



MGAA1-U185-00

Specification

Part Series	GNSS Receiver Module
Part Number	MGAA1-U185-00
Version	V0.2

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1. Overall

The MGAA1-U185 series are compact GNSS antenna modules. This small antenna module combines a right hand circular polarization (RHCP) patch antenna and receiver circuit. It is very suitable for IoT or mobile application.

This module support L1 band GNSS signal and multi system, GPS, GLONASS and QZSS. The multi-system GNSS receiver will increase the visible satellite and improve navigate performance, fast acquisition time and position accuracy.

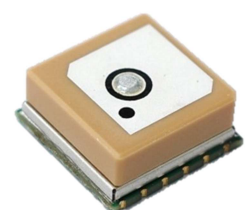
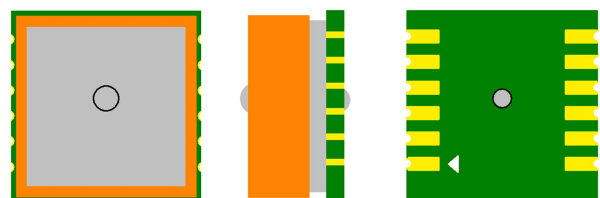
The embedded RHCP patch antenna has excellent performance in gain, axis ratio, and radiation pattern.

The receiver circuit provide fast TTFF time, acquisition time and up to 47 satellite channel. The module integrates low noise amplifier and high rejection filter. These designs (antenna & receiver) will provide high receiver sensitivity, reduce noise interface, anti-jamming and the best performance in GNSS application.

The MGAA1-U185 series is excellent and easy to use in navigation and position application. The package with stamp hole and compact, that is easy to mount on system board.

2. Feature

- L1 band GNSS receiver
- Integrated RHCP patch antenna
- Support GPS, GLONASS, QZSS
- Support Max. 47 channel
- Time to First Fixed (TTFF)
- Max 10Hz update rate
- Integrate low noise amplifier (LNA)
- Integrate high rejection filter (SAW filter)
- Signal voltage supply
- UART interface

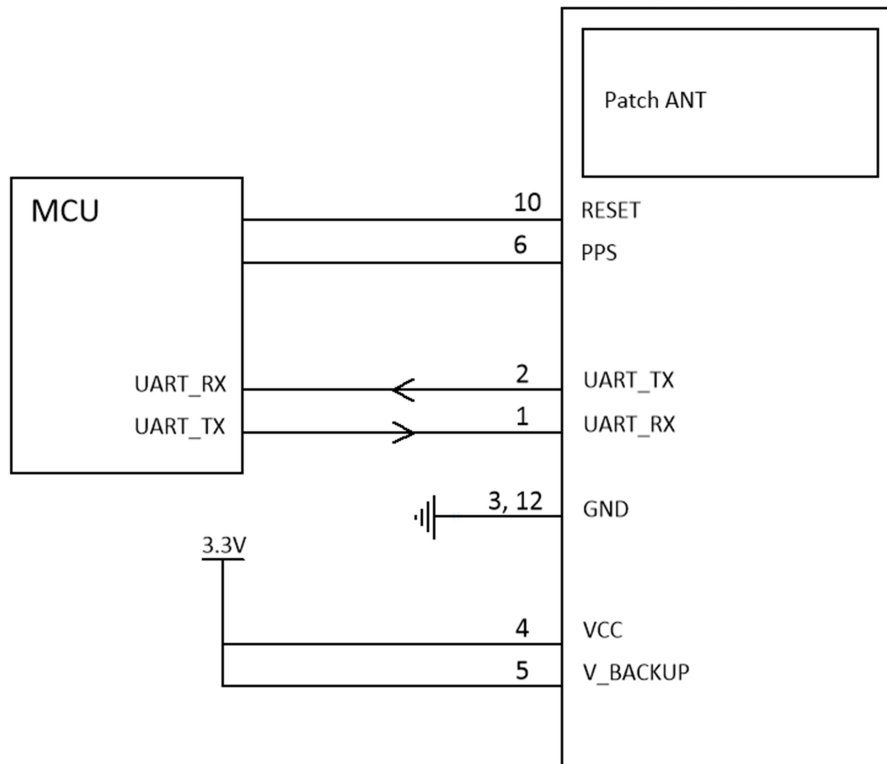


- low power consumption
- ESD protection
- Small package (16mm X 16mm X 7.5mm)
- Support SMD process
- RoSH/REACH Compliance
- CE/RED Certification (ETSI EN 303 413)

3. Application

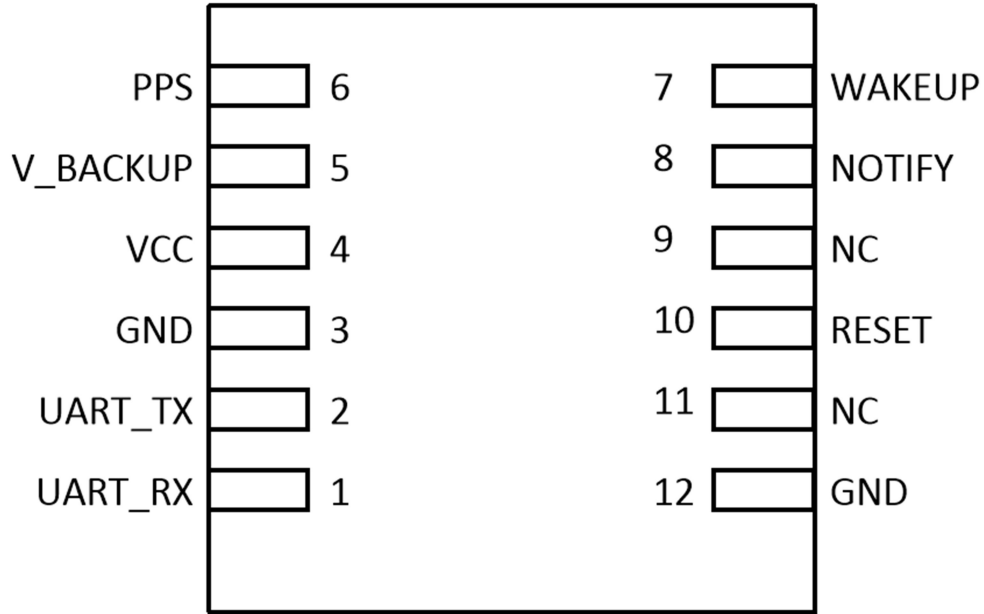
- Personal position and navigation
- IoT
- Bike or motorcycle
- Tracker

Simplified Schematic and application
MGAA1-U185



4. Pin Configuration and Function

4.1 Pin Configuration (Bottom View)



4.2 Pin Function

PIN		Type	Description
Number	Name		
1	UART_RX	I	UART receive, 1.8V level
2	UART_TX	O	UART transmit, 1.8V level
4	VCC	P	Voltage supply
5	V_BACKUP	P	Backup Voltage supply. It can be tied with VCC, if no backup source or battery.
6	PPS	O	1PPS signal, 1.8V level
7	WAKEUP	I	Host wakeup GNSS module. Wake-up module from stand-by mode. Low active. Open this pin, if no uses this function.
8	NOTIFY	O	GNSS module notify host. High active. Open this pin, if no uses this function.
10	RESET	I	Reset, internal pull-high. Low active
3, 12	GND	GND	Ground pin. Connect to system ground
9, 11	NC	NC	No connection

5. Performance

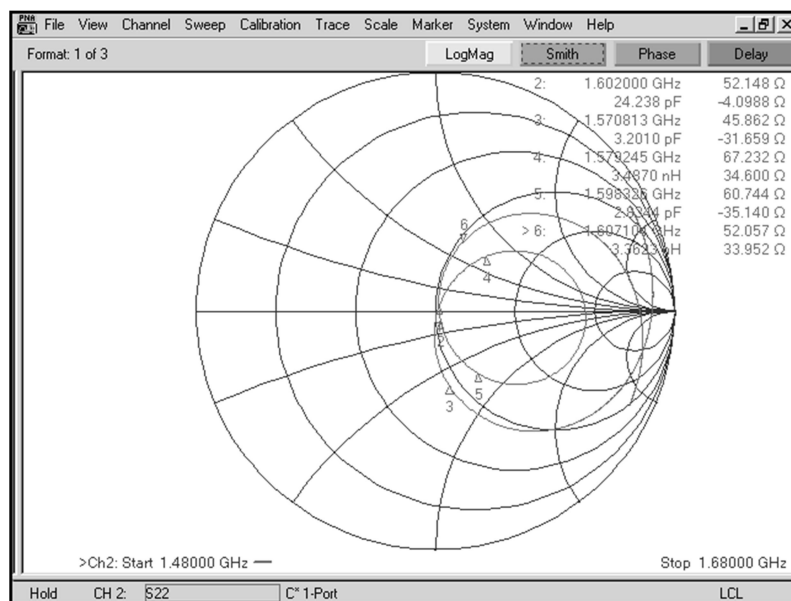
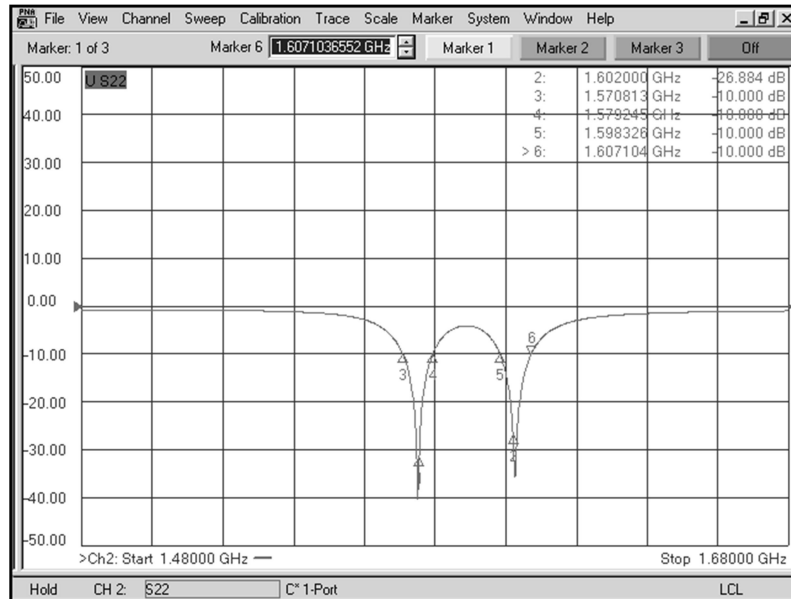
5.1 RF performance

Parameter	Specifications
Frequency (MHz)	GPS: L1 C/A, 1575.42 GLONASS: L1, 1603.68 QZSS: L1, 1575.42
Channel	47
Timing Accuracy	1pps, +/-10ns
Update rate	1Hz
Sensitivity	Tracking: -163 dBm Acquisition: -146 dBm
TTF	Host start: 1 sec Cold start: 28 sec
Position Precision (CEP)	2 m
Max input level	-40dBm

5.2 Antenna performance

Parameter	Specifications
Frequency (MHz)	GPS: 1575.42 +/- 2 GLONASS: 1598 ~1610
S11 (dB)	< -10
Polarization	RHCP
Peak Gain (dBic)	2.0 (typ.)
Axial Ratio (dBic)	-4.0 (typ.) at 1575.42MHz -5.5 (typ.) at 1602.00MHz

5.3 Antenna S-Parameter and matching factor

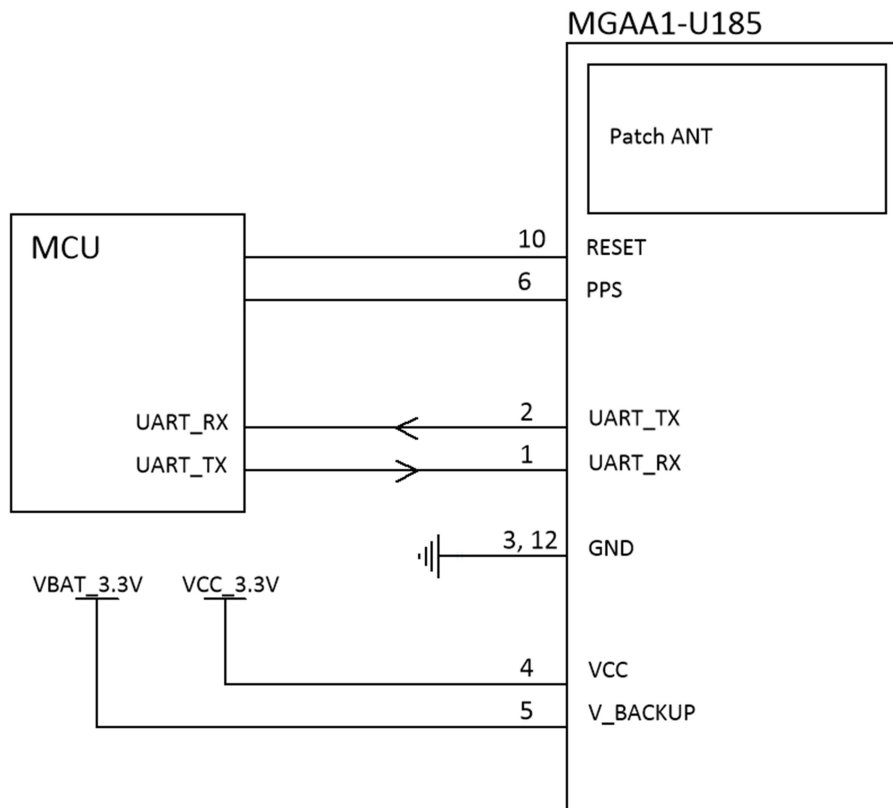


5.4 Digital performance

Parameter	Specifications
Update rate	1Hz
UART	9600 bps
Protocols	NMEA 0183

6. Application

6.1 Typical application in navigation system



7. Electrical Specification

7.1 Absolution Rating

Parameter	Description	Min	Max	Unit
VCC	Voltage input		5.5	V
V_BACKUP	Backup voltage input		5.5	V
RF_IN	Max RF input level		-40	dBm

7.2 ESD Rating

Mode	JEDEC Specification	Min	Max	Unit
Human body model	JESD22-A114-F	-2000	2000	V
Charge device model	JESD22-C101-D	-500	500	V

7.3 Recommended Operation Conditions

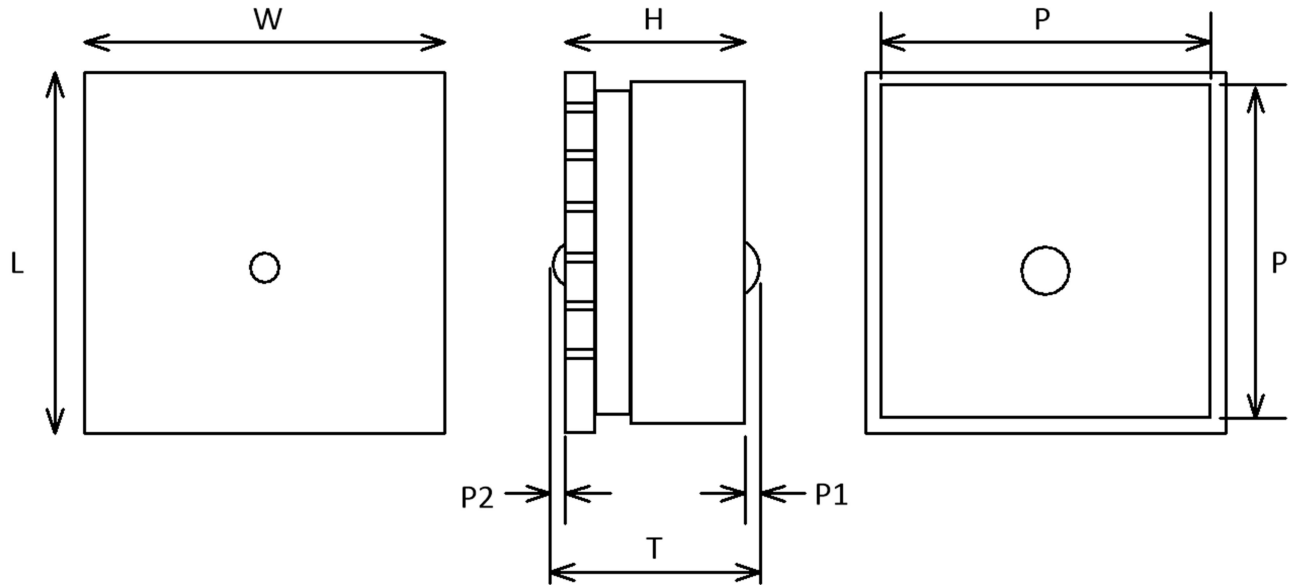
Parameter	Description	Min	Max	Unit
VCC	Voltage input	3	5	V
V_BACKUP	Backup voltage input	3	5	V
V-IH	IO, UART	1.2	2.1	V
V-IL	IO, UART	-0.3	0.6	V
V-OH	IO, UART	1.4		V
V-OL	IO, UART		0.4	V
Temp-op	Operation temperature	-40	+85	°C
Temp-st	Storage temperature	-40	+105	°C

7.4 Power consumption

Parameter	Description	typical	Unit
Pcon	Power consumption	95	mW

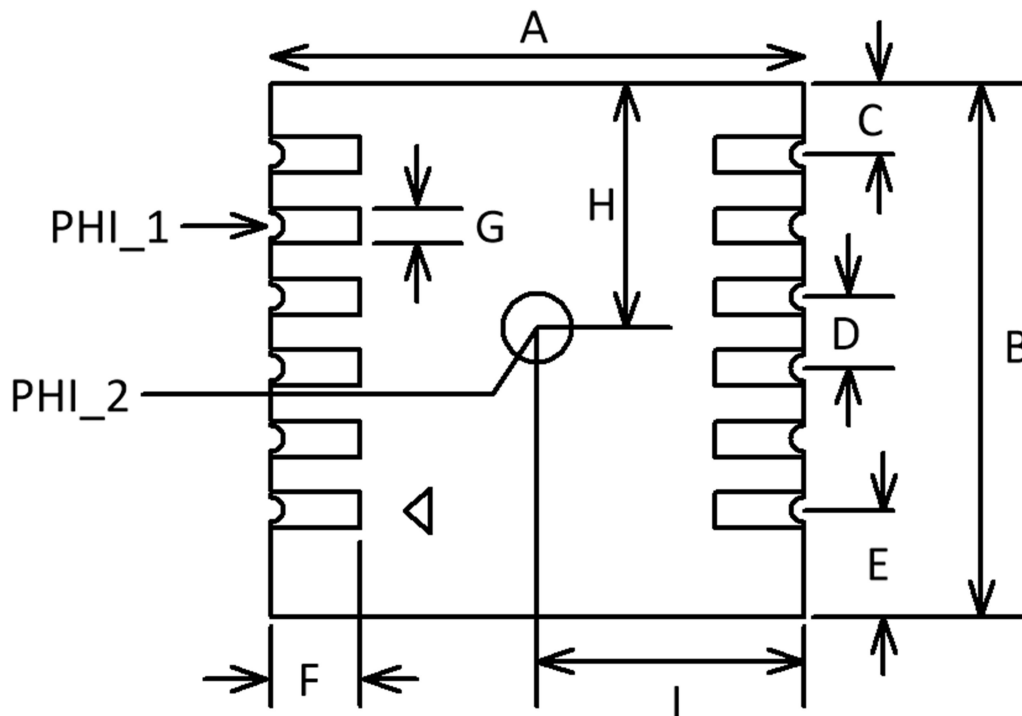
8. Mechanical Specification

8.1 Outline Dimensions



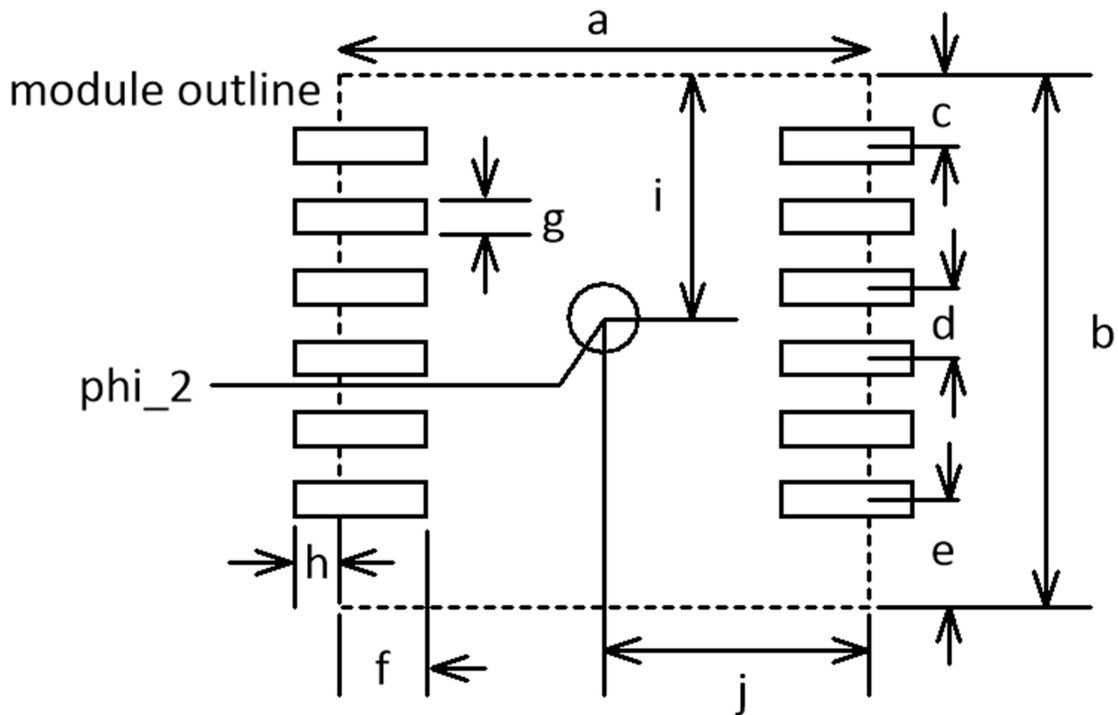
Symbol	Min (mm)	Normal (mm)	Max (mm)
W	15.9	16.0	16.1
L	15.9	16.0	16.1
H	6.3	6.5	6.7
T	7.1	7.5	7.9
P	14.7	14.9	15.1
P1	0.4	0.5	0.6
P2	0.4	0.5	0.6

8.2 Bottom Dimensions



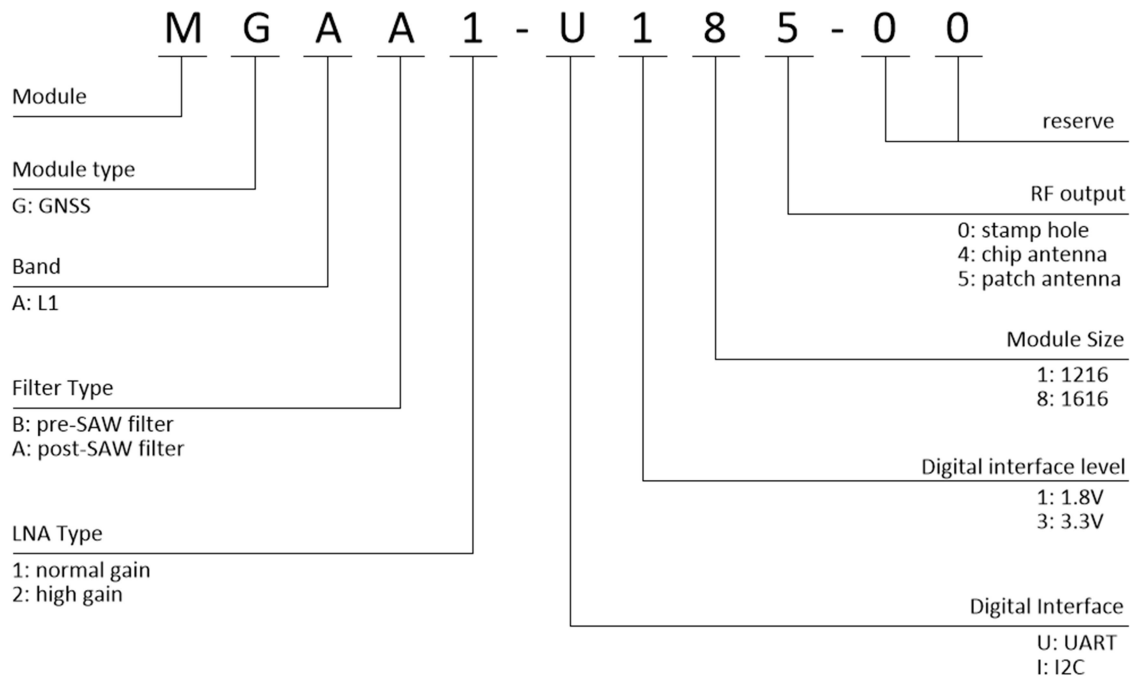
Symbol	Min (mm)	Normal (mm)	Max (mm)
A	15.9	16.0	16.1
B	15.9	16.0	16.1
C	1.13	1.15	1.17
D	2.52	2.54	2.56
E	2.13	2.15	2.17
F	1.45	1.5	1.55
G	0.95	1.0	1.05
H	7.55	7.6	7.65
I	7.95	8.0	8.05
PHI_1	0.45	0.5	0.55
PHI_2	2.7	2.8	2.9

8.3 PCB land pattern dimensions



Symbol	Dimensions (mm)
a	16.0
b	16.0
c	1.15
d	2.54
e	2.15
f	1.5
g	1.0
h	1.0
i	7.6
j	8.0
Phi_2	3.0 (cut out D=3mm hole on PCB)

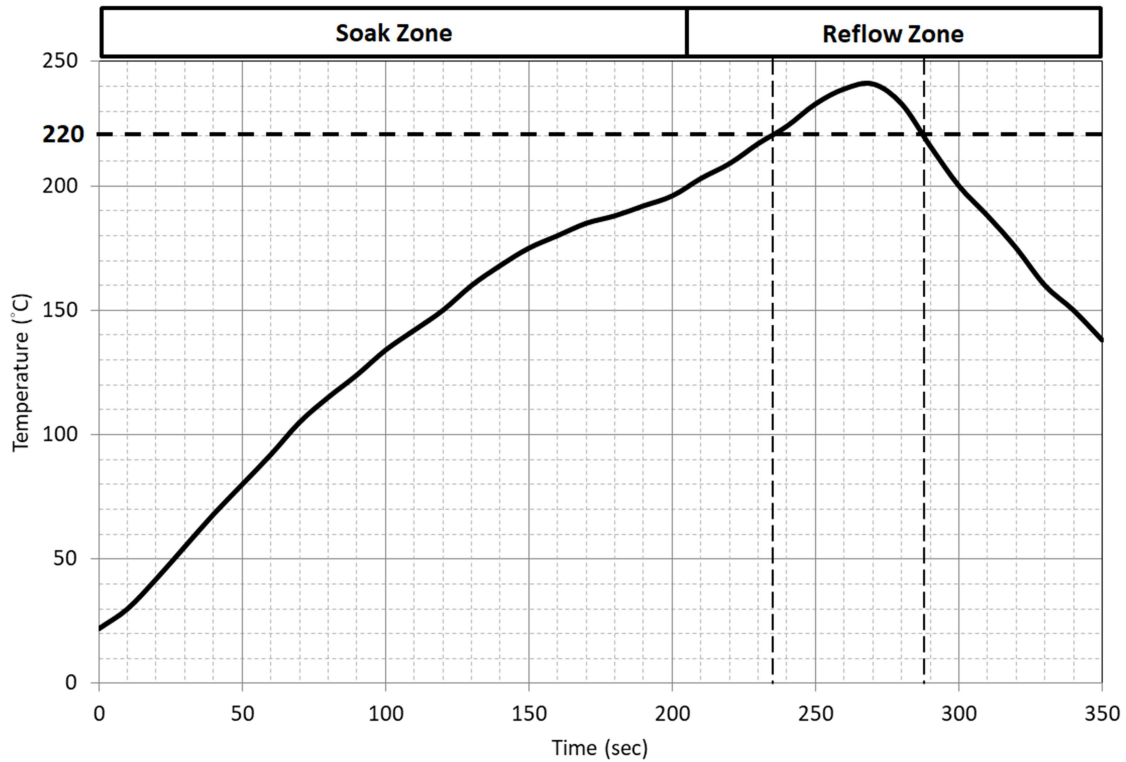
9. Ordering Information



Part Number	Description
MGAA1-U185 -00	GNSS L1 antenna module
MGAA1-U185 -00-EV	Evaluation Board

10. Manufacturing

10.1 Reflow Soldering Thermal Profile



10.2 Thermal profile parameter

Zone	Factor	Description
Soak Zone	Max slope	3°C/sec
	Soak time (150°C ~ 200°C)	60 sec ~120 sec
Reflow Zone	Max slope	2°C/sec
	Soak time (over 220°C)	40 sec ~60 sec
	Max temperature	245°C
	Cooling down slope	-1°C/sec to -3°C/sec
Reflow cycle	Max reflow cycle	1

11. Version

Version	Date	Description
V01	2024.05.06	Initial release
V0.2	2024.12.19	Add CE/RED certification (ETSI EN 303 413)