FCC TEST REPORT

For

ABELL INDUSTRIES CO., LTD

DMR Digital Repeater

Test Model: R50

Additional Model No.: R50(10), R50(20)

Prepared for	:	ABELL INDUSTRIES CO.,LTD
Address	:	701-702, 7/F, D Bldg, Qianwan Hard Technology Industrial Park, Nanchang community, Xixiang Rd., Bao An Dist., Shenzhen.
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	July 03, 2025
Number of tested samples	:	2
Sample No.	:	A250701051-1, A250701051-2
Serial number	:	Prototype
Date of Test	:	July 03, 2025 ~ July 31, 2025
Date of Report	:	August 01, 2025

NVLAP TESTING NVLAP LAB CODE 600167-0

FCC TEST REPORT
FCC Part 90

Report Reference No.	:	**LCSA07025051EA**
Date of Issue	:	August 01, 2025
Testing Laboratory Name.....	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	:	**ABELL INDUSTRIES CO., LTD**
Address	:	701-702, 7/F, D Bldg, Qianwan Hard Technology Industrial Park, Nanchang community, Xixiang Rd., Bao An Dist., Shenzhen.
Test Specification		
Standard.....	:	FCC CFR Title 47 Part 2, Part 90
Test Report Form No.	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2011-03

Test Item Description.....	:	**DMR Digital Repeater**
Trade Mark	:	ABELL
Test Model.....	:	R50
Ratings	:	Please Refer to Page 6
Result	:	**Pass**

Compiled by:	**Supervised by:**	**Approved by:**
Martin Lee/ Administrator	Jack Liu/ Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCSA07025051EA	August 01, 2025 Date of issue

Test Model.....	: R50
EUT.....	: DMR Digital Repeater
Applicant.....	**: ABELL INDUSTRIES CO., LTD**
Address.....	: 701-702, 7/F, D Bldg, Qianwan Hard Technology Industrial Park, Nanchang community, Xixiang Rd., Bao An Dist., Shenzhen.
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: ABELL INDUSTRIES CO., LTD**
Address.....	: 701-702, 7/F, D Bldg, Qianwan Hard Technology Industrial Park, Nanchang community, Xixiang Rd., Bao An Dist., Shenzhen.
Telephone.....	: /
Fax.....	: /
Factory.....	**: ABELL INDUSTRIES CO., LTD**
Address.....	: 701-702, 7/F, D Bldg, Qianwan Hard Technology Industrial Park, Nanchang community, Xixiang Rd., Bao An Dist., Shenzhen.
Telephone.....	: /
Fax.....	: /

Test Result	Pass

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Report Version	Issue Date	Revision Content	Revised By
000	August 01, 2025	Initial Issue	--

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Test Report Description Page

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	DMR Digital Repeater
Test Model	:	R50
Additional Model No.	:	R50(10), R50(20)
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Ratings	:	Power: 10/20Watt Input: AC 100-240V, 2.6A, 50-60Hz DC 12V
Hardware Version	:	V1
Software Version	:	V1.06.01
PMR	:	
Operating Frequency	:	400~470MHz
Channel Separation	:	Analog Voice 12.5KHz Digital Voice/Data 12.5KHz
Modulation Type	:	FM for Analog Voice 4FSK for Digital Voice/Digital Data
Rated Output Power	:	High Power 20W; Lower Power 10W
Antenna Description	:	External Antenna, 5.0dBi (Max.)

Note: For a more detailed antenna description, please refer to the antenna specifications or the antenna report provided by the customer.

1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
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1.3. External I/O Cable

I/O Port Description	Quantity	Cable
Power Port	1	N/A
ANT Port	1	N/A
EXT-I/O Port	1	N/A
USB Port	1	N/A
DC 12V Port	1	N/A

1.4. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10:2013 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to ETSI TR 100 028 " Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics" and is documented in the Shenzhen LCS Compliance Testing Laboratory Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6. Measurement Uncertainty

Test Item	Uncertainty	Note
Frequency error	30 Hz	(1)
Transmitter power conducted	0.62 dB	(1)
Transmitter power Radiated	2.67 dB	(1)
Conducted spurious emission 9KHz-12.75 GHz	1.22 dB	(1)
Conducted Emission 9KHz-30MHz	1.63 dB	(1)
Radiated spurious emission 30~1000MHz	3.10 dB	(1)
Radiated spurious emission 1~18GHz	3.80 dB	(1)
Radiated spurious emission 18-40GHz	3.90 dB	(1)
Occupied Bandwidth	35Hz	(1)
Emission Mask	1.25dB	(1)
Transmitter Frequency Behavior	6.8%	(1)

(1) . This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7. Description of Test Modes

The EUT has been tested under typical operating condition. As, test modes selected as below by the technical parameters of the EUT:

Operation Mode	Description of operation mode	Additional information
TM1	4FSK+BW12.5KHz+TX	The EUT is set with 4FSK modulation and 12.5KHz bandwidth at maximum rated power for transmitter, powered by DC 12V power
TM2	4FSK+BW12.5KHz+TX	The EUT is set with 4FSK modulation and 12.5KHz bandwidth at minimum rated power for transmitter, powered by DC 12V power
TM3	FM+BW12.5KHz+TX	The EUT is set with FM modulation and 12.5KHz bandwidth at maximum rated power for transmitter, powered by DC 12V power
TM4	FM+BW12.5KHz+TX	The EUT is set with FM modulation and 12.5KHz bandwidth at minimum rated power for transmitter, powered by DC 12V power

2. SYSTEM TEST CONFIGURATION

2.1. TEST STANDARDS

The tests were performed according to following standards:
FCC Rules Part 90: PRIVATE LAND MOBILE RADIO SERVICES.
ANSI/TIA-603-E-2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
47 CFR FCC Part 15 Subpart B: Unintentional Radiators
FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
ANSI C63.26:2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.
ANSI C63.4:2014: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

2.2. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.3. EUT Exercise

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.4. Test Sample

The application provides 1 samples to meet requirement;

Sample Number	Description
Sample 1	continuous transmit

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. EUT Exercise Software

N/ A

3.3. Special Accessories

N/ A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULT

Transmitter Requirements				
FCC General Rules Part (47CFR)	Description of Test	Test Sample	Result	Remark
2.1046 90.205	Maximum Transmitter Power	Sample 1	Compliant	Note 1
2.1047 (a) 90.207	Modulation Characteristics - Audio Frequency Response	Sample 1	Compliant	Note 1
2.1047 (b) 90.207	Modulation Characteristics - Modulation Limiting	Sample 1	Compliant	Note 1
2.1049 90.210	Occupied Bandwidth Tests; Emission Mask	Sample 1	Compliant	Note 1
2.1055 90.213	Frequency Stability	Sample 1	Compliant	Note 1
90.214	Transient Frequency Behavior	Sample 1	Compliant	Note 1
2.1053 90.210	Transmitter Radiated Spurious Emission	Sample 1	Compliant	Note 1
2.1051 90.210	Spurious Emission On Antenna Port	Sample 1	Compliant	Note 1

Remark:
1. Note 1 – Test results inside test report;
2. Note 2 – N/A - Not Applicable for this device.because it is digital device.*

5. TEST CONDITIONS AND RESULTS

5.1. Maximum Transmitter Power

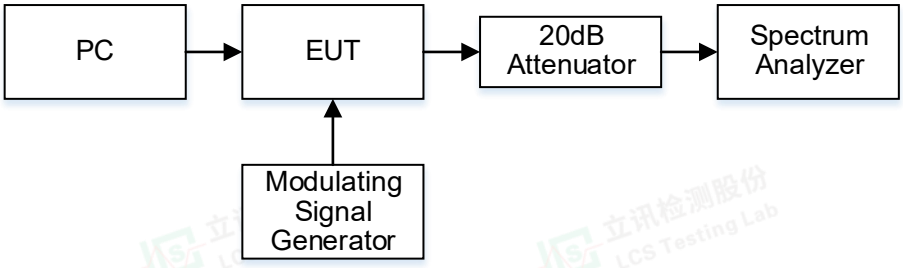
5.1.1 Test Applicable

Per FCC Part 2.1046 and Part 90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area

5.1.2 Test Procedure

Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted bellow:
If the power output is adjustable, measurements shall be made for the highest and lowest power levels.
The EUT connect to the Receiver through 20 dB attenuator.
Measurement with Spectrum Analyzer conducted external power supply with 7.2V stabilized supply voltage.

5.1.3 Test Configuration



5.1.4 Test Results

Temperature	24.5℃	Humidity	54.7%
Test Engineer	Jay Luo	Test Voltage	Normal Voltage

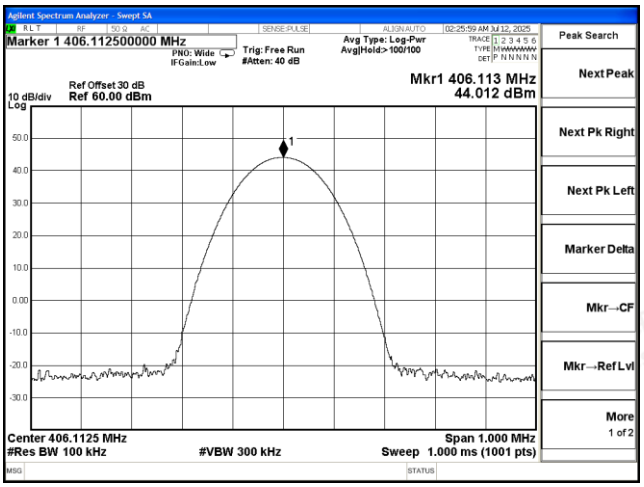
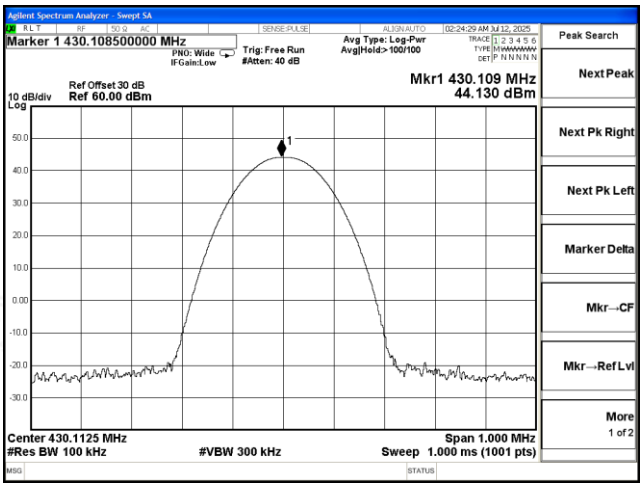
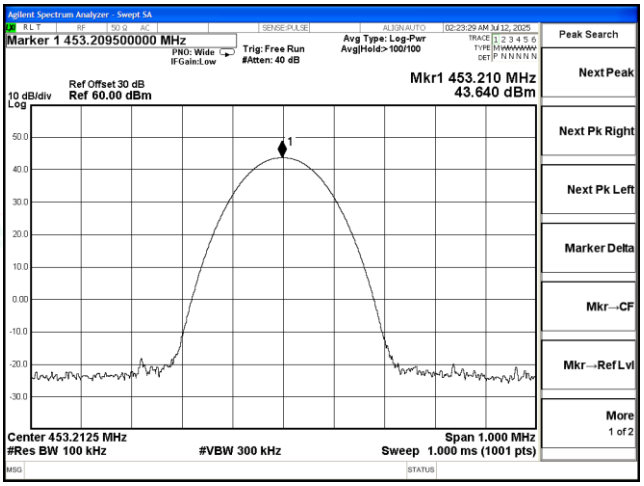
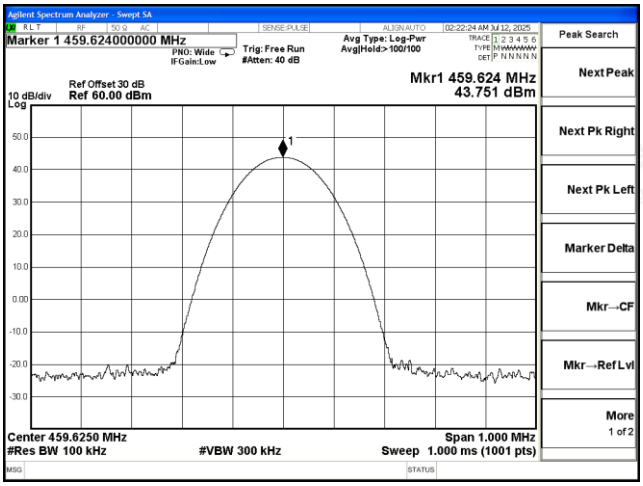
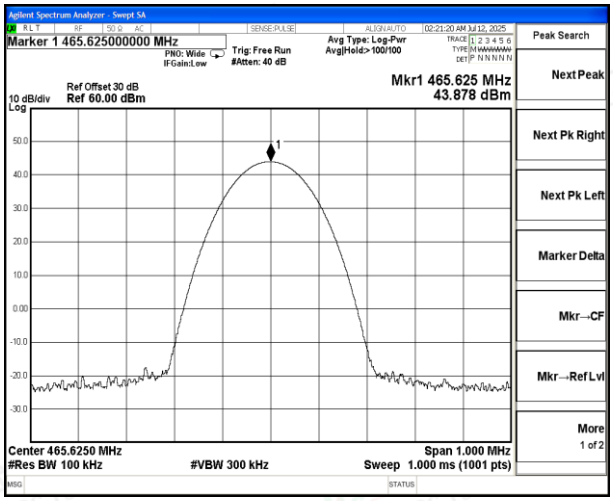
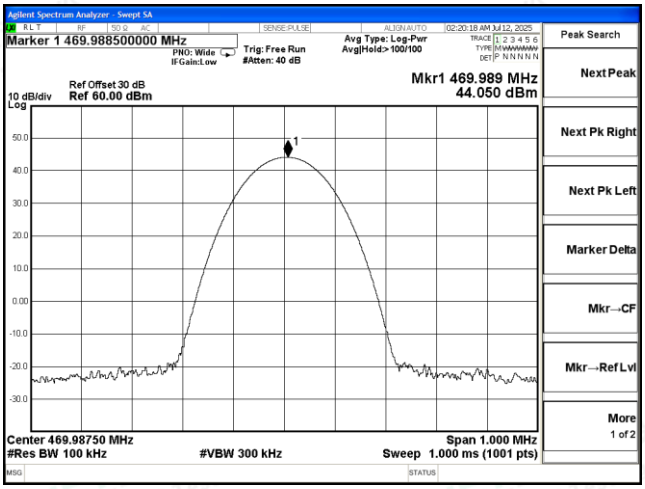
Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Test Results (dBm)
Digital 4FSK	12.5KHz	TM1	L	406.1125	44.012
			M 1	430.1125	44.130
			M 2	453.2125	43.640
			M 3	459.625	43.751
			M 4	465.625	43.878
			H	469.9875	44.050
	12.5KHz	TM2	L	406.1125	41.002
			M 1	430.1125	41.138
			M 2	453.2125	40.972
			M 3	459.625	40.932
			M 4	465.625	40.938
			H	469.9875	40.983
FM	12.5KHz	TM3	L	406.1125	44.022
			M 1	430.1125	44.186
			M 2	453.2125	43.632
			M 3	459.625	43.737
			M 4	465.625	43.895
			H	469.9875	43.980
	12.5KHz	TM4	L	406.1125	41.409
			M 1	430.1125	41.158

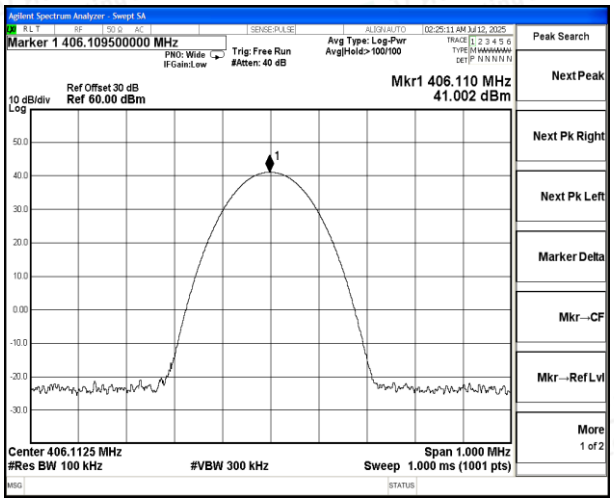
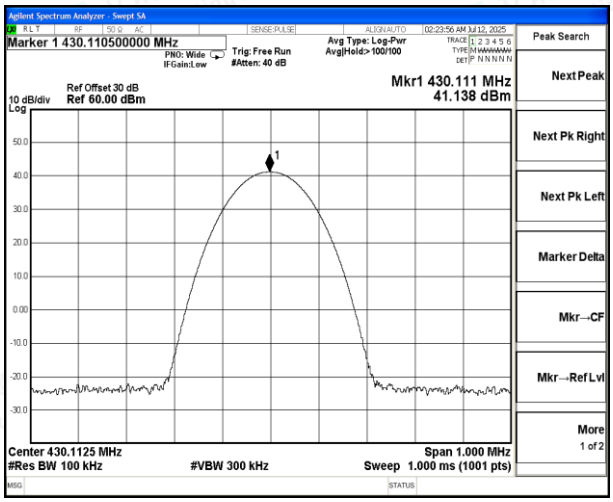
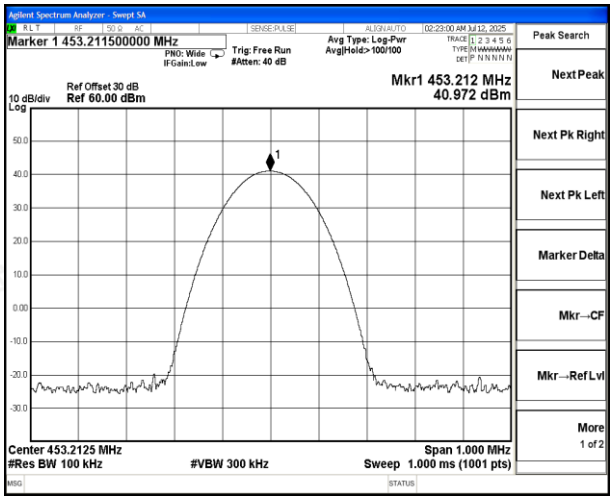
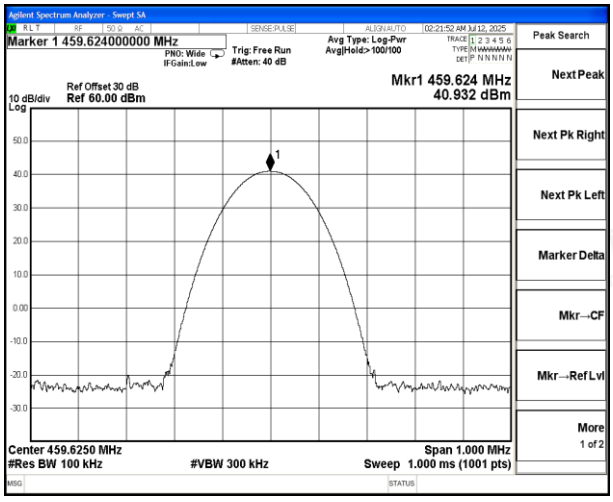
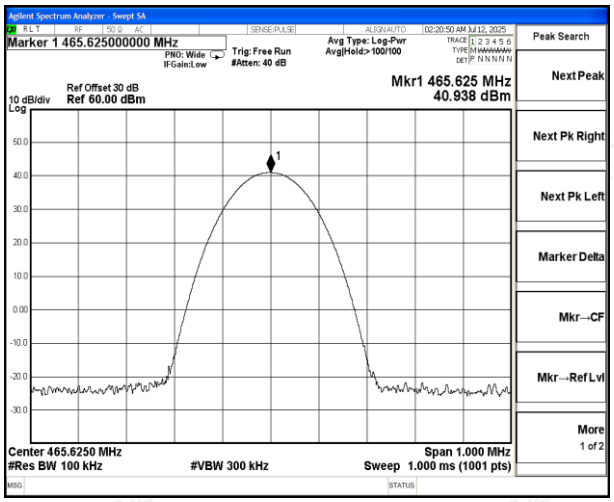
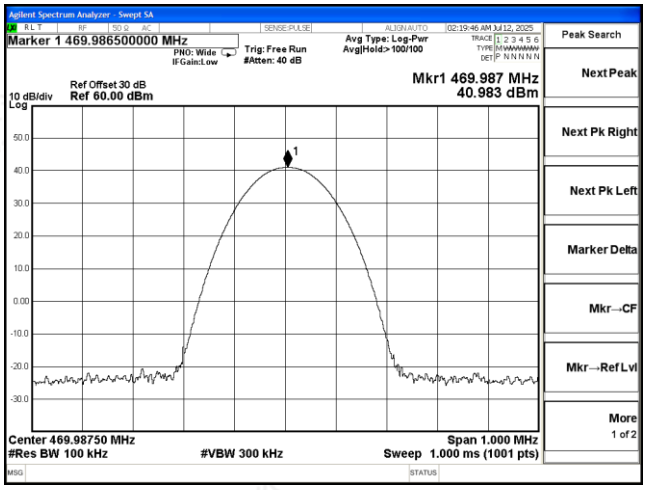
			M 2	453.2125	40.972
			M 3	459.625	40.923
			M 4	465.625	40.925
			H	469.9875	40.954
Limit		The limit is dependent upon the station's antenna HAAT and required service area.			
Test Results		PASS			

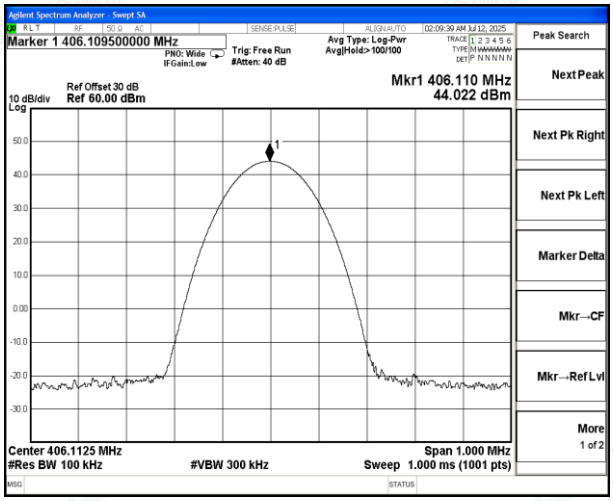
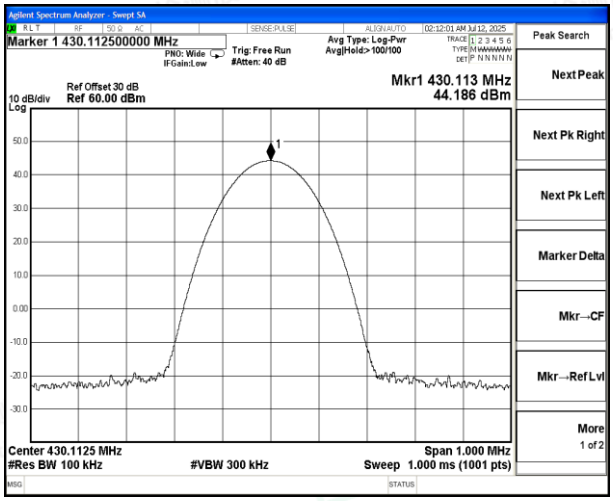
Note: The high rated power level is 20W(43dBm), and low rated power level is 10W(40dBm).

Remark:

1. Please refer to following plot.

Transmitter Power	
TM1	*TM1*
	
406.1125 MHz	430.1125 *MHz*
	
453.2125 *MHz*	459.625 *MHz*
	
465.625 *MHz*	469.9875 *MHz*

Transmitter Power	
TM2	*TM2*
	
406.1125 MHz	430.1125 *MHz*
	
453.2125 *MHz*	459.625 *MHz*
	
465.625 *MHz*	469.9875 *MHz*

Transmitter Power	
TM3	TM3
	
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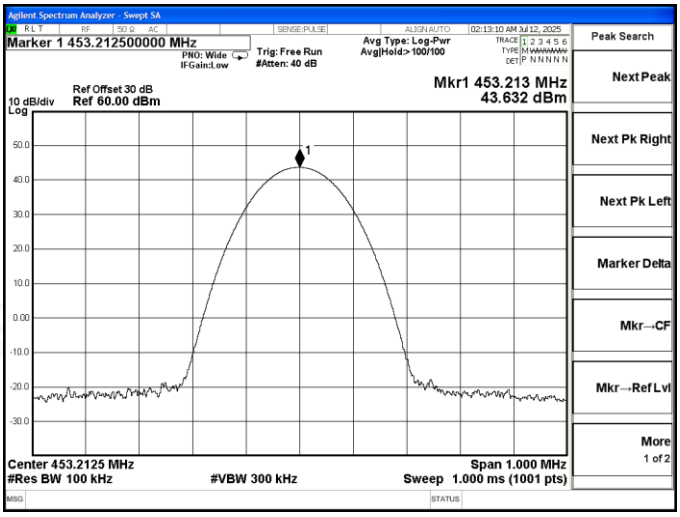
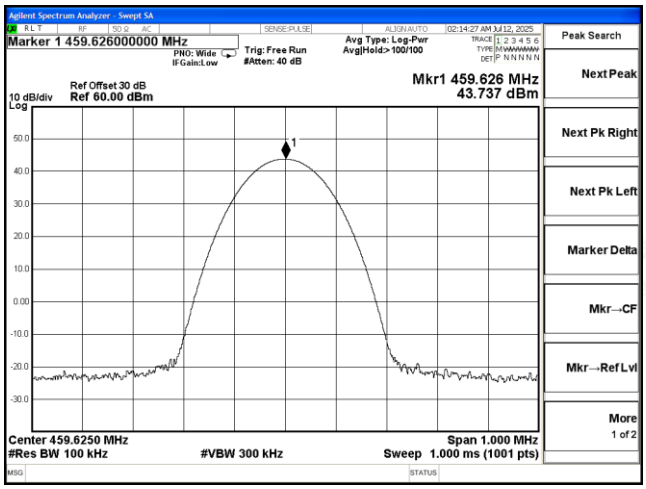
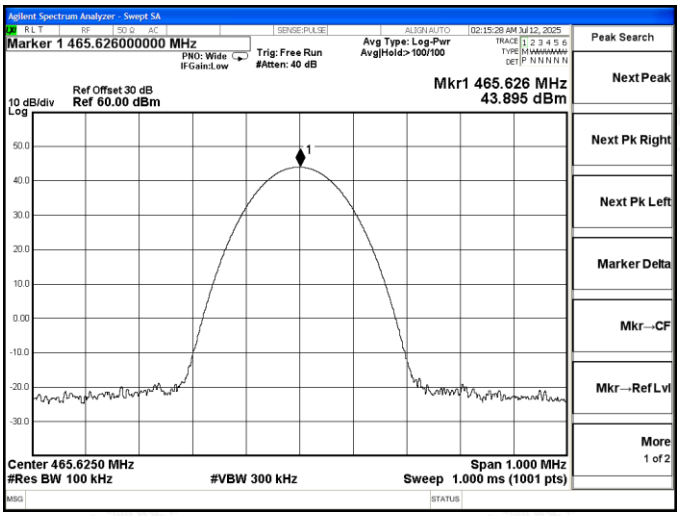
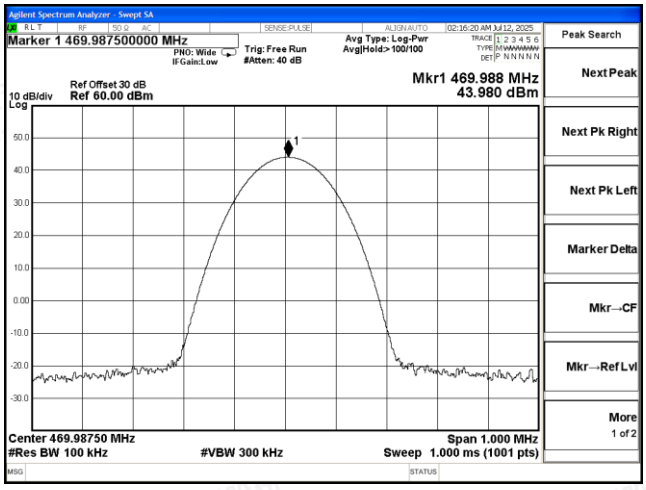
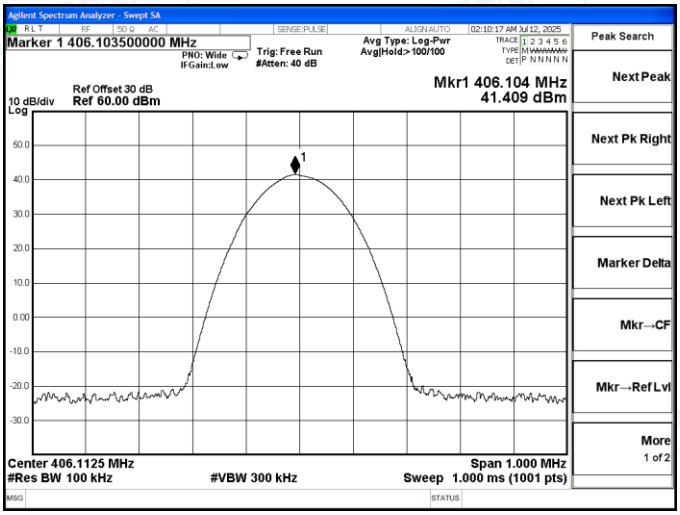
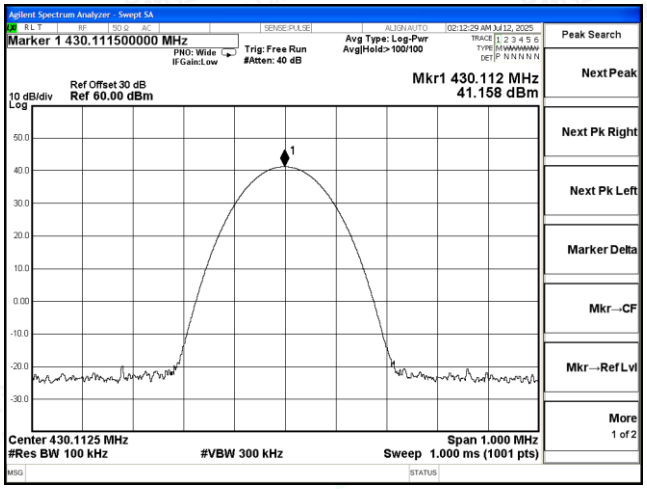
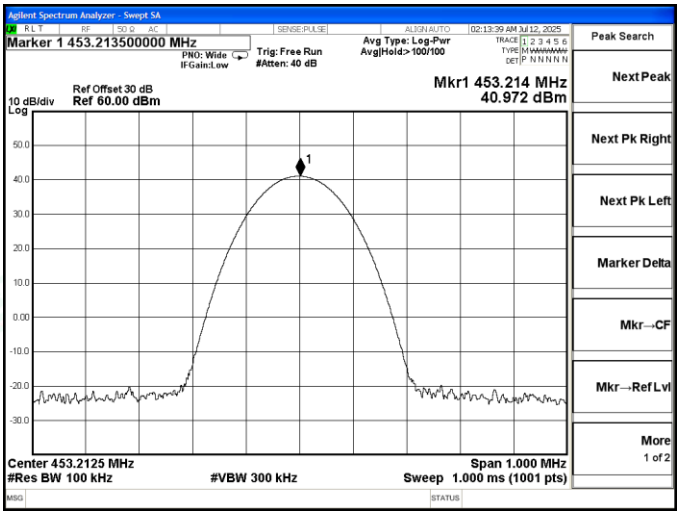
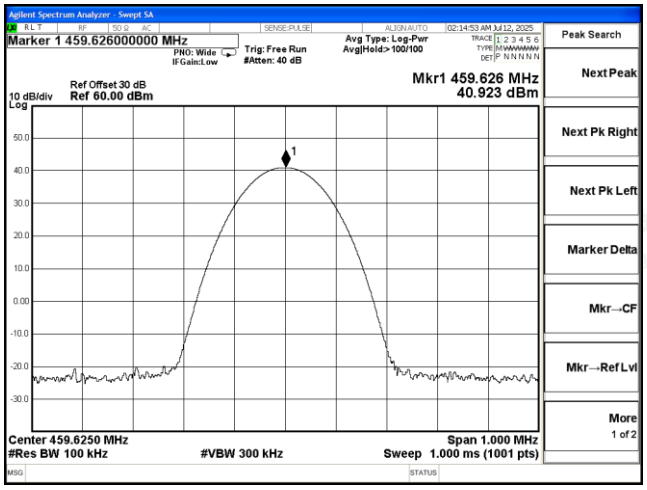
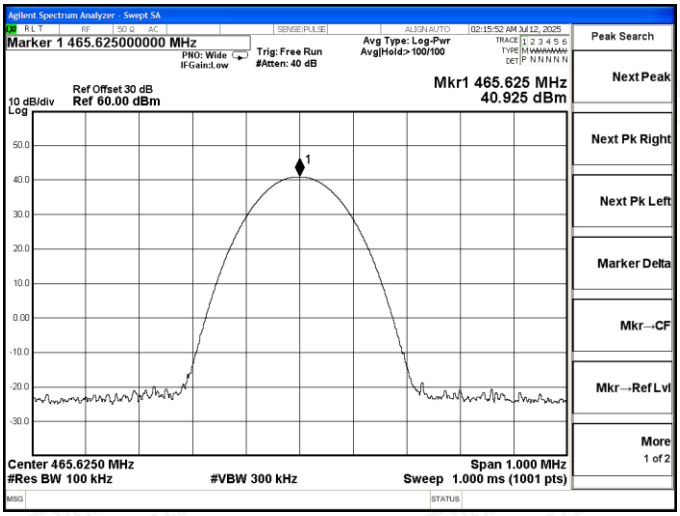
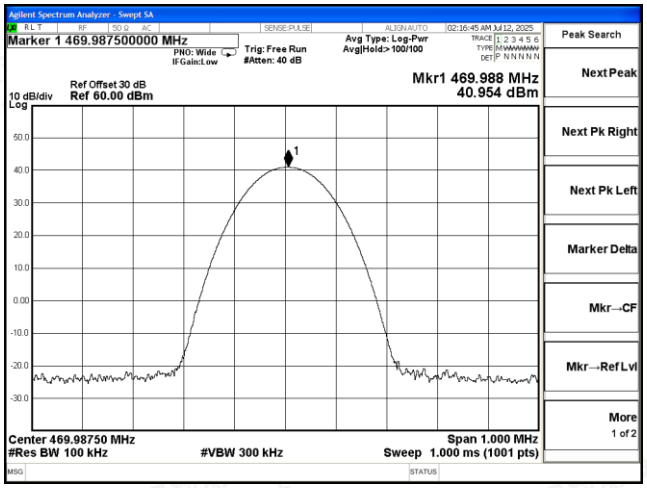
	
453.2125 MHz	459.625 MHz
	
465.625 MHz	469.9875 MHz

Transmitter Power	
TM4	*TM4*
	
406.1125 MHz	430.1125 *MHz*
	
453.2125 *MHz*	459.625 *MHz*
	
465.625 *MHz*	469.9875 *MHz*

5.2. Occupied Bandwidth and Emission Mask Test

5.2.1 Test Applicable

(a). Occupied Bandwidth: The EUT was connected to the audio signal generator and the spectrum analyser via the main RF connector, and through an appropriate attenuator. The EUT was controlled to transmit its maximum power. Then the bandwidth of 99% power can be measured by the spectrum analyser.

(b). Emission Mask B: For transmitters that are equipped with an audio low-pass filter pursuant to §90.211(a), the power of any emission must be below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

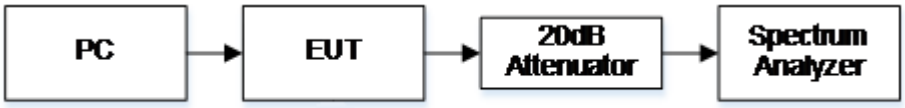
(c). Emission Mask D, 12.5 kHz channel bandwidth equipment: For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the centre of the authorized bandwidth f_0 to 5.625 kHz removed from f_0: Zero dB.

(2) On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 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 centre 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.

5.2.2 Test Configuration



5.2.3 Test Procedure

1 Set EUT as normal operation.

2 Set SPA Centre Frequency = fundamental frequency, RBW=300Hz, VBW= 1 KHz, span =50 KHz .

3 Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.

5.2.4 Test Results

Temperature	24.5℃	Humidity	54.7%
Test Engineer	Jay Luo	Test Voltage	Normal Voltage

Occupied Bandwidth

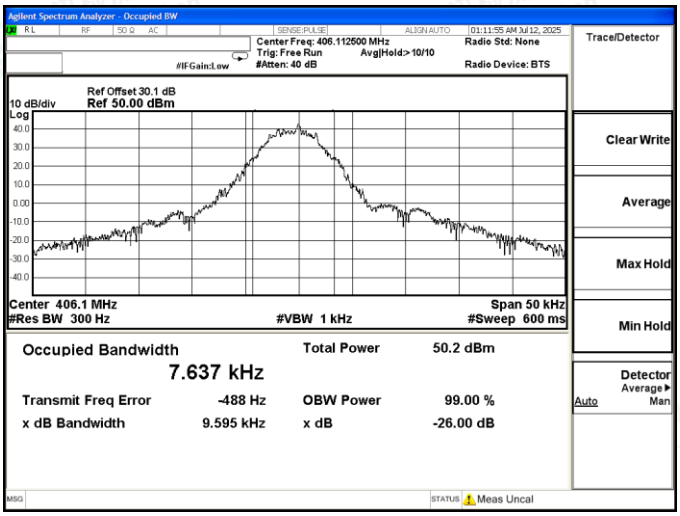
Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Occupied Bandwidth (KHz)	
					99%	26dB
4FSK	12.5 KHz	TM1	L	406.1125	7.637	9.595
			M 1	430.1125	7.669	9.669
			M 2	453.2125	7.755	9.706
			M 3	459.625	7.773	9.623
			M 4	465.625	7.805	9.590
			H	469.9875	7.927	10.270
4FSK	12.5 KHz	TM2	L	406.1125	7.501	9.671
			M 1	430.1125	7.792	9.874
			M 2	453.2125	7.953	9.585
			M 3	459.625	7.575	9.870
			M 4	465.625	7.644	9.598
			H	469.9875	7.886	10.310
FM	12.5 KHz	TM3	L	406.1125	5.677	10.300
			M 1	430.1125	5.634	10.270
			M 2	453.2125	5.532	7.913
			M 3	459.625	5.565	10.160
			M 4	465.625	5.606	10.240
			H	469.9875	5.576	10.190
FM	12.5 KHz	TM4	L	406.1125	5.678	10.300
			M 1	430.1125	5.633	10.260
			M 2	453.2125	5.515	5.779
			M 3	459.625	5.565	10.160
			M 4	465.625	5.610	10.240
			H	469.9875	5.578	10.190
Limit			11.25KHz for 12.5KHz Channel Separation			
Test Results			PASS			

Remark:

2. Please refer to following plots.

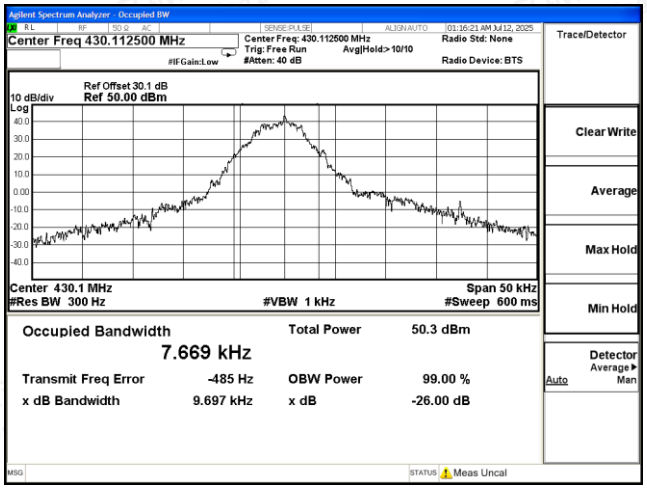
99% and 26dB Bandwidth

TM1

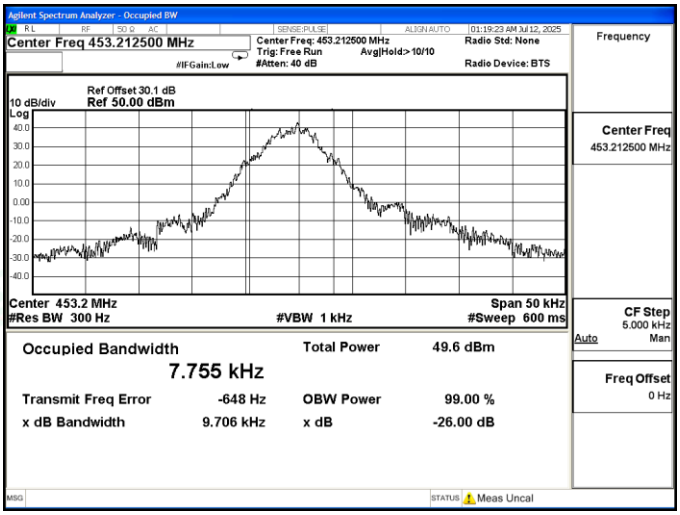


406.1125 MHz

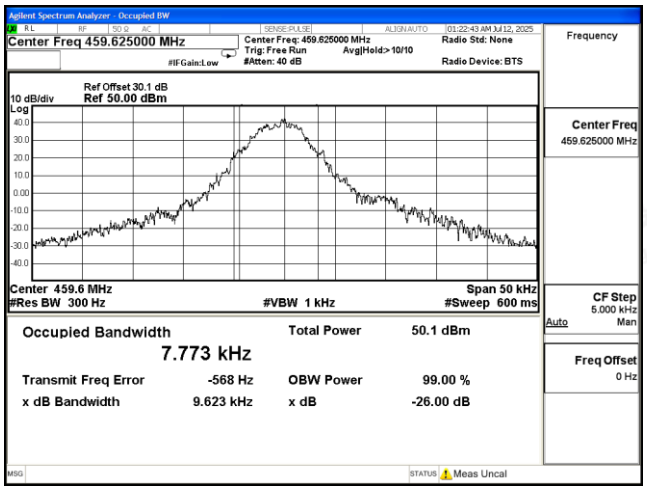
TM1



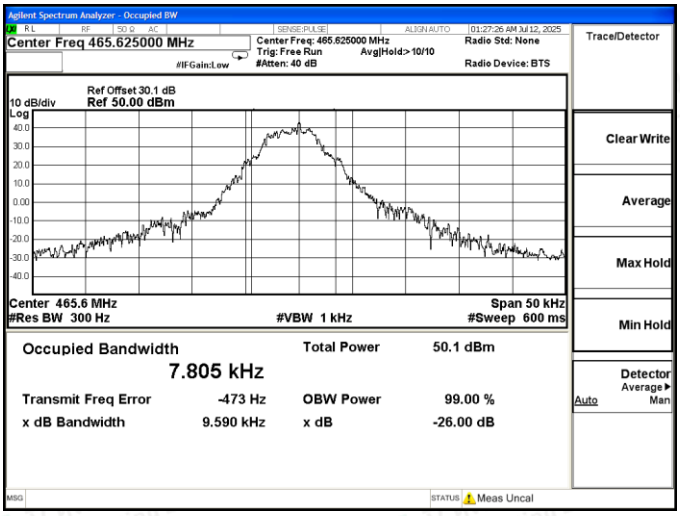
430.1125 MHz



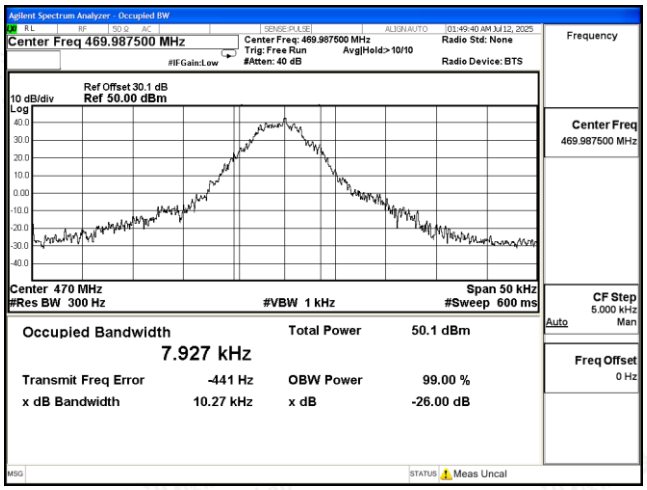
453.2125 MHz



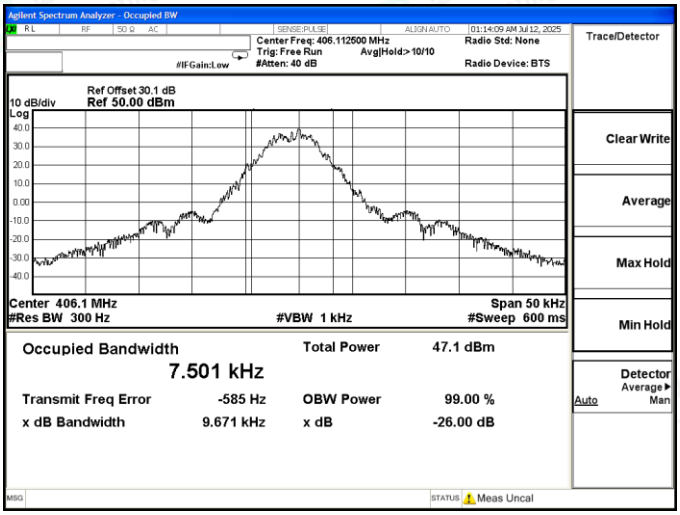
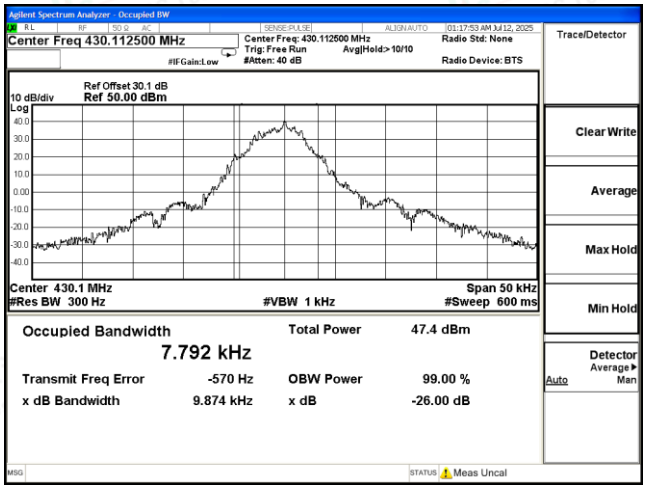
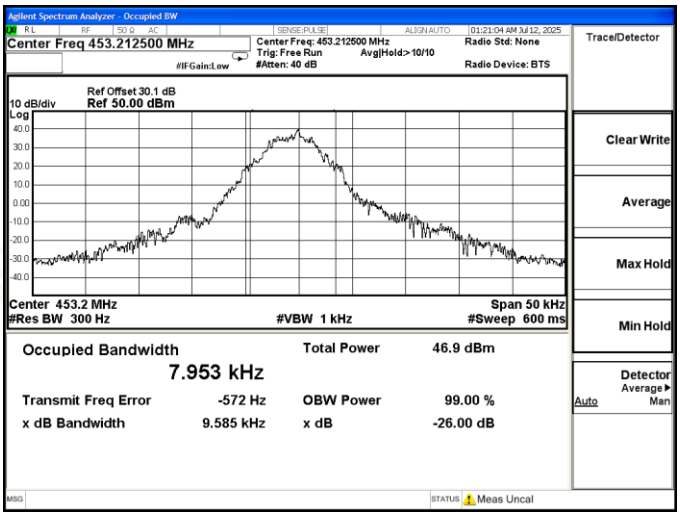
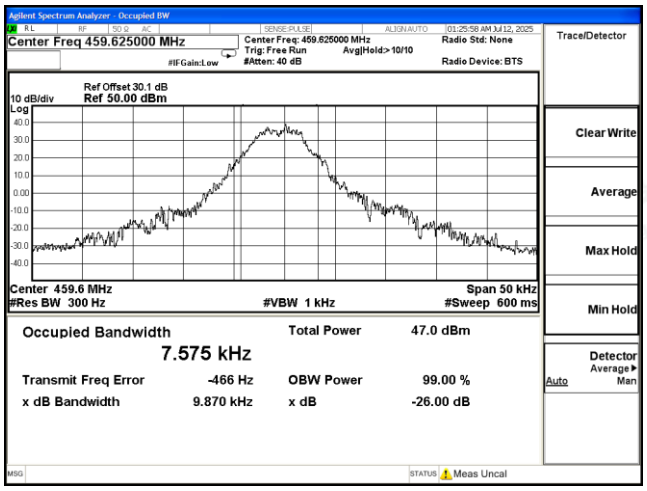
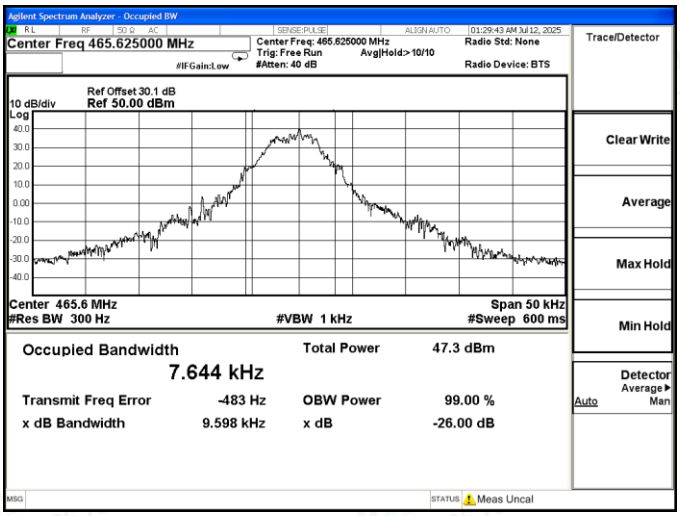
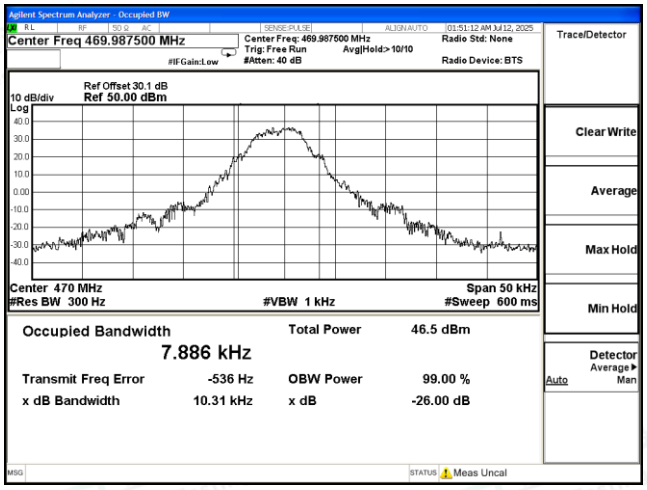
459.625 MHz

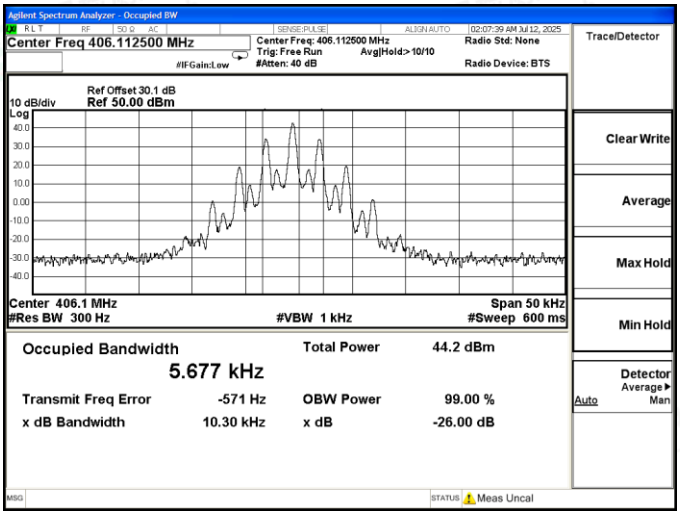
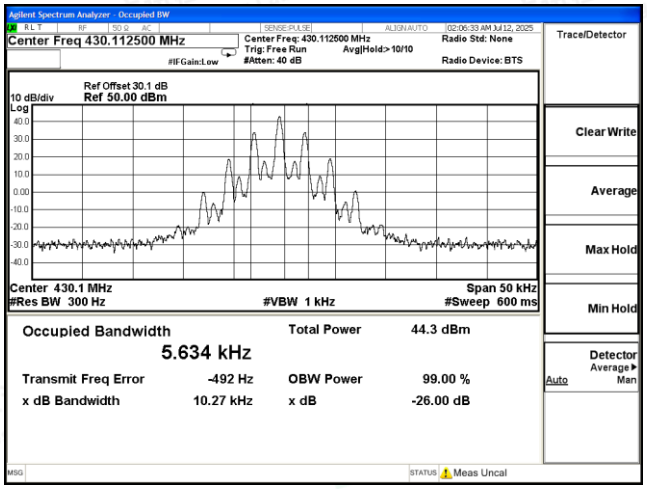
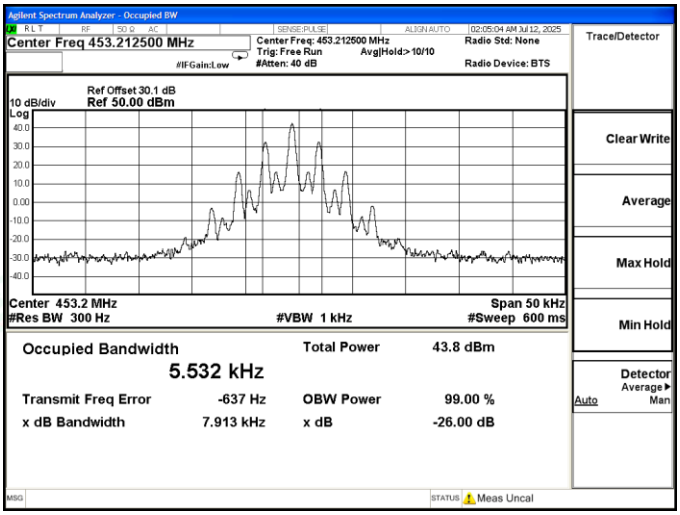
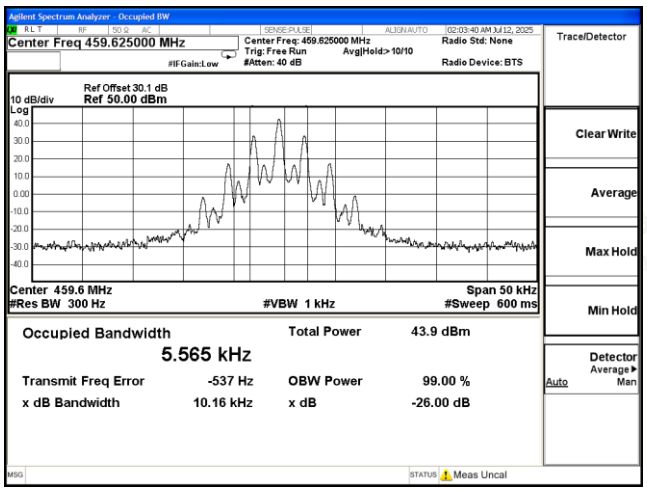
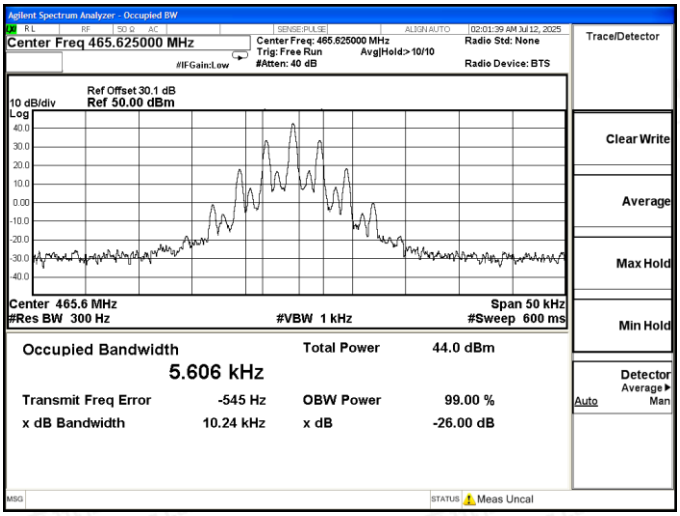
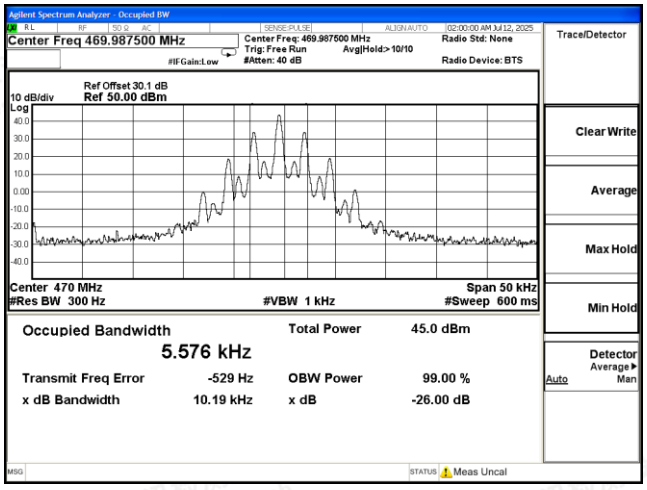


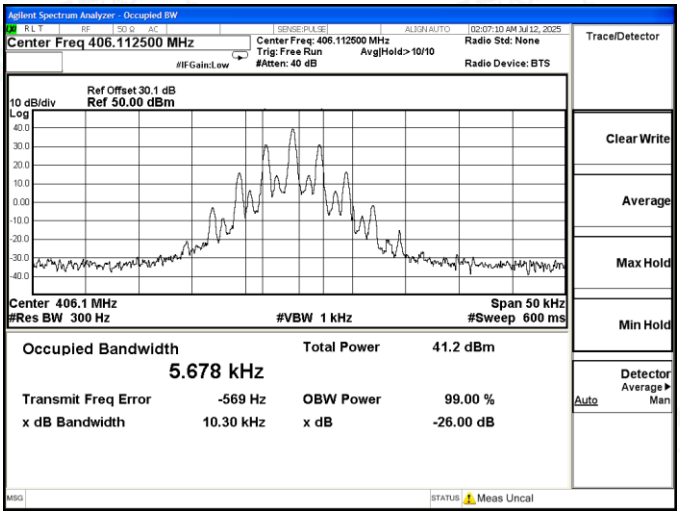
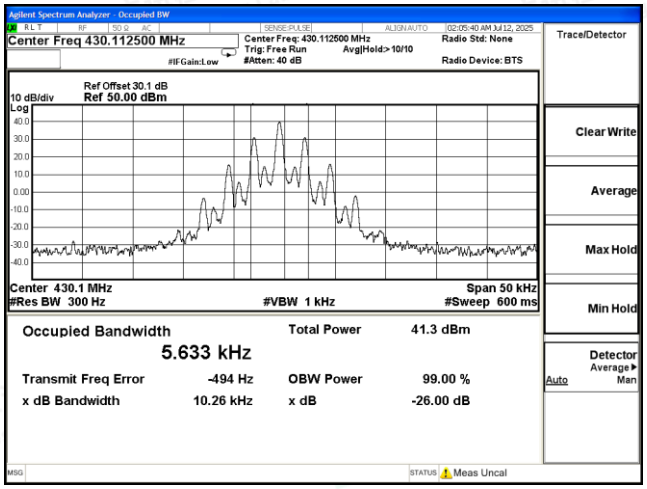
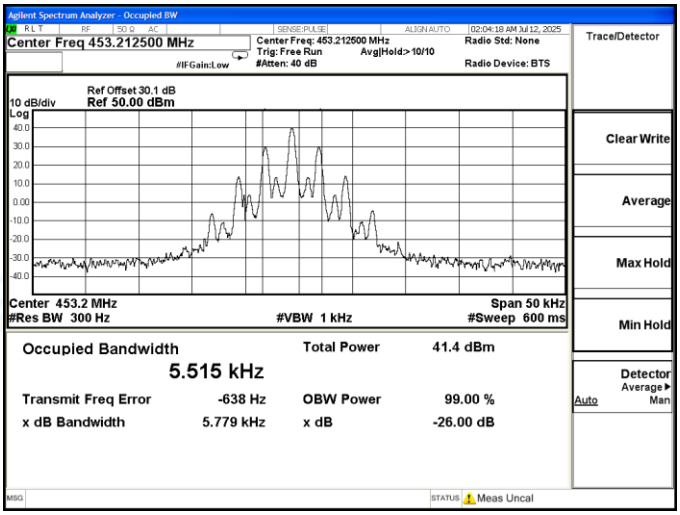
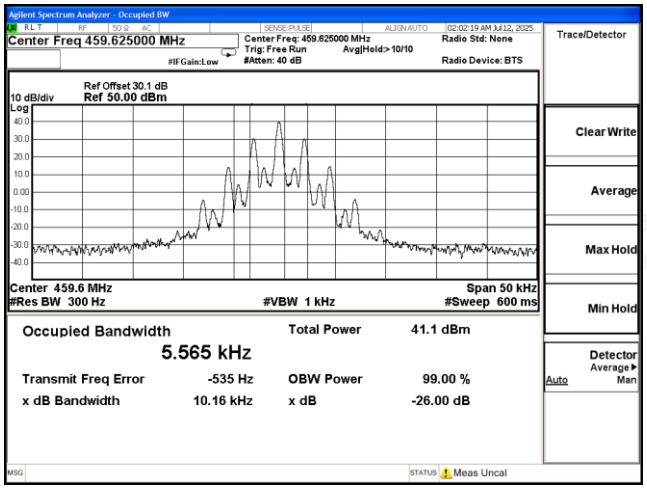
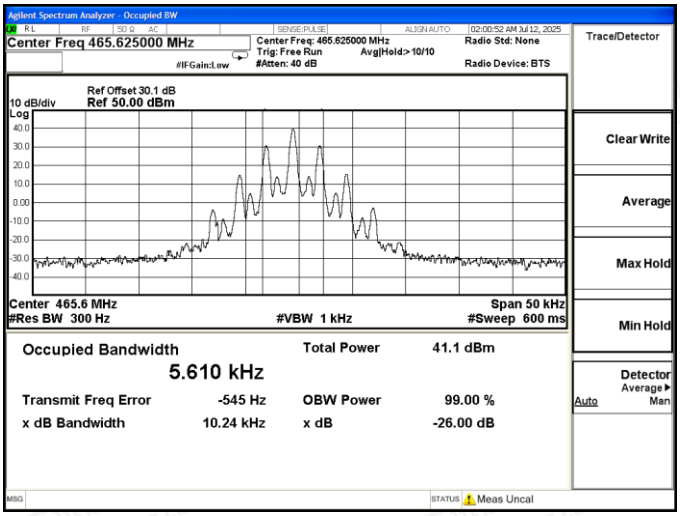
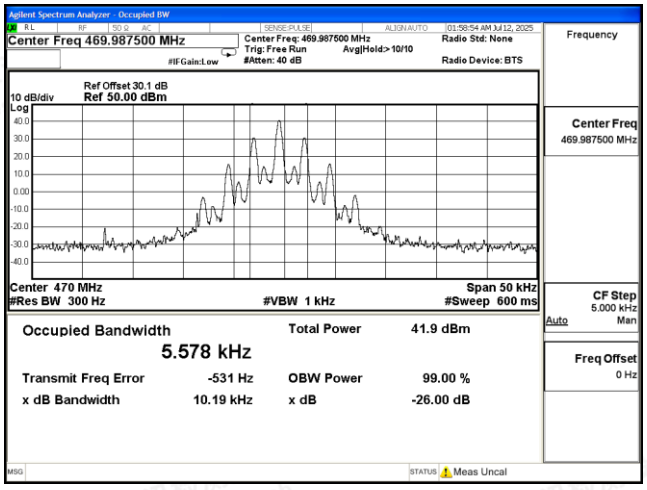
465.625 MHz



469.9875 MHz

99% and 26dB Bandwidth	
TM2	TM2
	
406.1125 MHz	430.1125 MHz
	
453.2125 MHz	459.625 MHz
	
465.625 MHz	469.9875 MHz

99% and 26dB Bandwidth	
TM3	TM3
	
406.1125 MHz	430.1125 MHz
	
453.2125 MHz	459.625 MHz
	
465.625 MHz	469.9875 MHz

99% and 26dB Bandwidth	
TM4	TM4
	
406.1125 MHz	430.1125 MHz
	
453.2125 MHz	459.625 MHz
	
465.625 MHz	469.9875 MHz

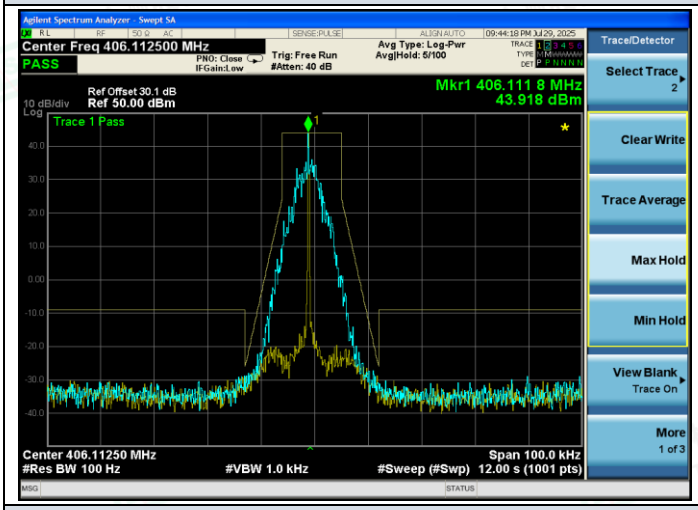
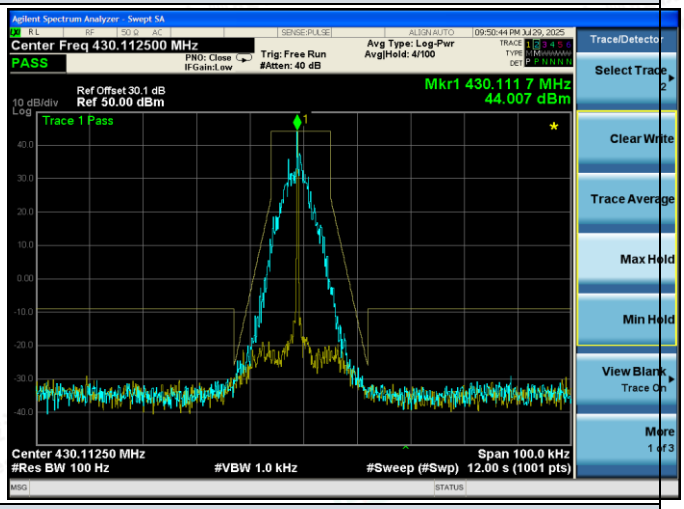
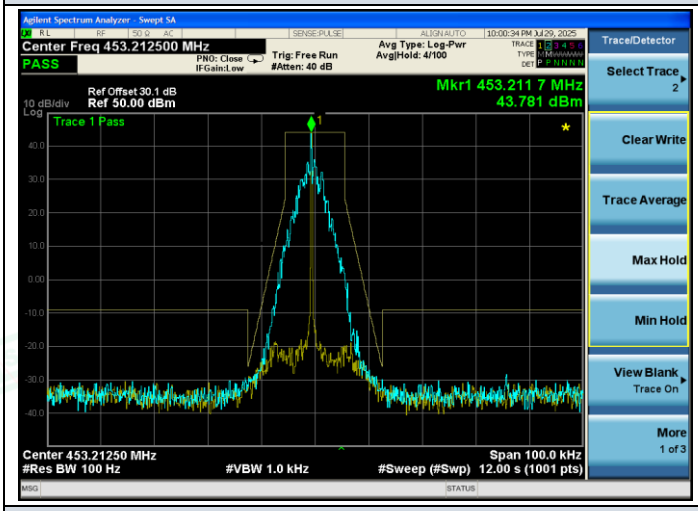
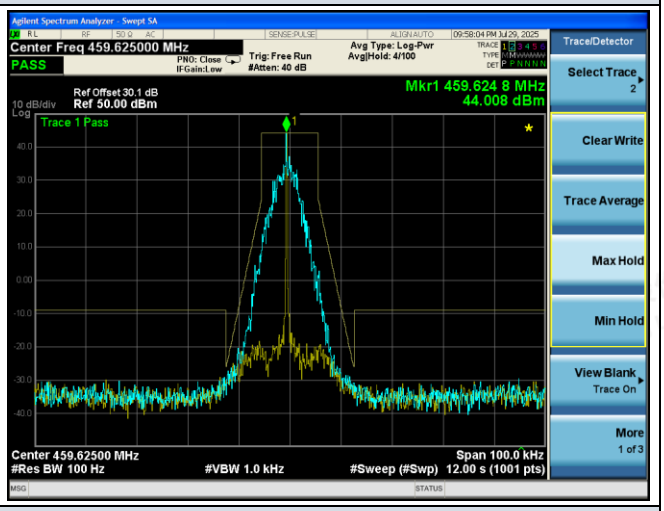
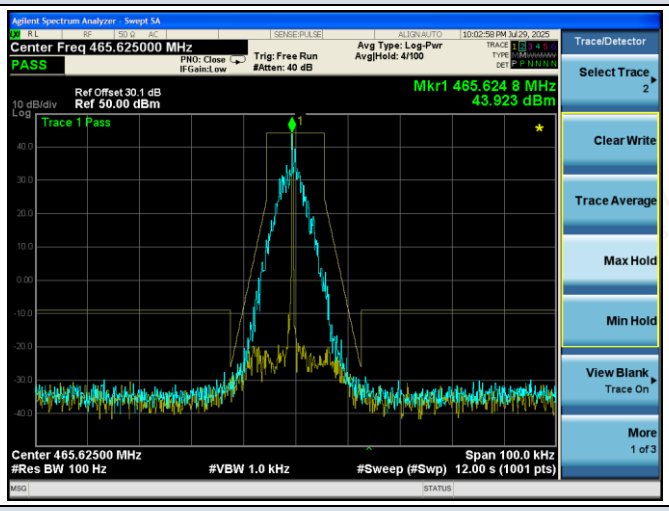
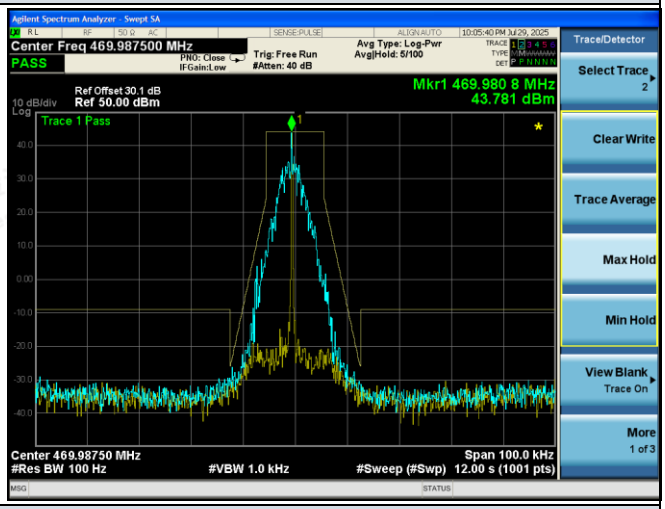
Temperature	24.5℃	Humidity	54.7%
Test Engineer	Jay Luo	Test Voltage	Normal Voltage

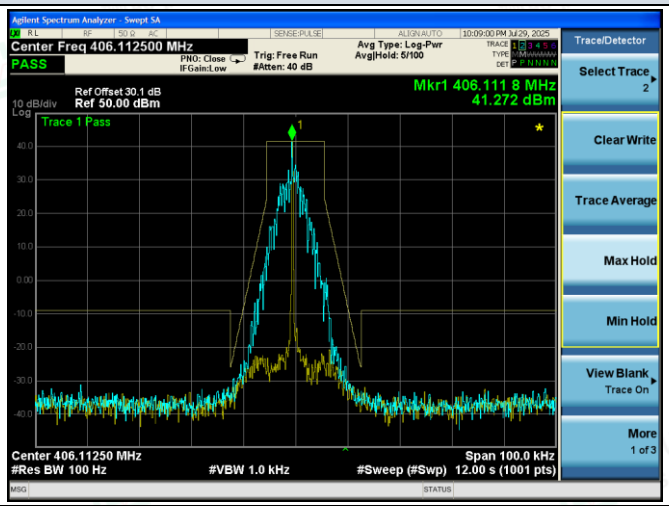
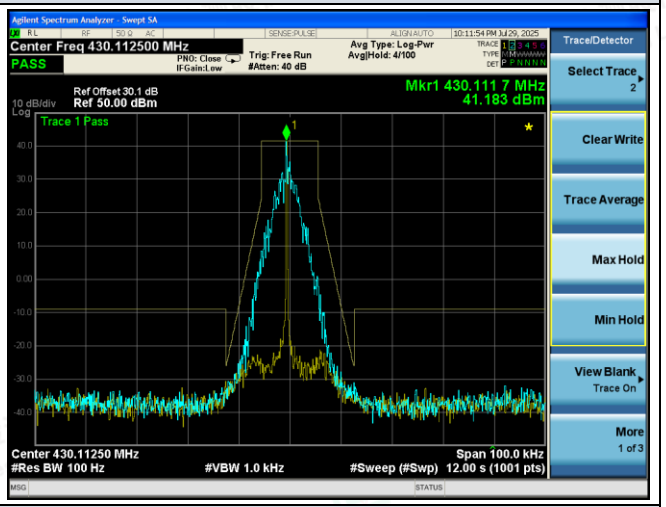
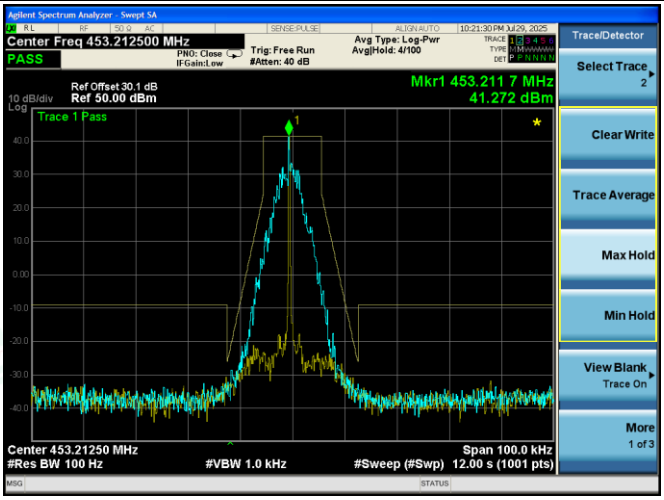
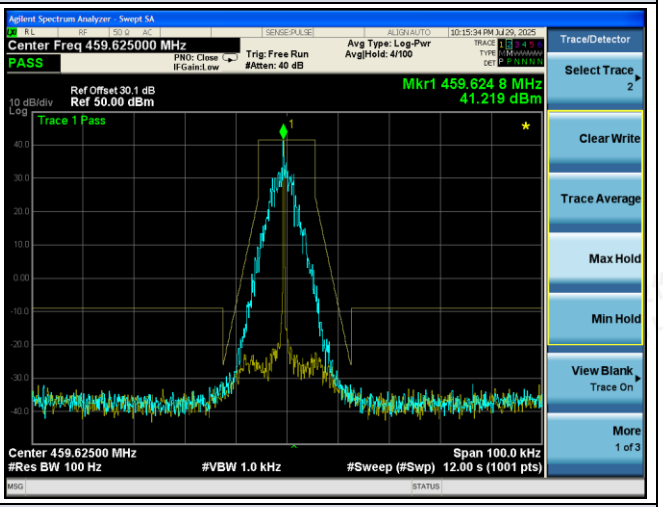
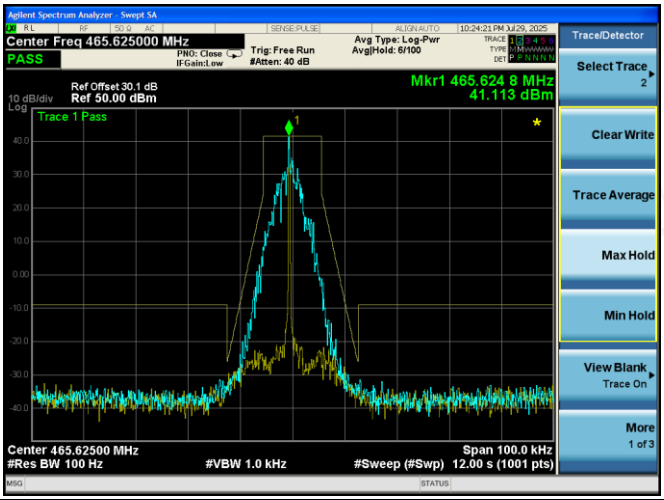
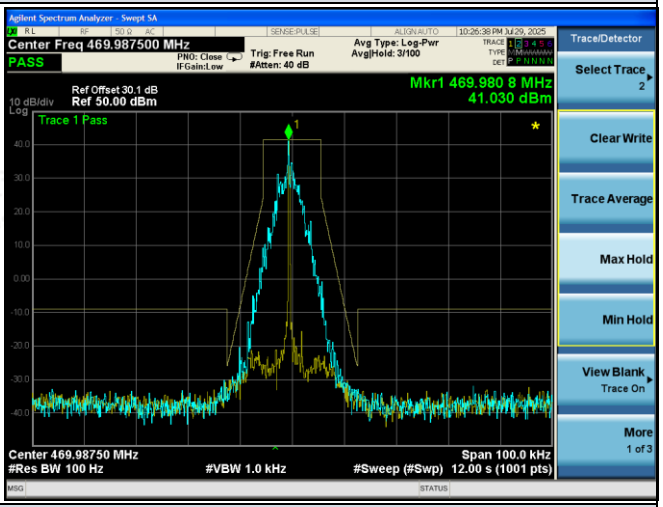
Emission Mask

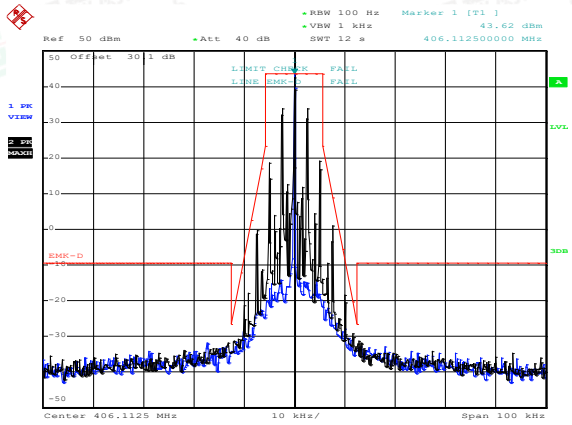
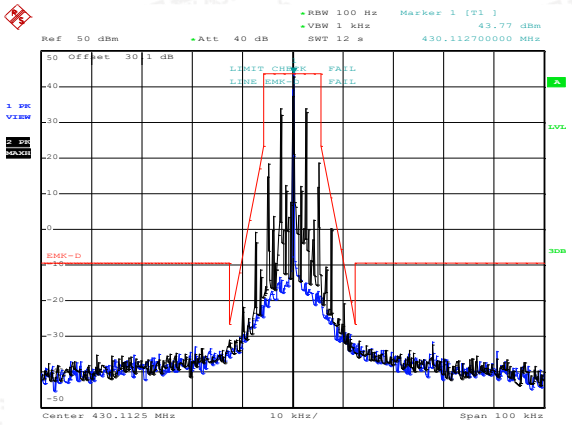
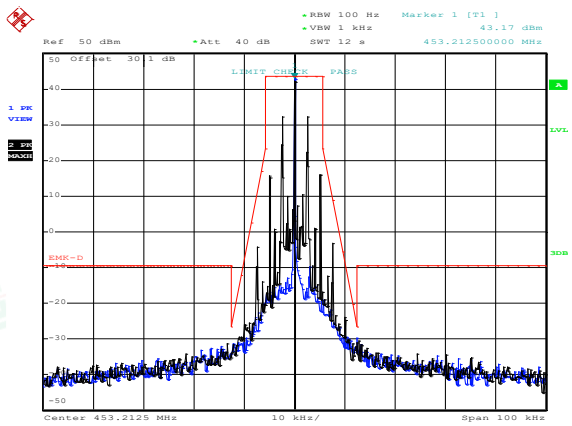
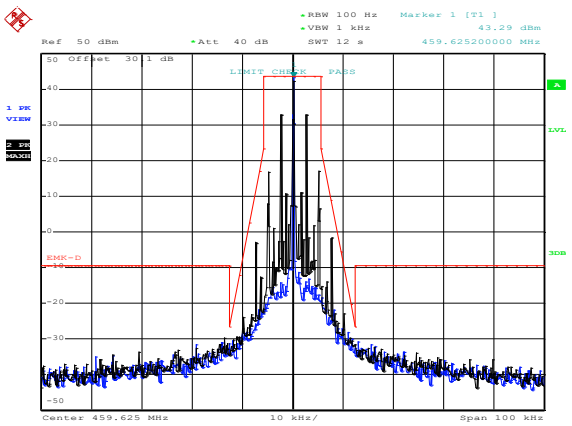
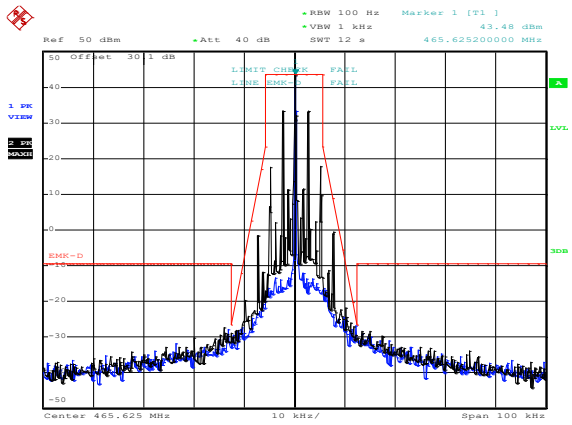
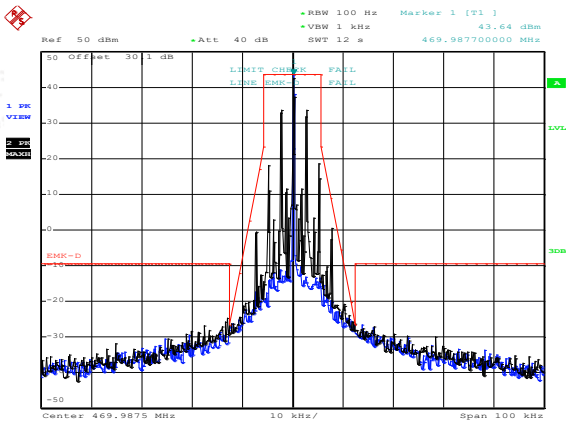
Modulation Type	Channel Separation	Operation Mode	Test Channel	Test Frequency (MHz)	Applicable Mask	RBW (Hz)
4FSK	12.5 KHz	TM1	L	406.1125	D	100
			M 1	430.1125	D	100
			M 2	453.2125	D	100
			M 3	459.625	D	100
			M 4	465.625	D	100
			H	469.9875	D	100
4FSK	12.5 KHz	TM2	L	406.1125	D	100
			M 1	430.1125	D	100
			M 2	453.2125	D	100
			M 3	459.625	D	100
			M 4	465.625	D	100
			H	469.9875	D	100
FM	12.5 KHz	TM3	L	406.1125	D	300
			M 1	430.1125	D	300
			M 2	453.2125	D	300
			M 3	459.625	D	300
			M 4	465.625	D	300
			H	469.9875	D	300
FM	12.5 KHz	TM4	L	406.1125	D	300
			M 1	430.1125	D	300
			M 2	453.2125	D	300
			M 3	459.625	D	300
			M 4	465.625	D	300
			H	469.9875	D	300
Test Results			PASS			

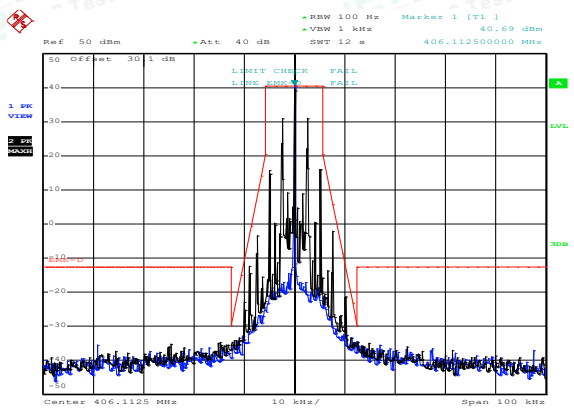
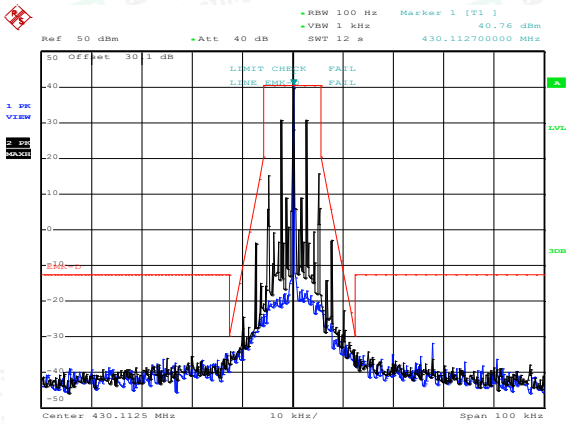
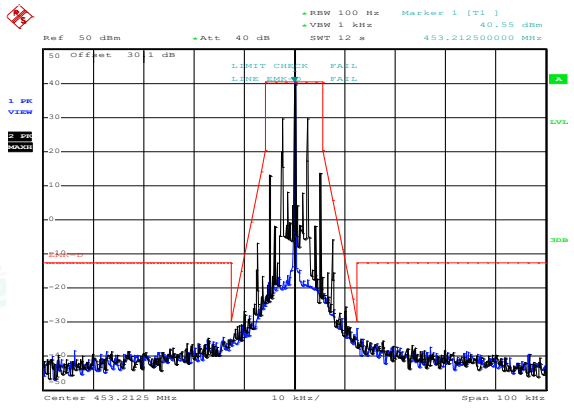
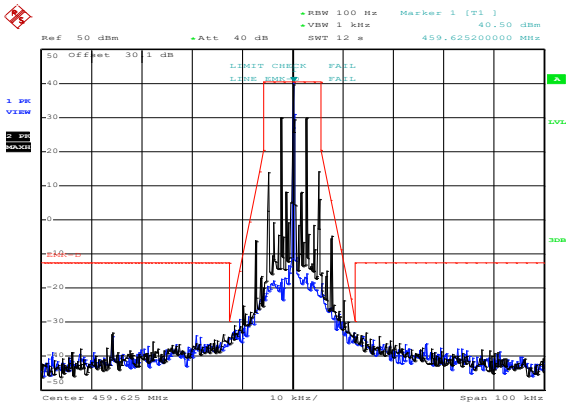
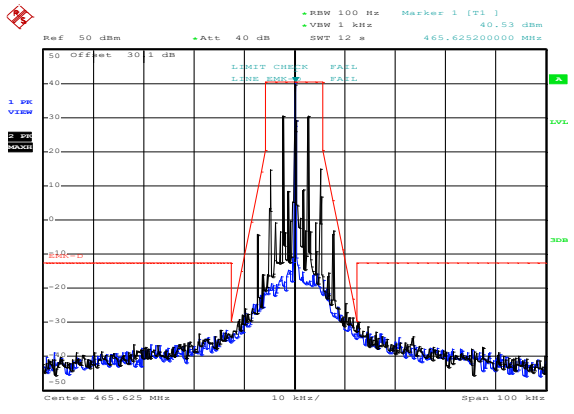
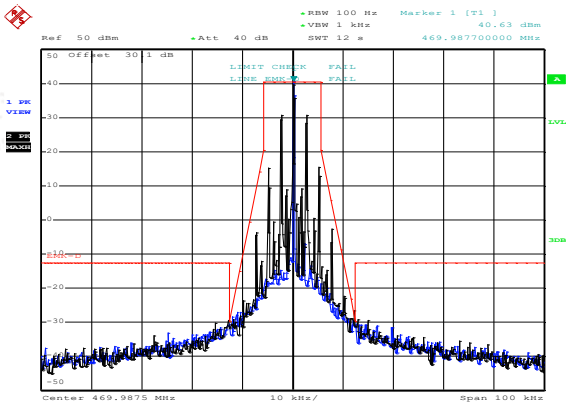
Remark:

2. Please refer to following plots.

Emission Mask	
TM1	*TM1*
	
406.1125 MHz	*430.1125 MHz*
	
453.2125 MHz	*459.625 MHz*
	
465.625 MHz	*469.9875 MHz*

Emission Mask	
TM2	TM2
	
406.1125 MHz	430.1125 MHz
	
453.2125 MHz	459.625 MHz
	
465.625 MHz	469.9875 MHz

Emission Mask	
TM3	TM3
	
Date: 17.JUL.2025 13:36:36	Date: 17.JUL.2025 14:04:29
406.1125 MHz	430.1125 MHz
	
Date: 17.JUL.2025 14:14:41	Date: 17.JUL.2025 14:22:39
453.2125 MHz	459.625 MHz
	
Date: 17.JUL.2025 14:26:25	Date: 17.JUL.2025 14:31:42
465.625 MHz	469.9875 MHz

Emission Mask	
TM4	TM4
 Date: 17.JUL.2025 14:53:58	 Date: 17.JUL.2025 14:51:00
406.1125 MHz	430.1125 MHz
 Date: 17.JUL.2025 14:47:20	 Date: 17.JUL.2025 14:44:15
453.2125 MHz	459.625 MHz
 Date: 17.JUL.2025 14:41:20	 Date: 17.JUL.2025 14:36:30
465.625 MHz	469.9875 MHz

5.3. Transmitter Radiated Spurious Emission

5.3.1 Test Applicable

According to the ANSI C63.26:2015 test method, and according to Section 90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with 12.5 KHz channel bandwidth:

1 On any frequency removed from the centre of the authorized bandwidth f_o to 5.625 KHz removed from f_o: Zero dB

2 On any frequency removed from the centre of the authorized bandwidth by a displacement frequency (f_d in KHz) f_o of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27dB

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

For transmitters designed to transmit with 25 KHz channel separation and equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as following:

1 On any frequency removed from the assigned frequency by more than 50 percent, but no more than 100 percent of the authorized bandwidth: At least 25 dB.

2 On any frequency removed from the assigned frequency by more than 100 percent, but no more than 250 percent of the authorized bandwidth: At least 35 dB.

3 On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43+10log (P) dB.

5.3.2 Test Configuration