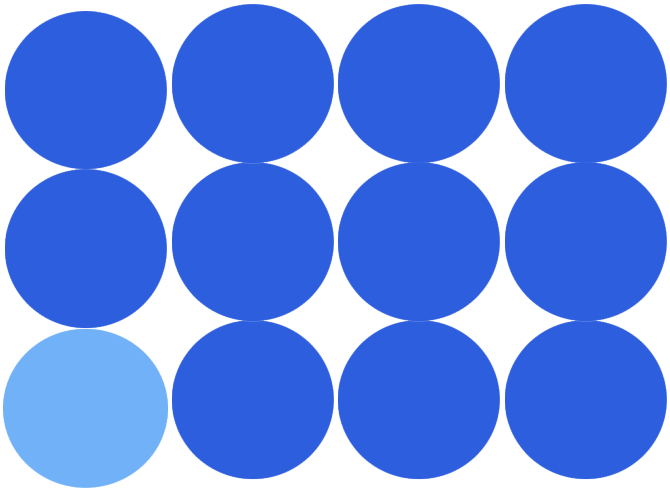
Temporal Filter Video Core Datasheet



Feature Summary

- Input/Output Video
- Variable size Common Video Format
- Algorithm
- Recursive averager
- High precision (example 16 bits for 8 bit input video)
- Only 1 frame buffer required (size depends on implementation)
- No frame delays
- Error
- High precision (implementation dependent)
- Error from floating point version (using same recursive algorithm) is < 0.6 pixels over any range of input data
- Modes
- Transparent/bypass (also achieved by =1)
- Filtering over N frames (1 to 128)
- Frame store write disabled (freeze frame)
- Frame store read disabled (scaler)
- Memory Interface
- 1 frame store
- Write interface + FIFO
- Read interface + FIFO
- Packing for writing
- Unpacking for reading

The Temporal Filter Video Core is used to filter high frequency noise from a video stream.

General Information

This is accomplished by averaging image data over multiple frames in time. Each pixel is averaged with the same pixel location in N temporally spaced frames. Noise is reduced since pixels which deviate substantially from the average will tend to be averaged out. The algorithm implemented is a recursive approximation of an average. Since recursive operations can degrade the signal due to quantization effects, care was taken to ensure precision (as compared to a floating point implementation).

The design is fully synchronous to a single system clock input, and has an asynchronous active low system reset.

The Temporal Filter Video Core has been designed to allow for easy integration into custom user applications. Configuration of the core is done through simple wire I/O interface. Any processor bus interface can be connected to these signals so it can be configured through the customers bus interface. If desired, the core can be delivered with a simple bus interface that will provide all address decoding and read/write control.

The core is motion adaptive, and it will locally not filter if no motion is present in a localized area, preserving the highest quality signal.

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Diagrams

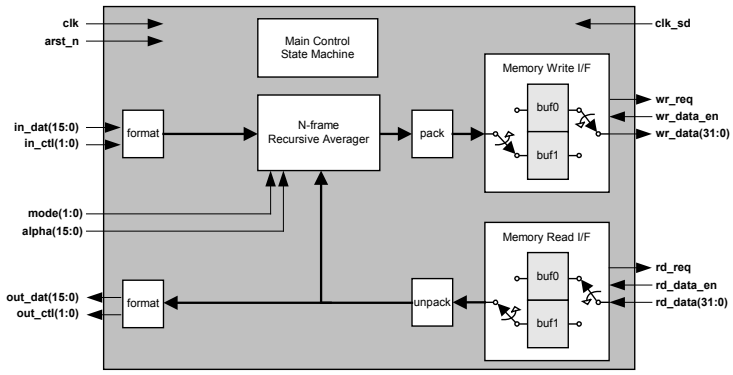

Figure 1 – Temporal Filter Block Diagram

I/O Description

Table 1 – Temporal Filter Core I/O Description

Signal	IO	Description
clk	I	Clock (main core)
clk_sd	I	Clock (sdram)
arst_n	I	Async reset
in_data(15:0)	I	Input video data
in_ctl(1:0)	I	Input video control
out_data(15:0)	I	Output video data
out_ctl(1:0)	I	Output video control
mode(1:0)	I	Operation Mode 0 = Transparent 1 = Normal Filter 2 = Write Off (freeze frame) 3 = Read Off (scaler)
alpha(15:0)	I	Alpha Coefficient 1/N, where N is the number of frames to average. (0.16)
wr_req	O	Memory write request
wr_data_en	I	Memory write data enable
wr_data(31:0)	O	Memory write data
rd_req	O	Memory read request
rd_data_en	I	Memory read data enable
rd_data(31:0)	I	Memory read data

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