P370

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Type of Project: New IEEE Standard
PAR Request Date: 17-Apr-2015
PAR Approval Date: 11-Jun-2015
PAR Expiration Date: 31-Dec-2019
Status: PAR for a New IEEE Standard

1.1 Project Number: P370
1.2 Type of Document: Standard
1.3 Life Cycle: Full Use

2.1 Title: Electrical Characterization of Printed Circuit Board and Related Interconnects at Frequencies up to 50 GHz.

3.1 Working Group: Electrical Characterization of High Speed Interconnect (EMC/SDCom/Elec_Char)
Contact Information for Working Group Chair
Name: Xiaoning Ye
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Contact Information for Working Group Vice-Chair
None

3.2 Sponsoring Society and Committee: IEEE Electromagnetic Compatibility Society/Standards Development Committee (EMC/SDCom)
Contact Information for Sponsor Chair
Name: Alistair Duffy
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Name: Edward Hare
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4.1 Type of Ballot: Individual
4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot: 12/2016
4.3 Projected Completion Date for Submittal to RevCom: 08/2017

5.1 Approximate number of people expected to be actively involved in the development of this project: 30
5.2 Scope: This document addresses the quality of measured S parameters for electrical printed circuit board (PCB) and related interconnect at frequencies up to 50 GHz. This might include but is not limited to: test fixturing, methods and processes for controlling the accuracy and consistency of measured data for broadband signals with frequency content up to 50 GHz.
The standard is applicable to: PCB and related interconnects (including package, connector, cable, etc.) used in high speed digital applications, operating with signals at frequencies up to 50 GHz; most industries using such interconnects; major measurement approaches (Time Domain or Frequency Domain) for collecting S-Parameter data; significant methods of removing/de-embedding fixture and instrumentation effects.

5.3 Is the completion of this standard dependent upon the completion of another standard: No
5.4 Purpose: The purpose of this standard is to define methodologies by which high-quality scattering parameters (S-Parameters) can be obtained for electrical PCB and related interconnects that are intended to operate at frequencies up to 50 GHz.

5.5 Need for the Project: As high speed interconnect data rates increase (beyond 25 Gbps), the need for quality interconnect measurements becomes critical. However, standard practices are lacking on how to measure PCB and related interconnects at high frequencies:
* Most instruments, such as VNA (Vector Network Analyzer), TDR/TDT (Time-Domain Reflectometry/Time-domain Transmissometry) can make good measurements at the end of a coaxial interface. However, test fixtures need to be inserted between an instrument's coaxial interface and the Device Under Test (DUT) (PCB, package, connector, cable, etc.). There are various de-embedding approaches already commercially available, however, the de-embedding algorithms are often proprietary, and verification of the accuracy of the de-embedded S parameters is left to the user.
* A poorly designed test-fixture can lead to inaccurate de-embedded S- Parameters. An IEEE standard is needed to specify the electrical requirements of a properly designed test fixture to achieve high quality de-embedding.

* The quality of measured S parameters of DUT can vary widely. There is no IEEE standard to check and validate the quality of S-Parameters before they are distributed for use. This has created many complications for engineers who are utilizing the measured S-Parameters for high speed interconnect analysis. An IEEE standard is needed to check post measurement S-Parameter.

5.6 Stakeholders for the Standard: * Semiconductor industry where high speed interconnect is utilized to transmit data in-between Silicon ICs or systems.
* Manufactures and assembly houses of high speed interconnects such as packages, PCBs, cables, and connectors, etc.
* Original Equipment Manufacturers (OEM) and Original Design Manufacturers (ODM), etc for computer/communication/mobile /networking equipment and other systems.
* EDA (Electronic Design Automation) vendors who provide software solutions for de-embedding, S-Parameter post-processing, etc.
* Interconnect characterization equipment vendors/tools and fixtures, such as VNA, TDR/TDT, probes, high precision cables, etc.

Intellectual Property
6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?: Yes
If yes please explain: We may use or refer to published papers that needs copyright release.

6.1.b. Is the Sponsor aware of possible registration activity related to this project?: No

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7.1 Are there other standards or projects with a similar scope?: Yes
If Yes please explain: There was a specification developed by Small Form Factor (SFF) Committee: SFF-8414 ("HPEI Passive Cable Assembly and PCB S-Parameter Measurements", Rev 10.1, January 24, 2007).
* Note: SFF-8414 addressed similar concerns in general terms. Additional more implementation specific standard and recommended practices are needed so that the target audience can easily follow. Furthermore, there are many new developments in de-embedding methodologies, fixture design, and S-Parameter quality check during the past years.

There is an on-going project sponsored by IEEE Instrumentation and Measurement Society: IEEE P378(TM) Recommended Practice for Scattering Parameter Measurements and Uncertainty Analysis Using Network Analyzers.
* Note: P378(TM) focuses on quantifying the measurement uncertainty and error from instrument point of view. This PAR focuses on fixture design, fixture de-embedding, and quality of measured S-Parameters for high speed interconnect characterization. These two projects are complementary.

and answer the following
Sponsor Organization: IEEE Instrumentation and Measurement Society
Project/Standard Number: P378
Project/Standard Date:
Project/Standard Title: Recommended Practice for Scattering Parameter Measurements and Uncertainty Analysis Using Network Analyzers.
7.2 Joint Development
Is it the intent to develop this document jointly with another organization?: No

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8.1 Additional Explanatory Notes (Item Number and Explanation):