ADVANTECH

Enabling an Intelligent Planet

Whitepaper

Fast Track to Proof Your Sensor Concept in 30 Days

Receive 2 working samples of M2.COM sensor carrier board and corresponding module within 30 days (based on the sensor utilized in the development board)

Advantech Corp.

Abstract

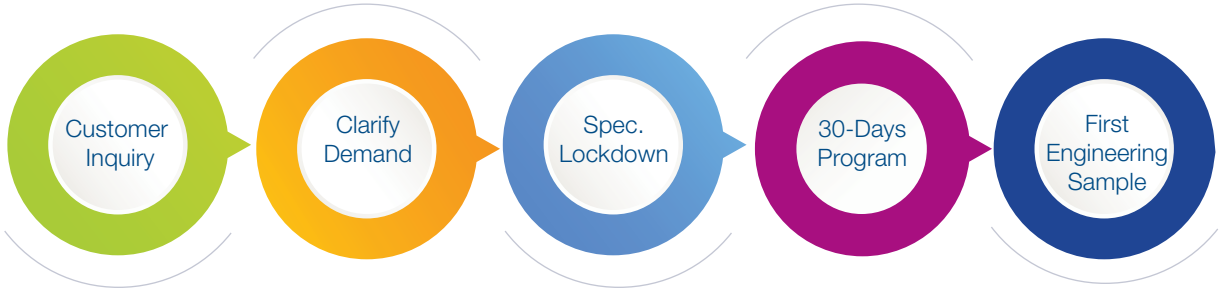
In the age of IoT transformation, emerging architecture and technology spider webs through multiple arenas of IoT infrastructure. All these devices need communication bridges to pass raw data through the network to reach central servers for processing. And how well a sensor is designed forms the backbone on how well the data is captured and communicated. Yet, a working sensor can take months, if not years to develop. This white paper examines the critical design aspects of sensor development, including mechanical, algorithmic, RF technology, interface, and more, and how developers can fast track to proof their design concepts with Advantech's 30 Day Smart Sensor Program.

Introduction

Embedded devices all around us are being transformed into "Interconnected Smart Devices." For devices installed in remote, unattended and harsh environments, a stable and reliable communication bridge between the end device and the central server is a must. The Sensor design forms the critical communication path between physical events and the digital world. Developing a working IoT sensor involves multiple technical expertise, the MEMS sensor, RF technologies, sensor algorithm, and development board. In this development process, developers are often challenged with technical resources, integration and compatibility.

A) The 30-Day Smart Sensor Program:

1) Program Process



#	Term & Condition
1	30 – Day customization program starts spec. Lockdown & NRE Received
2	Program is based on available standard development boards-WISE DBXXX as reference design
3	If sensor selection is outside of WISE-DB 15XX offering, or customized software is required, these inquiries will be handle outside of WISE-EC 30 day's program and quoted separately
4	NRE for tooling/ Certification/ special SW&FW customizations or others will be quoted separately

2) Key Building Blocks

Advantech M2.COM Sensor Development Board Family: The M2.COM concept is for a modularized and standardized form factor that combines sensor, embedded system, and networking capabilities. The modular design makes it flexible enough to support different applications and allows for expanded possibilities that can fulfill the changing demands of the IoT world. M2.COM module integrates MCU, wireless and sensors to fulfill diverse IoT application development.

a. Technology Design & Services:

i. Standard Modular Design –M2.COM IoT Sensor Node Solutions

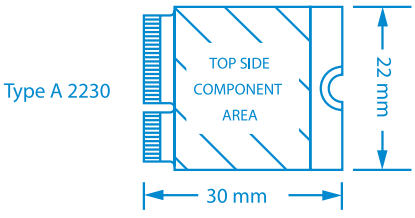
Advantech wireless IoT solutions are designed to be modular for flexible communication and sensor carrier board integration. Advantech created a new open standard called M2.COM, a sensor platform using a simple module design to provision a solid standard platform for IoT nodes and sensors.

M2.COM
Open Standard for IoT Applications

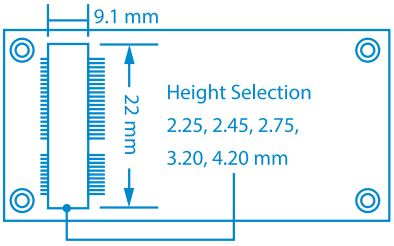
M2.COM adopts the Type A 2230 M.2 form factor with a 75-position host interface connector. The compact size is 30mm in length and 22mm in width, which is very helpful for micro sensor implementation and system integration. In order to provide data collection and device control, the pin-out includes USB, PWM, SDIO, I²C, I²S, UART, GPIO, SPI, and ADC, all of which help build connections with IoT sensors and control end devices. It's very simple to connect various sensors to M2.COM by utilizing the rich I/O interfaces powered by the built-in MCU.

Signal	Purpose
USB	Interface defined for Host, Device or OTG features.
PWM	Motor control and power supply control
SDIO	A common interface for extending storage through SD/MMC.
I^2C	The most popular interface for sensors e.g., pressure, temperature, moisture, and lightin sensors.
I^2S	Supports audio codecs for broadcasting and playing audio through external speakers
UART	A commonly used protocol for device control, such as motors and electrical control units
GPIO	Basic I/O control, such as indicator lights, alarms, and buzzers
SPI	LCM support to display values collected from the sensor or transmitted by an external device.
ADC	Using common GPIO pins, the ADC transforms the analog signal from the sensor into a digital signal, making the data readable and meaningful to the data analyzer.

M2.COM Module Dimensions



Connector Dimensions

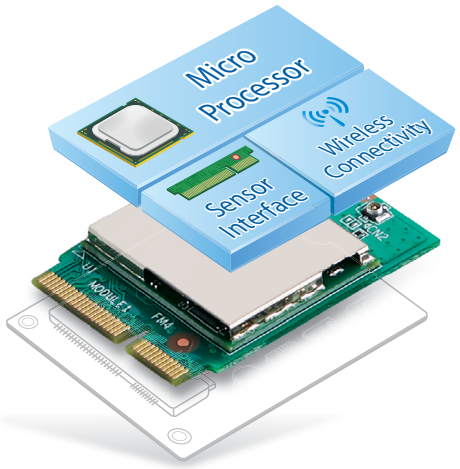


WISE-1500 Series IoT Sensor Nodes	WISE-1500 Series IoT Sensor Node Starter Kits
	
• LAN: WiFi, Bluetooth low energy, SmartMesh • LPWAN: LoRa, SigFox, LTE-M, NB-IoT	• WISE-1500 series module • Development & debug boards • Software development Kit • Node to cloud integration • WISE-PaaS trial services

ii. Complete RF Design & Certification Ready

To simplify the development of wireless IoT applications, Advantech offers verified wireless gateway and node devices with software for IoT developers. With verified software services including BSP/SDK, WSN API and remote management APIs, IoT developers can quickly start their projects. Moreover, all Advantech wireless IoT solutions are certified for FCC, CE, CCC or TELEC.

CE FC SRRC TELEC



Diverse Wireless Technology

Wi Fi · Bluetooth · dust networks · LoRa · Sub-1GHz · sigfox · Lte

SEMTECH · Texas Instruments · Linear Technology · Cypress Embedded in Tomorrow

Multiple Sensor Interface

UART	SPI	PWM
I2C	ADC	GPIO

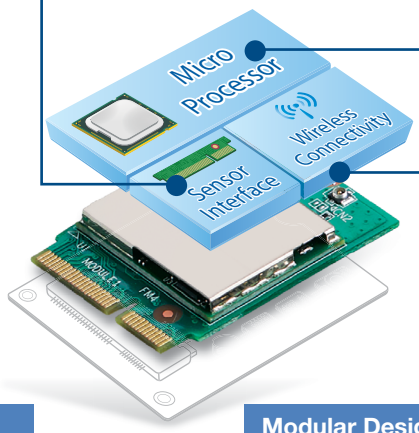
Levels · Humidity · Temp. · Pressure · Power

Programmable MCU (Micro Processor), we Integrate:

- Standardized hardware defined for sensor node usage,uch as ADC, GPIO, I2C, SPI, UART interfaces.
- Hardware and software design guide ready for ADC, GPIO, I2C, SPI, UART integration.

Programmable MCU (Micro Processor), we Integrate:

- mbed/RTOS to enable I/O interface and programmable capacity.
- IoT-agent for IoT protocols and cloud connectivity.
- Data security with TLS/DTLS to provide guaranteed security.



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Standardization
M.2 Connector

Modular Design
Flexible support for diverse sensor carriei boards

Model	Photo	Size	Sensor	Applications	I/O interface	Schedule
WISE-DB1500 M2.COM		100mm x 72 mm	**TI HDC1080DMBT** Temperature/Humidity	• Environment monitoring • Industrial automation	1 RS-232/422/485 I2C, 1 I2S, 8 GPIO, 2 PWM, 2 ADC	MP
WISE-DB1502 Bosch Sensors		70mm x 70mm	**Bosch BME680** VOC Pressure Temperature/Humidity **Bosch BMA280** Accelerometer	• Indoor air quality • Environment/Vibration monitoring • Industrial automation	1 RS-232/422/485 1 SPI, 2 ADC, 2 GPIO	May
WISE-DB1505 Arduino compatible		100mm x 72 mm	**TI HDC1080DMBT** Temperature/Humidity **ADI ADXL345BCCZ** Accelerometer	• Environment monitoring • Vibration monitoring	I2C, 8 GPIO, 2 PWM, 6 ADC, 1 UART	June
WISE-DB1506 Rohm Sensors		70mm x 70mm	**Rohm** Accelerometer (KX126) Geomagnetic (BM1422) Color/Light (BH1745) Gyro (KXG08) Pressure/Temperature (BH1383A)	• Environment monitoring • Vibration monitoring • Parking Sensing • Color detection	2 I2C, 8 GPIO, 2 PWM, 4 ADC	Aug
WISE-DB1507 STM Sensors		70mm x 70mm	**STM** Accelerometer/ gyro (ISM330DLC) Magnetometer (IIS2MDC) Pressure (LPS22HB) Temperature/Humidity (HTS221)	• Environment/Vibration monitoring • Parking Sensing • Color detection	2 I2C, 8 GPIO, 2 PWM, 4 ADC, 1 SPI	Sep

3) Wireless Design-In Services:

The 30 day program allow faster jump start to proof the concept and move things forward, with benefit of faster overall development from sensor connection, sensor/data management and easy to adopt RF capability. For sensors outside of our development board selection and not covered by the 30 day program, Advantech can still help develop a custom sensor carrier board for them. Advantech Wireless design-in service provides design and integration assistance from concept to final production, helping customers achieve faster time to market with lower development complexity and minimal integration cost.

1) Concept

Advantech offers a wide range of wireless services to help Customers' vertical markets applications. With starter kit and SDK, Customers can quickly build proof of concept products to verify their application.

2) Design

After the validation pf PoC products, Advantech provides Customers with design guidelines and antenna selection . Once The design is completed, Advantech offers technical reviews to improve the schematics and RF design so customers benefit from the reduced risk of new product launches.

3) Integration

Advantech also offers customization services based on your Specific application requirements.

4) Production

Advantech offers worldwide delivery and after sales services.

B) How the Program Expedite Your Project Development

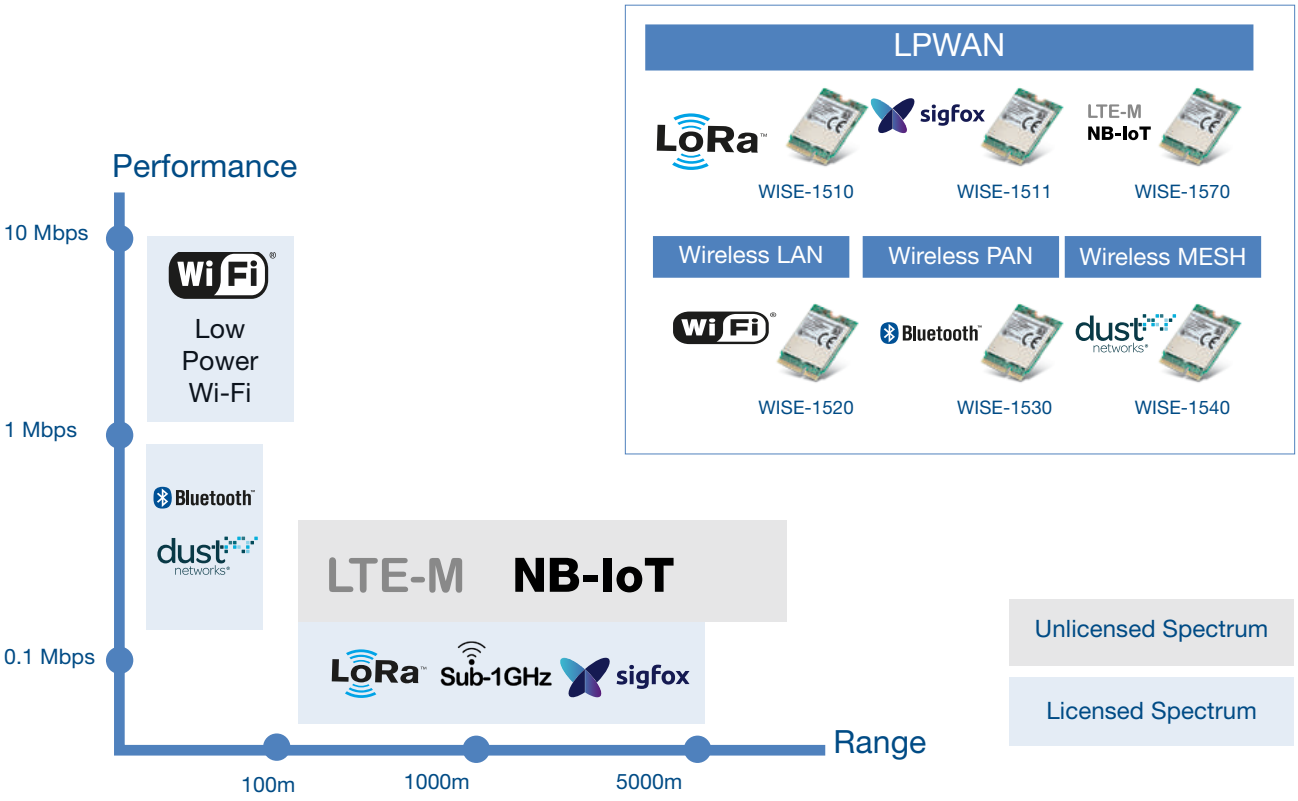
The 30 day program allow faster jump start to proof the concept and move things forward, with benefit of faster overall development from sensor connection, sensor/data management and easy to adopt RF capability. In other words, it helps augment limited resource issues that slow down the time to market. Sensor integrators can focus on the development of custom sensor and leave the electronic parts to Advantech based on the sensor available from our development boards.

1) Sensor Nodes with MEMS Sensors

Advantech WISE-1500 series support all the necessary software stacks to build up IoT sensor devices. The ARM mbed or RTOS forms the foundation of the embedded microprocessor operating system, supporting multiple IoT communication protocols including LWM2M, OSGI, AllJoyn and MQTT. Data can be quickly and easily acquired and transformed into different formats to communicate with WISE-PaaS or other cloud services.

Advantech's WISE-1500 Series sensor-node modules are integrated with different IoT wireless protocols, such as low-power Wi-Fi, LoRa, Sigfox, BLE, and NB-IoT to meet a variety of IoT application requirements.

Advantech Wireless Iot Sensore Node Module Technology Roadmap



2) Sensor Algorithm

Customers may have difficulty figuring out how to interact with the sensor and retrieve correct data. Advantech's development board offering wide variety of sensors and providing sample algorithm to help customer jump start the development on communication with the sensor of their choice.

3) Adopting RF

A custom sensor design from ground up will require design of the circuit board with RF component and require to certify their complete solution with local agency certificate requirement. Advantech's M2.COM module with wide variety of built-in RF certified for many regional RF certificate requirement minimized development and certification effort.

4) Software Development Effort

Designing software on top of sensor algorism to manage data coming from firmware/MCU data can be a difficult task. Either Advantech WISE-PaaS/RMM or ARM mbed provides SDK to access sensor data for optimal performance. Both software tool also provides remote management and monitoring of the hardware from throughout the sensor network.

C) Conclusion:

The most important element in IoT solutions is data acquisition, Advantech provides scalable sensor node solutions for data acquisition. Designed with a wide range of integrated wireless network management and cloud connectivity platforms. The 30 day program allow faster jump start to proof the concept and move things forward, with benefit of faster overall development from sensor connection, sensor/data management and easy to adopt RF capability.

About Advantech

Founded in 1983, Advantech boasts more than 7,000 employees in 21 countries and 92 offices worldwide. As an intelligent systems company, Advantech is a leading provider of trusted, innovative products, services, and solutions. In response to the emerging Smart City and IoT Era and diverse market needs, Advantech formed four strategic business groups to serve specific markets such as the industrial automation, intelligent services, embedded, and intelligent systems markets. Through close cooperation with partners, Advantech is able to provide complete solutions for a wide array of applications across a diverse range of industries.

Advantech's corporate mission and goal are, "Enabling an Intelligent Planet" and "Partnering for Smart City and IoT Solutions". Advantech will continue innovating to accelerate the evolution of each industry in an effort to become the most influential global corporation in the Smart City and IoT Era. As an industrial leader, Advantech developed the M2.COM open standard to enable more IoT applications. M2.COM is a sensor platform based on a simple modular design that provides a solid, standardized solution for IoT sensor nodes and sensors.