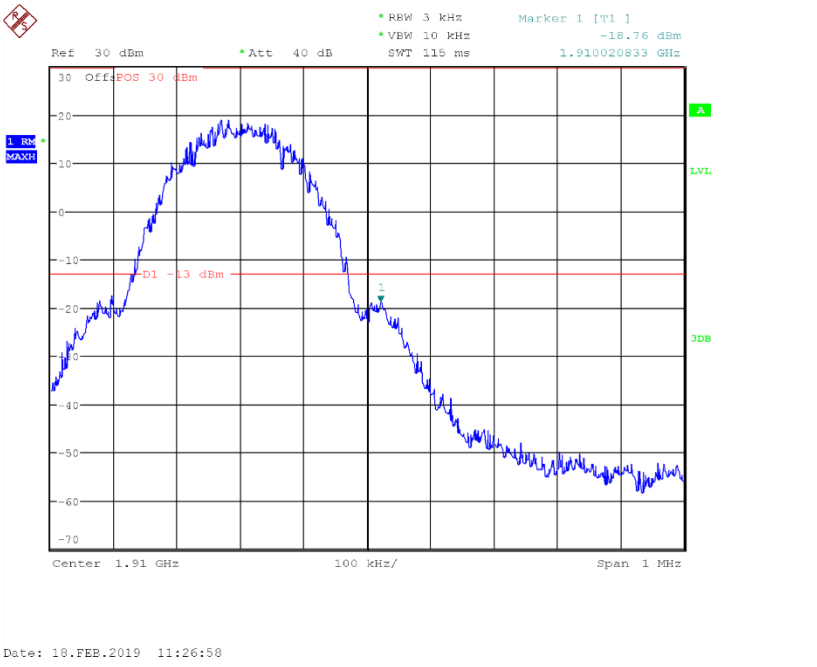


Fig.48 **Channel 810- LOW BAND EDGE BLOCK**

EDGE 1900

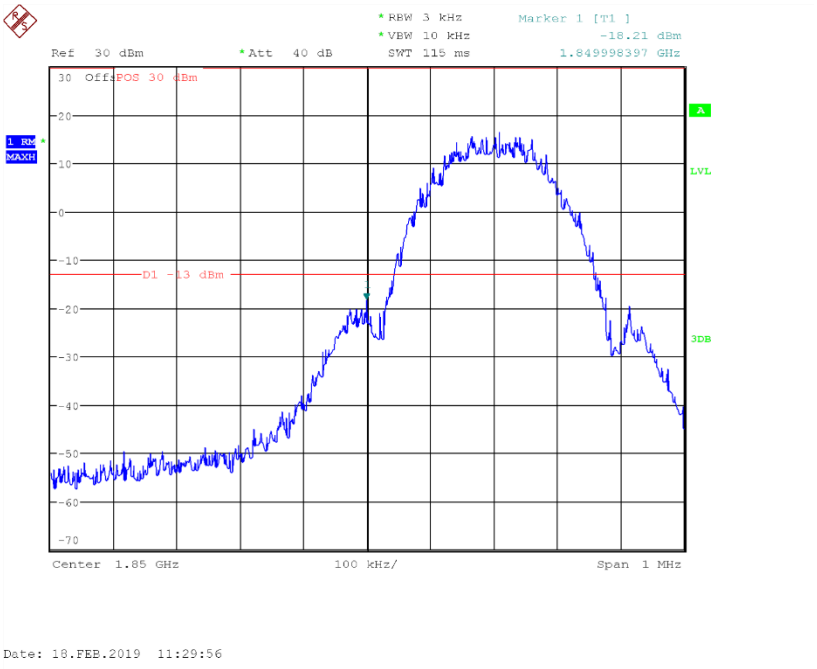


Fig.49 **Channel 512- LOW BAND EDGE BLOCK**

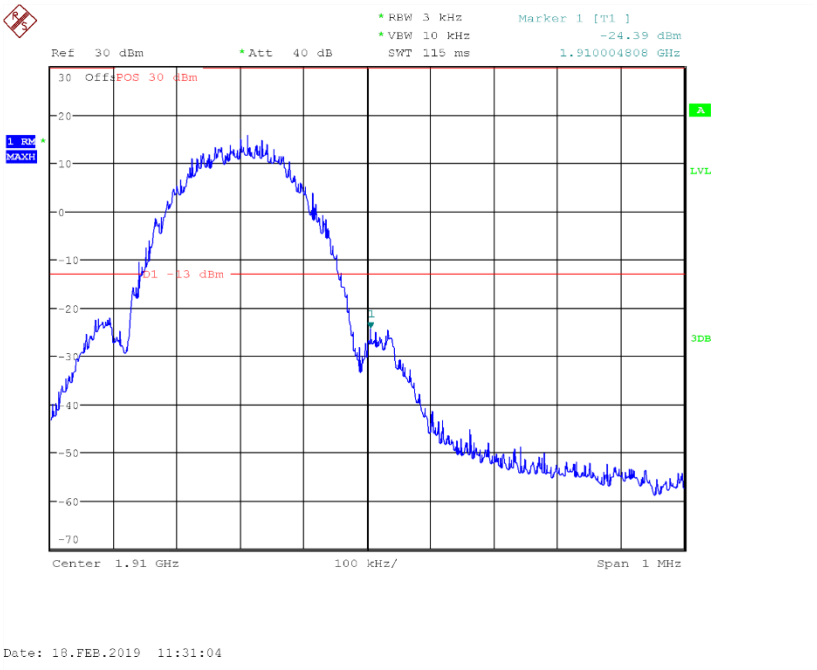


Fig.50 **Channel 810- LOW BAND EDGE BLOCK**

WCDMA BAND II

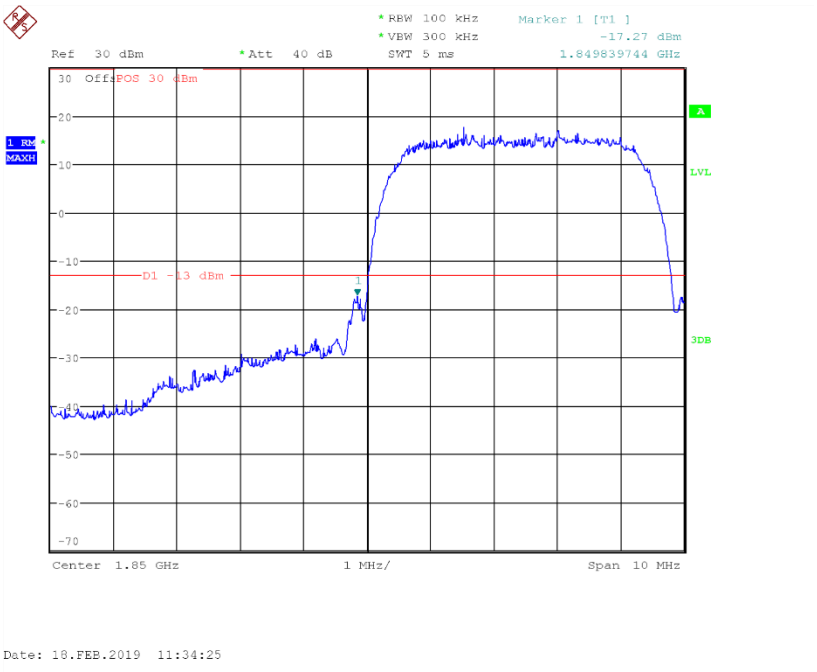


Fig.51 **Channel 9262- LOW BAND EDGE BLOCK**

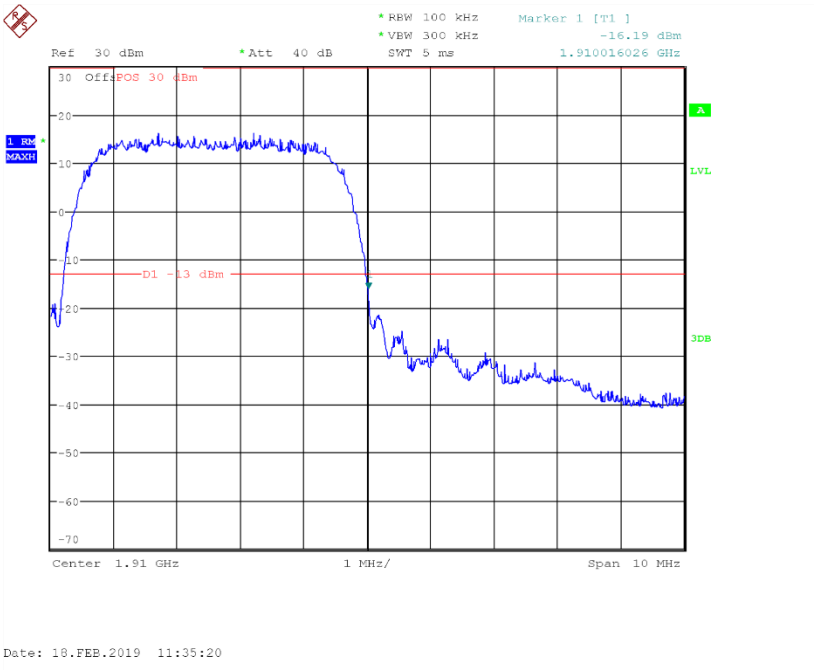


Fig.52 **Channel 9538- LOW BAND EDGE BLOCK**

Conclusion: PASS

WCDMA BAND IV

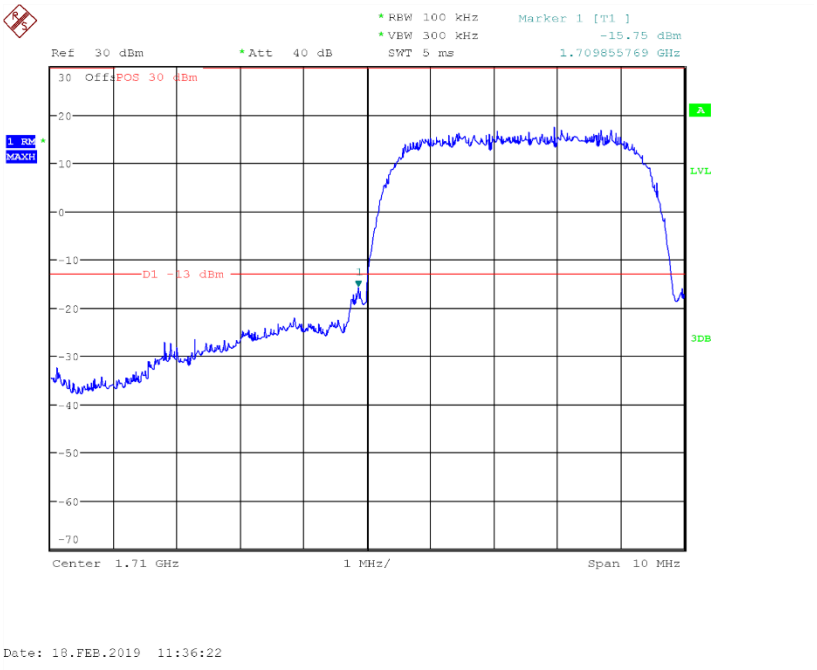


Fig.53 **Channel 1312- LOW BAND EDGE BLOCK**

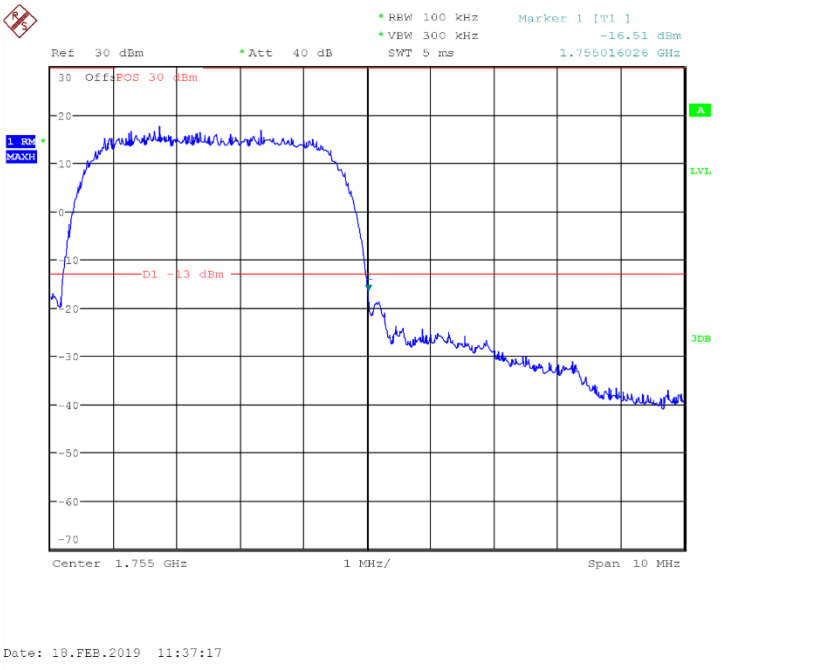


Fig.54 **Channel 1513- LOW BAND EDGE BLOCK**

Conclusion: PASS

WCDMA BAND V

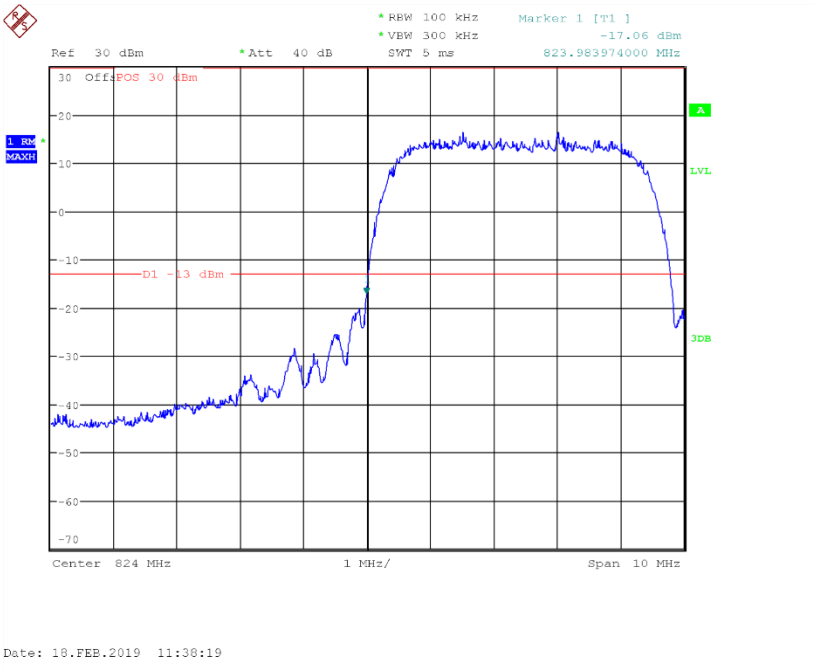


Fig.55 **Channel 4132- LOW BAND EDGE BLOCK**

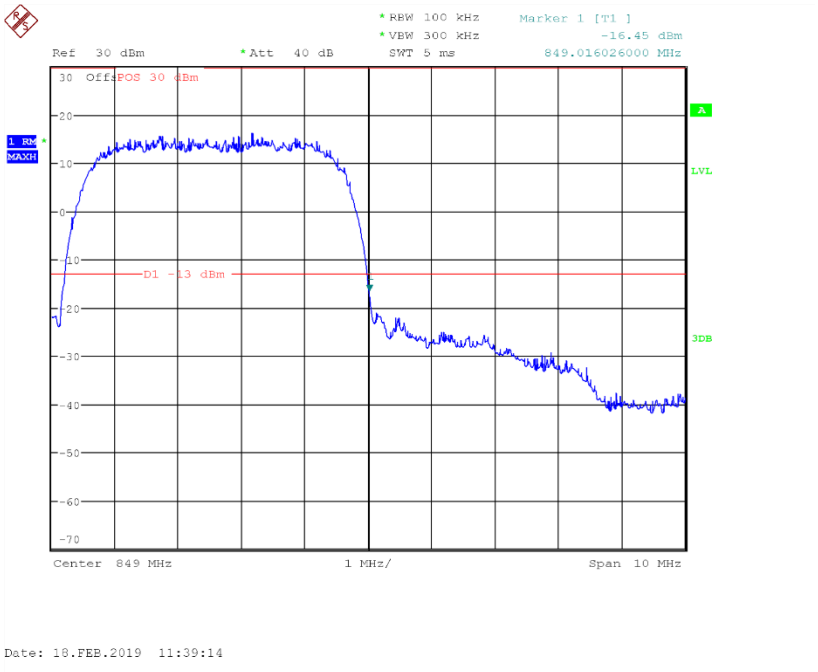


Fig.56 **Channel 4233- LOW BAND EDGE BLOCK**

Conclusion: PASS

ANNEX A.6. FREQUENCY STABILITY

Method of test measurements please refer to KDB971168 D01 v03 clause 9

A.5.1.Method of Measurement and test procedures

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on mid channel of GSM850, PCS1900, WCDMA BANDII and WCDMA BANDV, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 C increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

A.5.2. Measurement Limit

A.5.2.1. For Hand carried battery powered equipment

According to the JTC standard the GSM frequency stability of the carrier shall be accurate to within 0.1ppm of the received frequency from the base station. And the WCDMA is 2.5ppm. This accuracy is sufficient to meet Sec.24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.6VDC and 4.35VDC, with a nominal voltage of 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages was varied from 85% to 115%.

A.5.2.2. For equipment powered by primary supply voltage

According to the JTC standard the GSM frequency stability of the carrier shall be accurate to within 0.1ppm of the received frequency from the base station. And the WCDMA is 2.5ppm. This accuracy is sufficient to meet Sec.24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

A.5.3 Test results

GSM850 Mid Channel/fc(MHz) 189/836.4

Frequency Error VS Temperature

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.8	-30	2.84	84
3.8	-20	0.32	84
3.8	-10	2.78	84
3.8	0	1.1	84
3.8	10	1.29	84
3.8	20	0.32	84
3.8	30	0.77	84
3.8	40	6.39	84
3.8	50	8.52	84

8

Frequency Error VS Voltage

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.6	25	4.07	84
3.8	25	5.29	84
4.35	25	7.43	84

PCS1900 Mid Channel/fc(MHz) 661/1880

Frequency Error VS Temperature

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.8	-30	-14.4	196
3.8	-20	-17.63	196
3.8	-10	-11.95	196
3.8	0	-16.59	196
3.8	10	-21.24	196
3.8	20	-17.82	196
3.8	30	-18.6	196
3.8	40	-18.21	196
3.8	50	-16.59	196

Frequency Error VS Voltage

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.6	25	-17.56	196
3.8	25	-16.72	196
4.35	25	-19.11	196

WCDMA BAND II Mid Channel/fc(MHz) 9400 /1880

Frequency Error VS Temperature

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.8	-30	-0.81	4700
3.8	-20	-0.66	4700
3.8	-10	-1.13	4700
3.8	0	0.12	4700
3.8	10	-0.46	4700
3.8	20	-0.49	4700
3.8	30	-1.3	4700
3.8	40	-1.88	4700
3.8	50	-0.93	4700

Frequency Error VS Voltage

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.6	25	0.31	4700
3.8	25	-1.1	4700
4.35	25	-0.37	4700

WCDMA BAND IV Mid Channel/fc(MHz) 1413/1732.6

Frequency Error VS Temperature

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.8	-30	-2.11	4331.5
3.8	-20	-1.68	4331.5
3.8	-10	-1.27	4331.5
3.8	0	-0.98	4331.5
3.8	10	0.21	4331.5
3.8	20	-0.27	4331.5
3.8	30	-0.46	4331.5
3.8	40	-0.55	4331.5
3.8	50	-0.21	4331.5

Frequency Error VS Voltage

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.6	25	-1.34	4331.5
3.8	25	-1.40	4331.5
4.35	25	-0.28	4331.5

WCDMA BAND V Mid Channel/fc(MHz) 4183/836.6

Frequency Error VS Temperature

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.8	-20	-0.53	2091.5
3.8	-10	0.12	2091.5
3.8	0	-0.38	2091.5
3.8	10	-1.42	2091.5
3.8	20	-0.58	2091.5
3.8	30	0.18	2091.5
3.8	40	-1.4	2091.5
3.8	50	-0.41	2091.5
3.8	60	0.32	2091.5

Frequency Error VS Voltage

Power Supply (VDc)	Environment Temperature(℃)	Frequency error(Hz)	Limit (Hz)
3.6	25	-0.61	2091.5
3.8	25	-0.79	2091.5
4.35	25	0.09	2091.5

Conclusion: PASS

ANNEX A.7. CONDUCTED SPURIOUS EMISSION

A.7.1. GSM Measurement Method and test procedures

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 10 GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; If the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give a optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
The trace mode is set to MaxHold to get the highest signal at each frequency;
Wait 25 seconds;Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

GSM 850 Transmitter

Channel	Frequency(MHz)
128	824.2
189	836.4
251	848.8

PCS 1900 Transmitter

Channel	Frequency(MHz)
512	1850.2
661	1880.0
810	1909.8

A.7.1.1. Measurement Limit

Part 24.238 and Part 22.917 specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A7.1.2. Measurement result

Spurious emission limit -13dBm.

Note: peak above the limit line is the carrier frequency.

A7.1.2.1. GSM850

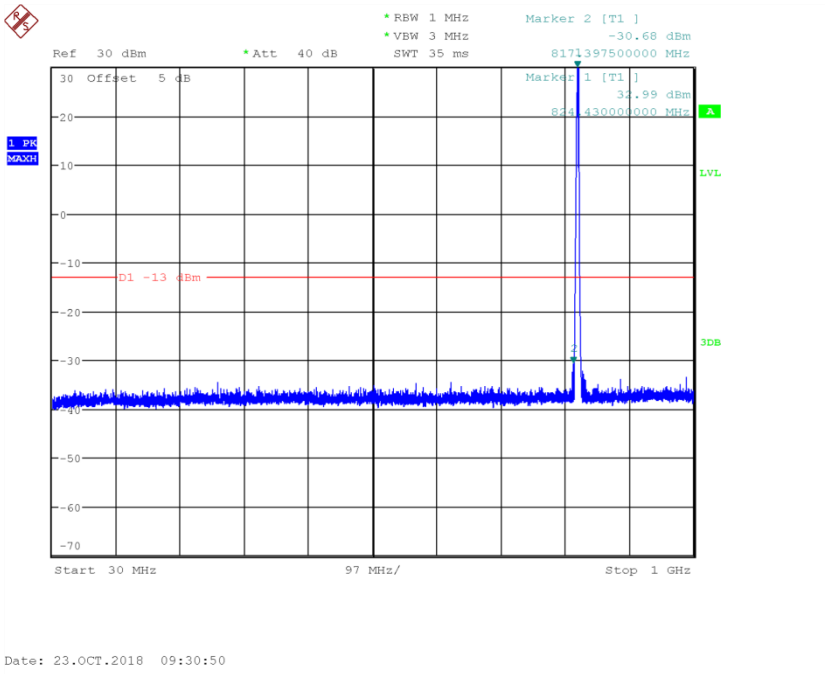


Fig.57 **Channel 128: 30MHz~1GHz**

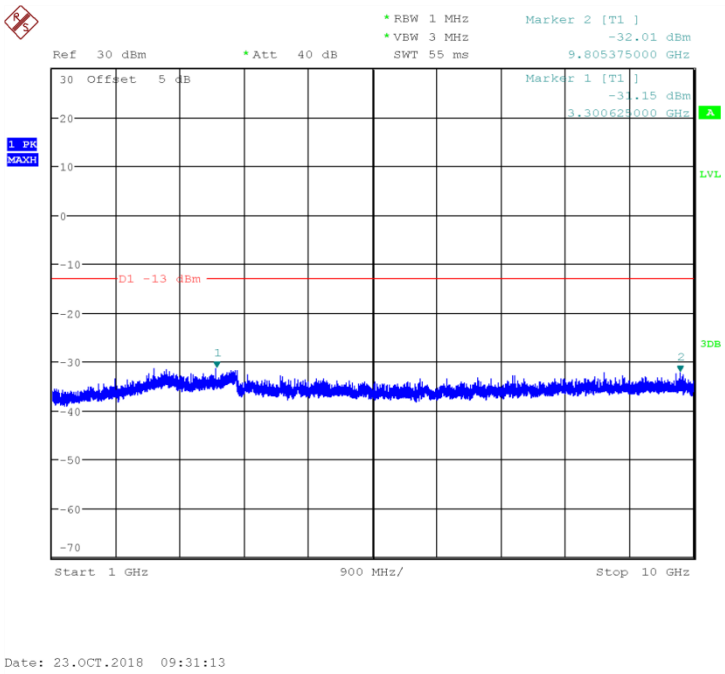


Fig.58 **Channel 128: 1GHz~10GHz**

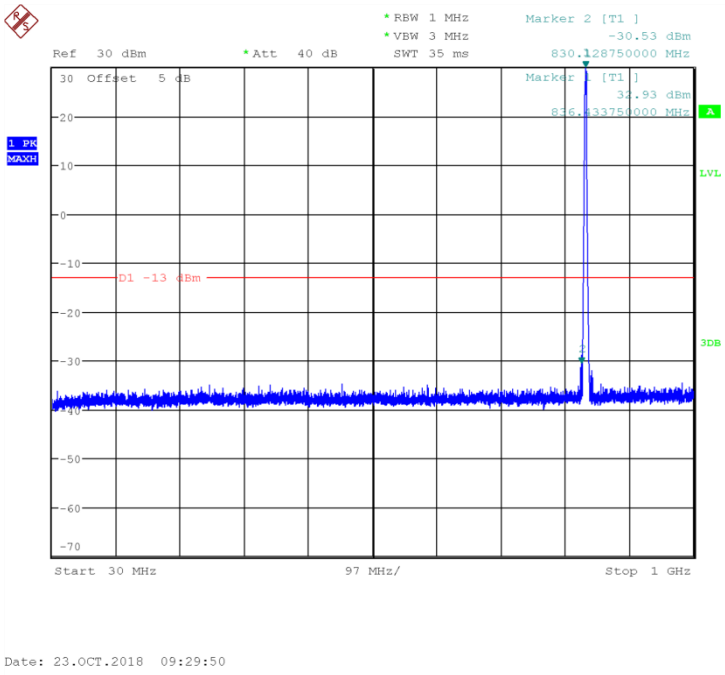


Fig.59 **Channel 189: 30MHz~1GHz**

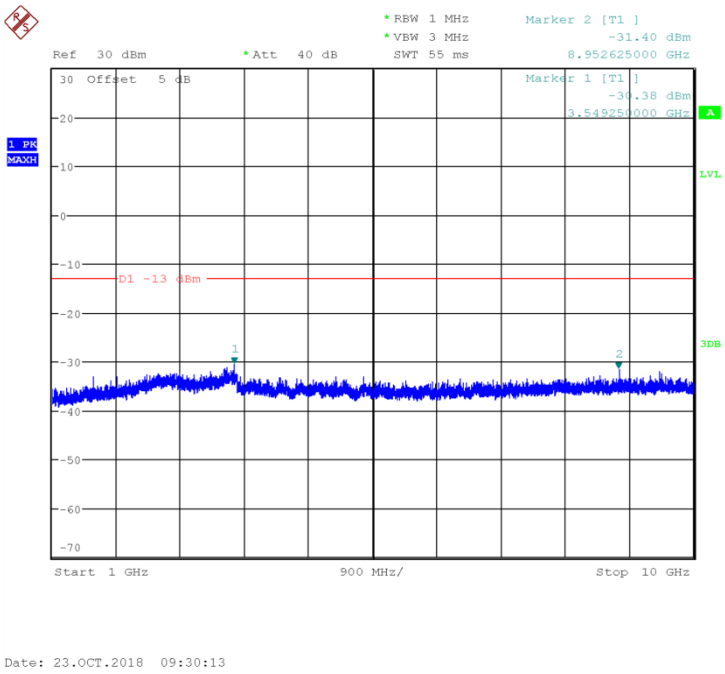


Fig.60 **Channel 189: 1GHz~10GHz**

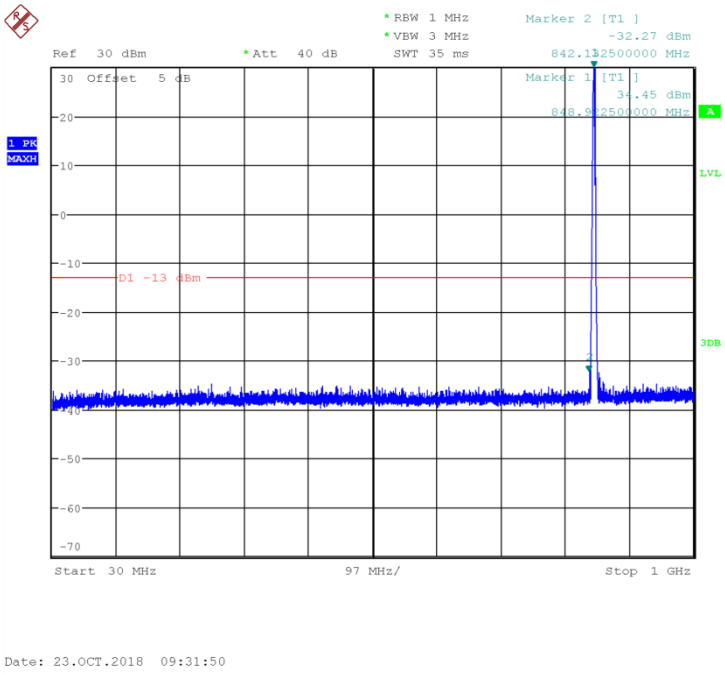


Fig.61 **Channel 251: 30MHz~1GHz**

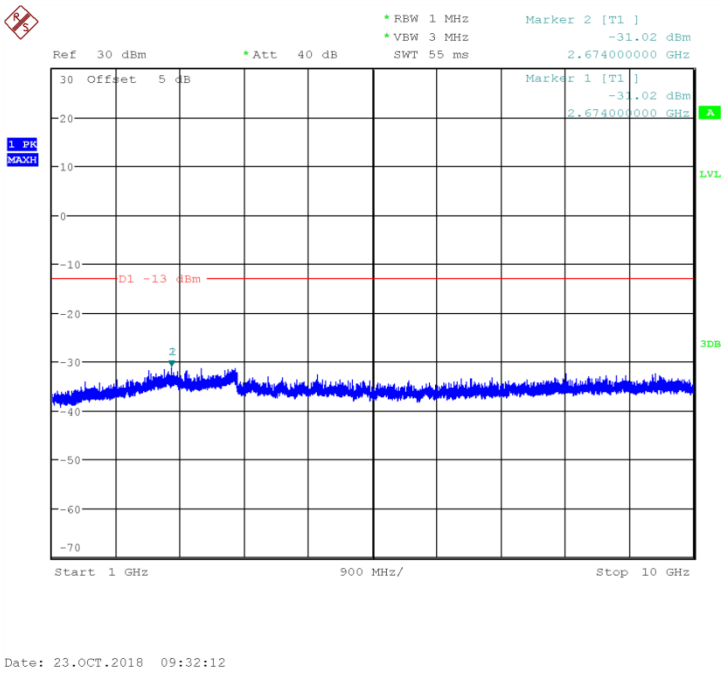


Fig.62 **Channel 251: 1GHz~10GHz**

A7.1.2.2. GSM1900

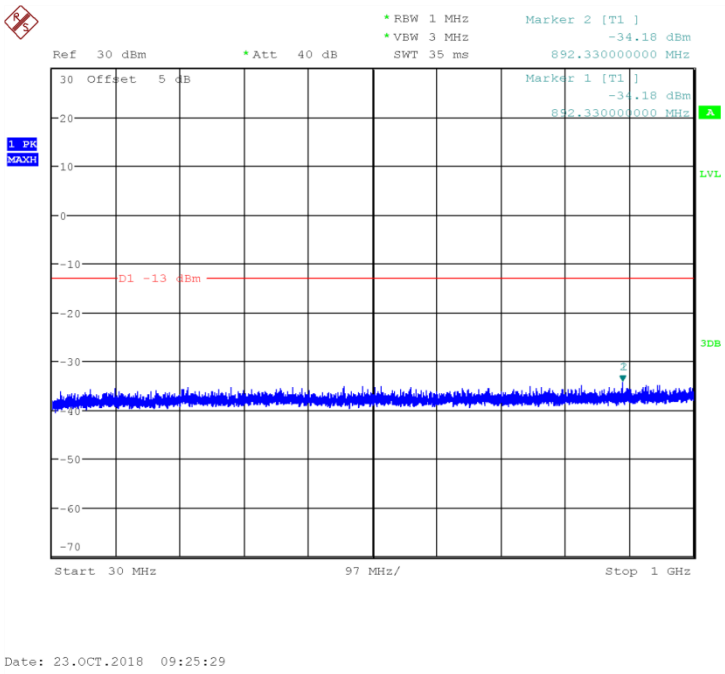


Fig.63 **Channel 512: 30MHz~1GHz**

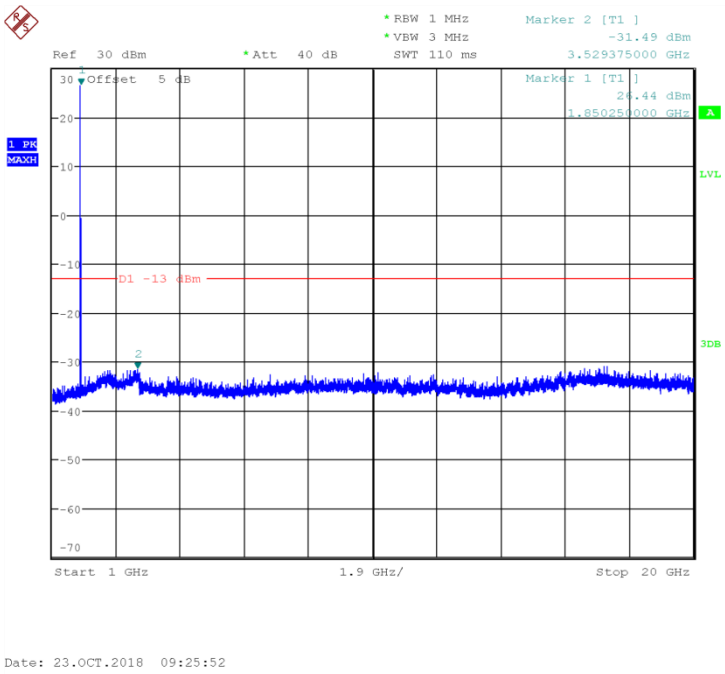


Fig.64 **Channel 512: 1GHz~20GHz**

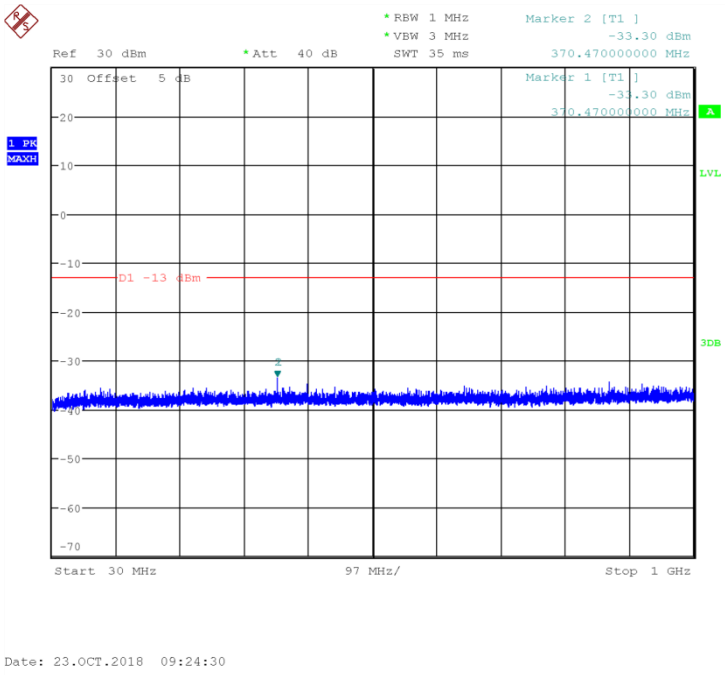


Fig.65 **Channel 661: 30MHz~1GHz**

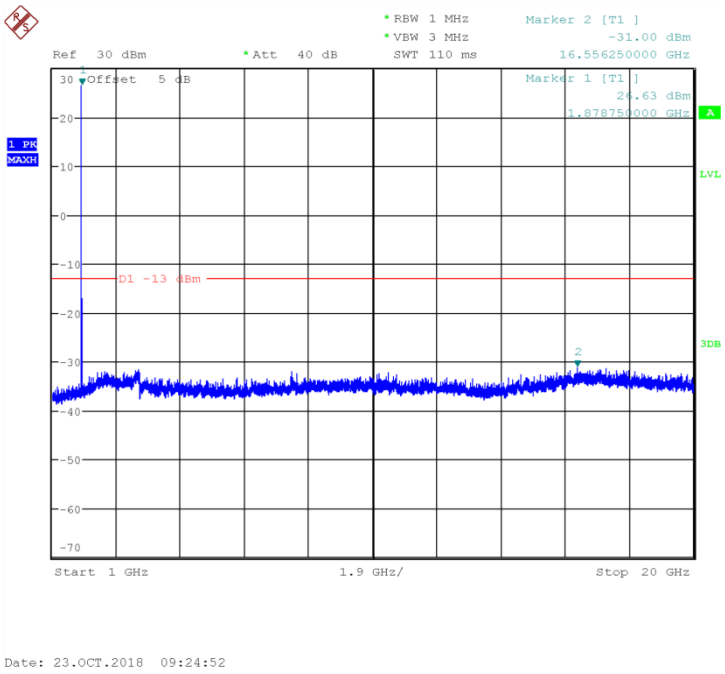


Fig.66 **Channel 661: 1GHz~20GHz**

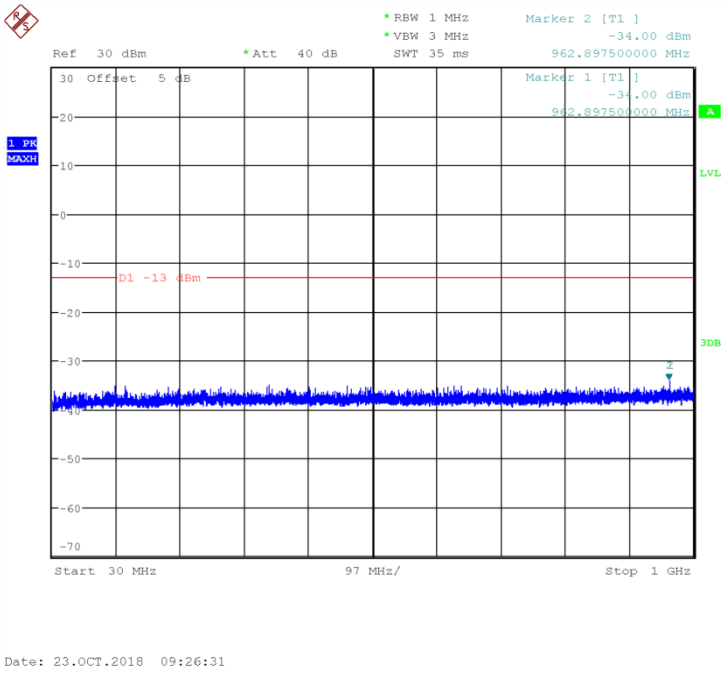


Fig.67 **Channel 810: 30MHz~1GHz**

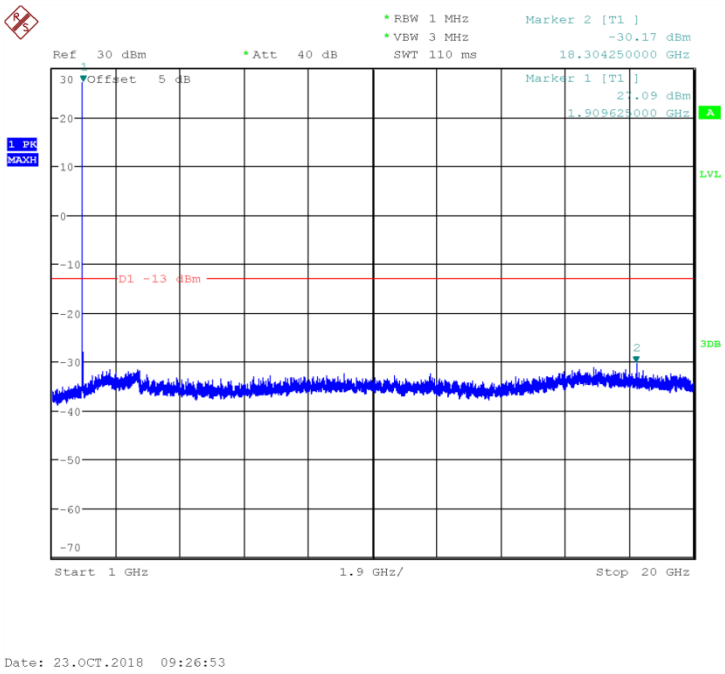


Fig.68 **Channel 810: 1GHz~20GHz**

Conclusion: PASS

A7.2. WCDMA Measurement Method and test procedures

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of WCDMA Band II, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For WCDMA Band V, data taken from 30 MHz to 10GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; If the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give a optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
The trace mode is set to MaxHold to get the highest signal at each frequency;
Wait 25 seconds;
Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

WCDMA Band II Transmitter

Channel	Frequency (MHz)

9262	1852.40
9400	1880.00
9538	1907.60

WCDMA Band IV Transmitter

Channel	Frequency (MHz)
1312	1712.40
1413	1732.60
1513	1752.60

WCDMA Band V Transmitter

Channel	Frequency (MHz)
4132	826.40
4183	836.60
4233	846.60

A 7.2.1. Measurement Limit

Part 24.238 and Part 22.917 specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A 7.2.2. Measurement result

Spurious emission limit -13dBm.

Note: peak above the limit line is the carrier frequency.

A 7.2.2.1. WCDMA Band II

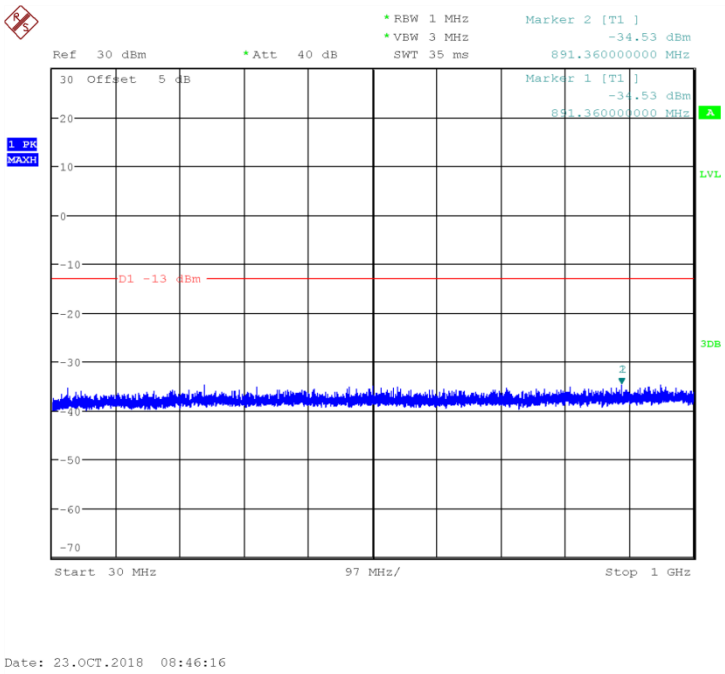


Fig.69 **Channel 9262: 30MHz~1GHz**

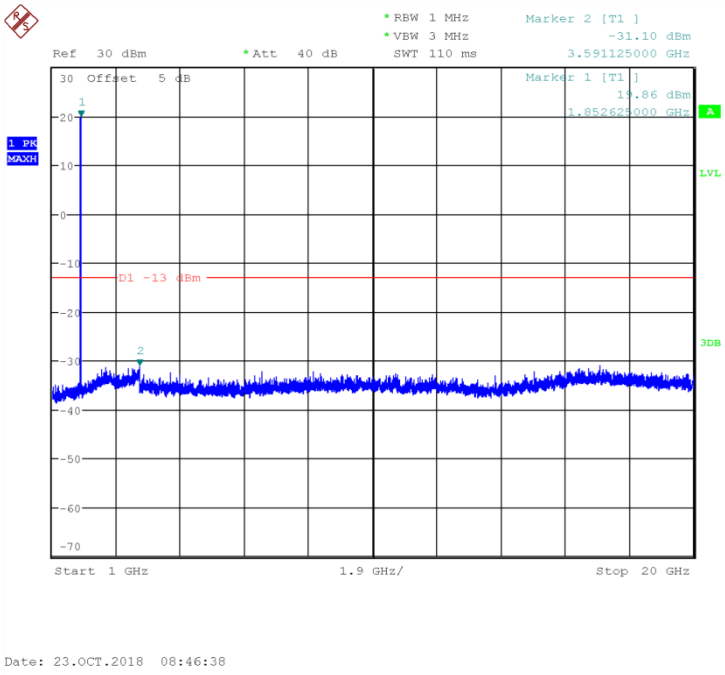


Fig.70 **Channel 9262: 1GHz~20GHz**

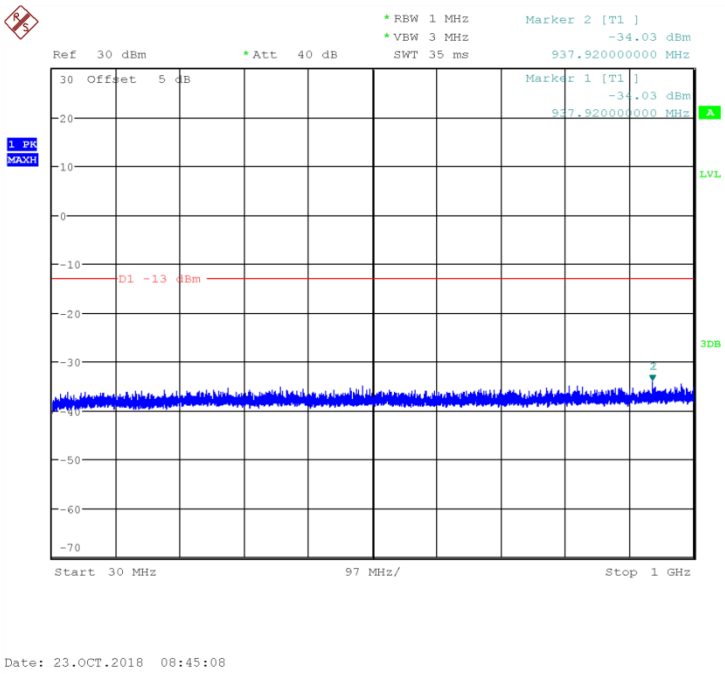


Fig.71 **Channel 9400: 30MHz~1GHz**

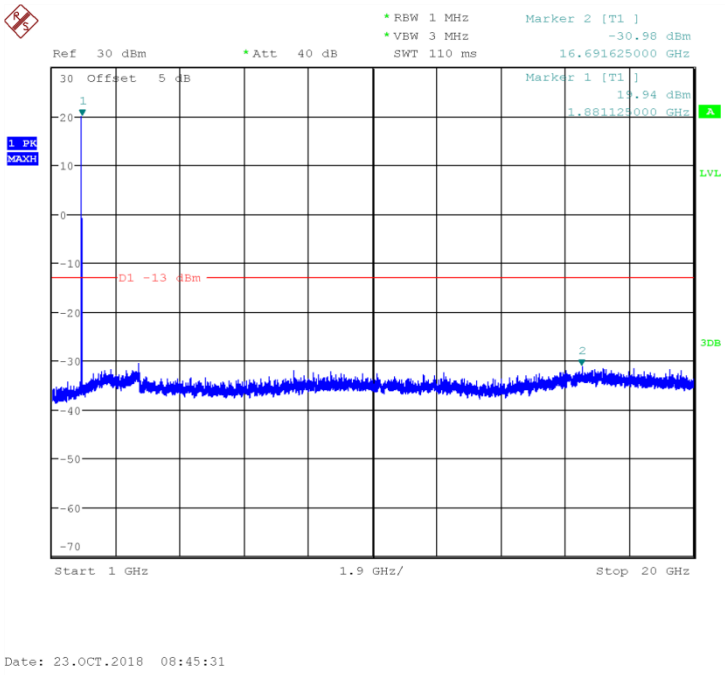


Fig.72 **Channel 9400: 1GHz~20GHz**

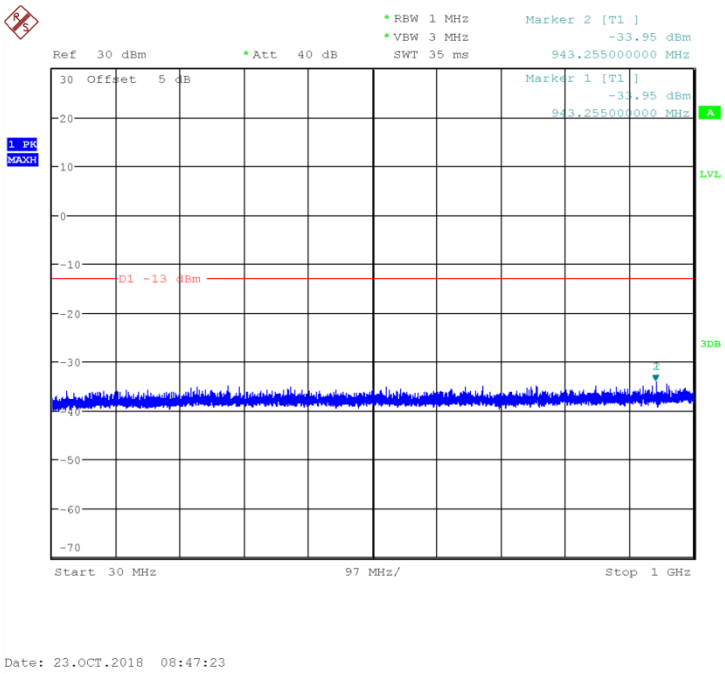


Fig.73 **Channel 9538: 30MHz~1GHz**

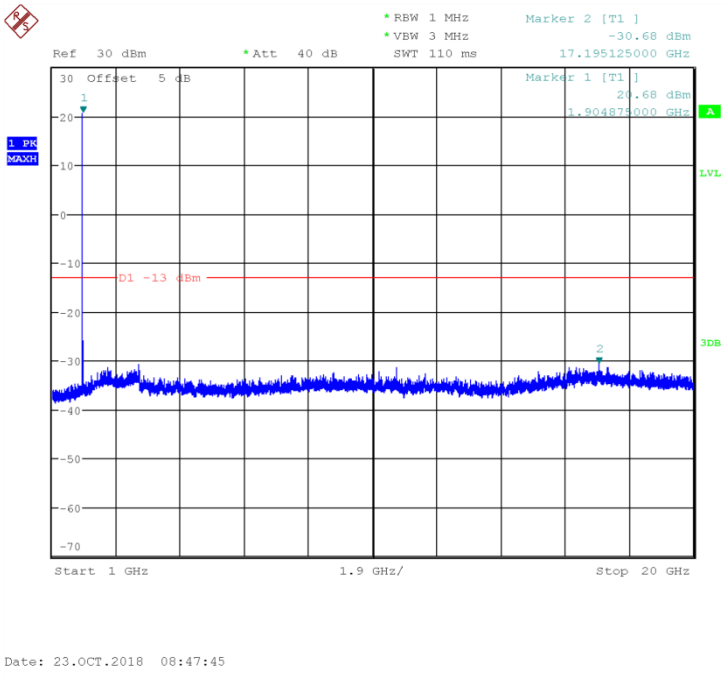


Fig.74 **Channel 9538: 1GHz~20GHz**

Conclusion: PASS

A 7.2.2.1. WCDMA Band IV

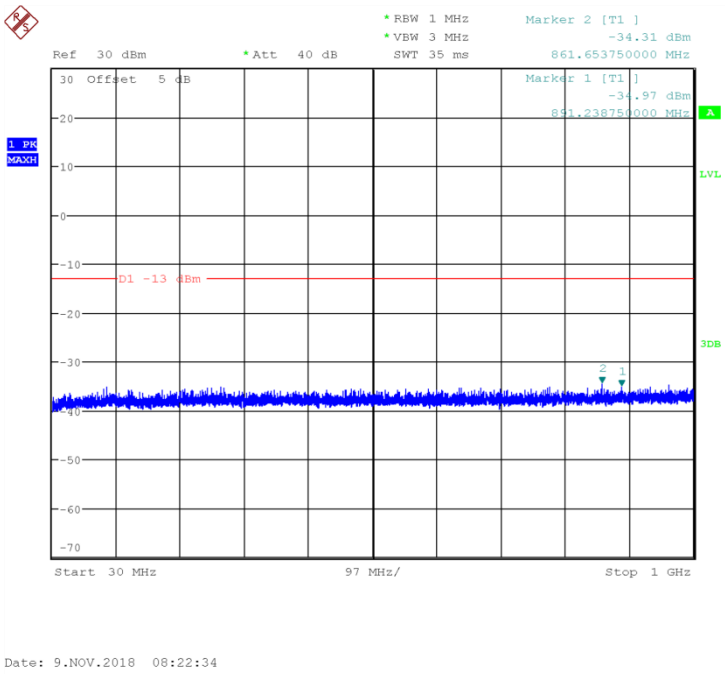


Fig.75 **Channel 1312: 30MHz~1GHz**

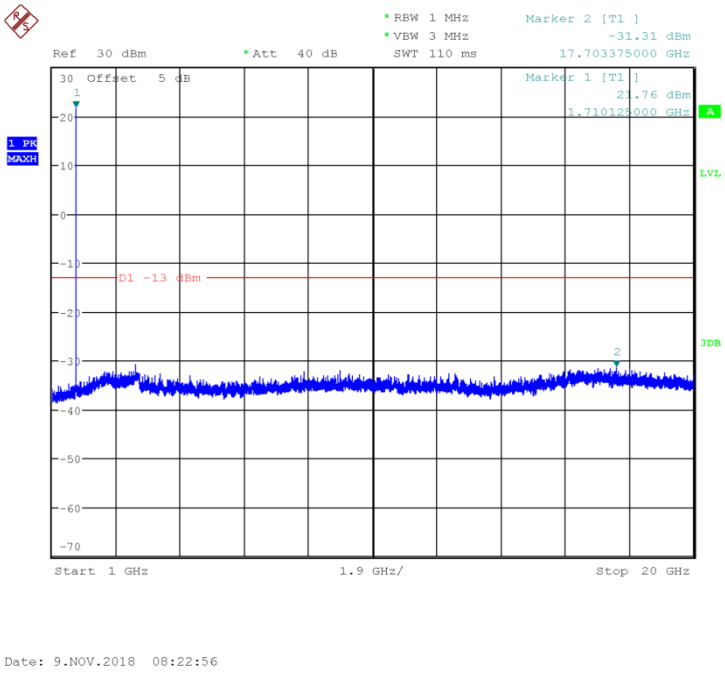


Fig.76 **Channel 1312: 1GHz~20GHz**

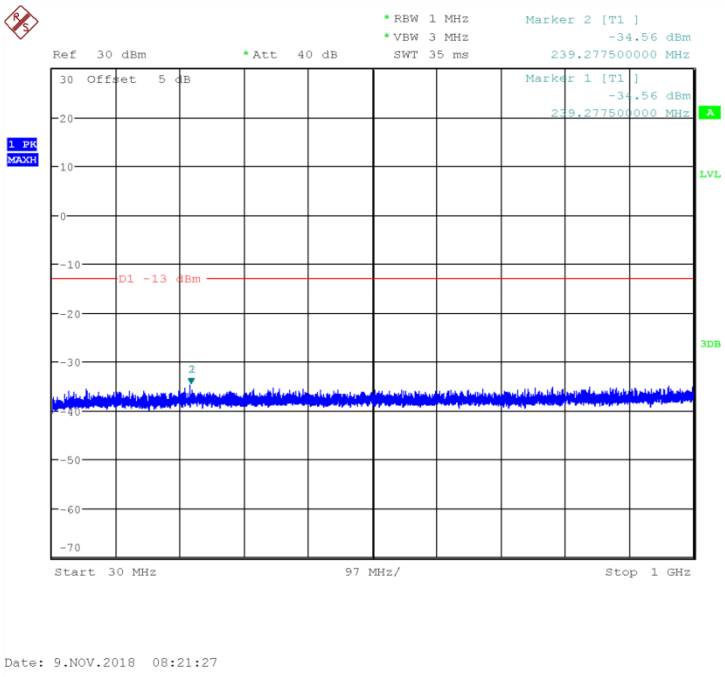


Fig.77 **Channel 1413: 30MHz~1GHz**

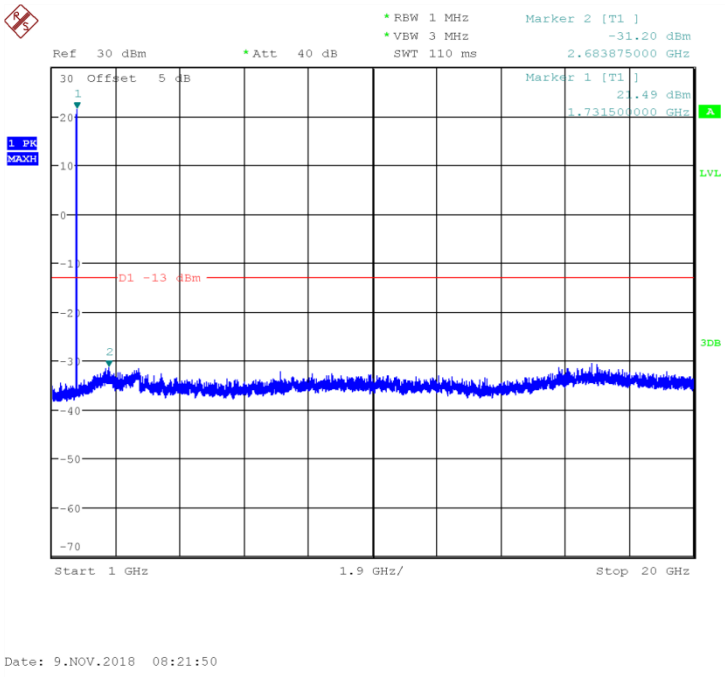


Fig.78 **Channel 1413: 1GHz~20GHz**

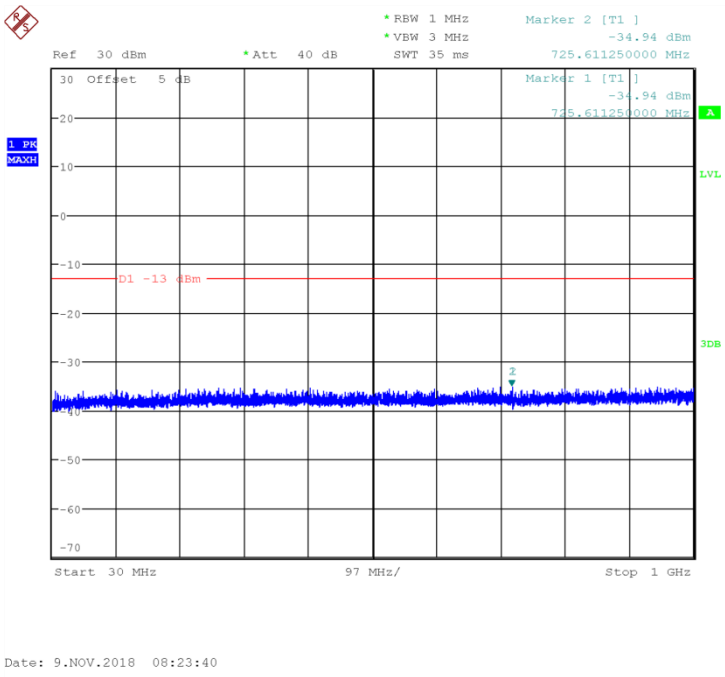


Fig.79 **Channel 1513: 30MHz~1GHz**

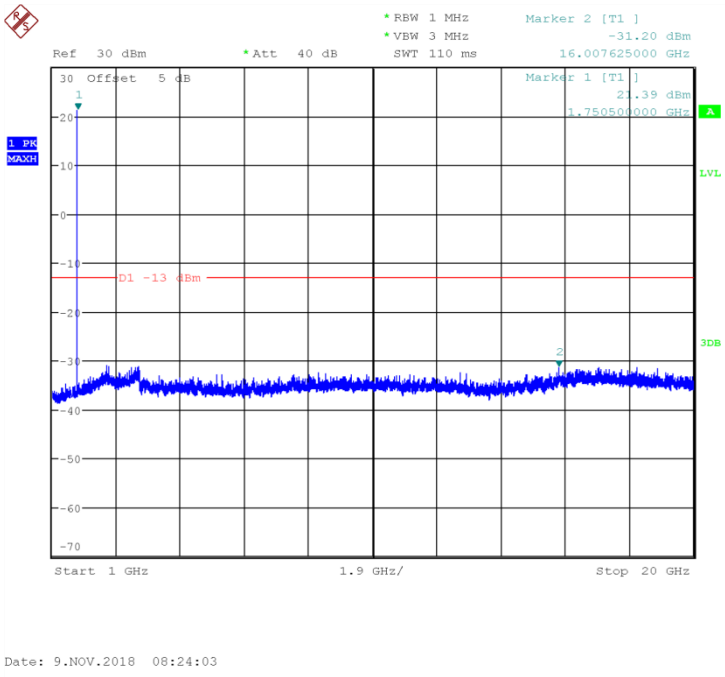


Fig.80 **Channel 1513: 1GHz~20GHz**

Conclusion: PASS

A 7.2.2.3. WCDMA Band V

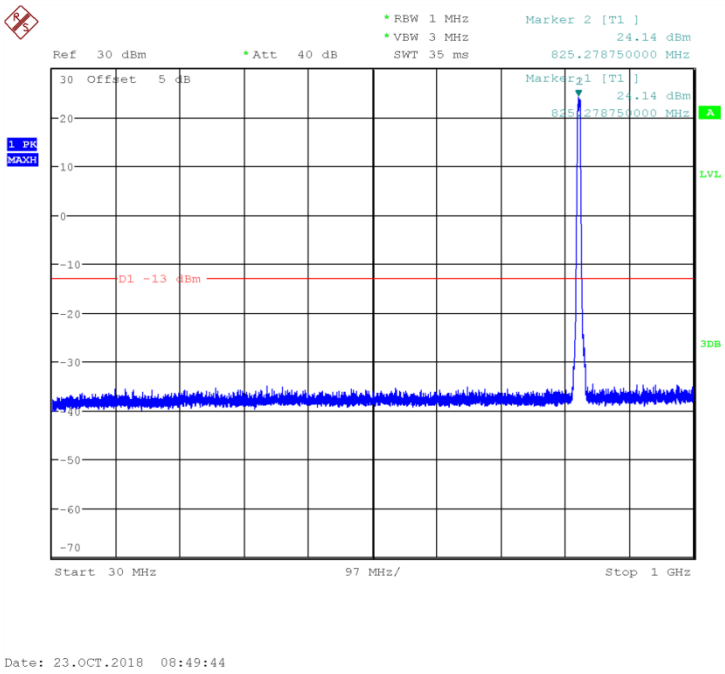


Fig.81 **Channel 4132: 30MHz~1GHz**

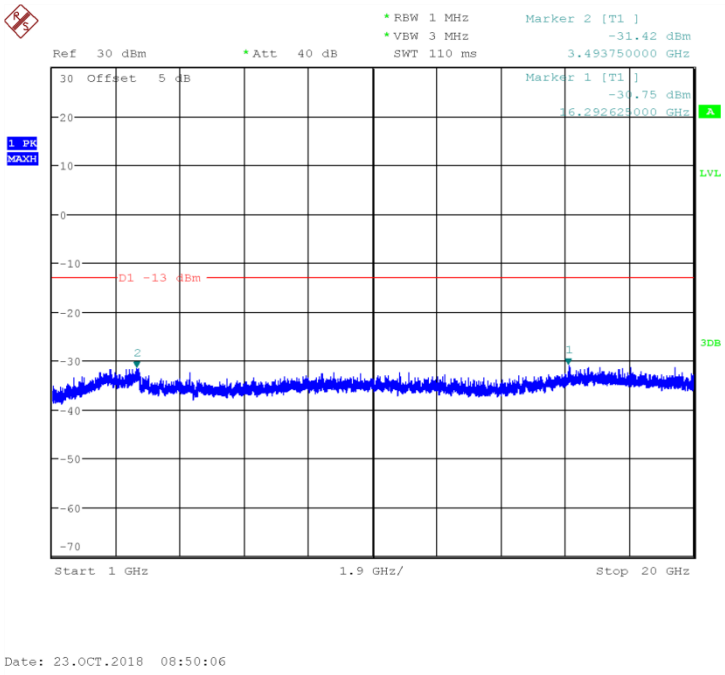


Fig.82 **Channel 4132: 1GHz~20GHz**

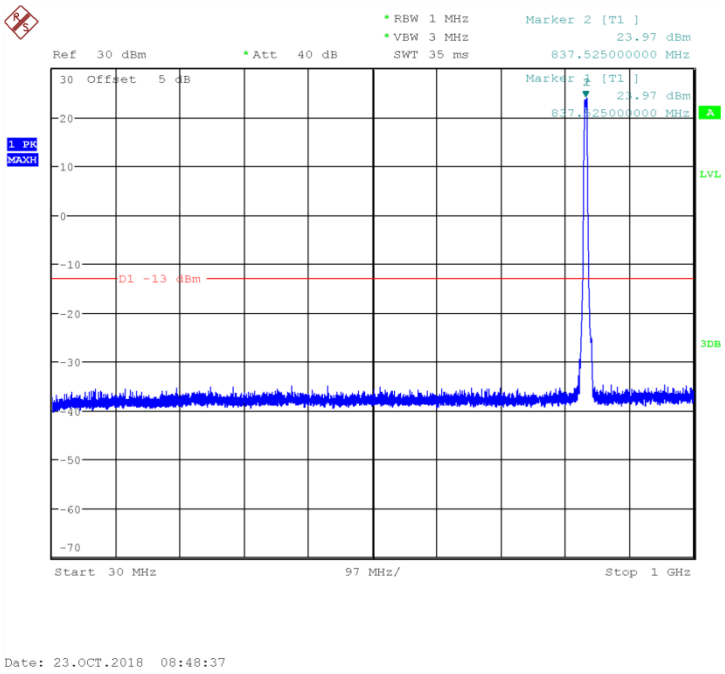


Fig.83 **Channel 4183: 30MHz~1GHz**

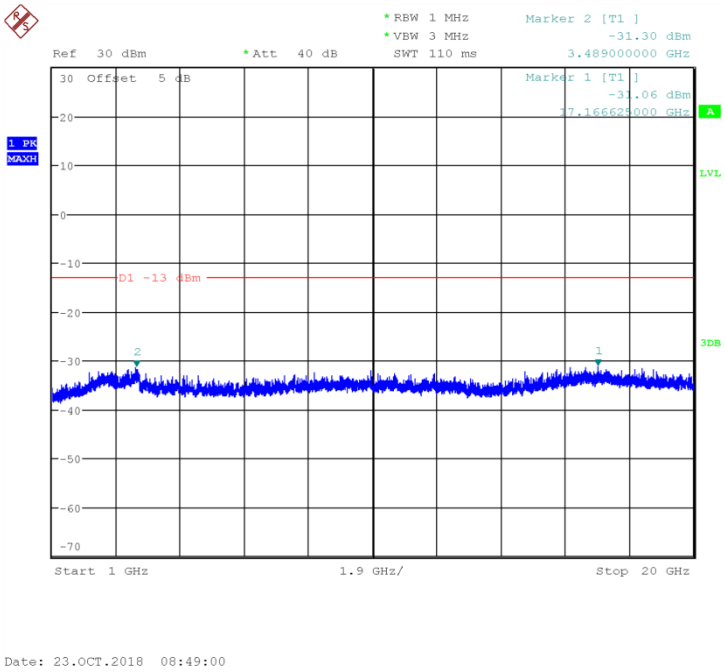


Fig.84 **Channel 4183: 1GHz~20GHz**

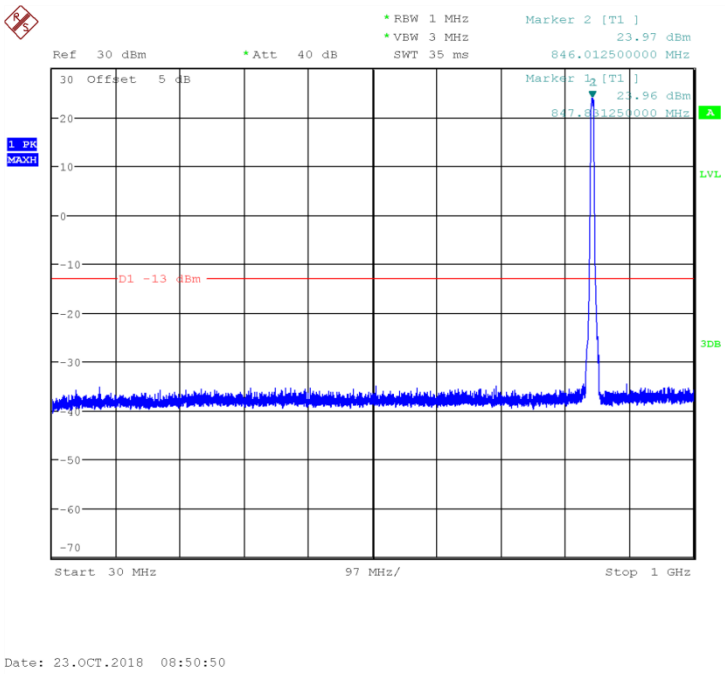


Fig.85 **Channel 4233: 30MHz~1GHz**

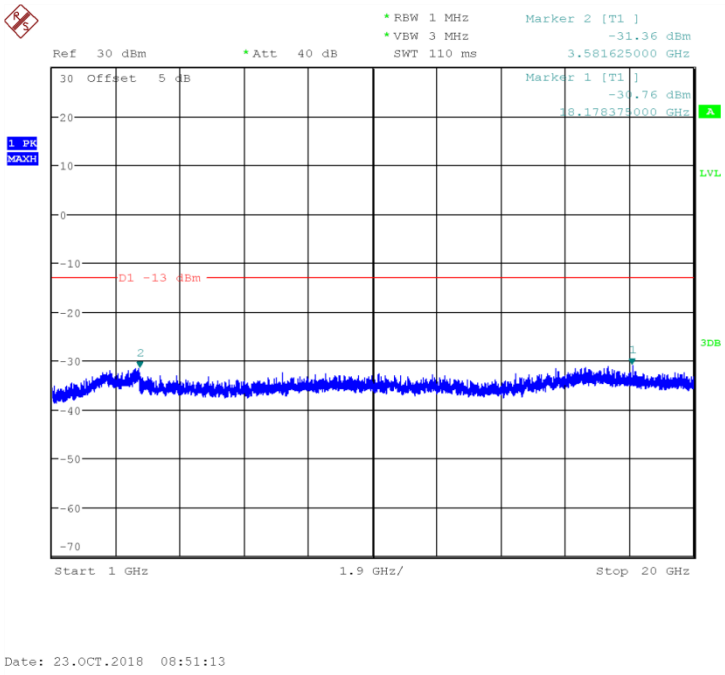


Fig.86 **Channel 4233: 1GHz~20GHz**

Conclusion: PASS

ANNEX A.8. RADIATED

A.8.1. EIRP

A.8.1.1. GSM EIRP

A.8.1.1.1. Description

This is the test for the maximum radiated power from the EUT.

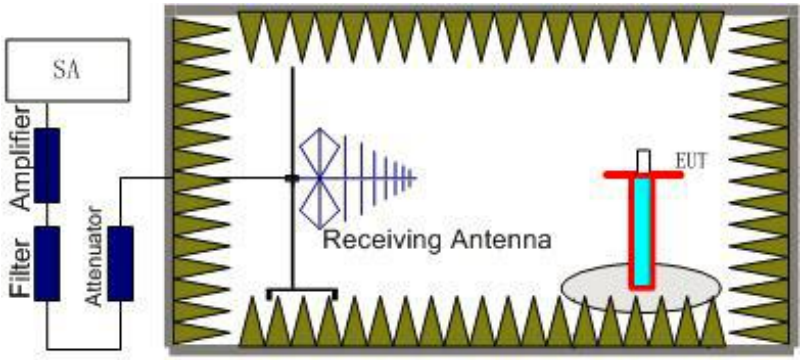
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power"and 24.232(c) specifies that "Peak transmit power must be measured over any interval ofcontinuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."Rule Part 22.913(a) specifies ” The ERP of mobile transmitters and auxiliary test transmitters must

not exceed 7 Watts.”

A.8.1.1.2. Method of Measurement

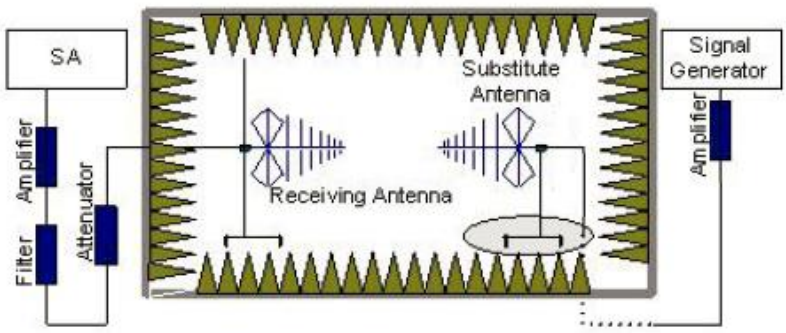
The measurements procedures in TIA-603E-2016 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from thereceive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUTfor emission measurements. The height of receiving antenna is 1.5m. The test setup refers tofigure below. Detected emissions were maximized at each frequency by rotating the EUTthrough 360° and adjusting the receiving antenna polarization. The radiated emissionmeasurements of all transmit frequencies in three channels (High, Middle, Low) weremeasured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level duringthe test. And the maximum value of the receiver should be recorded as (Pr).

3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at

thereference point of the chamber. An RF Signal source for the frequency band of interest isconnected to the substitution antenna with a cable that has been constructed to not interferewith the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of thesubstitution antenna, and adjust the level of the signal generator output until the value of thereceiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. Thetest should be performed by rotating the test item and adjusting the receiving antennapolarization.

4. A amplifier should be connected to the Signal Source output port. And the cable should beconnect between the Amplifier and the Substitution Antenna.

The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should berecorded after test.

The measurement results are obtained as described below:

Power(EIRP)=P_{Mea}+ P_{Ag}- P_{cl}+ G_a

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dBi) and known input power.

6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

A.8.1.1.3 GSM 850-ERP 22.913(a)

A.8.1.1.3.1 Limits

	Power Step	Burst Peak ERP (dBm)
GPRS	3	≤38.45dBm (7W)
EDGE	6	≤38.45dBm (7W)

A.8.1.1.3.2 Measurement result

GPRS(GMSK)

Frequency (MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_aAntenna Gain(dBd)	PeakERP(dBm)	Polarization
824.2	-5.96	3.1	37	3.11	31.05	H
836.6	-6.55	3.1	37	3.11	30.46	H
848.8	-7.37	3.1	37	3.11	29.64	H

EDGE(8PSK)

Frequency (MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_aAntenna Gain(dBd)	PeakERP(dBm)	Polarization
824.2	-13.55	3.1	37	3.11	23.46	H
836.6	-13.16	3.1	37	3.11	23.85	H
848.8	-13.39	3.1	37	3.11	23.62	H

Frequency: 848.8MHz

Peak ERP(dBm)= P_{Mea}(-13.39dBm) - P_{cl}(3.1dB) +P_{Ag}(37dB) + G_a(3.11dBd)
= 23.62dBm
Note: ANALYZER SETTINGS: RBW = VBW = 3MHz

A.8.1.1.4 PCS 1900-EIRP 24.232(c)

A.8.1.1.4.1 Limits

	Power Step	Burst Peak EIRP (dBm)
GPRS	3	≤33dBm (2W)
EDGE	6	≤33dBm (2W)

A.8.1.1.4.2 Measurement result

GPRS(GMSK)

Frequency (MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_aAntenna Gain(dBi)	PeakEIRP(dBm)	Polarization
1850.2	-9.82	4.6	36	4.7	26.28	V
1880.0	-8.7	4.6	35.6	4.7	27	H
1909.8	-8.54	4.7	36	4.7	27.46	V

EDGE(8PSK)

Frequency (MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_aAntenna Gain(dBi)	PeakEIRP(dBm)	Polarization
1850.2	-15	4.6	36	4.7	21.1	V
1880.0	-15.23	4.6	35.6	4.7	20.47	H
1909.8	-15.27	4.7	36	4.7	20.73	V

Frequency: 1909.8MHz
Peak EIRP(dBm)= P_{Mea}(-15.27dBm) - P_{cl}(4.7dB)+ P_{Ag}(36dB) +G_a(4.7dB)=20.73dBm
ANALYZER SETTINGS: RBW = VBW = 3MHz

A.8.1.2. WCDMA EIRP

A.8.1.2.1. Description

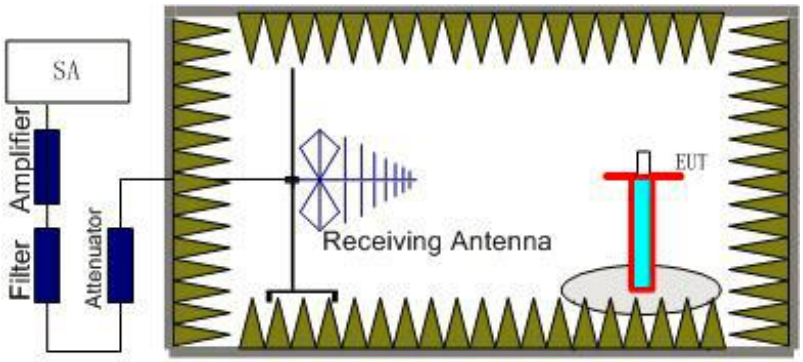
This is the test for the maximum radiated power from the EUT.
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power"and 24.232(c) specifies that "Peak transmit power must be measured over any interval ofcontinuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."Rule Part 22.913(a) specifies ” The ERP of mobile transmitters and auxiliary test

transmitters mustnot exceed 7 Watts."

A.8.1.2.2. Method of Measurement

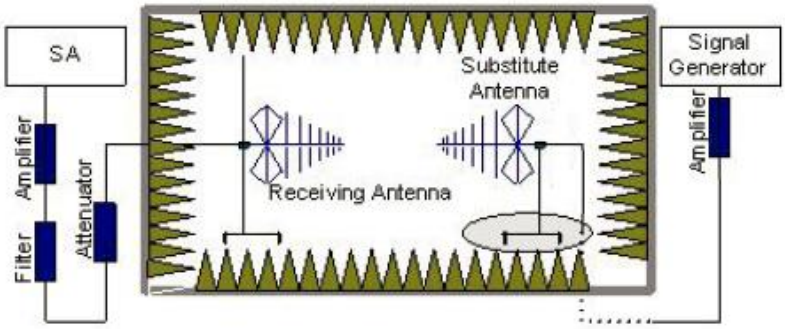
The measurements procedures in TIA-603E-2016 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from thereceive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUTfor emission measurements. The height of receiving antenna is 1.5m. The test setup refers tofigure below. Detected emissions were maximized at each frequency by rotating the EUTthrough 360° and adjusting the receiving antenna polarization. The radiated emissionmeasurements of all transmit frequencies in three channels (High, Middle, Low) weremeasured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).

3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust 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.

4. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna.

The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

Power(EIRP)=P_{Mea}+ P_{Ag} -P_{cl}+ G_a

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.

6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

A.8.1.2.3 WCDMA Band II-ERP

A.8.1.2.3.1 Limits

	Burst Peak EIRP (dBm)
WCDMA Band II	≤33dBm (2W)

A.8.1.2.3.1.1Measurement result

Frequency (MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_aAntenna Gain(dBi)	PeakEIRP(dBm)	Polarization
1852.4	-22.35	3.54	43.8	2.9	20.81	V
1880.0	-21.89	3.54	43.8	2.9	21.27	H
1907.6	-21.7	3.54	43.8	2.9	21.46	V

Frequency: 1907.6MHz

Peak EIRP(dBm)= P_{Mea}(-21.7dBm)- P_{cl}(3.54dB)+ P_{Ag}(43.8dB)+G_a(2.9dBi) =21.46dBm

ANALYZER SETTINGS: RBW = VBW = 5MHz

A.8.1.2.4 Limits

	Burst Peak EIRP (dBm)
WCDMA Band IV	≤33dBm (2W)

A.8.1.2.4.1 Measurement result

Frequency (MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_aAntenna Gain(dBd)	PeakERP(dBm)	Polarization
1712.4	-11.74	4.6	36	2.9	22.56	H
1732.6	-12.61	4.6	36	2.9	21.69	H
1752.6	-12.27	4.6	36	2.9	22.03	H

Frequency: 1752.6MHz

Peak ERP(dBm)= P_{Mea}(-12.27dBm)- P_{cl}(4.6dB)+P_{Ag}(36dB)+G_a(2.9dBd)=22.03dBm

ANALYZER SETTINGS: RBW = VBW = 5MHz

A.8.1.2.5Limits

	Burst Peak ERP (dBm)

WCDMA Band V	≤38.45dBm (7W)

A.8.1.2.5.1 Measurement result

Frequency (MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_aAntenna Gain(dBd)	PeakERP(dBm)	Polarization
826.4	-15.21	3.1	37	2.9	21.59	H
836.6	-15.86	3.1	37	2.9	20.94	H
846.6	-16.06	3.1	37	2.9	20.74	H

Frequency: 846.6 MHz

Peak ERP(dBm)= P_{Mea}(-16.06dBm)- P_{cl}(3.1dB)+P_{Ag}(37dB)+G_a(2.9dBd)=20.74dBm

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: the EUT was displayed in several different direction, the worst cases were shown.

A.8.2 EMISSION LIMIT (§2.1051/§22.917§24.238)

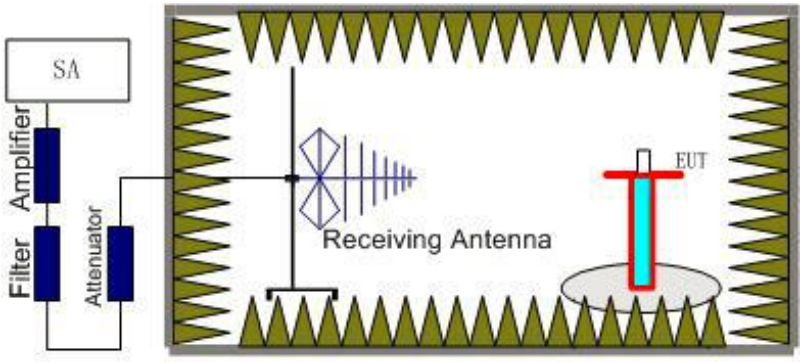
A.8.2.1 GSM Measurement Method

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

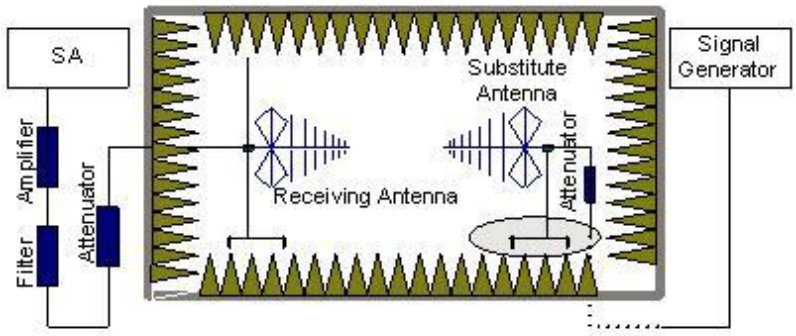
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of PCS1900 and GSM850.

A.8.2.2 The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10thharmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust 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.
4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.
A amplifier should be connected in for the test.
The Path loss (P_{pl}) is the summation of the cable loss .
The measurement results are obtained as described below:
Power(EIRP)=P_{Mea}- P_{pl}+ G_a
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi

A.8.2.3 Measurement Limit

Part 24.238 and Part 22.917 specify that 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.
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43

+ 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.8.2.4 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz) and GSM850 band (824.2MHz, 836.6MHz, 848.8MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS1900 ,GSM850 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

A.8.2.5 Measurement Results

Measurements results:

Frequency	Channel	Frequency Range	Result
GSM850	Low	30MHz~10GHz	P
	Middle	30MHz~10GHz	P
	High	30MHz~10GHz	P
GSM1900	Low	30MHz~20GHz	P
	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P

GSM850

GPRS Mode Channel 128

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
1853.6	-41.54	4.6	2.9	-43.24	-13	H
2473.9	-34.43	5.3	3.7	-36.03	-13	V
3161.5	-47.93	6.0	4.7	-49.23	-13	V

3578.1	-46.9	6.5	4.7	-48.7	-13	H
4551.9	-48.18	7.4	7.3	-48.28	-13	V
5493.5	-49.37	8.2	9.5	-48.07	-13	V

Note:

GPRS 850, CH128

Power(ERP)= Pmea-Pcl+Ga=-49.37-8.2+9.5=-48.07dbm

This method Applicable to the following table.

GPRS Mode Channel 189

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
1815.0	-41.12	4.5	2.9	-42.72	-13	V
2510.4	-34.83	5.4	3.7	-36.53	-13	V
3195.0	-47.86	6.1	4.7	-49.26	-13	H
4183.8	-49.34	7.0	7.7	-48.64	-13	V
4939.6	-49.39	7.7	9.0	-48.09	-13	V
5942.3	-50.16	8.5	10.4	-48.26	-13	V

GPRS Mode Channel 251

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
1882.5	-40.75	4.6	2.8	-42.55	-13	H
2726.8	-35.44	5.7	4.1	-37.04	-13	V
3574.6	-47.19	6.4	4.7	-48.89	-13	H

4243.8	-46.85	7.1	7.7	-46.25	-13	V
4968.5	-49.11	7.7	9.0	-47.81	-13	H
5680.4	-50.58	8.5	10.5	-48.58	-13	V

EGPRS Mode Channel 128

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
1465.6	-43.32	4.1	3.4	-44.02	-13	H
2558.6	-35.54	5.4	3.7	-37.24	-13	V
3205.4	-47.7	6.1	4.7	-49.1	-13	V
3976.2	-49.71	6.9	7.7	-48.91	-13	H
4950.0	-49.72	7.7	9.0	-48.42	-13	V
5785.4	-50.89	8.4	10.5	-48.79	-13	V

Note:

EGPRS 850, CH128

Power(ERP)= Pmea-Pcl+Ga=-50.89-8.4+10.5=-48.79dbm

This method Applicable to the following table.

EGPRS Mode Channel 189

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
2268.2	-38.1	5.1	3.3	-39.9	-13	H
3575.8	-47.07	6.5	4.7	-48.87	-13	H
4568.1	-48.23	7.4	7.3	-48.33	-13	H

5966.5	-49.65	8.5	10.4	-47.75	-13	V
7166.2	-50.35	9.4	13.7	-46.05	-13	H
8249.2	-52.48	10.1	17.3	-45.28	-13	H

EGPRS Mode Channel 251

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
1826.8	-41.33	4.6	2.9	-43.03	-13	H
2694.6	-34.97	5.6	4.1	-36.47	-13	V
3175.4	-48.07	6.1	4.7	-49.47	-13	H
3973.8	-49.84	6.8	7.7	-48.94	-13	V
4587.7	-47.59	7.4	7.3	-47.69	-13	V
5244.2	-49.04	8.0	8.7	-48.34	-13	V

GSM1900

GPRS Mode Channel 512

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
3581.4	-50.6	6.5	4.7	-52.4	-13	V
4255.2	-52.99	7.1	7.7	-52.39	-13	H
5148.6	-52.32	7.9	8.7	-51.52	-13	H
6379.2	-52.75	8.9	11.5	-50.15	-13	H
9229.2	-54.13	10.6	18.5	-46.23	-13	H

11630.4	-48.13	12.2	17.6	-42.73	-13	V

GPRS Mode Channel 661

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
3585.0	-49.63	6.5	4.7	-51.43	-13	H
4557.6	-51.01	7.4	7.3	-51.11	-13	V
6404.4	-52.09	8.9	11.5	-49.49	-13	V
7867.2	-54.01	9.9	15.3	-48.61	-13	V
10176.0	-52.25	11.3	17.4	-46.15	-13	V
12988.8	-47.67	13.2	20.2	-40.67	-13	H

GPRS Mode Channel 810

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
3578.4	-50.14	6.5	4.7	-51.94	-13	V
4543.8	-50.75	7.4	7.3	-50.85	-13	V
6007.2	-52.98	8.6	10.4	-51.18	-13	V
7872.0	-53.36	9.9	15.3	-47.96	-13	V
9835.2	-53.38	11.0	18.3	-46.08	-13	H
12847.2	-46.77	12.5	19.2	-40.07	-13	V

Conclusion: PASS

Note: the EUT was displayed in several different direction, the worst cases were shown.

EGPRS Mode Channel 512

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
3700.2	-48.29	6.6	7.7	-47.19	-13	V
5551.2	-43.44	8.2	9.5	-42.14	-13	H
7400.4	-43.42	9.7	14.6	-38.52	-13	V
9663.6	-54.11	10.9	18.3	-46.71	-13	V
11613.6	-49.08	12.2	18.1	-43.18	-13	V
12938.4	-47.62	13.0	20.2	-40.42	-13	H

EGPRS Mode Channel 661

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
3760.2	-50.46	6.6	7.7	-49.36	-13	H
5640.6	-46.83	8.3	10.5	-44.63	-13	V
7519.2	-41.18	9.7	14.6	-36.28	-13	V
9712.8	-53.3	10.9	18.3	-45.9	-13	V
10797.6	-48.75	11.7	17.3	-43.15	-13	V
14292.0	-48.48	13.6	23.5	-38.58	-13	H

EGPRS Mode Channel 810

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
3580.2	-50.07	6.5	4.7	-51.87	-13	V
5729.4	-46.49	8.5	10.5	-44.49	-13	H
7639.2	-53.71	9.7	15.3	-48.11	-13	H
9234.0	-53.78	10.6	18.5	-45.88	-13	V
10809.6	-49.67	11.7	17.3	-44.07	-13	V
12894.0	-47.93	13.0	20.2	-40.73	-13	H

Conclusion: PASS

A.7.2.2. WCDMA Measurement Method

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

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238 and Part 24.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band V.

The procedure of radiated spurious emissions is the same like GSM.

A.7.2.2.1. Measurement Limit

Part 24.238 and Part 22.917 specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.7.2.2.2. Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the WCDMA Band V (826.4MHz, 836.6MHz and 846.6MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the WCDMA Band V into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify

this.

A.7.2.2.3. Measurement Results Table

N05

Frequency	Channel	Frequency Range	Result
WCDMA Band II	Low	30MHz~20GHz	P
	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P
WCDMA Band IV	Low	30MHz~20GHz	P
	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P
WCDMA Band V	Low	30MHz~20GHz	P
	Middle	30MHz~20GHz	P
	High	30MHz~20GHz	P

WCDMA BAND II Mode Channel 9262

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
3857.6	-60.88	6.7	7.7	-59.88	-13	V
4910.8	-59.26	7.7	9.0	-57.96	-13	V
6922.4	-60.43	9.3	12.9	-56.83	-13	H
9194.0	-62.11	10.5	18.5	-54.11	-13	H
12604.0	-55.25	12.8	18.7	-49.35	-13	H
16823.0	-49.16	15.8	20.0	-44.96	-13	V

WCDMA BAND II Mode Channel 9400

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
4073.2	-60.8	6.9	7.7	-60	-13	V
5364.4	-58.23	8.1	8.7	-57.63	-13	H
6419.6	-60.91	8.9	11.5	-58.31	-13	V
8616.0	-63.58	10.3	18.1	-55.78	-13	H
10437.6	-57.94	11.6	17.1	-52.44	-13	V
13780.0	-58.58	13.8	24.8	-47.58	-13	H

WCDMA BAND II Mode Channel 9538

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
3950.4	-60.45	6.8	7.7	-59.55	-13	V
5417.2	-60.61	8.1	9.5	-59.21	-13	V
7741.2	-61.46	9.8	15.3	-55.96	-13	V
9169.2	-61.65	10.5	18.5	-53.65	-13	V
11036.8	-57.57	12.0	18.1	-51.47	-13	V
14461.5	-57.32	14.2	22.7	-48.82	-13	V

WCDMA BAND IV Mode Channel 1312

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization

4794.0	-58.57	7.6	7.9	-58.27	-13	H
6396.8	-58.92	8.9	11.5	-56.32	-13	H
9533.6	-60.1	10.7	18.6	-52.2	-13	V
12404.6	-56.51	12.5	18.7	-50.31	-13	V
14301.9	-57.68	13.6	23.5	-47.78	-13	V
16797.8	-49.54	15.8	20.0	-45.34	-13	V

WCDMA BAND IV Mode Channel 1413

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
4539.2	-58.46	7.4	7.3	-58.56	-13	V
6668.4	-60.39	9.1	12.3	-57.19	-13	H
8776.8	-62.26	10.4	18.5	-54.16	-13	V
11932.8	-54.67	12.5	17.1	-50.07	-13	V
14339.7	-57.67	13.6	23.5	-47.77	-13	H
16837.6	-49.63	15.8	20.0	-45.43	-13	V

WCDMA BAND IV Mode Channel 1513

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
5260.4	-58.51	8.0	8.7	-57.81	-13	V

6899.2	-60.47	9.3	12.9	-56.87	-13	V
8916.4	-63.7	10.4	18.3	-55.8	-13	V
10819.6	-55.92	11.7	17.3	-50.32	-13	H
12860.2	-56.03	13.0	19.2	-49.83	-13	H
14297.7	-56.57	13.6	23.5	-46.67	-13	V

WCDMA BAND V Mode Channel 4132

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
1651.1	-56.91	4.3	2.9	-58.31	-13	H
2481.9	-48.46	5.3	3.7	-50.06	-13	V
3864.0	-60.95	6.7	7.7	-59.95	-13	H
4784.0	-59.17	7.6	7.9	-58.87	-13	V
6408.8	-60.44	8.9	11.5	-57.84	-13	H
8326.0	-63.14	10.1	17.3	-55.94	-13	H

WCDMA BAND V Mode Channel 4183

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
1671.8	-56.54	4.3	2.9	-57.94	-13	H
2562.7	-50.68	5.4	3.7	-52.38	-13	V

3677.2	-60.82	6.6	7.7	-59.72	-13	H
4534.8	-59	7.4	7.3	-59.1	-13	V
5810.0	-60.51	8.4	10.5	-58.41	-13	H
6885.2	-60.99	9.3	12.9	-57.39	-13	V

WCDMA BAND V Mode Channel 4233

Final result:

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarization
1695.0	-56.63	4.4	2.9	-58.13	-13	H
2633.8	-50.1	5.5	4.1	-51.5	-13	H
3684.0	-59.51	6.6	7.7	-58.41	-13	V
4540.8	-58.51	7.4	7.3	-58.61	-13	V
5965.2	-59.85	8.5	10.4	-57.95	-13	V
7178.2	-61.86	9.5	13.7	-57.66	-13	H

Conclusion: PASS

ANNEX B. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

************End Of Report************