

## Trimble's Embedded Solutions Features & Configurations Criteria

Trimble has expanded its range of Embedded GPS Receiver Modules with two new additions to its Condor family, the C1216 and C1722. The new modules feature major advancements in signal tracking for applications working in poor signal environments. With their higher sensitivity, performance and faster startup times, the Condor GPS modules enable system integrators to easily add Global Positioning System (GPS) capability to a mobile device with minimal impact on its size or battery life at a very economical price.

Trimble's Condor GPS modules are complete, ready-to-go receivers that provide position, velocity and time data with leading edge acquisition times. Compatible with active or passive antennas, the Condor GPS receivers can be used in portable handheld, battery-powered applications such as sport accessories, PDAs, cameras, computer and communication peripherals as well as vehicle tracking, navigation, and security products.

Trimble's Condor family of GPS modules represents a smart alternative to GPS chipsets for a variety of consumer and commercial positioning applications. The modules offer lower development costs, multiple form factors for flexibility, and high-quality positioning backed by Trimble's 30 plus years of GPS experience.

The Condor GPS family includes modules with different form factors and interface options:

- The tiny **Condor C1011** module packs powerful positioning performance into a small size, 10mm x 11mm x 2.01mm, which is ideal for portable navigation products. It features a 36-ball surface-mount interface Land Grid Array (LGA) that can be electrically connected to a printed circuit board (PCB) by using a socket or soldering it directly to the PCB.
- The **Condor C1919** is a 19mm x 19mm x 2.5mm surface-mount format common with the Trimble Copernicus® II and Panda GPS modules. As a surface-mount module with 28 reflow-solderable edge castellations, the C1919 requires no costly I/O and RF connectors.
- Continuing Trimble's tradition of advancing technology while preserving a customer's investment, the **Condor C2626** module measuring 26mm x 26mm x 6mm leverages the popular Lassen® iQ form factor. It features a single 8-pin (2x4) male header connector for power and data I/O.
- The **Condor C1216** and **C1722** provide the Condor capabilities in a form factor similar to competitive products thereby enabling manufacturers an easier transition to the benefits of the Condor GPS. The C1216 module measures 12mm x 16mm x 2.13mm while the C1722 module measures 17mm x 22mm x 2.13mm

The Condor modules can generate position fixes with high accuracy in extremely challenging environments and under poor signal conditions (down to -160dBm). The receiver consumes typically 37 mA at 3.3 V with continuous tracking. In addition, the Condor receivers provide a configurable 1 PPS synchronized to GPS/UTC, typically within 25 nanoseconds (one sigma) and an update rate up to 10Hz.

Trimble's Condor GPS modules are capable of receiving Satellite Based Augmentation System (SBAS) corrections, including the U.S. Wide Area Augmentation System (WAAS) and the European Geostationary Overlay Service (EGNOS). They also support GPS assistance (aGPS).

The Condor GPS starter kit includes all the tools necessary to test and evaluate the Condor GPS receiver, including: a Condor GPS receiver in a rugged enclosure suitable for testing and data collection; a GPS antenna; PC-based analysis tools; and documentation.

### New Antenna Companion Modules

Trimble have also introduced new Antenna Companion Modules (ACM) that combine a GPS receiver and a matched antenna in an easy to integrate module—the Trimble Silvana™ ACM, Anapala™ ACM and the very new Zelia™. Silvana and Anapala are compatible with Trimble's Copernicus II and Condor GPS solutions.

Silvana ACM offers an onboard antenna as well as a connector for an external antenna. An antenna detection circuit automatically switches to the external antenna when connected.

The Anapala ACM also supports multiple GPS solutions, but relies on the integral matched antenna.

The Zelia integrates an antenna element, Condor C1011 GPS receiver, Real Time Clock, and LNA in one very small package.

## Comparison Chart

The following table provides an easy lookup for comparing the range of embedded GPS receiver modules.

	<b>Lassen IQ 46240-25</b>	<b>Copernicus II 63530-00</b>	<b>Condor C1011 68674-00</b>	<b>C1919A 67650-10</b>	<b>C1919C 67650-20</b>	<b>Condor C1216 68676-00</b>	<b>Condor C1722 68675-00</b>	<b>Condor C2626 70896-05</b>
<b>Power requirements</b>								
Vcc min	3.00	2.70	3.00	3.00	3.00	3.00	3.00	3.00
Vcc max	3.60	3.30	3.60	3.60	3.60	3.60	3.60	3.60
Vcc typ	3.30	3.00	3.30	3.30	3.30	3.30	3.30	3.30
Vbat min	2.5V	2.70	2.00	2.00	2.00	2.00	2.00	2.00
Vbat max	Vcc - 10%	3.30	Vcc	Vcc	Vcc	Vcc	Vcc	Vcc
Typical supply current	27mA	44mA	33mA	37mA	37mA	<35mA (ex. Ant)	<35mA (ex. Ant)	<35mA (ex. Ant)
Typical RTC current	20µA	7µA	5µA	5µA	5µA	5µA	5µA	5µA
<b>Start up Times</b>								
Reacquisition	<2s	2s	<2s	<2s	<2s	<2s	<2s	<2s
Hot start	<10s	3s	<2s	<2s	<2s	<2s	<2s	<2s
Warm Start	<38s	35s	<35s	<35s	<35s	<35s	<35s	<35s
Cold Start	<50s	39s	<38s	<38s	<38s	<38s	<38s	<38s
<b>Accuracy</b>								
Autonomous position @ 50% CEP	<5m	<2.5m	2m	2m	2m	2m	2m	2m
Autonomous position @ 90% CEP	<8m	<5.0m	<5.0m	<5.0m	<5.0m	<5.0m	<5.0m	<5.0m
Autonomous altitude @ 50% CEP	<10m	<5m	<3m	<3m	<3m	<3m	<3m	<3m
Autonomous altitude @ 90% CEP	<16m	<8m	<8m	<8m	<8m	<8m	<8m	<8m
SBAS position @ 50% CEP	NA	<2m	<2m	<2m	<2m	<2m	<2m	<2m
SBAS position @ 90% CEP	NA	<4m	<4m	<4m	<4m	<4m	<4m	<4m
SBAS altitude @ 50% CEP	NA	<3m	<3m	<3m	<3m	<3m	<3m	<3m
SBAS altitude @ 90% CEP	NA	<5m	<5m	<5m	<5m	<5m	<5m	<5m
Velocity	0.06m/s	0.06m/s	0.06m/s	0.06m/s	0.06m/s	0.06m/s	0.06m/s	0.06m/s
<b>Timing output</b>								
PPS	3.3V TTL	3.0V TTL	2.8V TTL	2.8V TTL	2.8V TTL	2.8V TTL	2.8V TTL	2.8V TTL
PPS accuracy to UTC (1 sigma)	+/-50ns	+/-60ns	+/-25ns	+/-25ns	+/-25ns	+/-25ns	+/-25ns	+/-25ns
PPS pulse width	80µs	4.2µs	4.2µs	4.2µs	4.2µs	4.2µs	4.2µs	4.2µs
<b>Sensitivity</b>								
Standard acquisition	-130dBm	-142dB	-146dBm	-146dBm	-146dBm	-146dBm	-146dBm	-146dBm
Enhanced acquisition	-136dBm	-144dBm (-148dBm with current eph)	NA	NA	NA	NA	NA	NA
Tracking	-140dBm	-160dBm	-160dBm	-160dBm	-160dBm	-160dBm	-160dBm	-160dBm
<b>Protocols</b>								
TSIP	Yes	Yes	No	No	No	No	No	No
NMEA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TAIP	Yes	Yes	No	No	No	No	No	No
RTCM	Yes	No	No	No	No	Yes	No	No
<b>GPS Output</b>								
1Hz	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
up to 5Hz (TBD for 10Hz)	No	No	Yes	Yes	Yes	Yes	Yes	Yes
<b>General</b>								
SBAS	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AGPS	No	Yes	Future release	Future release	Yes	Yes	Yes	Yes
DGPS	Yes	No	No	No	No	No	No	No
COCOM Velocity	<515m/s	<515m/s	<515m/s	<515m/s	<515m/s	<515m/s	<515m/s	<515m/s
Acceleration		2G	2G	2G	2G	2G	2G	2G
On board reset controller	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flash programmable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Antennas</b>								
Supports external active antenna	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supports passive antenna	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
External LNA for passive required	NA	No	Yes	No	No	Yes	No	No
Open/Short Detection built in	Yes	Yes	No	No	Yes	No	Yes	Yes
Internal LNA gain		20dB	NA	19dB	19dB	19dB	19dB	19dB
<b>Load Options</b>								
32kHz Clock onboard	Yes	Yes	No	Yes	No	Yes	Yes	Yes
<b>Interfaces</b>								
Serial	2	2	1	1	1	1 + RTCM_IN	1	1 (2 ports joined)
USB	No	No	No	No	No	1	1	No
SPI	No	No	No	No	No	No	No	No
I <sup>2</sup> C	No	No	No	No	No	No	No	No
<b>Mechanical (mm)</b>	26.0 x 26.0 x 6.0	19.0 x 19.0 x 2.54	10.0 x 11.0 x 2.01	19.0 x 19.0 x 2.54	19.0 x 19.0 x 2.54	16.0 x 12.2 x 2.13	17.0 x 22.4 x 2.13	26.0 x 26.0 x 6.0
<b>Pricing</b>	Prices start as low as US\$16.00 for the C1011 with an MOQ of 1K - ex works Step Global & excluding GST							

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