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Digital cellular telecommunications system (Phase 2 and Phase 2+) (GSM); Base Station System (BSS) equipment specification; Radio aspects (GSM 11.21 version 8.2.1 Release 1999)

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ETSI EN 301 087 V8.2.1 (2000-10)

European Standard (Telecommunications series)

**Digital cellular telecommunications system (Phase 2 & Phase 2+);
Base Station System (BSS) equipment specification;
Radio aspects
(GSM 11.21 version 8.2.1 Release 1999)**

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GSM®

GLOBAL SYSTEM FOR
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Contents

Intellectual Property Rights	8
Foreword.....	8
1 Scope	9
2 References	10
3 Definitions, abbreviations, frequency bands and channels.....	11
3.1 Definitions	11
3.2 Abbreviations	12
3.3 Frequency bands and channels	12
3.3.1 Frequency bands	12
3.3.2 Channels and channel numbering	13
4 General test conditions and declarations	13
4.1 Output power and determination of power class	13
4.2 Specified frequency range	14
4.3 Frequency hopping	14
4.4 RF power control.....	14
4.5 Downlink discontinuous transmission (DTX).....	14
4.6 Test environments	15
4.6.1 Normal test environment	15
4.6.2 Extreme test environment	15
4.6.2.1 Extreme temperature	15
4.6.3 Vibration.....	16
4.6.4 Power supply	16
4.7 Acceptable uncertainty of measurement equipment.....	16
4.8 Interpretation of measurement results.....	20
4.9 Selection of configurations for testing.....	20
4.10 BTS Configurations.....	21
4.10.1 Receiver diversity	21
4.10.2 Duplexers.....	21
4.10.3 Power supply options.....	22
4.10.4 Ancillary RF amplifiers	22
4.10.5 BSS using antenna arrays	23
4.10.6 BTS supporting 8-PSK modulation	24
5 Format and interpretation of tests.....	24
6 Transmitter	25
6.1 Static Layer 1 functions.....	25
6.1.1 Test purpose.....	25
6.1.2 Test case	25
6.1.3 Essential conformance	25
6.1.4 Complete conformance	25
6.1.5 Requirement reference	26
6.2 Modulation accuracy	26
6.2.1 Test purpose.....	26
6.2.2 Test case	26
6.2.3 Essential conformance	27
6.2.4 Complete conformance	28
6.2.5 Requirement reference	28
6.3 Mean transmitted RF carrier power.....	28
6.3.1 Test purpose.....	28
6.3.2 Test case	28
6.3.3 Essential conformance	29
6.3.4 Complete conformance	29
6.3.5 Requirement reference	30
6.4 Transmitted RF carrier power versus time	30

6.4.1	Test purpose.....	30
6.4.2	Test case	30
6.4.3	Essential conformance	31
6.4.4	Complete conformance	31
6.4.5	Requirement reference	33
6.5	Adjacent channel power	33
6.5.1	Spectrum due to modulation and wideband noise.....	33
6.5.1.1	Test purpose	33
6.5.1.2	Test case.....	33
6.5.1.3	Essential Conformance.....	34
6.5.1.4	Complete conformance	36
6.5.1.5	Requirement reference	36
6.5.2	Switching transients spectrum	36
6.5.2.1	Test purpose	36
6.5.2.2	Test case.....	36
6.5.2.3	Essential conformance	38
6.5.2.4	Complete conformance	38
6.5.2.5	Requirement reference	38
6.6	Spurious emissions from the transmitter antenna connector	38
6.6.1	Conducted spurious emissions from the transmitter antenna connector, inside the BTS transmit band.....	39
6.6.1.1	Test Purpose.....	39
6.6.1.2	Test Case.....	39
6.6.1.3	Essential conformance	39
6.6.1.4	Complete conformance	39
6.6.1.5	Requirement Reference.....	39
6.6.2	Conducted spurious emissions from the transmitter antenna connector, outside the BTS transmit band	39
6.6.2.1	Applicability (Phase 2).....	39
6.6.2.1.1	Test Purpose	40
6.6.2.1.2	Test Case	40
6.6.2.1.3	Essential conformance.....	41
6.6.2.1.4	Complete conformance.....	41
6.6.2.1.5	Requirement Reference.....	41
6.6.2.2	Applicability (Phase 2).....	41
6.6.2.2.1	Test Purpose	41
6.6.2.2.2	Test Case	42
6.6.2.2.3	Essential conformance.....	43
6.6.2.2.4	Complete conformance.....	43
6.6.2.2.5	Requirement Reference	44
6.7	Intermodulation attenuation.....	44
6.7.1	Test purpose.....	44
6.7.2	Test case	44
6.7.3	Essential Conformance	45
6.7.4	Complete conformance	46
6.7.5	Requirement reference	47
6.8	Intra Base Station System intermodulation attenuation.....	47
6.8.1	Test purpose.....	47
6.8.2	Test case	47
6.8.3	Essential conformance	48
6.8.4	Complete conformance	48
6.8.5	Requirement reference	49
6.9	Intra Base Station System intermodulation attenuation, MXM 850 and MXM 1900	49
6.9.1	Test purpose.....	49
6.9.2	Test case	49
6.9.3	Essential conformance	49
6.9.4	Complete conformance	49
6.9.5	Requirement reference	49
6.10	Intra Base Station System intermodulation attenuation, PCS 1900 and GSM 850	50
6.10.1	Test purpose.....	50
6.10.2	Test case	50
6.10.3	Essential conformance	50
6.10.4	Complete conformance	51

6.10.5	Requirement reference	51
7	Receivers	51
7.1	Static Layer 1 receiver functions (nominal error ratios).....	51
7.1.1	Test Purpose.....	51
7.1.2	Test Case.....	52
7.1.3	Essential conformance	53
7.1.4	Complete conformance	53
7.1.5	Requirement Reference.....	54
7.2	Erroneous Frame Indication Performance	54
7.2.1	Test Purpose.....	54
7.2.2	Test Case.....	54
7.2.3	Essential conformance	55
7.2.4	Complete conformance	55
7.2.5	Requirement reference	55
7.3	Static Reference Sensitivity Level.....	55
7.3.1	Test Purpose.....	55
7.3.2	Test Case.....	55
7.3.3	Essential conformance	57
7.3.4	Complete conformance	57
7.3.5	Requirements Reference	58
7.4	Multipath Reference Sensitivity Level	59
7.4.1	Test Purpose.....	59
7.4.2	Test Case.....	59
7.4.3	Essential conformance	61
7.4.4	Complete conformance	62
7.4.5	Requirement Reference.....	66
7.5	Reference interference level	66
7.5.1	Test Purpose.....	66
7.5.2	Test Case.....	66
7.5.3	Essential conformance	70
7.5.4	Complete conformance	73
7.5.5	Requirements Reference	78
7.6	Blocking Characteristics.....	78
7.6.1	Test Purpose.....	78
7.6.2	Test Case.....	78
7.6.3	Essential conformance	82
7.6.4	Complete conformance	83
7.6.5	Requirements reference	83
7.7	Intermodulation characteristics	83
7.7.1	Test Purpose.....	83
7.7.2	Test Case.....	83
7.7.3	Essential conformance	85
7.7.4	Complete conformance	85
7.7.5	Requirement Reference.....	85
7.8	AM suppression.....	85
7.8.1	Test Purpose.....	85
7.8.2	Test Case.....	85
7.8.3	Essential conformance	87
7.8.4	Complete conformance	87
7.8.5	Requirement Reference.....	87
7.9	Spurious emissions from the receiver antenna connector.....	87
7.9.1	Test Purpose.....	87
7.9.2	Test Case.....	87
7.9.3	Essential conformance	87
7.9.4	Complete conformance	88
7.9.5	Requirement Reference.....	88
8	Radiated spurious emissions	88
8.1	Test Purpose	88
8.2	Test Case	88
8.3	Essential conformance.....	89

8.4	Complete conformance.....	90
8.5	Requirement reference	90
9	Radio link management.....	90
9.1	General	90
9.2	Synchronization.....	90
9.2.1	Timing Tolerance.....	91
9.2.1.1	Test purpose	91
9.2.1.2	Test case.....	91
9.2.1.3	Essential conformance	91
9.2.1.4	Complete conformance	91
9.2.1.5	Requirement reference	92
9.3	Frame structure.....	92
9.3.1	BCCH Multiframe	92
9.3.1.1	Test purpose	92
9.3.1.2	Test case.....	92
9.3.1.3	Essential conformance	92
9.3.1.4	Complete conformance	92
9.3.1.5	Requirement reference	92
9.3.2	TDMA-frame structure	93
9.3.2.1	Test purpose	93
9.3.2.2	Test case.....	93
9.3.2.3	Essential conformance	93
9.3.2.4	Complete conformance	93
9.3.2.5	Requirement reference	93
9.4	Radio link measurements	93
9.4.1	Signal Strength.....	94
9.4.1.1	Measurement Accuracy.....	94
9.4.1.1.1	Test purpose	94
9.4.1.1.2	Test case	94
9.4.1.1.3	Essential conformance.....	94
9.4.1.1.4	Complete conformance.....	94
9.4.1.2	Selectivity of signal strength measurements.....	95
9.4.1.2.1	Test purpose	95
9.4.1.2.2	Test case	95
9.4.1.2.3	Essential conformance.....	96
9.4.1.2.4	Complete conformance.....	96
9.4.1.2.5	Requirement reference.....	96
9.4.2	Signal quality	97
9.4.2.1	Test purpose	97
9.4.2.2	Test case.....	97
9.4.2.3	Essential conformance	97
9.4.2.4	Complete conformance	97
9.4.2.5	Requirement reference	98
9.4.3	Idle channel signal level	98
9.4.3.1	Test purpose	98
9.4.3.2	Test case.....	98
9.4.3.3	Essential conformance	99
9.4.3.4	Complete conformance	99
9.4.3.5	Requirement reference	99
9.5	Adaptive frame alignment	99
9.5.1	Test purpose.....	99
9.5.2	Test case	100
9.5.3	Essential conformance	100
9.5.4	Complete conformance.....	100
9.5.5	Requirement reference.....	101

Annex A (informative):	Testing of statistical parameters.....	102
A.1	General theoretical methodology	102
A.2	Detailed theoretical methodology	104
A.3	Limitations and corrections to the theoretical methodology	105
A.3.1	Independent errors.....	105
A.3.2	Gaussian distribution.....	105
A.3.3	Stationary random processes	105
A.3.4	Low error ratios.....	106
A.3.5	Total corrections.....	106
A.4	Alternative experimental methodology	106
A.5	Detailed definition of error events.....	107
Annex B (informative):	Description of special test equipment.....	108
B.1	Base Station System Test Equipment (BSSTE)	108
B.1.1	Fading and multipath propagation simulator.....	108
B.2	Measurement set ups for TX intermodulation.....	108
B.2.1	Test set-up for Intermodulation Attenuation (6.7.).....	108
B.2.1.1	RX-Band.....	109
B.2.1.2	Outside RX Band.....	109
B.2.2	Test set-up for Intra BSS Intermodulation Attenuation (6.8.)	110
B.2.2.1	RX-Band.....	110
B.2.2.2	TX-Band	110
Annex C (informative):	Number of samples needed for statistical testing.....	111
C.1	GSM 900; Number of samples for testing.....	111
C.2	DCS 1800; Number of Samples for Testing.....	131
Annex D (informative):	Change history	152
History		154

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Special Mobile Group (SMG).

The present document specifies the Radio Frequency (RF) test methods and conformance requirements for GSM 400, GSM 900 and DCS 1800, PCS 1900, MXM 850 and MXM 1900 Base Station Systems (BSS)s within the Digital cellular telecommunications system (Phase 2+).

The contents of the present document may be subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of the present document it will then be re-submitted for formal approval procedures by ETSI with an identifying change of release date and an increase in version number as follows:

Version 8.x.y

where:

- 8 GSM Phase 2+ Release 1999, [SIST EN 301 087 V8.2.1:2003](https://standards.iteh.ai/catalog/standards/sist/b34c7821-8178-4d65-9c7c-a8e5454a5719/sist-en-301-087-v8-2-1-2003)
- x the second digit is incremented for changes of substance, i.e. technical enhancements, corrections, updates, etc.;
- y the third digit is incremented when editorial only changes have been incorporated in the specification.

NOTE: The present document contains both essential conformance requirements and complete conformance requirements. Essential conformance requirements are those requirements which may be deemed sufficient for radio type approval purposes, complete conformance requirements cover all conformance aspects.

National transposition dates	
Date of adoption of this EN:	29 September 2000
Date of latest announcement of this EN (doa):	31 December 2000
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2001
Date of withdrawal of any conflicting National Standard (dow):	30 June 2001

1 Scope

The present document specifies the Radio Frequency (RF) test methods and conformance requirements for GSM 400, 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 clause 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.

For each test, two conformance requirements are specified:

- essential conformance requirements;
- complete conformance requirements.

Essential conformance requirements are those which are required:

- a) to ensure compatibility between the radio channels in the same cell;
- b) to ensure compatibility between cells, both co-ordinated and unco-ordinated;
- c) to ensure compatibility with existing systems in the same or adjacent frequency bands;
- d) to verify the important aspects of the transmission quality of the system.

Essential conformance requirements are sufficient to verify the performance of the equipment for radio type approval purposes, in countries where this is applicable. For GSM 850, MXM 850, PCS 1900 and MXM 1900 only the complete conformance requirements are applicable.

Complete conformance requirements may be tested to verify all aspects of the performance of a BSS. These 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 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 clause 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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1999 document, references to GSM documents are for Release 1999 versions (version 8.x.y).

- [1] GSM 01.04 (ETR 350): "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 04.22 (ETS 300 946): "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".
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[SIST EN 301 087 V8.2.1:2003](https://standards.iteh.ai/catalog/standards/sist/b34c7821-8178-4d65-9c7c-300576)
- [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] GSM 08.20: "Digital cellular telecommunications system (Phase 2); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [11] ETS 300 019-1: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment Part 1-0: Classification of environmental conditions Introduction".
- [12] IEC 68-2: "Basic environmental testing procedures; Part 2: Tests".
- [13] IEC 721: "Classification of environmental conditions".
- [14] ETR 027: "Radio and Equipment Systems; methods of measurement for mobile radio equipment".
- [15] ETR 028: "Radio and Equipment Systems; Uncertainties in the measurement of mobile radio equipment characteristics".
- [16] ETS 300 113: "Radio Equipment and Systems; Land mobile service; Technical characteristics and test conditions for radio equipment intended for transmission of data (and speech) and having an antenna connector".

- [17] GSM 04.22 (ETS 300 563): "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".
- [18] GSM 05.01: "Digital cellular telecommunications system (Phase 2+); Physical layer on the radio path; General description".
- [19] GSM 05.02 (EN 300 908): "Digital cellular telecommunications system (Phase 2+); Multiplexing and multiple access on the radio path".
- [20] GSM 05.03 (EN 300 909): "Digital cellular telecommunications system (Phase 2+); Channel coding".
- [21] GSM 05.04 (EN 300 959): "Digital cellular telecommunications system (Phase 2+); Modulation".
- [22] GSM 05.05 (EN 300 910): "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception".
- [23] GSM 05.08 (EN 300 911): "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control".
- [24] GSM 05.10 (EN 300 912): "Digital cellular telecommunications system (Phase 2+); Radio subsystem synchronization".

3 Definitions, abbreviations, frequency bands and channels

3.1 Definitions

SIST EN 301 087 V8.2.1:2003

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

8-PSK: modulation type as defined by GSM 05.04 (ETS 300 959) [21] clause 3.

Carrier Frequency: centre of the ARFCN under test.

GMSK: modulation type as defined by GSM 05.04 (ETS 300 959) [21] clause 2.

GSM: unless otherwise specified, references to GSM include GSM 400, GSM 850, GSM 900, DCS1800, PCS 1900, MXM 850 and MXM 1900.

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 GSM 05.05 (EN 300 910 [22]). In the present document, this also includes a BSS which incorporates a pico-BTS.

micro-BTS: as defined in GSM 05.05 (ETS 300 577 [7] and EN300 910 [22]). In the present document, this also includes a BSS which incorporates a micro-BTS.

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 GSM 05.05 (EN 300 910) [22] which is not a micro-BTS or Pico-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.

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).

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

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

Relevant RX band (or relevant receive band): receive band defined in clause 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 clause 4.2).

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.

3.2 Abbreviations

Unless otherwise stated, abbreviations used in the present document shall have the meaning given in GSM 01.04 (ETR 350) [1].

B	"Bottom"; the lowest frequency on which a test is performed
M	"Middle"; a frequency in the middle portion of the operating band of the BSS on which a test is performed
T	"Top"; the highest frequency on which a test is performed

3.3 Frequency bands and channels

3.3.1 Frequency bands

The frequency bands for the Base Station System are given in table 1.

Table 1: Frequency bands for GSM Base Station Systems

	TX:	RX:
P-GSM900	935 MHz to 960 MHz	890 MHz to 915 MHz
DCS1800	1 805 MHz to 1 880 MHz	1 710 MHz to 1 785 MHz
E-GSM900	925 MHz to 960 MHz	880 MHz to 915 MHz
R-GSM900	921 MHz to 960 MHz	876 MHz to 915 MHz
GSM 450	460,4 MHz to 467,6 MHz	450,4 MHz to 457,6 MHz
GSM 480	488,8 MHz to 496 MHz	478.8 MHz to 486 MHz
GSM 850 and MXM 850	869 MHz to 894 MHz	824 MHz to 849 MHz
PCS 1900 and MXM 1900	1 930 MHz to 1 990 MHz	1 850 MHz to 1 910 MHz

NOTE: It is up to the operator to choose any subset of these bands (or the complete band) on a location basis within a frequency band assigned to the operator by the authority responsible for frequency management issues.

3.3.2 Channels and channel numbering

The channel numbers (ARFCN) for the carrier frequencies (RF channels) within the frequency bands defined above (as defined in GSM 05.05 (EN 300 910) [22]), are given in table 2. $F_l(n)$ is the frequency of the centre of the RF channel n in the lower band (=RX) and $F_u(n)$ the corresponding frequency in the upper band (=TX).

Table 2: Channel Numbering: Frequencies are in MHz

P-GSM900	$F_l(n)=890+0,2*n$	$1 \leq n \leq 124$	$F_u(n)=F_l(n)+45$
E-GSM900	$F_l(n)=890+0,2*n$ $F_l(n)=890+0,2*(n-1 024)$	$0 \leq n \leq 124$ $975 \leq n \leq 1023$	$F_u(n)=F_l(n)+45$
R-GSM900	$F_l(n)=890+0,2*n$ $F_l(n)=890+0,2*(n-1 024)$	$0 \leq n \leq 124$ $955 \leq n \leq 1023$	$F_u(n)=F_l(n)+45$
DCS1800	$F_l(n)=1 710,2+0,2*(n-512)$	$512 \leq n \leq 885$	$F_u(n)=F_l(n)+95$
PCS 1900 and MXM 1900	$F_l(n) = 1 850,2 + 0,2*(n-512)$	$512 \leq n \leq 810$	$F_u(n) = F_l(n) + 80$
GSM 450	$F_l(n) = 450,6 + 0,2*(n-259)$	$259 \leq n \leq 293$	$F_u(n) = F_l(n) + 10$
GSM 480	$F_l(n) = 479 + 0,2*(n-306)$	$306 \leq n \leq 340$	$F_u(n) = F_l(n) + 10$
GSM 850 and MXM 850	$F_l(n) = 824,2 + 0,2*(n-128)$	$128 \leq n \leq 251$	$F_u(n) = F_l(n) + 45$

4 General test conditions and declarations

The requirements of this clause apply to all tests in the present document, when applicable.

The general conditions during the tests should be according to the relevant parts of ETR 027 [14] (methods of measurement for mobile radio equipment) with the exceptions and additions defined in the individual tests.

Many of the tests in the present document measure a parameter relative to a value which is not fully specified in the GSM specifications. For these tests, the conformance requirement is determined relative to a nominal value specified by the manufacturer.

<https://standards.iteh.ai/catalog/standards/sist/b34c7821-8178-4d65-9c7c-18e3494a7199/etsi-en-301-087-v8-2-1-2003>

Certain functions of a BTS are optional in the GSM specifications.

When specified in a test, the manufacturer shall declare the nominal value of a parameter, or whether an option is supported.

4.1 Output power and determination of power class

The manufacturer shall declare the rated maximum power per TRX at GMSK modulation. For a micro or pico-BTS, this shall be specified at the antenna connector. For a normal BTS, it shall be stated whether this is specified at the input to the combiner or at the antenna connector of the BSS.

For a micro-BTS, the class of the micro-BTS shall be determined from the declared maximum power, according to table 3. Where applicable, the manufacturer shall declare whether the BTS meets the requirements of a micro or pico-BTS.

For a BTS supporting 8-PSK, the manufacturer shall declare the output power capability at 8-PSK modulation. The class of a micro-BTS or a pico-BTS is defined by the highest output power capability for either modulation.

Table 3: Micro and pico-BTS Power Classes

TRX power class	GSM 900, GSM 850 and MXM 850 micro and pico-BTS Maximum output power	DCS1800, PCS 1900 and MXM 1900 micro and pico-BTS Maximum output power
M1	(>19)-24 dBm	(>27)-32 dBm
M2	(>14)-19 dBm	(>22)-27 dBm
M3	(>9)-14 dBm	(>17)-22 dBm
P1	(>13)-20 dBm	(>16)-23 dBm