

F6122

Dual-beam Rx Active Beamforming IC 17.7GHz – 21.2GHz

The F6122 is a 16-channel dual-beam receive active beamforming RFIC designed for application in K/Ka-Band SATCOM planar phased array antennas. The IC has eight RF input ports, two RF output ports and 16 (8 per beam) phase/amplitude control channels. The eight input ports of the IC may be driven by eight single-polarized elements or four dual-polarized elements of an electronically scanned array (ESA). Each channel has 6-bits of digital phase and gain control resolution spanning 360° and 28dB of dynamic range, enabling precise beam pattern and polarization control.

The IC operates from a single supply of 2.1V–2.5V. When paired with the Renesas F6922 LNA, it achieves a typical cascaded gain of 30dB, while minimizing the front end feed loss due to the flexibility of LNA physical placement near the antenna feeds. The chip includes SPI programmable power management features such as a low power standby mode, independent enable controls on every channel, lower power bias mode and a single-beam operation mode. The device SPI bus and control pins operate from standard 1.8V logic at speeds up to 50MHz. Advanced digital modes and large on-chip memory allow for < 100ns beam position switching times at the array level, greatly reducing dead time and latency.

Finally, the compact and CTE-matched FC-BGA organic package, with all single-ended 50Ω matched RF ports and 0.5mm pitch, greatly simplifies the physical integration of these devices onto large antenna panels.

Features

- 17.7GHz–21.2GHz operation
- Supports 4 dual-pol or 8 single-pol elements
- Two simultaneous and independent beam outputs
- 360° phase control with 6-bit resolution
- 28dB gain control with 0.45dB step size
- 2.3V nominal single supply input
- Standard 1.8V digital logic
- IDAC for external LNA biasing
- Temperature compensation
- Temperature sensor with digital readout
- Advanced digital modes with fast beam steering
- On-chip beam-state memory
- 3.8 × 4.6 × 0.9 mm, 63-pin FC-BGA

Applications

- Phased Array Antennas
- K/Ka-Band SATCOM Terminals
- Aerospace, Maritime and SOTM

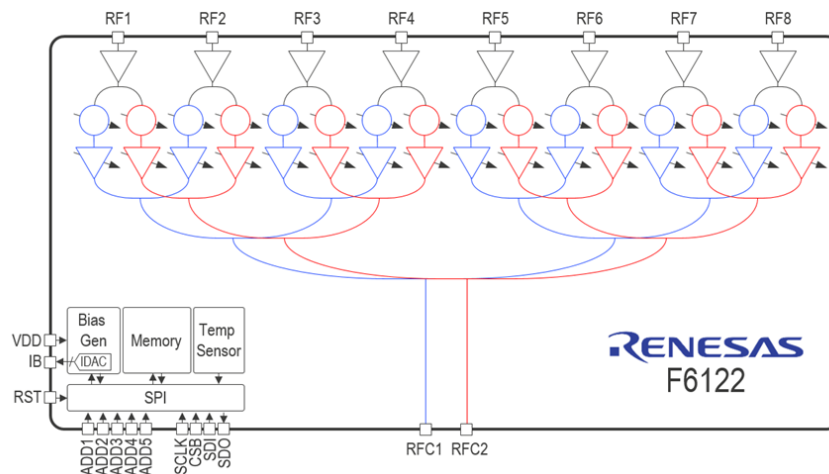


Figure 1. F6122 Block Diagram

---

## Ordering Information

Part Number	Package	MSL Rating	Carrier Type	Temp. Range
F6122SAVGI	3.8 × 4.6 × 0.9 mm 63-BGA	3	Tray	-40°C to +85°C
F6122SAVG18	3.8 × 4.6 × 0.9 mm 63-BGA	3	Reel	-40°C to +85°C
F6122SEVS	F6122 Evaluation System. Includes Digital Interface Board, RF Evaluation Board, USB Cable, Power Supply Cable, Digital Interconnect Cable, Evaluation Software, Device Drivers and RF De-embed Files.			

## IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers skilled in the art designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only for development of an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising out of your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Rev.1.0 Mar 2020)

### Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,  
Koto-ku, Tokyo 135-0061, Japan  
[www.renesas.com](http://www.renesas.com)

### Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:  
[www.renesas.com/contact/](http://www.renesas.com/contact/)

### Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.