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Part 2: Radio conformance testing

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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Railway Telecommunications (RT).

The present document is part 2 of a multi-part deliverable covering the Railway Telecommunications (RT); GSM-R improved receiver parameters, as identified below:

Part 1: "Requirements for radio reception";

Part 2: "Radio conformance testing".

1 Scope

The present document describes the technical characteristics and methods of testing the improved receiver performance for professional mobile stations (professional MS), for the Pan European digital cellular communications system and Personal Communication Systems (PCS) operating in the 900 MHz band (GSM 900), standardized by ETSI Special Mobile Group (SMG).

The present document is valid for professional MS implemented according Phase 2+ R99.

The present document covers the requirements for testing the improved GSM-R receiver in order to provide sufficient performance for mobile equipment.

It does not necessarily include all the characteristics which may be required by a user or subscriber, nor does it necessarily represent the optimum performance achievable.

The present document is part of the GSM-series of technical specifications. The present document neither replaces any of the other GSM technical specifications or GSM related ETSs or ENs, nor is it created to provide full understanding of (or parts of) the GSM 900 system. The present document lists the additional test procedures, and provides the methods of test for testing a professional MS for conformance to the GSM standard.

For a full description of the system, reference should be made to all the GSM technical specifications or GSM related ETSs or ENs. Clause 2 provides a complete list of the GSM technical specifications, GSM related ETSs, ENs, and ETRs, on which this conformance test specifications is based.

The present document applies to the unit which includes the hardware to establish a connection across the radio interface.

2 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 reference 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.

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2.1 Normative references

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

[1] ETSI TS 100 607-1: "Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP 11.10-1 Release 1999)".

[2] ETSI TS 100 910: "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception (3GPP TS 05.05 Release 1999)".

[3] ETSI TS 102 933-1: "Railway Telecommunications; GSM-R improved receiver parameters; Part 1: Requirements for radio reception".

2.2 Informative references

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] ETSI TR 101 748: "Digital cellular telecommunications system (Phase 2+) (GSM); Abbreviations and acronyms (GSM 01.04)".

[i.2] ETSI EN 300 607-1 (V8.1.1): "Digital cellular telecommunications system (Phase 2+) (GSM); Mobile Station (MS) conformance specification; Part 1: Conformance specification (GSM 11.10-1 version 8.1.1 Release 1999)".

3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 101 748 [i.1] apply.

4 Receiver

In this clause receiver measurements are described, for professional mobile stations equipped with a permant antenna connector only. Wherever in this clause, for FACCH tests, the SS is required to send a Layer 3 message not requiring a Layer 3 response from the professional MS the message can be a TEST INTERFACE message or a STATUS message, possibly with an unknown Protocol Discriminator.

Testing philosophy

Certain assumptions concerning the functional mechanisms of GSM receivers have been made in order to define tests that will verify the receiver performance without excessive redundancy and excessive test times.

The receiver functions can be divided into:

- Analogue RF and IF stages that are affected by input levels, temperature and power supply levels.
- Demodulator that is affected by input levels and interfering signals.
- Decoders that are affected by the different logical channels and input levels.

The tests are designed to stress each of these blocks with a minimum of redundancy.

4.1 Reference sensitivity

The reference sensitivity is the signal level at the professional MS receiver input at which a certain BER and FER must be achieved.

The requirements and this test apply to professional MS supporting speech.

For tests using ARFCN ranges the following table shall be used.

Table 1: ARFCN Ranges

	Term		
Band	**Low ARFCN range**	**Mid ARFCN range**	**High ARFCN range**
E-GSM 900	975 to 980	60 to 65	120 to 124
R-GSM 900	955 to 960 (R-GSM) and 975 to 980 (E-GSM)	60 to 65	120 to 124
ER-GSM 900	940 to 945 (ER-GSM) 975 to 980 (E-GSM)	60 to 65	120 to 124

4.2 Intermodulation rejection

4.2.1 Intermodulation rejection - speech channels

4.2.1.1 Definition and applicability

The intermodulation rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the wanted signal frequency.

The requirements and this test apply to professional MS supporting speech.

4.2.1.2 Conformance requirement

As specified by EN 300 607-1 [i.2]: "In the presence of two unwanted signals with a specific frequency relationship to the wanted signal frequency the Class II RBER for TCH/FS shall meet the reference sensitivity performance of table 1 in GSM 05.05; GSM 05.05, 5.2".

4.2.1.3 Test purpose

To verify that the professional MS does not exceed the conformance requirement with an allowance for the statistical significance of the test.

4.2.1.4 Method of test

NOTE: The measurements address the third order intermodulation, which represents the most serious case.

4.2.1.4.1 Initial conditions

A call is set up according to the generic call set up procedure on a TCH with an ARFCN in the mid range (see table 1), power control level set to maximum power.

The SS transmits Standard Test Signal C1 on the traffic channel.

4.2.1.4.2 Procedure

a) The amplitude of the wanted signal is set to -100 dBm.

b) The SS commands the professional MS to create the loop back facility signalling erased frames.

c) The SS produces a static wanted signal, and two static interfering (unwanted) signals at the same time. There is no correlation in the modulation between the signals.

- The first interfering signal is on a frequency equal to the centre frequency of an ARFCN four above that of the receiver. This signal is static and unmodulated.
- The second interfering signal is on an ARFCN eight above that of the receiver. This signal is static, continuous and modulated by random data.
- The amplitude of both the interfering signals is set according to table 2.

d) The SS compares the data of the signal that it sends to the professional MS with the signal which is looped back from the receiver after demodulation and decoding, and checks the frame erasure indication.

- The SS tests the RBER compliance of class II bits by examining at least the minimum number of samples of consecutive bits. Bits only taken from those frames which do not signal frame erasure. The number of error events is recorded.

e) The measurement of step d) is repeated with the two unwanted signals having frequencies corresponding to ARFCN four and eight below the ARFCN of the wanted signal.

f) Steps b) to e), are repeated but with the receiver operating on an ARFCN in the low range (see table 1) for ER-GSM 900.

g) Steps b) to e), are repeated but with the receiver operating on an ARFCN in the high range (see table 1).

h) Steps a) to g) are repeated under extreme test conditions.

Table 2: Intermodulation test signal levels

	Professional MS R-GSM 900 and ER-GSM 900
	dBm
WANTED SIGNAL	-100
FIRST INTERFERER	-36
SECOND INTERFERER	-50

NOTE: Some of the levels in table 2 are different to those specified in TS 102 933-1 [3] due to the consideration of the effect of modulation sideband noise from the second interferer.

4.2.1.5 Test requirements

The error rate measured in this test shall not exceed the test limit error rate values given in table 3.

This shall apply under normal condition and under any combination of normal and extreme test voltages and ambient temperature, and with the two interfering signals at either side of the wanted frequency.

Table 3: Limits for intermodulation rejection

Channel	Propagation conditions	Type of measurement	Test limit error rate %	Minimum No. of samples
TCH/FS Class II	Static	RBER	2,439	8 200

4.2.2 Intermodulation rejection - control channels

4.2.2.1 Definition and applicability

The intermodulation rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the wanted signal frequency.

The requirements and this test apply to professional MS not supporting speech.

4.2.2.2 Conformance requirement

As specified by EN 300 607-1 [i.2]: "In the presence of two unwanted signals with a specific frequency relationship to the wanted signal frequency the Class II RBER for TCH/FS shall meet the reference sensitivity performance of table 1 in GSM 05.05; GSM 05.05, 5.2".

4.2.2.3 Test purpose

To verify that the professional MS does not exceed the conformance requirement with an allowance for the statistical significance of the test.

4.2.2.4 Method of test

NOTE: The measurements address the third order intermodulation, which represents the most serious case.

4.2.2.4.1 Initial conditions

A call is set up according to the generic call set up procedure on a TCH with an ARFCN in the mid range (see table 1), power control level set to maximum.

The SS transmits Standard Test Signal C1 on the traffic channel. The amplitude of the wanted signal is set to -100 dBm.

4.2.2.4.2 Procedure

a) The SS produces a TUhigh wanted signal, and two static interfering (unwanted) signals at the same time. There is no correlation in the modulation between the signals:

- The first interfering signal is on a frequency equal to the centre frequency of an ARFCN four above that of the receiver. This signal is static and unmodulated.
- The second interfering signal is on an ARFCN eight above that of the receiver. This signal is static, continuous and modulated by random data.
- The amplitude of both the interfering signals is set according to table 2.

b) The SS sends a Layer 3 message which does not require a Layer 3 response from the professional MS. The SS determines the number of frame erasure events during at least the minimum number of samples of FACCH/F frames.

NOTE 1: These frames will not be consecutive but it is expected that the statistical significance of the tests will not be unduly degraded.

c) The measurement of step b) is repeated with the two unwanted signals having frequencies corresponding to ARFCN four and eight below the ARFCN of the wanted signal.

d) Steps a) to c), are repeated but with the receiver operating on an ARFCN in the low range (see table 1) for ER-GSM 900.

e) Steps a) to c), are repeated but with the receiver operating on an ARFCN in the high range (see table 1).

f) Steps a) to e) are repeated under extreme test conditions.

Table 4: Intermodulation test signal levels

	Professional MS R-GSM 900 and ER-GSM 900
	dBm
WANTED SIGNAL	-100
FIRST INTERFERER	-36
SECOND INTERFERER	-50

NOTE 2: Some of the levels in table 4 are different to those specified in TS 102 933-1 [3] due to the consideration of the effect of modulation sideband noise from the second interferer.

4.2.2.5 Test requirements

The error rate measured in this test shall not exceed the test limit error rate values given in table 5.

This shall apply under normal condition and under any combination of normal and extreme test voltages and ambient temperature, and with the two interfering signals at either side of the wanted frequency.

Table 5: Limits for intermodulation rejection

Channel	**Propagation conditions**	**Type of measurement**	**Test limit error rate %**	**Minimum No. of max-samples**
FACCH/F	TUhigh/No FH	FER	8,961	6 696

4.2.3 Blocking and spurious response - speech channels for professional MS supporting the R-GSM 900 and ER-GSM 900 band

4.2.3.1 Definition and applicability

Blocking is a measure of the ability of the receiver to receive a modulated wanted input signal in the presence of an unwanted input signal, on frequencies other than those of the spurious responses or the adjacent channels, without exceeding a given degradation.

The requirements and this test apply to professional MS supporting speech.

4.2.3.2 Conformance requirement

1) The blocking characteristics of the receiver are specified separately for in-band and out-of-band performance as identified in TS 102 933-1 [3], clause 5.1.

   The reference sensitivity performance as specified in table 1 of TS 100 910 [2] shall be met when the following signals are simultaneously input to the receiver:

   - a useful signal at frequency f_0, as specified in TS 102 933-1 [3], clause 5.1;
   - a continuous, static sine wave signal at a level as in the table of TS 102 933-1 [3], clause 5.1 and at a frequency (f) which is an integer multiple of 200 kHz.

     With the following exceptions, called spurious response frequencies:

     a) ER-GSM 900/R-GSM 900: in band, for a maximum of six occurrences (which if grouped shall not exceed three contiguous occurrences per group);

     b) out-of-band, for a maximum of 24 occurrences (which if below f_0 and grouped shall not exceed three contiguous occurrences per group).

   Where the above performance shall be met when the continuous sine wave signal (f) is set to a level of -40 dBm.

4.2.3.3 Test purpose

1) To verify that the in band blocking performance is met without exceeding the total number of allowed in band spurious responses. An allowance is made for the statistical significance of the test.

2) To verify that at selected out-of-band frequencies, the out-of-band blocking performance is met without exceeding the total number of allowed out-of-band spurious responses. An allowance is made for the statistical significance of the test.

NOTE: Not all of the possible out-of-band frequencies are tested as this results in excessive test time. However, the total number of out-of-band spurious responses, specified in TS 102 933-1 [3], clause 5.1, are allowed to ensure a fair test of the professional MS.

4.2.3.4 Method of test

4.2.3.4.1 Initial conditions

A call is set up according to the generic call set up procedure, except the BCCH frequency list shall be empty, on a TCH with an arbitrary ARFCN in the range supported by the professional MS. The power control level is set to maximum power.

The SS transmits Standard Test Signal C1 on the traffic channel (TCH frequency FR).

The SS commands the professional MS to create traffic channel loop back signalling erased frames.

4.2.3.4.2 Procedure

a) The SS produces a static wanted signal and a static interfering signal at the same time. The amplitude of the wanted signal is set to -100 dBm.

b) The unwanted signal is a C.W. signal (Standard test signal IO) of frequency FB. It is applied in turn on the subset of frequencies calculated in step c) in the overall range 100 kHz to 12,75 GHz, where FB is an integer multiple of 200 kHz.

However, frequencies in the range FR ± 600 kHz are excluded.

NOTE 1: As specified by EN 300 607-1 (V8.1.1) [i.2], clause 14.7: "Allowance must be made for possible spurious signals arising from the SS. These are particularly likely at sub harmonic frequencies nFB where n = 2, 3, 4, 5, etc.".

c) The frequencies at which the test is performed (adjusted to an integer multiple of 200 kHz channels most closely approximating the absolute frequency of the calculated blocking signal frequency) are the combined frequencies from i), ii) and iii) below:

i) The total frequency range formed by:

- R-GSM 900 the frequencies between F_{lo} + (IF_1 + IF_2 + ... +IF_n +19,5 MHz)

  and F_{lo} - (IF_1 + IF_2 + ... + IF_n + 19,5 MHz).

- ER-GSM 900 the frequencies between F_{lo} + (IF_1 + IF_2 + ... +IF_n +21 MHz)

  and F_{lo} - (IF_1 + IF_2 + ... + IF_n + 21 MHz).

  and the frequencies +100 MHz and -100 MHz from the edge of the relevant receive band.

Measurements are made at 200 kHz intervals.

ii) The three frequencies IF_1, IF_1 + 200 kHz, IF_1 - 200 kHz.

iii) The frequencies:

- mF_{lo} + IF_1,
- mF_{lo} - IF_1,
- mFR,
- where m is all positive integers greater than or equal to 2 such that either sum lies in the range 100 kHz to 12,75 GHz.

The frequencies in step ii) and iii) lying in the range of frequencies defined by step i) above need not be repeated.

Where:

- F_{lo} - local oscillator applied to first receiver mixer
- IF_1 ... IF_n - are the n intermediate frequencies
- F_{lo}, IF_1, IF_2 ... IF_n shall be declared by the manufacturer in the PIXIT statement TS 100 607-1 [1], clause 3.

d) The level of the unwanted signal is set according to table 6.

Table 6: Level of unwanted signals for professional MS

	Professional MS R-GSM 900/ER-GSM 900
FREQUENCY	**LEVEL IN dBm**
FR ± 600 kHz to FR ± 800 kHz	-35
FR ± 800 kHz to FR ± 1,6 MHz	-30
FR ± 1,6 MHz to FR ± 5 MHz	-20
100 kHz to < 835 MHz	-23
835 MHz to < 873 MHz	+0
873 MHz to < 880 MHz	+0
880 MHz to < 912 MHz	-5
912 MHz to < 915 MHz	-18
915 MHz to FR - 5 MHz	-20
FR + 5 MHz to 930 MHz	-20
> 930 MHz to 945 MHz	-16
> 945 MHz to 980 MHz	+0
> 980 MHz to 1 000 MHz	+0
> 1 000 MHz to 12,75 GHz	-23

NOTE 2: These values differ from TS 102 933-1 [3] because of practical generator limits in the SS.

e) The SS compares the data of the signal that it sends to the professional MS with the signal which is looped back from the receiver after demodulation and decoding, and checks the frame erasure indication:

- The SS tests the RBER compliance for the bits of class II, by examining sequences of at least the minimum number of samples of consecutive bits of class II, where bits are taken only from those frames for which no bad frame indication was given. The number of error events is recorded.
- If a failure is indicated it is noted and counted towards the allowed exemption totals.
- In the case of failures discovered at the predicted frequencies at steps f ii), iii) or iv) the test is repeated on the adjacent channels ±200 kHz away. If either of these two frequencies fail then the next channel 200 kHz beyond is also tested. This process is repeated until all channels constituting the group of failures is known.

4.2.3.5 Test requirements

The error rate measured in this test shall not exceed the test limit error rate values given in table 7.

This shall apply under normal test voltage and ambient temperature, and with the interfering signal at any frequency in the range specified.

Table 7: Limits for blocking

Channel	Type of measurement	Test limit error rate %	Minimum number of samples
TCH/FS Class II	RBER	2,439	8 200

The following exceptions are allowed:

- A maximum of six failures in the frequency band 915 MHz to 930 MHz (which, if grouped, shall not exceed three 200 kHz channels per group).
- A maximum of 24 failures in the combined bands 100 kHz to 915 MHz and 930 MHz to 12,75 GHz (which, if below FR and grouped, shall not exceed three 200 kHz channels per group).

If the number of failures does not exceed the maximum allowed figures stated above, the test of clause 4.2.3.4 is repeated at the frequencies at which the failures occurred. The level of the unwanted signal is set to -40 dBm and the performance requirement is once again that that stated in table 7.

The number Error rate measured in this test shall not exceed the test limit error rate values given in table 7.

No failures are allowed at this lower unwanted signal level.

4.2.4 Blocking and spurious response - control channels for professional MS supporting the R-GSM and ER-GSM band

4.2.4.1 Definition and applicability

Blocking is a measure of the ability of the receiver to receive a modulated wanted input signal in the presence of an unwanted input signal, on frequencies other than those of the spurious responses or the adjacent channels, without exceeding a given degradation.

The requirements and this test apply to professional MS not supporting speech.

4.2.4.2 Conformance requirement

1) The blocking characteristics of the receiver are specified separately for in-band and out-of-band performance as identified in TS 102 933-1 [3], clause 5.1.

   The reference sensitivity performance as specified in table 1 of TS 100 910 [2] shall be met when the following signals are simultaneously input to the receiver:

   - a useful signal at frequency f_0, as specified in TS 102 933-1 [3], clause 5.1;
   - a continuous, static sine wave signal at a level as in the table of TS 102 933-1 [3], clause 5.1 and at a frequency (f) which is an integer multiple of 200 kHz.

     With the following exceptions, called spurious response frequencies:

     a) ER-GSM 900/R-GSM 900: in band, for a maximum of six occurrences (which if grouped shall not exceed three contiguous occurrences per group),

     b) out-of-band, for a maximum of 24 occurrences (which if below f_0 and grouped shall not exceed three contiguous occurrences per group).

   Where the above performance shall be met when the continuous sine wave signal (f) is set to a level of -40 dBm.

4.2.4.3 Test purpose

1) To verify that the in band blocking performance is met without exceeding the total number of allowed in band spurious responses. An allowance is made for the statistical significance of the test.

2) To verify that at selected out-of-band frequencies, the out-of-band blocking performance is met without exceeding the total number of allowed out-of-band spurious responses. An allowance is made for the statistical significance of the test.

NOTE: Not all of the possible out-of-band frequencies are tested as this results in excessive test time. However, the total number of out-of-band spurious responses, specified in TS 102 933-1 [3], clause 5.1, are allowed to ensure a fair test of the professional MS.

4.2.4.4 Method of test

4.2.4.4.1 Initial conditions

A call is set up according to the generic call set up procedure, except the BCCH frequency list shall be empty, on a TCH with an arbitrary ARFCN in the range supported by the professional MS. The power control level is set to maximum power.

The SS transmits Standard Test Signal C1 on the traffic channel (TCH frequency FR).

4.2.4.4.2 Procedure

a) The SS sends a Layer 3 message which does not require a Layer 3 response from the professional MS. Due to interfering signals, the professional MS may not be able to acknowledge the Layer 2 frame. Frame erasures are indicated by repeated L2 frames.

b) The SS is set to produce a TUhigh wanted signal and a static interfering signal at the same time. The SS sets the amplitude of the wanted signal to -100 dBm.

c) The unwanted signal is a C.W. signal (Standard test signal IO) of frequency FB. It is applied in turn on the subset of frequencies calculated at step f) in the overall range 100 kHz to 12,75 GHz, where FB is an integer multiple of 200 kHz.

However, frequencies in the range FR ± 600 kHz are excluded.

NOTE 1: As specified by EN 300 607-1 (V8.1.1) [i.2], clause 14.7: "Allowance must be made for possible spurious signals arising from the SS. These are particularly likely at sub harmonic frequencies nFB where n = 2, 3, 4, 5, etc.".

d) The frequencies at which the test is performed (adjusted to an integer multiple of 200 kHz channels most closely approximating the absolute frequency of the calculated blocking signal frequency) are the combined frequencies from i), ii) and iii) which follow:

i) The total frequency range formed by:

- R-GSM 900 the frequencies between F_{lo} + (IF_1 + IF_2 + ... +IF_n +19,5 MHz)

  and F_{lo} - (IF_1 + IF_2 + ... + IF_n + 19,5 MHz).

- ER-GSM 900 the frequencies between F_{lo} + (IF_1 + IF_2 + ... + IF_n +21 MHz)

  and F_{lo} - (IF_1 + IF_2 + ... + IF_n + 21 MHz).

  and the frequencies + 100 MHz and - 100 MHz from the edge of the relevant receive band.

Measurement are made at 200 kHz intervals.

ii) The three frequencies IF_1, IF_1 + 200 kHz, IF_1 - 200 kHz.

iii) The frequencies:

- mF_{lo} + IF_1,
- mF_{lo} - IF_1,
- mFR,
- where m is all positive integers greater than or equal to 2 such that either sum lies in the range 100 kHz to 12,75 GHz.

The frequencies in step ii) and iii) lying in the range of frequencies defined by step i) above need not be repeated.

Where:

- F_{lo} - local oscillator applied to first receiver mixer
- IF_1 ... IF_n - are the n intermediate frequencies
- F_{lo}, IF_1, IF_2 ... IF_n shall be declared by the manufacturer in the PIXIT statement TS 100 607-1 [1], clause 3.

e) The level of the unwanted signal is set according to table 8.

Table 8: Level of unwanted signals for professional MS

	Professional MS R-GSM 900/ER-GSM 900
FREQUENCY	**LEVEL IN dBm**
FR ± 600 kHz to FR ± 800 kHz	-35
FR ± 800 kHz to FR ± 1,6 MHz	-30
FR ± 1,6 MHz to FR ± 5 MHz	-20
100 kHz to < 835 MHz	-23
835 MHz to < 873 MHz	+0
873 MHz to < 880 MHz	+0
880 MHz to < 912 MHz	-5
912 MHz to < 915 MHz	-18
915 MHz to FR - 5 MHz	-20
FR + 5 MHz to 930 MHz	-20
> 930 MHz to 945 MHz	-16
> 945 MHz to 980 MHz	+0
> 980 MHz to 1 000 MHz	+0
> 1 000 MHz to 12,75 GHz	-23

NOTE 2: These values differ from TS 102 933-1 [3] because of practical generator limits in the SS.

f) The SS determines the number of frame erasure events during at least the minimum number of samples. If a failure is indicated, it is noted and counted towards the allowed exemption total.

In the case of failures discovered at the predicted frequencies at steps f ii), iii) or iv) the test is repeated on the adjacent channels ±200 kHz away. If either of these two frequencies fail then the next channel 200 kHz beyond is also be tested. This process is repeated until all channels constituting the group of failures is known.

4.2.4.5 Test requirements

The error rate measured in this test shall not exceed the test limit error rate given in table 9.

This shall apply under normal test voltage and ambient temperature, and with the interfering signal at any frequency in the range specified.

Table 9: Limits for blocking

Channel	Type of measurement	Test limit error rate	Minimum No. of samples
FACCH/F	FER	8,961	6 696

The following exceptions are allowed:

- A maximum of six failures in the band 915 MHz to 930 MHz (which, if grouped, shall not exceed three 200 kHz channels per group).
- A maximum of 24 in the combined bands 100 kHz to 915 MHz and 930 MHz to 12,75 GHz (which, if below FR and grouped, shall not exceed three 200 kHz channels per group).

If the number of failures do not exceed the maximum allowed figures stated above, the test of clause 4.2.4.4 is repeated at the frequencies at which the failures occurred. The level of the unwanted signal is set to -40 dBm and the performance requirement is once again that stated above.

The number of Error Events recorded in this test shall not exceed the test limit error rate values given above, when using the maximum number of samples.

No failures are allowed at this lower unwanted signal level.

5 Other requirements

Test cases which are not explicitly described in the present document shall be taken from TS 100 607-1 [1] Release 99.

Annex A (informative): Bibliography

- ETSI EN 300 919: "Digital cellular telecommunications system (Phase 2+) (GSM); Types of Mobile Stations (MS) (GSM 02.06)".
- CENELEC EN 50155: "Railway applications - Electronic equipment used on rolling stock".
- CENELEC EN 50125-1: "Railway applications - Environmental conditions for equipment".

History

Document history		
V1.1.1	December 2010	Publication
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