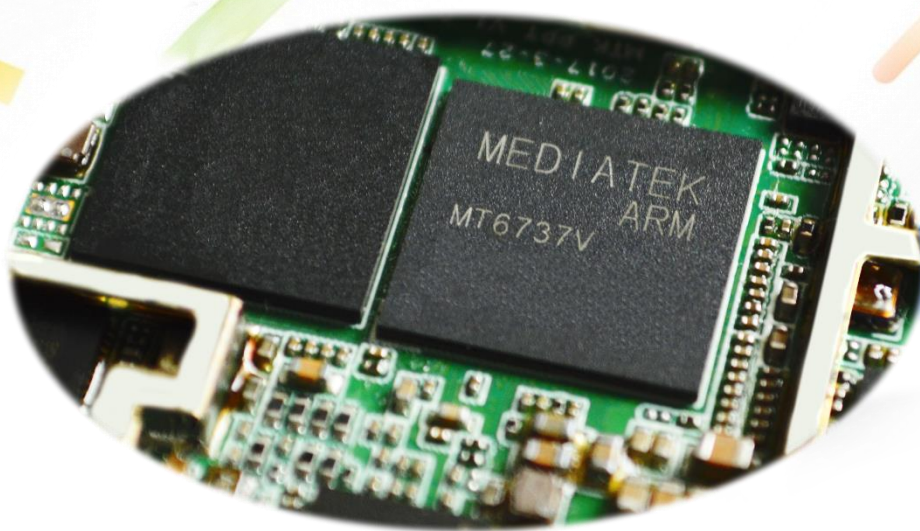


CM-MT6737 Reference User Manual

V1. 201907



Boardcon Embedded Design

www.boardcon.com

1. Introduction

1.1. About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2. Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website (www.boardcon.com , www.armdesigner.com).

These include manuals, application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence, If you have questions, comments, or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3. Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lightning or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs make after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.



Content

1 CM-MT6737 Introduction	3
1.1 Summary	3
1.2 CM-MT6737 Specifications	4
1.3 Block Diagram.....	5
1.4 Pin Definition.....	6
1.5 The Development Board for Application.....	10
2 Hardware Design Guide.....	11
2.1 Peripheral Circuit Reference	11
2.1.1 SIM Card.....	11
2.1.2 SD Card	11
2.1.3 USB2.0 OTG.....	12
2.1.4 UART	12
2.1.5 Audio, MIC, Speaker	12
2.1.6 Camera	13
2.1.7 Display	15
2.1.8 Printer	19
2.2 Power Supply Circuit Design	19
2.3 RF Circuit Design.....	20
2.3.1 RF Technical Indicators.....	20
2.3.2 RF Antenna Circuit Design.....	21
3 Product Electrical Characteristics	22
3.1 Power Supply.....	22
3.2 Operating Current	22
3.3 Reliability Test.....	22

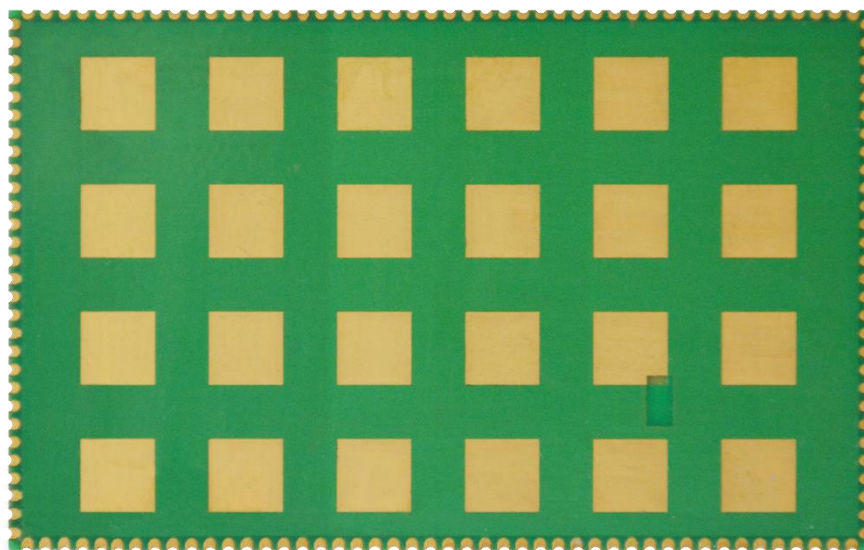
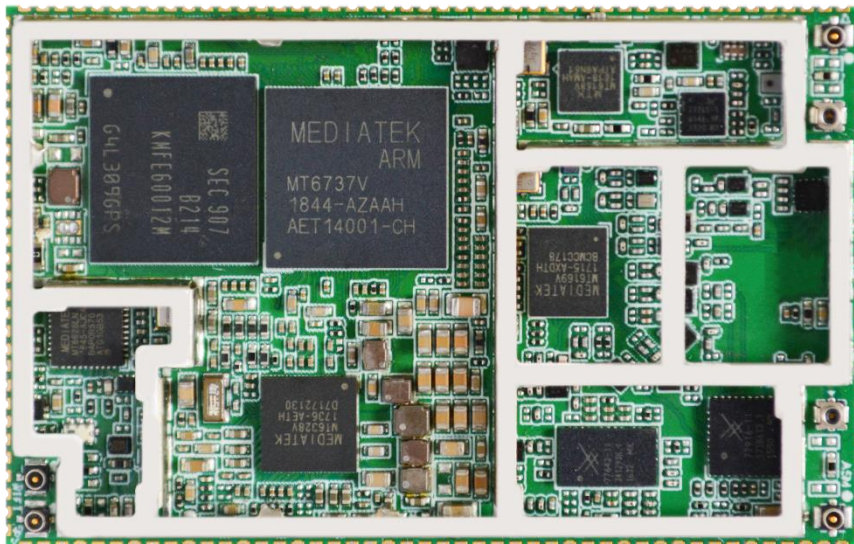
1 CM-MT6737 Introduction

1.1 Summary

CM-MT6737 is a Computer-on-Module powered by MediaTek MT6737 processor that integrates a 64-bit architecture and designed mainly for Android smartphones. The MT6737 module is coupled with 1GB RAM and 4GB eMMC and available with 3G/4G, GPS and WiFi/Bluetooth module with antennas. It can handle 13MP camera and allows for 1080p videos to be played at 30fps.

The CM-MT6737 runs Android7.0 and pins out media I/O including MIPI, as well as speaker, headphone, mic, and I2S.

The module is aimed at automotive, smart speaker, smart wear, and security monitoring.





1.2 CM-MT6737 Specifications

Item	Parameter	Specification
Mechanical properties	Size	60mm x 38mm x 2.2mm
	Weight	10.2g
	Package Type	Stamp hole (150pin)
Baseband	Processor architecture	ARM Cortex-A53 Quad-core 1.3GHz
	(U)SIM/SIM	Standard 6 PIN SIM card interface 3V SIM card and 1.8V SIM card
	RAM	On-board 1GB LPDDR, up to 3GB
	ROM	On-board 4GB eMMC up to 32GB
	USB	USB2.0
	Max power consumption	2.5W
	Voltage	DC 3.7V – 4.2V
	Operating Current	Peak current ≤ 1.3 A Normal working average current ≤ 680 mA Normal working average current (no service) ≤ 75 mA Standby current is about 3.3mA
Radio Frequency	GSM	B3/B8
	CDMA2000	EVD0 (BC0)
	UMTS	B1/B8
	TD-SCDMA	B34/B39
	LTE-FDD/ LTE-TDD	FDD: B1/B3/B5/B8 TDD: B38/B39/B40/B41(100M)
	Main antenna	Support
	Diversity receiving antenna	Support
	Antenna interface	Onboard copper shaft antenna IPEX MHF4 socket
Technical Standard	GPRS Type	Class B
	3GPP Protocol	R99, R5, R6, R7
	Operating System	Android 7.0
Environmental Characteristics	Operating Temperature	TBD
	Storage Temperature	TBD
	Humidity	5%~ 95%
Application	RAS dialing	Support
	Short message	Support
	Lock net	Support
	SIM READER	Support
	Upgrade	Support

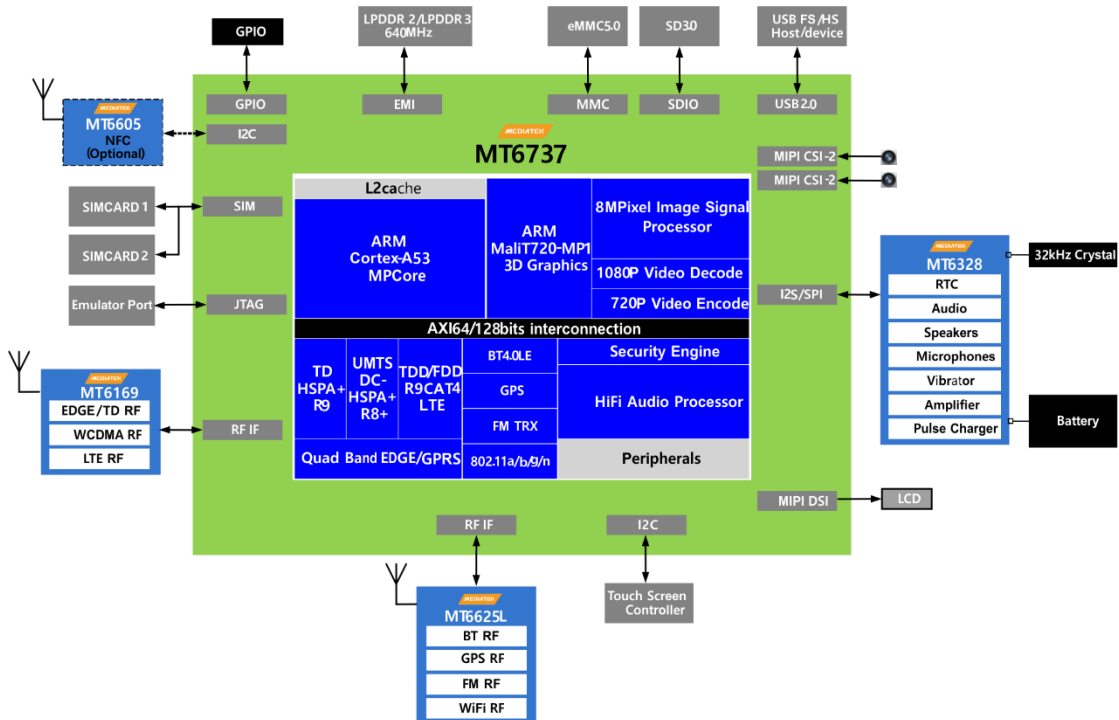
Illustrate:

1. The maximum power consumption is the average value measured at the maximum transmit power;
2. The peak current, normal working average current and normal working (no service) current value in the working current are the maximum values tested in the maximum power consumption mode. The standby current is the current in the SLEEP mode.

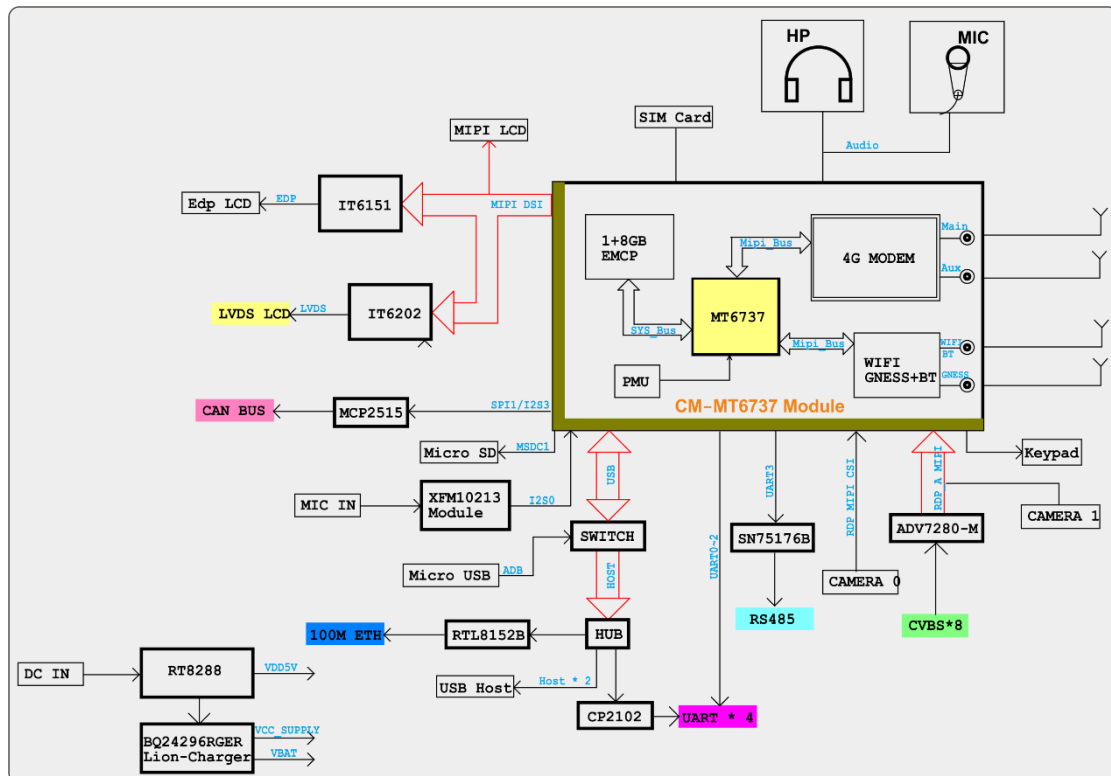


1.3 Block Diagram

◆ CPU



◆ Board





1.4 Pin Definition

Pin	Signal	Function	Description / Alternate functions	IO Level
1	EINT10	Touch panel Interrupt /GPIO10	PWM1/KROW2 /I2S1_MCK	1.8V
2	BPI_Bus17	Touch panel Reset / GPIO99	Add Level shift	1.4V
3	URXD3	UART3 RX / GPIO59	UCTS2/PWM3/KROW6 /DPI_CKO	1.8V
4	UTXD3	UART3 TX / GPIO60	URTS2/PWM4/KROW7 /DPI_CEO	1.8V
5	URXD2	UART2 RX / GPIO57	MD_RXD/KROW4 /DPI_HSYNCO	1.8V
6	UTXD2	UART2 TX / GPIO58	MD_TXD/KROW5 /DPI_VSYNCO	1.8V
7	URXD1	UART1 RX / GPIO76	MD_RXD/SCL3	1.8V
8	UTXD1	UART1 TX / GPIO77	MD_TXD	1.8V
9	URXD0	UART0 RX / GPIO74	MD_RXD/SDA3	1.8V
10	UTXD0	UART0 TX / GPIO75	MD_RXD	1.8V
11	EINT0	USB ID Interrupt / GPIO0	PWM3/KCOL2 /DPI_D4	1.8V
12	ENT2	GPIO Interrupt / GPIO2	CLKM0/PTA_TXD/DRV VBUS/DPI_D6	1.8V
13	GND	GND	\	0V
14	CMMCLK	Camera clock Output	GPIO45	1.8V
15	CMMCLK1	Camera clock 1 / GPIO46	USB ID/KCOL6	1.8V
16	GND	GND	\	0V
17	SCL2	I2C_SCL2	GPIO52	1.8V
18	SDA2	I2C_SDA2	GPIO51	1.8V
19	SCL0	CAM SCL	GPIO48	1.8V
20	SDA0	CAM SDA	GPIO47	1.8V
21	EINT12	CAM_PDN1 / GPIO12	I2S0MCK/KCOL2/IRTX	1.8V
22	EINT11	CAM_RST1 / GPIO11	IRTX/CLKM0/I2S2MCK	1.8V
23	EINT6	GPIO_CAM_RST / GPIO6	SPI_CLK/I2S1_LRCK /DPI_D10	1.8V
24	PCM_TX	GPIO_CAM_PWND / GPIO64	PCM1_DI/I2S0_MCK /DPI_D3	1.8V
25	GND	GND	\	0V
26	RDN3	Rear camera Lane3 N	GPI30	1.8V
27	RDP3	Rear camera Lane3 P	GPI31	1.8V
28	RDN2	Rear camera Lane2N	GPI28	1.8V
29	RDP2	Rear camera Lane2P	GPI29	1.8V
30	RDN1	Rear camera Lane1N	GPI24	1.8V



31	RDP1	Rear camera Lane1P	GPI25	1.8V
32	RDN0	Rear camera Lane0N	GPI22	1.8V
33	RDP0	Rear camera Lane0P	GPI23	1.8V
34	GND	GND	\	0V
35	RCN	Rear camera CLK N	GPI26	1.8V
36	RCP	Rear camera CLK P	GPI27	1.8V
37	GND	GND	\	0V
38	RDP3_A	Front camera Lane3 P	GPI41 / CMDAT2	1.8V
39	RDN3_A	Front camera Lane3 N	GPI40 / CMDAT3	1.8V
40	RDP2_A	Front camera Lane2 P	GPI39 / CMDAT4	1.8V
41	PDN2_A	Front camera Lane2 N	GPI38 / CMDAT5	1.8V
42	RDN1_A	Front camera Lane1 N	GPI34/CMDAT9/CMCS D2	1.8V
43	RDP1_A	Front camera Lane1 P	GPI35/CMDAT8/CMCS D3	1.8V
44	RDP0_A	Front camera Lane0 P	GPI33/CMVSYNC/CM CSD1	1.8V
45	RDN0_A	Front camera Lane0 N	GPI32/CMHSYNC/CM CSD0	1.8V
46	GND	GND	\	\
47	RCP_A	Front camera CLK P	GPI37 / CMDAT6	1.8V
48	RCN_A	Front camera CLK N	GPI36 / CMDAT7	1.8V
49	GND	GND	\	\
50	VMCH_PMU	TF Power Output	Max 300mA	3.3V
51	MSDC1_DAT0	TF data0	GPIO168	2.8V
52	MSDC1_DAT1	TF data1	GPIO169	2.8V
53	MSDC1_DAT2	TF data2	GPIO170	2.8V
54	MSDC1_DAT3	TF data3	GPIO171	2.8V
55	MSDC1_CMD	TF data control signal	GPIO166	2.8V
56	EINT5	EINT_SD / GPIO5	UCTS2/DPI_D9	1.8V
57	MSDC1_CLK	TF clock	GPIO167	2.8V
58	GND	GND	\	0V
59	VIO28_PMU	IO PWR Output Max 200mA		2.8V
60	VIO18_PMU	Power Output Max 200mA		1.8V
61	GND	GND	\	0V
62	SIM1_SIO	SIM data	GPIO162	2.8V
63	SIM1_SCLK	SIM clock	GPIO160	2.8V
64	SIM1_SRST	SIM reset	GPIO161	2.8V
65	GND	GND	\	0V
66	VSIM1	1.8V/3.0V Max 50mA		POWER
67	GND	GND	\	0V
68	ACCDDET	Headphone detection	\	1.8V
69	GND	GND	\	0V



70	VCAM_IO_PMU	Camera IO power (1.8V/200mA)	\	\
71	VCAMD_PMU	Camera DVDD power	\	\
72	VCAMA_PMU	Camera AVDD power (2.8V/200mA)	\	\
73	VCAM_AF_PMU	Camera AF power (1.2V-3.3V, less than 200mA)	\	\
74	GND	GND	\	0V
75	VRTC	RTC battery power in / out	Add back battery	2.8V
76	VIBR_PMU	Vibration motor power out	(1.2~3.3V/100mA)	POWER
77	VGP1_PMU	Power Out(1.2~3.3V/200mA)	\	POWER
78	DSI_TE	SPK_EN	GPIO147	1.8V
79	GND	GND	\	0V
80	AU_HSN	Speaker - (MAX 0.2W)	\	\
81	AU_HSP	Speaker + (MAX 0.2W)	\	\
82	GND	GND	\	0V
83	MIC1_P	Headphone mic output +	\	\
84	MIC1_N	Headphone mic output -	\	\
85	GND	GND	\	0V
86	MICBIAS1	MIC power output	\	\
87	MICBIAS0	MIC power output	\	\
88	GND	GND	\	0V
89	MIC0_P	Main MIC output +	\	\
90	MIC0_N	Main MIC output -	\	\
91	GND	GND	\	0V
92	AU_HPL	Headphone L-channel output	\	\
93	AU_HPR	Headphone R-channel output	\	\
94	SPK_P	Speaker + (MAX 0.8W)	\	\
95	SPK_N	Speaker - (MAX 0.8W)	\	\
96	GND	GND	\	0V
97	LCM_RST	MIPI LCD reset	GPIO146	1.8V
98	TDN0	MIPI LCD Lane0N	GPI151	1.8V
99	TDP0	MIPI LCD Lane0P	GPI150	1.8V
100	TDP1	MIPI LCD Lane1P	GPI152	1.8V
101	TDN1	MIPI LCD Lane1N	GPI153	1.8V
102	TDP2	MIPI LCD Lane2P	GPI156	1.8V
103	TDN2	MIPI LCD Lane2N	GPI157	1.8V
104	TDP3	MIPI LCD Lane3P	GPI158	1.8V
105	TDN3	MIPI LCD Lane3N	GPI159	1.8V
106	GND	GND	\	0V
107	TCP	MIPI LCD clock P	GPI154	1.8V
108	TCN	MIPI LCD clock N	GPI155	1.8V
109	GND	GND	\	0V
110	USB_DM	USB port0 D- differential data line	\	3.3V

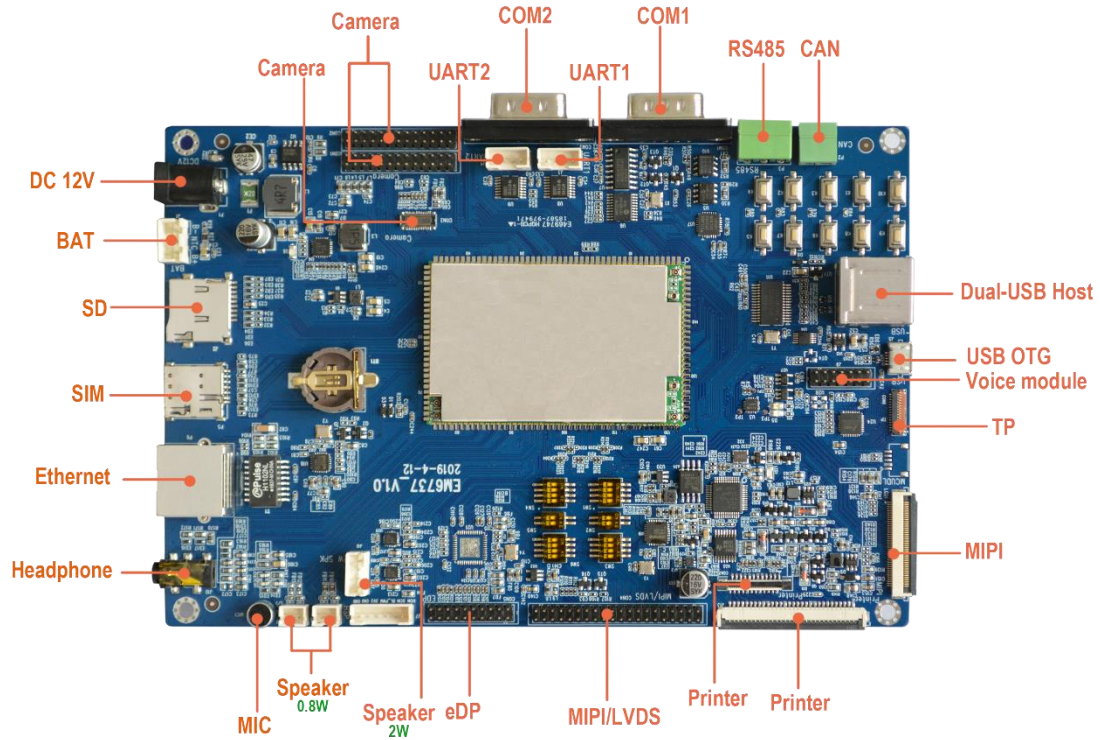


111	USB_DP	USB port0 D+ differential data line	\	3.3V
112	GND	GND	\	0V
113	VBUS	Connect MICROUSB 5V	\	5V
114	VBAT	3.7--4.2V (Peak current 1.5A)	\	3.7--4.2V
115	VBAT	3.7--4.2V (Peak current 1.5A)	\	3.7--4.2V
116	VBAT	3.7--4.2V (Peak current 1.5A)	\	3.7--4.2V
117	VBAT	3.7--4.2V (Peak current 1.5A)	\	3.7--4.2V
118	VBAT	3.7--4.2V (Peak current 1.5A)	\	3.7--4.2V
119	GND	GND	\	0V
120	GND	GND	\	0V
121	GND	GND	\	0V
122	GND	GND	\	0V
123	GND	GND	\	0V
124	BATSNS/ISENSE	Connect Battery Input+ or VBAT Pin(if No Battery)	\	Power
125	CS_P	Gauge sensor differential IN+	good shielding	1.8V
126	CS_N	Gauge sensor differential IN-	good shielding	1.8V
127	BAT-NTC	Battery temperature detection	\	\
128	KPROW1	Keypad row 1	GPIO82	1.8V
129	KPROW0	Keypad row 0	GPIO81	1.8V
130	EINT9	Interrupt / GPIO9	PCM1_DO0/CLKM2	1.8V
131	EINT8	Interrupt / GPIO8	URTS3/PCM1_DO1 /KCOL4	1.8V
132	SPI_CS	SPI chip select	GPIO65/KROW2	1.8V
133	GND	GND	\	0V
134	SYSRSTB	System reset button or control	INPUT	1.8V
135	PWR_KEY	Power button	INPUT	\
136	GND	GND	\	0V
137	SPI_MI	SPI data in	GPIO67/UCTS1	1.8V
138	SPI_CK	SPI clock	GPIO66/KCOL2	1.8V
139	SPI_MO	SPI data out	GPIO68/URTS1	1.8V
140	I2S_LRCK	I2S0 LRCK / GPIO79	PCM1_SYNC/PWM3	1.8V
141	I2S_DATA_IN	I2S0 DI / GPIO79	PCM1_DI/PWM0/	1.8V
142	I2S_BCK	I2S0 BCK / GPIO80	PCM1_CLK/PWM4	1.8V
143	KPCOL0	Keypad column 0	GPIO84/URTS0 /AUXIF_CLK	1.8V
144	KPCOL1	Keypad column 1	GPIO85/UCTS0 /AUXIF_ST	1.8V
145	SCL1	I2C1SCL	GPIO50	1.8V
146	SDA1	I2C1SDA	GPIO49	1.8V
147	SCL3	I2C3SCL	GPIO54	1.8V
148	SDA3	I2C3SDA	GPIO53	1.8V



149	DISP_PWM	LCD backlight control	GPIO69/PWM1	1.8V
150	EINT1	Interrupt / GPIO1	PMW2/PTA_RXD /DPI_D5	1.8V

1.5 The Development Board for Application



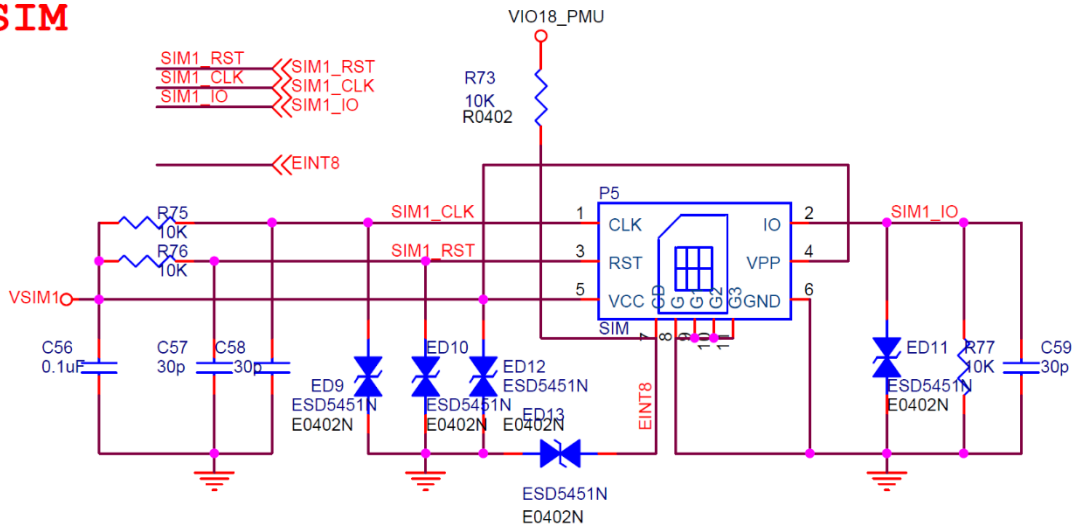


2 Hardware Design Guide

2.1 Peripheral Circuit Reference

2.1.1 SIM Card

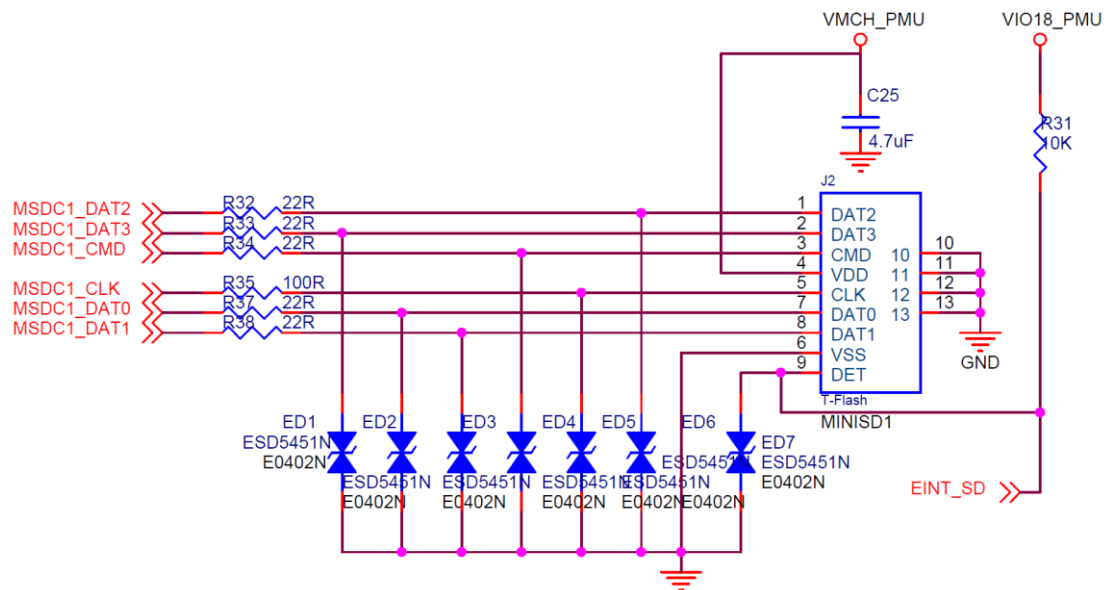
SIM



The M6038 HSDPA module integrates a SIM card interface that complies with ISO7816-3 standard, and supports automatic detection of 3.0V/1.8V SIM cards.

2.1.2 SD Card

SD card is detected by EINT_SD.

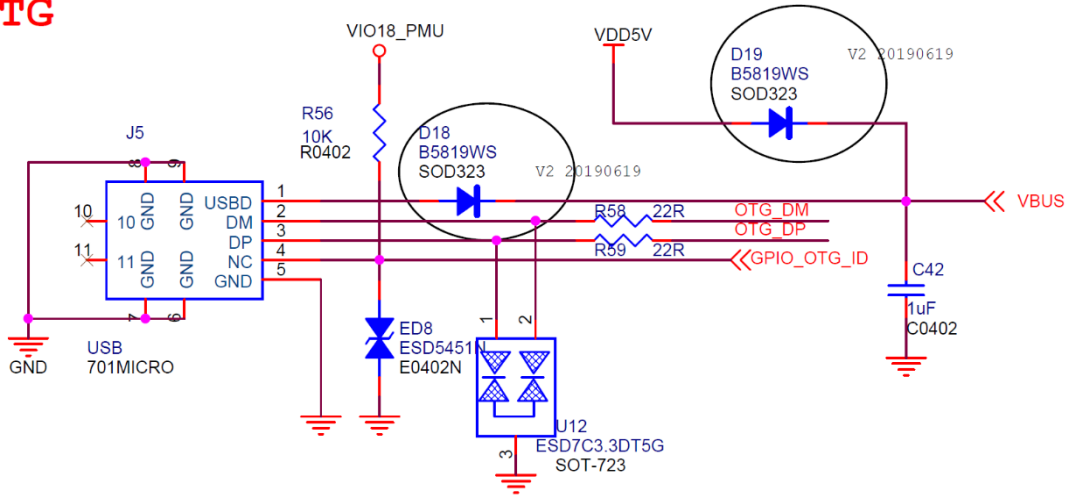


2.1.3 USB2.0 OTG

The USB bus is mainly used for data transmission, software upgrade, and module program detection. USB2.0 OTG supports OTG master and slave modes, allows external expansion to HOST, and supports full-speed and high-speed modes.

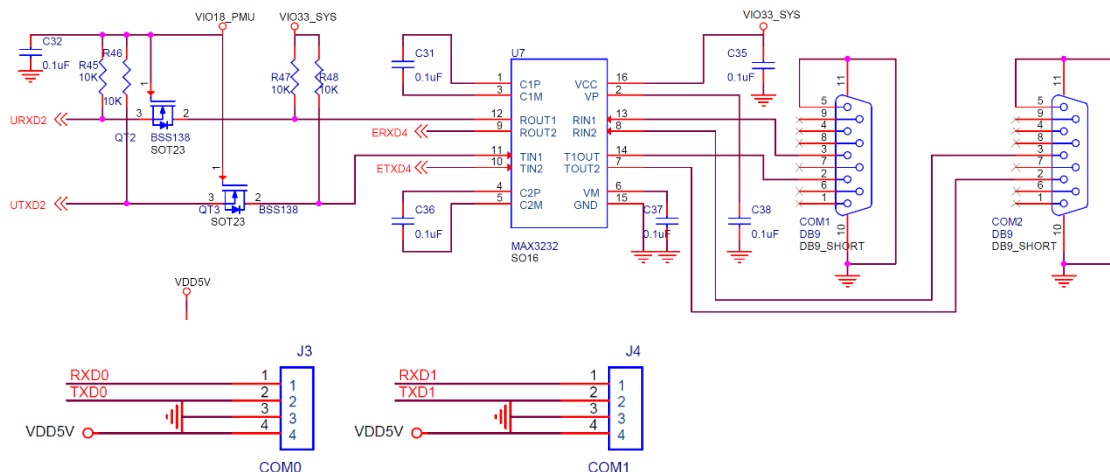
It requires an external circuit to provide 5.0V power to the VBUS pin.

OTG



2.1.4 UART

The module provides 1-3 UARTs for serial communication and AT command input with external devices. For normal UART applications (non-Bluetooth), the maximum baud rate is 230400bps, and the high-speed baud rate of 4Mbps is only supported under Bluetooth 2.0 applications. The default baud rate is 115200bps. The module interface level is 1.8V. If the level of the interface with other external processors does not match, it is recommended to add a level shifting circuit.



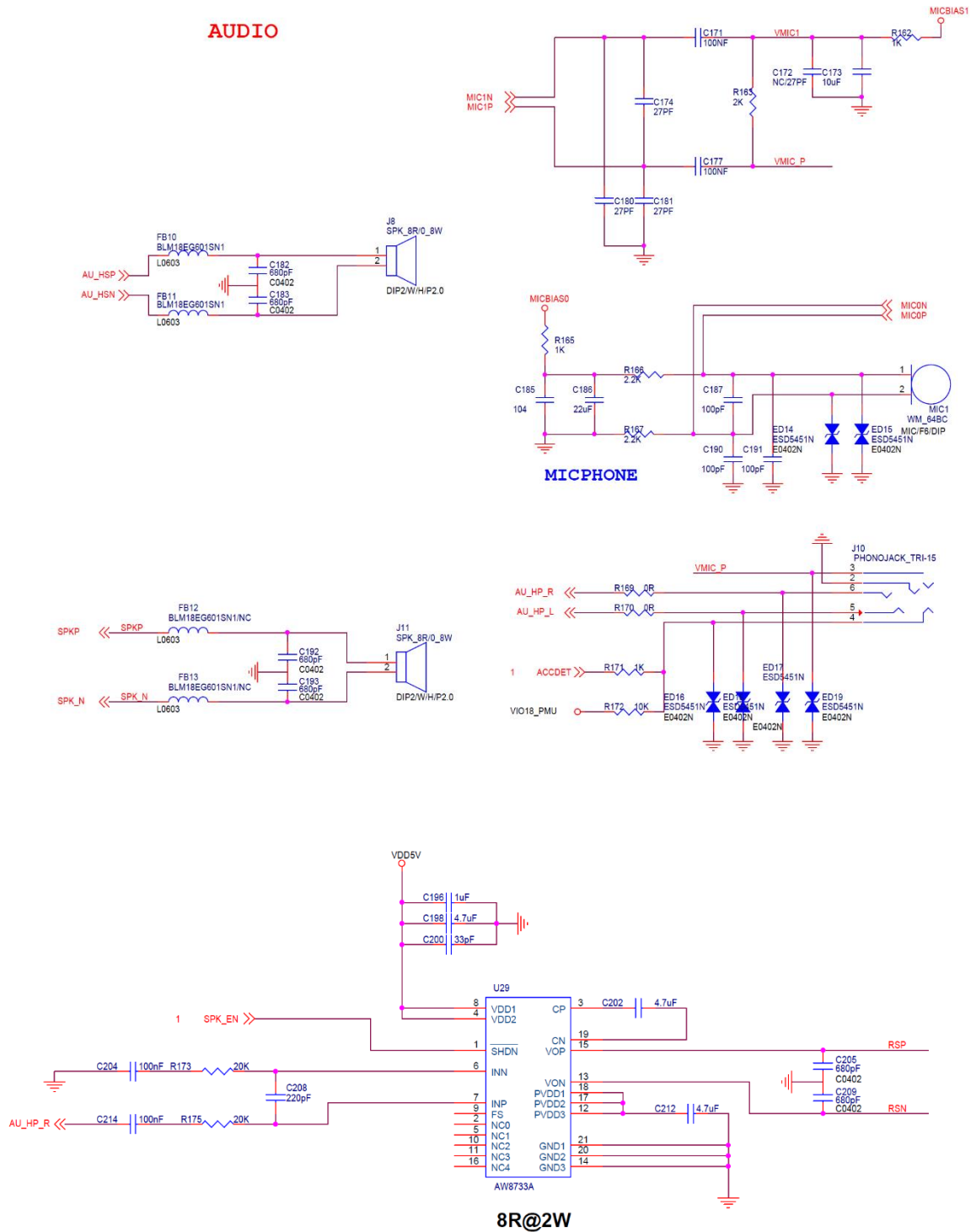
2.1.5 Audio, MIC, Speaker

Support both iPhone and Nokia mode interfaces.

The module provides two onboard microphones. If only one onboard microphone is required, it must be

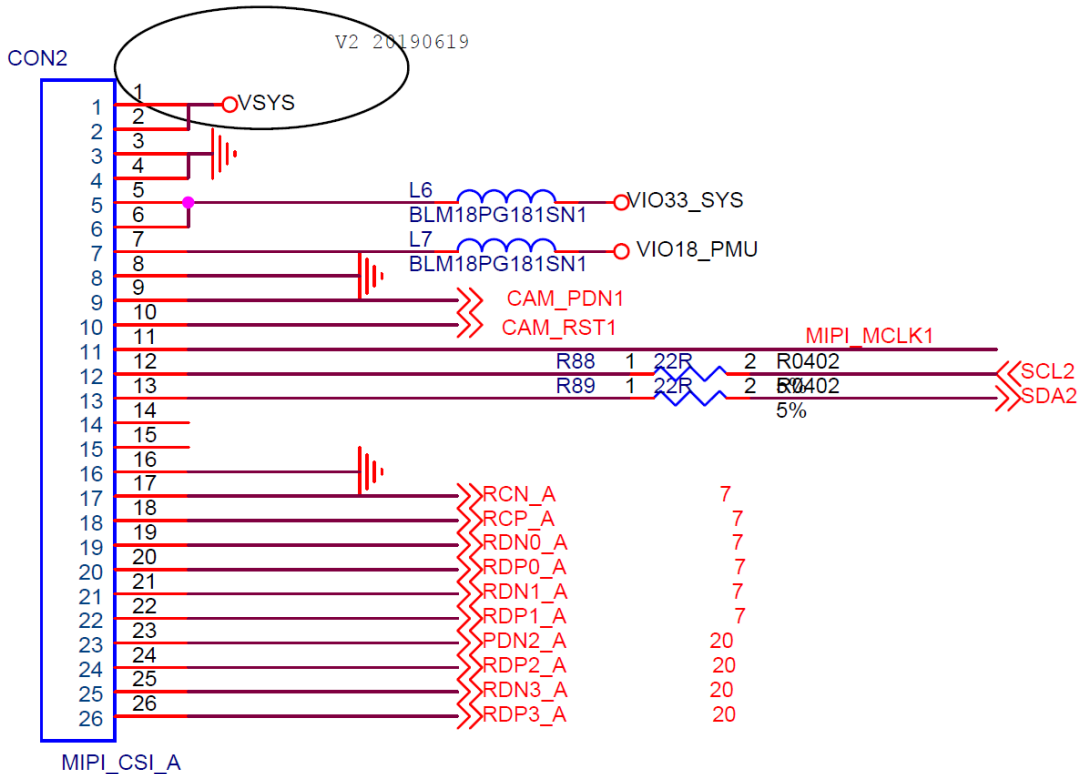
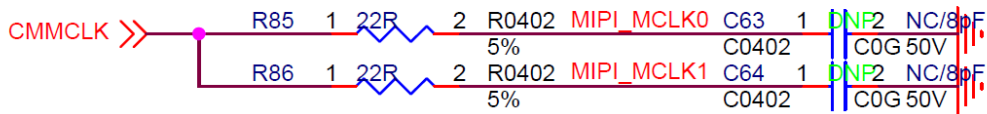
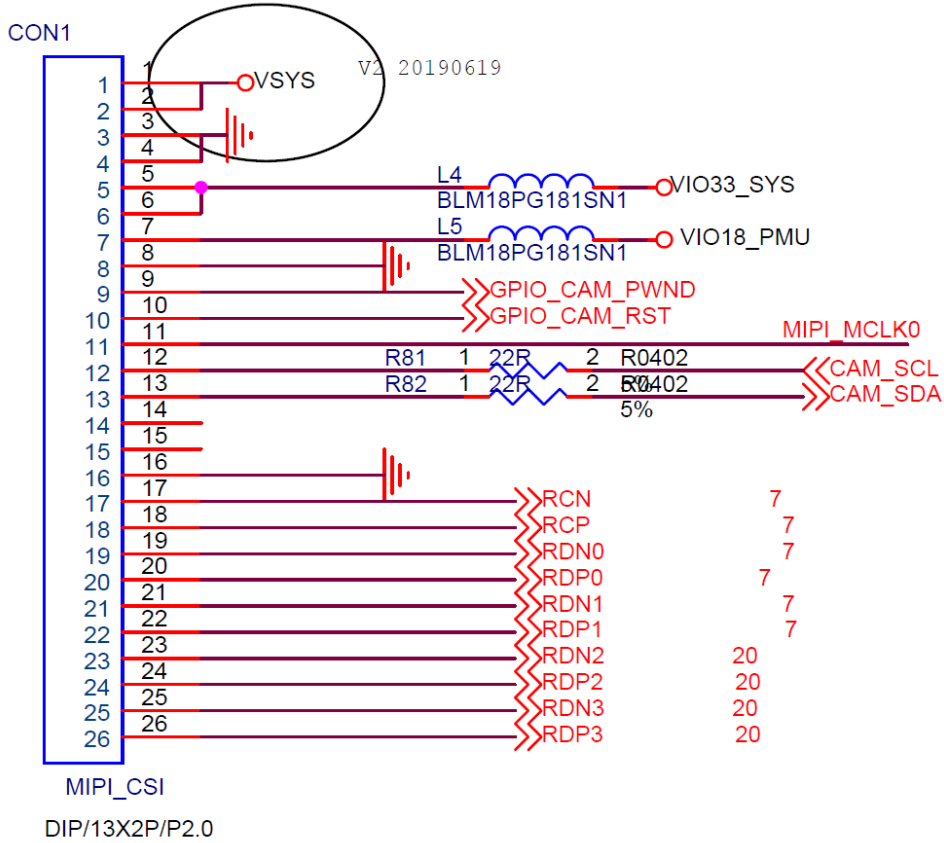


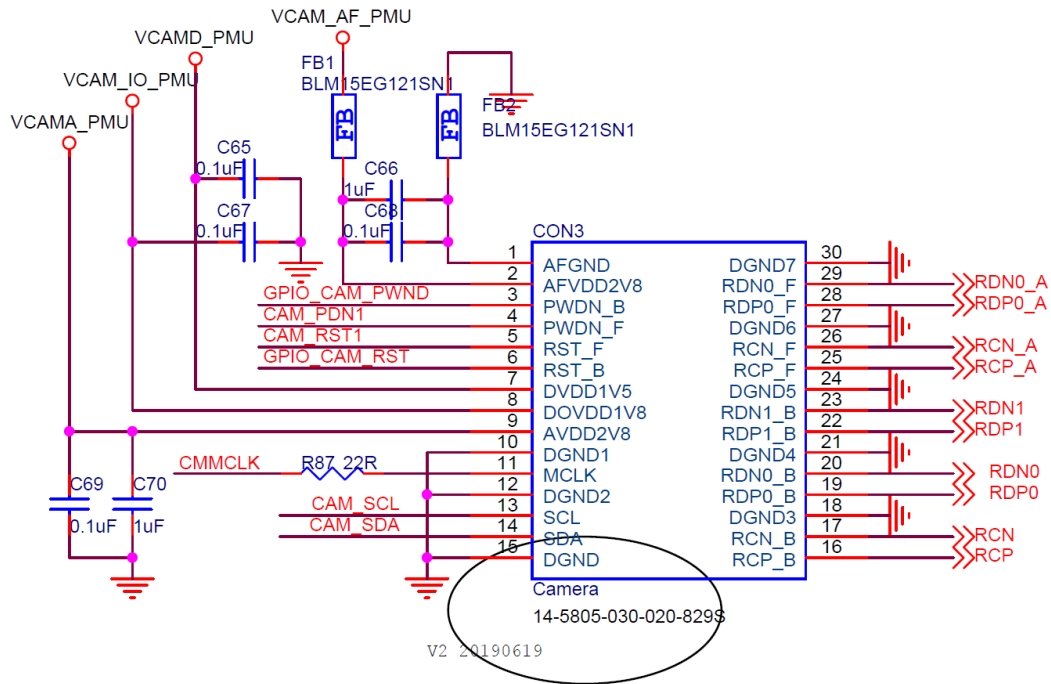
connected to the main microphone first.



2.1.6 Camera

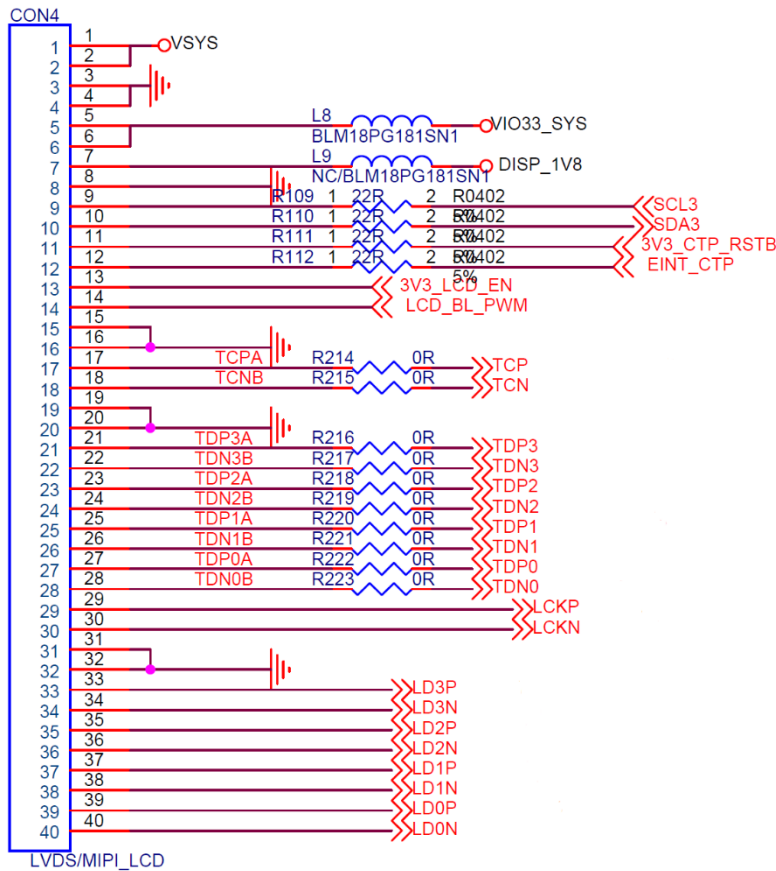
CM-MT6737 Supports MIPI CSI-2 high-speed camera serial interface with 4 data lane (for main) + 4 data lane (for sub). MT6737 equips a 13M camera ISP with advanced features e.g. auto focus, anti-handshake, auto sensor defect pixel correction, continuous video AF, face detection, burst shot, and panorama view.

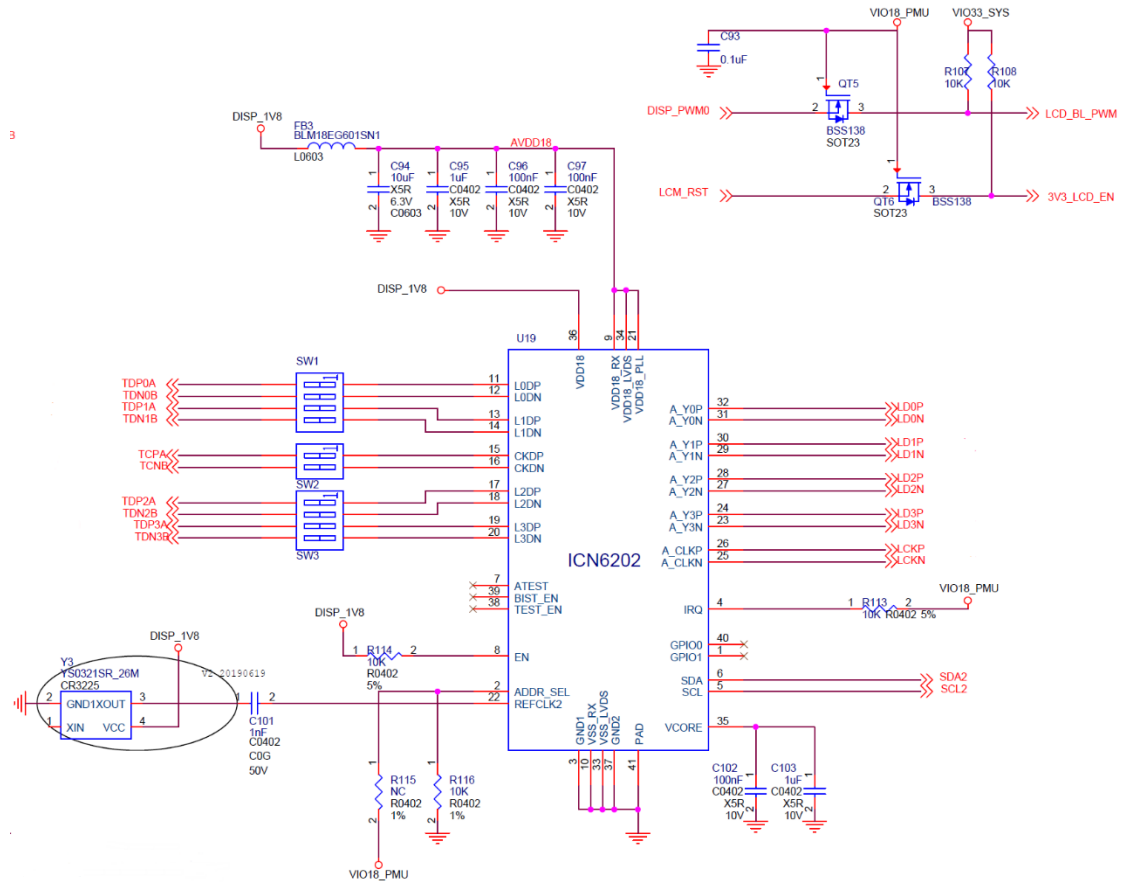




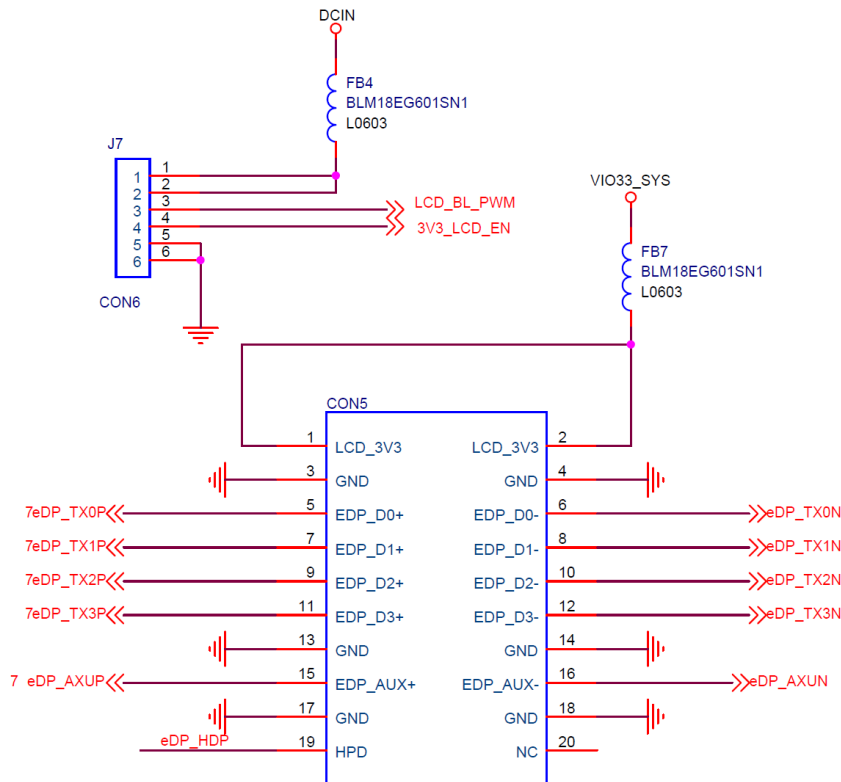
2.1.7 Display

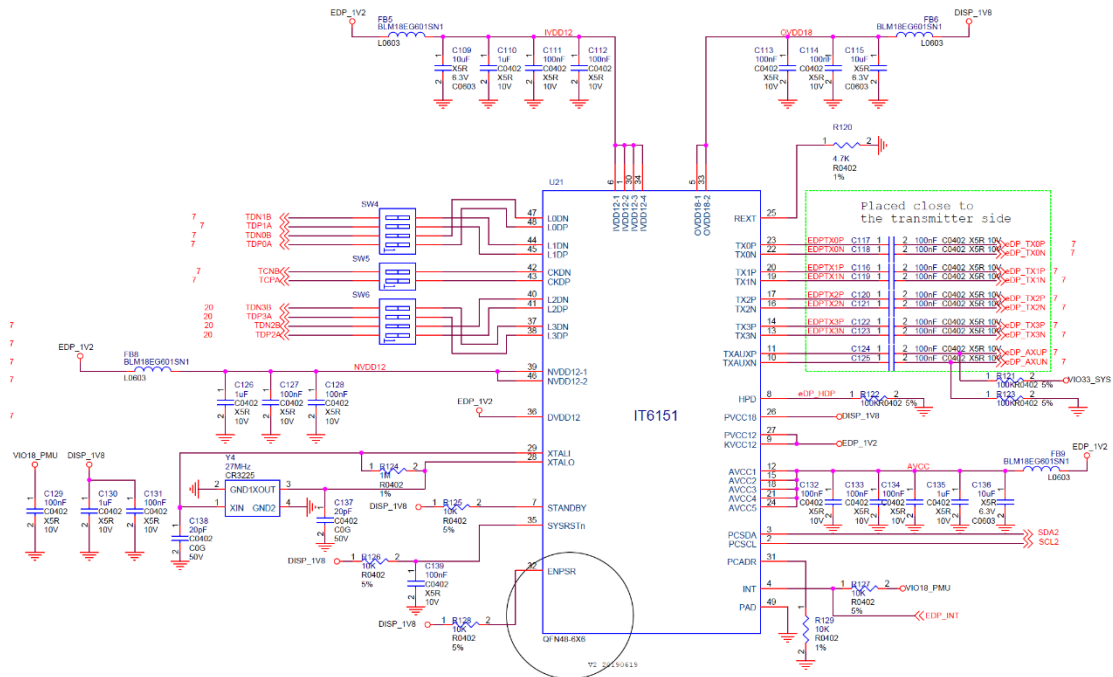
MIPI to LVDS



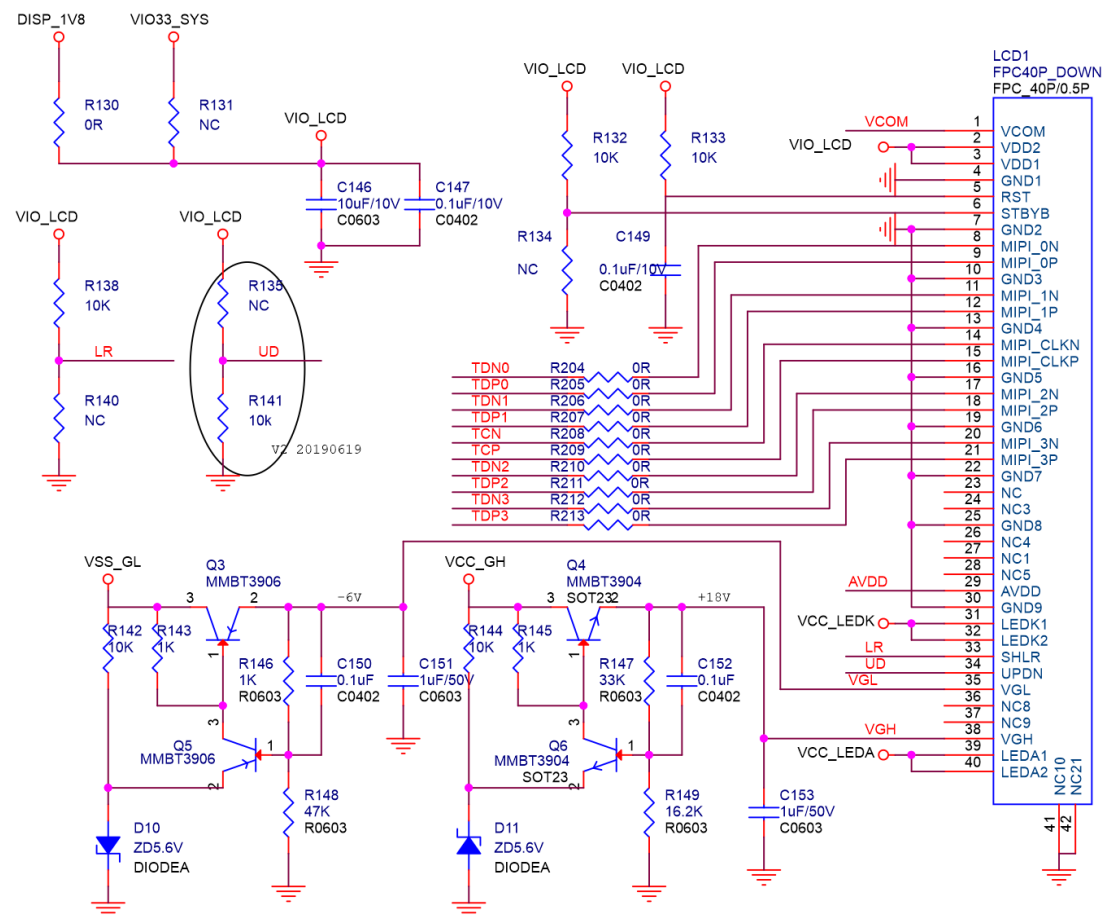


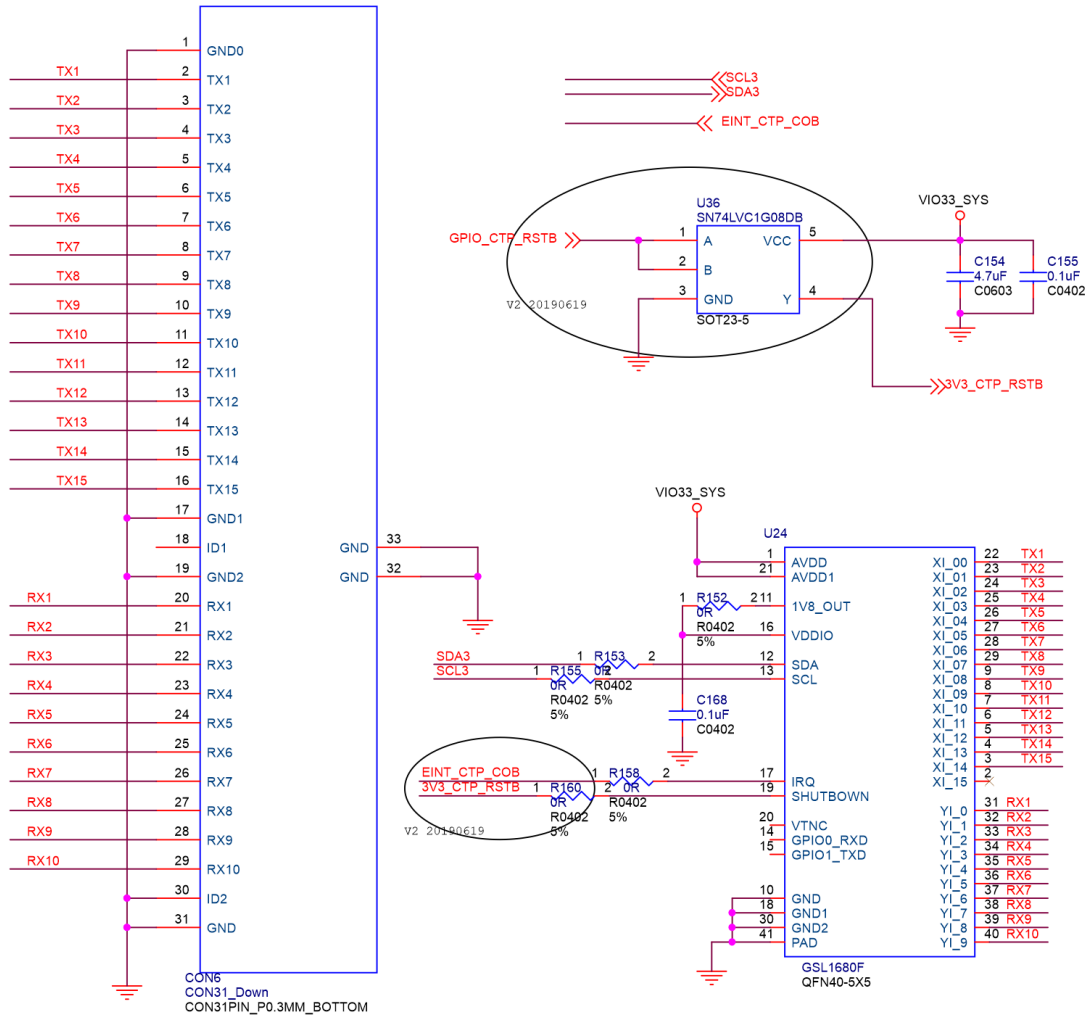
MIPI to eDP





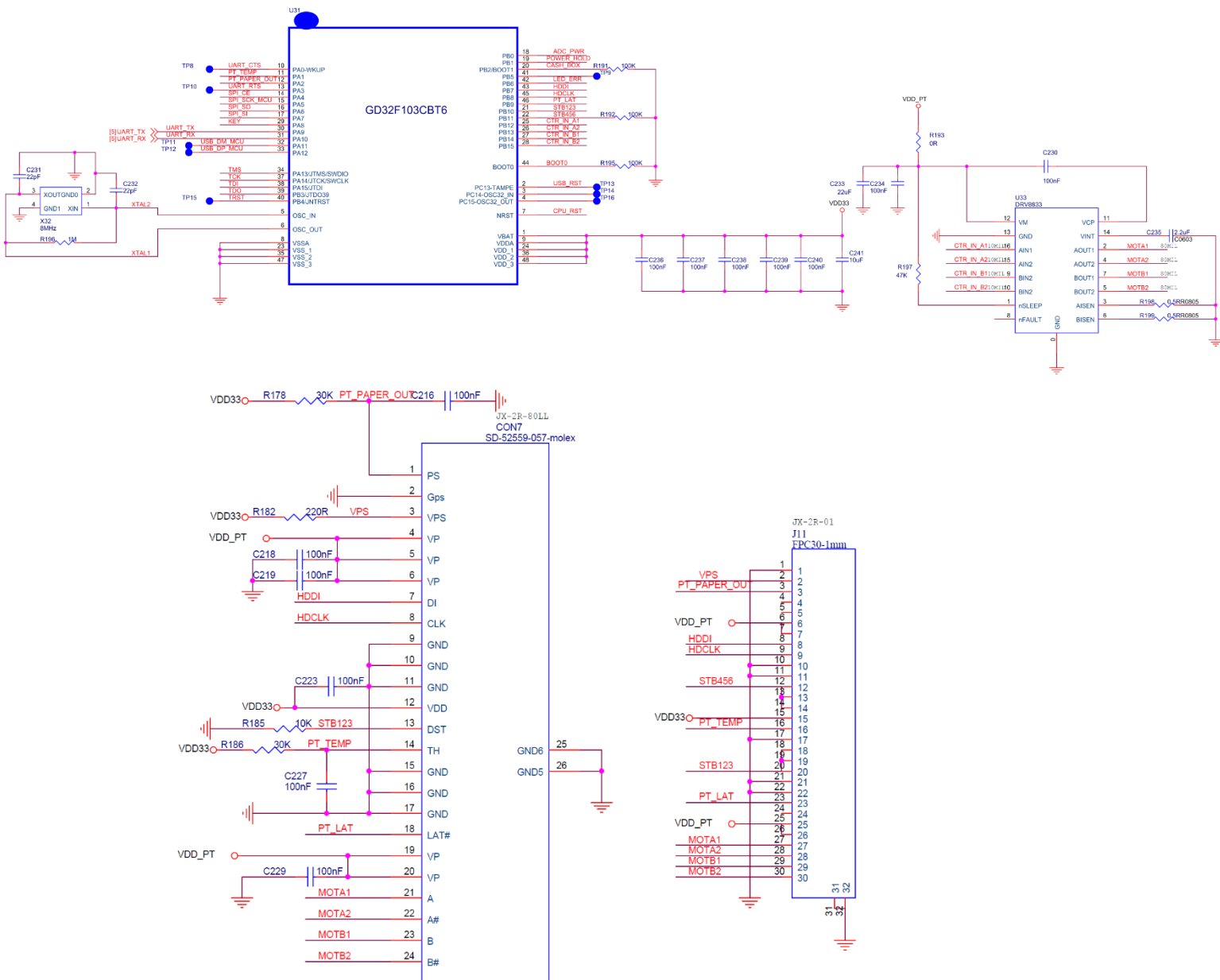
MIPI Panel with Touch





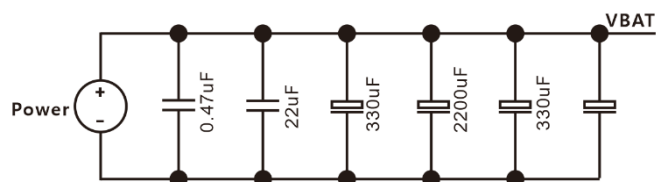


2.1.8 Printer



2.2 Power Supply Circuit Design

The system board power supply VBAT is required to have a power supply capacity of 2A or more to meet the peak current demand of the module.



2.3 RF Circuit Design

2.3.1 RF Technical Indicators

The test RF indicators shall be tested in strict accordance with the relevant 3GPP test specifications.

The WCDMA 2100/900 RF indicators meet the requirements of the 3GPP TS 34.121 protocol.

The GSM/GPRS/EDGE850/900/1800/1900 RF specifications meet the 3GPP TS 05.05 protocol requirements.

The CM-MT6737 supports AGPS, so the AGPS antenna is required. The design of the AGPS antenna is consistent with the main antenna, and its efficiency index is allowed to be reduced by 3 dB. The isolation between the main antenna and the diversity antenna is required to be greater than 12 dB. Antenna indicator requirements include passive and active indicators.

Passive indicator

The passive specifications of the antenna are different according to the different types of products.

Take the 3G tablet as an example

Primary antenna passive indicator (recommended)

Frequency Band	824-960MHz	1710-2170MHz
VSWR in Free Space	<3:1	<3:1
Peak Gain in Free Space	>0dBi	>0dBi
3-D Average Gain in Free Space	-3dBi	-3dBi
Antenna Efficiency	>50%	>50%

Diversity antenna passive indicator

Frequency Band	824-960MHz	1710-2170MHz
VSWR in Free Space	<3:1	<3:1
Secondary-to-Primary Antenna Isolation, S21	< -10dB	< -10dB
Peak Gain Ratio of the Secondary to Primary Antenna	> -5dB	-5dB
3-D Average Gain Ratio of the Secondary to Primary Antenna	-5dB	-5dB

GPS antenna passive indicator

Frequency Band	1565.42MHz-1585.42MHz
VSWR in Free Space	<2:1
Secondary-to-Primary Antenna Isolation, S21	< -20dB
Peak Gain Ratio of the Secondary to Primary Antenna	> 0dBi
3-D Average Gain Ratio of the Secondary to Primary Antenna	> -3dBi

Active indicator

Different products have different requirements for the active specifications of the antenna. Take 3G tablet as an example.

TRP: <W850/W1900/W2100>18dBm;

GSM850>27dBm, GSM900>27dBm;

DCS1800>24dBm, PCS1900>24dBm>;



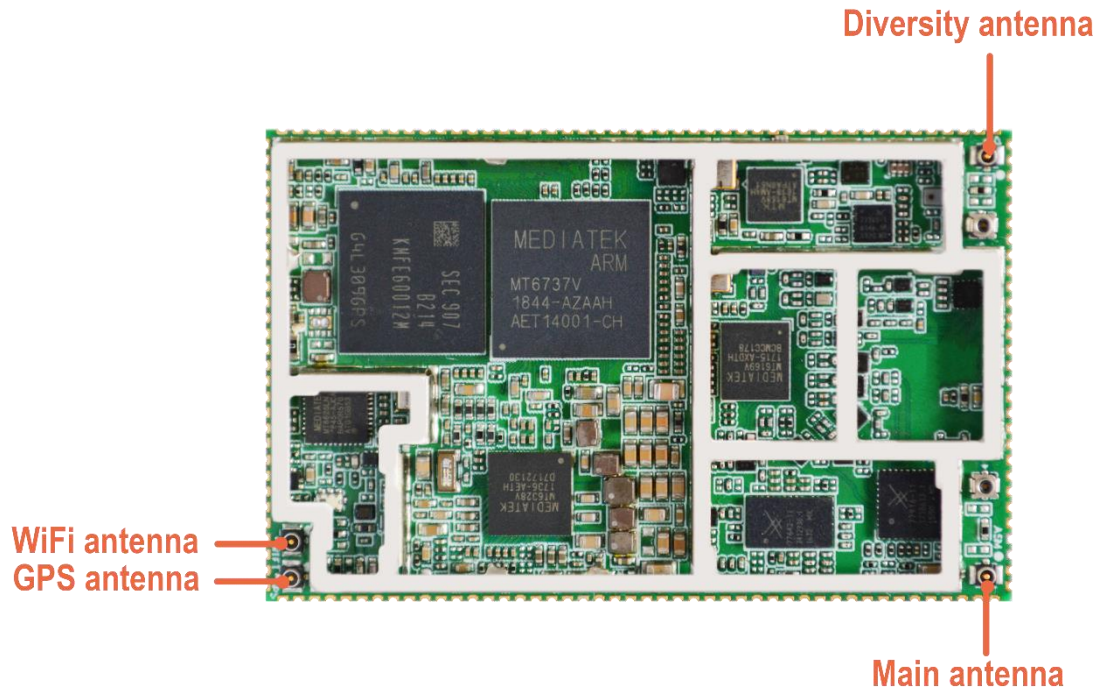
TIS: <W850<-100dBm; W1900/W2100<-103dBm;

GSM850<-100dBm, GSM900<-100dBm;

DCS1800/PCS1900<-102dBm.

2.3.2 RF Antenna Circuit Design

The RF antenna of CM-MT6737 has four interfaces: main antenna, diversity antenna, GPS antenna, WiFi antenna, and access mode is RF connector mode, RF connector is IPEX MHF4





3 Product Electrical Characteristics

3.1 Power Supply

The input voltage range is DC 3.7V~4.2V, and the typical value is 4.0V

Parameter	Min	Typ	Max
Input voltage	3.7V	4.0V	4.2V

3.2 Operating Current

The IDLE mode indicates the power consumption when there is no service, and the operating current range when there is data service under GSM / WCDMA.

Mode	Status	Average value	Remark
GSM	No service mode current	≤75mA	IDLE mode
	Data transmission current	≤660mA	GPRS/EDGE mode
WCDMA	No service mode current	≤75mA	IDLE mode
	Data transmission current	≤500mA	HSPA mode

3.3 Reliability Test

Temperature Test in Windless Environment

Mode	Ambient temperature	Voltage	Transmit power	Duration	Result
GPRS Class 10	+25 °C	(3.8±10%)V	Max	≥1hour	Pass
EDGE Class 12	+25 °C	(3.8±10%)V	Max	≥1hour	Pass
WCDMA	+25 °C	(3.8±10%)V	Max	≥1hour	Pass