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QUETZALCOATL

Matched Filter for Spread-Spectrum Modem

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1 Operation

Quetzalcoatl is a digital matched finite impulse response filter implementing two versions of the same filter function

$$y_{t+l} = x_t - 3x_{t-2} - 7x_{t-3} - 9x_{t-4} - 7x_{t-5} - 3x_{t-6} + x_{t-8}$$

that differ in their input and output formats.

2 Application

Quetzalcoatl is designed as an input/output filter in a Digital Spread Spectrum Modem. The input filter on the *recevier* side is identical to the output filter on the *transmitter* side, except for their data widths and formats.

3 Test

Quetzalcoatl has been verified on the IMS XL-60 ASIC Verification System. No design errors have been detected. All in all, 30 prototype chips using two different packages were tested. All of the 10 chips using a 40 pin DIL package showed full functionality at 60MHz, and one chip that was tested at 100MHz using a slightly less strict test was found to work.
Of the 20 chips packaged using an 68 pin grid array package, 5 were defective. The other 15 chips showed full functionality at 60 and 100 MHz.

4 Design Data

QUETZALCOATL		
Process Technology		
VLSI Technology	CMOS n-well $1.2\mu m$	cmn12a
Logic Structures		
Datapaths:	Sender input	1 bit
	Sender output	8 bits
	Receiver input	7 bits
	Receiver output	12 bits
Pads:	inputs – TTL compatible	14
	outputs – TTL compatible	21
	power: core / padframe	2 / 1
	ground: core / padframe	1 / 1
Physical Data		
Standardcell blocks:	Sender area	$0.2mm$ x $1.5mm$
	Sender cells / transistors	68 / 790
	Receiver area	$1.3mm$ x $1.5mm$
	Receiver cells / transistors	413 / 10027
Chip geometry:	area of core	$2.4mm^2$
	area of chip	$2.7mm$ x $2.6mm$
Package:		PGA68
Timing Data		
Working frequency:	system clock	65.472 MHz
	output data rate	65.472 MWords/s

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