AN-6036
FSHDMI04 Applications Layout Guidelines

Summary

HDMI applications use high-frequency digital data transfer (up to 1.65Gbps) on each line, making board layout an important factor in successful system implementation. The following board layout guidelines are provided as a point of reference to aid high-speed board design. There is no “perfect: board design in a real-world application, but to achieve best results, Fairchild has provided the following guidelines:

Guidelines

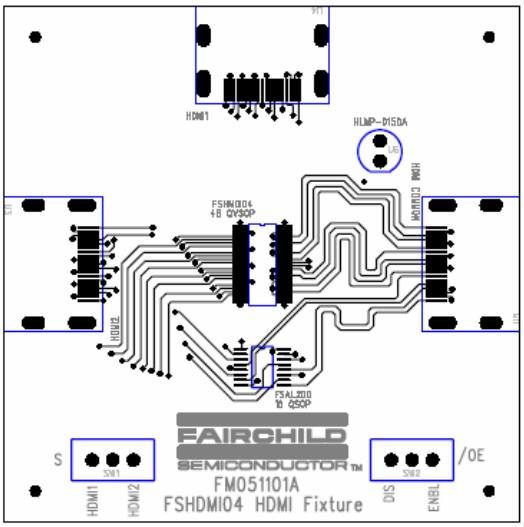
- Always minimize trace lengths by placing the FSHDMI04 as close to the HDMI receiver as possible, as well as by placing both parts as close to the HDMI connectors as possible.
- Use closely coupled 100-Ohm differential-controlled impedance traces for each TMDS pair (TMDS0, TMDS1, TMDS2) or loosely coupled 50 Ohms controlled single-ended traces.
- Minimize via usage on the FSHMDMI04 TMDS signal lines. Only use vias where necessary to connect with the HDMI connector or HDMI receiver chip.
- Make sure all TMDS pair trace lengths are matched (less than 250mil difference between TMDS+, TMDS-) to minimize intra-pair skew.
- Match all TMDS sets; TMDS0, TMDS1, TMDS2 have the same lengths to minimize inter-pair skew (less than 500mil difference between TMDS pairs).
- Maintain minimum individual spacing between adjacent, closely coupled differential pairs or loosely coupled 50-Ohms traces of at least three times the dielectric height. If possible, place a GND strip between parallel differential pairs on the same layer.
- Use a single, shared, uniform GND plane for all TMDS signaling lines.
- Isolate any other high-frequency data lines from the TMDS signal lines to avoid cross coupling (minimum three times dielectric height spacing).
- Place a 0.1uF bypass capacitor as close as possible to the V_{CC} pin of the FSHDMI04. Because the FSHDMI04 is a passive device and uses less than 1µA of current during steady-state operation, a single bypass capacitor is sufficient.
- **Optional:** There is debate among high-speed board layout experts regarding 90-degree corners. Some argue they should be avoided to reduce signal reflections and skew. Others have written papers stating that this is not critical to maintaining signal integrity. If there is room to round signal corners, it is an optional precaution.

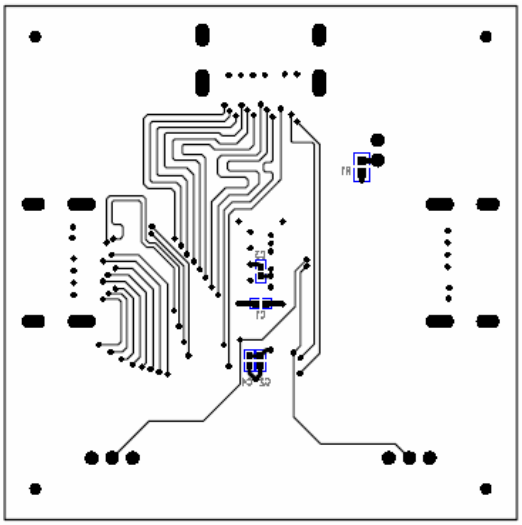
Examples

Fairchild has FSHDMI04 example layouts prepared for all three packages and can provide the Gerber files upon request to aid board design and layout. Please contact your local Fairchild representative to request copies of these files or demonstration boards. Below are examples the top-layer Gerber files for three of these boards.

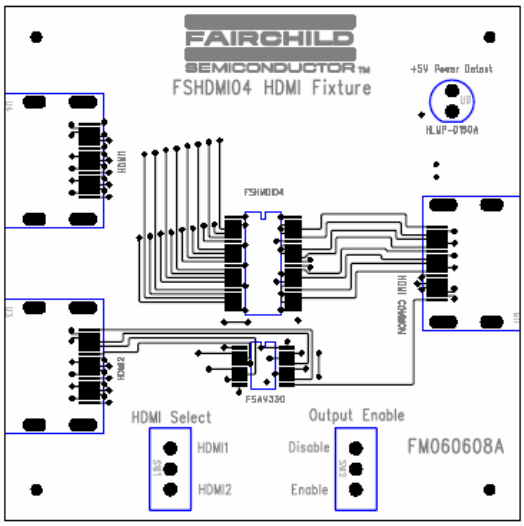
Example Layouts

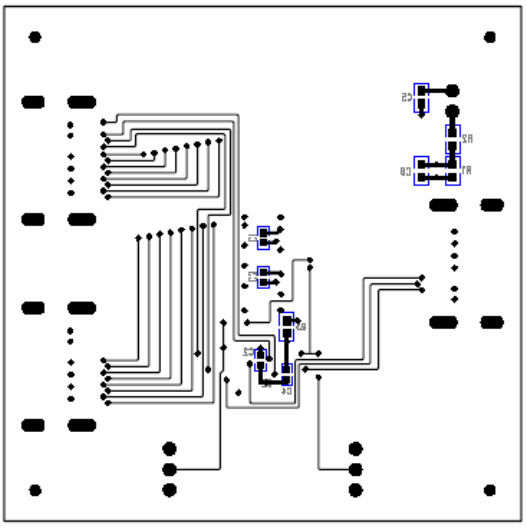
FSHDMI04 QVSOP Layout Top and Bottom view





FSHDMI04 TSSOP Layout Top and Bottom view





FSHDMI04MLP Layout Top and Bottom view