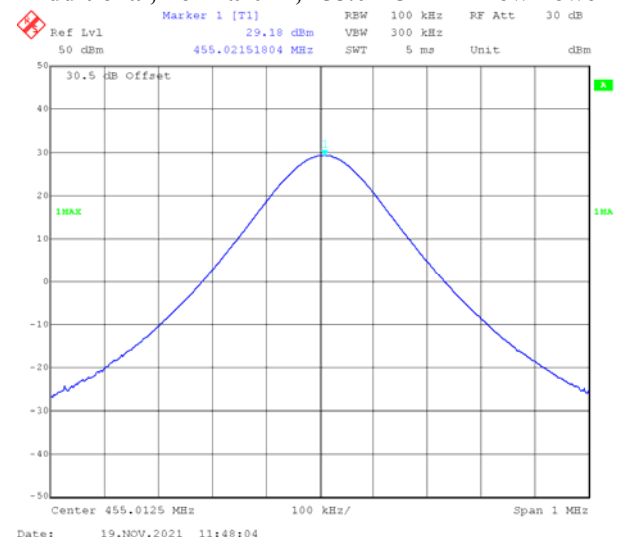
Part 90, Middle Channel, 453.2125 MHz Middle Power

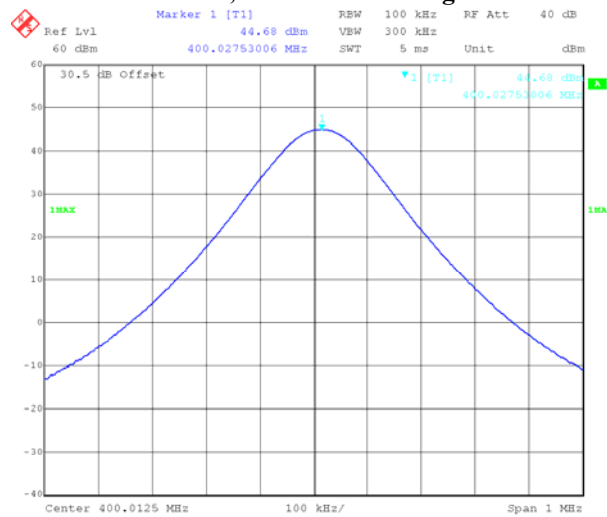
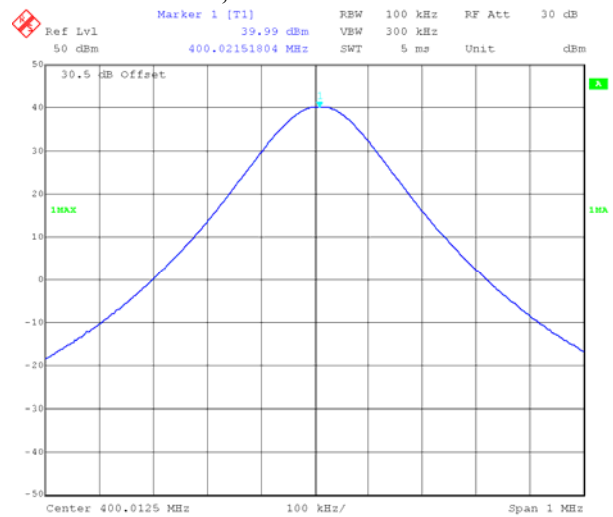
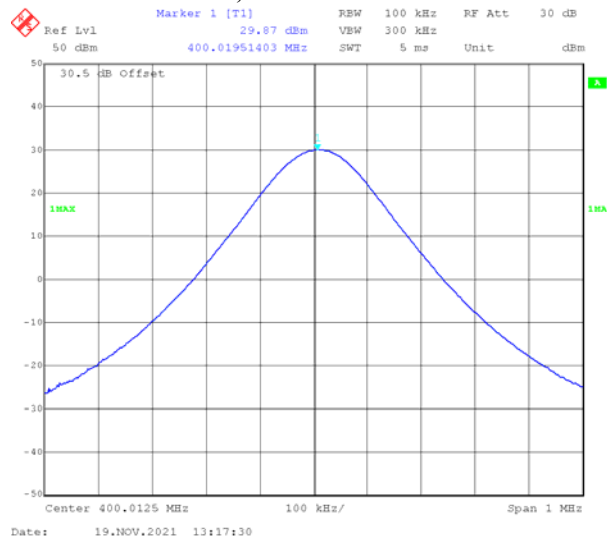
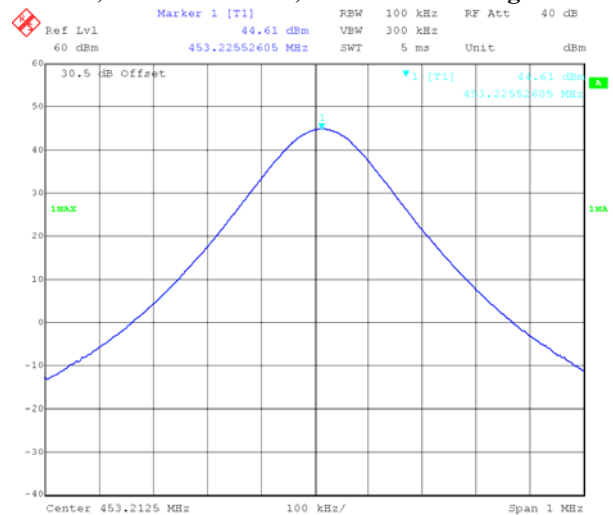
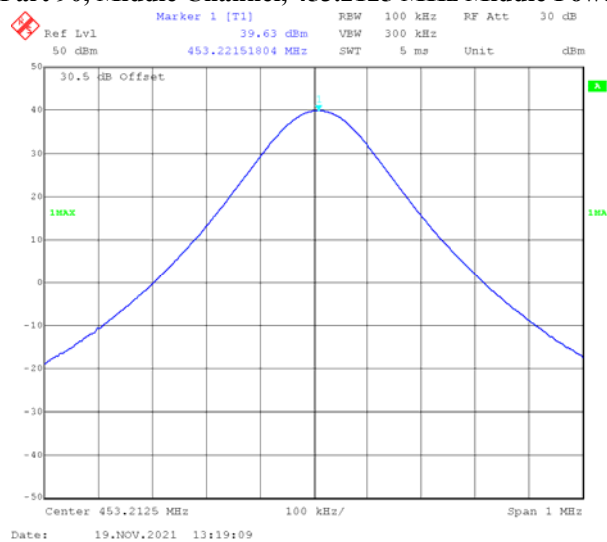
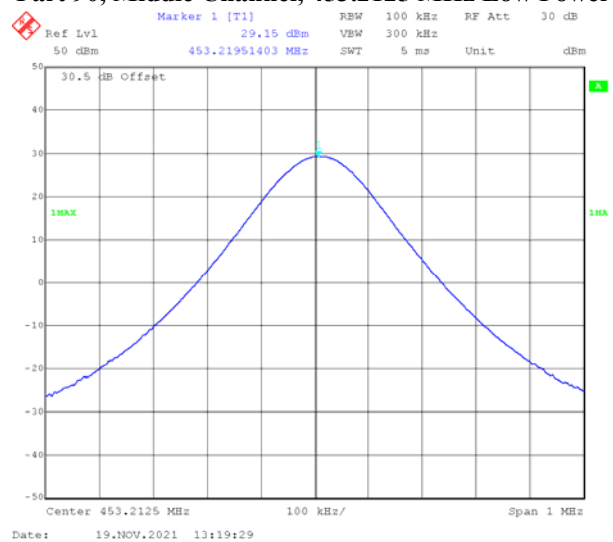
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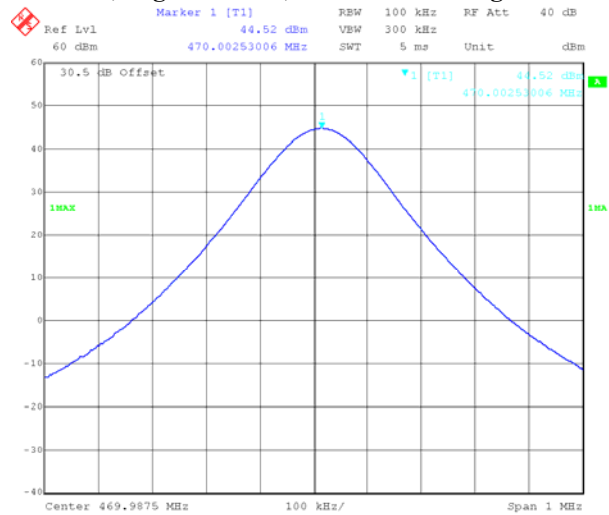
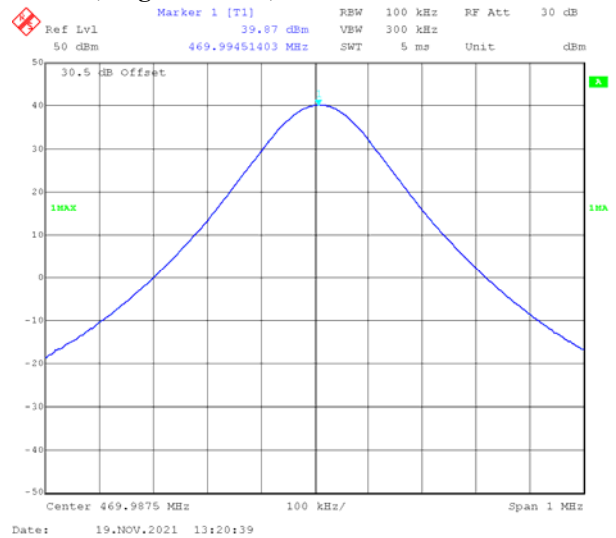
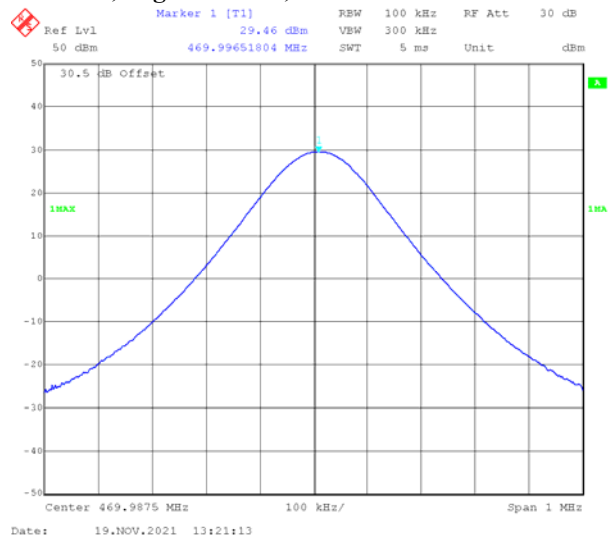
Part 90, Middle Channel, 453.2125 MHz Low Power

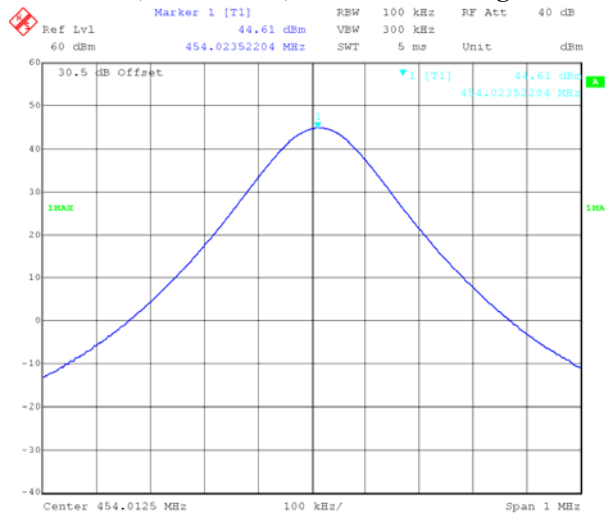
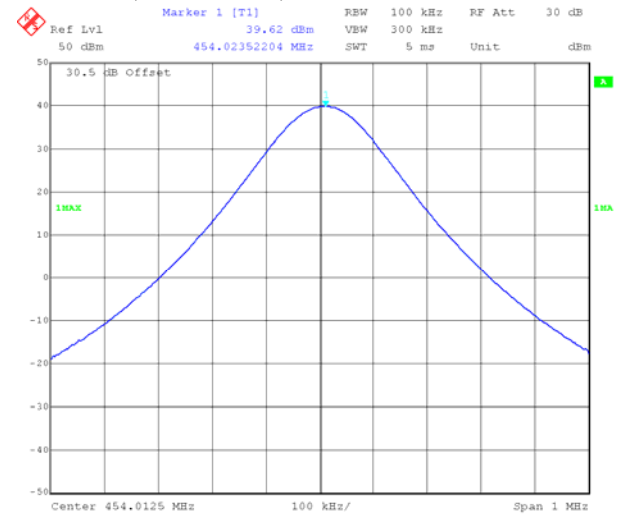
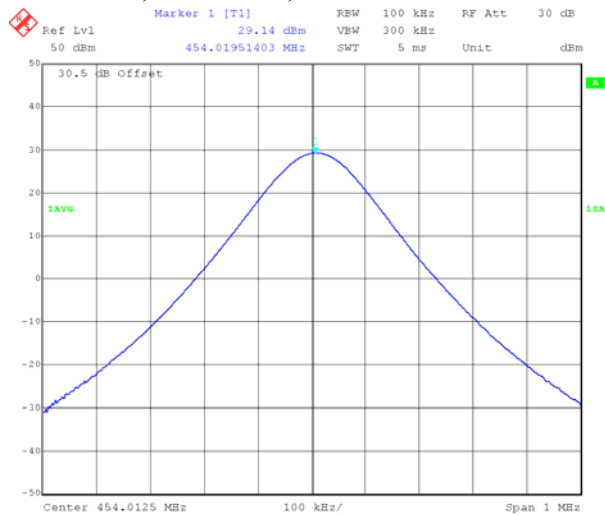
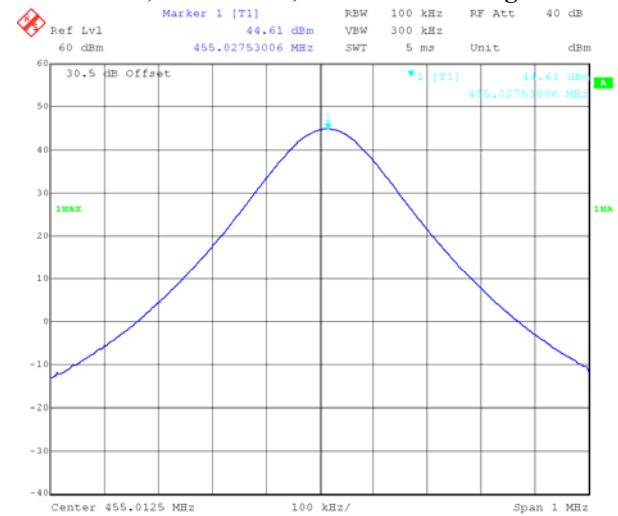
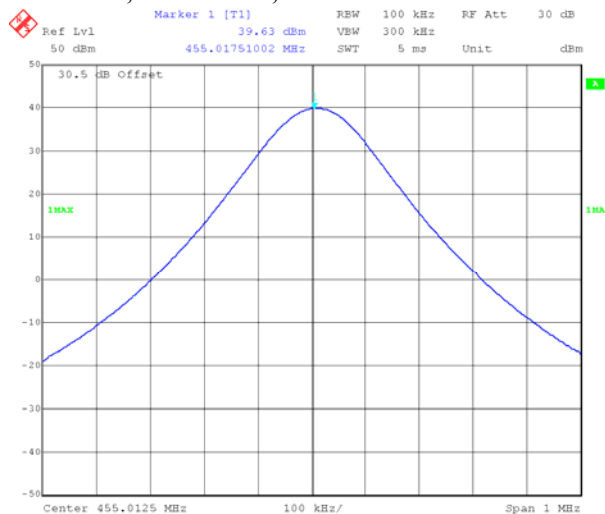
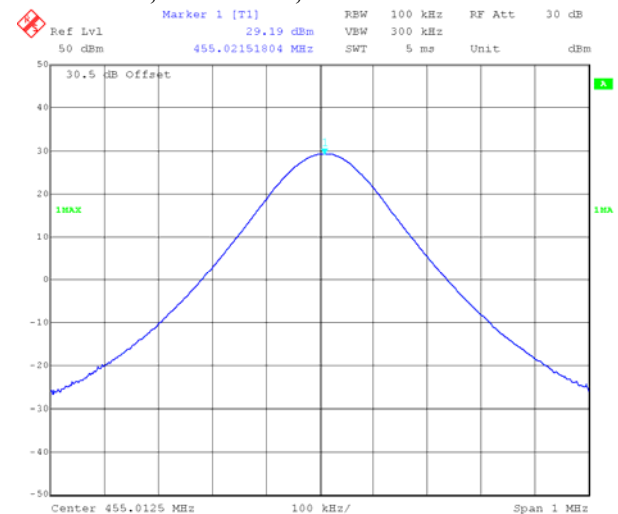
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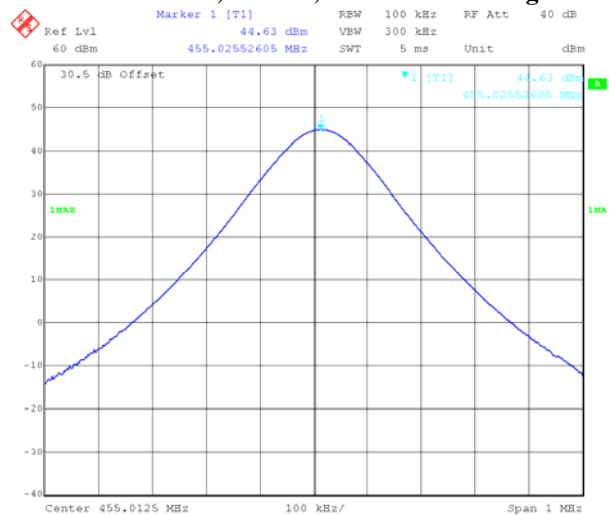
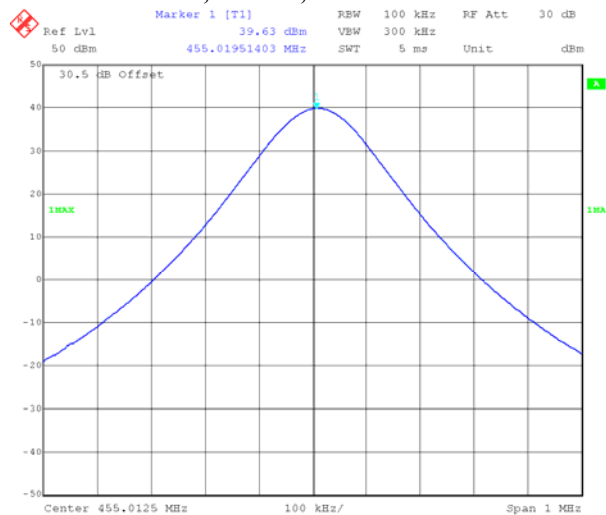
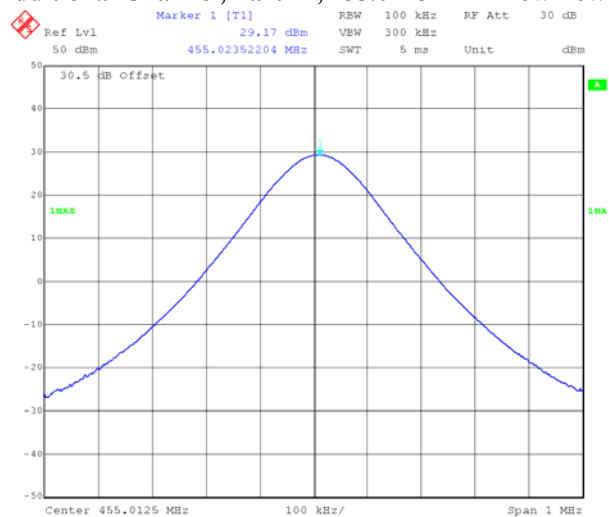
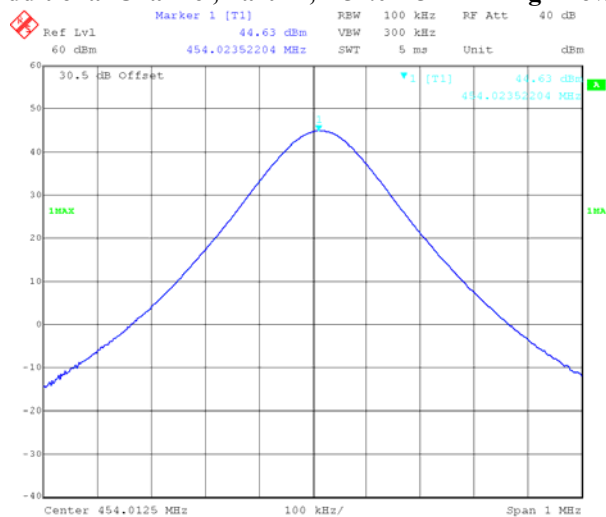
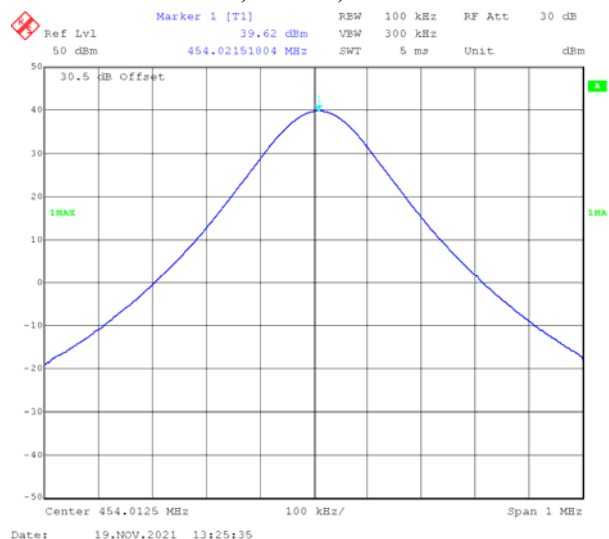
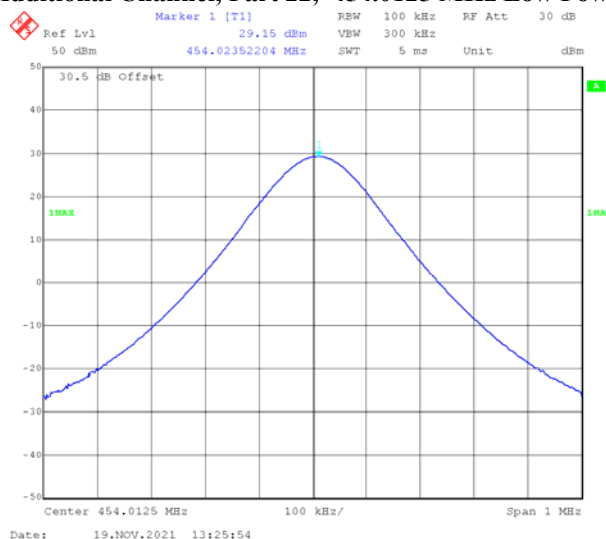
Part 90, High Channel, 469.9875MHz High Power**Part 90, High Channel, 469.9875 MHz Middle Power****Part 90, High Channel, 469.9875 MHz Low Power**

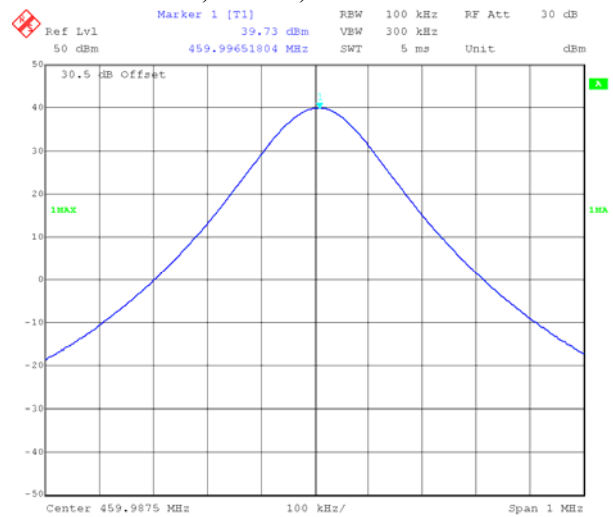
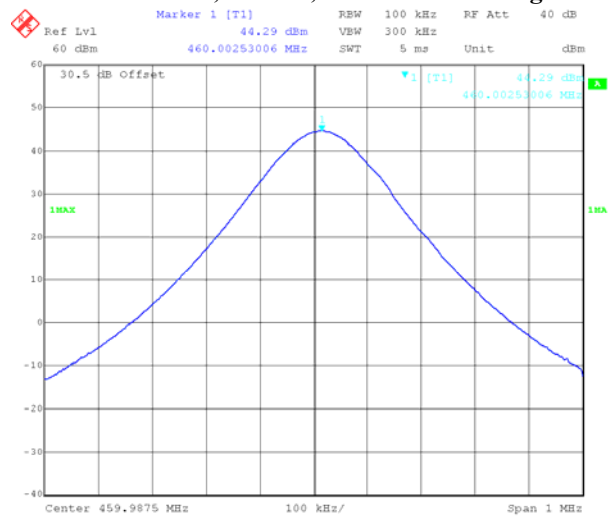
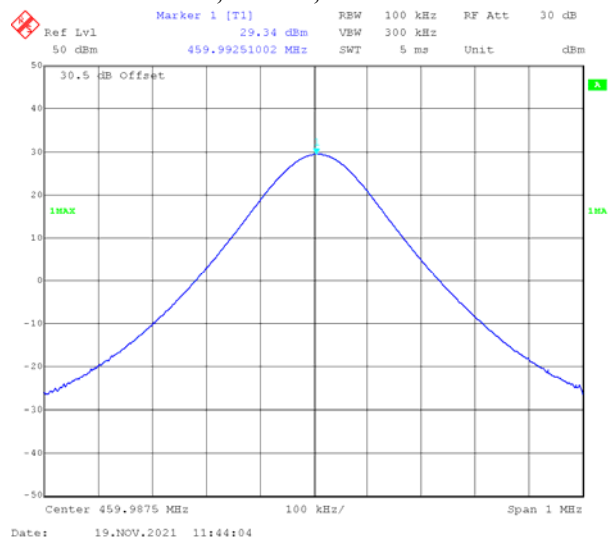
Additional, For Part 22, 454.0125 MHz High Power**Additional, For Part 22, 454.0125 MHz Middle Power****Additional, For Part 22, 454.0125 MHz Low Power****Additional, For Part 74, 455.0125 MHz High Power****Additional, For Part 74, 455.0125 MHz Middle Power****Additional, For Part 74, 455.0125 MHz Low Power**

4FSK, 12.5kHz:**Low Channel, 400.0125 MHz High Power****Low Channel, 400.0125 MHz Middle Power****Low Channel, 400.0125 MHz Low Power****Part 90, Middle Channel, 453.2125 MHz High Power****Part 90, Middle Channel, 453.2125 MHz Middle 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 Middle Power****Part 90, High Channel, 469.9875 MHz Low Power**

Additional, For Part 22, 454.0125 MHz High Power**Additional, For Part 22, 454.0125 MHz Middle Power****Additional, For Part 22, 454.0125 MHz Low Power****Additional, For Part 74, 455.0125 MHz High Power****Additional, For Part 74, 455.0125 MHz Middle Power****Additional, For Part 74, 455.0125 MHz Low Power**

FM, 25kHz:**Additional Channel, Part 74, 455.0125 MHz High Power****Additional Channel, Part 74, 455.0125 MHz Middle Power****Additional Channel, Part 74, 455.0125 MHz Low Power****Additional Channel, Part 22, 454.0125 MHz High Power****Additional Channel, Part 22, 454.0125 MHz Middle****Additional Channel, Part 22, 454.0125 MHz Low Power**

Additional Channel, Part 80, 459.9875 MHz High Power**Additional Channel, Part 80, 459.9875 MHz Low Power**

4.2 MODULATION CHARACTERISTIC:

Serial Number:	25W: CR21100111-RF-S2	Test Date:	2021-12-20
Test Site:	RF	Test Mode:	Transmitting
Tester:	Rinka Li	Test Result:	Pass

Environmental Conditions:					
Temperature: (°C)	22.6	Relative Humidity: (%)	39	ATM Pressure: (kPa)	101.3

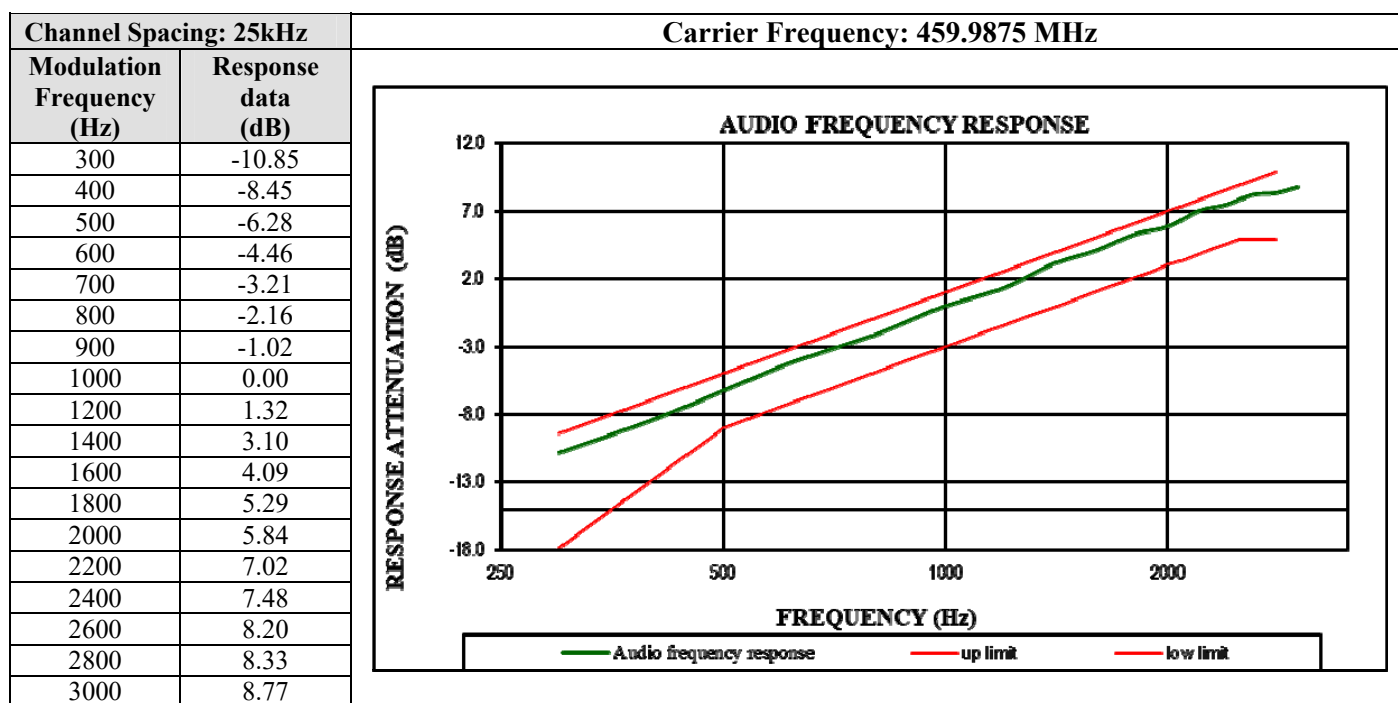
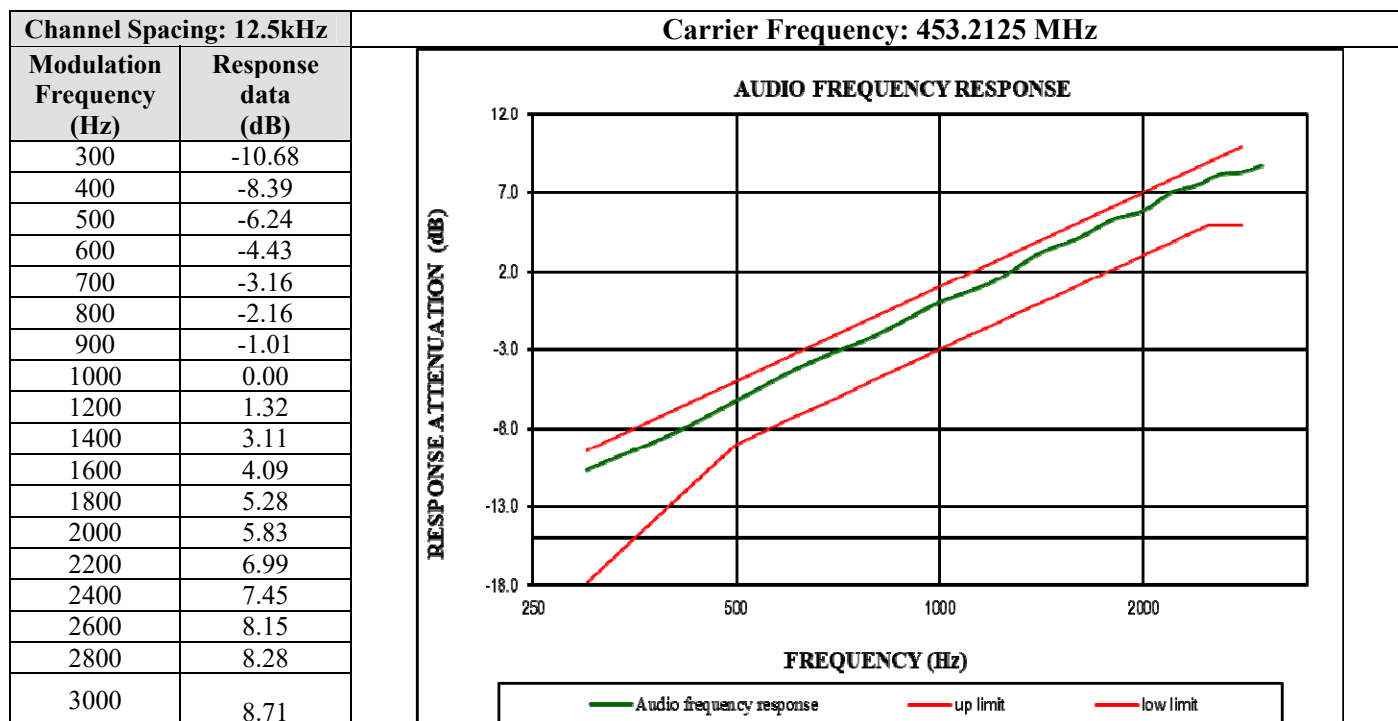
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
YINSAIGE	Coaxial Cable	LMR300	NJ0100001	2021-08-08	2022-08-07
YINSAIGE	Coaxial Cable	LMR300	NJ0100002	2021-08-08	2022-08-07
Weinschel	Coaxial Attenuators	53-20-34	LN751	2021-08-08	2022-08-07
UNI-T	Multimeter	UT39A+	C210582554	2021-09-30	2022-09-29
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A
HP	RF Communications Test Set	8920A	3438A05209	2021-07-22	2022-07-21

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

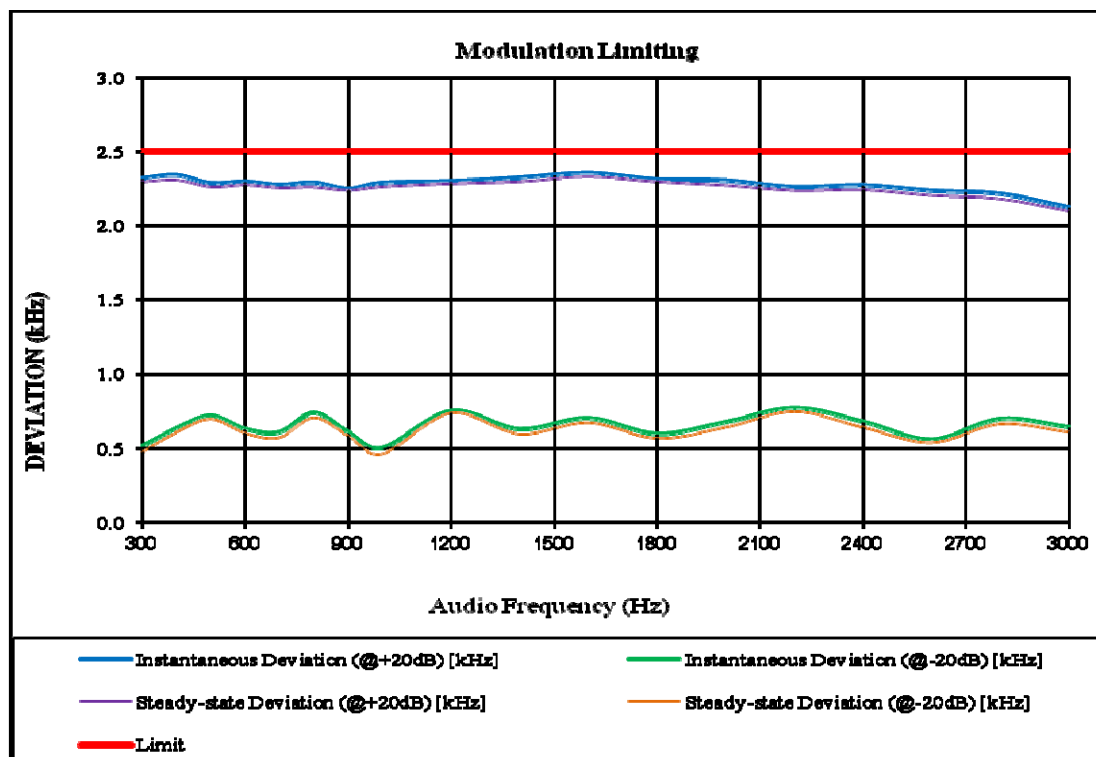
Test Data:

Audio Frequency Response – High Power

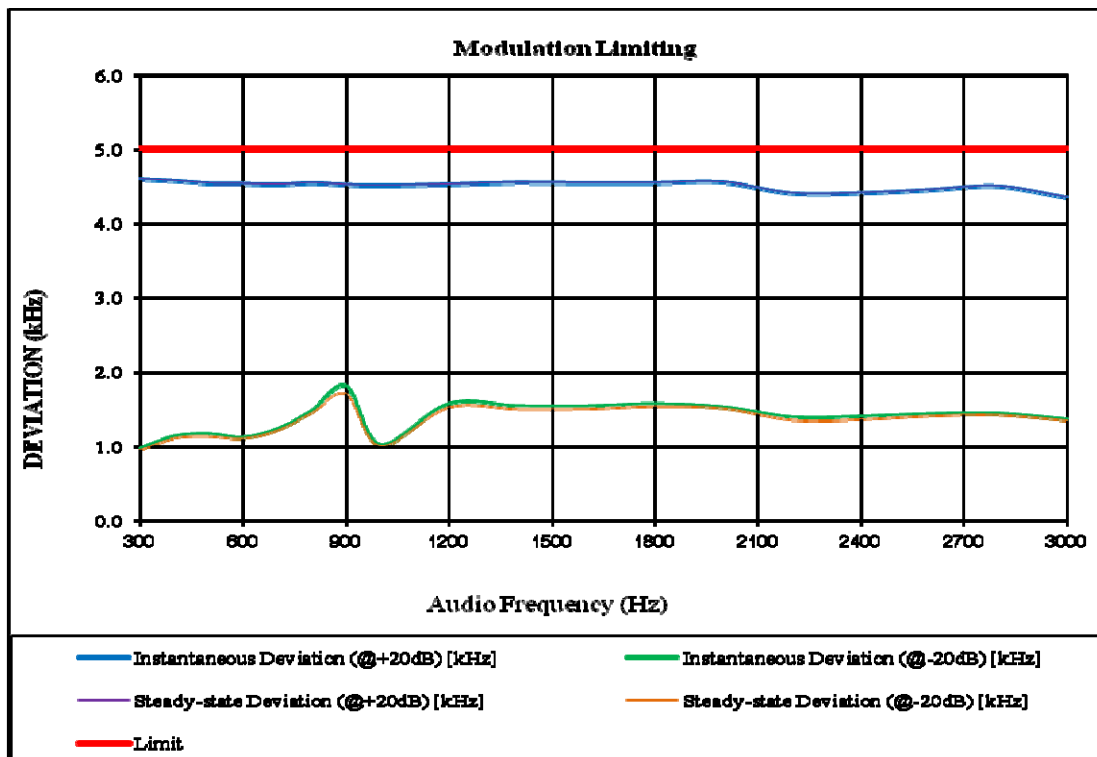


Modulation Limiting – High Power

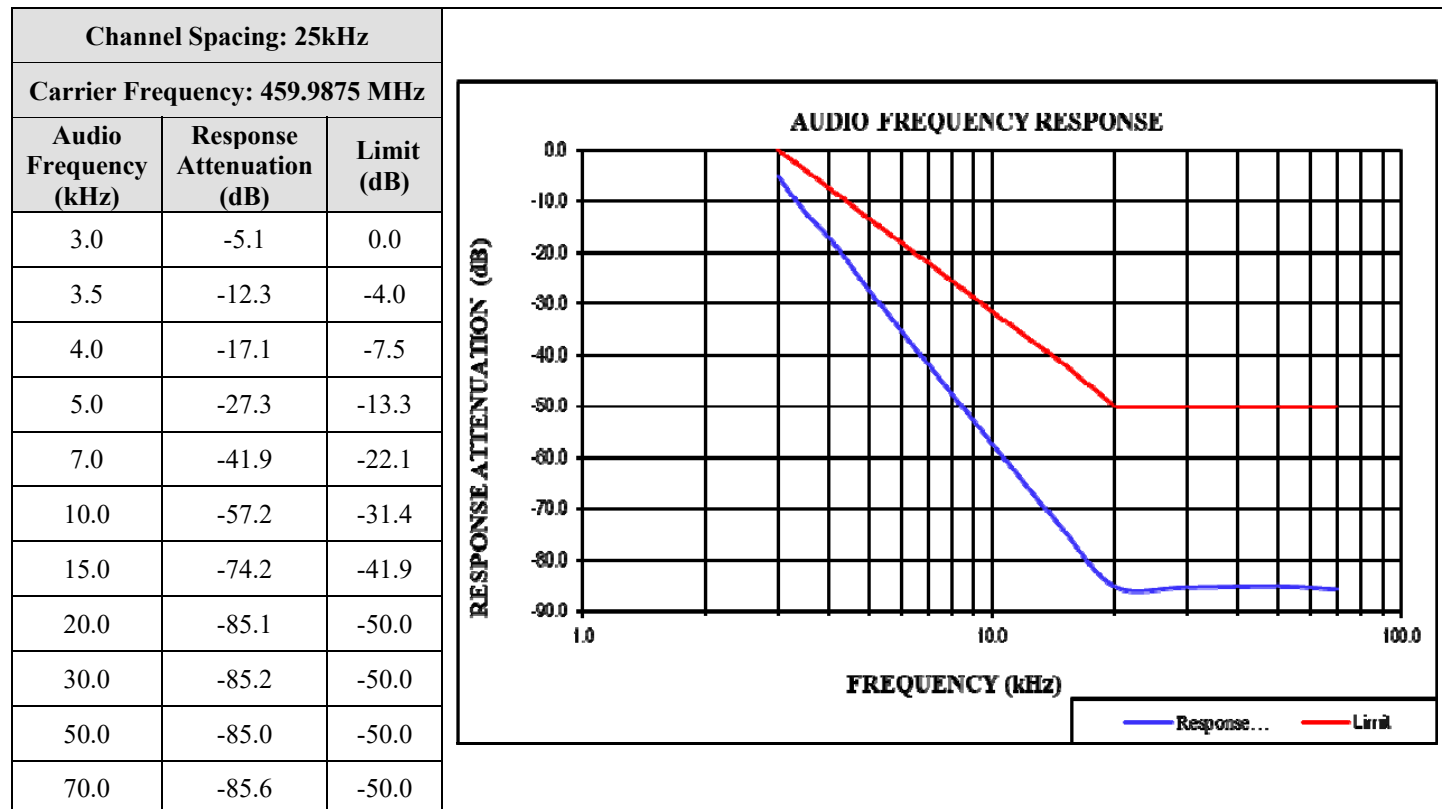
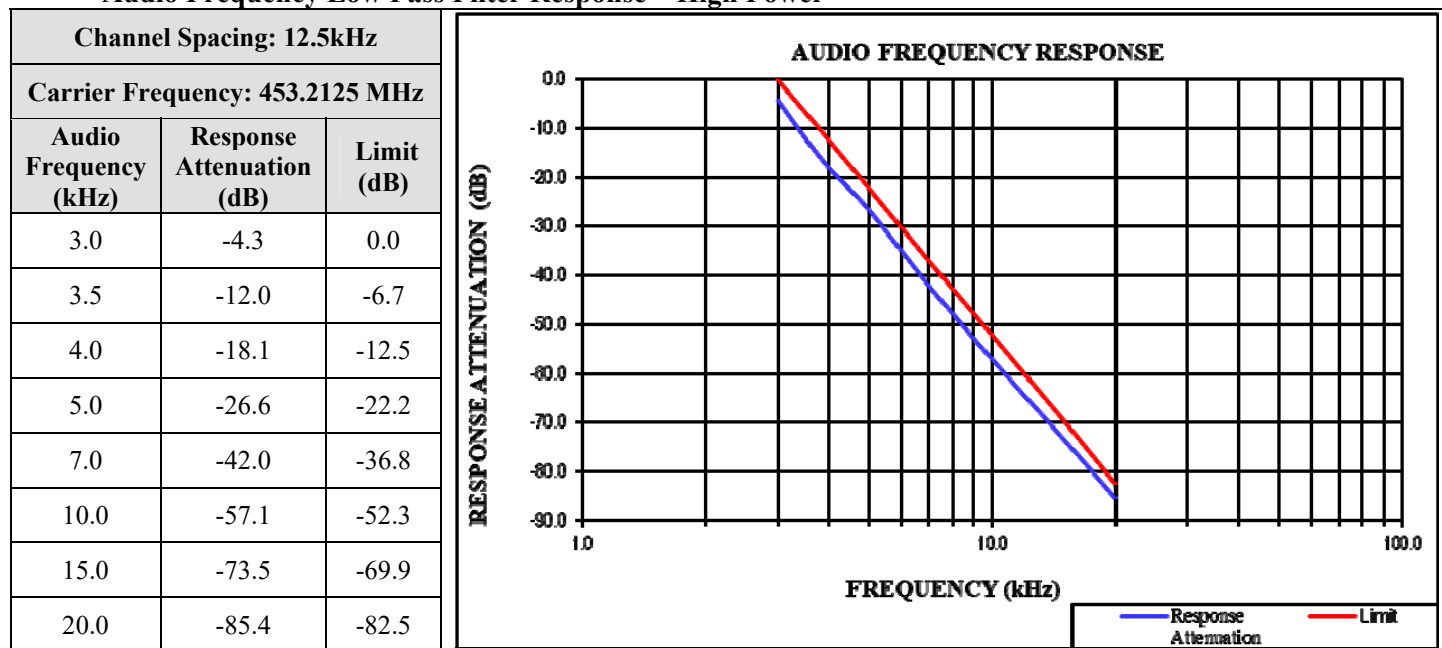
Channel Spacing: 12.5kHz		Carrier Frequency: 453.2125 MHz			
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit [kHz]
	Deviation (@+20dB) [kHz]	Deviation (@-20dB) [kHz]	Deviation (@+20dB) [kHz]	Deviation (@-20dB) [kHz]	
300	2.320	0.516	2.300	0.476	2.5
400	2.340	0.638	2.312	0.611	2.5
500	2.288	0.723	2.266	0.702	2.5
600	2.298	0.633	2.278	0.605	2.5
700	2.276	0.612	2.259	0.576	2.5
800	2.292	0.742	2.263	0.712	2.5
900	2.250	0.613	2.242	0.587	2.5
1000	2.290	0.506	2.266	0.466	2.5
1200	2.301	0.754	2.287	0.742	2.5
1400	2.324	0.632	2.301	0.600	2.5
1600	2.354	0.707	2.332	0.678	2.5
1800	2.312	0.600	2.300	0.571	2.5
2000	2.306	0.680	2.276	0.645	2.5
2200	2.261	0.774	2.241	0.753	2.5
2400	2.274	0.683	2.246	0.645	2.5
2600	2.237	0.562	2.207	0.541	2.5
2800	2.217	0.702	2.186	0.669	2.5
3000	2.127	0.646	2.102	0.612	2.5



Channel Spacing: 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	4.599	0.980	4.599	0.944	5
400	4.578	1.138	4.578	1.107	5
500	4.546	1.168	4.546	1.131	5
600	4.541	1.123	4.541	1.102	5
700	4.531	1.236	4.531	1.212	5
800	4.550	1.477	4.550	1.453	5
900	4.528	1.813	4.528	1.711	5
1000	4.517	1.028	4.517	1.001	5
1200	4.534	1.573	4.534	1.531	5
1400	4.556	1.544	4.556	1.507	5
1600	4.549	1.542	4.549	1.509	5
1800	4.550	1.573	4.550	1.544	5
2000	4.559	1.530	4.559	1.516	5
2200	4.413	1.393	4.413	1.355	5
2400	4.417	1.402	4.417	1.362	5
2600	4.460	1.436	4.460	1.411	5
2800	4.509	1.443	4.509	1.425	5
3000	4.353	1.364	4.353	1.346	5



Audio Frequency Low Pass Filter Response – High Power



4.3 OCCUPIED BANDWIDTH & EMISSION MASK:

Serial Number:	1W: CR21100111-RF-S2 10W: CR21100111-RF-S1 25W: CR21100111-RF-S2	Test Date:	2021-11-22~2021-12-20
Test Site:	RF	Test Mode:	Transmitting
Tester:	Rinka Li	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	22.6~26.2	Relative Humidity: (%)	34~66	ATM Pressure: (kPa)	101.1~101.9
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Signal Analyzer	FSIQ26	831929/006	2021-07-22	2022-07-21
R&S	Spectrum Analyzer	FSU26	200256	2021-07-22	2022-07-21
YINSAIGE	Coaxial Cable	LMR300	NJ0100001	2021-08-08	2022-08-07
YINSAIGE	Coaxial Cable	LMR300	NJ0100002	2021-08-08	2022-08-07
Weinschel	Coaxial Attenuators	53-20-34	LN751	2021-08-08	2022-08-07
UNI-T	Multimeter	UT39A+	C210582554	2021-09-30	2022-09-29
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A
HP	RF Communications Test Set	8920A	3438A05209	2021-07-22	2022-07-21

* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

Test Mode	Test Channel	Test Frequency (MHz)	High Power Level		Middle Power Level		Low Power Level		Note
			99% Occupied Bandwidth (kHz)	26dB Emission Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	26dB Emission Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	26dB Emission Bandwidth (kHz)	
FM 12.5kHz	Low	400.0125	9.920	10.321	9.920	10.321	9.920	10.321	Part 90
	Middle	453.2125	9.920	10.321	9.920	10.321	9.920	10.321	
	High	469.9875	10.020	10.321	9.920	10.321	9.920	10.321	
	Additional	454.0125	9.920	10.321	9.920	10.321	9.920	10.321	Part 22
	Additional	455.0125	9.920	10.321	9.920	10.321	9.920	10.321	Part 74
4FSK 12.5kHz	Low	400.0125	7.816	10.420	7.715	9.018	7.816	9.118	Part 90
	Middle	453.2125	7.916	9.920	7.816	9.519	7.816	9.820	
	High	469.9875	7.916	9.920	7.916	9.218	7.916	9.118	
	Additional	454.0125	7.816	9.820	7.715	9.419	7.816	9.319	Part 22
	Additional	455.0125	7.715	9.920	7.816	9.319	7.816	9.018	Part 74
FM 25kHz	Additional	454.0125	15.030	16.032	15.030	16.032	15.030	16.032	Part 22
	Additional	455.0125	15.030	16.032	15.030	15.832	15.030	15.832	Part 74
	Additional	459.9875	15.030	16.032	15.030	15.832	15.030	15.832	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.

$$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} = 11K0$$

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.

$$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 5.0 \text{ kHz}) = 16 \text{ kHz} = 16K0$$

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)

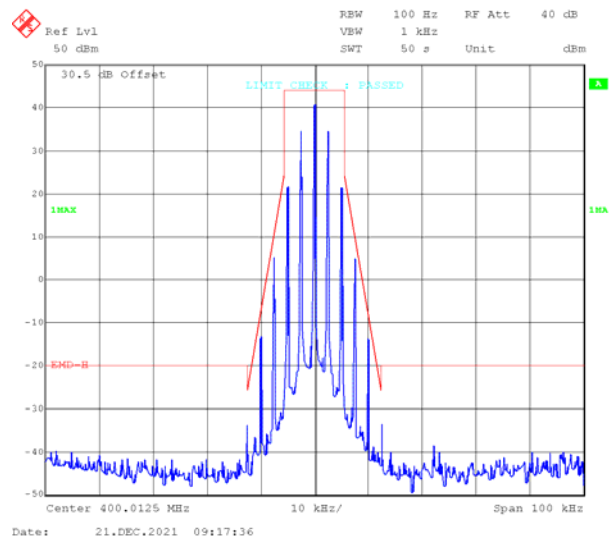
Emission Designator: 7K60F1D and 7K60F1E

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.

Low Channel



Delta 1 [T1] RBW 100 Hz RF Att 30 dB
 0.51 dB VBW 1 kHz SWT 25 s Unit dBm

Ref Lvl 45 dBm

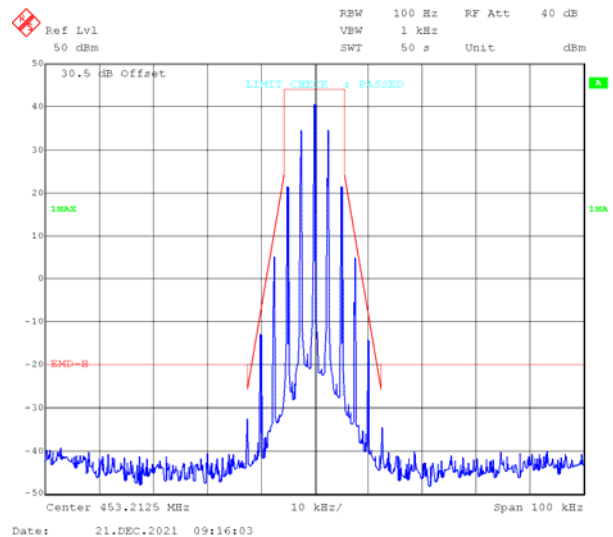
30.5 dB Offset
 D1 40.07 dBm

D2 10.7 dBm

1MAX

Center 453.2125 MHz 5 kHz/ Span 50 kHz

Date: 20 DEC 2021 16:27:33



Ref Lvl 45 dBm 10.32064128 kHz SWT 25 s Unit dBm

30.5 dB Offset

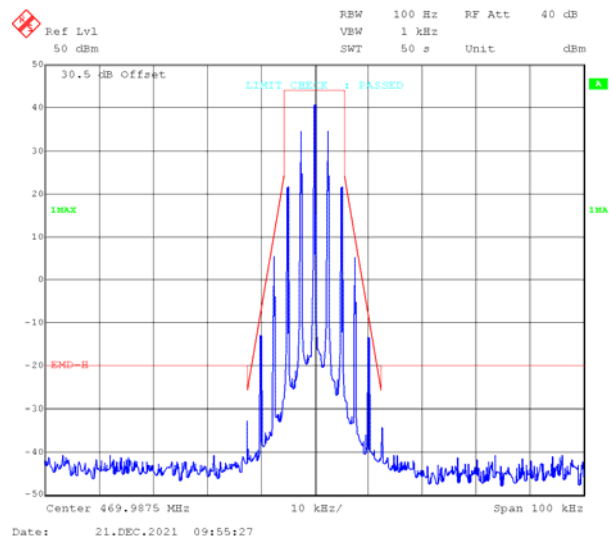
D1 40.12 dBm

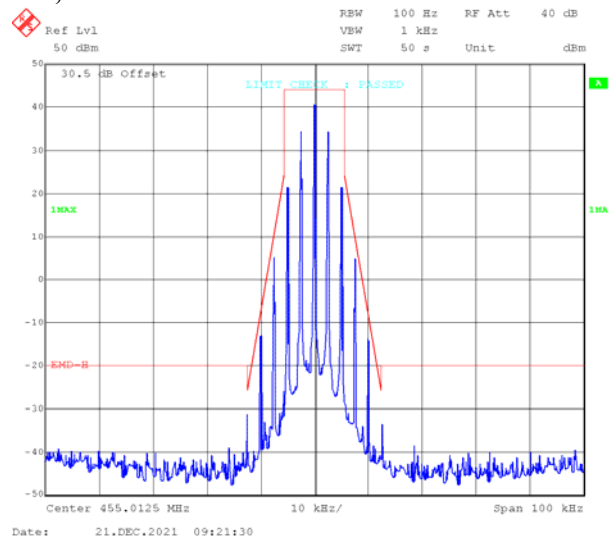
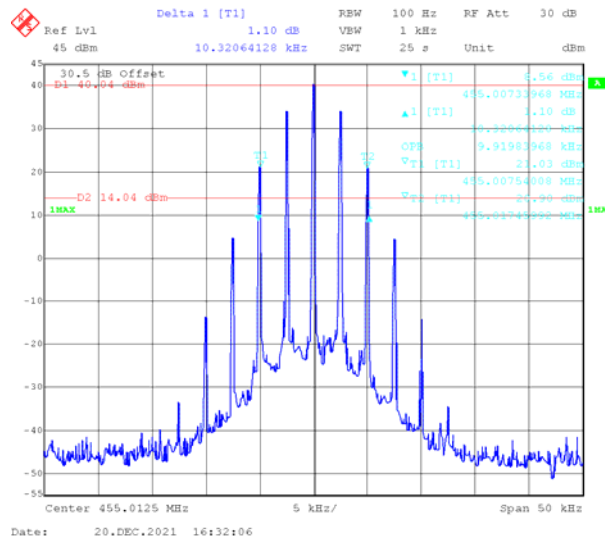
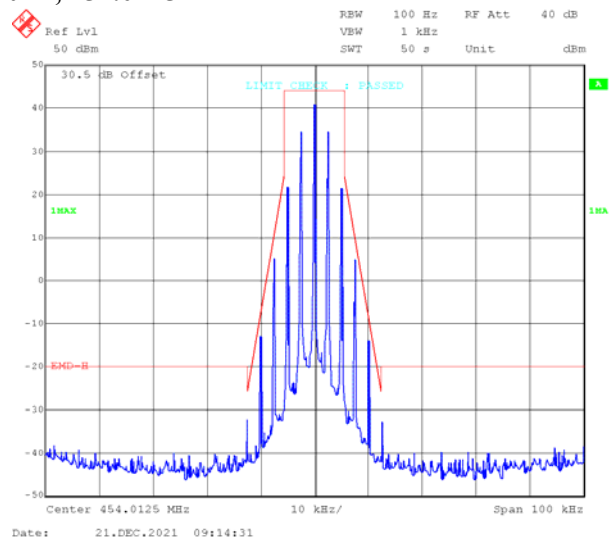
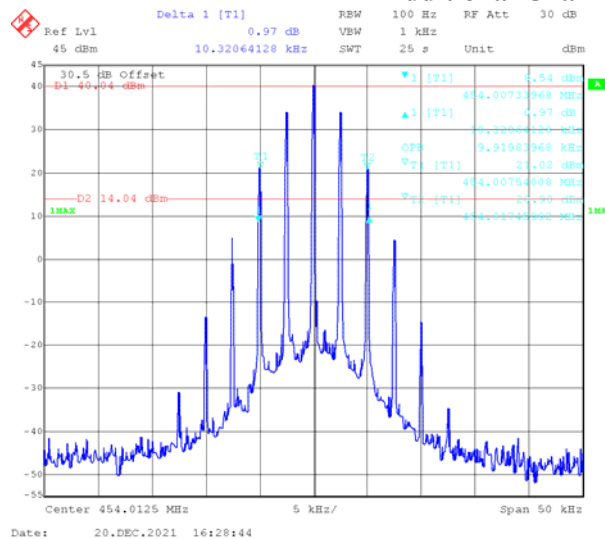
D2 14.12 dBm

1MAX

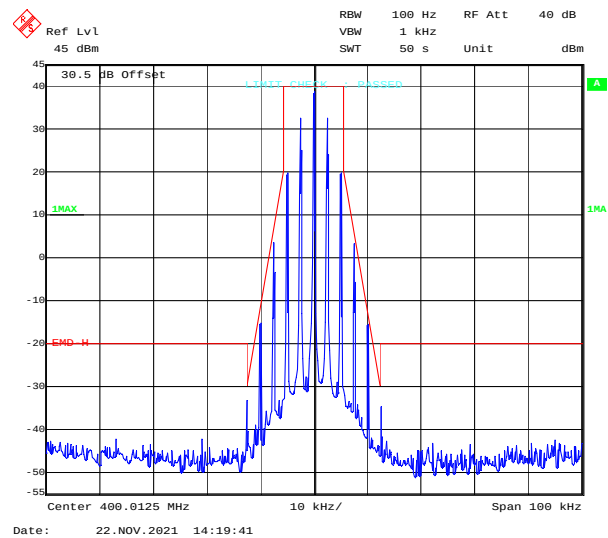
Center 469.9875 MHz 5 kHz/ Span 50 kHz

Date: 20.DEC.2021 16:52:53



Additional Channel Part 74, 455.0125 MHz**Additional Channel Part 22, 454.0125 MHz**

Low Channel



Ref Lvl 45 dBm

SWT 50 s Unit dBm

100 Hz RF Att 40 dB

VBW 1 kHz

30.5 dB Offset

1MAX

1MIN

END_H

Center 453.2125 MHz

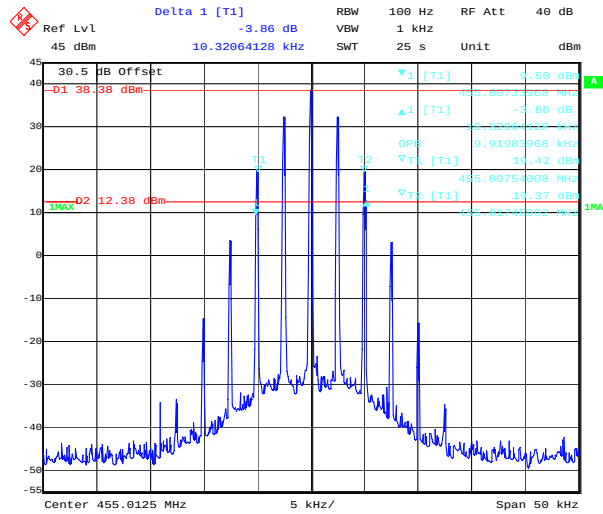
10 kHz/

Span 100 kHz

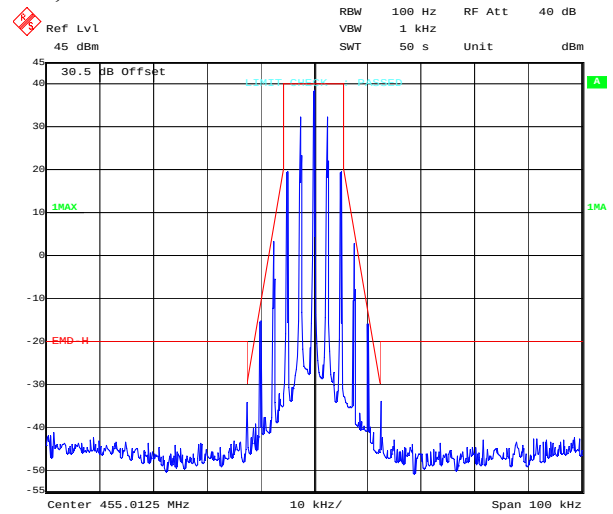
Date: 22.NOV.2021 14:27:23

[illegible]

Additional Channel Part 74, 455.0125 MHz

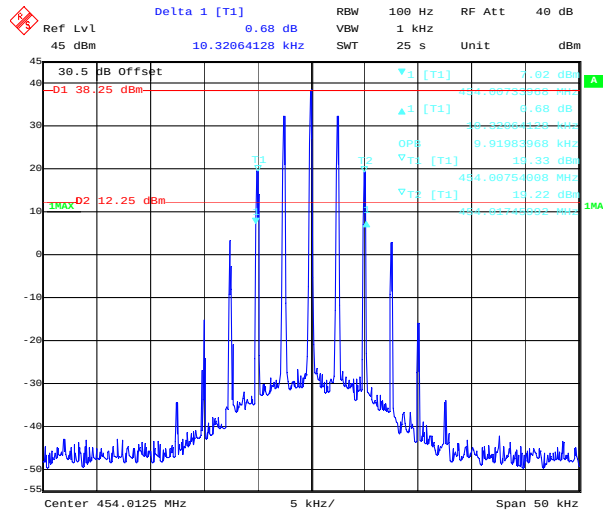


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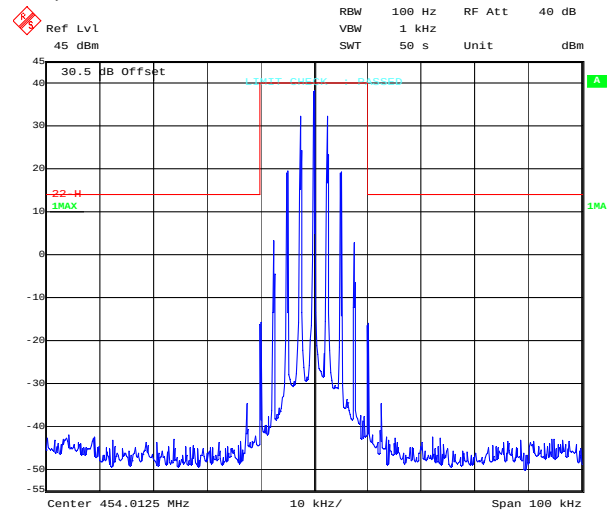


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Additional Channel Part 22, 454.0125 MHz



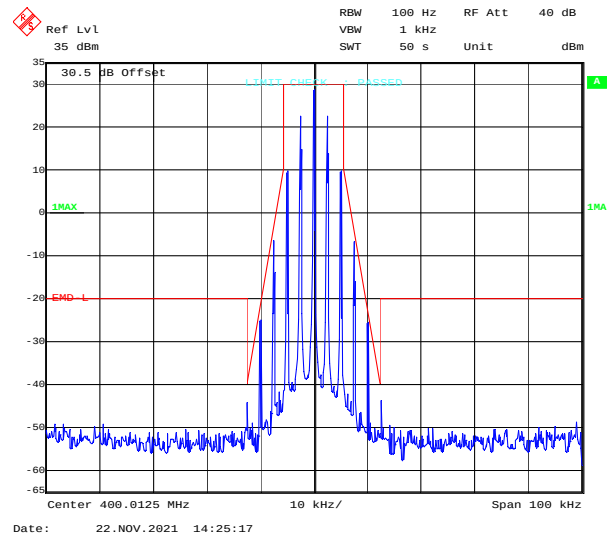
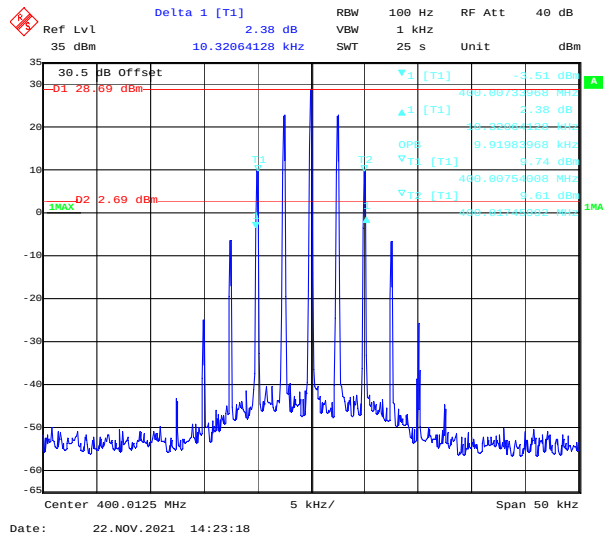
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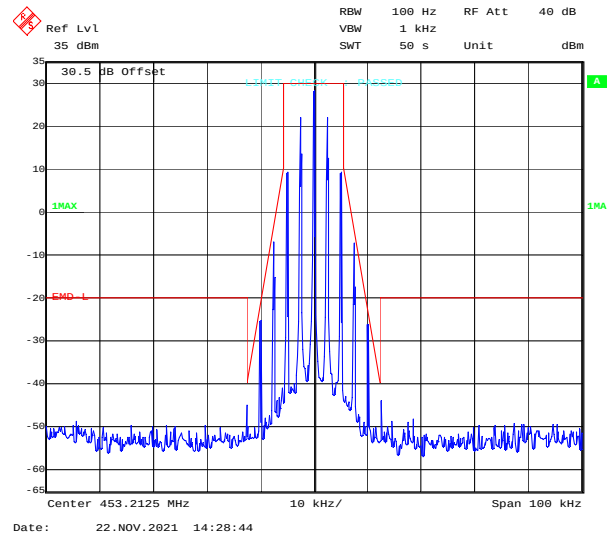
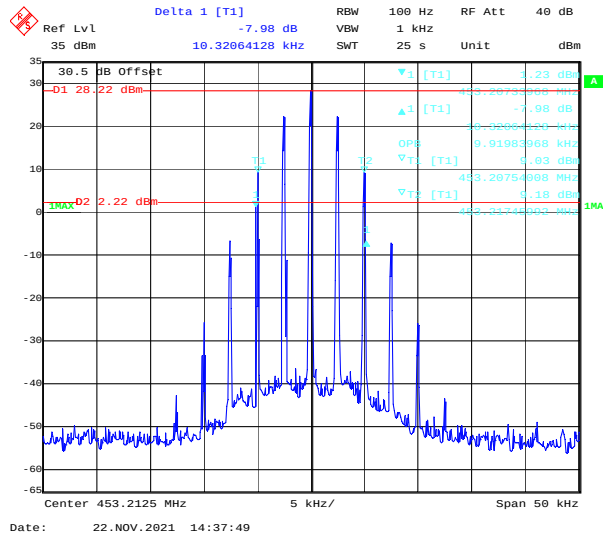
Date: 22.NOV.2021 17:31:44

FM, 12.5kHz, Low Power:

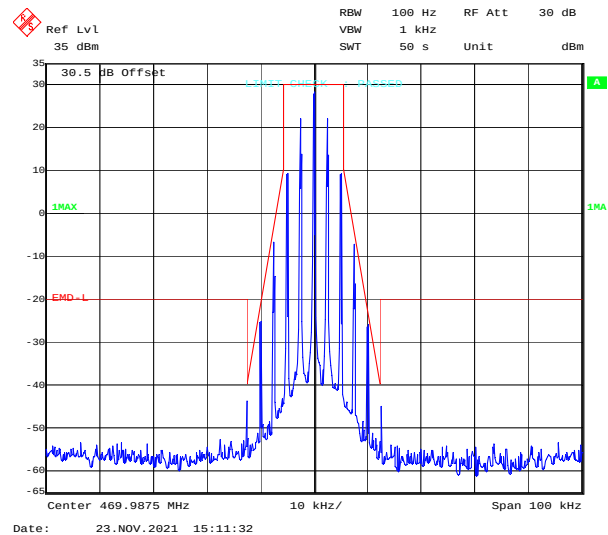
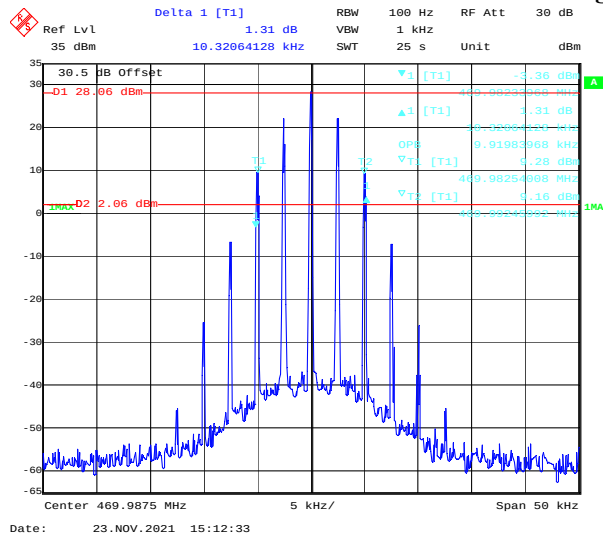
Low Channel



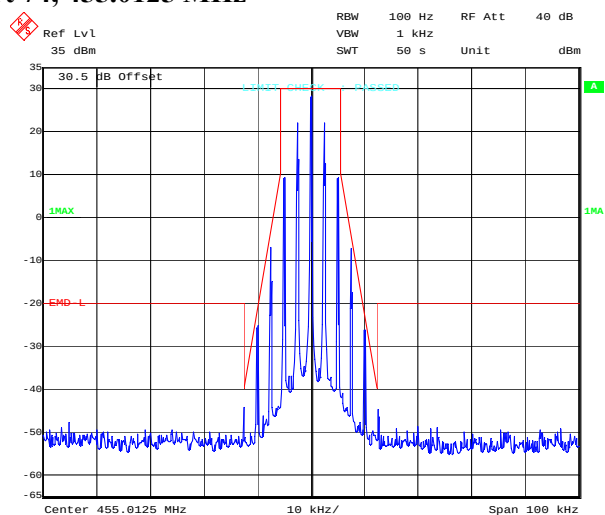
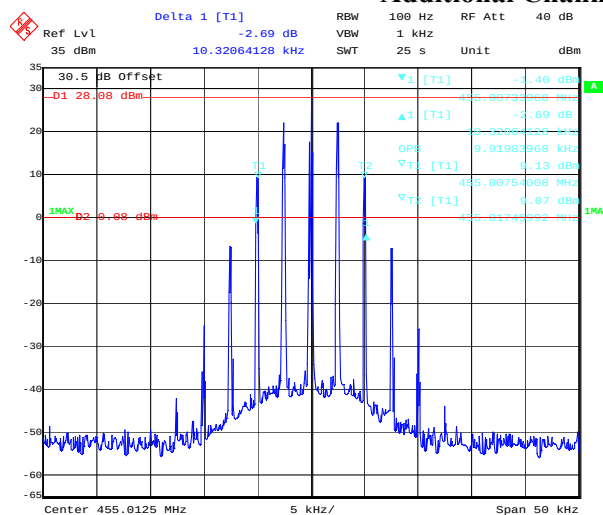
Middle Channel



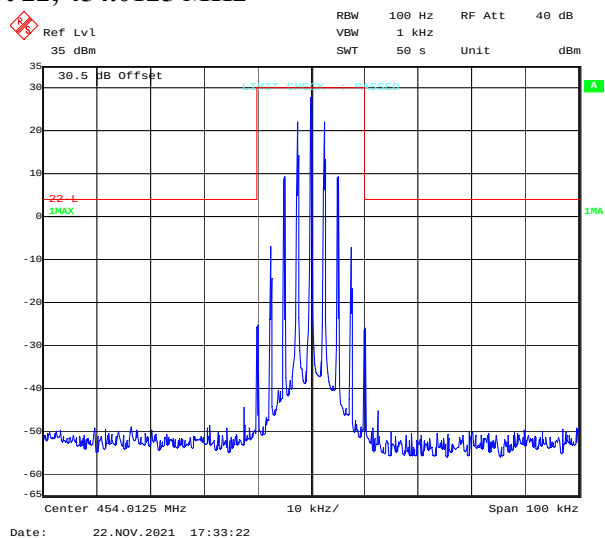
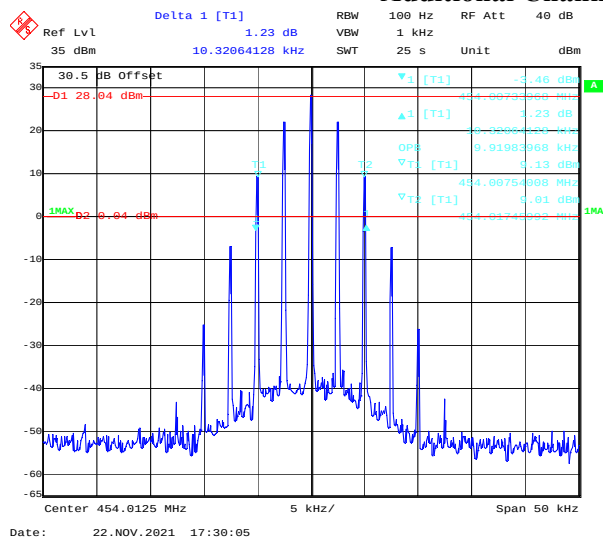
High Channel

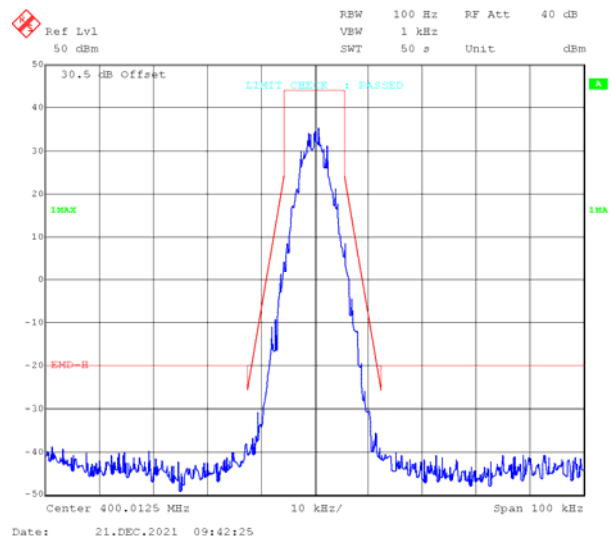
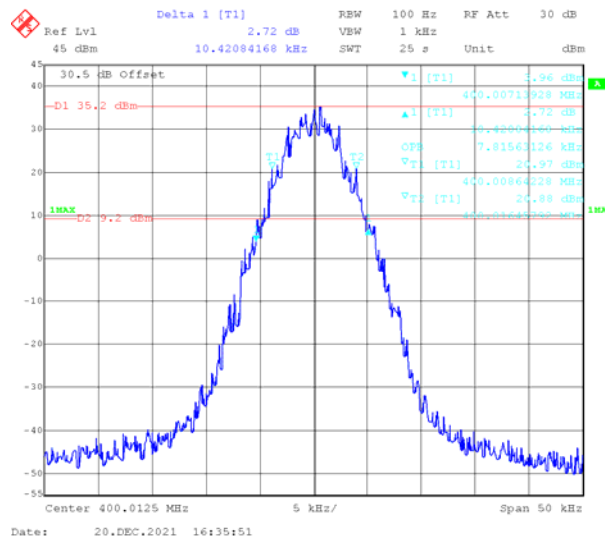
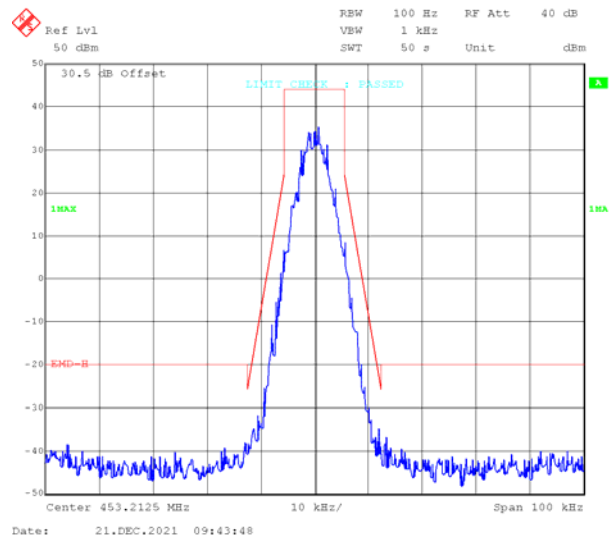
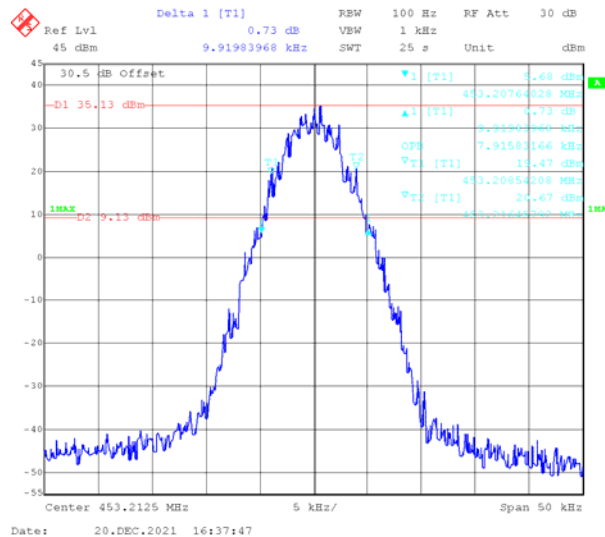
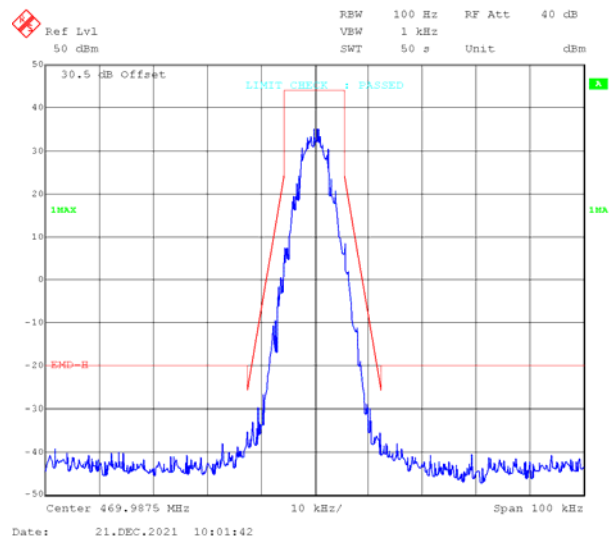
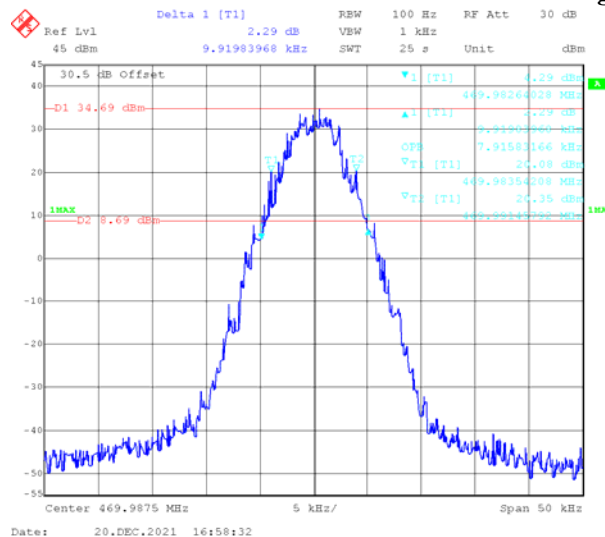


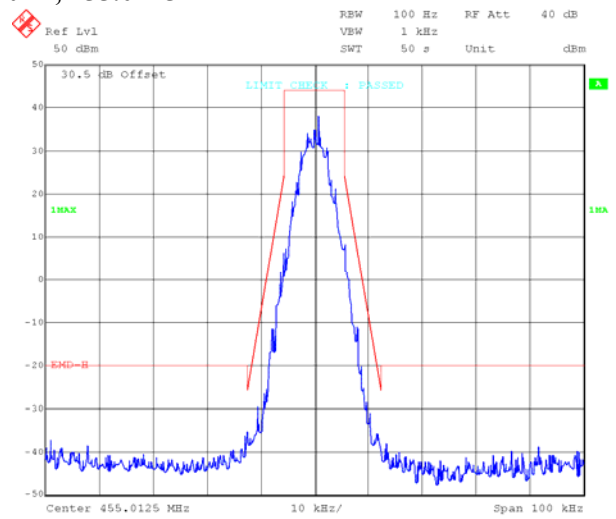
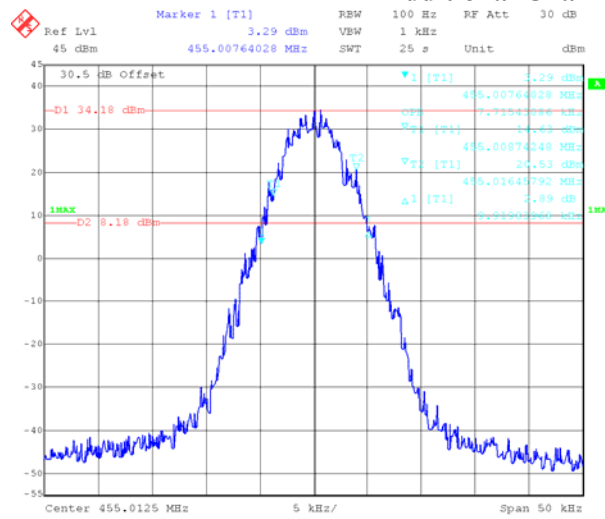
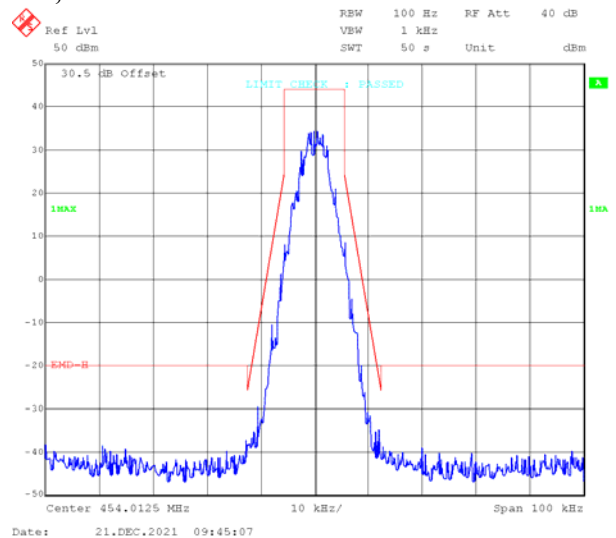
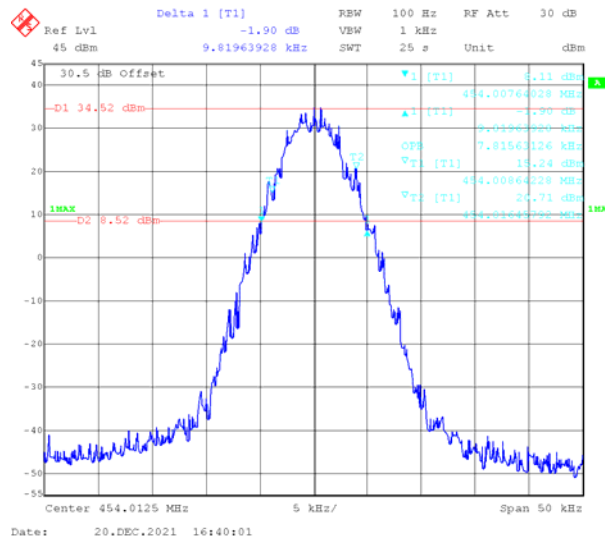
Additional Channel Part 74, 455.0125 MHz



Additional Channel Part 22, 454.0125 MHz

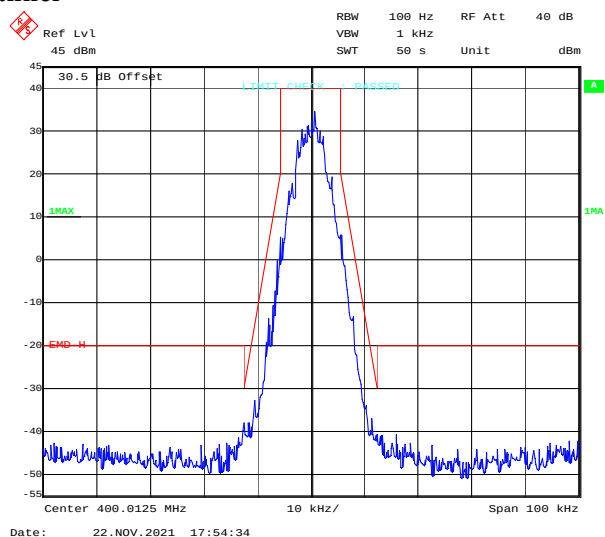
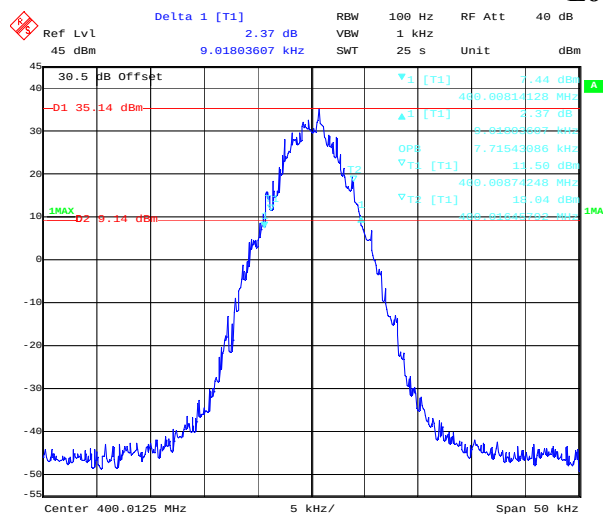


4FSK, 12.5kHz, High Power:**Low Channel****Middle Channel****High Channel**

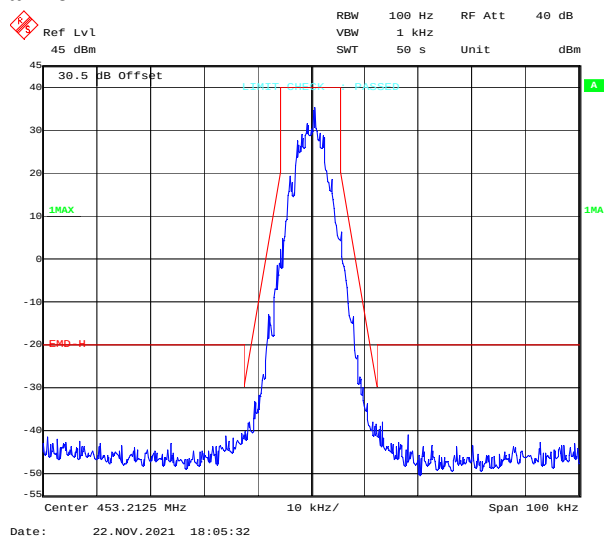
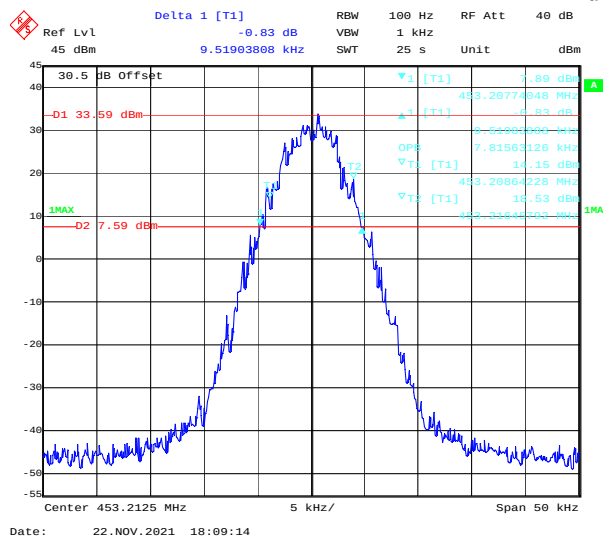
Additional Channel Part 74, 455.0125 MHz**Additional Channel Part 22, 454.0125 MHz**

4FSK, 12.5kHz, Middle Power:

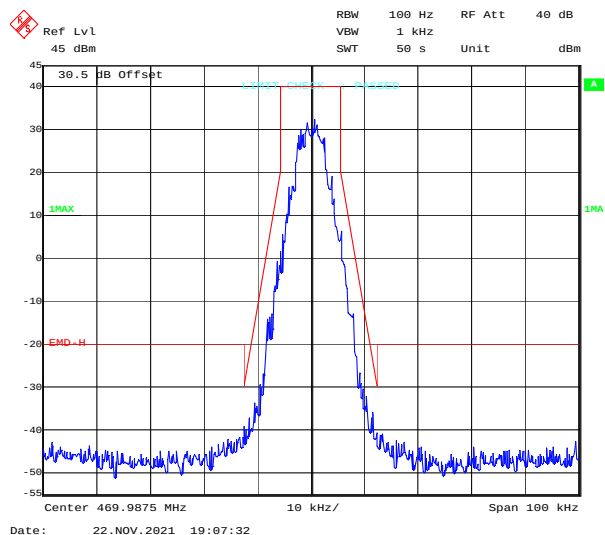
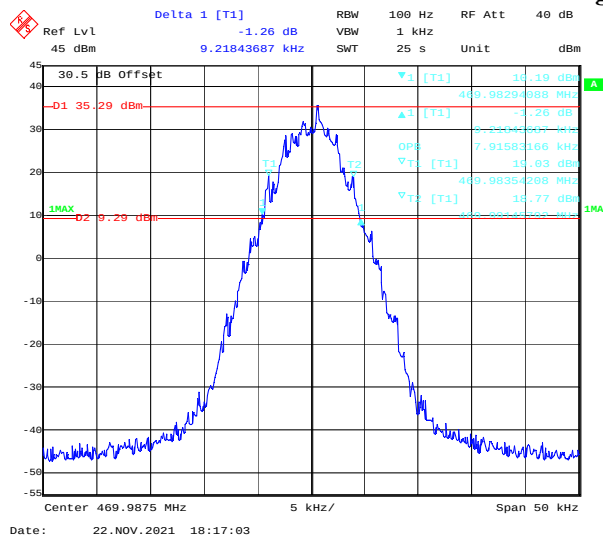
Low Channel



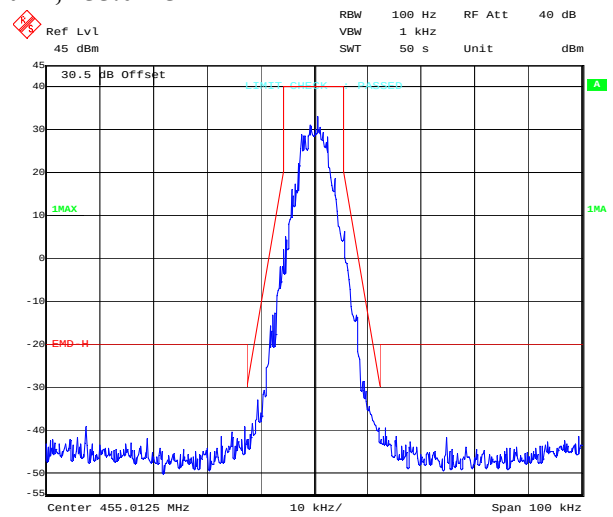
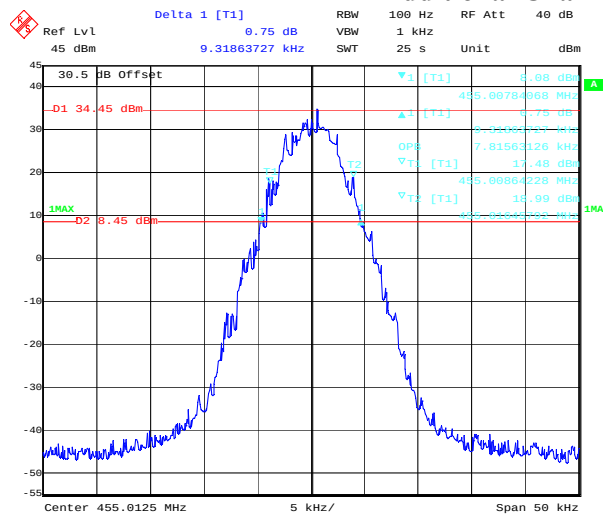
Middle Channel



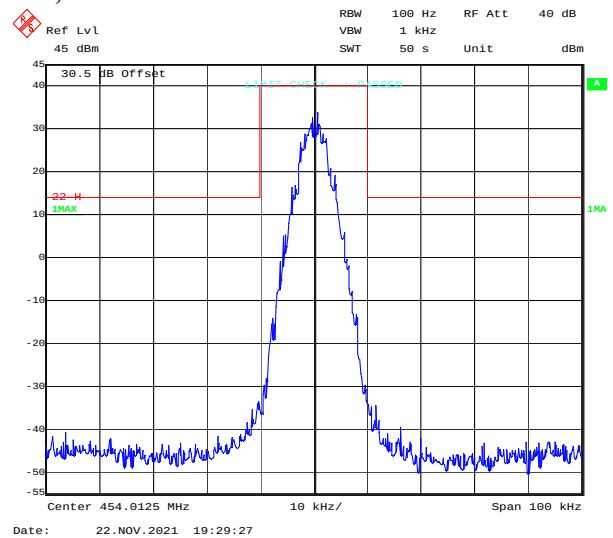
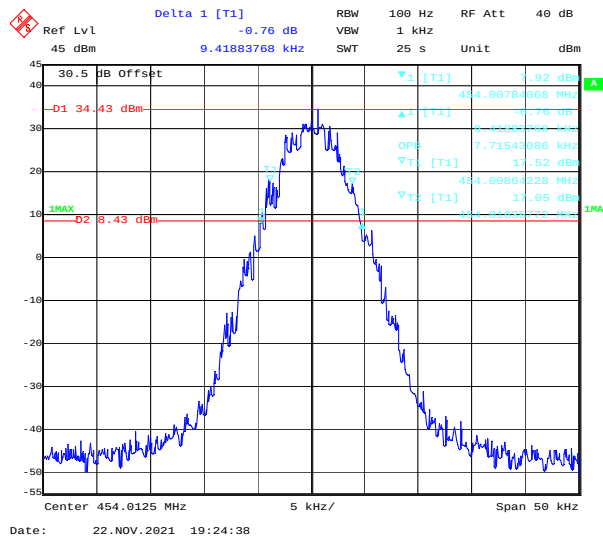
High Channel



Additional Channel Part 74, 455.0125 MHz

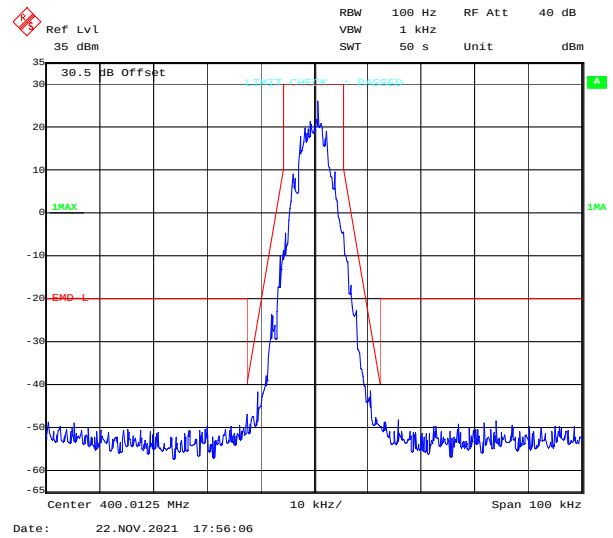
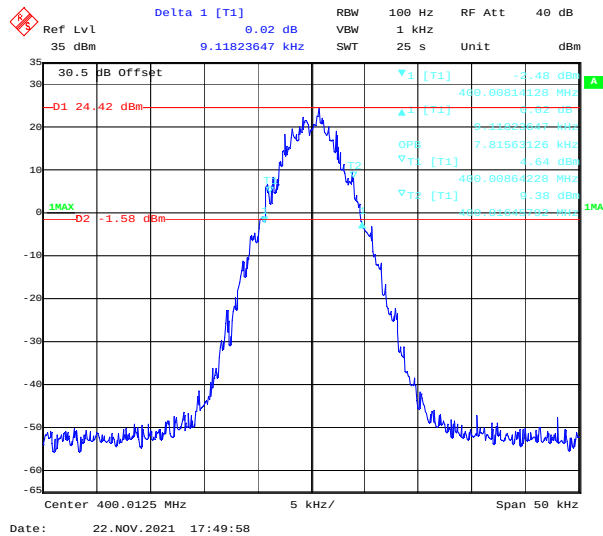


Additional Channel Part 22, 454.0125 MHz

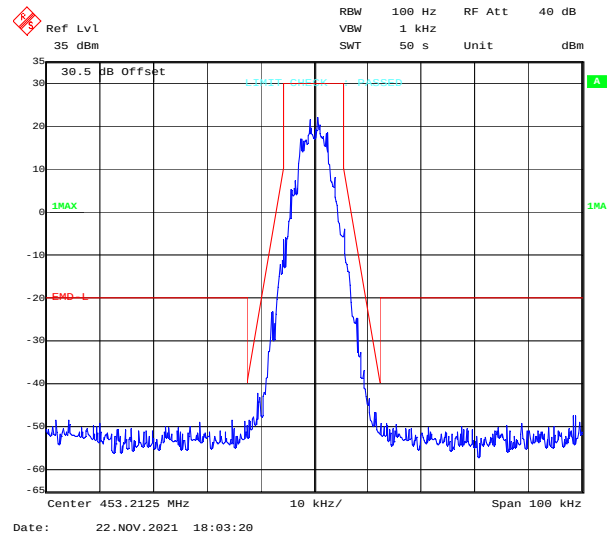
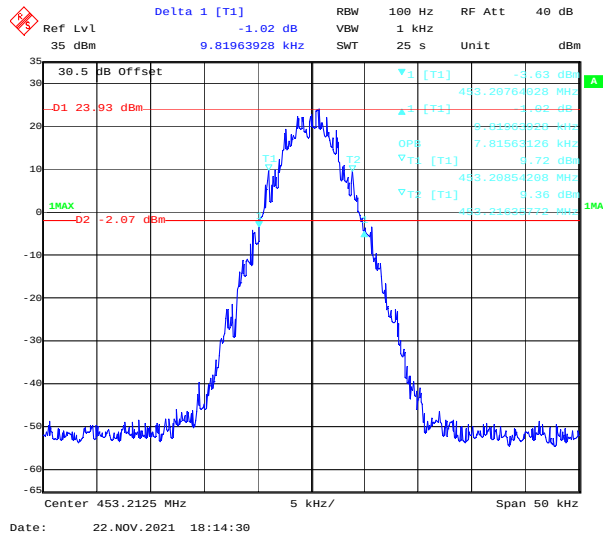


4FSK, 12.5kHz, Low Power:

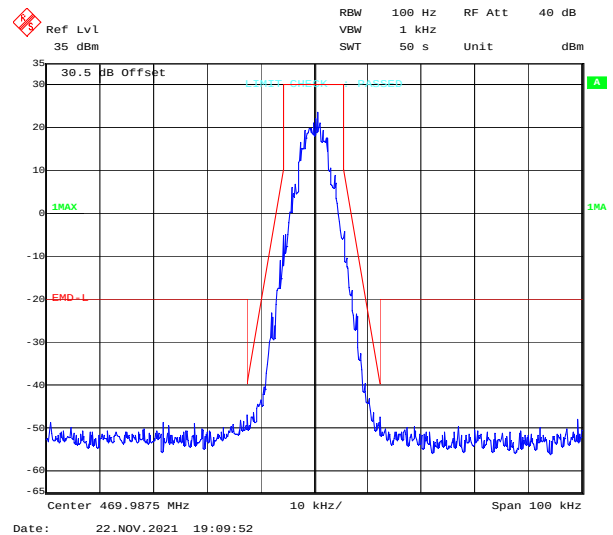
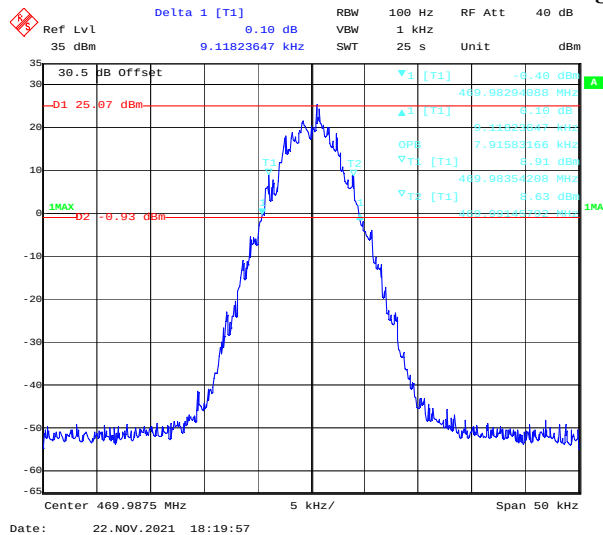
Low Channel



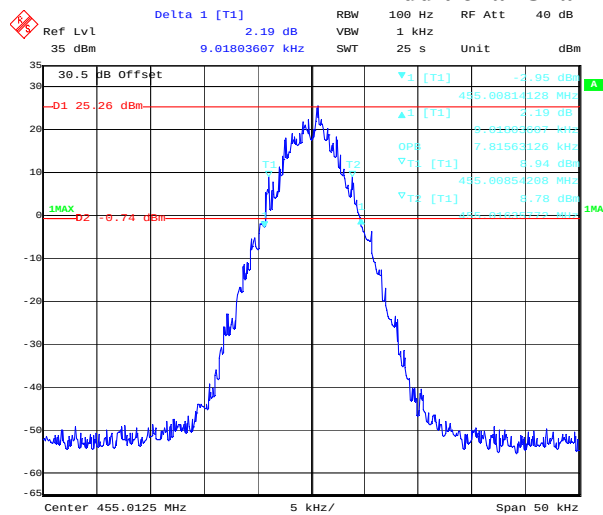
Middle Channel



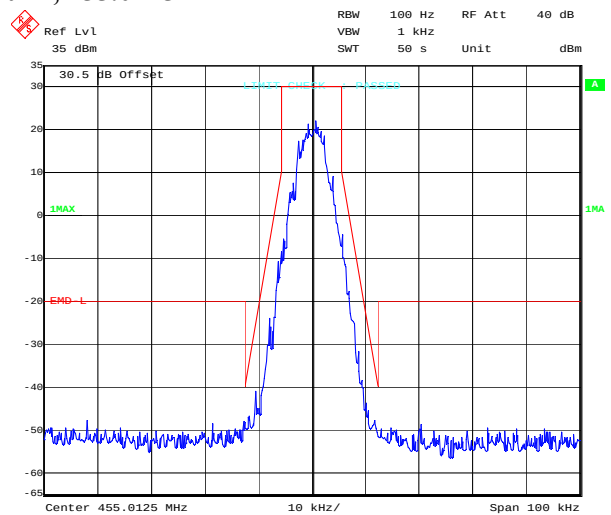
High Channel



Additional Channel Part 74, 455.0125 MHz

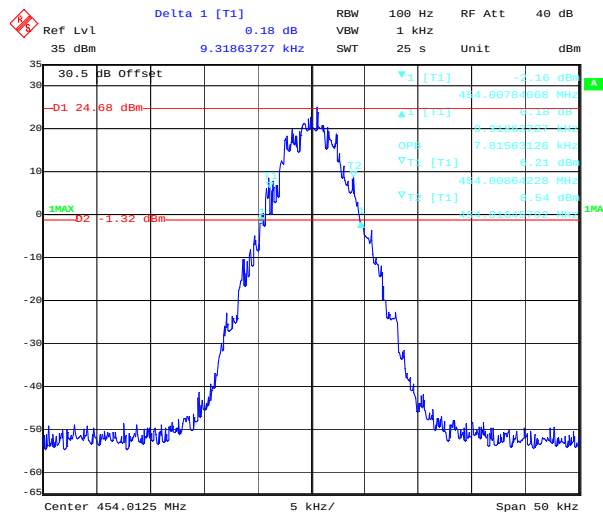


Date: 22.NOV.2021 19:22:19

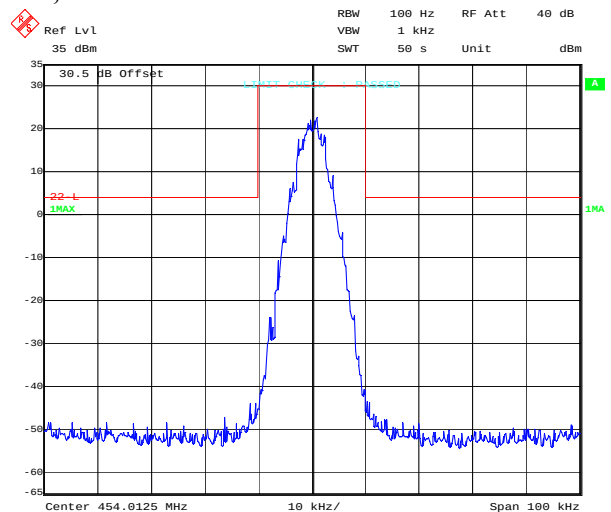


Date: 22.NOV.2021 19:15:16

Additional Channel Part 22, 454.0125 MHz

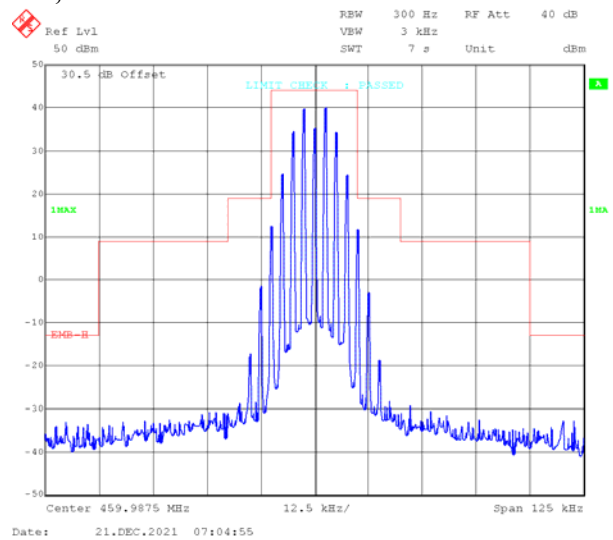


Date: 22.NOV.2021 19:26:42



Date: 22.NOV.2021 19:31:45

Additional Channel Part 80, 459.9875 MHz



Ref Lvl 45 dBm

Delta 1 [T1]

RBW 300 Hz

RF Att 30 dB

VBW 3 kHz

SWT 5.6 s

Unit dBm

30.5 dB Offset

D1 38.89 dBm

1MAX

D2 12.89 dBm

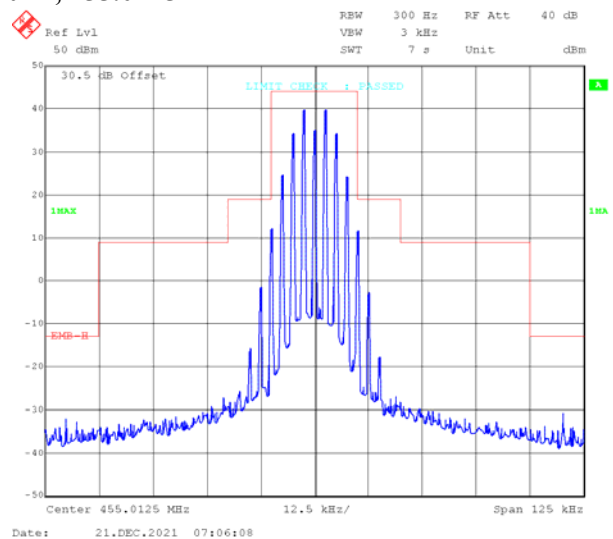
1MAX

Center 455.0125 MHz

10 kHz/

Span 100 kHz

Date: 20.DEC.2021 16:33:12



Delta 1 [T1]

Ref Lvl -10.23 dB

45 dBm 16.03206413 kHz

RBW 300 Hz RF Att 30 dB

SWT 3 kHz Unit dBm

30.5 dB Offset

D1 38.91 dBm

T1

T2

D2 12.91 dBm

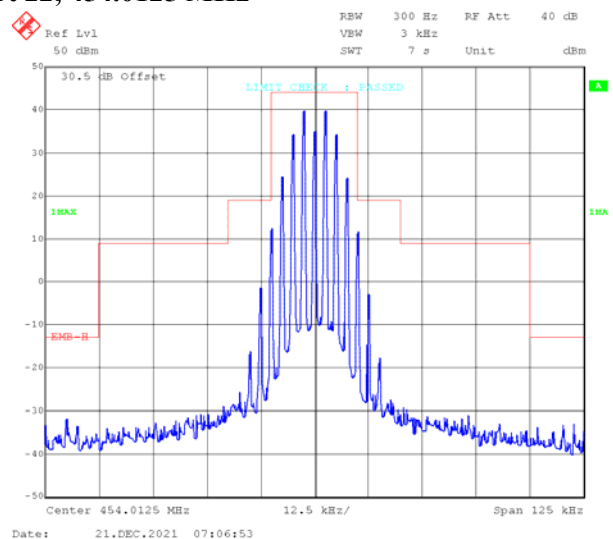
1MAX

Center 454.0125 MHz

10 kHz/

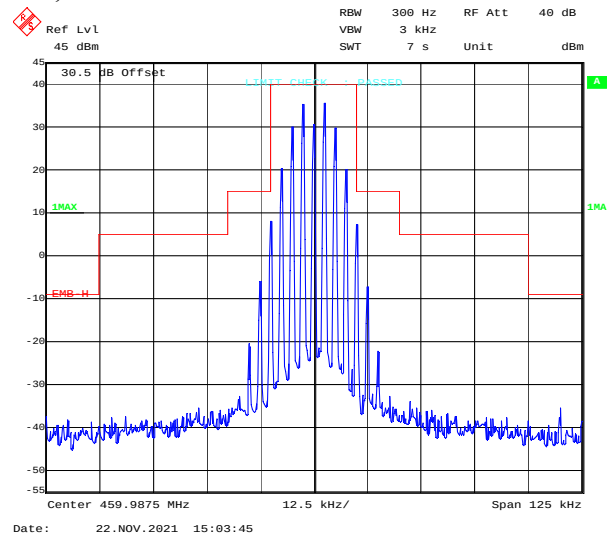
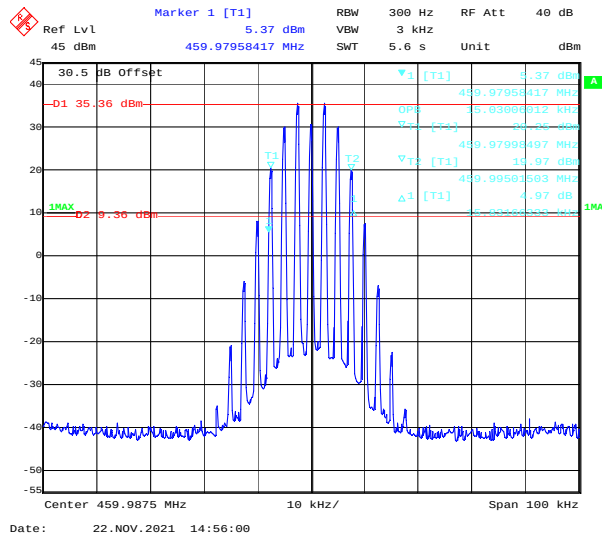
Span 100 kHz

Date: 20.DEC.2021 16:30:38

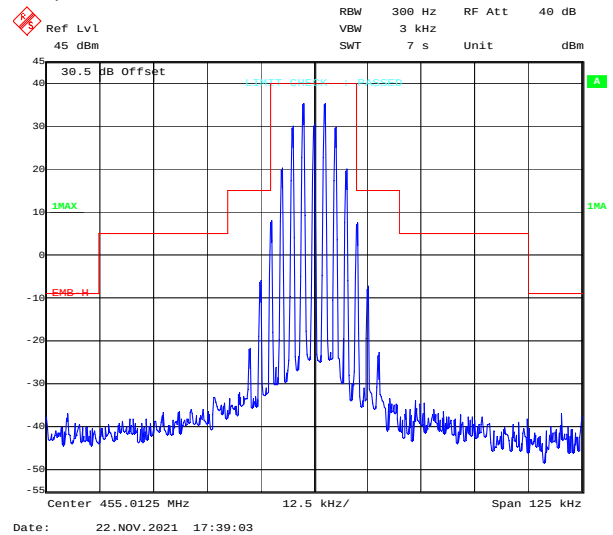
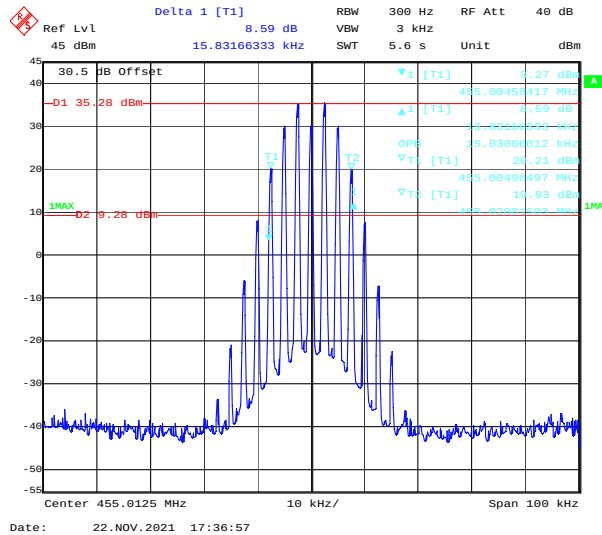


FM, 25 kHz, Middle Power:

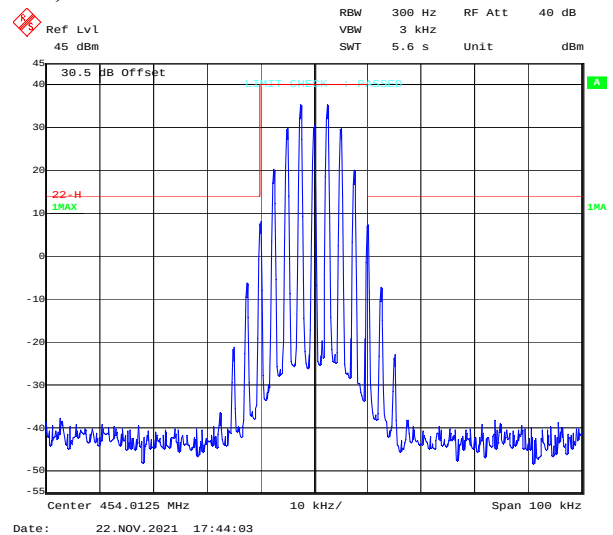
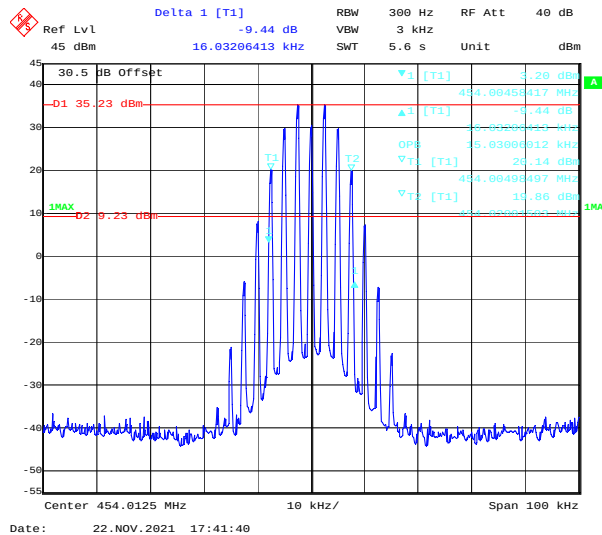
Additional Channel Part 80, 459.9875 MHz



Additional Channel Part 74, 455.0125 MHz

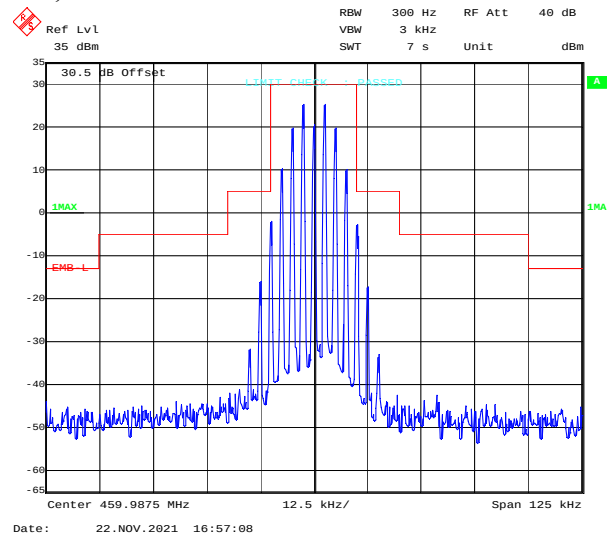
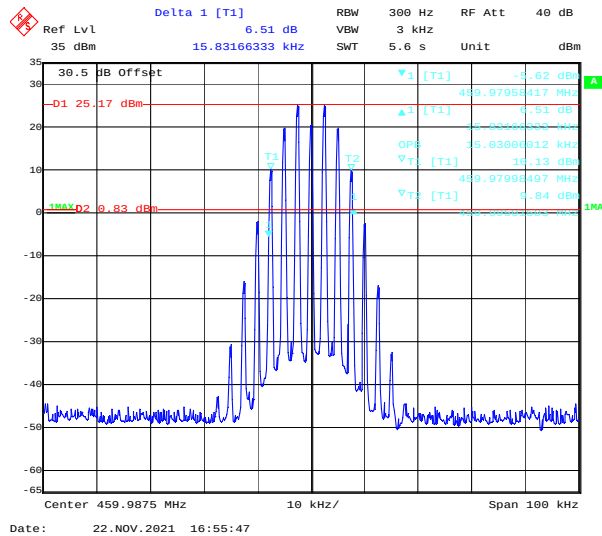


Additional Channel Part 22, 454.0125 MHz

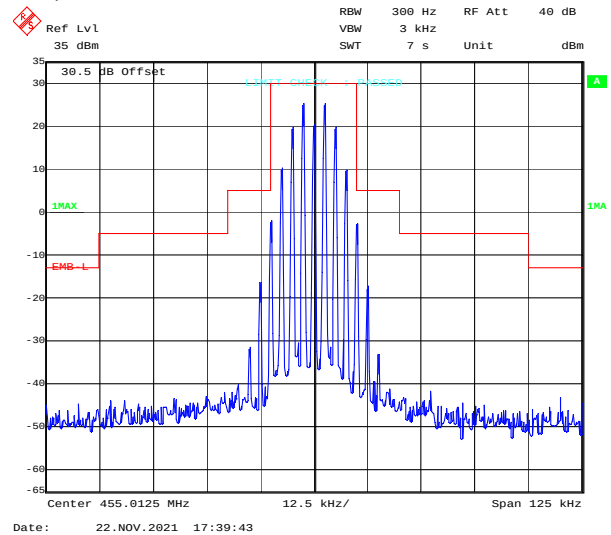
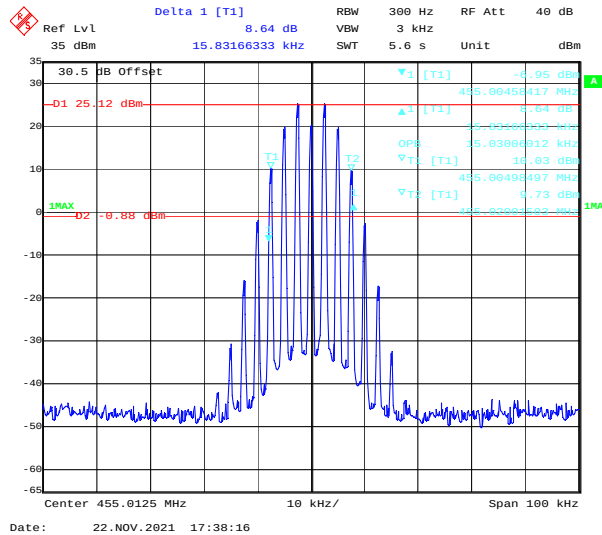


FM, 25 kHz, Low Power:

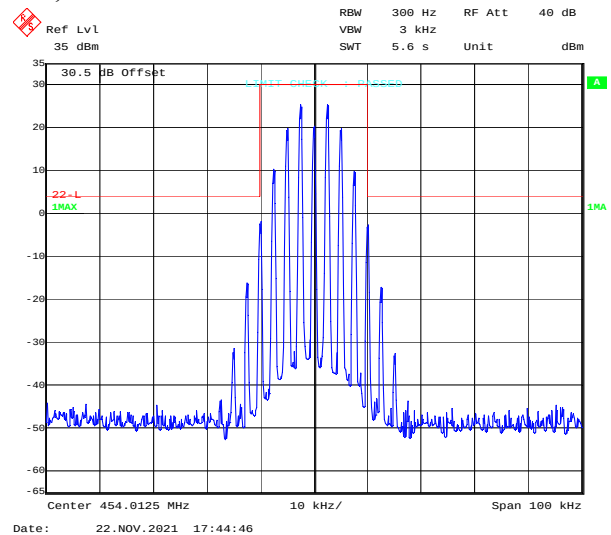
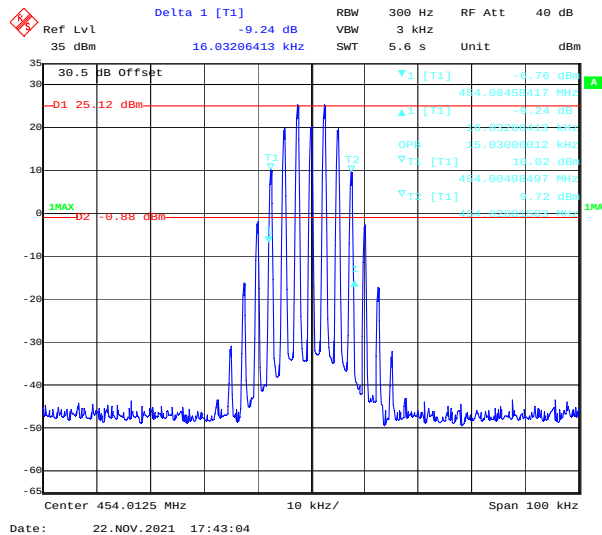
Additional Channel Part 80, 459.9875 MHz



Additional Channel Part 74, 455.0125 MHz



Additional Channel Part 22, 454.0125 MHz



4.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS:

Serial Number:	25W: CR21100111-RF-S2	Test Date:	2021-12-03
Test Site:	RF	Test Mode:	Transmitting (High power was tested)
Tester:	Rinka Li	Test Result:	Pass

Environmental Conditions:

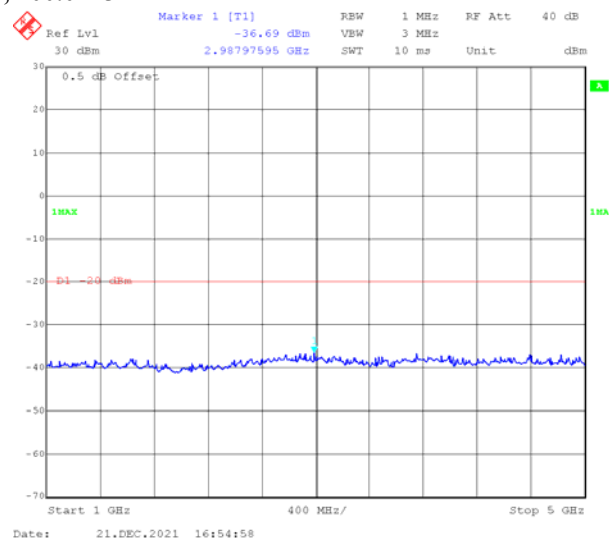
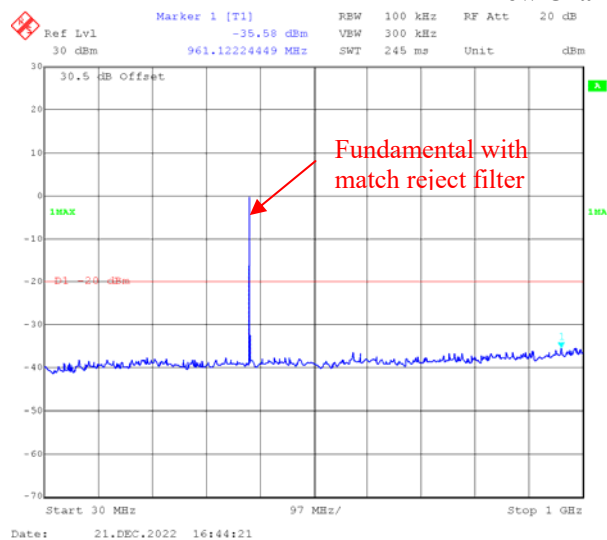
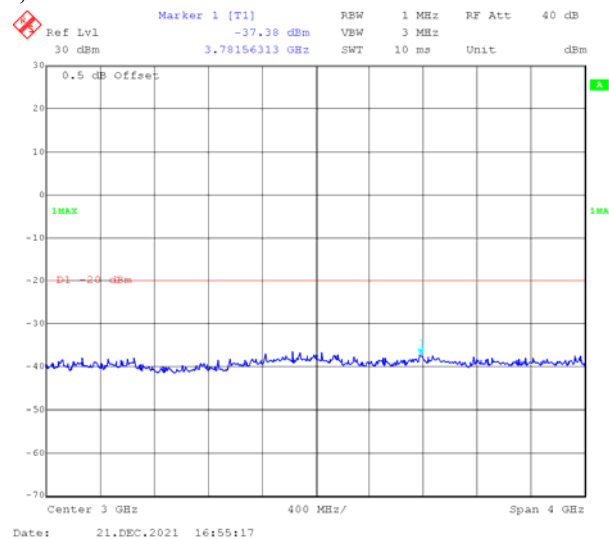
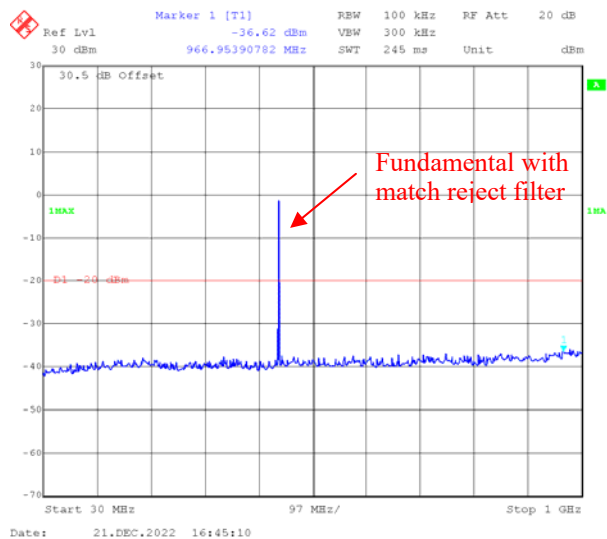
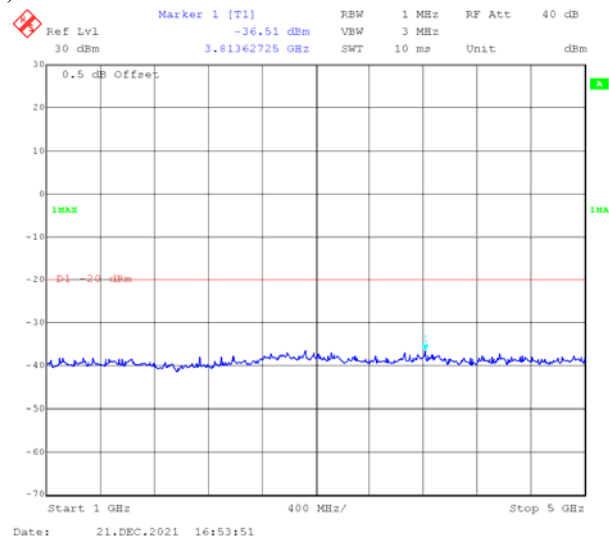
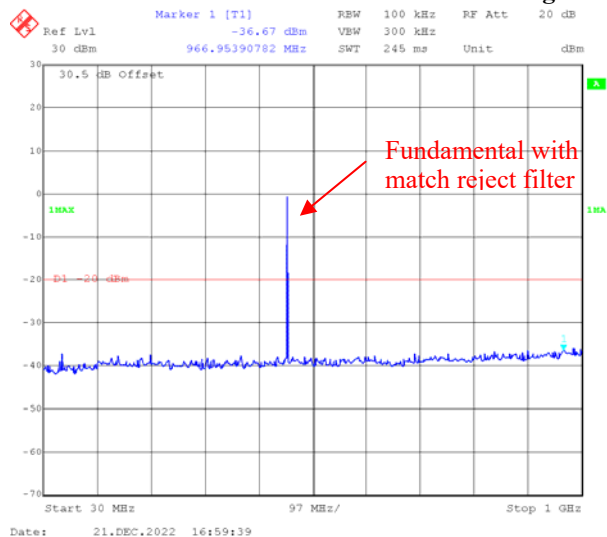
Temperature: (°C)	22.1	Relative Humidity: (%)	30	ATM Pressure: (kPa)	101.7
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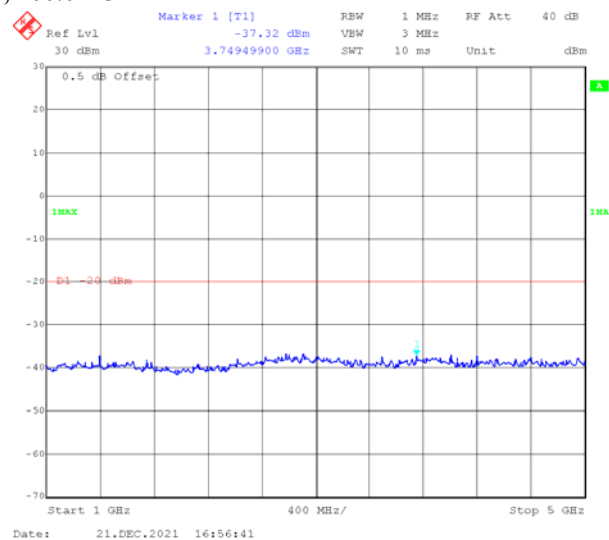
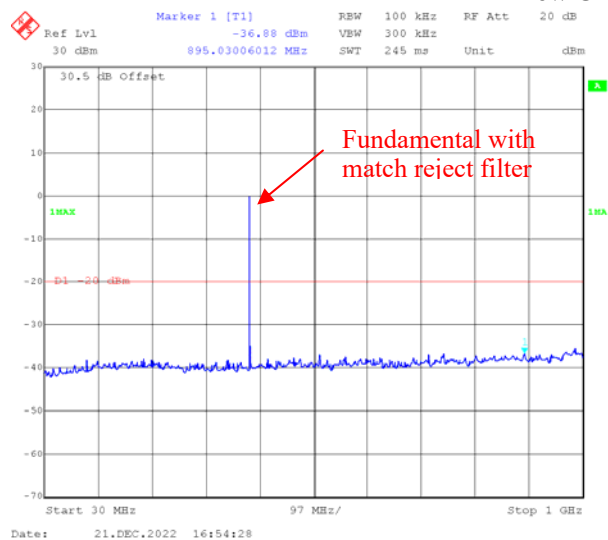
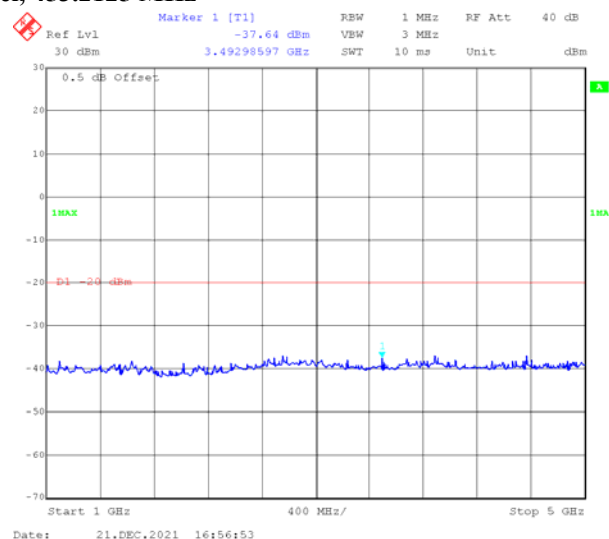
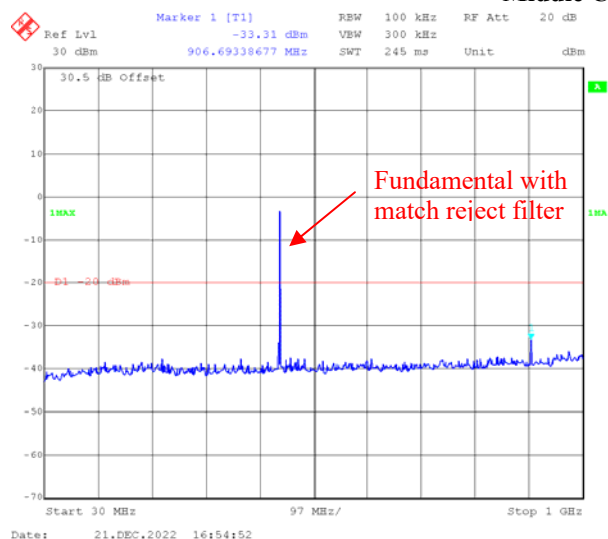
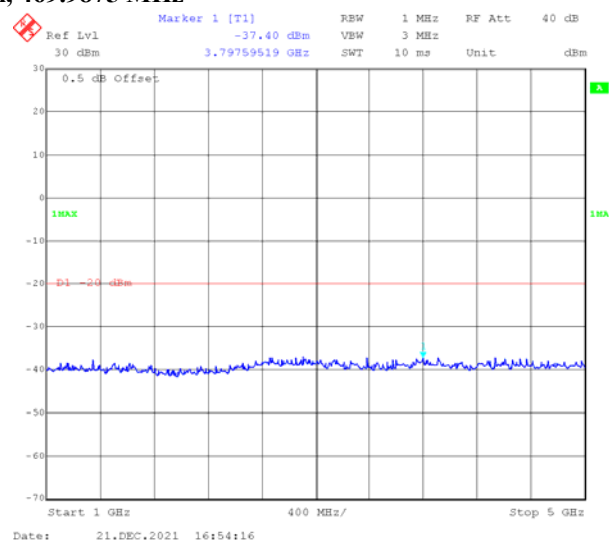
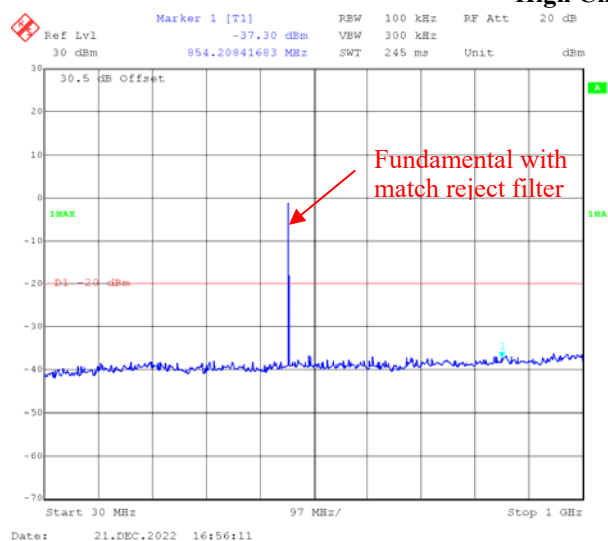
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Signal Analyzer	FSIQ26	831929/006	2021-07-22	2022-07-21
YINSAIGE	Coaxial Cable	LMR300	NJ0100001	2021-08-08	2022-08-07
YINSAIGE	Coaxial Cable	LMR300	NJ0100002	2021-08-08	2022-08-07
Weinschel	Coaxial Attenuators	53-20-34	LN751	2021-08-08	2022-08-07
UNI-T	Multimeter	UT39A+	C210582554	2021-09-30	2022-09-29
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A
E-Microwave	Band Rejection Filter	OBF-ZP-400-470-NF	OE02214273	2021-04-23	2022-04-22

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

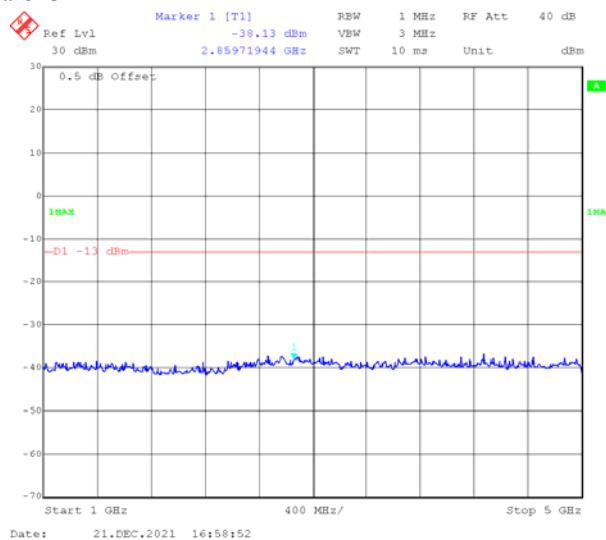
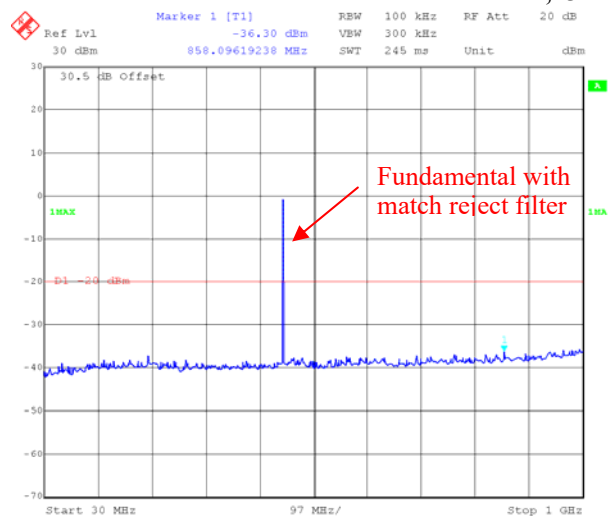
Test Data:

FM, 12.5kHz:**Low Channel, 400.0125 MHz****Middle Channel, 453.2125 MHz****High Channel, 469.9875 MHz**

4FSK, 12.5kHz:**Low Channel, 400.0125 MHz****Middle Channel, 453.2125 MHz****High Channel, 469.9875 MHz**

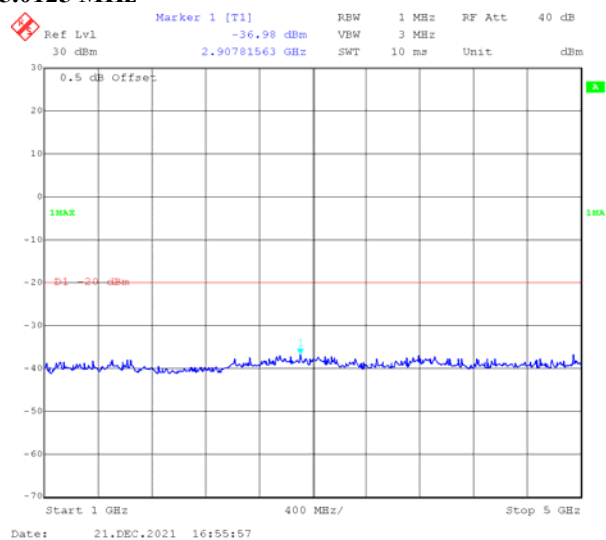
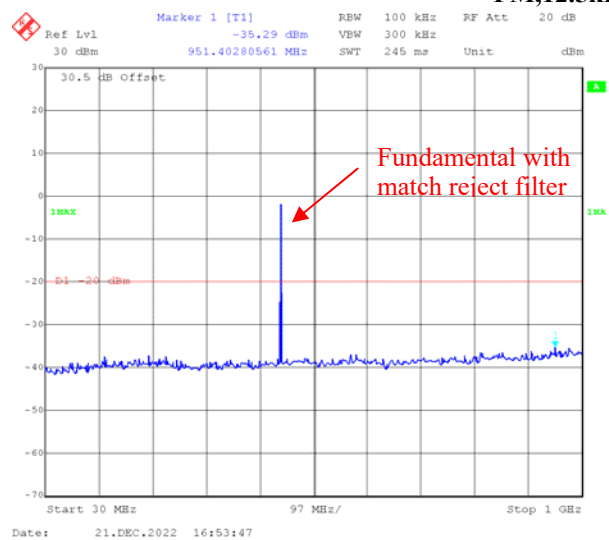
Part 80:

FM,25kHz, 459.9875 MHz

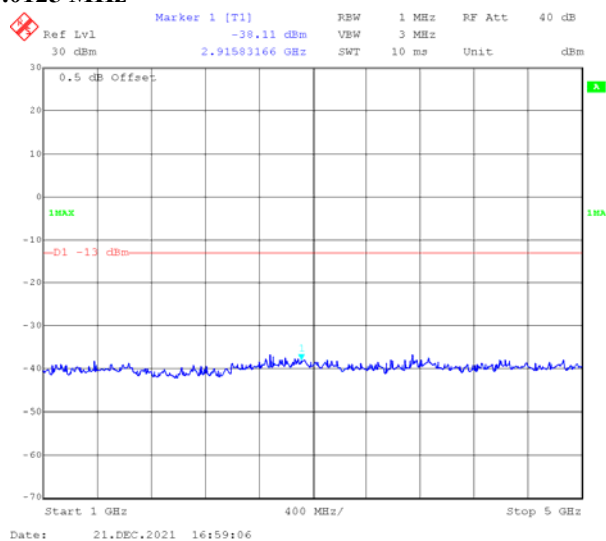
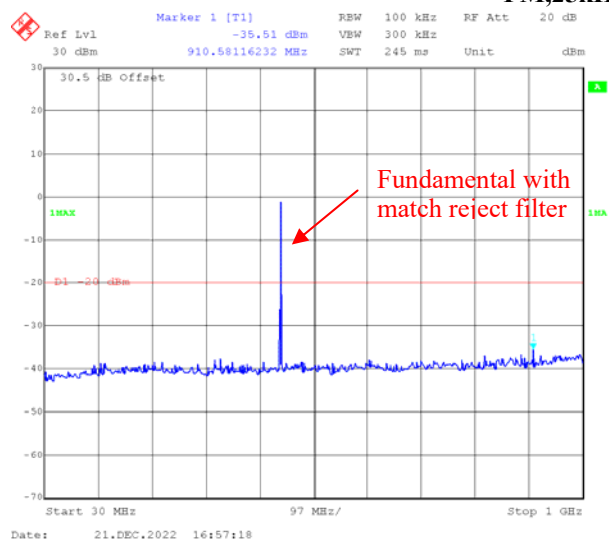


Part 74:

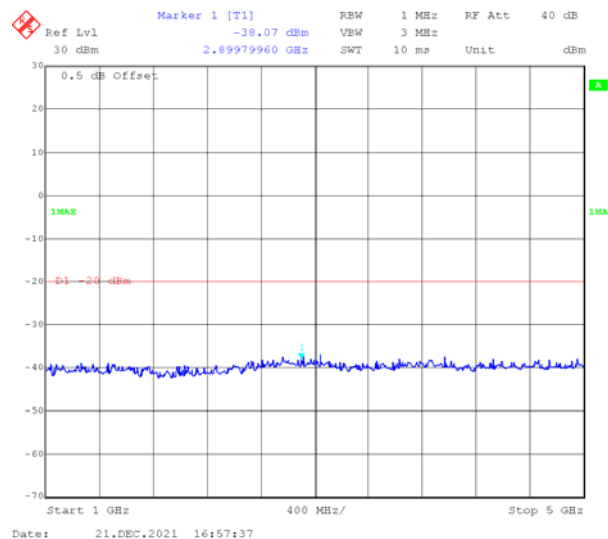
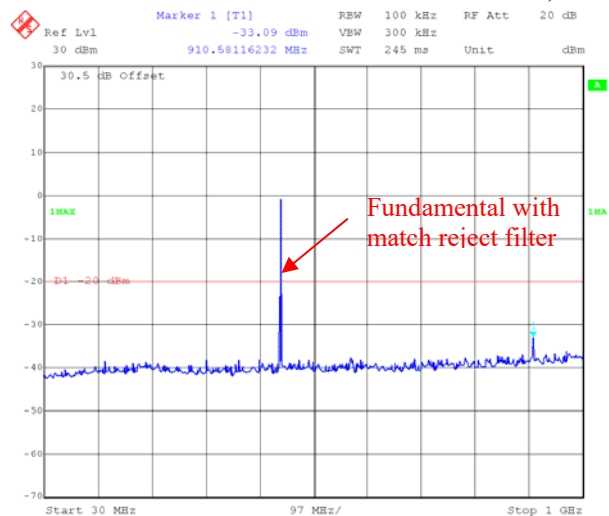
FM,12.5kHz, 455.0125 MHz



FM,25kHz, 455.0125 MHz

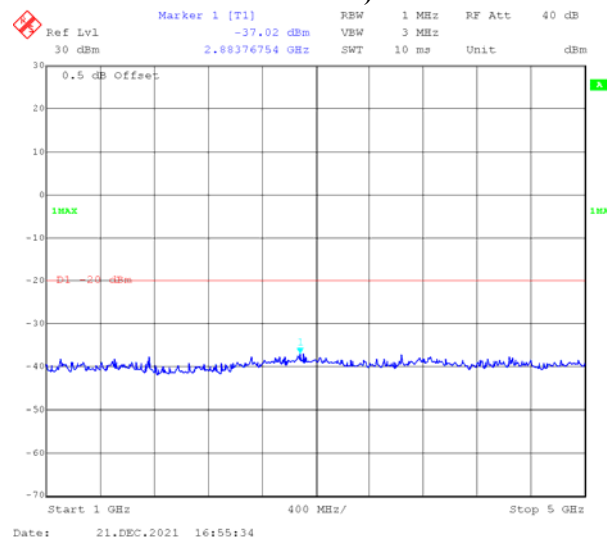
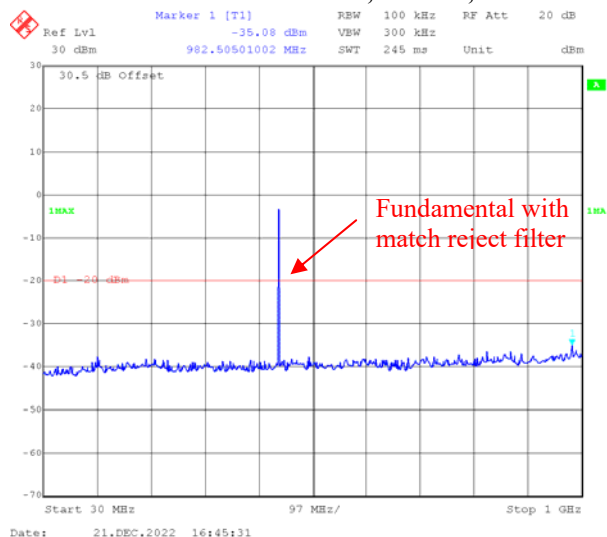


4FSK,12.5kHz, 455.0125 MHz

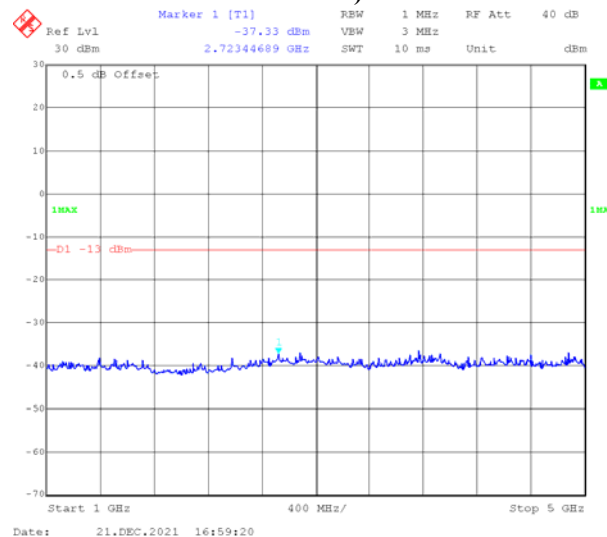
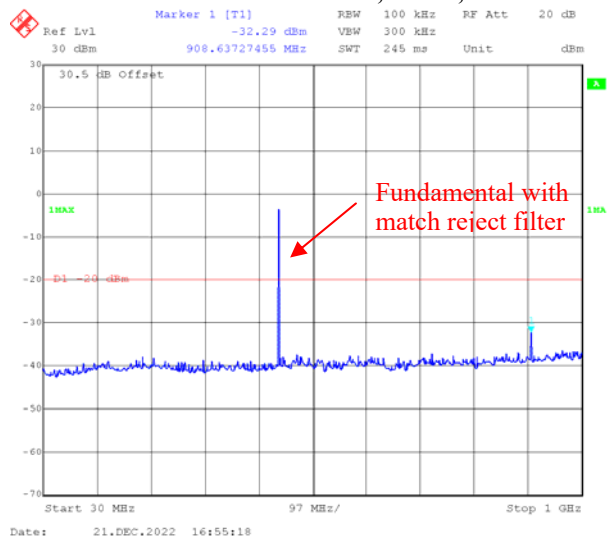


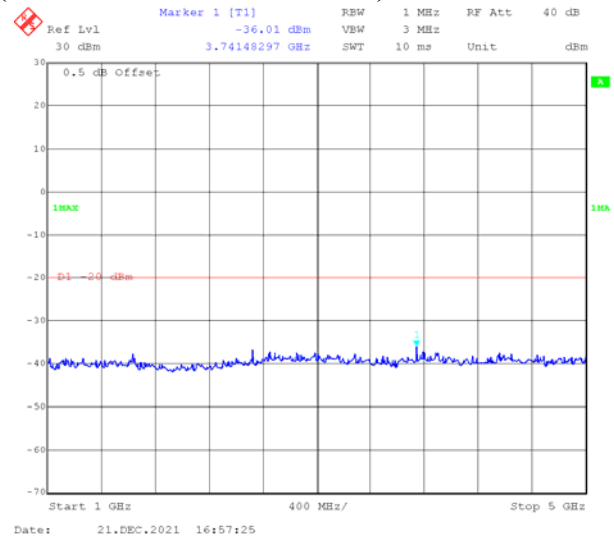
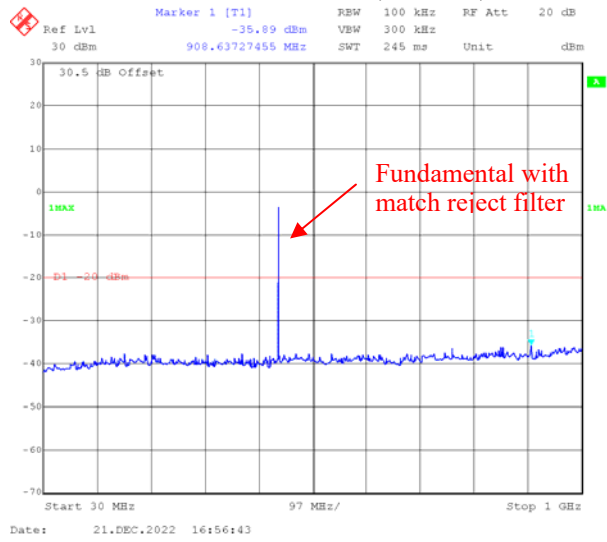
Part 22:

FM,12.5kHz, 454.0125 MHz (All emission under -13dBm limit)



FM,25kHz, 454.0125 MHz (All emission under -13dBm limit)



4FSK,12.5kHz, 454.0125 MHz (All emission under -13dBm limit)

4.5 RADIATED SPURIOUS EMISSIONS:

Serial Number:	10W: CR21100111-RF-S1 25W: CR21100111-RF-S2	Test Date:	2021-12-22
Test Site:	966-1/966-2	Test Mode:	Transmitting
Tester:	Tommy Luo, Carl Liang	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	21.1~22.3	Relative Humidity: (%)	51~57	ATM Pressure: (kPa)	101.1
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-5	2020-10-19	2023-10-18
R&S	EMI Test Receiver	ESR3	102724	2021-07-22	2022-07-21
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2021-07-18	2022-07-17
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2021-07-18	2022-07-17
Sonoma	Amplifier	310N	186165	2021-07-18	2022-07-17
EMCO	Adjustable Dipole Antenna	3121C	9109-756	N/A	N/A
MICRO-COAX	Coaxial Cable	UFA210B-0-0720-300300	99G1448	2021-07-25	2022-07-24
ETS-Lindgren	Horn Antenna	3115	9912-5985	2020-10-13	2023-10-12
R&S	Spectrum Analyzer	FSV40	101591	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2021-08-08	2022-08-07
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2021-08-08	2022-08-07
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2021-11-10	2022-11-09
AH	Double Ridge Guide Horn Antenna	SAS-571	1396	2021-10-18	2023-10-17
MICRO-COAX	Coaxial Cable	UFA210B-0-0720-300300	99G1448	2021-07-25	2022-07-24
Agilent	Signal Generator	E8247C	MY43321352	2021-04-25	2022-04-24

* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

For Configuration 1**30MHz - 5GHz:****Part 90**

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	44.49	-26.81	0.00	0.58	-27.39	-20.00	7.39
800.03	V	39.46	-28.28	0.00	0.58	-28.86	-20.00	8.86
1200.04	H	44.15	-58.71	7.66	0.69	-51.74	-20.00	31.74
1200.04	V	44.97	-58.63	7.66	0.69	-51.66	-20.00	31.66
1600.05	H	41.09	-63.28	8.62	0.83	-55.49	-20.00	35.49
1600.05	V	41.12	-63.28	8.62	0.83	-55.49	-20.00	35.49
2000.06	H	37.02	-65.11	9.10	0.89	-56.90	-20.00	36.90
2000.06	V	43.10	-58.40	9.10	0.89	-50.19	-20.00	30.19
2400.08	H	35.53	-65.52	9.34	0.98	-57.16	-20.00	37.16
2400.08	V	36.00	-64.79	9.34	0.98	-56.43	-20.00	36.43
2800.09	H	33.14	-66.79	9.88	1.04	-57.95	-20.00	37.95
2800.09	V	33.54	-66.26	9.88	1.04	-57.42	-20.00	37.42
3200.10	H	40.32	-56.80	10.28	1.11	-47.63	-20.00	27.63
3200.10	V	42.88	-53.99	10.28	1.11	-44.82	-20.00	24.82
3600.11	H	34.51	-63.04	10.50	1.24	-53.78	-20.00	33.78
3600.11	V	33.96	-63.45	10.50	1.24	-54.19	-20.00	34.19
4000.13	H	36.12	-59.64	10.90	1.29	-50.03	-20.00	30.03
4000.13	V	38.05	-57.51	10.90	1.29	-47.90	-20.00	27.90
4FSK, Frequency: 400.0125MHz-12.5 kHz								
800.03	H	42.85	-28.45	0.00	0.58	-29.03	-20.00	9.03
800.03	V	40.16	-27.58	0.00	0.58	-28.16	-20.00	8.16
1200.04	H	44.62	-58.24	7.66	0.69	-51.27	-20.00	31.27
1200.04	V	45.29	-58.31	7.66	0.69	-51.34	-20.00	31.34
1600.05	H	41.58	-62.79	8.62	0.83	-55.00	-20.00	35.00
1600.05	V	42.83	-61.57	8.62	0.83	-53.78	-20.00	33.78
2000.06	H	38.56	-63.57	9.10	0.89	-55.36	-20.00	35.36
2000.06	V	41.23	-60.27	9.10	0.89	-52.06	-20.00	32.06
2400.08	H	37.54	-63.51	9.34	0.98	-55.15	-20.00	35.15
2400.08	V	37.02	-63.77	9.34	0.98	-55.41	-20.00	35.41
2800.09	H	34.52	-65.41	9.88	1.04	-56.57	-20.00	36.57
2800.09	V	33.69	-66.11	9.88	1.04	-57.27	-20.00	37.27
3200.10	H	42.00	-55.12	10.28	1.11	-45.95	-20.00	25.95
3200.10	V	44.67	-52.20	10.28	1.11	-43.03	-20.00	23.03
3600.11	H	34.53	-63.02	10.50	1.24	-53.76	-20.00	33.76
3600.11	V	34.00	-63.41	10.50	1.24	-54.15	-20.00	34.15
4000.13	H	37.63	-58.14	10.90	1.29	-48.53	-20.00	28.53
4000.13	V	38.24	-57.32	10.90	1.29	-47.71	-20.00	27.71

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: 453.2125MHz-12.5 kHz								
906.43	H	34.94	-33.67	0.00	0.55	-34.22	-20.00	14.22
906.43	V	36.14	-29.86	0.00	0.55	-30.41	-20.00	10.41
1359.64	H	48.26	-55.05	8.11	0.77	-47.71	-20.00	27.71
1359.64	V	45.19	-58.33	8.11	0.77	-50.99	-20.00	30.99
1812.85	H	37.85	-65.58	8.88	0.90	-57.60	-20.00	37.60
1812.85	V	42.75	-60.80	8.88	0.90	-52.82	-20.00	32.82
2266.06	H	35.69	-66.38	9.26	0.95	-58.07	-20.00	38.07
2266.06	V	36.77	-65.19	9.26	0.95	-56.88	-20.00	36.88
2719.28	H	34.11	-65.86	9.75	1.05	-57.16	-20.00	37.16
2719.28	V	33.61	-66.30	9.75	1.05	-57.60	-20.00	37.60
3172.49	H	37.38	-59.86	10.27	1.13	-50.72	-20.00	30.72
3172.49	V	38.49	-58.54	10.27	1.13	-49.40	-20.00	29.40
3625.70	H	34.41	-63.08	10.53	1.22	-53.77	-20.00	33.77
3625.70	V	34.63	-62.75	10.53	1.22	-53.44	-20.00	33.44
4078.91	H	35.91	-60.05	10.85	1.29	-50.49	-20.00	30.49
4078.91	V	35.63	-60.26	10.85	1.29	-50.70	-20.00	30.70
4532.13	H	35.70	-59.97	10.64	1.37	-50.70	-20.00	30.70
4532.13	V	36.11	-59.33	10.64	1.37	-50.06	-20.00	30.06
4FSK, Frequency: 453.2125MHz-12.5 kHz								
906.43	H	34.81	-33.80	0.00	0.55	-34.35	-20.00	14.35
906.43	V	35.69	-30.31	0.00	0.55	-30.86	-20.00	10.86
1359.64	H	47.47	-55.84	8.11	0.77	-48.50	-20.00	28.50
1359.64	V	44.36	-59.16	8.11	0.77	-51.82	-20.00	31.82
1812.85	H	37.01	-66.42	8.88	0.90	-58.44	-20.00	38.44
1812.85	V	42.11	-61.44	8.88	0.90	-53.46	-20.00	33.46
2266.06	H	35.76	-66.31	9.26	0.95	-58.00	-20.00	38.00
2266.06	V	36.79	-65.17	9.26	0.95	-56.86	-20.00	36.86
2719.28	H	33.33	-66.64	9.75	1.05	-57.94	-20.00	37.94
2719.28	V	34.52	-65.39	9.75	1.05	-56.69	-20.00	36.69
3172.49	H	36.94	-60.30	10.27	1.13	-51.16	-20.00	31.16
3172.49	V	40.01	-57.02	10.27	1.13	-47.88	-20.00	27.88
3625.70	H	35.17	-62.32	10.53	1.22	-53.01	-20.00	33.01
3625.70	V	35.56	-61.82	10.53	1.22	-52.51	-20.00	32.51
4078.91	H	35.90	-60.06	10.85	1.29	-50.50	-20.00	30.50
4078.91	V	36.11	-59.78	10.85	1.29	-50.22	-20.00	30.22
4532.13	H	34.87	-60.80	10.64	1.37	-51.53	-20.00	31.53
4532.13	V	35.99	-59.45	10.64	1.37	-50.18	-20.00	30.18

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	36.21	-31.58	0.00	0.64	-32.22	-20.00	12.22
939.98	V	33.85	-31.50	0.00	0.64	-32.14	-20.00	12.14
1409.96	H	42.54	-61.14	8.25	0.72	-53.61	-20.00	33.61
1409.96	V	39.39	-64.34	8.25	0.72	-56.81	-20.00	36.81
1879.95	H	34.39	-68.69	8.96	0.88	-60.61	-20.00	40.61
1879.95	V	36.98	-65.86	8.96	0.88	-57.78	-20.00	37.78
2349.94	H	34.53	-66.95	9.31	0.97	-58.61	-20.00	38.61
2349.94	V	35.58	-65.67	9.31	0.97	-57.33	-20.00	37.33
2819.93	H	31.65	-68.19	9.91	1.05	-59.33	-20.00	39.33
2819.93	V	31.83	-67.92	9.91	1.05	-59.06	-20.00	39.06
3289.91	H	32.71	-64.01	10.32	1.15	-54.84	-20.00	34.84
3289.91	V	33.24	-63.23	10.32	1.15	-54.06	-20.00	34.06
3759.90	H	33.90	-62.51	10.66	1.24	-53.09	-20.00	33.09
3759.90	V	33.49	-62.80	10.66	1.24	-53.38	-20.00	33.38
4229.89	H	33.64	-62.41	10.76	1.32	-52.97	-20.00	32.97
4229.89	V	33.70	-62.29	10.76	1.32	-52.85	-20.00	32.85
4699.88	H	34.26	-60.56	10.84	1.41	-51.13	-20.00	31.13
4699.88	V	34.40	-60.45	10.84	1.41	-51.02	-20.00	31.02
4FSK, Frequency: 469.9875MHz-12.5 kHz								
939.98	H	35.87	-31.92	0.00	0.64	-32.56	-20.00	12.56
939.98	V	33.90	-31.45	0.00	0.64	-32.09	-20.00	12.09
1409.96	H	48.62	-55.06	8.25	0.72	-47.53	-20.00	27.53
1409.96	V	42.44	-61.29	8.25	0.72	-53.76	-20.00	33.76
1879.95	H	39.83	-63.24	8.96	0.88	-55.16	-20.00	35.16
1879.95	V	41.75	-61.10	8.96	0.88	-53.02	-20.00	33.02
2349.94	H	38.47	-63.01	9.31	0.97	-54.67	-20.00	34.67
2349.94	V	40.96	-60.29	9.31	0.97	-51.95	-20.00	31.95
2819.93	H	35.39	-64.45	9.91	1.05	-55.59	-20.00	35.59
2819.93	V	35.98	-63.78	9.91	1.05	-54.92	-20.00	34.92
3289.91	H	36.17	-60.55	10.32	1.15	-51.38	-20.00	31.38
3289.91	V	37.56	-58.92	10.32	1.15	-49.75	-20.00	29.75
3759.90	H	37.41	-59.00	10.66	1.24	-49.58	-20.00	29.58
3759.90	V	37.25	-59.04	10.66	1.24	-49.62	-20.00	29.62
4229.89	H	38.93	-57.12	10.76	1.32	-47.68	-20.00	27.68
4229.89	V	37.93	-58.06	10.76	1.32	-48.62	-20.00	28.62
4699.88	H	37.67	-57.15	10.84	1.41	-47.72	-20.00	27.72
4699.88	V	37.44	-57.41	10.84	1.41	-47.98	-20.00	27.98

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	33.84	-34.44	0.00	0.60	-35.04	-13.00	22.04
919.98	V	31.09	-34.65	0.00	0.60	-35.25	-13.00	22.25
1379.96	H	54.18	-49.33	8.16	0.74	-41.91	-13.00	28.91
1379.96	V	49.40	-54.24	8.16	0.74	-46.82	-13.00	33.82
1839.95	H	37.25	-66.04	8.91	0.89	-58.02	-13.00	45.02
1839.95	V	42.30	-60.97	8.91	0.89	-52.95	-13.00	39.95
2299.94	H	34.40	-67.52	9.28	0.98	-59.22	-13.00	46.22
2299.94	V	35.81	-65.90	9.28	0.98	-57.60	-13.00	44.60
2759.93	H	33.60	-66.35	9.82	1.06	-57.59	-13.00	44.59
2759.93	V	33.84	-66.02	9.82	1.06	-57.26	-13.00	44.26
3219.91	H	36.63	-60.40	10.29	1.13	-51.24	-13.00	38.24
3219.91	V	39.04	-57.74	10.29	1.13	-48.58	-13.00	35.58
3679.90	H	35.02	-62.35	10.58	1.23	-53.00	-13.00	40.00
3679.90	V	35.76	-61.57	10.58	1.23	-52.22	-13.00	39.22
4139.89	H	36.35	-59.63	10.82	1.28	-50.09	-13.00	37.09
4139.89	V	35.69	-60.26	10.82	1.28	-50.72	-13.00	37.72
4599.88	H	36.24	-59.21	10.72	1.40	-49.89	-13.00	36.89
4599.88	V	36.08	-59.20	10.72	1.40	-49.88	-13.00	36.88

Part 74

art 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	31.77	-36.75	0.00	0.54	-37.29	-20.00	17.29
910.03	V	34.05	-31.88	0.00	0.54	-32.42	-20.00	12.42
1365.04	H	47.71	-55.66	8.12	0.77	-48.31	-20.00	28.31
1365.04	V	44.47	-59.08	8.12	0.77	-51.73	-20.00	31.73
1820.05	H	38.16	-65.23	8.88	0.90	-57.25	-20.00	37.25
1820.05	V	40.62	-62.86	8.88	0.90	-54.88	-20.00	34.88
2275.06	H	35.74	-66.29	9.27	0.96	-57.98	-20.00	37.98
2275.06	V	36.63	-65.26	9.27	0.96	-56.95	-20.00	36.95
2730.08	H	33.14	-66.82	9.77	1.06	-58.11	-20.00	38.11
2730.08	V	33.82	-66.08	9.77	1.06	-57.37	-20.00	37.37
3185.09	H	35.47	-61.72	10.27	1.12	-52.57	-20.00	32.57
3185.09	V	38.16	-58.80	10.27	1.12	-49.65	-20.00	29.65
3640.10	H	34.37	-63.09	10.54	1.22	-53.77	-20.00	33.77
3640.10	V	34.99	-62.38	10.54	1.22	-53.06	-20.00	33.06
4095.11	H	35.62	-60.38	10.84	1.27	-50.81	-20.00	30.81
4095.11	V	35.97	-59.99	10.84	1.27	-50.42	-20.00	30.42
4550.13	H	34.86	-60.75	10.66	1.36	-51.45	-20.00	31.45
4550.13	V	36.10	-59.30	10.66	1.36	-50.00	-20.00	30.00
FM, Frequency: 455.0125MHz-25 kHz								
910.03	H	32.07	-36.45	0.00	0.54	-36.99	-13.00	23.99
910.03	V	33.91	-32.02	0.00	0.54	-32.56	-13.00	19.56
1365.04	H	48.65	-54.72	8.12	0.77	-47.37	-13.00	34.37
1365.04	V	46.32	-57.23	8.12	0.77	-49.88	-13.00	36.88
1820.05	H	37.12	-66.27	8.88	0.90	-58.29	-13.00	45.29
1820.05	V	39.68	-63.80	8.88	0.90	-55.82	-13.00	42.82
2275.06	H	36.62	-65.41	9.27	0.96	-57.10	-13.00	44.10
2275.06	V	37.29	-64.60	9.27	0.96	-56.29	-13.00	43.29
2730.08	H	33.63	-66.33	9.77	1.06	-57.62	-13.00	44.62
2730.08	V	33.51	-66.39	9.77	1.06	-57.68	-13.00	44.68
3185.09	H	34.94	-62.25	10.27	1.12	-53.10	-13.00	40.10
3185.09	V	37.80	-59.16	10.27	1.12	-50.01	-13.00	37.01
3640.10	H	34.96	-62.50	10.54	1.22	-53.18	-13.00	40.18
3640.10	V	36.08	-61.29	10.54	1.22	-51.97	-13.00	38.97
4095.11	H	35.54	-60.46	10.84	1.27	-50.89	-13.00	37.89
4095.11	V	35.12	-60.84	10.84	1.27	-51.27	-13.00	38.27
4550.13	H	35.60	-60.01	10.66	1.36	-50.71	-13.00	37.71
4550.13	V	36.00	-59.40	10.66	1.36	-50.10	-13.00	37.10

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	31.73	-36.79	0.00	0.54	-37.33	-20.00	17.33
910.03	V	33.95	-31.98	0.00	0.54	-32.52	-20.00	12.52
1365.04	H	49.18	-54.19	8.12	0.77	-46.84	-20.00	26.84
1365.04	V	46.70	-56.85	8.12	0.77	-49.50	-20.00	29.50
1820.05	H	36.88	-66.51	8.88	0.90	-58.53	-20.00	38.53
1820.05	V	41.08	-62.40	8.88	0.90	-54.42	-20.00	34.42
2275.06	H	36.69	-65.34	9.27	0.96	-57.03	-20.00	37.03
2275.06	V	37.10	-64.79	9.27	0.96	-56.48	-20.00	36.48
2730.08	H	33.62	-66.34	9.77	1.06	-57.63	-20.00	37.63
2730.08	V	33.71	-66.19	9.77	1.06	-57.48	-20.00	37.48
3185.09	H	36.48	-60.71	10.27	1.12	-51.56	-20.00	31.56
3185.09	V	37.85	-59.11	10.27	1.12	-49.96	-20.00	29.96
3640.10	H	34.48	-62.98	10.54	1.22	-53.66	-20.00	33.66
3640.10	V	35.10	-62.27	10.54	1.22	-52.95	-20.00	32.95
4095.11	H	35.36	-60.64	10.84	1.27	-51.07	-20.00	31.07
4095.11	V	36.21	-59.75	10.84	1.27	-50.18	-20.00	30.18
4550.13	H	35.67	-59.94	10.66	1.36	-50.64	-20.00	30.64
4550.13	V	36.13	-59.27	10.66	1.36	-49.97	-20.00	29.97

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	32.15	-36.42	0.00	0.54	-36.96	-13.00	23.96
908.03	V	33.54	-32.43	0.00	0.54	-32.97	-13.00	19.97
1362.04	H	49.49	-53.85	8.11	0.77	-46.51	-13.00	33.51
1362.04	V	45.23	-58.31	8.11	0.77	-50.97	-13.00	37.97
1816.05	H	39.93	-63.48	8.88	0.90	-55.50	-13.00	42.50
1816.05	V	42.12	-61.40	8.88	0.90	-53.42	-13.00	40.42
2270.06	H	37.73	-64.32	9.26	0.95	-56.01	-13.00	43.01
2270.06	V	37.57	-64.36	9.26	0.95	-56.05	-13.00	43.05
2724.08	H	33.48	-66.49	9.76	1.05	-57.78	-13.00	44.78
2724.08	V	33.47	-66.44	9.76	1.05	-57.73	-13.00	44.73
3178.09	H	37.10	-60.12	10.27	1.12	-50.97	-13.00	37.97
3178.09	V	39.34	-57.66	10.27	1.12	-48.51	-13.00	35.51
3632.10	H	33.97	-63.51	10.53	1.22	-54.20	-13.00	41.20
3632.10	V	34.94	-62.44	10.53	1.22	-53.13	-13.00	40.13
4086.11	H	36.38	-59.60	10.85	1.28	-50.03	-13.00	37.03
4086.11	V	35.52	-60.40	10.85	1.28	-50.83	-13.00	37.83
4540.13	H	35.81	-59.84	10.65	1.36	-50.55	-13.00	37.55
4540.13	V	36.09	-59.33	10.65	1.36	-50.04	-13.00	37.04
FM, Frequency: 454.0125MHz-25 kHz								
908.03	H	31.39	-37.18	0.00	0.54	-37.72	-13.00	24.72
908.03	V	33.91	-32.06	0.00	0.54	-32.60	-13.00	19.60
1362.04	H	48.96	-54.38	8.11	0.77	-47.04	-13.00	34.04
1362.04	V	44.80	-58.74	8.11	0.77	-51.40	-13.00	38.40
1816.05	H	38.83	-64.58	8.88	0.90	-56.60	-13.00	43.60
1816.05	V	42.32	-61.20	8.88	0.90	-53.22	-13.00	40.22
2270.06	H	36.91	-65.14	9.26	0.95	-56.83	-13.00	43.83
2270.06	V	37.82	-64.11	9.26	0.95	-55.80	-13.00	42.80
2724.08	H	33.66	-66.31	9.76	1.05	-57.60	-13.00	44.60
2724.08	V	33.53	-66.38	9.76	1.05	-57.67	-13.00	44.67
3178.09	H	37.85	-59.37	10.27	1.12	-50.22	-13.00	37.22
3178.09	V	39.27	-57.73	10.27	1.12	-48.58	-13.00	35.58
3632.10	H	34.75	-62.73	10.53	1.22	-53.42	-13.00	40.42
3632.10	V	34.36	-63.02	10.53	1.22	-53.71	-13.00	40.71
4086.11	H	35.52	-60.46	10.85	1.28	-50.89	-13.00	37.89
4086.11	V	36.27	-59.65	10.85	1.28	-50.08	-13.00	37.08
4540.13	H	36.32	-59.33	10.65	1.36	-50.04	-13.00	37.04
4540.13	V	35.84	-59.58	10.65	1.36	-50.29	-13.00	37.29

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	31.64	-36.93	0.00	0.54	-37.47	-13.00	24.47
908.03	V	33.71	-32.26	0.00	0.54	-32.80	-13.00	19.80
1362.04	H	46.94	-56.40	8.11	0.77	-49.06	-13.00	36.06
1362.04	V	44.91	-58.63	8.11	0.77	-51.29	-13.00	38.29
1816.05	H	40.17	-63.24	8.88	0.90	-55.26	-13.00	42.26
1816.05	V	43.01	-60.51	8.88	0.90	-52.53	-13.00	39.53
2270.06	H	37.63	-64.42	9.26	0.95	-56.11	-13.00	43.11
2270.06	V	38.27	-63.66	9.26	0.95	-55.35	-13.00	42.35
2724.08	H	33.52	-66.45	9.76	1.05	-57.74	-13.00	44.74
2724.08	V	33.40	-66.51	9.76	1.05	-57.80	-13.00	44.80
3178.09	H	36.41	-60.81	10.27	1.12	-51.66	-13.00	38.66
3178.09	V	39.90	-57.10	10.27	1.12	-47.95	-13.00	34.95
3632.10	H	35.43	-62.05	10.53	1.22	-52.74	-13.00	39.74
3632.10	V	34.33	-63.05	10.53	1.22	-53.74	-13.00	40.74
4086.11	H	35.71	-60.27	10.85	1.28	-50.70	-13.00	37.70
4086.11	V	36.31	-59.61	10.85	1.28	-50.04	-13.00	37.04
4540.13	H	36.35	-59.30	10.65	1.36	-50.01	-13.00	37.01
4540.13	V	36.01	-59.41	10.65	1.36	-50.12	-13.00	37.12

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

For Configuration 2**30MHz - 5GHz:****Part 90**

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	34.45	-36.85	0.00	0.58	-37.43	-20.00	17.43
800.03	V	35.75	-31.99	0.00	0.58	-32.57	-20.00	12.57
1200.04	H	42.35	-60.51	7.66	0.69	-53.54	-20.00	33.54
1200.04	V	43.19	-60.41	7.66	0.69	-53.44	-20.00	33.44
1600.05	H	42.51	-61.86	8.62	0.83	-54.07	-20.00	34.07
1600.05	V	44.59	-59.81	8.62	0.83	-52.02	-20.00	32.02
2000.06	H	53.43	-48.70	9.10	0.89	-40.49	-20.00	20.49
2000.06	V	59.69	-41.81	9.10	0.89	-33.60	-20.00	13.60
2400.08	H	34.64	-66.41	9.34	0.98	-58.05	-20.00	38.05
2400.08	V	35.54	-65.25	9.34	0.98	-56.89	-20.00	36.89
2800.09	H	34.20	-65.73	9.88	1.04	-56.89	-20.00	36.89
2800.09	V	34.91	-64.89	9.88	1.04	-56.05	-20.00	36.05
3200.10	H	34.00	-63.12	10.28	1.11	-53.95	-20.00	33.95
3200.10	V	35.16	-61.71	10.28	1.11	-52.54	-20.00	32.54
3600.11	H	34.98	-62.57	10.50	1.24	-53.31	-20.00	33.31
3600.11	V	36.71	-60.70	10.50	1.24	-51.44	-20.00	31.44
4000.13	H	35.10	-60.66	10.90	1.29	-51.05	-20.00	31.05
4000.13	V	35.96	-59.60	10.90	1.29	-49.99	-20.00	29.99
4FSK, Frequency: 400.0125MHz-12.5 kHz								
800.03	H	35.96	-35.34	0.00	0.58	-35.92	-20.00	15.92
800.03	V	31.65	-36.09	0.00	0.58	-36.67	-20.00	16.67
1200.04	H	43.64	-59.22	7.66	0.69	-52.25	-20.00	32.25
1200.04	V	43.94	-59.66	7.66	0.69	-52.69	-20.00	32.69
1600.05	H	41.93	-62.44	8.62	0.83	-54.65	-20.00	34.65
1600.05	V	45.02	-59.38	8.62	0.83	-51.59	-20.00	31.59
2000.06	H	55.18	-46.95	9.10	0.89	-38.74	-20.00	18.74
2000.06	V	55.03	-46.47	9.10	0.89	-38.26	-20.00	18.26
2400.08	H	35.74	-65.31	9.34	0.98	-56.95	-20.00	36.95
2400.08	V	34.87	-65.92	9.34	0.98	-57.56	-20.00	37.56
2800.09	H	34.52	-65.41	9.88	1.04	-56.57	-20.00	36.57
2800.09	V	35.83	-63.97	9.88	1.04	-55.13	-20.00	35.13
3200.10	H	34.47	-62.65	10.28	1.11	-53.48	-20.00	33.48
3200.10	V	33.96	-62.91	10.28	1.11	-53.74	-20.00	33.74
3600.11	H	36.34	-61.21	10.50	1.24	-51.95	-20.00	31.95
3600.11	V	36.69	-60.72	10.50	1.24	-51.46	-20.00	31.46
4000.13	H	35.85	-59.91	10.90	1.29	-50.30	-20.00	30.30
4000.13	V	36.27	-59.29	10.90	1.29	-49.68	-20.00	29.68

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: 453.2125MHz-12.5 kHz								
906.43	H	29.44	-39.17	0.00	0.55	-39.72	-20.00	19.72
906.43	V	28.75	-37.25	0.00	0.55	-37.80	-20.00	17.80
1359.64	H	51.37	-51.94	8.11	0.77	-44.60	-20.00	24.60
1359.64	V	51.74	-51.78	8.11	0.77	-44.44	-20.00	24.44
1812.85	H	43.30	-60.13	8.88	0.90	-52.15	-20.00	32.15
1812.85	V	45.22	-58.33	8.88	0.90	-50.35	-20.00	30.35
2266.06	H	43.45	-58.62	9.26	0.95	-50.31	-20.00	30.31
2266.06	V	49.98	-51.98	9.26	0.95	-43.67	-20.00	23.67
2719.28	H	36.67	-63.30	9.75	1.05	-54.60	-20.00	34.60
2719.28	V	36.58	-63.33	9.75	1.05	-54.63	-20.00	34.63
3172.49	H	33.96	-63.28	10.27	1.13	-54.14	-20.00	34.14
3172.49	V	33.88	-63.15	10.27	1.13	-54.01	-20.00	34.01
3625.70	H	34.72	-62.77	10.53	1.22	-53.46	-20.00	33.46
3625.70	V	35.32	-62.06	10.53	1.22	-52.75	-20.00	32.75
4078.91	H	35.91	-60.05	10.85	1.29	-50.49	-20.00	30.49
4078.91	V	38.01	-57.88	10.85	1.29	-48.32	-20.00	28.32
4532.13	H	35.35	-60.32	10.64	1.37	-51.05	-20.00	31.05
4532.13	V	36.21	-59.23	10.64	1.37	-49.96	-20.00	29.96
4FSK, Frequency: 453.2125MHz-12.5 kHz								
906.43	H	29.88	-38.73	0.00	0.55	-39.28	-20.00	19.28
906.43	V	27.85	-38.15	0.00	0.55	-38.70	-20.00	18.70
1359.64	H	51.67	-51.64	8.11	0.77	-44.30	-20.00	24.30
1359.64	V	51.38	-52.14	8.11	0.77	-44.80	-20.00	24.80
1812.85	H	43.43	-60.00	8.88	0.90	-52.02	-20.00	32.02
1812.85	V	45.67	-57.88	8.88	0.90	-49.90	-20.00	29.90
2266.06	H	43.37	-58.70	9.26	0.95	-50.39	-20.00	30.39
2266.06	V	50.41	-51.55	9.26	0.95	-43.24	-20.00	23.24
2719.28	H	36.80	-63.17	9.75	1.05	-54.47	-20.00	34.47
2719.28	V	36.06	-63.85	9.75	1.05	-55.15	-20.00	35.15
3172.49	H	33.98	-63.26	10.27	1.13	-54.12	-20.00	34.12
3172.49	V	34.76	-62.27	10.27	1.13	-53.13	-20.00	33.13
3625.70	H	34.68	-62.81	10.53	1.22	-53.50	-20.00	33.50
3625.70	V	35.50	-61.88	10.53	1.22	-52.57	-20.00	32.57
4078.91	H	35.82	-60.14	10.85	1.29	-50.58	-20.00	30.58
4078.91	V	38.78	-57.11	10.85	1.29	-47.55	-20.00	27.55
4532.13	H	36.48	-59.19	10.64	1.37	-49.92	-20.00	29.92
4532.13	V	37.02	-58.42	10.64	1.37	-49.15	-20.00	29.15

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	37.49	-30.30	0.00	0.64	-30.94	-20.00	10.94
939.98	V	39.12	-26.23	0.00	0.64	-26.87	-20.00	6.87
1409.96	H	56.03	-47.65	8.25	0.72	-40.12	-20.00	20.12
1409.96	V	53.72	-50.01	8.25	0.72	-42.48	-20.00	22.48
1879.95	H	45.21	-57.87	8.96	0.88	-49.79	-20.00	29.79
1879.95	V	50.05	-52.79	8.96	0.88	-44.71	-20.00	24.71
2349.94	H	45.46	-56.02	9.31	0.97	-47.68	-20.00	27.68
2349.94	V	46.71	-54.54	9.31	0.97	-46.20	-20.00	26.20
2819.93	H	35.36	-64.48	9.91	1.05	-55.62	-20.00	35.62
2819.93	V	34.45	-65.30	9.91	1.05	-56.44	-20.00	36.44
3289.91	H	34.98	-61.74	10.32	1.15	-52.57	-20.00	32.57
3289.91	V	35.93	-60.55	10.32	1.15	-51.38	-20.00	31.38
3759.90	H	36.66	-59.75	10.66	1.24	-50.33	-20.00	30.33
3759.90	V	36.37	-59.92	10.66	1.24	-50.50	-20.00	30.50
4229.89	H	37.35	-58.69	10.76	1.32	-49.25	-20.00	29.25
4229.89	V	38.18	-57.81	10.76	1.32	-48.37	-20.00	28.37
4699.88	H	37.45	-57.37	10.84	1.41	-47.94	-20.00	27.94
4699.88	V	37.53	-57.32	10.84	1.41	-47.89	-20.00	27.89
4FSK, Frequency: 469.9875MHz-12.5 kHz								
939.98	H	37.84	-29.95	0.00	0.64	-30.59	-20.00	10.59
939.98	V	32.69	-32.66	0.00	0.64	-33.30	-20.00	13.30
1409.96	H	54.94	-48.74	8.25	0.72	-41.21	-20.00	21.21
1409.96	V	53.82	-49.91	8.25	0.72	-42.38	-20.00	22.38
1879.95	H	46.03	-57.05	8.96	0.88	-48.97	-20.00	28.97
1879.95	V	45.51	-57.33	8.96	0.88	-49.25	-20.00	29.25
2349.94	H	43.32	-58.17	9.31	0.97	-49.83	-20.00	29.83
2349.94	V	45.56	-55.69	9.31	0.97	-47.35	-20.00	27.35
2819.93	H	32.99	-66.85	9.91	1.05	-57.99	-20.00	37.99
2819.93	V	33.70	-66.05	9.91	1.05	-57.19	-20.00	37.19
3289.91	H	34.00	-62.72	10.32	1.15	-53.55	-20.00	33.55
3289.91	V	34.17	-62.30	10.32	1.15	-53.13	-20.00	33.13
3759.90	H	34.67	-61.74	10.66	1.24	-52.32	-20.00	32.32
3759.90	V	34.71	-61.58	10.66	1.24	-52.16	-20.00	32.16
4229.89	H	36.44	-59.61	10.76	1.32	-50.17	-20.00	30.17
4229.89	V	36.67	-59.31	10.76	1.32	-49.87	-20.00	29.87
4699.88	H	35.79	-59.03	10.84	1.41	-49.60	-20.00	29.60
4699.88	V	34.89	-59.96	10.84	1.41	-50.53	-20.00	30.53

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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	31.65	-36.63	0.00	0.60	-37.23	-13.00	24.23
919.98	V	31.33	-34.41	0.00	0.60	-35.01	-13.00	22.01
1379.96	H	58.33	-45.18	8.16	0.74	-37.76	-13.00	24.76
1379.96	V	57.52	-46.12	8.16	0.74	-38.70	-13.00	25.70
1839.95	H	45.48	-57.81	8.91	0.89	-49.79	-13.00	36.79
1839.95	V	48.20	-55.07	8.91	0.89	-47.05	-13.00	34.05
2299.94	H	43.69	-58.23	9.28	0.98	-49.93	-13.00	36.93
2299.94	V	51.24	-50.47	9.28	0.98	-42.17	-13.00	29.17
2759.93	H	34.25	-65.70	9.82	1.06	-56.94	-13.00	43.94
2759.93	V	34.68	-65.18	9.82	1.06	-56.42	-13.00	43.42
3219.91	H	34.08	-62.95	10.29	1.13	-53.79	-13.00	40.79
3219.91	V	35.09	-61.69	10.29	1.13	-52.53	-13.00	39.53
3679.90	H	34.67	-62.70	10.58	1.23	-53.35	-13.00	40.35
3679.90	V	35.78	-61.55	10.58	1.23	-52.20	-13.00	39.20
4139.89	H	35.47	-60.51	10.82	1.28	-50.97	-13.00	37.97
4139.89	V	36.00	-59.95	10.82	1.28	-50.41	-13.00	37.41
4599.88	H	35.84	-59.61	10.72	1.40	-50.29	-13.00	37.29
4599.88	V	35.97	-59.31	10.72	1.40	-49.99	-13.00	36.99

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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	28.87	-39.65	0.00	0.54	-40.19	-20.00	20.19
910.03	V	30.39	-35.54	0.00	0.54	-36.08	-20.00	16.08
1365.04	H	51.87	-51.50	8.12	0.77	-44.15	-20.00	24.15
1365.04	V	51.42	-52.13	8.12	0.77	-44.78	-20.00	24.78
1820.05	H	44.23	-59.16	8.88	0.90	-51.18	-20.00	31.18
1820.05	V	45.50	-57.98	8.88	0.90	-50.00	-20.00	30.00
2275.06	H	44.03	-58.00	9.27	0.96	-49.69	-20.00	29.69
2275.06	V	50.64	-51.25	9.27	0.96	-42.94	-20.00	22.94
2730.08	H	35.08	-64.88	9.77	1.06	-56.17	-20.00	36.17
2730.08	V	34.78	-65.12	9.77	1.06	-56.41	-20.00	36.41
3185.09	H	33.18	-64.01	10.27	1.12	-54.86	-20.00	34.86
3185.09	V	33.94	-63.02	10.27	1.12	-53.87	-20.00	33.87
3640.10	H	34.51	-62.95	10.54	1.22	-53.63	-20.00	33.63
3640.10	V	35.42	-61.95	10.54	1.22	-52.63	-20.00	32.63
4095.11	H	35.57	-60.43	10.84	1.27	-50.86	-20.00	30.86
4095.11	V	37.01	-58.95	10.84	1.27	-49.38	-20.00	29.38
4550.13	H	35.91	-59.70	10.66	1.36	-50.40	-20.00	30.40
4550.13	V	36.68	-58.72	10.66	1.36	-49.42	-20.00	29.42
FM, Frequency: 455.0125MHz-25 kHz								
910.03	H	29.26	-39.26	0.00	0.54	-39.80	-13.00	26.80
910.03	V	28.61	-37.32	0.00	0.54	-37.86	-13.00	24.86
1365.04	H	51.58	-51.79	8.12	0.77	-44.44	-13.00	31.44
1365.04	V	51.85	-51.70	8.12	0.77	-44.35	-13.00	31.35
1820.05	H	43.69	-59.70	8.88	0.90	-51.72	-13.00	38.72
1820.05	V	45.56	-57.92	8.88	0.90	-49.94	-13.00	36.94
2275.06	H	44.63	-57.40	9.27	0.96	-49.09	-13.00	36.09
2275.06	V	51.04	-50.85	9.27	0.96	-42.54	-13.00	29.54
2730.08	H	35.12	-64.84	9.77	1.06	-56.13	-13.00	43.13
2730.08	V	35.44	-64.46	9.77	1.06	-55.75	-13.00	42.75
3185.09	H	33.58	-63.61	10.27	1.12	-54.46	-13.00	41.46
3185.09	V	33.43	-63.53	10.27	1.12	-54.38	-13.00	41.38
3640.10	H	34.87	-62.59	10.54	1.22	-53.27	-13.00	40.27
3640.10	V	35.73	-61.64	10.54	1.22	-52.32	-13.00	39.32
4095.11	H	35.64	-60.36	10.84	1.27	-50.79	-13.00	37.79
4095.11	V	36.01	-59.95	10.84	1.27	-50.38	-13.00	37.38
4550.13	H	36.21	-59.40	10.66	1.36	-50.10	-13.00	37.10
4550.13	V	36.94	-58.46	10.66	1.36	-49.16	-13.00	36.16

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	23.59	-44.93	0.00	0.54	-45.47	-20.00	25.47
910.03	V	30.35	-35.58	0.00	0.54	-36.12	-20.00	16.12
1365.04	H	51.40	-51.97	8.12	0.77	-44.62	-20.00	24.62
1365.04	V	51.42	-52.13	8.12	0.77	-44.78	-20.00	24.78
1820.05	H	43.70	-59.69	8.88	0.90	-51.71	-20.00	31.71
1820.05	V	45.51	-57.97	8.88	0.90	-49.99	-20.00	29.99
2275.06	H	44.90	-57.13	9.27	0.96	-48.82	-20.00	28.82
2275.06	V	51.03	-50.86	9.27	0.96	-42.55	-20.00	22.55
2730.08	H	33.97	-65.99	9.77	1.06	-57.28	-20.00	37.28
2730.08	V	34.63	-65.27	9.77	1.06	-56.56	-20.00	36.56
3185.09	H	34.01	-63.18	10.27	1.12	-54.03	-20.00	34.03
3185.09	V	33.99	-62.97	10.27	1.12	-53.82	-20.00	33.82
3640.10	H	34.73	-62.73	10.54	1.22	-53.41	-20.00	33.41
3640.10	V	35.08	-62.29	10.54	1.22	-52.97	-20.00	32.97
4095.11	H	35.09	-60.91	10.84	1.27	-51.34	-20.00	31.34
4095.11	V	36.26	-59.70	10.84	1.27	-50.13	-20.00	30.13
4550.13	H	35.34	-60.27	10.66	1.36	-50.97	-20.00	30.97
4550.13	V	36.34	-59.06	10.66	1.36	-49.76	-20.00	29.76

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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	27.71	-40.86	0.00	0.54	-41.40	-13.00	28.40
908.03	V	29.41	-36.56	0.00	0.54	-37.10	-13.00	24.10
1362.04	H	51.75	-51.59	8.11	0.77	-44.25	-13.00	31.25
1362.04	V	51.94	-51.60	8.11	0.77	-44.26	-13.00	31.26
1816.05	H	44.93	-58.48	8.88	0.90	-50.50	-13.00	37.50
1816.05	V	46.90	-56.62	8.88	0.90	-48.64	-13.00	35.64
2270.06	H	44.29	-57.76	9.26	0.95	-49.45	-13.00	36.45
2270.06	V	51.07	-50.86	9.26	0.95	-42.55	-13.00	29.55
2724.08	H	35.07	-64.90	9.76	1.05	-56.19	-13.00	43.19
2724.08	V	35.15	-64.76	9.76	1.05	-56.05	-13.00	43.05
3178.09	H	34.17	-63.05	10.27	1.12	-53.90	-13.00	40.90
3178.09	V	35.02	-61.98	10.27	1.12	-52.83	-13.00	39.83
3632.10	H	34.43	-63.05	10.53	1.22	-53.74	-13.00	40.74
3632.10	V	34.82	-62.56	10.53	1.22	-53.25	-13.00	40.25
4086.11	H	35.03	-60.95	10.85	1.28	-51.38	-13.00	38.38
4086.11	V	37.15	-58.77	10.85	1.28	-49.20	-13.00	36.20
4540.13	H	36.26	-59.39	10.65	1.36	-50.10	-13.00	37.10
4540.13	V	36.64	-58.78	10.65	1.36	-49.49	-13.00	36.49
FM, Frequency: 454.0125MHz-25 kHz								
908.03	H	27.85	-40.72	0.00	0.54	-41.26	-13.00	28.26
908.03	V	28.05	-37.92	0.00	0.54	-38.46	-13.00	25.46
1362.04	H	51.68	-51.66	8.11	0.77	-44.32	-13.00	31.32
1362.04	V	51.46	-52.08	8.11	0.77	-44.74	-13.00	31.74
1816.05	H	44.52	-58.89	8.88	0.90	-50.91	-13.00	37.91
1816.05	V	46.89	-56.63	8.88	0.90	-48.65	-13.00	35.65
2270.06	H	44.25	-57.80	9.26	0.95	-49.49	-13.00	36.49
2270.06	V	51.09	-50.84	9.26	0.95	-42.53	-13.00	29.53
2724.08	H	35.94	-64.03	9.76	1.05	-55.32	-13.00	42.32
2724.08	V	35.48	-64.43	9.76	1.05	-55.72	-13.00	42.72
3178.09	H	34.00	-63.22	10.27	1.12	-54.07	-13.00	41.07
3178.09	V	34.62	-62.38	10.27	1.12	-53.23	-13.00	40.23
3632.10	H	34.20	-63.28	10.53	1.22	-53.97	-13.00	40.97
3632.10	V	35.88	-61.50	10.53	1.22	-52.19	-13.00	39.19
4086.11	H	36.40	-59.58	10.85	1.28	-50.01	-13.00	37.01
4086.11	V	36.96	-58.96	10.85	1.28	-49.39	-13.00	36.39
4540.13	H	36.07	-59.58	10.65	1.36	-50.29	-13.00	37.29
4540.13	V	36.55	-58.87	10.65	1.36	-49.58	-13.00	36.58

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	27.97	-40.60	0.00	0.54	-41.14	-13.00	28.14
908.03	V	28.66	-37.31	0.00	0.54	-37.85	-13.00	24.85
1362.04	H	51.39	-51.95	8.11	0.77	-44.61	-13.00	31.61
1362.04	V	51.96	-51.58	8.11	0.77	-44.24	-13.00	31.24
1816.05	H	44.84	-58.57	8.88	0.90	-50.59	-13.00	37.59
1816.05	V	46.66	-56.86	8.88	0.90	-48.88	-13.00	35.88
2270.06	H	43.89	-58.16	9.26	0.95	-49.85	-13.00	36.85
2270.06	V	50.99	-50.94	9.26	0.95	-42.63	-13.00	29.63
2724.08	H	36.94	-63.03	9.76	1.05	-54.32	-13.00	41.32
2724.08	V	36.25	-63.66	9.76	1.05	-54.95	-13.00	41.95
3178.09	H	33.71	-63.51	10.27	1.12	-54.36	-13.00	41.36
3178.09	V	33.99	-63.01	10.27	1.12	-53.86	-13.00	40.86
3632.10	H	34.80	-62.68	10.53	1.22	-53.37	-13.00	40.37
3632.10	V	35.34	-62.04	10.53	1.22	-52.73	-13.00	39.73
4086.11	H	36.16	-59.82	10.85	1.28	-50.25	-13.00	37.25
4086.11	V	36.60	-59.32	10.85	1.28	-49.75	-13.00	36.75
4540.13	H	36.48	-59.17	10.65	1.36	-49.88	-13.00	36.88
4540.13	V	36.54	-58.88	10.65	1.36	-49.59	-13.00	36.59

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

4.6 FREQUENCY STABILITY:

Serial Number:	25W: CR21100111-RF-S2	Test Date:	2021-12-20
Test Site:	RF	Test Mode:	Transmitting
Tester:	Rinka Li	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	22.6	Relative Humidity: (%)	39	ATM Pressure: (kPa)	101.3
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Signal Analyzer	FSIQ26	831929/006	2021-07-22	2022-07-21
YINSAIGE	Coaxial Cable	LMR300	NJ0100001	2021-08-08	2022-08-07
YINSAIGE	Coaxial Cable	LMR300	NJ0100002	2021-08-08	2022-08-07
Weinschel	Coaxial Attenuators	53-20-34	LN751	2021-08-08	2022-08-07
BACL	TEMP&HUMI Test Chamber	BTH-150	30026	2021-07-22	2022-07-21
UNI-T	Multimeter	UT39A+	C210582554	2021-09-30	2022-09-29
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A
HP	RF Communications Test Set	8920A	3438A05209	2021-07-22	2022-07-21

* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

FCC Part 90:

FM,12.5kHz, Reference Frequency: 453.2125 MHz, Limit: ± 2.5 ppm			
Temperature (°C)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
-30	14.4	453.212522	0.05
-20		453.212522	0.05
-10		453.212532	0.07
0		453.212532	0.07
10		453.212532	0.07
20		453.212520	0.04
30		453.212530	0.07
40		453.212530	0.07
50		453.212528	0.06
20	12.0	453.212528	0.06
20	16.8	453.212528	0.06

4FSK, 12.5kHz, Reference Frequency: 453.2125MHz, Limit: ± 2.5 ppm			
Temperature (°C)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
-30	14.4	453.212658	0.35
-20		453.212658	0.35
-10		453.212668	0.37
0		453.212668	0.37
10		453.212668	0.37
20		453.212656	0.34
30		453.212666	0.37
40		453.212666	0.37
50		453.212664	0.36
20	12.0	453.212664	0.36
20	16.8	453.212664	0.36

FCC Part 80:

FM,25kHz, Reference Frequency: 459.9875MHz,Limit: ± 5.0 ppm			
Temperature (°C)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
-30	14.4	459.987522	0.05
-20		459.987522	0.05
-10		459.987532	0.07
0		459.987532	0.07
10		459.987532	0.07
20		459.987520	0.04
30		459.987530	0.07
40		459.987530	0.07
50		459.987528	0.06
20	12.0	459.987528	0.06
20	16.8	459.987528	0.06

FCC Part 74:

FM, 12.5kHz, Reference Frequency: 455.0125 MHz, Limit: ± 5.0 ppm			
Temperature (°C)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
-30	14.4	455.012522	0.05
-20		455.012522	0.05
-10		455.012532	0.07
0		455.012532	0.07
10		455.012532	0.07
20		455.012520	0.04
30		455.012530	0.07
40		455.012530	0.07
50		455.012528	0.06
20	12.0	455.012528	0.06
20	16.8	455.012528	0.06

4FSK, 12.5kHz, Reference Frequency: 455.0125 MHz, Limit: ± 5.0 ppm			
Temperature (°C)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
-30	14.4	455.012602	0.22
-20		455.012602	0.22
-10		455.012612	0.25
0		455.012612	0.25
10		455.012612	0.25
20		455.012600	0.22
30		455.012610	0.24
40		455.012610	0.24
50		455.012608	0.24
20	12.0	455.012608	0.24
20	16.8	455.012608	0.24

FM, 25kHz, Reference Frequency: 455.0125 MHz, Limit: ± 5.0 ppm			
Temperature (°C)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
-30	14.4	455.012522	0.05
-20		455.012522	0.05
-10		455.012532	0.07
0		455.012532	0.07
10		455.012532	0.07
20		455.012520	0.04
30		455.012530	0.07
40		455.012530	0.07
50		455.012528	0.06
20	12.0	455.012528	0.06
20	16.8	455.012528	0.06

FCC Part 22:

FM, 12.5kHz, Reference Frequency: 454.0125MHz, Limit: ± 5.0 ppm			
Temperature (°C)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
-30	14.4	454.012520	0.04
-20		454.012520	0.04
-10		454.012520	0.04
0		454.012520	0.04
10		454.012520	0.04
20		454.012520	0.04
30		454.012520	0.04
40		454.012520	0.04
50		454.012520	0.04
20	12.0	454.012520	0.04
20	16.8	454.012520	0.04

4FSK, 12.5kHz, Reference Frequency: 454.0125MHz, Limit: ± 5.0 ppm			
Temperature (°C)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
-30	14.4	454.012803	0.67
-20		454.012803	0.67
-10		454.012813	0.69
0		454.012813	0.69
10		454.012813	0.69
20		454.012801	0.66
30		454.012811	0.69
40		454.012811	0.69
50		454.012809	0.68
20	12.0	454.012809	0.68
20	16.8	454.012809	0.68

FM, 25kHz, Reference Frequency: 454.0125MHz, Limit: ± 5.0 ppm			
Temperature (°C)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
-30	14.4	454.012522	0.05
-20		454.012522	0.05
-10		454.012532	0.07
0		454.012532	0.07
10		454.012532	0.07
20		454.012520	0.04
30		454.012530	0.07
40		454.012530	0.07
50		454.012528	0.06
20	12.0	454.012528	0.06
20	16.8	454.012528	0.06

4.7 TRANSIENT FREQUENCY BEHAVIOR

Serial Number:	25W: CR21100111-RF-S2	Test Date:	2021-12-03
Test Site:	RF	Test Mode:	Transmitting
Tester:	Rinka Li	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	25.5	Relative Humidity: (%)	45	ATM Pressure: (kPa)	101.7
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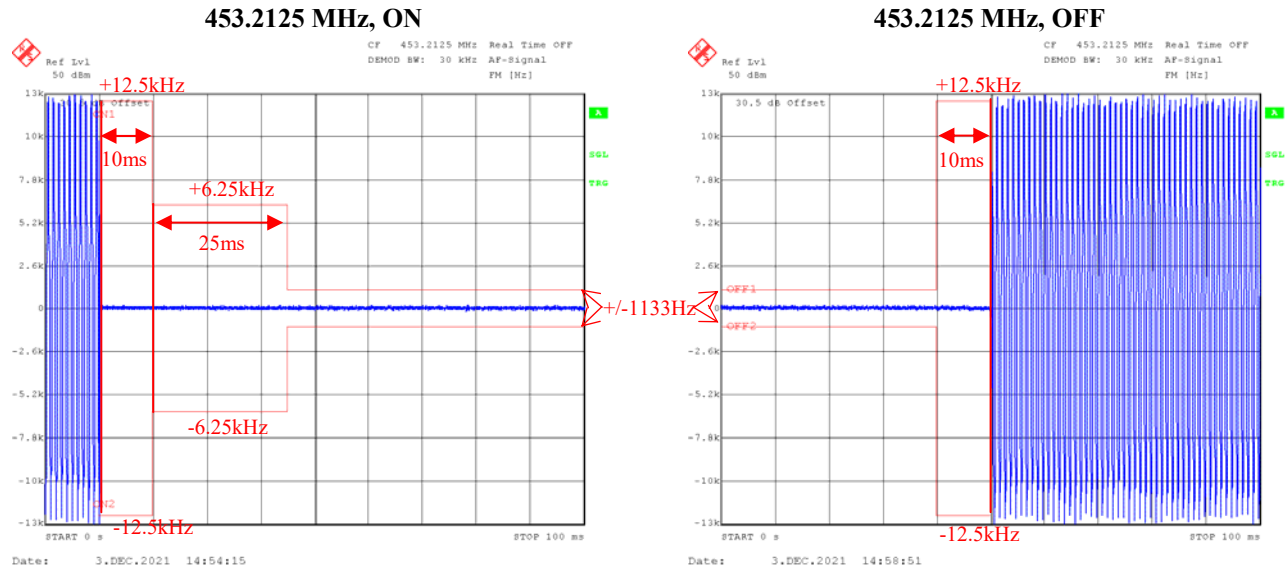
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Signal Analyzer	FSIQ26	831929/006	2021-07-22	2022-07-21
YINSAIGE	Coaxial Cable	LMR300	NJ0100001	2021-08-08	2022-08-07
YINSAIGE	Coaxial Cable	LMR300	NJ0100002	2021-08-08	2022-08-07
Weinschel	Coaxial Attenuators	53-20-34	LN751	2021-08-08	2022-08-07
BACL	TEMP&HUMI Test Chamber	BTH-150	30026	2021-07-22	2022-07-21
UNI-T	Multimeter	UT39A+	C210582554	2021-09-30	2022-09-29
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A
HP	RF Communications Test Set	8920A	3438A05209	2021-07-22	2022-07-21

* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

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	



Note:

Per TIA-603-E, the signal trace shall be maintained within the allowable limits following t_2 & t_3 , and the allowable limits refer to Part 90.213, so:

$$\text{allowable limit} = f_c \cdot 2.5\text{ppm} = 453.2125 \text{ MHz} \cdot 2.5\text{ppm} = 1133 \text{ Hz};$$

5. RF EXPOSURE EVALUATION

5.1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

5.1.1 Applicable Standard

According to 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for Maximum Permissible Exposure (MPE)

Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3- 3.0	614	1.63	(100)*	6
3.0 - 30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6

f = frequency in MHz;

* = Plane-wave equivalent power density;

5.1.2 MPE Calculation

Prediction of power density at the distance of the applicable MPE limit

$$S = PG/4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

5.1.3 Calculated Result

Frequency (MHz)	Maximum Allowable Antenna Gain (dBi)	Cable Loss (dB)	Maximum output power including Tune-up Tolerance (dBm)	Operation Duty Cycle (%)	Evaluation Distance (cm)	Power Density (mW/cm ²)	Power Density Limit (mW/cm ²)
400-470	10	1	44.77	50	86	1.285	1.333

Result: Device meet MPE requirement at 86 cm distance away from Antenna.

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