SIDERION

[GNSS] \ Polaris F10N

*Compact dual-band L1/L5 multipath mitigation GNSS device based on U-blox **DAN-F10N**. Embedded L1/L5 GNSS antenna. Onboard **RM3100** magnetometer and **BMP581** barometric sensor.*

Datasheet - In Production

Features

- 5V - 60mA power supply
- LEDs status: Power/Timepulse
- Timepulse output
- I²C/UART digital interfaces
- Onboard Bosch BMP581 barometer
- Onboard PNI RM3100 compass
- Onboard L1/L5 GNSS antenna

Applications

- Drones
- Ground vehicles
- Precise navigation

Description

The Siderion **Polaris F10N** is an affordable, compact standard precision dual-band patch antenna module based on the u-blox F10 L1/L5 GNSS device. It provides robust meter-level positioning accuracy in challenging environments.

Using u-blox **DAN-F10N** proprietary dual-band multipath mitigation technology, the Polaris F10N utilises the best signals from the L1/L5 bands to achieve better accuracy in urban environments.

The onboard **BMP581** absolute barometric pressure sensor and the professional-grade **RM3100** compass enhance the overall performance of the Polaris F10N.

The JST-GH connectors make them perfect to be connected to a Pixhawk or any autopilots.

The Polaris F10N operates across a temperature range from -40°C to +70°C.

Table 1. Device summary

Order ref code	Temperature [°C]	Product size [mm]	Weight [g]
SID-GNSS-POLARIS_F10N	-40 to +70	38.0 x 38.0 x 15.0	30

Contents

1. Block diagram and pin description

1.1 Block diagram

Figure 1. Polaris F10N block diagram & connectivity

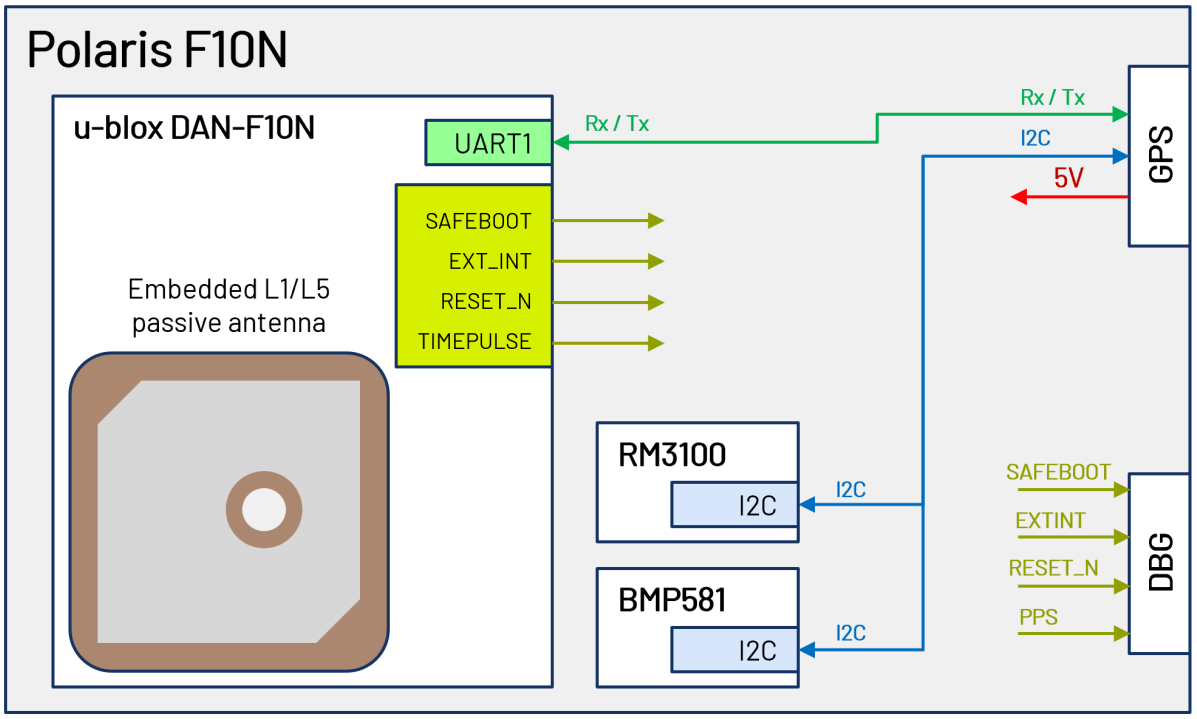
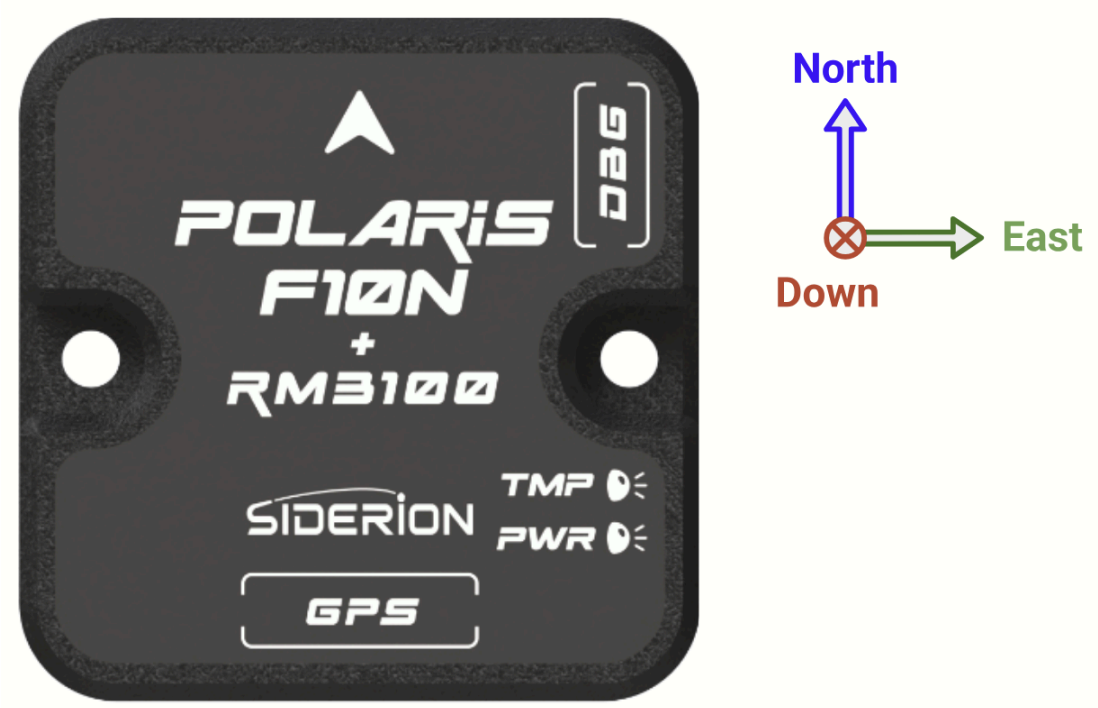


Figure 2. Polaris F10N North-East-Down (NED) orientation (top view)



1.2 LED description

Table 2. Polaris F10N LED sequence status

LED name	Color	Light sequence	Comment
Power	Blue		Solid blue LED when powered ON
Timepulse	Green		No Timepulse
			Timepulse LED is blinking at the selected rate

1.3 Pin description

Figure 2. Polaris F10N pinout (top view & side views)

Table 3. Pinout configuration

	Pin	Name	Type	Function
GPS	A1	5V IN	P	5V input
	A2	UART1 RXD	I	UART1 receive
	A3	UART1 TXD	O	UART1 transmit
	A4	I2C SCL	I	I2C clock
	A5	I2C SDA	I/O	I2C data
	A6	GND	P	Ground reference
DBG	B1	TIMEPULSE	O	Timepulse output
	B2	nRESET	I	Reset input
	B3	EXTINT	I	External Interrupt input
	B4	nSAFEBOOT	I	Safe Boot input

P : Power / I : Input / O : Output

2. Absolute maximum ratings

Stresses above those listed as “absolute maximum ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device under these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Table 4. Polaris F10N absolute maximum ratings

Symbol	Parameter	Maximum value	Units
Vusb	USB supply voltage	-0.3 to +6	V
Vdd	Internal supply voltage	-0.5 to +3.6	V
Vdd_IO	I/O pins supply voltage	-0.5 to Vdd+0.1	V
Icc_RF	RF output current	50	mA
Prfin	Input power at RF_IN	0	dBm
W	Product weight	30	g
TOP	Operating temperature	-40 to +70	°C
TSTG	Storage temperature	-40 to +80	°C

This device is sensitive to electrostatic discharge (ESD), improper handling can cause permanent damage to the part.

3. Specifications

3.1 Ublox DAN-F10N specifications

Table 5. DAN-F10N mechanical and electrical specifications

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
Vusb	USB supply voltage		4.5	5.0	5.5	V
Vdd	Internal supply voltage			3.3		V
Vdd_IO	Supply voltage for I/O			3.3		V
Idd	Current consumption				50	mA
Vil	IO pin low level input voltage		0		0.8	V
Vih	IO pin high level input voltage		2		Vdd+ 0.3	V
Vol	IO pin low level output voltage	Iol = 1mA			0.4	V
Voh	IO pin high level output voltage	Ioh = 1mA	Vdd- 0.4			V
Top	Operating temperature		-40		+85	°C

Table 6. DAN-F10N general performance

Parameter	Specifications	Value
Receiver type	Multi-band GNSS high precision	
Accuracy of Timepulse	RMS 99%	30 ns 60 ns
Frequency of Timepulse		0.25 Hz to 10 MHz
Operational limits	Dynamics Altitude Velocity	< 4g 80,000 m 500 m/s
Velocity accuracy		0.03 m/s

Table 7. DAN-F10N performance in different GNSS mode

GNSS	Parameter	GPS+GAL+BDS	GPS+BDS	GPS+GAL	GPS
Acquisition	Cold start Hot start Aided start	28 s 2 s 2 s	28 s 2 s 2 s	27 s 2 s 2 s	27 s 2 s 2 s
Update rate		10 Hz	10 Hz	10 Hz	20 Hz
Horizontal pos. accuracy	PVT	1.0 m CEP	1.0 m CEP	1.0 m CEP	1.5 m CEP
Sensitivity	Tracking & Nav. Reacquisition Cold start Hot start	-164 dBm -156 dBm -145 dBm -156 dBm	-164 dBm -156 dBm -145 dBm -156 dBm	-164 dBm -156 dBm -145 dBm -156 dBm	-164 dBm -156 dBm -145 dBm -156 dBm

Table 8. DAN-F10N supported GNSS constellations and signals

System	Signal	Frequency
GPS	L1C/A L5	1575.420 MHz 1176.450 MHz
Galileo	E1-B/C E5a	1575.420 MHz 1176.450 MHz
BeiDou	B1C B2a	1575.420 MHz 1176.450 MHz
QZSS	L1C/A, L1C/B L5	1575.420 MHz 1176.450 MHz
NavIC	L5-SPS	1176.450 MHz

3.2 PNI RM3100 specifications

Table 9. RM3100 electrical specifications

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
Vdd	Internal supply voltage		2.0	3.0	3.6	V
Vdd_IO	Supply voltage for I/O		2.0	3.0	3.6	V
Vdd_Ripple	Vdd ripple voltage				0.05	Vpp
Idd	Current consumption				1	mA
Vil	IO pin low level input voltage		0		0.3* Vdd	V
Vih	IO pin high level input voltage		0.7* Vdd		Vdd	V
Iidle	Idle Mode Current				1	µA
Ileak	Leakage Current @ DVDD pin (AVDD=AVSS=DVSS=0V, DVDD=3.6V)				100	nA
Top	Operating temperature		-20		+85	°C
I2Cadd	7bit I2C address	0b0100000				

Table 10. RM3100 Geomagnetic Sensor Performance

Parameter	Cycle counts			Units
	50	100	200	
Field Measurement Range	-800 to +800			µT
Gain	20	38	75	LSB/µT
Sensitivity	50	26	13	nT
Noise	30	20	15	nT
Noise Density @ Max. Single-Axis Sample Rate	1.2			nT/√Hz
Repeatability over ±200 µT	15	8	8	nT
Hysteresis over ±200 µT	15			nT
Linearity over ±200 µT	0.5			%

Maximum Single-Axis Sample Rate (divide by 3 for max. 3-axis sample rate)	1600	850	440	Hz
Single-Axis Average Current @ 24 Hz Sample Rate (equivalent to 3-axis @ 8 Hz)	70	135	260	µA
Bias Resistor, Rb	121			Ω
Ext. Timing Resistor for Clock, REXT	33			KΩ
Circuit Oscillation Frequency	180			kHz

3.3 Bosch Sensortech BMP581 specifications

Table 11. BM581 electrical specifications

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
Type	Absolute barometric pressure sensor					
Pres	Pressure Range		30		125	kPa
Vdd	Supply Voltage (VDD)		1.65		3.6	V
Idd	Current Consumption	Peak Deep standby			260 0.55	µA
Abac	Absolute Accuracy	-5°C to 65°C		±30		Pa
Reac	Relative Accuracy	700 to 1100 hPa		±6		Pa
Reac	Relative Accuracy	900 to 1100 hPa		±0.4		Pa
Noise	Noise (Lowest Bandwidth)			0.08		Pa
Temp_off	Temperature Coefficient Offset			±0.5		Pa
ltd	Long-term Drift (12 months)			±0.1		Pa
Sd	Solder Drift			±30		Pa
ODR	Output Data Rate	continuous mode normal mode			480 240	Hz Hz
Int	Interfaces	I²C			1	MHz
Temp	Temperature Range		-40		85	°C
I2Cadd	7bit I2C address	0b1000110				

4. Applications

4.1 Standalone configuration

5. Communication interfaces

There are several communications interfaces including UART and I2C. UART is used to communicate with the DAN-F10N whereas I2C is used to communicate with both embedded sensors: RM3100 & BM581. All the inputs have internal pull-up resistors in normal operation and can be left open if not used. All the PIOs are supplied by VCC, therefore all the voltage levels of the PIO pins are related to Vdd supply voltage.

5.1 UART Interface

There is one UART interface: UART. UART operates up to and including a speed of 1 Mbaud. No hardware flow control on UART is supported.

Figure 4. UART chronogram specifications

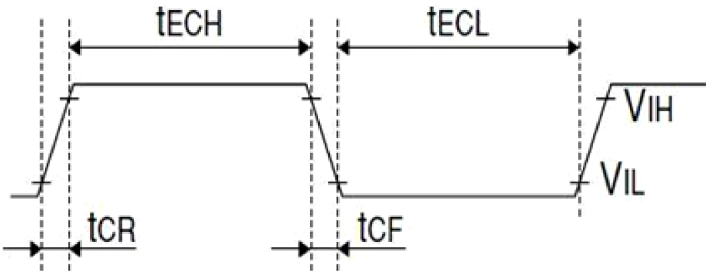


Table 12. DAN-F10N serial UART timing specifications

Symbol	Parameter	Min.	Max.	Units
Vil	LOW-LEVEL input voltage	0	0.2xVdd	V
Vih	HIGH-LEVEL input voltage	0.7xVdd	Vdd+0.3	V
tECH	HIGH period of external data input	0	0.4	µs
tECL	LOW period of external data input	TBA	TBA	µs
Ru	Baudrate	9600	921600	bps
tCR	Rise time of data		5	ns
tCF	Fall time of data		5	ns

5.2 Slave I2C interface

An I2C compliant interface is available for communication between the RM3100 and BM581 sensors **only**, with an external host CPU. The interface can be operated in slave mode only. It is fully compatible with Fast-Mode-Plus of the I2C industry standard. Since the maximum SCL clock frequency is 1 MHz (in Fast-Mode-Plus), the maximum bit rate is 1 Mbit/s. The interface stretches the clock when slowed down while serving interrupts, therefore the real bit rates may be slightly lower.

Figure 5. I2C chronogram specifications

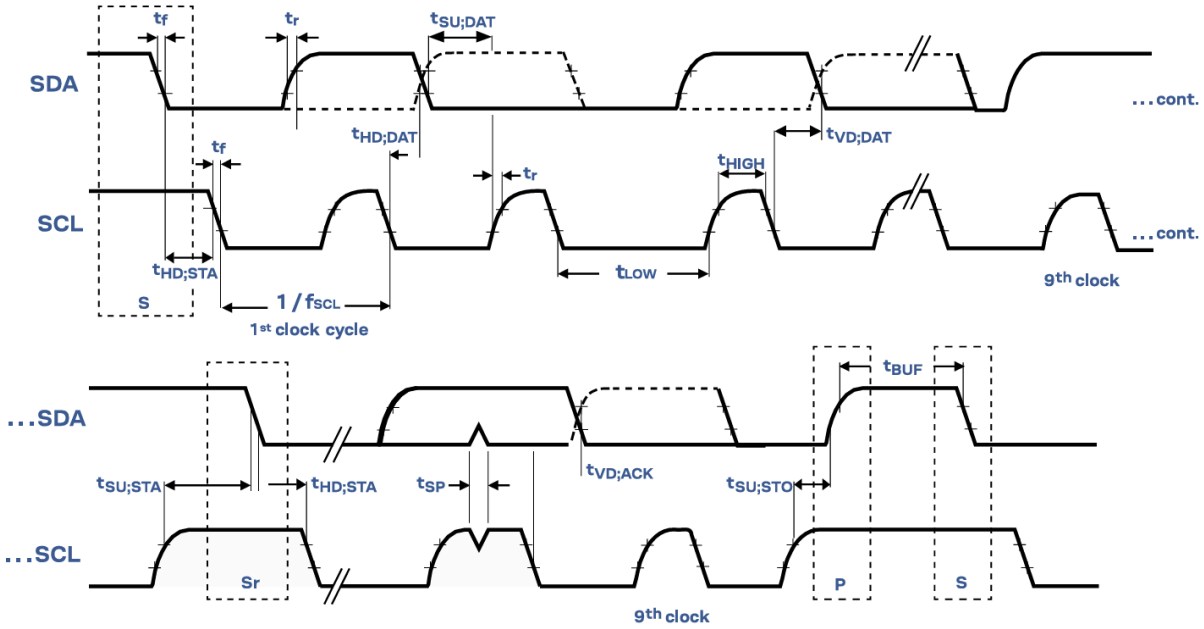
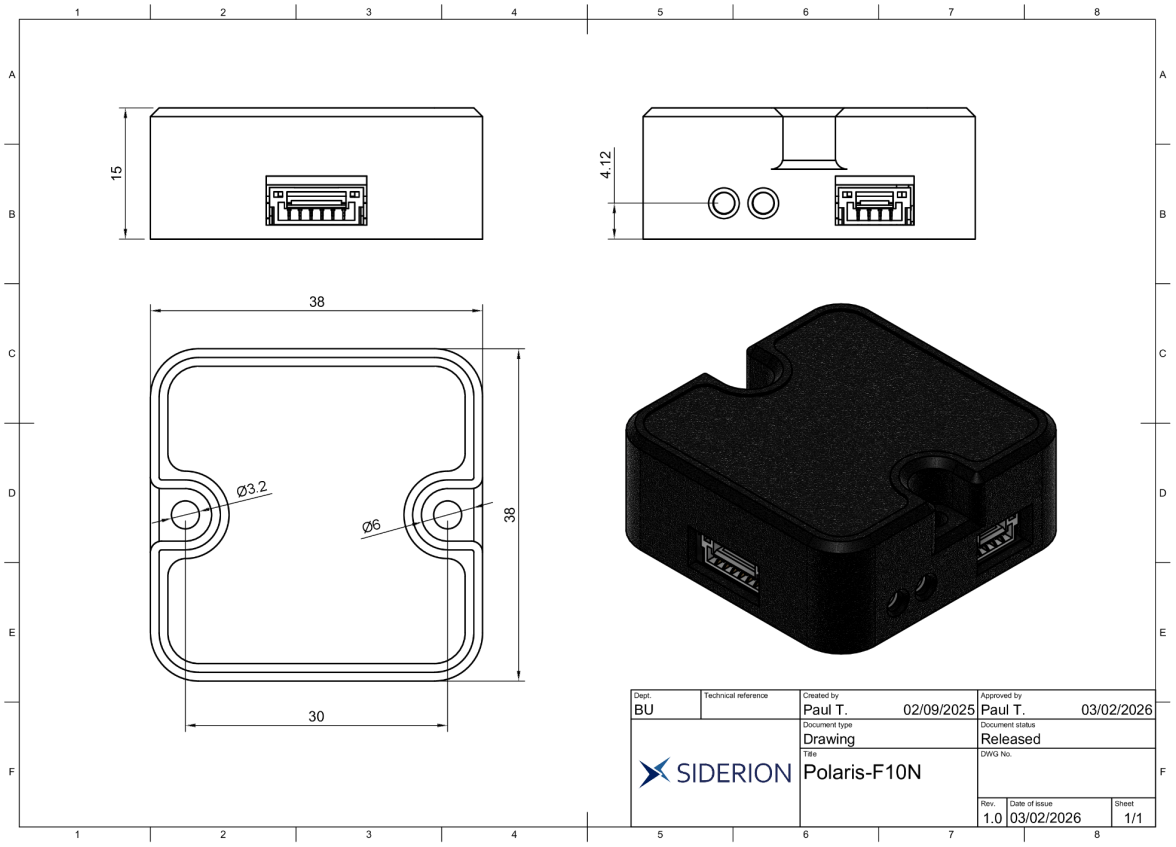


Table 13. Polaris F10N I2C timing specifications

Symbol	Parameter	Min	Max	Units
Vil	LOW-LEVEL input voltage	Vss-0.3	0.3xVdd	V
Vih	HIGH-LEVEL input voltage	0.7xVdd	Vdd+0.3	V
Fscl	SCL clock frequency	0	1	MHz

6. Mechanical drawings

Figure 6. Polaris F10N v1.0 mechanical drawings



7. Revision history

Table 14. Document revision history

Date	Revision	Changes
01-Sep-2025	1.0	SiderionDoc_Polaris_F10N / Initial release
26-May-2026	1.1	Figure 1 - Block Diagram added

8. Appendix

U-blox DAN-F10N datasheet: DAN-F10N Data sheet

U-blox DAN-F10N integration manual: DAN-F10N Integration manual

Siderion user's guide:

Siderion tutorials:

IMPORTANT NOTICE – PLEASE READ CAREFULLY

Siderion reserves the right to make changes, corrections, enhancements, modifications, and improvements to Siderion products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on Siderion products before placing orders. Siderion products are sold pursuant to Siderion's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of Siderion products and Siderion assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by Siderion herein.

Resale of Siderion products with provisions different from the information set forth herein shall void any warranty granted by Siderion for such product.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

SIDERION