International Telecommunication Union

ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R M.1343-1
(06/2005)

Essential technical requirements of mobile earth stations for global non-geostationary mobile-satellite service systems in the band 1-3 GHz

M Series

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Note: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

Electronic Publication
Geneva, 2009

RECOMMENDATION ITU-R M.1343-1*, **

Essential technical requirements of mobile earth stations for global non-geostationary mobile-satellite service systems in the band 1-3 GHz

(Question ITU-R 210/8)

(1997-2005)

Scope

This Recommendation provides the essential technical requirements of mobile Earth stations for global non-geostationary mobile-satellite systems in the band 1-3 GHz that should be used by administrations as a common technical basis for establishing type approval requirements for MES terminals; facilitating the licensing of MES terminal operations; facilitating the development of mutual recognition arrangements of type approval of MES terminals; and facilitating the development of mutual recognition arrangements to facilitate the circulation and use of MES terminals.

The ITU Radiocommunication Assembly,

considering

a) that various technically and operationally different global non-geostationary (non-GSO) satellite systems in the mobile-satellite service (MSS) are planned to commence operation in the near future;

b) that these non-GSO MSS systems are expected to provide personal communications on a global basis to either hand-held or transportable mobile earth stations (MES) terminals;

c) that MES terminals are expected to operate with these global non-GSO MSS systems in various countries and hence, the circulation of MES terminals is an important aspect of these systems;

d) that the circulation of terminals among administrations is usually subject to a number of regulations including satisfactory type approval to an agreed technical standard;

e) that there is a need for identifying the essential technical requirements for the type approval of MES terminals of global non-GSO MSS systems;

f) that there is a need to protect safety services;

g) that the essential technical requirements should achieve an acceptable balance between equipment design and production cost and the need for effective use of the radio-frequency spectrum and should be impartial with respect to all global non-GSO MSS technologies, subject to the protection of other radio systems;

h) that the specification of values for essential technical requirements for TDMA non-GSO MSS systems would not prevent the specification of the same or higher values for CDMA non-GSO MSS systems,

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* This Recommendation should be brought to the attention of the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO), particularly with respect to the operational techniques referred to in *recommends 3*.

** Radiocommunication Study Group 4 made editorial amendments to this Recommendation in 2009 in accordance with Resolution ITU-R 1.

considering also

a) that the World Telecommunication Policy Forum (WTPF-96) which addressed Global Mobile Personal Communications by Satellite (GMPCS) policy and regulatory issues, adopted Opinion No. 3, calling upon the three ITU Sectors, each within its competence, to initiate new studies or pursue current ones, and to reach conclusions as soon as practicable to facilitate the introduction of GMPCS on a global and regional basis;

b) that the World Telecommunication Policy Forum (WTPF-96) which addressed Global Mobile Personal Communications by Satellite (GMPCS) policy and regulatory issues, also adopted Opinion No. 4, establishment of a Memorandum of Understanding (MoU) to facilitate the circulation of GMPCS user terminals (GMPCS-MoU) which, *inter alia*, requested the Secretary-General of the ITU to take the necessary steps to prepare a GMPCS-MoU related to the circulation of GMPCS user terminals to facilitate the full implementation of GMPCS;

c) that the development of relevant ITU Recommendations could facilitate the preparation and adoption of the GMPCS-MoU;

d) that the identification by the ITU-R of essential technical requirements for MES terminals operating with global non-GSO MSS systems would provide a common technical basis for facilitating type approval of MES terminals by various national authorities and the development of mutual recognition arrangements for type approvals of MES terminals and mutual recognition arrangements for circulation of MES terminals among administrations;

e) that the identification by the ITU-R of essential technical requirements for MES terminals operating with global non-GSO MSS systems in the 1 to 3 GHz range would ensure that interference will not be caused to other radio services by non-GSO MSS MES terminals;

f) that other relevant technical characteristics are prescribed by the Radio Regulations that pertain to the effective use of the radio-frequency spectrum by mobile earth stations;

g) that, for a particular GMPCS system, some MES equipment parameters such as e.i.r.p. and necessary bandwidth which are not contained in this Recommendation, are contained in the information provided as part of the Appendix 4 of the Radio Regulations,

considering further

a) that it would be necessary for non-GSO MSS systems to have the capability to determine the location of the MES terminals operating with non-GSO MSS systems in order to fulfil the relevant requirements of Resolution 25 (Rev.WRC-03) and WTPF-96 Opinion No. 2;

b) that essential technical requirements should be measurable and verifiable,

recommends

1 that the essential technical requirements of MES terminals for global non-GSO MSS systems in the bands 1-3 GHz in Annexes 1 and 2 should be used by administrations as a common technical basis for:

a) establishing type approval requirements for MES terminals;

b) facilitating the licensing of MES terminal operations;

c) facilitating the development of mutual recognition arrangements of type approval of MES terminals;

d) facilitating the development of mutual recognition arrangements to facilitate the circulation and use of MES terminals;

2 that the non-GSO MSS systems should be capable of determining the location of its operating MES terminals;

3 that the further studies mentioned in Note 4 to Table 7 be initiated to finalize the e.i.r.p. values for the bands between 1 580.42 MHz and 1 605 MHz and for the band 1 605-1 610 MHz, and include study of the operational techniques that may enable the values to be met.

NOTE 1 – The operational techniques referred to in this Recommendation should be brought to the attention of civil aviation authorities.

NOTE 2 – Administrations which, for national spectrum management purposes, require additional information on equipment parameters which are not contained in this Recommendation, can obtain this information from the relevant RR Appendix 4 parameters.

Annex 1

Essential technical requirements of MES for global non-GSO MSS systems in the bands 1-3 GHz using TDMA

This Annex contains essential technical requirements for MES terminals of global non-GSO MSS systems using TDMA and operating in the bands 1-3 GHz. The tables on the following pages of this Annex summarize the maximum unwanted emission requirements for such terminals. In addition to these unwanted emission requirements there is an additional requirement for automatic shut-off features of MES terminals which is:

Automatic shut-off features: The MES terminals should include a means of identifying whether there is a malfunctioning processor or other fault in its operation and be capable of automatically shutting down transmissions in the case of an identified malfunction no later than one second after a malfunction has been identified.

Throughout this Recommendation, various terms which are defined in the Radio Regulations are used. In addition to these terms there is an additional essential term which is defined as follows:

Nominated bandwidth (B_n): The B_n of the MES radio-frequency transmission is wide enough to encompass all spectral elements of the transmission which have a level greater than the specified levels of unwanted emissions. The B_n is defined relative to the MES actual carrier frequency f_c.

B_n is the width of the frequency interval ($f_c - a, f_c + b$), where a and b, which is specified by the terminal manufacturer, may vary with f_c.

The frequency interval ($f_c - a, f_c + b$) does not encompass more than either:

– when $a = b$, 4 nominal carrier frequencies for narrow-band systems;

– when $a \neq b$, 1 nominal carrier frequency for narrow-band systems; or

– 1 nominal carrier frequency for wideband systems.

The frequency interval ($f_c - a, f_c + b$) is within the assigned band of the MES terminals.

TABLE 1

Maximum unwanted emissions outside the band 1 610 to 1 626.5 MHz and the band 1 626.5 to 1 628.5 MHz for an MES using TDMA access techniques

Frequency (MHz)	Carrier-on	
	e.i.r.p. (dBW) (Note 1)	Measurement bandwidth
0.1-30	–66	10 kHz
30-1 000	–66	100 kHz
1 000-1 559	–60	1 MHz
1 559-1 573.42	–70	1 MHz (Note 2)
1 573.42-1 580.42	–70 (Note 3)	1 MHz (Note 2)
1 580.42-1 590	–70	1 MHz (Note 2)
1 590-1 605	–70	1 MHz (Note 2)
1 605-1 610	(Note 4)	1 MHz (Note 2)
1 610-1 626.5	Not applicable (Note 5)	Not applicable
1 626.5-1 628.5	Not applicable	Not applicable
1 628. 5-1 631.5	–60	30 kHz
1 631.5-1 636.5	–60	100 kHz
1 636.5-1 646.5	–60	300 kHz
1 646.5 -1 666.5	–60	1 MHz
1 666.5-2 200	–60	3 MHz
2 200-12 750	–60	3 MHz

NOTE 1 – Average responding instruments should be used to measure the e.i.r.p. values. Except when Note 3 applies:

a) the measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency, or

b) a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits.

For non-continuous signals the measurement should be performed over the active part of the burst.

NOTE 2 – Measurement bandwidths less than 1 MHz (e.g. 30 kHz, 100 kHz or 300 kHz) are allowable provided the power in the narrower bandwidth is integrated over 1 MHz.

NOTE 3 – Averaged over 20 ms.

NOTE 4 – 70 dBW/MHz at 1 605 MHz, linearly interpolated in dB/MHz, to –10 dBW/MHz at 1 610 MHz. Appropriate protection of the Global Navigation Satellite System (GNSS) needs to be considered, recognizing the current operation and phased transition of the GLONASS system into the new frequency plan. The Russian Federation states that the level of –70 dBW/MHz shall be used to provide protection of GLONASS receiver operations and that a level of –37 dBW/MHz at 1 610 MHz, linearly interpolated to –70 dBW/MHz at 1 607.5 MHz, is sufficient to protect GLONASS wideband operations in the final GLONASS frequency plan.

NOTE 5 – MESs shall operate in the frequency band 1 610-1 626.5 MHz in accordance with RR No. 5.364. Subject to modification of the GLONASS frequency plan and operating GLONASS receivers, MSS operators, through national administrations, should apply the procedures of RR Nos. 9.11A and 9.17A, where applicable to reach agreement, on a bilateral basis, to acceptable conditions for the joint operation of the GLONASS and MSS systems, including testing to ensure electromagnetic compatibility between the GLONASS receivers and MESs.

TABLE 2

Maximum unwanted emissions within the allocated band 1 610 to 1 626.5 MHz and the band 1 626.5 to 1 628.5 MHz of an MES operating such that the nominated bandwidth is entirely or partially contained in the frequency band 1 618.25 to 1 626.5 MHz (Notes 1 and 2)

The maximum e.i.r.p. of the unwanted emissions inside the band 1 610 to 1 626.5 MHz and the band 1 626.5 to 1 628.5 MHz from MESs operating within the band 1 610 to 1 626.5 MHz should not exceed the limits in Table 2.

Frequency offset (kHz) (Note 3)	Carrier-on	
	e.i.r.p. (dBW) (Note 4)	Measurement bandwidth (kHz) (Note 5)
0 to 160	–35	30
160 to 225	–35 to –38.5	30
225 to 650	–38.5 to –45	30
650 to 1 365	– 45	30
1 365 to 1 800	– 53 to –56	30
1 800 to 16 500	– 56	30

NOTE 1 – Average responding instruments should be used to measure the e.i.r.p. values. The measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency. Alternatively, a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits. For non-continuous signals, the measurement should be performed over the active part of the burst.

NOTE 2 – The MES should include means of inhibiting transmissions when necessary to protect the radioastronomy service in the 1 610.6-1 613.8 MHz band from emissions produced by the MES.

NOTE 3 – Frequency offset is determined from:

a) the nearest edge of the nominated bandwidth of the nominal carrier closest to the MSS system operating in another assigned band within the band 1 610 to 1 626.5 MHz. The frequency offset is measured in the direction of the adjacent MSS system.

b) the upper edge of the nominated bandwidth of the carrier under test for emissions within the band 1 626.5 to 1 628.5 MHz.

NOTE 4 – Linearly interpolated in dBW versus frequency offset.

NOTE 5 – The measurement bandwidth used may be 3 kHz if the unwanted e.i.r.p. limits are reduced correspondingly.

TABLE 3

Maximum e.i.r.p. of the unwanted emissions of an MES in the carrier-off state

Frequency (MHz)	e.i.r.p. (dBW)	Measurement bandwidth
0.1-30	– 87	10 kHz
30-1 000	– 87	100 kHz
1 000-12 750	– 77	100 kHz

NOTE 1 – Peak hold measurement techniques should be used. These values must be at or below the values for the carrier-on state.

TABLE 4

Maximum unwanted emissions outside the 1 980-2 025 MHz allocations from an MES (Note 1)

Frequency (MHz)	Carrier-on	
	e.i.r.p. (dBW) (Note 2)	Measurement bandwidth
0.1-30	–66	10 kHz
30-1 000	–66	100 kHz
1 000-1 559	–60	3 MHz
1 559-1 626.5	–70 (Note 3)	1 MHz
1 626.5-1 950	–60	3 MHz
1 950-1 960	–60	1 MHz
1 960 -1 970	–60	300 kHz
1 970-1 975	–60	100 kHz
1 975-1 978	–60	30 kHz
1 978-1 980	The levels in Table 5, as appropriate, for the frequency offset 0-2 MHz, should apply from 1 978-1 980 MHz.	
1 980 to *y* (Note 4)	Not applicable	Not applicable
y to *y*+2	The levels in Table 5, as appropriate, for the frequency offset 0-2 MHz should apply from *y* to *y*+2 MHz.	
y+2 to *y*+5	–60	30 kHz
y+5 to *y*+10	–60	100 kHz
y+10 to *y*+20	–60	300 kHz
y+20 to *y*+30	–60	1 MHz
y+30 to 12 750	–60	3 MHz

NOTE 1 – The MSS (Earth-to-space) is allocated frequencies on a co-primary basis in the band 1 980-2 010 MHz in all Regions and in the band 2 010-2 025 MHz in Region 2 subject to the dates of entry into force mentioned in RR No. 5.389A.

NOTE 2 – Average responding instruments should be used to measure the e.i.r.p. values. Except when Note 3 applies:

a) the measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency, or

b) a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits.

For non-continuous signals the measurement should be performed over the active part of the burst.

NOTE 3 – Averaged over 20 ms.

NOTE 4 – The value of *y* (MHz) corresponds to the upper band edge of the allocation.

TABLE 5

Maximum unwanted emissions from an MES using TDMA access technique within the 1 980-2 025 MHz allocations (Notes 1 and 2)

Frequency offset (kHz) (Note 3)	Carrier-on	
	e.i.r.p. (dBW)	Measurement bandwidth (kHz)
0 to 166	0-(offset × 55/166)	3 kHz
166 to 575	– 55	3 kHz
575 to 1 175	– 60	3 kHz
1 175 to 1 525	–50-((offset-1 175) × 5/350)	30 kHz
1 525 to 45 000	– 55	30 kHz

NOTE 1 – The MSS (Earth-to-space) is allocated frequencies on a co-primary basis in the band 1 980-2 010 MHz in all Regions and in the band 2 010-2 025 MHz in Region 2 subject to the dates of entry into force mentioned in RR No. 5.389A.

NOTE 2 – Average responding instruments should be used to measure the e.i.r.p. values. The measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency. Alternatively, a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits. For non-continuous signals, the measurement should be performed over the active part of the burst.

NOTE 3 – Frequency offset is determined from edge of nominated bandwidth.

TABLE 6

Maximum e.i.r.p. of the unwanted emissions of an MES in the carrier-off state

Frequency (MHz)	e.i.r.p. (dBW)	Measurement bandwidth
0.1-30	–87	10 kHz
30-1 000	–87	100 kHz
1 000-12 750	–77	100 kHz

NOTE 1 – Peak hold measurement techniques should be used. These values must be at or below the values for the carrier-on state.

Annex 2

Essential technical requirements of MES for global non-GSO MSS systems in the bands 1-3 GHz using CDMA

This Annex contains essential technical requirements for MES terminals of global non-GSO MSS systems using CDMA and operating in the bands 1-3 GHz. The tables on the following pages of this Annex summarize the maximum unwanted emission requirements for such terminals. In addition to these unwanted emission requirements there is an additional requirement for automatic shut-off features of MES terminals which is:

Automatic shut-off features: The MES should include a means of identifying whether there is a malfunctioning processor or other fault in its operation and be capable of automatically shutting down transmissions in the case of an identified malfunction no later than one second after a malfunction has been identified.

Throughout this Recommendation, various terms, which are defined in the Radio Regulations are used. In addition to these terms there is an additional essential term which is defined in this Recommendation as follows:

Nominated bandwidth (B_n) (NOTE 1): The B_n of the MES radio-frequency transmission is wide enough to encompass all spectral elements of the transmission which have a level greater than the specified levels of unwanted emissions. The B_n is defined relative to the MES actual carrier frequency f_c.

B_n is the width of the frequency interval ($f_c - a$, $f_c + b$), where a and b, which is specified by the terminal manufacturer, may vary with f_c.

The frequency interval ($f_c - a$, $f_c + b$) does not encompass more than either:

– when $a = b$, 4 nominal carrier frequencies for narrow-band systems;

– when $a \neq b$, 1 nominal carrier frequency for narrow-band systems; or

– 1 nominal carrier frequency for wideband systems.

The frequency interval ($f_c - a$, $f_c + b$) is within the assigned band of the MES.

NOTE 1 – A narrowband system in this context is a system in which the nominal carrier frequency spacing for MES transmissions in the Earth-to-space direction is less than 300 kHz. If this frequency spacing is greater than 300 kHz, the system is wideband.

TABLE 7

Maximum unwanted emissions outside the band 1 610 to 1 626.5 MHz and the band 1 626.5 to 1 628.5 MHz for an MES using CDMA access techniques

Frequency (MHz)	Carrier-on	
	e.i.r.p. (dBW) (Note 1)	Measurement bandwidth
0.1-30	– 66	10 kHz
30-1 000	– 66	100 kHz
1 000-1 559	–60	1 MHz
1 559-1 573.42	–70	1 MHz (Note 2)
1 573.42-1 580.42	–70 (Note 3)	1 MHz (Note 2)
1 580.42-1 590	(Note 4)	1 MHz (Note 2)
1 590-1 605	(Note 4)	1 MHz (Note 2)
1 605-1 610	(Note 4 and 5)	1 MHz (Note 2)
1 610-1 626.5 (Note 6)	Not applicable	Not applicable
1 626.5-1 628.5	Not applicable	Not applicable
1 628. 5-1 631.5	–60	30 kHz
1 631.5-1 636.5	–60	100 kHz
1 636.5-1 646.5	–60	300 kHz
1 646.5 -1 666.5	–60	1 MHz
1 666.5-2 200	–60	3 MHz
2 200-12 750	–60	3 MHz

NOTE 1 – Average responding instruments should be used to measure the e.i.r.p. values. Except when Note 3 applies:

a) the measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency, or

b) a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits.

For non-continuous signals the measurement should be performed over the active part of the burst.

NOTE 2 – Measurement bandwidths less than 1 MHz (e.g. 30 kHz, 100 kHz or 300 kHz) are allowable provided the power in the narrower bandwidth is integrated over 1 MHz.

NOTE 3 – Averaged over 20 ms.

NOTE 4 – The e.i.r.p. values for the bands 1 580.42-1 590 MHz, 1 590-1 605 MHz, and for the lower band edge in the 1 605-1 610 MHz band require further study. See *recommends* 3. An MES terminal that meets a value of –70 dBW/MHz, prior to the completion of further study, will be considered to have met the final values in the bands stated above and at 1 605 MHz, since those final values will be no lower than –70 dBW/MHz. The assignment of frequencies to an MES terminal by an MSS system should enable an e.i.r.p. value of –70 dBW/MHz for the protection of GNSS to be fulfilled. The e.i.r.p. value of –70 dBW is subject to further study in ITU-R.

NOTE 5 – Taking into account NOTE 4, the value at 1 605 MHz, linearly interpolated in dB/MHz, to –10 dBW/MHz at 1 610 MHz. Appropriate protection of GNSS needs to be considered, recognizing the current operation and phased transition of the GLONASS system into the new frequency plan. The Russian Federation states that the level of –70 dBW/MHz shall be used to provide protection of GLONASS receiver operations and that a level of –37 dBW/MHz at 1 610 MHz, linearly interpolated to –70 dBW/MHz at 1 607.5 MHz, is sufficient to protect GLONASS wideband operations in the final GLONASS frequency plan.

NOTE 6 – Mobile earth stations shall operate in the frequency bands 1 610-1 626.5 MHz in accordance with RR No. 5.364. Subject to modification of the GLONASS frequency plan and operating GLONASS receivers, MSS operators, through national administrations, should apply the procedures of RR Nos. 9.11A and 9.17A, where applicable to reach agreement, on a bilateral basis, to acceptable conditions for the joint operation of the GLONASS and MSS systems, including testing to ensure electromagnetic compatibility between the GLONASS receivers and MES.

TABLE 8

Maximum unwanted emissions within the allocated band 1 610 to 1 626.5 MHz and the band 1 626.5 to 1 628.5 MHz of an MES operating such that the nominated bandwidth is entirely or partially contained in the frequency band 1 618.25 to 1 626.5 MHz (Notes 1 and 2)

The maximum e.i.r.p. of the unwanted emissions inside the band 1 610 to 1 626.5 MHz and the band 1 626.5 to 1 628.5 MHz from MESs operating within the band 1 610 to 1 626.5 MHz should not exceed the limits in Tables 8 or 9.

Frequency offset (kHz) (Note 3)	Carrier-on	
	e.i.r.p. (dBW) (Note 4)	Measurement bandwidth (kHz) (Note 5)
0 to 160	–35	30
160 to 225	–35 to –38.5	30
225 to 650	–38.5 to –45	30
650 to 1 365	–45	30
1 365 to 1 800	–53 to –56	30
1 800 to 16 500	–56	30

NOTE 1 – Average responding instruments should be used to measure the e.i.r.p. values. The measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency. Alternatively, a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits. For non-continuous signals, the measurement should be performed over the active part of the burst.

NOTE 2 – The MES should include means of inhibiting transmissions when necessary to protect the radioastronomy service in the 1 610.6-1 613.8 MHz band from emissions produced by the MES.

NOTE 3 – Frequency offset is determined from:

a) the nearest edge of the nominated bandwidth of the nominal carrier closest to the MSS system operating in another assigned band within the band 1 610 to 1 626.5 MHz. The frequency offset is measured in the direction of the adjacent MSS system.

b) the upper edge of the nominated bandwidth of the carrier under test for emissions within the band 1 626.5 to 1 628.5 MHz.

NOTE 4 – Linearly interpolated in dBW versus frequency offset.

NOTE 5 – The measurement bandwidth used may be 3 kHz if the unwanted e.i.r.p. limits are reduced correspondingly.

TABLE 9

Maximum unwanted emissions within the allocated band 1 610 to 1 626.5 MHz and the band 1 626.5 to 1 628.5 MHz of an MES operating such that the nominated bandwidth is entirely contained in the frequency band 1 610 to 1 618.25 MHz (Notes 1 and 2)

Frequency offset (kHz) (Note 3)	Carrier-on	
	e.i.r.p. (dBW) (Note 4)	Measurement bandwidth (kHz) (Note 5)
0 to 160	–32	30
160 to 2 300	–32 to –56	30
2 300 to 16 500	–56	30

NOTE 1 – Average responding instruments should be used to measure the e.i.r.p. values. The measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency. Alternatively, a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits. For non-continuous signals, the measurement should be performed over the active part of the burst.

NOTE 2 – The MES should include means of inhibiting transmissions when necessary to protect the radioastronomy service in the 1 610.6-1 613.8 MHz band from emissions produced by the MES.

NOTE 3 – Frequency offset is determined from:

a) the nearest edge of the nominated bandwidth of the nominal carrier closest to the MSS system operating in another assigned band within the band 1 610 to 1 626.5 MHz. The frequency offset is measured in the direction of the adjacent MSS system.

b) the upper edge of the nominated bandwidth of the carrier under test for emissions within the band 1 626.5 to 1 628.5 MHz.

NOTE 4 – Linearly interpolated in dBW versus frequency offset.

NOTE 5 – The measurement bandwidth used may be 3 kHz if the unwanted e.i.r.p. limits are reduced correspondingly.

TABLE 10

Maximum unwanted emissions of an MES using CDMA access techniques within the assigned band of CDMA carriers (Note 1)

Frequency offset (kHz) (Note 2)	Carrier-on	
	e.i.r.p. (dBW) (Note 3)	Measurement bandwidth (kHz) (Note 4)
0 to 70	–6 to –20	30
70 to 600	–20 to –28	30
600 to 2 000	–28 to –45	30
2 000 to 5 000	–45 to –69	30
5 000 to 16 500	–69	30

NOTE 1 – Average responding instruments should be used to measure the e.i.r.p. values. The measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency. Alternatively, a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits. For non-continuous signals, the measurement should be performed over the active part of the burst.

NOTE 2 – Frequency offset is determined from edge of nominated bandwidth.

NOTE 3 – Linearly interpolated in dBW versus frequency offset.

NOTE 4 – The measurement bandwidth used may be 3 kHz if the unwanted e.i.r.p. limits are reduced correspondingly.

TABLE 11

Maximum e.i.r.p. of the unwanted emissions of an MES in the carrier-off state

Frequency (MHz)	e.i.r.p. (dBW)	Measurement bandwidth
0.1-30	–87	10 kHz
30-1 000	–87	100 kHz
1 000-12 750	–77	100 kHz

NOTE 1 – Peak hold measurement techniques should be used. These values must be at or below the values for the carrier-on state.

TABLE 12

Maximum unwanted emissions from an MES operating within the allocation, outside the 1 980-2 025 MHz allocations (Notes 1 and 2)

Frequency (MHz)	Carrier-on	
	e.i.r.p. (dBW) (Note 2)	Measurement bandwidth
0.1-30	–66	10 kHz
30-1 000	–66	100 kHz
1 000-1 559	–60	3 MHz
1 559-1 626.5	–70 (Note 3)	1 MHz
1 626.5-1 950	–60	3 MHz
1 950-1 960	–60	1 MHz
1 960 -1 970	–60	300 kHz
1 970-1 975	–60	100 kHz
1 975-1 978	–60	30 kHz
1 978-1 980	The levels in Table 13, as appropriate, for the frequency offset 0-2 MHz, should apply from 1 978-1 980 MHz	
1 980 to *y* (Note 4)	Not applicable	Not applicable
y to *y*+2	The levels in Table 13, as appropriate, for the frequency offset 0-2 MHz should apply from *y* to *y*+2 MHz	
y+2 to *y*+5	–60	30 kHz
y+5 to *y*+10	–60	100 kHz
y+10 to *y*+20	–60	300 kHz
y+20 to *y*+30	–60	1 MHz
y+30 to 12 750	–60	3 MHz

NOTE 1 – The MSS (Earth-to-space) is allocated frequencies on a co-primary basis in the band 1 980-2 010 MHz in all Regions and in the band 2 010-2 025 MHz in Region 2 subject to the dates of entry into force mentioned in RR No. 5.389A.

NOTE 2 – Average responding instruments should be used to measure the e.i.r.p. values. Except when Note 3 applies:

a) the measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency, or

b) a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits.

For non-continuous signals the measurement should be performed over the active part of the burst.

NOTE 3 – Averaged over 20 ms.

NOTE 4 – The value of *y* (MHz) corresponds to the upper band edge of the allocation.

TABLE 13

Maximum unwanted emissions falling in the 1 980-1 990 MHz band from an MES using CDMA access techniques within the 1 980-2 025 MHz allocations (Notes 1 and 2)

Frequency offset (kHz) (Note 3)	Carrier-on	
	e.i.r.p. (dBW)	Measurement bandwidth (kHz)
0 to 166	0-(offset × 55/166)	3 kHz
166 to 575	–55	3 kHz
575 to 1 175	–60	3 kHz
1 175 to 1 525	–50-((offset-1 175) × 5/350)	30 kHz
1 525 to 45 000	–55	30 kHz

NOTE 1 – The MSS (Earth-to-space) is allocated frequencies on a co-primary basis in the band 1 980-2 010 MHz in all Regions and in the band 2 010-2 025 MHz in Region 2 subject to the dates of entry into force mentioned in RR No. 5.389A.

NOTE 2 – Average responding instruments should be used to measure the e.i.r.p. values. The measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency. Alternatively, a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits. For non-continuous signals, the measurement should be performed over the active part of the burst.

NOTE 3 – Frequency offset is determined from edge of nominated bandwidth.

TABLE 14

Maximum unwanted emissions falling in the 1 990-2 025 MHz band from an MES using CDMA access techniques within the 1 980-2 025 MHz allocations (Notes 1 and 2)

Frequency offset (kHz) (Note 3)	Carrier-on	
	e.i.r.p. (dBW)	Measurement bandwidth (kHz)
0 to 160	–35	30
160 to 2 300	–35-(offset-160) × 21/2140	30
2 300 to 45 000	–56	30

NOTE 1 – The MSS (Earth-to-space) is allocated frequencies on a co-primary basis in the band 1 980-2 010 MHz in all Regions and in the band 2 010-2 025 MHz in Region 2 subject to the dates of entry into force mentioned in RR No. 5.389A.

NOTE 2 – Average responding instruments should be used to measure the e.i.r.p. values. The measurement time should be such that the difference of the measured e.i.r.p. levels, averaged over subsequent measurement samples, is less than 1 dB at any particular measurement frequency. Alternatively, a measurement time of 100 ms may be used if the measured e.i.r.p. values comply with the applicable limits. For non-continuous signals, the measurement should be performed over the active part of the burst.

NOTE 3 – Frequency offset is determined from edge of nominated bandwidth.

TABLE 15

Maximum e.i.r.p. of the unwanted emissions of an MES in the carrier-off state

Frequency (MHz)	e.i.r.p. (dBW)	Measurement bandwidth
0.1-30	–87	10 kHz
30-1 000	–87	100 kHz
1 000-12 750	–77	100 kHz

NOTE 1 – Peak hold measurement techniques should be used. These values must be at or below the values for the carrier-on state.