

TEST REPORT

Applicant Name : Fujian Belfone Communications Technology Co.,Ltd.
Address : A15 Huaqiao Economic Development Zone, Shuangyang,
Luojiang, Quanzhou, Fujian, China
Report Number : SZ4210929-54621E-RF-00
FCC ID: 2AARFBFTR85001

Test Standard (s)

FCC PART 90

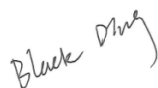
Sample Description

Product Type: Digital intercom relay station
Model No.: BF-TR8500
Multiple Model(s) No.: N/A
Trade Mark: N/A
Date Received: 2021/09/29
Date of Test: 2021/10/14~2022/01/19
Report Date: 2022/01/19

Test Result:	Pass*
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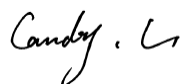
* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:



Black Ding
EMC Engineer

Approved By:



Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

Shenzhen Accurate Technology Co., Ltd. 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 an asterisk "★". Customer model name, addresses, names, trademarks etc. are not considered data.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	400MHz~480MHz
Rated Transmit Power	20Watts(High), 12.5Watts(Middle), 5Watts(Low)
Channel separation	12.5kHz
Modulation Technique	4FSK
Antenna Specification*	3.5dBi (provided by the applicant)
Voltage Range	AC 85-264V or DC 11-13.8V
Sample serial number	SZ4210929-54621E-RF-S1 (Assigned by ATC)
EUT Received Date:	2021-09-29
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2, and Part 90 of the Federal Communication Commissions rules.

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 90 – Private Land Mobile Radio Service

Applicable Standards: ANSI C63.26-2015.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		±0.73dB
Unwanted Emission, conducted		±1.6dB
RF Frequency		±0.082*10 ⁻⁷
Emissions, Radiated	30MHz - 1GHz	±4.28dB
	1GHz - 18GHz	±4.98dB
	18GHz - 26.5GHz	±5.06dB
Temperature		±1°C
Humidity		±6%
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 Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. 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.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISED), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Justification

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

Equipment Modifications

No modification was made to the EUT.

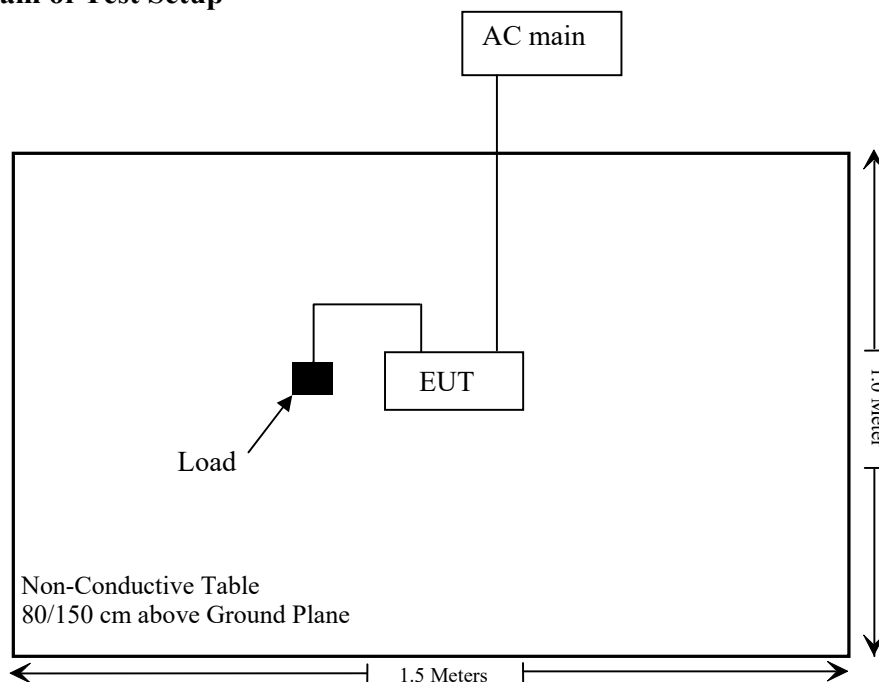
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Unknown	LOAD	Unknown	Unknown

External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielding Detachable AC Cable	1.5	EUT	AC Mains
Shielding Detachable RF Cable	1.0	EUT	Load

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliant
§2.1046; §90.205	RF Output Power	Compliant
§2.1047; §90.207	Modulation Characteristic	Not Applicable
§2.1049; §90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliant
§2.1051; §90.210	Spurious Emission at Antenna Terminal	Compliant
§2.1053; §90.210	Spurious Radiated Emissions	Compliant
§2.1055; §90.213	Frequency Stability	Compliant
§90.214	Transient Frequency Behavior	Compliant

Not Applicable: Not apply for digital modulation.

Note: EUT support AC power supply and DC power supply, pre-test this two type power supply, the worst case AC power supply was tested.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde& Schwarz	Test Receiver	ESR	101817	2020/12/24	2021/12/23
Rohde&Schwarz	Spectrum Analyzer	FSV40	101495	2020/12/24	2021/12/23
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2021/11/09	2022/11/08
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-5m	No.3	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.5	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-10m	No.7	2021/11/09	2022/11/08
Unknown	RF Coaxial Cable	N-2m	No.8	2021/11/09	2022/11/08
Schwarzbeck	Bilog Antenna	VULB9163	9163-194	2020/01/05	2023/01/04
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-655	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Unknown	RF Coaxial Cable	N-1m	No.7	2020/12/25	2021/12/24
Anritsu	Signal Generator	68369B	004114	2021/07/31	2022/07/30
RF Conducted Test					
SPECTRUM ANALYZER	Rohde & Schwarz	FSU26	200982	2021/07/06	2022/07/05
OREGON SCIENTIFIC	Temperature & Humidity Meter	JB913R	GZ-WS004	2020/01/02	2023/01/01
E-Microwave	Band Rejector Filter	OBF-ZP-400-470-NF	OE01201051	2020/10/15	2021/10/14
E-Microwave	Band Rejector Filter	OBF-ZP-400-470-NF	OE01201051	2021/10/15	2022/10/14
Aeroflex/Weinschel	30dB Attenuator (Input 250W/Output 50W)	58-30-33	PS467	2020/12/25	2021/12/24
Aeroflex/Weinschel	30dB Attenuator (Input 250W/Output 50W)	58-30-33	PS467	2021/12/25	2022/12/24
Mini-Circuits	Power Splitter	DC-18000MHz	SF10944151S	2020/12/25	2021/12/24

HP Agilent	RF Communication test set	8920B	3325U00859	2021/03/15	2022/03/15
Fluke	Desktop Multi Meter	45	8392013	2020/12/25	2021/12/24
Aeroflex	3920 DIGifal Radio tester	3920	100636779	2021/10/08	2022/10/07
Piaobian	Voltage regulator	TDGC2	Unknown	NCR	NCR
E-Microwave	Band Rejector Filter	OBF-ZP-400-470-NF	OE01201051	2021-10.15	2022-10-14

* Statement of Traceability: Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §2.1091&§1.1310- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 2.1091 and subpart 1.1310 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 Occupational/Controlled Exposure

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	1824/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	/	/	5.0	≤6

f = frequency in MHz

* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

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, the power gain factor, is normally numeric gain.

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

Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm ²)	Strictest MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
400-480	3.5	2.24	43.5	22387.21	55	1.32	1.33

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 55cm from nearby persons.

Result: Compliance

FCC §2.1046 & §90.205 - RF OUTPUT POWER

Applicable Standard

FCC §2.1046 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 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2021-10-14 to 2021-11-10.

Test Mode: Transmitting

Test Result: Pass. Please refer to following table.

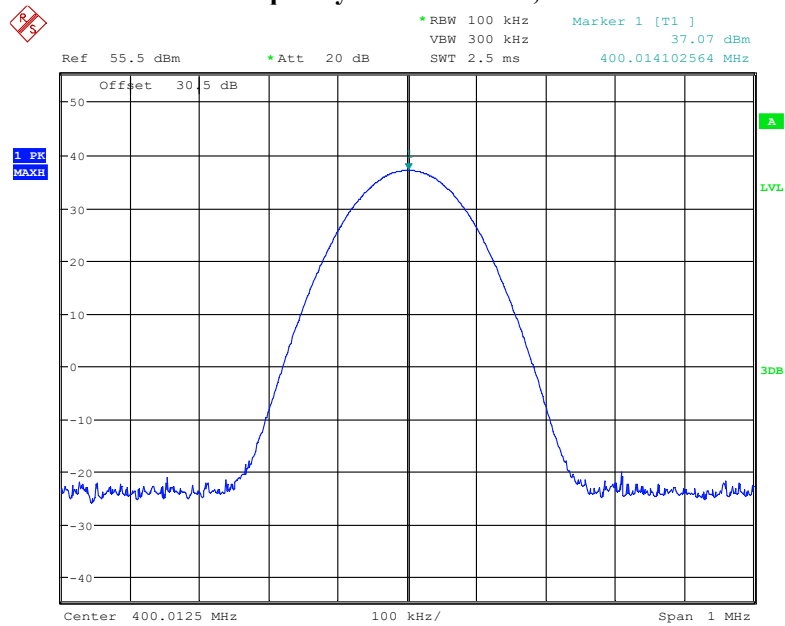
Conducted Output Power

Mode	Frequency Spacing (kHz)	Frequency (MHz)	Power level	Output Power (dBm)	Output Power (W)
Digital	12.5	400.0125	High	43.08	20.324
			Middle	41.42	13.868
			Low	37.07	5.093
		440.0125	High	43.06	20.230
			Middle	41.37	13.709
			Low	37.07	5.093
		479.9875	High	43.01	19.999
			Middle	41.49	14.093
			Low	37.25	5.309

High power: 20W (limit: 16~24W)
Middle power: 12.5W(limit: 10~15W)
Low power: 5W (Limit: 4~6W)

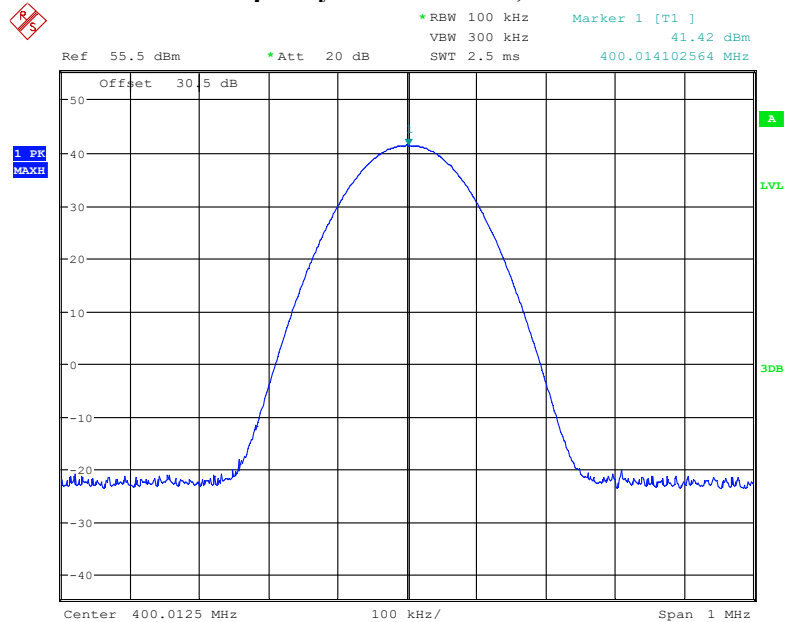
Digital:

Frequency 400.0125 MHz, Low Power

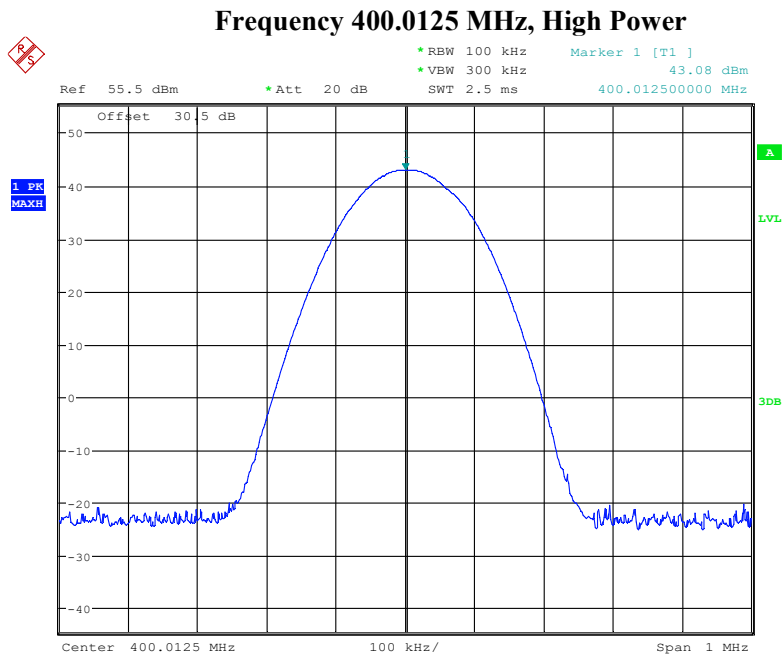


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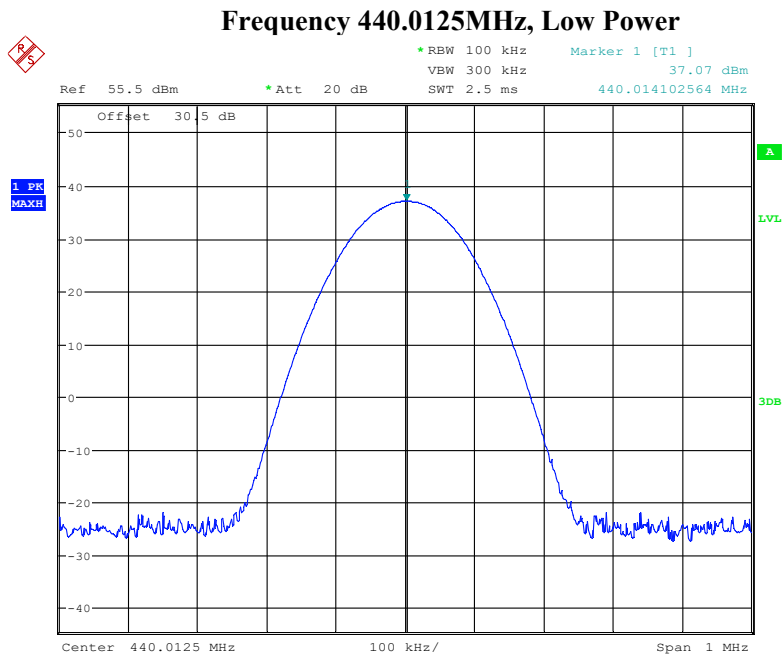
Frequency 400.0125 MHz, Middle Power



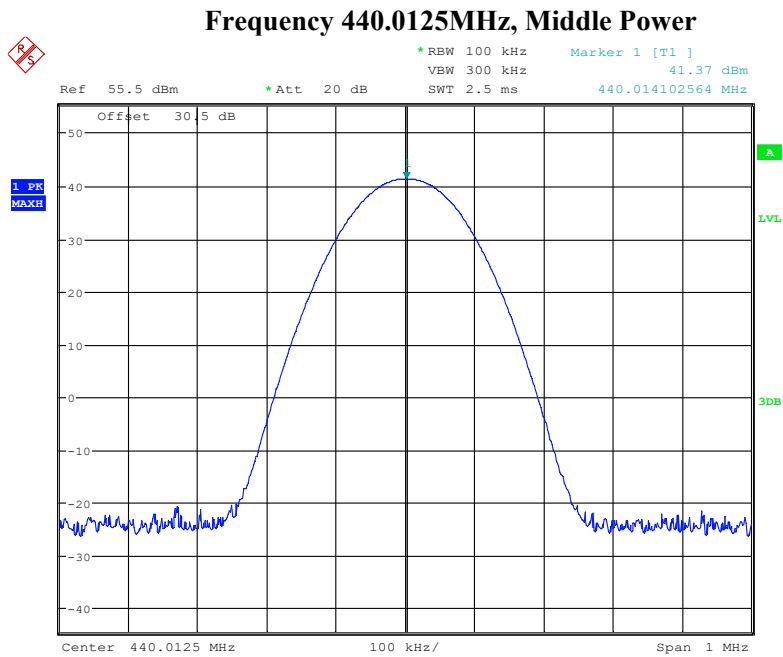
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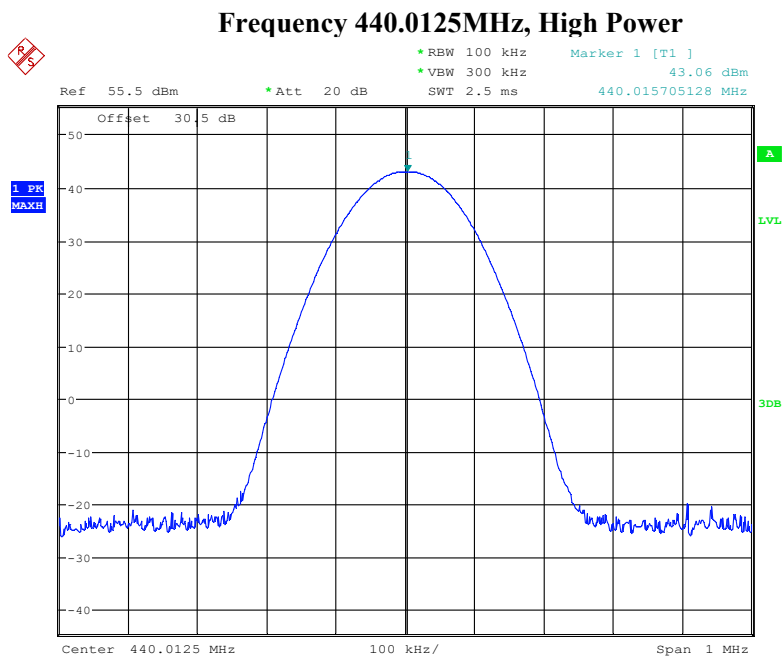
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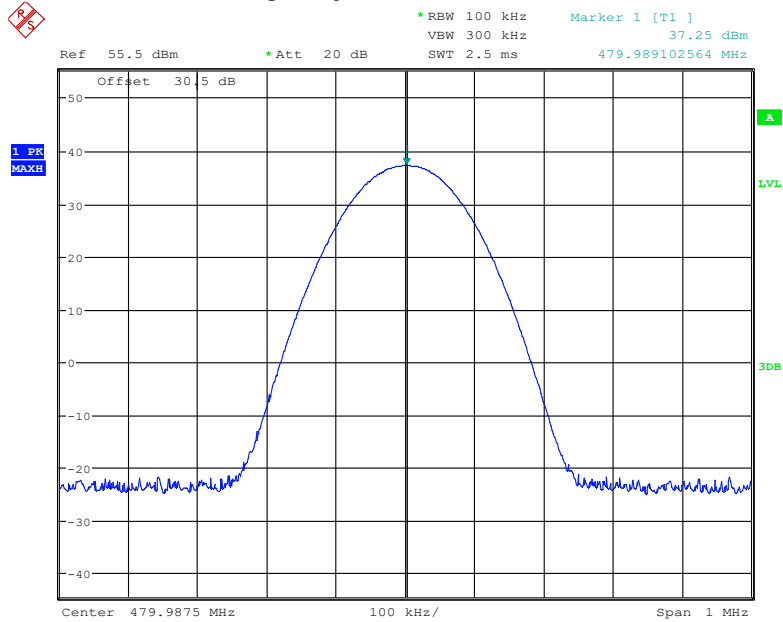
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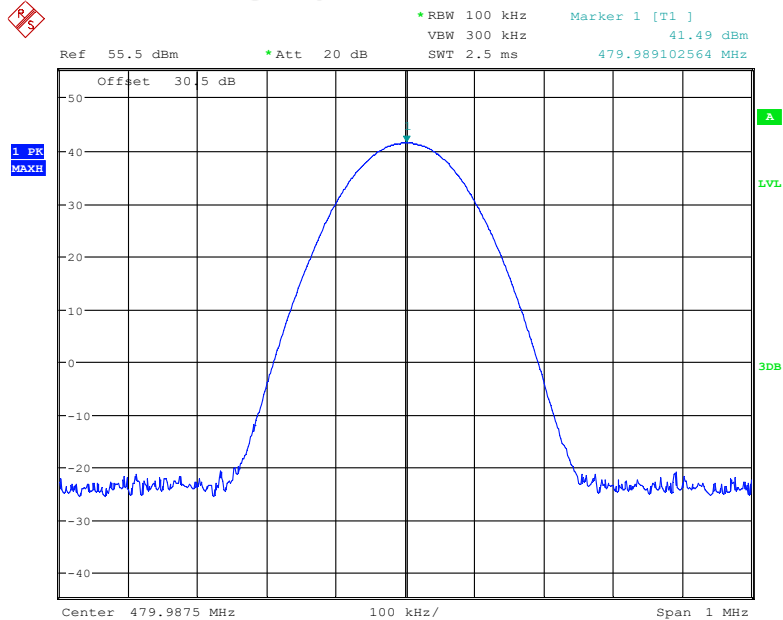
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Date: 10.NOV.2021 13:15:43

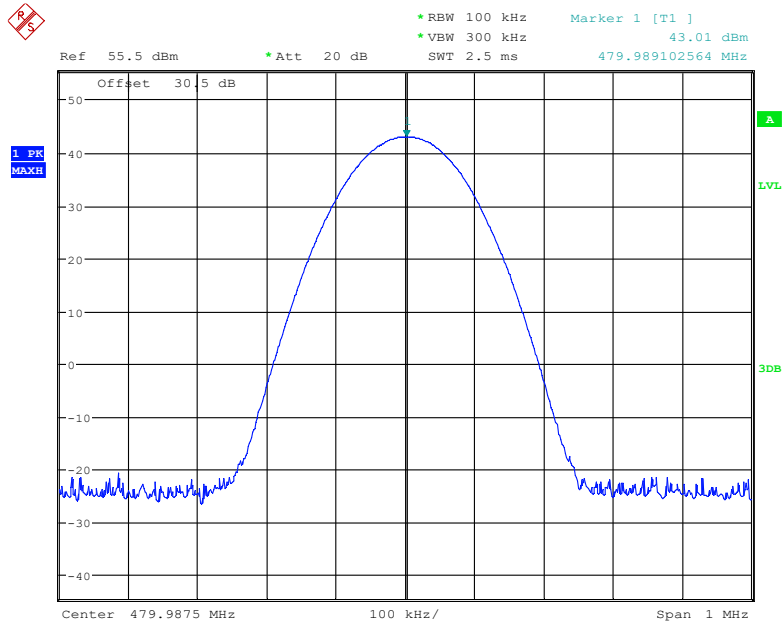
Frequency 479.9875 MHz, Low Power

Date: 14.OCT.2021 12:48:50

Frequency 479.9875 MHz, Middle Power

Date: 14.OCT.2021 12:49:44

Frequency 479.9875 MHz, High Power



Date: 10.NOV.2021 13:20:42

FCC §2.1049 & §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

Applicable Standard

FCC §2.1049 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.

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:	25 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2022-01-18 and 2022-01-19.

Test mode: transmitting

Test Result: Pass. Please refer to the following tables and plots.

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power Level	99% Occupied Bandwidth (kHz)	26 dB Emissions Bandwidth (kHz)
Digital	12.5	400.0125	High	6.827	8.077
	12.5		Middle	6.731	7.788
	12.5		Low	6.827	8.077

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power Level	99% Occupied Bandwidth (kHz)	26 dB Emissions Bandwidth (kHz)
Digital	12.5	440.0125	High	6.827	8.019
	12.5		Middle	6.731	7.442
	12.5		Low	6.635	8.019

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power Level	99% Occupied Bandwidth (kHz)	26 dB Emissions Bandwidth (kHz)
Digital	12.5	479.9875	High	6.635	7.731
	12.5		Middle	6.538	7.596
	12.5		Low	6.346	7.404

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

Emission Designator

For Digital Mode (Channel Spacing: 12.5 kHz)

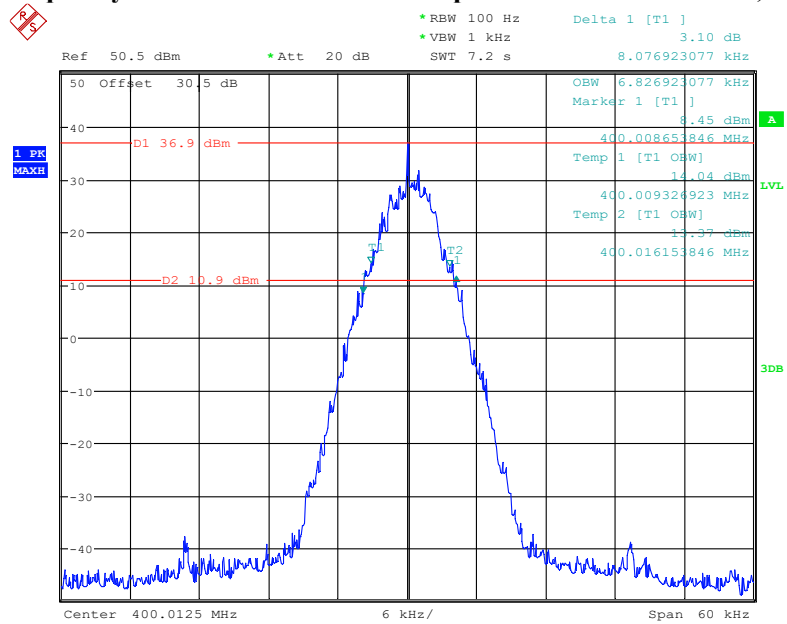
Emission Designator 7K60F1D and 7K60F1E

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).

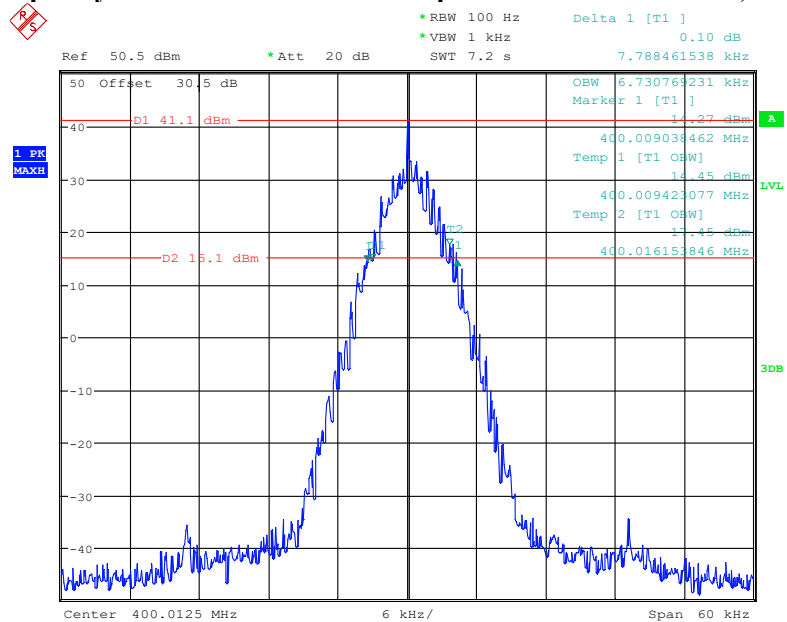
F1D and F1E portion of the designator indicates digital information.

Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60F1D and 7K60F1E.

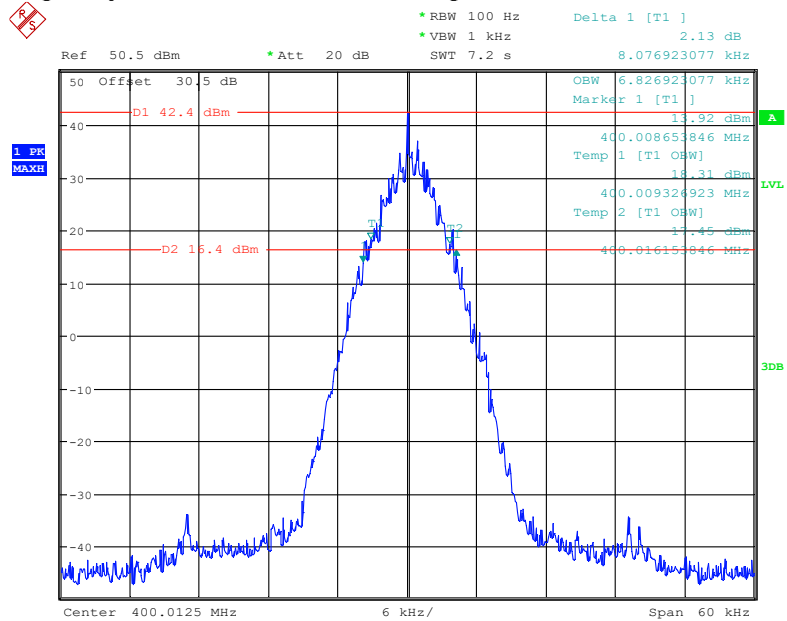
Digital:

Frequency 400.0125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power

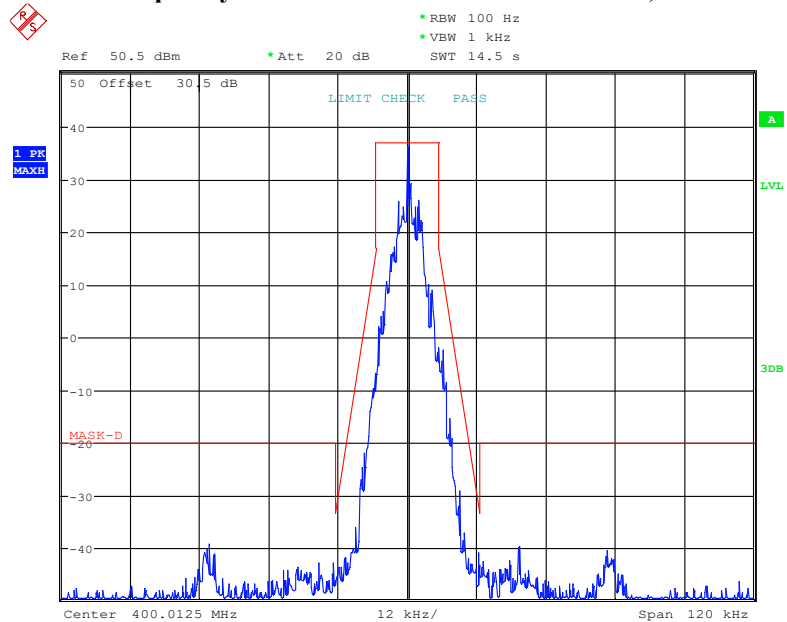
Date: 18.JAN.2022 16:27:32

Frequency 400.0125 MHz: 99% Occupied & 26 dB Bandwidth, Middle Power

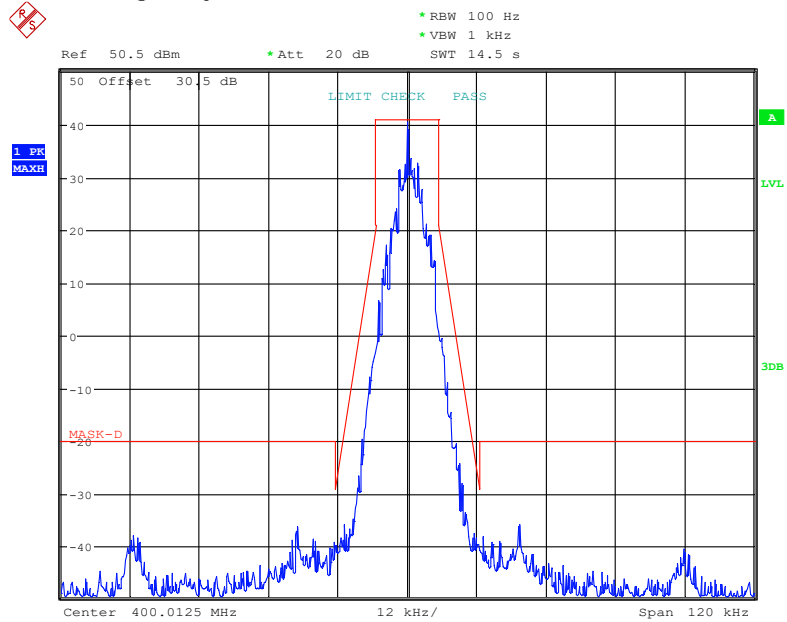
Date: 18.JAN.2022 16:42:04

Frequency 400.0125 MHz: 99% Occupied & 26 dB Bandwidth, High Power

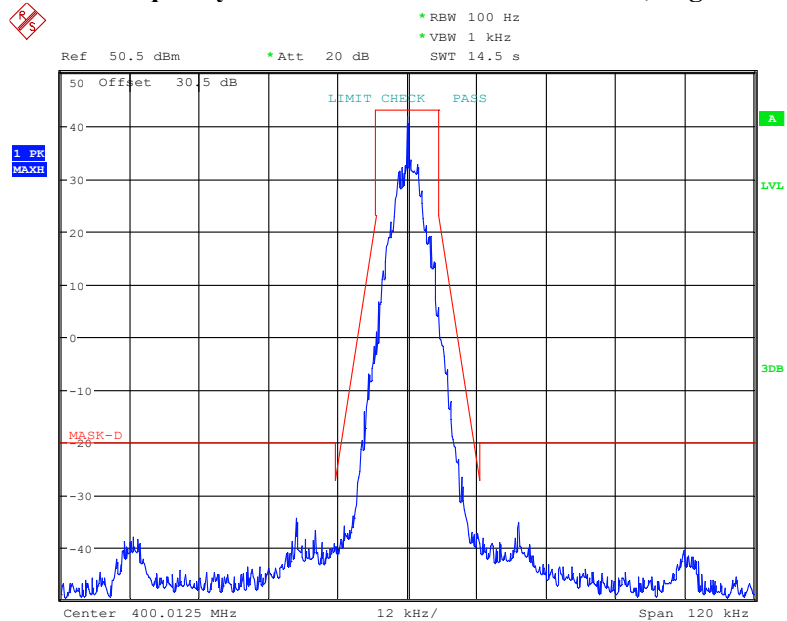
Date: 18.JAN.2022 16:43:28

Frequency 400.0125 MHz: Emission Mask D, Low Power

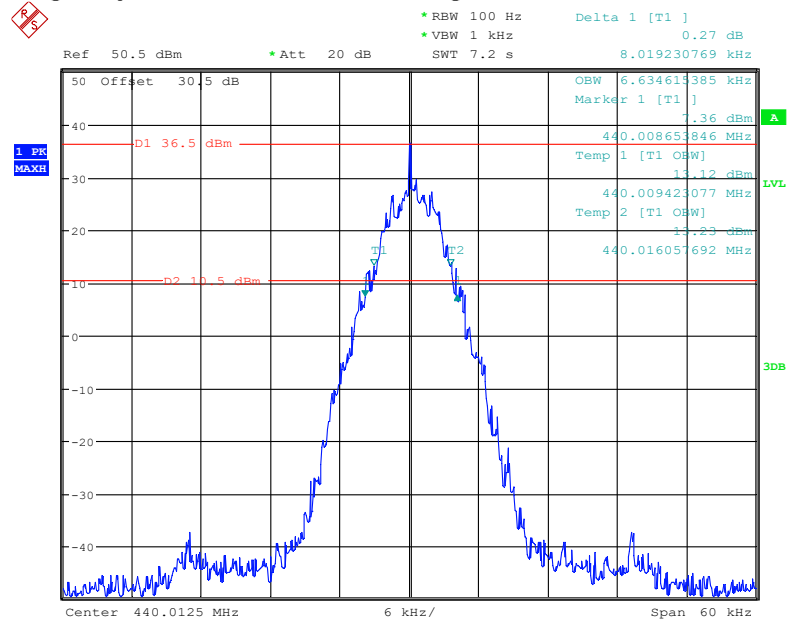
Date: 18.JAN.2022 15:01:01

Frequency 400.0125 MHz: Emission Mask D, Middle Power

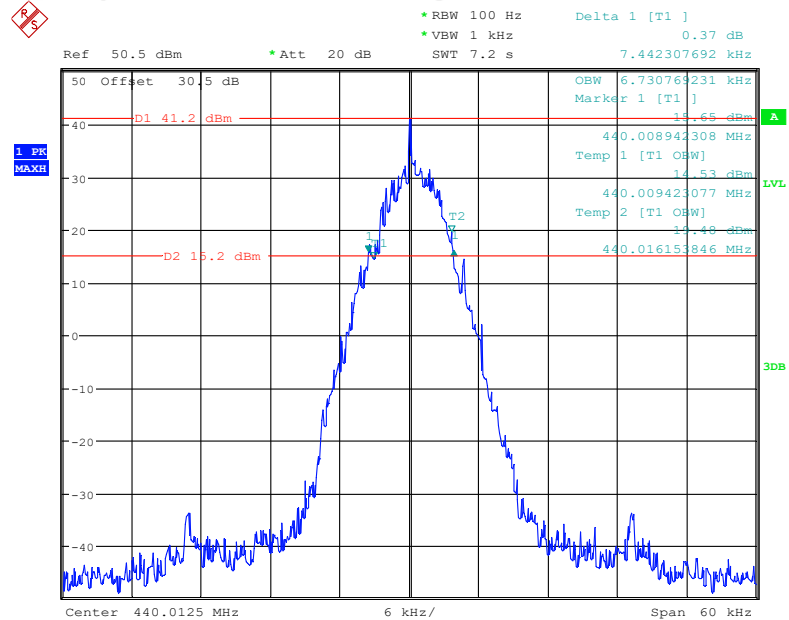
Date: 18.JAN.2022 14:56:48

Frequency 400.0125 MHz: Emission Mask D, High Power

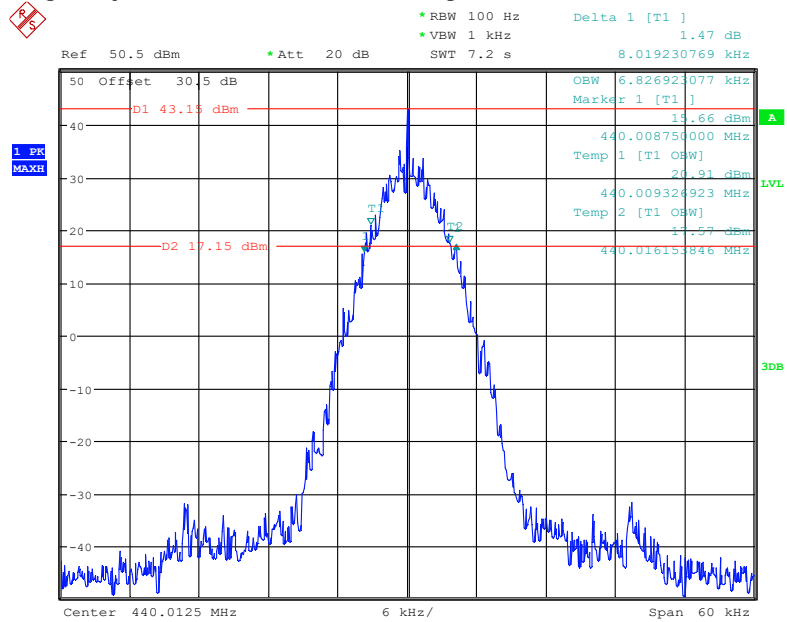
Date: 18.JAN.2022 14:58:05

Frequency 440.0125MHz: 99% Occupied & 26 dB Bandwidth, Low Power

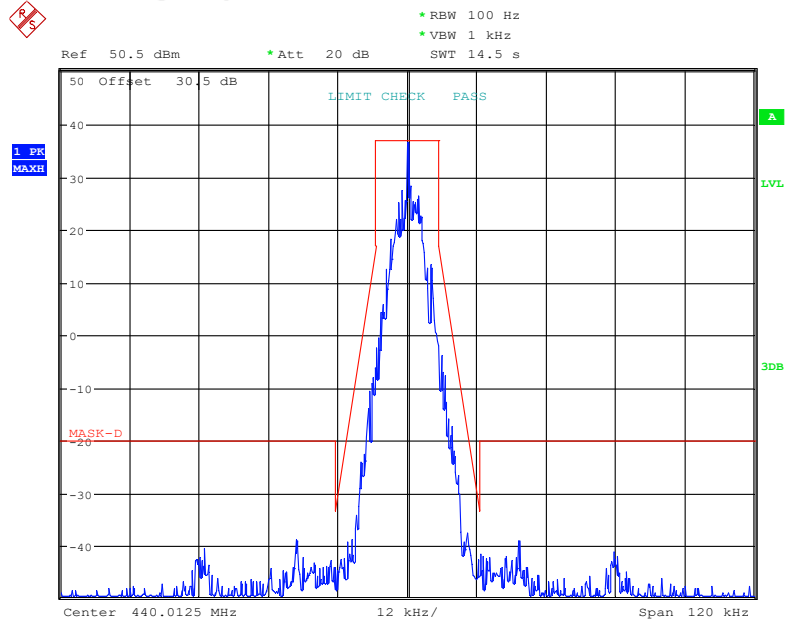
Date: 18.JAN.2022 16:50:12

Frequency 440.0125MHz: 99% Occupied & 26 dB Bandwidth, Middle Power

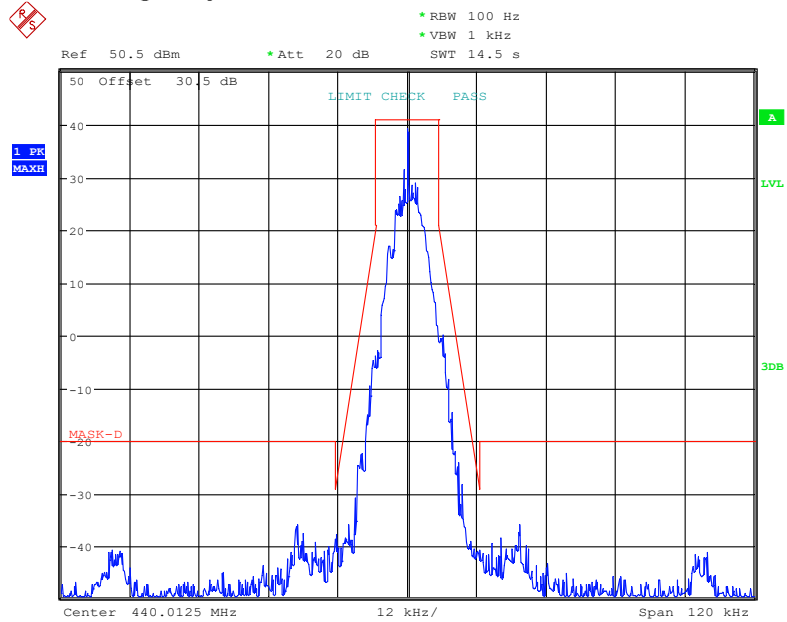
Date: 18.JAN.2022 16:54:33

Frequency 440.0125MHz: 99% Occupied & 26 dB Bandwidth, High Power

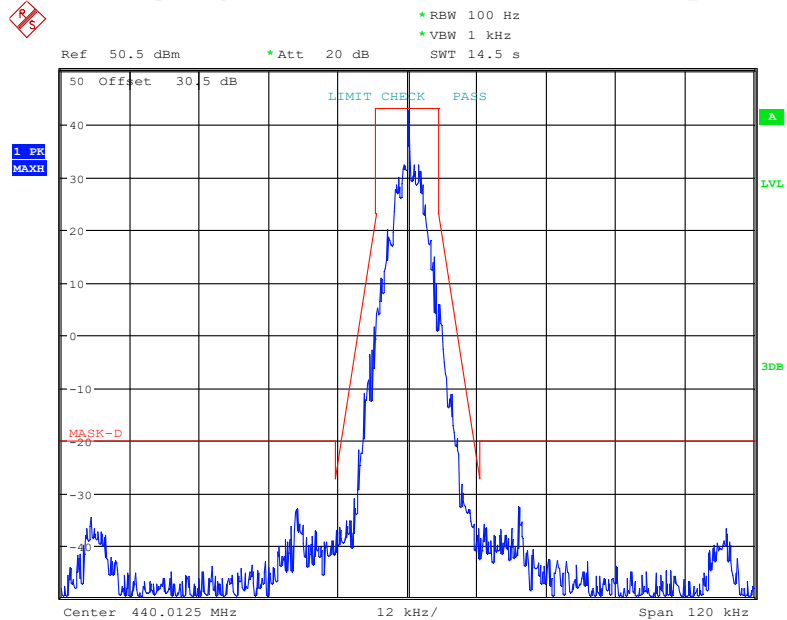
Date: 18.JAN.2022 17:03:02

Frequency 440.0125MHz: Emission Mask D, Low Power

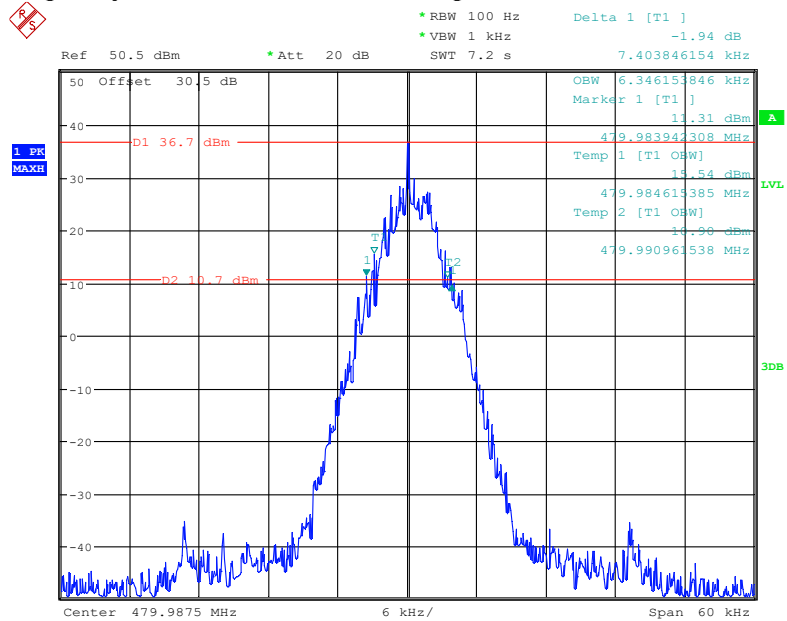
Date: 18.JAN.2022 15:12:43

Frequency 440.0125MHz: Emission Mask D, Middle Power

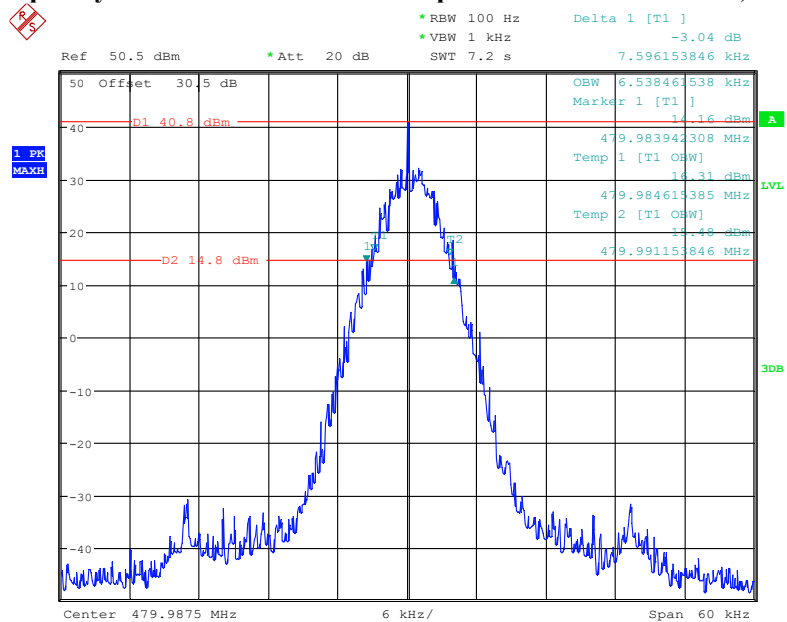
Date: 18.JAN.2022 15:17:22

Frequency 440.0125MHz: Emission Mask D, High Power

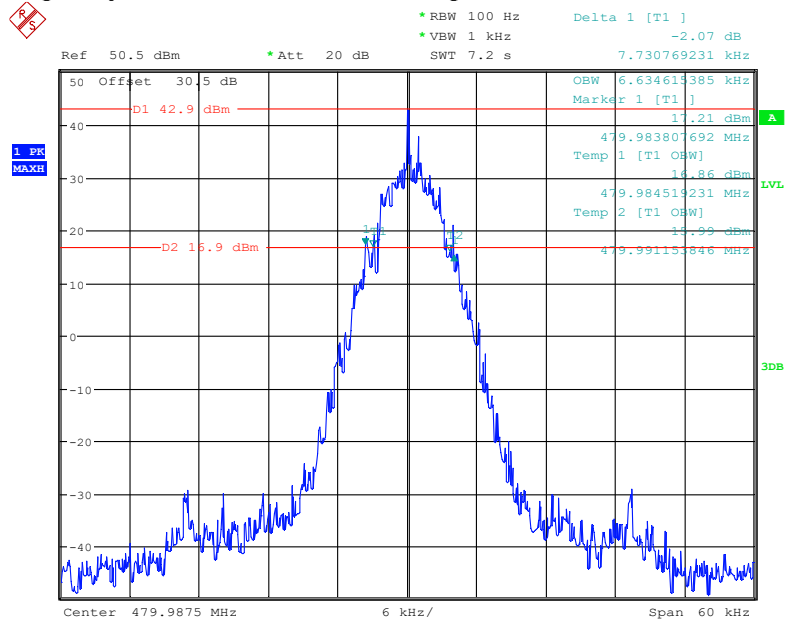
Date: 19.JAN.2022 09:10:06

Frequency 479.9875 MHz: 99% Occupied & 26 dB Bandwidth, Low Power

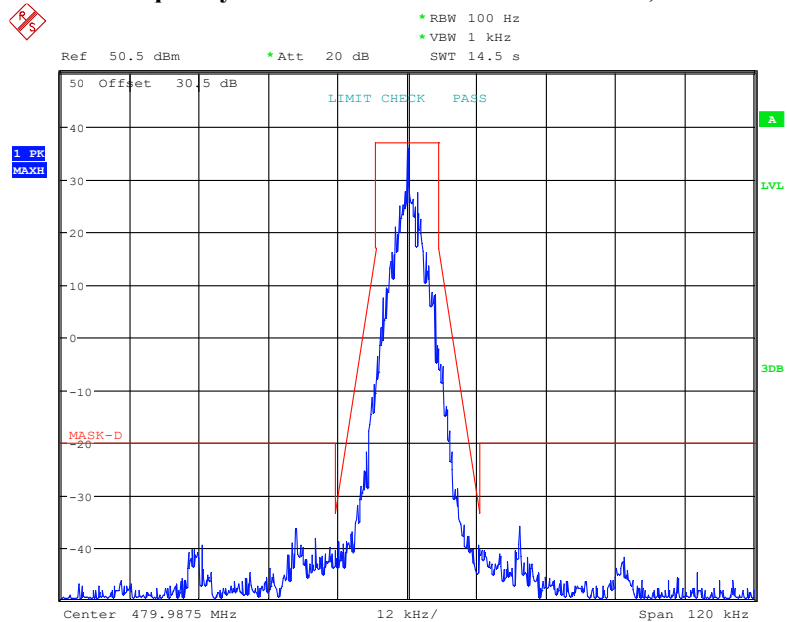
Date: 18.JAN.2022 16:18:15

Frequency 479.9875 MHz: 99% Occupied & 26 dB Bandwidth, Middle Power

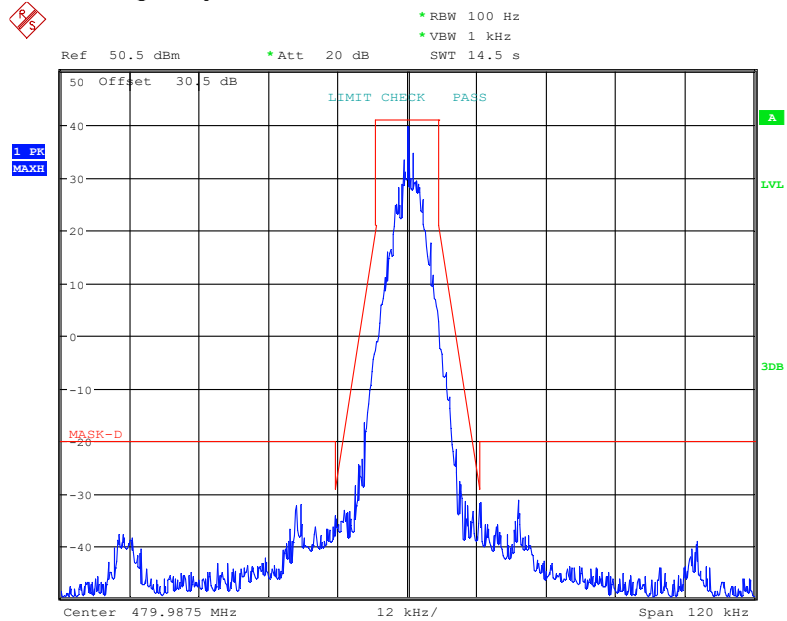
Date: 18.JAN.2022 16:20:06

Frequency 479.9875 MHz: 99% Occupied & 26 dB Bandwidth, High Power

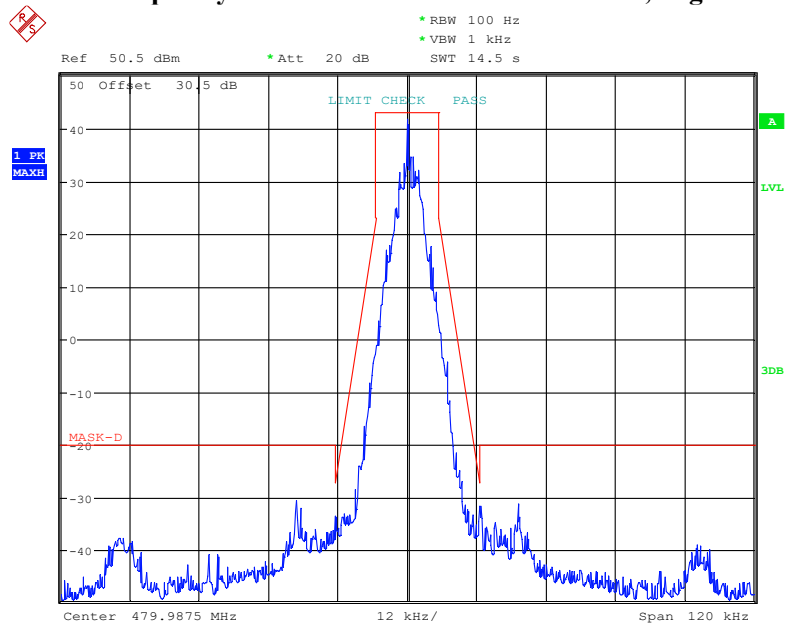
Date: 18.JAN.2022 16:17:11

Frequency 479.9875 MHz: Emission Mask D, Low Power

Date: 18.JAN.2022 15:28:27

Frequency 479.9875 MHz: Emission Mask D, Middle Power

Date: 18.JAN.2022 15:30:42

Frequency 479.9875 MHz: Emission Mask D, High Power

Date: 18.JAN.2022 15:32:41

FCC §2.1051 & §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.

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

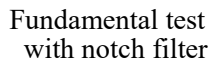
Temperature:	25 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2021-10-14 and 2021-11-23.

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

Test Result: Pass. Please refer to the following plots.

30MHz – 1 GHz, - Low Channel

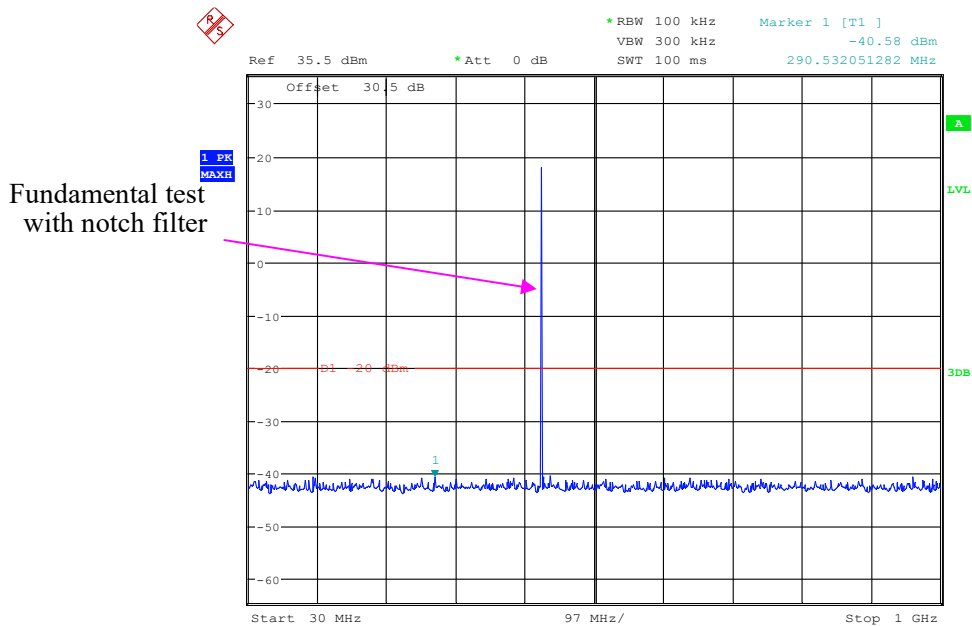


1 GHz – 5 GHz, - Low Channel



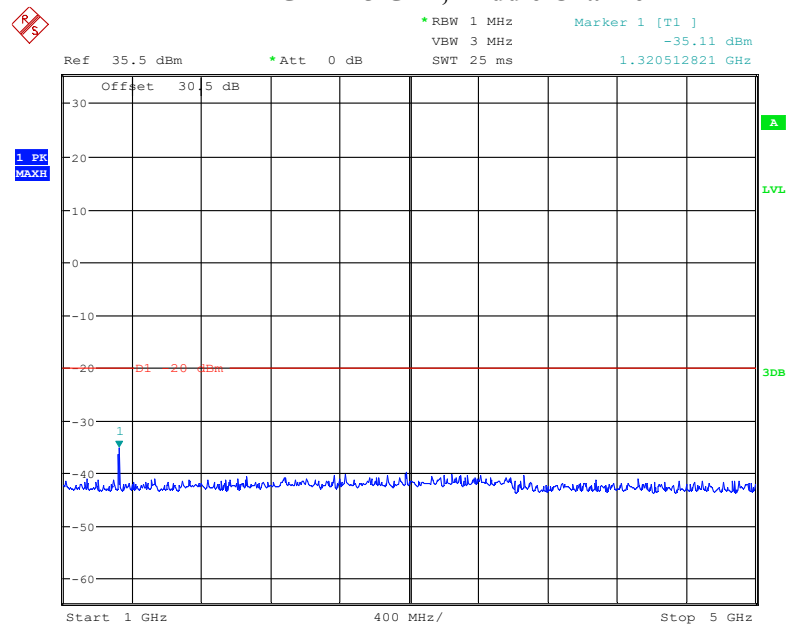
FCC- RF

30MHz – 1 GHz, - Middle Channel

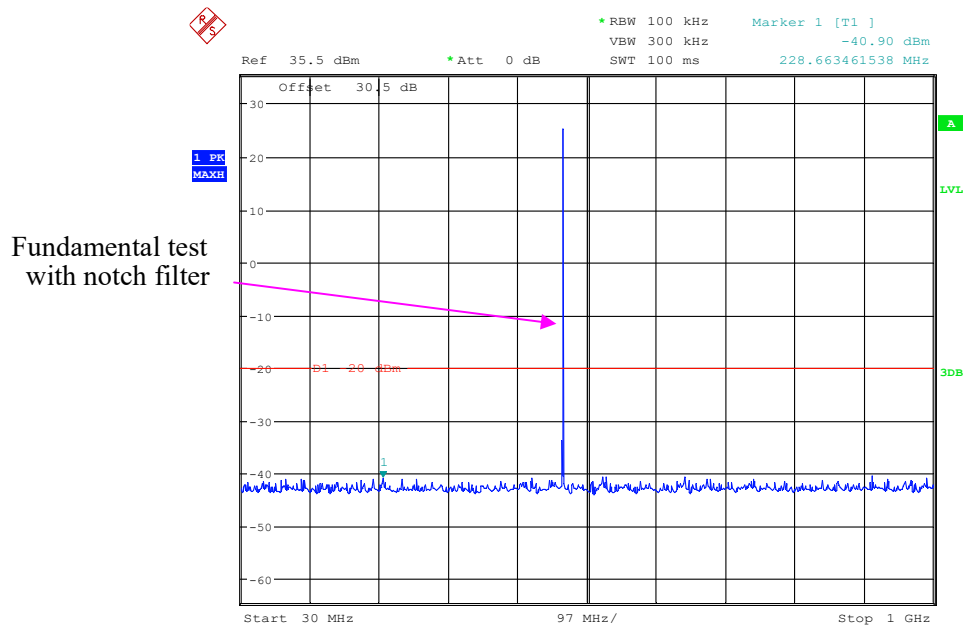


Date: 14.OCT.2021 10:53:10

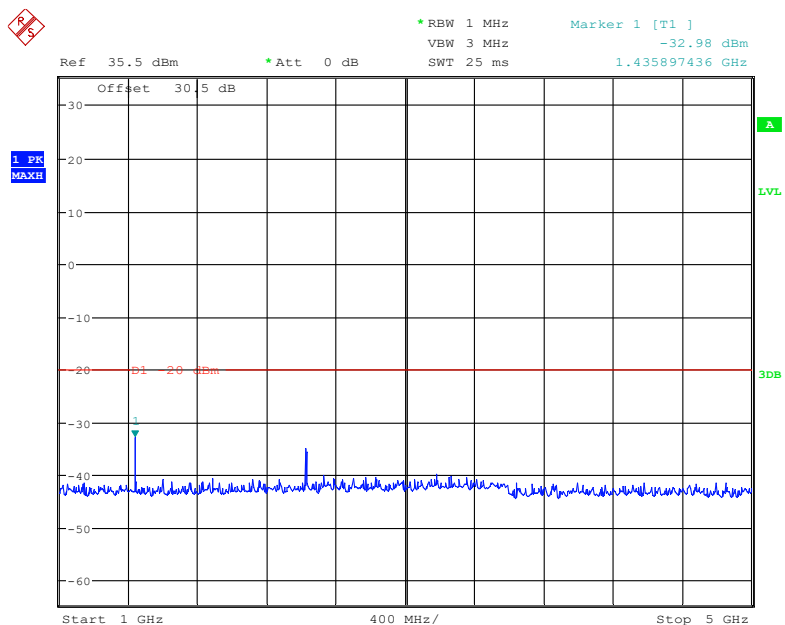
1 GHz – 5 GHz, Middle Channel



Date: 14.OCT.2021 10:53:43

30MHz – 1 GHz, - High Channel

Date: 23.NOV.2021 10:48:14

1 GHz – 5 GHz, High Channel

Date: 23.NOV.2021 10:48:38

FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053 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 lg (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = 50 + 10 Log₁₀ (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

Test Data

Environmental Conditions

Temperature:	25~26.7 °C
Relative Humidity:	46~55 %
ATM Pressure:	101.0 kPa

The testing was performed by Caro hu on 2021-11-05 for below 1GHz and 2021-11-12 for above 1GHz.

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

Test Result: Pass. Please refer to the following tables.

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
400.0125MHz								
800.025	-60.92	299	1.8	H	10.62	-50.3	-20	30.3
800.025	-61.35	314	1.1	V	12.05	-49.3	-20	29.3
1200.04	-46.93	215	1.5	H	-1.97	-48.9	-20	28.9
1200.04	-45.71	249	1.9	V	-1.79	-47.5	-20	27.5
1600.05	-42.59	232	1.4	H	-2.81	-45.4	-20	25.4
1600.05	-43.81	174	1.2	V	-2.89	-46.7	-20	26.7
2000.06	-36.35	187	1	V	-1.25	-37.6	-20	17.6
2000.06	-37.54	351	1.1	H	-1.56	-39.1	-20	19.1
2400.08	-43.12	68	1.6	V	1.32	-41.8	-20	21.8
2400.08	-44.16	212	1.9	H	1.36	-42.8	-20	22.8
2800.09	-33.49	294	1.9	V	2.79	-30.7	-20	10.7
2800.09	-34.83	28	1.4	V	2.93	-31.9	-20	11.9
3200.1	-38.09	243	1.7	H	2.79	-35.3	-20	15.3
3200.1	-36.03	118	1.6	V	2.93	-33.1	-20	13.1
3600.11	-38.04	13	1.6	H	3.54	-34.5	-20	14.5
3600.11	-34.37	125	1.8	V	3.47	-30.9	-20	10.9
4000.13	-44.79	15	1.5	V	6.39	-38.4	-20	18.4
4000.13	-41.18	295	1.7	H	6.28	-34.9	-20	14.9
440.0125 MHz								
880.025	-69.29	293	2.1	H	11.07	-58.22	-20	38.22
880.025	-73.57	102	2	V	12.25	-61.32	-20	41.32
1320.04	-44.87	16	2.1	H	-0.53	-45.4	-20	25.4
1320.04	-48.66	248	1.9	V	-0.74	-49.4	-20	29.4
1760.05	-36.13	295	1.7	H	-2.47	-38.6	-20	18.6
1760.05	-34.61	165	1.8	V	-2.49	-37.1	-20	17.1
2200.06	-41.35	62	2.2	V	-1.25	-42.6	-20	22.6
2200.06	-40.34	144	1.1	H	-1.56	-41.9	-20	21.9
2640.08	-42.12	190	1.2	V	1.32	-40.8	-20	20.8
2640.08	-41.76	348	1.4	H	1.36	-40.4	-20	20.4
3080.09	-29.69	333	1.9	V	2.79	-26.9	-20	6.9
3080.09	-33.13	166	1.6	V	2.93	-30.2	-20	10.2
3520.1	-36.04	242	1.5	H	3.54	-32.5	-20	12.5
3520.1	-33.27	32	1.1	V	3.47	-29.8	-20	9.8
3960.11	-43.29	285	1.8	H	6.39	-36.9	-20	16.9
3960.11	-42.88	13	1	V	6.28	-36.6	-20	16.6
4400.13	-34.59	127	1.6	V	8.69	-25.9	-20	5.9
4400.13	-32.77	141	1.8	H	8.27	-24.5	-20	4.5

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
479.9875 MHz								
959.975	-70.55	347	1	H	11.79	-58.76	-20	38.76
959.975	-71.44	1	1.8	V	12.48	-58.96	-20	38.96
1439.96	-44.17	273	1.7	H	-0.53	-44.7	-20	24.7
1439.96	-44.66	109	2	V	-0.74	-45.4	-20	25.4
1919.95	-40.65	205	1.9	H	-1.25	-41.9	-20	21.9
1919.95	-38.54	211	1.5	V	-1.56	-40.1	-20	20.1
2399.94	-45.22	90	2	V	1.32	-43.9	-20	23.9
2399.94	-44.26	101	2	H	1.36	-42.9	-20	22.9
2879.93	-37.82	68	1.7	V	1.32	-36.5	-20	16.5
2879.93	-38.86	175	1.8	H	1.36	-37.5	-20	17.5
3359.91	-38.24	323	1.6	V	3.54	-34.7	-20	14.7
3359.91	-39.07	180	1.8	V	3.47	-35.6	-20	15.6
3839.9	-43.89	47	1.5	H	6.39	-37.5	-20	17.5
3839.9	-42.38	319	1.1	V	6.28	-36.1	-20	16.1
4319.89	-41.09	84	1.5	H	8.69	-32.4	-20	12.4
4319.89	-40.97	270	1.7	V	8.27	-32.7	-20	12.7
4799.88	-44.29	153	1.1	V	9.19	-35.1	-20	15.1
4799.88	-41.7	324	1	H	8.3	-33.4	-20	13.4

Note:

Absolute Level = Reading Level + Substituted Factor

Substituted Factor contains: SG Level - Cable loss+ Antenna Gain

Margin = Limit - Absolute Level

FCC §2.1055 & §90.213 - FREQUENCY STABILITY

Applicable Standard

FCC §2.1055 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:	25 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2021-10-14 to 2021-11-10.

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

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

Digital Modulation, Reference Frequency: 440.0125MHz, Limit: ± 1.5 ppm			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (°C)	Voltage Supplied (V _{AC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	120	440.012785	0.648
40	120	440.012836	0.764
30	120	440.012754	0.577
20	120	440.012981	1.093
10	120	440.012937	0.993
0	120	440.012877	0.857
-10	120	440.013015	1.170
-20	120	440.013005	1.148
-30	120	440.012912	0.936
Frequency Stability versus Input Voltage			
20	102	440.012639	0.316
20	138	440.012752	0.573

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

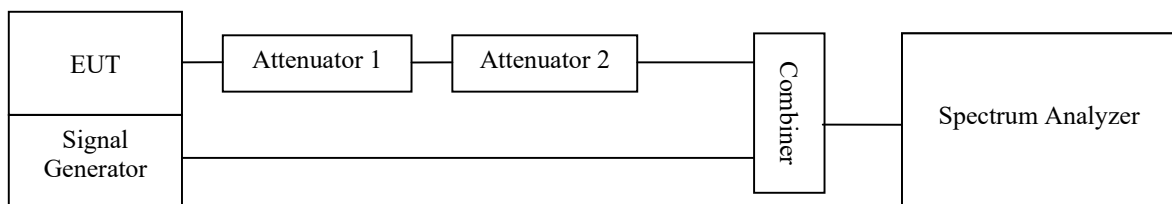
Applicable Standard

Regulations: FCC §90.214

Test method: ANSI C63.26-2015 §6.5.2

Test Procedure

- Connect the EUT and test equipment as shown on the following block diagram.
- Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
- 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.
- Turn on the transmitter.
- 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 .
- Turn off the transmitter.
- 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.
- Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
- 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.
- 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 .
- 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

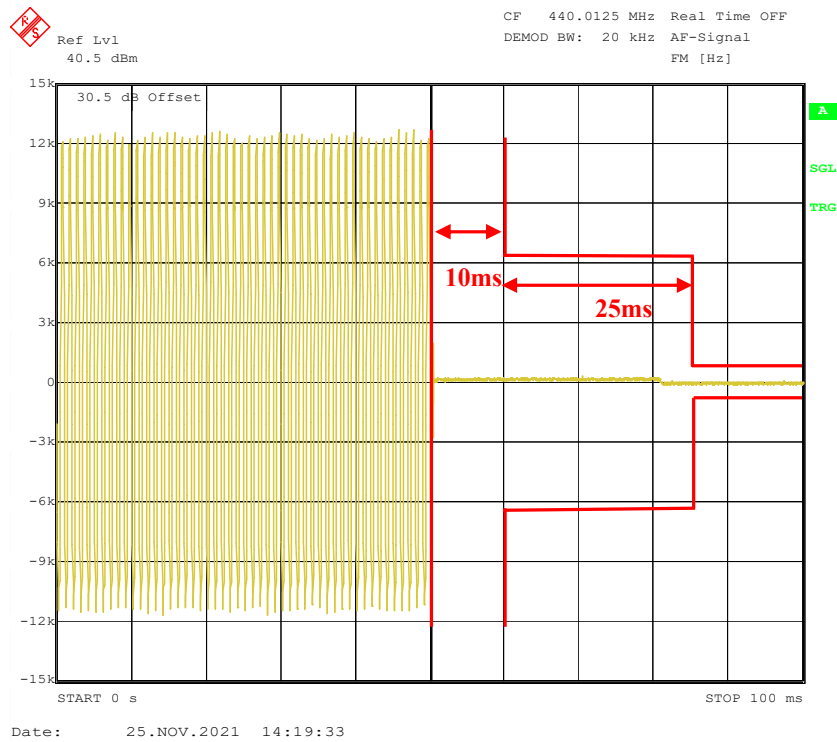
Environmental Conditions

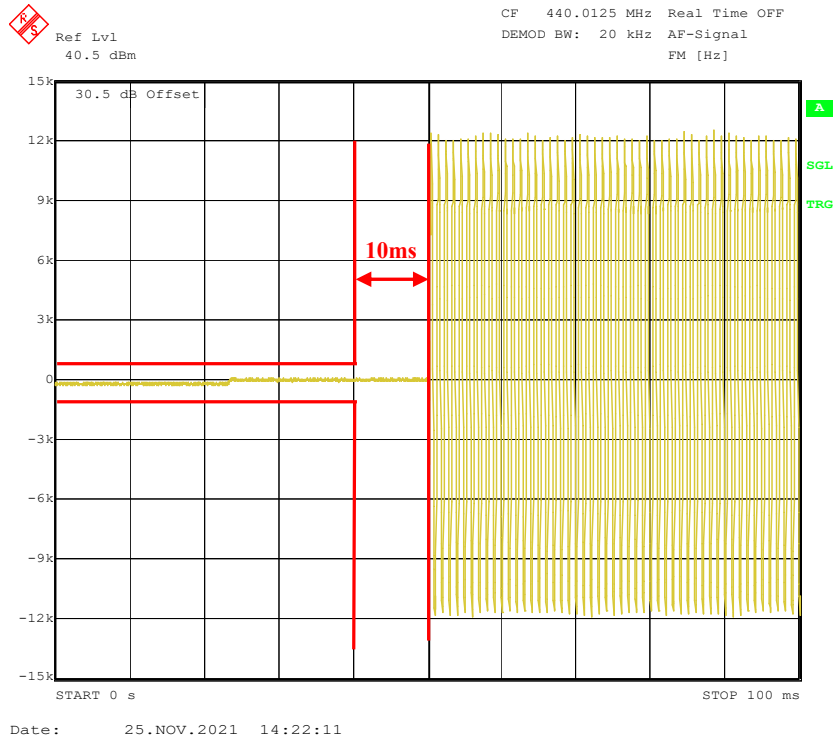
Temperature:	25 °C
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Ding on 2021-11-25.

Test Result: Pass. Please refer to the following tables and plots.

Turn on



Turn off******* END OF REPORT *******