

EJ511 Datasheet

USB3.1 Gen1 Video Capture IC



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1. Introduction

EJ511 is an USB 3.1 Gen1 capture IC supporting 1080p/60fps full high definition video through RGB and I2S inputs. When EJ511 connects to USB 2.0 platform, it can support MJPEG compression to provide high video quality on USB 2.0 limit bandwidth.

EJ511 can record original contents from various sources such as smart device, camcorder, set-top box, DVD/BD player and game console.

EJ511 uses OS native UVC and UAC drivers and is compatible with Microsoft Windows, Mac OS and Linux. It can fit in different media capture and streaming applications. It is the optimal solution for capturing high definition videos and postproduction.

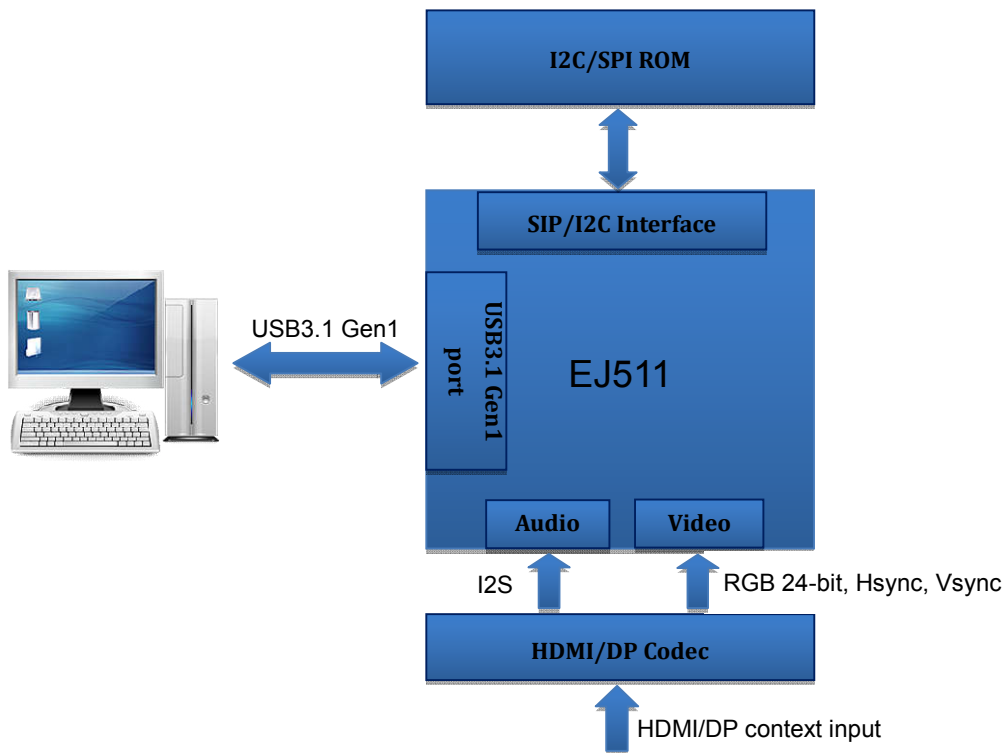


Figure 1-1. Application Diagram

2. Features

- Support USB3.1 Gen1 Specification
- Support standard USB Video Class (UVC)
- Support standard USB Audio Class (UAC)
- Support MJPEG and YUY2 (YUV4:2:2) format
- Support video output YUY2 format and resolution up to 1920x1080p @60Hz in USB3.1 Gen1
- Support video output MJPEG format and resolution up to 1920x1080p @60Hz in USB2.0 or USB3.1 Gen1
- Support 44.1KHz and 48KHz PCM stereo audio output
- Support digital video input interface: RGB 24-bit, Hsync, Vsync, Data Enable
- Support digital audio input interface: I²S, Data formats of 16-bit, 16-bit stereo (Two channels)
- Support SPI / I2C interface
- Supports In System Programming (ISP) Firmware Update by USB port
- It is compatible with Windows 7, 8, 8.1, 10 or later, Linux OS, Mac OS

3. Specifications

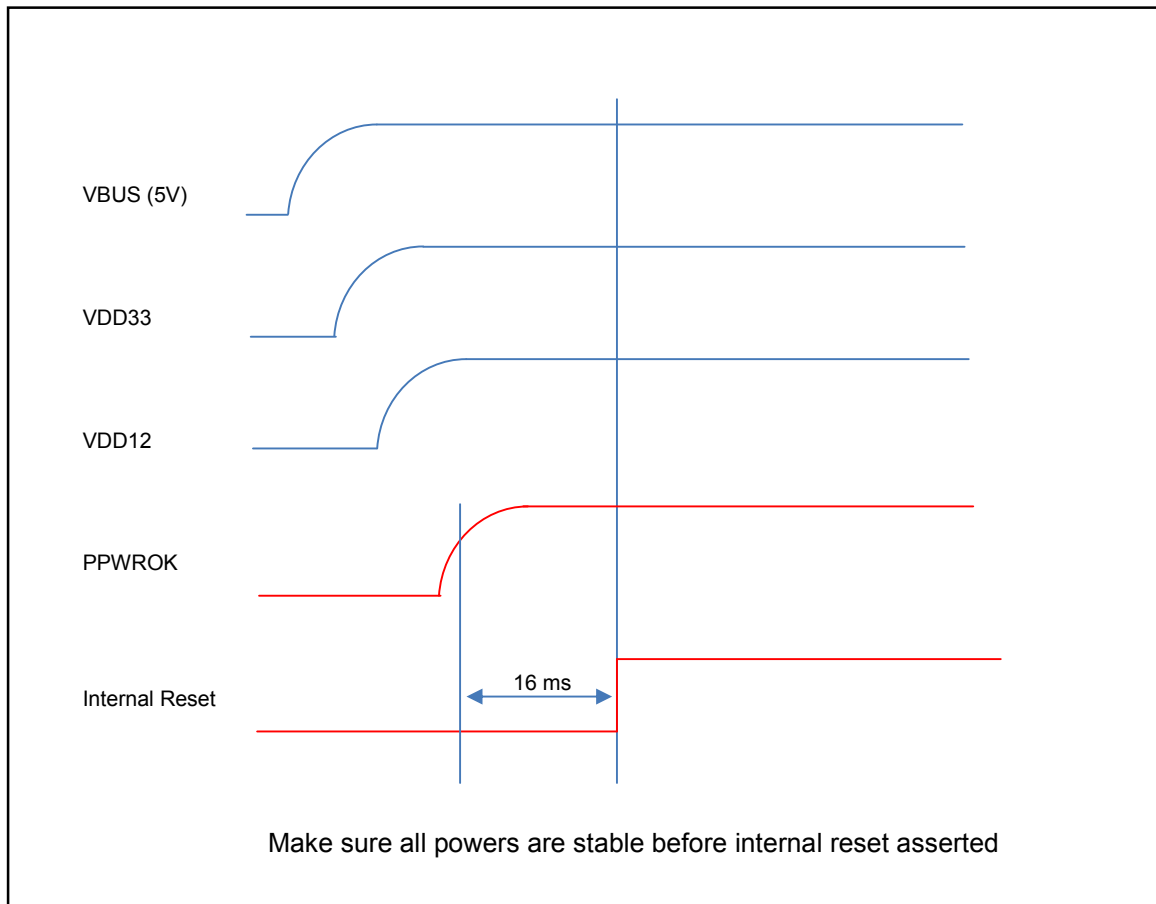
- Host Interface
 - USB3.1 Gen1 : 300 ~ 350MB/s transfer bandwidth
 - USB2.0 : 40MB/s transfer bandwidth
- Audio and Video capture
 - Complies with UVC (USB video class) specifications
 - Complies with UAC (USB audio class) specifications
- Video Receiver Interface
 - RGB 24-bit,
 - Hsync
 - Vsync
 - Data Enable
 - Pixel Clock : 150MHz (Max)
- Audio Receive interface
 - I2S interface
 - Data formats of 16-bit
 - 16-bit stereo (Two channels)
- ROM interface
 - SPI or I2C interface
- Output color space
 - YUY2 (YUV 4:2:2)
- Compression
 - Hardware Motion JPEG (MJPEG) compression
- Resolution / Frame rate
 - Resolution up to 1920x1080p
 - Frame rate up to 60Hz
- Upgrade Firmware
 - Upgradeable by USB
- Operating System : x86 and x64
 - Windows 7, 8, 8.1, 10 and later ...
 - Linux
 - Mac OS

Table 4-1. EJ511 (QFN88) Pin Description

Pin No.	Signal Name	Type (IN / OUT)	Description
1	AVDD12	PWR	Analog AVDD12 power-in
2	AGND	GND	Analog ground
3	TXN	Analog OUT-	SS_TXN
4	TXP	Analog OUT+	SS_TXP
5	AVDD12	PWR	Analog AVDD12 power-in
6	AVDD12	PWR	Analog AVDD12 power-in
7	AGND	GND	Analog ground
8	RXN	Analog IN-	SS_RXN
9	RXP	Analog IN+	SS_RXP
10	PXL_BLUE_DIN0	IN	Bit0 video data of blue channel
11	PXL_BLUE_DIN1	IN	Bit1 video data of blue channel
12	PXL_BLUE_DIN2	IN	Bit2 video data of blue channel
13	PXL_BLUE_DIN3	IN	Bit3 video data of blue channel
14	PXL_BLUE_DIN4	IN	Bit4 video data of blue channel
15	PXL_BLUE_DIN5	IN	Bit5 video data of blue channel
16	PXL_BLUE_DIN6	IN	Bit6 video data of blue channel
17	PXL_BLUE_DIN7	IN	Bit7 video data of blue channel
18	PXL_CLK_IN	IN	Pixel clock of video data
19	VDD33	PWR	Digital VDD33 power-in
20	VDD12	PWR	Digital VDD12 power-in
21	GND	GND	Digital ground
22	5V_IN	PWR	5V power-in
23	LDO33_OUT	PWR	LDO 3.3V output is only for VDD33 of EJ511
24	VDD12	PWR	Digital VDD12 power-in
25	GND	GND	Digital ground
26	PXL_HSYNC_IN	IN	HSYNC signal of video data
27	PXL_DE_IN	IN	Data enable of video data
28	PXL_G_DIN0	IN	Bit0 video data of green channel
29	PXL_G_DIN1	IN	Bit1 video data of green channel
30	PXL_G_DIN2	IN	Bit2 video data of green channel
31	PXL_G_DIN3	IN	Bit3 video data of green channel
32	PXL_G_DIN4	IN	Bit4 video data of green channel
33	PXL_G_DIN5	IN	Bit5 video data of green channel
34	PXL_G_DIN6	IN	Bit6 video data of green channel
35	PXL_G_DIN7	IN	Bit7 video data of green channel
36	VDD33	PWR	Digital VDD33 power-in
37	TESTN	IN	Test mode enable(low active)
38	GPIO0	IN/OUT	General purpose IN/OUT 0
39	GPIO1	IN/OUT	General purpose IN/OUT 1
40	SPI_WP_	IN/OUT	SPI write protect
41	SPI_DI	IN/OUT	SPI data input
42	SPI_CS_	IN/OUT	SPI chip select
43	SPI_DO	IN/OUT	SPI data output

Pin No.	Signal Name	Type (IN / OUT)	Description
44	SPI_CK	IN/OUT	SPI clock
45	SPI_HOLD_	IN/OUT	SPI hold
46	GPIO2	IN/OUT	General purpose IN/OUT 2
47	VDD33	PWR	Digital 3.3V power-in
48	PXL_RED_DIN0	IN	Bit0 video data of red channel
49	PXL_RED_DIN1	IN	Bit1 video data of red channel
50	PXL_RED_DIN2	IN	Bit2 video data of red channel
51	PXL_RED_DIN3	IN	Bit3 video data of red channel
52	PXL_RED_DIN4	IN	Bit4 video data of red channel
53	PXL_RED_DIN5	IN	Bit5 video data of red channel
54	PXL_RED_DIN6	IN	Bit6 video data of red channel
55	PXL_RED_DIN7	IN	Bit7 video data of red channel
56	VDD12	PWR	Digital VDD12 power-in
57	NC		
58	NC		
59	AGND	GND	Analog ground
60	AVDD12	PWR	Analog AVDD12 power-in
61	AVDD12	PWR	Analog AVDD12 power-in
62	NC		
63	NC		
64	AGND	GND	Analog ground
65	AVDD12	PWR	Analog AVDD12 power-in
66	NC		
67	AVDD33	PWR	Analog AVDD33 power-in
68	AGND	GND	Analog ground
69	NC		
70	NC		
71	GND	GND	Digital ground
72	INTR_I/GPIO4	IN	Interrupt in / GPIO4, Default Input
73	INTR_O/GPIO5	OUT	Interrupt out / GPIO5, Default Output
74	GPIO3	IN/OUT	General purpose IN/OUT 3
75	I2CM_SDA	IN/OUT	I2C master data
76	I2CM_CLK	OUT	I2C master clock
77	VDD33	PWR	Digital VDD33 power-in
78	VDD12	PWR	Digital VDD12 power-in
79	I2S_LRCLK	IN	I2S LRCLK of audio data
80	I2S_CLK	IN	I2S clock of audio data
81	I2S_SDA	IN	I2S data of audio data
82	PXL_VSYNC_IN	IN	VSYNC signal of video data
83	PPWR2_OK	IN	Power OK
84	DM	Analog IO-	USB DM
85	DP	Analog IO+	USB DP
86	AGND	GND	Analog ground
87	AVDD33	PWR	Analog AVDD33 power-in
88	XI	Analog IN	Crystal input, 30MHz +/-50ppm

5. Power on sequence



6. Electrical Characteristics

Table 6-1. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Operating temperature	Ta	+0	-	+70	°C
Junction temperature	Tj	+25	-	+95	°C
Storage temperature	Tstg	-20	-	+120	°C
Digital VDD12 voltage	VDDC12	1.30	1.33	1.36	V
Digital VDD33 I/O voltage	VDD33	3.135	3.3	3.465	V
Analog AVDD12 voltage	AVDD12	1.30	1.33	1.36	V
Analog AVDD33 voltage	AVDD33	3.135	3.3	3.465	V

Table 6-2. General DC Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Analog 5V input voltage	AVCC5V	4.5	5.0	5.5	V
LDO 3.3 output voltage	V33_OUT	3.1	3.2	3.3	V
Output high voltage	VOH	2.4			V
Output low voltage	VOL			0.4	V
Input high voltage	VIH	2.0			V
Input low voltage	VIL			0.8	V

7. Package Information

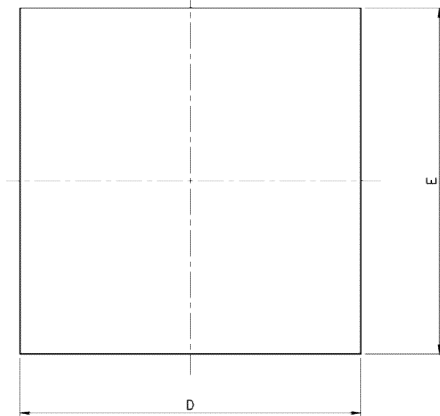


Figure 7-1. Top View

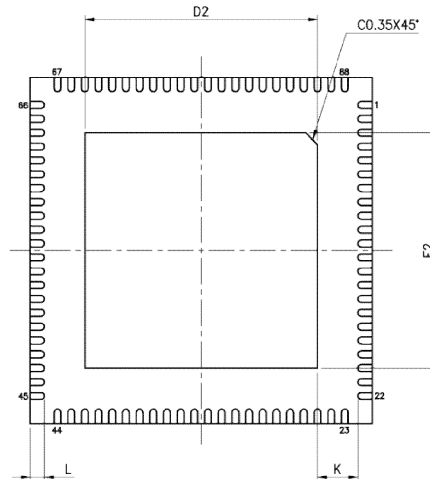


Figure 7-2. Bottom View

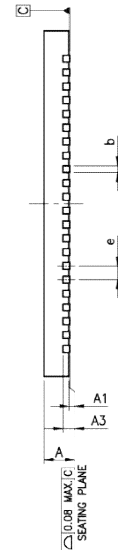


Figure 7-3. Section View

		Package Type		
JEDEC Outline	MO-220			
Package Code	VQFN (YA88)			
Symbols	Min.	Nom.	Max.	
A	0.80	0.85	0.90	
A1	0.00	0.02	0.05	
A3	0.203 REF.			
D	10.00 BSC			
E	10.00 BSC			
e	0.40 BSC			
L	0.30	0.40	0.50	
K	0.20	-	-	

Note:

- All dimensions are in millimeters.
- Dimension b applies to metalized terminal and is measured between 0.15mm and 0.30mm from the terminal tip. If the terminal has the optional radius on the other end of the terminal, the dimension b should not be measured in that radius area.
- Bilateral co-planarity zone applies to the exposed heat sink slug as well as the terminals.

Pad Size	D2			E2			b			Lead Finish		JEDEC Code
	Min.	Nom.	Max.	Min.	Nom.	Max.	Min.	Nom.	Max.	Pure Tin	PPF	
276 x 27	6.75	6.80	6.85	6.75	6.80	6.85	0.15	0.20	0.25	V	X	(W)VNNE-1