

---

**GEA Mission**

The Global Electronics Association promotes industry growth and strengthens supply chain resilience.

**About IPC  
Standards by  
Global Electronics  
Association**

IPC standards and publications by Global Electronics Association are designed to serve the public interest through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining with minimum delay the proper product for their particular need. Existence of such standards and publications shall not in any respect preclude any entity from manufacturing or selling products not conforming to such standards and publications, nor shall the existence of such standards and publications preclude their voluntary use.

IPC standards and publications by Global Electronics Association are approved by committees without regard to whether the standards or publications may involve patents on articles, materials or processes. By such action, Global Electronics Association does not assume any liability to any patent owner, nor does Global Electronics Association assume any obligation whatsoever to parties adopting a standard or publication. Users are wholly responsible for protecting themselves against all claims of liabilities for patent infringement.

**Global Electronics  
Association  
Position Statement  
on Specification  
Revision Change**

The use and implementation of IPC standards and publications by Global Electronics Association are voluntary and part of a relationship entered into by customer and supplier. When a standard or publication is revised or amended, the use of the latest revision or amendment as part of an existing relationship is not automatic unless required by the contract. Global Electronics Association recommends the use of the latest revision or amendment.

**Standards  
Improvement  
Recommendations**

Global Electronics Association welcomes comments for improvements to any standard in its library. All comments will be provided to the appropriate committee.

If a change to technical content is requested, data to support the request is recommended. Technical comments to include new technologies or make changes to published requirements should be accompanied by technical data to support the request. This information will be used by the committee to resolve the comment.

To submit your comments, visit the Status of Standardization page at [www.electronics.org/status](http://www.electronics.org/status).



# IPC-2591 Version 2.1

## Connected Factory Exchange (CFX)

If a conflict occurs between the English language and translated versions of this document, the English version will take precedence.

Developed by the IPC-CFX Standard Task Group (2-17a) of the Electronic Product Data Description Committee (2-10) of IPC

### **Global Electronics Association Standards and Artificial Intelligence (AI) Statement**

Global Electronics Association is the trading name of IPC International, Inc., which owns the copyright to all IPC Standards and other IPC materials.

The Global Electronics Association explicitly prohibits:

- The integration or transfer of any data whether in the form of IPC books, standards, metadata, or other formats — into AI engines or algorithms by any person or entity, including authorized distributors and their end users.
- Activities involving data harvesting, text and data mining, enrichment, or the creation of derivative works based on this data, including the use of automated data collection methods or artificial intelligence.

Any breach of these provisions is considered a copyright infringement unless expressly authorized in advance in writing by the Global Electronics Association.

### ***Supersedes:***

IPC-2591,  
Version 2.0 – February 2025  
IPC-2591,  
Version 1.7 – August 2023  
IPC-2591,  
Version 1.6 – March 2023  
IPC-2591,  
Version 1.5 – July 2022  
IPC-2591,  
Version 1.4 – December 2021  
IPC-2591,  
Version 1.3 – February 2021  
IPC-2591,  
Version 1.2 – September 2020  
IPC-2591,  
Version 1.1 – January 2020  
IPC-2591 – March 2019

Users of this publication are encouraged to participate in the development of future revisions.

### **Contact:**

Global Electronics Association  
3000 Lakeside Drive, Suite 105N  
Bannockburn, Illinois  
60015-1249  
Tel 847 615.7100  
Fax 847 615.7105

# Table of Contents

|            |                                           |   |            |                                                                   |    |
|------------|-------------------------------------------|---|------------|-------------------------------------------------------------------|----|
| <b>1</b>   | <b>SCOPE</b> .....                        | 1 | <b>2.2</b> | <b>ECMA International</b> .....                                   | 4  |
| <b>1.1</b> | <b>Purpose</b> .....                      | 1 | <b>2.3</b> | <b>International Organization for Standardization (ISO)</b> ..... | 4  |
| <b>1.2</b> | <b>Application of This Standard</b> ..... | 1 | <b>2.4</b> | <b>SEMI</b> .....                                                 | 4  |
| <b>1.3</b> | <b>CFX and The Hermes Standard</b> .....  | 1 | <b>3</b>   | <b>GENERAL REQUIREMENTS</b> .....                                 | 4  |
| <b>1.4</b> | <b>Updates to This Standard</b> .....     | 1 | <b>3.1</b> | <b>Guidance on the Use of This Standard</b> .....                 | 4  |
| <b>1.5</b> | <b>Definition of Requirements</b> .....   | 2 | 3.1.1      | Technical Reference .....                                         | 4  |
| <b>1.6</b> | <b>Order of Precedence</b> .....          | 2 | 3.1.2      | Application Reference .....                                       | 4  |
| 1.6.1      | Conflict .....                            | 2 | <b>3.2</b> | <b>Users of CFX</b> .....                                         | 4  |
| 1.6.2      | Clause References .....                   | 2 | 3.2.1      | Automated Assembly Processes .....                                | 4  |
| <b>1.7</b> | <b>Acronyms</b> .....                     | 2 | 3.2.2      | In-House Manufacturing Solution Development ..                    | 5  |
| <b>1.8</b> | <b>Terms and Definitions</b> .....        | 2 | 3.2.3      | MES Software Solutions.....                                       | 5  |
| 1.8.1      | Activity .....                            | 2 | <b>3.3</b> | <b>Software Development Environment</b> .....                     | 5  |
| 1.8.2      | Component.....                            | 2 | <b>3.4</b> | <b>CFX Support Declaration</b> .....                              | 5  |
| 1.8.3      | Dashboard.....                            | 2 | <b>4</b>   | <b>CFX STRUCTURAL OVERVIEW</b> .....                              | 5  |
| 1.8.4      | Data Integrity.....                       | 2 | <b>4.1</b> | <b>Primary Transport Layer: AMQP v1.0</b> .....                   | 5  |
| 1.8.5      | Endpoint .....                            | 2 | 4.1.1      | CFX Message Channels.....                                         | 6  |
| 1.8.6      | Factory Resource.....                     | 2 | 4.1.2      | Channel Configuration.....                                        | 7  |
| 1.8.7      | Lane .....                                | 3 | 4.1.3      | CFX Message Types.....                                            | 7  |
| 1.8.8      | Lock .....                                | 3 | 4.1.4      | CFX Compression.....                                              | 7  |
| 1.8.9      | Material Carrier .....                    | 3 | 4.1.5      | CFX – AMQP Message Properties .....                               | 7  |
| 1.8.10     | Material Chain .....                      | 3 | <b>4.2</b> | <b>Encoding: JSON</b> .....                                       | 7  |
| 1.8.11     | Material Location.....                    | 3 | 4.2.1      | JSON Data Types .....                                             | 8  |
| 1.8.12     | Material Package .....                    | 3 | <b>4.3</b> | <b>CFX-Defined Content</b> .....                                  | 8  |
| 1.8.13     | Material Traceability.....                | 3 | <b>4.4</b> | <b>CFX Key Parameters</b> .....                                   | 8  |
| 1.8.14     | Materials .....                           | 3 | 4.4.1      | Endpoint Identification (CFX Handle).....                         | 8  |
| 1.8.15     | Operator .....                            | 3 | 4.4.2      | TransactionID .....                                               | 8  |
| 1.8.16     | Process Endpoint (Station).....           | 3 | <b>4.5</b> | <b>CFX Message Envelope</b> .....                                 | 9  |
| 1.8.17     | Production Unit.....                      | 3 | <b>4.6</b> | <b>Operator Information</b> .....                                 | 9  |
| 1.8.18     | Recipe.....                               | 3 | <b>4.7</b> | <b>CFX Endpoint Configuration</b> .....                           | 9  |
| 1.8.19     | Root.....                                 | 3 | 4.7.1      | Specific CFX Endpoint Configuration<br>Addresses .....            | 10 |
| 1.8.20     | Setup.....                                | 3 | <b>4.8</b> | <b>Message Attachments</b> .....                                  | 10 |
| 1.8.21     | State (Production State).....             | 3 | 4.8.1      | Specifying Message Attachments.....                               | 11 |
| 1.8.22     | Station (Process Endpoint) .....          | 3 | 4.8.2      | In-Band Message Attachments .....                                 | 11 |
| 1.8.23     | Stage.....                                | 3 | 4.8.3      | Out-of-Band Attachments .....                                     | 12 |
| 1.8.24     | Subassembly .....                         | 3 | 4.8.4      | Supported Tabular Data Formats for Message<br>Attachments .....   | 12 |
| 1.8.25     | Symptom.....                              | 3 | <b>4.9</b> | <b>Supported Message Attachment Types</b> .....                   | 13 |
| 1.8.26     | Tool.....                                 | 3 | 4.9.1      | SolderPasteInspection.<br>SolderPasteMeasurement .....            | 13 |
| 1.8.27     | Transactional Endpoint .....              | 3 |            |                                                                   |    |
| <b>2</b>   | <b>APPLICABLE DOCUMENTS</b> .....         | 4 |            |                                                                   |    |
| <b>2.1</b> | <b>IPC</b> .....                          | 4 |            |                                                                   |    |

|             |                                                                      |           |            |                                                                 |           |
|-------------|----------------------------------------------------------------------|-----------|------------|-----------------------------------------------------------------|-----------|
| 4.9.2       | PCBInspection.OffsetMeasurement .....                                | 13        | 7.2.6      | CFX.InformationSystem.<br>WorkOrderManagement (Level 2).....    | 32        |
| <b>4.10</b> | <b>Messages Supporting Attachments .....</b>                         | <b>14</b> | <b>7.3</b> | <b>CFX.Maintenance (Level 1).....</b>                           | <b>33</b> |
| 4.10.1      | CFX.Production.TestAndInspection.<br>UnitsInspected Attachments..... | 14        | <b>7.4</b> | <b>CFX.Materials (Level 1).....</b>                             | <b>33</b> |
| <b>4.11</b> | <b>CFX Message Recorder .....</b>                                    | <b>14</b> | 7.4.1      | CFX.Materials.Management (Level 2).....                         | 33        |
| <b>5</b>    | <b>CFX OPERATIONAL MODELING .....</b>                                | <b>14</b> | 7.4.1.1    | CFX.Materials.Management.<br>MSDManagement (Level 3).....       | 34        |
| <b>5.1</b>  | <b>Equipment State Model .....</b>                                   | <b>14</b> | 7.4.2      | CFX.Materials.Storage (Level 2).....                            | 34        |
| <b>5.2</b>  | <b>Station Fault Event Model .....</b>                               | <b>17</b> | 7.4.3      | CFX.Materials.Transport (Level 2).....                          | 34        |
| <b>5.3</b>  | <b>Production Unit Architecture .....</b>                            | <b>17</b> | <b>7.5</b> | <b>CFX.Production (Level 1).....</b>                            | <b>35</b> |
| 5.3.1       | Production Unit Data Population .....                                | 17        | 7.5.1      | CFX.Production.Application (Level 2) .....                      | 36        |
| 5.3.2       | Production Unit Status .....                                         | 19        | 7.5.2      | CFX.Production.Assembly (Level 2) .....                         | 36        |
| 5.3.3       | Production Endpoint Decision-Making<br>Categories .....              | 20        | 7.5.2.1    | CFX.Production.Assembly.PressInsertion<br>(Level 3) .....       | 36        |
| 5.3.4       | Examples of Production Unit Status .....                             | 20        | 7.5.3      | CFX.Production.Hermes (Level 2) .....                           | 36        |
| 5.3.4.1     | Processing Station .....                                             | 20        | 7.5.4      | CFX.Production.LoadingAndUnloading<br>(Level 2) .....           | 37        |
| 5.3.4.2     | Processing Station Creating Scrap.....                               | 21        | 7.5.5      | CFX.Production.Processing (Level 2) .....                       | 37        |
| 5.3.4.3     | Inspection Station Identifying Potential Defect...                   | 21        | 7.5.6      | CFX.Production.ReworkAndRepair (Level 2) ...                    | 37        |
| 5.3.4.4     | Review/Repair Station Resolving Failed<br>Production Unit.....       | 22        | 7.5.7      | CFX.Production.TestAndInspection (Level 2) ...                  | 37        |
| 5.3.4.5     | Review/Repair Station Scrapping Failed<br>Production Unit.....       | 22        | <b>7.6</b> | <b>CFX.ResourcePerformance (Level 1) .....</b>                  | <b>38</b> |
| <b>5.4</b>  | <b>Production Station Process Model.....</b>                         | <b>23</b> | 7.6.1      | CFX.ResourcePerformance.PressInsertion<br>(Level 2) .....       | 38        |
| <b>6</b>    | <b>CFX TOPICS AND DYNAMIC STRUCTURES .....</b>                       | <b>23</b> | 7.6.2      | CFX.ResourcePerformance.SMTPlacement<br>(Level 2) .....         | 39        |
| <b>6.1</b>  | <b>Hierarchy of CFX Topics .....</b>                                 | <b>24</b> | 7.6.3      | CFX.ResourcePerformance.<br>SolderPastePrinting (Level 2) ..... | 39        |
| <b>6.2</b>  | <b>CFX Message Names.....</b>                                        | <b>25</b> | 7.6.4      | CFX.ResourcePerformance.THTInsertion<br>(Level 2) .....         | 39        |
| <b>6.3</b>  | <b>CFX Structures .....</b>                                          | <b>25</b> | <b>7.7</b> | <b>CFX.Sensor (Level 1) .....</b>                               | <b>39</b> |
| <b>6.4</b>  | <b>CFX Dynamic Structures .....</b>                                  | <b>25</b> | 7.7.1      | CFX.Sensor.Identification (Level 2).....                        | 39        |
| <b>6.5</b>  | <b>CFX Messaging Requirements .....</b>                              | <b>25</b> | <b>7.8</b> | <b>CFX Message Flow .....</b>                                   | <b>40</b> |
| <b>6.6</b>  | <b>CFX Qualification.....</b>                                        | <b>25</b> | 7.8.1      | Production Endpoint (Station) Connection.....                   | 40        |
| 6.6.1       | Declaration of Responsibility for<br>Implementation.....             | 25        | 7.8.2      | Station State Transition .....                                  | 41        |
| <b>7</b>    | <b>CFX MESSAGES.....</b>                                             | <b>31</b> | 7.8.3      | Station Processing .....                                        | 42        |
| <b>7.1</b>  | <b>Root Level Messages.....</b>                                      | <b>31</b> | <b>8</b>   | <b>CFX TECHNICAL REFERENCE.....</b>                             | <b>42</b> |
| <b>7.2</b>  | <b>CFX.InformationSystem (Level 1).....</b>                          | <b>31</b> |            |                                                                 |           |
| 7.2.1       | CFX.InformationSystem.DataTransfer<br>(Level 2) .....                | 31        |            |                                                                 |           |
| 7.2.2       | CFX.InformationSystem.OperatorValidation<br>(Level 2) .....          | 31        |            |                                                                 |           |
| 7.2.3       | CFX.InformationSystem.ProductionScheduling<br>(Level 2) .....        | 32        |            |                                                                 |           |
| 7.2.4       | CFX.InformationSystem.TopicValidation<br>(Level 2) .....             | 32        |            |                                                                 |           |
| 7.2.5       | CFX.InformationSystem.UnitValidation<br>(Level 2) .....              | 32        |            |                                                                 |           |

## Figures

|            |                                      |    |
|------------|--------------------------------------|----|
| Figure 1-1 | Version Change Tracking Example..... | 2  |
| Figure 4-1 | CFX Channels Between Endpoints ..... | 6  |
| Figure 4-2 | The CFX TransactionID .....          | 8  |
| Figure 5-1 | SEMI E10 Equipment State Model.....  | 14 |

|               |                                                                           |    |                   |                                                                |           |
|---------------|---------------------------------------------------------------------------|----|-------------------|----------------------------------------------------------------|-----------|
| Figure 5-2    | Examples of PrimaryIdentifier and UnitIdentifier Cases .....              | 18 | Table 7-4         | CFX.InformationSystem.<br>ProductionScheduling Messages .....  | 32        |
| Figure 5-3    | Examples of Groupings of Production Units ..                              | 18 | Table 7-5         | CFX.InformationSystem.TopicValidation<br>Messages.....         | 32        |
| Figure 5-4    | Panelized Printed Board (Top View) .....                                  | 19 | Table 7-6         | CFX.InformationSystem.UnitValidation<br>Messages.....          | 32        |
| Figure 5-5    | CFX Unit Locations Identified on<br>Multiple-Board Panel (Top View) ..... | 19 | Table 7-7         | CFX.InformationSystem.<br>WorkOrderManagement Messages .....   | 32        |
| Figure 5-6    | Panel Processing Example —<br>No Defects Found .....                      | 20 | Table 7-8         | CFX.Maintenance Messages .....                                 | 33        |
| Figure 5-7    | Panel Processing Example –<br>One Production Unit Scrapped .....          | 21 | Table 7-9         | CFX.Materials.Management Messages .....                        | 33        |
| Figure 5-8    | Panel Inspection Example –<br>One Production Unit Failure .....           | 21 | Table 7-10        | CFX.Materials.Management.<br>MSDManagement Messages .....      | 34        |
| Figure 5-9    | Panel Review/Repair Example –<br>One Production Unit Repaired .....       | 22 | Table 7-11        | CFX.Materials.Storage Messages .....                           | 34        |
| Figure 5-10   | Panel Review/Repair Example –<br>Whole Panel Scrapped .....               | 22 | Table 7-12        | CFX.Materials.Transport Messages .....                         | 34        |
| Figure 5-11   | CFX Production Station Process Model .....                                | 23 | Table 7-13        | CFX.Production Messages .....                                  | 35        |
| Figure 7-1    | CFX Station Connection Example<br>Message Flow .....                      | 40 | Table 7-14        | CFX.Production.Application Messages .....                      | 36        |
| Figure 7-2    | CFX Station State Transition Example<br>Message Flow .....                | 41 | Table 7-15        | CFX.Production.Assembly Messages .....                         | 36        |
| Figure 7-3    | CFX Station Processing Example<br>Message Flow .....                      | 42 | Table 7-16        | CFX.Production.Assembly.PressInsertion<br>Messages.....        | 36        |
|               |                                                                           |    | Table 7-17        | CFX.Production.Hermes Messages.....                            | 36        |
|               |                                                                           |    | Table 7-18        | CFX.Production.LoadingAndUnloading<br>Messages.....            | 37        |
|               |                                                                           |    | Table 7-19        | CFX.Production.Processing Messages.....                        | 37        |
|               |                                                                           |    | Table 7-20        | CFX.Production.ReworkAndRepair<br>Messages.....                | 37        |
|               |                                                                           |    | Table 7-21        | CFX.Production.TestAndInspection<br>Messages.....              | 37        |
|               |                                                                           |    | Table 7-22        | CFX.ResourcePerformance Messages.....                          | 38        |
|               |                                                                           |    | Table 7-23        | CFX.ResourcePerformance.PressInsertion<br>Messages.....        | 38        |
|               |                                                                           |    | Table 7-24        | CFX.ResourcePerformance.SMTPlacement<br>Messages.....          | 39        |
|               |                                                                           |    | Table 7-25        | CFX.ResourcePerformance.<br>SolderPastePrinting Messages ..... | 39        |
|               |                                                                           |    | Table 7-26        | CFX.ResourcePerformance.THTInsertion<br>Messages.....          | 39        |
|               |                                                                           |    | Table 7-27        | CFX.Sensor.Identification Messages .....                       | 39        |
| <b>Tables</b> |                                                                           |    |                   |                                                                |           |
| Table 4-1     | Types of CFX Messages .....                                               | 7  |                   |                                                                |           |
| Table 4-2     | CFX – AMQP Message Properties .....                                       | 7  |                   |                                                                |           |
| Table 4-3     | CFX Message Envelope .....                                                | 9  |                   |                                                                |           |
| Table 4-4     | Format of Attachments Array Entries.....                                  | 11 |                   |                                                                |           |
| Table 4-5     | Columns for SolderPasteMeasurement<br>Attachment Type .....               | 13 |                   |                                                                |           |
| Table 4-6     | Columns for OffsetMeasurement<br>Attachment Type .....                    | 13 |                   |                                                                |           |
| Table 5-1     | Equipment State Code and Status Mapping ...                               | 16 |                   |                                                                |           |
| Table 5-2     | Station Event Fault Model .....                                           | 17 |                   |                                                                |           |
| Table 5-3     | PrimaryIdentifier and UnitIdentifier Fields ...                           | 17 |                   |                                                                |           |
| Table 6-1     | CFX Capability Requirements by<br>Equipment Type .....                    | 26 |                   |                                                                |           |
| Table 6-2     | Required Messages by Capability .....                                     | 28 |                   |                                                                |           |
| Table 7-1     | CFX.Root Messages .....                                                   | 31 |                   |                                                                |           |
| Table 7-2     | CFX.InformationSystem.DataTransfer<br>Messages.....                       | 31 |                   |                                                                |           |
| Table 7-3     | CFX.InformationSystem.<br>OperatorValidation Messages .....               | 31 |                   |                                                                |           |
|               |                                                                           |    | <b>APPENDIX A</b> | <b>Index of Acronyms and Abbreviations.....</b>                | <b>43</b> |

# IPC-2591, Version 2.1

## Connected Factory Exchange (CFX)

---

### 1 SCOPE

This standard establishes the requirements for the omnidirectional exchange of information between manufacturing processes and associated host systems for assembly manufacturing. This standard applies to communication between all executable processes in the manufacture of printed board assemblies – automated, semiautomated and manual – and is applicable to related mechanical assembly and transactional processes.

**1.1 Purpose** With the growth and acceptance of digital modeling and practices in manufacturing, the lack of a holistic Industrial Internet of Things (IIoT) standard for the transfer of information between machines, systems and processes has become a severe limitation to the growth of digitization and computerization in the electronics manufacturing industry, inhibiting technology innovations such as Industry 4.0 and Smart Factories being available to all companies in the industry, regardless of size, sector and location.

This Connected Factory Exchange (CFX) standard provides a true “plug and play” Internet of Things (IoT) communication environment throughout manufacturing, where all equipment, manufacturing processes and transactional stations can communicate with each other without the need for the development and use of bespoke interfaces. CFX-enabled equipment and solutions from different vendors work seamlessly together.

There are many types of users of this CFX standard, including equipment vendors, solution providers, in-house information technology (IT) groups, etc. The many types of data included in CFX are used in different ways depending on the application; for example, closed-loop feedback systems, live production dashboards, traceability (IPC-1782), manufacturing execution systems (MES) control, lean supply chain management, active quality management, production control, etc.

As CFX data is fully omnidirectional, any CFX endpoint connection can consume data as well as create it. As an illustration, consider the scenario in which a single machine from a certain vendor is connected in-line with other machines from different vendors. CFX messages are sent from the single machine to other machines in the line, and to host systems such as MES. The single machine can also receive CFX messages from all other machines in the line, as well as from the host systems in order to optimize the machine operation and enable the vendor of the machines to create added-value functionality, such as to support machine-specific Industry 4.0. In this way, a smart, digital, Industry 4.0 factory will be comprised of many different Industry 4.0 computerization applications, each of which can be provided by different suppliers, at the machine, line, site and even enterprise levels, all working together, sharing data seamlessly through CFX.

This CFX standard supports the concept of big data by including data of different types from across the factory, including performance, materials, resources, users, quality events, product tracking, etc., all of which can be combined to create a big-data environment. CFX, therefore, provides many kinds of added value opportunities to the whole manufacturing operation, including, for example, improving operational efficiency and productivity, quality and reliability, agility and responsiveness. This CFX standard helps organizations ensure that end users/consumers will receive products and services that meet or exceed their expectations and in the timeliest and most economically viable method.

**1.2 Application of This Standard** This standard defines the communication protocol and content across all assembly production processes, irrespective of type or method of operation. It can also be applied to transactional operations. There are no restrictions in terms of product classification sector, size of operation or location. Surface-mount technology (SMT) production is not required to be a part of the factory. Though intended to support all aspects of printed board production, the use of CFX can be extended downstream to include, for example, mechanical assembly, personalization, packing and shipping, as well as upstream to include, for example, electrical and mechanical subassemblies.

**1.3 CFX and The Hermes Standard** This CFX standard is complementary to IPC-HERMES-9852. The Hermes Standard, as an advanced, intelligent Surface Mount Equipment Manufacturers Association (SMEMA) standard replacement, provides near-instant line control, passing information about production units as they pass down the line. CFX provides vertical messaging that is complementary to Hermes.

**1.4 Updates to This Standard** The IPC-CFX Standard Task Group intends to make frequent incremental revisions to this standard to support additional machines and processes. Version updates are identified by version number and the change (added, removed, etc.), so the reader can easily identify changes in each version. See Figure 1-1 for an example of this version change tracking using a portion of the CFX.Production.TestAndInspection table of this standard as an example.

An itemized version history of the CFX SDK is available at <https://www.electronics.org/cfx-home-page>.