

K/Ka-band Chipset & Modules Overview



Arralis plug and play K/Ka-band chipset

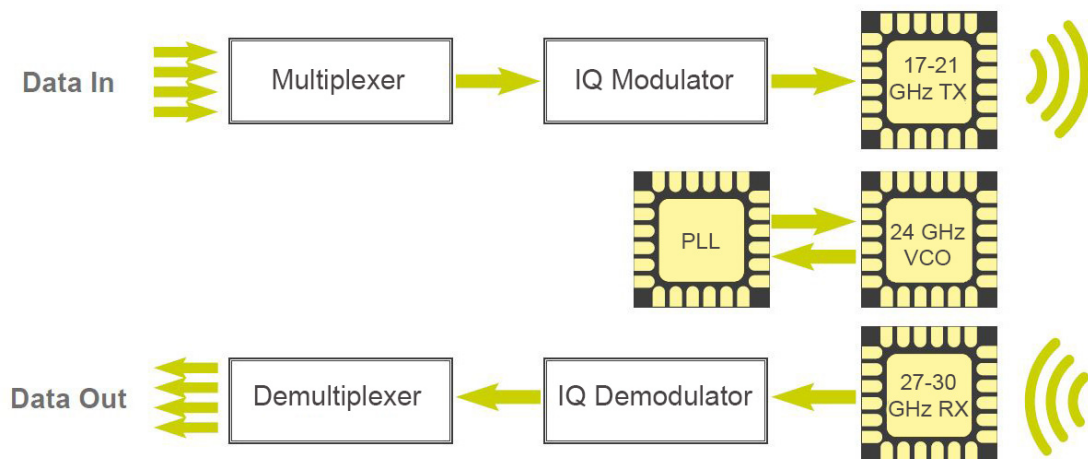
Unlock advanced capacity for mass consumer applications for on the go satellite communications.

Overview

This first of its kind K/Ka-band chipset comprises all of the circuits required to build a K/Ka-band satellite and ground front end that will connect easily with high power amplifiers and antennas. K/Ka-band is the future of satellite technology due to smaller antennas and ground terminals as well as dramatically lowered costs.

Our chipset was developed to meet the needs of the growing demand for low cost Ka-band satellite equipment that is simple to interface with current digital internet hardware. Applications include 5G communications, airborne high speed Wi-Fi, low earth orbit mega constellation communications, drone constellations, SAT-Drone-Ground data networks, satellite to automotive connectivity, connected vehicles, last mile and remote internet solutions, and IoT and M2M communications.

The ITAR free chips are available as individual die on a space qualified process. In the latter case, only four devices are needed to make a complete transmitter/receiver whether for space or ground applications. The diagram below explains the setup:



The example above shows a typical set-up for a downlink where the transmit frequency is in the 17-21 GHz band and the receive frequency is in the 27-30 GHz band. Filtering and high power amplifiers are not shown for clarity.

A single phase-locked VCO is included that provides the local oscillator feed for both up and down conversion. (See pre-designed application boards KKa-TR-UL-1929 Uplink Transceiver Module and KKa-TR-DL-1929 Downlink Transceiver Module on the back page).

The devices have direct IQ inputs and outputs, so are ideal for high data rate complex modulation techniques such as QAM. Additional modulators and multiplexers are readily available and can be easily interfaced.

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Antennas

Flat Panel Array Antenna 17-21 GHz

K-FPA-1721 (Preliminary)

The flat panel technology developed by Arralis is a high-performance solution for modern communication systems. The antenna has a small profile and flat geometry, this technology enables wide operational bandwidth, good polarization purity and high gain in accordance with customer needs.

Features

- 17-21 GHz range
- 19 GHz center frequency
- Right handed circular polarization (RHCP)

Flat Panel Array Antenna 27-31 GHz

Ka-FPA-2730 (Preliminary)

The flat panel technology developed by Arralis is a high-performance solution for modern communication systems. The antenna has a small profile and flat geometry, this technology enables wide operational bandwidth, good polarization purity and high gain in accordance with customer needs.

Features

- 27-31 GHz range
- 29.25 GHz center frequency
- Polarization LHCP or RHCP

Power Amplifiers

Evaluation boards for Power Amplifiers are available on request.

GaAs PHEMT MMIC Power Amplifier 17-21 GHz

K-PA-1721

A 3-stage MMIC power amplifier that provides 22 dBm of saturated power and >29% PAE, with 5 dBm input power from a 3 V supply voltage and 220 mA current.

Features

- >22 dBm saturated output power
- 21 dB small signal gain
- <0.5 dB gain flatness

GaAs PHEMT MMIC Power Amplifier 27-31 GHz

K-PA-2731

A 3-stage MMIC power amplifier that provides 20 dBm of saturated power and > 17% PAE, with 3 dBm input power, from a 3 V supply voltage and 210 mA current.

Features

- >20 dBm saturated output power
- 20 dB small signal gain
- <1.0 dB gain flatness

10 W GaN MMIC High Power Amplifier 17-20.5 GHz

K-HPA-10W-1721

A high power MMIC amplifier fabricated on Space Qualified 0.25 um GaN on SiC. This MMIC delivers >10 W saturated output power across the band, with power-added efficiency in excess of 25% and large-signal gain of 20 dB.

Available as surface mount ceramic package 'K-HPA10W-1721-SM'.

Features

- Power >10 W saturated
- 25 dB small signal gain
- 20 dB large signal gain
- Integrated power detector

10 W High Power Amplifier Module 17-20.5 GHz

K-HPA10W-1721-SSPA

An integrated high power amplifier module delivering over 10 W of saturated power. The module is biased from a single 20-28 V DC supply and activated through an enable signal. The modules dimensions are 63x60x25 mm.

Available as 20 W SSPA 'K-HPA20W-1721-SSPA'.

Features

- Power >10 W saturated
- Integrated temperature and power detector
- 24 dB small signal gain

Low Noise Amplifiers

Evaluation boards for Low Noise Amplifiers are available on request.

GaAs PHEMT MMIC Low Noise Amplifier

17-21 GHz & 27-31 GHz

KKa-LNA-1929

A 3-stage MMIC low noise amplifier that provides up to 20dB of stable gain, with a noise figure of 2.5dB from a 4V supply voltage and 41mA current.

Features

- 20 dB gain
- 2.5 dB noise figure
- Unconditionally stable

Multi-Stage Modular Low Noise Amplifier

17-21 GHz & 27-31 GHz

Ka-LNA-2131-M

A multi-stage modular low noise amplifier that provides up to 34 dB gain with a noise figure of 2.5 dB from a single supply voltage from 7 V to 40 V. The LNA incorporates an enable/disable, current and temperature sensor function allowing for remote fault analysis.

Features

- 34 dB gain
- 2.5 dB noise figure
- Unconditionally stable

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Oscillators and Dividers

GaAs PHEMT MMIC Frequency Divider 23.9- 24.8 GHz

K-FD-2325

A frequency divider MMIC that covers input frequencies from 23.9-24.8 GHz and outputs the divided frequencies from 11.95-12.4 GHz.

Features

- 11.95-12.4 GHz output frequency
- >3 dBm output power

GaAs PHEMT MMIC Voltage Controlled Oscillator

23.5-24.8 GHz

K-VCO-2325

A bare die voltage controlled oscillator MMIC with integrated sub-harmonic mixer and using a tuning voltage between 0 and 1.6 V. This MMIC provides a constant 15 dBm output power over all tuning voltages.

Features

- 15 dBm output power
- Integrated sub-harmonic mixer for phase stability

GaAs PHEMT MMIC Voltage Controlled Oscillator

23.25-24.25 GHz

K-VCO-2324

A bare die voltage controlled oscillator MMIC with integrated sub-harmonic mixer and using a tuning voltage between 0 and 1 V. This MMIC provides a constant 15 dBm output power over all tuning voltages.

Features

- 15 dBm output power
- Integrated F/2 signal generation

Mixers

IQ MMIC Mixer 17-21 GHz

K-IQM-1721

An I/Q MMIC diode mixer with integrated quadrature coupler for single side-band (LO-IF/LO-RF) operation in either up or downconverter modes.

Features

- 17-21 GHz RF
- 2-7 GHz IF
- 10 dB conversion loss
- 13 dBm LO drive

IQ MMIC Mixer 27-31 GHz

Ka-IQM-2731

An I/Q MMIC diode mixer with integrated quadrature coupler for single sideband (LO+IF / RF-LO) operation in both up and downconverter modes.

Features

- 27-31 GHz
- 15 dB conversion loss
- 13 dBm LO drive
- >19 dB LO-RF isolation

GaAs MMIC Sub-Harmonic Mixer 22.5-25 GHz

K-SHM-2225

A GaAs sub-harmonic mixer, covering frequencies from 22.5 to 25 GHz with LO signals in the range of 10.8 to 13.6 GHz. This MMIC incorporates an anti-parallel diode pair and is usable for LO drive levels of <10 dBm.

Features

- 22.5-25 GHz
- <16 dB conversion loss
- Low LO drive level requirement

Multiplier and Switch

GaAs MMIC x2 Frequency Multiplier 30-46 GHz

Ka-x2M-3046

A wideband passive Schottky diode frequency multiplier MMIC that transforms frequencies from 15-23 GHz into 30-46 GHz. This MMIC provides 7 dBm output power with ± 1 dB conversion loss variation at an input drive level of 18 dBm.

Features

- 15-23 GHz input
- 30-46 GHz output
- 11 dB conversion loss
- 7 dBm output power

GaAs Diode SPDT 18-29 GHz

Ka-SPDT-1829

An SPDT Schottky diode based switch that covers frequencies from 18-29 GHz with very low loss (2 dB) when closed and isolation greater than 10 dB when open.

Features

- 18-29 GHz
- 2 dB insertion loss
- 10 dB isolation
- 10 dB return loss (closed)

Up/Downconverters

GaAs PHEMT Upconverter Core Chip 17-21 GHz

K-UC-1721

An integrated IQ mixer and medium power amplifier MMIC that upconverts frequencies from 3-7 GHz into the 17-21 GHz.

Features

- 3-7 GHz input
- >10 dB conversion gain
- 20 dBm saturated power

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GaAs PHEMT Upconverter Core Chip 27-31 GHz**Ka-UC-2731**

An integrated IQ mixer and medium power amplifier MMIC that upconverts frequencies from 3-7 GHz into 27-31 GHz.

Features

- 3-7 GHz input
- >10 dB conversion gain
- 20 dBm saturated power

GaAs PHEMT Downconverter Core Chip 17-21 GHz**K-DC-1721**

An integrated low noise amplifier and IQ mixer MMIC that downconverts frequencies from 17-21 GHz into 3-7 GHz.

Features

- 3-7 GHz output
- >6 dB conversion gain
- 2.5 dB noise figure

Phase Shifters**Variable Phase Shifter MMIC 17-21 GHz****K-PS-1721**

A MMIC analogue phase shifter enabling more than 350° phase variation with excellent matching and very low insertion loss variation over all phases and frequencies (± 1.9 dB), and excellent phase tracking over all frequencies (less than $\pm 15^\circ$).

Features

- 6 dB insertion loss
- 9 dB return loss
- 350° phase variation

Variable Phase Shifter MMIC 25.5-32.5 GHz**Ka-PS-2533**

A MMIC analogue phase shifter enabling 360° phase variation with very low insertion loss variation over all phases and frequencies (± 2 dB), and excellent phase tracking over all frequencies (less than $\pm 25^\circ$).

Features

- 7 dB insertion loss
- 5 dB return loss
- >360° phase variation

Phase Shifter with Integrated Power Amplifier 17-21 GHz**K-PSPA-1721**

A MMIC analogue phase shifter core chip with integrated power amplifier that enables more than 360° phase variation with excellent matching, 15 dB gain with less than ± 2 dB variation and less than $\pm 15^\circ$ phase tracking.

Features

- 15 dB gain
- 10 dB return loss
- >360° phase variation
- 22.5 dBm output power

Phase Shifter with Integrated Power Amplifier 27-32.5 GHz**K-PSPA-2733**

A MMIC analogue phase shifter core chip with integrated power amplifier that enables more than 360° phase variation, supplies typically 17 dB gain with low variation and excellent phase tracking with less than $\pm 20^\circ$.

Features

- 17 dB gain
- 5 dB input return loss
- 10 dB output return loss
- >360° phase variation
- 20 dBm output power

Transceivers**Integrated Uplink Transceiver Module for K/Ka-band****KKa-TR-UL-1929 (Preliminary)**

A fully integrated standalone transceiver module designed for K/Ka-band communications systems. This transceiver operates as a wideband up/down converter designed for either a ground or an airborne environment. It includes an on-board frequency synthesizer and low power consumption in a stackable enclosure and is able to offer up to 2.5 GHz of instantaneous bandwidth.

Features

- 17-21 GHz input
- 27-30 GHz output
- TX IF frequency 1-4 GHz
- RX IF frequency 1-5 GHz

Integrated Downlink Transceiver Module for K/Ka-band**KKa-TR-DL-1929**

A fully integrated standalone transceiver module designed for K/Ka-band communications systems. This transceiver operates as a wideband up/down converter designed for use in low earth orbit. It includes an on-board frequency synthesizer and low power consumption in a stackable enclosure and is able to offer up to 2.5 GHz of instantaneous bandwidth.

Features

- 27-30 GHz input
- 17-21 GHz output
- TX IF frequency 1-5 GHz
- RX IF frequency 1-4 GHz

Integrated Downlink Transceiver Module for Ku-band**Ku-TR-DL-1113 (Preliminary)**

A fully integrated stand-alone transceiver module designed to operate in low earth orbit with an on board 1U stackable enclosure.

Features

- 10.7-12.7 GHz output
- 12.75-14.75 GHz input
- TX LO frequency 13.7 GHz
- RX LO frequency 11.75 GHz

Single Channel Satellite Communications**Transceiver Module for K/Ka-band****KKa-TR-SC-1929**

A transceiver module which enables direct interface with a modem or Software Defined Radio enabling full-function Ka-band satellite systems.

Features

- 17-21 GHz output
- 27-31 GHz input
- Low noise receiver < 3 dB
- 20 W transmitter power

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