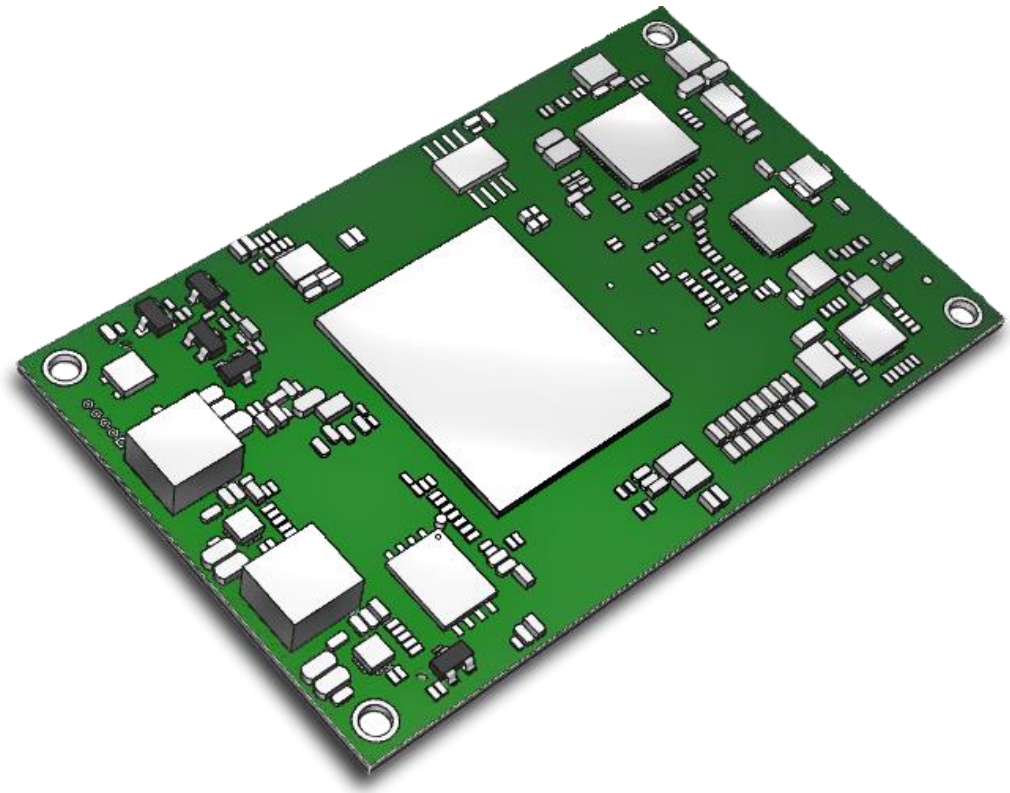
SOM-P6001

SOM-P6001 is designed based on Cortex-A73 processor. This module is targeted for faster and multimedia applications. The SOM-P6001 has 2GB DDR4 RAM, SPI flash. With the extreme peripheral integration, the SOM-P6001 module supports industry latest high performance interfaces such as, USB3.2, Gigabit Ethernet, HDMI 2.1

User Manual



INTRODUCTION

The **SOM-P6001** is a System on Module (SoM) that integrates a processor, memory, NAND flash storage, and power circuitry. This module enables designers to fully leverage the hardware and software resources of the SOM-P6001 in their custom systems and form factors. Additionally, these modules provide enhanced I/O interfaces, offering greater flexibility for designers.

The **SOM-P6001**'s electrical interface uses two 120-pin high-density connectors, and its overall physical form factor is more compact, even considering the connectors.

Through the provided software and hardware, along with a 1Gb Ethernet switch that supports IGMP Snooping, the **SOM-P6001** offers a complete Ultra-HD 4K@144Hz 4:4:4 / 8K@60Hz 4:2:2 DSC video broadcasting solution. It is suitable for various 4K applications, including healthcare, digital signage, and more. It can transmit Ultra-HD 4K@144Hz 4:4:4 / 8K@60Hz 4:2:2 DSC HDMI 2.1 video over IP networks.

Broadcasting format options include Point-to-Point, Point-to-Many, and Multicasting. Multicasting operates through a managed 1Gb switch with 802.1Q VLAN functionality, enabling remote control of multiple devices.

FEATURES

- ARM Cortex A73 64-bit SOC @1.2GHz Dual core
- 2G-Bit DDR
- 1Gb/4Gb SPI Flash
- Small Footprint 80mm × 50mm module
- 4 × M2 mounting holes
- HDMI 2.1 & HDCP 2.3
- Resolution up to 4K@144 4:4:4/ 8K@60 4:2:2 DSC
- USB-C (Alt Mode DP 1.4) and HDMI input
- Supports VRR(Variable Refresh Rate) & ALLM(Auto Low Latency Mode)
- Multi format Video Encode & Decode capability (Proprietary Advanced Video Codec,(4K144,2K/60) hardware solution)
- Can be configured as a full duplex transmitter and receiver when 4K@144 4:4:4
- Auto equalization
- Pure unaltered uncompressed 7.1ch digital HDMI over cat.6A transmission
- DTS-HD Master Audio and Dolby TrueHD high bit rate audio support
- Supports bi-directional full frequency IR signal from 20KHz to 60KHz
- Analog audio Input & Output
- Full duplex RS-232 control up to 115,200 bps
- Supports seamless switching

- Supports video wall function and image rotation/flip
- Supports PiP (Picture-in-Picture), PbP (Picture-by-Picture), and PoP (Chroma Key)
- Supports custom scaling to display
- Supports USB 3.1 Gen1 host mode for UVC webcam and USB 3.1 Gen2 UVC device mode
- Integrated port for 1G LAN/ network device

PACKAGE CONTENTS

- 1x SOM-P6001 PCB
- 1x User Manual

SPECIFICATIONS

Model Name	SOM-P6001
Technical	
Role of usage	Transceiver
HDMI compliance	HDMI 2.1
HDCP compliance	HDCP 2.3
Video bandwidth	up to FRL 6 (48G)
Video support	up to 4K@144 4:4:4/ 8K@60 4:2:2 DSC
Audio support	Surround sound [up to 7.1ch) or stereo digital audio
Equalization	Auto
Input TMDS signal	1.2 Volts [peak-to-peak]
Input DDC signal	5 Volts [peak-to-peak, TTL]
ESD protection	Human body model — ±15kV [air-gap discharge] & ±8kV [contact discharge]
PCB stack-up	6-layer board [impedance control — differential 100Ω; single 50Ω]
IR pass-thru	Bi-directional
RS-232 support	Yes
I/O connector	120 Pin *2
Mechanical	
Dimensions [L x W x H]	80x50x10mm
Operation temperature	0~40°C [32~104°F]
Storage temperature	-20~60°C [-4~140°F]
Relative humidity	20~90% RH [no condensation]

PIN DESCRIPTIONS TABLE

J1 Connector

Pin Name	Pin	IO	Description	Notes
EARCRX_N	1	I	Enhanced Audio Return Channel Receiver	
HUB1_UFP1_SSTX1N	2	O	SuperSpeed differential transmitter pair (negative) (Device)	
EARCRX_P	3	I	Enhanced Audio Return Channel Receiver	
HUB1_UFP1_SSTX1P	4	O	SuperSpeed differential transmitter pair (positive) (Device)	
DGND	5	P	DFP21_DM	
HUB1_UFP1_SSRX1N	6	I	SuperSpeed differential receiver pair (negative) (Device)	
HDMI_TX_CLK-	7	O	Differential Clock Output Pair for HDMI Output Por	
HUB1_UFP1_SSRX1P	8	I	SuperSpeed differential receiver pair (positive) (Device)	
HDMI_TX_CLK+	9	O	Differential Clock Output Pair for HDMI Output Port	
HUB1_UFP1_VBUS	10	O	Up stream USB Port Power	
DGND	11	P	Ground	
SPI_DI_S_GP	12	I	Slave In Master Out	
HDMI_TX_D0-	13	O	Differential Data Output Pair0 for HDMI Output Port	
SPI_CS_S_GP	14	I	SPI Select In	
HDMI_TX_D0+	15	O	Differential Data Output Pair0 for HDMI Output Port	
SPI_SCK_S_GP	16	I	SPI Serial Clock	
DGND	17	P	Ground	
SPI_DO_S_GP	18	O	Slave Out Master IN	
HDMI_TX_D1-	19	O	Differential Data Output Pair0 for HDMI Output Port	
HSDP_2	20	B	USB 2.0 differential pair (negative)	
HDMI_TX_D1+	21	O	Differential Data Output Pair1 for HDMI Output Port	
HSDM_2	22	B	USB 2.0 differential pair (negative)	
HSOP1	23	O	SuperSpeed differential transmitter pair (positive) (HOST)	
HSIP1	24	I	SuperSpeed differential receiver pair (positive) (HOST)	
HDMI_TX_D2-	25	O	Differential Data Output Pair2 for HDMI Output Port	
HSIN1	26	I	SuperSpeed differential receiver pair (positive) (HOST)	

HDMI_TX_D2+	27	O	Differential Data Output Pair2 for HDMI Output Port	
HSOP1	28	O	SuperSpeed differential transmitter pair (positive) (HOST)	
HTX_5V_EN	29	O	HDMI +5V Output Enable	
HSON1	30	O	SuperSpeed differential transmitter pair (positive) (HOST)	
HTX_HPD	31	I	Hot Plug Input	
AUDIO_JACK_3	32	I	Audio Jack Plug Detect 3	
HTX_SCL	33	O	I^2C serial clock for DDC	
AUDIO_JACK_2	34	I	Audio Jack Plug Detect 2	
HTX_SDA	35	B	I^2C serial data for DDC	
AUDIO_JACK_1	36	I	Audio Jack Plug Detect 1	
NC	37			
IRTX_OUT	38	O	Ir transmit output	
EARCTX_N	39	O	Enhanced Audio Return Channel Transmit	
IRRX	40	I	Ir receive input	
EARCTX_P	41	O	Enhanced Audio Return Channel Transmit	
UART1_RTS	42	O	RS-232 request to send	
DGND	43	P	Ground	
UART1_CTS	44	I	RS-232 clear to send	
HDMI0_CLK-	45	I	Differential Clock Input Pair for HDMI Input Port	
UART1_RX	46	I	RS-232 receiver input1	
HDMI0_CLK+	47	I	Differential Clock Input Pair for HDMI Input Po	
UART1_TX	48	O	RS-232 driver output1	
DGND	49	P	Ground	
UART0_RX	50	I	RS-232 receiver input0	
HDMI0_D0-	51	I	Differential Data Input Pair0 for HDMI Input Port	
UART0_TX	52	O	RS-232 driver output0	
HDMI0_D0+	53	I	Differential Data Input Pair0 for HDMI Input Port	
I2C0_INT_ST	54	I	PMIC(ALT Pin)	
DGND	55	P	Ground	
UART2_TX	56	O	RS-232 driver output2	
HDMI0_D1-	57	I	Differential Data Input Pair1 for HDMI Input Port	
I2C5_SCL_ST	58	O	I2C Serial Clock5	
HDMI0_D1+	59	I	Differential Data Input Pair1 for HDMI Input Port	
I2C5_SDA_ST	60	O	I2C Serial Data5	
DGND	61	P	Ground	
LED05	62	O	LED 5 Driver	
HDMI0_D2-	63	I	Differential Data Input Pair2 for HDMI Input Port	
LED04	64	O	LED 5 Driver	
HDMI0_D2+	65	I	Differential Data Input Pair2 for HDMI Input Port	

DBDIS2	66			
DGND	67	P	Ground	
PD1_CC1	68	B		
HDMI_CEC	69	B	HDMI RX Consumer Electronics Control	
PD1_CC2	70	B		
HRX_SCL	71	I	I^2C serial clock for DDC	
HSDM_0	72	B	USB2 Port for USBC	
HRX_SDA	73	B	I^2C serial data for DDC	
HSDP_0	74	B	USB2 Port for USBC	
HDMI_RX_5V_Det	75	I	HDMI 5V detect Input	
NC	76			
HRX_HPD	77	O	HDMI Hot Plug Output	
NC	78			
POWER_EN_1	79	O	Power Enable 1	
I2C0_SCL_ST	80	O	PMIC I2C Serial Clock0	
POWER_EN_2	81	O	Power Enable 2	
I2C0_SDA_ST	82	B	PMIC I2C Serial Data0	
POWER_EN_3	83	O	Power Enable 3	
NC	84		Test Point	
POWER_EN_4	85	O	Power Enable 4	
VBUS_ALT_EN	86	O	VBUS PD Mode Enable	
NC	87			
PMIC_EN	88	O	PMIC Enable	
DGND	89	P	Ground	
VBUS_ALT_DIS	90	O	VBUS ALT Mode Disable	
AUX0P_RX	91	B	AUX Channel	
SARADC1	92	I	SARADC Channel1	
AUX0N_RX	93	B	AUX Channel	
SARADC0	94	I	SARADC Channel0	
DGND	95	P	Ground	
SARADC3	96	I	SARADC Channel3	
LANE0N	97	I	DisplayPort lane0	
SARADC2	98	I	SARADC Channel2	
LANE0P	99	I	DisplayPort lane0	
VCONN1	100	O	CC1 Pin +5V power Enable	
DGND	101	P	Gound	
VCONN2	102	O	CC2 Pin +5V power Enable	
LANE1P	103	I	DisplayPort lane1	
RESET#	104	I	Board Reset	
LANE1N	105	I	DisplayPort lane1	
PD0_CC2	106	B	Configuration Channel 2	
DGND	107	P	Ground	
NC	108			
LANE2N	109	I	DisplayPort lane2	
PD0_CC1	110	B	Configuration Channel 1	
LANE2P	111	I	DisplayPort lane3	
DBDIS1	112			
DGND	113	P	Gound	
LSADC3	114	I	LSADC Channel3	
LANE3P	115	I	DisplayPort lane3	
LSADC1	116	I	LSADC Channel1	
LANE3N	117	I	DisplayPort lane3	

LSADC0	118	I	LSADC Channel0	
DGND	119	P	Gound	
LSADC2	120	I	LSADC Channel2	

J2 Connector

Pin Name	Pin	IO	Description	Notes
Fiber_HSON	1	O	1.25GHz serial interfaces to transfer data	
A1P_TX	2	O	SuperSpeed differential transmitter pair (negative) (Device)	
Fiber_HSOP	3	O	1.25GHz serial interfaces to transfer data	
A1P_TX	4	O	SuperSpeed differential transmitter pair (positive) (Device)	
Fiber_HSIN	5		1.25GHz serial interfaces to receive data	
REFCLK_M1	6		SuperSpeed differential receiver pair (negative) (Device)	
Fiber_HSIP	7	O	1.25GHz serial interfaces to receive data t	
REFCLK_P1	8		SuperSpeed differential receiver pair (positive) (Device)	
HUB1_UFP1_DP	9	O	USB 2.0 differential pair (negative) (Device)	
REFCLK_N0	10			
HUB1_UFP1_DP	11		USB 2.0 differential pair (positive) (Device)	
REFCLK_P0	12	I		
NC	13			
DFP_OVC1_B	14	I	USB Port1 Over Current	
OVERIP_GPIO_OUT7-	15	O		
DFP21_DM	16	B	Down Stream USB 2.0 differential pair 1	
OVERIP_GPIO_OUT6	17	O	USB 2.0 differential pair (negative)	
DFP21_DP	18	B	Down Stream USB 2.0 differential pair 1	
OVERIP_GPIO_OUT5	19	I	General Purpose Output5	
SPI_DO_M_GP	20	O	Master Out Slave In	
OVERIP_GPIO_OUT4	21	O	General Purpose Output4	
SPI_SCK_M_GP	22	O	SPI Serial Clock	
OVERIP_GPIO_OUT2	23	O	General Purpose Output2	
SPI_CS_OUTPUT_GP	24	O	SPI Chip Select	
OVERIP_GPIO_OUT1	25	O	General Purpose Output1	

SPI_DI_M_GP	26	I	Master In Slave Out	
DGND	27	P	Ground	
DFP_OVC2_B	28	I	USB Port2 Over Current	
LED03	29	O		
DFP22_DM	30	B	Down Stream USB 2.0 differential pair 2	
OVERIP_GPIO_OUT3	31	O		
DFP22_DP	32	B	Down Stream USB 2.0 differential pair 2	
OVERIP_GPIO_OUT0	33		General Purpose Output0	
DFP_OVC3_B	34		USB Port3 Over Current	
DGND	35	P	Ground	
DFP23_DM	36	B	Down Stream USB 2.0 differential pair 3	
LED00	37			
DFP23_DP	38	B	Down Stream USB 2.0 differential pair 3	
LED_HDMI_INPUT_2_GP	39	O		
DFP_OVC4_B	40		USB Port4 Over Current	
LED_HDMI_INPUT_1_GP	41	O		
DFP24_DM	42	B	Down Stream USB 2.0 differential pair 4	
DGND	43	P	Gound	
DFP24_DP	44	B	Down Stream USB 2.0 differential pair 4	
LED06	45	O	LED 6 Driver	
I2C6_SCL	46		I2C Serial Clock6	
LED09	47	O	LED 9 Driver	
I2C6_SDA	48		I2C Serial Data6	
LED08	49	O	LED 8 Driver	
E_VCTRL	50			
LED07	51	O	LED 7 Driver	
C_VCTRL	52			
LED01	53	O	LED 1 Driver	
I2C3_SCL	54		I2C Serial Clock3	
LED02	55	O	LED 2 Driver	
I2C3_SDA	56		I2C Serial Data3	
POE_1_GP	57	O		
OVERIP_GPIO_IN4	58	I	General Purpose Input4	
LTM_TRIGGER_OUT	59			
OVERIP_GPIO_IN5	60	I	General Purpose Input5	
EF1V8_EN	61			
OVERIP_GPIO_IN6	62	I	General Purpose Input6	
MICBIAS_EN	63	O		
OVERIP_GPIO_IN7	64	I	General Purpose Input7	
DGND	65	P	Ground	
OVERIP_GPIO_IN3	66	I	General Purpose Input3	
NC	67			
OVERIP_GPIO_IN2	68	I	General Purpose Input2	
SPDIFIN	69	I	SPDIF Input	
OVERIP_GPIO_IN1	70	I	General Purpose Input1	
AGND	71	P	Analog Ground	
OVERIP_GPIO_IN0	72	I	General Purpose Input0	
AI0L	73		Audio Line Input Left	

DGND	74	P	Ground	
AGND	75	P	Analog Ground	
SPDIFOUT	76	O	SPDIF Output	
MICL	77	I	Microphone Left Input	
AGND	78	P	Analog Ground	
AGND	79	P	Analog Ground	
AI0R	80	I	Audio Line Input Right	
AO0L	81	O	Audio Line Output Left	
AGND	82	P	Analog Ground	
AGND	83	P	Analog Ground	
MICR	84	I	Microphone Right Input	
HP_OUT_R	85	O	Head Phone Right Output	
AGND	86	P	Analog Ground	
I2C1_SDA	87	B	I2C Serial DATA1	
AO0R	88	O	Audio Line Output Rigth	
I2S_DO_3	89	O	I2S Data Output 3	
HP_OUT_L	90	O	Head Phone Left Output	
I2S_DO_1	91	O	I2S Data Output 1	
I2C1_SCL	92	B	I2C Serial Clock1	
I2S_DI_3	93	I	I2S Data Input 3	
I2S_DO_4	94	O	I2S Data Output 4	
I2S_DI_1	95	I	I2S Data Input 1	
I2S_DO_2	96	O	I2S Data Output 2	
I2S_WCLK	97	O	I2S Word Clock	
I2S_DI_4	98	I	I2S Data Input 4	
NC	99			
I2S_DI_2	100	I	I2S Data Input 2	
NC	101			
I2S_SCLK	102	O	I2S Bit Clock	
NC	103			
I2S_MCLK	104	O	I2S Master Clock	
DGND	105	P	Ground	
DGND	106	P	Ground	
DDR_2V5	107	P	+2.5V	
STB_3V3	108	P	+3.3V	
DGND	109	P	Ground	
M_1V8	110	P	+1.8V	
DDR_PWR	111	P	+1.8V	
DGND	112	P	Ground	
DGND	113	P	Ground	
A1V0_PWR	114	P	+1v	
STB_5V	115	P	+5V Input	
DGND	116	P	Ground	
STB_5V	117	P	+5v	
DGND	118	P	Ground	
STB_5V	119	P	+5v	
DGND	120	P	Ground	

INTERFACES

HDMI 2.1 Receiver/Transmitter

The SOM-P6001 module with support for two HDMI 2.1 interfaces—one as a **receiver port** and the other as a **transmitter port**—capable of handling **8K images**, is an excellent option for high-performance video processing applications. Here's a breakdown of what this implies and potential applications:

1. **Receiver Port:**
   - Supports **input** of 8K video signals (up to 7680 x 4320 resolution) at high frame rates.
   - Ideal for applications requiring advanced video capture, such as live streaming, video conferencing, or image analysis.
2. **Transmitter Port:**
   - Capable of **outputting** 8K video signals to displays or other devices.
   - Useful for applications like digital signage, broadcasting, and VR/AR systems.
3. **8K Capability:**
   - Enhanced bandwidth allows resolutions up to 8K at 60Hz or 4K at 144Hz.
   - Support for dynamic HDR, wider color spaces, and high refresh rates ensures superior image quality.

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USB Type-C DisplayPort (DP) Alt Mode

DP 1.4 support allows a USB Type-C port to transmit video and audio signals using the DisplayPort standard

Gigabit Ethernet PHY

The SOM-P6001 module's support for Ethernet connectivity using a standard **1:1 RJ45 MagJack** simplifies integration by offering straightforward compatibility with Ethernet networks.

USB 3.1 Up/Down Stream

Up Stream Port. USB 3.1 Gen2

Data Transfer Speed up to 10 Gbps.

Down Stream Port. USB 3.1 Gen1

Data Transfer Speed up to 5 Gbps.

Digital Audio Input/Output

S/PDIF

.Commonly used for home theater systems.

.Transmits stereo PCM or compressed audio (like Dolby Digital, DTS).

I2S

. Interface for digital audio data transmission between chips.

.Used in audio DACs, ADCs.

Analog Audio Input/Output

Micro Input:

Mic-Level input

Line Input/Output

Line-Level input Output

HeadPhone Output

HeadPhone Output

General Purpose Input/Output

3.3V Digital inputs and outputs

I2C Bus

The I2C bus is controlled by the firmware. It can be used as a general I2C bus**.**

WARRANTY

The SELLER warrants the **SOM-P6001 Module** free from defects in the material and workmanship for 1 year from the date of purchase from the SELLER or an authorized dealer. Should this product fail to be in good working order within 1 year warranty period, The SELLER, at its option, repair or replace the unit, provided that the unit has not been subjected to accident, disaster, abuse or any unauthorized modifications including static discharge and power surge. This warranty is offered by the SELLER for its BUYER with direct transaction only. This warranty is void if the warranty seal on the metal housing is broken.

Unit that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for 90 days from the day of reshipment to the BUYER. If the unit is delivered by mail, customers agree to insure the unit or assume the risk of loss or damage in transit. Under no circumstances will a unit be accepted without a return authorization number.

The warranty is in lieu of all other warranties expressed or implied, including without limitations, any other implied warranty or fitness or merchantability for any particular purpose, all of which are expressly disclaimed.

Proof of sale may be required in order to claim warranty. Customers outside Taiwan are responsible for shipping charges to and from the SELLER. Cables and power adapters are limited to a 30 day warranty and must be free from any markings, scratches, and neatly coiled.

The content of this manual has been carefully checked and is believed to be accurate. However, The SELLER assumes no responsibility for any inaccuracies that may be contained in this manual. The SELLER will NOT be liable for direct, indirect, incidental, special, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. **Also, the technical information contained herein regarding the SOM-P6001 Module features and specifications is subject to change without further notice.**