



MIA-M10C

Standard precision GNSS module

Professional grade

Data sheet



Abstract

This data sheet describes MIA-M10C, an ultra-small form factor and ultra-low-power GNSS receiver compatible with external active antennas for asset tracking applications.

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* In the not recommended for new designs (NRND) status, the product is still in production, but it is not recommended for new designs. For the latest product statuses, see the product website or contact u-blox.

This document applies to the following products:

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Contents

Document information.....	2
Contents.....	3
1 Functional description.....	4
1.1 Overview.....	4
1.2 Performance.....	4
1.3 Supported GNSS constellations.....	5
1.4 Supported protocols.....	6
1.5 Firmware features.....	6
2 Block diagram.....	8
3 Pin definition.....	9
3.1 Pin assignment.....	9
3.2 Pin state.....	11
4 Electrical specifications.....	12
4.1 Absolute maximum ratings.....	12
4.2 Operating conditions.....	12
4.3 Oscillator parameters.....	13
4.4 Indicative power requirements.....	14
5 Communication interfaces.....	16
5.1 UART.....	16
5.2 I2C.....	16
5.3 Default interface settings.....	18
6 Mechanical specifications.....	19
7 Qualifications and approvals.....	20
8 Product handling.....	21
8.1 Packaging.....	21
8.1.1 Reels.....	21
8.1.2 Tapes.....	21
8.2 Soldering.....	22
9 Product marking and ordering information.....	23
9.1 Product marking.....	23
9.2 Product identifiers.....	23
9.3 Ordering codes.....	24
Related documents.....	25
Revision history.....	26
Contact.....	27

1 Functional description

1.1 Overview

MIA-M10C has an extremely small footprint to enable miniature product designs. Exceptional sensitivity and acquisition time for all L1 GNSS signals are attributed to its integrated M10 standard precision low power platform.

The M10 platform supports concurrent reception of four GNSSs (GPS, GLONASS, Galileo, and BeiDou). The high number of visible satellites enables the receiver to select the best signals. This maximizes the position availability, in particular under challenging conditions such as in deep urban canyons.

u-blox Super-Signal (Super-S) technology offers great RF sensitivity and can improve the dynamic position accuracy with small antennas or in non-line-of-sight scenarios.

MIA-M10C is cost and power optimized for designs where a SAW filter and an LNA are integrated in the external active antenna. It operates with an outstanding low power consumption of less than 15 mW in a 1 Hz cyclic tracking power save mode.

1.2 Performance

Parameter	Specification	Value
Receiver type		u-blox M10 receiver
Accuracy of time pulse signal	RMS	30 ns
	99%	60 ns
Frequency of time pulse signal		Default 1PPS (0.25 Hz to 10 MHz configurable)
Operational limits ¹	Dynamics	≤ 4 g
	Altitude	80,000 m
	Velocity	500 m/s
Velocity accuracy ²		0.05 m/s
Dynamic heading accuracy ²		0.3 deg

Table 1: MIA-M10C specifications

Parameter		GPS+GAL	GPS+GAL +GLO	GPS+GAL +BDS B1I (default)	GPS+GAL +BDS B1C	GPS+GAL +BDS B1C +GLO
Max navigation update rate ³	Default	10 Hz	6 Hz	3 Hz	8 Hz	4 Hz
	High performance ⁴	20 Hz	16 Hz	12 Hz	16 Hz	10 Hz
Position accuracy (CEP) ^{5, 6}		1.5 m	1.5 m	1.5 m	1.5 m	1.5 m

¹ Assuming Airborne 4 g platform.

² 50% at 30 m/s for dynamic operation.

³ Minimum 98% fix rate under typical conditions.

⁴ Configuration required.

⁵ GPS is always in combination with SBAS and QZSS.

⁶ CEP, 50%, 24 hours static, -130 dBm, > 6 SVs for each GNSS system.

Parameter		GPS+GAL	GPS+GAL +GLO	GPS+GAL +BDS B1I (default)	GPS+GAL +BDS B1C	GPS+GAL +BDS B1C +GLO
Time To First Fix (TTFF) ^{5, 7, 8}	Cold start	28 s	24 s	28 s	29 s	24 s
	Hot start	1 s	1 s	1 s	1 s	1 s
	AssistNow Live Orbits ⁹	1 s	1 s	1 s	1 s	1 s
	AssistNow Predictive Orbits ¹⁰	2 s	2 s	3 s	2 s	2 s
	AssistNow Autonomous ¹¹	3 s	4 s	4 s	4 s	4 s
Sensitivity ¹²	Tracking and navigation	-164 dBm	-164 dBm	-162 dBm	-162 dBm	-163 dBm
	Reacquisition	-160 dBm	-160 dBm	-160 dBm	-160 dBm	-160 dBm
	Cold Start	-148 dBm	-148 dBm	-148 dBm	-148 dBm	-148 dBm
	Hot start ⁷	-159 dBm	-159 dBm	-159 dBm	-159 dBm	-159 dBm

Table 2: MIA-M10C typical performance in multi-constellation GNSS modes.

Parameter		GPS	GLONASS	BDS B1I	GALILEO	BDS B1C
Max navigation update rate ³	Default	18 Hz	18 Hz	18 Hz	18 Hz	18 Hz
	High performance ⁴	25 Hz	25 Hz	25 Hz	25 Hz	25 Hz
Position accuracy (CEP) ^{5, 6}		1.5 m	4 m	2 m	3 m	2 m
Time To First Fix (TTFF) ^{5, 7, 8}	Cold start	29 s	27 s	31 s	41 s	65 s
	Hot start	1 s	1 s	1 s	1 s	1 s
	AssistNow Live Orbits ⁹	1 s	2 s	2 s	7 s	N/A
Sensitivity ¹²	Tracking and navigation	-163 dBm	-160 dBm	-158 dBm	-159 dBm	-159 dBm
	Reacquisition	-160 dBm	-158 dBm	-157 dBm	-155 dBm	-156 dBm
	Cold Start	-148 dBm	-147 dBm	-144 dBm	-137 dBm	-133 dBm
	Hot start ⁷	-159 dBm	-159 dBm	-158 dBm	-155 dBm	-157 dBm

Table 3: MIA-M10C typical performance in single-GNSS modes

1.3 Supported GNSS constellations

MIA-M10C is a concurrent GNSS receiver that can receive and track multiple GNSS systems. To achieve lower power consumption, the receiver can be configured for a subset of GNSS constellations.

The default configuration on MIA-M10C is concurrent reception of GPS, Galileo, and BeiDou B1I with QZSS and SBAS enabled.

The following GNSS and their signals are supported:

System	Signals
GPS / QZSS	L1C/A (1575.42 MHz)
Galileo	E1-B/C (1575.42 MHz)

⁷ Commanded starts.

⁸ All satellites at -130 dBm. Measured at room temperature.

⁹ Dependent on the speed and latency of the aiding data connection, commanded starts.

¹⁰ Using seven days old AssistNow Predictive Orbits data. External memory may be required.

¹¹ Using two days old orbital predicted data. External memory may be required.

¹² Demonstrated with a good external LNA. Measured at room temperature.

System	Signals
GLONASS	L1OF (1602 MHz + k*562.5 kHz, k = -7,..., 5, 6)
BeiDou ¹³	B1I (1561.098 MHz), B1C (1575.42 MHz)

Table 4: Supported GNSS and signals on MIA-M10C

The following GNSS assistance services are supported:

Service	Support
AssistNow Live Orbits	GPS L1C/A, Galileo E1, QZSS L1C/A, GLONASS L1OF, BeiDou B1I
AssistNow Predictive Orbits	GPS L1C/A, Galileo E1, GLONASS L1OF
AssistNow Autonomous	GPS L1C/A, Galileo E1, GLONASS L1OF, QZSS L1C/A, BeiDou B1I

Table 5: Supported Assisted GNSS (A-GNSS) services

The following augmentation systems are supported:

System	Support
SBAS	EGNOS, GAGAN, MSAS, WAAS, KASS, and SouthPAN
QZSS	L1S (SLAS)

Table 6: Supported augmentation systems


The SBAS and QZSS augmentation systems can be enabled only if GPS operation is also enabled.

1.4 Supported protocols

MIA-M10C supports the following interface protocols:

Protocol	Type
UBX	Input/output, binary, u-blox proprietary
NMEA versions 2.1, 2.3, 4.0, 4.10 and 4.11 (default)	Input/output, ASCII

Table 7: Supported protocols

1.5 Firmware features

Feature	Description
Antenna supervisor ¹⁴	Antenna supervisor for active antenna control and short detection
CloudLocate GNSS	Extends the life of energy-constrained IoT applications. Small payload messages supported.
Assisted GNSS	AssistNow Live Orbits, AssistNow Predictive Orbits, and AssistNow Autonomous
Backup modes	Hardware backup mode, hardware standby mode, and software standby mode, all with optional RTC
Power save modes	On/off, cyclic tracking
Super-S	Improved accuracy with small antennas
Galileo return link messages	Galileo search and rescue (SAR) return link messages (RLM) via Galileo satellite signal
Data batching	Stores position/velocity/time information over up to 10 min in RAM without host interaction

¹³ BeiDou B1I cannot be enabled simultaneously with BeiDou B1C or GLONASS L1OF.

¹⁴ External components required, some pins need to be reconfigured.

Feature	Description
Odometer	Measures traveled distance with support for different user profiles

Table 8: Firmware features

Feature	Description
Anti-jamming	RF interference and jamming detection and reporting
Anti-spoofing	Spoofing detection and reporting
Configuration lockdown	Receiver configuration can be locked by command
Message integrity	All messages can be cryptographically signed
Secure boot	Only signed firmware images are executed

Table 9: Security features

2 Block diagram

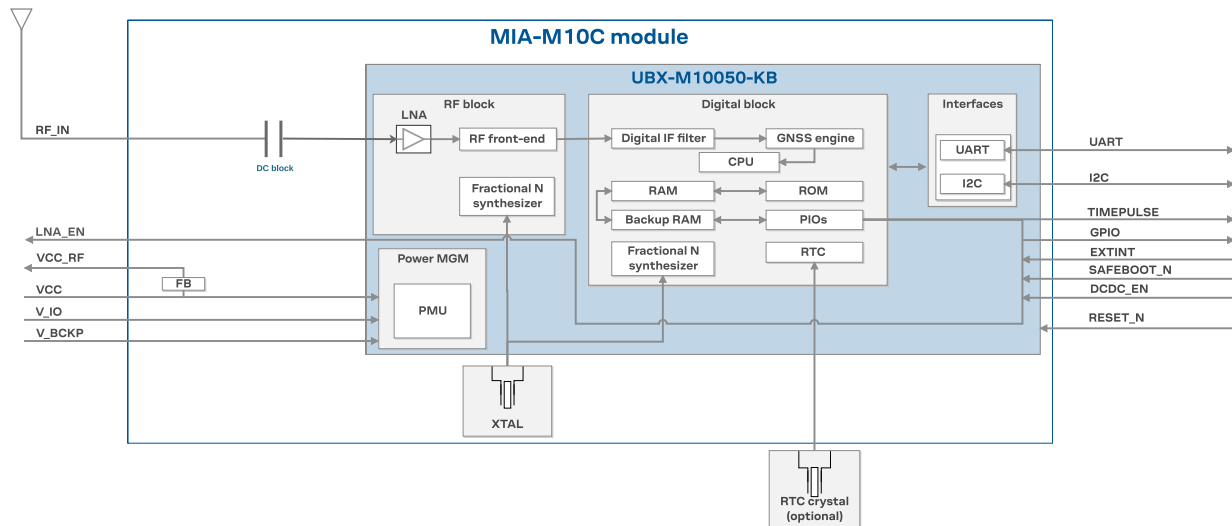


Figure 1: MIA-M10C block diagram

3 Pin definition

3.1 Pin assignment

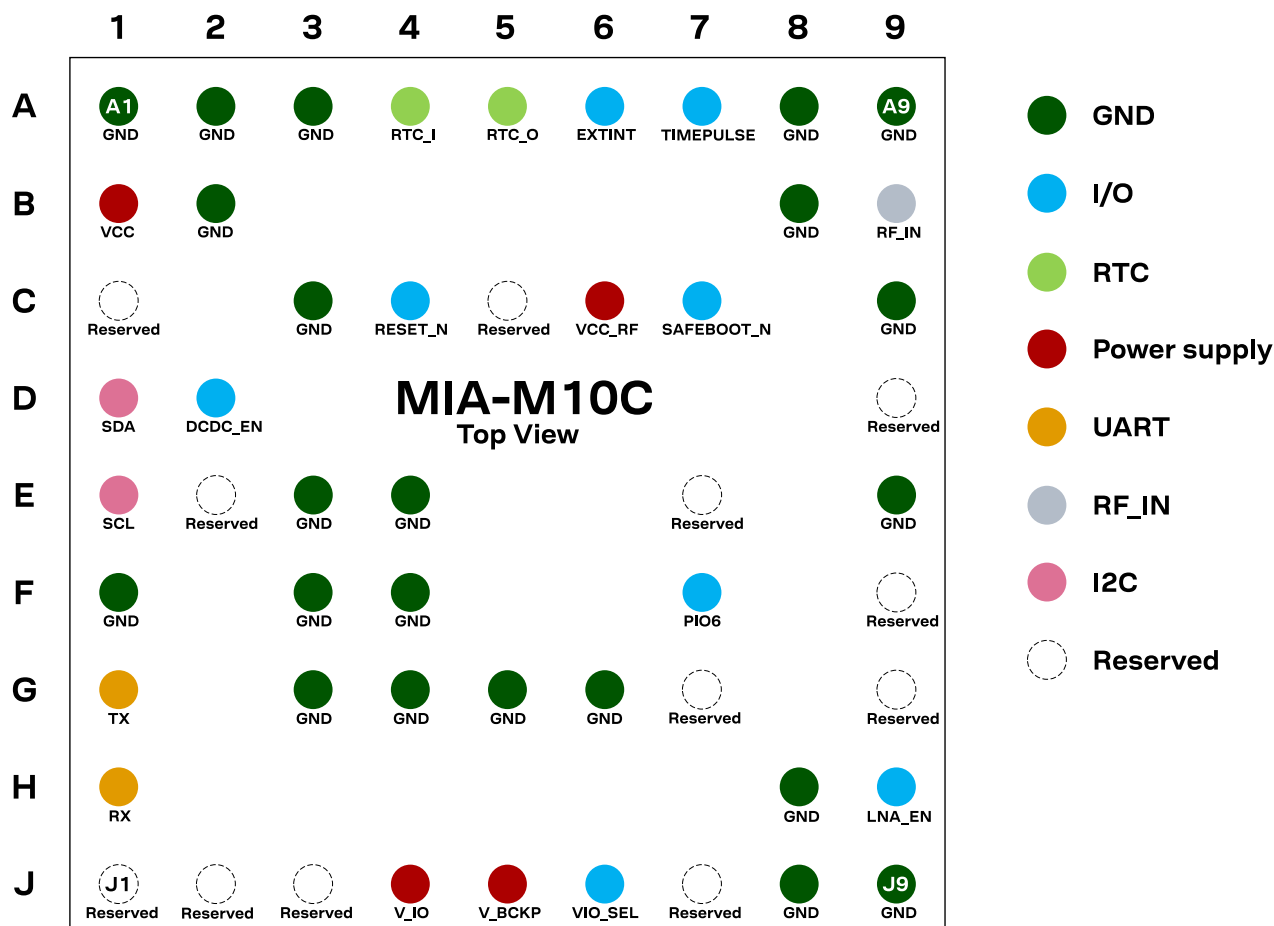


Figure 2: MIA-M10C pin assignment

Pin no.	Name	PIO no.	I/O	Description
A1	GND	-	-	Connect to GND
A2	GND	-	-	Connect to GND
A3	GND	-	-	Connect to GND
A4	RTC_I	-	I	RTC input. Leave open if not used.
A5	RTC_O	-	O	RTC output. Connect to GND if not used.
A6	EXTINT	5	I	External interrupt. Leave open if not used.
A7	TIMEPULSE	4	O	Time pulse signal (shared with SAFEBOOT_N pin) ¹⁵
A8	GND	-	-	Connect to GND
A9	GND	-	-	Connect to GND
B1	VCC	-	I	Main power supply input
B2	GND	-	-	Connect to GND
B8	GND	-	-	Connect to GND

Pin no.	Name	PIO no.	I/O	Description
B9	RF_IN	-	I	RF signal input
C1	Reserved	-	-	Leave open
C3	GND	-	-	Connect to GND
C4	RESET_N	-	I	System reset (active low). Has to be low for at least 1 ms to trigger a reset.
C5	Reserved	-	-	Leave open
C6	VCC_RF	-	O	Filtered power supply for RF active components like external active antenna or LNA, both optional
C7	SAFEBOOT_N	-	I	Safeboot mode (active low). Leave open if not used. ¹⁵
C9	GND	-	-	Connect to GND
D1	SDA	2	I/O	I2C data. Leave open if not used.
D2	DCDC_EN	-	O	Enable/disable external DC/DC converter. Leave open if not used.
D9	Reserved	-	-	Leave open
E1	SCL	3	I	I2C clock. Leave open if not used.
E2	Reserved	-	-	Leave open
E3	GND	-	-	Connect to GND
E4	GND	-	-	Connect to GND
E7	Reserved	-	-	Leave open
E9	GND	-	-	Connect to GND
F1	GND	-	-	Connect to GND
F3	GND	-	-	Connect to GND
F4	GND	-	-	Connect to GND
F7	PIO6	6	I/O	Digital I/O. Leave open if not used.
F9	Reserved	-	-	Connect to GND ¹⁶
G1	TX	1	O	UART TX. Leave open if not used.
G3	GND	-	-	Connect to GND
G4	GND	-	-	Connect to GND
G5	GND	-	-	Connect to GND
G6	GND	-	-	Connect to GND
G7	Reserved	-	-	Leave open ¹⁷
G9	Reserved	-	-	Leave open
H1	RX	0	I	UART RX. Leave open if not used.
H8	GND	-	-	Connect to GND
H9	LNA_EN	-	O	On/Off external LNA or active antenna
J1	Reserved	-	-	Leave open
J2	Reserved	-	-	Leave open
J3	Reserved	-	-	Leave open
J4	V_IO	-	I	IO voltage supply
J5	V_BCKP	-	I	Backup voltage supply. Leave open if no external backup supply.

¹⁵ The receiver enters safeboot mode if this pin is low at start up. The SAFEBOOT_N pin is internally connected to TIMEPULSE pin through a 1 k Ω series resistor.

¹⁶ For future compatibility with the MIA dual-band version, connect this pin to ground by placing a 0 Ω resistor to GND.

¹⁷ For compatibility with the TCXO-based MIA variant, add a placeholder for a 0 Ω resistor from this pin to GND.

Pin no.	Name	PIO no.	I/O	Description
J6	VIO_SEL	-	I	Voltage selector for V _{IO} supply. Connect to GND for 1.8 V supply, or leave open for 3.3 V supply.
J7	Reserved	-	-	Leave open
J8	GND	-	-	Connect to GND
J9	GND	-	-	Connect to GND

Table 10: MIA-M10C pin assignment

3.2 Pin state

Table 11 defines the state of the PIOs and RESET_N pins in different modes. The functions of the PIOs are as defined in the default configuration.

PIO no.	Pin no.	Default function	Continuous mode	Software standby mode	Safe boot mode
0	H1	RXD	Input pull-up	Input pull-up	Input pull-up
1	G1	TXD	Output	Input pull-up	Output
2	D1	SDA	Input pull-up	Input pull-up	Input pull-up
3	E1	SCL	Input pull-up	Input pull-up	Input pull-up
4 ¹⁵	C7	SAFEBOOT_N	Output	Input pull-up	Output (low)
	A7	TIMEPULSE	Output	Input pull-up	Output (low)
5	A6	EXTINT	Input pull-up	Input pull-up	Input pull-up
6	F7	Digital input	Input pull-up	Input pull-up	Input pull-up
7	H9	LNA_EN	Output (high)	Input pull-down	Input pull-up
-	C4	RESET_N	Input pull-up	Input pull-up	Input pull-up

Table 11: Pin state


In reset mode (RESET_N = low), all PIOs are configured as input pull-up.



In hardware backup mode (VCC = 0 V and V_{IO} = 0 V), PIOs must not be driven.

4 Electrical specifications

4.1 Absolute maximum ratings

- CAUTION. Risk of device damage. Exceeding the absolute maximum ratings may affect the lifetime and reliability of the device or permanently damage it. Do not exceed the absolute maximum ratings.
- This product is not protected against overvoltage or reversed voltages. Use appropriate protection to avoid device damage from voltage spikes exceeding the specified boundaries.

Symbol	Parameter	Min	Max	Unit
VCC	Main supply voltage	−0.3	1.98	V
	Voltage ramp on VCC ¹⁸	25	35000	μs/V
V_IO	IO supply voltage, VIO_SEL = GND	−0.3	1.98	V
	IO supply voltage, VIO_SEL = open	−0.3	3.6	V
	Voltage ramp on V_IO ¹⁸	25	35000	μs/V
V_BCKP	Backup supply voltage	−0.3	3.6	V
RTC_I	Voltage on RTC_I	−0.3	1.155	V
V_PIO	Input voltage on RESET_N and digital pins VIO_SEL = GND	−0.3	V_IO + 0.3 (max 1.98)	V
	Input voltage on RESET_N and digital pins VIO_SEL = open	−0.3	V_IO + 0.3 (max 3.6)	V
I_PIO	Max source / sink current, digital pins ¹⁹	−10	10	mA
ICC_RF	Max source current, VCC_RF		200	mA
V_DC _{rfin}	DC voltage at RF_IN	−5.5	+5.5	V
P _{rfin}	RF input power at RF_IN ²⁰		+15	dBm
T _{amb}	Ambient temperature	−40	+85	°C
T _s	Storage temperature	−40	+85	°C

Table 12: Absolute maximum ratings

4.2 Operating conditions

Table 13 shows the general operating conditions. Table 14 shows the electrical parameters for digital I/O.

- The V_IO voltage range is selected with the VIO_SEL pin.

Symbol	Parameter	Min	Typical	Max	Unit
VCC	Main supply voltage ²¹	1.35	1.8	1.98	V
V_IO	IO supply voltage, VIO_SEL = GND	1.68	1.8	1.98	V
	IO supply voltage, VIO_SEL = open	2.7	3.3	3.6	V
V_BCKP	Supply voltage, backup domain	1.65		3.6	V

¹⁸ Exceeding the voltage ramp speed may permanently damage the device.

¹⁹ The SAFEBOOT_N pin has an internal 1 kΩ series resistor.

²⁰ Test conditions: source impedance = 50 Ω, continuous wave.

²¹ Requires a stable and accurate supply voltage, 30 mVpp maximum voltage ripple up to 3 MHz.

Symbol	Parameter	Min	Typical	Max	Unit
V _{IO_SWITCH}	V _{IO} voltage threshold to switch an internal supply for the backup domain from V _{IO} to V _{BCKP}		1.45		V
VCC _{RF}	VCC _{RF} output voltage		VCC - 0.1		V
ICC _{RF}	VCC _{RF} output current			50	mA
Z _{in} ²²	Input impedance at RF_IN		50		Ω
NF _{tot}	Receiver chain noise figure		3.5		dB
Ext_gain ²³	External gain at RF_IN, normal gain mode (default)			40	dB
	External gain at RF_IN, low gain mode	14		50	dB
	External gain at RF_IN, bypass mode	23		60	dB
T _{opr}	Operating temperature	-40		+85	°C

Table 13: General operating conditions

Symbol	Parameter	Min	Typical	Max	Unit
I _{leak}	Leakage current input pins ²⁴		25		nA
V _{in}	Input pin voltage range	0		V _{IO}	V
V _{il}	Low-level input voltage			0.63	V
V _{ih}	High-level input voltage	0.68 x V _{IO}			V
V _{ol}	Low-level output voltage, I _{out} = -2 mA ²⁵			0.4	V
V _{oh}	High-level output voltage, I _{out} = 2 mA ²⁵	V _{IO} - 0.4			V
R _{pu, IO}	Pull-up resistance, Digital IO ²⁶ . V _{IO_SEL} = GND	6	17	72	kΩ
R _{pu, IO}	Pull-up resistance, Digital IO ²⁶ . V _{IO_SEL} = open	8	18	40	kΩ
R _{pd, IO}	Pull-down resistance, Digital IO	21	80	180	kΩ
R _{pu, SAFEBOOT_N}	Pull-up resistance, SAFEBOOT_N ²⁷	6	17	72	kΩ
R _{pu, RESET_N}	Pull-up resistance, RESET_N	7	10	13	kΩ
V _{ol_dcdcen} ²⁸	DCDC_EN low-level output voltage, I _{out} = -10 μA			0.06	V
V _{oh_dcdcen} ²⁸	DCDC_EN high-level output voltage, I _{out} = 10 μA	1.45	1.55	1.65	V
R _p	Output resistance, DCDC_EN	3	4.5	6	kΩ

Table 14: Digital IO

4.3 Oscillator parameters

Table 15 shows the electrical parameters for the RTC (optional).

Parameter	Min	Typical	Max	Unit
RTC oscillator frequency		32768		Hz
RTC startup time		250	700	ms
RTC crystal ESR			100	kΩ

²² The RF_IN input integrates a built-in DC block.

²³ The internal LNA gain is configurable.

²⁴ V_{in} = V_{IO}, at room temperature.

²⁵ TIMEPULSE (PIO4) has 4 mA current drive/sink capability.

²⁶ TXD, RXD, TIMEPULSE, EXTINT, SCL, SDA, and LNA_EN.

²⁷ The SAFEBOOT_N pin has an additional 1 kΩ series resistor.

²⁸ Special voltage level and current drive capability. Can be used as an enable signal for an external DC/DC converter.

Parameter	Min	Typical	Max	Unit
RTC input capacitance at RTC_I, RTC_O (per pin to GND)	7	10	14	pF
RTC_I input voltage, external clock				
V _{il_RTC}	0		0.22	V
V _{ih_RTC}	0.71		1.1	V

Table 15: RTC parameters

4.4 Indicative power requirements

This section provides examples of typical current requirements. They are characterized on samples using a cold start command. The actual power requirements may vary depending on the firmware version used, the external circuitry, the number of satellites tracked, the signal strength, the type and time of start, duration, internal LNA gain mode, and the test conditions.

All values in [Table 16](#), and [Table 17](#) have been measured at 25 °C ambient temperature with the default configuration unless otherwise stated. SBAS and QZSS are active in all measurements.

[Table 16](#) shows indicative current consumption for VCC and V_{IO}.

Symbol (Parameter)	Conditions	GPS	GPS+GAL	GPS+GAL +GLO	GPS+GAL +BDS B1I (default)	GPS+GAL +BDS B1C	GPS+GAL +BDS B1C +GLO	Unit
I _{VCC} ^{29, 30} (Current at VCC)	Acquisition ³¹	16.5	22	28	26	24.5	29	mA
	Tracking (Continuous mode)	13	15	18.5	19	18	21	mA
	Tracking (Power save mode) ³²	5	5.5	6.5	6.5	-	-	mA
I _{VIO} ^{29, 33} (Current at V _{IO})	Acquisition and Tracking (Continuous mode)	1.7	1.7	1.8	1.7	1.7	1.8	mA
	Tracking (Power save mode) ³²	1.5	1.5	1.5	1.5	-	-	mA

Table 16: Typical currents for 1.8 V supply at VCC and V_{IO}


The inrush current can go up to 100 mA at startup. Ensure that the external power supply is able to deliver up to 100 mA.

[Table 17](#) shows current consumption for the backup modes.

Symbol	Parameter	Conditions	Typ.	Unit
I _{V_BCKP} ³⁴	Total current in hardware backup mode	V _{BCKP} = 3.3 V, V _{IO} = VCC = 0 V	28	μA
I _{VIO}	V _{IO} current in software standby mode or in hardware standby mode	V _{IO} = 1.8 V	37	μA
		V _{IO} = 3.3 V	46	μA
I _{VCC}	VCC current in software standby mode	VCC = 1.8 V	3	μA

Table 17: Backup currents

²⁹ 1 Hz navigation update rate.

³⁰ Internal LNA set to normal gain. Simulated signal using power levels of -130 dBm.

³¹ Average current from start-up until the first fix.

³² Cyclic tracking operation. BeiDou B1C is not supported in this mode.

³³ Same current with voltage at V_{IO} = 1.8 V and 3.3 V.

³⁴ I_{V_BCKP} current in normal operation (V_{BCKP} = 3.3 V, V_{IO} = VCC = 1.8 V) is ~3 μA.



Extreme operating temperatures can significantly impact the specified values. If an application operates near the min or max temperature limits, ensure the specified values are not exceeded.

5 Communication interfaces

The receiver supports communication over the UART and I2C interfaces.

All the inputs have an internal pull-up resistor in normal operation and can be left open if not used. The voltage level at the PIO pins is related to the V_{IO} supply voltage.

5.1 UART

The UART interface supports configurable baud rates. Hardware flow control is not supported. UART specifications are described in [Table 18](#).

Symbol	Parameter	Min	Max	Unit
R _u	Baud rate	9600	921600	bit/s
Δ _{Tx}	Tx baud rate accuracy	-1%	+1%	-
Δ _{Rx}	Rx baud rate tolerance	-2.5%	+2.5%	-

Table 18: UART specifications

5.2 I2C

An I2C interface is available for communication with an external host CPU in the I2C Fast-mode. Backwards compatibility with the Standard-mode I2C bus operation is not supported. The interface can be operated only in the peripheral mode with a maximum clock frequency of 400 kHz³⁵.

The interface can make use of clock stretching by holding the SCL line LOW to pause a transaction. In this case, the bit transfer rate is reduced. The maximum clock stretching time is 20 ms.

³⁵ External pull-up resistors may be needed to achieve 400 kbit/s communication speed, as the internal pull-up resistance can be very large.

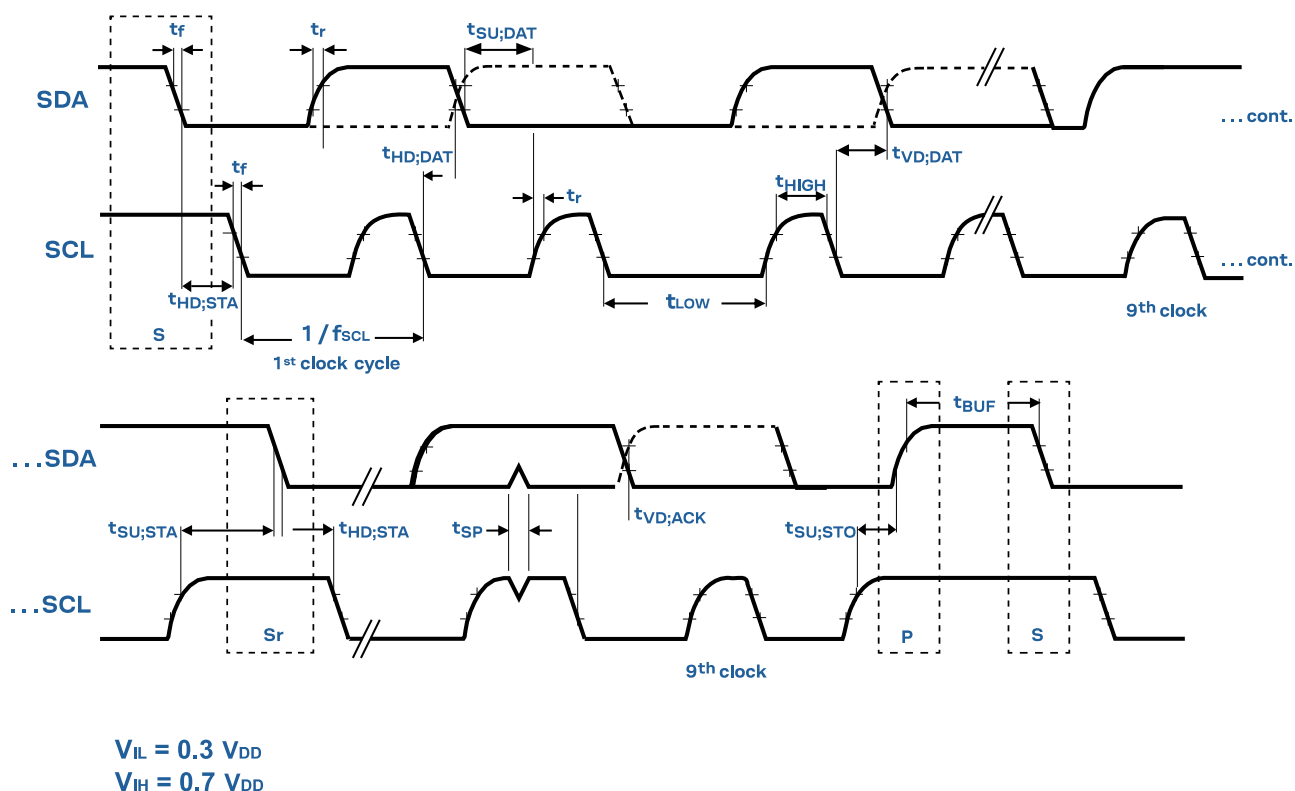


Figure 3: I2C peripheral specification

Symbol	Parameter	I2C Fast-mode		Unit
		Min	Max	
f_{SCL}	SCL clock frequency	0	400	kHz
$t_{HD;STA}$	Hold time (repeated) START condition	0.6	-	μs
t_{LOW}	Low period of the SCL clock	1.3	-	μs
t_{HIGH}	High period of the SCL clock	0.6	-	μs
$t_{SU;STA}$	Setup time for a repeated START condition	0.6	-	μs
$t_{HD;DAT}$	Data hold time	0 ³⁶	- ³⁷	μs
$t_{SU;DAT}$	Data setup time	100	-	ns
t_r	Rise time of both SDA and SCL signals	-	300 (for C = 400pF)	ns
t_f	Fall time of both SDA and SCL signals	-	300 (for C = 400pF)	ns
$t_{SU;STO}$	Setup time for STOP condition	0.6	-	μs
t_{BUF}	Bus-free time between a STOP and START condition	1.3	-	μs
$t_{VD;DAT}$	Data valid time	-	0.9 ³⁷	μs
$t_{VD;ACK}$	Data valid acknowledge time	-	0.9 ³⁷	μs
V_{nL}	Noise margin at the low level	0.1 V_{IO}	-	V

³⁶ External device must provide a hold time of at least one transition time (max 300 ns) for the SDA signal (with respect to the min V_{ih} of the SCL signal) to bridge the undefined region of the falling edge of SCL.

³⁷ The maximum $t_{HD;DAT}$ must be less than the maximum $t_{VD;DAT}$ or $t_{VD;ACK}$ with a maximum of 0.9 μs by a transition time. This maximum must only be met if the device does not stretch the LOW period (t_{LOW}) of the SCL signal. If the clock stretches the SCL, the data must be valid by the set-up time before it releases the clock.

Symbol	Parameter	I2C Fast-mode		Unit
		Min	Max	
V _{nH}	Noise margin at the high level	0.2 V _{IO}	-	V

Table 19: MIA-M10C I2C peripheral timing and specifications

5.3 Default interface settings

Interface	Settings
UART	38400 baud³⁸, 8 bits, no parity bit, 1 stop bit. - Input messages: NMEA and UBX - Output messages: NMEA GGA, GLL, GSA, GSV, RMC, VTG and TXT
I2C	7-bit I2C address (0x42). - Input messages: NMEA and UBX - Output messages: NMEA GGA, GLL, GSA, GSV, RMC, VTG and TXT

Table 20: Default interface settings

³⁸ 9600 baud in the safe boot mode.

6 Mechanical specifications

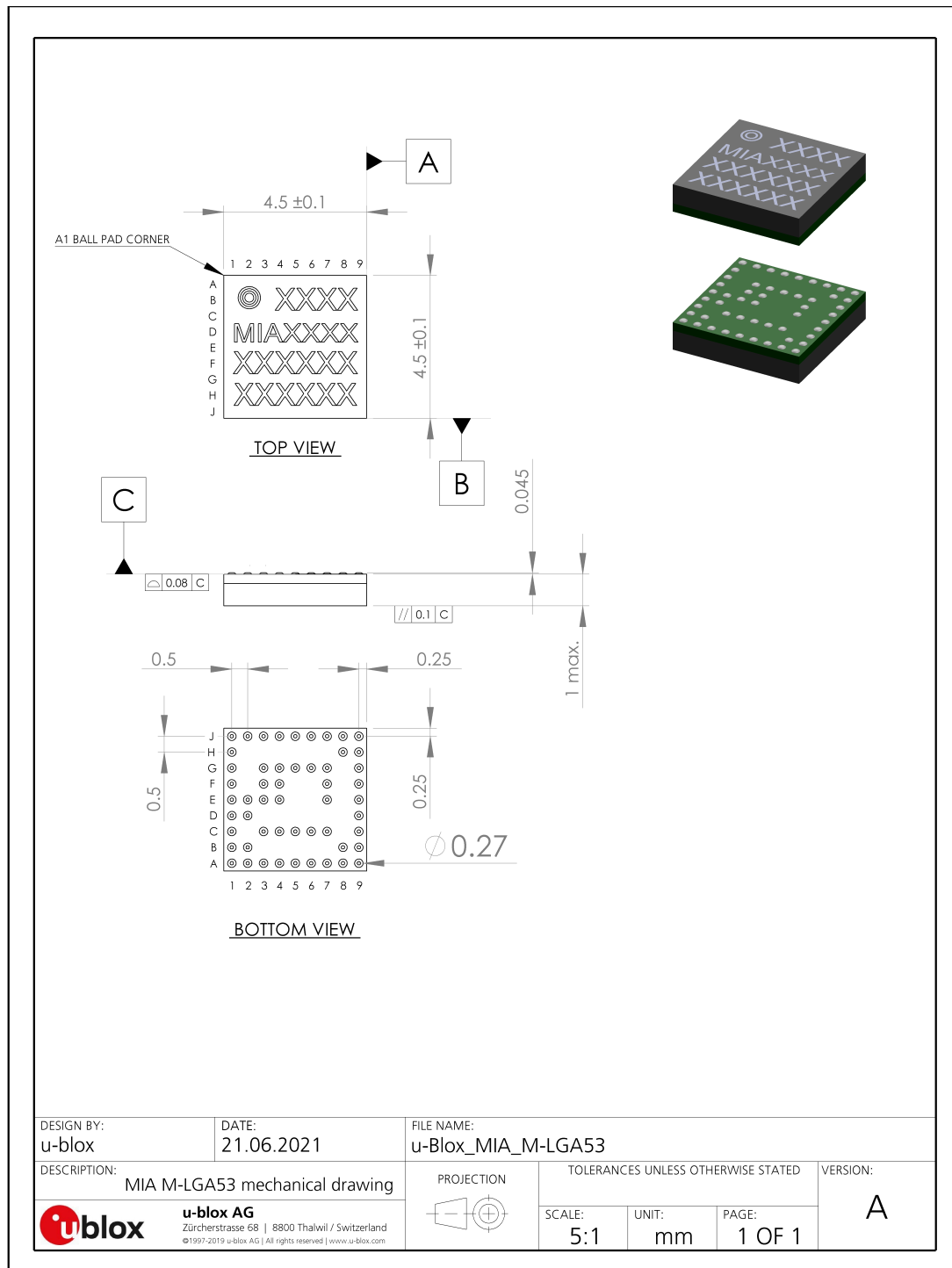


Figure 4: MIA-M10C mechanical drawing

Typical weight: 0.06 g.

7 Qualifications and approvals

Type	Description
Quality and reliability	
Product qualification	Qualified according to u-blox qualification policy, based on a subset of AEC-Q104
Manufacturing	Manufactured at IATF 16949 certified sites
Environmental	
RoHS compliance	Yes
Moisture sensitivity level (MSL) ^{39, 40}	3
Type approvals	
European RED certification (CE)	Declaration of Conformity (DoC) is available on the u-blox website .
UK conformity assessment (UKCA)	Yes

Table 21: Qualifications and approvals

³⁹ For MSL standard see IPC/JEDEC J-STD-020 and J-STD-033 [5].

⁴⁰ For more information regarding moisture sensitivity levels, labeling, storage, and drying, see the Product packaging reference guide [4].

8 Product handling

8.1 Packaging

The MIA-M10C modules are delivered as hermetically sealed, reeled tapes to enable efficient production, production lot set-up and tear-down. For more information, see the Product packaging reference guide [4].

8.1.1 Reels

MIA-M10C modules are deliverable in quantities of 1000 pieces on a reel. They are shipped on reel type A1, as specified in the Product packaging reference guide [4].

8.1.2 Tapes

Figure 5 shows the feed direction and illustrates the orientation of the components on the tape.

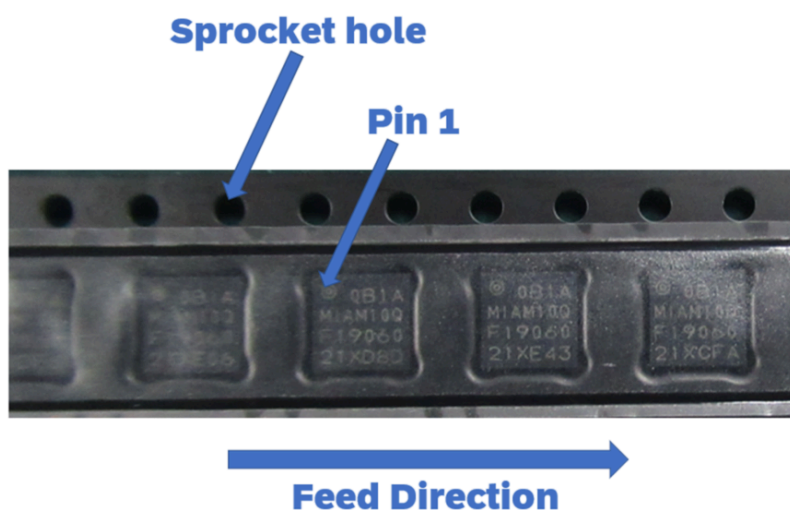


Figure 5: Orientation of the components on the tape

The feed direction into the pick and place pick-up is from the reel (located on the left of the figure) towards right, and the tape is fed to the right.

The dimensions of the tape are specified in Figure 6 (measurements in mm).

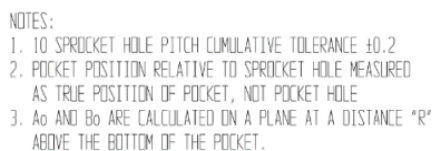


Figure 6: Tape specification

Reflow soldering is described in the IPC/JEDEC J-STD-020 standard [5].

9 Product marking and ordering information

This section provides information about product marking and ordering.

9.1 Product marking

The product marking provides information on MIA-M10C and its revision, as in [Figure 7](#). For a description of the product marking, see [Table 22](#)

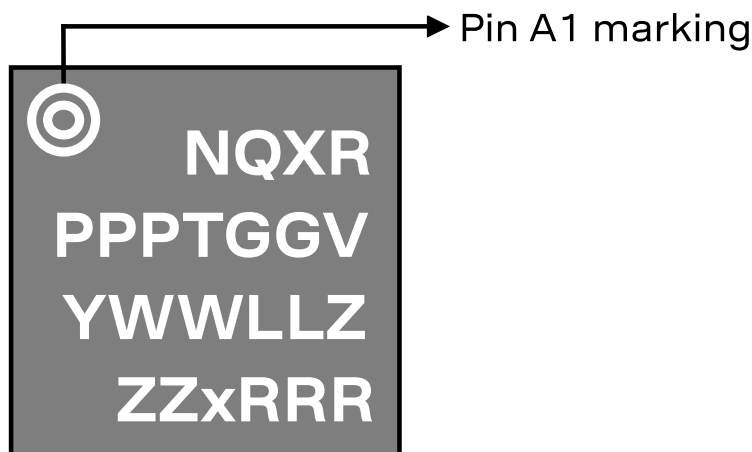


Figure 7: Example of MIA-M10C product marking

Code	Meaning	Example
PPP	Form factor	MIA
TGG	Platform	M10 = u-blox M10
V	Variant	C = Standard precision, ROM and XTAL
YWWLL	Date code and lot number	Y = production year, A = 2017, B = 2018,..., G =2023, H= 2024 etc. WW = calendar week LL = lot number
ZZZ	Other production information	-
N	Major product version	0 = 00, 1 = 01, ...
Q	Product grade	A = Automotive, B = Professional
X	Revision	Hardware and firmware versions
R	Other production code	-
x	Engineering samples (No X = serial production)	-

Table 22: Description of product marking

9.2 Product identifiers

The MIA-M10C marking features three product identifiers: product name, ordering code and type number. The product name identifies all u-blox products, independent of packaging and product grade, and it is used in documentation such as this data sheet. The ordering code includes the major product version and product grade, while the type number additionally includes the hardware and firmware versions.

Table 23 describes the three different product identifiers used in the MIA-M10C module product marking.

Identifier	Format	Example
Product name	PPP-TGGV	MIA-M10C
Ordering code	PPP-TGGV-NNQ	MIA-M10C-00B
Type number	PPP-TGGV-NNQ-XX	MIA-M10C-00B-02

Table 23: Product identifiers

9.3 Ordering codes

Ordering code	Product	Remark
MIA-M10C-00B	u-blox M10 GNSS receiver module, professional grade	

Table 24: Product ordering codes

u-blox provides information on product changes affecting the form factor, size or function of the product. For the Product change notifications (PCNs), see our website at: <https://www.u-blox.com/en/product-resources>.

Related documents

- [1] MIA-M10C Integration manual, [UBX-23001616](#)
- [2] u-blox M10 SPG 5.10 Release notes, [UBX-22001426](#)
- [3] u-blox M10 SPG 5.10 Interface description, [UBX-21035062](#)
- [4] Product packaging reference guide, [UBX-14001652](#)
- [5] Joint IPC/JEDEC standard, www.jedec.org



For regular updates to u-blox documentation and to receive product change notifications please register on our homepage <https://www.u-blox.com>.

Revision history

Revision	Date	Comments
R01	15-Mar-2023	Initial release
R02	16-May-2023	Added 1 Hz navigation update rate footnote in section Indicative power requirements.
R03	19-Jan-2024	Engineering sample Added sections: - Pin state Updated sections: - Performance - Firmware features: removed Protection level (not supported) - Operating conditions: added information on the input impedance and the DC block at RF_IN - Indicative power requirements
R04	01-Feb-2024	Initial production Added sections: - Approvals Updated sections: - Performance
R05	16-Jan-2025	Added sections: - Product handling: Soldering, Packaging Updated sections: - Pin assignment: pin A6 and F7 description - Absolute maximum ratings: V_{IO} for VIO_SEL = GND - Communication interfaces - Mechanical specifications - Qualifications and approvals Change in document structure - Moisture sensitivity level (MSL) included in chapter Qualifications and approvals
R06	17-Apr-2026	New manufacturing site. Updated sections: - Document information: new type number. - Supported GNSS constellations: correction in documentation – removed BDSBAS from supported augmentation systems. - Firmware features: AssistNow service. Legacy AssistNow services Online and Offline have been replaced with the corresponding new services Live Orbits and Predictive Orbits.

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