TEST REPORT

Applicant Name:	Cobra Electronics Corporation
Address:	1701 Golf Road, Suite 3-900 Rolling Meadows Illinois United States 60008
Report Number:	2401V59584E-RF-00
FCC ID:	BBOPERF450

Test Standard (s)

FCC PART 90

Sample Description

Product Type:	Cobra UHF Business Radio
Model No.:	Performa 450
Multiple Model(s) No.:	Performa 400
Trade Mark:	Cobra
Date Received:	2024/07/10
Issue Date:	2024/10/12

Test Result:	Pass▲

▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Bruce Lin

Bruce Lin
RF Engineer

Approved By:

Jimmy Xiao

Jimmy Xiao
EMC Manager

Note: The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "▼".

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	2401V59584E-RF-00	Original Report	2024/10/12

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Cobra UHF Business Radio
Tested Model	Performa 450
Multiple Model(s)	Performa 400
Frequency Range	450-470MHz
Rated Transmit Power	2Watts(High), 0.5Watt(Low)
Channel separation	12.5kHz
Modulation Technique	FM
Antenna Specification#	0dBi (provided by the applicant)
Voltage Range	DC 3.8Vfrom battery
Sample serial number	Performa 450: 2OAD-3; Performa 400: 2OAD-2 (RF Conducted Test) 2OAD-1 (Performa 450: Radiated Test) 2OAD-2 (Performa 400: Radiated Test) (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	Adapter 1 Model: TJ05301W0506000US Input: 100-240V~50/60Hz 1.2A MAX Output: 5.0V, 6000mA Adapter 2 Model: GF-A0501000SUS Input: 100-240V~50/60Hz 0.4A Max Output: 5.0V, 1000mA
Note 1: The Multiple models are electrically identical with the test model except for Screen. Please refer to the declaration letter# for more detail, which was provided by manufacturer. Note 2: The model Performa 450 has LED screen, model Performa 400 does not have LED screen.	

Objective

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

Test Methodology

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

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA 603-E, ANSI C63.26-2015.

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

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
Frequency Error		213.55Hz
RF output power, conducted		0.72dB
Unwanted Emission, conducted		1.75dB
Audio Frequency Response		0.1dB
Low Pass Filter Response		1.2dB
Modulation Limiting		1%
Radiated Spurious Emission	30MHz~200MHz (Horizontal)	4.48dB
	30MHz~200MHz (Vertical)	4.55dB
	200MHz~1000MHz (Horizontal)	4.85dB
	200MHz~1000MHz (Vertical)	5.05dB
	1GHz - 6GHz	5.35dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

Each test item follows test standards and with no deviation.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

Test channel information

Test Mode	Test Frequency (MHz)
FM, 12.5kHz	450.0125
	460.0000
	469.9875

Equipment Modifications

No modification was made to the EUT.

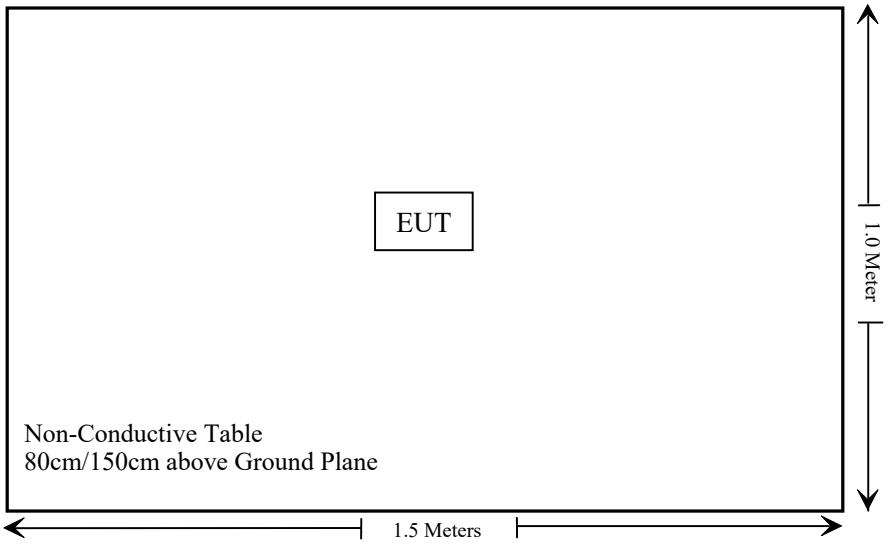
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
FCC §1.1307 & §2.1093	RF Exposure	Compliant
§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					
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310 N	186238	2024/05/21	2025/05/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Unknown	Cable	Chamber A Cable 1	N/A	2024/06/18	2025/06/17
Unknown	Cable	XH500C	J-10M-A	2024/06/18	2025/06/17
COM-POWER	Dipole Antenna	AD-100	721027	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2024/03/27	2025/03/26
COM-POWER	Pre-amplifier	PA-122	181919	2024/06/18	2025/06/17
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
The Electro-Mechanics Co.	Horn Antenna	3115	9107-3694	2024/06/06	2027/06/05
Unknown	RF Cable	KMSE	735	2024/06/18	2025/06/17
Unknown	RF Cable	UFA147	219661	2024/06/18	2025/06/17
Agilent	Signal Generator	N5183A	MY50140588	2023/12/18	2024/12/17
Unknown	U Band Pass Filter	NHP-600+	15542	2024/06/27	2025/06/26
RF Conducted Test					
R&S	SPECTRUM ANALYZER	FSU26	200120	2024/01/08	2025/01/07
BACL	Temperature & Humidity Chamber	BTH-150-40	30144	2024/01/16	2025/01/15
HP	RF Communication test set	8920B	US36141849	2024/01/16	2025/01/15
ANRITSU	Microwave peak power sensor	MA24418A	12622	2024/05/21	2025/05/20
instek	DC Power Supply	GPS-3030DD	EM832096	NCR	NCR
R&S	Audio Analyzer	UPV	101782	2024/01/16	2025/01/15
R&S	Signal Analyzer	FSIQ26	837405/023	2024/01/08	2025/01/07
Fluke	Digital Multimeter	287	19000011	2024/05/21	2025/05/20
WEINSCHEL	30dB Attenuator	58-30-33	PS509	2024/06/27	2025/06/26

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

FCC §1.1307&§2.1093 - RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: 2402V59584E-20.

FCC §2.1046 & §90.205 - RF OUTPUT POWER

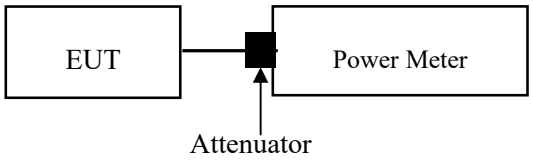
Applicable Standard

FCC §2.1046 and §90.205

Test Procedure

According to ANSI C63.26-2015 section 5.2.3.3

Conducted RF Output Power:



Test Data

Environmental Conditions

Temperature:	25.7 ℃
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Cheeb Huang on 2024-08-20.

Test Mode: Transmitting

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

Model: Performa 450

Modulation Mode	Channel Separation	f_c	Reading	Limit
		MHz	(dBm)	(dBm)
FM	12.5kHz	450.0125	32.86	33.80
		460	32.87	33.80
		469.9875	32.93	33.80
FM	12.5kHz	450.0125	27.02	27.78
		460	27.12	27.78
		469.9875	27.12	27.78

Note: Rated high power: 2W (Limit: ≤2.4W)
Rated low power: 0.5W (Limit: ≤0.6W)

Model: Performa 400

Modulation Mode	Channel Separation	f_c MHz	Reading (dBm)	Limit (dBm)
FM	12.5kHz	450.0125	32.53	33.80
		460	32.24	33.80
		469.9875	32.67	33.80
FM	12.5kHz	450.0125	26.98	27.78
		460	27.01	27.78
		469.9875	27.03	27.78

Note: Rated high power: 2W (Limit: ≤2.4W)
Rated low power: 0.5W (Limit: ≤0.6W)

FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC

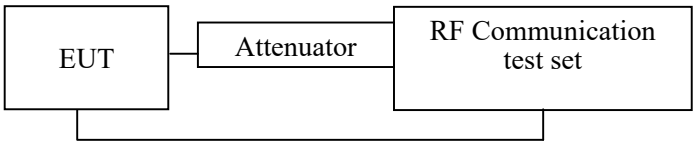
Applicable Standard

FCC§2.1047 and §90.207:

(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 section 5.3



Test Data

Environmental Conditions

Temperature:	25.7 ℃
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Cheeb Huang from 2024-08-20 to 2024-10-12.

Test Mode: Transmitting (High power level was tested)

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

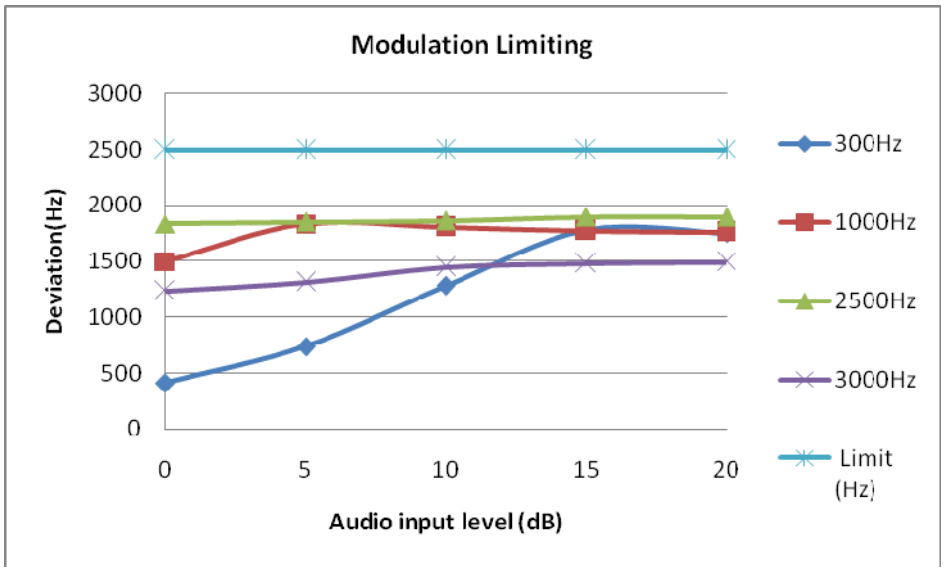
Analog Modulation:

MODULATION LIMITING

Carrier Frequency: 460MHz, Separation: 12.5 kHz

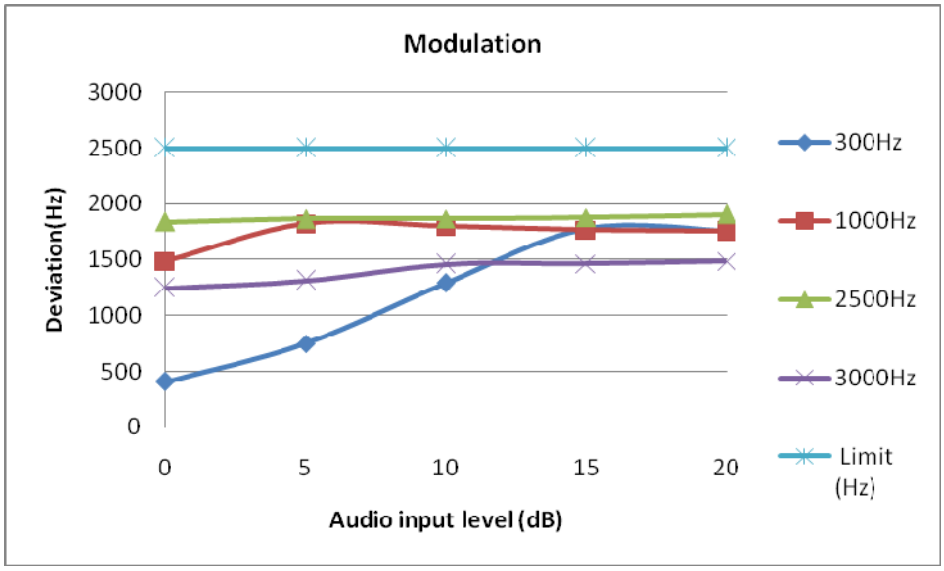
PK+ Deviation

Audio input level (dB)	Deviation (Hz)				Limit (Hz)
	300Hz	1000Hz	2500Hz	3000Hz	
20	1751	1762	1892	1493	2500
15	1781	1774	1892	1483	2500
10	1279	1807	1861	1447	2500
5	735	1834	1852	1314	2500
0	410	1500	1834	1232	2500



PK- Deviation

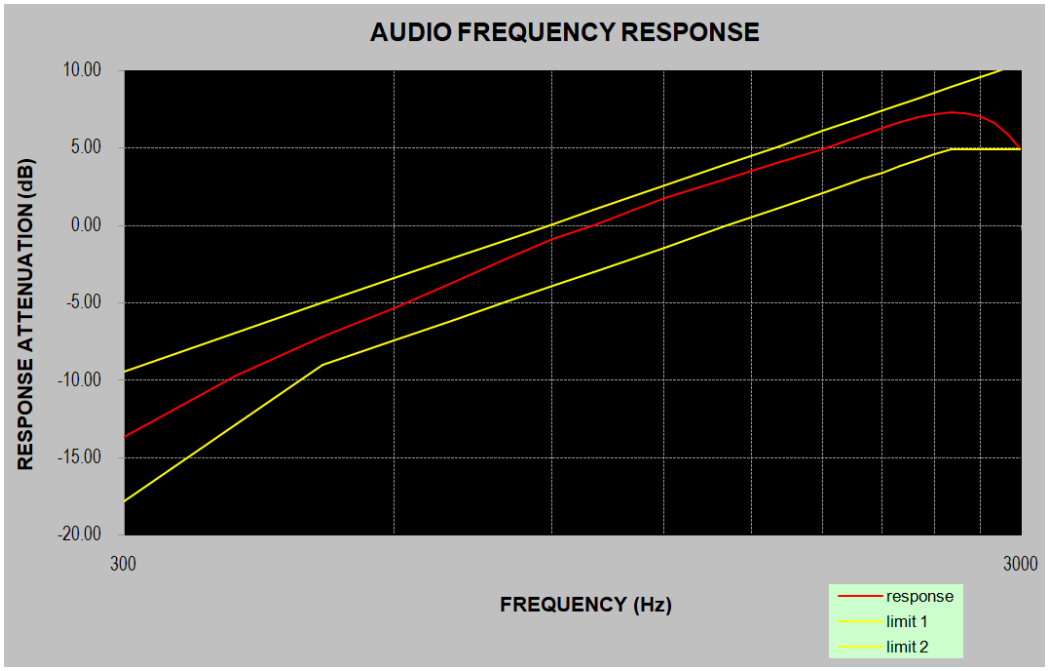
Audio input level (dB)	Deviation (Hz)				Limit (Hz)
	300Hz	1000Hz	2500Hz	3000Hz	
20	1759	1752	1906	1486	2500
15	1779	1768	1876	1466	2500
10	1293	1801	1869	1459	2500
5	748	1824	1864	1311	2500
0	409	1487	1837	1247	2500



Audio Frequency Response

Carrier Frequency: 460MHz, Separation: 12.5 kHz

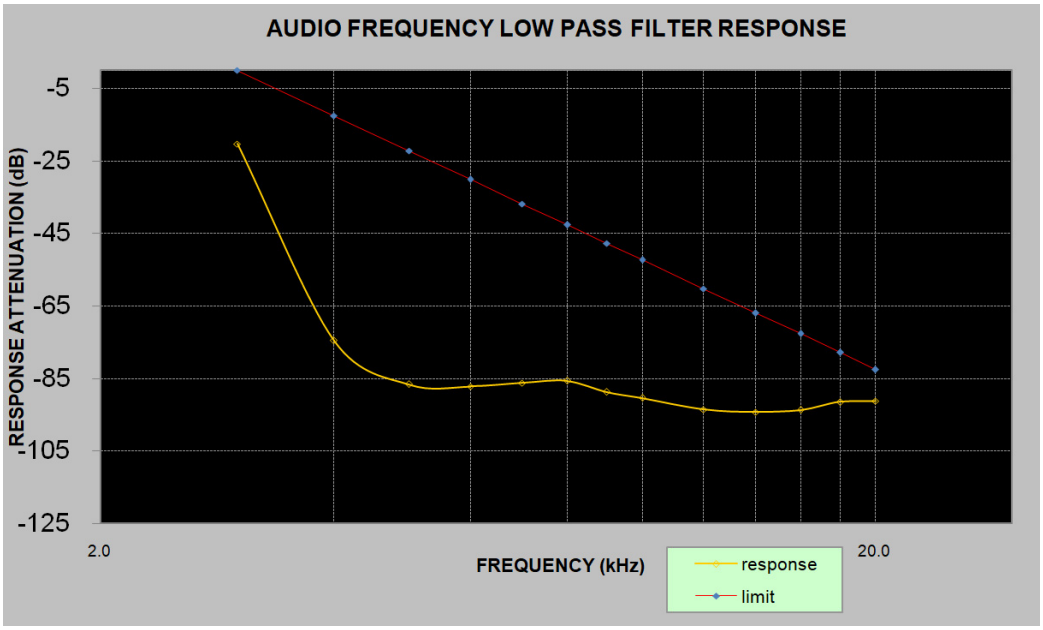
Audio Frequency (Hz)	Response Attenuation (dB)
300	-13.64
400	-9.68
500	-7.17
600	-5.32
700	-3.66
800	-2.11
900	-0.88
1000	0.00
1200	1.76
1400	3.00
1600	4.03
1800	4.95
2000	5.86
2100	6.31
2200	6.68
2300	7.01
2400	7.20
2500	7.30
2600	7.26
2700	7.04
2800	6.59
2900	5.89
3000	4.95


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

Audio Frequency Lows Pass Filter Response

Carrier Frequency: 460MHz, Separation: 12.5 kHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-20.3	0.0
4.0	-74.5	-12.5
5.0	-86.6	-22.2
6.0	-87.2	-30.1
7.0	-86.2	-36.8
8.0	-85.6	-42.6
9.0	-88.7	-47.7
10.0	-90.4	-52.3
12.0	-93.6	-60.2
14.0	-94.3	-66.9
16.0	-93.7	-72.7
18.0	-91.5	-77.8
20.0	-91.2	-82.5



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

Applicable Standard

FCC §2.1049 and §90.210

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

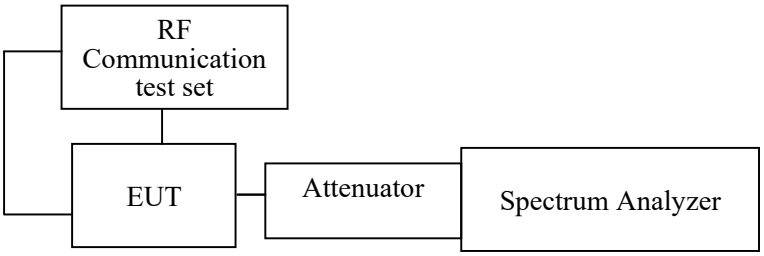
1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0, 0dB.

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

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

Test Procedure

According to ANSI C63.26-2015 section 5.4.4.



The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring (99%) power bandwidth:

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).
b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3. NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.
d) Set the detection mode to peak, and the trace mode to max-hold.
e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.
f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with

the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Test Data

Environmental Conditions

Temperature:	25.7 ℃
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Cheeb Huang on 2024-08-20.

Test mode: Transmitting

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

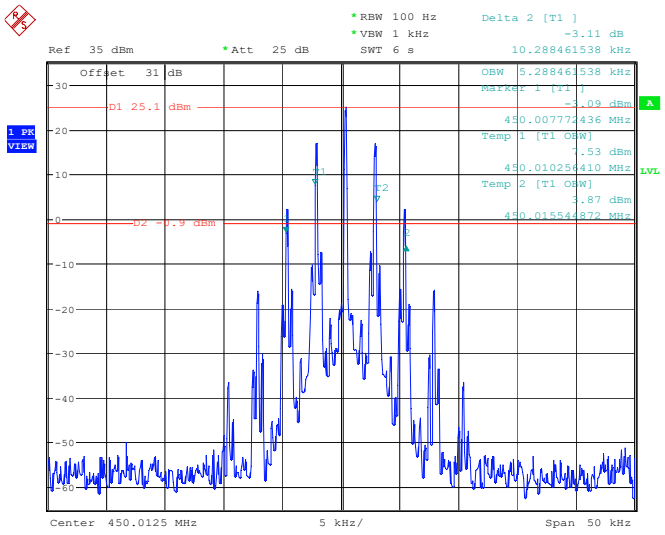
Modulation Mode	Channel Separation	Power level	f_c (MHz)	99% Occupied Bandwidth (kHz)
FM	12.5kHz	High	450.0125	5.288
			460	5.288
			469.9875	5.288
FM	12.5kHz	Low	450.0125	5.288
			460	5.288
			469.9875	5.288

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

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

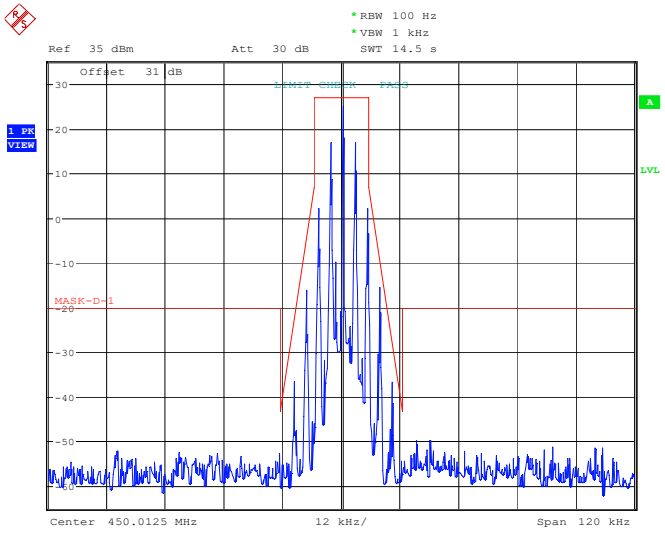
For FM Mode (Channel Spacing: 12.5 kHz)
Emission Designator 11K0F3E. In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation. BW = 2(M+D) = 2(3.0 kHz + 2.5 kHz) = 11 kHz → 11K0*
F3E portion of the designator represents an FM voice transmission Therefore, the entire designator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

Frequency 450.0125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



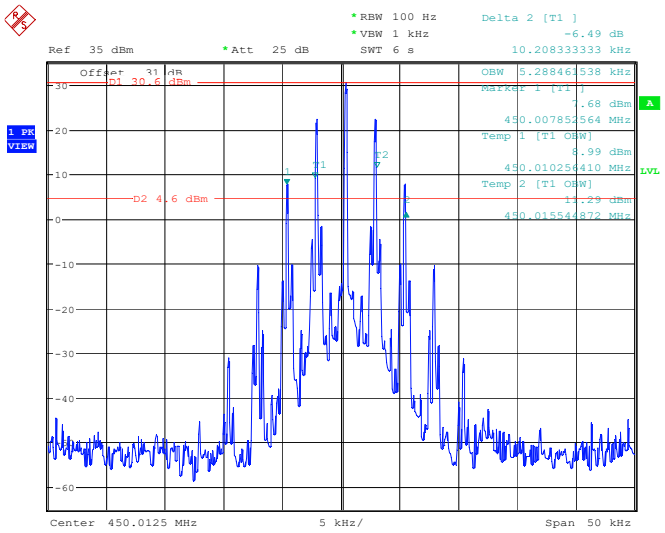
ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 10:55:32

Frequency 450.0125 MHz: Emission Mask D, Low Power



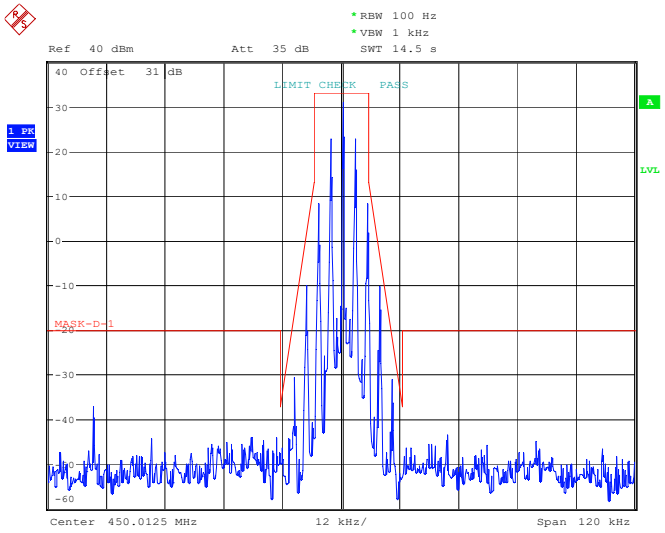
ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 10:48:43

Frequency 450.0125 MHz: 99% Occupied & 26 dB Bandwidth, High Power



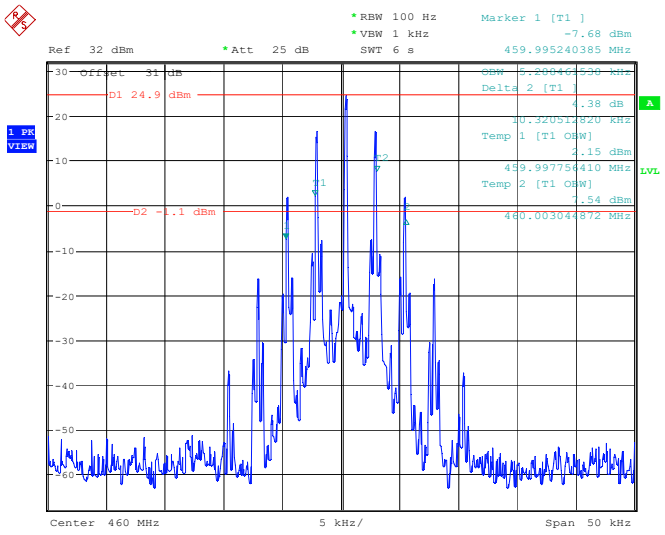
ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:02:07

Frequency 450.0125 MHz: Emission Mask D, High Power



ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 10:13:47

Frequency 460 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



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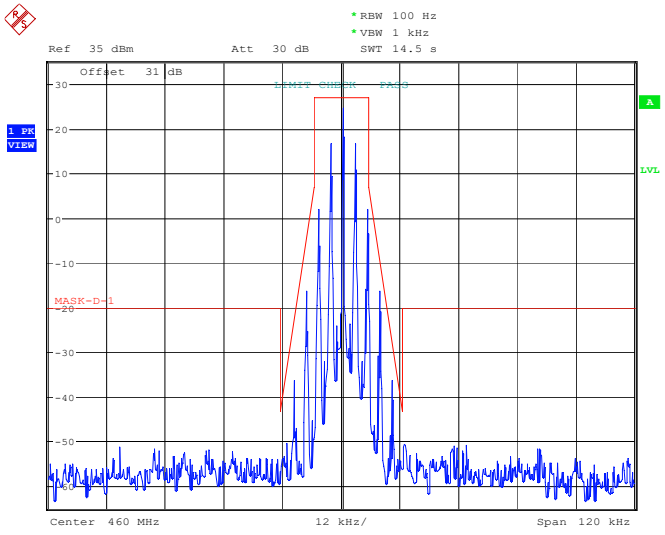
Date: 20.AUG.2024 11:04:38

Frequency 460 MHz: Emission Mask D, Low Power



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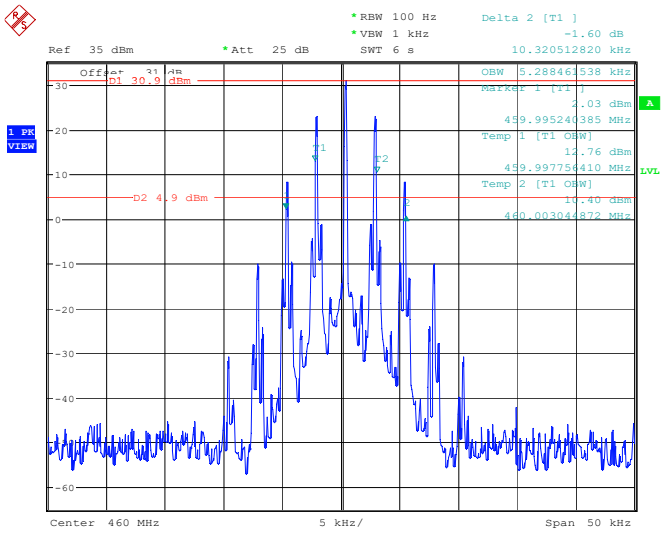
Frequency 460MHz: 99% Occupied & 26 dB Bandwidth, High Power



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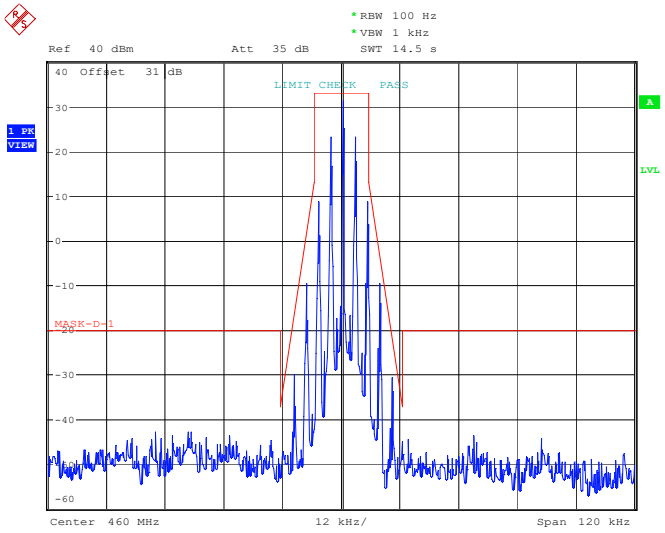
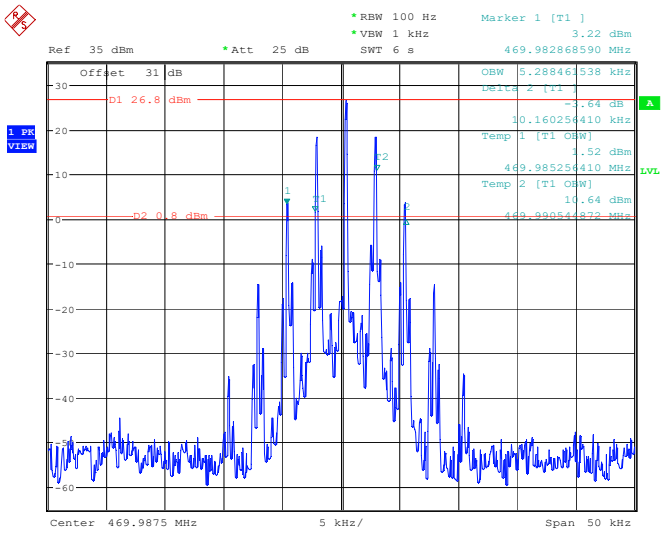
Date: 20.AUG.2024 11:09:56

Frequency 460 MHz: Emission Mask D, High Power



ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 10:14:55

Frequency 469.9875 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



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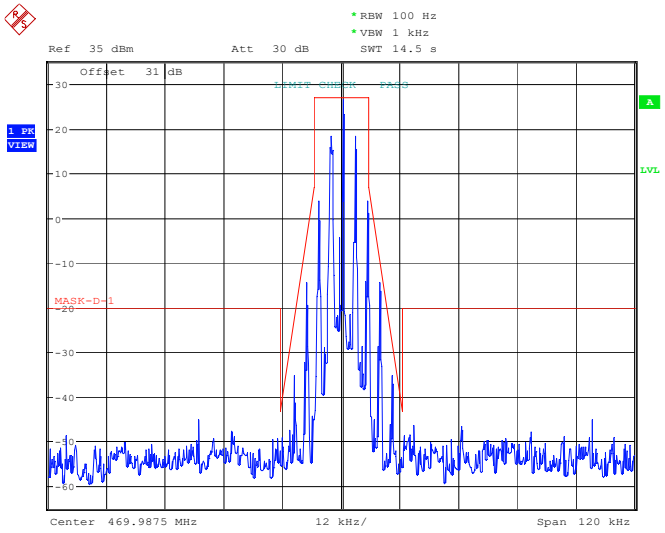
Frequency 469.9875 MHz: Emission Mask D, Low Power



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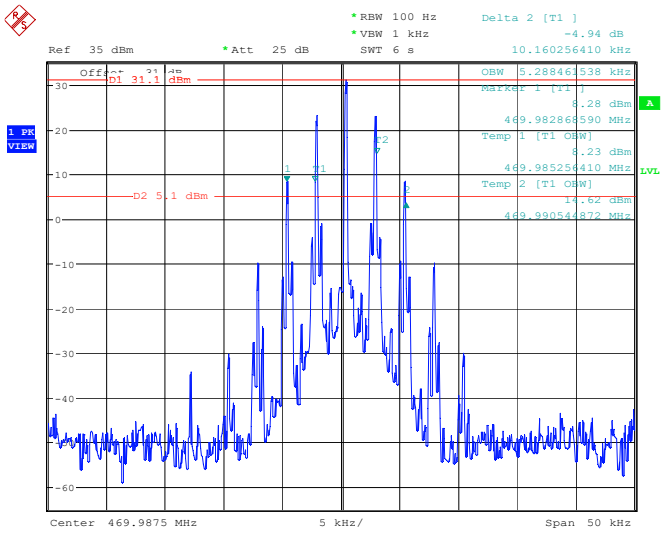
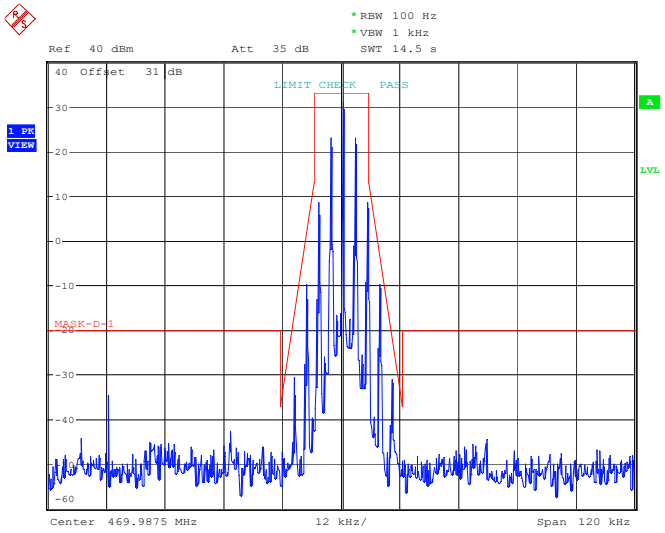
Date: 20.AUG.2024 10:45:59

Frequency 469.9875 MHz: 99% Occupied & 26 dB Bandwidth, High Power



ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:17:56

Frequency 469.9875 MHz: Emission Mask D, High Power



ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 10:20:14

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

Applicable Standard

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

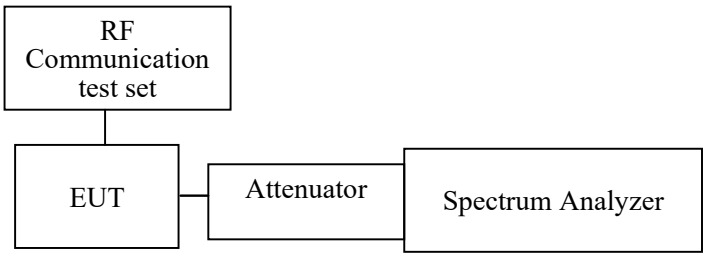
1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0, 0 dB.

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

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

Test Procedure

According to ANSI C63.26-2015 section 5.7



Note: The path loss from EUT to Spectrum Analyzer has included in the result.

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

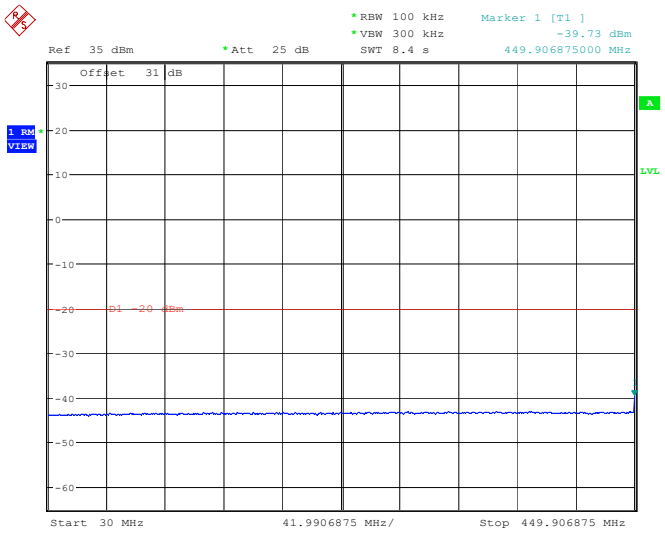
Temperature:	25.7 ℃
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Cheeb Huang on 2024-08-20.

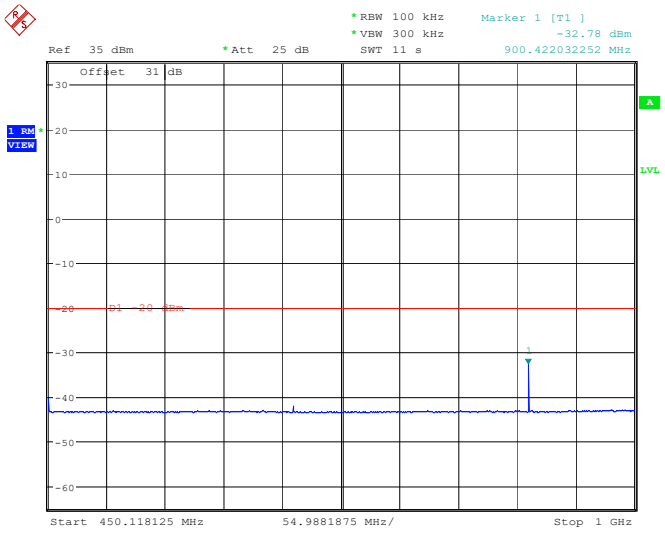
Test Mode: Transmitting, worst case for high power level.

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

30MHz – 1 GHz, Low Channel

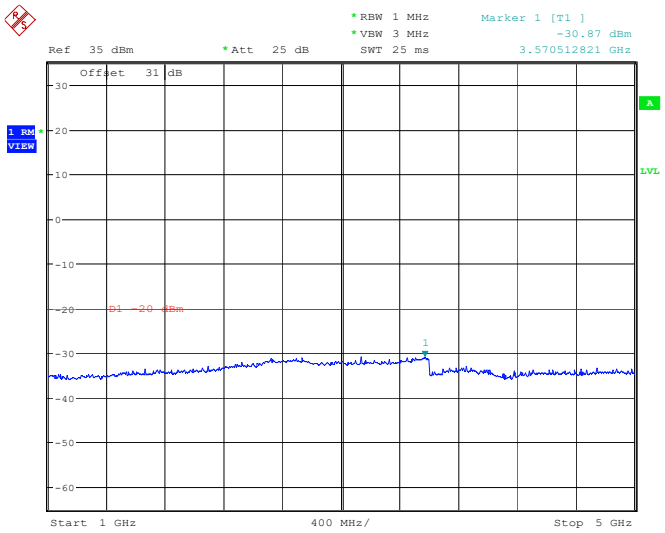


ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:31:45



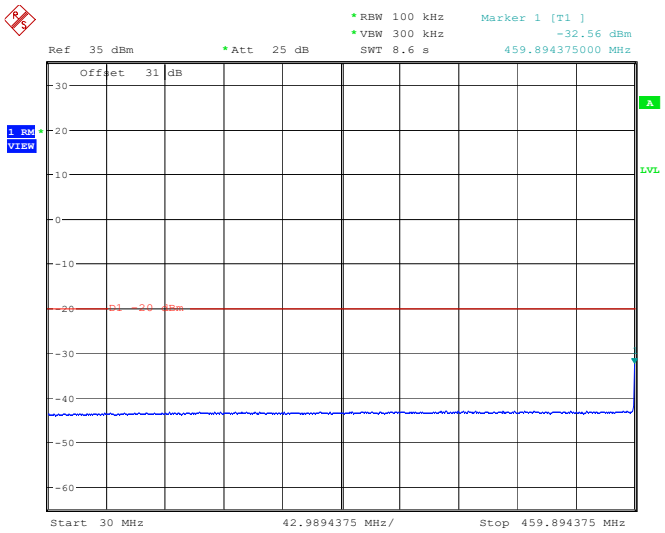
ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:33:13

1 GHz – 5 GHz, Low Channel

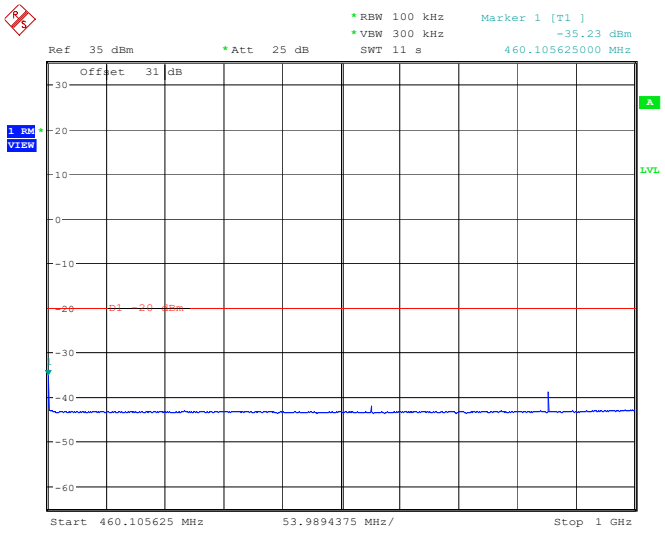


ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:55:22

30MHz – 1 GHz, Middle Channel

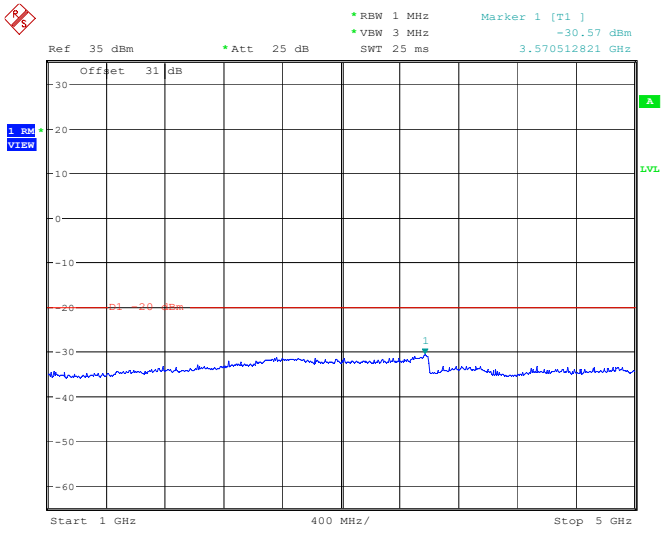


ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:36:17



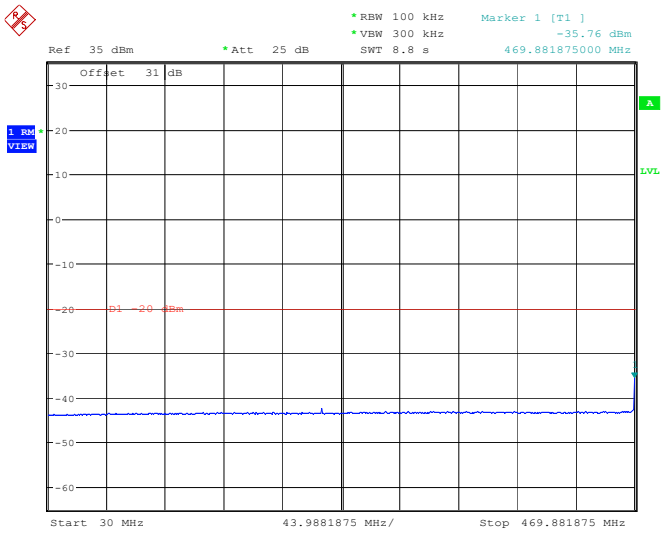
ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:34:45

1 GHz – 5 GHz, Middle Channel

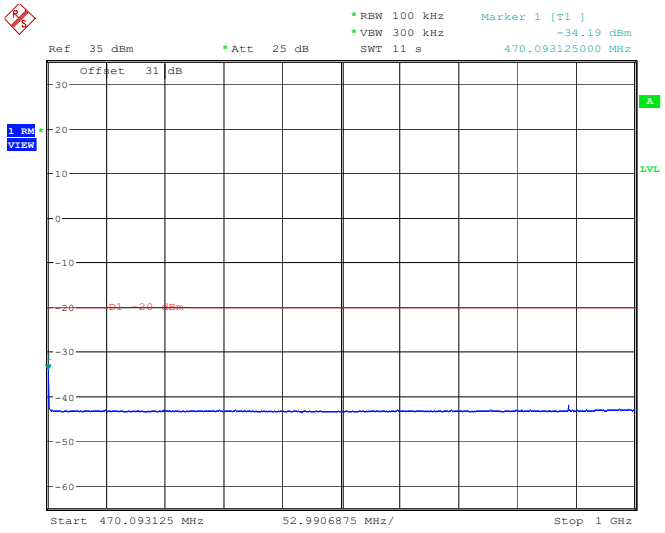


ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:54:49

30MHz – 1 GHz, High Channel

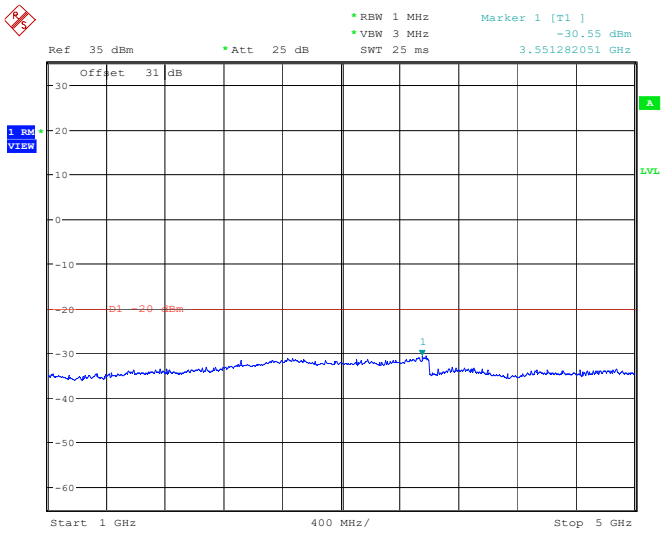


ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:43:33



ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:50:06

1 GHz – 5 GHz, High Channel



ProjectNo.:2401V59584E-RF Tester:Cheeb Huang
Date: 20.AUG.2024 11:54:27

FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053 and §90.210

Test Procedure

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

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

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

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

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

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

Test Data

Environmental Conditions

Temperature:	22~25.6 ℃
Relative Humidity:	50~54 %
ATM Pressure:	101.0 kPa

The testing was performed by Anson Su on 2024-08-01 for below 1GHz and Dylan Yang on 2024-07-30 for above 1GHz.

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

Note: Scan with X-AXIS, Y-AXIS, Z-AXIS, the worst case Y-AXIS was recorded

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

Frequency (MHz)	Receiver Reading (dBm)	Polar (H/V)	Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Model: Performa 450								
450.0125 MHz								
900.025	34.84	H	-30.5	1.33	0.0	-31.83	-20	11.83
900.025	34.42	V	-30.7	1.33	0.0	-32.03	-20	12.03
1350.04	61.23	H	-46.5	0.80	7.90	-39.40	-20	19.40
1350.04	60.32	V	-48.1	0.80	7.90	-41.00	-20	21.00
1800.05	66.25	H	-41.2	0.90	8.40	-33.70	-20	13.70
1800.05	62.79	V	-45.3	0.90	8.40	-37.80	-20	17.80
2250.06	65.47	H	-41.9	1.10	9.40	-33.60	-20	13.60
2250.06	62.22	V	-45.2	1.10	9.40	-36.90	-20	16.90
2700.08	60.86	H	-46.0	1.10	9.00	-38.10	-20	18.10
2700.08	56.88	V	-49.7	1.10	9.00	-41.80	-20	21.80
3150.09	58.98	H	-47.0	1.20	7.60	-40.60	-20	20.60
3150.09	56.91	V	-48.8	1.20	7.60	-42.40	-20	22.40
3600.10	59.37	H	-46.3	1.30	10.90	-36.70	-20	16.70
3600.10	61.21	V	-44.2	1.30	10.90	-34.60	-20	14.60
4050.11	56.13	H	-48.4	1.40	10.60	-39.20	-20	19.20
4050.11	52.82	V	-51.7	1.40	10.60	-42.50	-20	22.50
4500.13	46.29	H	-57.9	1.40	10.60	-48.70	-20	28.70
4500.13	54.92	V	-48.9	1.40	10.60	-39.70	-20	19.70
460 MHz								
920.00	34.52	H	-30.8	1.33	0.0	-32.13	-20	12.13
920.00	35.36	V	-29.7	1.33	0.0	-31.03	-20	11.03
1380.00	61.67	H	-46.0	0.80	7.90	-38.90	-20	18.90
1380.00	61.25	V	-47.2	0.80	7.90	-40.10	-20	20.10
1840.00	66.67	H	-40.8	0.90	8.40	-33.30	-20	13.30
1840.00	63.74	V	-44.4	0.90	8.40	-36.90	-20	16.90
2300.00	66.19	H	-41.1	1.10	9.40	-32.80	-20	12.80
2300.00	62.96	V	-44.5	1.10	9.40	-36.20	-20	16.20
2760.00	61.37	H	-45.2	1.20	9.20	-37.20	-20	17.20
2760.00	57.48	V	-48.8	1.20	9.20	-40.80	-20	20.80
3220.00	59.54	H	-46.5	1.20	7.60	-40.10	-20	20.10
3220.00	57.27	V	-48.5	1.20	7.60	-42.10	-20	22.10
3680.00	59.90	H	-45.5	1.30	11.00	-35.80	-20	15.80
3680.00	62.11	V	-43.1	1.30	11.00	-33.40	-20	13.40
4140.00	56.48	H	-48.0	1.40	10.60	-38.80	-20	18.80
4140.00	53.41	V	-51.1	1.40	10.60	-41.90	-20	21.90
4600.00	46.54	H	-57.5	1.50	10.50	-48.50	-20	28.50
4600.00	55.79	V	-47.8	1.50	10.50	-38.80	-20	18.80

Frequency (MHz)	Receiver Reading (dBm)	Polar (H/V)	Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
469.9875 MHz								
939.975	34.11	H	-31.2	1.33	0.0	-32.53	-20	12.53
939.975	42.68	V	-22.4	1.33	0.0	-23.73	-20	3.73
1409.96	66.52	H	-41.2	0.80	7.90	-34.10	-20	14.10
1409.96	66.68	V	-41.7	0.80	7.90	-34.60	-20	14.60
1879.95	72.31	H	-35.1	1.00	8.00	-28.10	-20	8.10
1879.95	65.49	V	-42.6	1.00	8.00	-35.60	-20	15.60
2349.94	63.78	H	-43.6	1.10	9.40	-35.30	-20	15.30
2349.94	62.39	V	-45.1	1.10	9.40	-36.80	-20	16.80
2819.93	68.08	H	-38.5	1.20	9.20	-30.50	-20	10.50
2819.93	67.62	V	-38.7	1.20	9.20	-30.70	-20	10.70
3289.91	66.15	H	-39.8	1.30	8.80	-32.30	-20	12.30
3289.91	66.61	V	-39.1	1.30	8.80	-31.60	-20	11.60
3759.90	72.37	H	-32.8	1.30	10.70	-23.40	-20	3.40
3759.90	68.35	V	-36.7	1.30	10.70	-27.30	-20	7.30
4229.89	65.73	H	-38.7	1.40	10.80	-29.30	-20	9.30
4229.89	61.72	V	-42.6	1.40	10.80	-33.20	-20	13.20
4699.88	63.86	H	-40.0	1.50	10.30	-31.20	-20	11.20
4699.88	60.99	V	-42.3	1.50	10.30	-33.50	-20	13.50

Frequency (MHz)	Receiver Reading (dBm)	Polar (H/V)	Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Model: Performa 400								
450.0125 MHz								
900.025	30.01	H	-35.3	1.33	0.0	-36.63	-20	16.63
900.025	36.25	V	-28.8	1.33	0.0	-30.13	-20	10.13
460 MHz								
920.00	28.94	H	-36.4	1.33	0.0	-37.73	-20	17.73
920.00	36.22	V	-28.9	1.33	0.0	-30.23	-20	10.23
469.9875MHz								
939.975	27.01	H	-38.3	1.33	0.0	-39.63	-20	19.63
939.975	36.24	V	-28.8	1.33	0.0	-30.13	-20	10.13

Note:
Absolute Level = Substituted Level + Antenna Gain – Cable Loss
Margin = Limit - Absolute Level

FCC §2.1055 & §90.213 - FREQUENCY STABILITY

Applicable Standard

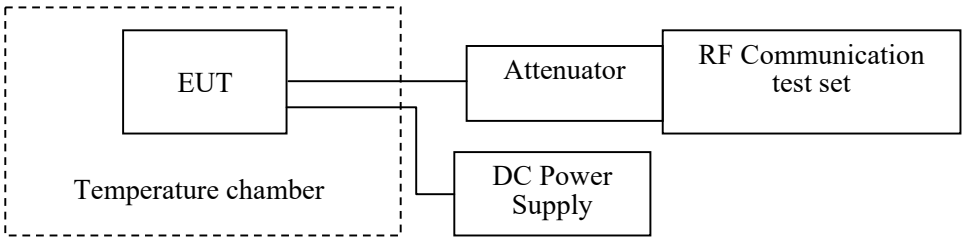
FCC §2.1055 and §90.213

Test Procedure

According to ANSI C63.26-2015 section 5.6

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

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



Test Data

Environmental Conditions

Temperature:	25.7 ℃
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Cheeb Huang on 2024-08-20.

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

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

Reference Frequency: 460MHz, Limit: 2.5ppm, 12.5kHz			
Environment Temperature (°C)	**Power Supplied (V_{DC})**	**Frequency Measure with Time Elapsed**	
		Reading (MHz)	**Result (ppm)**
-30	3.8	460.0002370	0.52
-20		460.0002070	0.45
-10		460.0002960	0.64
0		460.0002360	0.51
10		460.0003330	0.72
20		460.0002250	0.49
30		460.0002930	0.64
40		460.0003500	0.76
50		460.0002960	0.64
Frequency Stability Versus Input Voltage			
20	3.2	460.0003080	0.67
20	4.2	460.0002780	0.60

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

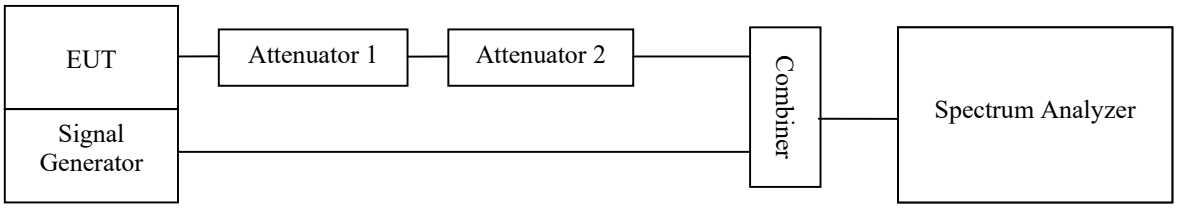
Applicable Standard

Regulations: FCC §90.214

Test method: ANSI C63.26-2015

Test Procedure

a) Connect the EUT and test equipment as shown on the following block diagram.
b) Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
c) Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at ±12.5 kHz deviation and set its output level to -100dBm.
d) Turn on the transmitter.
e) Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as P_0.
f) Turn off the transmitter.
g) Adjust the RF level of the signal generator to provide RF power equal to P_0. This signal generator RF level shall be maintained throughout the rest of the measurement.
h) Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
i) Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at ±4 divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "tiger offset" to -10ms for turn on and -15ms for turn off.
j) Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be t_{on}. The trace should be maintained within the allowed divisions during the period t_1 and t_2.
k) Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period t_3.



Test Data

Environmental Conditions

Temperature:	25.7 °C
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Cheeb Huang on 2024-08-20.

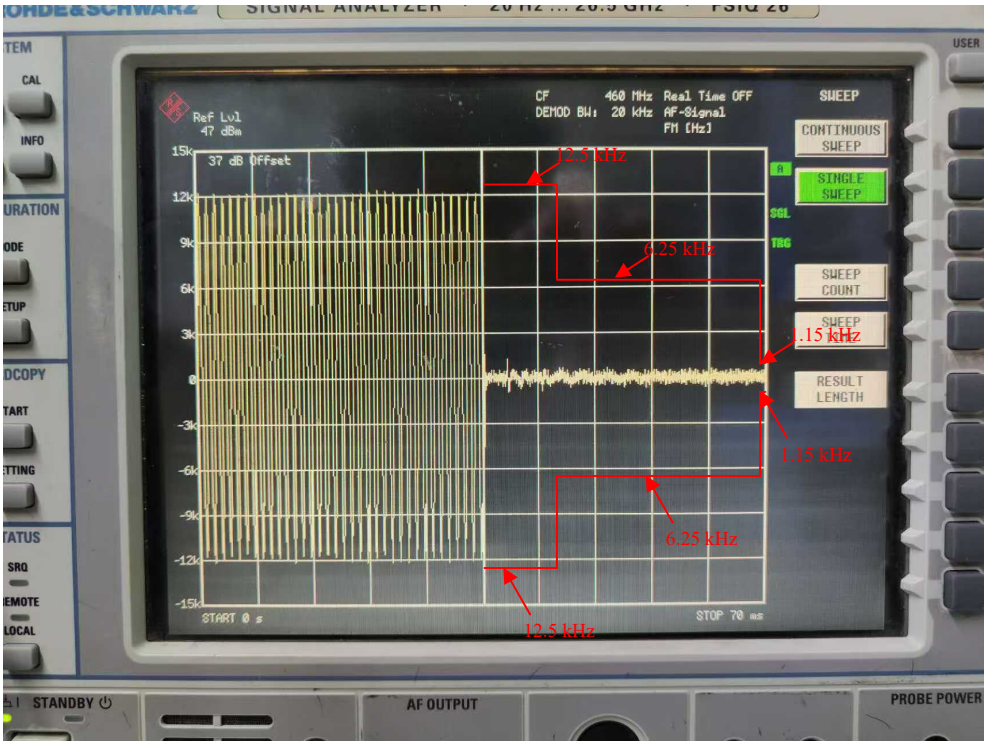
***Test Result: Pass**. Please refer to the following tables and plots.*

Channel Separation (kHz)	Transient Period (ms)	Transient Frequency	Result
12.5	10(t1)	±12.5kHz	Pass
	25(t2)	±6.25kHz	Pass
	10(t3)	±12.5kHz	Pass

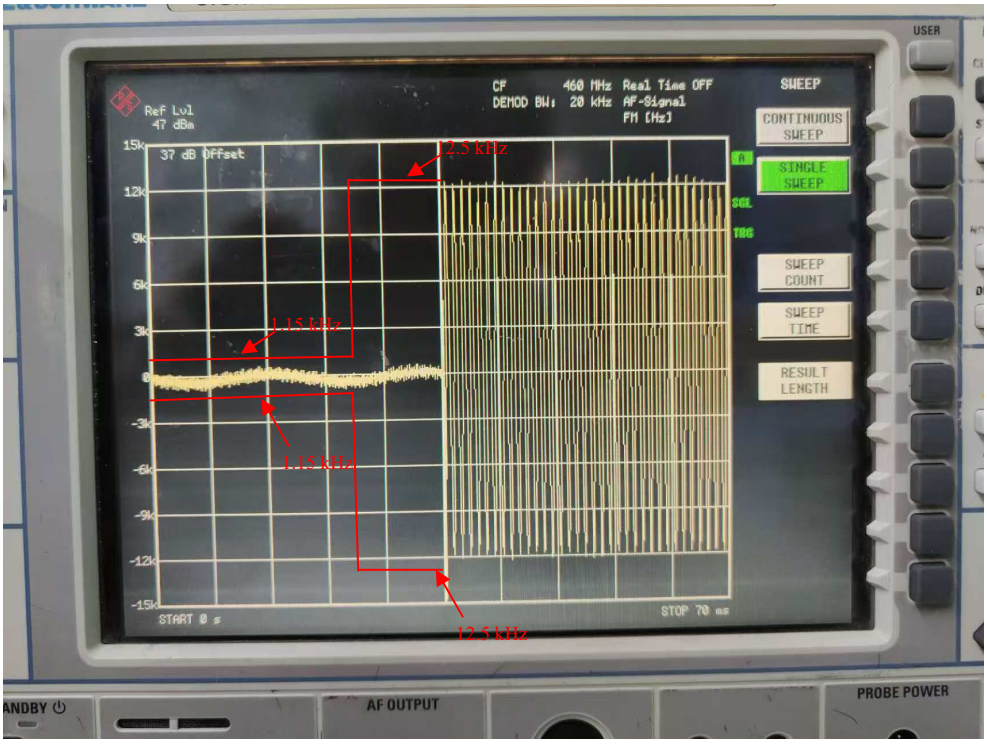
Note: During the time from the end of t_2 to the beginning of t_3, the frequency difference not exceed the limits specified in §90.213

For 460MHz 12.5 kHz mode, the limit is 460MHz*2.5ppm=1.15kHz

Turn on



Turn off


USER
CF 460 MHz Real Time OFF
DEMOD BW: 20 kHz AF-Signal
FM [Hz]
SWEEP
Ref Lvl
47 dBm
37 dB Offset
12.5 kHz
1.15 kHz
1.15 kHz
12.5 kHz
START 0 s
STOP 70 ms
CONTINUOUS SWEEP
SINGLE SWEEP
SWEEP COUNT
SWEEP TIME
RESULT LENGTH
AF OUTPUT
PROBE POWER

EUT PHOTOGRAPHS

Please refer to the attachment 2401V59584E-RF External photo and 2401V59584E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2401V59584E-RF Test Setup photo.

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