ETSI TS 151 021 V17.0.0 (2022-05)

**Digital cellular telecommunications system (Phase 2+) (GSM);
Base Station System (BSS) equipment specification;
Radio aspects
(3GPP TS 51.021 version 17.0.0 Release 17)**

Reference
RTS/TSGR-0051021vh00

Keywords
GSM

ETSI

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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1 Scope

The present document specifies the Radio Frequency (RF) test methods and conformance requirements for GSM 400, GSM 700, T-GSM 810, GSM 900, ER-GSM 900 and DCS 1800, PCS 1900, GSM 850, MXM 850 and MXM 1900 Base Station Systems (BSS)s. These have been derived from, and are consistent with, the core GSM specifications specified in the requirements reference subclause of each test with the exception that requirements expressed as a reference to regulatory documents (e.g. FCC) have not been included in the present document.

The present document is applicable to BSS meeting the requirements of either GSM Phase 2 or GSM Phase 2+. Unless otherwise stated, all tests are applicable to BSS meeting Phase 2 and/or Phase 2+ GSM requirements, because the requirements of the Phase 2 and Phase 2+ core GSM specifications which are referenced in the test are consistent. Most differences between Phase 2 and Phase 2+ requirements represent Phase 2+ features which are optional for the BSS to support.

Conformance requirements may be tested to verify all aspects of the performance of a BSS. These minimum requirements are intended to be used by manufacturers and operators to allow conformance and acceptance testing to be performed in a consistent manner; the tests to be performed should be agreed between the parties.

In some tests there are separate requirements for micro-BTS and BTS. If there is no separate requirement for a micro-BTS, the requirements for the BTS apply to a micro-BTS.

In Rel-7, higher symbol rate is introduced for EGPRS2-B. EGPRS2-A and all other channels use normal symbol rate. For definition of normal and higher symbol rate see 3GPP TS 45.004. All tests and requirements apply to both symbol rates except otherwise stated in the test.

In some tests there are separate requirements for multicarrier BTS, that apply for all classes of multicarrier BTS (Wide Area, Medium Range and Local Area, cf. [22]) unless otherwise stated. If there is no separate requirement for a multicarrier BTS class, the requirement designated for BTS and normal BTS apply to that multicarrier BTS class.

In Rel-12, BTS operating in the ER-GSM 900 band is introduced. In some tests there are separate requirements for BTS operating in the ER-GSM 900 band. If there is no separate requirement, the requirements for normal BTS apply.

In Rel-13, BTS support of a low-complexity, low data throughput service in environments experiencing high propagation attenuation as indoors in basements etc. is introduced. This service, based on EGPRS, with extended coverage is called EC-GSM-IoT. The requirements for EGPRS apply in case no specific requirement is explicitly stated for EC-GSM-IoT.

In the present document, the reference point for RF connections (except for the measurement of mean transmitted RF carrier power) is the antenna connector, as defined by the manufacturer. The present document does not apply to repeaters or RF devices which may be connected to an antenna connector of a BSS, except as specified in subclause 4.10.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: " Vocabulary for 3GPP Specifications ".

[2] GSM 04.22: "Digital cellular telecommunications system (Phase 2+); Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[3] GSM 05.01: "Digital cellular telecommunications system (Phase 2); Physical layer on the radio path; General description".

[4] GSM 05.02 (ETS 300 574): "Digital cellular telecommunications system (Phase 2); Multiplexing and multiple access on the radio path".

[5] GSM 05.03 (ETS 300 575): "Digital cellular telecommunications system (Phase 2); Channel coding".

[6] GSM 05.04 (ETS 300 576): "Digital cellular telecommunications system (Phase 2); Modulation".

[7] GSM 05.05 (ETS 300 577): "Digital cellular telecommunications system (Phase 2); Radio transmission and reception".

[8] GSM 05.08 (ETS 300 578): "Digital cellular telecommunications system (Phase 2); Radio subsystem link control".

[9] GSM 05.10 (ETS 300 579): "Digital cellular telecommunications system (Phase 2); Radio subsystem synchronization".

[10] 3GPP TS 08.20: "Digital cellular telecommunications system (Phase 2); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[11] ETSI EN 300 019-1: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment Part 1-0: Classification of environmental conditions Introduction".

[12] IEC 60 068-2: "Basic environmental testing procedures; Part 2: Tests".

[13] IEC 60 721: "Classification of environmental conditions".

[14] ETSI ETR 027: "Radio and Equipment Systems; methods of measurement for mobile radio equipment".

[15] ETSI ETR 028: "Radio and Equipment Systems; Uncertainties in the measurement of mobile radio equipment characteristics".

[16] ITU-R Rec. SM.329-7: "Spurious emissions"

[17] 3GPP TS 05.05: " Digital cellular telecommunications system (Phase 2+); Radio transmission and reception ".

[18] 3GPP TS 45.001: "Physical layer on the radio path; General description".

[19] 3GPP TS 45.002: "Multiplexing and multiple access on the radio path".

[20] 3GPP TS 45.003: "Channel coding".

[21] 3GPP TS 45.004: "Modulation".

[22] 3GPP TS 45.005: "Radio transmission and reception".

[23] 3GPP TS 45.008: "Radio subsystem link control".

[24] 3GPP TS 45.010: "Radio subsystem synchronization".

[25] TIA/EIA-136-C: "TDMA Third Generation Wireless".

[26] EN 300 019-1-3: "Equipment Engineering (EE): Environmental conditions and environmental tests for telecommunications equipment Part 1-3; Classification of environmental conditions, Stationary use at weather-protected locations".

[27] EN 300 019-1-4: "Equipment Engineering (EE): Environmental conditions and environmental tests for telecommunications equipment Part 1-4; Classification of environmental conditions, Stationary use at non-weather-protected locations".

[28] IEC 60 721-3-3 "Stationary use at weather protected locations".

[29] IEC 60 721-3-4 "Stationary use at non weather protected locations".

[30] 3GPP TS 24.022 "Radio Link Protocol (RLP) for circuit switched bearer and teleservices".

[31] 3GPP TS 48.020 "Rate adaption on the Base Station System - Mobile services Switching Centre (BSS - MSC) interface".

[32] 3GPP TS 25.113 "Base Station (BS) and repeater ElectroMagnetic Compatibility (EMC)".

[33] 3GPP TS 36.113 "E-UTRA - Base Station (BS) and repeater ElectroMagnetic Compatibility (EMC)".

[34] 3GPP TS 43.059 "Functional stage 2 description of Location Services (LCS) in GERAN".

[35] 3GPP TS 49.031 "Base Station System Application Part LCS Extension (BSSAP-LE)".

[36] 3GPP TS 44.018 " Mobile radio interface layer 3 specification; GSM/EDGE Radio Resource Control (RRC) protocol".

[37] 3GPP TS 45.010 "Radio subsystem synchronization".

3 Definitions, abbreviations, frequency bands and channels

3.1 Definitions

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

8-PSK: modulation type as defined 3GPP TS 45.004 clause 3.

Carrier Frequency: centre of the ARFCN under test.

GMSK: modulation type as defined by 3GPP TS 45.004 clause 2.

GSM: unless otherwise specified, references to GSM include GSM 400, GSM 700, T-GSM 810, GSM 850, GSM 900, ER-GSM 900, DCS 1800, PCS 1900, MXM 850 and MXM 1900.

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

BSS: in the present document, the term BSS (or base station subsystem) applies to both a BTS and integrated BSS. If a separate BSC is required to perform tests on a BTS, the BSC may be regarded as test equipment and the environmental conditions of the BSC need not be controlled.

pico-BTS: as defined in 3GPP TS 45.005. In the present document, this also includes a BSS which incorporates a pico-BTS.

micro-BTS: as defined in 3GPP TS 05.05 and 3GPP TS 45.005. In the present document, this also includes a BSS which incorporates a micro-BTS.

Multicarrier BTS: defined as BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active components simultaneously.

Wide Area (WA) multicarrier BTS: defined as a class of multicarrier BTS, characterized by requirements derived from macro cell scenarios. The class has either multicarrier transmitter only, or both multicarrier transmitter and receiver.

Medium Range (MR) multicarrier BTS: defined as a class of multicarrier BTS, characterized by requirements derived from micro cell scenarios. The class has both multicarrier transmitter and multicarrier receiver.

Local Area (LA) multicarrier BTS: defined as a class of multicarrier BTS, characterized by requirements derived from pico cell scenarios. The class has both multicarrier transmitter and multicarrier receiver.

MXM: mixed Mode system. Mixed-mode is defined as a network that deploys both 30 kHz RF carriers and 200 kHz RF carriers in geographic regions where the Federal Communications Commission (FCC) or similar regulations are applied. In the present document MXM 850 and MXM 1900 are defined.

normal BTS: any BTS or BSS as defined by 3GPP TS 05.05 and 3GPP TS 45.005 which is not a micro-BTS, pico-BTS or multicarrier BTS.

BSSTE: base Station System Test Equipment; see annex B.

manufacturer: in the present document, a reference to a manufacturer shall also apply to an agent of the manufacturer.

T-GSM 810: Trunking GSM 810 band. For T-GSM 810 the requirements for GSM 900 shall apply, apart for those parameters for which a separate requirement exists.

P-GSM: primary GSM 900 band.

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

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

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

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

GSM 700: unless otherwise specified, references to GSM 700 include GSM 710 and GSM 750 band.

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

Relevant TX band (or relevant transmit band): transmit band defined in subclause 3.3.1 for the frequency band of BTS declared by the manufacturer.

Relevant RX band (or relevant receive band): receive band defined in subclause 3.3.1 for the frequency band of BTS declared by the manufacturer.

Operating band: transmit and receive operating bands together comprise the frequency band supported by the BSS; (see subclause 4.2).

Base Station RF bandwidth: The instantaneous bandwidth in which a multicarrier BTS transceiver transmits or transmits and receives multiple carriers simultaneously.

Maximum Base Station RF bandwidth: The maximum bandwidth in which a multicarrier BTS transceiver transmits or transmits and receives multiple carriers simultaneously.

Maximum Transmit Filter bandwidth: The maximum bandwidth of the duplexer or the transmit filter used in a multicarrier BTS when transmitting carriers simultaneously.

Circuit switched logical channels: all the standard GSM logical channels, including traffic channels (TCH), common control channels (RACH) and dedicated control channels (SDCCH, SACCH).

Packet switched logical channels: all the General Packet Radio Services (GPRS) packet data logical channels, including packet traffic channels (PDTCH and PACCH) and packet common control channels (PRACH).

GPRS: any subset of the packet traffic channels PDTCH/CS-1 to CS-4 and related control channels.

EGPRS: any subset of the packet traffic channels PDTCH/MCS-1 to MCS-9 and related control channels.

ECSD: any subset of the E-TCH traffic channels and related control channels.

EGPRS2-A: packet traffic channels utilizing any subset of the packet traffic channels MCS-1 to 6 and PDTCH/UAS-7 to UAS-11 in uplink, together with MCS-1 to 4 and PDTCH/DAS-5 to DAS-12 in downlink, and related control channels. In addition, MCS-7 and MCS-8 may be used in downlink when either the USF or the PAN or both are addressed to one or more EGPRS mobile stations.

EGPRS2-B: packet traffic channels utilizing any subset of the packet traffic channels MCS-1 to 4 and PDTCH/UBS-5 to UBS-12 in uplink, together with MCS-1 to 4 and PDTCH/DBS-5 to DBS-12 in downlink, and related control channels. In addition, MCS-6 to MCS-9, DAS-5, DAS-6, DAS-8, DAS-9, DAS-10 pad, DAS-11, and DAS-12pad may be used in downlink under the conditions specified in 3GPP TS 44.060.

EGPRS2: Any of EGPRS2-A and EGPRS2-B

16-QAM: modulation type as defined 3GPP TS 45.004 clause 4 for EGPRS2-A and clause 5 for EGRPS2-B.

32-QAM: modulation type as defined 3GPP TS 45.004 clause 4 for EGPRS2-A and clause 5 for EGRPS2-B.

QPSK: modulation type as defined 3GPP TS 45.004 clause 5, used in EGPRS2-B.

Blind Physical Layer Transmissions: see 3GPP TS 43.064.

Coverage Class: see 3GPP TS 43.064.

EC-GSM-IoT: Extended Coverage GSM for Internet of Things.

EC operation: See 3GPP TS 43.064.

EC-channels: Logical channels specifically defined for EC operation, see 3GPP TS 45.002.

Overlaid CDMA: Multiplexing scheme where up to four mobile stations can be assigned orthogonal codes to simultaneously transmit on the same physical channel in the uplink, see 3GPP TS 45.002. Used in EC operation.

Overlaid CDMA subchannel: One out of up to four logical channels multiplexed on the same physical channels through the use of orthogonal Overlaid CDMA codes.

VAMOS mode: as defined in 3GPP TS 45.001 clause 13.1.

AQPSK: modulation type as defined in 3GPP TS 45.004 clause 6.

VAMOS sub-channel: as defined in 3GPP TS 45.001 clause 13.1.

SCPIR_UL: Subchannel power imbalance ratio on uplink, as defined in 3GPP TS 45.005 clause 1.3.

SCPIR_DL: identical to SCPIR as defined in 3GPP TS 45.004 clause 6.

Minimum carrier frequency spacing: minimum spacing between the centre frequencies of simultaneously transmitted or received GSM carriers of a BTS belonging to a multicarrier BTS class. The minimum carrier frequency spacing is 600 kHz.

Sub-block: This is one contiguous allocated block of spectrum for use by the same Base Station. There may be multiple instances of sub-blocks within an RF bandwidth.

Sub-block bandwidth: The bandwidth of one sub-block.

Sub-block gap: A frequency gap between two consecutive sub-blocks within an RF bandwidth, where the RF requirements in the gap are based on co-existence for un-coordinated operation.

Enclosure port: physical boundary of the apparatus through which electromagnetic fields may radiate or impinge.

Port: particular interface, of the specified equipment (apparatus), with the electromagnetic environment

Radio digital unit: equipment which contains base band and functionality for controlling radio unit

Radio equipment: equipment which contains radio digital unit and radio unit

Radio unit: equipment which contains transmitter and receiver

Equivalent combined power: as defined in 3GPP TS 45.005 [22] Annex T.

Phase and amplitude coherency: see 3GPP TS 45.005 [22] and 3GPP TS 45.004 [21].

3.2 Abbreviations

Unless otherwise stated, abbreviations used in the present document shall have the meaning given in 3GPP TR 21.905.

AQPSK	Adaptive Quadrature Phase Shift Keying
B	"Bottom"; the lowest frequency on which a test is performed, i.e. within the operating RX and TX band respectively