

# SAQ-210\_SAM

## Smart Agriculture Monitoring

- Precision Agriculture solution

- ✓ Multi-Sensor (Soil moisture, Leaf wetness,...)
- ✓ Smart Device Management (Real-time data, Power management,...)
- ✓ Optional Accessory (Solar solution, Wind speed & direction,...)



### Feature

- LTE compliant
- Integrated with calibrated and compensated sensors, data is ready to use
- All in one device: Soil moisture, Leaf wetness, Solar radiation, Rain meter, optional air sensing sensors
- Multiple power solution AC/DC or Solar
- RS-485, GPIO, ADC sensor port ready to connect various agriculture sensors
- Waterproof design perfect for outdoor usage
- support leaf camera (customized specification)

SAQ-210\_SAM Series are integrated with calibrated and compensated sensors, including soil moisture, leaf wetness, solar radiation, rainfall and a great variety of other agriculture sensors. Optional air quality sensors and gas sensors such as PM2.5, TVOC, CO, O3, NH3, etc. are also available.

SAQ-210\_SAM Series uses 4G LTE communication and high-performance MCU that enables the data to be analyzed in real-time. Furthermore, the device is managed and maintained by smart remote management system, which satisfies the various requirements of the IoT market.

It is a simple and perfect solution for Agriculture monitoring.

### RF Specifications

Model name	SAQ-Series		
Wireless	LTE		
Standard/Protocol	Up to non-CA CAT1 with 1.4 to 20 MHz RF bandwidth		
Frequency	FDD-LTE	WCDMA	GSM
	B1/B3/B7/B8/B20/B28A	B1/ B8	B3/ B8
Sensitivity	B1: -101.5dBm (10M) B3: -101.5dBm (10M) B7: -99.5dBm (10M) B8: -101dBm (10M) B20: -102.5dBm (10M) B28: -102dBm (10M)	B1: -110dBm B8: -110.5dBm	-109dBm
Data rate	Max 10 Mbps(DL) Max 5 Mbps (UL)	Max 384 Kbps (DL) Max 384 Kbps(UL)	Max 107 Kbps (DL) Max 85.6 Kbps(UL)

## Sensor Specifications

Sensor Operation	Principle	Range	Response time	Accuracy(at 25°C)	Repeatability	Long Term Output Drift	Resolution
PM2.5	OPC	0~1000 µg/m <sup>3</sup>	< 10 sec	±10 µg/m <sup>3</sup> / ±10%	-	-	1 µg/ m <sup>3</sup>
tVOC	CMOS	0~60000ppb	-	-	-	-	-
Temp. /Rh	Band gap sensor/ Capacitive measurement	Temp: -40~+125°C Humidity: 0~100 %RH	Temp: > 2sec. at τ63% Humidity:<8sec.at τ63%	Temperature: ±1°C Humidity: ±5%RH	Temp:±0.24°C Humidity:±0.25%RH	Temp: < 0.03°C/yr Humidity:<0.25%RH/yr	Temp:0.01°C Humidity:0.01%RH

## Soil Moisture Sensor

Principle	Frequency Domain Reflectometry (FDR)
Volumetric Water Content Range	0~60% (up to 100% with reduced accuracy)
Volumetric Water Content Accuracy	±3%VWC (in mineral soils with moderate salinity from 0!50% VWC)
Volumetric Water Content Resolution	0.1%
Temp. Range	-40 ~ 80°C
Temp. Accuracy	Typical ±2°C
Temp. Resolution	0.01°C
Output	RS485

## Leaf Wetness Sensor

Principle	Capacitance technology
Operating Temperature Range	-40 °C ~ 60 °C
Output	300~1,250 mV

## Solar Radiation Sensor

Transducer	silicon photodiode
Spectral Response (10% points)	400 ~ 1100 (nm)
Cosine Response	±3% (0° to ±70° incident angle); ±10% (±70° to ±85° incident angle)
Output Range	0~1800 (W/m <sup>2</sup> )
Accuracy	±5% of full scale (Reference: Eppley PSP at 1000 W/m <sup>2</sup> ) plus 45 W/m <sup>2</sup> per 30m of additional cable
Resolution and Units	1 (W/m <sup>2</sup> )
Operating Temperature	-40°C ~ 65°C
Output	ADC

## Rain Collectors

Sensor Type	Tipping spoon(0.2mm) 214cm <sup>2</sup> collection area
Accuracy	±5% for rain rates up to 10"/hr (250 mm/hr)
Resolution	0.1 (mm)

## Wind speed & direction

DAVIS	Range	Accuracy
Direction	360°	±3°
Speed	0 to 200 mph	±2 mph or ±5%

## Optional Gas Sensor

Sensor Operation	Principle	Range	Response time	Accuracy(at 25°C)	Repeatability	Long Term Output Drift	Resolution
<b>Carbon Monoxide (CO)</b>	Electrochemical	0~20 ppm	< 30 sec. at $\tau_{90}$	$\pm 0.1$ ppm in 7 ppm	< $\pm 5\%$ CO equivalent	$\pm 0.1$ ppm/yr (zero drift)	0.01 ppm
<b>Nitrogen Dioxide (NO<sub>2</sub>)</b>	Electrochemical	0~2 ppm	< 80 sec. at $\tau_{90}$	$\pm 10$ ppb in 100 ppb	< $\pm 5\%$ NO <sub>2</sub> equivalent	$\pm 20$ ppb/yr (zero drift)	0.01 ppb
<b>Ozone (O<sub>3</sub>)</b>	Electrochemical	0~1.5 ppm	< 80 sec. at $\tau_{90}$	$\pm 10$ ppb in 100 ppb	< $\pm 5\%$ O <sub>3</sub> equivalent	$\pm 20$ ppb/yr (zero drift)	0.01 ppb
<b>Ammonia(NH<sub>3</sub>)</b>	Electrochemical	0~8 ppm	< 40 sec. at $\tau_{90}$	$\pm 0.5$ ppm in 5 ppm	< $\pm 5\%$ NH <sub>3</sub> equivalent	< 20% /yr	0.01 ppb
<b>Sulfur Dioxide(SO<sub>2</sub>)</b>	Electrochemical	0~1 ppm	< 60 sec. at $\tau_{90}$	$\pm 15$ ppb in 100 ppb	< $\pm 5\%$ SO <sub>2</sub> equivalent	$\pm 20$ ppb/yr (zero drift)	0.01 ppb
<b>Hydrogen Sulfide(H<sub>2</sub>S)</b>	Electrochemical	0~7 ppm	< 60 sec. at $\tau_{90}$	$\pm 0.05$ ppm in 5ppm	< $\pm 5\%$ H <sub>2</sub> S equivalent	$\pm 0.1$ ppm/yr (zero drift)	0.01 ppb

## Optional Solar Power Solution

Solar Panel		Battery	
Output Power	30 W	Number of cells	16 cell (2S8P)
Max power voltage	17.3V	Battery Max Voltage	8.4 V
Max power current	1.78A	Standard Discharge Capacity	26.4 AH
Dimensions	345 x380 x35 mm	Increment Type	
Weight	3kg	Number of cells	32 cell (2S16P)
		Battery Max Voltage	8.4 V
		Standard Discharge Capacity	52.8 AH

## Operational Specifications

System Operation	
Operating Temperature	-10~+55 °C
Operating Humidity	15~85%RH, Non-condensing
Storage temperature	-40 ~ 85°C.
Warm-up time	≤ 1 min. (at full specs ≤ 15 minutes)
Power supply	AC power-in, 110V or 220V
Power consumption	3.5 W
Installation	wall-mount and pole-mount
Dimension (cm)	30(L) x 27(W) x 18(H)
Weight (kg)	3kg