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Pixel Formats – Area Scan

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Introduction

Understanding pixel formats allow you to understand how images are put together. More specifically, understanding these pixel formats will help you if you need to extract specific information from the pixels in the image that you receive from the camera.

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Description

Color-processed pixel formats

FOR YCbCr and YUV, see the separate sections for these formats.

RGB8

Byte 0

7	6	5	4	3	2	1	0
7							0

Byte 1

7	6	5	4	3	2	1	0
7							0

Byte 2

7	6	5	4	3	2	1	0
7							0

RGB12p

Byte 0



7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 1

3	2	1	0	11	10	9	8
7	6	5	4	3	2	1	0

Byte 2

11	10	9	8	7	6	5	4
7	6	5	4	3	2	1	0

Byte 3

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 4

3	2	1	0	11	10	9	8
7	6	5	4	3	2	1	0

Byte 5

3	2	1	0	7	6	5	4
7	6	5	4	3	2	1	0

Byte 6

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 7

3	2	1	0	11	10	9	8
7	6	5	4	3	2	1	0

Byte 8

3	2	1	0	7	6	5	4
7	6	5	4	3	2	1	0

RGB16

Byte 0

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 1

15	14	13	12	11	10	9	8
7	6	5	4	3	2	1	0

Byte 2

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 3

15	14	13	12	11	10	9	8
7	6	5	4	3	2	1	0

Byte 4

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 5

15	14	13	12	11	10	9	8
7	6	5	4	3	2	1	0

RGB24

Byte 0

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 1



15	14	13	12	11	10	9	8
7							0

Byte 2

23	22	21	20	19	18	17	16
7							0

Byte 3

7	6	5	4	3	2	1	0
7							0

Byte 4

15	14	13	12	11	10	9	8
7							0

Byte 5

23	22	21	20	19	18	17	16
7							0

Byte 6

7	6	5	4	3	2	1	0
7							0

Byte 7

15	14	13	12	11	10	9	8
7							0

Byte 8

23	22	21	20	19	18	17	16
7							0

BGR8

Byte 0

7	6	5	4	3	2	1	0
7							0

Byte 1

7	6	5	4	3	2	1	0
7							0

Byte 2

7	6	5	4	3	2	1	0
7							0

BGR12p

Byte 0

7	6	5	4	3	2	1	0
7							0

Byte 1

3	2	1	0	11	10	9	8
7							0

Byte 2

11	10	9	8	7	6	5	4
7							0

Byte 3

7	6	5	4	3	2	1	0
7							0

Byte 4

3	2	1	0	11	10	9	8
7							0

Byte 5

11	10	9	8	7	6	5	4
7							0

Byte 6

7	6	5	4	3	2	1	0
7							0

Byte 7

3	2	1	0	11	10	9	8
7							0

Byte 8

11	10	9	8	7	6	5	4
7							0

BGR16

Byte 0

7	6	5	4	3	2	1	0
7							0

Byte 1

15	14	13	12	11	10	9	8
7							0

Byte 2

7	6	5	4	3	2	1	0
7							0

Byte 3

15	14	13	12	11	10	9	8
7							0

Byte 4

7	6	5	4	3	2	1	0
7							0

Byte 5

15	14	13	12	11	10	9	8
7							0

BGR24

Byte 0

7	6	5	4	3	2	1	0
7							0

Byte 1

15	14	13	12	11	10	9	8
7							0

Byte 2

23	22	21	20	19	18	17	16
7							0

Byte 3

7	6	5	4	3	2	1	0
7							0

Byte 4

15	14	13	12	11	10	9	8
7							0

Byte 5

23	22	21	20	19	18	17	16
7							0

Byte 6



7	6	5	4	3	2	1	0	0
7								0
Byte 7								
15	14	13	12	11	10	9	8	0
7								0
Byte 8								
23	22	21	20	19	18	17	16	0
7								0

Bayer RG formats

The BayerRG pixel formats are repetitions of a 2x2 grid comprising a top row containing one red (R) and one green (G) filter, and a bottom row containing one green (G) and one blue (B) filter.

Bayer formats are raw pixel formats.

BayerRG8

Byte 0	7	6	5	4	3	2	1	0	0
7									0
Byte 1									
7	6	5	4	3	2	1	0	0	0
7									0
Byte 2	7	6	5	4	3	2	1	0	0
7									0
Byte 3	7	6	5	4	3	2	1	0	0
7									0
Byte n	7	6	5	4	3	2	1	0	0
7									0
Byte n+1	7	6	5	4	3	2	1	0	0
7									0
Byte n+2	7	6	5	4	3	2	1	0	0
7									0
Byte n+3	7	6	5	4	3	2	1	0	0
7									0

BayerRG10

Byte 0	7	6	5	4	3	2	1	0	0
7									0
Byte 1									
7	pad	pad	pad	pad	pad	pad	9	8	0
7									0
Byte 2	7	6	5	4	3	2	1	0	↑
7									0

Byte 3

pad	pad	pad	pad	pad	pad	9	8
7						0	

Byte 2n

7	6	5	4	3	2	1	0
7						0	

Byte 2n+1

pad	pad	pad	pad	pad	pad	9	8
7						0	

Byte 2n+2

7	6	5	4	3	2	1	0
7						0	

Byte 2n+3

pad	pad	pad	pad	pad	pad	9	8
7						0	

BayerRG10p

Byte 0

7	6	5	4	3	2	1	0
7						0	

Byte 1

5	4	3	2	1	0	9	8
7						0	

Byte 2

3	2	1	0	9	8	7	6
7						0	

Byte 3

1	0	9	8	7	6	5	4
7						0	

Byte 4

9	8	7	6	5	4	3	2
7						0	

Byte 1.25n

7	6	5	4	3	2	1	0
7						0	

Byte 1.25n+1

5	4	3	2	1	0	9	8
7						0	

Byte 1.25n+2

3	2	1	0	9	8	7	6
7						0	

Byte 1.25n+3

1	0	9	8	7	6	5	4
7						0	

Byte 1.25n+4

9	8	7	6	5	4	3	2
7						0	

BayerRG10Packed

Byte 0

9	8	7	6	5	4	3	2
7						0	

Byte 1

pad	pad	1	0	pad	pad	1	0
7 0							

Byte 2

9	8	7	6	5	4	3	2
7 0							

Byte 1.5n

9	8	7	6	5	4	3	2
7 0							

Byte 1.5n+1

pad	pad	1	0	pad	pad	1	0
7 0							

Byte 1.5n+2

9	8	7	6	5	4	3	2
7 0							

BayerRG12

Byte 0

7	6	5	4	3	2	1	0
7 0							

Byte 1

pad	pad	pad	pad	11	10	9	8
7 0							

Byte 2

7	6	5	4	3	2	1	0
7 0							

Byte 3

pad	pad	pad	pad	11	10	9	8
7 0							

Byte 2n

7	6	5	4	3	2	1	0
7 0							

Byte 2n+1

pad	pad	pad	pad	11	10	9	8
7 0							

Byte 2n+2

7	6	5	4	3	2	1	0
7 0							

Byte 2n+3

pad	pad	pad	pad	11	10	9	8
7 0							

BayerRG12p

Byte 0

7	6	5	4	3	2	1	0
7 0							

Byte 1

3	2	1	0	11	10	9	8
7 0							

Byte 2

11	10	9	8	7	6	5	4
7 0							

Byte 1.5n

7	6	5	4	3	2	1	0
0							

Byte 1.5n+1

3	2	1	0	11	10	9	8
0							

Byte 1.5n+2

11	10	9	8	7	6	5	4
0							

BayerRG12Packed

Byte 0

11	10	9	8	7	6	5	4
0							

Byte 1

3	2	1	0	3	2	1	0
0							

Byte 2

11	10	9	8	7	6	5	4
0							

Byte 1.5n

11	10	9	8	7	6	5	4
0							

Byte 1.5n+1

3	2	1	0	3	2	1	0
0							

Byte 1.5n+2

11	10	9	8	7	6	5	4
0							

BayerRG16

Byte 0

7	6	5	4	3	2	1	0
0							

Byte 1

15	14	13	12	11	10	9	8
0							

Byte 2

7	6	5	4	3	2	1	0
0							

Byte 3

15	14	13	12	11	10	9	8
0							

Byte 2n

7	6	5	4	3	2	1	0
0							

Byte 2n+1

15	14	13	12	11	10	9	8
0							

Byte 2n+2

7	6	5	4	3	2	1	0
0							

Byte 2n+3

15	14	13	12	11	10	9	8
7							0

BayerRG24

Byte 0

7	6	5	4	3	2	1	0
7							0

Byte 1

15	14	13	12	11	10	9	8
7							0

Byte 2

23	22	21	20	19	18	17	16
7							0

Byte 3

7	6	5	4	3	2	1	0
7							0

Byte 4

15	14	13	12	11	10	9	8
7							0

Byte 5

23	22	21	20	19	18	17	16
7							0

Byte 3n

7	6	5	4	3	2	1	0
7							0

Byte 3n+1

15	14	13	12	11	10	9	8
7							0

Byte 3n+2

23	22	21	20	19	18	17	16
7							0

Byte 3n+3

7	6	5	4	3	2	1	0
7							0

Byte 3n+4

15	14	13	12	11	10	9	8
7							0

Byte 3n+5

23	22	21	20	19	18	17	16
7							0

Dual Bayer formats

The Dual Bayer pixel formats are for the dual extended-head cameras.

In the diagram below, Imager 1 pixels are shown with a regular border around each bit, and Imager 2 pixels are shown with a bold line around each bit.

Imager 1:



Imager 2:

1

DualBayerRG8

Byte 0

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 1

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 2

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 3

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 2n

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 2n+1

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 2n+2

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 2n+3

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

DualBayerRG10

Byte 0

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 1

pad	pad	pad	pad	pad	pad	9	8
-----	-----	-----	-----	-----	-----	---	---

7

0

Byte 2

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 3

pad	pad	pad	pad	pad	pad	9	8
-----	-----	-----	-----	-----	-----	---	---

7

0

Byte 4

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 5

pad	pad	pad	pad	pad	pad	9	8
-----	-----	-----	-----	-----	-----	---	---

7

0

Byte 6

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

7

0

Byte 7

pad	pad	pad	pad	pad	pad	9	8
7						0	

Byte 4n

7	6	5	4	3	2	1	0
7						0	

Byte 4n+1

pad	pad	pad	pad	pad	pad	9	8
7						0	

Byte 4n+2

7	6	5	4	3	2	1	0
7						0	

Byte 4n+3

pad	pad	pad	pad	pad	pad	9	8
7						0	

Byte 4n+4

7	6	5	4	3	2	1	0
7						0	

Byte 4n+5

pad	pad	pad	pad	pad	pad	9	8
7						0	

Byte 4n+6

7	6	5	4	3	2	1	0
7						0	

Byte 4n+8

pad	pad	pad	pad	pad	pad	9	8
7						0	

DualBayerRG10p

Byte 0

7	6	5	4	3	2	1	0
7						0	

Byte 1

5	4	3	2	1	0	9	8
7						0	

Byte 2

3	2	1	0	9	8	7	6
7						0	

Byte 3

1	0	9	8	7	6	5	4
7						0	

Byte 4

9	8	7	6	5	4	3	2
7						0	

Byte 2.5n

7	6	5	4	3	2	1	0
7						0	

Byte 2.5n+1

5	4	3	2	1	0	9	8
7						0	

Byte 2.5n+2



3	2	1	0	9	8	7	6
7							0

Byte 2.5n+3

1	0	9	8	7	6	5	4
7							0

Byte 2.5n+4

9	8	7	6	5	4	3	2
7							0

DualBayerRG10Packed

Byte 0

9	8	7	6	5	4	3	2
7							0

Byte 1

pad	pad	1	0	pad	pad	1	0
7							0

Byte 2

9	8	7	6	5	4	3	2
7							0

Byte 3

9	8	7	6	5	4	3	2
7							0

Byte 4

pad	pad	1	0	pad	pad	1	0
7							0

Byte 5

9	8	7	6	5	4	3	2
7							0

Byte 3n

9	8	7	6	5	4	3	2
7							0

Byte 3n+1

pad	pad	1	0	pad	pad	1	0
7							0

Byte 3n+2

9	8	7	6	5	4	3	2
7							0

Byte 3n+3

9	8	7	6	5	4	3	2
7							0

Byte 3n+4

pad	pad	1	0	pad	pad	1	0
7							0

Byte 3n+5

9	8	7	6	5	4	3	2
7							0

DualBayerRG12

Byte 0

7	6	5	4	3	2	1	0
7							0

Byte 1

pad	pad	pad	pad	11	10	9	8
7							0

Byte 2

7	6	5	4	3	2	1	0
7							0

Byte 3

pad	pad	pad	pad	11	10	9	8
7							0

Byte 4

7	6	5	4	3	2	1	0
7							0

Byte 5

pad	pad	pad	pad	11	10	9	8
7							0

Byte 6

7	6	5	4	3	2	1	0
7							0

Byte 7

pad	pad	pad	pad	11	10	9	8
7							0

Byte 4n

7	6	5	4	3	2	1	0
7							0

Byte 4n+1

pad	pad	pad	pad	11	10	9	8
7							0

Byte 4n+2

7	6	5	4	3	2	1	0
7							0

Byte 4n+3

pad	pad	pad	pad	11	10	9	8
7							0

Byte 4n+4

7	6	5	4	3	2	1	0
7							0

Byte 4n+5

pad	pad	pad	pad	11	10	9	8
7							0

Byte 4n+6

7	6	5	4	3	2	1	0
7							0

Byte 4n+7

pad	pad	pad	pad	11	10	9	8
7							0

DualBayerRG12p

Byte 0

7	6	5	4	3	2	1	0
7							0

Byte 1

3	2	1	0	11	10	9	8
							0



7

0

Byte 2

11	10	9	8	7	6	5	4	
7								0

Byte 3

7	6	5	4	3	2	1	0	
7								0

Byte 4

3	2	1	0	11	10	9	8	
7								0

Byte 5

11	10	9	8	7	6	5	4	
7								0

Byte 3n

7	6	5	4	3	2	1	0	
7								0

Byte 3n+1

3	2	1	0	11	10	9	8	
7								0

Byte 3n+2

11	10	9	8	7	6	5	4	
7								0

Byte 3n+3

7	6	5	4	3	2	1	0	
7								0

Byte 3n+4

3	2	1	0	11	10	9	8	
7								0

Byte 3n+5

11	10	9	8	7	6	5	4	
7								0

DualBayerRG12Packed

Byte 0

11	10	9	8	7	6	5	4	
7								0

Byte 1

3	2	1	0	3	2	1	0	
7								0

Byte 2

11	10	9	8	7	6	5	4	
7								0

Byte 3

11	10	9	8	7	6	5	4	
7								0

Byte 4

3	2	1	0	3	2	1	0	
7								0

Byte 5

11	10	9	8	7	6	5	4	↑
7								0

Byte 3n

11	10	9	8	7	6	5	4
7 0							

Byte 3n+1

3	2	1	0	3	2	1	0
7 0							

Byte 3n+2

11	10	9	8	7	6	5	4
7 0							

Byte 3n+3

11	10	9	8	7	6	5	4
7 0							

Byte 3n+4

3	2	1	0	3	2	1	0
7 0							

Byte 3n+5

11	10	9	8	7	6	5	4
7 0							

DualBayerRG16

Byte 0

7	6	5	4	3	2	1	0
7 0							

Byte 1

15	14	13	12	11	10	9	8
7 0							

Byte 2

7	6	5	4	3	2	1	0
7 0							

Byte 3

15	14	13	12	11	10	9	8
7 0							

Byte 4

7	6	5	4	3	2	1	0
7 0							

Byte 5

15	14	13	12	11	10	9	8
7 0							

Byte 6

7	6	5	4	3	2	1	0
7 0							

Byte 7

15	14	13	12	11	10	9	8
7 0							

Byte 4n

7	6	5	4	3	2	1	0
7 0							

Byte 4n+1

15	14	13	12	11	10	9	8
7 0							

Byte 4n+2



7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 4n+3

15	14	13	12	11	10	9	8
7	6	5	4	3	2	1	0

Byte 4n+4

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 4n+5

15	14	13	12	11	10	9	8
7	6	5	4	3	2	1	0

Byte 4n+6

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 4n+7

15	14	13	12	11	10	9	8
7	6	5	4	3	2	1	0

Polarized pixel formats

These pixel formats are for LUCID's polarized-light cameras.

PolarizedAngles_0d_45d_90d_135d_RGB8

32 bits per pixel

0	0	0	0	0	0	0	0
7	6	5	4	3	2	1	0

Byte 1

45	45	45	45	45	45	45	45
7	6	5	4	3	2	1	0

Byte 2

90	90	90	90	90	90	90	90
7	6	5	4	3	2	1	0

Byte 3

135	135	135	135	135	135	135	135
7	6	5	4	3	2	1	0

(0,0) pixel

Byte 0

0	0	0	0	0	0	0	0
7	6	5	4	3	2	1	0

Byte 1

45	45	45	45	45	45	45	45
7	6	5	4	3	2	1	0

Byte 2

90	90	90	90	90	90	90	90
7	6	5	4	3	2	1	0

Byte 3

135	135	135	135	135	135	135	135
7	6	5	4	3	2	1	0

(1,0) pixel

Byte 0

0	0	0	0	0	0	0	0
7	6	5	4	3	2	1	0



Byte 1	45	45	45	45	45	45	45	45	45
7	0								

Byte 2	90	90	90	90	90	90	90	90	90
7	0								

Byte 3	135	135	135	135	135	135	135	135	(0,1) pixel
7	0								

Byte 0	0	0	0	0	0	0	0	0	0
7	0								

Byte 1	45	45	45	45	45	45	45	45	45
7	0								

Byte 2	90	90	90	90	90	90	90	90	90
7	0								

Byte 3	135	135	135	135	135	135	135	135	(1,1) pixel
7	0								

PolarizedAngles_0d_45d_90d_135d_Mono8**32 bits per pixel**

Byte 0	0	0	0	0	0	0	0	0	0
7	0								

Byte 1	45	45	45	45	45	45	45	45	45
7	0								

Byte 2	90	90	90	90	90	90	90	90	90
7	0								

Byte 3	135	135	135	135	135	135	135	135	135
7	0								

PolarizedStokes_S0_S2_S1_S3_Mono8**32 bits per pixel**

Byte 0	S0								
7	0								

Byte 1	S1								
7	0								

Byte 2	S2								
7	0								

Byte 3	S3								
7	0								

PolarizedDoLP_AoLP_Mono8**16 bits per pixel**

Byte 0

D	D	D	D	D	D	D	D	D
7	0							

Byte 1

A	A	A	A	A	A	A	A	A
7	0							

PolarizedDoLP_AoLP_Mono12p**24 bits per pixel**

Byte 0

11	10	9	8	7	6	5	4	3	2	1	0
11	10	9	8	7	6	5	4	3	2	1	0

AoLP Pixel

DoLP Pixel

Byte 1

7	6	5	4	3	2	1	0	
7	0							

Byte 2

3	2	1	0	11	10	9	8	7	6	5	4
7	0								0		

PolarizedDoLP_Mono8**8 bits per pixel**

Byte 0

D	D	D	D	D	D	D	D	D
7	0							

PolarizedDoLP_Mono12p**12 bits per pixel**

Byte 0

11	10	9	8	7	6	5	4	3	2	1	0
11	10	9	8	7	6	5	4	3	2	1	0

DoLP Pixel 1

DoLP Pixel 2

Byte 1

7	6	5	4	3	2	1	0	
7	0							

Byte 2

3	2	1	0	11	10	9	8	7	6	5	4
7	0								0		

PolarizedAoLP_Mono8**8 bits per pixel**

Byte 0

A	A	A	A	A	A	A	A	A
7	0							



PolarizedAoLP_Mono12p**12 bits per pixel**

11	10	9	8	7	6	5	4	3	2	1	0	AoLP Pixel 1
11	10	9	8	7	6	5	4	3	2	1	0	AoLP Pixel 2
Byte 0												
7		6		5		4		3		2		0
7												0
Byte 1												
3		2		1		0		11		10		9
7												0
Byte 2												
11		10		9		8		7		6		5
7												0

Mono pixel formats

Mono pixel formats supported by LUCID cameras are shown below.

Mono8**8 bits per pixel**

Byte 0	7	6	5	4	3	2	1	0	0
7									0

Mono10**10 bits per pixel**

9	8	7	6	5	4	3	2	1	0	Pixel 1
9	8	7	6	5	4	3	2	1	0	Pixel 2
Byte 0										
7		6		5		4		3		2
7										0
Byte 1										
pad	pad	pad	pad	pad	pad	pad	pad	9	8	
7										0
Byte 2										
7		6		5		4		3		2
7										0
Byte 3										
pad	pad	pad	pad	pad	pad	pad	pad	9	8	
7										0

Mono10p**10 bits per pixel**

9	8	7	6	5	4	3	2	1	0	Pixel 1
9	8	7	6	5	4	3	2	1	0	Pixel 2
9	8	7	6	5	4	3	2	1	0	Pixel 3
9	8	7	6	5	4	3	2	1	0	Pixel 4
Byte 0										

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 1

5	4	3	2	1	0	9	8
7	6	5	4	3	2	1	0

Byte 2

3	2	1	0	9	8	7	6
7	6	5	4	3	2	1	0

Byte 3

1	0	9	8	7	6	5	4
7	6	5	4	3	2	1	0

Byte 4

9	8	7	6	5	4	3	2
7	6	5	4	3	2	1	0

Mono10Packed**10 bits per pixel**

9	8	7	6	5	4	3	2	1	0
9	8	7	6	5	4	3	2	1	0

Byte 0

9	8	7	6	5	4	3	2
7	6	5	4	3	2	1	0

Byte 1

pad	pad	1	0	pad	pad	1	0
7	6	5	4	3	2	1	0

Byte 2

9	8	7	6	5	4	3	2
7	6	5	4	3	2	1	0

Mono12**12 bits per pixel**

11	10	9	8	7	6	5	4	3	2	1	0
11	10	9	8	7	6	5	4	3	2	1	0

Byte 0

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 1

pad	pad	pad	pad	11	10	9	8
7	6	5	4	3	2	1	0

Byte 2

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 3

pad	pad	pad	pad	11	10	9	8
7	6	5	4	3	2	1	0

Mono12p**12 bits per pixel**

11	10	9	8	7	6	5	4	3	2	1	0
11	10	9	8	7	6	5	4	3	2	1	0

Byte 0

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 1

3	2	1	0	11	10	9	8
7	6	5	4	3	2	1	0

Byte 2

11	10	9	8	7	6	5	4
7	6	5	4	3	2	1	0

Mono12Packed**12 bits per pixel**

11	10	9	8	7	6	5	4	3	2	1	0
11	10	9	8	7	6	5	4	3	2	1	0

Byte 0

11	10	9	8	7	6	5	4
7	6	5	4	3	2	1	0

Byte 1

3	2	1	0	3	2	1	0
7	6	5	4	3	2	1	0

Byte 2

11	10	9	8	7	6	5	4
7	6	5	4	3	2	1	0

Mono16**16 bits per pixel**

Byte 0

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 1

15	14	13	12	11	10	9	8
7	6	5	4	3	2	1	0

Linescan ROI

Linescan ROI

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
...	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046

YCbCr Pixel Formats: Basic and subsampled

YCbCr Pixel Formats – Basic

All basic (non-subsampled) YCbCr pixel formats capture one luma (Y) component and two chroma components (Cr and Cb). These basic pixel formats are also known as YCbCr444 formats. Note: For YUV8, YUV16, and YUV24, substitute U for Cb (and V for Cr) in the diagrams below.

YCbCr8

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0



7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

Byte 0

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Byte 1

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Byte 2

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

YCbCr16

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Byte 0

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Byte 2

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Byte 4

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Byte 1

15	14	13	12	11	10	9	8
----	----	----	----	----	----	---	---

Byte 3

15	14	13	12	11	10	9	8
----	----	----	----	----	----	---	---

Byte 5

15	14	13	12	11	10	9	8
----	----	----	----	----	----	---	---

YCbCr24

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Byte 0

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Byte 3

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Byte 6

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Byte 1

15	14	13	12	11	10	9	8
----	----	----	----	----	----	---	---

Byte 4

15	14	13	12	11	10	9	8
----	----	----	----	----	----	---	---

Byte 7

15	14	13	12	11	10	9	8
----	----	----	----	----	----	---	---

Byte 2

23	22	21	20	19	18	17	16
----	----	----	----	----	----	----	----

Byte 5

23	22	21	20	19	18	17	16
----	----	----	----	----	----	----	----

Byte 8

23	22	21	20	19	18	17	16
----	----	----	----	----	----	----	----

YCbCr Pixel Formats – Subsampled

In subsampled pixel formats, the luma value in each pixel is sampled (read), but the chroma values are not. The purpose of subsampling is to reduce the amount of data. "422" subsampling means that that two samples each of Cb and Cr is recorded for every four samples of luma. Similarly, "411" subsampling means that that one sample each of Cb and Cr is recorded for every four samples of luma. In each subsampling scheme, Y1, Y2, Y3, and Y4 are luma values from pixels 1 to 4 respectively. Cb and Cr are averages calculated from the available pixels. YCbCr422_8_CbYCrY means that "422" subsampling is being used with 8 bits per channel, and the order of bytes is Y, Cb, Y, Cr. Note: The patterns shown below applies to YCbCr formats. To see the equivalent YUV formats, substitute U for Cb (and V for Cr).

YCbCr422_8_CbYCrY

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0

7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0
7	6	5	4	3	2	1	0



7	6	5	4	3	2	1	0	Cr
---	---	---	---	---	---	---	---	----

Byte 0

7	6	5	4	3	2	1	0	Cb Pixel 1
---	---	---	---	---	---	---	---	------------

Byte 1

7	6	5	4	3	2	1	0	Y
---	---	---	---	---	---	---	---	---

Byte 2

7	6	5	4	3	2	1	0	Cr
---	---	---	---	---	---	---	---	----

Byte 3

7	6	5	4	3	2	1	0	Y
---	---	---	---	---	---	---	---	---

YCbCr422_16_CbYCrY

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 1
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 2
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr

Byte 0

7	6	5	4	3	2	1	0	Cb
---	---	---	---	---	---	---	---	----

Byte 1

15	14	13	12	11	10	9	8	Cb Pixel 1
----	----	----	----	----	----	---	---	------------

Byte 2

7	6	5	4	3	2	1	0	Y
---	---	---	---	---	---	---	---	---

Byte 3

15	14	13	12	11	10	9	8	Y
----	----	----	----	----	----	---	---	---

Byte 4

7	6	5	4	3	2	1	0	Cr
---	---	---	---	---	---	---	---	----

Byte 5

15	14	13	12	11	10	9	8	Cr Pixel 1
----	----	----	----	----	----	---	---	------------

Byte 6

7	6	5	4	3	2	1	0	Y
---	---	---	---	---	---	---	---	---

Byte 7

15	14	13	12	11	10	9	8	Y Pixel 1
----	----	----	----	----	----	---	---	-----------

YCbCr422_24_CbYCrY

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	Y Pixel 1
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	Cb
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	Cr

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	Y Pixel 2
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	Cb
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	Cr

Byte 0

7	6	5	4	3	2	1	0	Cb
---	---	---	---	---	---	---	---	----

Byte 1

15	14	13	12	11	10	9	8	Cb Pixel 1
----	----	----	----	----	----	---	---	------------

Byte 3

7	6	5	4	3	2	1	0	Y
---	---	---	---	---	---	---	---	---

Byte 4

15	14	13	12	11	10	9	8	Y
----	----	----	----	----	----	---	---	---

Byte 6

7	6	5	4	3	2	1	0	Cr
---	---	---	---	---	---	---	---	----

Byte 7

15	14	13	12	11	10	9	8	Cr Pixel 1
----	----	----	----	----	----	---	---	------------

Byte 9

7	6	5	4	3	2	1	0	Y
---	---	---	---	---	---	---	---	---

Byte 10

15	14	13	12	11	10	9	8	Y Pixel 1
----	----	----	----	----	----	---	---	-----------

YCbCr411_8_CbYYCrYY

7	6	5	4	3	2	1	0	Y Pixel 1
7	6	5	4	3	2	1	0	Cb
7	6	5	4	3	2	1	0	Cr

7	6	5	4	3	2	1	0	Y Pixel 2
---	---	---	---	---	---	---	---	-----------

7	6	5	4	3	2	1	0	Cb
---	---	---	---	---	---	---	---	----



7	6	5	4	3	2	1	0	Cr
7	6	5	4	3	2	1	0	Y Pixel 3
7	6	5	4	3	2	1	0	Cb
7	6	5	4	3	2	1	0	Cr
7	6	5	4	3	2	1	0	Y Pixel 4
7	6	5	4	3	2	1	0	Cb
7	6	5	4	3	2	1	0	Cr

Byte 0

7	6	5	4	3	2	1	0	Cb Pixel 1
---	---	---	---	---	---	---	---	------------

Byte 1

7	6	5	4	3	2	1	0	Y1
---	---	---	---	---	---	---	---	----

Byte 2

7	6	5	4	3	2	1	0	Y2
---	---	---	---	---	---	---	---	----

Byte 3

7	6	5	4	3	2	1	0	Cr
---	---	---	---	---	---	---	---	----

Byte 4

7	6	5	4	3	2	1	0	Y3
---	---	---	---	---	---	---	---	----

Byte 5

7	6	5	4	3	2	1	0	Y4
---	---	---	---	---	---	---	---	----

YCbCr411_16_CbYYCrYY

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 1
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 2
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 3
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 4
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr

Byte 0

7	6	5	4	3	2	1	0	Cb
---	---	---	---	---	---	---	---	----

Byte 1

15	14	13	12	11	10	9	8	Cb Pixel 1
----	----	----	----	----	----	---	---	------------

Byte 2

7	6	5	4	3	2	1	0	Y1
---	---	---	---	---	---	---	---	----

Byte 3

15	14	13	12	11	10	9	8	Y1
----	----	----	----	----	----	---	---	----

Byte 4

7	6	5	4	3	2	1	0	Y2
---	---	---	---	---	---	---	---	----

Byte 5

15	14	13	12	11	10	9	8	Y2 Pixel 1
----	----	----	----	----	----	---	---	------------

Byte 6

7	6	5	4	3	2	1	0	Cr
---	---	---	---	---	---	---	---	----

Byte 7

15	14	13	12	11	10	9	8	Cr Pixel 1
----	----	----	----	----	----	---	---	------------

Byte 8

7	6	5	4	3	2	1	0	Y3
---	---	---	---	---	---	---	---	----

Byte 9

15	14	13	12	11	10	9	8	Y3 Pixel 1
----	----	----	----	----	----	---	---	------------

Byte 10

7	6	5	4	3	2	1	0	Y4
---	---	---	---	---	---	---	---	----

Byte 11

15	14	13	12	11	10	9	8	Y4 Pixel 1
----	----	----	----	----	----	---	---	------------

YCbCr411_24_CbYYCrYY

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 1
----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	---	-----------

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 2					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 3					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Y Pixel 4					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cb					
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Cr					
Byte 0	7	6	5	4	3	2	1	0	Cb	Byte 1	15	14	13	12	11	10	9	8	Cb	Byte 2	23	22	21	20	19	18	17	16	Cb Pixel 1
Byte 3	7	6	5	4	3	2	1	0	Y1	Byte 4	15	14	13	12	11	10	9	8	Y1	Byte 5	23	22	21	20	19	18	17	16	Y1
Byte 6	7	6	5	4	3	2	1	0	Y2	Byte 7	15	14	13	12	11	10	9	8	Y2	Byte 8	23	22	21	20	19	18	17	16	Y2 Pixel 1
Byte 9	7	6	5	4	3	2	1	0	Cr	Byte 10	15	14	13	12	11	10	9	8	Cr	Byte 11	23	22	21	20	19	18	17	16	Cr Pixel 1
Byte 12	7	6	5	4	3	2	1	0	Y3	Byte 13	15	14	13	12	11	10	9	8	Y3	Byte 14	23	22	21	20	19	18	17	16	Y3 Pixel 1
Byte 15	7	6	5	4	3	2	1	0	Y4	Byte 16	15	14	13	12	11	10	9	8	Y4	Byte 17	23	22	21	20	19	18	17	16	Y4 Pixel 1

QOI Pixel Formats

Quite OK Image Format (QOI) is a lossless image compression method implemented in LUCID's Triton cameras. For information on how to use QOI pixel formats, see the knowledge base Using QOI with LUCID Cameras (https://support.thinklucid.com/knowledgebase/using_qoi_with_lucid_cameras/).

Examples of QOI pixel formats:

- QOI_Mono8
- QOI_BayerRG8
- QOI_RGB8
- QOI_BGR8
- QOI_YCbCr8
- QOI_YCbCr8_CbYCr

Was this helpful?

 Yes

 No

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