

## EHTX-0401 4-Output HF Digital Transmitter



4DSP PC720



4DSP FMC204

The EHTX-0401 digital transmitter is hosted on a 4DSP platform consisting of the PC720 Kintex-7 PCIe card and the FMC204 4-Channel 16-bit DAC board.

Signals from the 4 RF outputs can be used for multi-channel processing, beam-forming, or any other application requiring multiple RF outputs.

With its 10 MHz reference input, the digital transmitter can upconvert baseband signals to RF signals from 2 MHz to 62 MHz with signal bandwidths from 7 kHz to 1.9 MHz. Boasting an output SNR of 75 dB and an SFDR of 90 dB, the EHTX-0401 can be used in applications requiring highly linear upconverters.

### FEATURES

RF Outputs:	4
Digital Upconverters:	4 (interpolation 64 to 4096)
NCOs:	1
Environmental:	Convection cooling
Operating Temperature:	0°C to +40°C

### APPLICATIONS

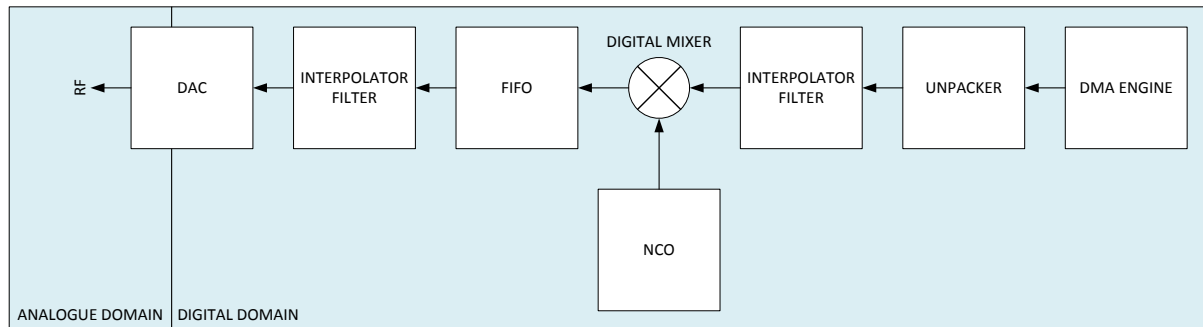
- Software defined radio (SDR)
- Beamforming
- Wireless communications
- Test measurement instruments
- Multi-channel digital transmitters
- RF stimulator for power-amplifiers

SPECIFICATIONS<sup>1</sup>

		Model			
		Min	As Configured	Max	Units
Analog Outputs	Number of RF Outputs		4		
	Output Coupling		AC		
	Bandwidth	2		62	MHz
	THD		-65		dBc
	Max Output Level		+4		dBm
	Output Impedance		50		$\Omega$
	DAC Resolution		16		Bits
Analog Inputs	External Clock Reference		10		MHz
	Input Impedance, Clock Reference (AC coupled)		50		$\Omega$
	External Clock Input Level	-6	0	+7	dBm
	External Trigger Input Impedance (DC coupled)		2500		$\Omega$
	External Trigger Input		1PPS LVTTTL / LVCMOS		
Digital Inputs	DUCs		4		
	NCOs		1		
	DUC Grouping		1		per NCO
	DUC Interpolation	64	2000	4096	
	Sampling Rate, $F_{IN}$	7.324218	62.5	1953.125	kSamp/sec
Transmitter Performance <sup>2</sup>	Dynamic Range			93	dB
	SFDR	73		90	dB
	Output SNR		75		dB
	In-Channel IMD3			-85	dBc
	In-Channel IMD2			-98	dBFS
	Tuning Resolution		0.47	0.47	Hz
	Passband Ripple			0.78	dB
	Passband Gain		-0.37		dB
	3dB Cutoff		80% x $F_{IN}$		kHz
	Stopband Attenuation			>122	dB
Power <sup>4</sup>	8-Lane PCIe Card			25	W
Connectors	RF Outputs		4 x MMCX		
	Clock Input		1 x MMCX		
	Trigger Input		1 x MMCX		
Environmental	Operating Temperature	0		+40	$^{\circ}$ C
	Storage Temperature	-50		+125	$^{\circ}$ C
	Operating Humidity (non-condensing)	0		100	%
	Storage Humidity	0		100	%
	Vibration (10 Hz to 3 kHz)		0.1		$g^2/Hz$
	Shock			30	G
	Conformal Coat		none		
Physical	Form Factor		Half-length Full-height PCIe		
	Dimensions		205 x 112		mm
	Mass		290		g

<sup>1</sup>Preliminary specifications subject to change. <sup>2</sup>All measurements in 42 kHz complex bandwidth with 84 MHz sampling clock. <sup>3</sup>Receiver ADC only with 84 MHz sampling clock. <sup>4</sup>At full load.

## ARCHITECTURE



Data from a host computer is injected into the EHTX-0401 through a packet format via a direct-memory access (DMA) engine. An unpacker extracts content from the data packets and feeds the information to an interpolation filter. The output of the interpolation filter is digitally mixed with the output of a numerically-controlled oscillator (NCO) to up-convert the base-band signal to an appropriate carrier frequency. A first-in-first-out (FIFO) queue controls the rate of information flow to the final interpolation filter and digital-to-analogue converter (DAC). Information flows for each RF output of the EHTX-0401 follows this process. Note that only one NCO is present on the EHRX-0401; all RF channels of the EHTX-0401 share the NCO.