RESOLUTION 5927-E/2017

THE DIRECTOR OF THE NATIONAL COMMUNICATIONS ENTITY

RESOLVES

ARTICLE 1°. - Approve the Technical Standard ENACOM-Q2-61.04 V17.1 “Radio Base Transceivers of Mobile Communication Services” that as ANNEX. Registered in the ELECTRONIC GENERATOR OF OFFICIAL DOCUMENTS as IF-2017-30905743-APN-DNPYC#ENACOM, forms an integral part of this measure.

ARTICLE 2°- The present resolution will go into effect after ONE HUNDRED AND EIGHTY (180) consecutive days after its publication.

Article 3°. - It is established that during the time disposed in Article °2 of the present the interested parties may obtain the inscription or renewal of their devices in the Registration of Telecommunications Activities and Materials according to the mechanism in the Resolution SC N° 784/87.

ARTICLE 4°.- Provide that those equipment that at the date of entry into force of this resolution are registered having complied with the provisions of Resolution SC No. 784/87 and the measurement protocol CNT-PM-1, approved by the CNT Resolution N ° 988/96, they will maintain such condition until the expiration of the validity period established by said regulations and, in the case of opting for the renewal of their registration upon expiration, they must comply with the requirements established in the present measure.

ARTICLE 5°. - Communicate, publish, give to the NATIONAL BUREAU OF OFFICIAL REGISTRY and file it. – Miguel Angel De Godoy

Note: The Annex/es that are part of this resolution are published in the BORA web edition

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Ente Nacional de Comunicaciones

Technical Standard ENACOM-Q2-61.04 V17.1

Base Station Transceivers
for Mobile Communications Services

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1. CHAPTER I: GENERAL CHARACTERISTICS

1.1. *Introduction*

The present regulation has been developed in order to cover the different technologies that use the base transceiver stations used in the set of services that, for the purposes of this document, are defined as "Mobile Communications Services (SCM)". In this first chapter, the general requirements are detailed, and in the later ones the corresponding for each technology are specified.

1.2. *Subject*

Specify the minimum necessary conditions, which must be met by the base transceiver station used for Mobile Communications Services, which favors the efficient use of the radio spectrum.

Establish test methods to be used by laboratories for checking these specifications

1.3. *Scope*

This standard will apply to base transceiver station, that are used for Mobile Communications Services in the frequency bands allocated in the Republic of Argentina, using GSM, UMTS, and LTE technologies

1.4. *Definition of terms and abbreviations*

The following definitions and abbreviations are adopted for the sole purpose of this document.

1.4.1. Definitions

Coupling Loss: This is the loss of signal level, defined for the channel between the antenna connector of the base station and the antenna connector of the user terminal. It consists of the free space path attenuation (which in turn is related to the distance between devices), antenna gains, losses by shielding or reflection, etc.

Transmitter ON period: Period of time during which the transmitter of the radio base is transmitting data and / or reference symbols, i.e. sub-frames of data.

Transmitter OFF period: Period of time during which the base station transmitter is not allowed to transmit.

Transmitter Transitory Period: The length of time the transmitter is switching from the OFF to ON period or vice versa.

Multi-standard Base Station: A radio base that is able to support different technologies (GSM, UMTS, LTE) simultaneously through a single transmitter.

Base Station Multicarrier: A base station that processes and combines different GSM carriers in a single transmitter, unlike traditional radio bases (also known as "Single Carrier").

GSM Technologies: GSM is a standard developed by ETSI describing digital cellular network protocols of second generation (2G) based on circuit switching. GPRS, as first evolution integrates several carriers allowing greater speed in packet switching applications, as internet access. EDGE is an improvement of the GSM access which allows to increase the bit rate in data applications for both circuit and packet switching.

UMTS Technologies UMTS: UMTS is a term used which includes the radio technologies of third generation (3G) developed inside the 3GPP based on the GSM Standard. HSDPA and HSUPA are updated versions of the UMTS that improves the connection speed in the uplinks and downlinks. HSPA refers to the combination of HSDPA and HSUPA. The HSPA+ standard integrates other modulation techniques allowing greater speed and capacity.

LTE Technologies: Standard for wireless highspeed data transmission communications for cellphones and data terminals. LTE Advanced is defined as and upgrade of LTE.

1.4.2. Abbreviations

ARFCN: “Absolute Radio-Frequency Channel Number”

DC-HSUPA: “Dual Carrier HSUPA”

EUT: Equipment Under Test

EDGE: “Enhanced Data rates for GSM Evolution”; Equals to “**EGPRS**” (“Enhanced GPRS”)

ENACOM: National Communications Entity

ETSI: **“**European Telecommunications Standards Institute”

FDD: “Frequency Division Duplex”

GPRS: “General Packet Radio Service”

GSM: “Global System for Mobile communications”

HSDPA: “High Speed Downlink Packet Access”

HSPA: “High Speed Packet Access”

HSPA+: “Evolved HSPA”

HSUPA: “High Speed Uplink Packet Access”

MIMO: “Multiple Input Multiple Output”

NRB: Setting of bandwidth transmission in resource blocks units

QPSK: “Quadrature Phase Shift Keying”

RAMATEL: Activities and Telecommunications Materials Registration

RB: “Resource Block”

RX: Receiver.

TCH/FS: “Traffic Channel / Full Speed”

TDD: “Time Division Duplex”

TX: Transmitter.

1.5. *Equipment Under Test Preparations (EUT)*

1.5.1. Applicant shall provide the laboratory with at least one representative sample, in terms of its operation, of the production model. It will constitute, for the purposes of this document, the Equipment Under Test (EUT).

1.5.2. The EUT will be identified with its corresponding brand, model, country of origin and serial number. In case the representative sample does not have identification, either for a safety issue because it is an Implantable Medical Device or because it is a prototype, the applicant must add the identification on the EUT in a way that can be easily distinguished individually.

1.5.3. It shall be accompanied by the technical documentation necessary to enable the operation established in the test methods.

1.5.4. In view of the need to use special adapters, connectors, cables or measurement kits, these will be provided by the applicant.

1.5.5. If a particular test requires the use of other equipment, similar to the EUT, as a counterpart of the same, it must be facilitated by the applicant.

1.5.6. You must have the configuration facilities (software, firmware, etc.) that allow the operation established in the test methods.

1.5.7. During the measurements, you will not be able to modify the EUT hardware under any circumstances.

1.5.8. ENACOM reserves the right to request technical documentation, samples and / or new tests on the homologated product at any time during the validity of the registration in RAMATEL.

NOTE: Beyond of the above considerations, the general requirements for the EUT, in every ETSI application standard should be taken into account.

1.6. *Technical Requirements*

1.6.1. General

The homologated equipment model must comply with the specifications of this standard for all operating conditions in which it is expected to be marketed, beyond the conditions under which it was tested.

Unless otherwise noted, the minimum requirements set forth herein are intended for a single transmitting antenna connector.

In case of multi-carrier transmission with one or multiple antennas, diversity of antennas or MIMO transmission, the requirements apply to each antenna output connector.

Transmission characteristics are specified on the radio base station antenna output connector. In the case of using any external equipment to it, such as power amplifiers or filters, or a combination of both, the requirements apply to the output of the last antenna connector of the entire chain.

For the verification of the specifications indicated in these standards, only conducted tests will be carried out.

1.6.2. Base Station Classes

Different sets of base stations are defined according to the following classification:

• Wide Area Base Station, commonly called macro cells. They are used to cover large areas with low - medium population density. They are characterized by a minimum coupling loss of 70 dB. A particular maximum power limit is not specified for this class of base station.

• Medium Range Base Station, commonly called micro cells. Typical installations are in urban areas with a high population density. They are characterized by a minimum coupling loss of 53 dB. The maximum power allowed for this class of base stations is 38 dBm.

• Local Area Base Station, commonly called peak cells. They are typically used to cover large indoor offices or as access points in outdoor enclosures. They are characterized by a minimum coupling loss of 45 dB. The maximum power allowed for this class of base station is 24 dBm.

• Home Base Station, commonly called femto cells. They are not particularly characterized by a certain loss of coupling; Its definition comes from the scope of application: small offices or homes. The maximum power allowed for this class of base station is 20 dBm for 1 TX, 17 dBm for 2 TX, 14 dBm for 4 TX and 11 dBm for 8 TX.

1.7. *Frequency Bands*

The following are the frequency bands allocated to the Mobile Communications Services in Argentina.

1.7.1. 28 Band (LTE)

Operation Band	Uplink (UL) Base Station Receives Terminal Transmits	Downlink (DL) Base Station Transmits Terminal Receives	Duplex Separation (MHz)
	F_{UL_low} – F_{UL_high}	F_{DL_low} – F_{DL_high}	
28	703 MHz – 748 MHz	758 MHz – 803 MHz	55

1.7.2. GSM 850 Band (GSM) / Band V (UMTS)

Operation Band	Uplink (UL) Base Station Receives Terminal Transmits	Downlink (DL) Base Station Transmits Terminal Receives	Duplex Separation (MHz)
	F_{UL_low} – F_{UL_high}	F_{DL_low} – F_{DL_high}	
GSM 850 / Band V	824 MHz – 849 MHz	869 MHz – 894 MHz	45

1.7.3. Band 8 (LTE)

Operation Band	Uplink (UL) Base Station Receives Terminal Transmits	Downlink (DL) Base Station Transmits Terminal Receives	Duplex Separation (MHz)
	F_{UL_low} – F_{UL_high}	F_{DL_low} – F_{DL_high}	
8	905 MHz – 915 MHz	950 MHz – 960 MHz	45

NOTE: It is relevant to clarify that the band 8 according to ETSI covers the frequencies between 880 and 915 MHz for the Uplink direction, and between 925 and 960 MHz for the Downlink direction.

1.7.4. Band 4 and Band 10 (LTE)

Operation Band	Uplink (UL) Base Station Receives Terminal Transmits	Downlink (DL) Base Station Transmits Terminal Receives	Duplex Separation (MHz)
	F_{UL_low} – F_{UL_high}	F_{DL_low} – F_{DL_high}	
10	1710 MHz – 1770 MHz	2110 MHz – 2170 MHz	400
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	400

NOTE: The band assigned in the Republic of Argentina corresponds to Band 10. Band 4 (also known as "AWS-1") presents characteristics slightly different from the previous one, and because it is supported by a large number of terminals, will be detailed in the corresponding chapter of this standard if there are particularities in the test methods to be followed.

1.7.5. PCS 1900 Band (GSM) / Band II (UMTS)

Operation Band	Uplink (UL) Base Station Receives Terminal Transmits	Downlink (DL) Base Station Transmits Terminal Receives	Duplex Separation (MHz)
	F_{UL_low} – F_{UL_high}	F_{DL_low} – F_{DL_high}	
PCS 1900 / Band II	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	80

1.7.6. Band 7 and Band 38 (LTE)

Operation Band	Uplink (UL) Base Station Receives Terminal Transmits	Downlink (DL) Base Station Transmits Terminal Receives	Duplex Separation (MHz)
	F_{UL_low} – F_{UL_high}	F_{DL_low} – F_{DL_high}	
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	120
38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	0

NOTE: Band 38 corresponds to TDD mode.

1.8. *Test Conditions*

1.8.1. Environmental condition

All the included measurements in this standard will be carried out in *normal environmental conditions*.
It is considered a *normal environmental condition* any combination of temperature, relative humidity and atmospheric pressure within the following limits:

Parameter	Minimum	Maximum
Temperature	15 ºC	35 ºC
Atmospheric Pressure	73,3 kPa (733 mbar)	106 kPa (1060 mbar)
Relative Humidity	<85 %	

1.8.2. Normal Power Supply Conditions

The equipment must be tested with the appropriate power source. For equipment that is connected to the mains, it will ensure to supply a voltage of 220 Vac and a frequency of 50 ± 1 Hz. If the equipment is supplied through sources not provided by the applicant, normal power conditions must be generated specified by the manufacturer.

The power cables will be arranged in such a way that they do not affect the results of the measurements.

1.9. *Results Presentation*

A single report containing the results of all the tests carried out on the EUT, subdivided into chapters, according to the technology used should be made. The report shall contain photographs of the sample tested, in which the connections, identification, etc. are clearly visible.

2. CHAPTER II: GSM TECHNOLOGIES

This section of the standard will apply to the base stations used for Mobile Communications Services in the frequency bands allocated in Argentina, which use GSM / GPRS / EDGE technologies. This technology, unlike UMTS and LTE, does not have a specific classification for home base stations.

2.1. *Technical Requirements*

2.1.1. Operation Bands

The equipment shall operate in the GSM 850 or PCS 1900 bands, as described in the general conditions.

2.1.2. Maximum Power Output

The maximum power output shall comply with the following limits within the channel bandwidth. It will be calculated as the average of the samples on the useful bits of a burst. The emission limits are detailed depending on the base station tested.

Limits	
Base Station Class	**Bands GSM 800 and PCS 1900**
Wide area range	-
Medium area range	< 38 dBm
Local area Range	< 24 dBm

NOTE: There is no power limit defined for wide range base stations

In all cases, the permitted tolerance with respect to the maximum power declared by the manufacturer is ± 2 dB.

2.1.3. Occupied Bandwidth

The occupied bandwidth is a measure of the bandwidth containing 99% of the total integrated average power of the transmitted spectrum within the assigned channel.

The occupied bandwidth shall be measured and the results included in the test report.

2.1.4. Non-desired Emissions

Non-desired Emissions are divided into "Out of Band Emissions" ("OOB") and "Spurious Emissions".
The emission spectrum of the user terminal consists of three components: the occupied bandwidth, the out-of-band domain and the spurious domain

Unless otherwise noted, all limits are expressed based on measurements using an RMS detector.

2.1.4.1. Out of Band Emissions

Out-of-band emissions are emissions at one or more frequencies located immediately outside the bandwidth required for transmission (excluding spurious emissions) which result from the modulation processes and the non-linearity of the transmitter.

The Base Station transmission mask applies from the frequencies located immediately above and below the boundary frequencies given by the bandwidth of the assigned channel, up to 2 MHz outside the transmission band.

It is defined as Δf to the frequency separation with respect to the center of the channel. For Δf values between 100 kHz and 600 kHz, the maximum power level is obtained by linear interpolation between the values identified in the tables.

The power of any emission shall not exceed the levels specified in the following tables:

For "Wide Range" base station with power greater than 43 dBm:

GSM 850 Band

Limit / Resolution Bandwidth			
Δf [kHz]	**Power Level**		**Resolution Bandwidth**
	Relative [dB]	**Absolute [dBm]**	
0 – 100	+0,5		30 kHz
200	-30	-65	30 kHz
250	-33	-65	30 kHz
400	-60 (*)	-65	30 kHz
600 – 1200	-70	-65	30 kHz
1200 – 1800	-73	-65	30 kHz
1800 – 6000	-75	-65	100 kHz
> 6000	-80	-65	100 kHz

(*) For devices that support QPSK, 8-PSK, 16-QAM or 32-QAM, the requirement for these modulations is -56 dB

PCS Band 1900:

Limit / Resolution Bandwidth

Δf [kHz]	Power Level		Resolution Bandwidth
	Relative [dB]	Absolute [dBm]	
0 – 100	+0,5		30 kHz
200	-30	-57	30 kHz
250	-33	-57	30 kHz
400	-60 (*)	-57	30 kHz
600 – 1200	-70	-57	30 kHz
1200 – 1800	-73	-57	30 kHz
1800 – 6000	-75	-57	100 kHz
> 6000	-80	-57	100 kHz

(*) For devices that support QPSK, 8-PSK, 16-QAM or 32-QAM, the requirement for these modulations is -56 dB

For "Wide Range" base stations with power lesser than 43 dBm

GSM 850 Band

Limit / Resolution Bandwidth			
Δf [kHz]	Power Level		Resolution Bandwidth
	Relative [dB]	Absolute [dBm]	
0 – 100	+0,5		30 kHz
200	-30	-65	30 kHz
250	-33	-65	30 kHz
400	-60 (*)	-65	30 kHz
600 – 1200	-62	-65	30 kHz
1200 – 1800	-65	-65	30 kHz
1800 – 6000	-67	-65	100 kHz
> 6000	-80	-65	100 kHz

(*) For devices that support QPSK, 8-PSK, 16-QAM or 32-QAM, the requirement for these modulations is -56 dB

PCS 1900 Band

Limit / Resolution Bandwidth

Δf [kHz]	Power Level		Resolution Bandwidth
	Relative [dB]	Absolute [dBm]	
0 – 100	+0,5		30 kHz
200	-30	-57	30 kHz
250	-33	-57	30 kHz
400	-60 (*)	-57	30 kHz
600 – 1200	-62	-57	30 kHz
1200 – 1800	-65	-57	30 kHz
1800 – 6000	-67	-57	100 kHz
> 6000	-80	-57	100 kHz

(*) For devices that support QPSK, 8-PSK, 16-QAM or 32-QAM, the requirement for these modulations is -56 dB

For "Medium Range" base stations

GSM 850 Band

Limit / Resolution Bandwidth			
Δf [kHz]	Power Level		Resolution Bandwidth
	Relative [dB]	Absolute [dBm]	
0 – 100	+0,5		30 kHz
200	-30		30 kHz
250	-33		30 kHz
400	-60 (*)		30 kHz
600 – 1200	-60		30 kHz
1200 – 1800	-63		30 kHz
> 1800	-70	-59	100 kHz

(*) For devices that support QPSK, 8-PSK, 16-QAM or 32-QAM, the requirement for these modulations is -56 dB

PCS 1900 Band

Limit / Resolution Bandwidth			
Δf [kHz]	Power Level		Resolution Bandwidth
	Relative [dB]	Absolute [dBm]	
0 – 100	+0,5		30 kHz
200	-30		30 kHz
250	-33		30 kHz
400	-60 (*)		30 kHz
600 – 1200	-60		30 kHz
1200 – 1800	-63		30 kHz
> 1800	-76	-57	100 kHz

(*) For devices that support QPSK, 8-PSK, 16-QAM or 32-QAM, the requirement for these modulations is -56 dB

For "Local Area" base stations

GSM 850 Band

Limit / Resolution Bandwidth			
Δf [kHz]	Power Level		Resolution Bandwidth
	Relative [dB]	Absolute [dBm]	
0 – 100	+0,5		30 kHz
200	-30		30 kHz
250	-33		30 kHz
400	-60 (*)		30 kHz
600 – 1200	-60		30 kHz
1200 – 1800	-63		30 kHz
> 1800	-70	-68	100 kHz

(*) For devices that support QPSK, 8-PSK, 16-QAM or 32-QAM, the requirement for these modulations is -56 dB

PCS 1900 Band

Limit / Resolution Bandwidth			
Δf [kHz]	Power Level		Resolution Bandwidth
	Relative [dB]	Absolute [dBm]	
0 – 100	+0,5		30 kHz
200	-30		30 kHz
250	-33		30 kHz
400	-60 (*)		30 kHz
600 – 1200	-60		30 kHz
1200 – 1800	-63		30 kHz
> 1800	-76	-65	100 kHz

(*) For devices that support QPSK, 8-PSK, 16-QAM or 32-QAM, the requirement for these modulations is -56 dB

NOTE: The applicable limit in each table is determined from the value relative to the power density, measured with a resolution bandwidth of 30 kHz at the center frequency of the channel, or the absolute value, which results in a higher value of power (the least restrictive criterion).

With respect to the "Multicarrier" base stations for both the GSM 850 band and PCS 1900 band, if the limits defined in the preceding tables are less than -47 dBm for Wide Range base stations; -53 dBm for Medium Range base stations; And -61 dBm for Local Area base stations, the latter must be used.

2.1.4.2. Spurious Emissions

Emissions at one or more frequencies located outside the necessary bandwidth, whose levels can be reduced without affecting the transmission of the corresponding information. They include harmonic emissions, eddy emissions, intermodulation products and frequency conversion products, excluding out-of-band emissions are considered spurious emissions.

Spurious emission limits are specified in terms of general requirements in line with Recommendation ITU-R SM.329 and the operating bands requirements to ensure the coexistence of user terminals.

The following limits are applicable for frequencies that are more than 2 MHz away from the edge of the transmission band.

For Wide Range, Middle Range and Local Area base stations, both traditional and multicarrier, the limits are:

Frequency Range	Maximum Level	Resolution Bandwidth
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz
150 kHz ≤ f < 50 MHz	-36 dBm	10 kHz
50 MHz ≤ f < 1000 MHz	-36 dBm	Δf ≥ 2 MHz: 30 kHz Δf ≥ 5 MHz: 100 kHz
1 GHz ≤ f < 12,75 GHz	-30 dBm	Δf ≥ 2 MHz: 30 kHz Δf ≥ 5 MHz: 100 kHz Δf ≥ 10 MHz: 300 kHz Δf ≥ 20 MHz: 1 MHz

It is defined as Δf to the frequency separation with respect to the edge of the transmission band.

2.1.5. Frequency Error

The frequency error is defined as the difference between the frequency of transmission by the base station and the nominal frequency of the assigned channel.

The limits are the following:

Base Station Classes	Limit
	Error (ppm)
Wide Range	±0,05
Medium Range	±0,05
Local Area	±0,1

2.2. *Test Methods*

The test methods specified in the **ETSI TS 151 021 V13.3.1 (2017-02)** or later version (depending on the updates thereof), or equivalent methods duly justified, shall be used in accordance with the following tables:

Test	Points of the standard to apply ETSI TS 151 021-1 V13.3.1 (2017-02)
Maximum Power Output (2.1.2.)	6.3
Occupied Bandwidth (2.1.3.)	N/A*
Transmission Mask (2.1.4.1.1)	6.5.1
Spurious Emissions (2.1.4.3.)	6.6
Frequency Error (2.1.5.)	6.2

(*) The measurement shall be carried out as defined by the ITU in the Radio Regulations and the test configuration used for out-of-band emissions.

Additional images and graphs of the reported results that are related to the measurements made, particularly for the tests of occupied bandwidth and Non-desired Emissions, should be included in the test report for all tests performed.

3. CHAPTER III: UMTS TECHNOLOGIES

3.1. *Technical Requirements*

3.1.1. Operation Band

The equipment must operate in the V or II bands, as described in the general conditions

3.1.2. Maximum Power Output

The output power of the base stations is the average power of a carrier delivered at a load of equal impedance to the nominal transmitter.

The nominal output power of the base station is the average power level per carrier that the manufacturer has declared available at the antenna connector.

The maximum power output ("Pmax") must comply with the limits indicated in the following table:

Base Station Class	Power limit
Wide area range	-
Medium area range	< 38 dBm
Local area Range	< 24 dBm
Home Base Station	< 20 dBm 1TX < 17 dBm 2TX < 14 dBm 4TX

NOTE: There is no power limit defined for wide range base stations

In all cases, the permitted tolerance with respect to the maximum power declared by the manufacturer is ± 2 dB

3.1.3. Occupied Bandwidth

The occupied bandwidth is a measure of the bandwidth containing 99% of the total integrated average power of the transmitted spectrum within the assigned channel.
The occupied bandwidth shall be measured and the results included in the test report.

The occupied bandwidth must be less than 5 MHz

3.1.4. Non-desired Emissions

Non-desired Emissions are divided into "Out of Band Emissions" ("OOB") and "Spurious Emissions".

The emission spectrum of the user terminal consists of three components: the occupied bandwidth, the out-of-band domain and the spurious domain

Unless otherwise noted, all limits are expressed based on measurements using an RMS detector.

3.1.4.1. Out of Band Emissions

Out-of-band emissions are emissions at one or more frequencies immediately outside the required bandwidth (excluding spurious emissions) which result from the modulation processes and the non-linearity of the transmitter.

Limits are specified in terms of a transmission mask and an Adjacent Channel Power Ratio.

3.1.4.1.1. Transmission mask

The transmission mask applies to frequencies located immediately above and below the boundary frequencies given by the bandwidth of the assigned channel.

For base stations that can operate in multiple bands using the same antenna connector, the unwanted emission limits apply to each band separately.

It is defined as Δf to the frequency separation with respect to the center of the channel.

Δfmax is 12.5 MHz or the distance to the edge of the band, whichever is greater.

The power of any broadcast shall not exceed the levels specified in the following tables for all classes of base stations for both band V and band II:

Δf [MHz]	**Pmax ≥ 43 dBm**	**Resolution Bandwidth**
2,5 – 2,7	-14 dBm	30 kHz
2,7 – 3,5	$\left\{-14dBm - 15 * \left(\frac{\Delta f}{MHz} - 2{,}7\right)\right\} dB$	30 kHz
3,5 – 7,5	-13 dBm	1 MHz
7,5 – ΔfMax	-13 dBm	1 MHz

Δf [MHz]	39 dBm ≤ Pmax < 43 dBm	Resolution Bandwidth
2,5 – 2,7	-14 dBm	30 kHz
2,7 – 3,5	$\left\{-14dBm - 15 * \left(\frac{\Delta f}{MHz} - 2{,}7\right)\right\} dB$	30 kHz
3,5 – 7,5	-13 dBm	1 MHz
7,5 – ΔfMax	Pmax - 56 dB	1 MHz

Δf [MHz]	31 dBm ≤ Pmax < 39 dBm	Resolution Bandwidth
2,5 – 2,7	Pmax - 53 dB	30 kHz
2,7 – 3,5	$\left\{Pmax - 53dB - 15 * \left(\frac{\Delta f}{MHz} - 2{,}7\right)\right\} dB$	30 kHz
3,5 – 7,5	Pmax - 52 dB	1 MHz
7,5 – ΔfMax	Pmax - 56 dB	1 MHz

Δf [MHz]	Pmax < 31 dBm	Resolution Bandwidth
2,5 – 2,7	-22 dBm	30 kHz
2,7 – 3,5	$\left\{Pmax - 53dB - 15 * \left(\frac{\Delta f}{MHz} - 2{,}7\right)\right\} dB$	30 kHz
3,5 – 7,5	-21 dBm	1 MHz
7,5 – ΔfMax	-25 dBm	1 MHz

Additionally, they must comply with the following limits:

Δf [MHz]	Additional Requirements	Resolution Bandwidth
2,5 – 2,7	-15 dBm	30 kHz
3,5 – Δfmáx	-13 dBm	Band V: 100 kHz Band II: 1 MHz

For home base stations, when the ΔfMáx is higher than 12.5 MHz, the additional limits of the following table apply:

Δf [MHz]	6 dBm ≤ Pmax < 20 dBm	P < 6 dBm	Resolution Bandwidth
12,5 – $\Delta f_{máx}$	P_{max} - 56 dB	-50 dBm	1 MHz

3.1.4.1.2. Adjacent Channel Power Ratio

The Adjacent Channel Power Ratio is the ratio of the average filtered power at the center of the assigned channel and the average filtered power at the center of the adjacent channel, measured with an elevated cosine filter (RRC).

In the case of transmission of two adjacent carriers, the Adjacent Channel Power Ratio is the ratio of the sum of the average filtered power at each of the transmitted frequencies and the average power centered at the center of the adjacent channel.

The Adjacent Channel Power Ratio shall comply with the limits of the following table or with an absolute power value in the adjacent channel of -15 dBm / MHz, -25 dBm / MHz, -32 dBm / MHz or -44.2 DBm / 3.84MHz depending on whether the base station is Wide Range, Middle Range, Local Area or Home Area, whichever is less restrictive.

Adjacent Channel Frequency	Adjacent Channel Power Ratio limit (dB)
± 5 MHz	45 dB
± 10 MHz	50 dB

3.1.4.2. Spurious Emissions

Emissions at one or more frequencies located outside the necessary bandwidth, whose levels can be reduced without affecting the transmission of the corresponding information. They include harmonic emissions, eddy emissions, intermodulation products and frequency conversion products, excluding out-of-band emissions are considered spurious emissions.

Spurious emission limits are specified in terms of general requirements in line with Recommendation ITU-R SM.329 and the operating bands requirements to ensure the coexistence of user terminals.

In this section, emissions in the range of the frequencies 10 MHz below the lower channel and 10 MHz above the upper channel of the band under analysis shall be considered as spurious.

For base stations operating on multiple bands that are mapped on separate antenna connectors, the requirements apply for each band.

The limits are the following:

Frequency Range	Maximum Level	Resolution Bandwidth
9 KHz ≤ f < 150 KHz	-36 dBm	1 kHz
150 KHz ≤ f < 50 MHz	-36 dBm	10 kHz
50 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz
1 GHz ≤ f < 12,75 GHz	-36 dBm	1 MHz

3.1.5. Frequency Error

The frequency error is defined as the difference between the actual transmission frequency and the assigned frequency.

The limits are as follows:

Base Station Classes	Limit
	Error (ppm)
Wide Range	±0,05
Medium Range	±0,05
Local Area	±0,1
Home Area	±0,25

3.2. *Test Methods*

The test methods specified in the **ETSI TS 125 141-1 V13.3.0 (2016-08)** or later version (depending on the updates thereof), or equivalent methods duly justified, shall be used in accordance with the following tables:

Test	Points of the standard to apply ETSI TS 125 141-1 V13.3.0 (2016-08)
Maximum Power Output (3.1.2.)	6.2
Occupied Bandwidth (3.1.3.)	6.5.1
Transmission Mask (3.1.4.1.1.)	6.5.2.1
Adjacent Channel Power Ratio (3.1.4.1.2)	6.5.2.2
Spurious Emissions (3.1.4.3)	6.5.3
Frequency Error (3.1.5.)	6.3

Additional images and graphs of the reported results that are related to the measurements made, particularly for the tests of occupied bandwidth and Non-desired Emissions, should be included in the test report for all tests performed.

4. CHAPTER IV: LTE TECHNOLOGIES

4.1. *Technical Requirements*

4.1.1. Operation Bands

The equipment shall operate within the bands 4, 7, 8, 10, 28 or 38 as described in the general conditions.

The bandwidths of channel specified by the manufacturer shall be taken into account for measurements.

In addition, they must support the number of resource block configurations according to the configured channel width according to the following table:

Channel Bandwidth [MHz]	**1,4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Resource Blocks [NRB]	6	15	25	50	75	100

4.1.2. Maximum Power Output

The total nominal output power of the base station is the average power for an equipment operating in single carrier, multiple carrier or carrier aggregation configurations that the manufacturer has declared to be available at the antenna connector during the ON period.

The maximum output power of the radio base ("Pmax") is the average power per carrier measured at the antenna connector during the ON period at a specified reference condition.

The nominal output power of the base station is the average power per carrier for operation in single carrier, multiple carrier or carrier aggregation configurations, which the manufacturer has declared to be available at the antenna connector during the ON period.

The nominal output power of the radio base shall comply with the following table:

Base Station Class	Nominal Power Output
Wide area range	-
Medium area range	< 38 dBm
Local area Range	< 24 dBm
Home Base Station	< 20 dBm 1TX < 17 dBm 2TX < 14 dBm 4TX < 11 dBm 8TX

NOTE: There is no power limit defined for wide range base stations

In all cases, the permitted tolerance with respect to the maximum power declared by the manufacturer is ± 2 dB

4.1.3. Occupied Bandwidth

The occupied bandwidth is a measure of the bandwidth containing 99% of the total integrated average power of the transmitted spectrum within the assigned channel.

The bandwidth occupied for all number resource block (NRB) configurations shall be less than the channel bandwidth specified in the following table:

Channel Bandwidth [MHz]	**1,4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**
Occupied Bandwidth [MHz]	1,4	3	5	10	15	20

4.1.4. Non-desired Emissions

Non-desired Emissions are divided into "Out-of-band emissions" and "Spurious emissions". The broadcast spectrum of the base station consists of three components: the occupied bandwidth, the out-of-band emissions domain and the spurious domain.

Unless noted otherwise, all limits are expressed based on measurements using an RMS detector.

4.1.4.1. Out of Band Emissions

Out-of-band emissions are emissions at one or more frequencies immediately outside the required bandwidth (excluding spurious emissions) which result from the modulation processes and the non-linearity of the transmitter.

Limits are specified in terms of a transmission mask and an Adjacent Channel Power Ratio

4.1.4.1.1. Transmission Mask

The emission limits in the operating band are defined from 10 MHz below the minimum frequency up to 10 MHz above the maximum frequency of each supported band.

The requirements apply to any type of transmitter considered, whether they are single carrier or multiple carriers, and for all modes of transmission specified by the manufacturer.

For base stations that can operate in multiple bands where they are mapped on separate antenna connectors, the requirements for each band individually.

For base stations that can operate in multiple bands using the same antenna connector, the mask limits apply to each band separately.

Δf is defined as the frequency separation from the center of the measuring filter to the edge of the channel.

Δfmax is the offset up to a frequency of 10 MHz outside the operating band.
Emissions should not exceed the maximum levels of the following tables:

Wide Range Base Stations		
Channel Bandwidth of 1,4 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 1,4 MHz	$-1dBm - \frac{10}{1{,}4}\frac{\Delta f}{MHz}dB$	100 kHz
1,4 MHz < Δf < 2,8	-11 dBm	100 kHz
2,8 MHz < Δf < Δfmáx	$\begin{cases} 16\ dBm, f < 1\ GHz \\ 15\ dBm, f > 1\ GHz \end{cases}$	$\begin{cases} 100\ kHz, f < 1\ GHz \\ 1\ MHz, f > 1\ GHz \end{cases}$

Wide Range Base Stations		
Channel Bandwidth of 3 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 3 MHz	$-5dBm - \frac{10}{3}\frac{\Delta f}{MHz}dB$	100 kHz
3 MHz < Δf < 6 MHz	-15 dBm	100 kHz
6 MHz < Δf < Δfmáx	$\begin{cases}16\ dBm, f < 1\ GHz \\ 15\ dBm, f > 1\ GHz\end{cases}$	$\begin{cases}100\ kHz, f < 1\ GHz \\ 1\ MHz, f > 1\ GHz\end{cases}$

Wide Range Base Stations		
Channel Bandwidth of 5, 10, 15 or 20 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 5 MHz	$-7dBm - \frac{7}{5}\frac{\Delta f}{MHz}dB$	100 kHz
5 MHz < Δf < min(10 MHz ; Δfmáx)	-14 dBm	100 kHz
10 MHz < Δf < Δfmáx	$\begin{cases}16\ dBm, f < 1\ GHz \\ 15\ dBm, f > 1\ GHz\end{cases}$	$\begin{cases}100\ kHz, f < 1\ GHz \\ 1\ MHz, f > 1\ GHz\end{cases}$

Medium Range Base Stations (31 dBm ≤ Pmax ≤ 38 dBm)		
Channel Bandwidth of 1,4 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 1,4 MHz	$Pmax - 45dbm - \frac{10}{1{,}4}\frac{\Delta f}{MHz}dB$	100 kHz
1,4 MHz < Δf < 2,8	Pmax -55 dB	100 kHz
2,8 MHz < Δf < Δfmáx	-25 dBm	100 kHz

Medium Range Base Stations (31 dBm ≤ Pmax ≤ 38 dBm)		
Channel Bandwidth of 3 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 3 MHz	$Pmax - 49dbm - \frac{10}{3}\frac{\Delta f}{MHz}dB$	100 kHz
3 MHz < Δf < 6 MHz	Pmax -59 dB	100 kHz
6 MHz < Δf < Δfmáx	Min{Pmax -59 dB, -25 dBm}	100 kHz

Medium Range Base Stations (31 dBm ≤ Pmax ≤ 38 dBm)		
Channel Bandwidth of 5, 10, 15, 20 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 5 MHz	$Pmax - 53dbm - \frac{7}{5}\frac{\Delta f}{MHz}dB$	100 kHz
5 MHz < Δf < min (10 MHz ; Δfmáx)	Pmax -60 dB	100 kHz
10 MHz < Δf < Δfmáx	Min (Pmax - 60 dB ; -25 dBm)	100 kHz

Medium Range Base Stations (Pmax ≤ 31 dBm)		
Channel Bandwidth of 1,4 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 1,4 MHz	$-14dbm - \frac{10}{1{,}4}\frac{\Delta f}{MHz}dB$	100 kHz
1,4 MHz < Δf < 2,8	-24 dBm	100 kHz
2,8 MHz < Δf < Δfmáx	-25 dBm	100 kHz

Medium Range Base Stations (Pmax ≤ 31 dBm)		
Channel Bandwidth of 3 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 3 MHz	$-18dbm - \frac{10}{3}\frac{\Delta f}{MHz}dB$	100 kHz
3 MHz < Δf < 6 MHz	-28 dBm	100 kHz
6 MHz < Δf < Δfmáx	-28 dBm	100 kHz

Medium Range Base Stations (Pmax ≤ 31 dBm)		
Channel Bandwidth of 5, 10, 15, 20 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 5 MHz	$Pmax - 53dbm - \frac{7}{5}\frac{\Delta f}{MHz}dB$	100 kHz
5 MHz < Δf < min(10 MHz ; Δfmáx)	-29 dBm	100 kHz
10 MHz < Δf < Δfmáx	-29 dBm	100 kHz

Local Area Base Stations		
Channel Bandwidth of 1,4 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 1,4 MHz	$-21dbm - \frac{10}{1{,}4}\frac{\Delta f}{MHz}dB$	100 kHz
1,4 MHz < Δf < 2,8	-31 dBm	100 kHz
2,8 MHz < Δf < Δfmáx	-31 dBm	100 kHz

Local Area Base Stations		
Channel Bandwidth of 3 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 3 MHz	$-25dbm - \frac{10}{3}\frac{\Delta f}{MHz}dB$	100 kHz
3 MHz < Δf < 6 MHz	-35 dBm	100 kHz
6 MHz < Δf < Δfmáx	-35 dBm	100 kHz

Local Area Base Stations		
Channel Bandwidth of 5, 10, 15, 20 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 5 MHz	$30dBm - \frac{7}{5}\frac{\Delta f}{MHz}dB$	100 kHz
5 MHz < Δf < min(10 MHz ; Δfmáx)	-37 dBm	100 kHz
10 MHz < Δf < Δfmáx	-37 dBm	100 kHz

Home Base Stations		
Channel Bandwidth of 1,4 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 1,4 MHz	$-30dbm - \frac{6}{1{,}4}\frac{\Delta f}{MHz}dB$	100 kHz
1,4 MHz < Δf < 2,8	-36 dBm	100 kHz
2,8 MHz < Δf < Δfmáx	Max {Pmax – 52 dB ; -50 dBm	1 MHz

Local Area Base Stations		
Channel Bandwidth of 3 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 3 MHz	$-34dbm - 2\,\frac{\Delta f}{MHz}dB$	100 kHz
3 MHz < Δf < 6 MHz	-40 dBm	100 kHz
6 MHz < Δf < Δfmáx	Max {Pmax – 52 dB ; -50 dBm}	1 MHz

Local Area Base Stations		
Channel Bandwidth of 5, 10, 15, 20 MHz		
Δf	**Limit**	**Resolution Bandwidth**
0 MHz < Δf < 5 MHz	$36dBm - \frac{6}{5}\,\frac{\Delta f}{MHz}dB$	100 kHz
5 MHz < Δf < min(10 MHz ; Δfmáx)	-42 dBm	100 kHz
10 MHz < Δf < Δfmáx	Max {Pmax – 52 dB ; -50 dBm}	100 kHz

4.1.4.1.2. Adjacent Channel Power Ratio

The Adjacent Channel Power ratio is the ratio of the average filtered power at the center of the assigned channel and the average filtered power at the center of the adjacent channel. The requirements apply outside the edges of the base station channel bandwidth regardless of the transmitter type considered, for all transmission modes declared by the manufacturer.

The power in the assigned channel and the power in the adjacent channel are measured with rectangular filters with the specified bandwidths for each channel bandwidth.

The Adjacent Channel Power Ratio shall meet the limits of the following table or an absolute power value in the adjacent channel of -15 dBm / MHz, - 25 dBm / MHz, -32 dBm / MHz or -50 dBm / MHz Depending on whether the base station is Wide Range, Medium Range, Local Area or Home area, whichever is less restrictive.

Adjacent Channel Power Ratio Limits			
Channel Bandwidth [MHz]	**Displacement below the lower frequency or above the upper frequency of the transmitted carrier**	**Filter Type and Bandwidth**	**Adjacent Channel Power Ratio**
1.4, 3, 5, 10, 15, 20	$BW_{channel}$	Rectangular (BW_{conf*})	45 dB
	2 x $BW_{channel}$	Rectangular (BW_{conf*})	45 dB

* BWconf represents the transmitted signal configured bandwidth

4.1.4.2. Spurious Emissions

Emissions at one or more frequencies located outside the necessary bandwidth, whose levels can be reduced without affecting the transmission of the corresponding information. They include harmonic emissions, eddy emissions, intermodulation products and frequency conversion products, excluding out-of-band emissions are considered spurious emissions.

Spurious emission limits are specified in terms of general requirements in line with Recommendation ITU-R SM.329 and the operating bands requirements to ensure the coexistence of user terminals.

In this section, emissions in the range of the frequencies 10 MHz below the lower channel and 10 MHz above the upper channel of the band under analysis shall be considered as spurious.

For base stations operating on multiple bands that are mapped on separate antenna connectors, the requirements apply for each band.

The requirements apply to any type of transmitter considered, whether single carrier or multiple carrier, and for all modes of transmission specified by the manufacturer.

Frequency Range	Maximum Level	Resolution Bandwidth
9 KHz ≤ f < 150 KHz	-36 dBm	1 kHz
150 KHz ≤ f < 50 MHz	-36 dBm	10 kHz
50 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz
1 GHz ≤ f < 12,75 GHz	-30 dBm	1 MHz

4.1.5. Frequency Error

The frequency error is defined as the difference between the frequency of the carrier transmitted by the base station and the assigned frequency.

The limits are the following:

Base Station Classes	Limit
	Error (ppm)
Wide Range	±0,05
Medium Range	±0,10
Local Area	±0,10
Home Area	±0,25

4.2. *Test Methods*

The test methods specified in the **ETSI TS 136 141-1 V13.6.0 (2017-01)** or later version (depending on the updates thereof), or equivalent methods duly justified, shall be used in accordance with the following tables.

Test	Points of the standard to apply ETSI TS 125 141-1 V13.3.0 (2016-08)
Maximum Power Output (4.1.2.)	6.2
Occupied Bandwidth (4.1.3.)	6.6.1
Transmission Mask (4.1.4.1.1.)	6.6.3
Adjacent Channel Power Ratio (4.1.4.2)	6.6.2
Spurious Emissions (4.1.4.3)	6.6.4
Frequency Error (4.1.5.)	6.5.1

Additional images and graphs of the reported results that are related to the measurements made, particularly for the tests of occupied bandwidth and Non-desired Emissions, should be included in the test report for all tests performed.