LP-150

ARM Pico-ITX Motherboard

User's Manual

Edition 1.3
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Packing List:

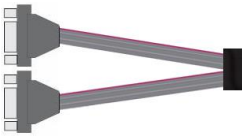
Please check the package content before you starting using the board.

1 x LP-150 Motherboard

Optional:

1 xDC Input Power Cable
(OALDC-B / 1040513)

1 x Audio cable
(OALPJ-HDUNB / 1040123)



1 x Dual COM cable
(OALES-BKU2NB / 1040090)

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Chapter 1 <Introduction>

1.1 <Product Overview>

LP-150 is a Pico motherboard that based on Rockchip RK3128 high performance Quad-core application processor to implement most useful features and functionalities of this integrated processor. This motherboard is designed to be a development board for customers to implement and verify their applications for RK3128 features.

The RK3128 Quad-core Cortex-A7 is integrates with separately Neon and FPU coprocessor, also shared 256KB L2 Cache. Mali400 MP2 GPU is embedded to support smoothly high-resolution (1080p) display and mainstream game.
Lots of high-performance interface to get very flexible solution, such as multi-pipe display with HDMI1.4, TV Encoder. Crypto hardware is integrated for support security BOOT. 32bits DDR3/LPDDR2 provides high memory bandwidths for high-performance.

The device enables OEMs and ODMs to quickly bring to market devices featuring robust operating systems support, rich user interfaces, and high processing performance life through the maximum flexibility of a fully integrated mixed processor solution.

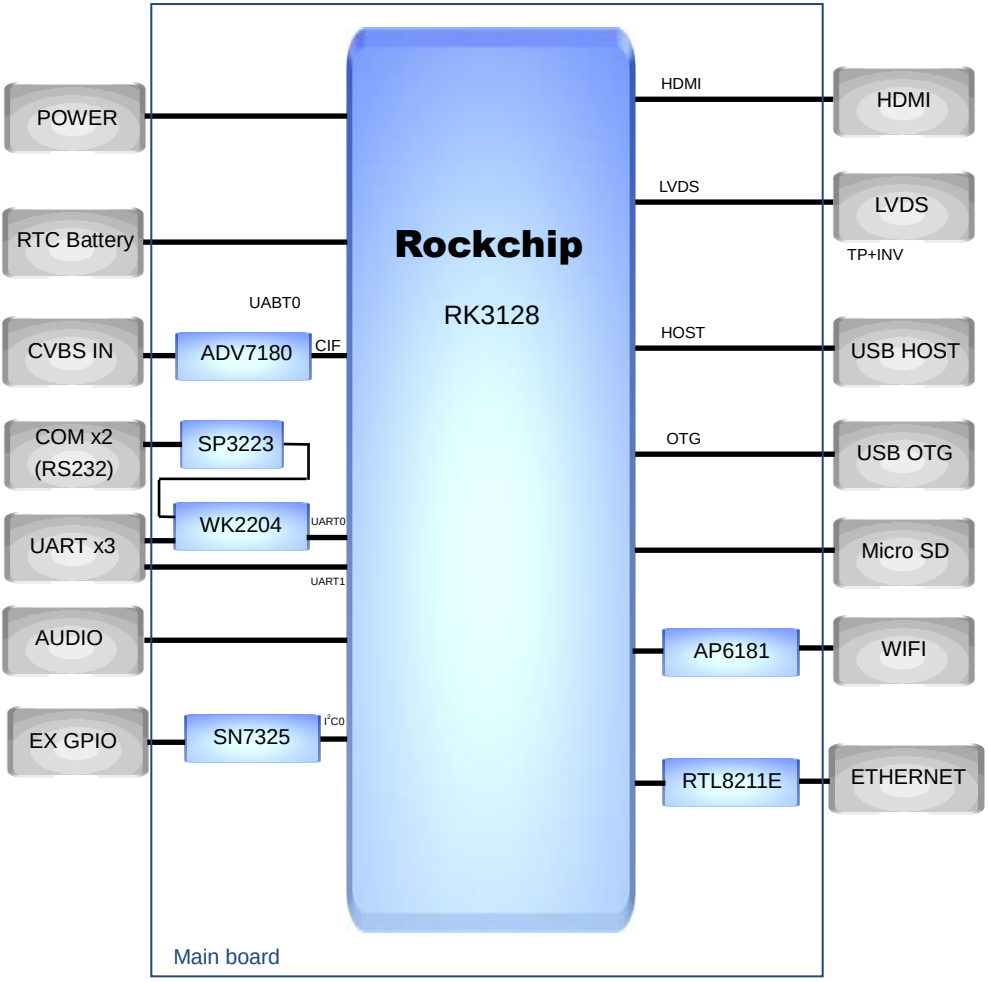
The Cortex-A7 processor builds on the energy-efficient 8-stage pipeline of the Cortex-A5 processor. It also benefits from an integrated L2 cache designed for low-power, with lower transaction latencies and improved OS support for cache maintenance. On top of this there is improved branch prediction and an improved memory system performance, with 64-bit load-store path, 128-bit AMBA 4 AXI buses and increased TLB size (256 entry, up from 128 entry for Cortex-A9 and Cortex-A5), increasing performance for large workloads such as web browsing.

In a 28nm process, the Cortex-A7 can run at 1.2-1.6GHz, has an area of 0.45mm2 (with Floating-Point Unit, NEON and a 32KB L1 cache) and requires less than 100mW of total power in typical conditions. This lowest performance profile makes it an ideal standalone processor for a range of mobile devices, and means the Cortex-A7 can ultimately deliver similar performance to the Cortex-A9 processor at much higher levels of power efficiency.

1.2 <Product Specification>

System	
Processor	Rockchip RK3128 Quad-core Cortex-A7
Speed	Cortex-A7@1.3 GHz
Memory	512MB DDR3
Real Time Clock	Integrated RTC onboard
GPU	Mali400 MP2 GPU is embedded
Display	
HDMI	Integrated HDMI 1.4 output up to 1080P
Display	Default 1024x600 LVDS LCD panel
Display Interface	Default Capacitive 1024x600 touch screen
Software	
OS	Compatible with Android 4.4.4
I/O	
Flash Support	1 x 8GB onboard eMMC, 1 x Micro SD card slot
Audio	Rk3128 Built-in Stereo Audio CODEC
LAN	RTL8211E Ethernet Transceiver
Internal I/O	1 x Pin header for RS232 x 2, 1 x Pin header for UART x 3 1 x LVDS panel connector, 1 x LVDS inverter connector, 1 x Pin header for expand GPIO, 1 x RTC battery 1 x Audio pin header for line-out and MIC-in 1 x system reset, power LED
External I/O	1 x Micro SD card slot, 1 x HDMI port, 1 x USB Host 2.0 ports 1 x USB OTG 2.0 port, 1 x RJ-45 LAN port, 1 x CVBS Input 1 x 5V DC-in power
Mechanical & Environmental	
Power Requirement	DC INPUT 5V
Size & Thickness	100mm x 72mm (L x W)
Temperature	Operating within 0°C~70°C (32°F~158°F) Storage within -20°C~80°C (-4°F~176°F)
Relative Humidity	10%~90%, non-condensing

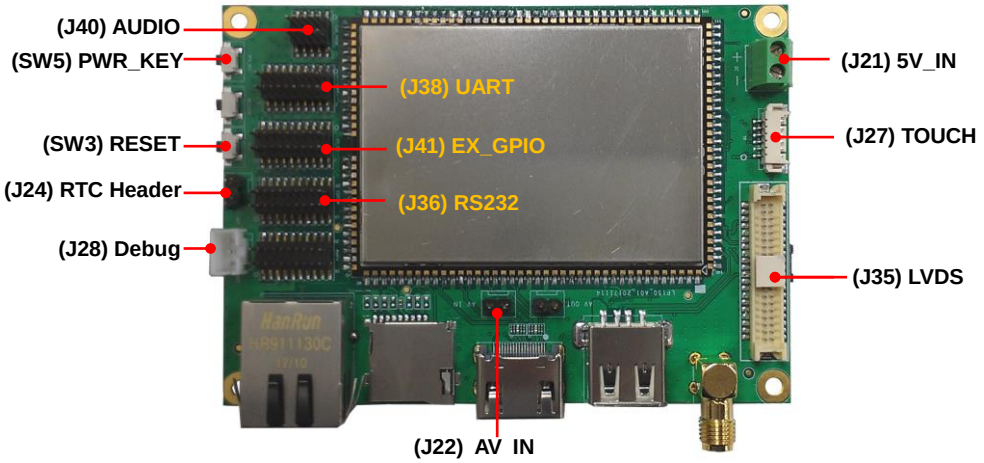
1.3 <Block Diagram>



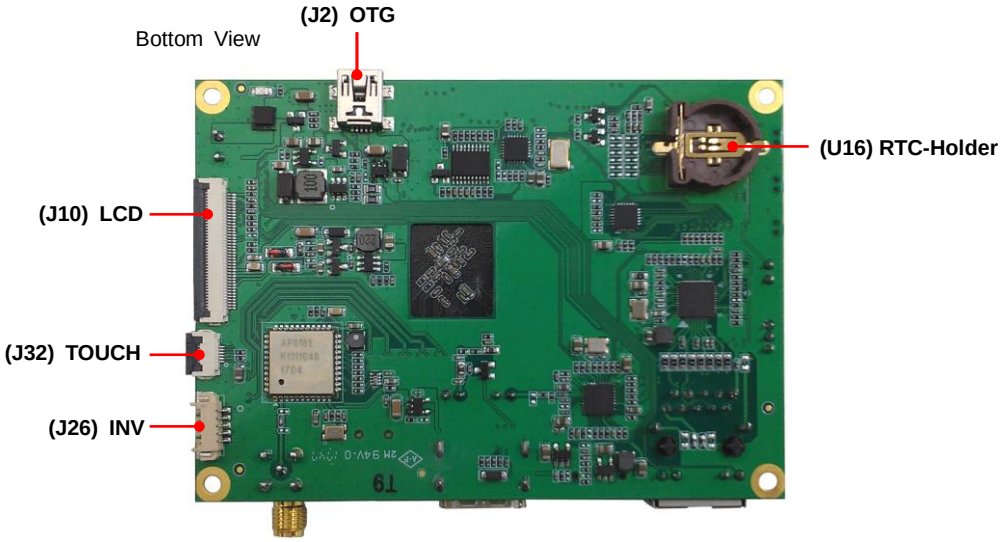
Chapter 2 <Hardware setup>

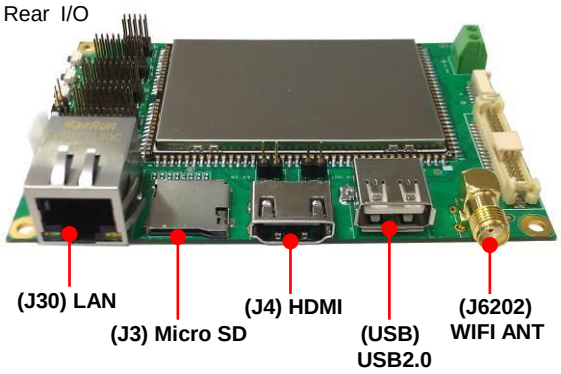
2.1 <Connector Location and Reference>

Top View



Bottom View





2.1.1 <Internal connectors list>

Connector	Function
J21	2-pin power input Terminal Block (5V Only)
J22	2-pin AV IN pin header
J27	6-pin Touch panel connector
J35	20 x 2-pin LVDS connector
J40	5 x 2-pin AUDIO pin header
J38	9 x 2-pin UART pin header
J41	10 x 2-pin External IO pin header
J36	10 x 2-pin RS-232 pin header
SW5	Power button
SW3	Reset button
J24	2-pin RTC battery pin header
J28	2-pin DEBUG pin header
U16	RTC Battery holder
J10	40-pin FPC LCD panel connector
J32	6-pin FPC Touch panel connector
J26	5-pin LCD inverter connector

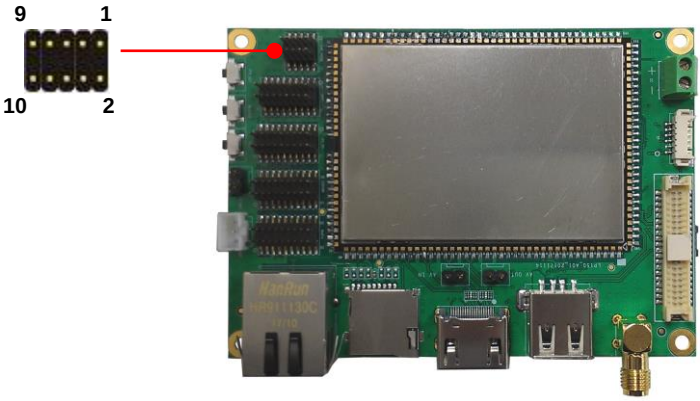
2.1.2 <External connectors list>

Connector	Function
J30	RJ45 LAN connector
J3	Micro SD connector
J4	HDMI connector
USB	USB Host 2.0 connector
J6202	WiFi SMA Antenna connector
J2	USB OTG 2.0 connector

2.2 <I/O Interface>

2.2.1 <Audio Interface>

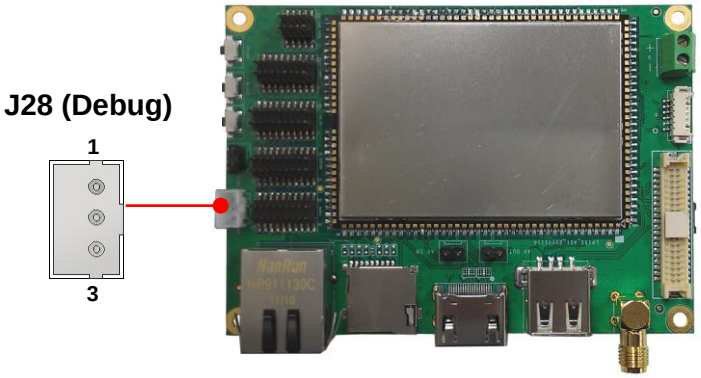
J40 (AUDIO)



J40: Front panel audio 10-pin header (Pitch 1.27mm x 2.54mm)

Pin	Signal	Pin	Signal
1	MIC_IN-	**2**	GND
3	MIC_IN+	**4**	NC
5	HP_OUTR	**6**	NC
7	NC	**8**	NC
9	HP_OUTL	**10**	NC

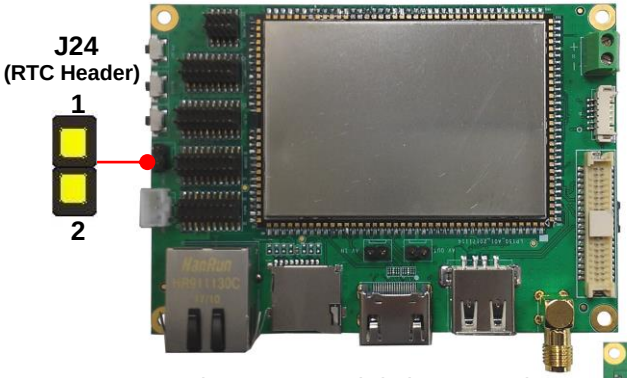
2.2.2 <Debug Interface>



J28: Debug 3-pin connector

Pin	Signal
1	UART_TX
2	UART_RX
3	GND

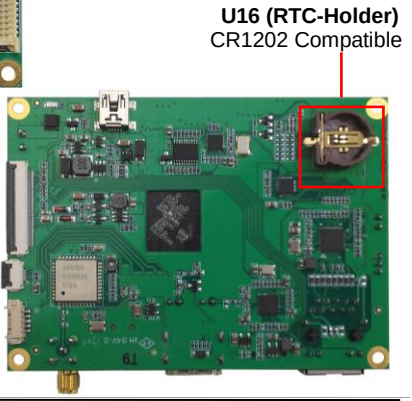
2.2.3 <RTC Interface>



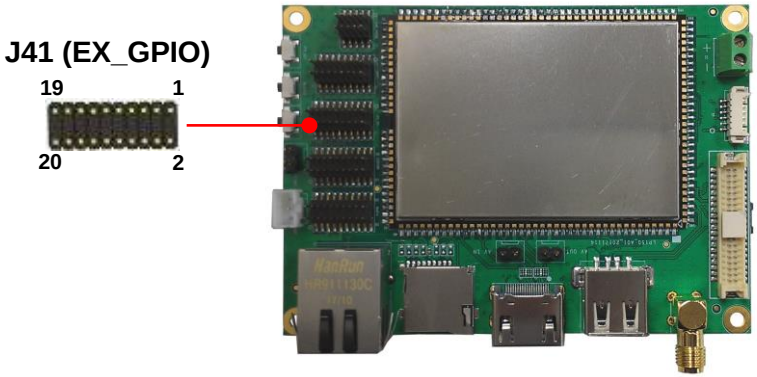
J24: RTC 2-pin connector (Pitch 2.54mm)

Pin	Signal
1	3.3V
2	GND

J24 and U16 are alternative to use



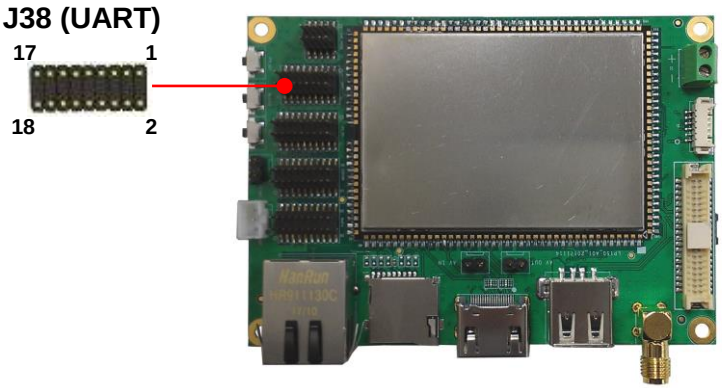
2.2.5 <Expend GPIO Interface>



J41: 16bits EX_GPIO 20-pin header (Pitch 1.27mm x 2.54mm)

Pin	Signal	Pin	Signal
1	EX_GPIO1	**2**	EX_GPIO2
3	EX_GPIO3	**4**	EX_GPIO4
5	EX_GPIO5	**6**	EX_GPIO6
7	EX_GPIO7	**8**	EX_GPIO8
9	EX_GPIO9	**10**	EX_GPIO10
11	EX_GPIO11	**12**	EX_GPIO12
13	EX_GPIO13	**14**	EX_GPIO14
15	EX_GPIO15	**16**	EX_GPIO16
17	VCCIO(3.3V)	**18**	GND
19	VCCIO(3.3V)	**20**	GND

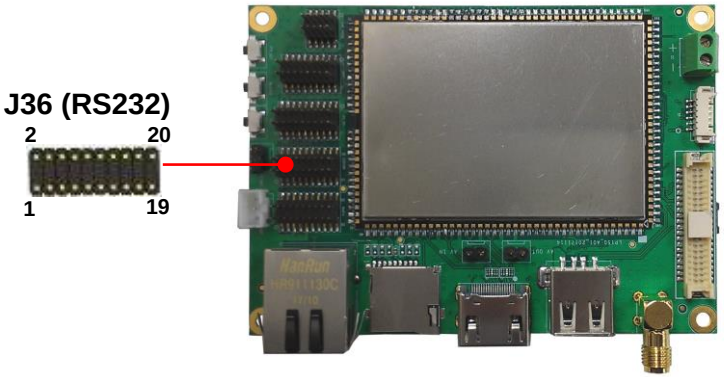
2.2.6 <UART Interface>



J38: 18-pin UART header (Pitch 1.27mm x 2.54mm)

Pin	Signal	Pin	Signal
1	UART1_RX_GPIO1_B2_SPI_RX	**2**	UART1_TX_GPIO1_B1_SPI_TX
3	UART1_RTS_GPIO1_B3_SPI_CSN	**4**	UART1_CTS_GPIO1_B0_SPI_CLK
5	GND	**6**	GND
7	UART_EX2_RX	**8**	UART_EX2_TX
9	UART_EX2_RTS	**10**	UART_EX2_CTS
11	GND	**12**	GND
13	UART_EX4_RX	**14**	UART_EX4_TX
15	UART_EX4_RTS	**16**	UART_EX4_CTS
17	GND	**18**	GND

2.2.7 <RS-232 Interface>



J36: 20-pin RS232 header (Pitch 1.27mm x 2.54mm)

Pin	Signal	Pin	Signal
1	NC	**2**	232_1_RX
3	232_1_TX	**4**	NC
5	GND	**6**	NC
7	NC	**8**	NC
9	NC	**10**	NC
11	NC	**12**	232_2_RX
13	232_2_TX	**14**	NC
15	GND	**16**	NC
17	NC	**18**	NC
19	NC	**20**	NC

Note:

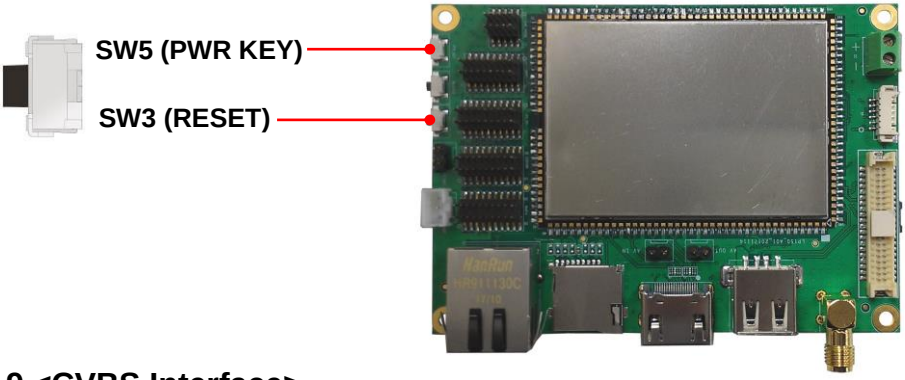
232_1_TX: direction input, from external device to RK3128.

232_2_TX: direction input, from external device to RK3128.

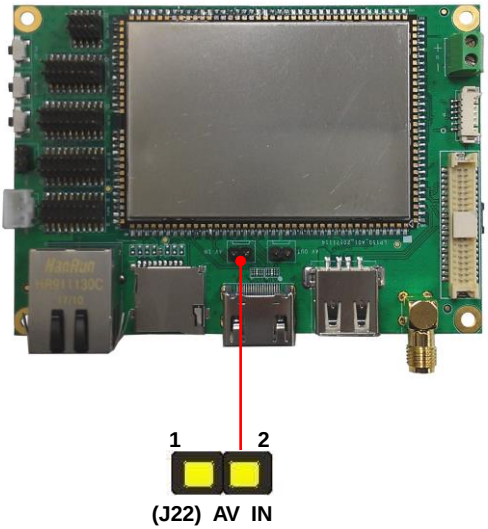
232_1_RX: direction output, from RK3128 to external device.

232_2_RX: direction output, from RK3128 to external device.

2.2.8 <Push Button>



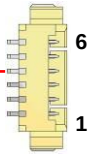
2.2.9 <CVBS Interface>



J22: 2-pin AV IN connector

Pin	Signal
1	CVBS IN
2	GND

2.2.10 <Touch Panel Interface>

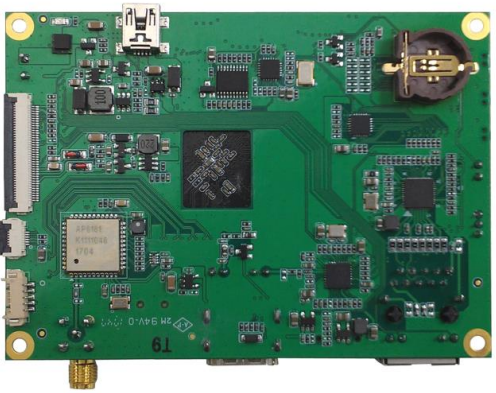


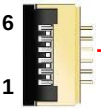
(J27) TOUCH

J27: 6-pin Touch panel connector (Pitch 1.25mm)

Pin	Signal
1	VCCIO(3.3V)
2	GND
3	TP_INT
4	TP_RST
5	I2C0_SDA
6	I2C0_SCL

2.2.11 <FPC Touch Interface> Shared with J27



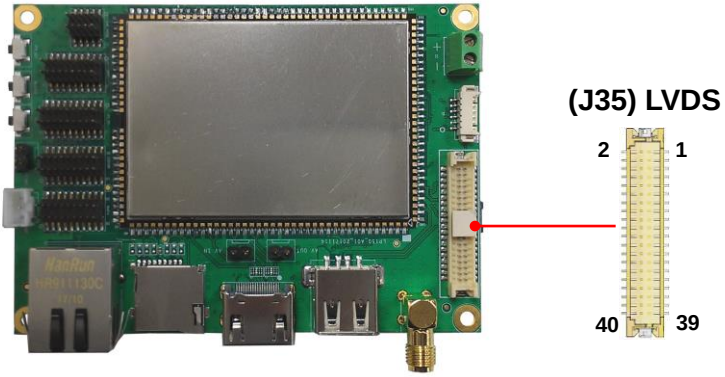


(J32) TOUCH

J32: 6-pin FPC Touch panel connector (Pitch 1.25mm)

Pin	Signal
1	TP_RST
2	VCCIO(3.3V)
3	GND
4	TP_INT
5	I2C0_SDA
6	I2C0_SCL

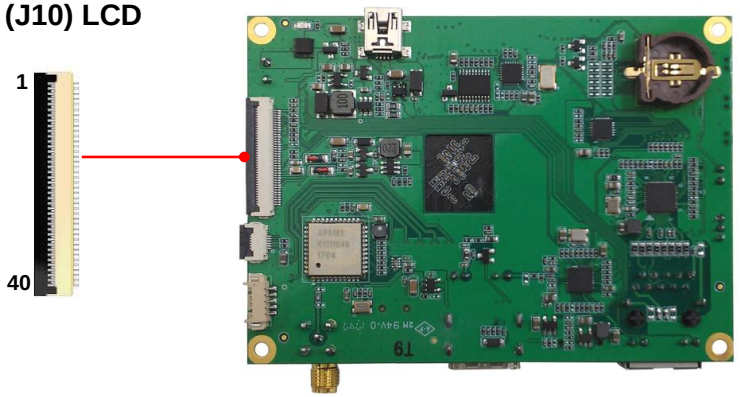
2.2.12 <LVDS Interface>



J35: LVDS 40-pin connector (Model: HIROSE DF13-40DP-1.25V compatible)

Pin	Signal	Pin	Signal
1	LCD_3V3	**2**	NC
3	NC	**4**	NC
5	NC	**6**	LVDS_0-
7	NC	**8**	LVDS_0+
9	NC	**10**	GND
11	NC	**12**	LVDS_1-
13	NC	**14**	LVDS_1+
15	NC	**16**	GND
17	NC	**18**	LVDS_2-
19	NC	**20**	LVDS_2+
21	NC	**22**	GND
23	NC	**24**	LVDS_CLK-
25	NC	**26**	LVDS_CLK+
27	NC	**28**	GND
29	NC	**30**	LVDS_3-
31	NC	**32**	LVDS_3+
33	NC	**34**	GND
35	LCD_RST	**36**	NC
37	LCD_STB	**38**	NC
39	NC	**40**	NC

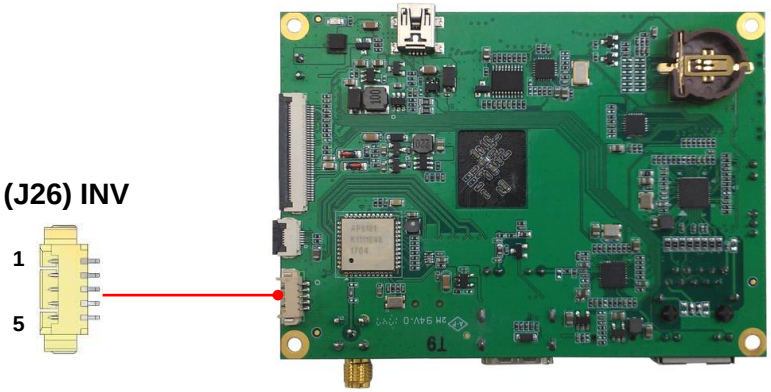
2.2.13 <FPC LCD Inverter Interface> Shared with J35



J10: 40-pin FPC LCD connector (Pitch 1.25mm)

Pin	Signal	Pin	Signal
1	VCOM	**21**	GND
2	LCD_3V3	**22**	LVDS_3-
3	LCD_3V3	**23**	LVDS_3+
4	NC	**24**	GND
5	LCD_RST	**25**	SELB
6	U_D	**26**	GND
7	L_R	**27**	AVDD
8	LCD_STB	**28**	GND
9	GND	**29**	VGH
10	LVDS_CLK-	**30**	NC
11	LVDS_CLK+	**31**	NC
12	GND	**32**	VGL
13	LVDS_0-	**33**	GND
14	LVDS_0+	**34**	NC
15	GND	**35**	VCC_LEDK
16	LVDS_1-	**36**	VCC_LEDK
17	LVDS_1+	**37**	NC
18	GND	**38**	NC
19	LVDS_2-	**39**	VCC_LEDA
20	LVDS_2+	**40**	VCC_LEDA

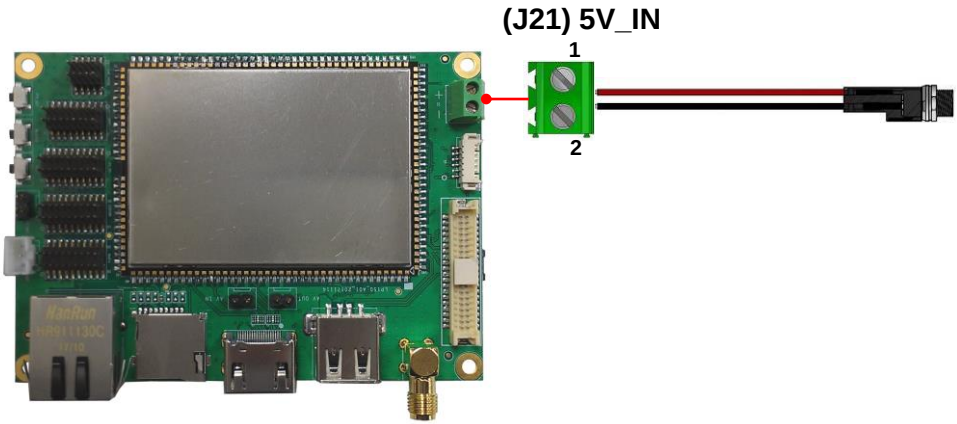
2.2.14 <LCD Inverter Interface>



J26: 5-pin LCD inverter connector (Pitch 1.25mm)

Pin	Signal
1	LCD_5V
2	LCD_3V3
3	GND
4	VCC_LEDK
5	VCC_LEDA

2.2.15 <Power supply>



J21: Terminal Block 2-pin power connector

Pin	Signal	Pin	Signal
1	Power in (5V ONLY)	**2**	GND

Contact information

Any advice or comment about our products and service, or anything we can help you please don't hesitate to contact with us. We will do our best to support you for your products, projects and business.

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