GPS World

2014 RECEIVER SURVEY

Now in its 22nd year, the annual *GPS World* Receiver Survey provides the longest running, most comprehensive database of GPS and GNSS equipment available in one place.

With information provided by 47 manufacturers on 380 receivers, the survey assembles data on the most important equipment features. Manufacturers are listed alphabetically. Footnotes and Abbreviations below supply additional information to guide you through the survey.

We have made every effort to present an accurate listing of receiver information, but *GPS World* cannot be held responsible for the accuracy of information supplied by the companies or the performance of any equipment listed. In some cases, data had to be abbreviated or truncated to fit the space available. Contact the manufacturers directly with questions about specific units. To be listed in the 2015 Receiver Survey, e-mail gpsworld@gpsworld.com.

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NOTES

1 User environment and applications:

A	=	aviation
C	=	recreational
D	=	defense
G	=	survey/GIS
H	=	handheld
L	=	land
M	=	marine
Met	=	meteorology
N	=	navigation
O	=	other
P	=	other position reporting
R	=	real-time DGPS ref.
S	=	space
T	=	timing
V	=	vehicle/vessel tracking
1	=	end-user product
2	=	board/chipset/module for OEM apps

2 Where three values appear, they refer to autonomous (code), real-time differential (code), and post-processed differential; where four values appear, they refer to autonomous (code), real-time differential (code), real-time kinematic, and post-processed differential.

3 Cold start: ephemeris, almanac, and initial position and time not known.

4 For a warm start, the receiver has a recent almanac, current time, and initial position, but no current ephemeris

5 Reacquisition time is based on the loss of signal for at least one minute.

6 E = provision for an external antenna
R = antenna is removable

ABBREVIATIONS

apps:	applications
ARINC:	Aeronautical Radio, Inc. standard
async:	asynchronous
bps:	bits per second
CP:	carrier phase
CEP:	circular error probable
diff:	differential
ext.:	external / int. = internal
m, min:	minutes
na or NA:	not applicable
nr:	no response
opt.:	optional
par.:	parallel
prog.:	programmable
ppm:	parts per million
RMS:	root mean square
s:	seconds
SBAS:	Satellite-Based Augmentation System
typ.:	typical
VRS:	Virtual reference station
WP:	waterproof
WR:	water resistant

Beyond General Receiver Specifications 2014

James Hamilton

The in-depth specifications presented in this GNSS receiver survey are critical for making the correct purchase decision, however specifications must always be considered in relation to the demands of your application. As a buyer you should weigh product technical features like size, weight, accuracy and availability against factors such as total cost of ownership, reliability, customer service and ease of integration.

Certain aspects of receiver functionality may not be directly comparable between manufacturers. When choosing your GNSS provider, consider the following to optimize your GNSS receiver selection:

ABSOLUTE ACCURACY VERSUS RELATIVE ACCURACY

The receiver survey displays the absolute positioning accuracy of the various receivers, but for some applications this is not the only quality that matters. In traditional GNSS applications such as surveying, absolute position accuracy is critical. Precision farming and machine automation require position output that is also very stable over time. GNSS position accuracy can vary over time with changes in satellite visibility or when the receiver changes between correction types. These changes can result in position solution discontinuities. Receivers vary greatly in how they deal with these shifts. When choosing a receiver, enquire about the receiver's relative position stability to ensure that the receiver will suit your application. NovAtel's GLIDE™ and Steadyline™ algorithms are designed to ensure the position from the receiver is as smooth as possible, regardless of the challenges presented by the operating environment.

HEADING AND ORIENTATION DETERMINATION

GNSS are by their nature position determination systems, but cannot easily measure orientation. Many applications including machine or vehicle automation, aircraft and marine vessel navigation, mobile or airborne mapping require accurate position and orientation information. Standard GNSS receivers can measure direction of travel as an approximation of heading, but true vehicle heading, roll and pitch must be derived using an alternate approach.

There are multiple ways to work around this limitation of GNSS. Heading can be determined by measuring the 3D offset between two or more GNSS antennas fixed to a vehicle. For environments where the GNSS signal availability is good, these systems can give a very accurate measurement of the heading and pitch of a vehicle. GNSS heading products like NovAtel's ALIGN® technology can be easily deployed onto a vehicle to provide heading for a range of applications.

Inertial sensors (gyroscopes and accelerometers) can also be used along with GNSS to compute a 3D attitude solution (roll, pitch, heading). GNSS/INS systems have the advantage of computing attitude and also of improving the position reliability of the GNSS receiver. NovAtel's tightly-coupled SPAN® GNSS/INS technology is available on all our OEM6® receivers. SPAN offers a range of IMUs to suit many applications requiring high-rate, robust positioning and precise attitude.

INTERFERENCE ROBUSTNESS

GNSS signals are extremely vulnerable to interference – either accidental or intentional. The frequency bands used by GNSS are under threat from increased usage of the spectrum adjacent to GNSS. In addition, individuals wanting to protect their privacy or with malicious intent of denying GNSS to others represent increasing challenges to the seamless usage of GNSS. It is critical that GNSS

receivers and antennas be designed to operate in the presence of these RF threats. NovAtel's GNSS receiver designs are built to withstand high levels of near-band interference without sacrificing other receiver features such as size and power consumption.

ANTENNA SELECTION

Choosing the correct GNSS antenna is vital to GNSS system performance. A high performance GNSS antenna provides superior multipath rejection and highly stable phase center, both important to precision operations. Matching the signals and frequencies between your antenna and receiver is critical. If your vendor has an antenna product-line, they can help fit the right antenna to the application.

With all spectrums of signals being utilized with modern GNSS, intentional and unintentional interference and jamming is becoming major concern. NovAtel's GAJT™ GPS anti-jam antenna uses a controlled radiation pattern antenna to eliminate in-band interference, mitigating the threat to military operations, timing and networks infrastructures.

EASE OF INTEGRATION

Integration factors to be considered before you buy include:

A receiver should have a scalable level of performance so that it can evolve as your needs change.

- Scalability: A receiver should have a scalable level of performance so that it can evolve as your needs change. In this way by integrating one receiver, a range of different applications can be satisfied with only a change of software.
- Interface Protocols: The survey identifies the communication options available with the listed receivers. It is also important to make sure the receiver you choose has the interface protocols you need for your application.
- Complementary Technology: Some GNSS receivers can be paired easily with other sensor devices to provide position and velocity solutions with higher precision and quicker update rates. These sensors includes: accelerometers, gyroscope, and odometer etc.

GNSS product information or integration advice can also be obtained by clicking on the "Get Expert Advice" button found throughout novatel.com

Choosing the right vendor

Just as there are technical considerations for choosing the right receiver, there are factors that should influence whom you choose as your GNSS partner. Some questions to consider include:

1. Does your vendor compete with you in your market? A true OEM supplier will support you in winning market share in your market and not show up at your customer with their product.

2. Does your vendor have a track record for GNSS innovation and leading-edge technology?

3. Integrating a receiver into your system can be a complex activity. Is your vendor set up to support you with the integration effort? Is the product well documented and designed for integration? Does the company have a support structure of application engineers capable with assisting with integration challenges?

4. Is your vendor a reliable and recognized manufacturer? As receivers become more complex, only proven manufacturers will succeed in offering high product quality and reliability.

5. Is your vendor a cooperative part of your supply chain? Your vendor should support your needs with quick lead times and flexible order fulfillment. NovAtel's field-upgradeable products allow customers to keep their inventory costs low and offer product flexibility.

6. Is your vendor financially stable? The recent recession has been difficult for the GNSS industry. Make sure your vendor is likely to be around to support you with your current product — and to develop innovative, next-generation technology.

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
Altus Positioning Systems *www.altus-ps.com*	APS-3	136 par.	GPS+GLONASS L1, C/A & CP; L2, P-code & CP; L2C; WAAS/EGNOS	All in View GPS + GLONASS	GLMNOPRV1	17.8 (Ø) x 9.0cm	<1.3kg	1.3m/0.5m/1cm+1ppm/ 2mm+0.5ppm (1-sigma)	10	0.04	<
	APS-3G	136 par.	GPS L1, C/A L2, P-code & CP; L2C; L5 code & CP, GALILEO L1 code & CP; E5a code & CP; WAAS/EGNOS	All in View GPS + GLONASS + GALILEO	GLMNOPRV1	17.8 (Ø) x 9.0cm	<1.3kg	1.3m/0.5m/1cm+1ppm/ 2mm+0.5ppm (1-sigma)	10	0.04	<
	APS-3L	136 par.	GPS L1, C/A L2, P-code & CP; L2C; L5 code & CP, GALILEO L1 code & CP; E5a code & CP; WAAS/EGNOS	All in View GPS + GLONASS + GALILEO	GLMNOPRV1	17.8 (Ø) x 9.0cm	<1.3kg	1.3m/0.5m/1cm+1ppm/ 2mm+0.5ppm (1-sigma)	10	0.04	<
	APS-U	136 par.	GPS L1, C/A L2, P-code & CP; L2C; L5 code & CP, GALILEO L1 code & CP; E5a code & CP; WAAS/EGNOS	All in View GPS + GLONASS + GALILEO	GLMNOPRV1	17.7 x 16.7 x 4.8cm	1.6kg	1.3m/0.5m/1cm+1ppm/ 2mm+0.5ppm (1-sigma)	10	0.04	<
	GIS-1	50	GPS L1 C/A; WAAS/EGNOS/MSAS	All in View GPS +	GLMNOPRV1	17.0 x 22.4 x 2.4mm	2.1g	2.5m CEP (Circular Error Probability)		0.5	<
Ashtech / Boards & Sensors *www.ashtech-oem.com*	MB 100 Board	45 par.	GPS and GLONASS L1 C/A, GPS L1/ L2 P(Y)-code, L2C, L1/L2 full wavelength carrier, SBAS code & carrier	12 GPS, 12 GLONASS, 3 SBAS	AGLMNOPRV2	2.3 x 2.2 x 0.4in	0.78oz	3m/25cm+1ppm/1cm+1ppm/ 0.3cm + 0.5ppm	nr	0.05s	4
	MB 800 Board	120 par.	GPS L1 C/A L1/L2 P-code, L2C, L5- GLONASS L1 C/A, L2 C/A code- GALILEO E1 and E5 - SBAS L1 code and carrier (WAAS/EGNOS/ MSAS)- Fully inde	12 GPS, 12 GLONASS, 3 SBAS	AGLMMetNOPRV2	3.9 x 3.1 x 0.5in	2.18oz	3m/25cm+1ppm/1cm+1ppm/ 0.3cm + 0.5ppm	nr	0.05s	4
	MB-One	240 par.	GPS L1 C/A L1/L2 P-code, L2C - GLONASS L1 C/A, L2 C/A code - GALILEO E1 - SBAS L1 (WAAS/ EGNOS/MSAS)- QZSS L1 - BeiDou B1	L1/L2 GPS/GLO, SBAS, Gal E1 and BeiDou B1	AGLMMetNOPRV2	2.79 x 1.81 x 0.43	0.85oz	3m/25cm+1ppm/1cm+1ppm/ 0.3cm + 0.5ppm	nr	0.05s	4
	SkyNav GG12W GPS+SBAS - FAA Certifiable Board	12 par.	L1 only, C/A-code and carrier (GPS and SBAS)	as above	ADNO2	4.3 x 3.3 x 0.6in	3.8oz	3m/1m/nr/5mm + 1 ppm	nr	0.2s	n
	HDS800 RTK+Heading System	240 par.	GPS L1 C/A L1/L2 P-code, L2C, L5- GLONASS L1 C/A, L2 C/A code- GALILEO E1 and E5 - SBAS L1 code and carrier (WAAS/EGNOS/ MSAS)- Fully inde	12 GPS, 12 GLONASS, 3 SBAS	AGLMMetNOPRV2	8.46 x 7.87 x 2.99in	4.6lb	3m/25cm+1ppm/1cm+1ppm/ 0.3cm + 0.5ppm	nr	0.05s	4
	ABX Series GNSS sensors	45, 120 or 240 par.	GPS L1 C/A L1/L2 P-code, L2C, L5- GLONASS L1 C/A, L2 C/A code- GALILEO E1 and E5 - SBAS L1 (WAAS/ EGNOS/MSAS/GAGAN)- QZSS	12 GPS, 12 GLONASS, 3 SBAS	AGLMMetNOPRV2	7.48 x 2.28 x 6.3in	2.70lb	2.5m/25cm+1ppm/1cm+1ppm/ 0.3cm + 0.5ppm	nr	0.05s	4
	ADU800	210 (120+2*45)	GPS L1 C/A L1/L2 P-code, L2C, L5- GLONASS L1 C/A, L2 C/A code- GALILEO E1 and E5 - SBAS L1 (WAAS/ EGNOS/MSAS)- QZSS	12 GPS, 12 GLONASS, 3 SBAS	AGLMMetNOPRV2	7.48 x 2.28 x 6.3in	3.08lb	3m/25cm+1ppm/1cm+1ppm/ 0.3cm + 0.5ppm	nr	0.05s	4
BAE Systems Rokar *www.baesystems.com*	BP GPS	12 par. Correlator	L1 only, C/A–code	12 - all in view	ADLNO2	4.72 x 0.63 x 4.82in	105g	5m/na/na/na	300	1	<
	NT4RLG GPS	12 par. Correlator	L1 only, C/A–code	12 - all in view	ADLNO2	4.72 x 0.63 x 4.82in	110g	5m/na/na/na	300	1	<
	NAVPOD NT	12 par.	L1 only, C/A–code	12 - all in view	ADNOR1	3.72 x 1.20 x 7.00in	580g	5m/na/na/na	300	1	<
	HNR-10	12 par. Correlator	L1 only, C/A–code	12 - all in view	ADNOT2	4.80 x 0.75 x 3.66in	150g	5m/na/na/na	40	10	<
	GH-C GPS	12 par. Correlator	L1 only, C/A–code	12 - all in view	ADNP2	2.5in diameter	25g	5m/na/na/na	300	1	<
	GH-L GPS	12 par. Correlator	L1 only, C/A–code	12 - all in view	ADNP2	2.3in diameter	40g	5m/na/na/na	300	1	<
	A/J SNIR GPS	24 par. Correlator	L1 GPS C/A–code, L1 Glonass	24 - all in view	ADNP2	2.49 x 4.33 x 8.11in	1.4kg	5m/na/na/na	300	10	<
Baseband Technologies, Inc. *www.basebandtech.com*	Snapshot Receiver	user define	GPS L1 C/A code	user define	ACDHLMNOPV12	na	na	~5m	na	500Hz	2
	Arduino compatible RF Shield (Eval) Kit	user define	GPS L1 C/A code	user define	ACDHLMNOPV12	na	<10g	~5m	na	500Hz	2
	BTI-2800LP	user define	GPS L1 C/A code	user define	ACDHLMNOPV12	0.7 x 0.7cm	<1g	~5m	na	500Hz	2
CHC **www.chcnav.com**	X91+ GNSS Receiver	220	GPS L1C/A,L1C,L2C, L2E,L5;GLONASS L1C/A,L1P,L2C/A,L2P,L3;SBAS;Galileo E1 E5A,E5B;Beidou B1, B3	44	GLMNVPR1	18(φ)*8cm	1.35Kg	1-5m/0.25m+1ppm/ 8mm+1ppm/ 3mm+0.5ppm	100	Up to 5 Hz RTK	<
	N71 GNSS Receiver	220	GPS L1C/A,L1C,L2C, L2E,L5;GLONASS L1C/A,L1P,L2C/A,L2P,L3;SBAS;Galileo E1 E5A,E5B;Beidou B1, B3	44	GLMNVPR1	19.5*14.5*5.1cm	1.35Kg	1-5m/0.25m+1ppm/ 8mm+1ppm/ 3mm+0.5ppm	100	Up to 50 Hz output standard	<
	X900+ GNSS Receiver	120	GPS L1,L2,L2C;GLONASS L1,L2; SBAS;Galileo E1,E5A,E5B;BeiDou B1,B2	Flexible Configuration:120 L1, 60 L1/L2	GLMNVPR1	19*20*8.4cm	1.4Kg	1-5m/0.25m+1ppm/ 10mm+1ppm/ 5mm+1ppm	20	Up to 5 Hz RTK	<
ComNav Technology Ltd. *www.comnavtech.com*	k508	198	GPS: L1 C/A code, L1/L2 P code, L5, BeiDou: B1, B2, B3, GLONASS: L1, L2, SBAS: WASS, EGNOS, MASAS	60	ADGLMetMNOPRTV2	60 × 100 × 11.6mm	42g	<1.5m autonomous/<1m SBAS/0.25m+1ppm DGPS/2.5mm+1ppm post processed (All values in Horiz, RMS)	GPS: 20ns, GPS+ Glonass+BeiDou: 20ns	10Hz PVT 20Hz Raw data	<
	k501G	120	GPS: L1 C/A code, L1/L2 P code, GLONASS: L1, L2, SBAS: WAAS, EGNOS, MSAS	40	ADGHLMetMNOPRTV2	71 × 46 × 13mm	26g	<1.5m autonomous/0.25m+1ppm DGPS/<1m SBAS/2.5mm+1ppm post processed (All values in Horiz, RMS)	GPS: 20ns, GPS+GLONASS: 20ns	10Hz PVT 20Hz Raw data	<
	k501	120	GPS: L1 C/A code, L1/L2 P code, BeiDou: B1, B2, B3 (Optional), SBAS: WAAS, EGNOS, MSAS	40	ADGHLMetMNOPRTV2	71 × 46 × 13mm	26g	<1.5m autonomous/0.25m+1ppm DGPS/<1m SBAS/2.5mm+1ppm post processed (All values in Horiz, RMS)	GPS: 20ns, BeiDou: 30ns, GPS+BeiDou: 20ns	10Hz PVT 20Hz Raw data	<
	k500	80	GPS: L1, GLONASS: L1, BeiDou: B1, SBAS: WAAS, EGNOS, MSAS	40	ADGHLMetMNOPRTV2	71 × 40 × 10mm	17.6g	<1.5m autonomous/0.1m+1ppm DGPS/<1m SBAS/2.5mm+1ppm post processed (All values in Horiz, RMS)	GPS: 20ns, BeiDou: 30ns, GPS+BeiDou: 20ns	10Hz PVT 20Hz Raw data	<
	T300	256	GPS: L1 C/A, L1/L2 P, L5, BeiDou: B1, B2, B3, GLONASS: L1/L2, SBAS: WASS, EGNOS, MASAS	66	ADGLMetMNOPRV1	15.8 × 7.5cm (W×H)	0.95kg (Include Batries)	<1.5m autonomous/<1m SBAS/10mm+0.5ppm RTK/2.5mm+1ppm post processed(All values in Horiz, RMS)		10Hz PVT 20Hz Raw data	<
	M600	120	GPS: L1 C/A code, L1/L2 P code, BeiDou: B1, B2, B3 (Optional) SBAS: WAAS, EGNOS, MSAS	40	ADGLMNOPRTV1	200 × 145 × 80mm	1.3kg	<1.5m autonomous/10mm+0.5ppm RTK/2.5mm+1ppm post processed (All values in Horiz, RMS)	GPS+BeiDou:20ns	10Hz PVT 20Hz Raw data	<
	M300	120	GPS: L1 C/A code, L1/L2 P code, BeiDou: B1, B2, B3 (Optional) SBAS: WAAS, EGNOS, MSAS	40	ADGLMNOPRTV1	200 × 145 × 80mm	1kg	<1.5m autonomous/10mm+1ppm RTK/2.5mm+1ppm post processed (All values in Horiz, RMS)	GPS+BeiDou:20ns	10Hz PVT 20Hz Raw data	<
CSR *www.csr.com*	GSD4t	48	GPS L1 C/A, SBAS, QZSS	24	CHNV2	3.4 x 2.7 x 0.6mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	GSD4e	48	GPS L1 C/A, SBAS, QZSS	24	CHNV2	3.5 x 3.2 x 0.6mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	SiRFPrima	Up to 64	GPS L1 C/A, SBAS, QZSS	All in View	CHNV2	16 x 16 x 1.1mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	SiRFPrima Automotive	Up to 64	GPS L1 C/A, SBAS, QZSS	All in View	CHNV2	16 x 16 x 1.1mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	SiRFPrimaII	Up to 64	GPS L1 C/A, SBAS, Glonass, Galileo, BeiDou, QZSS	All in View	CHNV2	17 x 17 x 1.1mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	SiRFPrimaII Automotive	Up to 64	GPS L1 C/A, SBAS, Glonass, Galileo, BeiDou, QZSS	All in View	CHNV2	17 x 17 x 1.1mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	SiRFAtlasIV	Up to 64	GPS L1 C/A, SBAS, QZSS	All in View	CHNV2	12 x 12 x 1.1mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	SiRFAtlasV	Up to 64	GPS L1 C/A, SBAS, QZSS	All in View	CHNV2	10 x 13 x 1.2mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	SiRFAtlasVI	Up to 64	GPS L1 C/A, SBAS, Glonass, Galileo, BeiDou, QZSS	All in View	CHNV2	13.4 x 12.6 x 1.16mm	na	10m/nr/nr/nr (95%)	nr	Variable	<

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	<45s	<15s	<1s	4	2 RS-232, 1 Bluetooth, 1 TNC	1, 200-115, 200	-20 to +65	INT/EXT (9-18 V DC)	7 W	INT/EXT	Dual Frequency Geodetic and RTK GNSS receiver
	<45s	<15s	<1s	4	2 RS-232, 1 Bluetooth, 1 TNC	1, 200-115, 200	-20 to +65	INT/EXT (9-18 V DC)	7 W	INT/EXT	Triple Frequency Geodetic and RTK GNSS receiver
	<45s	<15s	<1s	4	2 RS-232, 1 Bluetooth, 1 TNC	1, 200-115, 200	-20 to +65	INT/EXT (9-18 V DC)	7 W	INT/EXT	Dual Frequency Geodetic and RTK GNSS & TERRASTAR L-Band receiver
	<45s	<15s	<1s	8	3 RS-232, 1 Bluetooth, 1 USB, 1 Ethernet, 2 TNC	1, 200-115, 200	-20 to +65	EXT (9-30 V DC)	11 W	EXTERNAL (1 or 2)	Dual or Triple Frequency Geodetic and RTK, GNSS Heading, & TERRASTAR L-band receiver
	<26s	<1s	<1s	na	na	9, 600	-40 to +85	INT (2.7-3.6 V)		INT	A powerful all-in-one GIS solution PDA that integrates modern wireless technology on a rugged Windows Mobile® platform for effective portable computing for mobile survey applications.
	45s	35s	3s	3	RS-232, RS-232, USB 2.0	1 RS232 up to 921.6 kbits/sec (RxD, TxD, CTS and RTS signals)	–40 to +85	external	< 0.8W in GPS L1, < 0.95W in GPS L1/L2 or GPS+GLONASS L1	Ext. active antenna., 2 antenna connectors	Compact Dual-Frequency RTK OEM Board., 2 antenna connectors for handheld integration., BLADE Technology inside.
	45s	35s	3s	4	RS-232, LV-TTL, LV-TTL, USB 2.0	RS-232 up 921.6 kbits/sec; LV-TTL up to 5 Mbits/sec; USB 2.0 up to 12 Mbps	-40° to +185°F	external	1.9W (GPS only), 2.4W (GPS+GLONASS)	Ext. active antenna (L1, L2) GPS/GLONASS	GPS+GLONASS+SBAS Dual-Frequency OEM Board., Z-BLADE Technology inside.
	45s	30s	2s	5	3x RS-232, USB 2.0, Ethernet	RS-232 up to 921.6 k bps; USB 2.0 up to 12 Mbps; 10/100Mbps Ethr	–40 to +85	external	< 1W	Ext. active patch/antenna., 2 antenna connectors	GPS+GLONASS+SBAS+BeiDou Dual Frequency, Dual Antenna OEM Board., Z-BLADE Technology inside.
	nr	nr	<3s	2	RS-230	300–115, 200	–30 to +70	external	3	Patch, active (ER)	For aviation; designed to FAA/RTCA specifications
	45s	35s	3s	6	3x RS-232, USB 2.0, Bluetooth, Ethernet	RS-232 up 921.6 kbits/sec; USB 2.0 up to 12 Mbps;	-22° to +149°F	external	5W with one GNSS antenna	Ext. active antenna (L1, L2) GPS/GLONASS	GPS+GLONASS+SBAS Dual-board RTK+Heading System., Z-BLADE Technology inside.
	45s	35s	3s	3 - 4	2-3 RS-232, USB 2.0,		-22° to +140°F	external	2.4 W - 6.5 W	GNSS, GLONASS, Galileo, SBAS	GNSS-centric engine. GLONASS-only capable. Z-BLADE Technology inside.
	45s	35s	3s	4	3x RS-232, USB 2.0	RS-232 up 921.6 kbits/sec; USB 2.0 up to 12 Mbps;	-22° to +140°F	external	5.5W	Ext. active antenna (L1, L2) GPS/GLONASS	GPS+GLONASS+SBAS 6D positioning system., Z-BLADE Technology inside.
	<2min	20s	2–5s	1, 1	RS-422, RS-232	9, 600–38, 400	–40 to +85	ext	3.75	patch (E)	Smart munitions
	<2min	20s	2–5s	1, 1	RS-422, RS-232	9, 600–38, 400	–40 to +85	ext	3.75	patch (E)	Inertial system integration
	<2min	20s	<5s	1, 1	RS-232, RS-422	300–38, 400	–40 to +71	ext/int	4.5	patch (E)	A/C PODS
	<2min	20s	2–5s	1, 1	RS-422, RS-232	115200	–40 to +85	ext	4.5	patch (E)	10-MHz in, 2x1PPs out
	<2min	13s	3s	2	TTL	9, 600–115, 200	–40 to +85	ext	1	nr	GPS for artilery
	<2min	6s	3s	2	TTL	9, 600–115, 200	–40 to +85	ext/int	3	nr	GPS for artilery
	<2min	5s	<1s	1, 1	RS-422, RS-232	9, 600–115, 200	–40 to +71	ext	14	4X patch (E)	A/J GNSS for high dynamics
	2ms	2ms	2ms	na	na	na	na	na	na	na	SW based GPS receiver
	2ms	2ms	2ms	na	na	na	na	na	na	na	SW based GPS receiver
	2ms	2ms	2ms	2	Serial/Parallel	na	TBD	3.3	TBD	na	RFIC module
	<60 s	<30 s	< 15 s	3	RS232, Bluetooth, Radio Antenna	USB2.0, Bluetooth 2.0, GPRS 850/900/1800/ 1900MHz	-40 to +80	ext	2.6W	Internal	Compact GNSS Receiver
t	<60 s	<30 s	< 15 s	5	RS232, Antenna, GPRS Antenna, Radio Antenna, LAN	2400-460800	-30 to +65	ext	2.6W	External	GNSS Sensor with PC Control Utility and Web User Interface
	<60 s	<35 s	< 15 s	3	RS232, Bluetooth, Radio Antenna	USB2.0, Bluetooth 2.0, GPRS 850/900/1800/ 1900MHz	-40 to +80	ext	2.6W	Internal	Compact GNSS Receiver
	<50s	<30s	<2s	4	3 ×RS232, 1 USB	up to 921, 600 bps	-40 to+85	ext.	1.8W	MMCX acceptable	Triple Frequency Geodetic GNSS Antenna
	<50s	<30s	<2s	3	RS232	up to 921, 600 bps	-40 to+85	ext.	1W	MCX acceptable	Triple Frequency Geodetic GNSS Antenna
	<50s	<30s	<2s	3	RS232	up to 921, 600 bps	-40 to+85	ext.	1W	MCX acceptable	Triple Frequency Geodetic GNSS Antenna
	<50s	<30s	<2s	3	RS232	up to 921, 600 bps	-40 to+85	ext.	1W	MCX acceptable	Single Frequency$L_1/B_1/G_1$ GNSS Antenna
	<50s	<30s	<2s	3	1×RS232;1×USB, Bluetooth	up to 921, 600 bps	-40 to+65	int.	2.85W	internal	
	<50s	<30s	<2s	3	2UART;1PPS(optional)	up to 921, 600 bps	-40 to+70	ext.	3W	2×TNC acceptable	Triple Frequency Geodetic GNSS Antenna
	<50s	<30s	<2s	3	2UART;1PPS(optional)	up to 921, 600 bps	-40 to+70	ext.	2.5W	TNC acceptable	Triple Frequency Geodetic GNSS Antenna
	<35s	<34s	<1s	2	UART, SPI, I2C	user selectable	-40 to +85	Ext	0.008	E	Single die tracker
	<35s	<34s	<1s	2	UART, SPI, I2C	user selectable	-40 to +85	Ext	0.008	E	Single die engine
	<35s	<34s	<1s	na	na	user selectable	-40 to +85	Ext	~ 0.7 to 0.9	E	SOC: Apps Processor + GPU + GPS
	<35s	<34s	<1s	na	na	user selectable	-40 to +85	Ext	~ 0.7 to 0.9	E	SOC: Apps Processor + GPU + GPS
	<35s	<34s	<1s	na	na	user selectable	-40 to +85	Ext	~ 0.7 to 1.5	E	SOC: Apps Processor + GPU + video + GPS
	<35s	<34s	<1s	na	na	user selectable	-40 to +85	Ext	~ 0.7 to 1.5	E	SOC: Apps Processor + GPU + video + GPS
	<35s	<34s	<1s	na	na	user selectable	-20 to +70	Ext	~ 0.55 to 0.9	E	SOC: Apps Processor + GPS
	<35s	<34s	<1s	na	na	user selectable	-20 to +70	Ext	~ 0.55 to 0.9	E	SOC: Apps Processor + GPS
	<35s	<34s	<1s	na	na	user selectable	-40 to +85	Ext	~ 0.55 to 1.5	E	SOC: Apps Processor + GPU + GPS

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	SiRFstarV 5ea Automotive	Up to 52	GPS L1 C/A, SBAS, QZSS, Glonass, Galileo, BeiDou	24	CHNV2	7.00 x 10.00 x 1.2mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	SiRFstarV 5e	Up to 52	GPS L1 C/A, SBAS, QZSS, Glonass, Galileo, BeiDou	24	CHNV2	CSP 3.74 x 3.20 x 0.6mm, BGA 6.0 x 6.5 x 1.2mm	na	10m/nr/nr/nr (95%)	nr	Variable	<
	5t	Up to 52	GPS L1 C/A, SBAS, QZSS, Glonass, Galileo, BeiDou	24	CHNV2	3.11 x 2.20 x 0.6		10m/nr/nr/nr (95%)	nr	Variable	<
DataGrid, Inc. *www.datagrid-international.com*	Colibri	336 or more depending on config	L1 full cycle CP, C/A--code, L2 full cycle CP, P2, L2C code, SBAS, GLONASS L1, full cycle CP, C/A--code, L2 full cycle and L2 C/A code.Galileo E1.	30 or more depending on config	GLMNOVRT1	Ø 17 x 10cm	~400g depending on config.	1.5m/<1m /1cm/<1cm (RMS)	<35	1, 1/2, 1/5, 1/10	<
	Gator	336 or more depending on config	L1 full cycle CP, C/A--code, L2 full cycle CP, P2, L2C code, SBAS, GLONASS L1, full cycle CP, C/A--code, L2 full cycle and L2 C/A code.Galileo E1.	30 or more depending on config	GLMNOVRT1	10 x 8.4 x 3.5cm	340g	1.5m/<1m /1cm/<1cm (RMS)	<35	1, 1/2, 1/5, 1/10, 1/20	<
	Toughman	336 or more depending on config	L1 full cycle CP, C/A--code, L2 full cycle CP, P2, L2C code, SBAS, GLONASS L1, full cycle CP, C/A--code, L2 full cycle and L2 C/A code.Galileo E1.	30 or more depending on config	GLMNOVR1	20 x 8.5 x 3.5cm	600g	1.5m/<1m /1cm/<1cm (RMS)	<35	1, 1/2, 1/5, 1/10	<
	Mk3 "Chameleon"	336 or more depending on config	L1 full cycle CP, C/A--code, L2 full cycle CP, P2, L2C code, SBAS, GLONASS L1, full cycle CP, C/A--code, L2 full cycle and L2 C/A code.Galileo E1.	30 or more depending on config	GLMNOVRT1	27 x 8.5 x 3.5cm	750g	1.5m/<1m /1cm/<1cm (RMS)	<35	1, 1/2, 1/5, 1/10	<
	DGRx-GNSS (OEM)	336 or more depending on config	L1 full cycle CP, C/A--code, L2 full cycle CP, P2, L2C code, SBAS, GLONASS L1, full cycle CP, C/A--code, L2 full cycle and L2 C/A code. Galileo E1.	30 or more depending on config	AHGLMOVRT2	90 x 60 x 12mm	~ 50g	1.5m/<1m /1cm/<1cm (RMS)	<35	1, 1/2, 1/5, 1/10, 1/20 standard, higher rates optional.	<
Effigis Geo Solutions / OnPOZ Products *www.effigis.com*	SubX	16 par.	GPS L1 C/A code and carrier-phase, SBAS	16	GIS Mapping	12 x 6.5 x 4cm	0.67lb	2.5m/2m/na/0.01cm (CEP)		1Hz	<
EndRun Technologies *www.endruntechnologies.com*	Meridian Precision TimeBase	8 par.	GPS L1 C/A code	8	T1	17 x 1.75 x 10.75in	< 5lb	Autonomous	< 10 ns RMS	1	5
	Tycho Time & Frequency Reference	8 par.	GPS L1 C/A code	8	T1	17 x 1.75 x 10.75in	< 5lb	Autonomous	< 20 ns RMS	1	5
	Sonoma Network Time Server	12 par.	GPS L1 C/A code	12	T1	17 x 1.75 x 10.75in	< 5lb	Autonomous	< 30 ns	1	5
Exelis *www.exelisinc.com*	MSN Receiver	12	GPS L1/L2; , CA and P(Y)	12	D	18 x 19 x 5.25in	30lb				
	EGR 2500	12	GPS L1/L2; , CA and P(Y)	12	D	2.45 x 1.76 x 0.38in	31g	<10m	<30 ns	1Hz	<
ftech Radio Frequency System Corporation *www.f-tech.com.tw*	FM3901	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRTV2	11 x 11 x 2.15mm	2g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FMP12-TLP	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRV2	26 x 26 x 11.7mm	12.5g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FMP51	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRV2	22 x 22 x 8mm	8g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FM3702	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRTV2	11 x 11 x 2.15mm	2g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FMP31	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRV2	22 x 22 x 8mm	8g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FMP32	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRV2	26 x 26 x 11.7mm	12.5g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FM11	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRTV2	11 x 11 x 2.15mm	2g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FMP04-TLP	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRV2	26 x 26 x 11.7mm	12.5g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FMP04-RLP	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRV2	26 x 26 x 11.7mm	12.5g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FMP04-ULP	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRV2	26 x 26 x 11.7mm	12.5g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FM06-TLP	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACHLMNRTV2	16 x 16 x 6.7mm	6g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FGM-RLP	22 tracking + 66 acquisition	GPS L1 C/A code, SBAS	22	ACLMNRV2	30 x 34.1 x 8mm	50g	3m CEP/1.5mCEP	< 100ns RMS	1Hz default, max up to 10Hz by user define	<
	FGU04-T	50	GPS L1 C/A code, SBAS	50	ACHLMNRV2	26 x 26 x 11.7mm	12.5g	2.5m CEP	60ns RMS	1Hz default, max up to 5Hz by user define	<
	FGU-RLP	50	GPS L1 C/A code, SBAS	50	ACHLMNRV2	30 x 34.1 x 8mm	50g	2.5m CEP	60ns RMS	1Hz default, max up to 5Hz by user define	<
	FSP04-TLP	48	GPS L1 C/A code, SBAS	48	ACHLMNRV2	26 x 26 x 11.7mm	12.5g	na/2.5 m CEP50	< 50ns RMS	1Hz	<
Furuno *www.furuno.com*	GN86F	16	GPS L1 C/A, SBAS L1 C/A, QZSS L1 C/A	12 GPS, 2 SBAS, 2 QZSS	Navigation	12.2 x 16.0 x 2.8mm			10us (Max)	1 / 2 / 5 / 10Hz	3
	GN87F	26	GPS L1 C/A, SBAS L1 C/A, GLONASS L1OF, QZSS L1 C/A	12 GPS, 2 SBAS, 10 GLONASS, 2 QZSS	Navigation	12.2 x 16.0 x 2.8mm			10us (Max)	1 / 2 / 5 / 10Hz	3
	GV86	16	GPS L1 C/A, SBAS L1 C/A, QZSS L1 C/A	12 GPS, 2 SBAS, 2 QZSS	Navigation/V2X	12.2 x 16.0 x 2.8mm			10us (Max)	1 / 2 / 5 / 10Hz	3
	GV87	26	GPS L1 C/A, SBAS L1 C/A, GLONASS L1OF, QZSS L1 C/A	12 GPS, 2 SBAS, 10 GLONASS, 2 QZSS	Navigation/V2X	12.2 x 16.0 x 2.8mm			10us (Max)	1 / 2 / 5 / 10Hz	3
	GT86	16	GPS L1 C/A, SBAS L1 C/A, QZSS L1 C/A	12 GPS, 2 SBAS, 2 QZSS	Timing/LTE	12.2 x 16.0 x 2.8mm			15ns @1 sigma	1Hz	4
	GT87	26	GPS L1 C/A, SBAS L1 C/A, GLONASS L1OF, QZSS L1 C/A	12 GPS, 2 SBAS, 10 GLONASS, 2 QZSS	Timing/LTE	12.2 x 16.0 x 2.8mm			15ns @1 sigma	1Hz	4
	GT8736	26	GPS L1 C/A, SBAS L1 C/A, GLONASS L1OF, QZSS L1 C/A	12 GPS, 2 SBAS, 10 GLONASS, 2 QZSS	Timing/LTE	40.0 x 60.0mm			15ns @1 sigma	1Hz	4
	eRideOPUS 6	16	GPS L1 C/A, SBAS L1 C/A, QZSS L1 C/A	12 GPS, 2 SBAS, 2 QZSS	Automotive/Navigation/Timing	7.0 x 7.0mm				1 / 2 / 5 / 10Hz	3
	eRideOPUS 7	26	GPS L1 C/A, SBAS L1 C/A, GLONASS L1OF, QZSS L1 C/A	12 GPS, 2 SBAS, 10 GLONASS, 2 QZSS	Automotive/Navigation/Timing	7.0 x 7.0mm				1 / 2 / 5 / 10Hz	3

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	<33s	<32s	<1s	2	UART, SPI, I2C	user selectable	-40 to +85	Ext	0.008	E	Single die GNSS engine
	<33s	<32s	<1s	2	UART, SPI, I2C	user selectable	-40 to +85	Ext	0.008	E	Single die GNSS engine
	<33s	<32s	<1s	2	UART, SPI, I2C	user selectable	-40 to +85	Ext	0.008	E	single die tracker
	<40s	36s	<1s	1, 1	USB, Bluetooth option	1, 200–115, 200 bps	-40 to +85	int., ext, ., LilonP.	1.5 to 2	L1/L2 GNSS Internal	RTK, VRS, Precision post-procecssing, Precision GIS, GSM modem opt. WR. Fully wireless operation capable.
	<40s	36s	<1s	1, 1	PC Card (PCMCIA), USB	1, 200–115, 200 bps	-40 to +85	ext.	1.5	L1/L2 GNSS (E)	RTK, VRS, Precision post-procecssing, Precision GIS, GSM modem opt. WR
	<40s	36s	<1s	1, 1, 1, 1	Serial, A/D, USB, Bluetooth	1, 200–115, 200 bps	–30 to +70	int., ext., LilonP.	2.2	L1/L2 (E)	GPS L1/L2 carrierphase and data collection. WR
	<40s	36s	<1s	2, 1, 1, 1	Serial, A/D, USB, Bluetooth	1, 200–115, 200 bps	–30 to +70	int., ext, ., LilonP.	3.2	L1/L2 GNSS (E)	RTK, VRS, Precision post-procecssing, Precision GIS, GSM modem opt. WR
	<40s	<36 s	<1s	2	Serial	1, 200–115, 200 bps	–40 to +85	ext.	1.5	L1/L2 GNSS (E)	Based on easy-to-upgrade/modify FPGA design
	<<34s	<33s	<1s	1	1 BT	57600	–20 to +50	internal battery		Active, 27 db	
	5min	2min	< 1min	2	1 Ethernet, 1 RS-232	10/100 Base-T, 19200	0 to +50	External	< 10W	L1 (ER)	GPS Time & Frequency
	5min	2min	< 1min	2	1 Ethernet, 1 RS-232	10/100 Base-T, 19200	0 to +50	External	< 7W	L1 (ER)	GPS Time & Frequency
	5min	2min	< 1min	3	2 Ethernet, 1 RS-232	10/100/1000 Base-T, 19200	0 to +50	External	10W	L1 (ER)	NTP and PTP/IEEE-1588
								ext		external, active	
	<40s	<38s	<3s	4	RS-232, CMOS		-40 to +85	ext	<1W	external, active	SAASM
r	<35s	<33s	<1s	2	UART	4800-115200	-40 to +85	ext	19mA at 3.3V	ext., active or passive	MT3339 chipset, very high senstivity at -165dBM
r	<35s	<33s	<1s	1	UART	4800–115200	-40 to +85	ext / built-in backup battery	20mA at 3.3V	active internal antenna	as above
r	<35s	<33s	<1s	1	UART	4800–115200	-40 to +85	ext	20mA at 3.3V	active internal antenna	as above
r	<35s	<34s	<1s	2	UART	4800–115200	-40 to +85	ext	21mA at 3.3V	ext., active or passive	MT3337 ROM based chipset, low cost solution
r	<35s	<34s	<1s	1	UART	4800–115200	-40 to +85	ext	22mA at 3.3V	active internal antenna	as above
r	<35s	<34s	<1s	1	UART	4800–115200	-40 to +85	ext / built-in backup battery	22mA at 3.3V	active internal antenna	as above
r	<35s	<34s	<1s	2	UART	4800–115200	-40 to +85	ext	19mA at 3.3V	ext., active or passive	MT3329 chipset, very high senstivity at -165dBM
r	<35s	<34s	<1s	1	UART	4800–115200	-40 to +85	ext / built-in backup battery	24mA at 3.3V	active internal antenna	as above
r	<35s	<34s	<1s	1	RS232	4800–115200	-40 to +85	ext / built-in backup battery	24mA at 3.3V	active internal antenna	as above
r	<35s	<34s	<1s	1	USB	4800–115200	-40 to +85	ext / built-in backup battery	31mA at 3.3V	active internal antenna	as above
r	<35s	<34s	<1s	1	UART	4800–115200	-40 to +85	ext	24mA at 3.3V	active internal antenna	as above
r	<35s	<34s	<1s	1	UART/RS232	4800–115200	-40 to +85	ext	37mA at 3.3V	active internal antenna	Smart antenna model, multi type connector and various cable length availavle
	<27s	<27s	<1s	1	UART	4800–115200	-40 to +85	ext / built-in backup battery	45mA at 3.3V	active internal antenna	uBlox AMY-6M
	<27s	<27s	<1s	1	UART/RS232	4800–115200	-40 to +85	ext / built-in backup battery	45mA at 3.3V	active internal antenna	Smart antenna model, multi type connector and various cable length availavle
	<35s	35s	<1s	1	UART	4800/9600	-40 to +85	ext / built-in backup battery	24mA at 3.3V	active internal antenna	SiRF/CSR Star IV chipset GSD4e
	33s	30s	<1s	1	NMEA or FURUNO Binary	4800-230400,	–40 to +85	ext		Passive or Active	Galileo Ready, Active Anti-Jamming and Advanced Multipath Mitigation
	33s	30s	<1s	1	NMEA or FURUNO Binary	4800-230400,	–40 to +85	ext		Passive or Active	Multi-GNSS, Galileo Ready Active Anti-Jamming and Advanced Multipath Mitigation
	33s	30s	<1s	2	UART1 (for NMEA Input/Output), UART2/I2C selectable (for IMU sensor data input), Wheel tick capable	4800-230400,	–40 to +85	ext		Passive or Active	Galileo Ready, High performance Dead Reckoning Active Anti-Jamming and Advanced Multipath Mitigation
	33s	30s	<1s	2	UART1 (for NMEA Input/Output), UART2/I2C selectable (for IMU sensor data input), Wheel tick capable	4800-230400,	–40 to +85	ext		Passive or Active	Multi-GNSS, Galileo Ready High performance Dead Reckoning Active Anti-Jamming and Advanced Multipath Mitigation
	40s	35s	<5s	1	NMEA	4800-115200,	–40 to +85	ext		Passive or Active	Galileo Ready, Active Anti-Jamming and Advanced Multipath Mitigation, Time Pulse output (1PPS) and Clock output (configurable, e.g. 10MHz)
	40s	35s	<5s	1	NMEA or M12 Binary	4800-115200,	–40 to +85	ext		Passive or Active	Multi-GNSS, Galileo Ready Active Anti-Jamming and Advanced Multipath Mitigation, Time Pulse output (1PPS) and Clock output (configurable, e.g. 10MHz)
	40s	35s	<5s	1	M12 Binary	9600	–40 to +85	ext		Active	Multi-GNSS, Galileo Ready Active Anti-Jamming and Advanced Multipath Mitigation
	33s	30s	<1s		NMEA or FURUNO Binary	4800-230400,	–40 to +85	ext		Passive or Active	Galileo Ready, Dead Reckoning or Timing software available, For timing, Time Pulse output (1PPS) and Clock output (configurable, e.g. 10MHz)
	33s	30s	<1s		NMEA, FURUNO Binary or M12 Binary	4800-230400,	–40 to +85	ext		Passive or Active	Multi-GNSS, Galileo Ready Dead Reckoning or Timing software available, For timing, Time Pulse output (1PPS) and Clock output (configurable, e.g. 10MHz)

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	GF8557	14	GPS L1 C/A, SBAS L1 C/A	12 GPS, 2 SBAS	Timing/LTE/Digital Broadcast	100 x 100 x 19.9mm	<120g		30ns @ 2 sigma	1Hz	
Geneq inc. *www.sxbluegps.com*	SXBlue GNSS	39 channel	L1 C/A code & phase, GPS + GLONASS, SBAS	27	DGLMNR1	8.5 x 3.5 x 11.2cm	.6lb	2.5m/60cm/3cm/1cm , 95%	na	1 to 10Hz, optional 20Hz	6
	SXBlue II GPS	12 channel	L1 C/A code & phase GPS, SBAS	12	DGHLMNR1	8.0 x 4.7 x 14.1cm	1lb (w/ batt.)	2.5m/60cm/3cm/1cm , 95%	na	1 to 10Hz, optional 20Hz	6
	SXBlue II GNSS	39 channel	L1 GPS C/A code & phase, GPS + GLONASS, SBAS	27	DGHLMNR1	8.0 x 4.7 x 14.1cm	1lb (w/ batt.)	2.5m/60cm/3cm/1cm , 95%	na	1 to 10Hz, optional 20Hz	6
	iSXBlue II GNSS (New)	39 channel	L1 GPS C/A code & phase, GPS + GLONASS, SBAS	27	DGHLMNR1	8.0 x 4.7 x 14.1cm	1lb (w/ batt.)	2.5m/60cm/3cm/1cm , 95%	na	1 to 10Hz, optional 20Hz	6
	SXBlue II-L GPS	12 channel	L1 C/A code & phase GPS, SBAS, OmniSTAR VBS	12 + 1	DGHLMNR1	8.0 x 5.6 x 14.1cm	1lb (w/ batt.)	2.5m/80cm/3cm/1cm , 95%	na	1 to 10Hz, optional 20Hz	6
	SXBlue II-B GPS	12 channel	L1 C/A code & phase GPS, SBAS, DGPS Beacon	12	DGHLMNR1	8.0 x 5.6 x 14.1cm	2lb (w/ batt.)	2.5m/60cm/3cm/1cm , 95%	na	1 to 10Hz, optional 20Hz	6
	SXBlue GNSS L1/L2	117 channel	L1/L2/(L2C) C/A & P code, GPS + GLONASS, CP, SBAS	27	DGLMNR1	8.5 x 3.5 x 11.2cm	.6lb	2.5m/60cm/3cm/1cm , 95%	na	1Hz, optional 10 & 20Hz	6
	SXBlue III GNSS	117 channel	L1/L2/(L2C) C/A & P code, GLONASS, CP, SBAS	27	DGHLMNR1	8.0 x 4.7 x 14.1cm	1lb (w/ batt.)	2.5m/60cm/3cm/1cm , 95%	na	1Hz, optional 10 & 20Hz	6
	iSXBlue III GNSS (New)	117 channel	L1/L2/(L2C) C/A & P code, CP, GPS + GLONASS, SBAS, OmniSTAR VBS/ XP/HP/G2	27 + 1	DGHLMNR1	8.0 x 5.6 x 14.1cm	1lb (w/ batt.)	2.5m/60cm/3cm/1cm , 95%	na	1Hz, optional 10 & 20Hz	6
	SXBlue III-L GNSS	117 channel	L1/L2/(L2C) C/A & P code, CP, GPS + GLONASS, SBAS, OmniSTAR VBS/ XP/HP/G2	27 + 1	DGHLMNR1	8.0 x 5.6 x 14.1cm	1lb (w/ batt.)	2.5m/60cm/3cm/1cm , 95%	na	1Hz, optional 10 & 20Hz	6
Geodetics Inc. *www.geodetics.com*	Geo-iNAV	All in view	GPS L1 C/A code, 24 GPS; (L2 optional, SAASM optional)	All in view	Inertial Navigation System for Low-High Dynamic Platforms, UAV, UGV, USV	4.74 x 1.81 x 3.95in	1lbs 6oz	< 1.5 meter CEP / < 5cm CEP / < 5cm CEP	15 ns	1 to 0.1	5
GEOsat *www.geosat.de* *www.geosat.eu*	MXbox Hybrid	14 L1 (GPS), 12 L1 (Glonass), 2 SBAS; 28 total	L1, C/A CP smoothed, Glonass L1, SBAS, Beacon	28	GHLR1	115 x 115 x 40mm	0, 35kg	1, 5 m/0.4 m/nr/nr RMS	nr	1Hz	6
	GEOmeter MX	8 L1 (GPS), 4 L1 (Glonass), 2 SBAS; 14 total	L1, C/A CP smoothed, Glonass L1, SBAS, Beacon	14	GHLR1	180 x 100 x 40mm	1.2kg	3 m/0.5 m/nr/nr RMS	nr	1Hz	4
	GEObox smart 11	65 L1 (GPS)	L1, C/A	12	NV1	120 x 60 x 40mm	0.15kg	5 m/1 m/nr/nr CEP	nr	1Hz	4
GlobalTop Technology *www.gtop-tech.com*	FGPMMOPA6C	66 Channels All in View Tracking	GPS L1 C/A code	66	ACDGHLMMetNPRSTV2	16 x 16 x 6.2mm	< 6g	Without aid: 3.0m (50% CEP), DGPS (SBAS(WAAS, EGNOS, MSAS)): 2.5m (50% CEP)	10 ns RMS	Up to 10Hz(Default: 1Hz)	<
	FGPMMOPA6H	as above	GPS L1 C/A code	66	ACDGHLMMetNPRSTV2	16 x 16 x 4.7mm	< 4g	Without aid: 3.0m (50% CEP), DGPS (SBAS(WAAS, EGNOS, MSAS)): 2.5m (50% CEP)	10 ns RMS	Up to 10Hz(Default: 1Hz)	<
	Gmm-u2p	as above	GPS L1 C/A code	66	ACDGHLMMetNPRSTV2	9 x 12.7 x 2.1mm	< 1g	as above	10 ns RMS	Up to 10Hz(Default: 1Hz)	<
	FGPMMOSL3C	as above	GPS L1 C/A code	66	ACDGHLMMetNPRSTV2	11.5 x 13 x 2.1mm	< 2g	as above	10 ns RMS	Up to 10Hz(Default: 1Hz)	<
	Gmm-g3	99 channels	GPS/Glonass/Galileo (on request)	99	ACDGHLMMetNPRSTV2	11.5 x 13 x 2.1mm	< 1g	Without aid: 3.0m (50% CEP), DGPS (SBAS(WAAS, EGNOS, MSAS)): 2.5m (50% CEP)	10 ns RMS	Up to 10Hz(Default: 1Hz)	<
	Gms-g6	99 channels	GPS/Glonass/Galileo (on request)	99	ACDGHLMMetNPRSTV2	16 x 16 x 6.8mm	< 6g	Without aid: 3.0m (50% CEP), DGPS (SBAS(WAAS, EGNOS, MSAS)): 2.5m (50% CEP)	10 ns RMS	Up to 10Hz(Default: 1Hz)	<
Hemisphere GNSS *www.hemispheregnss.com*	A101 Smart Antenna	12 par.	L1 only, C/A–code & CP (SBAS)	12	AGLMNPRV1	5.7 x 4.1in	1.23lb	1.5m/0.3m/1cm/5mm 1-sigma	50	0.05	6
	A325 GNSS Smart Antenna	117 par. + 1	L1/L2, C/A & P code & CP, (SBAS), L-Band and GLONASS	27 + 1	AGLMNPRV1	4.09 x 5.7in	1.23lb	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	Crescent P102 OEM Board	12 par.	L1 only, C/A–code & CP (SBAS)	12	AGLMNPRV2	1.6 x 0.5 x 2.8in	<0.7oz	1.5m/0.3m/1cm/5mm 1-sigma	50	0.05	6
	Eclipse P302 OEM Module	117 par	L1/L2, C/A & P code & CP, (SBAS) and GLONASS	27	AGLMNPRV2	1.6 x 0.5 x 2.8in	<0.7oz	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	Eclipse P306 OEM Module	372 par	L1/L2, C/A & P code & CP, (SBAS) and GLONASS, BeiDou B1/B2/B3, Galileo E1/E5a/E5b, QZSS	89	AGLMNPRV2	1.6 x 0.5 x 2.8in	<0.8oz	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	Eclipse P320 GNSS OEM Module	117 par. + 1	L1/L2, C/A & P code & CP, (SBAS), L-Band and GLONASS	27 + 1	AGLMNPRV2	2.8 x 0.5 x 4.3in	<2.5oz	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	PA300 GNSS Smart Antenna Module	117 par	L1/L2, C/A & P code & CP, (SBAS) and GLONASS	27	AGLMNPRV2	3.2 x 2.0 x 1.5in	<4.7oz	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	R330 GNSS Receiver	117 par. + 1	L1/L2, C/A & P code & CP, (SBAS), L-Band, GLONASS and Beacon	27 + 1	AGLMNPRV2	4.7 x 1.8 x 7.0in	1.42lb	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	S320 GNSS Survey Receiver	117 par. + 1	L1/L2, C/A & P code & CP, (SBAS), L-Band and GLONASS	27 + 1	AGLMNPRV1	4.5 x 7.8in	3.3lb	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	SBX-4 (OEM)	2 par.	RTCM SC–104	na	GLMNPV2	2.0 x 0.54 x 3.0in	<1.0oz	na/na/na/na	na	na	<
	Vector H102 GPS Compass Module	12 par. (x2)	L1 only, C/A–code & CP (SBAS)	12	AGLMNOPV2	14.8 x 4.1 x 1.0in	<8.8oz	1.5m/0.3m/1cm/5mm 1-sigma	50	0.05	6
	Vector H200 GNSS Compass Module	117 par. (x2)	L1, C/A-code & CP, (SBAS) and GLONASS	27	AGLMNOPRV2	2.8 x 0.2 x 4.3in	<1.8oz	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	4
	Vector H320 GNSS Compass Module	117 par. (x2) + 1	L1/L2, C/A & P code & CP, (SBAS), L-Band and GLONASS	27 + 1	AGLMNOPRV2	2.8 x 0.6 x 6.0in	<3.7oz	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	Vector V102 GPS Compass	12 par. (x2)	L1 only, C/A–code & CP (SBAS)	12	AGLMNOPV1	16.4 x 6.2 x 2.7in	3.3lb	1.5m/0.3m/1cm/na 1-sigma	50	0.05	6
	Vector V103 GPS Compass	117 par. (x2)	L1, C/A-code & CP, (SBAS) and GLONASS	27	AGLMNOPV1	8.2 x 5.7 x 26.1in	5.4lb	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	Vector VS131 GNSS Compass	117 par. (x2)	L1, C/A-code & CP, (SBAS) and GLONASS	27	AGLMNOPV1	4.7 x 3.0 x 8.0in	2.5lb	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	6
	Vector VS330 GNSS Compass	117 par. (x2) + 1	L1/L2, C/A & P code & CP, (SBAS), L-Band and GLONASS	27 + 1	AGLMNOPV1	4.7 x 3.0 x 8.0in	2.5lb	1.5m/0.3m/1cm/5mm 1-sigma	20	0.05	4
IFEN GmbH *www.ifen.com*	SX-NSR	user-defined, Multi- & vector-, correlator	up to 8 (with 2nd RF front-end)) signal chains tracked in real-time in parallel, GPS L1 C/A, L2 P, L2C, L5, Galileo E1, E5a, E5b, E5 AltBOC, E6, GLONASS G1 C/A, G2 C/A, BeiDou B1, B2	user-defined	LNP1	15.7 x 6.9 x 18.0cm	3.5lb	~10m (95%); Code accuracy: <20cm; Carrier accuracy: < 1mm	<10 ns	up to 25Hz PVT	<
	NavX-NTR	120 par., Narrow, correlator	GPS L1 C/A, L2 P, L2C, L5, Galileo E1, E5ab, E6, GLONASS G1 C/A & P, GLONASS G2 P, BeiDou ready	60	NP1	19" x 2HU x 33cm	19.8lb	~10m (95%)	<10 ns	10Hz PVT	<
ikeGPS *www.ikeGPS.com*	ike300	16ch	GPS L1 C/A code, CP 16 GPS	16	DGH1	28 x 11 x 6		0.6m CEP (SBAS)/1.5m CEP autonomous	na	1Hz PVT	<
	ike1000	16ch	GPS L1 C/A code, CP 16 GPS	16	DGH1	28 x 11 x 6		0.6m CEP (SBAS)/1.5m CEP autonomous	na	1Hz PVT	<
Interstate Electronics Corporation *www.iechome.com*	TruTrak for projectile	12 dedicated or multiplexed	L1 only, L2 optional C/A– and P–code, Y–code	12	D	6.2 x 3.9 x 0.5in	<0.25lb	ITAR Controlled - Data available upon request	100	0.5	1

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
		-	-	2	Board to Board Connector, (10MHz, 1PPS, NMEA, TOD), MCX Connector (10MHz)	38400	-20 to +80	ext	Warm up:<14W, Steady state :<10W	Active	GPS Disciplined 10MHz via OXCO oscillator, Hold Over:<±8usec/24h
l	60s	35s	<1s	2	Bluetooth, RS-232 (all independent)	4, 800 - 460, 800	-40 to +85	Ext (5V, 12V or 24V)	3.2 W	L1 GNSS Active	The SXBlue series make optimal use of SBAS signals for ground users
l	60s	35s	<1s	3	Bluetooth, USB, RS-232 (all independent)	4, 800 - 115, 200	-40 to +85	Integrated battery	1.9 W	L1 GPS Active	to provide submeter realtime positioning all the time
l	60s	35s	<1s	3	Bluetooth, USB, RS-232 (all independent)	4, 800 - 460, 800	-40 to +85	Integrated battery	3.3 W	L1 GNSS Active	to provide submeter realtime positioning all the time
l	60s	35s	<1s	3	Apple Bluetooth, USB, RS-232 (all independent)	4, 800 - 460, 800	-40 to +85	Integrated battery	3.3 W	L1 GNSS Active	Apple iOS Bluetooth compatible for submeter work. Similar to SXBlue II GNSS.
l	60s	35s	<1s	3	Bluetooth, USB, RS-232 (all independent)	4, 800 - 230, 400	-40 to +70	Integrated battery	2.9 W	L1 GPS/LBand Active	Worldwide Portable OmniSTAR receiver (VBS Service). Integrated Battery.
l	60s	35s	<1s	3	Bluetooth, USB, RS-232 (all independent)	4, 800 - 230, 400	-40 to +85	Integrated battery	2.5 W	Combined L1 GPS/DGPS Beacon	Portable DGPS Beacon receiver. Integrated battery.
	60s	35s	<1s	2	Bluetooth, RS-232 (all independent)	4, 800 - 460, 800	-40 to +85	Ext (5V, 12V or 24V)	3.3 W	L1/L2 GNSS Active	Dual Frequency GPS+GLONASS (external power)
	60s	35s	<1s	3	Bluetooth, USB, RS-232 (all independent)	4, 800 - 460, 800	-20 to +60 (batttery)	Integrated battery	3.3 W	L1/L2 GNSS Active	Dual Frequency RTK GPS+GLONASS. Integrated battery.
	60s	35s	<1s	3	Bluetooth, USB, RS-232 (all independent)	4, 800 - 460, 800	-20 to +60 (batttery)	Integrated battery	3.9 W	L1/L2/LBand GNSS Active	Apple iOS Bluetooth compatible for centimeter work. Similar to SXBlue III GNSS.
	60s	35s	<1s	3	Bluetooth, USB, RS-232 (all independent)	4, 800 - 460, 800	-20 to +60 (batttery)	Integrated battery	3.9 W	L1/L2/LBand GNSS Active	Dual Frequency GNSS, Worldwide 10cm with OmniSTAR G2 service. Integrated battery.
	50s ± 15s	30s	3s	4	Serial, Ethernet, RF link TDMA	Programmable	-40c to +85c	External 10-30 VDC @2 AMPS	5	External	Fully Integrated Inertial Navigation System for Low-High Dynamic Platforms, UAV, UGV, USV
	60s	35s	0.5s	2	RS-232, USB, BT	9.600 - 115.200	–40 to +85	ext, 12 V	1	L1 GNSS (E) Beacon	SBAS and/or beacon and/or GPRS (NTRIP)
	40s	15s	2s	2	RS-232, USB, BT	38, 400	–40 to +85	ext, 12 V	1	L1 GNSS (E) Beacon	SBAS and/or beacon and/or GPRS, PDA-unit
	45s	38s	1s	7	3 digital, 1 analog	19, 200	–10 to +85	ext. 8 –30 V	0.2	L1 (E)	SBAS, GPRS modem
lt:	<<35s	<33s	<1s	1	UART	4, 800–115, 200	–40 to +85	ext	66 mW	Ceramic Patch Antenna	MTK (MediaTek) 3339 chipset, low power consumption, advanced software supported
lt:	<<35s	<33s	<1s	1	UART	4, 800–115, 200	–40 to +85	ext	66 mW	1. Ceramic Patch Antenna, 2. Support for External Antenna	MTK (MediaTek) 3339 chipset, additional ext antenna supported
lt:	<<35s	<33s	<1s	2	UART	4, 800–115, 200	–40 to +85	ext	50 mW	ext	MTK (MediaTek) 3339 chipset, low power consumption, advanced software supported
lt:	<<35s	<33s	<1s	2	UART	4, 800–115, 200	–40 to +85	ext	50 mW	ext	MTK (MediaTek) 3339 chipset, additional ext antenna supported
lt:	<<35s	<33s	<1s	2	UART	4, 800–115, 200	–40 to +85	ext	96 mW	ext	MTK (MediaTek) 3333 chipset, additional ext antenna supported
lt:	<<35s	<33s	<1s	2	UART	4, 800–115, 200	–40 to +85	ext	77mW	Ceramic Patch Antenna	MTK (MediaTek) 3333 chipset, advanced software supported
	60s	30s	<10s	2	RS-232, CAN	4, 800–115, 200	–30 to +70	External	<3	Integrated GPS+SBAS	GPS and SBAS smart antenna
	60s	30s	<10s	2	RS-232, Bluetooth, CAN	10/100 Mbps	-10 to +60	External	<4.6	GPS + SBAS + Lband + GLONASS (ER) (inc.)	L1/L2 GPS & GLONASS, OmniSTAR VBS/HP/XP/G2, SBAS and Bluetooth smart antenna
	60s	30s	<10s	4	3.3 V HCMOS	4, 800–115, 200	–30 to +70	External	<1.0	GPS + SBAS (ER)	GPS and SBAS receiver module
	60s	30s	<10s	6	3.3 V HCMOS, USB	4, 800–115, 200	-40 to +85	External	<1.9	GPS + SBAS + GLONASS + Galileo (ER)	L1/L2 GPS & GLONASS and SBAS receiver module
	60s	30s	<10s	6	3.3 V HCMOS, USB	4, 800–115, 200	-40 to +85	External	<2.55	GPS + SBAS + GLONASS + Galileo + BeiDou (ER)	Dual / Triple frequency GPS, GLONASS, BeiDou, Galileo, QZSS and SBAS receiver module
	60s	30s	<10s	5	3.3 V HCMOS, USB	4, 800–115, 200	–40 to +70	External	<2.5	GPS + SBAS + Lband + GLONASS (ER)	L1/L2 GPS & GLONASS, OmniSTAR VBS/HP/XP/G2, and SBAS receiver module
	60s	30s	<10s	2	3.3 V HCMOS	4, 800–115, 200	–30 to +70	External	<1.9	Integrated GPS + SBAS + GLONASS (ER)	L1/L2 GPS & GLONASS and SBAS smart antenna module
	60s	30s	<15s	2	RS-232	4, 800–115, 200	–40 to +70	External	<4.6	L1/L2 GPS + SBAS + Lband + GLONASS (ER) (inc.) + Beacon	L1/L2 GPS & GLONASS, OmniSTAR VBS/HP/XP/G2, Beacon, SBAS and USB logging receiver
	60s	30s	<10s	6	RS-232 (Multi-Use), RS-232, Bluetooth, USB, Bluetooth, SD, UHF, GSM	4, 800–38, 400	–30 to +70	Internal w/ Option of External	Rover: 4.4 Base Tx UHF: 7	Integrated GPS + SBAS + Lband + GLONASS (ER)	L1/L2 GPS & GLONASS, OmniSTAR VBS/HP/XP/G2, SBAS, UHF radio, GSM, SD & USB logging, Bluetooth smart antenna
	<60s	30s	<10s	2	3.3 V HCMOS	4, 800–115, 200	–30 to +70	External	<0.25	Beacon (ER)	61108-4 compliant beacon board with database search receiver module
	60s	30s	<10s	2	RS-232, NMEA2000	4, 800–115, 200	–40 to +70	External	<3	GPS + SBAS (ER)	GPS and SBAS compass smart antenna receiver module
	40s	20s	<10s	6	3.3 V HCMOS, USB	4, 800–115, 200	-40 to +85	External	<2.1	GPS + GLONASS + Galileo + Lband + SBAS (ER)	GPS & GLONASS, SBAS compass receiver module
	60s	30s	<10s	5	3.3 V HCMOS, USB	4, 800–115, 200	–30 to +70	External	<3.25	L1/L2 GPS + GLONASS + Galileo + Lband + SBAS (ER)	L1/L2 GPS & GLONASS, OmniSTAR VBS/HP/XP/G2 compass receiver module
	60s	30s	<10s	2	RS-232, NMEA2000	4, 800–115, 200	-40 to +70	External	<3	Integrated GPS + SBAS	GPS and SBAS compass receiver
	60s	30s	<10s	2	RS-232, RS-422	480 Mbps USB	–30 to +70	External	<5	Integrated GNSS + SBAS (optional Beacon)	GPS, GLONASS and SBAS compass receiver with integrated antennas (optional beacon differential)
	60s	20s	<10s	3	RS-232, USB	4, 800–115, 200	–30 to +70	External	<4.6	GPS + GLONASS + Galileo + Lband + SBAS + Beacon (ER)	GPS and GLONASS compass receiver with OmniSTAR VBS, SBAS and beacon differential
	40s	20s	<10s	3	RS-232, RS-422, USB	4, 800–115, 200	–30 to +70	External	<6.2	L1/L2 GPS + GLONASS + Galileo + Lband + SBAS + Beacon (ER)	L1/L2 GPS and GLONASS compass receiver with OmniSTAR VBS/HP/XP/G2, SBAS and Beacon differential, USB logging
	<55s	<10s	<1s	1 (2)	1 USB 2.0		-10 to +50	external	<7.5W	Active, external	Multi-frequency real-time software receiver with dual antenna feature, external sensor data interface. E.g. for scientific applications, fully flexible and open system includes external notebook.
	<60s	<30s	<1s	1	1 Ethernet		-10 to +50	ext (AC/DC)	90W	Active, external	Monitoring and reference station applications
	<35s	<20s	<5s	1	USB, RS232	153.6k (nominal)	–42 to +85	int	na	Internal Patch	internal Laser rangefinder (300m), compass and camera. For measuring remote GPS positions and measuring dimensions from images
	<35s	<20s	<5s	1	USB, RS232	9, 600 (nominal)	–20 to +70	int	na	Internal Patch	internal Laser rangefinder (300m), compass and camera. For measuring remote GPS positions and measuring dimensions from images
	120s	35s	5s	2	RS-422, TTL	153.6k (nominal)	–40 to +85	ext	3 (typ)	E	

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	TruTrak Locator	12 dedicated	L1/L2 C/A and P(Y)	12	D	4.0 x 2.3 (flares to 2.65) x 0.495in	<0.25lb	ITAR Controlled - Data available upon request	100	1	1
	TruTrak Munitions	12 dedicated or multiplexed	L1/L2 C/A and P(Y)	12	D	3.42 x 3.42 x 0.495in	<0.25lb	ITAR Controlled - Data available upon request	100	0.5 or 1	1
	TruTrak Evolution DS	24 dedicated	L1/L2 C/A and P(Y)	12	D	1.75 x 2.45in	35g	ITAR Controlled - Data available upon request	Data available upon request	Data available upon request	D a u n
	TruTrak Evolution SS	12 dedicated	L1 C/A and P(Y)	12	D	3.07 x 0.93in with tabs to 1.49in	23g	ITAR Controlled - Data available upon request	as above	as above	a
	TruTrak Type II	24 dedicated	L1/L2 C/A and P(Y)	12	D	1.76 x 0.368 x 2.45	35g	ITAR Controlled - Data avliable upon request	40 ns		<
	TruTrak DM	24 dedicated	L1/L2 C/A and P(Y)	12	D	2.46 x 0.347 x 2.49		ITAR Controlled - Data avliable upon request	40 ns		D a n
Jackson Labs Technologies, Inc. *www.jackson-labs.com*	SAASM CSAC (SAASM Chip Scale Cesium Atomic Clock) GPSDO	12 par.	L2, L1, Y(P), C/A, SAASM	12	ADLMMETNOT2	3 x 2.9 x 1in	<3oz	<2m RMS	<15ns RMS	1Hz	<
	HD CSAC (Chip Scale Cesium Atomic Clock) SWAP optimized GPSDO	50 par.	L1, C/A, WAAS, EGNOS, SBAS	50	ADLMMETNOT2	2 x 2.5 x 0.5in	<2oz	<2m RMS	<15ns RMS	1Hz	<
	CSAC (Chip Scale Cesium Atomic Clock) GPSDO	50 par.	L1, C/A, WAAS, EGNOS, SBAS	50	ADLMMETNOT2	3 x 2.5 x 0.5in	<2oz	<2m RMS	<15ns RMS	1Hz	<
	FireFly-IIA 10MHz GPSDO	50 par.	L1, C/A, WAAS, EGNOS, SBAS	50	ADLMMETNOTV2	1.5 x 3 x 1in	1.74oz	<2m RMS	<30ns RMS	1Hz	<
	Fury-DOCXO 10MHz GPSDO	12 par.	L1, C/A	12	ADLMMETNOT2	10.0 x 10.0 x 2.6cm	0.25lb	<5m RMS	<2ns RMS	1Hz	<
	FireFly-1A 10MHz GPSDO	50 par.	L1, C/A, WAAS, EGNOS, SBAS	50	ADLMMETNOTV2	1.0 x 2.5 x 0.5in	0.64oz	<2m RMS	<30ns RMS	1Hz	<
	ULN-2550 25MHz / 100MHz / 10MHz GPSDO	50 par.	L1, C/A, WAAS, EGNOS, SBAS	50	ADLMMETNOTV2	1.5 x 3.5 x 0.8in	1.8oz	<2m RMS	<30ns RMS	1Hz	<
	Mini-JLT GPSDO	50 par.	L1, C/A, WAAS, EGNOS, SBAS	50	ADLMMETNOTV2	5.05 x 1.38 x 0.7in	2oz	<2m RMS	<15ns RMS	1Hz	<
	LC_XO GPSDO 10MHz	50 par.	L1, C/A, WAAS, EGNOS, SBAS	50	ADLMMETNOTV2	0.97 x 0.97 x 0.5	<1oz	<2m RMS	<30ns RMS	1Hz	<
	HD CSAC SAASM GPSDO	12 par.	L2, L1, Y(P), C/A, SAASM	12	ADLMMETNOT2	2.85 x 2.0 x 0.5	<2oz	<2m RMS	<30ns RMS	1Hz	<
Japan Radio Co., Ltd. *www.jrc.co.jp/eng/*	GPS9 Series: CCA-700	16 channels + search channel	GPS/Galileo/SBAS/Quasi-zenith	16	CHLMNPV2	12.4 x 2.5 x 12.4mm	0.7g (approx)	2.3m typ., /2.0m typ., /na, (CEP)	na	1Hz	3
JAVAD GNSS *www.javad.com*	TRIUMPH-1	216	GPS CA/P1/P2/L2C/L5, Galileo E1/ E5A/E5B, GLONASS CA/P1/P2/L2C/L3, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1/E5B	all in view	1AGLMTNPROMet	178 x 96 x 178mm	1700g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	TRIUMPH-VS	216	GPS CA/P1/P2/L2C/L5, Galileo E1/ E5A/E5B, GLONASS CA/P1/P2/L2C/L3, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1/E5B	all in view	1GHLMTNPROMet	178 x 109 x 110mm	1700g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	TRIUMPH-NT	216	GPS CA/P1/P2/L2C/L5, Galileo E1/ E5A/E5B, GLONASS CA/P1/P2/L2C/L3, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1/E5B	all in view	1GHLMTNPROMet	178 x 100 x 110mm	1700g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	TRUMPH-4X	216	4x GPS CA/P1/P2/L2C/L5, 4x Galileo E1/E5A, 4x SBAS L1/L5, 4x QZSS CA/ SAIF/L2C/L5/L1C, 4x BeiDou E1	all in view	1AGLMTNPROMet	178 x 93 x 178mm	1850g	<2m/<0.5m /0.6cm+1 ppm/, 0.3cm+0.5 ppm	3	20Hz	<
	Alpha G3	216	GPS CA, Galileo E1, GLONASS CA, SBAS L1, QZSS CA/SAIF/L1C, BeiDou E1	all in view	1AGLMTNPROMet	148 x 85 x 35mm	430g	<2m/<0.5m /1.5cm+2 ppm/, 0.5cm+1.5ppm	3	100Hz	
	Alpha G2T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/E5A, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1	all in view	1AGLMTNPROMet	148 x 85 x 35mm	435g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5ppm	3	100Hz	
	Alpha G3T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/E5A, GLONASS CA/P1/P2/L2C, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/L1C, BeiDou E1	all in view	1AGLMTNPROMet	148 x 85 x 35mm	448g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	
	Alpha2-G3	216	GPS CA, Galileo E1, GLONASS CA, SBAS L1, QZSS CA/SAIF/L1C, BeiDou E1	all in view	1AGLMTNPROMet	148 x 85 x 35mm	430g	<2m/<0.5m /1.5cm+2 ppm/, 0.5cm+1.5 ppm	3	100Hz	
	Alpha2-G2	216	GPS CA, Galileo E1, SBAS L1, QZSS CA/SAIF/L1C, BeiDou E1	all in view	1AGLMTNPROMet	148 x 85 x 35mm	415g	<2m/<0.5m /1.5cm+2 ppm/, 0.5cm+1.5 ppm	3	100Hz	<
	Alpha2-G2T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/E5A, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1	all in view	1AGLMTNPROMet	148 x 85 x 35mm	435g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	
	Alpha2-G3T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/E5A, GLONASS CA/P1/P2/L2C, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/L1C, BeiDou E1	all in view	1AGLMTNPROMet	148 x 85 x 35mm	448g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	
	Delta G2T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/E5A, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1	all in view	1AGLMTNPROMet	109 x 35 x 169mm	394g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Delta G3T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/ E5A/E5B, GLONASS CA/P1/P2/L2C/L3, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1/E5B	all in view	1AGLMTNPROMet	109 x 35 x 169mm	401g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Delta-G3TAJ	216	GPS CA/P1/P2/L2C/L5, Galileo E1/ E5A/E5B, GLONASS CA/P1/P2/L2C/L3, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1/E5B	all in view	1AGLMTNPROMet	109 x 35 x 169mm	401g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Delta D-G2	216	2x GPS CA, 2x Galileo E1, 2x SBAS L1, 2x QZSS CA/SAIF/L1C, 2x BeiDou E1	all in view	1AGLMTNPROMet	109 x 35 x 169mm	414g	<2m/<0.5m /1.5cm+2 ppm/, 0.5cm+1.5 ppm	3	100Hz	<
	Delta D-G2D	216	2x GPS CA/P1/P2/L2C, 2x Galileo E1, 2x SBAS L1, 2x QZSS CA/SAIF/L2C/ L1C, 2x BeiDou E1	all in view	1AGLMTNPROMet	109 x 35 x 169mm	414g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Delta D-G3D	216	2x GPS CA/P1/P2/L2C, 2x Galileo E1, 2x Glonass CA/P1/P2/L2C, 2x SBAS L1, 2x QZSS CA/SAIF/L2C/L1C, 2x BeiDou E1	all in view	1AGLMTNPROMet	109 x 35 x 169mm	414g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Delta Q-G3D	216	4x GPS CA/P1/P2/L2C, 4x Galileo E1, 1x Glonass CA/P1/P2/L2C, 4x SBAS L1, 4x QZSS CA/SAIF/L2C/L1C, 4x BeiDou E1	all in view	1AGLMTNPROMet	109 x 35 x 169mm	454g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Sigma G2T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/E5A, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1	all in view	1AGLMTNPROMet	132 x 61 x 190mm	1270g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	120s	35s	5s	2	Serial RS-232 Serial TTL - CDU (debug)	Data available upon request	Data available upon request	ext	3 (typ)	E	
	120s	35s	5s	2	Serial RS-422 Serial TTL - CDU (debug)	as above	as above	ext	3 (typ)	E	
on	Data available upon request	Data available upon request	Data available upon request	3	COM1 (either RS-232 or CMOS), COM2 (CMOS), DS-101/102, TOD and 1PPS			Input power 3.3 VDC	Data available upon request	Two active	Fully security approved configuration
	as above	as above	as above	3	1 x RS 232 and 2 x CMOS serial ports, DS-101, TOD and 1-10PPS			as above	as above	Passive	as above
	<120s	<60	Data Avaliable on request		8 serial data ports, 2RS - 232 2 SPI (7 slaves) 2 SDLC AMRAAM IMU Ports 21 general purpose I/O Extrenal 10MHz input		- 40 to +85	3.3	1.5	Passive and Active	
	Data avliable on request		Data avliable on request		5 x RS - 422 supports SDLC/ AMRAAM DS101/102 TOD & 1PPS	4800 NMEA and 57, 600 SiRF Binary	–40to +85	3.3	2	Passive	
	<45s	<1s	<1s	2	DS101 Key-Port, RS-232, USB, Alarm, 10MHz, 5MHz, 1PPS, LCD port	9, 600 - 115, 200	-45 to +85˚	8.0-36.0 V	<2.7W	5V	SAASM GPS with Y(P) code (Keyed), C/A code, and Chip Scale Cesium Atomic Clock, two NMEA and SCPI ports
	<45s	<1s	<1s	2	RS-232, Alarm, 10MHz, 1PPS	9, 600 - 115, 200	-20 to +85˚	11.0-14.0 V	<1.2W	5V	Chip Scale Cesium Atomic Clock with GPS Disciplining, low Size Weight And Power optimized
	<45s	<1s	<1s	2	RS-232, USB, Alarm, 10MHz, 5MHz, 1PPS, LCD port	9, 600 - 115, 200	-20 to +85˚	8.0-36.0 V	<1.4W	5V	Chip Scale Cesium Atomic Clock with GPS Disciplining, two NMEA and SCPI ports, and Distribution Amplifier with 5 isolated outputs
	<45s	<1s	<1s	1	RS-232, Alarm, 10MHz, 1PPS	9, 600 - 115, 200	-20 to +85˚	11.0-14.0 V	<3.5W	5V	Built-In 10MHz Distribution Amplifier, 3-Axis Accelerometer, low-g option
	<150s	<40s	<1s	1	RS-232, Alarm, 10MHz, 1PPS	9, 600 - 115, 200	-20 to +85˚	11.0-14.0 V	<4.5W	3.3V or 5V	Rubidium Oscillator Replacement
	<45s	<1s	<1s	1	RS-232, Alarm, 10MHz, 1PPS	9, 600 - 115, 200	-20 to +85˚	8.0-14.0 V	<1.4W	3.3V	Ultra small and light GPS Disciplined Oscillator
	<45s	<1s	<1s	1	RS-232, Alarm, 10/25/50/100MHz, 1PPS	115, 200	-20 to +85˚	11.0-14.0 V	<3.5W	5V	Adds four 25MHz LVDS outputs (50MHz option), a 100MHz output, and a 10MHz output
	<45s	<1s	<1s	2	TTL/USB NMEA-0183, SCPI, 10MHz	9600bps async	-30 to +70	5V	<2.5W	3.3V/5V	Trimble™ Mini-T™ Legacy Replacement unit with improved phase noise, ADEV, and wider temp-range, Form-Fit-Function compatible
	<45s	<1s	<1s	1	TTL NMEA-0183, SCPI, 10MHz	9, 600 - 115, 200	-35 to +75	3.3V	<0.55W	5V	Socketable Low Cost GPSDO module with 1 inch square footprint and 10MHz output
	<60s	<1s	<1s	1	RS-232 NMEA-0183, SCPI, 10MHz, DS-101 KeyFill Port	9, 600 - 115, 200	-45 to +85	8.V-16V	<1.0W	3.3V	Ultra Small and Ultra Low Power SAASM GPS with Y(P), C/A code, and Chip Scale Cesium Atomic Clock.
	35s typ.	33s typ.	3s typ. (within 5 sec. block out)	1	1 UART	480 Mbps, 480 Mbps, 10/100 Mbps, 54 Mps, 2 Mbps	-35 to +75	ext	140mW, @3.3V	Active, Includes Pre-amplifier	Galileo:Hardware Ready
	<35s	<5s	<1s	2111111	RS232; USB; Ethernet; Wi-Fi; Bluetooth; 1PPS; Event Marker	480 Mbps, 480 Mbps, 10/100 Mbps, 54 Mps, 2 Mbps	-35 to +75	ext/int	4.5	I/E	2048MB memory, UHF/FH radio, GSM/GPRS/ EDGE/CDMA modem
	<35s	<5s	<1s	1111111	USB OTG; USB; Ethernet; Wi-Fi; Bluetooth; 1PPS; Event Marker/Ext. Freq In/Out	480 Mbps, 480 Mbps, 10/100 Mbps, 54 Mps, 2 Mbpsove	-35 to +75	ext/int	8	I/E	2048 MB embedded memory, 800x480 colour TFT LCD, 600 MHz processor running WinCE 6.0, removable microSD card, UHF/FH radio, GSM/GPRS/EDGE modem
	<35s	<5s	<1s	1111111	USB OTG; USB; Ethernet; Wi-Fi; Bluetooth; 1PPS; Event Marker or Ext. Freq In/Out	460.8 kbps, 12 Mbps, 2 Mbps	-35 to +75	ext/int	7.5	E	2048 MB embedded memory, 800x480 colour TFT LCD, 600 MHz processor running WinCE 6.0, removable microSD card, GSM/GPRS/ EDGE modem
	<35 s	<5 s	<1 s	21111	RS232; USB; Ethernet; Wi-Fi; Bluetooth	460.8 kbps, 12 Mbps, 2 Mbps	-35 to +75	ext/int	6.2	I/E	2048MB memory, UHF/FH radio, GSM/GPRS/ EDGE/CDMA modem
				11111	RS232, USB/RS232, Bluetooth, 1PPS/IRIG, Event Marker	460.8 kbps, 12 Mbps, 2 Mbps	-35 to +75	ext/int	1.8	E	256MB memory, GSM/GPRS modem
				11111	RS232, USB/RS232, Bluetooth, 1PPS/IRIG, Event Marker	460.8 kbps, 12 Mbps, 2 Mbps	-35 to +75	ext/int	1.9	E	256MB memory, GSM/GPRS modem
				11111	RS232, USB/RS232, Bluetooth, 1PPS/IRIG, Event Marker	460.8 kbps, 12 Mbps, 2 Mbps	-35 to +75	ext/int	2.6	E	256MB memory, GSM/GPRS modem
				11111	RS232, USB/RS232, Bluetooth, 1PPS/IRIG, Event Marker	460.8 kbps, 12 Mbps, 2 Mbps	-35 to +75	ext	1.6	E	256MB memory
	<35s	<5s	<1s	11111	RS232, USB/RS232, Bluetooth, 1PPS/IRIG, Event Marker	460.8 kbps, 12 Mbps, 2 Mbps	-35 to +75	ext	1.4	E	256MB memory
				11111	RS232, USB/RS232, Bluetooth, 1PPS/IRIG, Event Marker	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 1 Mps	-35 to +75	ext	1.7	E	256MB memory
				11111	RS232, USB/RS232, Bluetooth, 1PPS/IRIG, Event Marker	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 1 Mps	-35 to +75	ext	2.4	E	256MB memory
	<35s	<5s	<1s	31111221	RS232; RS422; USB; Ethernet; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 1 Mps	-35 to +75	ext	2.5	E	2048MB memory
	<35s	<5s	<1s	31111221	RS232; RS422; USB; Ethernet; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 1 Mps	-35 to +75	ext	3.4	E	2048MB memory
	<35s	<5s	<1s	31111221	RS232; RS422; USB; Ethernet; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 1 Mps	-35 to +75	ext	4.2	E	2048MB memory; , In Band Interference Rejection
	<35s	<5s	<1s	31111221	RS232; RS422; USB; Ethernet; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 1 Mps	-35 to +75	ext	2.2	E	2048MB memory
	<35s	<5s	<1s	31111221	RS232; RS422; USB; Ethernet; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 1 Mps	-35 to +75	ext	2.2	E	2048MB memory
	<35s	<5s	<1s	31111221	RS232; RS422; USB; Ethernet; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 2 Mbps, 1 Mps	-35 to +75	ext	3.9	E	2048MB memory
	<35s	<5s	<1s	31111221	RS232; RS422; USB; Ethernet; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8kbps, 460.8kbps, 480Mbps, 10/100 Mbps, 2 Mbps, 1Mps	-35 to +75	ext	5.2	E	2048MB memory
	<35s	<5s	<1s	211111221	RS232; RS422; USB; Ethernet; Bluetooth; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 2 Mbps, 1 Mps	-35 to +75	ext/int	3.3	E	2048MB memory, UHF/FH radio, GSM/GPRS/ EDGE modem

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	Sigma G3T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/ E5A/E5B, GLONASS CA/P1/P2/L2C/L3, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1/E5B	all in view	1AGLMTNPROMet	132 x 61 x 190mm	1277g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Sigma G3TAJ	216	GPS CA/P1/P2/L2C/L5, Galileo E1/ E5A/E5B, GLONASS CA/P1/P2/L2C/L3, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1/E5B	all in view	1AGLMTNPROMet	132 x 61 x 190mm	1270g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Sigma D-G2	216	2x GPS CA, 2x Galileo E1, 2x SBAS L1, 2x QZSS CA/SAIF/L1C, 2x BeiDou E1	all in view	1AGLMTNPROMet	132 x 61 x 190mm	1290g	<2m/<0.5m /1.5cm+2 ppm/, 0.5cm+1.5 ppm	3	100Hz	<
	Sigma D-G2D	216	2x GPS CA/P1/P2/L2C, 2x Galileo E1, 2x SBAS L1, 2x QZSS CA/SAIF/L2C/ L1C, 2x BeiDou E1	all in view	1AGLMTNPROMet	132 x 61 x 190mm	1290g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Sigma D-G3D	216	2x GPS CA/P1/P2/L2C, 2x Galileo E1, 2x Glonass CA/P1/P2/L2C, 2x SBAS L1, 2x QZSS CA/SAIF/L2C/L1C, 2x BeiDou E1	all in view	1AGLMTNPROMet	132 x 61 x 190mm	1290g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Sigma Q-G3D	216	4x GPS CA/P1/P2/L2C, 4x Galileo E1, 1x Glonass CA/P1/P2/L2C, 4x SBAS L1, 4x QZSS CA/SAIF/L2C/L1C, 4x BeiDou E1	all in view	1AGLMTNPROMet	132 x 61 x 190mm	1330g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	GISmore	216	GPS CA, Galileo E1, GLONASS CA, SBAS L1, QZSS CA/SAIF/L1C, BeiDou E1	all in view	1GORPV	79 x 36 x 131mm	303g	<3m/<0.5m /1.5cm+2 ppm/, 0.7cm+1.5 ppm	3	100Hz	<
	TR-G2	216	GPS CA, Galileo E1, SBAS L1, QZSS CA/SAIF/L1C, BeiDou E1	all in view	2AGLMTNPROMet	55 x 40 x 13mm	21g	<2m/<0.5m /1.5cm+2 ppm/, 0.5cm+1.5 ppm	3	100Hz	<
	TR-G3	216	GPS CA, Galileo E1, GLONASS CA, SBAS L1, QZSS CA/SAIF/L1C, BeiDou E1	all in view	2AGLMTNPROMet	57 x 66 x 12mm	34g	<2m/<0.5m /1.5cm+2 ppm/, 0.5cm+1.5 ppm	3	100Hz	<
	TR-G2T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/E5A, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1	all in view	2AGLMTNPROMet	57 x 66 x 12mm	34g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	TR-G3T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/E5A, GLONASS CA/P1/P2/L2C, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/L1C, BeiDou E1	all in view	2AGLMTNPROMet	57 x 88 x 12mm	47g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	TRE-G2T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/E5A, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1	all in view	2AGLMTNPROMet	100 x 80 x 14mm	70g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	TRE-G3T	216	GPS CA/P1/P2/L2C/L5, Galileo E1/ E5A/E5B, GLONASS CA/P1/P2/L2C/L3, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1/E5B	all in view	2AGLMTNPROMet	100 x 80 x 14mm	77g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	TRE-G3TAJ	216	GPS CA/P1/P2/L2C/L5, Galileo E1/ E5A/E5B, GLONASS CA/P1/P2/L2C/L3, SBAS L1/L5, QZSS CA/SAIF/L2C/L5/ L1C, BeiDou E1/E5B	all in view	2AGLMTNPROMet	100 x 80 x 14mm	77g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Duo-G2	216	2x GPS CA, 2x Galileo E1, 2x SBAS L1, 2x QZSS CA/SAIF/L1C, 2x BeiDou E1	all in view	2AGLMTNPROMet	100 x 80 x 14mm	90g	<2m/<0.5m /1.5cm+2 ppm/, 0.5cm+1.5 ppm	3	100Hz	<
	Duo-G2D	216	2x GPS CA/P1/P2/L2C, 2x Galileo E1, 2x SBAS L1, 2x QZSS CA/SAIF/L2C/ L1C, 2x BeiDou E1	all in view	2AGLMTNPROMet	100 x 80 x 14mm	90g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Duo-G3D	216	2x GPS CA/P1/P2/L2C, 2x Galileo E1, 2x Glonass CA/P1/P2/L2C, 2x SBAS L1, 2x QZSS CA/SAIF/L2C/L1C, 2x BeiDou E1	all in view	2AGLMTNPROMet	100 x 80 x 14mm	90g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
	Quattro-G3D	216	4x GPS CA/P1/P2/L2C, 4x Galileo E1, 1x Glonass CA/P1/P2/L2C, 4x SBAS L1, 4x QZSS CA/SAIF/L2C/L1C, 4x BeiDou E1	all in view	2AGLMTNPROMet	100 x 120 x 14mm	130g	<2m/<0.5m /1cm+1 ppm/, 0.3cm+0.5 ppm	3	100Hz	<
John Deere *www.JohnDeere.com*	SF3000	66 par.	GPS L1 C/A, L1/L2 P/Y and carrier phase, GLONASS G1 and G2, SP and HP and carrier, phase, (L5, L2C, Galileo; ready)	66 GNSS 1 StarFire	WP, LNOPR1, Precision Ag	22.3 x 16.5 x 22.3	1.6kg	2m/45cm+ppm/1cm+0.5ppm/ 0.5cm + 0.5ppm)	na	1Hz - 10Hz (user programmable)	<
Leica Geosystems AG *www.leica-geosystems.com*	PowerBox	72	GPS: L1, L2, L2C, GLONASS: L1, L2, SBAS	28	AGLMNOR1	190 x 159 x 82mm	2.7kg	5m/25cm/10mm+1ppm/ 5mm+0.5 ppm	< 20	20 Hz	5
	iCON gps 60	120	GPS: L1, L2, L2C, L5, GLONASS: L1, L2, Galileo E1, E5a, E5b, Alt-BOC, BeiDou, SBAS	Flexible configuration: 120 L1, 60 L1/L2	AGLMNOR1	197 x 197 x H 130mm	1.45kg	2-3m/25cm/10mm+1ppm/ 3mm+0.5ppm	< 20	20 Hz	5
	Viva GS08plus	120	GPS: L1, L2, L2C, GLONASS: L1, L2, SBAS	Flexible configuration: 120 L1, 60 L1/L2	AGLMNR1	D 186mm x H 71mm	0.7kg	2-3m/25cm/10mm+ 1ppm/ 3mm+ 0.5ppm	< 20	5 Hz	5
	Viva GS12	120	GPS: L1, L2, L2C, L5, GLONASS: L1, L2, Galileo E1, E5a, E5b, Alt-BOC, SBAS	Flexible configuration: 120 L1, 60 L1/L2	AGLMNR1	D 186mm x H 89mm	0.95kg	2-3m/25cm/10mm+1ppm/ 3mm+0.1ppm	< 20	20 Hz	5
	Viva GS10	120	GPS: L1, L2, L2C, L5, GLONASS: L1, L2, Galileo E1, E5a, E5b, Alt-BOC, BeiDou, SBAS	Flexible configuration: 120 L1, 60 L1/L2	AGLMNR1	166 x 79 x 212mm	1.20kg	2-3m/25cm/10mm+1ppm/ 3mm+0.1ppm	< 20	20 Hz	5
	Viva GS14	120	GPS: L1, L2, L2C, GLONASS: L1, L2, Galileo: E1, BeiDou, SBAS	Flexible configuration: 120 L1, 60 L1/L2	AGLMNR1	D 190mm x H 119mm	0.93kg	2-3m/25cm/10mm+1ppm/ 3mm+0.1ppm	< 20	20 Hz	5
	Viva GS15	120	GPS: L1, L2, L2C, L5, GLONASS: L1, L2, Galileo E1, E5a, E5b, Alt-BOC, BeiDou, SBAS	Flexible configuration: 120 L1, 60 L1/L2	AGLMNR1	D 198mm x H 196mm	1.34kg	2-3m/25cm/10mm+1ppm/ 3mm+0.1ppm	< 20	20 Hz	5
	Viva GS25	120	GPS: L1, L2, L2C, L5, GLONASS: L1, L2, Galileo E1, E5a, E5b, Alt-BOC, BeiDou, SBAS	Flexible configuration: 120 L1, 60 L1/L2	AGLMNR1	200 x 94 x 220mm	1.84kg	2-3m/25cm/10mm+1ppm/ 3mm+0.1ppm	< 20	20 Hz	5
	Zeno 5	48	GPS: L1	48	AGHLMNR1	158 x 78 x 38mm	0.375kg	2-5m/-/-/-	< 20	1 Hz	<
	Zeno 10	14	GPS: L1 code , GLONASS: L1 Code	14	AGHLMNR1	278 x 102 x 45mm	0.74kg	2-5m/Sub-meter/-/10mm+2ppm	< 20	5 Hz	<
	Zeno GG03	120	GPS: L1, L2, L2C, GLONASS: L1, L2, SBAS	Flexible configuration: 120 L1, 60 L1/L2	AGLMNR1	D 186mm x H 71mm	0.7kg	2-5m/40cm/10mm+2ppm/ 10mm+2ppm	< 20	5 Hz	5
	Zeno CS25 GNSS	120	GPS: L1, L2, L2C, GLONASS: L1, L2, SBAS	Flexible configuration: 120 L1, 60 L1/L2	AGHLMNR1	144 x 242 x 40mm	1.4kg	2-5m/50cm/10cm/10mm+2ppm	< 20	5 Hz	5
Microwave Photonic Systems *www.b2bphotonics.com*	OFW 3478/GPS - RF Fiber Optic Antenna for GPS	ALL Satellites in View	GLONASS, Galileo, GPS L1C/A, L2, L5 GPS	ALL Satellites in View	Ship, Aircraft, & Land Based	12 x 10 x 6in	12lb	~10m /LAAS: <0.5m	<<50 ns	10 Hz PVT, 1 Hz ARINC	<
NavCom Technology, Inc. *www.navcomtech.com*	Sapphire	66 par.	L1, L2, L5, G1 & G2	66 GNSS, +1 StarFire	DAGLMNPRTV2	4.73 x 3.94 x 0.43in	4oz	2m/45cm+ppm/1cm+0.5ppm/ 0.5cm + 0.5ppm)	+/-13ns (1PPS)	1Hz – 100Hz (user programmable)	<
	SF-3050	66 par.	L1, L2, L5, G1 & G2	66 GNSS, +1 StarFire	DAGLMNPRTV1	6.47 x 4.60 x 2.37in	1.1lb	as above	+/-13ns (1PPS)	1Hz – 100Hz (user programmable)	<
	SF-3040	66 par.	L1, L2, L5, G1 & G2	66 GNSS, +1 StarFire	DAGLMNPRTV1	8 x 4.36in	3.2lb	as above	na	1Hz – 10Hz (user programmable)	<
Nexteq Navigation Corporation *www.nexteqnav.com*	T8	50 channels	GPS L1 C/A code, SBAS	50	GHLOPRVE1	179 x 91 x 31mm	250g	5m/2.5m/ pp <1m	na	1Hz	2
	T6	50 channels	GPS L1 C/A code, SBAS	50	GHLOPRVE1	179 x 91 x 31mm	250g	<2m/<1m/20cm/20cm	na	1Hz	2

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	<35s	<5s	<1s	211111221	RS232; RS422; USB; Ethernet; Bluetooth; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 2 Mbps, 1 Mps	-35 to +75	ext/int	4.2	E	2048MB memory, UHF/FH radio, GSM/GPRS/ EDGE modem
	<35s	<5s	<1s	211111221	RS232; RS422; USB; Ethernet; Bluetooth; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8kbps, 460.8kbps, 480Mbps, 10/100 Mbps, 2 Mbps, 1Mps	-35 to +75	ext/int	5	E	2048MB memory, UHF/FH radio, GSM/GPRS/ EDGE modem, In Band Interference Rejection
	<35s	<5s	<1s	211111221	RS232; RS422; USB; Ethernet; Bluetooth; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 2 Mbps, 1 Mps	-35 to +75	ext/int	3	E	2048MB memory, UHF/FH radio, GSM/GPRS/ EDGE modem
	<35s	<5s	<1s	211111221	RS232; RS422; USB; Ethernet; Bluetooth; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 10/100 Mbps, 2 Mbps, 1 Mps	-35 to +75	ext/int	3	E	2048MB memory, UHF/FH radio, GSM/GPRS/ EDGE modem
	<35s	<5s	<1s	211111221	RS232; RS422; USB; Ethernet; Bluetooth; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	2 Mbps	-35 to +75	ext/int	4.7	E	2048MB memory, UHF/FH radio, GSM/GPRS/ EDGE modem
	<35s	<5s	<1s	211111221	RS232; RS422; USB; Ethernet; Bluetooth; CAN; 1PPS; Event Marker; IRIG/Ext. Freq In/Out	460.8 kbps, 12 Mbps, 1 Mps	-35 to +75	ext/int	6	E	2048MB memory, UHF/FH radio, GSM/GPRS/ EDGE modem
	<35s	<5s	<1s	1	Bluetooth	460.8 kbps, 460.8 kbps, 12 Mbps, 1 Mps	-35 to +75	ext/int	1.4	I	GSM/GPRS modem
	<35s	<5s	<1s	211111	RS232; USB; CAN; 1PPS; Event Marker; IRIG	460.8 kbps, 460.8 kbps, 12 Mbps, 1 Mps	-35 to +75	ext	1.2	E	256MB memory
	<35s	<5s	<1s	211111	RS232; RS422; USB; CAN; 1PPS; Event Marker; IRIG	460.8 kbps, 460.8 kbps, 12 Mbps, 1 Mps	-35 to +75	ext	1.4	E	256MB memory
	<35s	<5s	<1s	211111	RS232; RS422; USB; CAN; 1PPS; Event Marker; IRIG	460.8 kbps, 460.8 kbps, 480 Mbps, 1 Mps, 10/100 Mbps	-35 to +75	ext	1.5	E	256MB memory
	<35s	<5s	<1s	211111	RS232; RS422; USB; CAN; 1PPS; Event Marker; IRIG	460.8 kbps, 460.8 kbps, 480 Mbps, 1 Mps, 10/100 Mbps	-35 to +75	ext	2.2	E	256MB memory
	<35s	<5s	<1s	22122211	RS232; RS232/RS422; USB; CAN; 1PPS; Event Marker; IRIG; Ethernet; Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 1 Mps, 10/100 Mbps	-35 to +75	ext	2.5	E	2048MB memory
	<35s	<5s	<1s	221222111	RS232; RS232/RS422; USB; CAN; 1PPS; Event Marker; IRIG; Ethernet; Ext.Reference; Frequency, input	460.8 kbps, 460.8 kbps, 480 Mbps, 1 Mps, 10/100 Mbps	-35 to +75	ext	3.4	E	2048MB memory
	<35s	<5s	<1s	221222111	RS232; RS232/RS422; USB; CAN; 1PPS; Event Marker; IRIG; Ethernet; Ext. Freq In/Out	460.8 kbps, 460.8 kbps, 480 Mbps, 1 Mps, 10/100 Mbps	-35 to +75	ext	4.2	E	2048MB memory; , In Band Interference Rejection
	<35s	<5s	<1s	22122211	RS232; RS232/RS422; USB; CAN; 1PPS; Event Marker; IRIG; Ethernet	460.8 kbps, 460.8 kbps, 480 Mbps, 1 Mps, 10/100 Mbps	-35 to +75	ext	2.2	E	2048MB memory
	<35s	<5s	<1s	22122211	RS232; RS232/RS422; USB; CAN; 1PPS; Event Marker; IRIG; Ethernet	460.8 kbps, 460.8 kbps, 480 Mbps, 1 Mps, 10/100 Mbps	-35 to +75	ext	2.2	E	2048MB memory
	<35s	<5s	<1s	22122211	RS232; RS232/RS422; USB; CAN; 1PPS; Event Marker; IRIG; Ethernet	Up to 115.2 k	-40 to +85	ext	3.9	E	2048MB memory
	<35s	<5s	<1s	221222111	RS232; RS232/RS422; USB; CAN; 1PPS; Event Marker; IRIG; Ethernet; Ext. Freq In/Out	2, 400–115, 200	–40 to +65	ext	5.2	E	2048MB memory
	<60s	<50s	<20s		3 x RS232 1 x Can Bus	2, 400–115, 200	–40 to +70	ext	9 to 26 V DC	Internal dipole, Ext	Integrated 6-axis terrain compensation, proprietary RTK-Extend operating mode, compatibility with space-based differential corrections network (StarFire)
	50s	35s	0.5s	5	2 RS-232, 1 Power/RS-232, 1 RS232/RS422, 2 CAN, 1 TNC	2, 400–115, 200	–30 to +60	ext	3.8	MNA1202 GG	Dual frequency RTK GNSS machine navigation receiver
	50s	35s	0.5s	6	1 combined RS-232/PWR in/PWR out, 1 USB Host, 1 UART &USB, 1 TNC, 1 QN, 1 Bluetooth, 1 USB Host, 1 UART&USB, 1 Bluetooth	2, 400–115, 200	–40 to +65	ext/int	6.0	Internal or external (e.g. MNA1202 GG)	Triple frequency construction RTK GNSS receiver; including build in Display and Keyboard; external GNSS antenna support to be used on a construction machine
	50s	35s	0.5s	2	Combined (RS-232, Power, USB), 1 Bluetooth	2, 400–115, 200	–40 to +65	ext/int	2.0	Internal	Dual frequency geodetic and RTK GNSS receiver
	50s	35s	0.5s	2	Combined (RS-232, Power, USB), 1 Bluetooth	2, 400–115, 200	–40 to +65	ext/int	1.8	Internal	Triple frequency geodetic and RTK GNSS receiver
	50s	35s	0.5s	4	2 RS-232, 1 Combined (RS-232, USB), 1 Power, 1 TNC, 1 Bluetooth	2, 400–115, 200	–40 to +65	ext/int	3.2	AR10/AS10 triple frequency or AR25/ AR20 choke ring	Triple frequency geodetic and RTK GNSS receiver
	50s	35s	0.5s	2	1 RS-232, 1 combined (RS-232, Power, USB), 1 Bluetooth	2, 400–115, 200	–40 to +65	ext/int	2.0	Internal	Dual frequency geodetic and RTK GNSS receiver
	50s	35s	0.5s	4	1 RS-232, 1 combined (RS-232, Power, USB), 1 UART &USB, 1 Bluetooth	2, 400–115, 200	–40 to +65	ext/int	3.2	Internal	Triple frequency geodetic and RTK GNSS receiver
	50s	35s	0.5s	9	2 RS-232, 1 Combined (RS-232, Power, USB), 1 UART&USB, 1 USB A, 1 Mini USB, 1 PPS, 1 Event, 1 Power, 1 TNC, 1 Bluetooth	2, 400–115, 200	–40 to +65	ext/int	3.4	AR10/AS10 triple frequency or AR25/ AR20 choke ring	Triple frequency geodetic and RTK GNSS receiver
	<120s *	<35s*	<10s	2	1 Bluetooth, 1 USB (SnapOn module)			ext/int	1.3	Internal	Single Frequency Handheld GPS receiver
	<120s *	<35s*	<10s	4	1 Bluetooth, Wireless LAN, 1 RS-232, 1 Combined (RS-232, USB)	2, 400–115, 200	–23 to +60	ext/int	2.5	Internal/External	Single Frequency Handheld GNSS receiver
	50s	35s	0.5s	2	Combined (RS-232, Power, USB), 1 Bluetooth	100 Kbps ARINC	–55 to +80	ext/int	2.0	Internal	Dual frequency geodetic and RTK GNSS receiver
	50s	35s	0.5s	5	2 USB, 1 RS-232, LAN, Power, 1 Bluetooth	RS232: 9.6kbps – 115kbps; USB: up to 12Mbps; Ethernet: up to 100Mbps; Bluetooth: up to 230.4kbps	-40 to +85	ext/int	7-10	Internal/External	Dual frequency geodetic and RTK GNSS receiver
	<<75s	<20s	<1s	1	8 I/P, 3 O/P ARINC H/L, 1 RS-232	RS232: 9.6kbps – 115kbps; USB: up to 12Mbps; Ethernet: up to 100Mbps; Bluetooth: up to 230.4kbps	-40 to +70	ext	14W	Active, RTCA DO-228 Change 1 compliant	ARINC-743 Compliant sensor
r	<60s	<50s	<20s	5	4 x RS232	RS232: 9.6kbps – 115kbps;	-40 to +85	ext	4W typical	Crossed dipole (ER)	Latest generation of John Deere technology
r	<60s	<50s	<20s	5	2 x RS232 (1 configurable to RS422); 1 x USB 2.0 (host or device); 1 x Ethernet (10T/100T); 1 x Bluetooth	RS232: 9.6kbps – 115kbps; USB: up to 12Mbps; Ethernet: up to 100Mbps; Bluetooth: up to 230.4kbps	-40 to +71	ext	< 6 W	Crossed dipole (ER)	Integrated StarFire/RTK Extend multi-frequency receivers
	<60s	<50s	<20s	5	2 x RS232 (1 configurable to RS422); 1 x USB 2.0 (device); 1 x Bluetooth	RS232: 4.8kbps – 115kbps; USB: up to 12Mbps; Bluetooth: up to 230.4kbps	-10 to +60	hot swappable batteries	< 6 W	Crossed dipole (ER)	Integrated StarFire/RTK Extend multi-frequency receivers
	29s	29s	<1s	2	USB/Blue tooth	300-115, 200	l20 to +60	battery/ext. USB	0.5W with the GPS on	intertnal/external	Rugged and ready-to-use handheld with GIS data collection SW
	26s	26s	<1s	2	USB/Blue tooth	Fully configurable		battery/ext USB	0.5W with the GPS on	intertnal/external	RTK, i-PPP data service, Post processing, GIS data collection SW preinstalled

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	T5A	12 channels	GPS L1 C/A code, SBAS	12	GHLOPRVE1	215 x 97 x 57mm	700g	<2m/0.4m/20-2cm/20-2cm	na	1Hz	6
NovAtel *www.novatel.com*	OEM615	120	GPS: L1, L2, L2C, GLONASS: L1, L2 Galileo: E1 BeiDou, B1 SBAS	Flexible configuration: 120 L1, 60 L1/L2	ADGHLMMetNOPRTV2	46 x 71 x 11mm	24g	1.2m/0.4m DGPS/0.6m SBAS/0.01m + 1ppm RT-2/5mm + 1 ppm post processed (All values in Horiz. RMS)	20	50Hz max GNSS only, 200Hz max GNSS + INS	5
	OEM628	120	GPS: L1, L2, L2C, L5 GLONASS: L1, L2 Galileo: E1, E5, AltBOC BeiDou, B1, B2 SBAS L-band	Flexible configuration: 120 L1, 60 L1/L2	ADGLMMetNOPRTV2	60 x 100 x 9.1mm	37g	1.2m/0.4m DGPS/0.6m SBAS/0.6m VBS/0.15m XP/0.1m HP/0.01m + 1ppm RT-2/5mm + 1 ppm post processed (All values in Horiz. RMS)	20	100Hz max GNSS only, 200Hz max GNSS + INS	5
	OEM638	240	GPS: L1, L2, L2C, L5 GLONASS: L1, L2, L2C Galileo: E1, E5, AltBOC BeiDou B1, B2 SBAS L-band	Flexible configuration: 240 L1, 120 L1/L2	ADGLMMetNOPRTV2	85 x 125 x 14.3mm	37g	1.2m/0.4m DGPS/0.6m SBAS/0.6m VBS/0.15m XP/0.1m HP/0.01m + 1ppm RT-2/5mm + 1 ppm post processed (All values in Horiz. RMS)	20	100Hz max GNSS only, 200Hz max GNSS + INS	5
	OEM617D	120	GPS: L1, L2, L2C, GLONASS: L1, L2 Galileo: E1 BeiDou, B1, B2 SBAS	Flexible configuration: 120 L1, 60 L1/L2	ADGLMMetNOPRTV2	46 x 71 x 11mm	24g	1.2m/0.4m DGPS/0.6m SBAS/0.01m + 1ppm RT-2/5mm + 1 ppm post processed (All values in Horiz. RMS)	20	50Hz max GNSS only, 200Hz max GNSS + INS	5
	OEMStar	14	GPS: L1 GLONASS: L1 SBAS	14 channels configurable between GPS, GLONASS & SBAS	ADGLMMetNOPRTV2	46 x 71 x 13mm	18g	1.5m/0.5m DGPS/0.7m SBAS/	20	10Hz max	6
	OEMStar-BDS	14	GPS: L1 BeiDou: B1 SBAS	14 channels configurable between GPS, BeiDou & SBAS	ADGLMMetNOPRTV2	46 x 71 x 13mm	18g	1.5m/0.5m DGPS/0.7m SBAS/	20	10Hz max	6
	AG-STAR	14	GPS: L1, GLONASS: L1, SBAS	14 channels configurable between GPS, GLONASS & SBAS	DGLMMetNOPRTV12	155mm (D) x 68mm (H)	500g	1.5m SP/0.5m DGPS/0.9m SBAS (All values in Horiz. RMS)	20	10Hz max	8
	SMART6-L	120	GPS: L1, L2, L2C, GLONASS: L1, L2, Galileo: E1, BeiDou: B1, SBAS, L-band	Flexible configuration: , 120 L1, 60 L1/L2	DGLMMetNOPRTV12	155mm (D) x 81 mm (H)	<550g	1.5m L1 SP/1.2m L1+L2 SP/0.4m DGPS/0.6m SBAS/1cm+1ppm RT-2 (All values in Horiz. RMS)	20	50Hz max	5
	SMART6	120	GPS: L1, L2, L2C, GLONASS: L1, L2, Galileo: E1, BeiDou: B1, SBAS	Flexible configuration: , 120 L1, 60 L1/L2	DGLMMetNOPRTV12	155mm (D) x 81 mm (H)	<520g	1.5m L1 SP/1.2m L1+L2 SP/0.4m DGPS/0.6m SBAS/1cm+1ppm RT-2 (All values in Horiz. RMS)	20	20Hz max	5
	SPAN-IGM-A1	120	GPS: L1, L2, L2C, GLONASS: L1, L2, SBAS	Flexible configuration: , 120 L1, 60 L1/L2	ADGLMMetNOPRTV12	152 x 142 x 51mm	515g	1.2m/0.4m DGPS/0.6m SBAS/0.01m + 1ppm RT-2/5mm + 1 ppm post processed (All values in Horiz. RMS)	20	20Hz max GNSS only, 200Hz max GNSS + INS	5
	SPAN-IGM-S1	120	GPS: L1, L2, L2C, GLONASS: L1, L2, SBAS	Flexible configuration: , 120 L1, 60 L1/L2	ADGLMMetNOPRTV12	152 x 142 x 51mm	540g	1.2m/0.4m DGPS/0.6m SBAS/0.01m + 1ppm RT-2/5mm + 1 ppm post processed (All values in Horiz. RMS)	20	20Hz max GNSS only, 125 Hz max GNSS + INS	5
	SPAN-CPT (OEM6)	120	GPS: L1, L2, GLONASS: L1, L2 SBAS, L-band	Flexible configuration: , 120 L1, 60 L1/L2	ADGLMMetNOPRTV12	152 x 168 x 89mm	2.28kg	1.2m/0.4m DGPS/0.6m SBAS/0.01m + 1ppm RT-2/5mm + 1 ppm post processed (All values in Horiz. RMS)	20	20Hz max GNSS only, 100 Hz max GNSS + INS	5
	ProPak6	240	GPS: L1, L2, L2C, L5, GLONASS: L1, L2, L2C, Galileo: E1, E5, AltBOC, BeiDou B1, B2, SBAS, L-band	Flexible configuration: , 240 L1, 120 L1/L2	ADGLMMetNOPRTV2	190 x 185 x 75mm	1.8kg	1.2m/0.4m DGPS/0.6m SBAS/0.6m VBS/0.15m XP/0.1m HP/0.01m + 1ppm RT-2/5mm + 1 ppm post processed (All values in Horiz. RMS)	20	100Hz max GNSS only, 200Hz max GNSS + INS	5
	FlexPak-G2-Star	14	GPS: L1, GLONASS: L1, SBAS	14 channels configurable between GPS, GLONASS & SBAS	ADGLMMetNOPRTV12	45 x 147 x 113mm	313g	See OEMStar model	20	10Hz max	6
	FlexPak6	120	GPS: L1, L2, L2C, L5, GLONASS: L1, L2, Galileo: E1, E5, GIOVE-A/GIOVE-B (test), BeiDou, SBAS, L-band	Flexible configuration: , 120 L1, 60 L1/L2	ADGLMMetNOPRTV12	45 x 147 x 113mm	337g	See OEM628 model	20	100Hz max GNSS only, 200Hz max GNSS + INS	5
	GPStation-6	120	GPS: L1, L2, L2C, L5, GLONASS: L1, L2, Galileo: E1, E5, GIOVE-A/GIOVE-B (test), BeiDou, SBAS	40 L1/L2/L5	ALMetOT12	235 x 154 x 71mm	1.4kg	1.2m	20	50Hz max	6
	OEM625S	144	GPS SPS: L1, L2, L2C, GLONASS: L1, L2, Galileo: E1, SBAS, GPS PPS: L1(Y), L2(Y)	Flexible configuration: , 60 L1/L2 SPS, 24 L2/ L2 PPS		60 x 100 x 15.1mm	56g	1.2m/0.4m DGPS/0.6m SBAS/0.01m + 1ppm RT-2/5mm + 1 ppm post processed (All values in Horiz. RMS)		20Hz max	5
Nottingham Scientific Ltd *www.nsl.eu.com*	Stereo	Arch. dependent, configurable	Dual frequency: L1/E1/B1/L1OC or L1OF plus L5/E5A/B2 or E5B/L3OC or E6/B3 or L2C/L2OC or L2OF	Arch. Dependent	HNVCMD2	sw baseband	na	~10m/na/na	~50 ns	configurable, 50Hz max	<
	Wave	Arch. dependent, configurable	L1/E1/B1/L1OC, L1OF, L5/E5A/B2, E5B/ L3OC, E6/B3, L2C/L2OC, L2OF	Arch. Dependent	GLMMetNR2	sw baseband	na	~10m/na/na	~50 ns	configurable, 50Hz max	<
	SABRE	Fully configurable	L1, L5, L2C, L1OF, L2OF, E1, E5A, E5B	Fully configurable	ACDGHLMMetNOPRSTV2	na	na	~10m/na/na	~50 ns	configurable, 50Hz max	<
	JINGO	Fully configurable	L1	Fully configurable	ACDGHLMMetNOPRSTV2	na	na	~10m/na/na	~50 ns	configurable, 50Hz max	<
NVS Technologies AG *www.nvs-gnss.com*	NV08C-CSM	32 par., All-in-view	GPS L1 C/A code, GLONASS L1, SBAS L1, QZSS, GALILEO E1, BeiDou (BeiDou) L1	32	A, C, G, H, L, M, N, R, T, V, 2	20 x 26 x 2.5mm	5g	RMS:<1.5m/<1m/na	15 ns	1, 2, 5, 10Hz	2
	NV08C-Mini PCI-E	32 par., All-in-view	GPS L1 C/A code, GLONASS L1, SBAS L1, QZSS, GALILEO E1, BeiDou (BeiDou) L1	32	A, C, D, G, H, L, M, N, R, V, 2	30 x 50.95 x 4.2mm	7g	RMS:<1.5m/<1m/na	15 ns	1, 2, 5, 10Hz	2
	NV08C-RTK	32 par., All-in-view	GPS L1 C/A code, GLONASS L1, SBAS L1, QZSS, GALILEO E1, BeiDou (BeiDou) L1	32	A, C, D, G, H, L, M, N, R, V, 2	46 x 71 x 7.30mm	17g	RMS:<1.5m/<1m/0.01m	15 ns	1, 2, 5, 10Hz	2
	NV08C-CSM-BRD	32 par., All-in-view	GPS L1 C/A code, GLONASS L1, SBAS L1, QZSS, GALILEO E1, BeiDou (BeiDou) L1	32	A, C, D, G, H, L, M, N, R, V, 2	35 x 50 x 7.2mm	11g	RMS:<1.5m/<1m/na	15 ns	1, 2, 5, 10Hz	2

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	60s	45s	<1s	2	USB/Blue tooth	Fully configurable		battery/ext USB	<2W	intertnal/external	RTK, i-PPP data service, Post processing , GIS data collection SW preinstalled
	50s	35s	0.5s	6	3 x LV-TTL, 2 x CAN 1 x USB2.0 1 x PPS 2 x Event In	300 to 921,600 bps; 1 Mbps; 12 Mbps	-40 to +85	3.3 V DC	1W (typical)	Active (E)	RoHS-compliant; RT-2, GLIDE, PDP, RAIM, ALIGN and SPAN software features available
	50s	35s	0.5s	7	1 x RS-232 or RS-422, 2 x LV-TTL 2 x CAN 1 x USB2.0 1 x Ethernet 1 x PPS 2 x Event In	300 to 921,600 bps; 300 to 921,600 bps; 300 to 230,400 bps; 12 Mbps; 5 Mbps	-40 to +85	3.3 V DC	1.3W (typical)	Active (E)	RoHS-compliant; RT-2, L-Band, GLIDE, PDP, RAIM, ALIGN and SPAN software features available
	50s	35s	0.5s	12	2 x RS-232 or RS-422, 3 x LV-TTL, 2 x CAN 2 x USB2.0 1 x Ethernet, 1 x IMU 1 x PPS 4 x Event In, 7 x Event Out	300 to 921,600 bps; 300 to 921,600 bps; 300 to 230,400 bps; 1 Mbps;12 Mbps; 5 Mbps	-40 to +85	3.3 V DC or 4.5 - 36VCD	2.8W (typical)	Active (E)	RoHS-compliant; RT-2, L-Band, GLIDE, PDP, RAIM, ALIGN and SPAN software features available
	50s	35s	0.5s	6	3 x LV-TTL, 2 x CAN 1 x USB2.0 1 x PPS 2 x Event In	300 to 921,600 bps; 1 Mbps; 12 Mbps	-40 to +85	3.3 V DC	1W (typical)	Active (E)	Dual Antenna Heading/ALIGN RoHS-compliant; RT-2, GLIDE, PDP, RAIM, ALIGN and SPAN software features available
	65s	35s	<1.0s	3	2 x LV-TTL; 1 x USB2.0	300 to 921,600 bps; 300 to 230,400 bps; 12 Mbps	-40 to +85	3.15 to 5.25 VDC	0.36W GPS 0.45W GLONASS	Active (E)	RoHS-compliant; GLIDE and PDP software features available
	65s	35s	<1.0s	3	2 x LV-TTL; 1 x USB2.0	300 to 921,600 bps; 300 to 230,400 bps; 12 Mbps	-40 to +85	3.15 to 5.25 VDC	0.36W GPS 0.45W GLONASS	Active (E)	RoHS-compliant; GLIDE and PDP software features available
	85s	55s	<1.0s	2	2 x RS-232; 1 x Bluetooth (optional)	300 to 230, 400 bps	-40 to +75	8 to 36 V DC	2.5W (typical)	Patch	RoHS-compliant; GLIDE software feature available
	50s	35s	<1.0s	3	3 x RS-232; 1 x CAN NMEA2000; 1 x Emulated Radar	300 to 921, 600 bps	-40 to +75	8 to 36 VDC	2.9W (typical)	Pinwheel	RoHS-compliant; RT-2, GLIDE, Dual Frequency GLIDE, PDP, and ALIGN software features available
	50s	35s	<1.0s	3	3 x RS-232; 1 x CAN NMEA2000; 1 x Emulated Radar; 1 x Bluetooth Serial Port (optional)	300 to 921, 600 bps;	-40 to +70	8 to 36 VDC	3.5W (typical)	Pinwheel	RoHS-compliant; Tilt Sensor and Bluetooth options, RT-2, GLIDE, Dual Frequency GLIDE, PDP, and ALIGN software features available
	50s	35s	0.5s	4	1 x RS-232, 1 x RS-232 or RS-422, 1 x USB2.0, 1 x CAN	2400 to 921, 600 bps; 12 Mbps; 1 Mbps	-40ºC to +65°C	10 to 30 VDC	4W (typical)	Active (E)	RoHS-compliant; RT-2 software features available
	50s	35s	0.5s	4	1 x RS-232, 1 x RS-232 or RS-422, 1 x USB2.0, 1 x CAN	2400 to 921, 600 bps; 12 Mbps; 1 Mbps	-40ºC to +65°C	10 to 30 VDC	6W (typical)	Active (E)	RoHS-compliant; RT-2 software features available
	50s	35s	0.5s	4	2 x RS-232 UART COM Port; 1 x CAN; 1 x USB2.0	2400 to 921, 600 bps; 12 Mbps; 1 Mbps	-40ºC to +65°C	9 to 18 VDC	15W (max)	Active (E)	RoHS-compliant; RT-2, and OmniSTAR VBS/ HP/XP software features available
	50s	35s	0.5s	18	3 x RS-232 or RS-422, 2 x CAN , 2 x USB2.0, 1 x Ethernet, 1 x IMU, 1 x PPS, 4 x Event In, 4 x Event Out	300 to 921, 600 bps; 300 to 921, 600 bps; 300 to 230, 400 bps; , 1 Mbps;12 Mbps; 5 Mbps	-40 to +75	9 to 36 V DC	3.5W (Minimum)	Active (E)	Rugged, durable enclosure, housing OEM638™ receiver 4 GB On-board data logging, Serial, USB, Ethernet, WIFI and Bluetooth® Optional Dual input ALIGN Heading, and or GPRS/HSPA cellular modem
	65s	35s	<1.0s	3	1 x RS-232; 1 x RS-232 or RS-422, 1 x USB1.1	300 to 921, 600 bps; 300 to 230, 400 bps; 300 to 230, 400 bps; 5 Mbps	-40 to +75	6 to 18 V DC	0.6W (typical)	Active (E)	RoHS-compliant; GLIDE and PDP software features available
	50s	35s	0.5s	5	1 x RS-232, 1 x RS-232 or RS-422, 1 x USB2.0, 1 x CAN, 1 x Ethernet	300 to 921, 600 bps; 300 to 230, 400 bps; 300 to 230, 400 bps; 5 Mbps, 10/100 Mbps	-40 to +75	6 to 36 V DC	1.8W (typical)	Active (E)	RoHS-compliant; RT-2, L-Band, GLIDE, PDP, RAIM, ALIGN and SPAN software features available
	60s	35s	0.5s	4	3 x RS-232 or RS-422, 1 x USB2.0	300 to 230, 400 bps; , 1 Mbps;	-40 to +70	4.5 to 18 V DC	6W (typical)	Active (E)	Multi-frequency multi-constellation GNSS Ionospheric Scintillation and TEC Monitor (GISTM), receiver. Provides 50Hz phase and amplitude scintillation measurements (S4, σφ), TEC and TEC phase.
	50s	35s	0.5s	5	2 x RS-232, 2 x LV-TTL, 1 x USB2.0, 1 x key fill	300 to 921, 600 bps, 12 Mbps	-40 to +85	3.3 V DC	2.2W (typical)	Active (E)	RT-2, RAIM, and ALIGN software features available
	<40s	<35s	<2s	Arch. dependent	IP, USB	Fully configurable		ext	Arch. dependent	E	Dual frequency GNSS front end to be used with, for example, software defined radio GNSS receiver. Stereo contains two Front Ends (with common clock).
	<40s	<35s	<2s	Arch. dependent	IP, USB, LVDS	Fully configurable		ext	Arch. dependent	E	Multiple frequency direct bandpass GNSS front end to be used with, for example, software defined radio GNSS receiver.
	<40s	<35s	<2s	Fully configurable	Fully configurable	300 to 921, 600 bps;, 1 Mbps; 12 Mbps	-40 to +85	na	na	na	Pure SW receiver for GPS, GLONASS and GALILEO. Single or combined constellations. Snap-shot, kalman filtering, PPP positioning. Real-time or post-processing on digital IF.
	<40s	<35s	<2s	Fully configurable	Fully configurable	300 to 921, 600 bps; 300 to 921, 600 bps;, 1 Mbps; 12 Mbps; 10/100 Mbps	-40 to +85	na	na	na	SW GPS receiver for detection of GPS SPS SIGNAL INTERFERENCE. Uses pre-correlation, correlation and post-correlation techniques.
	25s	25s	<1s	2	2xUART; 1xSPI; 1xTWI (I2C compatible); 1PPS	9600 bps - 115200 bps	-40 to +85 °C	ext.	180mW (GNSS), 120mW (GPS), 24mW (GNSS), 18mW (GPS), 5mW (Sleep mode)	Active	Fleet mgmt, Telematics & anti-theft, in-car & PNDs, asset and personal tracking, surveillance & security/LTE, WiMAX, Wi-Fi & cell. base station timing/A-GNSS, dead reckoning, raw data output/Flash memory + power mgmt
	25s	25s	<1s	1/NMEA (default) or binary protocol	PCI-Express standard bus/virtual COM port device	9600 bps - 115200 bps	-40 to +85 °C	ext.	200mW (GNSS), 140mW (GPS), 0.4mA (Sleep mode)	Active & Passive (auto-switching current detector)	Rugged notebook PCs, tablets & handheld computers. Telematics & marine navigation. Surveillance, security and public safety. GIS, survey, machine control & PrecisionAg/A-GNSS, dead reckoning, raw data output/Flash memory + power mgmt.
	25s	25s	<1s	3/NMEA 0183 v2.3 (IEC61162-1), BINR (proprietary binary protocol), RTCM v.2.2, v.2.3, v.3.1	2xUART; 1xUSB	4800 bps - 230400 bps	-40 to +85 °C	ext.	300mW (GNSS), 500mW max	Active	Low Cost Single-Frequency GNSS RTK Receiver., Applications:, UAVs, Agriculture, Autonomous cars, Robotics, Construction measurements, Surveying, Heading and attitude determination, Aerial Photogrammetry
	25s	25s	<1s	2/ NMEA 0183 v2.3 (IEC61162-1), BINR (proprietary binary protocol), RTCM SC 104 (messages: #1, #9, #31, #34)	2xUART	4800 bps - 230400 bps	-40 to +85 °C	ext.	200mW (GNSS), 150mW (GPS) 0.4mA (Sleep mode)	Active & Passive (auto-switching current detector)	Rugged notebook PCs, tablets & handheld computers. Telematics & marine navigation. Surveillance, security and public safety. GIS, survey, machine control & PrecisionAg/A-GNSS, dead reckoning, raw data output/Flash memory + power mgmt.

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	NV08C-CSM-N24HS	32 par., All-in-view	GPS L1 C/A code, GLONASS L1, SBAS L1, QZSS, GALILEO E1, BeiDou (BeiDou) L1	32	T, 2		20g	RMS:<1.5m/<1m/na	15 ns	1, 2, 5, 10Hz	2
ORCA Technologies, LLC *www.orcatechnologies.com*	GS-101	12 parallel channels	GPS L1 C/A code	12	Time, Frequency, Position - Static or Mobile	3.07 x 1.06 x 4.72in	1lb	<9m 90%/2m CEP 50%/na/na	<100ns	1 second	<
	GS-102	12 parallel channels	GPS L1 C/A code	12	Time, Frequency, Position - Static or Mobile	4.06 x 2.09 x 4.72in	1lb	<9m 90%/2m CEP 50%/na/na	<100ns	1 second	<
	ORCA637VME	12 parallel channels	GPS L1 C/A code	12	Time, Frequency, Position - Static or Mobile	6U x 160mm	1lb	<9m 90%/2m CEP 50%/na/na	<100ns	1 second	<
Racelogic *www.labsat.co.uk*	LabSat, RLLSR01	All in View	GPS L1 C/A Code	All in View	CDGHLMNOTV1	17.0 x 12.8 x 3.8cm	750g	1.5m/na/na	50 ns, (RMS)	16.368 MHz	n
	LabSat 2, RLLSR02-GNL1	All in View	GPS L1 C/A Code, Galileo E1, GLONASS L1, BeiDou B1, QZSS L1, SBAS	All in View	CDGHLMNOTV1	17.0 x 12.3 x 4.6cm	750g	1.5m/na/na	50 ns, (RMS)	16.368 MHz	n
	LabSat 3, RLLS03-1RP-R	All in View	GPS L1 C/A Code, Galileo E1, GLONASS L1, BeiDou B1, QZSS L1, SBAS	All in View	CDGHLMNOTV1	16.7 x 12.8 x 4.3cm	910g w/ out battery, 960g with battery	1.5m/na/na	50 ns, (RMS)	16.368 MHz	n
	LabSat 3, RLLS03-2RP-R	All in View	GPS L1 C/A Code, Galileo E1, GLONASS L1, BeiDou B1, QZSS L1, SBAS	All in View	CDGHLMNOTV1	16.7 x 12.8 x 4.3cm	910g w/ out battery, 960g with battery	1.5m/na/na	50 ns, (RMS)	16.368 MHz	n
Rockwell Collins *www.rockwellcollins.com/gs/*	MPE–S, Miniature Precision Lightweight GPS Receiver (PLGR) Engine (SAASM) Type II	12 channels parallel, dual frequency	L1, C/A and P or Y Code, L2, P or Y Code	12	ADLMNTV2	2.45 x 0.285 x 1.76in	0.75oz	<4m CEP (WAGE), <2m (SDGPS)	<100	1	< ty
	MicroGRAM	12 channels parallel, dual frequency	L1, C/A and P or Y Code, L2, P or Y Code	12, All in view		1.0 x 1.25 x 0.275in	0.25oz	DGPS: <2m CEP, WAGE <4m CEP, PPS <12m CEP	<100	1	< ty
	NavFire-I, Integrated GPS-AJ System w/ Digital Nulling, Gun Hard, SAASM-Based	12/24 par.	L1, C/A, P or Y–code, L2, P–code or Y–code	all in view	ADLNO2	1.64 (D) x 0.95in	2.8oz	<3m CEP	<30	1-25 dependent on aiding	<
	NavStorm+, Integrated GPS-AJ System w/Digital Nulling, Gun Hard, SAASM-Based	12/24 par.	L1, C/A, P or Y–code, L2, P–code or Y–code	all in view	ADLNO2	2.8 (D) x 1.1in	8.8oz	<8m SEP	30	1–25 dependent on aiding	<
	NavStrike-24–Munitions GPS Embedded Module, SAASM-Based	12/24 par.	as above	all in view	ADNS2	3.5 x 3.0 x 0.75in	<0.5lb	na/3.7m/nr	30	1–25 dependent on aiding	<
	IGAS, Integrated GPS-AJ System w/ Digital Nulling and Beam-forming, SAASM-Based	24 par.	as above	all in view	ADNS2	4.35 x 5.15 x 0.9in	<2lb	na/2m typ./nr	30	1–25 dependent on aiding	<
	Micro DAGR (Defense Adv. GPS Receiver) SAASM Based	12 channel, parallel	L1, C/A and P or Y code,	all in view	ADHLMNPT1	3.9 x 2.6 x 1.4in	6.5oz , with, L91 batteries	<18.1m Horiz 95%	Unverified as of this date	1	L a d
	GPS Embedded Module (GEM)	12/24	L1, C/A, P or Y code, L2, P–code or Y–code	all in view	ADLMNPRSTV1	5.88 x 5.7 x 0.57	<0.8lb	na/2m typ./nr	30	1–25 dependent on aiding	<
	Airborne SAASM Reciever 3.3 (ASR 3.3)	12/24 Channel	L1, C/A, P or Y code, L2, P–code or Y–code	all in view		4.9 x 3.2 x 0.80in	<0.6lb	PPS:<5.6m RMS horizontal SPS:<6m RMS horizontal	PPS:<30 nanoseconds RMS; SPS:<45 nanoseconds RMS	4-25 dependent on aiding	<
	DIGAR	24 channel	L1, C/A, P or Y code, L2, P–code or Y–code	all in view		8.0 x 2.27 x 12.0in	<11lb	PPS: <5m SEP; SPS: <6m horizontal	<100 nanoseconds	Unaided: once-per-second pseudorange based, delta range based, 10 Hz	<
Septentrio *www.septentrio.com*	AsteRx-m OEM	136 par.	GPS+GLONASS L1, C/A and P-code & CP; L2, P-code & CP; WAAS/EGNOS	All in view (GPS/ GLONASS)	ADGHLMMetNOPRTV2	70 x 48mm	40g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	25Hz	<
	AsteRx-m GeoPod	136 par.	GPS+GLONASS L1, C/A and P-code & CP; L2, P-code & CP; WAAS/EGNOS	All in view (GPS/ GLONASS)	DGHLMMetNOPRTV1	78 x 110 x 35mm	200g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	25Hz	<
	AiRx2	64 par	GPS L1; (GPS L5 and GAL L1-E5a ready)	All in view GPS (GAL ready)	A	61 x 100 x 13.5mm	<100g	5m (95%)/3m (95%)	50 ns (95%)	20Hz	<
	AsteRx3 OEM	136 par.	GPS L1, C/A L2, P-code & CP; L2C; L5 code & CP, GALILEO L1 code & CP; E5abAltBOC code & CP; GLONASS L1L2L2CA, P-Code; BeiDou, QZSS, WAAS/EGNOS	All in View GPS + GLONASS + GALILEO	ADGLMMetNOPRTV2	60 x 90mm	60g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	25Hz	<
	AsteRx3 HDC	136 par.	as above	as above	ADGLMMetNOPRTV1	130 x 185 x 46mm	510g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	25Hz	<
	AsteRx2eH OEM	272 par.	GPS+GLONASS L1, C/A and P-code & CP; L2, P-code & CP; WAAS/EGNOS	14	ADGLMMetNOPRTV2	77 x 120mm	90g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm/0.3-0.6°/m	10	20Hz	<
	AsteRx2eH PRO	272 par.	as above	14	ADGLMMetNOPRTV1	245 x 140 x 37mm	930g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm/0.3-0.6°/m	10	20Hz	<
	AsteRx2i OEM	136 par.	as above	All in View GPS + GLONASS	ADGHLMMetNOPRTV2	60 x 90mm	60g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	50Hz	<
	AsteRx2i HDC	136 par.	as above	as above	ADGHLMMetNOPRTV1	130 x 185 x 46mm	510g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	50Hz	<
	AsteRx2e OEM	136 par.	GPS+GLONASS L1, C/A & CP; L2, P-code & CP; L2C; WAAS/EGNOS	as above	ADGHLMMetNOPRTV2	60 x 90mm	60g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	25Hz	<
	AsteRx2e HDC	136 par.	as above	as above	ADGHLMMetNOPRTV1	130 x 185 x 46mm	510g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	25Hz	<
	AsteRx2eL OEM	136 par.	GPS+GLONASS L1, C/A & CP; L2, P-code & CP; L2C; WAAS/EGNOS, L-Band (TERRASTAR)	as above	ADGHLMMetNOPRTV2	60 x 90mm	60g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	25Hz	<
	AsteRx2eL HDC	136 par.	as above	as above	ADGLMMetNOPRTV1	130 x 185 x 46mm	510g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	25Hz	<
	PolaRx4 PRO	264 Par.	GPS L1, C/A L2, P-code & CP; L2C; L5 code & CP, GALILEO L1 code & CP; E5a code & CP; WAAS/EGNOS; GLONASS L1 L2 L2 CA, P, BeiDou, QZSS	All in View	ADGHLMMetNOPRTV1	235 x 140 x 37mm	980g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	50Hz	<

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	25s	25s	<1s	2/ NMEA 0183 v2.3 (IEC61162-1), BINR (proprietary binary protocol), RTCM SC 104 (messages: #1, #9, #31, #34)	2xUART	4800 bps - 230400 bps	-40 to +85 °C	ext.	180mW (GNSS), 120mW (GPS) 0.1mA (Sleep mode)	Active	OEM module for precise timing and network synchronization needs., Applications:, WiFi, WiMAX, LTE, GSM, CDMA base station timing
	<20min	<1min	<1s	3	2 serial/1 USB		0 to 50	external	30 mw	active	Small portable GPS Receiver providing IRIG time, pulse rates, event capture and position over serial and USB ports. Can be portable with optional battery.
	<20min	<1min	<1s	3	2 serial/1 USB	1, 200–57, 600	0 to +50	external	30 mw	active	Small portable GPS Receiver providing IRIG time, pulse rates, event capture and position over serial and USB ports. Powered by external supply or internal rechargeable battery.
	<20min	<1min	<1s			1, 200–57, 600	0 to +50	bus		active	VME Time & Frequency Processor
	na	na	na	3	2 x SMA , 1 x USB	Variable	–40 to +85	8V to 30V DC	5.8W (Max)	Active	RF Record and Replay for GPS L1 C/A Code, Galileo E1
	na	na	na	5	3 x SMA , 2 x USB	Variable	–40 to +85	8V to 30V DC	7.0W (Max)	Active	RF Record and Replay for GPS L1, Galileo E1, GLONASS L1, BeiDou B1, QZSS L1
	na	na	na	7	3 x SMA , 2 x USB, 1 x RJ45, 1 x Expansion option for RS232 or CAN	Variable	–40 to +85	8V to 30V DC, or internal battery	7.0W (Max)	Active	RF Record and Replay for GPS L1, Galileo E1, GLONASS L1, BeiDou B1, QZSS, SBAS - Single Constellation Channel Output
	na	na	na	7	3 x SMA , 2 x USB, 1 x RJ45, 1 x Expansion included for RS232, CAN, & Dual-CAN	Variable	–40 to +85	8V to 30V DC, or internal battery	7.0W (Max)	Active	RF Record and Replay for GPS L1, Galileo E1, GLONASS L1, BeiDou B1, QZSS, SBAS - Dual Constellation Channel Output
	<100s typical	<60s typical	<8s for, <10s typical	3	RS-232, CMOS, Crypto (DS-101 and DS-102), HVQK, 1PPS, NMEA, ant.	Variable	–40 to +85	ext	0.7 W operating, 4 mW keep–alive	active remote (E)	U.S. Army standard; GB-GRAM; backward compatible
	<110s typical	<90s typical	<20s	2	Two independent serial ports (full duplex CMOS), 1 PPS, DS-101 and DS-102, ant.	9, 600–230, 400	–54 to +85	ext	<0.5 W operating, <0.3 mW Keep alive	active remote (E)	The worlds smallest, lightest , lowest powered SAASM-based GPS receiver in the world
	<60s	<30s	<15s	3	LVCMOS, DS-101, 1PPS, 10PPS input, antenna(s)	9, 600-230, 400	-45 to +85	ext	<2.8W	passive, 2-element (E)	2-card GPS-AJ system with 2-element digital nulling; 25k-G hardened, Deep Integration capable
	<60s	<8s	<15s	3	LVCMOS, DS-101, 1PPS, 10PPS input, antenna(s)	9, 600–230, 400	–45 to +85	ext	<5.0W	passive, 2-element (E)	2-card GPS-AJ system with up to 5-element digital nulling; 20k-G hardened, Deep Integration capable
	<60s	<8s	<15s	nr	RS-422, RS-232, DS-102, DS-101, HVQK, 1PPs, antenna	Variable	–32 to +70	ext	<4 W acquisition, <3 W tracking	passive (E)	Updated NavStrike GPS receiver using same form-factor, interfaces
	<60s	<8s	<15s	nr	RS-422, DS-102, DS-101, HVQK, 1PPs, antenna (4)	Variable	-20 to +60	ext	<12 W continuous	active remote, 4-element (E)	2-card integrated GPS-AJ system with 4-element RF interface
	Unverified as of this date	<25s	Unverified as of this date	1	RS-232, keyfill, external power	Variable	–54 to +85	Intl 2 AA batteries	Unverified as of this date	integral	SAASM-based, small, light-weight, portable 12-channel all-in-view, with commercial style graphical user interface
	<60s	<10s	<15s	nr	RS-232, RS-422, DS-102, DS-101, HVQK, 1PPs, DP RAM	up to 921kbaud	-40°C to +71°C	ext	<3 W	active or passive	GRAM-S (SEM-E) module
	<60s	<10s	<15s	nr	RS-232, RS-422, DS-102, DS-101, HVQK, 1PPs	9600-230400	-55 °C to +71 °C (	ext	<2W	Active or passive	ASR Form Factor
e	<60s	<10s	<15s	4	Dual redundant, RS-422 interfaces as SHCI buses; 1553; DS101/102; HVQK	300–230, 400;	-40 to +85	115V/400Hz	36	Passive 7-element CRPA	
	<45s	<15s (after reset)	<1s	3, 1, 1, 1	RS232, USB, event marker, PPS out	300–230, 400; 1-2 Mbps	-40 to +85	3.3V DC	500mW	(E)	Compact low-power dual frequency GPS/ GLONASS OEM receiver
	<45s	<15s (after reset)	<1s	1	USB	na	-20 to +50	5V DC	<1W	(ER)	Compact GPS/GLONASS RTK & DGNSS receiver for mobile computing platform
	<75s		<3s	4	RS232 or RS422 (ARINC ready)	300–230, 400; 1-2 Mbps	-40 to + 60	3 - 5.5 VDC	3W max	(E)	FAA TSO certifiable aviation receiver (BETA-3)
	<45s	<15s (after reset)	<1s	4, 1, 1, 2, 1	RS232, Ethernet, USB, event marker, PPS out	300–230, 400, 10 Mbps	–40 to +85	3–5.5 V DC	2.5W typ	(E)	Triple frequency high accuracy GPS/ GLONASS/GALILEO OEM receiver.
	<45s	<15s (after reset)	<1s	3, 1, 1, 2, 1	as above	300–230, 400, 10 Mbps	–40 to +60	9–30 V DC	3W typ	(E)	Tripple frequency high accuracy GPS/ GLONASS/GALILEO receiver in a versatile waterproof high-impact plastic housing.
	<45s	<15s (after reset)	<1s	4, 1, 1, 2, 1, 2	RS-232, Ethernet, USB, event marker, PPS out, Ref in/out	300–230, 400; 1-2 Mbps	-40 to + 85	5 V DC	4W typ	(E)	Single-board, dual-antenna/heading GPS/ GLONASS/SBAS receiver board
	<45s	<15s (after reset)	<1s	4, 1, 1, 2, 1, 2	as above	300–230, 400; 1-2 Mbps	-40 to + 60	9-30 V DC	5W typ	(E)	High precision dual-frequency 2-antenna GPS/ GLONASS/SBAS heading receiver
	<45s	<15s (after reset)	<1s	4, 1, 2, 1	RS232, USB, event marker, PPS out	300–230, 400; 1-2 Mbps	-40 to + 85	3.3V DC	2W IMU incl	(E)	high precision IMU enhanced GPS/GLONASS Dual-frequency OEM receiver.
	<45s	<15s (after reset)	<1s	3, 1, 2, 1	as above	300–230, 400; 1-2 Mbps	-40 to + 60	9–30 V DC	2.5W IMU incl	(E)	high precision IMU enhanced GPS/GLONASS Dual-frequency receiver in a versatile waterproof high-impact plastic housing.
	<45s	<15s (after reset)	<1s	2, 1, 1, 2, 1, 1	RS232, Ethernet, USB, event marker, PPS out, Ref in	300–230, 400; 1-2 Mbps	-40 to +85	3.3V DC	1.5W typ	(E)	Dual frequency high accuracy GPS/GLONASS OEM receiver .
	<45s	<15s (after reset)	<1s	2, 1, 1, 2, 1	RS232, Ethernet, USB, event marker, PPS out	300–230, 400; 1-2 Mbps	-40 to + 60	9–30 V DC	2W typ	(E)	Dual frequency high accuracy GPS/GLONASS receiver in a versatile waterproof high-impact plastic housing.
	<45s	<15s (after reset)	<1s	4, 1, 1, 2, 1	RS232, Ethernet, USB, event marker, PPS out	300–230, 400; 1-2 Mbps	-40 to + 60	3–5.5 V DC	2.5W typ	(E)	Dual frequency high accuracy GPS/GLONASS OEM receiver. TERRASTAR supported.
	<45s	<15s (after reset)	<1s	3, 1, 1, 2, 1	as above	300–230, 400; 1-2 Mbps	-40 to + 60	9–30 V DC	3W typ	(E)	Dual frequency high accuracy GPS/GLONASS receiver in a versatile waterproof high-impact plastic housing. TERRASTAR supported.
	<45s	<15s (after reset)	<1s	2, 1, 1, 2, 1, 1	RS232, Ethernet, USB, event marker, PPS out, Ref in	300–230, 400; 1-2 Mbps	-40 to + 70	9–30 V DC	6W typ	(E)	Multi-frequency GNSS reference receiver.

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	PolaRx4TR PRO	264 par.	GPS L1, C/A L2, P-code & CP; L2C; L5 code & CP, GALILEO L1 code & CP; E5a code & CP; WAAS/EGNOS; GLONASS L1 L2 L2 CA, P, BeiDou, QZSS	as above	DGLMetOPRTV1	235 x 140 x 37mm	980g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	50Hz	<
	PolaRxS PRO	136 par.	GPS L1, C/A L2, P-code & CP; L2C; L5 code & CP, GALILEO L1 code & CP; E5abAltBOC code & CP; WAAS/ EGNOS, BeiDou, QZSS	All in View GPS+GLO+GALILEO	DGLMetOPRTV1	300 x 140 x 37mm	980g	1.3m (1s)/ 0.6m (1s)/1cm +1 ppm/ 5mm + 1 ppm	10	100Hz	<
SkyTraq Technology, Inc. *www.skytraq.com.tw*	Venus816	167	L1 GPS, SBAS, QZSS	14	ACDGHLMMetNPRTV2	5 x 5 x 0.85mm	0.1g	<2.5m/nr/nr/nr(CEP)	10ns	1, 2, 4, 5, 8, 10, 20, 25, 40Hz	2
	Venus838LPx	167	L1 GPS, SBAS, QZSS	14	ACDGHLMMetNPRTV2	10 x 10 x 1.3mm	0.3g	<2.5m/nr/nr/nr(CEP)	10ns	1, 2, 4, 5, 8, 10, 20, 25, 40Hz	2
	Venus838FLPx	167	L1 GPS, SBAS, QZSS	14	ACDGHLMMetNPRTV2	10 x 10 x 1.3mm	0.3g	<2.5m/<2.0m/nr/nr(CEP)	10ns	1, 2, 4, 5, 8, 10, 20, 25, 40, 50Hz	2
	Venus838FLPx-T	167	L1 GPS, SBAS, QZSS	14	ACDGHLMMetNPRTV2	10 x 10 x 1.3mm	0.3g	<2.5m/<2.0m/nr/nr(CEP)	6ns	1, 2, 4, 5, 8, 10, 20, 25, 40, 50Hz	2
	Venus838FLPx-P	167	L1 GPS, SBAS, QZSS	14	ACDGHLMMetNPRTV2	10 x 10 x 1.3mm	0.3g	<2.5m/<1.0m/nr/nr(CEP)	10ns	1, 2, 4, 5, 8, 10, 20, 25, 40, 50Hz	2
	Venus858F	167	L1 GPS, GLONASS, BeiDou, SBAS, QZSS	28	ACDGHLMMetNPRTV2	10 x 10 x 1.3mm	0.3g	<2.5m/<2.0m/nr/nr(CEP)	10ns	1, 2, 4, 5, 8, 10, 20Hz	2
	Venus858F-T	167	L1 GPS, GLONASS, BeiDou, SBAS, QZSS	28	ACDGHLMMetNPRTV2	10 x 10 x 1.3mm	0.3g	<2.5m/<2.0m/nr/nr(CEP)	6ns	1, 2, 4, 5, 8, 10, 20Hz	2
	Venus858F-P	167	L1 GPS, GLONASS, BeiDou, SBAS, QZSS	28	ACDGHLMMetNPRTV2	10 x 10 x 1.3mm	0.3g	<2.5m/<1.0m/nr/nr(CEP)	10ns	1, 2, 4, 5, 8, 10, 20Hz	2
	S2532DR	65	L1 GPS, SBAS	12	ACDHLMNTV2	25 x 32 x 2.3mm	4g	<2.5m/nr/nr/nr(CEP)	60ns	1, 5, 10Hz	1
	S2532F8DR	167	L1 GPS, GLONASS, BeiDou, SBAS, QZSS	12	ACDHLMNTV2	25 x 32 x 2.3mm	4g	<2.5m/nr/nr/nr(CEP)	10ns	1, 5, 10Hz	1
Sokkia *www.sokkia.com*	GRX2	226 Channels with Universal Tracking Channel Technology	GPS: L1 C/A, L2C, L2 P(Y); GLONASS: L1/L2 code and carrier	>50	GL1	184 (Ø) x 95mm	1.1 kg	2–3m /50cm /10mm/3mm	10	0.05	<
	GSX2	226 Channels with Universal Tracking Channel Technology	GPS: L1 C/A, L2C, L2 P(Y); GLONASS: L1/L2 code and carrier	>50	GL1	150 x 150 x 64mm	0.85 kg	2–3m /40cm /10mm/3mm	10	0.01	<
Spectra Precision *www.spectraprecision.com*	ProMark 120	45 par.	SBAS, GPS L1 C/A , Glonass L1 C/A	All-in-view	HGLNR1	9.0 x 19.0 x 4.3cm	0.63kg	3m/30cm+1ppm/1cm+1ppm/ 0.5cm+1 ppm	100	0.05s	9
	ProMark 220	45 par.	SBAS, GPS L1 C/A L1/L2 P-code, L2C, Glonass L1 C/A, L2 C/A	All-in-view	HGLNR2	9.0 x 19.0 x 4.3cm	0.63kg	3m/25cm+1ppm/1cm+1ppm/ 0.5cm+1 ppm	100	0.05s	9
	ProMark 700	220		44	GLR1	20.5 x 20.5 x 6.2cm	0.65kg	1–5m/25cm+1ppm/1cm+1ppm/ 5mm+ 0.5 ppm	100	1s	6
	Epoch 50	220	GPS L1C/A, L2C, L2P, L5, GLONASS L1C/A, L1P, L2C/A, L2P, SBAS L1C/A, L5, Galileo GIOVE-A and GIOVE-B	44	GLR1	19.0 x 10.7 x 20.0cm	1.34kg	1–5m/25cm+1ppm/1cm+1ppm/ 3mm+ 0.1 ppm	100	1s	6
	ProMark 800	120 par.	GPS L1 C/A L1/L2 P-code, L2 C, L5, L1/ L2/L5 full wavelength carrier, GLONASS L1 C/A and L2 C/A, L1/L2 full wavelength carrier, GALILEO E1 and E5 , SBAS code and carrier	All-in-view	GLR1	22.8 x 18.8 x 8.4cm	1.4kg	3m/25cm+1ppm/1cm+1ppm/ 3mm+0.5ppm	nr	0.05s	1
	ProFlex 800	120 par.	GPS L1 C/A L1/L2 P-code, L2 C, L5, L1/ L2/L5 full wavelength carrier, GLONASS L1 C/A and L2 C/A, L1/L2 full wavelength carrier, GALILEO E1 and E5 , SBAS code and carrier	12GPS / 12Glonass / 3SBAS + low signal acquisition engines	AGLMNOPR1	21.5 x 20 x 7.6cm	2.1kg	3m/25cm+1ppm/1cm+1ppm/ 3mm+0.5ppm	nr	0.05s	9
Spectracom Corporation *www.spectracomcorp.com*	SecureSync	32	L1, C/A code GPS, GLONASS, future FW upgrades for Galileo and BeiDou	32	T2	42.5 x 4.4 x 35.6 cm	2.95kg	Autonomous	15 ns	1 Hz	<
	SecureSync SAASM	24	L1, C/A, P; L2, P & Y-code (encrypted P-code)	12	ADLMNOPT2	42.5 x 4.4 x 35.6 cm	2.95kg	Autonomous	40 ns	1 Hz	<
	TSync Timing Boards	12	L1, C/A code GPS, GLONASS, future FW upgrades for Galileo and BeiDou	32	LMPST1	Varied (based on form factor)	Varied (based on form factor)	40 m CEP; velocity 0.25 m/s CEP	15 ns	1 Hz	<
Spectrum Instruments *www.spectruminstruments.com*	Custom Time/ Frequency Modules	50 par.	GPS L1, C/A-code SBAS	All in View + 2 SBAS	ADGLMMetOPT12	Various	Various	2.5m/2.0m CEP	10	1	<
	TM-4	50 par.	GPS L1, C/A-code SBAS	All in View + 2 SBAS	DGLMMetNOPT1	4.0 x 1.5 x 4.125in Rack Brax avail.	1lb	2.5m/2.0m CEP	15	1	<
	TM-4D	50 par.	GPS L1, C/A-code SBAS	All in View + 2 SBAS	DGLMetOPT1	19.0 x 1.75 x 8.0in	6.5lb	2.5m/2.0m CEP	10	1	<
	TM-4M, TM4-M+, TM4-M/D	50 par.	GPS L1, C/A-code SBAS	All in View + 2 SBAS	DGLMMetOPT1	9.5 x 1.75 x 9.0in	4lb	2.5m/2.0m CEP	10	1	<
	TM-4MR	50 par.	GPS L1, C/A-code SBAS	All in View + 2 SBAS	DGLMMetOPT1	9.5 x 3.5 x 12.0in Rack Mountable	7.5lb	2.5m/2.0m CEP	5	1	<
	TM4-MRII	50 par.	GPS L1, C/A-code SBAS	All in View + 2 SBAS	DLMetOPT1	19.0 x 3.5 x 8.0in	6lb	2.5m/2.0m CEP	5	1	<
	TM-4OEM	50 par.	GPS L1, C/A-code SBAS	All in View + 2 SBAS	ADGLMMetOPT2	3.875 x 1.0 x 4.00in	0.5lb	2.5m/2.0m CEP	10	1	<
	TM4-PC/104	50 par.	GPS L1, C/A-code SBAS	All in View + 2 SBAS	ADGLMMetOPT2	3.775 x 0.497 x 3.55in	0.5lb	2.5m/2.0m CEP	10	1	<
	TM4-SN, TM4-S	50 par.	GPS L1, C/A-code SBAS	All in View + 2 SBAS	ADGLMNOPT2	5.1 x 1.0 x 1.6in	0.5lb	2.5m/2.0m CEP	15	1	<
	TM5-OEM	50 par.	GPS L1, C/A-code SBAS GLONASS	All in View + 2 SBAS	ADGLMNOPT2	60 x 114 x 16mm	0.5lb	2.5m/2.0m CEP	10	1	<
STMicroelectronics *www.st.com/gps*	Cartesio PLUS (STA2064)	32	GPS/Galileo (L1), SBAS	32	ACDGLHMNPTV	15 x 15 x 1.2mm	na	2m/1.5m/na/na	<50(rms)	1Hz	3
	Cartesio PLUS (STA2065)	32	GPS/Galileio (L1), SBAS	32	ACDGLHMNPTV	16 x 16 x 1.2mm	na	2m/1.5m/na/na	<50(rms)	1Hz	3
	Teseo Chipset	16	GPS (L1), SBAS	13	ACDGLHMNPTV2	RF 5x5mm BB 10x10mm	na	2m/1.5m/na/na	50 (rms)	1Hz	3
	Teseo MCM (STA8058)	16	GPS (L1), SBAS	13	ACDGLHMNPTV2	11 x 7 x 1.4mm	na	2m/1.5m/na/na	50 (rms)	1Hz	3
	TeseoII SOC, (STA8088EXG)	32	GPS/Galileio/Glonass QZSS (L1), SBAS	32	ACDGLHMNPTV2	9x9x1.2	na	2m/1.5m/na/na	<50(rms)	1Hz/5Hz/10Hz	3
	TeseoII SAL, (STA8088FG)	32	GPS/Galileio/Glonass QZSS (L1), SBAS	32	ACDGLHMNPTV2	7x7x1	na	2m/1.5m/na/na	<50(rms)	1Hz/5Hz/10Hz	3
	RF Front-End (STA5620)	na	L1	na	ACDGLHMNPTV2	5 x 5 x 1.0mm	na	na	na	na	n
	RF Front-End (STA5630)	na	L1	na	ACDGLHMNPTV2	5 x 5 x 1.0mm	na	na	na	na	n
Surrey Satellite Technology Ltd. *www.sstl.co.uk*	SGR-10	24	GPS L1 C/A	>12	NS1	160 x 50 x 160mm	1kg	<10m/-/-/1m (95%)	500	1	3
	SGR-20	24	GPS L1 C/A	>12	NOS1	160 x 50 x 160mm	1kg	<10m/-/-/1m (95%)	500	1	3
	SGR-07	12	GPS L1 C/A	12	NS1	120 x 47 x 76mm	450g	<10m/-/-/1m (95%)	500	1	9
	SGR-05P	12	GPS L1 C/A	12	NS2	70 x 10 x 70mm	60g	<10m/-/-/1m (95%)	500	1	9

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	<45s	<15s (after reset)	<1s	2, 1, 1, 2, 1, 1, 1, 1	RS232, Ethernet, USB, event marker, PPS out, Ref in, PPS in, Ref out	300–230, 400, 10 Mbps	–30 to +70	9–30 V DC	6W typ	(E)	Multi-frequency GNSS reference receiver for highly accurate timing and frequency transfer
	<45s	<15s (after reset)	<1s	4, 1, 2, 1, 2	RS232, Ethernet, event marker, PPS out, Ref out	300–230, 400, 10 Mbps	–30 to +70	9–30 V DC	6W typ	(E)	Scintillation monitoring receiver
0,	29s	28s	<1s	1	UART	4800/9600/38400/115200	-40 to +85	ext	0.07	active or passive	ROM GPS chipset
0,	29s	28s	<1s	1	UART	4800/9600/38400/115200	-40 to +85	ext	0.07	active or passive	ROM GPS module
0,	29s	28s	<1s	5	2 UART, 2 SPI, I2C	4800/9600/38400/115200	-40 to +85	ext	0.09	active or passive	Flash GPS module
0,	29s	28s	<1s	5	2 UART, 2 SPI, I2C	4800/9600/38400/115200	-40 to +85	ext	0.09	active or passive	Flash Precision Timing GPS module
0,	29s	28s	<1s	5	2 UART, 2 SPI, I2C	4800/9600/38400/115200	-40 to +85	ext	0.09	active or passive	Flash Precise Point Positioning GPS module
	29s	28s	<1s	5	2 UART, 2 SPI, I2C	4800/9600/38400/115200	-40 to +85	ext	0.12	active	Flash GPS/GLONASS/BeiDou module
	29s	28s	<1s	5	2 UART, 2 SPI, I2C	4800/9600/38400/115200	-40 to +85	ext	0.12	active	Flash Precision Timing GPS/GLONASS/ BeiDou module
	29s	28s	<1s	5	2 UART, 2 SPI, I2C	4800/9600/38400/115200	-40 to +85	ext	0.12	active	Flash Precise Point Positioning GPS/ GLONASS/BeiDou module
	1s	1s	<1s	1	UART	4800/9600/38400/115200	-40 to +85	ext	0.13	active	Dead-Reckoning GPS module
	1s	1s	<1s	1	UART	4800/9600/38400/115200	-40 to +85	ext	0.13	active	Dead-Reckoning GPS/GLONASS/BeiDou module
	<40	<20s	<1s	2	RS-232, Ext Power	2,400–115,200	–20 to +60	ext./int.	4	int.	Internal UHF digital radio and cellular option; Bluetooth
	<40	<20s	<1s	2	RS-232/Ext Power and mini USB	2,400–115,200	–20 to +60	ext./int.	2	int.	LongRange Technology; Bluetooth
	90s	15s	15s	3	RS232, USB, Bluetooth	up to 115200	-40 to +60	Ext./int.	3	Patch internal, patch active (ER) ext.	Versatile GNSS solution with exceptional post-processing
	90s	15s	15s	3	RS232, USB, Bluetooth	up to 115200	–30 to +55	Ext./int.	3	Patch internal, patch active (ER) ext.	All-in-one solution for network RTK
	60s	30s	15s	2	RS232, Bluetooth	RS232: up to 921.6 kbits/sec, Bluetooth 2.0 + EDR Class 2, SPP profile	-30 to +65	Int./ext.	3.7	Internal patch (ER)	The Perfect Network RTK Rover: Lightweight, Rugged and Simply Reliable
	60s	30s	15s	3	2 x RS232, Bluetooth	RS232/422: up to 921.6 kbits/sec, USB 2.0 host & device, Bluetooth 2.0 + EDR Class 2, SPP profile	-30 to +65	Int./ext.	4.4	Internal patch (ER)	Survey-grade GNSS receiver capable of high accuracy positioning
	110s	30s	3s	4	RS232, RS422, USB, Bluetooth	Selectable to 115, 200	-40 to +85	Int./ext.	4.5	Internal patch active. GPS/GLO/ GAL L1/L2/L5	The Full GNSS Productivity, GNSS Centric, Z-Blade
	90s	35s	3s	7	1 RS232/RS422, 2 RS232, USB, Bluetooth, Ethernet, 3.5G/GPRS GSM, Earth terminal	Selectable to 115, 200	-20 to +70	Int./ext.	with UHF and GNSS antenna < 5	External active antenna depending on application: Geodetic Survey Antenna, Machine, Marine or Choke Ring	Outstanding GNSS Performance in Ultra Rugged Design, GNSS Centric, Z-Blade
	< 15min	< 5min	< 5min	2	1 RS-232/1 Ethernet	9.6 Kbps	-20 to +65	ext	40-50 W	L1 (ER/WR)	Modular, plug-&-play, GPS Time and Frequency
	< 20min	< 5min	< 5min	2	2 RS-232/1 Ethernet	9.6 Kbps	-20 to +65	ext	40-50 W	L1/L2 (ER/WR)	Modular, plug-&-play, GPS Time and Frequency, SAASM compliant
	< 15min	< 5min	< 5min	NA	Register-based interface	Selectable	-40 to +85	ext	+5 V DC @ 55 mA	L1 (ER/WR)	GPS Time Code Processor available in multiple form factors
	<35s	<38s	<1s	Various	sine, 1PPS, RS-232, TTL, IRIG B, NTP, various	Selectable to 115, 200	-20 to +70	ext	Various	ext.	Customizable time/frequency platform
	<35s	<38s	<1s	2, 9	as above	Selectable to 115, 200	-20 to +70	ext	3.2	ext.	Time/Frequency reference instrument. IRIG-B
	<35s	<38s	<1s	24, 9	as above	Selectable to 115, 200	0 to +70	ext	4	ext.	Time/Frequency instrument with integrated Distribution Amplifier. IRIG-capable.
	<35s	<38s	<1s	6, 9	as above	Selectable to 115, 200	0 to +70	Universal AC	3.2	ext.	Time/Frequency instrument with internal UPS
	<35s	<38s	<1s	6, 9	as above	Selectable to 115, 200	-20 to +70 or -40 to +85	Universal AC	< 12	ext.	Time/Frequency instrument with Rubidium oscillator and integrated UPS
	<35s	<38s	<1s	6, 9	as above	Selectable to 115, 200	-20 to +70 or -40 to +85	Universal AC	<12	ext.	Time/Frequency instrument with Rubidium oscillator. Rack Mount
	<35s	<38s	<1s	2, 9	as above	Selectable to 115, 200	-40 to +85	ext	Various to under 2 W	ext.	Board level module, Time/Frequency, IRIG-B
	<35s	<38s	<1s	3, 9	10 MHz sine(x2), 1PPS, RS-232, TTL, IRIG B, NTP, various	Selectable to 115, 200	-20 to +70 or -40 to +85	ext	as above	ext.	Board level module, Time/Frequency, IRIG-B, PC/104 compliant
	<35s	<38s	<1s	2, 5	10 MHz LVDS, 1PPS LVDS, TTL, Custom	4800-115500	-40 to + 85	ext	as above	ext.	Board level module, Time/Frequency, MGRS, WAAS, High Sensitivity, Fully Shielded
	<35s	<38s	<1s	2, 8	sine, 1PPS, TTL, various	4800-115500	-40 to + 85	ext	3.2	ext.	Board level module, Time/Frequency, high sensitivity, WAAS, Fully Shielded
	35s	34s	<1s	17	UART, SPI, I2C, USB, CAN, SD/ MMC, I2S/TDM, SPDIF, GPIOs	4800-115500	-40 to + 85	1.25V	Variable (inquire)	E (passive & active)	Infotainment application processor with embedded GPS
	35s	34s	<1s	22	UART, SPI, I2C, USB, CAN, USB, SD/MMC, I2S/TDM, SPDIF, SmartCard, GPIOs	4800-115500	-40 to + 85	1.25V	Variable (inquire)	E (passive & active)	Infotainment application processor with embedded GPS
	39s	34s	<1s	10	UART, SPI, I2C, USB and CAN	4800-115500	-40 to + 85	ext/int	Variable (inquire)	E (passive & active)	Embedded Flash + EMI
	39s	34s	<1s	9	UART, SPI, I2C, USB and CAN	4800-115500	-40 to + 85	ext/int	Variable (inquire)	E (passive & active)	Embedded Flash
	35s	34s	<1s		UART, SPI, SQI, 2C, USB, CAN, SD/ MMC, I2S, FSMC, GPIOs	na	-40 to + 85	1.2V/1.8V	Variable (inquire)	E (passive & active)	Multiconstellation Sistem On Chip
	35s	34s	<1s		UART, SPI, SQI, 2C, USB, CAN, GPIOs	na	-40 to + 85	1.2V/1.8V	Variable (inquire)	E (passive & active)	Multiconstenstellatin Stand-Alone
	na	na	na	na	na	9, 600–38, 400	–20 to +50	2.56 - 3.3V	40mW	na	Fully integrated RF Front-end
	na	na	na	na	na	9, 600–38, 400	–20 to +50	1.62-1.98V	29mW	na	Low power GPS-Galileo RF Front-end
	3.5min	60s	nr	2	RS-422, CAN bus	9, 600–38, 400	–20 to +50	External	<6	2 patch + LNAs	Heritage space receiver
	3.5min	60s	nr	2	RS-422, CAN bus	9, 600–38, 400	–20 to +50	External	<7	4 patch + LNAs	Spacecraft att. determ.
	9m/2m	60s	nr	2	RS-422, CAN bus	9, 600–38, 400	–20 to +50	External	<2	1 patch + LNA	Packaged SGR-05P
	9m/2m	60s	nr	2	TTL, RS422, CAN	9, 600–115, 200	–20 to +50	External	1.5	1 Quadrifilar/patch + LNA	Rdcd-size OEM w TMR

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	SGR-05U	12	GPS L1 C/A	12	NS2	70 x 10 x 45mm	30g	<10m/-/-/1m (95%)	500	1	9
	SGR-ReSI	24	GPS L1 C/A, L2C	>12	NS1	300 x 40 x 200mm	1kg	10m/-/-/<1m (95%)	500	1	3
	SGR-Axio	24	GPS L1 C/A, L2C	>12	NS1	160 x 50 x 180mm	1kg	5m/-/-/<1m (95%)	100	1	3
Tallysman Wireless *www.tallysman.com*	TW5300	16	GPS L1 C/A code, 16 GPS	16	LV1	66.5 x 21mm	150g	~10m	na	1Hz	<
	TW5310	16	GPS L1 C/A code, 16 GPS	16	DLMNV1	66.5 x 21mm	150g	~10m	<100ns	1Hz	<
	TW5330	16	GPS L1 C/A code, 16 GPS	16	DLMNT1	66.5 x 21mm	150g	~10m	<100ns	1Hz	<
	TW5210	16	GPS L1 C/A code, 16 GPS	16	DLMNV1	57 x 15mm	175g	~10m	<100ns	1Hz	<
THALES - Avionics Division *www.thalesgroup.com*	GNSS 1000C	12	L1 : C/A	All in view	ADLMNPT2	149.35 x 144.65 x, 19mm	430g	< 5m (95%)	< 50	10Hz	<
	GNSS 1000G	20 par.	GPS L1 C/A code and, GLONASS L1	10 GPS + 10, GLONASS	ADLMN2	149.35 x 144.65 x, 19mm	430g	< 5m (95%)	< 50	5Hz	C s 2
	GNSS 1000S, SAASM-Based	24 par.	L1 : C/A, P or Y code, L2 : P or Y code	All in view	ADLMNPT2	149.35 x 144.65 x, 19mm	430g	< 3m (95%)	< 50	10Hz	<
	GNSS 100-2, SAASM-Based	24 par.	L1 : C/A, P or Y code, L2 : P or Y code	All in view	ADLMNPT1	221.5 x 162 x, 67.3mm	1.6kg	< 3m (95%)	< 50	10Hz	<
	GNSS 100-3, SAASM-Based	24 par.	L1 : C/A, P or Y code, L2 : P or Y code	All in view	ADLMNPT1	211 x 160 x 49mm	1.4kg	< 3m (95%)	< 50	10Hz	<
	TOPSTAR 200	12	L1 : C/A	All in view	AN1	66 x 216 x 241mm	1.6kg	< 15m, 1m, (SBAS) (95%)	< 50	1Hz or 5Hz	<
Topcon ***www.topconpositioning.com***	GR-5	226 Channels with Universal Tracking Channel Technology	GPS: L1/L2 C/A & P(Y), L2C, L5 carrier; GLONASS: L1/L2/L3 C/A & P carrier; GALILEO: E1, E5a, E5b code carrier*; BeiDou: B1, B2 C/A code carrier*; QZSS: L1 C/A & L1C, L2C, L5 code & carrier; SBAS: L1 code & carrier	>50	GL1	158.1 x 253.0 x 158.1mm	1.44kg	1.2m/40cm /10mm/3mm	10	up to 0.01	<
	HiPer V	226 Channels with Universal Tracking Channel Technology	GPS: L1/L2 C/A & P(Y), L2C carrier; GLONASS: L1/L2 C/A & P carrier; QZSS: L1 C/A & L1C, L2C code & carrier; SBAS: L1 code & carrier	>50	GL1	184 (Ø) x 95mm	1.0kg	1.2m /50cm /10mm/3mm	10	up to 0.05	<
	HiPer SR	226 Channels with Universal Tracking Channel Technology	GPS: L1/L2 C/A & P(Y), L2C carrier; GLONASS: L1/L2 C/A & P carrier; QZSS: L1 C/A & L1C, L2C code & carrier; SBAS: L1 code & carrier	>50	GL1	150 x 150 x 64 (mm)	0.85kg	1.2m /40cm /10mm/3mm	10	0.1	<
	GRS-1	226 Channels with Universal Tracking Channel Technology	GPS: L1/L2 C/A & P(Y), L2C carrier; GLONASS: L1/L2 C/A & P carrier; QZSS: L1 C/A & L1C, L2C code & carrier; SBAS: L1 code & carrier	>50	GHNLR7E	215 x 90 x 53mm	0.77kg	2–3m /50cm /10mm/3mm	10	0.01	<
	Net G3A	144 Channels with Universal Tracking Channel Technology	GPS: L1, L2, & L5 carrier; C/A L1, P L1, P L2, L2C; GLONASS: L1, L2, & L5 carrier, C/A L1, P L1, P L2, C/A L2; QZSS: L1 C/A & L1C, L2C, L5 code & carrier; SBAS: L1 code & carrier	>50	GLR1	166 x 93 x 275mm	3.0kg	1.2m/25cm /10mm/3mm	10	0.01	<
	MR-1	72 Channels with Universal Tracking Channel Technology	GPS: L1 C/A, L1/L2 P-code, L2C; GLONASS: L1/L2 code and carrier; SBAS: L1 code & carrier	36	GLM1	115x35x155mm	0.4kg	2–3m /40cm /10mm/3mm	25	0.01	<
	GB-3	72 Channels with Universal Tracking Channel Technology	GPS: L1, L2, & L5 carrier; L1 C/A, L1/L2 P-code, L2C; GLONASS: L1, L2, & L5 carrier, L1 C/A, L1/L2 P-code, L2 C/A; QZSS: L1 C/A & L1C, L2C code & carrier; SBAS: L1 code & carrier	36	GL1	110 x 35 x 240mm	0.6kg	2–3m /40cm /10mm/3mm	10	0.05	<
	B110	226 Channels with Universal Tracking Channel Technology	GPS: L1/L2 C/A & P(Y), L2C carrier; GLONASS: L1/L2 C/A & P carrier; QZSS: L1 C/A & L1C, L2C code & carrier; SBAS: L1 code & carrier	>50	2	40 x 55 x 10mm	na	1.2m /30cm /10mm/3mm	10	0.01	<
	OEM-1	72 Channels with Universal Tracking Channel Technology	GPS: L1 C/A, L2C, L2 P(Y); GLONASS: L1/L2 code and carrier; SBAS: L1 code & carrier	36	2	60 x 13 x 100mm	na	1.2m /30cm /10mm/3mm	25	0.01	<
	112 PII	144 Channels with Universal Tracking Channel Technology	GPS: L1, L2, & L5 carrier; C/A L1, P L1, P L2, L2C; GLONASS: L1, L2, & L5 carrier, C/A L1, P L1, P L2, C/A L2; QZSS: L1 C/A & L1C, L2C, L5 code & carrier; SBAS: L1 code & carrier	>50	2	112 x 14.7 x 100mm	na	1.2m /30cm /10mm/3mm	10	0.01	<
Trimble ***www.trimble.com***	Trimble AP10 Board Set	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, OmniSTAR	24	ADGLMNOPR2	167 x 100 x 45Hmm (including IMU)	0.28kg (including IMU)	1.5 – 3m/0.25- 1m/0.02 - 0.05m /0.02 - 0.05m	100	200Hz	<
	Trimble AP15 Board Set	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, OmniSTAR	24	ADGLMNOPR2	130 x 100 x 39Hmm (not including IMU)	0.28kg (not including IMU)	1.5 – 3m/0.25- 1m/0.02 - 0.05m /0.02 - 0.05m	100	200Hz	<
	Trimble AP20 Board Set	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, OmniSTAR	24	ADGLMNOPR2	130 x 100 x 39Hmm (not including IMU)	0.68kg (not including IMU)	1.5 – 3m/0.5 - 2m/0.02 - 0.05m /0.02 - 0.05m	100	100Hz	<
	Trimble AP40 Board Set	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, OmniSTAR	24	ADGLMNOPR2	130 x 100 x 39Hmm (not including IMU)	0.68kg (not including IMU)	1.5 – 3m/0.5 - 2m/0.02 - 0.05m /0.02 - 0.05m	100	200Hz	<
	Trimble AP50 Board Set	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, OmniSTAR	24	ADGLMNOPR2	130 x 100 x 39Hmm (not including IMU)	0.68kg (not including IMU)	1.5 – 3m/0.5 - 2m/0.02 - 0.05m /0.02 - 0.05m	100	200Hz	<
	Trimble AP60 Board Set	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, OmniSTAR	24	ADGLMNOPR2	130 x 100 x 39Hmm (not including IMU)	0.68kg (not including IMU)	1.5 – 3m/0.5 - 2m/0.02 - 0.05m /0.02 - 0.05m	100	200Hz	<
	BD910 GNSS Receiver	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, BeiDou B1/B2	44	DGLMNPRTV2	41 x 41 x 7mm	0.7oz	1–5m/0.25m + 0.5ppm/8mm + 1ppm/3mm + 0.1 ppm	100	20	<
	BD920 GNSS Receiver	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, BeiDou B1/B2	44	DGLMNPRTV2	51 x 41 x 7mm	0.85oz	1–5m/0.25m + 0.5ppm/8mm + 1ppm/3mm + 0.1 ppm	100	20	<
	BD920 -W3G GNSS Receiver	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, BeiDou B1/B2	44	DGLMNPRTV2	50 x 62 x 14mm	54oz	1–5m/0.25m + 0.5ppm/8mm + 1ppm/3mm + 0.1 ppm	100	20	<

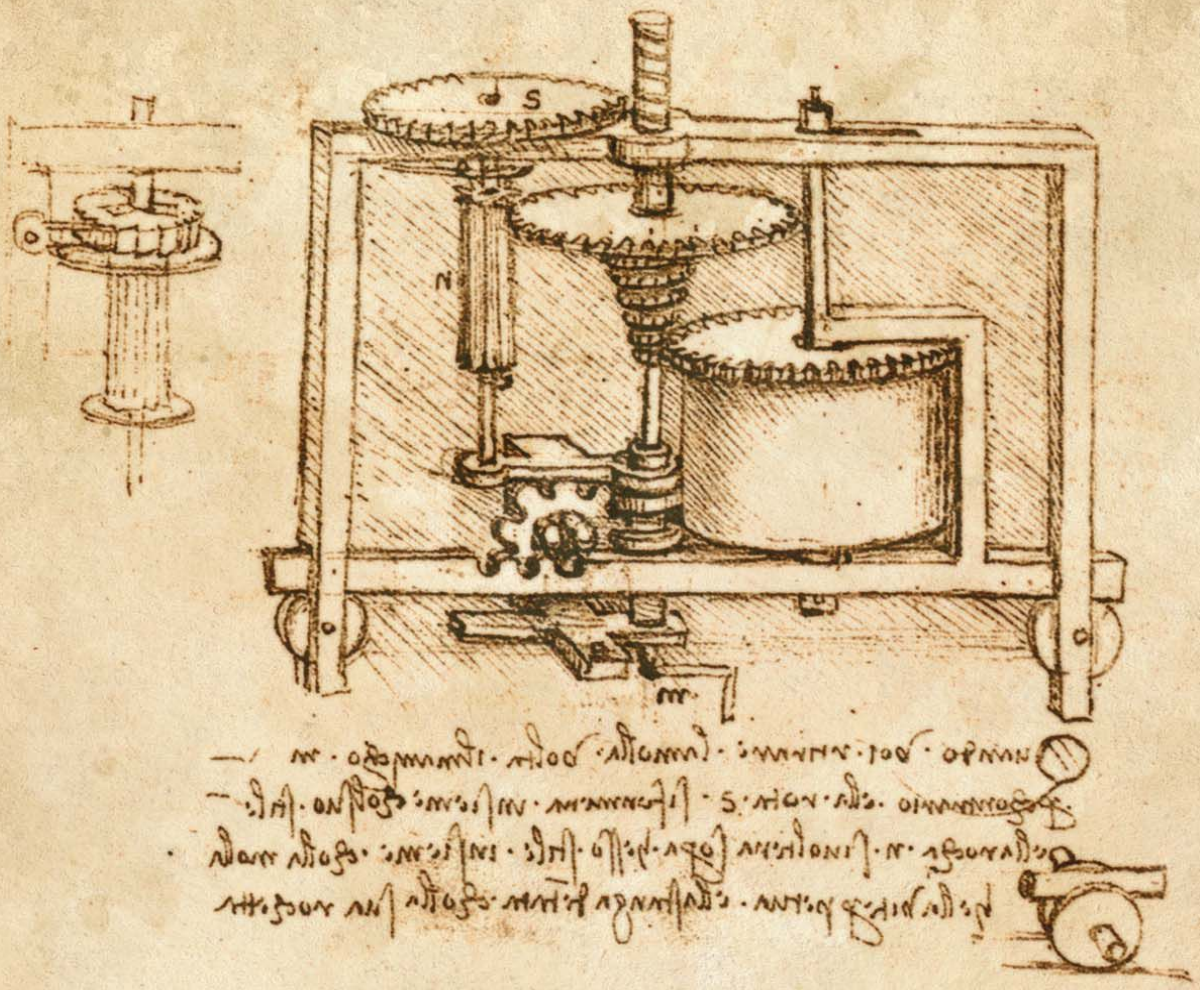
te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	9min	60s	nr	1	UART TTL	9, 600–115, 200	–20 to +50	External	1	1 Quadrifilar + LNA	University-grade space OEM
	3/2min	60s	nr	3	RS-422, CAN bus, LVDS	9, 600–115, 200	–20 to +50	External	10	Four spiral array, plus standard patches	Remote Sensing Capability (Reflection & RO)
	3/2min	60s	nr	3	RS-422, CAN bus, LVDS	9, 600–115, 200	-20 to +50	External	4-6	Up to 4 patches	New Generation Space Receiver
	<39s	<34s	<1s	1	1 RS-232, 2 digital inputs	Configurable to 115.2kb	-45C, +85C	12 V ext	1W	Integrated Active antenna	Integrated Telematics GPS Receiver/Antenna
	<39s	<34s	<1s	1	1 RS-232, differential 1PPS (RS-242)	Configurable to 115.2kb	-45C, +85C	5V or 12V ext	1W	Integrated Active antenna	Fixed mount, Integrated GPS Receiver/antenna
	<39s	<34s	<1s	1	1 RS-232, differential 1PPS (RS-242)	Configurable to 115.2kb	-45C, +85C	5V or 12 V ext	1W	Integrated Active antenna	Fixed Mount, Timing applications
	<39s	<34s	<1s	1	RS232 & opt USB	115 200	-46°C to, +101°C	5v or 12V ext	1W	Integrated Active antenna	Magnetic Mount GPS Receiver/Antenna
	<60s	20s	<5s	4, 1, 1, 1, 2	RS 422, DPRAM, DS-101, DS-102, HVQK, 1PPS, In/Out	115 200	-46°C to, +101°C	External	< 10W	Ext. Passive, or active (E)	SPS receiver, pin to pin compatible with GNSS 1000S.
	GPS : 200 s, GLO : 290 s	GPS : 50 s, GLO : 60 s	<15s	3, 1	RS 422, DPRAM	4800, 115, 200	-46°C to, +71°C	External	14 W	Ext. Passive, or active (E)	
	<60s	20s	<5s	4, 1, 1, 1, 2	RS 422, DPRAM, DS-101, DS-102, HVQK, 1PPS, In/Out	115200	-45°C to, +82°C	External	< 10W	Ext. Passive, or active (E)	SAASM Based, GRAM-S (SEM E), module
	<60s	20s	<5s	1 or 2, 2, 1, 1, 1, 1, 2	1553 or ARINC 429, RS422, NMEA, DS-101, DS-102, HVQK, 1PPS In/Out	100 000, 19200	-40°C to, +70°C	28 V dc	< 25 W	Ext. Passive, or active (E)	SAASM Based
	<60s	20s	<5s	4, 1, 2	RS 422, HVQK, 1PPS, In/Out	460800	–30 to +70	28 V dc	< 20 W	Ext. Passive, or active (E)	SAASM Based
	<210s	75s	<10s	8, 1, 3, 3	ARINC 429, RS 232, Time, Mark Pulse; discrete	460800	–40 to +65	28 V dc	< 18 W	Ext. Passive, or active (E)	TSO C145c (Beta-3) and , TSO C146c (Delta-4) certified
	<60 s	< 30 s	< 1 s	3	RS-232, USB, Ext Pwr	up to 460800	-30 to + 70C	ext./int.	3.3	int.	Internal digital UHF and FH915 (SpSp) radio with cellular (HSPA/CDMA) options; Bluetooth
	<60 s	< 35 s	<1s	2	RS-232, Ext Power	up to 115200	-40 to + 65C	ext./int.	4	int.	Internal digital UHF and FH915 (SpSp) radio with cellular (HSPA/CDMA) options; Bluetooth
	<40 s	<20s	<1s	2	RS-232/Ext Power and mini USB	up to 115200	–40 to + 65C	ext./int.	2	int.	LongLink Technology; Cellular; Bluetooth
	<30s	<10s	<1s	3	Mini USB, Power, Mini Serial	up to 460800	–20 to + 50C	ext./int.	5.3	int./ext.	Internal GSM or CDMA modem
	<60s	<10s	<1s	8	4 RS-232, 1 USB, 2 Power, 1 Ethernet	up to 460800	–40 to + 65C	ext.	< 4.5	ext.	GNSS reference network receiver; internal back up power (UPS); upto 5 IP addresses available, client and server functionality:
	<40s	<5s	<1s	3	1 common port for 2xRS-232, Power and PPS; 2 ext antenna	460800	–40 to + 75C	ext	4.0W Max	ext. (x2)	GNSS Modular receiver with dual antenna input support for precise heading (and inclination) determination using Topcon's VISOR technology; PPS support
	<60s	<35s	1s	4	RS-232, USB, power, Ethernet	460800	–40 to + 75C	ext.	3.5	ext.	Modular Recv, 20Hz, Bluetooth, PPS out, EM
	<60 s	<35 s	<1s	9	2 RS232, 4 LVTTL UART, 1 USB, 1 CAN, 1 I2C interface, 1PPS	up to 460800	40 to + 85C	ext.	1	ext	Compact OEM L1/L2 GNSS board for high precision RTK positioning
	<60s	<35s	<1s	6	3 RS-232, 1 USB, 2 CAN	2,400–115,200	-30 to + 85C	ext.	1.8	ext	OEM GPS Board with dual antenna input support for precise heading (and inclination) determination using Topcon's VISOR technology.
	<60s	<35s	<1s	8	4 RS-232, 1 Ethernet, 1 USB, 2 CAN	2,400–115,200	-40 to + 75 C	ext.	4.8	ext	OEM GPS Board; USB Host and Device
	<60s	<30s	<15s	1,4,1,5	Ethernet, RS232, 1PPS, Event	2,400–115,200	-40 to +75 C	ext	< 20 Watts (incl IMU and ant)	MMCX receptacle	GNSS + Inertial for continuous positioning during satellite blockage
	<60s	<30s	<15s	1,4,1,5	Ethernet, RS232, 1PPS, Event	2,400–115,200	-40 to +75 C	ext	< 20 Watts (incl ant, not incl IMU)	MMCX receptacle	GNSS + Inertial for continuous positioning during satellite blockage and high accuracy orientation for mobile mapping
	<60s	<30s	<15s	1,4,1,5	Ethernet, RS232, 1PPS, Event	2,400–115,200	-40 to +75 C	ext	< 20 Watts (incl ant, not incl IMU)	MMCX receptacle	GNSS + Inertial for continuous positioning during satellite blockage and high accuracy orientation for mobile mapping
	<60s	<30s	<15s	1,4,1,5	Ethernet, RS232, 1PPS, Event	2,400–115,200	-40 to +75 C	ext	< 20 Watts (incl ant, not incl IMU)	MMCX receptacle	GNSS + Inertial for continuous positioning during satellite blockage and high accuracy orientation for mobile mapping
	<60s	<30s	<15s	1,4,1,5	Ethernet, RS232, 1PPS, Event	115,200 RS-232, 10/100Mbps Ethr	-40 to +85	ext	< 20 Watts (incl ant, not incl IMU)	MMCX receptacle	GNSS + Inertial for continuous positioning during satellite blockage and high accuracy orientation for mobile mapping
	<60s	<30s	<15s	1,4,1,5	Ethernet, RS232, 1PPS, Event	115,200 RS-232, 10/100Mbps Ethr	-40 to +85	ext	< 20 Watts (incl ant, not incl IMU)	MMCX receptacle	GNSS + Inertial for continuous positioning during satellite blockage and high accuracy orientation for mobile mapping
	<45s	<30s	<2s	4,1,1	RS-232, Ethernet, USB	115,200 RS-232, 10/100Mbps Ethr	-40 to +85	ext	1.1W	MCXX receptacle	
	<45s	<30s	<2s	4,1,2	RS-232, Ethernet, USB	460,800 RS-232, 10/100Mbps Ethr	-40 to +75	ext	1.3W	MCXX receptacle	
	<45s	<30s	<2s	4,1,2	RS-232, Ethernet, USB	115,200 RS-232, 10/100Mbps Ethr	-40 to +75	ext	1.3W	MMCX receptacle, 44-pin header	

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	BD930 GNSS Receiver	220	GPS L1/L2/L5, GLONASS L1/L2/L23, SBAS, QZSS, GALILEO, BeiDou B1/B2		DGLMNPRTV2	51 x 41 x 7mm	1.06oz	1–5m/0.25m + 0.5ppm/8mm + 1ppm/3mm + 0.1 ppm	100	20	<
	BD982 GNSS Heading Receiver	220 x 2	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, VECTOR Antenna -GPS, GLONASS	44	DGLMNPRTV2	100 x 84.9 x 11.6mm	3.2oz	1–5m/0.25m + 0.5ppm/8mm + 1ppm/3mm + 0.1 ppm	100	50	<
	BD970 GNSS Receiver	220	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, BeiDou B1/B2	44	DGLMNPRTV2	100 x 60 x 11.6mm	2.2oz	1–5m/0.25m + 0.5ppm/8mm + 1ppm/3mm + 0.1 ppm	100	50	<
	BX982 GNSS Heading Receiver	220 x 2	GPS L1/L2, GLONASS L1/L2, SBAS, QZSS, GALILEO, VECTOR Antenna -GPS, GLONASS	44	DGLMNPRTV2	262 x 140 x 55mm	1.6kg	1–5m/0.25m + 0.5ppm/8mm + 1ppm/3mm + 0.1 ppm	100	50	<
	Trimble NetR9	440	GPS: L1 C/A, L2C, L2E (Trimble method for tracking L2P), L5 GLONASS: L1 C/A and unencrypted P code, L2 C/A2 and unencrypted P code, L3 CDMA Galileo L1 CBOC, E5A, E5B & E5AltBOC BeiDou: B1, B2, B3QZSS: L1 C/A, L1C, L1 SAIF, L2C, L5, LEX SBAS: L1C/A, L5 L-Band OmniSTAR (VBS, HP and XP) + RTX Expandable for future signals pending ICD releases.	88	GLMMetNVPRT1	26.5 x 13.0 x 5.5cm	1.75kg	1–5m/0.25m + 0.5ppm/8mm + 1ppm/3mm + 0.1 ppm	100	50Hz	<
	Trimble SPS985 GNSS Smart Antenna	440	GPS: L1 C/A, L2C, L2E, L5 GLONASS: L1 C/A, L2 C/A2, P Galileo: L1 CBOC, E5A, E5B & E5AltBOC BeiDou: B1, B2, QZSS: L1 C/A, L1C,L1 SAIF, L2C, L5, LEX SBAS: L1C/A, L5 L-Band OmniSTAR (VBS, HP and XP) + RTX	Unrestricted	GLVPRT1	12 × 13cm (4.7 x 5.1 in)	1.55kg (3.42lb) receiver only including radio and battery	1–5m/0.25m + 1ppm/8mm + 1ppm/3mm + 0.1ppm	100	1,2,5,10,20Hz	<
	Trimble SPS855 GNSS Modular Receiver	440	GPS: L1 C/A, L2C, L2E, L5 GLONASS: L1 C/A, L2 C/A2, P Galileo: L1 CBOC, E5A, E5B & E5AltBOC BeiDou: B1, B2, QZSS: L1 C/A, L1C,L1 SAIF, L2C, L5, LEX SBAS: L1C/A, L5 L-Band OmniSTAR (VBS, HP and XP) + RTX	Unrestricted	LMNPRTV1	24 × 12 × 5cm (9.4 x 4.7 x 1.9in)	1.65kg (3.64lb) receiver with internal battery and radio	1–5m/0.25m + 1ppm/8mm + 1ppm/3mm + 0.1ppm	100	1,2,5,10,20Hz	<
	Nomad 900G Series	12 par.	L1 C/A code, SBAS	12		3.9 x 6.9 x 2.0in	1.23lb	na/2 - 5m/1 - 3m Post-proc	na	1	6
	Trimble R3	12	L1 C/A Code, L1 Full Cycle Carrier, WAAS/EGNOS	12	GHLP1	9.5 x 4.4 x 24.2cm	0.62kg	1-5m/na/na/5mm + 0.5ppm	100	1Hz	<
	Trimble R4	220	GPS: L1C/A, L1C, L2C, L2E; GLONASS (optional): L1C/A, L1P, L2C/A, L2P, L3; SBAS: L1C/A– SBAS: L1C/A; Galileo (optional): E1, E5A, E5B; BeiDou (optional): B1, B2	44	GLMNVPR1	19.0 (Ø) x 10.2cm	1.52kg	1–5m/0.25m + 1ppm,0.50m + 1ppm/3mm + 0.5ppm,5mm + 0.5ppm	100	1Hz RTK	<
	Trimble R5	72	GPS L1 C/A Code, L2C, L1/L2 Full Cycle Carrier; GLONASS L1 C/A Code, L1 P Code, L2 P Code, L1/L2 Full Cycle Carrier; WAAS/EGNOS Channels	24	GLMMetNVPRT1	13.5 x 8.5 x 24cm	1.5kg	1–5m/0.25m + 0.5ppm/8mm + 1ppm/3mm + 0.1 ppm	100	1Hz RTK	<
	Trimble R6	220	GPS: L1C/A, L1C, L2C, L2E, L5; GLONASS (optional): L1C/A, L1P, L2C/A, L2P, L3; SBAS: L1C/A– SBAS: L1C/A; Galileo (optional): E1, E5A, E5B; BeiDou (optional): B1, B2	44	GLMNVPR1	19.0 (Ø) x 10.2cm	1.52kg	1–5m/0.25m + 1ppm,0.50m + 1ppm/3mm + 0.5ppm,5mm + 0.5ppm	100	1Hz RTK	<
	Trimble R7	72	GPS L1 C/A Code, L2C, L1/L2/L5 Full Cycle Carrier1; GLONASS L1 C/A Code, L1 P Code, L2 P Code, L1/L2 Full Cycle Carrier, WAAS, EGNOS; OmniSTAR VBS, HP, XP	24	GLMMetNVPRT1	13.5 x 8.5 x 24cm	1.5kg	1–5m/0.25m + 1ppm/8mm + 1ppm/3mm + 0.1 ppm	100	1Hz RTK	<
	Trimble R8	440	GPS: L1C/A, L1C, L2C, L2E, L5; GLONASS: L1C/A, L1P, L2C/A, L2P, L3; SBAS: L1C/A– SBAS: L1C/A; Galileo: E1, E5A, E5B; BeiDou: B1, B2	88	GLMNVPR1	19.0 (Ø) x 10.4cm	1.52kg	1–5m/0.25m + 1ppm,0.50m + 1ppm/3mm + 0.5ppm,5mm + 0.5ppm	100	1Hz RTK	<
	Trimble R10	440	GPS: L1C/A, L1C, L2C, L2E (Trimble method for tracking L2P), L5; GLONASS: L1C/A, L1P, L2C/A (GLONASS M only), L2P, L3; SBAS: L1C/A, L5; Galileo: E1, E5a, E5B; BeiDou: B1, B2; CenterPoint RTX; OmniSTAR VBS, HP, XP, G2; WAAS, QZSS, MSAS, EGNOS, GAGAN	88	GLMNVPR1	11.9 (Ø) x 13.6cm	1.12kg	1–5m/0.25m + 1ppm/8mm + 1ppm/3mm + 0.1 ppm	100	1Hz RTK	<
	GeoXR	220	GPS: L1C/A, L2C, L2E; GLONASS: L1C/A, L1P, L2C/A, L2P; SBAS (WAAS/ EGNOS/MSAS): L1C/A	44	GHLN1	9.9 x 23.4 x 5.6cm	0.925kg	1–5m/0.25m + 1ppm,0.50m + 1ppm/13mm + 1ppm/5mm + 0.5ppm	100	1Hz RTK	<
	Buffalo	32	L1, C/A code GPS, GLONASS	32	AGHLMMETNPV2	19 x 19 x 2.54mm	1.74g	<1.5	50	1 Hz	3
	Bison	32	L1, C/A code GPS, GLONASS	32	AGHLMMETNPV2	19 x 19 x 2.54mm	1.74g	<1.5	50	5 - 20Hz	3
	Aardvark	22	L1, C/A code	22	AGHLMMETNPV2	19 x 19 x 2.54mm	0.544g	<2.5		1, 5, 10Hz	3
	A3000	22	L1, C/A code	22	LV1	115 x 78 x 26mm	100g	<2.5		1, 5, 10Hz	3
	Copernicus II GPS	12	L1, C/A code	12	AGHLMMETNPV2	2.54 x 19 x 19	0.7oz	3m	50	1	3
	Condor C1011	22	L1, C/A code	22	AGHLMMETNPV2	10 x 10 x 2mm	0.364g	<2.5		1Hz	3
	Condor C1216	22	L1, C/A code	22	AGHLMMETNPV2	16 x 12.2 x 2.13mm	0.544g	<2.5		1Hz	3
	Condor C1722	22	L1, C/A code	22	AGHLMMETNPV2	17 x 22.4 x 2.13mm	0.953g	<2.5		1Hz	3

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	<45s	<30s	<2s	4,1,1	RS-232, Ethernet, USB	115,200 RS-232, 10/100Mbps Ethr	-40 to +80	ext	1.7W	MCXX receptacle	
	<45s	<30s	<2s	4,1,1,1	RS-232, Ethernet, USB, CAN	460,800 RS-232, 10/100Mbps Ethr	-40 to +75	ext	2.1 W	MCXX receptacle	
	<45s	<30s	<2s	3,1,1,1	RS-232, Ethernet, USB, CAN	38400	-40 to +85	ext	1.5W	MCXX receptacle	
	<45s	<30s	<2s	3,1,1,1	RS-232, Ethernet, USB, CAN	57600	–40 to +85	ext	4.1 W	TNC	
	<60s	<30s	<15s	1,1,1,1,1	D9 Serial; 7pin Lemo; Mini USB (Device and Host modes); RJ45 Ethernet: TCP/IP, UDP, HTTP, HTTPS, FTP, NTRIP Caster, NTRIP Client, NTRIP Server, NTP; Bluetooth	2400 - 460800	–40 to +65	ext	3.8 W (setting dependent)	Zephyr Geodetic II GNSS Choke Ring GNSS-Ti Choke Ring	Full GNSS CORS featuring advanced data logging and power parameters, 8GB internal memory, global RTX correction capability, secure Web User Interface with Position Monitoring.
	<60s	<30s	<12s	2,3	Wi-Fi, Lemo, Bluetooth		-30 to +60	Internal Li-Ion and ext	< 3.7W in RTK mode	Smart Antenna with Internal Zephyr Model 2	The Trimble SPS985 GNSS Smart Antenna has an ultra-rugged GNSS smart antenna design with integrated wireless communications. It is ideal for construction applications such as grade checking, construction site surveying, site supervision, and as a temporary base station with traditional radio or Wi-Fi communications.
	<60s	<30s	<12s	3,1,3	RS-232, Ethernet, Bluetooth	110 - 115,000	-20 to +60	Internal Li-Ion and ext	6 W	Zephyr Model 2	The Trimble SPS855 GNSS Modular Receiver allows maximum flexibility for use as a base station or rover. The modular receiver can be located in a safe location while the external antenna can be placed for maximum usability.
	60s typ.	40s typ.	<5s typ.	2,1,1	RS-232/Bluetooth/USB (selected model or via separate accessory)	110 - 115,000	-20 to +60	int/opt ext	1.3 w/typical use	Int Patch	Ultra rugged handheld available in a number of configurations (camera, barcode scanner, cellular data).
	<90s	<30s	<15s	6	RS-232/USB/2 Compact Flash/GPS antenna/Power	115,200 (Port 1–3); USB 1 Mbps	–40 to +65	ext/int	0.6 W receiver and antenna	external Trimble A3	Complete L1 GPS postprocessing solution
	<60s	<30s	<15s	3,1,1	2 x RS232, Bluetooth, Radio coms	38,400 (Port 1 115,200 (Port 2)	–40 to +65	ext/int	< 3.2W in RTK mode	Internal Zephyr 2	Trimble R-Track Technology, Advanced Maxwell Survey GNSS chip
	<60s	<30s	<15s	3,1,1,1	RS232, radio antenna, GNSS antenna, Compact Flash	115,200 (Port 1–3); USB 1 Mbps	–40 to +65	ext/int	"4w Fast Static 5.9 w/radio, BT RTK"	Zephyr 2, Z Geodetic 2 w/Stealth GP, GNSS Choke Ring	as above
	<60s	<30s	<15s	3,1,1	2 x RS232, Bluetooth, Radio coms	38,400 (Port 1 115,200 (Port 2)	–40 to +65	ext/int	< 3.2W in RTK mode	Internal Zephyr 2	Trimble R-Track Technology, Advanced Maxwell Survey GNSS chip
	<60s	<30s	<15s	3,2,1,1,1,1	RS232, radio antenna, GNSS antenna, Compact Flash, Bluetooth	"USB 2.0 1Mbps, Serial 460,800 bps, Bluetooth 2.1 + EDR, WiFi 802.11b/g, UMTS/HSDPA 850/900/2100 MHz, GPRS/EDGE 850/900/1800/1900 MHz"	–40 to +65	ext/int	"4w Fast Static 5.9 w/radio, BT RTK"	Zephyr 2, Z Geodetic 2 w/Stealth GP, GNSS Choke Ring	as above
	<60s	<30s	<15s	3,1,1	2 x RS232, Bluetooth, Radio coms	38,400 (Port 1 115,200 (Port 2)	–40 to +65	ext/int	< 3.2W in RTK mode	Internal Zephyr 2	Trimble 360 Technology, Advanced Maxwell Survey GNSS chips
	<60s	<30s	<15s	1,1,1,1,1,1	USB, RS232, Bluetooth, WiFi, Radio antenna, 3.5G UMTS Cellular Modem	38,400 (Port 1 115,200 (Port 2)	–40 °C to +65 °C (–40 °F to +149 °F)	ext/int	< 5.1W in RTK mode	Internal Zephyr 2	HD-GNSS processing technology, xFill Technology, Surepoint Technology with Full Tilt Compensation, Trimble CenterPoint RTX and Trimble 360 support, GLONASS support, Galileo Support, COMPASS Support,Advance Maxwell survey GNSS chip
	<60s	<30s	<15s	1,1,1,1	USB, Bluetooth, WiFi, 3.5G	"USB 2.0, Bluetooth 2.1 + EDR, WiFi 802.11b/g, UMTS/HSDPA 850/900/2100 MHz, GPRS/EDGE 850/900/1800/1900 MHz"	–20 to +50	ext/int	2.7W - 3.7W	Internal L1/L2 and external Zephyr 2 antenna	Trimble R-Track Technology, Advanced Maxwell Survey GNSS chip
	35s	32s	2.5s	2	serial	57600	–40 to +85	ext	52mA @ 3V typical	supports active/passive	Can produce position solution from GPS + GLONASS combined constellations
	38s	35s	2s	1	serial	115200	–40 to +85	ext	45mA @ 3V typical	supports active/passive	Dead reckoning position when connected to vehicle speed. Onboard gyro and accel.
	38s	35s	2s	1 + 1	serial & usb	38400	–40 to +85	ext	<37 mA typical 20◦C	supports active/passive	Dead reckoning position when connected to vehicle speed. Onboard gyro.
	38s	35s	2s	1 + 1	serial	9600	–40 to +85	ext/int battery	<40 mA typical, 9 - 30 VDC	supports active/passive	Dead reckoning position when connected to vehicle speed. Onboard gyro. IP54 packaging, onboard battery and charger
	38s	35s	2s	2	TTL		–40 to +85	ext/int	44 mA @3.0 V	Micropatch (ER)	
	38s	35s	2s	1	serial		–40 to +85		<37 mA typical 20◦C		
	38s	35s	2s	1 + 1	serial & usb		–40 to +85		<37 mA typical 20◦C		
	38s	35s	2s	1	serial & usb		–40 to +85		<37 mA typical 20◦C		

Manufacturer	Model	Channels/ tracking mode	Signal tracked	Maximum number of satellites tracked	User environment and applications[1]	Size (W x H x D)	Weight	Position: autonomous (code) / real-time differential (code) / , real-time kinematic/post-processed[2]	Time (nanosec)	Position fix update rate (sec)	C
	Condor C1919	22	L1, C/A code	22	AGHLMMETNPV2	19 x 19 x 2.54mm	1.74g	<2.5		1Hz	3
	Condor C2626	22	L1, C/A code	22	AGHLMMETNPV2	26 x 26 x 6mm	6.486g	<2.5		1Hz	3
	Acutime GG Multi-GNSS Smart Antenna	12	L1, C/A code GPS, GLONASS	32	LMPST1	3.74 D, 2.85in H	5.4oz	40m CEP; velocity 0.25m/s CEP	15	1	<
	Acutime GG Multi-GNSS Starter Kit	12	L1, C/A code GPS, GLONASS	32	LMPST1	5 x 6.12in	12.8oz	na	15	1	<
	Bullet III GPS Antenna	na	L1	na	TI	3.05 x 2.61	6.0oz	na	na	na	n
	Bullet Multi-GNSS Antenna	na	L1, C/A Code GPS & GLONASS	na	TI	3.05 x 2.61	6.0oz	na	na	na	n
	Resolution SMTx Embedded GPS Timing Module	14	L1 only, C/A code	14	T2	19 x 19 x 2.54mm	1.8oz	na	15 ns	1Hz	n
	Resolution SMT GG Embedded Multi-GNSS Timing Module	32	L1, C/A code GPS, GLONASS	32	T2	19 x 19 x 2.54mm	1.8oz	<1.5	15 ns	1 Hz	3
	Thunderbolt E Disciplined Clock	12	L1 only C/A code	12	T2	4 x 2 x 5	0.628lb	na	<15 ns	1Hz	n
	GPS Pathfinder ProXRT	440	L1 / L2, GPS / GLONASS L1 / L2, Omnistar, SBAS	88	GLN1	9.4 x 4.7 x 1.9in	3.42lb	na / 30cm / 10cm / 10cm	na	1	6
	Trimble Pro 6T	220	GPS: L1C/A; GLONASS: L1C/A, L1P	24	GLN1	"Height: 204mm (8in) Diameter: 138mm (5.4in)"	inc. battery: 1040g (2.3lb)	2-5m/ 75cm/50cm/50cm	na	1HZ	6
	Trimble Pro 6H	220	GPS: L1C/A, L2C, L2E; GLONASS: L1C/A, L1P, L2C/A, L2P	24	GLN1	"Height: 204mm (8in) Diameter: 138mm (5.4in)"	inc. battery: 1040g (2.3lb)	2-5m/ 75cm/10cm/10cm	na	1HZ	6
	Force 22E MRU Module	24	L1, C/A, P & Y-code (encrypted P-code); L2, P & Y-code	12	ADLMNOPT2	3.14 x 3.82 x 0.5in	3.9oz	<5m	40	1	<
	FR-22 SAASM Receiver	24	L1, C/A, P & Y-code (encrypted P-code); L2, P & Y-code	12	ADLMNOPTV1	5.25 x 4.5 x 1.7in	1.1lb	<5m	40	1	<
	Force 27 SEGR	24	L1, C/A, P & Y-code (encrypted P-code); L2, P & Y-code	12	ADLMNOPT2	3.92 x 4.92 x 0.6in	0.5lb	<5m	40	1 to 10	<
	Force 524D GRAM/ GASR Module	24	L1, C/A, P & Y-code (encrypted P-code); L2, P & Y-code	12	ADLMNOPT2	5.88 x 5.715 x 0.6in	0.94lb	<5m	40	1 to 10	<
	Force 524D VMEA	24	L1, C/A, P & Y-code (encrypted P-code); L2, P & Y-code	12	ADLMNOPT2	6U VME, Single-Height	2.5lb	<5m	40	1 to 10	<
	TA–24 Certified Sensor	24	L1, C/A, P & Y-code (encrypted P-code); L2, P & Y-code	12	ADNOPT1	5.00 x 9.50 x 2.10in	3.73lb	<5m	40	1	<
	Trimble Geo 7X	220	GPS: L1C/A, L2C, L2E; GLONASS: L1C, L2P; Galileo: E1; QZSS: L1C/A, L2C, L1-SAIF; BeiDou: B1; SBAS: WAAS/ EGNOS/MSAS/GAGAN (L1C/A)	44	GHLN1	234 x 99 x 56mm (9.2 x 3.9 x 2.2in)	1080g	2-5m/75cm/10cm/10cm (1cm with carrier)	na	1Hz	<
u-blox *www.u-blox.com*	UBX-M8030-KA/KT u-blox M8 concurrent GNSS single chip, QFN package, automotive/standard grade	72 par	GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1 SBAS L1 C/A: WAAS, EGNOS, MSAS Galileo-ready E1B/C	All in view, 2 concurrently (GPS, GLONASS, BeiDou). All SBAS.	CDHLMMetNPTV2	5.00 x 9.50 x 2.10in	na	2.0 m CEP, For default mode: GPS / SBAS / QZSS+GLONASS with TCXO	50 (RMS)	Single GNSS, up to 18 Hz, Concurrent GNSS, up to 10 Hz	C 2 s
	UBX-M8030-CT u-blox M8 concurrent GNSS single chip; Standard Grade, CSP package	72 par	GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1 SBAS L1 C/A: WAAS, EGNOS, MSAS Galileo-ready E1B/C	All in view, 2 concurrently (GPS, GLONASS, BeiDou). All SBAS.	CDHLMMetNPTV2	234 x 99 x 56mm (9.2 x 3.9 x 2.2in)	na	2.0 m CEP, For default mode: GPS / SBAS / QZSS+GLONASS with TCXO	50 (RMS)	Single GNSS, up to 18 Hz, Concurrent GNSS, up to 10 Hz	C 2 s
	UBX-M8030-KA-DR u-blox M8 3D Dead Reckoning GNSS single chip; Standard Grade, QFN package	72 par	GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1 SBAS L1 C/A: WAAS, EGNOS, MSAS Galileo-ready E1B/C	All in view, 2 concurrently (GPS, GLONASS, BeiDou). All SBAS.	CDHLMMetNPTV2	5.0 x 5.0 x 0.59mm	na	Horizontal pos. accuracy, Autonomous: 2.5 m CEP, SBAS: 2.0 m CEP, GPS/GLONASS: 4.0 m CEP	50 (RMS)	Up to 20 Hz	C 2 s
	UBX-M8030-KT-DR u-blox M8 3D Dead Reckoning GNSS single chip; Standard Grade, QFN package	72 par	GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1 SBAS L1 C/A: WAAS, EGNOS, MSAS Galileo-ready E1B/C	All in view, 2 concurrently (GPS, GLONASS, BeiDou). All SBAS.	CDHLMMetNPTV2	5.0 x 5.0 x 0.59mm	na	Horizontal pos. accuracy, Autonomous: 2.5 m CEP, SBAS: 2.0 m CEP, GPS/GLONASS: 4.0 m CEP	50 (RMS)	Up to 20 Hz	C 2 s
	MAX-M8M concurrent GNSS Module	72 par	GPS/QZSS L1 C/A, GLONASS L1 FDMA, SBAS: WAAS, EGNOS, MSAS	All in view, concurrently (GPS, GLONASS). All SBAS.	CDHLMMetNPV2	9.7 x 10.1 x 2.5mm	1.4g	3.0 m CEP	50 (RMS)	up to 10	2 h a s
	NEO-7M GPS/GNSS Module	56 par	GPS/QZSS L1 C/A, GLONASS L1 FDMA, SBAS: WAAS, EGNOS, MSAS	All in view, sequentially (GPS, GLONASS, Galileo, BeiDou). All SBAS.	CDHLMMetNPV2	12.2 x 16.0 x 2.4mm	1.6g	GPS: 2.5m/<2m/na/na (CEP), GLONASS: 4.0m/na/na/na	50 (RMS)	up to 10	2 a s
	EVA-7M GNSS Module	56 par	GPS/QZSS L1 C/A, GLONASS L1 FDMA, SBAS: WAAS, EGNOS, MSAS	All in view, sequentially (GPS, GLONASS, Galileo, BeiDou). All SBAS.	CDHLMMetNPV2	7.0 x 7.0 x 1.1mm	0.4g	GPS: 2.5 m CEP, SBAS: 2.0 m CEP, GPS/GLONASS: 4.0 m CEP	50 (RMS)	10	3 C C
	NEO-7P GPS PPP Module	56 par	GPS/QZSS L1 C/A, GLONASS L1 FDMA, SBAS: WAAS, EGNOS, MSAS	All in view, sequentially (GPS/QZSS, GLONASS). All SBAS.	CDHLMMetNPV2	12.2 x 16.0 x 2.4mm	1.6g	GPS: 2.5 m CEP, GLONASS: 4 m CEP, GPS/SBAS: 2.0 m CEP, GPS/ SBAS + PPP: <1 m CEP	50 (RMS)	10	2 h a s
	LEA-M8F GNSS Timing module	72 par	GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1 SBAS L1 C/A: WAAS, EGNOS, MSAS Galileo-ready E1B/C	All in view, 2 concurrently (GPS, GLONASS, BeiDou). All SBAS.	CDHLMMetNPV2	17.0 x 22.4 x 3.6mm	2.1g	<2.5m/<2m/na/na (CEP)	50 (RMS)	na	2 h a s
	LEA-6R Dead Reckoning GPS Module	16 par.	L1, C/A code, DGPS, WAAS/EGNOS	All in view (GPS, GALILEO or SBAS)	DLNPV2	17 x 22.4 x 3mm	2.1g	<2.5m/<2m/na/na (CEP)	50 (RMS)	1	2 a s

te	Cold start[3]	Warm start[4]	Re–acquisition[5]	No. of ports	Port type	Baud rate	Operating temperature (degrees Celsius)	Power source	Power consumption (Watts)	Antenna type[6]	Description or Comments
	38s	35s	2s	1	serial	9600	–40 to +85		<37 mA typical 20◦C		
	38s	35s	2s	1	serial	9600	–40 to +85		<37 mA typical 20◦C		
	<60s	<2s	<2s	2	RS-422/485 or RS-232	na	–40 to +85	ext	<1.0	Patch	
	<60s	<2s	<2s	2	RS-422	na	–40 to +85	ext	<1.0	Patch	
	na	na	na	na	na	9600	–40 to +85	ext	<20 mA - 3V 30 mA - 5V	na	
	na	na	na	na	na	9600	–40 to +85	ext	<20 mA - 3V 30 mA - 5V	na	
	na	na	na	2	TTL	9600	–40 to +85	ext	330 mW	Active/external	
	35s	32s	2.5s	2	serial	9600	0 - +60	ext	45mA @ 3V typical		
	na	na	na	1	RS232	115,200 (RS 232); USB 1Mbp	–30 to +60	ext	na	External active 5v	
	60s typ	30s typ.	<5s typ	2,2	Bluetooth / RS232	110 - 115,000	-20 to + 60	int / opt. ext	4.4W	Ext antenna	Flexible GNSS receiver with real-time decimeter accuracy
	60s typ.	30s typ.	<5s typ.	2,2	RS-232/Bluetooth/USB	110 - 115,000	-20 °C to +60 °C (-4 °F to 140 °F)	ext/int	<1	Internal and external L1/L2 antenna	Trimble Floodlight satellite shadow reduction technology
	60s typ.	30s typ.	<5s typ.	2,2	RS-232/Bluetooth/USB	110 - 115,000	-20 °C to +60 °C (-4 °F to 140 °F)	ext/int	<1	Internal and external L1/L2 antenna	Trimble Floodlight satellite shadow reduction technology
	<60s	<2s	<2s	3	RS-232, RS-422	variable	–40 to +85	ext	<4W	+5VDC Active L1/L2 FRPA	SAASM Compliant
	<60s	<2s	<2s	3	RS-232, RS-422	variable	–40 to +85	ext	<6W	+5VDC Active L1/L2 FRPA	SAASM Compliant
	<60s	<2s	<2s	3	RS-232, RS-422	variable	-54 to +85	ext	<6W	Various FRPA/CRPA/DAE	SAASM Compliant
	<60s	<2s	<2s	4	RS-232, RS-422, DP-RAM	variable	-54 to +85	ext	<7.5W	Various FRPA/CRPA/DAE	SAASM Compliant
	<60s	<2s	<2s	4	RS-232, RS-422, A24 and A32 VME	4,800 - 115,200 bps; USB: 12 Mb/s	-40 to +85	ext	<7.5W	Various FRPA/CRPA/DAE	SAASM Compliant
	<60s	<2s	<2s	4	ARINC-429, RS-422, RS-232	4,800 - 115,200 bps; USB: 12 Mb/s	-40 to +55	ext	<15W	+5VDC Active L1/L2 FRPA	SAASM Compliant
	<60s	<30s	<5s	1,3,1,2	RS-232 (via cable adapter) / Integrated virtual com ports/USB/ Bluetooth	110 - 115,000	-30 to +60 C	external/ internal	<4.5W (typ)	Internal or external L1/L2 antenna	Includes cellular data capability, Trimble Floodlight Technology and laser rangefinder module.
o z	Cold start: 26s, Hot start: 1s	Aided start: 2s	<1s	4	1 x UART, 1 x USB, 1 x SPI, 1 x I2C	variable	-54 to +85	ext	<6W	Various FRPA/CRPA/DAE	SAASM Compliant
o z	Cold start: 26s, Hot start: 1s	Aided start: 2s	<1s	4	1 x UART, 1 x USB, 1 x SPI, 1 x I2C	variable	-54 to +85	ext	<7.5W	Various FRPA/CRPA/DAE	SAASM Compliant
	Cold start: 26s, Hot start: 1s	Aided start: 2s	<1s	4	1 x UART, 1 x USB, 1 x SPI, 1 x I2C	4,800 - 115,200 bps; USB: 12 Mb/s	-40 to +85	ext	<7.5W	Various FRPA/CRPA/DAE	SAASM Compliant
	Cold start: 26s, Hot start: 1s	Aided start: 2s	<1s	4	1 x UART, 1 x USB, 1 x SPI, 1 x I2C	4,800 - 115,200 bps; USB: 12 Mb/s	-40 to +55	ext	<15W	+5VDC Active L1/L2 FRPA	SAASM Compliant
	23s (1.3s hot and aided starts)	28s (1s hot and aided starts)		2	1 x UART, 1 x I2C	110 - 115,000	-30 to +60 C	external/ internal	<4.5W (typ)	Internal or external L1/L2 antenna	Includes cellular data capability, Trimble Floodlight Technology and laser rangefinder module.
	29s (1s hot and aided starts)	28s (1s hot and aided starts)	<1s	4	1 x USB, 1 x UART, 1x SPI, 1x I2C	4, 800 - 115, 200	-40 to +85	1.65 V – 3.6 V	47 mW @ 1.8 V (Continuous)	E (passive & active)	Versatile, multi-GNSS module for GPS, GLONASS, Galileo and QZSS
	30/32s GPS/ GLONASS	26s	<1s	4	1 x USB, 1 x UART, 1x SPI, 1x I2C	4, 800 - 115, 200	-40 to +85	1.65 - 3.6 V	16.5 mA @ 3 V (Continuous); 4 mA @ 3 V Power Save mode (1 Hz)	E (passive & active)	World's smallest standalone GNSS module, all components integrated, requires only an external antenna
	29s (<3s hot and aided starts)	32s	<1s	4	1 x USB, 1 x UART, 1x SPI, 1x I2C	as above	-40 to +85	2.7 - 3.6 V	70 mW @ 3.0 V (continuous)	E (passive & active)	Precision Point Positioning for sub-meter accuracy applications, (delivers full benefits after the first few minutes of operation with an, unobstructed sky view.)
	26s (<3s hot and aided starts)	32s	<1s	3	1 x UART, 1x SPI, 1x I2C	4, 800 - 115, 200	-40 to +85	3.0 - 3.6 V	100 mW	E (passive & active)	GNSS module for precision timing applications such as femto cells, macrocells, small cells, infrastructure electronics, banking.
	27s (2s hot and aided starts)	27s	<1s	3	1 x UART, 1 x USB, 1 x SPI	9600 configurable	-40 to +85	2.7 - 3.6 V	<80 mW; PSM, 1Hz	E (passive & active)	GPS module with embedded stand-alone Automotive Dead Reckoning (ADR), after-market



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