



Positioning Leadership

Product Guide

Look into NovAtel's Precise Positioning Engines and Enclosures

See why NovAtel's extensive product line, including L1 and L1/L2 positioning engines and enclosures, is on the leading edge of positioning technology development. Whatever your requirements NovAtel delivers, from meter- to centimeter-level positioning.



UPDATED



OEM4-G2L

NovAtel's OEM4-G2L is a compact, high performance GPS engine, measuring just 60 millimeters by 100 millimeters. It features NovAtel's latest in precise positioning technology, including Pulse Aperture Correlator (PAC™) and an Application Programming Interface (API) option.

Features

- Two serial ports that support speeds up to 921,600 and 230,400 bits per second
- USB for high-speed communication
- Low power consumption
- Auxiliary strobe signals, including a configurable PPS output and event mark inputs

Hardware Specifications

Size	60 x 100 x 16 mm
Weight	56 g
Input Voltage	+3.3 VDC
Power Consumption	1.6 W (typical)

Communication Ports

- 1 RS-232 serial port capable of 921,600 bps
- 1 LV-TTL serial port capable of 230,400 bps
- 1 USB port capable of 5 Mbps

Connectors

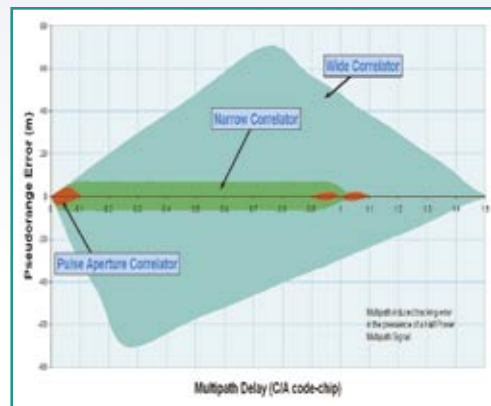
Main	24-pin dual-row male header
Antenna	MMCX female
External Oscillator	MMCX female

OEM4-G2L and OEM4-G2 Common Features

Features

- Software fully compatible with existing OEM4 family receivers
- Multiple software models, including L1 or L1/L2
- Support for SBAS corrections (WAAS, EGNOS, MSAS)
- Field-upgradeable firmware
- USB communications
- External oscillator input
- Two event mark inputs with polarity control
- Tracking enhancements such as faster L2 reacquisition
- 24-channel “all-in-view” parallel tracking
- Patented Pulse Aperture Correlator (PAC™) technology*
- RT-2® corrections for centimeter-level accuracy
- 20 Hz position and raw data output rates

* NovAtel's PAC virtually eliminates pseudorange error.



Performance¹

Position Accuracy	
Single Point L1	1.8 m CEP
Single Point L1/L2	1.5 m CEP
WAAS L1	1.2 m CEP
WAAS L1/L2	0.8 m CEP
DGPS (L1, C/A)	0.45 m CEP
RT-20 ²	< 20 cm CEP
RT-2	1 cm + 1 ppm

Measurement Precision	
L1 C/A Code	6 cm RMS
L2 P(Y) Code	25 cm RMS (AS on)
L1 Carrier Phase	0.75 mm RMS (differential channel)
L2 Carrier Phase	2 mm RMS (differential channel)

Data Rates	
Measurements	20 Hz
Position	20 Hz

Time to First Fix	
Cold Start ³	50 s
Warm Start ⁴	40 s
Hot Start ⁵	30 s

Signal Reacquisition	
L1	0.5 s (typical)
L2	1.0 s (typical)

Time Accuracy ⁶	20 ns RMS
----------------------------	-----------

Velocity Accuracy	0.03 m/s RMS
-------------------	--------------

Dynamics	
Velocity ⁷	514 m/s
Vibration	4 g (sustained tracking)

Hardware Specifications

Operating Temperature	-40°C to +85°C
Storage Temperature	-45°C to +95°C
Humidity	95% non-condensing



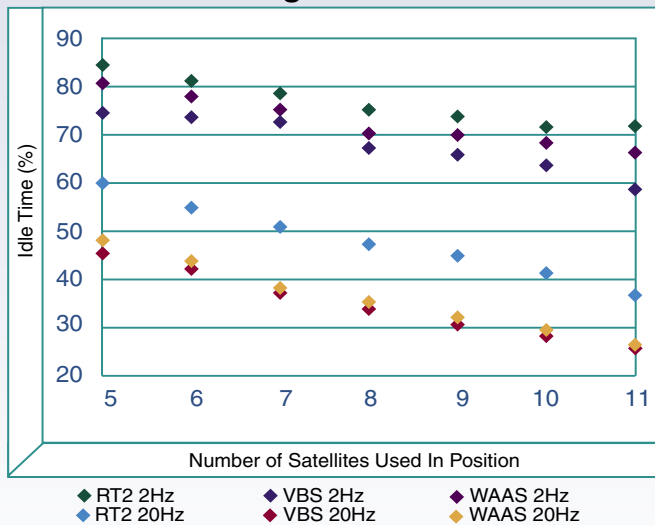
API Features

- Enables the development of specialized C/C++ applications
- Virtual port interface to the GPS receiver
- Interface with external devices
- Multiple tasks, with varying priority levels
- Message queuing functionality
- Control many of the receiver's GPIO lines
- SoftLoad interface and field upgradeable

API Benefits

- With a three year run rate of 660 boards, NovAtel's API should deliver a 24% cost reduction
- Faster time to market without additional hardware development
- Faster return on investment
- Ability to focus on application development instead of hardware development

Average Idle Times



SW: - 2.110

Frequency: - Refers to bestposa log logging rate

RT-2: - model RT2
 - rtaobs ontime 1
 - rcaref ontime 10
 - number of satellites tracked equals number of satellites used in position

VBS: - model RT2WLBA
 - number of satellites tracked equals number of satellites used in position + 2 (2 WAAS)
 - ecutoff 5

WAAS: - model RT2W
 - number of satellites tracked equals number of satellites used in position + 2 (2 WAAS)
 - ecutoff 5

OEM4-G2

NovAtel's OEM4-G2 is a high performance GPS engine with all of the features of the OEM4-G2L plus enhanced functionality. It features PAC technology, an API option, as well as a USB port and three serial ports. It also provides a noticeable reduction in power consumption over the original OEM4 receiver.

Features

- Serial port user-configurable for RS-232 or RS-422 operation
- Wide input voltage range
- Auxiliary strobe signals, including a configurable PPS output and event mark inputs

Hardware Specifications

Size 85 x 125 x 17 mm

Weight 80 g

Input Voltage +4.5 to +18 VDC

Power Consumption 2.3 W (typical)

Communication Ports

- 1 RS-232 or RS-422 (user-configurable) serial port capable of 921,600 bps
- 1 RS-232 serial port capable of 230,400 bps
- 1 LV-TTL serial port capable of 230,400 bps
- 1 USB port capable of 5 Mbps

Connectors

Main 40-pin dual-row male header

Antenna MMCX female

External Oscillator MMCX female



ProPak-G2plus

Features

- Three high speed serial ports and USB capability
- RS-232 or RS-422 interface
- Waterproof to IEC 60529 IPX7
- Can be used as a base station or a rover
- Supports peripheral devices, including an inertial measurement unit (IMU) or radio
- External oscillator input, configurable event mark inputs, and PPS output

Hardware Specifications

Size	185 x 154 x 71 mm
Weight	1.0 kg
Input Voltage ⁸	+9 to +18 VDC
Power Consumption	2.5 W (typical)
Communication Ports	<ul style="list-style-type: none"> • 2 RS-232 or RS-422 serial ports capable of 230,400 bps • 1 RS-232 serial port capable of 230,400 bps • 1 USB port capable of 5 Mbps
Connectors	
Power	4-pin LEMO
Antenna Input	TNC female
External Oscillator	BNC female
COM1	DB-9 male
COM2	DB-9 male
AUX (COM3)	DB-9 male
I/O	DB-9 female
Operating Temperature	-40°C to +75°C
Storage Temperature	-45°C to +95°C
Humidity	95% non-condensing
Waterproof	IEC 60529 IPX7
Regulatory	FCC Class B, CE



FlexPak

Features

- Available with the dual-frequency OEM4-G2L or the L1-only SUPERSTAR II GPS engine
- Shock and dust resistant and waterproof to IEC 60529 IPX7

Hardware Specifications⁹

Size	45 x 147 x 123 mm
Weight	
FlexPak-G2L	350 g
FlexPak-SSII	307 g
Input Voltage	+6 to +18 VDC
Power Consumption	
FlexPak-G2L	2.6 W (typical)
FlexPak-SSII	0.9 W (typical)
Communication Ports	
FlexPak-G2L	<ul style="list-style-type: none"> • 1 RS-232 serial port capable of 921,600 bps • 1 RS-232 or RS-422 (user-configurable) serial port capable of 230,400 bps • 1 USB port capable of 5 Mbps
FlexPak-SSII	<ul style="list-style-type: none"> • 1 RS-232 serial ports capable of 19,200 bps • 1 RS-232 DGPS port capable of 19,200 bps
Connectors	
Power	3-pin waterproof Deutsch
Antenna Input	Waterproof TNC female
COM1, COM2	13-pin waterproof Deutsch
Operating Temperature	
FlexPak-G2L	-40°C to +75°C
FlexPak-SSII	-30°C to +75°C
Storage Temperature	-40°C to +85°C
Humidity	95% non-condensing
Waterproof	IEC 60529 IPX7
Regulatory	FCC, CE



ProPak-LB plus

Features

- Able to receive OmniSTAR L-band differential corrections for autonomous decimeter-level accuracy (with a subscription to OmniSTAR service)
- Three RS-232 serial ports
- Waterproof to IEC 60529 IPX7
- Configurable PPS output and event mark input
- Provides communication support for an external IMU
- SBAS capable

Hardware Specifications

Size	185 x 154 x 71 mm
Weight	1.1 kg
Input Voltage	+7 to +15 VDC
Power Consumption	3.7 W (typical)
Communication Ports	<ul style="list-style-type: none"> • 3 RS-232 serial ports capable of 230,400 bps
Connectors	
Power	2-pin Switchcraft
Antenna Input	TNC female
COM1	6-pin Switchcraft
COM2	7-pin Switchcraft
COM3	8-pin Switchcraft
Operating Temperature	-40°C to +75°C
Storage Temperature	-40°C to +90°C
Humidity	95% non-condensing
Waterproof	IEC 60529 IPX7
Regulatory	FCC Class B, CE



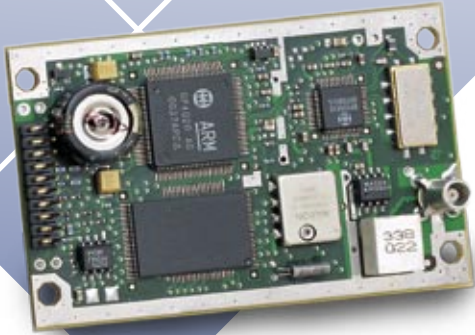
DL-4 plus

Features

- LCD panel and keypad for on-the-fly configuration
- Built-in memory card for data storage
- High speed RS-232 or RS-422 serial ports and USB capability
- Waterproof to IEC 60529 IPX7
- External oscillator input, event mark inputs, and PPS output
- Power and communication support for an IMU

Hardware Specifications

Size	185 x 154 x 71 mm
Weight	1.2 kg
Input Voltage ⁸	+9 to +18 VDC
Power Consumption	3.5 W (typical)
Communication Ports	<ul style="list-style-type: none"> • 2 RS-232 or RS-422 serial ports capable of 230,400 bps • 1 RS-232 serial port capable of 230,400 bps • 1 USB port capable of 5 Mbps
Connectors	
Power	4-pin LEMO
Antenna Input	TNC female
External Oscillator	BNC female
COM1	DB-9 male
COM2	DB-9 male
AUX (COM3)	DB-9 male
I/O	DB-9 female
Operating Temperature	
Receiver	-40°C to +55°C
Display	-20°C to +55°C
Storage Temperature	-40°C to +85°C
Humidity	95% non-condensing
Waterproof	IEC 60529 IPX7
Regulatory	FCC Class B, CE



SUPERSTAR II

Features

- Code and carrier phase tracking with 5 Hertz position, velocity, time (PVT) output or 5 Hertz raw data output
- SBAS capable and can be used as a base station or a rover
- Low power consumption

Hardware Specifications

Size	46 x 71 x 13 mm
Weight	22 g
Input Voltage	+3.3 or +5 VDC
Power Consumption	
3.3 V version	0.5 W (typical)
5 V version	0.8 W (typical)
Communication Ports	
• 2 TTL serial ports capable of 19,200 bps	
Connectors	
Main	20-pin dual-row male header
Antenna Input	MCX female
Operating Temperature	-30°C to +75°C
Storage Temperature	-40°C to +85°C
Humidity	5% to 95% non-condensing to 60°C

SMART ANTENNA

Features

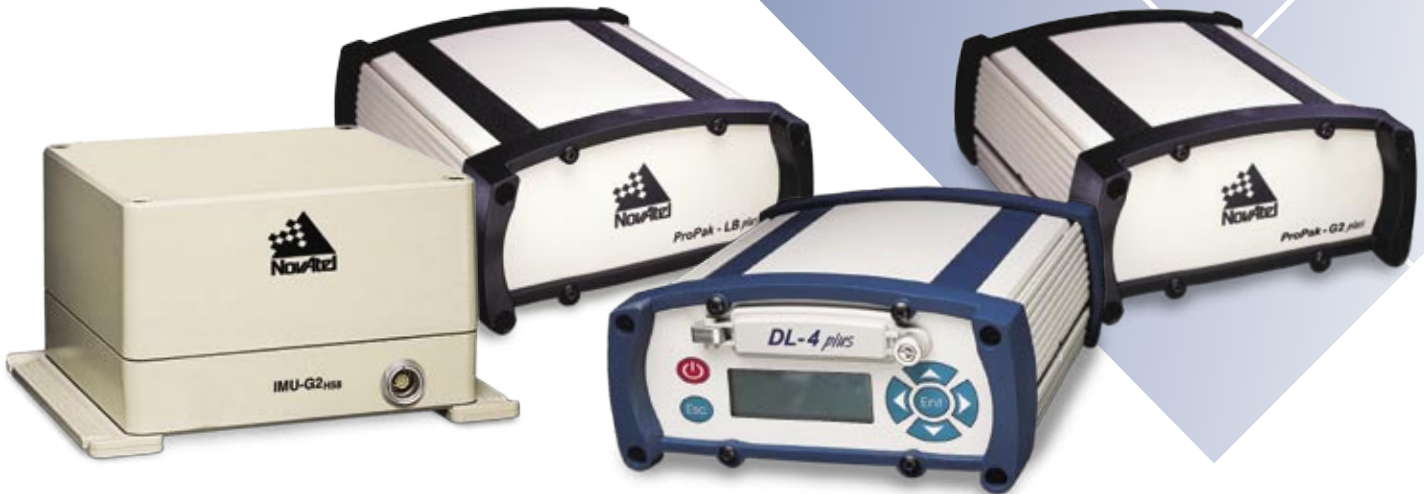
- Code and carrier phase tracking with 5 Hertz PVT output or 5 Hertz raw data output
- SBAS capable and designed for harsh environments
- RS-232 or RS-422 interface

Hardware Specifications

Size	115 mm diameter x 90 mm height
Weight	575 g
Input Voltage	+9 to +36 VDC
Power Consumption	1.4 W (typical)
Communication Ports	
• 2 RS-232 or RS-422 serial ports capable of 19,200 bps	
Connectors	
RS-232 version	7-pin plastic or 6-pin metal
RS-422 version	12-pin standard mount or cable mount
Operating Temperature	-30°C to +75°C
Storage Temperature	-40°C to +85°C
Humidity	SAE J1455/4.2, procedure I, II
Regulatory	FCC Class A, CE

L1 Product Performance¹

Position Accuracy		Data Rates	
Single Point L1	< 5 m CEP	Measurements	5 Hz
WAAS L1	< 1.5 m CEP	Position	5 Hz
DGPS (L1, C/A)	< 1 m CEP	Time to First Fix	
Measurement Precision		Cold Start ³	120 s
L1 C/A Code	75 cm RMS	Warm Start ⁴	45 s
L1 Carrier Phase	1 cm RMS (differential channel)	Hot Start ⁵	15 s
Velocity Accuracy	0.05 m/s RMS	Signal Reacquisition	< 1 s (typical)



SPAN Technology

NovAtel's SPAN™ (Synchronized Position Attitude Navigation) Technology combines GPS and inertial functionality to provide uninterrupted operation with highly accurate position and attitude measurements. SPAN Technology offers a choice of GPS receivers and inertial measurement units (IMUs) to allow system integrators to build the system that meets their needs.

Features

- Uninterrupted operation during reduced satellite coverage or temporary outages
- 100 Hertz position and attitude data
- Choice of GPS receivers, including the DL-4 plus, ProPak-LB plus, and ProPak-G2 plus
- Selection of ring laser gyro (RLG) IMUs, with additional IMUs to be supported in the future
- Quick conversion to stand-alone GPS operation
- Single cable connection between receiver and IMU for power and communication interface (DL-4 plus and ProPak-G2 plus only)
- Seamless integration with NovAtel SPAN Technology firmware

IMU Hardware Specifications

Size	160 x 160 x 100 mm
Weight	3.4 kg
Power Consumption	12 W (typical)
Interface	RS-232 or RS-422
Connector	10-pin LEMO
Operating Temperature	-30°C to +60°C
Storage Temperature	-45°C to +80°C
Humidity	95% non-condensing

SPAN Technology System Performance

For all other performance specifications, see "OEM4-G2L and OEM4-G2 Common Features" inside first page.

Data Rates	
INS Measurements	100 Hz
INS Position	100 Hz
INS Attitude	100 Hz
INS Velocity	100 Hz
Velocity Accuracy	0.02 m/s RMS (nominal)
Attitude Accuracy (with IMU-G2H58 only)	
Pitch	0.015° RMS
Roll	0.015° RMS
Azimuth	0.05° RMS
Acceleration Accuracy	0.03 m/s ² RMS

IMU Performance

Unless otherwise specified, specifications listed apply to both the IMU-G2H58 and IMU-G2H62.

Gyro Input Range	± 1000 deg/sec
Gyro Rate Bias	
IMU-G2H58	1.0 deg/hr
IMU-G2H62	10.0 deg/hr
Gyro Rate Scale Factor	150 ppm
Angular Random Walk (IMU-G2H58 only)	0.125 deg/hr
Accelerometer Range	± 50 g
Accelerometer Linearity	500 ppm
Accelerometer Scale Factor	300 ppm
Accelerometer Bias	
IMU-G2H58	1.0 mg
IMU-G2H62	3.0 mg

Product Summary

Product	Signals Tracked	Position Accuracy (Single Point / Differential / RTK)	Size (millimeters)	Weight	Position Update Rate (Hertz)	Cold Start (seconds) (typical)	Warm Start (seconds) (typical)	Ports	Baud Rate (bits per second)	Operating Temperature (degrees Celsius)	Storage Temperature (degrees Celsius)	Power Consumption (Watts) (typical)
OEM4-G2L	L1 C/A code and carrier phase (GPS and SBAS), L2 P(Y) code and carrier phase	1.5 m CEP / 0.45 m CEP / 1 cm + 1 ppm	60 x 100 x 16	56 g	20	50	40	RS-232 COM1, LV-TTL COM2, USB	COM1 up to 921,600, COM2 up to 230,400, USB up to 5 Mbps	-40 to +85	-45 to +95	1.6
OEM4-G2	L1 C/A code and carrier phase (GPS and SBAS), L2 P(Y) code and carrier phase	1.5 m CEP / 0.45 m CEP / 1 cm + 1 ppm	85 x 125 x 17	80 g	20	50	40	RS-232 or RS-422 COM1, RS-232 COM2, LV-TTL COM3, USB	COM1 up to 921,600, COM2 and COM3 up to 230,400, USB up to 5 Mbps	-40 to +85	-45 to +95	2.3
ProPak-G2 plus	L1 C/A code and carrier phase (GPS and SBAS), L2 P(Y) code and carrier phase	1.5 m CEP / 0.45 m CEP / 1 cm + 1 ppm	185 x 154 x 71	1.0 kg	20	50	40	RS-232 or RS-422 COM1 and COM3, RS-232 COM2, USB	COM1, COM2, and COM3 up to 230,400, USB up to 5 Mbps	-40 to +75	-45 to +95	2.5
FlexPak-G2L	L1 C/A code and carrier phase (GPS and SBAS), L2 P(Y) code and carrier phase	1.5 m CEP / 0.45 m CEP / 1 cm + 1 ppm	45 x 147 x 123	350 g	20	50	40	RS-232 COM1, RS-232 or RS-422 COM2, USB	COM1 up to 921,600, COM2 up to 230,400, USB up to 5 Mbps	-40 to +75	-40 to +85	2.6
ProPak-LB plus	L1 C/A code and carrier phase (GPS and SBAS), L2 P(Y) code and carrier phase, L-band	1.5 m CEP / 0.10 m CEP (OmniSTAR HP) / 1 cm + 1 ppm	185 x 154 x 71	1.1 kg	20	50	40	RS-232 COM1, COM2, and COM3	COM1, COM2, and COM3 up to 230,400	-40 to +75	-40 to +90	3.7
DL-4 plus	L1 C/A code and carrier phase (GPS and SBAS), L2 P(Y) code and carrier phase	1.5 m CEP / 0.45 m CEP / 1 cm + 1 ppm	185 x 154 x 71	1.2 kg	20	50	40	RS-232 or RS-422 COM1 and COM3, RS-232 COM2, USB	COM1, COM2, and COM3 up to 230,400, USB up to 5 Mbps	-20 to +55	-40 to +85	3.5
SUPERSTAR II	L1 C/A code and carrier phase (GPS and SBAS)	< 5 m CEP / < 1 m CEP / not applicable	46 x 71 x 13	22 g	5	120	45	TTL COM1 and COM2	COM1 and COM2 up to 19,200	-30 to +75	-40 to +85	0.8 (5 V), 0.5 (3.3 V)
SMART ANTENNA	L1 C/A code and carrier phase (GPS and SBAS)	< 5 m CEP / < 1 m CEP / not applicable	115 Ø x 90	575 g	5	120	45	RS-232 COM1 and DGPS input or RS-422 COM1 and COM2	COM1, DGPS input, and COM2 up to 19,200	-30 to +75	-40 to +85	1.4
FlexPak-SSII	L1 C/A code and carrier phase (GPS and SBAS)	< 5 m CEP / < 1 m CEP / not applicable	45 x 147 x 123	307 g	5	120	45	RS-232 COM1 and COM2	COM1 and COM2 up to 19,200	-30 to +75	-40 to +85	0.9

Upgrading

When you are ready to add functionality to your positioning engine, NovAtel can provide a code that unlocks additional features. This procedure can be performed at your premises without returning your receiver to the factory and takes only a few minutes. This means you can purchase the receiver that meets your needs today and upgrade the software in the future as your system integration challenges change and evolve.

Accessories

NovAtel's family of precise positioning products also includes accompanying cables and high performance antennas. NovAtel's GPS-700 antenna series features patented Pinwheel™ technology to achieve less than 1 mm offset between L1 and L2 phase centers. It is available in L1 only and L1/L2 models, is small and light, and delivers improved L2 as well as low elevation satellite tracking.

For detailed product technical specifications, please call:

1-800-NovAtel

in U.S. or Canada or +1-403-295-4900

email: sales@novatel.ca

internet: www.novatel.com

NovAtel Inc.

1120 - 68th Avenue NE

Calgary, Alberta, Canada T2E 8S5

1 Typical values. Performance specifications subject to GPS system characteristics, US DOD operational degradation, ionospheric conditions, satellite geometry, baseline length, and multipath effects.

2 Expected accuracy after three minute static convergence.

3 Typical value. No almanac or ephemeris and no approximate position or time.

4 Typical value. Almanac saved and approximate position and time entered. No recent ephemeris.

5 Typical value. Almanac and recent ephemeris saved and approximate position and time entered.

6 Time accuracy does not include biases due to RF or antenna delay.

7 Export licensing restricts operation to a maximum of 18,288 meters and 514 meters per second.

8 While operating without an external IMU, the ProPak-G2 plus and DL-4 plus can accept an input voltage between +7 and +18 VDC.

9 Unless otherwise indicated, all specifications apply to both the FlexPak-G2L and the FlexPak-SSII.

