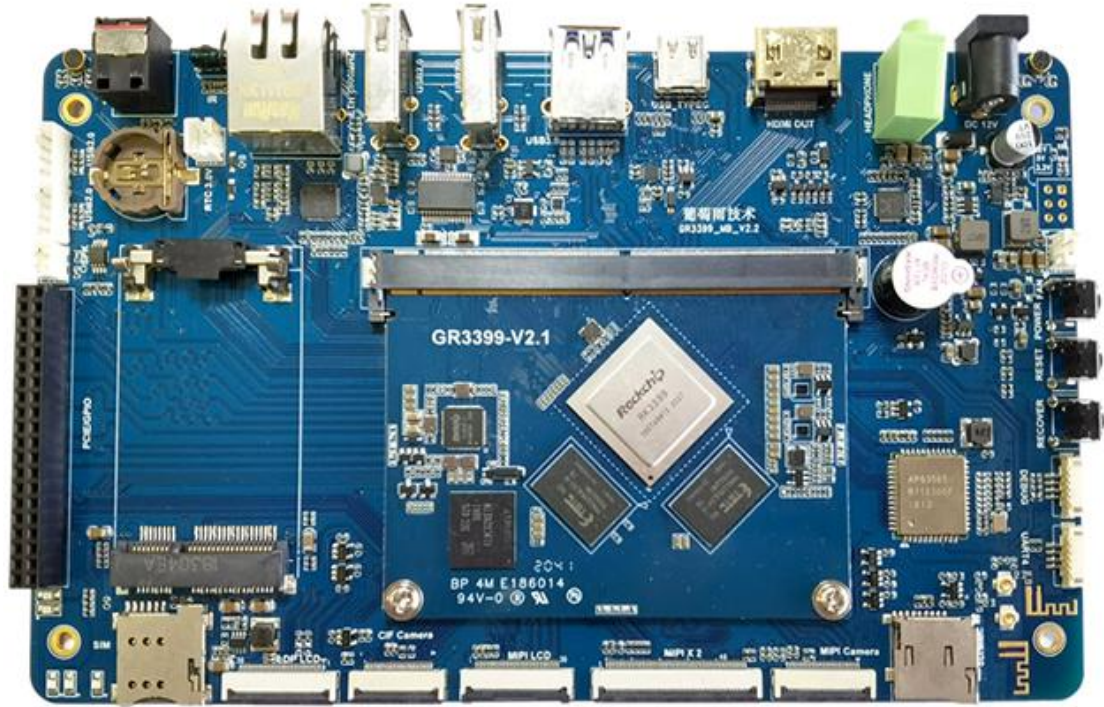


GR3399 Development Board Hardware Manual



Shenzhen Graperain Technology Co., Ltd.
www.graperain.com

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Release notes

Version	Release Date	Author	Description
Rev.01	2018-6-01	David	Revision

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Chapter 1 GR3399 Development Board Introduction

1.1 Brief Introduction

GR3399 dev board bases on Rockchip RK3399 (64bit) chip platform, which is designed by Shenzhen Graperrain Technology Co., Ltd..

GR3399 dev board consists of GR3399 SOM and carrier board.

GR3399 SOM is based on Rockchip RK3399, 64 bit 6-core, work-station-level processor. It's Dual-core Cortex-A72 + Quad-core Cortex-A53. The frequency is up to 2.0GHz. The new kernel is almost 100% performance up than A15/A17/A57.

Integrated with ARM Mali-T860 MP4 graphics processor, supports OpenGL ES1.1/2.0/3.0/3.1, OpenVG1.1, OpenCL, Directx11, AFBC (ARM Frame Buffer Compression). Such powerful GPU supports H.265HEVC and VP9, H.265 encode and 4K HDR. And it can be applied to computer vision, learning machine, 4K 3D etc..

Interfaces: Dual MIPI-CSI, dual ISP, PCIe, USB3.0, USB2.0, TypeC etc.

GR3399 development board designed almost all the functions of the CPU, especially in data communication and expansion. Peripherals on board including: 4G LTE, TypeC, USB3.0, USB2.0, Gigabit Ethernet, dual-wifi, bluetooth, audio/video input/output, sensors, display port, communication port, cameras etc..

It supports Android7.1, Linux and Debian. Source code are open.

Applications: high-definition display with advertising machine, vending machines, teaching terminals, automatic identification, robotics, security monitoring, financial POS, vehicle control terminals, VR, etc.. With the dev board to test, it will accelerate product development time.

GR3399 dev board features:

- Size: 186mm*116mm, can be used in final product.
- Powerful functions, rich interfaces, wide applications.
- Supports Android7.1, Linux, Debian. Source code open, accelerate develop time.
- Stable and reliable board.

1.2 Specifications

Parameters	
Appearance	Gold finger SOM + carrier board
Size	186mm*116mm
Layer	SOM 8-layer/carrier board 4-layer

System Configuration	
CPU	Rockchip RK3399
Frequency	Cortex A53 quad core 1.4GHz + dual core A72 (2GHz)
RAM	standard 2GB, can be custom to 4GB
eMMC	4GB/8GB/16GB/32GB eMMC optional, standard 8GB
Power IC	RK808, dynamic frequency modulation
Graphic and video processor	Mali-T860 MP4, quad core GPU Support OpenGL ES 1.1/2.0/3.0/3.1, Openvg1.1, OpenCL, Directx11 Support 4K VP9 and 4K 10bits H265/H.264 video encoder, up to 60 fps 1080P multi-form video encoder 1080P video encoder, H.264, VP8

Interfaces parameters	
Display	MIPI , eDP output
Ethernet	RTL8211E Gigabit PHY
Touch	Capacitive touch,can use USB or UART to extend resistive touch
Audio	AC97/IIS/PCM, support record and play
SD	2 channel SDIO output
eMMC	On board eMMC
Ethernet	Gigabit
USB HOST	2 channel HOST2.0, 1 channel HOST3.0
USB TYPEC	1 channel
UART	5 channel UART, support flow control uart
PWM	2 channel PWM output
IIC	6 channel IIC output
SPI	1 channel SPI output
ADC	5 channel ADC
Camera	1 channel BT656/BT601, 2 channel MIPI
HDMI	High-definition audio and video output, Audio and video synchronization output
MIPI	1channel MIPI RX, 1 channel MIPI TX, 1 channel MIPI RX/TX
eDP	Support

Electrical characteristics	
Input Voltage	12V/2A
Output Voltage	12V/5V/3.3V

Storage temperature	-30~80 degree
Working temperature	-20~70 degree

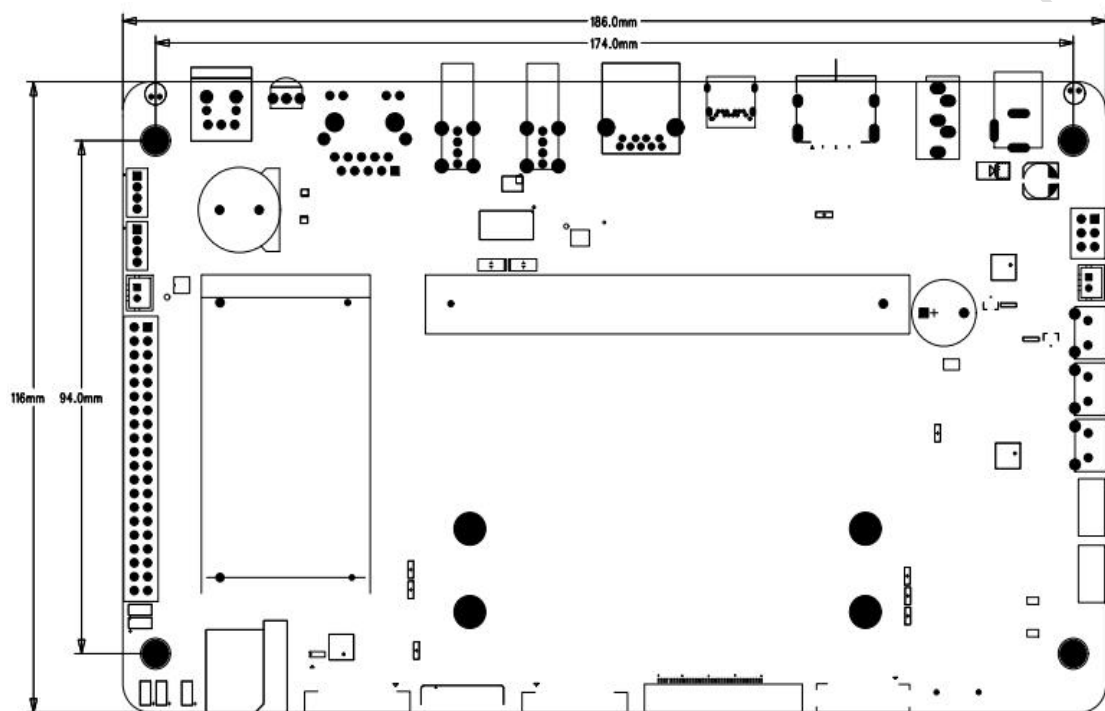
1.3 Dev Board Appearance



Dev board front side

1.4 Dev Board Structure

Size

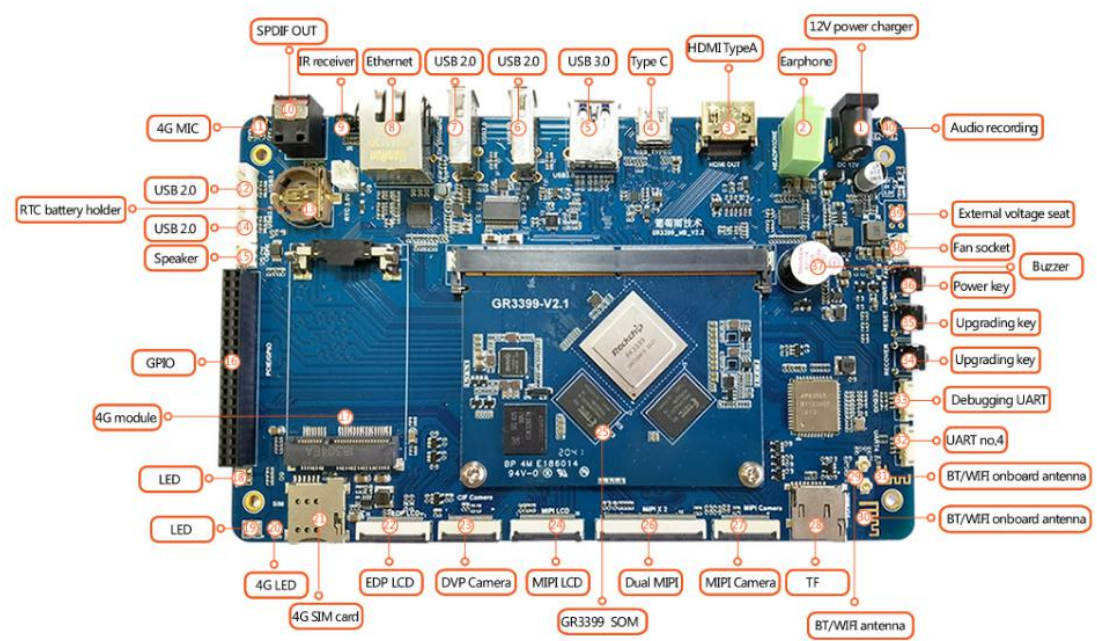


1.5 SOM Appearance

Please refer to *GR3399 Gold Finger System on Module Introduction.pdf*.

Chapter 2 Dev Board Hardware Manual

2.1 Hardware Interfaces Description



Interfaces details		
Number	Name	Description
【1】	12V power charger	12V power input
【2】	Earphone	Audio earphone output
【3】	HDMI TypeA	HDMI TypeA output
【4】	TypeC	TypeC
【5】	USB3.0	USB3.0
【6】	USB2.0	USB2.0
【7】	USB2.0	USB2.0
【8】	Ethernet	RJ45
【9】	IR receiver	IR receiver
【10】	SPDIF OUT	SPDIF output
【11】	4G Mic	4G communication record
【12】	USB2.0	USB2.0 4pin
【13】	RTC	RTC
【14】	USB2.0	USB2.0 4pin
【15】	Speaker	2pin speaker socket
【16】	GPIO	Include PCIE and GPIO extension

【17】	4G module	4G LTE, EC20 module in default
【18】	LED	Controllable LED
【19】	4G LED	4G LED light
【20】	LED	Controllable LED
【21】	4G SIM card	4G SIM card slot
【22】	EDP LCD	EDP LCD
【23】	DVP Camera	DVP Camera
【24】	MIPI LCD	MIPI LCD, standard 7 inch mipi
【25】	GR3399 SOM	GR3399 SOM
【26】	Dual MIPI	Dual MIPI, input/output
【27】	MIPI Camera	MIPI Camera, standard OV13850
【28】	TF card	TF card slot
【29】	BT/WIFI antenna	BT/WIFI antenna
【30】	BT/WIFI onboard antenna	BT/WIFI onboard antenna
【31】	BT/WIFI onboard antenna	BT/WIFI onboard antenna
【32】	UART no.4	UART no.4, TTL
【33】	Debugging UART	Debugging UART, TTL
【34】	Upgrading key	Upgrading key
【35】	Reset	Reset
【36】	Power	Power
【37】	Buzzer	Buzzer
【38】	Fan socket	Fan socket, 12V power supply
【39】	External voltage seat	External volt, 12V/5V/3.3V, GND
【40】	Audio recording	Audio recording MIC
【41】	Sensors(not mark in pic)	Onboard gravity sensor, gyroscope, light sensor

2.2 GR3399 SOM Pin Definitions

Pin Definitions			
Back pins	Signal	Front pins	Signal
1	GND	2	VCC_SYS
3	GND	4	VCC_SYS
5	GND	6	VCC_SYS
7	GND	8	VCC_SYS
9	GND	10	VCC_SYS

11	GND	12	VCC_SYS
13	GND	14	VCC_SYS
15	RESET_L	16	VCC_SYS
17	POWER_KEY	18	VCC_SYS
19	VCC_CHARGE_EN	20	VCC_SYS
21	PMIC_EXT_EN	22	VCC_SYS
23	VCC_3V0	24	VCC_SYS
25	VCC_3V0	26	VCC_SYS
27	VCC_SDIO	28	VCC3V3_S5
29	VCC_SDIO	30	VCC3V3_S5
31	VCC3V3_S0	32	GND
33	VCC3V3_S0	34	GND
35	VCC3V3_S7	36	GND
37	VCC3V3_S7	38	GND
39	VCC1V8_DVP	40	GND
41	VCC1V8_CODEC	42	GND
43	VCC1V8_CODEC	44	EDPAUXN
45	VCC_1V5	46	EDPAUXP
47	VCC_1V5	48	GND
49	VCC1V8_S3	50	EDP_TX0N
51	VCC1V8_S3	52	EDP_TX0P
53	VCC_1V8	54	GND
55	VCC_1V8	56	EDP_TX1N
57	VCC_RTC	58	EDP_TX1P
59	VCC_EFUSE	60	GND
61	MAC_TXD3	62	EDP_TX2P
63	MAC_TXEN	64	EDP_TX2N
65	MAC_CRIS	66	GND
67	MAC_TXD1	68	EDP_TX3P
69	MAC_RXER/INT	70	EDP_TX3N
71	MAC_TXD2	72	GND
73	MAC_MCLK	74	GPIO2_B4/DVP_PDN0_H
75	MAC_RXD3	76	GPIO2_B1/I2C6_SDA/CIF_HRE
77	MAC_TXD0	78	GPIO2_B0/I2C7_SCL/CIF_VSY
79	MAC_RXDV	80	GPIO2_A0/I2C2_SDA/CIF_D0
81	MAC_RXD0	82	GPIO2_A1/I2C2_SCL/CIF_D1
83	MAC_COL/PMEB	84	GPIO2_A2/CIF_D2
85	MAC_RXCLK	86	GPIO2_A3/CIF_D3
87	MAC_TXCLK	88	GPIO2_A4/CIF_D4
89	MAC_MDC	90	GPIO2_A5/CIF_D5
91	MAC_RXD1	92	GPIO2_A6/CIF_D6
93	MAC_RXD2	94	GPIO2_A7/I2C7_SDA/CIF_D7
95	MAC_MDIO	96	GPIO2_B2/I2C6_SCL/CIF_CLKI

97	GND	98	GPIO2_B3/CIF_CLKO
99	PCIE_TX2P	100	GND
101	PCIE_TX2N	102	SPI1_CLK
103	GND	104	SPI1_RXD
105	PCIE_RX2_P	106	SPI1_TXD
107	PCIE_RX2_N	108	SPI1_CSN0
109	GND	110	GPIO0_B5
111	PCIE_TX3N	112	GPIO0_A2
113	PCIE_TX3P	114	GPIO1_C6
115	GND	116	TOUCH_INT_L
117	PCIE_RX3_P	118	LCD_EN_H
119	PCIE_RX3_N	120	GPIO1_D0
121	GND	122	I2C4_SCL
123	PCIE_REF_CLKP	124	I2C4_SDA
125	PCIE_REF_CLKN	126	GPIO1_A1
127	GND	128	SPK_CTL_H
129	PCIE_TX0N	130	GPIO1_A0
131	PCIE_TX0P	132	GPIO0_B0
133	GND	134	GPIO1_C7
135	PCIE_RX0_N	136	GPIO1_A3
137	PCIE_RX0_P	138	GPIO1_A4
139	GND	140	IR_RX
141	PCIE_TX1N	142	GND
143	PCIE_TX1P	144	RTC_CLK_OUT
145	GND	146	GND
147	PCIE_RX1_N	148	HOST1_DP
149	PCIE_RX1_P	150	HOST1_DM
151	GND	152	GND
153	ADC_IN0	154	HOST0_DM
155	ADC_IN1	156	HOST0_DP
157	ADC_IN2	158	GND
159	ADC_IN4	160	TYPEC0_U2VBUSDET
161	ADKEY_IN	162	USB3_SSTXN
163	GND	164	USB3_SSTXP
165	USB3_DP	166	GND
167	USB3_DM	168	USB3_SSRXP
169	GND	170	USB3_SSRXN
171	TYPEC0_DM	172	GND
173	TYPEC0_DP	174	TYPEC0_TX2N
175	GND	176	TYPEC0_TX2P
177	TYPEC0_SBU2_DC	178	GND
179	TYPEC0_SBU2_DC	180	TYPEC0_RX2P
181	GND	182	TYPEC0_RX2N

183	TYPEC0_SBU2	184	GND
185	TYPEC0_SBU1	186	TYPEC0_TX1N
187	GND	188	TYPEC0_TX1P
189	TYPEC0_RX1N	190	GND
191	TYPEC0_RX1P	192	HDMI_TX2P
193	GND	194	HDMI_TX2N
195	MIPI_TX0_D0P	196	GND
197	MIPI_TX0_D0N	198	HDMI_TX1P
199	GND	200	HDMI_TX1N
201	MIPI_TX0_D1P	202	GND
203	MIPI_TX0_D1N	204	HDMI_TX0P
205	GND	206	HDMI_TX0N
207	MIPI_TX0_CLKP	208	GND
209	MIPI_TX0_CLKN	210	HDMI_TXCP
211	GND	212	HDMI_TXCN
213	MIPI_TX0_D2N	214	GND
215	MIPI_TX0_D2P	216	MIPI_RX0_D0N
217	GND	218	MIPI_RX0_D0P
219	MIPI_TX0_D3P	220	GND
221	MIPI_TX0_D3N	222	MIPI_RX0_D1N
223	GND	224	MIPI_RX0_D1P
225	MIPI_TX1/RX1_D3N	226	GND
227	MIPI_TX1/RX1_D3P	228	MIPI_RX0_CLKN
229	GND	230	MIPI_RX0_CLKP
231	MIPI_TX1/RX1_D2N	232	GND
233	MIPI_TX1/RX1_D2P	234	MIPI_RX0_D2N
235	GND	236	MIPI_RX0_D2P
237	MIPI_TX1/RX1_CLKN	238	GND
239	MIPI_TX1/RX1_CLKP	240	MIPI_RX0_D3N
241	GND	242	MIPI_RX0_D3P
243	MIPI_TX1/RX1_D1N	244	GND
245	MIPI_TX1/RX1_D1P	246	BT_REG_ON_H
247	GND	248	WIFI_HOST_WAKE_L
249	MIPI_TX1/RX1_D0N	250	WIFI_REG_ON_H
251	MIPI_TX1/RX1_D0P	252	BT_HOST_WAKE_L
253	GND	254	GPIO0_B4
255	SDMMC0_CLK	256	CHG_CC_INT_L
257	SDMMC0_PWR_H	258	UART0_RTS
259	SDMMC0_DET_L	260	UART0_TXD
261	SDMMC0_CMD	262	UART0_CTS
263	SDMMC0_D0	264	UART0_RXD
265	SDMMC0_D1	266	DVP_PDN1_H
267	SDMMC0_D2	268	CAMERA_RST_L

269	SDMMC0_D3	270	CABC_EN
271	SDIO0_CMD	272	BT_WAKE_L
273	SDIO0_D0	274	GPIO4_C6/PWM1_D
275	SDIO0_D1	276	GPIO4_B3
277	SDIO0_D2	278	PORT_HP
279	SDIO0_D3	280	SPDIF_TX
281	SDIO0_CLK	282	PCIE_CLKREG
283	RTC_CLK0_WIFI	284	GPIO4_D2
285	GND	286	I2C1_SDA
287	I2S_CLK	288	I2C1_SCL
289	I2S0_LRCK_RX	290	GPIO4_A5
291	I2S0_SCL	292	HP_DET_H
293	HDMIIN_PWREN18/I2S1_SCL	294	VCC5V0_HOST_EN
295	HDMIIN_STBY/I2S1_SDIO	296	UART2DBG_RX
297	GPIO3_D4/I2S0_SDI1	298	UART2DBG_TX
299	HDMIIN_PWREN33/I2S1_SDO	300	LCD_RST_H
301	HDMIIN_RST/I2S1_LRCK_RX	302	LCD_BL_PWM
303	I2S0_SDIO	304	I2C_SDA_HDMI
305	GPIO3_D5/I2S0_SDO2	306	HDMI_CEC
307	I2S0_SDO0	308	I2C_SCL_HDMI
309	GPIO3_D6/I2S0_SDO1	310	GND
311	I2S0_LRCK_TX	312	GND
313	GND		

Note: more details of GR3399 SOM, please refer to *GR3399 Gold Finger System on Module Introduction.pdf*.

Chapter 3 Hardware Design

3.1 Design Reference

If use GR3399 platform for product design and development, related to power supply, USB, HDMI, eDP, MIPI, PCIe, TypeC, audio, network (Ethernet, WIFI, Bluetooth), camera etc., can refer to our carrier board design. the circuit and layout of those parts are open to customers.

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Chapter 4 Product Portfolio

4.1 System on Module Series

G4418 SOM(Samsung S5P4418)
G6818 SOM(Samsung S5P6818)
G3288 SOM(Rockchip RK3288, stamp hole)
GR3288 SOM (Rockchip RK3288 Immersion Gold MXM)
GR3128 SOM(Rockchip RK3128 Immersion Gold MXM)
GR3399 SOM(Rockchip RK3399 Immersion Gold MXM)
M9 SOM(Qualcomm 8916, 8953)

4.2 Development Board Series

G4418 development board (Samsung S5P4418)
G6818 development board (Samsung S5P6818)
G3288 development board (Rockchip RK3288 stamp hole)
GR3288 development board (Rockchip RK3288 Immersion Gold MXM)
GR3399 development board (Rockchip RK3399 Immersion Gold MXM)

4.3 Single Board Computer (SBC) Series

G4418 single board computer (Samsung S5P4418)
G6818 single board computer (Samsung S5P6818)
G3128 single board computer (Rockchip RK3128)
G3288 single board computer (Rockchip RK3288)
G3399 single board computer (Rockchip RK3399)

Instructions: More information and other products, please pay attention to website or contact us directly.

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