HDMI Layout Simplification with CMD MediaGuard Devices

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INTRODUCTION

California Micro Devices has greatly simplified the task of impedance matching and isolation protection for HDMI designs with the introduction of the integrated MediaGuard™ device family.

MediaGuard's unique TSSOP38 footprint eliminates many of the variables and uncertainty involved in approaching a new HDMI layout with multiple SOT or MSOP ESD devices. The "flow through" routing and very low, matched parasitics ensure that the designer can easily identify and target *specific* impedance mismatches and trim the trace width to compensate without the need for bulky Common Mode Chokes or long differential compensation traces.

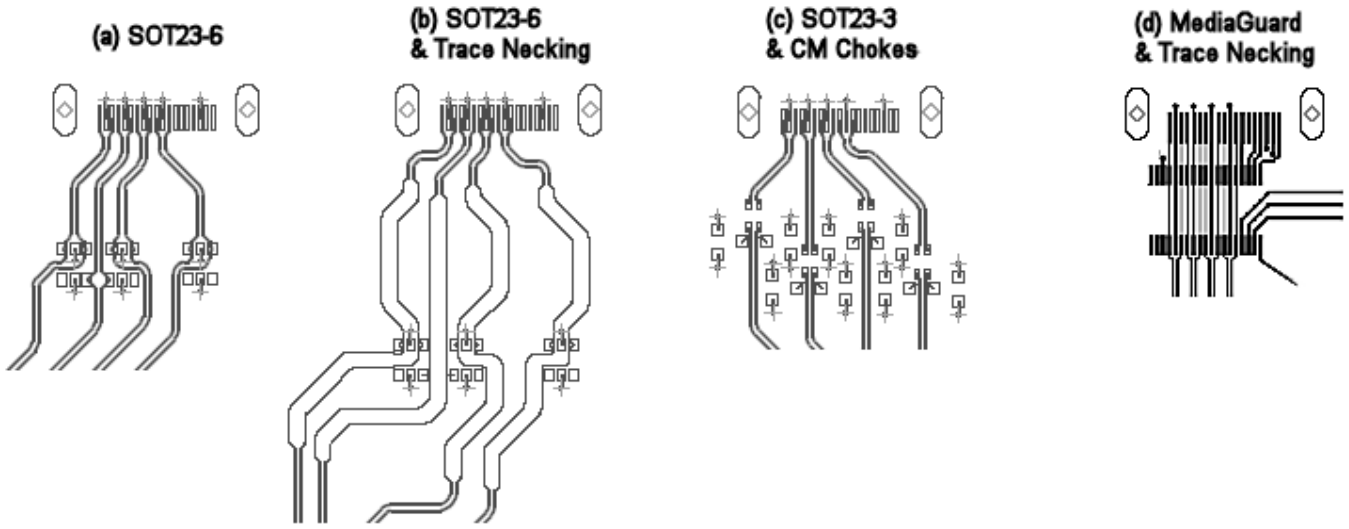

Figure 1 Layout Comparison

The Mediaguard layout (Fig 1d) continues the single-ended connector layout directly into the ESD protection area, thus simplifying the options for routing.

After selecting the placement of the MediaGuard chip relative to the connector, the designer need only consider the width of the trace segments for the target PCB stackup dimensions and be done!

The following TDR output shows the sample results on a Comparative Trace Impedance Board built with the following parameters:

Number of Layers	6
Stackup	Signal Layer 1 (Top) *[Shown in Diagrams]* Ground Layer Signal Layer 2 *[Not Used Here]* Signal Layer 3 *[Not Used Here]* Power Layer Sig. Layer 4 (Bottom) *[Not Used Here]*
Board Thickness	62mils
Copper Thickness	1oz finished (0.5oz Cu + 0.5oz plating)
Solder Mask Dielectric Constant	3.5
Solder Mask Thickness	0.7mils
Dielectric Material and Dielectric Constant	FR4, εr = 4
Dielectric thickness between Layer 1 and GND	7.5mils
Trace width of 100Ω diff. traces	10mils
Trace separation of 100Ω diff. traces	9mils

Table 1

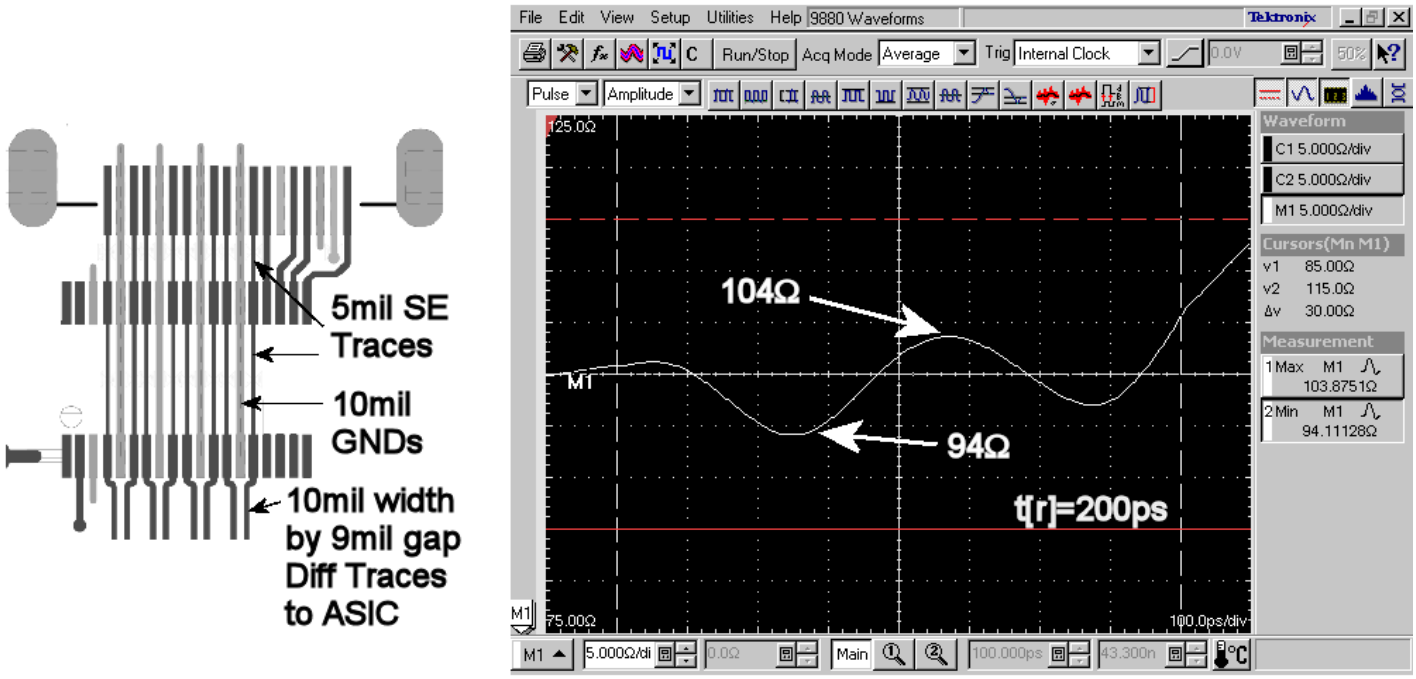

Figure 2

Using a risetime faster than the 200ps sufficient for HDMI compliance can increase the observed resolution, and the designer can identify individual impedance discontinuities that might be "averaged out" by the longer incident risetime. With the uniform layout of the MediaGuard devices it is a straightforward and realtively simple method to adjust each segment and tune it to the desired impedance without inadvertently affecting another area. See the CMD Application Note *"HDMI Comparative Trace Impedance Demonstration Boards"* for further information.

SUMMARY

MediaGuard devices greatly minimize the problems associated with laying out a well protected high performance HDMI port. The "flow through" pinout simplifies the puzzle of component orientation, thus providing a uniform layout that is easy to tune.

Additionally, the industry leading low-capacitance and matched parasitics of the MediaGuard devices in particular eliminate the need for the additional expense of Common Mode Chokes, and also reduces the board space needed for "trace necking." This low-impact ESD protection coupled with outstanding isolation and backdrive protection for all high- *and* low-speed HDMI signals makes the MediaGuard family an ideal choice for HDMI port protection.

PLEASE REVIEW ALL OF THE CURRENT HDMI DESIGN GUIDELINES AVAILABLE AT
http://www.calmicro.com/applications/customer/downloads/current-cmd-mediaguard-design-guidelines.zip

(Many of these documents are specifically related to MediaGuard products, but they are also generally applicable to PicoGuard products in HDMI applications)

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