Application Note 1772: Oct 21, 2002

Where to Go for Regulations Concerning Short-Range Devices (SRD)

Even though the use of short-range devices does not require a license, the products themselves are governed by laws and regulations, which vary from country to country. These devices all fall under the jurisdiction of various regulatory agencies. This document attempts to give a brief summary of the requirements and direct the reader to where the information can be found on the web. An overview of the FCC part 15 and ETSI EN 300-220 is included.

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In the USA, the Federal Communications Commission (FCC) is responsible for regulating all RF devices. Any product intended for unlicensed operation is regulated by the Code of Federal Regulations (CFR), Title 47, Part 15. Part 15 sections are available at http://www.access.gpo.gov/nara/cfr/waisidx_01/47cfr15_01.html.

Section 15.231 covers the 260-470MHz band, while section 15.249 covers the 902-928MHz band.

What follows is a brief summary of sections 15.231 and 15.249.

Section 15.231

According to part 15.231 (paragraphs a through d), a device is allowed to transmit:

- Control or command signals
- ID codes
- Radio control signals during emergencies

However, it is not allowed to:

- Transmit voice or video
- Control toys
- Transmit continuous data

If the transmitter is activated manually, transmission must cease within 5 seconds of the switch being released. If transmission is automatic, then it must cease within 5 seconds of activation. Periodic transmission at regular predetermined intervals are not allowed, unless the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter, as in the case of periodic polling or supervision of transmitters used in security or safety applications.

The maximum field strength of the fundamental (260-470MHz) is increasing linear from 3750µV/m to 12500µV/m. These limits are specified at a distance of 3m. Spurious emissions are to be attenuated by 20dB of fundamental.

The bandwidth shall not be any wider than 0.25% of the center frequency. The bandwidth is determined at the points 20dB down from the modulated carrier.

Devices may be employed for any type of operation (paragraph e) provided the output power is halved, the maximum transmission time is limited to 1 second and the period between transmissions is 30 times the transmission period (but never less than 10 seconds). All other paragraph b through d provisions still apply.

Section 15.249

Devices operating in the 902-928MHz band are certified under part 15.249 and are allowed a field strength of up to 50mV/m (at a distance of 3 meters). Harmonics are limited to 500µV/m while other spurious emissions are limited to 50dBc.

There are no restrictions on content or duration of a transmission.

In Europe, the European Conference of Postal and Telecommunications Administrations (CEPT) has the responsibility of frequency assignments and output power. The European Radiocommunications Office (ERO) is the permanent office supporting the Electronic Communications Committee (ECC) of the CEPT and publishes the recommendations which are described in ERC REC 70-03 The following is a summary for the 433MHz and 868MHz frequency bands. The complete document is available at http://www.ero.dk/.

Class	Frequency Band	Power (e.r.p)	Duty Cycle	Channel Spacing	Notes
1e	433.050-434.79	10mW	<10%	No spacing	Non-specific SRDs. Audio and voice signals should be avoided.
10c	863.000-865.000	10mW	100%	200kHz	Wireless microphones
13a	863.000-865.000	10mW	100%	No spacing (300kHz for analog systems)	Wireless audio
1f	868.000-868.600	25mW	<1.0%	No spacing	Non-specific SRDs
7a	868.600-868.700	10mW	<0.1%	25kHz	Alarms
1g	868.700-869.200	25mW	<0.1%	No spacing	Non-specific SRDs
7d	869.200-869.250	10mW	<0.1%	25kHz	Alarms
7b	869.250-869.300	10mW	<0.1%	25kHz	Alarms
1h	869.300-869.400	10mW	No restriction	25kHz	Non-specific SRDs
1i	869.400-869.650	500mW	<10%	25kHz	Non-specific SRDs
7c	869.650-869.700	25mW	<10%	25kHz	Alarms
1k	869.700-870.000	5mW	100%	No spacing	Non-specific SRDs

The European Telecommunications Standards Institute (ETSI) produces the testing and approval standards. Standards for SRD devices are covered in EN 300 220:

http://pda.etsi.org/pda/home.asp?wki_id=9343 (EN 300 220-1)
http://pda.etsi.org/pda/home.asp?wki_id=8804 (EN 300 220-2)
http://pda.etsi.org/pda/home.asp?wki_id=6474 (EN 300 220-3)

A brief summary follows:

Frequency Error (Section 8.1)

The frequency error or drift shall not exceed the values given under normal or extreme conditions.

Channel Spacing	Frequency Error Limit (kHz)	
	300-500MHz	500-1000MHz
10/12.5kHz	±1 (b) ±1.5 (m) ±2.5 (p)	No value specified
20/25kHz	±2 (b) ±2 (m) ±2.5 (p)	±2.5 (b) ±2.5 (m) ±3 (p)

Note: (b) = fixed station; (m) = mobile station; (p) = portable station.

Carrier Power (conducted) (Section 8.2)

This applies to equipment with a permanent external antenna connector. The carrier output power shall not exceed the power class value given.

Power Class	Power Level (mW)
5a	0.025
7a	5
8	10
9	25
11	100
12	500

Effective Radiated Power (Section 8.3)

Applies to equipment with an integral or dedicated antenna. Same limits as above.

Adjacent Channel Power (Section 8.5)

The adjacent channel power should not exceed:

	Channel Separation < 20kHz	Channel Separation ≥ 20kHz
Normal Test Conditions	10µW	200nW
Extreme Test Conditions	32µW	640nW

Range of Modulation Bandwidth for Wide Band Equipment (>25KHz) (Section 8.6)

The range of modulation bandwidth includes all associated side bands above the appropriate spurious level and the frequency error or drift under extreme test conditions. The spurious level limit is 250nW.

Spurious Emission (Section 8.7)

The measurement should be done without modulation applied. For transmitters operating on frequencies below 470MHz, the measurement should be done over 9kHz to 4GHz. For equipment operating above 470MHz, the upper limit is 12.75GHz. The power of any spurious emission, conducted or radiated, shall not exceed the following values:

State	47MHz to 74MHz 87.5MHz to 118MHz 174MHz to 230MHz 470MHz to 832MHz	Other Frequencies below 1000MHz	Frequencies Above 1000MHz
Operating	4nW	250nW	1µW
Standby	2nW	2nW	20nW

Frequency Stability for Low Voltage Conditions (Section 8.8)

For battery operated equipment, it is required that the transmitter remains on channel when the voltage drops below the lower extreme voltage level, or cease to operate altogether.

Receiver Spurious Radiation (Section 9.4)

Receiver spurious radiations are emissions from the equipment and antenna. For receivers operating on frequencies below 470MHz, the measurement should be done over 9kHz to 4GHz. For equipment operating above 470MHz, the upper limit is 12.75GHz. The power of any spurious emission, conducted or radiated, shall not exceed the following values:

	<1000MHz	>1000MHz
Spurious Limit	2nW	2nW

In Australia, the Australian Communication Authority (ACA) is responsible for managing the radiofrequency spectrum. Standards for SRD devices are spelled out in AS-4268.2-1995. More details can be found at http://www.aca.gov.au/legal/licence/class/lipd.htm.

To find more information on other countries, check the Asia-Pacific Economic Cooperation Telecommunications and Information Working Group's (APEC TEL WG) website at http://www.apectelwg.org/apec/alos/osite_1.html.

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