

BEAMFORMING ICs FOR SATCOM AND RADAR ACTIVE ANTENNAS



Renesas offers a comprehensive portfolio of industry-leading silicon beamforming ICs (BFICs) for electronically steerable phased array antennas (ESAs) enabling next-generation system solutions for Satcom, Radar and point-to-point communications. The compact and highly integrated devices use advanced features and technology including RapidBeam™, TrueDB™, package-integrated filtering and heterogeneously pseudo-lithic integration to enable best-in-class performance. The separate Tx, Rx and LNA ICs readily support a variety of antenna architectures such as full-duplex, half-duplex, 1D and 2D arrays allowing wide flexibility in optimization of system cost and performance trades.

The compact devices are available in planar BGA packages enabling the realization of low profile and low weight flat-panel antennas with $\lambda/2$ element spacing. Each beamforming IC contains 8 or 16 independently controlled active channels providing precise beam pattern shaping and polarization control. Furthermore, the BFICs and LNAs may be paired with Renesas power and timing products for a more complete system solution resulting in accelerated time-to-market.

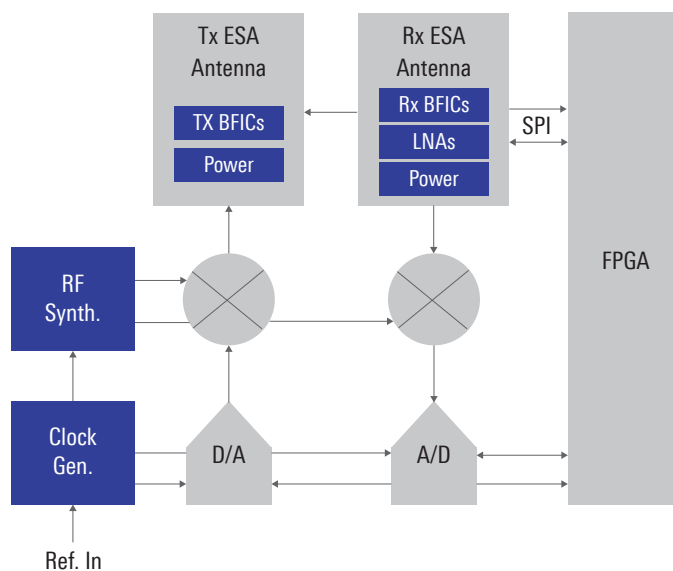
Applications

- Electronically steered phased array antennas (ESAs)
- Flat-panel antennas
- Ku-Band Satcom terminals
- Ka-Band Satcom terminals
- CDL Terminals
- Communication and Radar system

Features and benefits

- Two independent simultaneous beams with TrueDB™
- Fast beam steering with RapidBeam™
- Lowest system noise figure with separated LNAs
- Compact FC-BGA package simplifies $\lambda/2$ planar integration
- PTAT and PTAT² for gain compensation over temperature
- Integrated filter for Tx signal rejection and co-existence with co-located 5G mmWave systems

System Block Diagram



ACTIVE BEAMFORMING ICS FOR SATCOM & RADAR PHASED ARRAY ANTENNAS

The Renesas active beamforming ICs and LNAs are market-proven to deliver the industry's best RF performance for next-generation electronically steerable phased array antennas.

Rx Dual-Beam* Active Beamforming ICs for Satcom / Radar

Part Number	Description	Frequency (GHz)	Electronic Gain (dB)	Voltage (V)	Package (mm)
F6121	16-channel Ku-Band	10.7 – 12.75	11	2.1 – 2.5	3.8 x 4.6, 63-BGA
F6123	16-channel Ku / CDL-Band	14 – 17	11	2.1 – 2.5	3.8 x 4.6, 63-BGA
F6212	16-channel Ka-Band	17.7 – 21.2	27	2.1 – 2.5, 0.9 – 1.0	7.6 x 7.6, 165-BGA

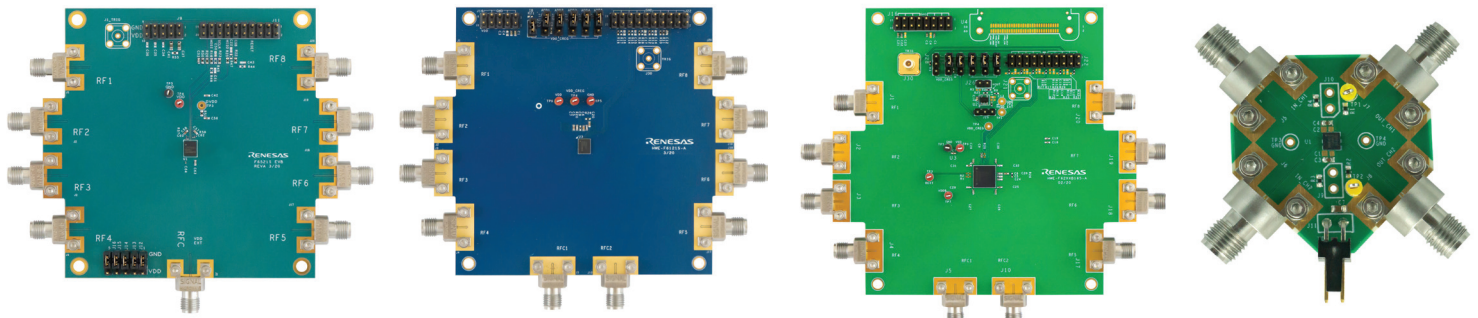
* All dual-beam ICs are programmable for single-beam mode operation resulting in a 30-40% reduction in power consumption. The F6212 is also available as a lower cost single-beam variant under P/N F6202.

Tx Active Beamforming ICs for Satcom / Radar

Part Number	Description	Frequency (GHz)	Gain (dB)	OP1dB (dBm)	Voltage (V)	Package (mm)
F6521	8-ch Tx Ku-Band	13.75 – 14.5	25	10.5	2.1 – 2.5	3.8 x 4.6, 62-BGA
F6522	8-ch Ka-Band	27.5 – 31.0	28	11	2.1 – 2.5	3.8 x 4.6, 62-BGA
F6513	8-ch Ku / CDL-Band	14 – 17	23	12.5	2.1 – 2.5	3.8 x 4.6, 62-BGA

Low Noise Amplifiers for Satcom / Radar

Part Number	Description	Frequency (GHz)	Gain (dB)	NF (dB)	OP1dB (dBm)	OIP3 (dBm)	Voltage (V)	Current (mA/ch)	Package (mm)
F6921	Dual-ch LNA, Ku-Band Satcom	10.7 – 12.75	19.5	1.4	-7	2	0.9 – 1.0	13	2.7 x 2.7, 23-BGA
F6922	Dual-ch LNA, Ka-Band Satcom	17.7 – 21.2	19.5	1.8	-2	10	0.9 – 1.0	16	2.7 x 2.7, 23-BGA
F6923	Dual-Ch LNA, Ku / CDL-Band	14 – 17	19.5	1.5	-2	10	0.9 – 1.0	17	2.7 x 2.7, 23-BGA



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