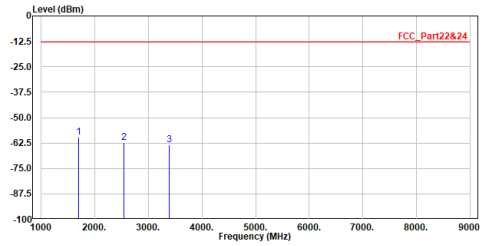
Mode 20: NB-IoT Band 26 (Part 22)

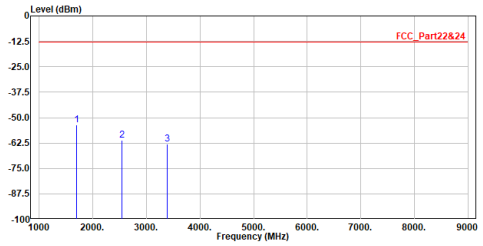
Site :HC-CB02
Condition :3m Horizontal
Mode :NB-IoT_B26(Part22)_CH27038
Test by :Ling



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1697.600	-59.68	-13.00	-46.68	-41.87	-17.81	Peak
2	2546.400	-62.27	-13.00	-49.27	-46.74	-15.53	Peak
3	3395.200	-63.24	-13.00	-50.24	-49.24	-14.00	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) – 104.8 = 11.8 dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB02
Condition :3m Vertical
Mode :NB-IoT_B26(Part22)_CH27038
Test by :Ling

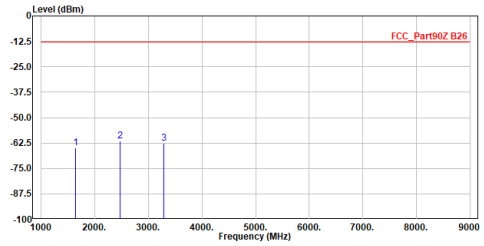


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1697.600	-53.59	-13.00	-40.59	-35.78	-17.81	Peak
2	2546.400	-61.08	-13.00	-48.08	-45.55	-15.53	Peak
3	3395.200	-62.93	-13.00	-49.93	-48.93	-14.00	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) – 104.8 = 11.8 dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Mode 21: NB-IoT Band 26 (Part 90)

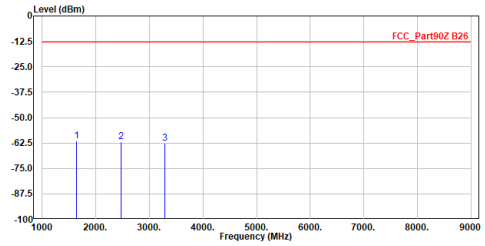
Site :HC-CB02
Condition :3m Horizontal
Mode :NB-IoT_B26(Part90)_CH26787
Test by :Ling



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1647.400	-64.93	-13.00	-51.93	-47.03	-17.90	Peak
2	2471.100	-61.45	-13.00	-48.45	-45.69	-15.76	Peak
3	3294.800	-62.72	-13.00	-49.72	-48.68	-14.04	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) – 104.8 = 11.8 dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB02
Condition :3m Vertical
Mode :NB-IoT_B26(Part90)_CH26787
Test by :Ling

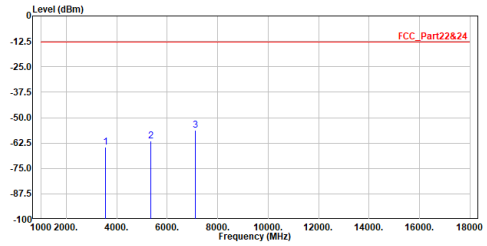


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1647.400	-61.55	-13.00	-48.55	-43.65	-17.90	Peak
2	2471.100	-61.79	-13.00	-48.79	-46.03	-15.76	Peak
3	3294.800	-62.80	-13.00	-49.80	-48.76	-14.04	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) – 104.8 = 11.8 dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Mode 22: NB-IoT Band 66

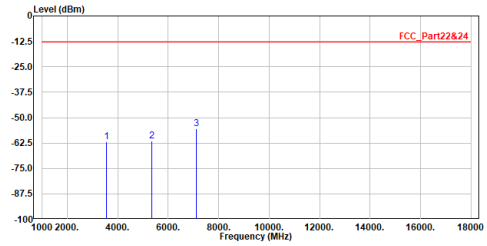
Site :HC-CB02
Condition :3m Horizontal
Mode :NB-IoT_B66_CH132322
Test by :Ling



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3559.600	-64.60	-13.00	-51.60	-50.80	-13.80	Peak
2	5339.400	-61.42	-13.00	-48.42	-52.22	-9.20	Peak
3	7119.200	-56.21	-13.00	-43.21	-51.65	-4.56	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) – 104.8 = 11.8 dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB02
Condition :3m Vertical
Mode :NB-IoT_B66_CH132322
Test by :Ling

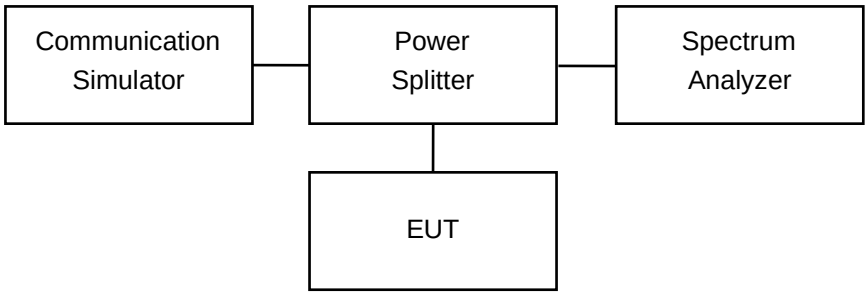


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3559.600	-61.83	-13.00	-48.83	-48.03	-13.80	Peak
2	5339.400	-61.52	-13.00	-48.52	-52.32	-9.20	Peak
3	7119.200	-55.61	-13.00	-42.61	-51.05	-4.56	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) – 104.8 = 11.8 dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

7. Conducted Band Edge

7.1. Test Setup



7.2. Test Procedure

1. The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement.
2. In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

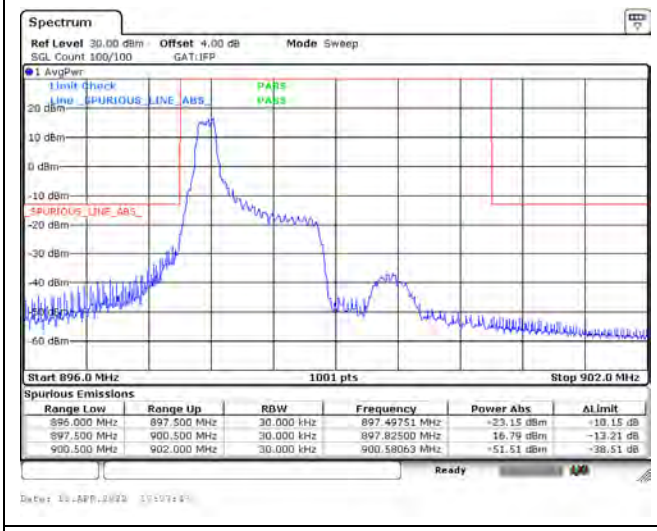
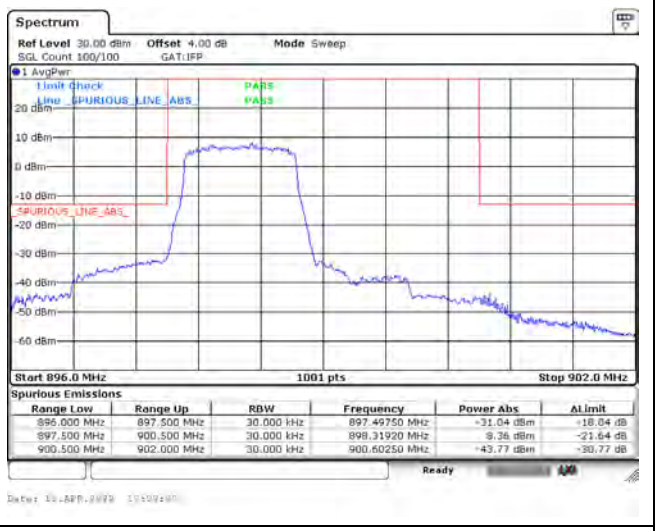
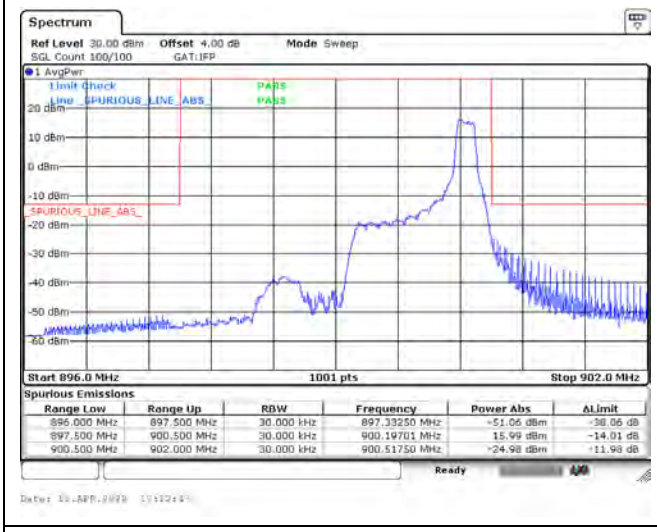
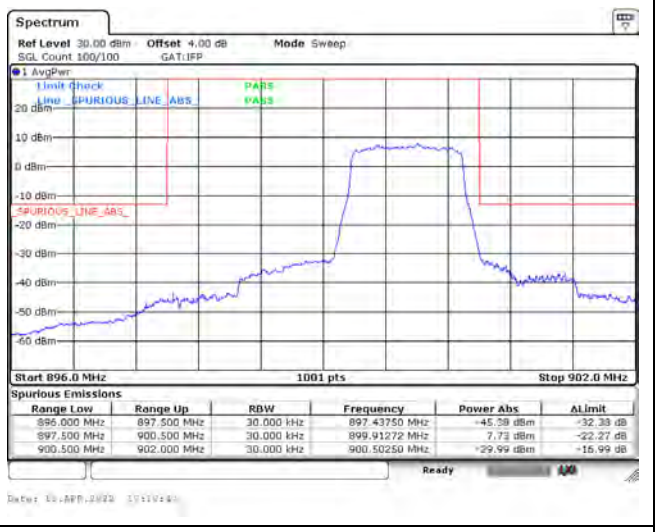
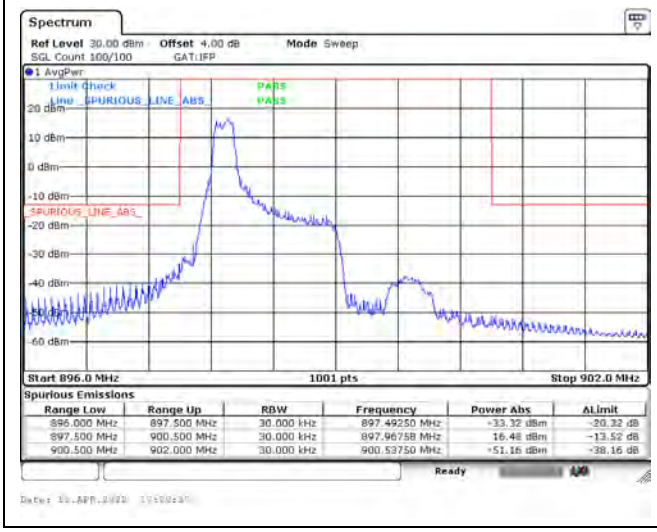
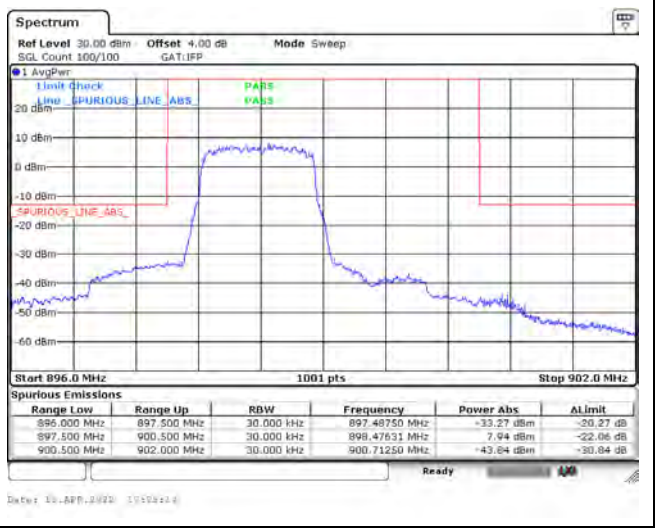
7.3. Test Methodology and Reference Procedures

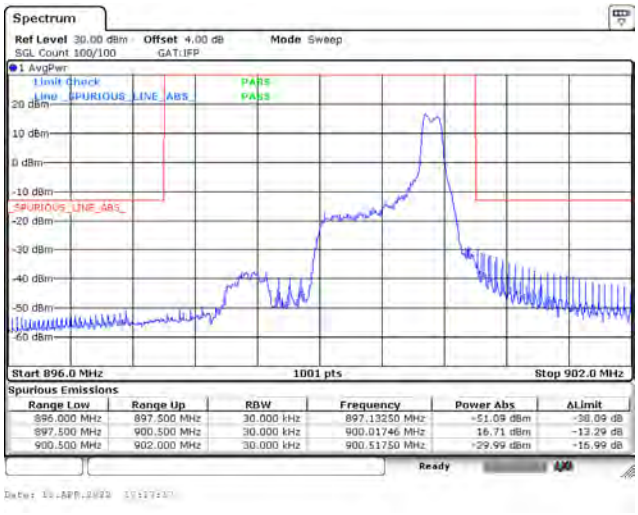
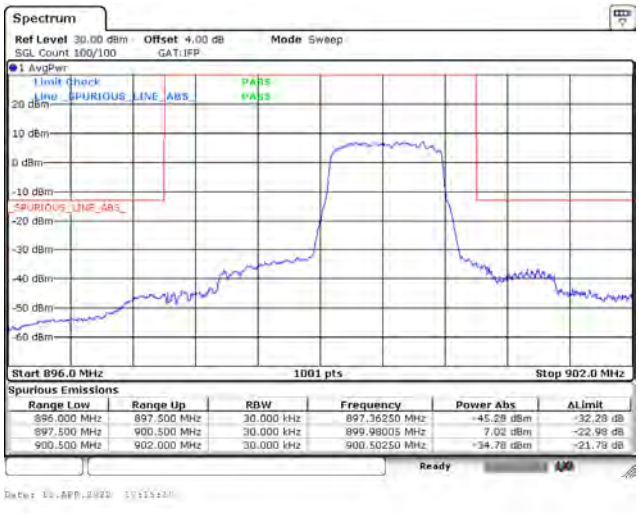
KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI C63.26-2015

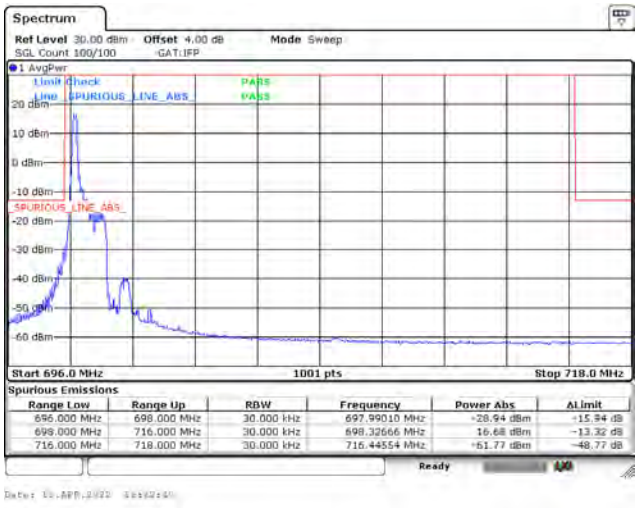
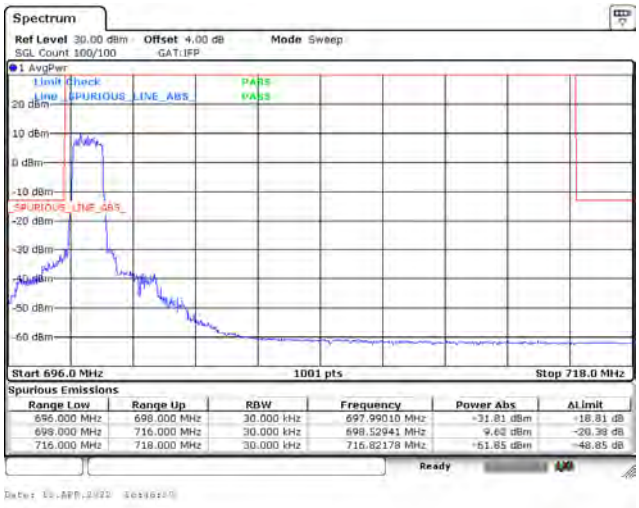
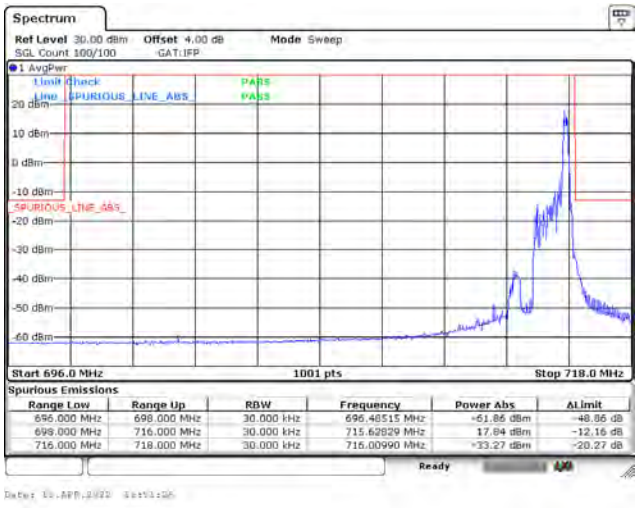
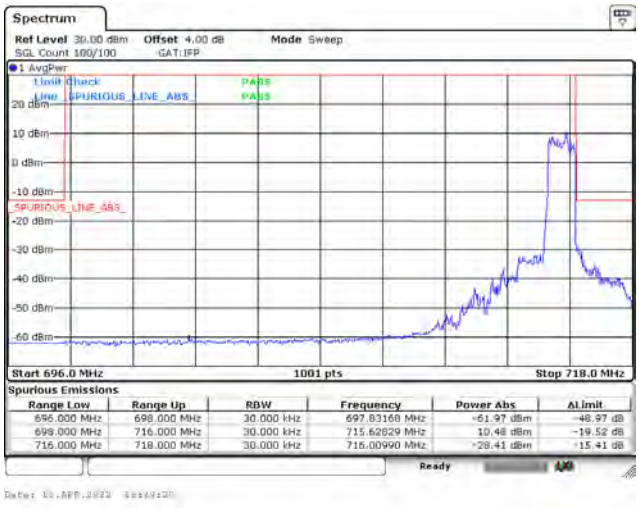
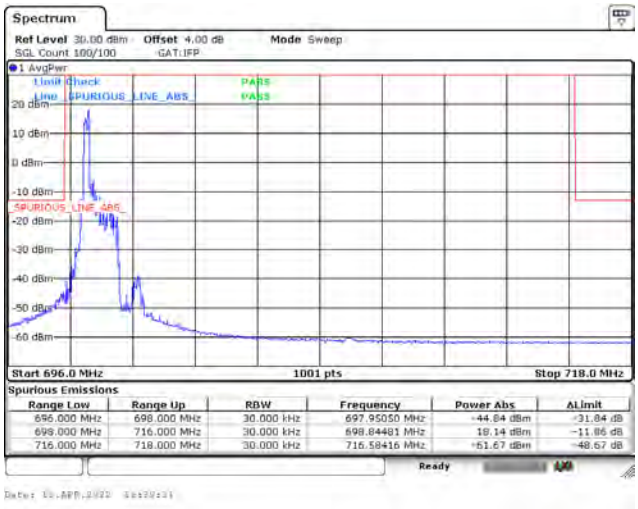
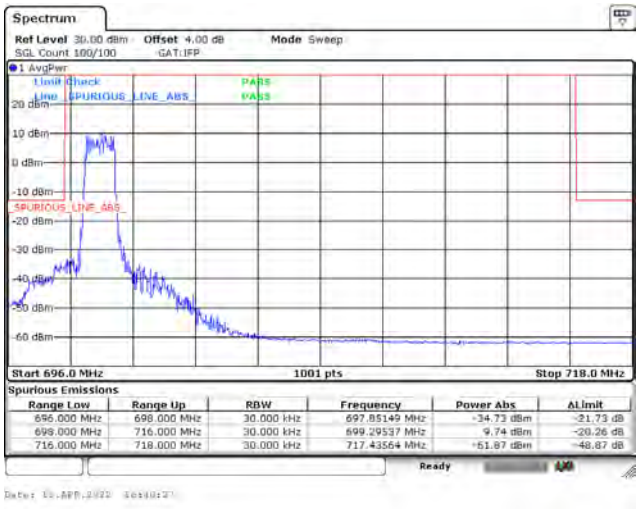
7.4. Test Result of Conducted Band Edge

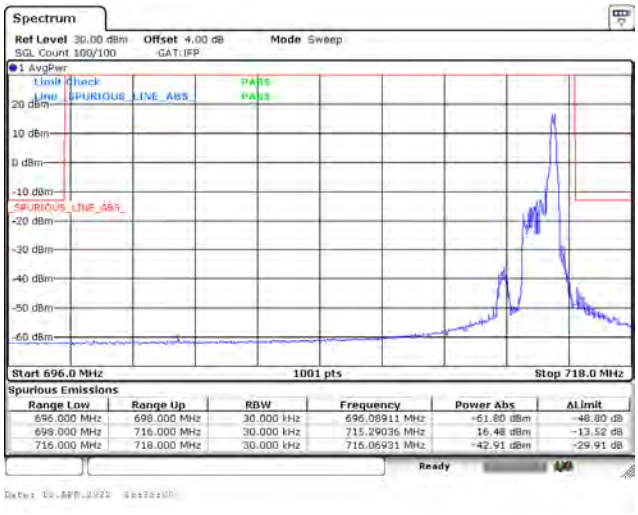
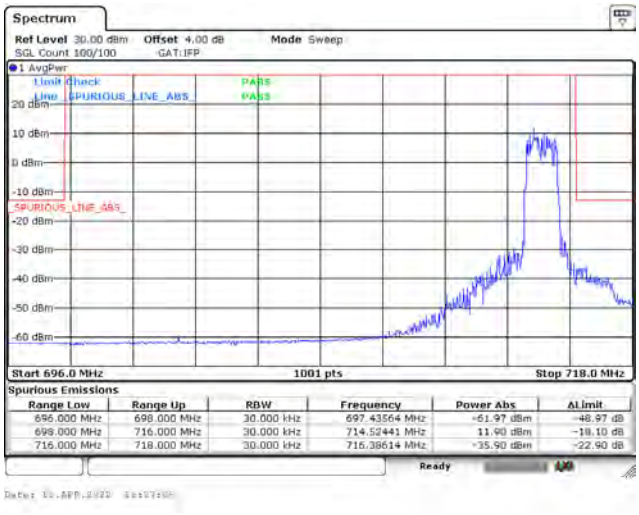
Mode 1: Cat-M1 Band 8 (FCC only)

1.4 MHz / QPSK / CH21632 / 1RB0	1.4 MHz / QPSK / CH21632 / 6RB0
	
1.4 MHz / QPSK / CH21648 / 1RB5	1.4 MHz / QPSK / CH21648 / 6RB0
	
3 MHz / QPSK - Low / CH21640 / 1RB0	3 MHz / QPSK - Low / CH21640 / 6RB0
	

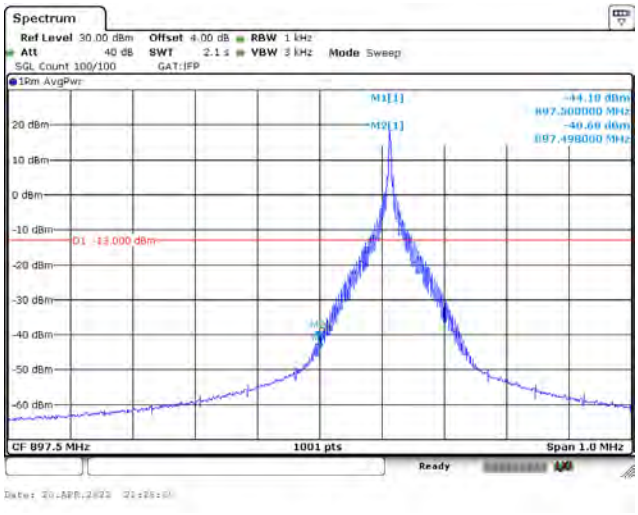
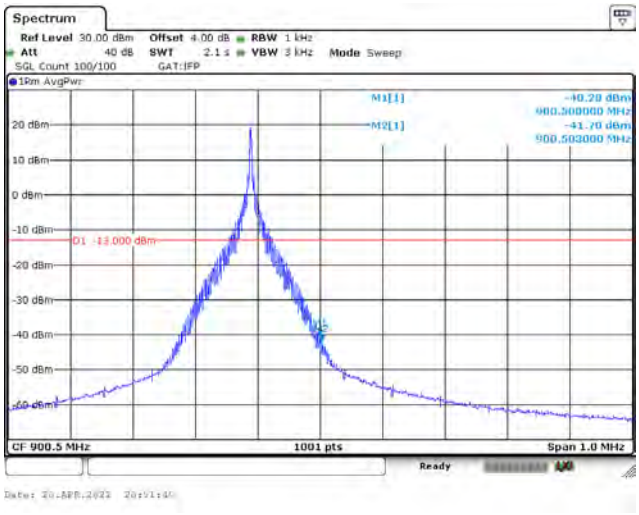
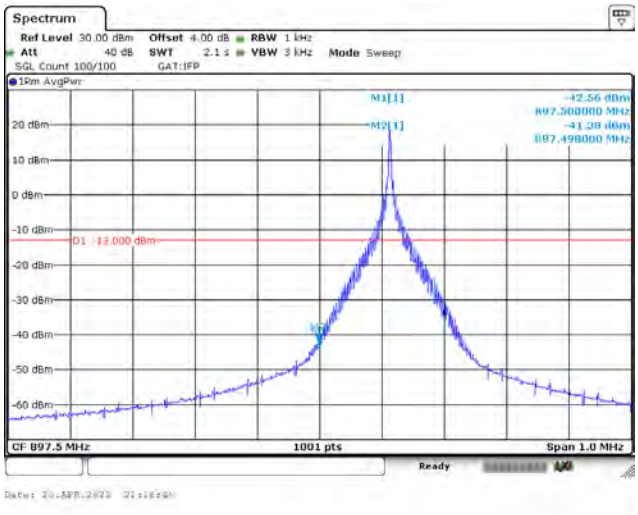
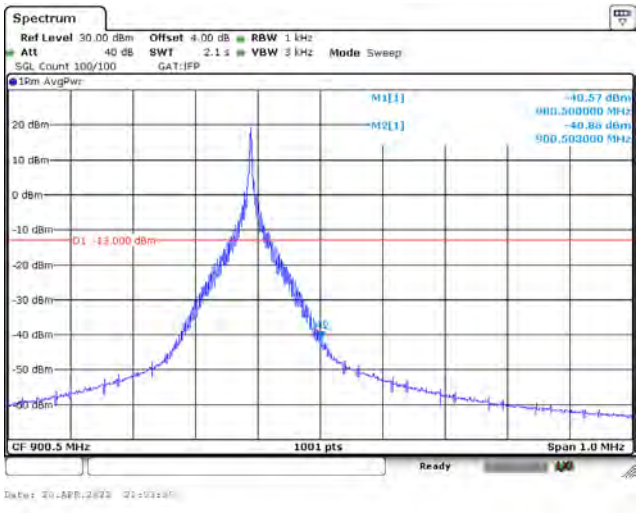
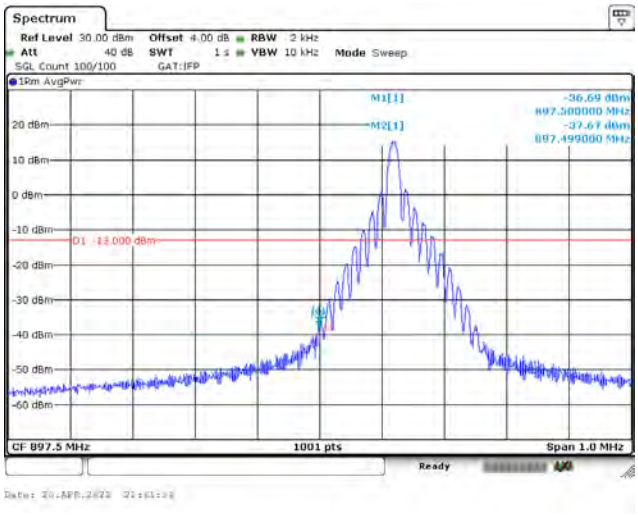
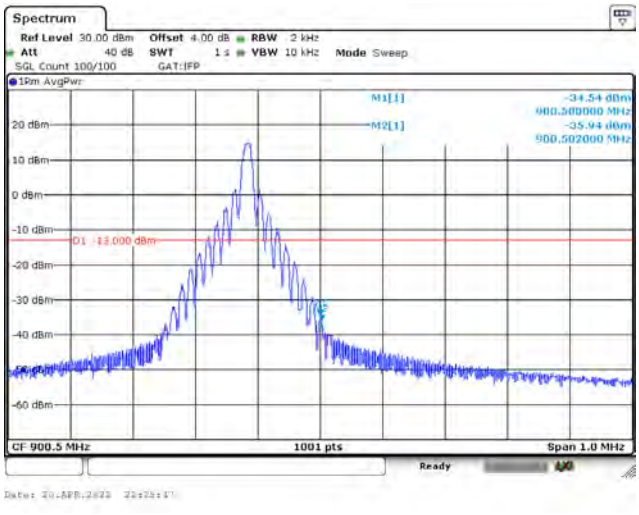
3 MHz / QPSK - Hight / CH21640 / 1RB5	3 MHz / QPSK - Hight / CH21640 / 6RB0
	

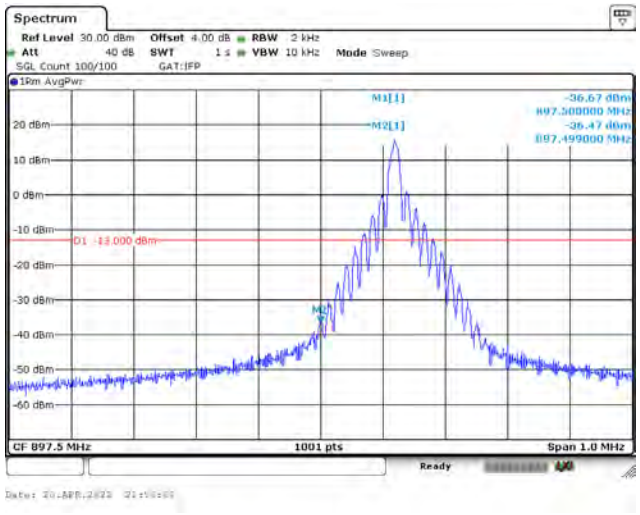
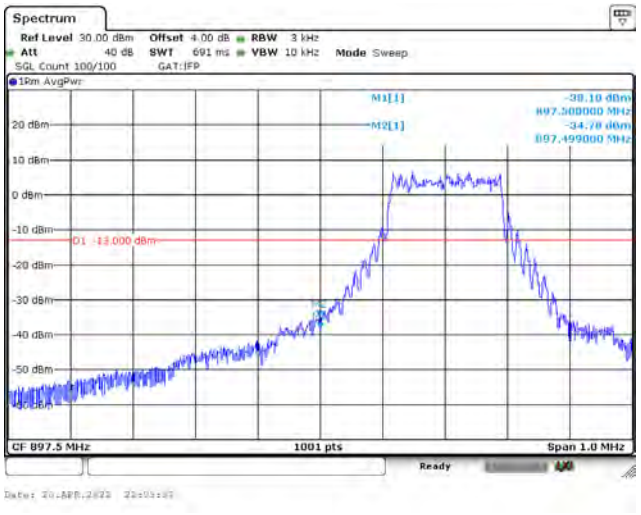
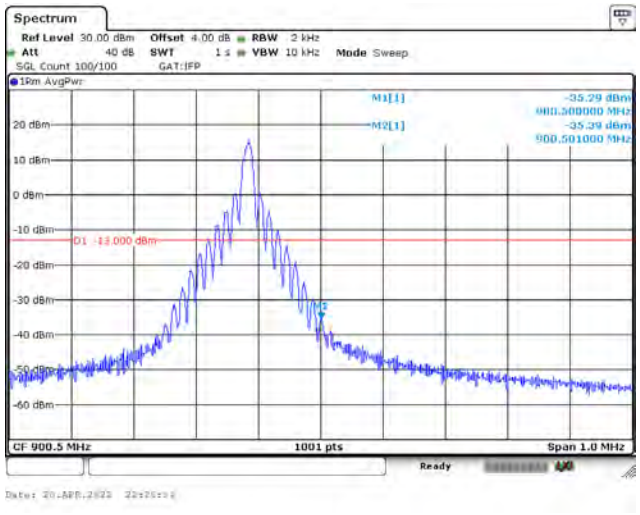
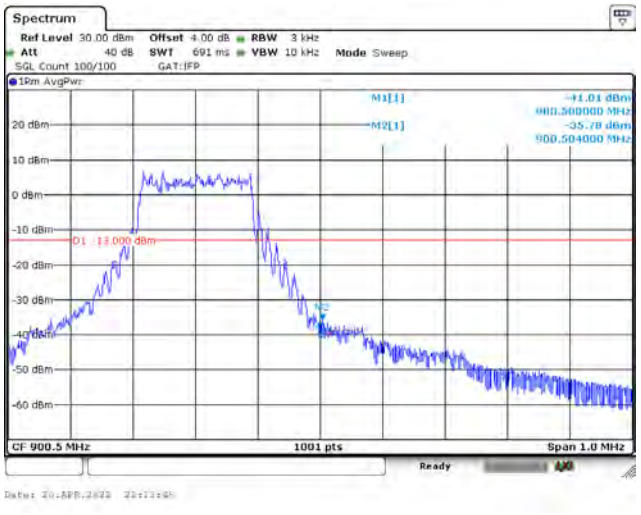
Mode 2: Cat-M1 Band 85

5 MHz / QPSK / CH134027 / 1RB0	5 MHz / QPSK / CH134027 / 6RB0
	
5 MHz / QPSK / CH134157 / 1RB5	**5 MHz / QPSK / CH134157 / 6RB0**
	
10 MHz / QPSK / CH134052 / 1RB0	**10 MHz / QPSK / CH134052 / 6RB0**
	

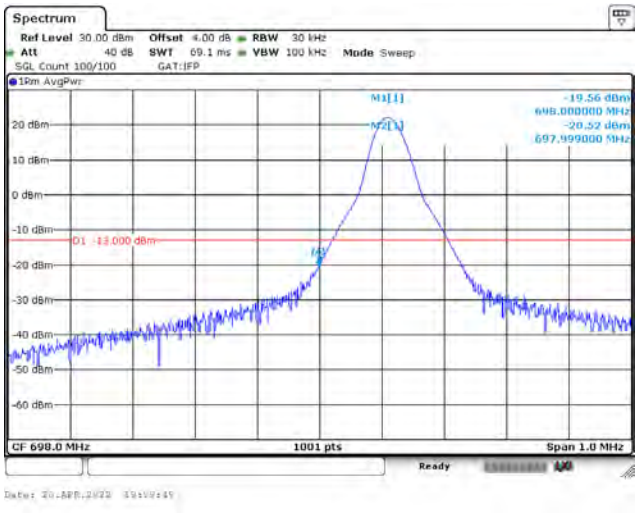
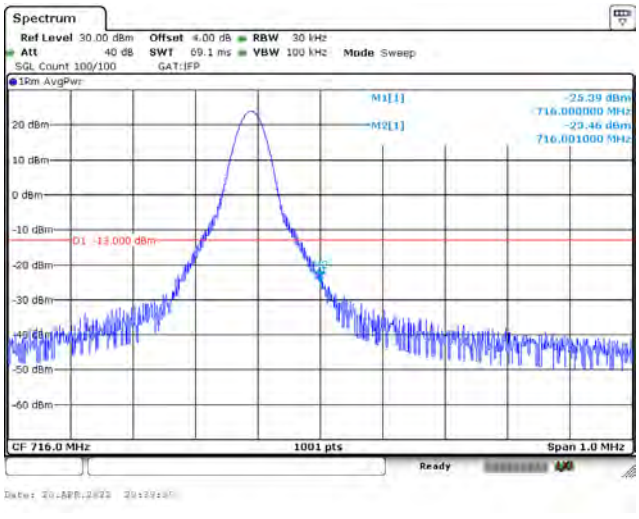
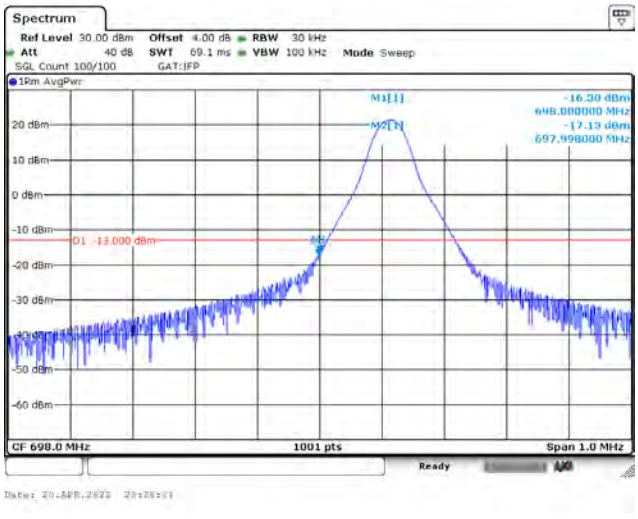
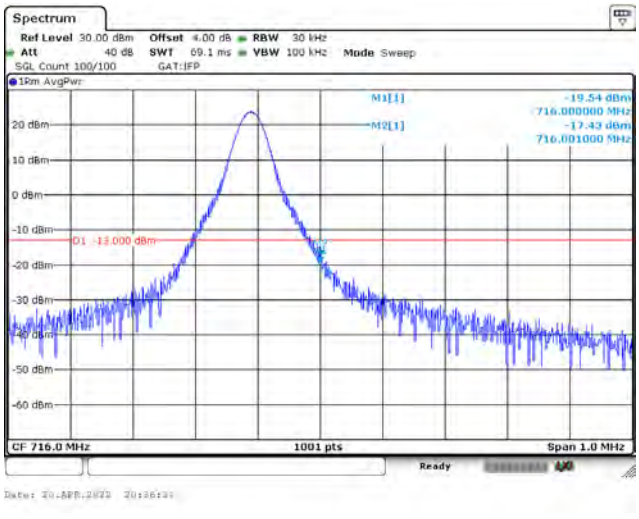
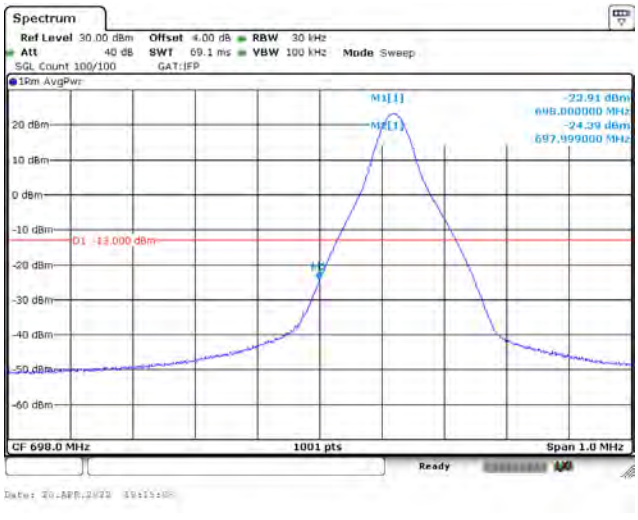
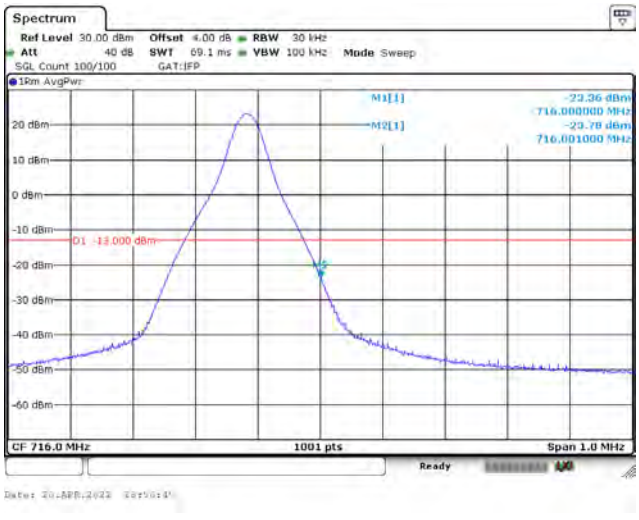
10 MHz / QPSK / CH134132 / 1RB5	10 MHz / QPSK / CH134132 / 6RB0
	

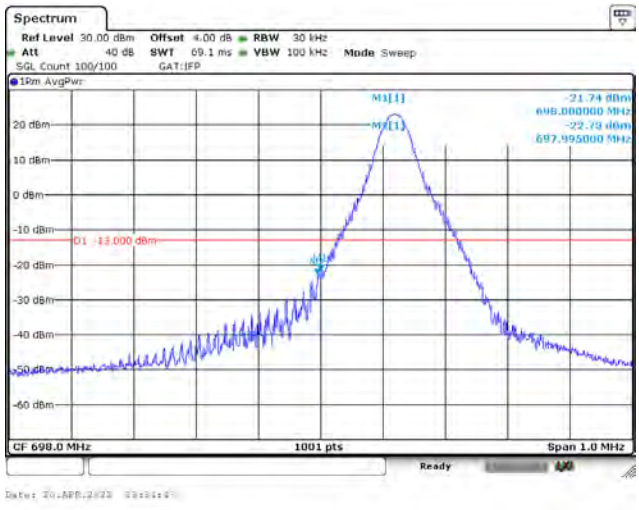
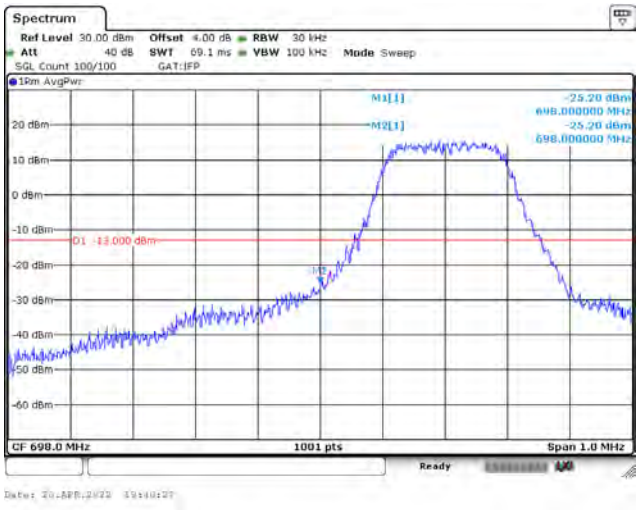
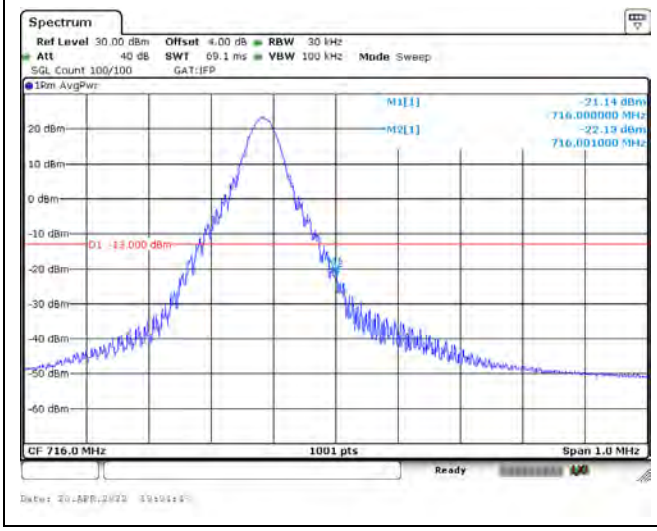
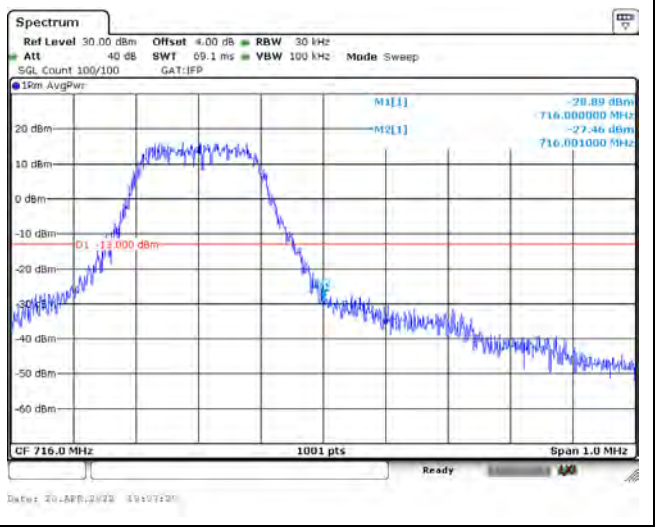
Mode 3: NB-IoT Band 8 (FCC only)

3.75 kHz / BPSK / CH21627 / 1RB0	3.75 kHz / BPSK / CH21653 / 1RB47
	
3.75 kHz / QPSK / CH21627 / 1RB0	**3.75 kHz / QPSK / CH21653 / 1RB47**
	
15 kHz / BPSK / CH21627 / 1RB0	**15 kHz / BPSK / CH21653 / 1RB11**
	

15 kHz / QPSK / CH21627 / 1RB0	15 kHz / QPSK / CH21627 / 12RB0
	
15 kHz / QPSK / CH21653 / 1RB11	**15 kHz / QPSK / CH21653 / 12RB0**
	

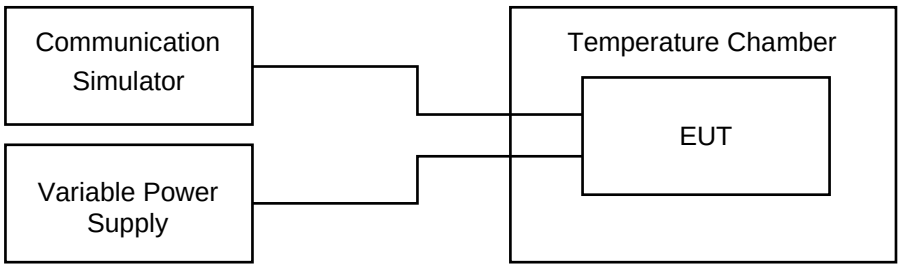
Mode 4: NB-IoT Band 85

3.75 kHz / BPSK / CH134004 / 1RB0	3.75 kHz / BPSK / CH134180 / 1RB47
	
3.75 kHz / QPSK / CH134004 / 1RB0	3.75 kHz / QPSK / CH134180 / 1RB47
	
15 kHz / BPSK / CH134004 / 1RB0	15 kHz / BPSK / CH134180 / 1RB11
	

15 kHz / QPSK / CH134004 / 1RB0	15 kHz / QPSK / CH134004 / 12RB0
	
15 kHz / QPSK / CH134180 / 1RB11	**15 kHz / QPSK / CH134180 / 12RB0**
	

8. Frequency Stability

8.1. Test Setup



8.2. Test Procedure

Frequency Stability under Temperature Variations:

The EUT under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a communication simulator. The EUT was placed inside the temperature chamber. Set the EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability under Voltage Variations:

Set chamber temperature to 20℃. Use a variable AC or DC power supply to power the EUT and set the voltage to rated voltage. Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

8.3. Test Methodology and Reference Procedures

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI C63.26-2015

8.4. Test Result of Frequency Stability

Mode 1: Cat-M1 Band 8 (FCC only)

LTE Band 8 / 1.4 MHz / 898.2 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	1.05	0.0012
3.70	1.11	0.0012
2.80	0.89	0.0010

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	0.95	0.0011
-20	0.40	0.0004
-10	1.67	0.0019
0	1.14	0.0013
10	1.06	0.0012
20	1.72	0.0019
30	0.65	0.0007
40	0.95	0.0011
50	1.34	0.0015
60	0.66	0.0007
70	0.06	0.0001

LTE Band 8 / 1.4 MHz / 899.8 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	0.98	0.0011
3.70	1.04	0.0012
2.80	1.17	0.0013

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	0.81	0.0009
-20	1.08	0.0012
-10	1.04	0.0012
0	0.73	0.0008
10	1.58	0.0018
20	0.04	0.0000
30	0.46	0.0005
40	0.61	0.0007
50	0.78	0.0009
60	0.77	0.0009
70	1.45	0.0016

LTE Band 8 / 3 MHz / 899 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	1.23	0.0014
3.70	1.35	0.0015
2.80	1.63	0.0018

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	1.00	0.0011
-20	0.79	0.0009
-10	1.06	0.0012
0	0.63	0.0007
10	1.21	0.0013
20	0.55	0.0006
30	0.53	0.0006
40	0.81	0.0009
50	1.20	0.0013
60	0.71	0.0008
70	0.78	0.0009

Mode 2: Cat-M1 Band 85

LTE Band 85 / 5 MHz / 700.5 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	1.37	0.0020
3.70	1.11	0.0016
2.80	0.74	0.0011

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	1.43	0.0020
-20	1.04	0.0015
-10	1.01	0.0014
0	0.80	0.0011
10	0.84	0.0012
20	1.32	0.0019
30	0.58	0.0008
40	0.20	0.0003
50	1.08	0.0015
60	0.84	0.0012
70	1.50	0.0021

LTE Band 85 / 5 MHz / 713.5 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	0.69	0.0010
3.70	1.02	0.0014
2.80	1.33	0.0019

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	1.20	0.0017
-20	0.46	0.0006
-10	0.07	0.0001
0	0.65	0.0009
10	1.14	0.0016
20	0.75	0.0011
30	0.93	0.0013
40	0.83	0.0012
50	0.51	0.0007
60	1.31	0.0018
70	0.57	0.0008

LTE Band 85 / 10 MHz / 703 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	0.83	0.0012
3.70	1.22	0.0017
2.80	1.39	0.0020

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	1.14	0.0016
-20	0.50	0.0007
-10	0.64	0.0009
0	0.60	0.0009
10	0.52	0.0007
20	0.56	0.0008
30	0.87	0.0012
40	0.45	0.0006
50	2.12	0.0030
60	0.17	0.0002
70	1.24	0.0018

LTE Band 85 / 10 MHz / 711 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	1.77	0.0025
3.70	1.94	0.0027
2.80	2.11	0.0030

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	2.37	0.0033
-20	3.08	0.0043
-10	1.95	0.0027
0	1.76	0.0025
10	2.50	0.0035
20	1.04	0.0015
30	1.80	0.0025
40	2.19	0.0031
50	1.79	0.0025
60	2.82	0.0040
70	1.74	0.0024

Mode 3: NB-IoT Band 8 (FCC only)

LTE Band 8 / 3.75 kHz / 897.7 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	1.44	0.0016
3.70	1.78	0.0020
2.80	2.13	0.0024

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	0.42	0.0005
-20	1.83	0.0020
-10	1.26	0.0014
0	1.83	0.0020
10	0.96	0.0011
20	1.04	0.0012
30	1.66	0.0018
40	1.35	0.0015
50	2.56	0.0029
60	1.54	0.0017
70	1.38	0.0015

LTE Band 8 / 3.75 kHz / 900.3 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	1.42	0.0016
3.70	1.55	0.0017
2.80	1.89	0.0021

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	1.23	0.0014
-20	0.95	0.0011
-10	2.03	0.0023
0	1.41	0.0016
10	0.78	0.0009
20	1.39	0.0015
30	1.14	0.0013
40	1.37	0.0015
50	1.50	0.0017
60	1.01	0.0011
70	1.23	0.0014

Mode 4: NB-IoT Band 85

LTE Band 85 / 3.75 kHz / 698.2 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	1.15	0.0016
3.70	1.38	0.0020
2.80	1.11	0.0016

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	0.85	0.0012
-20	1.28	0.0018
-10	0.86	0.0012
0	0.69	0.0010
10	0.94	0.0013
20	1.20	0.0017
30	0.87	0.0012
40	0.07	0.0001
50	0.23	0.0003
60	1.43	0.0020
70	1.06	0.0015

LTE Band 85 / 3.75 kHz / 715.8 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
4.35	1.19	0.0017
3.70	1.56	0.0022
2.80	1.79	0.0025

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-30	0.87	0.0012
-20	1.54	0.0022
-10	1.32	0.0018
0	0.96	0.0013
10	1.23	0.0017
20	1.02	0.0014
30	0.66	0.0009
40	0.65	0.0009
50	1.73	0.0024
60	0.41	0.0006
70	1.27	0.0018