Block Convolutional Encoder

Overview

Convolutional encoding is a process of adding redundancy to a signal stream to provide error correction capability. The figure below shows a digital communication system using the Convolutional Encoder. The digital data stream (such as voice, image or any packetized data) is first convolutionally encoded, then modulated and finally transmitted through a channel.
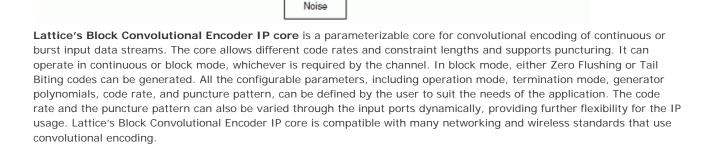

Lattice's Block Convolutional Encoder IP core is a parameterizable core for convolutional encoding of continuous or burst input data streams. The core allows different code rates and constraint lengths and supports puncturing. It can operate in continuous or block mode, whichever is required by the channel. In block mode, either Zero Flushing or Tail Biting codes can be generated. All the configurable parameters, including operation mode, termination mode, generator polynomials, code rate, and puncture pattern, can be defined by the user to suit the needs of the application. The code rate and the puncture pattern can also be varied through the input ports dynamically, providing further flexibility for the IP usage. Lattice's Block Convolutional Encoder IP core is compatible with many networking and wireless standards that use convolutional encoding.

Features

Compatible with the following standards: IEEE 802.16-2004, IEEE 802.11a, 3GPP, 3GPP2 and DVB-S

Supports both continuous and block encoding

Variable constraint length from 3 to 9

- Supports both Zero Flushing and Tail Biting termination modes
- Supports both internal and external zero padding in Zero Flushing mode

Supports both internal and external tail adding in Tail Biting mode

Supports a wide range of programmable code rates (input_rate/output_rate)

User defined generator polynomials

Output puncturing with unrestricted, user programmable puncture patterns

Supports dynamic puncturing mode, in which both the code rate and puncture patterns can be varied through ports
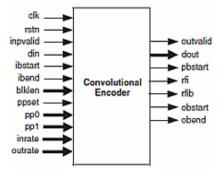
Punctured code rate can be programmed to k/n, where k can be from 2 to 12 and n can be from k+1 to 2k-1; additionally, rate 1/2 is supported in dynamic puncture mode

Handshake signals to support breaks in data stream or encoder busy conditions

Performance and Resource Utilization

LatticeECP3[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
Config 1	41	44	48	-	13	482

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
Config 2	24	25	34	-	12	500
Config 3	9	6	16	-	7	500
Config 4	108	136	131	-	30	346
Config 5	40	45	53	-	8	435

1. Performance and utilization data are generated targeting an LFE3-95E-8FN672CES device using 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[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
Config 1	45	44	48	-	13	466
Config 2	25	25	34	-	12	509
Config 3	9	6	16	-	7	883
Config 4	116	141	131	-	30	352
Config 5	43	45	53	-	8	504

1. Performance and utilization data are generated targeting an LFE2M/S35E-7F484C device using 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 family.

LatticeECP2[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
Config 1	44	42	48	-	13	404
Config 2	24	25	34	-	12	372
Config 3	9	6	16	-	7	563
Config 4	119	143	131	-	30	278
Config 5	43	46	53	-	8	397

1. Performance and utilization data are generated targeting an LFE2-50E-7F672C device using 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 LatticeECP2/ECP2S family.

LatticeECP/EC[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
Config 1	44	44	48	-	13	404
Config 2	24	25	34	-	12	372
Config 3	9	6	16	-	7	563
Config 4	119	143	131	-	30	278
Config 5	43	46	53	-	8	397

1. Performance and utilization data are generated targeting an LFEC/P20E-5F672C device using 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[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
Config 1	41	42	48	-	13	400

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
Config 2	24	24	34	-	12	400
Config 3	9	6	16	-	7	400
Config 4	115	146	131	-	30	392
Config 5	40	44	53	-	8	400

1. Performance and utilization data are generated targeting an LFSC/M3GA25E-7F900C device using 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 LatticeSC/SCM family.

LatticeXP2[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
Config 1	45	44	48	-	13	481
Config 2	25	25	34	-	12	491
Config 3	9	6	16	-	7	647
Config 4	116	141	131	-	30	298
Config 5	43	47	53	-	8	495

1. Performance and utilization data are generated targeting an LFXP2-17E-7F484C device using 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.

LatticeXP[1]

IPexpress User-Configurable Mode	SLICEs	LUTs	Registers	sysMEM EBRs	I/Os	f_{MAX} (MHz)
Config 1	44	42	48	-	13	327
Config 2	24	25	34	-	12	361
Config 3	9	6	16	-	7	589
Config 4	115	127	131	-	30	250
Config 5	40	46	53	-	8	363

1. Performance and utilization data are generated targeting an LFXP20E-5F484C device using 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 Numbers
LatticeECP3	CONV-BLK-E3-U3
LatticeECP2M	CONV-BLK-PM-U3
LatticeECP2	CONV-BLK-P2-U3
LatticeECP/EC	CONV-BLK-E2-U3
LatticeSC	CONV-BLK-SC-U3
LatticeXP2	CONV-BLK-X2-U3
LatticeXP	CONV-BLK-XM-U3

IP Version: 3.6

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**.