

Manual AMB2301

Version 1.1



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1 Introduction

AMBER wireless provides with the AMB2301 a certified, qualified and listed Bluetooth class 2 module. It is based on LMX9830 from Texas Instruments. This module is qualified for a serial data or audio transmission.

The module has an integrated PCB-antenna and can be placed into a circuit with surface mount techniques.

AMB2301 comes with an integrated firmware with the complete Bluetooth Stack (Bluetooth 2.0). The Stack supports SPP, GAP, SDAP, DUN, OBEX, HSP and other Profiles.

A Point-to-Point connection and a Point-to-Multipoint (Piconet) connection are supported by the firmware. Up to seven active links (Piconet) and one SCO-link (Audio) are possible.

The module can be integrated easily in a system. According to the application and the settings the AMB2301 can work as a stand-alone-slave-module e.g. as a virtual cable replacement in combination with any other commercial Bluetooth system.

1.1.1 Block diagram

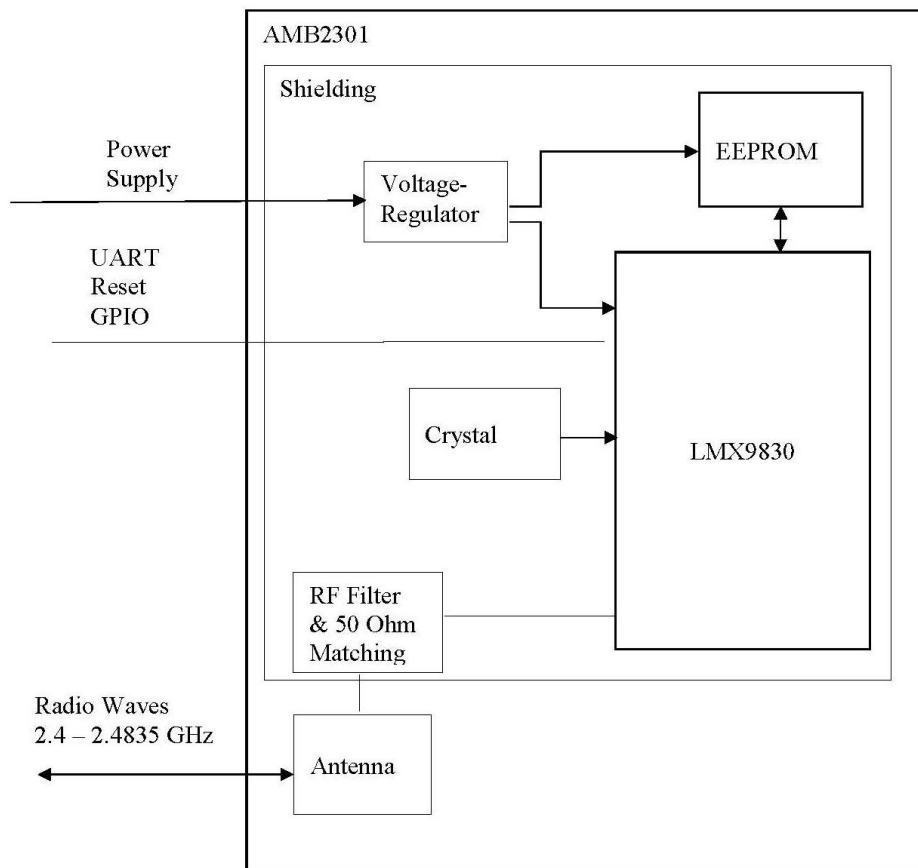


Figure 1 Block diagram

2 Physical parameters

Voltage supply	2.9 to 3.6V
Current consumption	typ. 65mA
RF output	typ. 0dBm (Class 2)
Rx sensitivity	typ. -80dBm
Data rate UART	2.4 to 921.6 kbits/s
Operating temperature	-40°C to 85°C
Antenna	Integrated PCB antenna
Dimension	27.5 x 16.0 x 3.5mm
Bluetooth-PIN	0000
Miscellaneous	All further technical data according to the LMX9830 module of Texas Instruments, see [1]

3 Pinout

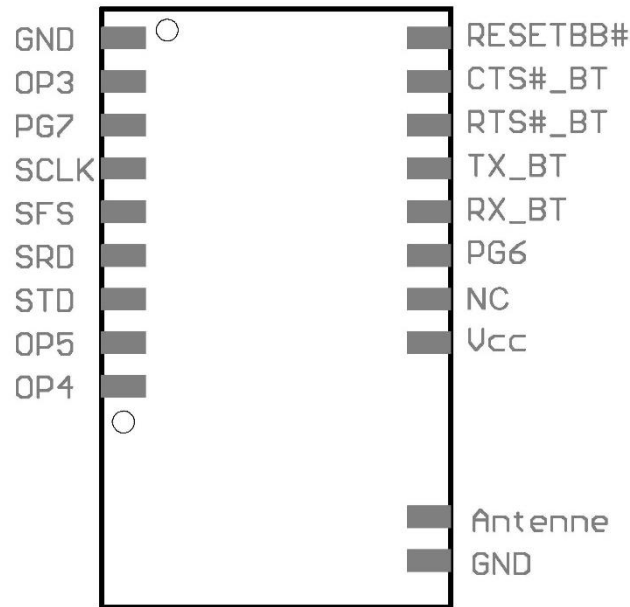


Figure 2 Pinout

Pin name	Typ ¹	Notice
GND	I	Ground
OP3	I	Must be connected to Vcc
PG7	I/O	GPIO (default setting: UART activity)
SCLK	I/O	Audio PCM Interface Clock
SFS	I/O	Audio PCM Interface Frame Synchronization
SRD	I	Audio PCM Interface Receive Data Input
STD	O	Audio PCM Interface Transmit Data Output
OP5	I	Configuration UART-data rate at Start up
OP4	I/O	Configuration UART-data rate at Start up, otherwise GPIO
RESETBB#	I	Reset, internal Pull up, active low
CTS#_BT	I	Host Serial Port Clear To Send, active low ²
RTS#_BT	O	Host Serial Port Request To Send, active low ³
TX_BT	O	Host Serial Port Transmit Data
RX_BT	I	Host Serial Port Receive Data
PG6	I/O	GPIO (default setting: BT link status)
NC	I	Do not connect.
Vcc	I	Power supply, 2.9V to 3.6V
Antenna	O	Not internally connected.

Table 1 Pin out

¹ I = Input, O = Output

² Connect with ground if not used

³ Not connected if not used

3.1 Minimum connection to run the AMB2301

In order to realize a radio transmission, the following connections of the AMB2301 have to be wired:

VCC, GND	Power supply
RX, TX	UART data
RTS, CTS	UART handshake; if does not need: short RTS and CTS or contact CTS at GND (without flow control it can come to overrun and lost data)
OP3	High (connect to VCC)
OP4, OP5	Configuration UART, see chapter 2.2.3 (open or 1KΩ pull-up)

All other pins don't need to be connected.

3.2 Default settings

All parameters are stored inside the internal EEPROM. See [1] and [2]. In the Bluetooth environment, the device announces itself as a XXXXXX (Device Name), whereas XXXXXX has to be replaced by the device's Bluetooth address.

3.3 Detailed Description

3.3.1 UART configuration with OP4, OP5

The serial interface of the AMB2301 must be configured as follows:

OP4	OP5	Function
Open	Open	UART speed read from NVS (EEPROM)
Open	High	UART speed 9.6 kbps
High	Open	UART speed 115.2 kbps
High	High	UART speed 921.6 kbps

Caution: Use 1KOhm pull up for OP4 and OP5 High state.

While power up OP4 and OP5 are pulled down internally. Using other resistor values might lead to malfunction.

3.3.2 UART interface RX_BT, TX_BT, RTS#_BT and CTS#_BT

The interface serves for communication with the AMB2301. Hardware handshake is used (RTS/CTS). If this should not be supported by the host system, RTS#_BT and CTS#_BT must be short circuit or CTS#_BT put on Low levels.

This can lead however to data loss due to overrun.

Therefore it is recommended to use handshake.

3.3.3 Details to the remaining connections of the AMB2301

ResetBB#	Internal Pull up, low active, no external pull up recommended
SCLK, SFS, SRD, STD	Audio interface, if not used, pins does not attached
PG6, PG7	I/O ports, if not used, pins does not attached
Vcc, Gnd	Power supply

3.4 Commando Interface

The AMB2301 based on LMX9830 provides a simple Commando Interface. Detailed Information can be found in the IC documentation [2]. To simplify the use of this commands further a PC tool, the "Simply Blue Commander" is available.

4 Hardware integration

4.1 Dimension

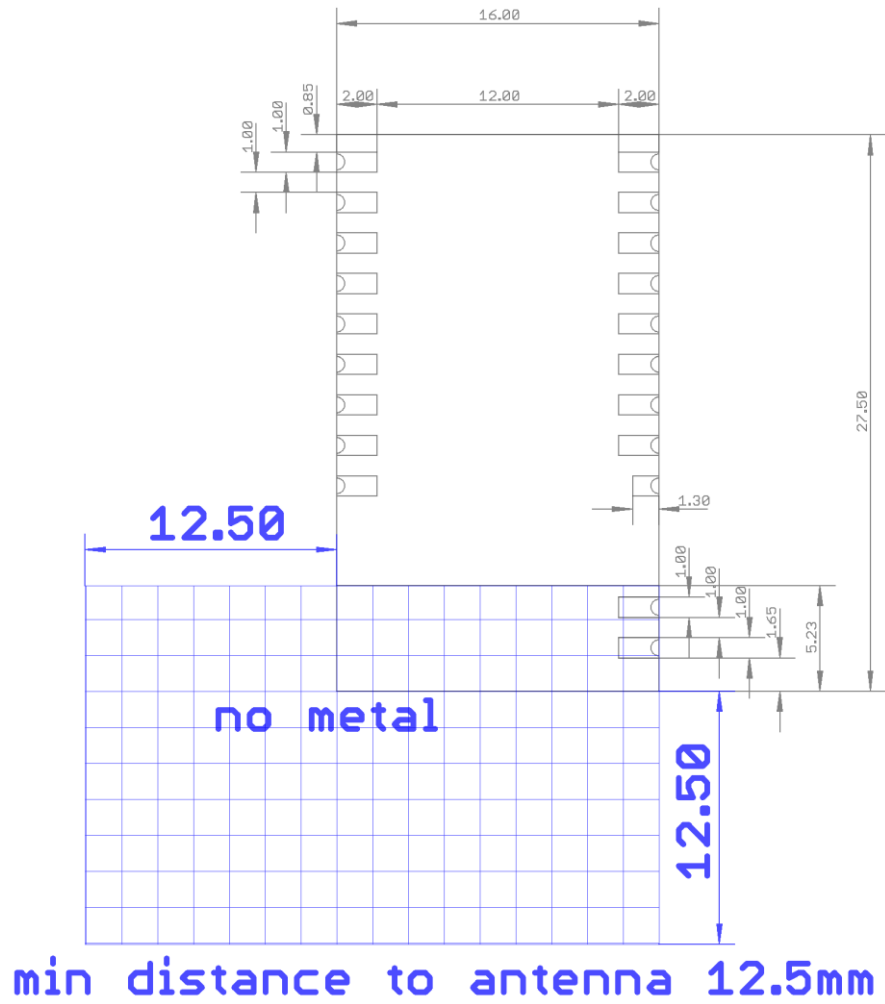


Figure 3 Measures, recommended distance to antenna

4.2 Recommendation for footprint

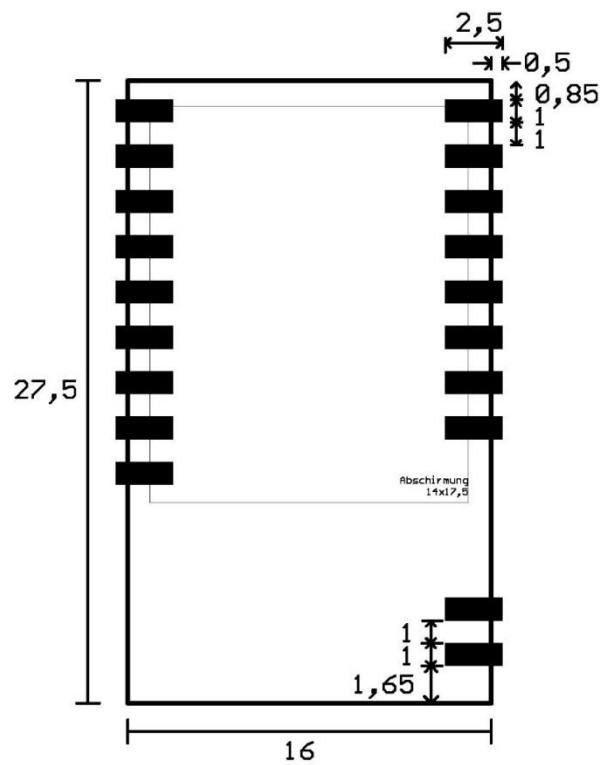


Figure 4 Footprint, all dimensions in mm

4.3 Design recommendation

4.3.1 Layout

To achieve the maximum of range no metal (ground, strip line, components, etc..) has to be near the antenna, as shown hatched in the following figure. The antenna should have a distance of minimum 12.5mm to any ground, strip line or component. Most suitable is to place the antenna at the edge of the motherboard.

Caution: The AMB2301 is not isolated on the bottom side, so even if there are normally no short circuit problems because of the solder resist, an isolation should be placed between AMB2301 and motherboard in case of any copper on the top side of the motherboard underneath the AMB2301.

4.3.2 Power supply

For a reliable operation of the module, the power supply has to be provided with a slew rate over 3V per 500 microseconds. Take care of having no voltage on any pin until the power supply is turned on properly (Tip: Pay attention to remaining charges of smoothing capacitors).

4.4 Soldering & Reflow

- The AMB2301-TR Units suits for automatic assembly reflow process.
- AMB2301 are not vacuum packed and must be dried before soldering.
- The temperature curve depends on the motherboard its character, like the number and conditioning of parts, etc. Please ask your manufacturer.
- Depending on the limit values of the components following limits are not allowed to excess
 - 260°C max. 10s (Crystal)

The following drawing shows the example of the temperature curve of a 31cm² PCB assembled on one side.

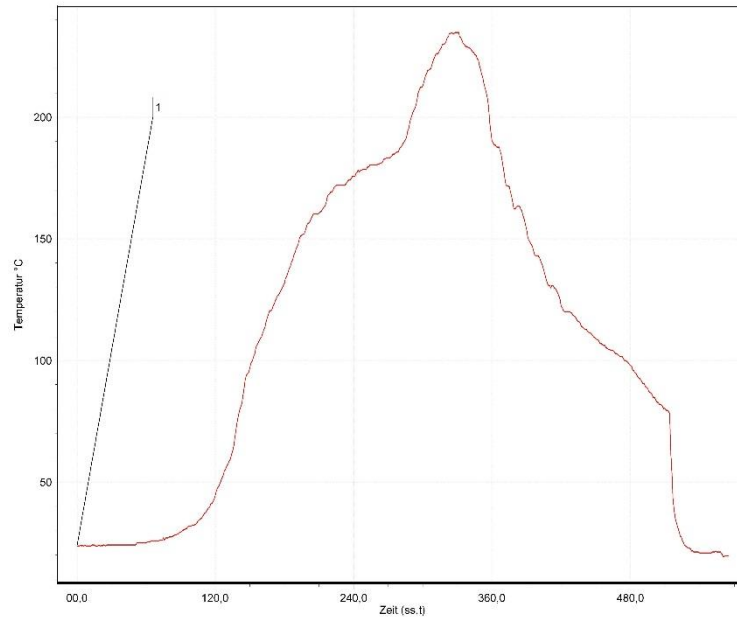


Figure 5 Example of a temperature curve

Caution: Soldering profile has to be adapted corresponding to the conditions on the motherboard.

4.5 Warning notice



Caution! ESD sensitive device.

Care should be taken when handling the device in order to prevent permanent damage.



MSL 4

Caution! This assembly contains moisture sensitive devices.

Care should be taken when processing the device. It requires proper handling per IPC/JEDEC J-STD-033.



Please be aware, that the cable of the power supply must not exceed a maximum length of 3 meters to comply with CE requirements regarding EMC.



Since the module itself is not fused the voltage supply shall be fed from a limited power source according to EN 62368-1.

5 Modification from AMB2300 to AMB2301

There is no modification required regarding hardware connection or connection to the host (soft and hardware).

Due to the new integrated antenna Radio Matters inside the application might be retested.

No modification concerning the Bluetooth listing is required, as the AMB2301 comes under the same Declaration ID as the AMB2300. Customer Listings were supposed to link to this Declaration ID since market launch.

6 References

- [1] LMX9830 Data Sheet
- [2] LMX9830 Software User's Guide
- [3] Simply Blue Commander

7 Regulatory compliance information

7.1 Important notice

The use of Radio frequencies is limited by national regulations. The AMB2301 has been designed to comply with the RED 2014/53/EU directive of the European Union.

The AMB2301 can be operated without notification and free of charge in the area of the European Union.

Conformity assessment of the final product

The AMB2301 is a subassembly. It is designed to be embedded into other products (products incorporating the AMB2301 are henceforward referred to as "final products").

It is the responsibility of the manufacturer of the final product to ensure that the final product is in compliance with the essential requirements of the European Union's Radio Equipment directive (RED).

The conformity assessment of the subassembly AMB2301 carried out by AMBER wireless GmbH does not replace the required conformity assessment of the final product in accordance to the RED .

Exemption clause

Relevant regulation requirements are subject to change. AMBER wireless GmbH does not guarantee the accuracy of the before mentioned information. Directives, technical standards, procedural descriptions and the like may be interpreted differently by the national authorities. Equally, the national laws and restrictions may vary with the country. In case of doubt or uncertainty, we recommend that you consult with the authorities or official certification organizations of the relevant countries. AMBER wireless GmbH is exempt from any responsibilities or liabilities related to regulatory compliance.

7.3 EU Declaration of Conformity



EU DECLARATION OF CONFORMITY

Radio equipment: **AMB2301**

The manufacturer: AMBER wireless GmbH
Rudi-Schillings-Straße 31
54296 Trier
+49 651 99355 0

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration: **AMB2301**

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation: Directive 2014/53/EU and 2011/65/EU.

Following harmonised norms or technical specifications have been applied:

EN 300 328 V2.1.1 (2016-11)
EN 301 489-1 V2.2.0 (draft)
EN 301 489-17 V3.2.0 (draft)
EN 62479: 2010
EN 62368-1: 2014/AC: 2015

Trier, 8th of February 2018
Place and date of issue

7.4 FCC Compliance statement AMB2301

FCC ID: R7TAMB2301

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:



(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

(FCC 15.19)

Modifications (FCC 15.21)

Caution: Changes or modifications for this equipment not expressly approved by AMBER wireless may void the FCC authorization to operate this equipment.

7.5 IC Compliance statement AMB2301

Certification Number: 5136A-AMB2301

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

8 Bluetooth Product Listing Certificate

 Bluetooth™		BQC: Roland Becker RB-WWS Limited, Room 2108, 21/F., C C Wu Building, 302-308 Hennessy Road, Hong Kong
<h1>PRODUCT LISTING CERTIFICATE</h1>		
<p>This is to certify that the qualification requirements for the below stated product have been reviewed and BQC acknowledged. As a result thereof an End Product Listing entry has been created which can be found following the above stated hyperlink.</p>		
Product ID:	AMB2301	HongKong, 2018.02.05 place, date (yyyy.mm.dd)
Declaration ID:	D013784	 Roland Becker <small>Digitally signed by Roland Becker DN: cn=Roland Becker, o=RB-WWS Limited, ou, email=roland@rb-wws.com, c=HK Date: 2018.02.05 12:42:27 +0800</small>
Related QD ID(s):	10627	
Member Company:	Amber wireless GmbH	signature
Listing Date:	2018-02-05	
Listing link:	https://launchstudio.bluetooth.com/ListingDetails/12123	
Coverd Funtionality:	Baseband Conformance, Generic Access Profile, Interoperability Test Specification, Link Manager, Logical Link Control and Adaption Protocol, Radio, RFCOMM, Serial Port Profile, Service Discovery Application Profile, Service Discovery Protocol	

9 Important information

9.1 Exclusion of liability

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9.3 Usage restriction

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By using AMBER wireless products, the user agrees to these terms and conditions.

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