MINEWSEMI

GNSS Module

ME3RGR11

Datasheet

V 1.0.0

Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Michelle	2026.06.01	

Part Number

Model	Hardware Code
ME3RGR11	4NN

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https://en.minewsemi.com/file/ME3RGR11_Datasheet_EN.pdf

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1 PRODUCT INTRODUCTION

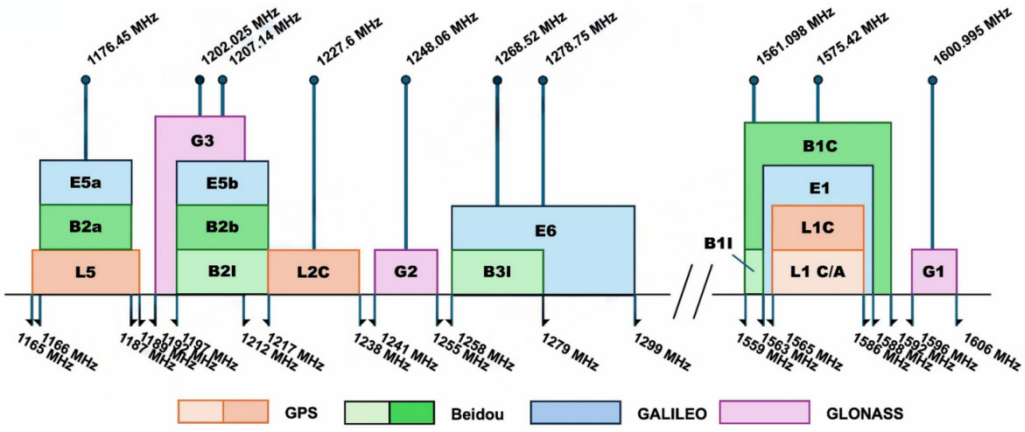
1.1 General Description

ME3RGR11 is a full-constellation, full-frequency and high-precision satellite positioning module. It is equipped with a high-performance 600 MHz application processor and integrates a double-precision floating-point arithmetic processing unit. With built-in multiple algorithms including RTK, PPP, PPP-RTK and multi-sensor data fusion processing, and paired with professional-grade digital NIC narrowband anti-interference unit, it greatly enhances signal receiving and processing performance in complex electromagnetic environments and ensures continuous and reliable operation of the product.

With 1040 channels, ME3RGR11 can receive, track and process satellite signals across the entire sky. It fully handles multiple signal frequencies of navigation systems including BDS, GPS, GLONASS, Galileo and QZSS. Tailored dedicated design schemes are integrated for the new-generation BDS-3 signal system, with optimized adaptation in hardware implementation and algorithms to fully support the extensive application of global BDS-3 signals.

ME3RGR11 supports multiple satellite-based augmentation systems. It can receive satellite signals of all global navigation satellite systems and all frequency points, and is also compatible with PPP-B2b, Galileo E6 HAS, QZSS L6 and CLAS satellite-based augmentation signals. Adopting an RTK decision model trained by neural networks, it effectively raises the RTK fixing rate and shortens convergence time in complex scenarios.

Boasting outstanding positioning performance, ME3RGR11 serves as an ideal option for industrial applications including smart ports, power systems, railways, high-precision navigation, autonomous driving, handheld terminals, precision agriculture, land area measurement and setting-out, as well as inspection operations.



1.2 Key Parameters

Indicators	Parameters	Value
Satellite Systems	Level	Industrial-grade
	Operating temperature	-40~85℃
	Storage temperature	-55~90℃
	Humidity	95%non-condensing
	Packaging	LGA
	Dimensions	16.0*12.2*2.5mm
	Number of serial ports	3

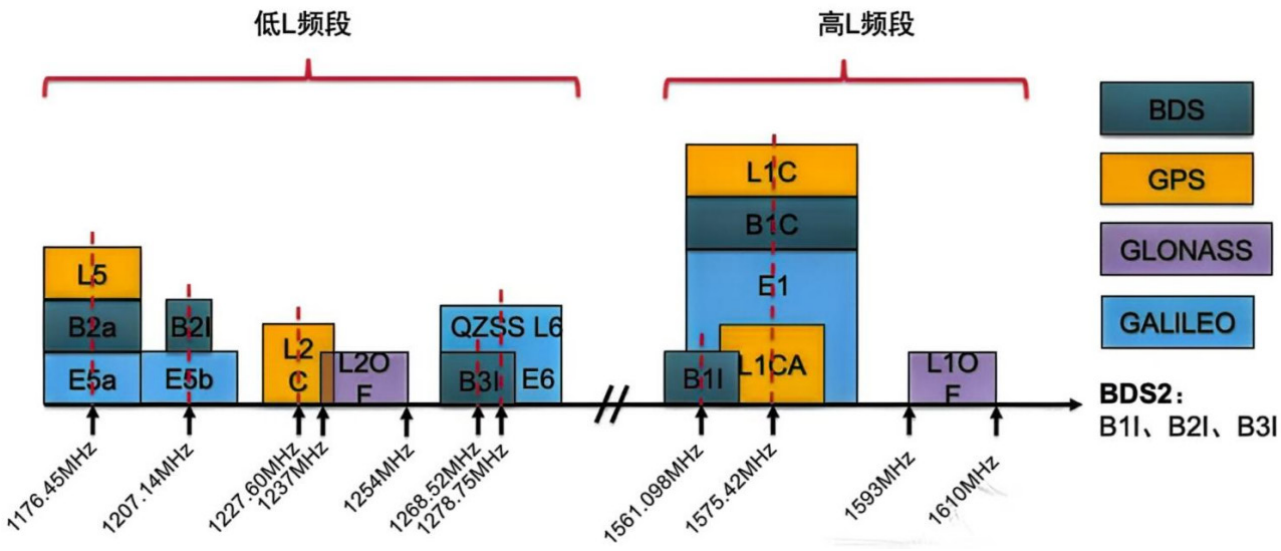
Indicators	Parameters	Value
Frequency	B1I/B1C/L1CA/E1/G1/QZL1	✔
	B2a/L5/E5a/NavIC/QZL5	✔
	B2I/B2b/E5b/L2/QZL2	✔
	G2/B3I	✔
	L-Band	✘
	E6 HAS/QZL6	✔
	PPP-B2b	✔
	SBAS L1CA	✔
GNSS	RTK positioning（10Hz）	✔
	Dual-antenna direction-finding（10Hz）	✘
	PVT single-point positioning（20Hz）	✔
	Original observation（20Hz）	✔
	Satellite-based correction data output	✔
Data Format	RTCM 3.3	Input/Output
	NMEA-0183	Versions 2.3 and 4.11
Number of Tracking Channels		1040
TTFF	Cold start	30s
	RTK initialization time	<5s
Pseudorange Observation Accuracy (1σ)		10cm
Carrier Phase Observation Accuracy（1 σ）		1mm
Horizontal Positioning Accuracy（1 σ）	PVT single-point positioning	1.5m
	DGPS differential positioning	0.4m
	RTK accuracy	1cm+1ppm
Elevation Positioning Accuracy（1 σ）	PVT single-point positioning	2.5m
	DGPS differential positioning	0.8m
	RTK accuracy	1.5cm+1ppm
Speed Measurement Accuracy（1 σ）		0.05m/s
Directional Accuracy（1 σ）		✘

Indicators	Parameters	Value
Time Service Accuracy (1 σ)		10ns
Maximum Data Refresh Rate	RTK	10Hz
	Dual-antenna direction-finding	✕
	PVT single-point positioning	20Hz
	Original metric	20Hz

2 TECHNICAL INFORMATION

2.1 Supporting Constellations

ME3RGR11 can simultaneously receive full-system multi-frequency (L1+L2+L5) satellite signals of GPS, BDS, GLONASS, GALILEO, IRNSS/NAVIC, QZSS and satellite augmentation system SBAS. The main GNSS frequencies are shown in the figure below.



System	L1/E1/E2/B1	L2/B2	L5/E5	L6/E6/E6/B3
GPS	1575.42	1227.6	1176.45	
BEIDOU	1561.098, 1575.42, 1589.742	1207.14	1176.45	1268.52
GLONASS	1598.063-1605.375	1242.938-1248.625		
GALILEO	1575.42		1176.45, 1207.14, 1191.795	1278.75
QZSS	1575.42	1227.6	1176.45	1278.75
SBAS	1575.42			
Omni STAR, CDGPS	1525 - 1560			

2.2 Satellite-based Augmentation System (SBAS)

ME3RGR11 supports reception of SBAS broadcast signals. These systems supplement GNSS data with regional or wide-area GPS augmentation data. The system broadcasts distance correction and integrity information via satellite, which GNSS receivers can utilize to enhance result accuracy. SBAS satellites can serve as additional satellites for ranging (navigation), thereby further improving availability. Supported SBAS types include: GAGAN, WAAS, EGNOS, and MSAS.

Typology	Satellite Navigation System	Operation and Maintenance Country/Region
Master Navigation System (GNSS)	GPS Beidou (BDS) GLONASS GALILEO	United States of America China Russia EU
local Navigation system	QZSS NAVIC/IRNSS	Japanese India
Star-based Wide Area Strengthening (SBAS)	WASS EGNOS MSAS GAGAN	United States of America EU Japanese India

2.3 Quasi-Zenith Satellite (QZSS)

The Quasi-Zenith Satellite System (QZSS) is a navigation satellite coverage system serving the Pacific region spanning Japan and Australia. This system transmits additional GPS L1C/A and L5 signals. The module can simultaneously receive and track these signals alongside GPS, thereby enhancing availability and maintaining positioning accuracy even under challenging signal conditions such as urban canyons.

2.4 Carrier Phase Technology - RTK

The module supports GPS, BeiDou, GLONASS, Galileo and QZSS multi-satellite systems, as well as L1+L2+L5 frequency points. Combined with RTK (carrier phase differential) technology, the ME3RGR11 can achieve centimeter-level positioning accuracy, which greatly improves the device's positioning accuracy while maintaining ultra-low power consumption. Differential positioning is a necessary condition for centimeter-level accuracy, and the application needs to ensure that the receiver receives stars well.

2.5 Satellite Augmentation - Differential DGNSS

The ME3RGR11 supports code differential functionality and D-GNSS, capable of receiving RTCM2.3 or user-defined pseudorange correction data. When operating as a rover, the ME3RGR11 will attempt to provide optimal positioning accuracy based on the received correction data. Upon receiving an RTCM message input stream, it will immediately enter differential mode. Once in D-GNSS mode, an improvement in positioning accuracy can be expected.
D-GNSS is a differential system in which mobile stations use reference data from a reference station. If the RTCM correction function is not available, it will operate as a stand-alone precision receiver for GNSS satellite-based or single-point positioning.

2.6 Crystal Oscillator

The ME3RGR11 utilizes a TCXO, enabling weak signal acquisition and achieving faster start-up and reacquisition times. The TCXO ensures the product remains stable and immune to frequency interference across its entire operating range (–40° to +85°C), making it a reliable positioning module.

2.7 Real-Time Clock (RTC)

The RTC is driven by a 32 kHz oscillator using an RTC crystal. If the main power supply voltage fails, certain sections of the receiver will shut down, but the RTC will continue to operate, providing a timing reference for the receiver. This operating mode is called "hardware backup mode," which enables all relevant data to be preserved in backup RAM for a subsequent warm start.

2.8 Power System

The ME3RGR11 module operates in two modes: Full Power Mode and Battery Backup Mode.
Full Power Mode: All power supplies are active, and the module functions normally, receiving and processing signals.
Battery Backup Mode: The module requires only a minimal current (approximately 20uA) to maintain the RTC clock and backup RAM. The module's built-in farad capacitor provides backup power for a limited duration.

2.9 Working Mode

The ME3RGR11 supports both rover and base station modes, which are configured via commands. In base station mode, the system supports autonomous optimisation to calculate the convergence of the base station coordinates.

3 ELECTRICAL SPECIFICATION

3.1 Absolute Maximum Rating

Notation	Parameters	Minimum Value	Maximum Value	Unit
VCC	Mains voltage	-0.5	3.63	V
VBAT	Backup power supply voltage	-0.5	3.63	V
VI-max	I/O Pin Input Voltage	-0.5	3.63	V
Vhbm	ESD Contact	-	2000	V
T-storage	Storage temperature	-40	+85	℃
T-solder	Reflow temperature	--	250	℃

Pressurizing the equipment beyond the "Absolute Maximum Rating" may cause permanent damage.
The above figures are pressure ratings only. Products are not overvoltage or reverse voltage protected. If necessary, voltage spikes exceeding the supply voltage specifications listed in the table above must be limited to the specified range using an appropriate protection diode.

3.2 DC Characteristics

Notation	Parameters	Minimum Value	Typical Value	Maximum Values	Unit (Of Measure)
VCC	Mains voltage	2.5	3.3	3.6	V
VBAT	Backup power supply voltage	2.5	3.3	3.6	V
ICC_{max}	Maximum operating current on VCC	--	3.3	45	mA
T_{env}	Operating Temperature	-40	--	85	°C

3.3 Power Wastage

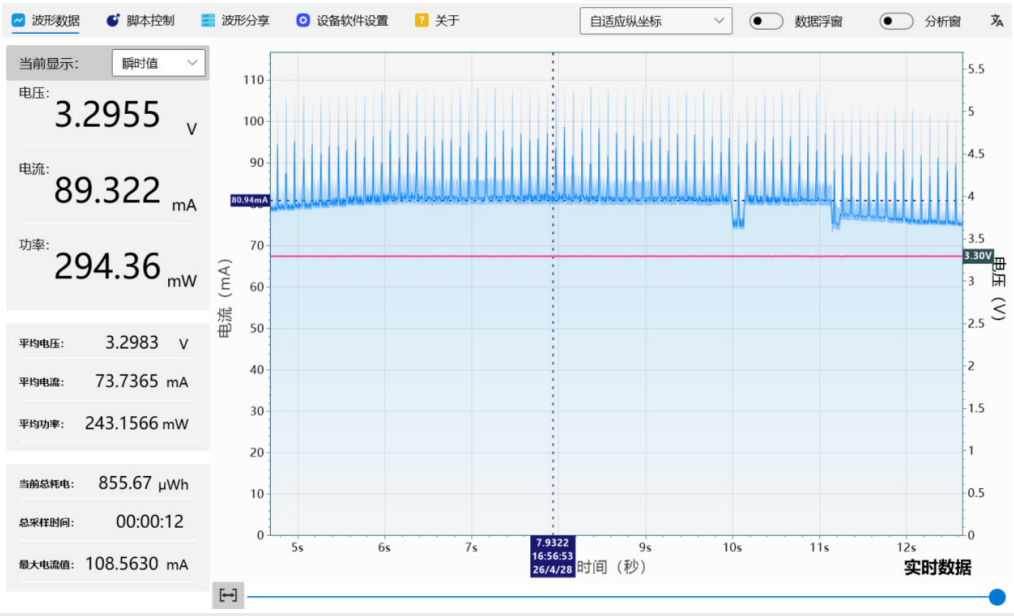
Notation	Parameters	Measurement Pins	Typical Value	Unit (of measure)
ICCRX1 [1]	capture phase	VCC [2]	75	mA
ICCRX2 [1]	tracking stage	VCC [2]	85	mA
ICCDBM	Dormant	VBAT[3]	20	uA

Remarks:
1. Under open sky, using GNSS, L1 + L5 bands, tracking 32 satellites, successful positioning is achieved.
2. Conditions: VCC=3.3V, room temperature, all pins suspended
3.Condition: VBAT = 3.3V, room temperature, all pins left floating

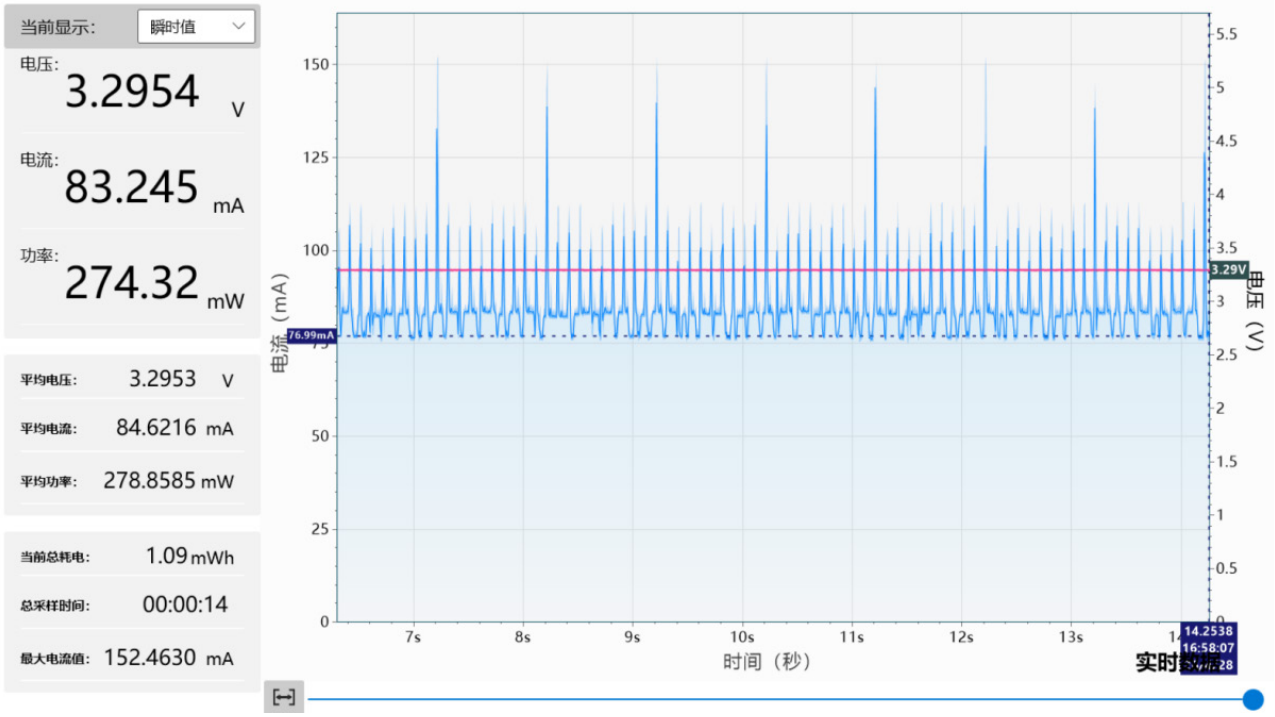
All of the above specifications are at 25°C ambient temperature. Extreme operating temperatures can seriously affect specification values. Applications operating near temperature limits may be affected.

The values in the table are for customer reference only and are intended as examples of typical power requirements. Values are characterized as samples and actual power requirements will vary depending on the firmware version used, external circuitry, number of satellites tracked, signal strength, type of activation as well as time, duration, and test conditions.

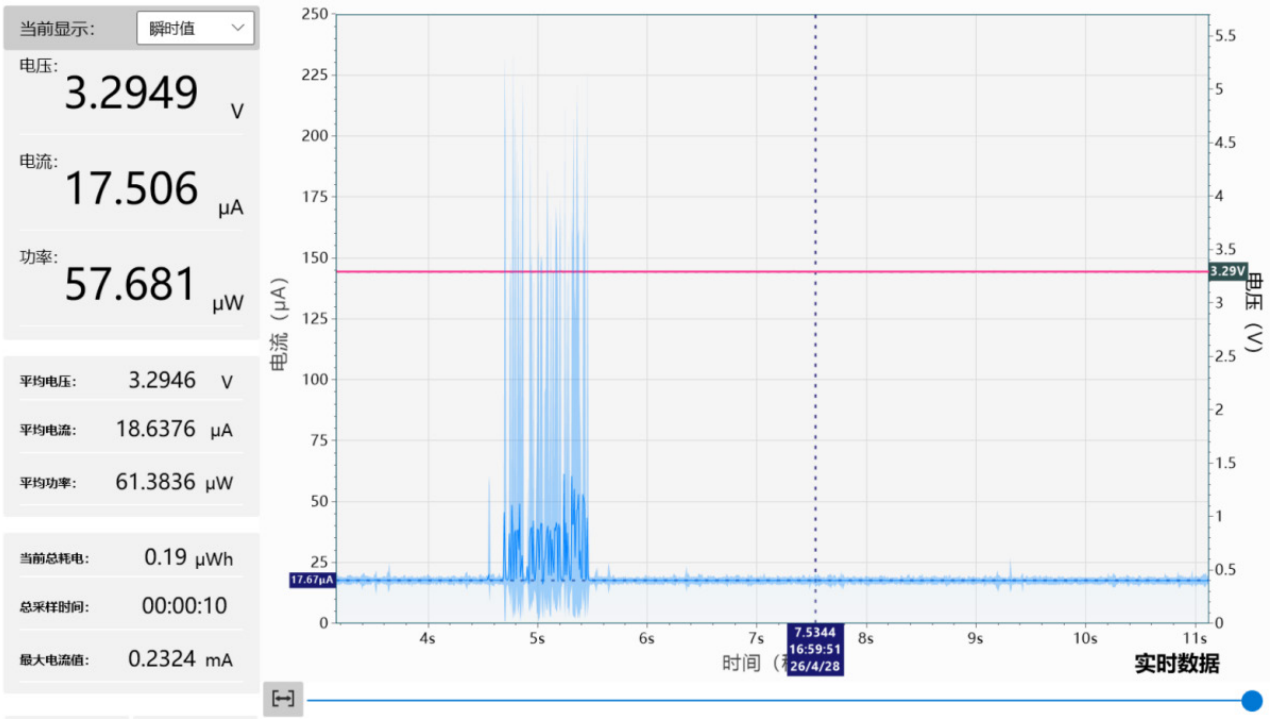
The measured values of the capture phase current are as follows:



The following shows the power consumption during the tracking phase:



The following are the power consumption figures for RTC mode:



3.4 Antenna Gain Requirements

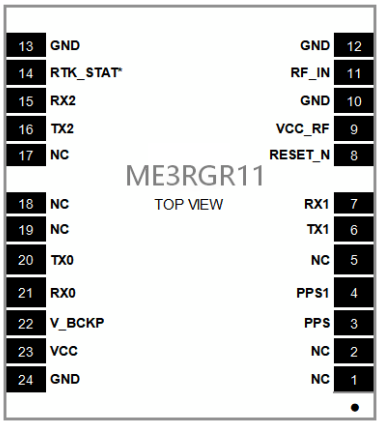
As the ME3RGR11 features a built-in LNA and supports passive GNSS antennas, care must be taken to control the gain of any external antenna. The ME3RGR11 can only demonstrate its superior positioning performance when connected to a GNSS antenna that supports all frequencies (L1, L2 and L5) and provides a strong satellite signal.

Notation	Parameters	Min	Max	Unit
RFgain	Input Gain	0	30	dB

4 PACKAGE DEFINITION

4.1 Module Pin Definitions

The ME3RGR11 utilises the industry-standard 16×12 mm, LGA-24-pin package, with an additional 55 ground and heat dissipation pads on the underside, ensuring excellent compatibility. The configuration is as follows:

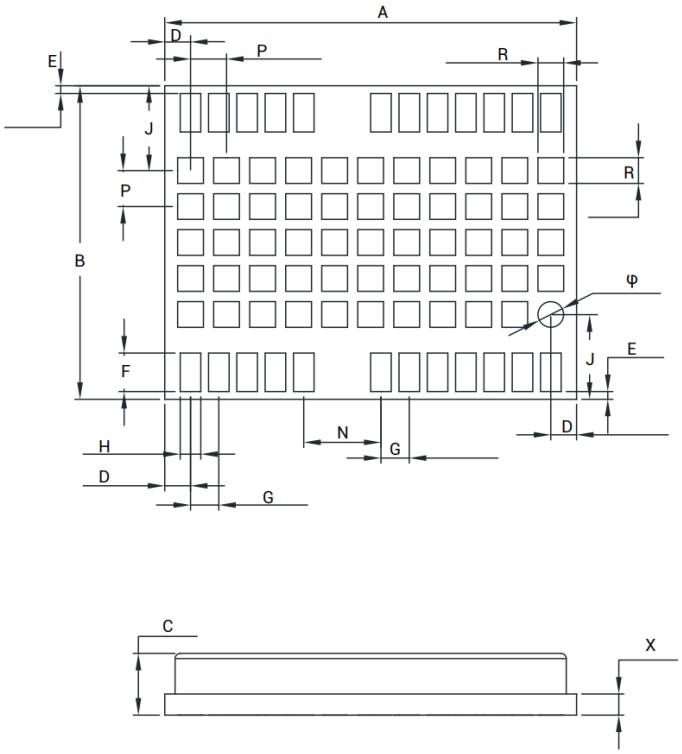


Serial Number	Pin Name	I/O	Description
1	NC		NC
2	NC		NC
3	PPS	O	second pulse
4	Reserved	I/O	Connected to GPIO14
5	NC		NC
6	TX1	O	Data transmission via Serial Port 1
7	RX1	I	Data reception on Serial Port 1
8	RESET_N	I	System reset, active low, s ignal duration not less than 5 ms
9	RF_VCC		External antenna power supply
10	GND		GND
11	RF_IN		GNSS antenna signal input
12	GND		GND
13	GND		GND
14	RTK_STAT*	O	Output high: RTK Fix; Output low: RTK No Fix; Feature under development
15	NC		
16	NC		
17	NC		NC

Serial Number	Pin Name	I/O	Description
18	NC		NC
19	NC		NC
20	TX0	O	Data transmission on Serial Port 0
21	RX0	I	Serial Port 0 Data Reception
22	V_BACKUP	I	When the module's main power supply is disconnected, V_BACKUP supplies power to the RTC and related registers. The required voltage range is 2.5 V to 3.6 V. At a standard temperature of 25 °C, the operating current of V_BACKUP is approximately 20 μA when the module's main power supply is disconnected. When the hot-start function is not in use, V_BACKUP must be connected to VCC; it must not be grounded or left floating.
23	VCC	I	Module main power supply
24	GND		GND

5 PACKAGE SPECIFICATION

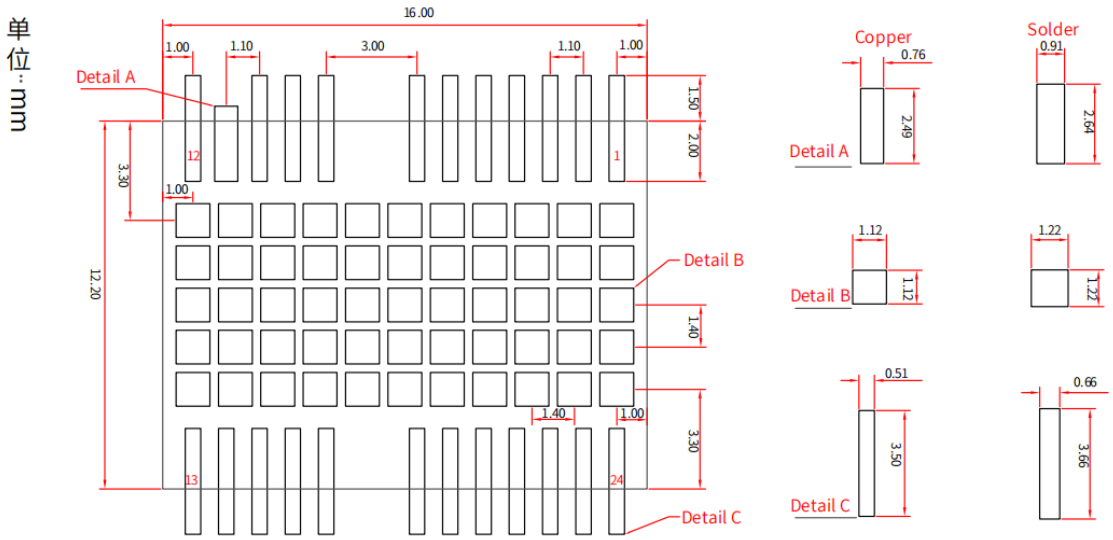
5.1 Sizes



5.2 Mechanical Dimensions

Serial Number	Minimum (mm)	Typical Values (mm)	Maximum Value (mm)
A	15.80	16.00	16.50
B	12.00	12.20	12.70
C	2.40	2.60	2.80
D	0.90	1.00	1.10
E	0.20	0.30	0.40
F	1.10	1.50	1.60
G	1.00	1.10	1.20
H	0.70	0.80	0.90
J	3.20	3.30	3.40
N	2.90	3.00	3.10
P	1.30	1.40	1.50
R	0.99	1.00	1.10
X	0.72	0.82	0.92
φ	0.99	1.00	1.10

5.3 Recommendations for PCB Assembly

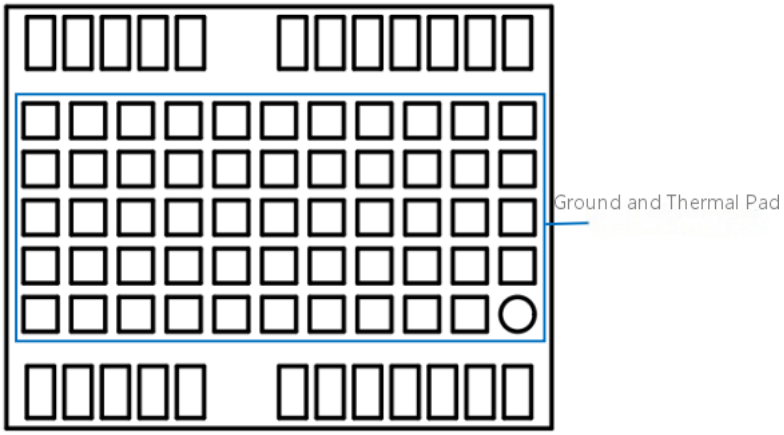


To facilitate testing, the pads for functional pins have been designed to be longer and may extend beyond the module outline. For example:

The pad shown in detail C extends 1.50 mm beyond the module outline;

The pad shown in detail A extends 0.49 mm beyond the module outline; As these pads are RF pins, it is desirable to keep the traces on the top layer as short as possible to minimise the impact of external interference on the RF signal; therefore, they have been designed to be slightly shorter. To effectively reduce the likelihood of solder bridging, the functional pin pads have been designed to be narrower than the module pins. However, as the pads described in detail A are RF pins, it is desirable to maintain continuity of impedance as much as possible; consequently, their width remains consistent with that of the module pins.

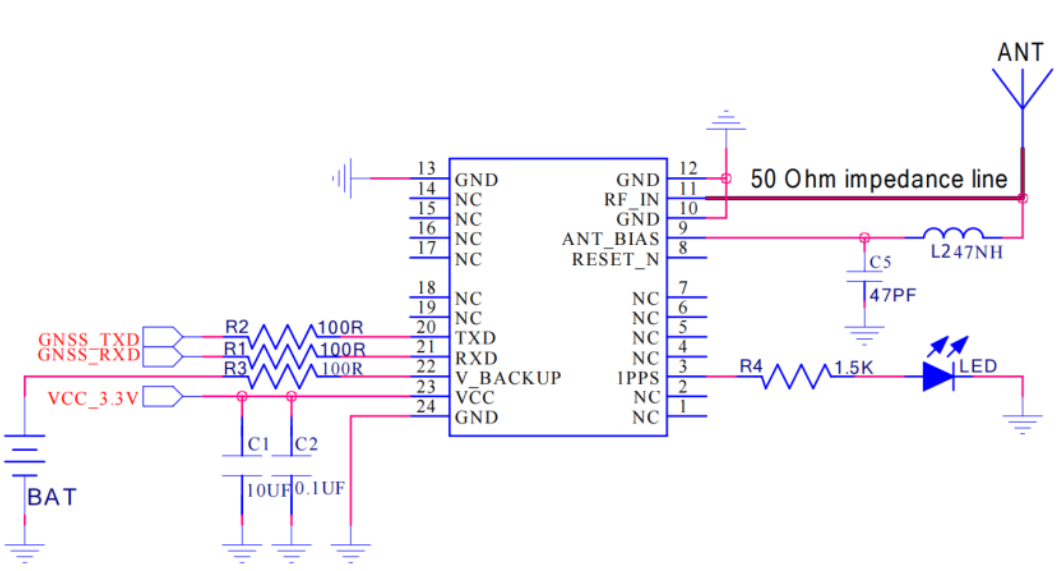
The 55 matrix-shaped pads in the centre of the ME3RGR11 module are used for heat dissipation and grounding. During PCB design, it is recommended that these be connected to a large ground plane to enhance the module's heat dissipation, As shown in the figure below.



6 REFERENCE DESIGN

6.1 Schematic Design

The reference design for ME3RGR11 is shown in the figure below. When connecting an active antenna, ensure the 47nH inductor at position L2 is in surface-mount configuration to power the active antenna. The characteristic impedance from the RF_IN pin to the antenna interface is 50Ω. Antenna performance is critical to system functionality; strictly adhere to the technical specifications for dual-band high-precision antennas. Pin 22 can be connected to the V_BACKUP backup power supply to support hardware hot-start capability.



6.2 Layout Notes

(1) Decoupling capacitors are placed close to the module power supply pins, and it is ensured that the power supply alignment width is more than 0.5mm;
(2) No wires are allowed to be routed at the bottom of the module patch;
(3) The RF alignment between the RF port of the module and the antenna interface should be 0.2mm~0.3mm, and the coplanar waveguide impedance model should be adopted, and the spacing between the alignment and the ground copper skin should be controlled to be about 1 times the spacing, and the impedance should be guaranteed to be 50Ω;
(4) The alignment from the module RF port to the antenna connector references Layer 2 ground and ensures that the Layer 2 ground plane is relatively complete;
(5) Modules should not be placed near sources of interference, such as communication module antennas, RF alignments, crystal oscillators, large inductors, and high-frequency digital signal lines.

6.3 Power Supply

The ME3RGR11 Positioning Module is equipped with two power supply pins: VCC and V_BCKP. Primary power is fed to the module through the VCC pin, and alternate power is fed to the module through the V_BCKP pin. To ensure the positioning performance of the module, the ripple of the module power supply should be controlled as much as possible. It is recommended to use an LDO supply with a maximum output current greater than 100mA. If the module's main power supply is disconnected, the system will provide power to the RTC and the Battery Backup RAM (BBR) through V_BCKP.
Therefore, even if the main power supply is disconnected, the ephemeris data can still be retained with the backup power supply and can be used for a hot or warm start when the system is powered up again. If no backup power supply is connected and no data is received by the module, then the system will perform a cold start when it is powered up again. Note: If there is no backup power available, connect the V_BCKP pin to the VCC mains or leave it blank.

6.4 Antenna

The ME3RGR11 incorporates a low-noise-figure LNA and SAW filter. It is recommended to use an active antenna with a gain less than 25dB and a noise figure below 1.5dB. The module supplies power to the external active antenna via RF_IN. If the active antenna cable is long, an active antenna with at least 15dB gain is required to compensate for line loss. To maintain ground integrity, routing traces beneath the module is not recommended and should be minimized.

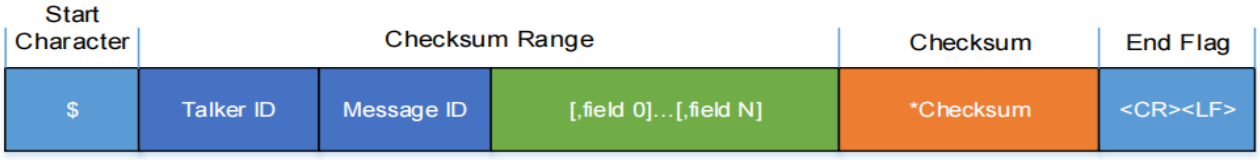
6.5 Serial Port Communication

The module Provides one way TTL level universal asynchronous transceiver (UART), the data format is: 1 bit start bit, 8 bit data bit, 1 bit stop bit, no parity bit, the default baud rate is 115200bps. after the module is normally powered on, the serial port will automatically send NMEA data. The host computer can set the working mode and baud rate of the module through the serial port. When this module is used in some specific application scenarios, the main power of the module may be turned off for power saving strategy to further reduce the power consumption.
In this case, in order to avoid the high level of the serial port affecting the normal operation of the module, it is strongly recommended to disconnect the serial port connection at the same time when disconnecting the main power supply, or set the serial port to the state of input state + pull-down resistor or high resistance state + pull-down resistor.

7 SOFTWARE PROTOCOL

7.1 NEMA0183 Protocols

The NMEA protocol is an ASCII based protocol where the record starts with $ and ends with a carriage return/line feed character, and the checksum of the NMEA message can be used to detect corrupted data transmission. The frame structure is as follows:



The NEMA message output for the ME3RGR11 is shown in the following table:

NMEA Record	Description	Default
GNGGA	Global positioning system fixed data	Y
GNGLL	Geographic position—latitude/longitude	N
GNGSA	GNSS DOP and active satellites	Y
GPGSV	GNSS satellites in view for GPS	Y
GLGSV	GNSS satellites in view for GLONASS	Y
BDGSV	GNSS satellites in view for BD	Y
GAGSV	GNSS satellites in view for GALILEO	Y
GQGSV	GNSS satellites in view for QZSS	Y
GNRMC	Recommended minimum specific GNSS data	Y
GNVTG	Course over ground and ground speed	N
GNZDA	Date and Time	N
GNGST	Position error statistics	N

7.2 Sample Data

Serial port data within 1 second after positioning example:

$GNRMC,104500.000,A,2243.11336685,N,11401.10826833,E,0.003,46.363,060526,,E,D,8*1E
$GNGGA,104500.000,2243.11336685,N,11401.10826833,E,4,45,0.427,116.513,M,-3.480,M,18.0,0000*49
$GNGSA,A,3,05,12,15,18,20,21,23,24,29,,,,0.858,0.427,0.744,1*34
$GNGSA,A,3,01,02,03,04,06,07,08,09,10,14,19,21,0.858,0.427,0.744,4*3C
$GNGSA,A,3,22,34,35,36,39,,,,,,,0.858,0.427,0.744,4*39
$GNGSA,A,3,69,70,71,79,80,83,84,85,,,,0.858,0.427,0.744,2*33
$GNGSA,A,3,04,05,06,09,10,11,12,36,,,,0.858,0.427,0.744,3*39
$GNGSA,A,3,02,03,07,,,,,,,,,0.858,0.427,0.744,5*30
$GPGSV,3,1,11,05,30,077,44,10,01,296,31,12,02,161,36,13,,,36,1*5A
$GPGSV,3,2,11,15,50,013,47,18,56,318,45,20,30,034,43,21,08,091,38,1*6D
$GPGSV,3,3,11,23,26,318,41,24,65,145,47,29,26,217,41,1*56

$GPGSV,2,1,08,05,30,077,42,10,01,296,28,12,02,161,34,15,50,013,44,6*6C
$GPGSV,2,2,08,18,56,318,47,23,26,318,42,24,65,145,47,29,26,217,38,6*67
$GPGSV,1,1,04,10,01,296,33,18,56,318,49,23,26,318,43,24,65,145,50,8*61
$GBGSV,5,1,17,01,50,128,48,02,45,243,45,03,65,190,48,04,34,106,48,1*7C
$GBGSV,5,2,17,06,49,012,48,07,48,159,48,08,26,192,42,09,42,338,44,1*7E
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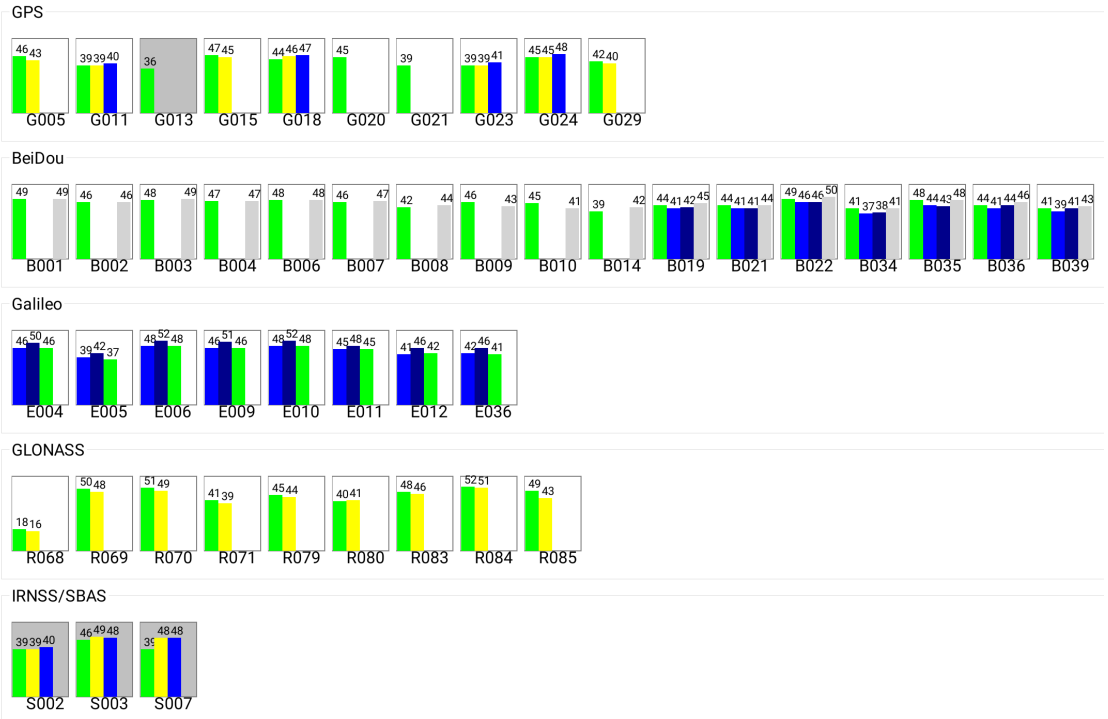
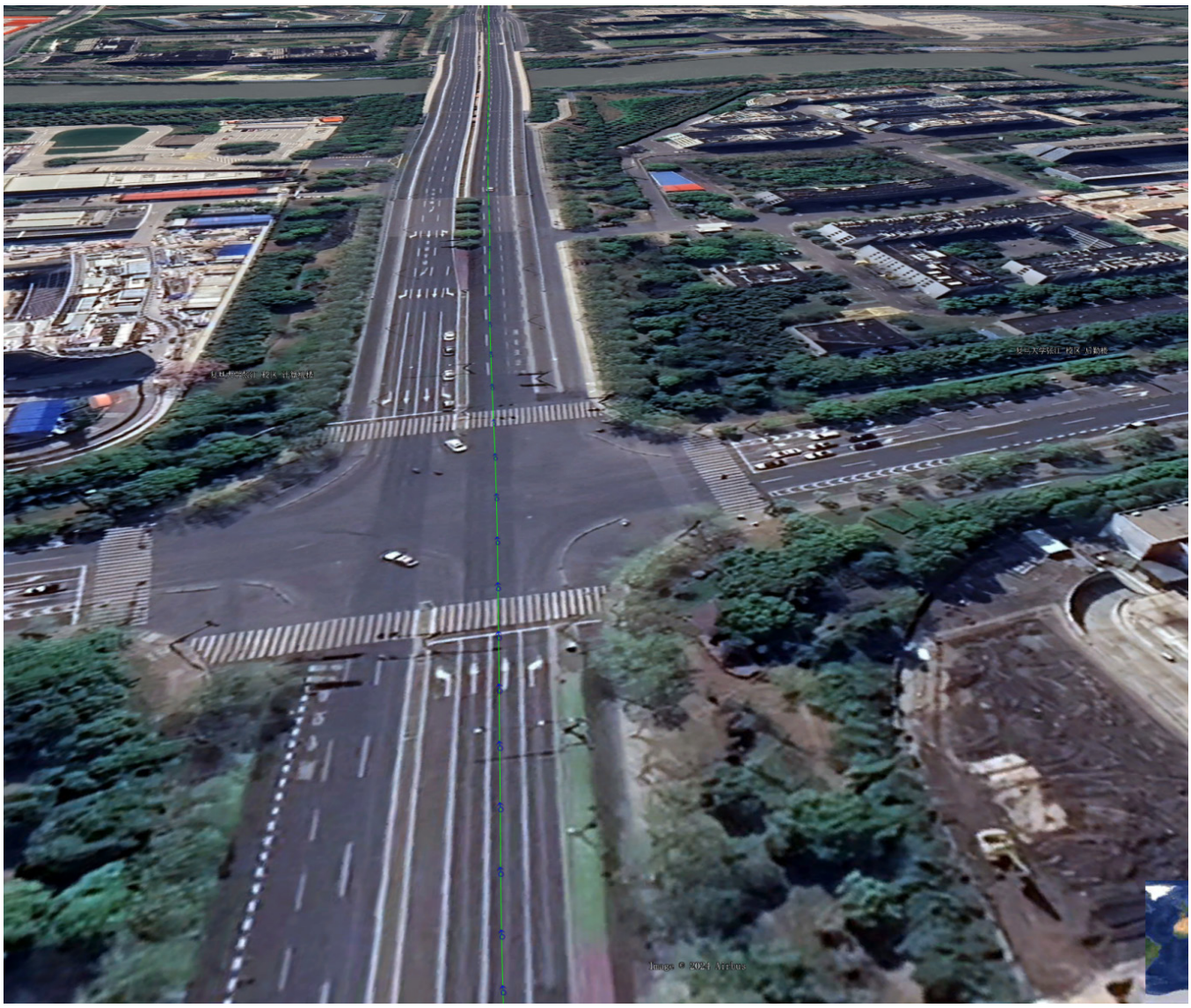
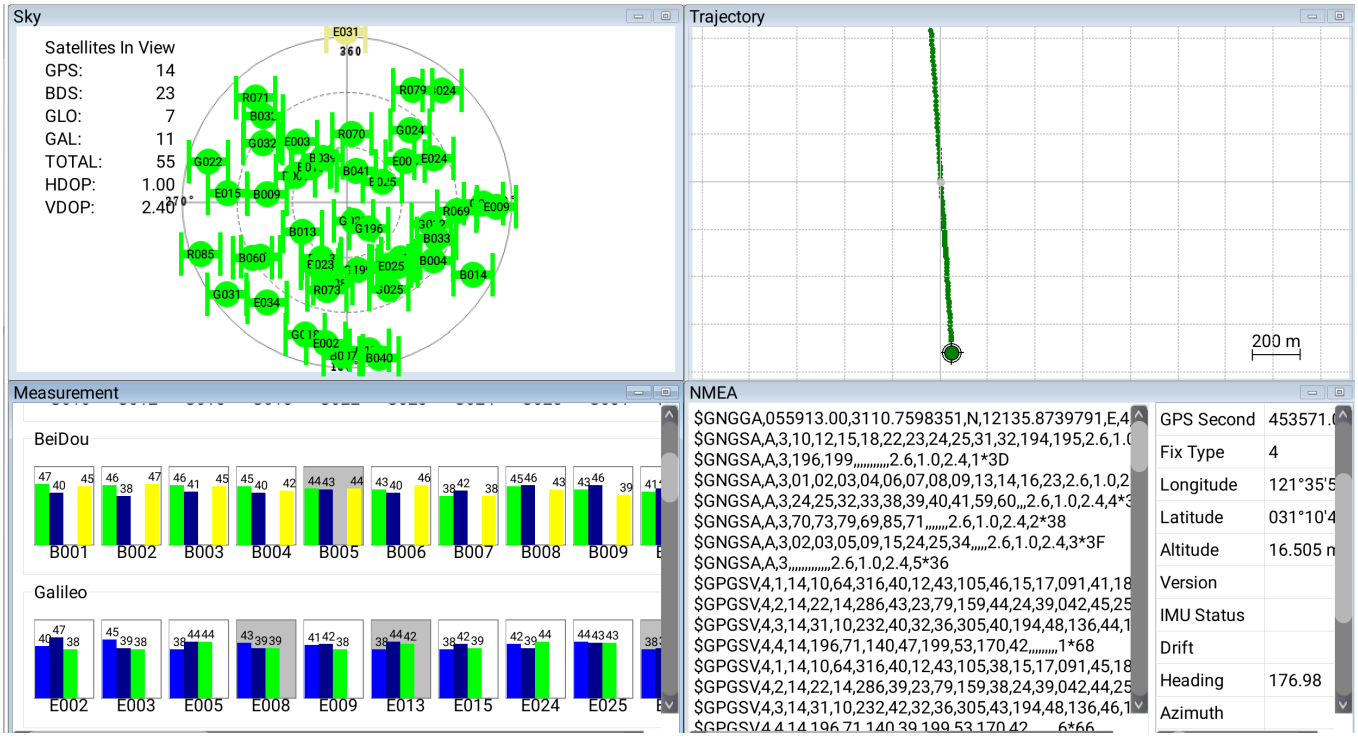
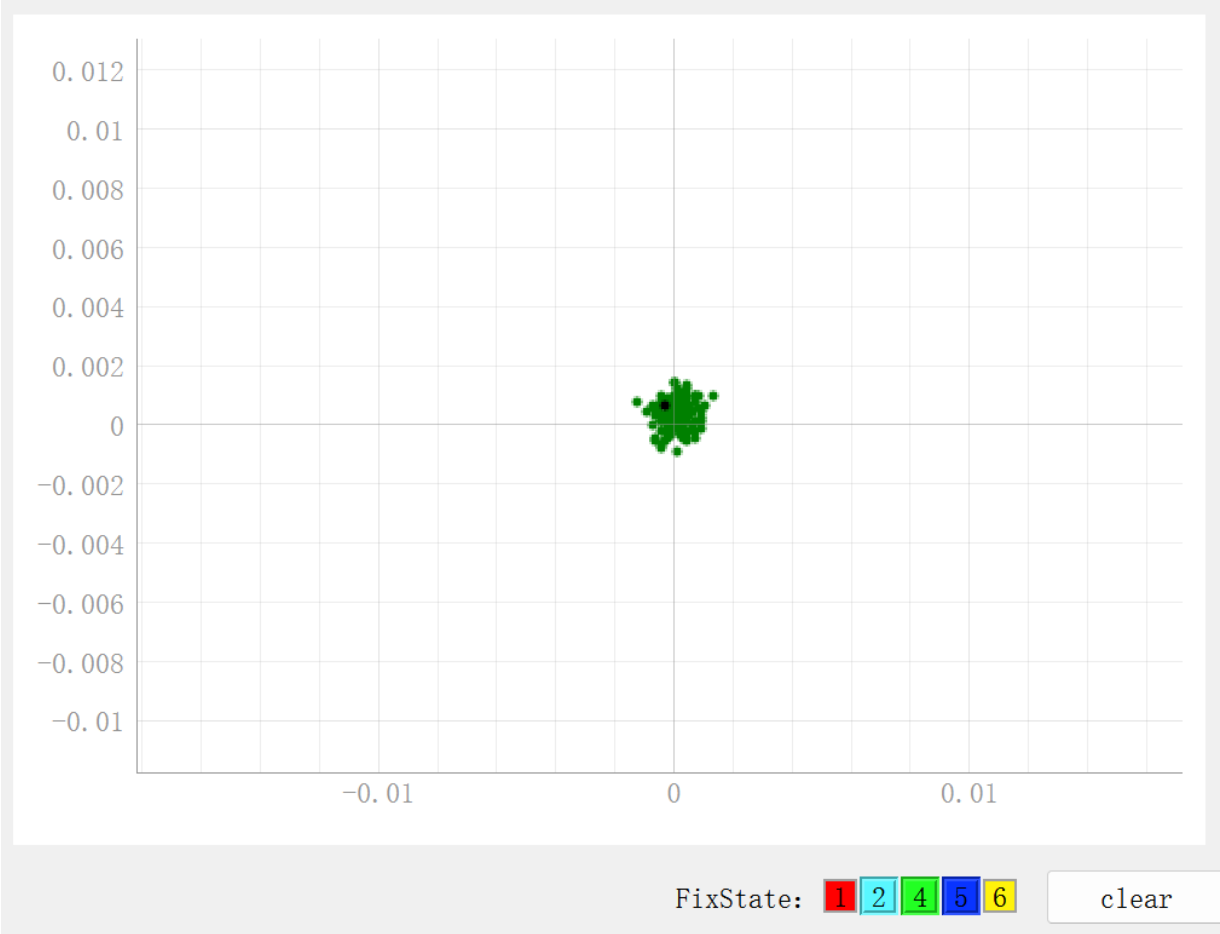
$GLGSV,2,2,08,80,14,131,46,83,18,165,46,84,68,204,52,85,49,315,52,1*7D
$GLGSV,2,1,08,69,26,022,47,70,42,320,49,71,11,262,42,79,16,078,46,3*76
$GLGSV,2,2,08,80,14,131,44,83,18,165,43,84,68,204,51,85,49,315,47,3*7F
$GAGSV,2,1,08,04,39,030,45,05,26,238,39,06,63,007,47,09,70,294,47,7*73
$GAGSV,2,2,08,10,54,130,47,11,81,080,44,12,30,135,38,36,39,327,44,7*7E
$GAGSV,2,1,08,04,39,030,46,05,26,238,40,06,63,007,48,09,70,294,47,1*77
$GAGSV,2,2,08,10,54,130,48,11,81,080,44,12,30,135,41,36,39,327,45,1*78
$GAGSV,2,1,08,04,39,030,50,05,26,238,44,06,63,007,51,09,70,294,51,2*78
$GAGSV,2,2,08,10,54,130,51,11,81,080,49,12,30,135,45,36,39,327,48,2*77
$GQGSV,1,1,03,02,13,154,39,03,60,131,46,07,59,149,40,1*5B
$GQGSV,1,1,03,02,13,154,39,03,60,131,49,07,59,149,48,6*5B
$GQGSV,1,1,03,02,13,154,41,03,60,131,48,07,59,149,49,8*5A

7.3 Example of an Actual Star Search









7.4 Common Commands

CMD TYPE	CMD Example:
Cold start	$KMDRST,h3F
Baud rate 115200	$KMDUART,COM0,115200
Baud rate 460800	$KMDUART,COM0,460800
Disable GSV output	$KMDMSG,COM0,GSV,0
Disable GSA output	$KMDMSG,COM0,GSA,0
Operating mode: Mobile station	$KMDMODE,rover
Base station operating mode	$KMDMODE,base
Save layout	$KMDSAVE

Notes:
1. All text formatting control commands must be followed by a carriage return (CR) and a line feed (LF);
2. As the ME3RGR11 has built-in Flash memory, data configurations will remain in effect after a power failure, but must be saved before the power is turned off;
3. High refresh rates may require a higher baud rate, such as 115200 or higher, to prevent serial data congestion;
4. The serial port configurations in the examples above all refer to the current serial port.

8 PACKAGING AND PROTECTION

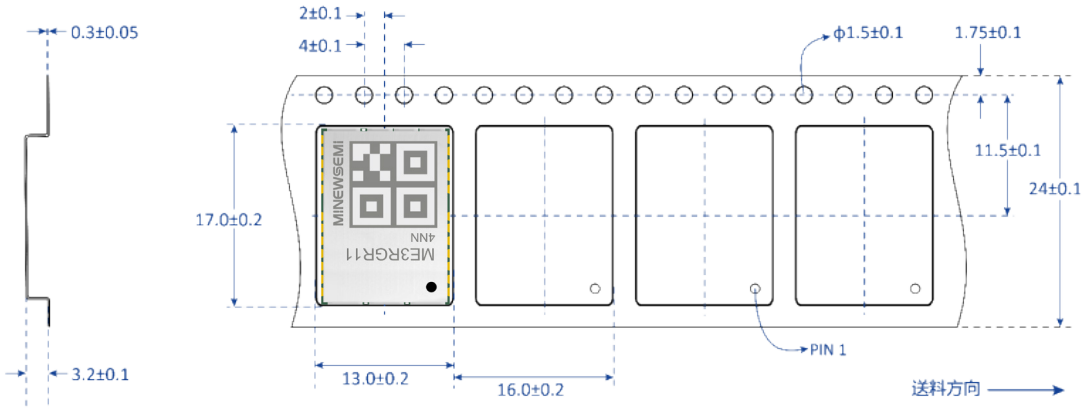
8.1 Wrap

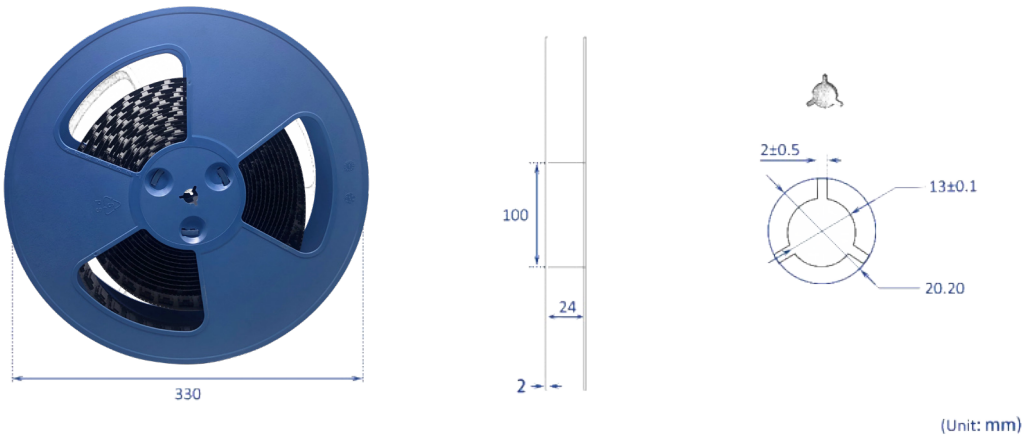
The ME3RGR11 is sensitive to both humidity and static electricity. During packaging and transportation, strictly adhere to relevant handling requirements and implement appropriate preventive measures to minimize product damage. The table below outlines the standard packaging structure for product shipment.

Offerings	Reels	Sealed Bags	Shipping Cartons
			
ME3RGR11	500pcs/roll	1 roll/bag	1 bag/box, 3 boxes/ctn

8.2 Carrier belts and trays

The ME3RGR11 is supplied on a reel (consisting of a tape and reel) and packaged in a ziplock bag with an anti-static effect to meet the customer's needs for efficient production, batch mounting and dismounting. The picture below shows the dimensional details of the reel tape.





8.3 Stockpile

In order to prevent the product from moisture and electrostatic discharge, the sealed bag of the product is equipped with desiccant and humidity indicator card, which allows the user to know the humidity condition of the environment in which the product is located. The product has a moisture sensitivity rating of MSL3.

8.4 ESD protection

The GNSS positioning module contains highly sensitive electronics and is an electrostatic sensitive device (ESD). Please note the following precautions, as failure to follow these precautions may result in serious damage to the module!

Ground yourself before patching the antenna. Do not touch any charged capacitors and other devices (e.g., antenna patch ~10 pF; coaxial cable ~50 -80 pF/m; soldering iron) when bringing out the RF pin;

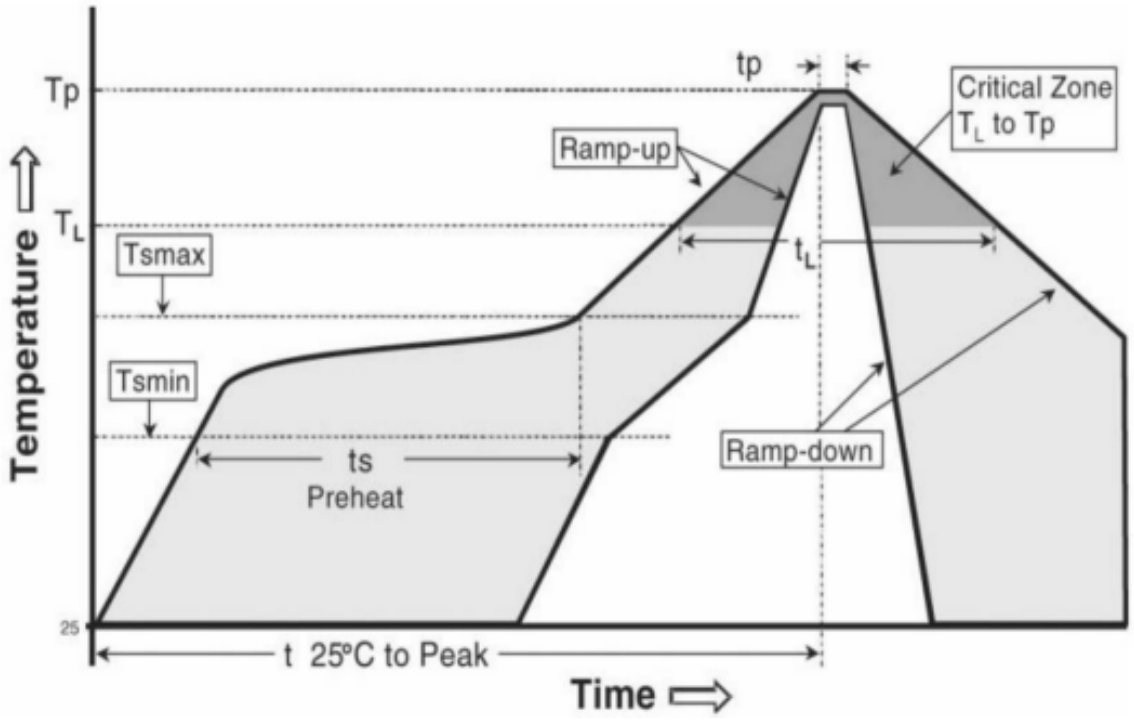
To prevent electrostatic discharge, do not expose the antenna area; if exposed by design, take appropriate ESD precautions and do not touch any exposed antenna area;

Be sure to use an ESD safe soldering iron when soldering RF connectors and antenna patches.

Add ESD diode to RF input to prevent ESD; add ESD diode to UART interface

8.5 Production requirements

The recommended welding temperature profile is shown below:



Temperature Curve	Lead-Free Process
Average rate of temperature increase (TL to TP)	3℃/s (max)
Minimum temperature during the preheating stage (Tsmin)	150℃
Maximum temperature during the preheating stage (Tsmax)	200℃
Preheating time (Tsmin to Tsmax.) (ts)	60~80s
Tsmax to TL Rate of heating	3℃/s (max)
Time taken to reach peak temperature from 25°C	8 min (max)
TL Temperature	217℃
Duration at temperatures above TL（tL）	60~150s
peak temperature (TP)	250 (±0/-5)℃
The duration during which the actual peak temperature remained within 5°C（tp）	20~40s
cooling rate	6℃/s (max)

To prevent module detachment during soldering, avoid designing modules for soldering on the back side of the board and preferably avoid subjecting them to two soldering cycles. If "back-side soldering with modules facing down during reflow" is unavoidable due to process requirements, the use of fixtures is recommended.
Soldering temperature settings depend on various factors at the manufacturing facility, such as the nature of the motherboard, solder paste type, and solder paste thickness. Please also refer to relevant IPC standards and solder paste specifications.
Since leaded soldering temperatures are relatively lower, prioritize other components on the board if this method is used. Stencil aperture patterns must meet the customer's product design requirements and inspection specifications. A stencil thickness of 0.15mm is recommended.

9 ORDERING INFORMATION

9.1 Order Part Number

Ordering Model	Pseudolaric acid	Default Baud Rate	Default Satellite Reception Frequency	Physical Interface
ME3RGR11	GNSS Module	115200	BDS（B1I+B2I+B3I+BIC+B2a）+GPS（L1C/A+L2C+L5）+GLONASS（G1+G2）+Galileo（E1+E5a+E5b）+QZSS（L1C/A+L2C+L5）	16*12, LGA

10 STORAGE CONDITIONS

- **Please use this product within 6 months after signing up for it.**
  - This product should be stored without opening the package at an ambient temperature of 5~35°C and a humidity of 20~70%RH.
  - This product will be stored for more than 6 months after receipt. They must be confirmed before use.
  - Products must be stored in non-corrosive gases (Cl2, NH3, SO2, NOx, etc.).
  - To avoid damage to the packaging materials, no excessive mechanical impact shall be applied, including but not limited to sharp objects adhering to the packaging materials and products falling.

- **This product is suitable for MSL3 (based on JEDEC standard J-STD-020).**
  - After opening the package, the product must be stored under conditions of ≤30°C/<60%RH. It is recommended to use it within 168 hours after opening the package.
  - When the color of the indicator in the package changes, the product should be baked before welding.

- **When exposed to (≥168h@30℃/60%RH) conditions, the recommended baking conditions:**
  1. 120 +5/-5℃, 8 hours, 1 time
  Products must be baked individually on heat-resistant trays because the materials (base tape, roll tape and cover tape) are not heat-resistant and the packaging materials may deform when the temperature is 120°C;
  2. 90℃ +8/-0℃, 24 hours, once
  The base tape can be baked together with the product at this temperature, Please pay attention to even heating.

11 HANDLING CONDITIONS

- Be careful in handling or transporting products because excessive stress or mechanical shock may break products.
- Handle with care if products may have cracks or damages on their terminals. If there is any such damage, the characteristics of products may change. Do not touch products with bare hands that may result in poor solder ability and destroy by static electrical charge.

12 QUALITY

Cognizant of our commitment to quality, we operate our own factory equipped with state-of-the-art production facilities and a meticulous quality management system. We hold certifications for ISO9001, ISO14001, ISO27001, OHSA18001, BSCI.

Every product undergoes stringent testing, including transmit power, sensitivity, power consumption, stability, and aging tests. Our fully automated module production line is now in full operation, boasting a production capacity in the millions, capable of meeting high-volume production demands.

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14 RELATED DOCUMENTS

- MinewSemi_Product_Naming_Reference_Manual
  https://en.minewsemi.com/file/MinewSemi_Product_Naming_Reference_Manual_EN.pdf
- MinewSemi_Connectivity_Module_Catalogue
  https://en.minewsemi.com/file/MinewSemi_Connectivity_Module_Catalogue_EN.pdf

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