

BW1099 - Myriad X SoM

1 Features

- Intel Movidius Myriad X VPU ma2485-C0
- 16MB QSPI NOR Flash (optional)
- 32Kb I2C EEPROM
- USB3.1, gen1 5gbps
- 1x 4-Lane MIPI CSI-2 D-PHY
- 2x 2-Lane MIPI CSI-2 D-PHY
- QSPI, SDIO, UART, I2C
- Boot Modes Supported: USB, NOR
- On-board power generation

MIPI CSI-2 D-PHY channel, allowing for multiple camera inputs.

Power-on Reset BOOT configuration can be modified with on-board resistor straps, and a 10-pin JTAG connector is also provided on-board to allow for debug without the need for a baseboard.

SoM power consumption is use-case dependent, but typical consumption is under 5W with thermal mitigation.

2 Applications

- Industrial automation
- Robotics and autonomy
- Security systems
- Remote intelligence

Device Information

PART NUMBER	SIZE (W x L x H) ¹
BW1099	40mm x 30mm x 17.5mm

1) Including components and heatsink

3 Description

The Luxonis BW1099 is a system-on-module (SoM) designed for integration into a top-level system with a need for a low-power, 4 TOPS AI vision system. The BW1099 interfaces with the system through a single 10-gbps-rated 100-pin DF40C-100DP-0.4V(51) board-to-board mezzanine connector which carries all signal I/O as well as 5V input. The on-board SMPS system regulates the 5V input and provides all necessary digital and analog power. An auxiliary power port is offered to interface without connection to a baseboard.

Core digital electronics on the BW1099 include the Movidius Myriad X VPU (MA2485-C0), a 16MB QSPI NOR flash, and 32kb EEPROM.

USB 3.1 Gen1, QSPI, UART, I2C, and SDIO are all broken out from the SoM and routed through the mezzanine connector to the system. Additionally, the BW1099 SoM exposes two 2-lane MIPI CSI-2 D-PHY channels and one 4-lane

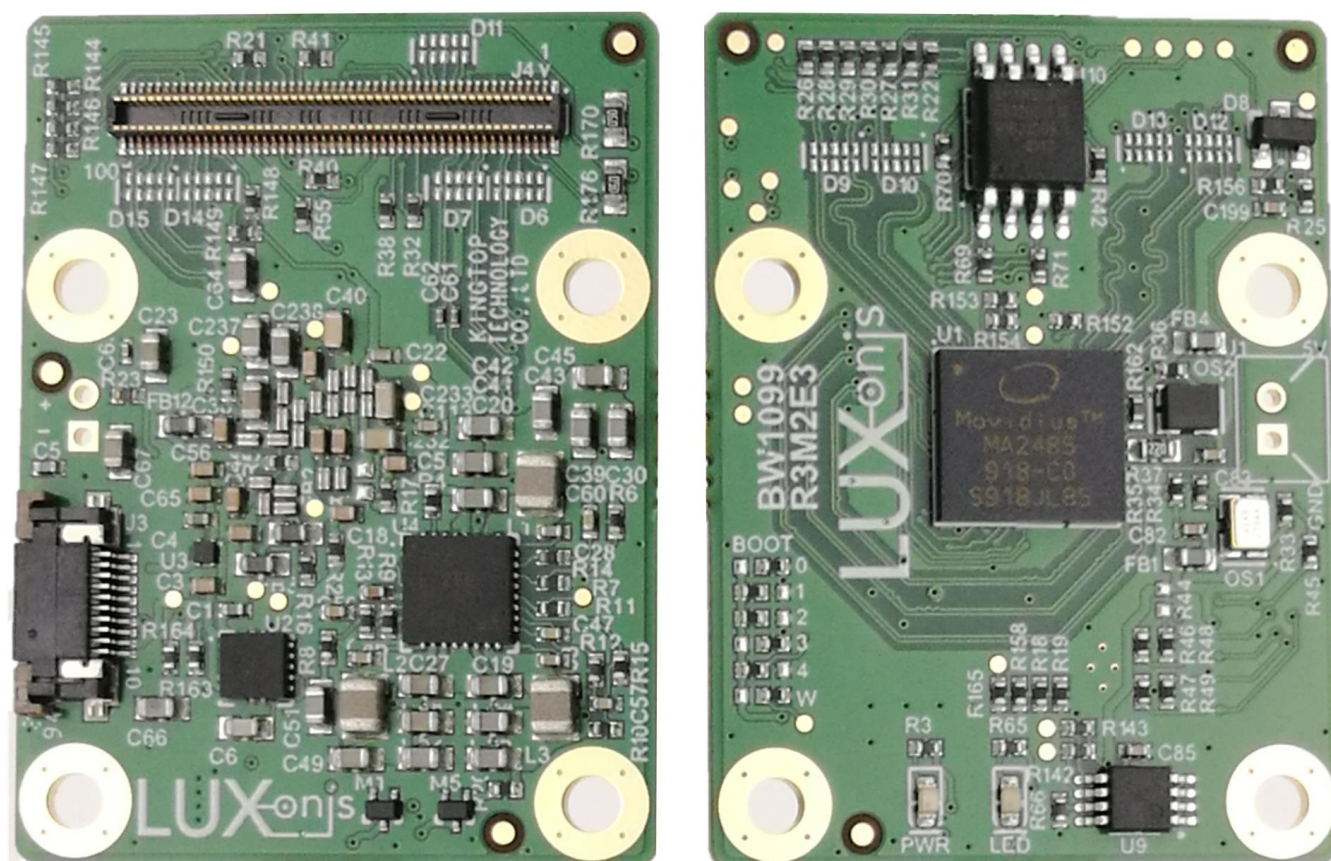


Figure 1 – Bottom and Top of BW1099 PCBA

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4 Block Diagram

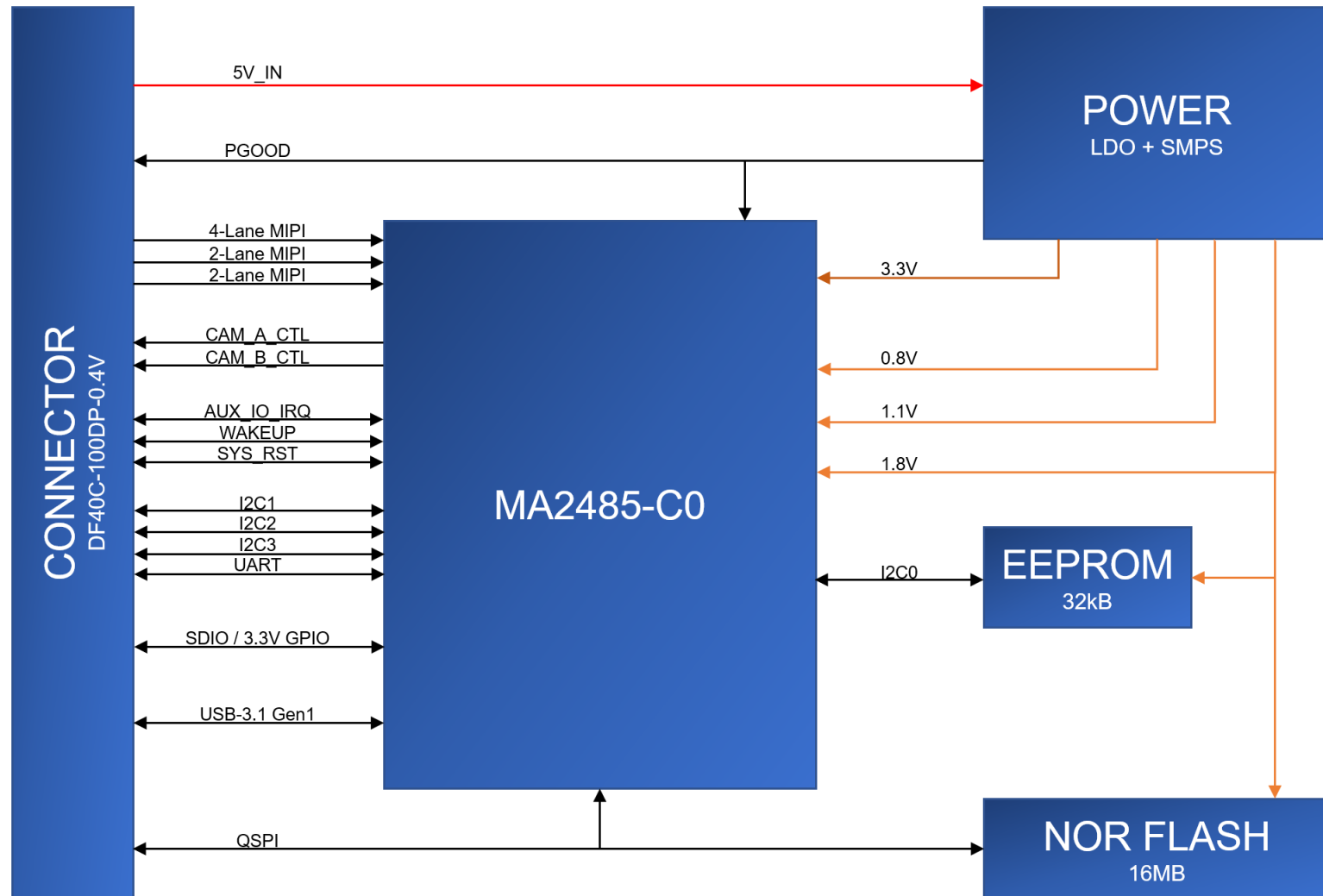


Figure 2 - Schematic Block Diagram

5 Electrical Characteristics

5.1 Absolute Maximum Ratings¹

SYMBOL	RATINGS	MIN	MAX	UNIT
V_{IN}	External input supply voltage range. ²	3.6	5.5	V
V_{I/O_1V8}	Input voltage SoM I/O for 1.8V logic	-0.3	2.0	V
V_{I/O_3V3}	Input voltage SoM I/O for 3.3V logic	-0.3	3.6	V
$I_{I/O}$	IO output current drive strength	2	12	mA
T_J	Junction temperature.		105	°C
T_{STG}	Storage temperature.	-30	150	°C

5.2 Recommended Operating Conditions

SYMBOL	RATINGS	MIN	TYP	MAX	UNIT
V_{IN}	External input supply voltage range. ²	4.5	5.0	5.25	V
V_{I/O_1V8}	Input voltage SoM I/O for 1.8V logic	0		1.8	V
V_{I/O_3V3}	Input voltage SoM I/O for 3.3V logic	0		3.3	V
P_Q	Quiescent power draw ³		0.3		W
P_{IDLE}	Idle power draw ⁴		0.7		W
P_{INFR}	Inference power draw ⁵		2.48		W
T_A	Ambient operating temperature ⁶		25	50	°C
T_J	Junction temperature. ⁶			105	°C

- 1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- 2) Applies to 5V input pins only
- 3) With SoM in reset
- 4) Myriad X booted to base mode via USB
- 5) Mobilenet-SSDV2 detector, 30fps
- 6) With default Luxonis passive heatsink, running Mobilenet-SSDV2 30fps. Custom or active thermal solutions are recommended in ambient environments >50°C, and/or for highly demanding inference operations >2.5W.

6 SoM Connector Pinout

The following contains the pinout of 100-pin Hirose DF40HC(3.0)-100DS-0.4V receptacle for the BW1099 SoM. The schematic symbol, footprint, and full IO pinout table can be found at the Luxonis Github repository.

1	J1		2
3	GND	GND	4
5	CAMA_CLKN	SGPIO_1	6
7	CAMA_CLKP	SGPIO_2	
9	GND		
11	CAMA_D0_N		8
13	CAMA_D0_P	GND	10
15	GND	USB_RX_P	12
17	CAMA_D1_N	USB_RX_N	14
19	CAMA_D1_P	GND	16
21	GND	USB_D_P	18
23	CAMA_D2_N	USB_D_N	20
25	CAMA_D2_P	GND	22
27	GND	USB_TX_P	24
29	CAMA_D3_N	USB_TX_N	26
31	CAMA_D3_P	GND	
33	GND		
35	CAMA_I2C_SDA	CAMA_CLK	28
37	CAMA_I2C_SCL	GND	30
39	PGOOD	SGPIO_4_3V3	32
41	RST	CAMA_RST	34
43	WAKEUP	SGPIO_8_3V3	36
45		SGPIO_9_3V3	38
47		SGPIO_10_3V3	40
49		SGPIO_11	42
51			
53			
55			
57			
59	GND	GND	44
61	GND	GND	46
63	5V	5V	48
65	5V	5V	50
67	5V	5V	52
69	5V/VBUS	5V	54
71	GND	GND	56
73	GND	GND	58
75			
77			
79			
81			
83			
85			
87			
89			
91			
93			
95			
97			
99			
100			

SGPIO_12 SGPIO_13/SPIO_CS_1 60

SGPIO_14_3V3 SPIO_SIO0 62

SGPIO_16_3V3 SPIO_SIO1 64

CAM_B_D_PWM SPIO_SIO2 66

CAM_B_PWDN_N SPIO_SIO3 68

SGPIO_22 SPIO_CS_0 70

GND GND 72

CAMB_CLK SPIO_SCK 74

GND GND 76

CAMB_I2C_SCL SGPIO_27 78

CAMB_I2C_SDA SGPIO_29 80

GND GND 82

CAMB_D1_N CAMC_D1_N 84

CAMB_D1_P CAMC_D1_P 86

GND GND 88

CAMB_D0_N CAMC_D0_N 90

CAMB_D0_P CAMC_D0_P 92

GND GND 94

CAMB_CLKN CAMC_CLKN 96

CAMB_CLKP CAMC_CLKP 98

GND GND 100

BW1099_Receptacle_DF40HC(3.0)-100DS-0.4V
3mm

Figure 3 - Schematic Symbol for BW1099 Baseboard Receptacle Connector

7 Mechanical Information

The following information is the most current data available for the designated device. This data is subject to change without notice and without revision of this document.

7.1 BW1099 Dimensions

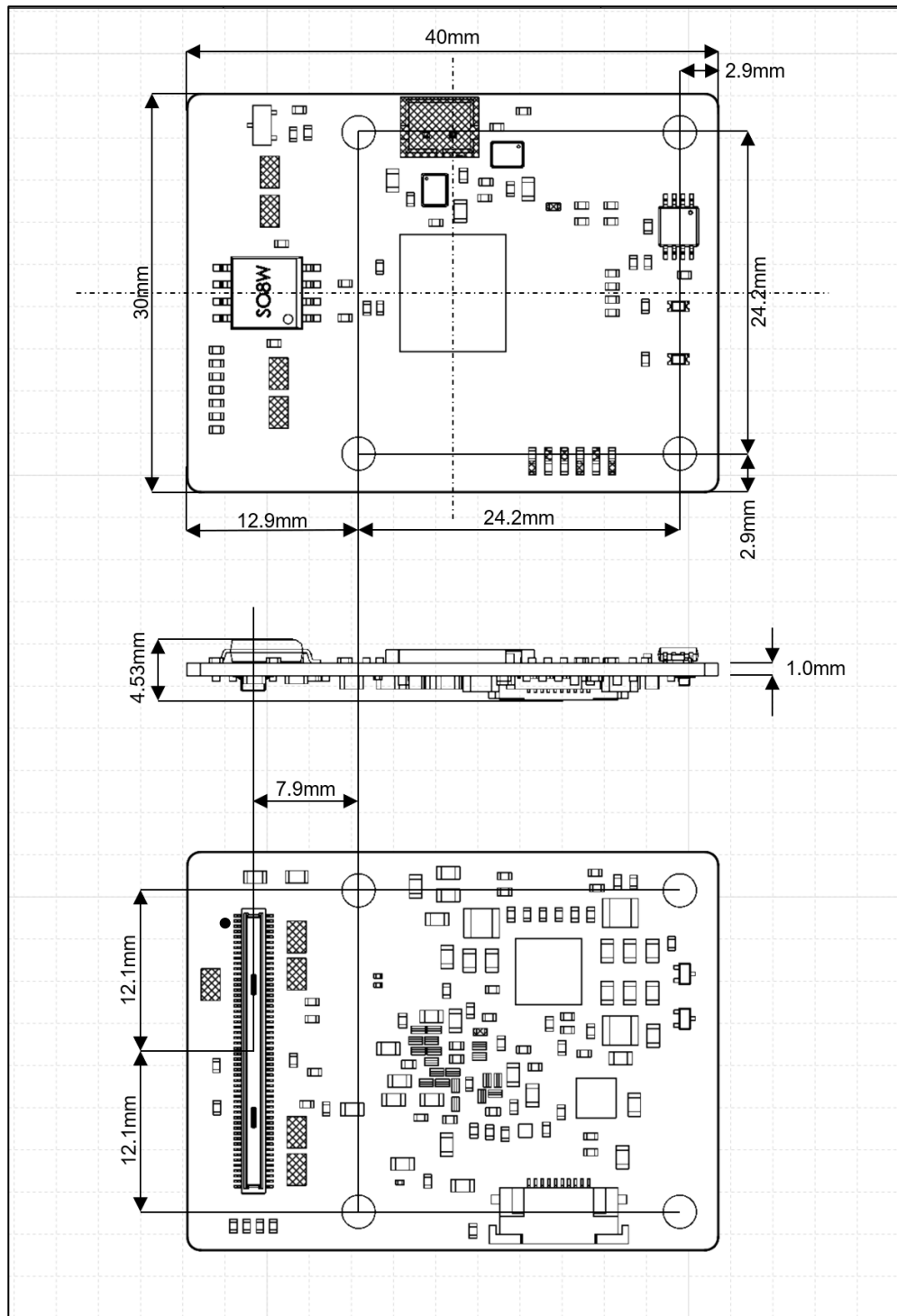


Figure 4 – Top, Side, and Bottom dimensions

7.2 Recommended Mounting Configuration

The BW1099 SoM is designed to be used with a 3mm mated-height connector and accompanying 3mm standoffs. The B2B connector plug is on the BW1099 (Hirose DF40C-100DP-0.4V), while the receptacle, which determines mated height, is on the baseboard (Hirose DF40HC(3.0)-100DS-0.4V). Würth Elektronik 9774030243R SMT standoffs are recommended.

7.3 BW1099 Mounting Holes

The BW1099 has 4 M2.5 mounting holes for securing the SoM. These mounting holes use a 2.6mm ID, and a 5.5mm OD pad, which is tied to SoM GND. M2-0.40 screws can be used with these pads to secure the SoM to the recommended Würth Elektronik 9774030243R SMT standoffs, or a custom solution using M2-0.40 or M2.5-0.45 screws can be used. Note that when using M2.5-0.45 screws, there is reduced tolerance between the B2B connector clocking and the screws' hole alignment. This must be accounted for to ensure proper connector mating.

7.4 SoM Clearance

3mm is the board-to-board standoff height when using the recommended mounting configuration, however, components on the underside of the BW1099 reduce this clearance. For highest design reliability, it is recommended not to place components on the baseboard underneath the SoM, but components with max height <1mm will have clearance.

In previous designs many components have been successfully placed on the baseboard beneath the SoM making careful use of the 3D STEP file of the SoM, which is available upon request.

8 Thermal Consideration

Power consumption can vary considerably depending on the application. A stereo vision application running Mobilenet-SSD V2 at 30fps typically consumes about 2.5W, but more aggressive applications can consume closer to 5W. Most of this power is consumed by the MA2485. While the VFBGA provides an excellent thermal path from the MA2485 to the SoM, the thermal sink is small, and the part temperature can quickly rise toward the 105C max.

Heatsinking of the MA2485 is required.