

12. Frequency Separation Measurement

12.1 Provisions Applicable

When the power is less than 0.125W: The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.

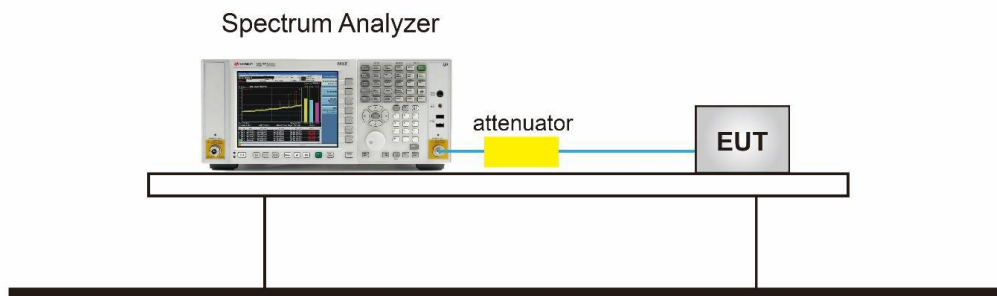
When the power is less than 1W: The minimum permissible channel separation for this system is 20dB BW.

12.2 Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Wide enough to capture the peaks of two adjacent channels.
2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
3. Video (or average) bandwidth (VBW) $\geq$ RBW.
4. Sweep: Auto.
5. Detector function: Peak.
6. Trace: Max hold. g) Allow the trace to stabilize.
7. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.
8. Input compensation coefficient (dB) = Cable Loss (dB) + Attenuator attenuation value (dB)

12.3 Measurement Setup (Block Diagram of Configuration)

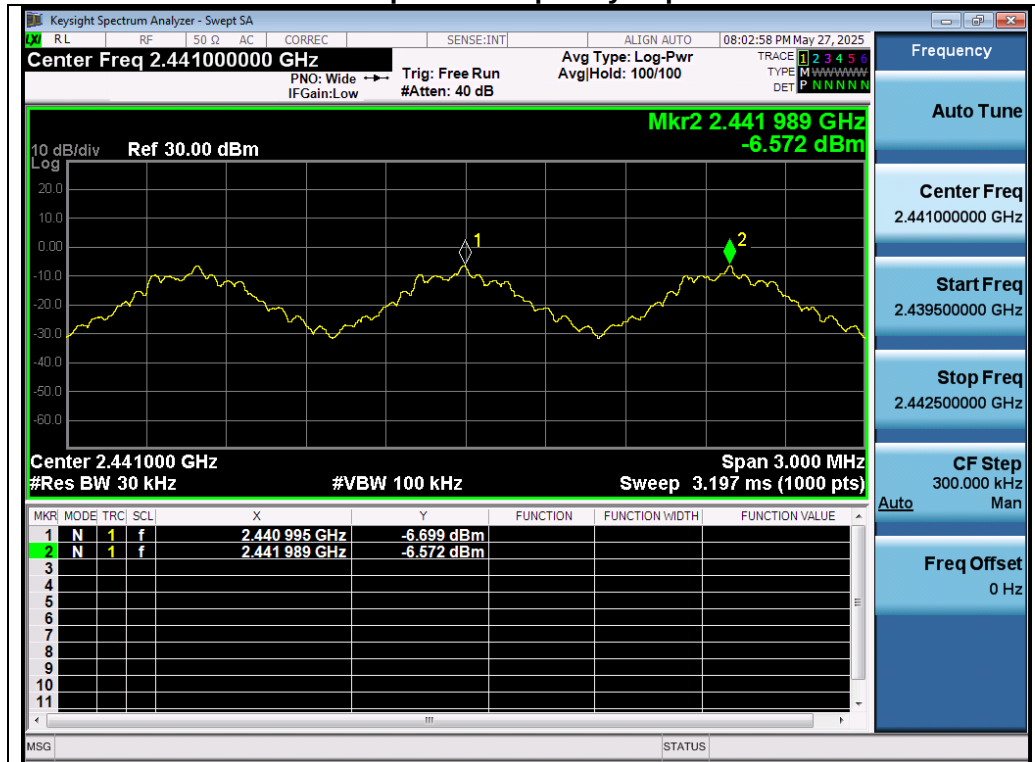


12.4 Measurement Result

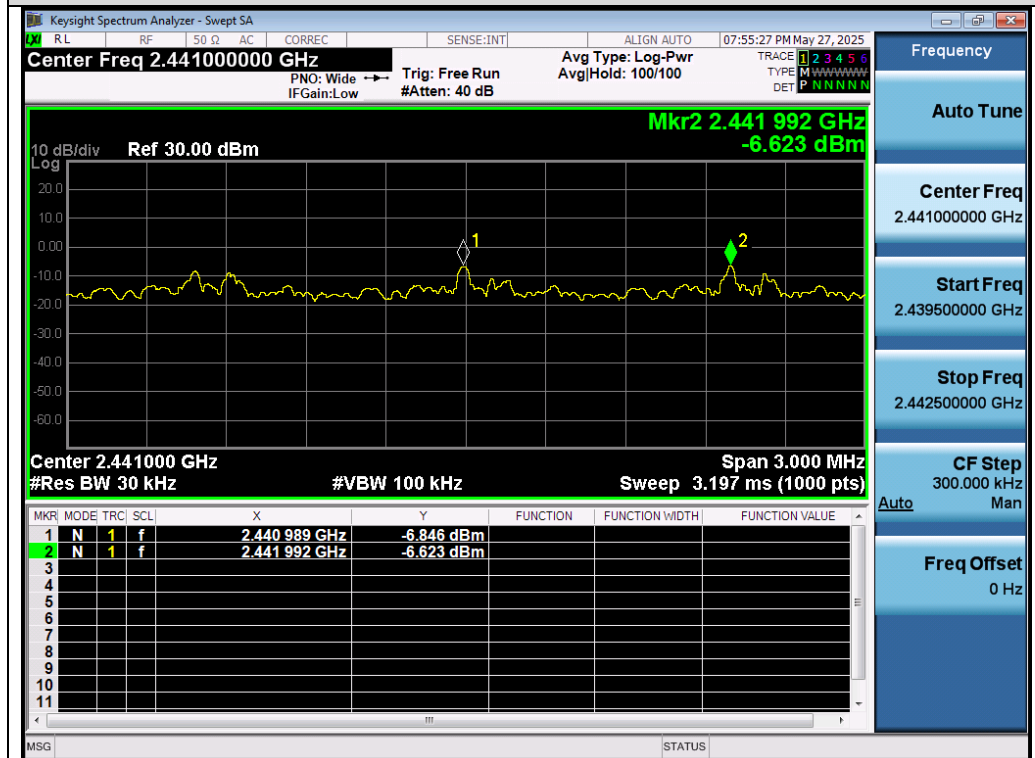
Test Data of Frequency Separation			
Test Mode	Channel Separation (MHz)	Limits (MHz)	Pass or Fail
GFSK Hopping	1.000	≥ 0.540	Pass
$\pi/4$ -DQPSK Hopping	1.003	≥ 0.842	Pass
8DPSK Hopping	0.967	≥ 0.843	Pass

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Test Graphs of Frequency Separation



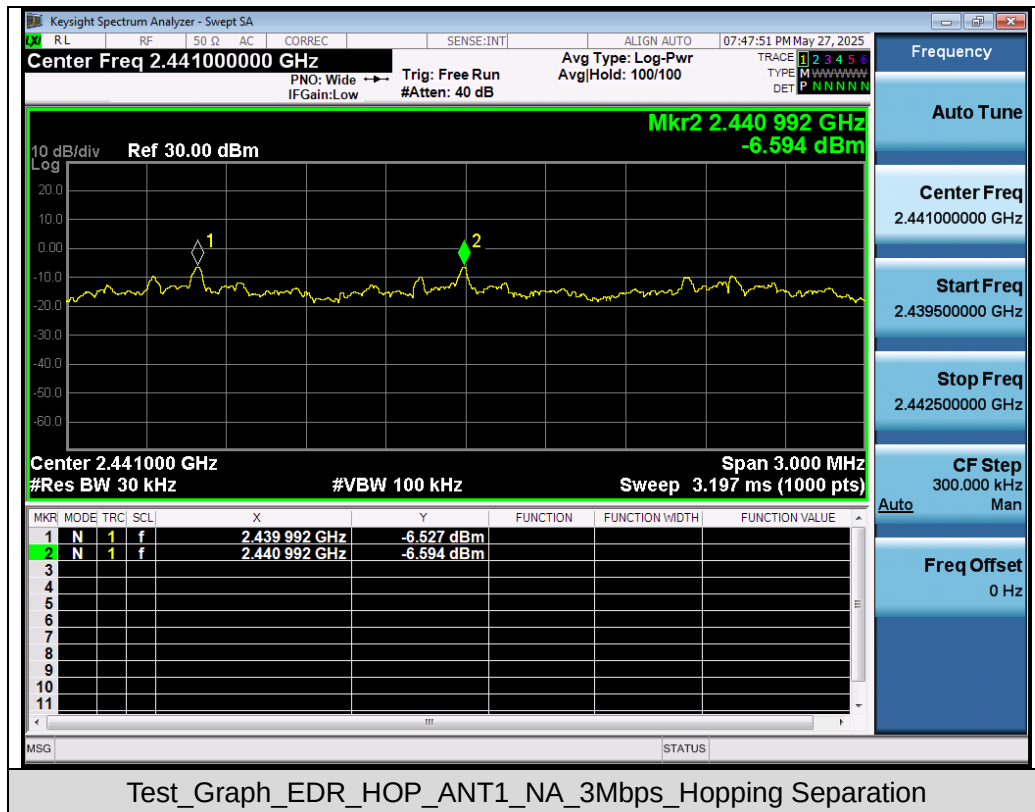
Test_Graph_BR_HOP_ANT1_NA_1Mbps_Hopping Separation



Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Hopping Separation

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13. AC Power Line Conducted Emission Test

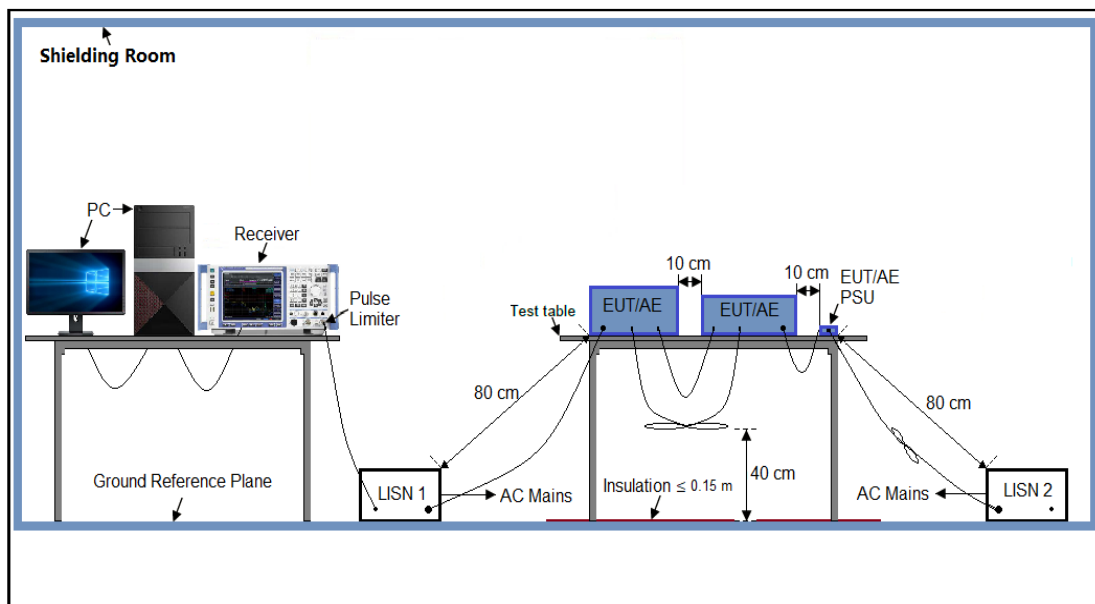
13.1 Measurement Limit

Frequency	Maximum RF Line Voltage	
	Q.P. (dB μ V)	Average (dB μ V)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

13.2 Measurement Setup (Block Diagram of Configuration)



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13.3 Preliminary Procedure of Line Conducted Emission Test

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side).
7. Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
8. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
9. During the above scans, the emissions were maximized by cable manipulation.
10. The test mode(s) were scanned during the preliminary test.
11. Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

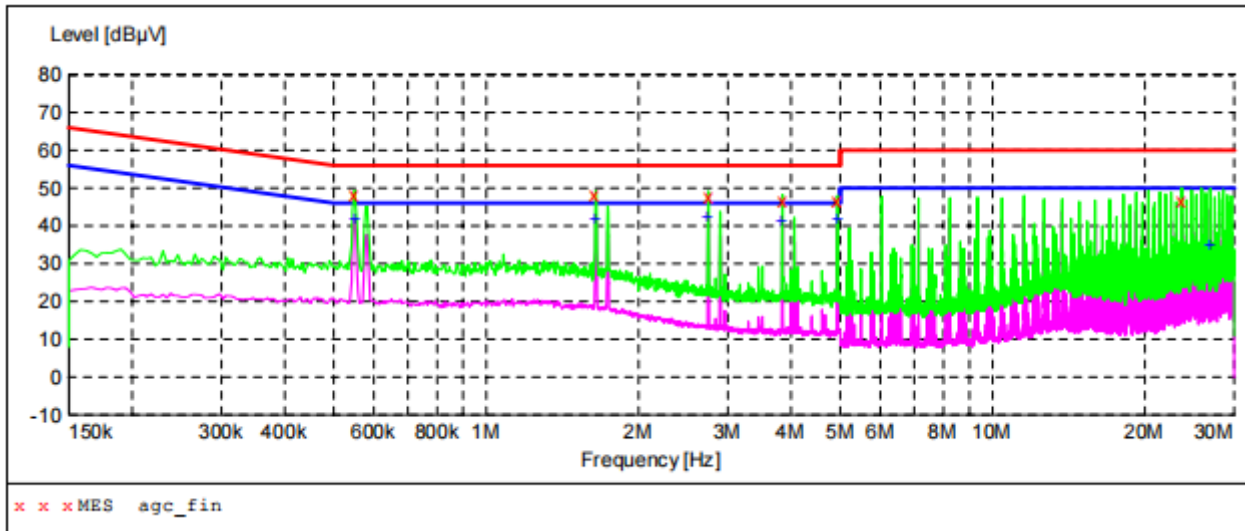
13.4 Final Procedure of Line Conducted Emission Test

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
3. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
4. The test data of the worst case condition(s) was reported on the Summary Data page.
5. A conducted emission is calculated by the following equation:
 - Measurement Level (dB μ V) = Receiver reading (dB μ V) + Transd (dB)
 - Transd (dB) = AMN Factor(dB)+Cable Loss(dB)+Attenuation(dB)
 - Margin = Limit-Level

13.5 Measurement Result

AC Power Line Conducted Emission Test

Test Mode	Mode 1	LISN Line	Hot Side
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**MEASUREMENT RESULT: "agc_fin"**

2025/7/2 22:01

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.550000	48.10	10.3	56	7.9	QP	L1
1.646000	48.00	10.4	56	8.0	QP	L1
2.746000	47.90	10.5	56	8.1	QP	L1
3.846000	46.80	10.6	56	9.2	QP	L1
4.942000	46.60	10.8	56	9.4	QP	L1
23.618000	46.50	16.1	60	13.5	QP	L1

MEASUREMENT RESULT: "agc_fin2"

2025/7/2 22:01

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.550000	41.80	10.3	46	4.2	AV	L1
1.646000	41.90	10.4	46	4.1	AV	L1
2.746000	42.30	10.5	46	3.7	AV	L1
3.846000	41.30	10.6	46	4.7	AV	L1
4.942000	42.00	10.8	46	4.0	AV	L1
26.918000	34.80	17.2	50	15.2	AV	L1

RESULT: PASS

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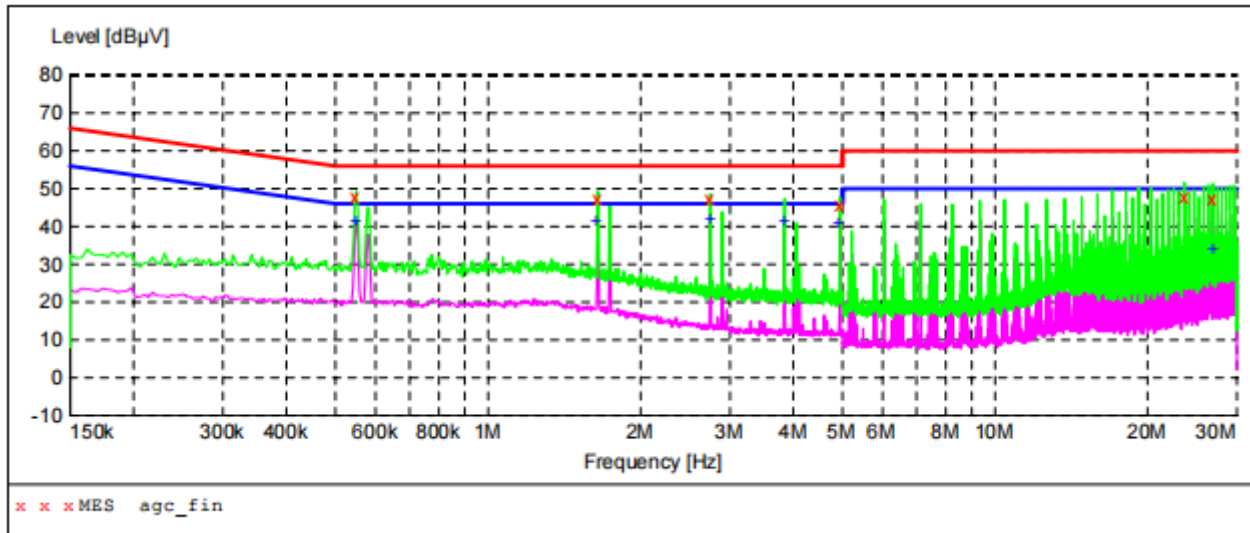
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AC Power Line Conducted Emission Test

Test Mode	Mode 1	LISN Line	Neutral Side
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MEASUREMENT RESULT: "agc_fin"

2025/7/2 22:04

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.550000	47.80	10.3	56	8.2	QP	N
1.646000	47.20	10.4	56	8.8	QP	N
2.746000	47.50	10.5	56	8.5	QP	N
4.942000	45.90	10.8	56	10.1	QP	N
23.614000	47.80	16.1	60	12.2	QP	N
26.922000	47.40	17.2	60	12.6	QP	N

MEASUREMENT RESULT: "agc_fin2"

2025/7/2 22:04

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.550000	41.70	10.3	46	4.3	AV	N
1.646000	41.20	10.4	46	4.8	AV	N
2.746000	42.00	10.5	46	4.0	AV	N
3.846000	41.20	10.6	46	4.8	AV	N
4.942000	41.00	10.8	46	5.0	AV	N
26.922000	34.30	17.2	50	15.7	AV	N

RESULT: PASS

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Appendix I: Photographs of Test Setup

Refer to the Report No.: AGC00259250504AP01

Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC00259250504AP02

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-----End of Report-----

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