BLE232PLUS

Manual ver. 1.1

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1. Overview

1.1.   BLE232PLUS overview

The BLE232PLUS is an interface adapter converting RS232 communication to 2.4 Ghz radio.

It is available as 2.4 Ghz radio peripheral or central device. It can be used to connect to any other 2.4 Ghz radio device such as a smartphone that supports 2.4 Ghz radio or two paired adapters can form a wireless RS232 bridge.

The BLE232PLUS has a AT command configuration interface. The configuration can be done via the radio GATT service (BLE232PLUS-peripheral) or directly via the RS232 serial port (BLE232PLUS-peripheral and BLE232PLUS-central).

If necessary and desired the module's microcontroller may be programmed by the user directly.

2. Features

- RS232PLUS interface

- 2.4 Ghz radio peripheral or central connectivity

- Powered via serial port or externally

- Supported radio GAP PHY 1MBPS, 2MBPS and CODED

- Configurable as peripheral or central device

- Configuration via serial port using AT command

- Wireless serial bridging

- Connects serial port to smartphones, sensors and other 2.4 Ghz radio devices that supports radio

3. Hardware describtion

3.1. Technical characteristics

Device feature	Value
RS232 lines	RX, TX
RS232 baudrates	1200, 2400, 4800, 9600, 14400, 19200, 28800, 31250, 38400, 56000, 57600, 76800, 115200, 230400, 250000, 460800
RS232 data bits	8
RS232 parity	None, Even
RS232 stop bit	1, 2
Radio role	Peripheral, Central
Radio GAP PHY	1Mbps, 2Mbps, CODED
Radio tx power	-20 to +8 dBm
Radio max data rate	1Mbit, 2Mbit, 500Kbps, 125Kbps
Current consumption	~8 mA

Table 3.1. BLE232PLUS Technical characteristics

The BLE232PLUS can be powered internally via the serial line. For male Connector This control signals (CTS, DSR, DCD and RI) and for female This control signals (RTS, DTR and RI) can be used as power supply.

The BLE232PLUS can as well be powered by an external power source between 3 to 16 Volt.

3.3. BLE232Plus printed circuit board
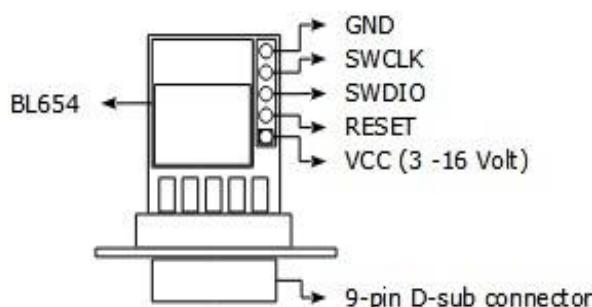
Figure 3.1. BLE232PLUS printed circuit board

4. Register description

4.1. Peripheral characteristics description

Desciption	Data Type	Units	Default	Permissions	Size
128Bit UUID: 91	2ffff0—3d4b-11e3-a760-0002a5d5c51b				
BLE232PLUS service UUID					
128Bit UUID: 91	2ffff1—3d4b-11e3-a760-0002a5d5c51b				
Serial Interface	uint8			Write, Write without response, Notify	
128Bit UUID: 91	2ffff2—3d4b-11e3-a760-0002a5d5c51b				
Serial Interface	uint8		0x0C	Read, write	1 Byte
Baud	Bit0-Bit3	0: 1200			
		1: 2400			
		2: 4800			
		3: 9600			
		4: 14400			
		5: 19200			
		6: 28800			
		7: 31250			
		8: 38400			
		9: 56000			
		10: 57600			
		11: 76800			
		12: 115200			
		13: 230400			
		14: 250000			
		15: 460800			
Parität	Bit4	0: NO			
		1: EVEN			
Stop-Bit	Bit5	0: ONE			
		1: TWO			
128Bit UUID: 91	2ffff3—3d4b-11e3-a760-0002a5d5c51b				
Note	String			Read, write	Max 20 Bytes
128Bit UUID: 91	2ffff4—3d4b-11e3-a760-0002a5d5c51b				
Device name	String		BLE232PLUS	Read, write	Max 20 Bytes
128Bit UUID: 91	2ffff5—3d4b-11e3-a760-0002a5d5c51b				
Tx power	int8		0x00	Read, write	1 Byte
		8: 8 dBm			
		7: 7 dBm			

Descibtion	Data type	Units	Default	Permissions	Size
		5: 5 dBm			
		4: 4 dBm			
		3: 3 dBm			
		2: 2 dBm			
		0: 0 dBm			
		-4: -4 dBm			
		-8: -8 dBm			
		-12: -12 dBm			
		-16: -16 dBm			
		-20: -20 dBm			
128Bit UUID: 912ffff6—3d4b-11e3-a760-0002a5d5c51b					
GAP advertising / scan PHY	uint8		0x01	Lesen, schreiben	1 Byte
		1: 1Mbps			
		4: CODED			
		6: 6 dBm			

Table 4.1. Peripheral characteristics describtion

4.2. AT command description

The AT command interface is available for the first 3 minutes after booting the BLE232PLUS adapter. During this time it is possible to enter via the RS232 serial port with three plus signs (+++) within one second and then one second pause and an carriage return (CR) or line feed (LF).
After a successful entry responds the AT command interface with an OK. Without any activity in the AT command interface, the BLE232PLUS will restart in 3 minutes.

AT-command syntax

The "AT" prefix must be set at the beginning of each command line. To terminate a command line enter <CR>. Commands are usually followed by a response that includes "<CR><LF><response><CR><LF>". Throughout this document, only the responses are presented, <CR><LF> are omitted intentionally.

Types of AT commands and responses

AT-Befehlstyp	Syntax	Funktion
Read [R]	ATXXXX?	This command returns the currently set value oft he parameter.

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Write [W]	ATXXXX=<...>	This command sets user-desinable parameter values.
Execution [E]	ATXXXX	The command executes an internal process.

Table 4.2. Types of AT commands and responses

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ATINFO   Execute command delivers a product information text.

Permission: E

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ATHELP   Execute command returns a list of all supported AT commands, their permissions and short info.

Permission: E

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ATECHO   Controls if the BLE232PLUS echoes characters received from TE during AT command state.
 Parameter Description:
0: Echo mode off
1: Echo mode on

Permission: RW
Default: 1

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ATEXIT   Execute command terminates the AT command interface and restarts the BLE232PLUS adapter.

Permission: E

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 ATSCFG   Can be used to store settings and factory reset.   Execute command stores settings in non-
volatile memory.
   Parameter Description:
 0: Factory reset
 1: Store settings in non-volatile memory

 Permission: WE

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 ATADDR   The read command returns the device address.   The write command can be used to overwrite the
device address.

 Permission: RW
 Default: 64 bit unique device identifier
  Example:
  Read command:
ATADDR?
CCE64F4F79F8
OK
  Write command:
ATADDR=CCE64F4F79F9
OK

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taskit

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ATPEER   The read command returns the peer address.   The write command can be used to overwrite the peer address.

Permission: RW
Default: EMPTY

ATROLE   The read command returns the radio role.   The write command can be used to set the radio role.
  Parameter Description:
 0: Peripheral
 1: Central

Permission: RW
Default: 0

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ATTPWR   The read command returns the radio Tx power.   The write command can be used to set the Tx power.
  Parameter Description:
 8:   8 dBm
 7:   7 dBm
 6:   6 dBm
 5:   5 dBm
 4:   4 dBm
 3:   3 dBm
 2:   2 dBm
 0:   0 dBm
 -4: -4 dBm
 -8: -8 dBm
 -12: -12 dBm
 -16: -16 dBm
 -20: -20 dBm

Permission: RW
Default: 0

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ATGPHY   The read command returns the GAP advertising / scan PHY.   The write command can be used to set the GAP advertising / scan PHY.
  Parameter Description:
 1: 1Mbps
 4: CODED

Permission: RW
Default: 1

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ATBAUD   The read command returns the RS232 serial port baud.   The write command can be used to set the
RS232 serial port baud.
  Parameter Description:
 0: 1200
 1: 2400
 2: 4800
 3: 9600
 4: 14400
 5: 19200
 6: 28800
 7: 31250
 8: 38400
 9: 56000
 10: 57600
 11: 76800
 12: 115200
 13: 230400
 14: 250000
 15: 460800

 Permission: RW
 Default: 12

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ATPARI   The read command returns the RS232 serial port parity.   The write command can be used to set the RS232
serial port parity.
  Parameter Description:
 0: NO
 1: EVEN

 Permission: RW
 Default: 0

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ATSTOP   The read command returns the RS232 serial port stop bits.   The write command can be used to set the RS232
serial port stop bits.
  Parameter Description:
 0: ONE
 1: TWO

 Permission: RW
 Default: 0

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In order to couple two BLE232PLUS adapters, the adress of the peripheral adapter (ATADDR) must be entered in the central adapter (ATPEER).

4. Dimensions

## 5.1. BLE232 board and housing dimensions
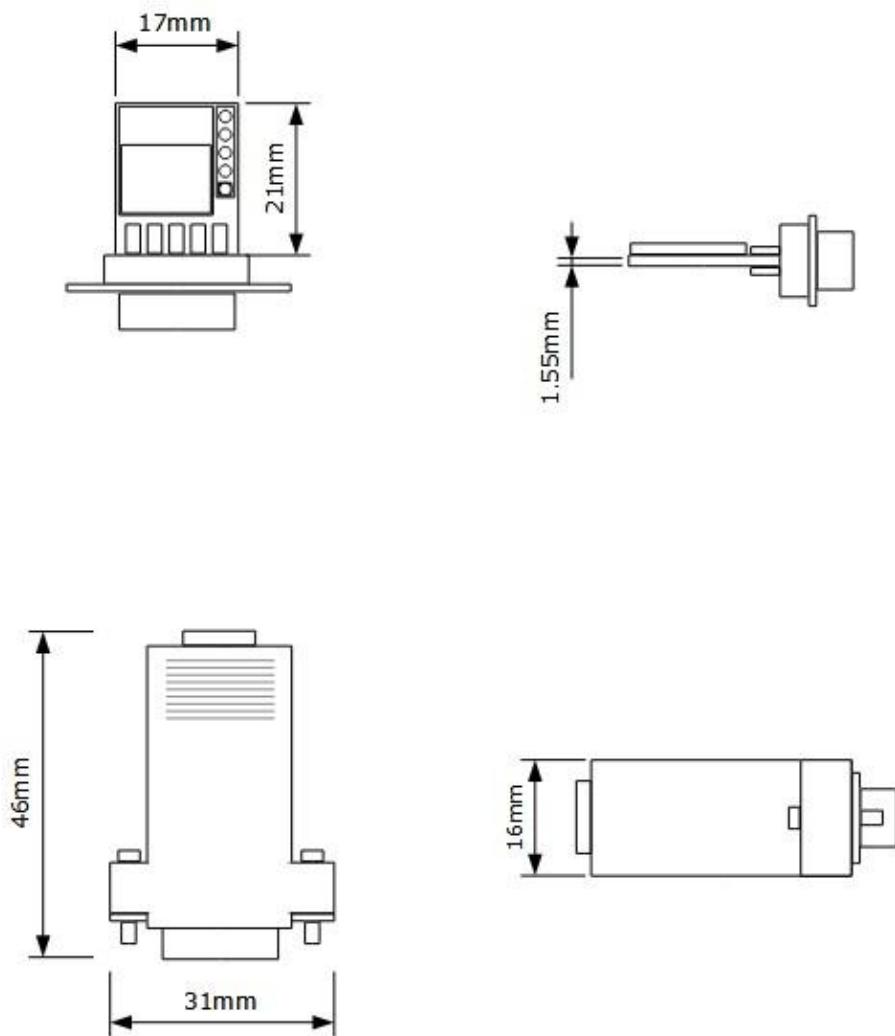
Figure 5.1. BLE232 board and housing dimensions

6. Technical data

6.1. Technical data

Radio transmission	
Operation frequency range	2402 - 2480 MHz
Channel spacing	2 MHz
Output power	-20 to +8 dBm
Modulation	GFSK, MSK
Connections	
RS232	9-pin D-sub-connector, male or female
Antenna	Chip or external (U.FL) antenna
Power supply voltage range	3 to 16 Volt
Internal power source	Via the serial line
External power source	On board
Radio	
Version	2.4 Ghz radio
Role	Peripheral, Central
Dimensions	
Circuit board	17x21x1.55mm
Housing	ca. 25x41x16mm

Table 6.1. BLE232 Technical data

6.2. Assignement oft he serial interface

Abbreviation	Pin Nr.	Male	Female
TxD	3	Output	Input
RxD	2	Input	Output
RTS	7	NC	Power
CTS	8	Power	NC
DSR	6	Power	NC
GND	5	Ground	Ground
DCD	1	Power	NC
DTR	4	NC	Power
RI	9	Power	Power

Table 6.2. BLE232 assignement of the serial interface

6.3. Federal Communications Commsission (FCC) für USA

The product including the antennas complies with Part 15 of the FCC Rules.
The FCC identification number is: SQGBL654.

7. Declaration of Conformity

7.1. Declaration of Conformity for Europe

For the following products:

> BLE232 PLUS
> Art.-Nr.: 546965 with 9. pol. DSUB-female
> Art.-Nr.: 546964 with 9. pol. DSUB-male

We declare that they comply with the following European Community Directives:

European Conformity According to RED (2014 / 53 / EU)

7.2. Declaration of conformity according to RED (2015/53 / EU) (2014 / 53 / EU)
Deutsch:

Die Produkte, auf die sich diese Erklärung bezieht, entsprechen den folgenden Normen oder normativen Dokumenten der elektromagnetischen Verträglichkeit

Sicherheit / Gesundheit:

> EN 62368-1:2016-05
> EN 62479:2011-09

EMV: EN 301 489-1 V2.1.1:2017-02
         EN 301 489-17 V3.1.1:2017-02

Radio: EN 300 328 V2.1.1:2016-11

RoHS: EU-Richtlinie 2011/65/EU

Aufgrund des in der Richtlinie 2014/53 / EU beschriebenen Konformitätsbewertungsverfahrens sollte die Endkundenausrüstung wie folgt gekennzeichnet werden:

$$C\mkern-4mu\epsilon$$

Der Endkunde muss unter allen Umständen sicherstellen, dass das Gerät einen Abstand von mehr als 20 cm zum menschlichen Körper hat.
Die Endkundenausrüstung muss den tatsächlichen Sicherheits-/Gesundheitsanforderungen entsprechen nach RED.

PAN172x und seine Modellversionen im angegebenen Referenzdesign können in allen Ländern des Europäischen Wirtschaftsraums (Mitgliedstaaten der EU, Europäische Freihandelsassoziationsstaaten [Island, Liechtenstein, Norwegen], Monaco, San Marino, Andorra und Türkei verwendet werden.

Englisch:

The products, to which this declaration relates are in conformity with the following standards or
normative documents of electromagnetic compatibility:

Safety / Health:

            EN 62368-1:2016-05
            EN 62479:2011-09

EMV: EN 301 489-1 V2.1.1:2017-02
            EN 301 489-17 V3.1.1:2017-02

Radio: EN 300 328 V2.1.1:2016-11

RoHS: EU-Directive 2011/65/EU

As a result of the conformity assessment procedure described in 2014/53/EU Directive, the end customer equipment should be labeled as follows:

$$\mathsf{C}\,\mathsf{E}$$

The end customer has to assure that the device has a distance of more than 20 cm from the human body under all circumstances.

The end customer equipment must meet the actual Safety/Health requirements according to RED.

PAN172x and its model versions in the specified reference design can be used in all countries of the European Economic Area (Member States of the EU, European Free Trade
Association States [Iceland, Liechtenstein, Norway]), Monaco, San Marino, Andorra, and Turkey.