

- Power efficient transmission and reception active antenna modules
- Ku-band SatComms, drone communications, 6G/FR3 Radio Units

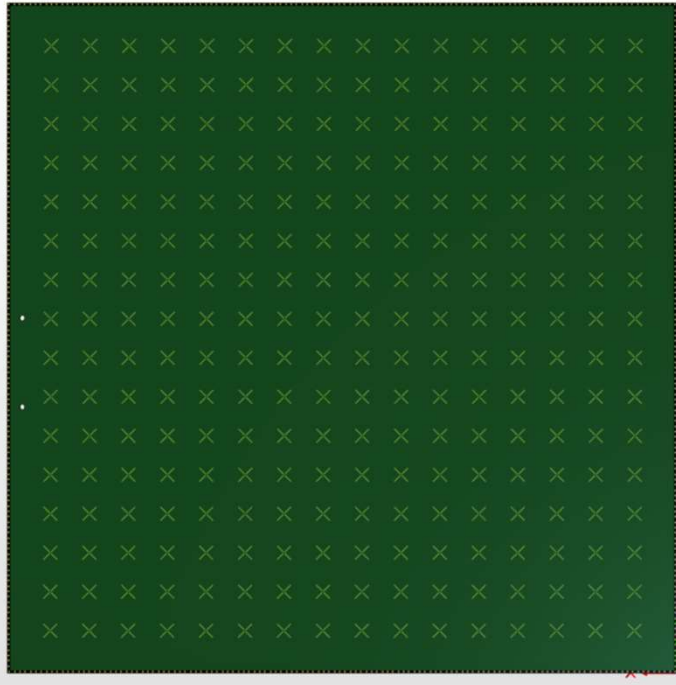


Fig.1 16x16 AE Active Antenna Array – front side

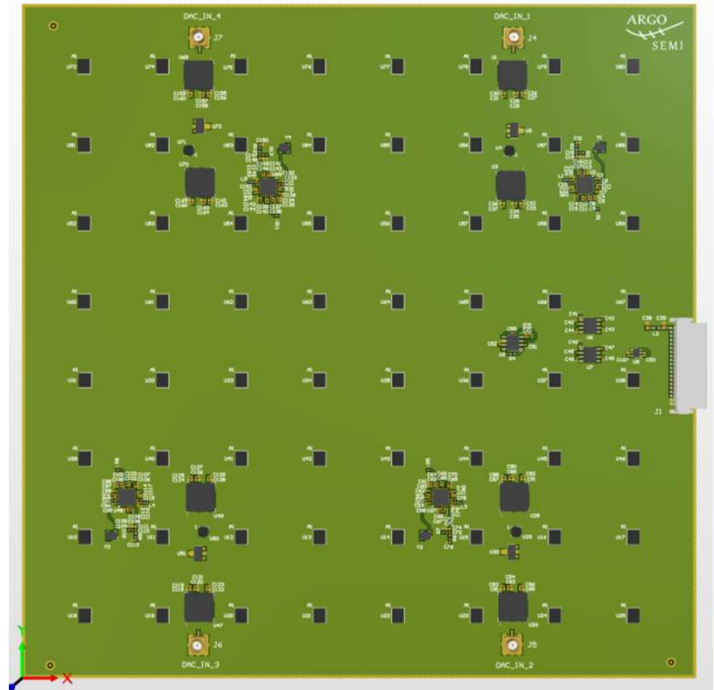


Fig.2 16x16 AE Active Antenna Array – back side

AS062x features

- Transmitter frequency band: 13.75GHz–14.5GHz
- Receiver frequency band: 10.7GHz–12.7GHz
- IBW: up to 400MHz
- Polarization: Configurable CP or +/-45° linear
- Dimensions: 235mm x 235mm (each of Tx & Rx)
- Beamwidth: Tx-5.1°, Rx-5.9°
- Antenna array size: 16 x 16
- Antenna gain: > 31dBi
- Number of accommodated RF signals: 4
- 4-subarray architecture for precise beam squint control
- Transmission with high power efficiency
- Can be used as a tile for large aperture antennas

Outline

ArgoSemi's AS062X family of active antenna products in the Ku frequency band offer a concise solution for demanding satellite communication

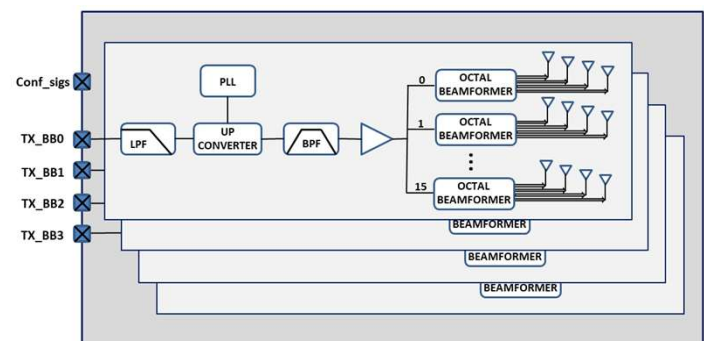


Fig.3 AS0621 Block Diagram

devices and other applications, balancing a high performance with low power consumption and low BOM. Figures 1 and 2 show the front side and the back side of the AS0621 transmitter module, implementing the coarse block diagram depicted in Fig.3. The module includes 4 subarrays, each one of 8x8 antenna elements (AE), associated with 16 octal beamforming ICs. Each IC is associated to a block of 2x2 AE and it can be configured to provide either circular or linear polarization. An identical architecture is used for the receiver too.



Description

The AS0621 active antenna module integrates an antenna array of 256 elements associated with 4 analog beamforming networks, each one covering a quadrant subarray. The S-parameters of the antenna element within the array are shown in Fig.4, indicating good reflection and isolation characteristics. When the element is configured to operate with circular polarization, it is characterized by the radiation diagram and the axial ratio curves shown in Figures 5 and 6 respectively. The boresight axial ratio across all in-band frequencies is smaller than 1.6dB.

A summary of the antenna element characteristics and the antenna array characteristics is given in Table 1, while a summary of the characteristics of

the populated module is shown in Table 2. The module is tailored for an architecture of 1x4 digital beamforming followed by four 1x64 analog one, balancing BOM and ability of beam squint control.

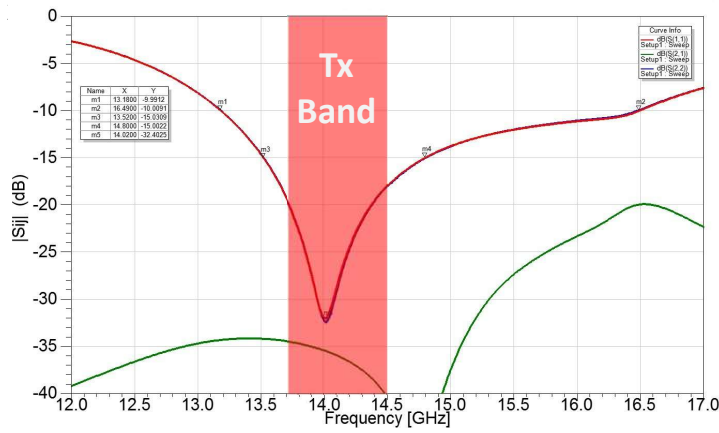


Fig.4 AS0621 Impedance Bandwidth

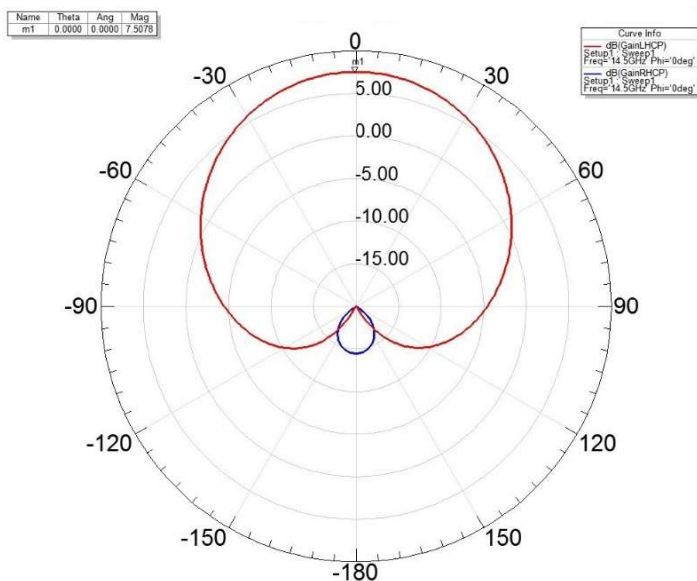


Fig.5 AS0621 LHCP Radiation Diagram

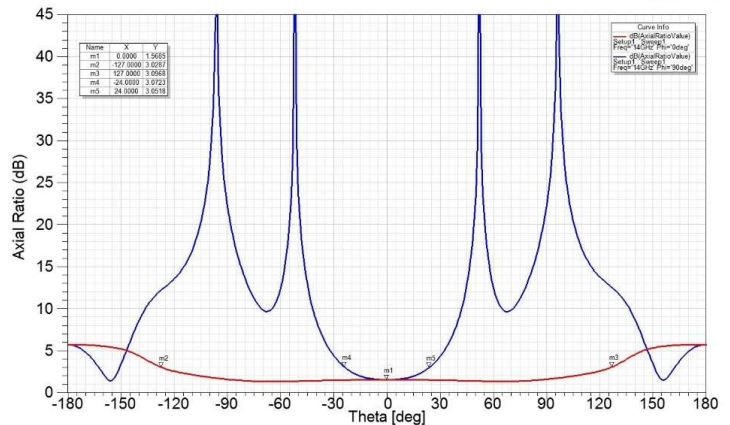


Fig.6 AS0621 Axial Ratio at 14GHz

Table.1 AS0621 Antenna Characteristics

Tx Antenna Characteristics		
Element	low bound (MHz)	13750
	high bound (MHz)	14500
	AE gain (dBi)	7.2
	beamwidth (deg)	95
	max in-band boresight axial ratio (dB)	1.6
	max in-band coupling (dB)	35
	CP X-pol suppression (dB)	27
Array	num of elements per side	16
	total number of elements	256
	array gain (dBi)	31.3
	array side size (mm)	235
	beamwidth (deg)	5.1
	weight (g)	95

Table.2 AS0621 Module Characteristics

Tx Active Antenna Module Characteristics	
Min input power (dBm)	-6.0
Max instantaneous DSBW (MHz)	400
Number of PAs / Tx channel	2
Output power per PA (dBm)	6.9
Losses after the antenna feed (dB)	1.2
Power at the antenna feed (dBm)	31.7
EIRP (dBm)	63.0
PA efficiency	8%
Power consumption on all PAs (W)	31.3

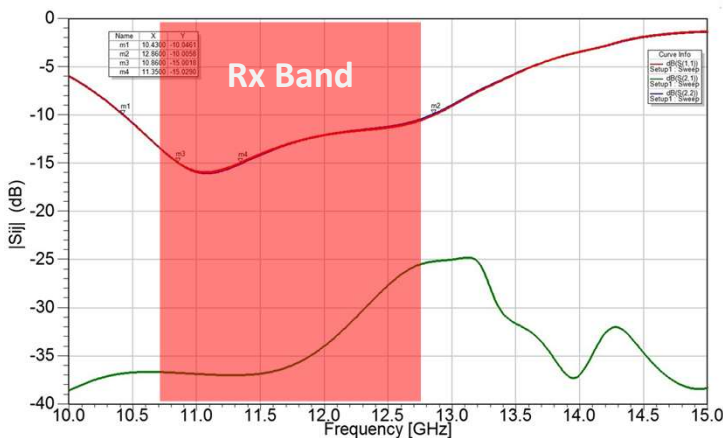


Fig.7 AS0622 Impedance Bandwidth

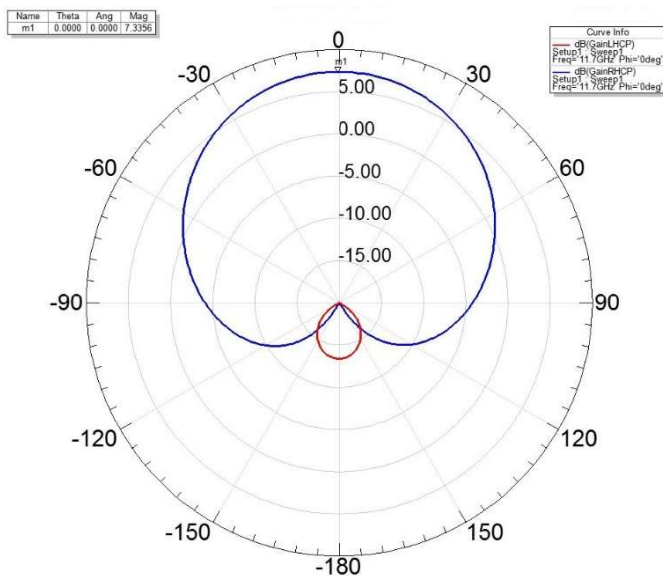


Fig.8 AS0622 RHCP Radiation Diagram

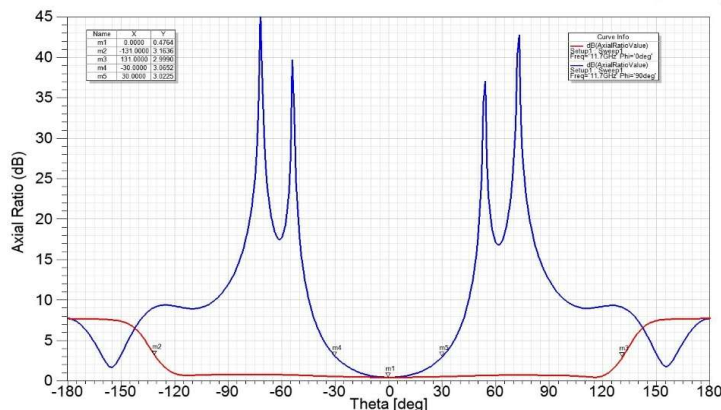


Fig.9 AS0622 Axial Ratio at 11.7GHz

Table.3 AS0622 Module Characteristics

Rx Active Antenna Module Characteristics	
Max instantaneous bandwidth (MHz)	400
Sensitivity for 11dB SNR (dBm)	-96.0

Description

The S-parameters of the antenna element within the array of AS0622 are shown in Fig.7, indicating good reflection and isolation characteristics. When the element is configured to operate with circular polarization, it is characterized by the radiation diagram and the axial ratio curves shown in Figures 8 and 9 respectively. The boresight axial ratio across all in-band frequencies is smaller than 1.1dB.

A summary of the antenna element characteristics and the antenna array characteristics is given in Table 4, while a summary of the characteristics of the populated AS0622 module is shown in Table 3.

A coarse block diagram of the AS0622 functionality is given in Fig.10, where the LNA components are omitted for simplicity. The G/T of this antenna module is 8.8dB, while a G/T in the vicinity of 14dB can be achieved by combining four modules.

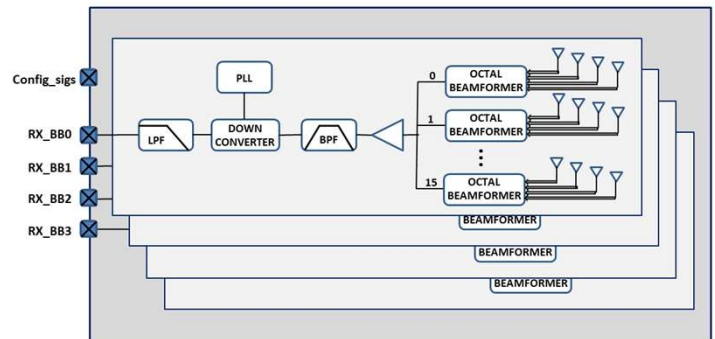


Fig.10 AS0622 Block Diagram

Table.4 AS0622 Antenna Characteristics

Rx Antenna Characteristics		
Element	low bound (MHz)	10700
	high bound (MHz)	12750
	AE gain (dBi)	7
	beamwidth (deg)	95
	max in-band boresight axial ratio (dB)	1.0
	max in-band coupling (dB)	25
	CP X-pol suppression (dB)	27
Array	num of elements per side	16
	total numer of elements	256
	array gain (dBi)	31.1
	array side size (mm)	235
	beamwidth (deg)	5.9
	weight (g)	125

