

Dynamic Block Reed-Solomon Encoder

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Dynamic Block Reed-Solomon Decoder

IP and Reference Design Forum

Overview

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 Broadcast (DVB) and Optical Carriers (i.e. OC-192).

IPexpress

USER CONFIGURABLE

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 first k symbols in the Reed-Solomon Encoder output are information symbols and the last n-k symbols are check symbols. This type of encoder, where the information symbols are unchanged and are followed by check symbols in the output, is called a systematic encoder. The figure below illustrates the operation of a systematic encoder.

- 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

Selectable Reed-Solomon Standards

OC-192

DVB

CCSDS

ATSC

IEEE 802.16-2004 WirelessMAN-SCa/OFDM

IEEE 802.16-2004 WirelessMAN-SC

Fully Synchronous

Registered Input Selection

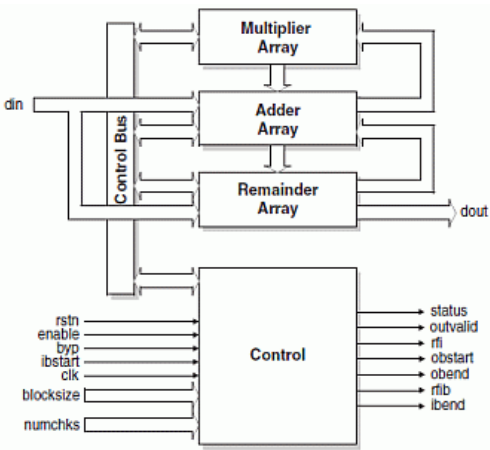
Systematic Encoder

Full Handshaking Capability

Dynamically Variable Block Size

Dynamically Variable Check Symbols

Dynamically Variable Check Symbols Puncturing



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Performance and Resource Utilization

LatticeECP3¹

IPexpress User-Configurable Mode	Slices	LUTs	Registers	sysMEM EBRs	I/Os	f _{MAX} (MHz)
OC-192	129	251	201	-	24	400
CCSDS	203	398	330	-	24	400
DVB	129	254	201	-	24	400
ATSC	150	293	233	-	24	400
IEEE 802.16-2004 WirelessMAN SCa	172	332	246	-	37	400
IEEE 802.16-2004 WirelessMAN SC	1276	2533	506	-	38	202

1. Performance and utilization data are generated using an LFE3-95E-8FN484CES device with Lattice Diamond 1.0 and Synplify Pro 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/S¹

IPexpress User-Configurable Mode	Slices	LUTs	Registers	sysMEM EBRs	I/Os	f _{MAX} (MHz)
OC-192	133	262	201	-	24	257
CCSDS	204	404	330	-	24	247

DVB	137	269	201	-	24	286
ATSC	159	315	233	-	24	266
IEEE 802.16-2004 WirelessMAN SCA	173	336	246	-	37	295
IEEE 802.16-2004 WirelessMAN SC	1287	2565	442	-	38	128

1. Performance and utilization data are generated using an LFE2M35E/SE-7F484C device with Lattice Diamond 1.0 and Synplify Pro 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 and LatticeECP2MS families.

LatticeECP2 / S¹

IPexpress User-Configurable Mode	Slices	LUTs	Registers	sysMEM EBRs	I / Os	f _{MAX} (MHz)
OC-192	133	262	201	-	24	320
CCSDS	204	404	330	-	24	250
DVB	137	269	201	-	24	276
ATSC	159	315	233	-	24	282
IEEE 802.16-2004 WirelessMAN SCA	173	336	246	-	37	280
IEEE 802.16-2004 WirelessMAN SC	1287	2565	442	-	38	112

1. Performance and utilization data are generated using an LFE2-50E/SE-7F484C device with Lattice Diamond 1.0 and Synplify Pro 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 LatticeECP2S family.

LatticeEC / P¹

IPexpress User-Configurable Mode	Slices	LUTs	Registers	sysMEM EBRs	I / Os	f _{MAX} (MHz)
OC-192	132	260	207	-	24	179
CCSDS	214	426	338	-	24	178
DVB	140	273	210	-	24	174
ATSC	161	320	245	-	24	169
IEEE 802.16-2004 WirelessMAN SCA	168	324	255	-	37	176
IEEE 802.16-2004 WirelessMAN SC	1222	2438	450	-	38	71

1. Performance and utilization data are generated using an LFEC/P20E-5F672C device with Lattice Diamond 1.0 and Synplify Pro 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 / M¹

IPexpress User-Configurable Mode	Slices	LUTs	Registers	sysMEM EBRs	I / Os	f _{MAX} (MHz)
OC-192	129	251	201	-	24	400
CCSDS	203	398	330	-	24	400
DVB	129	254	201	-	24	400
ATSC	150	293	233	-	24	400
IEEE 802.16-2004 WirelessMAN SCA	172	332	246	-	37	400
IEEE 802.16-2004 WirelessMAN SC	1276	2533	506	-	38	202

1. Performance and utilization data are generated using an LFSC/M3GA25E-7F900C device with Lattice Diamond 1.0 and Synplify Pro 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 LatticeSCM family.

LatticeXP2¹

IPexpress User-Configurable Mode	Slices	LUTs	Registers	sysMEM EBRs	I / Os	f _{MAX} (MHz)
OC-192	133	262	201	-	24	291
CCSDS	204	404	330	-	24	264
DVB	137	269	201	-	24	282
ATSC	159	315	233	-	24	278
IEEE 802.16-2004 WirelessMAN SCA	173	336	246	-	37	262
IEEE 802.16-2004 WirelessMAN SC	1287	2565	442	-	38	92

1. Performance and utilization data are generated using an LFXP2-17E-7FT256C device with Lattice Diamond 1.0 and Synplify Pro 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.

LatticeXP¹

IPexpress User-Configurable Mode	Slices	LUTs	Registers	sysMEM EBRs	I / Os	f _{MAX} (MHz)
OC-192	132	260	207	-	24	185
CCSDS	214	426	338	-	24	175

DVB	140	273	210	-	24	183
ATSC	161	320	245	-	24	164
IEEE 802.16-2004 WirelessMAN SCA	168	324	255	-	37	178
IEEE 802.16-2004 WirelessMAN SC	1222	2438	450	-	38	68

1. Performance and utilization data are generated using an LFXP20E-5F256C device with Lattice Diamond 1.0 and Synplify Pro 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	RSENC-DBLK-E3-U4
LatticeECP2M	RSENC-DBLK-PM-U4
LatticeECP2	RSENC-DBLK-P2-U4
LatticeECP/EC	RSENC-DBLK-E2-U4
LatticeSC	RSENC-DBLK-SC-U4
LatticeXP2	RSENC-DBLK-X2-U4
LatticeXP	RSENC-DBLK-XM-U4

IP Version: 4.5

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](#).