LoongBoard-L7

Release **1.0**

Loongboard.org

Table of Contents

Hardware Features of LoongBoard-L7

LoongBoard-L7 is AM437x evaluation board which designed and Manufactured by Chipsee.

Key features:

SOM Module	**CS-SOM437x**
CPU	AM437x, ARM Cortex A9, 800MHz/1GHz
RAM	1GB DDR3
eMMC	2GB~32GB①
NAND FLASH	512MB~2GB②
WiFi	On-board WiFi, IEEE 802.11 b/g/n
USB Host	3 Channel USB 2.0 Host
USB OTG	1 Channel USB OTG
Audio	3.5mm Audio In/Out Connector On board 1W Speaker
LAN	1 Channel 1Gigabyte LAN Connector
Buzzer	1
RTC	Yes, on board Lithium Battery support
RS232	2 Channels
RS485	1 Channel
CAN	2 Channels
Camera	1 Channel Camera(Support 2M or 5M)
Expansion Connector	2 Expansion Connectors,
Power Input	5V DC
Current	1500 mA max
Power Consumption	6W
Working Temperature	0°C to +70°C
OS	Linux
Dimension	190 x 112 x 28mm
Weight	250g

① The eMMC mounted by default is 2GB.And this eMMC can be used as storage disk only,can't be used to boot OS

② NAND FLASH is not mount by default. If user want to use the NAND FLASH, eMMC should be removed.

LoongBoard-L7

Figure 1 Top View(Linux)

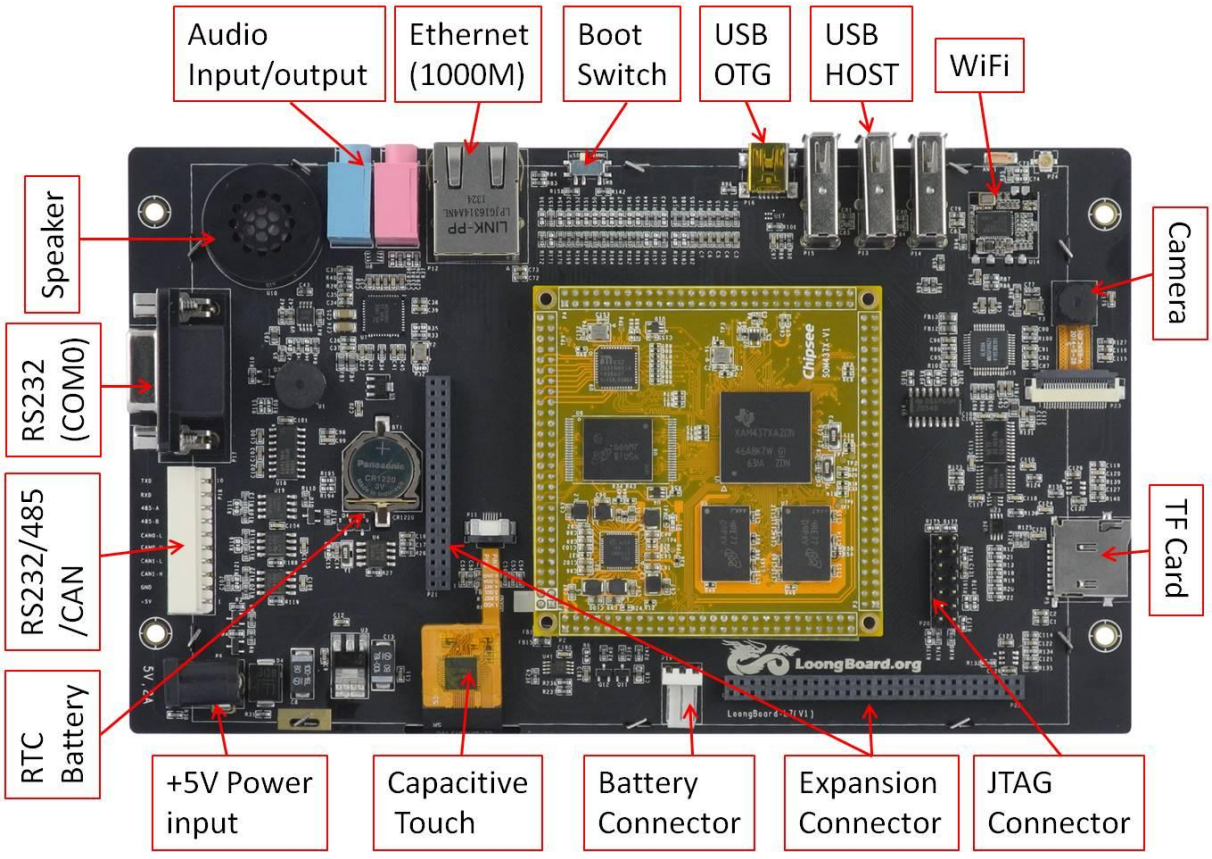

Figure 2 Back View

Figure 3 Side View

Power Input Connector

LoongBoard-L7 use 5V/2A DC power Input, and the total power Consumption is about **6W** normal. Figure 4 shows the 5V DC input connector. It's 2.1mm centre positive with 5.5mm outer barrel. And there is SMCJ05CA over voltage device used to prevent the plugging of high voltage adapter and inverse positive and negative Adapter.

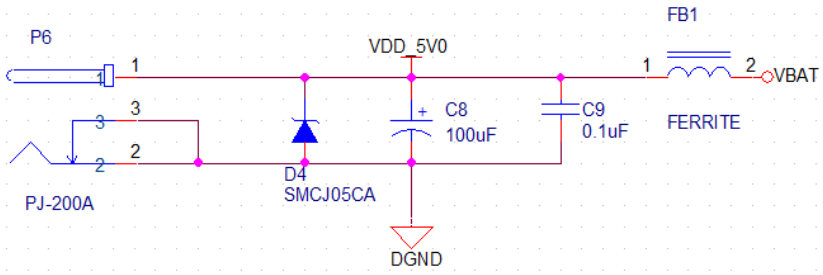

Figure 4 Power Input Connector and schematic.

Display LCD

LoongBoard-L7 use 7Inch LCD. The resolution is 1024*600 Pixel, Brightness is 300nit. LED Life time is 15000hours,View angle is 75°.

Capacitive Touch

LoongBoard-L7 use 5-Point Capacitive Touch, As Figure 5 shows. This Capacitive controller is FT5306.

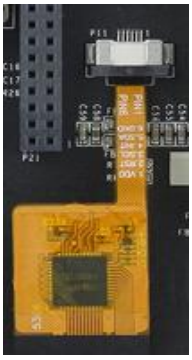

Figure 5 Capacitive Touch Connector

Be Attention:

Capacitive Touch is very sensitive to Power Noise. Ripple Voltage/Current from the Power Adapter will cause the LCD ripples, and will also cause the capacitive touch malfunction: If you use the APK Multi-Touch under Android to test, you can find the touch point float. There are several ways to solve this problem:

1) *Use a High quality Power Adapter. Or Use battery to provide the power like Cell phone or Tablet PC.*

2) *If user Power Adapter can't be good enough, there's another effective method to solve this problem: Make sure the LoongBoard-L7 Power GND* ***Connect to user "Power System Ground".*** *This method can eliminate the problem totally. User can also use another method to test this problem: Touch the GND of Power by one hand, The other hand operates on the Capacitive Touch Screen. In this case, user body acts as the Power System Ground.*

RS232 DB9 Connector

LoongBoard-L7 converts the CPU UART0 to RS232 level signal, and connects to a DB9 female connector as figure 6 shows. The CPU debug signal will output from this port by default.

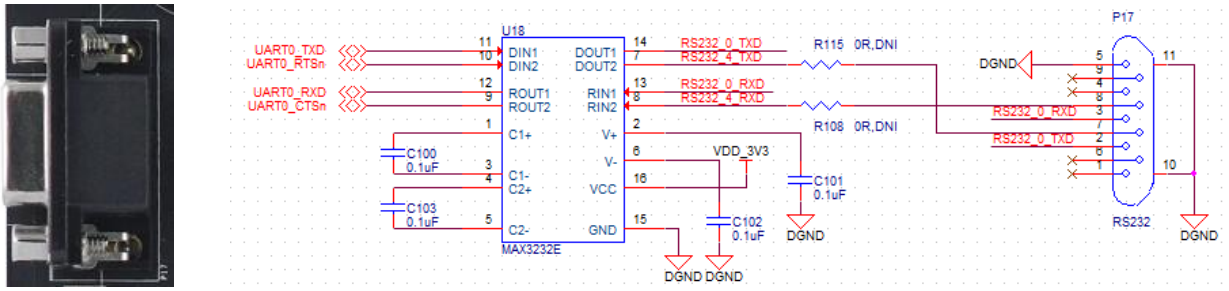

Figure 6 RS232 DB9 Connector

RS232 / RS485 / CAN Connector

The RS232 / RS485 / CAN connector is a 10 Pin 2.54mm connector. It is defined as P18 on the PCB as shown in Figure 7 RS232 / RS485 / CAN Connector.

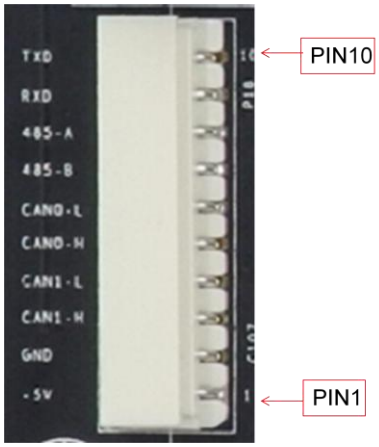

Figure 7 RS232 / RS485 / CAN Connector

As for the definition of every PIN, Please refer to Table 1.

Table 1 RS232 / RS485 / CAN Pin definition

Pin Number	Definition	Description
1	+5V	System +5V Power
2	GND	System Power Ground
3	CAN1_H	DCAN1 of CPU,CAN H signal
4	CAN1_L	DCAN1 of CPU,CAN L signal
5	CAN0_H	DCAN0 of CPU,CAN H signal
6	CAN0_L	DCAN0 of CPU,CAN L signal
7	485-B	UART3 of CPU, RS485 B Signal
8	485-A	UART3 of CPU, RS485 A Signal
9	RS232_4_RXD	UART4 of CPU,RS232 RXD signal
10	RS232_4_TXD	UART4 of CPU,RS232 TXD signal

Audio

As Figure 8 shows, the unit has got one Audio Input (“Line-in”) and one Audio output (“Line-out”). And it has a

Speaker on board. The speaker will be turn on by default. If user plugs connector to the Audio Output connector, the speaker will be turning off automatically.

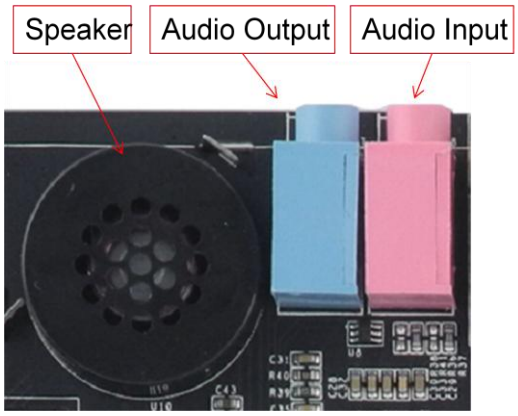

Figure 8 Audio Connector

LAN connector

LoongBoard-L7 has one channel Gigabit Ethernet. The connector can be found on the PCB labelled as P12 as Figure 9 shows.

Figure 9 Gigabit LAN Connector

Boot switch

LoongBoard-L7 has a boot switch which can be used to change boot sequence. It is defined as SW8 on the PCB as shown in Figure 3 Side View and Figure 10 Boot Switch. The position can either be eMMC or uSD. The device will boot from the location selected.

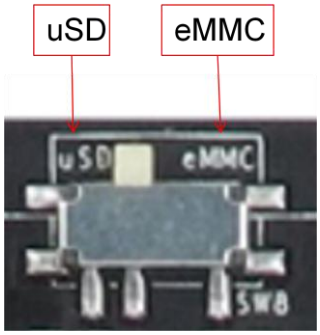

Figure 10 Boot Switch

Be Attention:
*Now this product support boot from uSD card only, **CAN'T** boot from eMMC:*

USB OTG Connector

LoongBoard-L7 has one USB OTG port labelled as P16 on the PCB board, as figure 11 shows. This port comes from the CPU USB0.

Figure 11 USB OTG connector

USB HOST Connector

LoongBoard-L7 has 3 USB HOST port as figure 12 shows. All these 3 ports come from the downstream of USB HUB GL850A labelled as U15 on the board. The upstream of this USB HUB come from CPU USB1.These 3 connectors will be recognize by the OS as USB1-2, USB1-3, USB1-4 from left to right.

Figure 12 USB HOST connector

WiFi Module

LoongBoard-L7 has WiFi module on board (IEEE 802.11 b/g/n) as figure 13 shows. The module based on RTL8188CUS which use USB interface, and connect to the USB HUB recognized by the CPU as USB1-1.LoongBoard-L7 have SMT WiFi antenna on board, so it don't need extra antenna by default. User can also connect external WiFi antenna to the I-PEX connector to improve the signal quality in some special case.

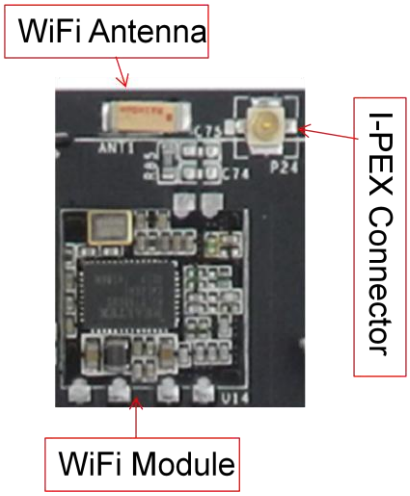

Figure 13 WiFi Module and Antenna

Camera Connector

LoongBoard-L7 has one Camera connector labelled as P23 as figure 14 shows, and the connector support 2M Camera OV2659 and 5M Camera OV5640.

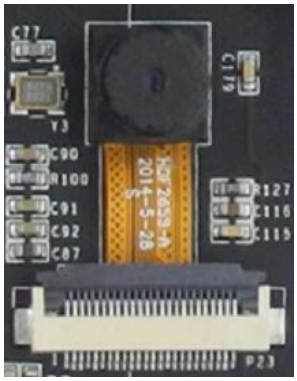

Figure 14 Camera Connector

Please note: LoongBoard-L7 Mounted 2M Camera **OV2659** by default.

uSD card

As in Figure 15 shows, uSD card connector labelled as P5 on the PCB. LoongBoard-L7 supports uSD card up to 32GB.

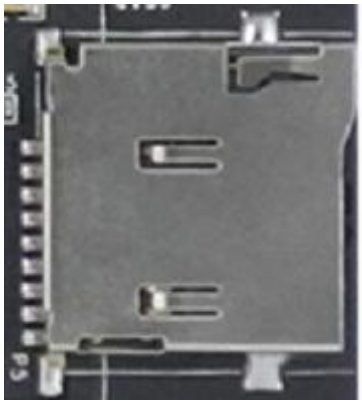

Figure 15 uSD Card Connector

Please note: The uSD card Slot **Mounted** 8GB uSD card by default.

External Battery Connector

LoongBoard-L7 has an external 5V Battery Connector as Figure 16 shows. This connector can be left open in normal. If customer wants to power this product by Battery instead of Power Adapter, Customer can connect their Battery to this port.

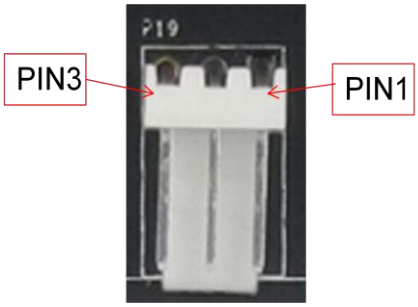

Figure 16 External Battery Connector

As for the definition of every PIN, Please refer to Table 2.

Table 2 External Battery Connector

Pin Number	Definition	Description
1	Battery	Battery Positive(+5V)
2	AC_DEC	Battery Monitor
3	GND	Battery Negative(GND)

JTAG Connector

LoongBoard-L7 has a JTAG connector as Figure 17 shows, and labelled as P20. It connects to the CPU JTAG port directly.

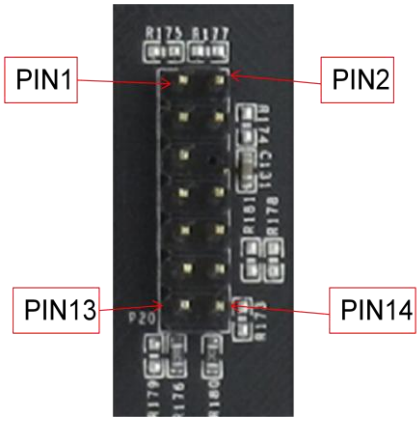

Figure 17 JTAG Connector

As for the definition of every PIN, Please refer to Table 3.

Table 3 JTAG Connector

Pin Number	Definition	Pin Number	Definition
1	TMS	2	TRST
3	TDI	4	GND
5	3.3V	6	NC
7	TDO	8	GND
9	NC	10	GND
11	TCK	12	GND
13	EMU0	14	EMU1

Expansion Connector

LoongBoard-L7 has 2 Expansion Connectors labelled as P21 and P22 on the PCB and as Figure 18 shows.

Figure 18 Expansion Connector P21

Figure 19 Expansion Connector P22

As for the definition of every Pin, Please refer to Table 4. Be attention all these signals are connected to CPU directly and use 3.3V logic, be careful to connect them to your board. Or it will be very easy to damage the product.

Table 4 Expansion Connector Definition

Expansion Connector P21					
PIN	Function	CPU PIN	PIN	Function	CPU PIN
1	GPMC_A7	F6	2	GPMC_A0	C3
3	GPMC_A5	E7	4	GPMC_A1	C5
5	GPMC_A2	C6	6	GPMC_A8	F7
7	GPMC_A4	D7	8	GPMC_A9	B4
9	GPMC_A3	A4	10	GPMC_A10	G8
11	GPMC_A6	E8	12	GPMC_A11	D8
13	GPMC_CSN3	B12	14	GPMC_CLK	A12
15	GPMC_BE1n	A3	16	MDIO_CLK	B17
17	MDIO_DATA	A17	18	GPMC_WAIT0	A2
19	GPMC_CS0n	A8	20	GPMC_WPn	B3
21	GPMC_WEN	D10	22	GPMC_ADVN_ALE	A9
23	GPMC_BE0N_CLE	C10	24	GPMC_OEN_REN	E10
25	GPMC_AD0	B5	26	GMPC_AD1	A5
27	GMPC_AD2	B6	28	GMPC_AD3	A6
29	GMPC_CSN1	B9	30	GMPC_CSN2	F10
31	GMPC_AD4	B7	32	GMPC_AD5	A7
33	GMPC_AD6	C8	34	GMPC_AD7	B8
35	MCASP0_FSR	K23	36	MCASP0_AHCLK	L24

				X	
37	MCASP0_AHCLKR	L23	38	MCASP0_AXR1	M25
39	VDD_3V3	**3.3V Power**	40	GND	**Power Ground**

Expansion Connector P22

PIN	Function	CPU PIN	PIN	Function	CPU PIN
1	ADC0_AIN2	Y13	2	ADC0_AIN1	Y12
3	ADC0_AIN3	AA13	4	ADC0_AIN0	AA12
5	ADC0_AIN4	AB13	6	ADC0_AIN5	AC13
7	ADC0_AIN6	AD13	8	ADC0_AIN7	AE13
9	ADC0_VREFP	AD14	10	ADC0_VREFN	AE14
11	ADC1_AIN3	AB15	12	ADC1_AIN4	AA15
13	ADC1_AIN5	Y15	14	ADC1_AIN2	AA16
15	ADC1_AIN1	AB16	16	ADC1_AIN0	AC16
17	ADC1_AIN6	AE16	18	ADC1_AIN7	AD16
19	ADC1_VREFP	AE15	20	ADC1_VREFN	AD15
21	CAM1_DATA0	AB20	22	CAM1_PCLK	AE21
23	CAM1_DATA2	AD21	24	CAM1_DATA1	AC21
25	CAM1_DATA4	AD22	26	CAM1_DATA3	AE22
27	CAM1_DATA6	AD23	28	CAM1_DATA5	AE23
29	CAM1_DATA8	AD24	30	CAM1_DATA7	AE24
31	CAM1_HSYNC	AD25	32	CAM1_DATA9	AC24
33	CAM1_FIELD	AC25	34	CAM1_VSYNC	AC23
35	I2C_SDA0	AB24	36	CAM1_WEN	AB25
37	I2C_SCL1	T20	38	I2C_SCL0	Y22
39	SPI0_D0	T22	40	I2C_SDA1	T21
41	SPI0_SCLK	P23	42	SPI2_CS0	T23
43	SPI2_D1	P20	44	SPI2_D0	P22
45	SPI2_SCLK	N20	46	SPI1_SCLK	N24
47	SPI1_CS0	M24	48	SPI1_D0	N22
49	SPI1_D1	H23	50	AUD_MCLK	**12MHz**
51	VDD_3V3	**3.3V Power**	52	UART3_CTSN	H22
53	VDD_5V0	**5.0V Power**	54	VDD_5V0	**5.0V Power**
55	GND	**Power Ground**	56	GND	**Power Ground**

Dimension

The product LoongBoard-L7 can be mounted using the 4 screw holes on the PCB as shown in Figure 7.Please make sure the display is not exposed to high pressure when mounting into an enclosure.

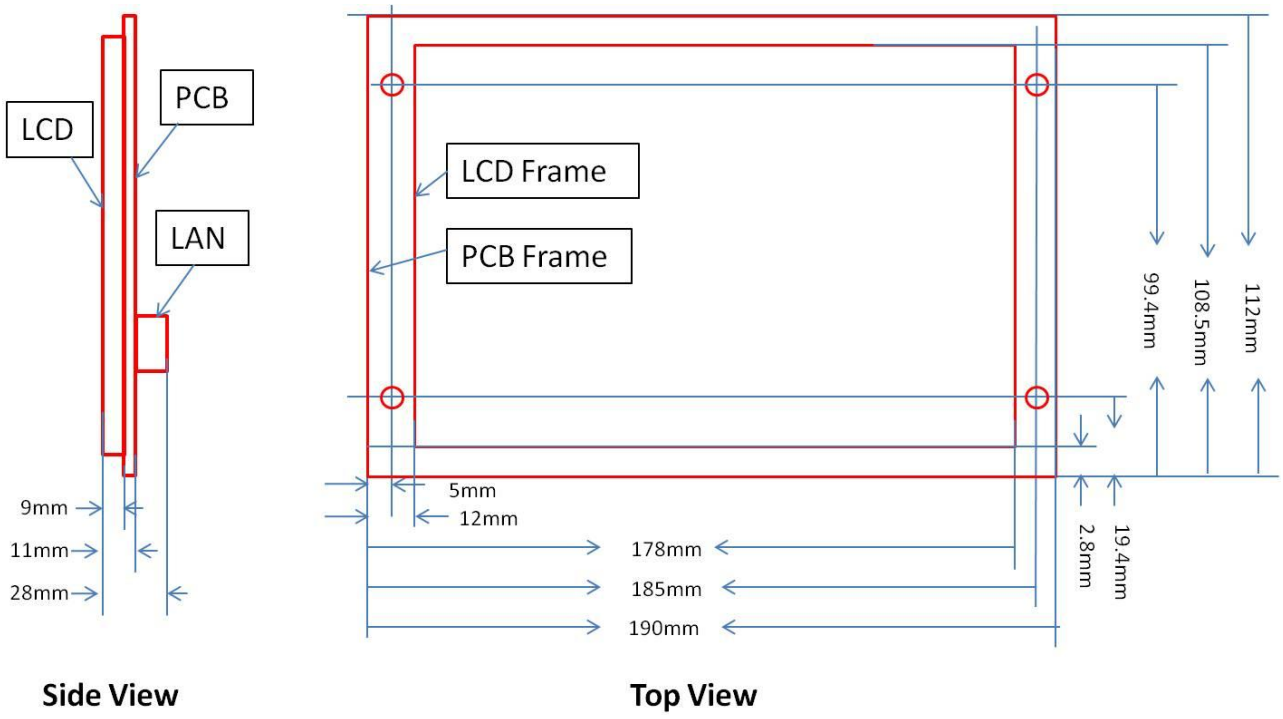

Figure 7 LoongBoard-L7 Dimensions

How to get support

LoongBoard is a sub-brand of Chipsee,Please feel free to contact Chipsee with any questions, queries or suggestions.If your question is about technical support or troubleshooting for one of our products, we kindly ask you to first check our documentation for a possible solution.
If you cannot find the solution you are looking for then please write to service@chipsee.com providing all possible details.

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