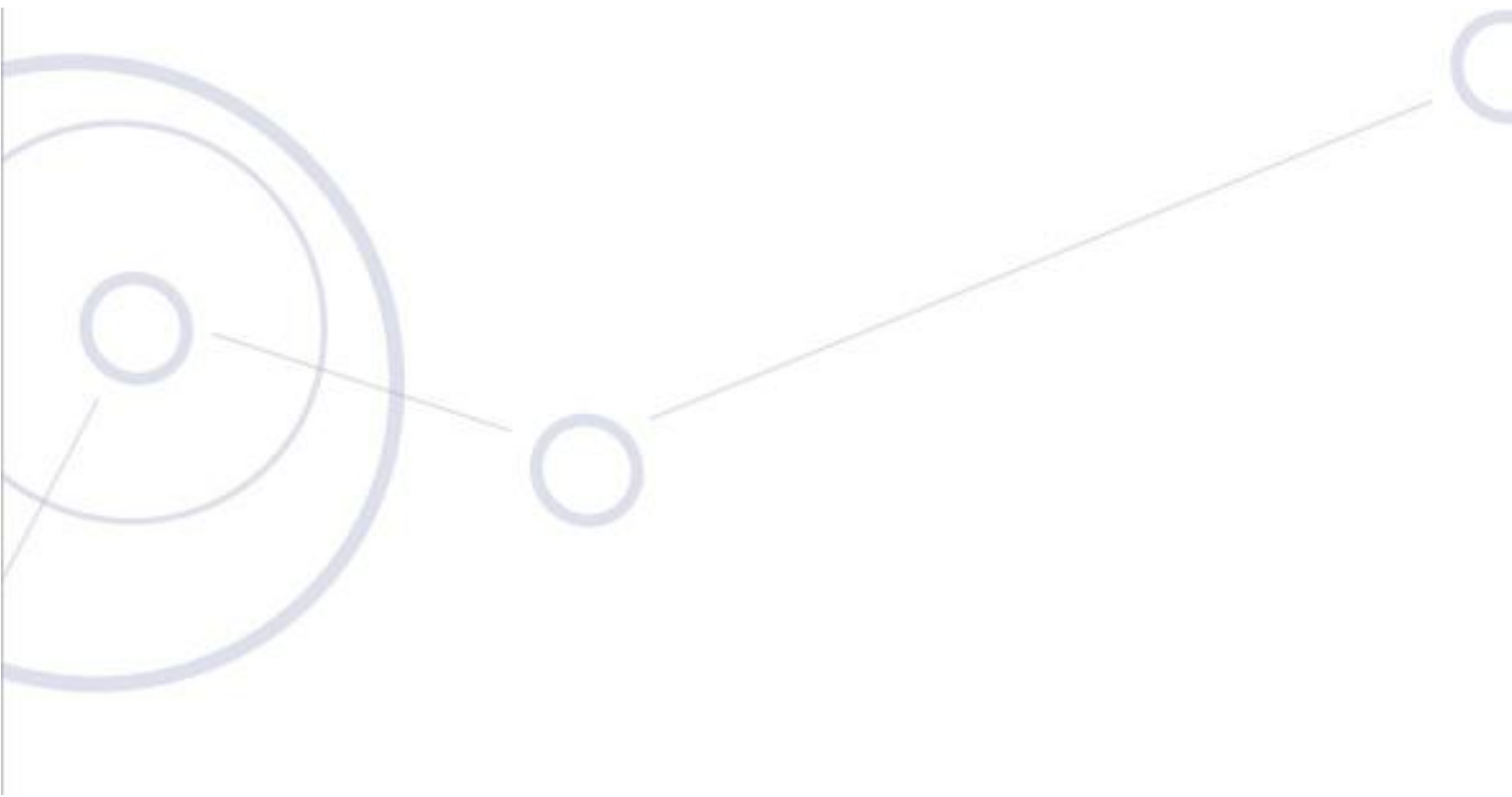


RADWIN

AP0127730, AP0134760

RF Module Operating in the 4.9-5.8 GHz bands

REFERENCE GUIDE



Regulatory Compliance

FCC/IC - Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules and IC RSS standards. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



Warning

It is the responsibility of the installer to ensure that when using the outdoor antenna kits, only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden by FCC rules 47 CFR part 15.204 and IC RSS standards.



Avertissement

Il est de la responsabilité de l'installateur de s'assurer que lorsque vous utilisez les kits d'antennes extérieures, seules les antennes certifiés avec le produit sont utilisés. L'utilisation d'une antenne autre que ceux qui sont certifiés avec le produit est expressément interdite par la réglementation FCC partie 47 CFR 15.204 et IC normes RSS.



Caution

Outdoor units and antennas should be installed ONLY by experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities. Failure to do so may void the product warranty and may expose the end user or the service provider to legal and financial liabilities. Resellers or distributors of this equipment are not liable for injury, damage or violation of regulations associated with the installation of outdoor units or antennas. The installer should configure the output power level of antennas according to country regulations and antenna type.



Prudence

Les unités extérieures et les antennes doivent être installés que par des professionnels expérimentés d'installation qui sont familiers avec les normes locales et les codes de sécurité et, si applicable, sont agréées par les autorités gouvernementales de réglementation compétents. Ne pas le faire peut annuler la garantie du produit et peuvent exposer l'utilisateur final ou le fournisseur de services d'obligations juridiques et financiers. Revendeurs ou distributeurs de ces équipements ne sont pas responsables des blessures, des dommages ou violation des règlements liés à l'installation des unités extérieures ou des antennes. L'installateur doit configurer le niveau de puissance de sortie des antennes conformément aux réglementations nationales et le type d'antenne.



Warning

This equipment should be installed and operated with a minimum distance of 354cm between the radiator and your body.



Avertissement

Cet équipement doit être installé et utilisé à une distance minimale de 354cm entre le radiateur et votre corps.



Warning

The module is granted to operate under FCC certification in the 4.9 GHz and 5.8 GHz bands only.



Warning

Devices subject to RSS-210 Annex 9 shall not be capable of transmitting in the band 5600-5650 MHz.

This device complies with Part 15 of the FCC rules and with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme la norme d'Industrie Canada exempts de licence RSS (s). Son fonctionnement est soumis aux deux conditions suivantes:

1. Cet appareil ne peut pas causer d'interférences, et
2. Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme la norme NMB-003 du Canada

Overview

The AP0127730, AP0134760 is an RF module operating in the 4.9 – 5.8 GHz frequency bands. It is a TDD OFDM radio supporting 5 MHz, 10 MHz, 20 MHz and 40 MHz channel bandwidths.

The RF module cannot work as a stand-alone device. It can operate and be controlled only when attached to a digital main board and altogether assembled in an enclosure suitable for outdoor use. The assembly of the RF module attached to the digital main board is hereafter referred to as 'ODU'. The ODU in its various outdoor enclosures is manufactured by RADWIN.

The RF module is certified as a limited modular approval type with the FCC ID: Q3KRW5XMOD and IC: 5100A-RW5XMOD.

Condition of Use

The AP0127730, AP0134760 RF module is a proprietary radio interface and can only be connected to digital boards manufactured by RADWIN. The ODU resides in an outdoor enclosure also manufactured and assembled by RADWIN or its subcontractors. The RF module is not for sale to the general public.

FCC rules and IC Regulation Restrictions

The ODU firmware is factory programmed to operate under the FCC rules and Industry Canada regulation restrictions. The firmware is locked and inaccessible by any third party. As a result of the above the user interface allows both the installer and the user to control the ODU only within the boundaries of the regional restrictions.

Antennas

The AP0127730, AP0134760 RF module is certified with various antenna types covering both Point-to-Point and Point-to-Multipoint systems up to 32 dBi gain.

Certified Antennas

Following is the list of antennas certified for use with the AP0127730, AP0134760 RF module:

Antenna Type	Manufacturer	Model Number	Antenna Max Gain (dBi)
Sector Dual Pole Integrated 120 Deg	RADWIN Ltd.	MT0128930	11
Sector Dual Pole 120 Deg	RADWIN Ltd.	RW-9061-5004	11
Sector Dual Pole Integrated 95 Deg	RADWIN Ltd.	AM0135060	12
Sector Dual Pole 90 Deg	RADWIN Ltd.	RW-9061-5001	14
Sector Dual Pole 60 Deg	RADWIN Ltd.	RW-9061-5002	16.5
Sector Dual Pole Integrated 90 Deg	RADWIN Ltd.	MT0125250	13
Flat Panel Dual Pole Integrated	RADWIN Ltd.	AM0119960	16
Flat Panel Dual Pole Integrated	RADWIN Ltd.	AM0111760	16.5
Flat Panel Dual Pole Integrated	RADWIN Ltd.	MT0070760	24
Flat Panel Dual Pole External	RADWIN Ltd.	RW-9612-5001	23
Flat Panel Dual Pole External	RADWIN Ltd.	RW-9622-5001	29
Dual Pole Dish	RADWIN Ltd.	RW-9721-5158	29
Dual Pole Dish	RADWIN Ltd.	RW-9732-4958*	32
Shark Fin Monopole	RADWIN Ltd.	RW-9401-5002	12.5

* Not applicable for 4.9 GHz band

Maximum Output Power

5725 – 5850 MHz band - FCC/IC

The maximum output power can be set as follows, when operating in the 5.8 GHz band, under FCC and IC regulations. The power values are for PtP systems and PtMP systems with 0 to 6 dBi total antenna assembly gain. For PtMP systems the total EIRP is limited to 36 dBm. Therefore the output power of these systems, using higher than 6 dBi total antenna assembly gains will be reduced to comply with 36 dBm EIRP.

The highest conducted output power shall be limited to 30 dBm in all channel bandwidths

4940 – 4990 MHz band - FCC/IC

The maximum output power can be set as follows, when operating in the 4.9 GHz band, under FCC and IC. The power values shown below are for systems using 0 to 26 dBi total antenna assembly gain. Systems using 29 dBi antenna gain must reduce output power by 3 dB.

5 MHz: 25.0 dBm
10 MHz: 23.0 dBm
20 MHz: 24.0 dBm

5250 – 5350 MHz band – FCC/IC

The maximum output power can be set as follows, when operating in the 5.2 GHz band, under IC regulations. The total EIRP limit is 30 dBm. The power values are for systems with 0 to 6 dBi total antenna assembly gain. For systems using higher than 6 dBi total assembly gain antennas the output power will be reduced to comply with 30 dBm EIRP.

5 MHz: 18.0 dBm
10 MHz: 20.0 dBm
20 MHz: 23.0 dBm
40 MHz: 24.0 dBm

5470 – 5725 MHz band – FCC/IC

The maximum output power can be set as follows, when operating in the 5.4 GHz band, under IC regulations. The total EIRP limit is 30 dBm. The power values are for systems with 0 to 6 dBi total antenna assembly gain. For systems using higher than 6 dBi total assembly gain antennas the output power will be reduced to comply with 30 dBm EIRP.

5 MHz: 17.0 dBm
10 MHz: 20.0 dBm
20 MHz: 23.0 dBm
40 MHz: 24.0 dBm

5150 – 5250 MHz band – FCC

The maximum output power can be set as follows when transmitting in the 5.1 GHz band, under FCC regulations.

The total EIRP limit for PtP applications is 53 dBm.

The total EIRP limit for PtMP applications is 36 dBm.

The total EIRP limit for PtMP applications when transmitting at elevations above 30° relative to the horizon is 21 dBm.

5 MHz: 24.0 dBm
10 MHz: 27.0 dBm
20 MHz: 28.0 dBm
40 MHz: 23.0 dBm

US - OPERATION TO AVOID INTERFERENCE WITH TDWR

The US FCC, NTIA, FAA, and industry are working to resolve interference to Terminal Doppler Weather Radar (TDWR) systems used near airports that has occurred from some outdoor wireless systems operating in the 5470 MHz – 5725 MHz band. These wireless devices are subject to Section 15.407. When operating as a master device they are required to implement radar detection and DFS functions and radios must not transmit on channels which overlap the 5600-5650 MHz band used by TDWR.

Additional information is available from

- the FCC's Knowledge Database (KDB) Publication 443999 "Interim Plans to Approve UNII Devices Operating in the 5470-5725 MHz Band with Radar Detection and DFS Capabilities" available at <https://fjallfoss.fcc.gov/kdb/GetAttachment.html?id=33781>
- the Wireless Internet Service Providers Association (WISPA) in coordination with Spectrum Bridge: <http://www.spectrumbridge.com/udia/home.aspx>. 5.4-GHz radios must be professionally installed. The professional installer must have the following expertise:
- Understanding of the configurations outlined in [Table 2: US FCC IDs and Industry Canada Certification Numbers and covered configurations](#), especially those applicable to the 5470-5725 MHz U-NII band.
- Understanding of the master/slave operation of the RADWIN 2000, RADWIN 5000 and RADWIN 6000 family products into which the RF Module AP0127730 or AP0134760 is assembled (hereafter: ODU). The Master ODU determines the operating frequency of the radio link (Master and Slave).
- Understanding of the devices frequency-scan selection settings and how they can be set to prevent scanning and therefore transmission on any specific frequencies.
- Understanding of the option to set primary and two alternate frequencies on the Master ODU.
- Ability to use the RADWIN Manager (hereafter: NMS) to set the primary and alternate transmit frequencies on the Master ODU, scanned frequencies on an Slave ODU, and Transmit Output Power of a radio.
- Ability to use the NMS Spectrum View utility feature to observe the local RF environment.
- Ability to determine if a radio is within 35 km (21.75 mi) of any Terminal Doppler Weather Radar (TDWR) using the Search function available at <http://www.spectrumbridge.com/udia/search.aspx>, or using various mapping programs and the data from in [Table 1: TDWR Location Information](#).
- Ability to set the Master ODU's transmit frequency (frequencies, if using alternate frequencies) and Slave ODU's scanned frequencies at least 30 MHz (center-to-center) from any TDWR operating frequency or frequencies within 35 km of the radio.

To gain this expertise the following training is required:

- Study of the documentation
- Familiarization in a lab or test environment
- Hands-on training with an experienced installer.

Procedure 1 provides the specific instructions to avoid interfering with TDWR when using 5.4GHz ODUs

Procedure 1: Avoiding interference with Terminal Doppler Weather Radar (TDWR)

1. Use standard installation procedures with the additional steps outlined below.
2. For each 5.4-GHz ODU, determine if it is within 35 km (21.75 mi) of any Terminal Doppler Weather Radar (TDWR). This can be done using the map search tool at <http://www.spectrumbridge.com/udia/search.aspx>, or other mapping tools using the data from [Table 1](#).

4. If a Master ODU is within 35 km (21.75 mi) of any TDWR, disable the primary transmit frequency (and alternate frequencies, if used) that are between 5570-5680 MHz.

5. If a Slave ODU is within 35 km (21.75) mi of any TDWR

- Ensure its Master ODU isn't using primary or alternate (if used) transmit frequencies that are within 5570-5680 MHz frequency range
- Set the Slave ODU's scanned frequencies to not include frequencies within 5570-5680 MHz frequency range

Note, even if the Master ODU itself is more than 35 km from the TDWR, if any of its Slave ODUs are within 35 km, it must not operate within 5570-5680 MHz frequency range.

Note, in some instances an ODU may be within 35 km of multiple TDWRs. In this case, the device must not use any frequency within 5570-5680 MHz frequency range.

6. Register each 5.4-GHz device operating within 35 km (21.75 mi) of any TDWR in the voluntary WISPA-sponsored database at <http://www.spectrumbridge.com/udia/home.aspx>.

Note, this database may help expedite resolution of any interference to TDWRs.

7. Registration includes, at a minimum, Latitude, Longitude, and External Antenna Model. When registering a device, choose whether to allow General Access or to have the device information viewable only by you and government representatives.

Table 1: TDWR Location Information

State	City	Longitude	Latitude	Frequency	Terrain Elevation (MSL) (ft)	Antenna Height above Terrain (ft)
AZ	PHOENIX	W 112 09 46	N 33 25 14	5610 MHz	1024	64
CO	DENVER	W 104 31 35	N 39 43 39	5615 MHz	5643	64
FL	FT LAUDERDALE	W 080 20 39	N 26 08 36	5645 MHz	7	113
FL	MIAMI	W 080 29 28	N 25 45 27	5605 MHz	10	113
FL	ORLANDO	W 081 19 33	N 28 20 37	5640 MHz	72	97
FL	TAMPA	W 082 31 04	N 27 51 35	5620 MHz	14	80
FL	WEST PALM BEACH	W 080 16 23	N 26 41 17	5615 MHz	20	113
GA	ATLANTA	W 084 15 44	N 33 38 48	5615 MHz	962	113
IL	MCCOOK	W 087 51 31	N 41 47 50	5615 MHz	646	97
IL	CRESTWOOD	W 087 43 47	N 41 39 05	5645 MHz	663	113
IN	INDIANAPOLIS	W 086 26 08	N 39 38 14	5605 MHz	751	97
KS	WICHITA	W 097 26 13	N 37 30 26	5603 MHz	1270	80
KY	COVINGTON CINCINNATI	W 084 34 48	N 38 53 53	5610 MHz	942	97
KY	LOUISVILLE	W 085 36 38	N 38 02 45	5646 MHz	617	113
LA	NEW ORLEANS	W 090 24 11	N 30 01 18	5645 MHz	2	97
MA	BOSTON	W 070 56 01	N 42 09 30	5610 MHz	151	113
MD	BRANDYWINE	W 076 50 42	N 38 41 43	5635 MHz	233	113
MD	BENFIELD	W 076 37 48	N 39 05 23	5645 MHz	184	113
MD	CLINTON	W 076 57 43	N 38 45 32	5615 MHz	249	97
MI	DETROIT	W 083 30 54	N 42 06 40	5615 MHz	656	113
MN	MINNEAPOLIS	W 092 55 58	N 44 52 17	5610 MHz	1040	80
MO	KANSAS CITY	W 094 44 31	N 39 29 55	5605 MHz	1040	64
MO	SAINT LOUIS	W 090 29 21	N 38 48 20	5610 MHz	551	97
MS	DESOTO COUNTY	W 089 59 33	N 34 53 45	5610 MHz	371	113
NC	CHARLOTTE	W 080 53 06	N 35 20 14	5608 MHz	757	113
NC	RALEIGH DURHAM	W 078 41 50	N 36 00 07	5647 MHz	400	113
NJ	WOODBURGE	W 074 16 13	N 40 35 37	5620 MHz	19	113
NJ	PENNSAUKEN	W 075 04 12	N 39 56 57	5610 MHz	39	113
NV	LAS VEGAS	W 115 00 26	N 36 08 37	5645 MHz	1995	64
NY	FLOYD BENNETT FIELD	W 073 52 49	N 40 35 20	5647 MHz	8	97
OH	DAYTON	W 084 07 23	N 40 01 19	5640 MHz	922	97
OH	CLEVELAND	W 082 00 28	N 41 17 23	5645 MHz	817	113
OH	COLUMBUS	W 082 42 55	N 40 00 20	5605 MHz	1037	113
OK	AERO. CTR TDWR #1	W 097 37 31	N 35 24 19	5610 MHz	1285	80
OK	AERO. CTR TDWR #2	W 097 37 43	N 35 23 34	5620 MHz	1293	97
OK	TULSA	W 095 49 34	N 36 04 14	5605 MHz	712	113
OK	OKLAHOMA CITY	W 097 30 36	N 35 16 34	5603 MHz	1195	64
PA	HANOVER	W 080 29 10	N 40 30 05	5615 MHz	1266	113
PR	SAN JUAN	W 066 10 46	N 18 28 26	5610 MHz	59	113
TN	NASHVILLE	W 086 39 42	N 35 58 47	5605 MHz	722	97
TX	HOUSTON INTERCONTL	W 095 34 01	N 30 03 54	5605 MHz	154	97
TX	PEARLAND	W 095 14 30	N 29 30 59	5645 MHz	36	80
TX	DALLAS LOVE FIELD	W 096 58 06	N 32 55 33	5608 MHz	541	80
TX	LEWISVILLE DFW	W 096 55 05	N 33 03 53	5640 MHz	554	31
UT	SALT LAKE CITY	W 111 55 47	N 40 58 02	5610 MHz	4219	80
VA	LEESBURG	W 077 31 46	N 39 05 02	5605 MHz	361	113
WI	MILWAUKEE	W 088 02 47	N 42 49 10	5603 MHz	820	113

Latitude and Longitude are specified in NAD 83 Last updated July 30, 2010

Table 2: US FCC IDs and Industry Canada Certification Numbers and covered configurations^{1,2}

Channel BW [MHz]	Center Freq. Range [MHz]
5	5255 - 5345
10	5260 - 5340
20	5265 - 5335
40	5275 - 5320
5	5475 - 5720 ³
10	5475 - 5720 ³
20	5480 - 5715 ³
40	5500 - 5695 ³
5	5727.5 - 5847.5
10	5730 - 5845
20	5735 - 5840
40	5745 - 5830
5	4942.5 – 4987.5
10	4945 – 4985
20	4950 - 4980
5	5157 - 5245
10	5162 – 5245
20	5165 – 5240
40	5172 - 5230

1. The table is relevant for all ODUs belonging to RADWIN 2000, RADWIN 5000 and RADWIN 6000 family products into which the RF Module AP0127730 or AP0134760 is assembled.
2. Under FCC ID: Q3KRW5XMOD, IC: 5100A-RW5XMOD
3. Excluding 5600-5650 MHz band

Radio parameters accessed by end-user

The following parameters can be accessed by user:

1. Output Power
2. Frequency channel
3. Channel bandwidth
4. Antenna gain in external antenna type device