SG / Enabling Innovators

Datasheet

CAP/T Sensor

November 2024 v1.0

The CAP/T Sensor is a multi-purpose BLE device with both sensor and beacon capabilities, designed for indoor applications with its integrated antenna. It reports temperature and humidity data, or transmits BLE signals for further analysis and interpretation, depending on your requirements.

- Chipset: Powered by Nordic's nR52840 Bluetooth® 5/BLE SoC
- Power Input: CR2032 battery, CR2032W battery
- Sensor: Temperature and humidity sensor
- Complete BLE RF solution with integrated antenna
- BLE 5 ready with Beacon advertising data packet format
- Tri-color LED indicator in red, green and blue
- Compact size: 37mm x 36.4mm x 11.5mm

Order Part Number	Description
SGW8130D	BLE temperature and humidity sensor with LED Indicator *Battery included*

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1. Electrical Specifications

Absolute Maximum Rating	
Power Supply	CR2032 battery
Operating Temperature	-20°C to 80°C (-40°C to 125°C with CR2032W battery)
Electrical Specification	
Core Module	SGW BLE Module
Current Consumption	Operation Mode: 30uA; Sleep Mode: 4.7uA
BLE RF Performance	
Radio Operating Frequencies	2402MHz ~ 2480MHz
Radio On-air Data Rate	1Mbps
Transmit Power	0dBm powered by nRF52840
Antenna	Onboard PCB antenna
Range	Up to 100 meters (open space at 0dBm)
Sensors	
Temperature Range & Precision	0°C – 60°C, ±0.3°C; -40°C – 125°C, ±2°C
Humidity Range & Precision	0 – 100% RH, ±3%

2. Data Packet

Data transmitted from CAP/T is formatted according to the Bluetooth® Core Specification with the below details.

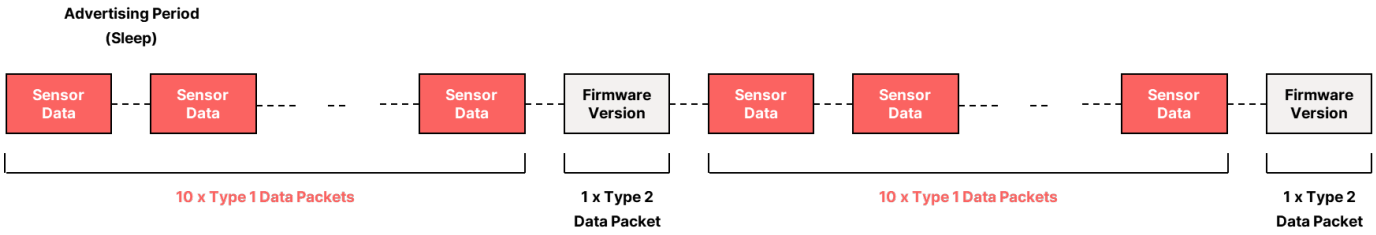
Field	Length	Description
Preamble	1 Byte	Used for synchronization and timing estimation at the receiver. Broadcast packets are always 0xAA.
Access Address	4 Bytes	Fixed broadcast packets with value = 0x8E89BED6
CRC	3 Bytes	Cyclic Redundancy Check (CRC) is an error-detecting code used to validate the packets for unwanted alterations.
Header	2 Bytes	Packet types information
Broadcast Address	6 Bytes	BLE Tag MAC address
Manufacturer ID	2 Bytes	Manufacturer ID = 0x0059
Temperature Data	2 Bytes	Temperature in 0.01°C, Byte in little endian, HEX format
Humidity Data	2 Bytes	Humidity in 0.01%, Byte in little endian, HEX format
Reserved	2 Bytes	Reserved
Battery Level	1 Byte	Battery level 0 – 100%, HEX format

Both the data packet transmission interval and data packet structure vary with the variant as well as the operation mode.

In Advertising Mode:

- CAP/T achieves the lowest possible power consumption by waking up, transmitting data and going back to sleep.
- The transmission periods are fixed at 1 second.
- CAP/T transmits two types of data packets:

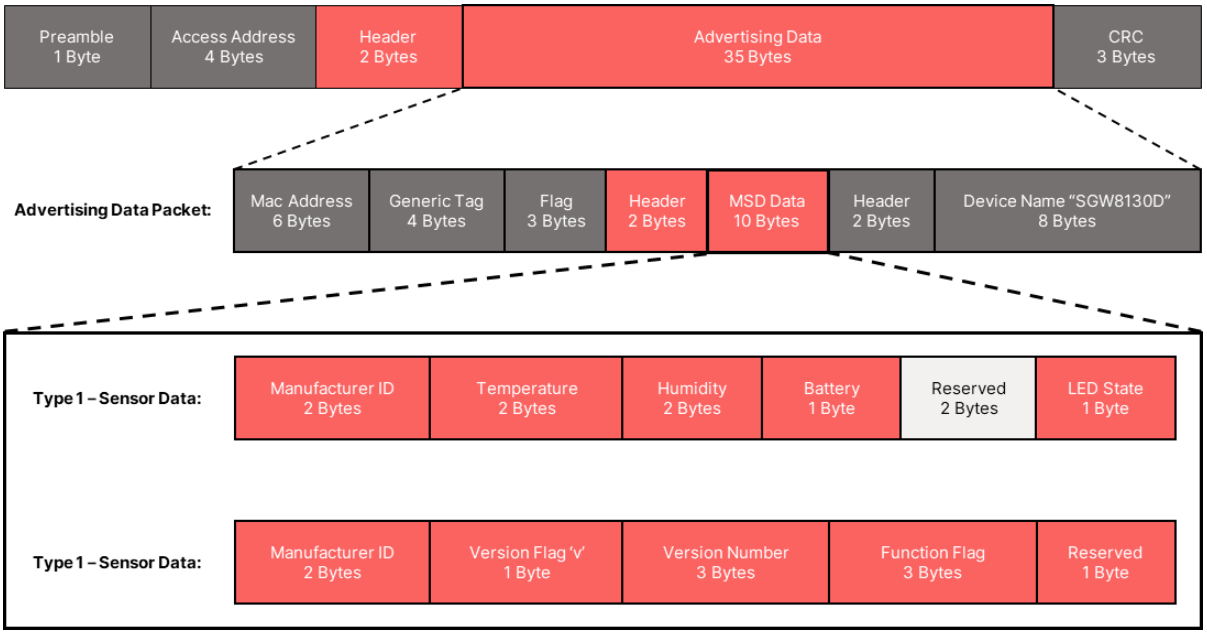
  - Type 1: Sensor Data
  - Type 2: Firmware Version
- 10 Type 1 data packets are followed by 1 Type 2 data packet in every transmission cycle, as below.



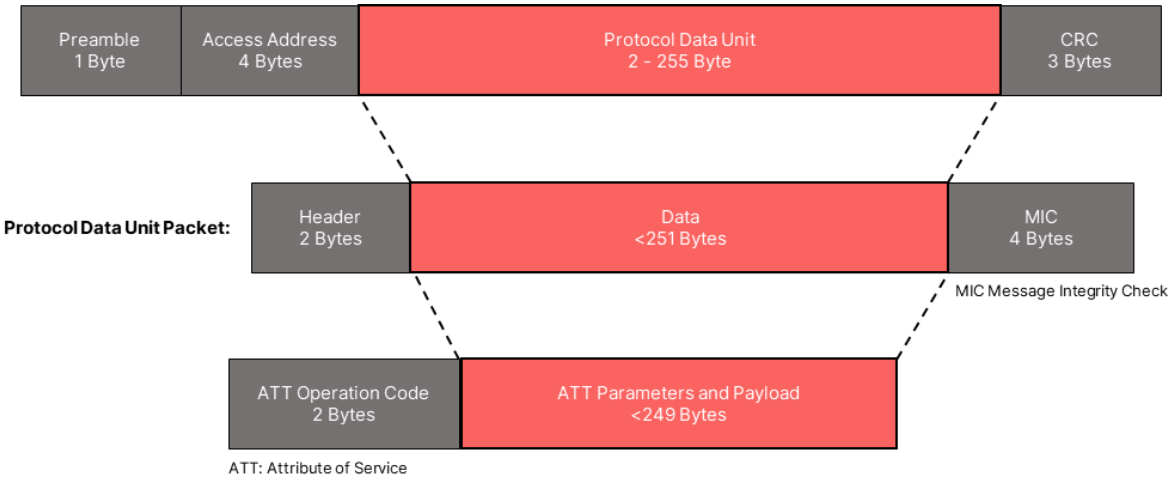
- In Connected Mode:
  - CAP/T reporting periods are configurable.

Data packet structure for each variant in each operation mode is detailed below.

- CAP/T
  - Advertising Data Packet with Advertising Period = 1 second



– Connected Data Packet with Reporting Period = Configurable



3. GATT Service Tables

CAP/T data packets are interpreted with the below tables.

a. Table 1: BLE Service UUID (for Connected Mode only)

- Standard Service:

	UUID	Data Size (Byte)	Function
Battery Service 0x180F			
Level	0x2A19	1	Battery level
Device Information Service 0x180A			
Manufacturer Name String	0x2A29	17	Manufacturer name
Model Number String	0x2A24	16	Model number
Firmware Revision String	0x2A26	18	Firmware revision
System ID	0x2A23	8	System ID

- Manufacturer Specific Service:

	UUID	Data Size (Byte)	Function
Secure DFU Service 0xFE59			
Buttonless DFU Without Bonds	8ec90003-f315-4f60-9fb8-838830daea50	20	DFU

Temperature Service f000aa00-0451-4000-b000-000000000000			
Data	f000**aa01**-0451-4000-b000-000000000000	2	Real-time sensor data (See Table 3)
Config	f000**aa02**-0451-4000-b000-000000000000	1	Set/get sensor on/off state
Period	f000**aa03**-0451-4000-b000-000000000000	2	Set/get reporting period
Humidity Service f000aa20-0451-4000-b000-000000000000			
Data	f000**aa21**-0451-4000-b000-000000000000	2	Real-time sensor data (See Table 3)
Config	f000**aa22**-0451-4000-b000-000000000000	1	Set/get sensor on/off state
Period	f000**aa23**-0451-4000-b000-000000000000	2	Set/get reporting period
IO Service f000aa64-0451-4000-b000-000000000000			
Data	f000**aa65**-0451-4000-b000-000000000000	16	Sensor configuration settings (See Table 2)

b. Table 2: Configuration Settings (for Connected Mode only)

	Input	**Description**
Data	0	Turn on/start measurements
	1	Turn off/stop measurements
Period	Sensor data reporting period definition	Default at 1 second
		Configuration • 1 = 1 second • 2 = 1 minute • 3 = 1 hour • 4 = 1 day
IO	1 Byte	LED on/off • 0 = Off • 1 = Red LED • 2 = Green LED • 3 = Blue LED
	2 Bytes	First Byte = Sensor type • 0 = Reserved • 1 = Temperature • 2 = Humidity
		Second Byte = Sensor on/off • 0 = Off • 1 = On
	8 Bytes	• Byte 1: Reserved • Byte 2: Temp_period • Byte 3: Humidity_period • Byte 4: Reserved • Byte 5: Reserved • Byte 6: Temp_period_unit • Byte 7: Humidity_period_unit • Byte 8: Reserved
	Input	**Description**

IO	Notification	Byte 1: LED_Status • Bit 0 = Red LED • Bit 1 = Green LED • Bit 2 = Blue LED
		Byte 2: Reserved
		Byte 3: Temperature on/off
		Byte 4: Humidity on/off
		Byte 5: Reserved
		Byte 6 – 13: Sensor (period + unit)
		Byte 14: Auto wakeup on/off
		Byte 15: Auto wakeup period
		Byte 16: Auto wakeup period unit

c. Table 3: Raw Data Conversion

Sensor	Data Length	Raw Data (HEX)	Conversion
Temperature	2 Bytes	TempL : TempH	HexToDec (TempH : TempL) / 100 = Temperature in °C
Humidity	2 Bytes	HumiL : HumiH	HexToDec (HumiH : HumiL) / 100 = Humidity in %

4. Revision History

Version	Released Date	Description
1.0	November 27, 2024	Initial document release

5. Contact

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