Description

The F6123 is a 16-channel dual-beam receive active beamforming RFIC designed for application in Ku/CDL-Band 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 can 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 26dB of dynamic range, enabling precise beam pattern and polarization control.

The IC operates from a single supply of 2.1 - 2.5V. When paired with the Renesas F6923 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 power management features such as a low-power standby mode, independent enable controls on every channel, and a single-beam mode activated via a dedicated control pin. 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 FCBGA organic package with all single-ended 50ohm matched RF ports and 0.5mm pitch greatly simplifies the physical integration of these devices onto large antenna panels.

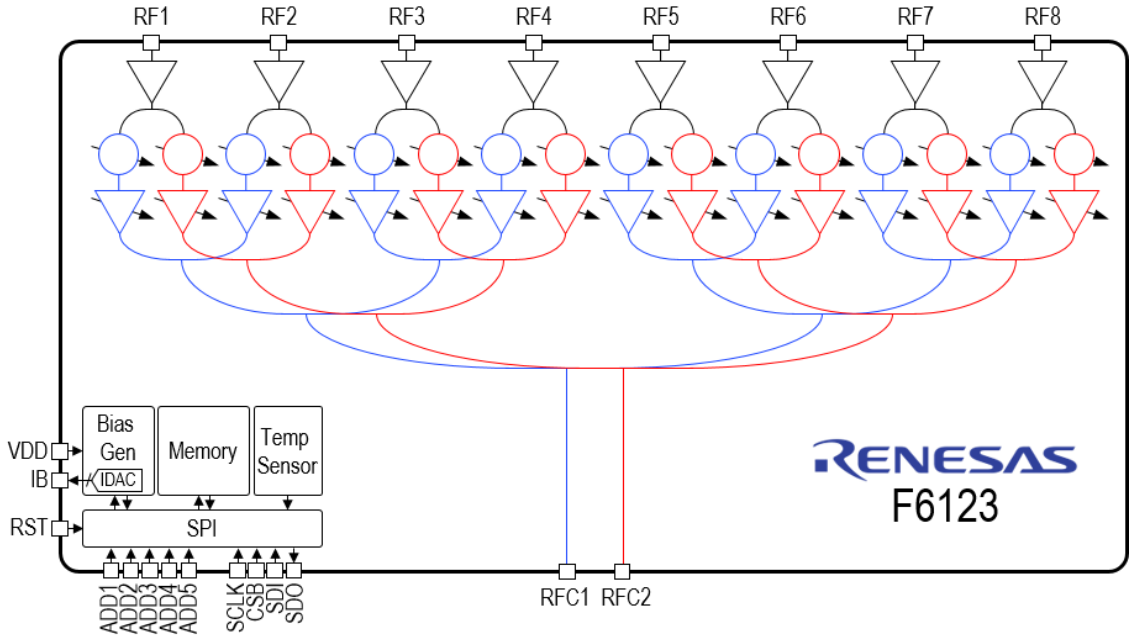
Features

- 14.4 – 17.3GHz operation
- Supports 4 dual-pol or 8 single-pol elements
- Two simultaneous and independent beam outputs
- 360° phase control with 6-bit resolution
- 26dB 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 w/ digital readout
- Advanced digital modes with fast beam steering
- On-chip beam-state memory
- 3.8 × 4.6 × 0.9 mm, 63-FCBGA

Typical Applications

- Phased array antennas
- Ku-Band SATCOM terminals
- Common Data Link (CDL) terminals
- Ku-Band radar
- Aerospace, maritime, and SOTM
- Instrumentation

Block Diagram



Ordering Information

Orderable Part Number	Package	MSL Rating	Carrier Type	Temperature
F6123AVGI	3.8 × 4.6 × 0.9 mm 63-BGA	3	Tray	-40°C to +85°C
F6123AVGI8	3.8 × 4.6 × 0.9 mm 63-BGA	3	Reel	-40°C to +85°C
F6123EVS	F6123 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.			

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