TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 90

TEST REPORT

For

Alinco Incorporated, Electronics Division

Yodoyabashi Dai Building 13F, 4-4-9 Koraibashi, Chuo-Ku, Osaka 541-0043, Japan

FCC ID: PH3DR-MD500T

Report Type:	**Product Type:**
Original Report	VHF/UHF DUAL BAND TRANSCEIVER

Project Engineer:	CK Huang
Report Number:	RSHD201211004-00B
Report Date:	2021-03-09
Reviewed By:	Oscar Ye EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Alinco Incorporated, Electronics Division
Tested Model	DR-MD500T
Product Type	VHF/UHF DUAL BAND TRANSCEIVER
Modulation Mode	FM/4FSK
Maximum Output Power(Conducted)	136-174MHz: High: 55W; Low: 5W 400-480MHz: High: 40W; Low: 5W
Operation Frequency	136-174MHz 400-480MHz
Power Supply	DC 13.8V
*Antenna Gain	1.0 dBi

Note: The Maximum Antenna Gain was provided by manufacturer.*

All measurement and test data in this report was gathered from production sample serial number: RSHD201211004-1.(Assigned by the BACL. The EUT supplied by the applicant was received on 2020-12-11)

Objective

This test report is prepared on behalf of *Alinco Incorporated, Electronics Division* in accordance with Part 2 and Part 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

No Related Submittal(s)/Grant(s)

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, 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 Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item	Uncertainty
Occupied Channel Bandwidth	±5%
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz~1GHz: 5.91dB 1GHz~6GHz: 4.68dB 6 GHz ~18 GHz: 4.92dB
Unwanted Emissions, conducted	±1.5dB
Temperature	±1.0℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.26-2015.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

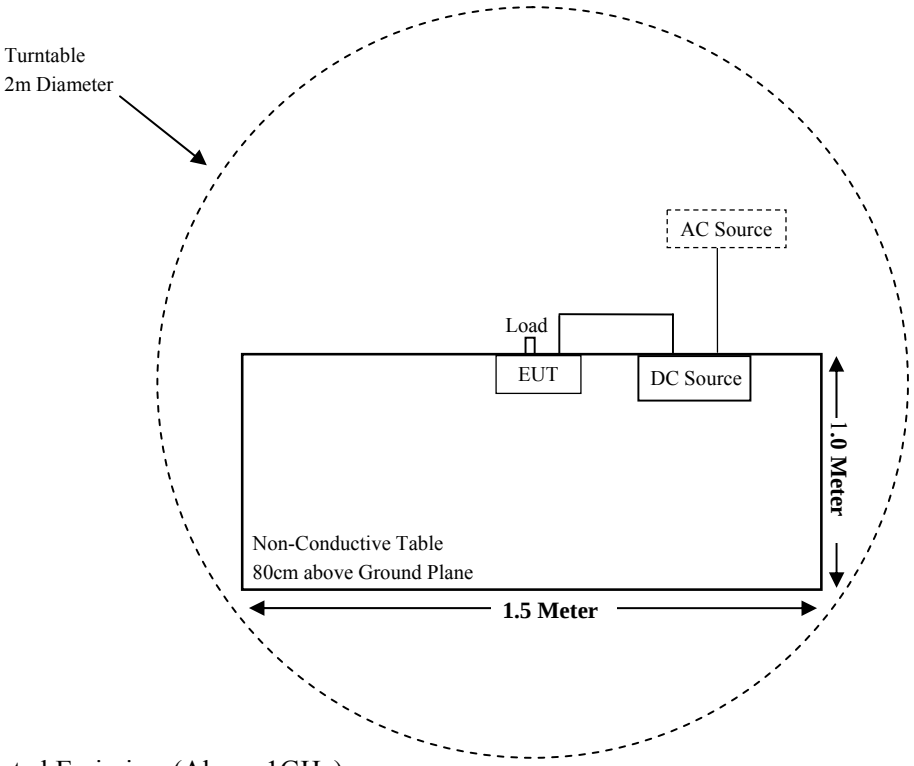
Manufacturer	Description	Model	Serial Number
EAST	DC Source	MCH-303D-II	14070562
N/A	Load	50Ω	N/A

External I/O Cable

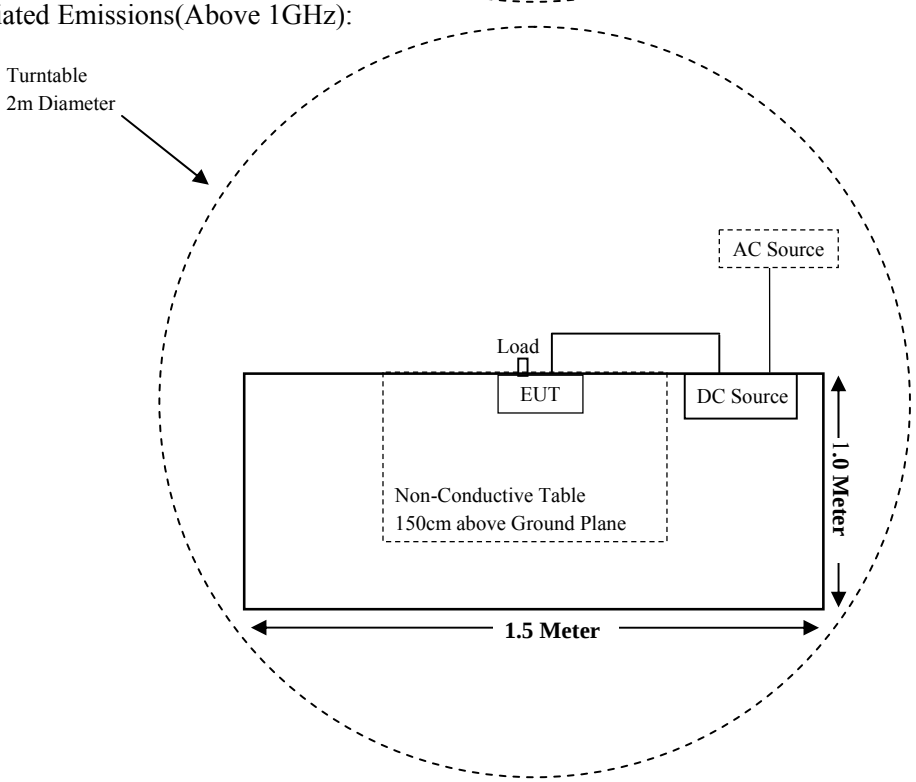
Cable Description	Length (m)	From/Port	To
Power Cable	1.2	EUT	DC Source

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§2.1046, §90.205	RF Output Power	Compliant
§2.1047, §90.207	Modulation Characteristic	Compliant
§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

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2020-11-27	2021-11-26
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2020-08-05	2023-08-04
Sunol Sciences	Bilog antenna	JB3	A060217	2020-11-28	2023-11-27
HP	Signal Generator	N5183A	MY51040755	2020-11-27	2021-11-26
Sonoma Instrunent	Pre-amplifier	310N	171205	2020-08-14	2021-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2020-08-15	2021-08-14
Radiated Emission Test（Chamber 2#）					
HP	Signal Generator	N5183A	MY51040755	2020-11-27	2021-11-26
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2020-04-01	2021-03-31
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2020-07-14	2023-07-13
ETS-LINDGREN	Horn Antenna	3115	6229	2020-01-07	2023-01-06
A.H.Systems,inc	Amplifier	PAM-0118P	512	2020-02-20	2021-02-19
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2020-08-15	2021-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048/027	2020-11-27	2021-11-26
Narda	Attenuator	30dB	030	2020-08-15	2021-08-14
BACL	Temperature & Humidity Chamber	BTH-150	30023	2020-11-25	2021-11-24
ZHAOXIN	DC Power Supply	RXN-605D	DC002	2020-10-10	2021-10-09
HP	RF communication test SET.	8920B	079	2020-04-01	2021-03-31
Alinco Incorporated, Electronics Division	RF Cable	Alinco Incorporated, Electronics Division C01	C01	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) 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, §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:

RB/W	Video B/W
100 kHz	300 kHz

Test Data

Environmental Conditions

Temperature:	23.1 ℃
Relative Humidity:	55 %
ATM Pressure:	101.2 kPa

The testing was performed by CK Huang on 2021-02-02.

Test Result: Compliant.

Test Mode: Transmitting

Band (MHz)	Modulation Mode	Channel Separation (kHz)	Frequency (MHz)	Power Level	Output Power (dBm)	Output Power (W)
136-174	Analog	12.5	136.025	High	46.97	49.77
				Lower	37.12	5.15
		12.5	155.000	High	47.09	51.17
				Lower	37.06	5.08
		12.5	173.975	High	47.02	50.35
				Lower	37.08	5.11
	Digital	12.5	136.025	High	46.99	50.00
				Lower	37.04	5.06
		12.5	155.000	High	47.01	50.23
				Lower	37.06	5.08
		12.5	173.975	High	47.06	50.82
				Lower	36.99	5.00
400-480	Analog	12.5	400.025	High	45.92	39.08
				Lower	36.88	4.88
		12.5	440.000	High	45.89	38.82
				Lower	36.91	4.91
		12.5	479.975	High	46.01	39.90
				Lower	37.00	5.01
	Digital	12.5	400.025	High	46.68	46.56
				Lower	36.91	4.91
		12.5	440.000	High	46.62	45.92
				Lower	36.89	4.89
		12.5	479.975	High	46.65	46.24
				Lower	37.01	5.02

Note: For 136-174MHz，the high rated power level is 55W and low rated power level is 5W.
For 400-480MHz，the high rated power level is 40W and low rated power level is 5W.

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: ANSI C63.26:2015

Test Data

Environmental Conditions

Temperature:	23.5 ℃
Relative Humidity:	55 %
ATM Pressure:	101.3 kPa

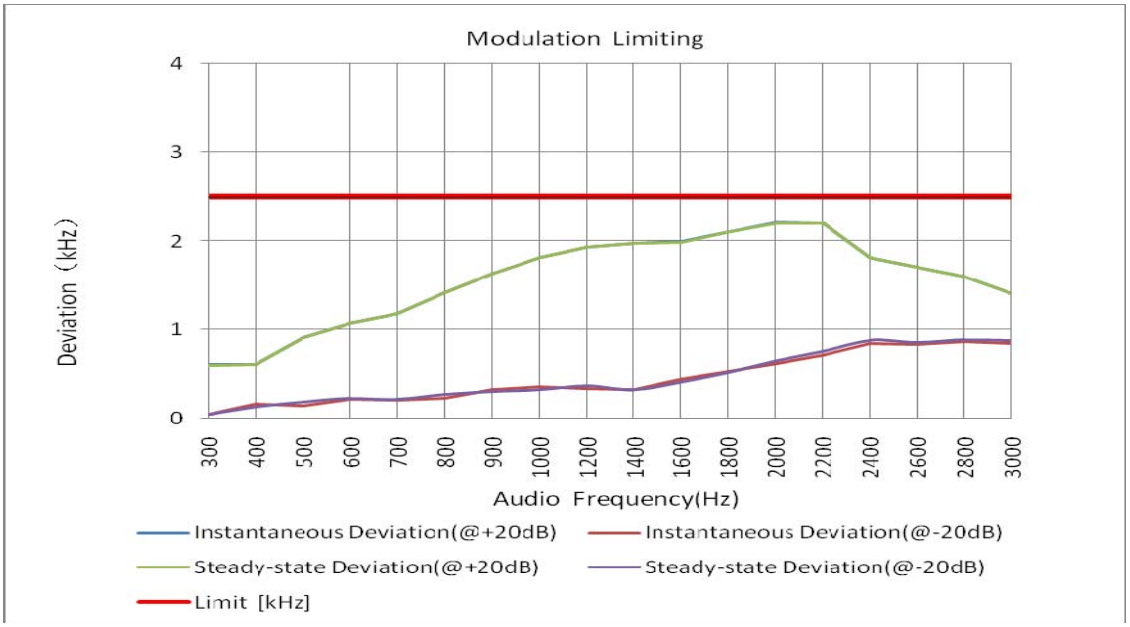
The testing was performed by CK Huang on 2021-02-07.

Test Mode: Transmitting

136-174 MHz Band:

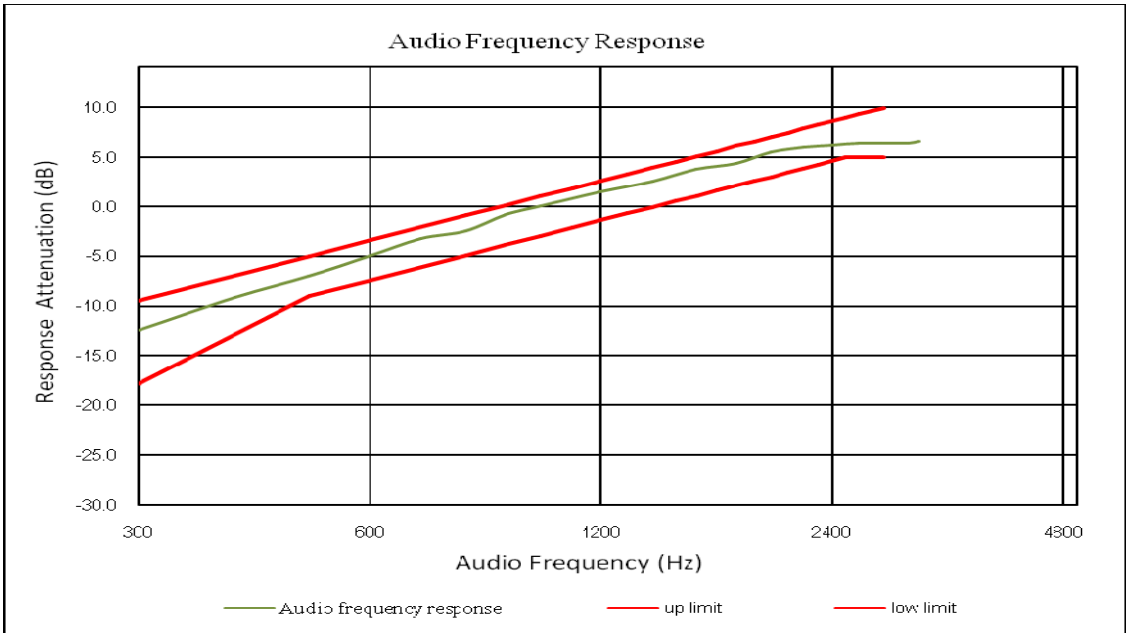
MODULATION LIMITING - High Power, 12.5kHz

Carrier Frequency: 136.025MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	0.609	0.044	0.601	0.042	2.5
400	0.602	0.165	0.606	0.133	2.5
500	0.908	0.140	0.906	0.189	2.5
600	1.067	0.220	1.069	0.227	2.5
700	1.183	0.204	1.180	0.215	2.5
800	1.414	0.227	1.417	0.274	2.5
900	1.627	0.323	1.629	0.308	2.5
1000	1.815	0.357	1.814	0.324	2.5
1200	1.932	0.337	1.935	0.373	2.5
1400	1.976	0.324	1.980	0.328	2.5
1600	1.995	0.448	1.993	0.415	2.5
1800	2.108	0.535	2.105	0.524	2.5
2000	2.210	0.619	2.208	0.648	2.5
2200	2.208	0.714	2.206	0.762	2.5
2400	1.811	0.846	1.814	0.880	2.5
2600	1.709	0.833	1.709	0.855	2.5
2800	1.604	0.865	1.605	0.887	2.5
3000	1.402	0.849	1.406	0.875	2.5



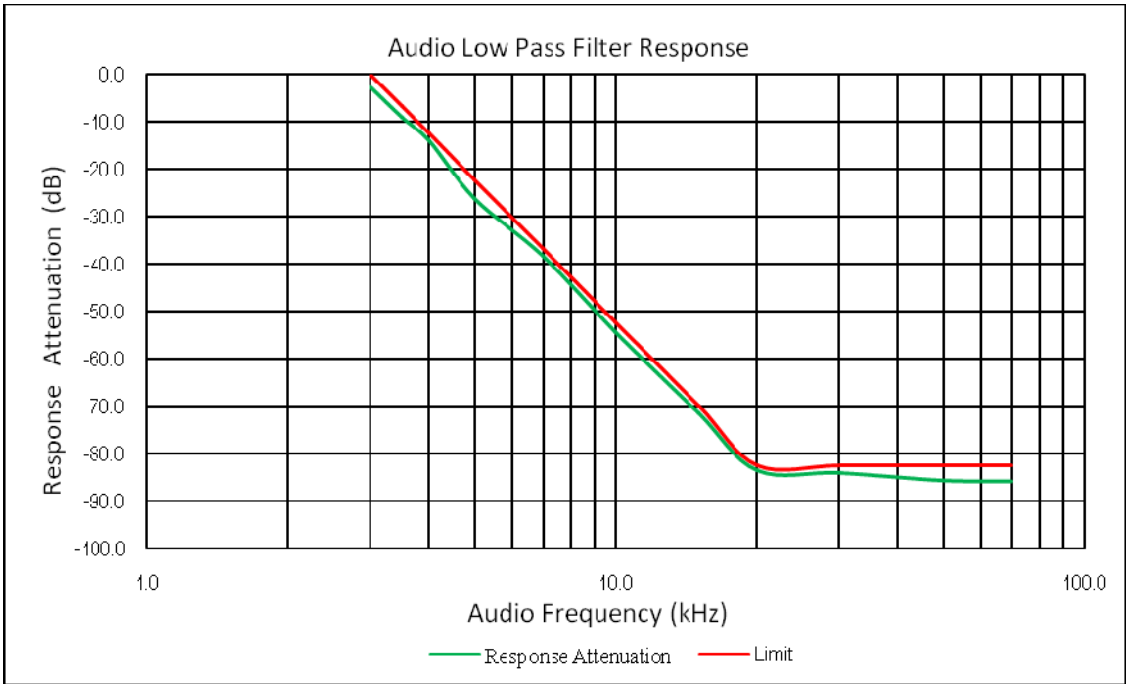
Audio Frequency Response - High Power, 12.5kHz

Carrier Frequency: 136.025MHz	
Audio Frequency (Hz)	**Response Attenuation (dB)**
300	-12.36
400	-9.12
500	-7.02
600	-4.96
700	-3.22
800	-2.46
900	-0.89
1000	0.00
1200	1.46
1400	2.56
1600	3.77
1800	4.39
2000	5.46
2200	5.96
2400	6.22
2600	6.34
2800	6.35
3000	6.39
3125	6.55



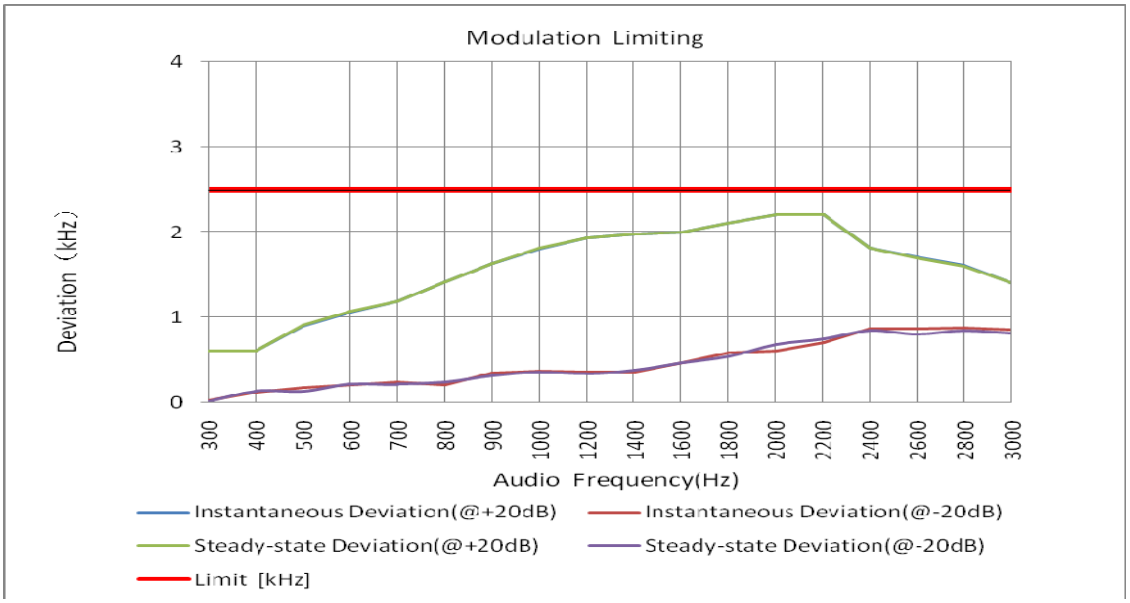
Audio Low Pass Filter Response - High Power,12.5kHz

Carrier Frequency: 136.025MHz		
Audio Frequency (kHz)	**Response Attenuation (dB)**	**Limit (dB)**
3.0	-2.6	0
3.5	-9.1	-6.7
4.0	-14.1	-12.5
5.0	-26.1	-22.2
7.0	-38.4	-36.8
10.0	-54.3	-52.3
15.0	-71.6	-69.9
20.0	-83.6	-82.5
30.0	-84.1	-82.5
50.0	-85.7	-82.5
70.0	-85.9	-82.5



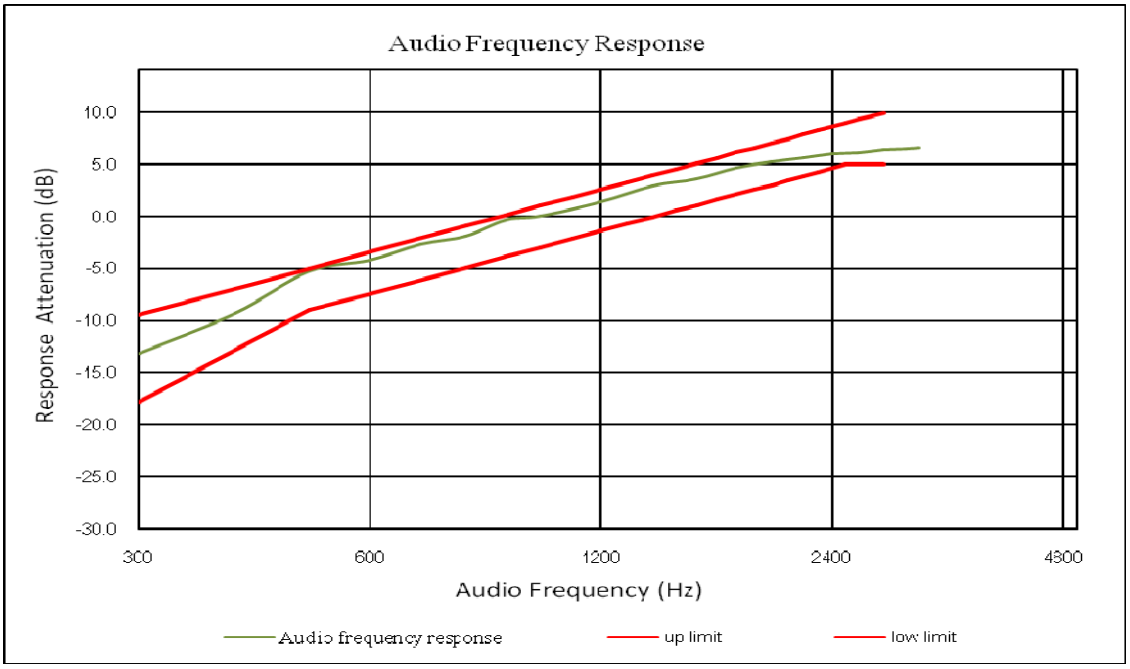
MODULATION LIMITING - High Power, 12.5kHz

Carrier Frequency: 155.000MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	0.604	0.029	0.605	0.014	2.5
400	0.607	0.124	0.609	0.137	2.5
500	0.902	0.176	0.909	0.131	2.5
600	1.061	0.203	1.067	0.221	2.5
700	1.187	0.241	1.185	0.216	2.5
800	1.414	0.206	1.411	0.241	2.5
900	1.627	0.347	1.627	0.318	2.5
1000	1.810	0.375	1.812	0.356	2.5
1200	1.937	0.354	1.936	0.340	2.5
1400	1.973	0.359	1.975	0.376	2.5
1600	1.997	0.465	1.999	0.462	2.5
1800	2.105	0.583	2.109	0.543	2.5
2000	2.206	0.607	2.201	0.682	2.5
2200	2.208	0.709	2.208	0.743	2.5
2400	1.812	0.862	1.817	0.849	2.5
2600	1.705	0.867	1.702	0.804	2.5
2800	1.608	0.879	1.601	0.843	2.5
3000	1.409	0.854	1.403	0.807	2.5



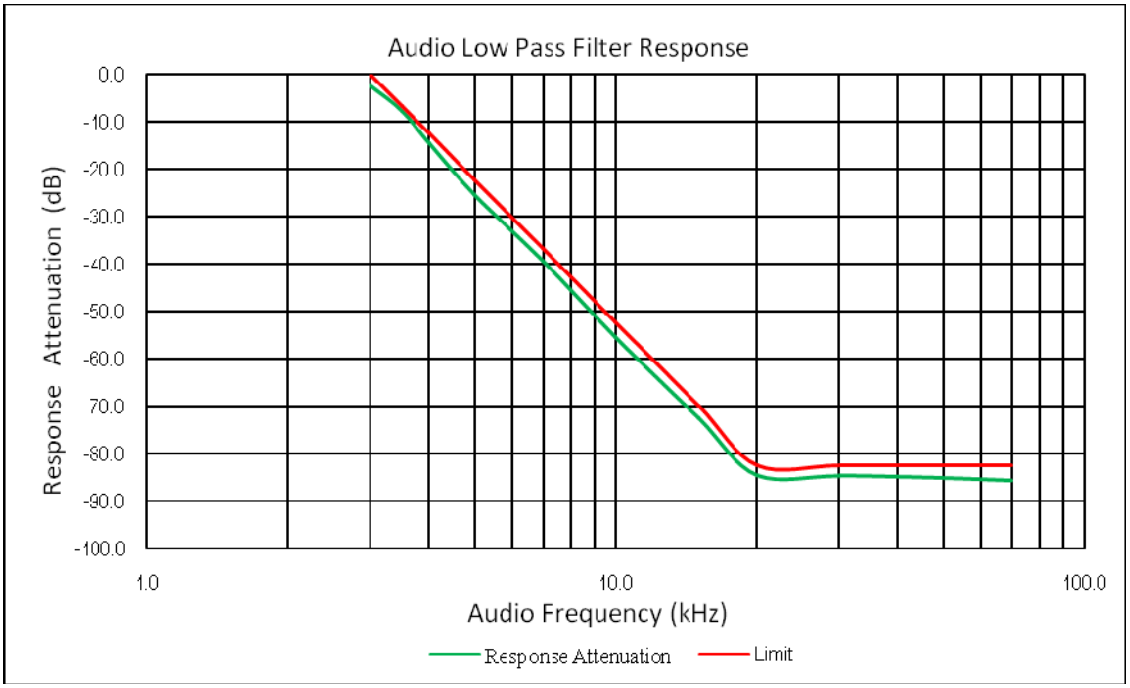
Audio Frequency Response - High Power, 12.5kHz

Carrier Frequency: 155.000MHz	
Audio Frequency (Hz)	**Response Attenuation (dB)**
300	-13.22
400	-9.36
500	-5.30
600	-4.18
700	-2.66
800	-1.89
900	-0.34
1000	0.00
1200	1.34
1400	2.95
1600	3.55
1800	4.66
2000	5.24
2200	5.64
2400	6.01
2600	6.13
2800	6.33
3000	6.49
3125	6.58



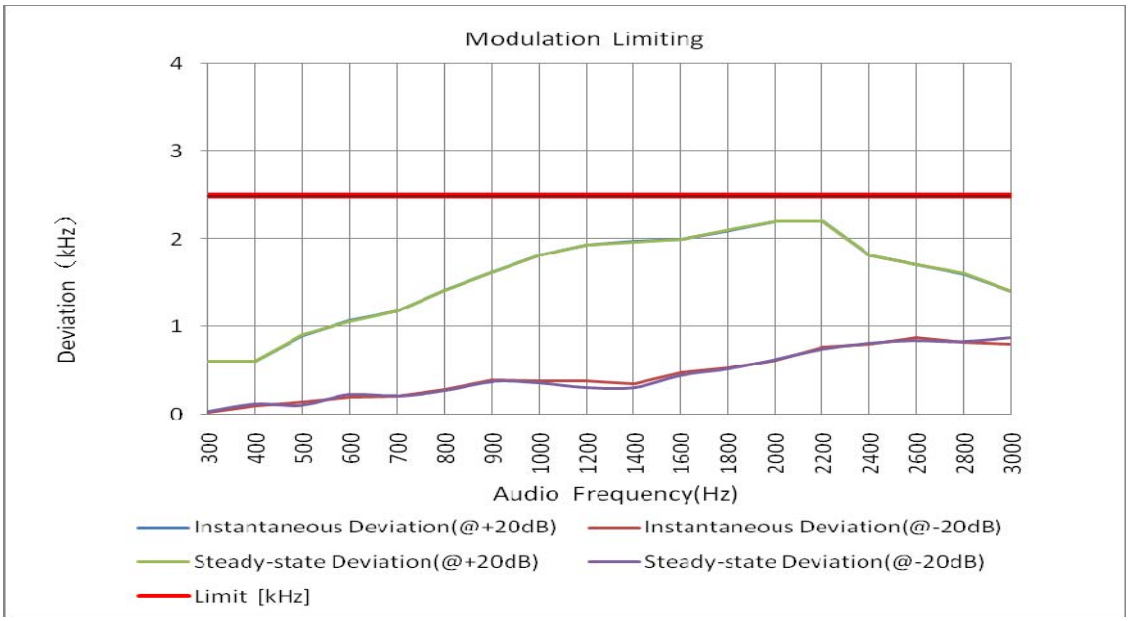
Audio Low Pass Filter Response - High Power,12.5kHz

Carrier Frequency: 155.000MHz		
Audio Frequency (kHz)	**Response Attenuation (dB)**	**Limit (dB)**
3.0	-2.4	0
3.5	-7.6	-6.7
4.0	-14.6	-12.5
5.0	-25.3	-22.2
7.0	-39.4	-36.8
10.0	-55.4	-52.3
15.0	-72.6	-69.9
20.0	-84.6	-82.5
30.0	-84.7	-82.5
50.0	-85.1	-82.5
70.0	-85.6	-82.5



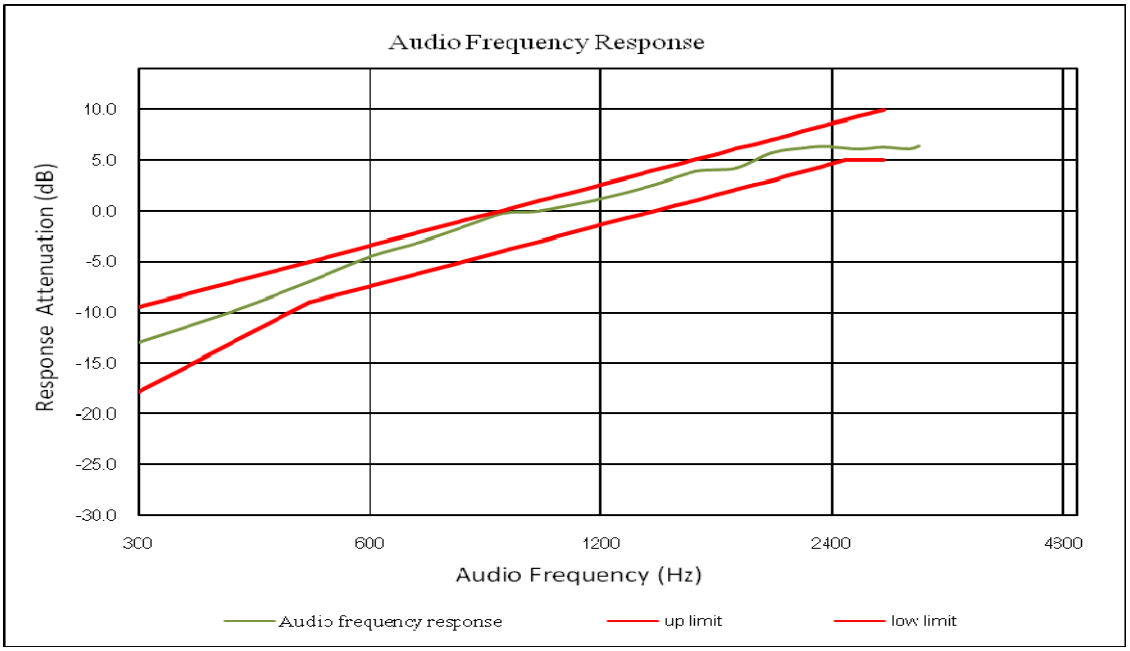
MODULATION LIMITING - High Power, 12.5kHz

Carrier Frequency: 173.975MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	0.606	0.030	0.603	0.041	2.5
400	0.610	0.103	0.605	0.126	2.5
500	0.902	0.139	0.909	0.112	2.5
600	1.068	0.201	1.063	0.228	2.5
700	1.183	0.213	1.181	0.213	2.5
800	1.420	0.282	1.419	0.271	2.5
900	1.623	0.390	1.626	0.373	2.5
1000	1.813	0.379	1.818	0.355	2.5
1200	1.938	0.378	1.933	0.304	2.5
1400	1.980	0.353	1.971	0.303	2.5
1600	1.995	0.480	1.994	0.450	2.5
1800	2.101	0.529	2.104	0.516	2.5
2000	2.207	0.622	2.202	0.633	2.5
2200	2.207	0.766	2.201	0.743	2.5
2400	1.812	0.804	1.815	0.811	2.5
2600	1.705	0.880	1.705	0.840	2.5
2800	1.601	0.826	1.607	0.829	2.5
3000	1.406	0.801	1.404	0.876	2.5



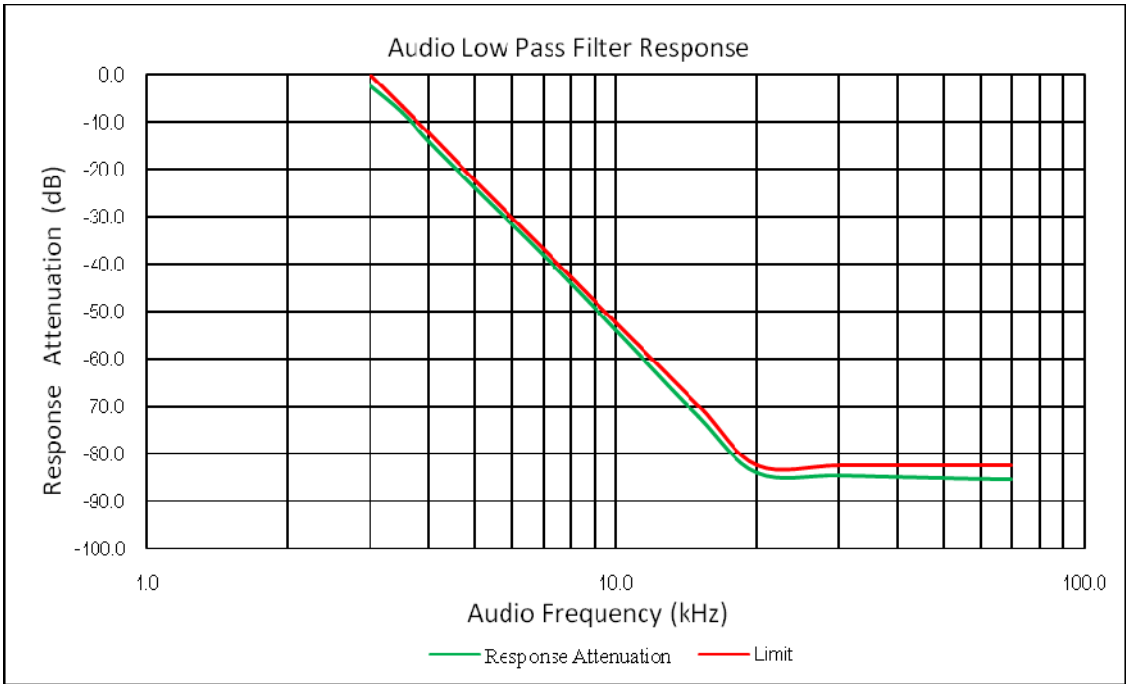
Audio Frequency Response - High Power, 12.5kHz

Carrier Frequency: 173.975MHz	
Audio Frequency (Hz)	**Response Attenuation (dB)**
300	-13.02
400	-9.76
500	-7.02
600	-4.55
700	-3.02
800	-1.56
900	-0.22
1000	0.00
1200	1.22
1400	2.51
1600	3.85
1800	4.17
2000	5.69
2200	6.22
2400	6.31
2600	6.08
2800	6.25
3000	6.12
3125	6.37



Audio Low Pass Filter Response - High Power,12.5kHz

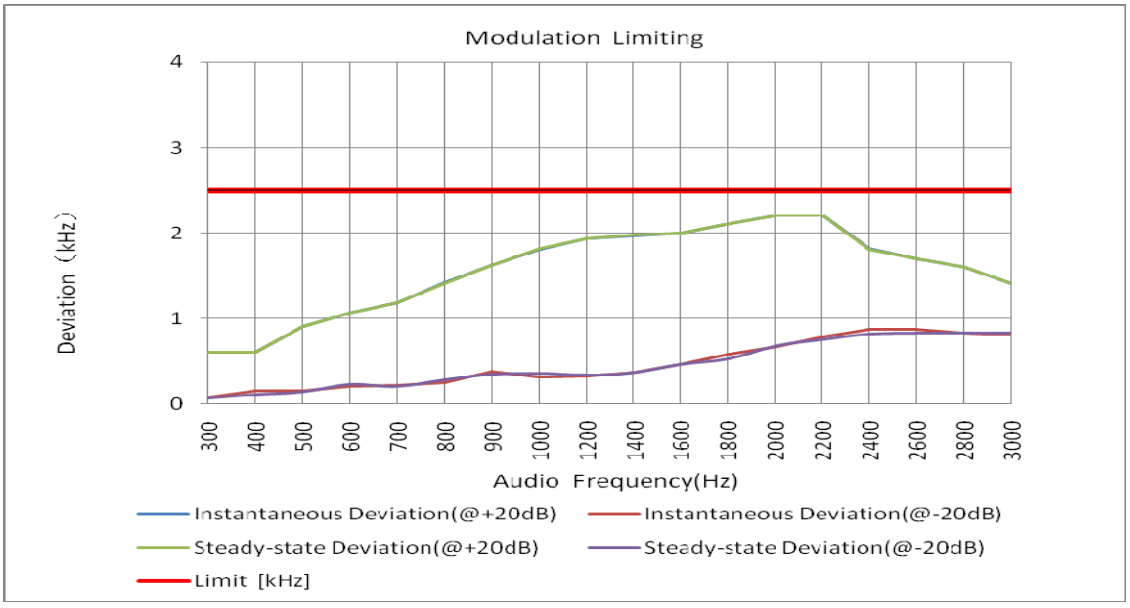
Carrier Frequency: 173.975MHz		
Audio Frequency (kHz)	**Response Attenuation (dB)**	**Limit (dB)**
3.0	-2.4	0
3.5	-7.9	-6.7
4.0	-14.2	-12.5
5.0	-23.9	-22.2
7.0	-38.1	-36.8
10.0	-53.9	-52.3
15.0	-72.4	-69.9
20.0	-84.1	-82.5
30.0	-84.6	-82.5
50.0	-85.2	-82.5
70.0	-85.4	-82.5



400-480 MHz Band:

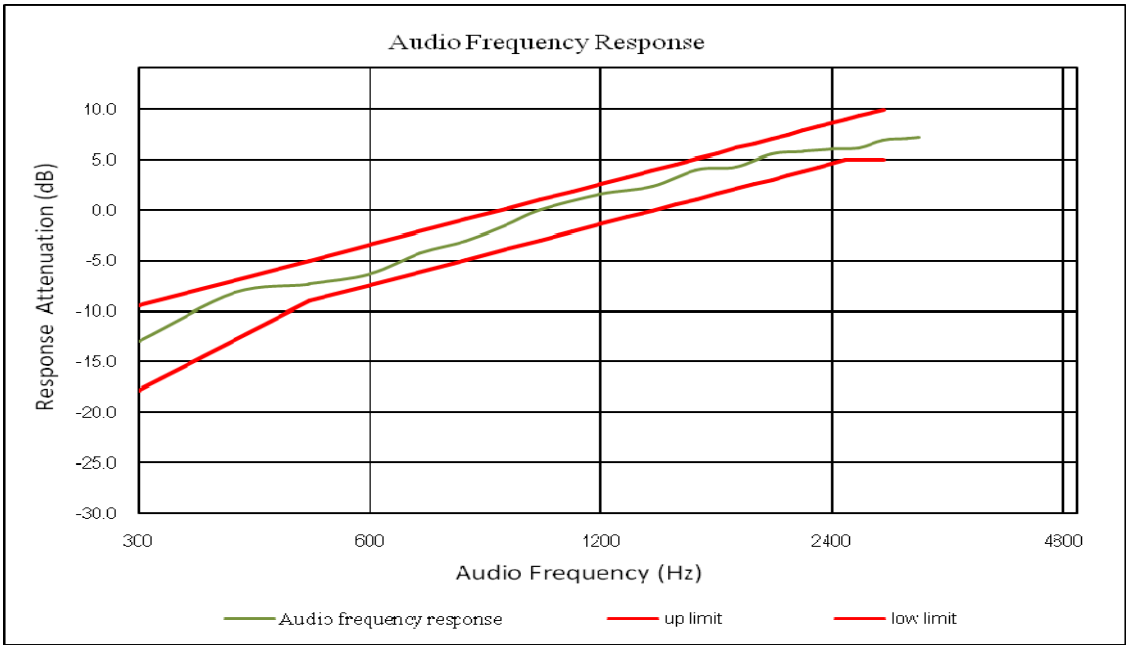
MODULATION LIMITING - High Power, 12.5kHz

Carrier Frequency: 400.025MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	0.607	0.074	0.605	0.069	2.5
400	0.607	0.158	0.601	0.109	2.5
500	0.908	0.158	0.906	0.138	2.5
600	1.065	0.204	1.061	0.229	2.5
700	1.182	0.213	1.183	0.205	2.5
800	1.419	0.249	1.412	0.284	2.5
900	1.626	0.383	1.624	0.342	2.5
1000	1.812	0.316	1.819	0.352	2.5
1200	1.932	0.330	1.937	0.341	2.5
1400	1.971	0.369	1.976	0.365	2.5
1600	1.995	0.466	1.995	0.462	2.5
1800	2.109	0.581	2.109	0.524	2.5
2000	2.201	0.671	2.202	0.680	2.5
2200	2.200	0.787	2.205	0.757	2.5
2400	1.819	0.871	1.812	0.814	2.5
2600	1.701	0.871	1.701	0.826	2.5
2800	1.601	0.830	1.607	0.831	2.5
3000	1.406	0.808	1.409	0.828	2.5



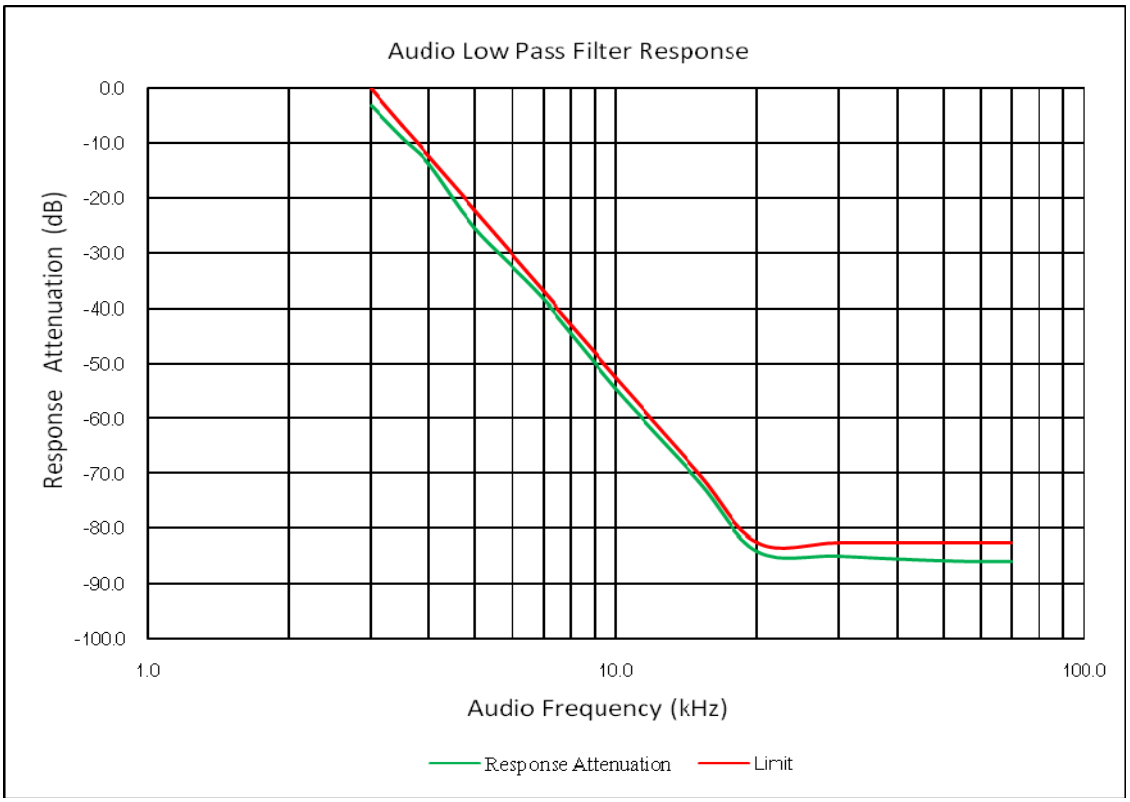
Audio Frequency Response - High Power, 12.5kHz

Carrier Frequency: 400.025MHz	
Audio Frequency (Hz)	**Response Attenuation (dB)**
300	-13.01
400	-8.21
500	-7.33
600	-6.38
700	-4.22
800	-3.02
900	-1.53
1000	0.00
1200	1.56
1400	2.33
1600	4.01
1800	4.26
2000	5.55
2200	5.77
2400	6.01
2600	6.12
2800	6.89
3000	7.02
3125	7.13



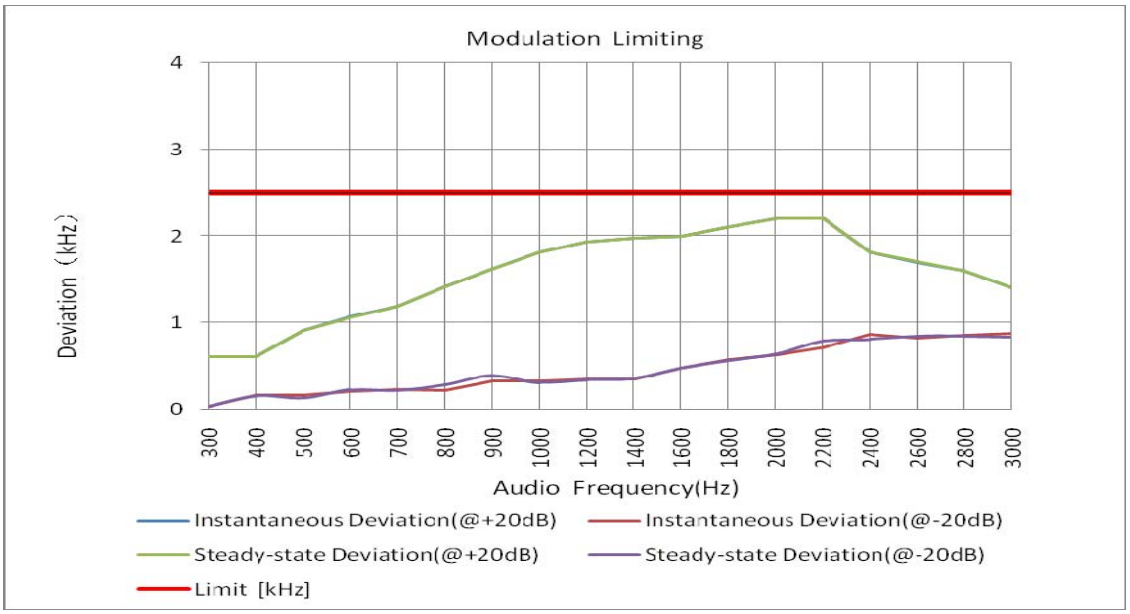
Audio Low Pass Filter Response - High Power,12.5kHz

Carrier Frequency: 400.025MHz		
Audio Frequency (kHz)	**Response Attenuation (dB)**	**Limit (dB)**
3.0	-3.1	0
3.5	-9.0	-6.7
4.0	-13.9	-12.5
5.0	-25.4	-22.2
7.0	-38.2	-36.8
10.0	-54.4	-52.3
15.0	-71.3	-69.9
20.0	-84.1	-82.5
30.0	-84.9	-82.5
50.0	-85.8	-82.5
70.0	-85.9	-82.5



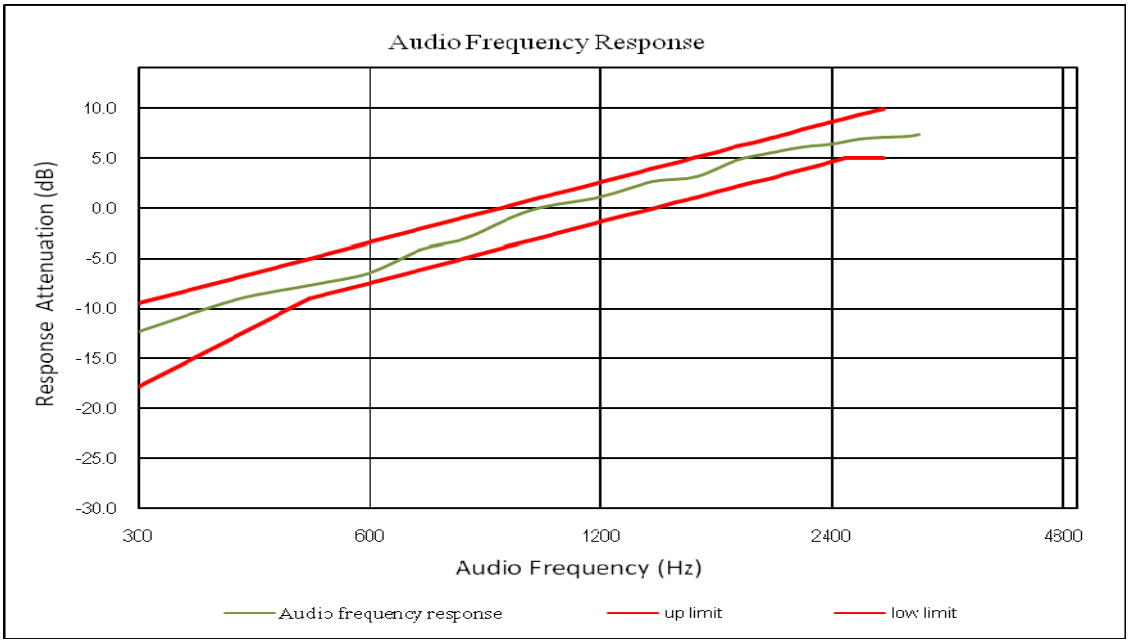
MODULATION LIMITING - High Power, 12.5kHz

Carrier Frequency: 440.000MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	0.607	0.035	0.607	0.037	2.5
400	0.604	0.160	0.602	0.157	2.5
500	0.908	0.170	0.905	0.133	2.5
600	1.068	0.209	1.061	0.225	2.5
700	1.186	0.225	1.185	0.224	2.5
800	1.412	0.216	1.411	0.288	2.5
900	1.625	0.325	1.624	0.388	2.5
1000	1.816	0.322	1.817	0.310	2.5
1200	1.938	0.344	1.936	0.343	2.5
1400	1.978	0.349	1.977	0.354	2.5
1600	1.994	0.473	2.000	0.477	2.5
1800	2.106	0.572	2.104	0.565	2.5
2000	2.204	0.624	2.202	0.639	2.5
2200	2.202	0.716	2.206	0.788	2.5
2400	1.811	0.868	1.815	0.807	2.5
2600	1.702	0.819	1.703	0.845	2.5
2800	1.605	0.859	1.601	0.846	2.5
3000	1.404	0.872	1.405	0.830	2.5



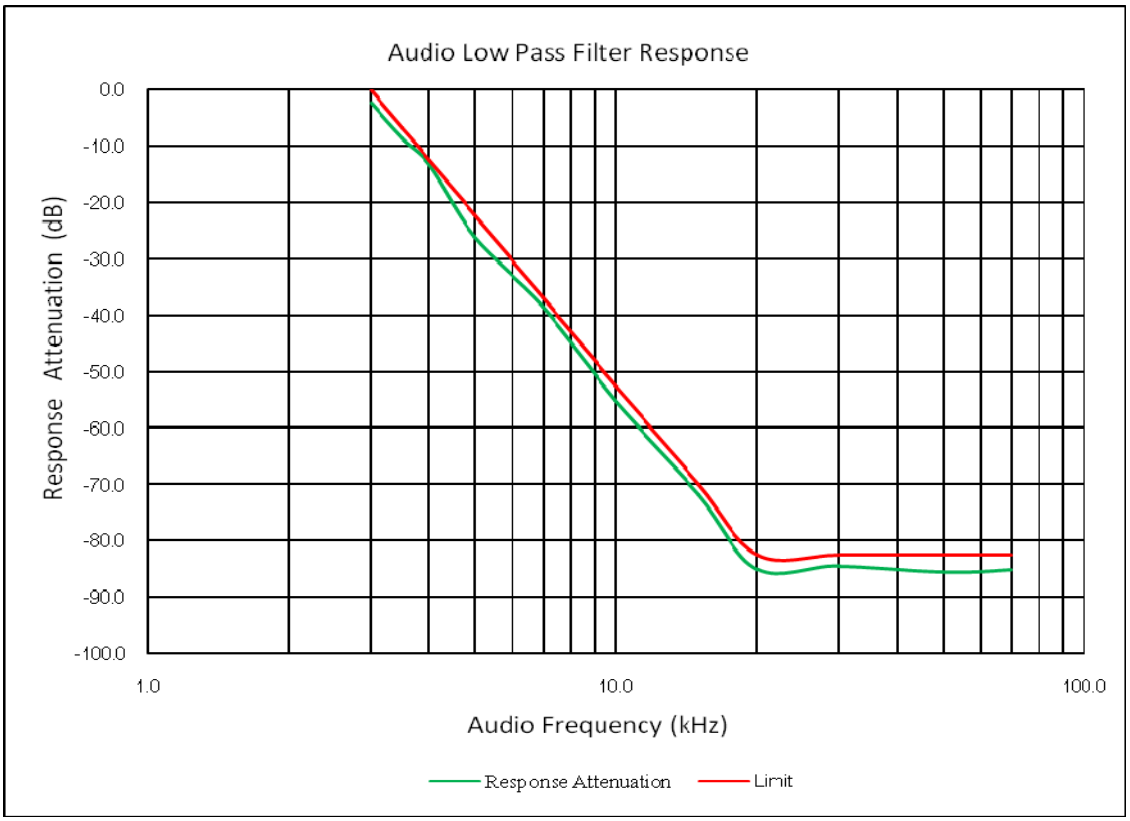
Audio Frequency Response - High Power, 12.5kHz

Carrier Frequency: 440.000MHz	
Audio Frequency (Hz)	**Response Attenuation (dB)**
300	-12.33
400	-9.12
500	-7.66
600	-6.45
700	-4.12
800	-3.02
900	-1.22
1000	0.00
1200	1.12
1400	2.63
1600	3.13
1800	4.76
2000	5.46
2200	6.12
2400	6.39
2600	6.87
2800	7.01
3000	7.12
3125	7.33



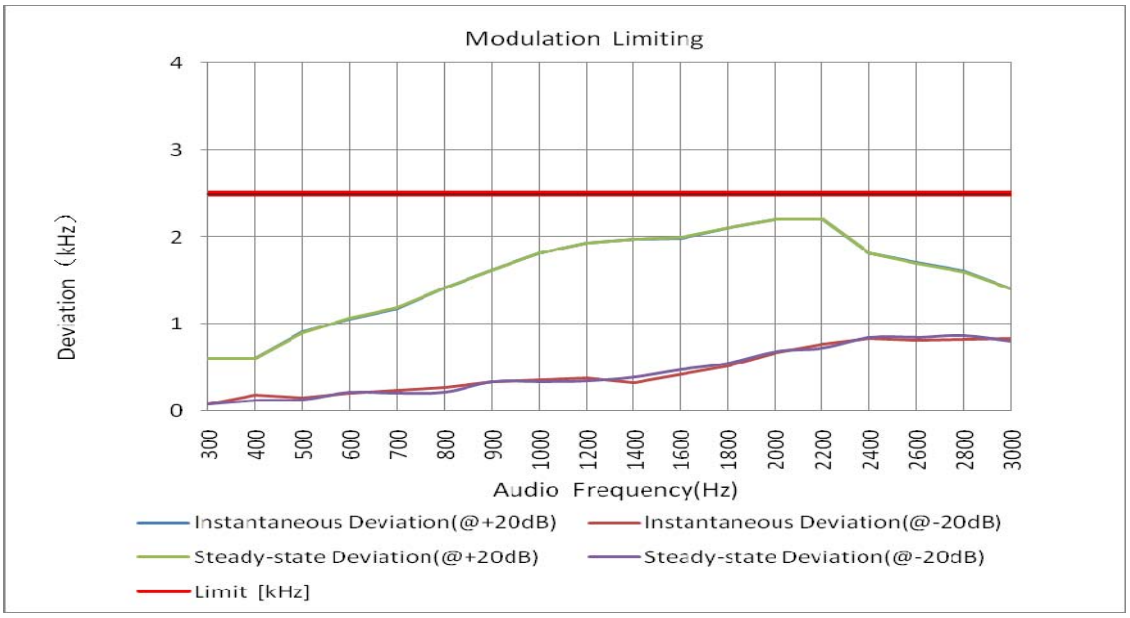
Audio Low Pass Filter Response - High Power,12.5kHz

Carrier Frequency: 440.000MHz		
Audio Frequency (kHz)	**Response Attenuation (dB)**	**Limit (dB)**
3.0	-2.2	0
3.5	-8.6	-6.7
4.0	-13.3	-12.5
5.0	-25.9	-22.2
7.0	-38.5	-36.8
10.0	-55.0	-52.3
15.0	-71.8	-69.9
20.0	-85	-82.5
30.0	-84.4	-82.5
50.0	-85.5	-82.5
70.0	-85.2	-82.5



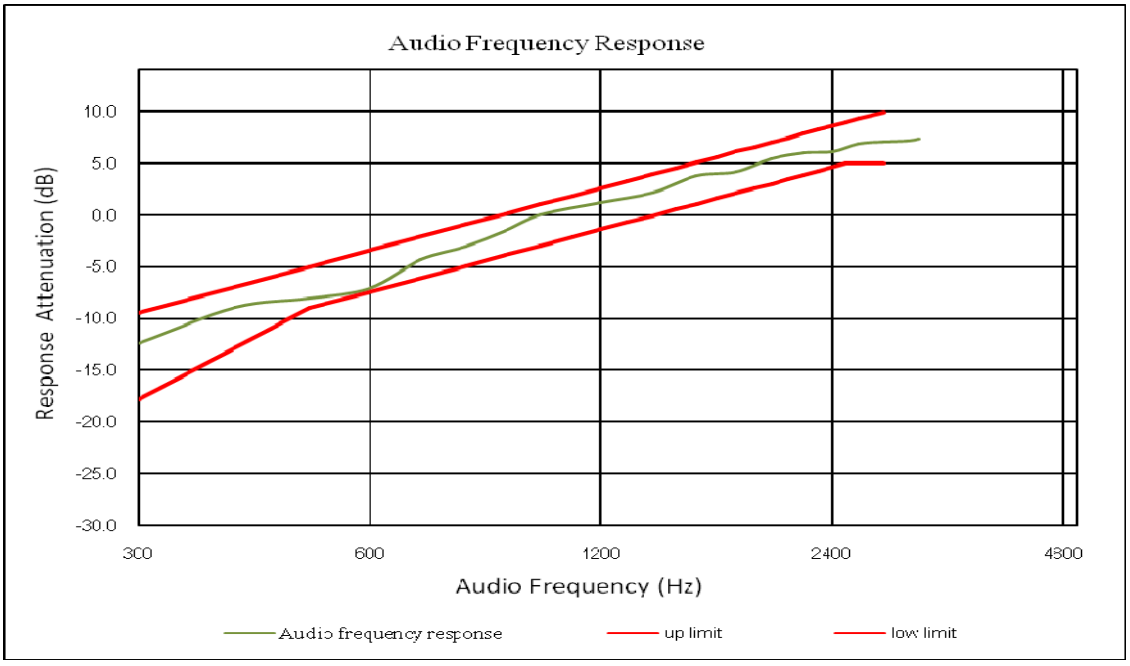
MODULATION LIMITING - High Power, 12.5kHz

Carrier Frequency: 479.975MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	0.606	0.074	0.609	0.081	2.5
400	0.607	0.190	0.605	0.121	2.5
500	0.909	0.150	0.901	0.134	2.5
600	1.064	0.203	1.066	0.217	2.5
700	1.180	0.239	1.189	0.209	2.5
800	1.417	0.277	1.412	0.219	2.5
900	1.625	0.342	1.620	0.341	2.5
1000	1.812	0.357	1.816	0.343	2.5
1200	1.935	0.385	1.930	0.349	2.5
1400	1.973	0.322	1.973	0.388	2.5
1600	1.991	0.420	1.997	0.480	2.5
1800	2.106	0.516	2.108	0.549	2.5
2000	2.209	0.675	2.202	0.688	2.5
2200	2.205	0.767	2.201	0.722	2.5
2400	1.813	0.830	1.816	0.844	2.5
2600	1.709	0.815	1.702	0.848	2.5
2800	1.606	0.825	1.601	0.871	2.5
3000	1.401	0.835	1.401	0.801	2.5



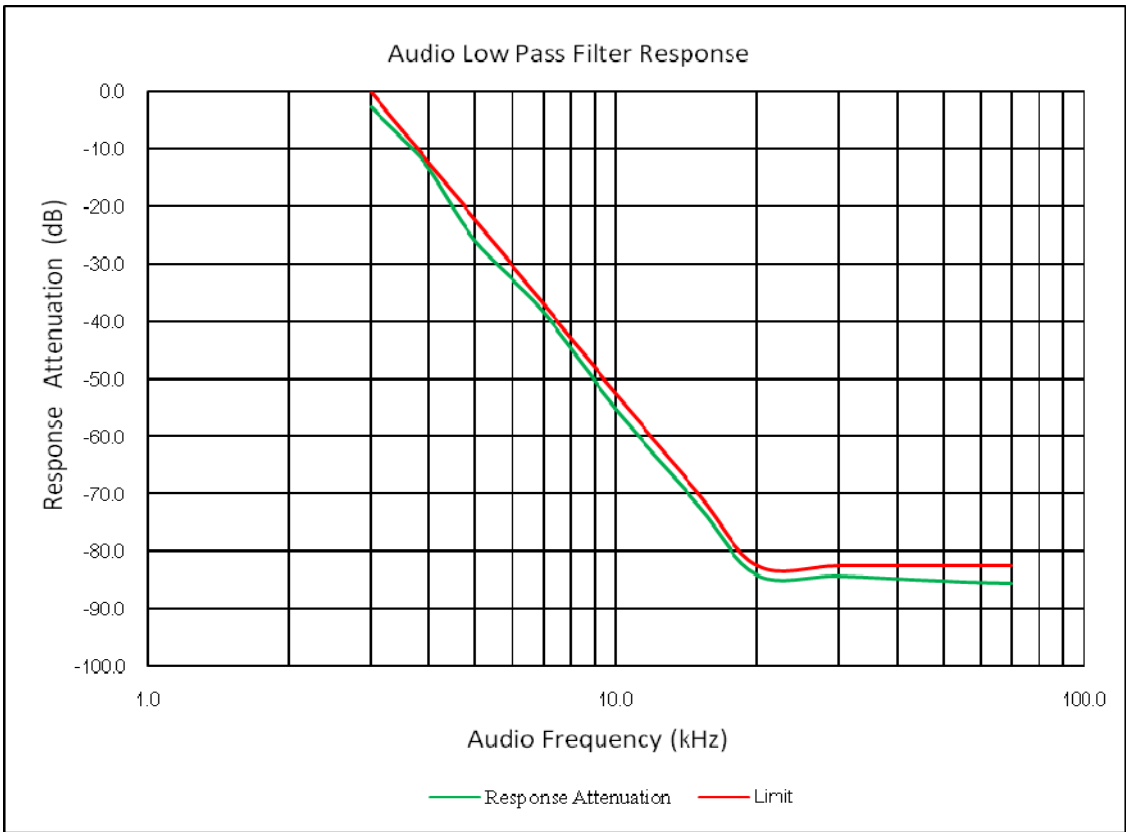
Audio Frequency Response - High Power, 12.5kHz

Carrier Frequency: 479.975MHz	
Audio Frequency (Hz)	**Response Attenuation (dB)**
300	-12.36
400	-8.98
500	-8.12
600	-7.12
700	-4.33
800	-3.02
900	-1.52
1000	0.00
1200	1.22
1400	2.12
1600	3.76
1800	4.13
2000	5.41
2200	6.01
2400	6.13
2600	6.85
2800	7.02
3000	7.12
3125	7.33



Audio Low Pass Filter Response - High Power,12.5kHz

Carrier Frequency: 479.975MHz		
Audio Frequency (kHz)	**Response Attenuation (dB)**	**Limit (dB)**
3.0	-2.6	0
3.5	-8.1	-6.7
4.0	-13.5	-12.5
5.0	-25.8	-22.2
7.0	-38.2	-36.8
10.0	-55.0	-52.3
15.0	-72.0	-69.9
20.0	-84.1	-82.5
30.0	-84.2	-82.5
50.0	-85.2	-82.5
70.0	-85.5	-82.5



FCC §2.1049, §90.209, §90.210 - OCCUPIED BANDWIDTH

Applicable Standard

FCC §2.1049, §90.209 and §90.210.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
The resolution bandwidth of the spectrum analyzer was set at 100 Hz or 300 Hz and the spectrum was recorded in the frequency band.

Test Data

Environmental Conditions

Temperature:	22.5-23.1 ℃
Relative Humidity:	50-55 %
ATM Pressure:	101.5-102.1 kPa

The testing was performed by CK Huang from 2021-02-03 to 2021-03-08.

Test Mode: Transmitting

Modulation Mode	fc (MHz)	Channel Separation (kHz)	Power Level	99% Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)
Analog	136.025	12.5	High	9.820	10.220
			Low	9.820	10.220
	155.000	12.5	High	9.820	10.220
			Low	9.820	10.220
	173.975	12.5	High	9.820	10.120
			Low	9.820	10.220
	400.025	12.5	High	9.820	10.220
			Low	9.820	10.220
	440.000	12.5	High	9.820	10.220
			Low	9.820	10.220
	479.975	12.5	High	9.920	10.220
			Low	9.820	10.220
Digital	136.025	12.5	High	7.315	9.619
			Low	6.814	9.018
	155.000	12.5	High	7.415	9.719
			Low	7.315	9.519
	173.975	12.5	High	7.315	10.120
			Low	7.415	9.519
	400.025	12.5	High	7.214	9.319
			Low	7.315	9.519
	440.000	12.5	High	7.214	9.519
			Low	7.415	9.719
	479.975	12.5	High	7.014	9.319
			Low	7.114	9.319

Note: Emission bandwidth was based on calculation method instead of measurement.

For FM Mode (Channel Spacing: 12.5 kHz)

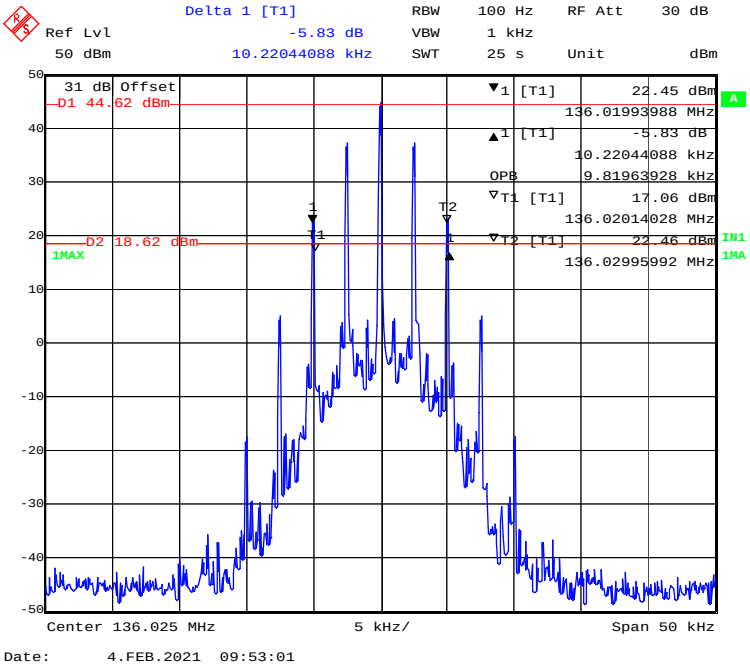
Emission Designator 11K0F3E
In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.
BW = 2(M+D) = 2*(3.0 kHz + 2.5 kHz) = 11 kHz = 11K0
F3E portion of the designator represents an FM voice transmission
Therefore, the entire designator for 12.5 kHz channel spacing FM mode is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

For Digital Mode (Channel Spacing: 12.5 kHz)

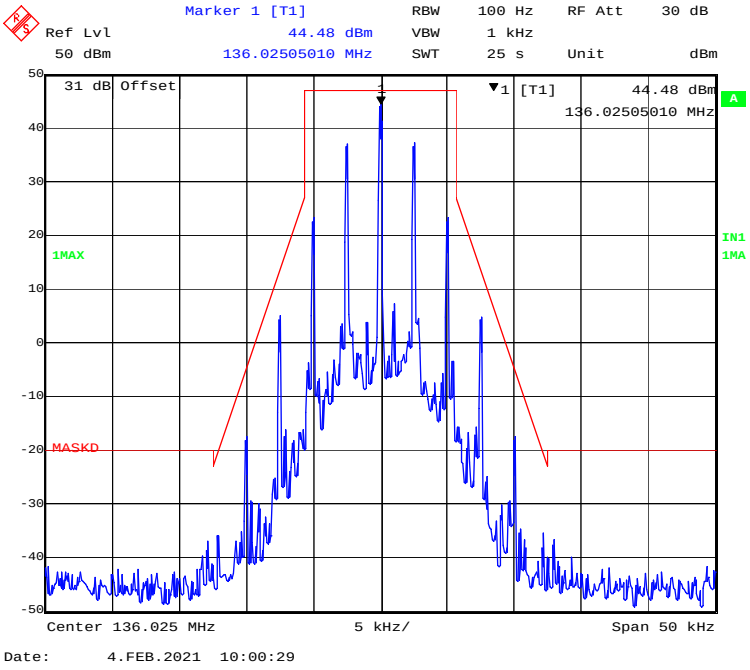
Emission Designator 7K60F1D and 7K60F1E
The 99% energy rule (title 47CFR 2.1049) was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 7.60 kHz. The emission mask was obtained from 47CFR 90.210(d).
F1D and F1E portion of the designator indicates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

For Analog Mode:

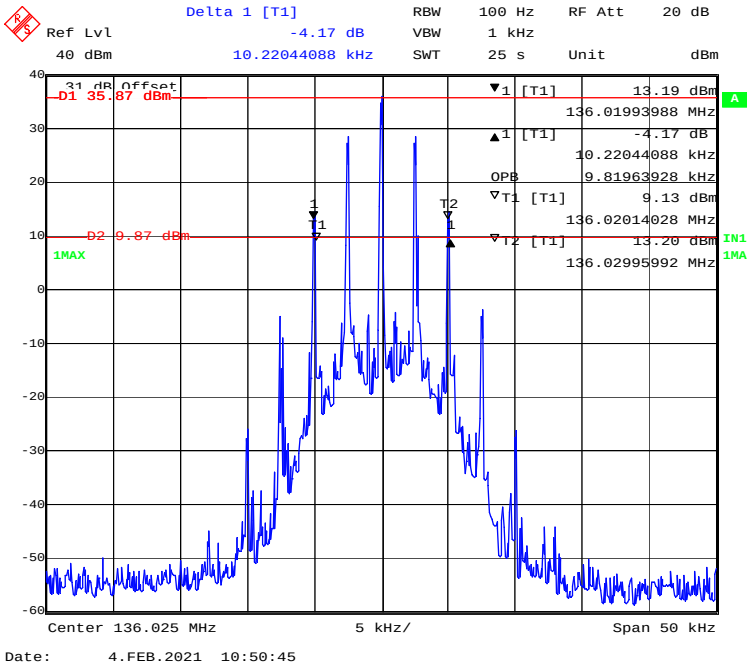
Frequency 136.025 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



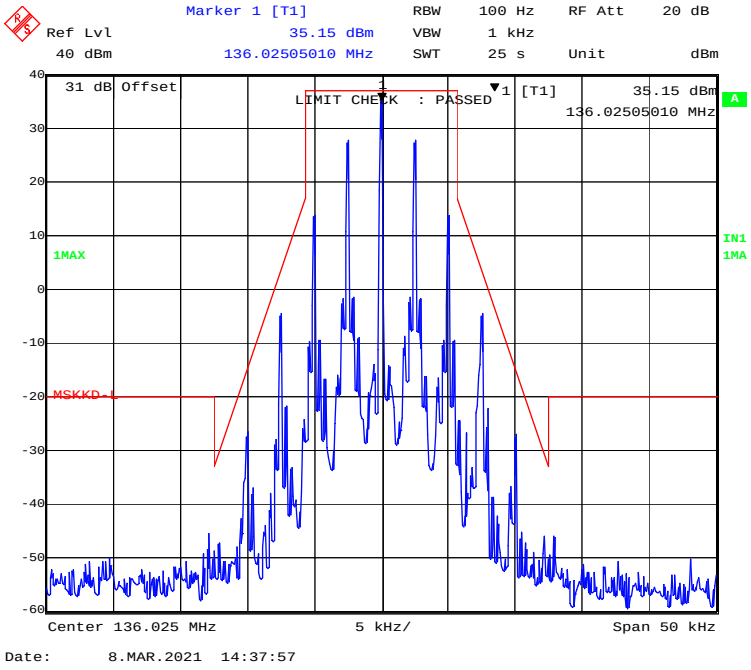
Emission Mask D



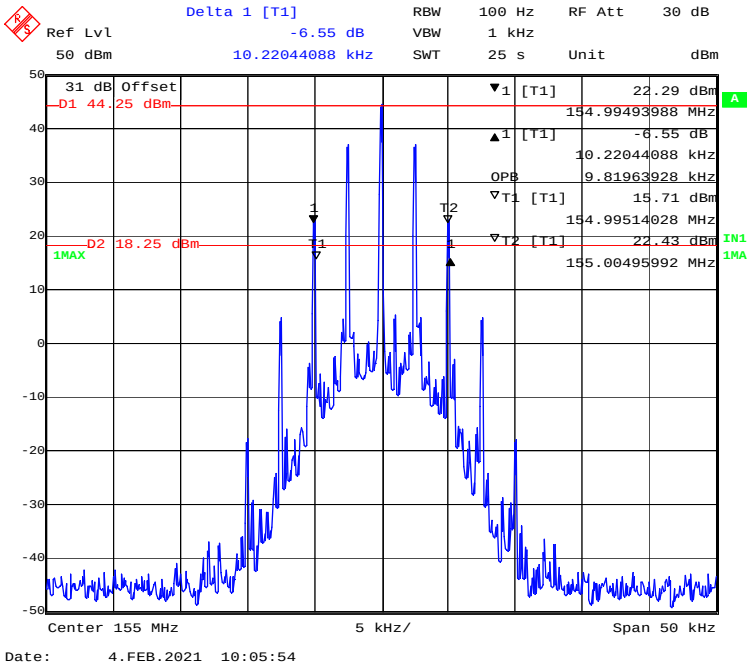
Frequency 136.025 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



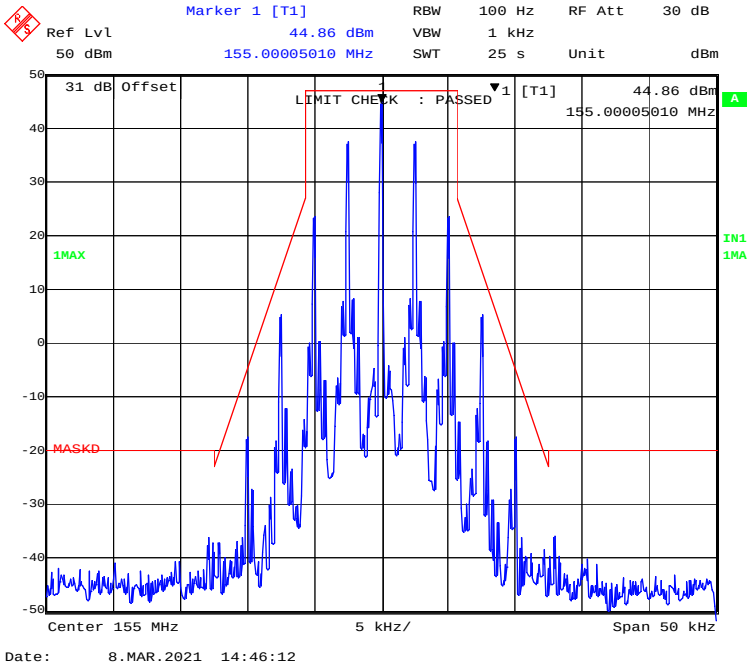
Emission Mask D



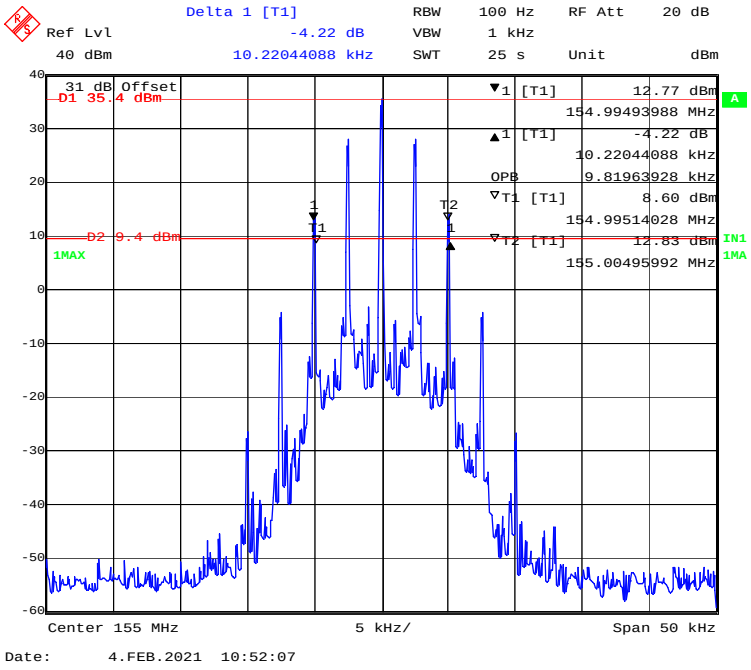
Frequency 155.000 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



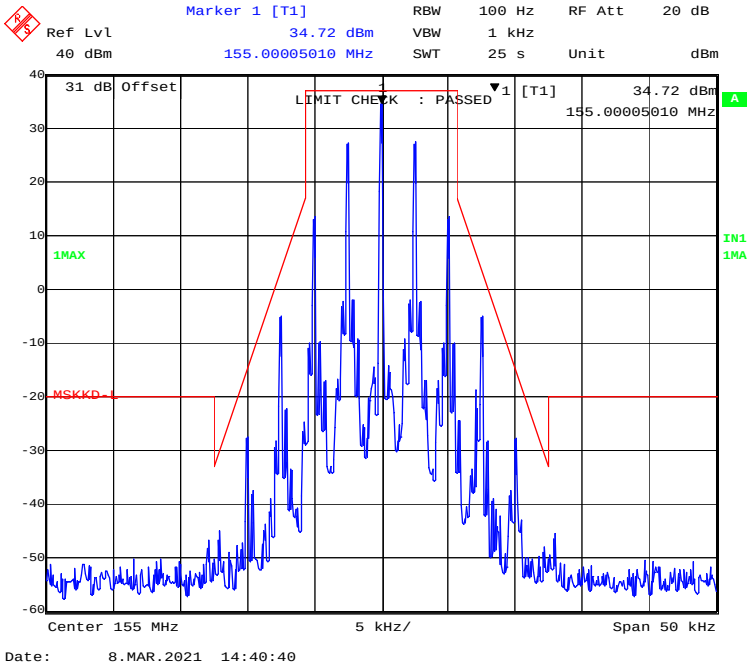
Emission Mask D



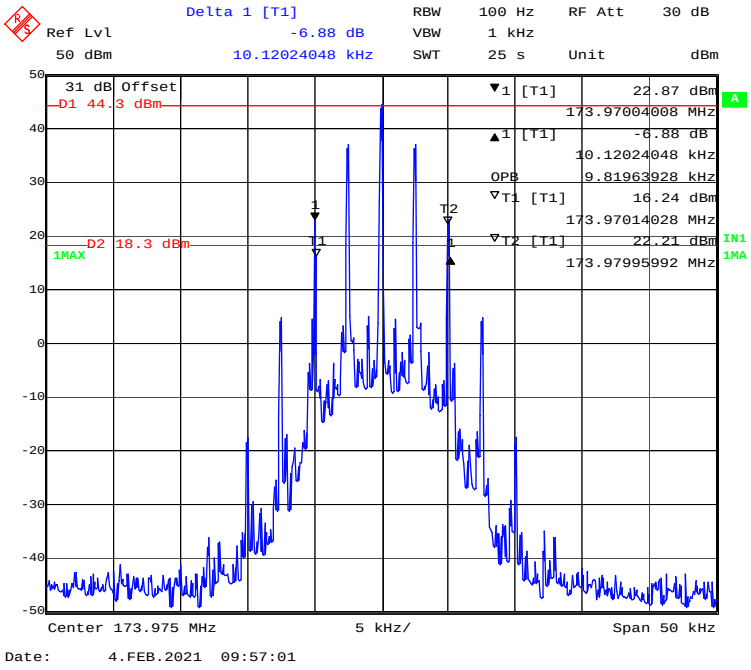
Frequency 155.000 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



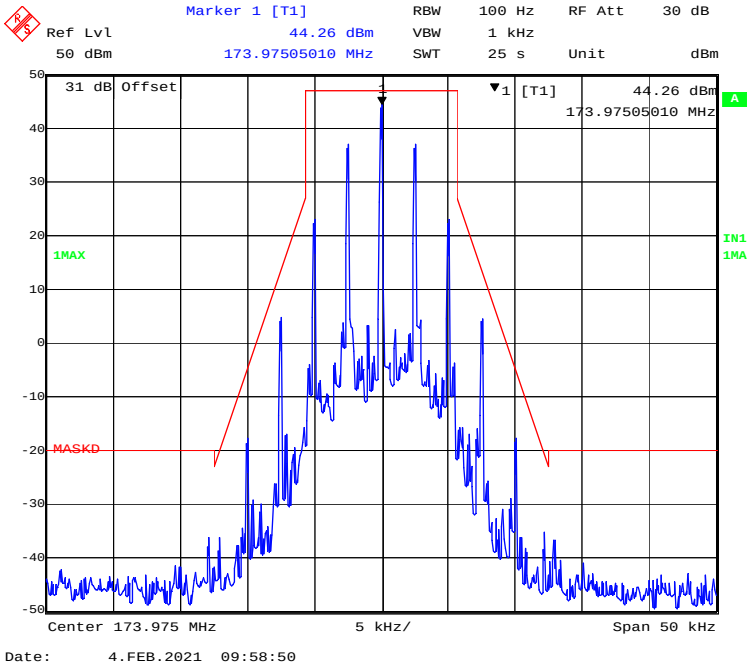
Emission Mask D



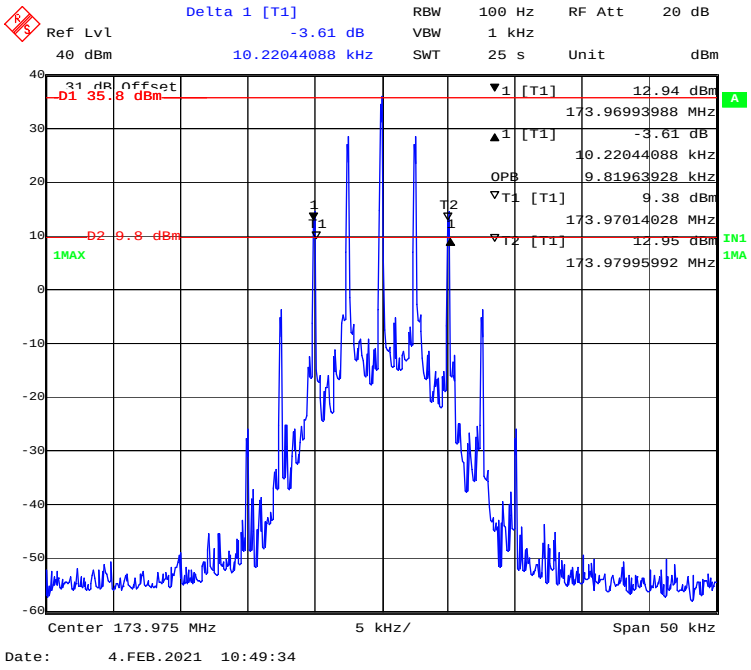
Frequency 173.975 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



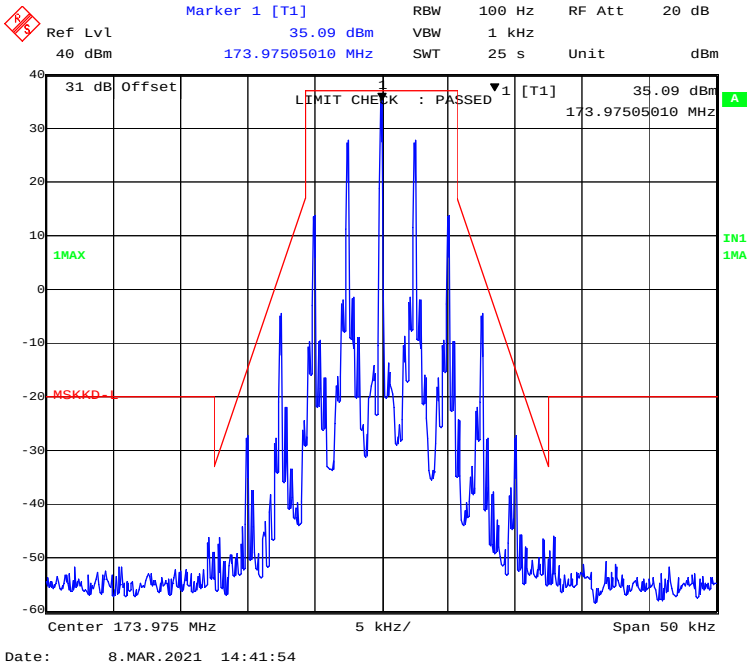
Emission Mask D



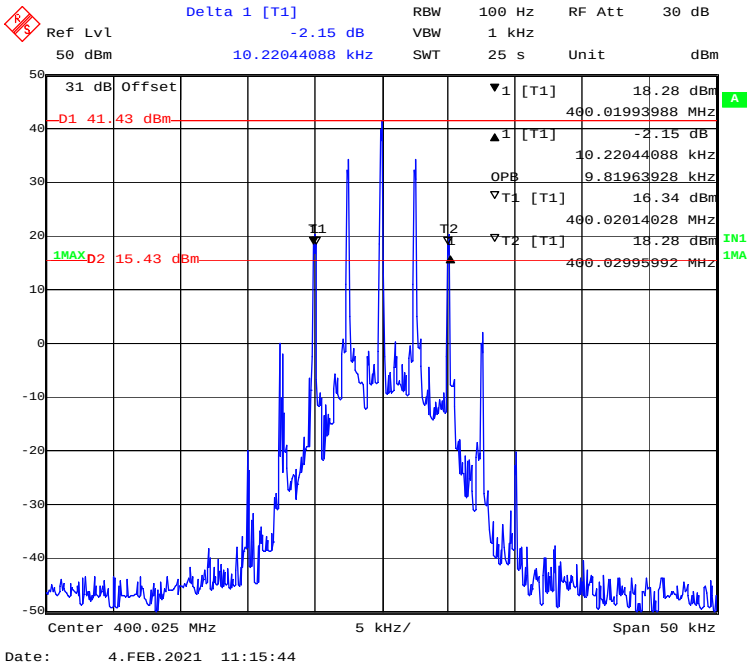
Frequency 173.975 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



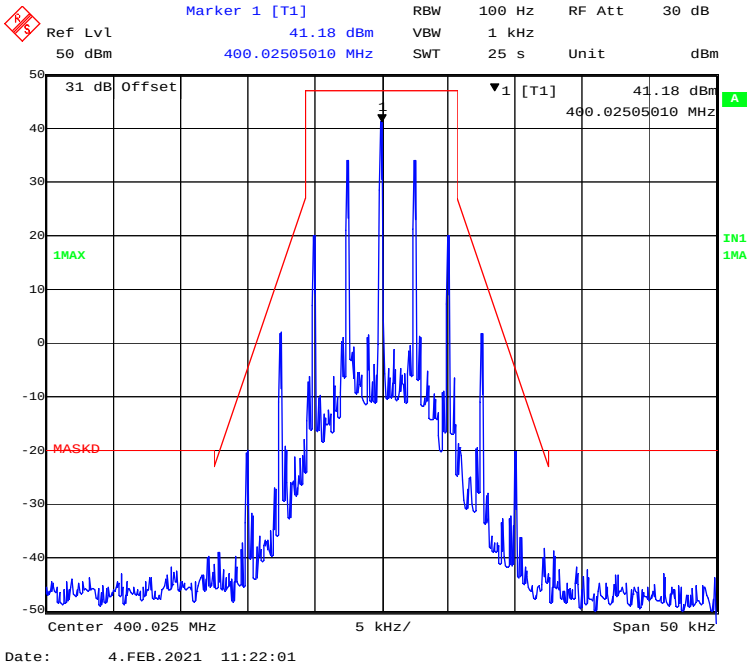
Emission Mask D



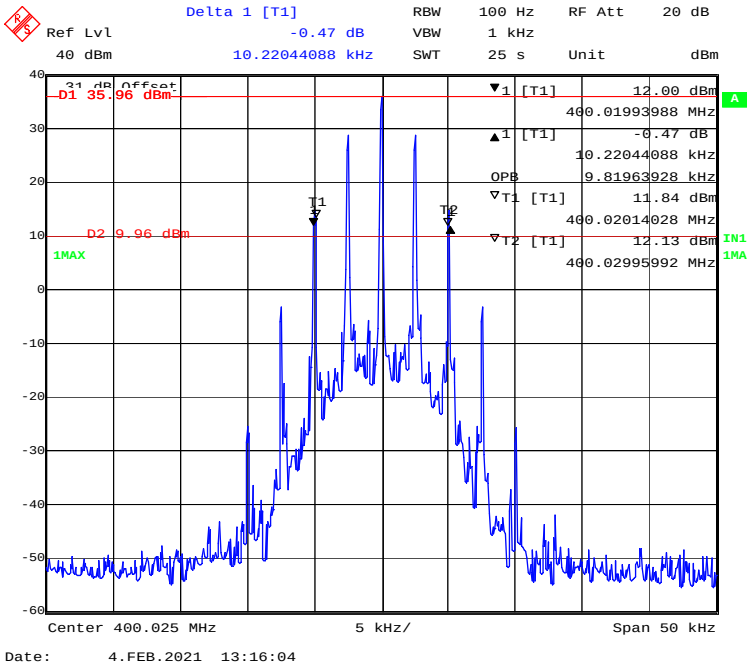
Frequency 400.025 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



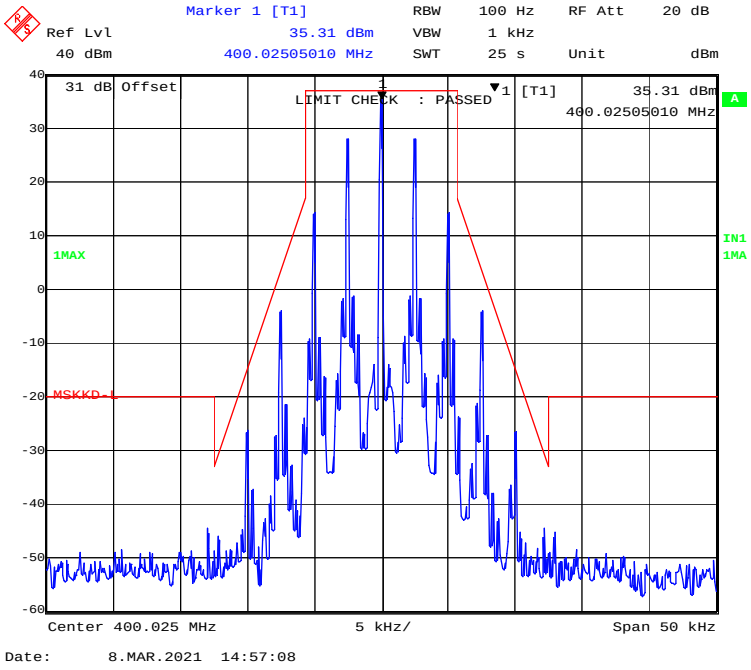
Emission Mask D



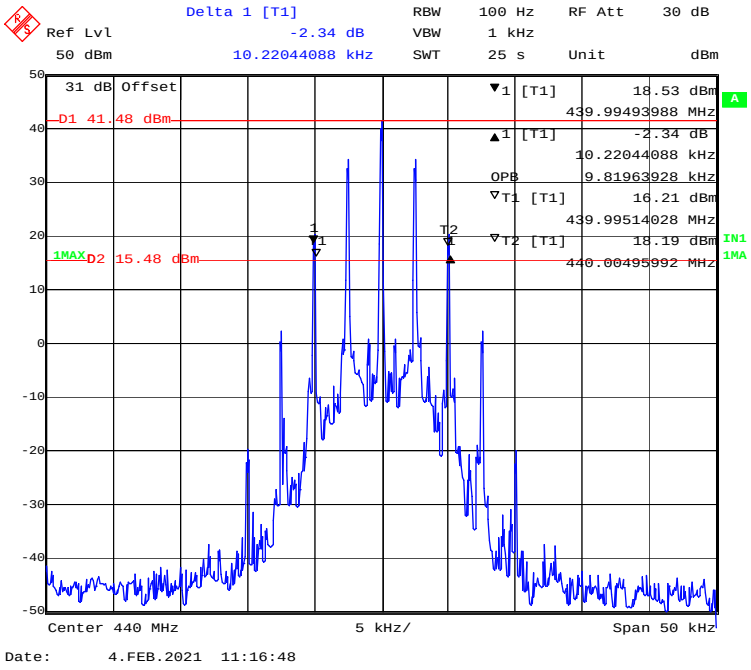
Frequency 400.025 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



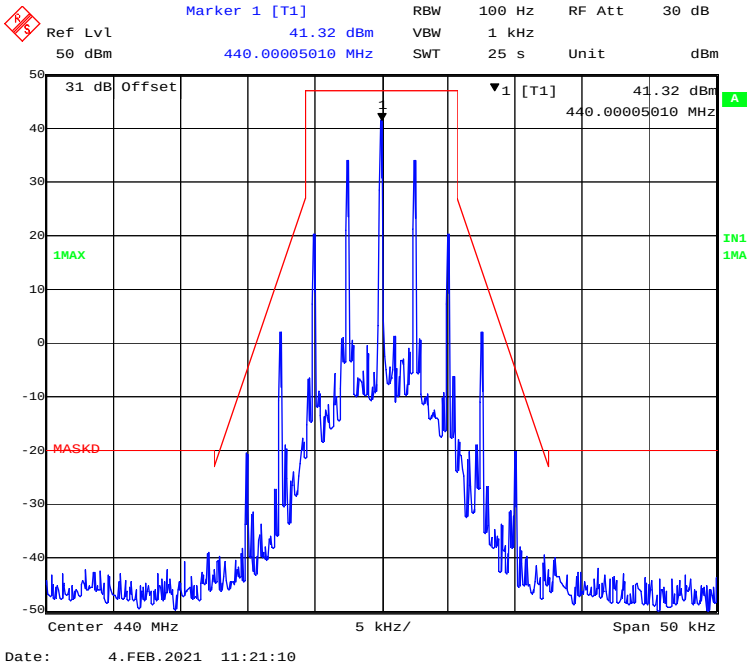
Emission Mask D



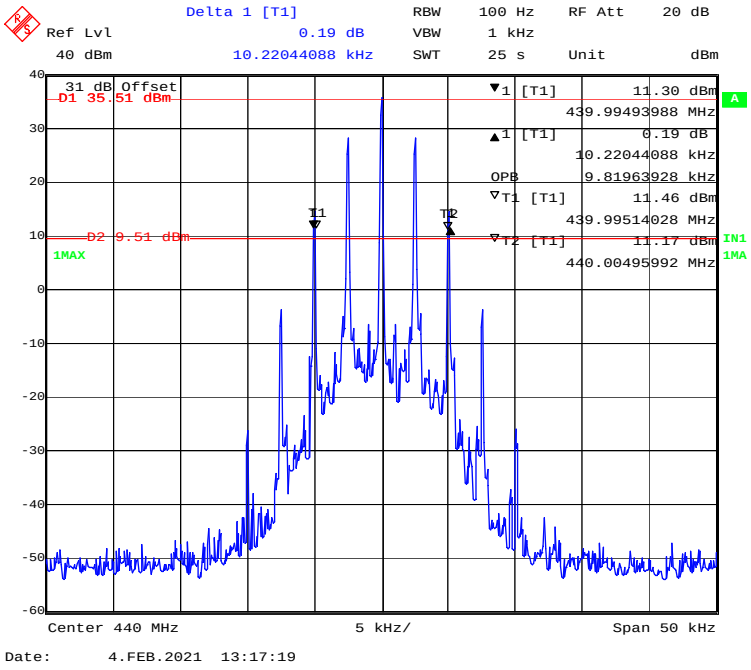
Frequency 440.000 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



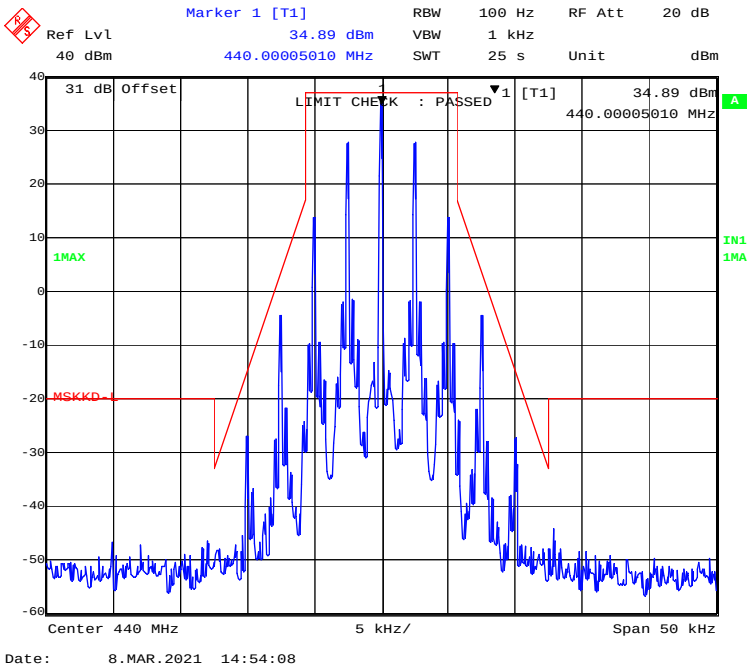
Emission Mask D



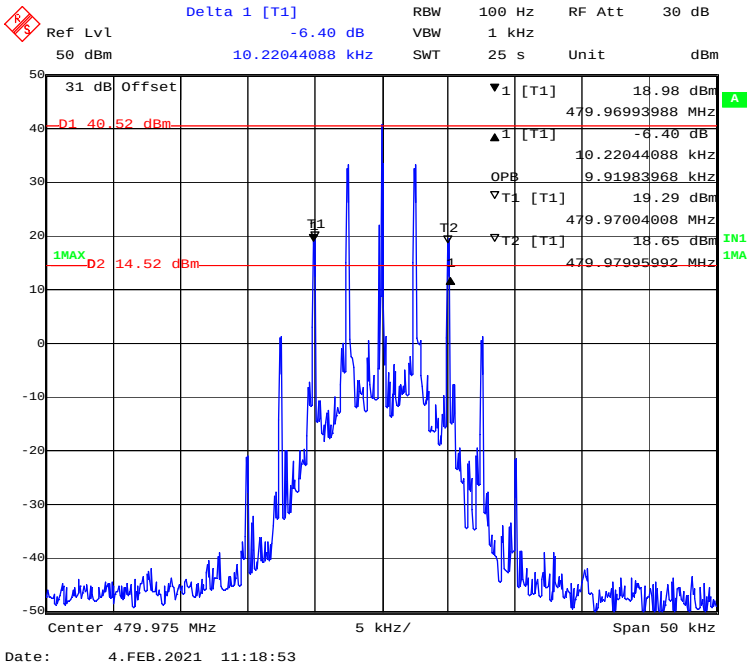
Frequency 440.000 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



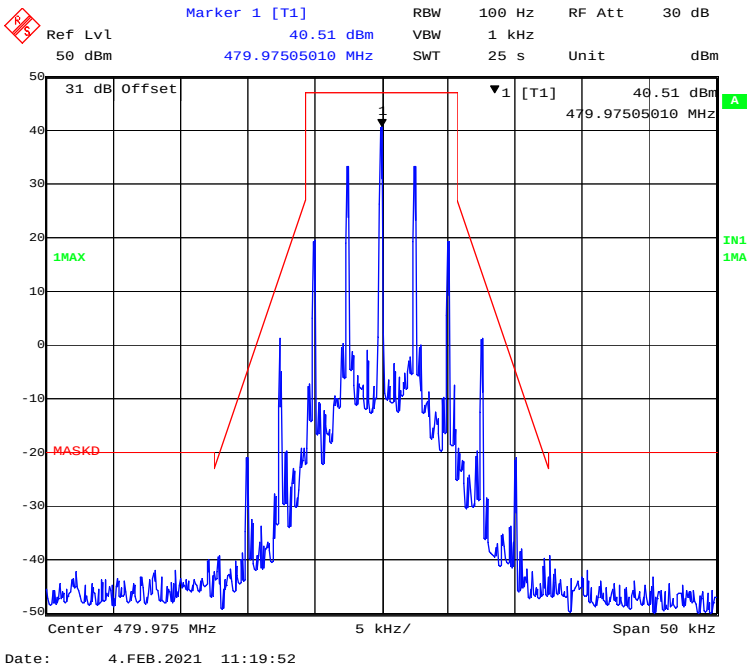
Emission Mask D



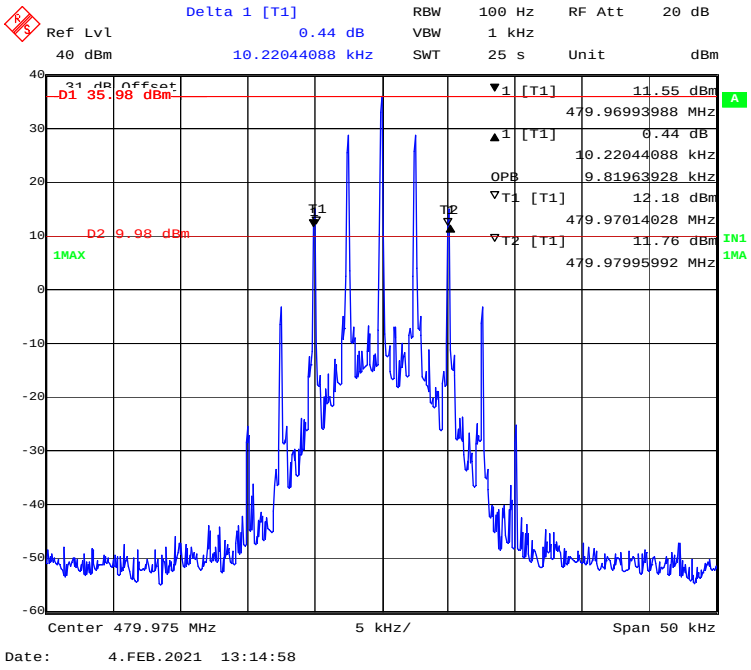
Frequency 479.975 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



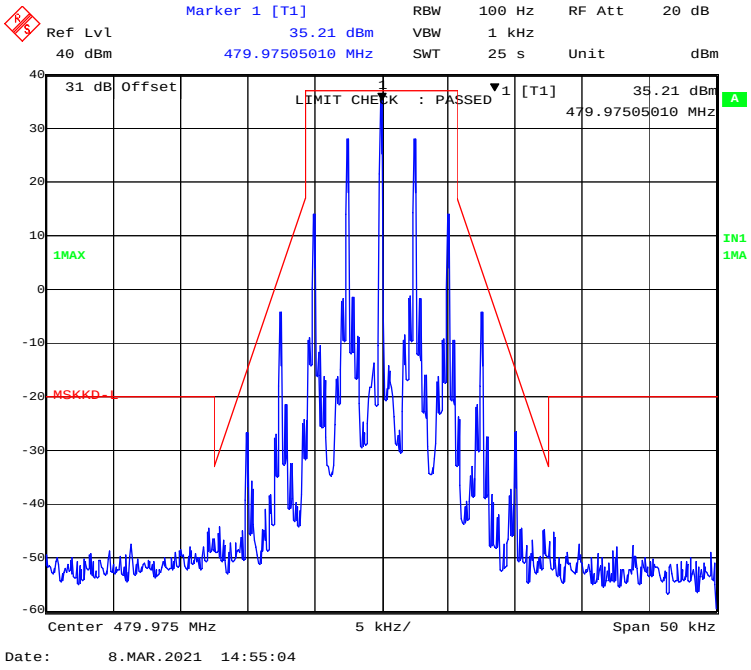
Emission Mask D



Frequency 479.975 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz

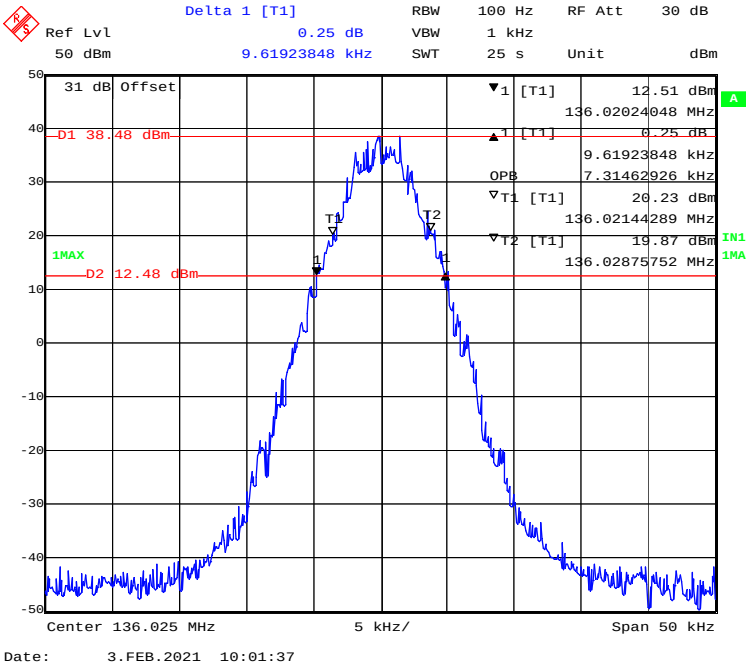


Emission Mask D

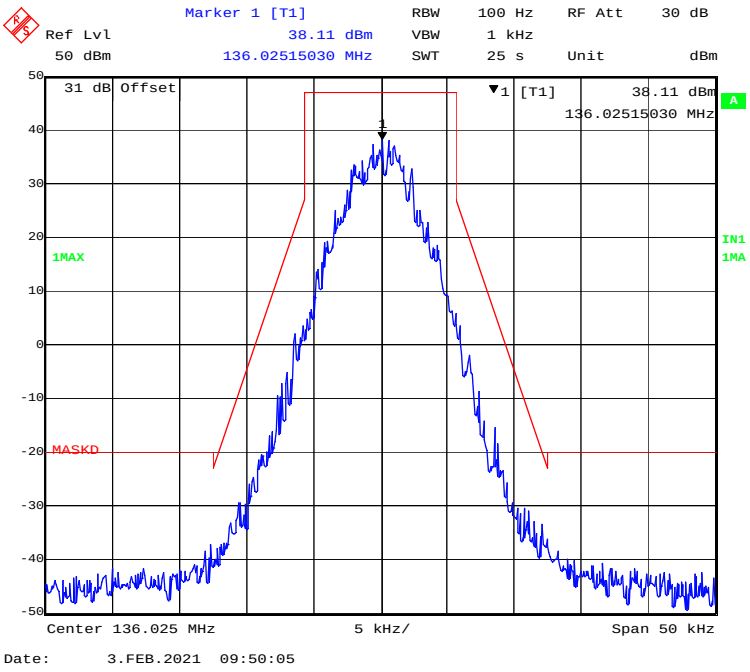


For Digital Mode:

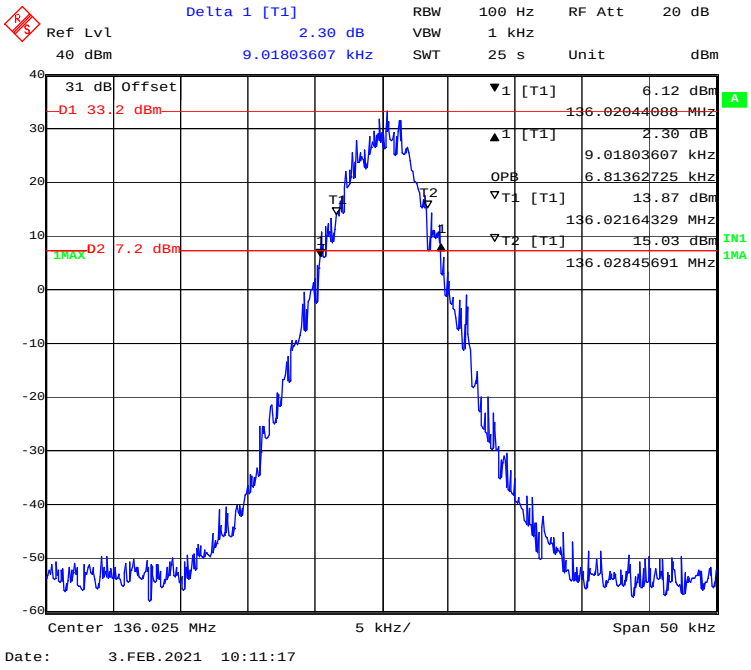
Frequency 136.025 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



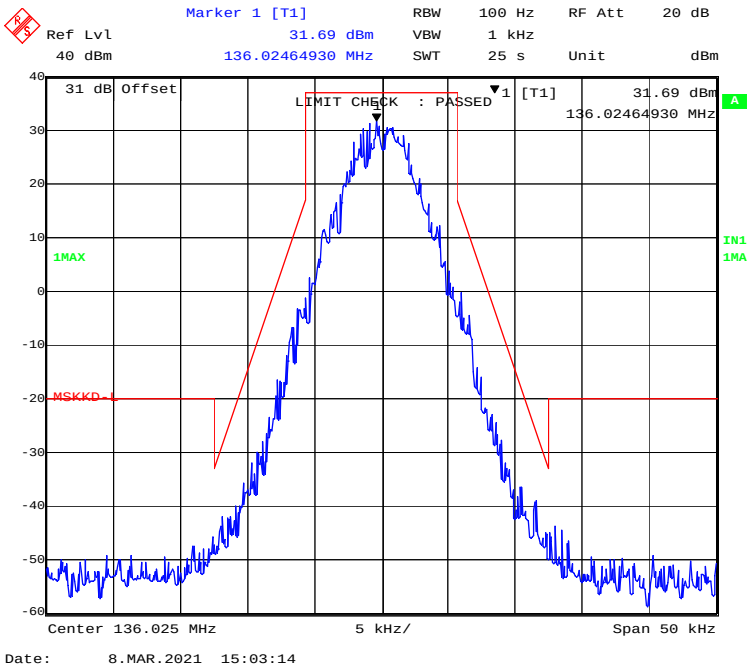
Emission Mask D



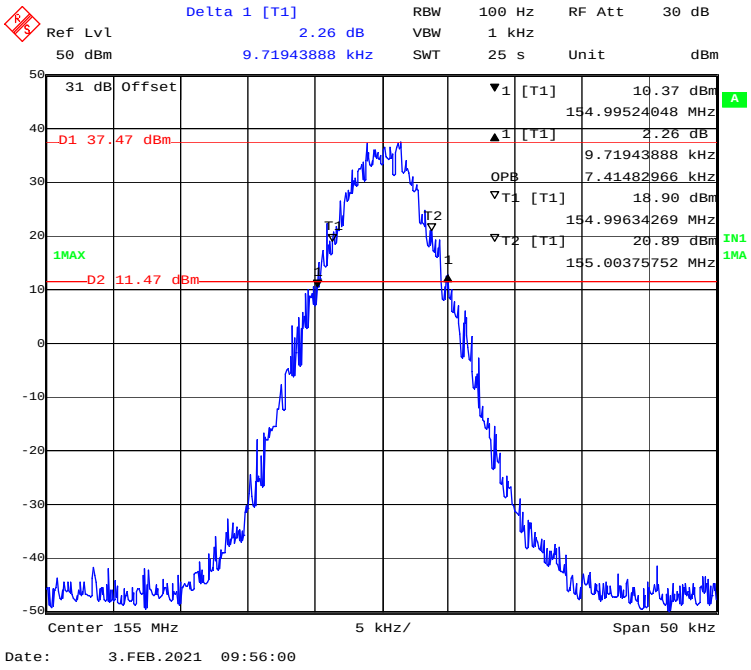
Frequency 136.025 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



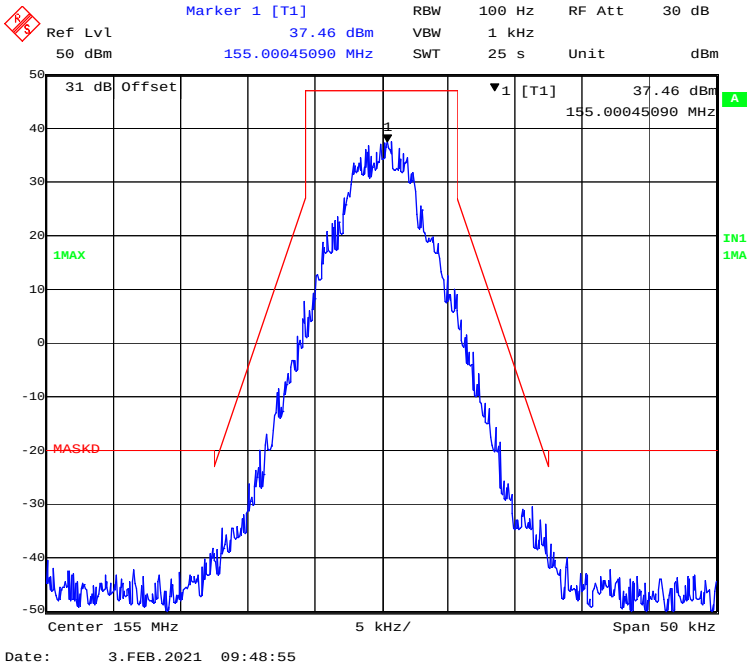
Emission Mask D



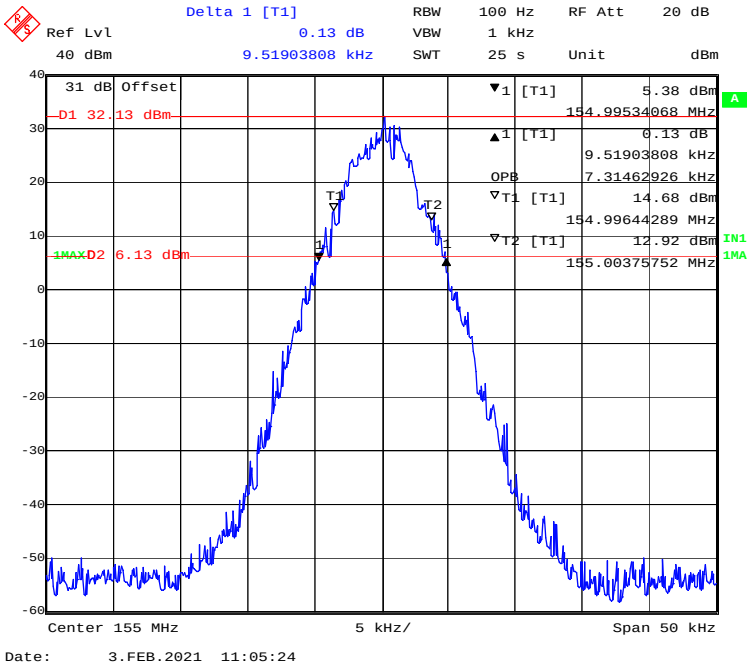
Frequency 155.000 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



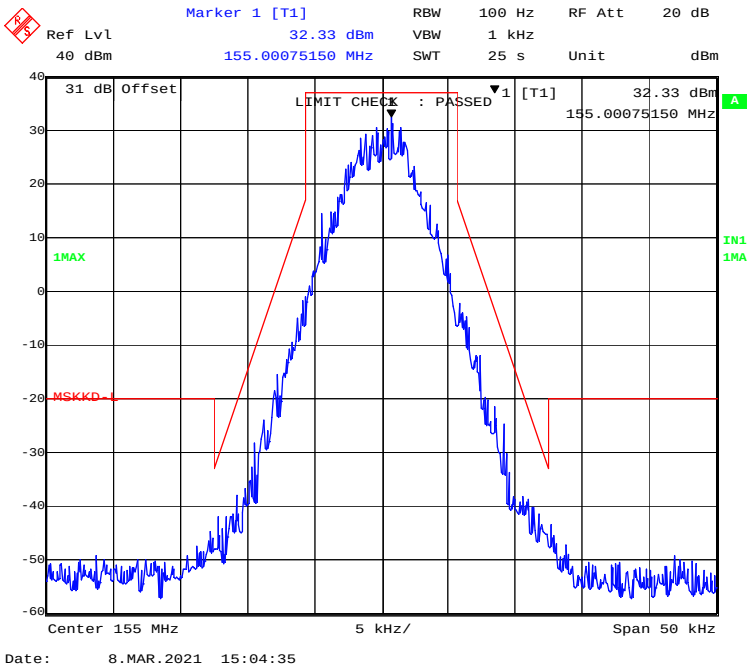
Emission Mask D



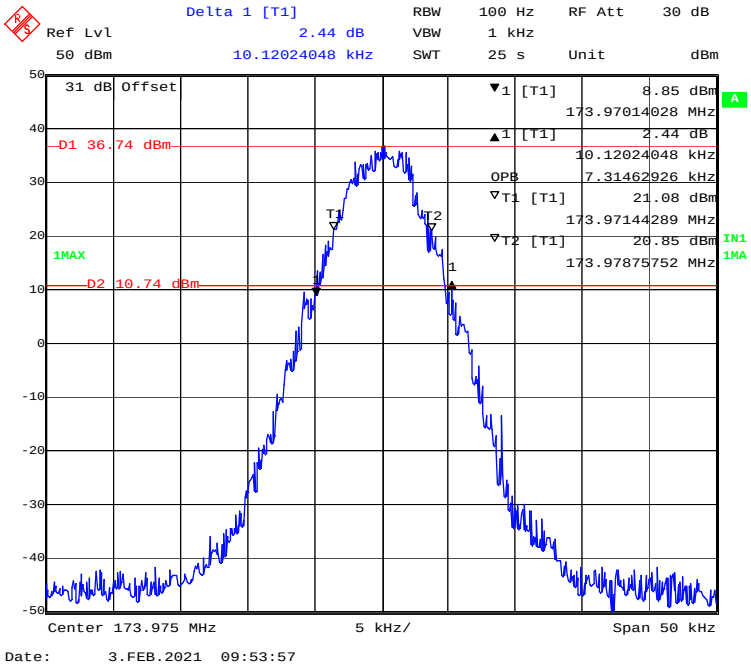
Frequency 155.000 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



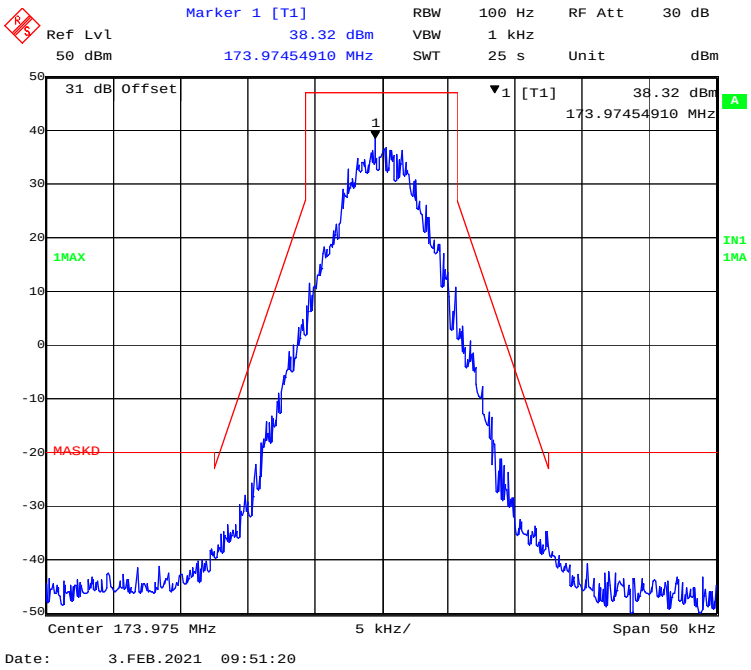
Emission Mask D



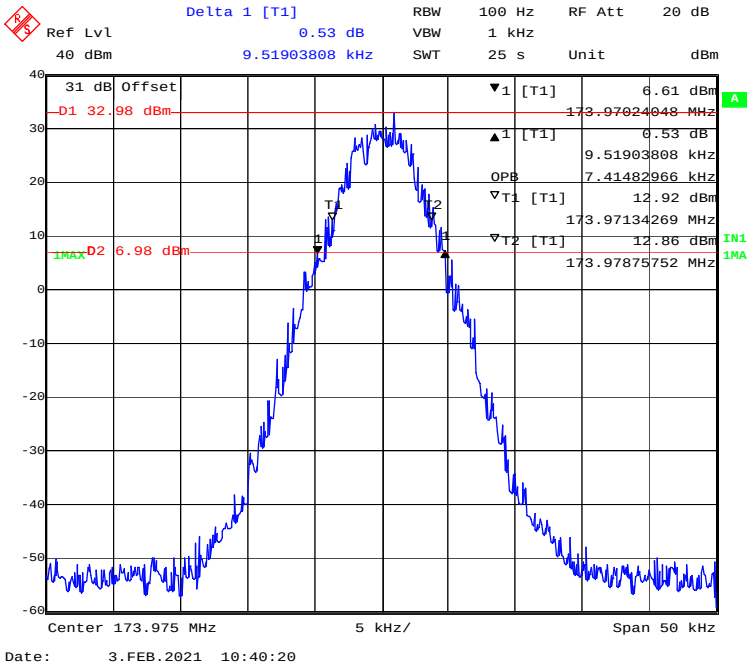
Frequency 173.975 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



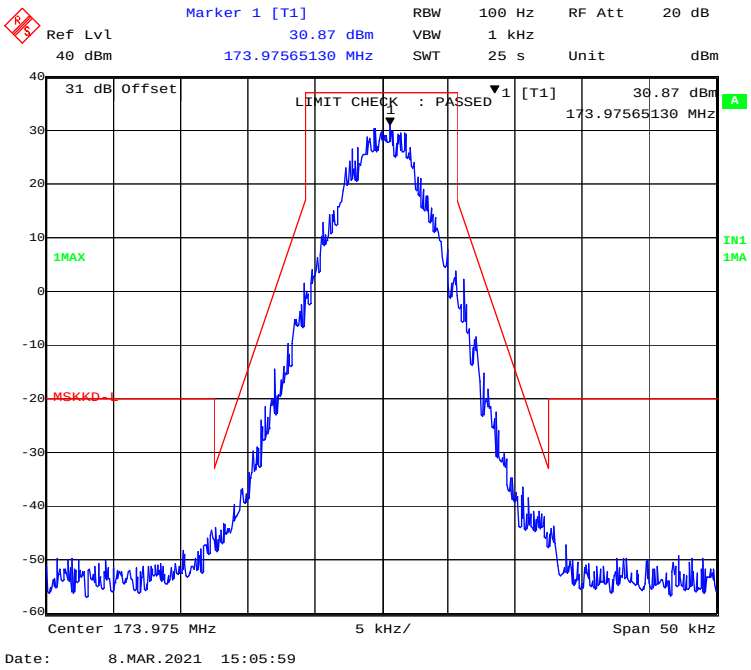
Emission Mask D



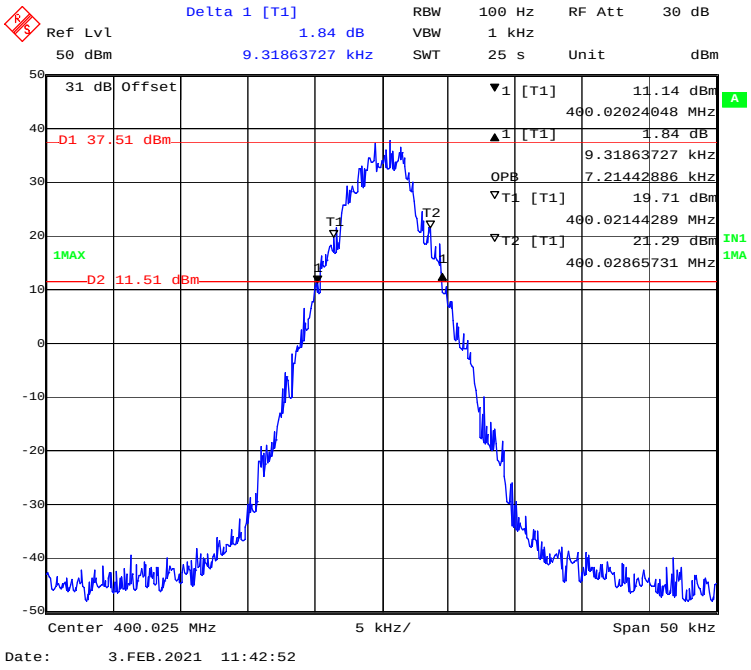
Frequency 173.975 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



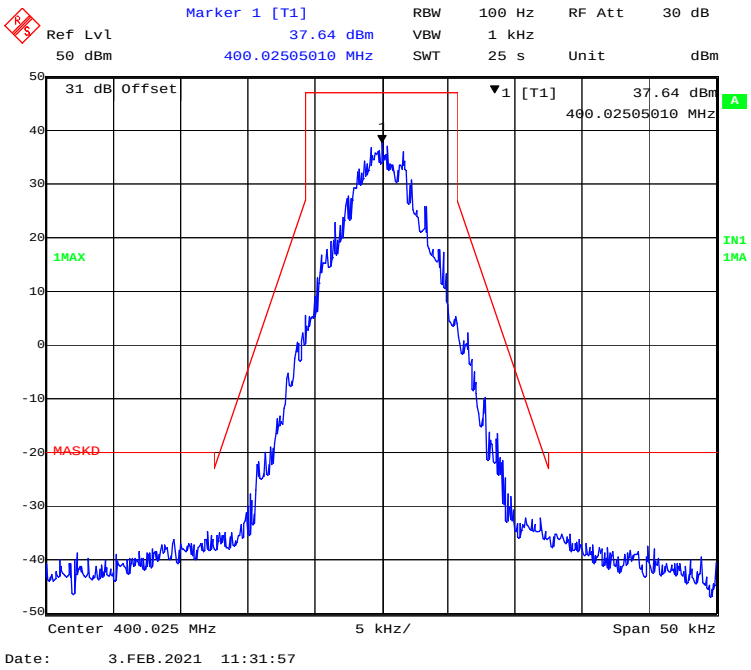
Emission Mask D



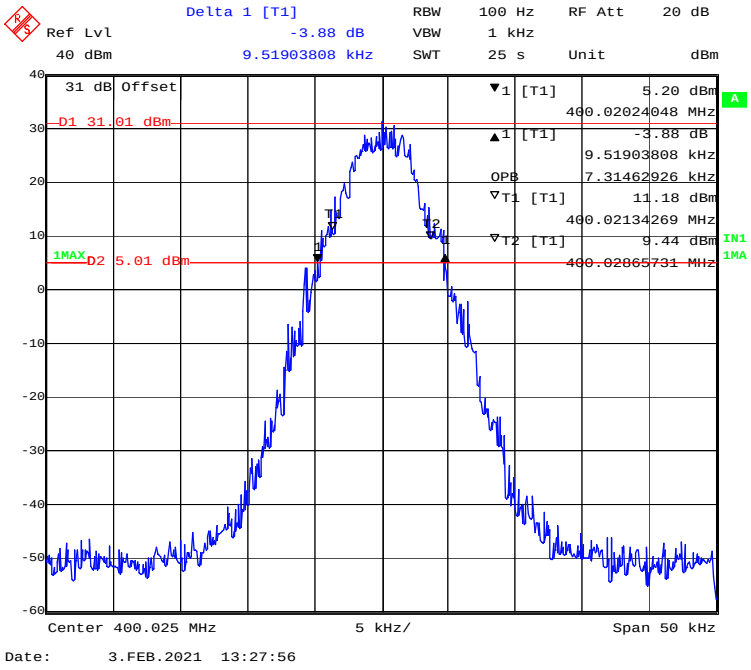
Frequency 400.025 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



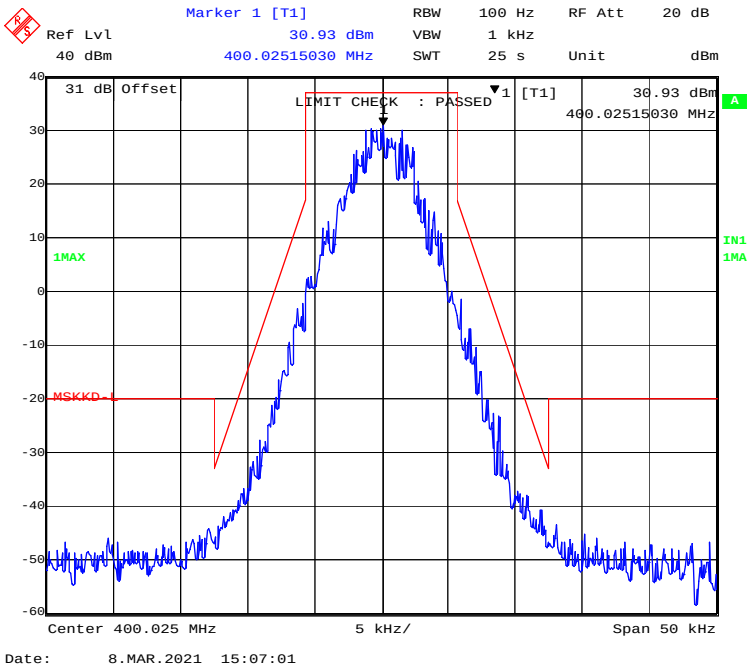
Emission Mask D



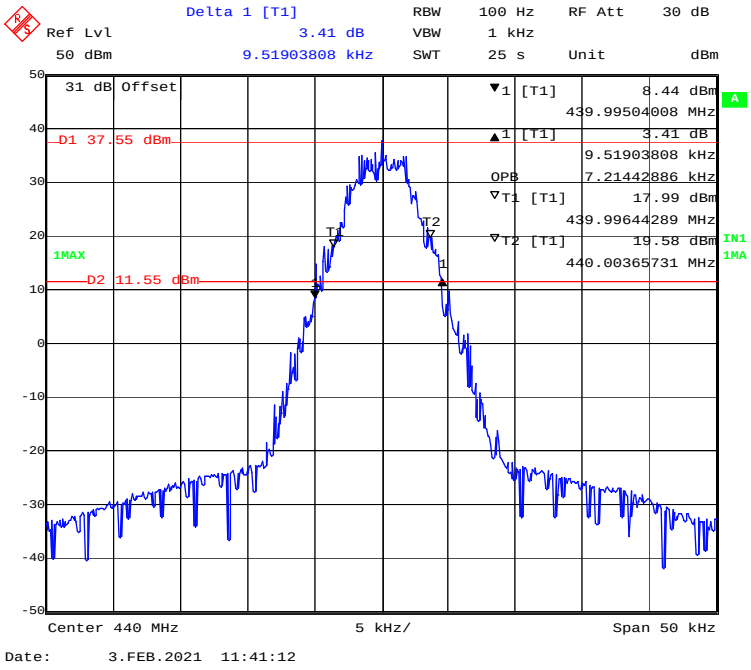
Frequency 400.025 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



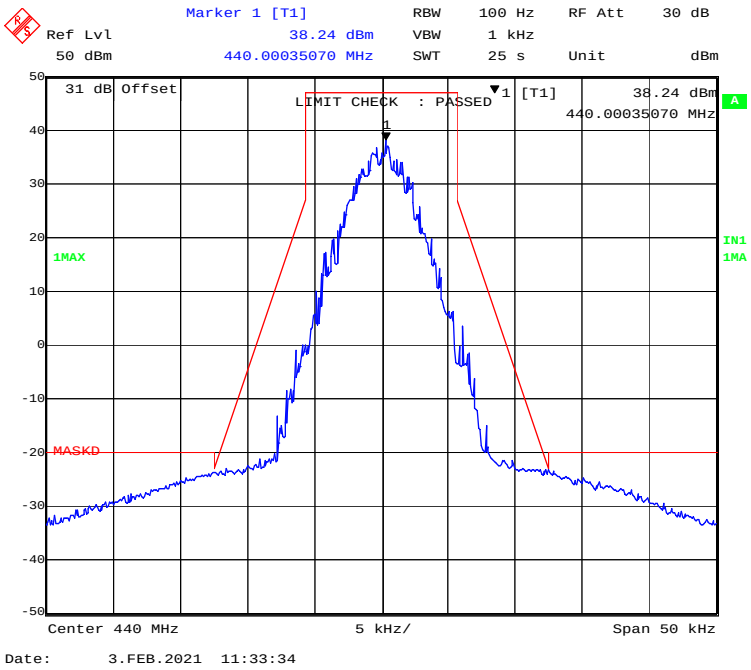
Emission Mask D



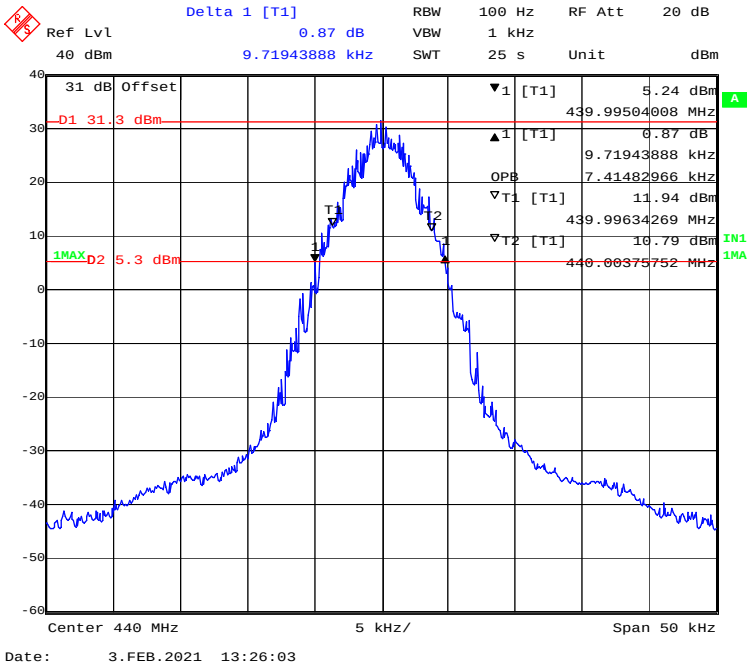
Frequency 440.000 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



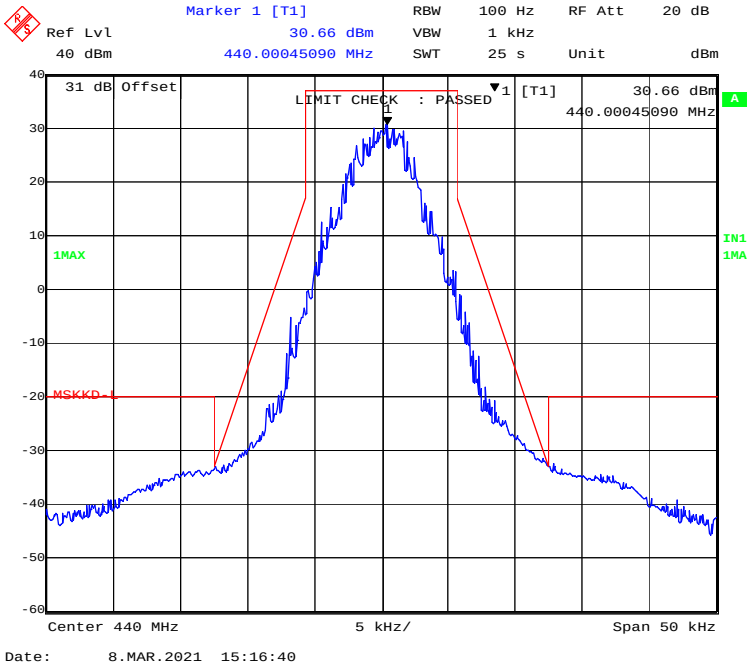
Emission Mask D



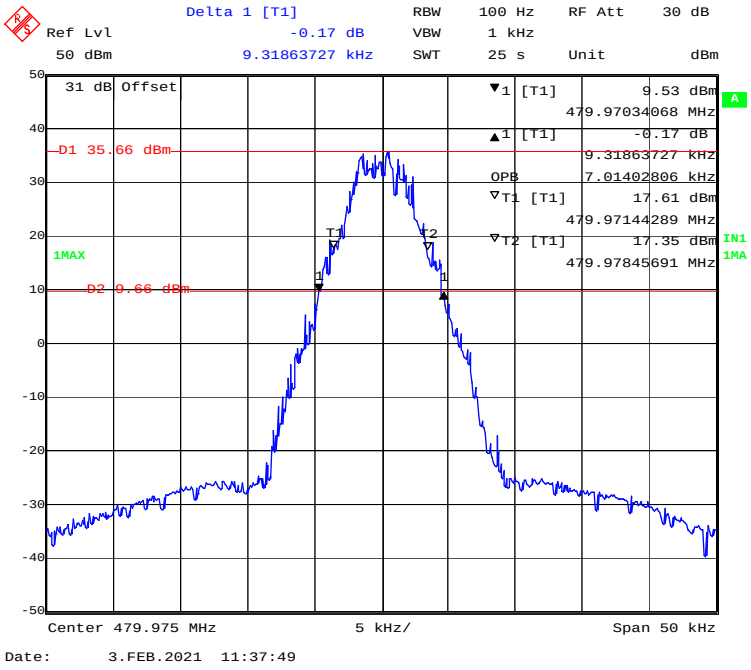
Frequency 440.000 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



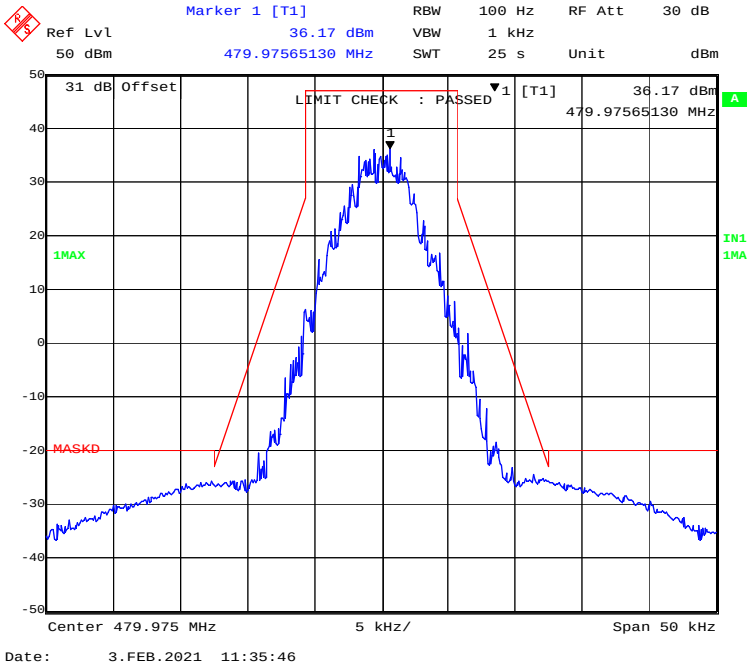
Emission Mask D



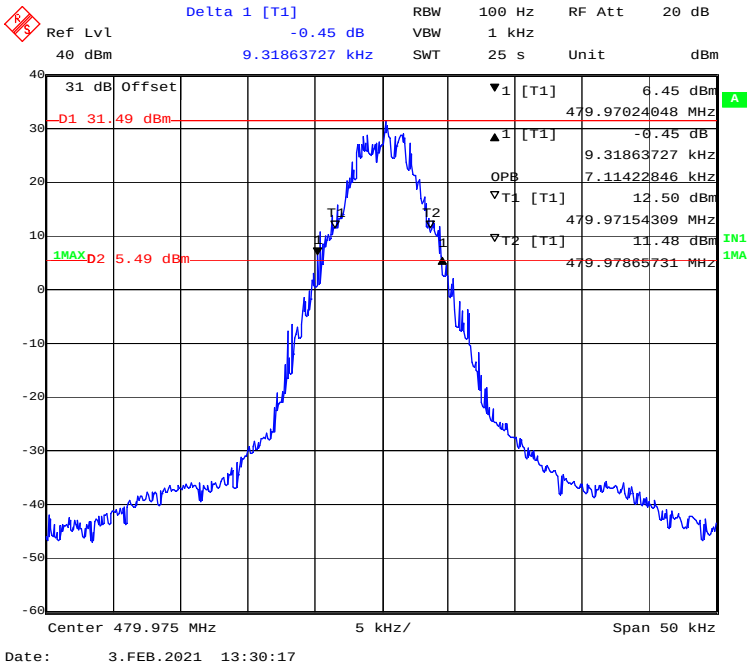
Frequency 479.975 MHz: 99% Occupied & 26 dB Bandwidth-High Power-12.5kHz



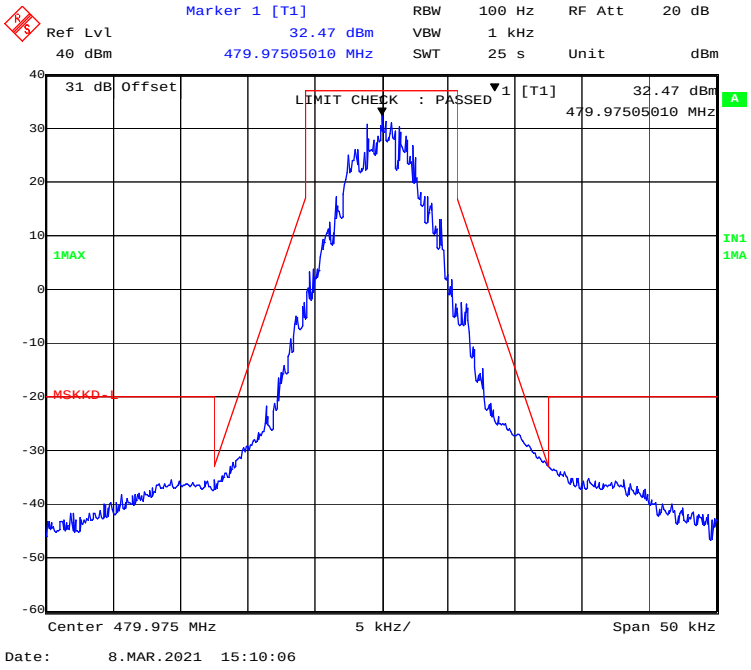
Emission Mask D



Frequency 479.975 MHz: 99% Occupied & 26 dB Bandwidth-Low Power-12.5kHz



Emission Mask D



FCC §2.1051 & §95.1779 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

FCC §2.1051 and §90.210

Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz 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:	22.5 ℃~23.1 ℃
Relative Humidity:	50 %~55 %
ATM Pressure:	101.5 kPa~102 kPa

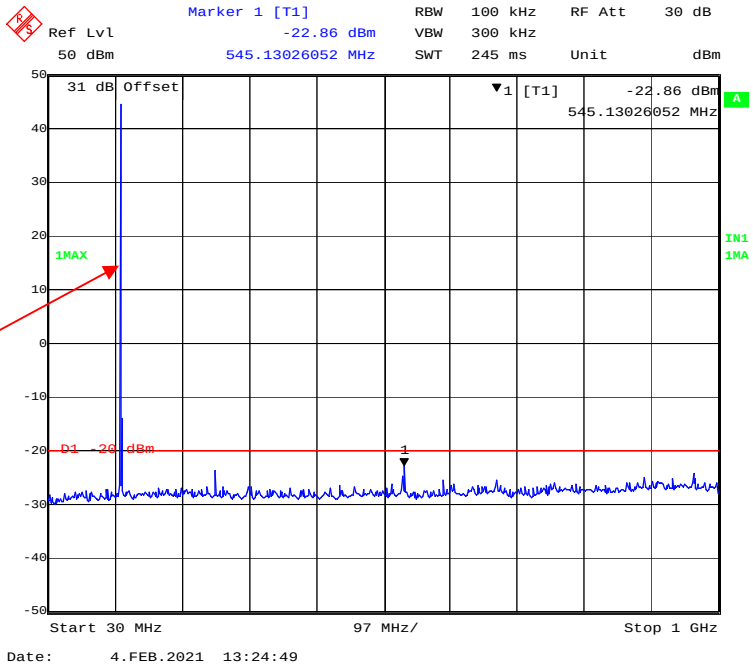
The testing was performed by CK Huang from 2021-02-03 to 2021-02-04.

Test Mode: Transmitting

Please refer to the following plots.

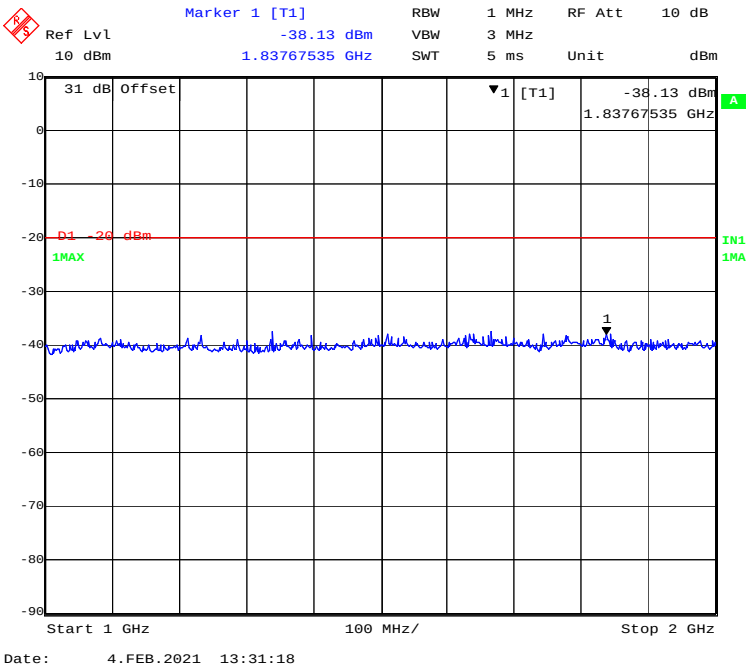
For Analog Mode:

Frequency:136.025 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

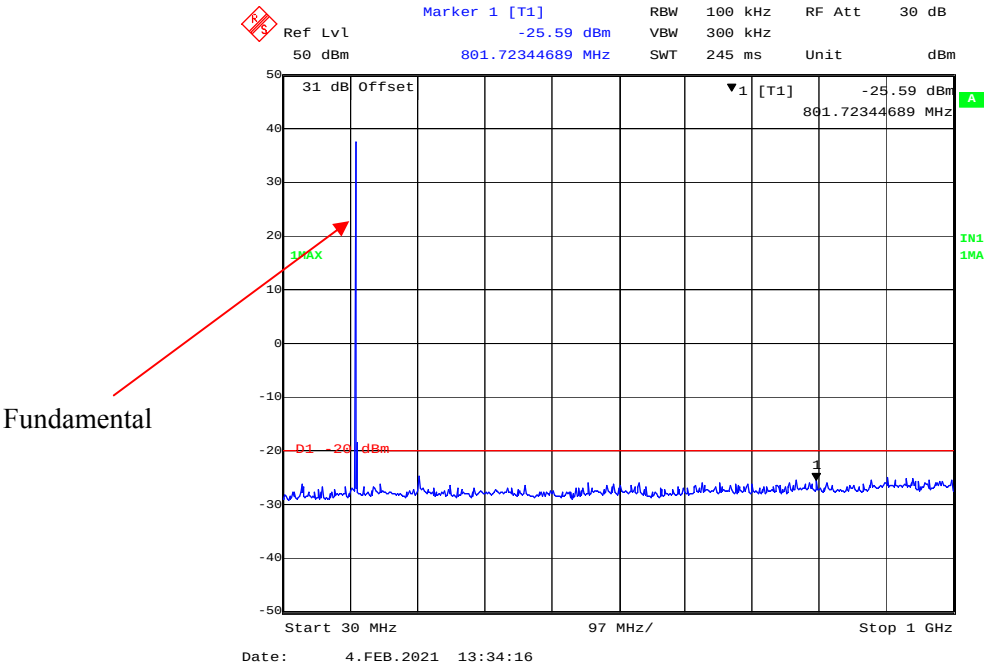


Fundamental

Frequency:136.025 MHz, 1 GHz - 2 GHz, High Power-12.5kHz

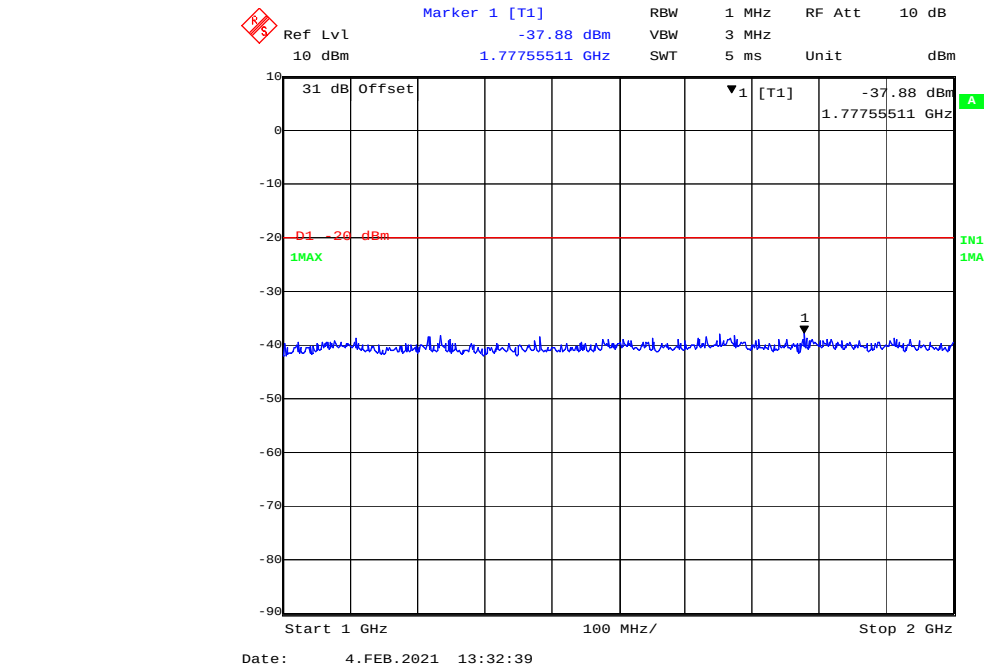


Frequency:136.025 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

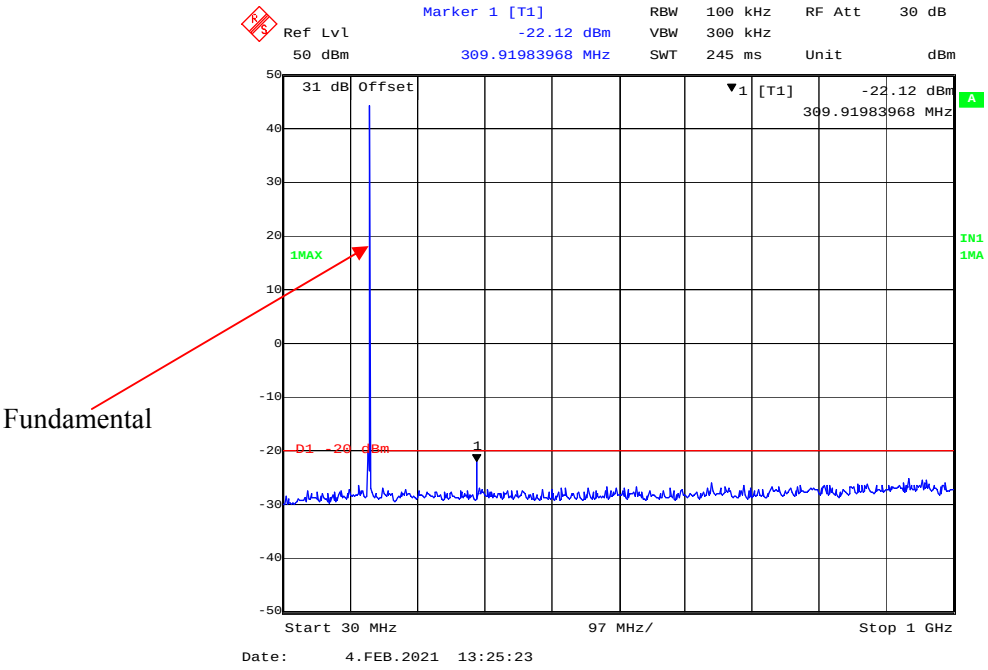


Fundamental

Frequency:136.025 MHz, 1 GHz - 2 GHz, Low Power-12.5kHz

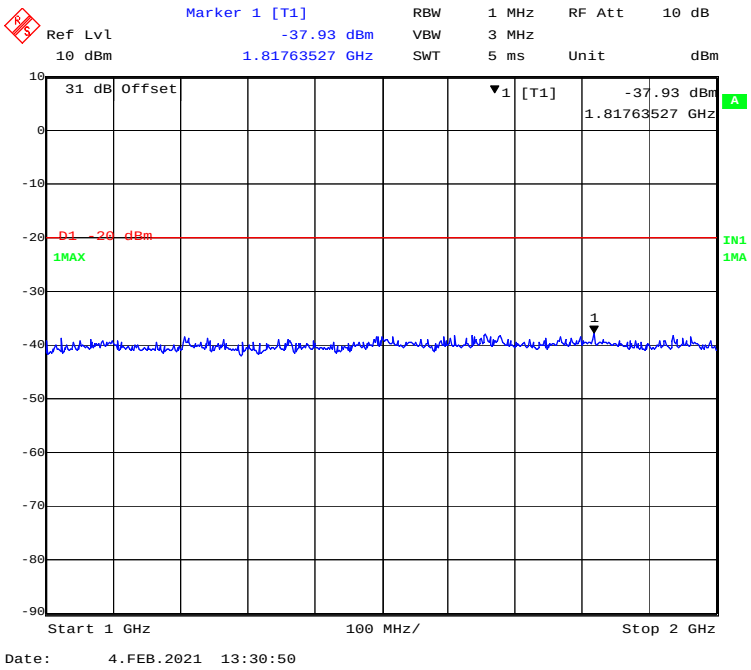


Frequency:155.000 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

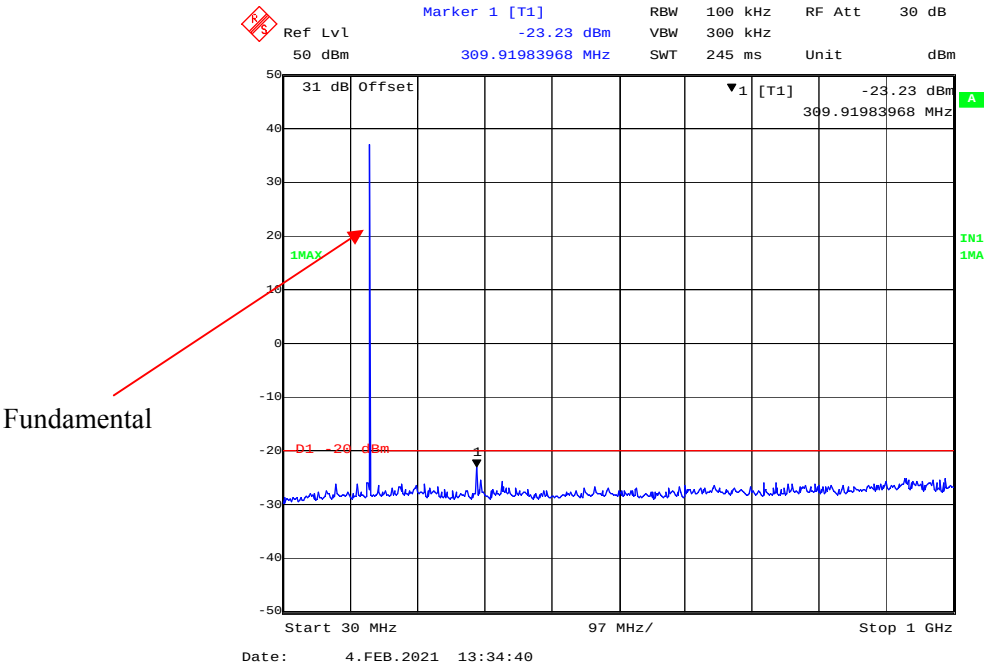


Fundamental

Frequency:155.000 MHz, 1 GHz - 2 GHz, High Power-12.5kHz

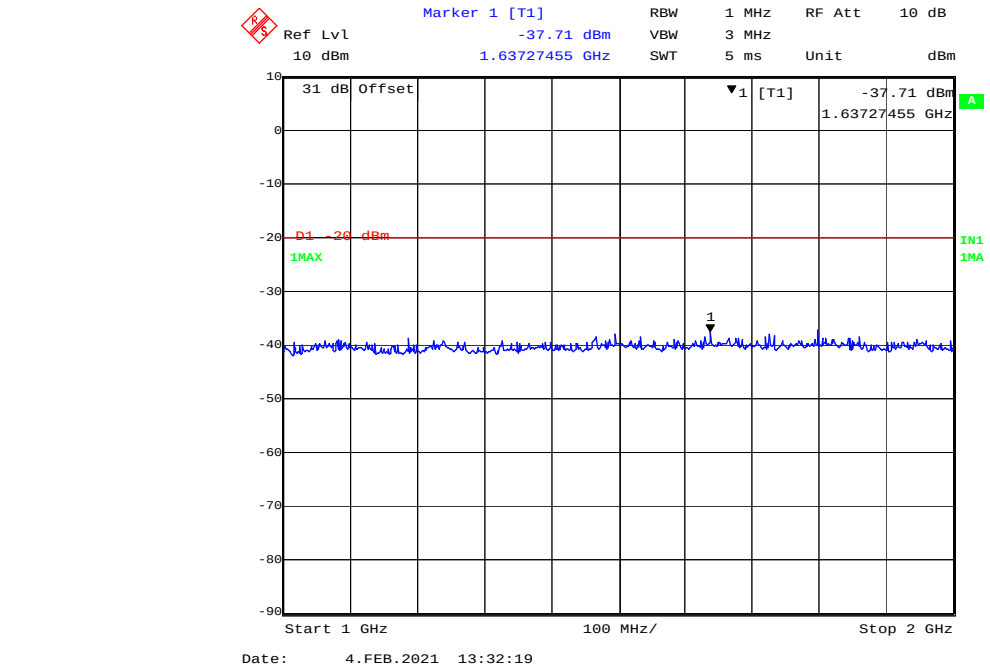


Frequency:155.000 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

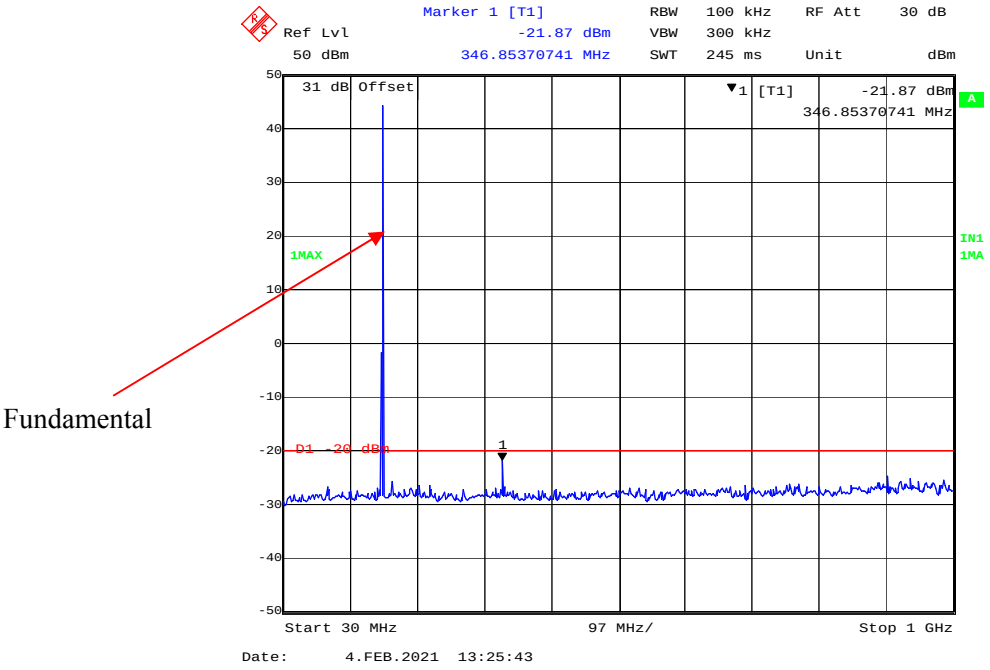


Fundamental

Frequency:155.000 MHz, 1 GHz - 2 GHz, Low Power-12.5kHz

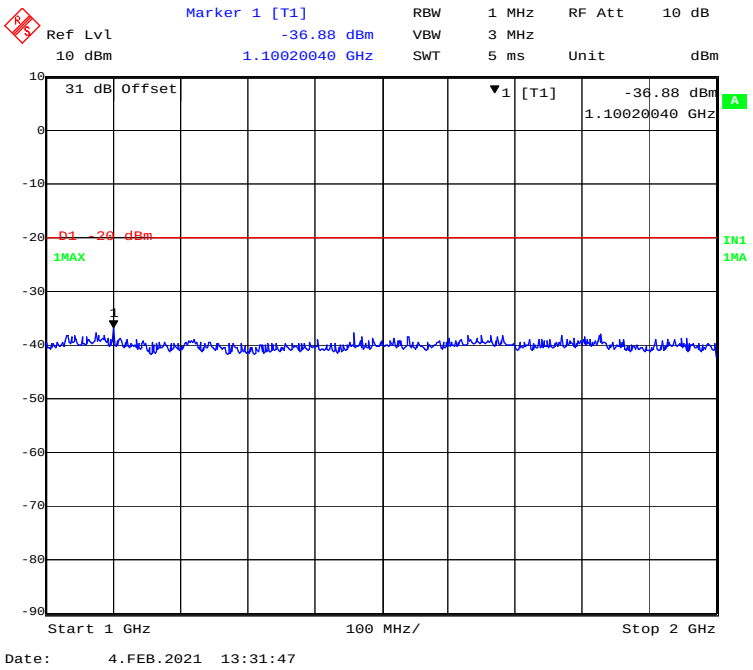


Frequency:173.975 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

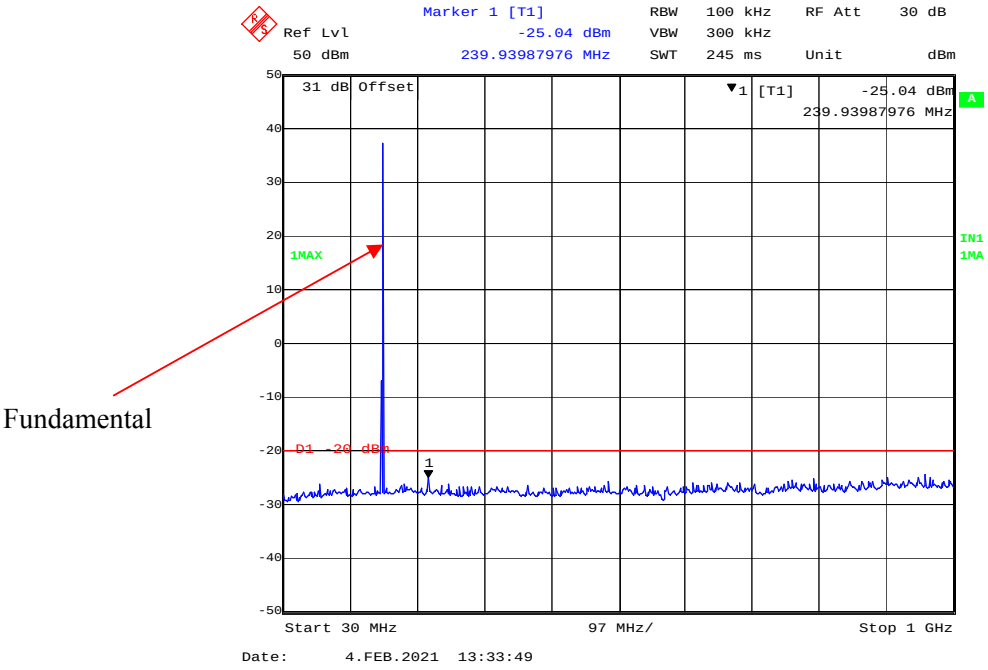


Fundamental

Frequency:173.975 MHz, 1 GHz - 2 GHz, High Power-12.5kHz

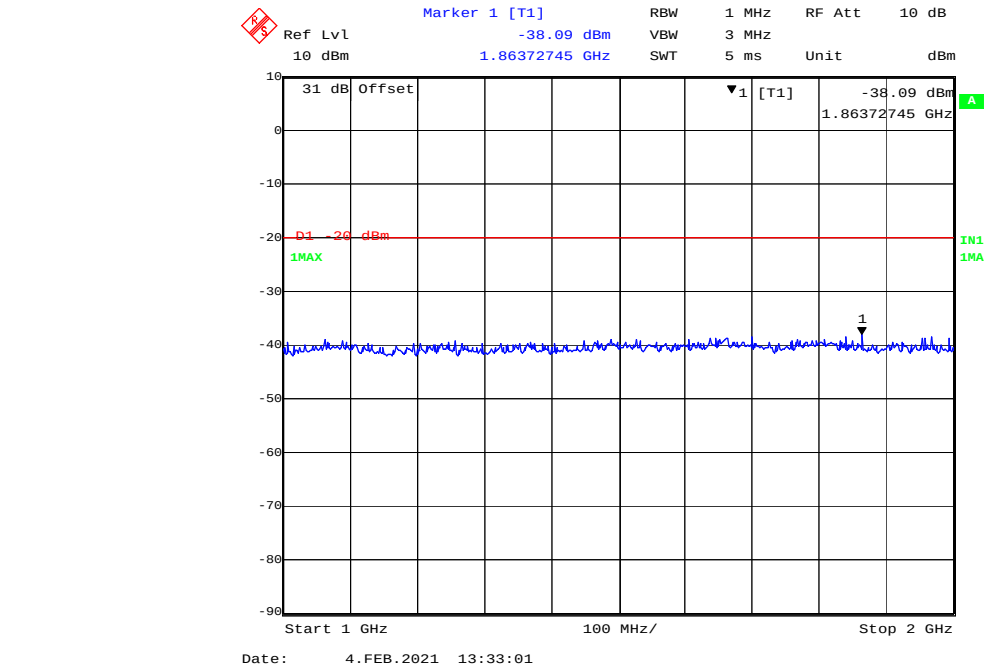


Frequency:173.975 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

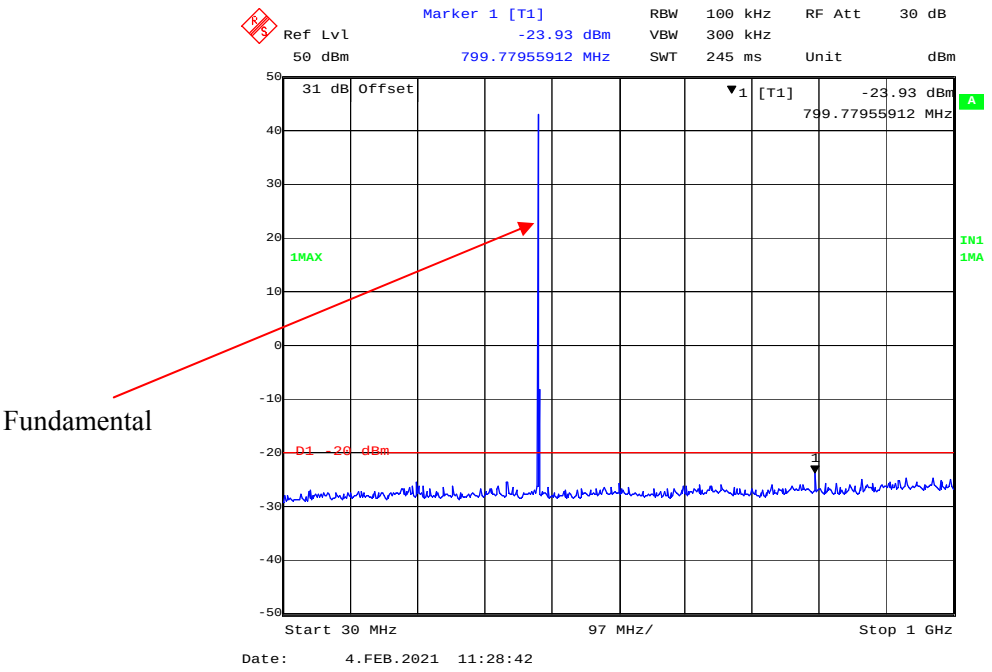


Fundamental

Frequency:173.975 MHz, 1 GHz - 2 GHz, Low Power-12.5kHz

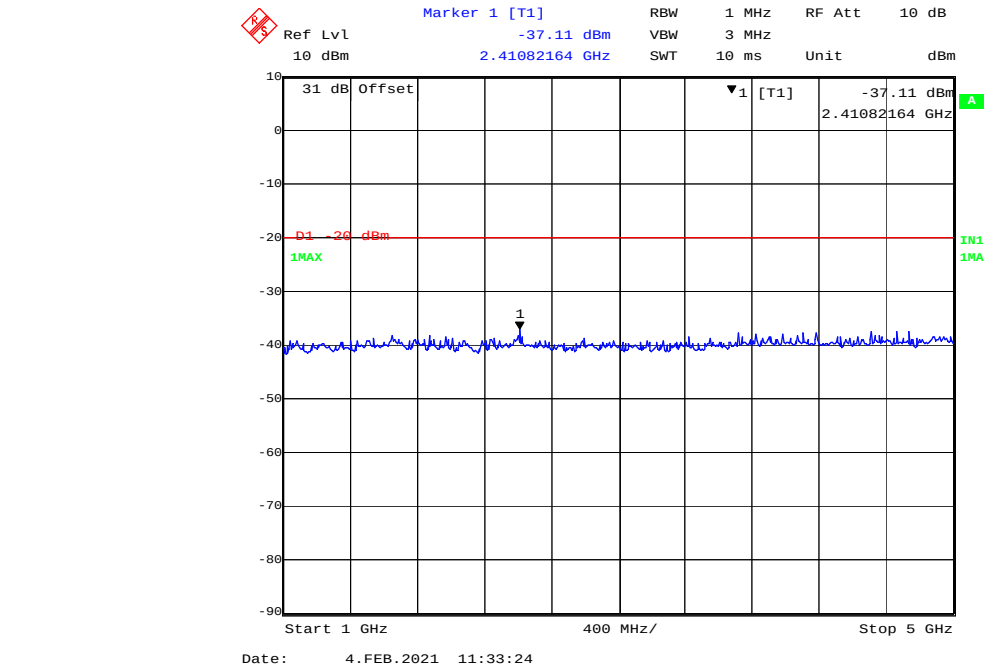


Frequency:400.025 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

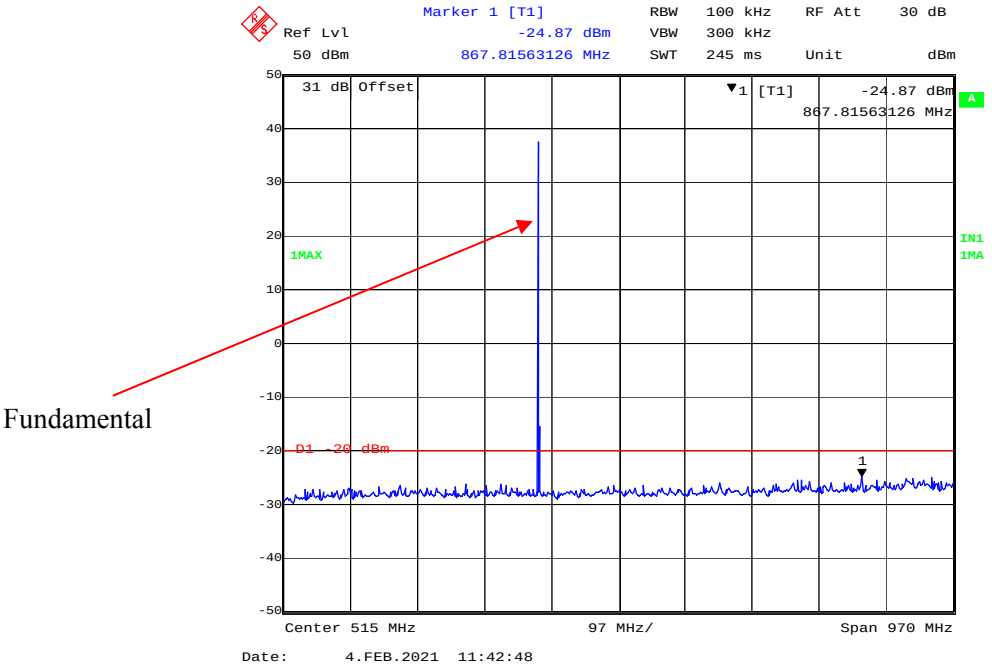


Fundamental

Frequency:400.025 MHz, 1 GHz - 5 GHz, High Power-12.5kHz

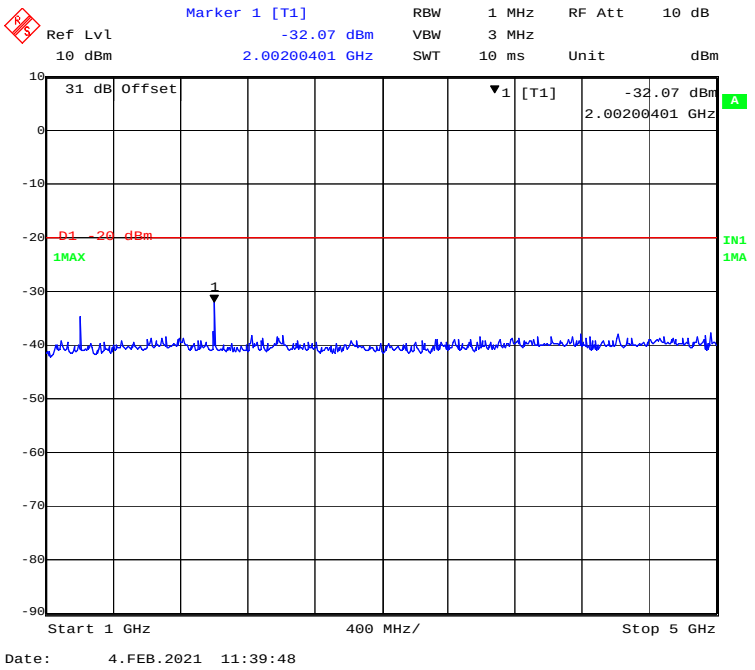


Frequency:400.025 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

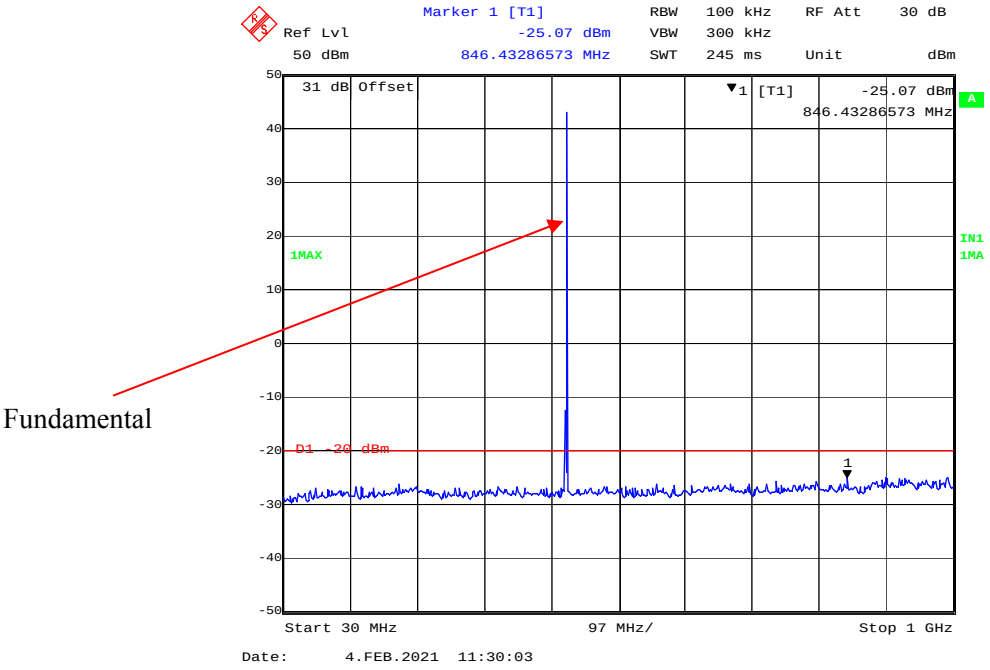


Fundamental

Frequency:400.025 MHz, 1 GHz - 5 GHz, Low Power-12.5kHz

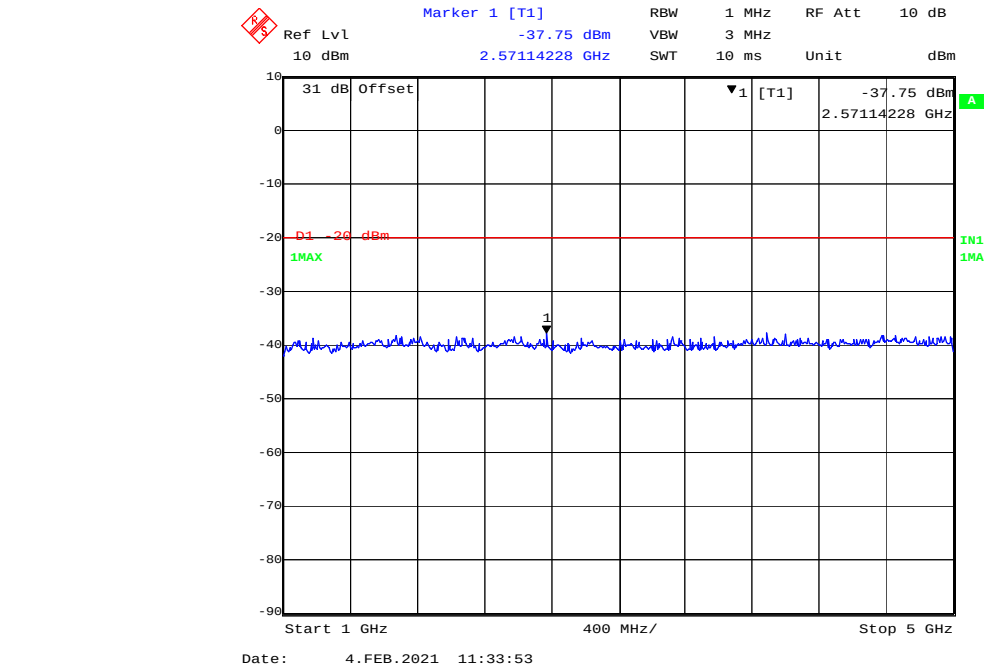


Frequency:440.000 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

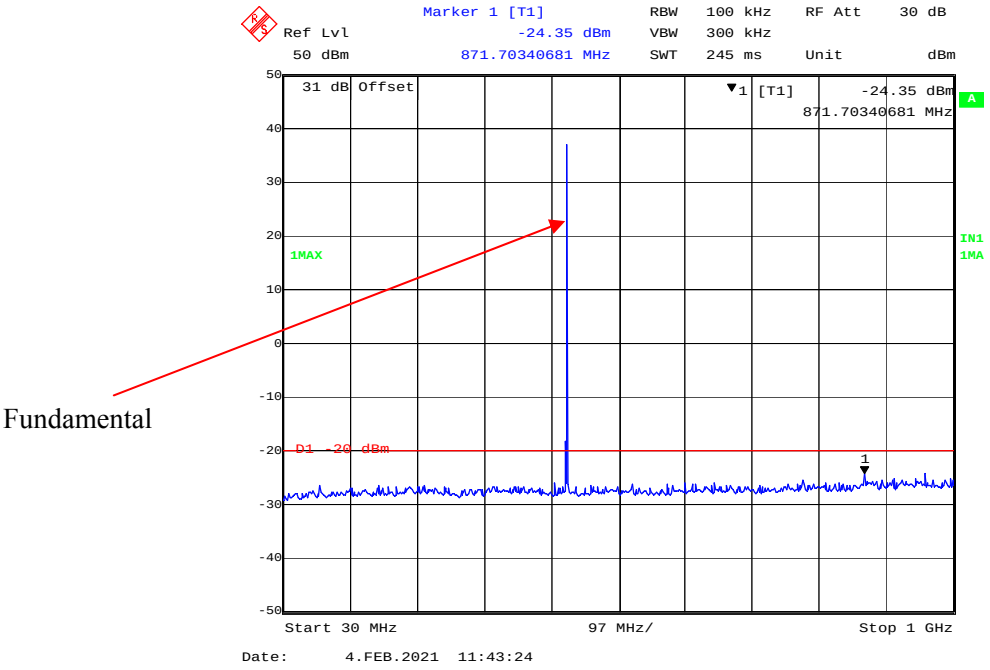


Fundamental

Frequency:440.000 MHz, 1 GHz - 5 GHz, High Power-12.5kHz

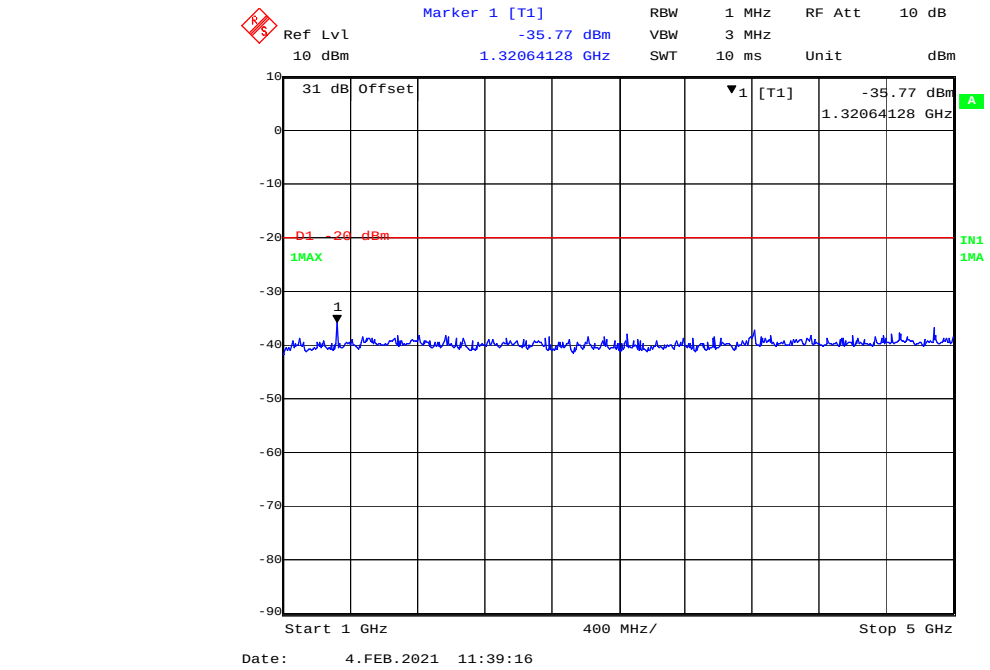


Frequency:440.000 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

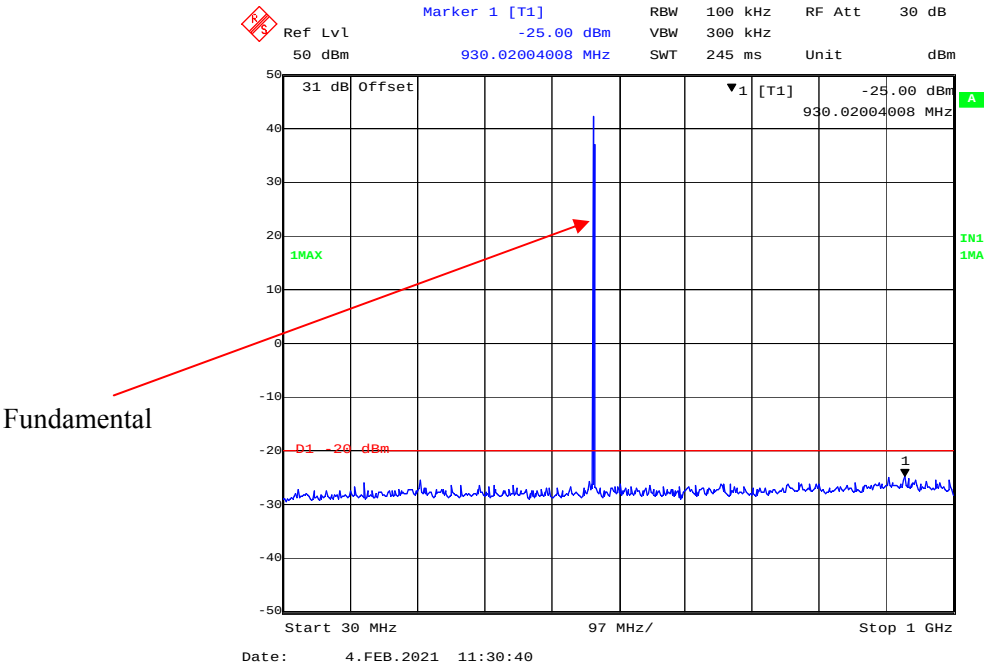


Fundamental

Frequency:440.000 MHz, 1 GHz - 5 GHz, Low Power-12.5kHz

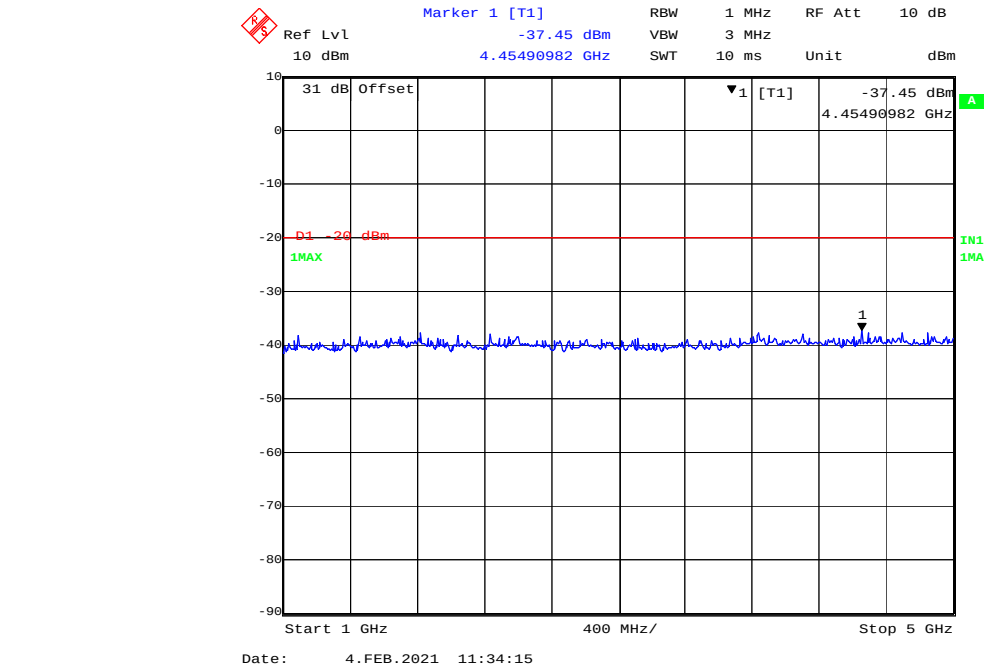


Frequency:479.975 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

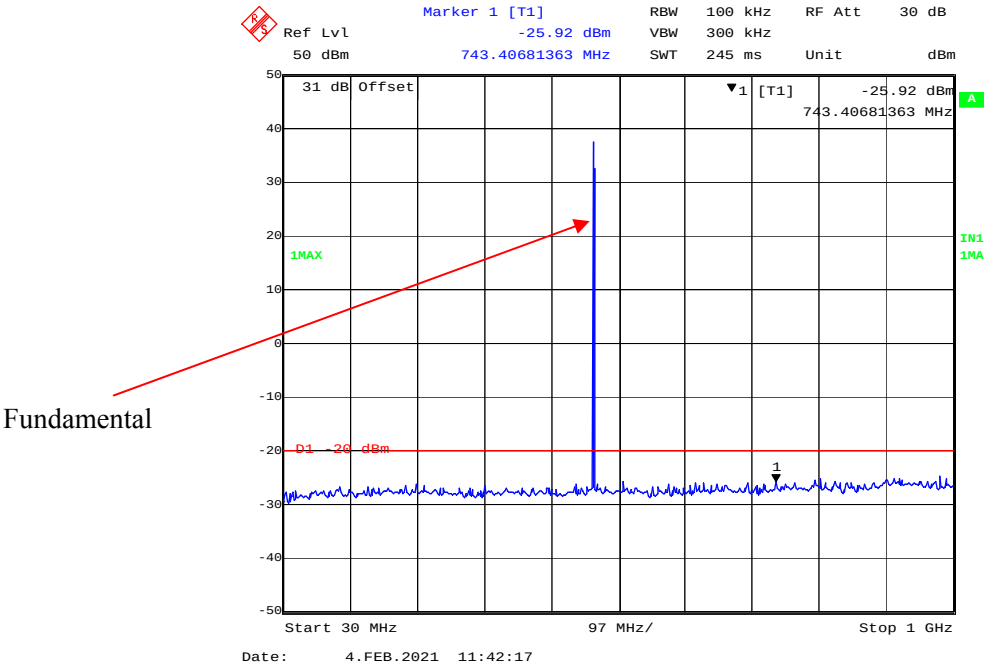


Fundamental

Frequency:479.975 MHz, 1 GHz - 5 GHz, High Power-12.5kHz

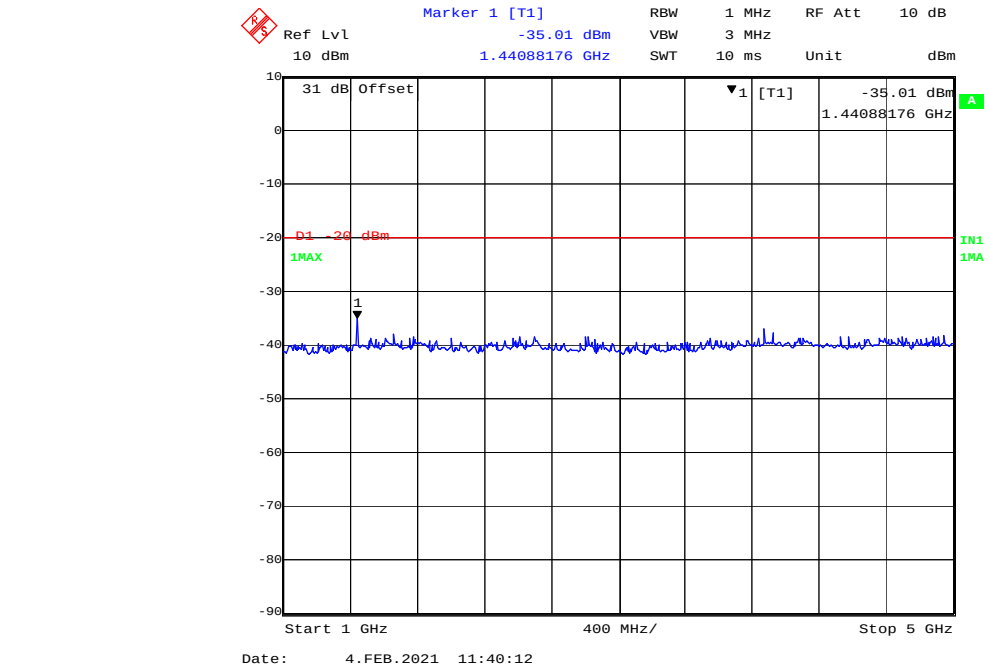


Frequency:479.975 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz



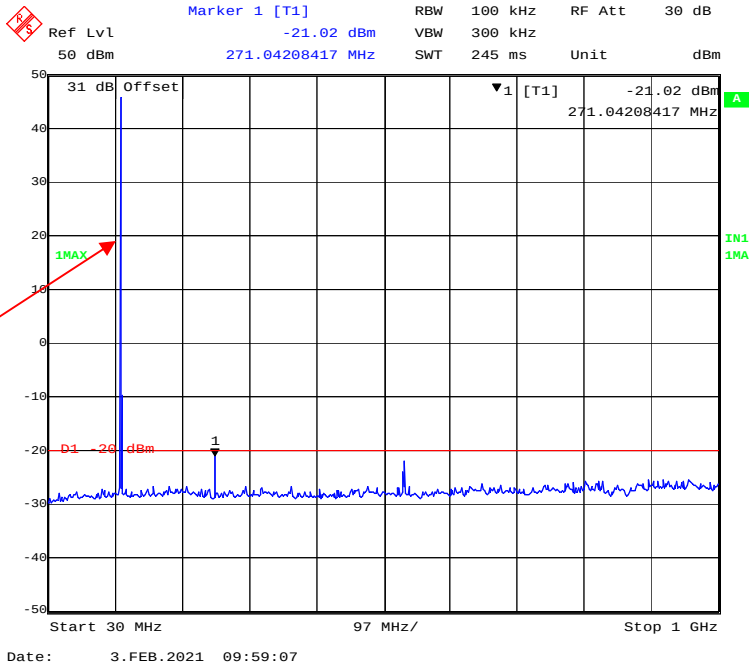
Fundamental

Frequency:479.975 MHz, 1 GHz - 5 GHz, Low Power-12.5kHz



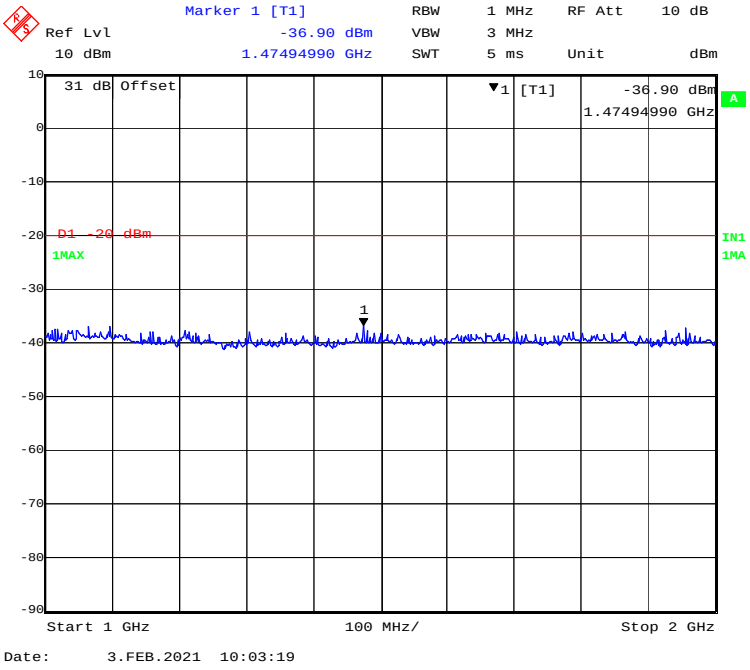
For Digital Mode:

Frequency:136.025 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

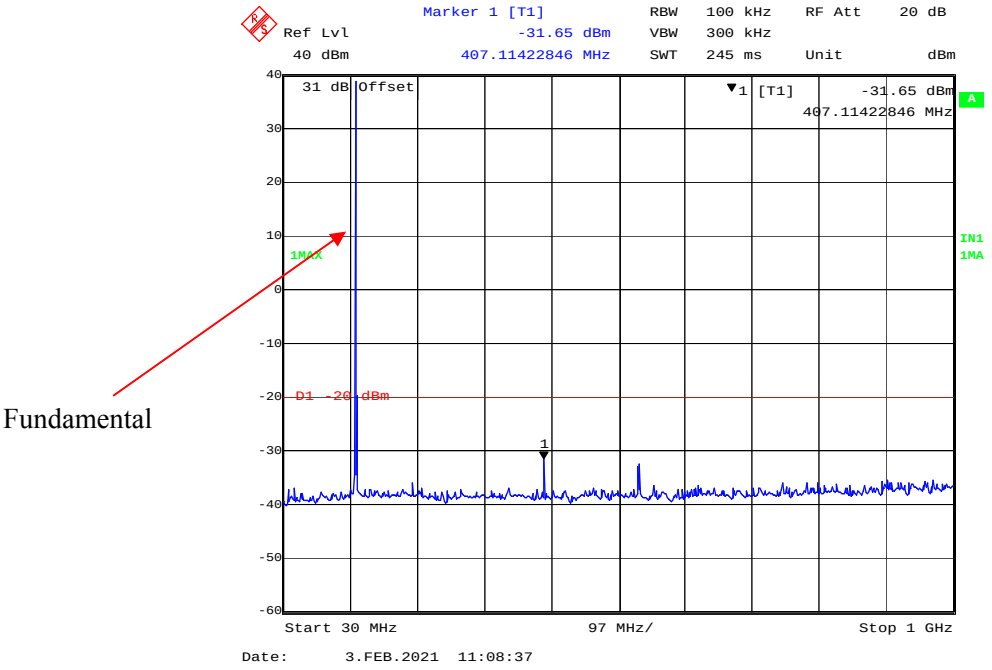


Fundamental

Frequency:136.025 MHz, 1 GHz - 2 GHz, High Power-12.5kHz

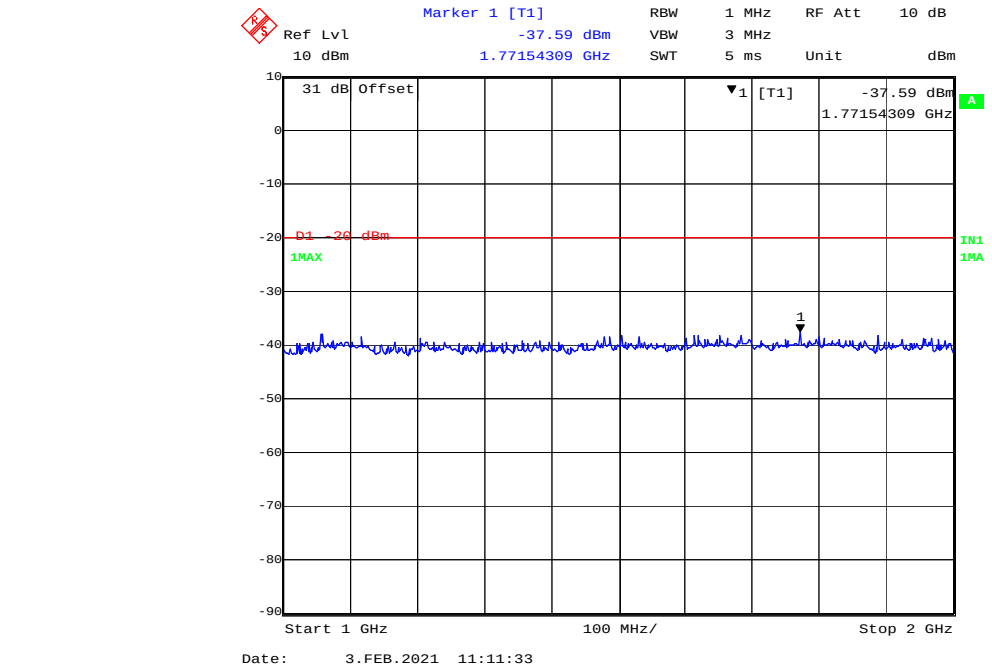


Frequency:136.025 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

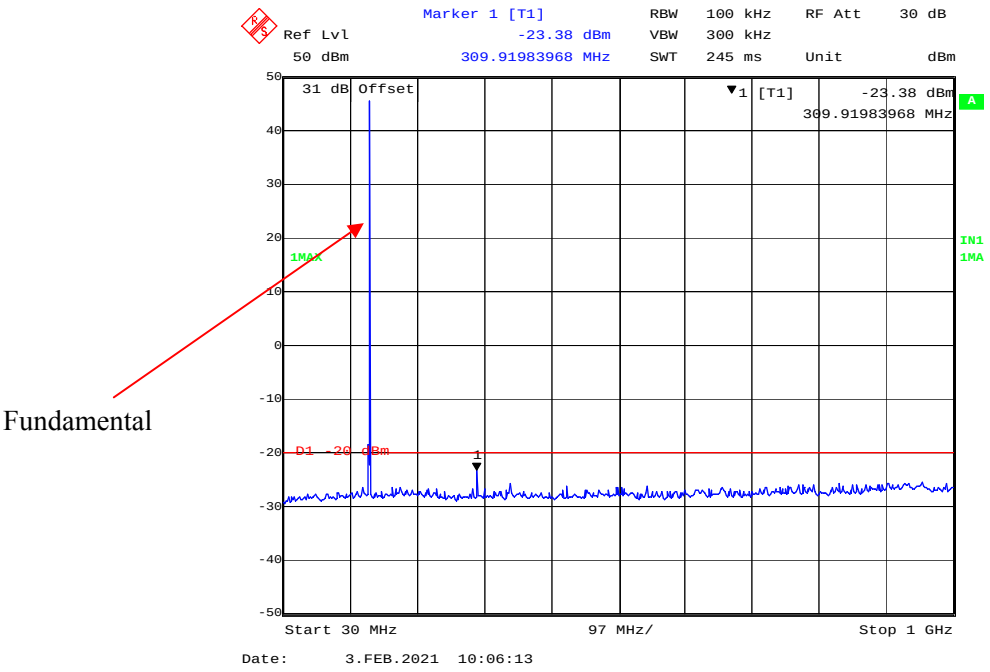


Fundamental

Frequency:136.025 MHz, 1 GHz - 2 GHz, Low Power-12.5kHz

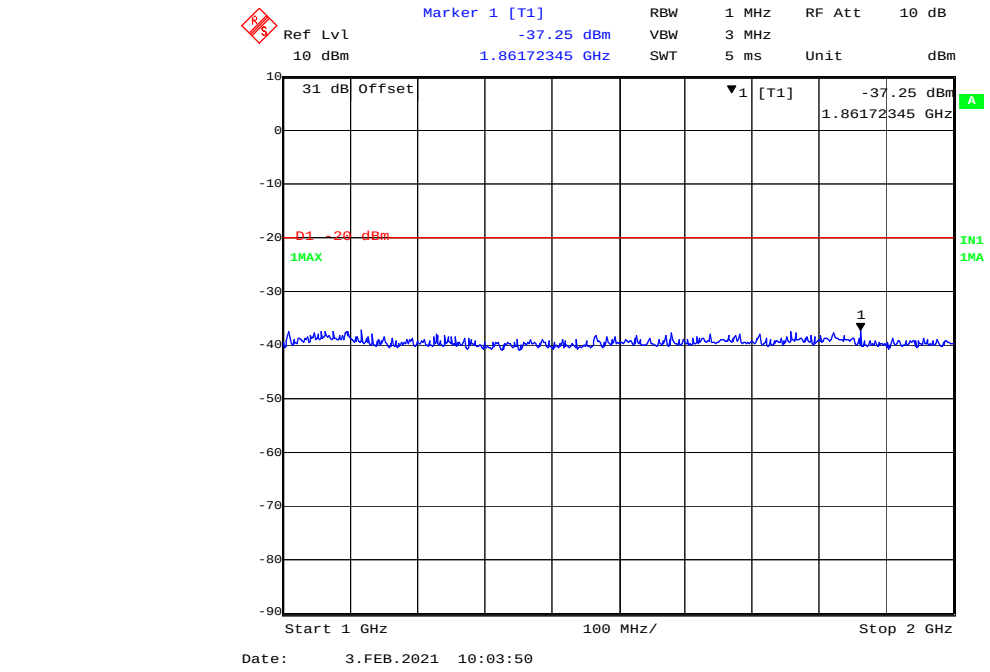


Frequency:155.000 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

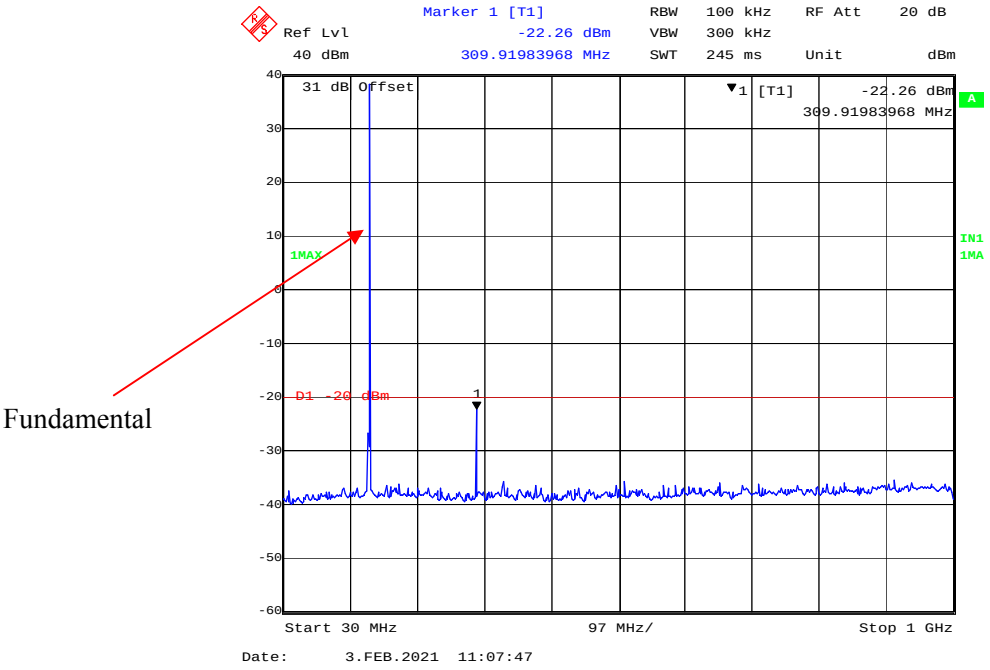


Fundamental

Frequency:155.000 MHz, 1 GHz - 2 GHz, High Power-12.5kHz

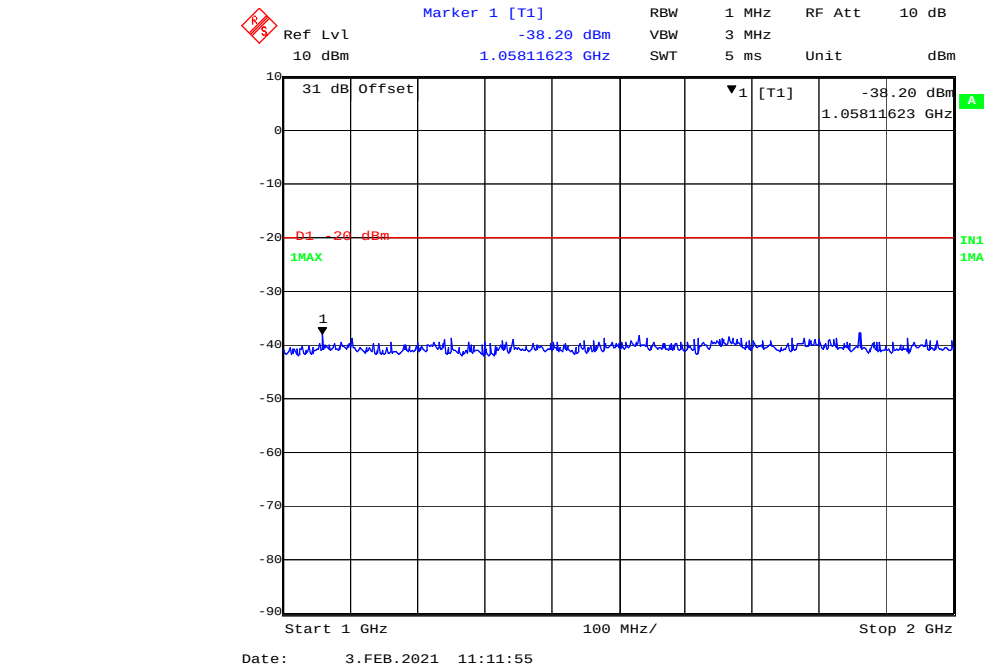


Frequency:155.000 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

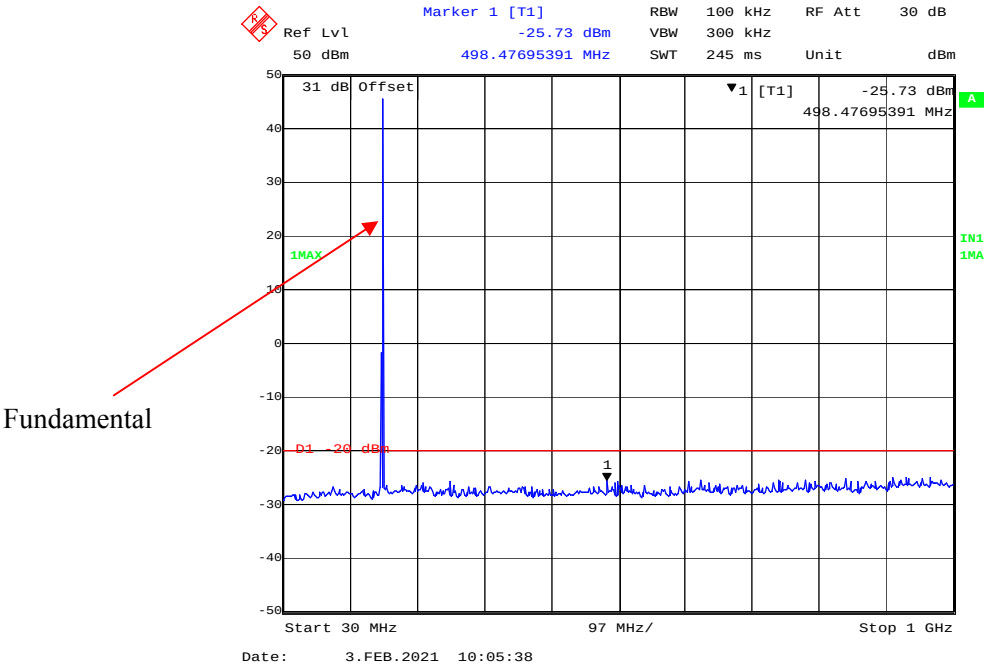


Fundamental

Frequency:155.000 MHz, 1 GHz - 2 GHz, Low Power-12.5kHz

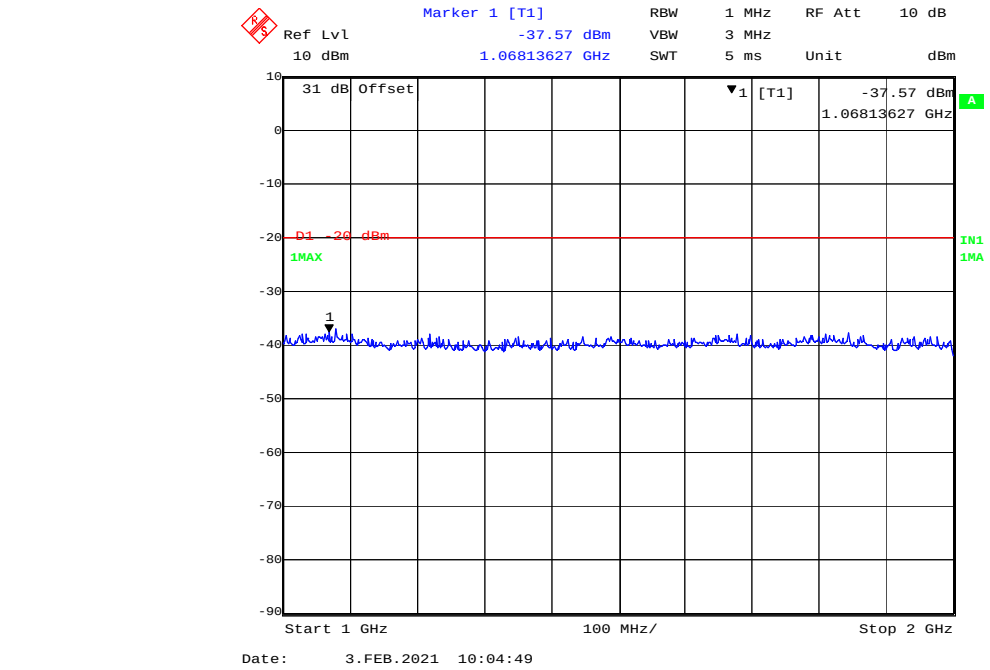


Frequency:173.975 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

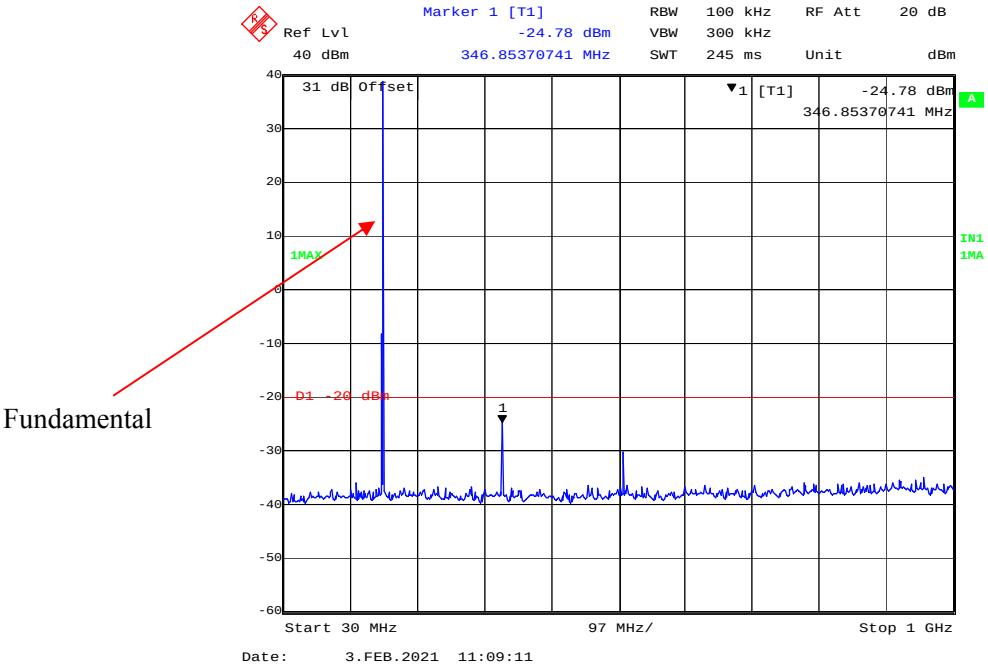


Fundamental

Frequency:173.975 MHz, 1 GHz - 2 GHz, High Power-12.5kHz

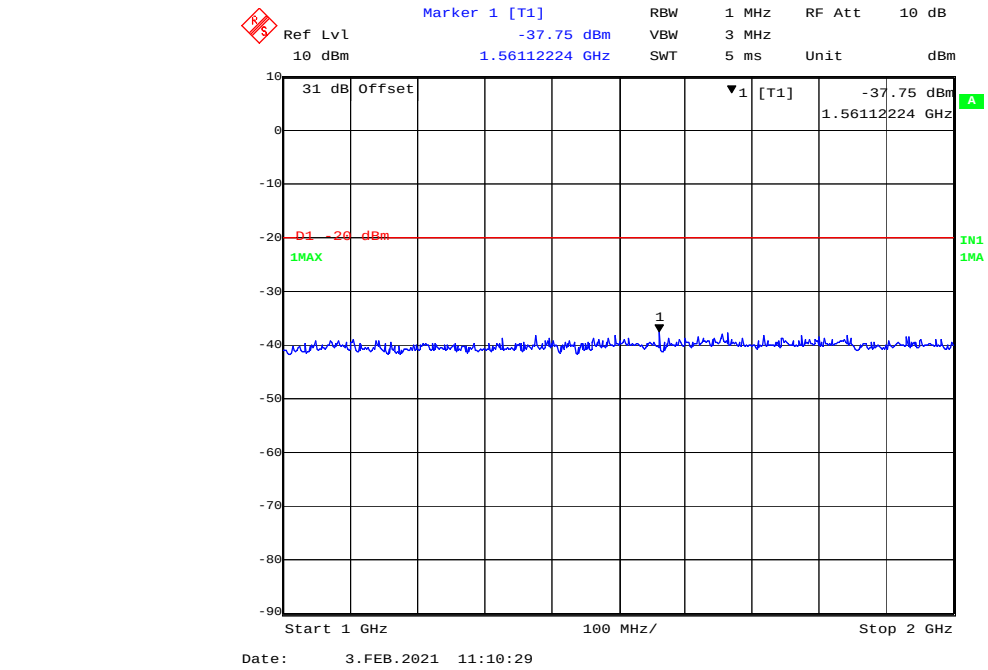


Frequency:173.975 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

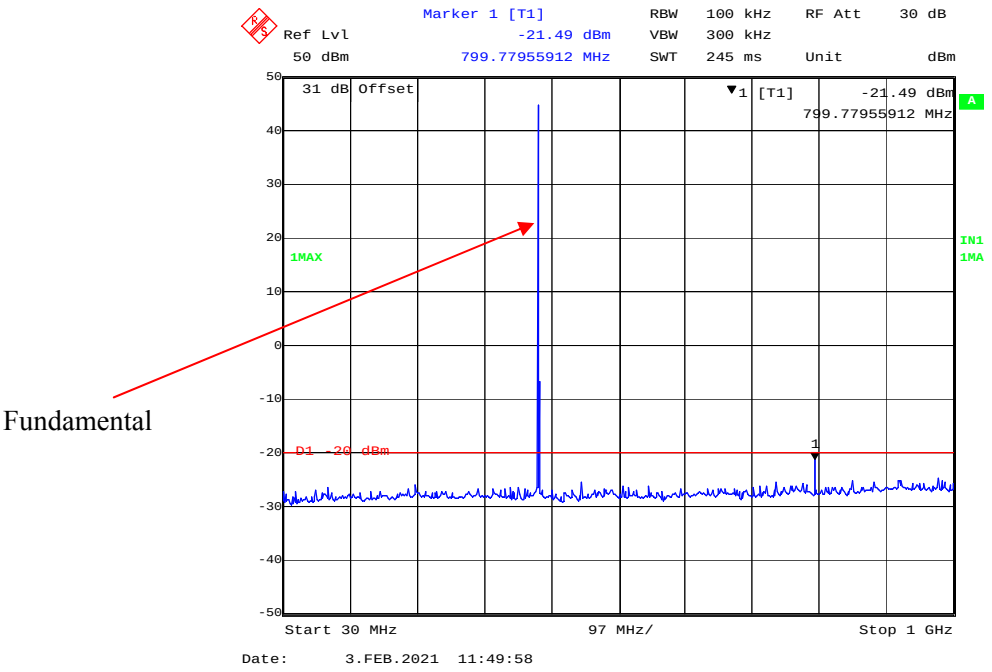


Fundamental

Frequency:173.975 MHz, 1 GHz - 2 GHz, Low Power-12.5kHz

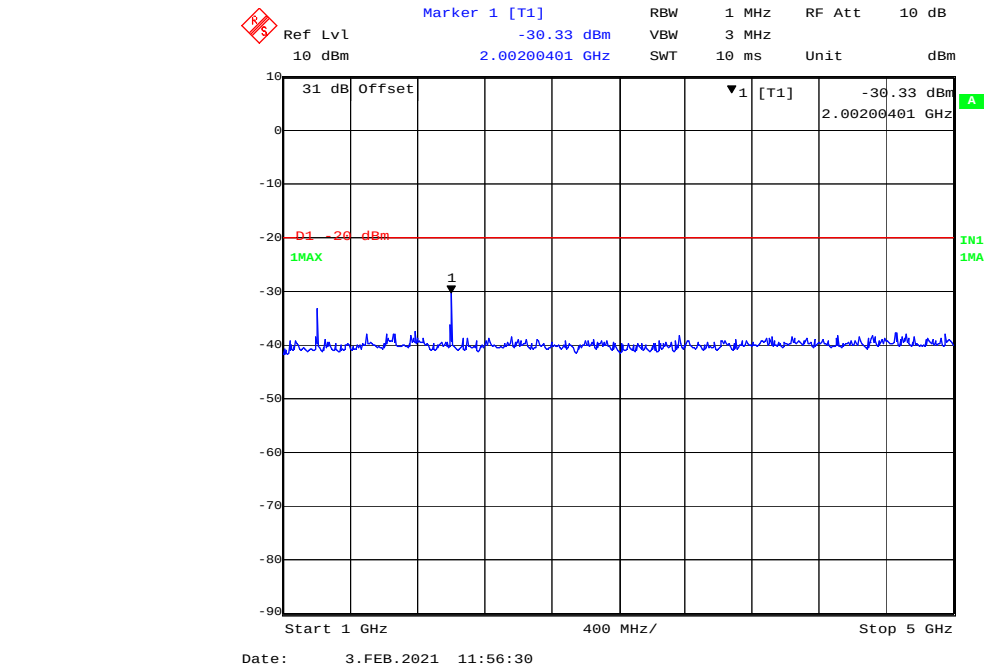


Frequency:400.025 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

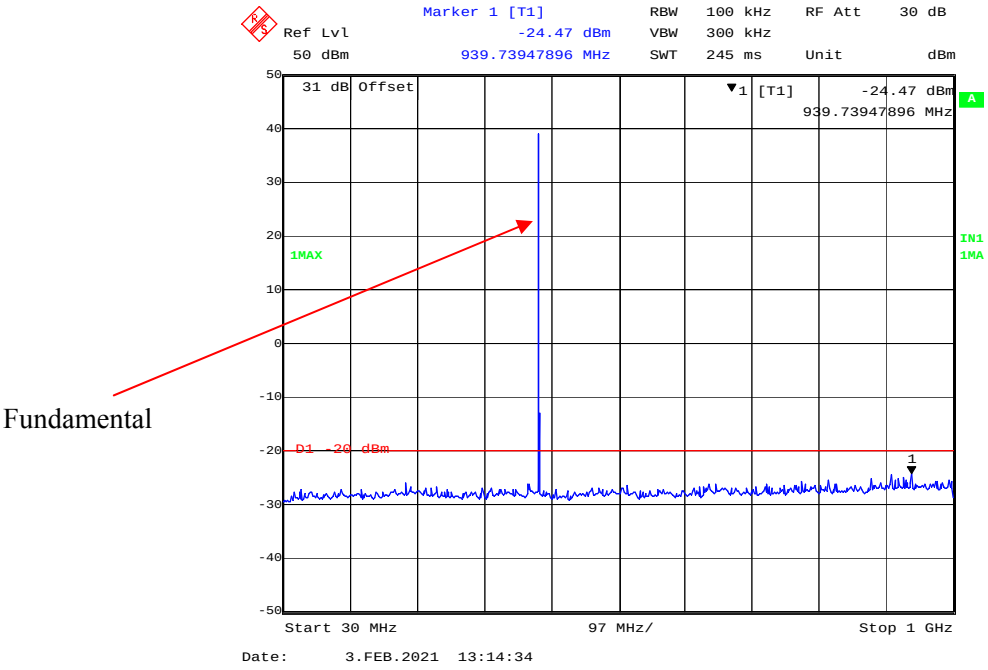


Fundamental

Frequency:400.025 MHz, 1 GHz - 5 GHz, High Power-12.5kHz

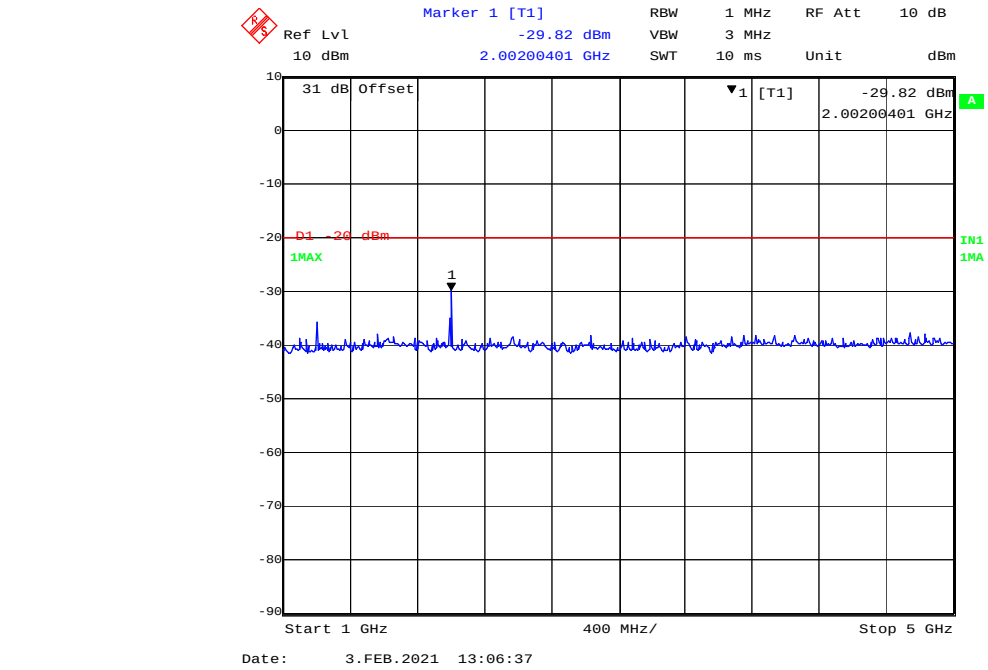


Frequency:400.025 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

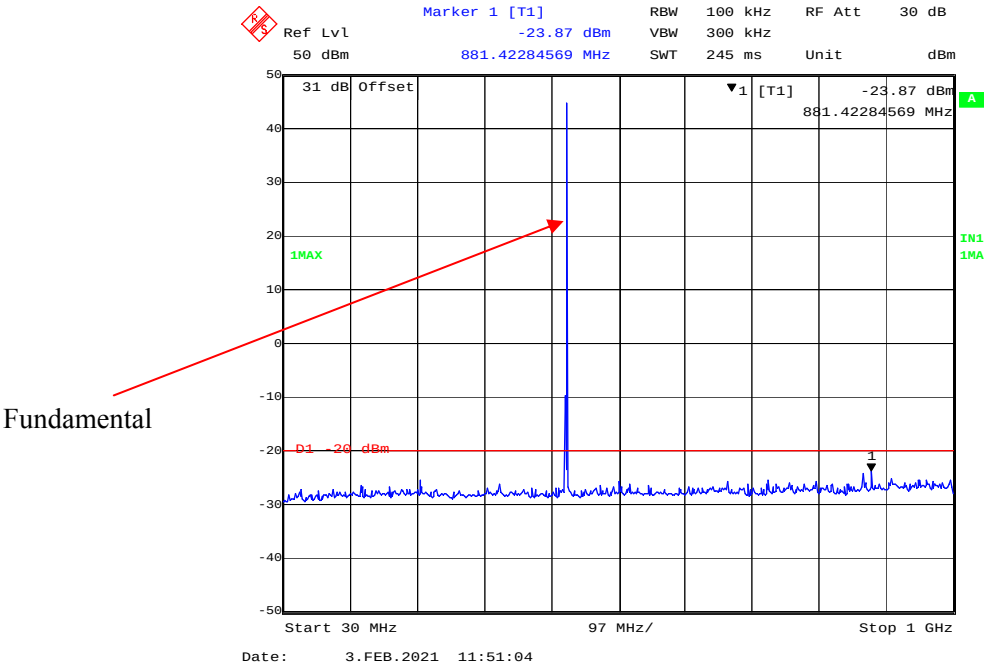


Fundamental

Frequency:400.025 MHz, 1 GHz - 5 GHz, Low Power-12.5kHz

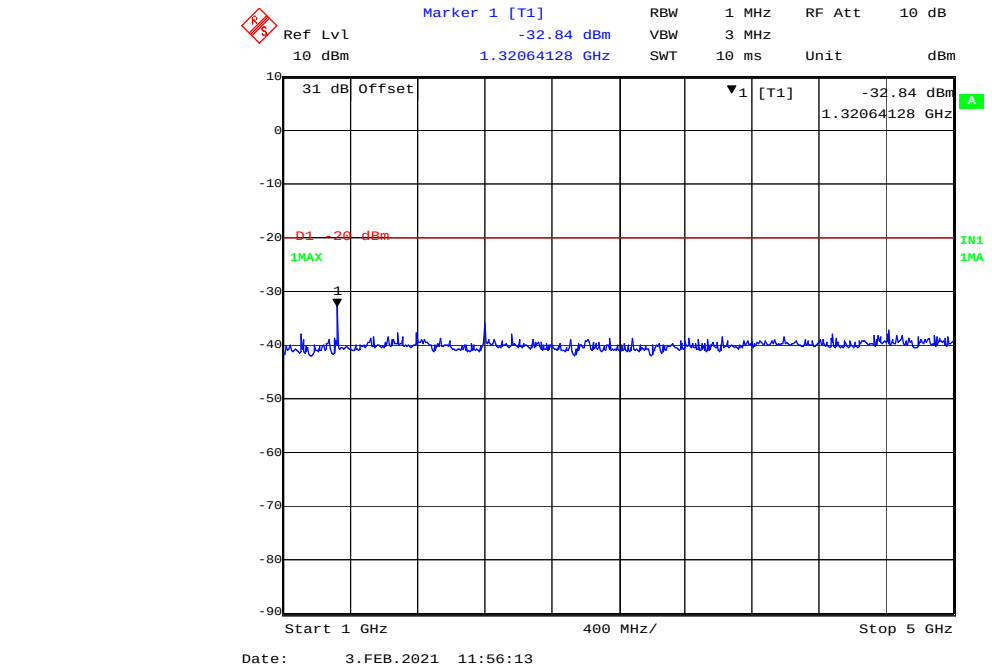


Frequency:440.000 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

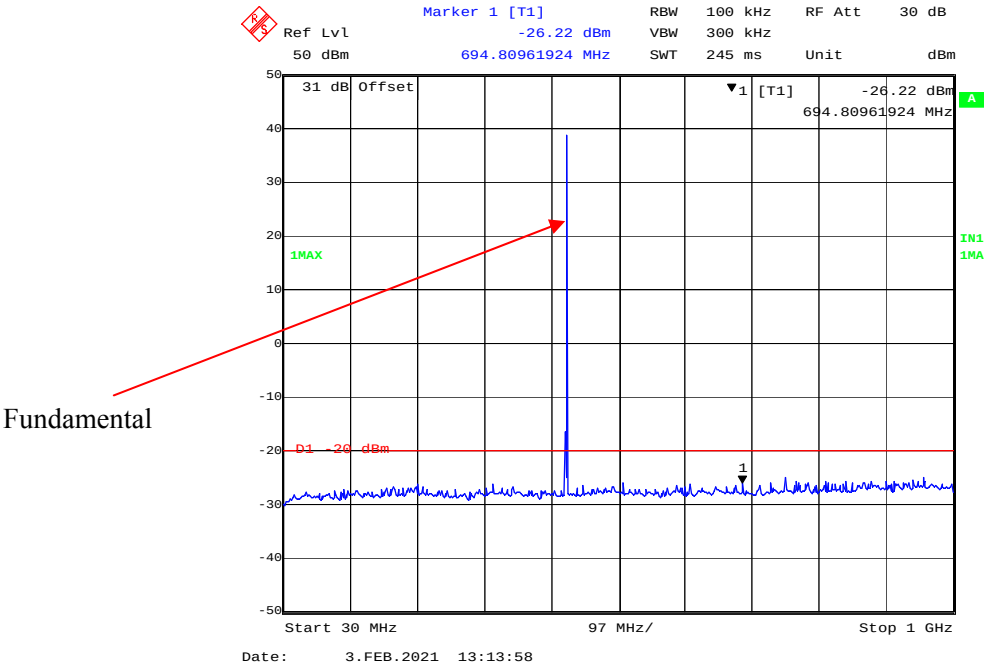


Fundamental

Frequency:440.000 MHz, 1 GHz - 5 GHz, High Power-12.5kHz

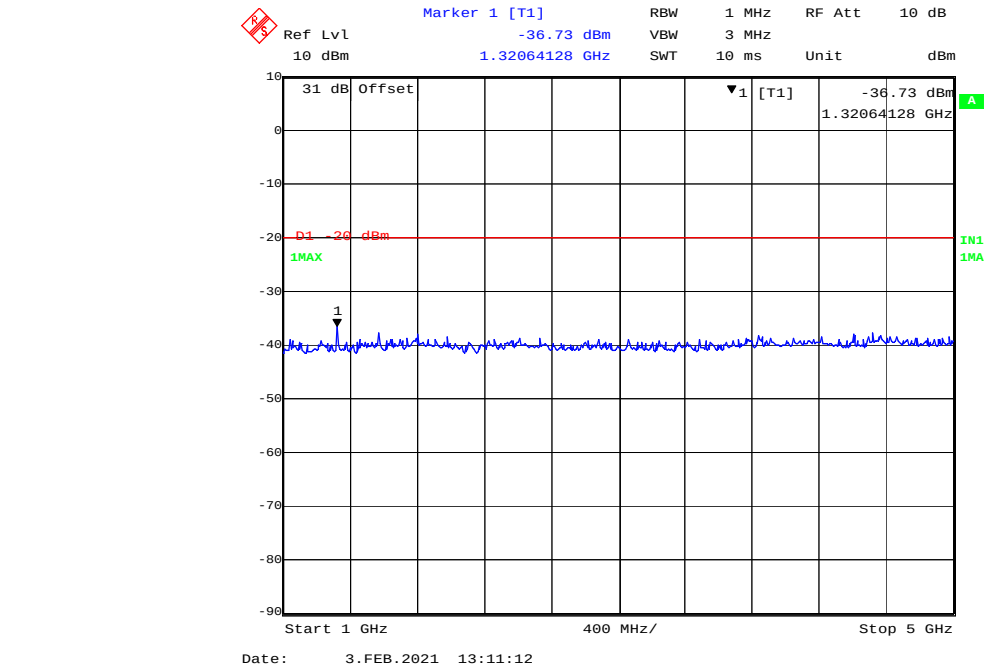


Frequency:440.000 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz

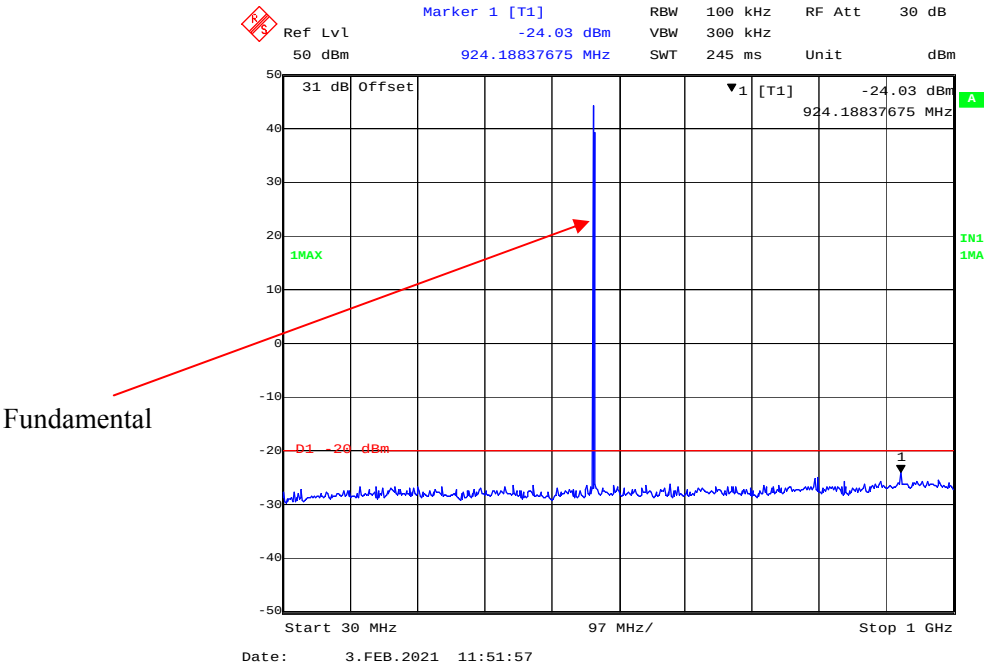


Fundamental

Frequency:440.000 MHz, 1 GHz - 5 GHz, Low Power-12.5kHz

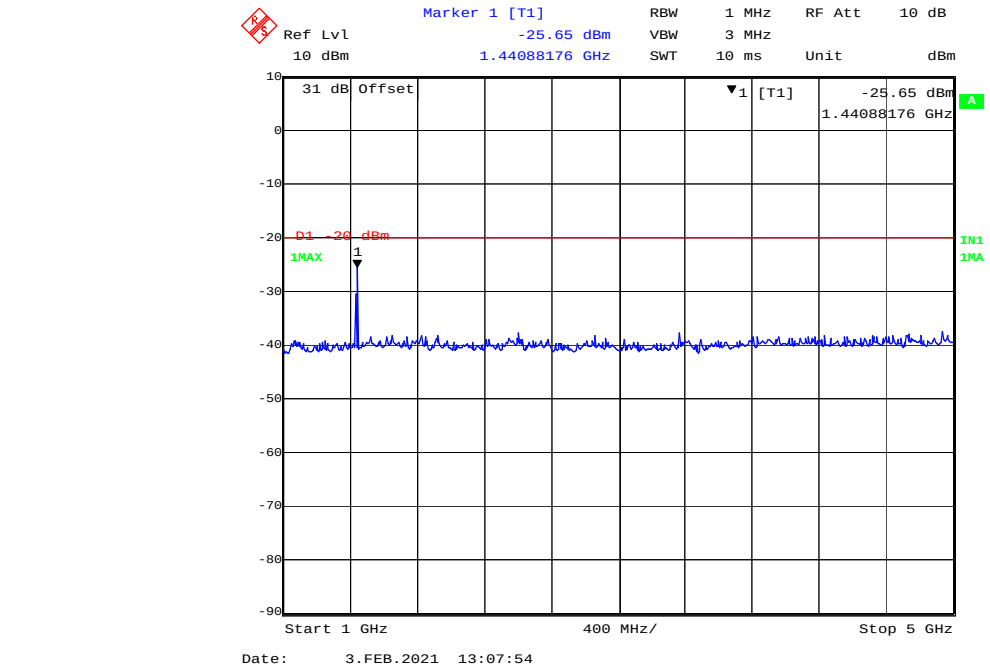


Frequency:479.975 MHz, 30 MHz – 1 GHz, High Power-12.5kHz

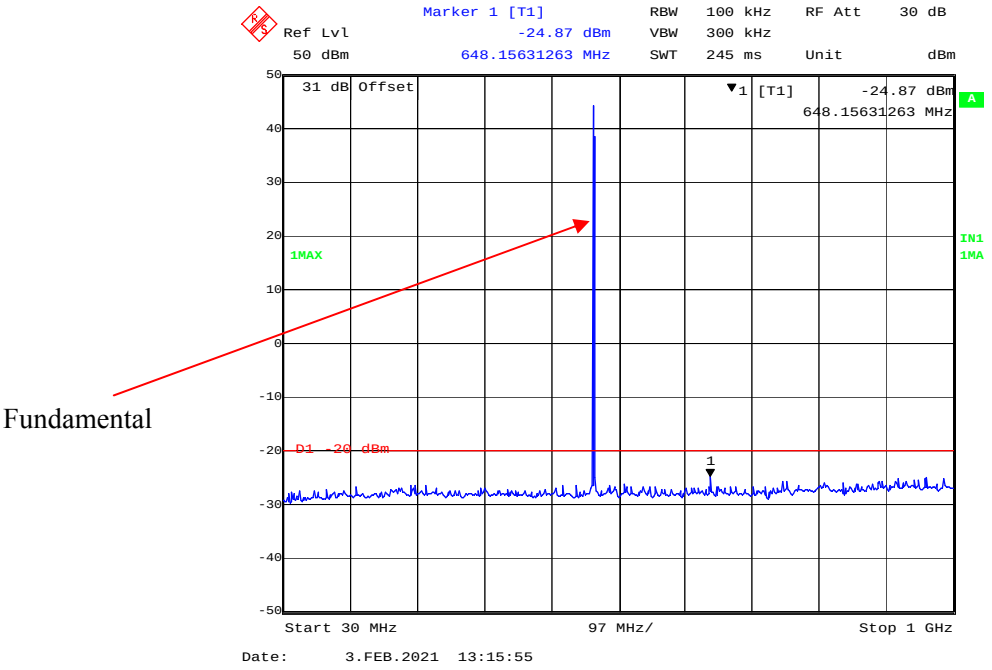


Fundamental

Frequency:479.975 MHz, 1 GHz - 5 GHz, High Power-12.5kHz

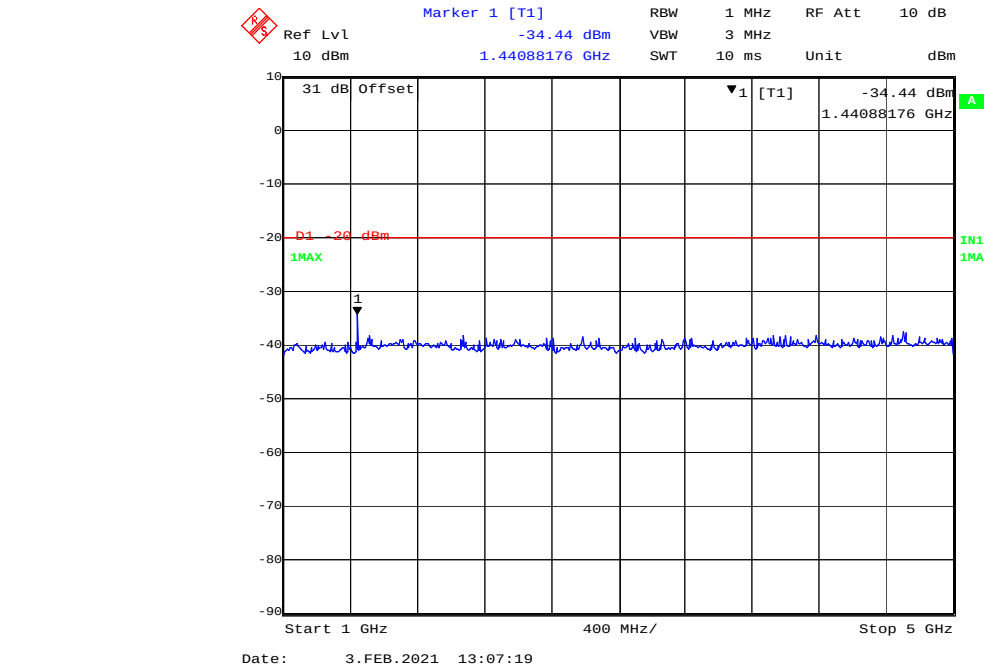


Frequency:479.975 MHz, 30 MHz – 1 GHz, Low Power-12.5kHz



Fundamental

Frequency:479.975 MHz, 1 GHz - 5 GHz, Low Power-12.5kHz



FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSION

Applicable Standard

FCC §2.1053, §90.210

Test Procedure

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

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

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

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

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

Test Data

Environmental Conditions

Temperature:	23.3 ℃
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

The testing was performed by CK Huang on 2021-02-06.

Test Mode: Transmitting

30MHz-5GHz:

136-174 MHz Band:

Frequency (MHz)	Receiver Reading (dBuV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd /dBi)			
Analog, Frequency: 136.025MHz(12.5kHz)										
272.05	81.98	209	150	H	-22	0.45	-2.21	-24.66	-20	4.66
272.05	81.62	44	150	V	-22.36	0.45	-2.21	-25.02	-20	5.02
1224.225	75.07	314	150	H	-38.75	0.8	7.43	-32.12	-20	12.12
1224.225	73.73	330	150	V	-40.09	0.8	7.43	-33.46	-20	13.46
Analog, Frequency: 155.000MHz(12.5kHz)										
310	86.52	273	150	H	-20.94	0.47	-2.01	-23.42	-20	3.42
310	87.25	226	150	V	-20.21	0.47	-2.01	-22.69	-20	2.69
1395	72.95	306	150	H	-41.21	0.82	7.91	-34.12	-20	14.12
1395	71.84	342	150	V	-42.32	0.82	7.91	-35.23	-20	15.23
Analog, Frequency: 173.975MHz(12.5kHz)										
347.95	88.3	268	150	H	-20.09	0.47	-1.77	-22.33	-20	2.33
347.95	87.58	145	150	V	-20.81	0.47	-1.77	-23.05	-20	3.05
1565.775	70.99	333	150	H	-42.93	0.83	8.3	-35.46	-20	15.46
1565.775	70.43	9	150	V	-43.49	0.83	8.3	-36.02	-20	16.02
Digital, Frequency: 136.025MHz(12.5kHz)										
272.05	84.62	305	150	H	-19.36	0.45	-2.21	-22.02	-20	2.02
272.05	84.95	51	150	V	-19.03	0.45	-2.21	-21.69	-20	1.69
1224.225	72.5	175	150	H	-41.32	0.8	7.43	-34.69	-20	14.69
1224.225	72.17	13	150	V	-41.65	0.8	7.43	-35.02	-20	15.02
Digital, Frequency: 155.000MHz(12.5kHz)										
309.19	87.58	175	150	H	-19.88	0.47	-2.01	-22.36	-20	2.36
309.19	86.48	287	150	V	-20.98	0.47	-2.01	-23.46	-20	3.46
1395	72.42	38	150	H	-41.74	0.82	7.91	-34.65	-20	14.65
1395	71.11	83	150	V	-43.05	0.82	7.91	-35.96	-20	15.96
Digital, Frequency: 173.975MHz(12.5kHz)										
347.94	88.27	240	150	H	-20.12	0.47	-1.77	-22.36	-20	2.36
347.94	87.17	261	150	V	-21.22	0.47	-1.77	-23.46	-20	3.46
1565.775	71.51	289	150	H	-42.41	0.85	8.3	-34.96	-20	14.96
1565.775	71.01	290	150	V	-42.91	0.85	8.3	-35.46	-20	15.46

400-480 MHz Band:

Frequency (MHz)	Receiver Reading (dBuV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd /dBi)			
Analog, Frequency: 400.025MHz(12.5kHz)										
800.05	74.63	86	100	H	-23.59	0.62	-1.25	-25.46	-20	5.46
800.05	73.13	200	150	V	-25.09	0.62	-1.25	-26.96	-20	6.96
1200.075	80.19	56	150	H	-33.58	0.8	7.36	-27.02	-20	7.02
1200.075	81.08	156	150	V	-32.69	0.8	7.36	-26.13	-20	6.13
Analog, Frequency: 440.000MHz(12.5kHz)										
880	71.34	335	150	H	-24.55	0.63	-1.01	-26.19	-20	6.19
880	70.4	111	100	V	-25.49	0.63	-1.01	-27.13	-20	7.13
1320	80.16	88	100	H	-33.85	0.81	7.7	-26.96	-20	6.96
1320	79.66	34	150	V	-34.35	0.81	7.7	-27.46	-20	7.46
Analog, Frequency: 479.975MHz(12.5kHz)										
959.95	73.13	257	150	H	-24.11	0.66	-1.19	-25.96	-20	5.96
959.95	72.63	267	100	V	-24.61	0.66	-1.19	-26.46	-20	6.46
1439.925	81.08	108	100	H	-33.17	0.82	8.03	-25.96	-20	5.96
1439.925	80.38	107	150	V	-33.87	0.82	8.03	-26.66	-20	6.66
Digital, Frequency: 400.025MHz(12.5kHz)										
800.05	73.63	336	100	H	-24.59	0.62	-1.25	-26.46	-20	6.46
800.05	72.24	167	150	V	-25.98	0.62	-1.25	-27.85	-20	7.85
1200.075	79.08	180	150	H	-34.69	0.8	7.36	-28.13	-20	8.13
1200.075	80.05	332	150	V	-33.72	0.8	7.36	-27.16	-20	7.16
Digital, Frequency: 440.000MHz(12.5kHz)										
880	71.1	80	150	H	-24.79	0.63	-1.01	-26.43	-20	6.43
880	70.5	68	100	V	-25.39	0.63	-1.01	-27.03	-20	7.03
1320	79.96	291	100	H	-34.05	0.81	7.7	-27.16	-20	7.16
1320	80.81	266	150	V	-33.2	0.81	7.7	-26.31	-20	6.31
Digital, Frequency: 479.975MHz(12.5kHz)										
959.95	72.34	355	150	H	-24.9	0.66	-1.19	-26.75	-20	6.75
959.95	72.87	110	100	V	-24.37	0.66	-1.19	-26.22	-20	6.22
1439.925	80.91	250	100	H	-33.34	0.82	8.03	-26.13	-20	6.13
1439.925	81.21	40	150	V	-33.04	0.82	8.03	-25.83	-20	5.83

Note:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level.

FCC§2.1055 (d), §90.213 - FREQUENCY STABILITY

Applicable Standard

FCC §2.1055, §90.213

Test Procedure

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

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

Test Data

Environmental Conditions

Temperature:	23.3 ℃
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

The testing was performed by CK Huang on 2021-02-05.

Test Mode: Transmitting

For 136-174 MHz Band:

Analog,Reference Frequency:136.025MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	136.02512	0.88	±5
-20		136.02519	1.40	
-10		136.02515	1.10	
0		136.02519	1.40	
10		136.02518	1.32	
20		136.02512	0.88	
30		136.02515	1.10	
40		136.02514	1.03	
50		136.0251	0.74	
20	12.4	136.02519	1.40	
20	15.2	136.02512	0.88	

Analog,Reference Frequency:155.000MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	155.00019	1.23	±5
-20		155.00015	0.97	
-10		155.00011	0.71	
0		155.00011	0.71	
10		155.00015	0.97	
20		155.00012	0.77	
30		155.00016	1.03	
40		155.0001	0.65	
50		155.00015	0.97	
20	12.4	155.00012	0.77	
20	15.2	155.00019	1.23	

Analog,Reference Frequency:173.975MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	173.97518	1.03	±5
-20		173.97513	0.75	
-10		173.97518	1.03	
0		173.97516	0.92	
10		173.9751	0.57	
20		173.97515	0.86	
30		173.97511	0.63	
40		173.97519	1.09	
50		173.97517	0.98	
20	12.4	173.97515	0.86	
20	15.2	173.97511	0.63	

Digital,Reference Frequency:136.025MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	136.02508	0.59	±5
-20		136.02503	0.22	
-10		136.02509	0.66	
0		136.02505	0.37	
10		136.02503	0.22	
20		136.02508	0.59	
30		136.02501	0.07	
40		136.02504	0.29	
50		136.0251	0.74	
20	12.4	136.02507	0.51	
20	15.2	136.02501	0.07	

Digital,Reference Frequency:155.000MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	155.0001	0.65	±5
-20		155.0001	0.65	
-10		155.00011	0.71	
0		155.0002	1.29	
10		155.00016	1.03	
20		155.00018	1.16	
30		155.00013	0.84	
40		155.00019	1.23	
50		155.00012	0.77	
20	12.4	155.00012	0.77	
20	15.2	155.00017	1.10	

Digital,Reference Frequency:173.975MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	173.97517	0.98	±5
-20		173.97517	0.98	
-10		173.97512	0.69	
0		173.97512	0.69	
10		173.97514	0.80	
20		173.97516	0.92	
30		173.97514	0.80	
40		173.97516	0.92	
50		173.97519	1.09	
20	12.4	173.97514	0.80	
20	15.2	173.97512	0.69	

For 400-480 MHz Band:

Analog,Reference Frequency:400.025MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	400.02564	1.60	±2.5
-20		400.02567	1.67	
-10		400.02563	1.57	
0		400.02567	1.67	
10		400.02561	1.52	
20		400.02569	1.72	
30		400.02564	1.60	
40		400.02568	1.70	
50		400.02566	1.65	
20	12.4	400.02565	1.62	
20	15.2	400.02561	1.52	

Analog,Reference Frequency:440.000MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	440.00069	1.57	±2.5
-20		440.00065	1.48	
-10		440.0006	1.36	
0		440.00062	1.41	
10		440.00068	1.55	
20		440.00062	1.41	
30		440.00062	1.41	
40		440.00068	1.55	
50		440.00063	1.43	
20	12.4	440.00061	1.39	
20	15.2	440.00063	1.43	

Analog,Reference Frequency:479.975MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	479.97567	1.40	±2.5
-20		479.97561	1.27	
-10		479.97567	1.40	
0		479.9757	1.46	
10		479.97561	1.27	
20		479.97561	1.27	
30		479.97565	1.35	
40		479.97568	1.42	
50		479.97566	1.38	
20	12.4	479.97563	1.31	
20	15.2	479.97561	1.27	

Digital,Reference Frequency:400.025MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	400.02563	1.57	±2.5
-20		400.02568	1.70	
-10		400.02565	1.62	
0		400.02567	1.67	
10		400.02564	1.60	
20		400.02566	1.65	
30		400.02566	1.65	
40		400.02567	1.67	
50		400.02567	1.67	
20	12.4	400.02568	1.70	
20	15.2	400.02565	1.62	

Digital,Reference Frequency:440.000MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	440.00067	1.52	±2.5
-20		440.00062	1.41	
-10		440.00062	1.41	
0		440.00063	1.43	
10		440.00067	1.52	
20		440.00061	1.39	
30		440.00061	1.39	
40		440.00065	1.48	
50		440.00062	1.41	
20	12.4	440.00066	1.50	
20	15.2	440.00069	1.57	

Digital,Reference Frequency:479.975MHz(12.5kHz)				
Temerature (℃)	**Voltage (V_{DC})**	**Reading (MHz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	13.8	479.97566	1.38	±2.5
-20		479.97562	1.29	
-10		479.97563	1.31	
0		479.97564	1.33	
10		479.97563	1.31	
20		479.97568	1.42	
30		479.97562	1.29	
40		479.97565	1.35	
50		479.97565	1.35	
20	12.4	479.97564	1.33	
20	15.2	479.97567	1.40	

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

Applicable Standard

Regulations: FCC §90.214

Test method: ANSI C63.26.

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 P0.

f) Turn off the transmitter.

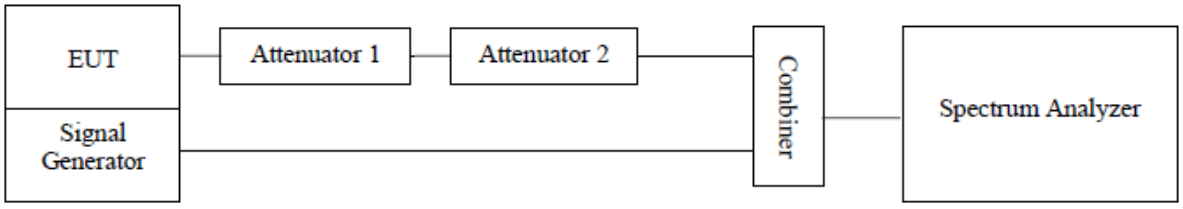
g) Adjust the RF level of the signal generator to provide RF power equal to P0. This signal generator RF level shall be maintained throughout the rest of the measurement.

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 ton. The trace should be maintained within the allowed divisions during the period t1 and t2.

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 t3.



Test Data

Environmental Conditions

Temperature:	23.3 ℃
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

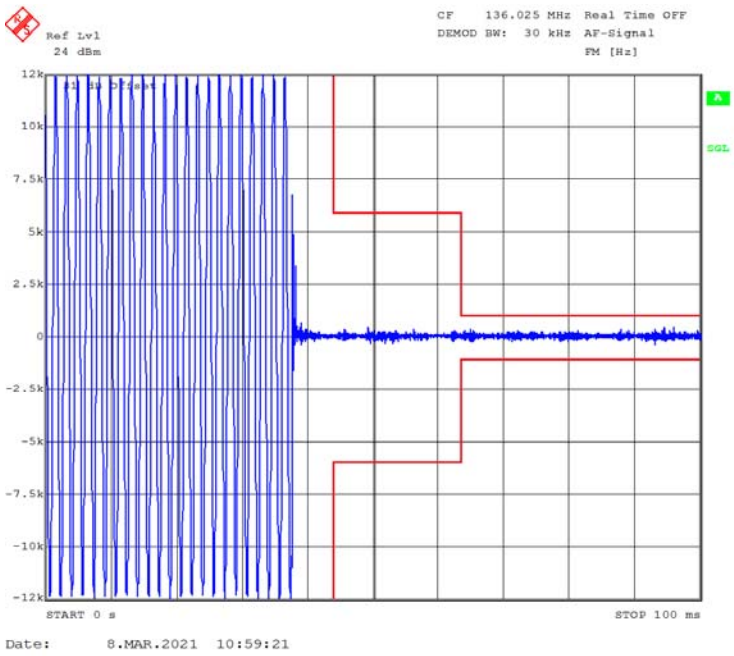
The testing was performed by CK Huang on 2021-03-08.

Band	Channel Spacing (kHz)	Transient Period (ms)	Transient Frequency(kHz)	Result
136-174MHz	12.5	<5(t_1)	±12.5	Pass
		<20(t_2)	±6.25	
		<5(t_3)	±12.5	
400-480MHz	12.5	<10(t_1)	±12.5	Pass
		<25(t_2)	±6.25	
		<10(t_3)	±12.5	

Please refer to the following plots:

Frequency:136.025 MHz, High Power-12.5kHz

Turn on



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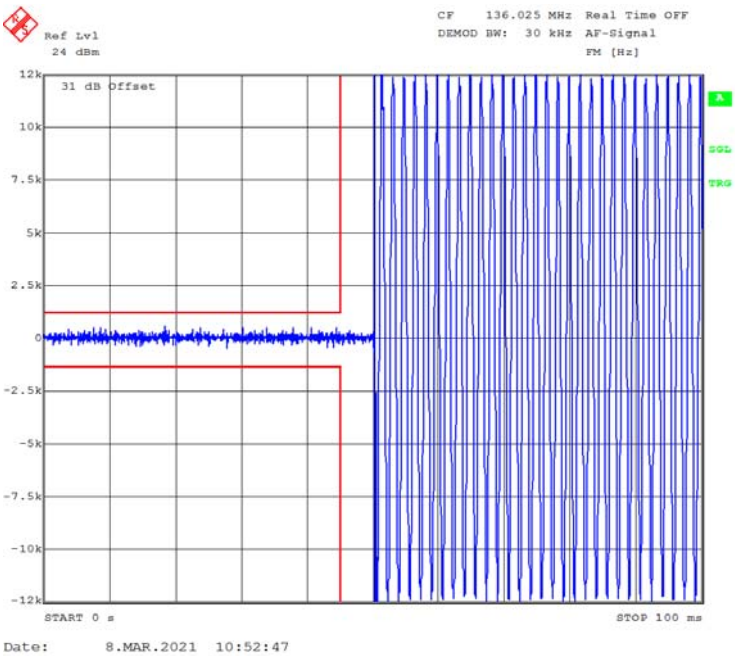

Frequency:136.025 MHz, Low Power-12.5kHz

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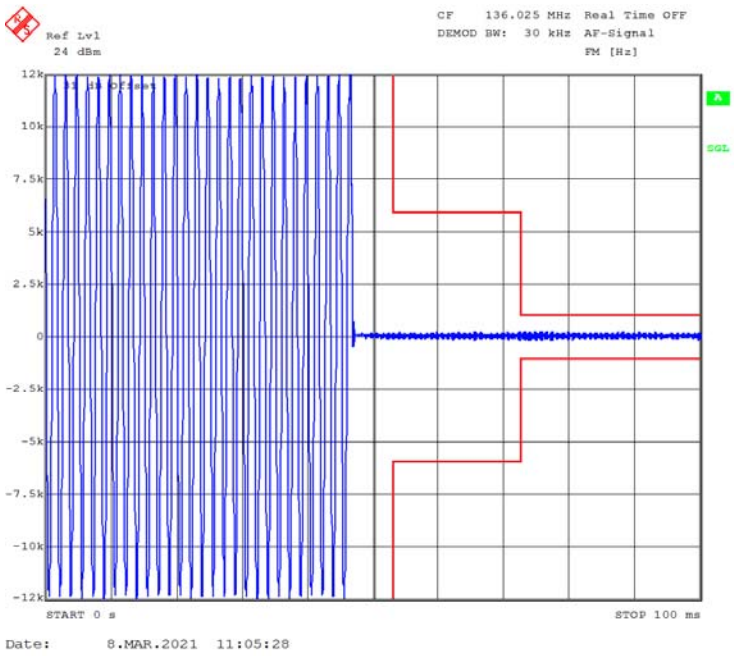

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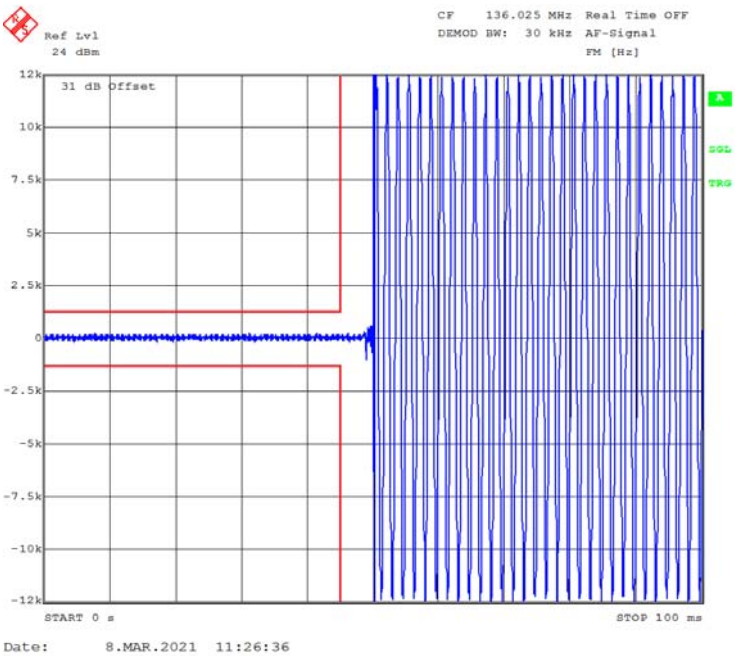
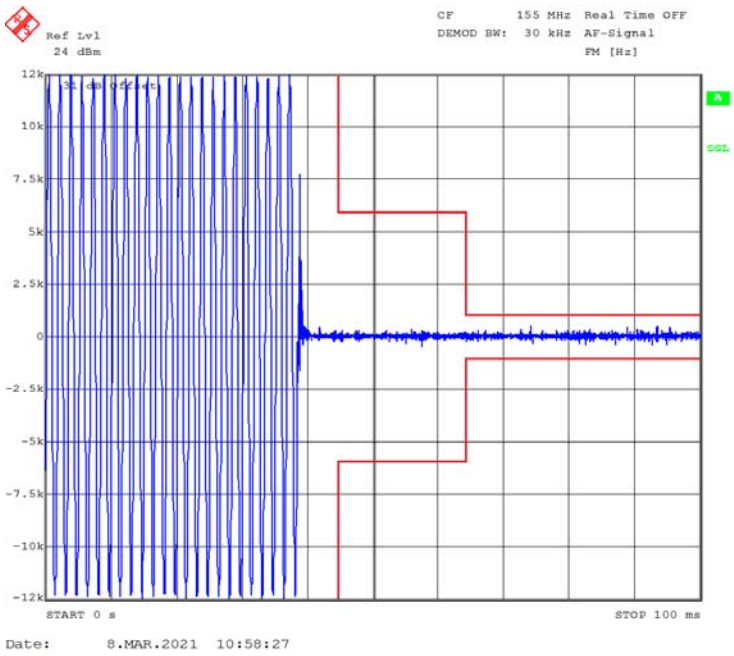


Frequency:155.000 MHz, High Power-12.5kHz

Turn on



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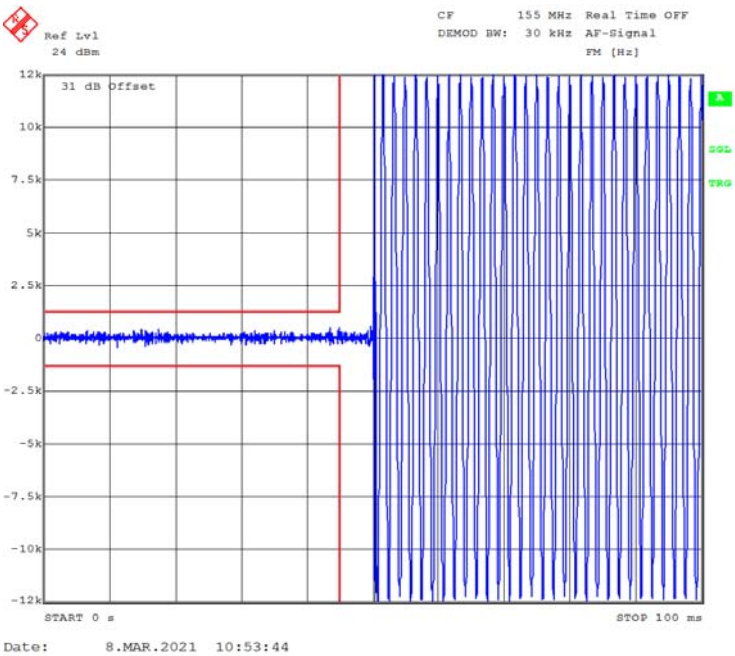
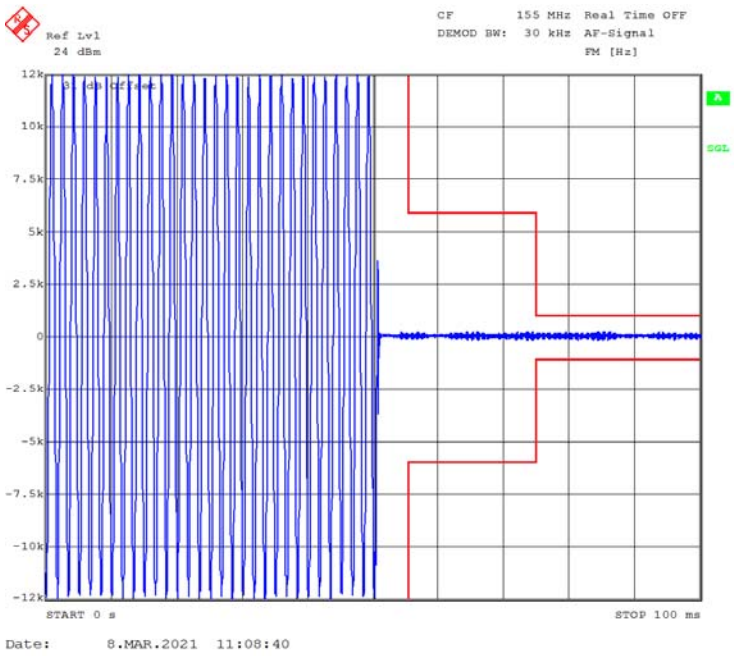
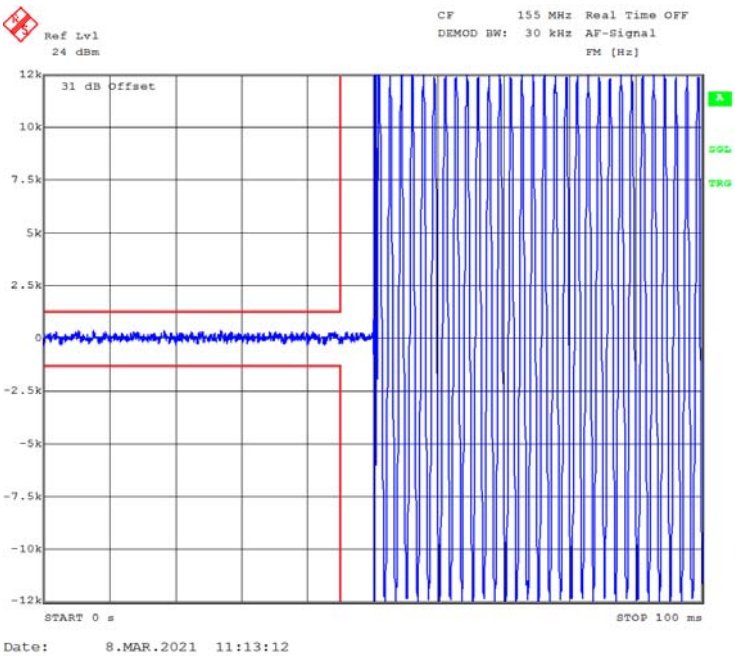


Frequency:155.000 MHz, Low Power-12.5kHz

Turn on

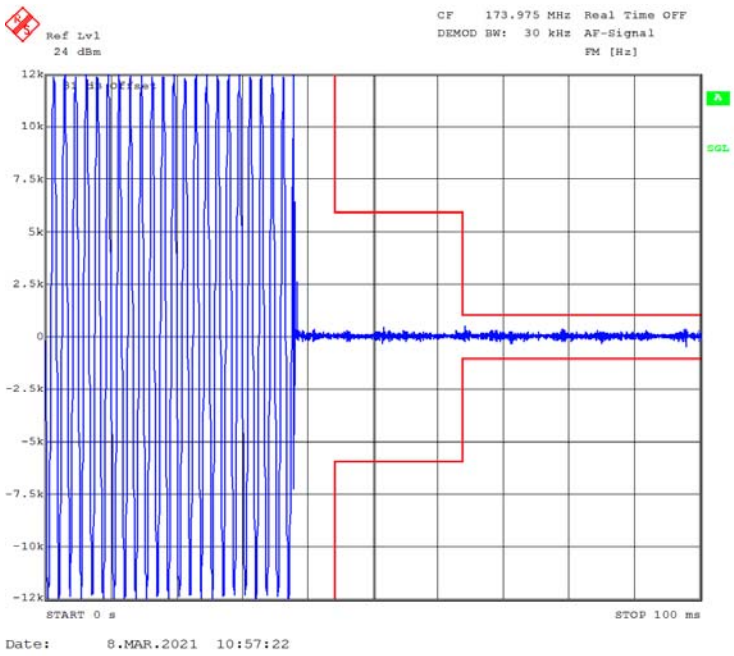


Turn off

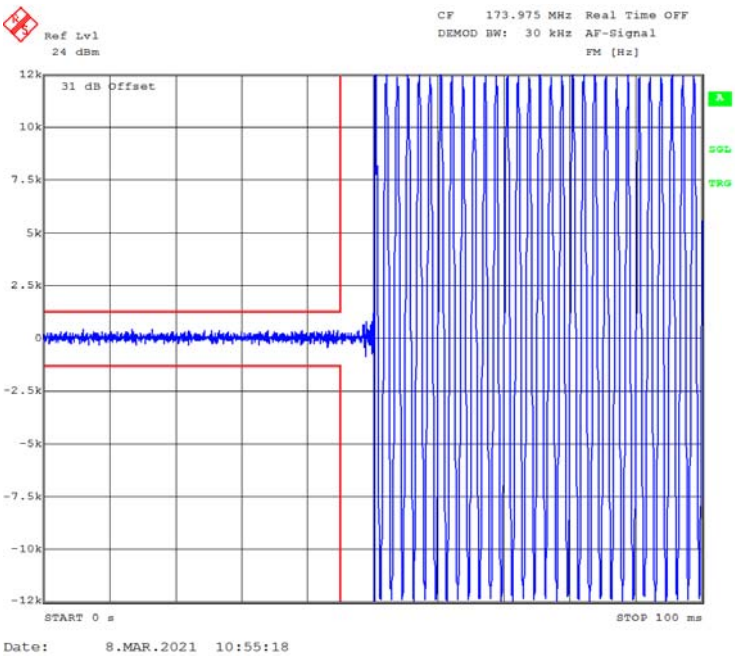


Frequency:173.975 MHz, High Power-12.5kHz

Turn on

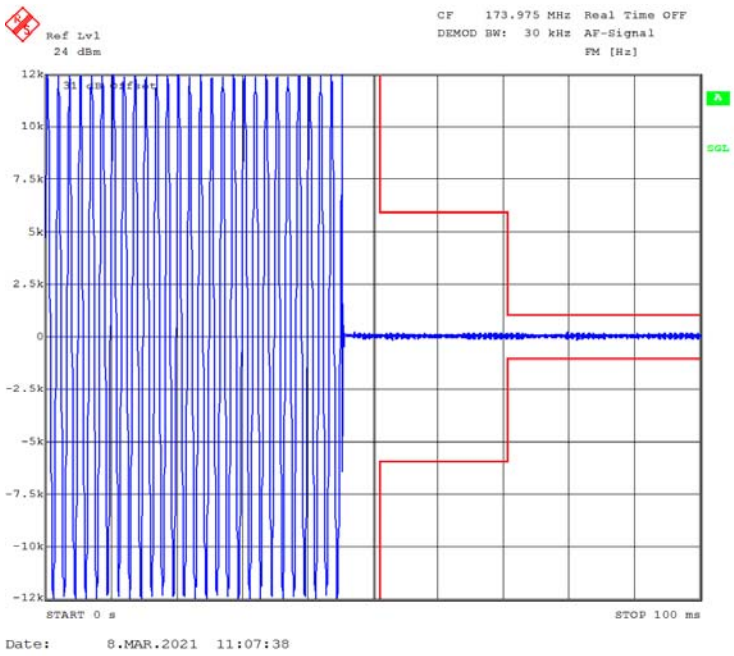


Turn off



Frequency:173.975 MHz, Low Power-12.5kHz

Turn on



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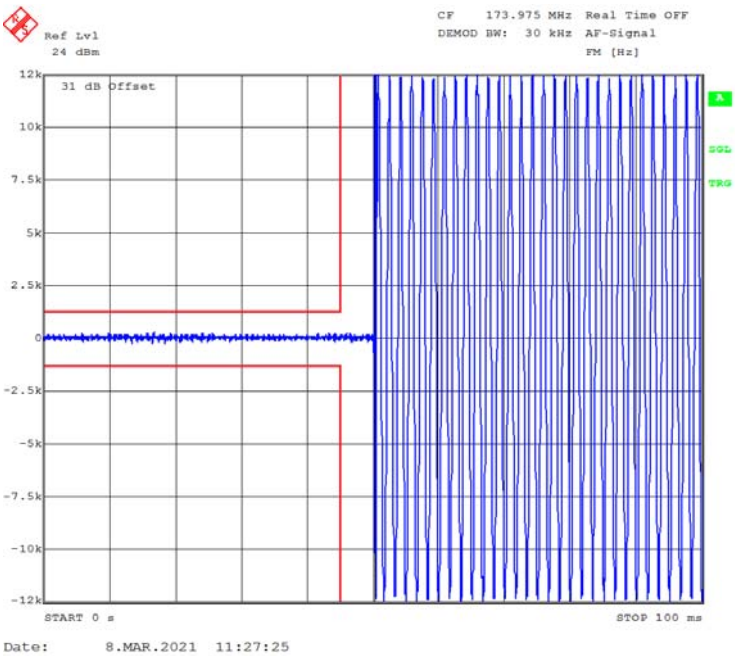
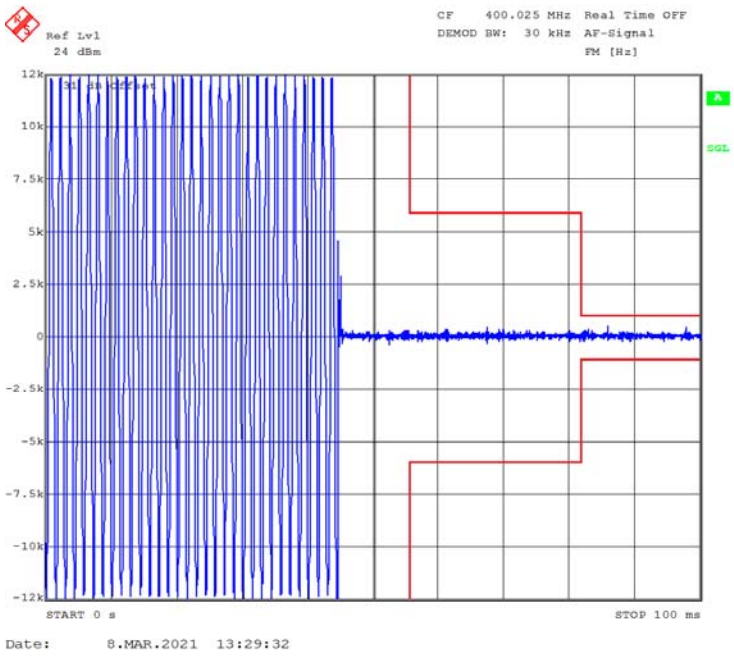
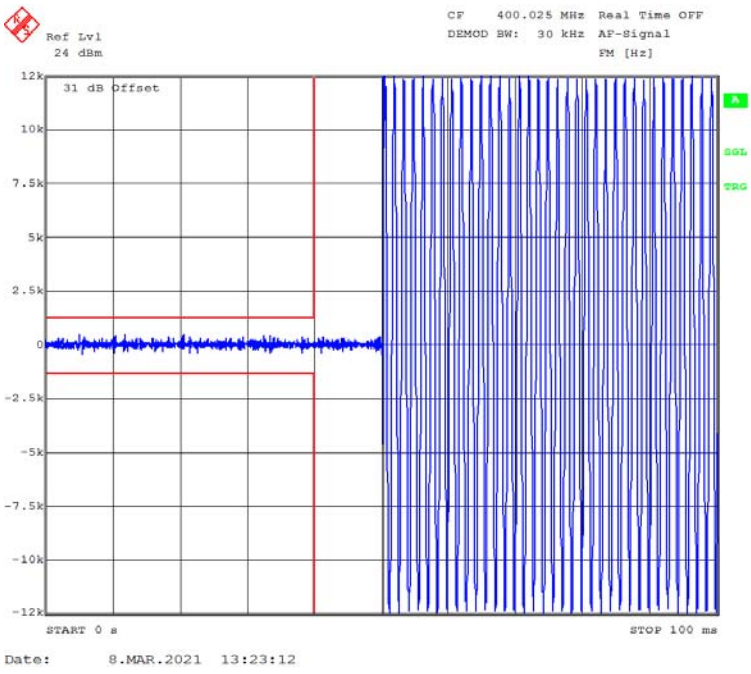


Frequency:400.025 MHz, High Power-12.5kHz

Turn on

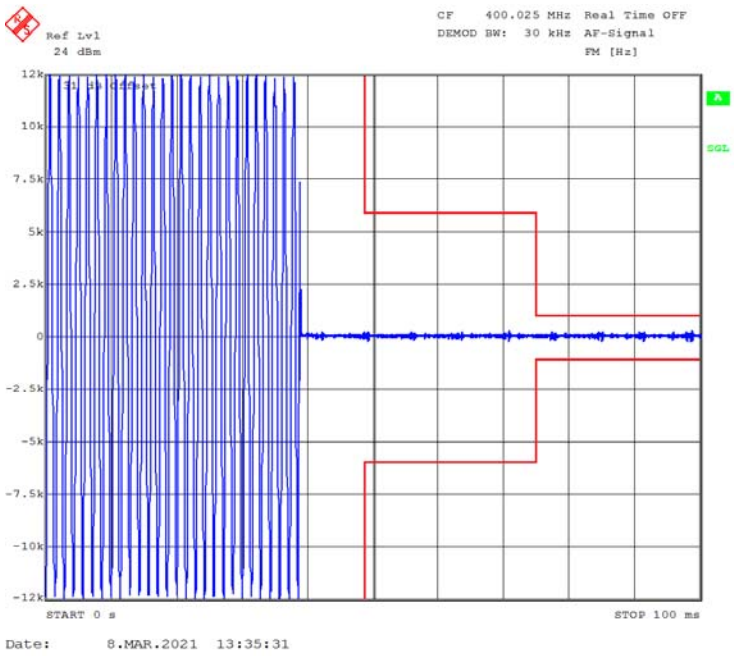


Turn off



Frequency:400.025 MHz, Low Power-12.5kHz

Turn on



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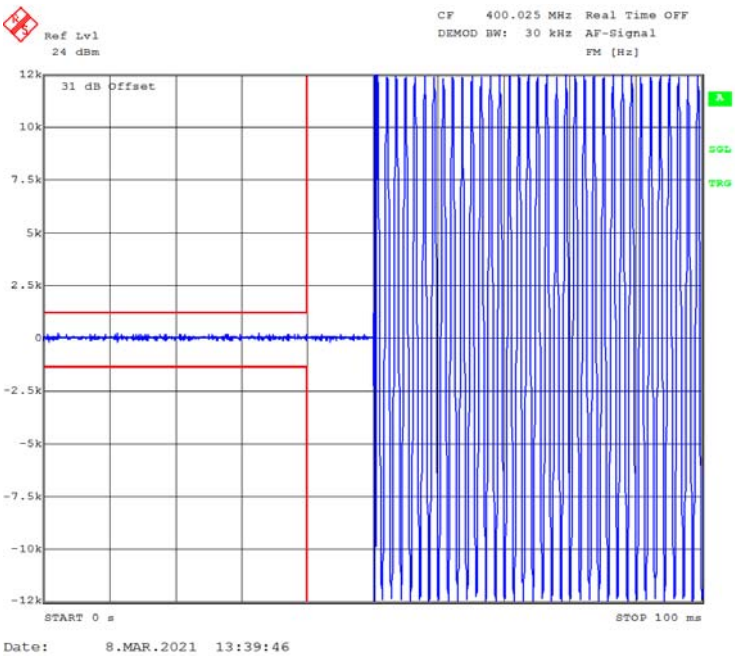
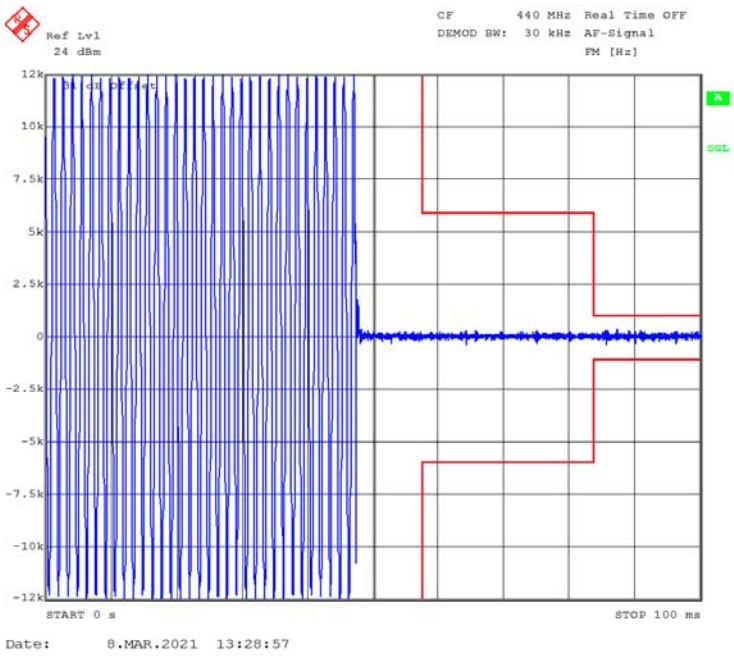


Frequency:440.000 MHz, High Power-12.5kHz

Turn on



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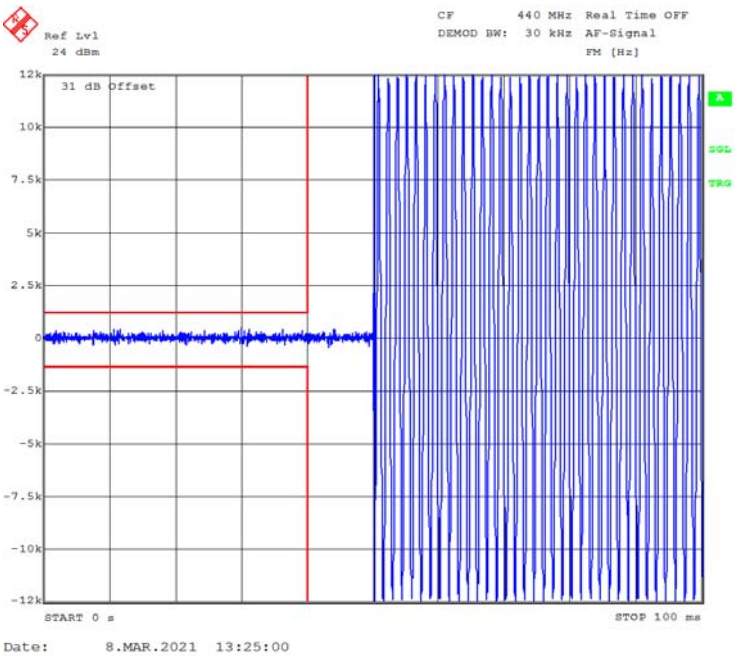

Frequency:440.000 MHz, Low Power-12.5kHz

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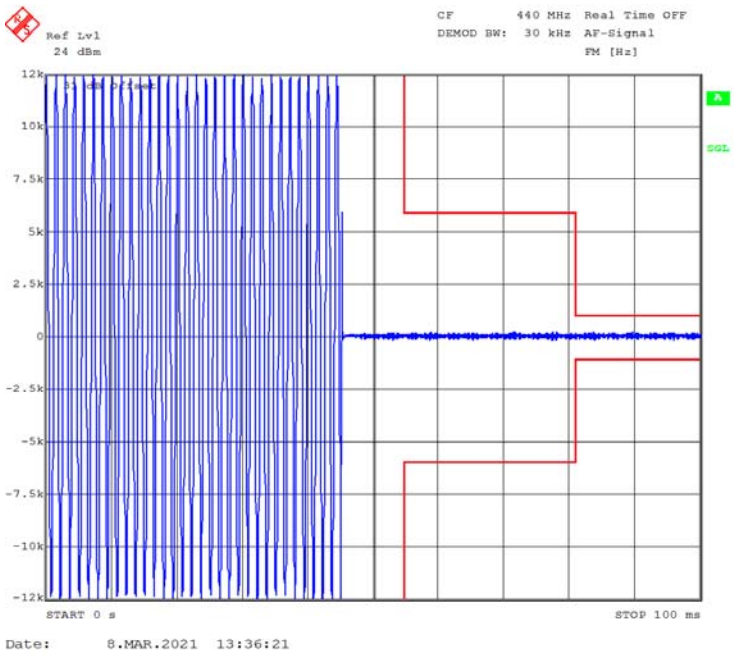

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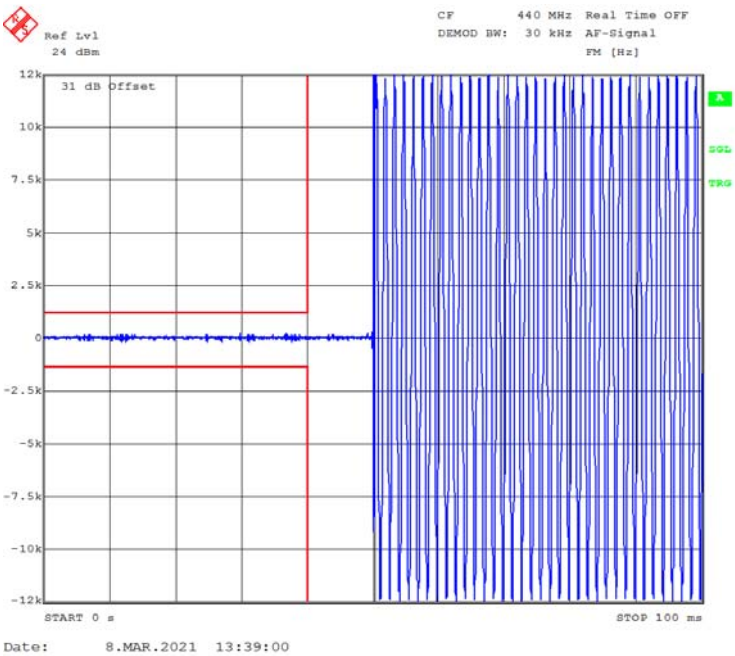
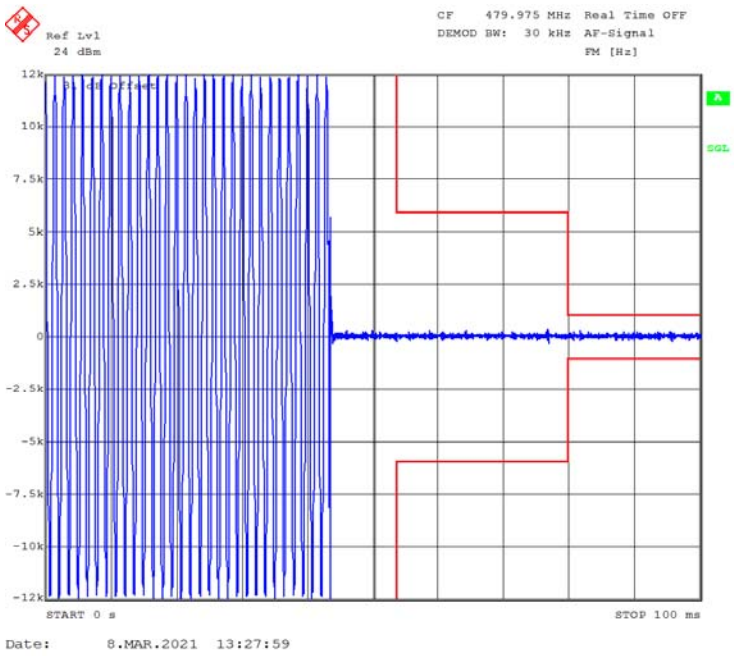


Frequency:479.975 MHz, High Power-12.5kHz

Turn on



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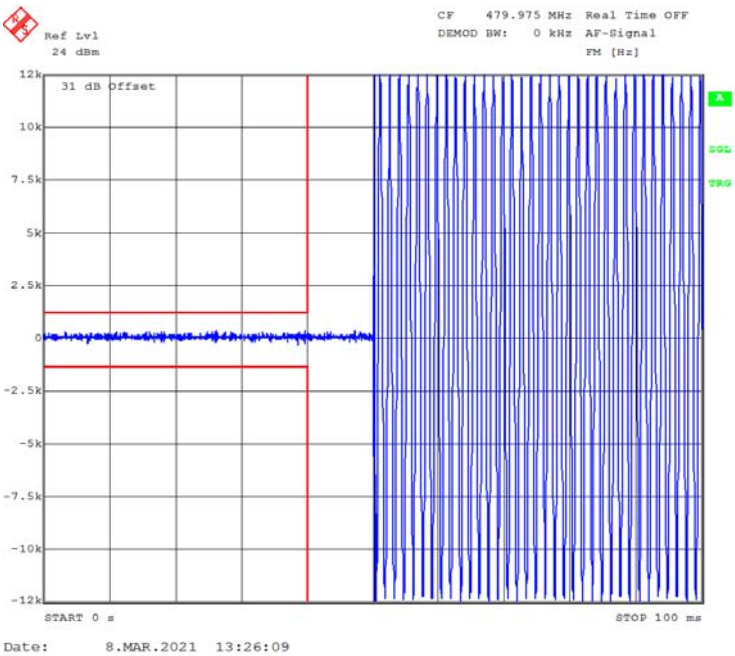
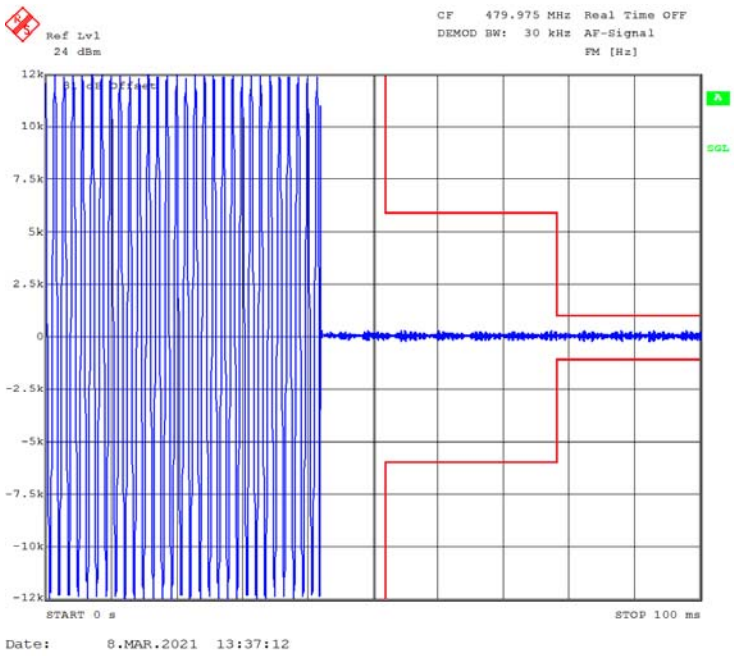


Frequency:479.975 MHz, Low Power-12.5kHz

Turn on



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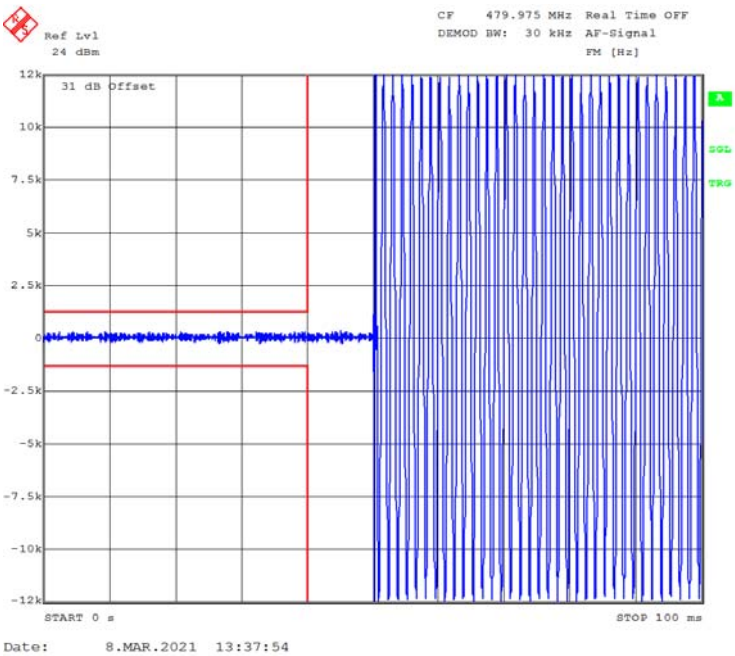

Declarations

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

3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

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