Draft ETSI EN 303 609 V12.4.1 (2016-01)

Global System for Mobile communications (GSM);
GSM Repeaters;
Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU

Reference
REN/MSG-0021-RED

Keywords
cellular, ER-GSM, GSM, repeater, R-GSM

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Sous-Préfecture de Grasse (06) N° 7803/88

Contents

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Mobile Standards Group (MSG), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

For non EU countries the present document may be used for regulatory (Type Approval) purposes.

The present document has been prepared in reply to the Commission's standardisation request Commission Implementing Decision C(2015) 5376 final of 04.08.2015 to provide a means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment.

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The present document is a revision of ETSI EN 300 609-4. The present document is part of a set of standards developed by ETSI that are designed to fit in a modular structure to cover radio equipment within the scope of the Directive 2014/53/EU [i.1]. The present document is produced following the guidance in ETSI EG 203 336 [i.2] as applicable.

1 Scope

The present document applies to the following radio equipment types:

1) Repeaters for GSM.

This radio equipment type is capable of operating in all or any part of the frequency bands given in table 1-1.

Table 1-1: GSM Repeater frequency bands

GSM band	Direction of transmission	GSM Repeater relevant frequency bands
P-GSM 900	Downlink	935 MHz to 960 MHz
	Uplink	890 MHz to 915 MHz
E-GSM 900	Downlink	925 MHz to 960 MHz
	Uplink	880 MHz to 915 MHz
R-GSM 900	Downlink	921 MHz to 960 MHz
	Uplink	876 MHz to 915 MHz
ER-GSM 900	Downlink	918 MHz to 960 MHz
	Uplink	873 MHz to 915 MHz
DCS 1 800	Downlink	1 805 MHz to 1 880 MHz
	Uplink	1 710 MHz to 1 785 MHz
GSM 450	Downlink	460,4 MHz to 467,6 MHz
	Uplink	450,4 MHz to 457,6 MHz
GSM 480	Downlink	488,8 MHz to 496 MHz
	Uplink	478,8 MHz to 486 MHz

NOTE 1: In some circumstances, for instance when an operator (or more than one operator who co-ordinate the use of repeaters), is not allocated a complete band as defined in table 1-1, it may be necessary to restrict the frequency range of operations of repeaters. In these circumstances, the test of "Gain outside pass band" in annex C may be used to verify the performance of the repeater.

NOTE 2: A repeater is designed to operate in one or several pass bands within the MS and BTS relevant transmit bands.

The present document covers requirements for GSM Repeaters for 3GPP Release 8, 9, 10, 11 and 12.

The present document contains requirements to demonstrate that radio equipment both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 151 026 (V12.0.0) (10-2014): "Digital cellular telecommunications system (Phase 2+); Base Station System (BSS) equipment specification; Part 4: Repeaters (3GPP TS 51.026 version 12.0.0 Release 12)".

[2] Recommendation ITU-R SM.329-12 (09-2012): "Unwanted emissions in the spurious domain".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Directive 2014/53/EU of the European parliament and of the council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

[i.2] ETSI EG 203 336 (V1.1.1) (08-2015): " Electromagnetic compatibility and Radio spectrum Matters (ERM); Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".

[i.3] ETSI TR 100 028 (all parts) (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

[i.4] ETSI TS 145 005 (V12.5.0) (04-2015): "Digital cellular telecommunications system (Phase 2+); Radio Transmission and reception (3GPP TS 45.005 version 12.5.0 Release 12)".

[i.5] Commission Implementing Decision C(2015) 5376 final of 04.08.2015: Commission Implementing Decision on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

broadband repeater: repeater which is designed for operation on any combination of ARFCNs (up to a specified maximum number) within the relevant band of the repeater

channelized repeater: repeater which is designed for operation on a specified subset of ARFCNs within the operating band of the repeater

NOTE: The subset of ARFCNs may be determined during the manufacture of the repeater, or may be programmable.

E-GSM: extended GSM 900 band (includes P-GSM band)

ER-GSM 900: extended Railway GSM 900 band (includes R-GSM band)

GSM: unless otherwise specified, references to GSM include GSM 400, GSM 900, ER-GSM 900 and DCS 1 800

GSM 400: unless otherwise specified, references to GSM 400 include GSM 450 and GSM 480 band

GSM 900: unless otherwise specified, references to GSM 900 include P-GSM, E-GSM and R-GSM band

GSM-R: GSM Railway communication, operated in the R-GSM or ER-GSM band, respectively

P-GSM: primary GSM 900 band

pass band: frequency range that the Repeater operates in with operational configuration

NOTE: This frequency range can correspond to one or several consecutive nominal channels. If they are not consecutive each subset of channels have to be considered as an individual pass band. The Repeater can have one or several pass bands.

relevant band: frequency band of GSM Repeater declared by the manufacturer according to the designations in table 1-1

repeater: bi-directional Radio Frequency (RF) amplifier which can amplify and transmit a received Mobile Station (MS) signal in the GSM MS transmit band, simultaneously it can amplify and transmit a radiated or conducted received Base Transceiver Station (BTS) RF signal in the GSM BTS transmit band

R-GSM: Railways GSM 900 band (includes P-GSM band and E-GSM band)

repeater system using frequency shift: repeater system consisting of two different elements, a master unit close to the BTS and at least one remote unit close to the area to be covered

NOTE: The master unit amplifies the channels from the BTS and shifts them to different GSM channels. In the remote unit the shifted channels from the master unit will be transferred back to the original channels and amplified. This is valid for the downlink signals as well as for the uplink signals.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ARFCN	Absolute Radio Frequency Channel Number
BSS	Base Station System
BTS	Base Transceiver Station
CW	Continuous Wave
DCS	Digital Cellular System
DUT	Device Under Test
EFTA	European Free Trade Association
ER-GSM	Extended Railways GSM
GSM	General System for Mobile communications
GSM-R	GSM Railway
MS	Mobile Station
RF	Radio Frequency
RMS	Root Mean Square
RSS	Root Sum of the Squares

4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the supplier. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

For guidance on how a supplier can declare the environmental profile see annex B.

4.2 Conformance requirements

4.2.0 Introduction

To meet the essential requirement under article 3.2 of Directive 2014/53/EU [i.1] for Repeater four essential parameters have been identified. Table 4.2.0-1 provides a cross reference between these four essential parameters and the corresponding seven technical requirements for equipment within the scope of the present document.

Table 4.2.0-1: Essential parameters, corresponding technical requirements and test suites

Essential parameters	Corresponding technical requirements	Corresponding test suites
Transmitter and receiver unwanted emissions in the spurious domain	4.2.1 Conducted spurious emissions	5.3.1
Radiated emissions	4.2.2 Radiated spurious emissions	5.3.2
Transmitter spectrum mask	4.2.3 Intermodulation attenuation	5.3.3
Transmitter unwanted emissions in the out of band domain		
Receiver radio-frequency intermodulation		
Receiver adjacent signal selectivity	4.2.4 Out of band gain	5.3.4
Transmitter frequency stability	4.2.5 Frequency error	5.3.5

NOTE: Some of the essential parameters of the ETSI EG 203 336 [i.2] are not included into the present document since those requirements are not applicable for repeater equipment.

4.2.1 Conducted spurious emissions

4.2.1.1 Definition

This test measures the conducted spurious emissions at the antenna ports.

4.2.1.2 Limit

This requirement applies to all antenna ports of the repeater, at maximum gain, and with the following input signals:

- without any RF input signal;
- with a continuous sinusoidal RF signal at a level which will result, when measured, in the maximum rated RF output power per channel, as declared by the manufacturer RF input signal.

The measured power shall not exceed:

- -36 dBm (250 nW) in the frequency band 9 kHz to 1 GHz;
- -30 dBm (1 µW) in the frequency band 1 GHz to 12,75 GHz.

Table 4.2.1.2-1: Measurement bandwidth for spurious emissions

Band	Frequency offset	Measurement bandwidth
	(offset from carrier)	
In the relevant BTS transmit Band or MS transmit band	≥ 100 kHz	3 kHz
100 kHz to 50 MHz	-	10 kHz
50 MHz to 500 MHz outside the relevant transmit band	(offset from edge of the relevant transmit band)	
	> 0 MHz	10 kHz
	≥ 2 MHz	30 kHz
	≥ 5 MHz	100 kHz
Above 500 MHz outside the relevant transmit band	(offset from edge of the relevant transmit band)	
	> 0 MHz	10 kHz
	≥ 2 MHz	30 kHz
	≥ 5 MHz	100 kHz
	≥ 10 MHz	300 kHz
	≥ 20 MHz	1 MHz
	≥ 30 MHz	3 MHz

4.2.1.3 Conformance

Conformance tests described in clause 5.3.1 shall be carried out.

4.2.2 Radiated spurious emissions

4.2.2.1 Definition

This test measures the effective power of spurious emissions radiated by the cabinet and structure.

4.2.2.2 Limit

This requirement applies to all antenna ports of the repeater, at maximum gain, and with the following input signals:

- without any RF input signal;
- with a continuous sinusoidal RF signal at a level which will result, when measured, in the maximum rated RF output power per channel, as declared by the manufacturer RF input signal.

The effective radiated power shall not exceed:

- -36 dBm (250 nW) in the frequency band 30 MHz to 1 GHz;
- -30 dBm (1µW) in the frequency band 1 GHz to 12,75 GHz.

Table 4.2.2.2-1: Measurement bandwidth for spurious emissions

Band	Frequency offset	Measurement bandwidth
	(offset from carrier)	
In the relevant BTS transmit Band or MS transmit band	≥ 100 kHz	3 kHz
30 MHz to 50 MHz	-	10 kHz
50 MHz to 500 MHz outside the relevant transmit band	(offset from edge of the relevant transmit band)	
	> 0 MHz	10 kHz
	≥ 2 MHz	30 kHz
	≥ 5 MHz	100 kHz
Above 500 MHz outside the relevant transmit band	(offset from edge of the relevant transmit band)	
	> 0 MHz	10 kHz
	≥ 2 MHz	30 kHz
	≥ 5 MHz	100 kHz
	≥ 10 MHz	300 kHz
	≥ 20 MHz	1 MHz
	≥ 30 MHz	3 MHz

4.2.2.3 Conformance

Conformance tests described in clause 5.3.2 shall be carried out.

4.2.3 Intermodulation attenuation

4.2.3.1 Definition

To verify that the level of intermodulation products, generated in non-linear elements of the repeater, in the presence of two RF input signals, do not exceed the specified limits.

4.2.3.2 Limit

This requirement applies to all antenna ports of the repeater, at maximum gain, and with the following input signals:

- with a continuous sinusoidal RF signal at a level which will result, when measured, in the maximum rated RF output power per channel, as declared by the manufacturer RF input signal;
- with 10 dB increased continuous sinusoidal RF signals compared to the continuous sinusoidal RF signal at a level which will result, when measured, in the maximum rated RF output power per channel, as declared by the manufacturer RF input signal.

The maximum level of intermodulation product shall be not greater than:

- -36 dBm (250 nW) in the frequency band 9 kHz to 1 GHz;
- -30 dBm (1µW) in the frequency band 1 GHz to 12,75 GHz.

4.2.3.3 Conformance

Conformance tests described in clause 5.3.3 shall be carried out.

4.2.4 Out-of-band gain

4.2.4.1 Definition

To test the net gain of the repeater outside the relevant MS or BTS transmit band.

This test shall also check the net gain at harmonic frequencies.

4.2.4.2 Limit

This requirement applies to all antenna ports of the repeater, at maximum gain.

The net gain in both directions through the repeater shall be less than:

- 50 dB at 400 kHz offset and greater;
- 40 dB at 600 kHz offset and greater;
- 35 dB at 1 MHz offset and greater;
- 25 dB at 5 MHz offset and greater;

from the edges of the relevant MS or BTS transmit bands.

4.2.4.3 Conformance

Conformance tests described in clause 5.3.4 shall be carried out.

4.2.5 Frequency error

4.2.5.1 Definition

This clause applies only to repeater systems using frequency shift and describes the test of the frequency error.

4.2.5.2 Limit

The average frequency error of the repeater system shall not exceed 0,1 ppm.

If tested, the average frequency error of a single repeater shall not exceed 0,05 ppm.

4.2.5.3 Conformance

Conformance tests described in clause 5.3.5 shall be carried out.

5 Testing for compliance with technical requirements

5.1 Environmental conditions for testing

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile.

Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the declared operational environmental profile) to give confidence of compliance for the affected technical requirements.

5.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit shall be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be documented in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 5.2-1.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated and shall correspond to an expansion factor (coverage factor) k = 1,96 (which provides confidence levels of 95 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). Principles for the calculation of measurement uncertainty are contained in ETSI TR 100 028 [i.3], in particular in annex D of the ETSI TR 100 028-2 [i.3].

Table 5.2-1 is based on these expansion factors.

Table 5.2-1: Maximum measurement uncertainty

Parameter	Condition	Uncertainty
Conducted spurious emissions	inside the BTS transmit band or MS transmit band	±1,5 dB
	in the receive band of the BSS	±3 dB
	elsewhere f ≤ 2,2 GHz 2,2 GHz < f ≤ 4 GHz f > 4 GHz	 ±1,5 dB ±2,0 dB ±4,0 dB
Radiated spurious emissions	RF power	±6,0 dB
Intermodulation attenuation	Formula: $\sqrt{(CW1\_level\_error)^2 + (2 \cdot CW2\_level\_error)^2 + (measurement\_error)^2}$ RSS: CW1 level error, 2 x CW2 level error, and measurement error (using all errors = ±0,5 dB)	±1,2 dB
Out-of-band gain	Calibration of test set-up shall be made without DUT in order to achieve the accuracy	±0,5 dB
Frequency error	Frequency	±10 Hz (±5 Hz for GSM 400)

5.3 Essential radio test suites

5.3.1 Conducted spurious emissions

5.3.1.1 Initial conditions

Test environment: normal, see ETSI TS 151 026 [1], clause 4.2.1.

1) One antenna port of the repeater shall be connected to a selective RF measurement device, for instance a spectrum analyser or a selective voltmeter, presenting to the repeater a load with an impedance of 50 Ω.

5.3.1.2 Procedures

1) An average power measurement of spurious emissions shall be performed for frequency offsets from the carrier frequency greater than 600 kHz, with a measurement bandwidth according to table 4.2.2.2-1, without any RF input signal. The relevant input antenna port of the repeater shall be terminated with 50 Ω. An average detector on the selective RF measurement device shall be enabled.

2) An average power measurement of spurious emissions shall be performed for frequency offsets from the carrier frequency greater than 600 kHz, with a measurement bandwidth according to table 4.2.2.2-1, with an RF input signal. An average detector on the selective RF measurement device shall be enabled. The relevant antenna input port of the repeater shall be connected to an RF signal generator. A continuous sinusoidal RF signal shall be input at a level which will result, when measured, in the maximum rated RF output power per channel, as declared by the manufacturer. The RF input signal shall be set to the centre frequency of the repeaters pass band. In the case of a channelized repeater, the RF input signal shall be set to the centre of the supported ARFCN closest to the centre of the range of ARFCNs supported by the repeater.

5.3.1.3 Test requirement

The results obtained shall be compared to the limits in clause 4.2.1.2 in order to prove compliance.

5.3.2 Radiated spurious emissions

5.3.2.1 Initial conditions

Test environment: normal, see ETSI TS 151 026 [1], clause 4.2.1.

1) A test site fulfilling the requirements of Recommendation ITU-R SM.329-12 [2] shall be used, except when it conflicts with the present document. The repeater shall be placed on a non-conducting support and shall be operated from a power source as recommended by the manufacturer via an RF filter, to prevent the power source or cable from influencing the result of the measurement.

5.3.2.2 Procedures

1) The relevant output antenna port of the repeater shall be terminated with 50 Ω. The relevant antenna input port of the repeater shall be connected to a RF signal generator in such a way that the connection does not influence the result of the measurement. The RF input signal shall be set to the centre frequency of the repeaters pass band. A continuous sinusoidal RF signal shall be input at a level which will result, when measured, in the maximum rated output power per channel, as declared by the manufacturer.

2) An average RF power measurement shall be performed for frequency offsets from the carrier frequency greater than 600 kHz over the frequency range 30 MHz to 12,75 GHz, with a measurement bandwidth according to table 4.2.2.2-1. An average detector shall be enabled. The repeater shall be rotated through 360° in the horizontal plane and the test antenna shall be raised or lowered until the maximum spurious signal level is detected. The effective radiated power of each spurious component shall be determined by a substitution measurement.

3) The measurements shall be repeated with orthogonal polarization of the test antenna.

4) The measurements shall be repeated with no RF input signal, in this case the relevant antenna input port of the repeater shall be terminated with 50 Ω.

5.3.2.3 Test requirement

The results obtained shall be compared to the limits in clause 4.2.2.2 in order to prove compliance.

5.3.3 Intermodulation attenuation

5.3.3.1 Initial conditions

Test environment: normal, see ETSI TS 151 026 [1], clause 4.2.1.

5.3.3.2 Procedures

1) The repeater shall be set to maximum gain.

2) Two continuous sinusoidal RF signals shall be fed to the input antenna port of the repeater using a combining device. The frequencies of both RF signals shall be within the repeater's pass band. The spacing between both RF signals shall be the minimum possible spacing applied in a network, i.e. 600 kHz.

   The level of both RF input signals shall be increased, until the maximum rated output power per channel, as declared by the manufacturer, is reached.

   In case of a repeater only supporting one channel, one RF input signal shall be set to the operating frequency and the other RF input signal at an offset of 400 kHz to either side successively. In this case the input signal at the repeaters operating frequency shall be increased, until the maximum rated output power per channel, as declared by the manufacturer, is reached. The second signal shall be set to the same input level.

3) The level of the third order intermodulation products shall be measured by means of a selective measurement device presenting to the repeater a load with an impedance of 50 Ω.

   An average power measurement shall be performed using a bandwidth of 3 kHz. An average detector shall be enabled.

4) The test shall be repeated with both RF input signals increased by 10 dB each.

NOTE: In this case, the automatic gain (level) control may reduce the gain to a value less than maximum gain in order to keep the maximum rated output power per channel, as declared by the manufacturer.

5) The measurements shall apply to all antenna ports of the repeater.

5.3.3.3 Test requirement

The results obtained shall be compared to the limits in clause 4.2.3.2 in order to prove compliance.

5.3.4 Out-of-band gain

5.3.4.1 Initial conditions

Test environment: normal, see ETSI TS 151 026 [1], clause 4.2.1;
extreme temperature, see ETSI TS 151 026 [1], clause 4.2.3.

5.3.4.2 Procedures

1) The repeater shall be set to maximum gain.

   In case of a channel selective repeater, two of the channel selective modules shall be set to the lowermost and the uppermost ARFCN within the repeater's pass band.

2) A continuous sinusoidal RF signal shall be fed successively at frequency offsets Y from the edges of the relevant MS or BTS transmit frequency band into the relevant input port of the repeater.

   The frequency offsets Y shall have the following values:

   - 400 kHz;
   - 600 kHz;

- 800 kHz;
- 1 MHz;
- 5 MHz;
- 10 MHz;
- 15 MHz;
- 20 MHz.

The power level of the RF input signal shall be at least 5 dB below the power level which would produce, when applied within the pass band, maximum rated output power, as declared by the manufacturer. This is to ensure that the equipment is operating in the linear output range.

3) The average output power in each case shall be measured and the net gain shall be recorded.

4) This shall be repeated with an RF input signal successively set to all harmonic frequencies of the repeaters pass band up to 12,75 GHz (i.e. multiples of the centre frequency of the repeaters pass band up to 12,75 GHz).

5) The measurements shall apply to all antenna ports of the repeater.

5.3.4.3 Test requirement

The results obtained shall be compared to the limits in clause 4.2.4.2 in order to prove compliance.

5.3.5 Frequency error

5.3.5.1 Initial conditions

Test environment: normal, see ETSI TS 151 026 [1], clause 4.2.1;
extreme temperature, see ETSI TS 151 026 [1], clause 4.2.3.

1) The repeater system shall be levelled according to the recommendations of the manufacturer. For the purpose of the frequency synchronization of the repeater system it might be necessary to connect the system to a BTS or an equivalent test equipment like a mobile tester. In all cases an accurate frequency synchronization source has to be used to synchronize the measurement setup.

5.3.5.2 Procedures

1) The test of the repeater system shall be performed at the lowest and the highest ARFCN supported by the repeater system.

   For the measurement of the frequency error a continuous, sinusoidal and synchronized RF signal shall be fed successively at a frequency of the relevant MS or BTS transmit frequency band into the relevant input port of the repeater.

   The power level of the RF input signal shall be at least 5 dB below the power level which would produce, when applied within the pass band, maximum rated output power, as declared by the manufacturer. This is to ensure that the equipment is operating in the linear output range.

2) The average output frequency shall be measured with a frequency counter.

3) The frequency error of single elements within the repeater system such as master unit or remote unit may be measured as well.

The results obtained shall be compared to the limits in clause 4.2.5.2 in order to prove compliance.

Annex A (normative): Relationship between the present document and the essential requirements of Directive 2014/53/EU

The present document has been prepared in reply to the Commission's standardisation request Commission Implementing Decision C(2015) 5376 final of 04.08.2015 to provide a means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment.

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table A.1: Relationship between the present document and the essential requirements of Directive 2014/53/EU

Harmonised Standard ETSI EN 303 609 The following requirements are relevant to the presumption of conformity under the article 3.2 of Directive 2014/53/EU [i.1]				
Requirement			**Requirement Conditionality**	
No	**Description**	**Reference: Clause No**	**U/C**	**Condition**
1	Conducted spurious emissions	4.2.1	U	
2	Radiated spurious emission	4.2.2	U	
3	Intermodulation attenuation	4.2.3	U	
4	Out-of-band gain	4.2.4	U	
5	Frequency error	4.2.5	C	Only for Repeater systems using frequency shift

Key to columns:

Requirement:

No A unique identifier for one row of the table which may be used to identify a requirement.

Description A textual reference to the requirement.

Clause Number Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

U/C Indicates whether the requirement shall be unconditionally applicable (U) or is conditional upon the manufacturers claimed functionality of the equipment (C).

Condition Explains the conditions when the requirement shall or shall not be applicable for a requirement which is classified "conditional".

Presumption of conformity stays valid only as long as a reference to the present document is maintained in the list published in the Official Journal of the European Union. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Other Union legislation may be applicable to the product(s) falling within the scope of the present document.

Annex B (informative): Environmental profile specification

The following environmental conditions may be declared by the supplier:

- barometric pressure: minimum and maximum;
- temperature: minimum and maximum;
- relative humidity: minimum and maximum;
- power supply: lower and upper voltage limit.

When operating outside the boundary limits of the declared operational environmental profile the equipment should not make ineffective use of the radio frequency spectrum so as to cause harmful interference.

Annex C (informative): Testing of gain for part band repeaters

C.1 Rationale for this test

The normative provisions of the present document specify the out-of-band gain relative to the edge of one of the GSM bands specified in clause 1. The purpose of this informative annex is to define a test method which may be used to measure the out-of-band gain for a repeater which is designed to operate only over part of one of these bands. This test may be used for acceptance testing or for regulatory purposes.

Agree the performance requirements prior to this test being performed, since ETSI TS 145 005 [i.4] does not specify the out-of-band gain requirements within a GSM band for such a repeater. Normally, the requirements for the uplink and downlink directions will be similar, but with the frequencies offset by 45 MHz or 95 MHz.

C.2 Gain outside pass band

C.2.1 Test purpose

To determine the net gain of the repeater outside its specified pass band (or bands), when this is less than a GSM band defined in clause 1 of the present document. Always meet the out-of-band gain requirements of the present document, whether or not this test is also performed.

This test is not a normative requirement of the present document.

C.2.2 Test case

Set the repeater to maximum gain. In case of a channel selective repeater, two of the channel selective set the modules to the lowermost and the uppermost ARFCN within the repeaters pass band.

Feed a continuous sinusoidal RF signal successively at each specified frequency into the relevant input port of the repeater. Set the power level of the RF input signal to at least 5 dB below the power level which would produce, when applied within the specified pass band, maximum rated output power, as declared by the manufacturer. This is to ensure that the equipment is operating in the linear output range.

Measure the average output power in each case and record the net gain.

Apply the measurements to all antenna ports of the repeater.

Test environment: normal
extreme temperature.

C.2.3 Conformance requirement

The requirement is met, if the gain through the repeater at each frequency specified to be measured is less than the specified value.

History

Document history		
Edition 1	January 1997	Publication as ETSI ETS 300 609-4
Edition 2	July 1998	Publication as ETSI ETS 300 609-4
Edition 3	October 1998	Publication as ETSI ETS 300 609-4
Edition 4	March 1999	Publication as ETSI ETS 300 609-4
V6.0.1	June 2002	Publication as ETSI TS 100 609-4
V7.0.0	June 2002	Publication as ETSI TS 100 609-4
V8.0.2	October 2000	Publication as ETSI EN 300 609-4
V9.2.1	October 2010	Publication ETSI EN 300 609-4
V10.2.1	November 2012	Publication ETSI EN 300 609-4
V12.4.1	January 2016	EN Approval Procedure AP 20160406: 2016-01-07 to 2016-04-06