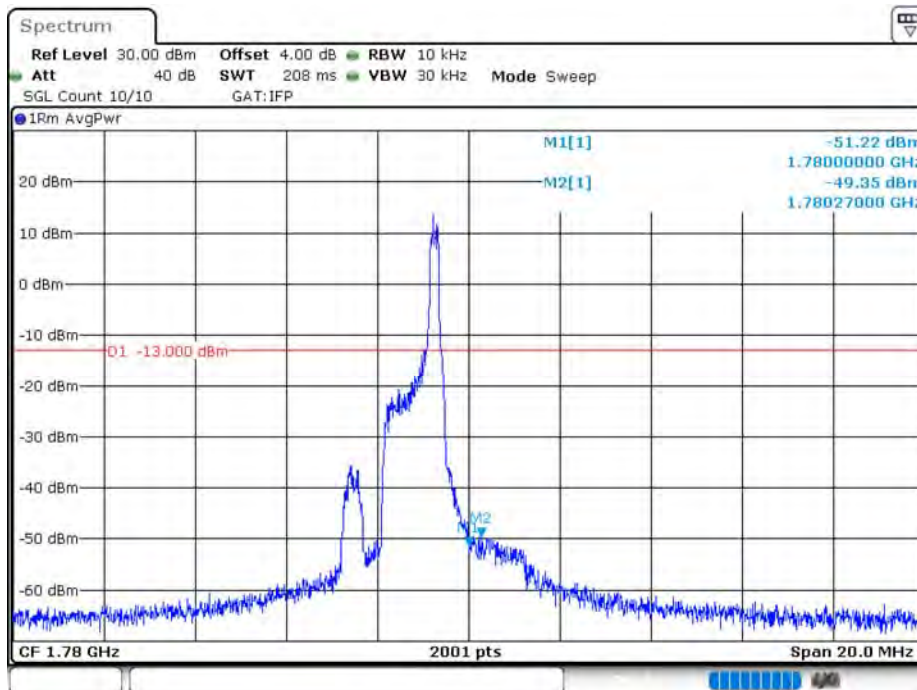
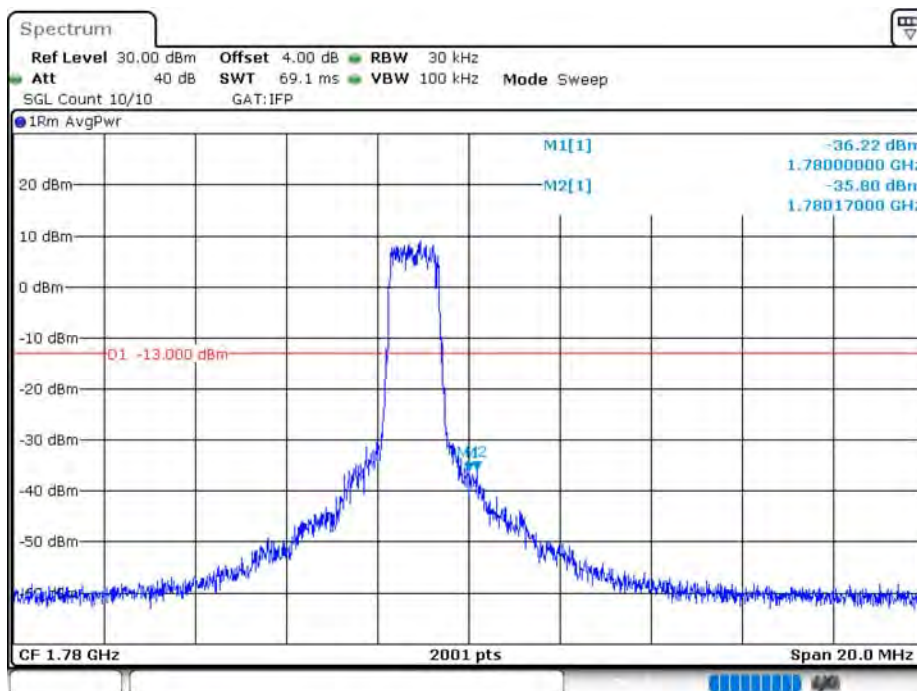


B66_CH132622_10M_QPSK_1RB5



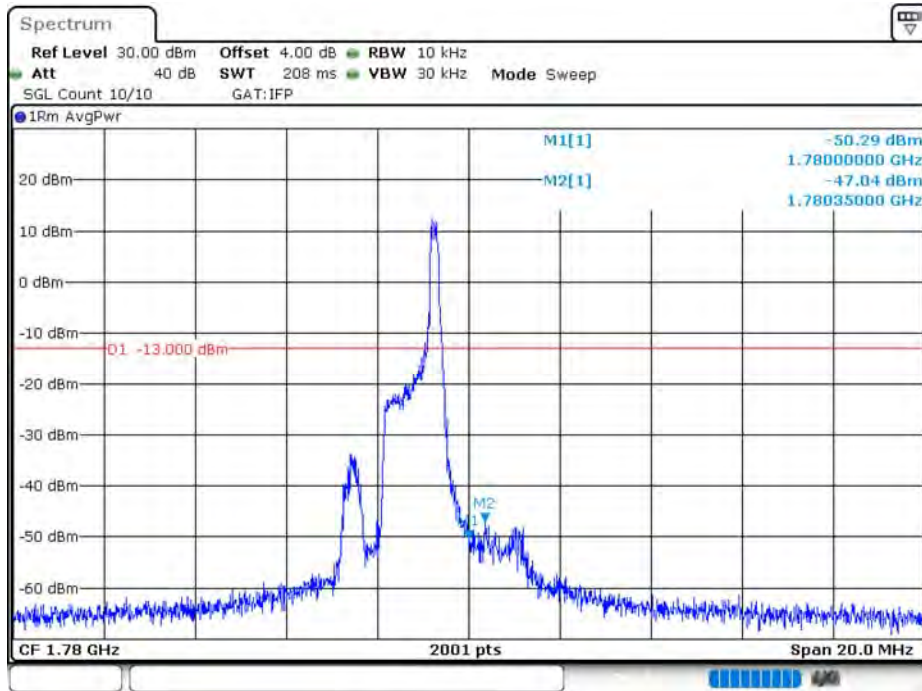
Date: 6.FEB.2020 13:48:38

B66_CH132622_10M_QPSK_6RB0



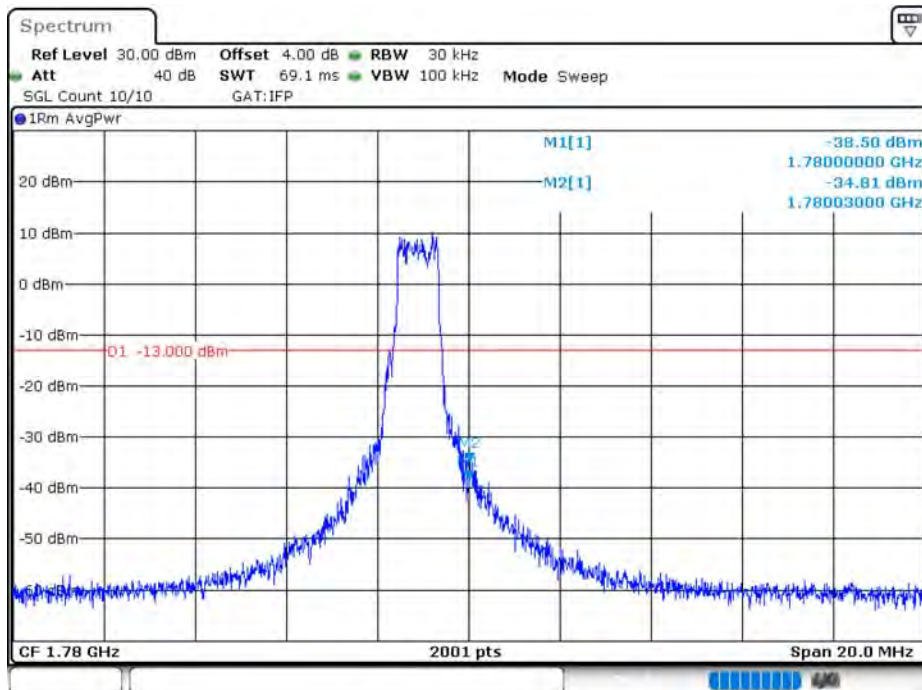
Date: 6.FEB.2020 11:48:33

B66_CH132622_10M_16-QAM_1RB5



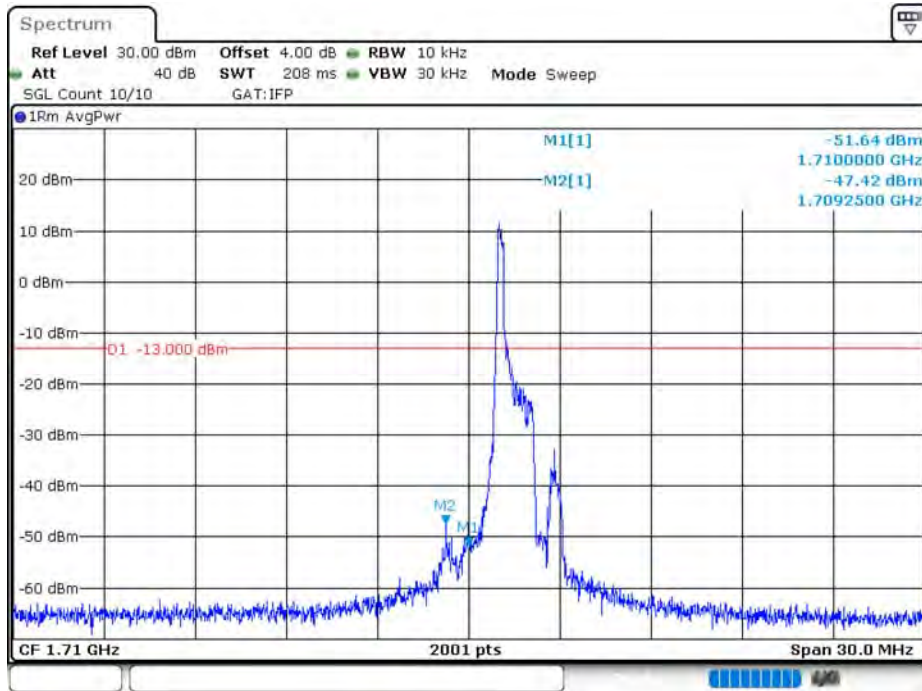
Date: 6.FEB.2020 13:49:21

B66_CH132622_10M_16-QAM_5RB1



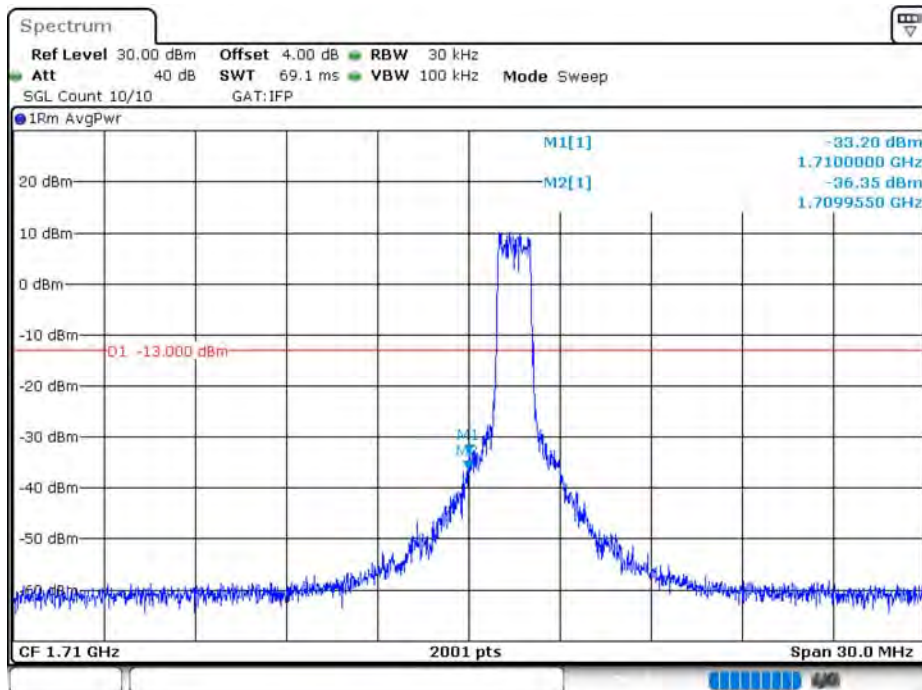
Date: 6.FEB.2020 11:49:03

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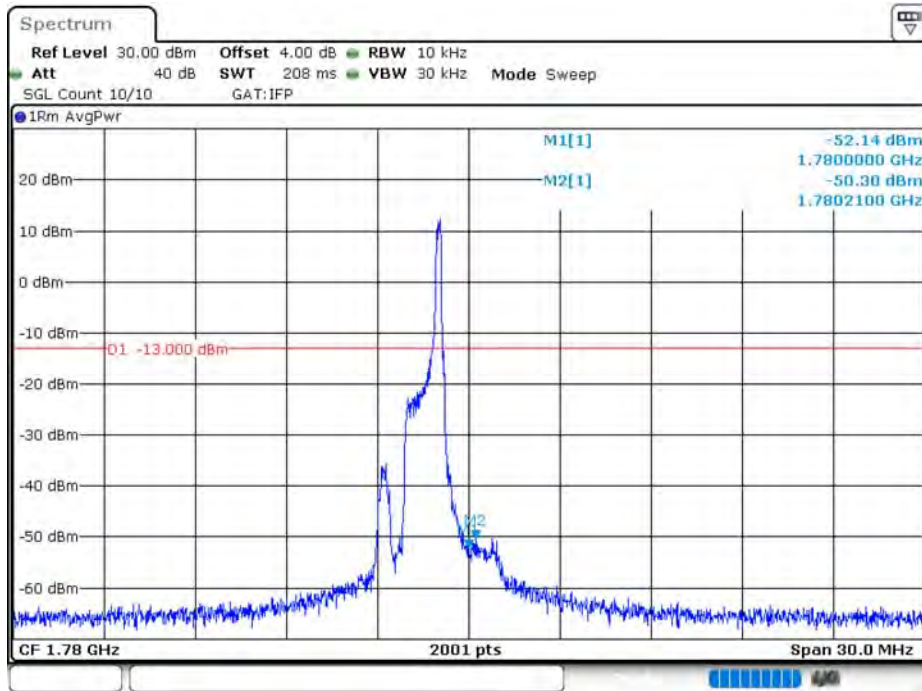
Date: 5.FEB.2020 14:58:11

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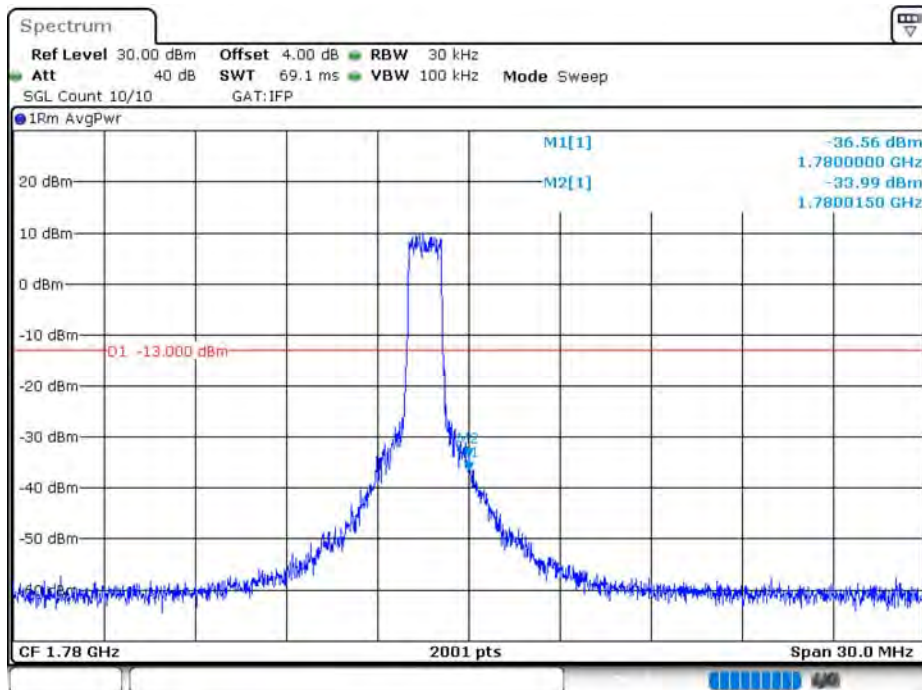
Date: 5.FEB.2020 14:56:14

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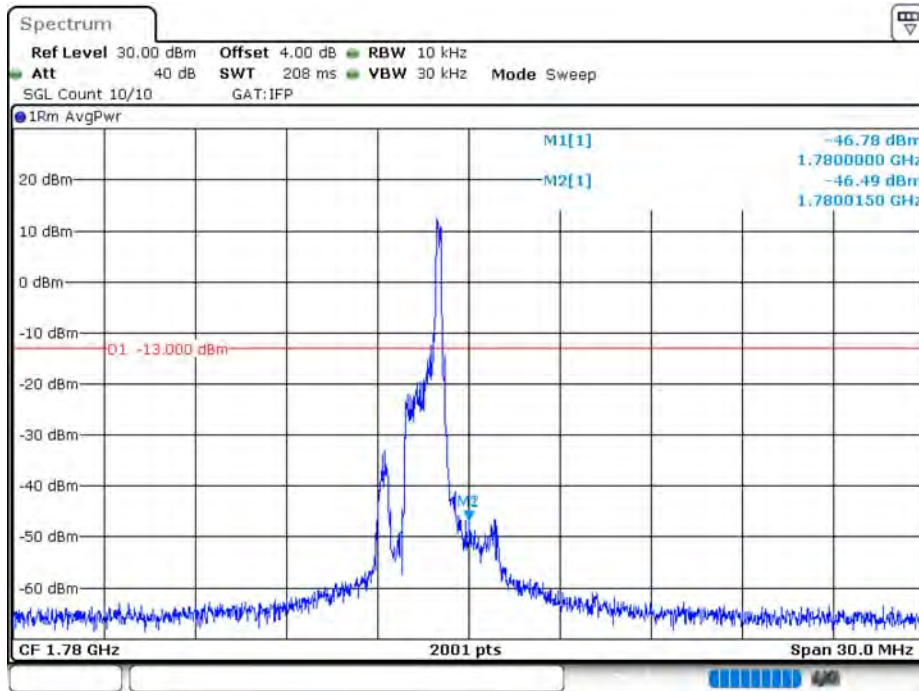
Date: 6.FEB.2020 13:26:29

B66_CH132597_15M_QPSK_6RB0

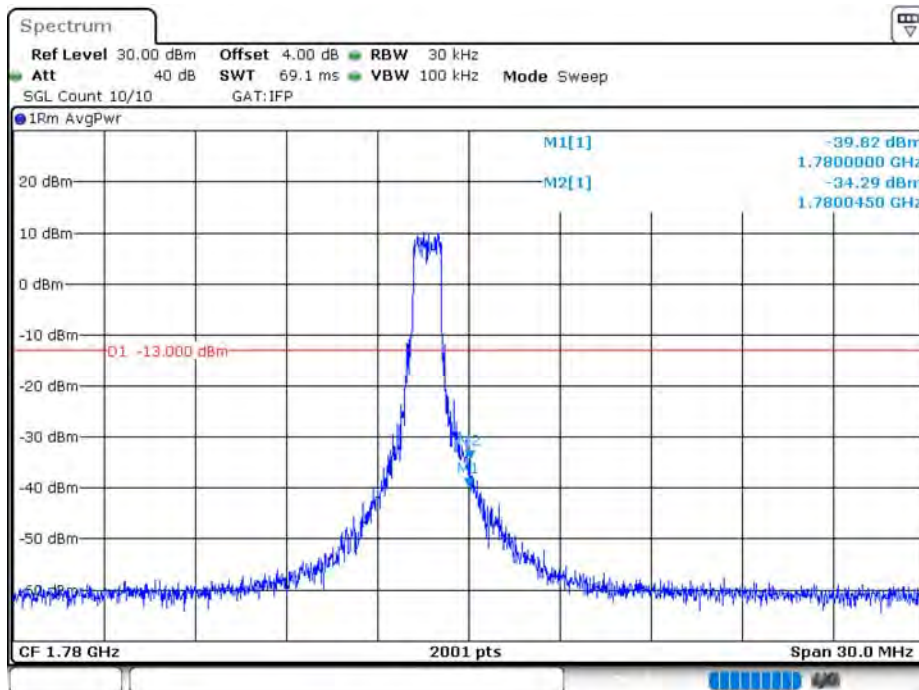


Date: 6.FEB.2020 13:27:12

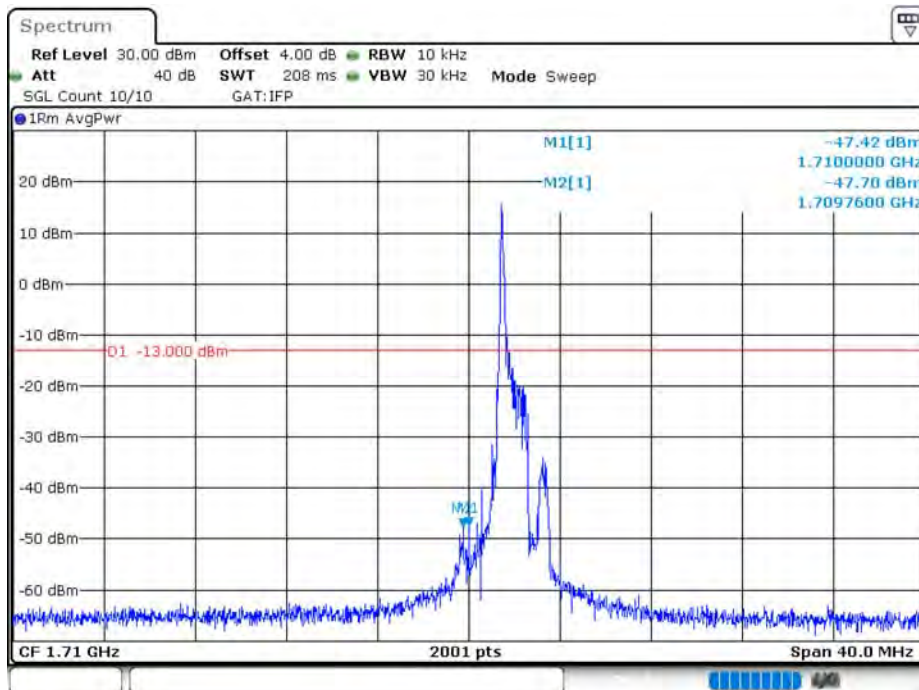
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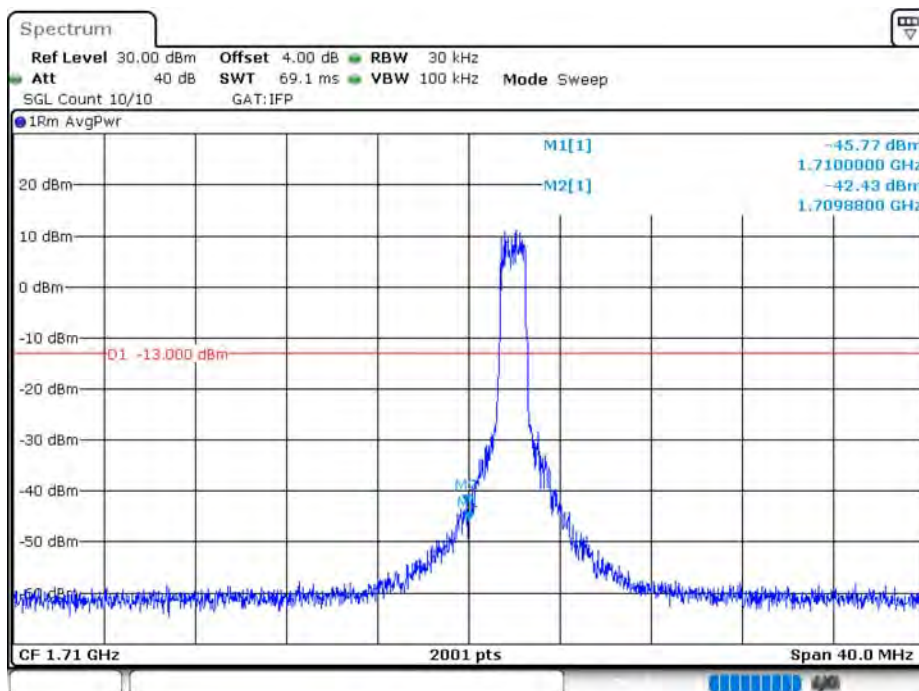
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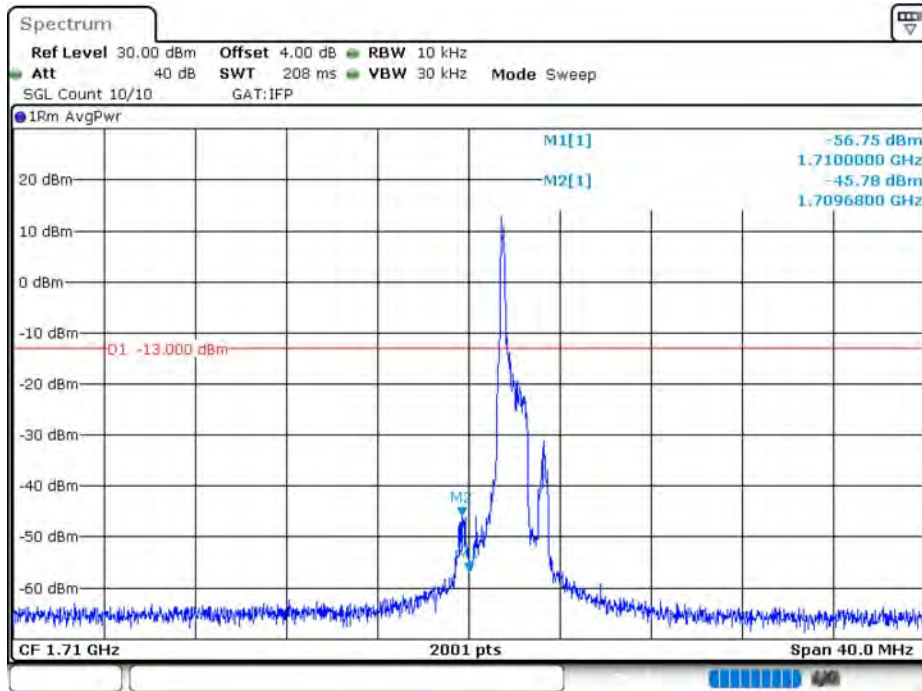
B66_CH132072_20M_QPSK_1RB0



B66_CH132072_20M_QPSK_6RB0

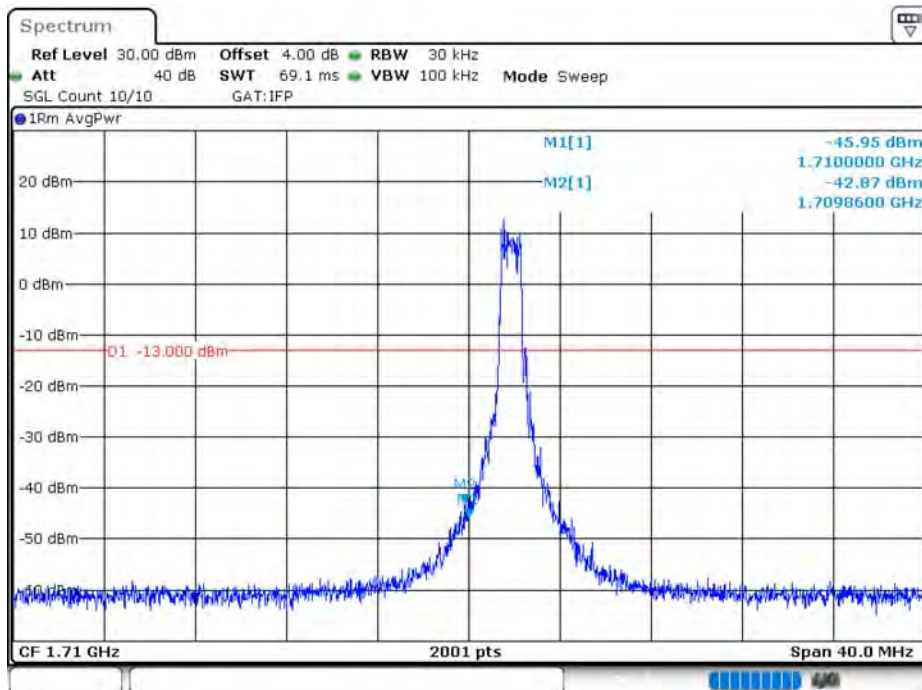


B66_CH132072_20M_16-QAM_1RB0



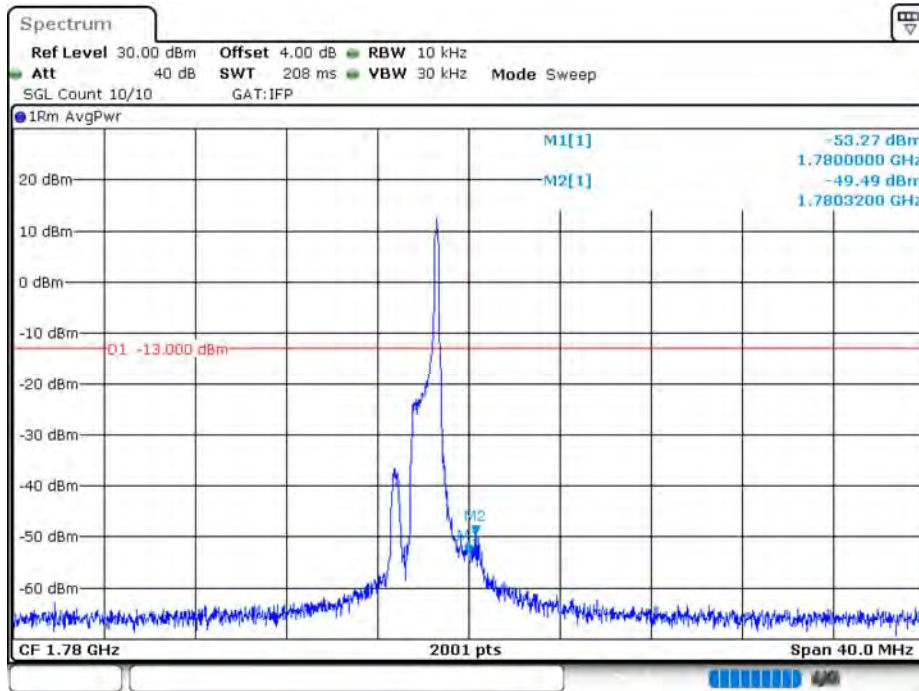
Date: 5.FEB.2020 15:19:30

B66_CH132072_20M_16-QAM_5RB0



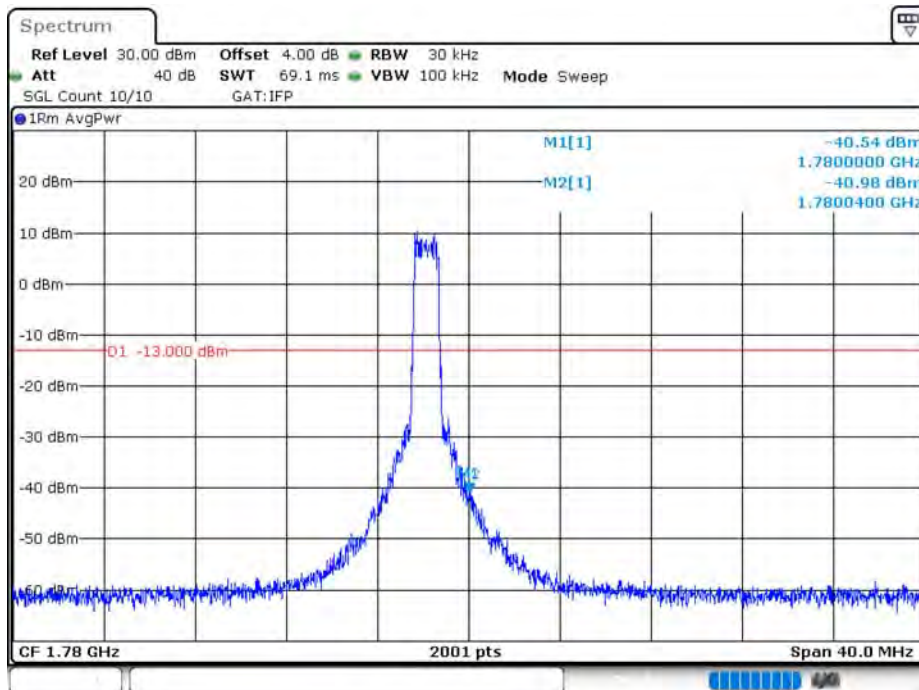
Date: 5.FEB.2020 15:22:09

B66_CH132572_20M_QPSK_1RB5



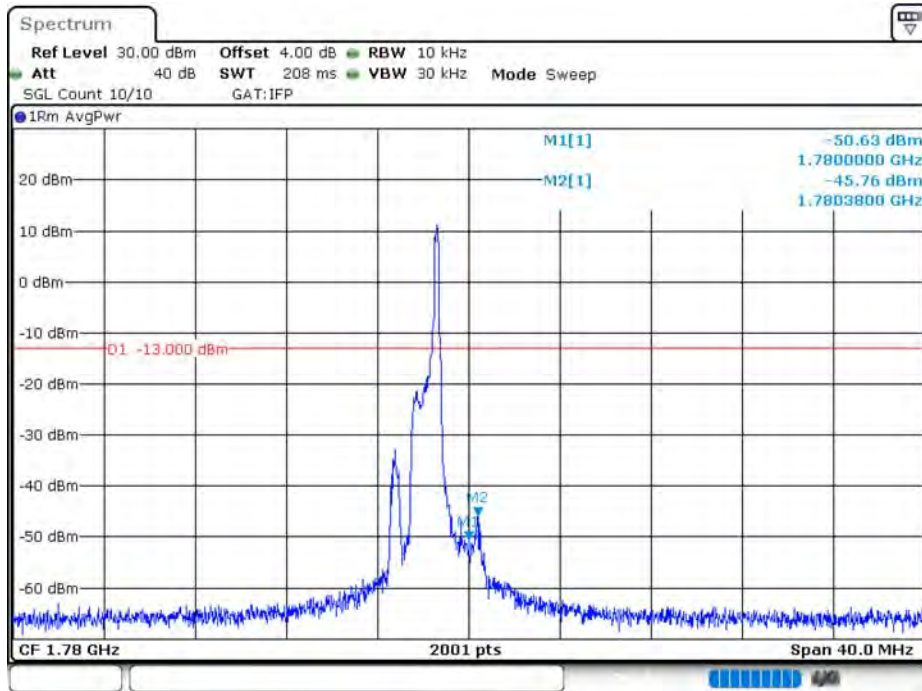
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B66_CH132572_20M_QPSK_6RB0

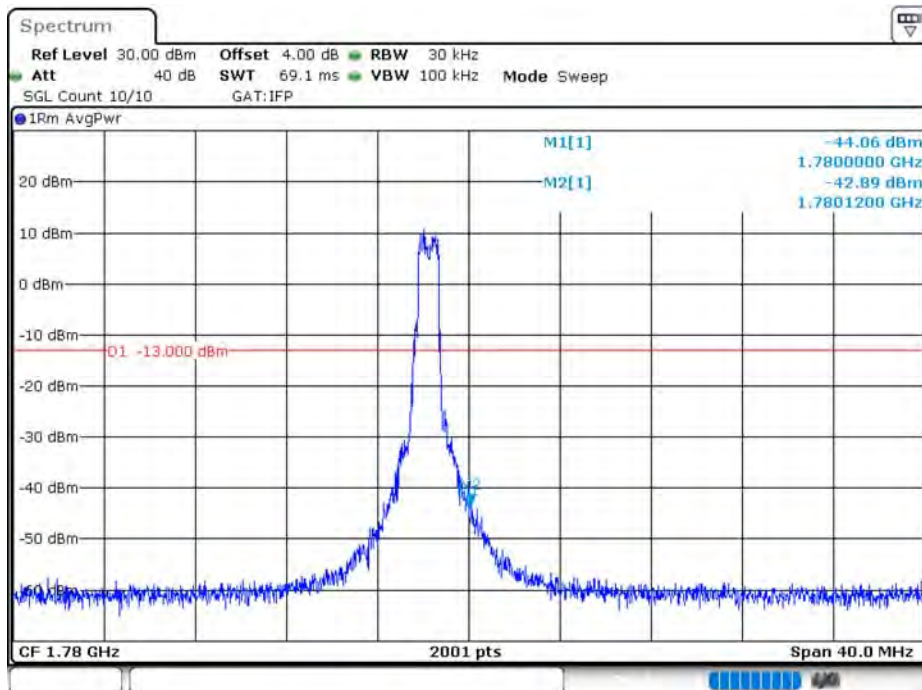


Date: 6.FEB.2020 11:11:12

B66_CH132572_20M_16-QAM_1RB5

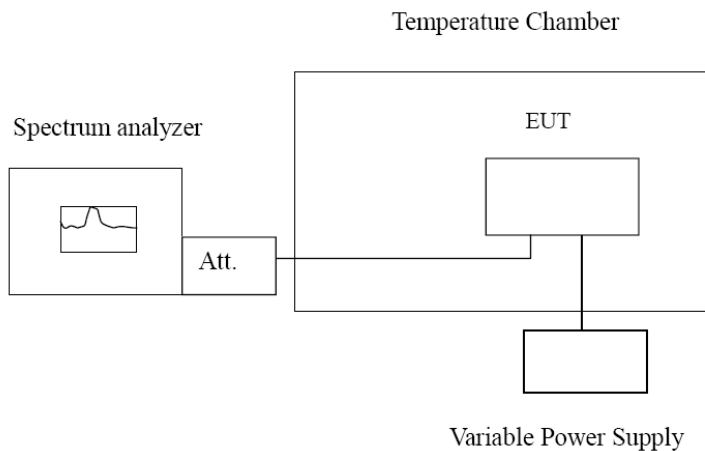


B66_CH132572_20M_16-QAM_5RB1



8. Frequency Stability

8.1. Test Setup



8.2. Test Procedure

Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

8.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 9

ANSI C63.26: 2015 Sub-clause 5.6

8.4. Test Result

Product	Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 1 : LTE Cat-M1_Band 2		
Date of Test	2020/02/13	Test Site	SR12-H
Temperature (°C)	21.0	Humidity (%RH)	58.0

LTE-Band 2 1860MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	0.57	0.0003
3.7	1.48	0.0008
3.2	0.39	0.0002

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.06	0.0006
-20	0.24	0.0001
-10	1.16	0.0006
0	0.62	0.0003
10	1.53	0.0008
20	1.49	0.0008
30	1.95	0.0010
40	1.18	0.0006
50	0.74	0.0004
60	1.23	0.0007
70	0.96	0.0005

LTE-Band 2 1880MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	1.02	0.0005
3.7	1.58	0.0008
3.2	1.14	0.0006

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.90	0.0005
-20	1.28	0.0007
-10	1.53	0.0008
0	0.92	0.0005
10	0.21	0.0001
20	0.98	0.0005
30	0.56	0.0003
40	0.71	0.0004
50	1.60	0.0009
60	0.15	0.0001
70	0.53	0.0003

LTE-Band 2 1900MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	0.56	0.0003
3.7	1.22	0.0006
3.2	0.67	0.0004

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.80	0.0004
-20	0.78	0.0004
-10	1.52	0.0008
0	-0.03	0.0000
10	0.71	0.0004
20	0.63	0.0003
30	1.34	0.0007
40	0.76	0.0004
50	-0.38	-0.0002
60	1.24	0.0007
70	0.87	0.0005

Product	Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 2 : LTE Cat-M1_Band 4		
Date of Test	2020/02/13	Test Site	SR12-H
Temperature (°C)	21.0	Humidity (%RH)	58.0

LTE-Band 4 1720MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	0.88	0.0005
3.7	1.54	0.0009
3.2	1.00	0.0006

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.18	0.0001
-20	1.03	0.0006
-10	1.18	0.0007
0	1.46	0.0008
10	1.25	0.0007
20	1.27	0.0007
30	1.23	0.0007
40	1.15	0.0007
50	1.66	0.0010
60	0.63	0.0004
70	1.07	0.0006

LTE-Band 4 1732.5MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	0.55	0.0003
3.7	1.23	0.0007
3.2	0.23	0.0001

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.22	0.0001
-20	0.91	0.0005
-10	0.79	0.0005
0	0.73	0.0004
10	0.79	0.0005
20	0.35	0.0002
30	0.56	0.0003
40	1.29	0.0007
50	1.03	0.0006
60	0.81	0.0005
70	0.97	0.0006

LTE-Band 4 1745MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	1.52	0.0009
3.7	1.38	0.0008
3.2	0.75	0.0004

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.09	0.0006
-20	1.68	0.0010
-10	0.58	0.0003
0	1.06	0.0006
10	0.56	0.0003
20	0.71	0.0004
30	1.43	0.0008
40	1.72	0.0010
50	1.59	0.0009
60	1.17	0.0007
70	0.35	0.0002

Product	Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 3 : LTE Cat-M1_Band 5		
Date of Test	2020/02/13	Test Site	SR12-H
Temperature (°C)	21.0	Humidity (%RH)	58.0

LTE-Band 5 829MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	0.63	0.0008
3.7	1.67	0.0020
3.2	1.79	0.0022

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.78	0.0021
-20	0.50	0.0006
-10	0.71	0.0009
0	1.34	0.0016
10	0.84	0.0010
20	1.54	0.0019
30	1.20	0.0014
40	0.96	0.0012
50	0.97	0.0012
60	1.12	0.0014
70	1.25	0.0015

LTE-Band 5 836.5MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	0.35	0.0004
3.7	1.26	0.0015
3.2	0.67	0.0008

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.54	0.0018
-20	0.63	0.0008
-10	0.31	0.0004
0	0.84	0.0010
10	0.76	0.0009
20	0.53	0.0006
30	0.55	0.0007
40	-0.14	-0.0002
50	0.49	0.0006
60	0.74	0.0009
70	0.81	0.0010

LTE-Band 5 844MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	0.27	0.0003
3.7	1.05	0.0012
3.2	1.05	0.0012

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.37	0.0004
-20	0.76	0.0009
-10	-0.43	-0.0005
0	-0.12	-0.0001
10	0.30	0.0004
20	0.67	0.0008
30	0.14	0.0002
40	0.13	0.0002
50	-0.15	-0.0002
60	0.80	0.0009
70	1.50	0.0018

Product	Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 4 : LTE Cat-M1_Band 12		
Date of Test	2020/02/13	Test Site	SR12-H
Temperature (°C)	21.0	Humidity (%RH)	58.0

LTE-Band 12 704MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	1.78	0.0025
3.7	1.78	0.0025
3.2	1.66	0.0024

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.36	0.0019
-20	0.77	0.0011
-10	0.45	0.0006
0	1.03	0.0015
10	1.23	0.0017
20	1.09	0.0015
30	1.61	0.0023
40	0.85	0.0012
50	0.75	0.0011
60	1.14	0.0016
70	0.41	0.0006

LTE-Band 12 707.5MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	1.27	0.0018
3.7	2.29	0.0032
3.2	2.07	0.0029

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.46	0.0021
-20	1.14	0.0016
-10	2.31	0.0033
0	0.81	0.0011
10	2.14	0.0030
20	1.26	0.0018
30	2.19	0.0031
40	2.30	0.0033
50	1.80	0.0025
60	1.81	0.0026
70	2.37	0.0033

LTE-Band 12 711MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	1.98	0.0028
3.7	2.02	0.0028
3.2	1.96	0.0028

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	2.60	0.0037
-20	2.03	0.0029
-10	0.95	0.0013
0	1.95	0.0027
10	1.31	0.0018
20	2.03	0.0029
30	1.39	0.0020
40	2.18	0.0031
50	1.06	0.0015
60	1.10	0.0015
70	2.00	0.0028

Product	Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 5 : LTE Cat-M1_Band 13		
Date of Test	2020/02/13	Test Site	SR12-H
Temperature (°C)	21.0	Humidity (%RH)	58.0

LTE-Band 13 782MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	2.11	0.0027
3.7	1.83	0.0023
3.2	1.71	0.0022

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.73	0.0022
-20	1.70	0.0022
-10	1.19	0.0015
0	1.20	0.0015
10	1.53	0.0020
20	0.81	0.0010
30	1.27	0.0016
40	1.42	0.0018
50	1.07	0.0014
60	0.82	0.0010
70	1.15	0.0015

Product	Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 6 : LTE Cat-M1_Band 25		
Date of Test	2020/02/13	Test Site	SR12-H
Temperature (°C)	21.0	Humidity (%RH)	58.0

LTE-Band 25 1860MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	0.91	0.0005
3.7	1.49	0.0008
3.2	1.54	0.0008

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.28	0.0007
-20	0.87	0.0005
-10	0.63	0.0003
0	0.46	0.0002
10	0.06	0.0000
20	0.51	0.0003
30	0.47	0.0003
40	0.64	0.0003
50	1.65	0.0009
60	0.88	0.0005
70	1.79	0.0010

LTE-Band 25 1882.5MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	-0.21	-0.0001
3.7	0.59	0.0003
3.2	0.11	0.0001

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.00	0.0000
-20	0.29	0.0002
-10	-0.09	0.0000
0	-0.05	0.0000
10	-0.50	-0.0003
20	0.66	0.0004
30	-0.16	-0.0001
40	0.07	0.0000
50	0.09	0.0000
60	-0.20	-0.0001
70	-0.37	-0.0002

LTE-Band 25 1905MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	-0.39	-0.0002
3.7	0.31	0.0002
3.2	-0.15	-0.0001

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.18	0.0001
-20	-0.83	-0.0004
-10	0.70	0.0004
0	0.00	0.0000
10	0.51	0.0003
20	0.11	0.0001
30	-0.57	-0.0003
40	-0.07	0.0000
50	0.24	0.0001
60	0.07	0.0000
70	0.02	0.0000

Product	Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations (Part 22)		
Test Mode	Mode 7 : LTE Cat-M1_Band 26		
Date of Test	2020/02/13	Test Site	SR12-H
Temperature (°C)	21.0	Humidity (%RH)	58.0

LTE-Band 26(Part 22) 831.5MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	1.95	0.0023
3.7	1.86	0.0022
3.2	1.48	0.0018

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	2.22	0.0027
-20	1.77	0.0021
-10	1.05	0.0013
0	0.89	0.0011
10	2.00	0.0024
20	0.84	0.0010
30	0.96	0.0012
40	1.12	0.0013
50	1.62	0.0019
60	0.96	0.0012
70	1.53	0.0018

LTE-Band 26(Part 22) 836.5MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	2.07	0.0025
3.7	1.83	0.0022
3.2	1.80	0.0022

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.49	0.0006
-20	0.99	0.0012
-10	1.20	0.0014
0	0.30	0.0004
10	2.10	0.0025
20	1.57	0.0019
30	1.30	0.0016
40	1.42	0.0017
50	0.57	0.0007
60	0.94	0.0011
70	1.50	0.0018

LTE-Band 26 (Part 22) 841.5MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	1.29	0.0015
3.7	1.60	0.0019
3.2	2.14	0.0025

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.26	0.0003
-20	1.21	0.0014
-10	-0.05	-0.0001
0	1.56	0.0019
10	0.64	0.0008
20	1.88	0.0022
30	1.00	0.0012
40	0.77	0.0009
50	0.09	0.0001
60	0.73	0.0009
70	0.50	0.0006

Product	Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations (Part 90)		
Test Mode	Mode 7 : LTE Cat-M1_Band 26		
Date of Test	2020/02/13	Test Site	SR12-H
Temperature (°C)	21.0	Humidity (%RH)	58.0

LTE-Band 26(Part 90) 819MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	-0.11	-0.0001
3.7	1.19	0.0015
3.2	0.99	0.0012

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.83	0.0022
-20	0.47	0.0006
-10	1.13	0.0014
0	0.76	0.0009
10	1.19	0.0015
20	-0.33	-0.0004
30	1.25	0.0015
40	1.34	0.0016
50	0.47	0.0006
60	-0.41	-0.0005
70	0.46	0.0006

Product	Module		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 8 : LTE Cat-M1_Band 66		
Date of Test	2020/02/13	Test Site	SR12-H
Temperature (°C)	21.0	Humidity (%RH)	58.0

LTE-Band 66 1720MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	1.89	0.0011
3.7	1.91	0.0011
3.2	2.16	0.0013

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	1.12	0.0007
-20	0.72	0.0004
-10	1.58	0.0009
0	1.51	0.0009
10	1.29	0.0008
20	1.15	0.0007
30	1.71	0.0010
40	1.13	0.0007
50	1.91	0.0011
60	1.41	0.0008
70	2.00	0.0012

LTE-Band 66 1745MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	-0.76	-0.0004
3.7	0.75	0.0004
3.2	0.41	0.0002

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.71	0.0004
-20	0.08	0.0000
-10	0.10	0.0001
0	0.51	0.0003
10	0.06	0.0000
20	0.05	0.0000
30	0.95	0.0005
40	0.20	0.0001
50	-0.19	-0.0001
60	0.68	0.0004
70	-0.03	0.0000

LTE-Band 66 1770MHz

Voltage

Voltage (VDC)	Frequency Error(Hz)	Frequency Error(ppm)
4.35	0.90	0.0005
3.7	1.06	0.0006
3.2	0.54	0.0003

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	0.37	0.0002
-20	1.06	0.0006
-10	0.21	0.0001
0	0.82	0.0005
10	1.40	0.0008
20	0.30	0.0002
30	0.63	0.0004
40	0.49	0.0003
50	1.07	0.0006
60	-0.36	-0.0002
70	0.97	0.0005