Teseo-ELE6A

Data brief

Automotive quad-bands GNSS module with open SDK

Product status link
Teseo-ELE6A

Product summary	
Order code	Teseo-ELE6A

Features

- Qualified AEC-Q104
- GNSS features:
  - Simultaneous quad-bands multi constellation GNSS
  - 192 (96 data and 96 pilot) signal tracking channels
- Hardware features:
  - Dual core ARM® Cortex®-M7 to support positioning PPP/RTK algorithm and measurement engine in a single module
  - Embedded flash
  - LCC 54 pins package (17.0 mm x 22 mm)
  - 3.3 V supply voltage range
  - Operating temperature (from -40° to +105°C)
- Firmware features:
  - PE-SDK platform to embed PPP/RTK algorithm in the module
  - GNSS measurement engine
  - Firmware upgrade
  - Free firmware configuration

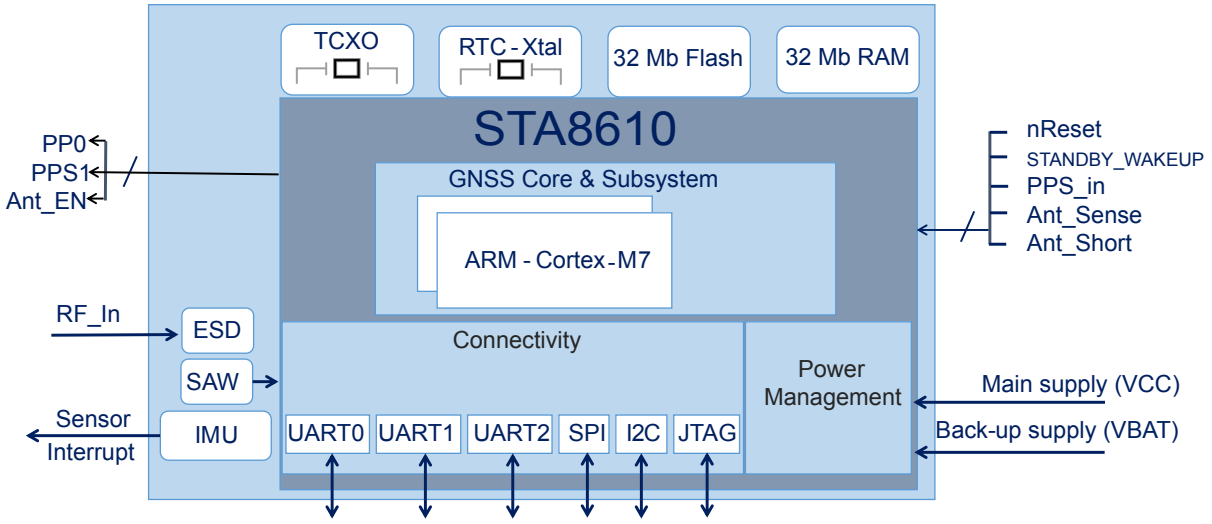
Description

The Teseo-ELE6A is an easy-to-use quad-bands multiconstellation global navigation satellite system (GNSS) standalone module, embedding Teseo VI single die standalone positioning receiver IC working simultaneously on multiple constellations (GPS/Galileo/Glonass/BeiDou/QZSS/IRNSS). The Teseo-ELE6A module brings the proven accuracy and robustness of the Teseo VI chip to the reach of everyone. The Teseo-ELE6A module provides high level and quality GNSS measurement data to support the PPP/RTK algorithm on internal or external MCU. Thanks to the dedicated SDK, the positioning Cortex®-M7 core for PPP/RTK algorithm the Teseo-ELE6A can embed precise positioning application with no need for an external host. Within its 17.0 mm x 22 mm size, Teseo-ELE6A is offering superior accuracy thanks to the on-board temperature-compensated crystal oscillator (TCXO) and a reduced time to first fix (TTFF) relying on its dedicated real-time clock (RTC) oscillator. Teseo-ELE6A offers real-time assisted GNSS. Teseo-ELE6A supports firmware configurability as well as firmware upgrades on both cores. Teseo-ELE6A module, being a certified solution, optimizes the time to market of the final applications, the embedded firmware and the complete evaluation environment saving development time.

1 Module description

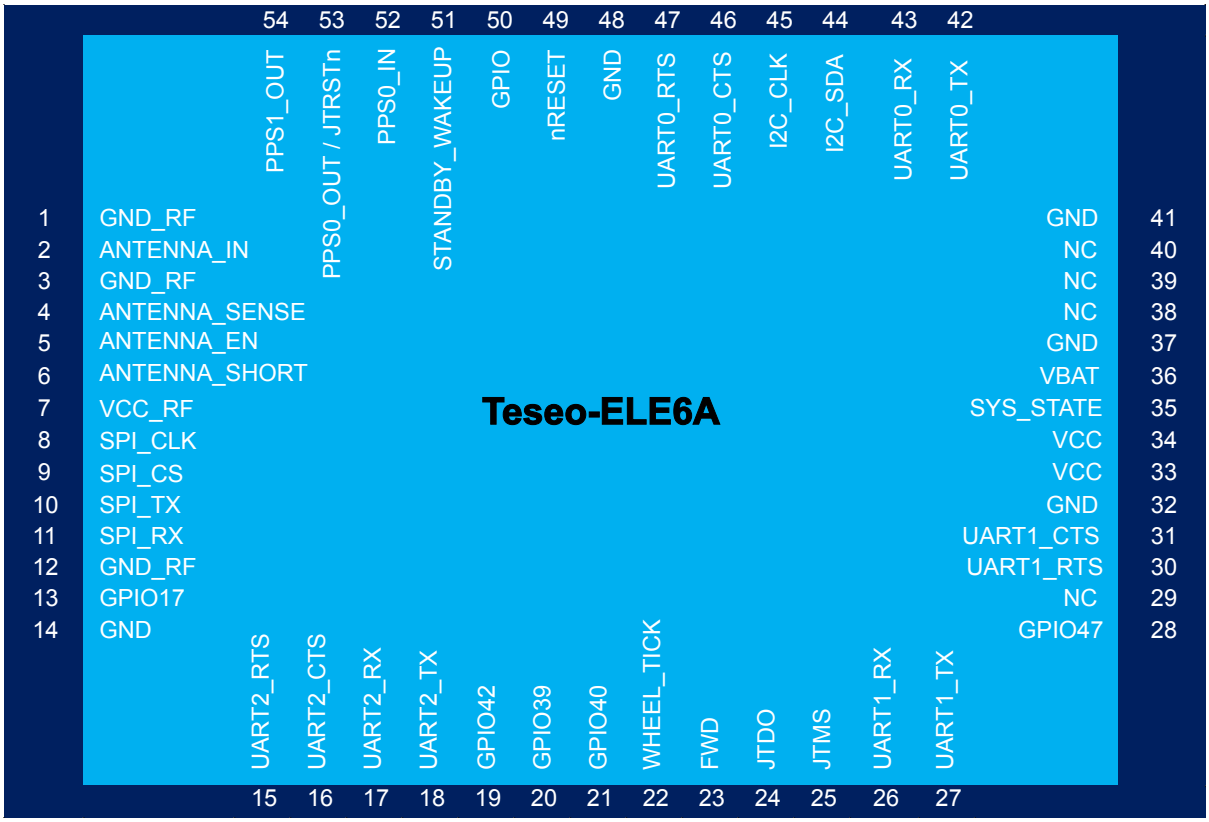
1.1 Block diagram

Figure 1. Block schematic



1.2 Pin configuration

Figure 2. Module pins layout



1.3 Pin out description

Table 1. Module pin out description

Number	Name	I/O	Description
1	GND_RF	Ground	Ground RF
2	ANTENNA_IN	I	Antenna input signal
3	GND_RF	Ground	Ground RF
4	ANTENNA_SENSE	I	Antenna sense signal
5	ANTENNA_EN	O	Antenna enable
6	ANTENNA_SHORT	I	Antenna Short
7	VCC_RF	O	VCC_RF
8	SPI_CLK	I	SPI clock
9	SPI_CS	I	SPI chip selector
10	SPI_TX	O	SPI_TX
11	SPI_RX	I	SPI_RX
12	GND_RF	GND	Ground RF
13	GPIO	GND	GPIO - 41
14	GND	GND	Ground
15	UART_2_RTS	I/O	UART_2_RTS
16	UART_2_CTS	I/O	UART_2_CTS
17	UART_2_RX	I	UART_2_RX
18	UART_2_TX	O	UART_2_TX
19	GPIO	I/O	GPIO - 42
20	GPIO	I/O	GPIO - 39
21	GPIO		GPIO - 40
22	WHEEL_TICK	I	Wheel-Tick - Dead-Reckoning input / JTDI
23	FWD	I	Forward - Dead-Reckoning input / JTCK
24	GPIO	I/O	GPIO 4 / JTDO
25	GPIO	I/O	GPIO 2 / JTMS
26	UART_1_RX	I	UART_1_RX
27	UART_1_TX	O	UART_1_TX
28	GPIO	I/O	GPIO 47
29	NC		
30	UART_0_RTS	I/O	UART_0_RTS
31	UART_0_CTS	I/O	UART_0_CTS
32	GND	GND	Ground
33	VCC	I	Input voltage supply
34	VCC	I	Input voltage supply
35	SENSORI_INTERRUPT	O	Sensor interrupt output
36	VBAT	I	Backup area voltage supply
37	GND	GND	Ground
38	NC		

Number	Name	I/O	Description
39	NC		
40	NC		
41	GND	GND	Ground
42	UART-0-TX	0	UART 0-TX
43	UART-0-RX	I	UART-0-RX
44	I2C_SD	I/O	I2C data
45	I2C_SCL	I/O	I2C clock
46	UART-0-CTX	I/O	UART 0-CTX
47	UART-0-RTX	I/O	UART-0-RTX
48	GND	GND	Ground
49	nReset	I	nReset signal
50	GPIO	I/O	
51	STANDBY_WAKEUP	I/O	STANDBY-WAKEUP signal
52	PPS0_IN	I	PPS0_Input
53	PPS0_OUT	O/I	PPS0 / JTRESETn
54	PPS1_OUT	O	PPS1

2 Supported GNSS constellations

The module firmware supports all the GNSS constellations (GPS, GLONASS, GALIELO, BEIDOU, QZSS, and IRNSS). The user can select what the application needs by the firmware configuration.

2.1 GPS

The module is designed to receive and track the L1C/A (1575.42 MHz), L1C (1575.42 MHz), L2C (1227.6 MHz), L5 (1176.45 MHz) signals provided by the global positioning system (GPS).

The module can receive and process GPS concurrently with Galileo, GLONASS, and BeiDou.

2.2 GLONASS

The module is designed to receive and track the L1OF (1598.0625 MHz-1605.375 MHz), L2OF (1242.9375 MHz - 1248.625 MHz), L1OC, L3OC (1207.14 MHz) signals provided by the Russian GLONASS satellite system.

The module can receive and process GLONASS concurrently with GPS, Galileo, and BeiDou.

2.3 BeiDou

The module is designed to receive and track the B1I (1561.98 MHz), B1C, B2I (1207.14 MHz), B2B, B3I (1268.52 MHz) signals provided by the Chinese BeiDou satellites system.

The module can receive and process BeiDou concurrently with GPS, Glonass, and Galileo.

2.4 Galileo

The module is designed to receive and track the E1B/C (1575.42 MHz), E5b (1207.14 MHz), E5a (1176.45 MHz), E6 (1278.75 MHz) signals provided by the European Galileo satellites system.

The module can receive and process Galileo concurrently with GPS, GLONASS, and BeiDou.

2.5 IRNSS

The module is designed to receive and track the L5 (1575.42 MHz) signal provided by the Indian IRNSS (Navic) satellites system.

The module can receive and process IRNSS concurrently with GPS, GLONASS, Galileo, and BeiDou.

2.6 QZSS

The module is designed to receive and track the L1C/A (1575.42 MHz) signal provided by the Japanese QZSS satellites system.

QZSS with GPS signals provide GNSS augmentation service for the Pacific region covering Japan and Australia. QZSS satellites are placed in a periodic highly elliptical orbit (HEO): these orbits allow the satellites to “dwell” for more than 12 hours a day at an elevation above 70° (it means that they appear almost overhead most of the time).

3 Augmentation systems

3.1 Satellite-based augmentation system

The module supports SBAS. SBAS is a wide area differential GPS (WADGPS), it is a system which provides differential GPS corrections data; SBAS includes the WAAS within the United States, the EGNOS within Europe, the multifunctional transport satellite (MTSAT)–based MSAS within Japan and southeast Asia, and the GPS and GEO augmented navigation (GAGAN) system in India.

SBAS data correction is used in the GNSS algorithm to provide a better position estimation. The overall SBAS differential correction mechanism can be conceived as built in 2 phases:

- The “acquire and tracking” phase
- The “decoding” phase

The “acquire and track” phase relates to the capacity of the acquisition engine to reliably track the configured SBAS satellite; during the decoding phase the SBAS message can be decoded to fetch the differential corrections.

The current longitude limits for each service are:

- WAAS -180°C to -25°C
- EGNOS -25°C to +50°C
- GAGAN +50°C to +100°C
- MSAS +100°C to +180°C

The module software with SBAS capability implements a command interface at the NMEA level to allow interaction with the SBAS library. It supports commands to enable/disable the SBAS functionality.

3.2 Differential GPS

The module supports differential-GPS data according to RTCM 2.3 (radio technical commission for maritime services).

Differential-GPS data improves position accuracy.

Revision history

Table 2. **Document revision history**

Date	Revision	Changes
24-Jan-2025	1	Initial release.
20-Feb-2025	2	Updated Features on cover page.

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