

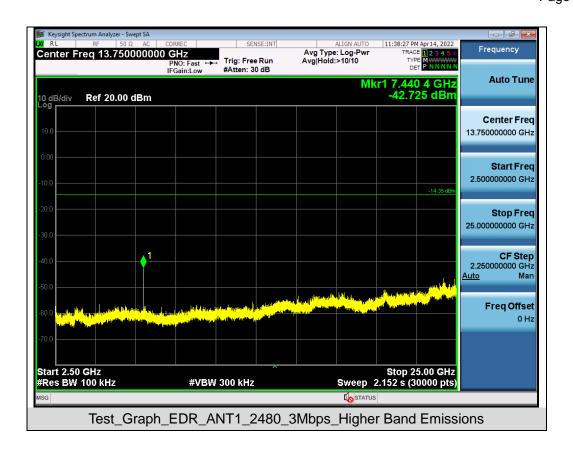
Test_Graph_EDR_ANT1_2480_3Mbps_Lower Band Emissions

#VBW 300 kHz

Stop 2.400 GHz Sweep 228.0 ms (30000 pts)

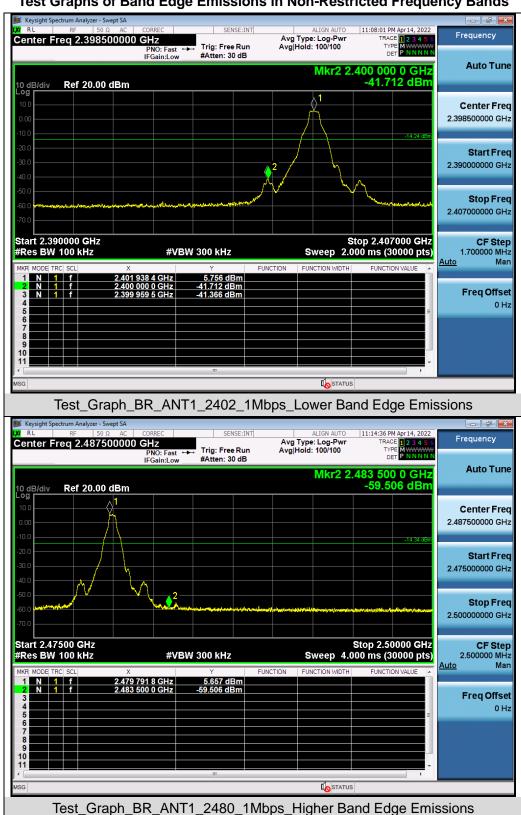
Start 30 MHz #Res BW 100 kHz







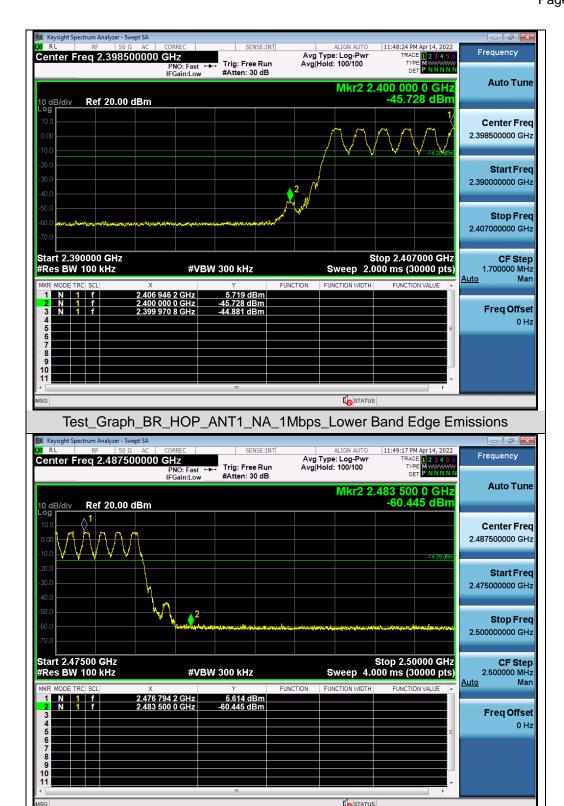
Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



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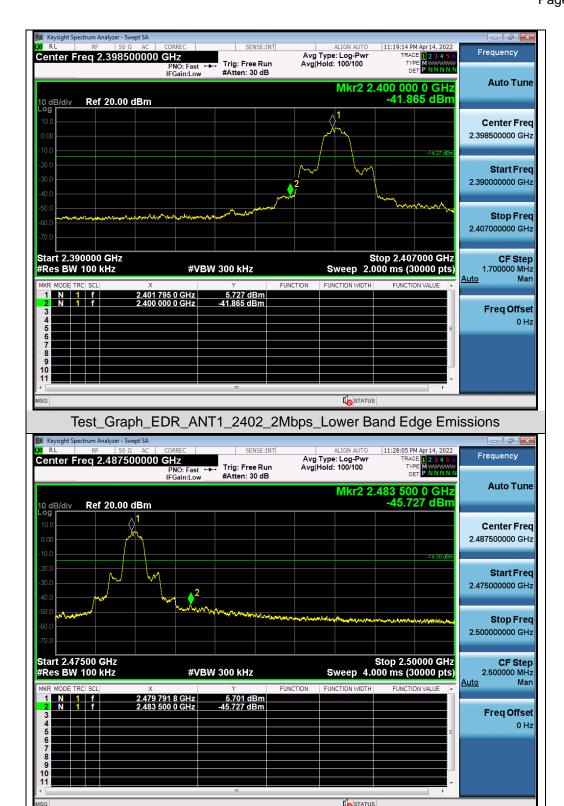
Web: http://www.agccert.com/





Test_Graph_BR_HOP_ANT1_NA_1Mbps_Higher Band Edge Emissions





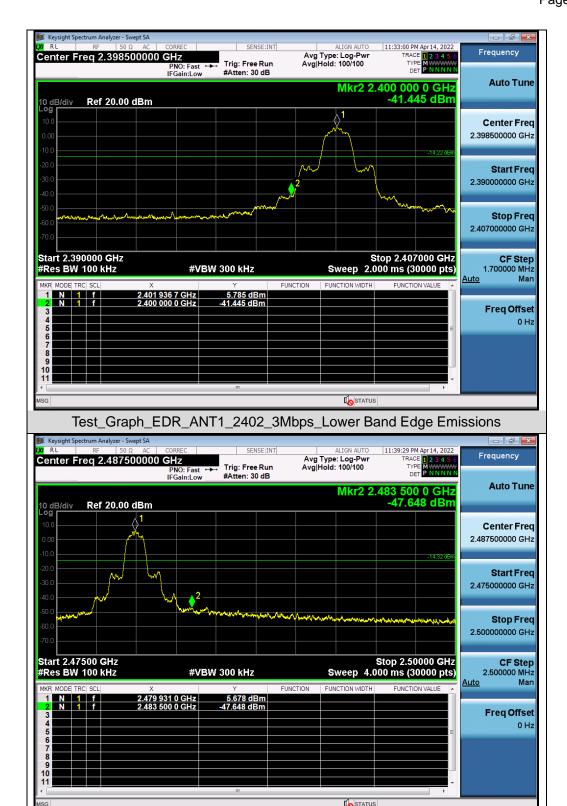
Test_Graph_EDR_ANT1_2480_2Mbps_Higher Band Edge Emissions





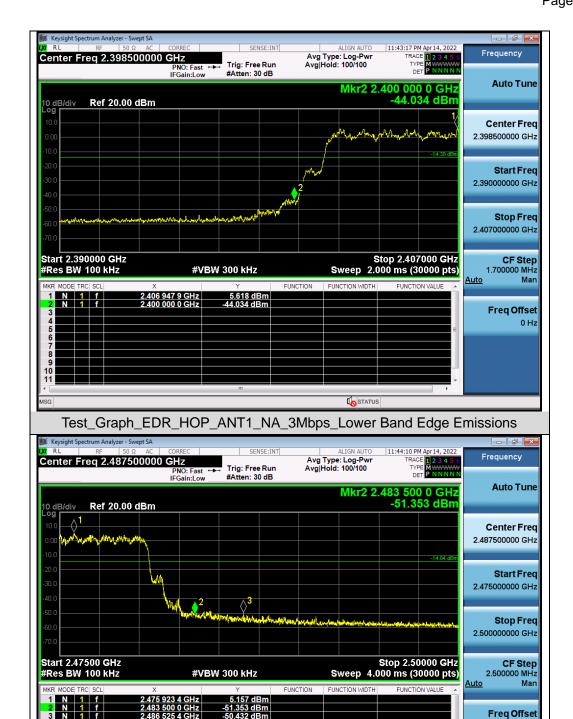
Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Higher Band Edge Emissions





Test_Graph_EDR_ANT1_2480_3Mbps_Higher Band Edge Emissions





Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Higher Band Edge Emissions



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

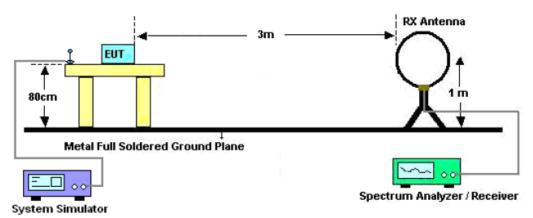
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start Stan Fraguency	1GHz~26.5GHz
Start ~Stop Frequency	1MHz/3MHz for Peak, 1MHz/3MHz for Average

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

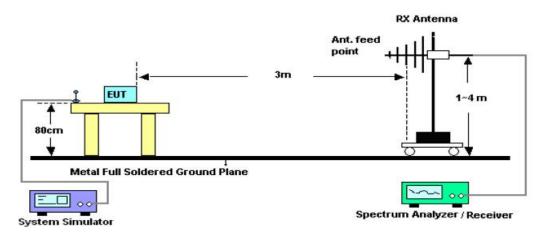


10.2. TEST SETUP

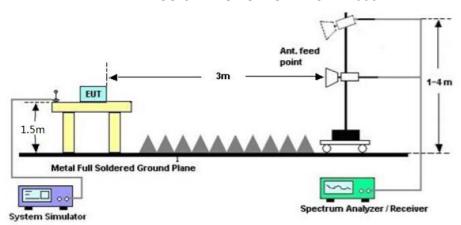
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz





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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

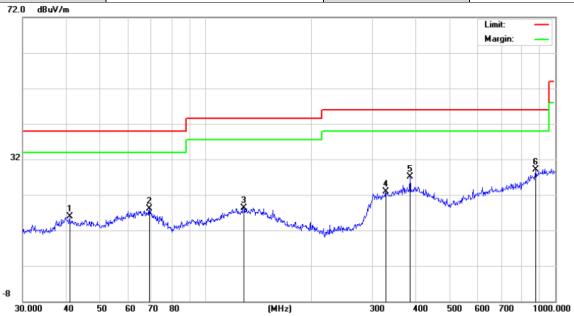
Radiated emission below 30MHz

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



Radiated emission from 30MHz to 1000MHz

EUT	Clip Pro	Model Name	TH-L12M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Horizontal

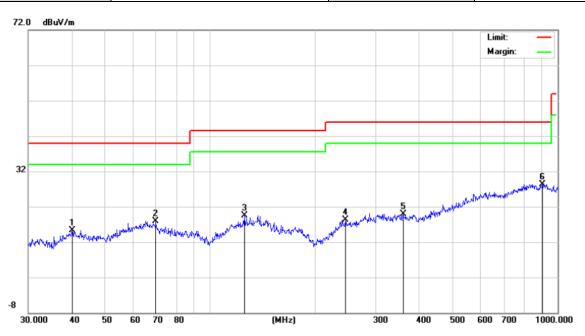


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		40.8446	5.95	9.98	15.93	40.00	-24.07	peak
2		69.1141	5.97	12.05	18.02	40.00	-21.98	peak
3	,	128.5630	5.44	12.83	18.27	43.50	-25.23	peak
4	(327.8873	5.76	17.06	22.82	46.00	-23.18	peak
5		383.9318	8.74	18.32	27.06	46.00	-18.94	peak
6	* (878.3214	6.93	22.12	29.05	46.00	-16.95	peak

RESULT: PASS



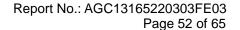
EUT	Clip Pro	Model Name	TH-L12M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Vertical



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		40.1347	5.21	10.07	15.28	40.00	-24.72	peak
2		69.8450	5.84	12.11	17.95	40.00	-22.05	peak
3		125.8864	6.47	13.05	19.52	43.50	-23.98	peak
4		245.0900	4.70	13.57	18.27	46.00	-27.73	peak
5		359.1860	5.70	14.18	19.88	46.00	-26.12	peak
6	*	903.3094	5.76	22.60	28.36	46.00	-17.64	peak

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

2. All test modes had been pre-tested. The mode 5 is the worst case and recorded in the report.





Radiated emission above 1GHz

EUT	Clip Pro	Model Name	TH-L12M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4804.000	44.57	0.08	44.65	74	-29.35	peak	
4804.000	37.36	0.08	37.44	54	-16.56	AVG	
7206.000	40.41	2.21	42.62	74	-31.38	peak	
7206.000	32.68	2.21	34.89	54	-19.11	AVG	
Remark:							
actor = Anter	actor = Antenna Factor + Cable Loss – Pre-amplifier.						

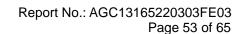
EUT	Clip Pro	Model Name	TH-L12M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	43.79	0.08	43.87	74	-30.13	peak
4804.000	36.62	0.08	36.7	54	-17.3	AVG
7206.000	40.38	2.21	42.59	74	-31.41	peak
7206.000	31.41	2.21	33.62	54	-20.38	AVG
temark:						

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





EUT	Clip Pro	Model Name	TH-L12M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Horizontal

	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
45.51	0.14	45.65	74	-28.35	peak
38.37	0.14	38.51	54	-15.49	AVG
41.56	2.36	43.92	74	-30.08	peak
34.28	2.36	36.64	54	-17.36	AVG
	45.51 38.37 41.56	45.51 0.14 38.37 0.14 41.56 2.36	45.51 0.14 45.65 38.37 0.14 38.51 41.56 2.36 43.92	45.51 0.14 45.65 74 38.37 0.14 38.51 54 41.56 2.36 43.92 74	45.51 0.14 45.65 74 -28.35 38.37 0.14 38.51 54 -15.49 41.56 2.36 43.92 74 -30.08

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

EUT	Clip Pro	Model Name	TH-L12M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4882.000	45.69	0.14	45.83	74	-28.17	peak	
4882.000	37.78	0.14	37.92	54	-16.08	AVG	
7323.000	40.34	2.36	42.7	74	-31.3	peak	
7323.000	33.62	2.36	35.98	54	-18.02	AVG	
Remark:							
Factor = Anter	Factor = Antenna Factor + Cable Loss – Pre-amplifier.						



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EUT	Clip Pro	Model Name	TH-L12M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	46.92	0.22	47.14	74	-26.86	peak
4960.000	38.74	0.22	38.96	54	-15.04	AVG
7440.000	41.56	2.64	44.2	74	-29.8	peak
7440.000	32.63	2.64	35.27	54	-18.73	AVG
Domark:						

Remark:

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

EUT	Clip Pro	Model Name	TH-L12M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4960.000	46.74	0.22	46.96	74	-27.04	peak	
4960.000	38.56	0.22	38.78	54	-15.22	AVG	
7440.000	40.63	2.64	43.27	74	-30.73	peak	
7440.000	31.48	2.64	34.12	54	-19.88	AVG	
Remark:							
Factor = Anter	na Factor + Cabl	e Loss – Pre-	amplifier.				

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=Level-Limit.

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

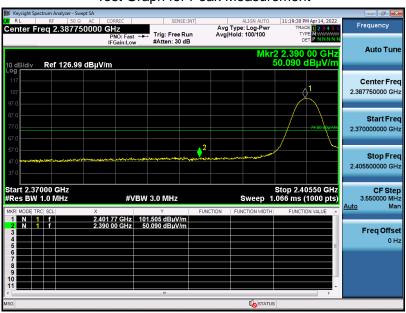
All test modes had been tested. The π /4-DQPSK modulation is the worst case and recorded in the report.



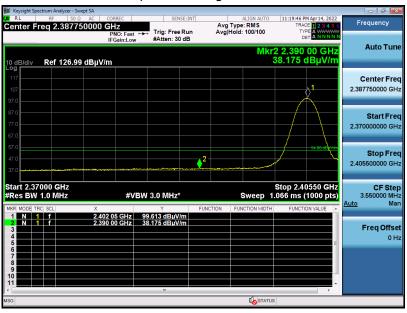
Test result for band edge emission at restricted bands

EUT	Clip Pro	Model Name	TH-L12M
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

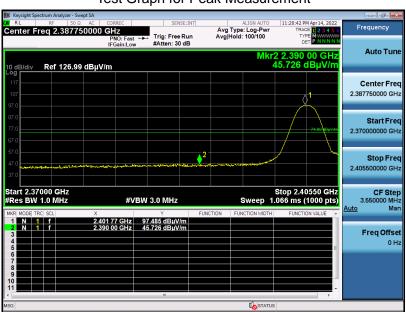


RESULT: PASS

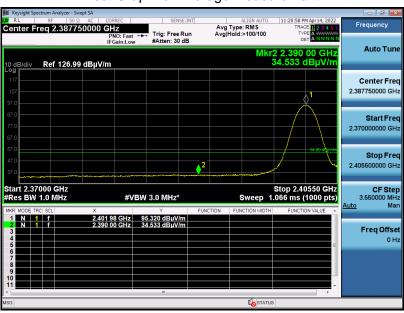


EUT	Clip Pro	Model Name	TH-L12M
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement





EUT	Clip Pro	Model Name	TH-L12M
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





EUT	Clip Pro	Model Name	TH-L12M
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.



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	79	>=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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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

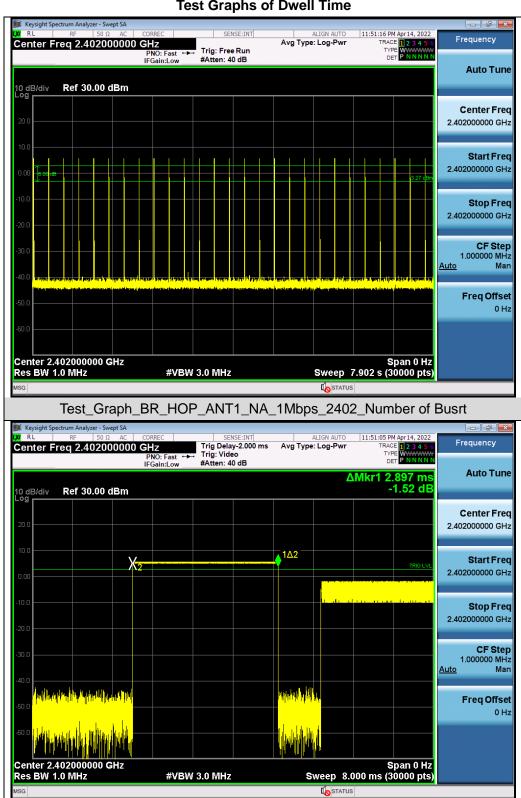
12.4. LIMITS AND MEASUREMENT RESULT

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	2.897	27.0*4	312.876	400	Pass		
2441	2.897	26.0*4	301.288	400	Pass		
2480	2.896	27.0*4	312.768	400	Pass		

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



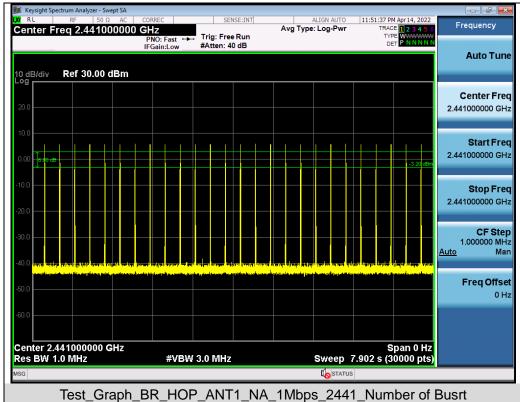
Test Graphs of Dwell Time

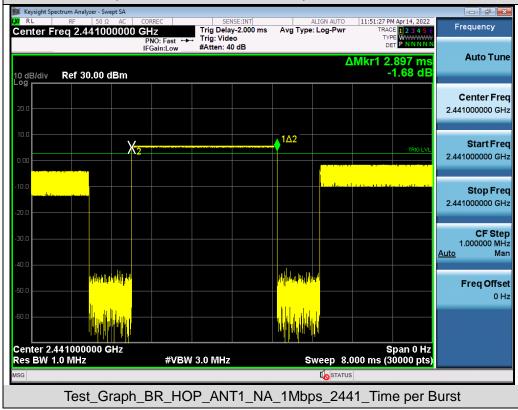


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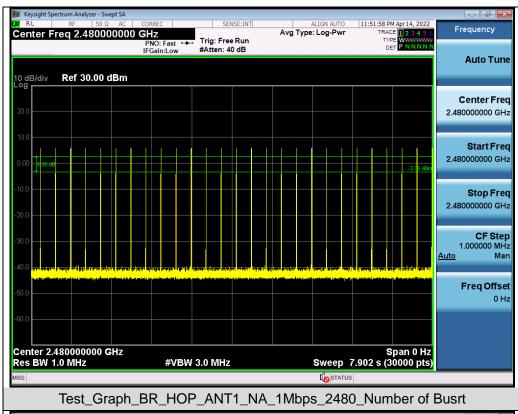
Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Time per Burst

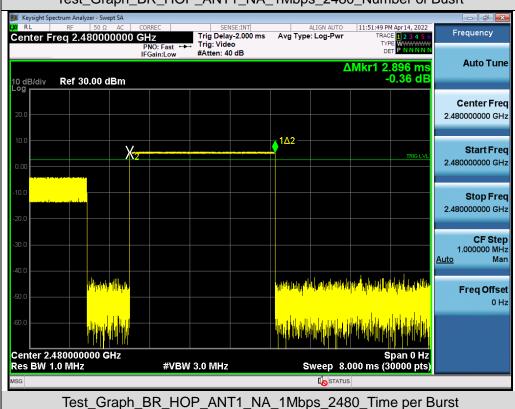














13. FREQUENCY SEPARATION

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

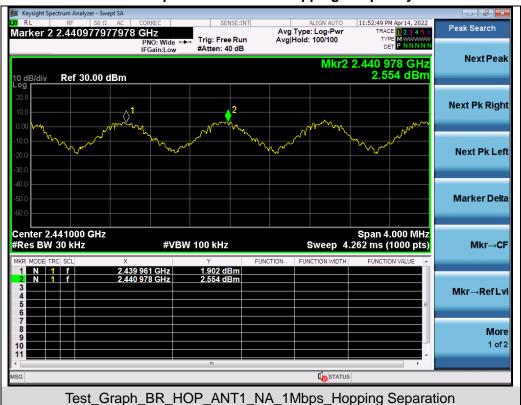
13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

13.4. LIMITS AND MEASUREMENT RESULT

Test Data of Frequency Separation						
Test Mode	Channel Separation (MHz)	Limits	Pass or Fail			
GFSK Hopping	1.017	>= 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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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC13165220303AP01

APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC13165220303AP02

----END OF REPORT----



Conditions of Issuance of Test Reports

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- 3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
- 4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
- 5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
- 6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
- 7.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
- 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.
- 9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.