
TEST REPORT FOR GSM TESTING

Report No.: SRTC2020-9004(F)-20111001(A)

Product Name: Mobile phone

Product Model: HLTE232E

Applicant: Hisense International Co., Ltd.

Manufacturer: Hisense Communications Co., Ltd.

Specification: FCC Part 24E, Part 22H, Part 2 (2019)

FCC ID: 2ADOBHLTE232E

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30 Shixing Street, Shijingshan District,

Beijing, P.R.China

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1. GENERAL INFORMATION

1.1 Notes of the test report

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1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, P.R.China
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Liu Jia
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1.3 Applicant's details

Company:	Hisense International Co., Ltd.
Address:	Floor 22, Hisense Tower, 17 Donghai Xi Road, Qingdao, 266071, China
City:	Qingdao
Country or Region:	China
Contacted person:	Geng Ruifeng
Tel:	+86-532-80877742
Fax:	---
Email:	gengruifeng@hisense.com

1.4 Manufacturer's details

Company:	Hisense Communications Co., Ltd.
Address:	218 Qianwangang Road, Qingdao Economic & Technological Development Zone, Qingdao, China
City:	Qingdao
Country or Region:	China
Contacted person:	Deng Tingting
Tel:	+86-532-55753708
Fax:	---
Email:	dengtingting@hisense.com

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2020-11-10
Testing Start Date:	2020-11-10
Testing End Date:	2020-11-23

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	40
Maximum Extreme	55	---
Minimum Extreme	0	---

Normal Supply Voltage (V d.c.):	3.80
Maximum Extreme Supply Voltage (V d.c.):	4.35
Minimum Extreme Supply Voltage (V d.c.):	3.50

2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

Frequency Range	GSM850: Tx:824~849MHz Rx:869~894MHz PCS1900: Tx:1850~1910MHz Rx:1930~1990MHz
Modulation Type	GPRS:GMSK EDGE: GMSK/8PSK
Emission Designator	300KGXW/300KG7W
Duplex Mode	FDD
Duplex Spacing	GSM850:45MHz PCS1900:80MHz
Antenna Type	Fixed Internal Antenna
Antenna Gain	GSM850: -0.95dBi/PCS1900: -0.69dBi
Power Supply	Battery/Charger
Hardware Version	FS185-MB-V5.0
Software Version	Hisense_HLTE232E_10_S01_01_01_MX05_debug_KS232D_0003673_20201107_0713
IMEI	869130050001655

Note: The difference between main supply and secondary supply is that the Battery, Camera, Memory, Fingerprint and do not affect the RF parameters, so the secondary supply evaluates the worst case of radiation.

Main Supply

Part Name	Model	Supplier(Brand)	Description
Battery	LPN385500	ShenzhenAerospaceElectronic Co.,Ltd.	PLG496590
Camera	BC12903V0	Kingcome	HI1336,COB,S1326A
fingerprint	S88ZC5045-A1	Shenzhen shennuoxin electronic technology co. LTD	SW9022

Secondary Supply

Part Name	Model Name	supplier	Remark
Battery	LPN385500	DONGGUAN MILEY ELECTRONICS CO.,LTD	496588P5000
Camera	OVX3545-LS051-AR13 35V1.0	JIANGXI O&V-STAR TECHNOLOGY CO.LTD	AR1335 COB
fingerprint	F272-KS232-SW9022-V1.0	JIANGXI O&V-STAR TECHNOLOGY CO.LTD	SW9022

2.2 Support Equipment

The following support equipment was used to exercise the DUT during testing:

Equipment	Battery
Manufacturer	ShenzhenAerospaceElectronic Co.,Ltd.
Model Number	PLG496590
Equipment	Battery
Manufacturer	DONGGUAN MILEY ELECTRONICS CO.,LTD
Model Number	496588P5000
Equipment	Charger
Manufacturer	SHENZHENTIANYIN ELECTRONICS CO., LTD.
Model Number	TPA-46050200UU
Equipment	Headset 1
Manufacturer	kelinDongguan Keling Electronic Technology Co., Ltd
Model Number	KS232D
Equipment	USB Cable 1
Manufacturer	kelinDongguan Keling Electronic Technology Co., Ltd
Model Number	KS232D

2.3 Summary table.

FCC Rule Part	Mode	Frequency Range (MHz)	ERP/ EIRP (dBm)	ERP/ EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
22H	GSM850	824.2-848.8	30.51	1.122	0.019	246KGXW
22H	EDGE850	824.2-848.8	23.27	0.220	0.026	246KG7W
24E	GSM1900	1850.2-1909.8	29.11	0.815	-0.011	250KGXW
24E	EDGE1900	1850.2-1909.8	25.39	0.346	0.015	252KG7W

3 REFERENCE SPECIFICATION

Specification	Version	Title
FCC Part2	2019	Frequency allocations and radio treaty matters; general rules and regulations
FCC Part22	2019	Public mobile services
FCC Part24	2019	Personal communications services
ANSI C63.26	2015	American national standard for compliance testing of transmitters used in licensed radio services
KDB 971168 D01	April 9, 2018	Measurement guidance for certification of licensed digital transmitters
TIA-603-E-2016	March 2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

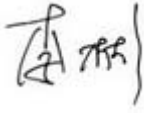
4 KEY TO NOTES AND RESULT CODES

The following are the definition of the test result.

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
NT	Normal Temperature
NV	Nominal voltage
HV	High voltage
LV	Low voltage

5 RESULT SUMMARY

No.	Test case	FCC reference	Verdict
1	RF Power Output	2.1046	Pass
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913(a)(5)/24.232(c)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Emission Bandwidth	2.1049	Pass
5	Spurious Emissions at antenna terminals	2.1051/22.917(a)/24.238(a)	Pass
6	Band Edges Compliance	2.1051/22.917(a)/24.238(a)	Pass
7	Frequency Stability	2.1055/22.355/24.235	Pass
8	Radiated Spurious Emissions	2.1053/22.917(a)/24.238(a)	Pass
9	Peak-Average Ratio	24.232(d)	Pass

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: Mr. Tong Daocheng 	Issued date: 20201124

6 TEST RESULT

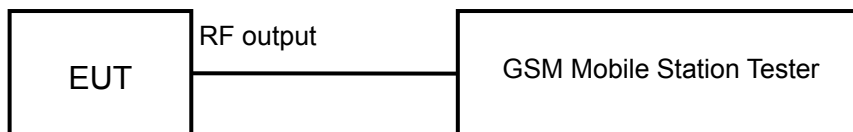
6.1 RF Power Output

Rule Part(s)
FCC Part 2.1046

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	40%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration. The measurement will be conducted at three channels (Low, Middle and High channels)

Limits: No specific conduct power requirements in part 2.1046.

Test result:

The test results are shown in Appendix A.

6.2 Effective Radiated Power and Effective Isotropic Radiated Power

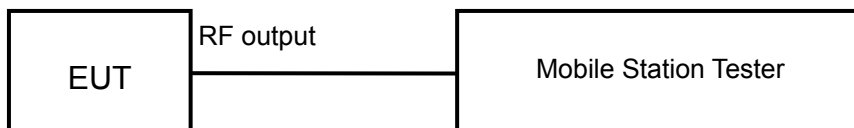
Rule Part(s)

FCC Part 22.913(a)(5)/Part 24.232(c)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	40%	101.9kPa

Test setup:



Test procedure:

KDB 971168 D01 v03r01 – Section 5.6

Test Settings

Subclause 5.2.5.5 of ANSI C63.26-2015 is applicable, along with the following provisions. For personal/portable radios utilizing an integral antenna, the factor LC is typically negligible. However, in a fixed station transmit system that utilizes a long cable run between the transmitter and the transmitting antenna, this factor can be significant. The minimum cable loss should be used in this equation.

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured is:

$$\text{ERP/EIRP} = \text{PMeas} - \text{LC} + \text{GT}$$

Where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm)

PMeas = measured transmitter output power or PSD, in dBW or dBm

LC = signal attenuation in the connecting cable between the transmitter and antenna in dB

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

Limits for GSM850:

Operation Mode	Power Step	E.R.P. (dBm)
GSM	5	≤38.45
GPRS	3	≤38.45
EDGE	6	≤38.45

Limits for PCS1900:

Operation Mode	Power Step	E.I.R.P. (dBm)
GSM	0	≤33
GPRS	3	≤33
EDGE	5	≤33

Test result:

The test results are shown in Appendix A.

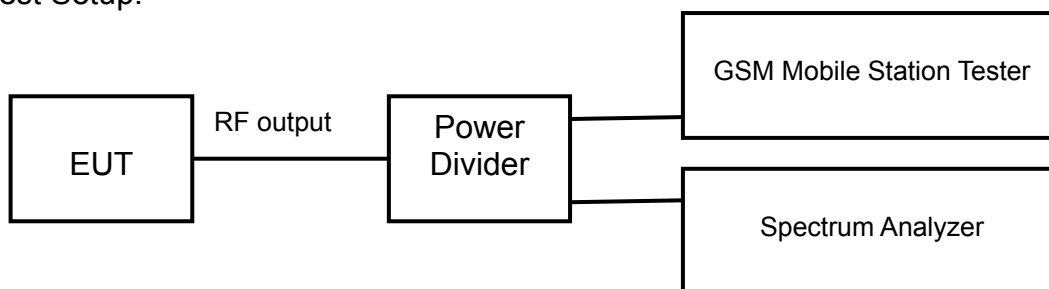
6.3 Occupied Bandwidth

Rule Part(s)
Part 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	40%	101.9kPa

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

The test results are shown in Appendix A.

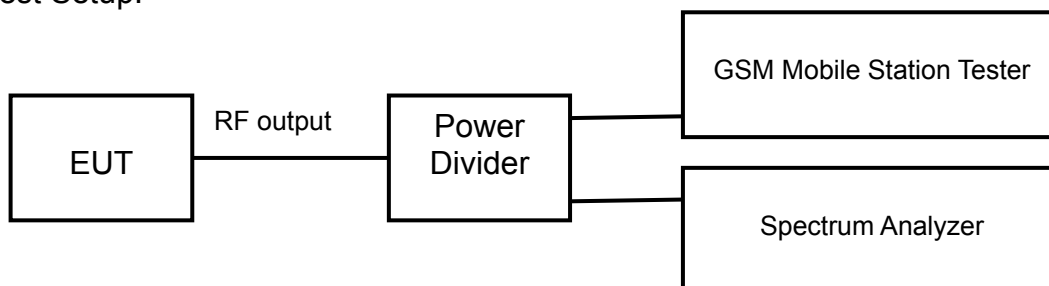
6.4 Emission Bandwidth-

Rule Part(s)
Part 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	40%	101.9kPa

Test Setup:



Test procedure:

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 26dB occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the emission bandwidth observed in Step 7

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

The test results are shown in Appendix A.

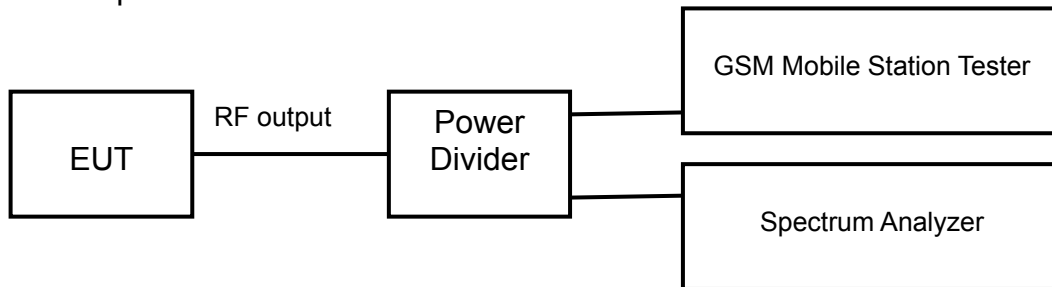
6.5 Spurious Emissions at antenna terminal

Rule Part(s)
FCC Part 2.1053/22.917 (a)/ 24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	40%	101.9kPa

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 10GHz for Cell, 20GHz for PCS
2. RBW=100 kHz (For below 1GHz), 1MHz (For above 1GHz)
3. VBW $\geq 3 \times$ RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Limits:

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{\text{[Watts]}})$, where P is the transmitter power in Watts.

Test result:

The test results are shown in Appendix A.

6.6 Band Edges Compliance

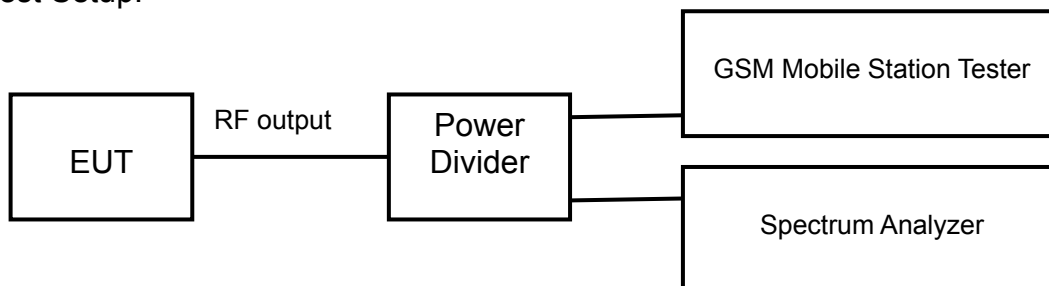
Rule Part (s)

FCC Part 2.1051/ 22.917(a) /Part 24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	40%	101.9kPa

Test Setup:



Test procedure:

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span=2MHz
3. RBW > 1% of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Limit: The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{\text{[Watts]}})$, where P is the transmitter power in Watts.

Test result:

The test results are shown in Appendix A.

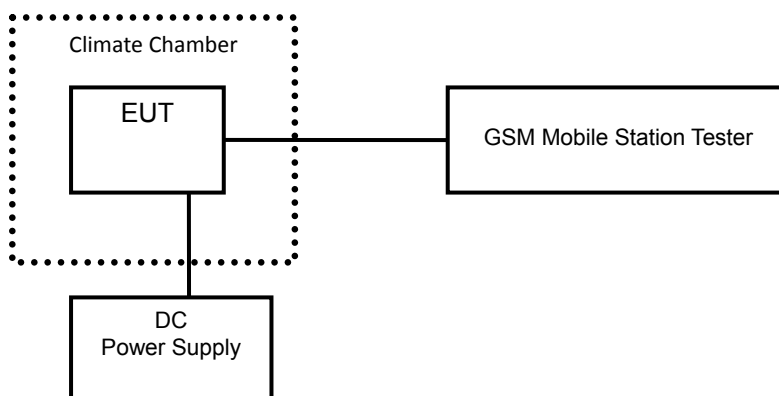
6.7 Frequency Stability

Rule Part(s)
FCC Part 2.1055/22.355 /Part 24.235

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	40%	101.9kPa

Test setup:



Test Procedure:
ANSI/TIA-603-E-2016

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C (The temperature range can be declared by the manufacturer). A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Limits: For Part 22, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency. For Part 24, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test result:
The test results are shown in Appendix A.

6.8 Radiated Spurious Emissions

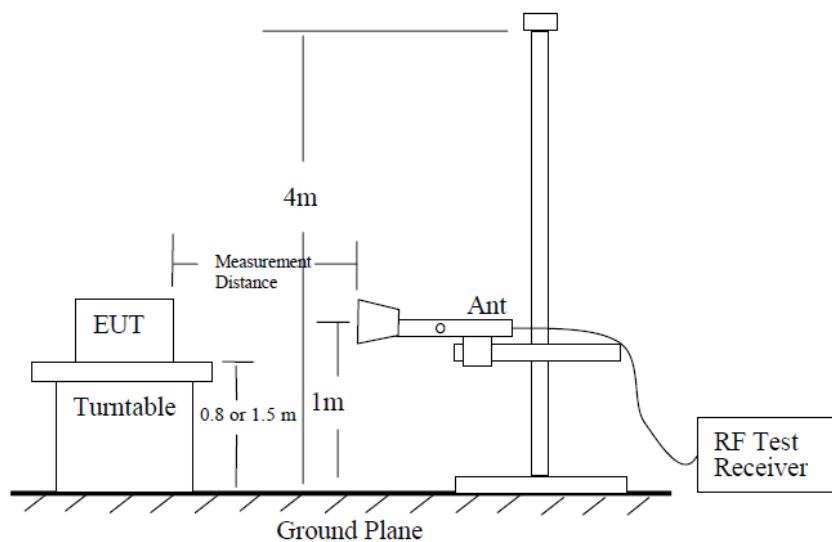
Rule Part(s)

FCC Part2.1053/ 22.917(a)/Part 24.238(a)

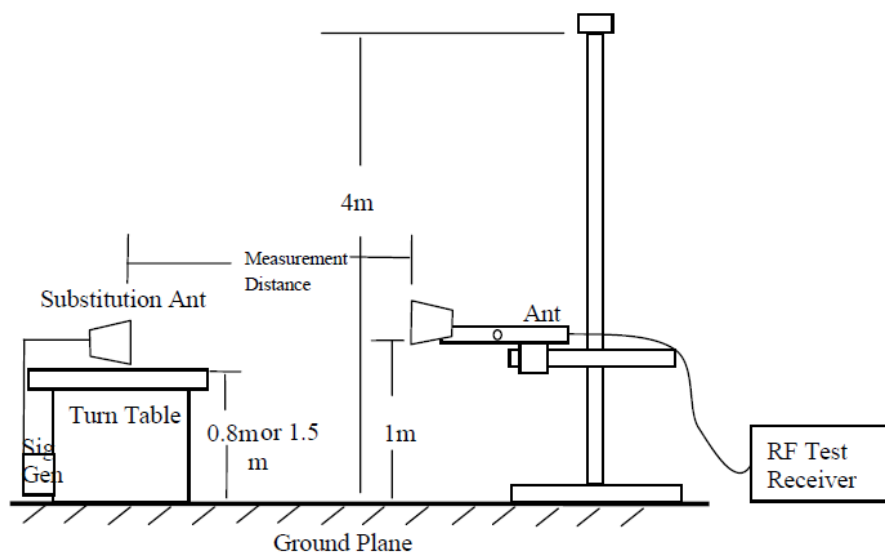
Ambient condition:

Temperature	Relative humidity	Pressure
25°C	40%	101.9kPa

Test Setup:



Step 1



Step 2

Test procedure:

The measurements procedures in TIA-603-E-2016 are used.

The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.

Step 1:

The measurement is carried out in the chamber. EUT was placed on a 0.8m ($f < 1\text{GHz}$)/1.5m ($f > 1\text{GHz}$) high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna from 1m to 4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 100 kHz ($f < 1\text{GHz}$)/1MHz ($f > 1\text{GHz}$). The antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 10th harmonic of the carrier. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power (P_{mea}) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A "reference path loss" should be calculated after test. The attenuation of "reference path loss" is the cable loss between the Signal Source with the Substitution Antenna (P_{ca}) and the Substitution Antenna Gain (G_a).

Calculation procedure:

The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:

$$\text{Power (EIRP)} = P_{\text{mea}} + P_{\text{ca}} + G_a$$

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15 \text{ (dB)}$.

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.

$$P = P_{\text{mea}} + P_{\text{ca}} + G_a = (-20\text{dBm}) + (-30\text{dB}) + (11\text{dB}) = -39\text{dBm}$$

Note: We tested both horizontal and vertical polarization, but only the largest numerical polarity of the two polarities was recorded in the final report.

Test result:

The test results are shown in Appendix B.

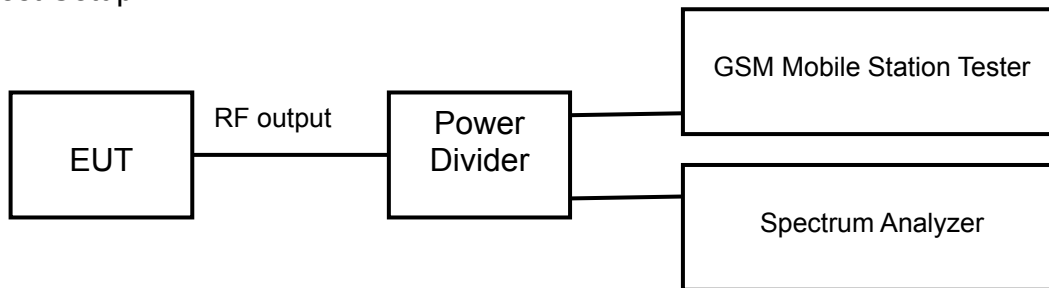
6.9 Peak-Average Ratio

Rule Part(s)
FCC Part 24.232(d)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	40%	101.9kPa

Test Setup:



Test procedure:
KDB 971168 D01 v03r01 – Section 5.7.1

Test settings:

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Limits: the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test result:

The test results are shown in Appendix A

7 MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
Occupied Bandwidth	3kHz	
Peak power output	0.67dB	
Band edge compliance	1.20dB	
Spurious emissions	30MHz~1GHz	2.83dB
	1GHz~12.75GHz	2.50dB
	12.75GHz~25GHz	2.75dB

8 TEST EQUIPMENTS

No.	Name/Model	Manufacturer	S/N	Calibration Date	Calibration Due Date
1	MT8820C Mobile Station Tester	Anritsu	6201300660	2020.08.20	2021.08.19
2	CMW500 Radio Communication Station	R&S	161702	2020.08.20	2021.08.19
2	FSV40 Spectrum Analyzer	R&S	101065	2020.08.20	2021.08.19
3	N9020A Spectrum Analyzer	Agilent	MY48010771	2020.08.20	2021.08.19
4	6007 Power Divider	Weinschel	6007-GJ-1	2020.08.20	2021.08.19
5	DC Power Supply E3645A	Agilent	MY40000741	2020.03.01	2021.02.28
6	Temperature chamber SH241	ESPEC	92013758	2020.08.20	2021.08.19
7	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	----	----	----
8	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	---	----	----
9	Turn table Diameter:1m	FRANKONIA	----	----	----
10	Turn table Diameter:5m	FRANKONIA	----	----	----
11	Antenna master FAC(MA4.0)	MATURO	----	----	----
12	Antenna master SAC(MA4.0)	MATURO	----	----	----
13	9.080m×5.255m×3.525m Shielding room	FRANKONIA	----	----	----
14	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100512	2020.08.20	2021.08.19
15	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100513	2020.08.20	2021.08.19
16	HL562 Ultra log antenna	R&S	100016	2020.08.20	2021.08.19
17	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2020.08.20	2021.08.19
18	ESI 40 EMI test receiver	R&S	100015	2020.08.20	2021.08.19
19	ESCS30 EMI test receiver	R&S	100029	2020.08.20	2021.08.19
20	HL562 Receive antenna	R&S	100167	2020.08.20	2021.08.19
21	ENV216 AMN	R&S	3560.6550.12	2020.08.20	2021.08.19

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

RF Power Output

GSM850

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.2	128	32.95
836.4	189	32.80
848.8	251	33.60

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
824.2	128	4Downlink1uplink	32.93
836.4	189		32.77
848.8	251		33.57
824.2	128	3Downlink2uplink	30.63
836.4	189		30.48
848.8	251		30.53
824.2	128	2Downlink3uplink	28.75
836.4	189		28.62
848.8	251		28.65
824.2	128	1Downlink4uplink	26.54
836.4	189		26.44
848.8	251		26.49

EGPRS (8PSK) Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
824.2	128	8PSK 4Downlink1uplink	26.42
836.4	189		26.47
848.8	251		26.29
824.2	128	8PSK 3Downlink2uplink	26.21
836.4	189		26.26
848.8	251		26.12
824.2	128	8PSK 2Downlink3uplink	25.11
836.4	189		24.26
848.8	251		24.95
824.2	128	8PSK 1Downlink4uplink	22.71
836.4	189		23.11
848.8	251		23.39

PCS1900

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	29.64
1880.0	661	29.60
1909.8	810	29.74

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
1850.2	512	4Downlink1uplink	29.63
1880.0	661		29.67
1909.8	810		29.80
1850.2	512	3Downlink2uplink	27.31
1880.0	661		27.12
1909.8	810		27.04
1850.2	512	2Downlink3uplink	25.68
1880.0	661		25.48
1909.8	810		25.39
1850.2	512	1Downlink4uplink	23.56
1880.0	661		23.39
1909.8	810		23.28

EGPRS (8PSK) Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
1850.2	512	8PSK 4Downlink1uplink	25.22
1880.0	661		26.08
1909.8	810		25.79
1850.2	512	8PSK 3Downlink2uplink	25.05
1880.0	661		25.89
1909.8	810		25.60
1850.2	512	8PSK 2Downlink3uplink	23.15
1880.0	661		24.15
1909.8	810		24.03
1850.2	512	8PSK 1Downlink4uplink	21.13
1880.0	661		21.59
1909.8	810		21.45

Occupied Bandwidth

GSM850

GSM MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	238.78
836.4	189	244.57
848.8	251	246.02

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	246.02
836.4	189	237.34
848.8	251	244.57

EDGE (8PSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	237.34
836.4	189	240.23
848.8	251	246.02

PCS1900

GSM MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	251.81
1880.0	661	238.78
1909.8	810	247.47

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	250.36
1880.0	661	243.13
1909.8	810	240.23

EDGE (8PSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	240.23
1880.0	661	266.28
1909.8	810	251.81

GSM850

GSM MODE:



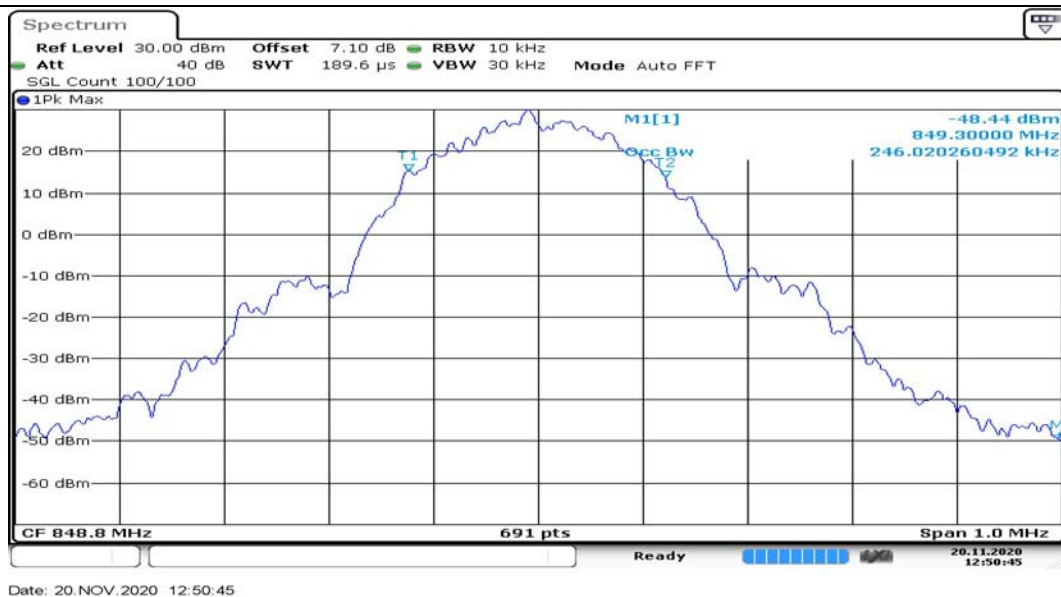
Date: 20.NOV.2020 12:49:00

Channel 128



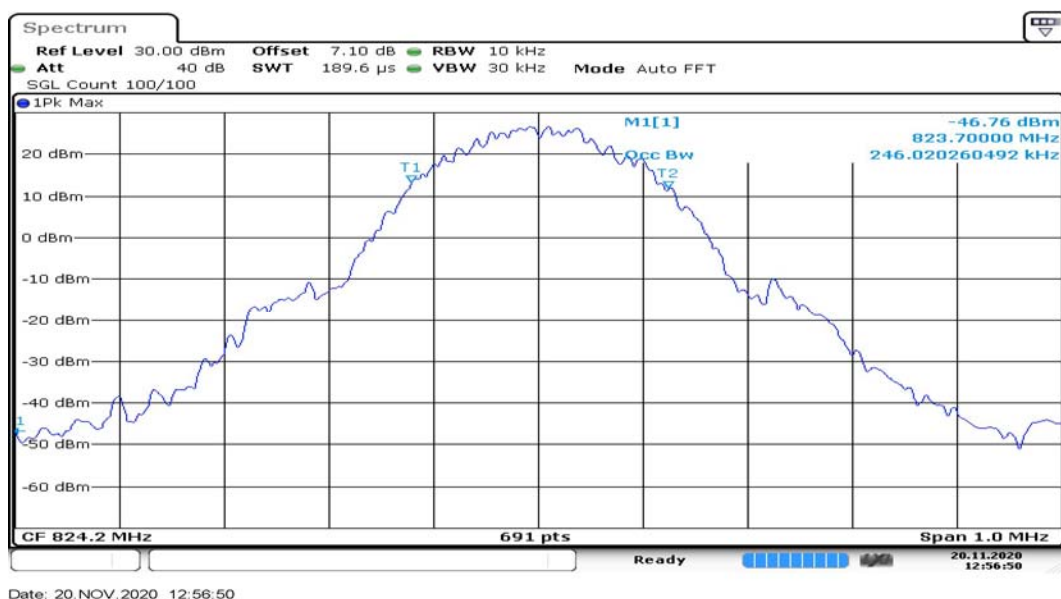
Date: 20.NOV.2020 12:50:02

Channel 189

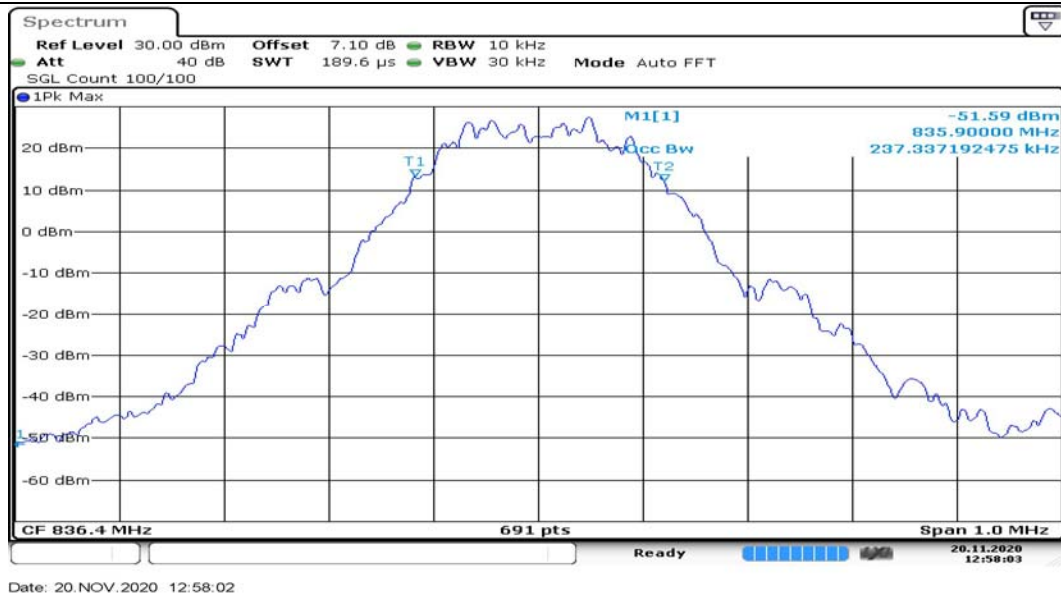


Channel 251

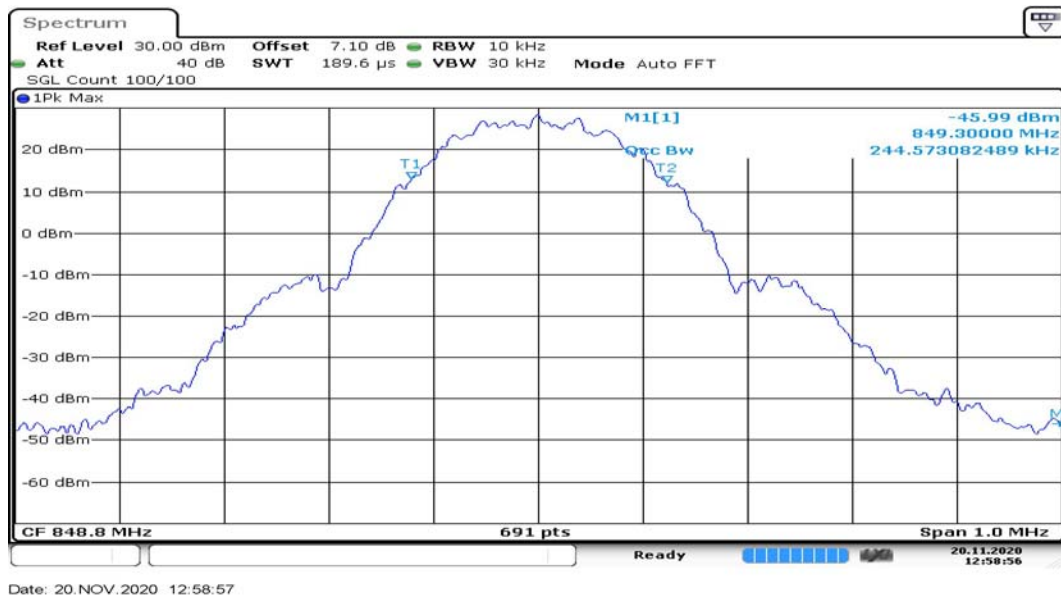
GPRS MODE:



Channel 128



Channel 189



Channel 251

EDGE (8PSK) MODE:



Date: 20.NOV.2020 13:02:26

Channel 128



Date: 20.NOV.2020 13:03:39

Channel 189



Channel 251

PCS1900
GSM MODE:



Channel 512



Channel 661



Channel 810

GPRS MODE:



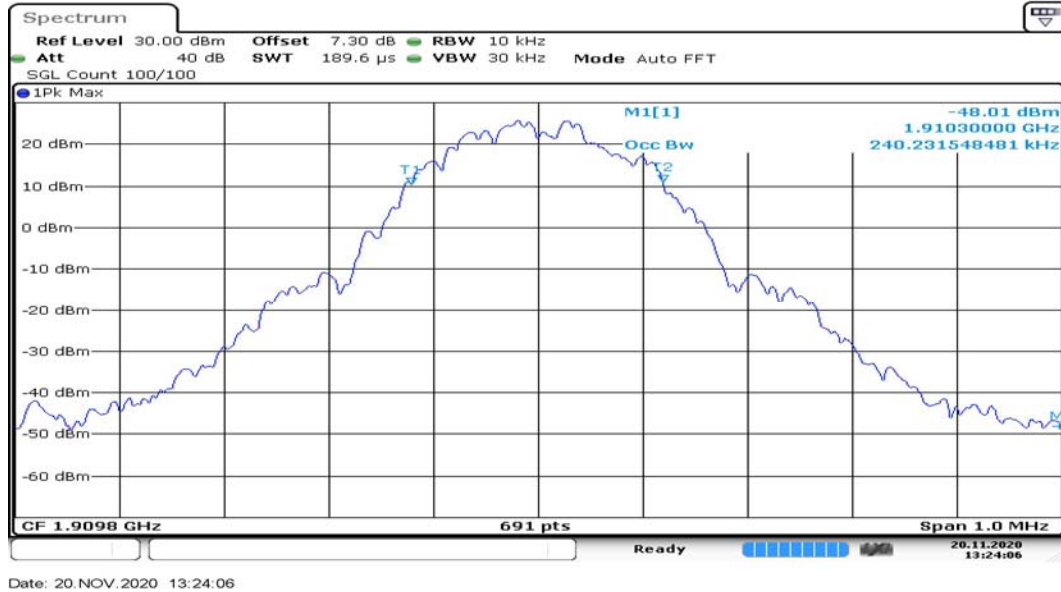
Date: 20.NOV.2020 13:21:56

Channel 512



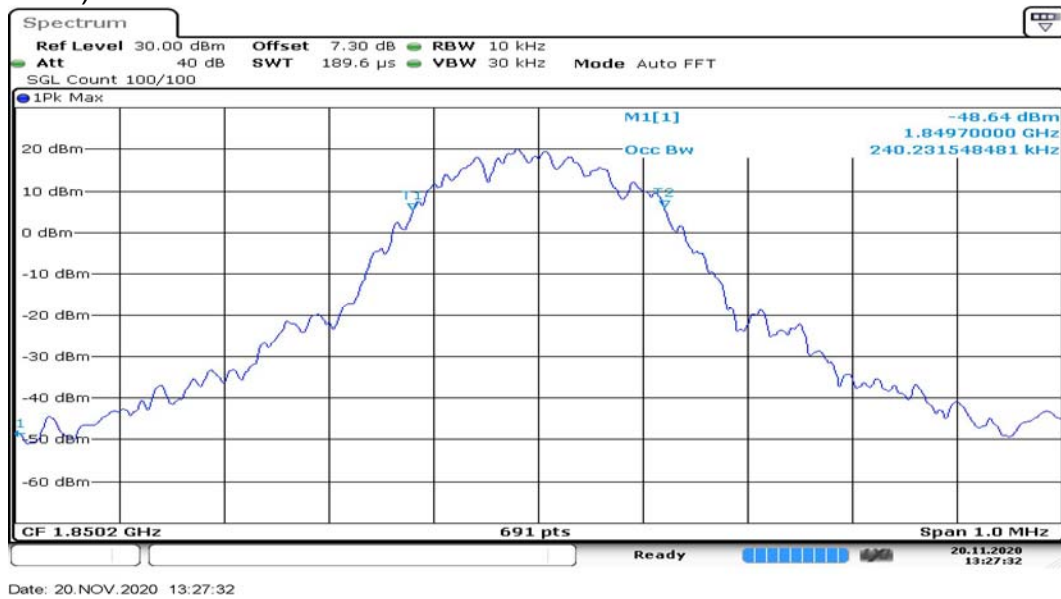
Date: 20.NOV.2020 13:23:11

Channel 661



Channel 810

EDGE (8PSK) MODE:



Channel 512



Channel 661



Channel 810

Emission Bandwidth

GSM850

GSM MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power(kHz)
824.2	128	301.00
836.4	189	309.70
848.8	251	309.70

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	312.60
836.4	189	299.60
848.8	251	302.50

EDGE (8PSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power(kHz)
824.2	128	283.60
836.4	189	312.60
848.8	251	308.20

PCS1900

GSM MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power(kHz)
1850.2	512	316.90
1880.0	661	309.70
1909.8	810	302.50

GPRS MODE:

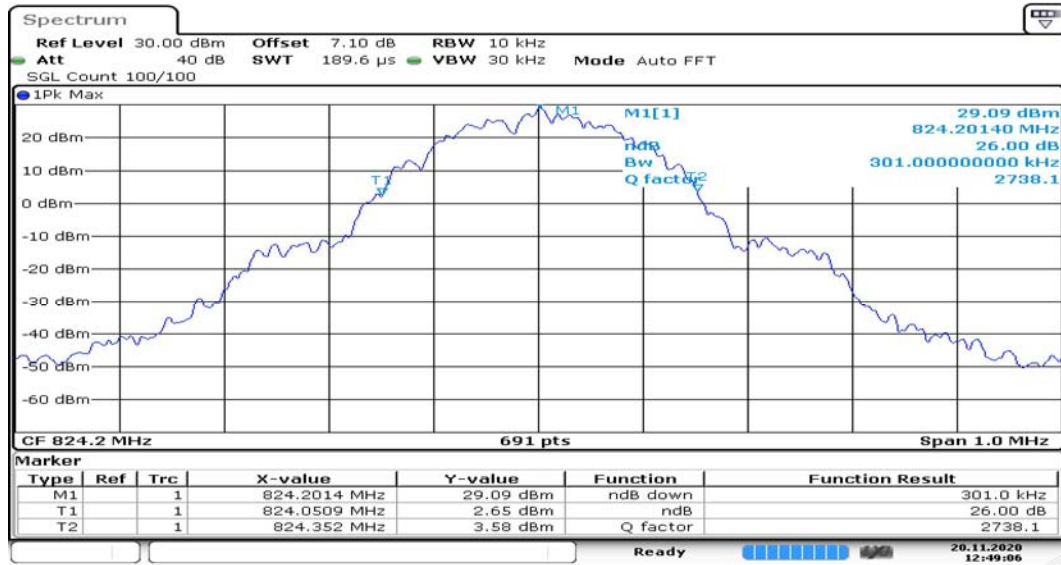
Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	305.40
1880.0	661	308.20
1909.8	810	295.20

EDGE (8PSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power(kHz)
1850.2	512	293.80
1880.0	661	298.10
1909.8	810	308.20

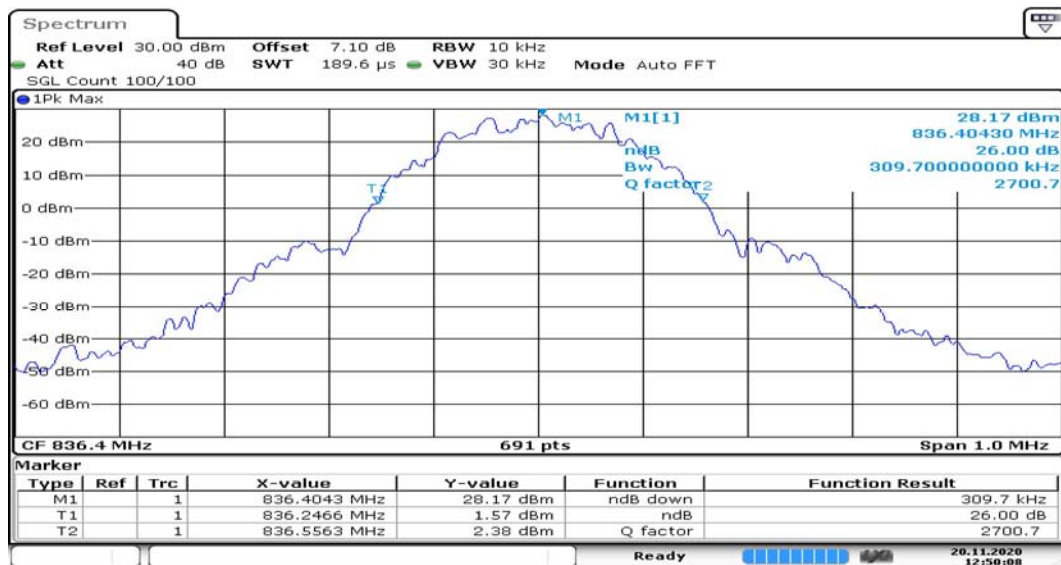
GSM850

GSM MODE:



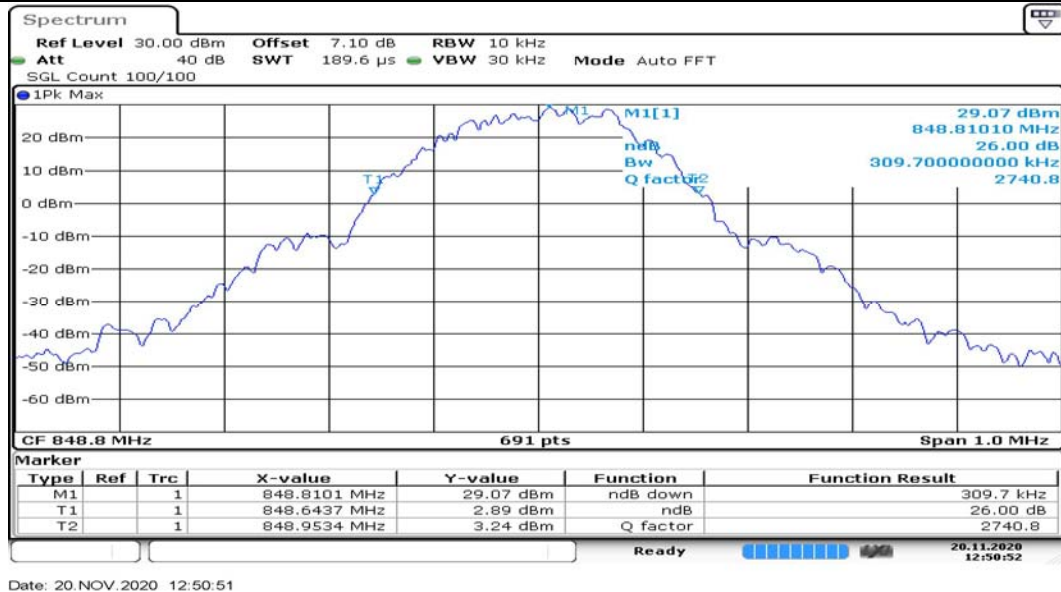
Date: 20.NOV.2020 12:49:06

Channel 128



Date: 20.NOV.2020 12:50:08

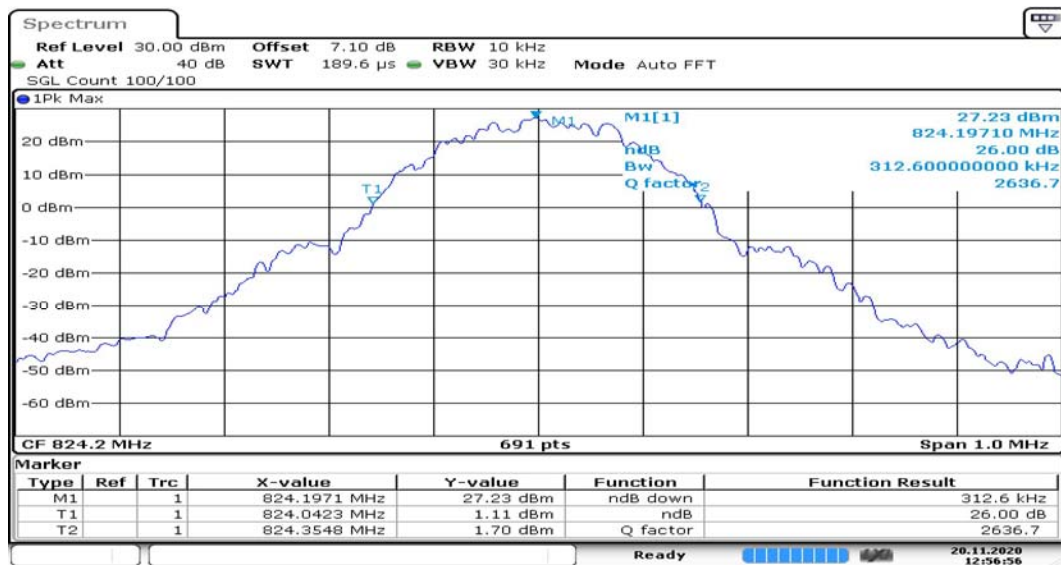
Channel 189



Date: 20. NOV. 2020 12:50:51

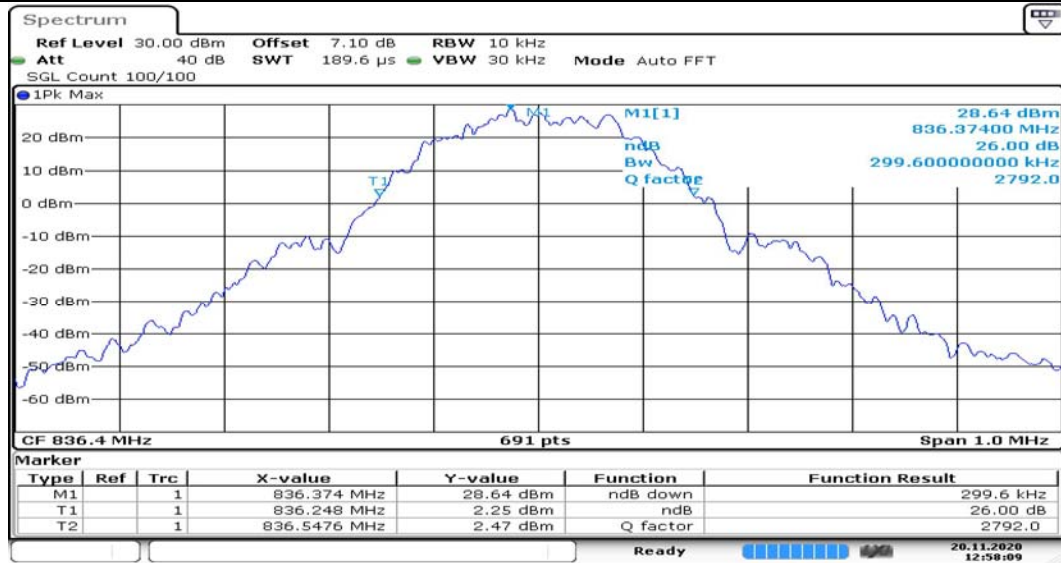
Channel 251

GPRS MODE:



Date: 20. NOV. 2020 12:56:56

Channel 128



Date: 20.NOV.2020 12:58:09

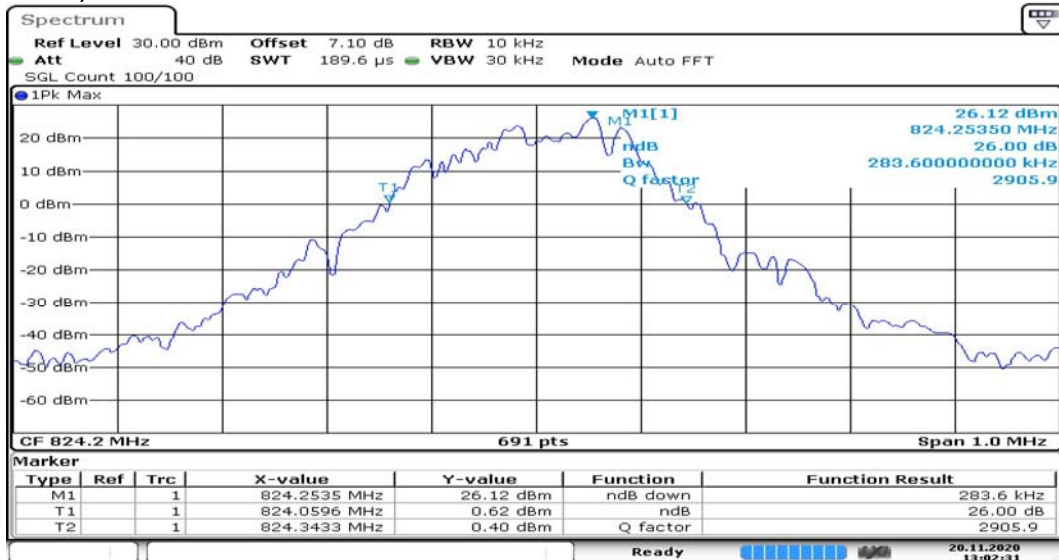
Channel 189



Date: 20.NOV.2020 12:59:03

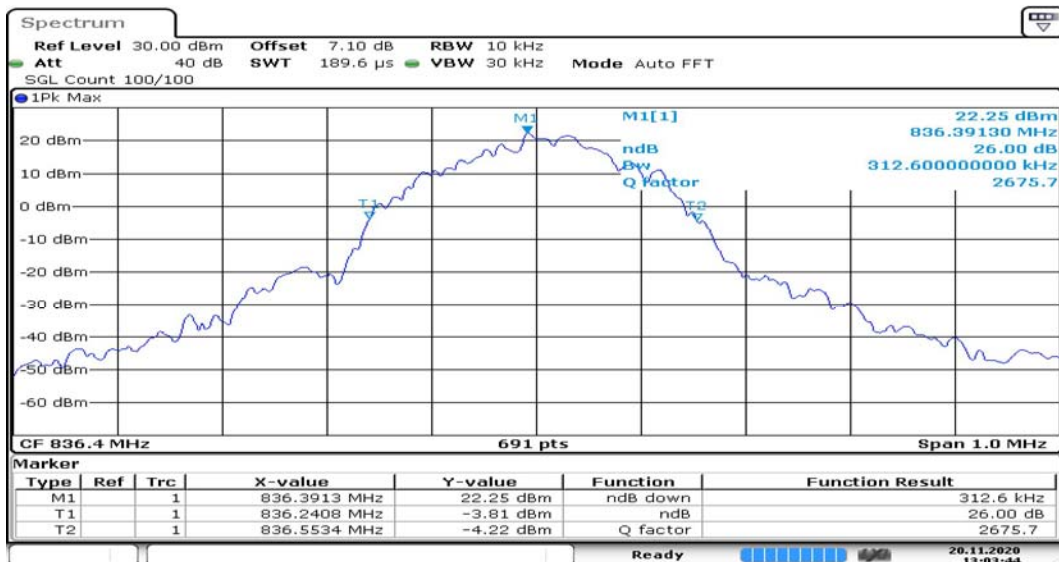
Channel 251

EDGE (8PSK) MODE:



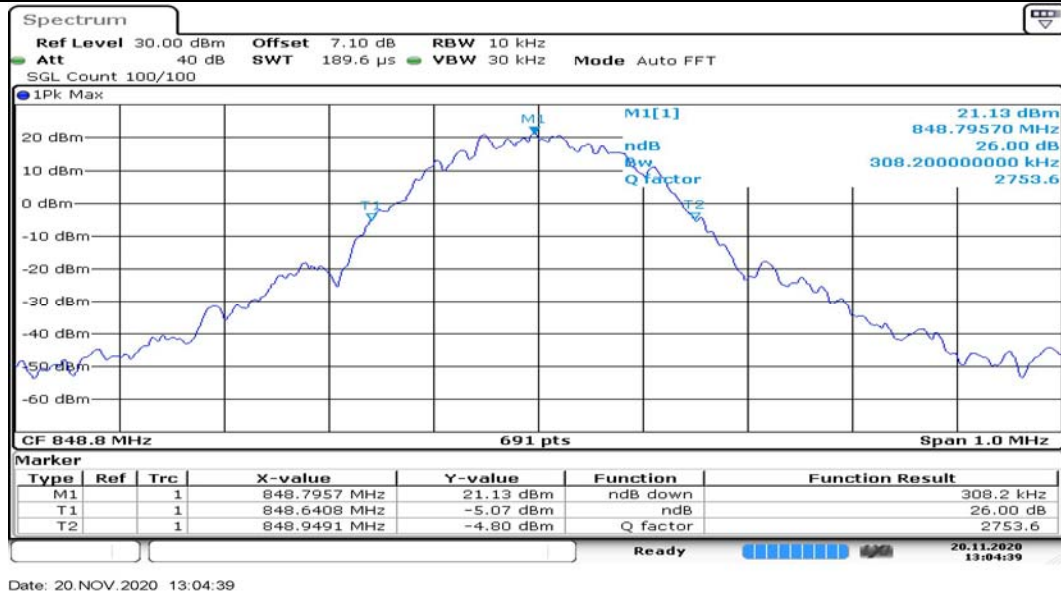
Date: 20.NOV.2020 13:02:32

Channel 128



Date: 20.NOV.2020 13:03:45

Channel 189

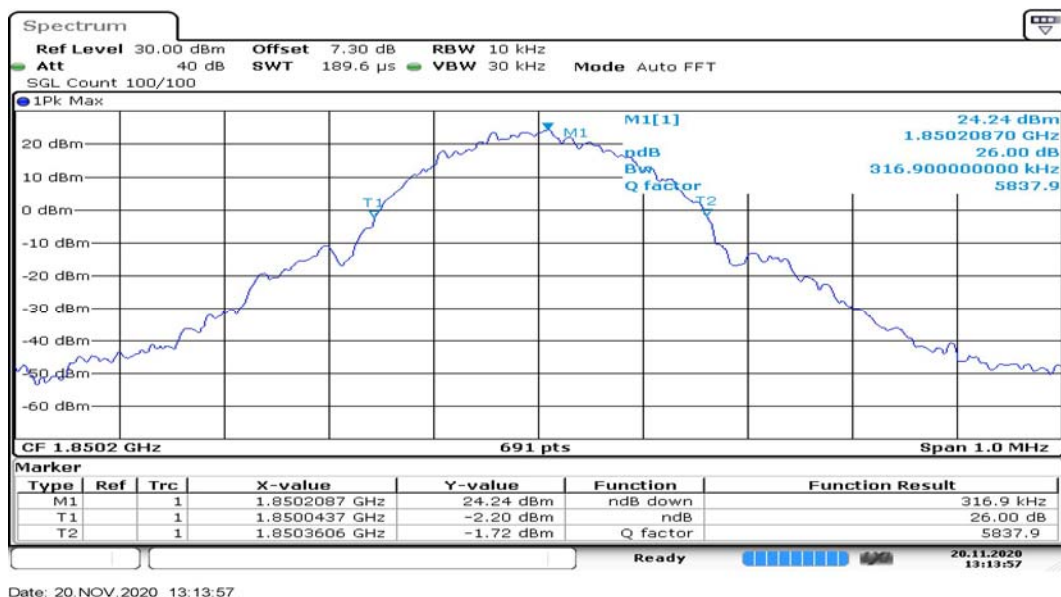


Date: 20. NOV. 2020 13:04:39

Channel 251

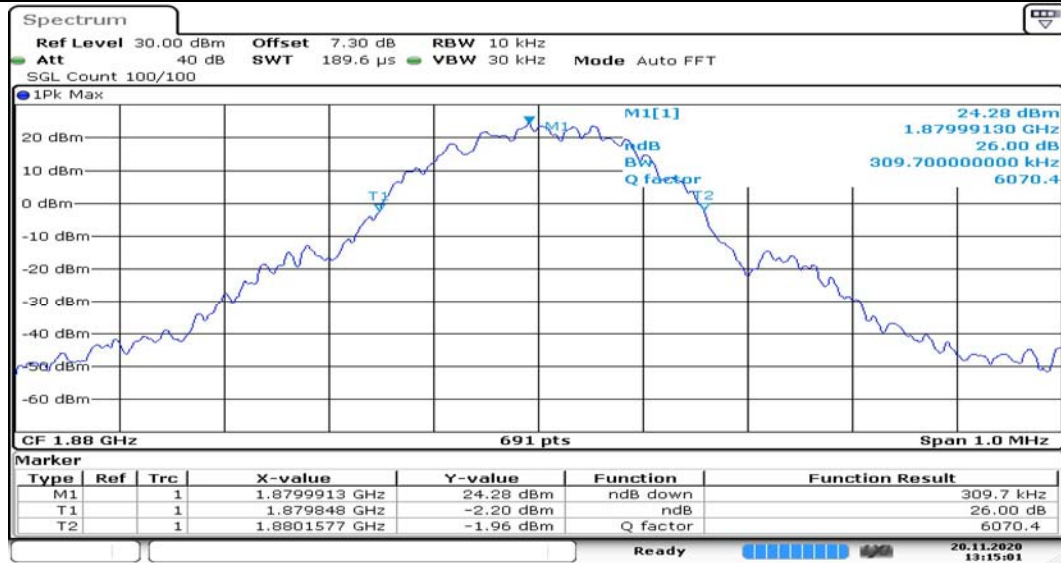
PCS1900

GSM MODE:



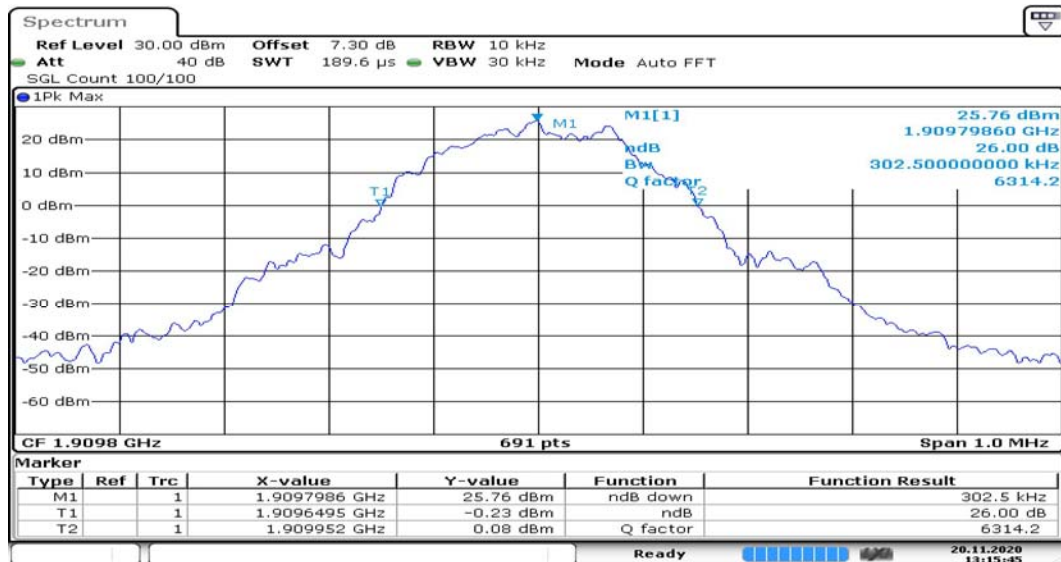
Date: 20. NOV. 2020 13:13:57

Channel 512



Date: 20.NOV.2020 13:15:01

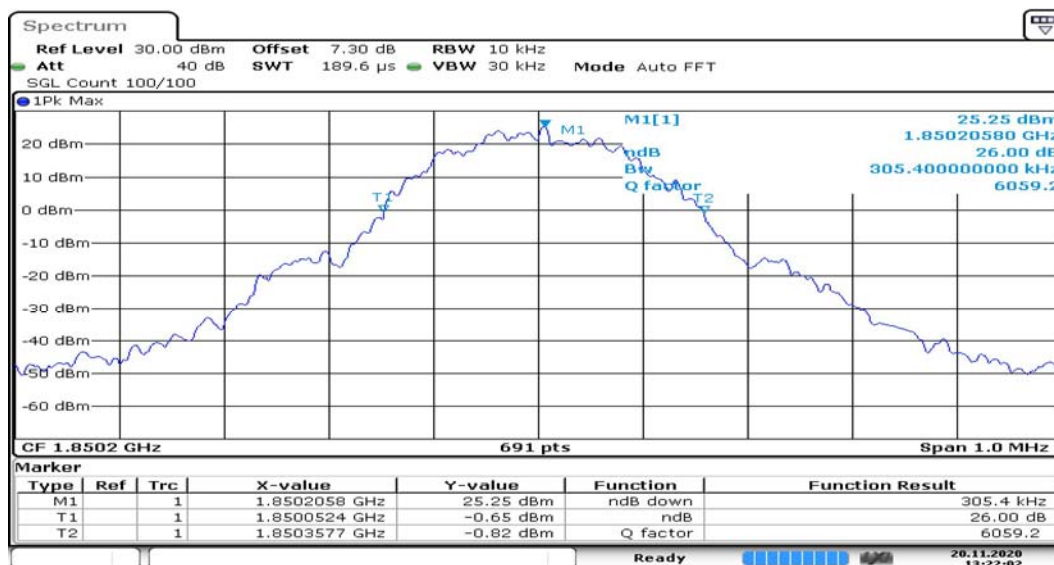
Channel 661



Date: 20.NOV.2020 13:15:46

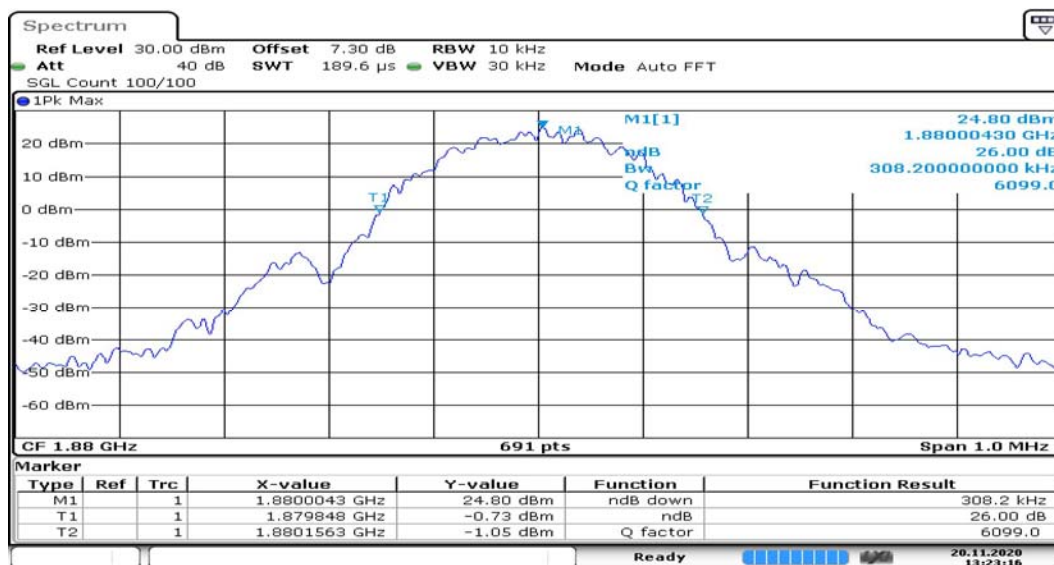
Channel 810

GPRS MODE:



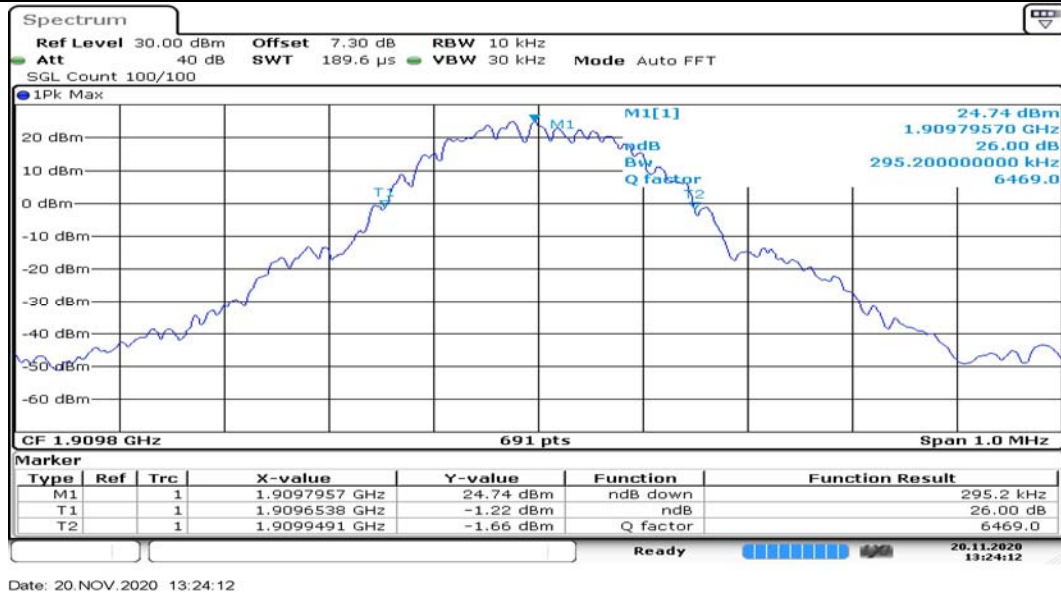
Date: 20.NOV.2020 13:22:02

Channel 512



Date: 20.NOV.2020 13:23:17

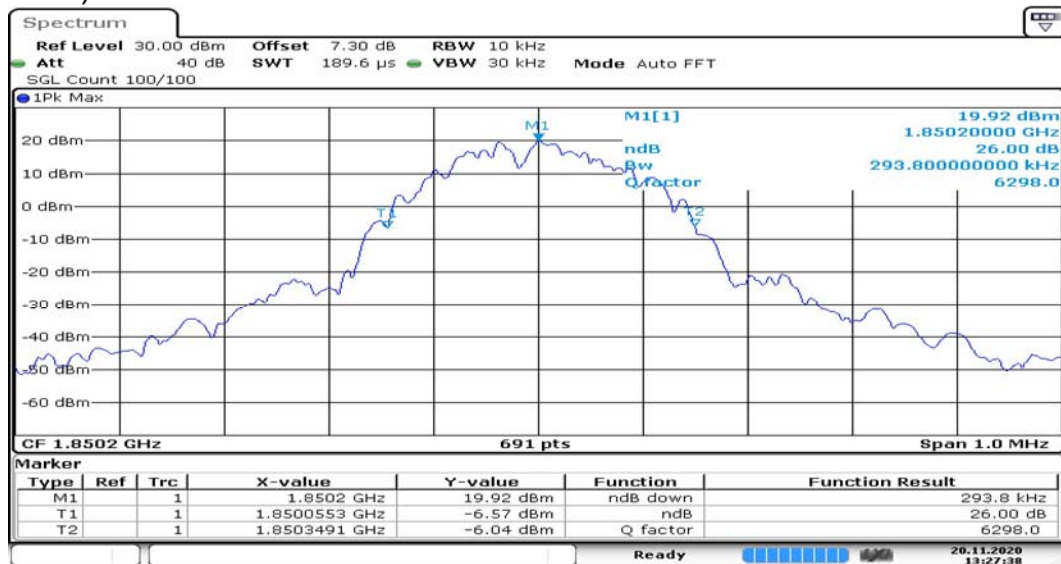
Channel 661



Date: 20.NOV.2020 13:24:12

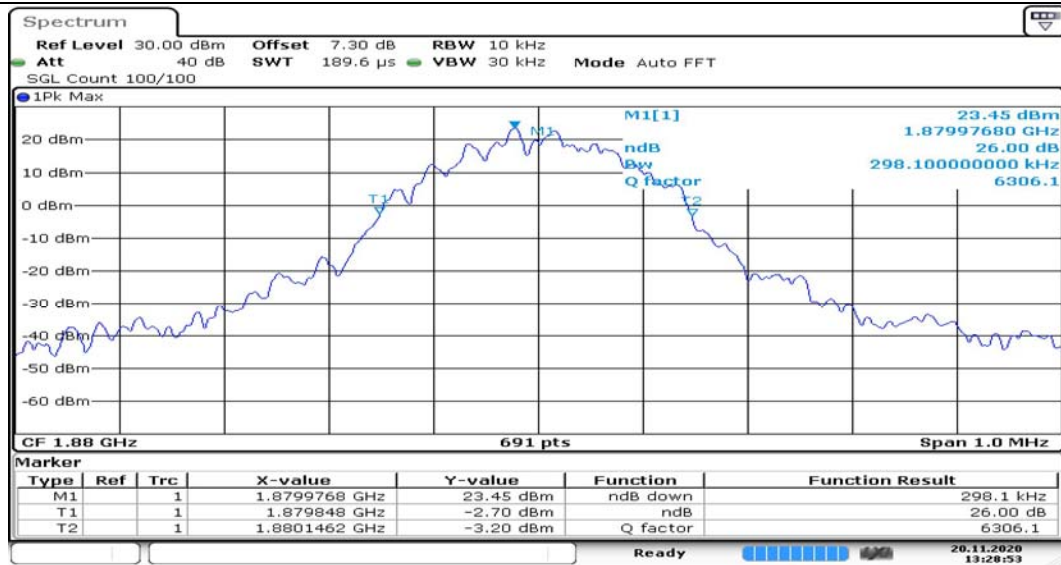
Channel 810

EDGE (8PSK) MODE:



Date: 20.NOV.2020 13:27:39

Channel 512



Date: 20.NOV.2020 13:28:53

Channel 661



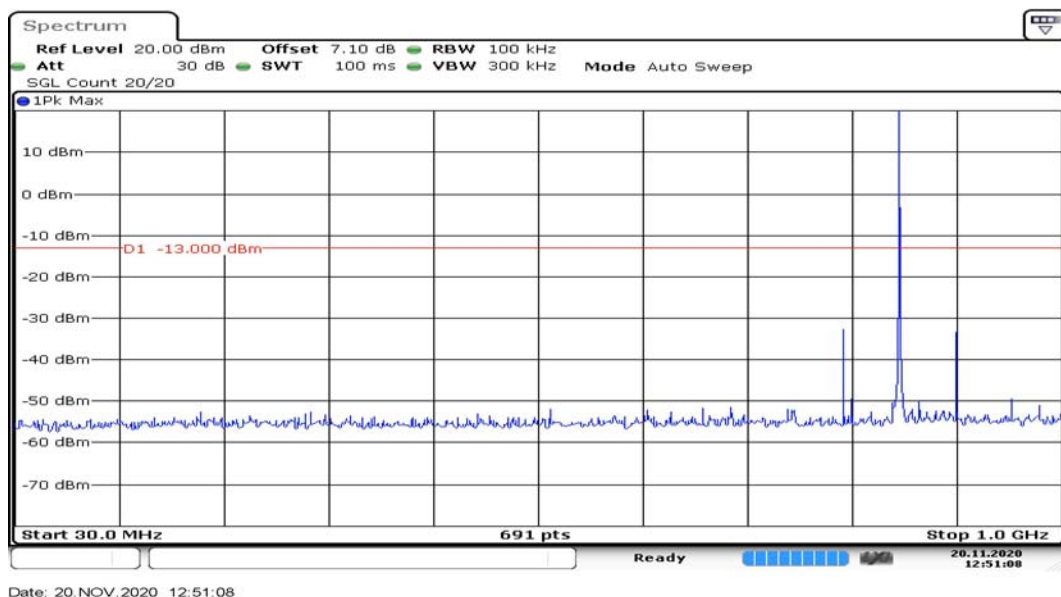
Date: 20.NOV.2020 13:29:49

Channel 810

Spurious Emissions at antenna terminal

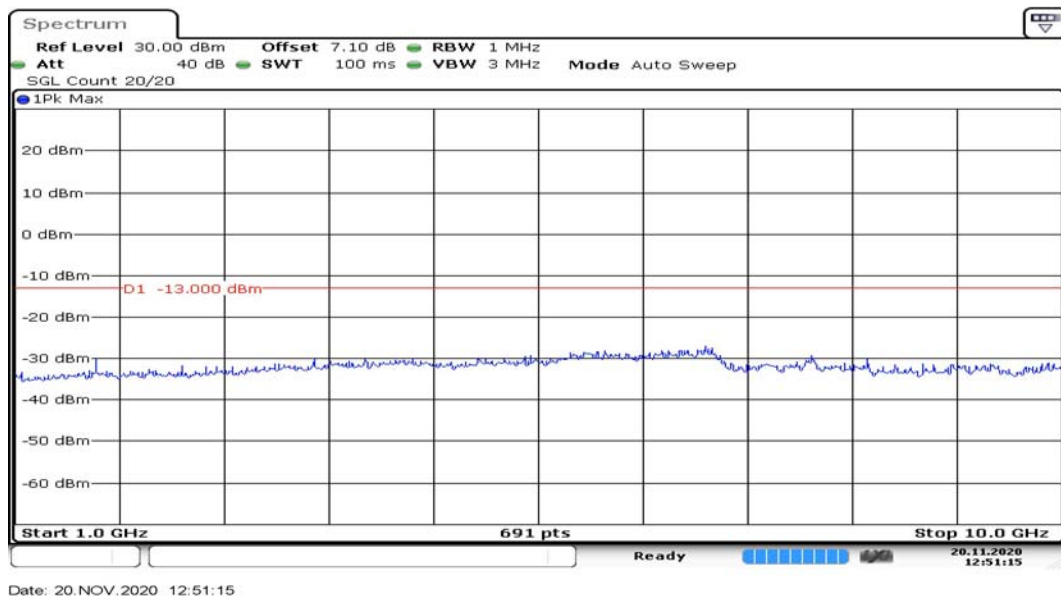
GSM850

GSM MODE:



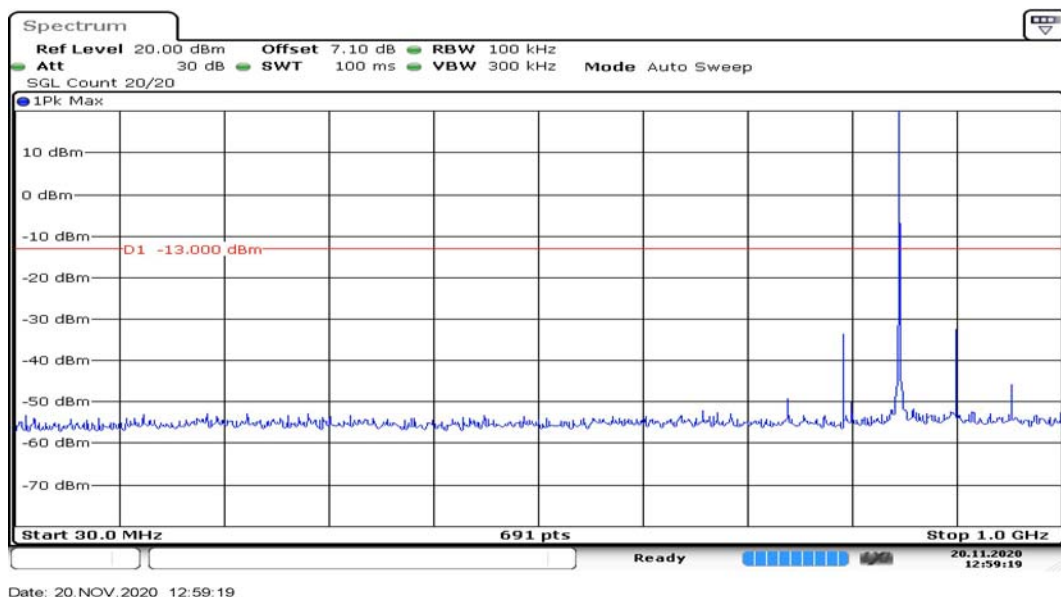
Channel 189 30MHz~1GHz

Note: The signal beyond the limit is the signal transmitted by EUT.



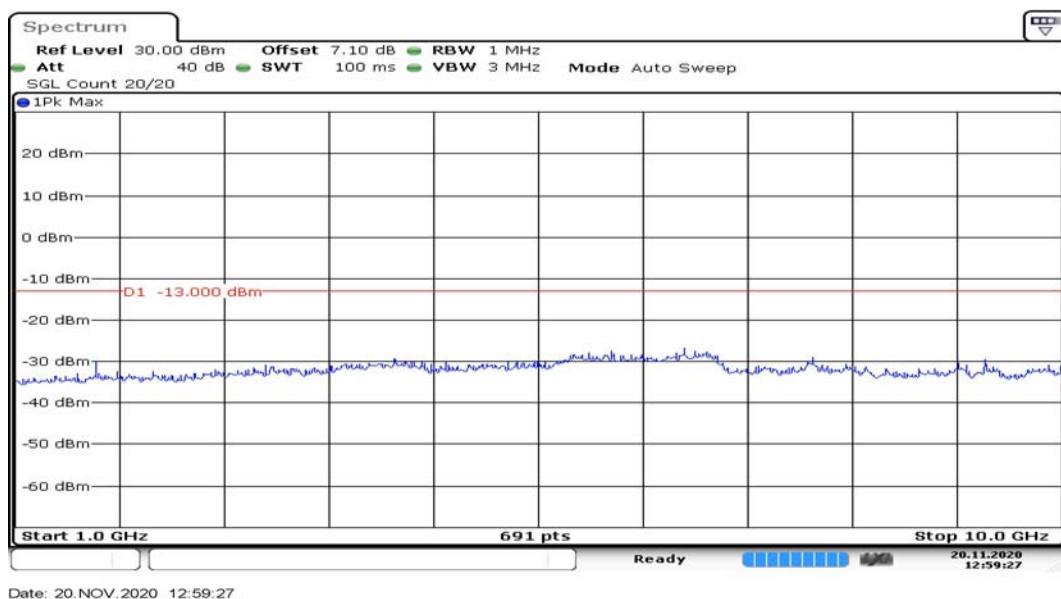
Channel 189 1GHz~10GHz

GPRS MODE:



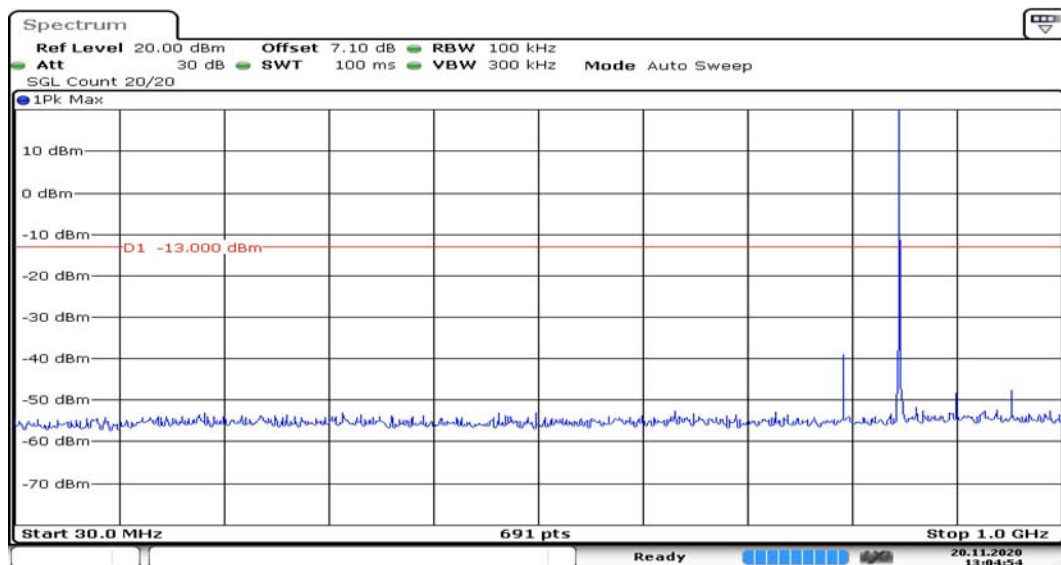
Channel 189 30MHz~1GHz

Note: The signal beyond the limit is the signal transmitted by EUT



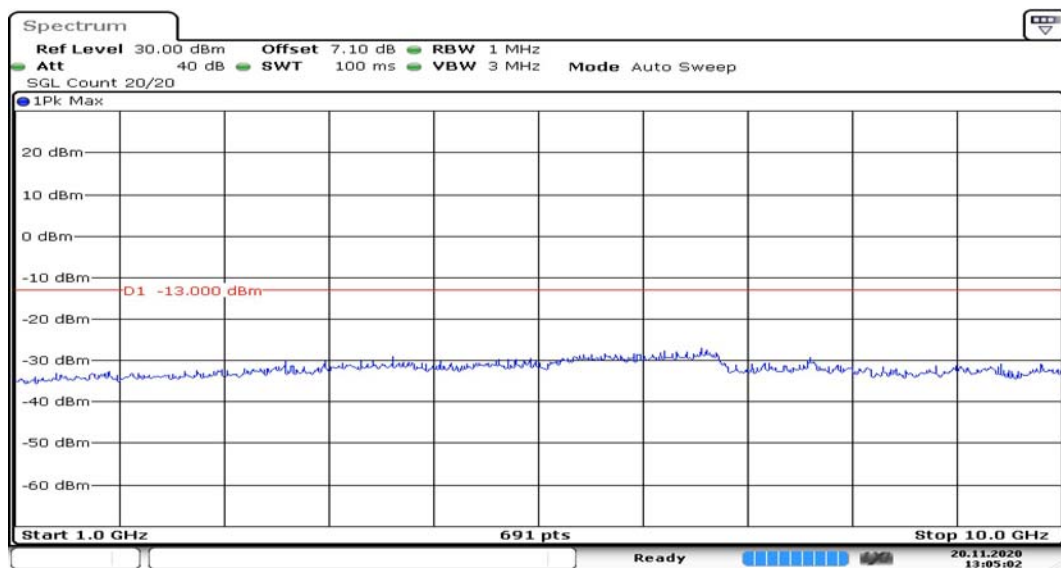
Channel 189 1GHz~10GHz

EDGE (8PSK) MODE:



Channel 189 30MHz~1GHz

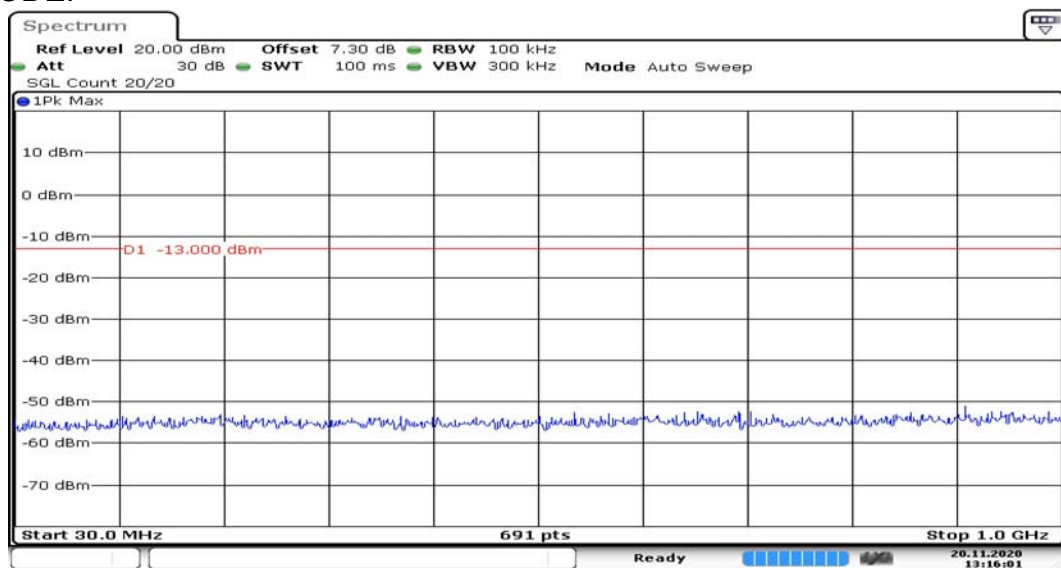
Note: The signal beyond the limit is the signal transmitted by EUT.



Channel 189 1GHz~10GHz

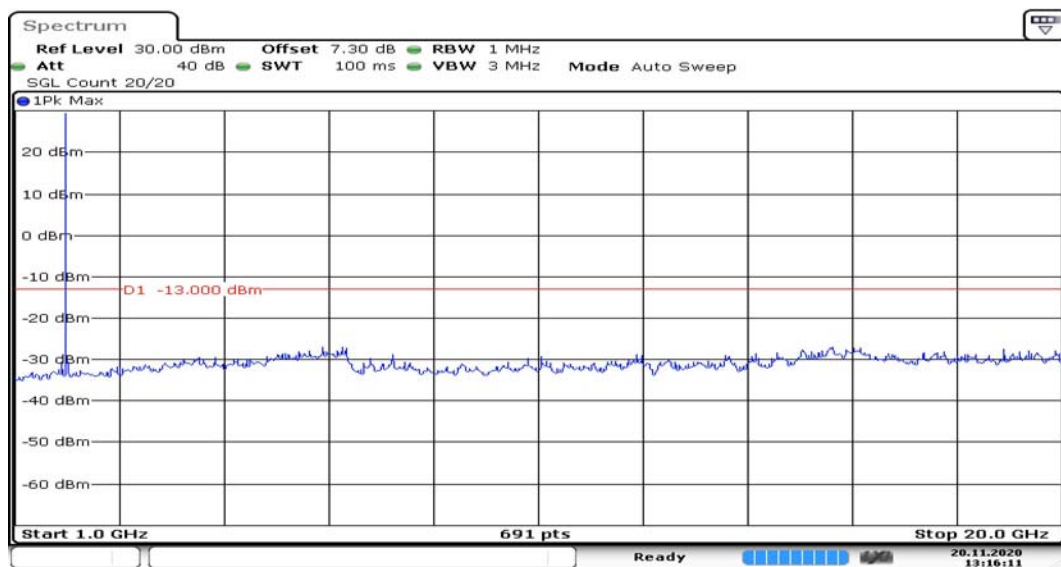
PCS1900

GSM MODE:



Date: 20.NOV.2020 13:16:02

Channel 661 30MHz~1GHz

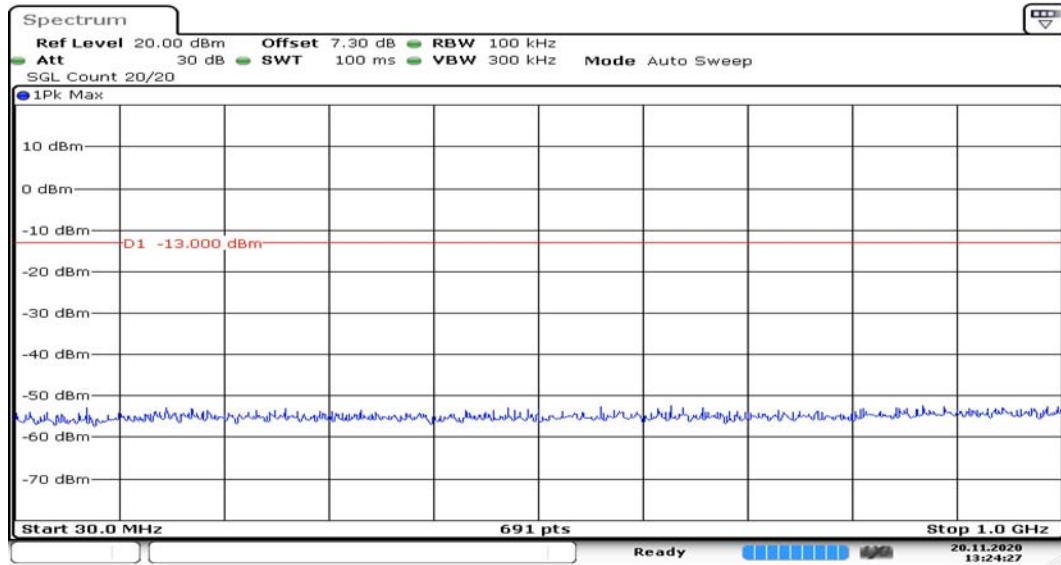


Date: 20.NOV.2020 13:16:11

Channel 661 1GHz~20GHz

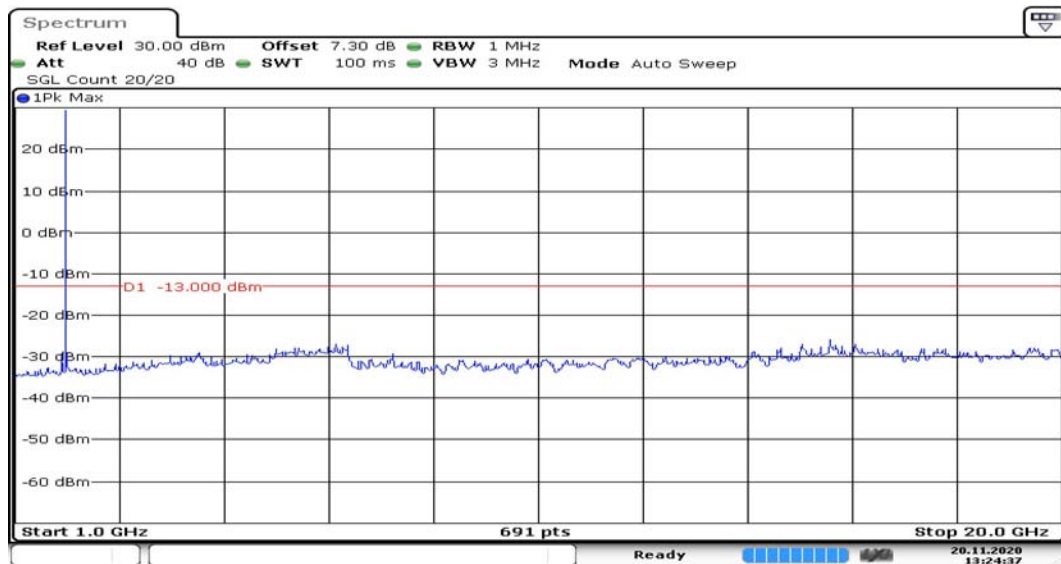
Note: The signal beyond the limit is the signal transmitted by EUT.

GPRS MODE:



Date: 20.NOV.2020 13:24:28

Channel 661 30MHz~1GHz

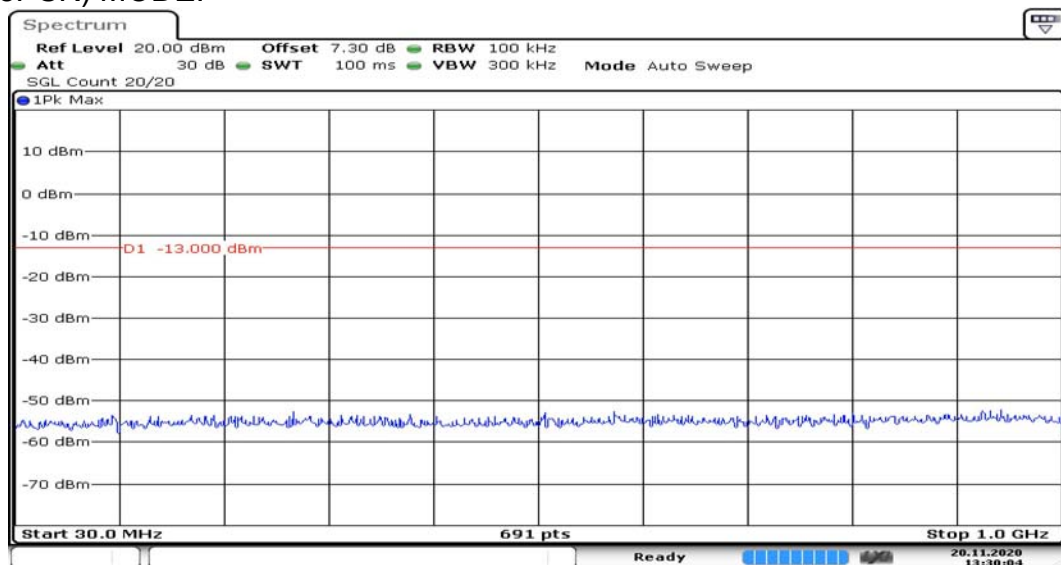


Date: 20.NOV.2020 13:24:37

Channel 661 1GHz~20GHz

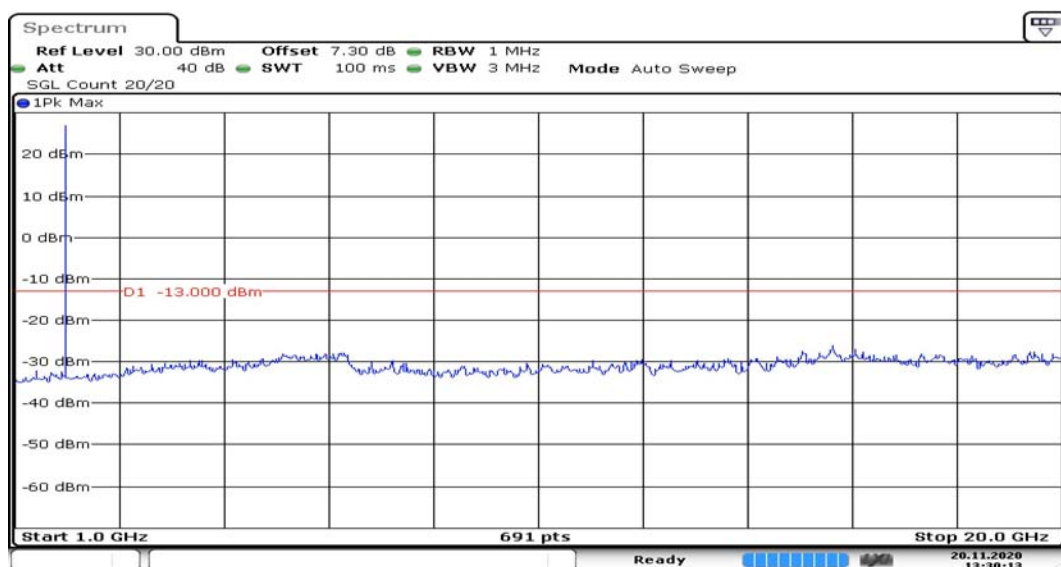
Note: The signal beyond the limit is the signal transmitted by EUT.

EDGE (8PSK) MODE:



Date: 20.NOV.2020 13:30:05

Channel 661 30MHz~1GHz



Date: 20.NOV.2020 13:30:14

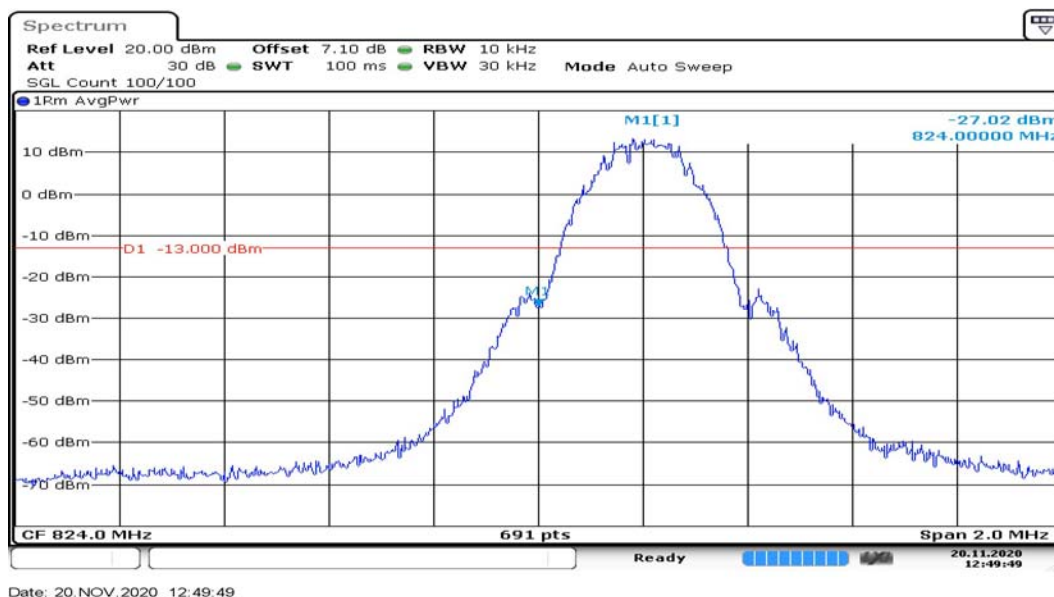
Channel 661 1GHz~20GHz

Note: The signal beyond the limit is the signal transmitted by EUT.

Band Edges Compliance

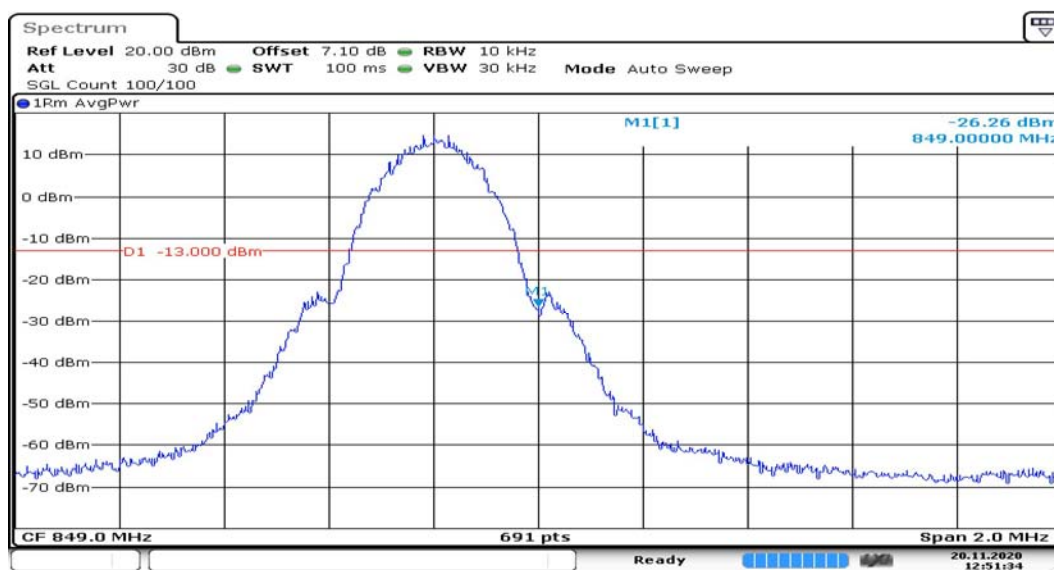
GSM850

GSM MODE:



Date: 20.NOV.2020 12:49:49

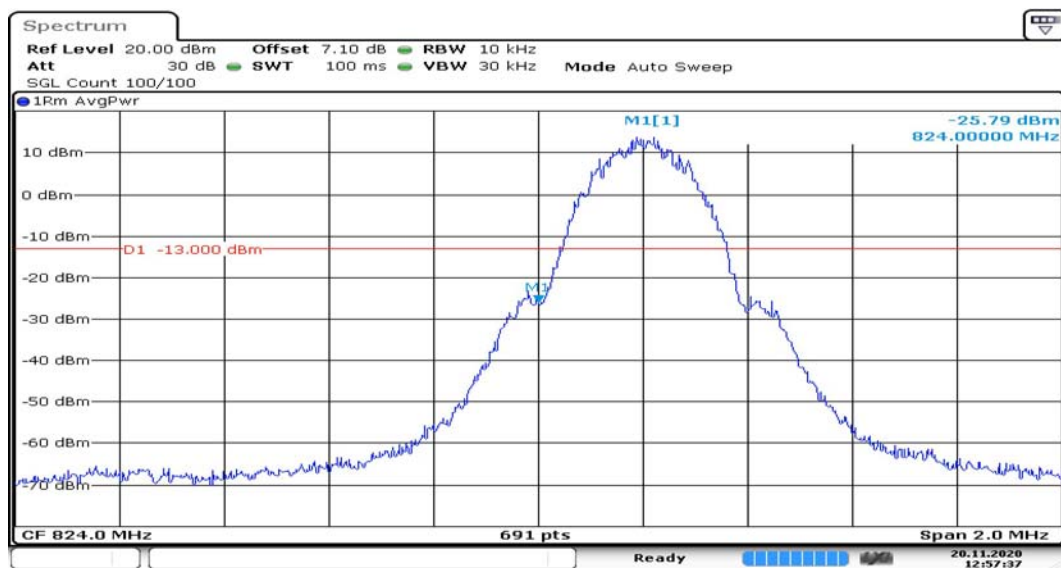
Channel 128



Date: 20.NOV.2020 12:51:34

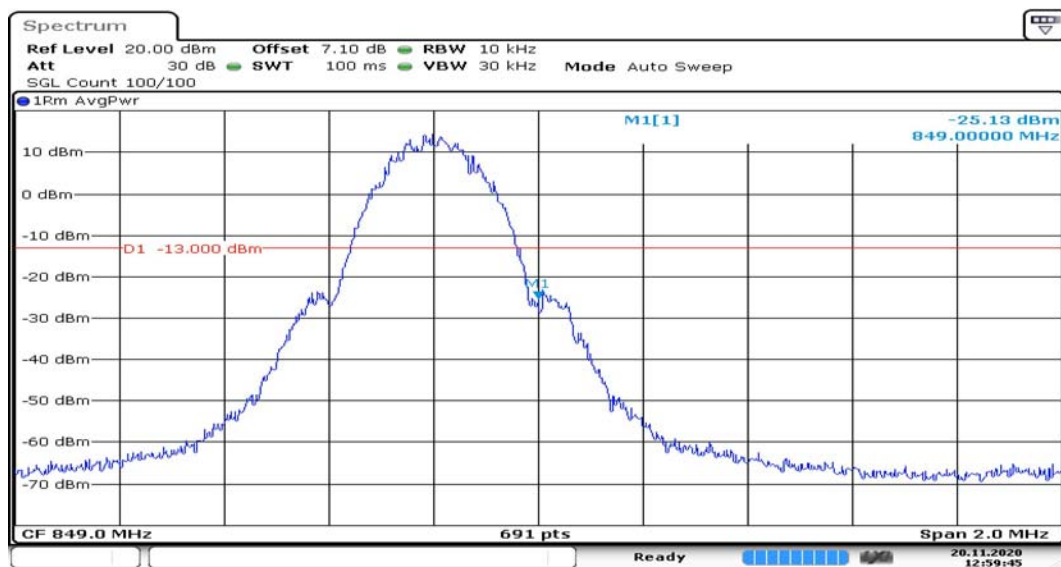
Channel 251

GPRS MODE:



Date: 20.NOV.2020 12:57:38

Channel 128



Date: 20.NOV.2020 12:59:45

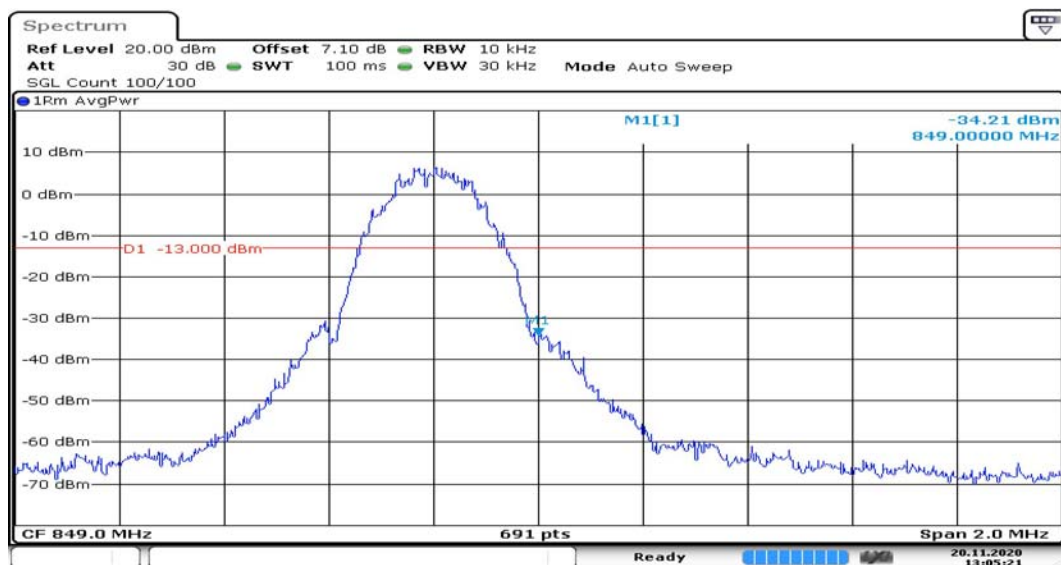
Channel 251

EDGE (8PSK) MODE:



Date: 20.NOV.2020 13:03:14

Channel 128



Date: 20.NOV.2020 13:05:21

Channel 251

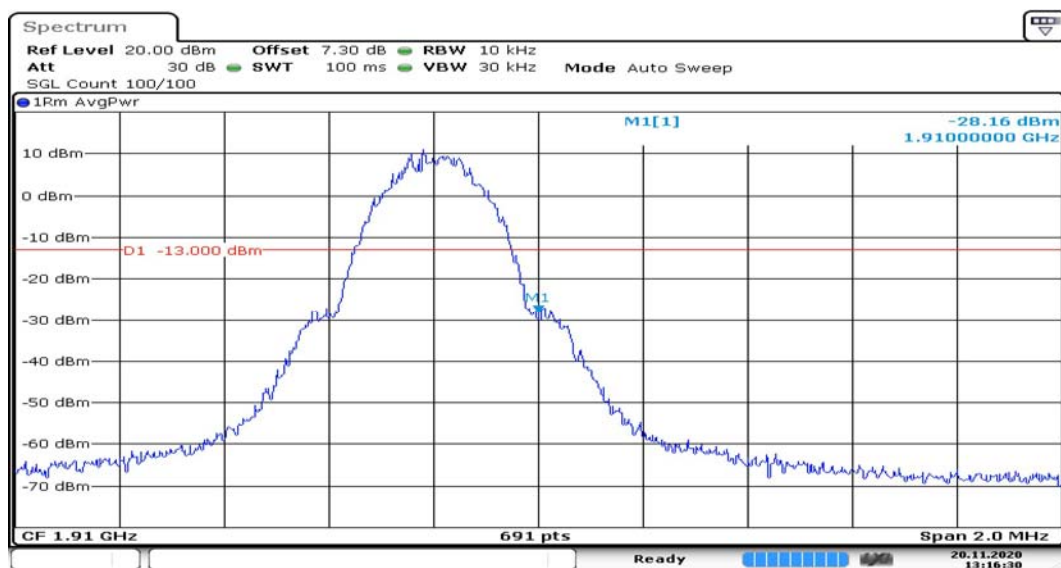
PCS1900

GSM MODE:



Date: 20.NOV.2020 13:14:41

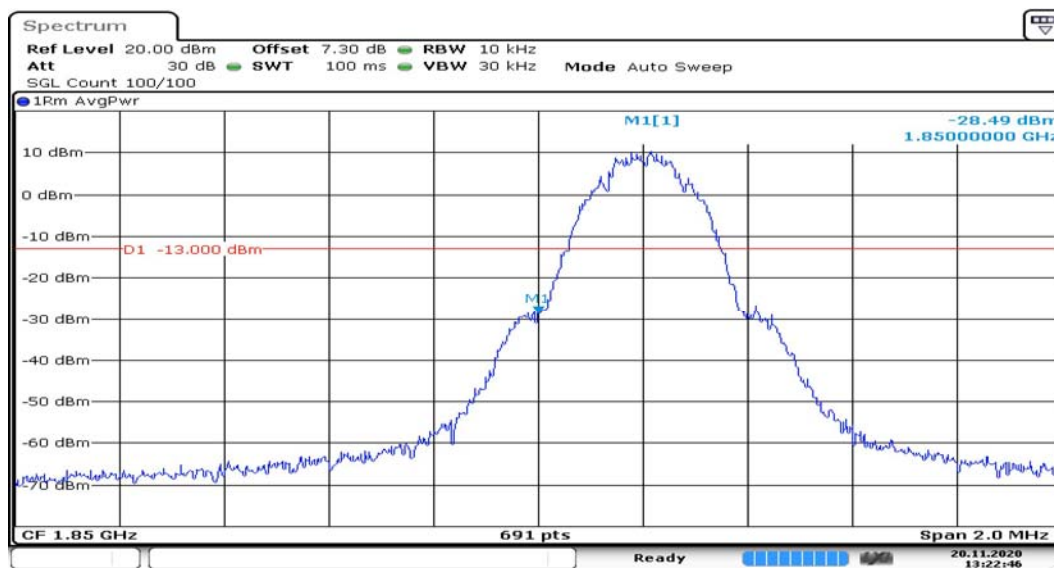
Channel 512



Date: 20.NOV.2020 13:16:30

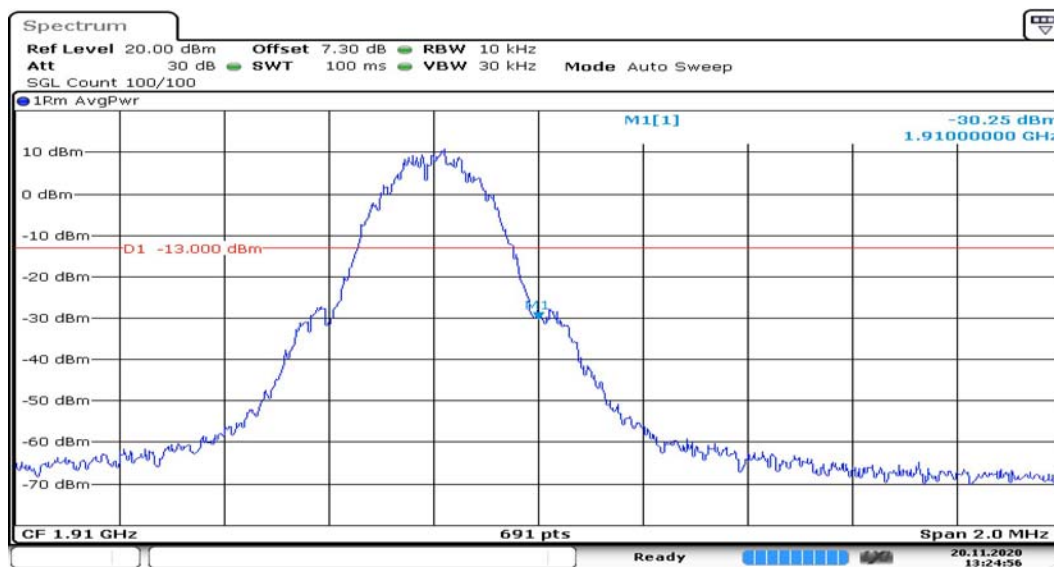
Channel 810

GPRS MODE:



Date: 20.NOV.2020 13:22:46

Channel 512



Date: 20.NOV.2020 13:24:56

Channel 810

EDGE (8PSK) MODE:



Date: 20. NOV. 2020 13:28:22

Channel 512



Date: 20. NOV. 2020 13:30:33

Channel 810

Frequency Stability

GSM850

GSM MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 189	Channel 251
0	0.015	-0.006	0.001
+10	0.015	-0.005	0.011
+20	0.000	0.000	0.000
+30	0.005	0.000	-0.005
+40	0.009	-0.005	0.014
+50	0.001	0.000	0.012
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 189	Channel 251
LV	0.001	-0.003	0.002
HV	0.004	0.002	-0.006

GPRS MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 189	Channel 251
0	0.011	-0.008	0.000
+10	0.019	-0.010	0.012
+20	0.000	0.000	0.000
+30	0.014	-0.012	0.009
+40	0.018	-0.015	0.012
+50	0.016	-0.002	-0.003
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 189	Channel 251
LV	0.005	-0.012	-0.001
HV	0.001	-0.008	-0.001

EDGE (8PSK) MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 189	Channel 251
0	0.011	0.006	0.016
+10	0.020	0.023	0.020
+20	0.000	0.000	0.000
+30	0.019	0.026	0.013
+40	0.012	0.012	-0.002
+50	0.012	0.016	0.001
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 189	Channel 251
LV	0.000	0.000	0.002
HV	0.000	0.004	-0.004

PCS1900

GSM MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
0	0.000	-0.007	0.002
+10	-0.011	-0.001	0.003
+20	0.000	0.000	0.000
+30	-0.002	-0.007	-0.001
+40	-0.002	-0.002	-0.001
+50	0.001	-0.002	0.002
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	0.003	-0.009	-0.002
HV	-0.002	-0.008	0.002

GPRS MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
0	0.000	-0.006	-0.003
+10	-0.001	-0.007	0.001
+20	0.000	0.000	0.000
+30	0.000	0.007	0.002
+40	-0.003	-0.005	-0.004
+50	0.000	-0.002	-0.006
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	-0.001	-0.004	-0.008
HV	-0.005	0.008	-0.003

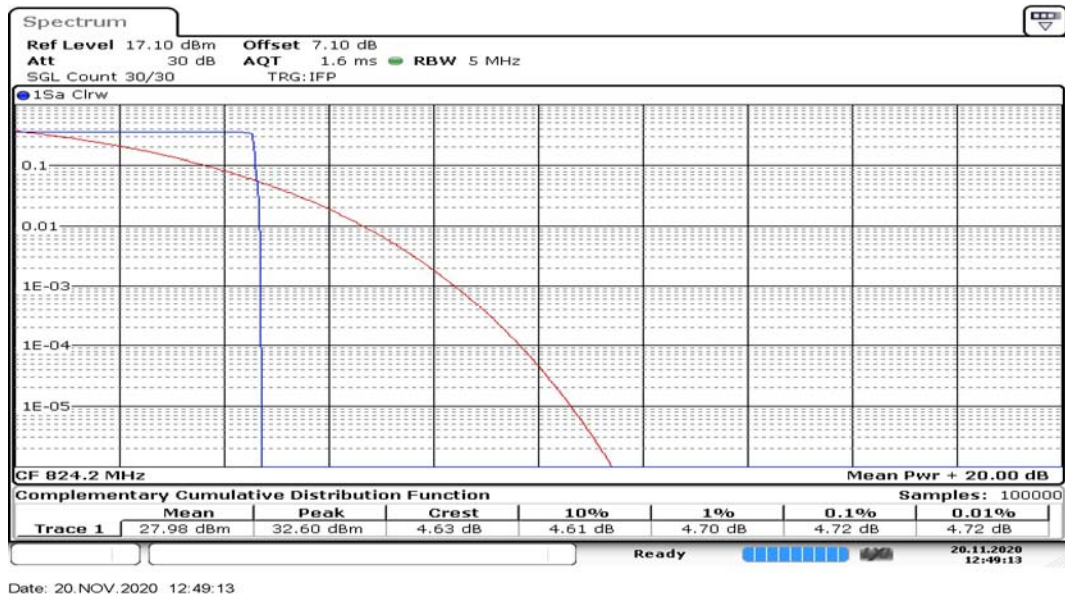
EDGE (8PSK) MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
0	0.015	0.001	0.013
+10	0.011	-0.001	0.003
+20	0.000	0.000	0.000
+30	0.007	0.010	0.004
+40	-0.003	-0.005	0.001
+50	-0.005	0.004	0.002
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	-0.006	0.006	0.009
HV	-0.004	0.001	0.005

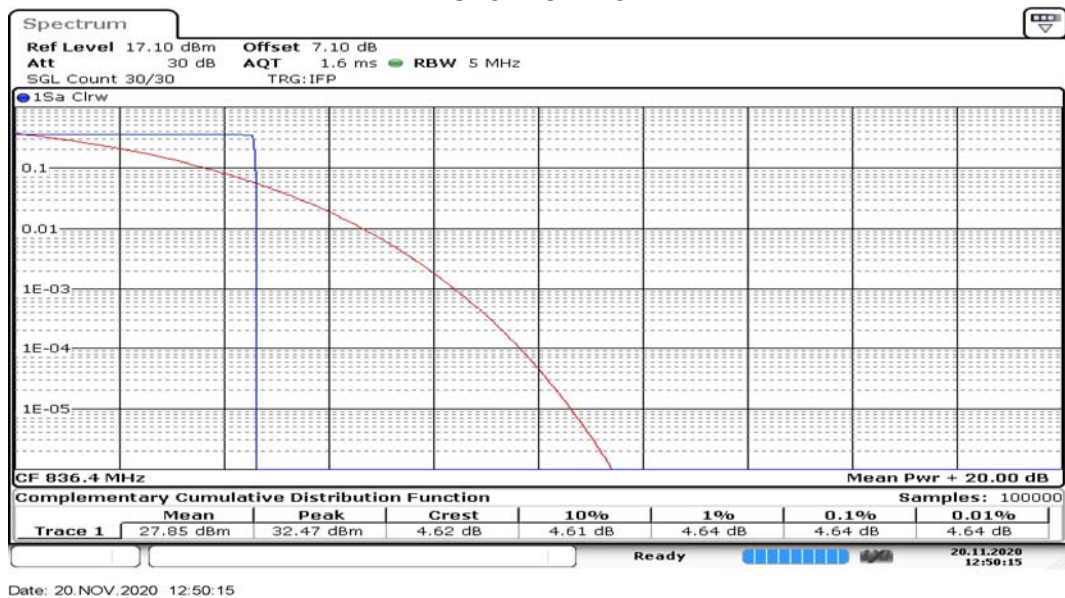
Peak-Average Ratio

GSM850

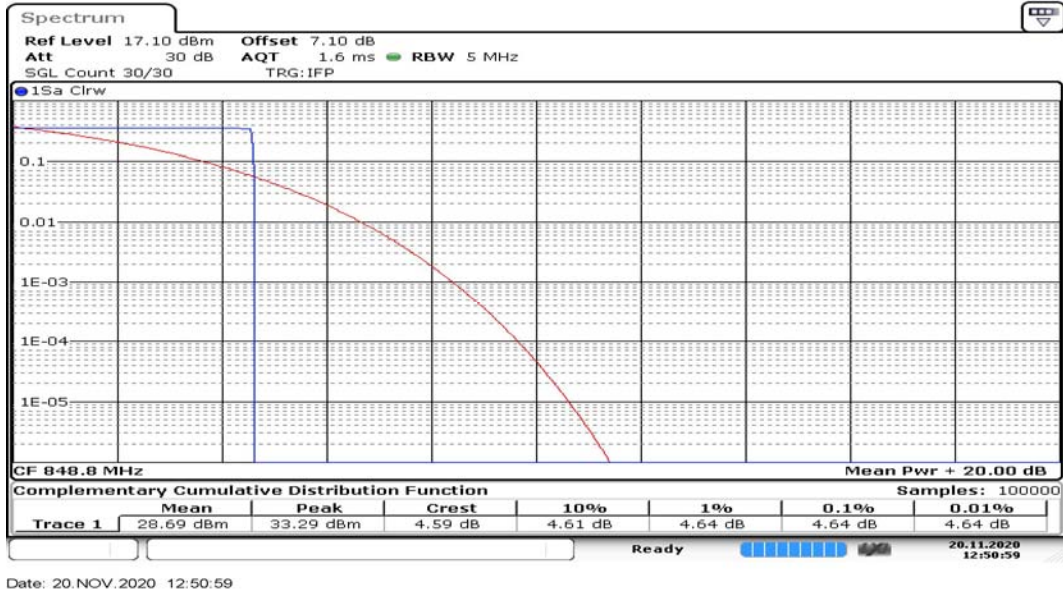
GSM MODE:



Channel 128

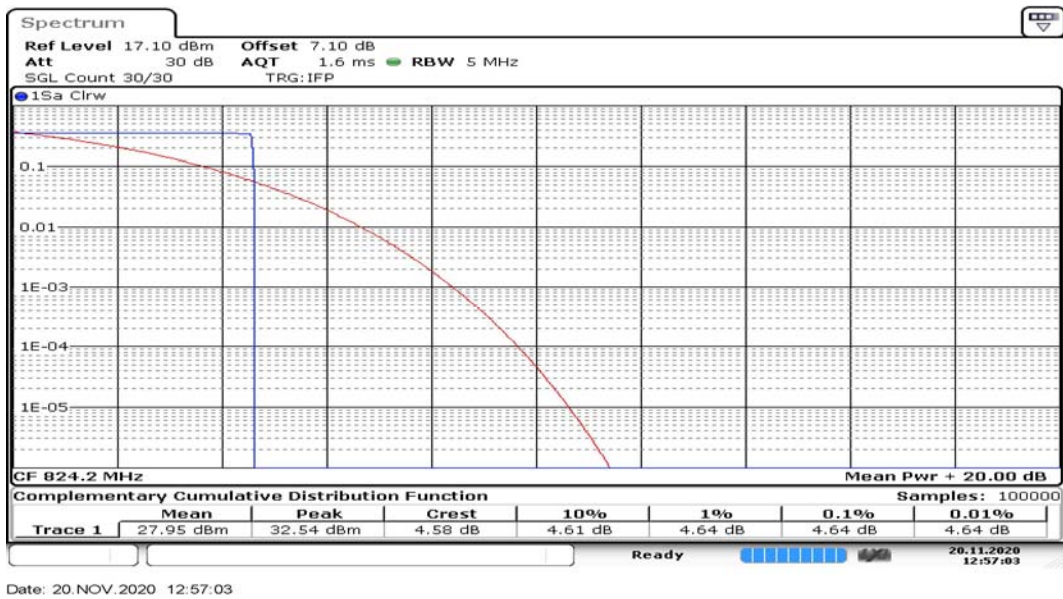


Channel 189



Channel 251

GPRS MODE:

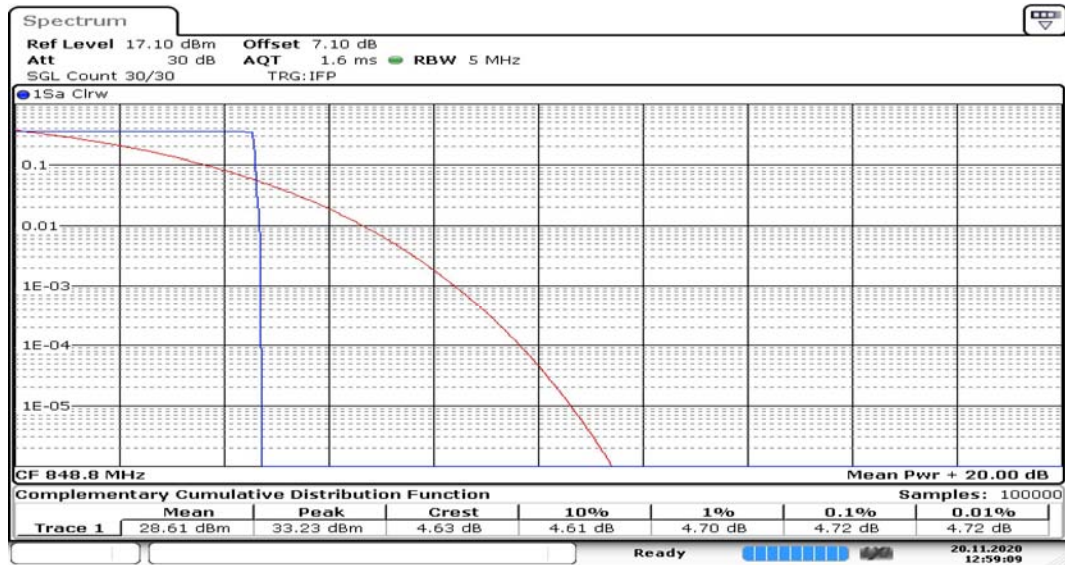


Channel 128



Date: 20. NOV. 2020 12:58:16

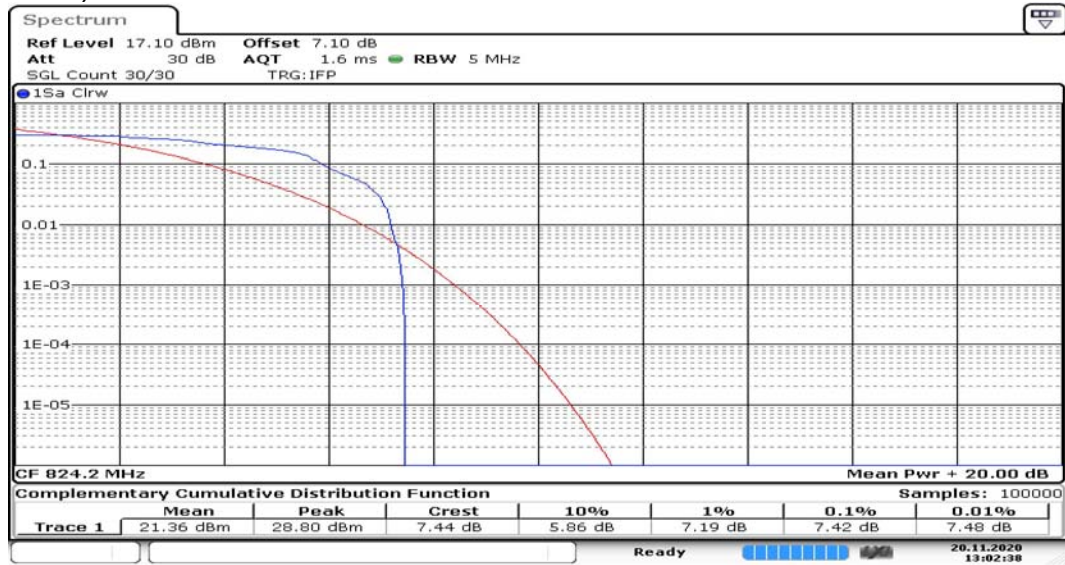
Channel 189



Date: 20. NOV. 2020 12:59:10

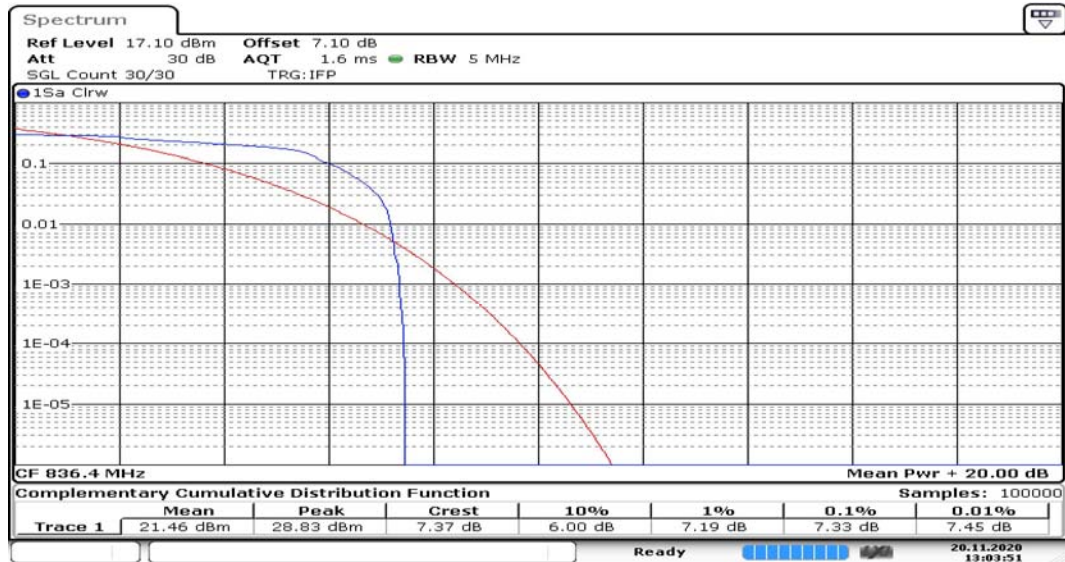
Channel 251

EDGE (8PSK) MODE:



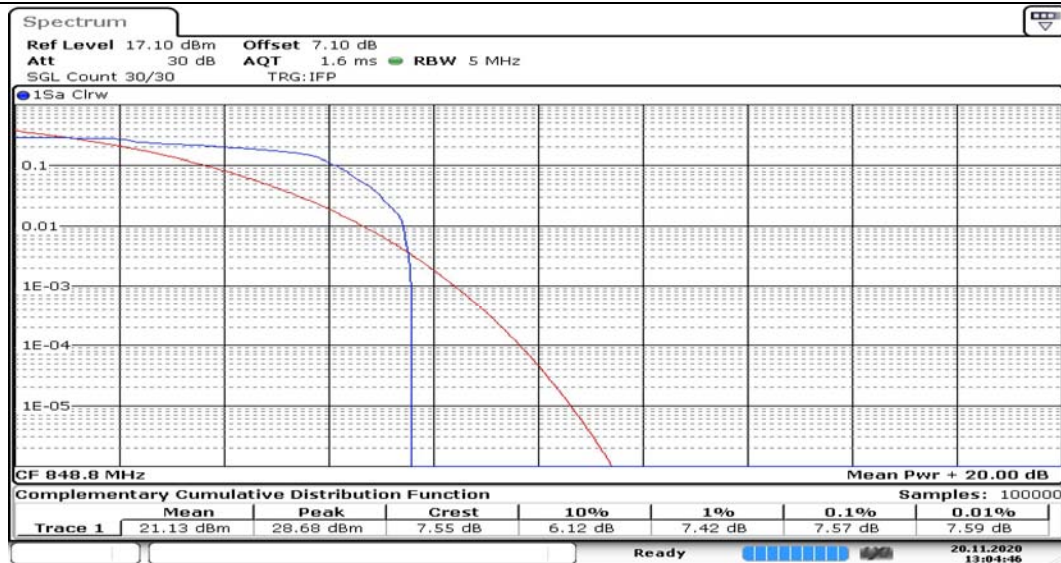
Date: 20.NOV.2020 13:02:39

Channel 128



Date: 20.NOV.2020 13:03:52

Channel 189

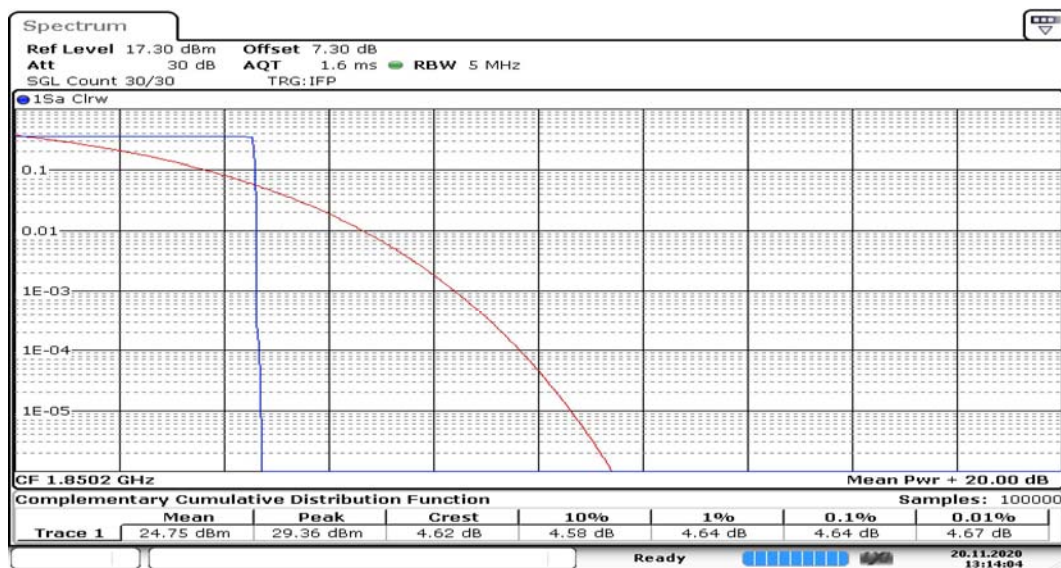


Date: 20. NOV. 2020 13:04:46

Channel 251

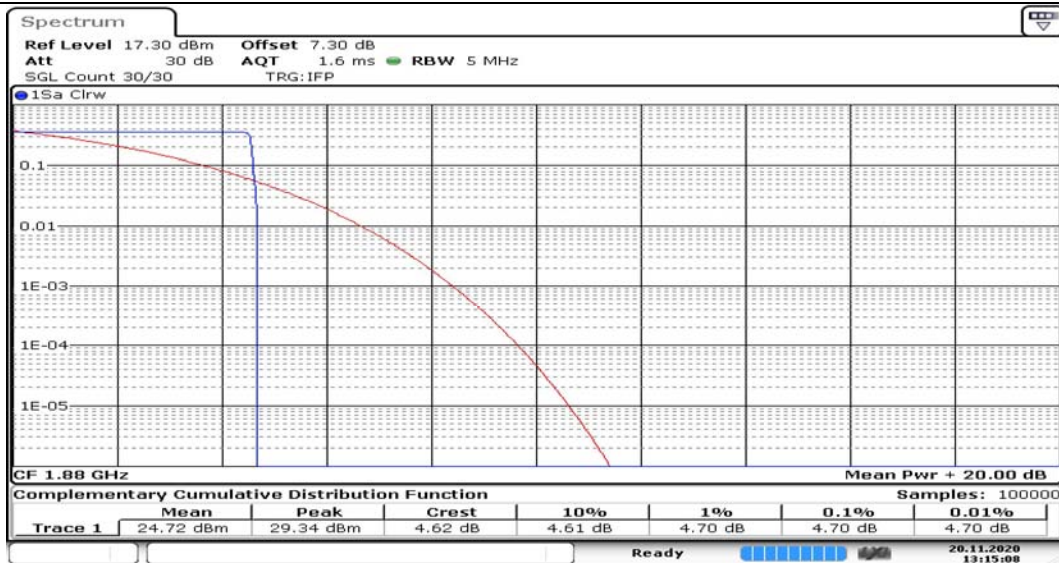
PCS1900

GSM MODE:



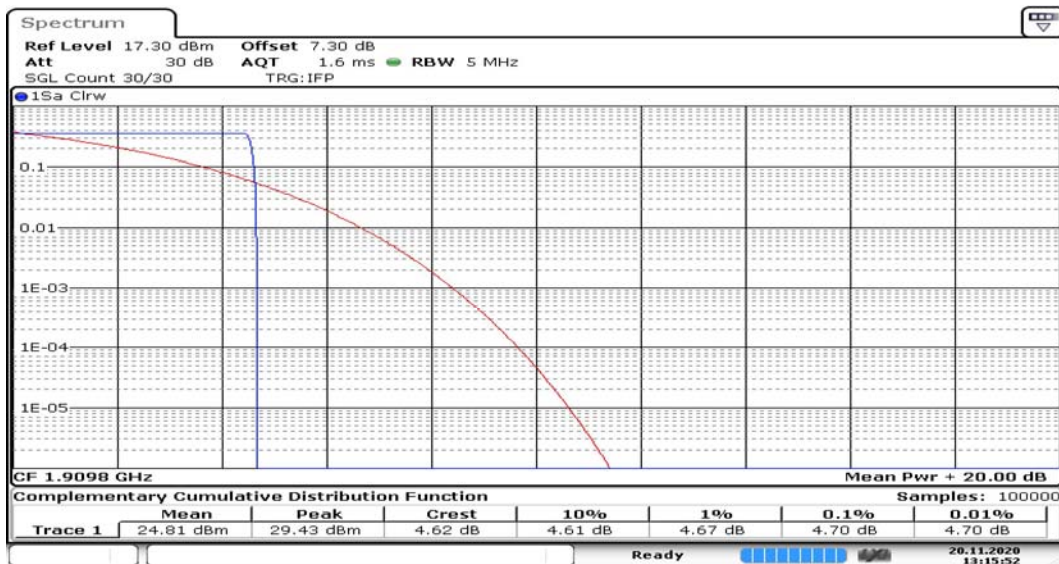
Date: 20. NOV. 2020 13:14:04

Channel 512



Date: 20.NOV.2020 13:15:08

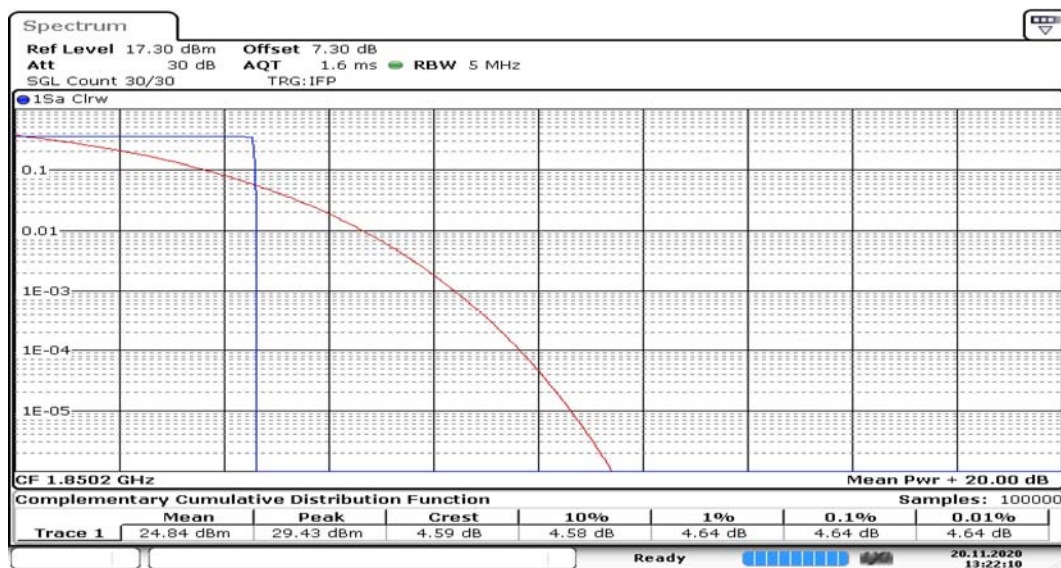
Channel 661



Date: 20.NOV.2020 13:15:53

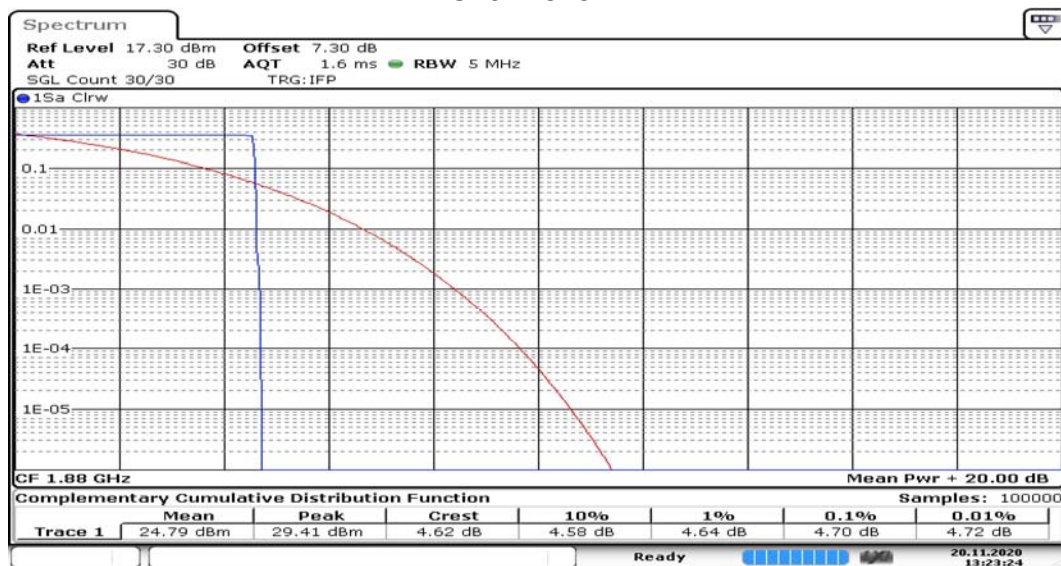
Channel 810

GPRS MODE:



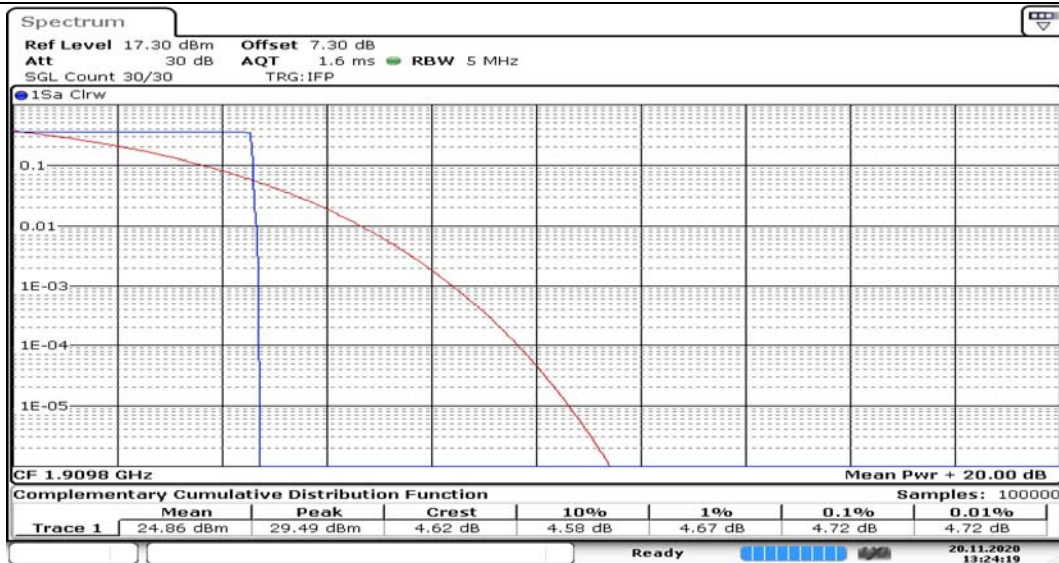
Date: 20.NOV.2020 13:22:09

Channel 512



Date: 20.NOV.2020 13:23:24

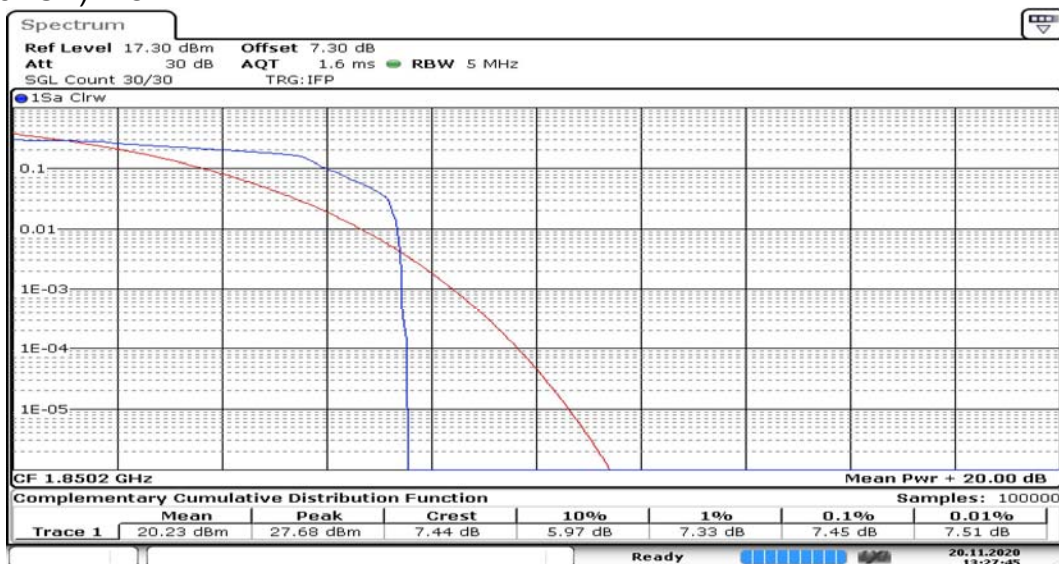
Channel 661



Date: 20. NOV. 2020 13:24:19

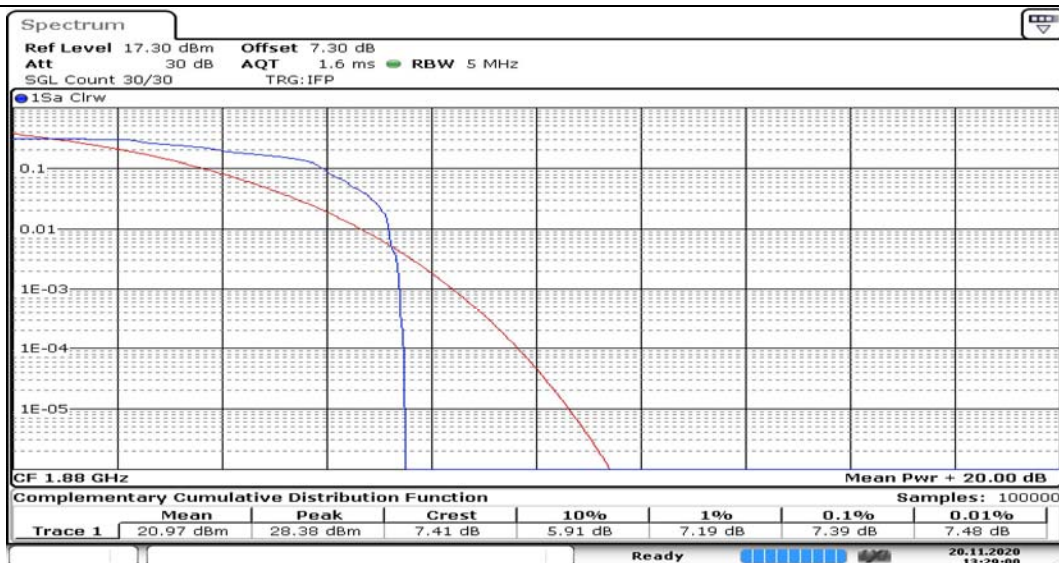
Channel 810

EDGE (8PSK) MODE:



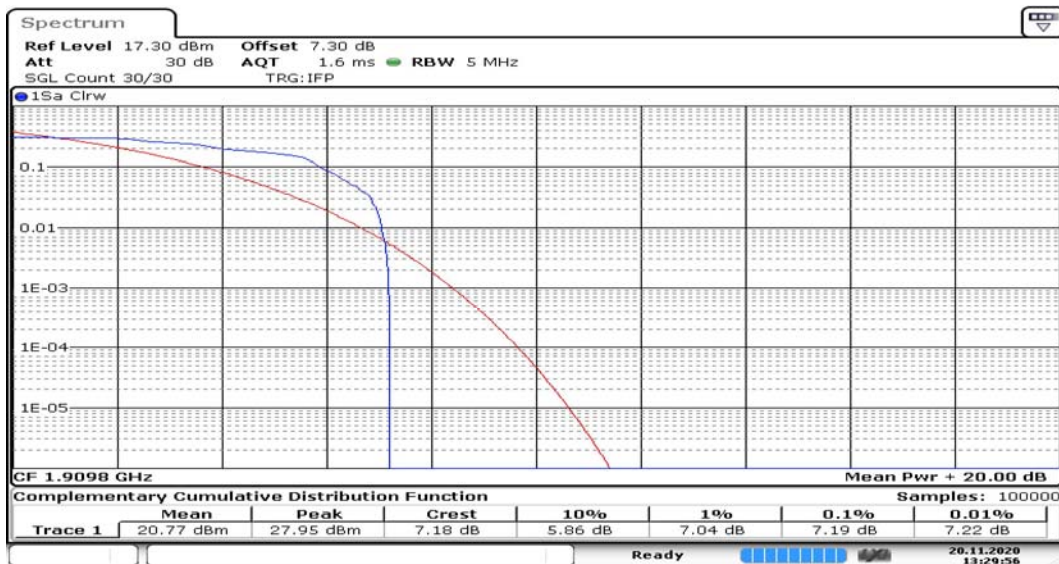
Date: 20. NOV. 2020 13:27:46

Channel 512



Date: 20. NOV. 2020 13:29:00

Channel 661



Date: 20. NOV. 2020 13:29:56

Channel 810

Effective Radiated Power and Effective Isotropic Radiated Power

GSM850

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
824.2	128	32.95	29.85	0.966
836.4	189	32.80	29.70	0.933
848.8	251	33.60	30.50	1.122

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Moce	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
824.2	128	4Downlink1uplink	32.93	29.83	0.960
836.4	189		32.77	29.67	0.930
848.8	251		33.57	30.47	1.120
824.2	128	3Downlink2uplink	30.63	27.53	0.570
836.4	189		30.48	27.38	0.550
848.8	251		30.53	27.43	0.550
824.2	128	2Downlink3uplink	28.75	25.65	0.370
836.4	189		28.62	25.52	0.360
848.8	251		28.65	25.55	0.360
824.2	128	1Downlink4uplink	26.54	23.44	0.220
836.4	189		26.44	23.34	0.220
848.8	251		26.49	23.39	0.220

EGPRS (8PSK) Measured Power:

Carrier frequency (MHz)	Channel No.	TX Moce	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
824.2	128	8PSK 4Downlink1uplink	26.42	23.32	0.210
836.4	189		26.47	23.37	0.220
848.8	251		26.29	23.19	0.210
824.2	128	8PSK 3Downlink2uplink	26.21	23.11	0.200
836.4	189		26.26	23.16	0.210
848.8	251		26.12	23.02	0.200
824.2	128	8PSK 2Downlink3uplink	25.11	22.01	0.160
836.4	189		24.26	21.16	0.130
848.8	251		24.95	21.85	0.150
824.2	128	8PSK 1Downlink4uplink	22.71	19.61	0.090
836.4	189		23.11	20.01	0.100
848.8	251		23.39	20.29	0.110

PCS1900

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
1850.2	512	29.64	28.95	0.785
1880.0	661	29.60	28.91	0.778
1909.8	810	29.74	29.05	0.804

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Moce	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
1850.2	512	4Downlink1uplink	29.63	28.94	0.783
1880.0	661		29.67	28.98	0.791
1909.8	810		29.80	29.11	0.815
1850.2	512	3Downlink2uplink	27.31	26.62	0.459
1880.0	661		27.12	26.43	0.440
1909.8	810		27.04	26.35	0.432
1850.2	512	2Downlink3uplink	25.68	24.99	0.316
1880.0	661		25.48	24.79	0.301
1909.8	810		25.39	24.70	0.295
1850.2	512	1Downlink4uplink	23.56	22.87	0.194
1880.0	661		23.39	22.70	0.186
1909.8	810		23.28	22.59	0.182

EGPRS (8PSK) Measured Power:

Carrier frequency (MHz)	Channel No.	TX Moce	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
1850.2	512	8PSK 4Downlink1uplink	25.22	24.53	0.284
1880.0	661		26.08	25.39	0.346
1909.8	810		25.79	25.10	0.324
1850.2	512	8PSK 3Downlink2uplink	25.05	24.36	0.273
1880.0	661		25.89	25.20	0.331
1909.8	810		25.60	24.91	0.310
1850.2	512	8PSK 2Downlink3uplink	23.15	22.46	0.176
1880.0	661		24.15	23.46	0.222
1909.8	810		24.03	23.34	0.216
1850.2	512	8PSK 1Downlink4uplink	21.13	20.44	0.111
1880.0	661		21.59	20.90	0.123
1909.8	810		21.45	20.76	0.119

APPENDIX B – TEST DATA OF RADIATED EMISSION

Radiated Spurious Emissions

GSM850

Test result:

GSM/GPRS MODE Channel 128:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1648.84	-52.73	-13	Vertical
1664.97	-51.54	-13	Vertical
2532.56	-44.21	-13	Vertical
2576.44	-43.76	-13	Vertical
8960.97	-39.57	-13	Vertical
9971.14	-36.09	-13	Vertical

EDGE (8PSK) MODE Channel 128:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1648.51	-53.28	-13	Vertical
1666.91	-51.21	-13	Vertical
2534.91	-44.60	-13	Vertical
2576.45	-44.17	-13	Vertical
8961.07	-39.16	-13	Vertical
9970.45	-36.49	-13	Vertical

GSM/GPRS MODE Channel 189:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1647.37	-53.34	-13	Vertical
1666.90	-51.03	-13	Vertical
2533.09	-44.71	-13	Vertical
2578.31	-44.04	-13	Vertical
8964.59	-39.04	-13	Vertical
9972.41	-36.03	-13	Vertical

EDGE (8PSK) MODE Channel 189:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1649.68	-52.96	-13	Vertical
1666.07	-50.91	-13	Vertical
2534.24	-44.42	-13	Vertical
2578.02	-44.64	-13	Vertical
8962.95	-39.45	-13	Vertical
9970.42	-36.63	-13	Vertical

GSM/GPRS MODE Channel 251:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1650.27	-52.71	-13	Vertical
1667.67	-51.52	-13	Vertical
2535.56	-44.37	-13	Vertical
2578.22	-43.83	-13	Vertical
8963.31	-39.08	-13	Vertical
9972.95	-35.47	-13	Vertical

EDGE (8PSK) MODE Channel 251:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1646.64	-53.41	-13	Vertical
1665.05	-51.62	-13	Vertical
2535.50	-44.38	-13	Vertical
2575.80	-44.55	-13	Vertical
8963.66	-39.37	-13	Vertical
9973.58	-35.70	-13	Vertical

GSM1900

Test result:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2461.49	-49.15	-13	Vertical
2779.46	-47.06	-13	Vertical
3724.58	-41.24	-13	Vertical
6675.37	-39.18	-13	Vertical
9961.51	-37.07	-13	Vertical
17818.89	-33.99	-13	Vertical

EDGE (8PSK) MODE Channel 512:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2460.15	-48.93	-13	Vertical
2781.61	-47.38	-13	Vertical
3725.53	-41.31	-13	Vertical
6678.70	-39.37	-13	Vertical
9960.35	-37.06	-13	Vertical
17818.42	-34.35	-13	Horizontal

GSM/GPRS MODE Channel 661:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2459.67	-49.39	-13	Vertical
2779.40	-47.54	-13	Vertical
3727.60	-40.74	-13	Vertical
6675.35	-39.47	-13	Vertical
9960.28	-37.70	-13	Vertical
17821.03	-33.86	-13	Vertical

EDGE (8PSK) MODE Channel 661:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2461.04	-48.75	-13	Vertical
2780.98	-47.32	-13	Vertical
3724.96	-40.83	-13	Vertical
6678.05	-39.58	-13	Vertical
9962.51	-37.17	-13	Vertical
17820.28	-34.26	-13	Vertical

GSM/GPRS MODE Channel 810:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2458.77	-49.03	-13	Vertical
2779.68	-47.67	-13	Vertical
3725.23	-40.88	-13	Vertical
6676.89	-39.51	-13	Vertical
9962.28	-37.40	-13	Vertical
17819.98	-34.37	-13	Vertical

EDGE (8PSK) MODE Channel 810:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2458.65	-48.99	-13	Vertical
2780.39	-47.76	-13	Vertical
3726.11	-40.65	-13	Vertical
6678.92	-39.59	-13	Vertical
9960.44	-37.09	-13	Vertical
17821.11	-34.23	-13	Vertical

Secondary supply worst case test result:

GSM850 GSM/GPRS MODE Channel 251 is selected as the worst point for RSE.

GSM/GPRS MODE Channel 251:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1649.71	-53.24	-13	Vertical
1668.60	-51.65	-13	Vertical
2534.22	-43.94	-13	Vertical
2577.28	-44.47	-13	Vertical
8964.60	-39.47	-13	Vertical
9969.93	-36.13	-13	Vertical

---End of Test Report---