

Transceiver Downlink Module 17-21 & 27-30 GHz



Product Datasheet

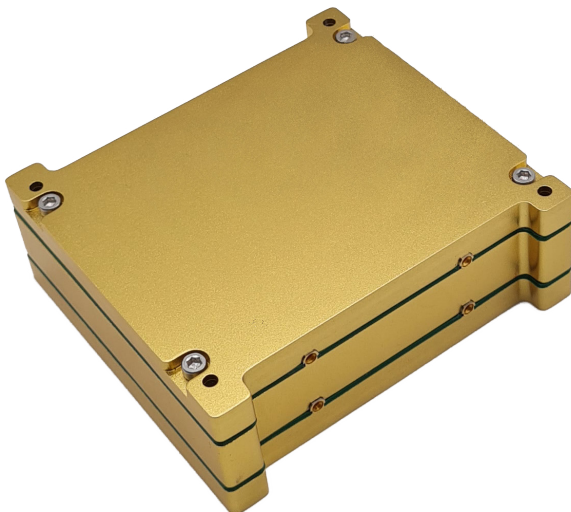
TR400

Integrated transceiver downlink module for Ka-band frequencies.

Overview

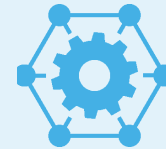
TR400 is a fully integrated standalone transceiver module designed for Ka-band communication systems. The Transceiver operates as a wideband up/down converter when combined with a modem/ Software Defined Radio (SDR) to enable a fully functional Ka-band satellite communications system designed for use in Low Earth Orbit (LEO).

This Transceiver offers up to 250 MHz of instantaneous bandwidth. On-board frequency synthesizers able to lock to an external or on-board 10 MHz or 100 MHz reference signal are included on the Transceiver. The on-board reference signals are provided by high precision, low power consuming Temperature Compensated Crystal Oscillators (TCXO) with frequency stability of $\pm 0.28\text{ppm}$ between -40°C to 85°C . The Transceiver is fully enclosed in an aluminium housing with SMP and SMPM RF connectors, DC Flying Leads for DC power and 6-Pin Pico-Lock connectors for DC power enable, PLL lock, current and temperature sensor connections.



Features

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



Applications

- Satellite communications
- High speed data communications
- IOT
- Security
- 5G

**Space Heritage 20th
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Rocket Labs Mission 18,
OHB SatComm

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Specification Overview

Transmitter

Parameter	Typical	Unit	
TX Output Frequency Range	17-21	GHz	
TX Saturated Output Power (Pin=-15 dBm)	27	dBm	
TX Output Power at P1dB Compression (Pin=-14 dBm)	26	dBm	
IF Input Frequency Range	1-5	GHz	
IF Input Power	-40 to -15	dBm	
Reference Frequency	10 or 100 (on-board or external)	MHz	
Reference Stability	±0.28 (-40 °C to +85 °C)	PPM	
Conversion Gain	38-43	dB	
Gain Flatness Across Full 1 - 5 GHz Band	±2.5	dB	
Gain Flatness Over 250 MHz Channel bandwidth from SDR	±1	dB	
Typical Phase Noise	10 MHz	100 MHz	dBc/Hz
1 kHz	-80	-94	dBc/Hz
10 kHz	-81	-95	dBc/Hz
100 kHz	-104	-110	dBc/Hz
1 MHz	-124	-120	dBc/Hz
Spurious (in band 1-5 GHz)	-50	dBc	
Supply Voltage Range	7-42	Vdc	
DC Power @ 12 VDC	<11.5	W	
DC Current @ 12 VDC	1	A	

Receiver

Parameter	Typical	Unit	
Rx Input Frequency Range	27-30	GHz	
RX Input Power Range	-120 to -30	dBm	
IF Output Frequency Range	1-4	GHz	
IF Output Power Range	-90 to 0	dBm	
Reference Frequency	10 or 100 (on-board or external)	MHz	
Reference Stability	±0.28 (-40 °C to +85 °C)	PPM	
Conversion Gain	30-35	dB	
Gain Flatness Across Full 1-4 GHz Band	±2.5	dB	
Gain Flatness Over Typical Channel Bandwidth from SDR	±1	dB	
Typical Phase Noise	10 MHz	100 MHz	dBc/Hz
1 kHz	-83	-89	dBc/Hz
10 kHz	-86	-90	dBc/Hz
100 kHz	-108	-95	dBc/Hz
1 MHz	-122	-119	dBc/Hz
Spurious (in band 1-4 GHz)	-60	dBc	
Image Rejection	62	dB	
Noise Figure	<2.5	dB	
Supply Voltage Range	7-42	Vdc	
DC Power @ 12 VDC	<6	W	
DC Current @ 12 VDC	0.5	A	

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Mechanical and Environmental

Mechanical

Parameter	Typical	Unit
PCB Dimensions	96 x 91 x 1 (max)	mm
Mechanical Enclosure Required	Yes	
Mechanical Enclosure Dimensions	96 x 91 x 38 (max)	mm
Total Mass	<1	kg
Form Factor Requirement	Cube Sat	
Enclosure Material Requirement	>2.4 mm thick aluminium	mm
Enclosure Plating Requirement	Gold or Nickel	
RF Connector Types	SMPM edge mount	
DC Connector Types	DC flying leads	
IF Signal Connector Types	SMP edge mounts	
Current Sensor, Temperature Sensor, Frequency Synthesiser Lock & DC Power Enable Connections	6-pin Pico-Lock Connector	

Environmental

Parameter	Typical
Operating Temperature Range	-40 °C to +85 °C
Operating Environment	
Radiation Tolerance (kRad)	
Vibration Requirement	
Vacuum Requirement	
Compliance Standards	

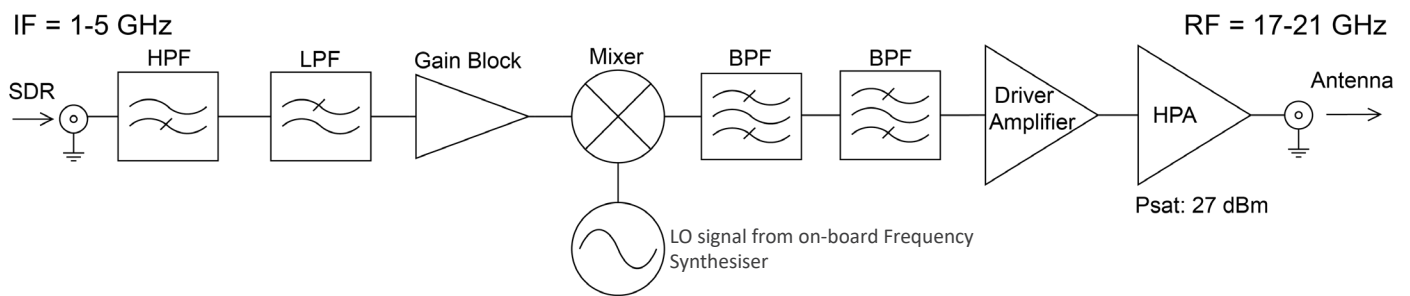
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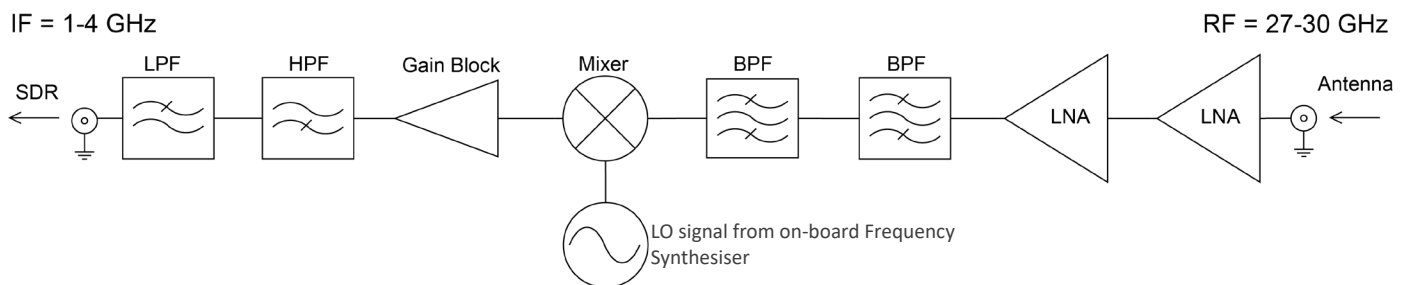
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Simplified Schematic Diagram

Upconverter K-band 17-21



Downconverter Ka-band 27-30

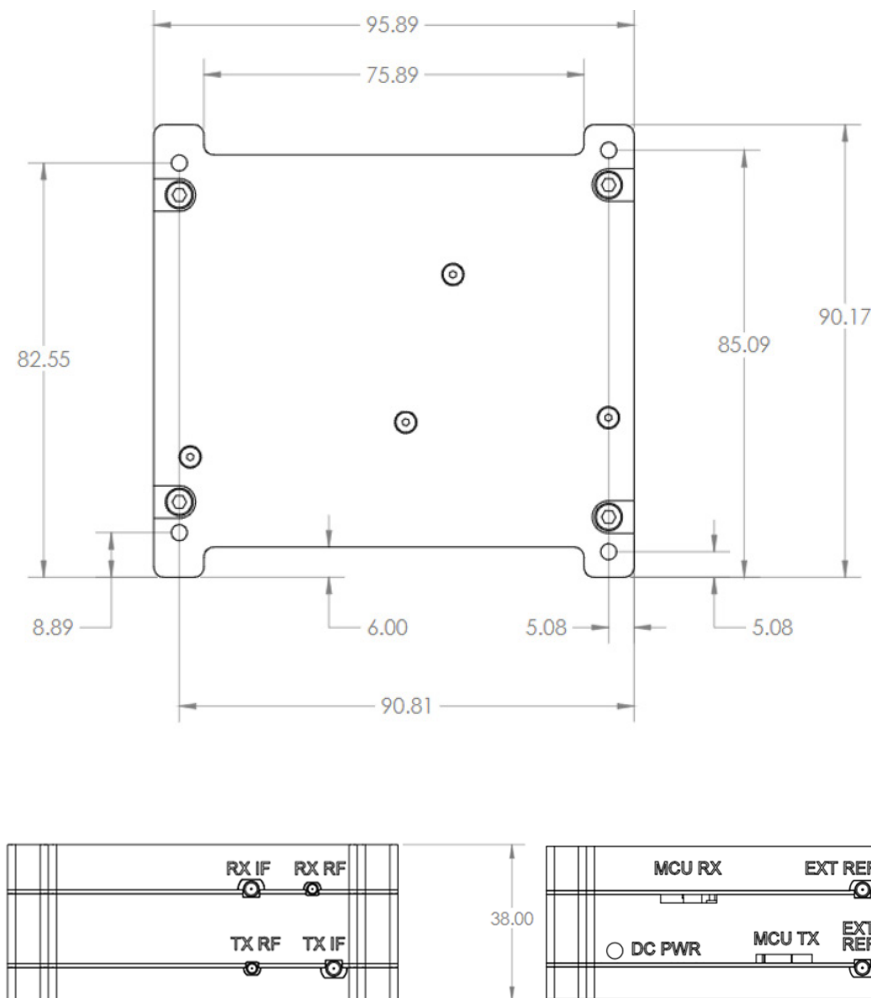


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Product Datasheet

Mechanical Enclosure Preliminary Dimensions



Contact Information

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TR400	Issue Date: 10/07/2023	DOC REV 1	Page 5 of 5
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