

QO-100 Amsat-DL Upconverter V4.2

serial data format

The Amsat upconverter version-4.2 has a serial interface on a 6-pin header near the LED row. Diagnostic messages and measured values are output here:

Level: 3,3 Volt (for connection to a RS232 interface a 3,3V - RS232 converter is UNCONDITIONALLY required !)

baud rate: 9600 Bd

Data bits: 8

stop bits: 1

parity: none

The diagnostic messages are not interesting for the normal user.

What is particularly interesting, however, is the output of measurement data:

Data format:

UPC_AA_BB_text terminated with newline.

in detail

UPC ... 3 characters header to indicate that display content follows. Lines not starting with UPC can be ignored.

_ ... Space

AA ... always twice 0, i.e. 00

_ ... Space

BB ... ID of the following record

_ ... Space

text ... Data content as ASCII text

Here is a selection of information that will be output:

BB	Description
00	PA temperature in degC
01	internal supply voltage after the 5V step-down converter in mV
02	Voltage corresponding to the transmit power (forward power) followed by the dBm value (approx. value)
04	status of the LOCK LED

05	frequency of the mixer oscillator
06	Status of PTT LED, resp. PTT input
07	Greeting message after power on
08	Message when the synthesizer resynchronizes, e.g. after failure of an external reference frequency
09	LOCK status of the ADF4531 synthesizer
10	Input frequency of the upconverter, according to jumper M, N
11	Overtemperature alarm: ON or OFF (threshold: 75 degrees C) followed by temperature in degC
12	Undervoltage alarm (5V Step-Down Converter): voltage in mV
13	Overvoltage alarm (5V Step-Down Converter): voltage in mV

Downconverter message pass-through:

The Amsat-DL downconverter also has corresponding serial messages. To receive both with a single serial port, downconverter and upconverter can be connected in series:

The serial output of the downconverter is connected to the serial input of the upconverter. The serial output of the upconverter is connected to a computer via a 3.3V-RS232 level converter. In the computer you can then read all messages. The messages of the downconverter start with header "OLD", those of the upconverter with "UPC".

Please note that due to a layout bug in the board revisions 4.2 and before a special workaround was needed. This was corrected in board revision 4.3.

Evaluation of the forward power:

The power is measured with an AD8312. The AD8312 is a logarithmic power detector. Its output voltage corresponds to the power in dBm.

If one wants to measure the actual power, an adjustment has to be done first. That is, the relationship between measured output voltage and real power must be measured at two powers (one low and one high). Then one can convert each measured voltage into the corresponding power. If this adjustment has to be done for every single board or if it can be done in general is not known yet, because you need a lot of boards. Who needs exact results must carry out the adjustment in any case for the individual board.

The evaluation of several boards showed that the measured values are very similar, so that a dBm exact measurement should be possible. Above message UPC 00 02 gives both the measurement voltage of the AD8312 and the estimated power in dBm. At the moment this "estimation" looks very precise, whether this will remain so will be seen after the production of a larger quantity of boards.

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