Using PI3WVR12412 and PI3HDX511A for MST hub

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Table of Contents

1. Introduction

MST hub with DP and HDMI input terminations

- When using PI3WVR12412 for MST hub with DP and HDMI input terminations as in figure 1, no need to use PI3HDX511A (figure 2).

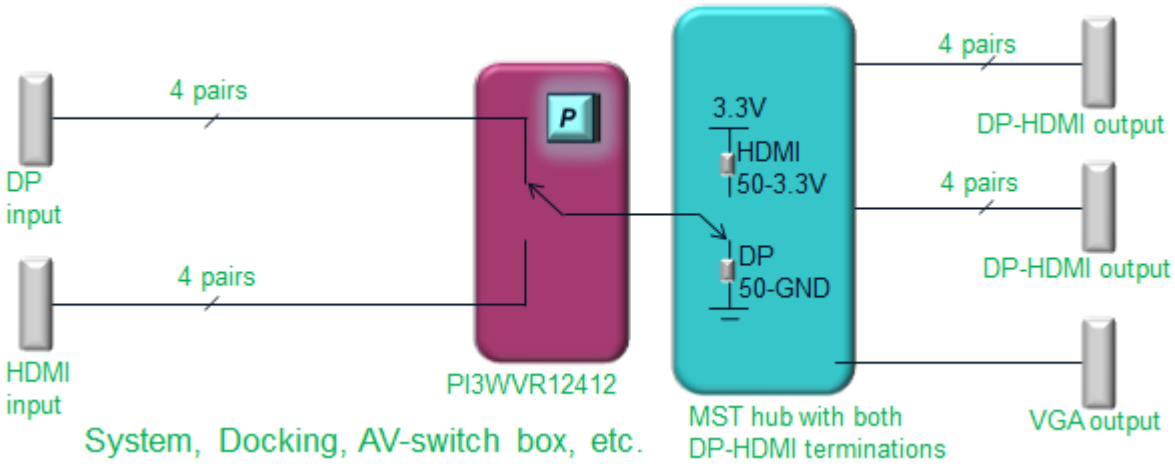


Figure 1, PI3WVR12412 for MST hub with both DP and HDMI input terminations

MST hub with only DP input terminations

Some MST hub:

- Can support DP and HDMI protocols with DP-PHY with 50ohm to GND input termination in MST hub
- Cannot support HDMI-PHY with 50ohm to 3.3V input termination in MST hub

The MST hub with only DP input termination needs a HDMI re-driver that can support HDMI at input and can support DP at output, such as PI3HDX511A with 50ohm to 3.3V source output termination (figure 2).

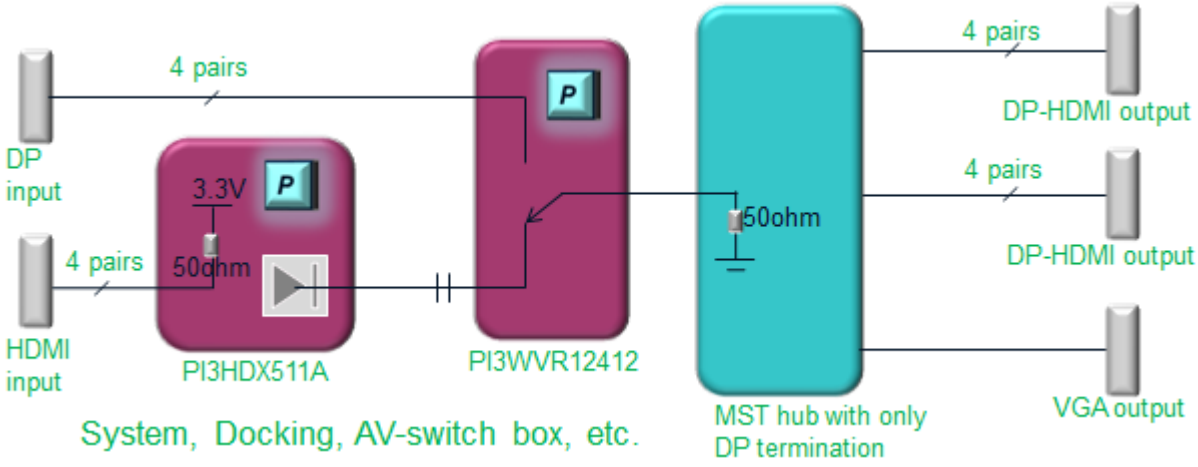


Figure 2, PI3WVR12412 and PI3HDX511A for MST hub with only HDMI input termination

2. Main Link Channels

DP channel

- PI3WVR12412 will auto detect and working in DP mode.
- No need for AC coupling, the DP-source has AC coupling per DP specification.

HDMI channel

- MST hub with both DP-HDMI terminations (refer to figure 1 and appendix 1)
  - PI3WVR12412 will auto detect and working in HDMI mode.
  - No need PI3HDX511A nor AC coupling.
- MST hub with only DP-termination (refer to figure 2 and appendix 2)
  - Needs PI3HDX511A with output AC coupling.
  - PI3WVR12412 will auto detect and working in DP mode.

3. Control Pins

OE1# and OE2# pins can be tied to ground. Use a system GPIO to control SEL pin.

6 Layout and power

90ohm differential impedance

Plane	Material	Thickness (mil)
Solder mask	Mask paint	1.2
Signal	Copper	1.9
Prepreg	2116	4.4
Vcc	Copper	1.4
Core		47
Vss	Copper	1.4
Prepreg	2116	4.4
Signal	Copper	1.9
Solder mask	Mask paint	1.2
Total		62.4

Table-2, the stack-up of 90ohm differential impedance

- ❑ Use 6-7-6 mils for trace-space-trace for the micro-strip lines (the traces on top and bottom layers) for 90ohm differential impedance.
- ❑ Use 6-5-6 mils for trace-space-trace for the strip-lines (the traces inside layers) for 90ohm differential impedance.
- ❑ Use FR4.
- ❑ Using standard 4 to 8 layers stack-up with 0.062 inch thick PCB.
- ❑ For micro-strip lines, using ½ OZ Cu plated is ok.
- ❑ For strip-lines in 6 plus players, using 1 OZ Cu is better.
- ❑ More pair-to-pair spacing for minimal crosstalk
- ❑ Target differential Zo of 90ohm ±15ohm
- ❑ The above is only for generic reference. Impedance shall be controlled in PCB fabrication.

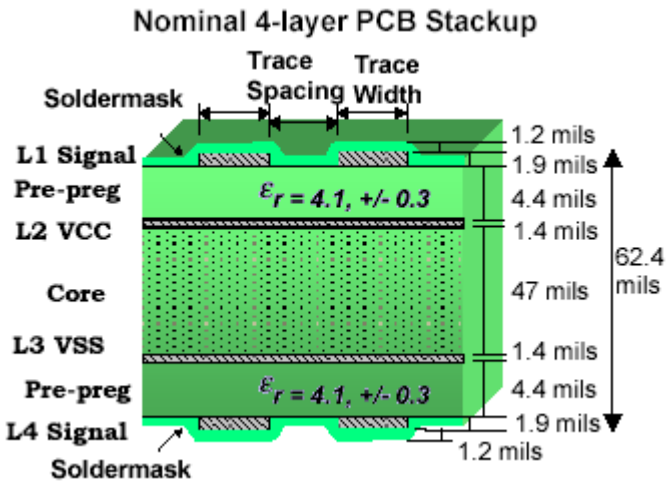


Figure 13, the PCB layers stack-up

The layout of traces

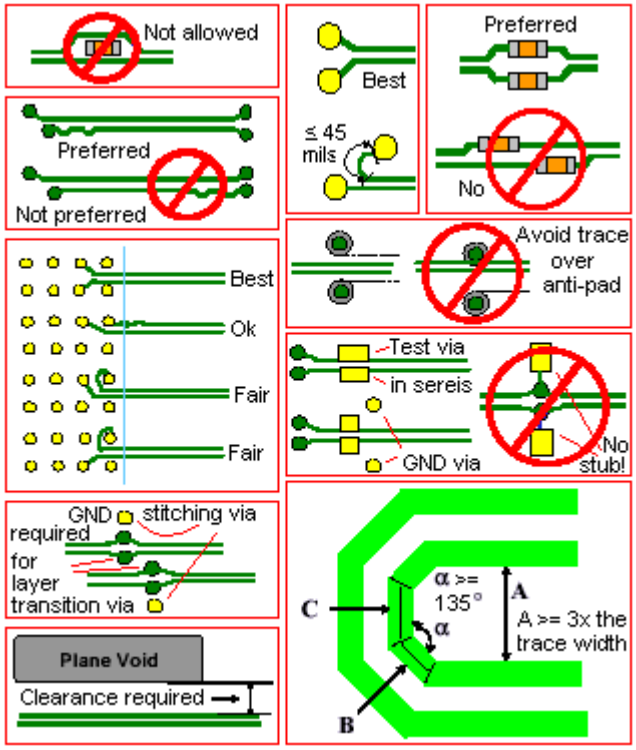
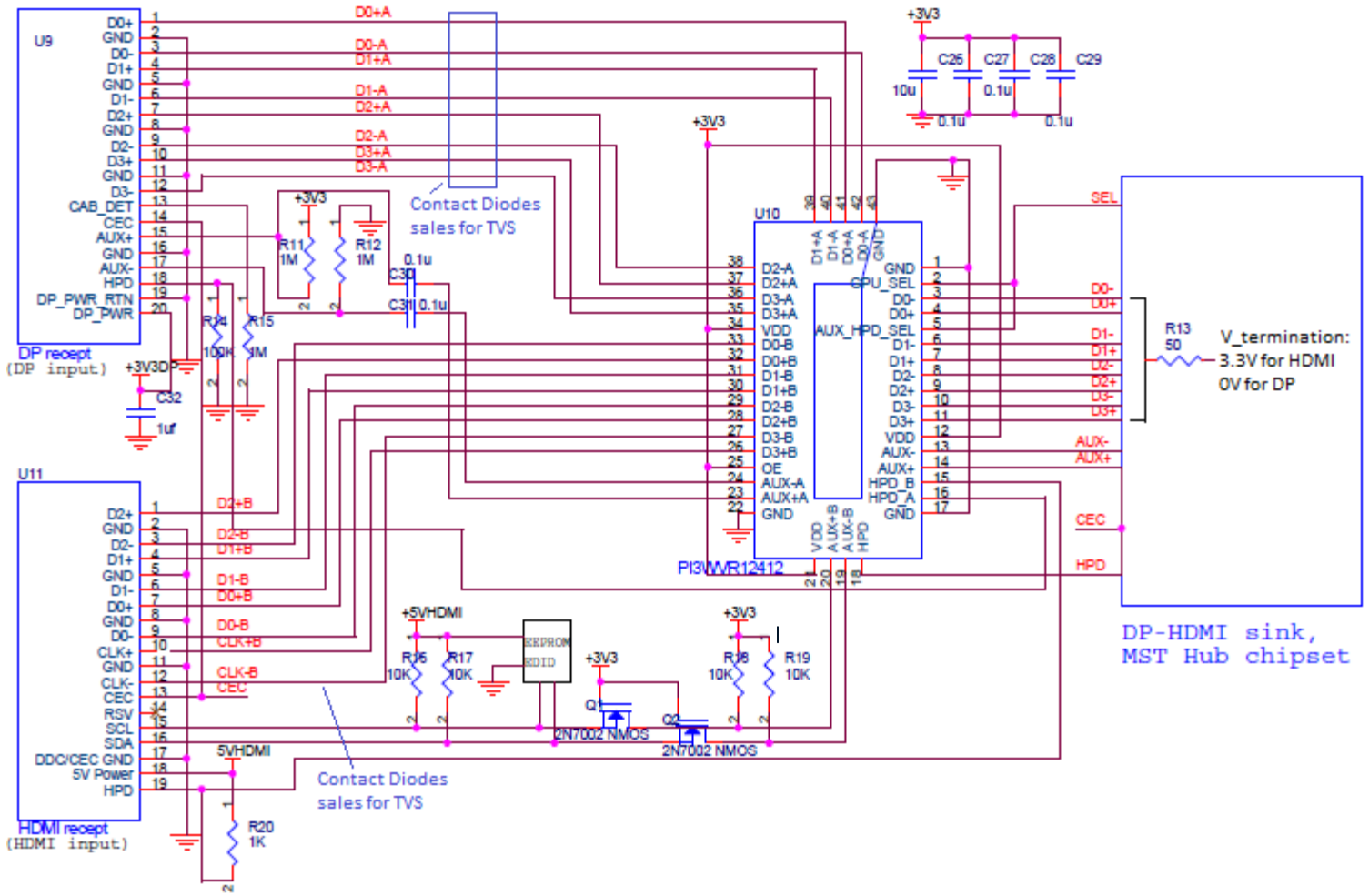


Figure 14, the layout of traces

VDD bypass capacitance and power-ground layers

- Use 0.1uf in size of 0402 for all the VDD (any power pins) pins of the IC device, as close to the VDD pins as possible, within 2-3mm if feasible.
- Use dedicated VDD and GND planes if feasible to minimize the power noise.

Appendix 1, application circuit using PI3WVR12412 for MST hub with both DP-HDMI input terminations



Appendix 2, application circuit using PI3WVR12412 and PI3HDX511A for MST hub with only DP input terminations