ESMT 晶豪科技股份有限公司

Cara-S – Uplynx Sigfox auto-zone GPS Tracker Board

Technical Brief

ESCD-UPLYNX-006 Rev 0.1

Chapter 1 Product Overview

Cara-S is a versatile all-in-one GPS positioning system solution which integrates GPS receiver, Sigfox uplink SoC and other technologies onto a 52mm x 40mm x 13mm PCB. The GPS location of the device is reported to the cloud server via Sigfox network. The auto multiple zone operation of the platform is guaranteed by Uplynx XS8001 SoC which makes Sigfox zone selection seamlessly. Application specific power optimization routine can be implemented with the help of on board G-sensor and thermistor. Data-logging can be setup at regular basis. The data set is stored internally in the XS8001 and can be read out via UART interface for analysis. Cara-S would be a scalable and perfect platform solutions for applications such as asset tracking, logistic tracking and monitoring.

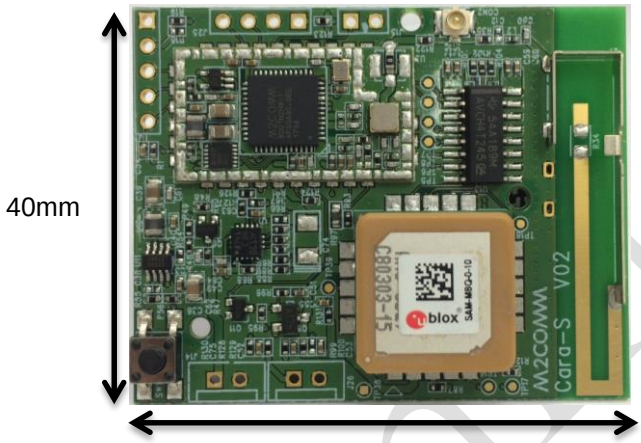

Figure 1-1 Top and Bottom View of Cara-S PCB

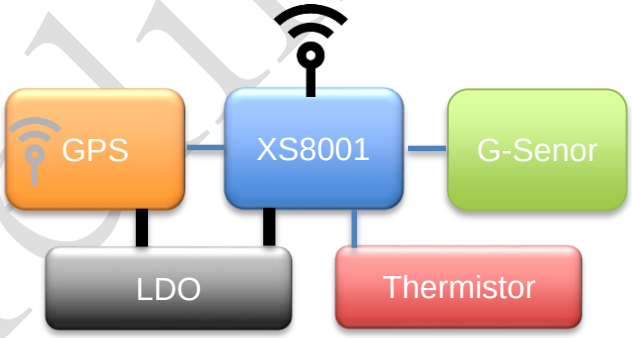

Figure 1-2 Block Diagram

1.1 Hardware Features

Core MCU and Sigfox modem:

- XS8001 (RCZ1,2,3,4 Sigfox Verified)
- Output Power 7dBm to 20dBm
- Temperature sensor via external thermistor
- Battery level detector
- 10 bit ADC

GPS Module:

Ublox SAM-M8Q
72-channel u-blox M8 engine
GPS L1C/A, SBAS L1C/A, QZSS L1C/A, QZSS L1 SAIF, GLONASS L1OF, Galileo E1B/C

On board antenna

868MHz, 902MHz, 920MHz PCB antenna for Sigfox operation
IPEX connector available for external antenna (optional)
GPS integrated antenna

G-Sensor

6D/4D orientation detection
free-fall and motion detection

Thermistor

1°C accuracy with XS8001 application circuit

Power supply

3.4V to 5V (typical Li battery)
Peak current consumption 150mA
Sleep current <20uA (with GPS hot start, BLE and XS8001 at sleep)

Dimension

52mm x 40mm x 13mm

Operating Temperature

-40 °C to 85 °C

1.2 Software Features

XS8001 Software Development Kit

Sigfox lib 2.3.1
Payload encryption support
Software Zone configuration
Temperature conversation

Chapter 2 Electrical Specification

2.1 Cara-S supply

Characteristics	Min	Typ	Max	Unit
System Supply Voltage	3.4		4.5	V
Operating Temperature	-40		85	℃

2.2 Sigfox Communication unit

Direction	Uplink only
Operating Frequency	868.13MHz (RCZ1) 902.2MHz (RCZ2/4) 923.2MHz (RCZ3c) 923.25MHz (RCZ5)
Output Power	7dBm to 22dBm
Embedded PCB antenna gain	0dBi
Antenna connector option	IPEX
RAM/ Flash	24k/128kB
MCU clock frequency	60MHz typ.
Sigfox Zone configuration	Auto switch according to GPS location

2.3 GPS

Accuracy of time pulse signal	30 ns rms
Frequency of time pulse signal	0.25 Hz…10 MHz
Operational limits-Altitude	50,000 m
Operational limits-Velocity	500 m/s
Velocity accuracy	0.05m/s
Heading accuracy	0.3 degrees

GNSS	GPS & GLONASS	GPS	GLONASS	Galileo
Horizontal position accuracy	2.5 m	2.5 m	8.0 m	TBC
Max navigation update rate	10 Hz	18 Hz	18 Hz	18 Hz
Time-To-First-Fix-Cold start	26 s	29 s	30 s	TBC 4
Time-To-First-Fix-Hot start	1 s	1 s	1 s	TBC 4
Sensitivity-Tracking & Navigation	–165 dBm	–164 dBm	–164 dBm	–157 dBm
Sensitivity-Reacquisition	–158 dBm	–158 dBm	–154 dBm	–151 dBm
Sensitivity-Cold start	–146 dBm	–146 dBm	–143 dBm	–136 dBm
Sensitivity-Hot start	–155 dBm	–155 dBm	–154 dBm	–149 dBm

2.4 G-sensor

Parameter	Test conditions	Typ.	Unit
Measurement range(2)	FS bit set to 00	±2.0	g
	FS bit set to 01	±4.0	g
	FS bit set to 10	±8.0	g
	FS bit set to 11	±16.0	g
Sensitivity	FS bit set to 00; High-resolution mode	1	mg/digit
	FS bit set to 00; Normal mode	4	mg/digit
	FS bit set to 00; Low-power mode	16	mg/digit
	FS bit set to 01; High-resolution mode	2	mg/digit
	FS bit set to 01; Normal mode	8	mg/digit
	FS bit set to 01; Low-power mode	32	mg/digit
	FS bit set to 10; High-resolution mode	4	mg/digit
	FS bit set to 10; Normal mode	16	mg/digit
	FS bit set to 10; Low-power mode	64	mg/digit
	FS bit set to 11; High-resolution mode	12	mg/digit
	FS bit set to 11; Normal mode	48	mg/digit
	FS bit set to 11; Low-power mode	192	mg/digit
Sensitivity change vs temperature	FS bit set to 00	0.01	%/°C
Typical zero-g level offset accuracy	FS bit set to 00	±40	mg
Zero-g level change vs temperature	Max delta from 25 °C	±0.5	mg/°C
Acceleration noise density	FS bit set to 00, High-Resolution mode (Table 10), ODR > 1300 Hz	220	µg/√Hz

2.5 Temperature Sensor

Characteristics	Min	Typ	Max	Unit
Operating Range	-30		80	°C
Accuracy (1 point calibration)		+-1		°C
Supply Current (temperature Compensated)		10u		A

2.6 Current Consumption

2.6.1 Static current consumption

Condition	Description (System VDD at 3.7V)	
Sleep	BLE (RTC enable), XS8001 (RTC enable), GPS at sleep (hot start allow)	40uA
XS8001 only	XS8001 is switched on for general purposes	10mA
GPS Acquisition		32mA
GPS Tracking		29mA
G-sensor active	50Hz ODR	11uA

G-sensor power down		0.5uA

2.6.2 GPS tracker consumption vs Sigfox RCZ

RCZ1

Transmission Power 14 dBm
Transmission Packet Size 12 Byte

	min	typ.	max	Unit
Supply Voltage		3.7		V
GPS location report frequency	1	24	144	times per day
Battery Consumption	1	3.5	20.5	mAhr per day
Battery Capacity for 1 year operation	460	1550	7400	mAhr

RCZ3/5 (LBT enabled)

Transmission Power 13 dBm
Transmission Packet Size 12 Byte

	min	typ.	max	Unit
Supply Voltage		3.7		V
GPS location report frequency	1	24	144	times per day
Battery Consumption	1	4	21	mAhr per day
Battery Capacity for 1 year operation	480	1600	7500	mAhr

RCZ2/4

Transmission Power 20 dBm
Transmission Packet Size 12 Byte

	min	typ.	max	Unit
Supply Voltage		3.7		V
GPS location report frequency	1	24	144	times per day
Battery Consumption	1	3	10	mAhr per day
Battery Capacity for 1 year operation	460	940	3460	mAhr

**GPS operation: 3 second hot start .*

Important Notice

Trademarks

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