

Ka band Transceiver Downlink Module

KKa-TR-DL-1929 Previously named LE-KaTR-104

Integrated Transceiver Downlink Module for K/Ka-Band Frequencies

Overview

KKa-TR-DL-1929 is a fully integrated stand-alone 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 (LEO.) It includes an on-board frequency synthesizer and low power consumption in a stackable enclosure. This transceiver offers up to 2.5GHz of instantaneous bandwidth.

It also includes a high-precision clock for LO generation; this clock can be used as a reference for other modules, or lock to an external system reference.

This transceiver can be used as a stand-alone up/down converter or combined with a modem/Software Defined Radio (SDR) enabling full-function K/Ka band satellite communication system.

Features

- Tx output frequency range 17 – 21 GHz.
- Rx Input frequency range 27 - 31 GHz.
- Tx IF frequency 1-5 GHz.
- Rx IF frequency 1-5 GHz.

Applications

- High speed data communications.
- Space communications.
- IOT.
- Security.



Space Heritage 20th January 2021
Rocket Labs Mission 18, OHB SatComm

| | | | | | |
|---|---------------------|----------------|------------------------|-----------|-------------|
|  | Ka band Preliminary | KKa-TR-DL-1929 | Issue date: 26 July 21 | DOC REV 4 | Page 1 of 7 |
|---|---------------------|----------------|------------------------|-----------|-------------|

Transmitter

| Parameter | Typical | Unit |
|---|---|----------|
| TX Output Frequency Range | 17 - 21 | (GHz) |
| TX Output Linear Power | 21 | (dBm) |
| IF Input Frequency Range | 1 - 5 | (GHz) |
| IF Input Power | -30 to 0 | (dBm) |
| Reference Frequency | 100 (on board or external) | (MHz) |
| Reference Stability | +/-0.3 (-40 to +85 degree C) | (PPM) |
| Conversion Gain | 30 | (dB) |
| Gain Flatness Over Typical Channel Bandwidth from SDR (250MHz) | <2 (specified over max channel bandwidth (250MHz) across entire 4GHz RX bandwidth. (SDR input channel band) | |
| Typical Phase Noise | | (dBc/Hz) |
| 10Hz | -40 | (dBc/Hz) |
| 100Hz | -60 | (dBc/Hz) |
| 1kHz | -70 | (dBc/Hz) |
| 10kHz | -80 | (dBc/Hz) |
| 100kHz | -100 | (dBc/Hz) |
| 1MHz | -123 | (dBc/Hz) |
| 10MHz | -140 | (dBc/Hz) |
| Spurious | -50 | (dBc) |
| Supply Voltage Range | 6 - 36 | (Vdc) |
| DC Power | <6 | (Watts) |

Specification Overview

Receiver

| Parameter | Typical | Unit |
|---|---|----------|
| RX Input Frequency Range | 27 - 31 | (GHz) |
| RX Input Power Range | -140 to -30 | (dBm) |
| IF Output Frequency Range | 1 - 5 | (GHz) |
| IF Output Power Range | -110 to 0 | (dBm) |
| Reference Frequency | 100 (on board or external) | (MHz) |
| Reference Stability | < 20 | (PPM) |
| Conversion Gain | 30 | (dB) |
| Gain Flatness Over Typical Channel Bandwidth from SDR (250MHz) | <2 (specified over max channel bandwidth (250MHz) across entire 4GHz RX bandwidth. (SDR input channel band) | |
| Typical Phase Noise | | (dBc/Hz) |
| 10Hz | -40 | (dBc/Hz) |
| 100Hz | -60 | (dBc/Hz) |
| 1kHz | -70 | (dBc/Hz) |
| 10kHz | -80 | (dBc/Hz) |
| 100kHz | -100 | (dBc/Hz) |
| 1MHz | -123 | (dBc/Hz) |
| 10MHz | -140 | (dBc/Hz) |
| Spurious | -60 | (dBc) |
| Noise Figure | <2.5 | (dB) |
| Supply Voltage Range | 6 - 42 (SMPS) | (Vdc) |

Mechanical and Environmental

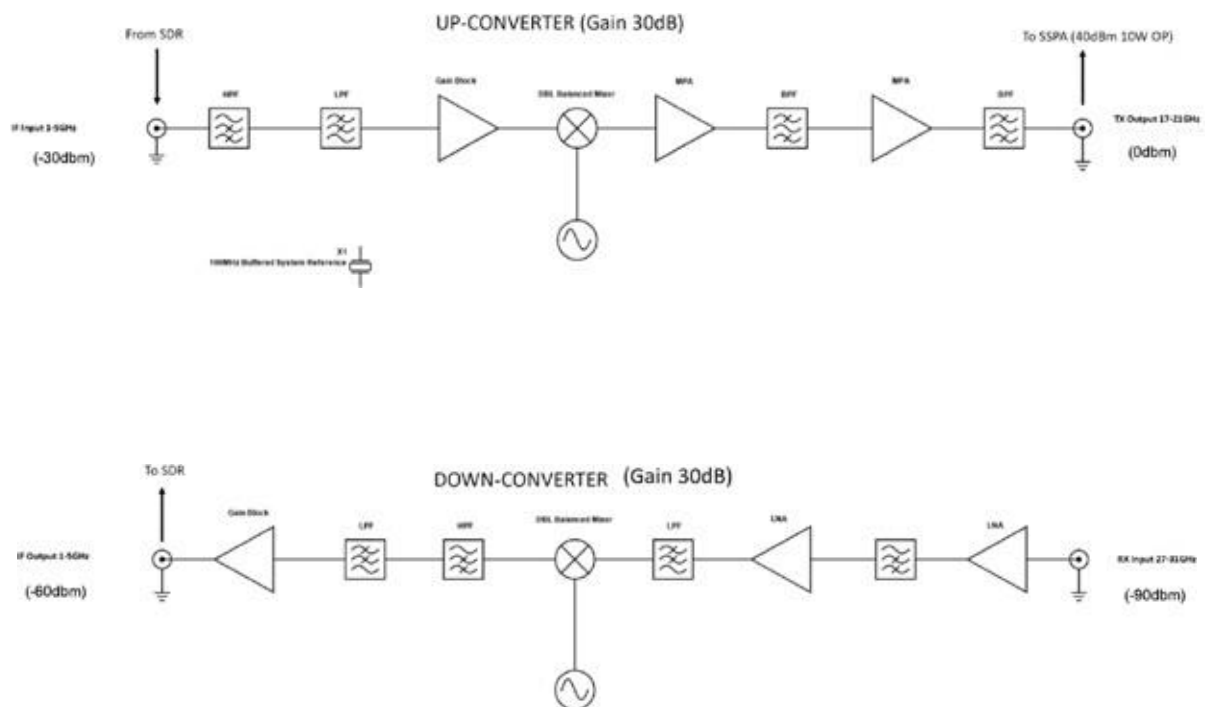
Mechanical

| Parameter | Typical | Unit |
|---------------------------------|--|------|
| PCB Dimensions | 96 x 91 x 2 (Max) | (mm) |
| Mechanical Enclosure Required | Yes | |
| Mechanical Enclosure Dimensions | 96 x 91 x 33 (Max) | (mm) |
| Total Mass | <1 | (kg) |
| Form Factor Requirement | Enclosure | |
| Enclosure Material Requirement | >2.54mm Aluminium | (mm) |
| Enclosure Plating Requirement | Gold | |
| RF Connector Types | SMPM edge mount | |
| DC Connector Types | DC Feedthrough or alt. high rel. panel mount | |
| IF Signal Connector Types | SMA edge mount | |

Environmental

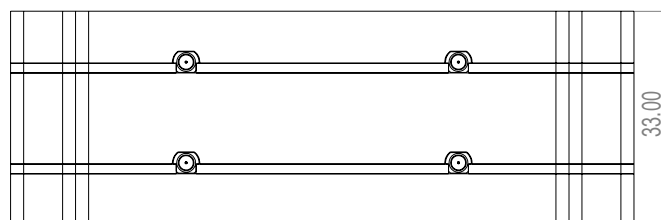
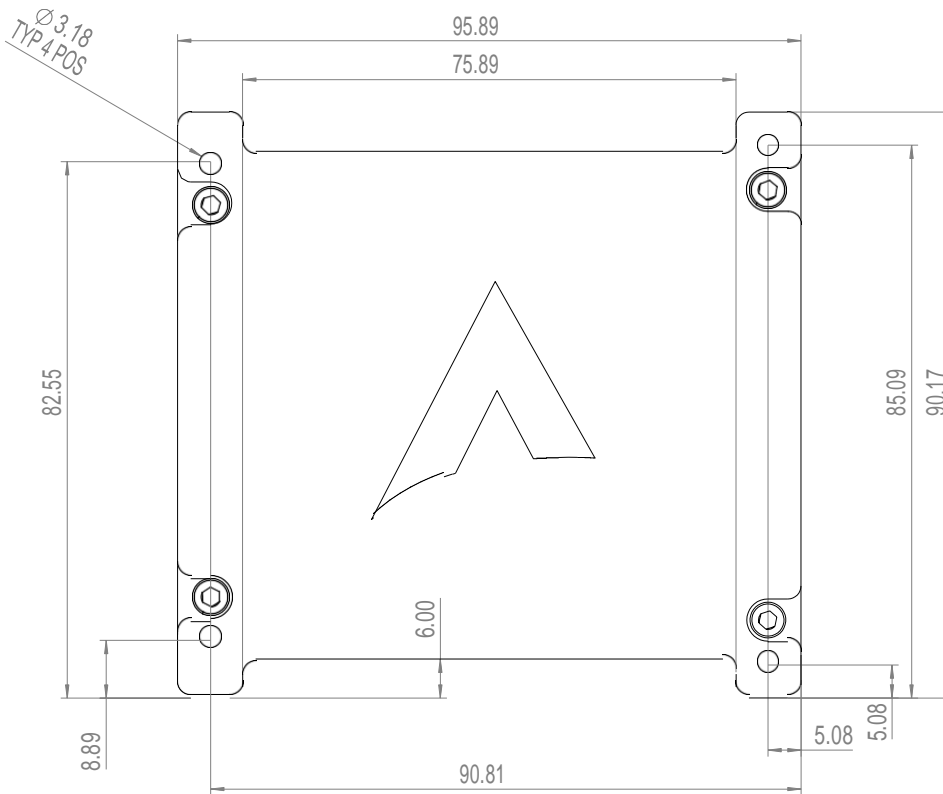
| Parameter | Typical |
|-----------------------------|-----------------|
| Operating Temperature Range | -40°C to +70 °C |
| Operational Environment | - |
| Radiation Tolerance (kRad) | - |
| Vibration Requirement | - |
| Vacuum Requirement | - |
| Compliance Standards | - |

Simplified Schematic Diagram



| | | | | | |
|---|---------------------|----------------|------------------------|-----------|-------------|
|  | Ka band Preliminary | KKa-TR-DL-1929 | Issue date: 26 July 21 | DOC REV 4 | Page 5 of 7 |
|---|---------------------|----------------|------------------------|-----------|-------------|

Mechanical Enclosure Preliminary Dimensions



| | | | | | |
|---|----------------------------|-----------------------|-------------------------------|------------------|--------------------|
|  | <p>Ka band Preliminary</p> | <p>KKa-TR-DL-1929</p> | <p>Issue date: 26 July 21</p> | <p>DOC REV 4</p> | <p>Page 6 of 7</p> |
|---|----------------------------|-----------------------|-------------------------------|------------------|--------------------|

Disclaimer

The information contained herein is believed to be reliable; however, Arralis makes no warranties regarding the information and assumes no responsibility or liability whatsoever for the use of the information contained herein. All information is subject to change without notice, therefore customers should obtain the latest relevant information before placing orders for Arralis products. The information contained herein does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights.

This information does not constitute a warranty with respect to the product described, and Arralis disclaims any and all warranties either expressed or implied, relating to sale and/or use of Arralis products including liability or warranties relating to fitness for a particular purpose, consequential or incidental damages, merchantability, or infringement of any patent, copyright or other intellectual property right.

Without limiting the generality of the foregoing, Arralis products are not warranted or authorised for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death..

Copyright 2021 © Arralis

©2021 Arralis Ltd. All rights reserved. Trademarks and registered trademarks are the property of their respective owners.

Arralis European Offices
t: +(44) 1793 239670 (UK)
e: sales@arralis.com

arralis.com

Arralis USA Office
+(1) 386 301 3249 (USA)
e: emilie.wren@arralis.com

| | | | | | |
|---|----------------------------|-----------------------|------------------------|------------------|-------------|
|  | Ka band Preliminary | KKa-TR-DL-1929 | Issue date: 26 July 21 | DOC REV 4 | Page 7 of 7 |
|---|----------------------------|-----------------------|------------------------|------------------|-------------|