Reed-Solomon Encoder

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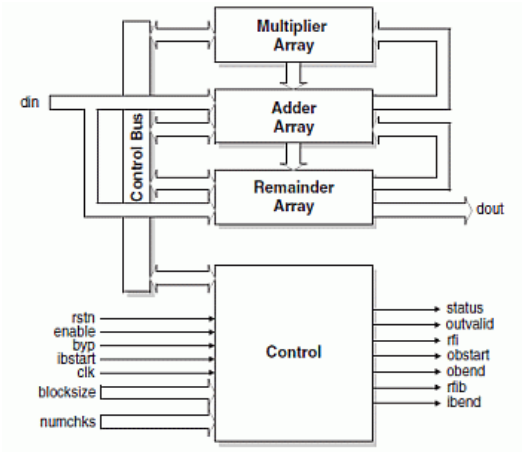
Overview

Reed-Solomon codes are used to perform Forward Error Correction (FEC). FEC introduces redundancy in the data before it is transmitted. The redundant data (check symbols) are transmitted with the original data to the receiver. For example, a Reed-Solomon decoder is used to help recover any erred data. This type of error correction is widely used in data communications applications such as Digital Video Broadcast (DVB) and Optical Carriers (i.e. OC-192).

The codes are referred to in the format RS(n,k) where k is the number of s-bit wide information (data) symbols and n is the total number of s-bit wide symbols in a codeword. The Reed-Solomon encoder generates a code such that the first k symbols output from the encoder are the information symbols and the next n-k symbols from the encoder are the check symbols added for error correction. When the data output is in the same order as the input it is referred to as a systematic encoder.



Features

- 3- to 12-Bit Symbol Width
- Configurable Polynomials
  - Field polynomial
  - Generator polynomial
    - Starting root
    - Root spacing
- User-defined Codewords
  - Maximum of 4095 symbols
  - Maximum of 256 check symbols
  - Shortened codes
- Selectable Reed-Solomon Standards
  - OC-192
  - DVB
  - CCSDS
  - ATSC
- Fully Synchronous
  - User-configured latency2
  - Registered input selection
- Systematic Encoder
- Full Handshaking Capability

Evaluation Configurations

Evaluation Configurations Available for Reed-Solomon Encoder for ORCA4[1]

Parameter File	Mode	PFUs	LUTs	Registers	PIO	EBR	fMAX (MHz)
reeds_enco_o4_1_001.lpc	OC192	58	210	194	22	N/A	168
reeds_enco_o4_1_002.lpc	CCSDS	88	327	323	22	N/A	156
reeds_enco_o4_1_003.lpc	DVB	58	201	194	22	N/A	167
reeds_enco_o4_1_004.lpc	ATSC	71	233	226	22	N/A	166

[1] Performance and utilization characteristics for OR4E02-2BA352. When using other devices performance may vary.

Evaluation Configurations Available for Reed-Solomon Encoder for XPGA[1]

Parameter File	Mode	PFUs	LUTs	Registers	External Pins	EBRs	fMAX (MHz)
reeds_enco_xp_1_001.lpc	OC192	86	273	248	24	N/A	166
reeds_enco_xp_1_002.lpc	CCSDS	161	504	457	22	N/A	149
reeds_enco_xp_1_003.lpc	DVB	84	273	240	22	N/A	155
reeds_enco_xp_1_004.lpc	ATSC	130	417	307	22	N/A	157

[1] Performance and utilization characteristics for LFX125B-04F256C. When using other devices, performance may vary.

Evaluation Configurations Available for Reed-Solomon Encoder for LatticeECP and LatticeEC[1]

Parameter File	Mode	SLICEs	LUTs	Registers	I/Os	sysMEM EBRs	fMAX (MHz)
reeds_enco_e2_1_001.lpc	OC192	147	252	217	24	N/A	206
reeds_enco_e2_1_002.lpc	CCSDS	280	460	413	24	N/A	194
reeds_enco_e2_1_003.lpc	DVB	149	253	220	24	N/A	205
reeds_enco_e2_1_004.lpc	ATSC	196	320	279	24	N/A	201

[1] Performance and utilization characteristics are generated using LFEC20E-5F672C in Lattice's ispLEVER v.4.1 software. When using this IP core in a different device, density, package, or speed grade, performance may vary.

Ordering Information

Part Numbers:
For ORCA4: REEDS-ENCO-O4-N1
For XPGA: REEDS-ENCO-XP-N1
For LatticeECP/EC:REEDS-ENCO-E2-N1

To find out how to purchase the Reed-Solomon Encoder IP Core, please contact your **local Lattice Sales Office**.