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CERTIFICATE # 4821.01

BACL
Bay Area Compliance Labs Corp.

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: YAMHM78XVHF

Report Type:	Product Type:
Original Report	DIGITAL MOBIL RADIO

Report Number:	RDG200119002-00C
Report Date:	2020-05-20
Reviewed By:	Jimmy Xiao RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	DIGITAL MOBIL RADIO
Tested Model	HM782 VHF
Multiple Models	HM780 VHF,HM786 VHF,HM788 VHF,HM785 VHF
Model Differences	Refer to the DOS letter
Frequency Range	136-174MHz
Rated Output Power (Conducetd)	High Power Level:50W Low Power Level:5W
Modulation Technique	FM, FSK
Antenna Specification	3.5dBi
Voltage Range	DC 13.6V
Date of Test	2020-03-17 to 2020-05-20
Sample serial number	RDG200119002-RF-S1 (Assigned by BACL, Shenzhen)
Received date	2020-01-19
Sample/EUT Status	Good condition

Objective

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS submissions with FCC ID: YAMHM78XVHF.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 22 – Public Mobile Service
Part 74 – Experimental Radio, Auxiliary, Special Broadcast and other Program Distributonal Service
Part 80 – Stations in the Maritime Services
Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA 603-D.

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

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		±1.5dB
Unwanted Emission, conducted		±1.5dB
Emissions, radiated	Below 1GHz	±4.70dB
	Above 1GHz	±4.80dB
Temperature		±1℃
Supply voltages		±0.4%

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

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

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.

Support Equipment List and Details

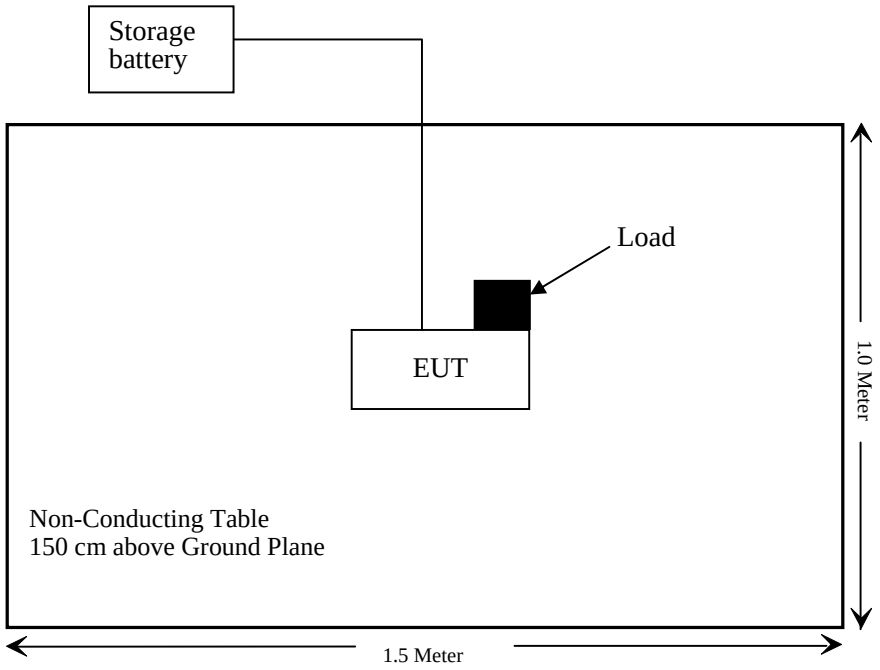
Manufacturer	Description	Model	Serial Number
BACL	Load	50 Ohm/100W	890125
Panosonic	Storage battery	G9N-21248	A372093NS

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielding Detachable DC Cable	3.0	EUT	Storage battery

Block Diagram of Test Setup

For Radiation emission



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§2.1046; § 22.727; §74.461; § 80.215; §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 Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2019/7/9	2020/7/8
Sonoma instrument	Pre-amplifier	310 N	186238	2019/4/20	2020/4/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
COM-POWER	Dipole Antenna	AD-100	721027	NCR	NCR
Unknown	Cable 2	RF Cable 2	Unknown	2019/11/28	2020/11/28
Unknown	Cable	Chamber Cable 1	Unknown	2019/11/29	2020/11/28
Unknown	Cable	Chamber Cable 4	EC-007	2019/11/29	2020/11/28
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2019/7/22	2020/07/21
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/28	2020/11/28
COM-POWER	Amplifier	QLW-18405536-J0	15964001002	2019/11/28	2020/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
A.H.System	Horn Antenna	SAS-200/571	135	2018/9/1	2021/8/31
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/28	2020/11/28
Unknown	RF Cable	W1101-EQ1 OUT	Unknown	2019/11/29	2020/11/28
Unknown	Signal Cable	RG-214	2	2019/11/29	2020/11/28
Agilent	Signal Generator	N5183A	MY51040755	2019/12/4	2020/12/4
Unknown	Band Pass Filter	NHP-250	2018002	2019/11/29	2020/11/28
RF Conducted Test					
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2020/3/2	2021/3/1
Unknown	RF Cable	Unknown	2301 276	2019/11/29	2020/11/28
HP Agilent	RF Communication test set	8920A	3325UC0859	2019/7/9	2020/7/8
Unknown	30dB Attenuator	50FH-030-100 RF	1.7000672E11	2019/11/29	2020/11/28
Unknown	Band Pass Filter	NHP-250	2018002	2019/11/29	2020/11/28
Yijia	Temperature & Humidity Meter	10316377	T-03-EM397	2019/10/14	2020/10/13
instek	DC Power Supply	GPS-3030DD	EM832096	NCR	NCR
Fluke	Digital Multimeter	287	19000011	2019/04/12	2020/04/12

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

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:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Chen on 2020-03-19.

Test Mode: Transmitting

Test Result: Compliance. Please refer to following table.

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power Level	Output Power (dBm)	Output Power (W)	Remark
Analog	12.5	136.025	High	47.15	51.88	For Federal
			Low	37.12	5.15	
	12.5	151.025	High	47.09	51.17	For Part 22
			Low	37.19	5.24	
	12.5	155.7525	High	47.07	50.93	For Part 90
			Low	37.21	5.26	
	12.5	153.025	High	47.04	50.58	For Part 74
			Low	37.22	5.27	
	12.5	173.975	High	47.23	52.84	For Federal
			Low	37.25	5.31	
	25	136.025	High	47.13	51.64	For Federal
			Low	37.08	5.11	
	25	151.025	High	47.13	51.64	For Part 22
			Low	37.11	5.14	
	25	153.025	High	47.04	50.58	For Part 74
			Low	37.16	5.20	
	25	155.7525	High	47.01	50.23	For Part 80
			Low	37.14	5.18	
	25	173.975	High	47.15	51.88	For Federal
			Low	37.18	5.22	
Digital	12.5	136.025	High	47.14	51.76	For Federal
			Low	37.04	5.06	
	12.5	151.025	High	47.07	50.93	For Part 22
			Low	37.12	5.15	
	12.5	155.7525	High	47.00	50.12	For Part 90
			Low	37.15	5.19	
	12.5	153.025	High	47.05	50.70	For Part 74
			Low	37.14	5.18	
	12.5	173.975	High	47.22	52.72	For Federal
			Low	37.20	5.25	

Rated high power is 50W, limit is 40-60W
Rated low power is 5W, limit is 4-6W

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/EIA-603 2.2.3

Test Data

Environmental Conditions

Temperature:	25℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Chen on 2020-03-19.

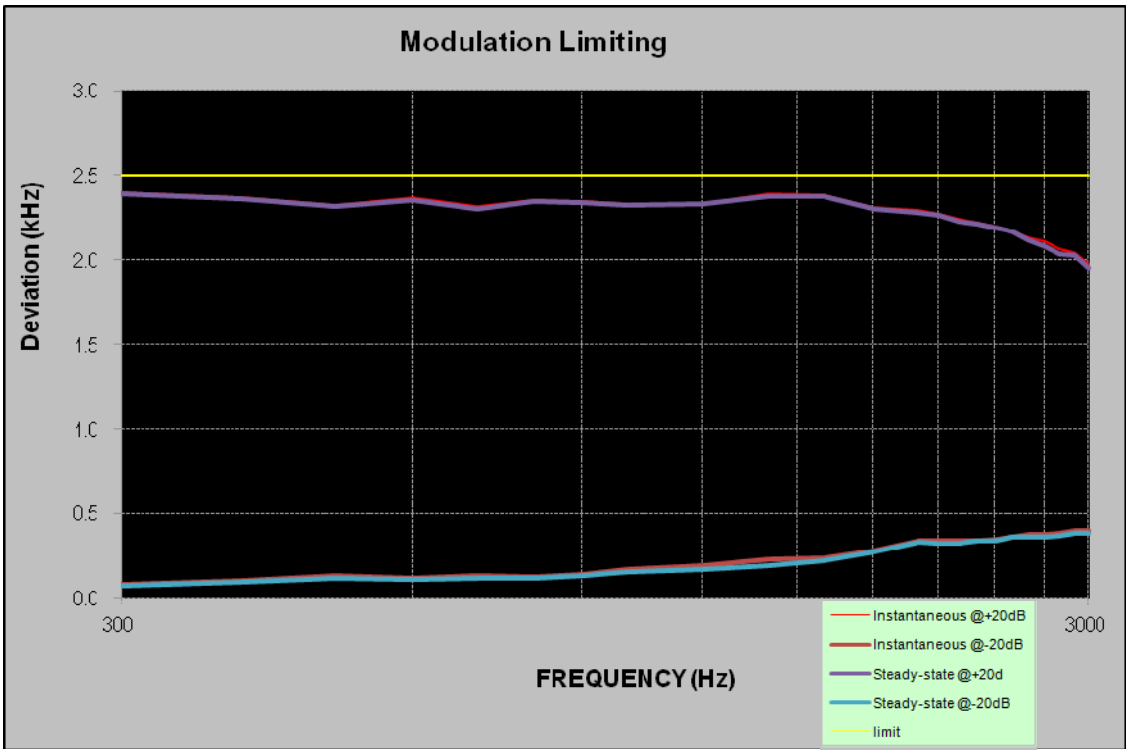
Test Mode: Transmitting

Result: Compliance.

MODULATION LIMITING

Carrier Frequency: 155.7525 MHz, Channel Separation=12.5 kHz

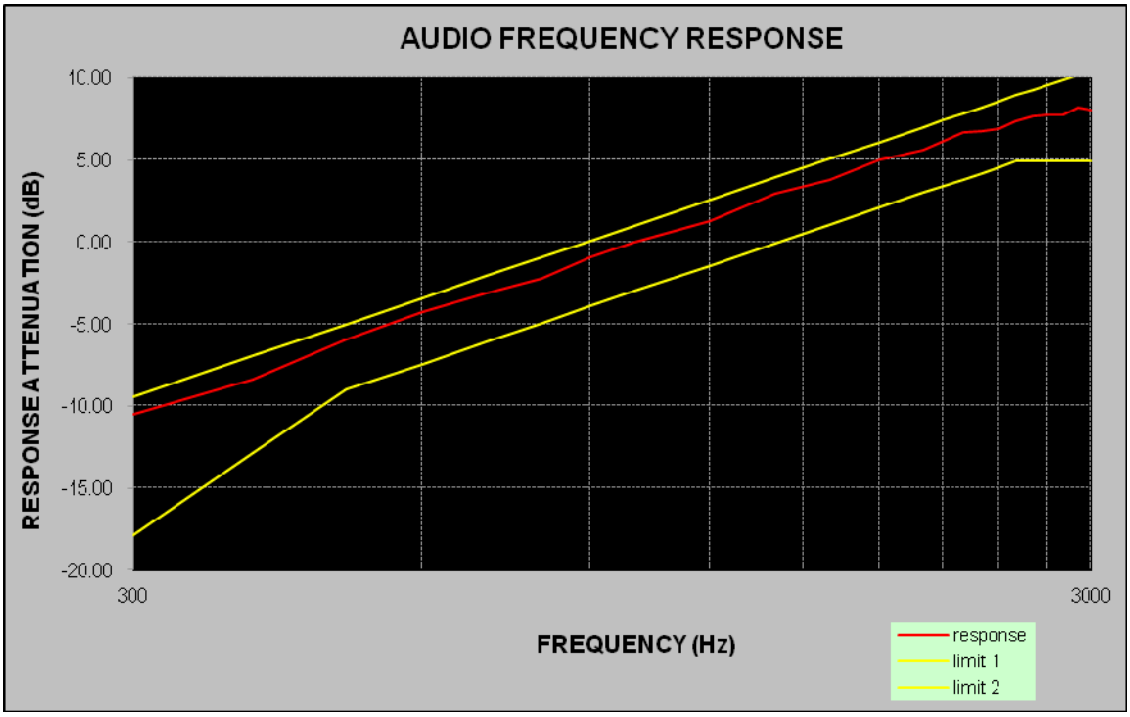
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	2.395	0.083	2.386	0.078	2.500
400	2.366	0.108	2.358	0.101	2.500
500	2.321	0.136	2.315	0.124	2.500
600	2.365	0.122	2.356	0.114	2.500
700	2.316	0.135	2.302	0.125	2.500
800	2.354	0.131	2.348	0.125	2.500
900	2.347	0.140	2.336	0.134	2.500
1000	2.329	0.171	2.325	0.157	2.500
1200	2.331	0.192	2.328	0.175	2.500
1400	2.386	0.233	2.377	0.197	2.500
1600	2.382	0.241	2.375	0.223	2.500
1800	2.311	0.284	2.302	0.275	2.500
2000	2.296	0.341	2.279	0.338	2.500
2100	2.270	0.343	2.265	0.331	2.500
2200	2.245	0.339	2.228	0.329	2.500
2300	2.222	0.343	2.215	0.339	2.500
2400	2.201	0.350	2.192	0.342	2.500
2500	2.171	0.367	2.168	0.361	2.500
2600	2.132	0.382	2.118	0.367	2.500
2700	2.109	0.381	2.079	0.364	2.500
2800	2.063	0.386	2.038	0.375	2.500
2900	2.046	0.400	2.032	0.387	2.500
3000	1.977	0.398	1.958	0.389	2.500


Modulation Limiting
Deviation (kHz)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
300
3000
FREQUENCY (Hz)
Instantaneous @+20dB
Instantaneous @-20dB
Steady-state @+20d
Steady-state @-20dB
limit

Audio Frequency Response

Carrier Frequency: 155.7525 MHz, Channel Separation=12.5 kHz

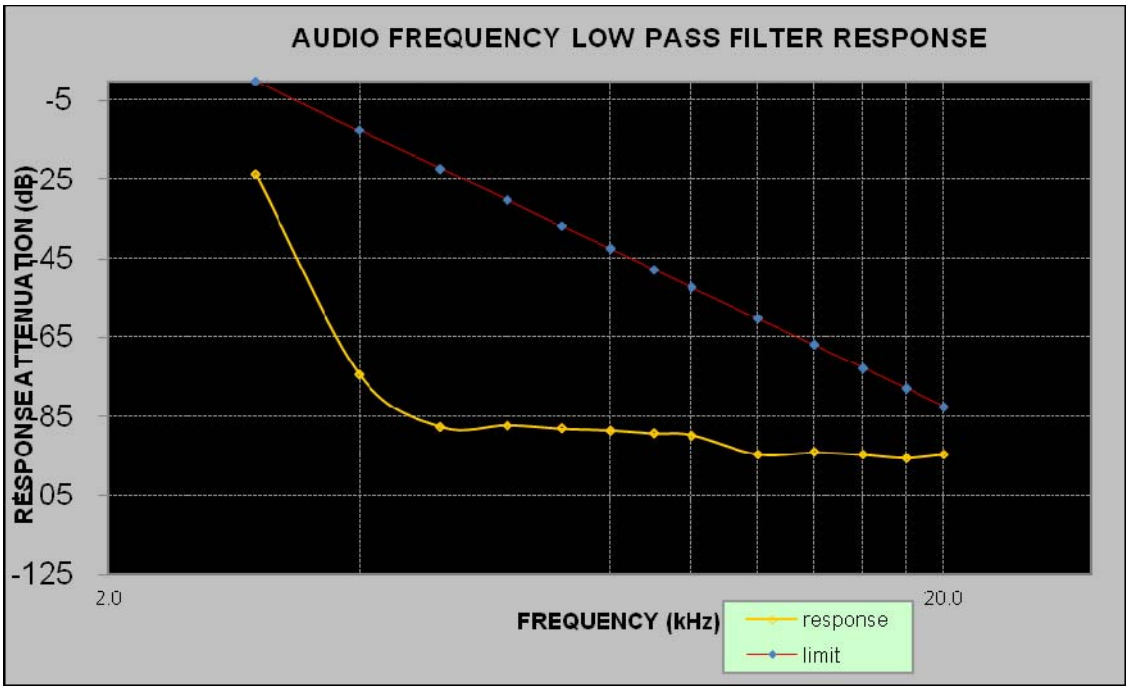
Audio Frequency (Hz)	Response Attenuation (dB)
300	-10.52
400	-8.40
500	-5.92
600	-4.26
700	-3.12
800	-2.20
900	-0.95
1000	0.00
1200	1.29
1400	2.95
1600	3.83
1800	5.02
2000	5.63
2100	6.15
2200	6.66
2300	6.78
2400	6.93
2500	7.34
2600	7.71
2700	7.75
2800	7.78
2900	8.18
3000	8.03


AUDIO FREQUENCY RESPONSE
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
RESPONSE ATTENUATION (dB)
300
3000
FREQUENCY (Hz)
response
limit 1
limit 2

Audio frequency lows pass filter response

Carrier Frequency: 155.7525 MHz, Channel Separation=12.5 kHz

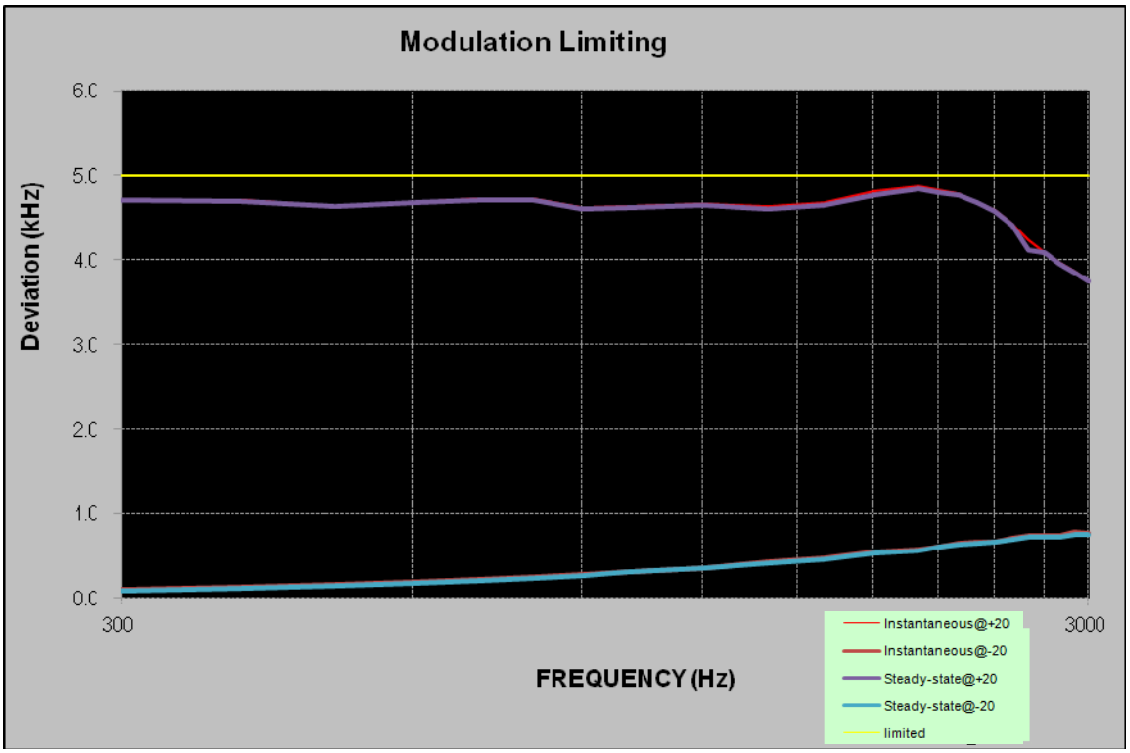
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-23.5	0.0
4.0	-74.5	-12.5
5.0	-87.6	-22.2
6.0	-87.2	-30.1
7.0	-88.1	-36.8
8.0	-88.5	-42.6
9.0	-89.3	-47.7
10.0	-89.7	-52.3
12.0	-94.6	-60.2
14.0	-94.1	-66.9
16.0	-94.7	-72.7
18.0	-95.5	-77.8
20.0	-94.6	-82.5



MODULATION LIMITING

Carrier Frequency: 155.7525 MHz, Channel Separation=25 kHz

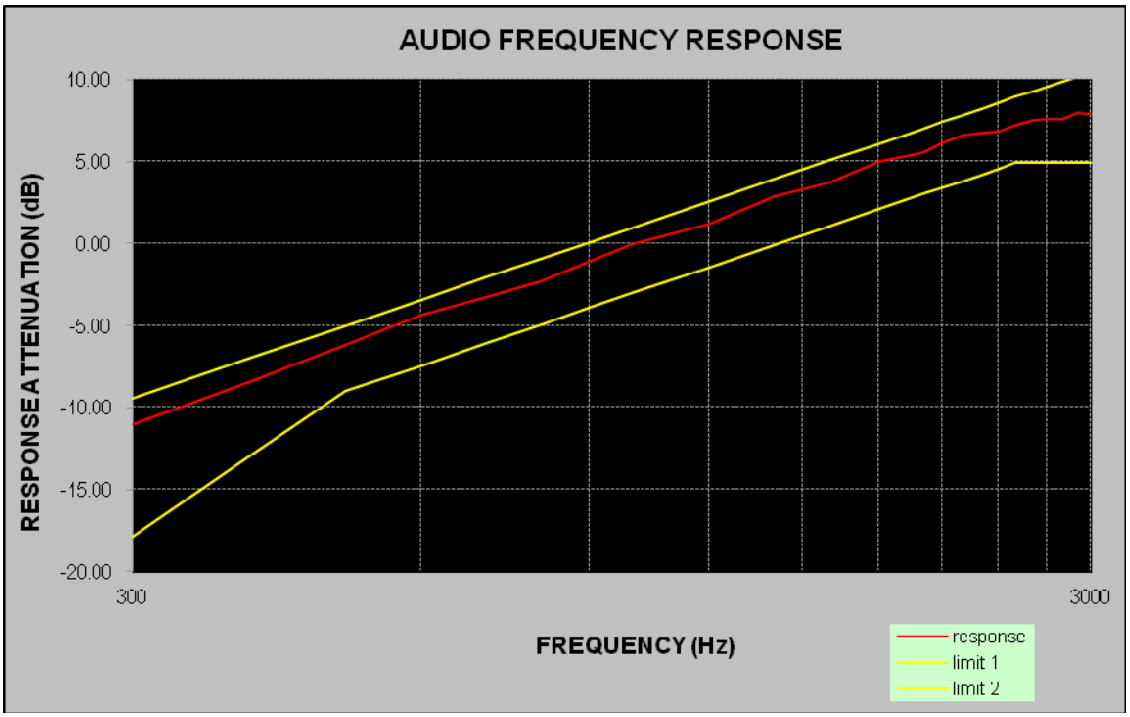
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	4.711	0.105	4.698	0.097	5
400	4.702	0.135	4.690	0.122	5
500	4.631	0.171	4.637	0.159	5
600	4.681	0.203	4.676	0.189	5
700	4.719	0.223	4.703	0.208	5
800	4.723	0.251	4.711	0.246	5
900	4.616	0.282	4.606	0.271	5
1000	4.627	0.320	4.615	0.313	5
1200	4.658	0.361	4.651	0.355	5
1400	4.632	0.435	4.605	0.418	5
1600	4.679	0.475	4.650	0.471	5
1800	4.804	0.547	4.771	0.540	5
2000	4.861	0.579	4.835	0.571	5
2100	4.821	0.617	4.800	0.612	5
2200	4.775	0.651	4.761	0.642	5
2300	4.682	0.666	4.669	0.653	5
2400	4.581	0.677	4.577	0.671	5
2500	4.429	0.713	4.411	0.706	5
2600	4.234	0.740	4.115	0.729	5
2700	4.094	0.741	4.086	0.730	5
2800	3.968	0.745	3.961	0.728	5
2900	3.862	0.782	3.858	0.764	5
3000	3.752	0.772	3.743	0.756	5


Modulation Limiting
Deviation (kHz)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
300
3000
FREQUENCY (Hz)
Instantaneous@+20
Instantaneous@-20
Steady-state@+20
Steady-state@-20
limited

Audio Frequency Response

Carrier Frequency: 155.7525 MHz, Channel Separation=25 kHz

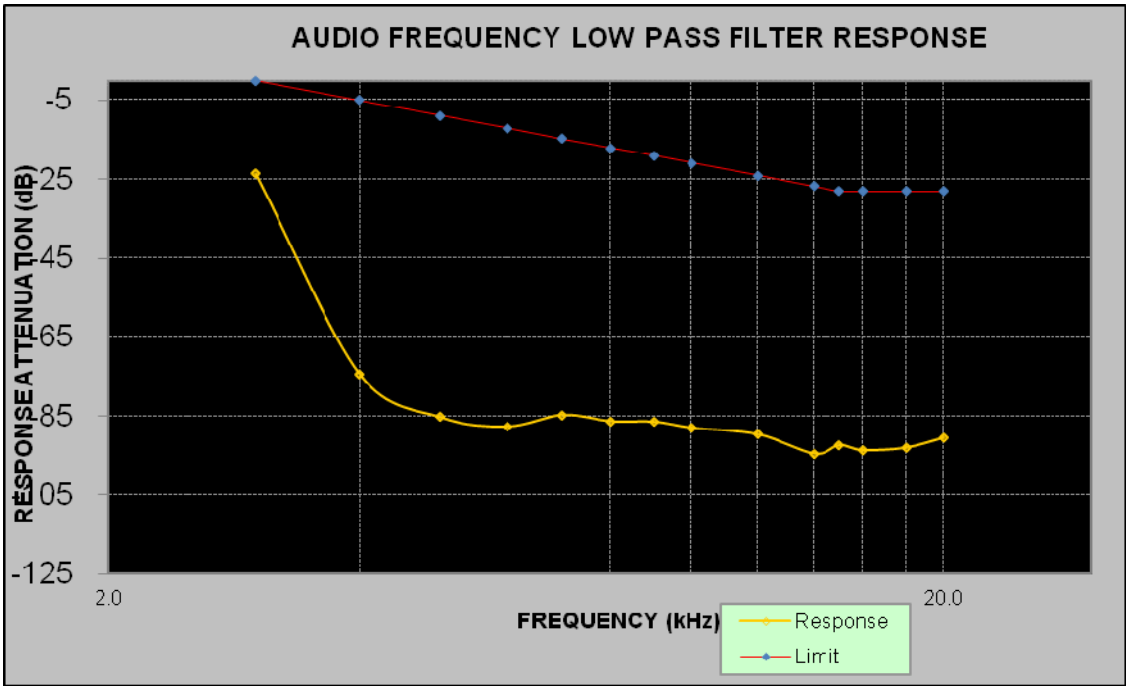
Audio Frequency (Hz)	Response Attenuation (dB)
300	-11.06
400	-8.40
500	-6.18
600	-4.36
700	-3.31
800	-2.30
900	-1.10
1000	0.00
1200	1.23
1400	2.89
1600	3.69
1800	5.01
2000	5.53
2100	6.14
2200	6.59
2300	6.73
2400	6.83
2500	7.25
2600	7.56
2700	7.57
2800	7.59
2900	7.97
3000	7.90


AUDIO FREQUENCY RESPONSE
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
RESPONSE ATTENUATION (dB)
300
3000
FREQUENCY (Hz)
response
limit 1
limit 2

Audio frequency lows pass filter response

Carrier Frequency: 155.7525 MHz, Channel Separation=25 kHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-23.5	0.0
4.0	-74.5	-5.0
5.0	-85.3	-8.9
6.0	-87.6	-12.0
7.0	-84.6	-14.7
8.0	-86.3	-17.0
9.0	-86.3	-19.1
10.0	-87.9	-20.9
15.0	-89.6	-24.1
20.0	-94.5	-26.8
30.0	-92.3	-28.0
40.0	-93.6	-28.0
50.0	-93.0	-28.0



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

Emission Mask D - 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0, 0dB.

2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 (f_d –2.88 kHz) dB.

3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz at least: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 30 kHz or more. In the 60 kHz bands immediately outside and adjacent to the authorized frequency range or channel, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 30 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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 and the spectrum was recorded in the frequency band ±50 kHz from the carrier frequency.

Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Chen on 2020-05-14.

Test mode: transimitting

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power Level	99% Occupied Bandwidth (kHz)	26 dB Emissions Bandwidth (kHz)	Remark
Analog Analog	12.5	151.025	L	9.936	10.337	For Part 22
	12.5		H	10.016	10.337	
	12.5	153.025	L	9.936	10.337	For Part 74
	12.5		H	10.016	10.337	
	12.5	155.7525	L	10.016	10.337	For Part 90
	12.5		H	10.016	10.337	
	25	151.025	L	14.984	15.785	For Part 22
	25		H	14.984	15.785	
	25	153.025	L	15.064	15.705	For Part 74
	25		H	15.064	15.705	
	25	155.7525	L	14.984	15.785	For Part 80
	25		H	15.064	15.705	
Digital	12.5	151.025	L	7.051	8.654	For Part 22
	12.5		H	7.292	9.455	
	12.5	153.025	L	7.131	9.295	For Part 74
	12.5		H	7.131	9.375	
	12.5	155.7525	L	7.372	8.974	For Part 90
	12.5		H	7.532	9.375	

Note: Emission designator is base on calculation instead of measurement.

Emission Designator Per CFR 47 §2.201& §2.202&, Bn = 2M + 2D

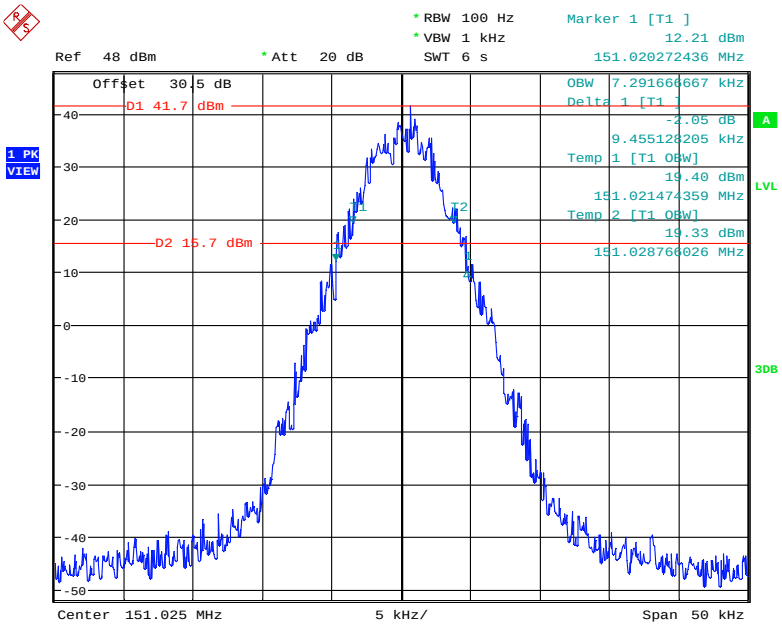
For FM Mode (Channel Spacing: 12.5 kHz)
Emission Designator 11K0F3E
In this case, the maximum modulationg frequency is 3.0kHz with a 2.5kHz deviation.
BW=2(M+D)= 2*(3.0kHz+2.5kHz)=11K0*
F3E portion of the designator indicates FM voice information.
Therefore, the entire designator for 12.5kHz channel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

For FM Mode (Channel Spacing: 25 kHz)
Emission Designator 16K0F3E
In this case, the maximum modulationg frequency is 3.0kHz with a 5kHz deviation.
BW=2(M+D)= 2*(3.0kHz+5.0kHz)=16K0*
F3E portion of the designator indicates FM voice information.
Therefore, the entire designator for 25kHz channel spacing FM modes 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, 7.417 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.

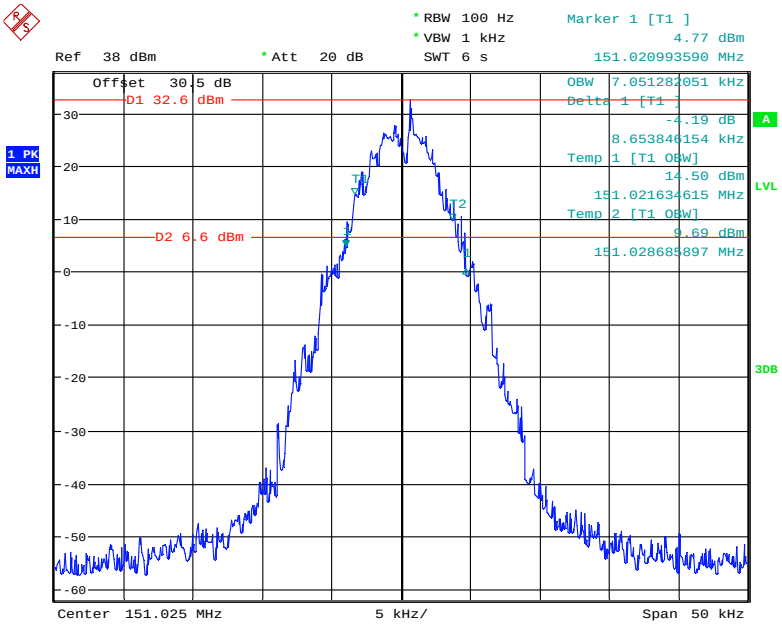
Digital Modulation:

Frequency 151.025 MHz: 99% Occupied & 26 dB Bandwidth, High Power



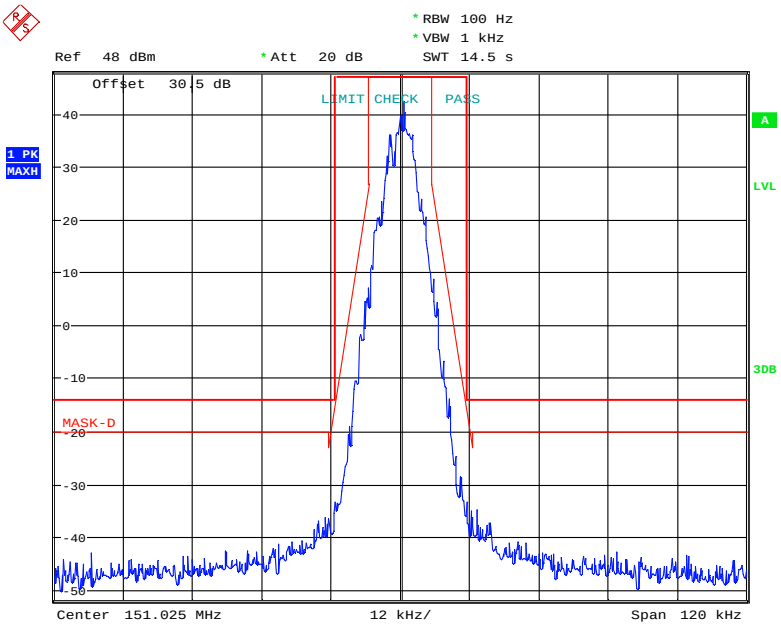
Date: 14.MAY.2020 20:01:08

Frequency 151.025 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



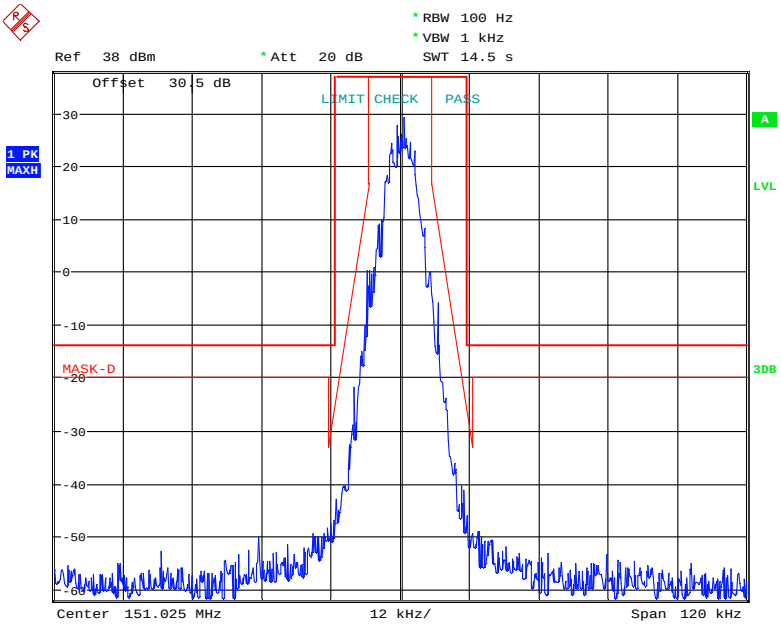
Date: 14.MAY.2020 20:03:00

Frequency 151.025 MHz: Emission Mask, High Power



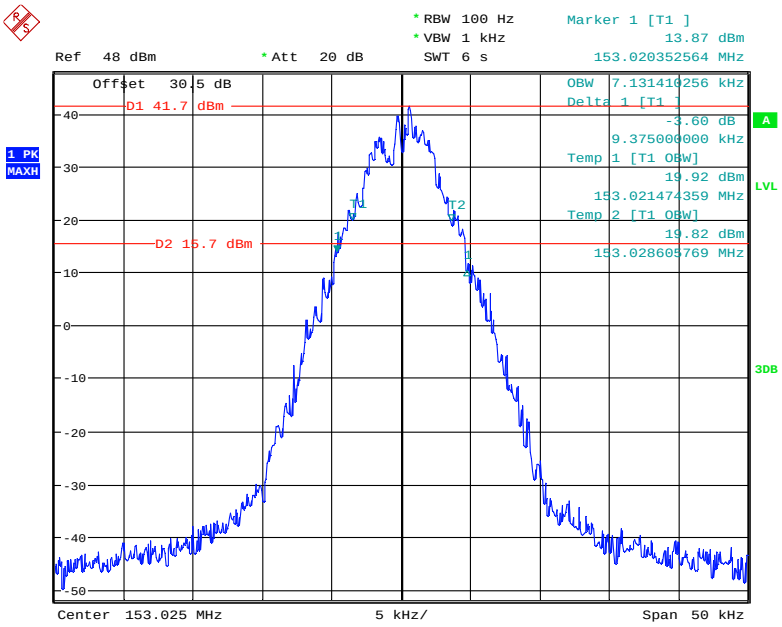
Date: 14.MAY.2020 19:50:28

Frequency 151.025 MHz: Emission Mask, Low Power



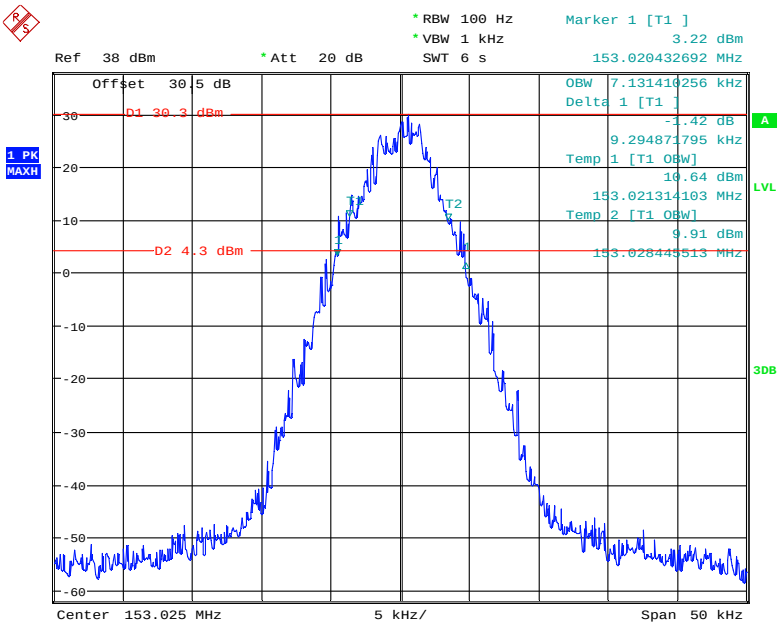
Date: 14.MAY.2020 19:45:55

Frequency 153.025 MHz: 99% Occupied & 26 dB Bandwidth, High Power



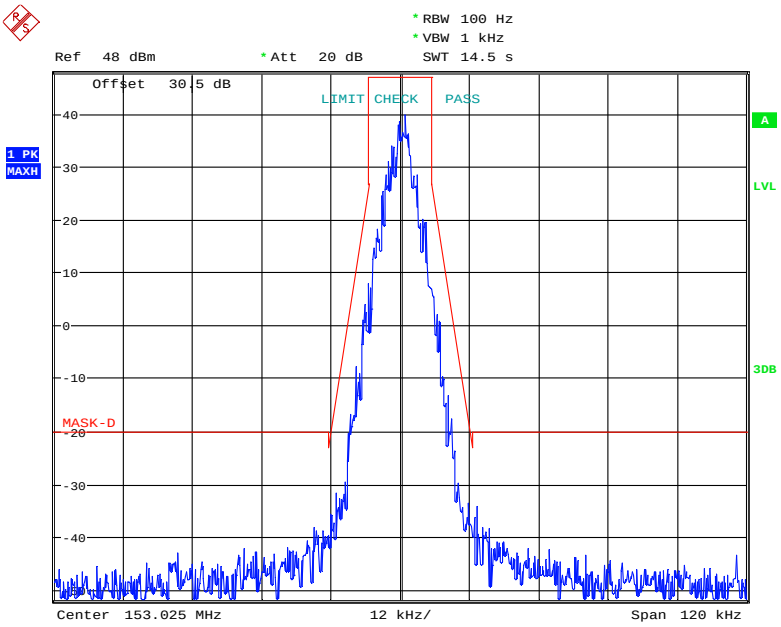
Date: 14.MAY.2020 20:07:23

Frequency 153.025 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



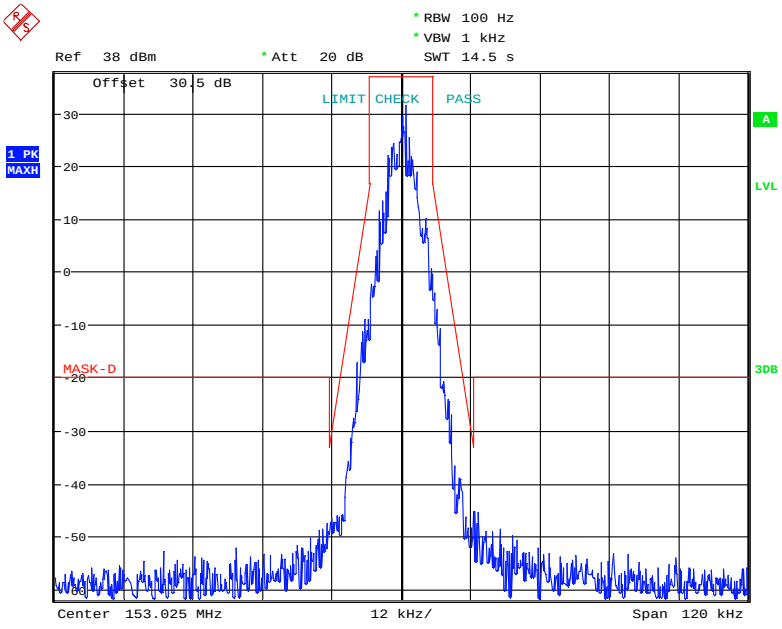
Date: 14.MAY.2020 20:05:00

Frequency 153.025 MHz MHz: Emission Mask D, High Power



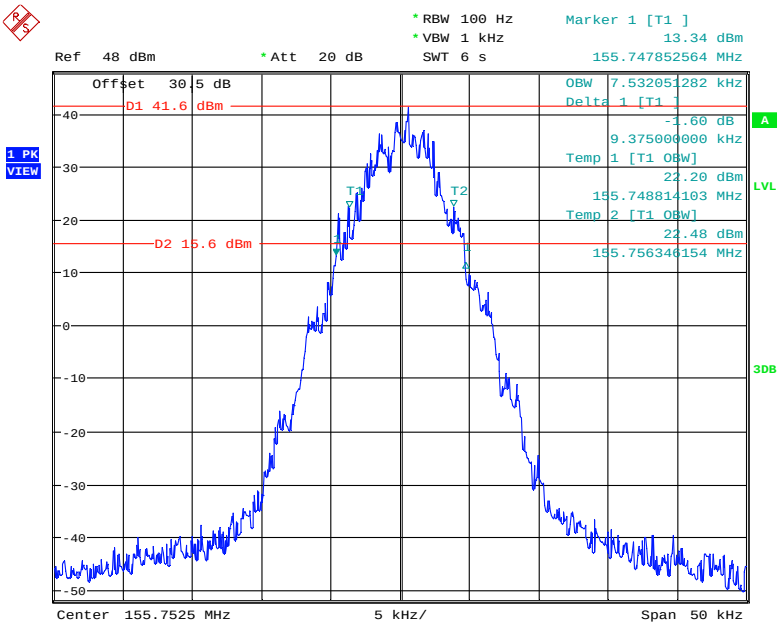
Date: 14.MAY.2020 19:42:49

Frequency 153.025 MHz MHz: Emission Mask D, Low Power



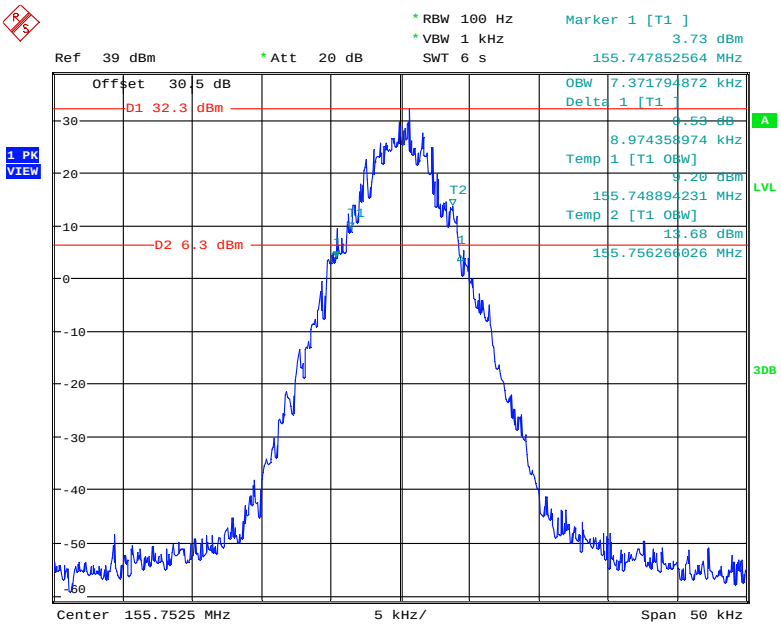
Date: 14.MAY.2020 19:44:28

Frequency 155.7525 MHz: 99% Occupied & 26 dB Bandwidth, High Power



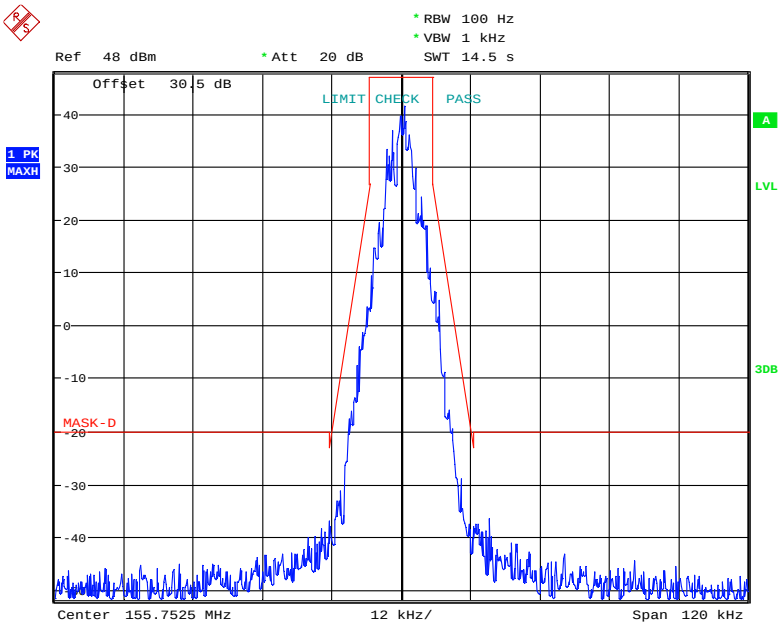
Date: 14.MAY.2020 19:59:14

Frequency 155.7525 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



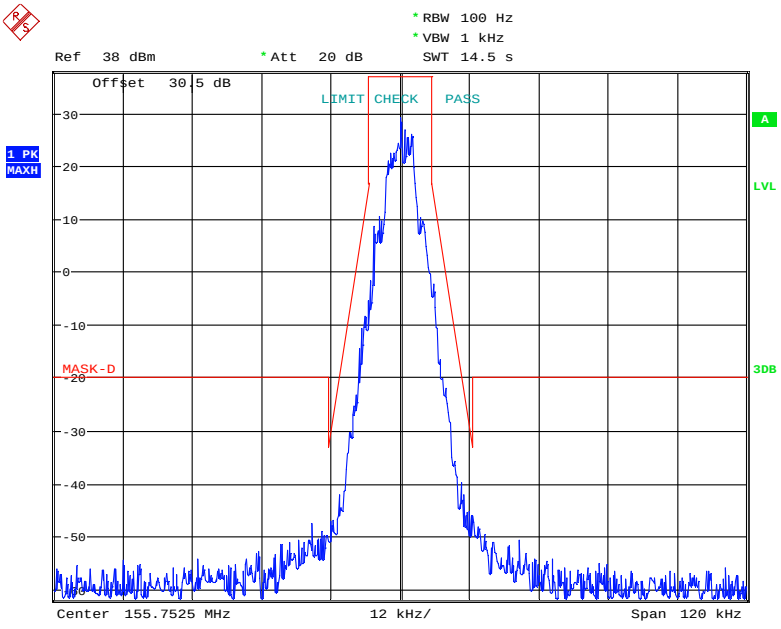
Date: 14.MAY.2020 19:56:59

Frequency 155.7525 MHz: Emission Mask D, High Power



Date: 14.MAY.2020 19:52:13

Frequency 155.7525 MHz: Emission Mask D, Low Power

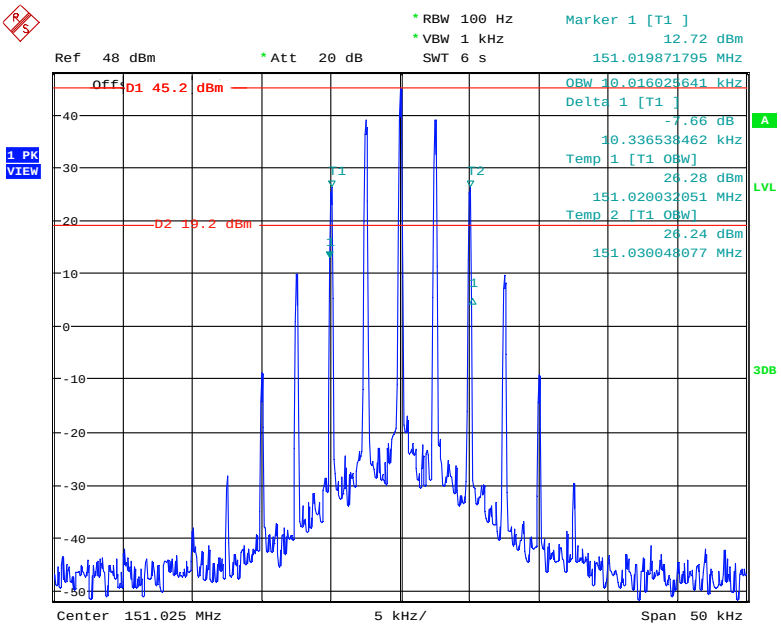


Date: 14.MAY.2020 19:53:44

Analog Modulation:

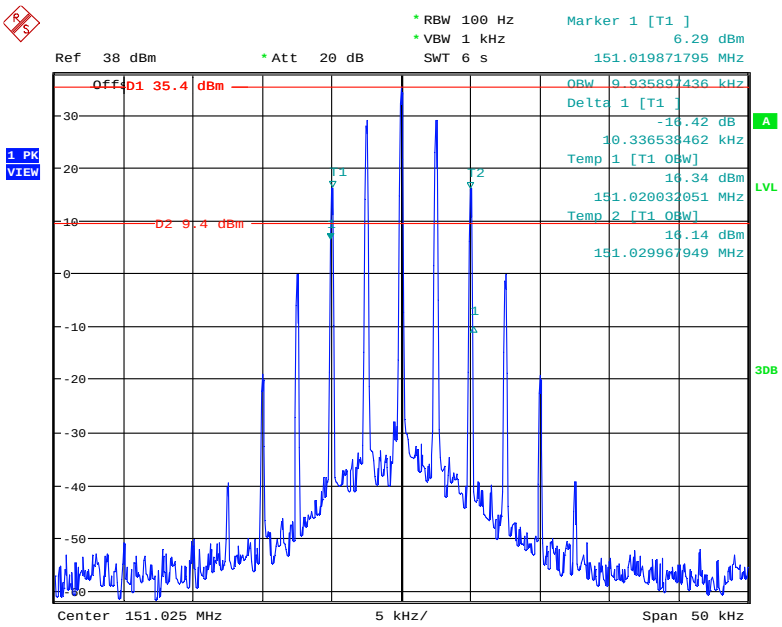
12.5k

Frequency 151.025 MHz: 99% Occupied & 26 dB Bandwidth, High Power



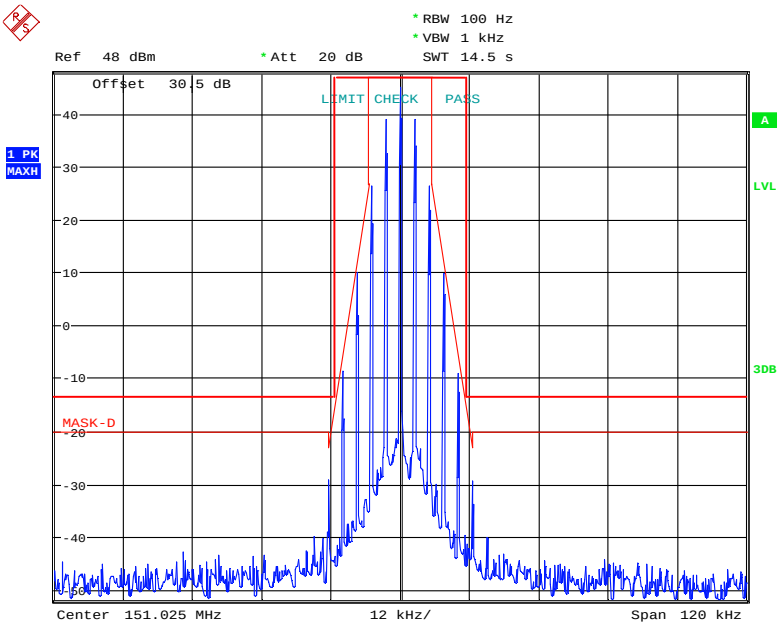
Date: 14.MAY.2020 19:21:41

Frequency 151.025 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



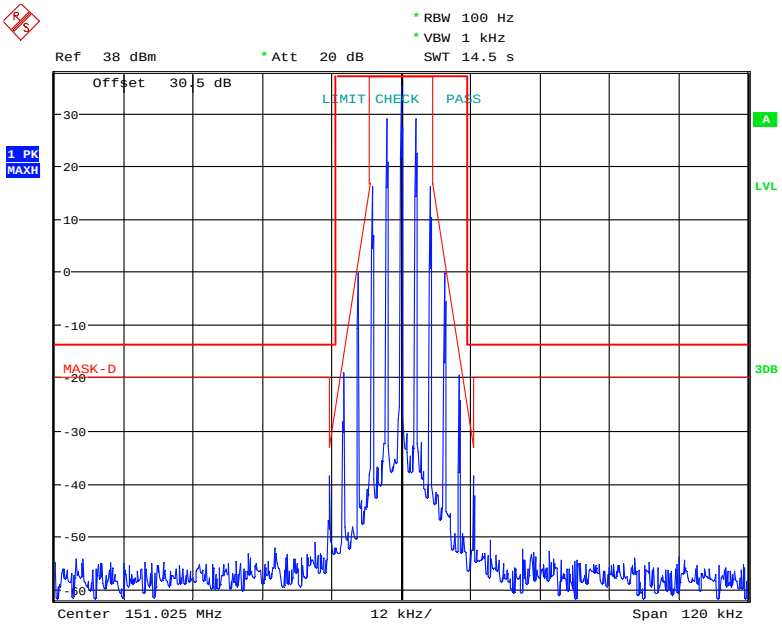
Date: 14.MAY.2020 19:22:39

Frequency 151.025 MHz: Emission Mask, High Power



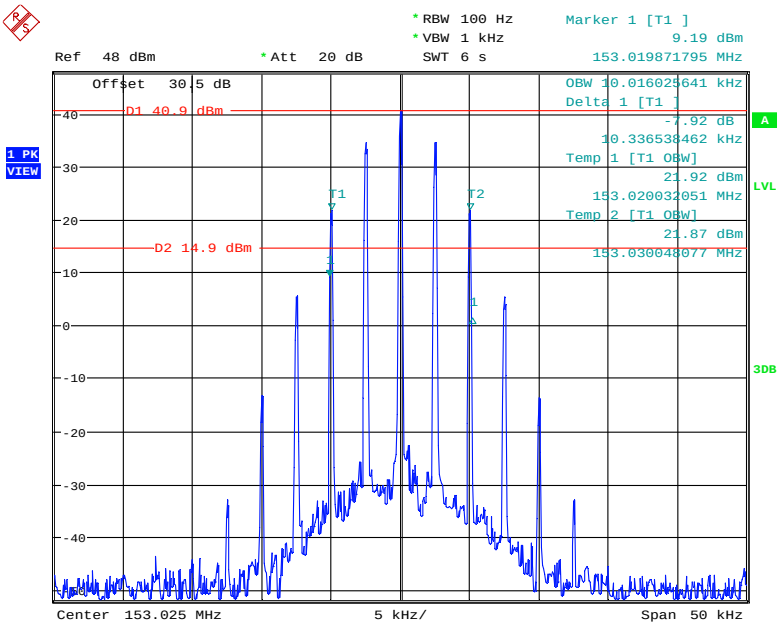
Date: 14.MAY.2020 19:19:55

Frequency 151.025 MHz: Emission Mask, Low Power



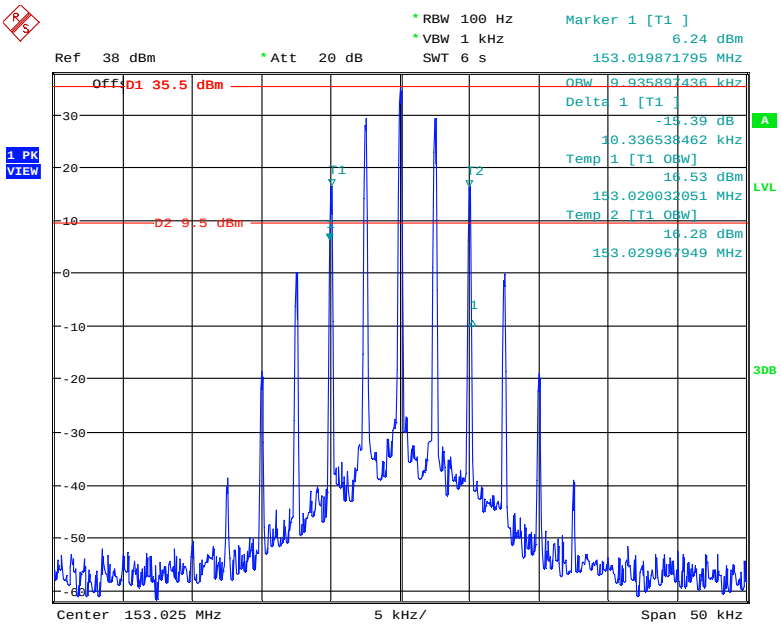
Date: 14.MAY.2020 19:23:55

Frequency 153.025 MHz: 99% Occupied & 26 dB Bandwidth, High Power



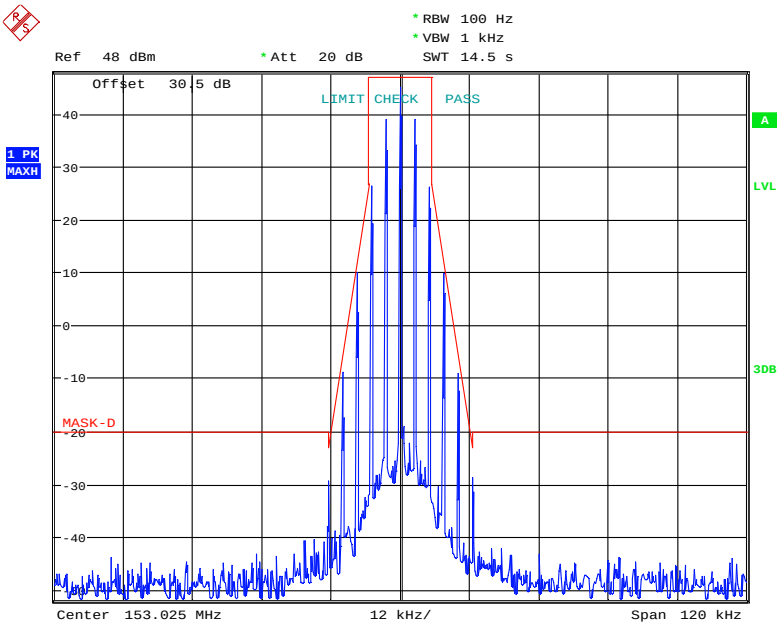
Date: 14.MAY.2020 19:14:33

Frequency 153.025 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



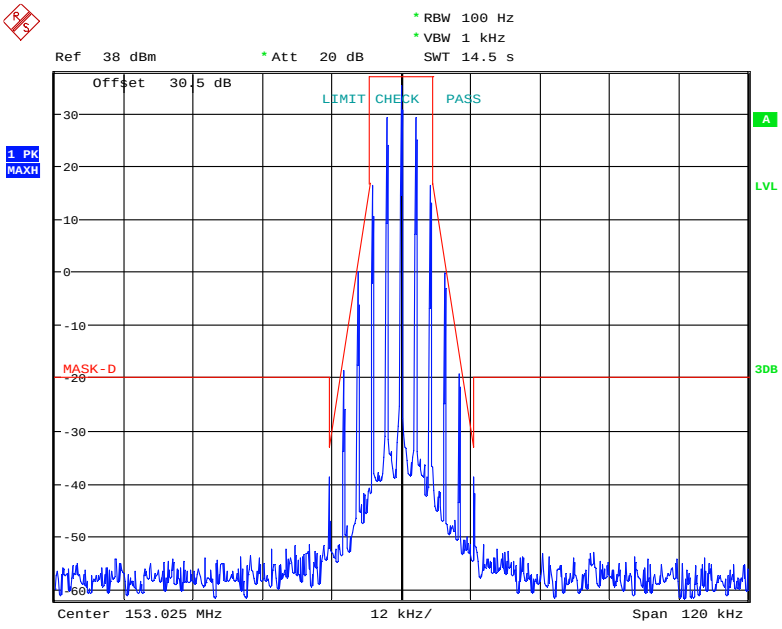
Date: 14.MAY.2020 19:15:37

Frequency 153.025 MHz MHz: Emission Mask D, High Power



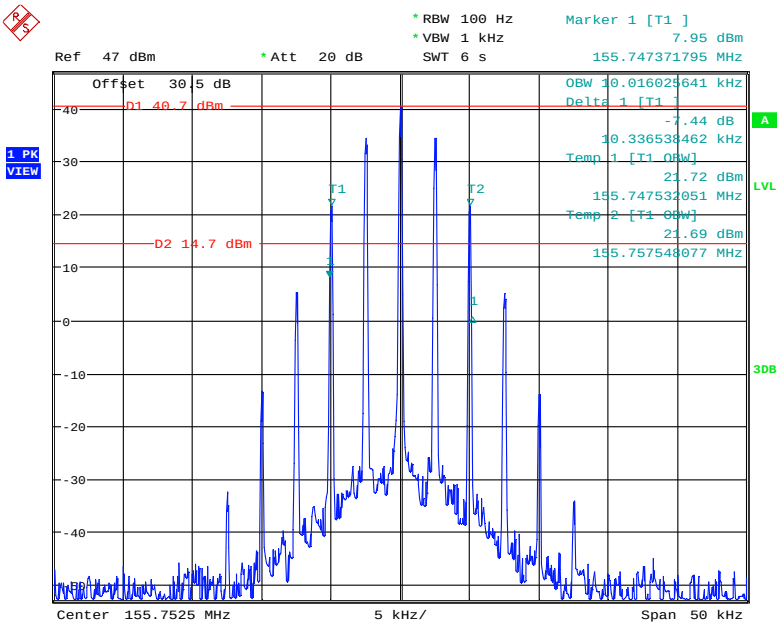
Date: 14.MAY.2020 19:18:21

Frequency 153.025 MHz MHz: Emission Mask D, Low Power



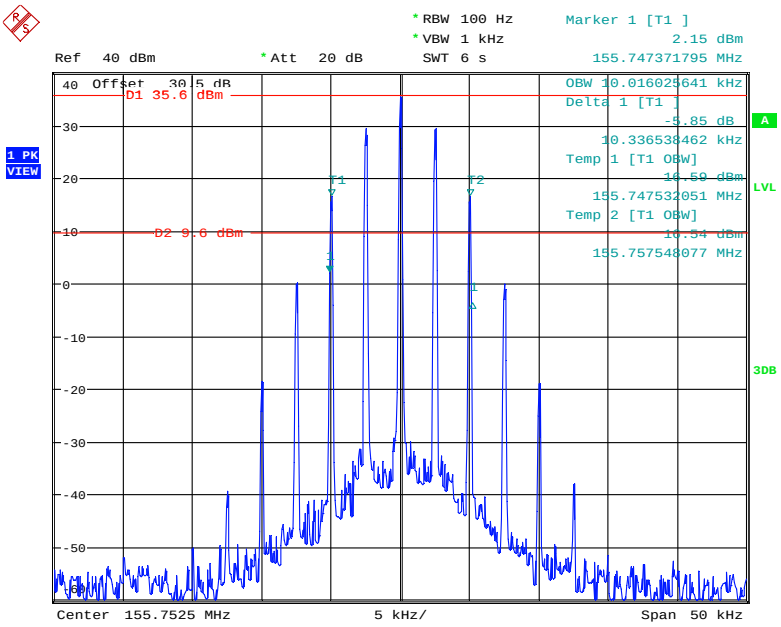
Date: 14.MAY.2020 19:16:55

Frequency 155.7525 MHz: 99% Occupied & 26 dB Bandwidth, High Power



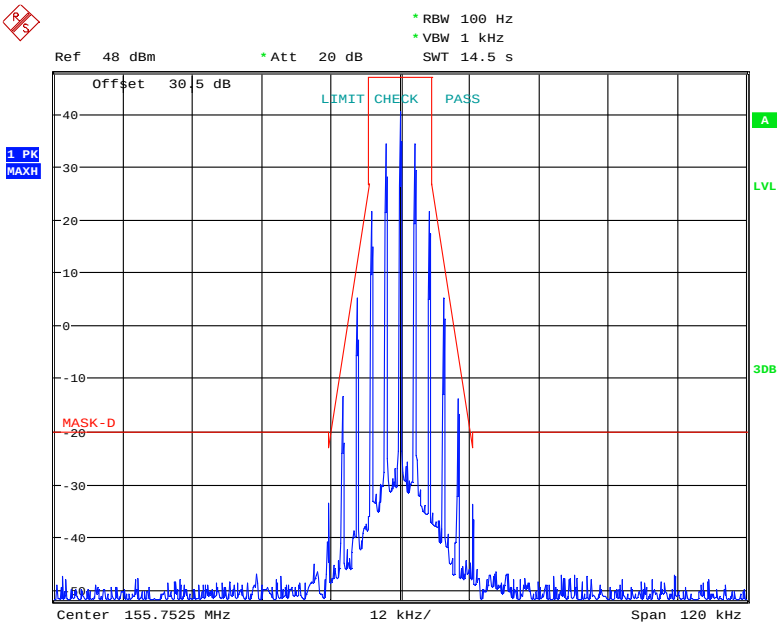
Date: 14.MAY.2020 19:08:30

Frequency 155.7525 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



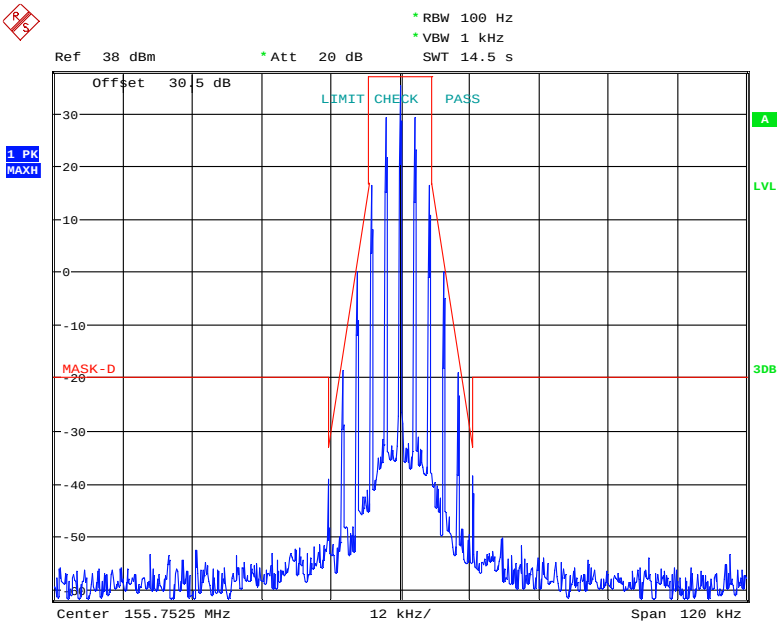
Date: 14.MAY.2020 19:07:00

Frequency 155.7525 MHz: Emission Mask D, High Power



Date: 14.MAY.2020 19:11:28

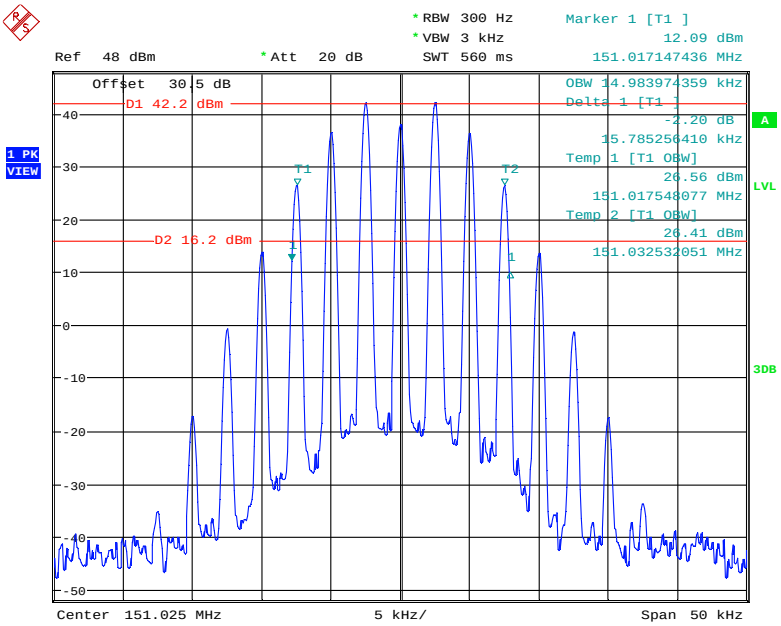
Frequency 155.7525 MHz: Emission Mask D, Low Power



Date: 14.MAY.2020 19:12:43

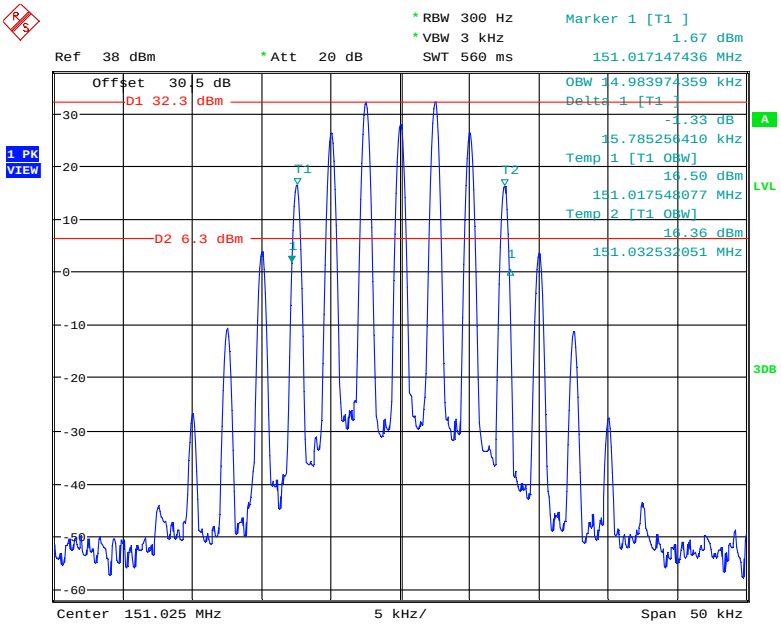
25k

Frequency 151.025 MHz: 99% Occupied & 26 dB Bandwidth, High Power



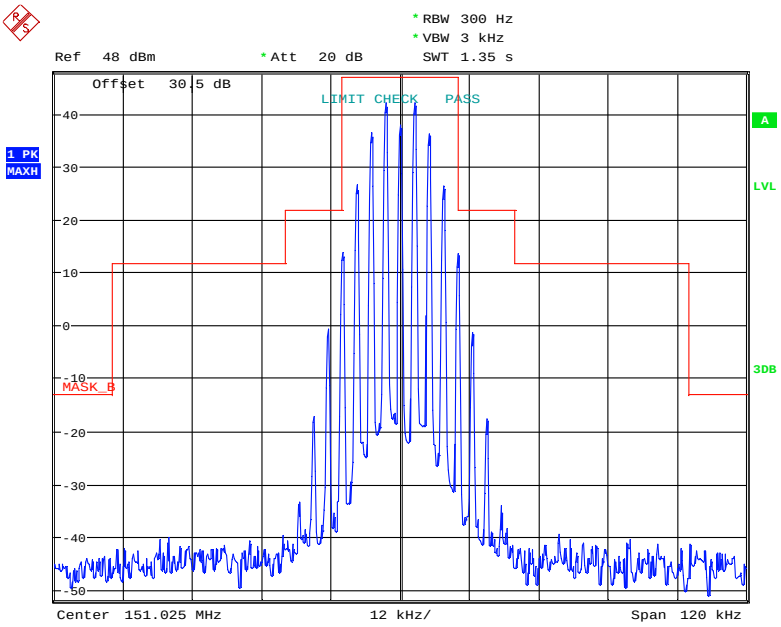
Date: 14.MAY.2020 19:29:44

Frequency 151.025 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



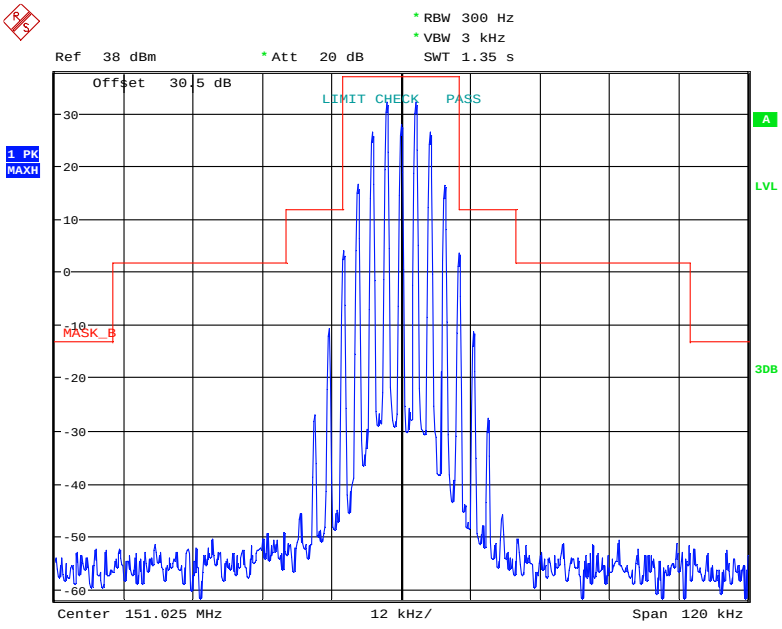
Date: 14.MAY.2020 19:28:50

Frequency 151.025 MHz: Emission Mask, High Power



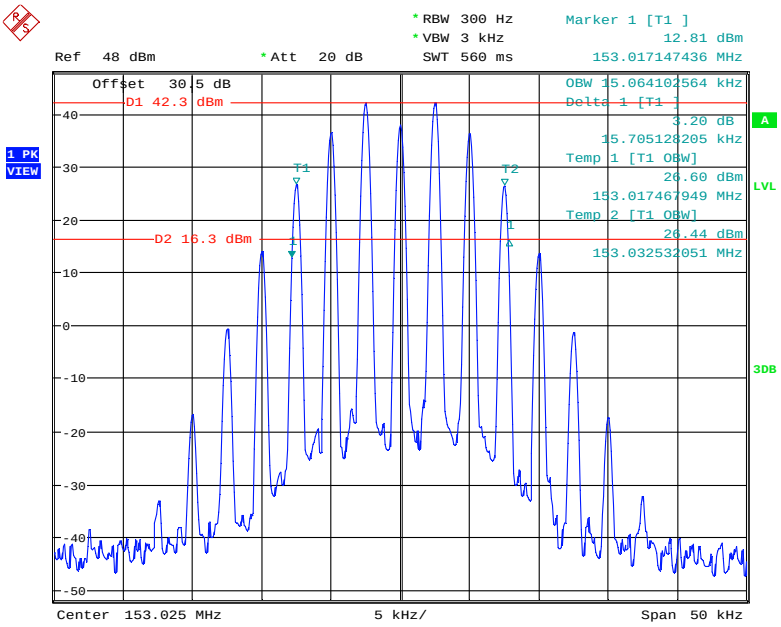
Date: 14.MAY.2020 19:38:13

Frequency 151.025 MHz: Emission Mask, Low Power



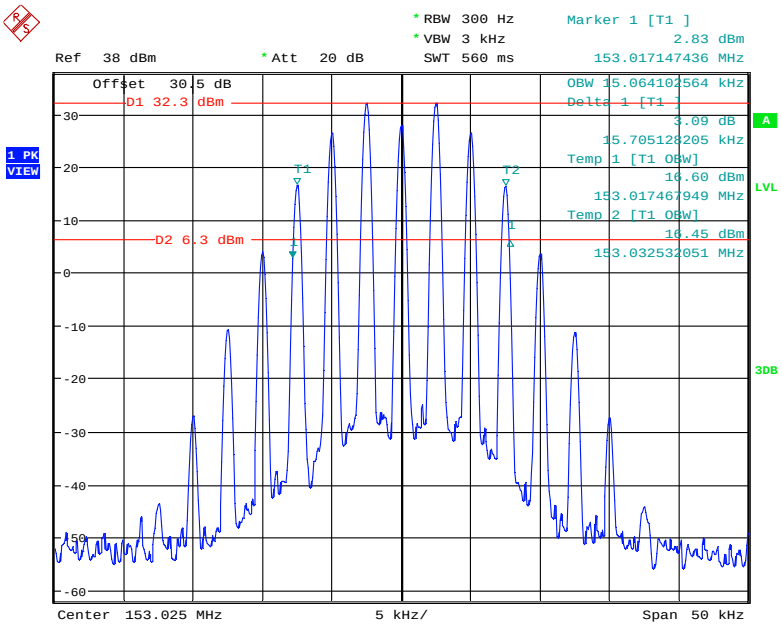
Date: 14.MAY.2020 19:37:28

Frequency 153.025 MHz: 99% Occupied & 26 dB Bandwidth, High Power



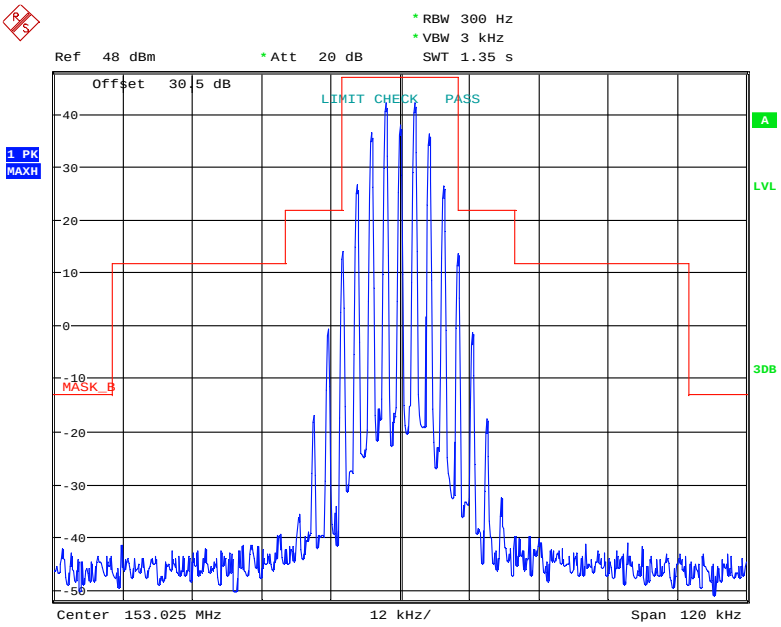
Date: 14.MAY.2020 19:31:51

Frequency 153.025 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



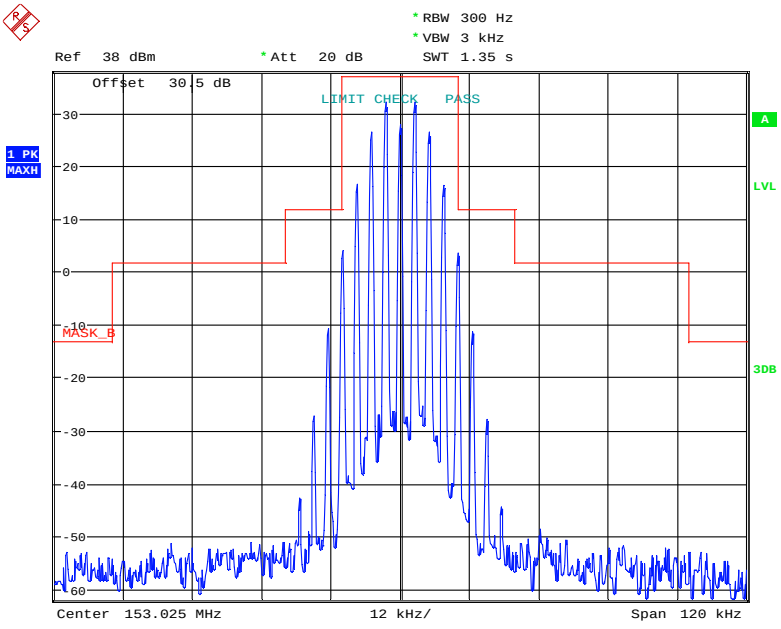
Date: 14.MAY.2020 19:32:27

Frequency 153.025 MHz MHz: Emission Mask B, High Power



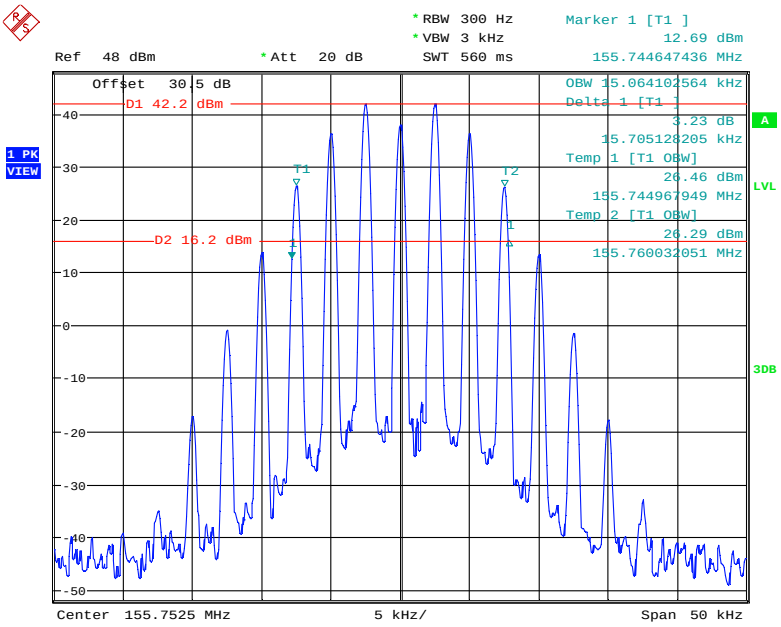
Date: 14.MAY.2020 19:35:44

Frequency 153.025 MHz MHz: Emission Mask B, Low Power



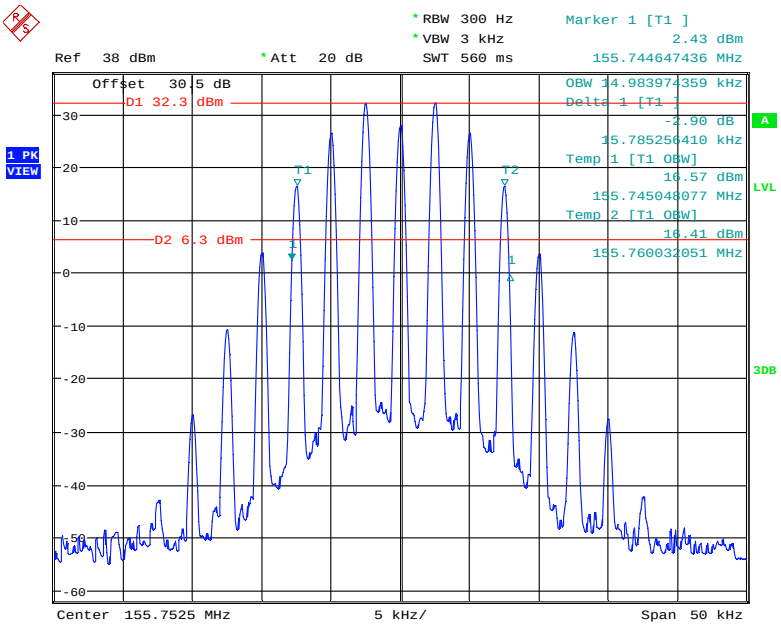
Date: 14.MAY.2020 19:36:51

Frequency 155.7525 MHz: 99% Occupied & 26 dB Bandwidth, High Power



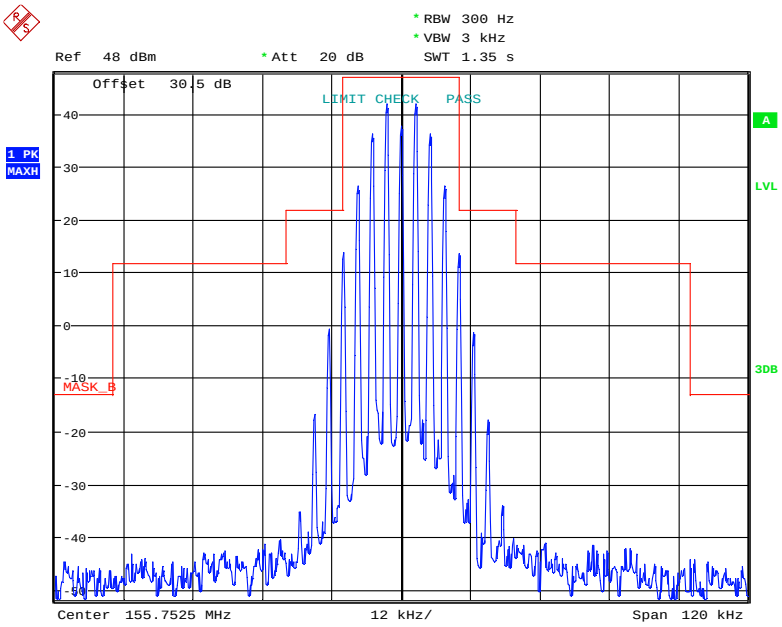
Date: 14.MAY.2020 19:30:52

Frequency 155.7525 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



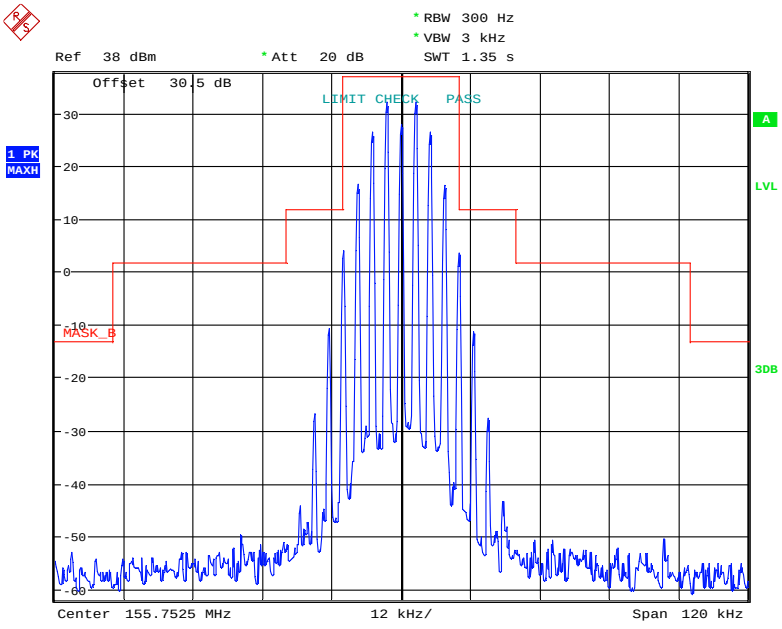
Date: 14.MAY.2020 19:33:16

Frequency 155.7525 MHz: Emission Mask B, High Power



Date: 14.MAY.2020 19:34:49

Frequency 155.7525 MHz: Emission Mask B, Low Power



Date: 14.MAY.2020 19:34:00

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

Applicable Standard

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0, 0 dB.

2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 (f_d –2.88 kHz) dB.

3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

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

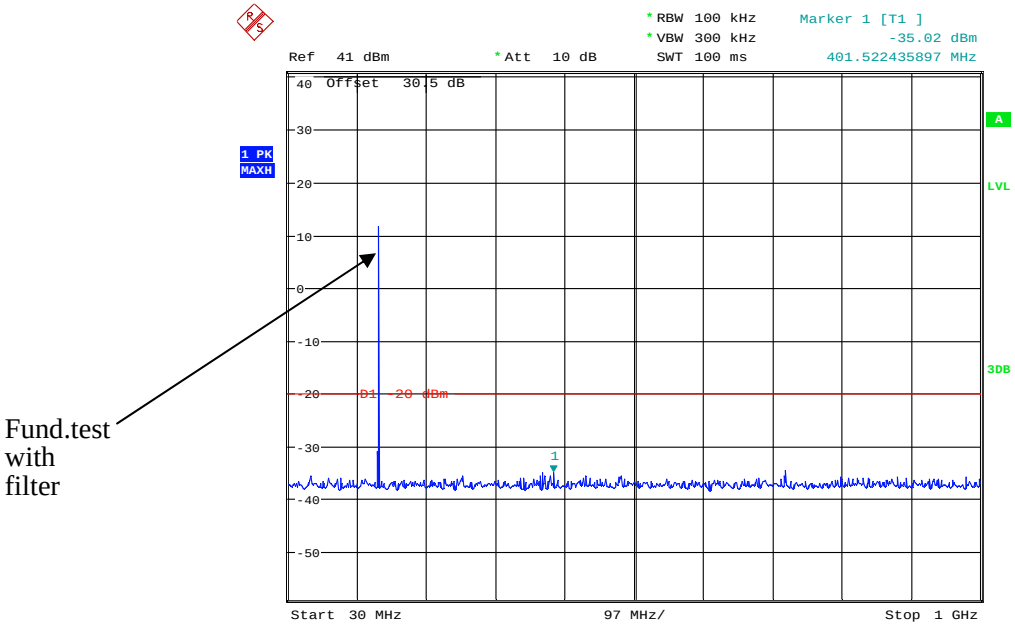
Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Chen from 2020-03-19 to 2020-05-19.

Test Mode: Transmitting, worst case for High power level, please refer to the following plots.

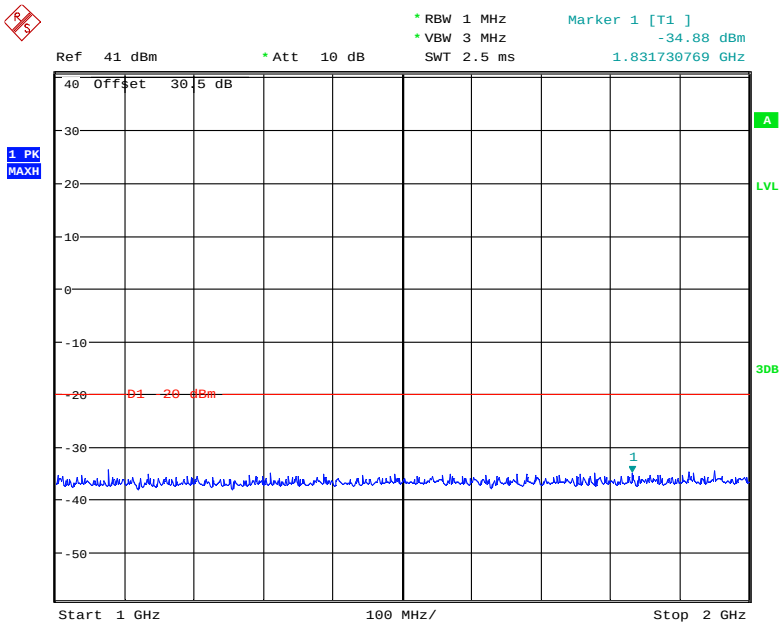
Digital Modulation:

30MHz – 1 GHz, 155.7525 MHz(Part 90)



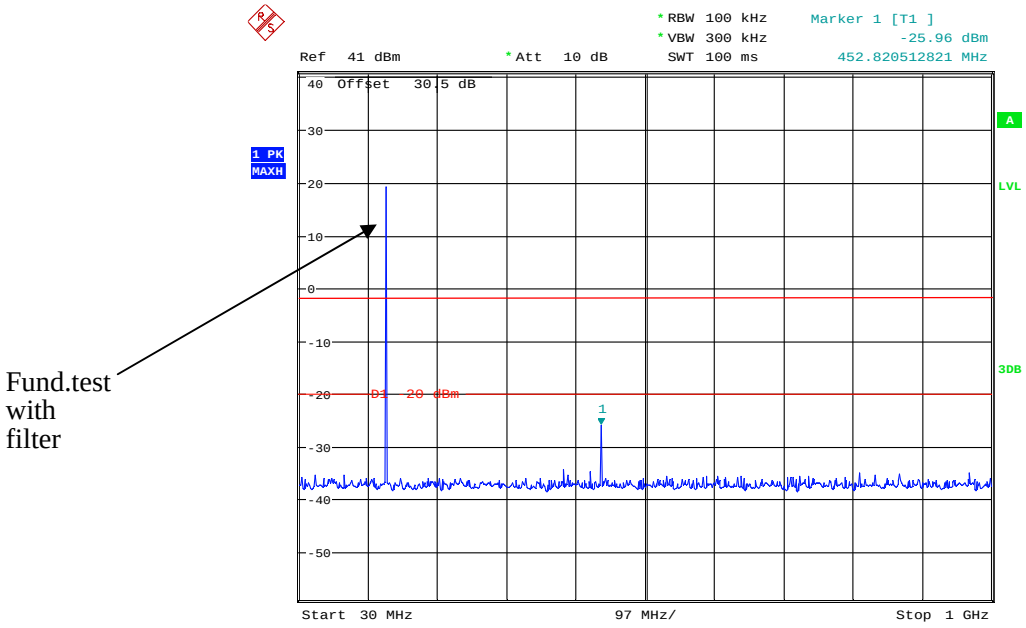
Date: 19.MAR.2020 17:16:39

1 GHz – 2 GHz, 155.7525 MHz(Part 90)



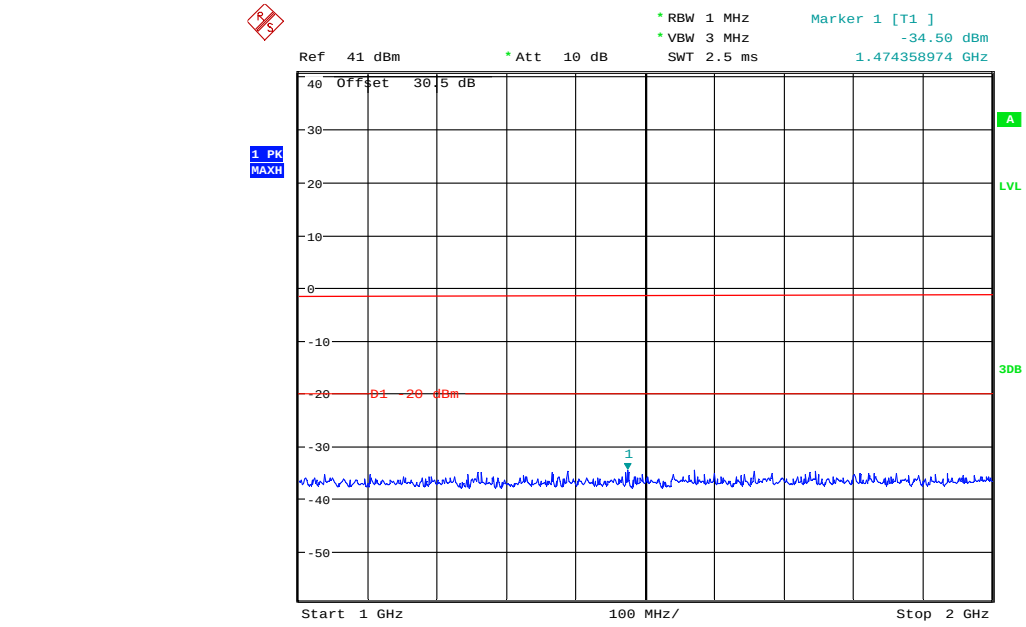
Date: 19.MAR.2020 17:17:13

30MHz – 1 GHz, 151.025 MHz(Part 22)



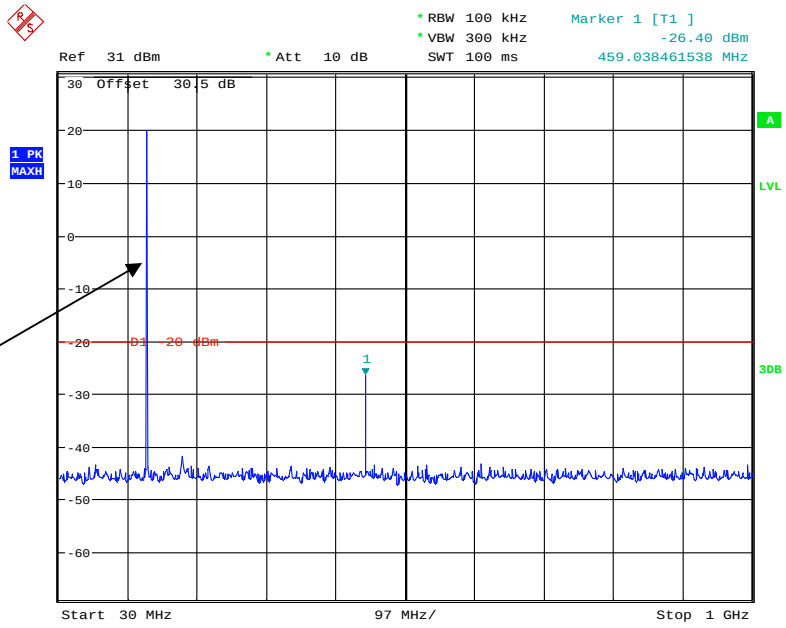
Date: 19.MAR.2020 17:11:14

1 GHz – 2 GHz, 151.025 MHz(Part 22)



Date: 19.MAR.2020 17:11:50

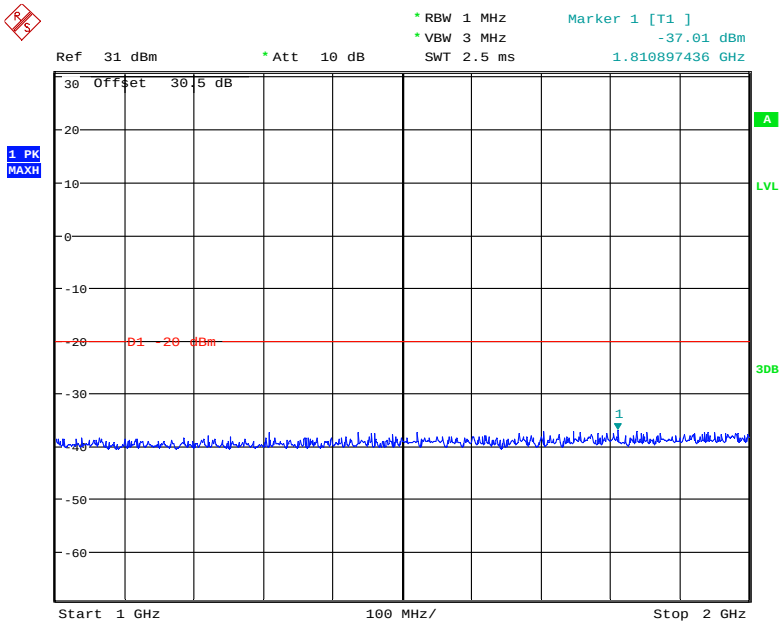
30MHz – 1 GHz, 153.025 MHz(Part 74)



Fund.test with filter

Date: 19.MAY.2020 18:55:29

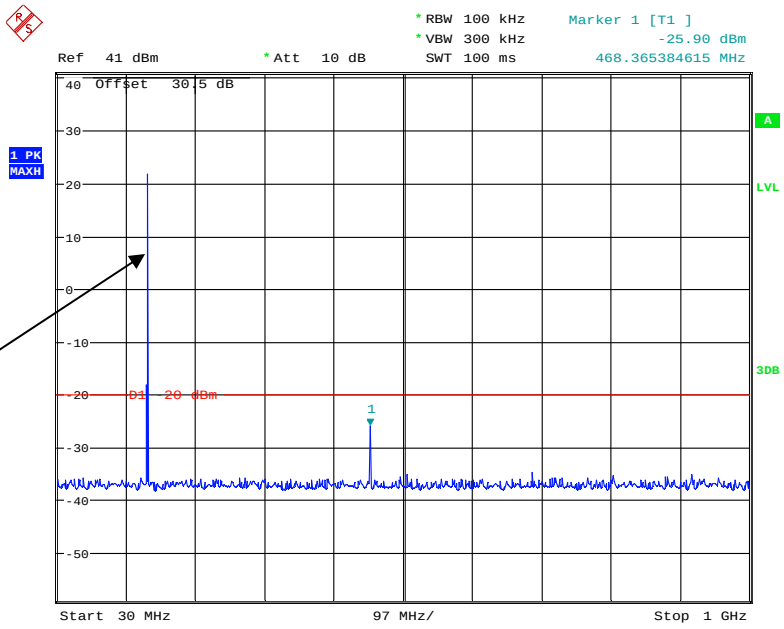
1 GHz – 2 GHz, 153.025 MHz(Part 74)



Date: 19.MAY.2020 18:55:57

Analog Modulation:
12.5k

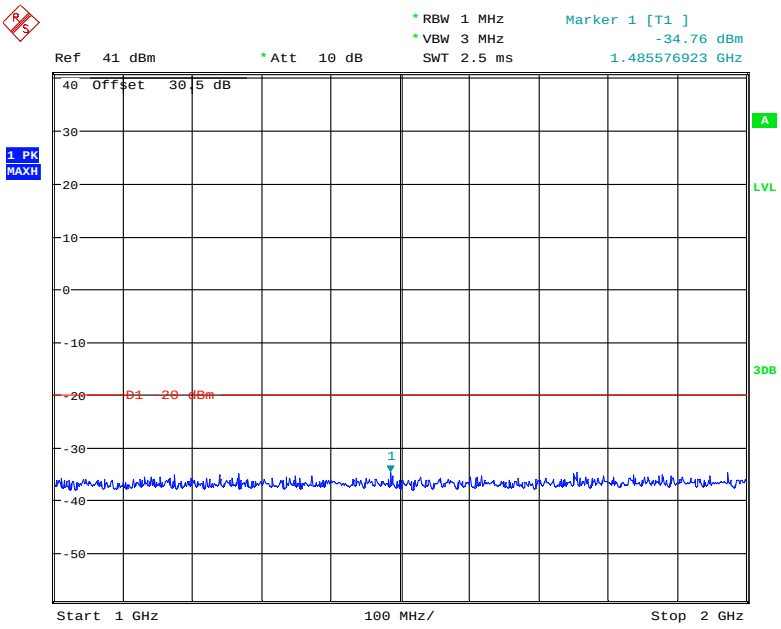
30MHz – 1 GHz, 155.7525 MHz(Part 90)



Fund.test with filter

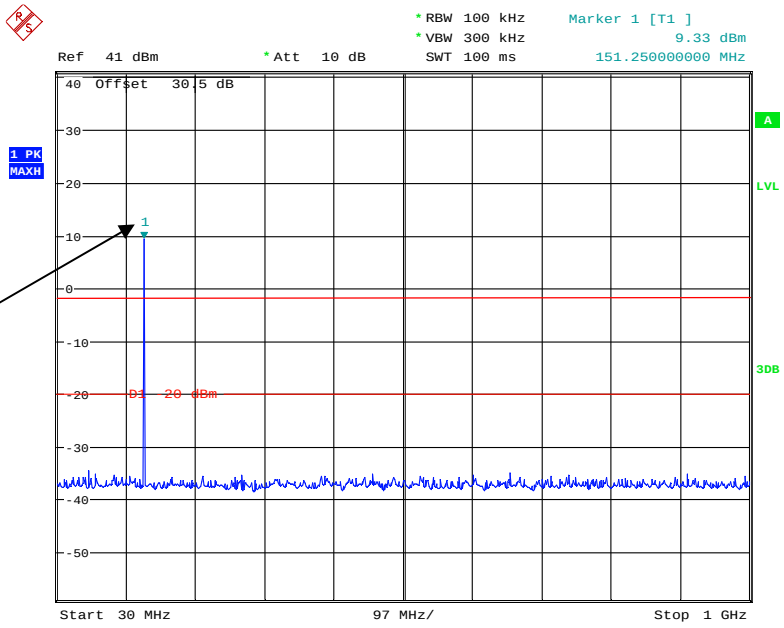
Date: 19.MAR.2020 17:18:17

1 GHz – 2 GHz, 155.7525 MHz(Part 90)



Date: 19.MAR.2020 17:17:39

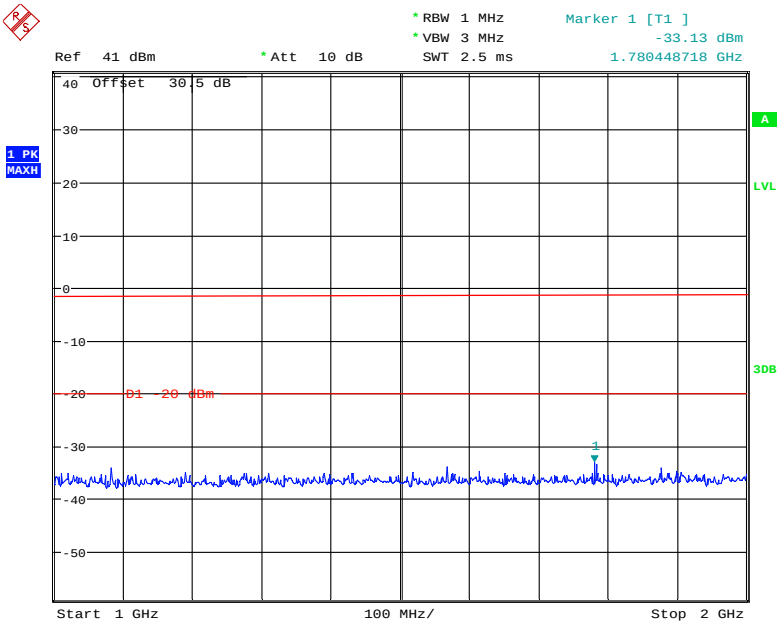
30MHz – 1 GHz, 151.025 MHz(Part 22)



Fund.test with filter

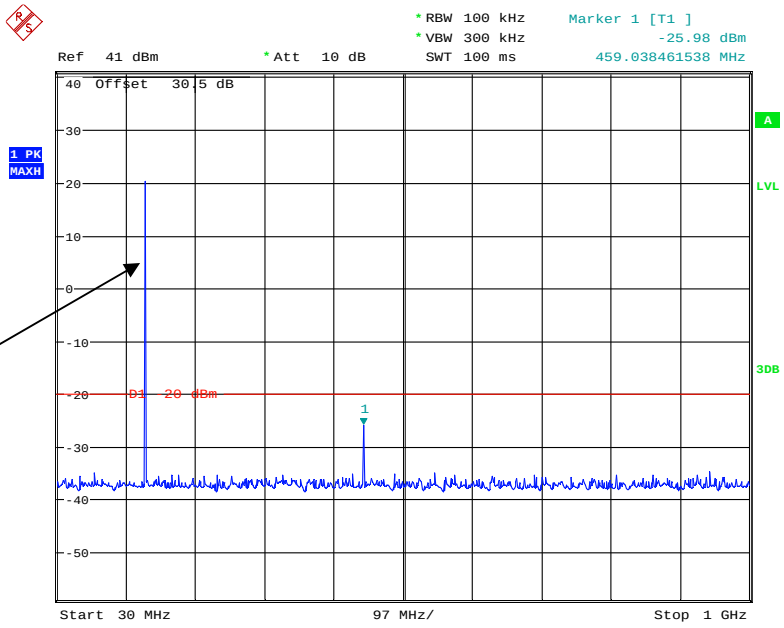
Date: 19.MAR.2020 17:12:26

1 GHz – 2 GHz, 151.025 MHz(Part 22)



Date: 19.MAR.2020 17:06:13

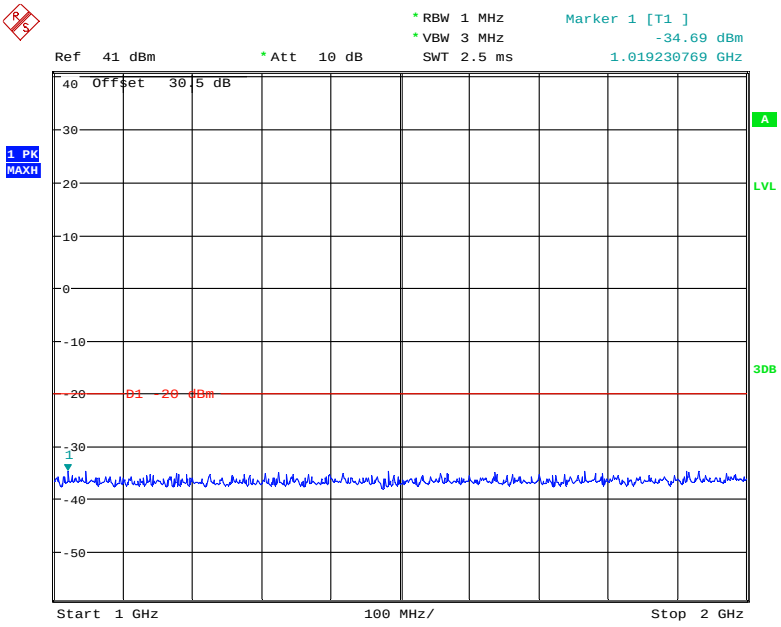
30MHz – 1 GHz, 153.025 MHz(Part 74)



Fund.test with filter

Date: 19.MAR.2020 17:13:28

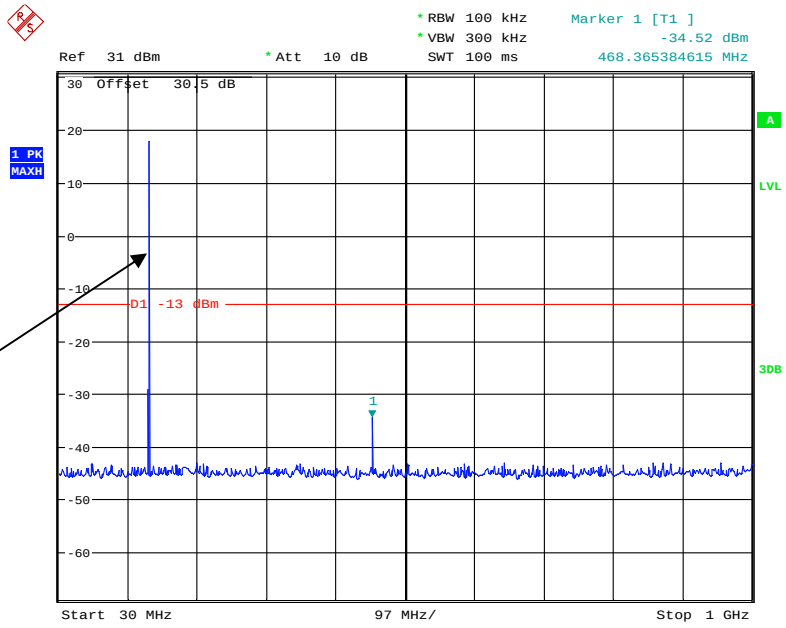
1 GHz – 2 GHz, 153.025 MHz(Part 74)



Date: 19.MAR.2020 17:14:04

25k

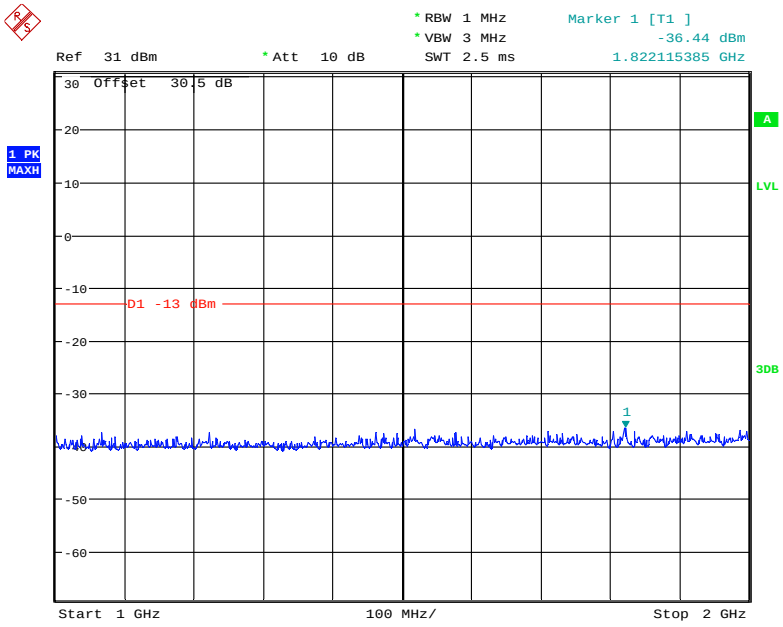
30MHz – 1 GHz, 155.7525 MHz(Part 80)



Fund.test with filter

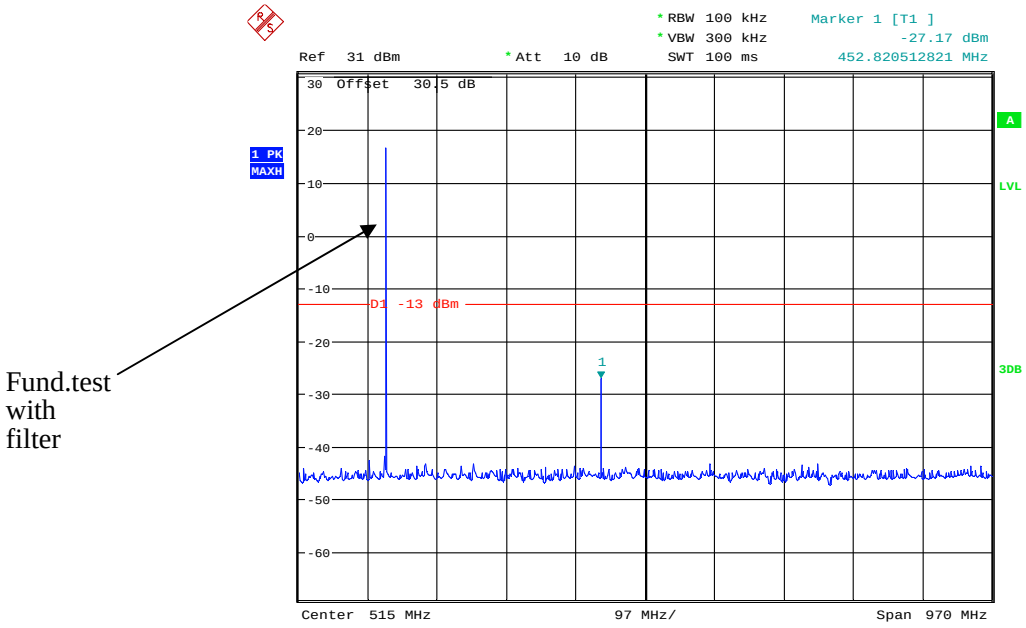
Date: 19.MAY.2020 18:58:23

1 GHz – 2 GHz, 155.7525 MHz(Part 80)



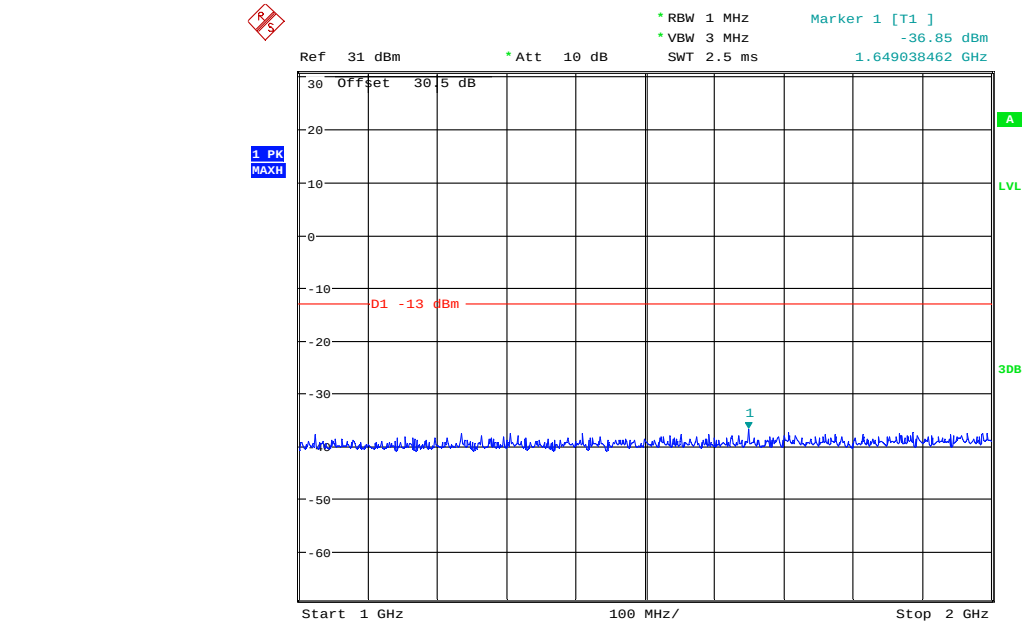
Date: 19.MAY.2020 19:01:32

30MHz – 1 GHz, 151.025 MHz(Part 22)



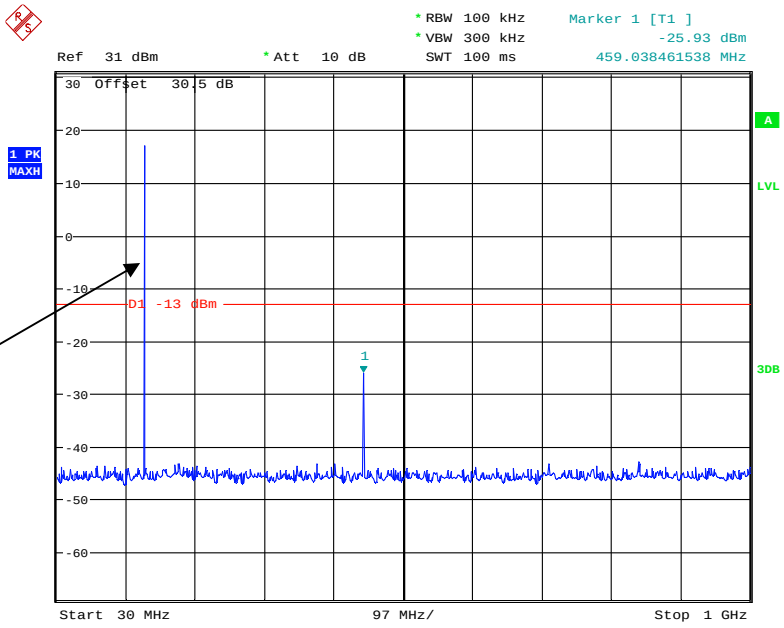
Date: 19.MAY.2020 18:49:07

1 GHz – 2 GHz, 151.025 MHz(Part 22)



Date: 19.MAY.2020 18:49:41

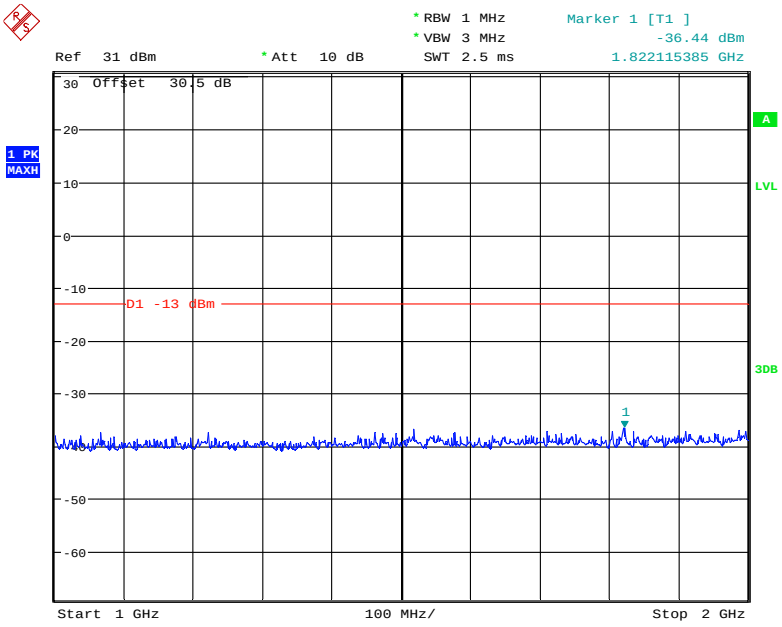
30MHz – 1 GHz, 153.025 MHz(Part 74)



Fund.test with filter

Date: 19.MAY.2020 18:57:03

1 GHz – 2 GHz, 153.025 MHz(Part 74)



Date: 19.MAY.2020 19:01:32

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

Spurious attenuation limit in dB =50+10 Log_{10} (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

Spurious attenuation limit in dB =43+10 Log_{10} (power out in Watts) for EUT with a 25 kHz channel bandwidth.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52%
ATM Pressure:	101.0 kPa

The testing was performed by Holland Yang on 2020-05-13 for below 1GHz and Charlie Cha for above 1GHz.

Test Mode: Transmitting, worst case for High power level.

30MHz - 2 GHz:

Frequency (MHz)	Receiver Reading (dBµV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Digital 151.025MHz, 12.5 kHz										
453.08	42.49	293	2.3	H	-54.5	0.91	0.0	-55.41	-13	42.41
453.08	33.94	93	1.6	V	-61.3	0.91	0.0	-62.21	-13	49.21
906.15	45.45	287	2.4	H	-51.8	1.24	0.0	-53.04	-13	40.04
906.15	47.11	4	1.1	V	-49.6	1.24	0.0	-50.84	-13	37.84
1208.20	44.74	347	2.5	H	-62.2	1.50	6.80	-56.90	-13	43.90
1208.20	44.35	337	1.8	V	-62.3	1.50	6.80	-57.00	-13	44.00
Digital 153.025 MHz, 12.5 kHz										
459.08	42.24	222	2.0	H	-54.7	0.91	0.0	-55.61	-20	35.61
459.08	37.69	289	2.0	V	-57.6	0.91	0.0	-58.51	-20	38.51
918.15	42.15	285	2.1	H	-55.1	1.24	0.0	-56.34	-20	36.34
918.15	43.21	289	2.3	V	-53.5	1.24	0.0	-54.74	-20	34.74
1224.20	44.86	248	2.4	H	-62.1	1.50	6.80	-56.80	-20	36.80
1224.20	44.67	289	1.5	V	-62.0	1.50	6.80	-56.70	-20	36.70
Digital 155.7525 MHz, 12.5 kHz										
467.30	43.06	177	2.0	H	-53.9	0.91	0.0	-54.81	-20	34.81
467.30	38.98	45	1.4	V	-56.3	0.91	0.0	-57.21	-20	37.21
934.51	44.16	218	1.5	H	-56.4	1.24	0.0	-57.64	-20	37.64
934.51	45.80	7	1.2	V	-53.5	1.24	0.0	-54.74	-20	34.74
1246.02	44.71	175	2.2	H	-62.2	1.50	6.80	-56.90	-20	36.90
1246.02	44.51	113	2.3	V	-62.1	1.50	6.80	-56.80	-20	36.80

Frequency (MHz)	Receiver Reading (dBµV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Analog 151.025MHz, 12.5 kHz										
453.08	39.11	282	1.8	H	-57.8	0.91	0.0	-58.71	-13	45.71
453.08	37.04	77	1.1	V	-58.2	0.91	0.0	-59.11	-13	46.11
906.15	45.24	80	1.5	H	-52.0	1.24	0.0	-53.24	-13	40.24
906.15	46.28	67	2.4	V	-50.5	1.24	0.0	-51.74	-13	38.74
1208.20	44.77	167	1.5	H	-62.2	1.50	6.80	-56.90	-13	43.90
1208.20	44.39	313	1.3	V	-62.2	1.50	6.80	-56.90	-13	43.90
Analog 153.025 MHz, 12.5 kHz										
459.08	34.51	334	2.5	H	-62.4	0.91	0.0	-63.31	-20	43.31
459.08	37.04	298	1.4	V	-58.2	0.91	0.0	-59.11	-20	39.11
918.15	42.02	219	1.8	H	-55.2	1.24	0.0	-56.44	-20	36.44
918.15	43.11	103	2.0	V	-53.6	1.24	0.0	-54.84	-20	34.84
1224.20	44.74	22	2.0	H	-62.2	1.50	6.80	-56.90	-20	36.90
1224.20	44.57	99	1.4	V	-62.1	1.50	6.80	-56.80	-20	36.80
Analog 155.7525 MHz, 12.5 kHz										
467.3	43.22	343	1.7	H	-53.7	0.91	0.0	-54.61	-20	34.61
467.3	36.80	32	2.4	V	-58.5	0.91	0.0	-59.41	-20	39.41
934.51	45.02	92	2.5	H	-52.2	1.24	0.0	-53.44	-20	33.44
934.51	46.37	151	2.4	V	-50.4	1.24	0.0	-51.64	-20	31.64
1246.02	44.76	328	1.9	H	-63.7	1.60	7.30	-58.00	-20	38.00
1246.02	44.54	48	1.3	V	-63.9	1.60	7.30	-58.20	-20	38.20

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Analog 151.025MHz, 25 kHz										
453.08	40.13	41	2.4	H	-56.8	0.91	0.0	-57.71	-13	44.71
453.08	36.89	202	1.3	V	-58.4	0.91	0.0	-59.31	-13	46.31
906.15	46.12	54	1.0	H	-51.1	1.24	0.0	-52.34	-13	39.34
906.15	47.29	266	2.2	V	-49.0	1.24	0.0	-50.24	-13	37.24
1208.20	44.85	354	2.1	H	-62.1	1.50	6.80	-56.80	-13	43.80
1208.20	44.34	288	1.3	V	-62.3	1.50	6.80	-57.00	-13	44.00
Analog 153.025 MHz, 25 kHz										
459.08	39.59	95	2.5	H	-57.4	0.91	0.0	-58.31	-13	45.31
459.08	36.81	322	1.5	V	-58.5	0.91	0.0	-59.41	-13	46.41
918.15	41.51	236	2.4	H	-55.8	1.24	0.0	-57.04	-13	44.04
918.15	43.83	213	1.9	V	-52.4	1.24	0.0	-53.64	-13	40.64
1224.20	44.87	176	1.7	H	-62.1	1.50	6.80	-56.80	-13	43.80
1224.20	44.71	240	1.6	V	-61.9	1.50	6.80	-56.60	-13	43.60
Analog 155.7525 MHz, 25 kHz										
467.3	44.11	277	1.8	H	-52.8	0.91	0.0	-53.71	-13	40.71
467.3	38.43	218	2.2	V	-56.8	0.91	0.0	-57.71	-13	44.71
934.51	45.81	274	1.7	H	-51.5	1.24	0.0	-52.74	-13	39.74
934.51	47.23	76	1.9	V	-49.0	1.24	0.0	-50.24	-13	37.24
1246.02	44.79	11	2.5	H	-63.7	1.60	7.30	-58.00	-13	45.00
1246.02	44.61	69	1.3	V	-63.8	1.60	7.30	-58.10	-13	45.10

Note:
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 AC/DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The power cable 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:	26 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Chen on 2020-03-19.

Test Mode: Transmitting

Note: The device is intended for fixed using.

Part90

Analog Modulation, 12.5kHz, Reference Frequency: 155.7525 MHz, Limit: ±5 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	13.6	155.752412	-0.56
40	13.6	155.752442	-0.37
30	13.6	155.752432	-0.44
20	13.6	155.752474	-0.17
10	13.6	155.752478	-0.14
0	13.6	155.752442	-0.37
-10	13.6	155.752469	-0.20
-20	13.6	155.752457	-0.28
-30	13.6	155.752433	-0.43
Frequency Stability versus Input Voltage			
20	11.6	155.752415	-0.55
20	15.6	155.752438	-0.40

Digital Modulation, 12.5kHz, Reference Frequency: 155.7525 MHz, Limit: ±5.0 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	13.6	155.752432	-0.44
40	13.6	155.752471	-0.19
30	13.6	155.752425	-0.48
20	13.6	155.752442	-0.37
10	13.6	155.752433	-0.43
0	13.6	155.752415	-0.55
-10	13.6	155.752445	-0.35
-20	13.6	155.752422	-0.50
-30	13.6	155.752458	-0.27
Frequency Stability versus Input Voltage			
20	11.6	155.752485	-0.10
20	15.6	155.752467	-0.21

Part80

Analog Modulation, 25kHz, Reference Frequency: 155.7525 MHz, Limit: ±5 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	13.6	155.752422	-0.50
40	13.6	155.752444	-0.36
30	13.6	155.752452	-0.31
20	13.6	155.752463	-0.24
10	13.6	155.752474	-0.17
0	13.6	155.752412	-0.56
-10	13.6	155.752462	-0.24
-20	13.6	155.752447	-0.34
-30	13.6	155.752438	-0.40
Frequency Stability versus Input Voltage			
20	11.6	155.752445	-0.35
20	15.6	155.752434	-0.42

Part22

Analog Modulation,12.5kHz, Reference Frequency: 151.025 MHz, Limit: ±5 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	13.6	151.024977	-0.15
40	13.6	151.024985	-0.10
30	13.6	151.024959	-0.27
20	13.6	151.024962	-0.25
10	13.6	151.024944	-0.37
0	13.6	151.024931	-0.46
-10	13.6	151.024980	-0.13
-20	13.6	151.024957	-0.28
-30	13.6	151.024986	-0.09
Frequency Stability versus Input Voltage			
20	11.6	151.024943	-0.38
20	15.6	151.024964	-0.24

Analog Modulation, 25kHz,Reference Frequency: 151.025 MHz, Limit: ±5 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	13.6	151.024975	-0.17
40	13.6	151.024948	-0.34
30	13.6	151.024965	-0.23
20	13.6	151.024955	-0.30
10	13.6	151.024967	-0.22
0	13.6	151.024959	-0.27
-10	13.6	151.024981	-0.13
-20	13.6	151.024965	-0.23
-30	13.6	151.024929	-0.47
Frequency Stability versus Input Voltage			
20	11.6	151.024936	-0.42
20	15.6	151.024945	-0.36

Digital Modulation,12.5kHz, Reference Frequency: 151.025 MHz, Limit: ±5.0 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	13.6	151.024941	-0.39
40	13.6	151.024969	-0.21
30	13.6	151.024949	-0.34
20	13.6	151.024928	-0.48
10	13.6	151.024981	-0.13
0	13.6	151.024940	-0.40
-10	13.6	151.024952	-0.32
-20	13.6	151.024991	-0.06
-30	13.6	151.024964	-0.24
Frequency Stability versus Input Voltage			
20	11.6	151.024924	-0.50
20	15.6	151.024989	-0.07

Part74

Analog Modulation, 12.5kHz, Reference Frequency: 153.025 MHz, Limit: ±5 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	13.6	153.024964	-0.24
40	13.6	153.024926	-0.48
30	13.6	153.024971	-0.19
20	13.6	153.024975	-0.16
10	13.6	153.024985	-0.10
0	13.6	153.024938	-0.41
-10	13.6	153.024965	-0.23
-20	13.6	153.024949	-0.33
-30	13.6	153.024982	-0.12
Frequency Stability versus Input Voltage			
20	11.6	153.024942	-0.38
20	15.6	153.024976	-0.16

Analog Modulation, 25kHz, Reference Frequency: 153.025 MHz, Limit: ±5 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (℃)	Voltage Supplied (V_{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	13.6	153.024968	-0.21
40	13.6	153.024976	-0.16
30	13.6	153.024988	-0.08
20	13.6	153.024943	-0.37
10	13.6	153.024952	-0.31
0	13.6	153.024945	-0.36
-10	13.6	153.024981	-0.12
-20	13.6	153.024967	-0.22
-30	13.6	153.024958	-0.27
Frequency Stability versus Input Voltage			
20	11.6	153.024931	-0.45
20	15.6	153.024962	-0.25

Digital Modulation, 12.5kHz, Reference Frequency: 153.025 MHz, Limit: ±5.0 ppm			
Test Environment		**Frequency Measure with Time Elapsed**	
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Measured Frequency (MHz)**	**Frequency Error (ppm)**
Frequency Stability versus Input Temperature			
50	13.6	153.024938	-0.41
40	13.6	153.024965	-0.23
30	13.6	153.024954	-0.30
20	13.6	153.024926	-0.48
10	13.6	153.024955	-0.29
0	13.6	153.024967	-0.22
-10	13.6	153.024955	-0.29
-20	13.6	153.024934	-0.43
-30	13.6	153.024944	-0.37
Frequency Stability versus Input Voltage			
20	11.6	153.024931	-0.45
20	15.6	153.024987	-0.08

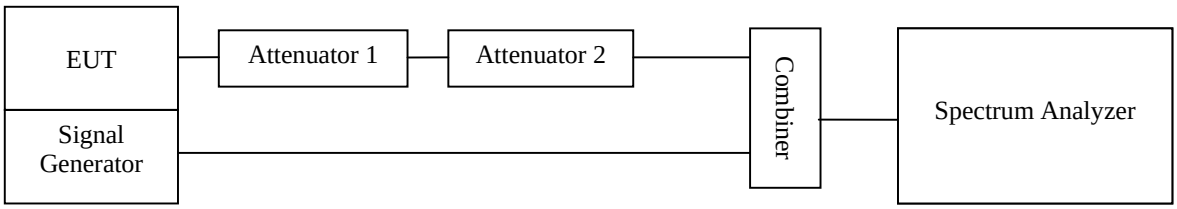
FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

Applicable Standard

Regulations: FCC §90.214
Test method: ANSI/TIA-603-D 2010, section 2.2.19.3

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:	25℃
Relative Humidity:	52 %
ATM Pressure:	101.1 kPa

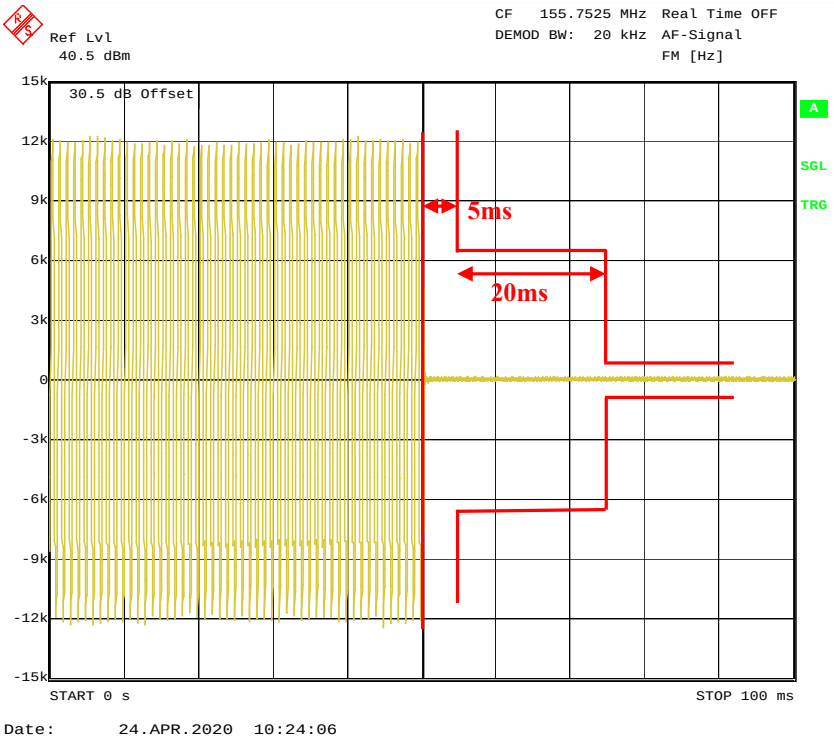
The testing was performed by Black Chen on 2020-04-24.

Channel Separation (kHz)	Transient Period (ms)	Transient Frequency	Result
12.5	5 (t1)	<+/-12.5 kHz	Pass
	20(t2)	<+/-6.25 kHz	
	5 (t3)	<+/-12.5 kHz	

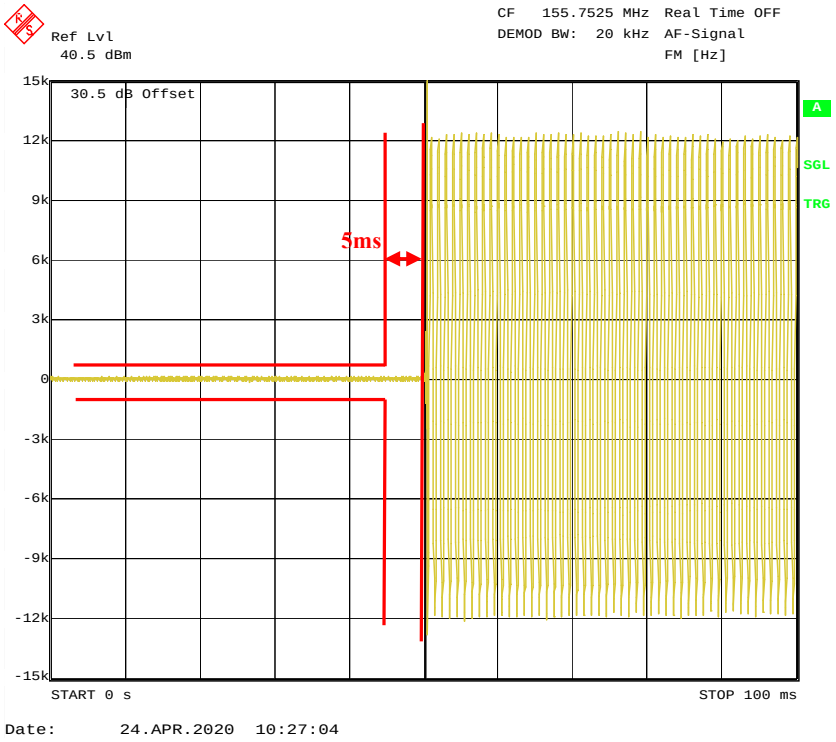
Please refer to the following plots.

Channel: 155.7525 MHz, 12.5 kHz

Turn on



Turn off



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