Dynamic Block Reed-Solomon Decoder

Documents & Downloads
- User Manuals

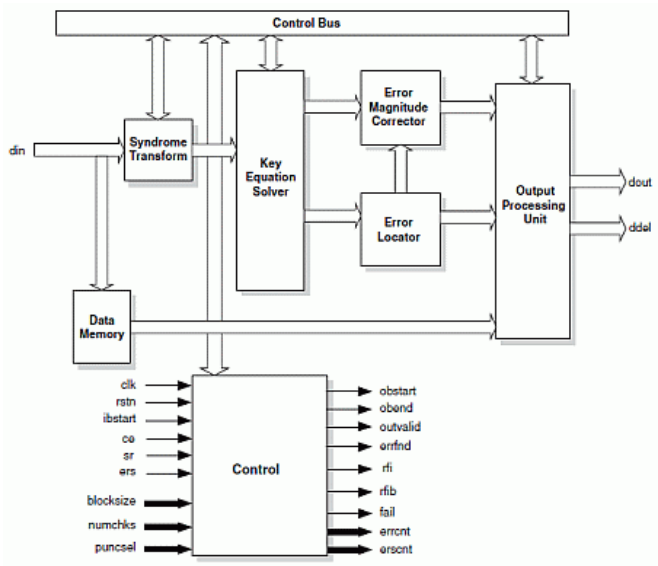
See Also
- Dynamic Block Reed-Solomon Encoder
- Block Convolutional Encoder
- Block Viterbi Decoder
- IP and Reference Design Forum

Overview

IPexpress USER CONFIGURABLE

Reed-Solomon codes are used to perform Forward Error Correction (FEC). FEC introduces controlled redundancy in the data before it is transmitted to allow error correction at the receiver. The redundant data (check symbols) are transmitted with the original data to the receiver. A **Reed-Solomon decoder** is used in the receiver to correct any transmission errors. This type of error correction is widely used in data communications applications such as Digital Video Broadcasting (DVB) and Optical Carriers (i.e. OC-192).

Lattice's Dynamic Block Reed-Solomon Decoder IP is compliant with several industry standards including the more recent IEEE 802.16-2004 and can be custom configured to support other non-standard applications as well. The Decoder supports a wide range of symbol widths and allows the user to define the field polynomial, generator polynomial and several other parameters. The newer standards like IEEE 802.16-2004 require the use of Reed-Solomon codes with dynamically varying block sizes. Lattice's Dynamic Block Reed-Solomon Decoder core provides an ideal solution that meets such needs of today's forward error correction world. This core allows the block size and number of check symbols to be varied dynamically through input ports. This IP core can be used with Lattice's Dynamic Block Reed-Solomon Encoder for a complete Reed-Solomon code based forward error correction application.



Reed-Solomon codes are written in the format RS(n, k) where k is the number of information symbols and n is the total number of symbols in a codeword or block. Each symbol in the codeword is wsymb bits wide. 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. The figure below illustrates the operation of a Reed-Solomon Decoder.

Features

- 3 to 12-bit Symbol Width
- Configurable Field Polynomial
- Configurable Generator Polynomial: Starting Root and Root Spacing
- User-defined codewords
  - Maximum of 4095 symbols
  - Maximum of 256 check symbols
  - Shortened codes
- Support of the following communication standards
  - OC-192
  - DVB
  - CCSDS
  - ATSC
  - IEEE 802.16-2004 WirelessMAN-SCa/OFDM
  - IEEE 802.16-2004 WirelessMAN-SC
- Fully Synchronous
- Systematic Decoder
- Full Handshaking Capability
- Dynamically Variable Block size
- Dynamically Variable Check Symbols
- Error, Erasure, and Puncturing modes
- Error Measurement information

Performance and Resource Utilization

LatticeECP3[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
OC-192	564	1062	791	2	37	148
CCSDS	990	1884	1322	2	38	149
DVB	591	1123	792	2	37	156

ATSC	776	1476	960	2	37	144
IEEE 802.16-2004 WirelessMAN SCa	912	1746	1252	2	51	145
IEEE 802.16-2004 WirelessMAN SC	1067	2031	1493	2	52	142

1. Performance and utilization data are generated using an LFE3-95E-8FN672CES device with with Lattice Diamond 1.0 and Synplify Pro for Lattice D-2009.12L-1 software. Performance may vary when using a different software version or targeting a different device density or speed grade within the LatticeECP3 family.

LatticeECP2M[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
OC-192	562	1117	791	2	37	169
CCSDS	963	1917	1322	2	38	163
DVB	591	1173	792	2	37	178
ATSC	756	1500	960	2	37	160
IEEE 802.16-2004 WirelessMAN SCa	917	1818	1252	3	51	151
IEEE 802.16-2004 WirelessMAN SC	1037	2056	1493	3	52	145

1. Performance and utilization data are generated using an LFE2M35E/SE-7F484C device with with Lattice Diamond 1.0 and Synplify Pro for Lattice D-2009.12L-1 software. Performance may vary when using a different software version or targeting a different device density or speed grade within the LatticeECP2M/S family.

LatticeECP2[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
OC-192	562	1117	791	2	37	175
CCSDS	963	1917	1322	2	38	157
DVB	591	1173	792	2	37	150
ATSC	756	1500	960	2	37	166
IEEE 802.16-2004 WirelessMAN SCa	917	1818	1252	3	51	152
IEEE 802.16-2004 WirelessMAN SC	1037	2056	1493	3	52	137

1. Performance and utilization data are generated using an LFE2-50E/S-7F672C device with with Lattice Diamond 1.0 and Synplify Pro for Lattice D-2009.12L-1 software. Performance may vary when using a different software version or targeting a different device density or speed grade within the LatticeECP2/S family.

LatticeECP/EC[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
OC-192	588	1171	795	2	37	123
CCSDS	980	1947	1349	2	38	114
DVB	604	1196	802	2	37	124
ATSC	766	1520	969	2	37	113
IEEE 802.16-2004 WirelessMAN SCa	927	1835	1279	3	51	116
IEEE 802.16-2004 WirelessMAN SC	1044	2066	1486	3	52	104

1. Performance and utilization data are generated using an LFEC/P20E-5F672C device with Lattice Diamond 1.0 and Synplify Pro for Lattice D-2009.12L-1 software. Performance may vary when using a different software version or targeting a different device density or speed grade within the LatticeECP/EC family.

LatticeSC/M[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
OC-192	591	1113	803	2	37	267
CCSDS	1033	1958	1348	2	38	245
DVB	642	1219	804	2	37	287
ATSC	804	1537	970	2	37	253
IEEE 802.16-2004 WirelessMAN SCa	965	1833	1276	2	51	240
IEEE 802.16-2004 WirelessMAN SC	1107	2101	1501	2	52	238

1. Performance and utilization data are generated using an LFSC/M3GA25E-7F900C device with with Lattice Diamond 1.0 and Synplify Pro for Lattice D-2009.12L-1 software. Performance may vary when using a different software version or targeting a different device density or speed grade within the LatticeSC/M family.

LatticeXP2[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
OC-192	562	1117	791	2	37	140
CCSDS	963	1917	1322	2	38	128
DVB	591	1173	792	2	37	157
ATSC	756	1500	960	2	37	128
IEEE 802.16-2004 WirelessMAN SCa	917	1818	1252	2	51	126

IEEE 802.16-2004 WirelessMAN SC	1037	2056	1493	2	52	127

1. Performance and utilization data are generated using an LFXP2-30E-7F484C device with with Lattice Diamond 1.0 and Synplify Pro for Lattice D-2009.12L-1 software. Performance may vary when using a different software version or targeting a different device density or speed grade within the LatticeXP2 family.

LatticeXP[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
OC-192	588	1171	795	2	37	110
CCSDS	980	1947	1349	2	38	108
DVB	604	1196	802	2	37	111
ATSC	766	1520	969	2	37	103
IEEE 802.16-2004 WirelessMAN SCa	928	1837	1279	2	51	109
IEEE 802.16-2004 WirelessMAN SC	1044	2066	1486	2	52	85

1. Performance and utilization data are generated using an LFXP20E-5F484C device with with Lattice Diamond 1.0 and Synplify Pro for Lattice D-2009.12L-1 software. Performance may vary when using a different software version or targeting a different device density or speed grade within the LatticeXP family.

Ordering Information

Family	Part Number
LatticeECP3	RSDEC-DBLK-E3-U3
LatticeECP2M	RSDEC-DBLK-PM-U3
LatticeECP2	RSDEC-DBLK-P2-U3
LatticeECP/EC	RSDEC-DBLK-E2-U3
LatticeSC/M	RSDEC-DBLK-SC-U3
LatticeXP2	RSDEC-DBLK-X2-U3
LatticeXP	RSDEC-DBLK-XM-U3

IP Express Version: 3.4

Evaluate: To download a full evaluation version of this IP, go to the IPexpress tool and click the IP Server button in the toolbar. All LatticeCORE IP cores and modules available for download will be visible. For more information on viewing/downloading IP please read the **IP Express Quick Start Guide**.
Purchase: To find out how to purchase the IP Core, please contact your **local Lattice Sales Office**.