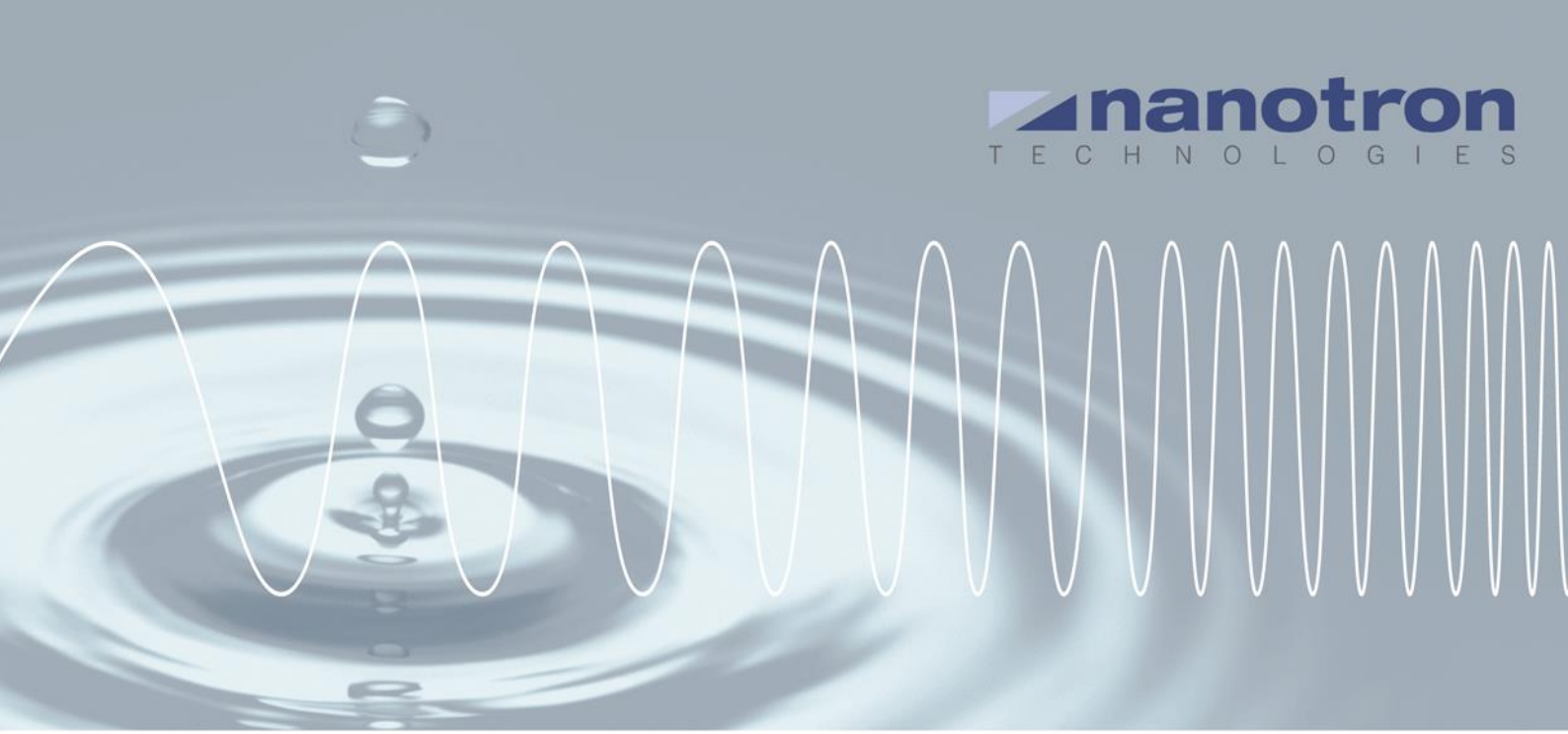

nanoANQ XT V2 RTLS Anchor - Data Sheet

1.2

NA-17-0372-0014

Document Information

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Contents

1. Introduction

The device *nanoANQ XT V2* acts as an anchor in Nanotron's Chirp Spread Spectrum (CSS) 2.4 GHz Real Time Locating System (RTLS).

The anchor can be integrated into any communication substation by interfacing directly with an Ethernet RJ-45 connector including Power over Ethernet (PoE). It precisely detects the time of arrival (ToA) and the received signal strength (RSSI) of tag blinks required for TDOA location applications. The anchor is able to range with other anchors to automatically determine their separation distances – a key capability to enable automatic system set-up and maintenance.

Together with nanoLOC-based tags and nanotron's Location Server, the anchor forms the basis for high throughput tracking and monitoring applications in harsh environments. Its design supports any 2.4 GHz antenna through U.FL connectors. There is one connector for each of the two independent radio channels.

Through its Ethernet port the anchor utilizes IP-based data and management protocols and features a built-in DHCP client. Thus it can be configured remotely through its API over the network.

Bidirectional payload exchange between the Location Server and individual tags is supported over the air.

In compliance with CE and other regulations the RF output power is adjustable between 0 and +19 dBm. Via USB and Ethernet the anchor can communicate with peripherals designed by the user.

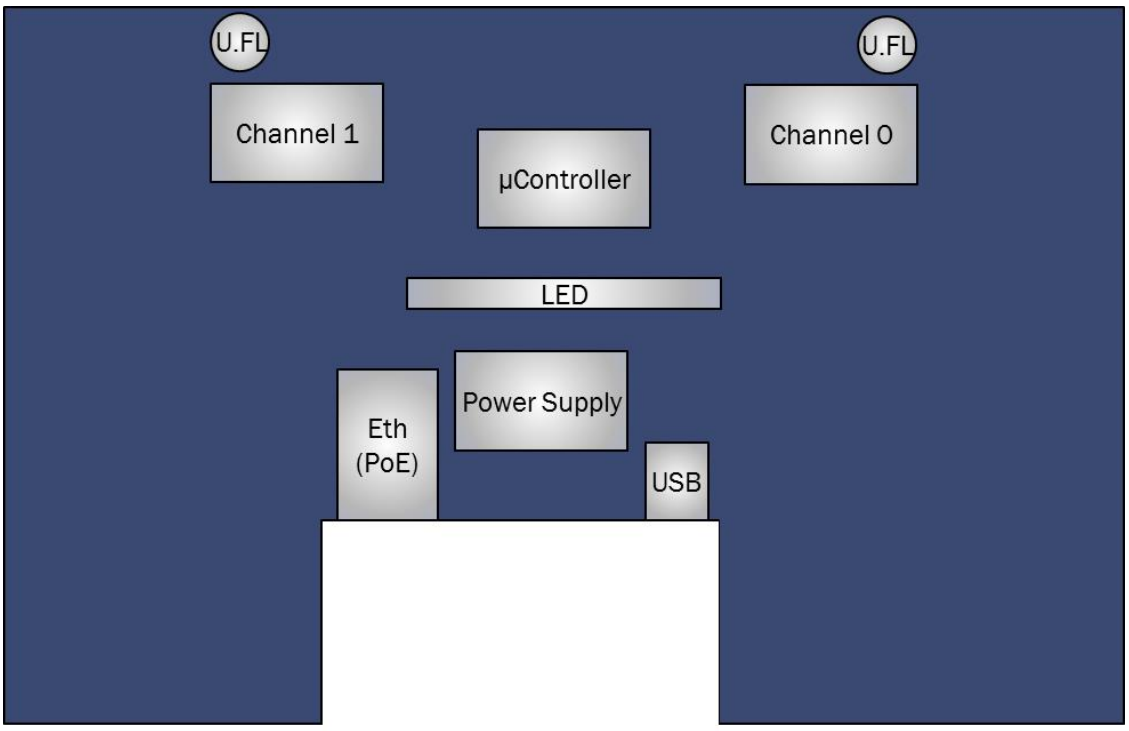

Figure 1-1: Overview of the nanoANQ XT V2 functional entities

2. Technical Data

Frequency range:	ISM-band 2.4 GHz, 2.400 … 2.4835 GHz
Modulation:	Chirp Spread Spectrum (CSS)
Number of RF channels:	2
RF output power:	-17 dBm to +19 dBm (adjustable)
RF sensitivity:	typically -88 dBm, 80 MHz mode, symbol duration 1 µs
RF interface:	2 U.FL connectors (default)
Data interface:	Ethernet 10BaseT/100BaseTX, USB, full speed 480 Mbit/s (maintenance only)
Optical user interface:	Light Emitting Diodes (LEDs) for indication of nanoANQ XT V2 state: 2 blue LEDs for RF receive state, 1 red LED for RF transmit state, 1 green LED for nanoANQ XT alive state, 1 green LED for power state, 1 tri-color: red/green/blue LED, user configurable, 8 white LEDs, user configurable
Supply voltages:	+48 V Power over Ethernet (recommended), +5 V USB
Power consumption:	Power over Ethernet: 5 W max. Classified as PD Class2 according to IEEE 802.3af (3.84 W… 6.49 W) USB 500 mA max.
Connectors:	1 x RJ45 Ethernet with PoE, 1 x Mini USB Type B, 2 x U.FL connectors (assembly option, default),
Operating temperature:	-30°C…+70°C
Dimensions:	180 mm x 154 mm, height: 19 mm (without housing)
Weight:	124 g (without housing)

3. Functional Description

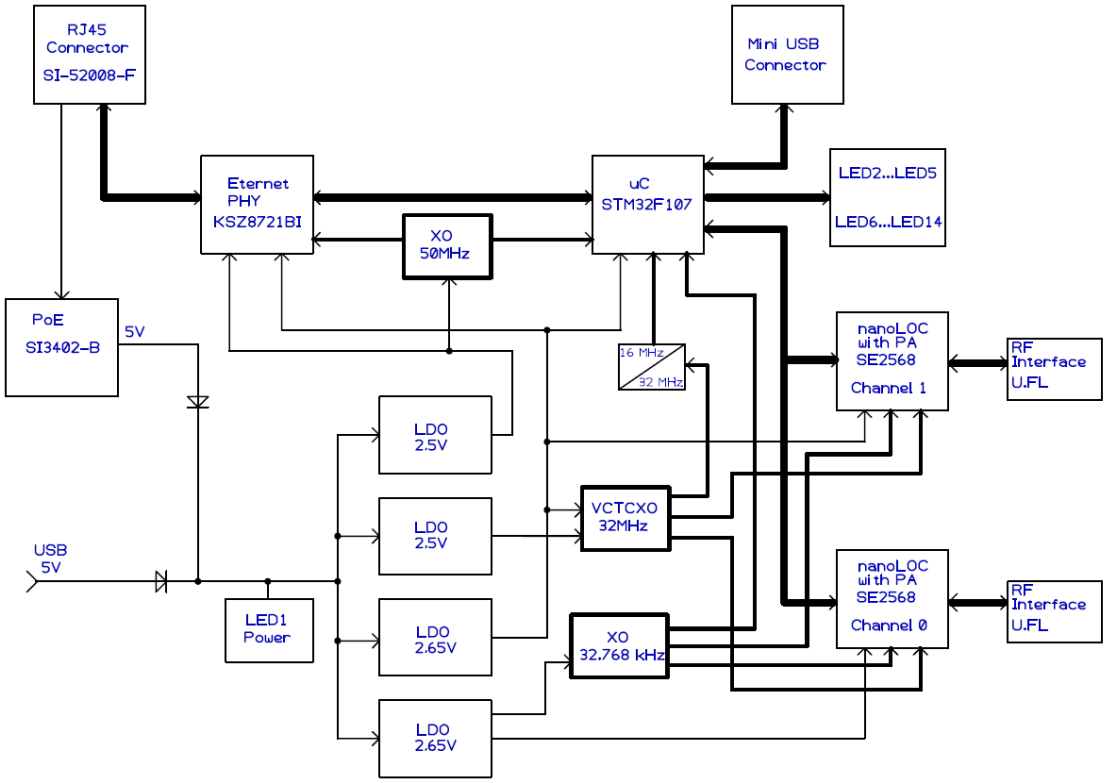

Figure 3-1: Block diagram of nanoANQ XT V2

3.1. Dual Channel Core Locating Unit

The core locating unit consists of two independent RF channels and the control unit. It captures incoming chirp spread spectrum (CSS) tag broadcasts and determines their time of arrival (ToA).

3.2. Antenna Connectors

By default each of the two RF channels features an U.FL connector allowing to use adapter cables between the anchor and external connectors (e.g. SMA or N).

3.3. Status LEDs

Five onboard Status LEDs are used to signal different operation modes of the anchor such as transmit, receive, alive or power on/off. The other eight LEDs are freely configurable via software. The placement of the LEDs are shown on Figure 4-1.

3.4. Power Supply and Clock Sources

The nanoANQ XT V2 can be operated via two alternative power supply sources via Ethernet PoE or USB. All required supply voltages are derived internally from the power supply unit. All clocks are generated on board.

3.5. Interfaces and API

The anchor is equipped with the required nanoANQ RTLS firmware to enable the anchor to operate in Nanotron's RTLS solution. The firmware can be updated via the anchor's Ethernet interface using the pre-flashed anchor firmware bootloader. For detailed information on how to upgrade anchor firmware see the nanoANQ user guide [1].

3.5.1. RF interface

The RF interface for channel 0 (A) and channel 1 (B) consists of U.FL connectors. The nominal output power of typical +19 dBm is provided into a 50 Ohm load impedance. Deviating loads can cause lower output power and higher operating current. Directly connected antennas should have a reflection factor not higher than 2.

3.5.2. Ethernet interface

The anchor provides an Ethernet 10BaseT/100BaseTX interface. Further, it provides Power over Ethernet (PoE) 48 V which is the recommended power source of the anchor.

Table 3-1: RJ-45 signals, pin description

Pin No.	Pin Name	Pin Description
1	TX +	Data
2	TX -	Data
3	RX +	Data
4	VDC +	PoE
5	VDC +	PoE
6	RX -	Data
7	VDC -	PoE
8	VDC -	PoE

3.5.3. USB interface

The anchor includes a USB 2.0 full speed interface for maintenance purposes only. It provides an alternative power supply 5 V source when PoE is not available. Therefore it has a mini USB-B type connector. Except optional protection circuits the USB interface needs no additional components.

Table 3-2: USB signals, pin description

Pin No.	Pin Name	Pin type	Pin Description
1	USB_OTG_FS_VBUS	I	USB Bus voltage
2	USB_OTG_FS_DM	I/O	USB differential serial data line
3	USB_OTG_FS_DP	I/O	USB differential serial data line
4	USB_OTG_FS_ID	I	USB connector identification
5	GND	-	circuit ground

3.6. Over-the-Air anchor Synchronization

The anchor supports nanotron's patent synchronization method (EP 2525236 A1) required to operate the device as part of a TDOA localization solution in conjunction with the appropriate location engine and server software.

3.7. Detection of Location Broadcasts

Tags that are part of the nanotron RTLS platform can send location broadcasts periodically in three different modes: 80 MHz with 1 µs symbol length (80/1), 80 MHz with 4 µs symbol length (80/4), and 22 MHz with 4 µs symbol length (22/4). 1 µs symbols require only one fourth of the airtime of 4 µs symbols. The 80/4 and 22/4 transmission modes provide 6 dB more link budget. Hence 80/1 is recommended for high tag densities and 80/4 or 22/4 is used when maximizing the anchor to tag range is the most important requirement.

The time of arrival (ToA) of tag broadcasts are captured by the anchor with better than 1 ns resolution and a detection rate of more than 900 per second. Through the air, radio waves travel approximately at 30 cm per 1 ns. ToAs from different anchors are used to calculate the time difference of arrival (TDoA). Several TDoAs results are combined to estimate the tag position.

3.8. API

The nanoANQ XT V2 has a powerful and versatile Application Interface (API). It is used to operate and maintain the anchors. Moreover, it is able via its backchannel to control and to exchange payload to and from the tags. How to use the API is explained in detail in the nanoANQ User Guide [1] and the nanoLES User Guide [2].

The location engine nanoLES uses the API as well as the RTLS Toolbox 3. Latter can be used during the deployment phase and to configure and maintain the system easily.

4. Connectors and LEDs

The following figures show the position of the connectors and LEDs

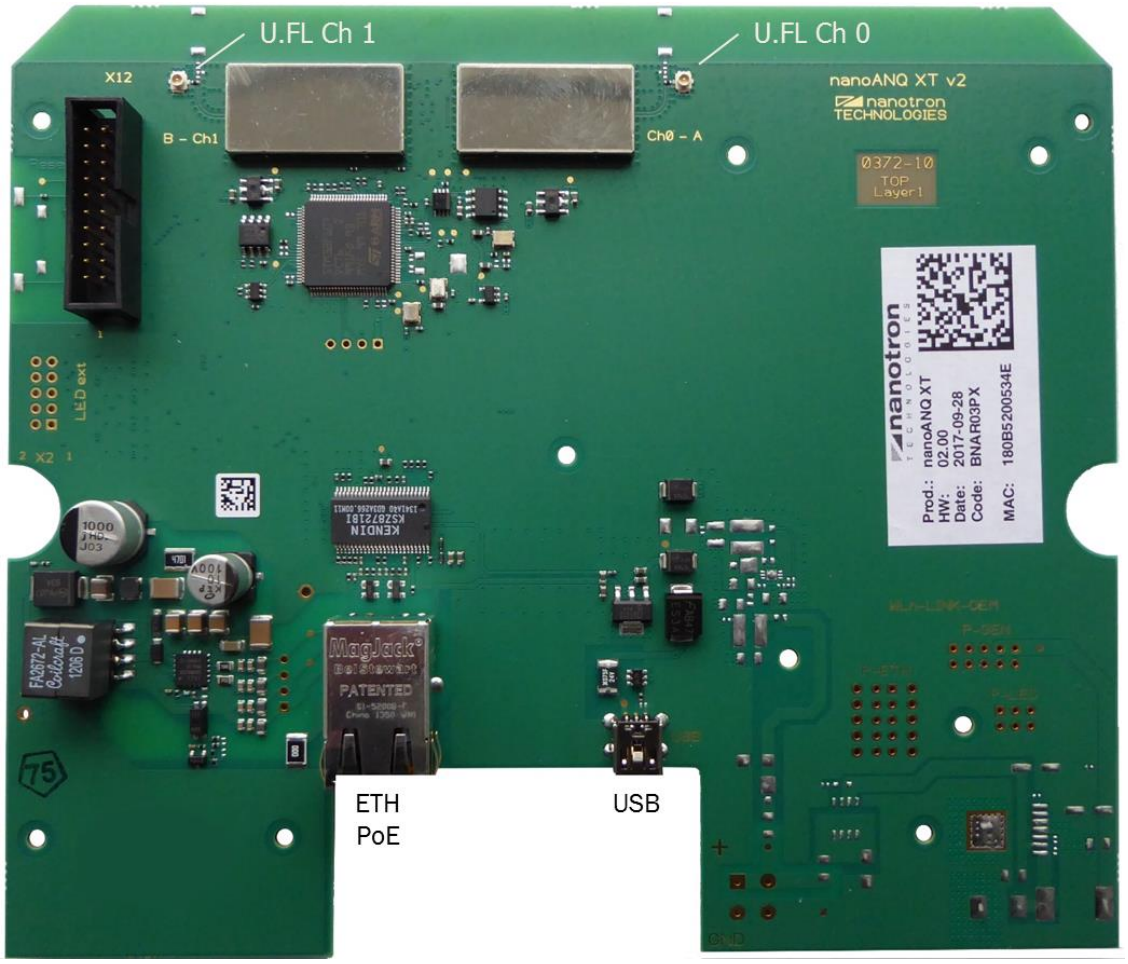

Figure 4-1: nanoANQ XT V2 top view with connectors

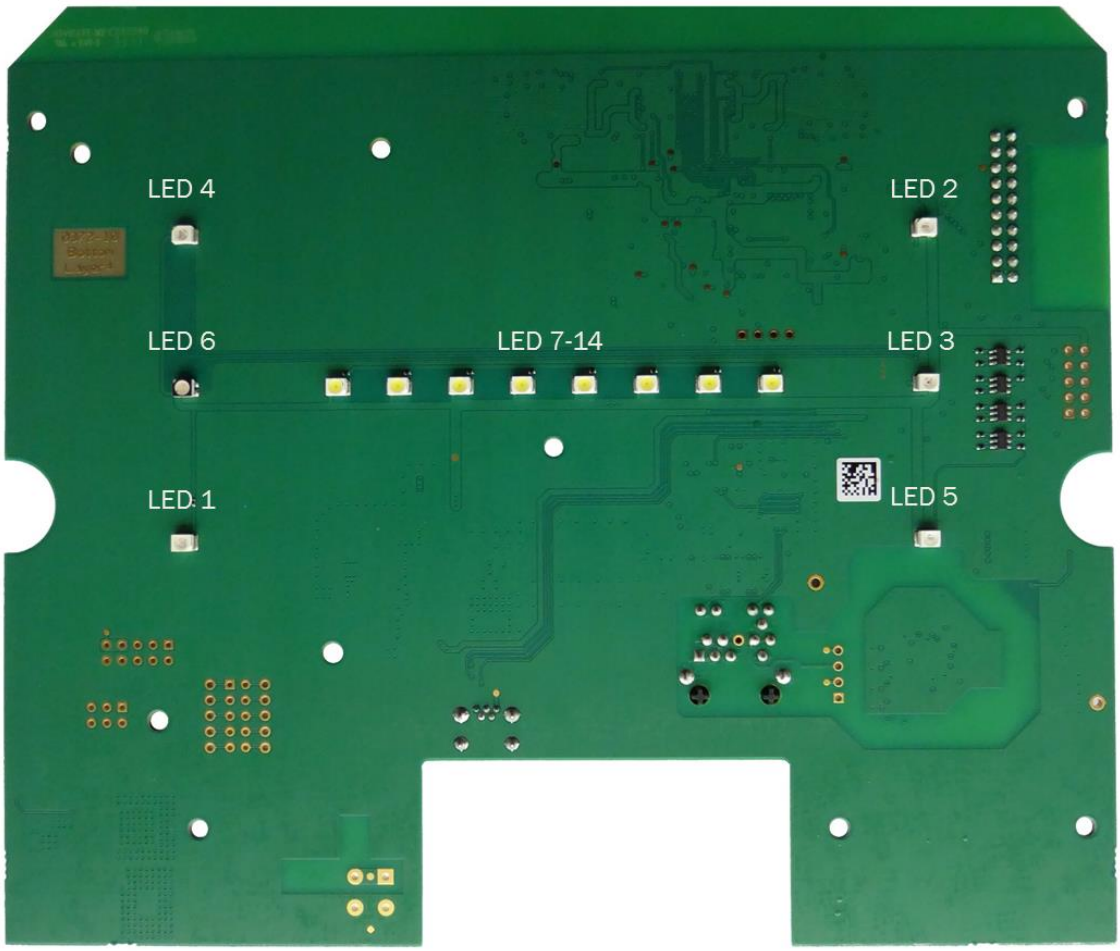

Figure 4-2: nanoANQ XT V2 bottom view with LEDs

5. Mechanical Dimensions

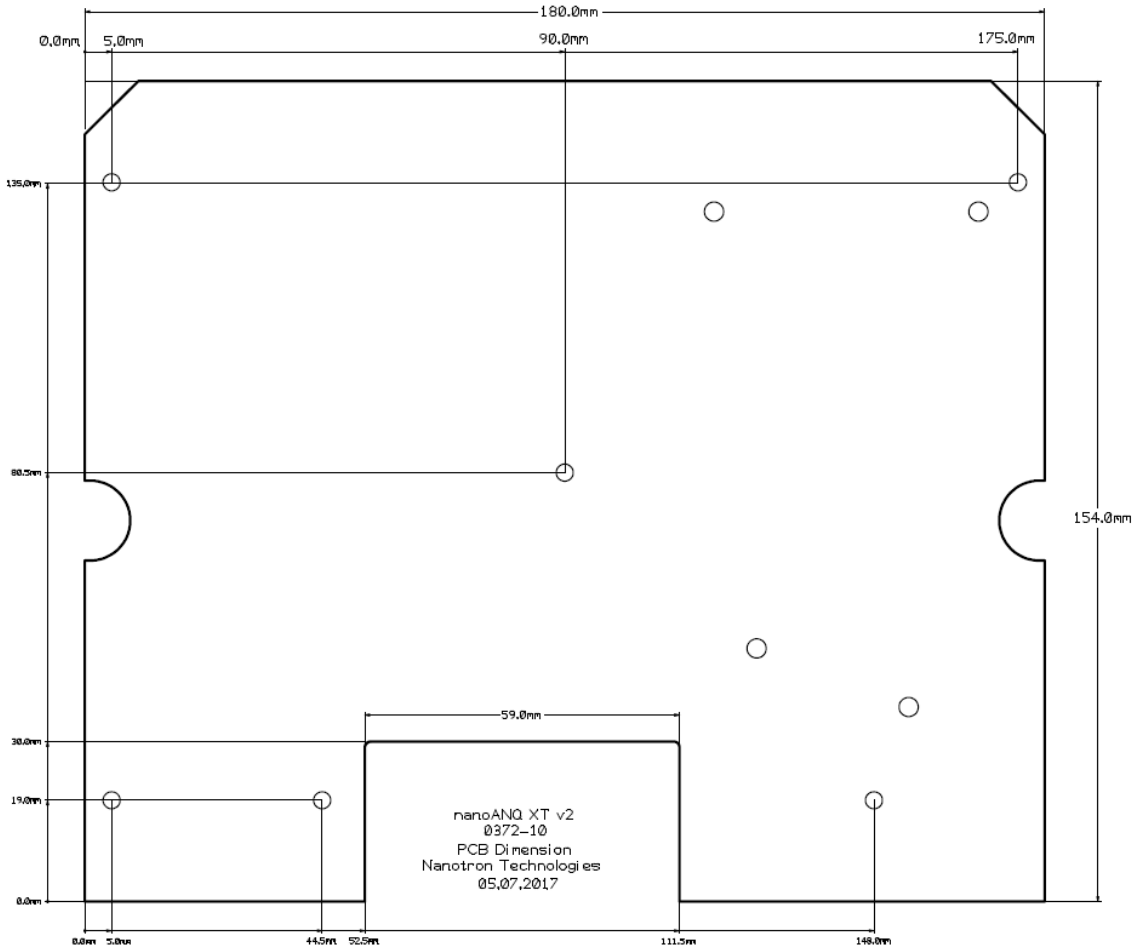

Figure 5-1: Dimension top view

6. References

[1] nanoANQ User Guide, Document ID: NA-13-0275-0025
[2] nanoLES User Guide, Document ID: NA-13-0243-0043

Document History

Date	Authors	Version	Description
2017-10-18	MBO	1.0	Initial Version
2018-09-13	MBO	1.1	Improved pictures. Editorial changes
2018-11-16	MBO	1.2	Removed chip antenna as option

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Today nanotron's *embedded location platform* delivers location-awareness for safety and productivity solutions across industrial and consumer markets. The platform consists of chips, modules and software that enable precise real-time positioning and concurrent wireless communication. The ubiquitous proliferation of interoperable location platforms is creating the location-aware Internet of Things.

Further Information

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