eAP87003C (EX8029) Datasheet

eSP870 Camera Module with Patterned IR Illuminator

(Non-NDA Version)

Revision 1.0
October 30, 2018

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EU-PCS	8542 31 0000	eYs3D camera processor chips are classified as "Electronic integrated circuits - Processors and controllers, whether or not combined with memories, converters, logic circuits, amplifiers, clock and timing circuits, or other circuits"
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Revision History

Rev	Date	Comments
1.0	October 30, 2018	Initial public release.

Table of Contents

1   Introduction

This document contains technical information of the dual sensor camera module with eYs3D eSP870 depth-map camera processor and patterned IR illuminator. The module can provide either or both color video and/or depthmap video streams. eSP870 depthmap processor is compliant to UVC1.1 and USB3.0 standard. Therefore, the module requires no specific drivers and provides high bandwidth for video transmission. The camera module can be integrated into applications involving gesture control, body gaming, and 3D scanning. The camera module is also a demonstration of the eSP870 reference design for its compact size and flexible form factor.

Figure 1.   3cm Baseline Module with enclosure

Table 1.   Key Parameters

Parameter	Description
Depthmap Processor	eSP870U
IR pattern illuminator wavelength	850nm +/-10 nm
IR pattern illuminator number of features	>10,000
Video Resolution	Please refer to Table 4 on page 8.
Lens	Optical Lens F:2.8 with HFOV:63.2º & VFOV:42º
Image Sensor	¼" CMOS WXGA (1Mp) HD Sensor
Power Source	USB bus power (5V/900mA by USB3.0; 5V/500mA by USB2.0)
PC Connection	USB3.0 & USB2.0
PID (Product ID)	0568
VID (Vender ID)	1E4E
Power Source	USB3.0 Type-MicroB Connector
Power Voltage	+5V
Operating Current With Patterned IR Illuminator	≦350mA
Operating Current Without Patterned IR Illuminator	≦280mA
Suspend Current	≦15mA

Note:

Operating current is measured under below criteria.

1.   Image output is delivered by YUV format at USB3.0.
2.   Depth-map resolution: VGA at 30fps.

Table 2.   Module Storage and Operating Conditions

Condition	Description	Min	Max	Unit
Storage (Ambient), Not Operating	Temperature	-20	70	°C
	Humidity	5%	95% [1]	-
Operating (Ambient)	Temperature	10	60	°C

Note:

1.   Non-condensing.

1.1 Pin Information of USB3.0 Connector

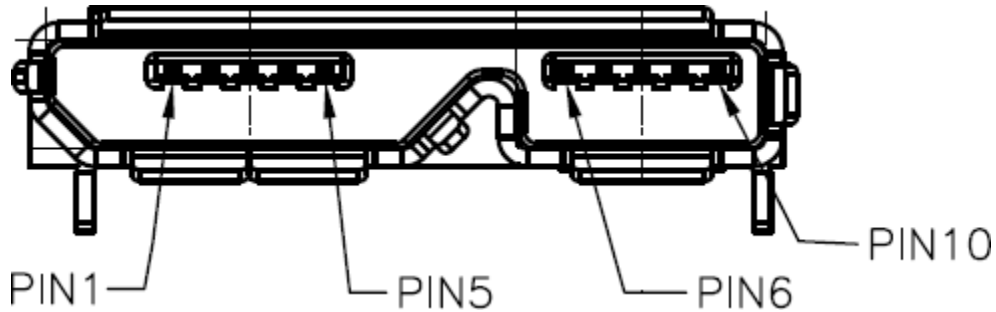Pin assignments and pin descriptions of USB3.0 micro B type connector are listed below.

Figure 3. Connector Drawing

Table 3. Pin Descriptions

Pin No.	Signal	Description	Mating Sequence
1	VBUS	Power	Second
2	D-	USB differential pair	Third
3	D+		
4	ID(GND)	Slave device ID	Second
5	GND	Ground for signal return	Second
6	StdA_SSRX-	SuperSpeed receiver differential pair	Last
7	StdA_SSR+		
8	GND_DRAIN	Ground for signal return	
9	StdA_SST-	SuperSpeed receiver differential pair	
10	StdA_SST+		
Shell	Shield	Connector metal shell	First

1.2 Ordering Information

Table 4. Part Number

Part Number	Description
eAP87003C	eSP870 Camera Module with patterned IR Illuminator with enclosure

2   Depth Accuracy

Depth accuracy is the minimum difference of distance at which the movement of same target can be distinguished and leads to at least 1 pixel difference of disparity on sensor plane. This is the meaning of the blue trend in the figures below.
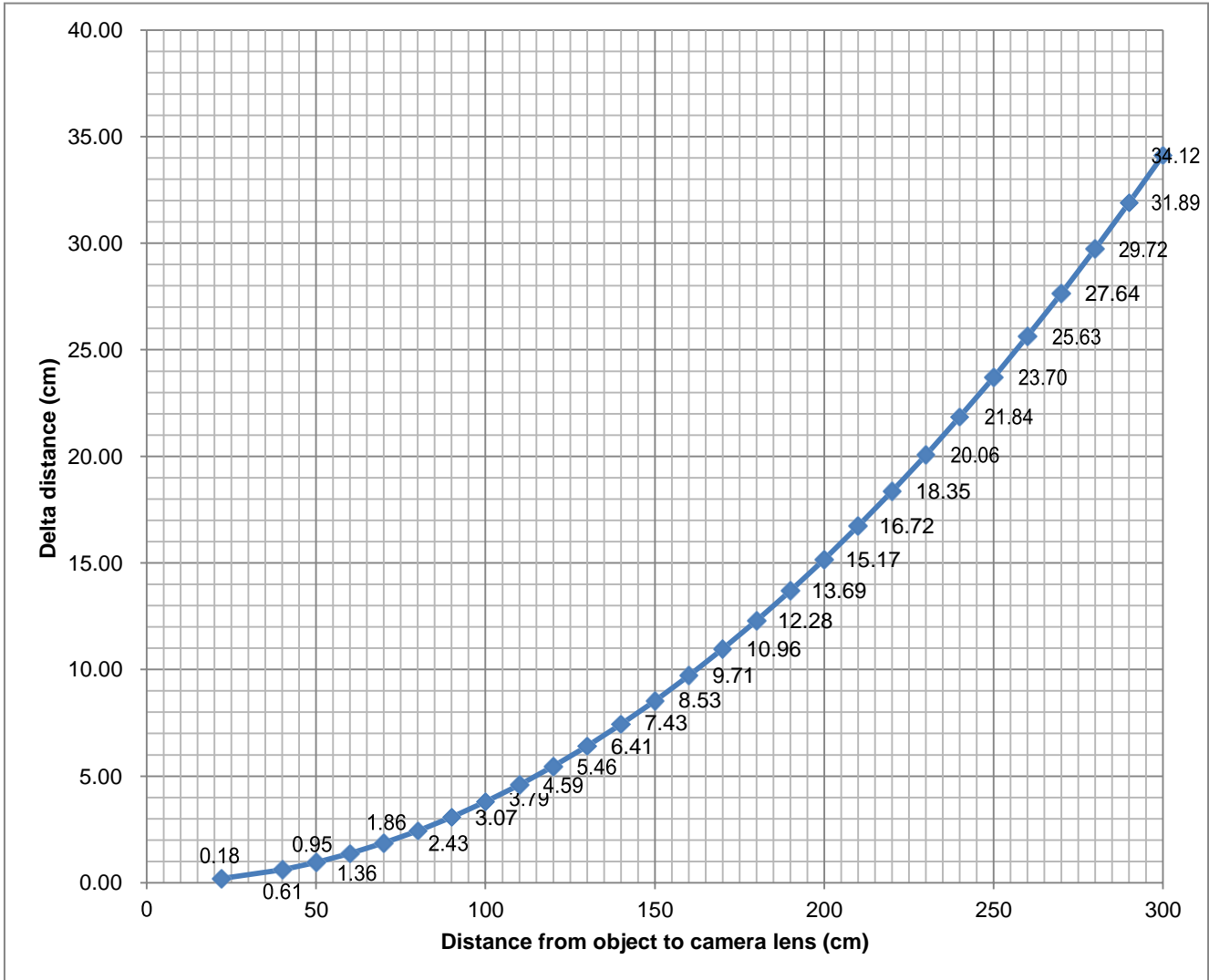

Figure 4.   Depth Accuracy Chart of 3cm Baseline (Depth resolution: 640x480)

Note:
1. Delta Distance means absolute value of the difference between distance of two locations of a measured object while it moves away from or moves forward to the camera module.
2. The accuracy shown above is a theoretical calculation based on perfect lighting condition and component specification. It is subject to change and would be downgraded in a real scenario.
3. The chart is generated based on below hardware configuration.
   • Lens: Optical Lens F:2.8 with HFOV:63.2º & VFOV:42º
   • Sensor: ¼" CMOS WXGA (1Mp) HD Sensor
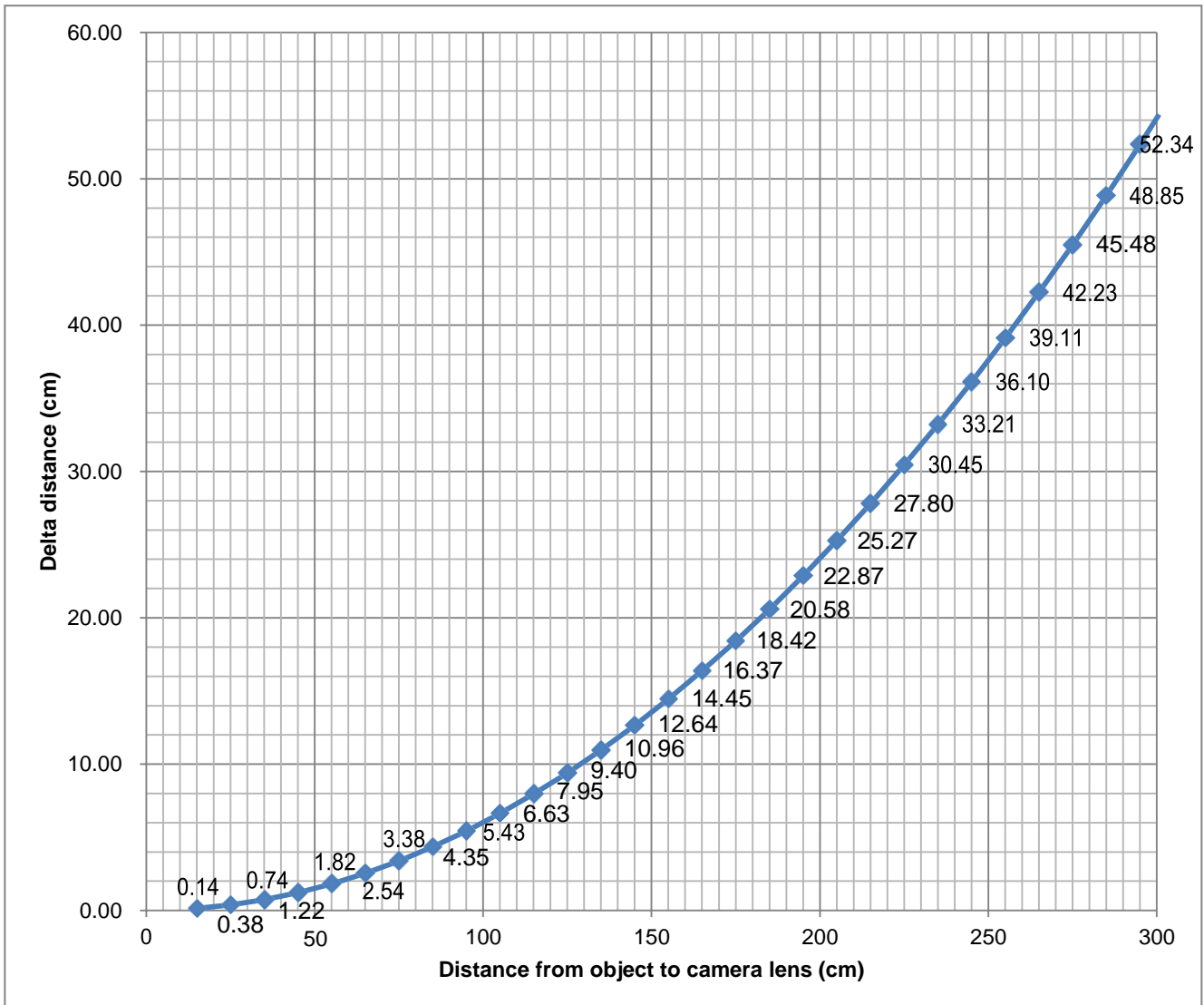4. Depth resolution of this figure: 640x480

Figure 5.   Depth Accuracy Chart of 3cm Baseline (Depth resolution: 640x400)

Note:

1. Delta Distance means absolute value of the difference between distance of two locations of a measured object while it moves away from or moves forward to the camera module.
2. The accuracy shown above is a theoretical calculation based on perfect lighting condition and component specification. It is subject to change and would be downgraded in a real scenario.
3. The chart is generated based on below hardware configuration.
    • Lens: Optical Lens F:2.8 with HFOV:63.2º & VFOV:42º
    • Sensor: ¼" CMOS WXGA (1Mp) HD Sensor
4. Depth resolution of this figure: 640x400
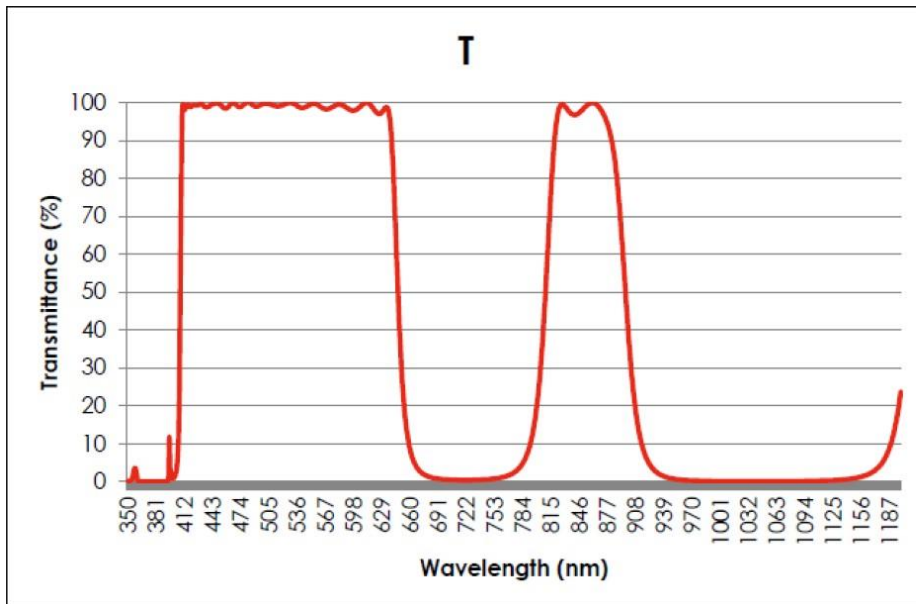
3   Video Output

Table 5.   Video Output

Mode	Denotation	Interface & Compression	EP1 Color (2D or 3D)		EP2 (Depth-map)		Comment
			Video Resolution	YUV (fps)	Video Resolution	Bitmap Frame Rate	
1	L' + D	USB 3.0	640x400	90/60/30	640x400	90/60/30	
2	L' + D	USB 3.0	640x480	30	640x480	30	[1]
3	L' + R' + D	USB 3.0	1280x400	90/60/30	640x400	90/60/30	Calibration
4	L' + R' + D	USB 3.0	640x240	90/60/30	320x240	90/60/30	[1], Calibration
5	L' + D	USB 3.0	320x240	90/60/30	320x240	90/60/30	[1]
6	L + D	USB 3.0	800x600	30	640x480	30	[1]
7	L + R + D	USB 3.0	1600x600	30	640x480	30	[1]
8	L + R + D	USB 3.0	800x300	90/60/30	320x240	90/60/30	[1]
9	L + R	USB 3.0	2560x720	30	-	-	
10	L + R	USB 3.0	1280x400	90/60/30	-	-	
11	L' + R'	USB 3.0	1280x480	30	-	-	
12	L(R)	USB 3.0	1280x720	60/30	-	-	[1], Default
13	D	USB 3.0	-	-	640x400	90/60/30	
14	D	USB 3.0	-	-	640x480	30	[1]
15	D	USB 3.0	-	-	320x240	90/60/30	[1]
16	L' + D	USB 2.0	640x480	15	640x480	15	[1]
17	L' + D	USB 2.0	640x400	15	640x400	15	
18	L' + D	USB 2.0	320x240	60/30	320x240	60/30	[1]
19	L' + R' + D	USB 2.0	640x240	30	320x240	30	
20	L + D	USB 2.0	800x600	15	640x480	15	[1]
21	L + R + D	USB 2.0	1600x600	5	640x480	5	[1]
22	L + R	USB 2.0	2560x720	5	-	-	
23	L + R	USB 2.0	1280x480	15	-	-	
24	L' + R'	USB 2.0	1280x480	15	-	-	
25	L(R)	USB 2.0	1280x720	10	-	-	Default
26	D	USB 2.0	-	-	640x400	30	
27	D	USB 2.0	-	-	640x480	30	[1]
28	D	USB 2.0	-	-	320x240	90/60/30	[1]
29	L' + D	USB 2.0 / MJPEG	640x480	30	640x480	30	[1]
30	L' + D	USB 2.0 / MJPEG	640x400	30	640x400	30	
31	L' + D	USB 2.0 / MJPEG	320x240	90/60/30	320x240	90/60/30	[1]
32	L' + R' + D	USB 2.0 / MJPEG	640x240	90/60/30	320x240	90/60/30	[1]
33	L + D	USB 2.0 / MJPEG	800x600	30	640x480	30	[1]
34	L + R + D	USB 2.0 / MJPEG	1600x600	30	640x480	30	[1]
35	L + R	USB 2.0 / MJPEG	2560x720	30	-	-	
36	L' + R'	USB 2.0 / MJPEG	1280x480	30	-	-	
37	L(R)	USB 2.0 / MJPEG	1280x720	30	-	-	

1.   [1] Rectified FOV will be about 20% less after rectification.
2.   L' means Rectified Left. D means Depth.

Table 6.   Spectrum Specification of IR Cut Filter

Items	SPEC 1 3	
Band Pass Coating	AOI	0° ~ 12°
	420-640nm	Tabs.>90%
	660±10nm	T=50%
	680-790nm	Tabs. <1.5%
	810±10nm	T = 50%
	830-870nm	Tabs. >90%
	885±10nm	T = 50%
	900-1000nm	Tabs. <1.5%

4   Module Dimensions