

BITBEAM

BBSDR High Speed Software Defined Radio

Extensible with Daughtercards to support multiple applications

General Information

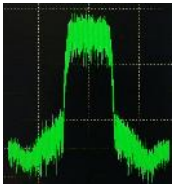
The BBSDR is a hybrid software-defined and analog-defined radio. It leverages the flexibility of SDR while maintaining high performance through the use of application specific daughtercards.

QPSK data rates are adjustable to 90 Mbps, and with higher order modulation faster data rates are also possible.

Theory of Operation

The BBSDR consists of a motherboard with two standardized slots for RF daughterboards, one for the transmit chain, and one for the receive chain.

The motherboard consists of the software defined radio and high performance baseband processor powered by an ARM and an FPGA, running the Linaro Linux operating system.



QPSK spectrum transmitted, received, and visualized on the BBSDR

SDR Specs

Channel bandwidth up to 50MHz
Arbitrary IQ Generation: 2-FSK, OOK, MSK, GFSK, BPSK, QPSK, 8-PSK, 16-QAM, 32-APSK, OQPSK, FM, AM, etc...
200+Mbps data rates possible with 32-APSK.

Software Interface

Onboard Processor running Linux OS
RS-485/RS-232/USB/LVDS/SPI/ETHERNET interfaces
GPIO ports for sensors and command signals
Can run GNUradio onboard
Bitrates & packet protocols configurable on-air
FEC programmable by user
Encryption programmable by user

A Linux image with drivers and example applications is included with the hardware. Example applications run OQPSK transmit at adjustable data rates up to 100 Mbps and OQPSK demod at adjustable data rates up to 30 Mbps.

The driver controls all hardware functions such as biasing of amplifiers and tuning of frequencies. Several libraries for generating common modulation schemes are included, and new behaviors can be programmed by the user in C, HDL, or through GNURadio.

Power Consumption

6.2VDC – 15VDC supply.
Unregulated battery voltage OK

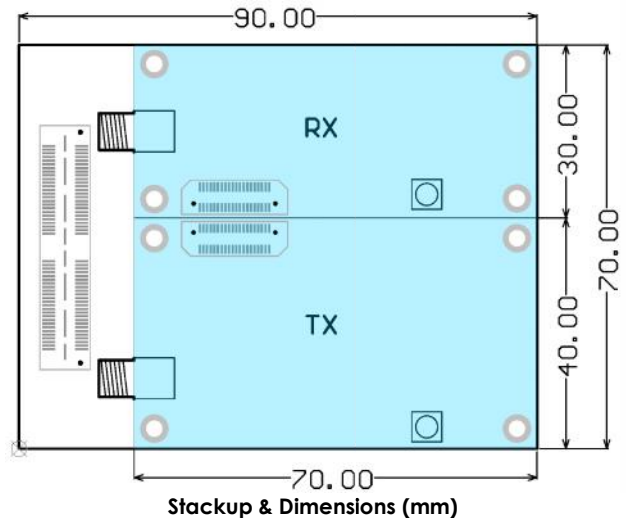
Consumption depends on performance requirements and daughterboard selection. For example, an S-band radio

transmitting 2.3 Watts full duplex at 50 Mbps consumes 10.6 Watts. Receive functionality typically consumes under 500 mW.

Mechanical

The BBSDR consists of a multi-board shielded assembly.

The BBSDR is sized so that it can fit onto a PC-104 carrier card. The top of the case must be thermally coupled to a heat sink.



The daughtercard to motherboard mating height is 9.05mm. The motherboard to carrier connector is a Samtec QSS series high speed mezzanine connector.

Daughtercards

X-Band TX

Frequency Range	8.1~8.5Ghz
Psat	35dBm
Power Consumption	<12.3W

S-Band RX

Frequency Range	2.0~2.1Ghz
Noise Figure	1.2dB
Power Consumption	430 - 490 mW

S-Band(ISM) TX

Frequency Range	2.4~2.5Ghz
Psat	34dBm
Power Consumption	<10.6W

S-Band(ISM) RX

Frequency Range	2..4~2.5Ghz
Noise Figure	1.2dB
Power Consumption	430 – 490 mW