

## **Project Documentation** | Micro Radar Altimeter Data Sheet

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**Project Number:**

**SMS Project Number:**

**Project Title:**

Micro Radar Altimeter

**Keyword(s):**

Micro Radar Altimeter Data Sheet

**Date:**

July 11, 2012

**Document:**

Micro Radar Altimeter Data Sheet.doc

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## 1 Micro Radar Altimeter Data Sheet

The Micro Radar Altimeter is one of the most advanced radar altimeters on the market today. This technologically leading product is intended for standard UAVs, small UAVs (sUAV), micro UAVs (MAV), fixed and rotary winged aircraft, VTOL aircraft, terrain awareness and warning systems (TAWS) and similar applications. Because of its high update rate it is also specifically suitable for wave height monitoring and terrain mapping.

It was derived from Smartmicro's automotive radar designs, therefore is extremely robust and has attractive cost.

A summary of the outstanding features of the product is given below.



### **Smallest Size**

The Micro Radar Altimeter is the smallest size altimeter available today – 11 x 9.9 x 2.84cm. With just 310cm<sup>3</sup> it outperforms all competitors.



### **Lowest Weight**

Lowest weight radar altimeter on the market. Only 350g in standard housing. Sensational 160g for fully integrated version.



### **Lowest Power**

Consuming just 3.7W from 7-32V DC it represents the lowest power altimeter device on the market.



### **Unbreakable Design**

Derived from automotive design, the Micro Radar Altimeter is extremely robust, works in -40 to +85°C temperatures and withstands highest shock and vibration levels.



### **One Single Unit**

Competitors need two models to cover 0.5 to 100m and 5m to max. height. The Micro Radar Altimeter does it all in one unit: 0.5 to 500m. Antenna System is integrated.



### **Fastest Update**

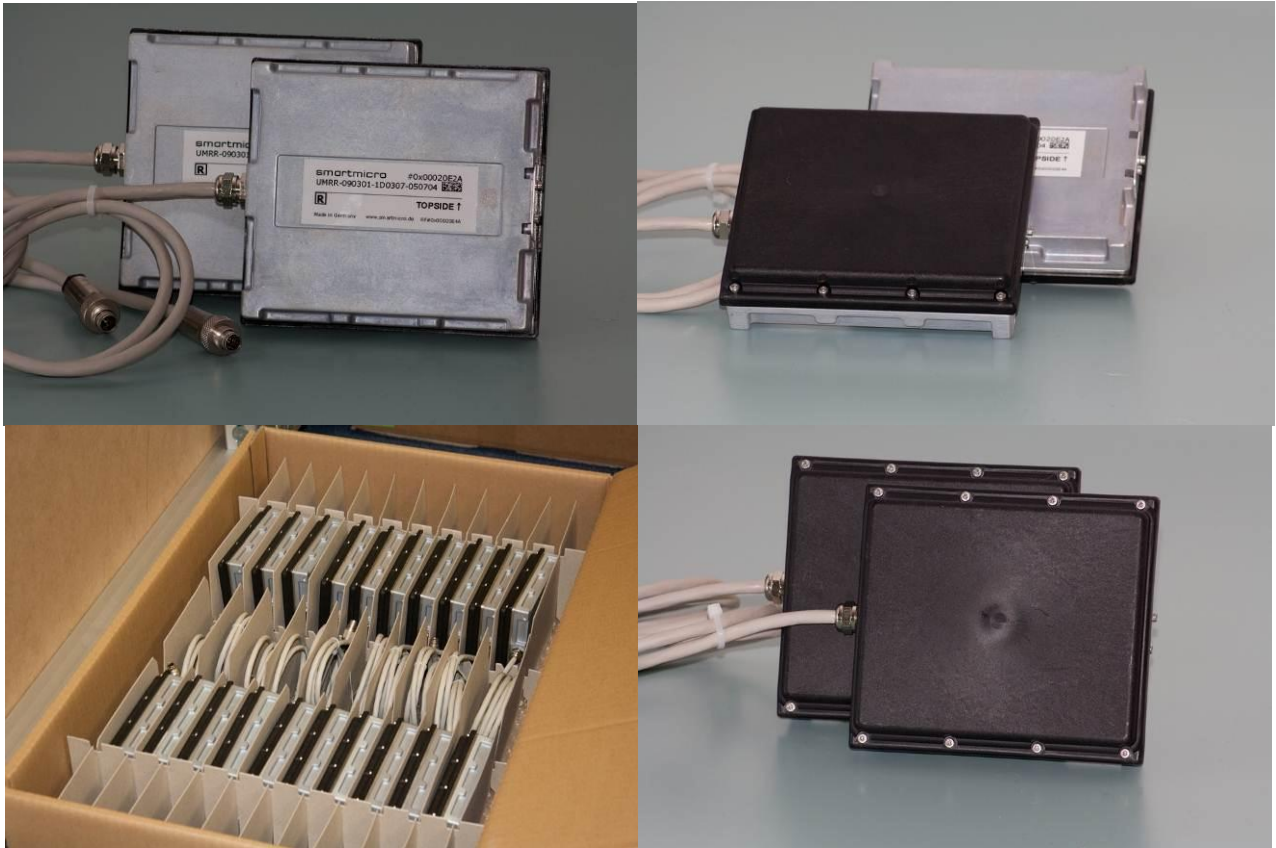
While most altimeters need 100ms for one measurement, the Micro Radar Altimeter takes just 17ms for one cycle – ideal for terrain mapping.

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## 1.1 Sensor Photographs



**Figure 1: Photographs of Altimeter Sensor in Standard Housing.**

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## 1.2 General Performance Data

Parameter	Value	Unit
<b>Sensor Performance</b>		
Minimum Height	0.5 <sup>1</sup>	m
Maximum Height	500 <sup>2</sup>	m
Supported Pitch and Roll angles	-20 ... +20 <sup>3</sup>	degrees
Maximum vertical speed	50	m/s
Maximum forward speed	75	m/s
Height Accuracy	3% or 0.5m (maximum of)	
Update time	<= 17	ms
Start Up Time	< 1 (lower accuracy altitude available) < 5 (altitude result in spec.)	s
<b>Environmental</b>		
Ambient Temperature	-40 ... +85	degree C
Shock	100	g <sub>rms</sub>
Vibration	14	g <sub>rms</sub>
IP	67	
Pressure / Transport altitude	0...10.000	m
<b>Mechanical</b>		
Weight	350 <sup>4</sup> (incl. 0.5m cable and connector)	g
Dimensions	See 1.5	
<b>Model No.</b>	<b>0Ax70x-22070x</b>	
DSP Board Identification	0Ax70x-22070x	
Housing Identification	05070x	
<b>General</b>		
Power Supply	7 ... 32 <sup>5</sup> 3.7	V DC W
Frequency Band	24.0 ... 24.25	GHz
Bandwidth	< 200	MHz
Max. Transmit Power (EIRP)	17	dBm
Interfaces	CAN V2.0b (passive), RS485 <sup>6</sup>	
Connector	8 Pin plug Binder Series 712 on 0.5m cable	CAN, RS485, Power

<sup>1</sup> Below minimum height, presence detection is available.

<sup>2</sup> Please note that the Radar system – like any other sensor system – although being well optimized and providing excellent performance, will not achieve a 100% detection probability and will not achieve a false alarm rate equal to zero.

<sup>3</sup> Combined Pitch + Roll angle shall not exceed given value. If exceeded, max. altitude and accuracy will be reduced.

<sup>4</sup> A lightweight variant is available at 160g weight, see section 1.3

<sup>5</sup> measured at connector; min. voltage slew rate 500V/s or max. voltage rise time 15ms; supply source impedance 0.5Ohms.

<sup>6</sup> It is recommended to use an external surge protection for power, CAN, RS485 and other interface ports.

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### 1.3 Light Weight Option

The light weight option is offered for weight optimized applications. This variant is particularly suited for integration into the customer's enclosure. If weight is very crucial, the altimeter even can be operated without a radome of its own but inside the customer's enclosure. The following deviations from section 1.2 apply.

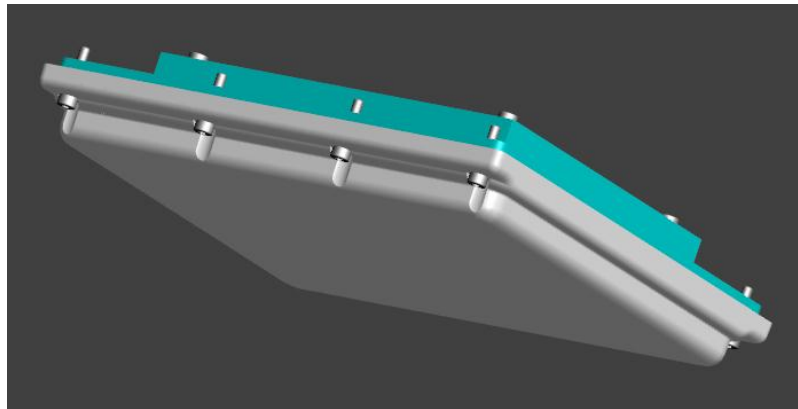


Figure 2: Light weight (integrated) model option including radome.

Parameter	Value	Unit
IP	40 (antenna part IP 67)	
Weight	160 fully integrated (customer radome) 235 integrated (including radome)	g
Dimensions	110 x 99 x 26 (without connector)	mm
Housing Identification	050A0x	
<b>Model Number</b>	<b>UMRR-0Ax70x-22070x-050A0x</b>	

### 1.4 Application Characteristics

#### 1.4.1 Pitch and Roll

Up to 20 degree pitch and 20 degree roll are supported. The beam shape is circular, the sum of pitch plus roll must not exceed 20 degree in any direction.

#### 1.4.2 Start-up time

After power up or reset, the altitude readings are within specified performance within 5 seconds.

#### 1.4.3 On-board diagnostics (BIT)

The UMRR sensor cyclically reports a status message providing the following information (Continuous BIT)

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- Sensor run time
- Sensor cycle time
- Sensor mode
- Hardware failure status bit
- Height output reliable bit

Initiated BIT is available. Sensor will send BIT results when it receives a command to do so.

### 1.5 Sensor Dimensions (Standard Model)

All values given in mm.

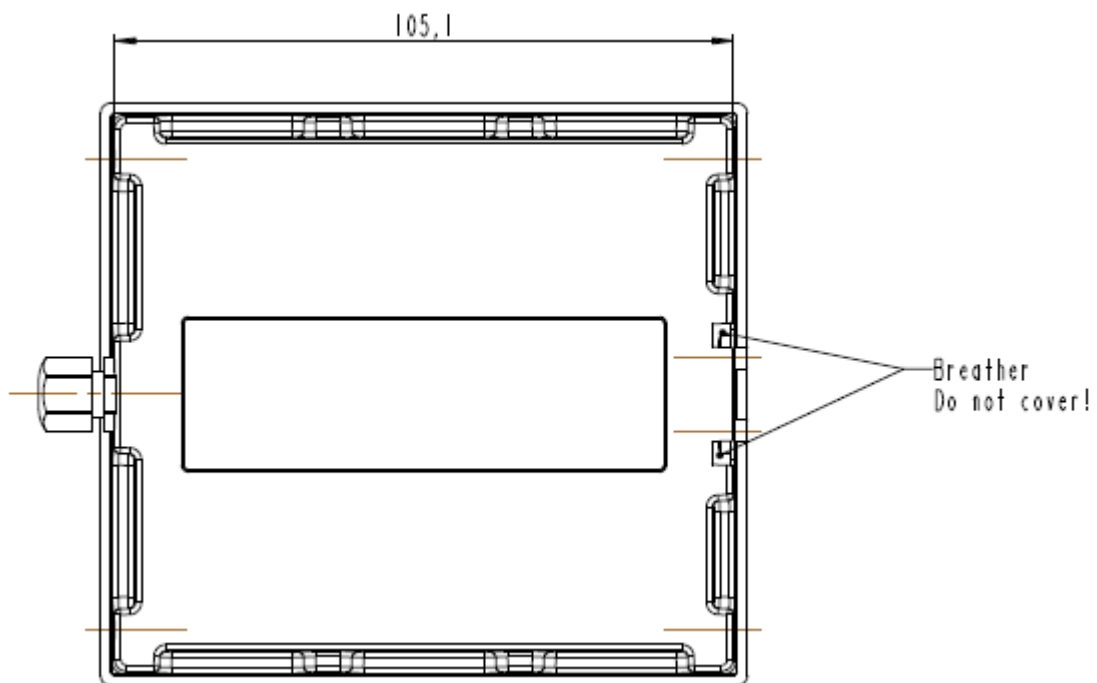
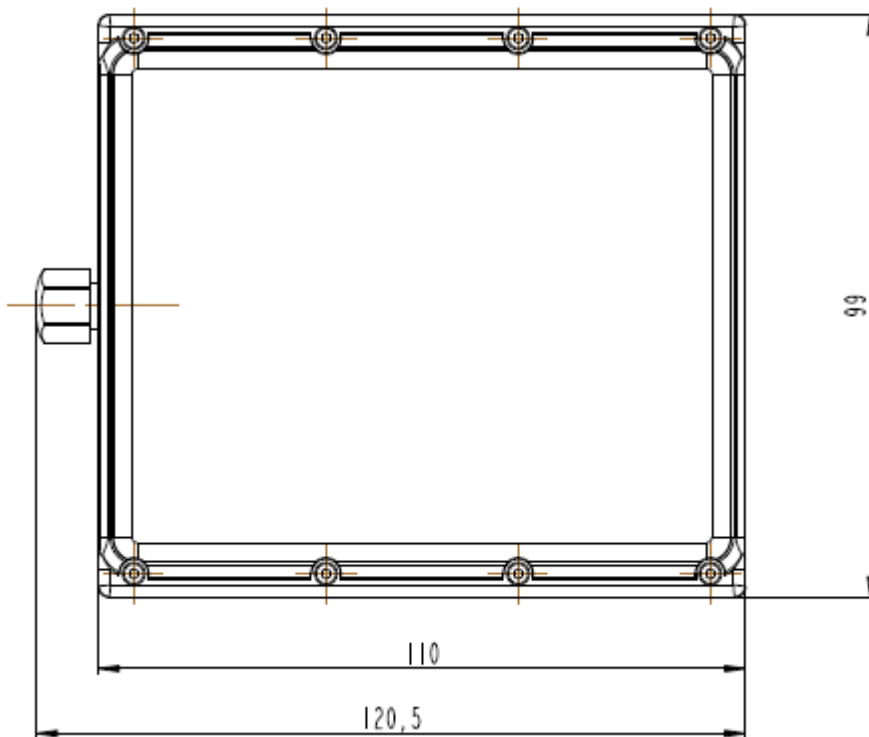
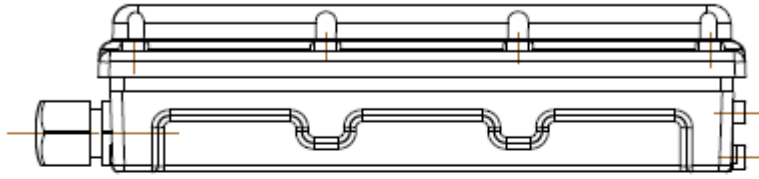


Figure 3: Sensor Rear Side.

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**Figure 4: Sensor Front and Top Side.**

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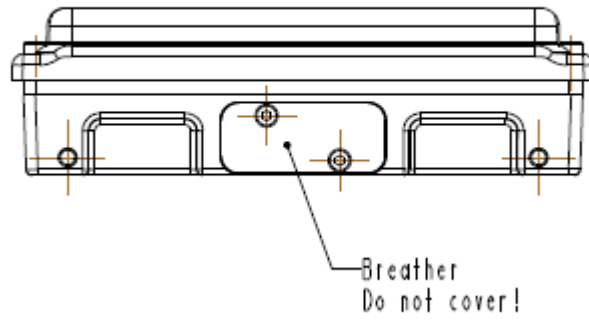


Figure 5: Sensor Left Side.

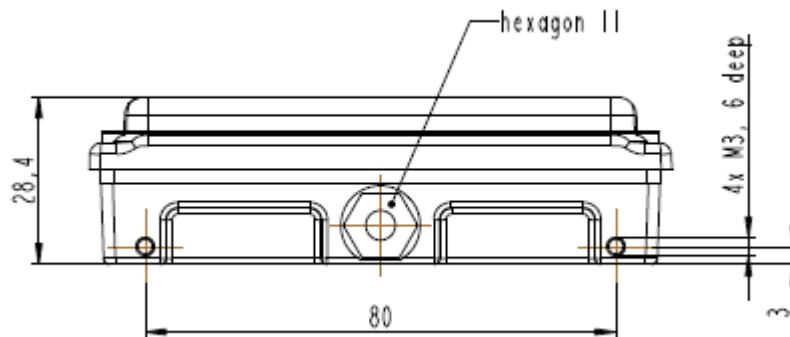


Figure 6: Sensor Right Side.

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## 1.6 Cable and connector

### 1.6.1 Sensor connector

The used sensor connector is an 8-pin male (plug) circular connector (waterproof IP67, series 712, manufacturer Binder GmbH, Germany). A female counterpart (socket) has to be used to connect to the sensor. The pin numbering of the female connector is shown in Figure 7, the pin out of the connector is shown in Table 1.

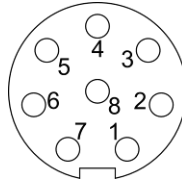


Figure 7: View on solder cup side of socket (rear view of female counterpart to be connected to sensor)

Pin	Function	Wire color
1	RS485 L	Pink = RS_485_L
2	Ground	Blue = GND
3	RS485 H	Grey = RS_485_H
4	CAN_L	Yellow = CAN_L
5	CAN_H	Green = CAN_H
6	not connected	Brown = n.c.
7	+7V...+32V	Red = Vcc (+7V...+32V)
8	not connected	White = n.c.

Table 1: Sensor connector pin out Model UMRR-0Axxxx, UMRR-0Bxxxx

Please note that in the standard configuration the sensor has no 120Ohms resistor on board (CAN bus termination between CAN\_L and CAN\_H)). The resistor is nevertheless possible at either end of a CAN bus and is in most cases integrated in the cable delivered along with the sensor (cable manufactured by Smartmicro).

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