ISIS - Innovative Solutions In Space B.V. • Molengraaffsingel 12-14 • 2629 JD Delft • The Netherlands • www.isispace.nl
info@isispace.nl • T +31 15 256 9018 • F: +31 15 257 3969 • IBAN: NL57RABO0118953524 BIC: RABONL2U • Reg.nr. 27293068 • VAT-nr. NL817198611B01

How to use this Option Sheet:

- Fill in the form digitally. You will need to have Adobe Acrobat reader installed (free download available at **http://get.adobe.com/reader/**).
- Press the check button at the end to verify if your Option Sheet is complete.
- Once you are ready, press the Enable Read Only button to prevent accidental changes, save the changes and send the digitally filled-in Option Sheet by email to your Sales Representative.
- If you have any questions regarding this option sheet or the fill-in procedure, please do not hesitate to contact your Sales Representative for help.

Customer Contact Information

Contact Name:	
Email Address:	
Phone Nr:	
Organization/ Company / Institution:	
Address:	
Address (Cont'd):	
Country:	

For ISIS Use – Leave Blank –

Order Confirmation:	
Allocated WO:	
Sales responsible:	
Project/Ref.:	HOOPOE

RF Configuration

Receiver

Uplink Center Frequency (140MHz – 150MHz):

145.905000

The amateur-satellite service segment of the VHF band is between 145.8MHz and 146MHz.

Please note that all frequency assignments for satellites need to be notified to the International Telecommunications Union (ITU) via your national radiocommunications administration. *In addition, national licensing may apply. ISIS advises to contact your radiocommunication administration on these matters. Additionally, frequencies within the amateur-satellite service segment require frequency coordination with the International Amateur Radio Union (IARU).*

Frequencies outside the above mentioned range may be possible but have to be approved by ISIS before order confirmation and may have an additional cost and / or lead time. Please leave the previous field blank and enter your request below:

Alternative Uplink Center Frequency (MHz):

Transmitter

Downlink Center Frequency (430MHz – 440MHz):

436.740000

The amateur-satellite service segment of the VHF band is between 435 and 438 MHz.

Please note that all frequency assignments for satellites need to be notified to the International Telecommunications Union (ITU) via your national radiocommunications administration. *In addition, national licensing may apply. ISIS advises to contact your radiocommunication administration on these matters. Additionally, frequencies within the amateur-satellite service segment require frequency coordination with the International Amateur Radio Union (IARU).*

Frequencies outside the above mentioned range may be possible but have to be approved by ISIS before order confirmation and may have an additional cost and / or lead time. Please leave the previous field blank and enter your request below:

Alternative Downlink Center Frequency (MHz):

Downlink Default Bitrate (bps):

(•) 1200 (Default) ( ) 2400 ( ) 4800 ( ) 9600

Default data rate of the transmitter at power-up. The data rate can be changed on command after start-up.

Transmitter Startup behavior

As soon as the radio is powered on, the transmitter can automatically start transmitting a beacon message and turn off afterwards. The transmission cycle is repeated in an infinite loop with a user-defined delay between each beacon packet and with an optional initial delay. The beacon transmission can be stopped on command as required by radio operations.

The parameters chosen in this option sheet only affect the automatic beacon at start-up and cannot be modified by command. Other beacon messages can be sent by the user by controlling the radio through I2C commands but those are not addressed in this document.

Beacon automatically started at power on:

(•) Off (Default) ( ) On

Beacon settings

Custom Message (Optional):

This specifies the beacon message to be sent automatically at start-up. This can be a text message but can also be a binary message. The message shall be compliant to the frame and buffer size specified in the Downlink frame and buffer size section.

This message cannot be changed during normal radio operations.

Interval between consecutive beacon messages (1s – 65535s)):

10

This setting allows the user to specify an interval between each beacon packet being automatically sent by the radio after start-up.

Delay after power ON (0s – 255s):

0

This setting allows the user to specify an initial delay between the first automatic beacon packet being automatically sent and radio turn-on.

Radio Link-Layer Protocol

Two options are available: AX.25 and HDLC. The latter provides minimum protocol overhead (only 2 bytes per frame required as a checksum to verify correct reception) but offers no addressing nor identification features. AX.25 offers instead addressing features (source and destination callsigns) but introduces an overhead of 18 bytes per frame. This option applies to both the transmitter and the receiver.

Protocol

(•) AX.25 (Default) ( ) HDLC

AX.25 Call Signs[1]

From Callsign (up to 6 characters and a number from 0 to 15, ex. NOCALL-0):

ON01IL - 0

To Callsign (up to 6 characters and a number from 0 to 15, ex. NOCALL-0):

4X4HSC - 0

Downlink frame and buffer size

Maximum size of the frames that could be sent by the transmitter section and maximum number of frames that can be buffered on the radio before transmission. The buffer uses a FIFO (First-In-First-Out) to simplify communication between the radio and the data source (generally the satellite OBC).

(•) 40 frames with a maximum payload size of 235 bytes

( ) Alternative.

Please leave a note in the text area below detailing your request. ISIS will review the information provided and contact you as soon as possible.

[1] **NOTE:** *Article 19 of the ITU Radio Regulations states that "All transmissions shall be capable of being identified either by identification signals or by other means". The "From" callsign is typically used for the spacecraft identification, the "To" callsign is typically used for the Ground Station identification. Legislation may vary according to the country in which operations are performed, so check with your national radiocommunications administration to be sure.*

Uplink frame and buffer size

Maximum size of the frames that could be received by the receiver section and maximum number of frames that can be buffered on the radio after reception. The buffer uses a FIFO (First-In-First-Out) to simplify communication between the radio and the data destination (generally the satellite OBC).

- (•) 40 frames with a maximum payload size of 200 bytes
- ( ) Alternative.

Please leave a note in the text area below detailing your request. ISIS will review the information provided and contact you as soon as possible.

Electrical Configuration

CSKB Pin-out

Even though only one I2C bus is used, there are two alternative sets of pins on the CSKB that could be used to connect to the board.

I2C Pin-out

I^2C Clock (SCL)

- (•) H1-43 (Default).
- ( ) H1-21 (Alternative).

I^2C Data (SDA)

- (•) H1-41 (Default).
- ( ) H1-23 (Alternative).

Mounting holes grounding

The board is mechanically mounted in a CubeSat stack by means of four mounting holes which are connected to ground by default. If so required, these mounting holes can be disconnected from the board electrical ground.

- (•) Holes Grounded (default).
- ( ) Holes NOT Grounded.

NOTE: *By default, the mounting holes are grounded by means of a 0Ohm resistor. For alternative grounding schemes, please leave a comment on the Additional Comment section. ISIS will review your request and contact you as soon as possible*

General purpose Input / Output pins

The transmitter and receiver section each have a digital GPIO reserved for customer-specific functionalities.

Functionality shall be defined by the customer, agreed upon by ISIS, and it may require additional cost and / or lead time.

The pins are separate between the receive and transmit sections and are completely independent.

RX section:

- (•) No GPIO pin used (default)
- ( ) GPIO pin enabled.

Please leave a note in the text area below detailing your request. ISIS will review the information provided and contact you as soon as possible.

TX section:

- (•) No GPIO pin used (default)
- ( ) GPIO pin enabled.

Please leave a note in the text area below detailing your request. ISIS will review the information provided and contact you as soon as possible.

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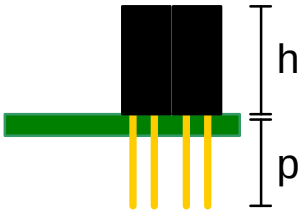
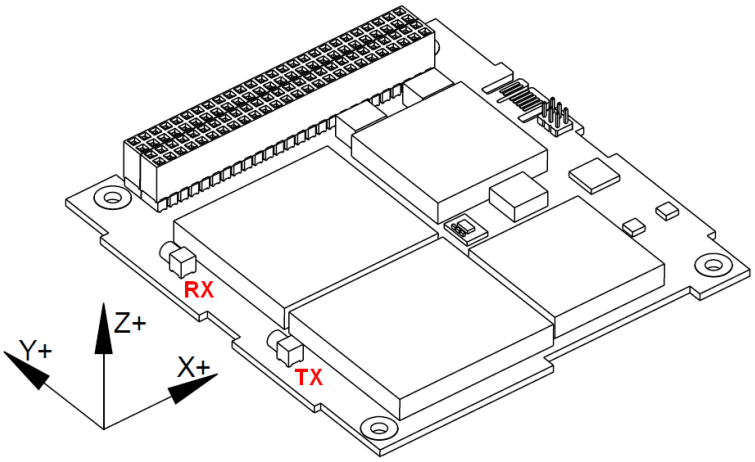
Connector Type and Placement

CSKB Connector



	Connector name	h [mm]	p [mm]	Remarks
◉	SSQ-126-23-G-D *Standard stack through.* *Other CSKB components possible on top and bottom.*	8.51	10	Default.
○	SSQ-126-21-G-D *Stack termination bottom.* *No other CSKB components possbile below the ISIS-TRXVU.*	8.51	2.64	Additional cost and / or lead time may apply.
○	ESQ-126-38-G-D *Standard stack through.* *Other CSKB components possible on top and bottom.*	11.01	7.3	Additional cost and / or lead time may apply.
○	ESQ-126-39-G-D *Standard stack through.* *Other CSKB components possible on top and bottom.*	11.01	12.19	Additional cost and / or lead time may apply.
○	TSW-126-07-G-D *Stack termination top.* *No other CSKB components possible above the ISIS-TRXVU.*	0.94	9.98	Additional cost and / or lead time may apply.
○	Alternative *Write full SAMTEC code below:*			**This option has to be approved by ISIS before order confirmation and may have an additional cost and / or lead time.**

RF Connectors



UHF Transmitter (TX) Connector Mounting position and orientation (type is MMCX male)

- **Default:**
  - Top mount, angled
  - Y+ (see image above)
- **Alternative.**
  - Top mount, angled
  - X- (see image above)

  Additional cost and lead time may apply; please contact your sales representative for further information.
- **Alternative.**
  - Top mount, angled
  - Y- (see image above)

  Additional cost and lead time may apply; please contact your sales representative for further information.
- **Alternative.**
  - Top mount, straight

  Additional cost and lead time may apply; please contact your sales representative for further information.

VHF Receiver (RX) Connector Mounting position and orientation (type is MMCX male)

- **Default:**
  - Top mount, angled
  - Y+ (see image above)
- **Alternative.**
  - Top mount, angled
  - X- (see image above)

  Additional cost and lead time may apply; please contact your sales representative for further information.
- **Alternative.**
  - Top mount, angled,
  - Y- (see image above)

  Additional cost and lead time may apply; please contact your sales representative for further information.
- **Alternative.**
  - Top mount, straight

  Additional cost and lead time may apply; please contact your sales representative for further information.

Software Configuration

I2C Protocol Settings

The I^2C addresses are defined in the code that is flashed in the microcontrollers. They cannot be changed without having the system.

The users can specify any other address if the default is not compatible with their system. The address can be any 7-bit number with the exception of reserved addresses, specified in the I2C bus specification (http://www.nxp.com/documents/user_manual/UM10204.pdf) and listed below.

Slave address (binary)	Slave address (hex)
0000 000	0x00
0000 001	0x01
0000 010	0x02
0000 011	0x03
0000 1XX	0x04 – 0x07
1111 XXX	0x78 – 0x7F

Receiver Address

- (•) Default (0x60).
- ( ) Alternative.

Alternative Receiver Address (0x##)

0x60

Transmitter Address

- (•) Default (0x61).
- ( ) Alternative.

Alternative Transmitter Address (0x##)

0x61

I2C Watchdog

This watchdog is implemented for safety reasons. It works in the following manner: If the radio does not receive any command from the main OBC for a given duration, the board will reset itself. This safety measure can be disabled by the user if required. This feature cannot be changed without having the system reprogrammed.

- (•) I2C watchdog enabled, timeout of 60 seconds (default)
- ( ) I2C watchdog enabled, user-defined value

  Value in seconds, between 30s and 3600s.

  Watchdog timeout: 60
- ( ) I2C watchdog disabled

Additional Comments

Please use this section in case you have additional comments or remarks. If any further option has been agreed during the sales process, please add it here. Everything listed here is subject to ISIS approval before order confirmation.

Reset Form | Check Option Sheet | Enable Read Only