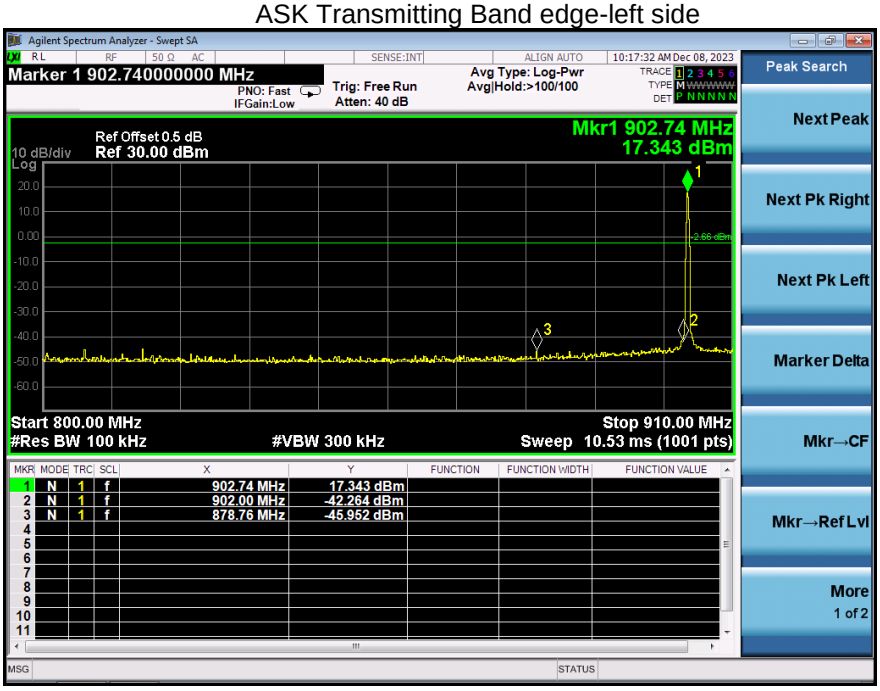
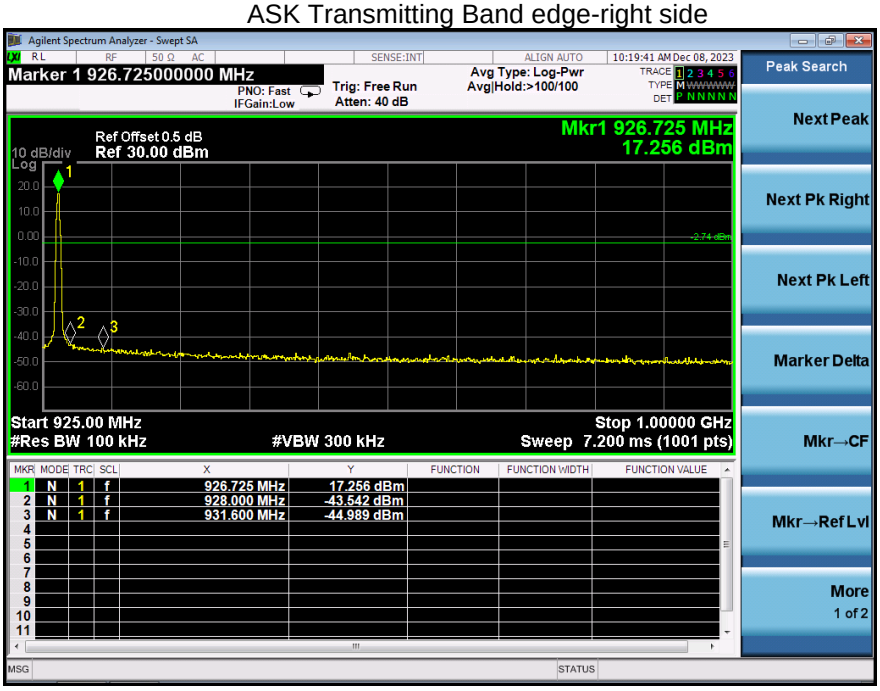
Antenna4

ASK Transmitting Band edge-left side

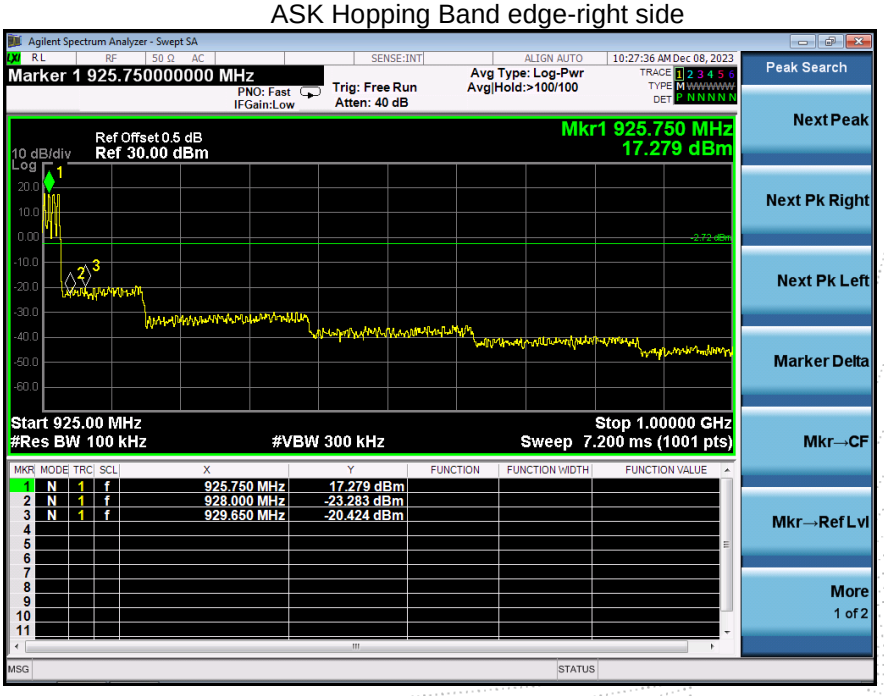


ASK Hopping Band edge-left side

ASK Transmitting Band edge-right side



ASK Hopping Band edge-right side



10. Occupy Bandwidth

10.1 Block Diagram Of Test Setup

10.2 Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

10.3 Test procedure

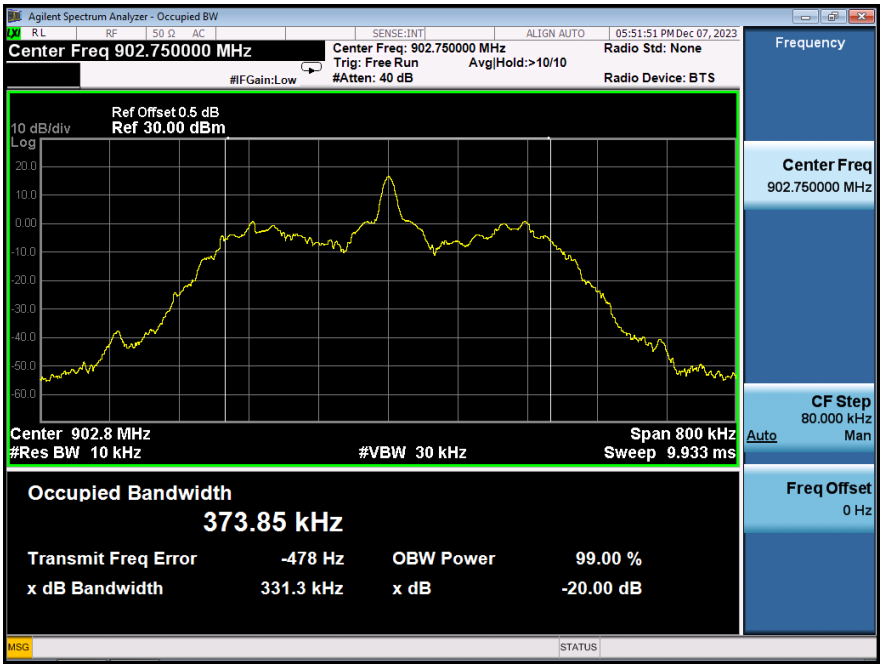
1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel; 1%≤RBW≤5% of the 20 dB bandwidth; VBW≥3RBW;
Sweep = auto; Detector function = peak; Trace = max hold.
4. Measure and record the results in the test report.

10.4 Test Result

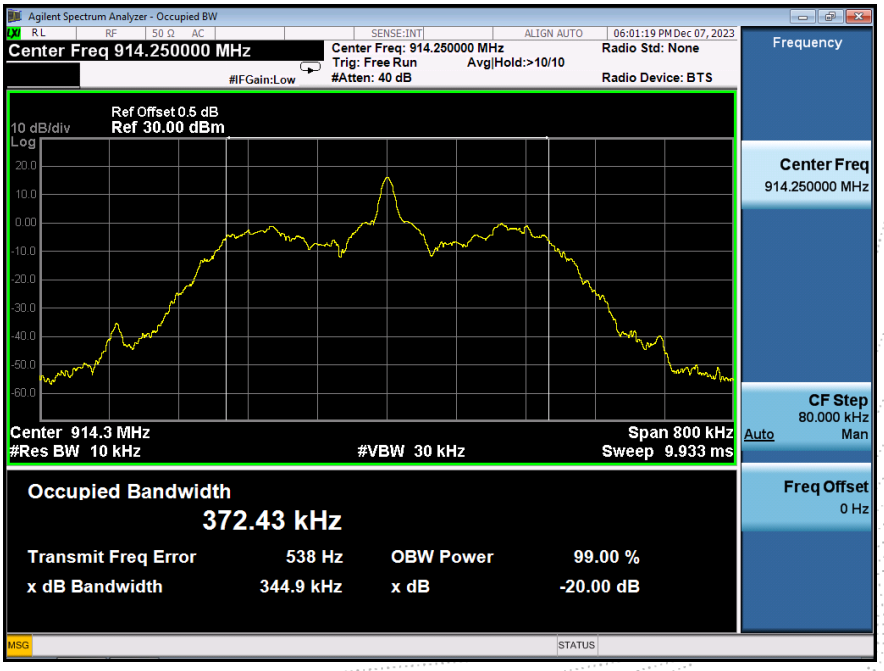
Test channel		ASK		
		20dB(kHz)	Limit(kHz)	Conclusion
Lowest	Antenna1	331.3	250< $BW20_{dB}$≤500	PASS
Middlest		344.9		PASS
Highest		346.1		PASS
Lowest	Antenna2	332.7		PASS
Middlest		330.8		PASS
Highest		316.1		PASS
Lowest	Antenna3	335.2		PASS
Middlest		334.1		PASS
Highest		330.0		PASS
Lowest	Antenna4	330.0		PASS
Middlest		326.9		PASS
Highest		331.7		PASS

Antenna1

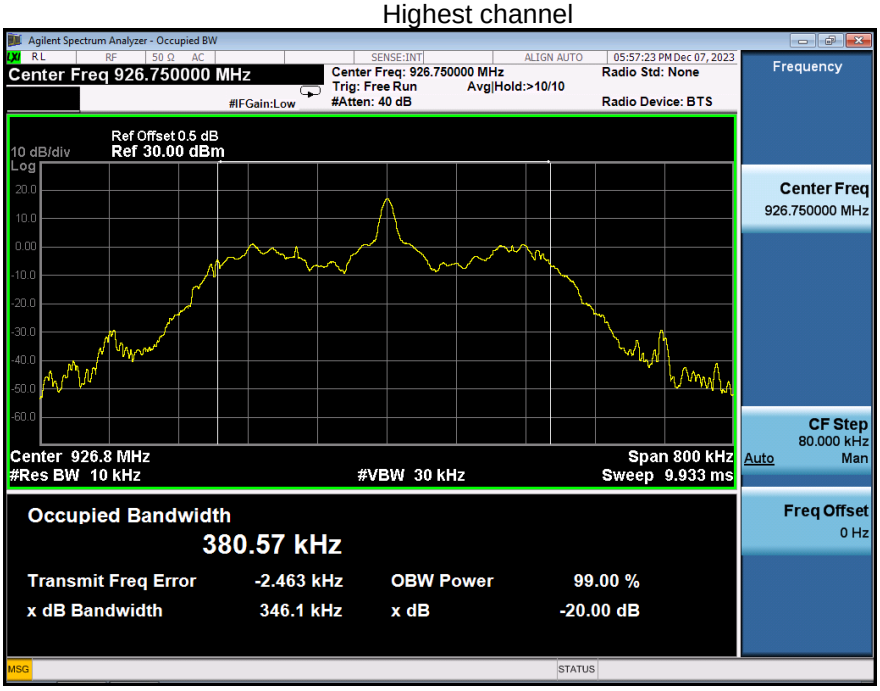
Lowest channel



Middlest channel

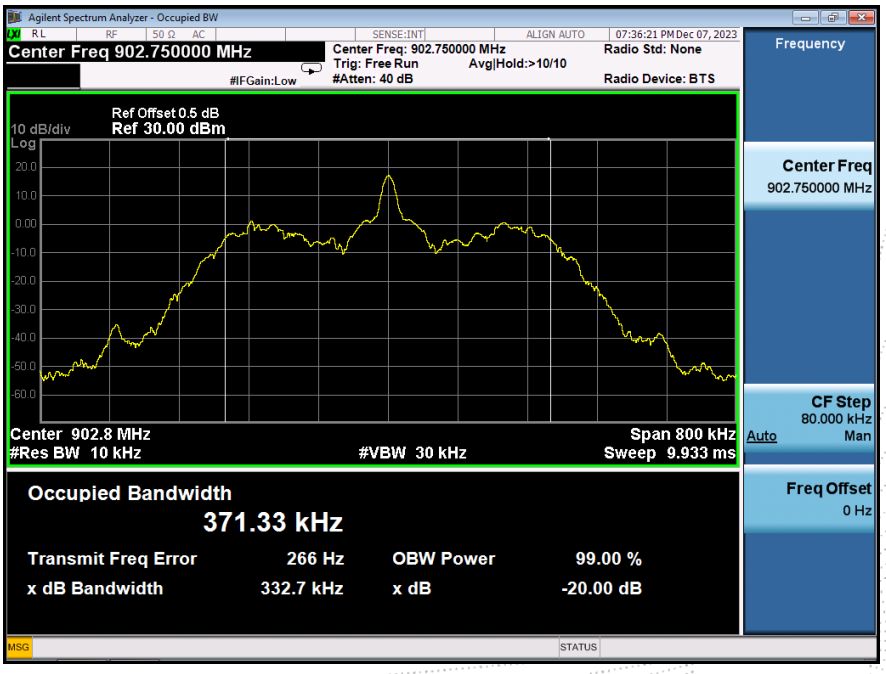


Highest channel

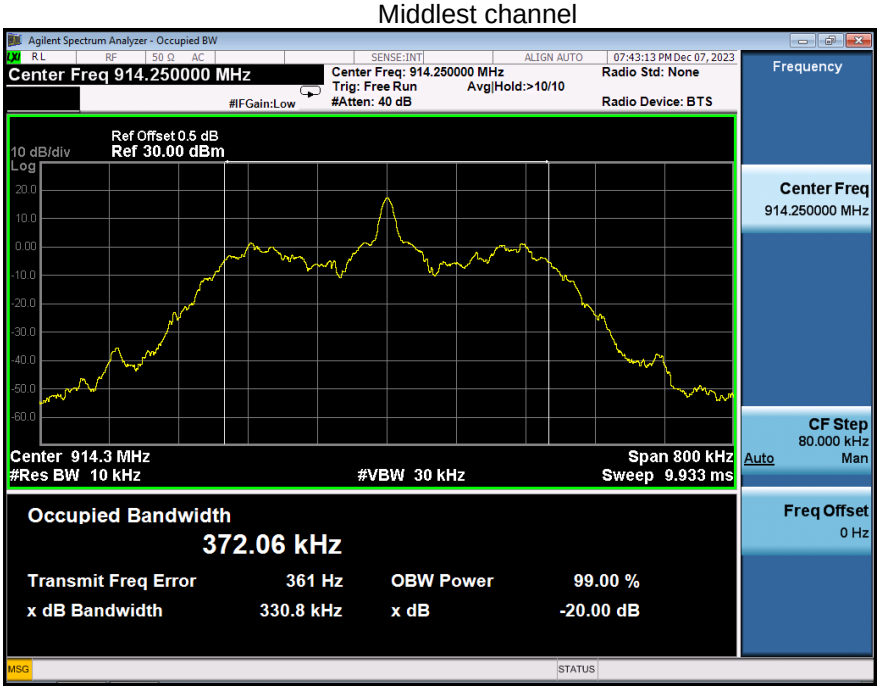


Antenna2

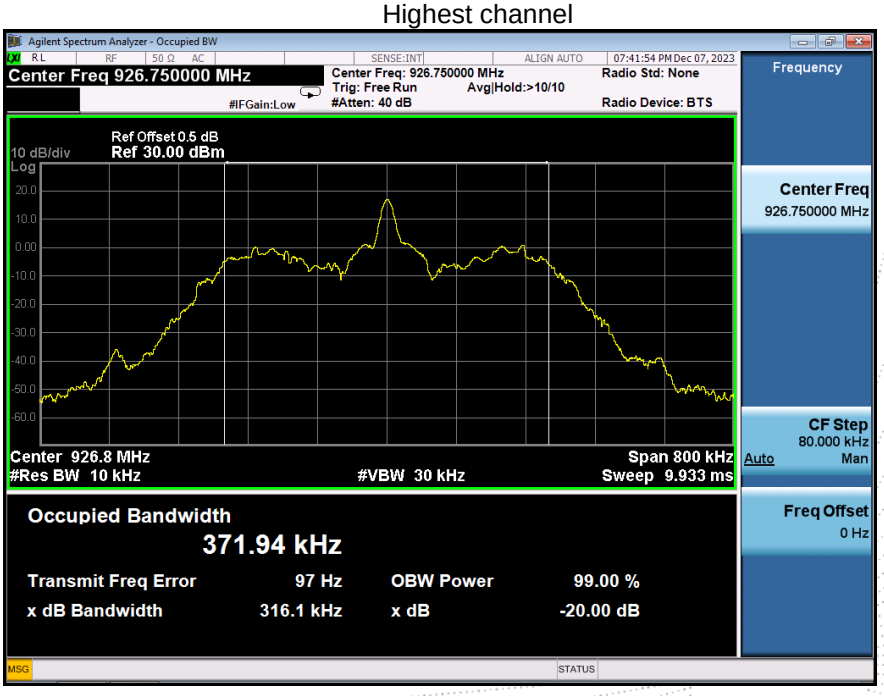
Lowest channel



Middlest channel

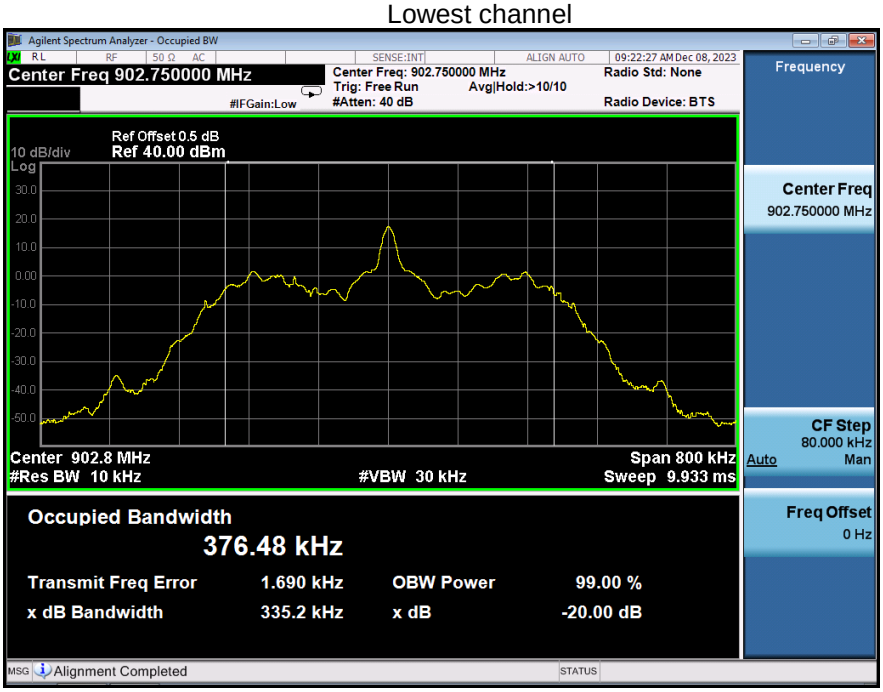


Highest channel

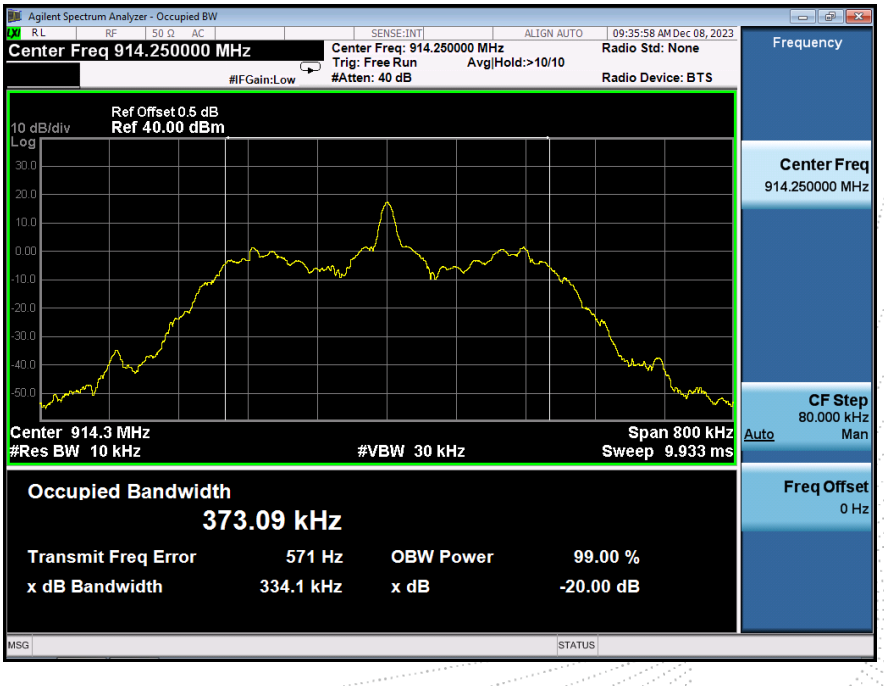


Antenna3

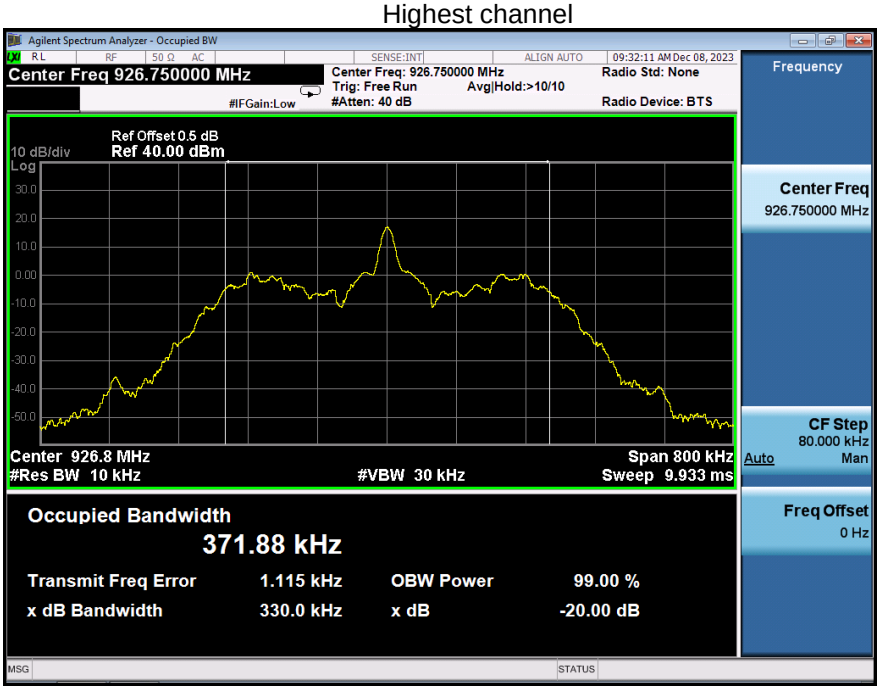
Lowest channel



Middlest channel

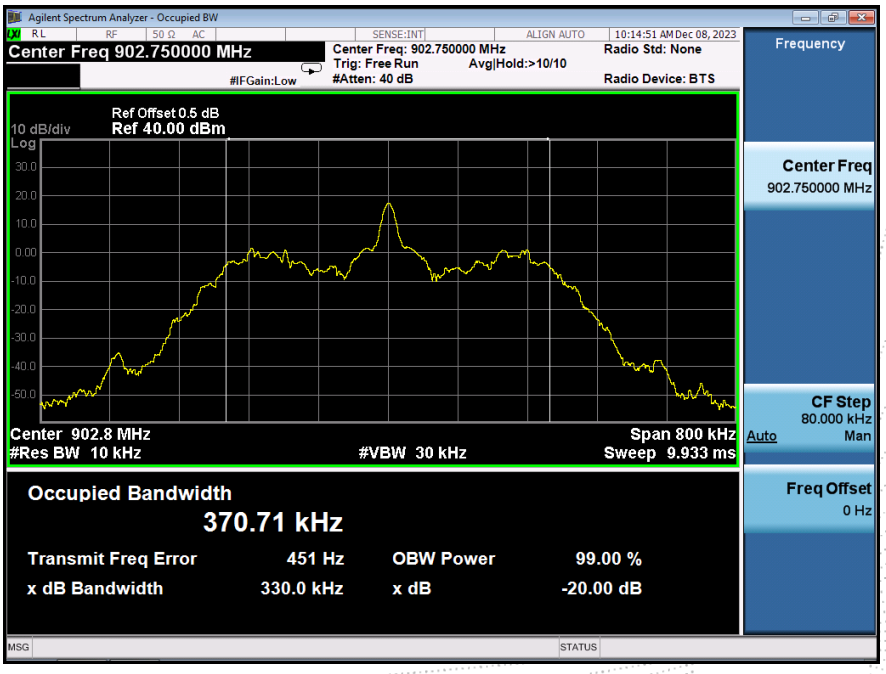


Highest channel

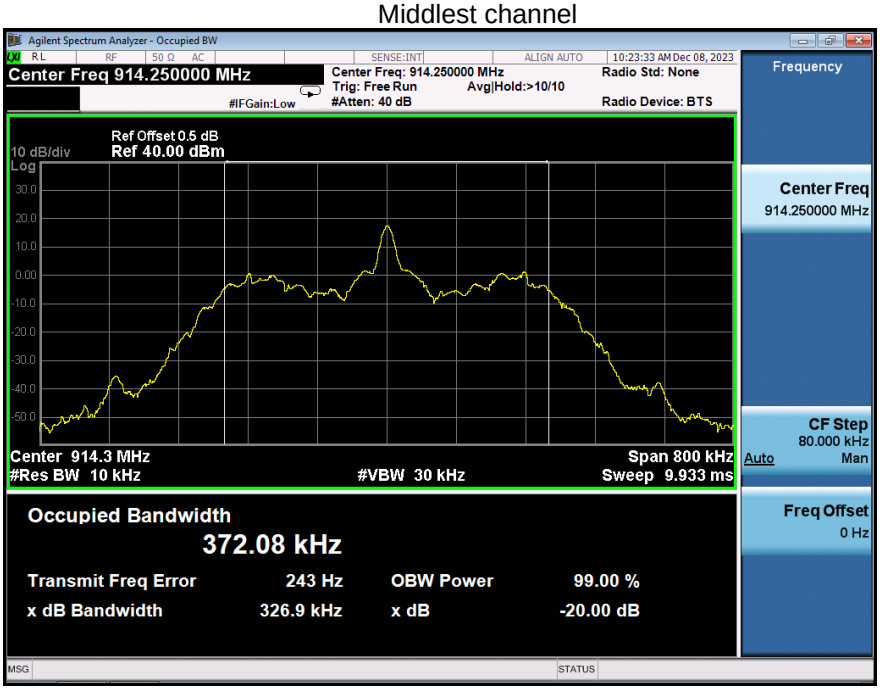


Antenna4

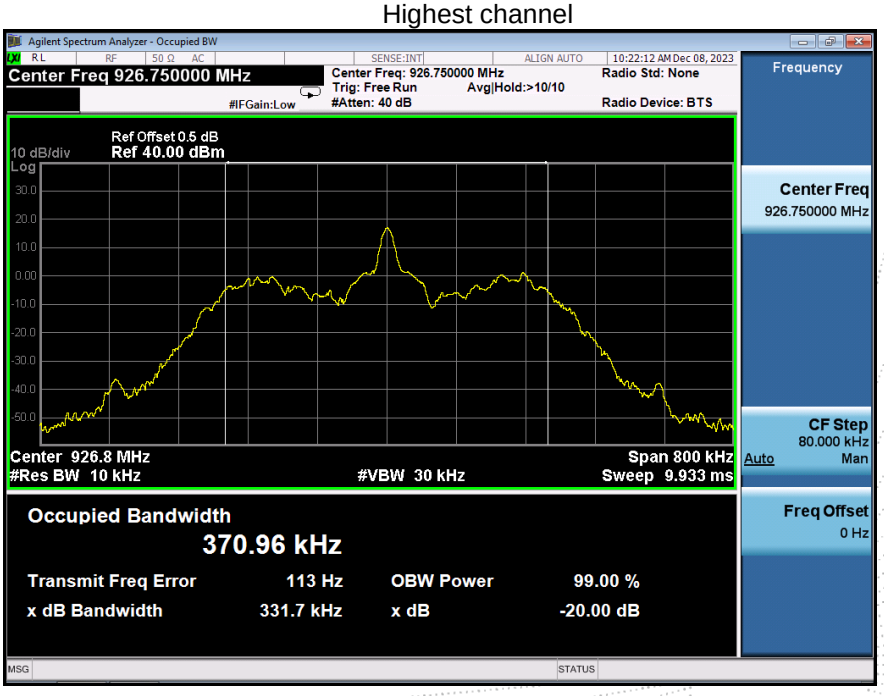
Lowest channel



Middlest channel

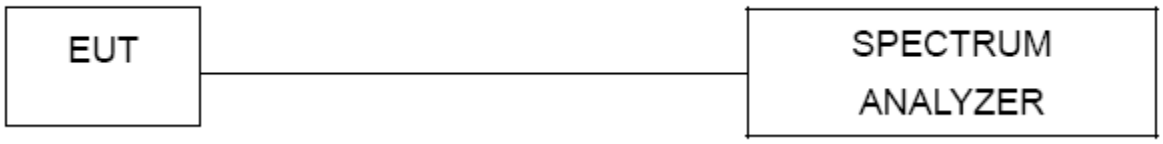


Highest channel



11. Conducted Output Power

11.1 Block Diagram Of Test Setup



11.2 Limit

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

For those cases where the rule specifies that the conducted output power be reduced by the amount in dB that the directional gain of the transmitting antenna exceeds 6 dBi, the applicable output power limit shall be calculated as follows:

$P_{out}=P_{limit}-(G_{TX}-6)$

where:
P_{Out} is the maximum conducted output power in dBm,
P_{Limit} is the output power limit in dBm,
G_{Tx} is the maximum transmitting antenna directional gain in dBi.

11.3 Test procedure

Use the following spectrum analyzer settings:
Span = approximately 5 times the 20 dB bandwidth,
centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize.
Use the marker-to-peak function to set the marker to the peak of the emission.

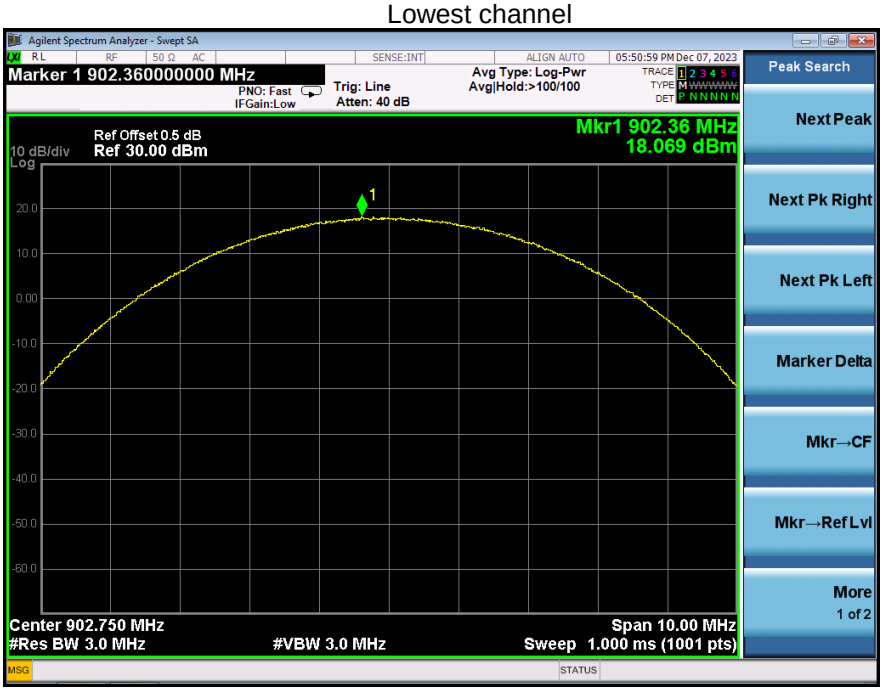
11.4 Test Result

ASK				
Test channel		**Peak Output Power (dBm)**	**Limit (dBm)**	**Result**
Lowest	Antenna1	18.069	20.46	PASS
Middlest		17.316	20.46	PASS
Highest		18.367	20.46	PASS
Lowest	Antenna2	18.502	20.46	PASS
Middlest		18.398	20.46	PASS
Highest		18.104	20.46	PASS
Lowest	Antenna3	18.997	20.46	PASS
Middlest		18.381	20.46	PASS
Highest		18.228	20.46	PASS
Lowest	Antenna4	18.693	20.46	PASS
Middlest		18.680	20.46	PASS
Highest		18.216	20.46	PASS

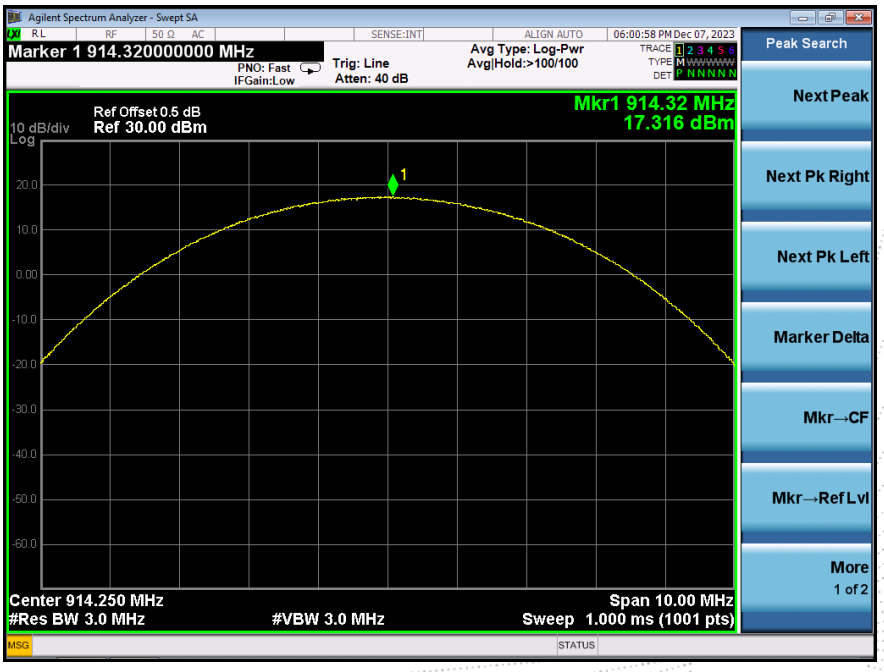
Note：The module does not support the MIMO mode.
Pout=Plimit –(GTX-6)=23.98 dBm-(9.52 dBi-6)=20.46 dBm

Antenna1

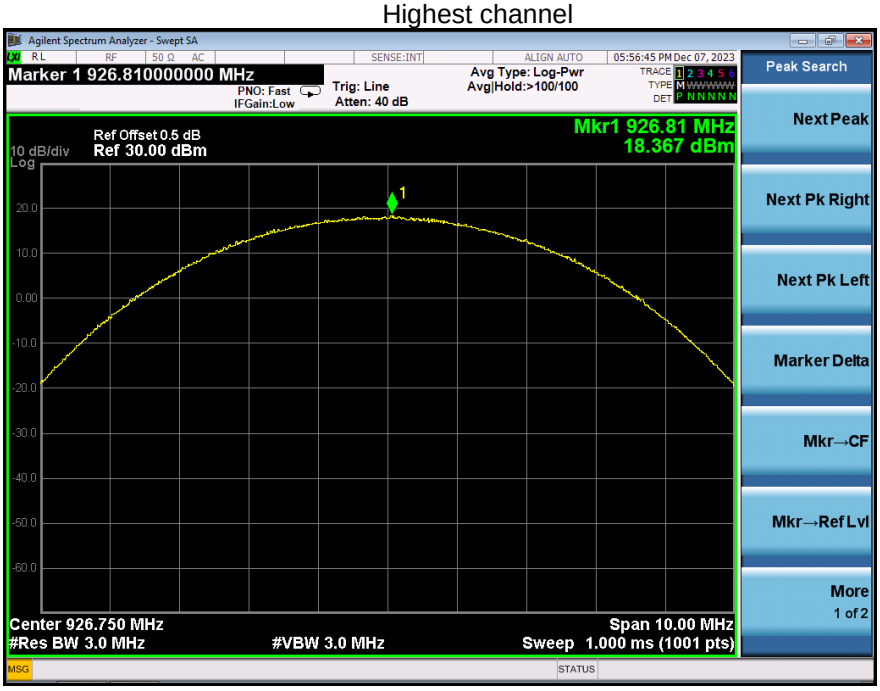
Lowest channel



Middlest channel

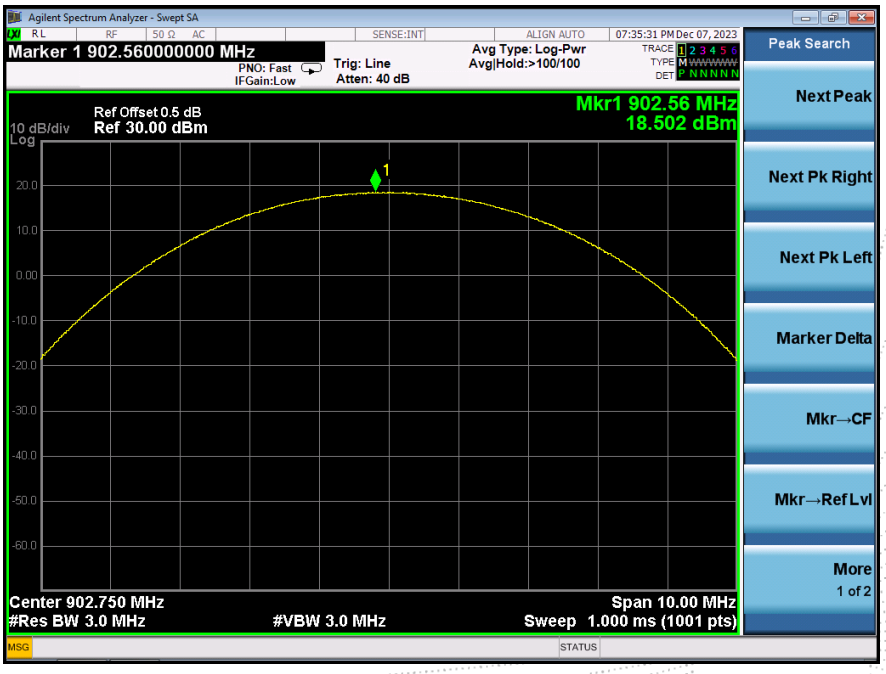


Highest channel

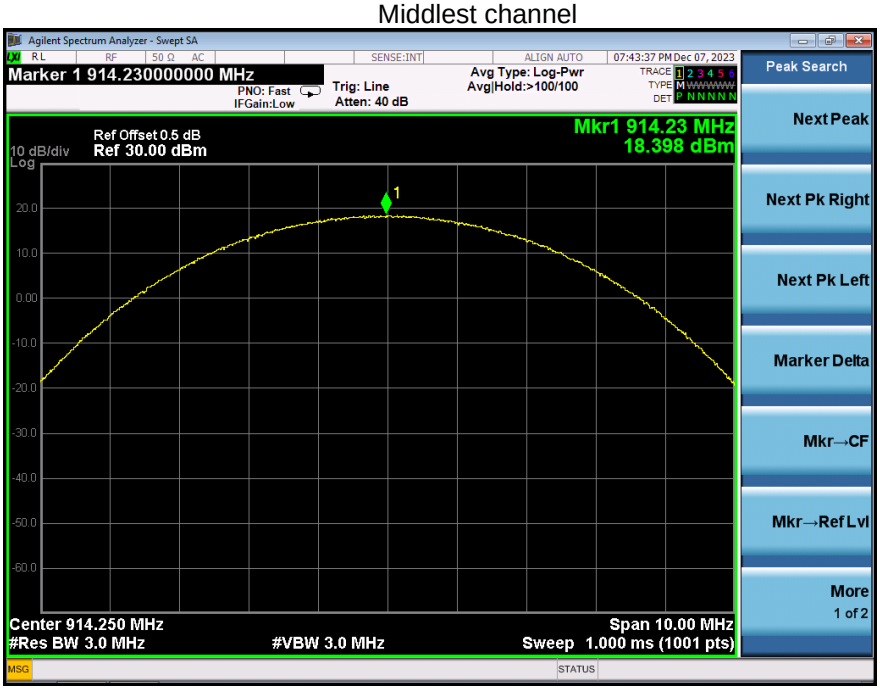


Antenna2

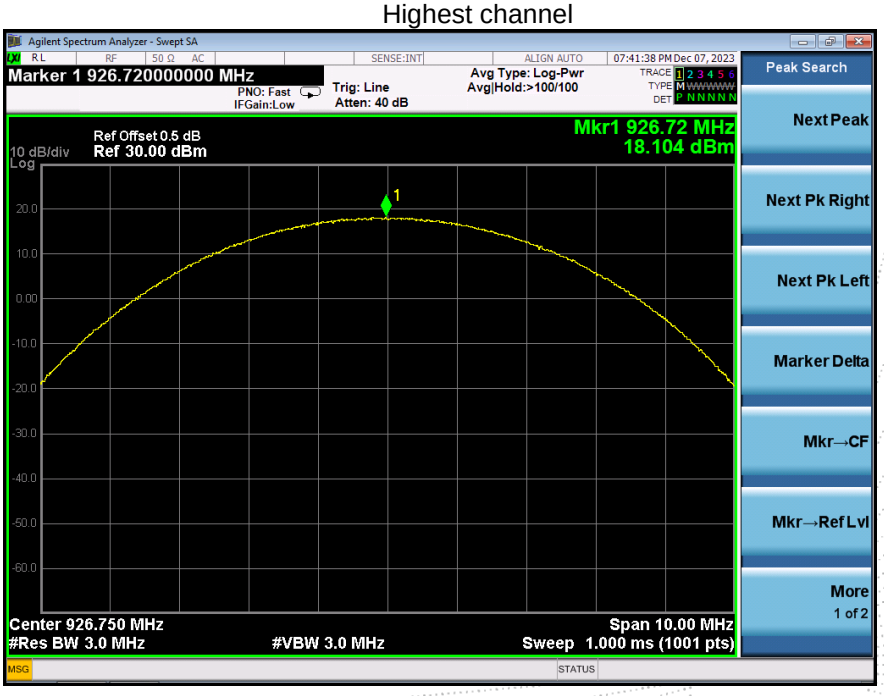
Lowest channel



Middlest channel

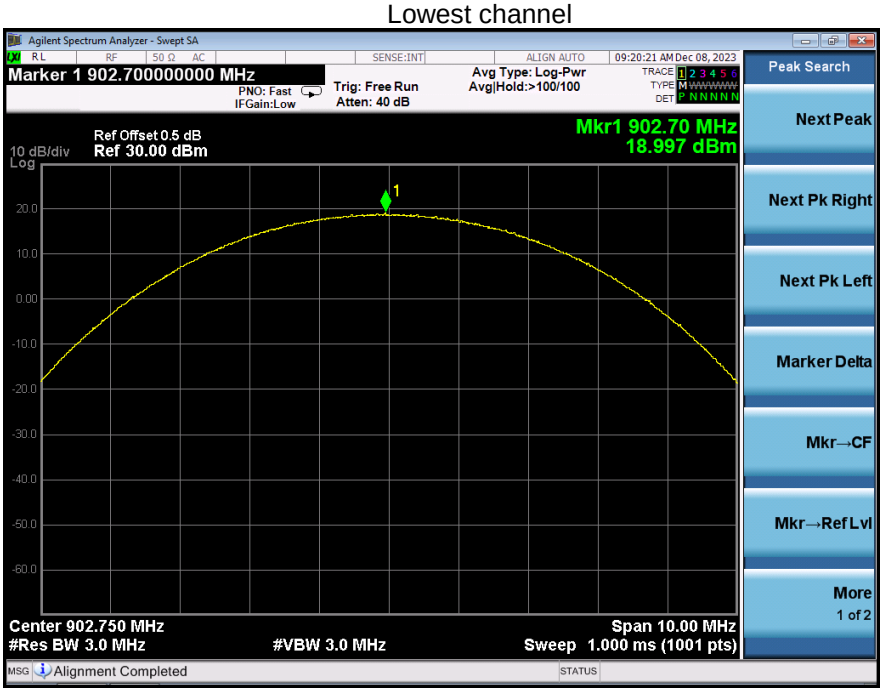


Highest channel

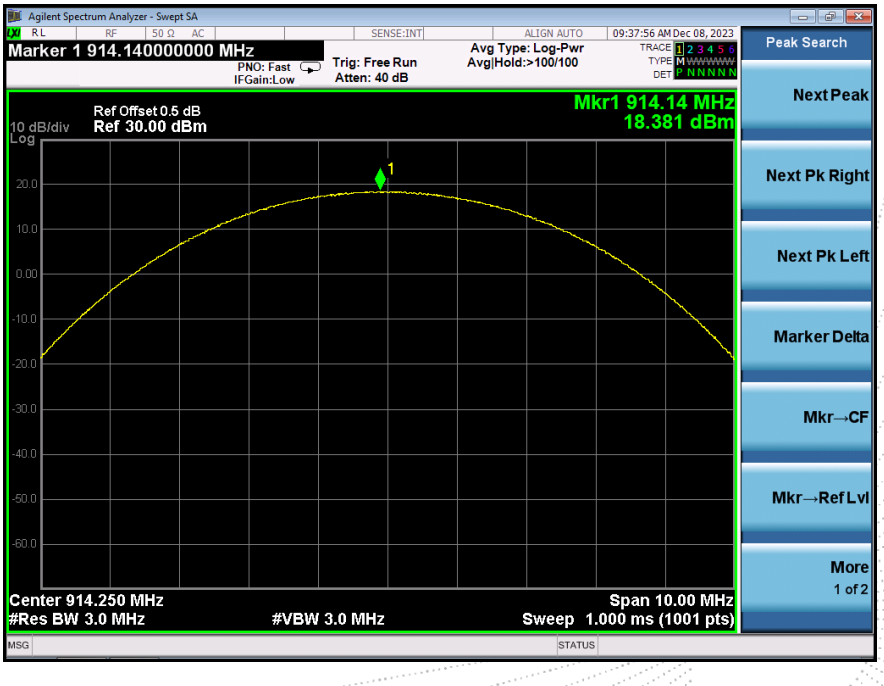


Antenna3

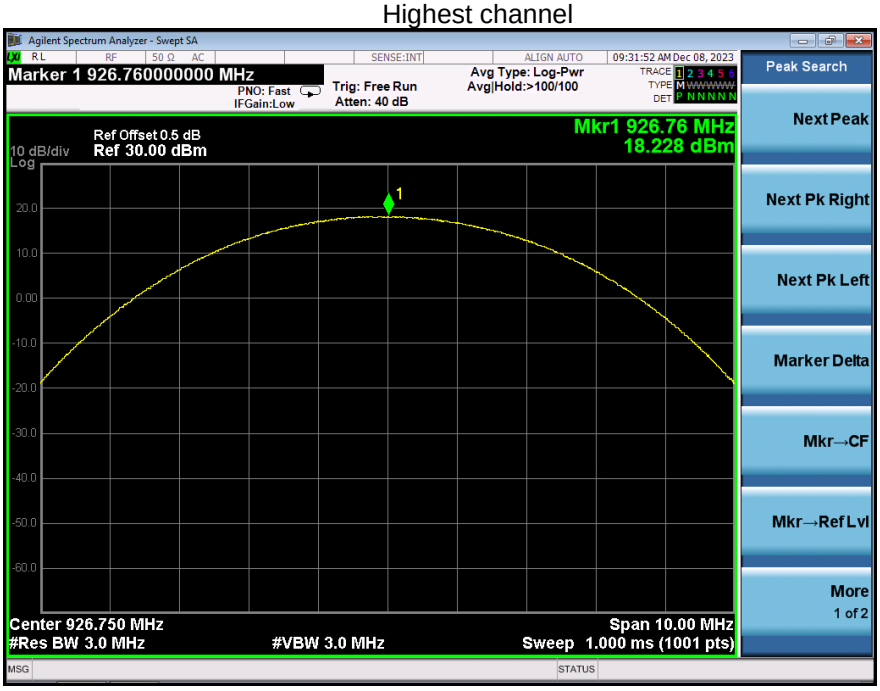
Lowest channel



Middlest channel

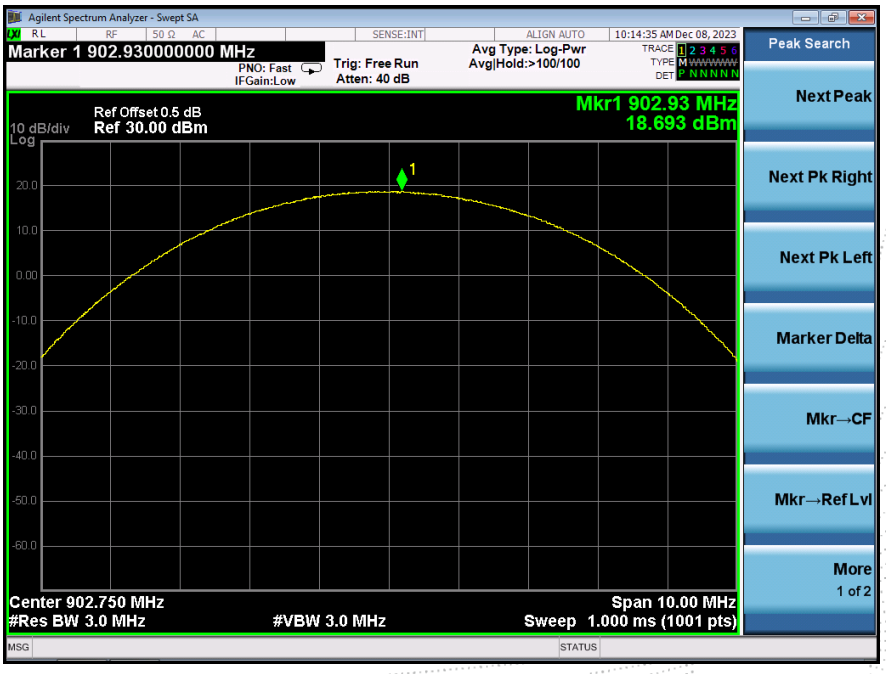


Highest channel

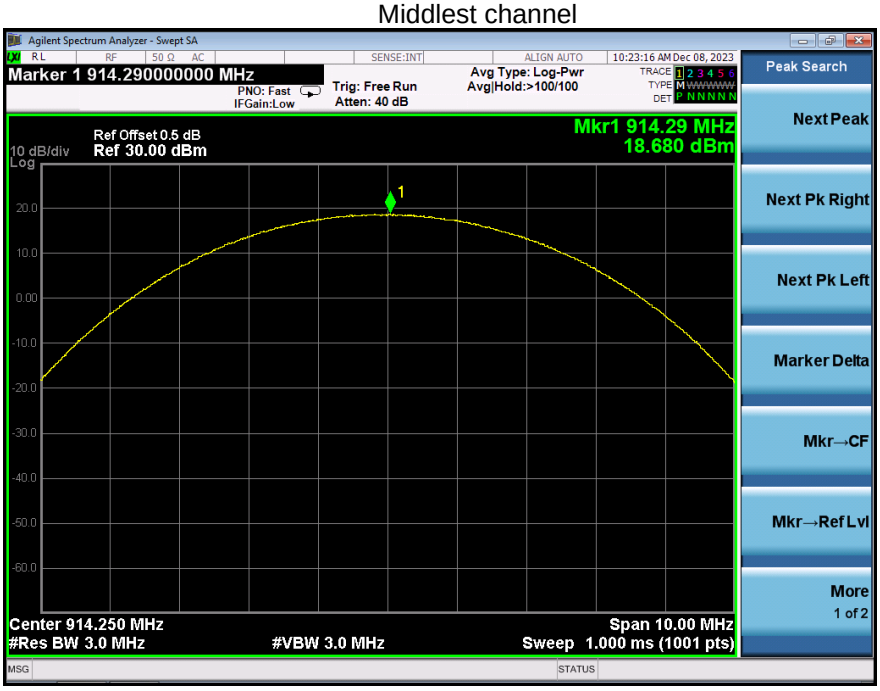


Antenna4

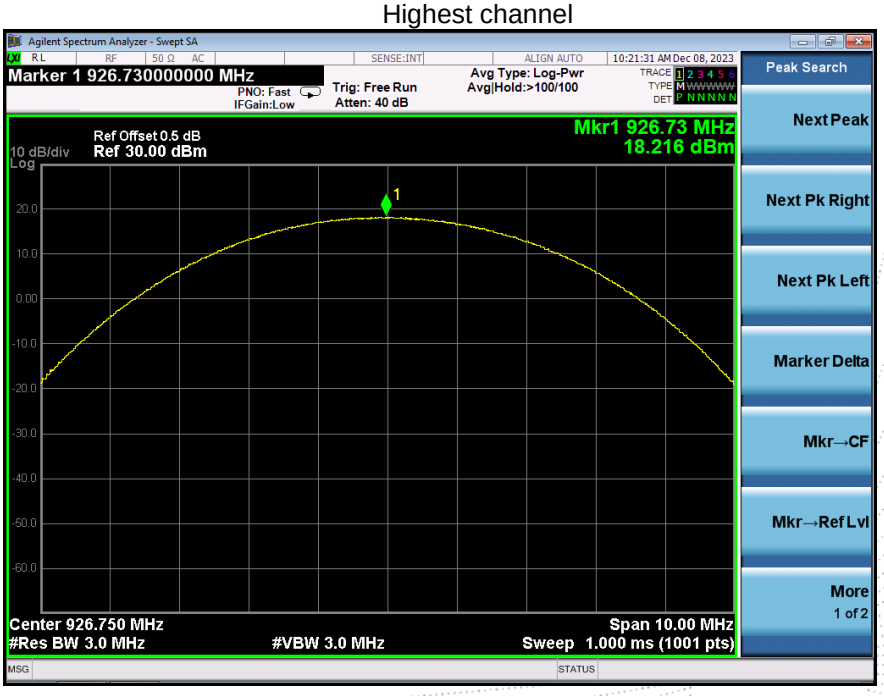
Lowest channel



Middlest channel

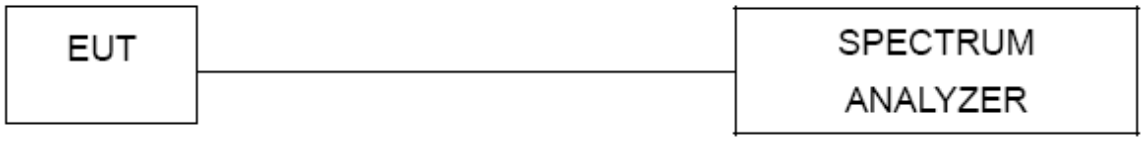


Highest channel



12. Hopping Channel Separation

12.1 Block Diagram Of Test Setup



12.2 Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

12.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz, Span = 1.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

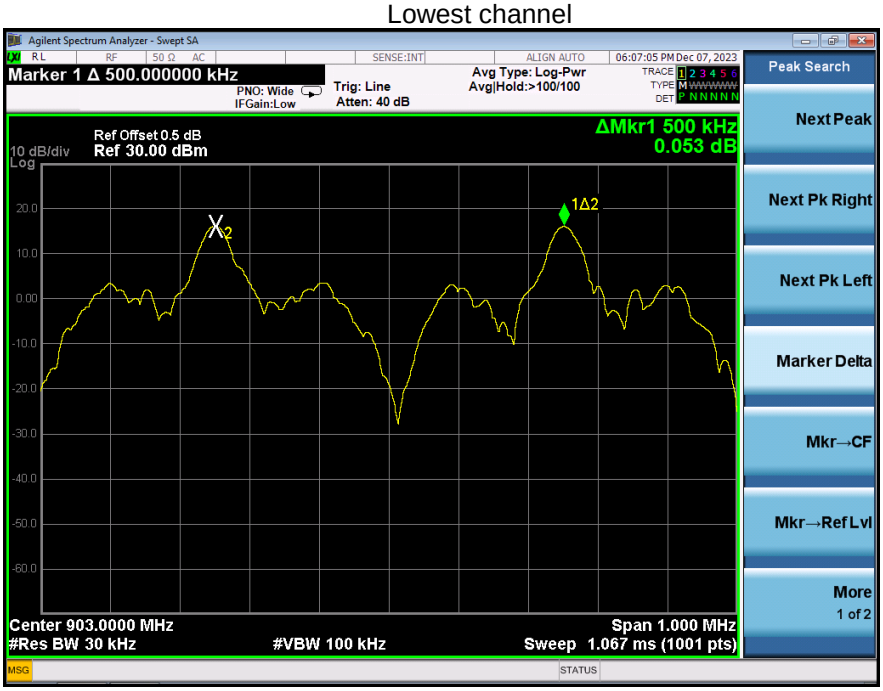
12.4 Test Result

For FHSS:

ASK				
Test channel		**Carrier Frequencies Separation (kHz)**	**Limit (kHz)**	**Result**
Lowest	Antenna1	500	331.3	PASS
Middlest		500	344.9	PASS
Highest		500	346.1	PASS
Lowest	Antenna2	500	332.7	PASS
Middlest		500	330.8	PASS
Highest		500	316.1	PASS
Lowest	Antenna3	500	335.2	PASS
Middlest		500	334.1	PASS
Highest		500	330.0	PASS
Lowest	Antenna4	499	330.0	PASS
Middlest		500	326.9	PASS
Highest		501	331.7	PASS

Antenna1

Lowest channel



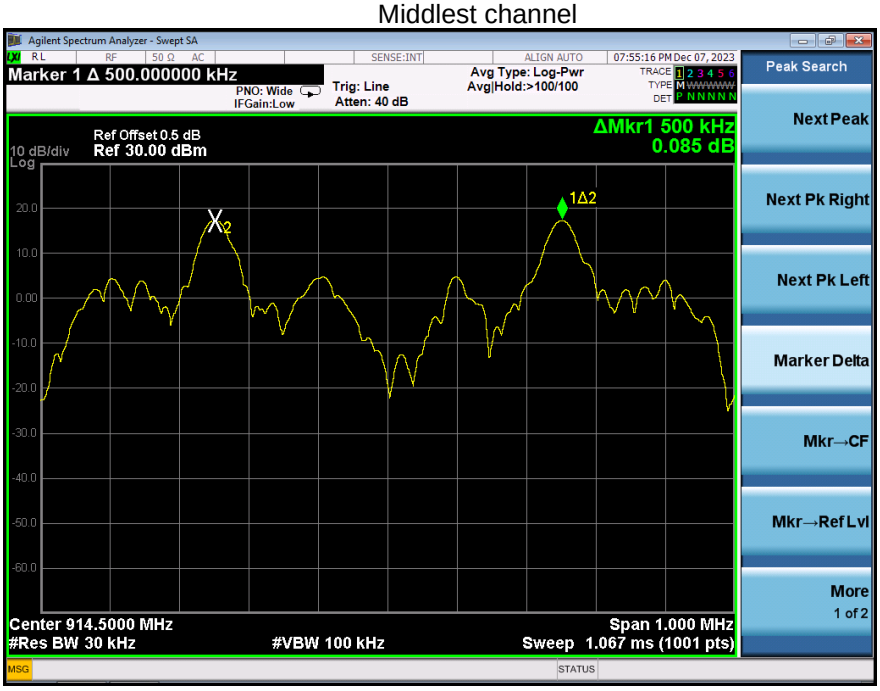
Middlest channel

Highest channel

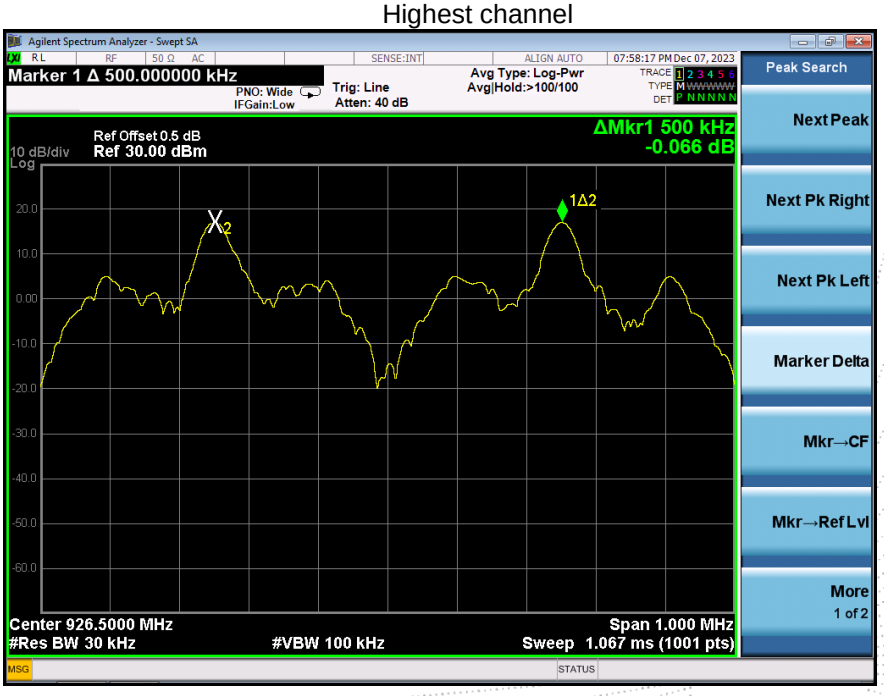
Antenna2

Lowest channel

Middlest channel

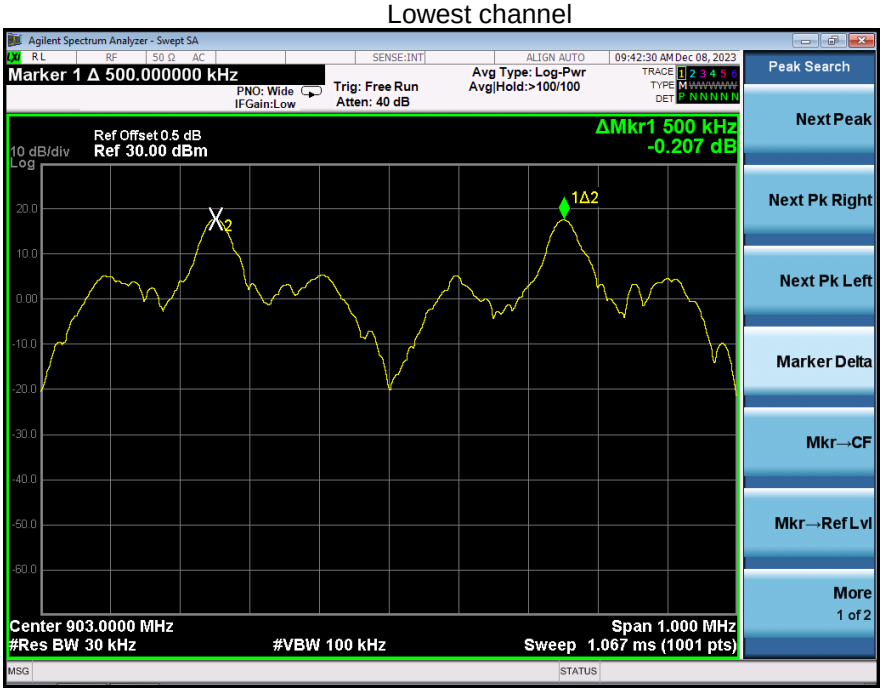


Highest channel



Antenna3

Lowest channel



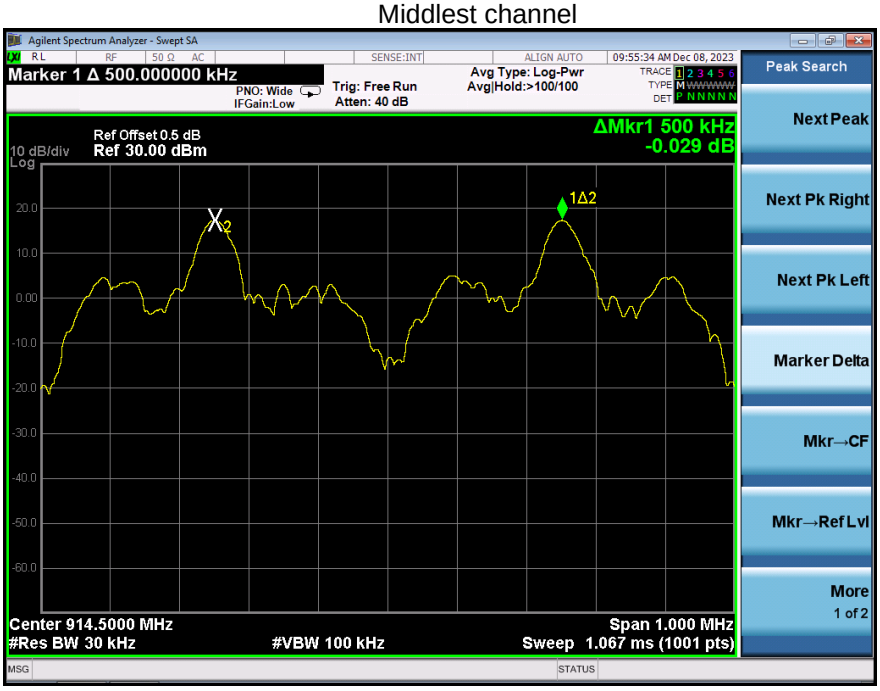
Middlest channel

Highest channel

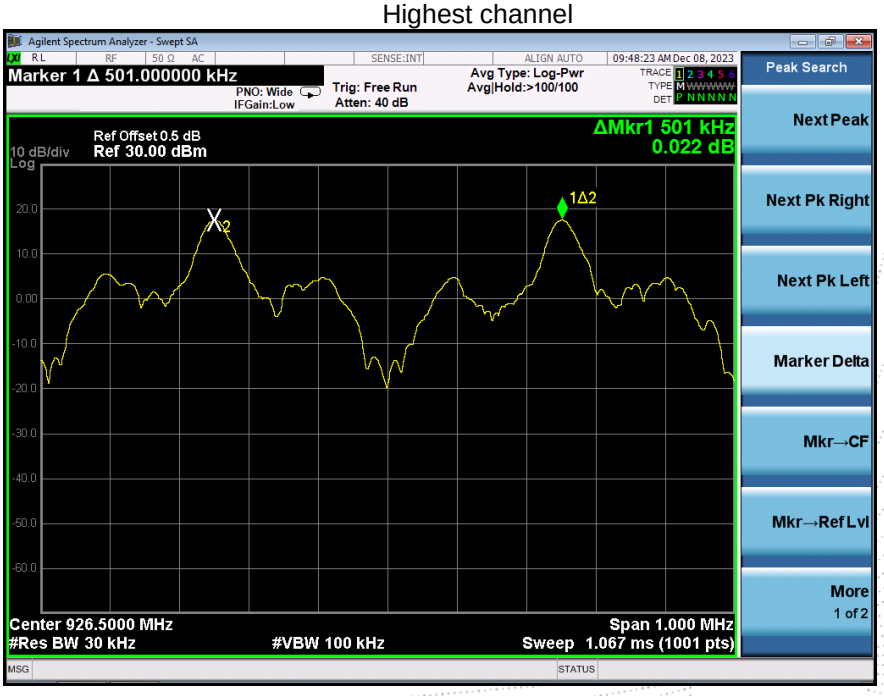
Antenna4

Lowest channel

Middlest channel

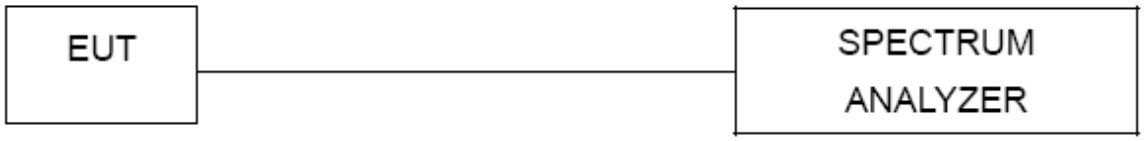


Highest channel



13. Number Of Hopping Frequency

13.1 Block Diagram Of Test Setup



13.2 Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

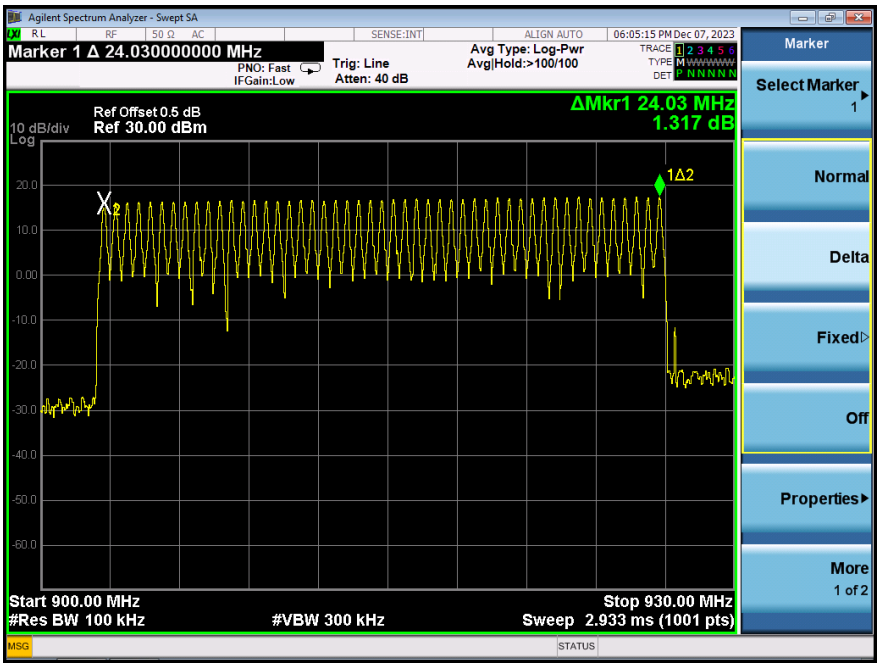
13.3 Test procedure

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Enable the EUT hopping function.
4. Use the following spectrum analyzer settings: Span = the frequency band of operation; set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold
5. The number of hopping frequency used is defined as the number of total channel.
6. Record the measurement data in report.

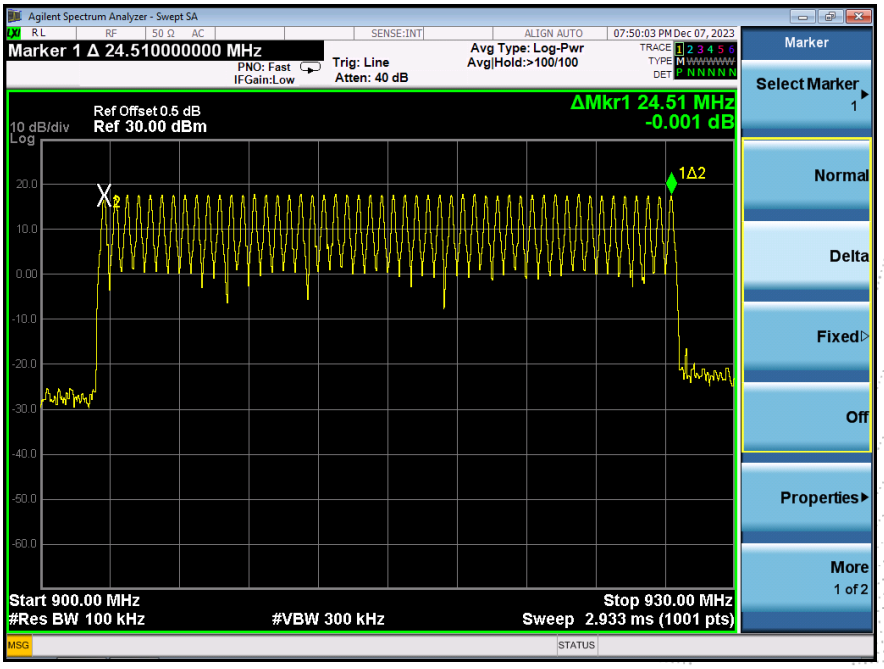
13.4 Test Result

Antenna	Hopping channel numbers	Limit	Result
Antenna1	49	$25 \leqslant N_{ch} < 50$	PASS
Antenna2	49		PASS
Antenna3	49		PASS
Antenna4	49		PASS

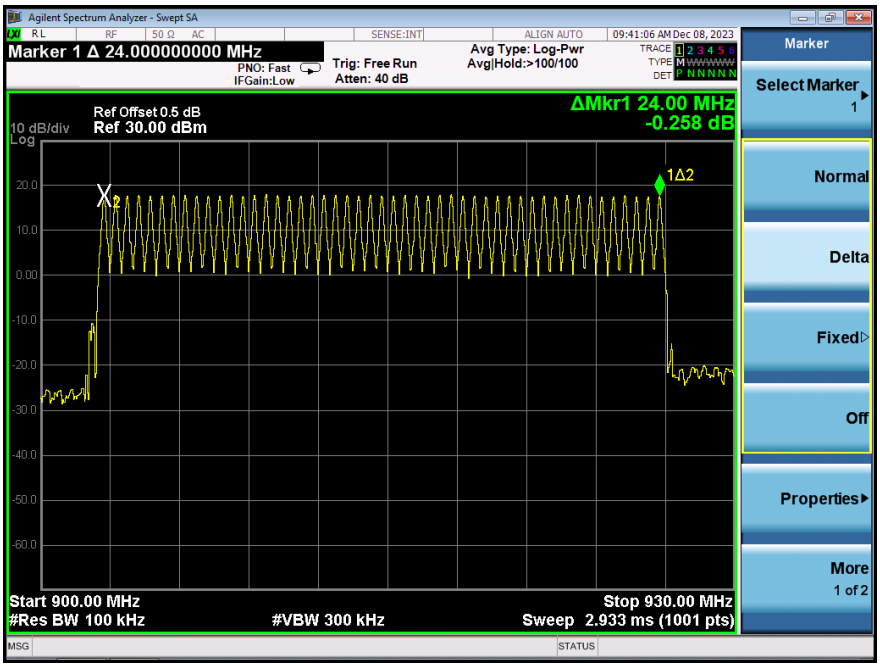
Antenna1



Antenna2



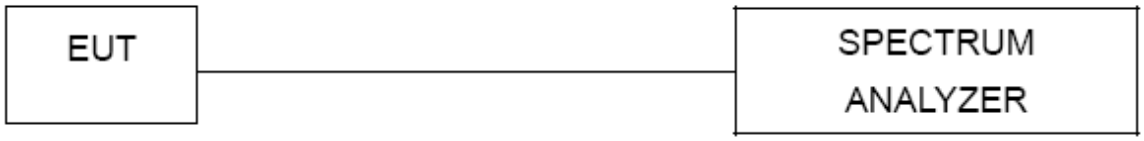
Antenna3



Antenna4

14. Dwell Time

14.1 Block Diagram Of Test Setup



14.2 Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

14.3 Test procedure

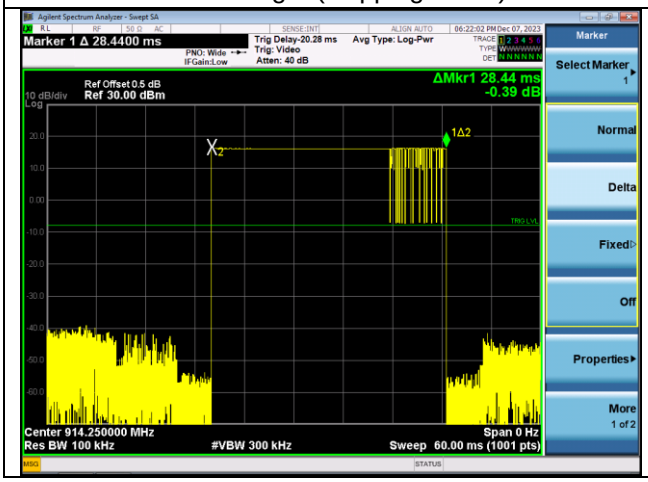
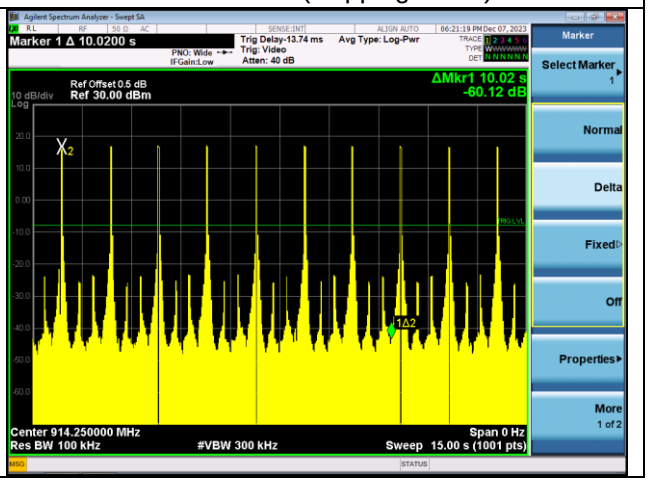
1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Enable the EUT hopping function.
4. The spectrum analyzer is set to:
Center frequency = 914.75MHz, Span = zero
RBW = 100 kHz (RBW shall be ⩽ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel),
VBW ⩾ RBW Detector function = peak,
Trace = max hold
5. Measure and record the results in the test report.

14.4 Test Result

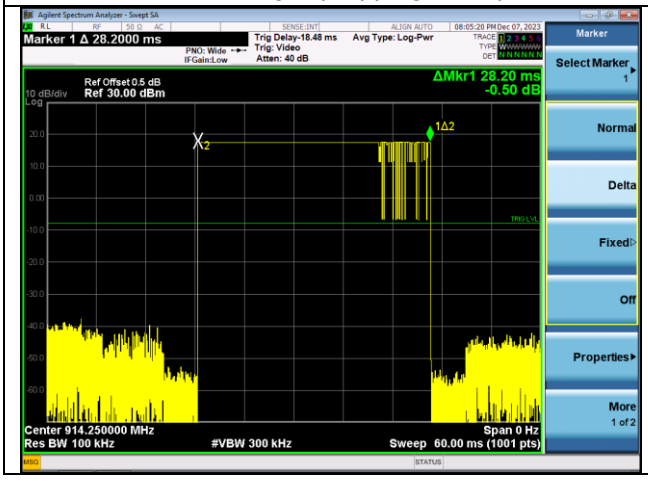
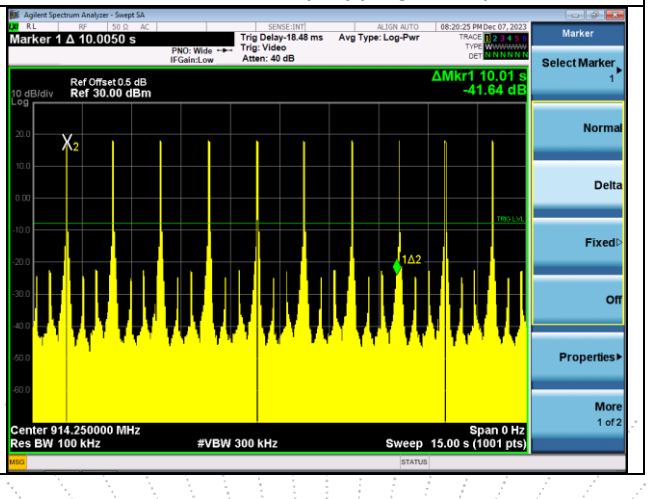
Antenna	Length (ms)	Number	Dwell time (ms)	Limit (ms)	Result
Antenna1	28.44	7	199.08	400	PASS
Antenna2	28.2	7	197.4	400	PASS
Antenna3	28.14	7	196.98	400	PASS
Antenna4	28.2	7	197.4	400	PASS

Note: Dwell time= Length* Number

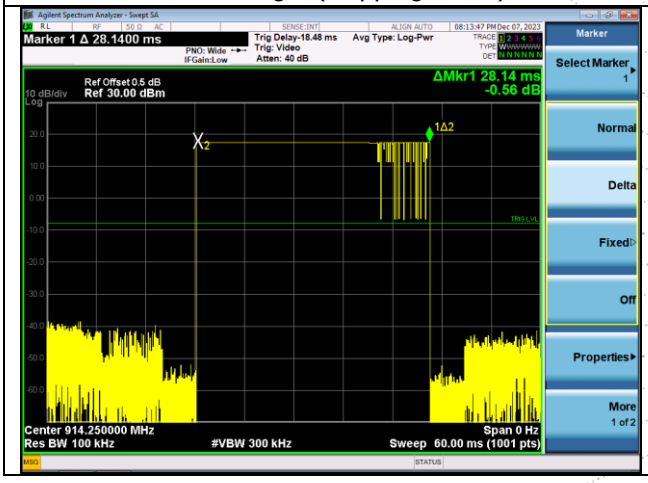
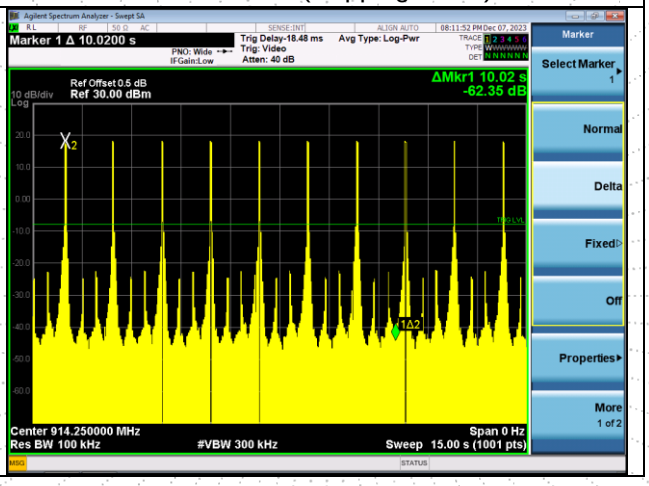
Antenna1

Length (Hopping Mode)	Period (Hopping Mode)
	

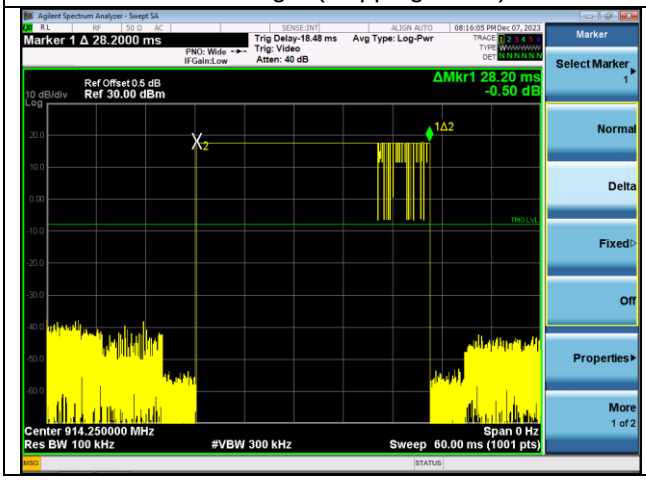
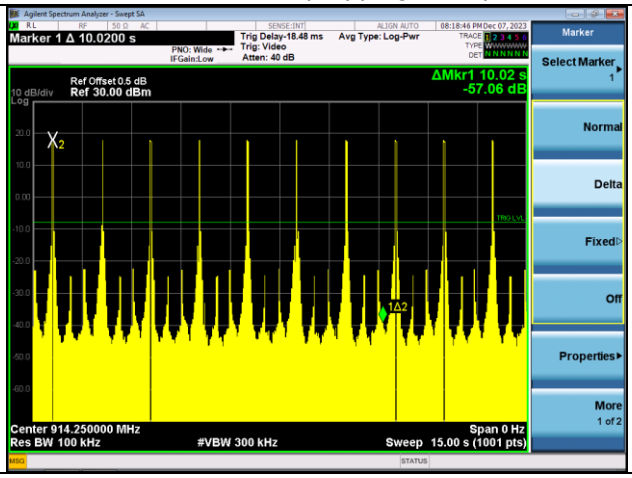
Antenna2

Length (Hopping Mode)	Period (Hopping Mode)
	

Antenna3

Length (Hopping Mode)	Period (Hopping Mode)
	

Antenna4

Length (Hopping Mode)	Period (Hopping Mode)
	

15. Antenna Requirement

15.1 Limit

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

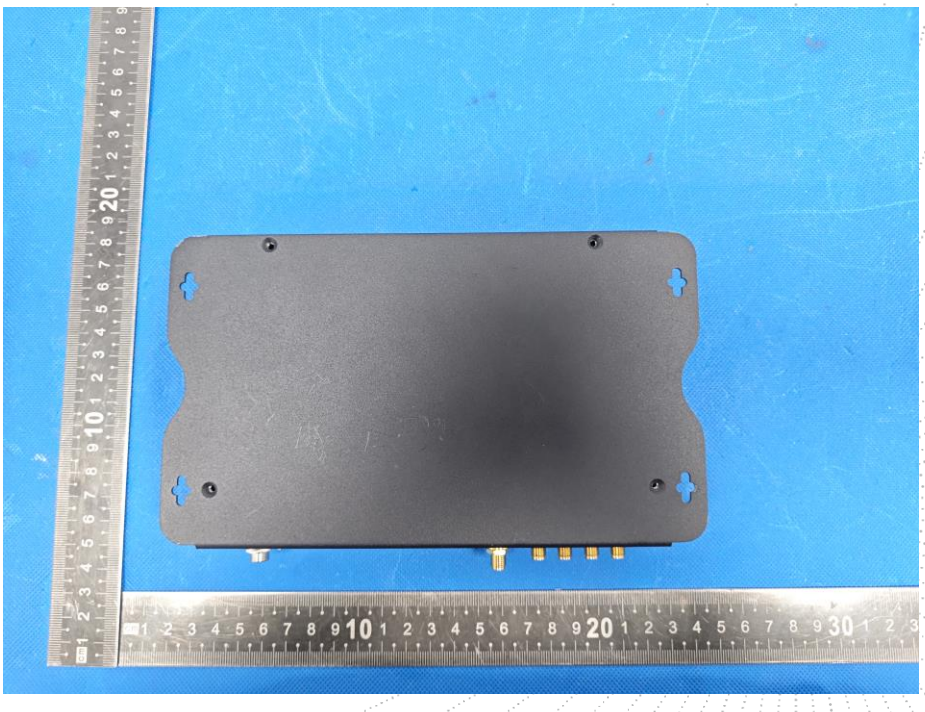
15.2 Test Result

The EUT antenna is External antenna, antenna gain is 9.52dBi, antenna connector type is RP-SMA, fulfill the requirement of this section.

16. EUT Photographs

EUT Photo 1

EUT Photo 2



Appendix-Photographs Of EUT Constructional Details

17. EUT Test Setup Photographs

Conducted emissions

Radiated Measurement Photos


BCTC
倍 测 检 测

STATEMENT

1. The equipment lists are traceable to the national reference standards.

2. The test report can not be partially copied unless prior written approval is issued from our lab.

3. The test report is invalid without the "special seal for inspection and testing".

4. The test report is invalid without the signature of the approver.

5. The test process and test result is only related to the Unit Under Test.

6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.

7. The quality system of our laboratory is in accordance with ISO/IEC17025.

8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

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