CadPack

Import from SCICARDS

Software tool for import part/net list from SCICARDS

Technical Info

Version : 2
Code : 81190416.128

Contents

Introduction

CAD files are the base for the automatic generation of test program for InCircuit of any technology.

In order to generate the ICT test program in a short time and without errors, both Bed of Nails and Flying Probe testers require the circuit information available in CAD format.

The Import from SCICARDS software tool converts the CAD files of the board from the SCICARDS format to the SPEA board data format.

Conventions, symbols and abbreviations

In the document, the ⓘ symbol is used to highlight information or notes useful to the reader.

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This manual can be updated in accordance with the evolution of the system and associated software.
It may contain preliminary contents or it may not be entirely updated with the latest versions used in the system.

Any remarks on errors and imperfections, or suggestions, can be addressed to:

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1. SCICARDS file data

With the "SCICARDS CAD files" words we refer to the output information generated by the SCICARDS CAD-CAE programs for the electrical diagrams design and PCB development, used to develop a test application (test program and adapter design).

Information stored in the "SCICARDS CAD files" concern an electronic board and can be used by an appropriate program to generate a test program and its test adapter design (Bed of Nails or list of movement for Flying Probes).

Information can be grouped in 4 different categories and typically are related to the printed circuit:

Part List
It is the list of all used devices, it must contain: devices drawing reference, part numbers, value, tolerances, device type, etc.
Net List
It is also called wiring list, containing device interconnection data; basically it is presentation of the electrical diagram.
Coordinate and access list
It is the list containing the devices coordinates, concerning their barycentre and pins.
Wiring and Routing list
It is the list containing the path of the Net tracks in the PCB.

For the import of the information above mentioned SPEA has developed the specific program for the translation, stored in a specified format, to its common data bank called "Board Data".
The name of this type of program is "CAD import driver".

For the required information, see the list in the following paragraphs.

1.1   Part List

The Part List is an ASCII text file, containing the list of all the parts used to assemble the board; sometimes it can be called **Bill of Material** (BOM).

In the Part List all information concerning the mounted and not mounted parts must be present.
For every part the following information must be defined:

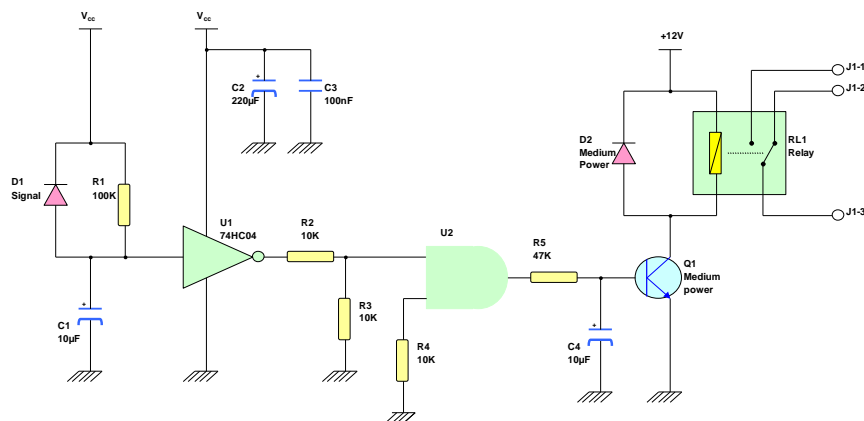| Information	Description
Drawing Reference	Reference designator (e.g. U10, R105, D23, etc.).
Part Number	Device code (e.g. 132549.012, C4QW08, 001-58-AA, etc.).
Value	Device value (e.g. 10KΩ, 10µF, 1mH, etc.).
Tolerance	Positive and negative device tolerances (e.g. 1%, 5%, etc.).
Mounting side	The legal values for this item can be: - **Top** (Component side) - **Bottom** (Soldering side) - **Not mounted Top** - **Not mounted Bottom**
Rotation [1]	Device mounting rotation angle (e.g. 0°, 180°, etc.).
Dimensions [1]	Device dimensions.
Case code [1]	Device package (case) code.

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[1] **Optional data (not yet managed)**

1.2 Net List

The Net List is an ASCII text file containing the device interconnection data; it is also called wiring list.
This list must contain the interconnection between devices, including pad and via.
Basically, it is the representation of the electrical diagrams.

For every net the following information must be defined:

Information	Description
Net name	Net identifier (e.g. +5V, RESET, A01, etc.).
Drawing reference	Reference designator of the device connected to the net (e.g. U10, R105, D23, etc.).
Pin name	Name of the device pin connected to the net (e.g. 1, 15, Anode, K, Negative, etc.).
Pin access side	Access side for the device pin, legal values are: - **Top** (Device side access). - **Bottom** (Soldering side access). - **Not accessible** - **All** (both top and bottom side access)

1.3 Coordinates and access list

The Coordinates and access list is an ASCII text file containing the devices coordinates concerning their barycentre and pins. Below, the required information:

Information	Description
Drawing Reference	Reference designator of the device connected to the net (e.g. U10, R105, D23, etc.).
Pin name	Name of the device pin connected to the net (e.g. 1, 15, Anode, K, Negative, etc.).
Pin X position	Pin X-coordinate.
Pin Y position	Pin Y-coordinate.
X barycentre [1]	Device X barycentre.
Y barycentre [1]	Device Y barycentre.

1.4 Wiring and Routing list

The Wiring and Routing list is an ASCII text file that contains all the coordinates of the Net tracks on the PCB and the link with the Net List. So the path of each net on the PCB is described in this file.

For every net the following information must be defined:

Information	Description
Net name	Net identifier (e.g. +5V, RESET, A01, etc.).
X Start	Track segment start X-coordinate.
Y Start	Track segment start Y-coordinate.
X End	Track segment end X-coordinate.
Y End	Track segment end Y-coordinate.
Width	Net segment thickness.
Layer	Layer the segment belongs to.

Example:

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[1] **Optional data**

2. SCICARDS file generalities

The SCICARDS required file is: **<FileName>.REA**

Containing the Part list, the Net list, the Pins and Vias coordinates and the Net routings.

The SPEA system is based on a PC platform operating in MS-Windows environment.

The files need to be stored into a directory defined by the user.

The SPEA Import from SCICARDS software tool can retrieve the SCICARDS file from each defined disk and directory.

3. SCICARDS file format

The SCICARDS files listed below are a significant example of the format that the file must have to be converted into SPEA format.

```
20 2 7
40 33 1 132 1 215 1 221 2 105 2 143 2 146 4 157 4 160 4 244 4 247 19 154
42 33 23 147 203 206 203 209 367 92 367 95 367 98 426 114 429 86 431 186 445 123 494 52
44 33 496 181 496 185 496 188 496 191 496 194 497 182 518 251 518 254 519 2 546 122 546 125
46 6 546 128 546 133
60 1 1
62 44 3280/48324 AA IG/OG CONTROL RE-COPPER                    7 DD/MM/YY hh.mm.ss 0 0
64 32 SCICARDS                         EXPORT
80 4 4 0 0 1
100 11 250 99 99 99 0 4
102 5 0 0 0
102 5 0 52000 0
102 5 65000 52000 0
102 5 65000 0 0
110 1 5
112 7 600 0 160 40
112 7 850 0 330 25
112 7 1000 0 460 5
112 7 1250 0 530 6
112 7 1750 0 0 7
114 1 5
116 7 150 500 160 0
116 7 150 750 330 0
116 7 150 1000 460 0
116 7 150 1150 530 0
116 7 150 1750 0 0
120 8 0 50 0 4 0
122 5 -152 -211 0
122 5 -152 50970 0
122 5 58903 50970 0
122 5 58903 -211 0
.
.
.
242 17 /**TEST-CONN(25)**              1            Net name
242 17 /TEST-CONN(24)                 2
242 17 /TEST-CONN(23)                 **3**         Net identifier
242 17 /TEST-CONN(22)                 4
**242** 17 /TEST-CONN(21)             5            Net description identifier
242 17 /TEST-CONN(20)                 6
.
.
242 17 /P-SUPPLIES(10)                26
242 17 5V-RTN                         27
242 17 NET288                         28
242 17 NET287                         29
242 17 NET286                         30
242 17 NET285                         31
242 17 /SEU-UC-MUX-IP(3               32
242 17 /PA-SPIN-DRIVE(9               33
242 17 15V-RTN                        34
242 17 /PA-SPIN-DRIVE(7               35
242 17 5V-POS                         36
242 17 -5V-REF1                       37
.
.
.
**322** 33 7 ROBO-1                   MTP10        Component description identifier
324 32 ROBO
```

```
326 24 0 1 0 0 -1- 0 2875 46625 2 0 0 0 0 0 1 1 0          Component location identifiern,
                                                           Mounting side (-1- = Top)
                                                           Rotation
                                                           X and Y barycenter
328 2 1
330 8 -1-2-3-4- 2875 46625 34 1
322 33 7 ROBO-2                          MTP10
324 32 ROBO                                                Part number description identifier
326 24 0 1 0 0 -1- 0 55875 14875 2 0 0 0 0 0 1 1 0
328 2 2
330 8 -1-2-3-4- 55875 14875 34 1                           Pin description identifier
.
.
.
322 33 14 LK12                           MLK2              Drawing reference
324 32 LINK                              MLK2
326 24 0 1 0 0 -1- 180 5370 18870 2 0 0 0 0 0 2 2 0
328 2 15
328 2 16
330 8 -1-2-3-4- 5875 18875 103 1
330 8 -1-2-3-4- 4875 18875 101 1
322 33 14 LK8                            MLK2
324 32 LINK                              MLK2              Part number
326 24 0 1 0 0 -1- 180 3370 17370 2 0 0 0 0 0 2 2 0
328 2 17
328 2 18
330 8 -1-2-3-4- 3875 17375 101 1                           Pin coordinates
330 8 -1-2-3-4- 2875 17375 38 1                            Net identifier
.
.
.
322 33 4 IC5                             MIC3
324 32 LTC1060                           MIC3
326 24 0 1 0 0 -1- 0 10375 28625 2 0 0 0 0 0 20 20 0
328 2 43
328 2 44
328 2 45
328 2 46
328 2 47
328 2 48
328 2 49
328 2 50
328 2 51
328 2 52
328 2 53
328 2 54
328 2 55
328 2 56
328 2 57
328 2 58
328 2 59
328 2 60
328 2 61
328 2 62
330 8 -1-2-3-4- 5875 27125 73 1
330 8 -1-2-3-4- 6875 27125 74 1
330 8 -1-2-3-4- 7875 27125 75 1
330 8 -1-2-3-4- 8875 27125 76 1
330 8 -1-2-3-4- 9875 27125 34 1
330 8 -1-2-3-4- 10875 27125 77 1
330 8 -1-2-3-4- 11875 27125 78 1
330 8 -1-2-3-4- 12875 27125 78 1
330 8 -1-2-3-4- 13875 27125 34 1
330 8 -1-2-3-4- 14875 27125 61 1
330 8 -1-2-3-4- 14875 30125 61 1
330 8 -1-2-3-4- 13875 30125 34 1
330 8 -1-2-3-4- 12875 30125 77 1
330 8 -1-2-3-4- 11875 30125 77 1
330 8 -1-2-3-4- 10875 30125 34 1
```

```
330 8 -1-2-3-4- 9875 30125 79 1
330 8 -1-2-3-4- 8875 30125 80 1
330 8 -1-2-3-4- 7875 30125 81 1
330 8 -1-2-3-4- 6875 30125 71 1
330 8 -1-2-3-4- 5875 30125 82 1
322 33 4 IC6                            MIC3
324 32 LTC1060                          MIC3
326 24 0 1 0 0 -1- 0 11375 38625 2 0 0 0 0 0 20 20 0
328 2 63
328 2 64
328 2 65
328 2 66
328 2 67
328 2 68
328 2 69
328 2 70
328 2 71
328 2 72
328 2 73
328 2 74
328 2 75
328 2 76
328 2 77
328 2 78
328 2 79
328 2 80
328 2 81
328 2 82
330 8 -1-2-3-4- 6875 37125 83 1
330 8 -1-2-3-4- 7875 37125 84 1
330 8 -1-2-3-4- 8875 37125 68 1
330 8 -1-2-3-4- 9875 37125 85 1
330 8 -1-2-3-4- 10875 37125 83 1
330 8 -1-2-3-4- 11875 37125 86 1
330 8 -1-2-3-4- 12875 37125 87 1
330 8 -1-2-3-4- 13875 37125 87 1
330 8 -1-2-3-4- 14875 37125 34 1
330 8 -1-2-3-4- 15875 37125 60 1
330 8 -1-2-3-4- 15875 40125 62 1
330 8 -1-2-3-4- 14875 40125 34 1
330 8 -1-2-3-4- 13875 40125 86 1
330 8 -1-2-3-4- 12875 40125 86 1
330 8 -1-2-3-4- 11875 40125 34 1
330 8 -1-2-3-4- 10875 40125 34 1
330 8 -1-2-3-4- 9875 40125 88 1
330 8 -1-2-3-4- 8875 40125 89 1
330 8 -1-2-3-4- 7875 40125 72 1
330 8 -1-2-3-4- 6875 40125 90 1
.
.
.
322 33 3 D23                            MD2
324 32 1N4148                           MD2
326 24 0 1 0 0 -1- 270 46375 6125 2 0 0 0 0 0 2 2 0
328 2 280
328 2 281
330 8 -1-2-3-4- 46375 8125 146 1
330 8 -1-2-3-4- 46375 4125 187 1
322 33 14 R135                          MR1
324 32 100K                             MR1
326 24 0 1 0 0 -1- 270 5875 7625 2 0 0 0 0 0 2 2 0
328 2 282
328 2 283
330 8 -1-2-3-4- 5875 10125 118 1
330 8 -1-2-3-4- 5875 5125 63 1
322 33 14 R134                          MR1
326 24 0 1 0 0 -1- 90 10875 7625 2 0 0 0 0 0 2 2 0
328 2 284
328 2 285
```

```
330 8 -1-2-3-4- 10875 5125 119 1
330 8 -1-2-3-4- 10875 10125 64 1
322 33 14 R102                              MR1
324 32 100K                       MR1
326 24 0 1 0 0 -1- 270 9875 7625 2 0 0 0 0 0 2 2 0
328 2 286
328 2 287
330 8 -1-2-3-4- 9875 10125 110 1
330 8 -1-2-3-4- 9875 5125 65 1
.
.
.
382 12 2875 46625 6 34 1 1 1 0                              Via X,Y coordinates
382 12 55875 14875 6 34 1 2 1 0
382 12 51875 42125 7 34 1 3 1 0                             Net identifier
382 12 51875 41125 7 34 1 3 2 0
382 12 48875 46125 7 34 1 4 1 0
382 12 47875 46125 7 34 1 4 2 0                             Via description identifier
382 12 19125 46125 7 68 1 5 1 0
382 12 18125 46125 7 69 1 5 2 0
382 12 18125 44875 7 69 1 6 1 0
382 12 19125 44875 7 70 1 6 2 0
382 12 5875 20375 7 100 1 7 1 0
382 12 4875 20375 7 101 1 7 2 0
382 12 5375 19625 7 102 1 8 1 0
382 12 4375 19625 7 101 1 8 2 0
382 12 5875 18875 7 103 1 9 1 0
382 12 4875 18875 7 101 1 9 2 0
382 12 3875 17375 7 101 1 10 1 0
382 12 2875 17375 7 38 1 10 2 0
382 12 5375 18125 7 104 1 11 1 0
382 12 4375 18125 7 101 1 11 2 0
382 12 3875 18875 7 101 1 12 1 0
382 12 2875 18875 7 37 1 12 2 0
382 12 5875 17375 7 105 1 13 1 0
```

4. Import setting

4.1   Pin function assignment

In order to correctly execute the CAD file import, this assignment table must be filled.

In order to correctly test some polarized devices such as diodes, bipolar transistors, etc., it is basic to correctly identify the pin function (i.e. anode, base, etc.) of each pin.

The fields contained in the table, are described below:

Field	Description
Device Type	Identifies the type of device (example: Resistors, Capacitors, Digital Devices, Diodes etc.).
Pin Function	Function concerning the Pin.
Pin Name	Pin reference.
Cad Pin	Pin reference in Cad file.

4.2   Drawing ref. initials/device type assignment

The SCICARDS file typically contains all information about the devices, such as value, tolerances and type; which are fundamental from the point of view of the test program generation.

The fields contained in the table are described below:

Field	Description
Drawing Reference	Initial letter identifying the **Device Type**.
Device Type	Identifies the type of device (example: Resistors, Capacitors, Digital Devices, Diodes etc.).
Default Tol+, Tol-	Value and tolerance of the device only if required (as for resistors).

It could happen that in the CAD file they are missing. For each drawing reference initial, the displayed table enables to define the following data default values:

- ♦ Device type
- ♦ Default positive tolerance
- ♦ Default negative tolerance

This means that if, for any reason, the CAD file does not contain the information mentioned above, the default values will be used.

5. Component Properties Identification

The ATPG Software of the SPEA Systems requires to identify the following data for each component:

Passive Components:

- ♦ **Component Family**
- ♦ **Part Number**
- ♦ **Component Value**
- ♦ **Tolerance + and -**

Other Components:

- ♦ **Component Family**
- ♦ **Part Number**
- ♦ **Device Name** (commercial name)

The **Component Family** is not specified in the Part List file, so it is requiired to fill a table containing the assignment between Drawing Reference initials and Component Family and the CAD Type before executing the import process.

The table contains also the default tolerance for the specified family of the components.

Example:

Device Type	Drawing. ref. initials	Default Tol+	Default Tol-
Capacitor	C	20	20
Resistor	R	10	10
Connector	J		
Digital IC	IC		

For polarized components such as diodes, it is important to identify the pin function (ex. Anode) of each pin.
Before running the import, it is required to edit the pin Id/pin function table.

Example:

Device Type	Pin Function	Pin Id
Diode	Anode	ANODE
Diode	Cathode	CATHODE
Polarized Capacitor	Positive	PLUS
Polarized Capacitor	Negative	MINUS

6. Component properties default value

The SPEA Import software automatically assigns a default value if all or part of the component properties are not available in the CAD file.

In this case a further manual ending can be done to perform the required modifications by using the Board Data editor.

The default values are shown in the following table:

Property	Default Value
Component Family	Not identified
Value of component	0
Tolerance	0
Device Name	None