

## Appendix 4

### Table of Maximum Permitted Spurious Emissions Power Levels

1. This Appendix derived indicates the maximum permitted power levels of unwanted emissions in the spurious domain using the values indicated in Table 1.
2. Spurious emissions from any part of the installation, other than the antenna and its transmission line, shall not have an effect greater than would occur if this antenna system were supplied with the maximum permitted power at the frequency of that emission.
3. These levels shall not, however, apply to emergency position-indicating radio beacon, emergency locator transmitters, emergency transmitters of ship, survival craft transmitters, survival craft stations or maritime transmitters when used in emergency situations.
4. For technical or operational reasons, more stringent levels than those specified may be applied to protect specific services in certain frequency bands. The levels applied to protect these services, such as safety and passive services, shall be those agreed upon by the appropriate world radiocommunication conference. More stringent levels may also be fixed by specific agreement between the competent authority concerned. Additionally, special consideration of transmitter spurious domain emissions may be required for the protection of safety services, radio astronomy and space services using passive sensors. Information on the levels of interference detrimental to radio astronomy, Earth exploration satellites and meteorological passive sensing is given in the most recent version of Recommendation ITU-R SM.329.
5. Spurious domain emission limits for combined radiocommunication and information.
6. The frequency range of the measurement of spurious domain emissions is from 9 kHz to 110 GHz or the second harmonic if higher.
7. The spurious domain emission levels are specified in the following reference bandwidths:
  - 1 kHz between 9 kHz and 150 kHz
  - 10 kHz between 150 kHz and 30 MHz
  - 100 kHz between 30 MHz and 1 GHz
  - 1 MHz above 1 GHz
8. The reference bandwidth of all space service spurious domain emissions should be 4 kHz.
9. For radar systems, the reference bandwidths for specifying spurious domain emission levels should be calculated for each particular system. Thus, for the four general types of radar pulse modulation utilized for radio navigation, radiolocation, acquisition, tracking and other radiodetermination functions, the reference bandwidth values are determined using the following:

For a fixed-frequency, non-pulse-coded radar, the reciprocal of the radar pulse length, in seconds (e.g. if the radar pulse length is 1  $\mu$ s, then the reference bandwidth is  $1/(1 \mu\text{s}) = 1 \text{ MHz}$ );

For a fixed-frequency, phase-coded pulsed radar, the reciprocal of the phase chip length, in seconds (e.g. if the phase-coded chip is 2  $\mu$ s long, then the reference bandwidth is  $1/(2 \mu\text{s}) = 500 \text{ kHz}$ ).

For a frequency modulated (FM) or chirped radar, the square root of the quantity obtained by dividing the chirp bandwidth in MHz by the pulse length, in  $\mu$ s (e.g. if the FM is from 1250 MHz to 1280 MHz, i.e. 30 MHz, during the pulse length of 10  $\mu$ s, then the reference bandwidth is  $(30 \text{ MHz}/10 \mu\text{s})^{1/2} = 1.73 \text{ MHz}$ ).

For radars operating with multiple waveforms, the reference bandwidth for specifying spurious domain emission levels is determined empirically from observations of the radar emission and is obtained following the guidance given in the most recent version of Recommendation ITU-R M.1177. In the case of radars, for which the bandwidth, as determined using the method above, is greater than 1 MHz, a reference bandwidth of 1 MHz should be used.

Table 1. Attenuation values used to calculate maximum permitted spurious domain emission power levels for use with radio equipment.

Service category, or equipment type	Attenuation (dB) below the power supplied to the antenna transmission line
All services except those services quoted below:	$43 + 10 \log (P)$ , or 70 dBc, whichever is less stringent
Space services (earth stations)	$43 + 10 \log (P)$ , or 60 dBc, whichever is less stringent
Space services (space stations)	$43 + 10 \log (P)$ , or 60 dBc, whichever is less stringent
Radiodetermination	$43 + 10 \log (PEP)$ , or 60 dB, whichever is less stringent
Broadcast television	$46 + 10 \log (P)$ , or 60 dBc, whichever is less stringent, without exceeding the absolute mean power level of 1 mW for VHF stations or 12 mW for UHF stations. However, greater attenuation may be necessary on a case by case basis
Broadcasting at FM	$46 + 10 \log (P)$ , or 70 dBc, whichever is less stringent; the absolute mean power level of 1 mW should not be exceeded
Broadcasting at MF/HF	50 dBc; the absolute mean power level of 50 mW should not be exceeded
SSB from mobile stations	43 dB below PEP
Amateur services operating below 30 MHz (including those using SSB)	$43 + 10 \log (PEP)$ , or 50 dB, whichever is less stringent
Services operating below 30 MHz, except space, radiodetermination, broadcast, those using SSB from mobile stations, and amateur	$43 + 10 \log (X)$ , or 60 dBc, whichever is less stringent, where $X = PEP$ for SSB modulation, and $X = P$ for other modulation
Low-power device radio equipment	$56 + 10 \log (P)$ , or 40 dBc, whichever is less stringent
Emergency transmitters	No limit

Notes:

P: mean power in watts supplied to the antenna transmission line, when burst transmission is used, the mean power P and the mean power of any spurious domain emissions are measured using power averaging over the burst duration.

PEP: peak envelope power in watts supplied to the antenna transmission line.

dB : decibels relative to the unmodulated carrier power of the emission. In the cases which do not have a carrier, for example in some digital modulation schemes where the carrier is not accessible for measurement, the reference level equivalent to dBc is decibels relative to the mean power P.

1. Spurious domain emission limits for all space services are stated in a 4 kHz reference bandwidth.
2. For analogue television transmissions, the mean power level is defined with a specified video signal modulation. This video signal has to be chosen in such a way that the maximum mean power level is supplied to the antenna transmission line.
3. All classes of emission using SSB are included in the category "SSB".

4. Low-power radio devices having a maximum output power of less than 100 mW and intended for short-range communication or control purposes; such equipment is in general exempt from individual licensing.
5. For radiodetermination systems, spurious domain emission attenuation (dB) shall be determined for radiated emission levels, and not at the antenna transmission line. The measurement methods for determining the radiated spurious domain emission levels from radar systems should be guided by the most recent version of Recommendation ITU-R M.1177.
6. In some cases of digital modulation (including digital broadcasting), broadband systems, pulsed modulation and narrow-band high-power transmitters for all categories of services, there may be difficulties in meeting limits close to 250% of the necessary bandwidth.
7. Earth stations in the amateur-satellite service operating below 30 MHz are in the service category “Amateur service operating below 30 MHz (including those using SSB)”.
8. Space stations in the space research service intended for operation in deep space are exempt from spurious domain emission limits.
9. Emergency position-indicating radio beacon, emergency locator transmitters, personal location beacons, search and rescue transponders, ship emergency, lifeboat and survival craft transmitters and emergency land, aeronautical or maritime transmitters.