

**Global System for Mobile communications (GSM);
Part 4: Harmonized EN for GSM Repeaters covering the
essential requirements of article 3.2 of the R&TTE Directive**

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Foreword

This Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Mobile Standards Group (MSG), and is now submitted for the ETSI standards One-step Approval Procedure.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [i.1] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [i.2] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive").

Technical specifications relevant to Directive 1999/5/EC [i.2] are given in annex A.

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

Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive [i.2]. The modular structure is shown in EG 201 399 [i.3].

1 Scope

The present document applies to the following radio equipment types:

- 1) Repeaters for GSM;

These radio equipment types are capable of operating in all or any part of the frequency bands given in table 1-1.

Table 1-1: GSM Repeater frequency bands

	Direction of transmission	GSM Repeater frequency bands
P-GSM900	Downlink	935 MHz to 960 MHz
	Uplink	890 MHz to 915 MHz
E-GSM900	Downlink	925 MHz to 960 MHz
	Uplink	880 MHz to 915 MHz
R-GSM900	Downlink	921 MHz to 960 MHz
	Uplink	876 MHz to 915 MHz
DCS1800	Downlink	1 805 MHz to 1 880 MHz
	Uplink	1 710 MHz to 1 785 MHz
GSM450	Downlink	460,4 MHz to 467,6 MHz
	Uplink	450,4 MHz to 457,6 MHz
GSM480	Downlink	488,8 MHz to 496 MHz
	Uplink	478,8 MHz to 486 MHz

NOTE: 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 operating band" in annex C may be used to verify the performance of the repeater.

The present document covers requirements for GSM Repeaters for Release 8.

The present document is intended to cover the provisions of Directive 1999/5/EC [i.2] (R&TTE Directive),

Article 3.2, which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive [i.2] may apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the web site <http://www.newapproach.org>.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

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.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- | | |
|-----|---|
| [1] | Void. |
| [2] | ETSI TS 151 026 (V8.2.0): "Digital cellular telecommunications system (Phase 2+); Base Station System (BSS) equipment specification; Part 4: Repeaters (3GPP TS 51.026 version 8.2.0 Release 8)". |
| [3] | ETSI TS 151 021 (V8.5.0): "Digital cellular telecommunications system (Phase 2+); Base Station System (BSS) equipment specification; Radio aspects (3GPP TS 51.021 version 8.5.0 Release 8)". |
| [4] | ITU-R Recommendation SM.329-10 (2003): "Unwanted emissions in the spurious domain". |
| [5] | ETSI TS 151 010-1 (V8.3.0): "Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP TS 51.010-1 version 8.3.0 Release 8)". |

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- | | |
|-------|---|
| [i.1] | Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations. |
| [i.2] | Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive). |
| [i.3] | ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive". |
| [i.4] | ETSI TR 102 215 (V1.3.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Recommended approach, and possible limits for measurement uncertainty for the measurement of radiated electromagnetic fields above 1 GHz". |

- [i.5] ETSI TR 100 028 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.6] ETSI TS 145 005 V8.7.0 (2009-12): "Digital cellular telecommunications system (Phase 2+); Radio Transmission and reception (3GPP TS 45.005 version 8.7.0 Release 8)".

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 operating 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.

pass band: repeater can have one or several pass bands

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

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
BTS	Base Transceiver Station
EVM	Error Vector Magnitude
MS	Mobile Station
RF	Radio Frequency

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

4.2.1 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 μ W) in the frequency band 1 GHz to 12,75 GHz.

Table 4.2.1.2-1: Measurement bandwidth for spurious emissions

Band	Frequency offset (offset from carrier)	Measurement bandwidth
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 ≥ 2 MHz ≥ 5 MHz	10 kHz 30 kHz 100 kHz
Above 500 MHz outside the Relevant transmit band	(offset from edge of the relevant transmit band) > 0 MHz ≥ 2 MHz ≥ 5 MHz ≥ 10 MHz ≥ 20 MHz ≥ 30 MHz	10 kHz 30 kHz 100 kHz 300 kHz 1 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 9 kHz 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 (offset from carrier)	Measurement bandwidth
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 ≥ 2 MHz ≥ 5 MHz	10 kHz 30 kHz 100 kHz
Above 500 MHz outside the Relevant transmit band	(offset from edge of the relevant transmit band) > 0 MHz ≥ 2 MHz ≥ 5 MHz ≥ 10 MHz ≥ 20 MHz ≥ 30 MHz	10 kHz 30 kHz 100 kHz 300 kHz 1 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.