

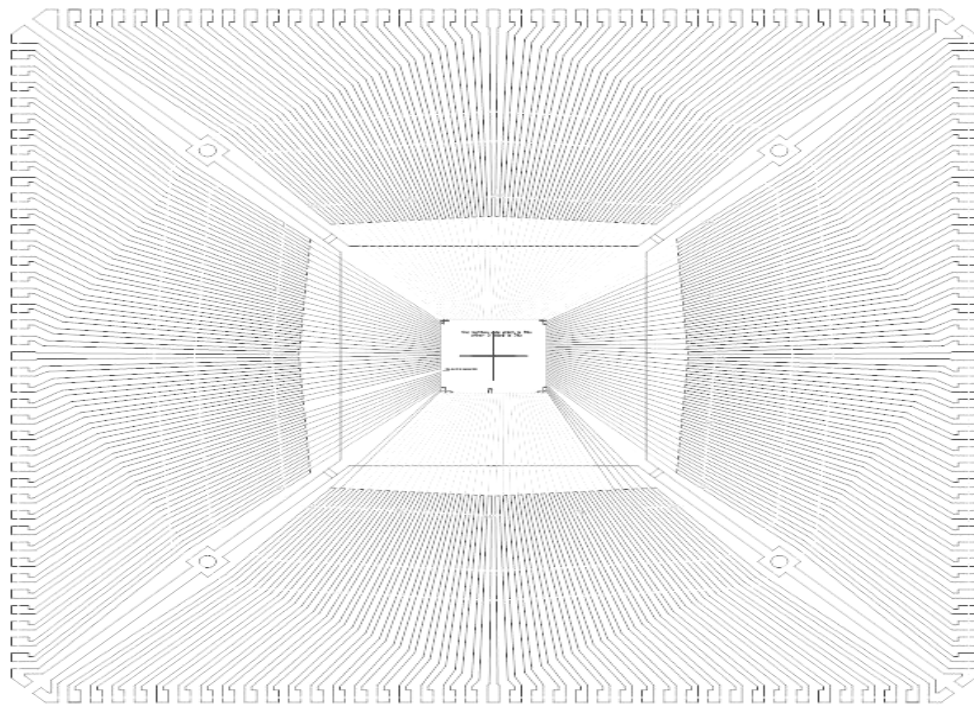
LONTIUM SEMICONDUCTOR CORPORATION

ClearedEdge™ Technology

LT9211

Board Design Guide

龙迅半导体



We produce mixed-signal products for a better digital world!

Reversion History

Date	Author	Version	Descriptions
2019-06-08		1.0	

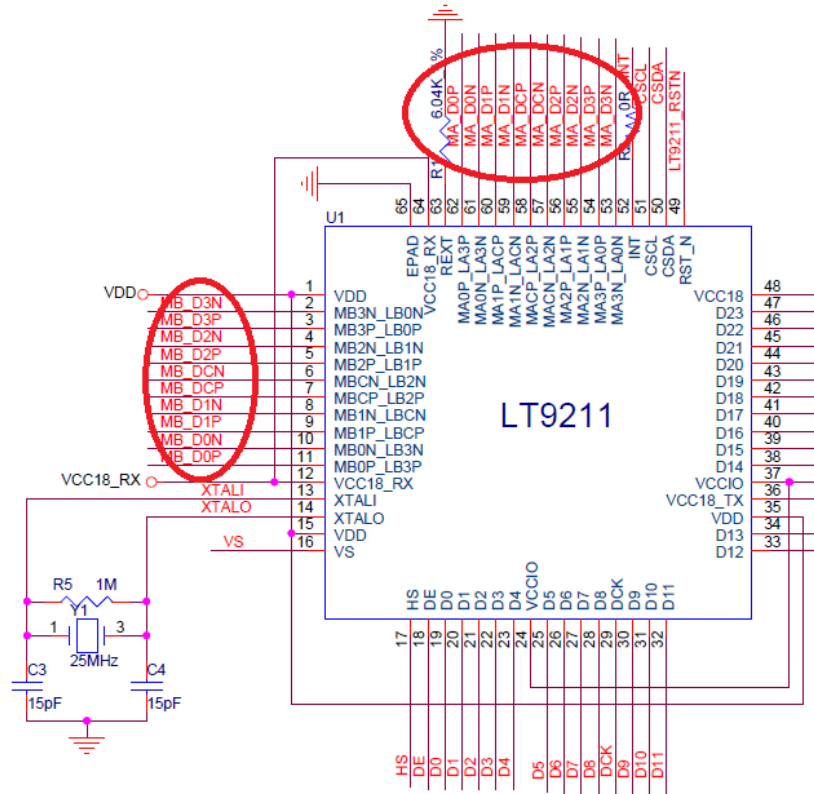
CONFIDENTIAL

MIPI Receiver

支持两个 port 的 MIPI 信号输入，单个 port 支持的最大分辨率为 1080P@60Hz。MIPI receiver 可以使用 1 lane clock 和 1~4 data lane。两个 MIPI receiver 可以选择一个使用。

Support dual-port MIPI DSI/CSI receiver, single port supports 1080P@60Hz. MIPI receiver can use one Clock Lane and one or more Data Lanes

Dual-port MIPI DSI/CSI transmitter can choose single port to use.



LVDS Receiver

支持两个 port 输入,单个 port 支持的最大分辨率为 720P@60Hz,两个 port 支持 1080P@60Hz。两个 LVDS receiver 可以选择一个或两个使用。

Support dual-port LVDS receiver, single port supports 720P@60Hz,dual port supports 1080P@60Hz.

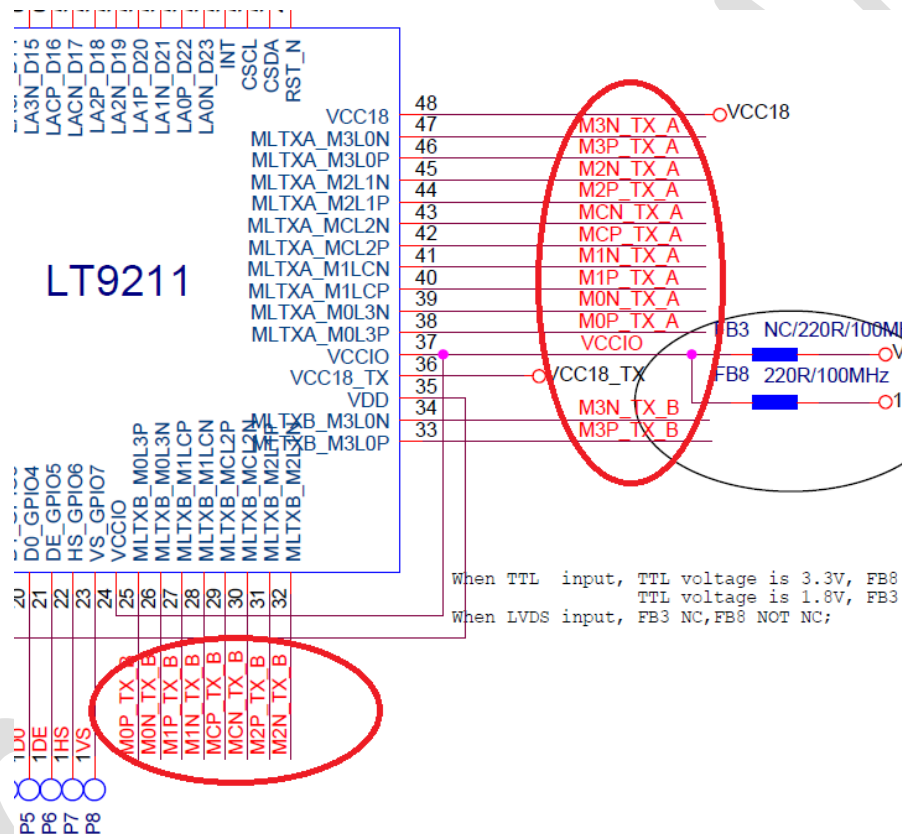
Dual-port LVDS receiver can choose single port or dual-port to use.

MIPI Transmitter

支持两个 port 的 MIPI 信号输出，单个 port 支持 1080P@60Hz,数据可以配置为 1~4lane。两个 MIPI transmitter 可以选择一个或者两个一起使用。

Support dual-port MIPI DSI/CSI transmitter, single port supports 1080P@60Hz. MIPI transmitter can use one Clock Lane and one or more Data Lanes.

Dual-port MIPI DSI/CSI transmitter can choose single port or dual-port to use.

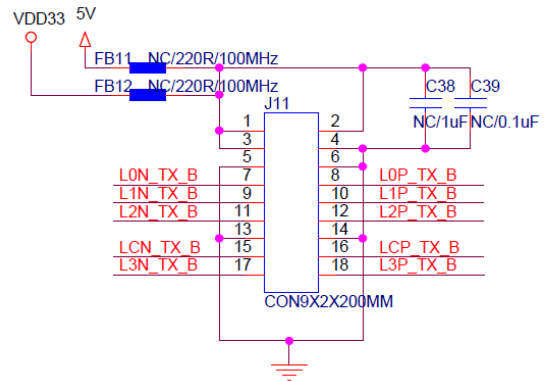
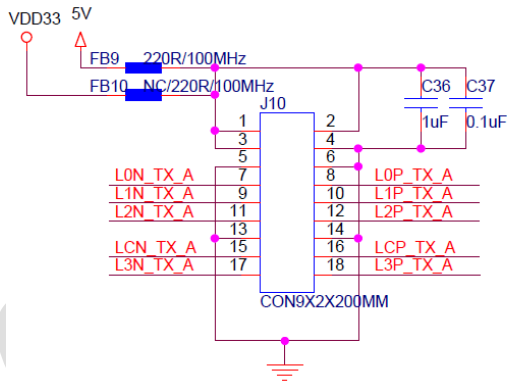
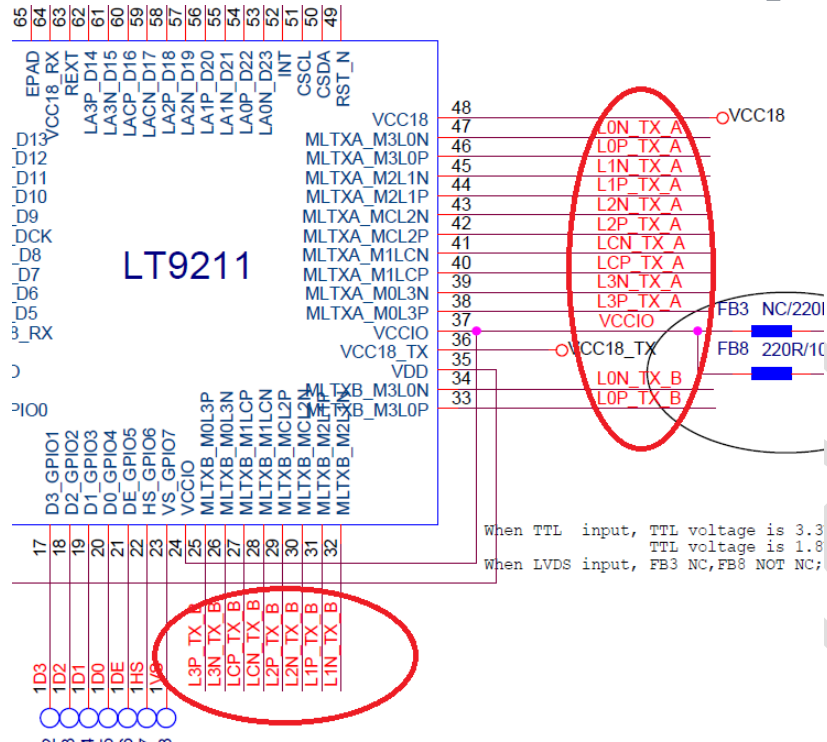


LVDS Transmitter

支持两个 port 输出,单个 port 支持的 最大分辨率为 720P@60Hz,两个 port 支持 1080P@60Hz。

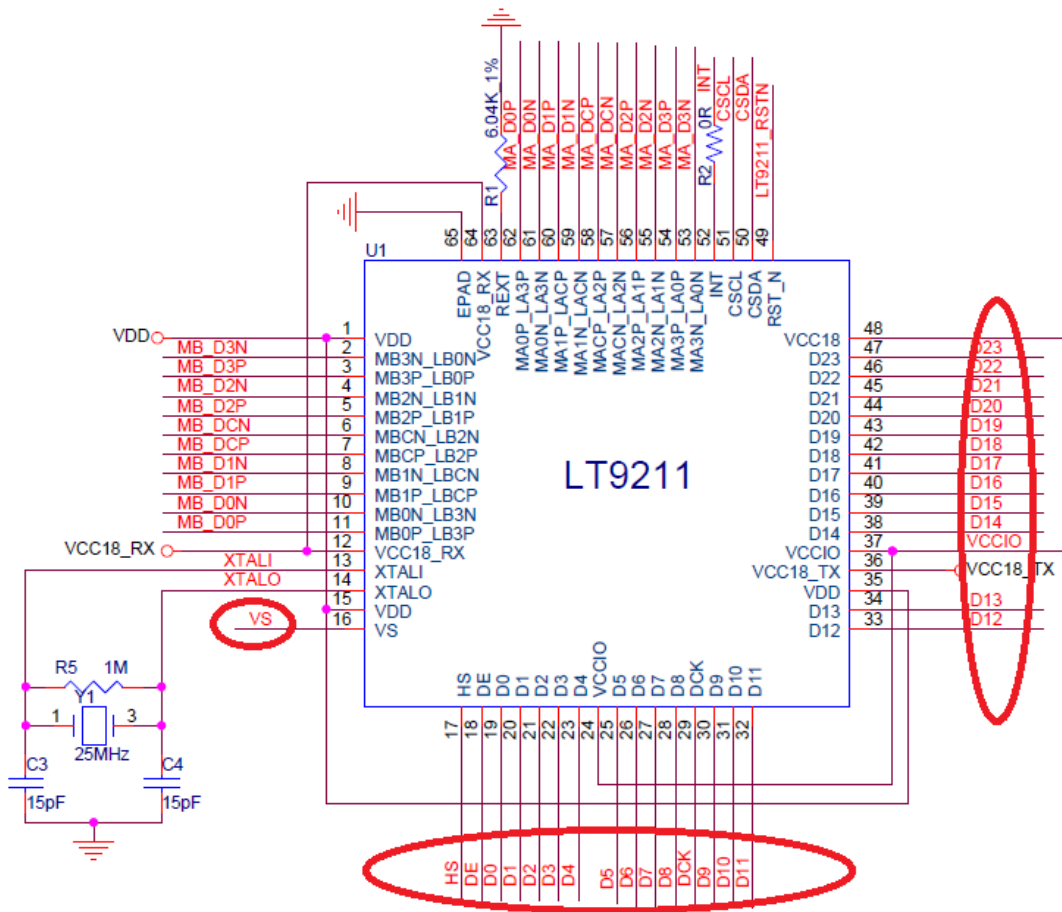
Support dual-port LVDS transmitter, single port supports 720P@60Hz,dual port supports 1080P@60Hz.

Dual-port LVDS transmitter can choose single port or dual-port to use.



TTL Output

Support 24-bit RGB and BT656/BT1120.



TTL OUTPUT

RGB OUTPUT:

D0: D7=R0: R7

D8: D15=G0: G7

D16: D23=B0: B7

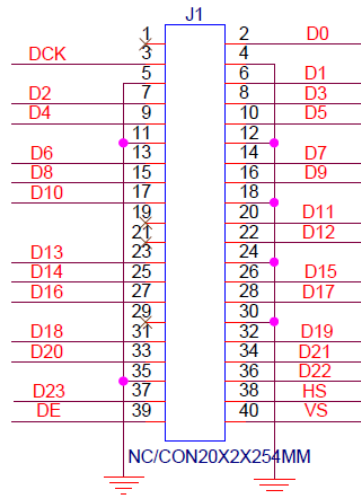
BT1120 OUTPUT:

$$D_0: \quad D_7 = C_0: \quad C_7$$

D8: D15=Y0: Y7

BT656 OUTPUT:

D8: D15=Ycbcr0: Ycbcr7



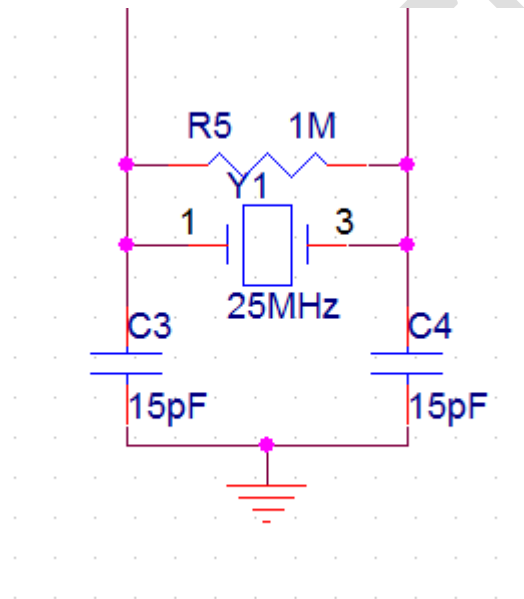
Crystal

LT9211 使用 25MHZ 无源晶振，建议选择负载电容小的晶振，请注意电路中负载电容值约为规格书中标注的 2 倍关系，晶振的频差不得大于 20PPM, 温度频差小于 30PPM。

1M 反馈电阻不能删除。

The LT9211 uses a 25MHZ passive crystal oscillator. It is recommended to select a crystal with a small load capacitance. Please note that value of the load capacitor in the circuit is about 2 times marked in the crystal specification. The frequency tolerance of the crystal should not be bigger than 20PPM, and the temperature tolerance should be less than 30PPM.

The 1M ohms feedback resistor cannot be deleted.



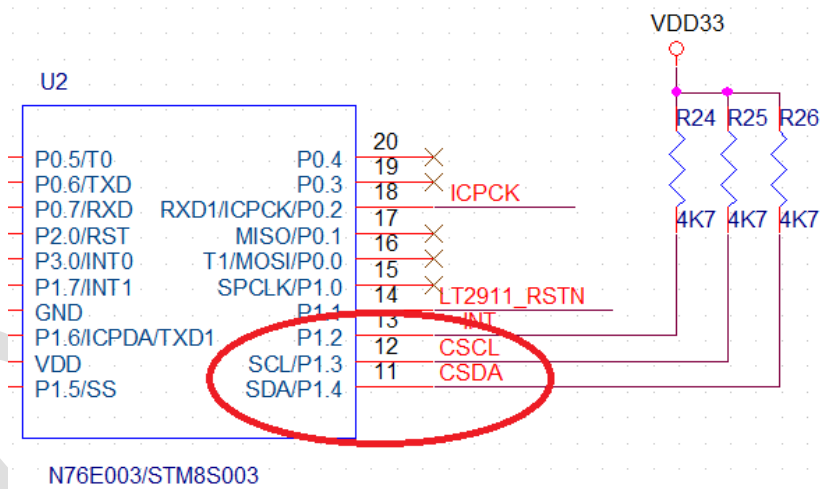
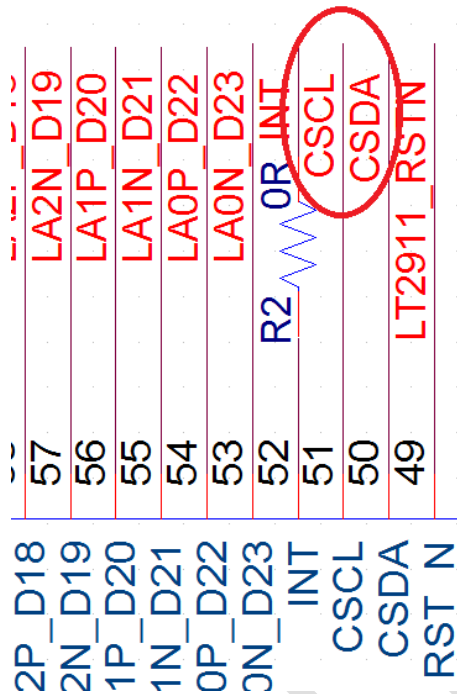
C_SCL/C_SDA

I2C 接口用来配置和读取寄存器，请连接到 MCU 上，可以上拉到 1.8V 或者 3.3V。

速率低于 200KHz。

I2C interface can be used to configure and read registers, please connect them to MCU, can be pulled up to 1.8V or 3.3V.

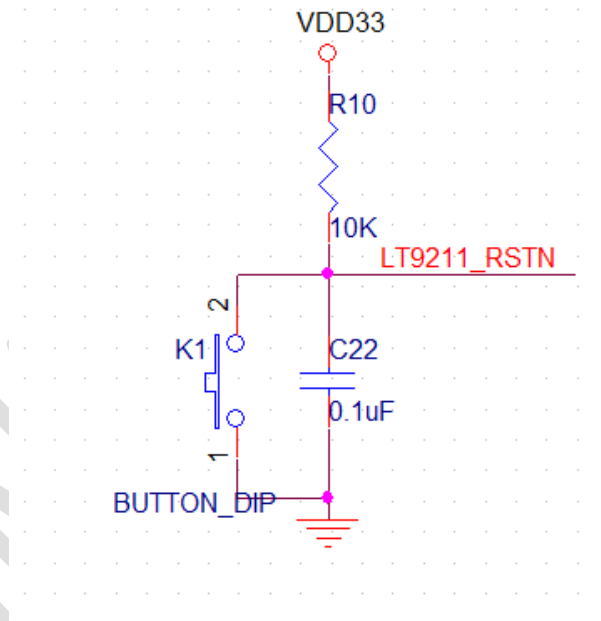
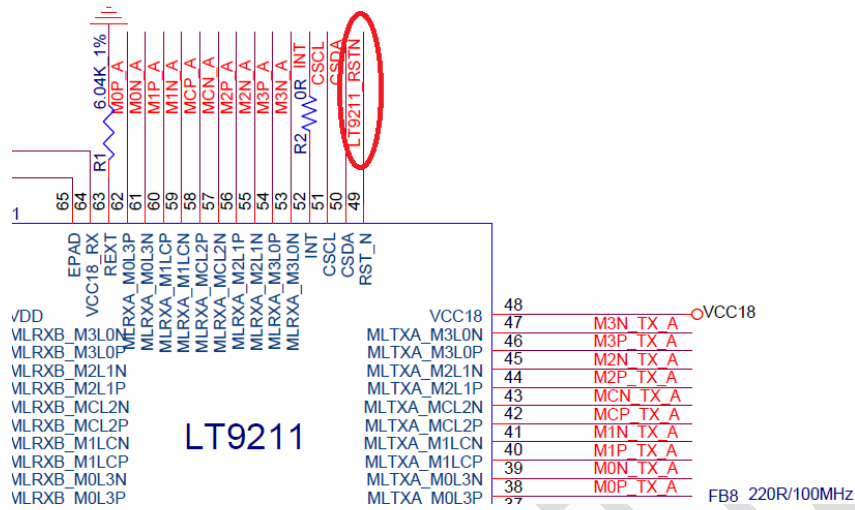
The rate is below 200KHz.



RSTN

芯片 RSTN 脚上拉到 3.3V 或 1.8V，请用 MCU 的 GPIO 控制此管脚，在 LT9211 上电后复位一下再工作。

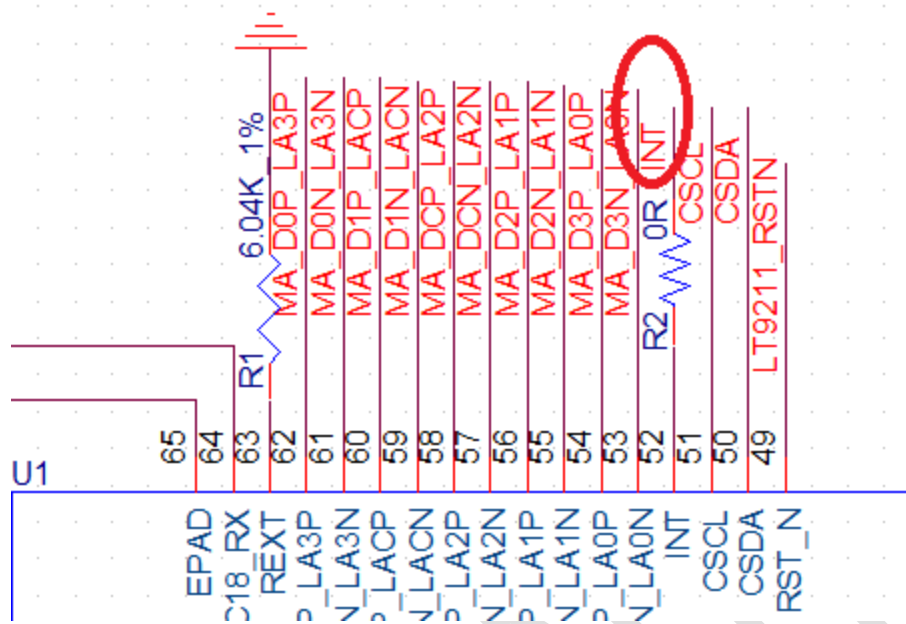
The RSTN pin can be pulled up to 1.8V or 3.3V, please use a GPIO to control this pin, please reset this pin after LT9211 powered up.



INT

此管脚可以输出一个中断，可以配置为 OD 或者 CMOS 输出。CMOS 输出的时候，最大输出电平是 1.8V。

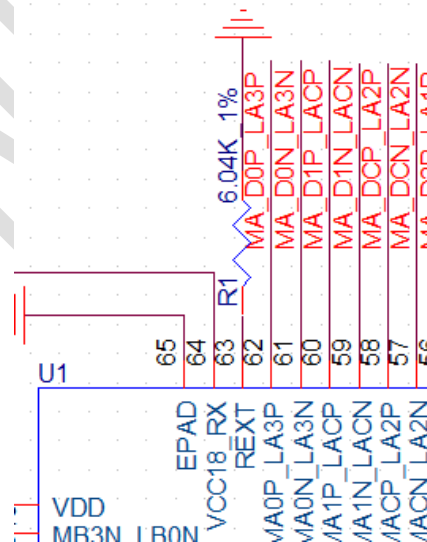
This pin is interrupt request output. It can be configured as Open-drain or CMOS output, when configured as CMOS output, the output high voltage is 1.8V.



REXT

外接 6.04K 电阻到地，精度 1%，提供参考电流，靠近芯片管脚放置。

REXT should be connected to ground via a 6.04KΩ resistor, and the resistance tolerance is 1%. It provides a reference current and should be placed close to the REXT pin.



VCCIO

对于有 RGB/TTL 输入或者输出的应用，若 VCCIO 接 3.3V，则 RGB/TTL 输入兼容 1.8V 和 3.3V，输出电平是 3.3V；若 VCCIO 接 1.8V，则 RGB/TTL 输入和输出电平都只支持 1.8V。

LVDS 和 MIPI 电平为标准电平，与 VCCIO 电平无关。

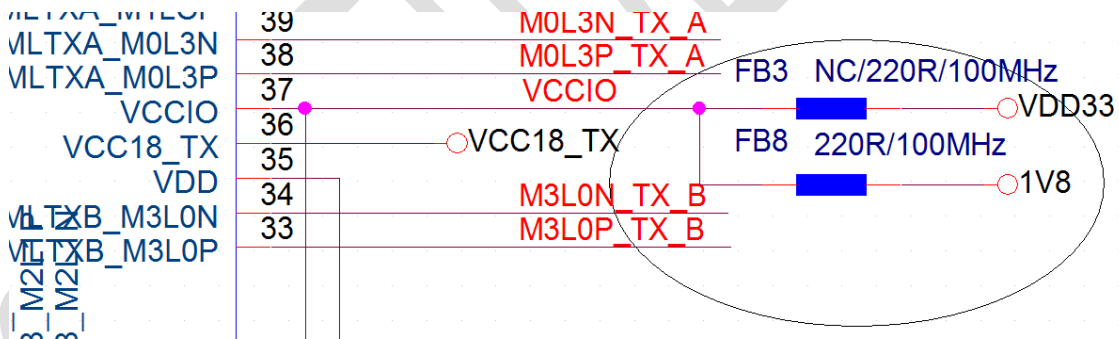
For applications with RGB/TTL input or output, if VCCIO is connected to 3.3V, the RGB/TTL input is compatible with 1.8V and 3.3V, and the output level is 3.3V; if VCCIO is connected to 1.8V, the RGB/TTL input and output power It only supports 1.8V.

LVDS and MIPI levels are standard and are independent of VCCIO levels.

VCCIO	RGB/TTL Input Level	RGB/TTL Output Level
3.3V	1.8V/3.3V	3.3V
1.8V	1.8V	1.8V

对于输入或输出都没 RGB/TTL 的应用，则 VCCIO 推荐接 1.8V 电源。

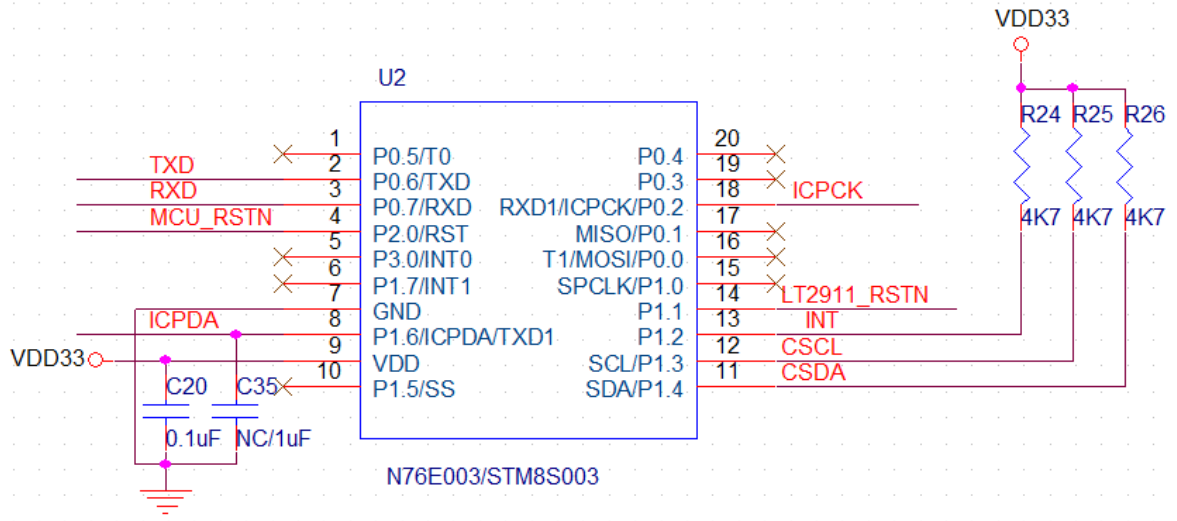
For applications where there is no RGB/TTL for input or output, VCCIO is recommended to be connected to a 1.8V power supply.



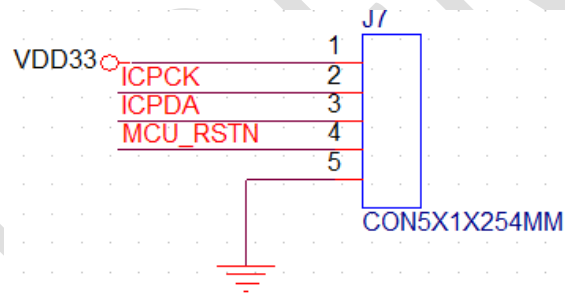
MCU

推荐型号是新唐的 N76E003，可以使用 SOC 来配置 LT9211。

The recommended model is Nuvoton's N76E003, you can use SOC to configure LT9211.



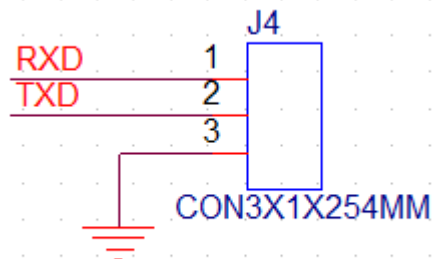
MCU Upgrade Interface



MCU Serial Port

建议加测试点，可以打印 LOG,波特率是 115200。

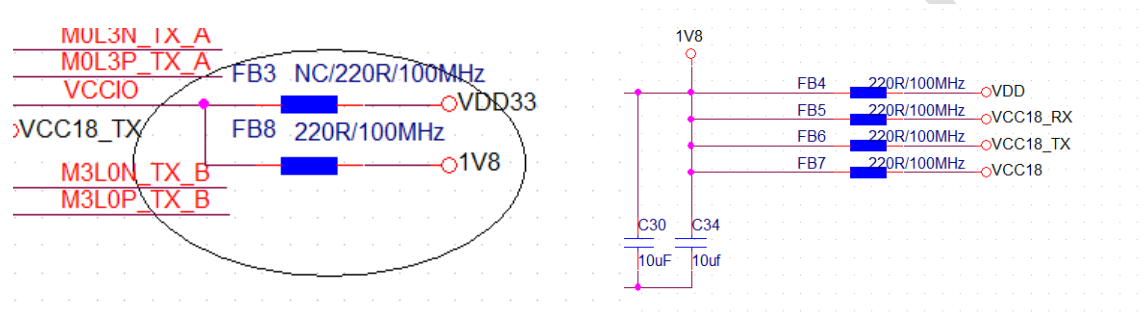
Please add test points, can print the log, the baud rate is 115200.



Bead

电源请串联磁珠，用于抑制电源上的高频噪声，尤其是数据传输速率较高的时候，不建议减少。

Please connect the beads in series to suppress the noise on the power supply. Especially when the data rate is high, it is not recommended to reduce them.

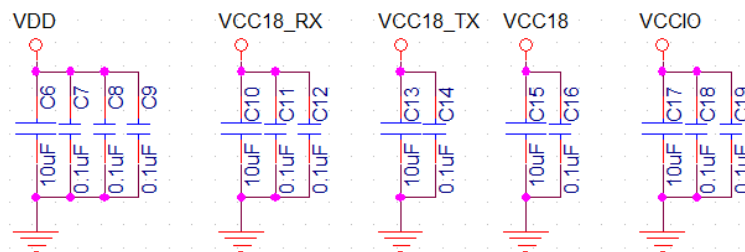


Decoupling Capacitor

请尽量保证芯片每个电源管脚都有一颗 0.1uF 的电容,且靠近管脚放置。

Please ensure that each power pin of the chip has a 0.1uF capacitor, and place the capacitors close to the pin.

Decouple Capacitance



PCB LAYOUT

Differential Impedance

LVDS 和 MIPI 信号线阻抗是 100 欧姆，可以使用软件 SI9000 计算差分阻抗,线宽和线距也可以使用 PCB 板厂推荐值，可以要求 PCB 工厂做阻抗控制。

The differential impedance of LVDS and MIPI are 100 ohms. The differential impedance can be calculated using SI9000, line width and spacing can also use the value recommended by the PCB factory. You can require PCB factory to do impedance control.

Differential Pair

差分对内长度差小于 20mil, 差分对间长度差小于 50mil。

The difference in length of intra-pair is less than 20 mil, the difference in length of inter-pair is less than 50 mil.

TTL 信号线要做等长,长度差在 100mil。

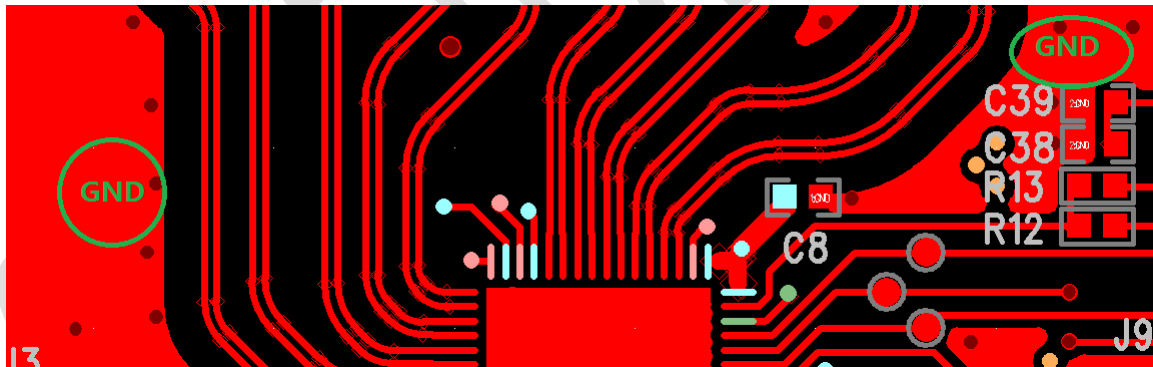
The difference in length of TTL signals is less than 100 mil,

差分对之间间距满足 3W 原则, 差分对最外围包地打地孔, 差分对之间可以不包地。

The space of inter-pair should bigger than 3 times of line width, the outside of all differential pairs should be added shield ground and ground via, and the inter-pair can't do this.

TTL 信号线间距满足 3W 原则,TTL clock 包地线处理, 地线要打过孔。

The space of TTL signals should bigger than 3 times of line width, the outside of TTL clock should be added shield ground and ground via.



Reference Layer

差分对走线最好有完整的参考层, 尽量不要分割参考层, 信号参考层最好是地层。

差分信号线拐角要拉弧线。

It is better to have a complete reference layer for the differential pair. Try not to divide the reference layer. The signal reference layer is preferably used the ground plane.

The corner of the differential line should better be drawn in an arc.

Power Layer

如果采用 4 层板，建议第三层走电源层，可以大面积铺铜的方法，提高电源的过流能力,同时提高散热和加大回流路径。

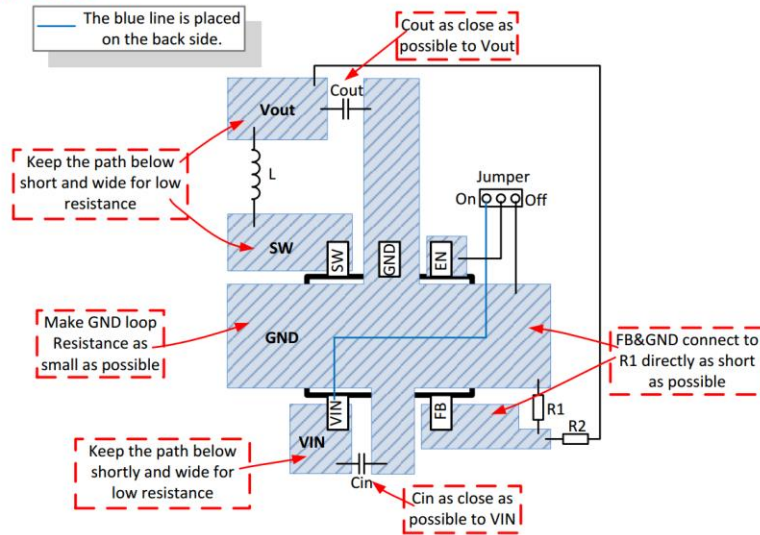
If a 4-layer board is used, the third layer can be used to as power layer, and the copper can be spread over a large area to improve the overcurrent capability of the power supply, while improving heat dissipation and increasing the current return path.

DC-DC Power Supply

布线方式请参考 DC- DC 的 datasheet,注意 DC-DC 模块尽量远离高速信号，并打地孔隔离。

Please refer to the DC-DC chip datasheet for the PCB layout. Note that the DC-DC chip should be kept away from high-speed signals as much as possible., PCB should be added ground via to isolate them.

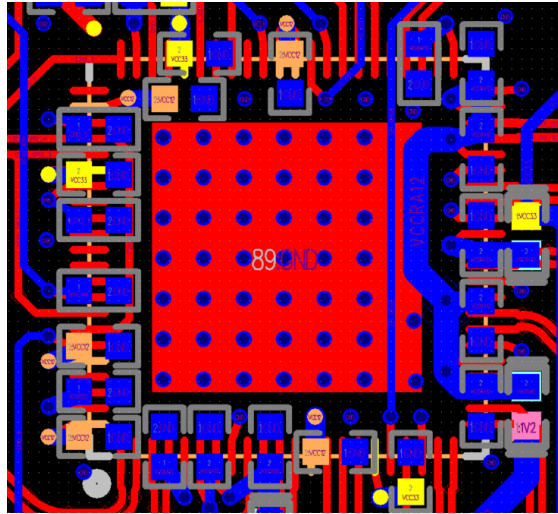
LAYOUT GUIDE



EPAD

如下图所示，在 EPAD 上尽量均匀的多打地孔，可以在帮助散热的同时，给电源 PIN 脚提供回流路径。

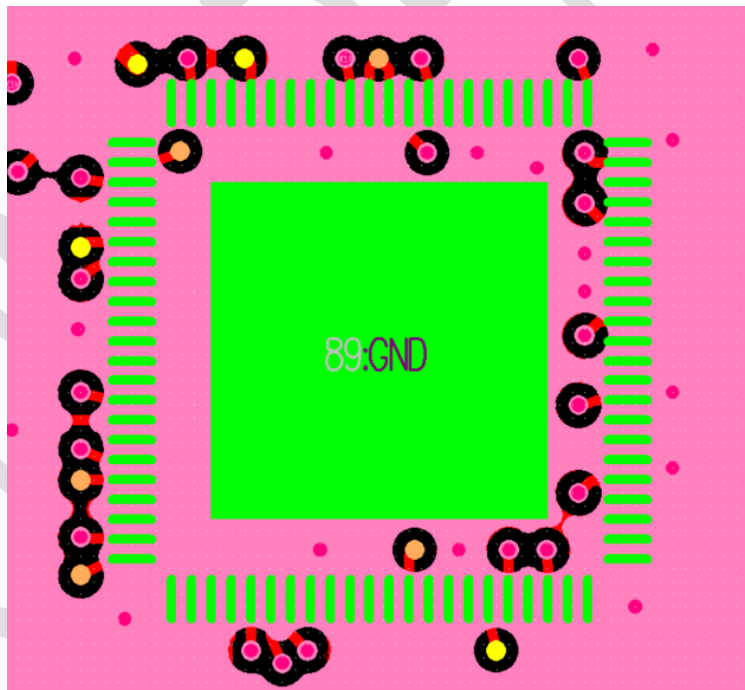
As shown in the figure below, evenly add the ground via on the EPAD, this can provide the path of return current to power pins and help to dissipate heat.

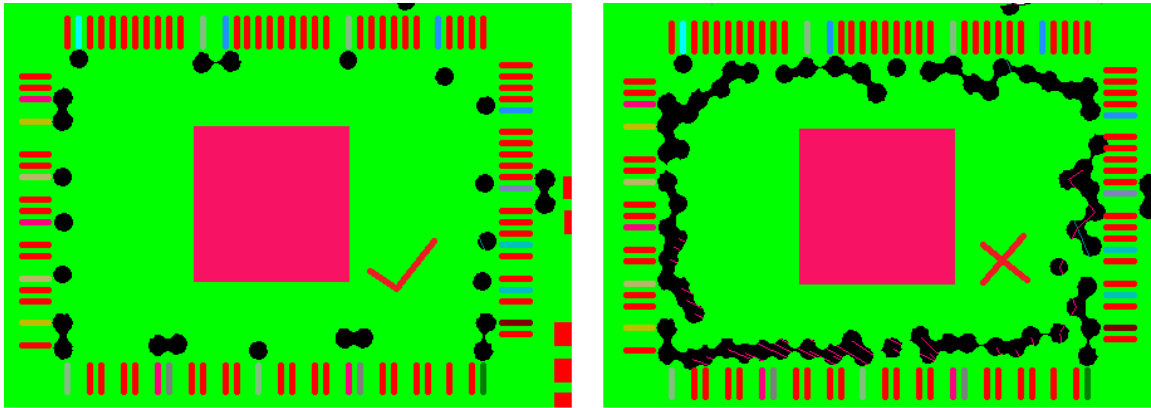


Signal Via

信号过孔要放置的分散，保证地铜箔能完整的连接上，保证散热。

The vias are to be dispersed to ensure that the ground copper be completely, this is better to heat dissipation.



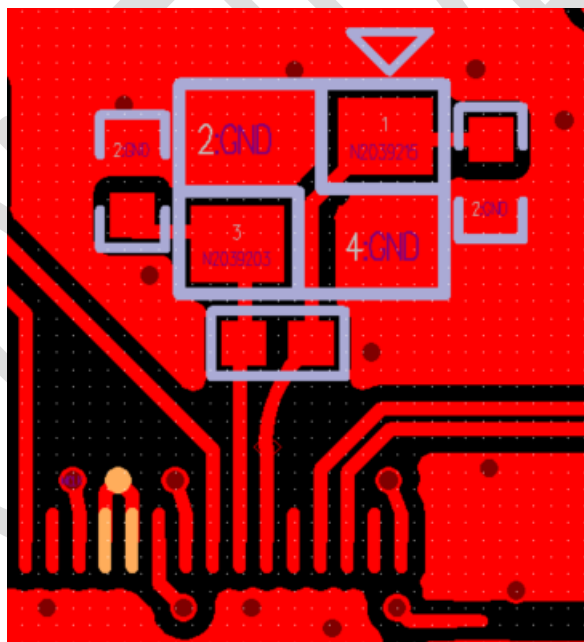


散热通道畅通 VS 散热通道隔断

Crystal

如下图所示，晶振可以视为一个强干扰源，在空间允许的情况下，尽量做到远离其他高速信号，包地并打地孔。

As shown in the figure below, the crystal oscillator can be regarded as a strong interference source. When the space of PCB permits, try to keep away from other high-speed signals, and add the shield ground and ground via outside of the crystal.



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