TEST REPORT

Applicant Name:	Kirisun Communication Co., Ltd.
Address:	3rd Floor, Building A, Tongfang Information Habour, No.11 Langshan Road Nanshan District, Shenzhen 518057 China
Report Number:	SZ4231215-75913E-RF-00C
FCC ID:	Q5EDP58501

Test Standard (s)

FCC PART 90

Sample Description

Product Type:	DMR Two Way Radio
Model No.:	DP580
Multiple Model(s) No.:	DP585
Trade Mark:	KIRISUN
Date Received:	2023/12/15
Issue Date:	2024/04/23

Test Result:	Pass▲

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

Prepared and Checked By:

Black Chen

RF Engineer

Approved By:

Nancy Wang

RF Supervisor

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	SZ4231215-75913E-RF-00C	Original Report	2024/04/23

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	DMR Two Way Radio
Tested Model	DP580
Multiple Model(s)	DP585
Frequency Range	136MHz -174MHz
Rated Transmit Power	5Watts(High), 1Watt(Low)
Channel separation	12.5kHz
Modulation Technique	4FSK/FM
Antenna Specification[#]	0dBi (provided by the applicant)
Voltage Range	DC7.4V form battery or DC 12V from charger base
Sample serial number	DP580: 2FAG-10 (RF Radiated Test) DP585: 2FAG-5 (RF Radiated Test) 2FAG-1 (RF Conducted Test) (Assigned by BACL, Shenzhen)
Normal/Extreme Condition	LV: Low Voltage 7V_{DC}; NV: Normal Voltage 7.4V_{DC}; HV: High Voltage 8.4V_{DC};
Sample/EUT Status	Good condition
Adapter Information	Model: TPQ-236A120100UW01 Input: AC100-240V~50/60Hz 0.4A Output: DC 12.0V .1.0A
Note: The Multiple models are electrically identical with the test model except for screen and keyboard. Please refer to the declaration letter[#] for more detail, which was provided by manufacturer.	

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		±5%
RF Frequency		213.55 Hz(k=2, 95% level of confidence)
RF output power, conducted		0.72 dB(k=2, 95% level of confidence)
Unwanted Emission, conducted		1.75 dB(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)	4.48dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	4.55dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	4.85dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.05dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.35dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.44dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.16dB(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.

Equipment Modifications

No modification was made to the EUT.

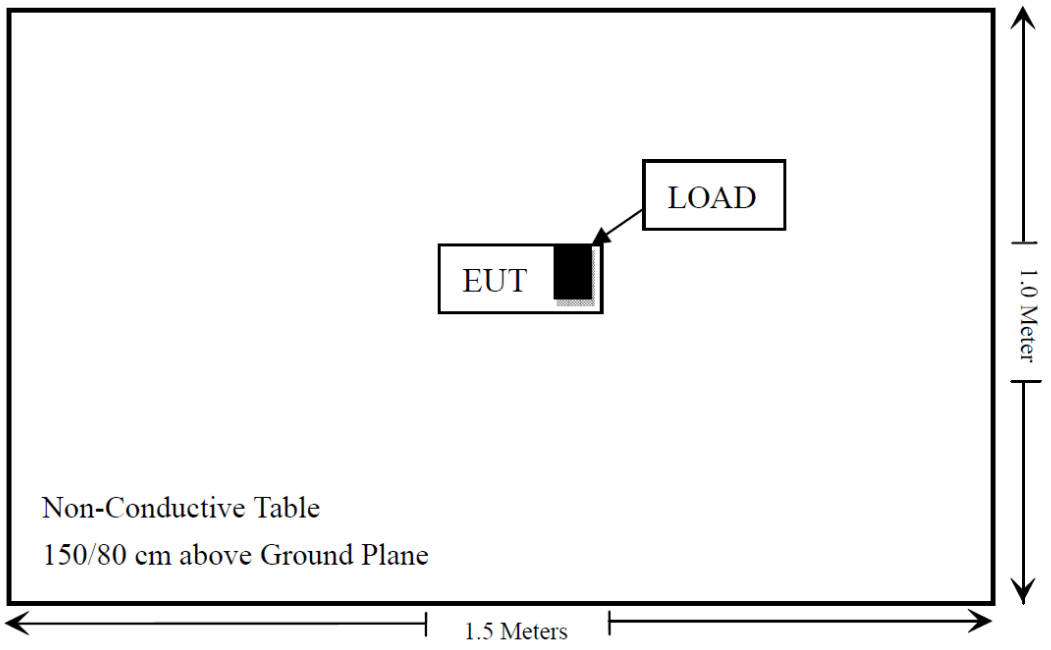
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Unknown	LOAD	Unknown	Unknown

External I/O Cable

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

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§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					
R&S	EMI Test Receiver	ESR3	102455	2023/02/08	2024/02/07
Sonoma instrument	Pre-amplifier	310 N	186238	2023/06/08	2024/06/07
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2024/07/19
Unknown	Cable	Chamber Cable 1	F-03-EM236	2023/08/03	2024/08/02
Unknown	Cable	Chamber Cable 4	EC-007	2023/08/03	2024/08/02
Agilent	Signal Generator	N5183A	MY50140588	2023/12/18	2024/12/17
COM-POWER	Dipole Antenna	AD-100	721027	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2023/04/18	2024/04/17
COM-POWER	Pre-amplifier	PA-122	181919	2023/06/29	2024/06/28
Schwarzbeck	Horn Anetenna	BBHA9120D(1201)	1143	2023/07/26	2024/07/25
A.H.System	Horn Antenna	SAS-200/571	135	2021/07/14	2024/07/13
Unknown	RF Cable	KMSE	0735	2023/10/08	2024/10/07
Unknown	RF Cable	UFA147	219661	2023/10/08	2024/10/07
Unknown	RF Cable	XH750A-N	J-10M	2023/10/08	2024/10/07
Agilent	Signal Generator	N5183A	MY50140588	2023/12/18	2024/12/17
RF Conducted Test					
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200982	2023/12/18	2024/12/17
BACL	Temperature & Humidity Chamber	BTH-150-40	30145	2024/01/16	2025/01/15
HP	RF Communication test set	8920B	US36141849	2024/01/16	2025/01/15
instek	DC Power Supply	GPS-3030DD	EM832096	NCR	NCR
Fluke	Digital Multimeter	287	19000011	2023/06/08	2024/06/07
R&S	Audio Analyzer	UPV	101782	2024/01/16	2025/01/15
JFW	30dB Attenuator	50FH-030-100 RF	F-03-EM032	2023/07/04	2024/07/03
R&S	Signal Analyzer	FSIQ26	837405/023	2024/01/08	2025/01/07
WEINSCHEL	Power Splitter	1515	RH386	2023/07/04	2024/07/03

* 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 §2.1093- RF EXPOSURE

Result: Compliance.

Please refer to SAR Report Number: SZ4231215-75913E-20A.

FCC §2.1046 & §90.205 - RF OUTPUT POWER

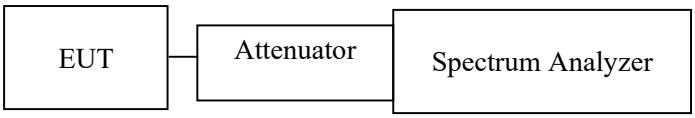
Applicable Standard

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:	24~25 ℃
Relative Humidity:	46~47 %
ATM Pressure:	101.0 kPa

The testing was performed by Hanic Pan on 2024-02-04 and 2024-02-05.

Test Mode: Transmitting

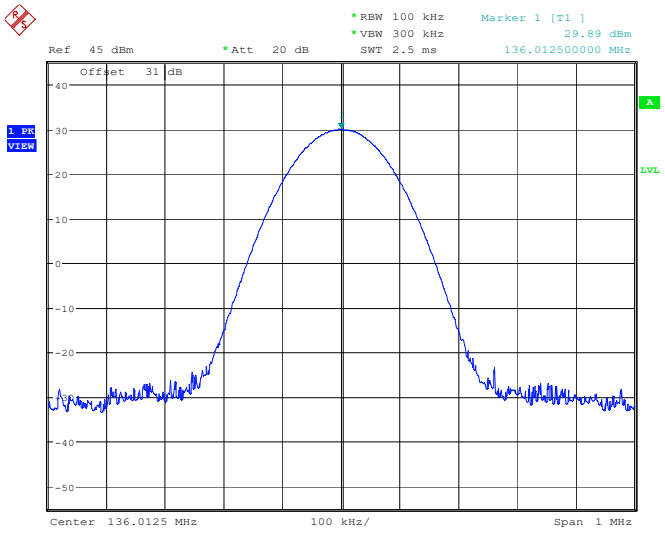
***Test Result: Pass**. Please refer to following table and plots.*

Modulation Mode	Channel Separation	f_c	Reading (dBm)		Limit (dBm)	
		MHz	High Power Level	Low Power Level	High Power Level	Low Power Level
Analog (FM)	12.5kHz	136.0125	36.74	29.89	37.78	30.79
		155.0125	36.82	29.93	37.78	30.79
		173.9875	36.84	30.12	37.78	30.79
Digital (4FSK)	12.5kHz	136.0125	37.20	30.15	37.78	30.79
		155.0125	36.81	29.89	37.78	30.79
		173.9875	36.96	30.09	37.78	30.79

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.

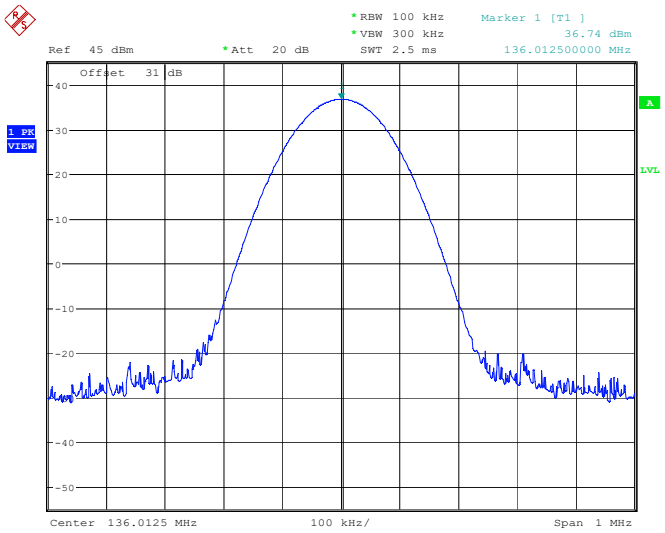
Analog

Frequency 136.0125MHz, Low Power



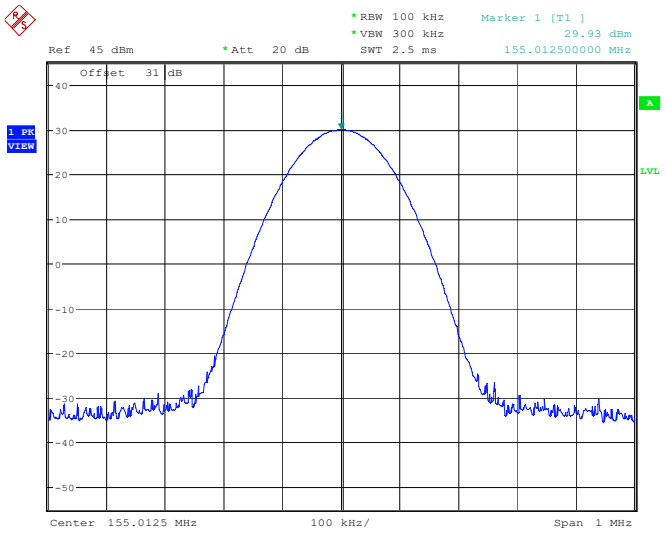
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 5.FEB.2024 09:03:03

Frequency 136.0125 MHz, High Power



ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 5.FEB.2024 09:03:26

Frequency 155.0125MHz, Low Power



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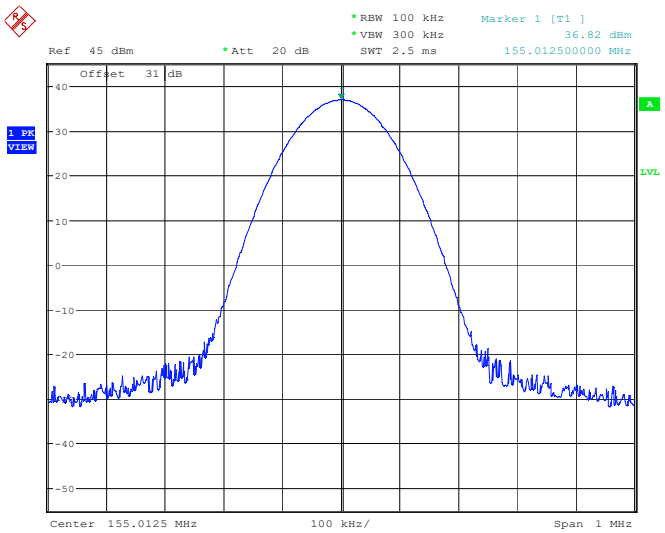
Date: 5.FEB.2024 09:06:07

Frequency 155.0125MHz, High Power



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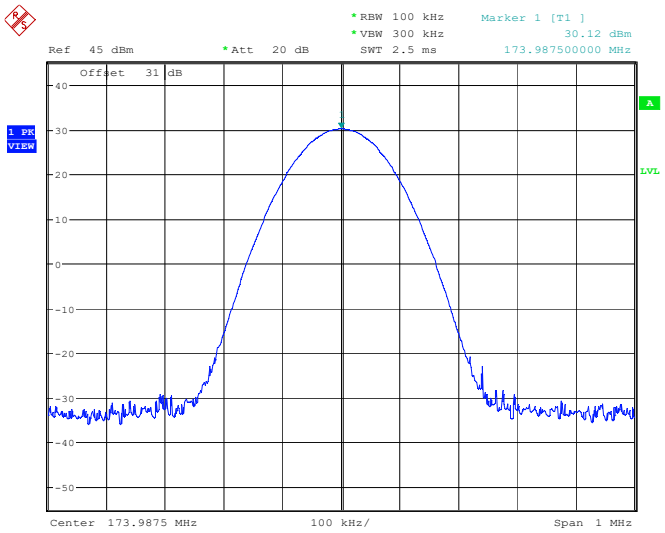
Date: 5.FEB.2024 09:05:50

Frequency 173.9875 MHz, Low Power



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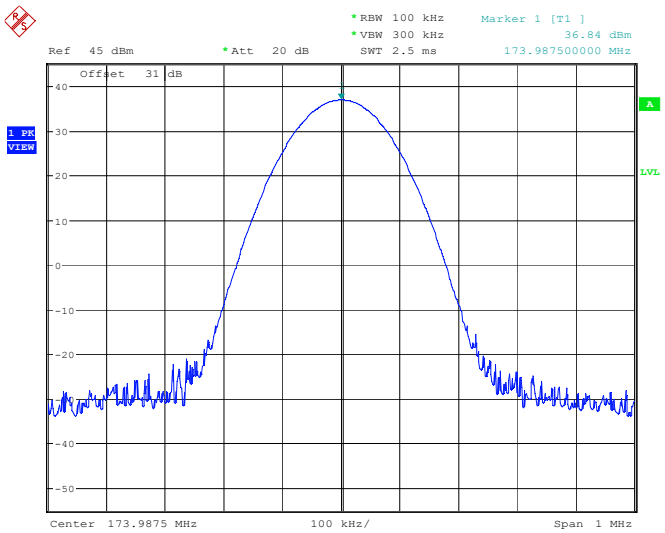
Date: 5.FEB.2024 09:12:40

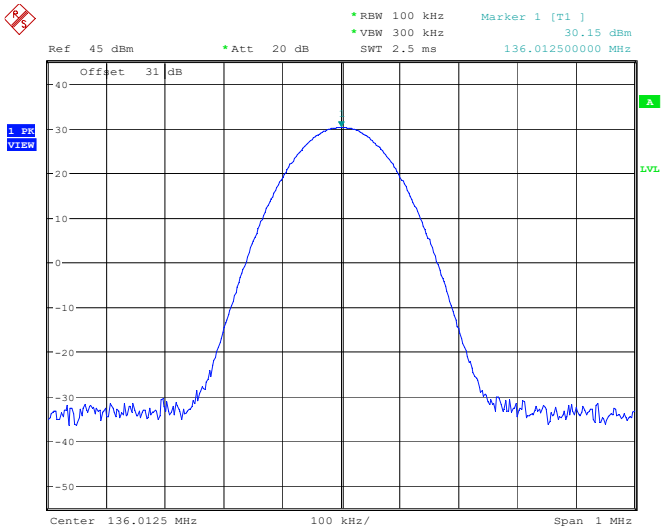
Frequency 173.9875 MHz, High Power



ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 5.FEB.2024 09:13:02

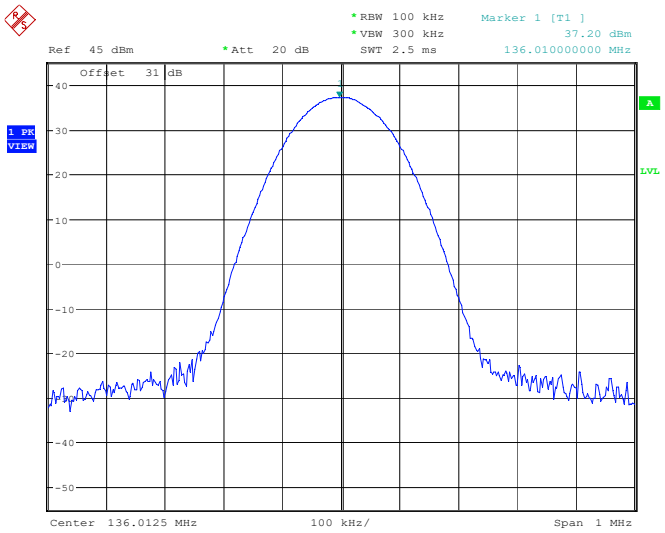
Digital

Frequency 136.0125MHz, Low Power



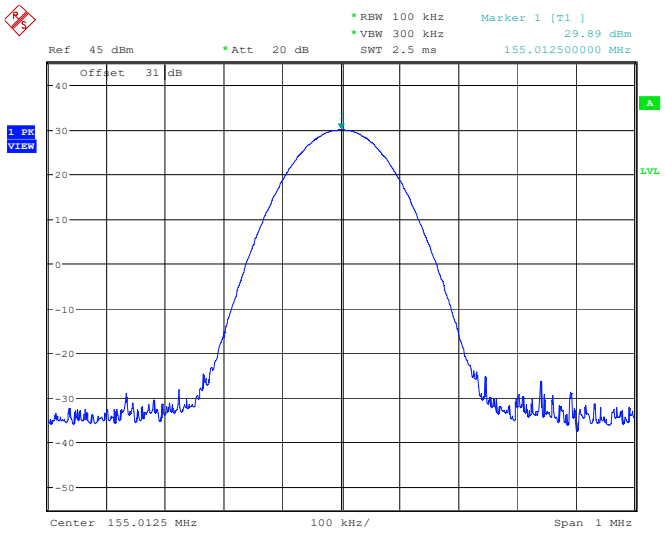
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 17:23:40

Frequency 136.0125 MHz, High Power



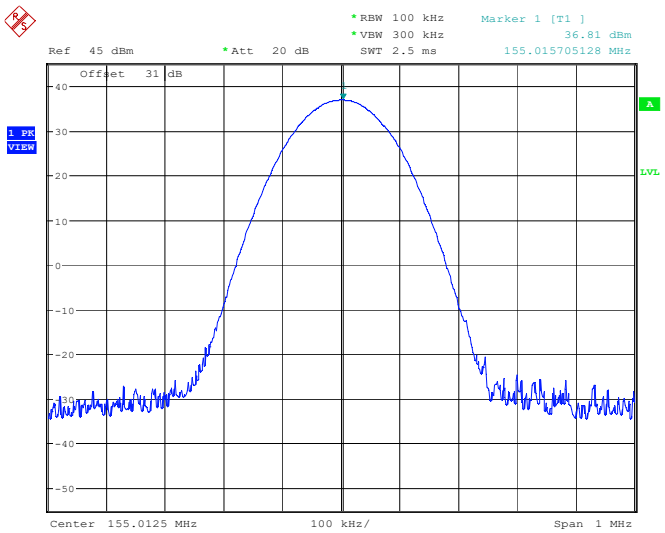
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 17:24:10

Frequency 155.0125MHz, Low Power



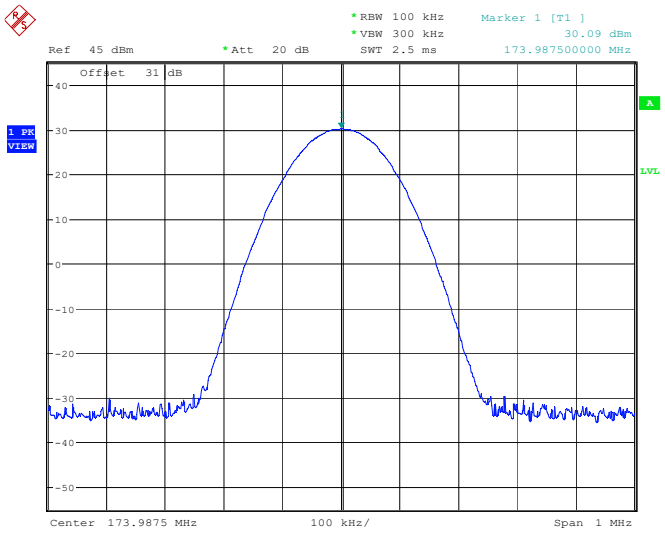
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 5.FEB.2024 08:56:04

Frequency 155.0125MHz, High Power



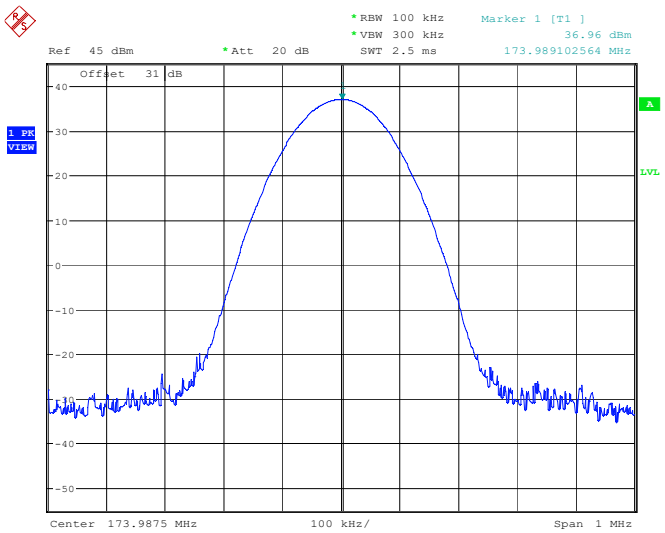
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 5.FEB.2024 08:56:34

Frequency 173.9875 MHz, Low Power



ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 5.FEB.2024 08:57:09

Frequency 173.9875 MHz, High Power



ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 5.FEB.2024 08:57:30

FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC

Applicable Standard

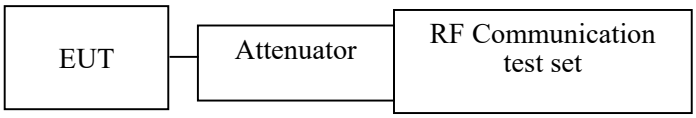
FCC§2.1047 and §90.207:

(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.

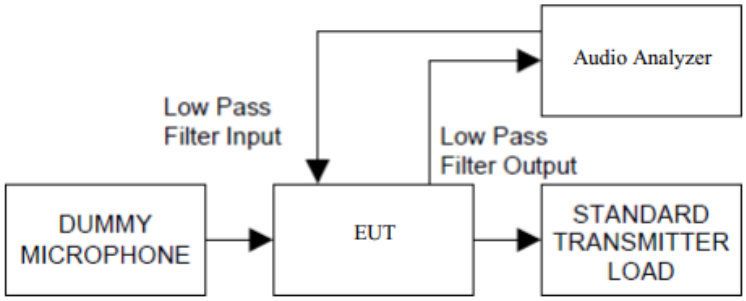
Test Procedure

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:	24~25 °C
Relative Humidity:	46~47 %
ATM Pressure:	101.0 kPa

The testing was performed by Hanic Pan on 2024-02-05.

Test Mode: Transmitting

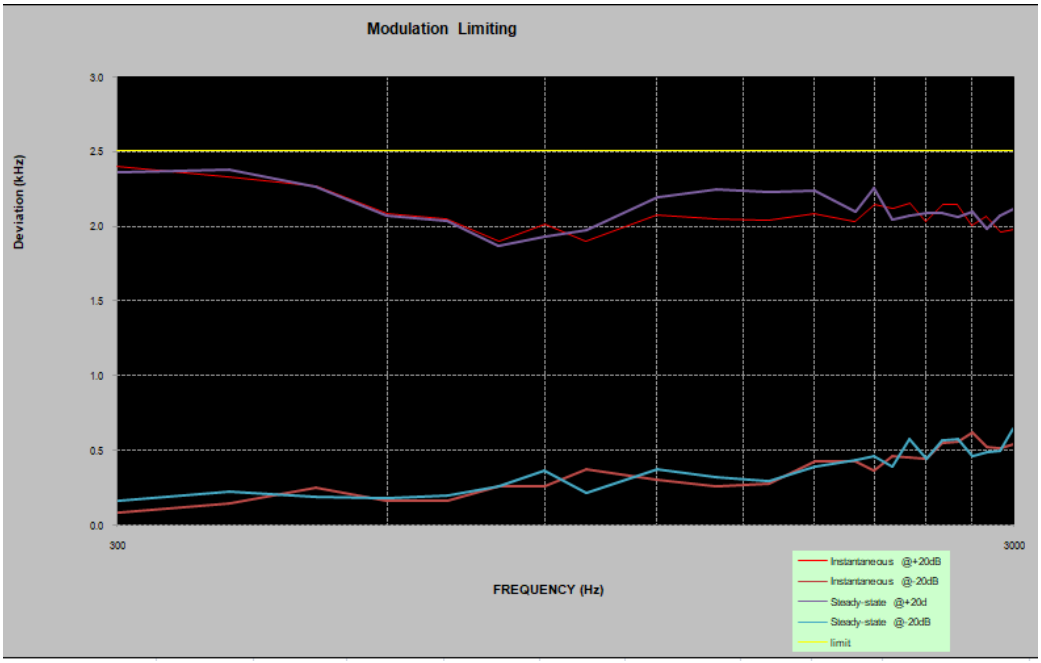
***Test Result: Pass**. Please refer to the following tables and plots.*

Analog Modulation:

MODULATION LIMITING

Carrier Frequency: 155.0125MHz, Separation: 12.5kHz

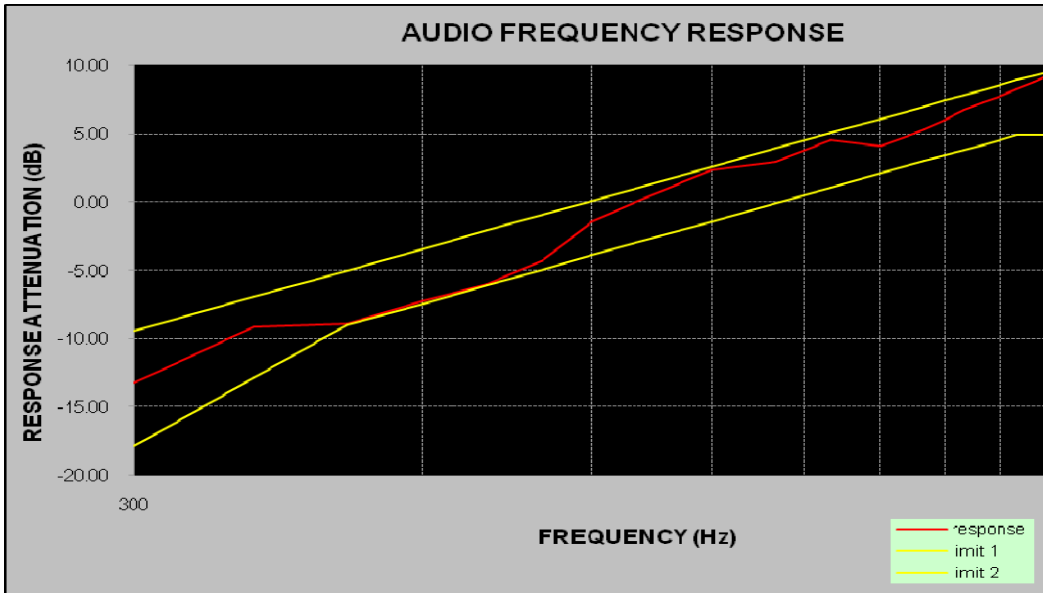
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	2.398	0.082	2.359	0.164	2.500
400	2.331	0.146	2.376	0.219	2.500
500	2.267	0.244	2.263	0.189	2.500
600	2.083	0.162	2.068	0.174	2.500
700	2.049	0.160	2.036	0.195	2.500
800	1.897	0.255	1.867	0.259	2.500
900	2.013	0.256	1.925	0.365	2.500
1000	1.900	0.368	1.974	0.214	2.500
1200	2.075	0.302	2.189	0.374	2.500
1400	2.042	0.258	2.244	0.314	2.500
1600	2.041	0.278	2.224	0.289	2.500
1800	2.081	0.426	2.239	0.391	2.500
2000	2.031	0.425	2.096	0.429	2.500
2100	2.147	0.363	2.252	0.462	2.500
2200	2.117	0.456	2.041	0.388	2.500
2300	2.151	0.451	2.072	0.576	2.500
2400	2.033	0.445	2.089	0.442	2.500
2500	2.144	0.551	2.084	0.565	2.500
2600	2.146	0.554	2.056	0.576	2.500
2700	2.000	0.613	2.094	0.457	2.500
2800	2.068	0.521	1.984	0.488	2.500
2900	1.957	0.513	2.072	0.497	2.500
3000	1.974	0.535	2.112	0.642	2.500


Modulation Limiting
Deviation (kHz)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
300
3000
FREQUENCY (Hz)
Instantaneous @+20dB
Instantaneous @-20dB
Steady-state @+20d
Steady-state @-20dB
limit

Audio Frequency Response

Carrier Frequency: 155.0125MHz, Separation: 12.5kHz

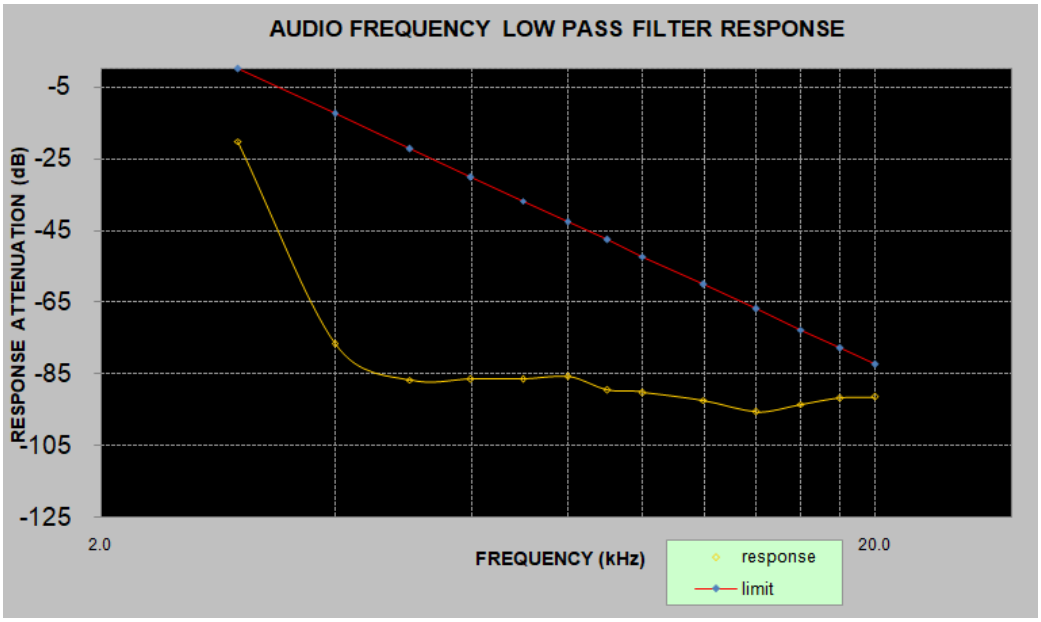
Audio Frequency (Hz)	Response Attenuation (dB)
300	-13.23
400	-9.17
500	-8.92
600	-7.21
700	-5.99
800	-4.24
900	-1.45
1000	0.00
1200	2.39
1400	2.93
1600	4.55
1800	4.11
2000	5.29
2100	6.03
2200	6.74
2300	7.32
2400	7.75
2500	8.28
2600	8.79
2700	9.34
2800	9.66
2900	9.79
3000	8.40


AUDIO FREQUENCY RESPONSE
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
RESPONSE ATTENUATION (dB)
300
FREQUENCY (Hz)
esponse
imit 1
imit 2

Audio frequency lows pass filter response

Carrier Frequency: 155.0125MHz, Separation: 12.5kHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-20.2	0.0
4.0	-76.6	-12.5
5.0	-86.7	-22.2
6.0	-86.5	-30.1
7.0	-86.4	-36.8
8.0	-85.8	-42.6
9.0	-89.7	-47.7
10.0	-90.2	-52.3
12.0	-92.4	-60.2
14.0	-95.7	-66.9
16.0	-93.5	-72.7
18.0	-91.7	-77.8
20.0	-91.6	-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.

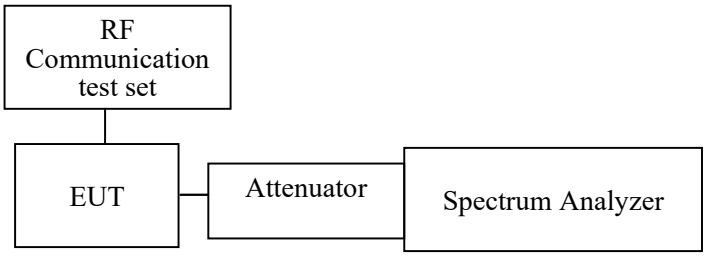
2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 (f_d –2.88 kHz) dB.

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.

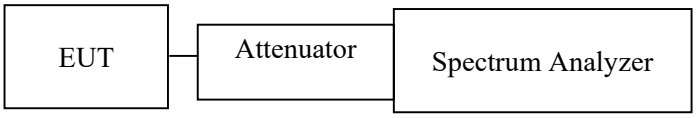
d) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the audio modulating circuit. Transmitters employing digital modulation techniques 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:	24~25 ℃
Relative Humidity:	46~47 %
ATM Pressure:	101.0 kPa

The testing was performed by Hanic Pan on 2024-02-04.

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	26 dB Bandwidth	99% Occupied Bandwidth	26 dB Bandwidth
		MHz	kHz	kHz	kHz	kHz
Analog (FM)	12.5kHz	136.0125	9.875	10.016	9.875	10.016
		155.0125	10.000	10.266	10.000	10.266
		173.9875	9.875	10.346	9.875	10.346
Digital (4FSK)	12.5kHz	136.0125	6.375	8.894	6.500	9.304
		155.0125	6.375	8.804	6.625	8.574
		173.9875	6.500	8.003	6.500	8.529

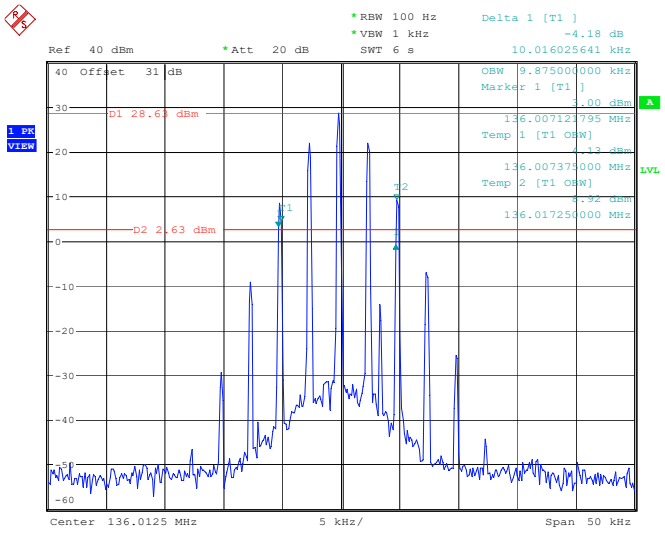
Note:
Emission bandwidth was based on calculation method instead of measurement.
Emission Designator: Per CFR 47 §2.201& §2.202, BW = 2M + 2D

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.

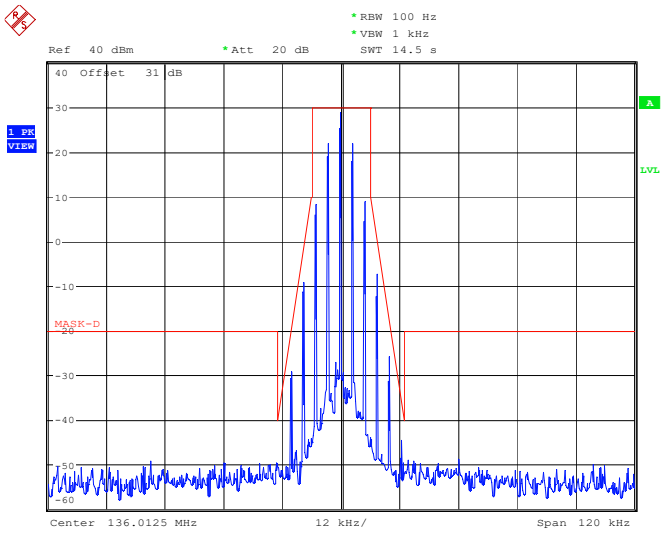
Analog

Frequency 136.0125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



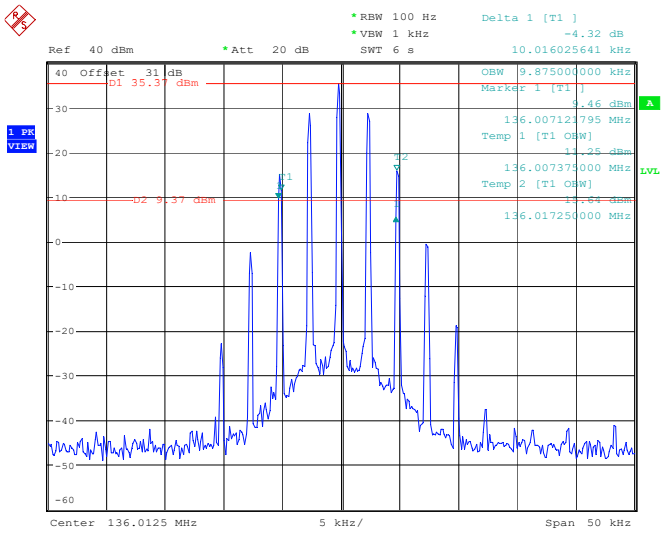
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 15:56:52

Frequency 136.0125 MHz: Emission Mask D, Low Power



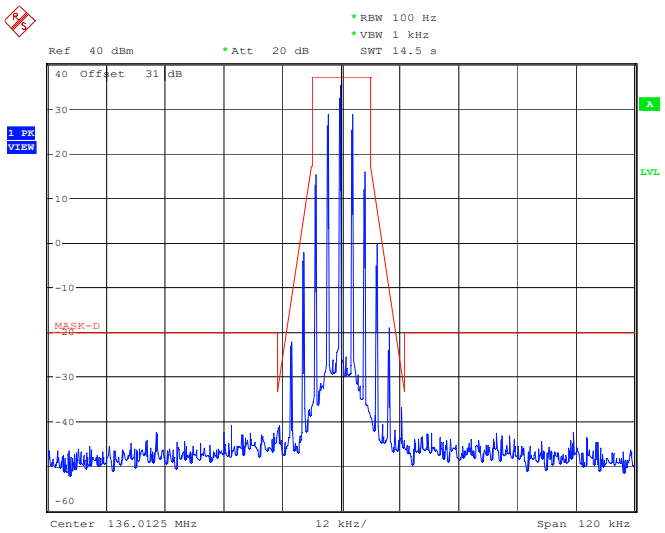
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 10:37:30

Frequency 136.0125 MHz: 99% Occupied & 26 dB Bandwidth, High Power



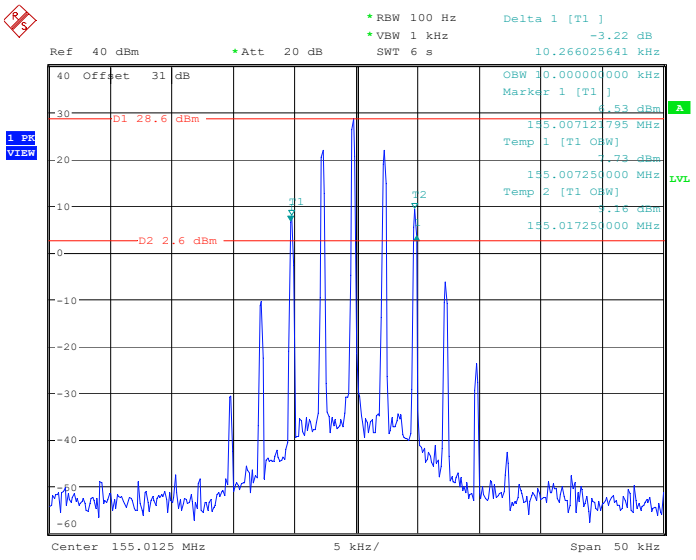
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 15:55:17

Frequency 136.0125 MHz: Emission Mask D, High Power



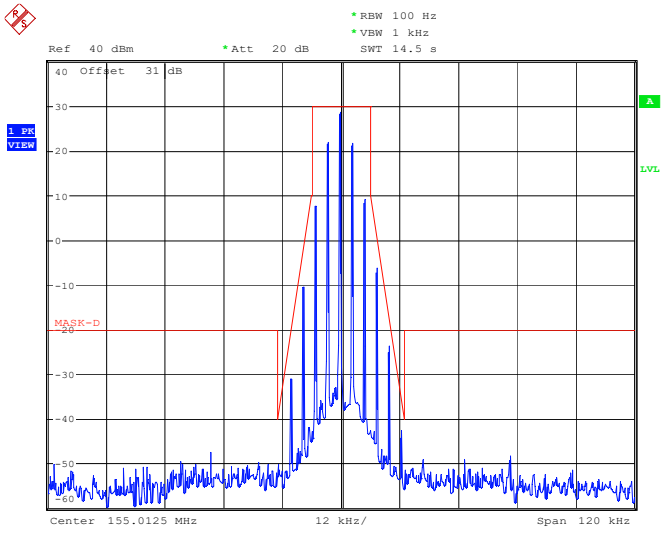
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 10:35:09

Frequency 155.0125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



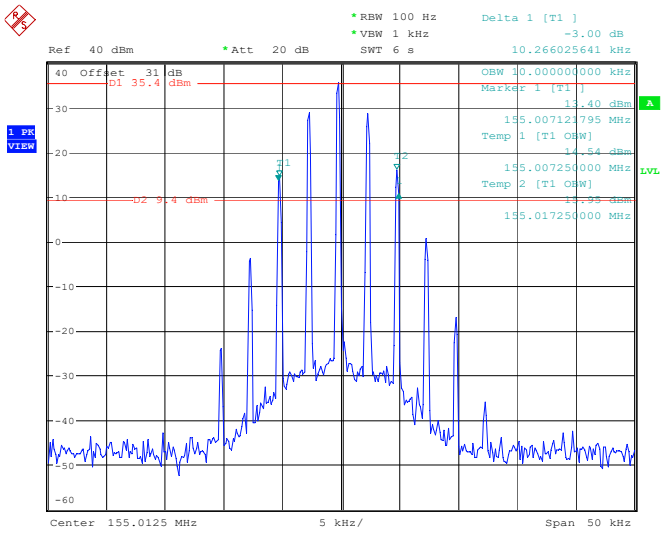
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 16:00:25

Frequency 155.0125 MHz: Emission Mask D, Low Power



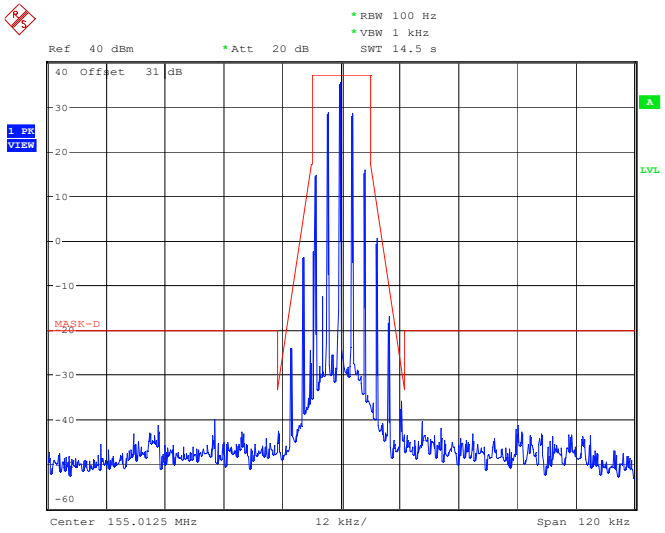
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 10:39:17

Frequency 155.0125MHz: 99% Occupied & 26 dB Bandwidth, High Power



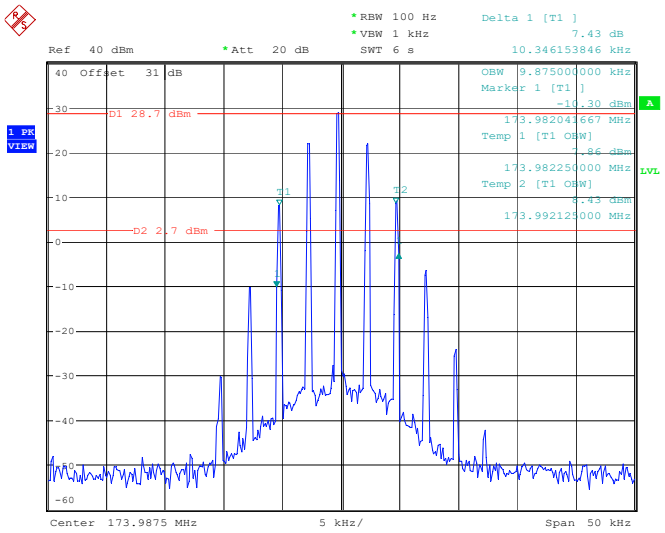
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 16:01:58

Frequency 155.0125 MHz: Emission Mask D, High Power



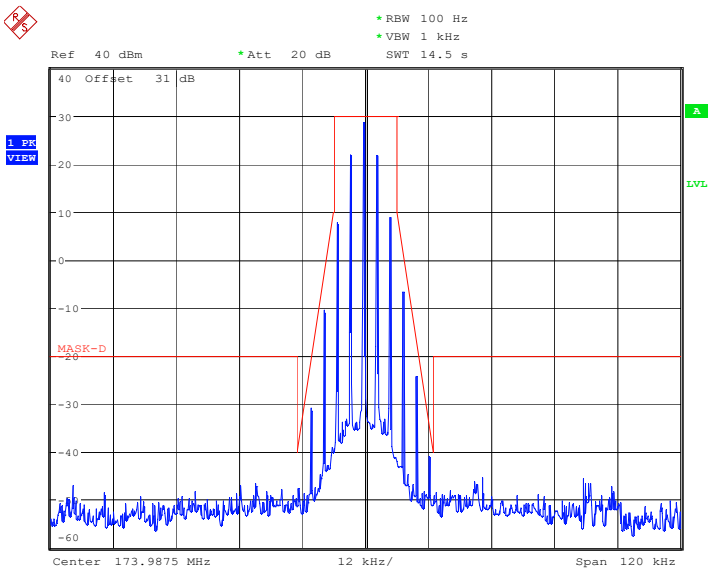
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 10:41:37

Frequency 173.9875 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



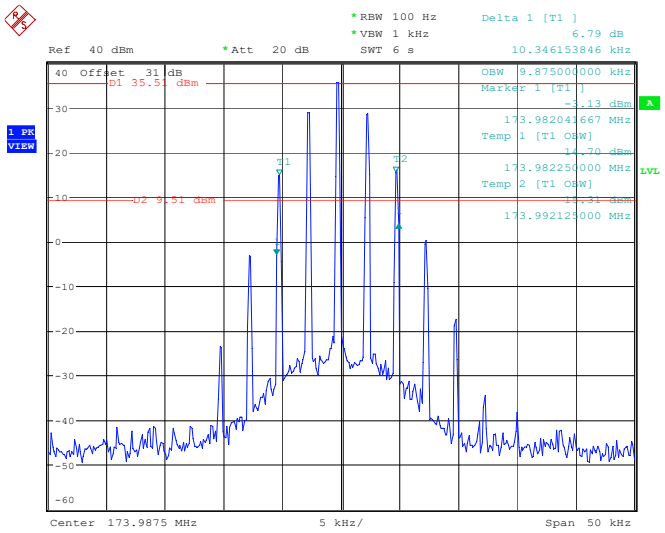
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 16:08:37

Frequency 173.9875 MHz: Emission Mask D, Low Power



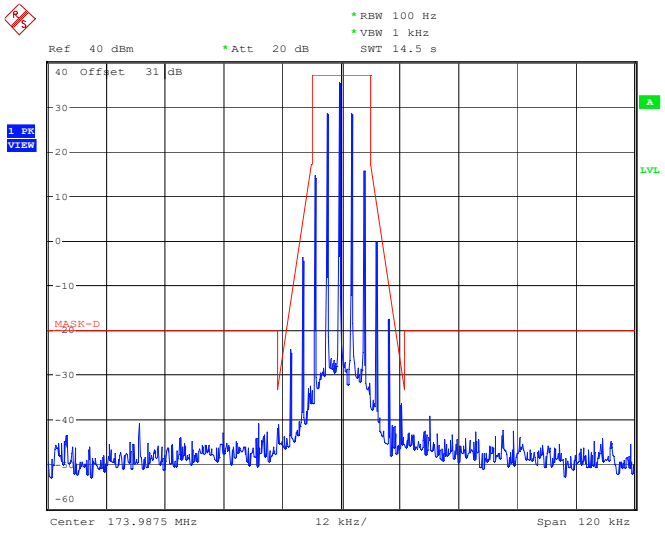
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 10:47:54

Frequency 173.9875 MHz: 99% Occupied & 26 dB Bandwidth, High Power



ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 16:04:10

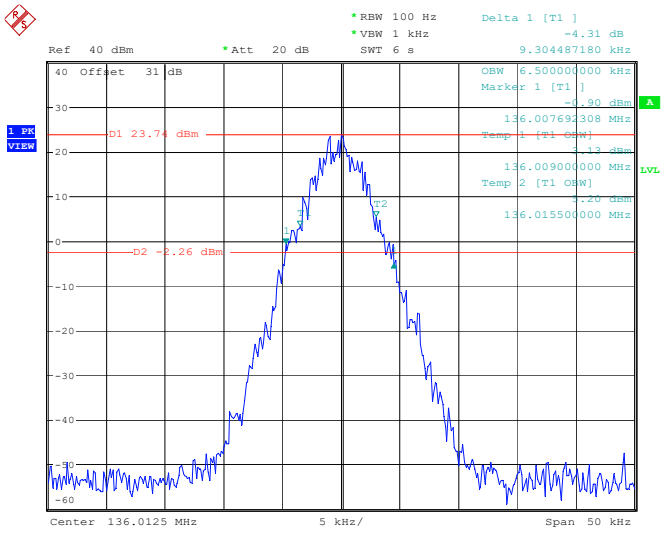
Frequency 173.9875 MHz: Emission Mask D, High Power



ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 10:45:07

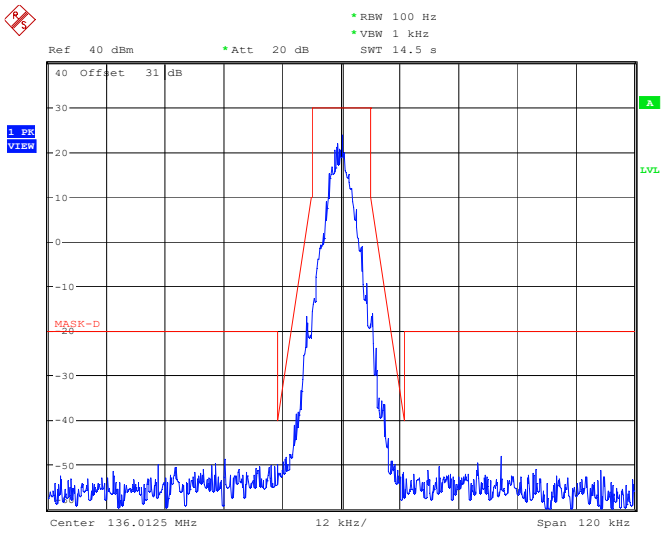
Digital

Frequency 136.0125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



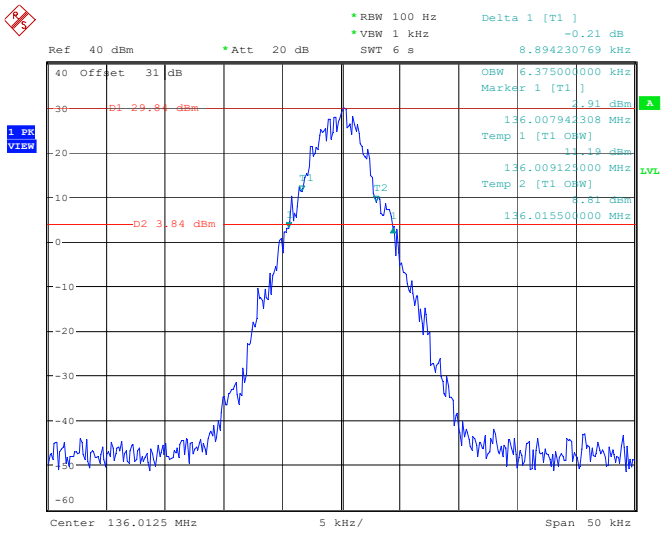
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 17:04:02

Frequency 136.0125 MHz: Emission Mask D, Low Power



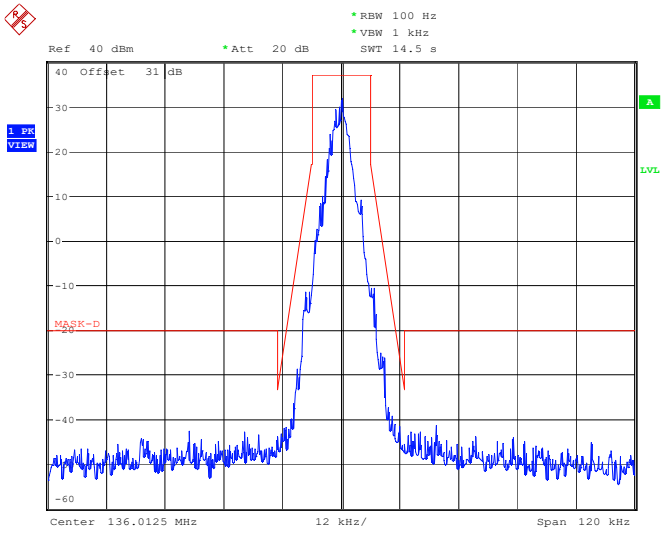
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 09:32:28

Frequency 136.0125 MHz: 99% Occupied & 26 dB Bandwidth, High Power



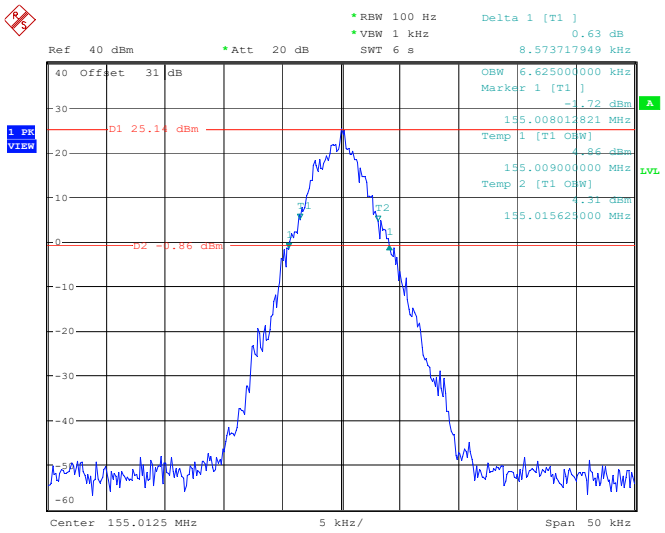
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 16:59:43

Frequency 136.0125 MHz: Emission Mask D, High Power



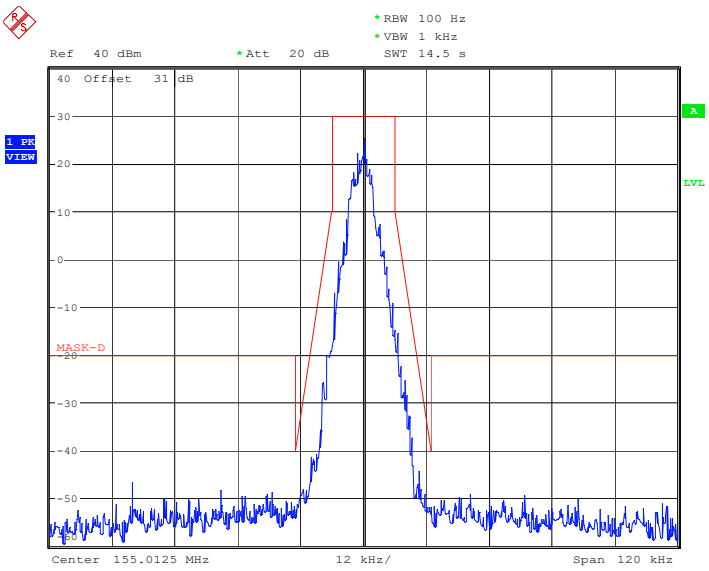
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 09:35:43

Frequency 155.0125 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



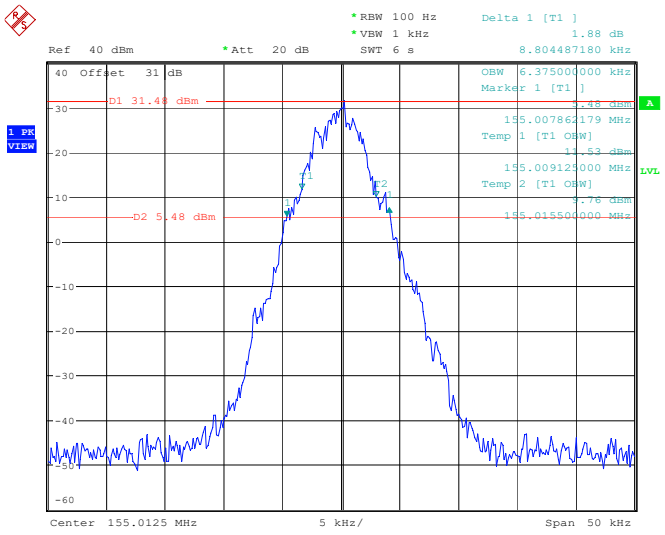
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 17:06:52

Frequency 155.0125 MHz: Emission Mask D, Low Power



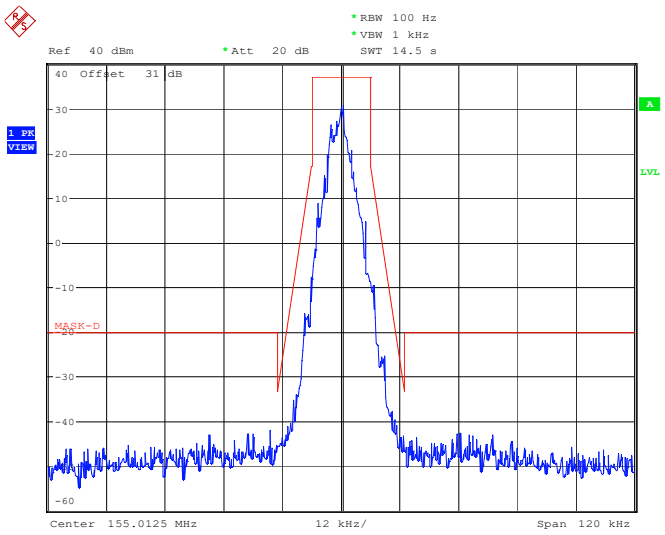
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 09:41:25

Frequency 155.0125MHz: 99% Occupied & 26 dB Bandwidth, High Power



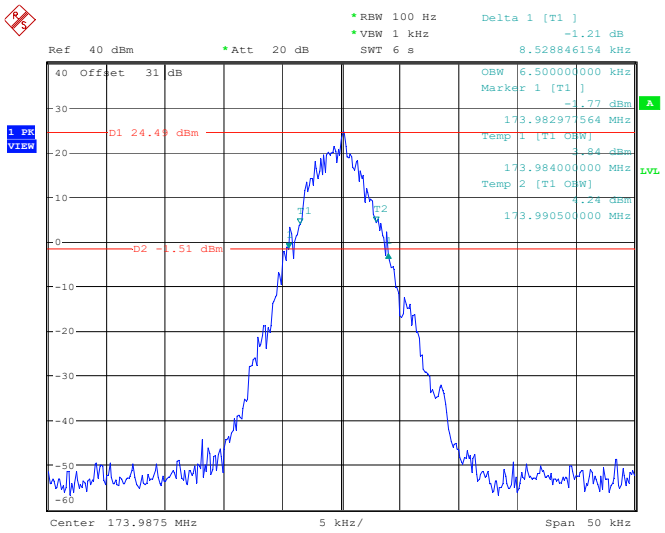
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 17:10:05

Frequency 155.0125 MHz: Emission Mask D, High Power



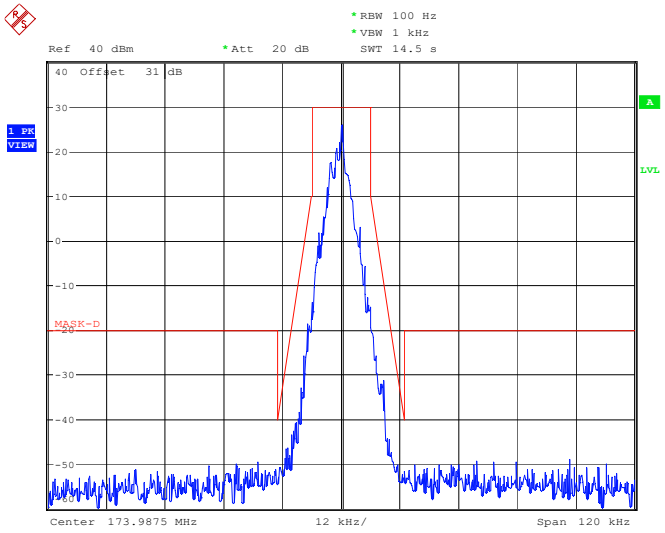
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 09:38:50

Frequency 173.9875 MHz: 99% Occupied & 26 dB Bandwidth, Low Power



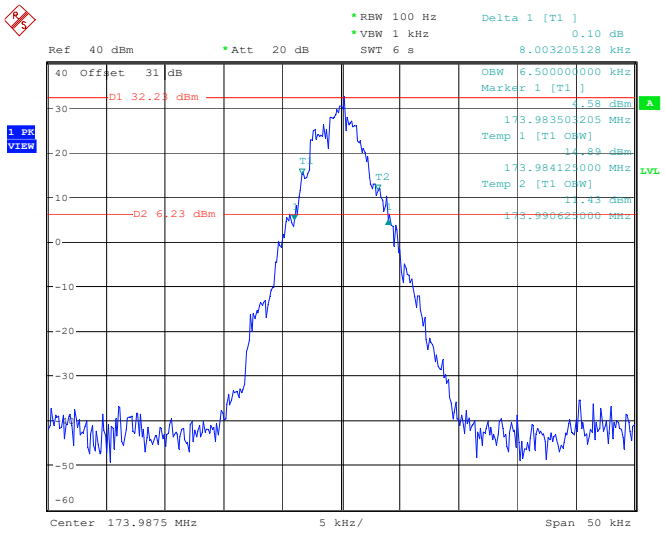
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 17:15:22

Frequency 173.9875 MHz: Emission Mask D, Low Power



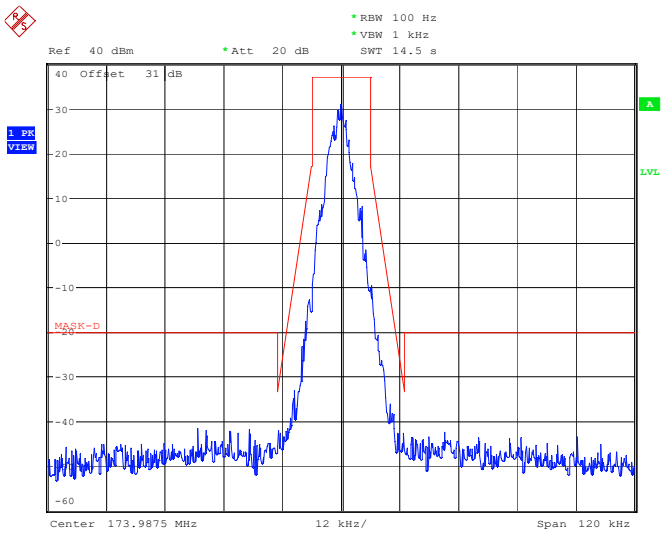
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 09:43:56

Frequency 173.9875 MHz: 99% Occupied & 26 dB Bandwidth, High Power



ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 17:12:55

Frequency 173.9875 MHz: Emission Mask D, High Power



ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 4.FEB.2024 09:46:34

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:

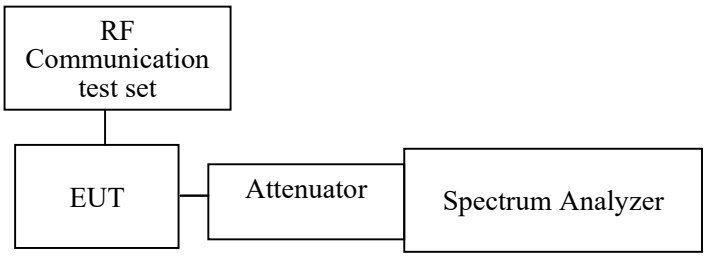
1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0, 0 dB.

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:	24~25℃
Relative Humidity:	46~47 %
ATM Pressure:	101.0 kPa

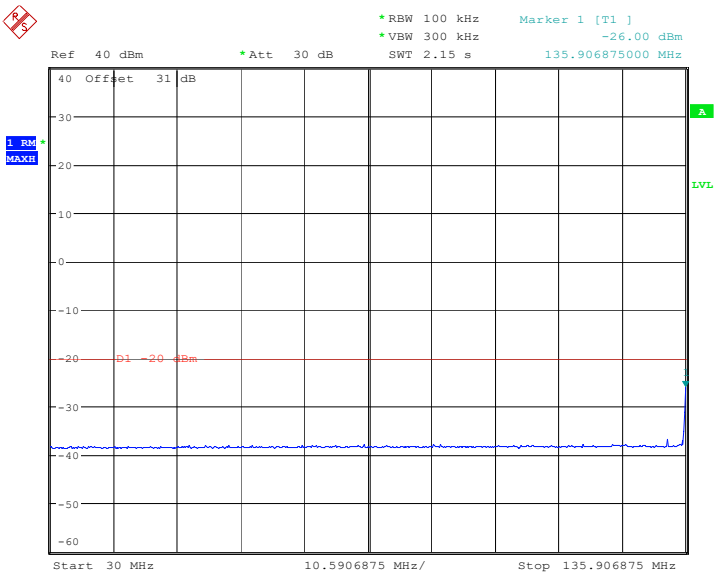
The testing was performed by Hanic Pan from 2024-03-25 to 2024-04-23.

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

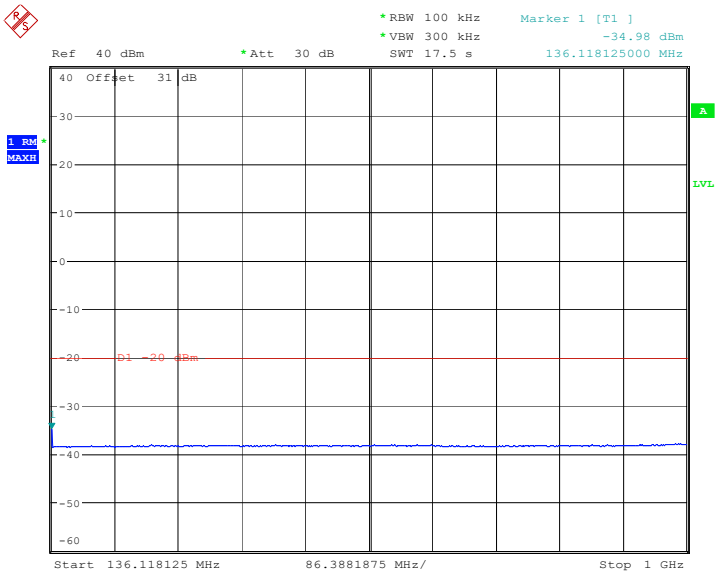
Test Result: Pass. *Please refer to the following plots.*

Analog

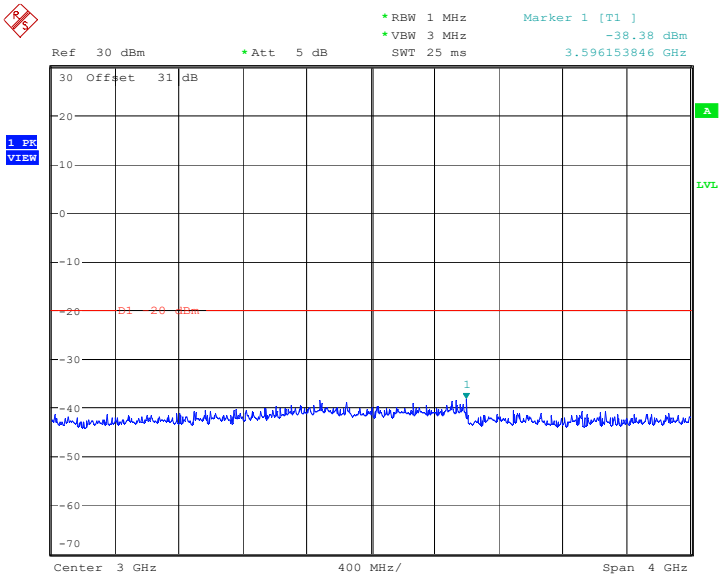
Low Channel



ProjectNo.:SZ4231215-75913E-RF Tester:Cheeb Huang
Date: 23.APR.2024 20:01:46

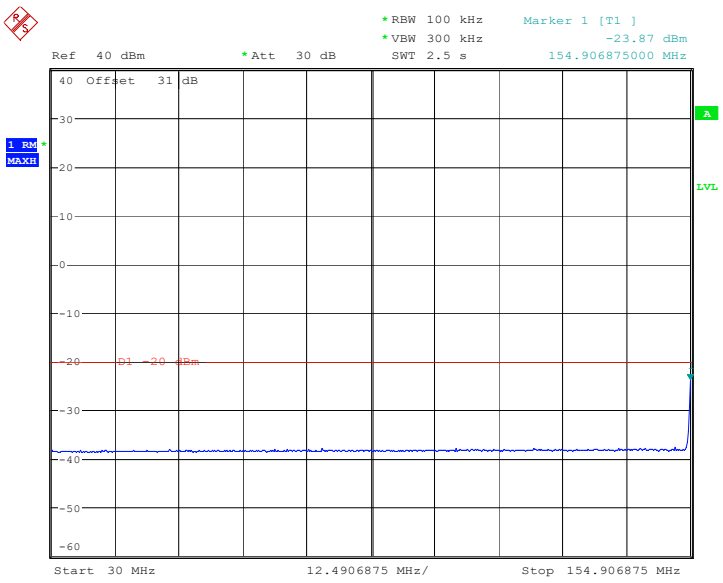


ProjectNo.:SZ4231215-75913E-RF Tester:Cheeb Huang
Date: 23.APR.2024 20:08:26

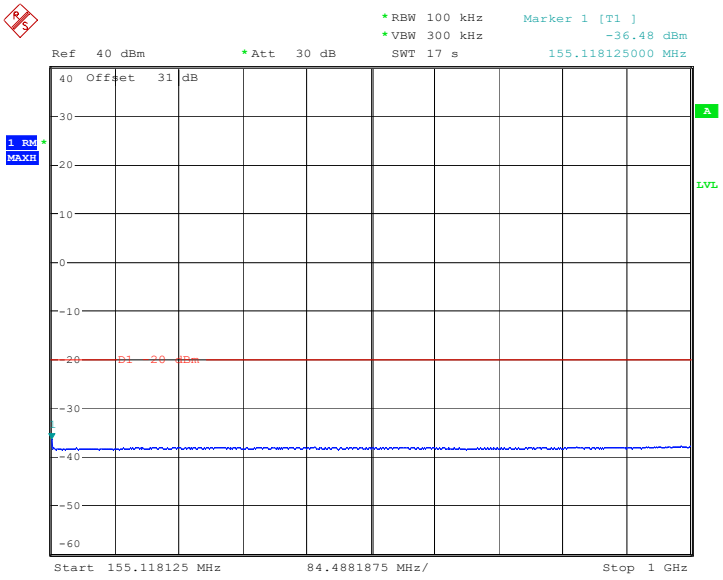


ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 25.MAR.2024 16:56:57

Middle Channel

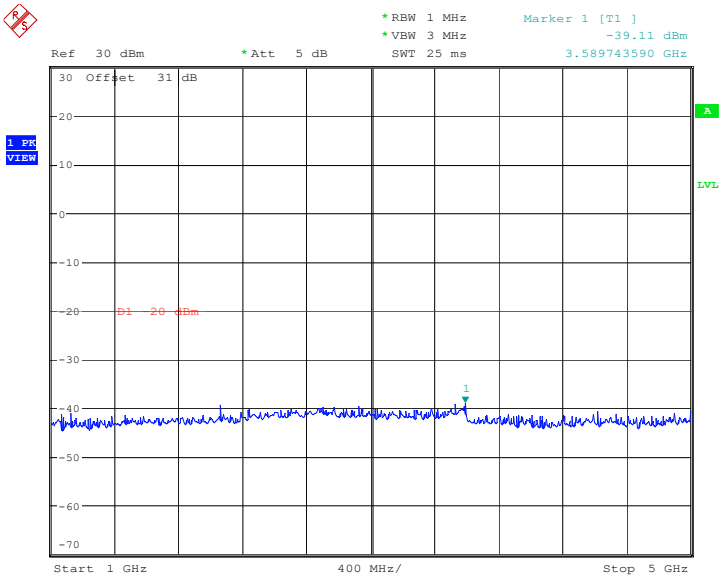


ProjectNo.:SZ4231215-75913E-RF Tester:Cheeb Huang
Date: 23.APR.2024 20:20:29



ProjectNo.:SZ4231215-75913E-RF Tester:Cheeb Huang

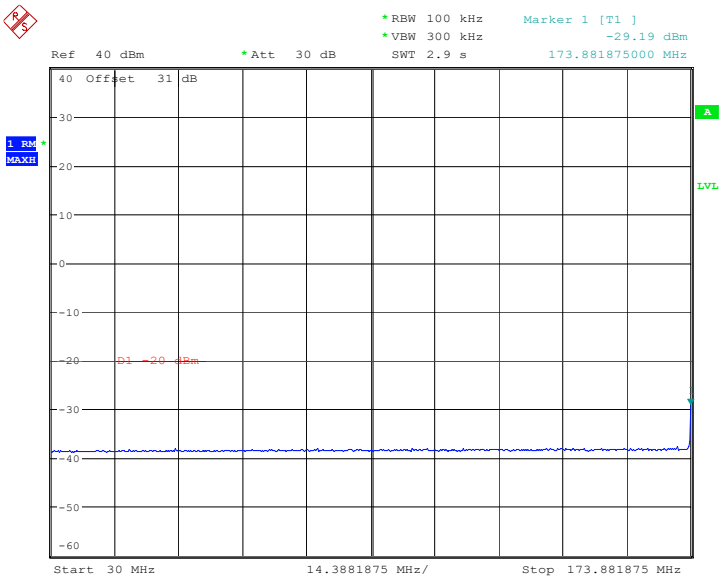
Date: 23.APR.2024 20:24:07



ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan

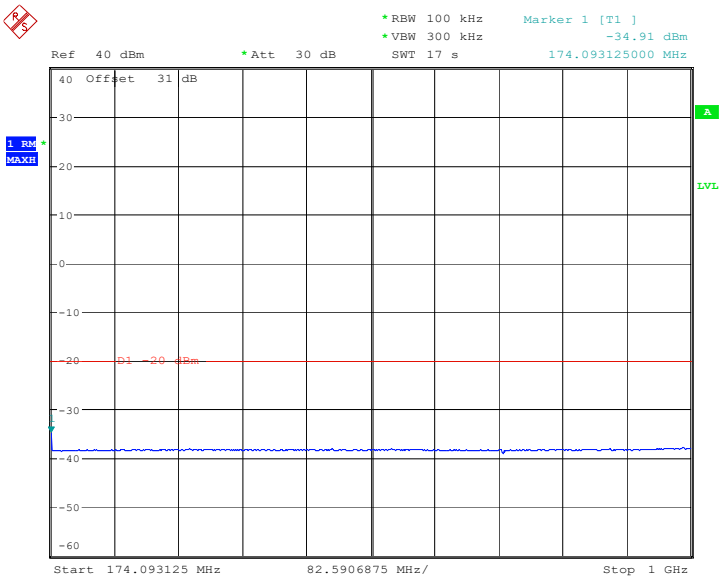
Date: 25.MAR.2024 16:56:19

High Channel



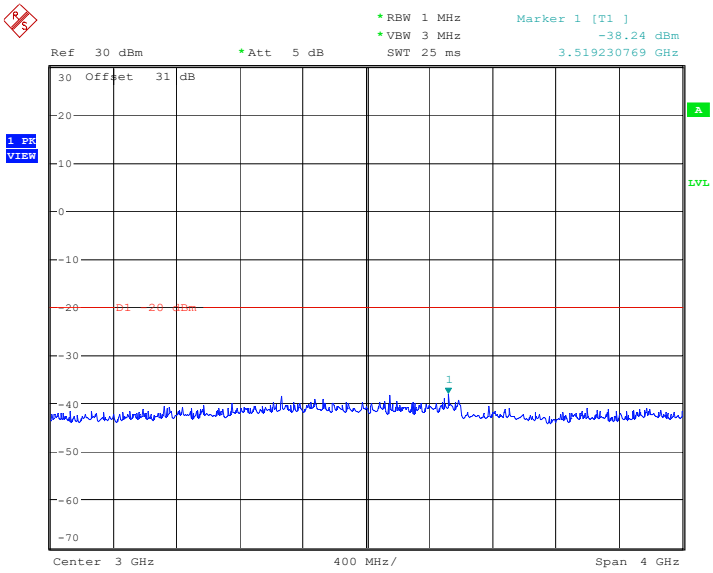
ProjectNo.:SZ4231215-75913E-RF Tester:Cheeb Huang

Date: 23.APR.2024 20:26:16



ProjectNo.:SZ4231215-75913E-RF Tester:Cheeb Huang

Date: 23.APR.2024 20:29:58

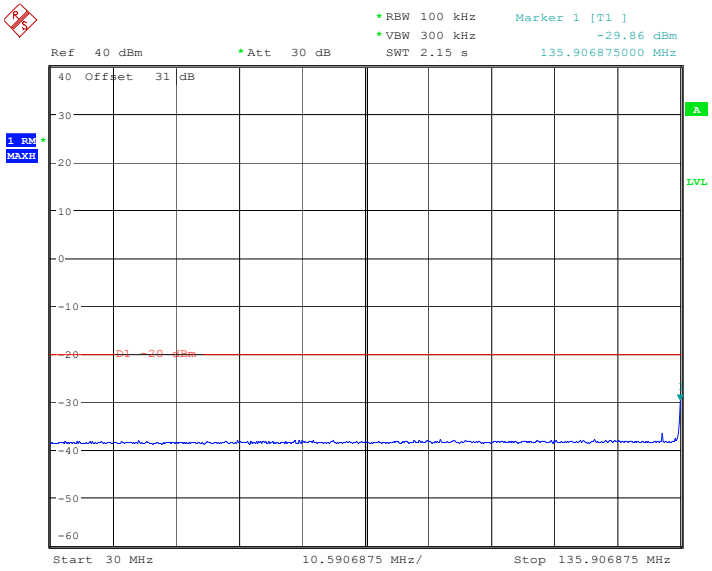


ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan

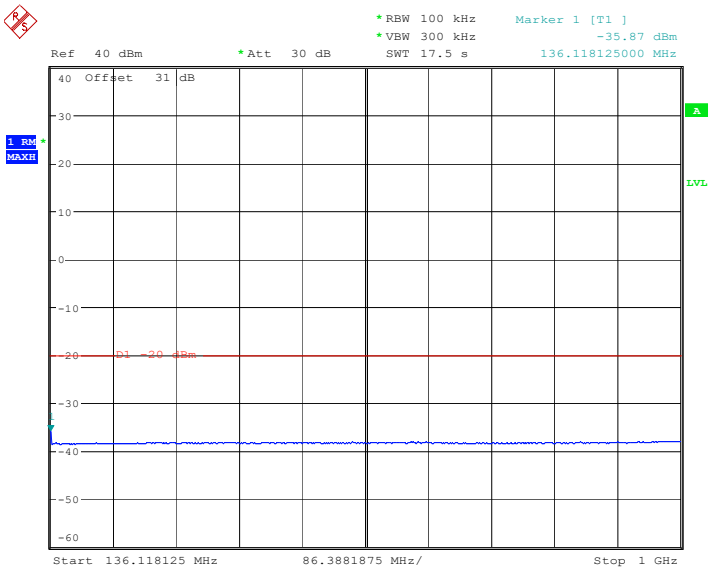
Date: 25.MAR.2024 16:57:57

Digital

Low Channel



ProjectNo.:SZ4231215-75913E-RF Tester:Cheeb Huang
Date: 23.APR.2024 20:04:08



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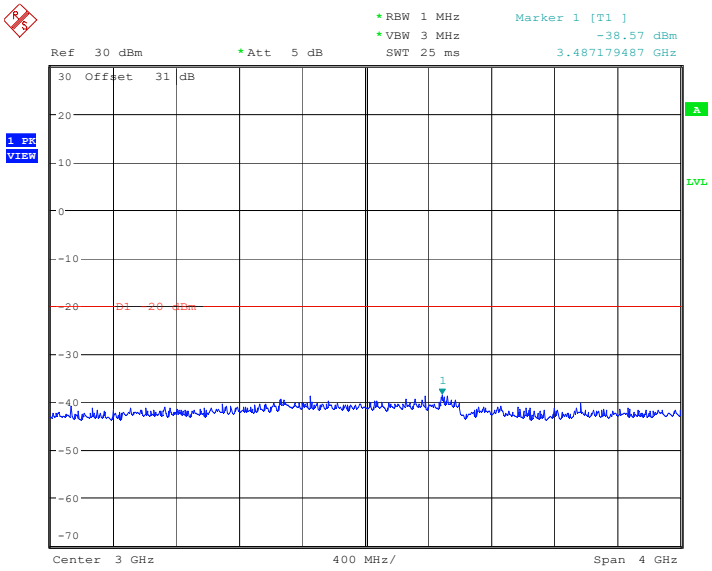
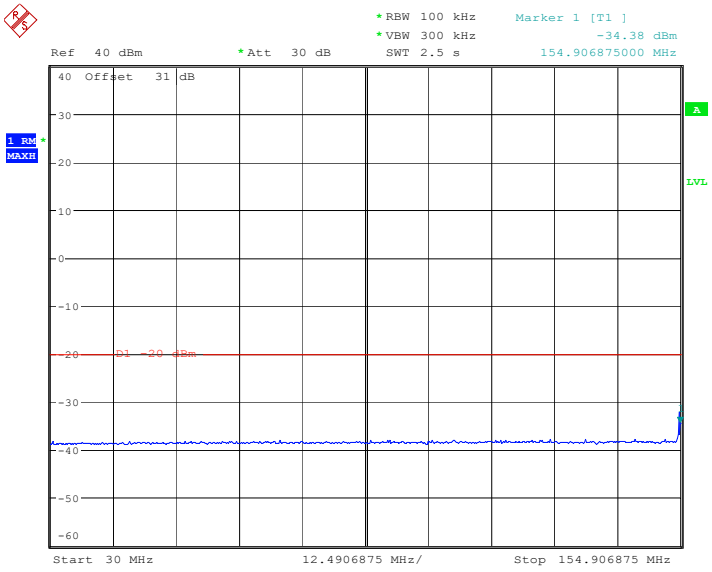


ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan
Date: 25.MAR.2024 17:03:04

Middle Channel



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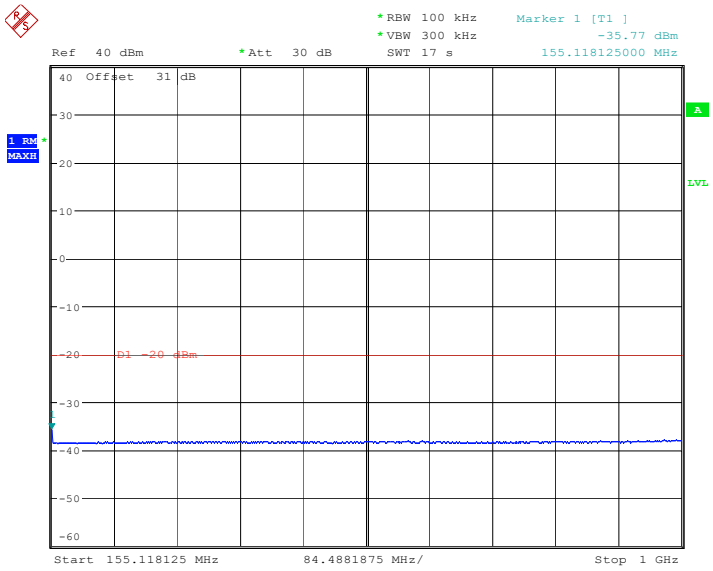
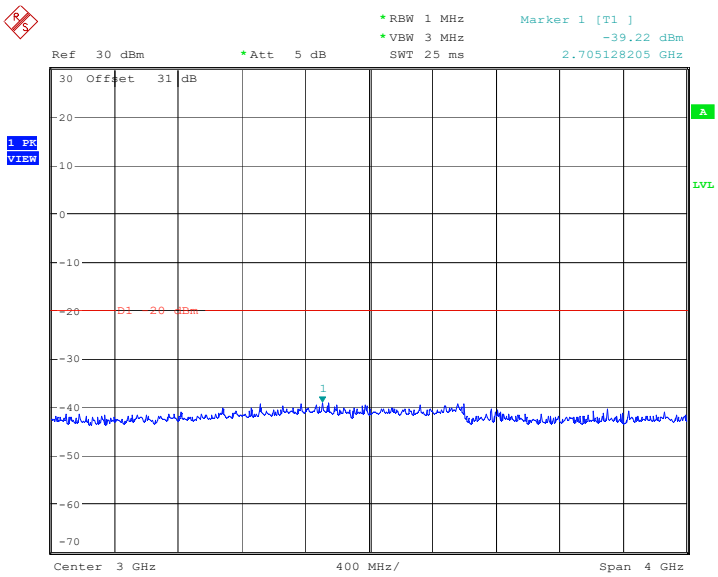


ProjectNo.:SZ4231215-75913E-RF Tester:Cheeb Huang

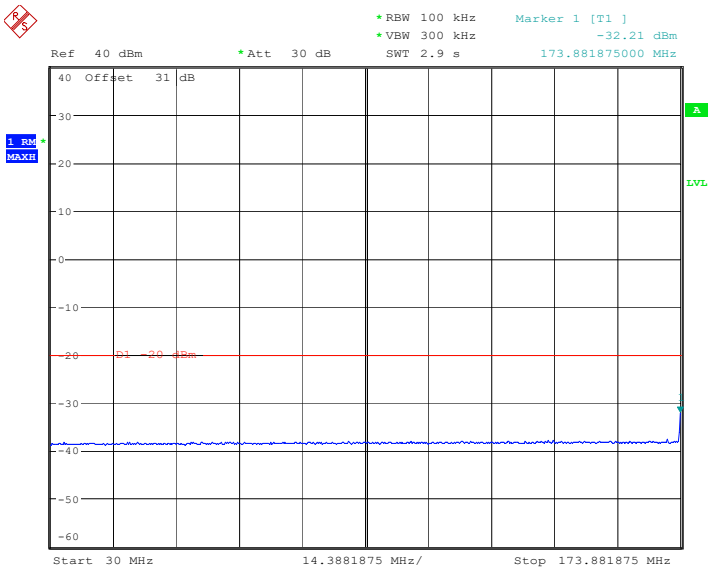
Date: 23.APR.2024 20:23:21



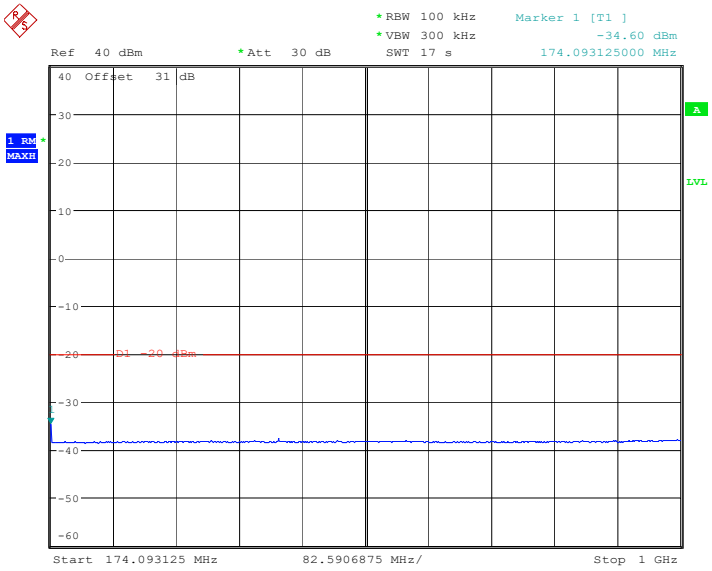
ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan

Date: 25.MAR.2024 17:02:11

High Channel



ProjectNo.:SZ4231215-75913E-RF Tester:Cheeb Huang
Date: 23.APR.2024 20:26:53



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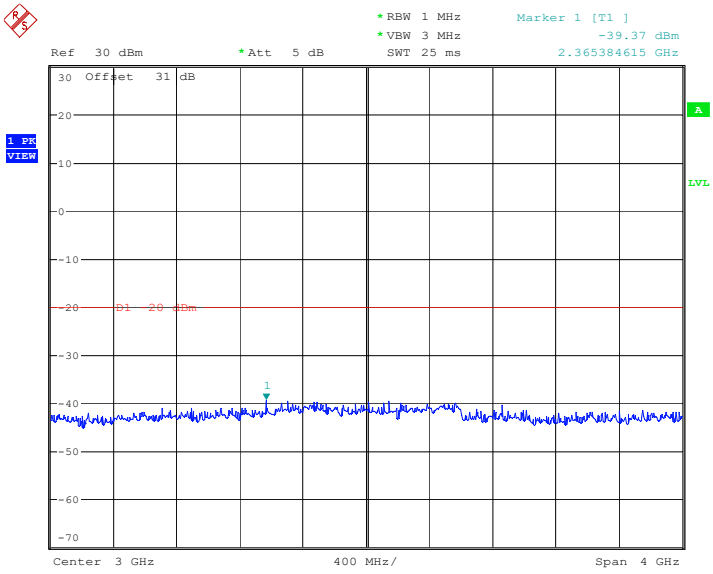


ProjectNo.:SZ4231215-75913E-RF Tester:Hanic Pan

Date: 25.MAR.2024 17:01:47

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:	22~24 ℃
Relative Humidity:	54~61 %
ATM Pressure:	101.0~101.2 kPa

The testing was performed by Warren Huang on 2024-01-31 for below 1GHz and Dylan Yang on 2024-01-31 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.*

For Model: DP580

30MHz-1GHz:

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								
136.0125MHz								
272.025	22.31	H	-57.7	0.90	0.0	-58.60	-20	38.60
272.025	23.16	V	-53.7	0.90	0.0	-54.60	-20	34.60
155.0125MHz								
310.025	23.20	H	-53.8	0.94	0.0	-54.74	-20	34.74
310.025	23.78	V	-50.4	0.94	0.0	-51.34	-20	31.34
173.9875MHz								
347.975	23.36	H	-52.5	0.98	0.0	-53.48	-20	33.48
347.975	24.31	V	-48.5	0.98	0.0	-49.48	-20	29.48
Digital								
136.0125MHz								
272.025	22.13	H	-57.9	0.90	0.0	-58.80	-20	38.80
272.025	21.89	V	-54.9	0.90	0.0	-55.80	-20	35.80
155.0125MHz								
310.025	22.56	H	-54.4	0.94	0.0	-55.34	-20	35.34
310.025	23.74	V	-50.5	0.94	0.0	-51.44	-20	31.44
173.9875MHz								
347.975	23.18	H	-52.7	0.98	0.0	-53.68	-20	33.68
347.975	24.69	V	-48.1	0.98	0.0	-49.08	-20	29.08

For Model: DP585

30MHz-1GHz:

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								
136.0125MHz								
272.025	22.34	H	-57.7	0.90	0.0	-58.60	-20	38.60
272.025	22.23	V	-54.6	0.90	0.0	-55.50	-20	35.50
155.0125MHz								
310.025	22.48	H	-54.5	0.94	0.0	-55.44	-20	35.44
310.025	23.55	V	-50.7	0.94	0.0	-51.64	-20	31.64
173.9875MHz								
347.975	23.39	H	-52.5	0.98	0.0	-53.48	-20	33.48
347.975	24.85	V	-47.9	0.98	0.0	-48.88	-20	28.88
Digital								
136.0125MHz								
272.025	22.45	H	-57.6	0.90	0.0	-58.50	-20	38.50
272.025	23.95	V	-52.9	0.90	0.0	-53.80	-20	33.80
155.0125MHz								
310.025	23.36	H	-53.6	0.94	0.0	-54.54	-20	34.54
310.025	23.65	V	-50.6	0.94	0.0	-51.54	-20	31.54
173.9875MHz								
347.975	23.20	H	-52.7	0.98	0.0	-53.68	-20	33.68
347.975	24.16	V	-48.6	0.98	0.0	-49.58	-20	29.58

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

Model: DP580

Above 1GHz:

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								
136.0125MHz								
1088.10	45.51	H	-62.0	0.70	6.50	-56.20	-20	36.20
1088.10	46.19	V	-62.7	0.70	6.50	-56.90	-20	36.90
1224.11	44.65	H	-63.0	0.80	6.90	-56.90	-20	36.90
1224.11	44.93	V	-62.9	0.80	6.90	-56.80	-20	36.80
1360.13	45.37	H	-62.3	0.80	7.90	-55.20	-20	35.20
1088.10	45.51	H	-62.0	0.70	6.50	-56.20	-20	36.20
155.0125MHz								
1085.09	45.95	H	-61.6	0.70	6.50	-55.80	-20	35.80
1085.09	46.24	V	-62.7	0.70	6.50	-56.90	-20	36.90
1240.10	44.47	H	-63.1	0.80	6.90	-57.00	-20	37.00
1240.10	45.79	V	-62.1	0.80	6.90	-56.00	-20	36.00
1395.11	46.15	H	-61.6	0.80	7.90	-54.50	-20	34.50
1395.11	45.21	V	-63.2	0.80	7.90	-56.10	-20	36.10
173.9875MHz								
1043.93	45.80	H	-61.7	0.70	6.20	-56.20	-20	36.20
1043.93	45.87	V	-63.2	0.70	6.20	-57.70	-20	37.70
1217.91	44.45	H	-63.2	0.80	6.90	-57.10	-20	37.10
1217.91	44.99	V	-62.9	0.80	6.90	-56.80	-20	36.80
1391.90	45.70	H	-62.0	0.80	7.90	-54.90	-20	34.90
1391.90	45.53	V	-62.9	0.80	7.90	-55.80	-20	35.80

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								
136.0125MHz								
1088.00	45.33	H	-62.2	0.70	6.50	-56.40	-20	36.40
1088.00	45.60	V	-63.3	0.70	6.50	-57.50	-20	37.50
1224.00	44.35	H	-63.3	0.80	6.90	-57.20	-20	37.20
1224.00	44.85	V	-63.0	0.80	6.90	-56.90	-20	36.90
1360.00	45.19	H	-62.5	0.80	7.90	-55.40	-20	35.40
1360.00	44.78	V	-63.6	0.80	7.90	-56.50	-20	36.50
155.0125MHz								
1085.09	45.35	H	-62.2	0.70	6.50	-56.40	-20	36.40
1085.09	46.10	V	-62.8	0.70	6.50	-57.00	-20	37.00
1240.10	44.53	H	-63.1	0.80	6.90	-57.00	-20	37.00
1240.10	45.81	V	-62.1	0.80	6.90	-56.00	-20	36.00
1395.11	45.64	H	-62.1	0.80	7.90	-55.00	-20	35.00
1395.11	44.99	V	-63.4	0.80	7.90	-56.30	-20	36.30
173.9875MHz								
1043.93	45.66	H	-61.8	0.70	6.20	-56.30	-20	36.30
1043.93	46.29	V	-62.8	0.70	6.20	-57.30	-20	37.30
1217.91	45.23	H	-62.4	0.80	6.90	-56.30	-20	36.30
1217.91	45.75	V	-62.1	0.80	6.90	-56.00	-20	36.00
1391.90	45.72	H	-62.0	0.80	7.90	-54.90	-20	34.90
1391.90	45.02	V	-63.4	0.80	7.90	-56.30	-20	36.30

FCC §2.1055 & §90.213 - FREQUENCY STABILITY

Applicable Standard

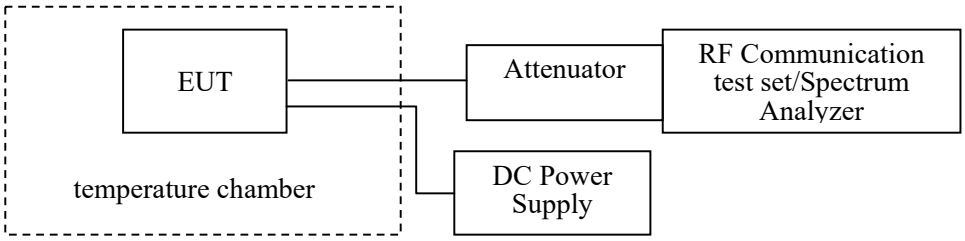
FCC §2.1055 and §90.213

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:	24~25℃
Relative Humidity:	46~47 %
ATM Pressure:	101.0 kPa

The testing was performed by Hanic Pan on 2024-02-05.

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

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

		fc =	155.0125	MHz FM Un-modulation	
Temperature	**Voltage**	**Reading**	**Frequency Error**	**Limit**	
℃	**Vdc**	**MHz**	**ppm**	**ppm**	
-30	NV	155.0125630	0.41	5	
-20		155.0125740	0.48		
-10		155.0125440	0.28		
0		155.0125320	0.21		
10		155.0125380	0.25		
20		155.0125650	0.42		
30		155.0125690	0.45		
40		155.0125710	0.46		
50		155.0125800	0.52		
20	LV	155.0125550	0.35		
20	HV	155.0125410	0.26		

FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

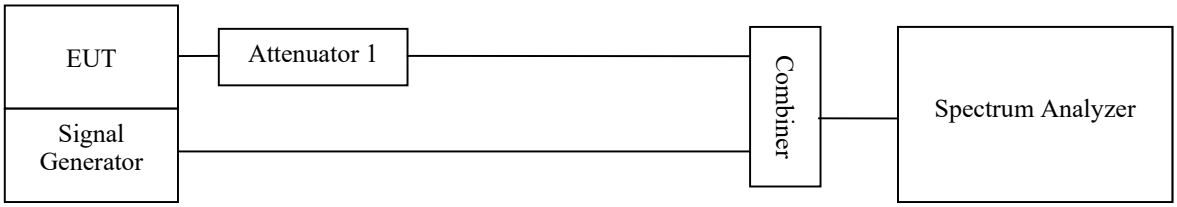
Applicable Standard

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:	24~25 ℃
Relative Humidity:	46~47 %
ATM Pressure:	101.0 kPa

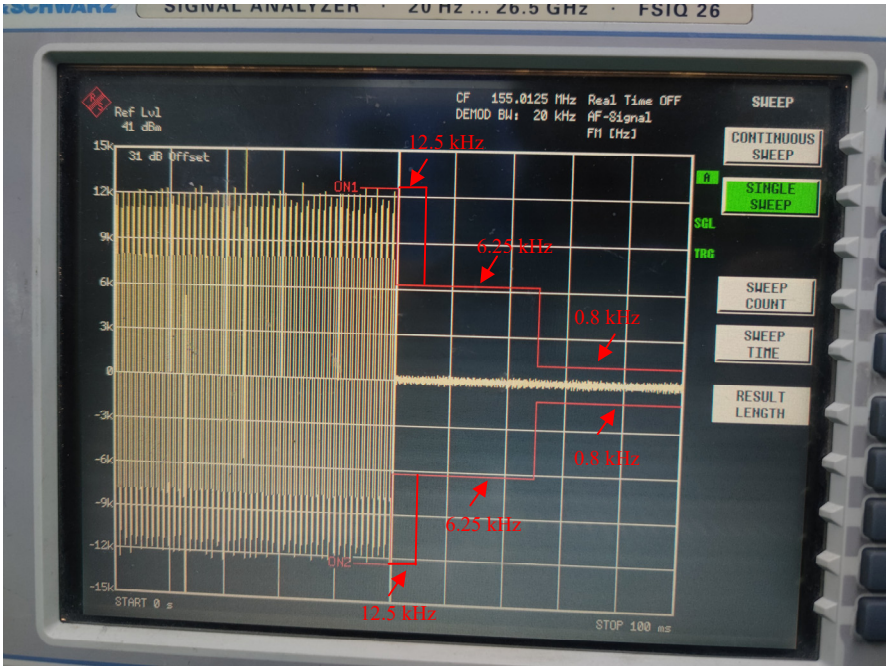
The testing was performed by Hanic Pan on 2024-02-05.

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

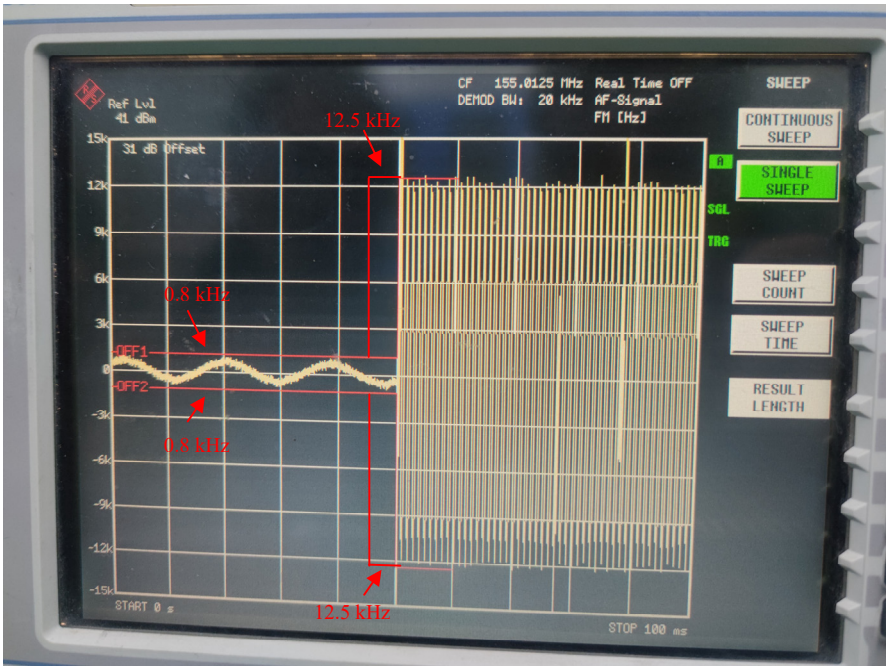
Channel Separation (kHz)	Transient Period (ms)	Transient Frequency	Result
12.5	5(t_1)	±12.5 kHz	Pass
	20(t_2)	±6.25 kHz	
	5(t_3)	±12.5 kHz	

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*+/-5ppm=+/-0.78kHz

Turn on



Turn off


CF 155.0125 MHz Real Time OFF
DEMOD BW: 20 kHz AF-Signal
FM [Hz]
Ref Lvl
41 dBm
31 dB Offset
12.5 kHz
0.8 kHz
OFF1
OFF2
0.8 kHz
12.5 kHz
START 0 s
STOP 100 ms
SWEEP
CONTINUOUS SWEEP
SINGLE SWEEP
SGL
TRG
SWEEP COUNT
SWEEP TIME
RESULT LENGTH

EUT PHOTOGRAPHS

Please refer to the attachment SZ4231215-75913E-RF External photo and SZ4231215-75913E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment SZ4231215-75913E-RFB Test Setup photo.

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