Amp'ed RF, Inc.
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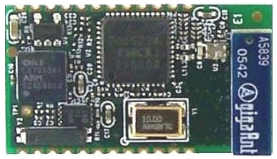
ZB-21

ZigBee OEM Module



15mm x 27mm

Features

- Full ZigBee standard support
- Complete RF ready module
- Integrated chip antenna
- OKI ARM7 microprocessor up to 33MHz
- 128K or 64K bytes of flash memory
- 16K bytes of SRAM memory
- 2K bytes of EEPROM memory
- 250K bps RF data rate
- 128-bit encryption security
- Range up to 30m Indoor, 100m LOS
- 16550 UART
- SPI interface
- I2C interface
- 4 A/D inputs
- 12 general purpose I/O, 3 are 20mA capable
- AT command set
- Low power modes, <25uA

Additional Documentation

- Quick Start Guide
- zbSerial Reference Guide
- HW Design Guide

Description

One of the most capable ZigBee modules available, the ZB-21 ZibBee OEM Module is designed for maximum flexibility. The ZB-21 module includes an OKI ARM7TDMI processor and a full function ZigBee RF radio.

The AR ZB-21 is a surface mount PCB module that provides fully embedded, ready to use ZigBee wireless technology. The ARM7 processor is available for flexible custom development, which makes this a true wireless micro-controller device.

Power consumption has been carefully optimized for battery powered applications, <25uA in sleep state.

Custom firmware may be easily pre-loaded into these highly tuned and tested modules so that they are ready to install without additional procedures.

Typical Wireless Applications

- Cable replacement/Serial communications
- Industrial diagnostics and control
- Wireless POS transactions
- Telemetry/Remote sensing and data capture
- Medical device communications
- Commercial/Home building automation
- Energy metering and control

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Hardware Specifications

Recommended Operating Conditions Current Consumption

General Conditions (VIN = 3.3V and 25°C)

Modes	Avg	Unit
Typical Power Consumption		
Typical data transmit	45	mA
Power down	25	uA
Peak current	90	mA

Selected RF Characteristics

Parameters	Typical	Unit
Antenna load	50	ohm
Sensitivity level	-92	dBm
Tx output power	-1	dBm

Absolute Minimum and Maximum Ratings

Rating	Min	Typical	Max	Unit
Operating Temperature Range	-20	+25	+70	°C
Supply Voltage VIN	2.85	3.0	5.0	Volts
Signal Pin Voltage	-	2.7	-	Volts
RF Frequency	2405	-	2480	MHz
Storage temperature range	-55	-	+150	°C
Supply voltage, VIN	-0.3	-	+ 5.0	Volts
Signal Pin Voltage	-0.3	-	3.6	Volts

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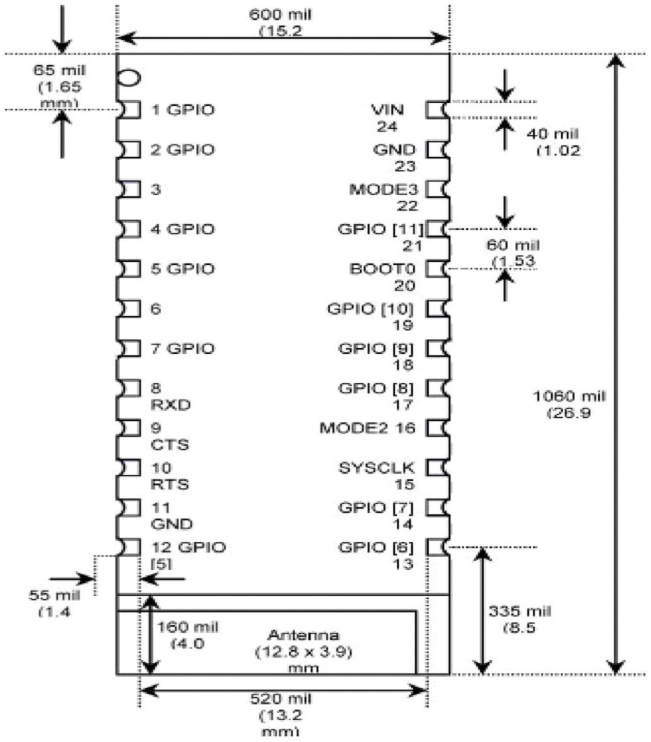
Pin Assignment

Name	Type	Pin#	Description	Alt Function
VIN		24	VIN	
GND		11, 23	GND	
UART Interface				
RXD	I	8	Receive data	
TXD	O	6	Transmit data	
CTS	I	9	Clear to send (active low)	
RTS	O	10	Request to send (active low)	
Special Function for Flash ROM				
SYSCLK	I	15	Input System Clock (4-33MHz)	External Clock Input (optional)
MODE2	I	16	System Clock Source: Internal (H),External (L)	
BOOT0	I	20	Input (active low)	Boot ROM, high Application ROM, low
MODE3	I	22	(Default: Pull Down)	Reserved for testing
RESET	I	3	Reset input (active low for 5 ms);	
GPIO – General Purpose Input/Output				
GPIO [0]	I/O	1	General Purpose Input/Output	SPI; MOSI
GPIO [1]	I/O	2	General Purpose Input/Output	SPI; SCLK
GPIO [2]	I/O	4	General Purpose Input/Output	SPI; SSN
GPIO [3]	I/O	5	General Purpose Input/Output	A/D, AIN2
GPIO [4]	I/O	7	General Purpose Input/Output	A/D, AIN0
GPIO [5]	I/O	12	General Purpose Input/Output	20mA current sink
GPIO [6]	I/O	13	General Purpose Input/Output	20mA current sink
GPIO [7]	I/O	14	General Purpose Input/Output	20mA current sink
GPIO [8]	I/O	17	General Purpose Input/Output	
GPIO [9]	I/O	18	General Purpose Input/Output	A/D, AIN3
GPIO [10]	I/O	19	General Purpose Input/Output	A/D, AIN1
GPIO [11]	I/O	21	General Purpose Input/Output	SPI; MISO



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Hardware Design

Amp'ed RF modules support UART, SPI, and GPIO hardware interfaces. This section details typical usage models for these features. Please note that the usage of these interfaces is dependant upon the firmware that is loaded into the module, and is beyond the scope of this document.

Notes

- RESET pin is internally pulled high.
- BOOT0 in should be tied low to start from application code ROM, high will enable the boot ROM code for Oki ISFP chip programming.
- MODE2 is internally pulled high, to use the internal clock source by default.
- MODE3 is internally pulled low. This pin is reserved for testing.
- All GND pins must be well grounded.
- The area around the module should be free of any ground planes, power planes, trace routings, or metal for at least 8 mm from the antenna in all directions.
- Traces should not be routed underneath the module.

Module Reflow Installation

The ZB-21 is a surface mount module supplied on a 24 pin, 4-layer PCB. The final assembly recommended reflow profile is:

For RoHS/Pb-free applications, Sn96.5/Ag3.0/Cu0.5 solder is recommended.

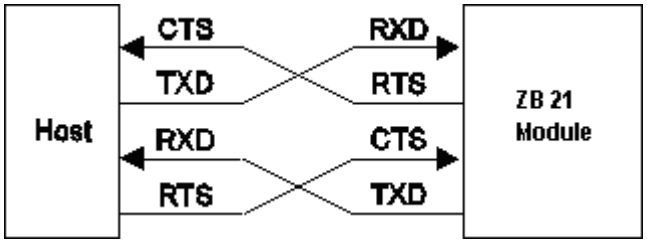
- Maximum peak temperature of 230° - 240°C (below 250°C).
- Maximum rise and fall slope after liquidous of < 2°C/second.
- Maximum rise and fall slope after liquidous of < 3°C/second.
- Maximum time at liquidous of 40 – 80 seconds.

GPIO Interface

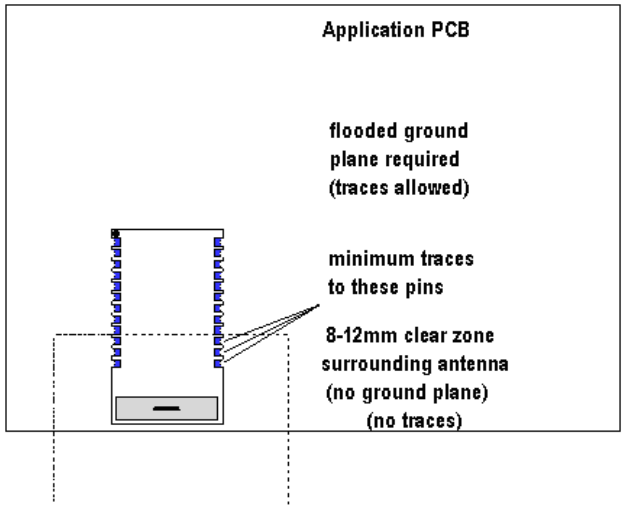
All GPIOs are capable of sinking and sourcing 3mA of I/O current, except GPIO5,6,and 7, which can sink 20mA of current. These pins are 5V tolerant.

UART Interface

The UART is compatible with the 16550 industry standard. Four signals are provided with the UART interface. The TXD and RXD pins are used for data while the CTS and RTS pins are used for flow control.



PCB Layout Guidelines



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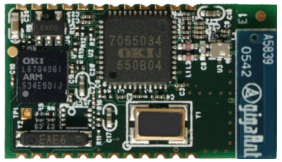
Ordering Information

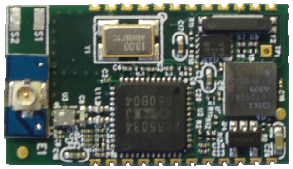
Part Name	Description
ZB-21	Integrated chip antenna
ZB-21L	No antenna, 50 ohm RF port
ZB-21Ext	Supports U.FL external antenna connector



ZB-21

Picture Not Available

ZB-21L



ZB-21Ext