		LOW	MID	HIGH
NB-IoT eFDD 8	Cell BW [MHz]	0.2	0.2	0.2
	CH no.	21626	21640	21654
	f [MHz]	897.6	899.0	900.4

		LOW	MID	HIGH
NB-IoT eFDD 12	Cell BW [MHz]	0.2	0.2	0.2
	CH no.	23011	23095	23178
	f [MHz]	699.1	707.5	715.8

		LOW	MID	HIGH
NB-IoT eFDD 13	Cell BW [MHz]	0.2	0.2	0.2
	CH no.	23181	23230	23279
	f [MHz]	777.1	782.0	786.9

		LOW	MID	HIGH
NB-IoT eFDD 66	Cell BW [MHz]	0.2	0.2	0.2
	CH no.	131973	132322	132671
	f [MHz]	1710.1	1745.0	1779.9

		LOW	MID	HIGH
NB-IoT eFDD 71	Cell BW [MHz]	0.2	0.2	0.2
	CH no.	133124	133297	133470
	f [MHz]	663.2	680.5	697.8

		LOW	MID	HIGH
NB-IoT eFDD 85	Cell BW [MHz]	0.2	0.2	0.2
	CH no.	134004	134092	134180
	f [MHz]	698.2	707.0	715.8

4.7 PRODUCT LABELLING

4.7.1 FCC ID LABEL

Please refer to the documentation of the applicant.

4.7.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.

5 TEST RESULTS

5.1 RF OUTPUT POWER

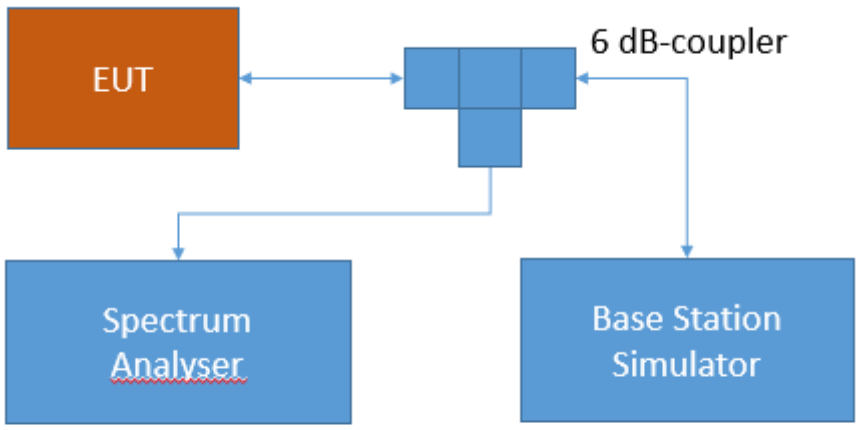
Standard **FCC PART 22 Subpart H**

The test was performed according to:
ANSI C63.26: 2015

5.1.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable RF Output power test case per § 2.1046 and RSS-GEN 6.12. The limit and the requirements come from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setup according to the following diagram:



Test Setup FCC Part 22/24/27/90 Cellular;
RF Output power

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

5.1.2 TEST REQUIREMENTS / LIMITS

FCC Part 22, § 22.913

(a) *Maximum ERP.* The ERP of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(5) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

RSS-132; 5.4 Transmitter Output Power and Equivalent Isotropically Radiated Power

The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts.

5.1.3 TEST PROTOCOL

Ambient temperature: 20 - 25 °C
Relative humidity: 30 - 40 %

Radio Technology	Ch	Re-source Blocks / Sub-carrier	Band-width [MHz]	Peak Cond. Power [dBm]	Average Cond. Power [dBm]	RMS Cond. Power [dBm]	FCC EIRP Limit [W]	IC EIRP Limit [W]	Max. Antenna Gain FCC [dBi]	Max. Antenna Gain IC [dBi]
GSM 850	low	-	0.2	33.20	31.29	31.98	11.5	11.5	7.40	7.40
GSM 850	mid	-	0.2	33.37	31.43	32.14	11.5	11.5	7.23	7.23
GSM 850	high	-	0.2	33.48	31.54	32.25	11.5	11.5	7.12	7.12
GSM 850 EDGE	low	-	0.2	30.69	27.44	27.96	11.5	11.5	9.91	9.91
GSM 850 EDGE	mid	-	0.2	30.61	27.43	27.82	11.5	11.5	9.99	9.99
GSM 850 EDGE	high	-	0.2	30.64	27.58	28.00	11.5	11.5	9.96	9.96
CAT-M1 eFDD 5 QPSK	low	1	1.4	-	-	22.6	11.5	11.5	18.00	18.00
CAT-M1 eFDD 5 QPSK	low	3	1.4	-	-	21.58	11.5	11.5	19.02	19.02
CAT-M1 eFDD 5 QPSK	low	6	1.4	-	-	20.58	11.5	11.5	20.02	20.02
CAT-M1 eFDD 5 QPSK	mid	1	1.4	-	-	22.59	11.5	11.5	18.01	18.01
CAT-M1 eFDD 5 QPSK	mid	3	1.4	-	-	21.65	11.5	11.5	18.95	18.95
CAT-M1 eFDD 5 QPSK	mid	6	1.4	-	-	20.55	11.5	11.5	20.05	20.05
CAT-M1 eFDD 5 QPSK	high	1	1.4	-	-	22.68	11.5	11.5	17.92	17.92
CAT-M1 eFDD 5 QPSK	high	3	1.4	-	-	21.5	11.5	11.5	19.10	19.10
CAT-M1 eFDD 5 QPSK	high	6	1.4	-	-	20.44	11.5	11.5	20.16	20.16
CAT-M1 eFDD 5 16QAM	low	1	1.4	-	-	22.3	11.5	11.5	18.30	18.30
CAT-M1 eFDD 5 16QAM	low	5	1.4	-	-	20.45	11.5	11.5	20.15	20.15
CAT-M1 eFDD 5 16QAM	mid	1	1.4	-	-	21.52	11.5	11.5	19.08	19.08
CAT-M1 eFDD 5 16QAM	mid	5	1.4	-	-	20.38	11.5	11.5	20.22	20.22
CAT-M1 eFDD 5 16QAM	high	1	1.4	-	-	21.04	11.5	11.5	19.56	19.56
CAT-M1 eFDD 5 16QAM	high	5	1.4	-	-	20.49	11.5	11.5	20.11	20.11
CAT-M1 eFDD 5 QPSK	low	1	3	-	-	22.37	11.5	11.5	18.23	18.23
CAT-M1 eFDD 5 QPSK	low	3	3	-	-	21.45	11.5	11.5	19.15	19.15
CAT-M1 eFDD 5 QPSK	low	6	3	-	-	20.43	11.5	11.5	20.17	20.17
CAT-M1 eFDD 5 QPSK	mid	1	3	-	-	22.47	11.5	11.5	18.13	18.13
CAT-M1 eFDD 5 QPSK	mid	3	3	-	-	21.38	11.5	11.5	19.22	19.22
CAT-M1 eFDD 5 QPSK	mid	6	3	-	-	20.46	11.5	11.5	20.14	20.14
CAT-M1 eFDD 5 QPSK	high	1	3	-	-	22.57	11.5	11.5	18.03	18.03
CAT-M1 eFDD 5 QPSK	high	3	3	-	-	21.42	11.5	11.5	19.18	19.18
CAT-M1 eFDD 5 QPSK	high	6	3	-	-	20.42	11.5	11.5	20.18	20.18
CAT-M1 eFDD 5 16QAM	low	1	3	-	-	22.23	11.5	11.5	18.37	18.37
CAT-M1 eFDD 5 16QAM	low	5	3	-	-	20.42	11.5	11.5	20.18	20.18
CAT-M1 eFDD 5 16QAM	mid	1	3	-	-	21.64	11.5	11.5	18.96	18.96
CAT-M1 eFDD 5 16QAM	mid	5	3	-	-	20.45	11.5	11.5	20.15	20.15
CAT-M1 eFDD 5 16QAM	high	1	3	-	-	21.77	11.5	11.5	18.83	18.83
CAT-M1 eFDD 5 16QAM	high	5	3	-	-	20.44	11.5	11.5	20.16	20.16
CAT-M1 eFDD 5 QPSK	low	1	5	-	-	22.29	11.5	11.5	18.31	18.31
CAT-M1 eFDD 5 QPSK	low	3	5	-	-	21.46	11.5	11.5	19.14	19.14
CAT-M1 eFDD 5 QPSK	low	6	5	-	-	21.45	11.5	11.5	19.15	19.15
CAT-M1 eFDD 5 QPSK	mid	1	5	-	-	22.55	11.5	11.5	18.05	18.05
CAT-M1 eFDD 5 QPSK	mid	3	5	-	-	21.42	11.5	11.5	19.18	19.18
CAT-M1 eFDD 5 QPSK	mid	6	5	-	-	21.50	11.5	11.5	19.10	19.10
CAT-M1 eFDD 5 QPSK	high	1	5	-	-	22.68	11.5	11.5	17.92	17.92
CAT-M1 eFDD 5 QPSK	high	3	5	-	-	21.44	11.5	11.5	19.16	19.16
CAT-M1 eFDD 5 QPSK	high	6	5	-	-	21.49	11.5	11.5	19.11	19.11
CAT-M1 eFDD 5 16QAM	low	1	5	-	-	23.32	11.5	11.5	17.28	17.28
CAT-M1 eFDD 5 16QAM	low	5	5	-	-	21.46	11.5	11.5	19.14	19.14
CAT-M1 eFDD 5 16QAM	mid	1	5	-	-	22.85	11.5	11.5	17.75	17.75
CAT-M1 eFDD 5 16QAM	mid	5	5	-	-	20.47	11.5	11.5	20.13	20.13
CAT-M1 eFDD 5 16QAM	high	1	5	-	-	22.57	11.5	11.5	18.03	18.03
CAT-M1 eFDD 5 16QAM	high	5	5	-	-	21.48	11.5	11.5	19.12	19.12

CAT-M1 eFDD 5 QPSK	low	1	10	-	-	22.37	11.5	11.5	18.23	18.23
CAT-M1 eFDD 5 QPSK	low	3	10	-	-	22.42	11.5	11.5	18.18	18.18
CAT-M1 eFDD 5 QPSK	low	6	10	-	-	21.41	11.5	11.5	19.19	19.19
CAT-M1 eFDD 5 QPSK	mid	1	10	-	-	22.54	11.5	11.5	18.06	18.06
CAT-M1 eFDD 5 QPSK	mid	3	10	-	-	22.45	11.5	11.5	18.15	18.15
CAT-M1 eFDD 5 QPSK	mid	6	10	-	-	21.42	11.5	11.5	19.18	19.18
CAT-M1 eFDD 5 QPSK	high	1	10	-	-	22.64	11.5	11.5	17.96	17.96
CAT-M1 eFDD 5 QPSK	high	3	10	-	-	22.47	11.5	11.5	18.13	18.13
CAT-M1 eFDD 5 QPSK	high	6	10	-	-	21.22	11.5	11.5	19.38	19.38
CAT-M1 eFDD 5 16QAM	low	1	10	-	-	23.28	11.5	11.5	17.32	17.32
CAT-M1 eFDD 5 16QAM	low	5	10	-	-	21.46	11.5	11.5	19.14	19.14
CAT-M1 eFDD 5 16QAM	mid	1	10	-	-	22.74	11.5	11.5	17.86	17.86
CAT-M1 eFDD 5 16QAM	mid	5	10	-	-	21.34	11.5	11.5	19.26	19.26
CAT-M1 eFDD 5 16QAM	high	1	10	-	-	22.56	11.5	11.5	18.04	18.04
CAT-M1 eFDD 5 16QAM	high	5	10	-	-	21.16	11.5	11.5	19.44	19.44
CAT-M1 eFDD 26 QPSK	low	1	1.4	-	-	22.70	11.5	11.5	17.90	17.90
CAT-M1 eFDD 26 QPSK	low	3	1.4	-	-	21.67	11.5	11.5	18.93	18.93
CAT-M1 eFDD 26 QPSK	low	6	1.4	-	-	20.64	11.5	11.5	19.96	19.96
CAT-M1 eFDD 26 QPSK	mid	1	1.4	-	-	22.75	11.5	11.5	17.85	17.85
CAT-M1 eFDD 26 QPSK	mid	3	1.4	-	-	21.81	11.5	11.5	18.79	18.79
CAT-M1 eFDD 26 QPSK	mid	6	1.4	-	-	20.72	11.5	11.5	19.88	19.88
CAT-M1 eFDD 26 QPSK	high	1	1.4	-	-	22.83	11.5	11.5	17.77	17.77
CAT-M1 eFDD 26 QPSK	high	3	1.4	-	-	21.60	11.5	11.5	19.00	19.00
CAT-M1 eFDD 26 QPSK	high	6	1.4	-	-	20.58	11.5	11.5	20.02	20.02
CAT-M1 eFDD 26 16QAM	low	1	1.4	-	-	21.62	11.5	11.5	18.98	18.98
CAT-M1 eFDD 26 16QAM	low	5	1.4	-	-	20.54	11.5	11.5	20.06	20.06
CAT-M1 eFDD 26 16QAM	mid	1	1.4	-	-	21.79	11.5	11.5	18.81	18.81
CAT-M1 eFDD 26 16QAM	mid	5	1.4	-	-	20.62	11.5	11.5	19.98	19.98
CAT-M1 eFDD 26 16QAM	high	1	1.4	-	-	21.08	11.5	11.5	19.52	19.52
CAT-M1 eFDD 26 16QAM	high	5	1.4	-	-	20.62	11.5	11.5	19.98	19.98
CAT-M1 eFDD 26 QPSK	low	1	3	-	-	22.91	11.5	11.5	17.69	17.69
CAT-M1 eFDD 26 QPSK	low	3	3	-	-	21.60	11.5	11.5	19.00	19.00
CAT-M1 eFDD 26 QPSK	low	6	3	-	-	20.66	11.5	11.5	19.94	19.94
CAT-M1 eFDD 26 QPSK	mid	1	3	-	-	22.79	11.5	11.5	17.81	17.81
CAT-M1 eFDD 26 QPSK	mid	3	3	-	-	21.63	11.5	11.5	18.97	18.97
CAT-M1 eFDD 26 QPSK	mid	6	3	-	-	20.66	11.5	11.5	19.94	19.94
CAT-M1 eFDD 26 QPSK	high	1	3	-	-	22.68	11.5	11.5	17.92	17.92
CAT-M1 eFDD 26 QPSK	high	3	3	-	-	21.53	11.5	11.5	19.07	19.07
CAT-M1 eFDD 26 QPSK	high	6	3	-	-	20.51	11.5	11.5	20.09	20.09
CAT-M1 eFDD 26 16QAM	low	1	3	-	-	21.88	11.5	11.5	18.72	18.72
CAT-M1 eFDD 26 16QAM	low	5	3	-	-	20.66	11.5	11.5	19.94	19.94
CAT-M1 eFDD 26 16QAM	mid	1	3	-	-	21.96	11.5	11.5	18.64	18.64
CAT-M1 eFDD 26 16QAM	mid	5	3	-	-	20.59	11.5	11.5	20.01	20.01
CAT-M1 eFDD 26 16QAM	high	1	3	-	-	21.81	11.5	11.5	18.79	18.79
CAT-M1 eFDD 26 16QAM	high	5	3	-	-	20.52	11.5	11.5	20.08	20.08
CAT-M1 eFDD 26 QPSK	low	1	5	-	-	22.85	11.5	11.5	17.75	17.75
CAT-M1 eFDD 26 QPSK	low	3	5	-	-	21.61	11.5	11.5	18.99	18.99
CAT-M1 eFDD 26 QPSK	low	6	5	-	-	21.67	11.5	11.5	18.93	18.93
CAT-M1 eFDD 26 QPSK	mid	1	5	-	-	22.79	11.5	11.5	17.81	17.81
CAT-M1 eFDD 26 QPSK	mid	3	5	-	-	21.69	11.5	11.5	18.91	18.91
CAT-M1 eFDD 26 QPSK	mid	6	5	-	-	21.69	11.5	11.5	18.91	18.91
CAT-M1 eFDD 26 QPSK	high	1	5	-	-	22.75	11.5	11.5	17.85	17.85
CAT-M1 eFDD 26 QPSK	high	3	5	-	-	21.51	11.5	11.5	19.09	19.09
CAT-M1 eFDD 26 QPSK	high	6	5	-	-	21.50	11.5	11.5	19.10	19.10
CAT-M1 eFDD 26 16QAM	low	1	5	-	-	23.10	11.5	11.5	17.50	17.50
CAT-M1 eFDD 26 16QAM	low	5	5	-	-	20.51	11.5	11.5	20.09	20.09
CAT-M1 eFDD 26 16QAM	mid	1	5	-	-	23.19	11.5	11.5	17.41	17.41
CAT-M1 eFDD 26 16QAM	mid	5	5	-	-	20.62	11.5	11.5	19.98	19.98
CAT-M1 eFDD 26 16QAM	high	1	5	-	-	22.89	11.5	11.5	17.71	17.71
CAT-M1 eFDD 26 16QAM	high	5	5	-	-	20.42	11.5	11.5	20.18	20.18
CAT-M1 eFDD 26 QPSK	low	1	10	-	-	22.73	11.5	11.5	17.87	17.87
CAT-M1 eFDD 26 QPSK	low	3	10	-	-	22.68	11.5	11.5	17.92	17.92
CAT-M1 eFDD 26 QPSK	low	6	10	-	-	21.67	11.5	11.5	18.93	18.93
CAT-M1 eFDD 26 QPSK	mid	1	10	-	-	22.74	11.5	11.5	17.86	17.86
CAT-M1 eFDD 26 QPSK	mid	3	10	-	-	22.67	11.5	11.5	17.93	17.93
CAT-M1 eFDD 26 QPSK	mid	6	10	-	-	21.59	11.5	11.5	19.01	19.01
CAT-M1 eFDD 26 QPSK	high	1	10	-	-	22.66	11.5	11.5	17.94	17.94
CAT-M1 eFDD 26 QPSK	high	3	10	-	-	22.55	11.5	11.5	18.05	18.05
CAT-M1 eFDD 26 QPSK	high	6	10	-	-	21.50	11.5	11.5	19.10	19.10
CAT-M1 eFDD 26 16QAM	low	1	10	-	-	23.54	11.5	11.5	17.06	17.06
CAT-M1 eFDD 26 16QAM	low	5	10	-	-	21.71	11.5	11.5	18.89	18.89
CAT-M1 eFDD 26 16QAM	mid	1	10	-	-	22.89	11.5	11.5	17.71	17.71

CAT-M1 eFDD 26 16QAM	mid	5	10	-	-	21.56	11.5	11.5	19.04	19.04
CAT-M1 eFDD 26 16QAM	high	1	10	-	-	22.85	11.5	11.5	17.75	17.75
CAT-M1 eFDD 26 16QAM	high	5	10	-	-	21.48	11.5	11.5	19.12	19.12
NB-IoT eFDD 5 QPSK	low	1	0.2	-	-	24.25	11.5	11.5	16.35	16.35
NB-IoT eFDD 5 QPSK	low	3	0.2	-	-	24.16	11.5	11.5	16.44	16.44
NB-IoT eFDD 5 QPSK	low	6	0.2	-	-	23.16	11.5	11.5	17.44	17.44
NB-IoT eFDD 5 QPSK	low	12	0.2	-	-	19.74	11.5	11.5	20.86	20.86
NB-IoT eFDD 5 QPSK	mid	1	0.2	-	-	24.12	11.5	11.5	16.48	16.48
NB-IoT eFDD 5 QPSK	mid	3	0.2	-	-	24.12	11.5	11.5	16.48	16.48
NB-IoT eFDD 5 QPSK	mid	6	0.2	-	-	22.85	11.5	11.5	17.75	17.75
NB-IoT eFDD 5 QPSK	mid	12	0.2	-	-	19.48	11.5	11.5	21.12	21.12
NB-IoT eFDD 5 QPSK	high	1	0.2	-	-	24.34	11.5	11.5	16.26	16.26
NB-IoT eFDD 5 QPSK	high	3	0.2	-	-	24.27	11.5	11.5	16.33	16.33
NB-IoT eFDD 5 QPSK	high	6	0.2	-	-	23.13	11.5	11.5	17.47	17.47
NB-IoT eFDD 5 QPSK	high	12	0.2	-	-	19.66	11.5	11.5	20.94	20.94
NB-IoT eFDD 5 BPSK	low	1	0.2	-	-	23.91	11.5	11.5	16.69	16.69
NB-IoT eFDD 5 BPSK	mid	1	0.2	-	-	23.41	11.5	11.5	17.19	17.19
NB-IoT eFDD 5 BPSK	high	1	0.2	-	-	23.07	11.5	11.5	17.53	17.53

Remark: Please see next sub-clause for the measurement plot.

SPOTCHECKS FOR CHILD PRODUCT (S01_AC01 = SARA-R422)

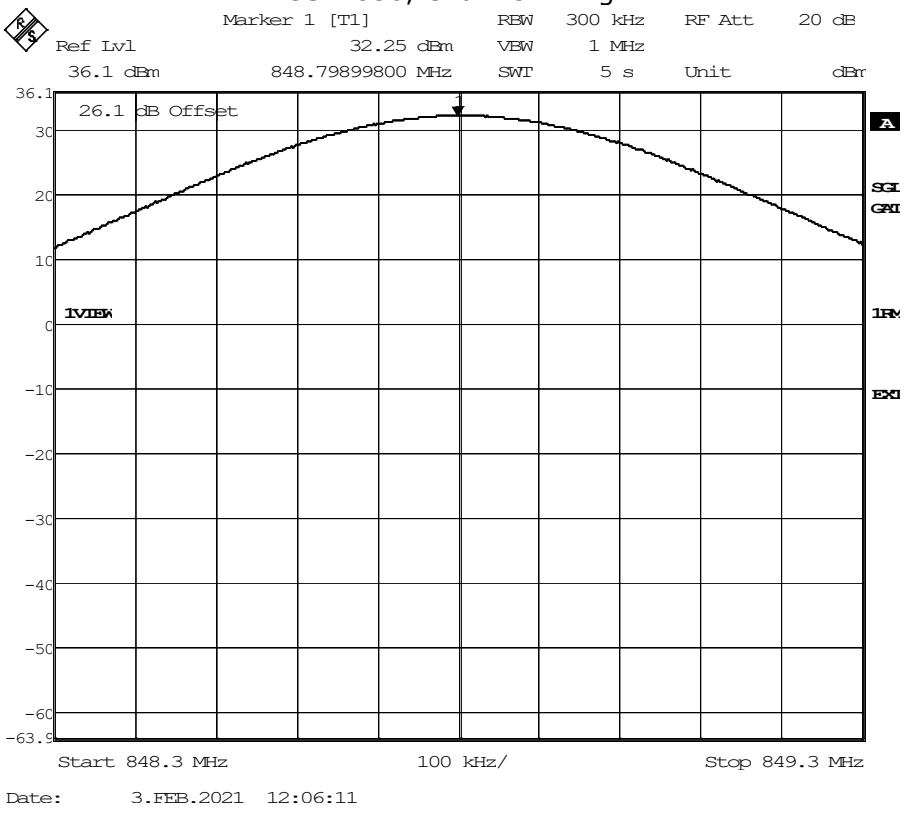
Radio Technology	Ch	Re-source Blocks / Sub-carrier	Band-width [MHz]	Peak Cond. Power [dBm]	Average Cond. Power [dBm]	RMS Cond. Power [dBm]	FCC EIRP Limit [W]	IC EIRP Limit [W]	Max. Antenna Gain FCC [dBi]	Max. Antenna Gain IC [dBi]
CAT-M1 eFDD 5 QPSK	mid	1	1.4	-	-	22.49	11.5	11.5	18.11	18.11
CAT-M1 eFDD 5 QPSK	mid	3	1.4	-	-	21.67	11.5	11.5	18.93	18.93
CAT-M1 eFDD 5 QPSK	mid	6	1.4	-	-	20.68	11.5	11.5	19.92	19.92
CAT-M1 eFDD 5 16QAM	mid	1	1.4	-	-	21.30	11.5	11.5	19.3	19.3
CAT-M1 eFDD 5 16QAM	mid	5	1.4	-	-	20.67	11.5	11.5	19.93	19.93
NB-IoT eFDD 5 QPSK	mid	1	0.2	-	-	23.62	11.5	11.5	16.98	16.98
NB-IoT eFDD 5 QPSK	mid	3	0.2	-	-	22.14	11.5	11.5	18.46	18.46
NB-IoT eFDD 5 QPSK	mid	6	0.2	-	-	22.25	11.5	11.5	18.35	18.35
NB-IoT eFDD 5 QPSK	mid	12	0.2	-	-	21.73	11.5	11.5	18.87	18.87
NB-IoT eFDD 5 BPSK	mid	1	0.2	-	-	23.53	11.5	11.5	17.07	17.07

SPOTCHECKS FOR CHILD PRODUCT (S01_AE01 = SARA-R422S)

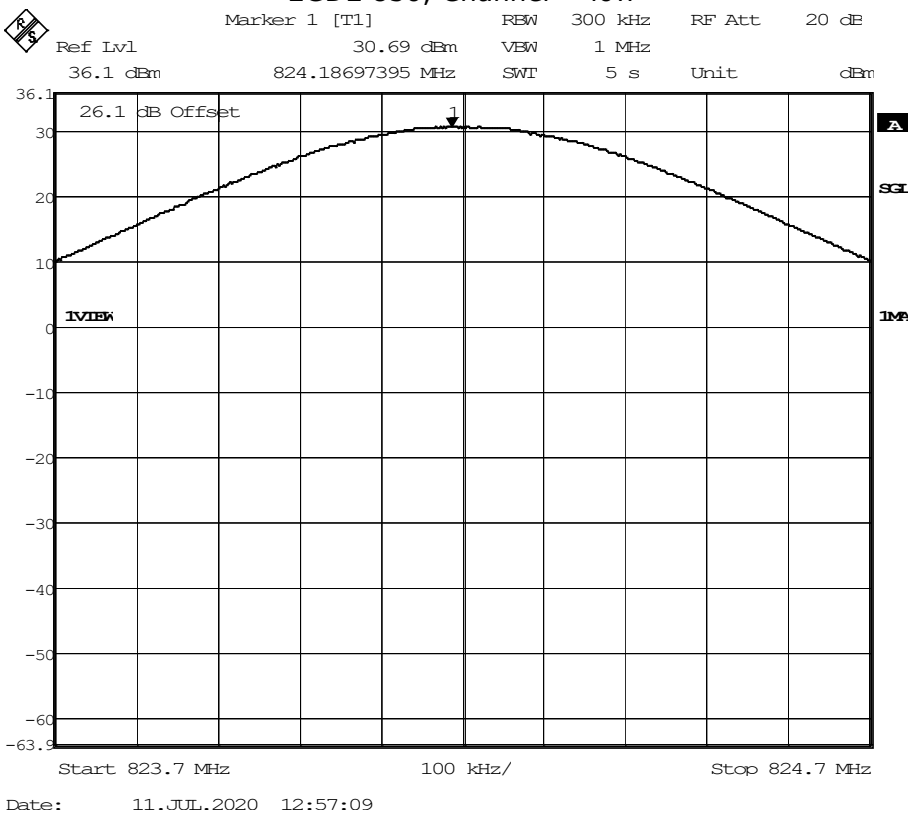
Radio Technology	Ch	Re-source Blocks / Sub-carrier	Band-width [MHz]	Peak Cond. Power [dBm]	Average Cond. Power [dBm]	RMS Cond. Power [dBm]	FCC EIRP Limit [W]	IC EIRP Limit [W]	Max. Antenna Gain FCC [dBi]	Max. Antenna Gain IC [dBi]
CAT-M1 eFDD 5 QPSK	mid	1	1.4	-	-	22.94	11.5	11.5	17.66	17.66
CAT-M1 eFDD 5 QPSK	mid	3	1.4	-	-	22.12	11.5	11.5	18.48	18.48
CAT-M1 eFDD 5 QPSK	mid	6	1.4	-	-	21.08	11.5	11.5	19.52	19.52
CAT-M1 eFDD 5 16QAM	mid	1	1.4	-	-	21.77	11.5	11.5	18.83	18.83
CAT-M1 eFDD 5 16QAM	mid	5	1.4	-	-	21.12	11.5	11.5	19.48	19.48
NB-IoT eFDD 5 QPSK	mid	1	0.2	-	-	24.18	11.5	11.5	16.42	16.42
NB-IoT eFDD 5 QPSK	mid	3	0.2	-	-	22.43	11.5	11.5	18.17	18.17
NB-IoT eFDD 5 QPSK	mid	6	0.2	-	-	22.72	11.5	11.5	17.88	17.88
NB-IoT eFDD 5 QPSK	mid	12	0.2	-	-	22.31	11.5	11.5	18.29	18.29
NB-IoT eFDD 5 BPSK	mid	1	0.2	-	-	24.20	11.5	11.5	16.4	16.4

5.1.4 MEASUREMENT PLOT (EXAMPLE PLOT)

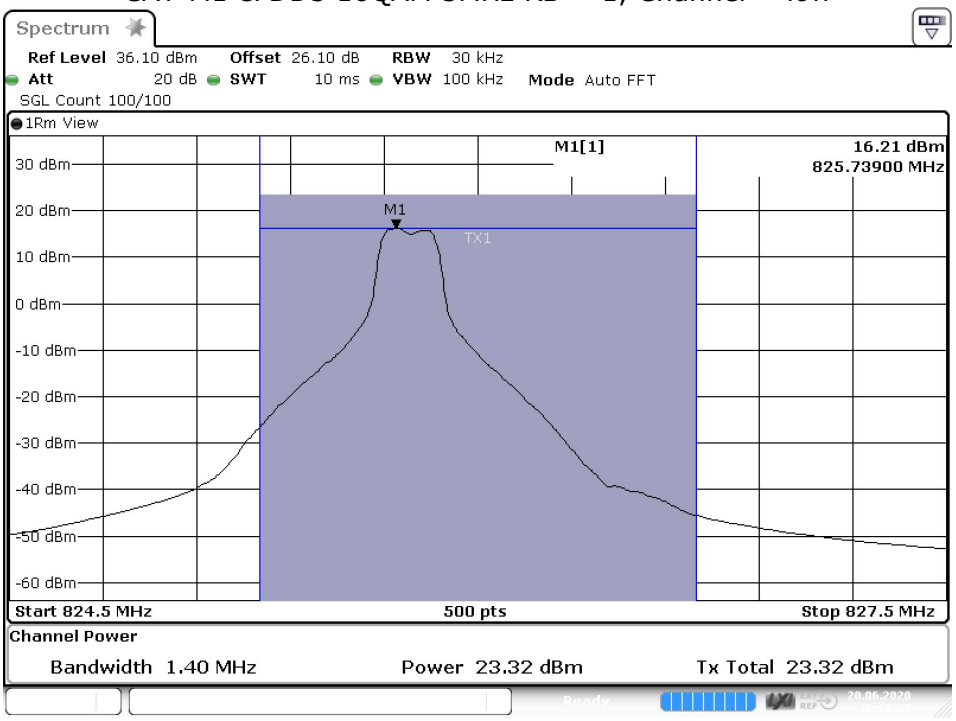
GSM 850, Channel = high



EGDE 850, Channel = low

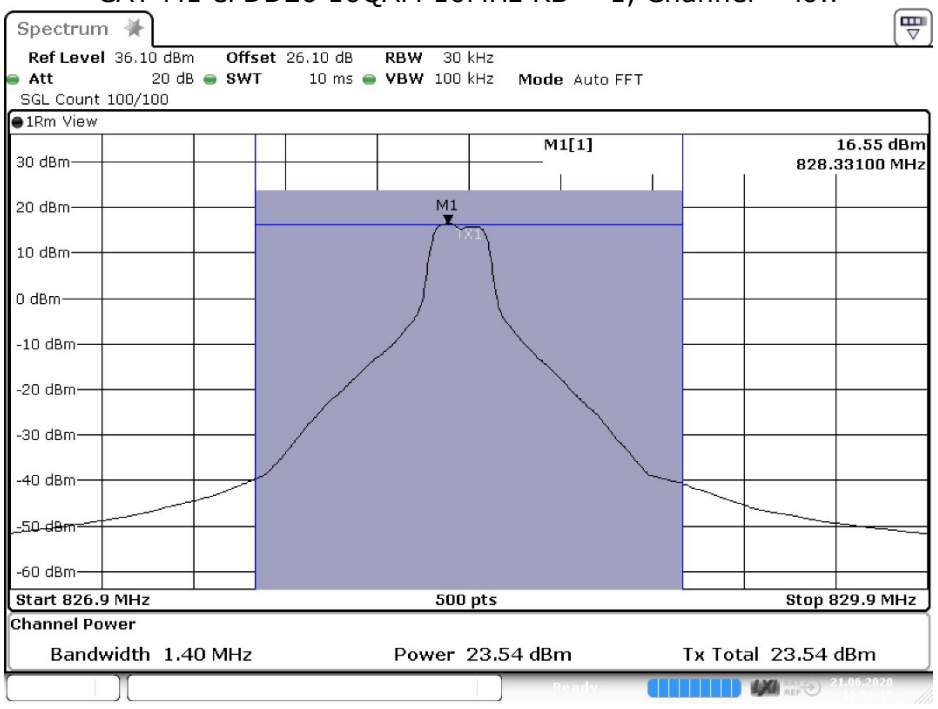


CAT-M1 eFDD5 16QAM 5MHz RB = 1, Channel = low

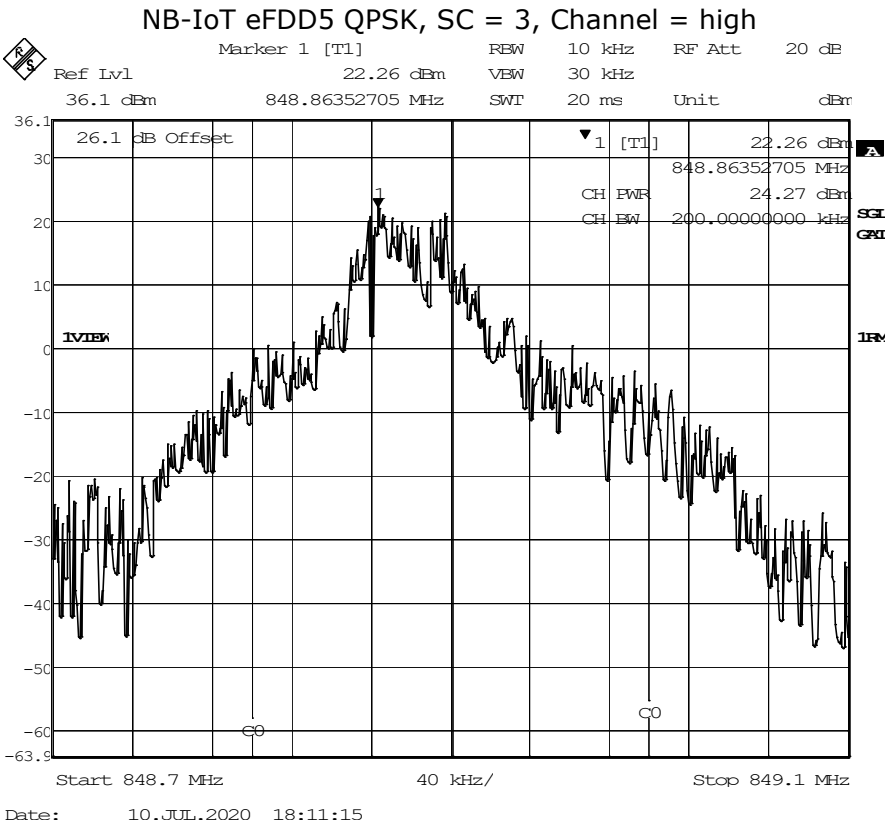


Date: 20.JUN.2020 16:28:36

CAT-M1 eFDD26 16QAM 10MHz RB = 1, Channel = low



Date: 21.JUN.2020 11:06:15



5.1.5 TEST EQUIPMENT USED

- Radio Lab

5.2 FREQUENCY STABILITY

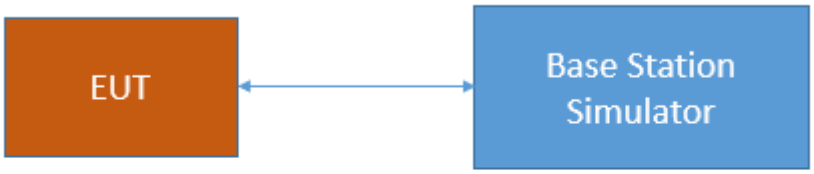
Standard **FCC PART 22 Subpart H**

The test was performed according to:
ANSI C63.26: 2015

5.2.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable frequency stability test case per § 2.1055 and RSS-GEN 6.11. The limit and the requirements come from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setup according to the following diagram:



Test Setup FCC Part 22/24/27/90 Cellular;
Frequency stability

The attenuation of the measuring / stimulus path is known for each measured frequency and are considered.

5.2.2 TEST REQUIREMENTS / LIMITS

FCC Part 22, § 22.355

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range [MHz]	Mobile Devices > 3 W [ppm]	Mobile Devices ≤ 3 W [ppm]
25 – 50	20.0	50.0
50 – 450	5.0	50.0
450 – 512	5.0	5.0
821 – 896	2.5	2.5

928 - 929	n/a	n/a
929 – 960	n/a	n/a
2110 - 2220	n/a	n/a

RSS-132; 5.3 Frequency Stability

The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the occupied bandwidth stays within each of the sub-bands (see Section 5.1) when tested to the temperature and supply voltage variations specified in RSS-Gen.

5.2.3 TEST PROTOCOL

GSM 850

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2095.5	3	15	passed
-30	5			5	12	passed
-30	10			6	10	passed
-20	0	normal	2095.5	4	13	passed
-20	5			4	13	passed
-20	10			3	12	passed
-10	0	normal	2095.5	5	14	passed
-10	5			4	12	passed
-10	10			3	15	passed
0	0	normal	2095.5	6	10	passed
0	5			6	11	passed
0	10			4	16	passed
10	0	normal	2095.5	5	13	passed
10	5			4	10	passed
10	10			3	14	passed
20	0	low	2095.5	6	12	passed
20	5			6	15	passed
20	10			3	11	passed
20	0	normal	2095.5	4	11	passed
20	5			4	12	passed
20	10			4	12	passed
20	0	high	2095.5	4	13	passed
20	5			5	12	passed
20	10			4	15	passed
30	0	normal	2095.5	6	11	passed
30	5			5	16	passed
30	10			5	14	passed
40	0	normal	2095.5	4	13	passed
40	5			4	15	passed
40	10			6	12	passed
50	0	normal	2095.5	5	12	passed
50	5			3	13	passed
50	10			4	13	passed

EDGE 850

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2095.5	11	14	passed
-30	5			9	13	passed
-30	10			5	9	passed
-20	0	normal	2095.5	14	17	passed
-20	5			8	19	passed
-20	10			13	16	passed
-10	0	normal	2095.5	8	10	passed
-10	5			13	16	passed
-10	10			16	19	passed
0	0	normal	2095.5	8	12	passed
0	5			12	17	passed
0	10			17	20	passed
10	0	normal	2095.5	14	17	passed
10	5			15	18	passed
10	10			21	25	passed
20	0	low	2095.5	9	12	passed
20	5			8	11	passed
20	10			11	14	passed
20	0	high	2095.5	12	19	passed
20	5			10	13	passed
20	10			9	12	passed
20	0	normal	2095.5	10	14	passed
20	5			11	14	passed
20	10			10	16	passed
30	0	normal	2095.5	15	18	passed
30	5			14	17	passed
30	10			12	15	passed
40	0	normal	2095.5	12	16	passed
40	5			11	15	passed
40	10			10	14	passed
50	0	normal	2095.5	11	17	passed
50	5			13	17	passed
50	10			17	20	passed

CAT-M1 eFDD5

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2091.25	0	-2	passed
-30	5			0	4	passed
-30	10			-1	-5	passed
-20	0	normal	2091.25	0	-3	passed
-20	5			-1	-2	passed
-20	10			-1	2	passed
-10	0	normal	2091.25	0	5	passed
-10	5			-1	-3	passed
-10	10			0	1	passed
0	0	normal	2091.25	0	-6	passed
0	5			0	-4	passed
0	10			-1	-2	passed
10	0	normal	2091.25	0	3	passed
10	5			2	3	passed
10	10			-1	4	passed
20	0	low	2091.25	1	-7	passed
20	5			2	6	passed
20	10			1	-4	passed
20	0	normal	2091.25	2	-5	passed
20	5			1	-4	passed
20	10			1	2	passed
20	0	high	2091.25	-1	-6	passed
20	5			-2	5	passed
20	10			2	4	passed
30	0	normal	2091.25	1	3	passed
30	5			1	-4	passed
30	10			-2	-6	passed
40	0	normal	2091.25	1	-4	passed
40	5			2	3	passed
40	10			-1	5	passed
50	0	normal	2091.25	2	4	passed
50	5			1	-2	passed
50	10			-1	-3	passed

CAT-M1 eFDD26

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2047.5	3	9	passed
-30	5			3	9	passed
-30	10			1	7	passed
-20	0	normal	2047.5	2	7	passed
-20	5			2	5	passed
-20	10			3	8	passed
-10	0	normal	2047.5	3	8	passed
-10	5			4	9	passed
-10	10			4	9	passed
0	0	normal	2047.5	3	9	passed
0	5			2	9	passed
0	10			3	7	passed
10	0	normal	2047.5	3	8	passed
10	5			3	6	passed
10	10			2	8	passed
20	0	low	2047.5	2	6	passed
20	5			2	7	passed
20	10			1	8	passed
20	0	normal	2047.5	2	7	passed
20	5			1	9	passed
20	10			1	9	passed
20	0	high	2047.5	2	7	passed
20	5			2	8	passed
20	10			3	8	passed
30	0	normal	2047.5	3	8	passed
30	5			2	6	passed
30	10			1	6	passed
40	0	normal	2047.5	3	9	passed
40	5			3	8	passed
40	10			2	7	passed
50	0	normal	2047.5	2	7	passed
50	5			1	8	passed
50	10			1	8	passed

NB-IoT eFDD5

Temp. °C	Duration min	Voltage	Limit Hz	Freq. error Average (Hz)	Freq. error Max. (Hz)	Verdict
-30	0	normal	2091.25	-1	15	passed
-30	5			1	34	passed
-30	10			-2	14	passed
-20	0	normal	2091.25	2	10	passed
-20	5			3	9	passed
-20	10			4	10	passed
-10	0	normal	2091.25	7	16	passed
-10	5			6	12	passed
-10	10			7	13	passed
0	0	normal	2091.25	7	14	passed
0	5			8	15	passed
0	10			7	15	passed
10	0	normal	2091.25	7	12	passed
10	5			4	13	passed
10	10			7	14	passed
20	0	low	2091.25	1	18	passed
20	5			3	9	passed
20	10			3	9	passed
20	0	normal	2091.25	2	7	passed
20	5			3	10	passed
20	10			1	8	passed
20	0	high	2091.25	2	10	passed
20	5			2	8	passed
20	10			1	-10	passed
30	0	normal	2091.25	0	5	passed
30	5			-2	6	passed
30	10			0	5	passed
40	0	normal	2091.25	-5	-10	passed
40	5			-6	-12	passed
40	10			-7	-14	passed
50	0	normal	2091.25	-8	-18	passed
50	5			-9	-14	passed
50	10			-7	-12	passed

5.2.4 TEST EQUIPMENT USED

- Radio Lab

5.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

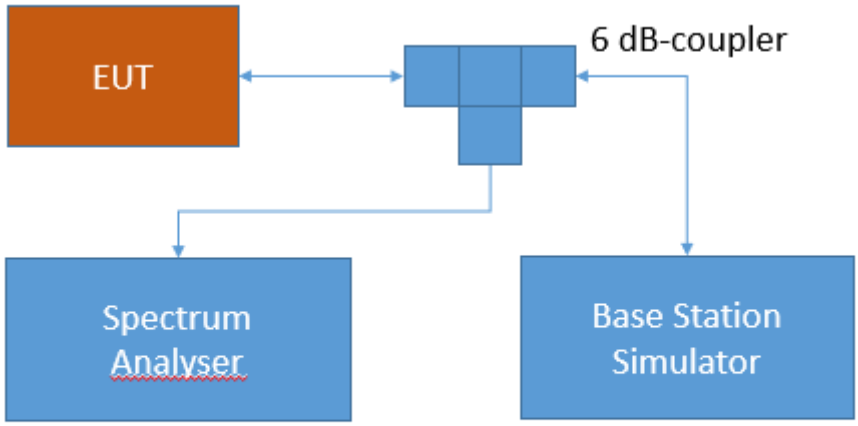
Standard **FCC PART 22 Subpart H**

The test was performed according to:
ANSI C63.26: 2015

5.3.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission test case per § 2.1051 and RSS-GEN 6.13. The limit comes from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setup according to the following diagram:



Test Setup FCC Part 22/24/27/90 Cellular;
Spurious Emissions at antenna terminal

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

5.3.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1051; Measurement required: Spurious emissions at antenna terminal:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

Part 22, Subpart H – Cellular Radiotelephone Service

§22 917 – Emission limitations for cellular equipment

(a) Out of band emissions. 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.

RSS-132; 5.5 Transmitter Unwanted Emissions

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

1. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p (watts).
2. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$ p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

5.3.3 TEST PROTOCOL

Ambient temperature: 20 - 25 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
GSM850	Low	rms	maxhold	3	823.98	-23.34	-13	10.34
GSM850	Mid	rms	maxhold	-			-13	>20
GSM850	High	rms	maxhold	3	849.01	-26.71	-13	13.71

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
EDGE850	Low	rms	maxhold	3	823.97	-32.63	-13	19.63
EDGE850	Mid	rms	maxhold	-			-13	>20
EDGE850	High	rms	maxhold	3	849.04	-33.94	-13	20.94

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
CAT-M1 eFDD5	Low	rms	maxhold	20	823.98	-32.63	-13	19.63
CAT-M1 eFDD5	Mid	rms	maxhold	-	-	-	-13	>20
CAT-M1 eFDD5	High	rms	maxhold	20	849.01	-22.94	-13	9.94

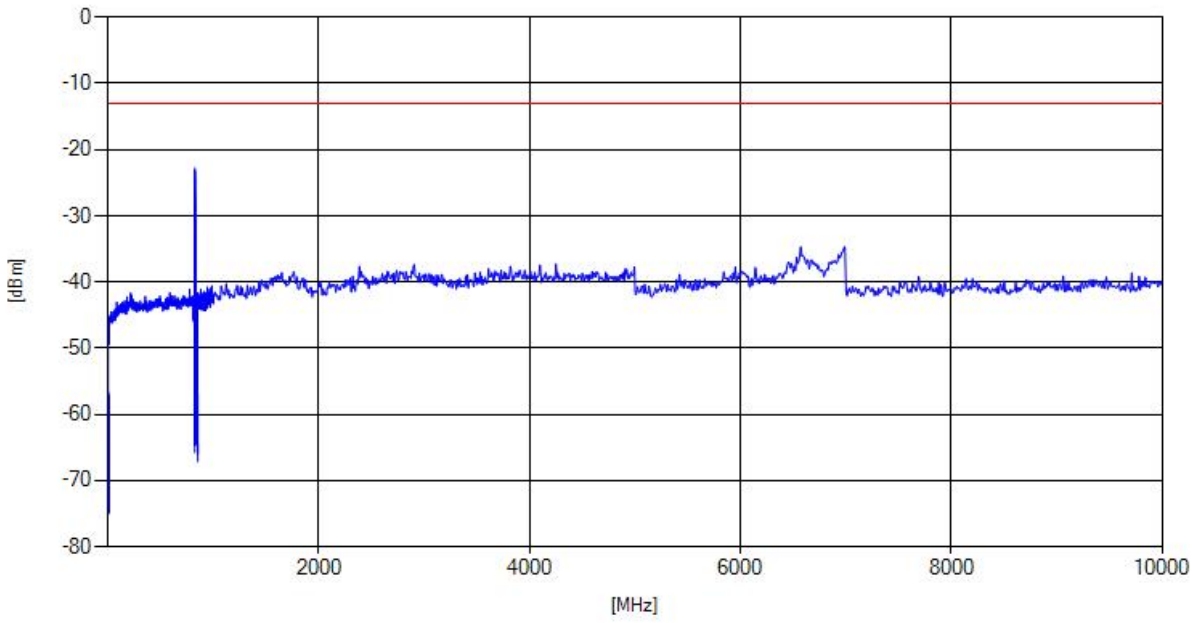
Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
CAT-M1 eFDD26	Low	rms	maxhold	20	824	-24.16	-13	11.16
CAT-M1 eFDD26	Mid	rms	maxhold	-	-	-	-13	>20
CAT-M1 eFDD26	High	rms	maxhold	20	849.01	-24.7	-13	11.7

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
NB-IoT eFDD5	Low	rms	maxhold	2	823.99	-20.31	-13	7.31
NB-IoT eFDD5	Mid	rms	maxhold	-	-	-	-13	>20
NB-IoT eFDD5	High	rms	maxhold	2	849.01	-20.78	-13	7.78

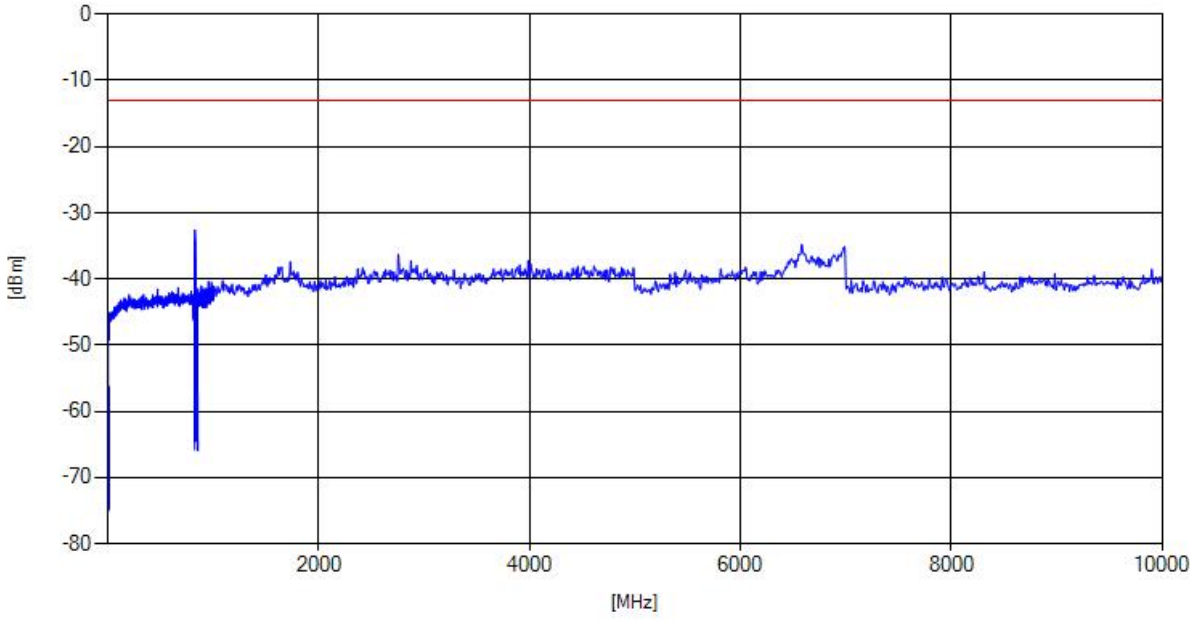
Remark: Please see next sub-clause for the measurement plot.

5.3.4 MEASUREMENT PLOT

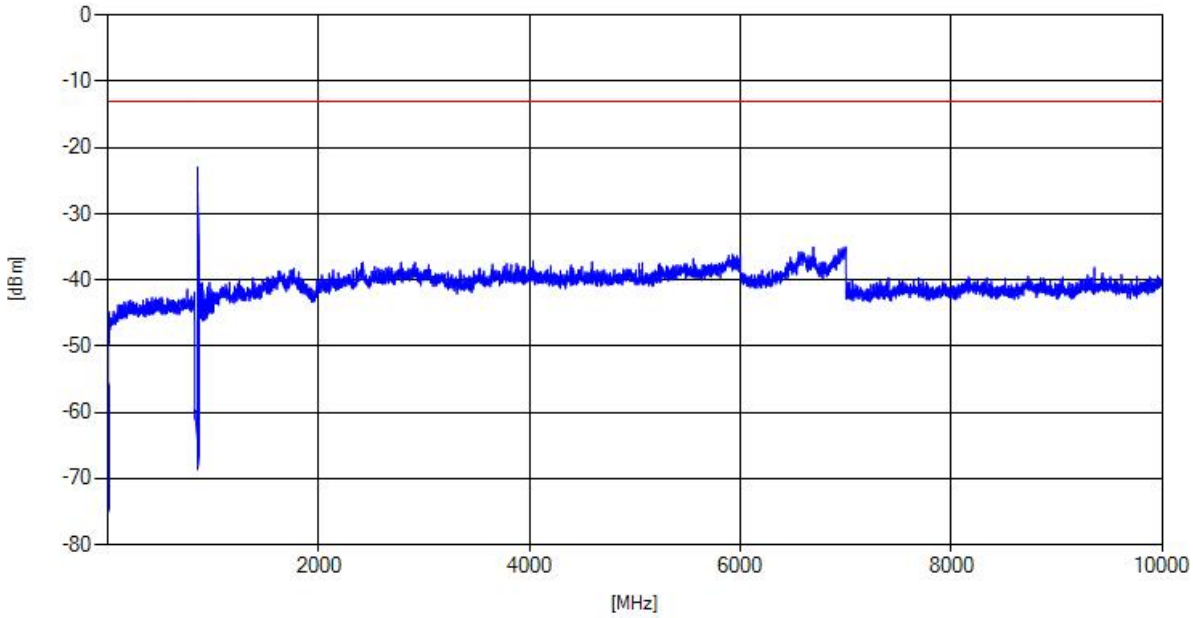
GSM 850, Channel = low



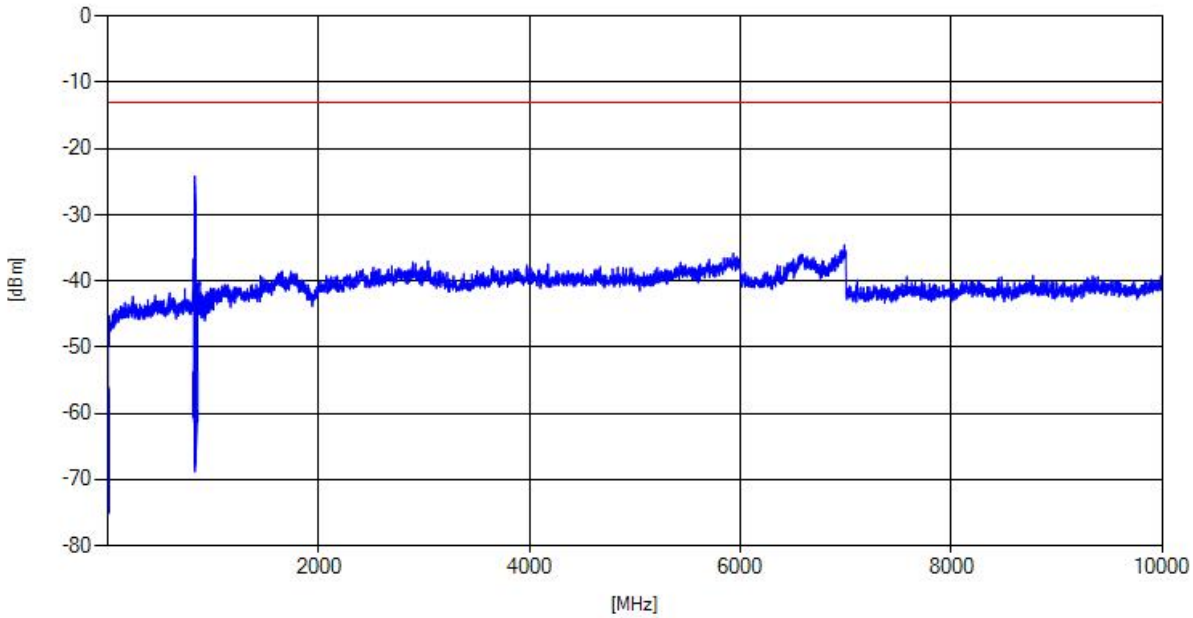
EDGE 850, Channel = low



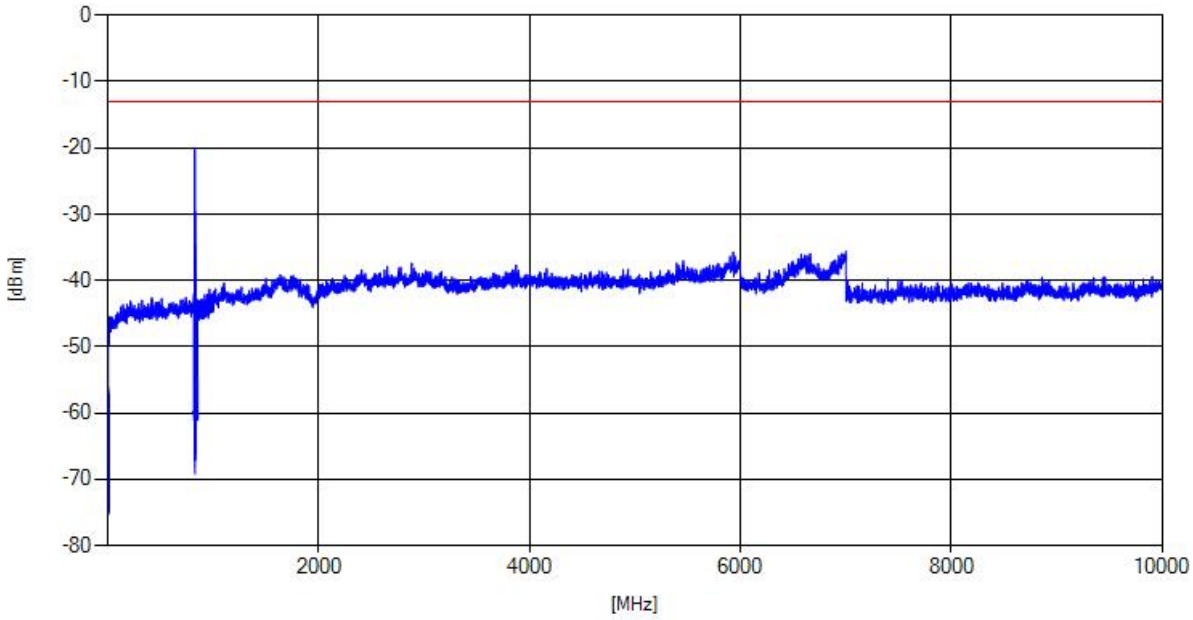
CAT-M1 eFDD5, Channel = high



CAT-M1 eFDD26, Channel = low



NB-IoT eFDD5, Channel = low



5.3.5 TEST EQUIPMENT USED

- Radio Lab

5.4 FIELD STRENGTH OF SPURIOUS RADIATION

Standard **FCC PART 22 Subpart H**

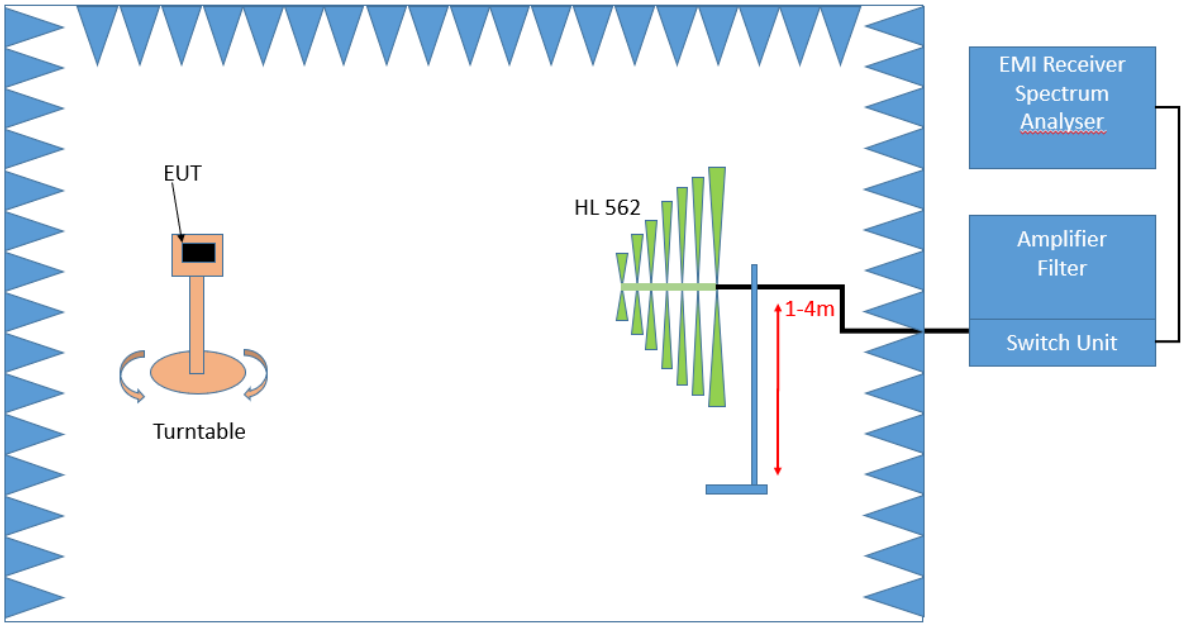
The test was performed according to:
ANSI C63.26: 2015

5.4.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable radiated spurious emission measurements per § 2.1053 and RSS-GEN 6.13. The limit and requirements come from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

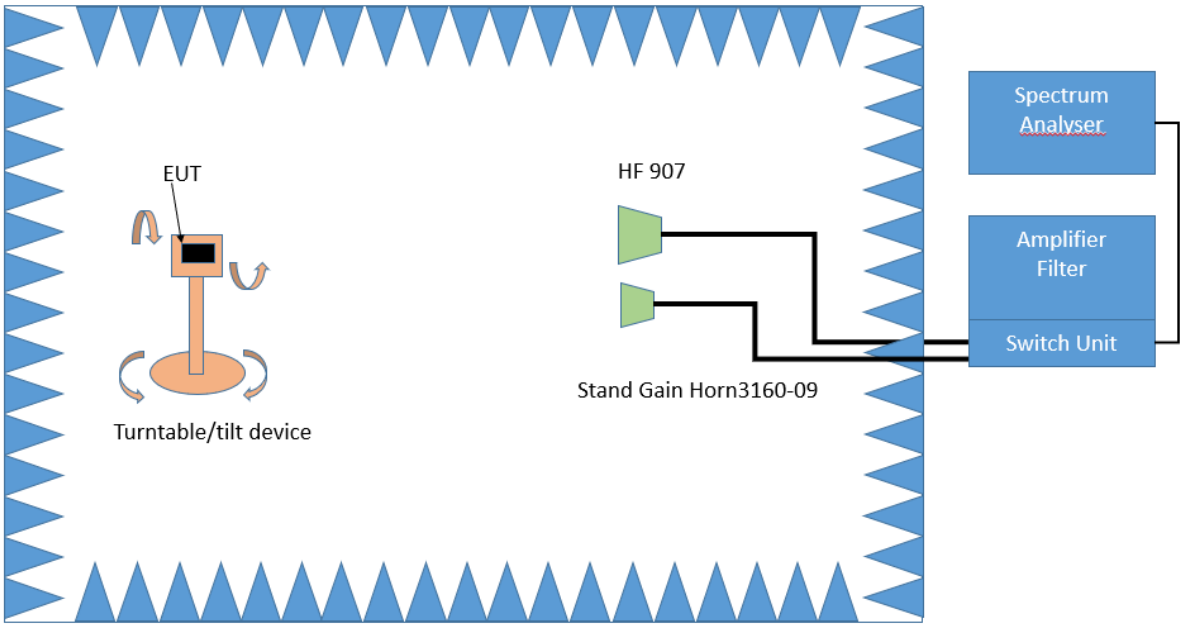
The EUT was connected to the test setup according to the following diagram:

Frequency Range: 30 MHz – 1 GHz:



Test Setup; Spurious Emission Radiated (SAC), 30 MHz- 1GHz

Frequency Range: 1 GHz – 26.5 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

The test set-up was made in accordance to the general provisions of ANSI C63.26 in a typical installation configuration. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m² in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.
The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered from a DC power source.

1. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan
This is a preliminary test to identify the highest amplitudes relative to the limit.
Settings for step 1:
- Antenna distance: 3 m
- Detector: Peak
- RBW: 100 kHz
- VBW: 300 kHz
- Sweep time: coupled
- Turntable angle range: –180° to 90°
- Turntable step size: 90°
- Height variation range: 1 – 4 m
- Height variation step size: 1.5 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: Adjustment measurement
In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.
For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by 360°. During this action, the value of emission is continuously measured. The turntable azimuth at the highest emission will be

recorded and adjusted. In this position, the antenna height will also slowly vary by 1 – 4 m. During this action, the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.
- Detector: Peak
- Measured frequencies: in step 1 determined frequencies
- RBW: 100 kHz
- VBW: 300 kHz
- Sweep time: coupled
- Turntable angle range: 360°
- Height variation range: 1 – 4 m
- Antenna Polarisation: max. value determined in step 1

Step 3: Final measurement with RMS detector
With the settings determined in step 3, the final measurement will be performed:
EMI receiver settings for step 4:
- Detector: RMQ
- Measured frequencies: in step 1 determined frequencies
- RBW: 100 kHz
- VBW: 300 kHz
- Sweep time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

3. Measurement above 1 GHz
The following modifications apply to the measurement procedure for the frequency range above 1 GHz:
Step 1:
The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.
All steps were performed with one height (1.5 m) of the receiving antenna only.
The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 45 °.
The turn table step size (azimuth angle) for the preliminary measurement is 45 °.
- Antenna distance: 3 m
- Detector: Peak
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: coupled
- Turntable angle range: –180° to 135°
- Turntable step size: 45°
- Polarisation: Horizontal + Vertical

Step 2:
Due to the fact, that in this frequency range the test is performed in a fully anechoic room, the height scan of the receiving antenna instep 2 is omitted. Instead of this, a maximum search with a step size ± 45° for the elevation axis is performed.
The turn table azimuth will slowly vary by ± 22.5°.
The elevation angle will slowly vary by ± 45°
EMI receiver settings (for all steps):
- Detector: Peak,
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: coupled

Step 3:
Spectrum analyser settings for step 3:
- Detector: RMS
- Measured frequencies: in step 1 determined frequencies
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep Time: 1 s

5.4.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1053; Measurement required: Field strength of spurious radiation:

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate.

Part 22, Subpart H – Cellular Radiotelephone Service

§ 22 917 – Emission limitations for cellular equipment

(a) Out of band emissions. 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.

RSS-132; 5.5 Transmitter Unwanted Emissions

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

1. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p (watts).
2. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$ p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

5.4.3 TEST PROTOCOL

Ambient temperature: 20 - 25 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
GSM850	low	rms	maxhold	3	823.98	-26.21	-13	13.21
GSM850	mid	rms	maxhold	-	-	-	-13	>20
GSM850	high	rms	maxhold	3	849.01	-29.44	-13	16.44

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
EDGE850	low	peak	maxhold	3	823.97	-24.4	-13	11.4
EDGE850	mid	rms	maxhold	-	-	-	-13	>20
EDGE850	high	rms	maxhold	-	-	-	-13	>20

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
CAT-M1 eFDD5	low	rms	maxhold	-	-	-	-13	>20
CAT-M1 eFDD5	mid	rms	maxhold	-	-	-	-13	>20
CAT-M1 eFDD5	high	rms	maxhold	-	-	-	-13	>20

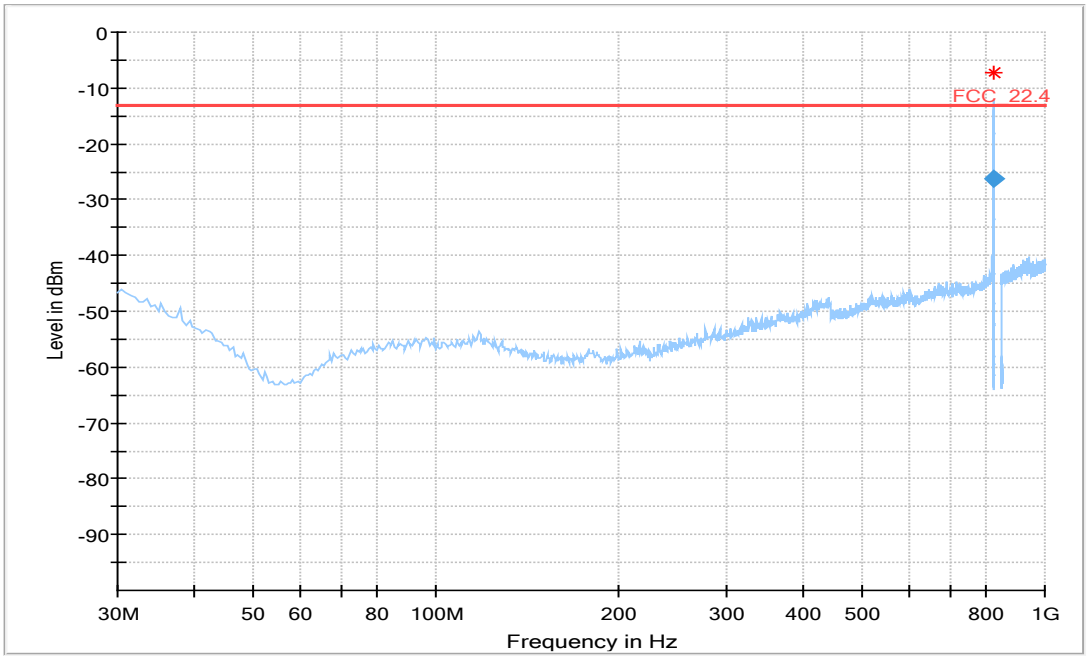
Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
CAT-M1 eFDD26	low	rms	maxhold	-	-	-	-13	>20
CAT-M1 eFDD26	mid	rms	maxhold	-	-	-	-13	>20
CAT-M1 eFDD26	high	rms	maxhold	-	-	-	-13	>20

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
NB-IoT eFDD5	low	rms	maxhold	823.99	3	-26.68	-13	13.68
NB-IoT eFDD5	mid	rms	maxhold	-	-	-	-13	>20
NB-IoT eFDD5	high	rms	maxhold	849	3	-24.16	-13	11.16

Remark: Please see next sub-clause for the measurement plot.

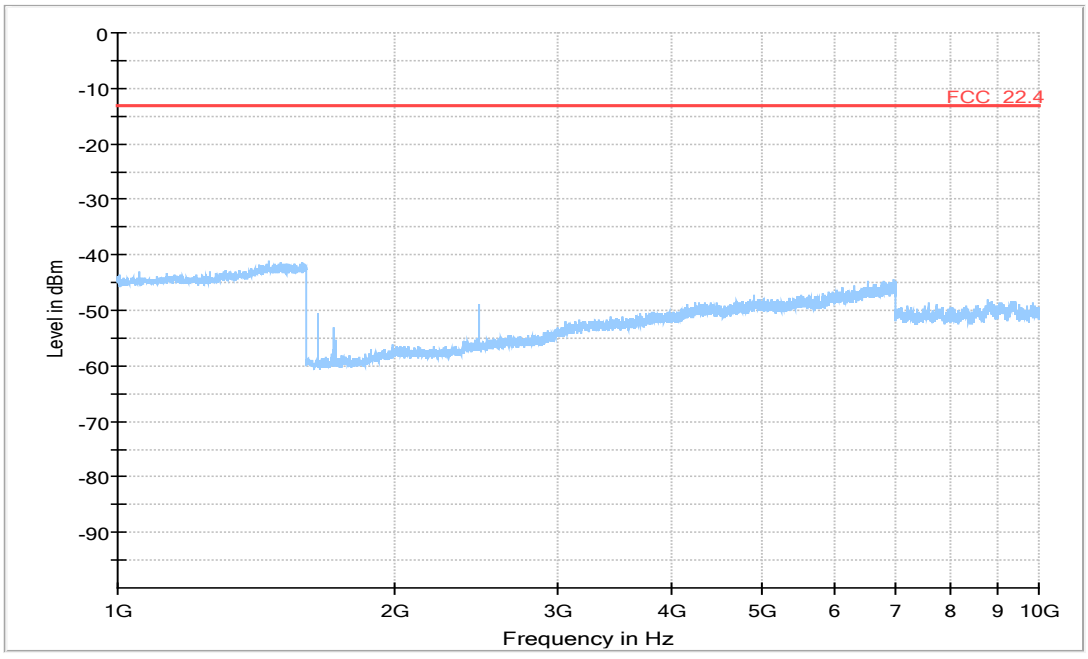
5.4.4 MEASUREMENT PLOT

GSM 850, Channel = low
30 MHz – 1 GHz

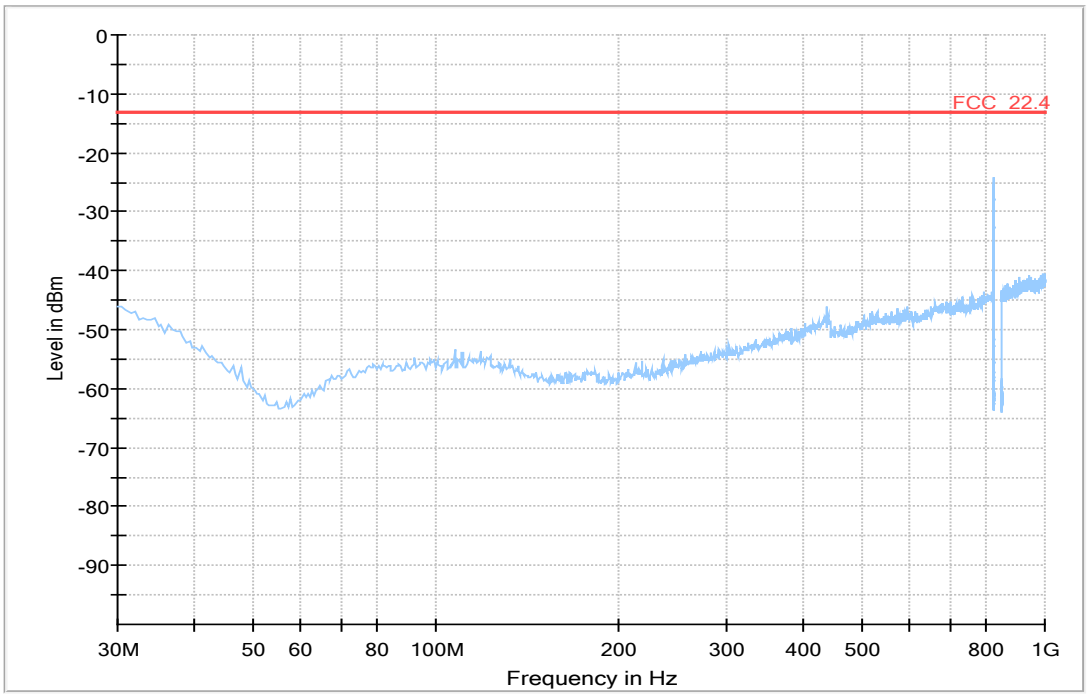


Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
823.982000	-26.21	-13.00	13.21	1000.0	3.000	105.0	H	77.0	-73.8

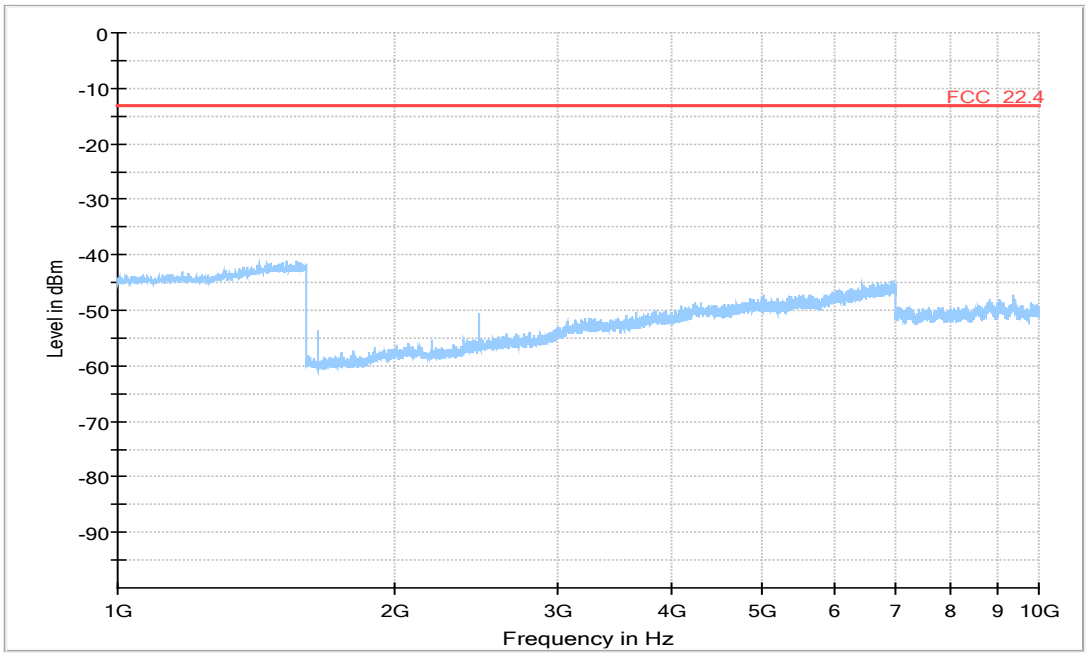
1 GHz – 10 GHz



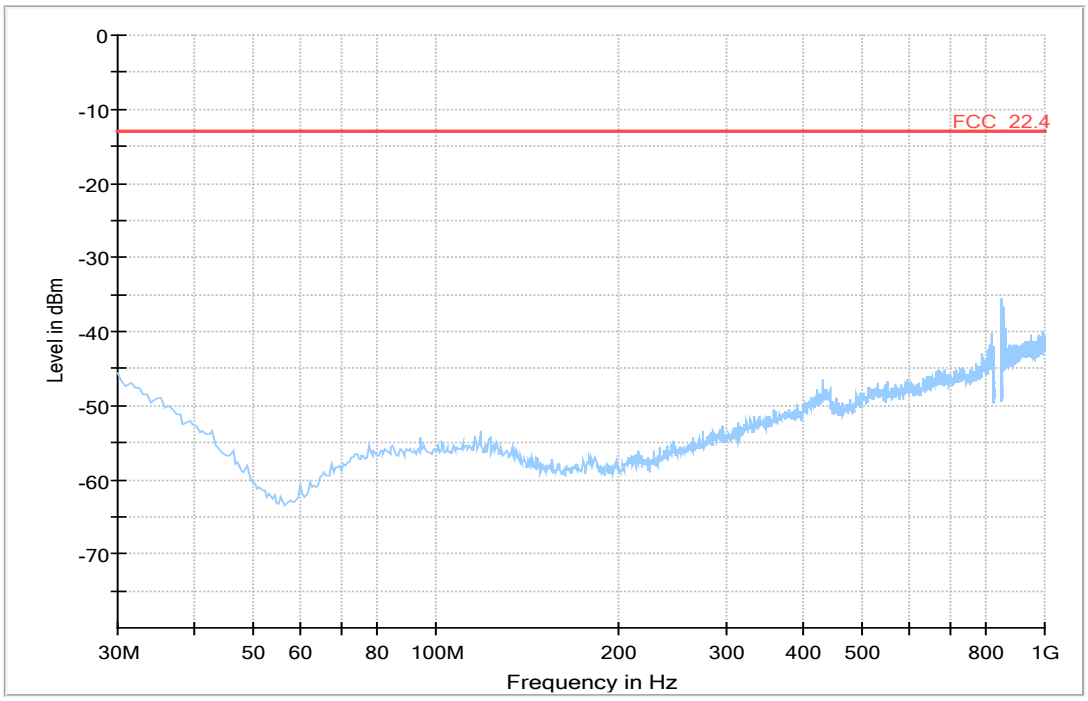
EDGE 850, Channel = low
30 MHz – 1 GHz



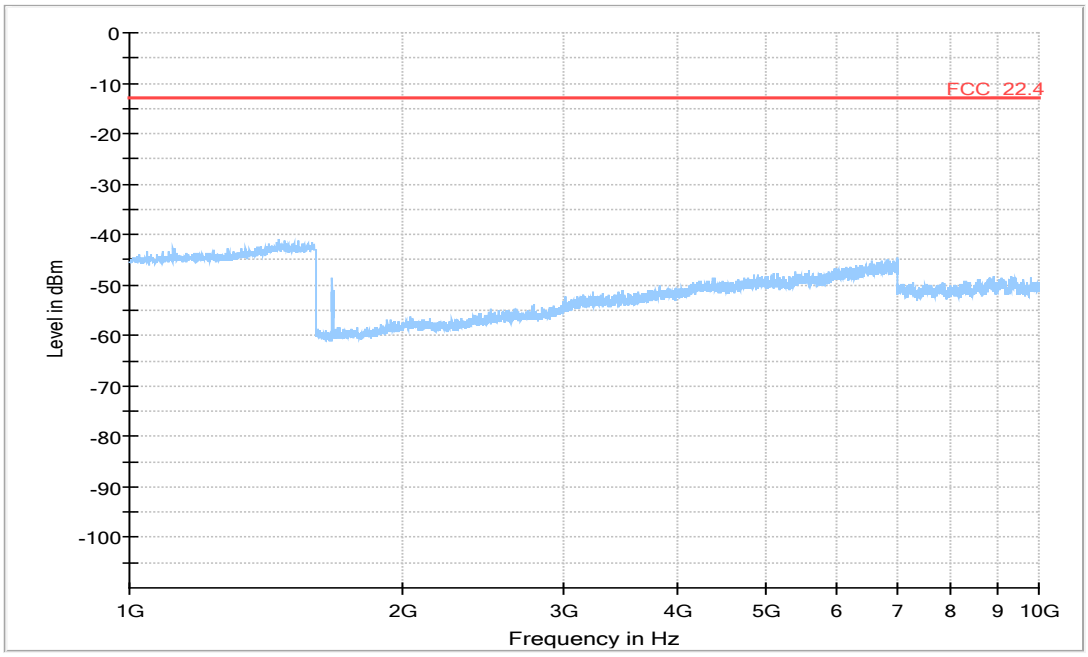
1 GHz – 10 GHz



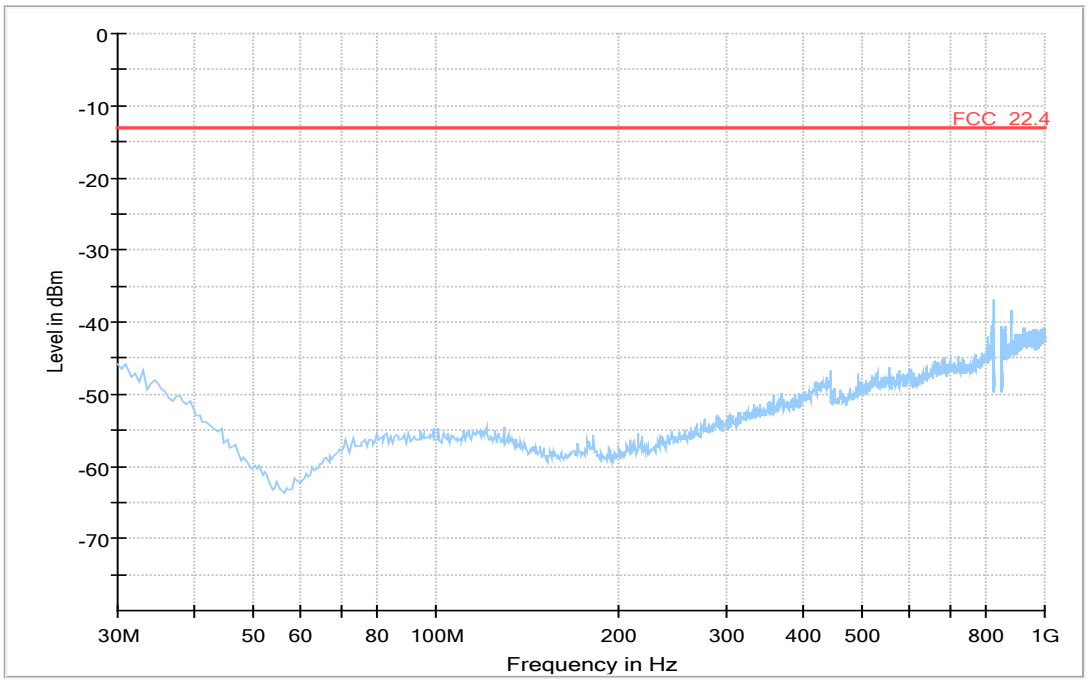
CAT-M1 eFDD5, Channel = mid
30 MHz – 1 GHz



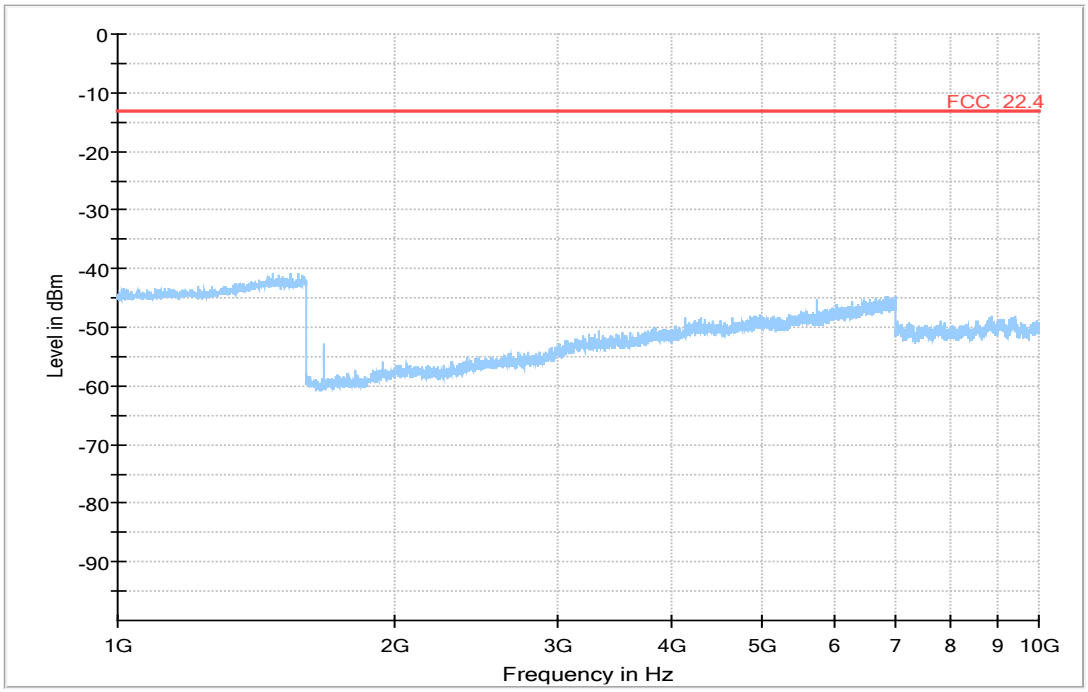
1 GHz – 10 GHz



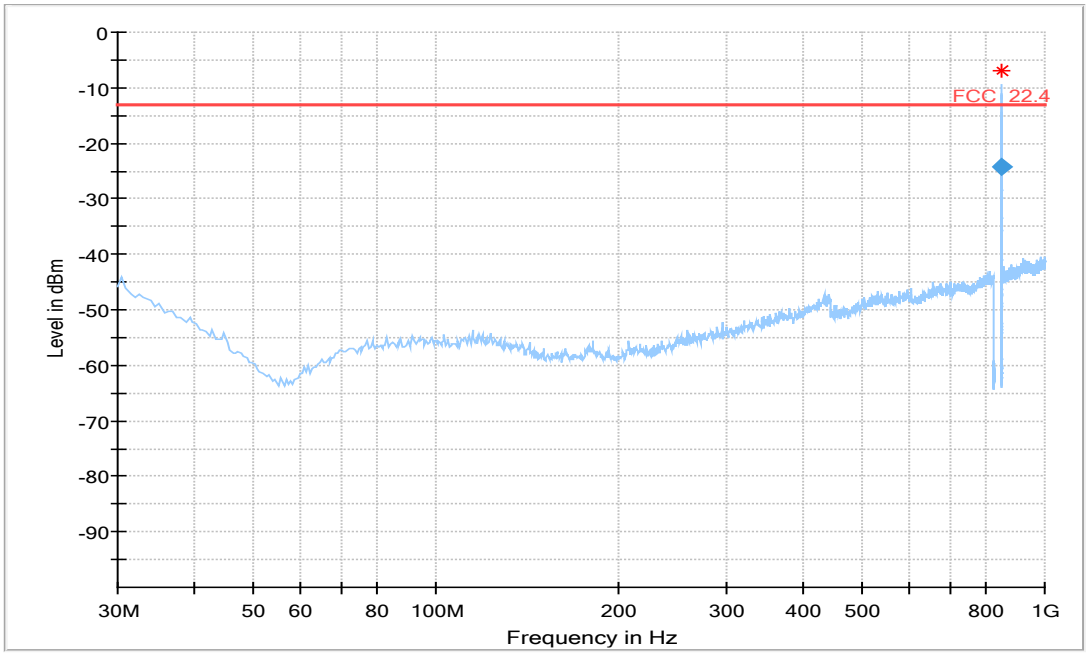
CAT-M1 eFDD26, Channel = mid
30 MHz – 1 GHz



1 GHz – 10 GHz

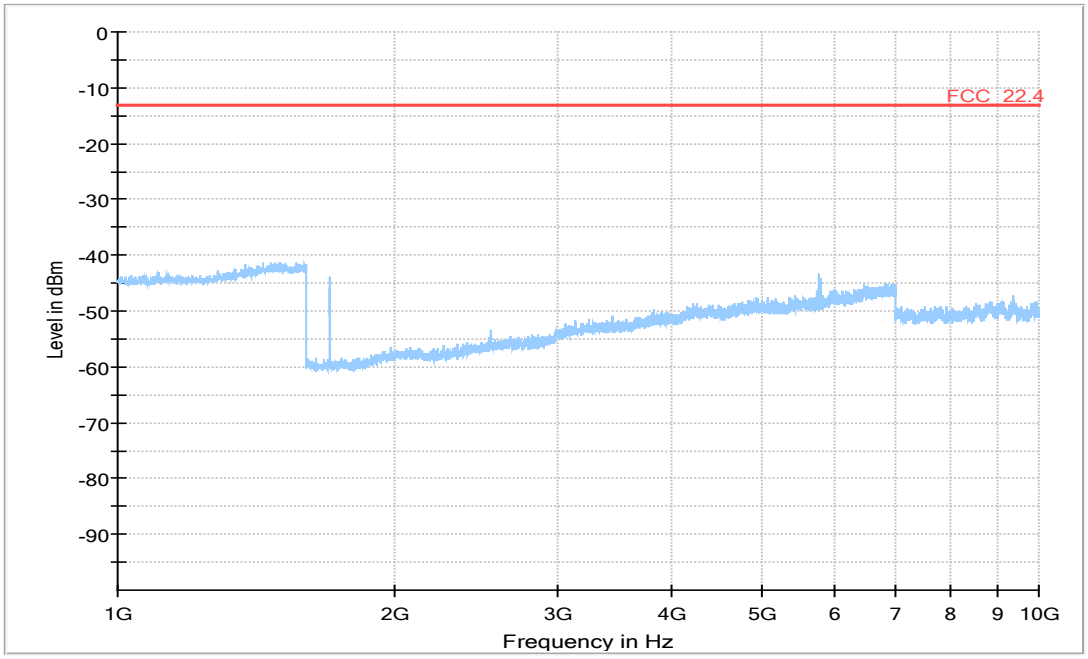


NB-IoT eFDD5, Channel = high
30 MHz – 1 GHz



Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
849.000000	-24.16	-13.00	11.16	1000.0	3.000	100.0	V	-190.0	-73.9

1 GHz – 10 GHz



5.4.5 TEST EQUIPMENT USED

- Radiated Emissions

5.5 EMISSION AND OCCUPIED BANDWIDTH

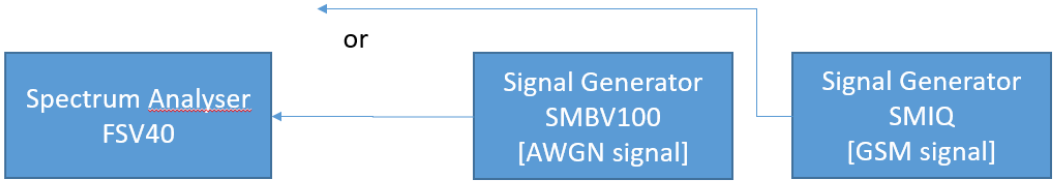
Standard **FCC PART 22 Subpart H**

The test was performed according to:
ANSI C63.26: 2015

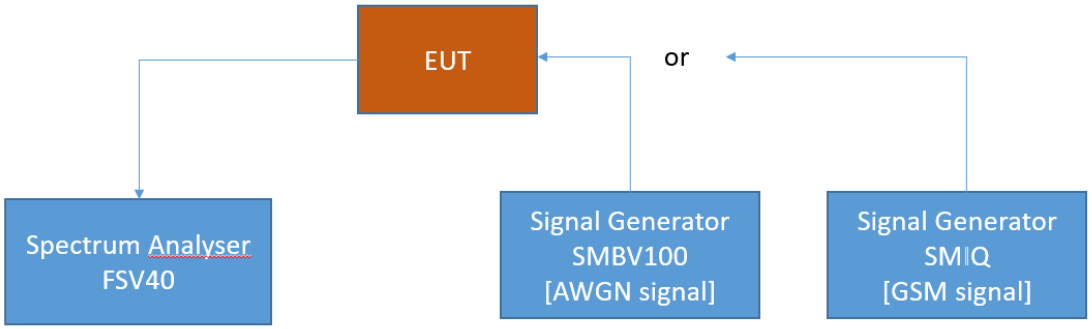
5.5.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission test case per FCC §2.1049 and RSS-GEN 6.7. The limit and the requirements come from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setups according to the following diagram:



FCC Part 22/24/27/90; Industrial Signal Booster
Test Setup step 1: Measuring characteristics of test signals



FCC Part 22/24/27/90; Industrial Signal Booster
Test Setup step 2; Occupied Bandwidth/Input-versus-output spectrum

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

5.5.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1049; Occupied Bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

(i) Transmitters designed for other types of modulation—when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

RSS-GEN; 6.6 Occupied Bandwidth

The emission bandwidth (×dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated × dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3× the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

5.5.3 TEST PROTOCOL

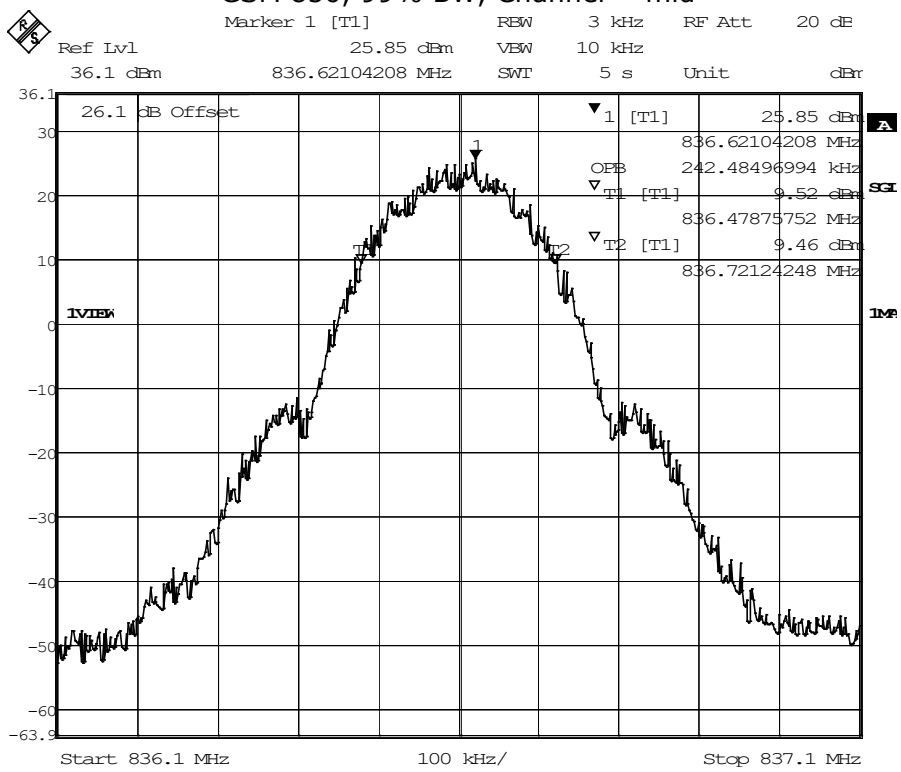
Ambient temperature: 20 - 25 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Ressource Blocks / Subcarrier	Bandwidth [MHz]	Nominal BW [MHz]	26 dB BW [kHz]	99 % BW [kHz]
GSM 850	Low	-	0.2	0.2	314.63	248.49
GSM 850	Mid	-	0.2	0.2	322.65	242.48
GSM 850	High	-	0.2	0.2	314.63	244.49
GSM 850 EDGE	Low	-	0.2	0.2	294.59	232.46
GSM 850 EDGE	Mid	-	0.2	0.2	286.57	234.47
GSM 850 EDGE	High	-	0.2	0.2	288.58	232.46
CAT-M1 eFDD 5 QPSK	Low	6	1.4	1.4	-	1100.20
CAT-M1 eFDD 5 QPSK	Mid	6	1.4	1.4	-	1100.20
CAT-M1 eFDD 5 QPSK	High	6	1.4	1.4	-	1106.21
CAT-M1 eFDD 5 16QAM	Low	5	1.4	1.4	-	937.88
CAT-M1 eFDD 5 16QAM	Mid	5	1.4	1.4	-	937.88
CAT-M1 eFDD 5 16QAM	High	5	1.4	1.4	-	943.89
CAT-M1 eFDD 26 QPSK	Low	6	1.4	1.4	-	1100.20
CAT-M1 eFDD 26 QPSK	Mid	6	1.4	1.4	-	1100.20
CAT-M1 eFDD 26 QPSK	High	6	1.4	1.4	-	1100.20
CAT-M1 eFDD 26 16QAM	Low	5	1.4	1.4	-	937.88
CAT-M1 eFDD 26 16QAM	Mid	5	1.4	1.4	-	937.88
CAT-M1 eFDD 26 16QAM	High	5	1.4	1.4	-	937.88
NB-IoT eFDD 5 QPSK	Low	12	0.2	0.2	-	188.38
NB-IoT eFDD 5 QPSK	Mid	12	0.2	0.2	-	192.38
NB-IoT eFDD 5 QPSK	High	12	0.2	0.2	-	188.38
NB-IoT eFDD 5 BPSK	Low	1	0.2	0.2	-	132.26
NB-IoT eFDD 5 BPSK	Mid	1	0.2	0.2	-	132.26
NB-IoT eFDD 5 BPSK	High	1	0.2	0.2	-	132.26

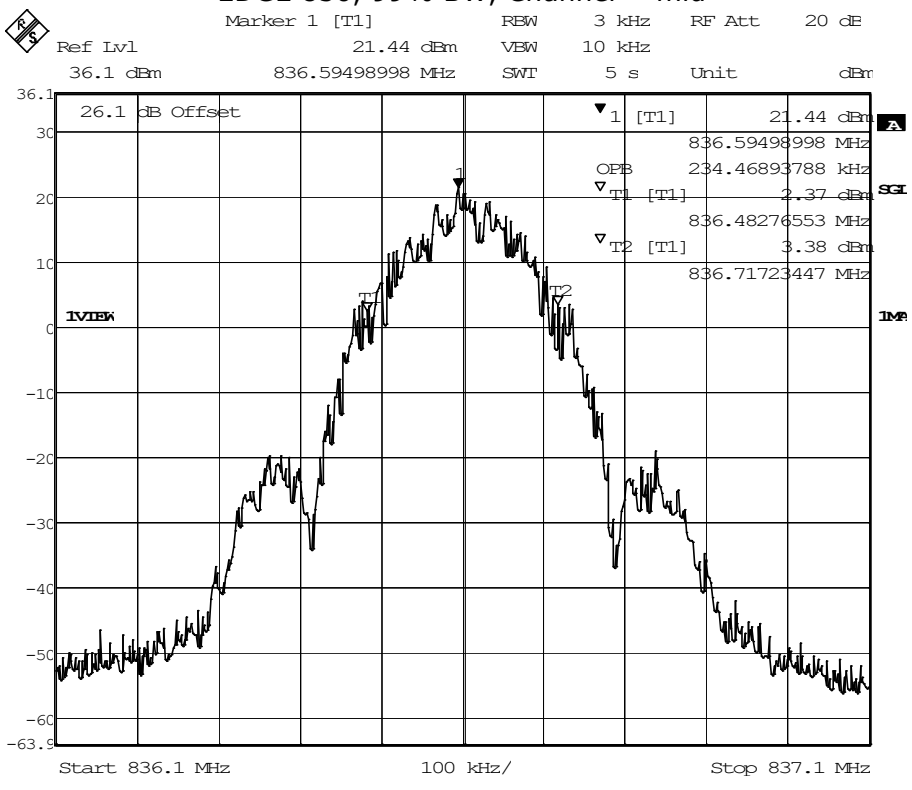
Remark: Please see next sub-clause for the measurement plot.

5.5.4 MEASUREMENT PLOT

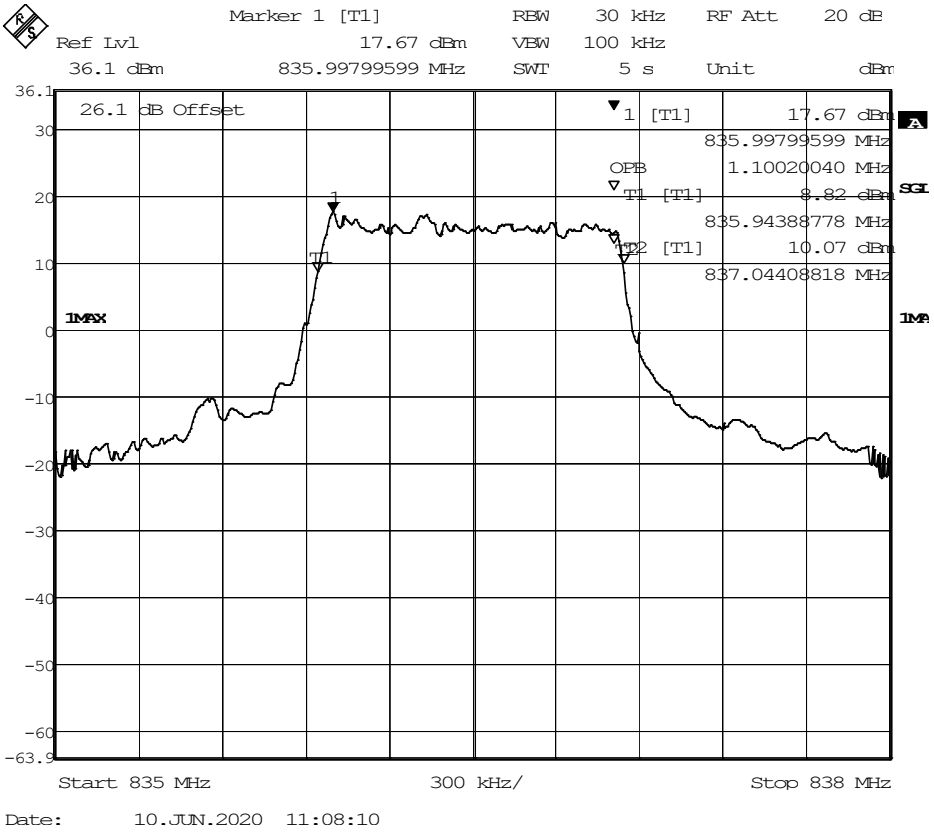
GSM 850, 99% BW, Channel = mid



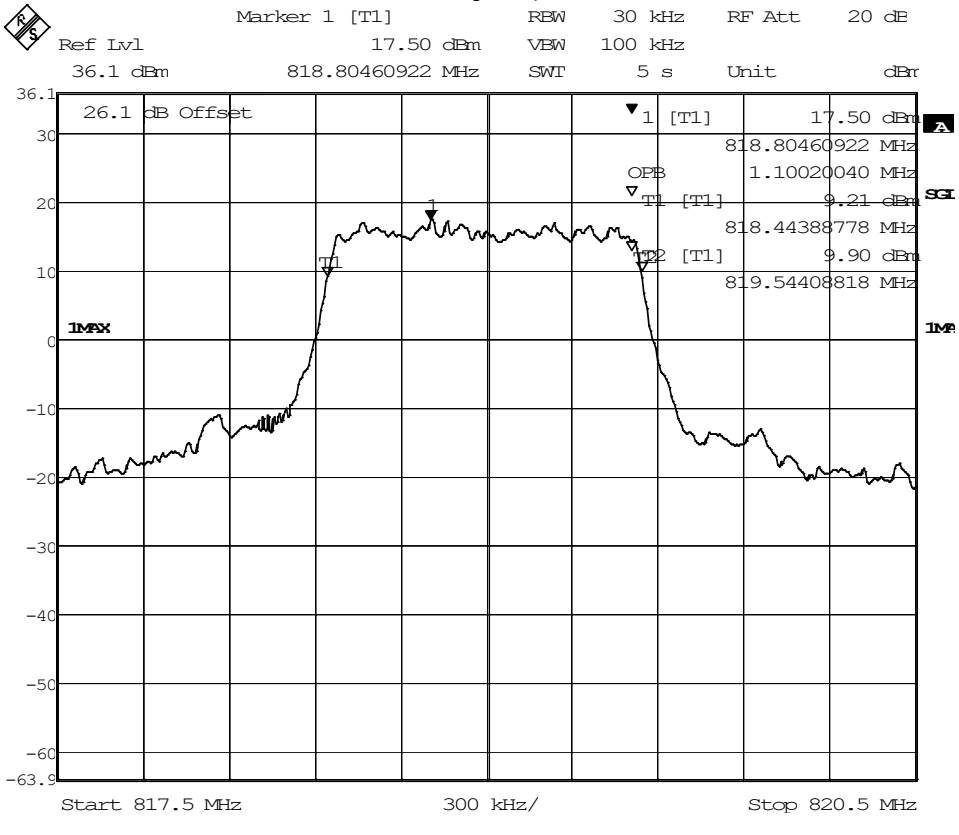
EDGE 850, 99% BW, Channel = mid



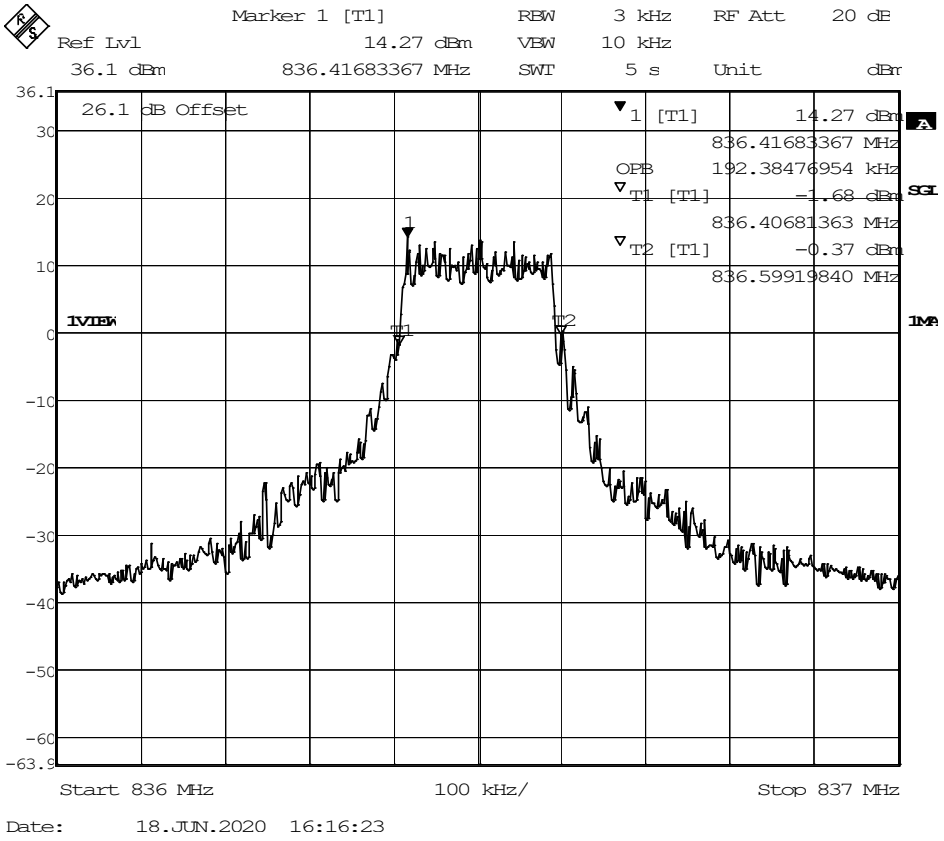
CAT-M1 eFDD 5 QPSK, Channel = mid



CAT-M1 eFDD 26 QPSK, Channel = mid



NB-IoT eFDD 5 QPSK, Channel = mid



5.5.5 TEST EQUIPMENT USED

- Radio Lab

5.6 BAND EDGE COMPLIANCE

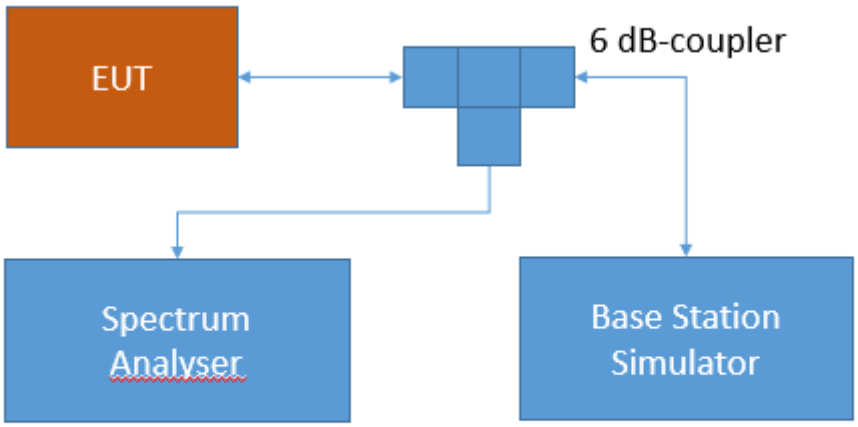
Standard **FCC PART 22 Subpart H**

The test was performed according to:
ANSI C63.26: 2015

5.6.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission test case per § 2. 1051 and RSS-GEN 6.13. The limit comes from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setup according to the following diagram:



Test Setup FCC Part 22/24/27/90 Cellular;
Band edge compliance

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

5.6.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1051; Measurement required: Spurious emissions at antenna terminal:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

Part 22, Subpart H – Cellular Radiotelephone Service

§22 917 – Emission limitations for cellular equipment

(a) Out of band emissions. 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.

RSS-132; 5.5 Transmitter Unwanted Emissions

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

1. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p (watts).
2. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$ p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

5.6.3 TEST PROTOCOL

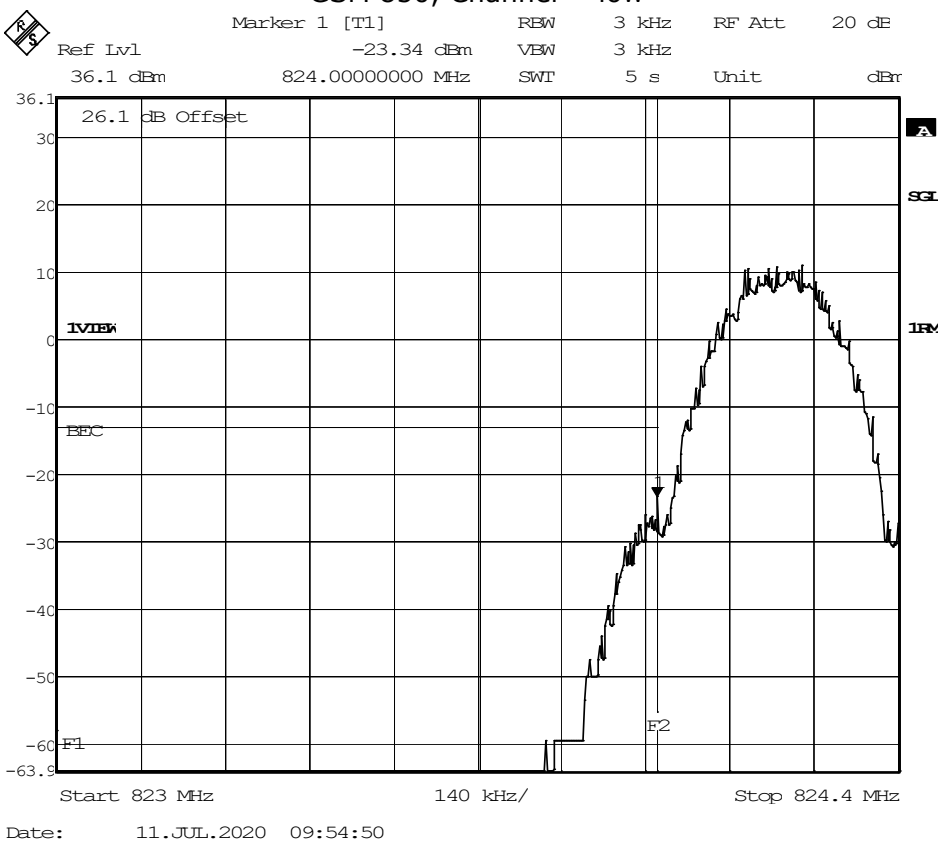
Ambient temperature: 20 - 25 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Resource Blocks / Subcarrier	Bandwidth [MHz]	Peak [dBm]	Average [dBm]	RMS [dBm]	Limit [dBm]	Margin to Limit [dB]
GSM 850	low	-	0.2	-16.09	-36.54	-23.34	-13	10.34
GSM 850	high	-	0.2	-15.75	-39.47	-28.84	-13	15.84
GSM 850 EDGE	low	-	0.2	-24.83	-47.42	-35.38	-13	22.38
GSM 850 EDGE	high	-	0.2	-27.6	-49.92	-38.64	-13	25.64
CAT-M1 eFDD 5 QPSK	low	6	1.4	-17.02	-24.82	-23.76	-13	10.76
CAT-M1 eFDD 5 QPSK	high	6	1.4	-14.84	-25.49	-24.35	-13	11.35
CAT-M1 eFDD 5 16QAM	low	5	1.4	-12.24	-23.21	-22.2	-13	9.2
CAT-M1 eFDD 5 16QAM	high	5	1.4	-16.35	-26.02	-24.98	-13	11.98
CAT-M1 eFDD 26 QPSK	low	6	1.4	-16.94	-24.82	-23.76	-13	10.76
CAT-M1 eFDD 26 QPSK	high	6	1.4	-15.39	-25.49	-24.35	-13	11.35
CAT-M1 eFDD 26 16QAM	low	5	1.4	-16.26	-23.48	-22.69	-13	9.69
CAT-M1 eFDD 26 16QAM	high	5	1.4	-16.18	-24.66	-23.62	-13	10.62
NB-IoT eFDD 5 QPSK	low	12	0.2	-7.56	-29.64	-20.28	-13	7.28
NB-IoT eFDD 5 QPSK	high	12	0.2	-10.19	-32.23	-21.26	-13	8.26
NB-IoT eFDD 5 BPSK	low	1	0.2	-7.59	-15.22	-13.4	-13	0.4
NB-IoT eFDD 5 BPSK	high	1	0.2	-26.97	-35.38	-34.86	-13	21.86

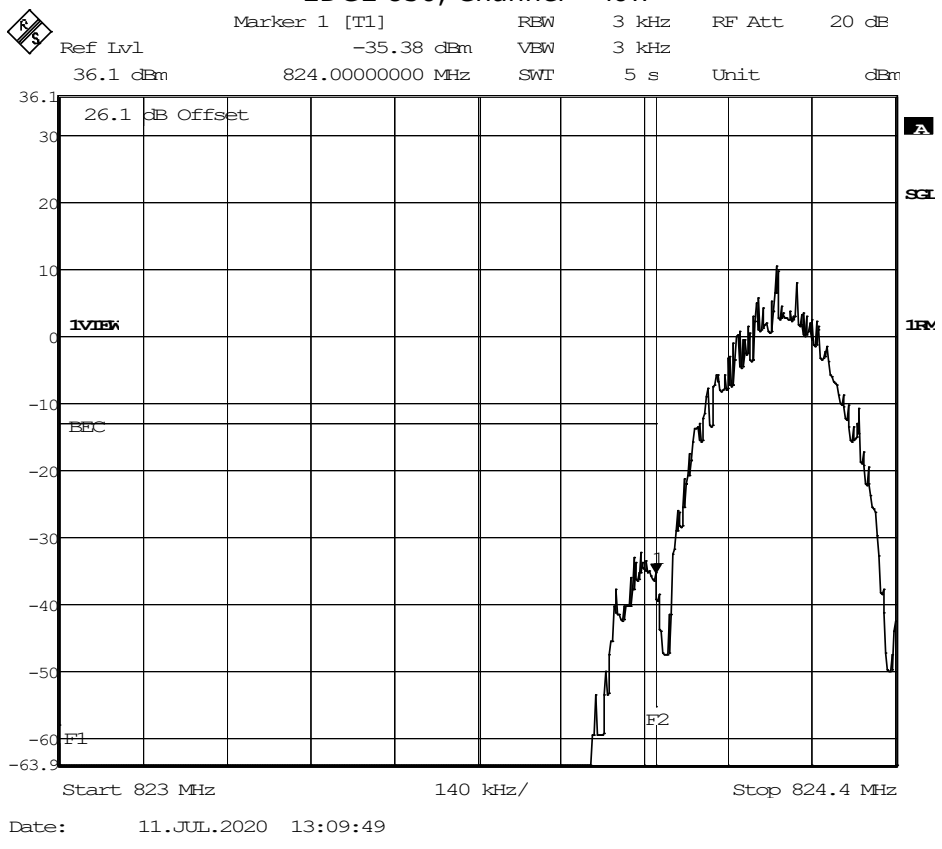
Remark: Please see next sub-clause for the measurement plot.

5.6.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

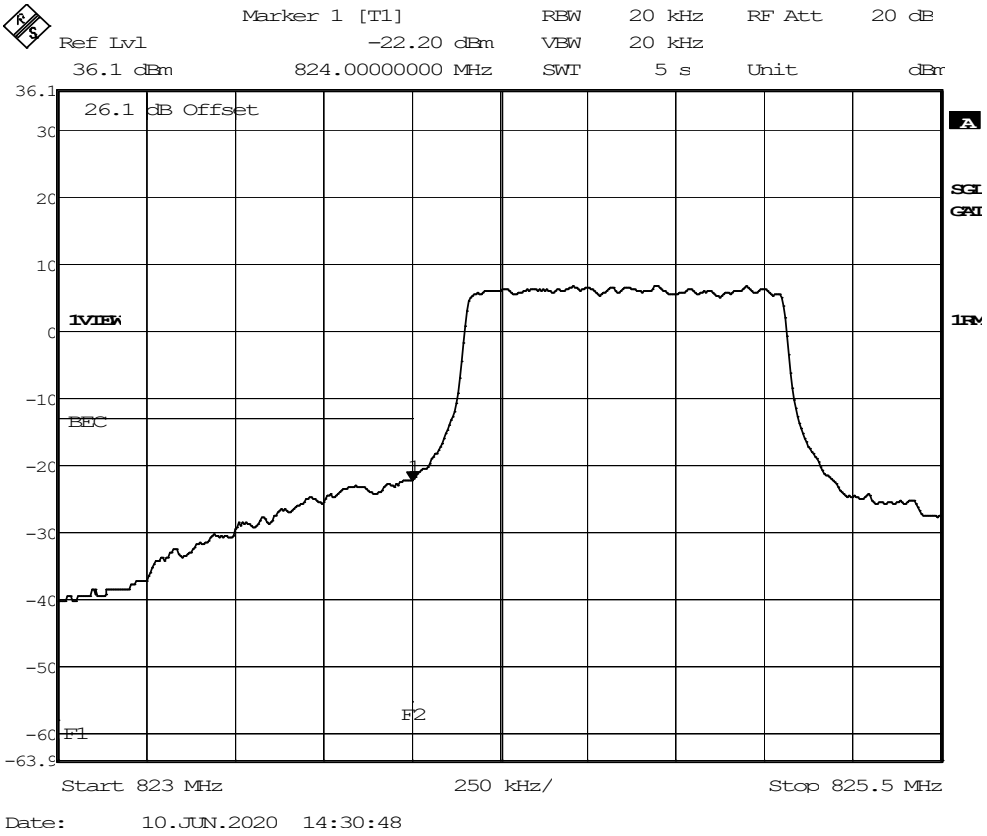
GSM 850, Channel = low



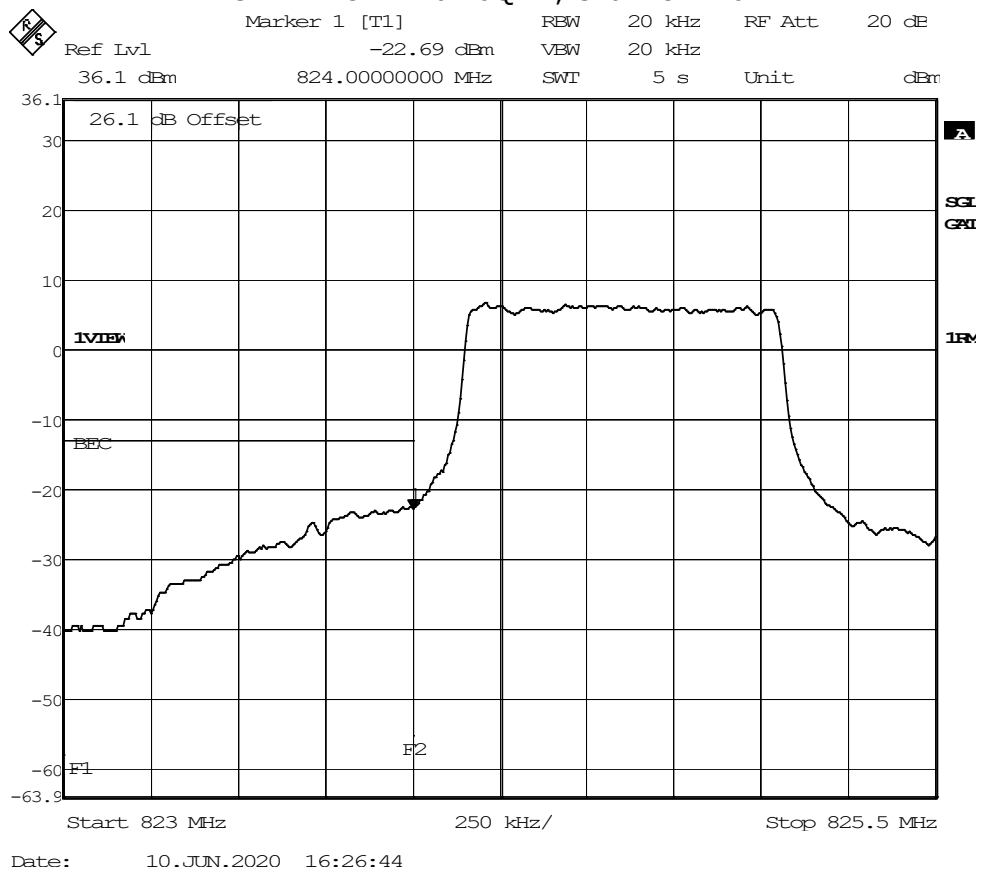
EDGE 850, Channel = low

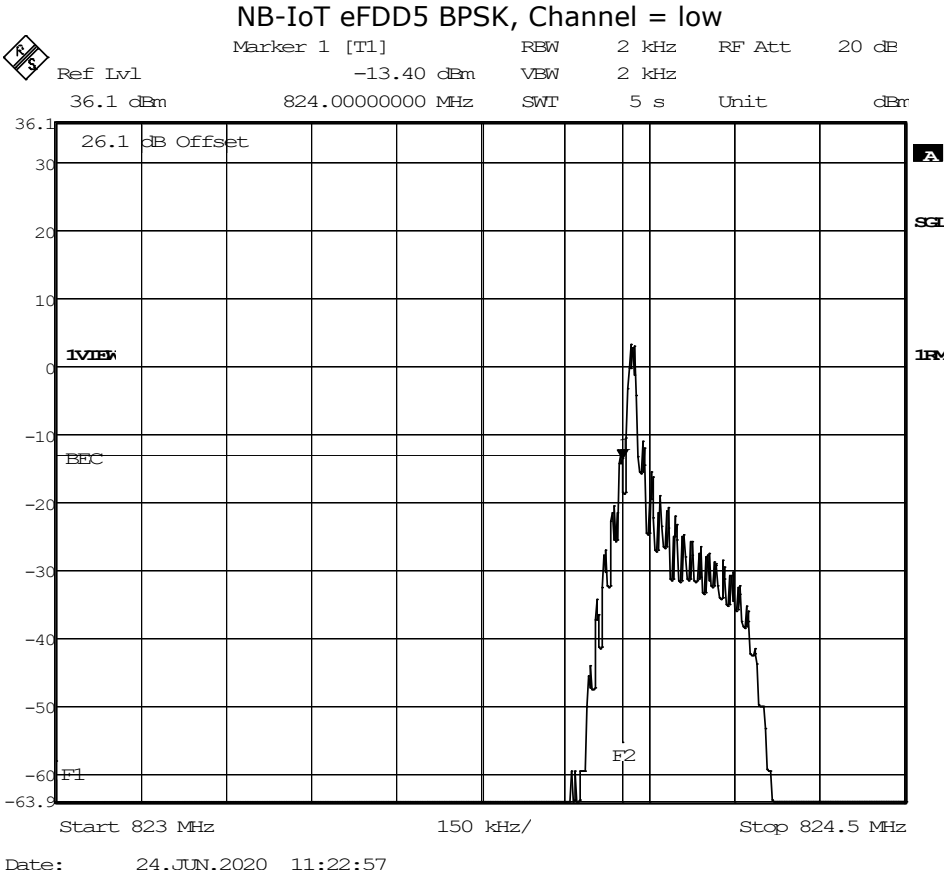


CAT-M1 eFDD5 16QAM, Channel = low



CAT-M1 eFDD26 16QAM, Channel = low





5.6.5 TEST EQUIPMENT USED

- Radio Lab

5.7 PEAK-AVERAGE-RATIO

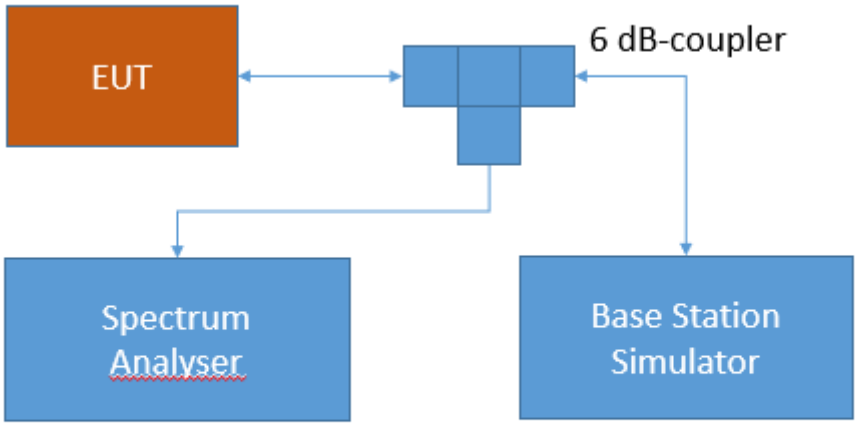
Standard **FCC PART 22 Subpart H**

The test was performed according to:
ANSI C63.26: 2015

5.7.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance of the EUT to the peak-to-average limits and requirements of the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setup according to the following diagram:



Test Setup FCC Part 22/24/27/90 Cellular;
Peak-average ratio

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams. The internal CCDF (complementary cumulative distribution function) of the spectrum analyser is used for this measurement

5.7.2 TEST REQUIREMENTS / LIMITS

FCC Part 22, § 22.913

There exists no applicable limit

RSS-132; 5.4 Transmitter Output Power and Equivalent Isotropically Radiated Power

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

5.7.3 TEST PROTOCOL

Ambient temperature: 20 - 25 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Resource Blocks / Subcarrier	Bandwidth [MHz]	Peak to Average Ratio [dB]	Limit (IC) [dB]
GSM 850	Low	-	0.2	1.91	13
GSM 850	Mid	-	0.2	1.94	13
GSM 850	High	-	0.2	1.94	13
GSM 850 EDGE	Low	-	0.2	3.25	13
GSM 850 EDGE	Mid	-	0.2	3.18	13
GSM 850 EDGE	High	-	0.2	3.06	13
CAT-M1 eFDD 5 QPSK	Low	6	1.4	10.29	13
CAT-M1 eFDD 5 QPSK	Mid	6	1.4	10.43	13
CAT-M1 eFDD 5 QPSK	High	6	1.4	10.49	13
CAT-M1 eFDD 5 16QAM	Low	5	1.4	11.22	13
CAT-M1 eFDD 5 16QAM	Mid	5	1.4	11.28	13
CAT-M1 eFDD 5 16QAM	High	5	1.4	11.30	13
CAT-M1 eFDD 26 QPSK	Low	6	1.4	10.38	13
CAT-M1 eFDD 26 QPSK	Mid	6	1.4	10.32	13
CAT-M1 eFDD 26 QPSK	High	6	1.4	10.49	13
CAT-M1 eFDD 26 16QAM	Low	5	1.4	11.3	13
CAT-M1 eFDD 26 16QAM	Mid	5	1.4	11.28	13
CAT-M1 eFDD 26 16QAM	High	5	1.4	11.39	13
NB-IoT eFDD 5 QPSK	Low	12	1.4	10.61	13
NB-IoT eFDD 5 QPSK	Mid	12	1.4	10.49	13
NB-IoT eFDD 5 QPSK	High	12	1.4	11.16	13
NB-IoT eFDD 5 BPSK	Low	1	1.4	3.48	13
NB-IoT eFDD 5 BPSK	Mid	1	1.4	3.42	13
NB-IoT eFDD 5 BPSK	High	1	1.4	3.80	13

Remark: Please see next sub-clause for the measurement plot.