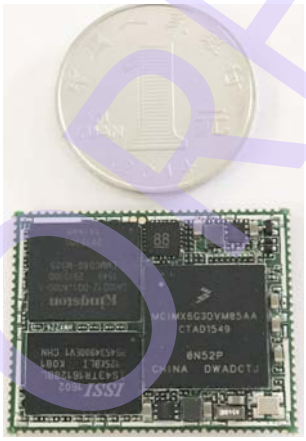
黄峰系列 IOT 核心板 W22

HWX226



HWX227

用户手册

HMCORE 安阔

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更新记录：

版本	更新内容	责任人	更新日期
V1			2016-5-1

HWCORE开源

目录

HWCORE

HMCORE 核心

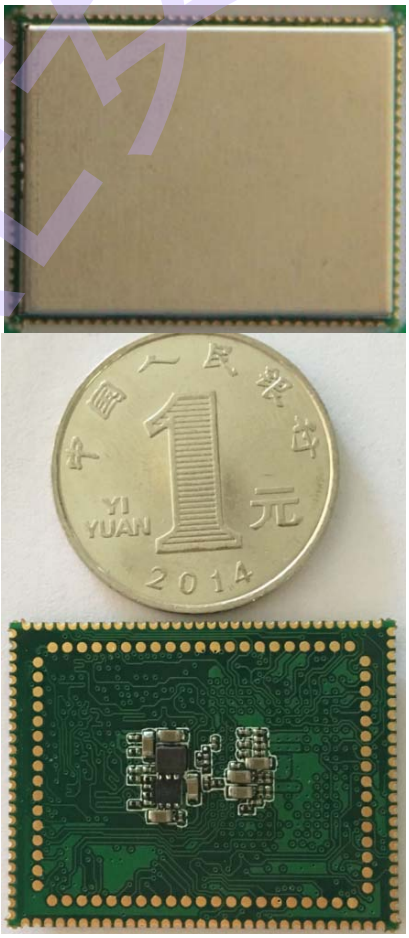
第1章 产品概述

1.1 产品介绍

黄蜂Wasp W22系列主要面向端口互通，多控制，空间小的IOT领域。PIN TO PIN及软件兼容包括IMX6UtraLite（W226G）, IMX7Dual（W227D）, IMX7Solo（W227S）三种。其主要特点是硬币大小（26x33mm），功耗低（Cotex-A7），多端口（如UART 8个）。 （HWX227设计中，尚未推出）

HWX226是公司推出的基于飞思卡尔（freescale Semiconductor）I.MX6UtraLite应用处理器的核心板。运行Linux 的最小系统硬件平台。由I.MX6UtraLite，LVDDR3/LPDDR、EMMC或QSPI构成。由于采用3.3V~5.5V的供电，再加上硬币大小使W22直接应用在LI电池供电的智能穿戴设备。从商业级，工业级，车规级的多温度等级适应工业车载。

1.2 应用举例



- 消费类

  智能穿戴，物联网 IOT

- 智能车载船载

  前装仪表盘，宝马遥控器

- 智能医疗及家居

  家庭健康护理，家庭网关

- 行业及事业，工业及视觉

  HMI，UPS 显示，充电桩，

1.3 包装内容

- 黄蜂 核心板
  - ✧ HWX226
  - ✧ HWX227

1.4 产品特性

- 产品参数
  - ✧ 产品尺寸：HWX226，26x33x2.8mm ;
  - ✧ 输入电源：VSYS 3.3~5V， VRTC_IN 2.4~3.3V,
  - ✧ 安装及连接：W22，油票半孔 112pin; 扩展脚 74pin
  - ✧ 工作温度：您选择的配置型号决定

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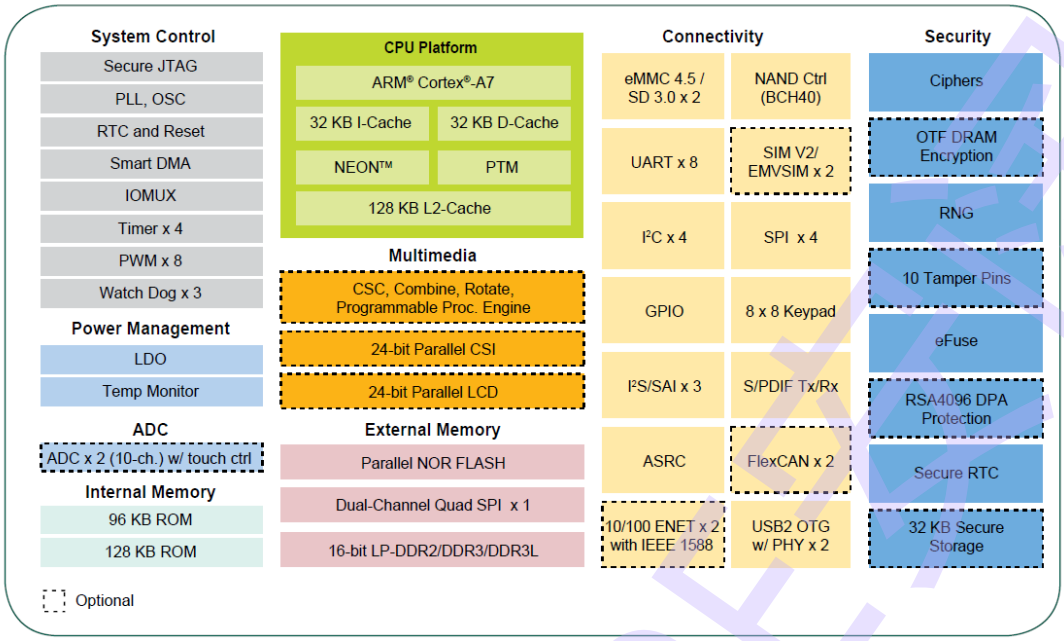
● 处理器

i.MX 6UltraLite APPLICATIONS PROCESSOR BLOCK DIAGRAM



● 板载存储器

✧ SDRAM (默认): 256MB LVDDR3;

✧ EMMC（默认）：4GByte 或 QSPI: 32MByte

● 接口

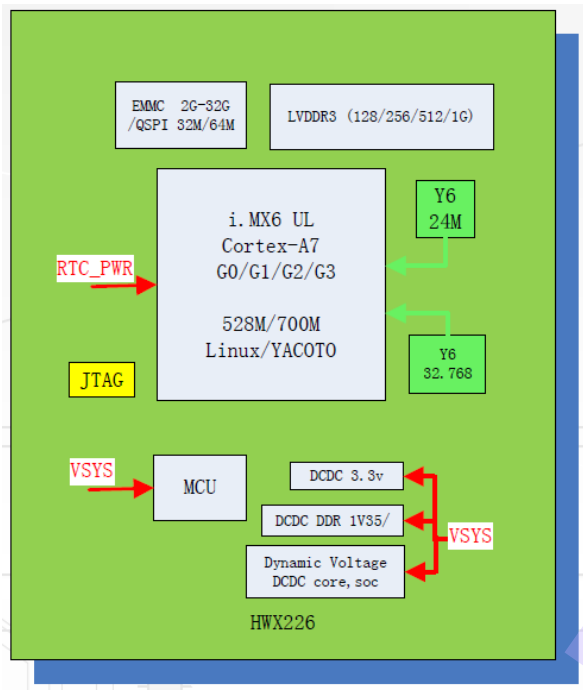
i.MX 6UltraLite DEVICE OPTIONS

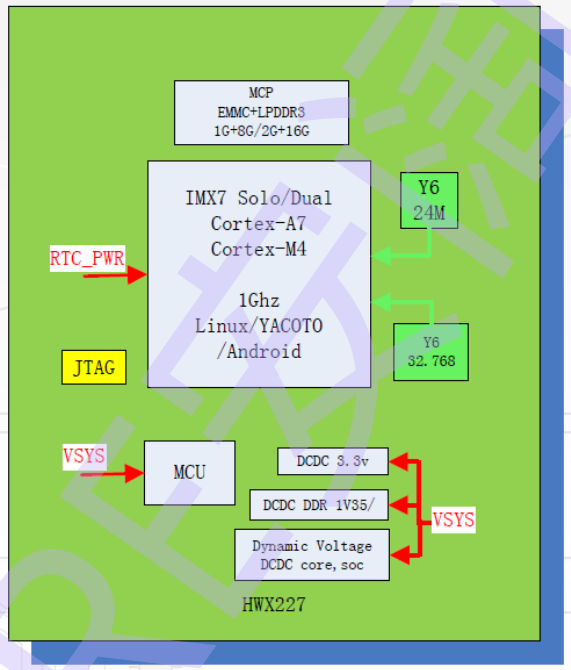
• Red indicates change from column to the left

Feature	MCIMX6G0	MCIMX6G1	MCIMX6G2	MCIMX6G3
Speed	528 MHz	528 MHz, 696 MHz	528 MHz, 696 MHz	528 MHz
Cache	32 KB-I, 32 KB-D	32 KB-I, 32 KB-D 128 KB L2	32 KB-I, 32 KB-D 128 KB L2	32 KB-I, 32 KB-D 128 KB L2
OCRAM	128 KB	128 KB	128 KB	128 KB
DRAM	16-bit LP-DDR2, DDR3/DDR3L	16-bit LP-DDR2, DDR3/DDR3L	16-bit LP-DDR2, DDR3/DDR3L	16-bit LP-DDR2, DDR3/DDR3L
eFuse for Customer	512-bit	1024-bit	1536-bit	2048-bit
NAND (BCH40)	Yes	Yes	Yes	Yes
Parallel NOR/EBI	Yes	Yes	Yes	Yes
Ethernet	10/100-Mbit/s x 1	10/100-Mbit/s x 1	10/100-Mbit/s x 2	10/100-Mbit/s x 2
USB with PHY	OTG, HS/FS x 1	OTG, HS/FS x 2	OTG, HS/FS x 2	OTG, HS/FS x 2
CAN	0	1	2	2
Security	Basic	TRNG, Crypto Engine (AES/TDES/SHA), Secure Boot	TRNG, Crypto Engine (AES/TDES/SHA), Secure Boot	TRNG, Crypto Engine (AES with DPA/TDES/SHA/RSA), Secure Boot, tamper monitor, PCI4.0 pre-certification, OTF DRAM encryption
Graphic	None	None	PxP	PxP
CSI	None	None	24-bit Parallel CSI	24-bit Parallel CSI
LCD	None	None	24-bit Parallel LCD	24-bit Parallel LCD
Quad SPI	1	1	1	1
SDIO	2	2	2	2
UART	4	8	8	8
I²C	2	4	4	4
SPI	2	4	4	4
I²S/SAI	1	3	3	3
S/PDIF	1	1	1	1
Timer/PWM	Timer x 2, PWM x 4	Timer x 4, PWM x 8	Timer x 4, PWM x 8	Timer x 4, PWM x 8
12-bit ADC	1 x 10-ch.	1 x 10-ch.	2 x 10-ch.	2 x 10-ch.

第2章 硬件系统介绍

2.1 电路框图介绍





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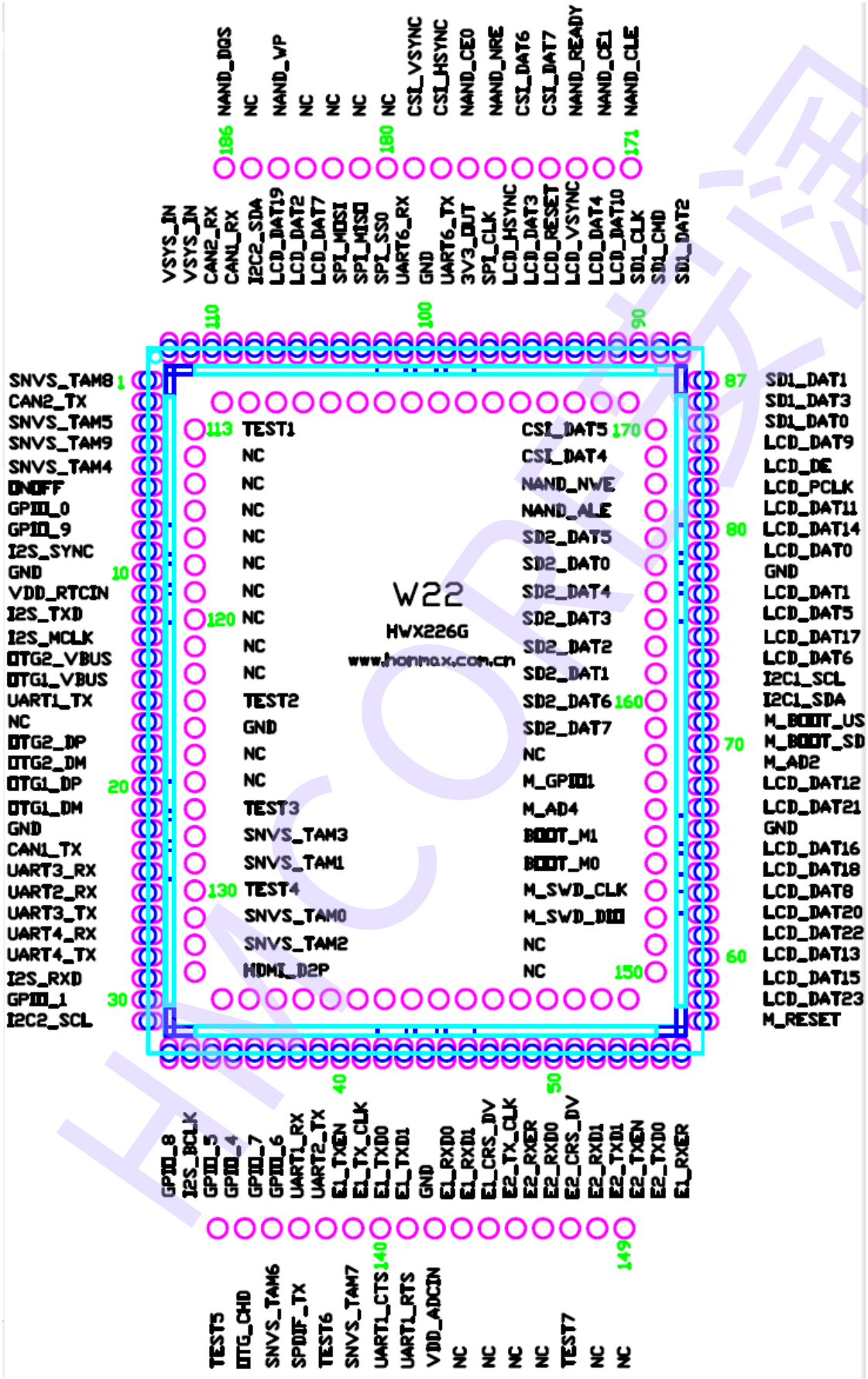
2.2 HWX226 脚位直观图



2.3 硬件接口

以下标明 ALT Mode 标注为 ALT 的， 有多种复用方式。2.3 章节仅为列举，具体请参考 IMX6UL，IMX7 的芯片规格书，与联系我们的销售人员索要 IMX 与模组管脚映射表。

2.3.1 电源接口，开机模式及 BOOT 模式接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
57		M_RESET	System reset, IMX6 + MCU reset. L active	No muxing	I
6		ON_OFF	1, power on/off key for Mobile, L active 2，connect GND will power up for no Powerkey system. 3，Long press 8 seconds for Power Off	No muxing	I
69		M_ADC2	1, ADC for Mobile Read Batt vlotage ,Low Power interceptiong. 2, No used must conncet 10k to MCU_PWR.	ALT	I
70		M_BOOT_SD	1,Boot Mode Select L: SD3, H: EMMC 2, KEY	ALT	I
157		M_PRG	1,MCU program mode enable,power on L active.Only Power on 1 second.	ALT	I/O
71		M_ BOOT_USB	1, Boot Mode Select M_ BOOT_USB M_BOOT_SD, 00: OTG MFG downloader 11: NAND FLASH 2, KEY	ALT	I
156		UB_ADC4	12bit, 0~3.3V, 1Mbps, ADC	ALT	I
111,112		VSYS_IN	System Power INPUT	P	I
11		VRTC_IN	RTC Power INPUT	P	I
10,22,44,66,78,100		GND			

2.3.2 SDIO 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
165		SD2_DAT0	Data0 in all mode,detect busy state	ALT	IO
161		SD2_DAT1	Data1 in 4/8-bit mode, detect interrupt in 1/4-bit mode	ALT	IO
162		SD2_DAT2	Data2 or Read Wait in 1/4-bit mode	ALT	IO

163		SD2_DAT3	Data3 in 4/8-bit mode or Configured as card detection pin in 1-bit mode	ALT	IO
164		SD2_DAT4	Data4 in 8-bit mode	ALT	IO
166		SD2_DAT5	Data5 in 8-bit mode	ALT	IO
160		SD2_DAT6	Data6 in 8-bit mode	ALT	IO
159		SD2_DAT7	Data7 in 8-bit mode	ALT	IO
176		SD2_CLK	Clock for MMC/SD/SDIO card	ALT	O
168		SD2_CMD	Control Mode	ALT	IO
85		SD1_DAT0	Data0 in all mode, detect busy state	ALT	IO
87		SD1_DAT1	Data1 in 4/8-bit mode, detect interrupt in 1/4-bit mode	ALT	IO
88		SD1_DAT2	Data2 or Read Wait in 1/4-bit mode	ALT	IO
86		SD1_DAT3	Data3 in 4/8-bit mode or Configured as card detection pin in 1-bit mode	ALT	IO
90		SD1_CLK	Clock for MMC/SD/SDIO card	ALT	O
89		SD1_CMD	Control Mode	ALT	IO

注：SD2 脚与模组内 EMMC 共用。

2.3.3 UART 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
16		UART1_TX	serial data transmit	ALT	O
38		UART1_RX	serial data receive	ALT	I
140		UART1_CTS	Clear to send	ALT	O
141		UART1_RTS	Request to send	ALT	I
39		UART2_TX	serial data transmit	ALT	O
25		UART2_RX	serial data receive	ALT	I
2		UART2_CTS	Clear to send	ALT	O
110		UART2_RTS	Request to send	ALT	I
26		UART3_TX	serial data transmit	ALT	O
24		UART3_RX	serial data receive	ALT	I
23		UART3_CTS	Clear to send	ALT	O
109		UART3_RTS	Request to send	ALT	I
28		UART4_TX	serial data transmit	ALT	O
27		UART4_RX	serial data receive	ALT	I
46		UART4_CTS	Clear to send	ALT	O

45		UART4_RTS	Request to send	ALT	I
31		UART5_TX	serial data transmit	ALT	0
108		UART5_RX	serial data receive	ALT	I
8		UART5_CTS	Clear to send	ALT	0
32		UART5_RTS	Request to send	ALT	I
50		UART6_TX	serial data transmit	ALT	0
52		UART6_RX	serial data receive	ALT	I
178		UART6_CTS	Clear to send	ALT	0
179		UART6_RTS	Request to send	ALT	I
51		UART7_TX	serial data transmit	ALT	0
55		UART7_RX	serial data receive	ALT	I
74		UART7_CTS	Clear to send	ALT	0
105		UART7_RTS	Request to send	ALT	I
53		UART8_TX	serial data transmit	ALT	0
54		UART8_RX	serial data receive	ALT	I
48		UART8_CTS	Clear to send	ALT	0
49		UART8_RTS	Request to send	ALT	I

2.3.4 I2C 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
72		I2C1_SDA	I2C1 data, pull up 4.7k to 3V3	No muxing	IO
73		I2C1_SCL	I2C1 clk, pull up 4.7k to 3V3	No muxing	0
30		I2C2_SDA	I2C2 data	ALT	IO
7		I2C2_SCL	I2C2 clk	ALT	0
38		I2C3_SDA	I2C3 data	ALT	IO
16		I2C3_SCL	I2C3 clk	ALT	0
25		I2C4_SDA	I2C4 data	ALT	IO
39		I2C4_SCL	I2C4 clk	ALT	0

2.3.5 CSI 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
97		CSI_DAT00		ALT	I
102		CSI_DAT01		ALT	I

104		CSI_DAT02		ALT	I
103		CSI_DAT03		ALT	I
169		CSI_DAT04		ALT	I
170		CSI_DAT05		ALT	I
175		CSI_DAT06		ALT	I
174		CSI_DAT07		ALT	I
178		CSI_HSYNC	Horizontal Synchronization signal	ALT	I
179		CSI_VSYNC	Vertical Synchronization signal	ALT	I
99		CSI_PIXCLK	pix clock	ALT	I
101		CSI_MCLK		ALT	I

2.3.6 PWM 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
32		PWM1	PWM output	ALT	0
8		PWM2	PWM output	ALT	0
35		PWM3	PWM output	ALT	0
34		PWM4	PWM output	ALT	0

2.3.7 RGB888 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
79		DISP0_DAT0	Data for RGB16bit,RGB18bit,RGB24bit, YCrCb-8bit,YCrCb-16bit,YCrCb-20bit…	ALT	0
77		DISP0_DAT1		ALT	0
106		DISP0_DAT2		ALT	0
95		DISP0_DAT3		ALT	0
92		DISP0_DAT4		ALT	0
76		DISP0_DAT5		ALT	0
74		DISP0_DAT6		ALT	0
105		DISP0_DAT7		ALT	0
63		DISP0_DAT8	Data for RGB16bit,RGB18bit,RGB24bit, YCrCb-16bit,YCrCb-20bit	ALT	0
84		DISP0_DAT9		ALT	0
91		DISP0_DAT10		ALT	0
81		DISP0_DAT11		ALT	0
68		DISP0_DAT12		ALT	0

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60		DISP0_DAT13		ALT	0
80		DISP0_DAT14		ALT	0
59		DISP0_DAT15		ALT	0
65		DISP0_DAT16	Data for RGB18bit,RGB24bit,YCrCb-20bit	ALT	0
75		DISP0_DAT17		ALT	0
64		DISP0_DAT18	Data for RGB24bit,YCrCb-20bit	ALT	0
107		DISP0_DAT19		ALT	0
62		DISP0_DAT20	Data for RGB24bit,	ALT	0
67		DISP0_DAT21		ALT	0
61		DISP0_DAT22		ALT	0
58		DISP0_DAT23		ALT	0
96		DISP0_HSYNC	Horizontal Synchronization signal	ALT	0
93		DISP0_VSYNC	Vertical Synchronization signal	ALT	0
82		DISP0_PIXCLK	pix clock	ALT	0
83		DISP0_DRDY	Data Enalbe	ALT	0
94		DISP0_RESET		ALT	0

2.3.8 CAN 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
23		CAN1_TX	FLEXCAN transmit	ALT	O
109		CAN1_RX	FLEXCAN receive	ALT	I
2		CAN2_TX	FLEXCAN transmit	ALT	O
110		CAN2_RX	FLEXCAN receive	ALT	I

2.3.9 ENET 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
45		ENET1_RXD0		ALT	IO
46		ENET1_RXD1		ALT	IO
47		ENET1_CRS_DV		ALT	IO
42		ENET1_TXD0		ALT	IO
43		ENET1_TXD1		ALT	IO

40		ENET1_TXEN		ALT	IO
41		ENET1_TXCLK		ALT	IO
56		ENET1_RXER		ALT	IO
50		ENET2_RXD0		ALT	IO
52		ENET2_RXD1		ALT	IO
51		ENET2_CRS_DV		ALT	IO
55		ENET2_TXD0		ALT	IO
53		ENET2_TXD1		ALT	IO
54		ENET2_TXEN		ALT	IO
48		ENET2_TXCLK		ALT	IO
49		ENET2_RXER		ALT	0
37		ENET_MDIO	Control information	ALT	IO
36		ENET_MDC	Control clock	ALT	0

2.3.10 USB 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
15		OTG1_VBUS	I.mx6 usb OTG part power supply	No muxing	I
20		OTG1_DP	USB OTG Data D+	No muxing	IO
21		OTG1_DN	USB OTG Data D-	No muxing	IO
7		OTG1_ID	USB ID signal (MFG no request)	ALT	I
14		OTG2_VBUS	I.mx6 usb HOST part power supply	No muxing	I
18		OTG2_DP	USB OTG Data D+	No muxing	IO
19		OTG2_DN	USB OTG Data D-	No muxing	IO
34		OTG2_ID	USB ID signal (MFG no request)	ALT	I

2.3.11 AUDIO I2S 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
12		I2S_TXD	I2S data transmit	ALT	0
33		I2S_TXC	I2S bit clock transmit	ALT	0
29		I2S_RXD	I2S data receive	ALT	I
9		I2S_SYNC	I2S L/R clock transmit	ALT	0
13		I2S_MCLK	I2S main clock transmit	ALT	0

2.3.12 SPI 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
112		SPI_CS0	Chip select signal	ALT	IO
113		SPI_MISO	Master data in; slave data out	ALT	IO
114		SPI_MOSI	Master data out; slave data in	ALT	IO
97		SPI_CLK	clock signal	ALT	IO

2.3.13 KEY 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
45		KEY_COL0	Column input or output pin	ALT	IO
46		KEY_ROW0	Row input or output pin	ALT	IO
47		KEY_COL1	Column input or output pin	ALT	IO
42		KEY_ROW1	Row input or output pin	ALT	IO
43		KEY_COL2	Column input or output pin	ALT	IO
40		KEY_ROW2	Row input or output pin	ALT	IO
41		KEY_COL3	Column input or output pin	ALT	IO
56		KEY_ROW3	Row input or output pin	ALT	IO
50		KEY_COL4	Column input or output pin	ALT	IO
52		KEY_ROW4	Row input or output pin	ALT	IO

2.3.14 电阻 TP 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
7		GPIO0	Wiper	ALT	IO
30		GPIO1	ynlr	ALT	IO
73		GPIO2	ypll	ALT	IO
72		GPIO3	xnlr	ALT	IO
35		GPIO4	xpul	ALT	IO

2.3.15 MQS 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
7		MQS_LEFT		ALT	IO
30		MQS_RIGHT		ALT	IO

2.3.16 SIM ISO/IEC7816-3 接口

PIN number		pin name	Description	ALT Mode	Direction
HWX226	HWX227				
179		sim1.PORT1_CLK		ALT	IO
178		sim1.PORT1_PD		ALT	IO
97		sim1.PORT1_RST_B		ALT	IO
102		sim1.PORT1_SVEN		ALT	IO
104		sim1.PORT1_TRXD		ALT	IO
103		sim2.PORT1_PD		ALT	IO
169		sim2.PORT1_CLK		ALT	IO
170		sim2.PORT1_RST_B		ALT	IO
175		sim2.PORT1_SVEN		ALT	IO
174		sim2.PORT1_TRXD		ALT	IO

2.4 绝对工作条件

超过以下表格所规定的范围可能已经损坏。

Parameter Description	Symbol	Min	Max	Unit
VDD Supply Voltage	VDD_PWR	-0.3	5.5	V
RTC_supply voltage	RTC_PWR	-0.3	3.3	V
USB VBUS	VBUS	-	5.25	V
USB Input voltage	USB_DP/USB_DN	-0.3	3.6	V
Input/output voltage range	Vin/Vout	-0.5	OVDD+0.3	V
ESD damage immunity: Human Body Model(HBM) Charge Device Model(CDM)	Vesd	 - -	 2000 500	V
Storage temperature range	Tstorage	-40	150	℃

OVDD is the I/O supply voltage

2.5 典型功耗

Supply Domain	Item	Condition	Soft	IMX6	P(mW)	Note
VSYS	480P video Playback	LCD display ON,480x272,60Hz 480p Video playback through Ethernet ARM CPU is heavily loaded Maximum frequencies are used for ARM, BUS,DDR clock	linux		450	
	System Idle Mode	ARM is power gated if kernel is in the lowest of idle. ANATOP will go into low power mode if lowest level of idle is entered and all PLLs are off Operating system is on LCD is turned off Screen in not refreshed.	linux		27	
	Deep-sleep		linux		12	
VRTC_IN		imx6 RTC power supply, 2.4~3.6V,205uA(Min)			430	uA

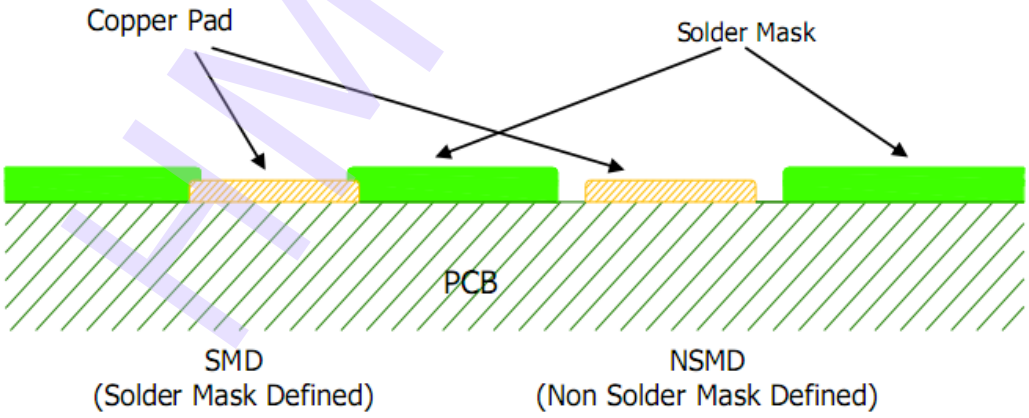
第3章 底板线路设计

3.1 W22 SMD 贴装

3.1.1 PCB PAD 设计

我们将为客户提供 Allegro,PADS 格式的 SCH，PCB 库。

3.1.2 PCB 制作建议



建议采用 绿油不允许上焊盘（NSMD）工艺。

建议底板 PCB 厚度不小于 1.2mm，翘区度小于 0.75%。

3.1.3 钢网

推荐钢网厚度为 0.15mm。

推荐钢网开窗与底板推荐焊盘 1：1。

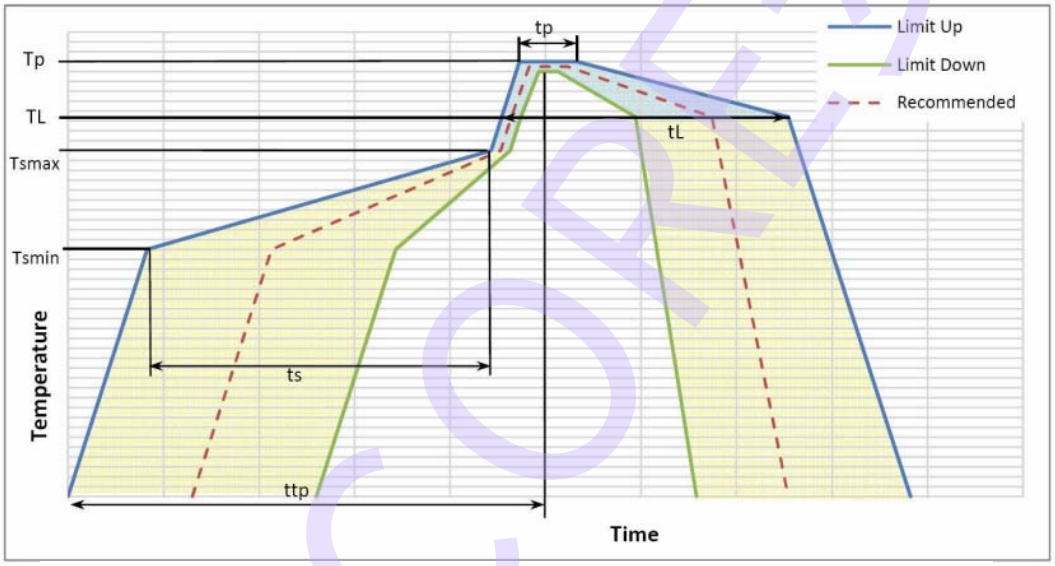
3.1.4 锡膏

推荐使用“no clean”且 “Lead free Sn/Ag/Cu” 的焊锡膏。

3.1.5 SMD 前准备，SMT 贴装

推荐烘烤 100 度+-5 度 3 小时。

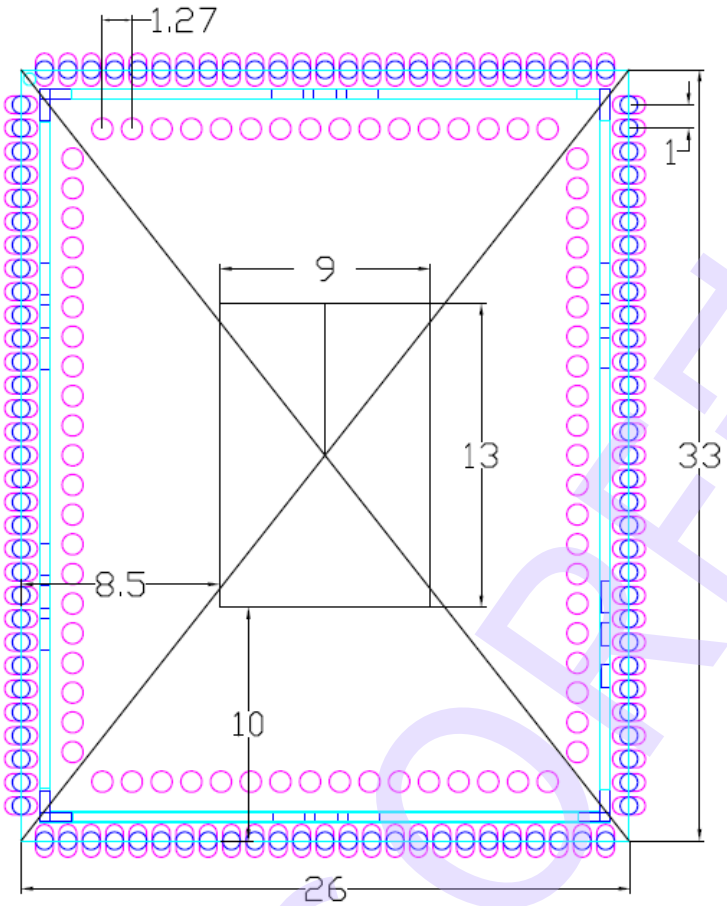
3.1.6 温度曲线



Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max
Preheat – Temperature Min (Tsmin) – Temperature Max (Tsmax) – Time (min to max) (ts)	 150°C 200°C 60-180 seconds
Tsmax to TL – Ramp-up Rate	 3°C/second max
Time maintained above: – Temperature (TL) – Time (tL)	 217°C 60-150 seconds
Peak Temperature (Tp)	245 +0/-5°C
Time within 5°C of actual Peak Temperature (tp)	10-30 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

注意：所有的温度是指封装表面温度。HWX226 仅能耐受一次回流焊接。

3.2 尺寸 mm



由于模组背面有元件，9x13mm 区域为底板开窗区域。

第4章 销售信息

4.1 PN 举例

W22axppyztsn

a： 6 IMX6, 7 IMX7

x: imx6 型号 G（6UL），X（SOLOX），S（SOLO），U(DualLite), D(Dual), Q（Qual），

pp: IMX6 功能标识符@+,同 IMX6 的编码规则

y: DDR3 容量 A=128M, B=256M，5=512M, 1=1G(默认),2=2G，4=4G

z: EMMC 容量 2=2G,4=4G, 8=8G, 1=16G, 3=32G, N=NC(不贴装)

QSPI 容量 A=128Mb,B=256Mb,C=512Mb

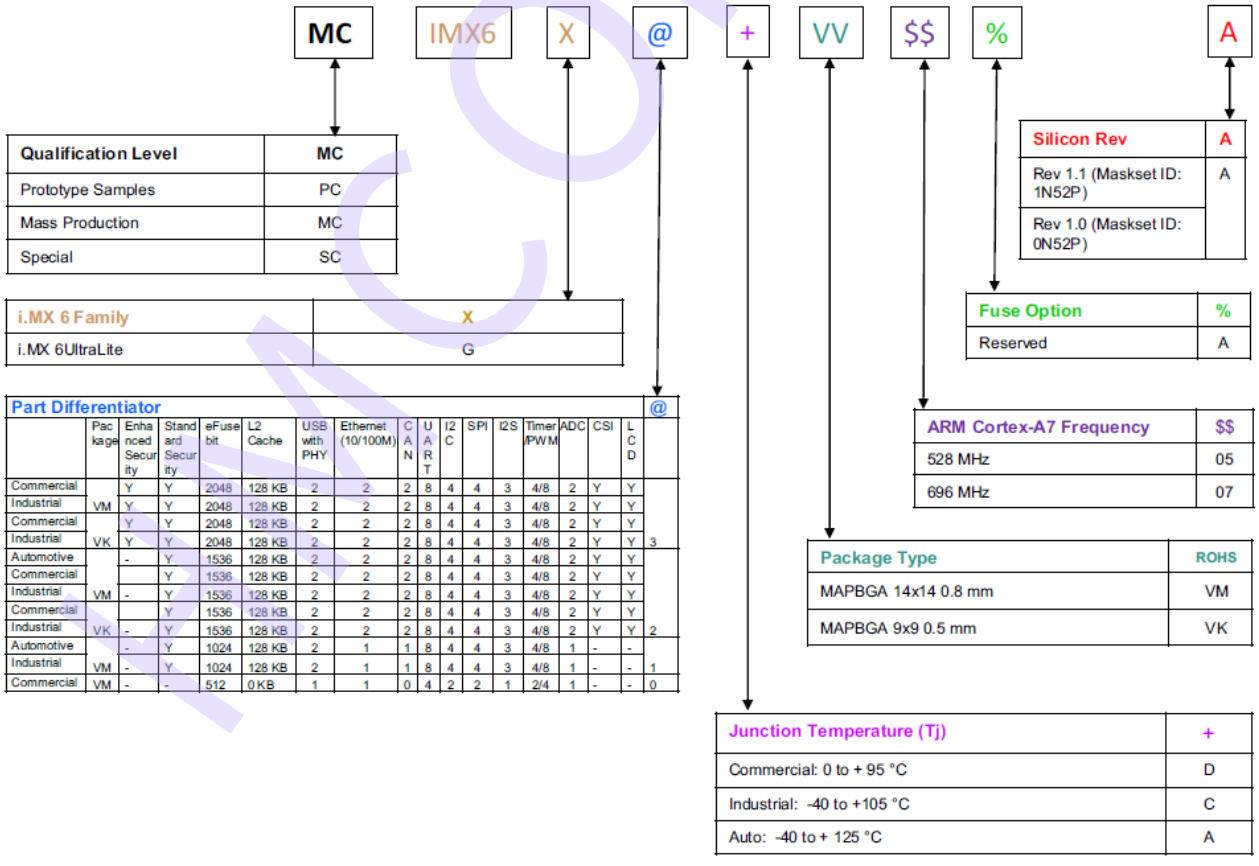
t: DDR3 温度 I=-40~85℃ "-"=0~85℃

s: QSPI，EMMC 温度 I=-40~85℃ "-"=-25~85℃

n: 底板配置顺序号。 " "=默认配置

Part Number	描述	主控型号
W226G2CB4I	ARM A7 版 单核 500Mhz ,-40~105℃， 256M DDR3 -40~85℃，4G EMMC -25~85℃	MCIMX6G2CVM05AB
W226G0DA4	ARM A7 版 单核 500Mhz ， 0~95℃， 128M DDR3 0~85℃，4G EMMC -25~85℃	MCIMX6G0DYM05AA

4. 2 IMX6 料号



	Package	Enhanced Security	Standard Security	eFuse bit	L2 Cache	USB with PHY	Ethernet (10/100M)	CAN	UART	I2C	SPI	I2S	Timer/PWM	ADC	CSI	LCD	
Commercial		Y	Y	2048	128 KB	2	2	2	8	4	4	3	4/8	2	Y	Y	
Industrial	VM	Y	Y	2048	128 KB	2	2	2	8	4	4	3	4/8	2	Y	Y	
Commercial		Y	Y	2048	128 KB	2	2	2	8	4	4	3	4/8	2	Y	Y	
Industrial	VK	Y	Y	2048	128 KB	2	2	2	8	4	4	3	4/8	2	Y	Y	3
Automotive		-	Y	1536	128 KB	2	2	2	8	4	4	3	4/8	2	Y	Y	
Commercial			Y	1536	128 KB	2	2	2	8	4	4	3	4/8	2	Y	Y	
Industrial	VM	-	Y	1536	128 KB	2	2	2	8	4	4	3	4/8	2	Y	Y	
Commercial			Y	1536	128 KB	2	2	2	8	4	4	3	4/8	2	Y	Y	
Industrial	VK	-	Y	1536	128 KB	2	2	2	8	4	4	3	4/8	2	Y	Y	2
Automotive		-	Y	1024	128 KB	2	1	1	8	4	4	3	4/8	1	-	-	
Industrial	VM	-	Y	1024	128 KB	2	1	1	8	4	4	3	4/8	1	-	-	1
Commercial	VM	-	-	512	0 KB	1	1	0	4	2	2	1	2/4	1	-	-	0

Figure 1. Part Number Nomenclature—i.MX 6UltraLite