TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 90

TEST REPORT

For

Tersus GNSS Inc.

Room 203, Building 02, Lane 666, Zhangheng Road, Pudong District, Shanghai, P.R.China.

FCC ID:2AMDJOSCAR

Report Type:	**Product Type:**
Original Report	Surveying GNSS Receiver

Project Engineer:	Chao Gao
Report Number:	RSHA190605001-00D
Report Date:	2021-04-09
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

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Tersus GNSS Inc.
Tested Model:	Oscar Ultimate
Series Model	Oscar Advanced,Oscar Basic
Product Type:	Surveying GNSS Receiver
Power Supply:	DC 9V~28V from external power supply and DC 7.4V from battery
RF Function:	UHF
Operating Band/Frequency:	410-470 MHz
Modulation Type:	4FSK
Channel Separation:	12.5 kHz
*Maximum Antenna Gain:	5.5 dBi
Rated Power:	High power: 2W, Low power: 0.5W

Note: The antenna gain was provided by the applicant.

All measurement andtest datain thisreportwas gatheredfromproduction sample serial number: RSHA190605001-1(Assigned by the BACL). The EUT supplied by the applicant was received on 2019-06-05.

Objective

This test report is prepared on behalf of *Tersus GNSS Inc.*in accordance with Part 2, and Part 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS Submittal with FCC ID: 2AMDJOSCAR
FCC Part 15.247 DSS Submittal with FCC ID: 2AMDJOSCAR

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 Part the following individual parts:

Pat90-Private Land Mobile Radio Service

Applicable Standards: ANSI C63.26:2015.

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

Measurement Uncertainty

Item		Uncertainty
Unwanted Emissions, radiated	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6 GHz ~18 GHz	4.92dB
	18 GHz~40 GHz	5.21dB
Occupied Channel Bandwidth		±5%
RF output power, conducted		±0.61dB
Unwanted Emissions, conducted		±1.5dB
Temperature		±1℃
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 D01and 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 C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

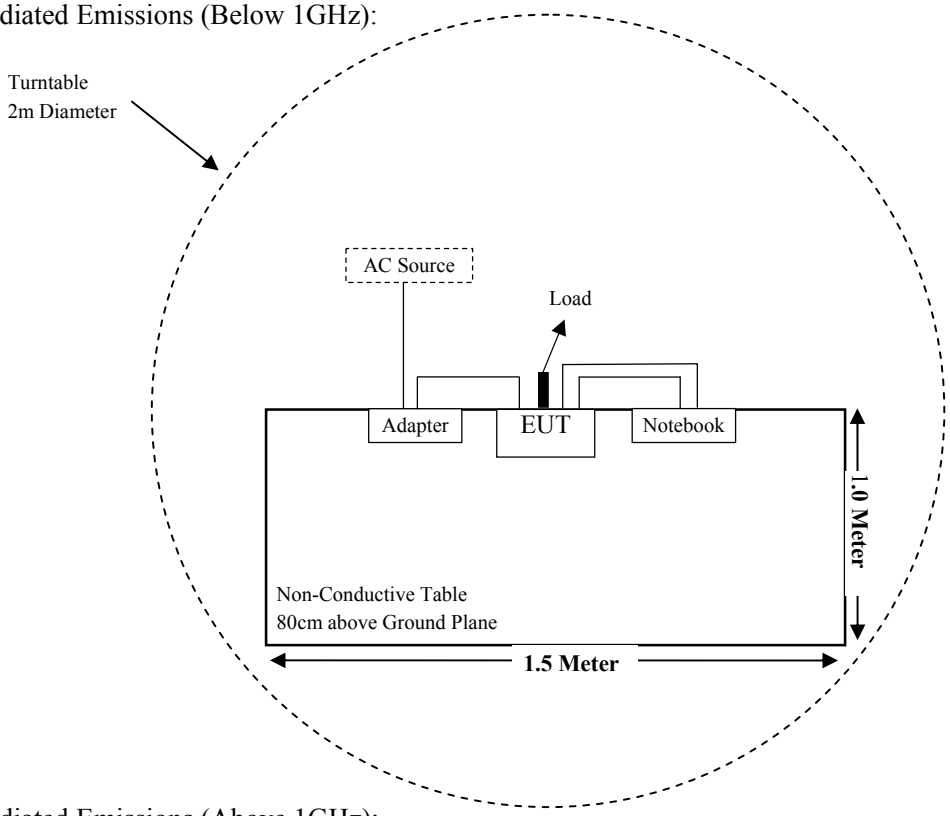
Manufacturer	Description	Model	Serial Number
DELL	Notebook	E6410	3094742521
SHENZHEN TIANYIN ELECTRONICS CO.,LTD	Adapter	TPA-46B050100UVU	Unknow
Unknow	Load	Unknow	Unknow
Unknow	Socket	Unknow	Unknow

External I/O Cable

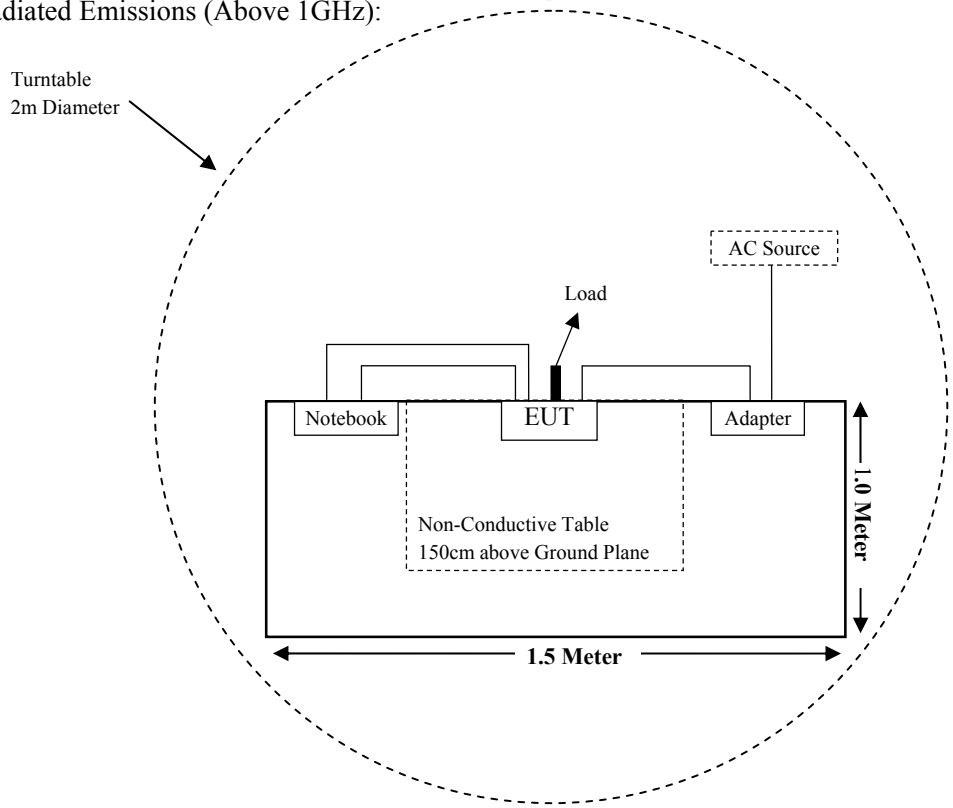
Cable Description	Length(m)	From Port	To
Data Cable	1.5	EUT	Notebook
Data Cable	1.0	EUT	Notebook
Power Cable	1.5	EUT	Adapter
Power Cable	1.0	Adapter	AC Source

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
§1.1310, §2.1091	Maximum Permissible Exposure (MPE)	Compliant
§2.1046, §90.205	RF Output Power	Compliant
§2.1047	Modulation Characteristic	Not Applicable (See Note)
§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

Note: The EUT is used in digital modulation.

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	2019-12-14	2020-12-13
Sunol Sciences	Hybrid Antenna	JB3	A090314-1	2017-08-05	2020-08-04
Sunol Sciences	Bilog antenna	JB3	A060217	2017-11-28	2020-11-27
HP	Signal Generator	N5183A	MY51040755	2019-12-14	2020-12-13
Sonoma Instrunent	Pre-amplifier	310N	171205	2019-08-14	2020-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2019-08-15	2020-08-14
Radiated Emission Test（Chamber 2#）					
HP	Signal Generator	N5183A	MY51040755	2019-12-14	2020-12-13
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2019-04-01	2020-03-31
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2017-07-15	2020-07-14
ETS-LINDGREN	Horn Antenna	3115	6229	2017-01-07	2020-01-06
A.H.Systems, inc	Amplifier	PAM-0118P	512	2019-02-20	2020-02-19
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-12-12	2020-12-11
MICRO-COAX	Coaxial Cable	Cable-11	011	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2019-08-15	2020-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2019-07-28	2020-07-27
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2020-07-28	2021-07-27
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048/027	2020-11-27	2021-11-26
Narda	Attenuator	30dB	030	2019-08-15	2020-08-14
Narda	Attenuator	30dB	030	2020-08-15	2021-08-14
BACL	Temperature & Humidity Chamber	BTH-150	30023	2019-12-20	2020-12-19
BACL	Temperature & Humidity Chamber	BTH-150	30023	2020-12-20	2021-12-19
HP	RF communication test SET.	8920B	079	2019-04-01	2020-03-31
HP	RF communication test SET.	8920B	079	2020-04-01	2021-03-31
Tersus GNSS Inc.	RF Cable	Tersus GNSS Inc.C01	C01	Each Time	/

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

FCC §1.1310 & §2.1091 –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 that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

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

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g.mW/cm^2);
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);

$$\sum_i \frac{S_i}{S_{Limit\_i}} \leq 1$$

Calculated Data:

2.4G Wi-Fi&BLE&BT: (Based on General Population/Uncontrolled Exposure)

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Output Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11b	2412~2462	1.0	1.26	20.00	100.00	25	0.0160	1.0
802.11g		1.0	1.26	21.50	141.25	25	**0.0226**	**1.0**
802.11n-HT20		1.0	1.26	18.50	70.79	25	0.0113	1.0
802.11n-HT40	2422~2452	1.0	1.26	15.50	35.48	25	0.0057	1.0
BLE	2402-2480	1.0	1.26	10.00	10.00	25	0.0016	1.0
BT	2402-2480	1.0	1.26	12.50	17.78	25	0.0029	1.0

WCDMA/LTE: (Based on General Population/Uncontrolled Exposure)

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Conducted Power		EvaluationDistance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
WCDMA Band II	1850-1910	1.0	1.26	24.50	281.84	25	0.0452	1.00
WCDMA Band V	824-849	1.0	1.26	24.50	281.84	25	0.0452	0.55
LTE Band 2	1850-1910	1.0	1.26	24.00	251.19	25	0.0403	1.00
LTE Band 4	1710-1755	1.0	1.26	24.00	251.19	25	0.0403	1.00
LTE Band 5	824-849	1.0	1.26	24.00	251.19	25	0.0403	0.55
LTE Band 12	699-716	1.0	1.26	24.00	251.19	25	0.0403	0.47
LTE Band 13	777-787	1.0	1.26	24.00	251.19	25	0.0403	0.52
LTE Band 17	704-716	1.0	1.26	24.00	251.19	25	**0.0403**	**0.47**

UHF: (Based on Occupational/controlled Exposure)

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Conducted Power		EvaluationDistance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
UHF	410-470	5.5	3.55	33.50	2238.72	25	**1.0112**	**1.37**

Note:
1.The Tune-up output power was declared by the Manufacturer.
2.The LTE module FCC ID: RI7LE910NAV2(Grant on: 08/19/2015)
3. 2.4G Wi-Fi/BT/BLE, LTE and UHF can transmit simultaneously; the worst condition as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0226/1.0+0.0403/0.47+1.0112/1.37=0.846< 1.0$$

Conclusion: The device meets MPE at distance 25cm.

FCC §2.1046 & §90.205 RF OUTPUTPOWER

Applicable Standard

FCC §2.1046 & §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.

SpectrumAnalyzerSetting:

RB/W	VideoB/W
100 kHz	300kHz

Test Data

Environmental Conditions

Temperature:	24.7℃~24.9℃
Relative Humidity:	50 %~53%
ATM Pressure:	101.2kPa ~101.7 kPa

The testing was performed by Chao Gao from 2019-12-30 to 2020-01-02.

EUT Operation Mode: Transmitting

Test Result: Compliant.

Pleaserefertofollowingtable.

Modulation Mode	ChannelSpacing(kHz)	fc (MHz)	Conducted Output Power (W)	
			High power level	Low power level
4FSK	12.5 kHz	410.025	1.897	0.418
		440.000	2.118	0.518
		469.975	1.991	0.479

Note: The rated high power level is 2W, and rated low power level is 0.5W.

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

Applicable Standard

FCC §2.1049, § 90.209 and § 90.210

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:
(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.
(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(fd−2.88 kHz) dB.
(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.
(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

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 100Hz and the spectrum was recorded in the frenquency band.

Test Data

Environmental Conditions

Temperature:	24.7℃~24.9℃
Relative Humidity:	51 %~52%
ATM Pressure:	101.1 kPa ~101.7 kPa

The testing was performed by Chao Gao from 2019-12-30 to 2019-12-31.

TestMode:Transmitting

Test Result: Compliant.

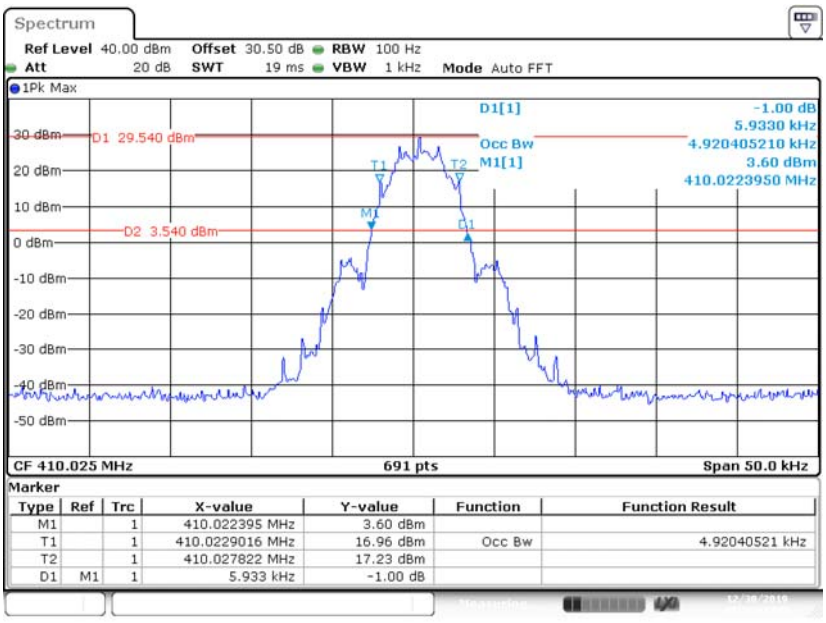
Modulation Mode	ChannelSpacing(kHz)	fc (MHz)	Power level	99% Bandwidth (kHz)	26dB Bandwidth (kHz)
4FSK	12.5 kHz	410.025	High	4.92	5.93
			Low	4.92	5.50
		440.000	High	4.85	5.79
			Low	4.78	5.79
		469.975	High	4.99	6.01
			Low	4.92	5.86

Note： Emssion Designator is base on calculation instead of measurement

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.

High Power,Occupied Bandwidth-410.025 MHz (4FSK 12.5kHz)



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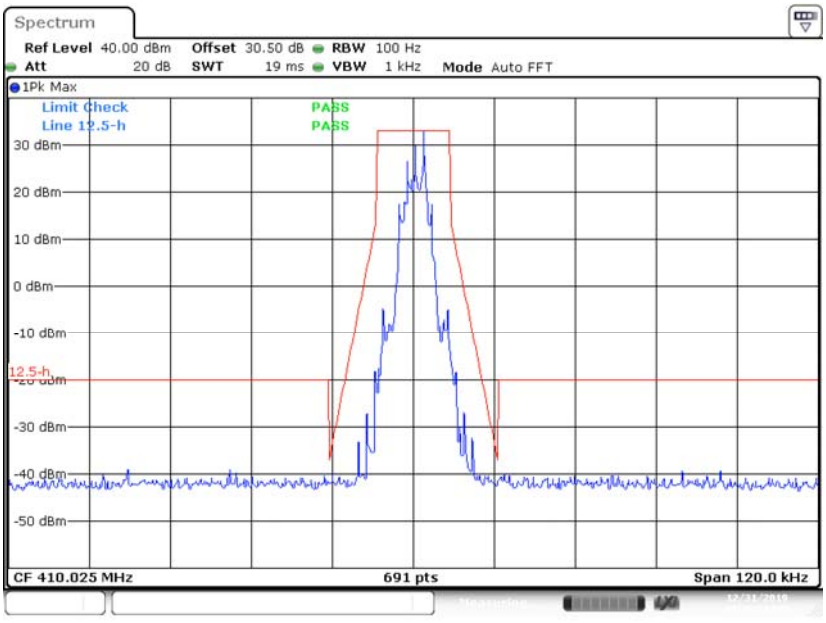
Emission Mask D



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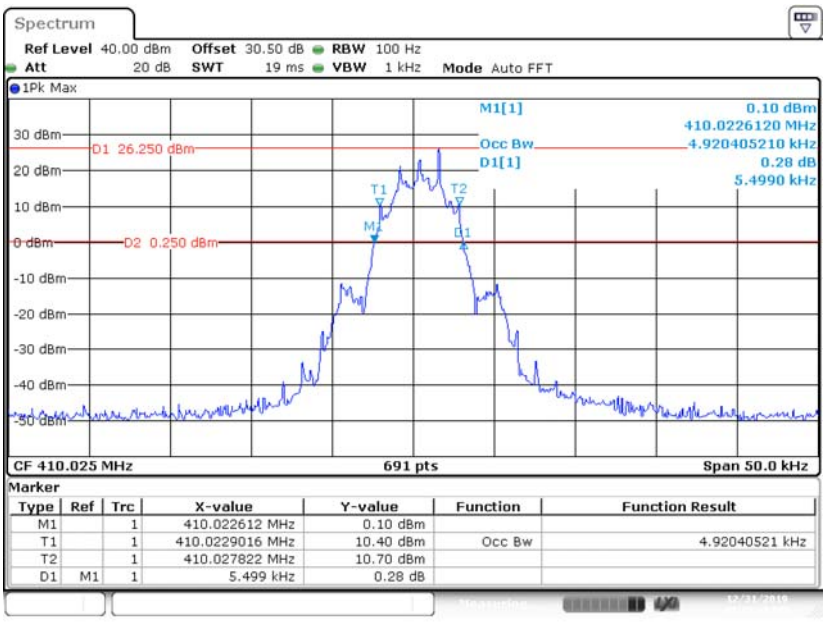
Low Power,Occupied Bandwidth-410.025 MHz (4FSK 12.5kHz)



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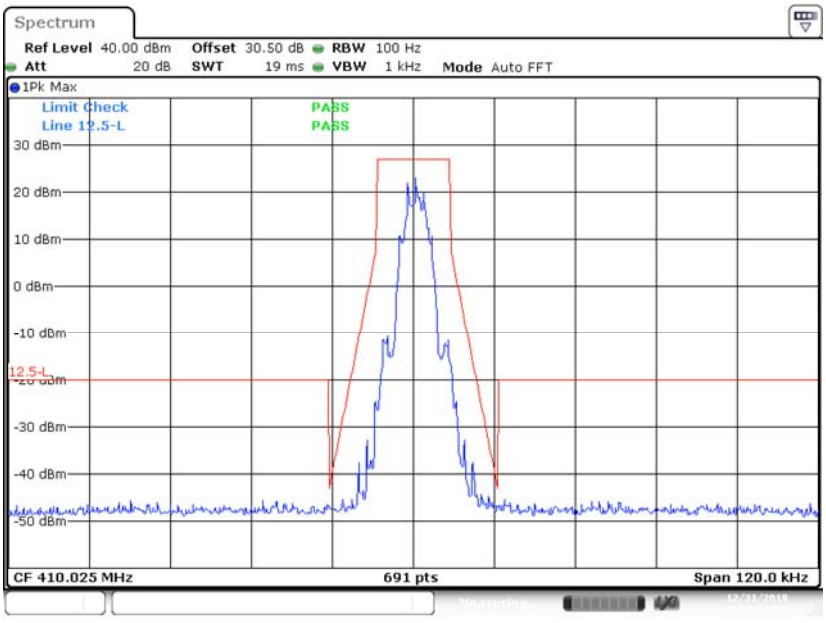

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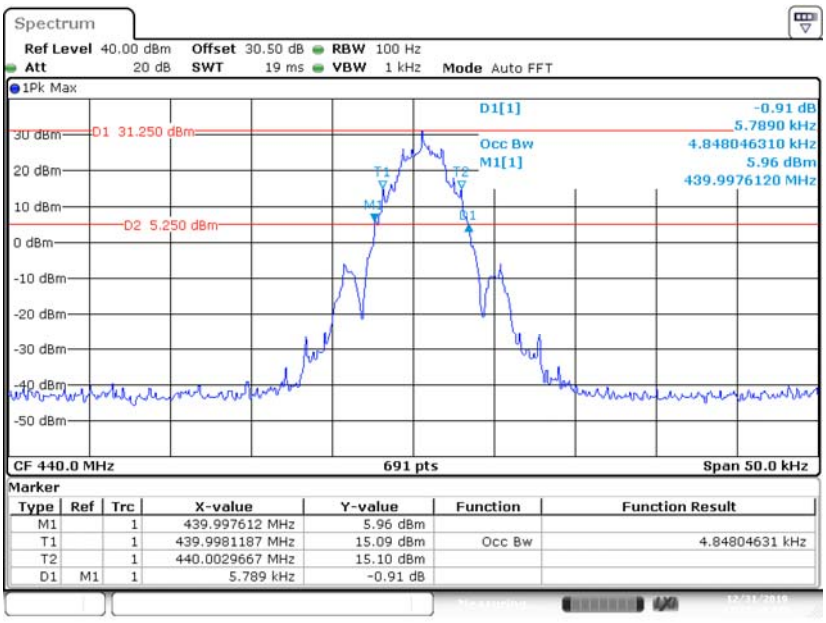
High Power, Occupied Bandwidth-440.000 MHz (4FSK 12.5kHz)



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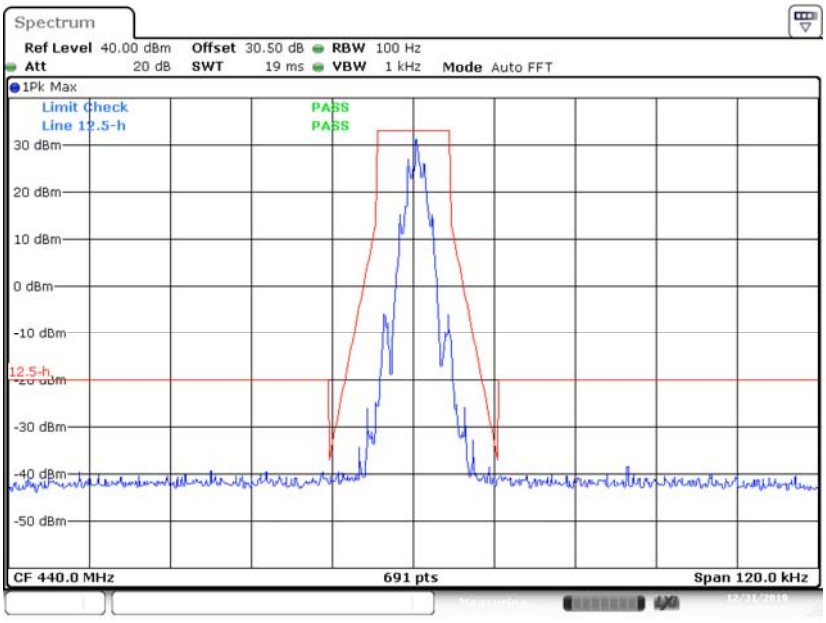

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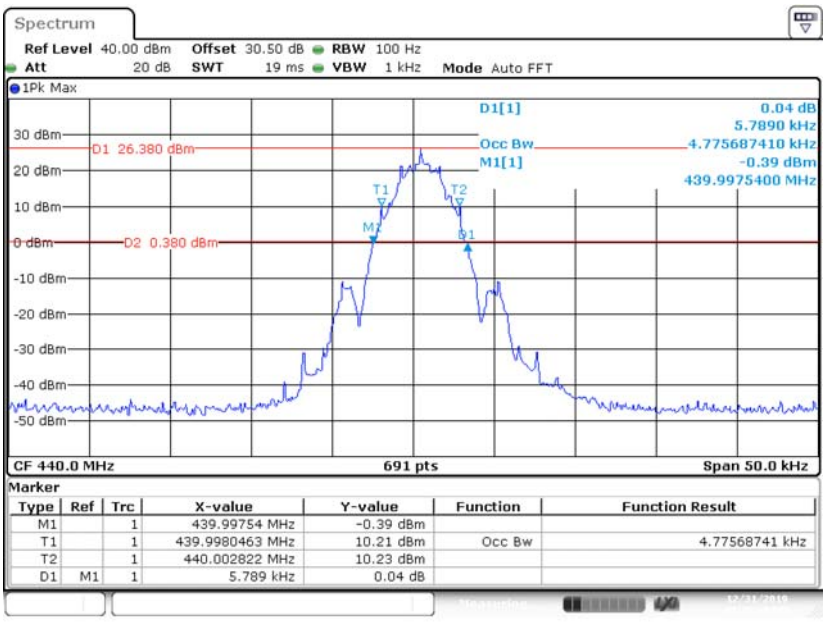
Low Power, Occupied Bandwidth-440.000 MHz (4FSK 12.5kHz)



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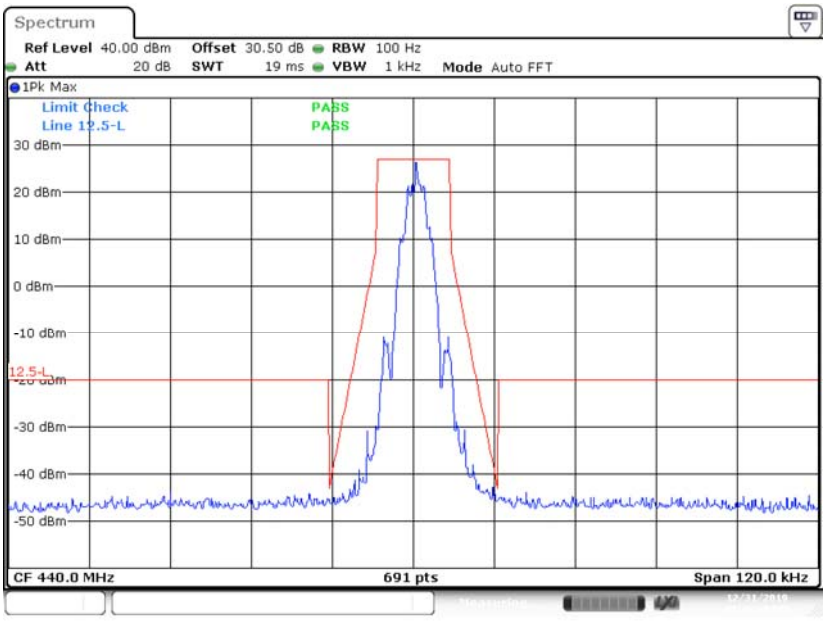
Emission Mask D



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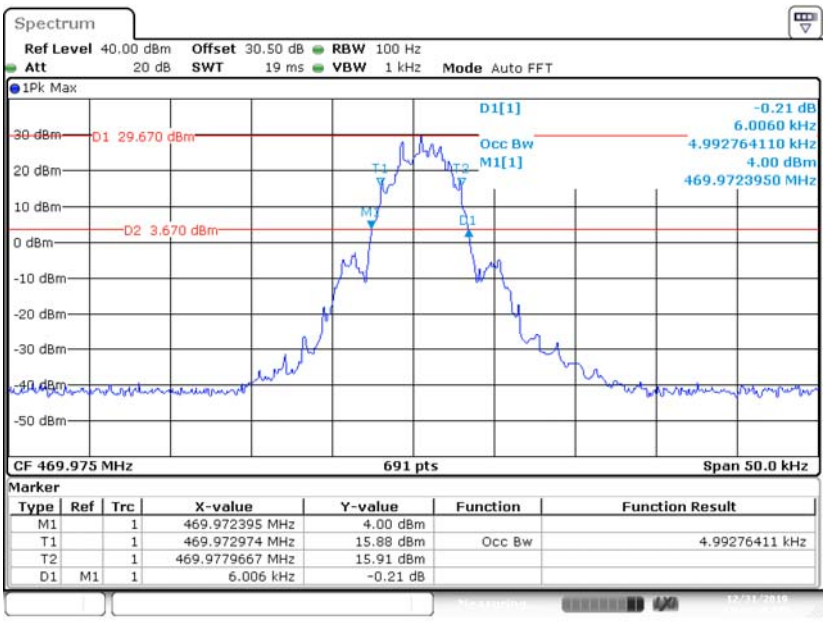
High Power, Occupied Bandwidth-469.975 MHz (4FSK 12.5kHz)



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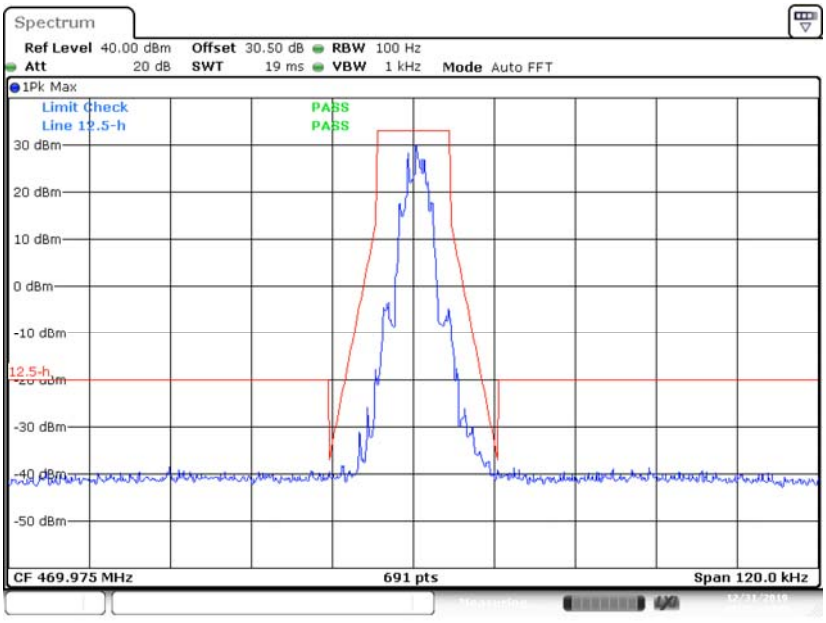
Emission Mask D



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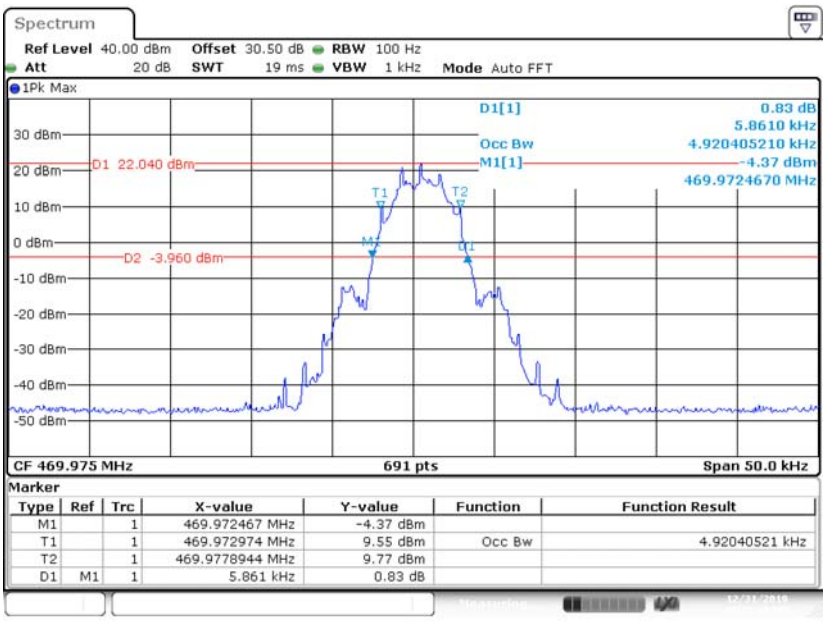
Low Power, Occupied Bandwidth-469.975MHz (4FSK 12.5kHz)



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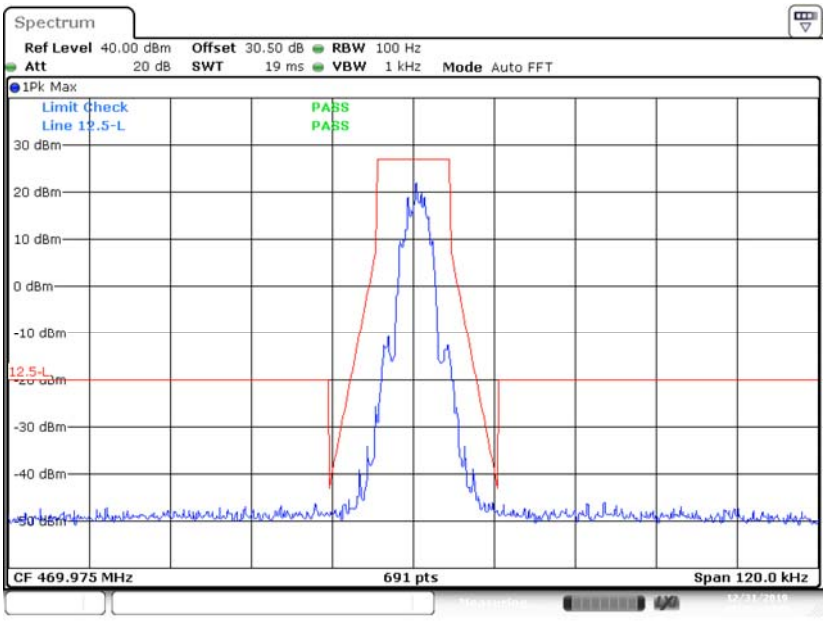
Emission Mask D



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FCC § 2.1051&§90.210- SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

FCC § 2.1051,§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:	23.5℃
Relative Humidity:	54%
ATM Pressure:	101.6 kPa

The testing was performed by Chao Gao on 2021-04-09.

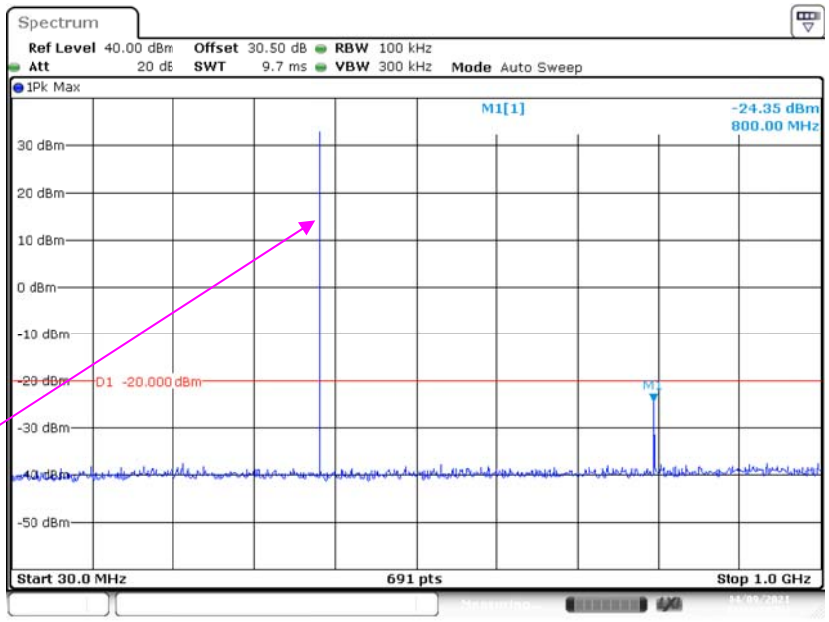
EUT Operation Mode: Transmitting

Test Result: Compliant.

Conducted Spurious Emissions at Antenna Port

High Power, 410.025 MHz, (4FSK 12.5kHz)

Fundamental



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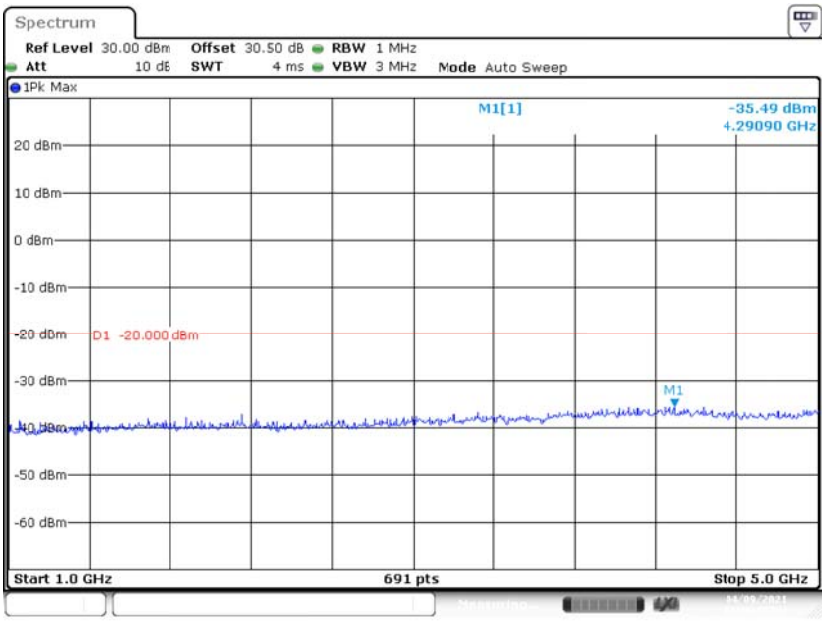

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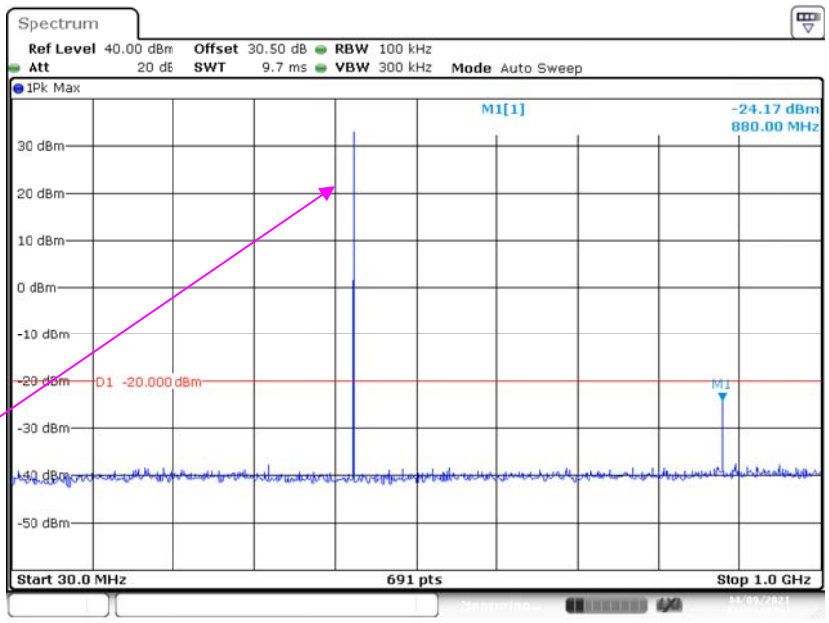
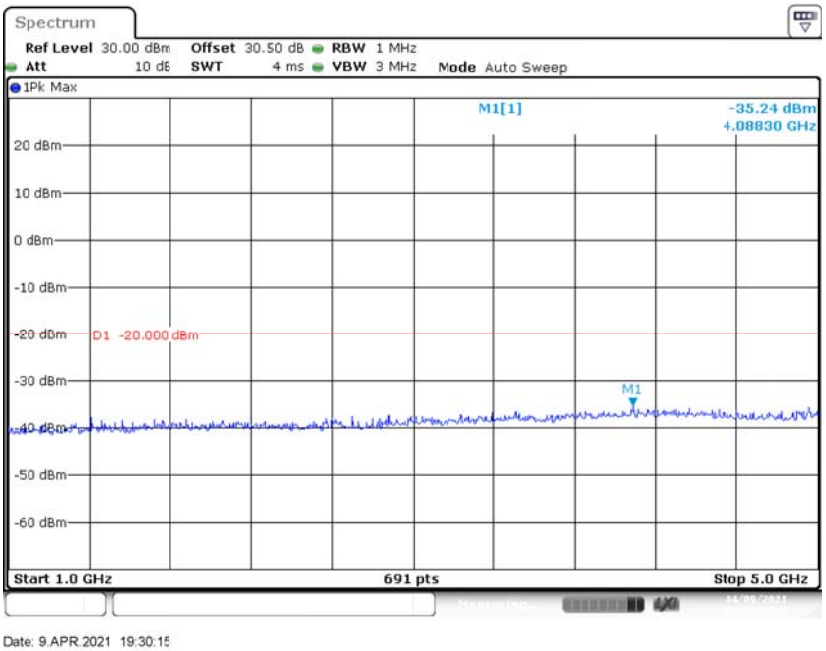
High Power, 440.000 MHz, (4FSK 12.5kHz)

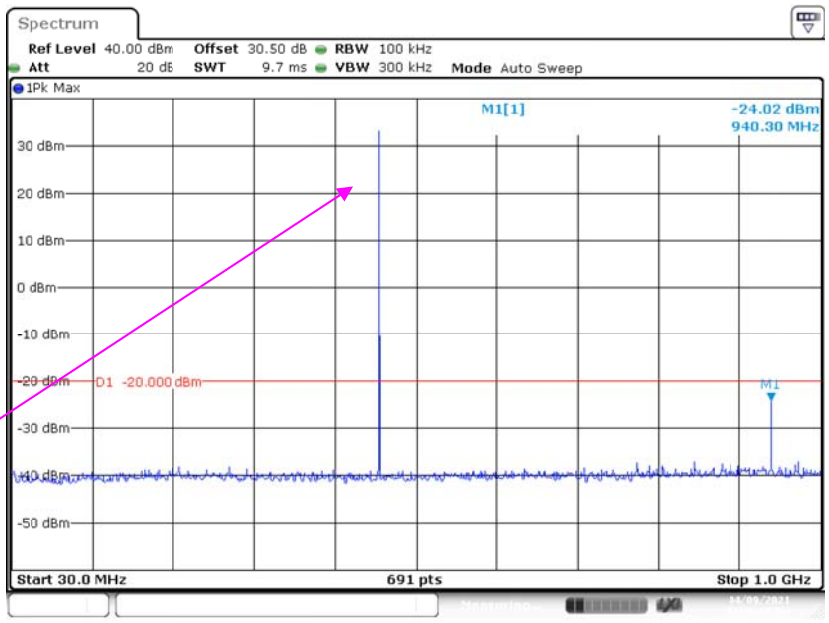
Fundamental

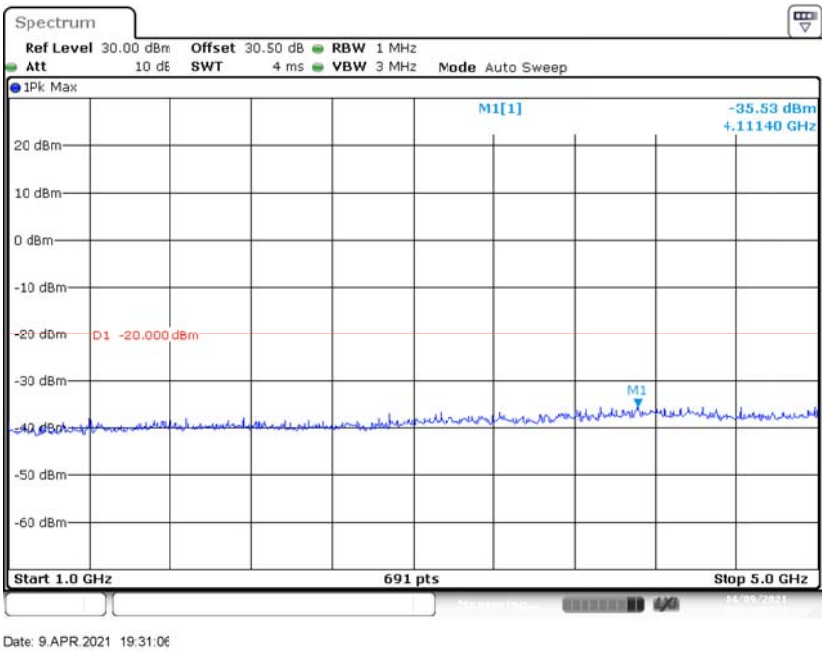




High Power, 469.975 MHz, (4FSK 12.5kHz)

Fundamental





FCC § 2.1053 & §90.210 - SPURIOUS RADIATED EMISSIONS

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:	24.5 ℃
Relative Humidity:	54 %
ATM Pressure:	101.3 kPa

The testing was performed by Chao Gao on 2020-01-02.

EUT Operation Mode: Transmitting in high power level (worst case)

30MHz - 5GHz:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	SGLevel (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
4FSK,Frequency: 410.025 MHz										
820.05	38.53	190	150	H	-57.85	0.62	-1.19	-59.66	-20	39.66
820.05	37.62	124	150	V	-60.75	0.62	-1.19	-62.56	-20	42.56
1533.45	67.14	42	150	H	-47.00	0.83	8.25	-39.58	-20	19.58
1533.45	66.43	147	150	V	-47.71	0.83	8.25	-40.29	-20	20.29
4FSK,Frequency: 440.000 MHz										
880.00	38.85	121	150	H	-57.04	0.63	-1.01	-58.68	-20	38.68
880.00	37.51	45	150	V	-59.11	0.63	-1.01	-60.75	-20	40.75
1533.45	66.89	88	150	H	-47.25	0.83	8.25	-39.83	-20	19.83
1533.45	66.18	178	150	V	-47.96	0.83	8.25	-40.54	-20	20.54
4FSK, Frequency: 469.975 MHz										
939.95	39.03	205	150	H	-58.78	0.64	-1.11	-60.53	-20	40.53
939.95	38.18	142	150	V	-56.05	0.64	-1.11	-57.80	-20	37.80
1533.45	66.75	107	150	H	-47.39	0.83	8.25	-39.97	-20	19.97
1533.45	65.45	82	150	V	-48.69	0.83	8.25	-41.27	-20	21.27

Note:
1) Antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.
2) Absolute Level = SG Level - Cable loss + Antenna Gain
3) Margin = Limit- Absolute Level

FCC § 2.1055 & §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 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 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:	22.5℃
Relative Humidity:	53 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2020-01-02.

EUT Operation Mode: Transmitting

Test Result: Compliant.

Reference Frequency：410.025MHz, High power						
Modulation Mode	ChannelSpacing(kHz)	Environment Temperature (℃)	Power Supply (V)	Measured Frequency (MHz)	Frequency Error ppm	Limit ppm
4FSK	12.5 kHz	-30	7.4	410.02378	-0.30	±2.5
		-20		410.02397	-0.25	±2.5
		-10		410.02418	-0.20	±2.5
		0		410.02453	-0.11	±2.5
		10		410.02473	-0.07	±2.5
		20		410.02486	-0.03	±2.5
		30		410.02516	0.04	±2.5
		40		410.02537	0.09	±2.5
		50		410.02568	0.17	±2.5
		20	6.3	410.02479	-0.05	±2.5
		20	8.4	410.02463	-0.09	±2.5

Reference Frequency：440.000MHz, High power						
Modulation Mode	ChannelSpacing(kHz)	Environment Temperature (℃)	Power Supply (V)	Measured Frequency (MHz)	Frequency Error ppm	Limit ppm
4FSK	12.5 kHz	-30	7.4	439.99878	-0.28	±2.5
		-20		439.99902	-0.22	±2.5
		-10		439.99938	-0.14	±2.5
		0		439.99967	-0.08	±2.5
		10		439.99982	-0.04	±2.5
		20		440.00021	0.05	±2.5
		30		440.00053	0.12	±2.5
		40		440.00072	0.16	±2.5
		50		440.00093	0.21	±2.5
		20	6.3	440.00035	0.08	±2.5
		20	8.4	440.00027	0.06	±2.5

Reference Frequency：469.975MHz, High power						
Modulation Mode	ChannelSpacing(kHz)	Environment Temperature (℃)	Power Supply (V)	Measured Frequency (MHz)	Frequency Error ppm	Limit ppm
4FSK	12.5 kHz	-30	7.4	469.97375	-0.27	±2.5
		-20		469.97394	-0.23	±2.5
		-10		469.97421	-0.17	±2.5
		0		469.97446	-0.11	±2.5
		10		469.97481	-0.04	±2.5
		20		469.97511	0.02	±2.5
		30		469.97543	0.09	±2.5
		40		469.97562	0.13	±2.5
		50		469.97587	0.19	±2.5
		20	6.3	469.97515	0.03	±2.5
		20	8.4	469.97507	0.01	±2.5

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.

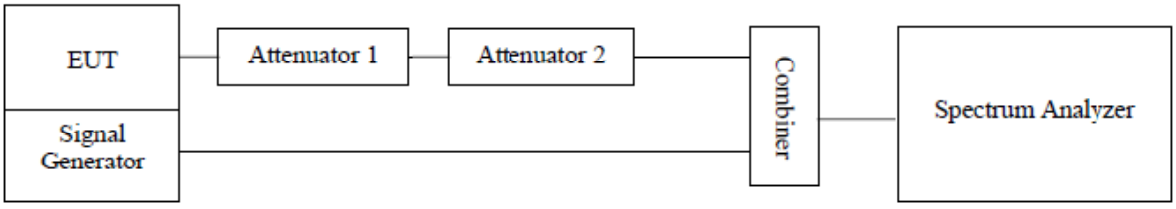
g) Adjust the RF level of the signal generator to provide RF power equal to P0. This signal generator RF level shall be maintained throughout the rest of the measurement.

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

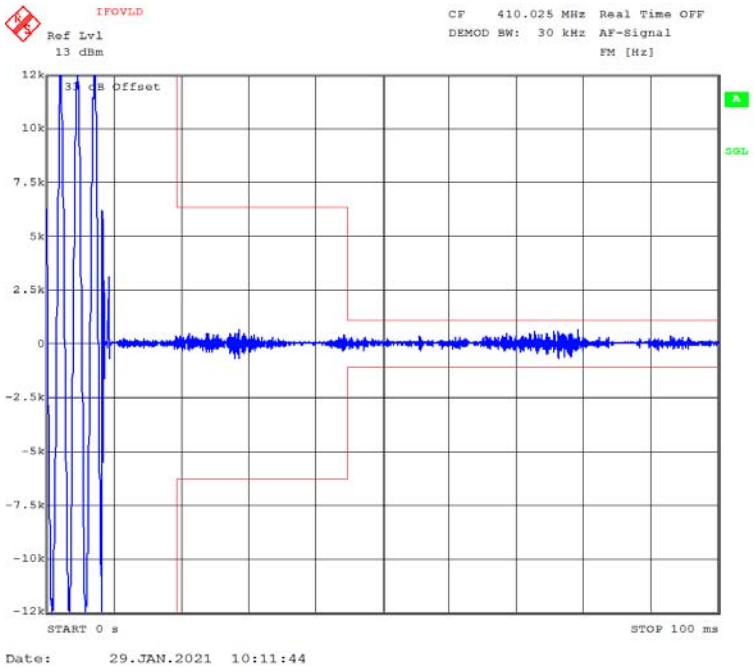
The testing was performed by Chao Gao on 2021-01-29

Band	Channel Spacing (kHz)	Transient Period (ms)	Transient Frequency(kHz)	Result
410-470MHz	12.5	<10(t_1)	±12.5	Pass
		<25(t_2)	±6.25	
		<10(t_3)	±12.5	

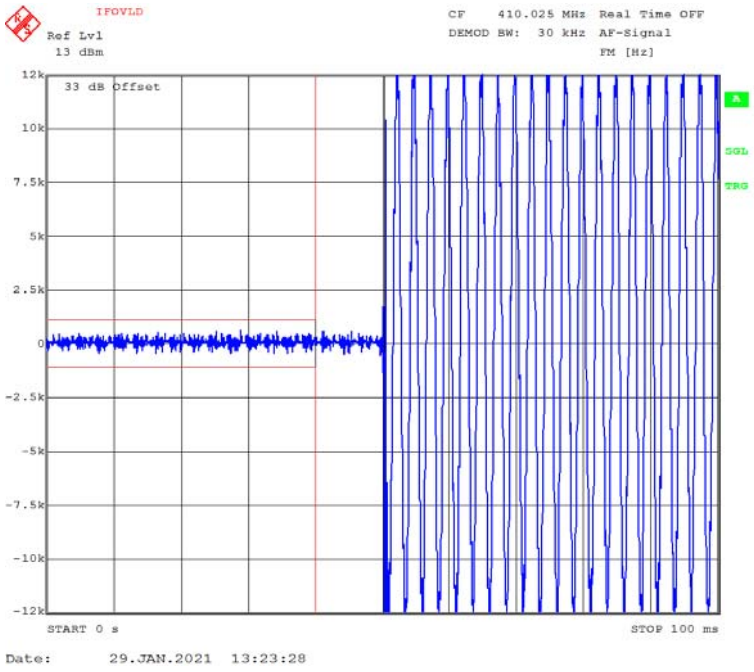
Please refer to the following plots:

Frequency:410.025 MHz, High Power-12.5kHz

Turn on

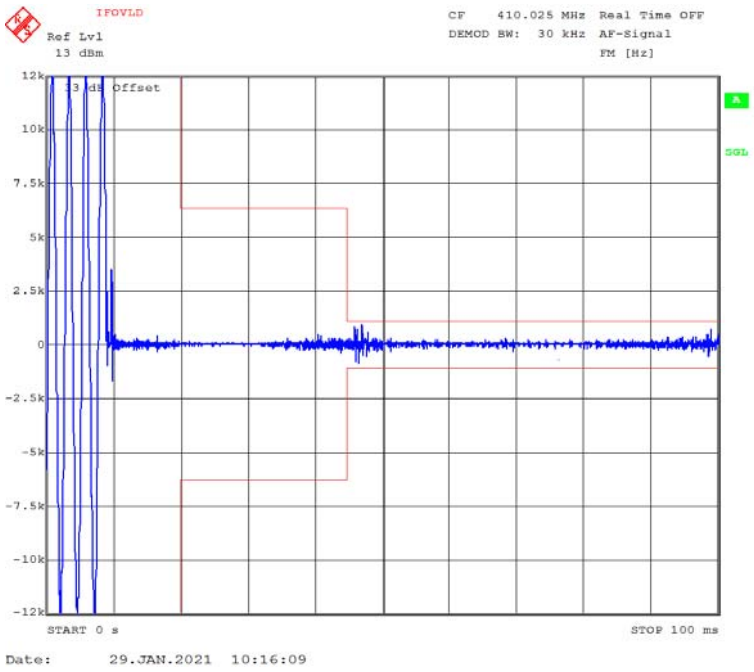


Turn off



Frequency:410.025 MHz, Low Power-12.5kHz

Turn on



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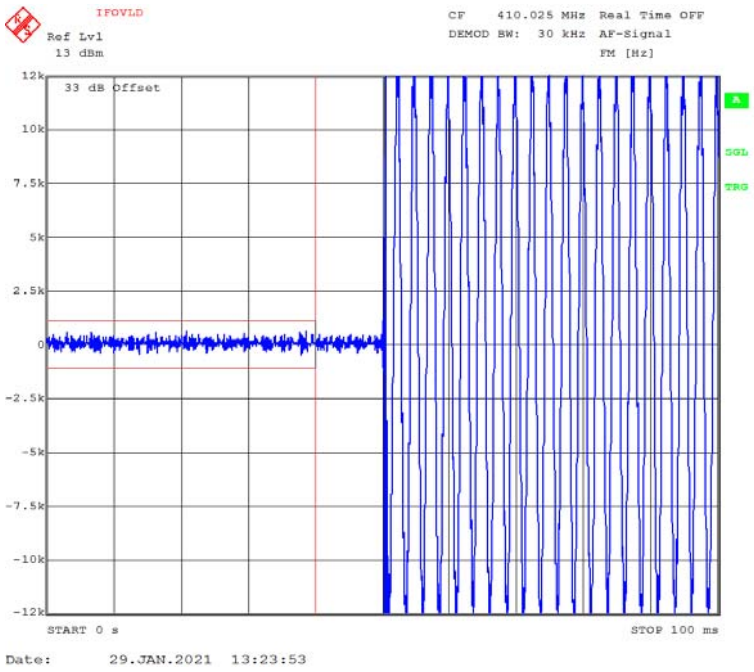
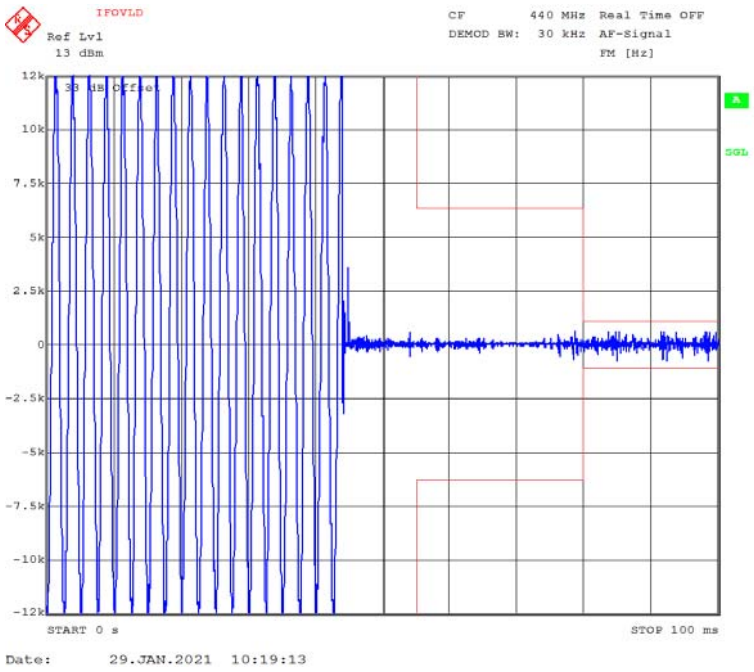


Frequency:440.000 MHz, High Power-12.5kHz

Turn on



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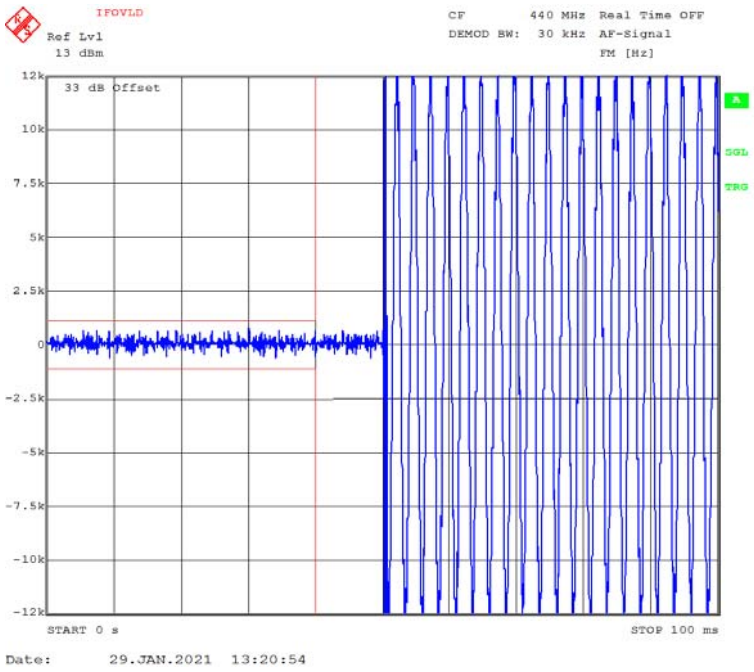
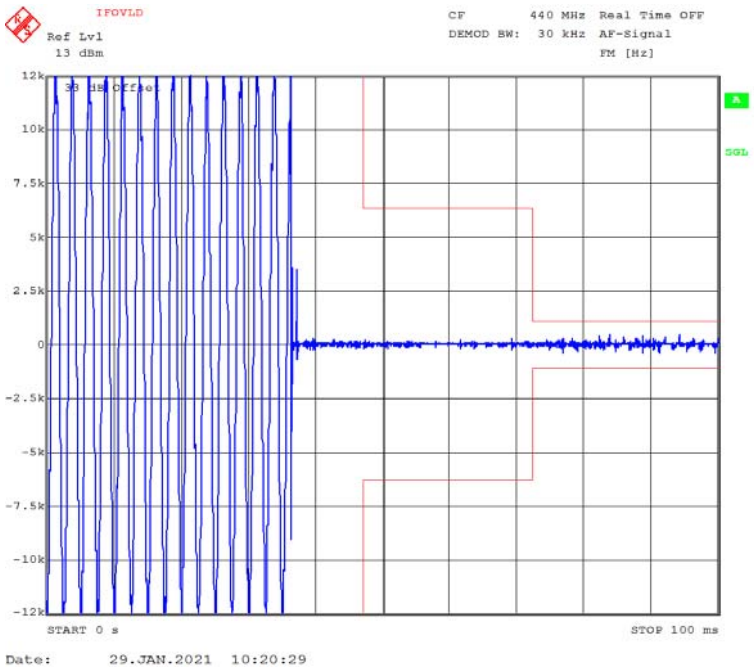
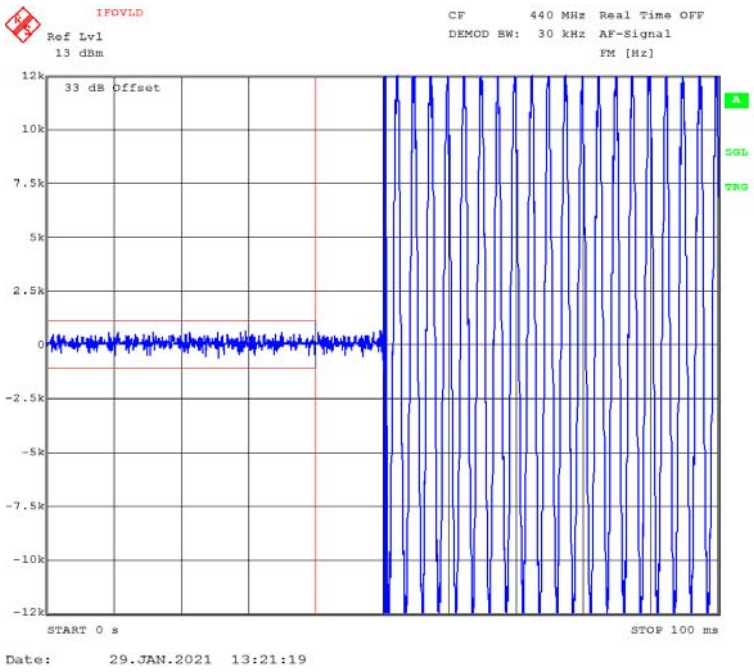


Frequency:440.000 MHz, Low Power-12.5kHz

Turn on

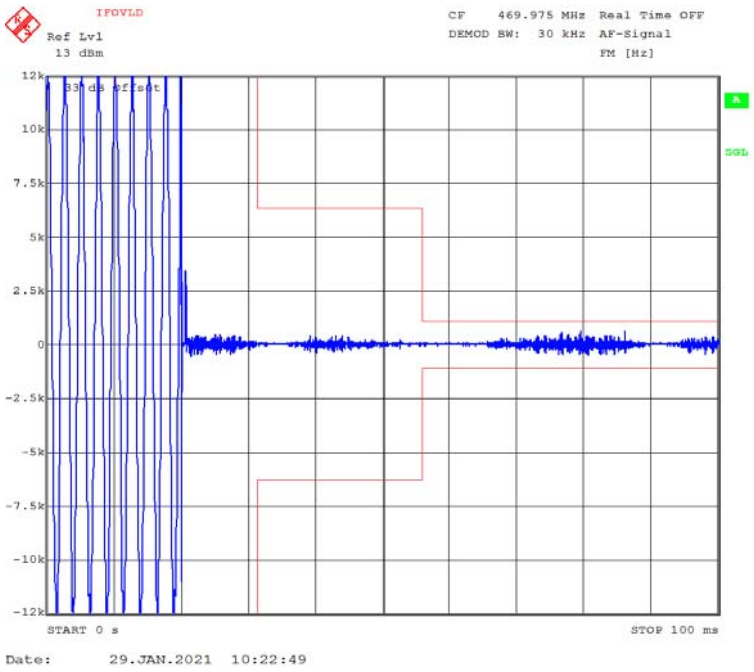


Turn off



Frequency:469.975 MHz, High Power-12.5kHz

Turn on



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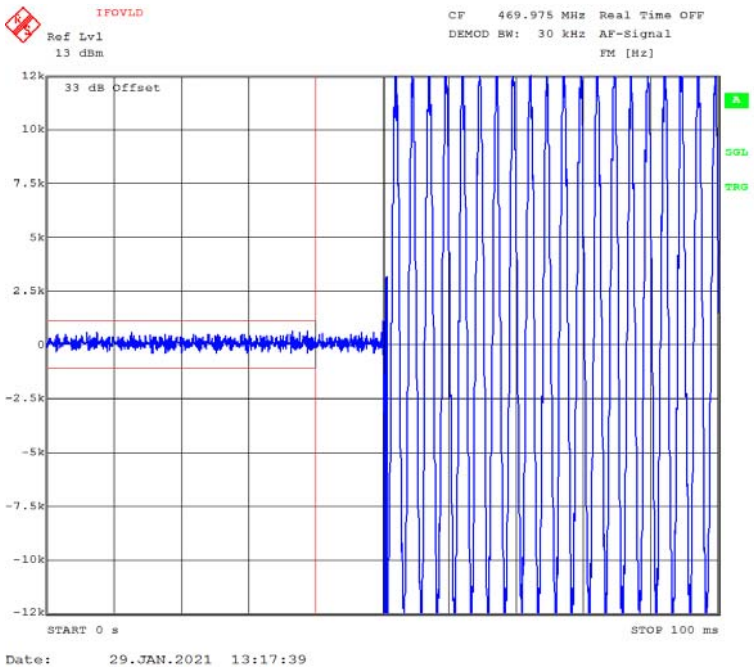
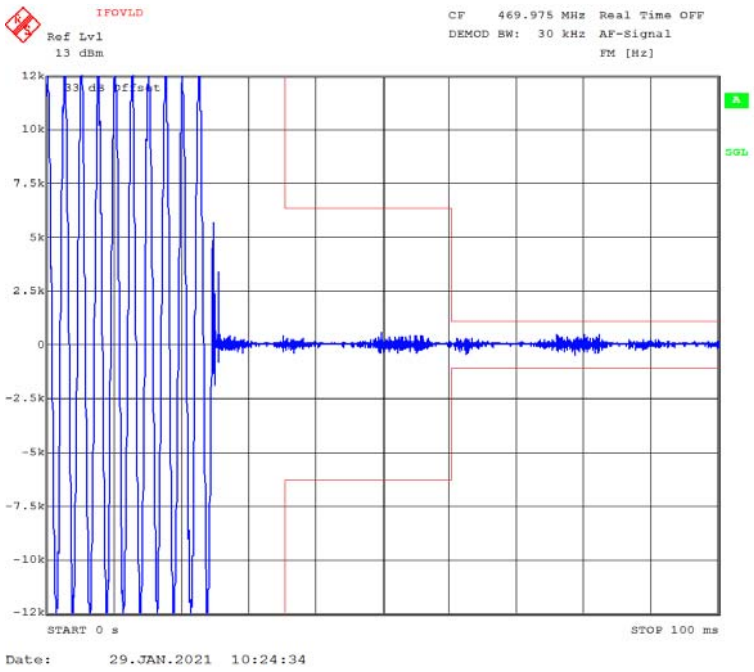
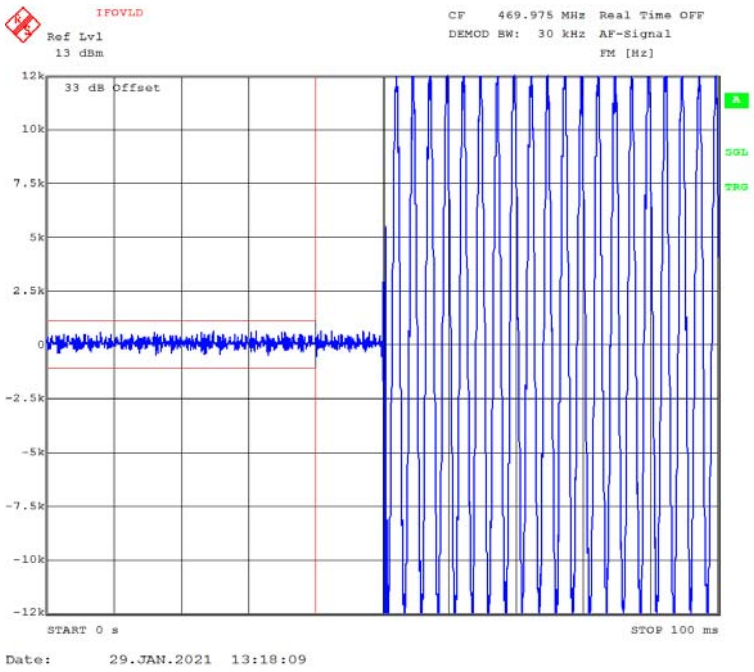


Frequency:469.975 MHz, Low Power-12.5kHz

Turn on



Turn off



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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