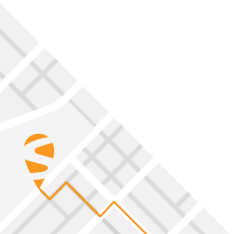




AsteRx4 to AsteRx-m3 transition: technical considerations

Version 1.0.0



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Septentrio
Greenhill Campus, Interleuvenlaan 15i
3001 Leuven, Belgium

<http://www.septentrio.com>

Phone: +32 16 300 800

Fax: +32 16 221 640



@septentrio

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2 Introducing the AsteRx-m3

The AsteRx-m3 is a state-of-the-art GNSS receiver family using triple frequency and multi-constellation GNSS technology both for maximal positioning availability and reliability in challenging conditions. The AsteRx-m3 product family includes both base station and rover receivers in single or dual antenna configuration.

The AsteRx-m3 product family provides RTK positioning at the lowest power consumption of any comparable device on the market,

The new product family includes 3 types of GNSS OEM boards.

AsteRx-m3 Pro is the rover receiver tracking signals from all available GNSS constellations on 3 frequencies. Simple and powerful, it operates both in single and dual antenna modes. The AsteRx-m3 ProBase, as its name suggests, is a product designed to operate as a base station for RTK and PPP-RTK networks.

Last but not least is the AsteRx-m3 Pro+, the best-in-class full-feature OEM receiver board flexible enough to fit into any application and to be used either as a rover or a base station in a single or a dual antenna mode.

3 What does the AsteRx-m3 bring?

Compared to the current AsteRx4 the AsteRx-m3 product family brings significant SWaP improvements reducing the footprint to 47 mm by 70 mm and the maximum power consumption about 4 W to ~1.8 W. The size and power reduction is obtained with no performance compromise.

4 AsteRx4 to AsteRx-m3 transition: technical considerations

The AsteRx-m3 product family is designed to provide a functional equivalent of the AsteRx4 but on a reduced footprint and a lower power consumption. In particular the AsteRx-m3 Pro+, which is the top of the line receiver, provides the same number of channels and the same flexibility to work in single or dual antenna..

4.1 Product comparison

	AsteRx4	AsteRx-m3 Pro+	AsteRx-m3 Pro	AsteRx-m3 ProBase
Dimensions	76.4 x 100 mm 3.03 x 3.93 in No break off edges 61 x 88.5 mm 2.4 x 3.48 in	47.5 x 70 x 9.32 mm 1.87 x 2.75 x 0.36 in		
Weight	55 g / 1.94 oz	27 g / 0.952 oz		
Input Voltage	3 - 5.5 VDC	3.3 VDC \pm 5%		
Maximum antenna current	200 mA	150 mA		
Max power consumption	4.3 W	1.86 W		1.18 W
Heading	Optional	Yes	Optional	NA
Max data rate (measurements)	100 Hz	100 Hz	10 Hz	10 Hz
Ethernet	PHY on board	RMII interface ¹	RMII interface ¹	RMII interface ¹
PPSOut	1	1 HW ready for 2	1 HW ready for 2	1 HW ready for 2
RF connectors	2 MMCX 90 deg	2 MMCX straight ²	2 MMCX straight ²	MMCX straight ²
Ref In	NA	Yes	NA	NA
Ref Out	On 80 pin	Dedicated uFL		

¹ refer to the AsteRx-m3 hardware manual for a reference design and recommendations for the PHY selection and integration.

² Variants with u.FL connectors and 90 deg MMCX connectors are foreseen for volume integrations. Contact your sales representative (sales@septentrio.com) for MOQ, pricing, part numbers and availability

4.2 Connectivity

The AsteRx4 features an 80 pin connector while the AsteRx-m3 product family connectivity is brought via a 30 pin connector (for basic interfacing) and a 60 pin connector for a more advanced usage.

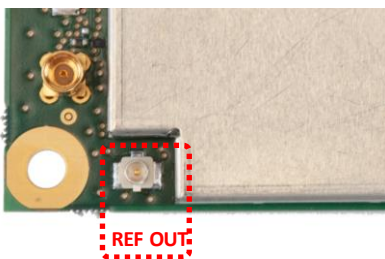
The detailed mapping of the 80 pin connector of the AsteRx4 to the 30 and 60 pin connectors of the AsteRx-m3 can be found in Appendix.

4.3 RF Interface

The following changes apply to the RF interface.

- ▶ Antenna net gain range of the AsteRx-m3 is 15-45 db as opposed to 15-50 db for AsteRx4
- ▶ The antenna current limit has changed from 200 mA per antenna to 150 mA.

4.4 Frequency Reference Output (REF OUT)



The frequency reference used by the receiver is available at the REFOUT u.FL connector. The signal on this pin provides a 10MHz square wave between 0 - 2.8 V with a 50 Ohm impedance.

The REFOUT signal – enabled by default - can be switched on and off via the **setREFOUTmode** command.

4.5 USB

By default, AsteRx-m3 is configured in USB 2.0 mode. AsteRx4 is configured in 1.1 mode by default.

We recommend USB 2.0 when designing in the AsteRx-m3.

4.6 Ethernet

The AsteRx4 receiver features an on board Ethernet PHY. The AsteRx-m3 product family requires the integration of an external PHY. Please refer to the AsteRx-m3 hardware manual for a reference design and recommendations for the PHY selection and integration.

4.7 GPIO

While the AsteRx4 has 3 General Purpose output pins, the AsteRx-m3 product family features only 2. Please see details on the AsteRx-m3 Hardware Manual.

5 Software

The following aspects should be accounted for in the software integration:

- ▶ The list of RTCM3 messages enabled by default in an output stream has changed:
AsteRx-m3: 1006, 1033, 1230, 1074, 1084, 1094 and 1194
AsteRx-m2/m2a: 1006, 1033, 1230, 1004, 1012
While different product names differentiate the AsteRx-m3 product variants, the hostname follows the same syntax as all our products, i.e. asterx-m3-1234567 with 1234567 representing the serial number of the receiver.
- ▶ Wakeup on COM1 activity is not available on the AsteRx-m3 product family

6 What AsteRx-m3 product fits the best my AsteRx-4?

The AsteRx-m3 Pro+ is the product that matches the best the current AsteRx-4 use cases, but in order to make sure that you do purchase the best option for your platform we advice you to contact your local sales representative.

Appendix: AsteRx4 80 pin connector remap

AsteRx4					AsteRx-m3			
Pin #	Name	Type	Level	Description	Connector	Pin #	Corresponding pin name	Remark
1	Gnd	Gnd	0	Ground.			GND	
3	USB_D-	I/O	USB	USB data signal negative D-.	30-pin	6	USB_D-	USB 2.0 default
5	USB_D+	I/O	USB	USB data signal positive D+.	30-pin	5	USB_D+	USB 2.0 default
7	Gnd	Gnd	0	Ground.			GND	
9	Reserved			Reserved for future use				
11	LANLED	O	LVTTTL	LAN link and activity indicator, see Appendix A of the AsteRx4 HW manual				Not available, Ethernet PHY not installed on the AsteRx-m3 board.
13	Reserved			Reserved for future use				
15	Vin	P	3.0V <Vin <5.5V	Main power supply input.	30-pin	1	Vin	Voltage range reduced to 3.3V +/-5%. Shall also be connected to pin 2.
17	Gnd	Gnd	0	Ground.			GND	
19	SCOM_RX1	I	LVTTTL	Serial COM 1 receive line (inactive state is high). Disabled when pin#69 is tied to ground.	30-pin	10	RX1	
21	SCOM_RX2	I	LVTTTL	Serial COM 2 receive line (inactive state is high). Disabled when pin#69 is tied to ground.	30-pin	14	RX2	
23	SCOM_RX3	I	LVTTTL	Serial COM 3 receive line (inactive state is high)	30-pin	16	RX3	
25	SCOM_RX4	I	LVTTTL	Serial COM 4 receive line (inactive state is high).	60-pin	16	RX4	
27	Gnd	Gnd	0	Ground.			GND	
29	VCC_3V3_OUT	P	3.3V	3.3V power supply output (10mA max), or 0V if the receiver is in sleep or stand-by mode.				the VCC_3V3_OUT pin is taken over by the IO_EN pin on AsteRx-m3. It is the pin that can be used to enable input buffers (see warning in both manuals)
31	Reserved			Reserved for future use				
33	Gnd	Gnd	0	Ground.			GND	
35	EVENT_B	I	LVTTTL	Event B input (see Firmware User	60-pin	57		For both events: the

				Manual for operation instructions)				pin is pulled-down on AsteRx-m3.
37	Gnd	Gnd	0	Ground.			GND	
39	REF_O	O	LVTTL	Output depends on the EXTREF_STAT pin level: EXTREF_STAT left open: 10-MHz square wave output from the internal frequency reference. EXTREF_STAT tied to ground: REF_O is disabled.	u.FL			Signal now available on a dedicated u.FL connector.
41	Gnd	Gnd	0	Ground.			GND	
43	REF_I	I	LVTTL	10-MHz square wave frequency reference input. Input ignored when EXTREF_STAT is left open.	60-pin	60	REF_IN	Sine wave or a square wave with a peak-to-peak amplitude between 2V and 5V. Always used when provided. Not hot-swappable.
45	SCOM_CTS2	I	LVTTL	Serial COM 2 CTS line	60-pin	12	CTS2	
47	SCOM_CTS3	I	LVTTL	Serial COM 3 CTS line	60-pin	14	CTS3	
49	LOGLED	O	LVTTL	Internal logging status indicator, see Appendix A.	30-pin	27	LOGLED	Max output current: 10mA.
51	TRACKLED	O	LVTTL	Tracking status indicator, see Appendix A.				Not available, GPLED signal can be used.
53	GP1	O	LVTTL	GP1 in setGPIOFunctionality command.	60-pin	9	GP1	
55	EXTREF_STAT	I	LVTTL	Sets the source of the 10-MHz frequency reference (internal or external).				Not available
57	Gnd	Gnd	0	Ground.			GND	
59	Reserved			Reserved for future use				
61	SD_CMD	O	LVTTL	SD card CMD line	30-pin	28	SD_CMD	
63	SD_CLK	O	LVTTL	SD card CLK line	30-pin	26	SD_CLK	
65	Reserved			Reserved for future use				
67	Gnd	Gnd	0	Ground.			GND	
69	TTLnRS232	I	LVTTL	LVTTL vs RS232 selection for COM1 and COM2. Internal pull up.				Not available, the AsteRx-m3 only support LVTTL serial port.
71	Reserved			Reserved for future use				
73	ETH_TX+	O	Ethernet	Ethernet TX+				Not available, Ethernet PHY not installed on the AsteRx-m3 board. Please refer to

								chapter TBD for a description on how to integrate Ethernet on the AsteRx-m3
75	ETH_TX-	O	Ethernet	Ethernet TX-				Not available, Ethernet PHY not installed on the AsteRx-m3 board. Please refer to chapter TBD for a description on how to integrate Ethernet on the AsteRx-m3
77	ETH_RX+	I	Ethernet	Ethernet RX+				Not available, Ethernet PHY not installed on the AsteRx-m3 board. Please refer to chapter TBD for a description on how to integrate Ethernet on the AsteRx-m3
79	ETH_RX-	I	Ethernet	Ethernet RX-				Not available, Ethernet PHY not installed on the AsteRx-m3 board. Please refer to chapter TBD for a description on how to integrate Ethernet on the AsteRx-m3
2	Gnd	Gnd	0	Ground.			GND	
4	USB_Vbus	P	4.35V≤V _{high} ≤5.25V	USB Power. Cannot be used to power the receiver.	30-pin		7	USB_Vbus
6	Gnd	Gnd	0	Ground.			GND	
8	nPWR_TOGGLE	I	LVTTL	Power toggling input, active negative. Applying a negative pulse to this pin orders the receiver to enter stand-by mode if it was operating,				Not available. The AsteRx-m3 uses a level-based nPDN state signal to define it's

				and to start operation if it was in stand-by mode (see section 2.10 of this document).				operation mode instead of a state transition input as a pulse.
10	nRST_IN	I	LVTTTL	Reset input, active negative. Receiver resets when driven low for at least 1ms. The net effect is similar to shortly disconnecting the power supply.	30-pin	8	nRST	TBC: The AsteRx-m3 stays in reset mode as long as the pin is driven low.
12	Reserved			Reserved for future use				
14	Vantenna	P	3.15V<Vant<12V	Antenna supply, max current per antenna 200mA. The voltage provided on this pin is transferred to the central conductor of the antenna MMCX connectors.	30-pin	18	VANT	The AsteRx-m3 allowed voltage input is reduced to 3<VANT<5.5V. The maximum current per antenna is 150mA.
16	Vin	P	3.0V<Vin<5.5V	Main power supply input	30-pin	2		Voltage range reduced to 3.3V +/-5%. Shall also be connected to pin 1.
18	Gnd	Gnd	0	Ground.			GND	
20	SCOM_TX1	O	LVTTTL	Serial COM 1 transmit line (inactive state is high)	30-pin	9	TX1	
22	SCOM_TX2	O	LVTTTL	Serial COM 2 transmit line (inactive state is high)	30-pin	13	TX2	
24	SCOM_TX3	O	LVTTTL	Serial COM 3 transmit line (inactive state is high)	30-pin	15	TX3	
26	SCOM_TX4	O	LVTTTL	Serial COM 4 transmit line (inactive state is high)	60-pin	15	TX4	
28	Gnd	Gnd	0	Ground.			GND	
30	Reserved			Reserved for future use				
32	Gnd	Gnd	0	Ground.			GND	
34	EVENT_A	I	LVTTTL	Event A input (see Firmware User Manual for operation instructions)	30-pin	19		Both events can be utilized for time-synchronization. Permission dependent.
36	Gnd	Gnd	0	Ground.			GND	
38	PPSout	O	LVTTTL	PPS output. See section 2.5.	30-pin	12	PPSout	
40	Gnd	Gnd	0	Ground.			GND	
42	SSNin1	I	LVTTTL	Proprietary input				

44	Button	I	LVTTTL	Input can be connected to a push button, used to enable and disable internal SBF and NMEA logging. High to low transitions are detected as "button pressed" events.	30-pin	25		
46	SCOM_RTS2	O	LVTTTL	Serial COM 2 RTS line	60-pin	11	RTS2	
48	SCOM_RTS3	O	LVTTTL	Serial COM 3 RTS line	60-pin	13	RTS3	
50	GPLED	O	LVTTTL	General-purpose status indicator, see Appendix A.	30-pin	22	GPLED	
52	GP3	O	LVTTTL	GP3 in setGPIOFunctionality command.				Not available, the AsteRx-m3 only features 2 General Purpose pins
54	GP2	O	LVTTTL	GP2 in setGPIOFunctionality command.	60-pin	44	GP2	
56	PVTLED	O	LVTTTL	PVT status indicator, see Appendix A.				Not available, GPLED can be used to provide the same functionality.
58	Gnd	Gnd	0	Ground.			GND	
60	Reserved			Reserved for future use				
62	SD_DAT0	I/O	LVTTTL	SD card DAT0 line	30-pin	30	SD_DAT0	
64	Reserved			Reserved for future use				
66	Reserved			Reserved for future use				
68	Gnd	Gnd	0	Ground.			GND	
70	Reserved			Reserved for future use				
72	ETH_BIAS	P	Ethernet	Bias pin for centre tap of Ethernet transformer				Not available, Ethernet PHY not installed on the AsteRx-m3 board. Please refer to chapter TBD for a description on how to integrate Ethernet on the AsteRx-m3
74	RS232_TX1	O	RS232	Serial COM 1 transmit line (RS232 level)				Not available, the AsteRx-m3 only support LVTTTL serial port.
76	RS232_RX1	I	RS232	Serial COM 1 receive line (RS232 level)				Not available, the AsteRx-m3 only support

								LVTTTL serial port.
78	RS232_TX2	O	RS232	Serial COM 2 transmit line (RS232 level)				Not available, the AsteRx-m3 only support LVTTTL serial port.
80	RS232_RX2	I	RS232	Serial COM 2 receive line (RS232 level)				Not available, the AsteRx-m3 only support LVTTTL serial port.