PROTECTION AND FILTERS FOR HDMI CONNECTORS

life.augmented

Complete portfolio for robust and efficient data communications

ST PROTECT

Ensure high quality HDMI signal transmission through the wide ST portfolio for differential and control channels, even with low quality cables.

High Definition Multimedia Interface (HDMI) is a proprietary audio/video digital interface for transferring video and audio data.

This link consists of an HDMI source and an HDMI sink connected by an HDMI cable.

Latest HDMI2.1 standard allows four differential FRL lanes with a maximum throughput of 12 Gbps per lane, for a total of up to 48 Gbps. The DDC, CEC, and HEAC are instead reserved for protocol signals.

Like all high-speed protocol connectors, HDMI is subject to ESD and other EMC issues like noise radiation and emissions. Proper protection solutions are needed against these constraints to ensure high quality and safe communication.

KEY FEATURES & BENEFITS

ECMF series

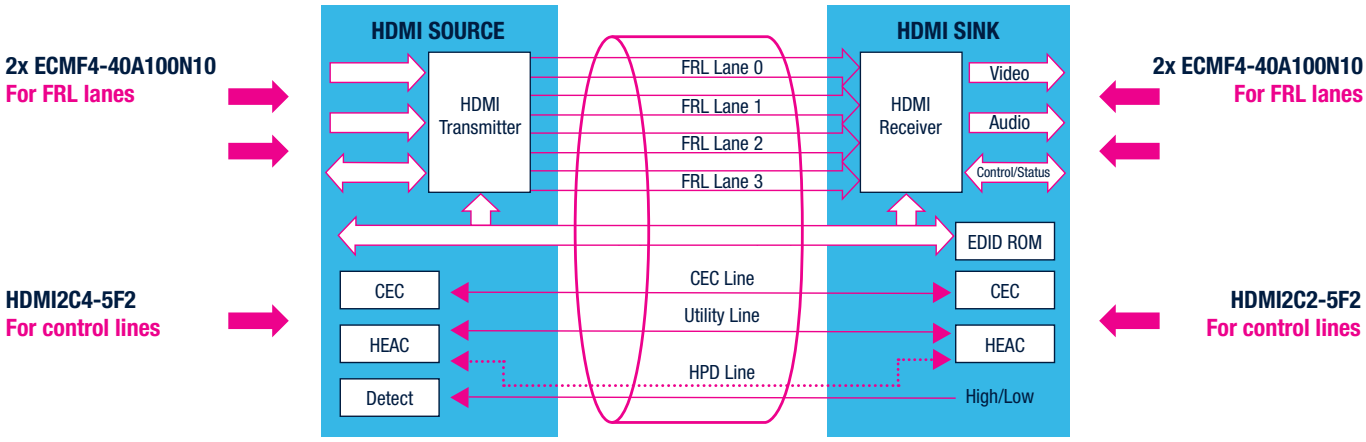
- Protects application from electrical discharge
- Suppresses noise radiation and avoids antenna desense
- Compatible with all high-speed standards

HSP series

- Protects application from electrical discharge
- No impact on useful signals
- High integration down to 0201 package

Application Specific Integrated Product (ASIP)

- Enhances long HDMI cable signals
- Compatible with a wide range of V_{DD_IC} voltages
- Protects applications from electrical discharge
- IEEE Milestone awarded technology



HDMI 2.1 block diagram

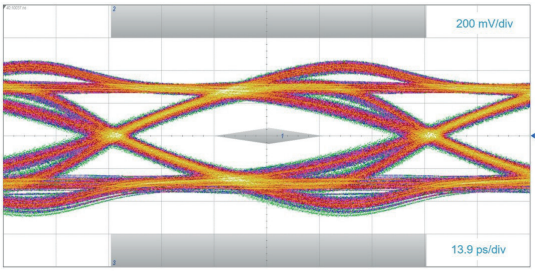
ECMF series

Combining ESD protection and common-mode filter in a single package

ECMF provides common-mode attenuation while ensuring signal integrity. Its dual clamping structure improves clamping voltage and robustness against electrostatic discharges.

The latest ECMF4-40A100N10 has a differential bandwidth up to 10.7 GHz, which is compliant with full range of applications using high-speed differential lines like USB4, HDMI 2.1, and DisplayPort.
It rejects unwanted RF frequencies for effective noise radiation suppression.

Main advantages of the ECMF series are:
- Large differential bandwidth for both CMF and ESD protection
- High immunity against ESD
- Design and layout simplification
- Reduces footprint up to 70%
- Higher reliability than discretes.



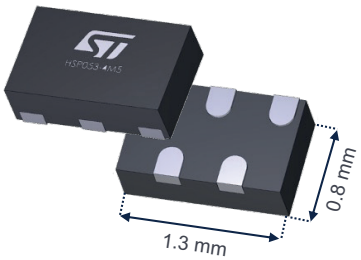
HDMI2.1 eye diagram 12 Gbps with ECMF4-40A100N10
(worst case cable model, Equalizer with 8dB CTLE and one-tap DFE)

HSP series

ESD protection for high-speed data lines

For standalone implementations, our HSP series provides effective protection against ESD while maintaining signal integrity.
The very high frequency bandwidth (18 GHz) of the HSP053-4M5 ensures negligible impact on the eye diagram and limited impact on the time domain reflectometry (TDR) response.

Delivered in the smallest 4-line QFN package footprint with 500 µm pitch, the HSP053-4M5 protects against ESD up to 10 kV contact as per IEC 61000-4-2.



Application Specific Integrated Product (ASIP)

Enhances control channel signals and protects against ESD

The HDMI2C4-5F2 and HDMI2C2-5F2 are integrated ESD protection devices up to 8kV (IEC 61000-4-2 level 4) with signal conditioning for the control links of HDMI transmitters and receivers.
These devices offer a simple solution for HDMI designers to achieve compliance with the stringent HDMI CTS over a wide temperature range.
- HDMI2Cx series is compatible with a wide range of voltage (VDD and level shifters on HPD & DDC lines)
- Dynamic pull-up resistors and signal reshaping improve application robustness with long, low quality cables
- For source devices, the HDMI2Cx series integrates a current limiter on the +5 V power line and thermal protection to manage short-circuit events.