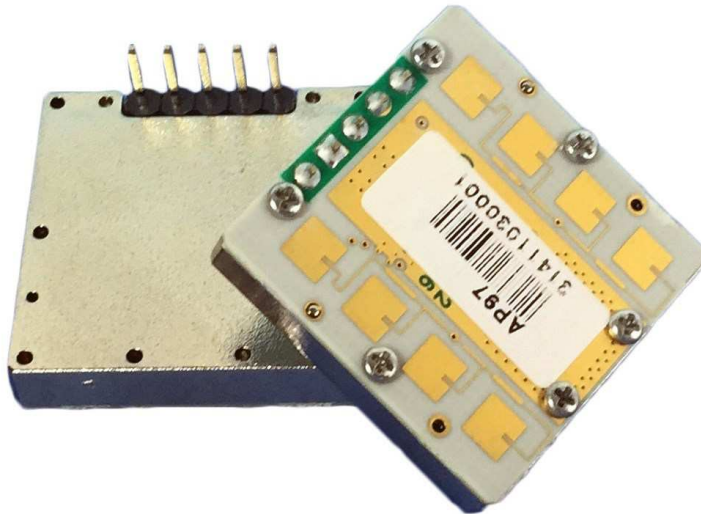


AP97

Dual Channel Miniature K-band Microwave Sensor



Features:

- Motion direction discrimination
- Small and flat profile
- Light weight
- CW and pulse mode operation
- Low current consumption

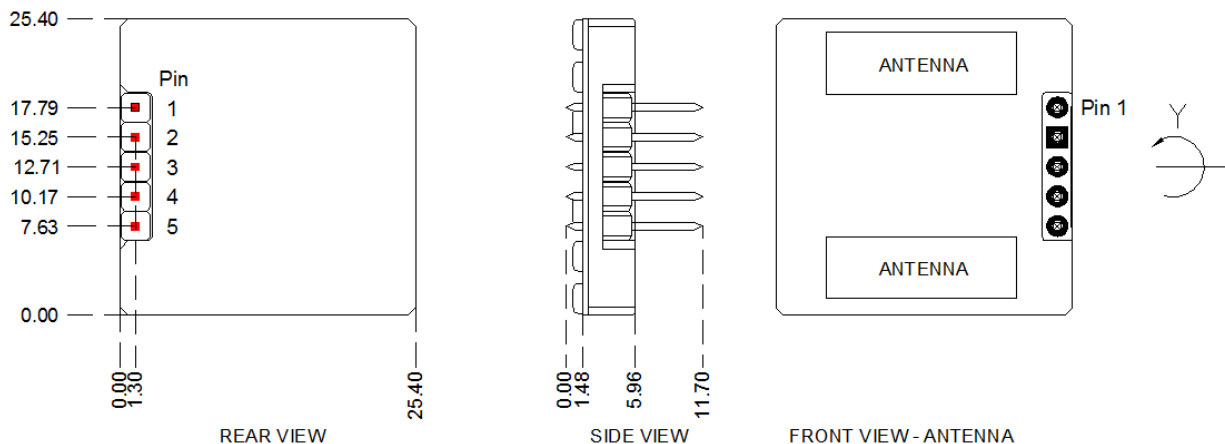
Applications:

- Motion detection
- Lighting control
- Security alarm
- Automatic door control

The AP97 series K-band miniature sensor is a Doppler transceiver with a HEMT oscillator, two single balanced mixers and bi-static microstrip patch antenna arrays. It is suitable for applications in automatic access, security, lighting control and speed measurement. It also has I-Q outputs to discriminate motion direction.

Its lightweight, miniature size and slim profile offer the flexibility to OEMs in making trendy and slim products.

Module Outline



All dimensions are in mm.

Pin	Name	Description
1	NC	Not connected
2	+V	Supply voltage, V_{IN}
3	I	Channel I
4	GND	Ground
5	Q	Channel Q

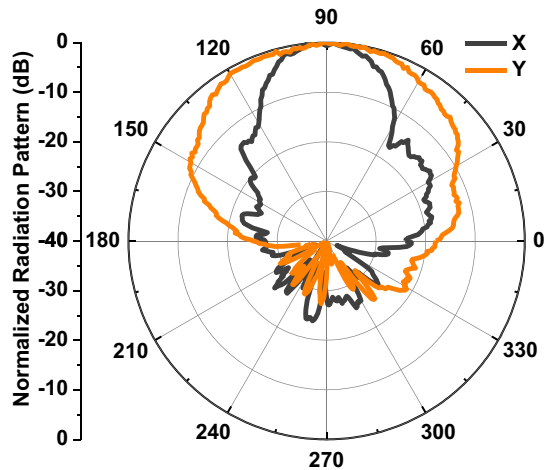
Note 1: Complies with EN 300 440.

Note 2: Complies with FCC Part 15.245.

Note 3: CAUTION: ELECTROSTATIC SENSITIVE DEVICE.
Observe precautions for handling and storage.



Antenna Beam Pattern



Technical Specifications

Unless noted otherwise, the specifications are measured in CW mode, $V_{IN} = 5 V_{DC}$ and 12k ohm load at +25°C.

Parameter	Remarks	Min	Typical	Max	Units
Operating Conditions					
Supply voltage, V_{IN}	AP97, AP97-1, AP97-2	4.75	5	5.25	V_{DC}
	AP97-3	2.85	3	3.15	V_{DC}
Current consumption			30	40	mA
Operating temperature		-20		60	°C
Recommended Pulse Scheme					
Pulse frequency	Pulse mode		2		KHz
Duty cycle	Pulse mode		2		%
Transmitter					
Operating frequency	AP97	24.075	24.125	24.175	GHz
	AP97-1	24.075	24.125	24.175	GHz
	AP97-2	24.150	24.200	24.250	GHz
	AP97-3	24.000	24.125	24.250	GHz
Radiated power (EIRP)			15		dBm
Spurious emission				-30	dBm
Frequency drift vs temperature			-1		MHz/°C
Antenna					
Antenna beam-width (3 dB) - X			80		°
Antenna beam-width (3 dB) - Y			32		°
Antenna sidelobe rejection			15		dB
Receiver					
I&Q amplitude balance			0.5	3	dB
I&Q phase difference		70	90	110	°
Physical Properties					
Dimensions			25.4×25.4×11.7		mm
Weight			3		g

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Placing the module in enclosure

When AP97 sensor module is housed in an enclosure, it is important to ensure that the performance of the module is not significantly degraded by the presence of the enclosure.

A suitable material with both lower dielectric constant and lower loss tangent (that is ABS) is preferred. Microwaves penetrate through plastic material without significant loss as long as it does not have direct contact with the antenna patch surface. In comparison, metal results in full reflection while water results in significant absorption of microwaves. Therefore it is important not to place any metallic material in front of the antenna.

Ideally, surface of the enclosure in front of the antenna should be flat. Curved surface introduces beam pattern distortion, both main beam and side-lobes.

It is also important for user to note that the selection of the enclosure thickness, and the spacing in between from the antenna patch surface, is in relation to the wavelength of the microwave signal and the dielectric constant of the enclosure material. For ABS material that has a dielectric constant of between 2.5 to 3.5, the recommended spacing is approximately 6mm, and the recommended thickness is between 3 to 4mm.

User is advised to fine-tune the spacing between the antenna and the enclosure in accordance to their application for optimum performance as depicted in figure 5.

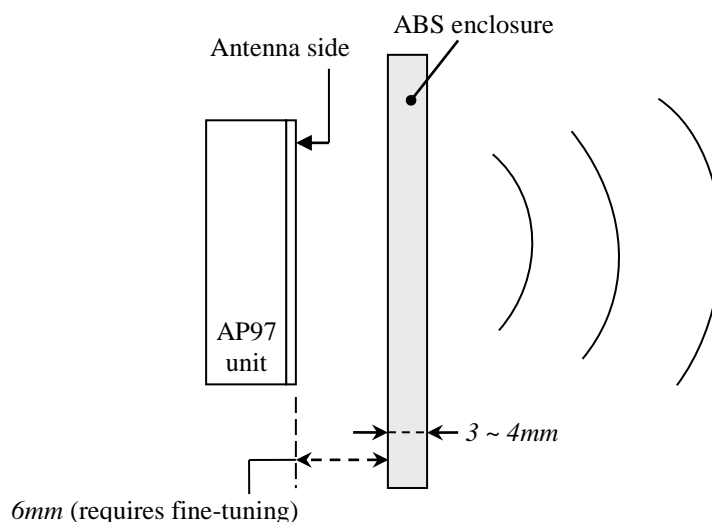


Figure 4: Optimizing thickness and clearance for ABS placed in front of AP97 sensor module.