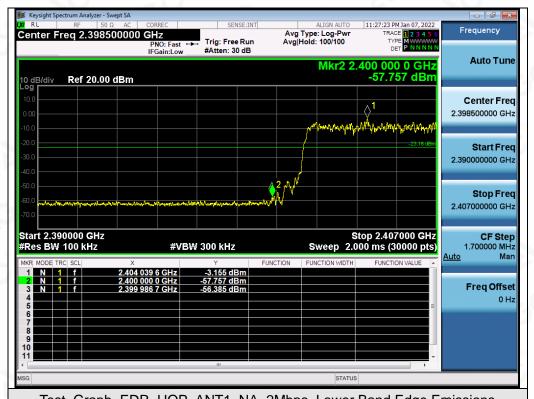
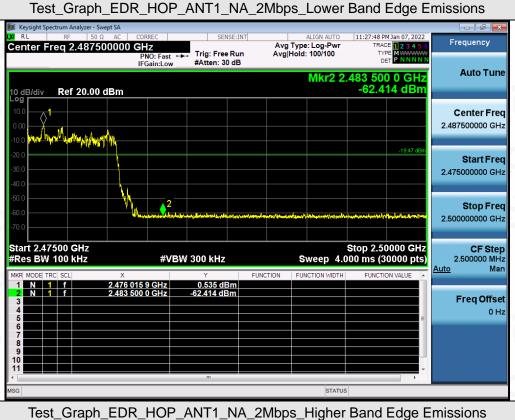


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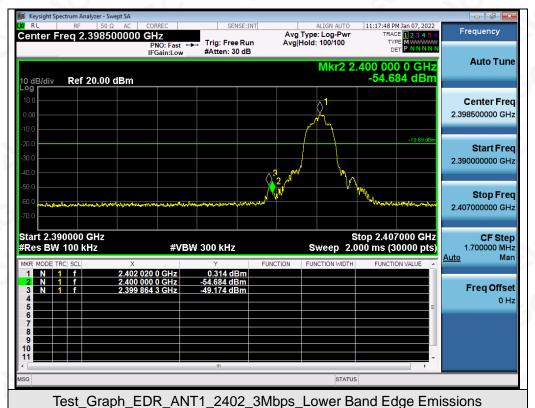


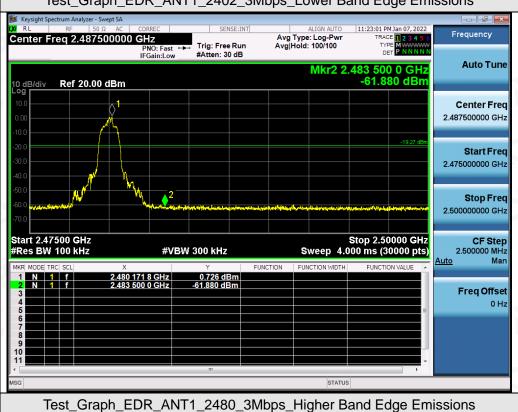




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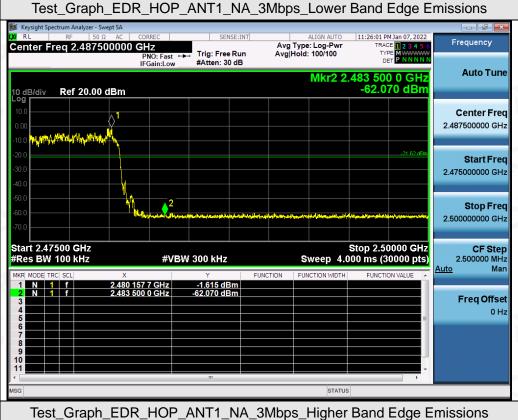




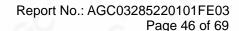
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10. RADIATED EMISSION

10.1. MEASUREMENT PROCEDURE

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

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Report No.: AGC03285220101FE03

Page 47 of 69

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

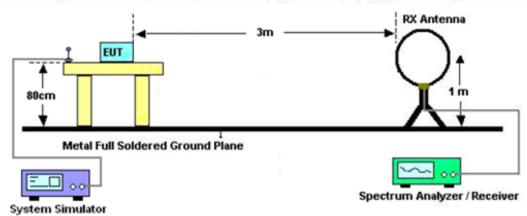
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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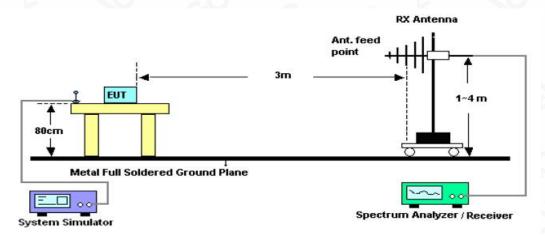


10.2. TEST SETUP

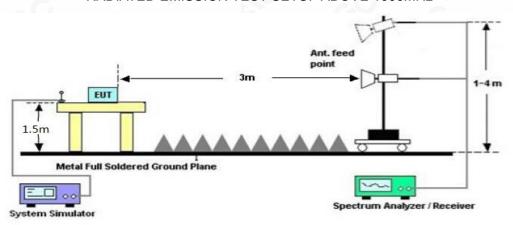
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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Report No.: AGC03285220101FE03

Page 49 of 69

10.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

10.4. TEST RESULT

Radiated emission below 30MHz

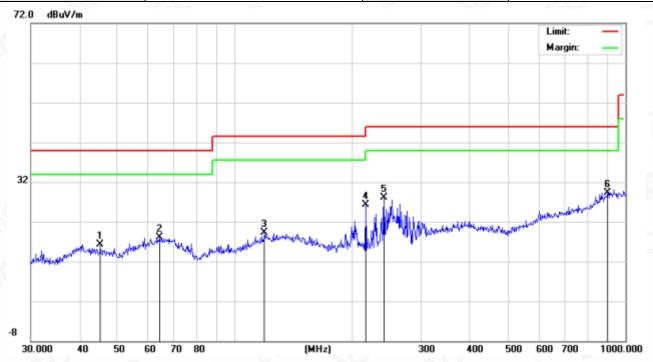
The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

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Radiated emission from 30MHz to 1000MHz

EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	21.8°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Horizontal



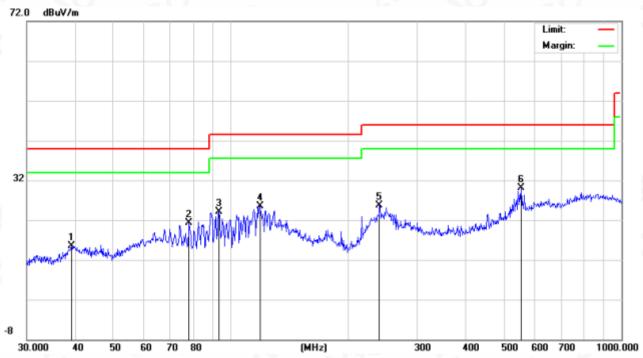
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		45.2166	6.92	9.38	16.30	40.00	-23.70	peak
2		63.9828	6.30	11.73	18.03	40.00	-21.97	peak
3		119.0180	6.58	12.81	19.39	43.50	-24.11	peak
4		216.0240	18.80	7.60	26.40	46.00	-19.60	peak
5		240.8304	19.55	8.65	28.20	46.00	-17.80	peak
6	*	900.1474	6.50	22.87	29.37	46.00	-16.63	peak

RESULT: PASS

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EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	21.8°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Vertical

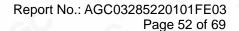


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		39.0245	5.90	9.55	15.45	40.00	-24.55	peak
2		78.1389	10.96	10.34	21.30	40.00	-18.70	peak
3		93.1132	14.68	9.37	24.05	43.50	-19.45	peak
4		118.6013	12.97	12.62	25.59	43.50	-17.91	peak
5		239.9874	12.00	13.66	25.66	46.00	-20.34	peak
6	*	552.8832	11.50	18.56	30.06	46.00	-15.94	peak

Note: 1. Factor=Antenna Factor + Cable loss, Over=Measurement-Limit.

2. All test modes had been pre-tested. The mode 6 is the worst case and recorded in the report.

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The test results the test report.



Radiated emission above 1GHz

EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Tree
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4804.000	48.21	0.08	48.29	74	-25.71	peak ©
4804.000	35.63	0.08	35.71	54	-18.29	AVG
7206.000	43.18	2.21	45.39	74	-28.61	peak
7206.000	31.87	2.21	34.08	54	-19.92	AVG
G	20				20	
emark:			0			

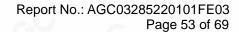
Factor = Antenna Factor + Cable Loss - Pre-amplifier.

EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Time
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4804.000	47.68	0.08	47.76	74	-26.24	peak
4804.000	37.03	0.08	37.11	54	-16.89	AVG
7206.000	41.97	2.21	44.18	74	-29.82	peak
7206.000	32.37	2.21	34.58	54	-19.42	AVG
<u> </u>			0			

Factor = Antenna Factor + Cable Loss - Pre-amplifier

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EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Horizontal

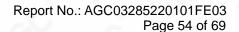
Meter Reading	Factor	Emission Level	Limits	Margin	Value Time
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
48.13	0.14	48.27	74	-25.73	peak
34.75	0.14	34.89	54	-19.11	AVG
44.42	2.36	46.78	74	-27.22	peak
30.53	2.36	32.89	54	-21.11	AVG
8			8	<u> </u>	
	(8)				(8)
	(dBµV) 48.13 34.75 44.42	(dBµV) (dB) 48.13 0.14 34.75 0.14 44.42 2.36	(dBμV) (dB) (dBμV/m) 48.13 0.14 48.27 34.75 0.14 34.89 44.42 2.36 46.78	(dBμV) (dB) (dBμV/m) (dBμV/m) 48.13 0.14 48.27 74 34.75 0.14 34.89 54 44.42 2.36 46.78 74	(dBμV) (dB) (dBμV/m) (dBμV/m) (dBμV/m) 48.13 0.14 48.27 74 -25.73 34.75 0.14 34.89 54 -19.11 44.42 2.36 46.78 74 -27.22

EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Vertical

(dBµV) 45.88 36.42	(dB) 0.14 0.14	(dBμV/m) 46.02 36.56	(dBµV/m) 74	(dB) -27.98	Value Type peak
36.42			(%)		
	0.14	36.56	- A		
		00.00	54	-17.44	AVG
40.76	2.36	43.12	74	-30.88	peak
33.52	2.36	35.88	54	-18.12	AVG
		(6)			
			<u>®</u>		
	33.52	33.52 2.36	33.52 2.36 35.88	33.52 2.36 35.88 54	33.52 2.36 35.88 54 -18.12

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

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he test results

he test report.



EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Time
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4960.000	47.97	0.22	48.19	74	-25.81	peak
4960.000	36.43	0.22	36.65	54	-17.35	AVG
7440.000	43.77	2.64	46.41	74	-27.59	peak
7440.000	31.85	2.64	34.49	54	-19.51	AVG
	⊗		9 70		<u> </u>	
mark:						

	(3)		(8)
EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Tree
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4960.000	46.55	0.22	46.77	74	-27.23	peak
4960.000	36.76	0.22	36.98	54	-17.02	AVG
7440.000	42.07	2.64	44.71	74	-29.29	peak
7440.000	33.42	2.64	36.06	54	-17.94	AVG
		100		8		
emark:	0		- C-C		<u>©</u>	

RESULT: PASS

Note

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Margin=Emission Level-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

All test modes had been tested. The π /4-DQPSK modulation is the worst case and recorded in the report.

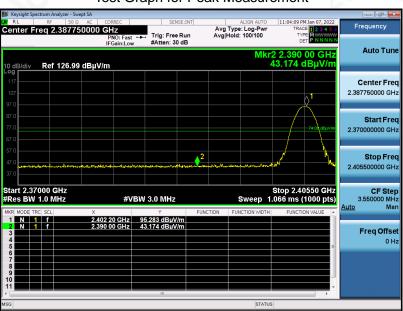
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Test result for band edge emission at restricted bands

EUT	Bluetooth module	Model Name FSC-BT958	
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



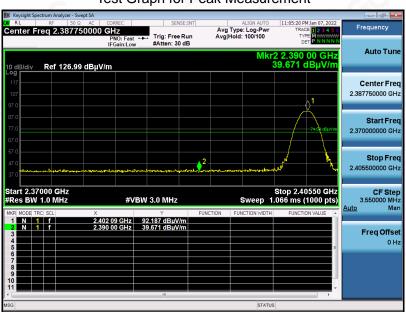
RESULT: PASS

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EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement

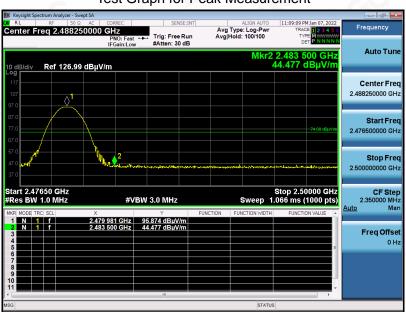


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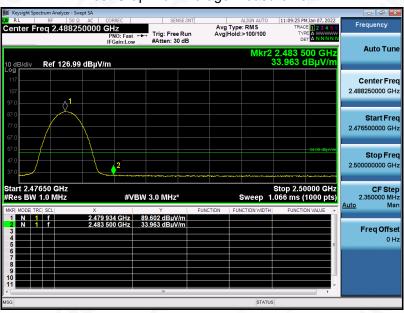


EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement

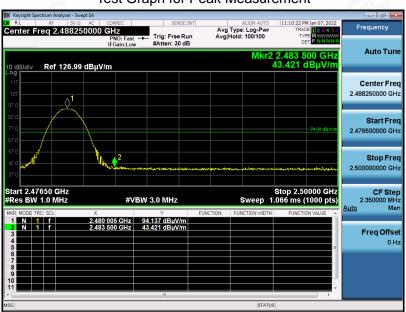


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EUT	Bluetooth module	Model Name	FSC-BT958
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



Note: The factor had been edited in the "Input Correction" of the Spectrum Analyzer. The π /4-DQPSK modulation is the worst case and recorded in the report.

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11. NUMBER OF HOPPING FREQUENCY

11.1. MEASUREMENT PROCEDURE

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

- 1. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- 2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- 3. VBW RBW. Sweep: Auto. Detector function: Peak. Trace: Max hold.
- 4. Allow the trace to stabilize.

11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

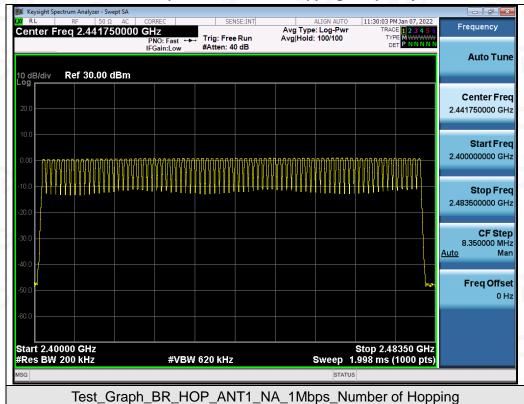
11.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

11.4. LIMITS AND MEASUREMENT RESULT

Test Data of Number of Hopping Frequency					
Test Mode Number of Hopping Frequency Limits Pass or Fail					
GFSK Hopping	>=15	Pass			

Test Graphs of Number of Hopping Frequency



Note: The GFSK modulation is the worst case and recorded in the report.

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Report No.: AGC03285220101FE03

Page 60 of 69

12. TIME OF OCCUPANCY (DWELL TIME)

12.1. MEASUREMENT PROCEDURE

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

- 1. Span: Zero span, centered on a hopping channel.
- 2. RBW shall be ≤channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
- 3. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
- 4. Detector function: Peak. Trace: Max hold.
- 5. Use the marker-delta function to determine the transmit time per hop.
- 6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) \times (period specified in the requirements / analyzer sweep time).

7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

12.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

12.4. LIMITS AND MEASUREMENT RESULT

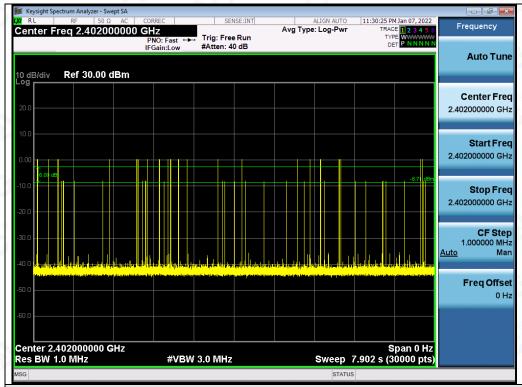
Test Data of Dwell Time							
Channel	Time of Pulse for DH5 (ms)	Number of hops in the period specified in the requirements	Sweep Time (ms)	Limit (ms)	Pass or Fail		
2402	2.890	21.0*4	242.760	400	Pass		
2441	2.890	20.0*4	231.200	400	Pass		
2480	2.890	20.0*4	231.200	400	Pass		

Note: The GFSK modulation is the worst case and recorded in the report.

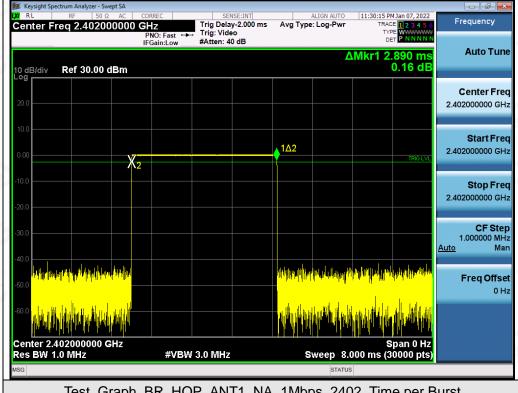
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Test Graphs of Dwell Time



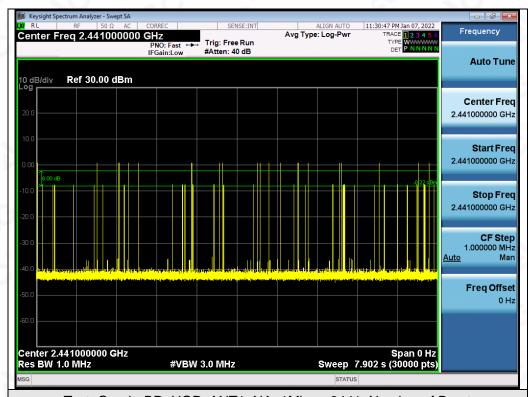
Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Number of Busrt

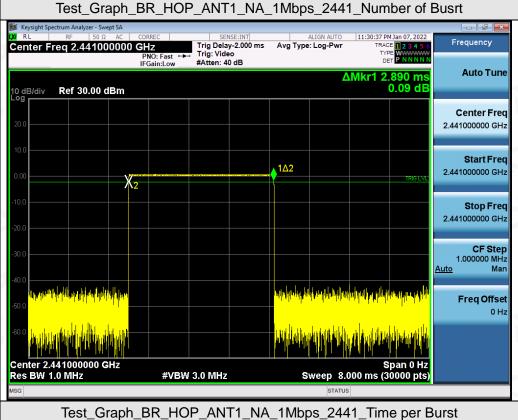


Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Time per Burst

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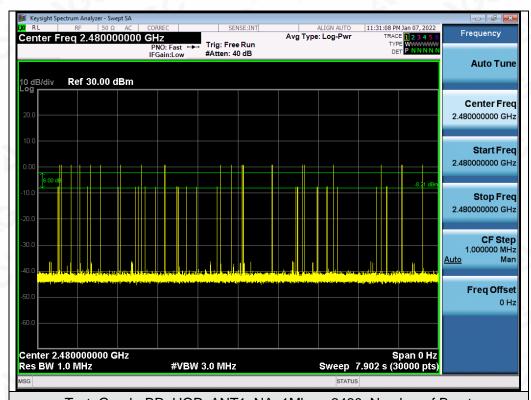


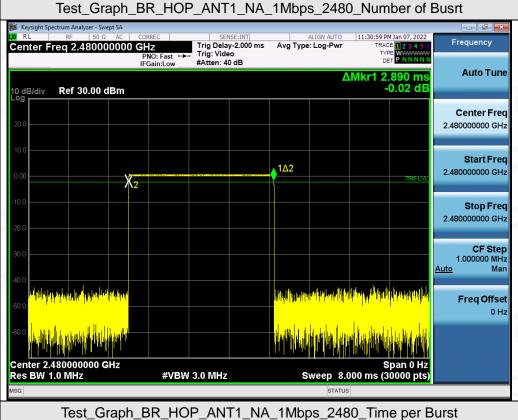




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13. FREQUENCY SEPARATION

13.1. 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) ≥ RBW.
- 4. Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

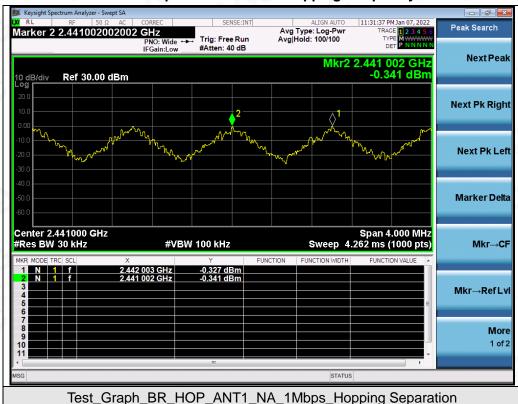
13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

13.4. LIMITS AND MEASUREMENT RESULT

Test Data of Frequency Separation							
Test Mode	Limits	Pass or Fail					
GFSK Hopping	1.001	>= 2/3 -20dB BW	Pass				

Test Graphs of Number of Hopping Frequency



Note: The GFSK modulation is the worst case and recorded in the report.

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14. LINE CONDUCTED EMISSION TEST

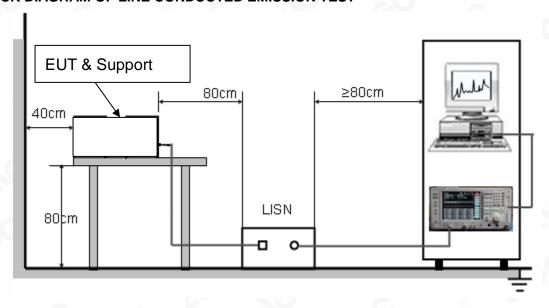
14.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency 150kHz~500kHz	Maximum R	F Line Voltage
Frequency	Q.P. (dBµV)	Average (dBμV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

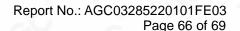
Note: 1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

14.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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14.3. 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 PC 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). 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.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

14.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

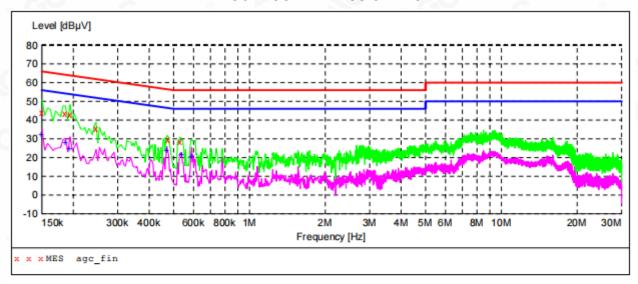
- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- 2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. 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.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.

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14.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L1



MEASUREMENT RESULT: "agc fin"

2022/1/12 15:12 Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	44.20	6.9	66	21.8	QP	L1	GND
0.185000	43.70	6.6	64	20.5	QP	L1	GND
0.192000	42.70	6.6	64	21.2	QP	L1	GND
0.243000	35.60	6.3	62	26.3	QP	L1	GND
0.472000	29.50	5.5	56	26.9	QP	L1	GND
0.532000	28.20	5.4	56	27.8	QP	L1	GND

MEASUREMENT RESULT: "agc fin2"

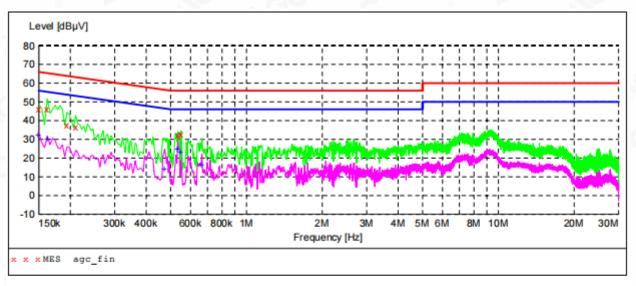
2022/1/12 Frequer			Limit dBµV	Margin dB	Detector	Line	PE
0.1500	000 32.00	6.9	56	24.0	AV	L1	GND
0.1830	000 28.10	6.6	54	26.1	AV	L1	GND
0.1920	000 25.00	6.6	54	28.9	AV	L1	GND
0.4720	000 23.50	5.5	47	23.0	AV	L1	GND
0.5360	000 21.80	5.4	46	24.2	AV	L1	GND
0.5920	20.40	5.4	46	25.6	AV	L1	GND

RESULT: PASS

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LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "agc fin"

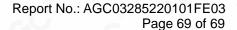
2022/1/12 15	:16						
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE
MHz	dΒμV	dB	dΒμV	dB			
0 150000	46.30	<i>c</i> 0		10.7	0.0		CNID
0.150000	46.30	6.9	66	19.7	QP	N	GND
0.162000	45.90	6.8	65	19.5	QP	N	GND
0.194000	37.60	6.6	64	26.3	QP	N	GND
0.210000	36.40	6.5	63	26.8	QP	N	GND
0.534000	32.40	5.4	56	23.6	QP	N	GND
0.550000	32.50	5.4	56	23.5	QP	N	GND

MEASUREMENT RESULT: "agc_fin2"

2022/1/12 15:	16						
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE
MHz	dΒμV	dB	dΒμV	dB			
0.150000	32.40	6.9	56	23.6	AV	N	GND
0.162000	30.20	6.8	55	25.2	AV	N	GND
0.474000	14.00	5.5	46	32.4	AV	N	GND
0.534000	24.80	5.4	46	21.2	AV	N	GND
0.550000	23.20	5.4	46	22.8	AV	N	GND
0.666000	16.10	5.4	46	29.9	AV	N	GND

RESULT: PASS

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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC03285220101AP02

APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC03285220101AP03

----END OF REPORT----

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- 8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
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