TEST REPORT

Applicant Name:	RCA Communications Systems
Address:	555 W. Victoria Street, Compton, California, United States 90220
Report Number:	2501R47293E-RF-00
FCC ID:	XYH-RDR8000V

Test Standard (s)

FCC PART 90

Sample Description

Product Type:	Professional Digital Two-Way Radio Repeater
Model No.:	RDR8000V
Multiple Model(s) No.:	N/A
Trade Mark:	N/A
Date Received:	2025/03/13
Issue Date:	2025/07/14

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	2501R47293E-RF-00	Original Report	2025/07/14

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Professional Digital Two-Way Radio Repeater
Tested Model	RDR8000V
Multiple Model(s)	N/A
Frequency Range	136-174MHz
Rated Transmit Power	50Watts/30Watts/10Watts/5Watts
Channel separation	12.5kHz
Modulation Technique	FM, 4FSK
Antenna Specification[#]	0dBi (provided by the applicant)
Voltage Range	AC 100-240V
Sample serial number	2ZHI-1 (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	N/A

Objective

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

Test Methodology

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

Part 90 – Private Land Mobile Radio Service

Applicable Standards: ANSI C63.26-2015.

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

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		109.2kHz(k=2, 95% level of confidence)
RF Frequency		56.6Hz(k=2, 95% level of confidence)
RF output power, conducted		0.86dB(k=2, 95% level of confidence)
Unwanted Emission, conducted		1.60dB(k=2, 95% level of confidence)
Audio Frequency Response		0.1dB
Low Pass Filter Response		1.2dB
Modulation Limiting		1%
Radiated Emissions	30MHz~200MHz (Horizontal)	5.32dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	5.43dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	5.77dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.73dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.34dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.40dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.64dB(k=2, 95% level of confidence)
Temperature		±1℃
Humidity		±1%
Supply voltages		±0.4%

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

Test Facility

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

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

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	136.0125
	155.0125
	173.9875
4FSK, 12.5kHz	136.0125
	155.0125
	173.9875

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

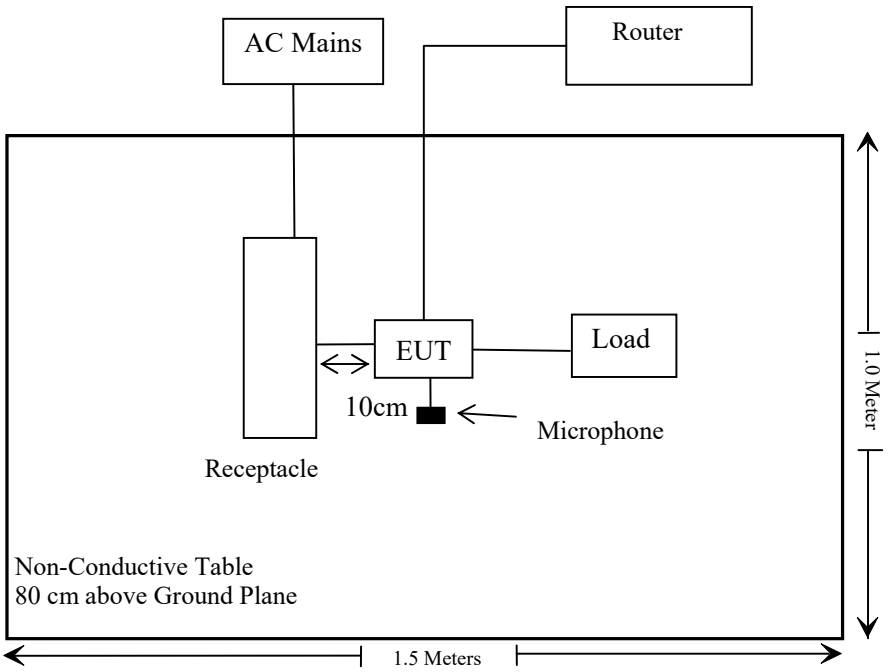
Manufacturer	Description	Model	Serial Number
Unknown	Load	Unknown	Unknown
OUPU	Receptacle	PDU-OP1606K	6971041358020
TP-Link	Router	RE705X	Unknown
Lisheng	Microphone	BF-59	Unknown

External I/O Cable

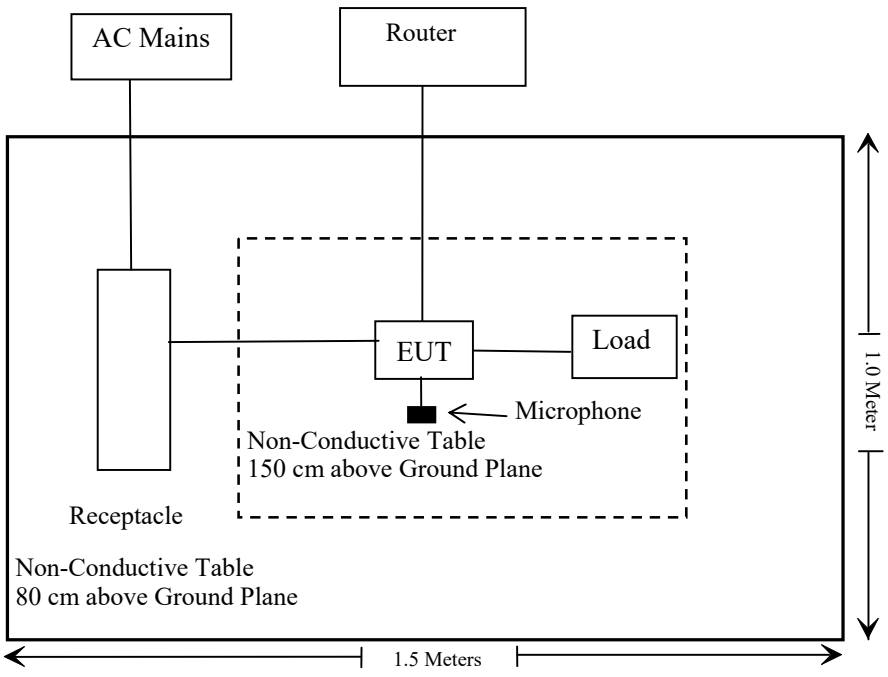
Cable Description	Length (m)	From Port	To
Unshielded Detachable AC Cable	1.5	AC mains	Receptacle
Unshielded Detachable AC Cable	1.5	EUT	Receptacle
Unshielded Detachable RJ45 Cable	2.0	EUT	Router

Block Diagram of Test Setup

Below 1GHz



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; §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	2024/12/04	2025/12/03
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
Unknown	Cable	2Y194	0735	2024/12/04	2025/12/03
Unknown	Cable	PNG214	1354	2024/12/04	2025/12/03
Agilent	Signal Generator	N5183A	MY50140588	2024/09/13	2025/09/12
COM-POWER	Dipole Antenna	3121C	9209-860	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2025/03/26	2026/03/25
A.H.System	Preamplifier	PAM-0118P	489	2024/11/15	2025/11/14
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	2024/12/06	2025/12/05
Unknown	RF Cable	UFA147	219661	2024/12/06	2025/12/05
Unknown	RF Cable	XH750A-N	J-10M	2024/12/06	2025/12/05
JD	Filter Switch Unit	DT7220FSU	DS79906	2024/09/09	2025/09/08
JD	Multiplex Switch Test Control Set	DT7220SCU	DS79903	2024/09/09	2025/09/08
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200982	2024/09/20	2025/09/19
BACL	Temperature & Humidity Chamber	BTH-150-40	30144	2024/12/06	2025/12/05
HP	RF Communication test set	8920B	US36141849	2024/12/04	2025/12/03
Fluke	Digital Multimeter	287	19000011	2025/04/29	2026/04/28
HELLVIAO	Contact voltage regulator	TDGC2-5KVA	Unknown	NCR	NCR
JFW	30dB Attenuator	50FH-030-100 RF	F-03-EM032	2024/06/27	2025/06/26
Unknown	Power Splitter	PD2	2000-600	2024/06/27	2025/06/26
Micro-Tronics	RF Cable	8082135	W1113	2024/06/27	2025/06/26
Rohde & Schwarz	Signal Analyzer	FSIQ26	837405/023	2024/12/04	2025/12/03
Rohde & Schwarz	Audio Analyzer	UPV	101782	2024/12/04	2025/12/03

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

Applicable Standard

According to 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.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
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
300-1,500			f/300	<6
1,500-100,000			5	<6

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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

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

S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator,the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain# (dBi)	Max Tune-up Power# (dBm)	Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
136-174	0	47.7	80	0.733	1.0

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 80cm from nearby persons.

Result: Compliant

FCC §2.1046 & §90.205 - RF OUTPUT POWER

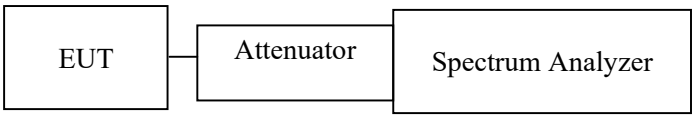
Applicable Standard

FCC §2.1046 and §90.205

Test Procedure

According to ANSI C63.26-2015 section 5.2.3.3

Conducted RF Output Power:



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

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

R B/W	Video B/W
100 kHz	300 kHz

Test Data

Environmental Conditions

Temperature:	25~26 ℃
Relative Humidity:	50~52 %
ATM Pressure:	101~102 kPa

The testing was performed by Cheeb Huang from 2025-03-31 to 2025-05-26

Test Mode: Transmitting

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

Rated Output Power: 50Watts

Modulation Mode	Channel Separation	f_c MHz	Reading (dBm)	Limit (dBm)
FM	12.5kHz	136.0125	47.39	47.78
		155.0125	47.31	47.78
		173.9875	47.43	47.78
4FSK	12.5kHz	136.0125	47.62	47.78
		155.0125	47.53	47.78
		173.9875	47.68	47.78

Rated Output Power: 30Watts

Modulation Mode	Channel Separation	f_c MHz	Reading (dBm)	Limit (dBm)
FM	12.5kHz	136.0125	45.26	45.56
		155.0125	45.06	45.56
		173.9875	45.13	45.56
4FSK	12.5kHz	136.0125	45.26	45.56
		155.0125	45.06	45.56
		173.9875	45.12	45.56

Rated Output Power: 10Watts

Modulation Mode	Channel Separation	f_c MHz	Reading (dBm)	Limit (dBm)
FM	12.5kHz	136.0125	40.28	40.79
		155.0125	40.10	40.79
		173.9875	40.19	40.79
4FSK	12.5kHz	136.0125	40.30	40.79
		155.0125	40.10	40.79
		173.9875	40.20	40.79

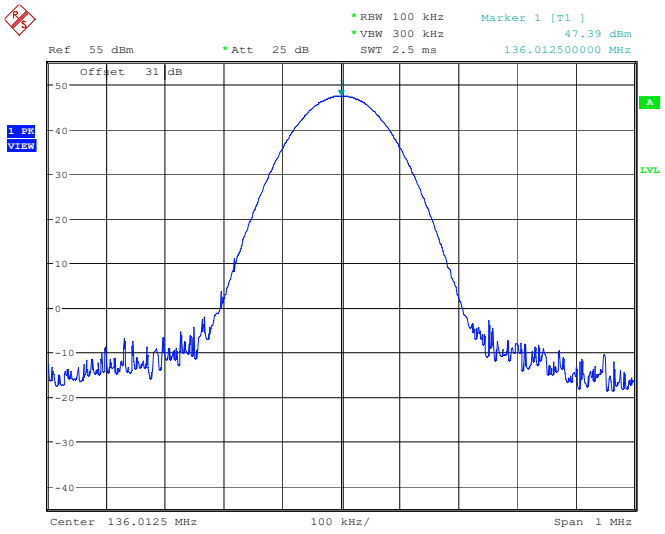
Rated Output Power: 5Watts

Modulation Mode	Channel Separation	f_c MHz	Reading (dBm)	Limit (dBm)
FM	12.5kHz	136.0125	36.99	37.78
		155.0125	36.82	37.78
		173.9875	36.92	37.78
4FSK	12.5kHz	136.0125	37.00	37.78
		155.0125	36.82	37.78
		173.9875	36.92	37.78

Note: The output power shall not exceed by more than 20 percent the manufacturer's rated output power for the particular transmitter specifically listed on the authorization

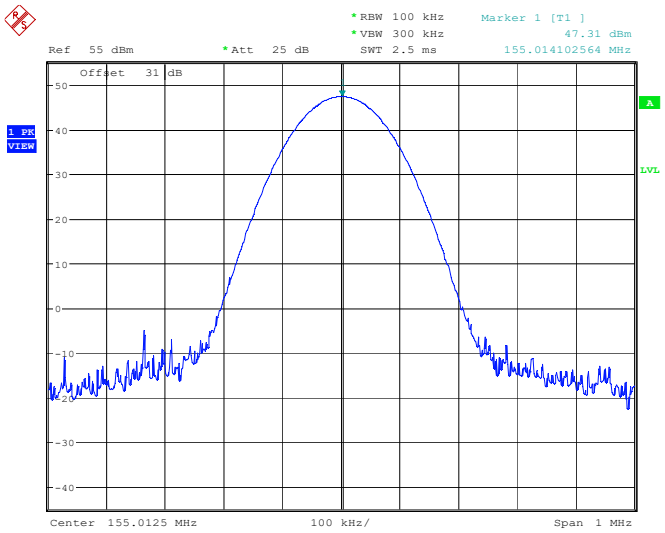
Analog, 12.5 kHz
50Watts:

Frequency 136.0125MHz



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 9.APR.2025 16:52:38

Frequency 155.0125MHz



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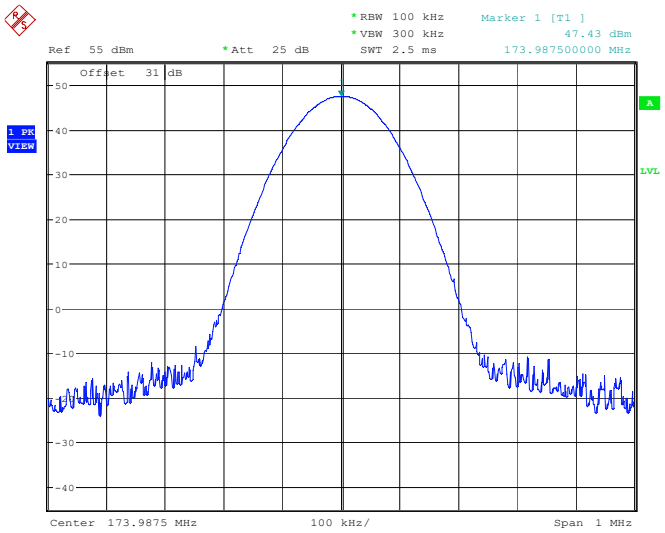
Frequency 173.9875MHz



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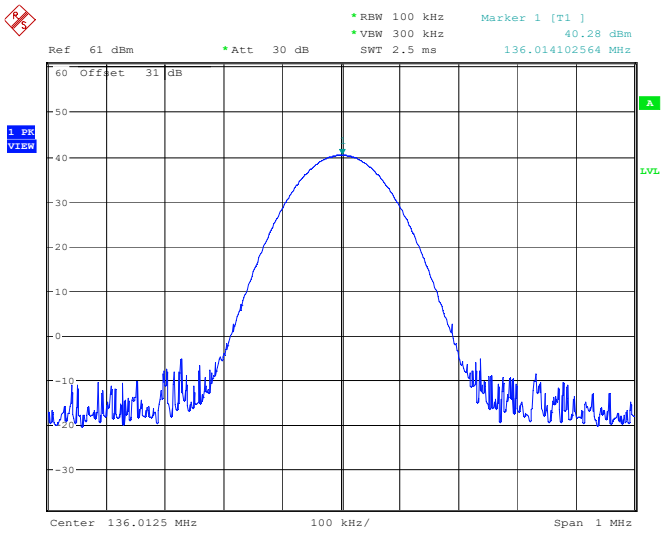
10Watts:

Frequency 136.0125MHz



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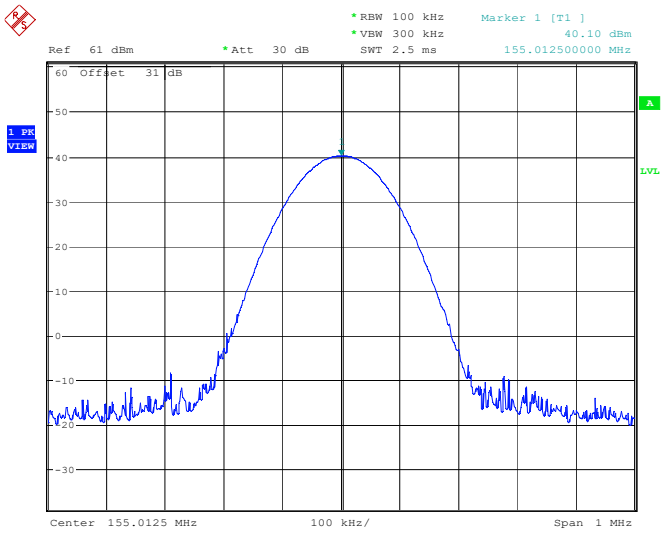
Frequency 155.0125MHz



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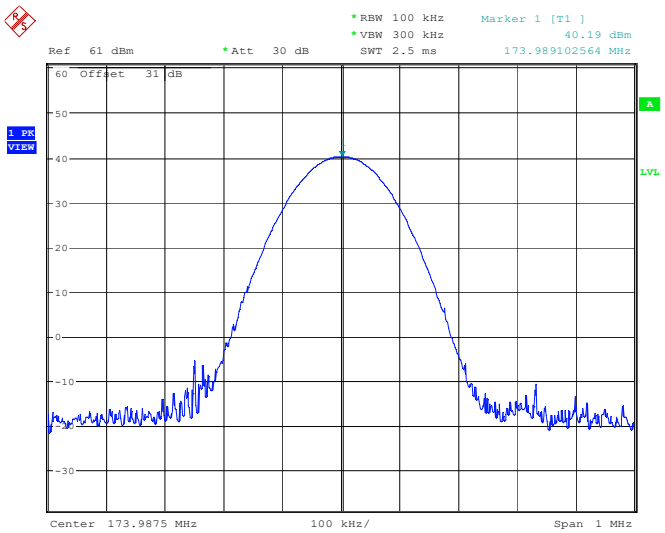
Frequency 173.9875MHz



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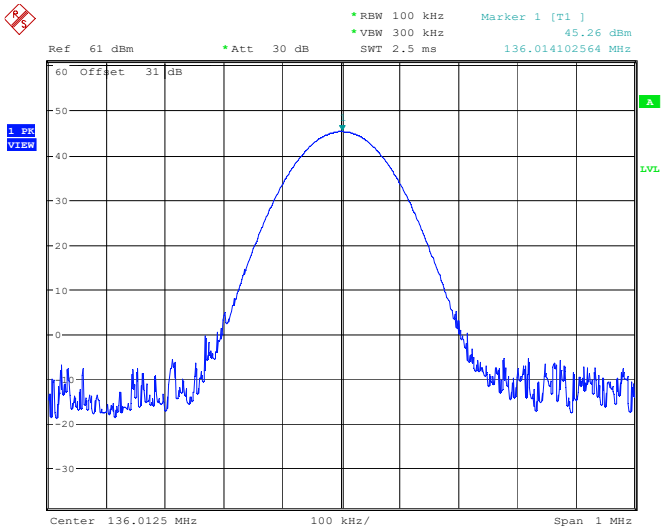
30Watts:

Frequency 136.0125MHz



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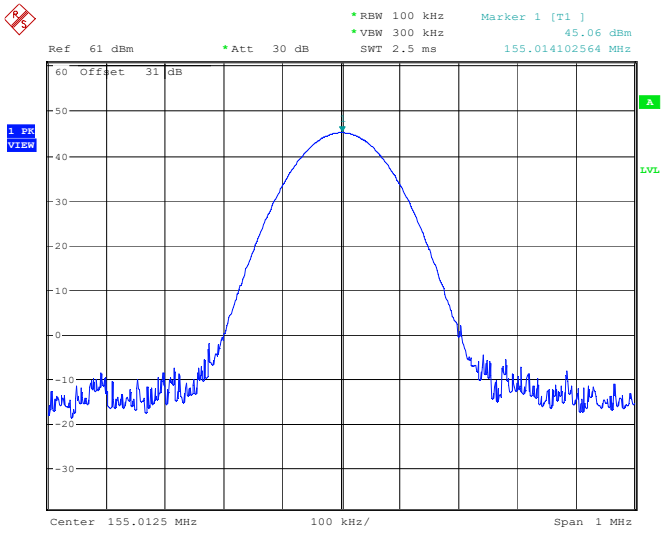
Frequency 155.0125MHz



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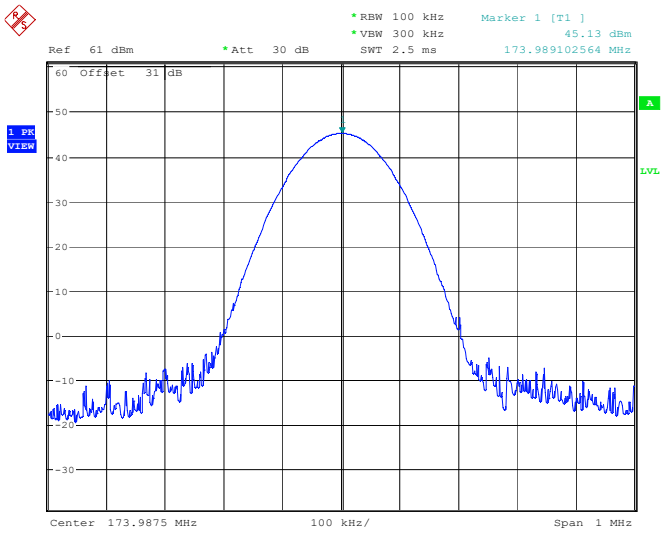
Frequency 173.9875MHz



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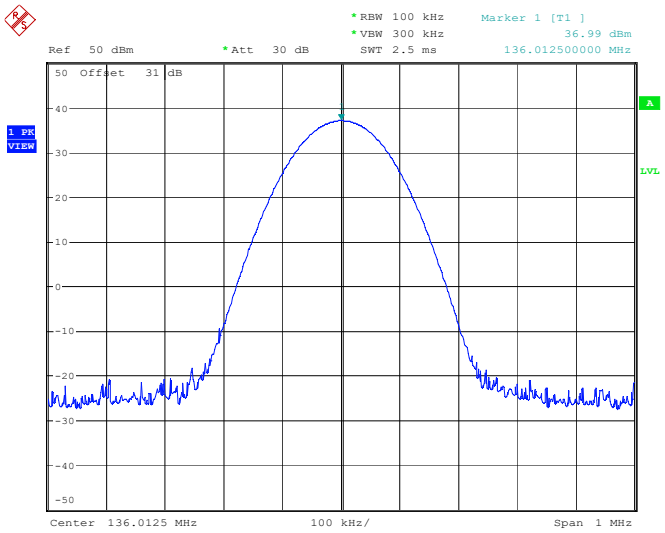
Date: 26.MAY.2025 18:55:28

5Watts:

Frequency 136.0125MHz



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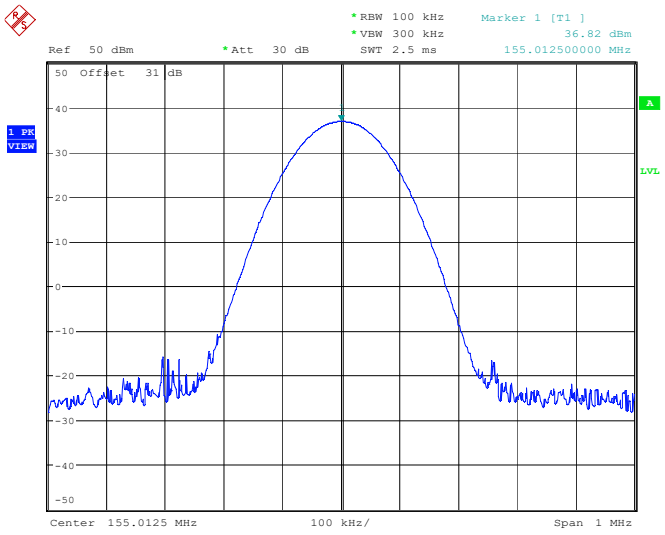
Frequency 155.0125MHz



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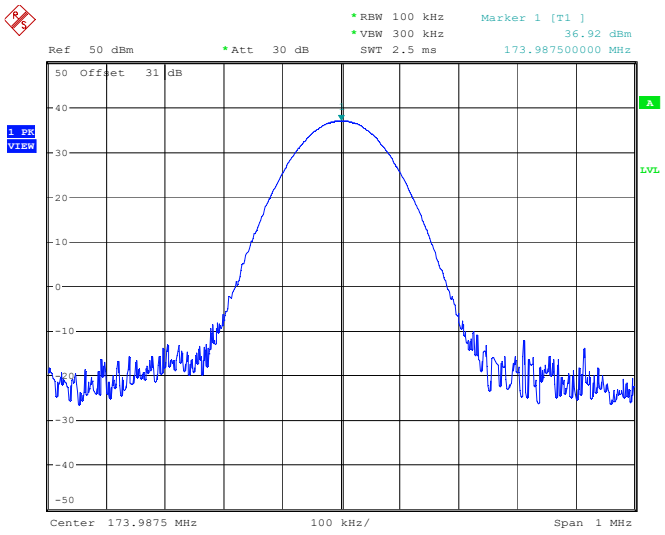
Frequency 173.9875MHz



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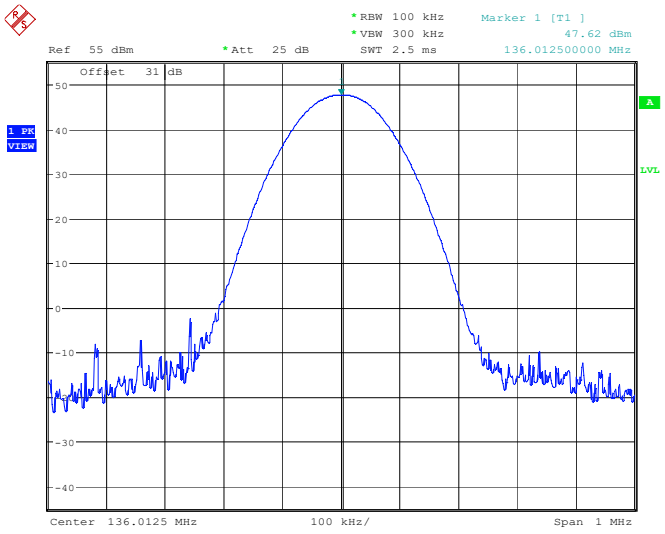
Digital, 12.5 kHz
50Watts:

Frequency 136.0125MHz



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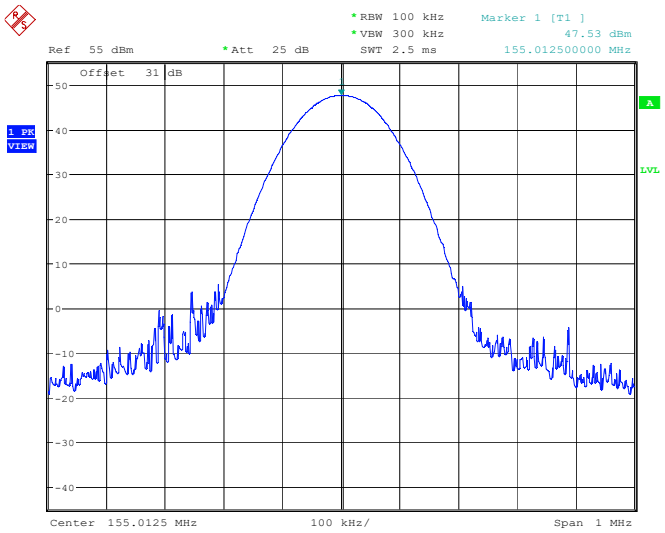
Frequency 155.0125MHz



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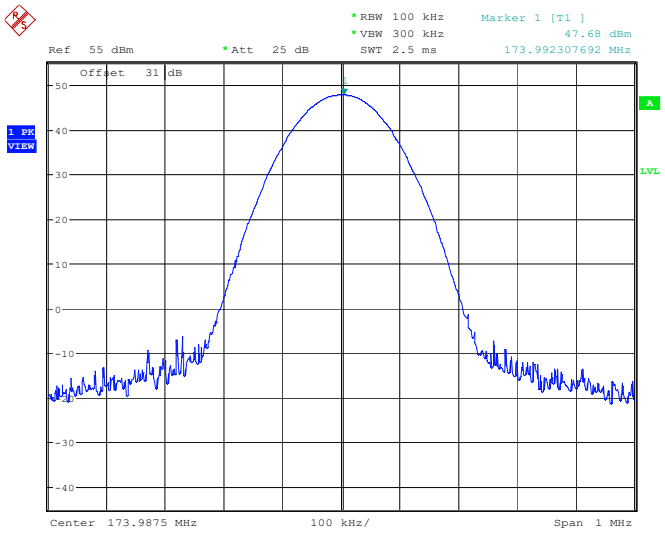
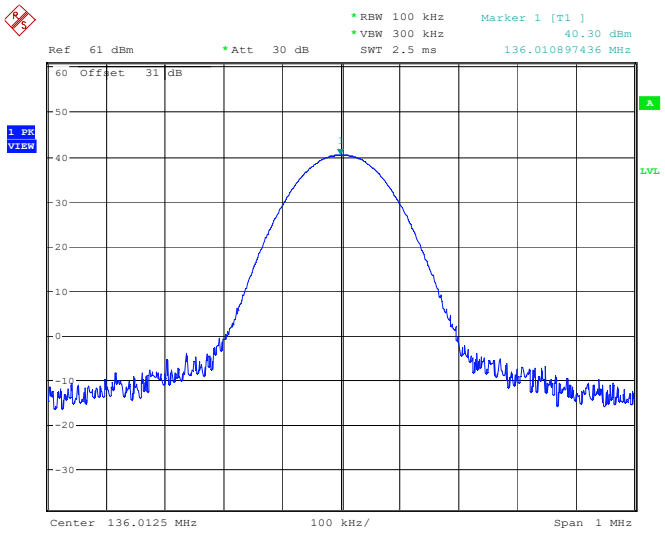
Frequency 173.9875MHz



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 9.APR.2025 16:51:30

10Watts:

Frequency 136.0125MHz



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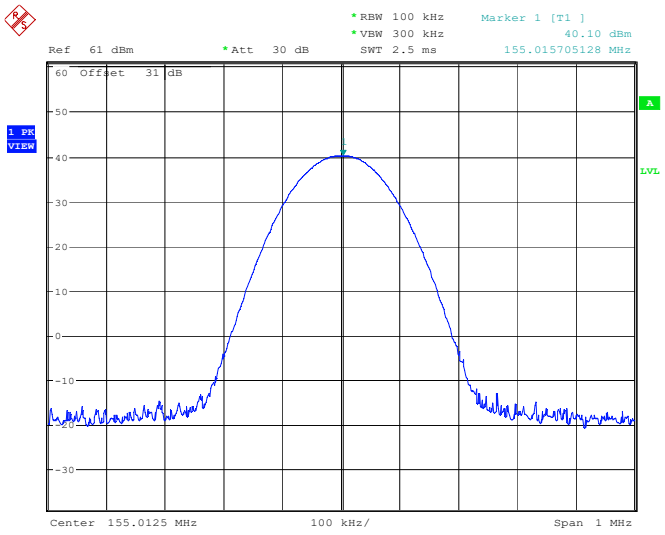
Frequency 155.0125MHz



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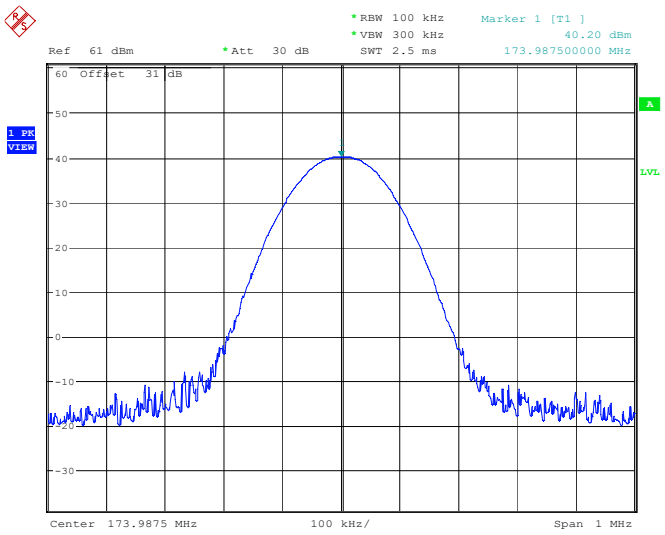
Frequency 173.9875MHz



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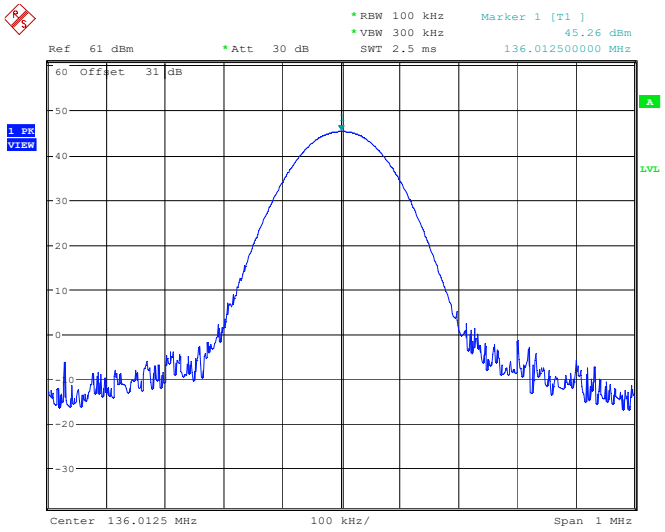
30Watts:

Frequency 136.0125MHz



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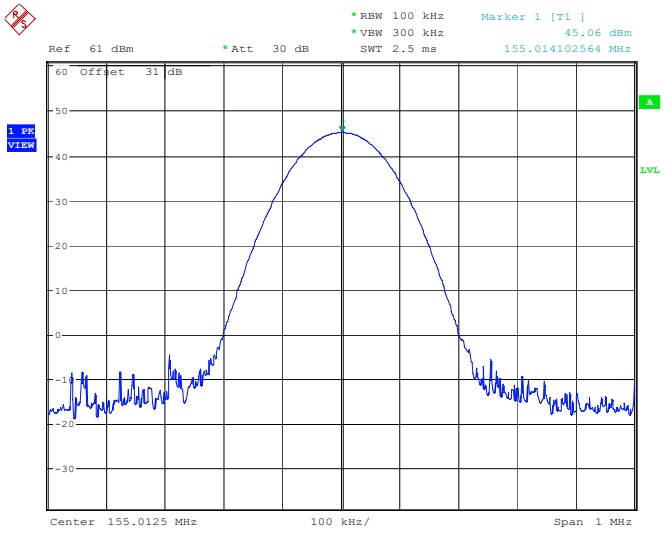

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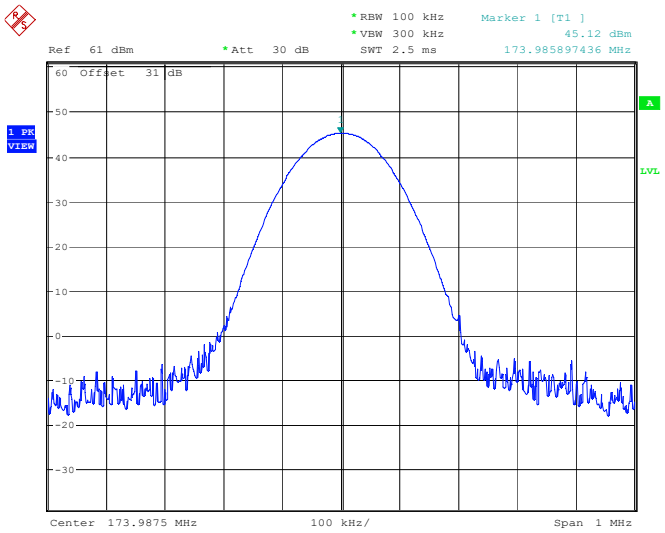
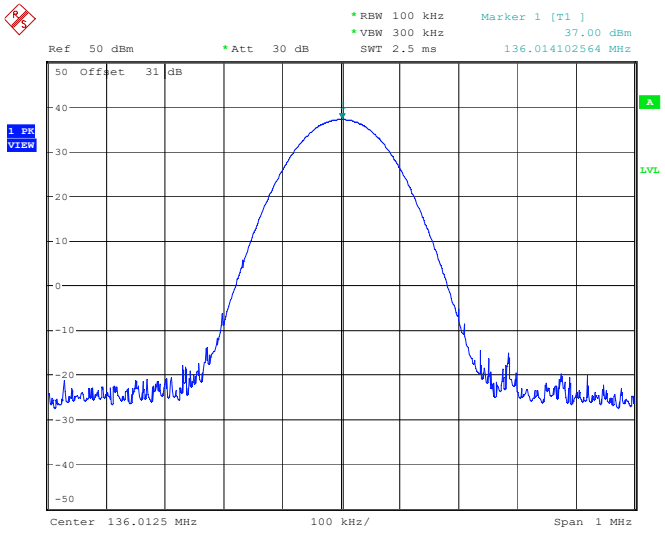
Frequency 173.9875MHz



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 26.MAY.2025 18:55:52

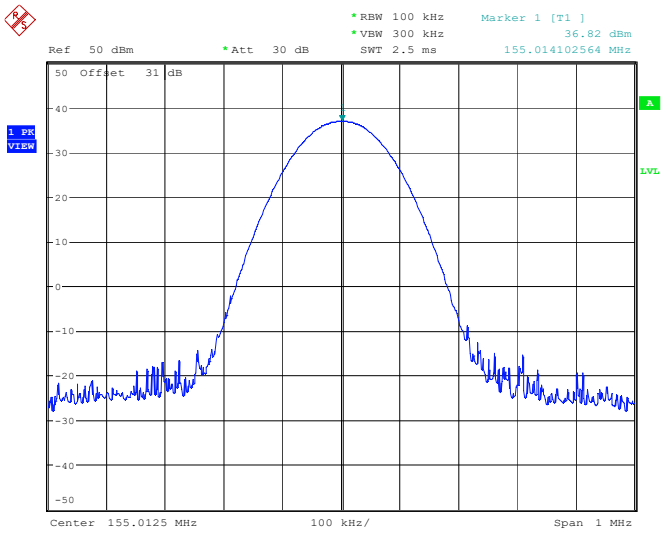
5Watts:

Frequency 136.0125MHz



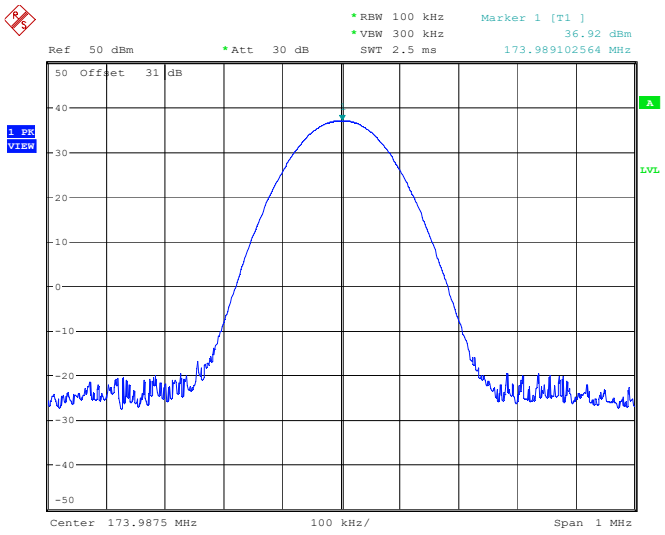
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 17:44:44

Frequency 155.0125MHz



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 17:46:22

Frequency 173.9875MHz



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 17:46:53

FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC

Applicable Standard

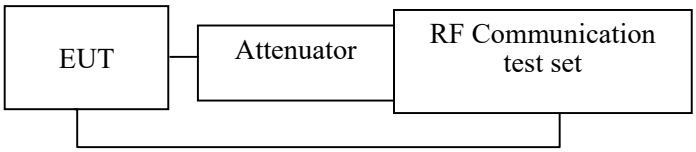
FCC§2.1047 and §90.207:

(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.

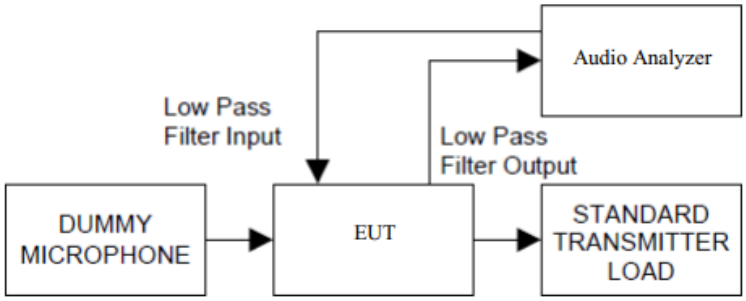
Test Procedure

Test Method: ANSI C63.26-2015 section 5.3

For modulation limiting and audio frequency response:



For Audio Low Pass Filter Response:



Test Data

Environmental Conditions

Temperature:	25~26 °C
Relative Humidity:	50~52 %
ATM Pressure:	101~102 kPa

The testing was performed by Cheeb Huang from 2025-03-31 to 2025-04-12.

Test Mode: Transmitting

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

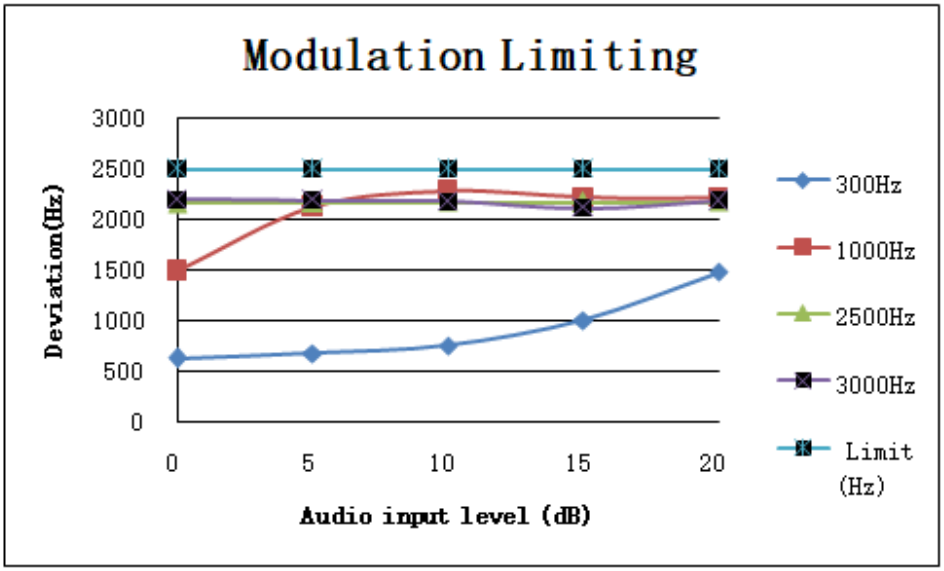
Analog Modulation:

MODULATION LIMITING

Carrier Frequency: 155.0125MHz, Separation: 12.5 kHz

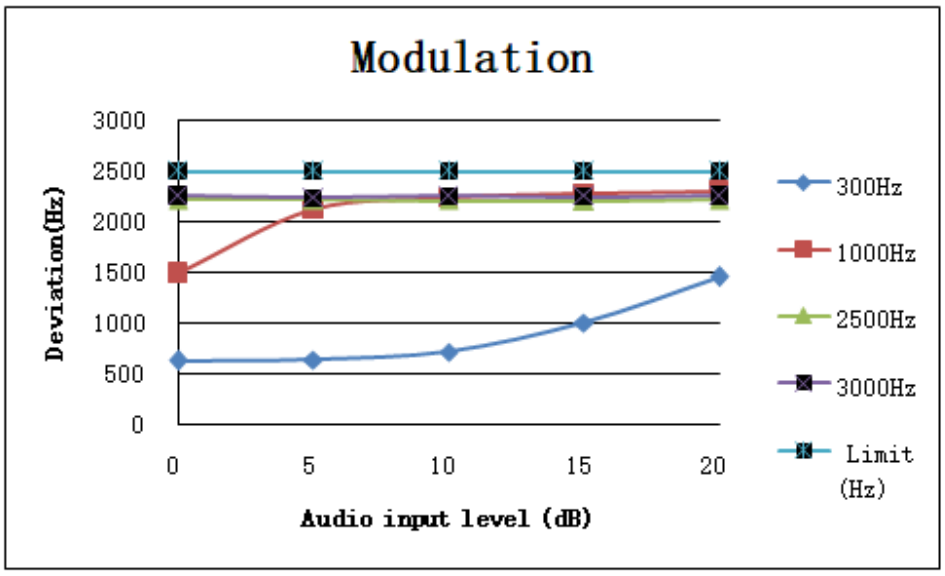
Peak+ deviation

Audio input level (dB)	Deviation (Hz)				Limit (Hz)
	300Hz	1000Hz	2500Hz	3000Hz	
20	1483	2213	2175	2191	2500
15	1014	2218	2168	2117	2500
10	756	2287	2175	2178	2500
5	681	2128	2168	2192	2500
0	635	1500	2163	2195	2500



Peak- deviation

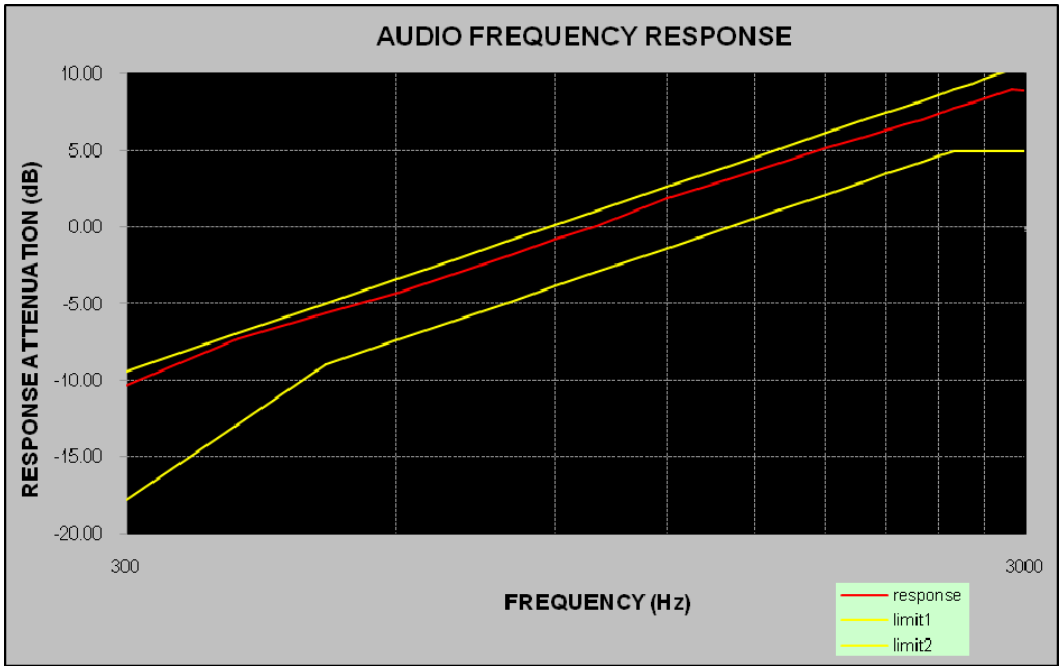
Audio input level (dB)	Deviation (Hz)				Limit (Hz)
	300Hz	1000Hz	2500Hz	3000Hz	
20	1457	2306	2217	2259	2500
15	1012	2278	2208	2251	2500
10	725	2241	2213	2258	2500
5	643	2126	2217	2237	2500
0	631	1500	2216	2261	2500



Audio Frequency Response

Carrier Frequency: 155.0125MHz, Separation: 12.5 kHz

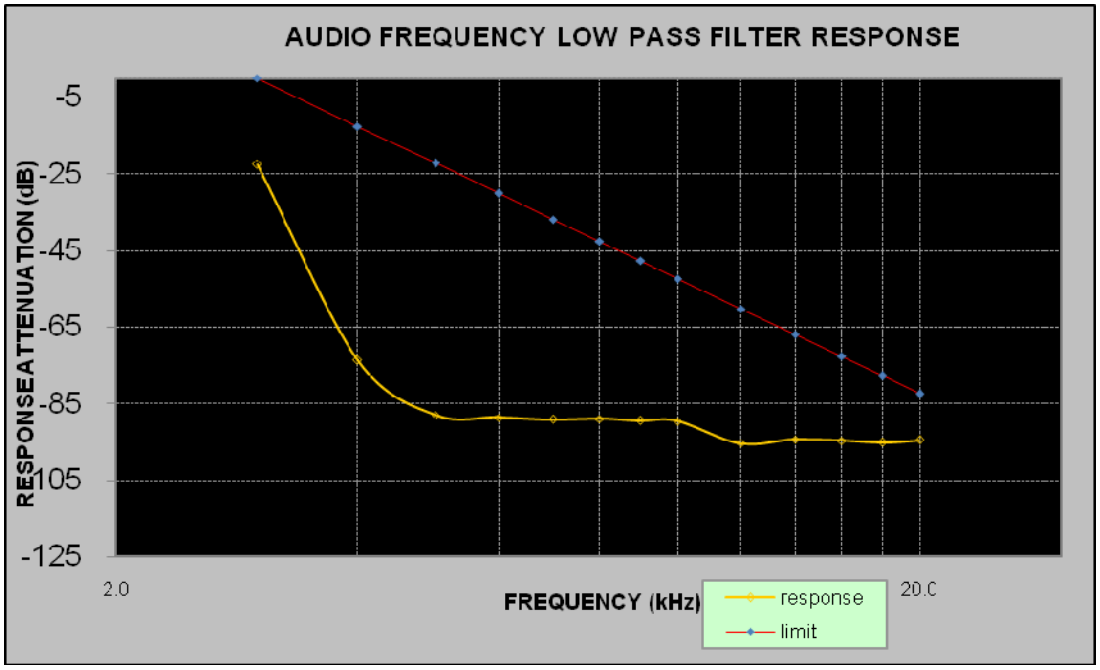
Audio Frequency (Hz)	Response Attenuation (dB)
300	-10.34
400	-7.29
500	-5.65
600	-4.35
700	-3.05
800	-1.87
900	-0.84
1000	0.00
1200	1.84
1400	3.03
1600	4.11
1800	5.11
2000	5.86
2100	6.24
2200	6.64
2300	7.00
2400	7.37
2500	7.70
2600	8.02
2700	8.34
2800	8.64
2900	8.92
3000	8.89


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
limit1
limit2

Audio frequency lows pass filter response

Carrier Frequency: 155.0125MHz, Separation: 12.5 kHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-22.5	0.0
4.0	-73.7	-12.5
5.0	-88.1	-22.2
6.0	-88.6	-30.1
7.0	-89.2	-36.8
8.0	-88.9	-42.6
9.0	-89.5	-47.7
10.0	-89.6	-52.3
12.0	-95.4	-60.2
14.0	-94.3	-66.9
16.0	-94.7	-72.7
18.0	-95.2	-77.8
20.0	-94.5	-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.

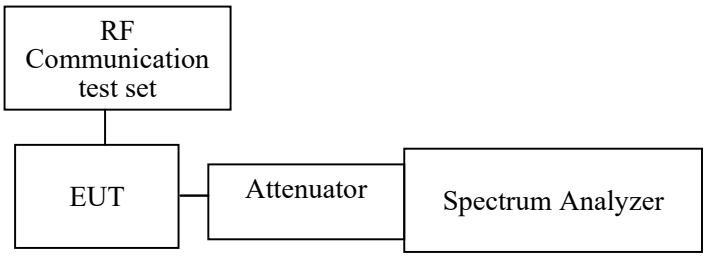
2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 (f_d –2.88 kHz) dB.

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

Analog mode:



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

a) Connect the equipment as illustrated.

b) Adjust the spectrum analyzer for the following settings:
1) Resolution Bandwidth: 100Hz for 12.5Hz Channel spacing, 200Hz for 25Hz Channel spacing .
2) Video Bandwidth at least 10 times the resolution bandwidth.
3) Sweep Speed slow enough to maintain measurement calibration.
4) Detector Mode = Positive Peak.
5) Span that will allow proper viewing of the test bandwidth.

c) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency. Key the transmitter, and set the level of the unmodulated carrier to a full scale reference line. This is the 0 dB reference for the measurement.

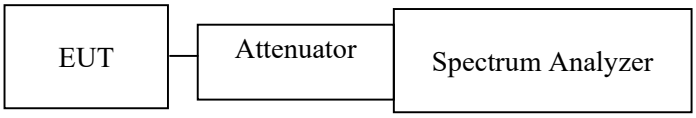
d) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the audio modulating circuit. Transmitters employing digital modulation techniques that bypass the limiter and the audio low-pass filter shall be modulated as specified by the manufacturer.

e) Path loss for the measurement included.

f) Measured the 26dB bandwidth, and use the spectrum analyzer Occupied bandwidth function to measurement the 99% Occupied bandwidth, save the plot

g) Record the resulting spectrum analyzer presentation of the emission level with an on-line recording device or in a photograph. It is recommended that the emission limit be drawn on the plotted graph or photograph. The spectrum analyzer presentation is the sideband spectrum

Digital mode:



a) Program and set radio to operate in desire test frequency and digital mode with modulation.

b) Connect the equipment as illustrated.

c) Adjust the spectrum analyzer for the following settings:
1) Resolution Bandwidth: 100Hz.
2) Video Bandwidth at least 10 times the resolution bandwidth.
3) Sweep Speed slow enough to maintain measurement calibration.
4) Detector Mode = Positive Peak.
5) Span that will allow proper viewing of the test bandwidth.

d) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency. Key the transmitter, and set the level of the unmodulated carrier to a full scale reference line. This is the 0 dB reference for the measurement.

e) Path loss for the measurement included in plot

f) Measured the 26dB bandwidth, and use the spectrum analyzer Occupied bandwidth function to measurement the 99% Occupied bandwidth, save the plot

g) Record the resulting spectrum analyzer presentation of the emission level with an on-line recording device or in a photograph. It is recommended that the emission limit be drawn on the plotted graph or photograph. The spectrum analyzer presentation is the sideband spectrum

Test Data

Environmental Conditions

Temperature:	25~26 ℃
Relative Humidity:	50~52 %
ATM Pressure:	101~102 kPa

The testing was performed by Cheeb Huang from 2025-03-31 to 2025-04-12.

Test mode: Transmitting

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

Modulation Mode	Channel Separation	f_c	High Power Level	Low Power Level
			99% Occupied Bandwidth	99% Occupied Bandwidth
		MHz	kHz	kHz
Analog (FM)	12.5kHz	136.0125	9.936	9.936
		155.0125	9.936	9.936
		173.9875	9.936	9.936
Digital (4FSK)	12.5kHz	136.0125	7.853	7.772
		155.0125	7.772	8.013
		173.9875	7.772	7.612

Note 1:
Emission bandwidth was based on calculation method instead of measurement.
Emission Designator: Per CFR 47 §2.201& §2.202, BW = 2M + 2D

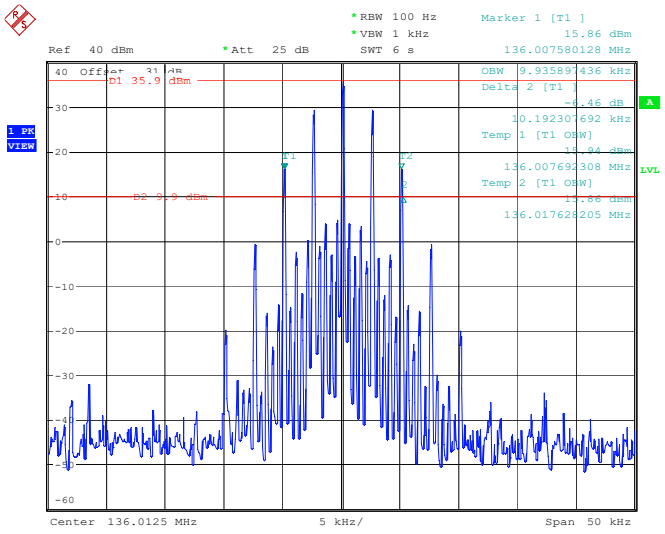
For FM Mode (Channel Spacing: 12.5 kHz)
Emission Designator: 11K0F3E
In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.
BW = 2(M+D) = 2(3.0 kHz + 2.5 kHz) = 11 kHz = 11K0*
F3E portion of the designator represents an FM voice transmission
Therefore, the entire designator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

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.

Note 2: High power level is 50Watts, Low power level is 5Watts.

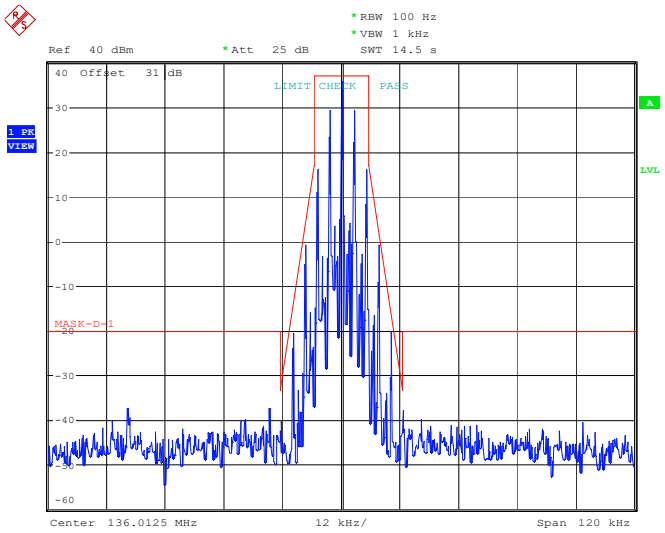
Analog
12.5 kHz

Frequency 136.0125 MHz: 99% Occupied Bandwidth, Low Power



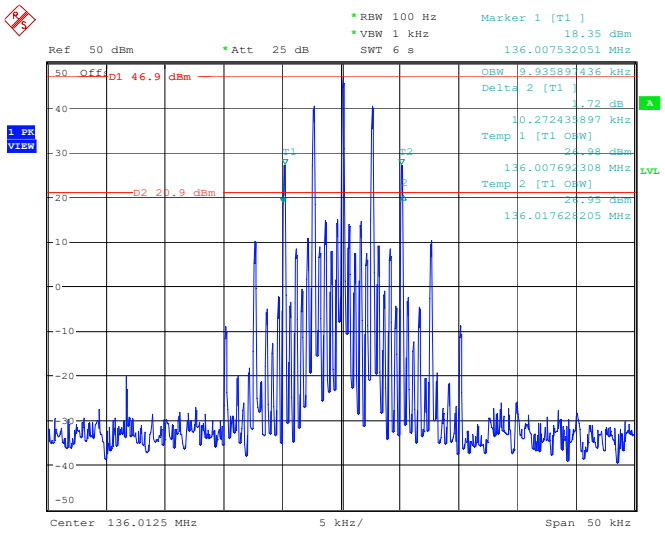
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 17:07:29

Frequency 136.0125 MHz: Emission Mask D, Low Power



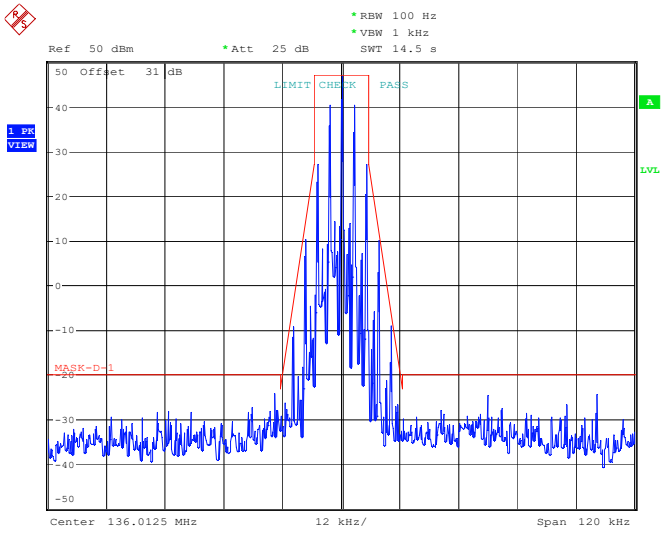
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 16:55:33

Frequency 136.0125 MHz: 99% Occupied Bandwidth, High Power



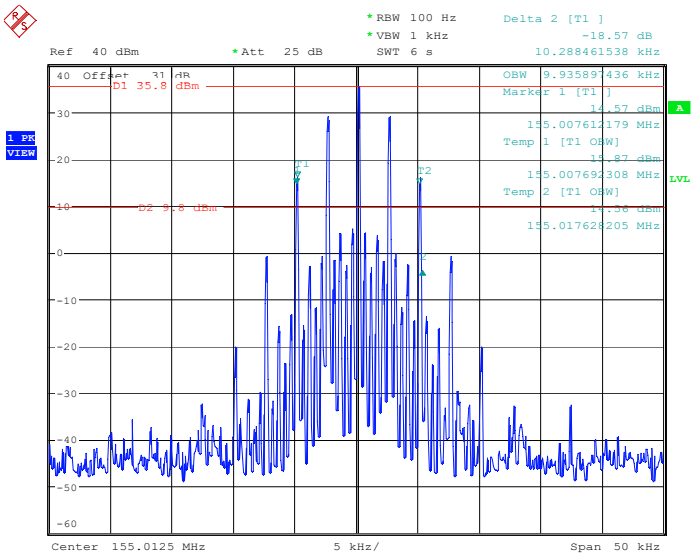
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 17:24:18

Frequency 136.0125 MHz: Emission Mask D, High Power



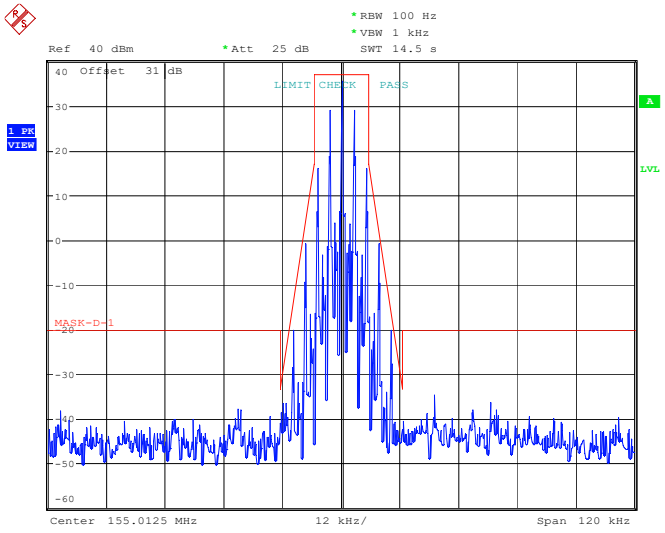
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 17:36:44

Frequency 155.0125 MHz: 99% Occupied Bandwidth, Low Power



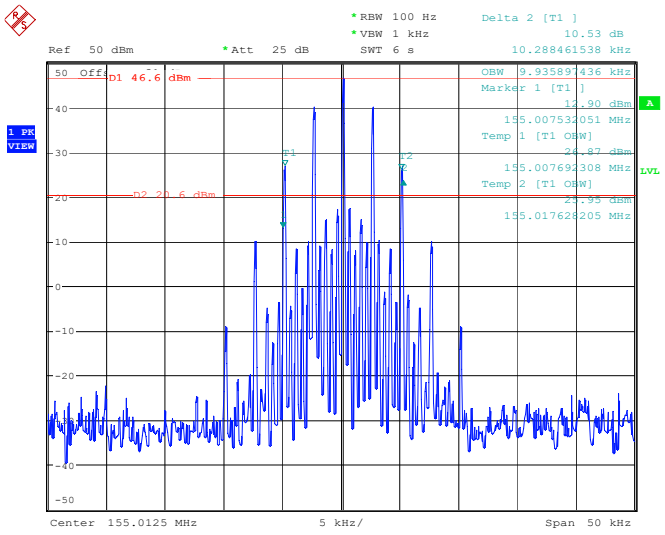
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 17:05:55

Frequency 155.0125 MHz: Emission Mask D, Low Power



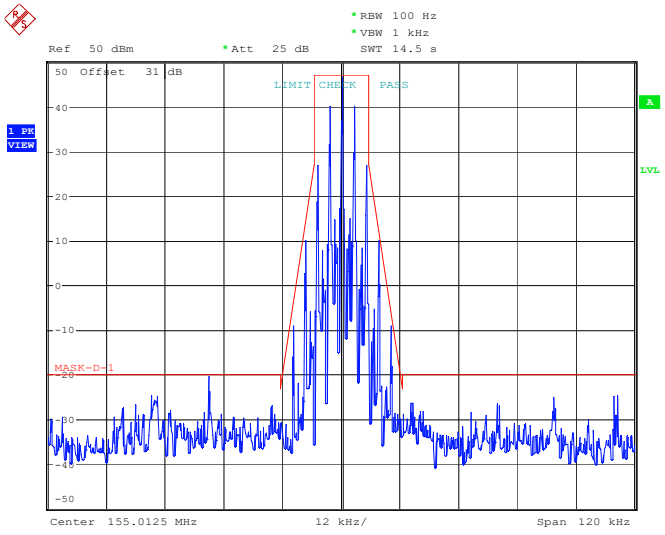
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 16:54:20

Frequency 155.0125MHz: 99% Occupied Bandwidth, High Power



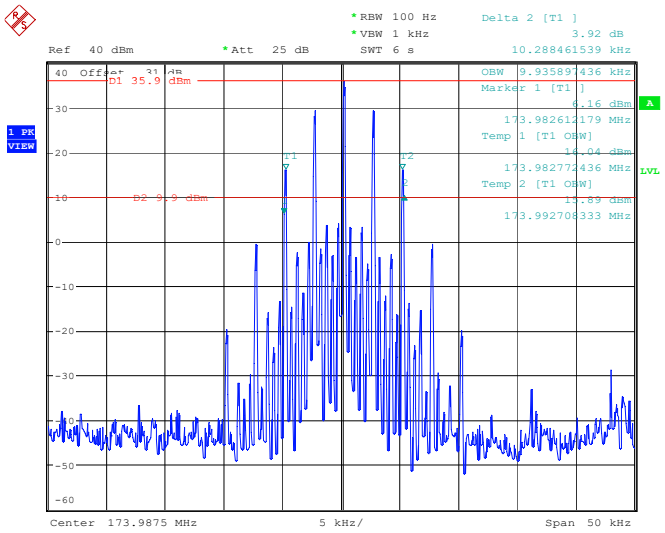
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 17:26:32

Frequency 155.0125 MHz: Emission Mask D, High Power



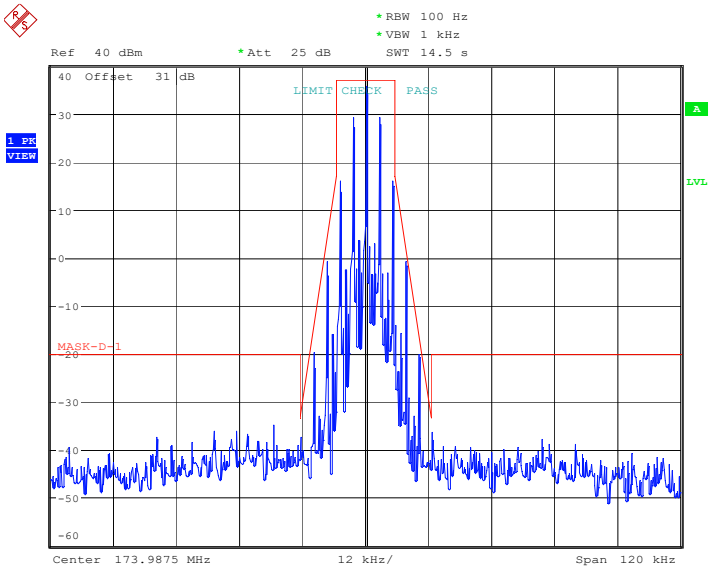
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 17:35:42

Frequency 173.9875 MHz: 99% Occupied Bandwidth, Low Power



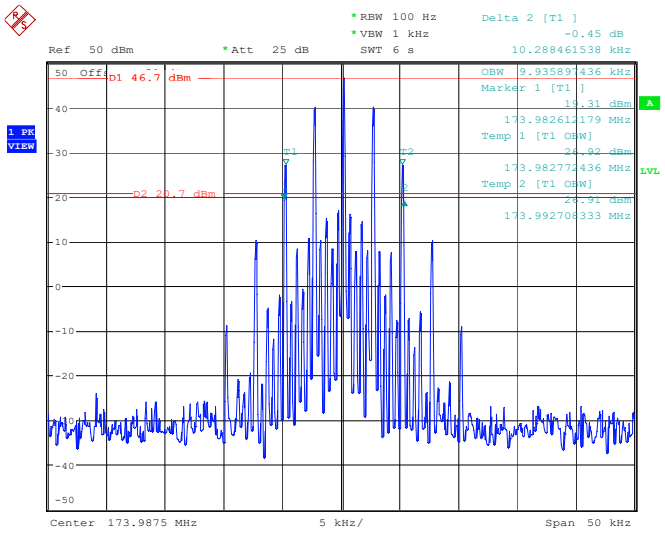
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 17:03:34

Frequency 173.9875 MHz: Emission Mask D, Low Power



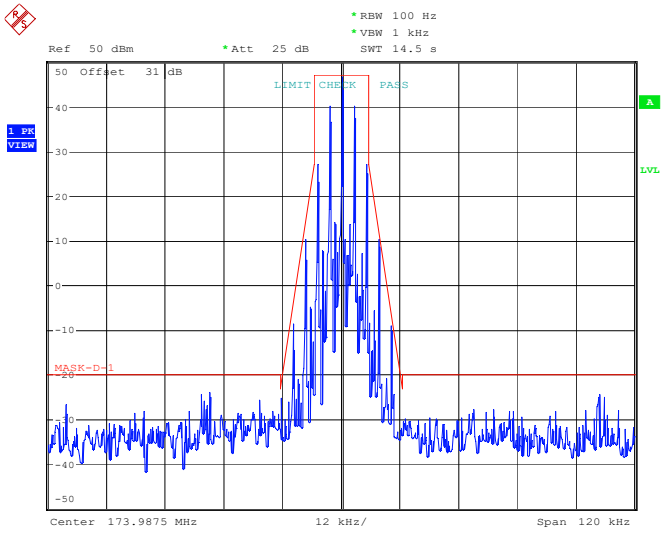
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 16:57:00

Frequency 173.9875 MHz: 99% Occupied Bandwidth, High Power



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 17:31:21

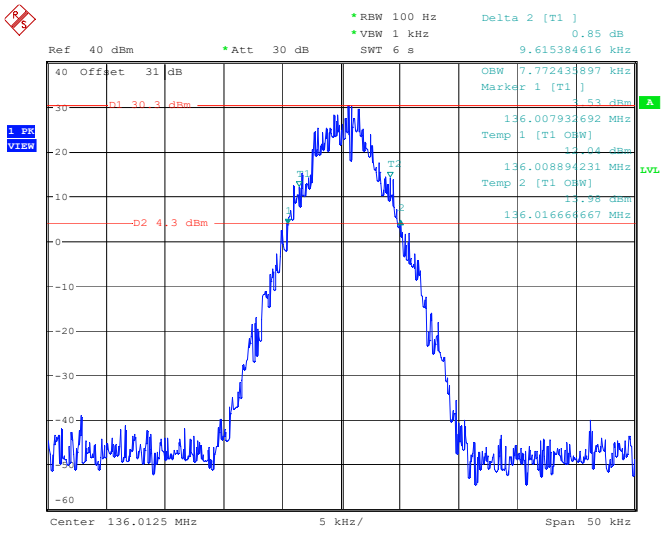
Frequency 173.9875 MHz: Emission Mask D, High Power



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 12.APR.2025 17:34:21

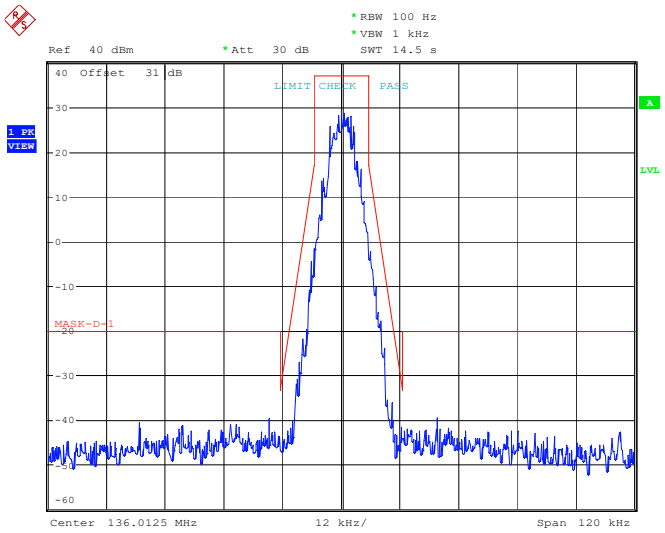
Digital

Frequency 136.0125 MHz: 99% Occupied Bandwidth, Low Power



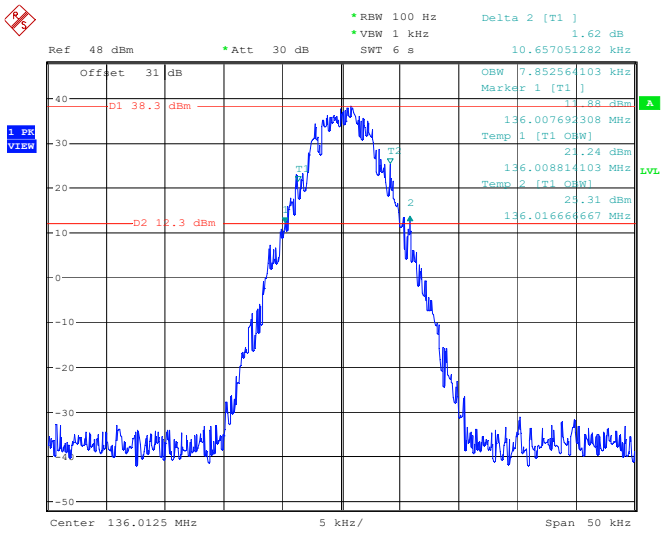
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 17:52:28

Frequency 136.0125 MHz: Emission Mask D, Low Power



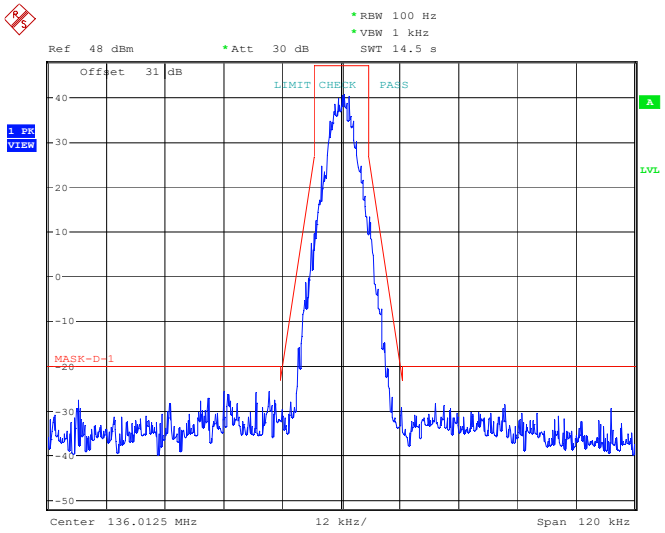
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 18:02:32

Frequency 136.0125 MHz: 99% Occupied Bandwidth, High Power



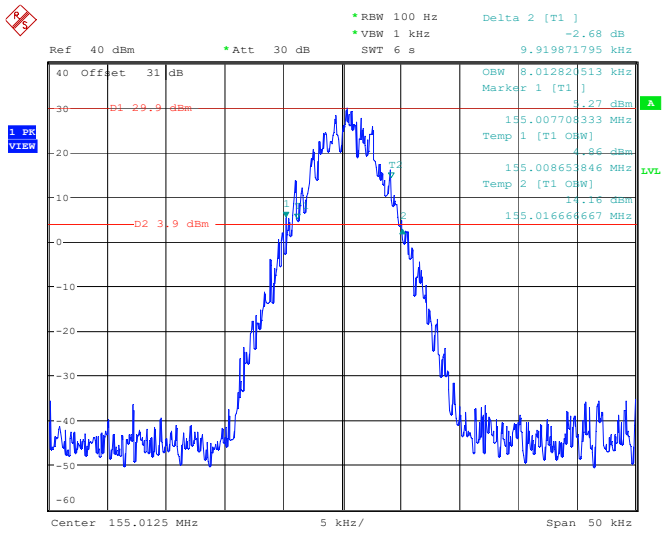
ProjectNo.:2501R47293E-RFTester:Cheeb Huang
Date: 31.MAR.2025 12:44:24

Frequency 136.0125 MHz: Emission Mask D, High Power



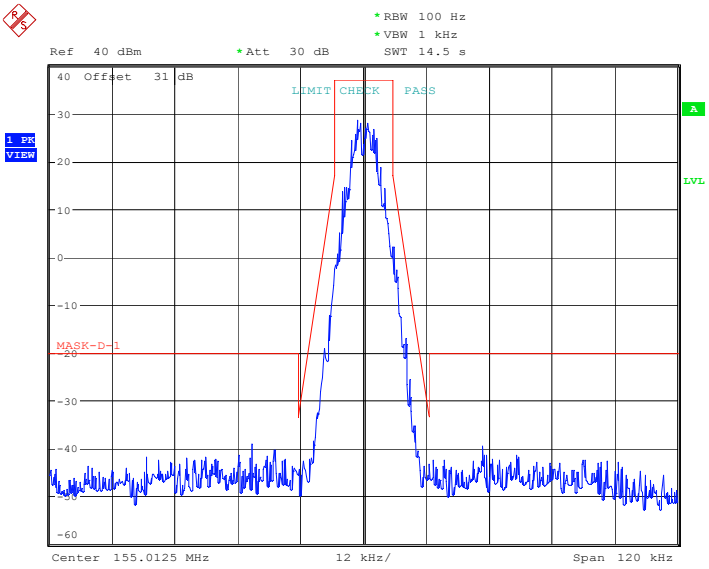
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 14:14:32

Frequency 155.0125 MHz: 99% Occupied Bandwidth, Low Power



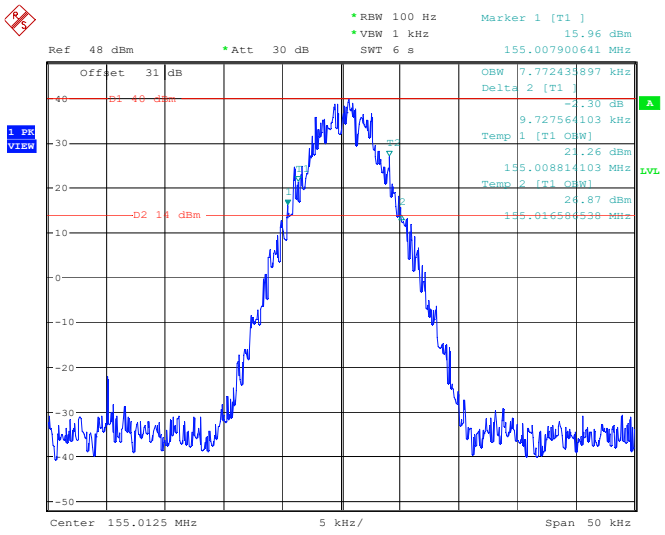
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 17:54:06

Frequency 155.0125 MHz: Emission Mask D, Low Power



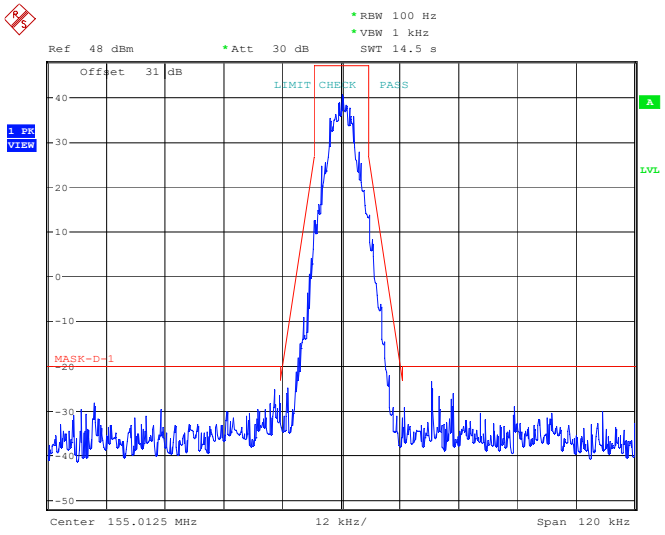
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 18:01:21

Frequency 155.0125MHz: 99% Occupied Bandwidth, High Power



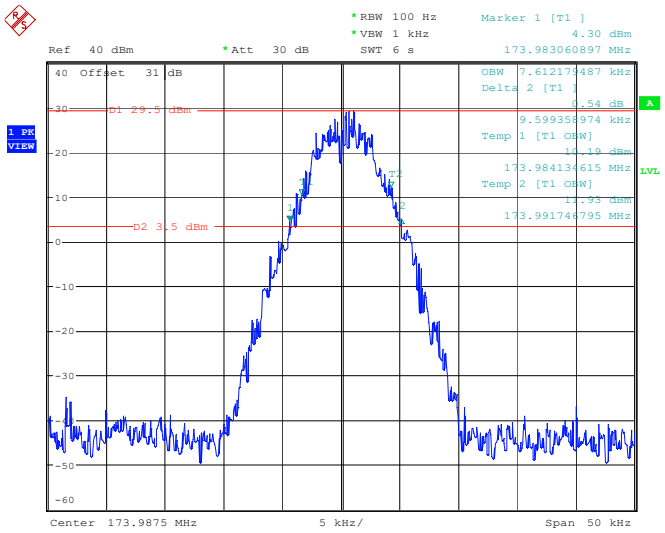
ProjectNo.:2501R47293E-RFTester:Cheeb Huang
Date: 31.MAR.2025 12:46:57

Frequency 155.0125 MHz: Emission Mask D, High Power



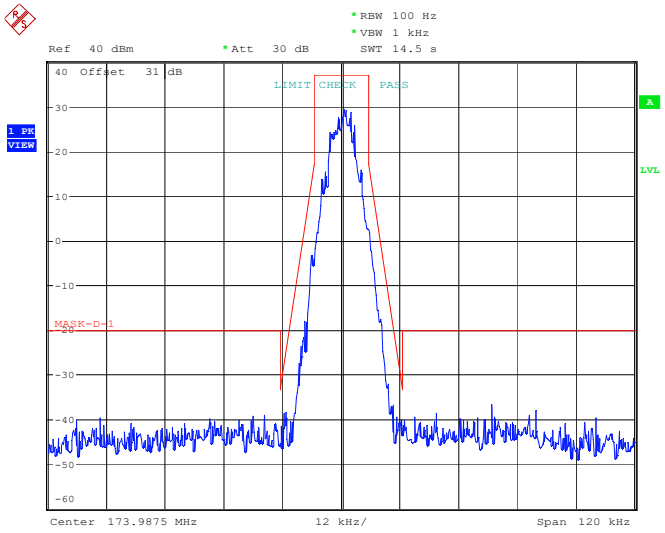
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 14:12:46

Frequency 173.9875 MHz: 99% Occupied Bandwidth, Low Power



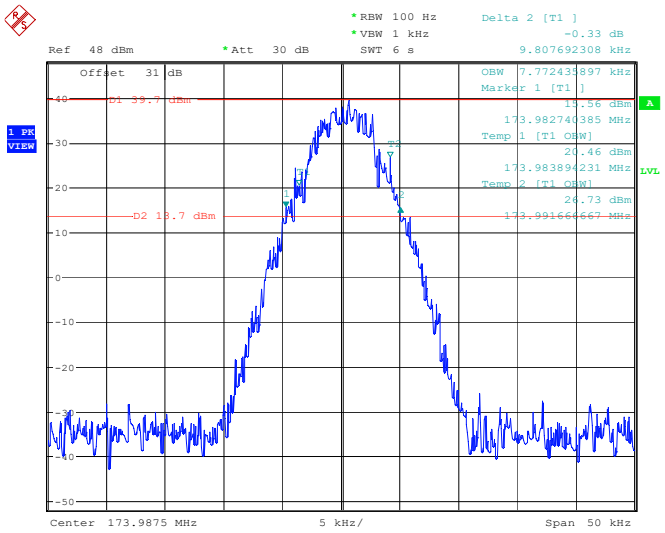
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 17:55:54

Frequency 173.9875 MHz: Emission Mask D, Low Power



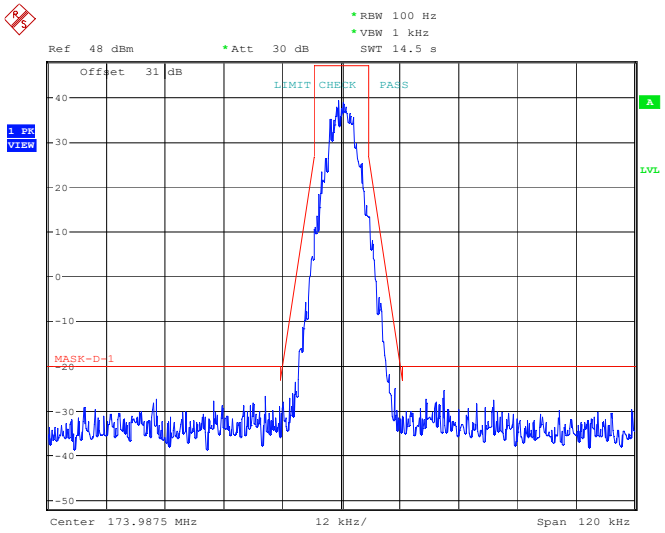
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 18:00:20

Frequency 173.9875 MHz: 99% Occupied Bandwidth, High Power



ProjectNo.:2501R47293E-RFTester:Cheeb Huang
Date: 31.MAR.2025 12:48:35

Frequency 173.9875 MHz: Emission Mask D, High Power



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 14:11:26

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:

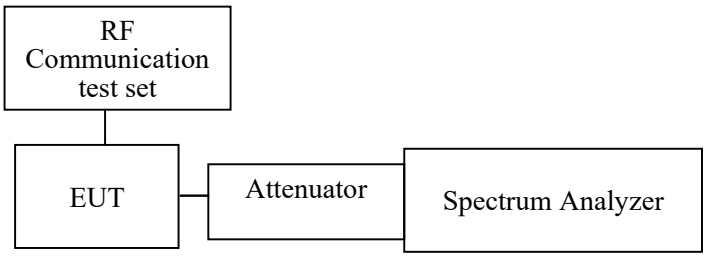
1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0, 0 dB.

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 100kHz for below 1GHz, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Data

Environmental Conditions

Temperature:	25.3 ℃
Relative Humidity:	52 %
ATM Pressure:	101 kPa

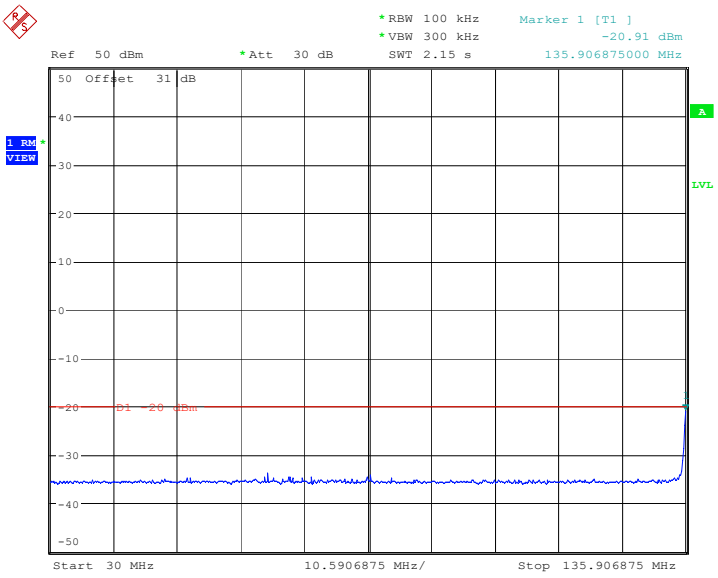
The testing was performed by Cheeb Huang on 2025-03-31.

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

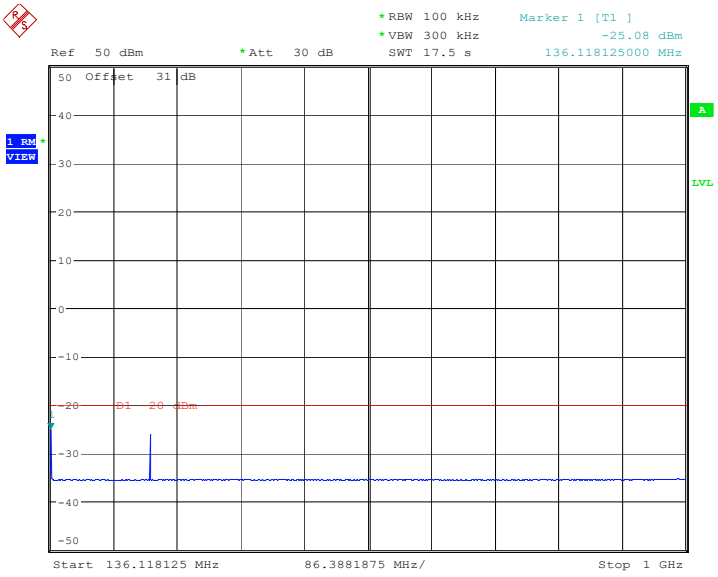
Test Result: Pass. *Please refer to the following plots.*

Analog
12.5kHz

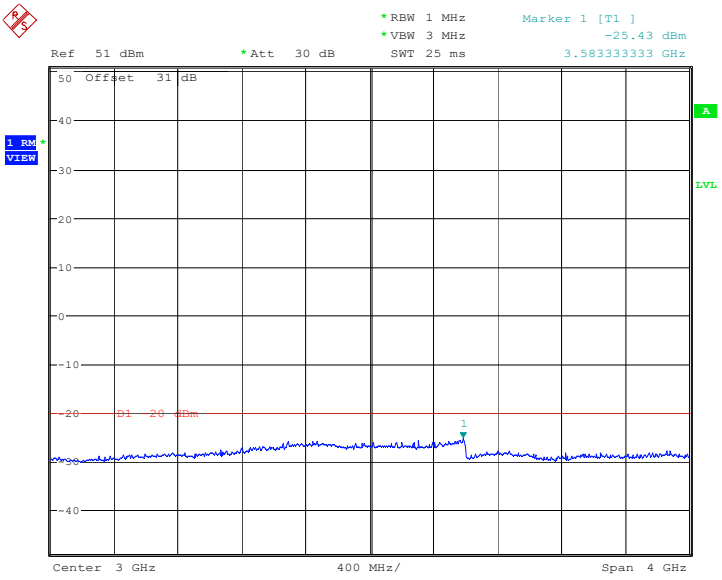
Low Channel



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 15:55:20

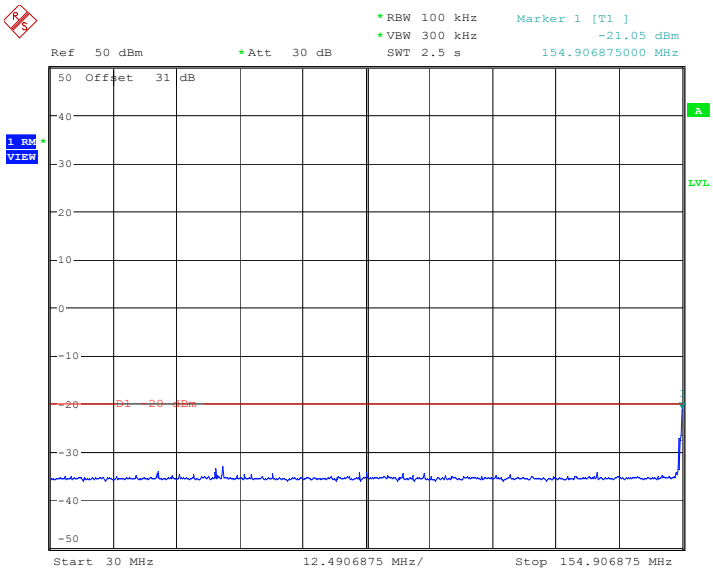


ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 15:59:06

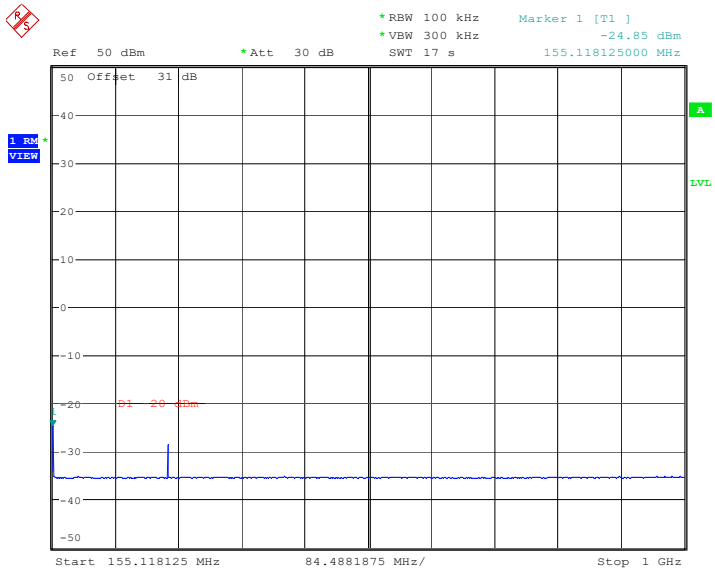


ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 15:48:55

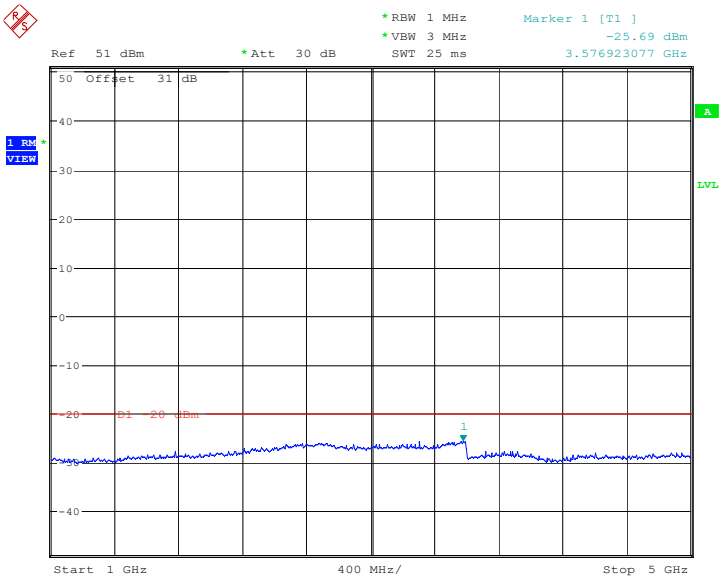
Middle Channel



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 16:02:18

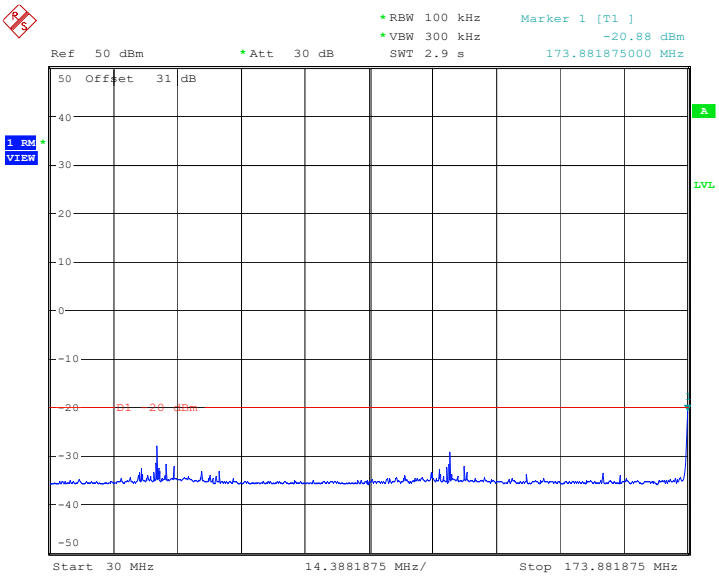


ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 16:05:17

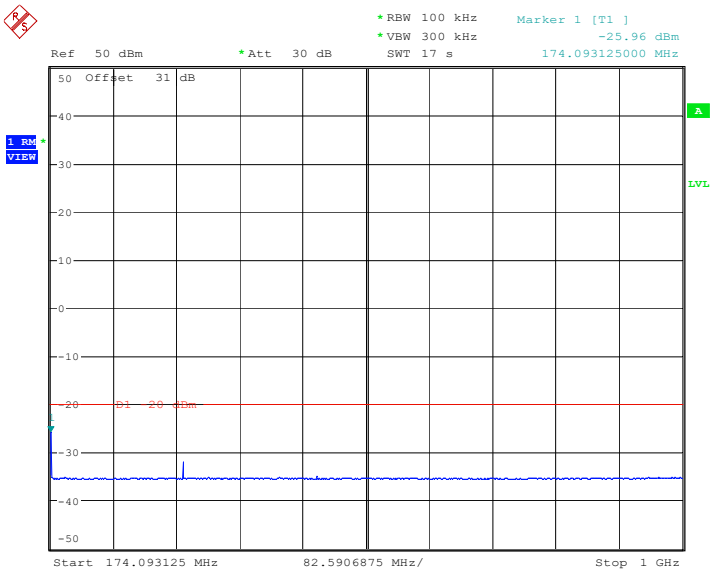


ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 15:49:18

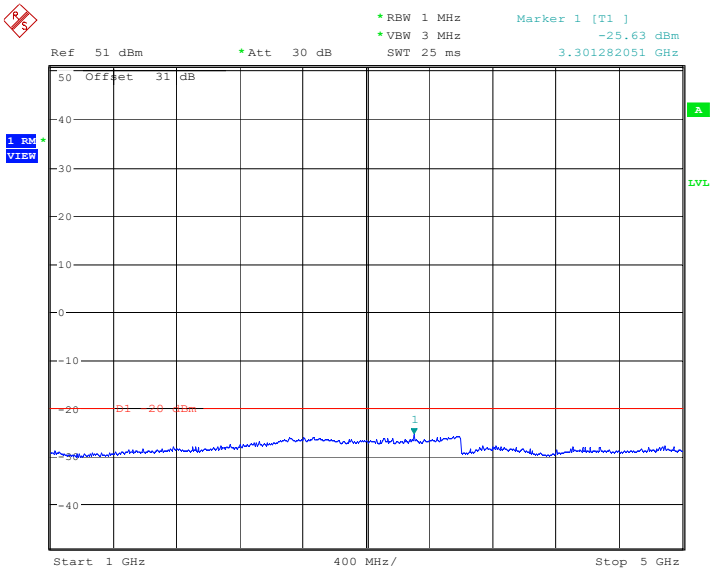
High Channel



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 16:08:34



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 16:07:21

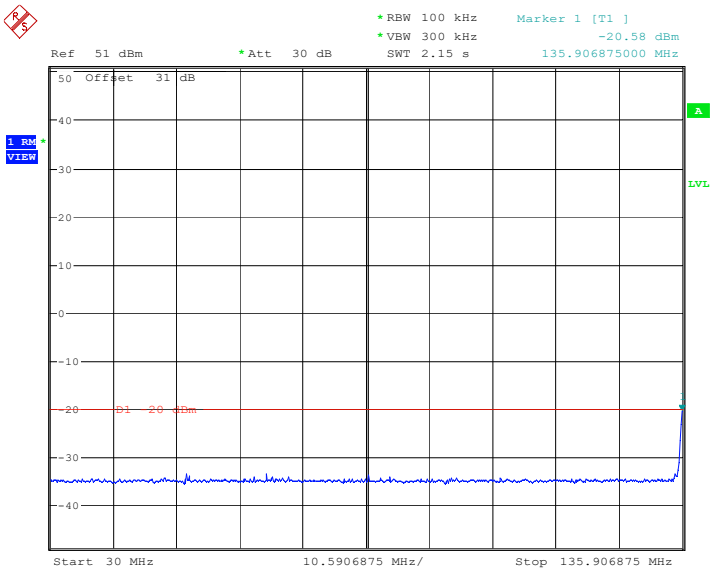


ProjectNo.:2501R47293E-RF Tester:Cheeb Huang

Date: 31.MAR.2025 15:49:43

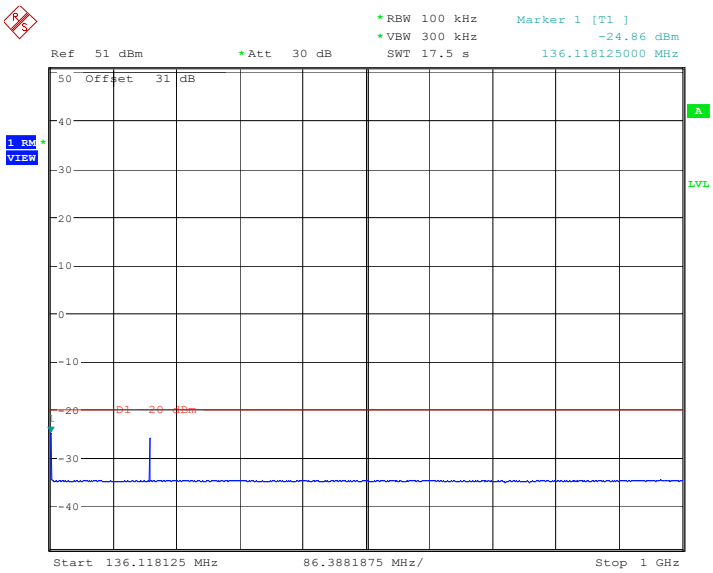
Digital

Low Channel



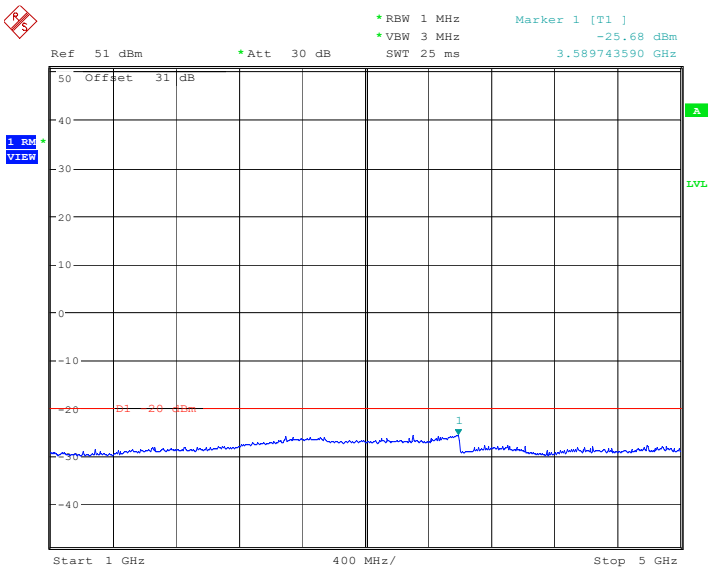
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang

Date: 31.MAR.2025 15:28:05



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang

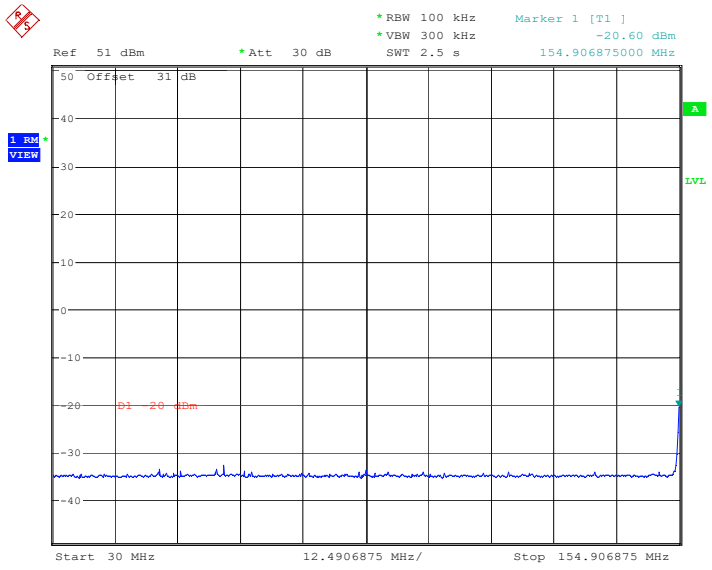
Date: 31.MAR.2025 15:31:22



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang

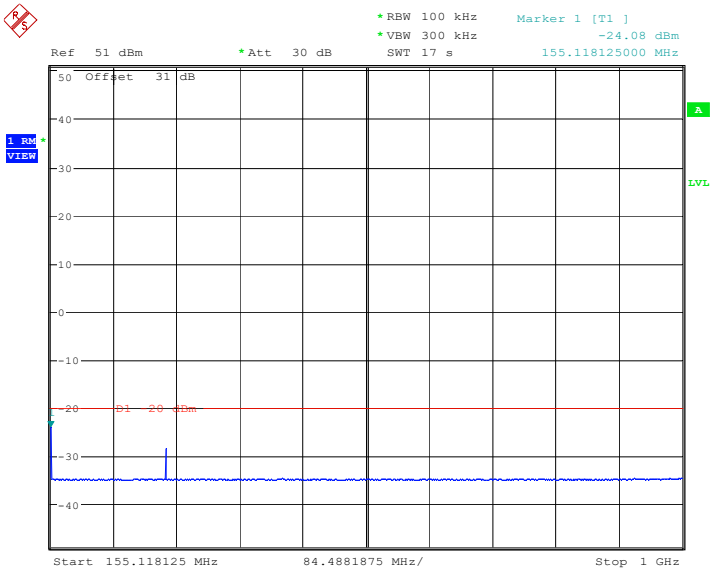
Date: 31.MAR.2025 15:32:53

Middle Channel

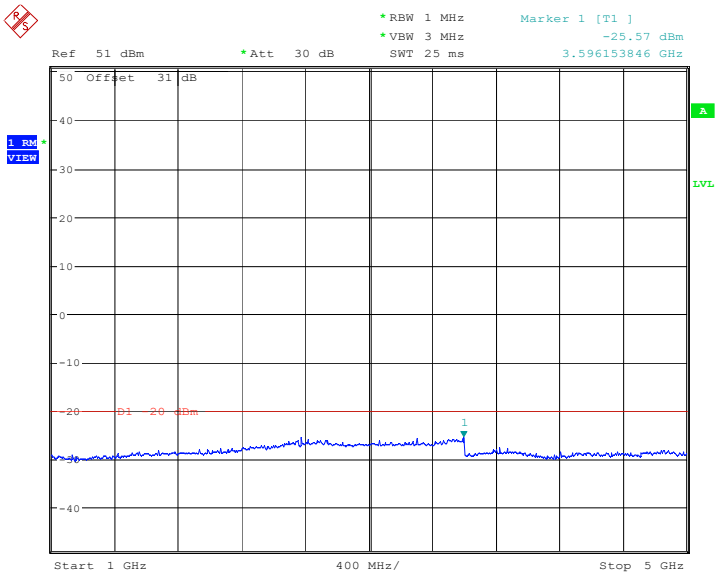


ProjectNo.:2501R47293E-RF Tester:Cheeb Huang

Date: 31.MAR.2025 15:38:40

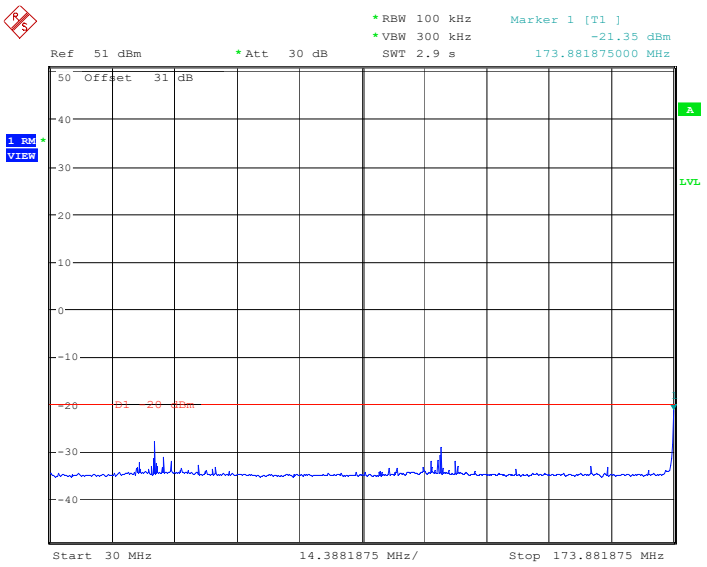


ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 15:35:34



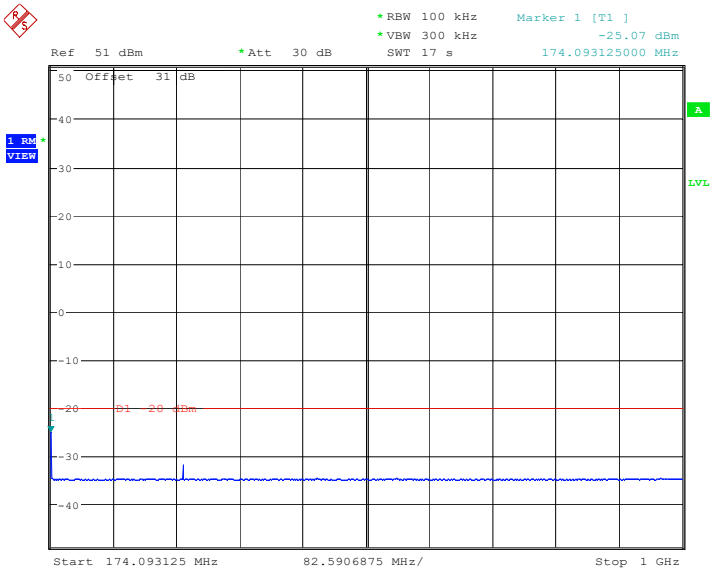
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang
Date: 31.MAR.2025 15:33:38

High Channel



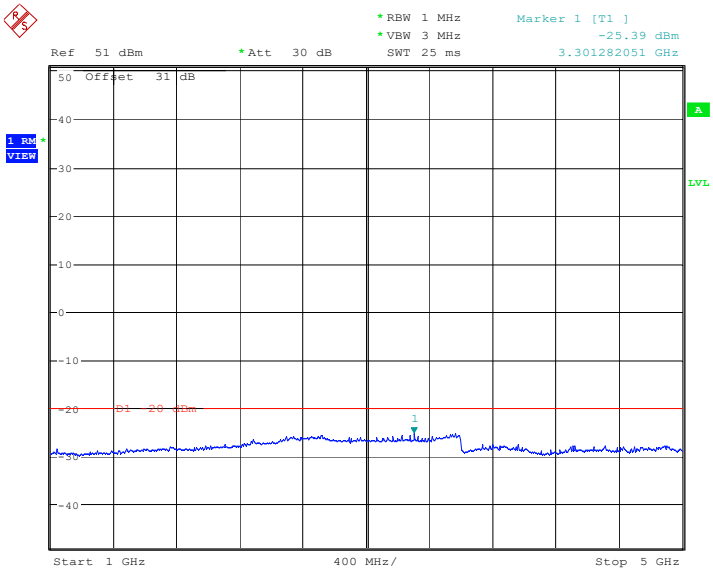
ProjectNo.:2501R47293E-RF Tester:Cheeb Huang

Date: 31.MAR.2025 15:41:40



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang

Date: 31.MAR.2025 15:45:46



ProjectNo.:2501R47293E-RF Tester:Cheeb Huang

Date: 31.MAR.2025 15:47:01

FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053 and §90.210

Test Procedure

Test method: ANSI C63.26-2015 clause 5.5

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:	21.6~26.0 ℃
Relative Humidity:	50~52 %
ATM Pressure:	100.8~101.4 kPa

The testing was performed by Alex Yan on 2025-04-22 for below 1GHz and Wing K Ji on 2025-04-21 for above 1GHz.

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

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

Frequency (MHz)	Receiver Reading (dBm)	Polar (H/V)	Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)			
Analog 12.5kHz								
136.0125 MHz								
276.025	26.33	H	-53.7	0.9	0.0	-54.60	-20	34.60
276.025	31.54	V	-45.3	0.9	0.0	-46.20	-20	26.20
1088.10	49.52	H	-64.5	1.10	6.10	-59.50	-20	39.50
1088.10	50.19	V	-65.2	1.10	6.10	-60.20	-20	40.20
1224.11	49.57	H	-64.7	1.10	6.70	-59.10	-20	39.10
1224.11	50.28	V	-64.7	1.10	6.70	-59.10	-20	39.10
1360.13	49.47	H	-65.5	0.90	7.80	-58.60	-20	38.60
1360.13	50.10	V	-64.9	0.90	7.80	-58.00	-20	38.00
1496.14	49.80	H	-64.8	1.20	8.20	-57.80	-20	37.80
1496.14	52.03	V	-63.1	1.20	8.20	-56.10	-20	36.10
155.0125 MHz								
310.025	25.94	H	-51.1	0.94	0.0	-52.04	-20	32.04
310.025	26.58	V	-47.6	0.94	0.0	-48.54	-20	28.54
1240.10	49.10	H	-65.1	1.10	6.70	-59.50	-20	39.50
1240.10	50.16	V	-64.8	1.10	6.70	-59.20	-20	39.20
1395.11	49.79	H	-64.5	0.90	7.80	-57.60	-20	37.60
1395.11	51.02	V	-64.0	0.90	7.80	-57.10	-20	37.10
1550.13	51.26	H	-63.6	1.50	8.60	-56.50	-20	36.50
1550.13	52.47	V	-62.4	1.50	8.60	-55.30	-20	35.30
1705.14	50.16	H	-64.0	1.50	8.80	-56.70	-20	36.70
1705.14	50.88	V	-63.9	1.50	8.80	-56.60	-20	36.60
173.9875 MHz								
347.975	24.35	H	-51.6	0.98	0.0	-52.58	-20	32.58
347.975	27.11	V	-45.7	0.98	0.0	-46.68	-20	26.68
1391.90	50.10	H	-64.2	0.90	7.80	-57.30	-20	37.30
1391.90	51.05	V	-64.0	0.90	7.80	-57.10	-20	37.10
1565.89	50.20	H	-64.1	1.50	8.60	-57.00	-20	37.00
1565.89	51.33	V	-63.5	1.50	8.60	-56.40	-20	36.40
1739.88	50.31	H	-64.4	1.50	8.80	-57.10	-20	37.10
1739.88	51.44	V	-63.3	1.50	8.80	-56.00	-20	36.00
1913.86	50.12	H	-64.2	1.20	9.40	-56.00	-20	36.00
1913.86	50.9	V	-64.1	1.20	9.40	-55.90	-20	35.90

Frequency (MHz)	Receiver Reading (dBm)	Polar (H/V)	Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBi/dBd)			
Digital 12.5kHz								
136.0125 MHz								
272.025	24.51	H	-55.5	0.90	0.0	-56.40	-20	36.40
272.025	26.03	V	-50.8	0.90	0.0	-51.70	-20	31.70
1088.10	49.88	H	-64.1	1.10	6.10	-59.10	-20	39.10
1088.10	51.54	V	-63.8	1.10	6.10	-58.80	-20	38.80
1224.11	51.19	H	-63.0	1.10	6.70	-57.40	-20	37.40
1224.11	52.33	V	-62.6	1.10	6.70	-57.00	-20	37.00
1360.13	49.81	H	-65.2	0.90	7.80	-58.30	-20	38.30
1360.13	50.22	V	-64.8	0.90	7.80	-57.90	-20	37.90
1496.14	49.20	H	-65.4	1.20	8.20	-58.40	-20	38.40
1496.14	50.38	V	-64.8	1.20	8.20	-57.80	-20	37.80
155.0125 MHz								
310.025	26.81	H	-50.2	0.94	0.0	-51.14	-20	31.14
310.025	27.85	V	-46.4	0.94	0.0	-47.34	-20	27.34
1240.10	51.17	H	-63.1	1.10	6.70	-57.50	-20	37.50
1240.10	52.4	V	-62.5	1.10	6.70	-56.90	-20	36.90
1395.11	49.03	H	-65.3	0.90	7.80	-58.40	-20	38.40
1395.11	50.02	V	-65.0	0.90	7.80	-58.10	-20	38.10
1550.13	49.75	H	-65.1	1.50	8.60	-58.00	-20	38.00
1550.13	51.14	V	-63.7	1.50	8.60	-56.60	-20	36.60
1705.14	50.31	H	-63.9	1.50	8.80	-56.60	-20	36.60
1705.14	51.5	V	-63.2	1.50	8.80	-55.90	-20	35.90
173.9875 MHz								
347.975	25.13	H	-50.8	0.98	0.0	-51.78	-20	31.78
347.975	28.35	V	-44.4	0.98	0.0	-45.38	-20	25.38
1391.90	49.93	H	-64.4	0.90	7.80	-57.50	-20	37.50
1391.90	50.76	V	-64.3	0.90	7.80	-57.40	-20	37.40
1565.89	49.55	H	-64.8	1.50	8.60	-57.70	-20	37.70
1565.89	50.35	V	-64.5	1.50	8.60	-57.40	-20	37.40
1739.88	49.86	H	-64.9	1.50	8.80	-57.60	-20	37.60
1739.88	50.48	V	-64.3	1.50	8.80	-57.00	-20	37.00
1913.86	49.98	H	-64.4	1.20	9.40	-56.20	-20	36.20
1913.86	51.34	V	-63.7	1.20	9.40	-55.50	-20	35.50

Note 1: The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.
Note 2:
Absolute Level = Substituted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

FCC §2.1055 & §90.213 - FREQUENCY STABILITY

Applicable Standard

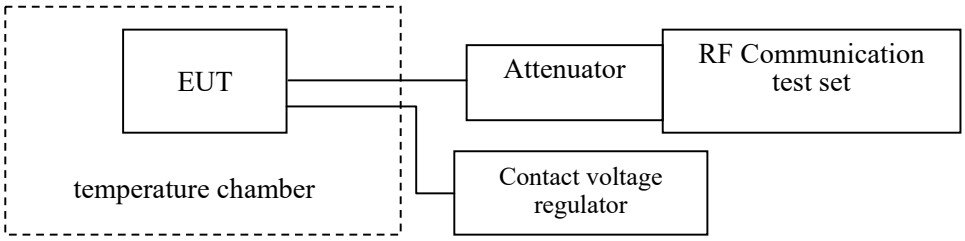
FCC §2.1055 and §90.213

Test Procedure

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 °C
Relative Humidity:	50 %
ATM Pressure:	101 kPa

The testing was performed by Cheeb Huang on 2025-05-29.

Test Mode: Transmitting (Unmodulation, Highest power level)

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

		fc =	155.0125	MHz
Temperature	**Voltage**	**Reading**	**Frequency Error**	**Limit**
°C	**V_{AC}**	**MHz**	**ppm**	**ppm**
-30	120	155.0126480	0.95	2.5
-20		155.0124910	-0.06	
-10		155.0124710	-0.19	
0		155.0126390	0.90	
10		155.0123480	-0.98	
20		155.0127560	1.65	
30		155.0124100	-0.58	
40		155.0124950	-0.03	
50		155.0125510	0.33	
20	102	155.0124030	-0.63	
20	138	155.0124030	-0.63	

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

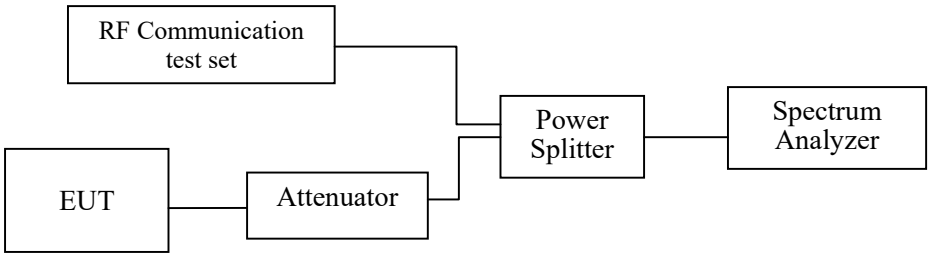
Applicable Standard

Regulations: FCC §90.214

Test method: ANSI C63.26-2015 clause 6.5.2.2

Test Procedure

a) Connect the EUT and test equipment as shown on the following block diagram.
b) Verify RF attenuator power rating for EUT providing adequate protection to the combining network and measurement equipment. Instrumentation linearity shall be confirmed per item j) of 4.2.3..
c) Tune spectrum analyzer center frequency to EUT frequency and span to at least 100 kHz. Set amplitude according to EUT RF power
d) Switch transmitter on and adjust settings in accordance with step c); switch transmitter to the off position.
e) Set analyzer to FM mode; re-tune analyzer to EUT frequency and span according to step c), while in FM demodulation mode.
f) An RF test signal of the same frequency as the EUT from the signal generator shall be modulated by a frequency of 1 kHz with a deviation equal to plus or minus the value of the channel spacing (separation). The RF signal strength shall be adjusted allowing the analyzer to demodulate the signal in FM mode.
g) Adjust analyzer x axis to capture at least 100 ms of demodulated signal.
h) Adjust analyzer y axis for the correct deviation amplitude.
i) The analyzer display should show a continuous 1 kHz signal and the channel spacing deviation amplitude.
j) Change analyzer settings to single sweep and external trigger. For newer analyzers, the channel bandwidth might have to be adjusted for the correct sample rate and sweep speed.
k) Turn on EUT and adjust analyzer to display desired signal by adjusting trigger settings and considerations in step j). Turn off EUT.
I) Repeat step k) until optimum set-up is achieved.



Test Data

Environmental Conditions

Temperature:	25~26 ℃
Relative Humidity:	50~52 %
ATM Pressure:	101~102 kPa

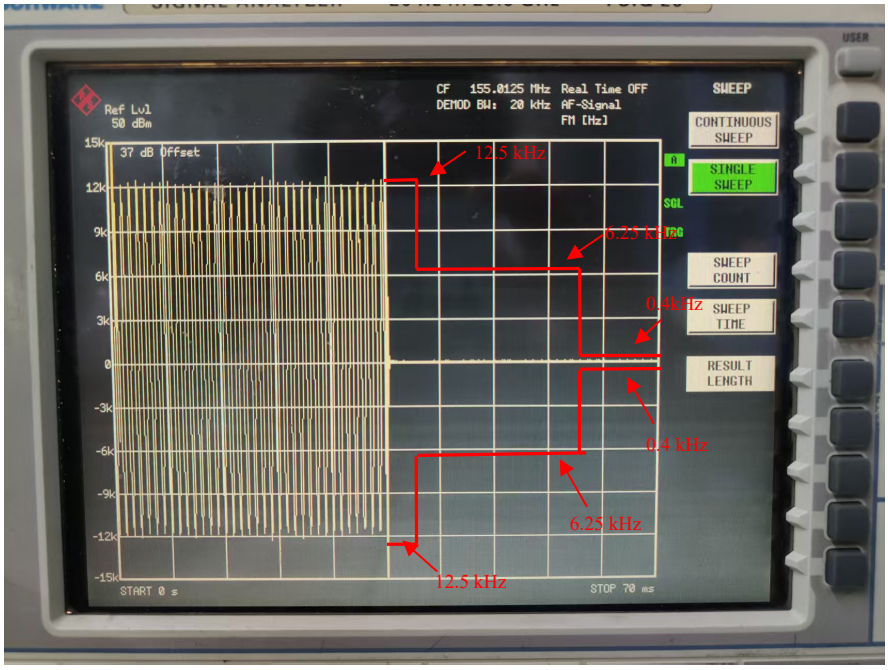
The testing was performed by Cheeb Huang from 2025-03-31 to 2025-04-12.

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

Channel Separation (kHz)	Transient Period (ms)	Transient Frequency (kHz)	Result
12.5	5(t1)	±12.5	Pass
	20(t2)	±6.25	
	5(t1)	±12.5	

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 155.0125MHz 12.5kHz mode, the limit is 155.0125MHz*2.5ppm=0.4kHz

Turn on



Turn off

EUT PHOTOGRAPHS

Please refer to the attachment 2501R47293E-RF External photo and 2501R47293E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2501R47293E-RF Test Setup photo.

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