Si2520 Reed-Solomon Encoder/Decoder

SIGLEAD

Introduction

This is high-speed Reed-Solomon encoder / decoder core, which is widely used in the error correction of various storage and communication systems. Four kinds of products are selectable to meet different demands.

Product No	Erasure	External RAM
Si2520	No	No
Si2520-E	Yes	No
Si2520-M	No	Yes
Si2520-EM	Yes	Yes

Features

- High-speed encoding / decoding
- Support shortened codes
- Number of bits per symbol (m) : 3 to 12 bits
- Number of symbols in a codeword (n) : 3 to 2^m-1 symbols
- Number of information symbols (k) : 1 to 2^m-3 symbols
- Number of correctable symbols (t) : 1 to 2^{m-1}-1 symbols
- Primitive polynomial configurable
- Generator polynomial configurable $g(x)=\prod_{i=0}^{2t-1}(x+\alpha^{s+i})$
- Support erasure correction
- No external RAM option
- Available limitation of number of correctable symbols
- Support continuous encoding / decoding due to pipeline (except the case of n<4t+2)
- Fully synchronous design using a single clock
- ASIC friendly design

Deliverables

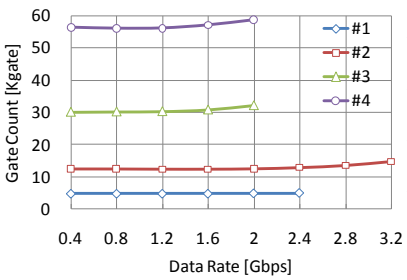
- Verilog-RTL source code
- FPGA netlist (Xilinx, Altera, Lattice etc.)
- ASIC netlist (need ASIC cell library)
- CPU/DSP source code (C, Assembler)

Test bench and test patterns are also provided.

Gate Count / Performance

- TSMC 90nm

(Constraints : Clock skew 20%, Using wire load model)



#1 : Si2520 (m=4,n=15,k=11,t=2)
#2 : Si2520 (m=8,n=20,k=16,t=2)
#3 : Si2520-M (m=8,n=255,k=239,t=8)
#4 : Si2520-EM (m=8,n=204,k=188,t=8)

Interface

- Encoder

	Name	Description
Input	ICLK	Clock
	IXRST	Asynchronous reset
	IDATA[m-1:0]	Information symbol
	IDEN	Information symbol enable
Output	ORDY	Ready to input inform. Symbol
	ODATA[m-1:0]	Code symbol
	ODEN	Code symbol enable

- Decoder

	Name	Description
Input	ICLK	Clock
	IXRST	Asynchronous reset
	IDATA[m-1:0]	Code symbol
	IDEN	Code symbol enable
	IERS	Erasure position (*1)
	ILMT[h-1:0]	Correctable symbol limitation (*3)
	IRAMRD[m-1:0]	External RAM read data (*2)
Output	ORDY	Ready to input code symbol
	ODATA[m-1:0]	Decoded symbol
	ODEN	Decoded symbol enable
	OFAIL	Decoding fail flag
	OERRNUM[h-1:0]	Number of corrected symbols
	OEND	Decoding end flag
	ORAMWA[a-1:0]	External RAM write address (*2)
	ORAMWE	External RAM write enable (*2)
	ORAMWD[m-1:0]	External RAM write data (*2)
	ORAMRA[a-1:0]	External RAM read address (*2)
	ORAMRE	External RAM read enable (*2)

*1 : Only for Si2520-E, Si2520-EM
*2 : Only for Si2520-M, Si2520-EM
*3 : Only when limitation of number of correctable symbols is used

Applications

- Communications (support various standards with RS code)
- Hard disk drive, Optical disc drive, Solid state drive

The content might change without a previous notice due to the improvement.

Please contact us for further works such as IP customization and peripheral circuit design.

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