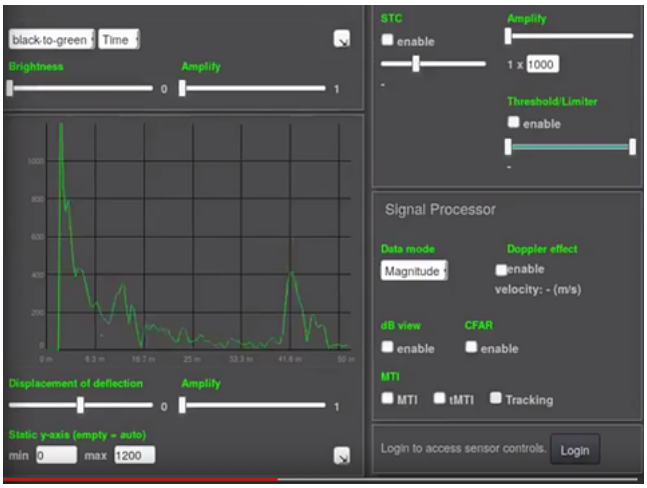
FMCW Base Module - Data Sheet

At the heart of the system is an FMCW transceiver. A variable trigger wave allows to generate also a Frequency Shift Key Mode. In addition, the transceiver can operate in Doppler mode. The transmitter can emit very short pulses through the antenna and monitor the reflected pulses. The pulses are reflected of fixed objects (buildings, trees…) and moving objects (cars, people…) which pass the antenna beam. The FMCW Base Module provides the opportunity to study Doppler effects.
The signals are digitally processed using a Digital Signal Processor (DSP), data is visualized through the analysis and visualization software SkyRadar FreeScopes.
The system in its standard standard configuration has a range up to 50 m (detecting objects of the size of a car). The standard version comes with an array antenna.

General Features

- Active radar, designed for perfectly save indoors and outside operation in close and near range (transmitter output power significantly lower as such of a mobile phone).
- The following operating modes can be technically enabled in the hardware
  - FMCW
  - Doppler
- Antenna
  - Patch antenna
  - Default operation 24 GHz
- Powerful and fast radar image processor.
- All measurements are performed in near-to real time. No sub-sampling or substitution techniques.
- Optimized for detection of real targets in a 3-dimensional space within laboratories or outside , remote controlled remote controlled aircrafts. No limiting target table or rail system required.
- Extendable with rotary tripod, parabolic reflector, linear conveyor for SAR operations

System Features



Power and Physical Characteristics	12V
Output power at transmitter	+19 dbm (~ 75 mW)
Maximum Range	more than 50 m
Sampling Rate	50 fps / 2 Mega-samples per second
Dimensions	with array antenna: 230mm x 270mm x 100mm
Net Weight	1.00 - 2.00 kg

Range and Antenna	**Standard**
Max Bandwidth (configurable)	1 GHz (~ 4,2% of the centre operating frequency)
Sweep time value	79 µs
Resolution at 1 GHz Bandwidth	15 cm
Spurious Emissions (ETSI 300 440)	- 30 dBM

Range	> 24 m (persons) > 50 m (cars)
Minimium Distance	1.5 m
Antenna	Patch Antenna
Horizontal Antenna Beamwidth	30 dBi
Vertical Antenna Beamwidth	20 dBi
Antenna Gain	+ 17 dBi

Transmitter Features

Supply Voltage	**12V**
Supply Current	300 mA
Operating Temperature	-20 ... + 60 °C

Table: General operative characteristics of the Transceiver

	min.	**typ.**	**max.**
Carrier Frequency	23.8 Ghz	24,0 GHz	24,8 Ghz
Transmitter Output Power:	18 dBm	19 dBm (~75mW)	20 dBm

Table : Operative characteristics of the Transmitter

Receiver Features

Receiver Gain (configurable)	+ 20 dBi ... 80 dBi
Receiver Sensitivity	– 132 dBm
Overall Sensitivity	- 151 dBc

Table : Operative characteristics of the Receiver (subsection of the Transceiver)

Delivery and Export Regulations based on European Law

SkyRadar produces products to train the civil use of radar equipment. We actively take that mission to makes this world a better and safer place. We do not provide goods which are in conflict of the dual use regulation (unless with specific written consent of the European Regulation Bodies and if the purpose is a peaceful one). SkyRadar has received a general export permit 40066564 dated 22.08.2011.

SkyRadar emphasizes that the COUNCIL REGULATION (EC) No 428/2009 and its amendments are the only authentic legal reference and that the information in this document does not constitute legal advice.

According Paragraph 6A008, goods are subject to the above stated Regulation, when they comply to the following criteria:

Criteria	**Explanation why SkyRadar does not comply to these criteria**
a. Operating at frequencies from 40 GHz to 230 GHz and having any of the following: ...	The system operates at 24 GHz and operates with max 75 mW far below the critical threshold
b. A tunable bandwidth exceeding ± 6,25 % of the 'centre operating frequency'	The bandwidth is 4,2% of the centre operating frequency
c. Capable of operating simultaneously on more than two carrier frequencies	The system operates with one carrier frequency
d. Capable of operating in synthetic aperture (SAR), inverse synthetic aperture (ISAR) radar mode, or sidelooking airborne (SLAR) radar mode	The base module itself does not include SAR, iSAR or SLAR features.
e. Incorporating electronically scanned array antennae	The system does not work with electronically

	scanned array antennae. It operates either with 1-2 horn antennae or with a static patch antenna.

The dual use regulation, in particular paragraph 6A008 does not control "Displays or monitors used for air traffic control (ATC)", as done by SkyRadar FreeScopes.

Section l.1 of paragraph 6A008 addresses "Automatic target tracking" providing, at any antenna rotation, the predicted target position beyond the time of the next antenna beam passage. This paragraph however does not "control conflict alert capability in ATC systems". Only that is done by the SkyRadar FreeScopes software. Target tracking in terms of trajectory projection, as done by military systems is explicitly excluded and not part of the system.

Paragraph 6A108 concerns Radar systems and tracking systems, other than those specified in entry 6A008. It covers Radar and laser radar systems designed or modified for use in space launch vehicles specified in 9A004 or sounding rockets specified in 9A104. This is not applicable to the SkyRadar training equipment.