

RFT4

Dual-Channel 20-6500 MHz Wideband Tuner **Rx/Rx, Tx/Tx, and Rx/Tx Capable**



DESCRIPTION

The RFT4 is a dual-channel, fast-tuning digital tuner covering 0.5 to 6500 MHz. The two channels may be configured via software command as two receivers, as two transmitters, or as one receiver and one transmitter. As a 20-6500 MHz receiver, a channel converts and outputs a 40-MHz bandwidth IF, either as a 14-bit digital IF or as an analog IF. As a 20-6500 MHz transmitter, a channel accepts such an IF, either in digital form from a WPM3 module, or in analog form from the front panel input, and can output the converted spectrum at up to +20 dBm. HF is received or transmitted directly from a channel's HF port.

The RFT4 occupies one 3U-size CompactPCI slot.

- RF: 20-6500 MHz frequency range, 40-MHz BW, 5-MHz step size
- HF: 0.5-32 MHz
- 85-dB typical dynamic range for both RF and HF receive configurations (two tones, -40 dBm each)
- Interfaces directly with WPM3A processor/exciter module. Can be installed in DRT 3rd-Generation ("C") systems, including the DRT11xxC, DRT12xxC, and DRT23xxC.
- Coherent operation of multiple tuners without LO distribution modules; software-reconfigurable
- Flexible Antenna I/O, all software-reconfigurable:
 - Two RF inputs per channel allows attachment of multiple antennas without external switches
 - RF daisy-chaining, to allow single-antenna operation of both channels and multiple RFT4s
 - Separate transmit output connectors
 - Dedicated HF connectors
 - DC Bias available at RX1 and RX2 ports (each programmable +11V or +5.1V; 100 mA with short-circuit protection).
- Single-slot 3U CompactPCI form factor and standard control interface (32-bit PCI via J1 connector)

RECEIVER OPERATION

RX and AUX Input Ports

Each channel's RX and AUX input ports are functionally the same. The control software selects which port is connected to the receiver path. The AUX1 input is usually cabled to the adjacent RFT4's RX OUT port to allow receive daisy-chaining of an intercept antenna.

- Input Frequency Range 20 to 6500 MHz
- Final IF Bandwidth 40 MHz
- Center Frequency Tuning Range 40 to 6480 MHz
- Tuning Resolution 5 MHz
- VSWR 2.5:1 maximum, 1.25:1 to 2:1 typical
- Maximum Input without Damage +30 dBm continuous (RF)
12 VDC (antenna DC bias must be Off)
- Connectors SMA jack (RX1 and RX2)
SSMC jack (AUX1 and AUX2)

HF Ports

Each channel's HF port is software-reconfigurable for both RX and TX modes.

- Input Frequency Range 0.5 to 32 MHz (full specifications 1.7 to 30 MHz)
- VSWR 2.5:1 maximum
- Maximum Input without Damage +30 dBm continuous
- Connectors SSMC jack (HF1 and HF2)
- Full-Scale Input (automatic AGC engaged) -23 dBm, single-tone (5 dB dynamic headroom)

IF Ports (analog outputs in receiver operation)

- 3-dB Bandwidth 40 MHz minimum
- IF Passband 100 to 140 MHz
- Spectral Sense 20 to 3000 MHz: Inverted relative to RF input
3000 to 6500 MHz: Non-Inverted relative to RF input
- Anti-alias filtering 80 dB minimum
- Full-scale output power level (receive) -1 dBm (high-level analog output mode)
-30 dBm (digital output "monitor" mode)

RX OUT Port (antenna daisy chain)

The Channel 1 RF or AUX input may be internally daisy-chained to Channel 2 through a preamp or passive splitter (software-selectable). In turn, this daisy-chained antenna input, or either of the Channel 2 RF inputs, may be directed to the RX OUT port to feed another RFT4.

Digital IF Outputs

In Receiver applications, the digital IFs are outputs to the CompactPCI backplane via the J2 connector.

- Sample Rate 96 Msps
- Sample Resolution 14 bits
- 3-dB Bandwidth 40 MHz minimum
- Effective Center Frequency 24 MHz
- Anti-alias filtering 80 dB minimum
- Format 14-bit parallel TTL, two's-complement
- Connector J2 (CompactPCI backplane interface)

TRANSMITTER OPERATION

TX Output Ports

- Output Frequency Range 20 to 6500 MHz
- 3-dB Bandwidth 40 MHz minimum
- Passband Amplitude Ripple 3 dB peak-to-peak, maximum
1 dB peak-to-peak, maximum, with digital equalization
- Tuning Resolution 5 MHz
- Power Level -30 to +20 dBm with full-scale analog or digital input
- VSWR 2.5:1 maximum

HF Ports

Each channel's HF port is software-reconfigurable for both RX and TX modes.

- Output Frequency Range 0.5 to 32 MHz (full specifications 1.7 to 30 MHz)
- Power Level -14.5 to +10 dBm with maximum digital input
- VSWR 2.5:1 maximum
- Passband Amplitude Ripple 2 dB peak-to-peak, maximum

Digital IF Inputs

The digital IF buses of the J2 CompactPCI connector are inputs during TX applications. The digital IFs are typically generated by a WPM3 module.

- Sample Rate 96 Msps
- Sample Resolution 14 bits
- 3-dB Bandwidth 40 MHz minimum
- Anti-alias filtering 80 dB minimum
- Spectral Sense Non-Inverted or Inverted (software-selectable)
- Format 14-bit parallel TTL, two's-complement
- Connector J2 (CompactPCI backplane interface)

IF Ports (analog inputs in transmitter operation)

- IF Passband 100 to 140 MHz
- 3-dB Bandwidth 40 MHz minimum
- Spectral Sense 20-3000 MHz: Inverted (relative to TX output)
3000-6500 MHz: Non-Inverted (relative to TX output)
- Anti-alias filtering 80 dB minimum
- Full-Scale Input power level -3 dBm

LO PORTS

FIXED LO IN and OUT Front-Panel Ports

A DRT REF3 module provides a fixed-frequency LO signal to the RFT4. This LO is daisy-chained out the front panel in order to provide the same coherent reference to other DRT tuners.

TUNING LO IN and OUT Front-Panel Ports

The RFT4 has a flexible tuning LO structure allowing coherent and independent configurations. The modes of operation are software-reconfigurable.

CONTROL

- Normal tuning, attenuation, and other mode settings are controlled through the CompactPCI bus interface (J1 connector).
- A frequency/attenuation table for fast scanning, up to 1000 entries per channel, may be programmed through the CompactPCI bus.

PHYSICAL/ENVIRONMENTAL

Operating Temperature Range: –20 to +60°C (–4 to +140°F) (Inlet air temperature of any DRT system in which the RFT4 is installed. The RFT4 components withstand +85°C (+185°F) temperatures, so the systems in which these modules are installed must maintain an internal rise of 85°C – 60°C = +25°C (+45°F) or less.)

Size: Single-slot 3U CompactPCI, approximately 0.8 in wide x 4 in high x 6.5 in deep (2 cm wide x 10 cm high x 16.5 cm deep)

Weight: < 1.75 lbs. (794 g)

Power Consumption: 34 watts maximum Less consumption in Sleep and other modes

Front Panel I/O Definitions and Characteristics

Port Label	Connector Type	Function	Electrical Characteristics
RX1 / RX2	SMA jack	Ch1 / Ch2 20 to 6500 MHz Receive Input	–29 dBm single-tone full-scale input (no RF attenuation) +7 dBm clipping +30 dBm maximum without damage Antenna Bias, software-selectable, +4.5V/+11V/OFF
TX1 / TX2	SSMC jack	Ch1 / Ch2 20 to 6500 MHz Transmit Output	–30 to +20 dBm single-tone output
AUX1	SSMC jack	20 to 6500 MHz, Auxiliary Ch1 Receive Input (usually configured as module-to-module Antenna Distribution Input)	–29 dBm single-tone full-scale input (no RF attenuation) +7 dBm clipping +30 dBm maximum without damage
AUX2	SSMC jack	20 to 6500 MHz Input, used for Auxiliary Ch2 Receive	–29 dBm single-tone full-scale input (no RF attenuation) +7 dBm clipping +30 dBm maximum without damage
RX OUT	SSMC jack	20 to 6500 MHz Output, used for distributing Ch2's receive signal to another RFT4. [note: Ch1 feeds Ch2 internally, and Ch2 feeds RX OUT]	Typical application would be antenna connected to RX1, with Ch1 preamp on, simultaneously feeding (internally) Ch2 with preamp off, and then Ch2 feeding RX Out. In this configuration, net gain is ~ 0 dB from RX1 input to RX Out output.
HF1 / HF2	SSMC jack	Ch1 / Ch2 0.5 – 32 MHz Receive Input or Transmit Output	<ul style="list-style-type: none"> As HF Receive Input –25 dBm single-tone full-scale input (no RF attenuation) +10 dBm clipping +30 dBm maximum without damage As HF TX Output –14.5 to +10 dBm single-tone output
IF1 / IF2	SSMC jack	Ch1 / Ch2 100 to 140 MHz Analog Input or Output	<ul style="list-style-type: none"> As Analog Receive IF Output –1 dBm (high-level analog output mode) –30 dBm (digital output "monitor" mode) +10 dBm maximum without damage As Analog Transmit IF Input –3 dBm Input Level
TUNE LO IN/OUT	SSMC jack	Tuning LO Input and Output jacks	+0 dBm Nominal Input and Output Levels (-3 to +3 allowable)
FIXED LO IN/OUT	SSMC jack	Fixed LO Input and Output jacks	+0 dBm Nominal Input and Output Levels (-3 to +3 allowable)
I/O	15-pin Nanonics Dualobe	Multi-pin I/O: <ul style="list-style-type: none"> RS-232 #1 (TX, RX, GND) RS-232 #2 (TX, RX, GND) Qty 6 GPIO (3 GND pins for these 6 GPIO lines) 	<ul style="list-style-type: none"> GPIO, 0/+5V Logic

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