8. Spurious Emissions

8.1 Conducted spurious emissions

8.1.1 MS allocated a channel

Conducted spurious emissions, when the MS has been allocated a channel, are emissions from the antenna connector at frequencies other than those of the carrier and sidebands associated with normal modulation.

8.1.1.1 Test purpose

To verify that conducted spurious emissions, in the frequency band 100KHz to 12.75GHz excluding the GSM900 and DCS1800 receive bands, from the MS when allocated a channel shall not exceed the conformance requirements.

NOTE: The band 9~100KHz is not tested, because of test implementation problems.

(Refer to ETSI EST 300 607-1, 12.1.1.3 Test purpose)

8.1.1.2 Conformance requirement

The conducted spurious power emitted by the MS, when allocated a channel, under normal voltage conditions, shall be no more than the levels in following table.

Frequency range	Power level in dBm	
	GSM900	DCS1800
100 kHz to1GHz	-36	-36
1GHz to12.75GHz	-30	
1GHz to1710MHz		-30
1710MHz to 1785MHz		-36
1785MHz to 12.75GHz		-30

The requirements and this test apply to all types of GSM900 and

DCS1800 MS with a permanent antenna connector.

(Refer to ETSI EST 300 607-1, 12.1.1.2 Conformance requirement)

8.1.1.3 Method of measurement

8.1.1.3.1 Initial conditions

A call is set up by the SS according to the generic call set up procedure on a channel in the Mid ARFCN range.

The SS commands the MS to loop back its channel decoder output to channel encoder input.

The SS sends Standard Test Signal C1.

The SS sets the MS to operate at its maximum output power.

8.1.1.3.2 Procedure

Measurements are made in the frequency range 100 kHz to 12,75GHz. Spurious emissions are measured at the connector of the transceiver, as the power level of any discrete signal, higher than the requirement minus 6 dB, delivered into a 50Ohm load.

The measurement bandwidth based on a 5 pole synchronously tuned filter. The power indication is the peak power detected by the measuring system.

The measurement on any frequency shall be performed for at least one TDMA frame period with the exception of the idle frame.

Frequency range	Frequency offset	Filter bandwidth	Approx. video bandwidth
100KHz to 50MHz	–	10KHz	30KHz
50 to 500MHz	–	100KHz	300KHz
500MHz to12.75GHz excl. relevant TX band: P-GSM:890 to 915MHz DCS:1710 to 1785MHz and the RX bands: 925 to 960MHz 1805to 1880MHz	0 to10MHz ≥10MHz ≥20MHz ≥30MHz (offset from edge of relevant TX band)	100KHz 300KHz 1MHz 3MHz	300KHz 1MHz 3MHz 3MHz

relevant TX band: P-GSM:890 to 915MHz DCS:1710 to 1785MHz	1.8 to 6.0MHz (offset from carrier)	30kHz	100kHz

NOTE 1: The frequency ranges 925MHz to 960MHz and 1805MHz to 1880MHz are excluded as these ranges are tested.

NOTE 2: The filter and video bandwidths, and frequency offsets are only correct for measurements on an MS transmitting on a channel in the Mid ARFCN range.

NOTE 3: Due to practical implementation, the video bandwidth is restricted to a maximum of 3MHz.

(Refer to ETSI EST 300 607-1, 12.1.1.4 Method of test)

8.1.1.4 Test Requirement

The power of any spurious emission shall not exceed the levels given in following table.

Frequency range	Power level in dBm	
	GSM900	DCS1800
100KHz to1GHz	-36	-36
1GHz to12.75GHz	-30	
1GHz to1710MHz		-30
1710MHz to 1785MHz		-36
1785MHz to 12.75GHz		-30

(Refer to ETSI EST 300 607-1, 12.1.1.5 Test requirement)

8.1.2 MS allocated a channel

Conducted spurious emissions are any emissions from the antenna connector, when the MS is in idle mode.

The requirements and this test apply to all types of GSM900 and DCS1800 MS with a permanent antenna connector.

(Refer to ETSI EST 300 607-1, 12.1.2 MS allocated a channel)

8.1.2.1 Test purpose

To verify that conducted spurious emissions, in the frequency band

100KHz to 12.75GHz from the MS when in idle mode do not exceed the conformance requirements.

NOTE: The band 9 ~100KHz is not tested, because of test implementation problems.

(Refer to ETSI EST 300 607-1, 12.1.2.3 Test purpose)

8.1.2.2 Conformance requirement

The conducted spurious power emitted by the MS, when in idle mode, under normal voltage conditions shall be no more than the levels in following table.

Frequency range	Power level in dBm
9KHz to 880MHz	-57
880MHz to 915MHz	-59
915MHz to 1GHz	-57
1GHz to 1710MHz	-47
1710MHz to 1785MHz	-53
1785MHz to 12.75GHz	-47

The requirements and this test apply to all types of GSM900 and DCS1800 MS with a permanent antenna connector.

(Refer to ETSI EST 300 607-1, 12.1.2.2 Conformance requirement)

8.1.2.3 Method of measurement

8.1.2.3.1 Initial conditions

The BCCH message content from the serving cell shall ensure that Periodic Location Updating is not used and that page mode is continuously set to Paging Reorganization and BS_AG_BLKS_RES is set to 0 so that the MS receiver will operate continually.

The CCCH_CONF shall be set to 000. 1 basic physical channel used for CCCH not combined with SDCCHs.

The BCCH allocation shall either be empty or contain only the serving cell BCCH.

NOTE: This is to ensure that the receiver does not scan other ARFCN. Scanning other ARFCN could lead to a moving in frequency of

the spurious and therefore to the possibility of either not measuring a spurious emission or measuring it more than once.

The MS is in MM state "idle, updated".

8.1.2.3.2 Procedure

Measurements are made in the frequency range 100KHz to 12.75GHz. Spurious emissions are measured as the power level of any discrete signal, higher than the requirement in table 12.4 minus 6 dB, delivered into a 50Ohm load.

The measurement bandwidth based on a 5 pole synchronously tuned filter is set according to table 12.5. The power indication is the peak power detected by the measuring system.

The measurement time on any frequency shall be such that it includes the time during which the MS receives a TDMA frame containing the paging channel.

Frequency range	Filter bandwidth	Video bandwidth
100KHz to 50MHz	10KHz	30KHz
50MHz to 12.75GHz	100KHz	300KHz

(Refer to ETSI EST 300 607-1, 12.1.2.4 Method of test)

8.1.2.4 Test requirement

The power of any spurious emission shall not exceed the levels given in following table.

Frequency range	Power level in dBm
100kHz to 880MHz	-57
880MHz to 915MHz	-59
915MHz to 1000MHz	-57
1GHz to 1710MHz	-47
1710MHz to 1785MHz	-53
1785MHz to 12.75GHz	-47

(Refer to ETSI EST 300 607-1, 12.1.2.5 Test requirement)

8.2 Radiated spurious emissions

8.2.1 MS in allocated a channel

Radiated spurious emissions, when the MS has been allocated a channel, are any emissions radiated by the cabinet and structure of the mobile station, including all interconnecting cables.

This is also known as "cabinet radiation".

The requirements apply to all types of GSM900 and DCS1800 MS. The test applies to all types of GSM900 and DCS1800 MS with the exception of the test at extreme voltages for an MS where a practical connection, to an external power supply, is not possible.

NOTE: A "practical connection" shall be interpreted to mean it is possible to connect extreme voltages to the MS without interfering with the configuration of the MS in a way which could invalidate the test.

(Refer to ETSI EST 300 607-1, 12.2.1 MS in allocated a channel)

8.2.1.1 Test purpose

To verify that radiated spurious emissions from the MS when allocated a channel shall not exceed the conformance requirements under normal voltage conditions.

(Refer to ETSI EST 300 607-1, 12.2.1.3 Test purpose)

8.2.1.2 Conformance requirement

The radiated spurious power emitted by the MS, when allocated a channel, under normal voltage conditions, shall be no more than the levels in following table:

Frequency range	Power level in dBm	
	GSM900	DCS1800
30KHz to1GHz	-36	-36
1GHz to 4GHz	-30	
1GHz to1710MHz		-30
1710MHz to 1785MHz		-36
1785MHz to 4GHz		-30

The requirements apply to all types of GSM900 and DCS1800 MS. The test applies to all types of GSM900 and DCS1800 MS with the exception of the test at extreme voltages for an MS where a practical connection, to an external power supply, is not possible.

(Refer to ETSI EST 300 607-1, 12.2.1.2 Conformance requirement)

8.2.1.3 Method of measurement

8.2.1.3.1 Initial conditions

A call is set up by the SS according to the generic call set up procedure on a channel in the Mid ARFCN range.

NOTE: The power supply shall be connected to the MS such that the physical configuration does not change in a way that could have an effect on the measurement. In particular, the battery pack of the MS should not normally be removed. In cases where no practical connection can be made to the power supply, the MS's intended battery source shall be used.

The SS commands the MS to loop back its channel decoder output to its channel encoder input.

The SS sends Standard Test Signal C1.

The SS sets the MS to operate at its maximum output power.

8.2.1.3.2 Initial conditions

Initially the test antenna is closely coupled to the MS and any spurious emission radiated by the MS is detected by the test antenna and receiver in the range 30MHz to 4GHz.

NOTE: This is a qualitative step to identify the frequency and presence of spurious emissions which are to be measured in subsequent steps.

The test antenna separation is set to the appropriate measurement distance and at each frequency at which an emission has been detected, the MS shall be rotated to obtain maximum response and the effective radiated power of the emission determined by a substitution measurement. In case of an anechoic shielded chamber pre-calibration may be used instead of a substitution measurement.

The measurement bandwidth, based on a 5 pole synchronously tuned filter, is set according to following table. The power indication is the peak power detected by the measuring system.

The measurement on any frequency shall be performed for at least one TDMA frame period, with the exception of the idle frame.

NOTE 1: This ensures that both the active times (MS transmitting) and the quiet times are measured.

NOTE2: For these filter bandwidths some difficulties may be experienced with noise floor above required measurement limit. This will depend on the gain of the test antenna, and adjustment of the measuring system bandwidth is permissible. Alternatively, for test frequencies above 900 MHz, the test antenna separation from the MS may be reduced to 1 meter.

The measurements are repeated with the test antenna in the orthogonal polarization plane.

Frequency range	Frequency offset	Filter bandwidth	Approx. video bandwidth
30 to 50MHz	-	10KHz	30KHz
50 to 500MHz	-	100KHz	300KHz
500MHz to 4GHz,	0 to 10MHz	100KHz	300KHz
	≥10MHz	300KHz	1MHz
excl. relevant TX band:	≥20MHz	1MHz	3MHz
P-GSM: 890 to 915MHz	≥30MHz	3MHz	3MHz
DCS: 1710 to 1785MHz	(offset from edge of relevant TX band)		
relevant TX band:			
P-GSM: 890 to 915MHz	1.8 to 6.0MHz	30MHz	100KHz
DCS: 1710 to 1785MHz	(offset from carrier)		

NOTE 1: The filter and video bandwidths, and frequency offsets are only correct for measurements on an MS transmitting on a channel in the Mid ARFCN range.

NOTE 2: Due to practical implementation of a SS, the video bandwidth is restricted to a maximum of 3MHz.

(Refer to ETSI EST 300 607-1, 12.2.1.4 Method of test)

8.2.1.4 Test requirement

The power of any spurious emission shall not exceed the levels given in following table.

(Refer to ETSI EST 300 607-1, 12.2.1.5 Test requirement)

8.2.2 MS in idle mode

Radiated spurious emissions, when the MS is in idle mode, are any emissions radiated by the cabinet and structure of the mobile station, including all interconnecting cables.

This is also known as "cabinet radiation".

The requirements apply to all types of GSM900 and DCS1800 MS. The test applies to all types of GSM900 and DCS1800 MS with the exception of the test at extreme voltages for an MS where a practical connection, to an external power supply, is not possible.

NOTE: A "practical connection" shall be interpreted to mean it is possible to connect extreme voltages to the MS without interfering with the configuration of the MS in a way which could invalidate the test.

(Refer to ETSI EST 300 607-1, 12.2.2 MS in idle mode)

8.2.2.1 Test purpose

To verify that radiated spurious emissions from the MS when in idle mode do not exceed the requirements under normal voltage conditions.

(Refer to ETSI EST 300 607-1, 12.2.2.3 Test purpose)

8.2.2.2 Conformance requirement

a) The radiated spurious power emitted by the MS, when in idle mode, under normal voltage conditions, shall be no more than the levels in following table.

b) The radiated spurious power emitted by the MS, when in idle mode,

shall be no more than the levels in following table.

Frequency range	Power level in dBm
30KHz to 880MHz	-57
880MHz to 915MHz	-59
915MHz to 1GHz	-57
1GHz to 1710MHz	-47
1710MHz to 1785MHz	-53
1785MHz to 12.75GHz	-47

The requirements apply to all types of GSM900 and DCS1800 MS. The test applies to all types of GSM900 and DCS1800 MS with the exception of the test at extreme voltages for an MS where a practical connection, to an external power supply, is not possible.

(Refer to ETSI EST 300 607-1, 12.2.2.2 Conformance requirement)

8.2.2.3 Method of measurement

8.2.2.3.1 Initial conditions

NOTE: The power supply shall be connected to the MS such that the physical configuration does not change in a way that could have an effect on the measurement. In particular, the battery pack of the MS should not normally be removed. In cases where no practical connection can be made to the power supply, the MS's intended battery source shall be used.

The BCCH message content from the serving cell shall ensure that Periodic Location Updating is not used and that page mode is continuously set to Paging Reorganization and BS_AG_BLKS_RES is set to 0 so that the MS receiver will operate continually.

The CCCH_CONF shall be set to 000. 1 basic physical channel used for CCCH not combined with SDCCHs.

The BCCH allocation shall either be empty or contain only the serving cell BCCH.

NOTE: This is to ensure that the receiver does not scan other ARFCN. Scanning other ARFCN could lead to a moving in frequency of the spurious and therefore to the possibility of either not measuring a spurious emission or measuring it more than once.

The MS is in MM state "idle, updated".

8.2.2.3.2 Procedure

Initially the test antenna is closely coupled to the MS and any spurious emission radiated by the MS are detected by the test antenna and receiver in the range 30MHz to 4GHz.

NOTE: This is a qualitative step to identify the frequency and presence of spurious emissions which are to be measured in subsequent steps.

The test antenna separation is set to the appropriate measurement distance and at each frequency at which a spurious emission has been detected the MS is rotated to obtain a maximum response.

The effective radiated power of the emission is determined by a substitution measurement. In case of an anechoic shielded chamber pre-calibration may be used instead of a substitution measurement.

The measurement bandwidth based on a 5 pole synchronously tuned filter shall be according to following table. The power indication is the peak power detected by the measuring system.

The measurement time on any frequency shall be such that it includes the time during which the MS receives a TDMA frame containing the paging channel.

NOTE: For these filter bandwidths some difficulties may be experienced with noise floor above required measurement limit. This will depend on the gain of the test antenna, and adjustment of the measuring system bandwidth is permissible. Alternatively, for test frequencies above 900MHz, the test antenna separation from the MS may be reduced to 1 meter.

Frequency range	Filter bandwidth	Video bandwidth
30MHz to 50MHz 50MHz to 4GHz	10KHz 100KHz	30KHz 300KHz

The measurements are repeated with the test antenna in the orthogonal polarization plane.

(Refer to ETSI EST 300 607-1, 12.2.2.4 Method of test)

8.2.2.4 Test requirement

The power of any spurious emission shall not exceed the levels given in following table.

(Refer to ETSI EST 300 607-1, 12.2.2.5 Test requirement)