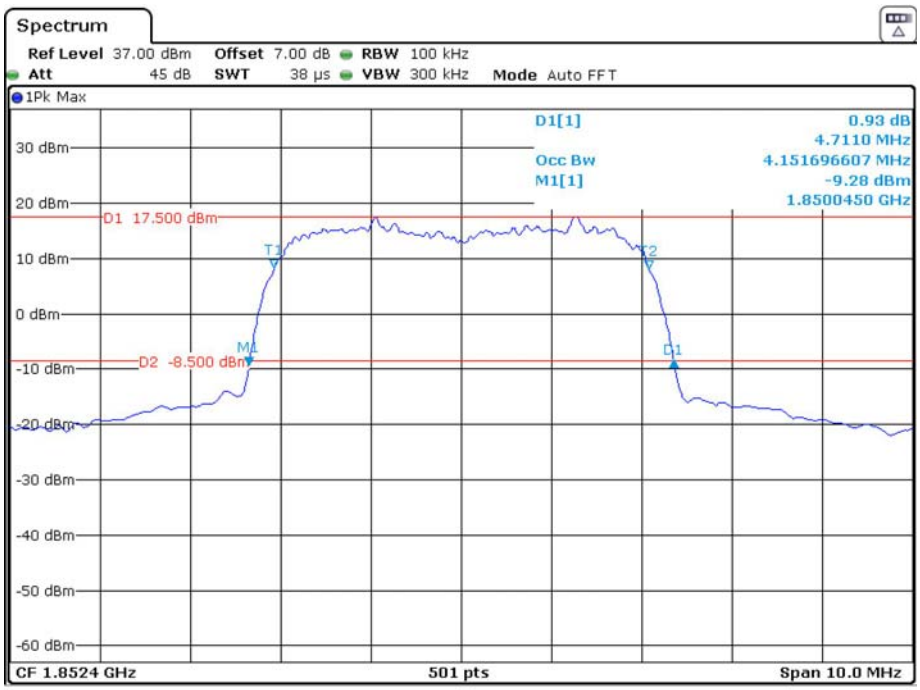
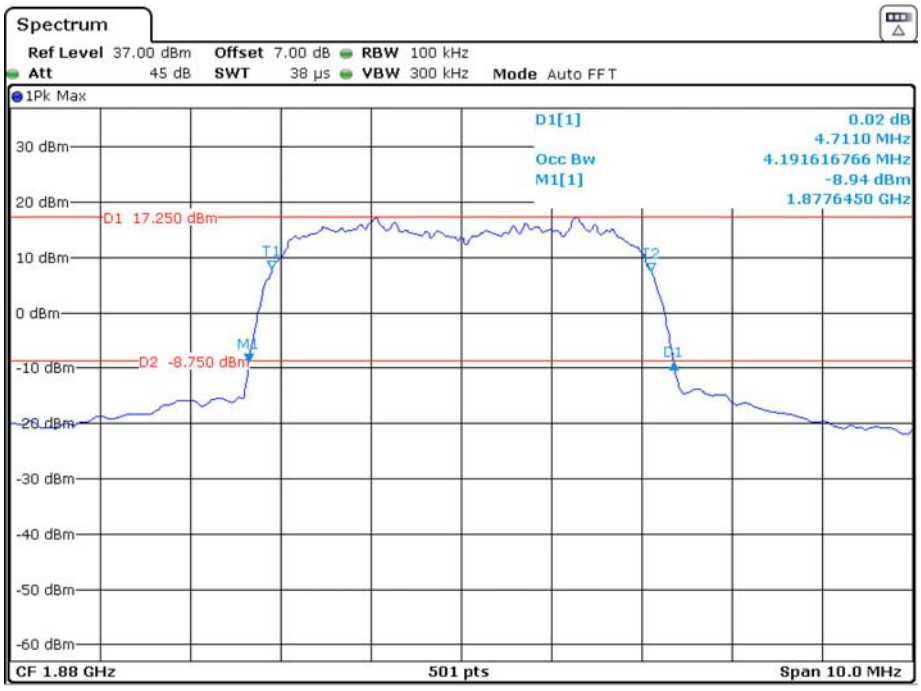
26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode, Low channel



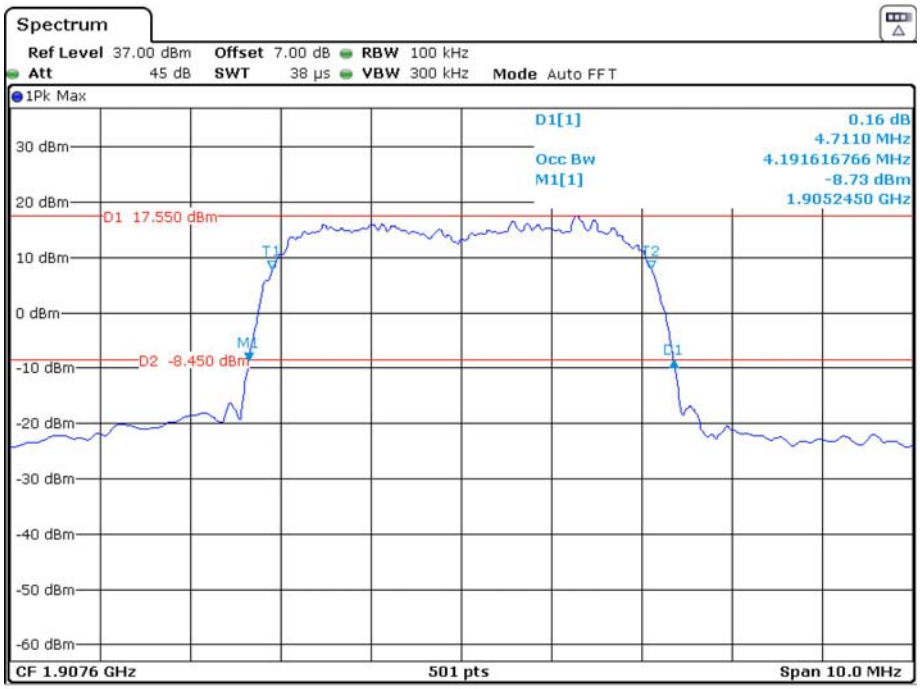
Date: 14.APR.2022 19:29:39

26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode, Middle channel



Date: 14.APR.2022 19:31:13

26 dB Emissions &99% Occupied Bandwidth for HSDPA (16QAM) Mode, High channel



LTE Band 2:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.096	1.290	1.102	1.278	1.102	1.284
	16QAM	1.096	1.278	1.096	1.278	1.102	1.308
3 MHz	QPSK	2.683	2.904	2.683	2.928	2.683	2.940
	16QAM	2.671	2.952	2.683	2.940	2.683	2.928
5 MHz	QPSK	4.511	4.940	4.511	4.920	4.511	4.920
	16QAM	4.511	4.940	4.511	4.940	4.511	4.960
10 MHz	QPSK	8.942	9.680	8.942	9.600	8.982	9.640
	16QAM	8.942	9.600	8.942	9.640	8.982	9.640
15 MHz	QPSK	13.473	14.640	13.473	14.520	13.473	14.640
	16QAM	13.473	14.580	13.533	14.580	13.473	14.580
20 MHz	QPSK	17.964	19.200	17.884	19.200	17.964	19.200
	16QAM	17.964	19.200	17.964	19.360	17.884	19.280

LTE Band 5:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.096	1.284	1.096	1.302	1.102	1.278
	16QAM	1.102	1.302	1.090	1.272	1.102	1.290
3 MHz	QPSK	2.683	2.916	2.683	2.928	2.683	2.928
	16QAM	2.683	2.940	2.683	2.940	2.683	2.940
5 MHz	QPSK	4.511	4.940	4.511	4.940	4.491	4.880
	16QAM	4.511	4.920	4.511	4.940	4.511	4.960
10 MHz	QPSK	8.942	9.680	8.942	9.600	8.942	9.680
	16QAM	8.942	9.560	8.942	9.640	8.982	9.640

LTE Band 12:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
1.4 MHz	QPSK	1.096	1.284	1.102	1.302	1.102	1.278
	16QAM	1.102	1.302	1.096	1.278	1.096	1.284
3 MHz	QPSK	2.683	2.904	2.671	2.916	2.683	2.940
	16QAM	2.683	2.940	2.683	2.940	2.683	2.940
5 MHz	QPSK	4.511	4.920	4.511	5.040	4.511	4.900
	16QAM	4.491	4.900	4.511	4.940	4.511	4.940
10 MHz	QPSK	8.982	9.680	8.942	9.600	8.942	9.600
	16QAM	8.942	9.600	8.942	9.680	8.942	9.600

LTE Band 13:

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
5 MHz	QPSK	4.511	4.940	4.511	4.940	4.511	4.920
	16QAM	4.491	4.900	4.511	4.940	4.511	4.960
10 MHz	QPSK	/	/	8.942	9.640	/	/
	16QAM	/	/	8.942	9.560	/	/

LTE Band 41

Bandwidth	Modulation	Low channel		Middle channel		High channel	
		OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)	OBW (MHz)	26dB EBW (MHz)
5 MHz	QPSK	4.491	4.980	4.511	4.940	4.511	4.980
	16QAM	4.511	4.940	4.511	4.940	4.511	5.020
10 MHz	QPSK	8.942	9.640	8.942	9.760	8.942	9.600
	16QAM	8.942	9.520	8.942	9.560	8.942	10.120
15 MHz	QPSK	13.473	14.520	13.473	14.520	13.473	14.580
	16QAM	13.473	14.580	13.533	14.580	13.473	14.640
20 MHz	QPSK	17.884	19.120	17.884	19.280	17.884	19.280
	16QAM	17.964	19.280	17.964	19.280	17.884	19.040

The test plots of LTE band please refer to the Appendix A.

FCC §2.1051, §22.917(a) & §24.238(a)& §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

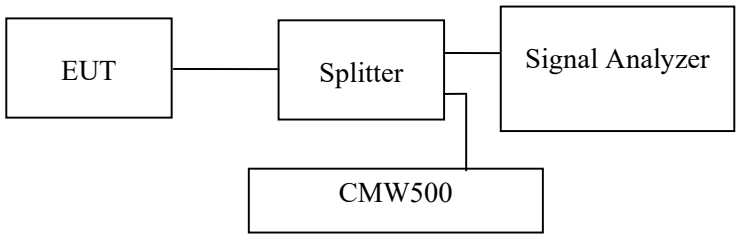
Applicable Standard

FCC §2.1051, §22.917(a) & §24.238(a)&§27.53.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic.



Test Data

Environmental Conditions

Temperature:	26~28 ℃
Relative Humidity:	56~60 %
ATM Pressure:	101.0~102.0 kPa

The testing was performed by Nick Fang from 2022-04-14 to 2022-04-25.

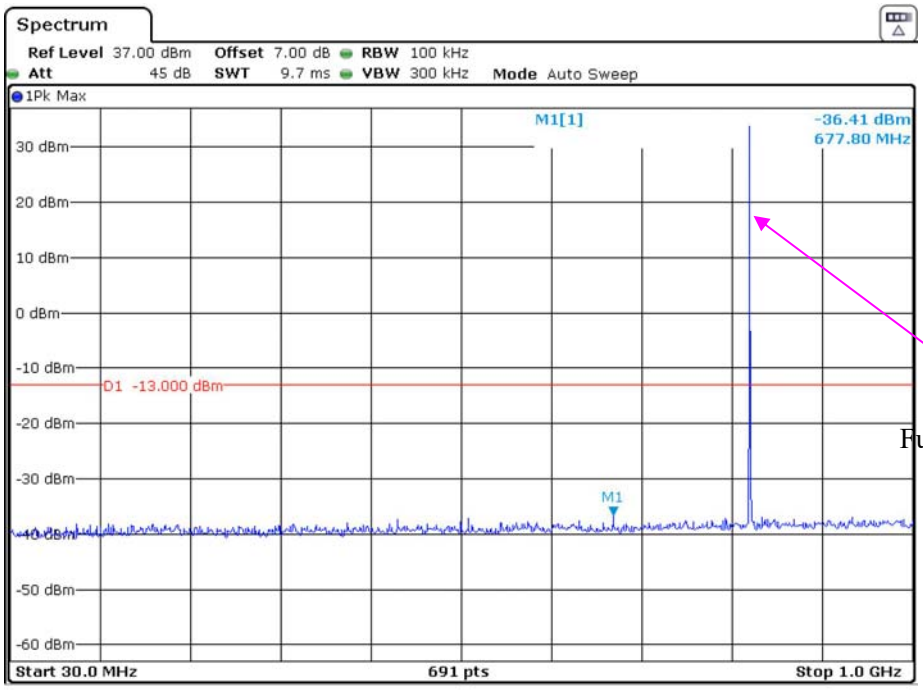
EUT operation mode: Transmitting

Test result: Pass

Please refer to the following plots.

Cellular Band
Low Channel:

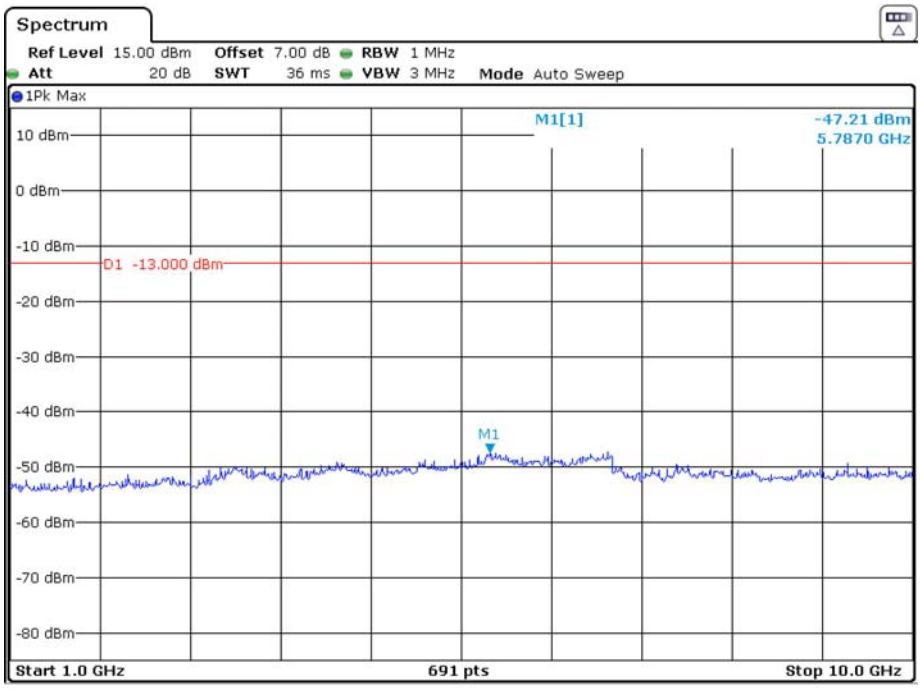
30 MHz – 1 GHz (GSM Mode)



Fundamental test

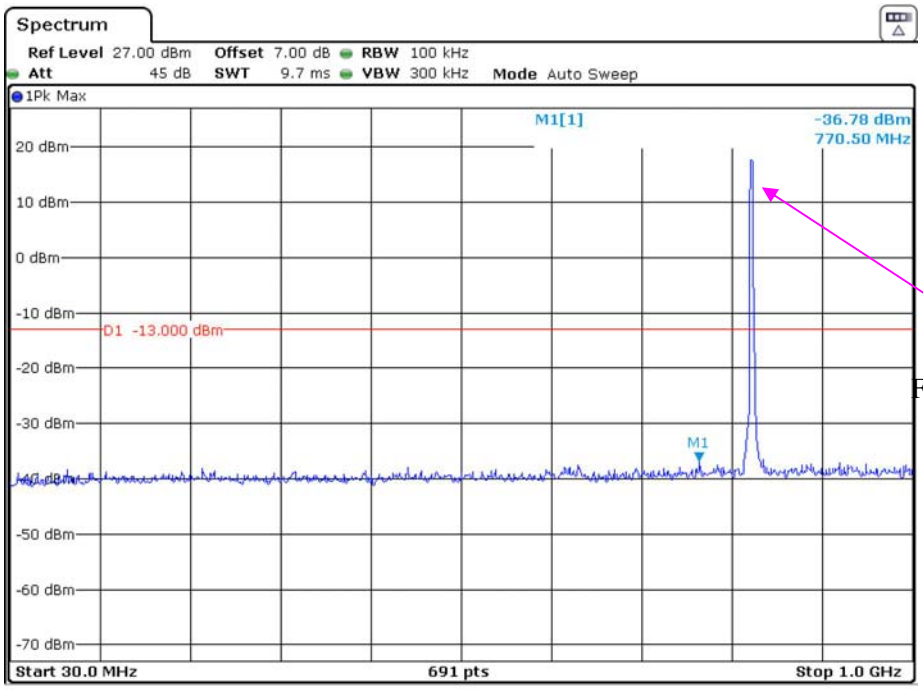
Date: 14.APR.2022 10:09:33

1 GHz – 10 GHz (GSM Mode)



Date: 14.APR.2022 10:12:12

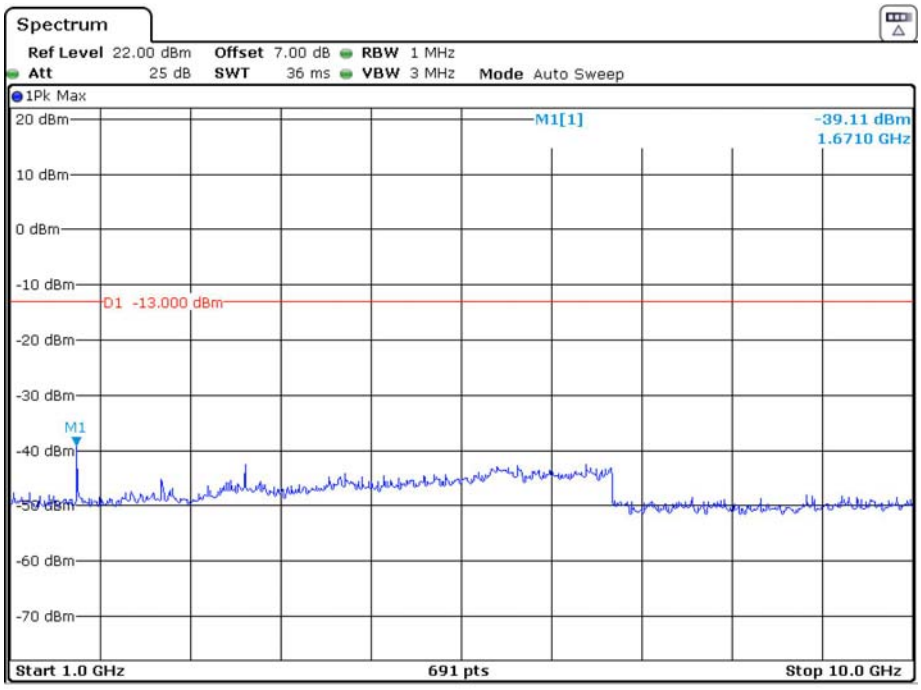
30 MHz – 1 GHz (WCDMA Mode)



Fundamental test

Date: 14.APR.2022 10:51:47

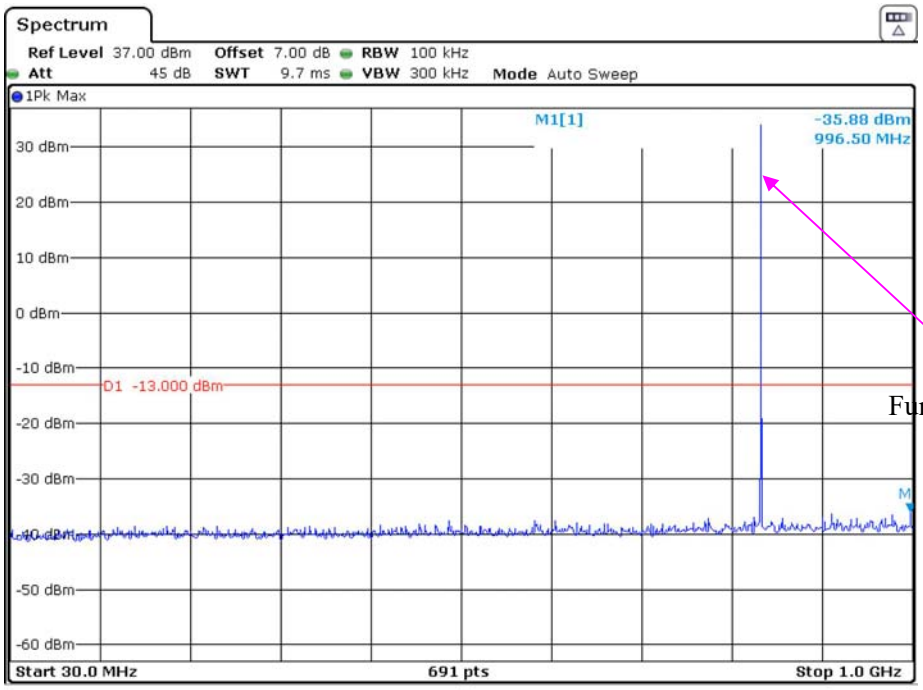
1 GHz – 10 GHz (WCDMA Mode)



Date: 14.APR.2022 10:53:35

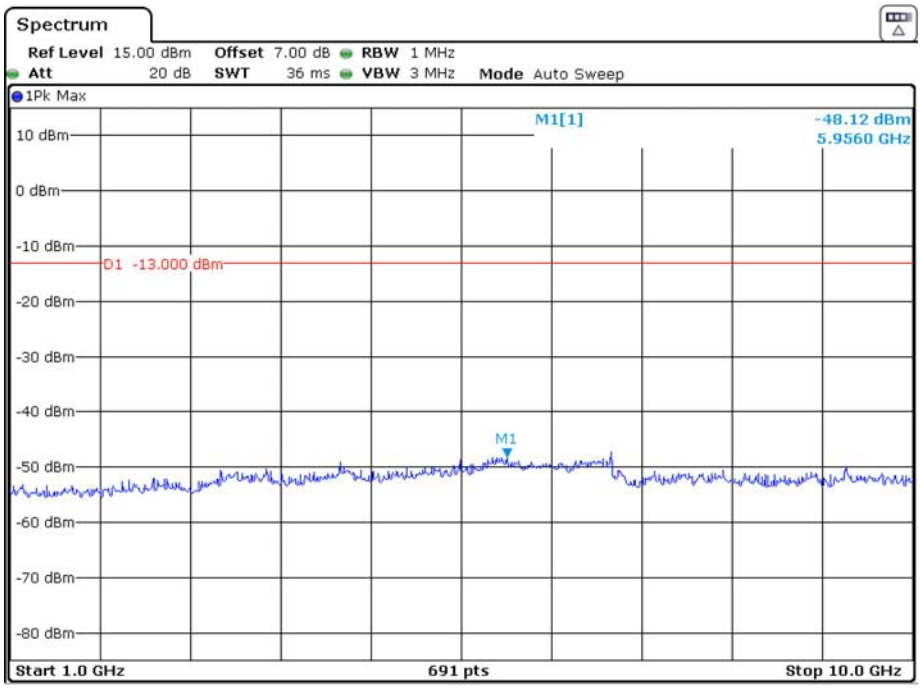
Middle Channel:

30 MHz – 1 GHz (GSM Mode)



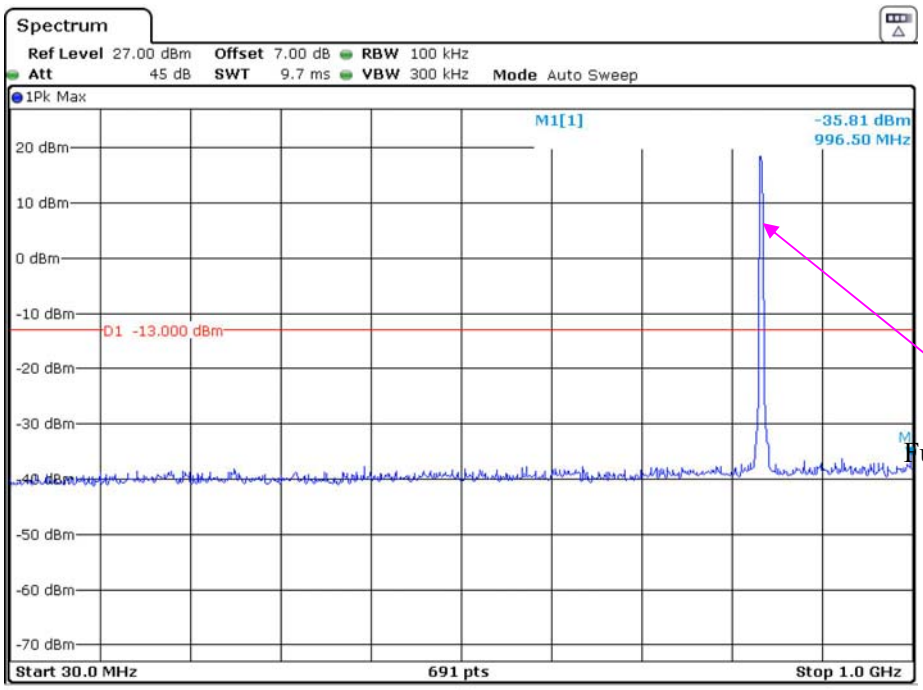
Date: 14.APR.2022 10:09:49

1 GHz – 10 GHz (GSM Mode)



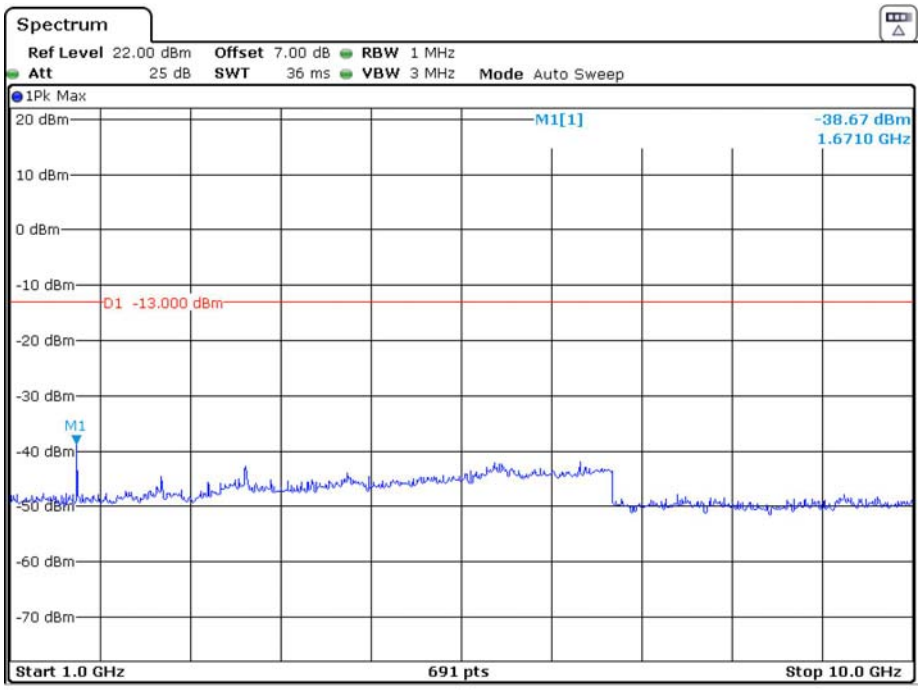
Date: 14.APR.2022 10:11:28

30 MHz – 1 GHz (WCDMA Mode)



Date: 14.APR.2022 10:52:06

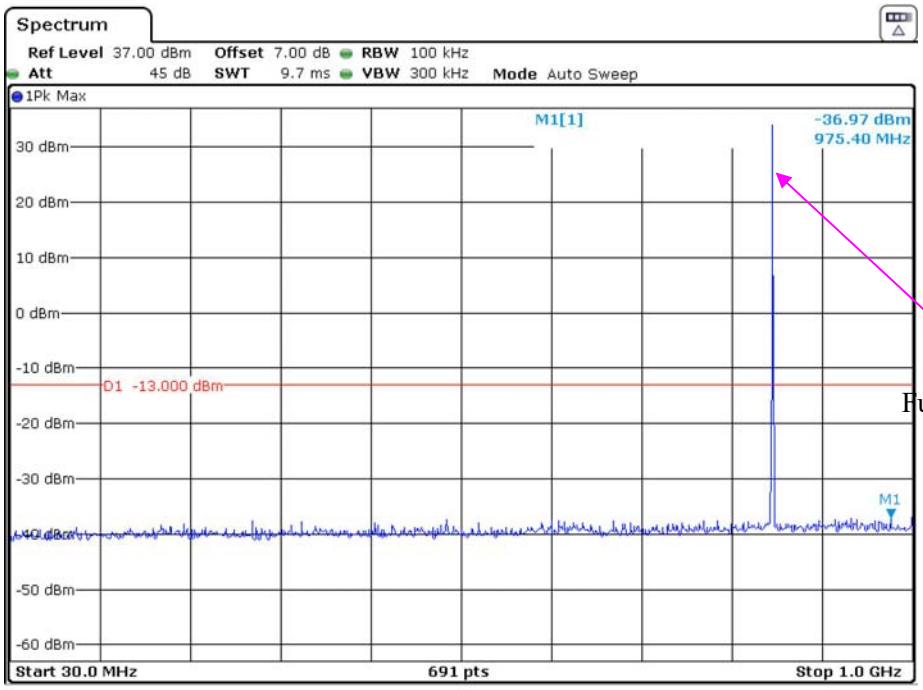
1 GHz – 10 GHz (WCDMA Mode)



Date: 14.APR.2022 10:53:27

High Channel:

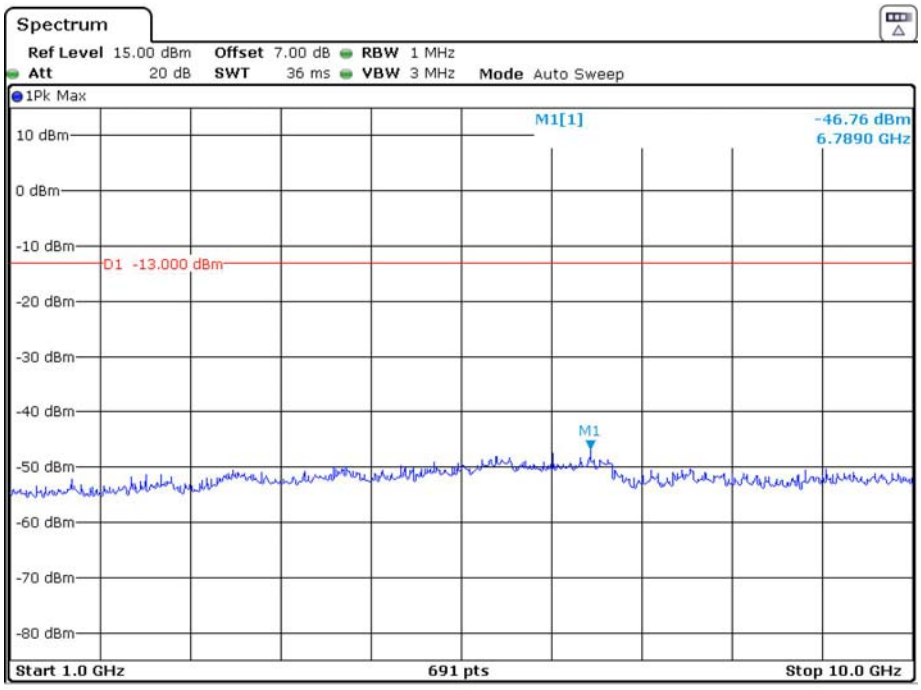
30 MHz – 1 GHz (GSM Mode)



Fundamental test

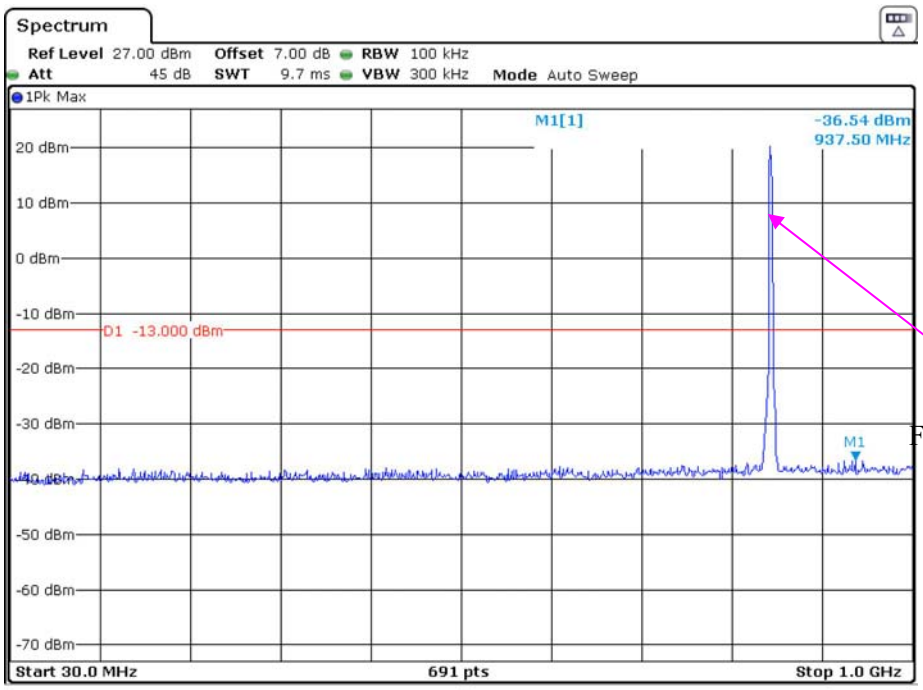
Date: 14.APR.2022 10:10:08

1 GHz – 10 GHz (GSM Mode)



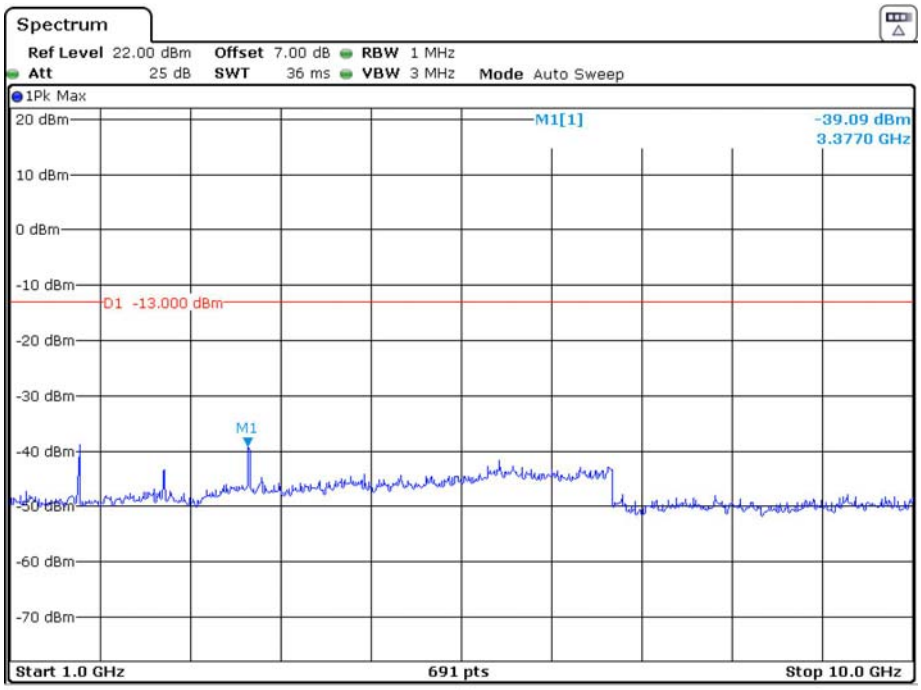
Date: 14.APR.2022 10:11:18

30 MHz – 1 GHz (WCDMA Mode)



Date: 14.APR.2022 10:52:46

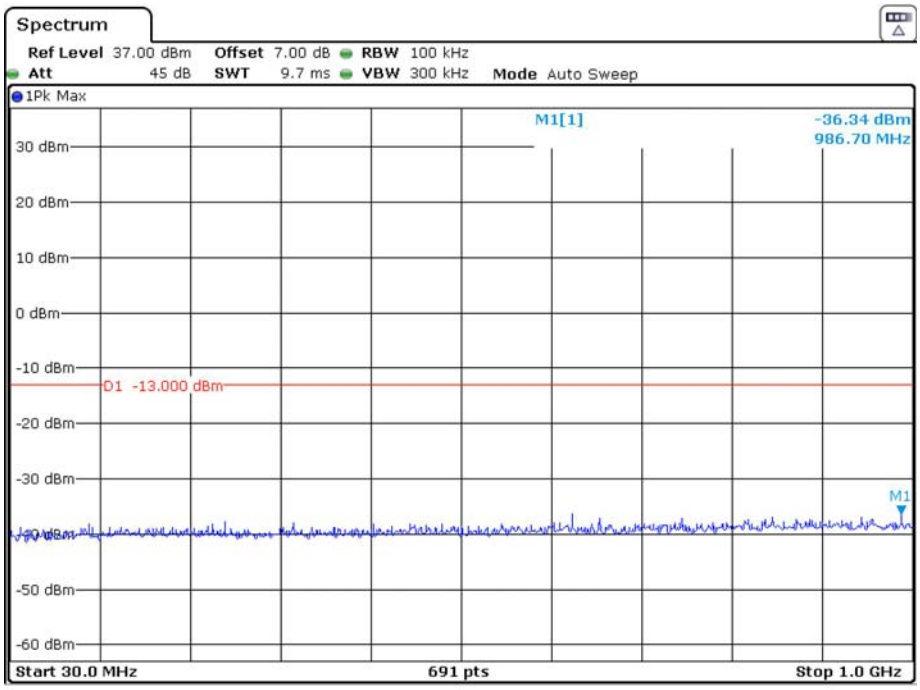
1 GHz – 10 GHz (WCDMA Mode)



Date: 14.APR.2022 10:53:13

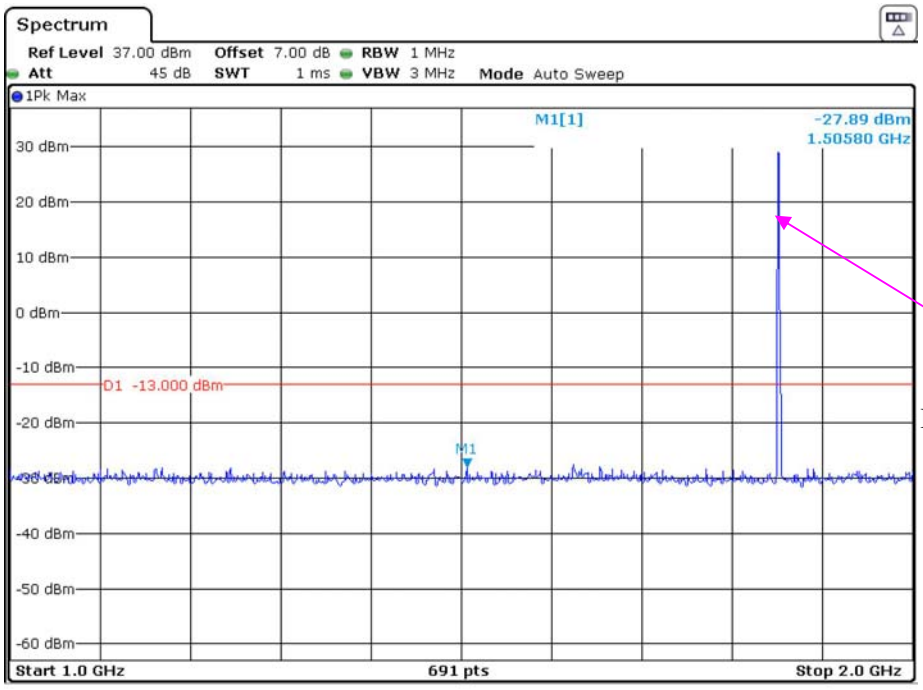
PCS Band
Low Channel:

30 MHz – 1 GHz (GSM Mode)



Date: 14.APR.2022 10:34:26

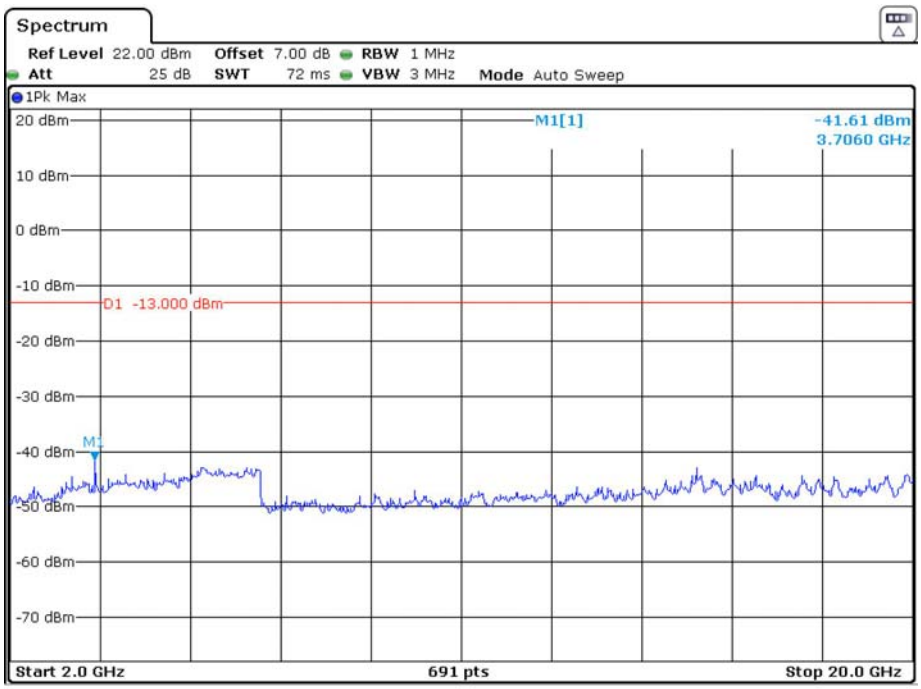
1 GHz – 2 GHz (GSM Mode)



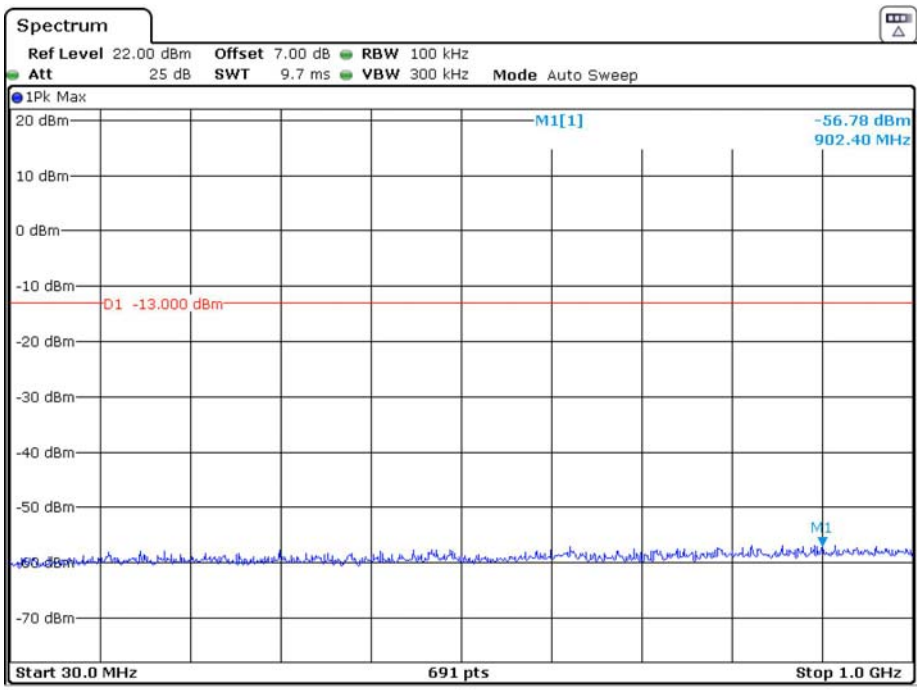
Fundamental test

Date: 14.APR.2022 10:36:26

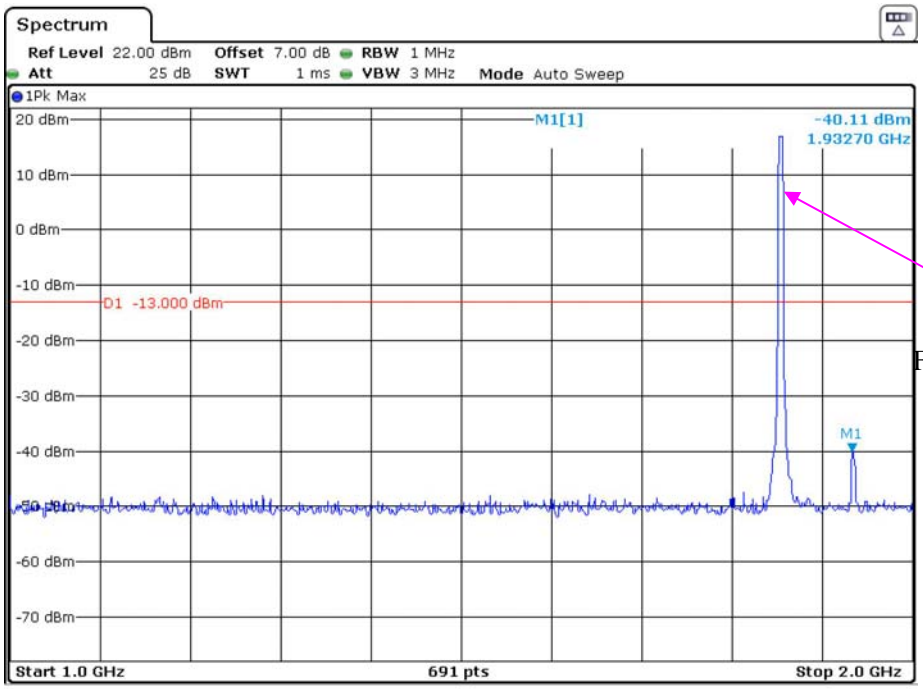
2 GHz – 20 GHz (GSM Mode)



30 MHz – 1 GHz (WCDMA Mode)



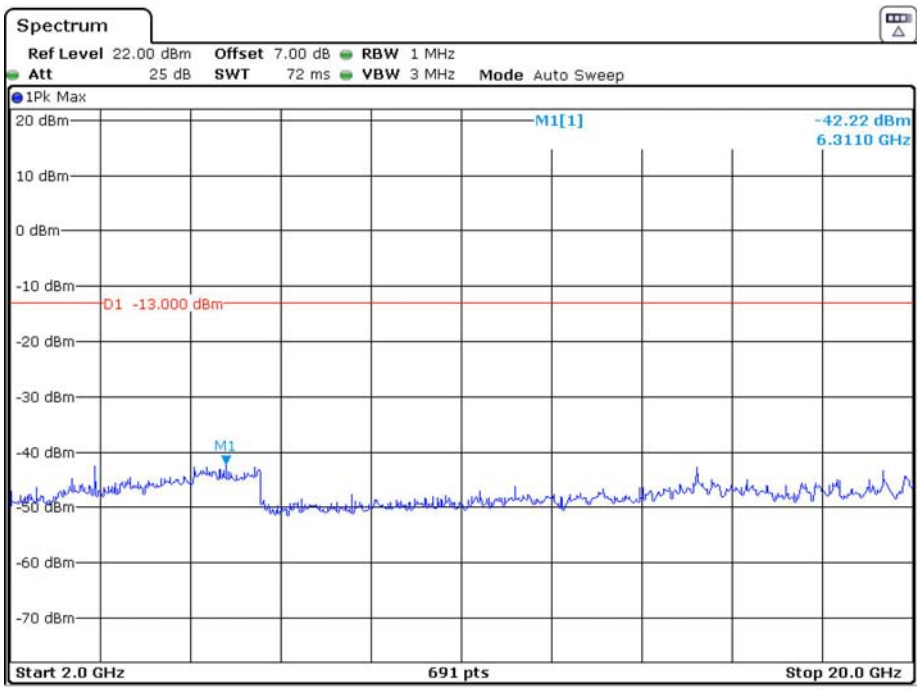
1 GHz – 2 GHz (WCDMA Mode)



Fundamental test

Date: 14.APR.2022 10:43:48

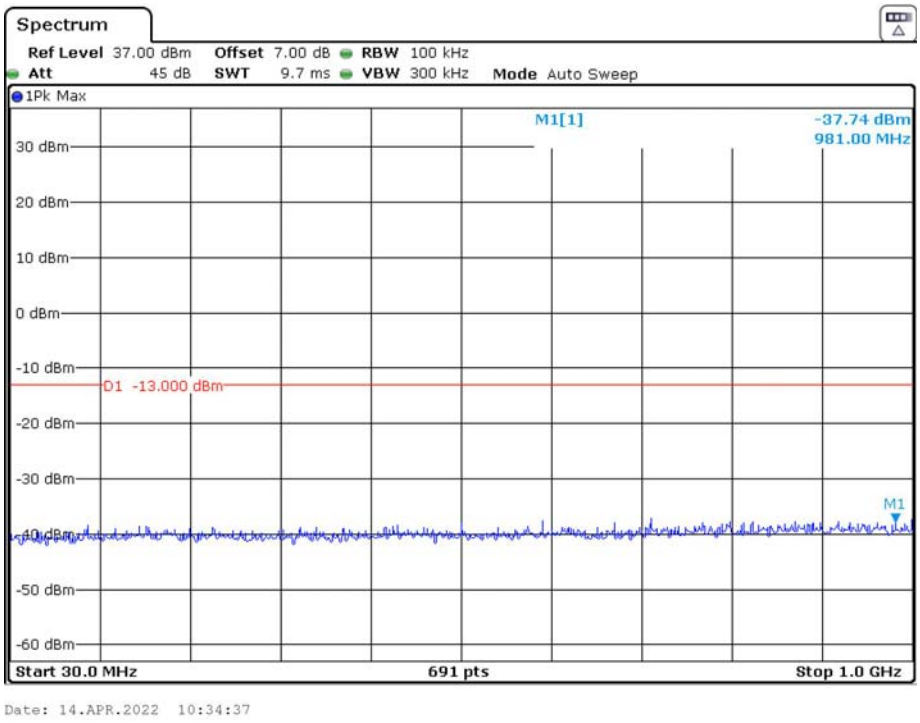
2 GHz – 20 GHz (WCDMA Mode)



Date: 14.APR.2022 10:44:05

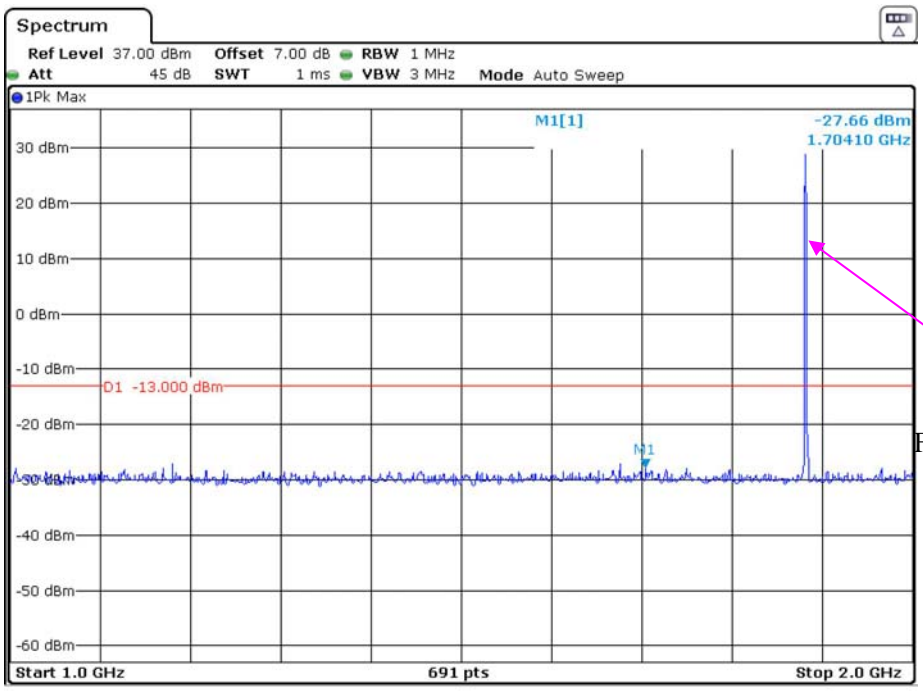
Middle Channel:

30 MHz – 1 GHz (GSM Mode)



Date: 14.APR.2022 10:34:37

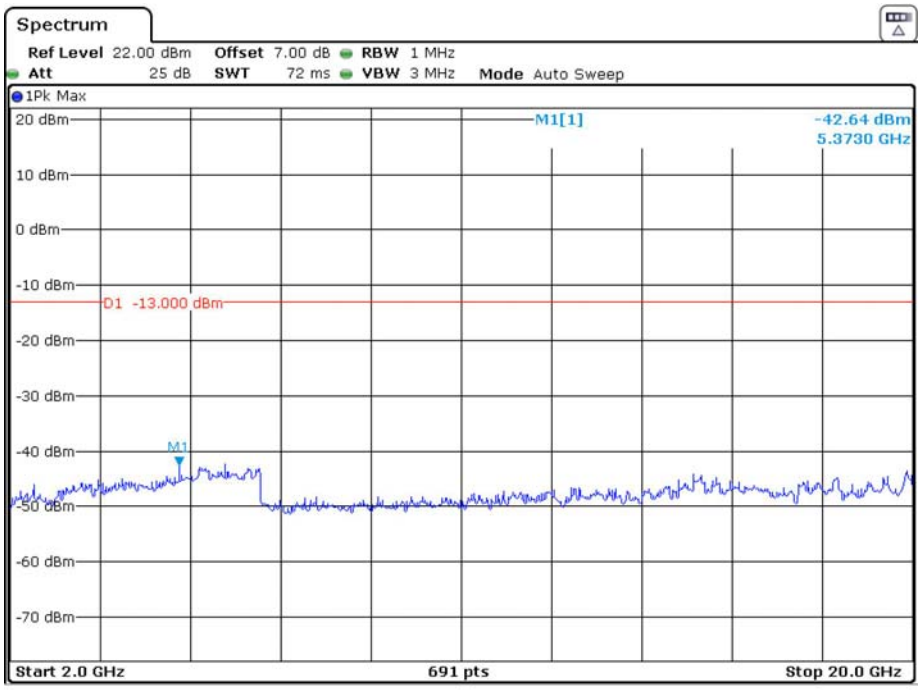
1 GHz – 2 GHz (GSM Mode)



Fundamental test

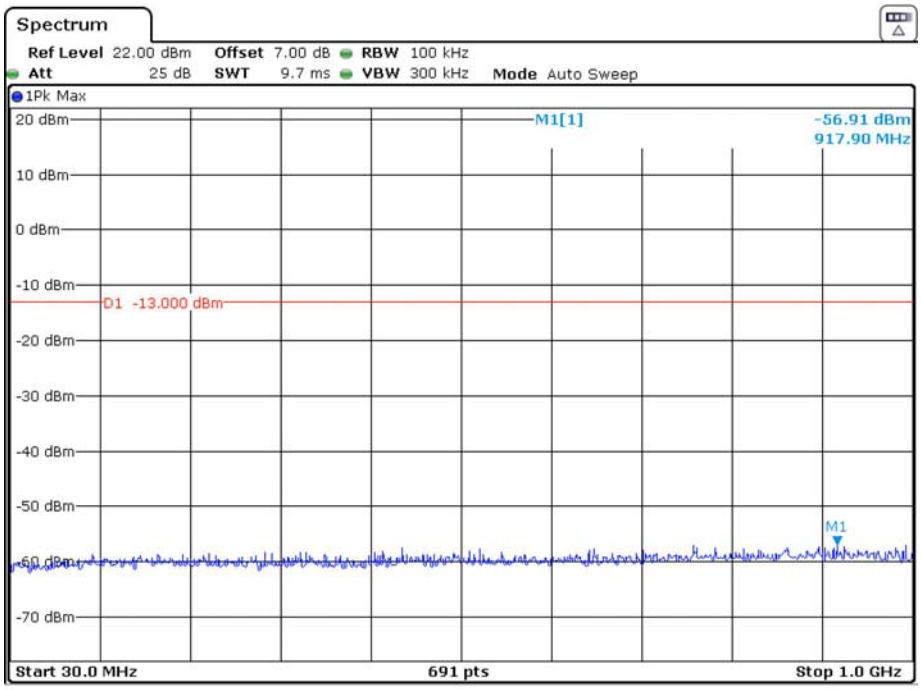
Date: 14.APR.2022 10:36:04

2 GHz– 20 GHz (GSM Mode)



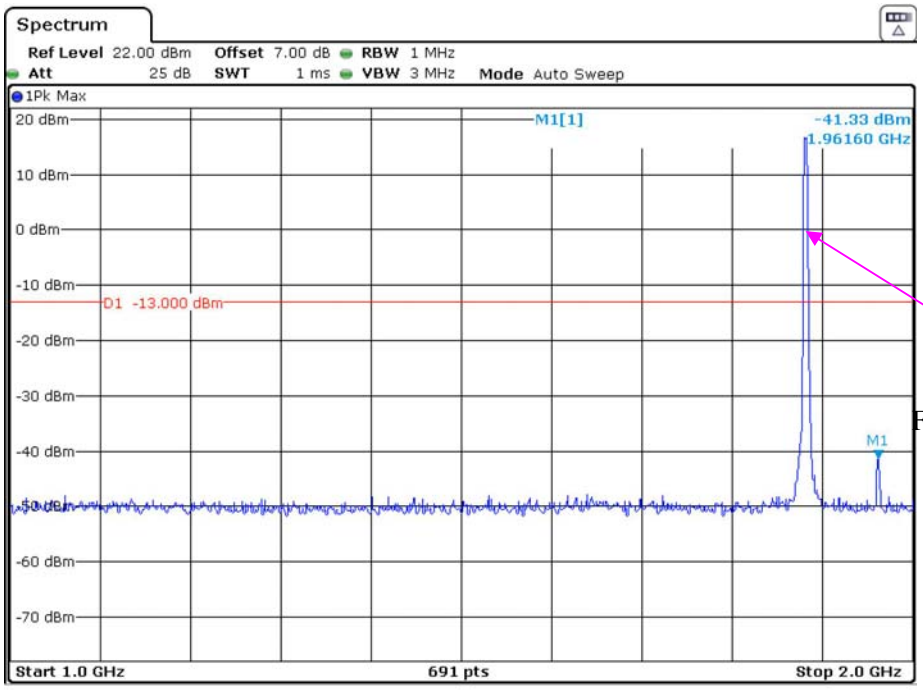
Date: 14.APR.2022 10:37:08

30 MHz – 1 GHz (WCDMA Mode)



Date: 14.APR.2022 10:42:25

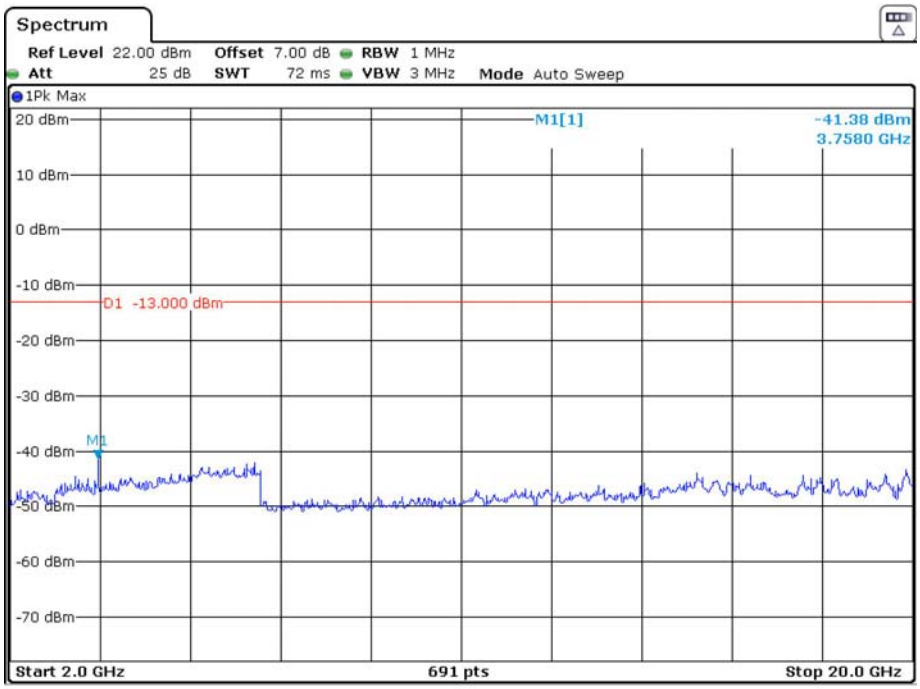
1 GHz – 2 GHz (WCDMA Mode)



Fundamental test

Date: 14.APR.2022 10:43:33

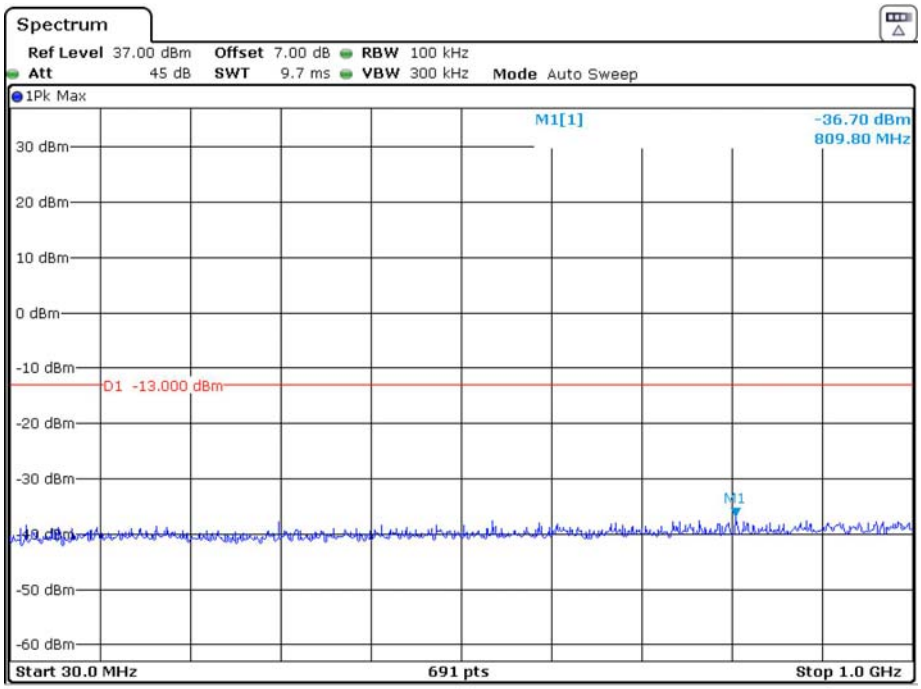
2 GHz – 20 GHz (WCDMA Mode)



Date: 14.APR.2022 10:44:21

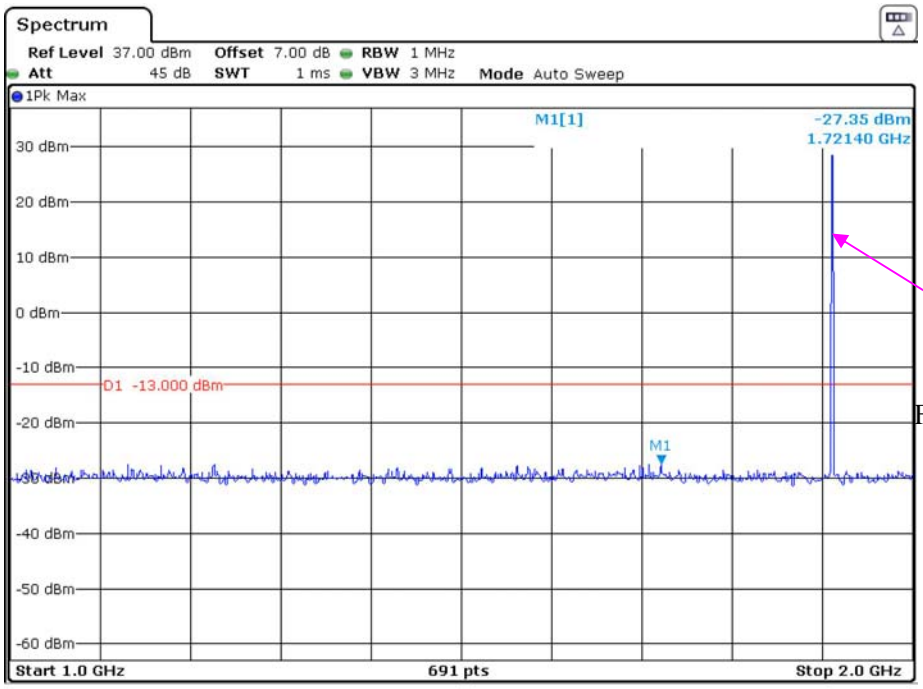
High Channel:

30 MHz – 1 GHz (GSM Mode)



Date: 14.APR.2022 10:34:50

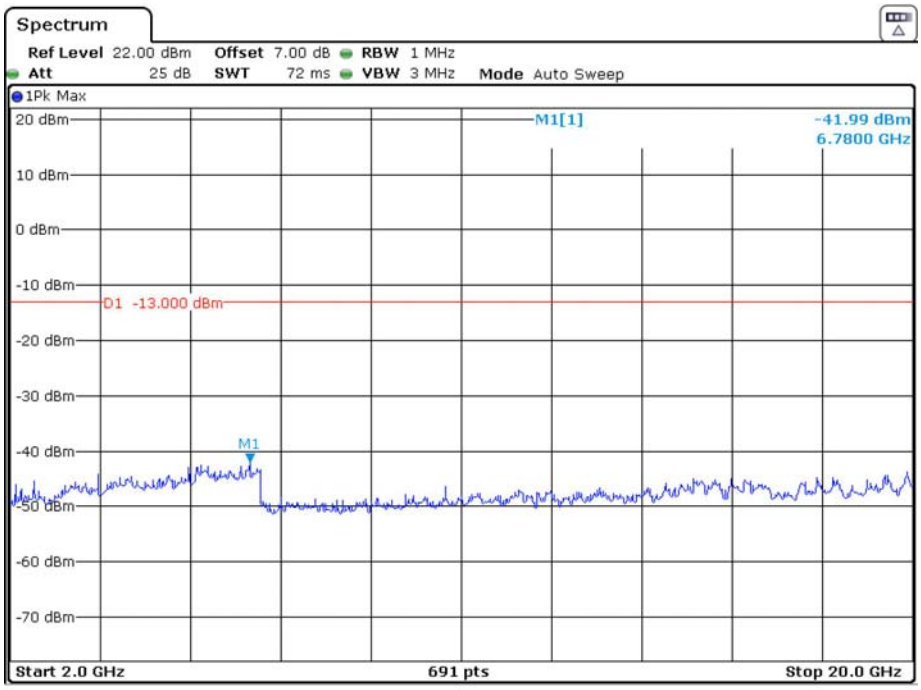
1 GHz– 2 GHz (GSM Mode)



Fundamental test

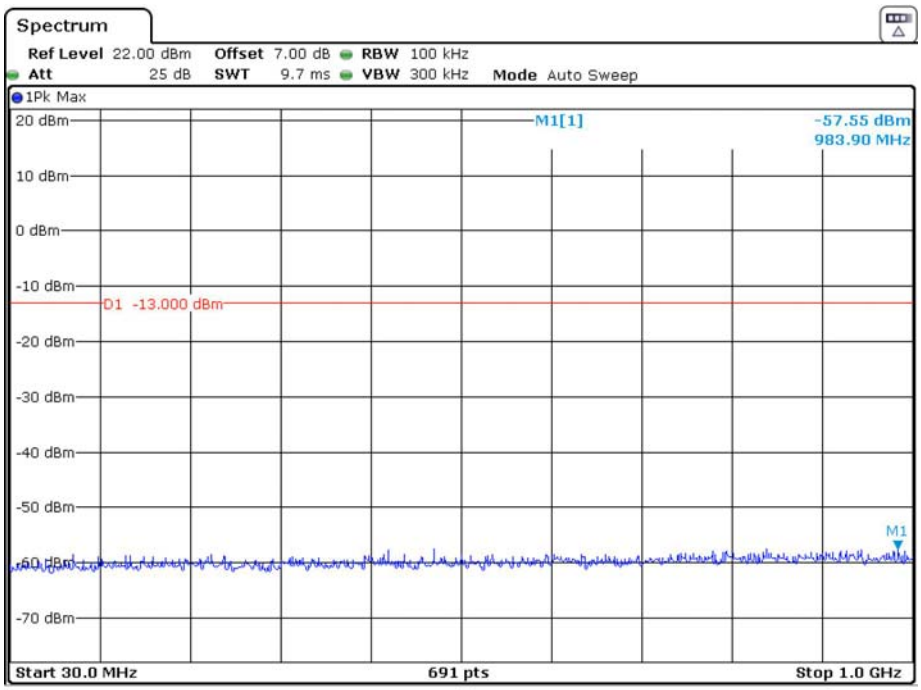
Date: 14.APR.2022 10:35:41

2 GHz– 20 GHz (GSM Mode)



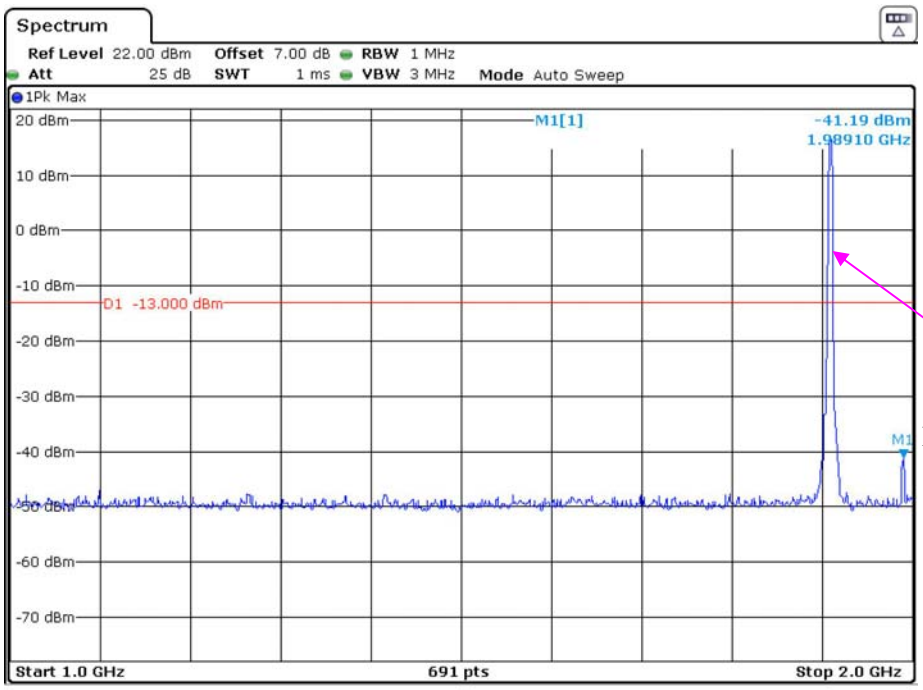
Date: 14.APR.2022 10:37:18

30 MHz – 1 GHz (WCDMA Mode)



Date: 14.APR.2022 10:42:40

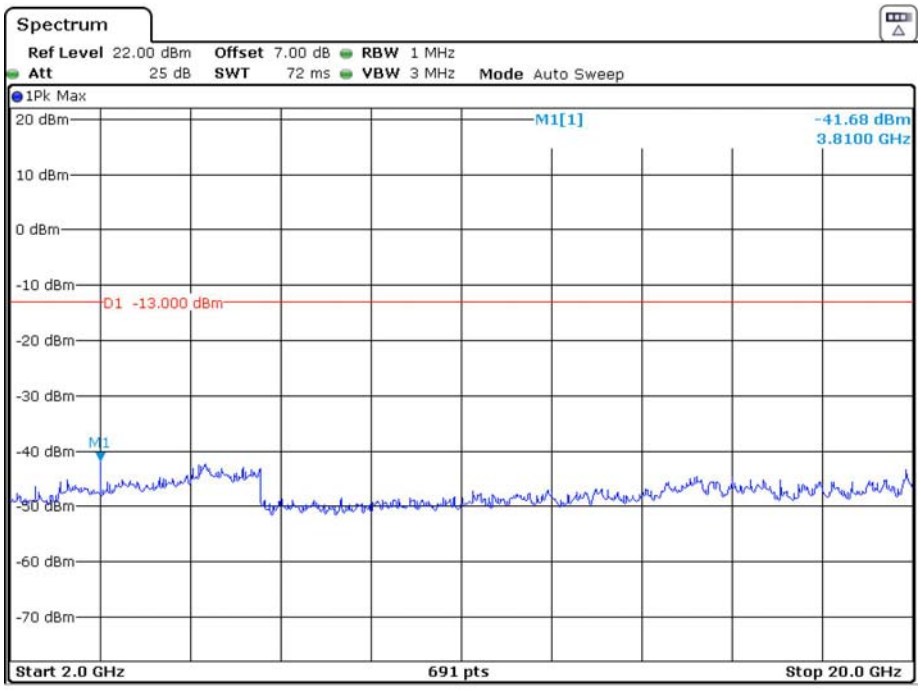
1 GHz – 2 GHz (WCDMA Mode)



Fundamental test

Date: 14.APR.2022 10:43:21

2GHz – 20 GHz (WCDMA Mode)



Date: 14.APR.2022 10:44:36

The test plots of LTE band please refer to the Appendix B.

FCC § 2.1053; § 22.917 (a);§ 24.238 (a); §27.53 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917(a)& § 24.238(a) &§ 27.53.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the receiving antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Test Data

Environmental Conditions

Temperature:	25~25.5 ℃
Relative Humidity:	50~66 %
ATM Pressure:	101.0 kPa

The testing was performed by Leo Li from 2022-05-18 to 2022-05-23.

EUT operation mode: Transmitting (Scan with X-AXIS, Y-AXIS, Z-AXIS, the worst case Y-AXIS was recorded)

The worst case is as below:

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
GSM850								
Test frequency range: 30MHz-10GHz								
Low channel								
961.68	-63.15	179	1.4	H	10	-53.15	-13	-40.15
961.68	-64.31	6	2.3	V	11.7	-52.61	-13	-39.61
1648.4	-50.30	18	1.3	H	3.5	-46.80	-13	-33.80
1648.4	-48.70	48	2.1	V	3.1	-45.60	-13	-32.60
2472.6	-38.90	102	2.4	H	6.6	-32.30	-13	-19.30
2472.6	-34.20	253	2.3	V	5.8	-28.40	-13	-15.40
3296.8	-51.10	325	2.3	H	6.4	-44.70	-13	-31.70
3296.8	-50.30	314	1.8	V	5.7	-44.60	-13	-31.60
Middle channel								
961.44	-63.08	229	1.1	H	10	-53.08	-13	-40.08
961.44	-64.48	208	1.7	V	11.7	-52.78	-13	-39.78
1673.2	-51.20	359	1.6	H	3.8	-47.40	-13	-34.40
1673.2	-48.00	3	1.3	V	3.1	-44.90	-13	-31.90
2509.8	-39.30	164	2	H	6.2	-33.10	-13	-20.10
2509.8	-35.80	23	1.1	V	5.6	-30.20	-13	-17.20
3346.4	-51.10	25	1.3	H	6.6	-44.50	-13	-31.50
3346.4	-49.10	40	1.4	V	5.4	-43.70	-13	-30.70
High channel								
961.38	-62.81	192	2.4	H	10	-52.81	-13	-39.81
961.38	-64.61	262	2.2	V	11.7	-52.91	-13	-39.91
1697.6	-52.50	252	1.8	H	4.1	-48.40	-13	-35.40
1697.6	-48.80	15	1.5	V	3.1	-45.70	-13	-32.70
2546.4	-41.50	78	2.0	H	6.1	-35.40	-13	-22.40
2546.4	-37.40	41	1.8	V	5.8	-31.60	-13	-18.60
3395.2	-51.20	158	2.1	H	6.2	-45.00	-13	-32.00
3395.2	-50.20	316	2.1	V	5.4	-44.80	-13	-31.80

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
GSM1900								
Test frequency range: 30MHz-20GHz								
Low channel								
962.03	-63.52	221	1.6	H	10	-53.52	-13	-40.52
962.03	-64.51	168	1.5	V	11.7	-52.81	-13	-39.81
3700.4	-54.30	263	1.3	H	8.1	-46.20	-13	-33.20
3700.4	-53.30	201	2.4	V	7.6	-45.70	-13	-32.70
5550.6	-50.40	16	1.8	H	9.6	-40.80	-13	-27.80
5550.6	-50.70	2	2.2	V	9.1	-41.60	-13	-28.60
Middle channel								
961.47	-63.23	21	2.4	H	10	-53.23	-13	-40.23
961.47	-64.43	175	1.4	V	11.7	-52.73	-13	-39.73
3760	-55.60	354	1.5	H	8.8	-46.80	-13	-33.80
3760	-54.00	6	2	V	8	-46.00	-13	-33.00
5640	-50.40	340	2	H	10.2	-40.20	-13	-27.20
5640	-51.00	244	2	V	9.4	-41.60	-13	-28.60
High channel								
961.6	-63.31	121	1.5	H	10	-53.31	-13	-40.31
961.6	-64.48	33	1.4	V	11.7	-52.78	-13	-39.78
3819.6	-55.60	292	1.6	H	8.7	-46.90	-13	-33.90
3819.6	-54.30	158	2.3	V	7.9	-46.40	-13	-33.40
5729.4	-51.20	160	1.9	H	10.6	-40.60	-13	-27.60
5729.4	-51.90	27	1.9	V	10.2	-41.70	-13	-28.70

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
WCDMA Band 2								
Test frequency range: 30MHz-20GHz								
Low channel								
962.27	-63.61	103	1.3	H	10	-53.61	-13	-40.61
962.27	-64.5	67	2.2	V	11.7	-52.8	-13	-39.8
3704.8	-55.10	133	2.0	H	8.1	-47.00	-13	-34.00
3704.8	-53.30	183	1.6	V	7.6	-45.70	-13	-32.70
Middle channel								
961.62	-62.89	85	2.1	H	10	-52.89	-13	-39.89
961.62	-64.04	6	1.6	V	11.7	-52.34	-13	-39.34
3760	-55.20	325	1.9	H	8.8	-46.40	-13	-33.40
3760	-54.20	191	1.7	V	8	-46.20	-13	-33.20
High channel								
962.3	-62.99	167	1.7	H	10	-52.99	-13	-39.99
962.3	-64.05	111	1	V	11.7	-52.35	-13	-39.35
3815.2	-55.70	38	1.5	H	8.7	-47.00	-13	-34.00
3815.2	-54.50	277	1.5	V	7.9	-46.60	-13	-33.60

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
WCDMA Band 5								
Test frequency range: 30MHz-10GHz								
Low channel								
961.48	-62.94	214	1.3	H	10	-52.94	-13	-39.94
961.48	-64.01	19	1.6	V	11.7	-52.31	-13	-39.31
1652.8	-57.10	45	1.2	H	3.5	-53.60	-13	-40.60
1652.8	-56.60	55	1.2	V	3.1	-53.50	-13	-40.50
2479.2	-53.20	317	1.5	H	6.6	-46.60	-13	-33.60
2479.2	-51.90	125	1.4	V	5.8	-46.10	-13	-33.10
3305.6	-52.00	296	1.7	H	6.4	-45.60	-13	-32.60
3305.6	-51.00	178	1.9	V	5.7	-45.30	-13	-32.30
Middle channel								
961.59	-63.42	303	2.2	H	10	-53.42	-13	-40.42
961.59	-63.88	358	1.1	V	11.7	-52.18	-13	-39.18
1673.2	-57.30	44	1.1	H	3.8	-53.50	-13	-40.50
1673.2	-56.60	28	2.4	V	3.1	-53.50	-13	-40.50
2509.8	-52.50	115	2.2	H	6.2	-46.30	-13	-33.30
2509.8	-50.80	33	2.2	V	5.6	-45.20	-13	-32.20
3346.4	-51.50	77	1.3	H	6.6	-44.90	-13	-31.90
3346.4	-50.90	284	2.2	V	5.4	-45.50	-13	-32.50
High channel								
961.84	-63.8	111	1.1	H	10	-53.8	-13	-40.8
961.84	-64.17	81	2.4	V	11.7	-52.47	-13	-39.47
1693.2	-57.70	224	1.7	H	4.1	-53.60	-13	-40.60
1693.2	-56.70	116	2.3	V	3.1	-53.60	-13	-40.60
2539.8	-52.80	336	1.3	H	6.1	-46.70	-13	-33.70
2539.8	-51.40	57	1.4	V	5.8	-45.60	-13	-32.60
3386.4	-51.80	81	1.9	H	6.2	-45.60	-13	-32.60
3386.4	-50.30	229	2.2	V	5.4	-44.90	-13	-31.90

LTE Bands: (pre-scan all bandwidths and modulation, the worst case as below)

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
LTE Band 2								
Test frequency range: 30MHz-20GHz								
QPSK, 1.4MHz, Low channel								
961.46	-63.16	31	2	H	10	-53.16	-13	-40.16
961.46	-64.11	329	2	V	11.7	-52.41	-13	-39.41
3701.4	-54.90	280	2.1	H	8.1	-46.80	-13	-33.80
3701.4	-53.90	282	1.7	V	7.6	-46.30	-13	-33.30
5552.1	-54.50	321	1.8	H	9.6	-44.90	-13	-31.90
5552.1	-54.10	255	2.3	V	9.1	-45.00	-13	-32.00
QPSK, 1.4MHz, Middle channel								
962.16	-63.38	238	1.8	H	10	-53.38	-13	-40.38
962.16	-64.63	117	1.3	V	11.7	-52.93	-13	-39.93
3760	-56.00	208	1.9	H	8.8	-47.20	-13	-34.20
3760	-54.20	147	1.2	V	8	-46.20	-13	-33.20
5640	-54.90	181	2.1	H	10.2	-44.70	-13	-31.70
5640	-54.00	296	1.7	V	9.4	-44.60	-13	-31.60
QPSK, 1.4MHz, High channel								
961.99	-62.88	288	1.3	H	10	-52.88	-13	-39.88
961.99	-64.63	353	1.7	V	11.7	-52.93	-13	-39.93
3818.6	-56.10	324	1.8	H	8.7	-47.40	-13	-34.40
3818.6	-54.90	216	1.9	V	7.9	-47.00	-13	-34.00
5727.9	-56.10	283	1.7	H	10.6	-45.50	-13	-32.50
5727.9	-55.50	260	1.1	V	10.2	-45.30	-13	-32.30

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
LTE Band 5								
Test frequency range: 30MHz-10GHz								
QPSK, 1.4MHz, Low channel								
961.63	-63.71	270	1.1	H	10	-53.71	-13	-40.71
961.63	-63.93	349	1.6	V	11.7	-52.23	-13	-39.23
1649.4	-45.40	253	1.3	H	3.5	-41.90	-13	-28.90
1649.4	-49.50	298	1.7	V	3.1	-46.40	-13	-33.40
2474.1	-33.50	78	1.5	H	6.6	-26.90	-13	-13.90
2474.1	-40.30	349	1.6	V	5.8	-34.50	-13	-21.50
3298.8	-51.40	138	1.4	H	6.4	-45.00	-13	-32.00
3298.8	-51.20	66	2	V	5.7	-45.50	-13	-32.50
QPSK, 1.4MHz, Middle channel								
961.71	-63.16	360	2.4	H	10	-53.16	-13	-40.16
961.71	-64.71	248	2.1	V	11.7	-53.01	-13	-40.01
1673.0	-42.60	167	2	H	3.8	-38.80	-13	-25.80
1673.0	-46.50	275	1.4	V	3.1	-43.40	-13	-30.40
2509.5	-39.50	15	2.4	H	6.2	-33.30	-13	-20.30
2509.5	-39.10	134	2.3	V	5.6	-33.50	-13	-20.50
3346.0	-51.60	121	2.2	H	6.6	-45.00	-13	-32.00
3346.0	-50.90	90	1.6	V	5.4	-45.50	-13	-32.50
QPSK, 1.4MHz, High channel								
961.47	-63.65	298	1.3	H	10	-53.65	-13	-40.65
961.47	-64.16	197	1.9	V	11.7	-52.46	-13	-39.46
1696.6	-49.50	236	2.4	H	4.1	-45.40	-13	-32.40
1696.6	-46.30	98	1.8	V	3.1	-43.20	-13	-30.20
2544.9	-40.20	30	1.2	H	6.1	-34.10	-13	-21.10
2544.9	-31.40	358	2.2	V	5.8	-25.60	-13	-12.60
3393.2	-52.10	18	1.3	H	6.2	-45.90	-13	-32.90
3393.2	-50.70	147	1.8	V	5.4	-45.30	-13	-32.30

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
LTE Band 12								
Test frequency range: 30MHz-10GHz								
QPSK, 1.4MHz, Low channel								
961.66	-63.55	25	1.2	H	10	-53.55	-13	-40.55
961.66	-64.07	181	2.2	V	11.7	-52.37	-13	-39.37
1399.4	-54.2	122	1.5	H	5.9	-48.30	-13	-35.30
1399.4	-55.8	114	1.8	V	5.9	-49.90	-13	-36.90
2099.1	-41.8	28	1.4	H	6.3	-35.50	-13	-22.50
2099.1	-40.5	46	1.4	V	5.1	-35.40	-13	-22.40
2798.8	-49.2	10	2	H	6.7	-42.50	-13	-29.50
2798.8	-47.6	277	1.7	V	6.7	-40.90	-13	-27.90
QPSK, 1.4MHz, Middle channel								
961.99	-63.38	339	2	H	10	-53.38	-13	-40.38
961.99	-63.83	240	2.2	V	11.7	-52.13	-13	-39.13
1415	-60.5	232	1.9	H	5.9	-54.60	-13	-41.60
1415	-57.7	296	1.4	V	5.9	-51.80	-13	-38.80
2122.5	-38.5	193	2.3	H	6.3	-32.20	-13	-19.20
2122.5	-48.2	316	1.5	V	5.1	-43.10	-13	-30.10
2830	-45.6	63	2.2	H	6.7	-38.90	-13	-25.90
2830	-43.1	323	1.1	V	6.7	-36.40	-13	-23.40
QPSK, 1.4MHz, High channel								
962.24	-63.7	291	2.3	H	10	-53.7	-13	-40.7
962.24	-64.15	310	2.3	V	11.7	-52.45	-13	-39.45
1430.6	-59	128	1.4	H	5.9	-53.10	-13	-40.10
1430.6	-58.8	148	2.1	V	5.9	-52.90	-13	-39.90
2145.9	-45.1	352	1.9	H	6.3	-38.80	-13	-25.80
2145.9	-48.7	147	2.4	V	5.1	-43.60	-13	-30.60
2861.2	-40.1	315	2.5	H	6.7	-33.40	-13	-20.40
2861.2	-41.2	354	1.1	V	6.7	-34.50	-13	-21.50

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
LTE Band 13								
Test frequency range: 30MHz-10GHz								
QPSK, 5MHz, Low channel								
961.91	-63.72	171	1.4	H	10	-53.72	-13	-40.72
961.91	-63.88	33	1.4	V	11.7	-52.18	-13	-39.18
1559.0	-45.49	359	2.1	H	-2.81	-48.30	-40	-8.30
1559.0	-46.51	155	1.2	V	-2.89	-49.40	-40	-9.40
2338.5	-45.22	270	1.9	H	1.22	-44.00	-13	-31.00
2338.5	-41.18	117	2.3	V	1.18	-40.00	-13	-27.00
3118.0	-49.04	22	1.5	H	2.84	-46.20	-13	-33.20
3118.0	-48.77	184	2.3	V	2.97	-45.80	-13	-32.80
QPSK, 5MHz, Middle channel								
962.06	-63.41	155	1.9	H	10	-53.41	-13	-40.41
962.06	-64.16	187	2.1	V	11.7	-52.46	-13	-39.46
1564.0	-48.09	359	2.1	H	-2.81	-50.90	-40	-10.90
1564.0	-46.81	155	1.2	V	-2.89	-49.70	-40	-9.70
2346.0	-45.82	270	1.9	H	1.22	-44.60	-13	-31.60
2346.0	-46.18	117	2.3	V	1.18	-45.00	-13	-32.00
3128.0	-49.34	22	1.5	H	2.84	-46.50	-13	-33.50
3128.0	-48.97	184	2.3	V	2.97	-46.00	-13	-33.00
QPSK, 5MHz, High channel								
961.32	-62.92	102	1.8	H	10	-52.92	-13	-39.92
961.32	-64.72	278	1.1	V	11.7	-53.02	-13	-40.02
1569.0	-48.29	359	2.1	H	-2.81	-51.10	-40	-11.10
1569.0	-45.51	155	1.2	V	-2.89	-48.40	-40	-8.40
2353.5	-43.62	270	1.9	H	1.22	-42.40	-13	-29.40
2353.5	-32.98	117	2.3	V	1.18	-31.80	-13	-18.80
3138.0	-49.24	22	1.5	H	2.84	-46.40	-13	-33.40
3138.0	-48.77	184	2.3	V	2.97	-45.80	-13	-32.80

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
LTE Band 41								
Test frequency range: 30MHz-26.5GHz								
QPSK, 5MHz, Low channel								
961.7	-63.71	194	2.3	H	10	-53.71	-25	-28.71
961.7	-63.88	105	2.1	V	11.7	-52.18	-25	-27.18
5075	-55.7	335	1.2	H	11.2	-44.50	-25	-19.50
5075	-55.8	139	1.5	V	10.8	-45.00	-25	-20.00
7612.5	-66.6	150	1.9	H	21.2	-45.40	-25	-20.40
7612.5	-62.4	162	1.7	V	20.2	-42.20	-25	-17.20
QPSK, 5MHz, Middle channel								
961.33	-63.17	139	2.1	H	10	-53.17	-25	-28.17
961.33	-64.64	251	1.2	V	11.7	-52.94	-25	-27.94
5190	-54.5	274	1.2	H	10.5	-44.00	-25	-19.00
5190	-54.3	253	1.2	V	10	-44.30	-25	-19.30
7785	-62.9	56	2.2	H	18.3	-44.60	-25	-19.60
7785	-62.1	61	2.2	V	18	-44.10	-25	-19.10
QPSK, 5MHz, High channel								
961.42	-62.82	294	1.8	H	10	-52.82	-25	-27.82
961.42	-64.46	334	1.5	V	11.7	-52.76	-25	-27.76
5305	-52.3	326	1.7	H	9.6	-42.70	-25	-17.70
5305	-49.5	168	2.4	V	8.8	-40.70	-25	-15.70
7957.5	-64.9	13	1.4	H	18.9	-46.00	-25	-21.00
7957.5	-63.7	338	1.1	V	18.5	-45.20	-25	-20.20

Note:
Absolute Level = Reading Level + Substituted Factor
Substituted Factor contains: SG Level - Cable loss+ Antenna Gain
Margin = Absolute Level - Limit

FCC§ 22.917 (a);§ 24.238 (a); §27.53 (c)(h)(m) - BAND EDGES

Applicable Standard

According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

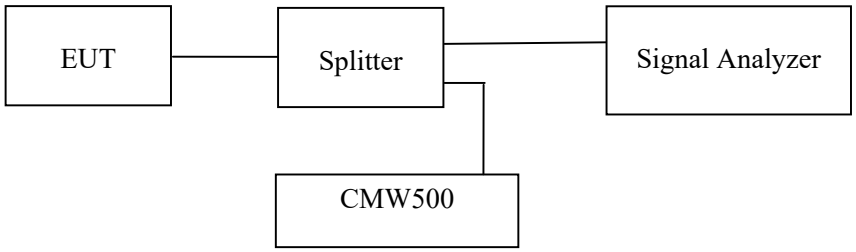
According to FCC §27.53 (c), For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

According to FCC §27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency



Test Data

Environmental Conditions

Temperature:	26~28 ℃
Relative Humidity:	56~60 %
ATM Pressure:	101.0~102.0 kPa

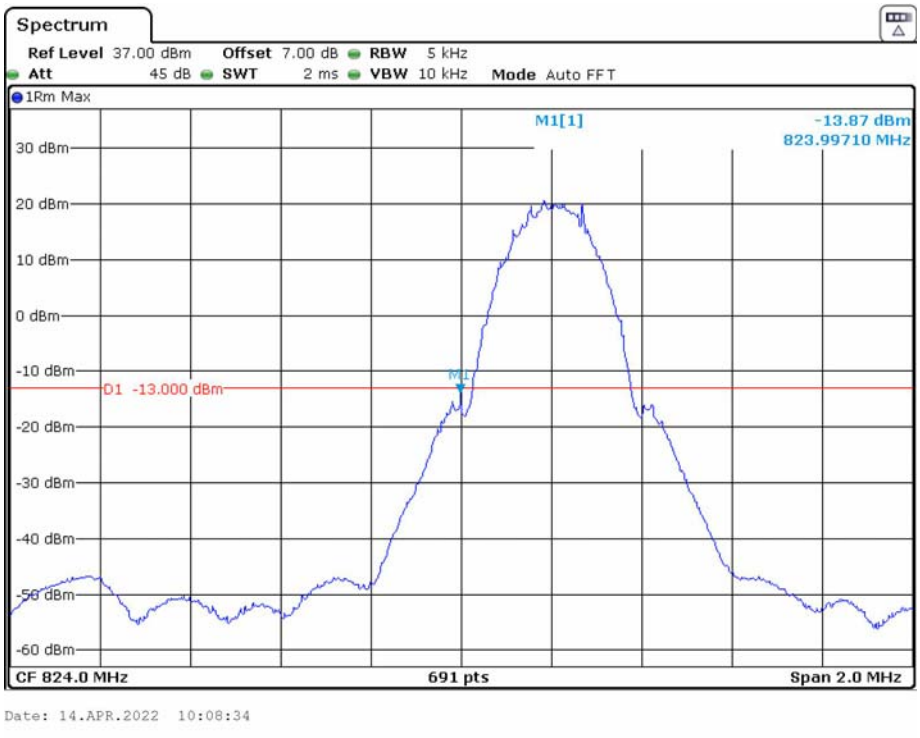
The testing was performed by Nick Fang from 2022-04-14 to 2022-04-25.

EUT operation mode: Transmitting (Worst case)

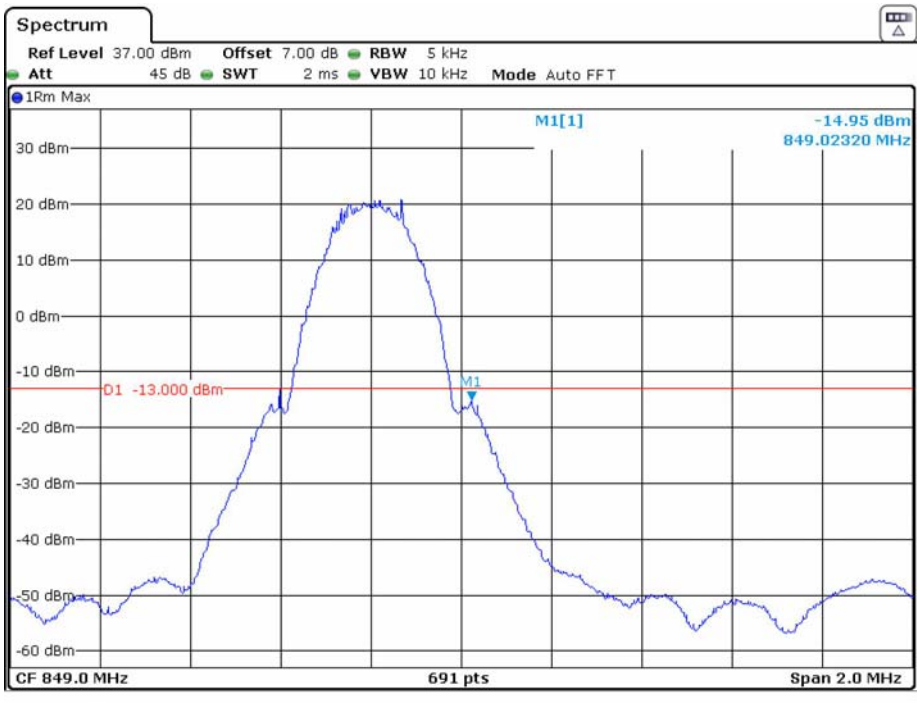
Test Result: Pass

Please refer to the following plots.

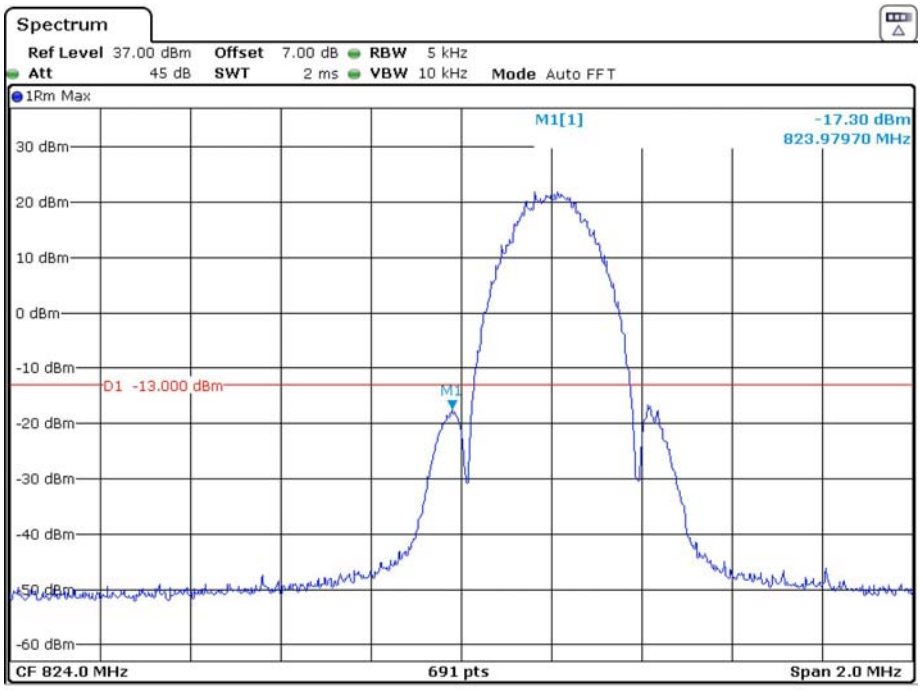
Cellular Band, Left Band Edge for GSM (GMSK) Mode



Cellular Band, Right Band Edge for GSM (GMSK) Mode

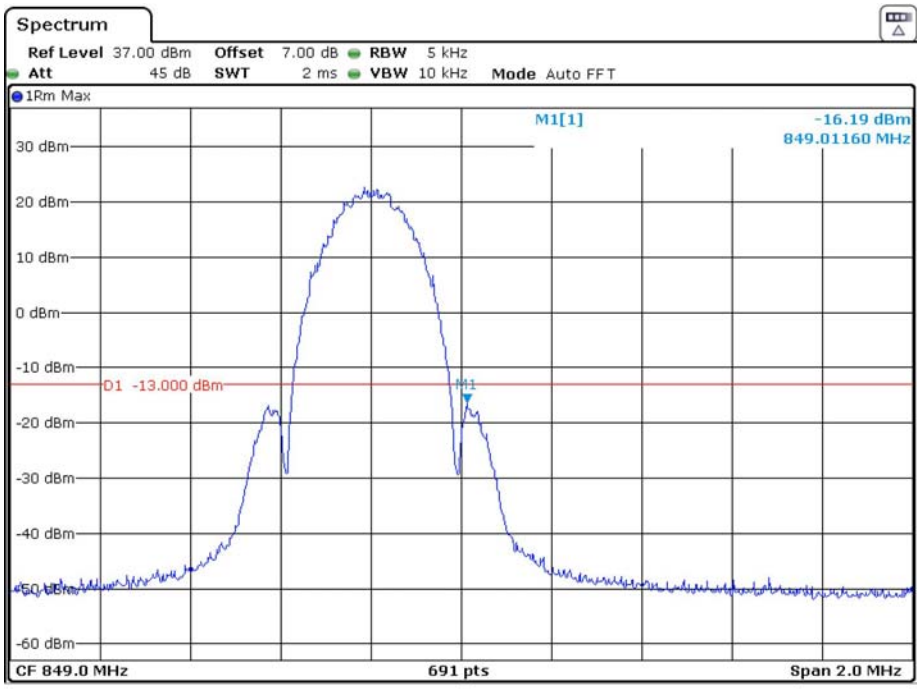


Cellular Band, Left Band Edge for EDGE Mode



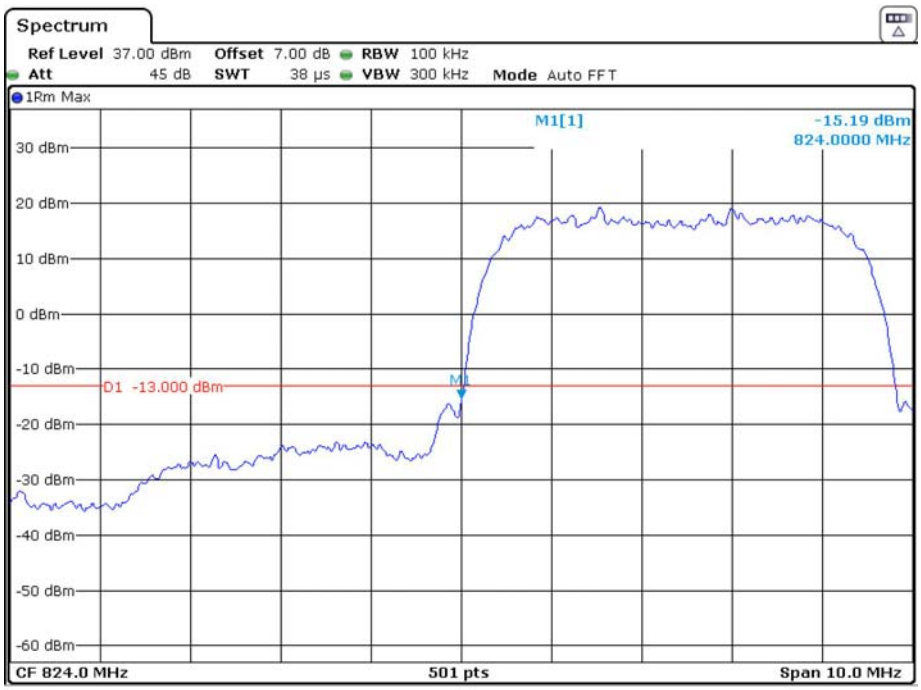
Date: 14.APR.2022 10:16:07

Cellular Band, Right Band Edge for EDGE Mode



Date: 14.APR.2022 10:16:46

Cellular Band, Left Band Edge for RMC (BPSK) Mode



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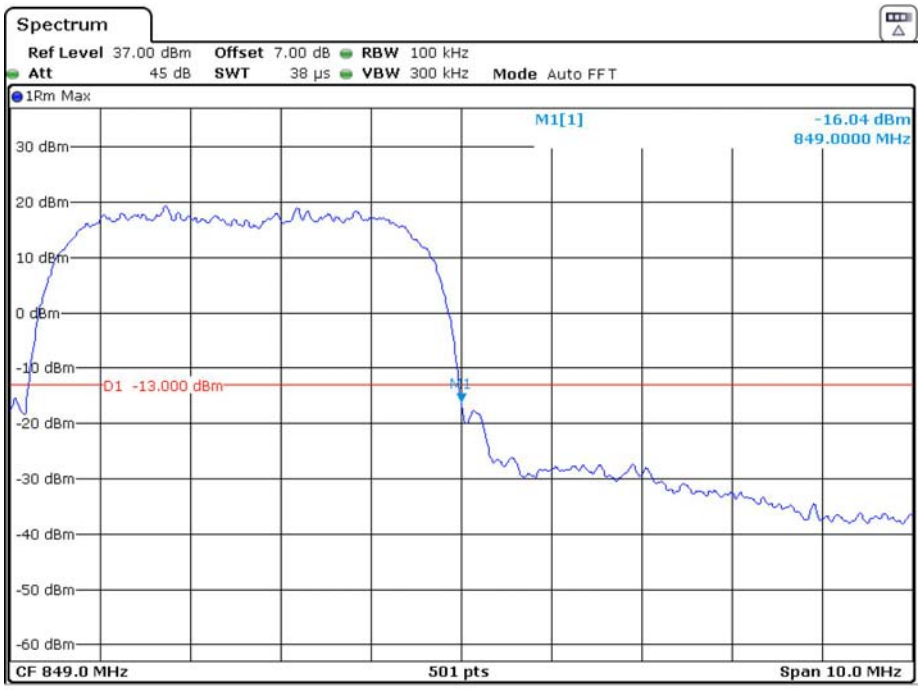
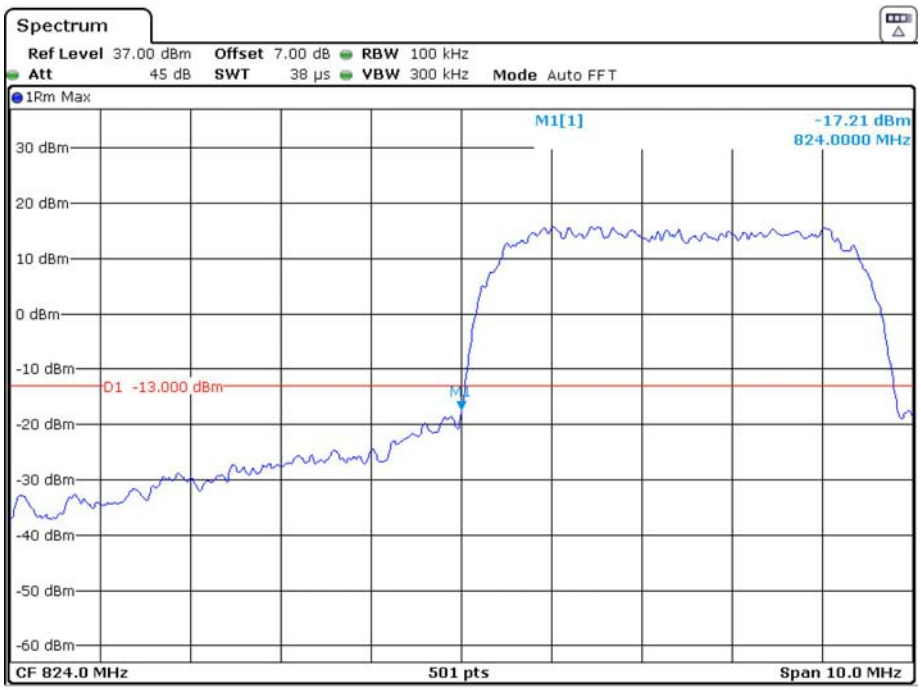
Cellular Band, Right Band Edge for RMC (BPSK) Mode



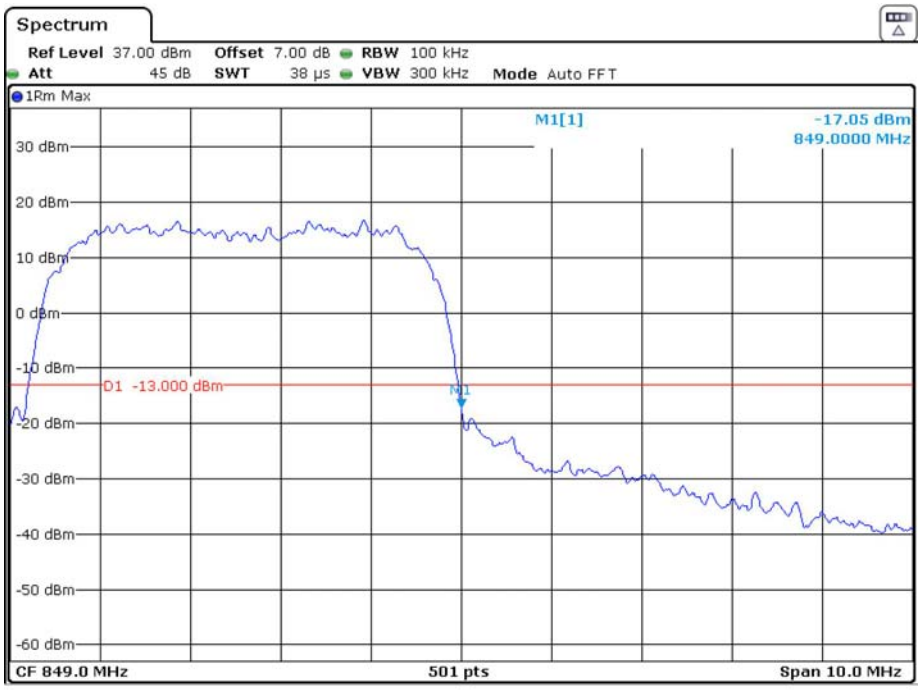
Date: 14.APR.2022 19:22:53

Cellular Band, Left Band Edge for HSDPA(16QAM) Mode



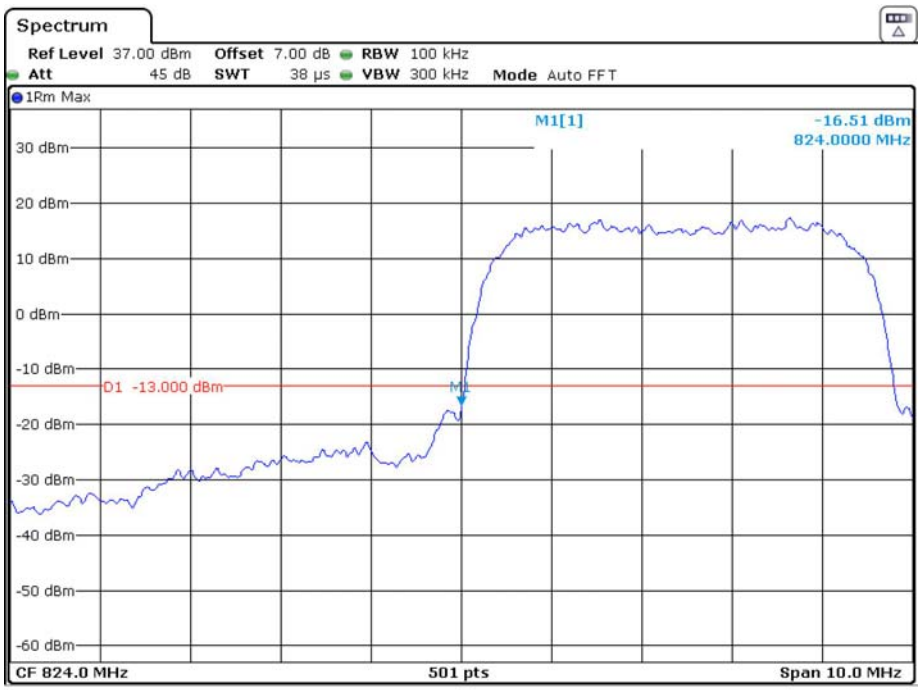
Date: 14.APR.2022 19:27:39

Cellular Band, Right Band Edge for HSDPA (16QAM) Mode



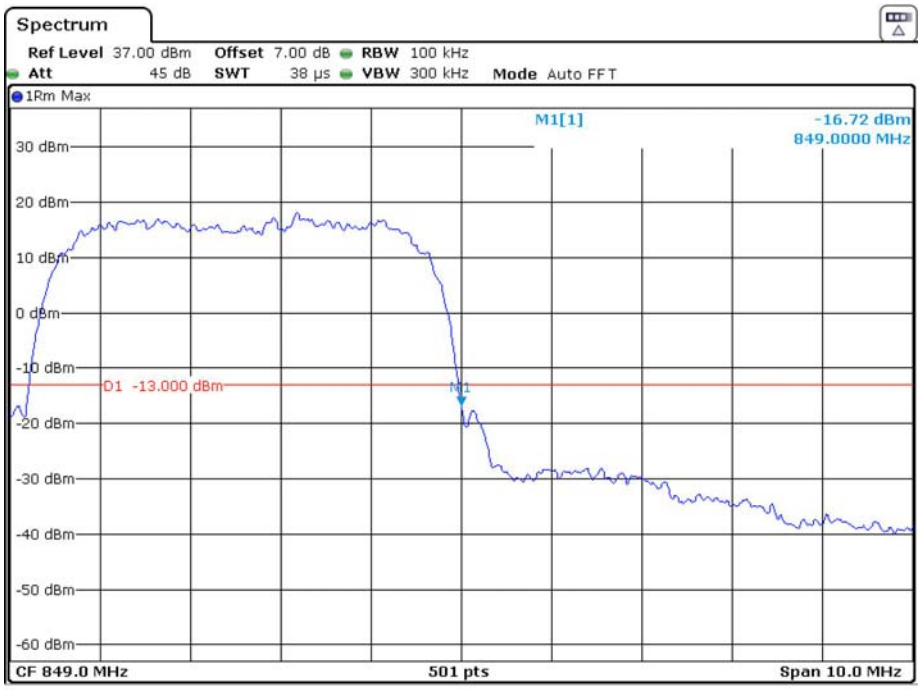
Date: 14.APR.2022 19:27:56

Cellular Band, Left Band Edge for HSUPA (QPSK) Mode



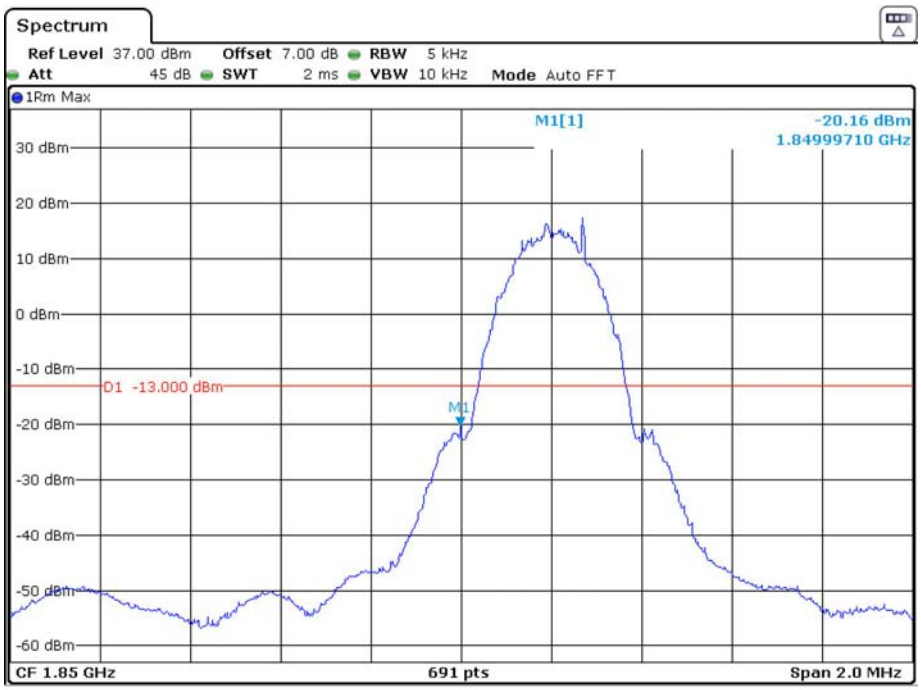
Date: 14.APR.2022 19:49:14

Cellular Band, Right Band Edge for HSUPA (QPSK) Mode



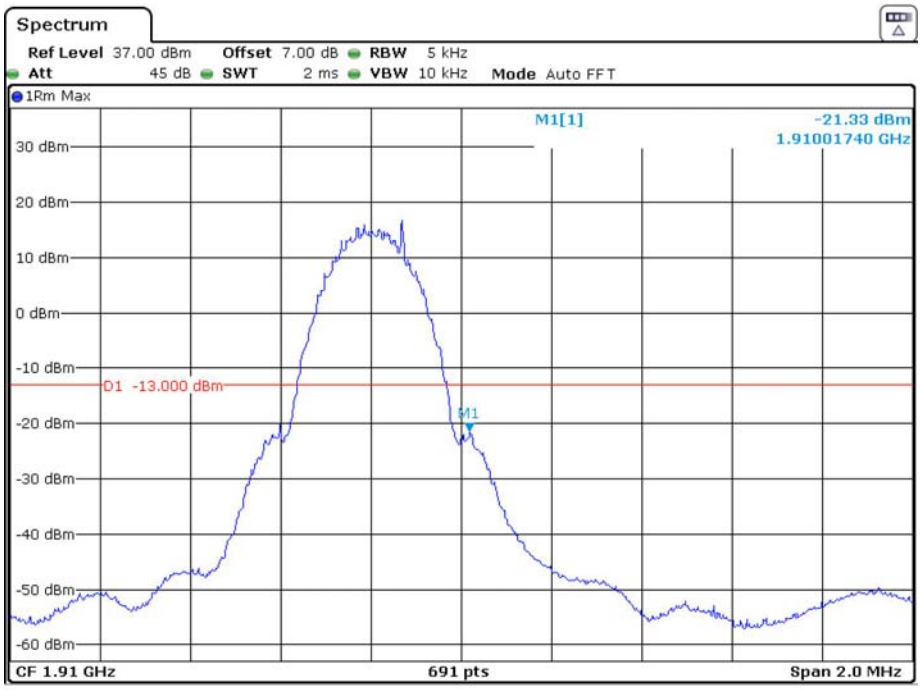
Date: 14.APR.2022 19:49:28

PCS Band, Left Band Edge for GSM (GMSK) Mode



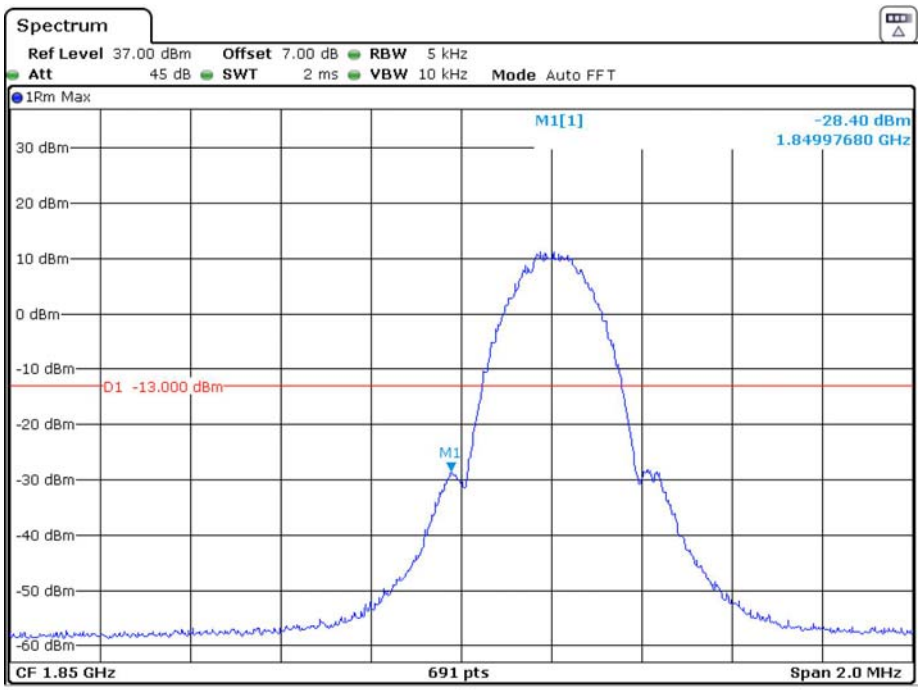
Date: 14.APR.2022 10:26:51

PCS Band, Right Band Edge for GSM (GMSK) Mode

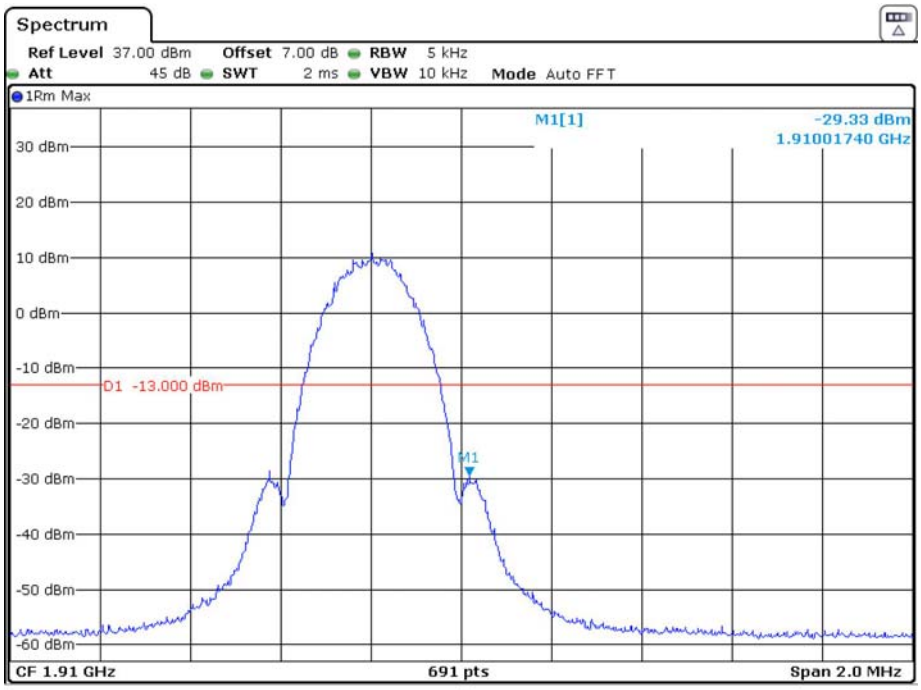


Date: 14.APR.2022 10:26:17

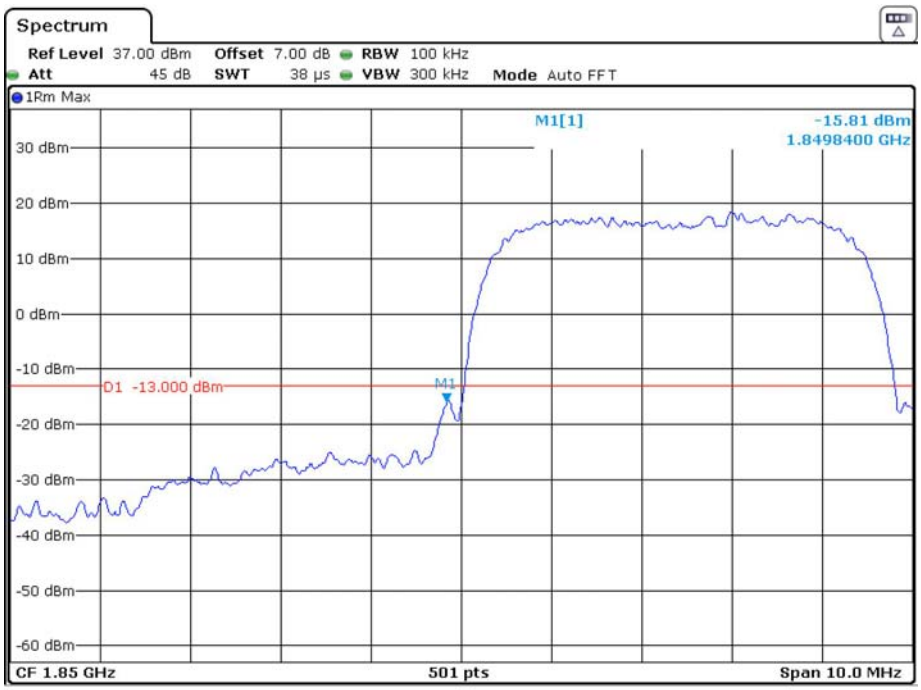
PCS Band, Left Band Edge for EDGE Mode



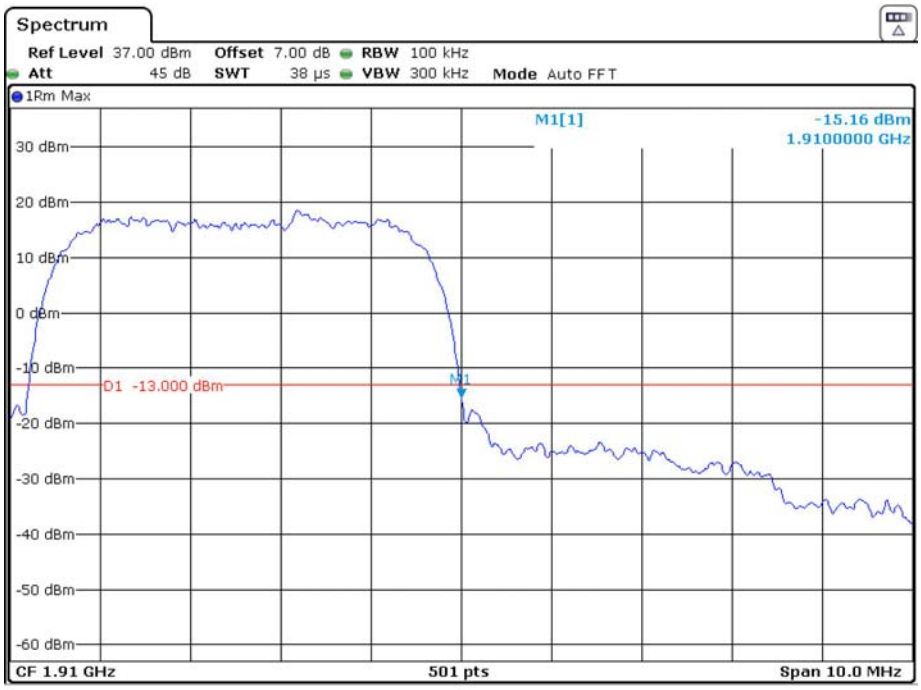
PCS Band, Right Band Edge for EDGE Mode



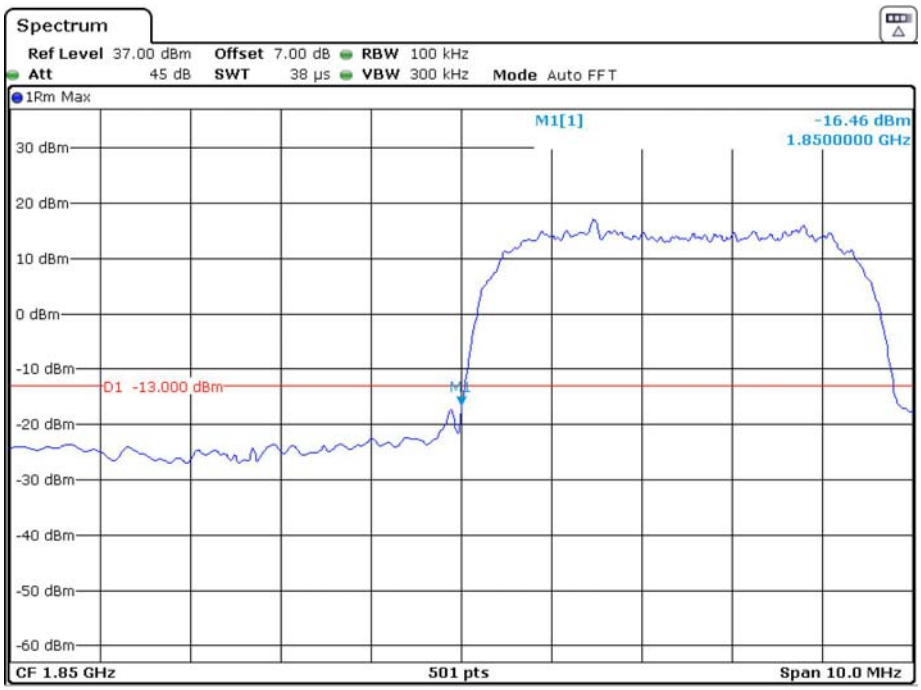
PCS Band, Left Band Edge for RMC (BPSK) Mode



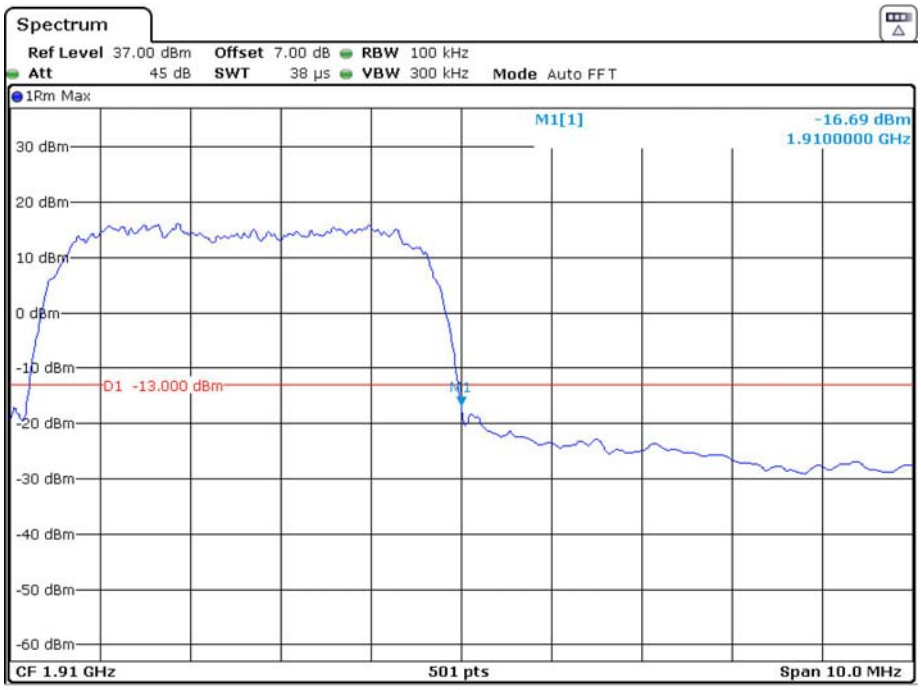
PCS Band, Right Band Edge for RMC (BPSK) Mode



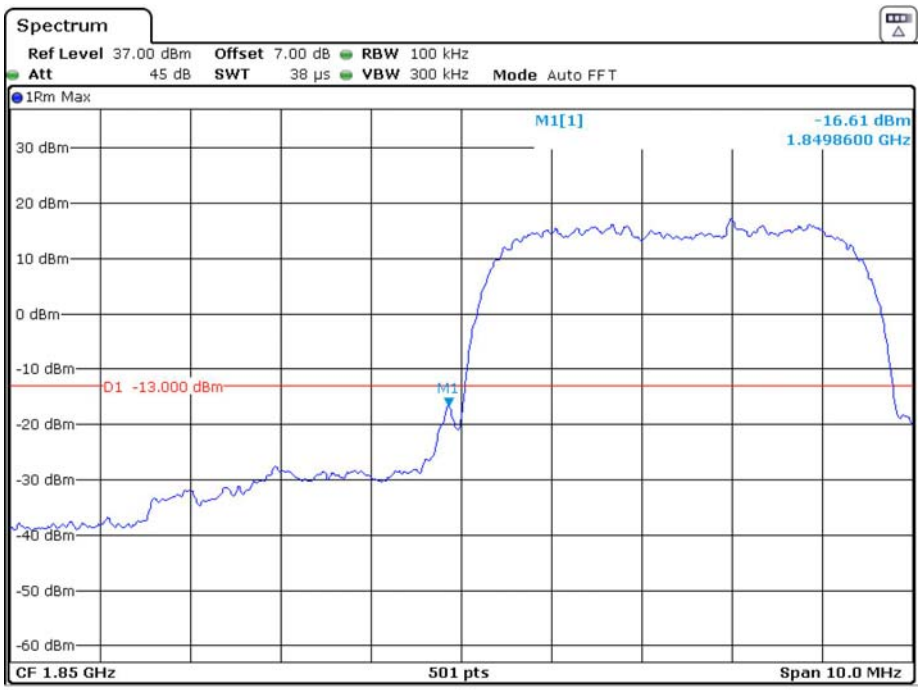
PCS Band, Left Band Edge for HSDPA(16QAM) Mode



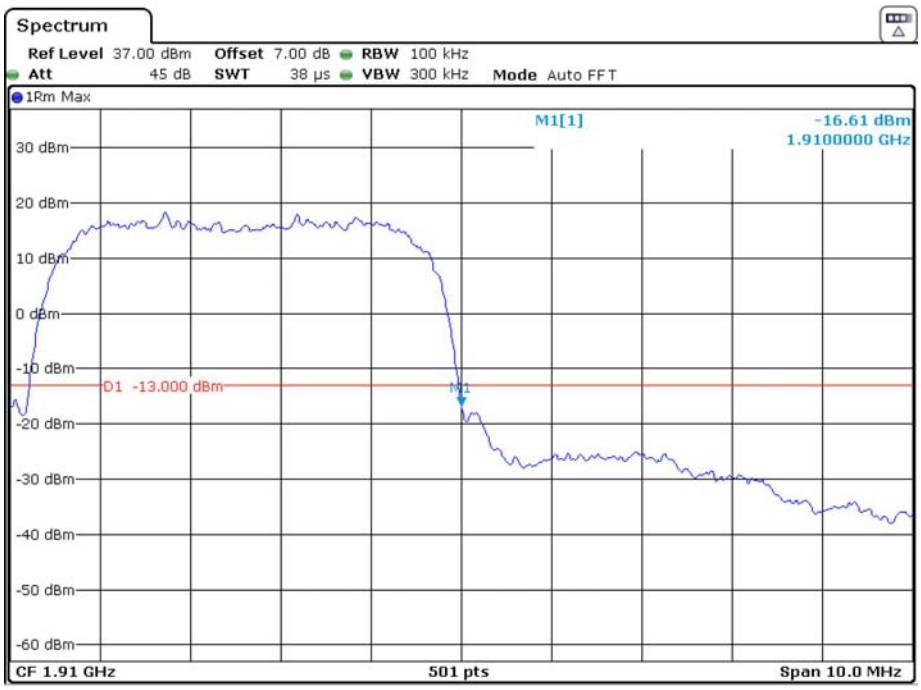
PCS Band, Right Band Edge for HSDPA (16QAM) Mode



PCS Band, Left Band Edge for HSUPA (QPSK) Mode



PCS Band, Right Band Edge for HSUPA (QPSK) Mode



The test plots of LTE bands please refer to the Appendix C.

FCC § 2.1055; § 22.355; § 24.235; §27.54 - FREQUENCY STABILITY

Applicable Standard

FCC § 2.1055, §22.355, §24.235&§27.54.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile > 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

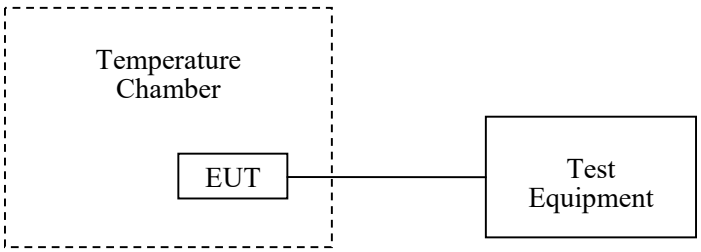
According to §24.235&§27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The AC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



Test Data

Environmental Conditions

Temperature:	26~28 ℃
Relative Humidity:	56~60 %
ATM Pressure:	101.0~102.0 kPa

The testing was performed by Nick Fang from 2022-04-09 to 2022-04-25.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the following tables.

Cellular Band (Part 22H)

GSM Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	N.V.	3	0.0036	2.5
-20		5	0.0060	2.5
-10		7	0.0084	2.5
0		4	0.0048	2.5
10		6	0.0072	2.5
20		1	0.0012	2.5
30		2	0.0024	2.5
40		5	0.0060	2.5
50		3	0.0036	2.5
20	L.V.	4	0.0048	2.5
	H.V.	6	0.0072	2.5

EDGE Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	N.V.	4	0.0048	2.5
-20		6	0.0072	2.5
-10		3	0.0036	2.5
0		5	0.0060	2.5
10		-4	-0.0048	2.5
20		-3	-0.0036	2.5
30		-7	-0.0084	2.5
40		4	0.0048	2.5
50		3	0.0036	2.5
20	L.V.	5	0.0060	2.5
	H.V.	8	0.0096	2.5

WCDMA Mode

Middle Channel, f_o =836.6MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	N.V.	1.55	0.0019	2.5
-20		2.43	0.0029	2.5
-10		2.63	0.0031	2.5
0		2.51	0.0030	2.5
10		2.34	0.0028	2.5
20		1.22	0.0015	2.5
30		2.14	0.0026	2.5
40		2.64	0.0032	2.5
50		2.58	0.0031	2.5
20	L.V.	2.34	0.0028	2.5
	H.V.	2.41	0.0029	2.5

PCS Band (Part 24E)
GSM Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	N.V.	-2	-0.0011	pass
-20		4	0.0021	pass
-10		7	0.0037	pass
0		3	0.0016	pass
10		-6	-0.0032	pass
20		-5	-0.0027	pass
30		4	0.0021	pass
40		3	0.0016	pass
50		1	0.0005	pass
20	L.V.	8	0.0043	pass
	H.V.	7	0.0037	pass

EDGE Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	N.V.	-8	-0.0043	pass
-20		6	0.0032	pass
-10		3	0.0016	pass
0		4	0.0021	pass
10		6	0.0032	pass
20		-7	-0.0037	pass
30		8	0.0043	pass
40		6	0.0032	pass
50		10	0.0053	pass
20	L.V.	3	0.0016	pass
	H.V.	4	0.0021	pass

WCDMA Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	N.V.	1.45	0.0008	pass
-20		1.62	0.0009	pass
-10		1.36	0.0007	pass
0		1.42	0.0008	pass
10		2.46	0.0013	pass
20		1.37	0.0007	pass
30		2.86	0.0015	pass
40		2.39	0.0013	pass
50		2.41	0.0013	pass
20	L.V.	2.56	0.0014	pass
	H.V.	2.63	0.0014	pass

LTE:
QPSK:
Band 2:

10.0 MHz Middle Channel, f_o =1880MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	N.V.	-1.42	-0.0008	pass
-20		-9.97	-0.0053	pass
-10		-6.13	-0.0033	pass
0		6.17	0.0033	pass
10		7.92	0.0042	pass
20		6.46	0.0034	pass
30		-6.52	-0.0035	pass
40		7.18	0.0038	pass
50		-9.69	-0.0052	pass
20	L.V.	-8.17	-0.0043	pass
	H.V.	-7.05	-0.0038	pass

Band 5:

10.0 MHz Middle Channel, f_o=836.5MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	N.V.	-6.07	-0.0073	2.5
-20		9.11	0.0109	2.5
-10		8.51	0.0102	2.5
0		-7.15	-0.0085	2.5
10		-5.29	-0.0063	2.5
20		7.24	0.0087	2.5
30		-5.81	-0.0069	2.5
40		5.59	0.0067	2.5
50		6.87	0.0082	2.5
20	L.V.	9.94	0.0119	2.5
	H.V.	9.99	0.0119	2.5

Band 12:

10 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	N.V.	699.0395	715.9688	699	716
-20		699.0378	715.9675	699	716
-10		699.0376	715.9668	699	716
0		699.0355	715.9642	699	716
10		699.0346	715.9686	699	716
20		699.0352	715.9677	699	716
30		699.0332	715.9664	699	716
40		699.0342	715.9643	699	716
50		699.0318	715.9656	699	716
20	L.V.	699.0322	715.9644	699	716
	H.V.	699.0327	715.9632	699	716

Band 13:

10 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	N.V.	777.1262	786.8464	777	787
-20		777.1267	786.8455	777	787
-10		777.1243	786.8442	777	787
0		777.1245	786.8444	777	787
10		777.1234	786.8435	777	787
20		777.1262	786.8437	777	787
30		777.1234	786.8444	777	787
40		777.1262	786.8483	777	787
50		777.1251	786.8474	777	787
20	L.V.	777.1242	786.8462	777	787
	H.V.	777.1232	786.8434	777	787

Band 41:

10 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	N.V.	2535.0585	2654.9443	2535	2655
-20		2535.0545	2654.9455	2535	2655
-10		2535.0546	2654.9434	2535	2655
0		2535.0532	2654.9412	2535	2655
10		2535.0545	2654.9456	2535	2655
20		2535.0537	2654.9446	2535	2655
30		2535.0532	2654.9457	2535	2655
40		2535.0545	2654.9432	2535	2655
50		2535.0523	2654.9356	2535	2655
20	L.V.	2535.0452	2654.9424	2535	2655
	H.V.	2535.0524	2654.9433	2535	2655

Note: the applicant declared the operating frequency range is 2535-2655MHz for LTE Band 41.

16QAM:

Band 2:

10.0 MHz Middle Channel, f_o =1880MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	N.V.	-2.39	-0.0013	pass
-20		-6.68	-0.0036	pass
-10		9.77	0.0052	pass
0		-7.62	-0.0041	pass
10		-9.91	-0.0053	pass
20		-9.82	-0.0052	pass
30		-6.68	-0.0036	pass
40		-8.85	-0.0047	pass
50		5.67	0.0030	pass
20	L.V.	6.05	0.0032	pass
	H.V.	7.52	0.0040	pass

Band 5:

10.0 MHz Middle Channel, f_o =836.5MHz				
Temperature (℃)	**Voltage Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	N.V.	-4.15	-0.0050	2.5
-20		6.80	0.0081	2.5
-10		-9.52	-0.0114	2.5
0		-8.15	-0.0097	2.5
10		-8.88	-0.0106	2.5
20		-9.82	-0.0117	2.5
30		8.38	0.0100	2.5
40		6.75	0.0081	2.5
50		-5.89	-0.0070	2.5
20	L.V.	8.98	0.0107	2.5
	H.V.	-7.83	-0.0094	2.5

Band 12:

10 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	N.V.	699.0386	715.9694	699	716
-20		699.0377	715.9688	699	716
-10		699.0352	715.9646	699	716
0		699.0344	715.9674	699	716
10		699.0326	715.9656	699	716
20		699.0435	715.9624	699	716
30		699.0342	715.9626	699	716
40		699.0342	715.9645	699	716
50		699.0332	715.9632	699	716
20	L.V.	699.0347	715.9643	699	716
	H.V.	699.0336	715.9671	699	716

Band 13:

10 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	N.V.	777.0357	786.9248	777	787
-20		777.0343	786.9242	777	787
-10		777.0326	786.9235	777	787
0		777.0354	786.9242	777	787
10		777.0337	786.9261	777	787
20		777.0332	786.9242	777	787
30		777.0331	786.9253	777	787
40		777.0325	786.9246	777	787
50		777.0242	786.9252	777	787
20	L.V.	777.0343	786.9276	777	787
	H.V.	777.0354	786.9244	777	787

Band 41:

10 MHz Bandwidth					
Temperature (℃)	**Power Supplied (V_{DC})**	**F_L (MHz)**	**F_H (MHz)**	**F_L Limit (MHz)**	**F_H Limit (MHz)**
-30	N.V.	2535.0565	2654.8584	2535	2655
-20		2535.0497	2654.8566	2535	2655
-10		2535.0436	2654.8563	2535	2655
0		2535.0427	2654.8542	2535	2655
10		2535.0435	2654.8553	2535	2655
20		2535.0423	2654.8542	2535	2655
30		2535.0427	2654.8552	2535	2655
40		2535.0445	2654.8537	2535	2655
50		2535.0452	2654.8562	2535	2655
20	L.V.	2535.0433	2654.8547	2535	2655
	H.V.	2535.0437	2654.8523	2535	2655

Note: the applicant declared the operating frequency range is 2535-2655MHz for LTE Band 41.

******* END OF REPORT *******