

# The Industry's First 1-Chip GPS Receiver Incorporates Sony's Unique RF Technologies

## CXD2951GA/GH/GL

The global positioning system (GPS), which uses artificial satellites that dot the sky, is mainly used in car navigation systems.

Sony has achieved improved sensitivity, faster processing, and lower power to bring GPS functionality to the cellular phones and other mobile equipment that we use in our daily lives, and is now releasing the industry's first 1-chip CMOS GPS LSI that includes a built-in RF circuit.

- 1-chip CMOS GPS LSI independently developed by Sony
- High-performance GPS LSI that achieves improved sensitivity, faster processing, and lower power
- Supports a wide range of applications
- The industry's smallest GPS module developed

### ■ 1-chip CMOS GPS LSI Independently Developed by Sony

Figure 1 presents a simplified block diagram of the CXD2951GA/GH/GL. The RF/IF unit is the industry's first high-frequency circuit designed in the same fabrication process technology as the digital block using Sony's RFCMOS technology. This circuit receives 1.5 GHz GPS signal with the front-end LNA, and after mixing, passes a 1 MHz signal to the baseband system. This circuit strives for minimal power consumption by using a high-sensitivity comparator and circuit structure simplification. Interference from

digital noise was reduced by layout improvements. In the baseband unit, Sony developed a unique new architecture that separates the acquisition block from the tracking block. Separating these blocks allowed the development of optimal algorithms, and enables the device to achieve high performance. The control block performs optimized power management to achieve even lower power consumption. In addition, the device provides an external bus, GPIO, UART, USB 1.1, and built-in RTC circuits, thus integrating all the functions required for GPS on a single CMOS chip. Thus this device can be used to implement an ultraminiature, low cost GPS receiver.

### ■ High-Performance GPS LSI that Achieves Improved Sensitivity, Faster Processing, and Lower Power

The CXD2951GA/GH/GL achieves the high tracking sensitivity of -150 dBm, and is capable of reception even indoors. In combination with its hot start positioning time of 2 to 5 seconds and its low power of 50 mW (intermittent positioning) during tracking, it is an extremely high-performance GPS LSI.

### ■ Supports a Wide Range of Applications

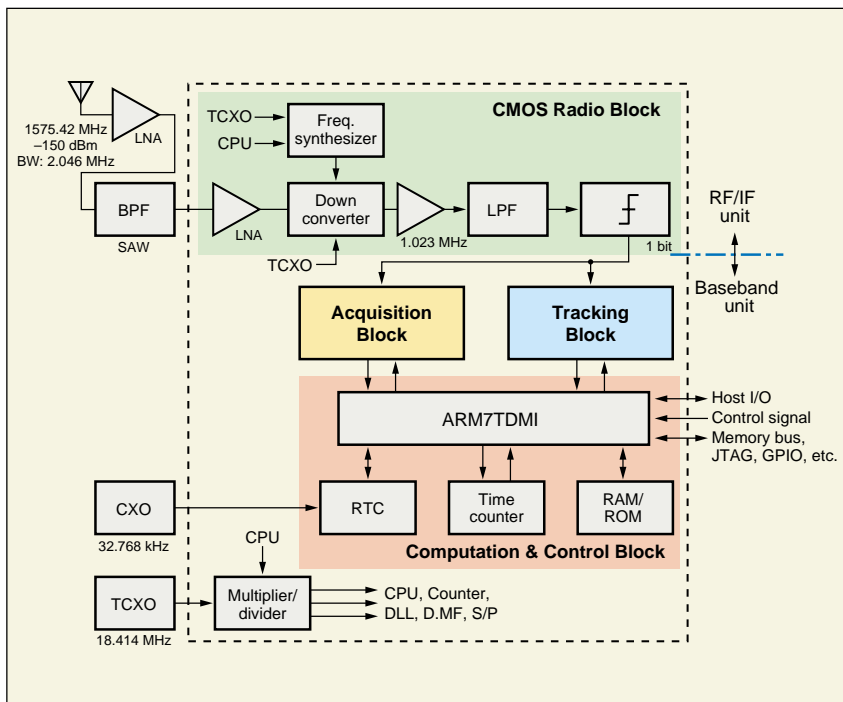
The CXD2951GA/GH/GL features a TCXO circuit that supports arbitrary frequencies from 10 to 30 MHz and is thus highly compatible with a wide range of applications. It also supports simple connection using a serial interface allowing GPS functionality to be included in a small space. Sony provides an extensive API as software support for this device, and it can also support network assisted GPS operation. In addition to conventional GPS functionality, this software also supports WAAS.

### ■ The Industry's Smallest GPS Module Developed

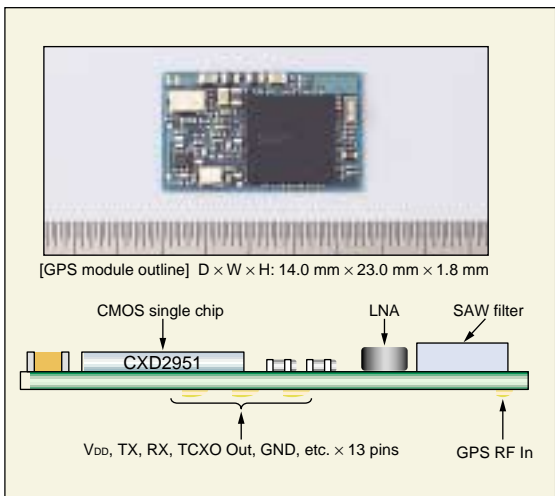
Sony has now developed the industry's smallest surface mounting GPS module with a mounting area of only 322 mm<sup>2</sup>. Sony is also proceeding with the development of a QS9000 conforming automotive module as well to respond to a wide range of user needs.

## V O I C E

In designing the CXD2951GA/GH/GL, a great many people from research labs and design and development groups worked together forming a powerful team that crossed over organizational boundaries with the slogan "best in the world!". Although difficult days with many all night sessions continued as we resolved problem after problem, we are confident that this IC represents the crystallization of the whole range of Sony technologies and that it achieves the industry's highest level of GPS performance. From now on, no one need worry about becoming lost, wherever in the whole wide world they may be.



■ Figure 1 CXD2951GA/GH/GL Block Diagram



■ Figure 3 GXB5001 Single-Chip GPS Module

**The Concept: An Easily Connectable GPS**

- GPS functionality can be incorporated in a wide range of applications using a simple serial interface connection.
- The industry's first single-chip CMOS GPS IC
- The industry's fastest level of position measurement (hot start mode: 2 to 5 seconds)
- Low power consumption (tracking mode: 50 mW)
- High sensitivity (tracking mode: -150 dBm)

\* E911: Enhanced emergency communication system. The FCC established a law that requires that it be possible to identify the position of the cellular phone when an emergency report is made with a cellular phone. This law took effect on October 5, 2001.  
E112: An EU law similar to E911.

■ Figure 2 Support a Wide Range of Applications

■ Table 1 CXD2951GA/GH/GL Main Specifications

Item	Condition	Typical value	Unit
Reception sensitivity	Acquisition	-140	dBm
	Tracking	-150	dBm
TTFF	Hot start	2 to 5	s
	Warm start	35 to 40	s
	Cold start	35 to 50	s
Positional precision	Open air with PDOP ≤ 2.0	1 s: < 6 m	—
TCXO	Arbitrary frequency	10 to 30	MHz
Package (D × W × H)	CXD2951GA (0.5 mm pitch)	12 × 12 × 1.2	mm
	CXD2951GH (0.8 mm pitch)	13 × 13 × 1.0	mm
	CXD2951GL (0.5 mm pitch)	10 × 10 × 0.9	mm