

By the TRA Board Decisions No 114/2009 and 115/2009, Regulations on Short Range Devices (SRD), Short Range Radars (SRR) and Wireless Access Systems including Radio Local Area Networks (WAS/RLANs) regulated by Annexes E, F and G of regulations organizing the registration and usage of frequencies and radio equipment and their pricing issued by Decision 133/2008 on 28th October 2008, have been updated and effective from January 10, 2010. Annex E has been further updated through TRA Board Decisions No 11/2011 effective from January 30, 2011. Therefore, these shall be taking into account in the application of the National Frequency Assignment Table.

Annex E. Short Range Devices, Frequency Ranges and Power Limitations

SRDs may be fixed, mobile or portable stations which have a radio frequency output connector and dedicated antenna or an integral antenna. Applications include telecommand, alarms, data communication, detection of avalanche victims, meter reading, asset tracking, hearing aids, movement detection and alert, remote controls, inductive systems, and many other applications. These devices may employ different types of modulation and may have speech application.

- **SRDs shall be designed to meet the following basic objectives:**

- The device is intended to operate in unprotected and shared frequency bands. Its operation shall not cause interference with other authorized radio-communication services, and be able to tolerate any interference caused by other radio-communication services, electrical or electronic equipment.
- The device shall not be constructed with any external or readily accessible control which permits the adjustment of its operation in a manner that is inconsistent with these Requirements.
- The device shall be marked with the supplier/manufacturer's name or identification mark, and the supplier/manufacturer's model or type reference. The markings shall be legible, indelible and readily visible.

- **Regulatory Requirements**

- All SRDs that are intended to be manufactured and/or imported shall be type approved by the Telecommunications Regulatory Authority (TRA) of the Sultanate of Oman before they are placed on the Omani market.
- The operation of SRDs that meet these requirements and are appropriately type approved are exempted from individual licensing if other conditions are not stated hereinafter.
- Local companies selling, manufacturing and/or importing SRDs are requested to register with TRA as dealers of telecommunications equipment.

- **Technical Requirements**

- The SRD shall comply with the maximum field strength or output power given in Table 124, operating in its intended frequency band or frequencies. It shall fulfil the relevant requirements of this specification on all the permitted frequencies which it is intended to operate.

- **Type-approval Requirements**

Along with application for type approval, the applicant shall present the documents that provide the full technical specifications of the equipment and the documents that prove its conformity to the technical standards adopted (or required) in the Sultanate like ETSI and IEC standards or alternative national standards. These documents shall be obtained from accredited bodies and may include, but not limited to:

- EMC, Safety and RF conformity test reports
- Manufacturer's Declaration of Conformity
- Certificates of Conformity.

Further details regarding frequency ranges, radiated power and typical applications are provided in the table below.

Authorized Frequency bands / Frequencies		Power / Magnetic Field	Channel Spacing	Duty Cycle (%)	Examples of SRD Applications	Remarks
1	13.553-13.567 MHz	42 dBμA/m at 10m	no channel spacing – the whole stated frequency band may be used	no duty cycle restriction	Non-specific Short Range Devices ¹ (Telemetry, Telecommand, Alarms and Data in general and other similar applications)	
1.1	26.957-27.283 MHz	42 dBμA/m at 10 metres or 10 mW ERP				
2	40.660-40.700 MHz	10 mW ERP		below 10 %		
3	433.050-434.790 MHz <u>(note 4)</u>	10 mW ERP				
4	433.050-434.790 MHz <u>(note 4bis)</u>	1 mW ERP -13 dBm/10 kHz for wide band channels ²	up to 25 kHz	no duty cycle restriction		Applications providing audio <u>should be excluded</u> . See Note 4bis for voice applications
5	434.040-434.790 MHz (note 4bis)	10 mW ERP				
6	868.0 – 868.6 MHz (note 4)	25 mW ERP	no spacing, for 1 or more channels (note 2)	below 1 % or LBT (note 1)		
7	868.7-869.2 MHz (note 4)	25 mW ERP		below 0.1 % or LBT (note 1)		
8	869.4-869.65 MHz (note 4)	500 mW ERP	25 kHz ³ (for one or more channels)	below 10 % or LBT (note 1)		Narrow/ wide-band modulation The whole stated frequency band may be used as 1 channel for high speed data transmission
9	869.7-870 MHz (note 4bis)	5 mW ERP	no channel spacing, for 1 or more channels)			
9.2	863-870 MHz (note 3, 4 and 6)	25 mW ERP	≤100 kHz for 47 or more channels (note 2)	below 0.1 % or LBT (note 1 and 5)	FHSS modulation	
		25 mW ERP (note 6) Power density: -4.5 dBm/100 kHz (note 8)		below 0.1 % or LBT (note 1, 5 and 6)	DSSS and other wideband modulation other than FHSS	
		25 mW ERP	≤100 kHz, for 1 or more channels (note 2 and 7)	below 0.1 % or LBT (note 1 and 5)	Narrow/ wide-band modulation	
9.3	2400-2483.5 MHz	10 mW ERP				
9.4	5725-5875 MHz	25 mW ERP				

¹ Video applications should only be used above 2.4 GHz.

² For the purpose of this Technical Specification wideband channels are those with a bandwidth greater than 250 kHz.

³ The center frequency of the first channel is at a distance of channel spacing/2 from the lower frequency band edge.

Authorized Frequency bands / Frequencies		Power / Magnetic Field	Channel Spacing	Duty Cycle (%)	Examples of SRD Applications	Remarks	
10	457 kHz	7 dBμA/m at 10 m	continuous wave (CW) – no modulation	no duty cycle restriction	Detection of avalanche victims		
11	169.4-169.475 MHz	500 mW ERP	12.5 kHz, 25 kHz, Max 50 kHz	below 10 %	Meter reading		
				below 1 %	Asset Tracking and Tracing Systems		
12	169.4875-169.5875 MHz	10 mW ERP	12.5 kHz, 25 kHz, max 50 kHz	no duty cycle restriction	Aids for hearing impairment		
13	2400-2483.5 MHz	25 mW EIRP	no channel spacing – the whole stated frequency band may be used.	No duty cycle restriction	Movement Detection and Alert		
14	169.481250 MHz, 169.593750 MHz	10 mW ERP	12.5 kHz	below 1 %	Alarm systems, social alarms, alarms for security and safety		
15	868.6-868.7 MHz		25 kHz ⁴ or the whole frequency band may also be used as one channel for high speed data transmission	below 0.1 %			
16	869.250-869.3 MHz		25 kHz ⁴			below 10 %	
17	869.650-869.7 MHz			25 mW ERP		below 0.1 %	Social alarms
17.2	869.2-869.25 MHz			10 mW ERP		below 1 %	
17.3	869.3-869.4 MHz						
18	26.995, 27.045, 27.095, 27.145, 27.195 MHz	100 mW ERP	10 kHz ⁴	no duty cycle restriction	Model control		
19	34.995-35.225 MHz					only for flying models	
20	40.665, 40.675, 40.685, 40.695 MHz						
21	9 – 59.750 kHz	72 dBμA/m at 10 metres ⁵ (at 30 kHz descending 3 dB/oct)	No channel spacing – whole stated frequency band may be used	no duty cycle restriction	Inductive applications	in case of external antennas only loop coil antennas shall be employed	
		42 dBμA/m at 10 metres					
		72 dBμA/m at 10 metres ⁵ (at 30 kHz descending 3 dB/oct)					
22	59.750 – 60.250 kHz						
23	60.250 – 70 kHz						

⁴ The center frequency of the first channel is at a distance of channel spacing/2 from the lower frequency band edge.

⁵ In the case of loop antennas (integral or dedicated) with an area between 0.05 m² and 0.16 m², field strength is reduced by 10 * log (area/0.16 m²); for an antenna area less than 0.05 m² field strength is reduced by 10 dB.

Authorized Frequency bands / Frequencies		Power / Magnetic Field	Channel Spacing	Duty Cycle (%)	Examples of SRD Applications	Remarks
24	70 – 119 kHz	42 dBµA/m at 10 metres				
25	119 – 135 kHz	72 dBµA/m at 10 metres ⁵ (at 30 kHz descending 3 dB/oct)				
26	7400 – 8800 kHz	9 dBµA/m at 10 metres				
27	26.957 – 27.283 MHz	42 dBµA/m at 10 metres				
27.2	10.2-11 MHz	9 dBµA/m at 10 metres				
28	402-405 MHz	25 µW ERP	25 kHz ⁶ or individual transmitters may combine adjacent channels for an increased bandwidth of up to 300 kHz	no duty cycle restriction	Medical Implants	
29	863 – 865 MHz	10 mW e.r.p.	No channel spacing – whole stated frequency band may be used ⁷	no duty cycle restriction	Wireless Audio Applications	There shall be no transmission of an RF carrier in the absence of an audio input
29.2	87.5-108 MHz (note 11)	50 nW ERP	200 kHz			
29.3	470-790 (note 13)	50 mW e.r.p.	No spacing	No requirement		Radio microphones and Assistive Listening Devices
30	865-868 MHz	20 µW ERP (note 9)	200 kHz	LBT, max. Period of continuous transmission on channel is 4 s	Radio Frequency Identification (RFID) Applications (e.g. automatic article identification, asset tracking, alarms systems, waste management, personal identification, access control, proximity sensors, anti-theft systems, location systems, data transfer to handheld devices and wireless control systems etc.)	RFID tags may respond on any channel within the band Interrogators are not required to use LBT in the 4 high power channels
30.1	13.553-13.567 MHz	42 dBµA/m at 10m	No spacing	No requirement		For inductive applications
30.2	13.553-13.567 MHz	60 dBµA/m at 10m	No spacing	No requirement		For RFID and EAS only
31	2446-2454 MHz (note 10)	≤500 mW EIRP >(500 mW-4 W) EIRP	No spacing	No requirement ≤15% duty cycle		Power levels above 500 mW are restricted to use inside the boundaries of a building and the duty cycle of all transmissions shall in this case be ≤15% in any 200 ms period (30 ms on /170 ms off)
32	77-81 GHz	Note 12	Note 12		Road Transport and Traffic Telematics (RTTT)	Short range radar (SRR)

Table 124 – SRD, Frequency Ranges, Radiated Power and Typical Applications

⁶ The center frequency of the first channel is at a distance of channel spacing/2 from the lower frequency band edge.

⁷ In the case of analogue systems the maximum occupied bandwidth shall not exceed 300 kHz.

Note1: for frequency agile devices the duty cycle limit applies to the total transmission unless LBT is used. For LBT devices without frequency agility, the duty cycle limit applies.

Note 2: the preferred channel spacing is 100 kHz allowing for a subdivision into 50 kHz or 25 kHz

Note 4: the duty cycle, LBT or equivalent technique shall not be user dependent and shall therefore be guaranteed by appropriate technical means

Note 4bis: audio applications should be excluded. Voice applications allowed with spectrum access technique such as LBT or equivalent technique, the transmitter shall include a power output sensor controlling the transmitter to a maximum transmit period of 1 minute.

Note 5: Duty cycle may be increased to 1% if the band is limited to 865-868 MHz

Note 6: for other wide-band modulation than FHSS and DSSS with a bandwidth of 200 kHz to 3 MHz, duty cycle can be increased to 1% if the band is limited to 865-868 MHz and power to ≤ 10 mW e.r.p.

Note 8: the power density can be increased to +6.2 dBm/100 kHz and +0.8 dBm/100 kHz, if the band of operation is limited to 865-868 MHz and 865-870 MHz respectively.

Note 9: maximum radiated power is 2 W ERP in four high power channels (4, 7, 10 and 13). Channel centre frequencies are $864.9 \text{ MHz} + (0.2 \text{ MHz} * \text{channel number})$

Note 10: Frequency Hopping Spread Spectrum (FHSS) techniques should be used as means of mitigation when more than 500 mW EIRP is used

Note 11: systems should be designed so that when not in use there should be no transmission of an RF carrier. When audio signals are not present, apparatus must employ a transmission time out facility. Pilot tones that ensure continuity of transmission are not permitted. The user interface of SRD shall permit as a minimum the selection of any and all possible frequencies within the 88.1 MHz to 107.9 MHz and as a maximum 87.6 MHz to 107.9 MHz.

Note 12: maximum mean power density of -3 dBm/MHz e.i.r.p. associated with a peak limit of 55 dBm EIRP. Maximum mean power density outside a vehicle resulting from the operation of one SRR equipment shall not exceed -9 dBm/MHz EIRP.

Note 13: The band 790-862 MHz may also be used for Wireless Radio Microphones and Assistive Listening Devices till 17 June 2015 with the same characteristics and conditions as for the band 470-790 MHz.

Annex F. Technical Specifications for Wideband and Broadband Data Transmission Systems

Frequency Band	Allowed Power	Type of allowed Applications	Restrictions	Mandatory Mitigation Techniques	Additional Requirements
2400-2483.5 MHz	100 mW max. mean EIRP For wide band and broadband modulations other than frequency hopping spread spectrum, the maximum spectrum power density is limited to 10mW/MHz	RLANs	Indoor use only		Integral (no external antenna socket) or dedicated antenna only
5150-5250 MHz	200 mW max. mean EIRP 10 mW/MHz max. mean EIRP density	WAS/RLANs	Indoor use only		
5250-5350 MHz	200 mW max. mean EIRP 10 mW/MHz max. mean EIRP density	WAS/RLANs	Indoor use only	TPC ¹ DFS ²	
5470-5725 MHz	1 W max. mean EIRP 50 mW/MHz max. mean EIRP density	WAS/RLANs		TPC ¹ DFS ²	
5725-5850 MHz	2 W max. mean EIRP 20 dBm/MHz max. mean EIRP density	FWA systems only	Outdoor use only	TPC ³ DFS ⁴	Elevation plane antenna patterns of FWA central and terminal stations shall meet appropriate envelop patterns derived from Recommendation ITU-R F.1336-1

1. WAS/RLANs operating in the bands 5250-5350 MHz and 5470-5725 MHz shall either employ transmitter power control (TPC), or, if TPC is not used, then the maximum permitted mean EIRP and the corresponding mean EIRP density limits shall be reduced by 3 dB;
2. WAS/RLANs operating in the bands 5250-5350 MHz and 5470-5725 MHz shall use mitigation techniques complying with the detection, operational and response requirements described in Annex 1 of Recommendation ITU-R M.1652 to ensure compatible operation with the radiodetermination system;
3. FWA systems operating in frequency band 5725-5850 MHz shall employ TPC with a range of at least 5 dB;
4. FWA systems operating in frequency band 5725-5850 MHz shall employ DFS mechanisms with equivalent DFS detection threshold (dBm) at receiver input shall be as following:

$$DFS(dBm) = -69 + 23 - (\text{Max.Tx EIRP}(dBm)) - 10 \lg ChS(MHz) + Grx(dBi)$$
, where ChS is nominal operating channel width and Grx is receiver antenna gain.

Table 125 – WAS/RLANs, Technical Specifications.

Annex G. Technical Specifications of Short Range Radar (SRR)

An SRR is defined as a radiocommunication equipment that falls in the general category of vehicular radar systems and provides collision mitigation and traffic safety applications;

Technical Specifications	Short Range Radar (SRR)
Frequency Band:	21.65-26.65 GHz
EIRP max.:	-41.3 dBm/MHz maximum mean power density 0 dBm/50MHz peak power density
References:	ETSI EN 302 288-1 and ETSI EN 302 288-2

Table 126 – Short Range Radar, Ultra Wideband Component, Technical Specifications

Technical Specifications	Short Range Radar (SRR)
Frequency Band:	24.05-24.25 GHz
EIRP max.:	20 dBm maximum peak power
Duty Cycle:	10% for peak emissions higher than -10 dBm EIRP
References:	ETSI EN 302 288-1 and ETSI EN 302 288-2

Table 127 – Short Range Radar, Narrowband Component, Technical Specifications

Operation of SRR equipment is on a non-interference and non-protected basis;

Emissions within the 23.6-24 GHz band that appear 30° or greater above the horizontal plane shall be attenuated by at least 25 dB up to 2010 and 30 dB up to 1 July 2013 for above SRR systems;

24 GHz frequency range may only be used in Oman for new SRR systems until the reference date that is set to 1 July 2013. After this reference date, the 79 GHz range for new SRR systems or alternative permitted technical solutions must be used for road vehicle collision mitigation and traffic safety applications, while existing 24 GHz equipment may still operate to the end of the lifetime of the vehicles;

Any type of SRR equipment shall be type approved by the TRA.