CAUI4 electrical, signaling and jitter test proposal

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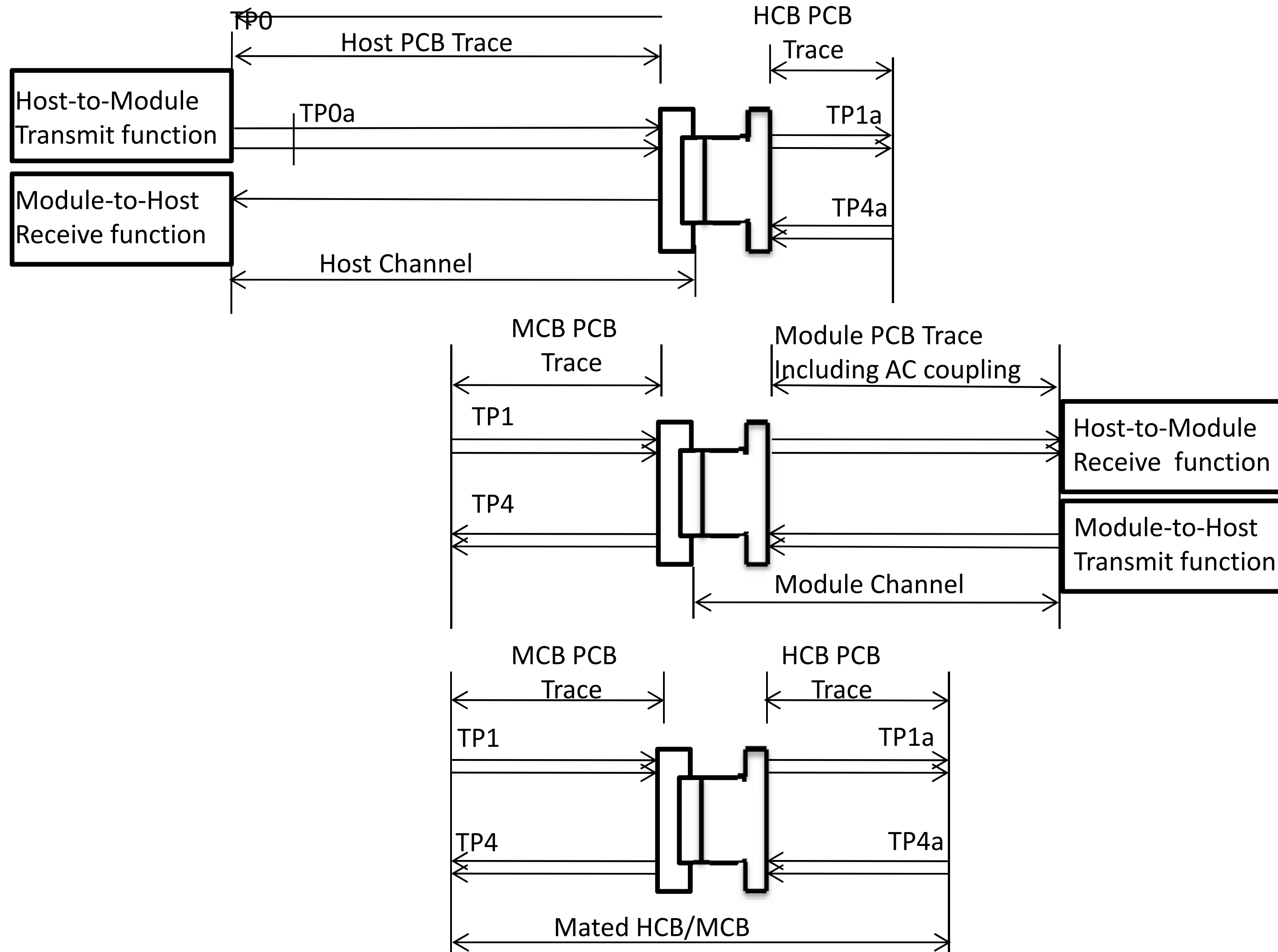
Agenda

- Overview of jitter test proposal
- Proposed measurement points
- Diagrams of proposed test set up
- Proposed jitter test method
- Summary

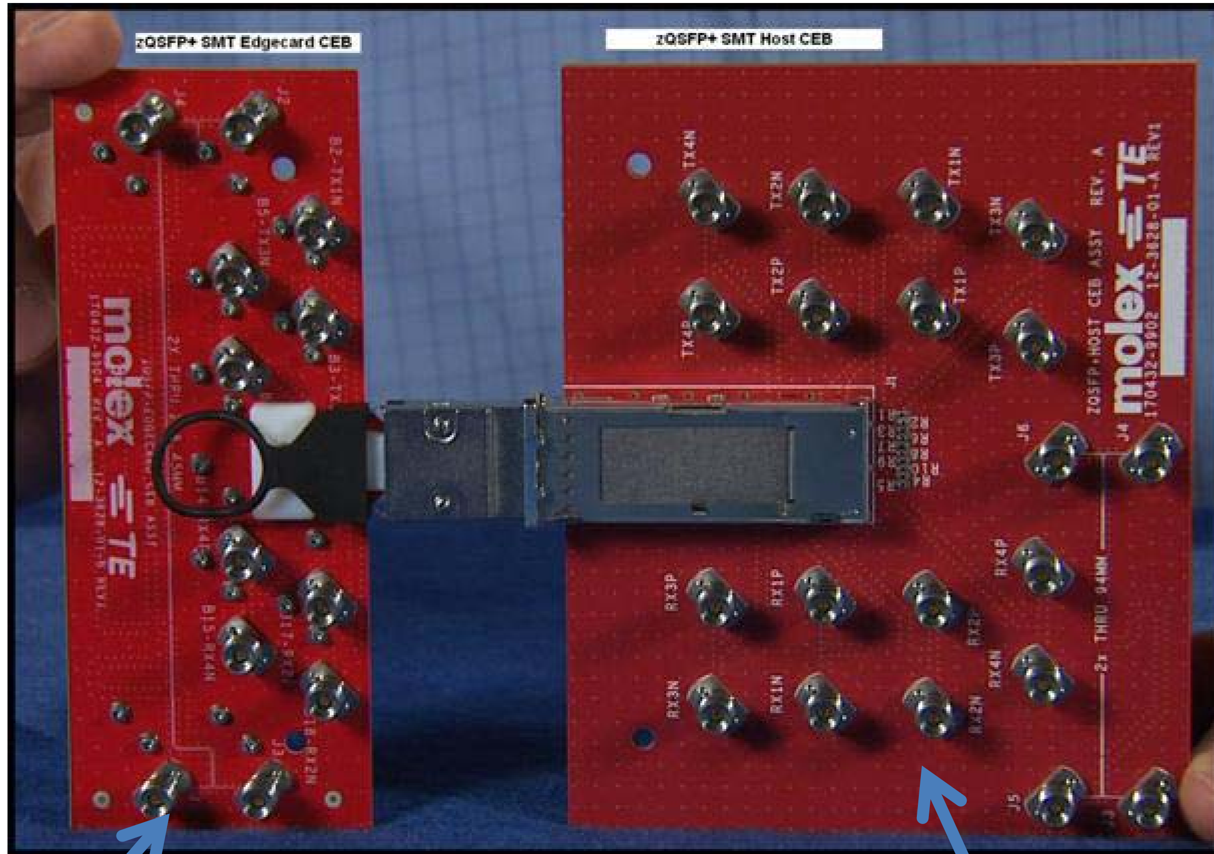
CAUI4 Chip to module jitter test proposal

- Proposed test methodology is based on OIF CEI-28G-VSR draft interop agreement revision 8.0.
  - Same compliance test boards used for CR4
  - Reference receiver test method has already been demonstrated (Xilinx, Agilent, Semtech, Tektronix, Altera)
  - S parameters are measured using standard VNA equipment

Proposed measurement points



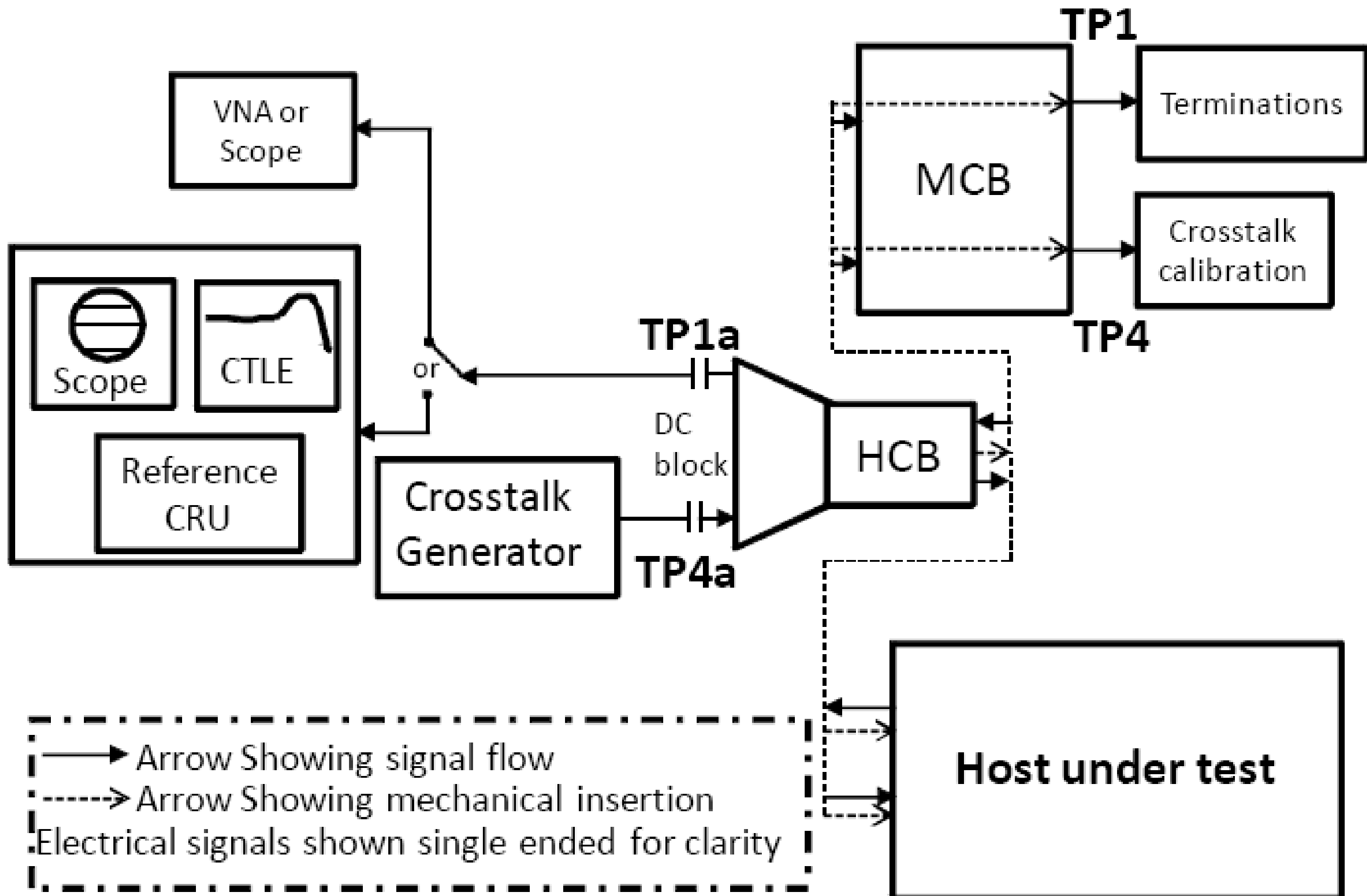
Compliance boards



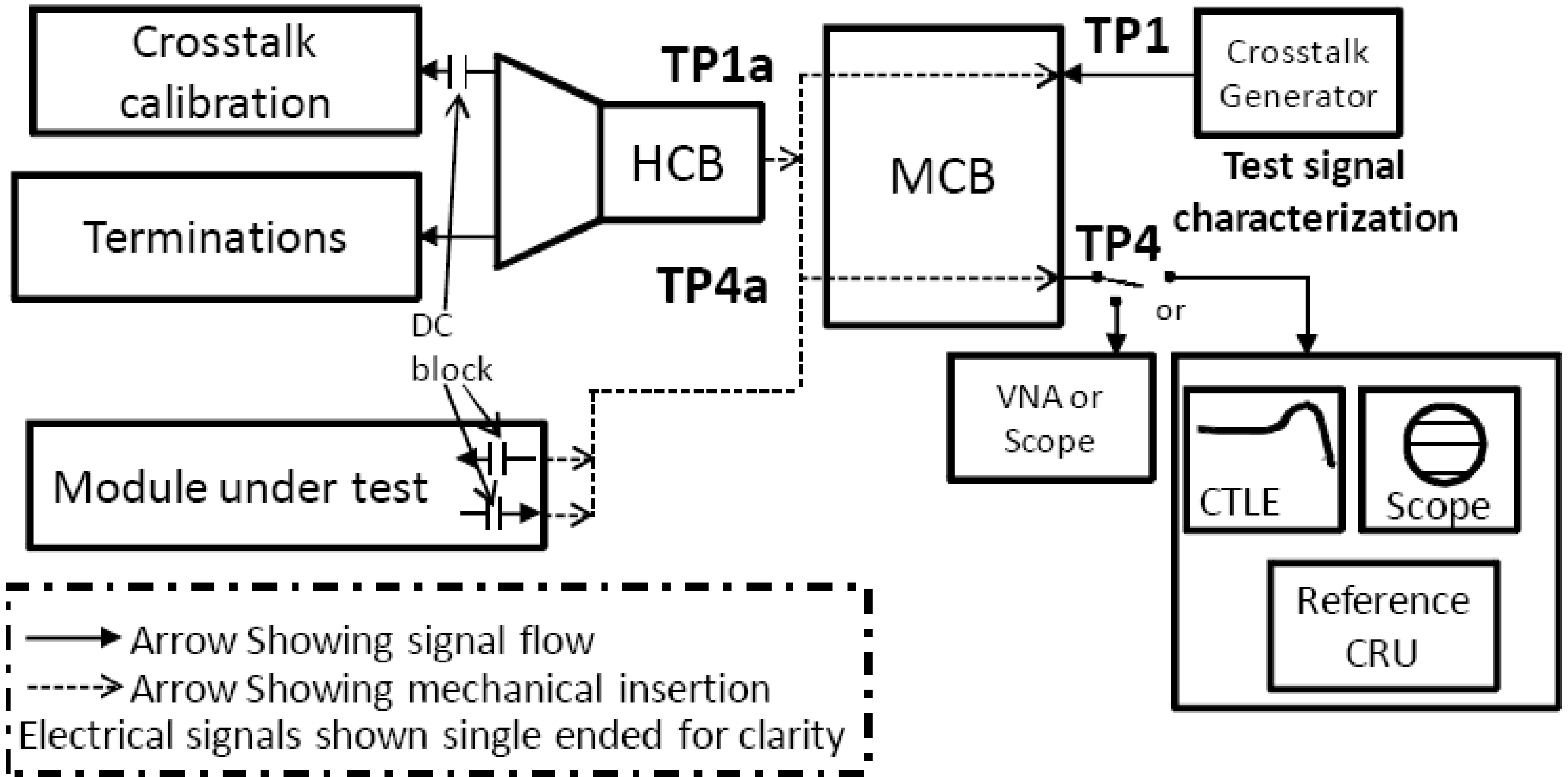
Host compliance board

Module compliance board

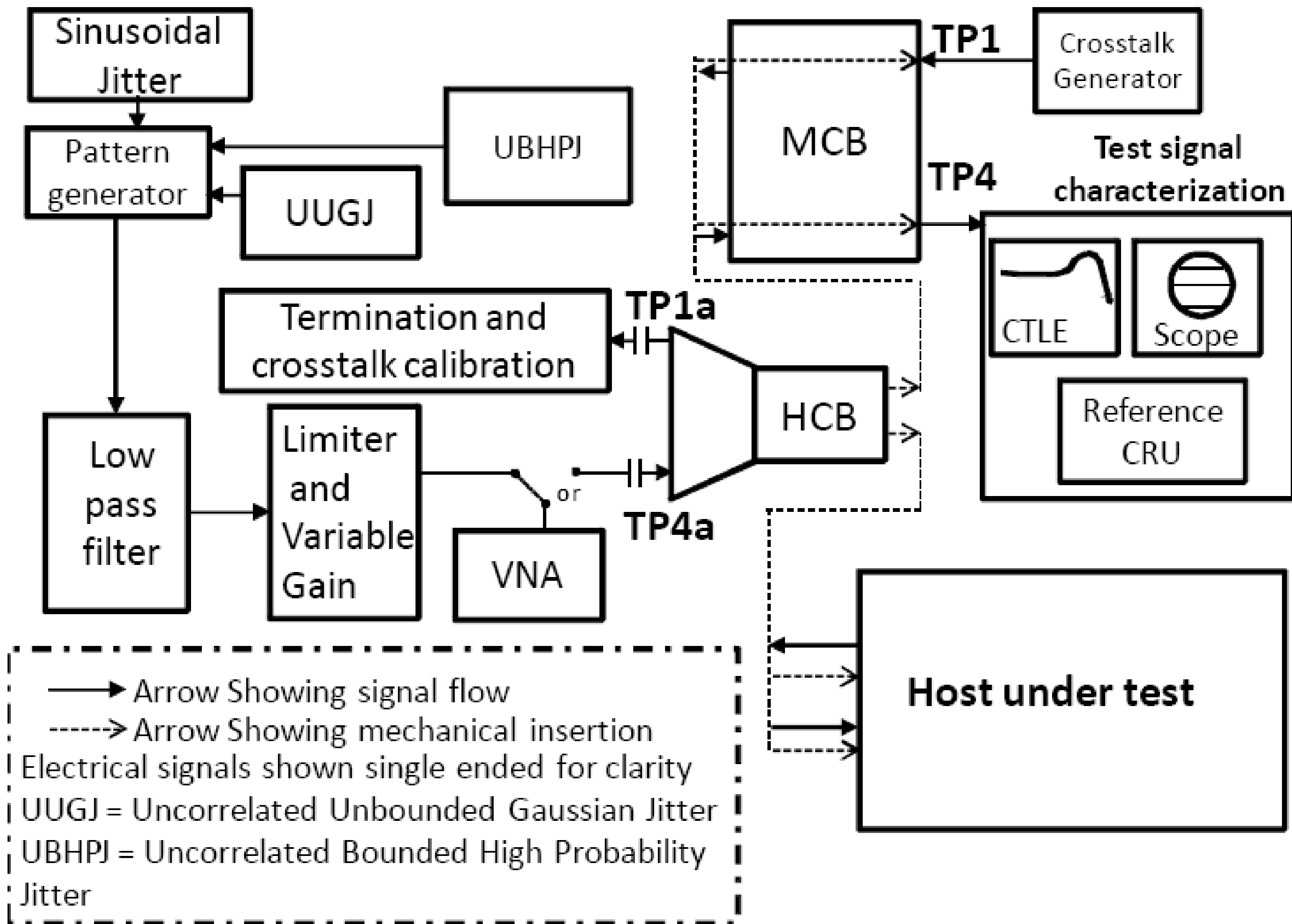
Host output test set up



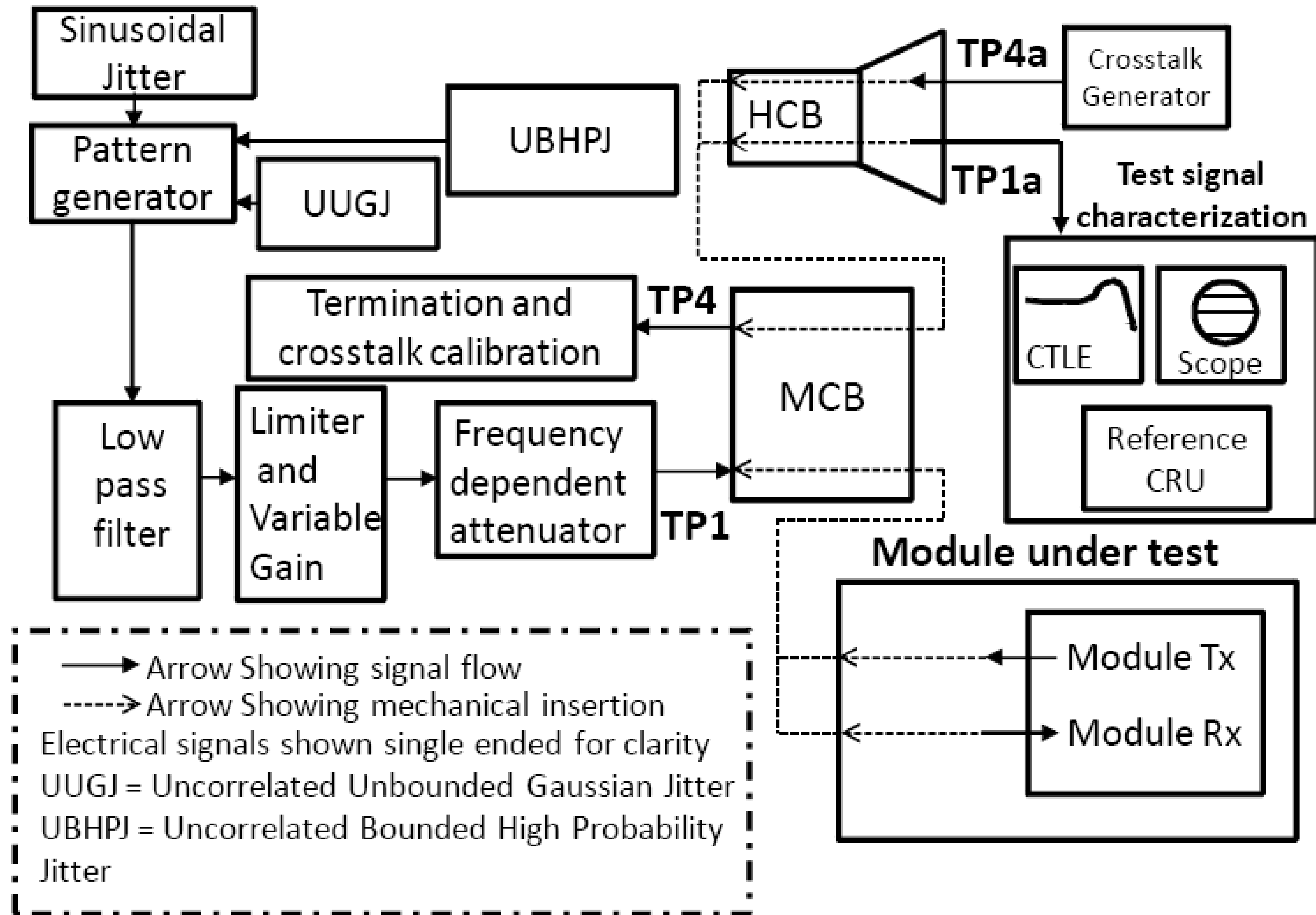
Module output test setup



Host input test setup



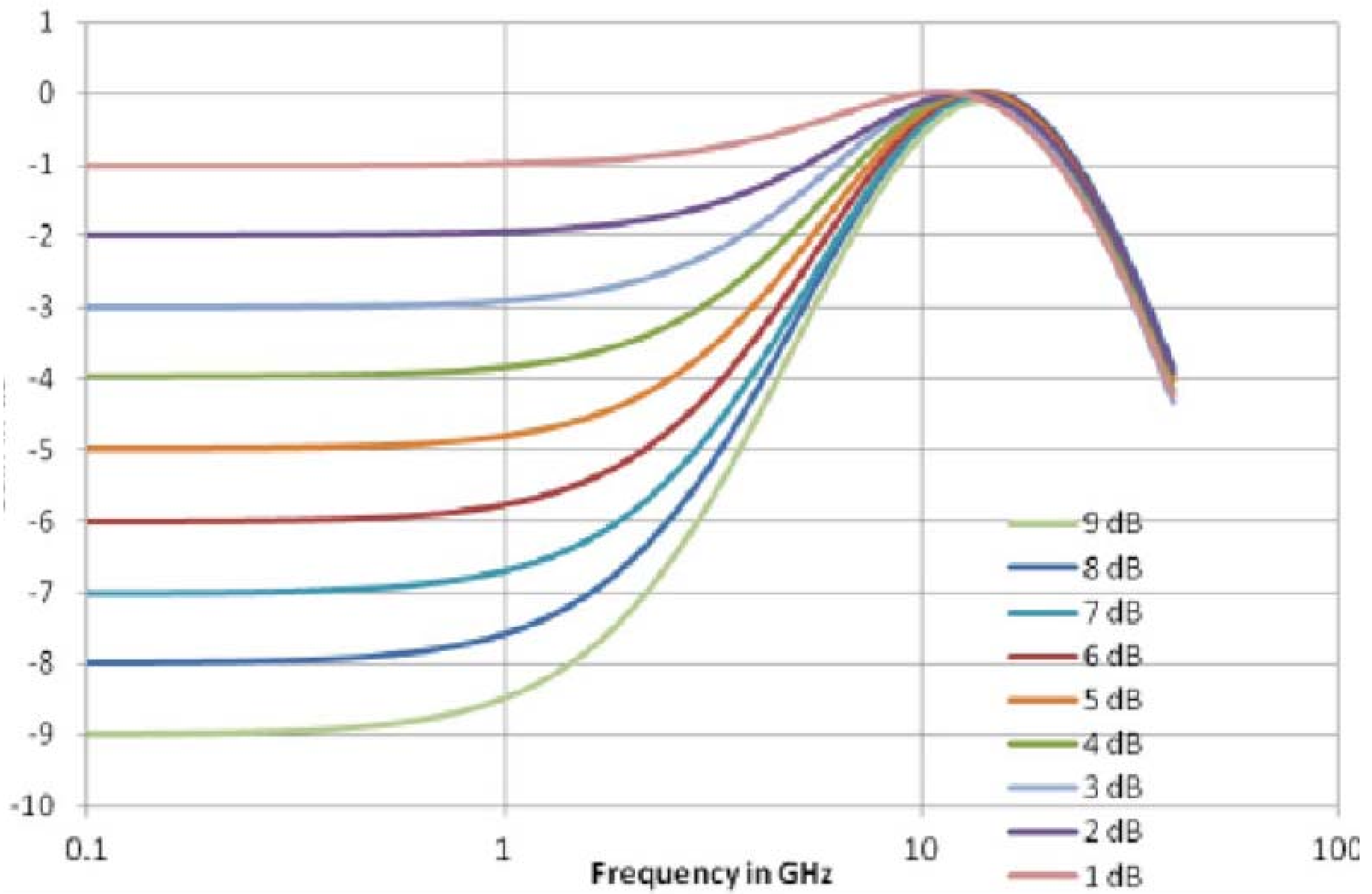
Module input test setup



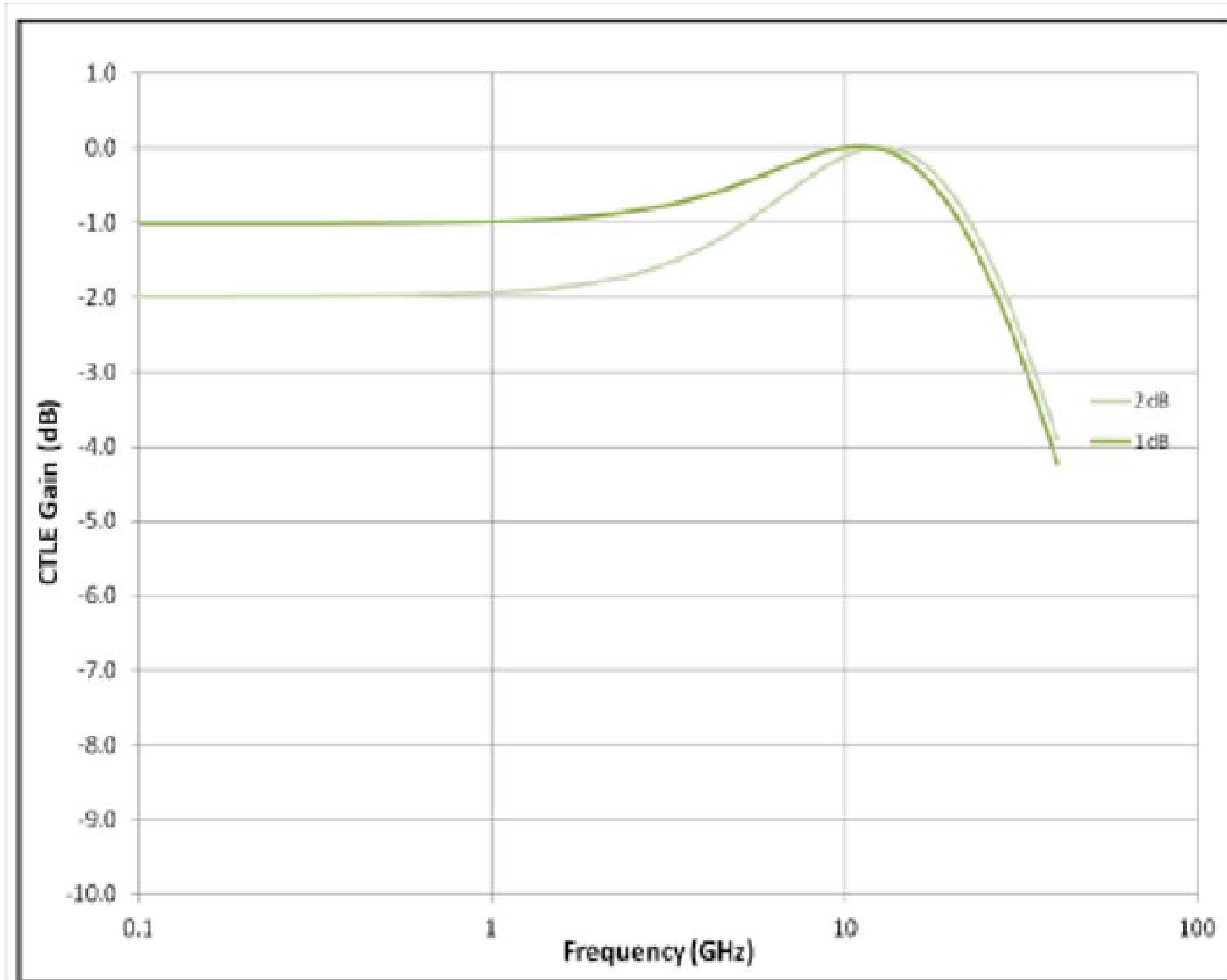
Eye width and eye height test methodology: Reference receiver

- A reference receiver with a CTLE is used to measure eye width and eye height.
  - The module output measurement (TP4) is an open eye but still uses a minimal CTLE (1-2dB) to equalize the signal w/o the use of transmit Equalization
  - The host output measurement (TP1a) may be a closed eye. The CTLE (1-10 dB) is used to open the eye before measuring eye width and height

Reference receiver CTLE gain options for host output testing



Reference receiver CTLE gain options for module output testing



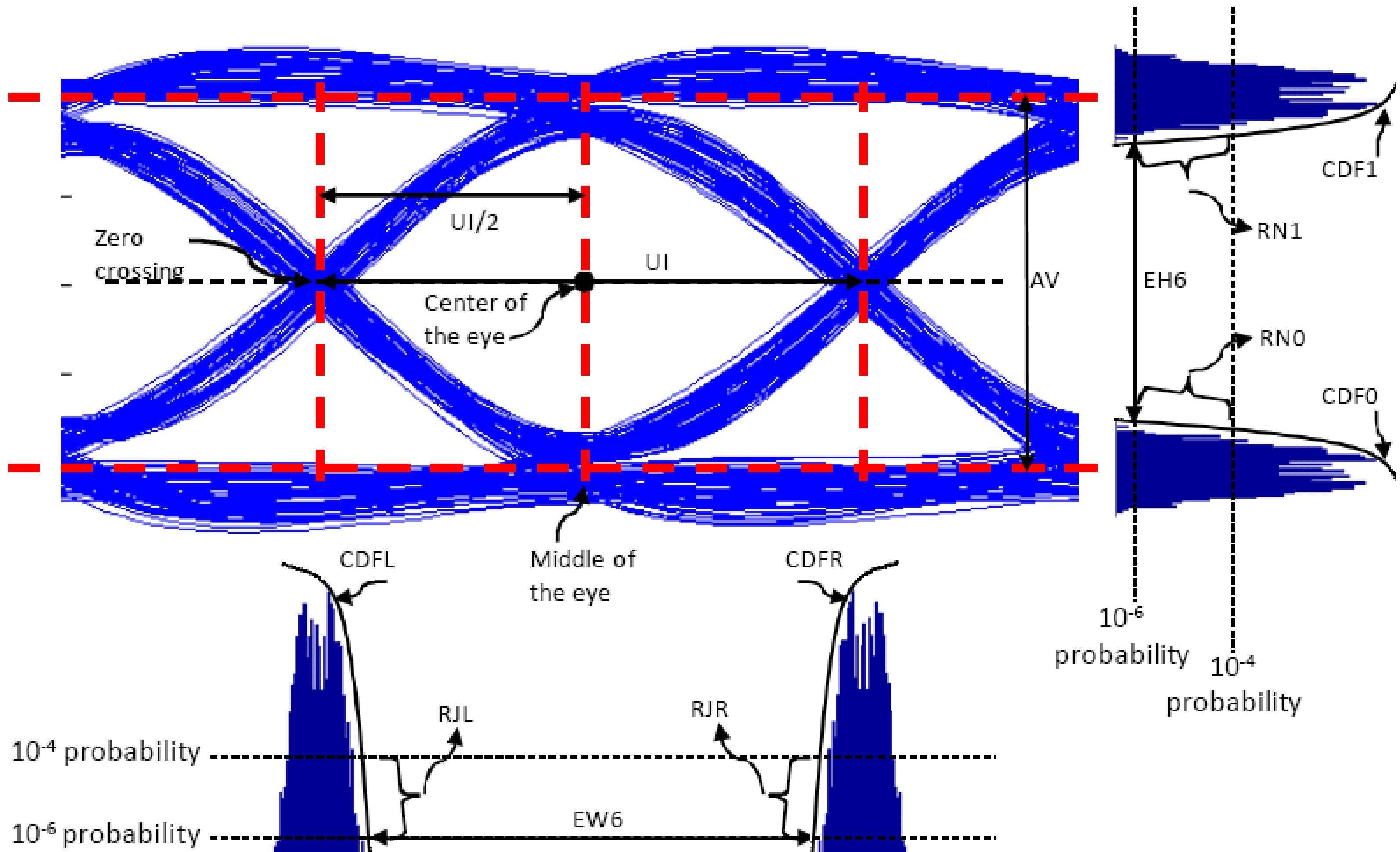
Eye width and eye height test methodology: CDFs for eye width

- Using the equalized signal out of the CTLE the CDF of the jitter at zero crossing is constructed for both left edge (CDFL) and right edge (CDFR) of the eye.
  - CDFL and CDFR are calculated as the cumulative sum of histograms of the zero crossing samples at the left (CDFL) and right (CDFR) edges of the eye.
- The eye width (EW6) is calculated as the difference between CDFL and CDFR with a value of 10-6.
- The Dual-Dirac and tail fitting technique is used to calculate the best linear fit. The linear fit between 1e-4 and 1e-6 probability is used to calculate the eye width at 10-15 probability

Eye width and eye height test methodology: CDFs for eye height

- Using the equalized signal out of the CTLE the CDFs of the signal amplitude in the middle 5% of the eye are constructed for both logic 1 (CDF1) and logic 0 (CDF0) of the eye.
  - CDF1 and CDF0 are calculated as the cumulative sum of histograms of the amplitude samples at the top (CDF1) and bottom (CDF0) of the eye.
- The eye height (EH6) is calculated as the difference between CDF1 and CDF0 with a value of 10-6.
- The Dual-Dirac and tail fitting technique is used to calculate the best linear fit. The linear fit between 1e-4 and 1e-6 probability is used to calculate the eye height at 10-15 probability

Jitter and eye height parameters

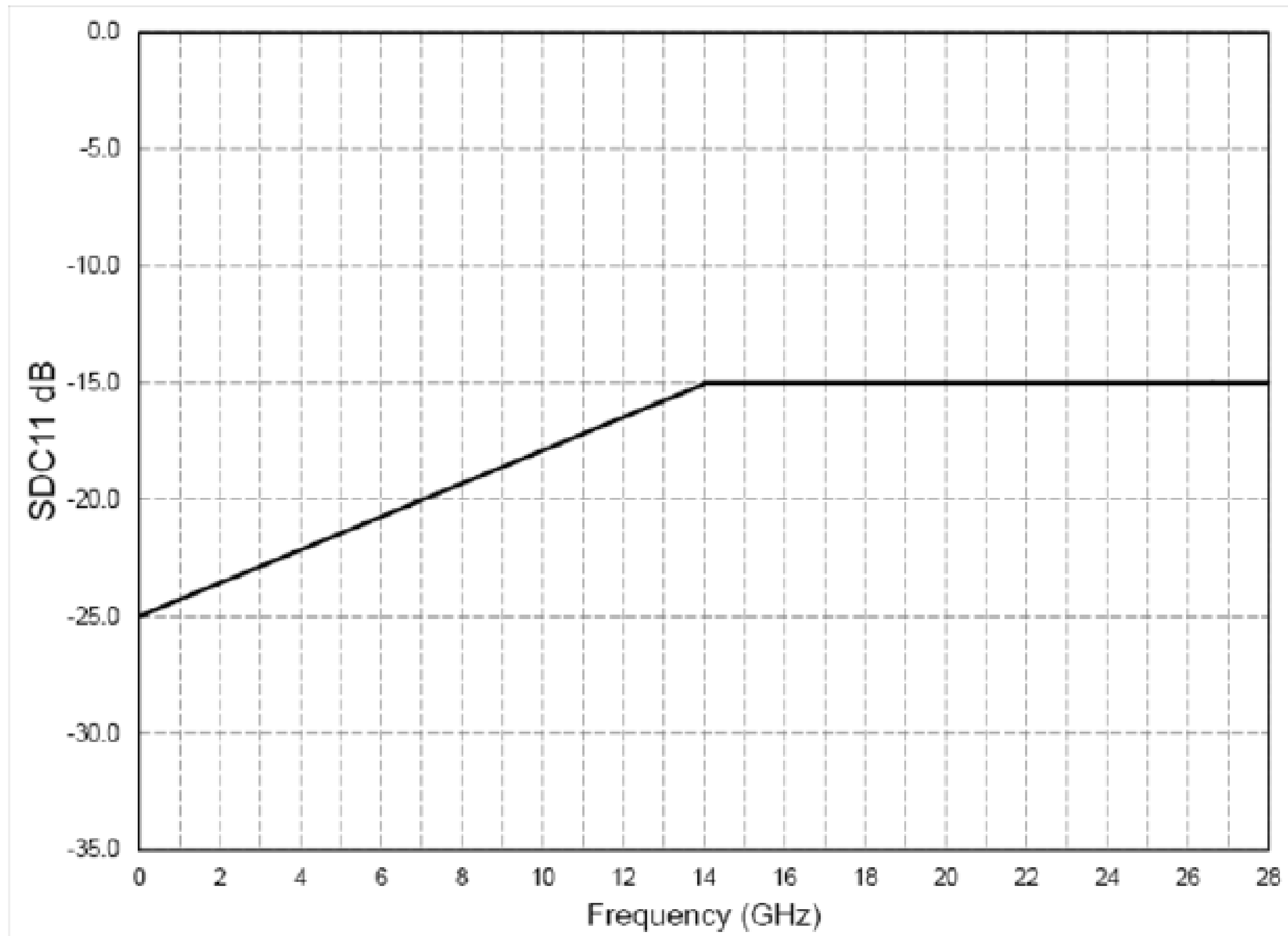


S parameter measurements

- Host and module S parameters are measured using the test set up shown
  - SDC11, SCD11 for module input/output, host input/output
  - SDD11, SDD22 for module input/output, host input/output

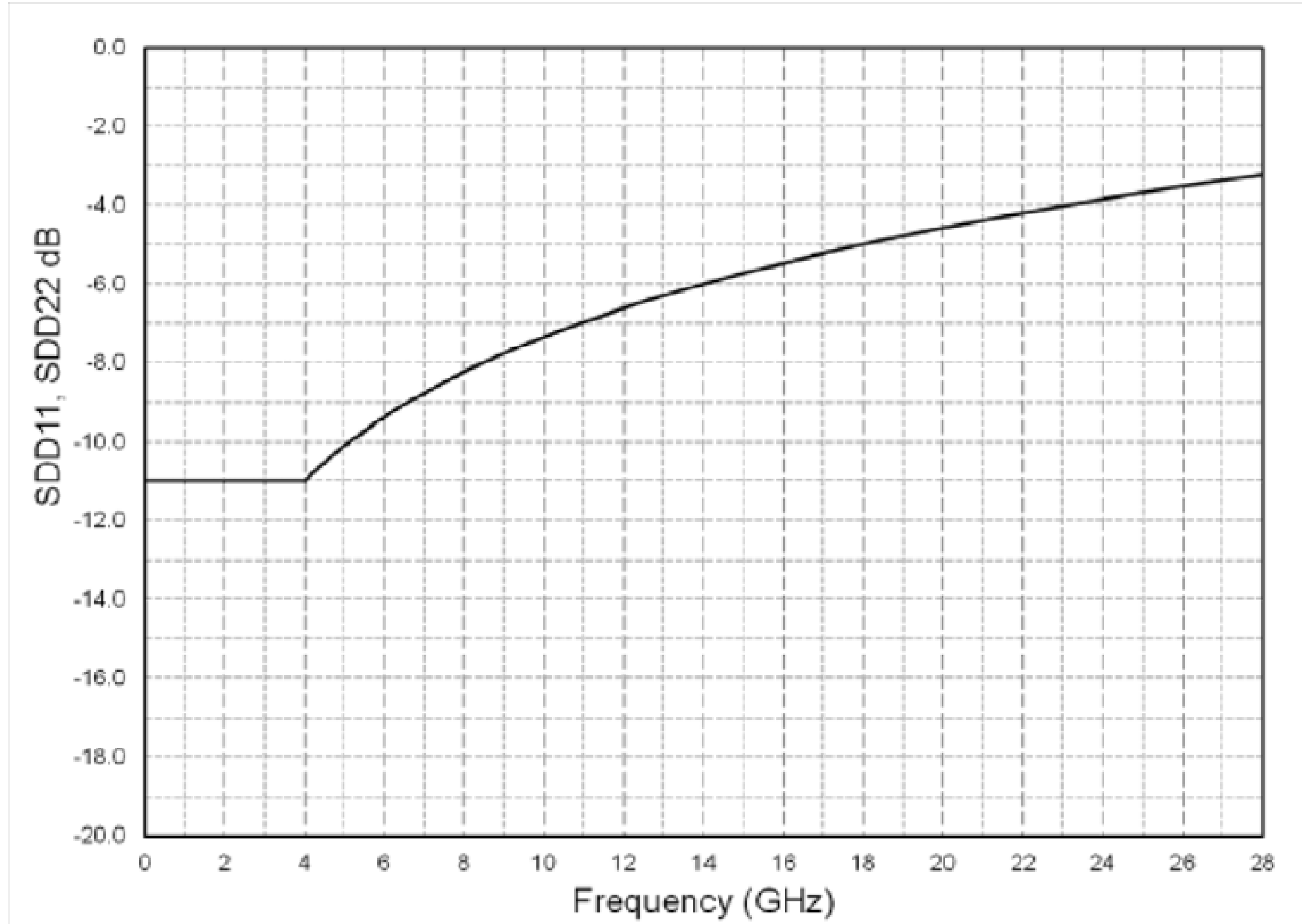
Mode conversion

SDC11, SCD11 for module input/output and host input/output



Return loss

SDD11, SDD22 for module input/output, host input/output



Summary

- The proposed jitter test measurement methodology should be adopted as the basis for the CAUI4 chip to module interface.
  - Common compliance boards with CR4
  - Proposed reference receiver has been demonstrated
  - Leverages existing work done by the OIF (Lets not reinvent statistics)