

SS Microelectronics Technology Pvt. Ltd.

SS PILOT 01: GPS Based Pilot Sonde

SS PILOT 01 pilot sonde provides high precision of Pressure, wind speed and wind direction, excellent Data availability and quality with error detection and correction. The digital transmitter consumes low power and occupy narrow frequency band. The frequency of GPS based Pilot-sonde can be tuned continuously among the meteorological frequency band from 400 to 406MHz to avoid being interfered by another same frequency signal. Frequency range is limited so that inadvertent tuning to unauthorized frequency is prevented. The Pilot-sonde is calibrated before delivery; the calibration data is stored in the pilot-sonde and is read automatically by the ground equipment during pilot-sonde preparation.



SS Pilot 01: GPS based Pilot Sonde

SPECIFICATIONS	
Pressure and Geopotential Height (derived from GPS heights)	
Measurement range	3hpa~1080hpa
Resolution	0.1 hpa
Accuracy	0.5hpa
Wind (derived from GPS signals)	
Positional accuracy	5 m
Positional resolution	0.1 m
Positional range	More than 16 Km
Wind speed range	0~90 m/s
Wind speed accuracy	0.15m/s
Wind speed resolution	0.1 m/s
Measurement range of wind direction	0~360°
Wind direction accuracy	2°
Wind direction resolution	0.1°

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Transmitter	
Frequency Range	400~406 MHz
Frequency Drift	<±5 kHz
RE Output Power	Less than 100 mw
Modulation	FSK
Transmission range	More than 200 Km.
Measurement cycle	1Hz
Data downlink	2400bit/s
Emission bandwidth	25 KHz
Dimensions and Weight	
Dimensions	φ50x150 (mm*mm)
Weight with dry-cell batteries	Less than 120 g
Dry-cell Batteries	
Voltage	6V nominal
Operating time	More than 140min

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SS PILOT GRS 01: Ground Receiving System

In the past few years many countries has rapidly developed and adopted Upper-air operational system, GPS sounding systems, GPS based pilot sondes. We S S Micro Electronics Technology (P) Ltd. have also developed Indigenous Upper-air operational system, GPS sounding systems and GPS based pilot sondes under govt. of India make in India program. This system is used to measure wind direction, wind speed, altitude and pressure of the atmosphere. This system is highly automatic because it applies high-accuracy positioning of the GPS to track automatically the in-flight radiosonde without radar tracking on the ground.

System Components and Features

The Ground Receiving System (SS PILOT GRS 01) developed by S S Micro Electronics Technology (P) Ltd. mainly consists of Omni directional antenna (hereinafter referred to as antenna), ground receiver, sounding software and terminal computer.

The antenna automatically traces Pilot-sondes under the control of the terminal computer. The receiver transfers signals received from the pilot sonde into digital information and sends it to the computer. The terminal computer and software realizes the collection and processing of sounding data, data checking and error correcting, system fault monitoring and alarming. The UPS system has capacity for running the complete sounding system for more than 2 hours. Rating and frequency of the UPS input voltage is 200 to 240 V/AC.

Antenna

The antenna is a directional UHF antenna to receive radiosonde signals in the 400-406MHz meteorological band. The antenna consists of six antenna segments for horizontal reception and one segment for upwards direction. Each horizontal segment is a folded ground plane antenna with a 60°corner reflector. For the upwards direction, the antenna is equipped with a cross dipole. One antenna segment at a time is connected for the reception. The antenna switch is controlled to make the selection between seven directions by the position from the flying radiosonde GPS. The antenna is able to reliably receive the pilot-sonde signal at elevation angle of 5 degrees or lower. The output signal of antenna is sent for further processing to receiver after being pre filtered and amplified by LNA.

SPECIFICATIONS	
Operating Frequency	400~406 MHz
The half-wave dipole antenna	
Type of Polarization	Horizontal Polarization
Antenna Gain	>5dB
Beam Width	>60° (3dB)
Antenna Standing Wave Ratio	<1.5
The directional Antenna	
Type of Polarization	Vertical Polarization

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Antenna Gain	>7dB
Beam Width	
H Side Symmetrical	>60° (3dB)
E Side Asymmetrical(0~augmentation direction)	>50° (3dB)
Antenna Standing Wave Ratio	<1.5
Filter	
Band Width	403±3MHz (3dB)
Standing Wave	<2
Insertion Loss	<2dB
Switches	
Isolation	<-18dB
Insertion Loss	<1dB
LNA	
Gain	>22dB
Noise Figure	<1
Operating temperature (Outer Unit)	-40°C~+85°C
Cables between antenna and receiver	More than 30 m
Maximum wind speed	65m/s

Ground Receiver

The radio signal is converted to IF by down converter, and then sent to sounding software for further processing after being demodulated, decoded to digital data. The receiver is able to receive and correctly process transmissions from the pilot-sonde when other pilot-sondes of similar type are operating at a frequency separation of +/- 200 kHz and beyond 10 km distance from the receiver.

SPECIFICATIONS	
Sensitivity	≤-115dBm (S/N=12dB)
Frequency Range	400~406MHz
AFC Control Precision	2KHz
Input Impedance	50Ω
Output Form	RS232
Operating temperature (Inner Unit)	+5°C~+50°C
Power Supply	AC, 220V/50Hz

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Sounding Software

The software is responsible for controlling and testing ground receiving equipment. It results in data products by calculating, displaying and processing data received from pilot sonde, the operation system is in Windows.

System control, monitoring and data collecting

- a) Antenna tracking & control mode: manual/ auto;
- b) Frequency tracking & control mode: manual/ auto;
- c) Failure locating, displaying and warning;
- d) Real time displaying the GPS working state;
- e) Real time record, restore initial information of GPS and air sounding.

Data processing

- a) Real-time displays wind speed, wind direction, temperature, humidity, pressure in graph and data form;
- b) Real-time show the location of flying radiosonde;
- c) Convenient to browse any test result of temperature, pressure, humidity or wind in database.

Meteorological product

Produce standard and significant level points. Significant level data is stored for generation of reports& messages for transmission to network.

Generates BUFR, TEMP, PILOT messages for transmission in WMO format.

Network

Ability to convey data through LAN or Internet.

Printing

Print all necessary Meteorological data products.