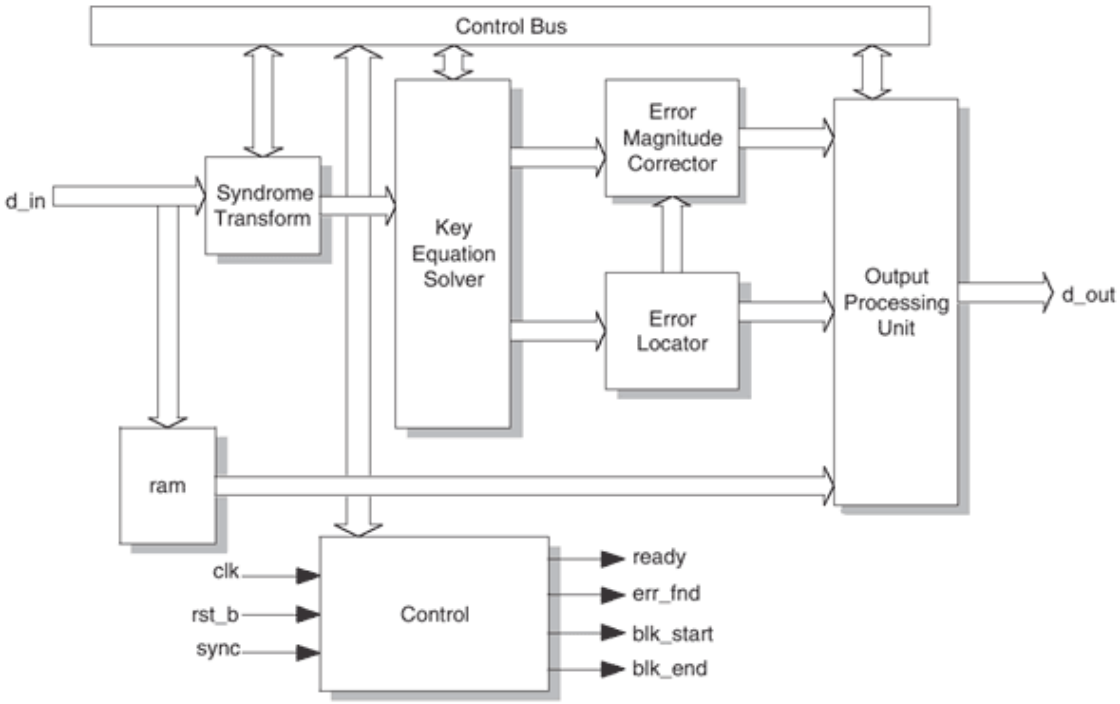
Reed-Solomon Decoder

Overview

Reed-Solomon codes are used to perform Forward Error Correction. FEC encoders introduce redundancy in data before it is transmitted. The redundant data (check symbols) are transmitted along with the original data through the channel. A Reed-Solomon decoder at the receiver is used to recover any corrupted data. This type of error correction is widely used in data communications applications such as hard disk and media storage (CD) systems, Digital Video Broadcast (DVB) and Optical Carriers (e.g. OC-192).

The codes are represented by the format RS(n,k) where n is the total number of s-bit wide symbols, and k is the number of s-bit wide information (data) symbols in a codeword. The Reed-Solomon Decoder performs detection and correction of encoded data available at the receiver after demodulation. The RS encoded data is then processed to determine whether any errors have occurred during transmission. Once the number of errors is determined, the decoder decides if they are within the range of correction. After determining this, the decoder corrects the errors in the received data. A typical application of space signal processing is shown in Figure 2.



Features

Forward Error Correction (FEC) for Communication and Common Applications

Selectable Reed-Solomon Standards

- CCSDS (255,223) . Consultative Committee for Space Data Systems
- ATSC (207,187) . Advanced Television Systems Committee
- DVB (204,188) . Digital Video Broadcasting
- OC-192 (255,239) . Optical Carrier

Shortened Codes Supported

Errors/Erasures Supported

Supports Symbol Widths From 3 to 12 Bits, Corresponding to GF(8) to GF(4096) Respectively

User-Defined and Default Field and Generator Polynomials Supported

Error Measurement Information

Evaluation Configurations

Performance and Resource Utilization for ORCA 4[1]

Parameter File	Mode	PFUs	LUTs[2]	Registers	SysMEM EBRs	fMAX (MHz)	External Pins
reeds_deco_o4_1_001.lpc	OC192	321	1595	918	2	83	35
reeds_deco_o4_1_002.lpc	CCSDS	621	2627	1565	2	76	36
reeds_deco_o4_1_003.lpc	DVB	330	1764	911	2	85	35
reeds_deco_o4_1_004.lpc	ATSC	423	2139	1072	2	84	35

[1] Performance and utilization characteristics are generated using an OR4E042BA352 in ispLEVER™ software v.3.0. Synthesized using Synplicity Synplify, v.7.0.3. When using this IP core in different density, package, speed, or grade within the ORCA 4 family, performance may vary slightly.

[2] LUT is a standard logic block of some Lattice devices. For more information, check the data sheet of the device.

Performance and Resource Utilization for XPGA[1]

Parameter File	Mode	ispXPGA PFUs[2]	LUTs	Registers	SysMEM EBRs	fMAX (MHz)	External Pins
reeds_deco_xp_1_001.lpc	OC192	571	2034	1033	2	83	35
reeds_deco_xp_1_002.lpc	CCSDS	1011	3660	1717	2	76	36
reeds_deco_xp_1_003.lpc	DVB	586	2089	1049	2	84	35
reeds_deco_xp_1_004.lpc	ATSC	712	2536	1286	2	80	35

[1] Performance and Utilization characteristics are generated using LFX500B-04F516C. When using this IP core in different density, package, speed, or grade within the ispXPGA family, performance may vary slightly.

[2] PFU is a standard logic block of some Lattice devices. For more information, refer to the data sheet of the device.

Performance and Resource Utilization for LatticeECP and LatticeEC[1]

Parameter File	Mode	SLICEs	LUTs	Registers	I/Os[2]	sysMEM EBRs	fMAX (MHz)
reeds_deco_e2_1_001.lpc	OC192	812	1188	792	35	2	110
reeds_deco_e2_1_002.lpc	CCSDS	1389	1950	1419	36	2	102
reeds_deco_e2_1_003.lpc	DVB	816	1202	793	35	2	113
reeds_deco_e2_1_004.lpc	ATSC	1053	1491	991	35	2	103

[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.

[2] The I/Os for these configurations include the optional signals d_del and err_cnt. The width of the err_cnt signal bus is 5 for the CCSDS configuration, and 4 for the other evaluation configurations.

Ordering Information

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

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