cadence

INVENTIVE

Gerber Out

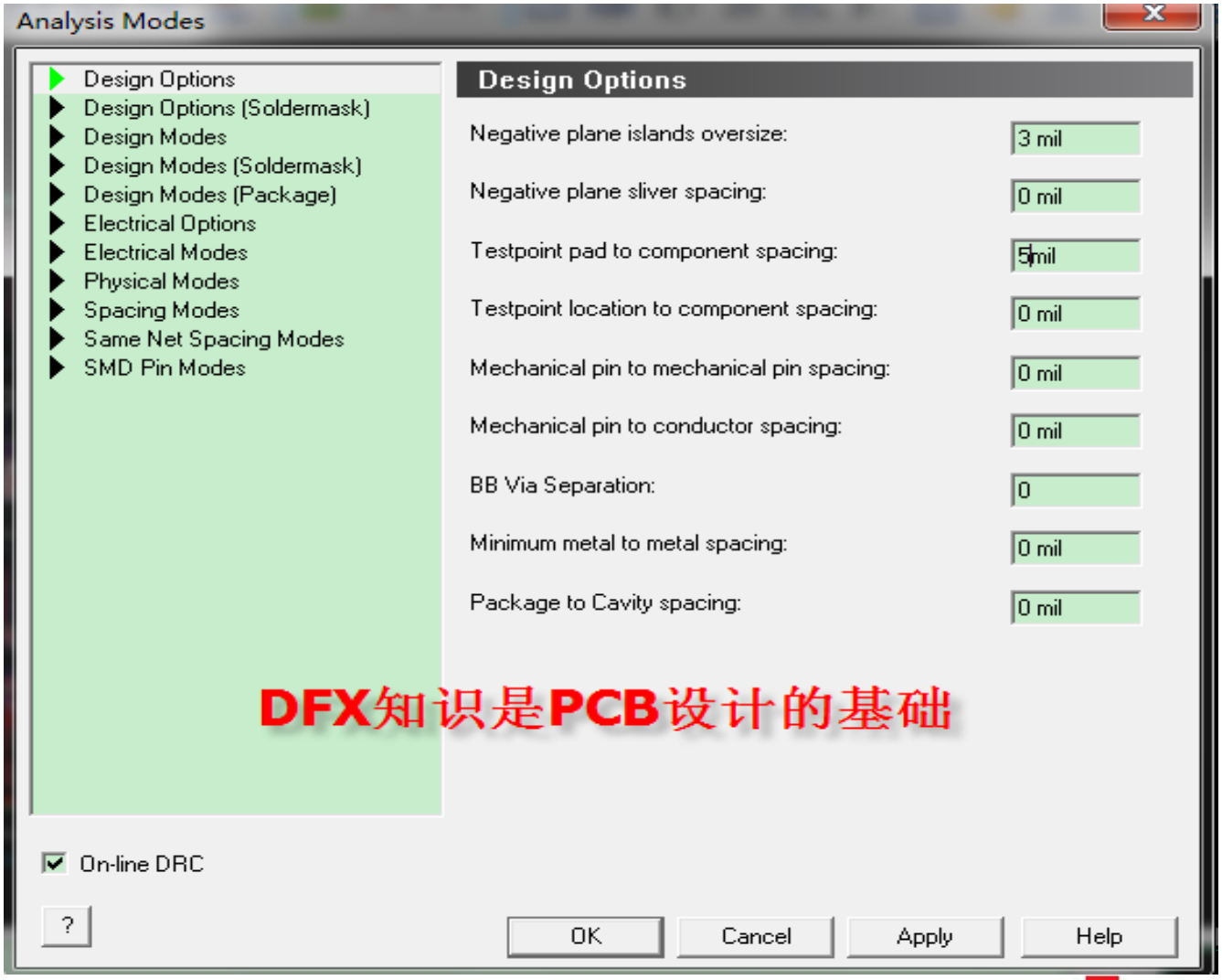
------Channel Partner COMTECH 科通

内容提要

- PCB后处理
  - DFX要求
  - 丝印（Silkscreen）
  - 工程标注
  - 输出光绘前的检查流程
- 光绘输出
  - 钻孔文件
  - CAM输出
  - 其他

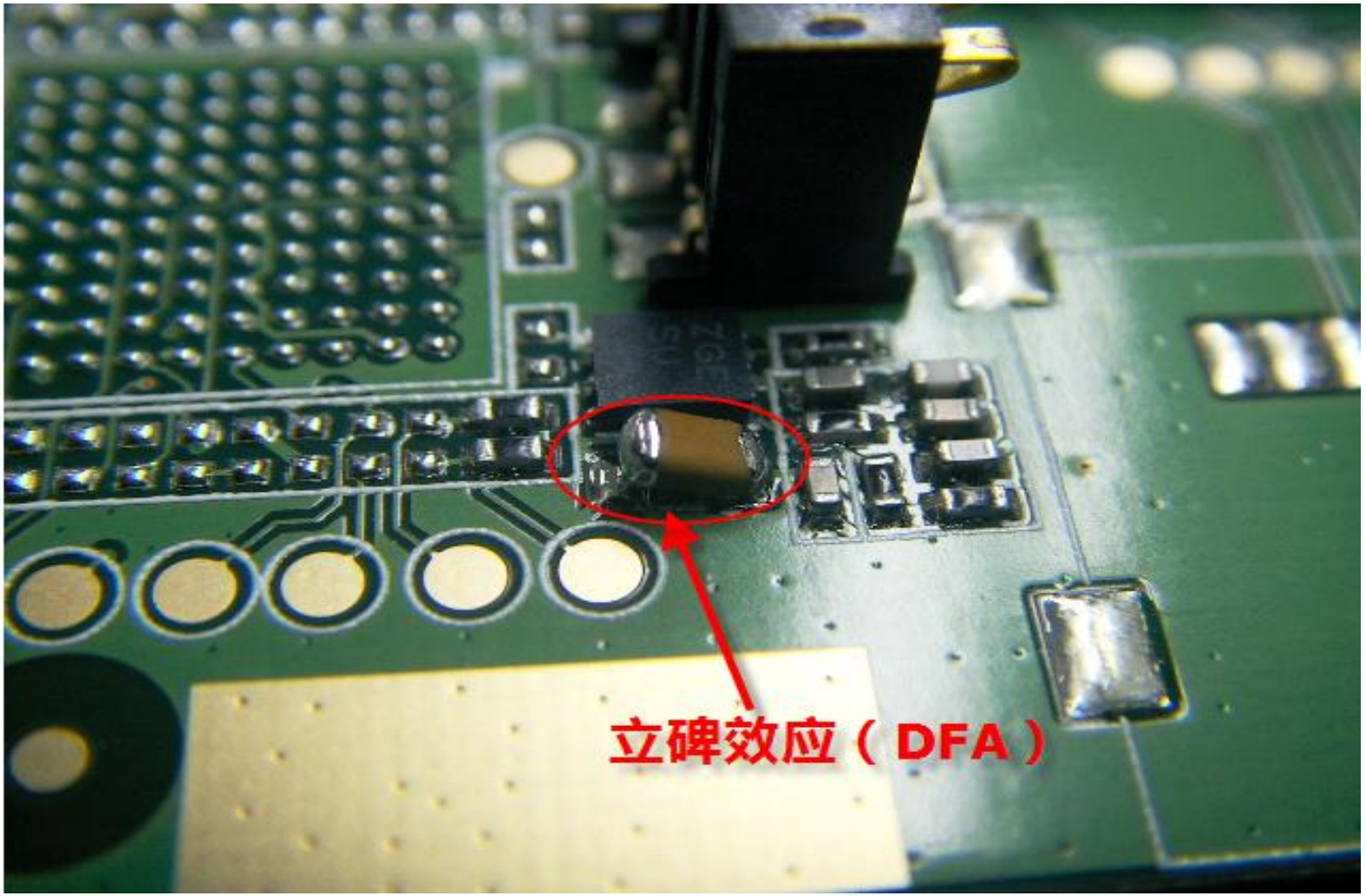
PCB后处理——DFX要求

- DFM、DFA、DFT、DFC…



PCB后处理——DFX要求

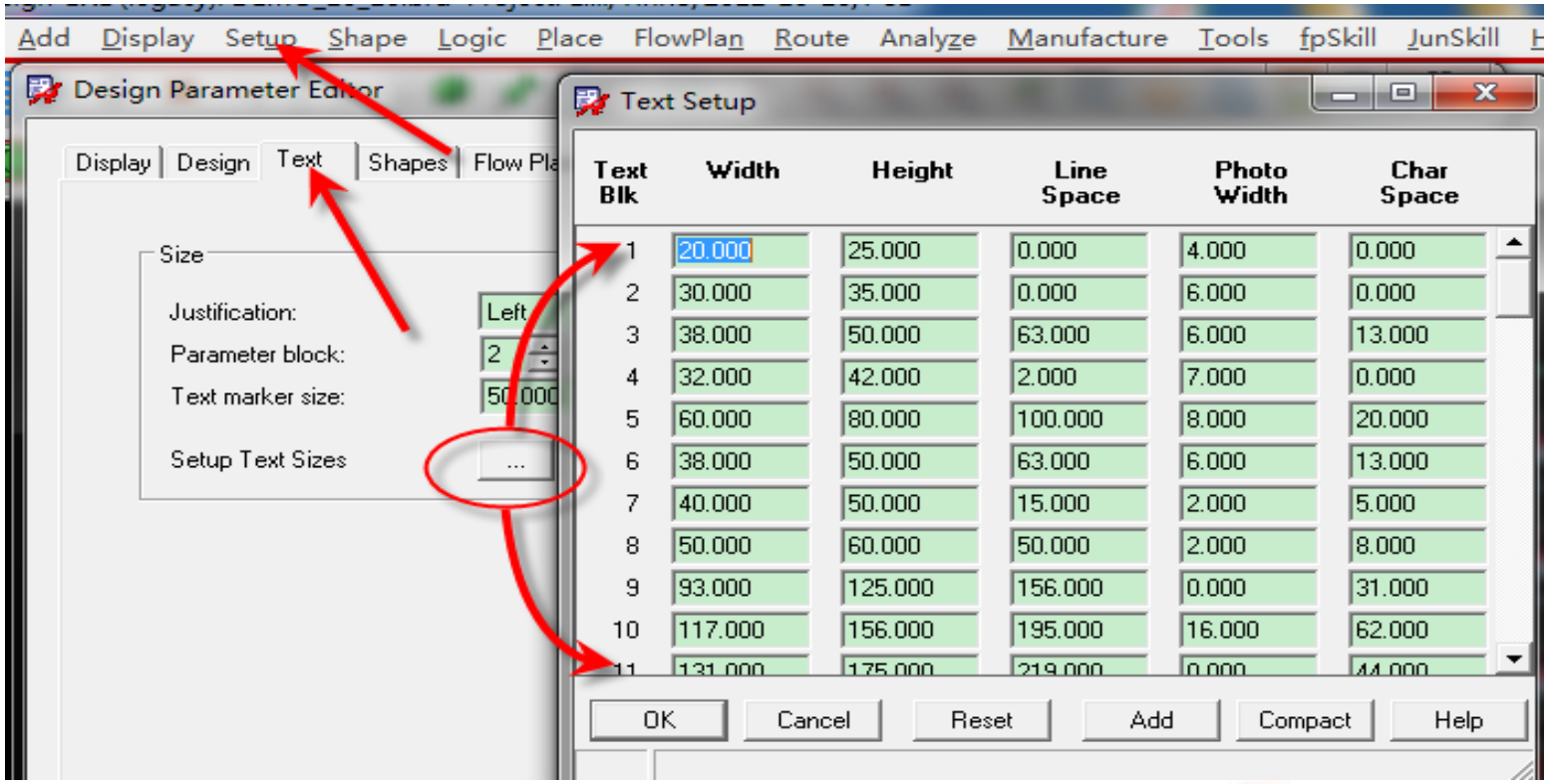
- DFM、DFA、DFT、DFC…



PCB后处理——丝印（Silkscreen）

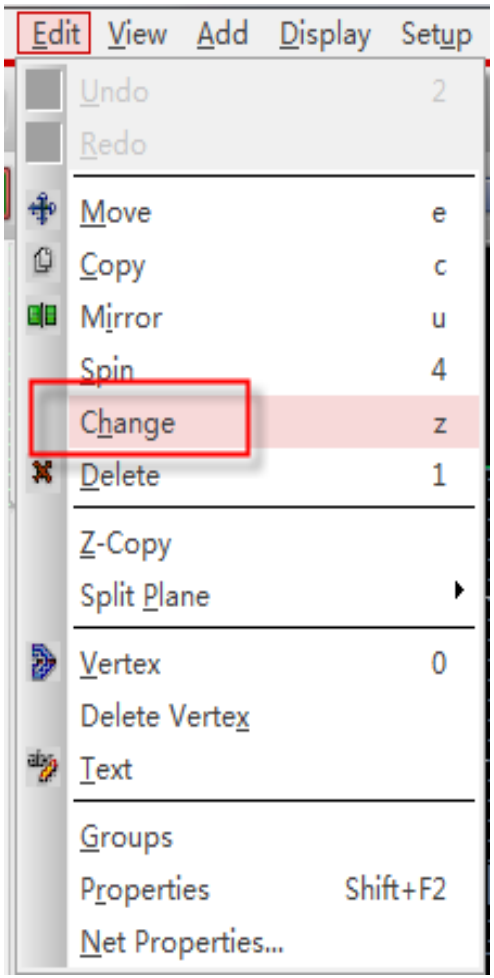
丝印是PCB表面的文字说明，模糊、混乱、残缺的丝印可能造成严重的后果——器件焊反、调试不方便……

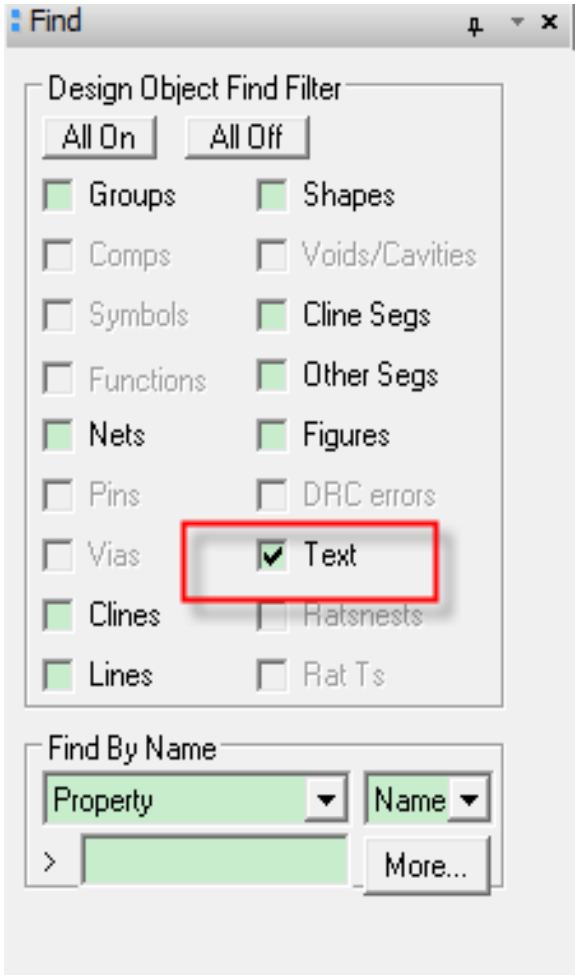
- 丝印调整
  - 字号参数设置

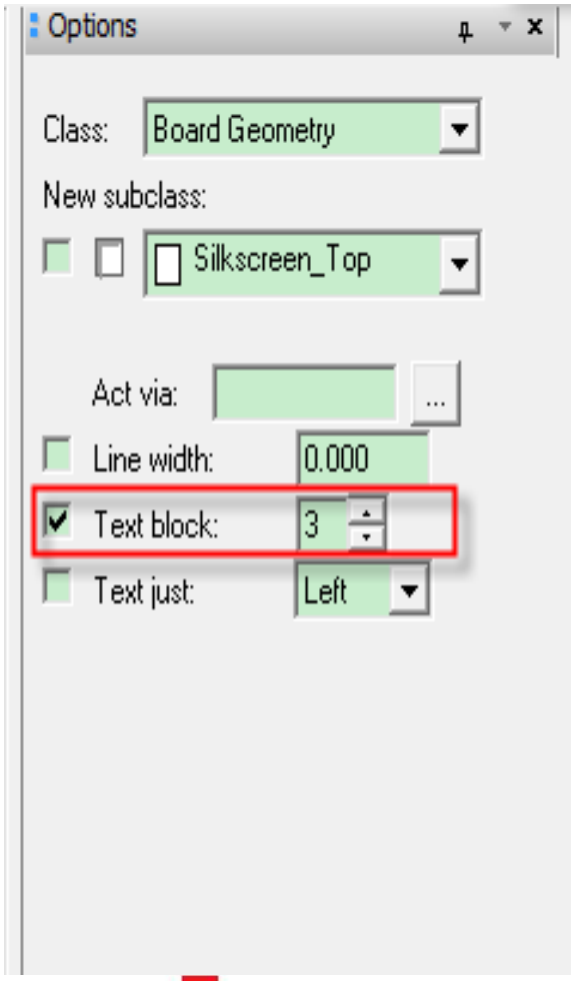


PCB后处理——丝印（Silkscreen）

- 丝印调整
  - 统一字符编号（**Change命令**）







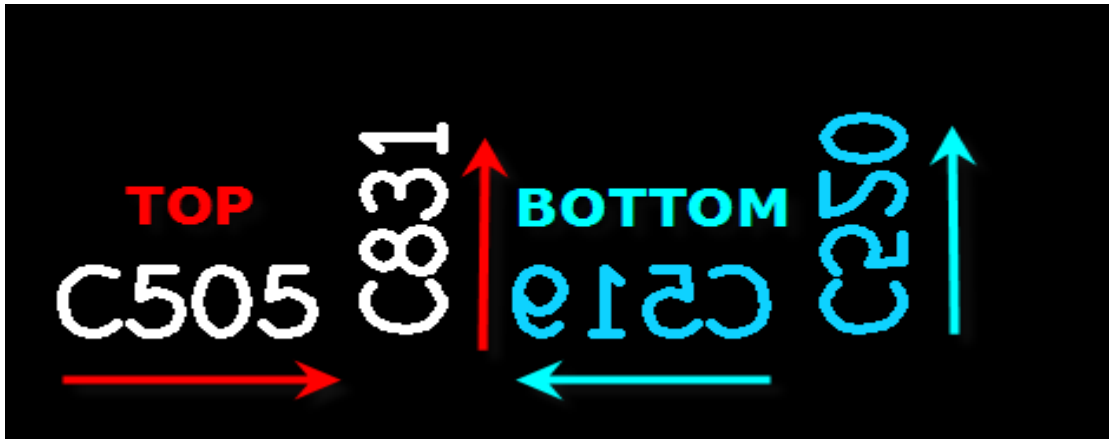
PCB后处理——丝印（Silkscreen）

- 丝印调整
  - 字号使用

通用位号字体丝印(mil单位)
字粗(Photo Width)/字高(Height)/字宽(Width)尺寸为:
4/25/20（单板过密或局部过密）；
5/30/25（常规设计）；
6/45/35（单板密度很小）。
一般都统一使用5/30/25或者6/45/35，
局部比较密的可以局部使用4/25/20，
位号丝印的种类最多不能超过两种。

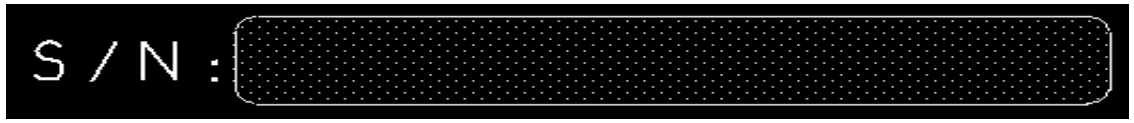
来自某板厂的推荐值

  - 丝印方向

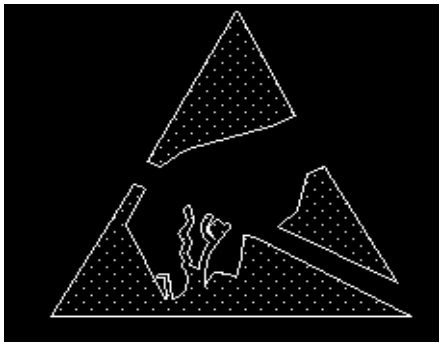


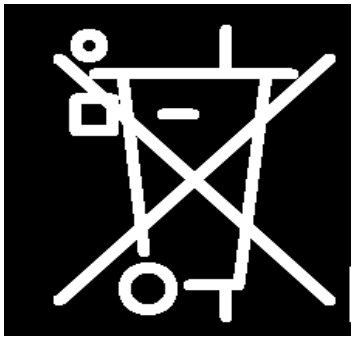
PCB后处理——丝印（Silkscreen）

- 丝印设计常规要求
  - 不允许任何丝印上阻焊和焊盘且要保证适当距离
  - 丝印尽量避免压过孔（特别注意3、6、8……）
  - 有极性和安装方向要求的器件要在丝印层标明
  - 如果因空间限制要删除部分丝印，要保证装配层有这些丝印
  - 丝印调整避开注意Mark点和ICT测试点
  - 器件脚标注意与相应脚对应，特别注意“1”脚标示
  - 板名和版本
  - 条形码



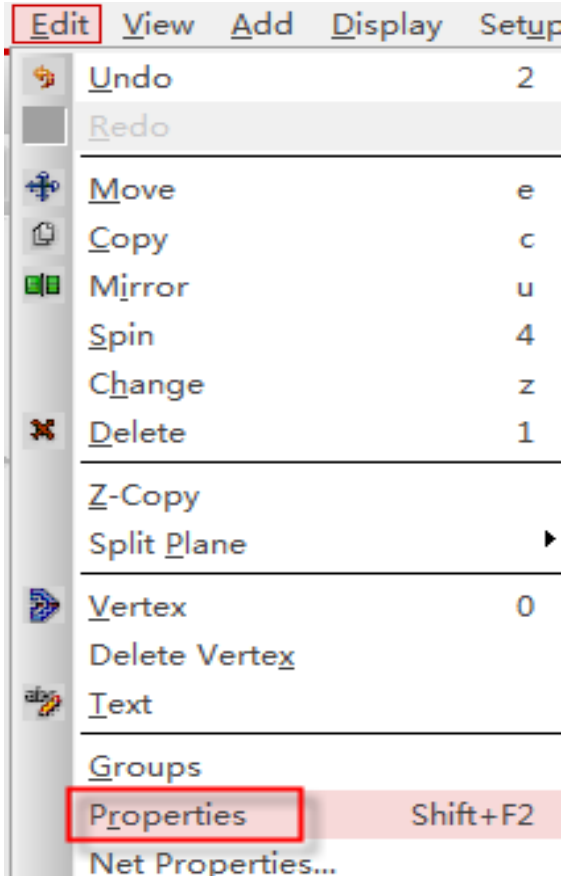
  - 其他（光纤盘绕方向、波峰焊过板方向、安规静电&高压标记）

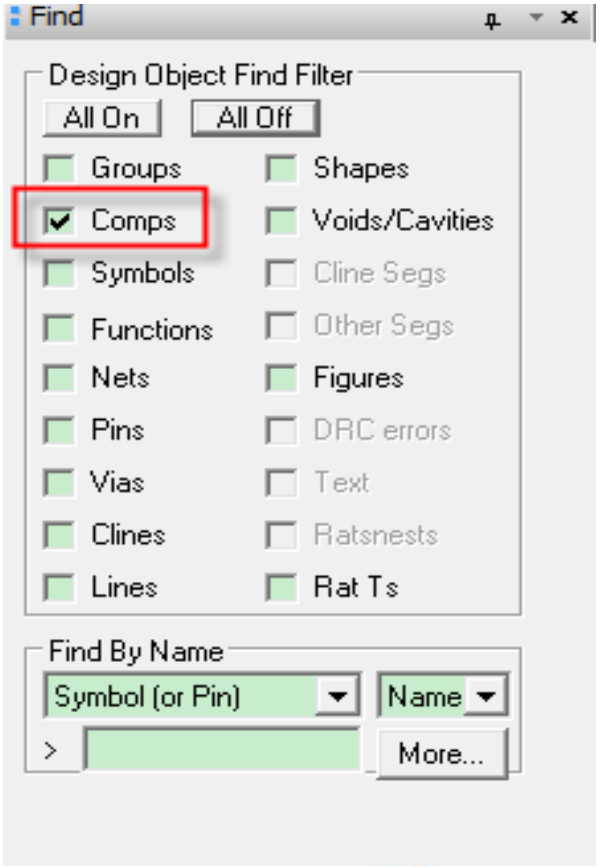




PCB后处理——丝印（Silkscreen）

- 丝印重命名及反标
  - 器件编号重命名
    - 器件附上**Auto_Rename**属性





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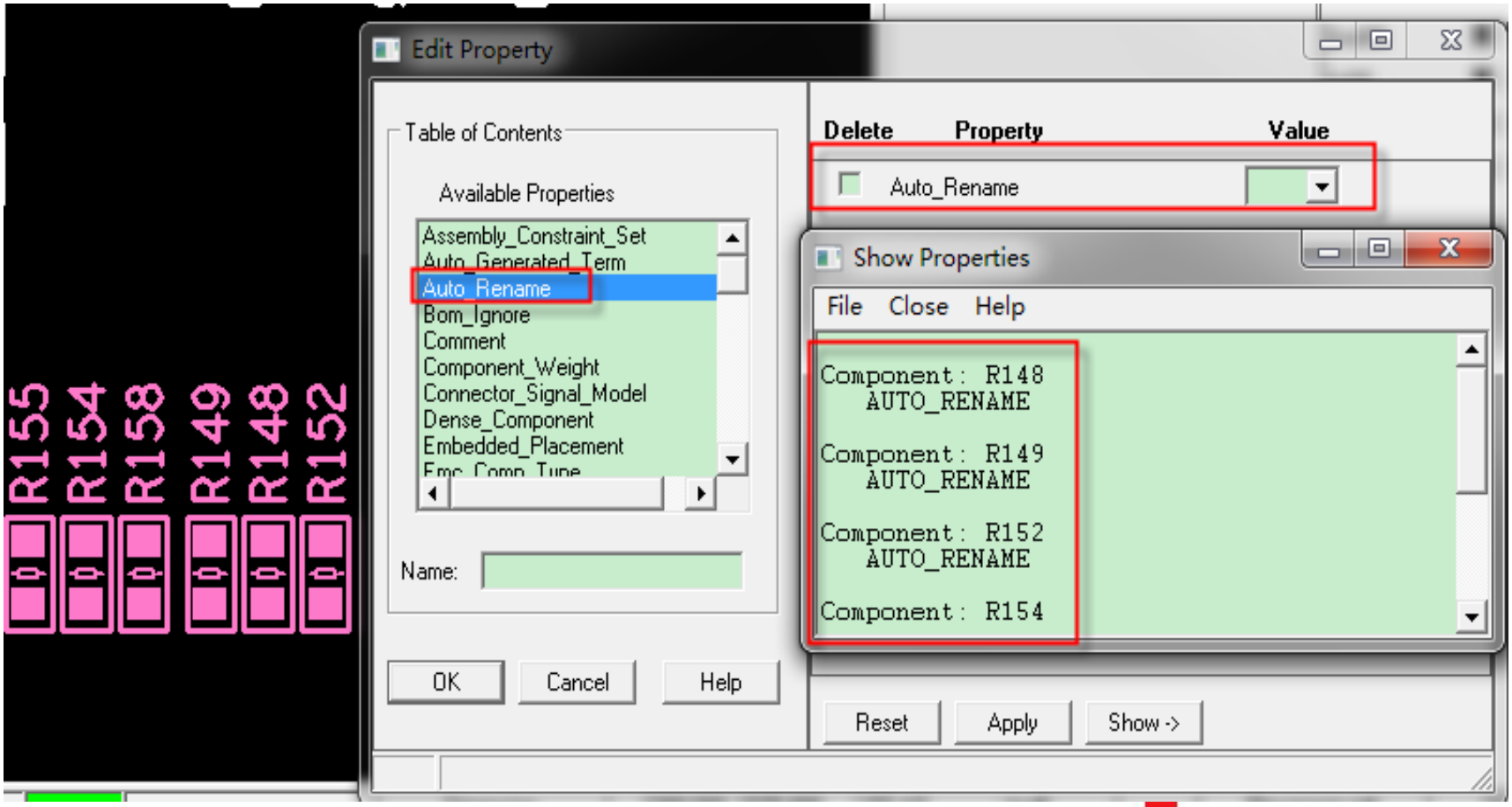
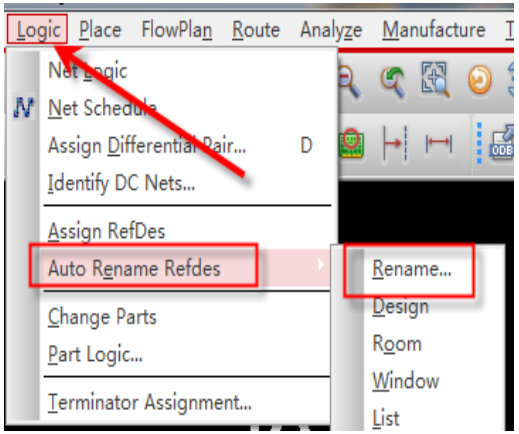
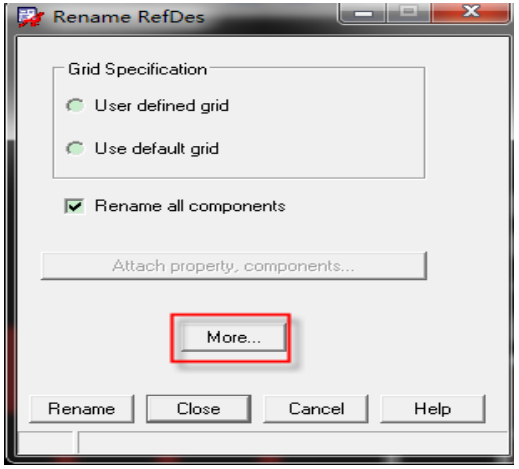
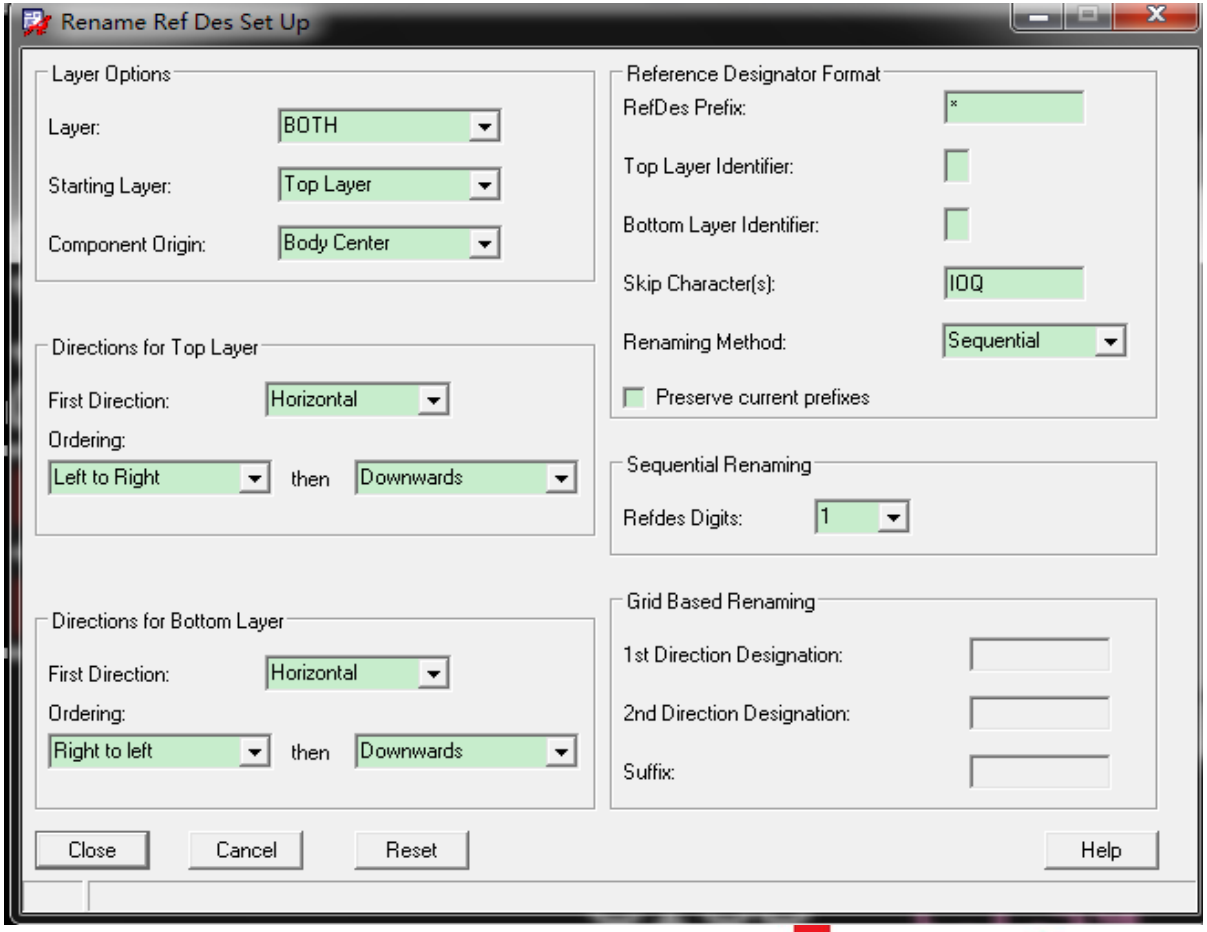


PCB后处理——丝印（Silkscreen）

- 丝印重命名及反标
  - 器件编号重命名
    - 参数设置

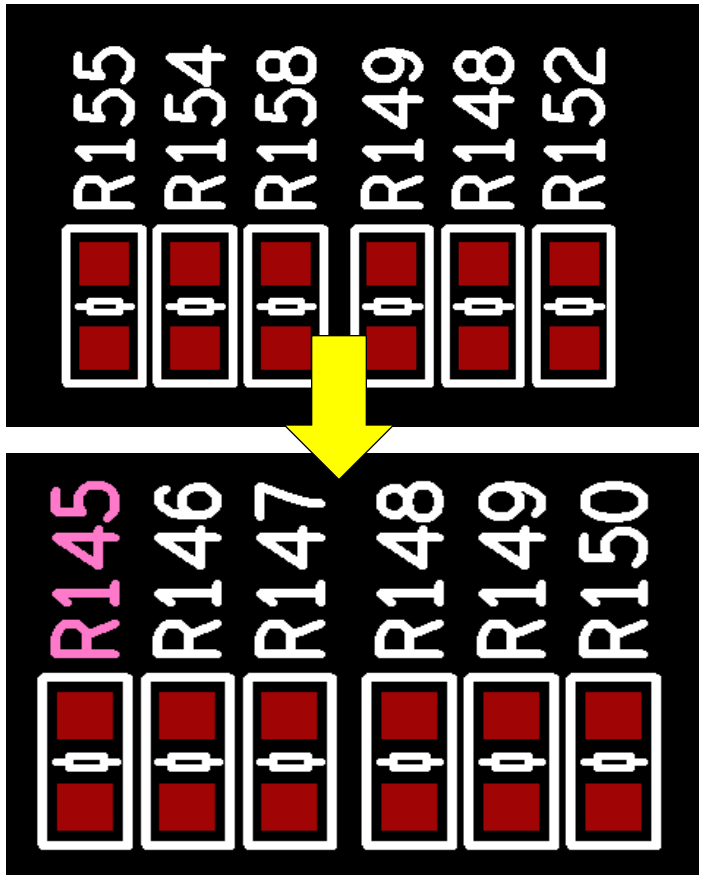






PCB后处理——丝印（Silkscreen）

- 丝印重命名及反标
  - 器件编号重命名
    - 参数设置



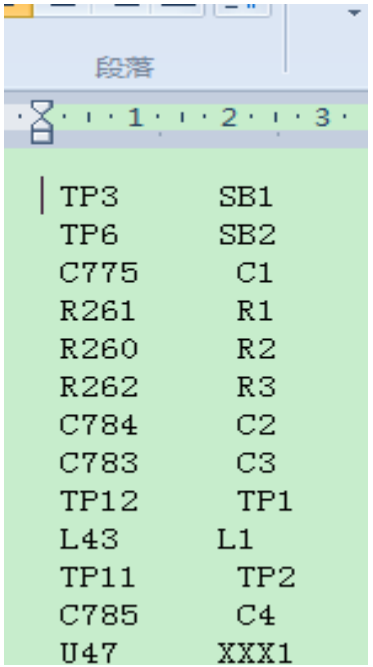
rename.log - 记事本

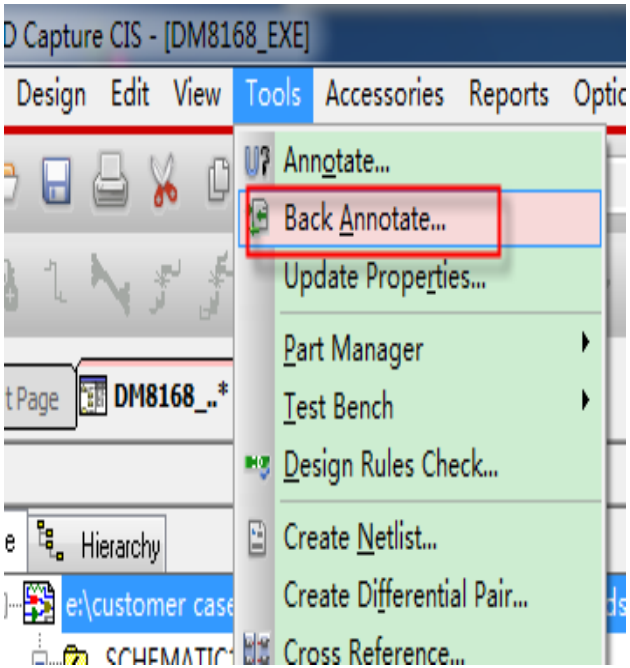
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

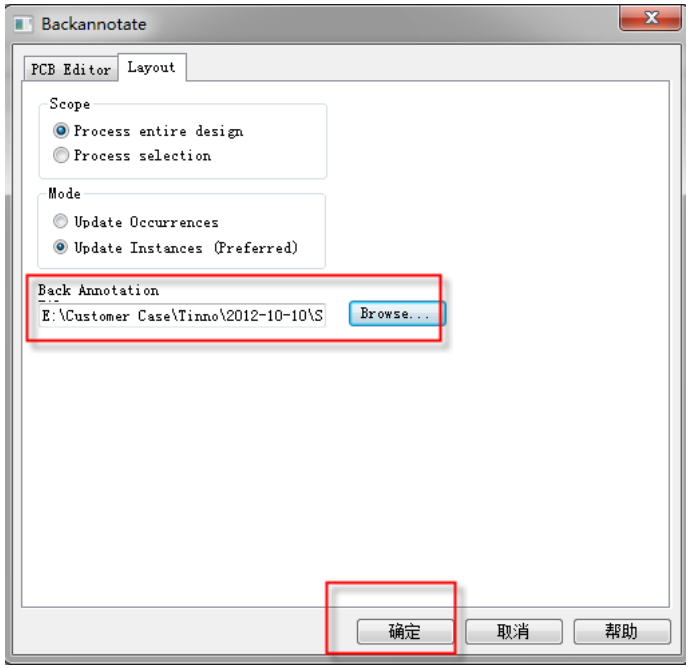
```
OLD C831      NEW C123
OLD U26      NEW X9
OLD U24      NEW X10
OLD U2      NEW XXX5
OLD U22      NEW X11
OLD R155      NEW R145
OLD R154      NEW R146
OLD R158      NEW R147
OLD R149      NEW R148
OLD R148      NEW R149
OLD R152      NEW R150
OLD U36      NEW REF DE10
OLD Y3      NEW G6
OLD Y2      NEW G7
OLD C694      NEW C124
OLD U28      NEW REF DE11
OLD R150      NEW R151
OLD R151      NEW R152
OLD R153      NEW R153
OLD C690      NEW C125
```

PCB后处理——丝印（Silkscreen）

- 丝印重命名及反标
  - 反标回原理图
    - 编辑rename.log文件，去除多余信息，保存成OrCAD Capture识别的文件格式*.swp，

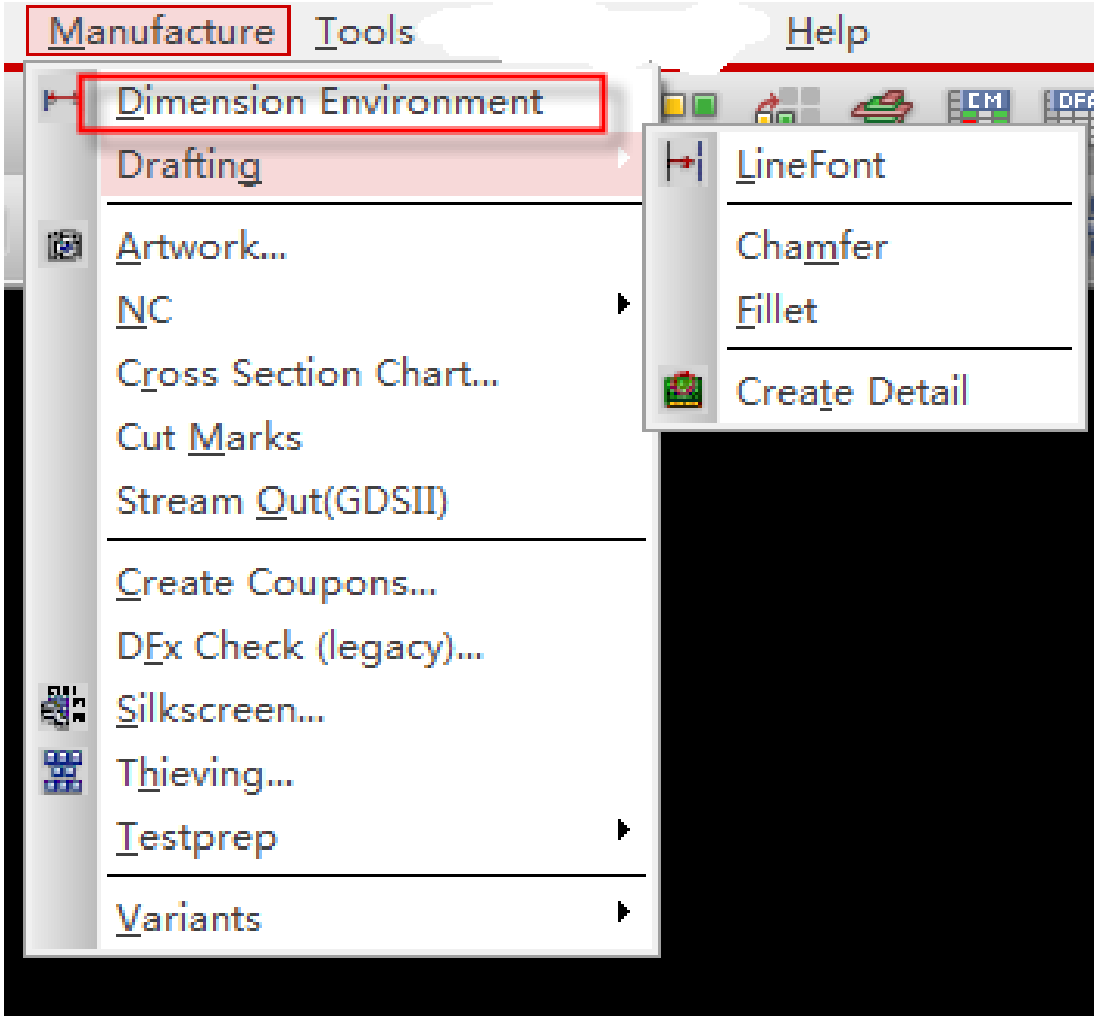


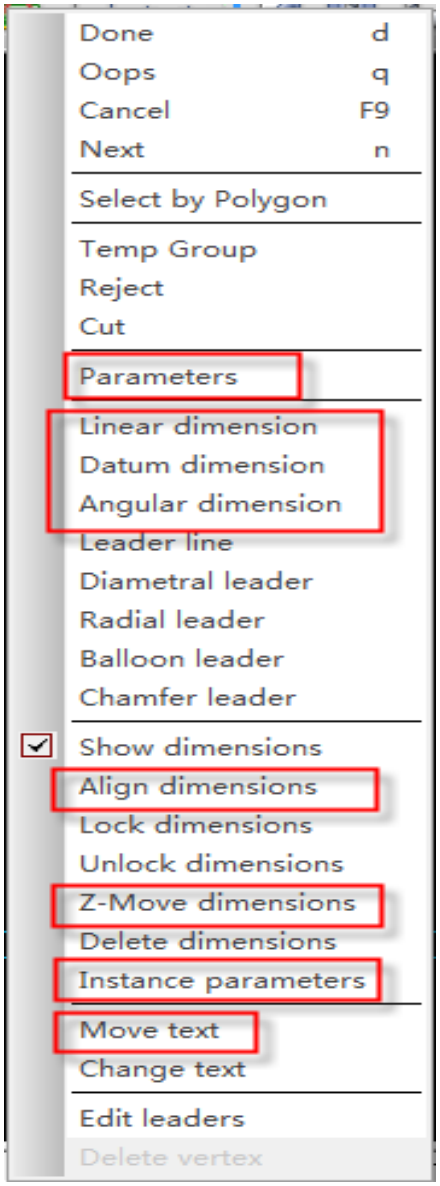




PCB后处理——工程标注

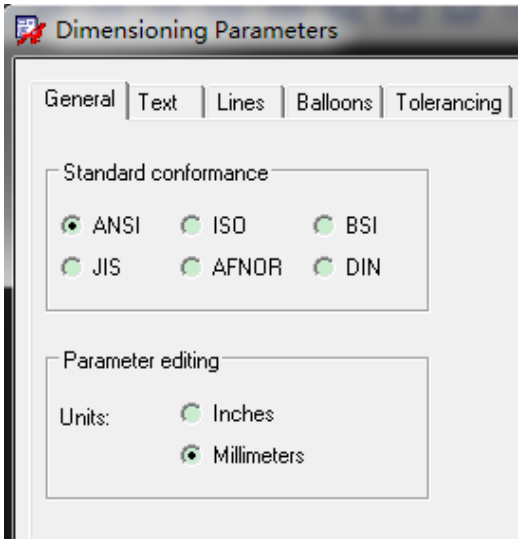
- 尺寸标注

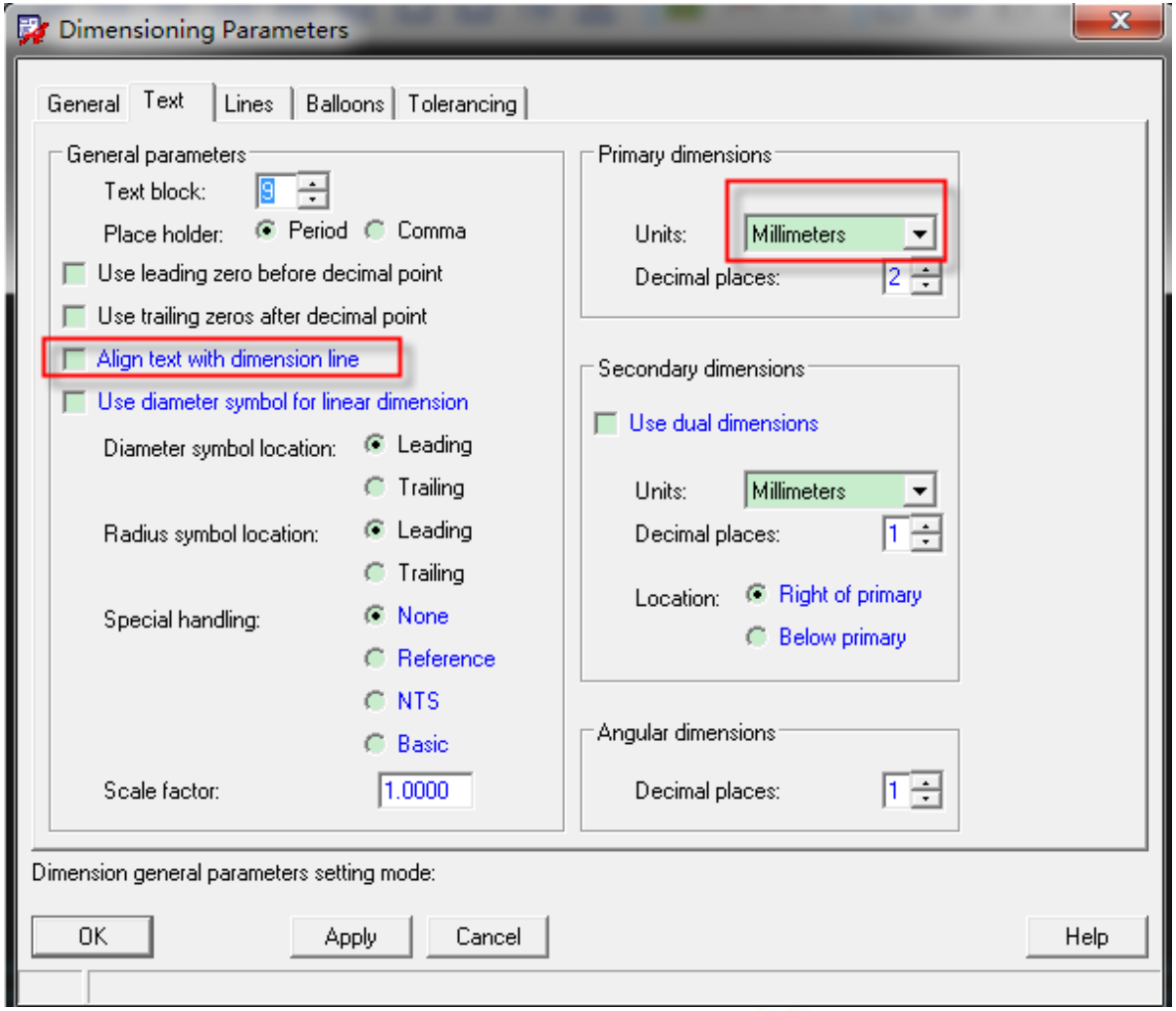




PCB后处理——工程标注

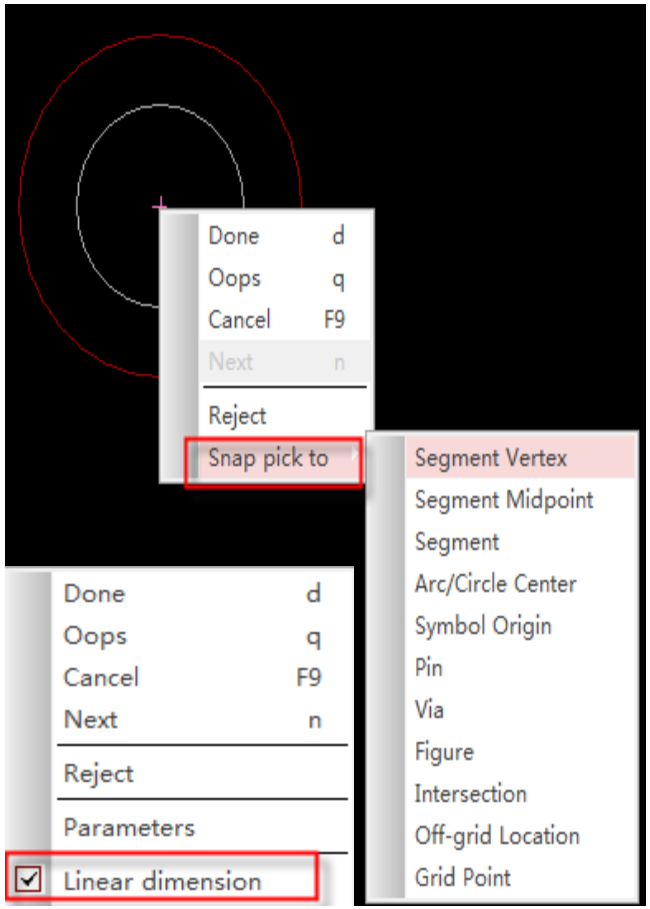
- 尺寸标注
  - 设置参数

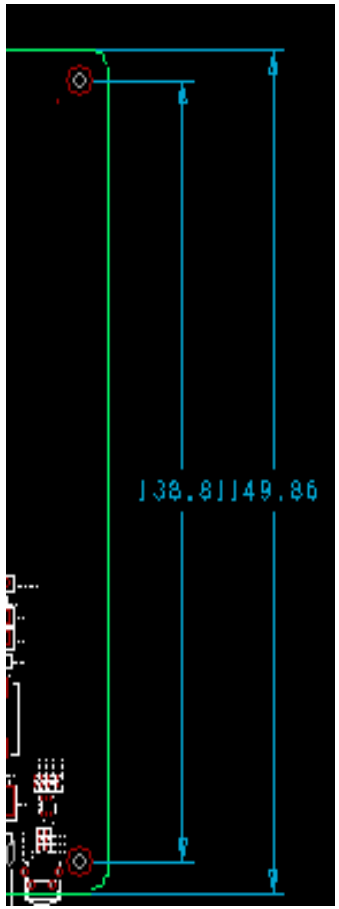


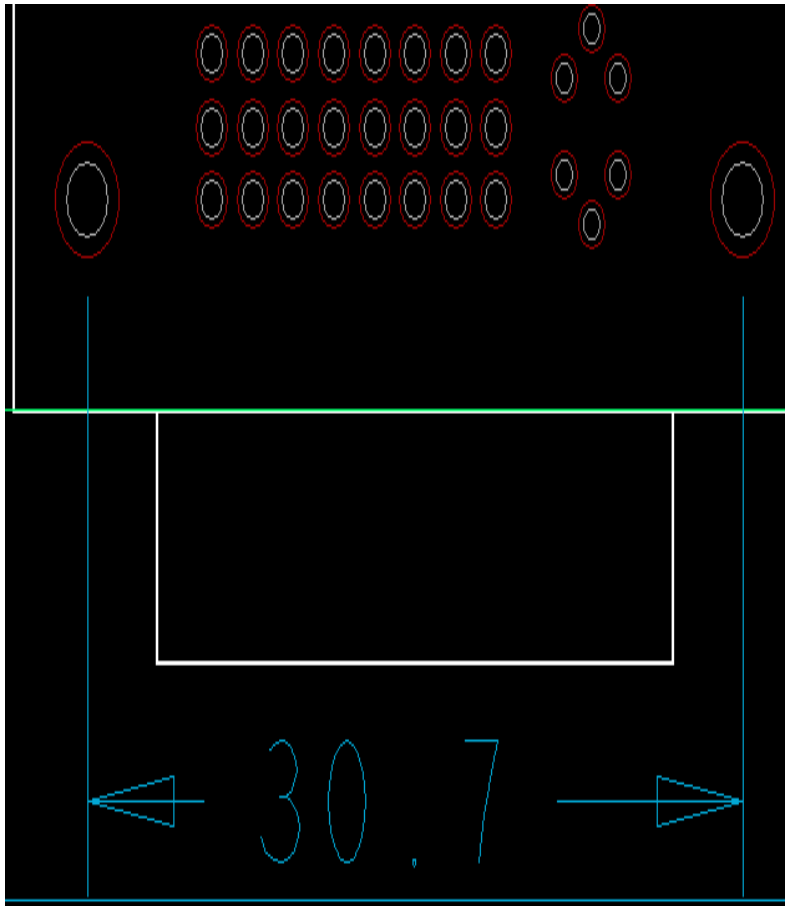


PCB后处理——工程标注

- 尺寸标注
  - 线性标注（**Linear Dimension**）

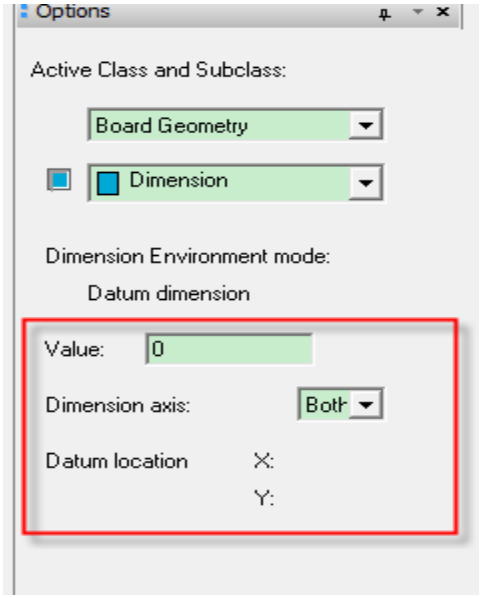


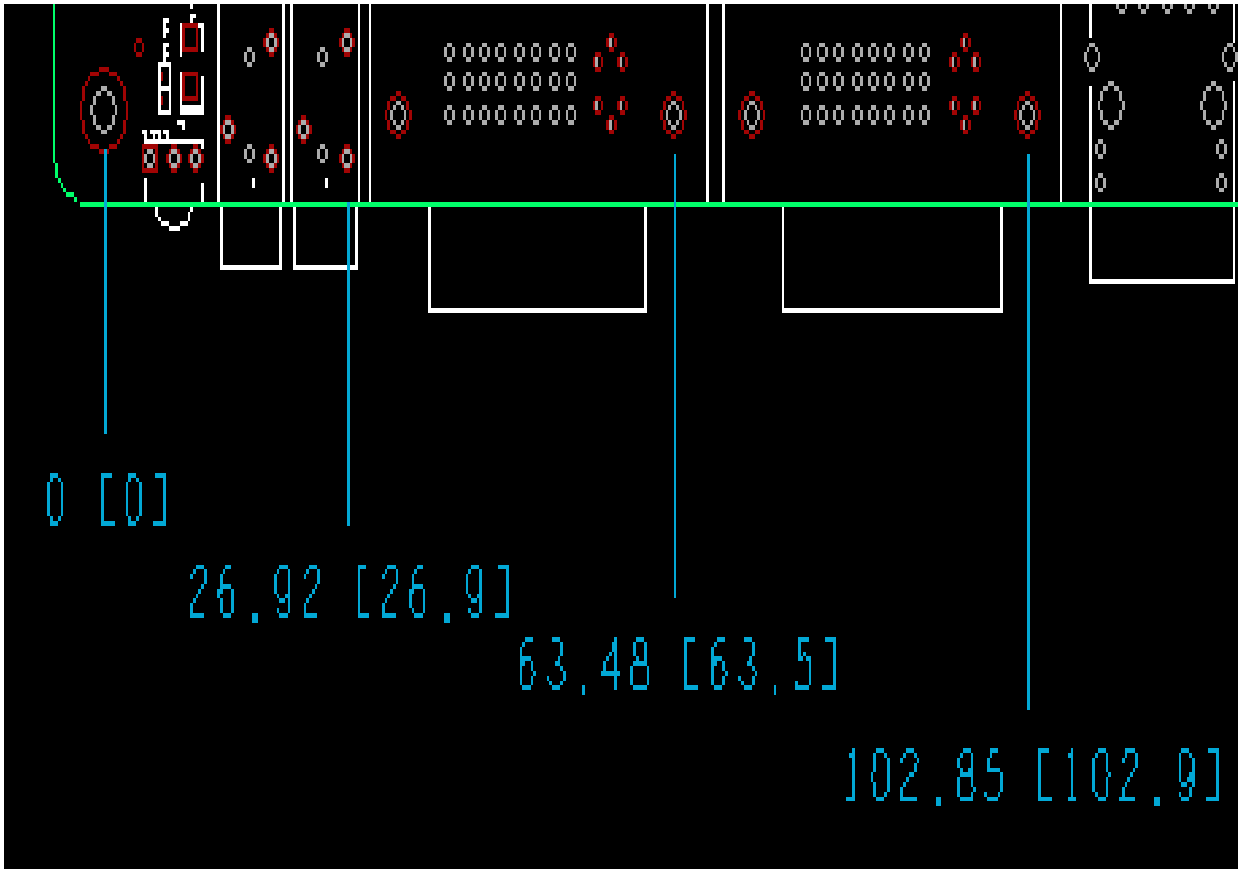




PCB后处理——工程标注

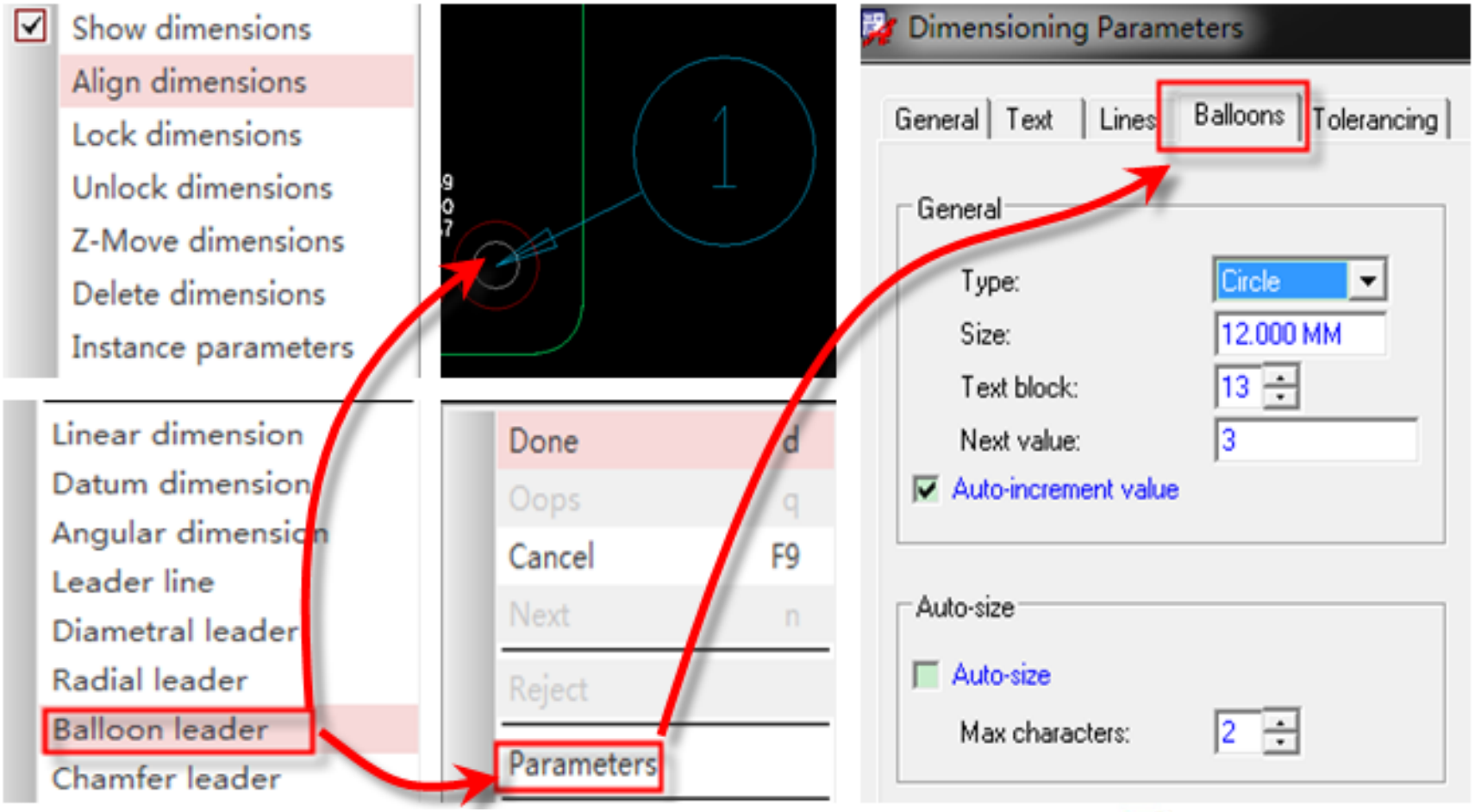
- 尺寸标注
  - 基准标注法（**Datum Dimension**）





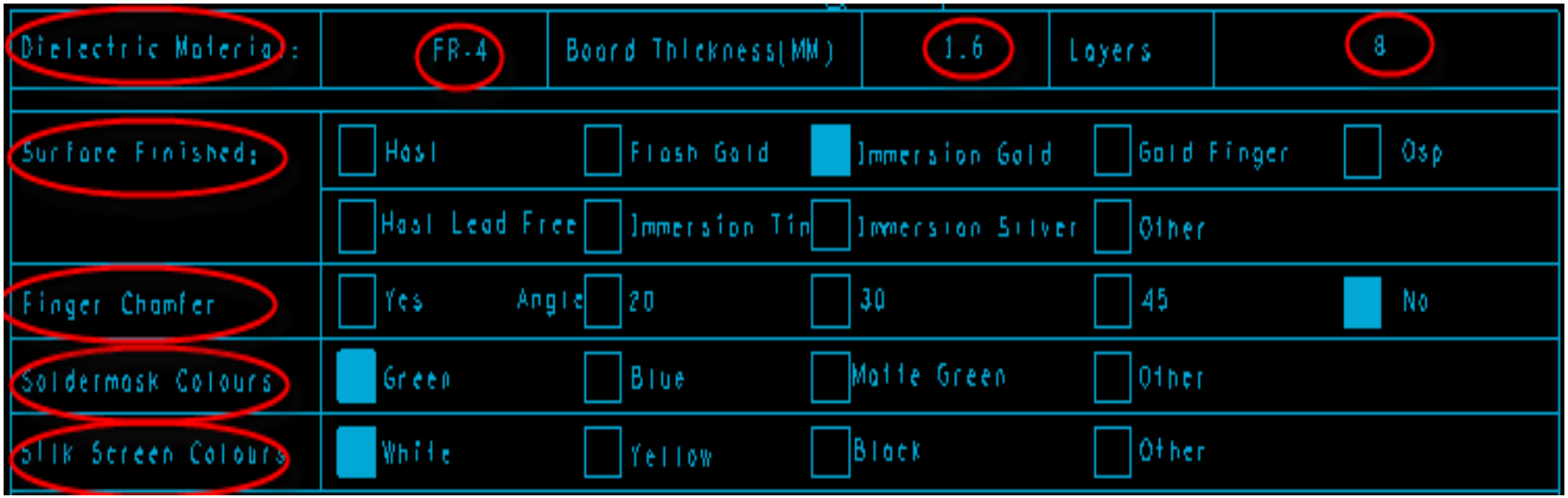
PCB后处理——工程标注

- 尺寸标注
  - 其他和标注相关的命令



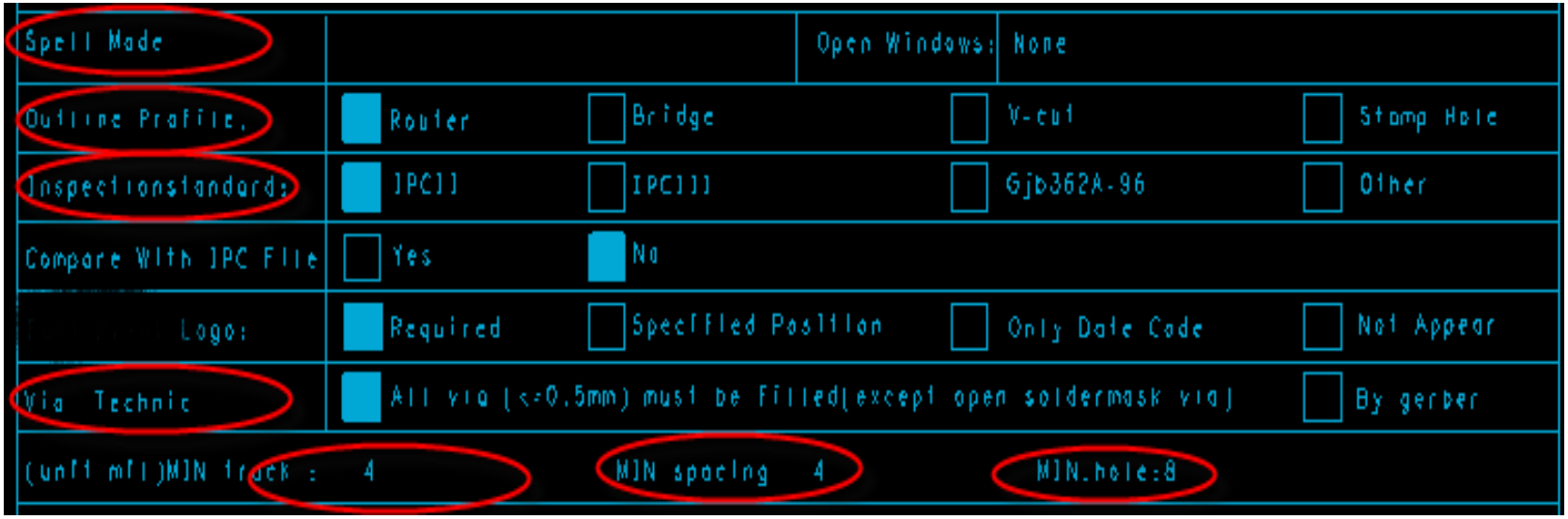
PCB后处理——工程标注

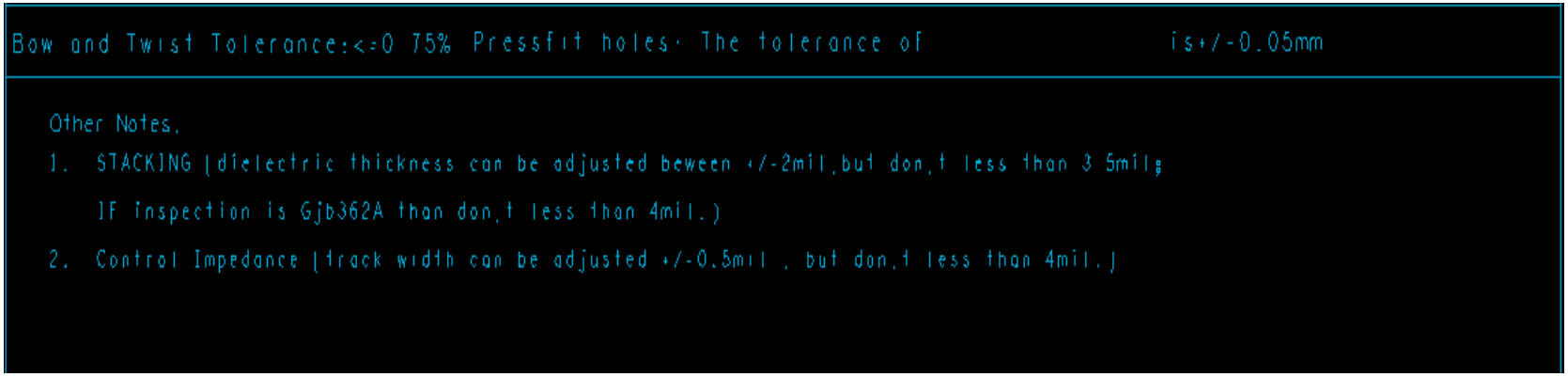
- 技术说明文档资料（Drill层相关标注）
  - 材料
  - 成品板厚度和允许公差
  - 表面处理工艺
  - 翘曲度
  - **Solder Masker**
  - 丝印



PCB后处理——工程标注

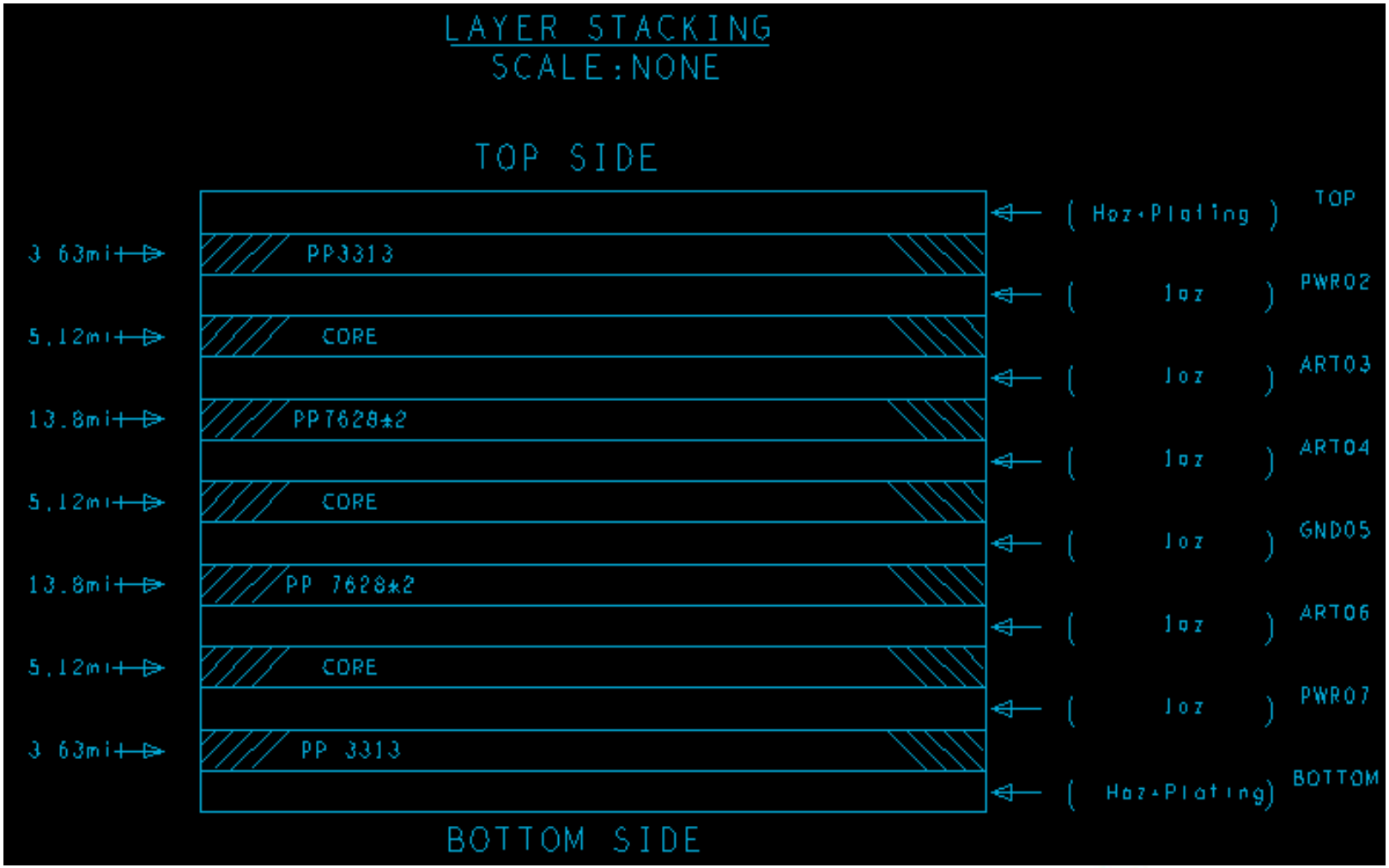
- 技术说明文档资料（Drill层相关标注）





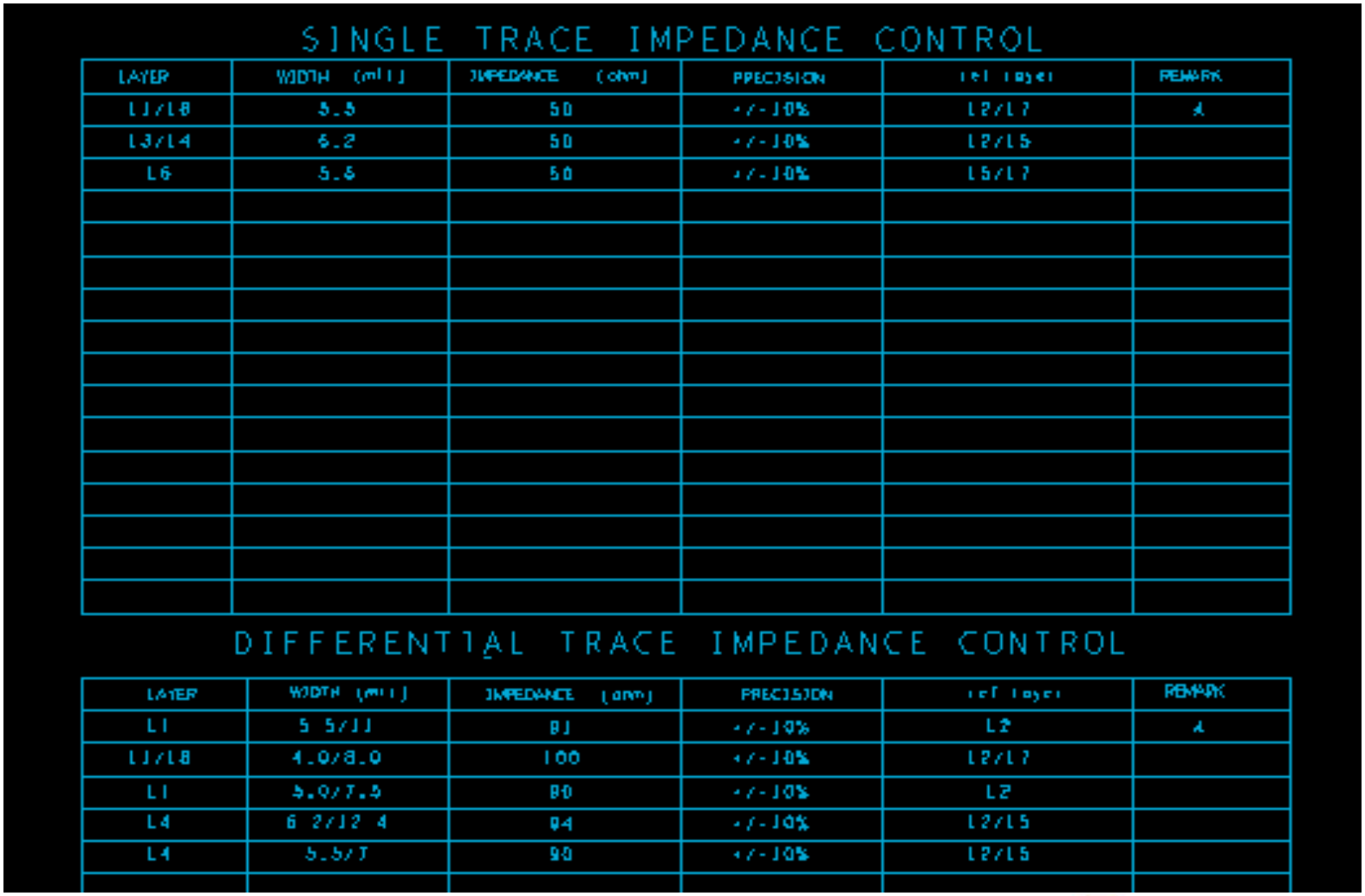
PCB后处理——工程标注

- 技术说明文档资料（Drill层相关标注）



PCB后处理——工程标注

- 技术说明文档资料（Drill层相关标注）



SINGLE TRACE IMPEDANCE CONTROL

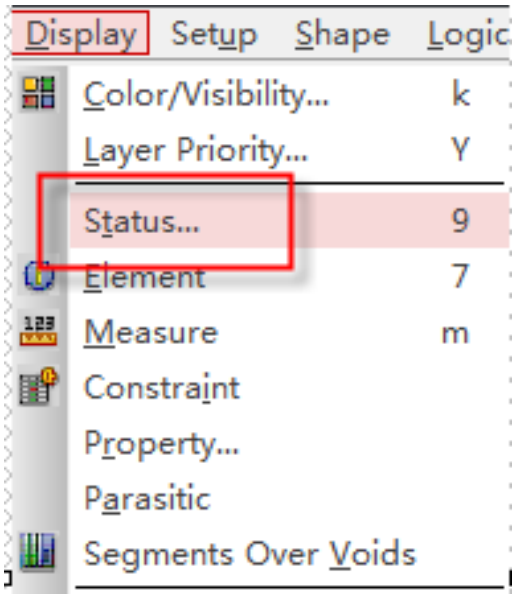
LAYER	WIDTH (mil)	IMPEDANCE (ohm)	PRECISION	ref layer	REMARK
L1/L8	5.5	50	+/-10%	L2/L7	4
L3/L4	6.2	50	+/-10%	L2/L5	
L6	5.5	50	+/-10%	L5/L7	

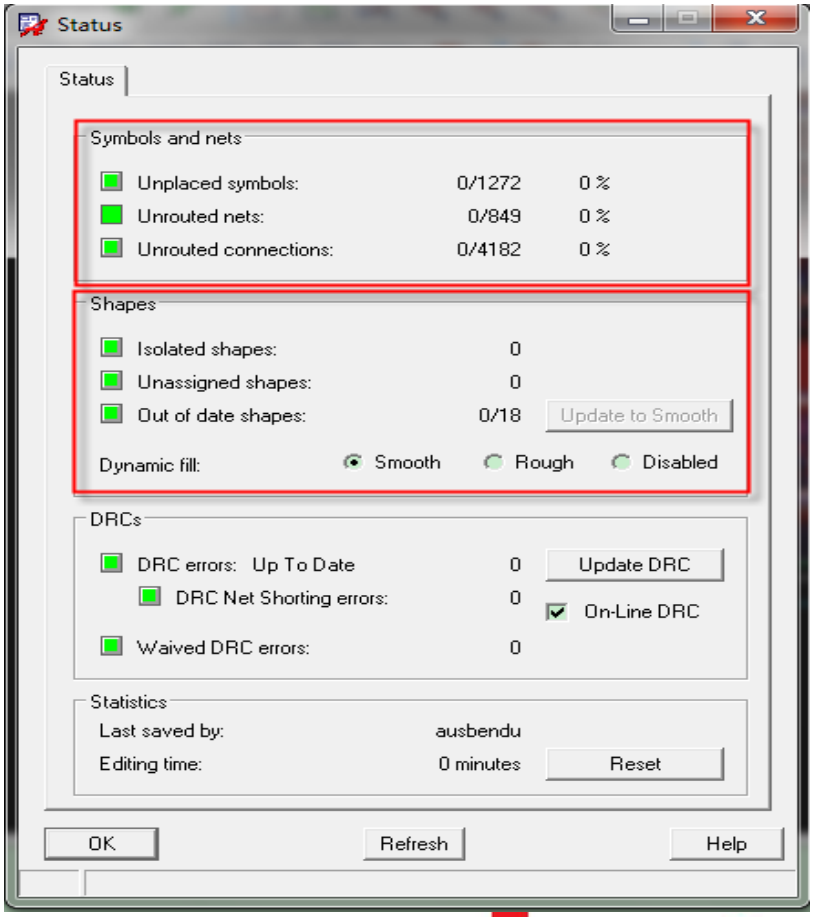
DIFFERENTIAL TRACE IMPEDANCE CONTROL

LAYER	WIDTH (mil)	IMPEDANCE (ohm)	PRECISION	ref layer	REMARK
L1	5 5/11	81	+/-10%	L2	4
L1/L8	4.0/8.0	100	+/-10%	L2/L7	
L1	5.9/7.5	80	+/-10%	L2	
L4	6 2/12 4	94	+/-10%	L2/L5	
L4	5.5/7	90	+/-10%	L2/L5	

PCB后处理——输出光绘前的检查流程

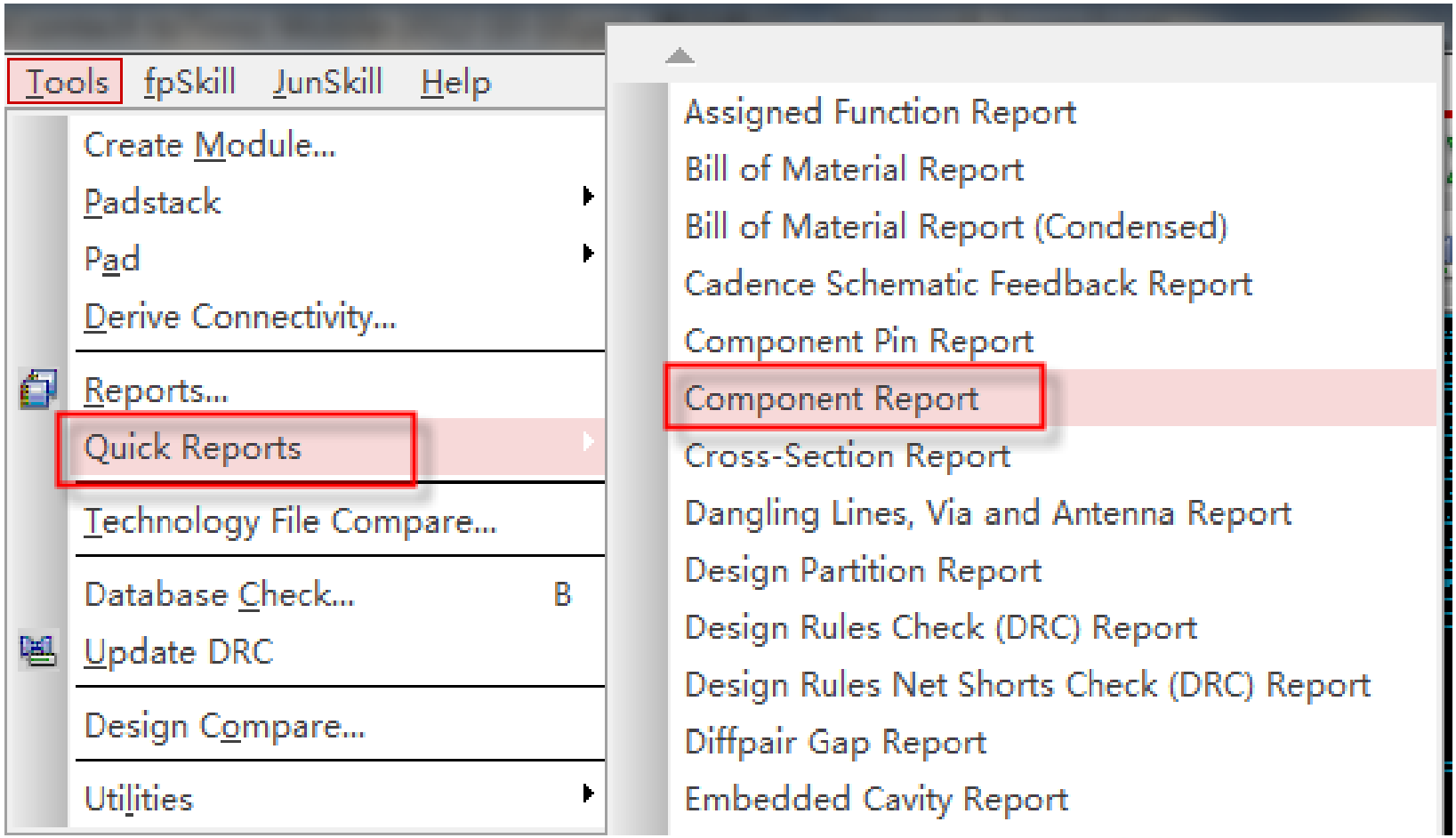
- 基于Check List的检查
  - 出光绘文件之前一般要经过严格的检查流程，每个公司都有自己的Check List，包括了原理图、PCB设计、生产等环节的要求。
- Display Status检查





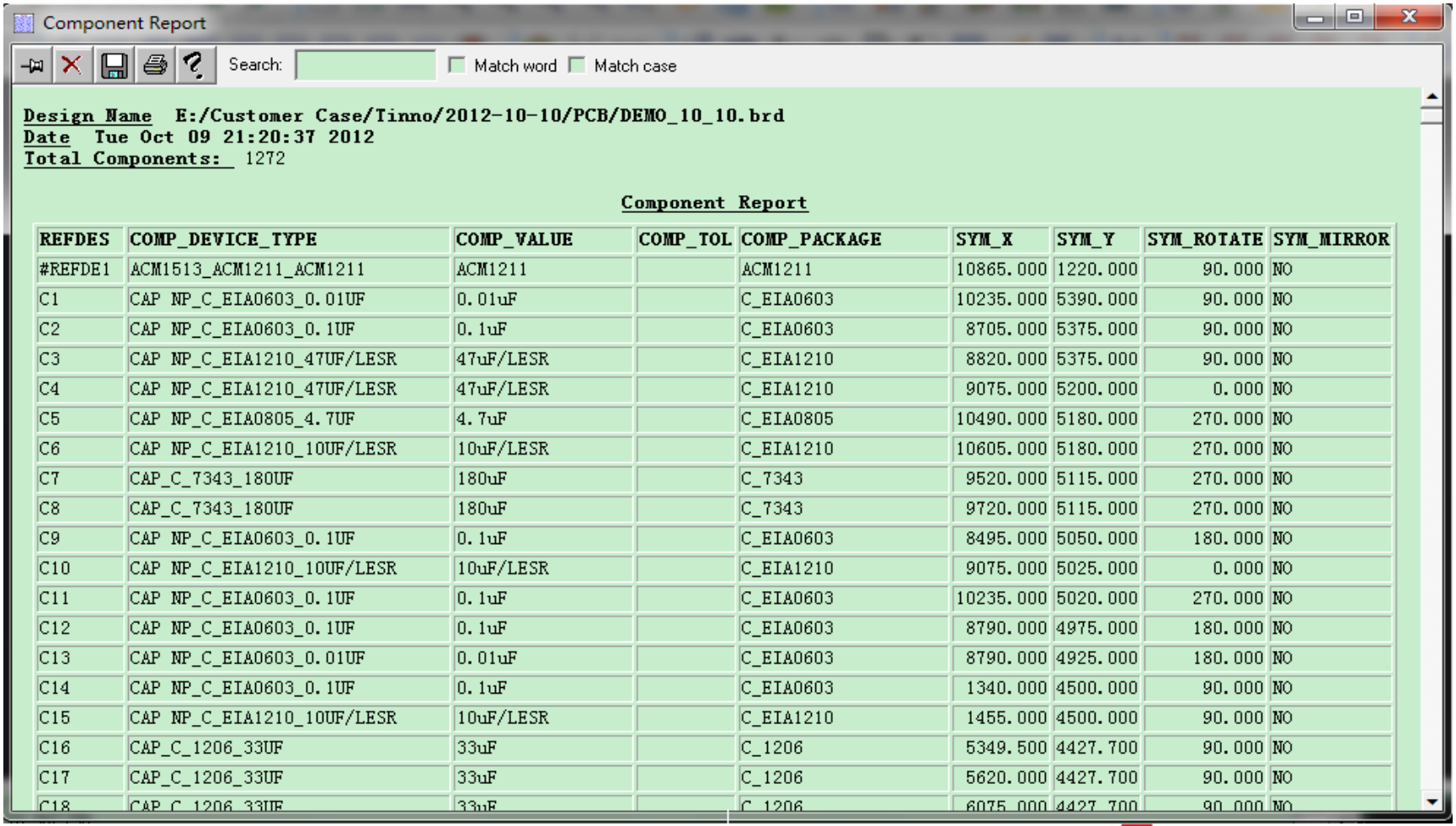
PCB后处理——输出光绘前的检查流程

- 报表检查
  - **Component Report**



PCB后处理——输出光绘前的检查流程

- 报表检查
  - **Component Report**


Component Report

Search: Match word Match case

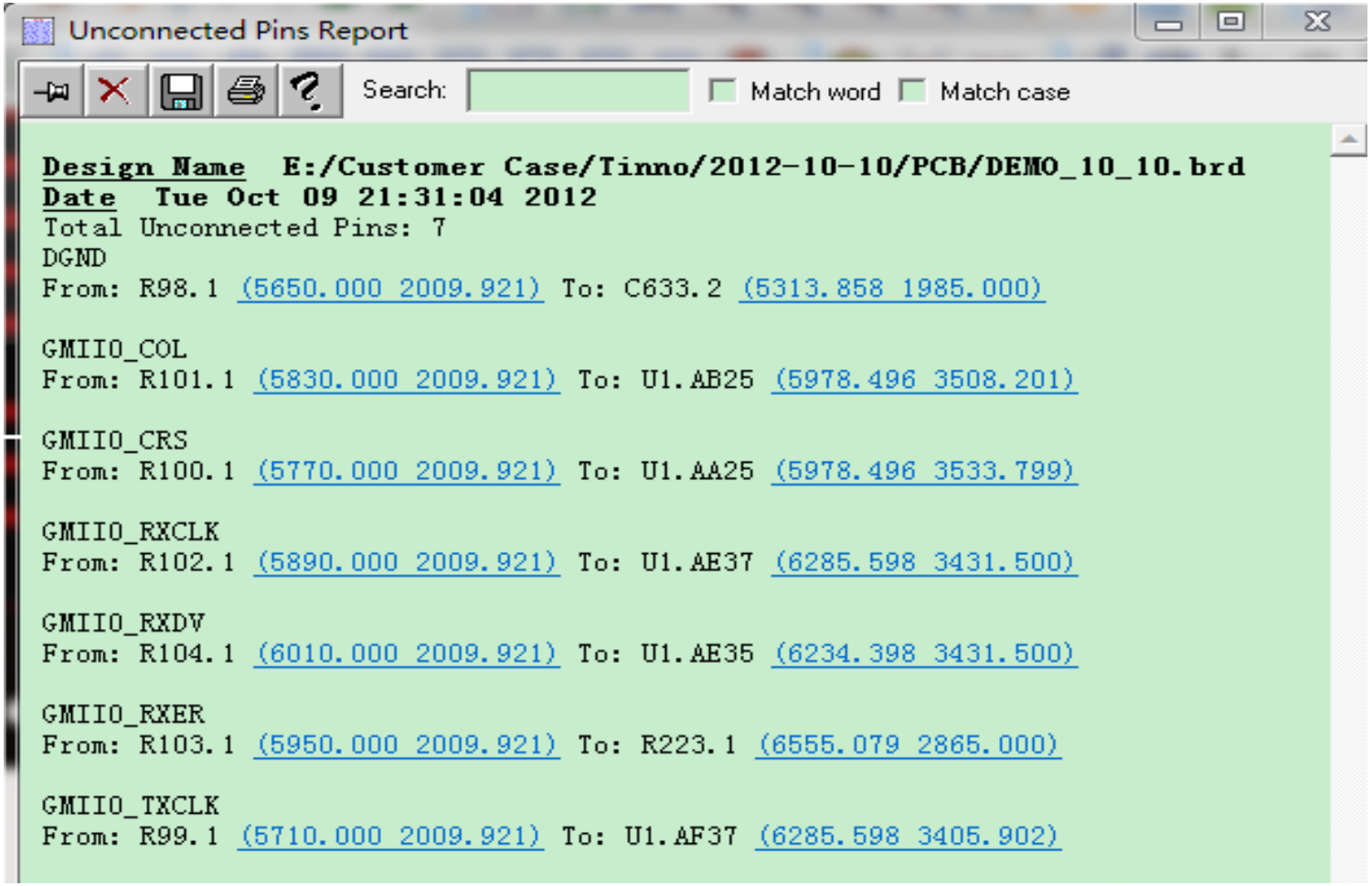
Design Name E:/Customer Case/Tinno/2012-10-10/PCB/DEMO_10_10.brd
Date Tue Oct 09 21:20:37 2012
Total Components: 1272

Component Report

REFDES	COMP_DEVICE_TYPE	COMP_VALUE	COMP_TOL	COMP_PACKAGE	SYM_X	SYM_Y	SYM_ROTATE	SYM_MIRROR
#REFDE1	ACM1513_ACM1211_ACM1211	ACM1211		ACM1211	10865.000	1220.000	90.000	NO
C1	CAP NP_C_EIA0603_0.01UF	0.01uF		C_EIA0603	10235.000	5390.000	90.000	NO
C2	CAP NP_C_EIA0603_0.1UF	0.1uF		C_EIA0603	8705.000	5375.000	90.000	NO
C3	CAP NP_C_EIA1210_47UF/LESR	47uF/LESR		C_EIA1210	8820.000	5375.000	90.000	NO
C4	CAP NP_C_EIA1210_47UF/LESR	47uF/LESR		C_EIA1210	9075.000	5200.000	0.000	NO
C5	CAP NP_C_EIA0805_4.7UF	4.7uF		C_EIA0805	10490.000	5180.000	270.000	NO
C6	CAP NP_C_EIA1210_10UF/LESR	10uF/LESR		C_EIA1210	10605.000	5180.000	270.000	NO
C7	CAP_C_7343_180UF	180uF		C_7343	9520.000	5115.000	270.000	NO
C8	CAP_C_7343_180UF	180uF		C_7343	9720.000	5115.000	270.000	NO
C9	CAP NP_C_EIA0603_0.1UF	0.1uF		C_EIA0603	8495.000	5050.000	180.000	NO
C10	CAP NP_C_EIA1210_10UF/LESR	10uF/LESR		C_EIA1210	9075.000	5025.000	0.000	NO
C11	CAP NP_C_EIA0603_0.1UF	0.1uF		C_EIA0603	10235.000	5020.000	270.000	NO
C12	CAP NP_C_EIA0603_0.1UF	0.1uF		C_EIA0603	8790.000	4975.000	180.000	NO
C13	CAP NP_C_EIA0603_0.01UF	0.01uF		C_EIA0603	8790.000	4925.000	180.000	NO
C14	CAP NP_C_EIA0603_0.1UF	0.1uF		C_EIA0603	1340.000	4500.000	90.000	NO
C15	CAP NP_C_EIA1210_10UF/LESR	10uF/LESR		C_EIA1210	1455.000	4500.000	90.000	NO
C16	CAP_C_1206_33UF	33uF		C_1206	5349.500	4427.700	90.000	NO
C17	CAP_C_1206_33UF	33uF		C_1206	5620.000	4427.700	90.000	NO
C18	CAP_C_1206_33UF	33uF		C_1206	6075.000	4427.700	90.000	NO

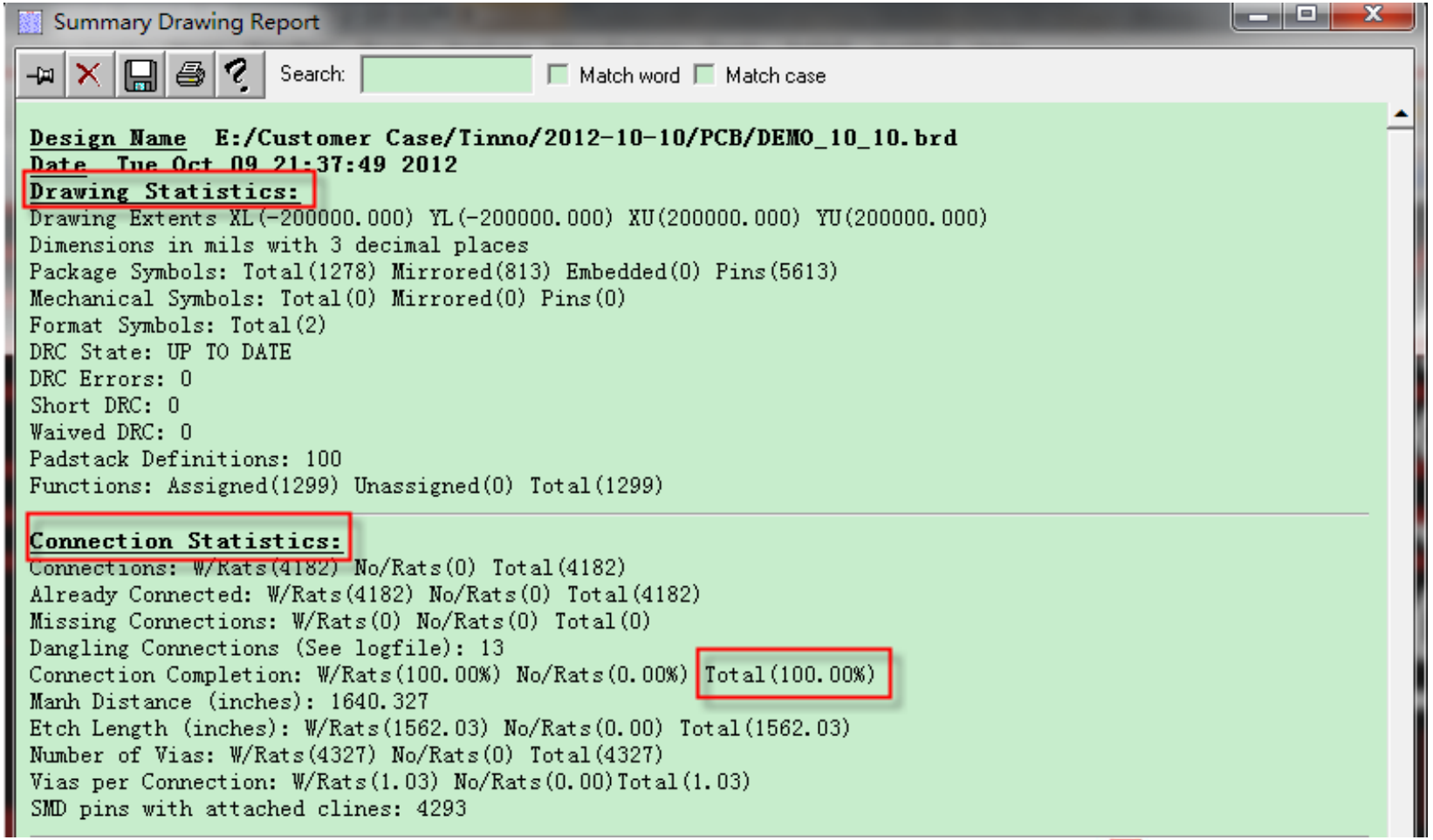
PCB后处理——输出光绘前的检查流程

- 报表检查
  - **Unconnected Pins**



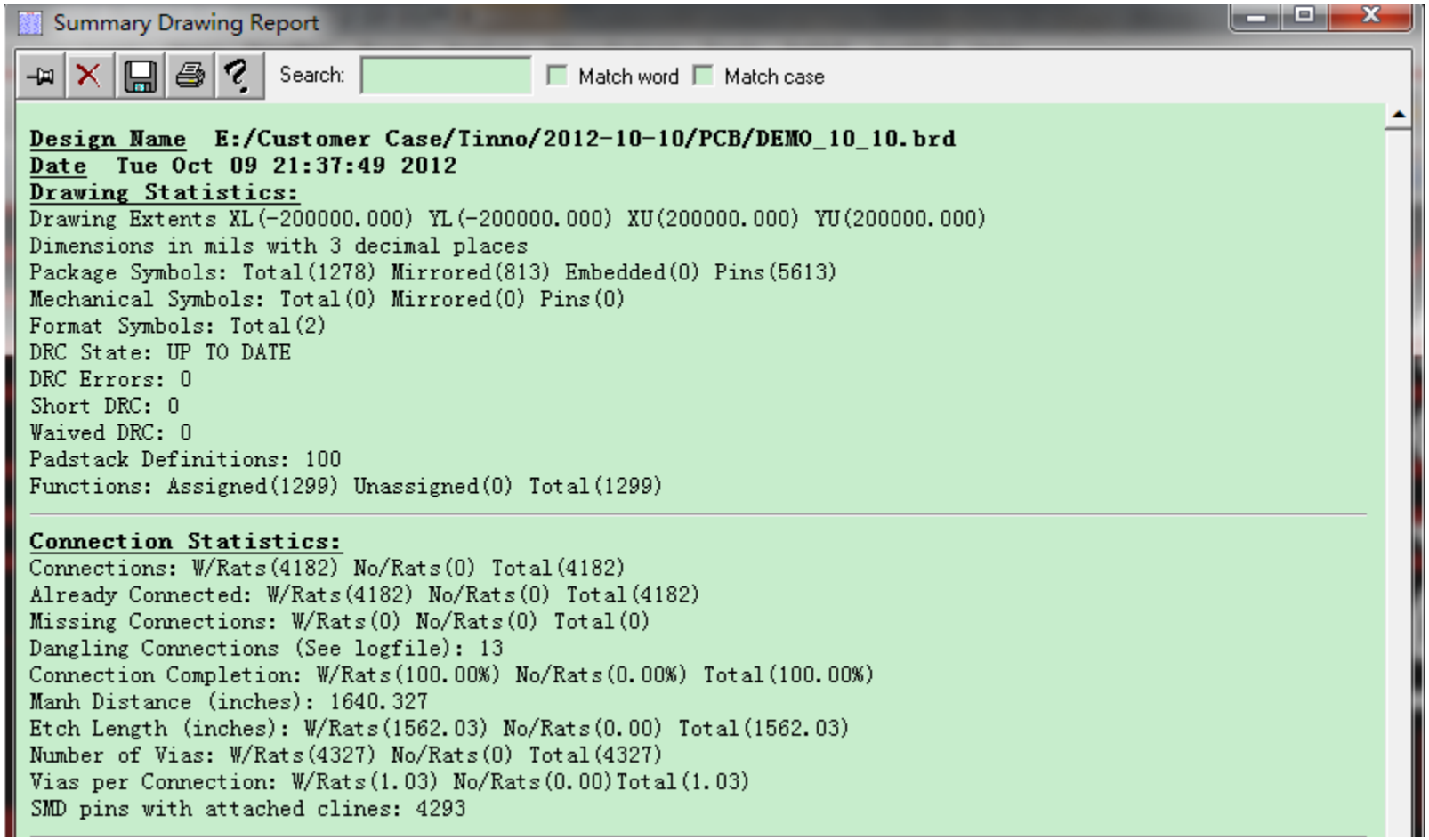
PCB后处理——输出光绘前的检查流程

- 报表检查
  - **Dangling Lines、Via and Antenna Report**



PCB后处理——输出光绘前的检查流程

- 报表检查
  - **Summary Drawing Report**



PCB后处理——输出光绘前的检查流程

- 报表检查
  - **Summary Drawing Report（续上表）**

Layout Statistics:

Components: Placed(1272) Unplaced(0) Total(1272)
Nets: W/Rats(849) No/Rats(0) Total(849)
Pins: W/Rats(5031) No/Rats(0) Unused(564) Unplaced(0) Total(5595)
Equivalent ICs (1 pin = 1/14 EIC): 399
RatTs: 0
Router Keepin (in): (0.0200,0.0200) by (11.7910,5.8855)
Layout area (sq in): 69.03
Average ratlength (in): 0.4
Rat density (in/sq in): 23.761
Double-sided rat density (in/sq in): 11.880

Layout/Pin Density Statistics

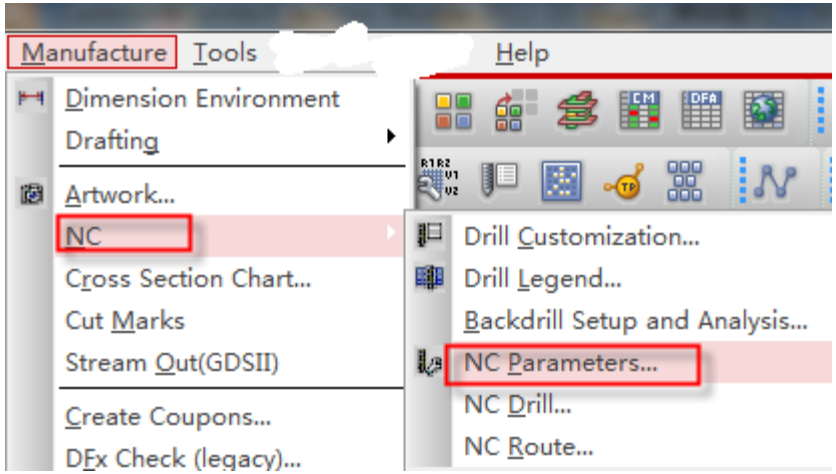
Layer	Layout Area (sq in)	Components	Pins	Layout Density (sq in/EIC)	Pin Density (pins/sq in)
External(Double-Sided)	138.07	1278	5613	0.344	40.653
Embedded(0)	0.00	0	0	0.000	0.000
Design	69.03	1278	5613	0.172	81.307

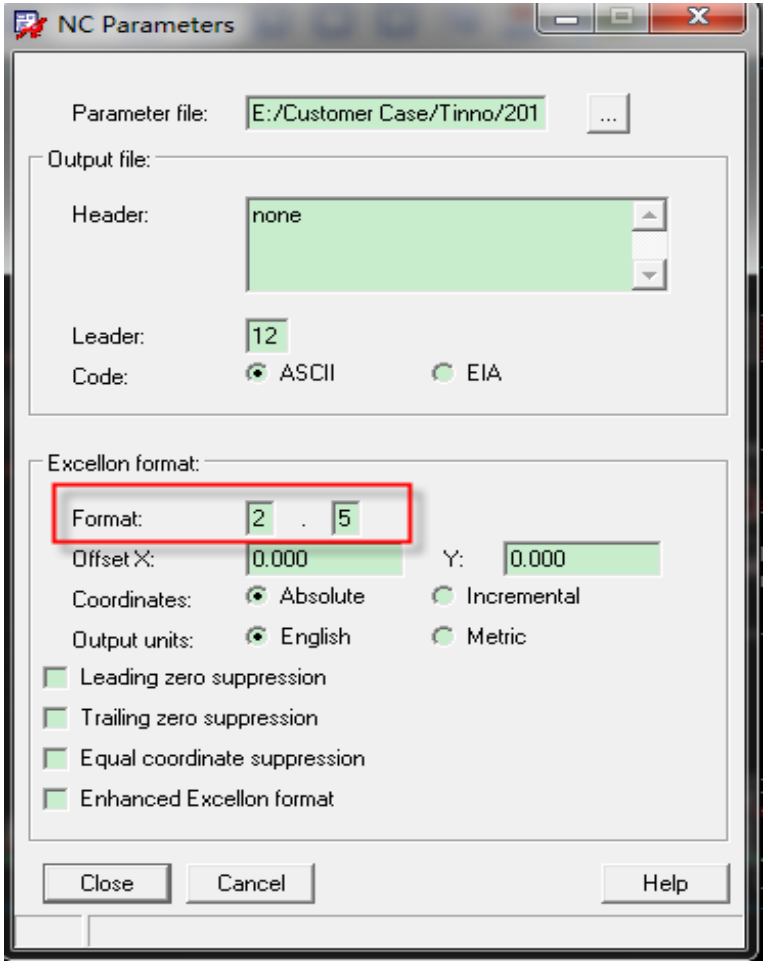
Etch Layer Statistics:

Layer	Clines/Carcs	Shapes(voids)	Rectangles	Lines/Arcs	Text	Components(Pins)
TOP	3293	105(115)	0	3	0	465(3854)
GND02	0	4(14)	0	0	0	0(0)
ART03	404	23(373)	0	0	0	0(0)
PWR04	0	5(12)	0	0	0	0(0)
GND05	0	4(14)	0	0	0	0(0)
ART06	338	19(321)	0	0	0	0(0)
PWR07	0	5(12)	0	0	0	0(0)
BOTTOM	1812	90(212)	0	3	0	813(1759)

光绘输出——钻孔文件

- 参数设置
  - Allegro生产的钻孔信息主要集中在Manufacture_NC菜单

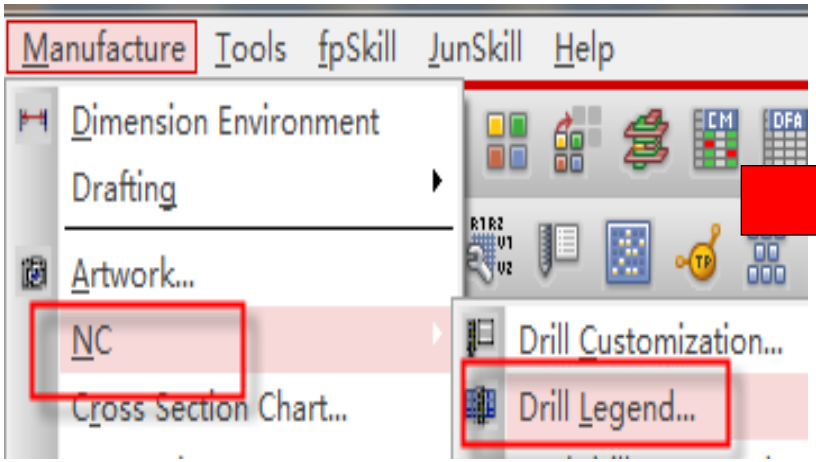


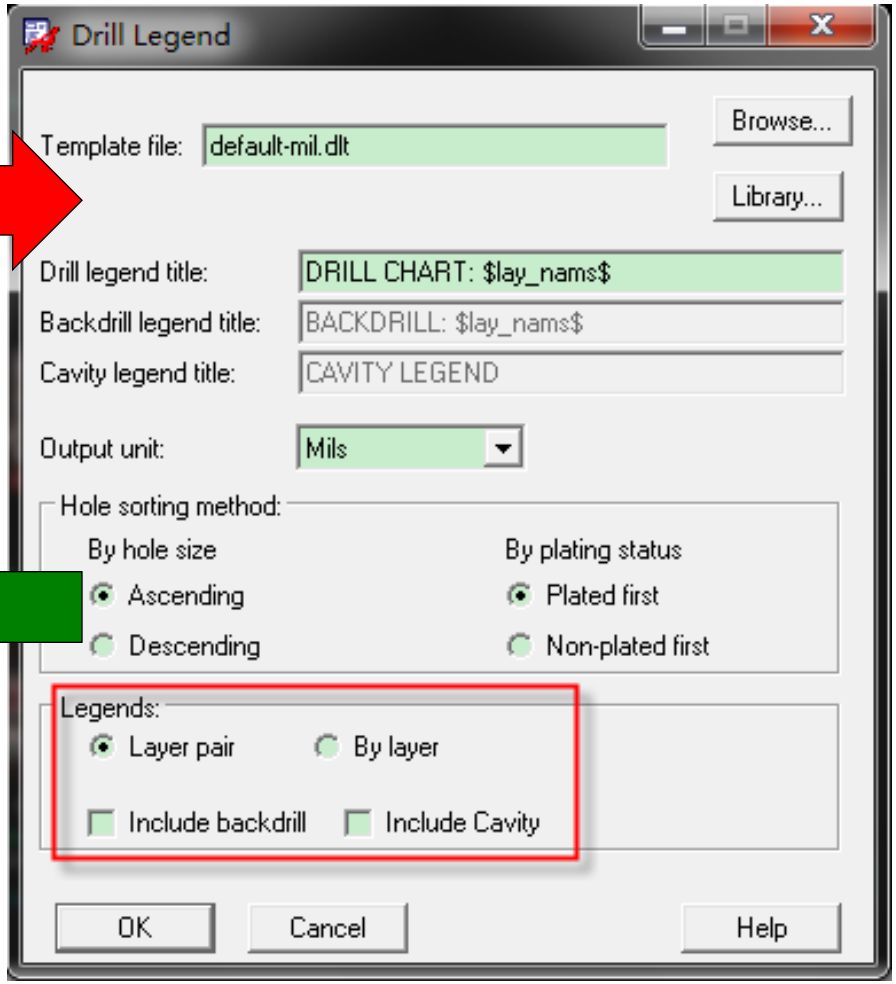


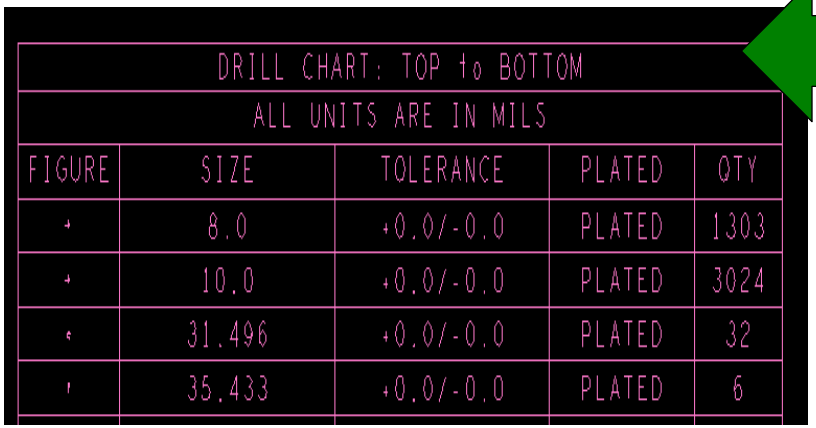
钻孔单位和精度。
要与PCB设计的单位一致。
对于公制单位的PCB钻孔
精度需要提高到2.5。

光绘输出——钻孔文件

- 生成钻孔表







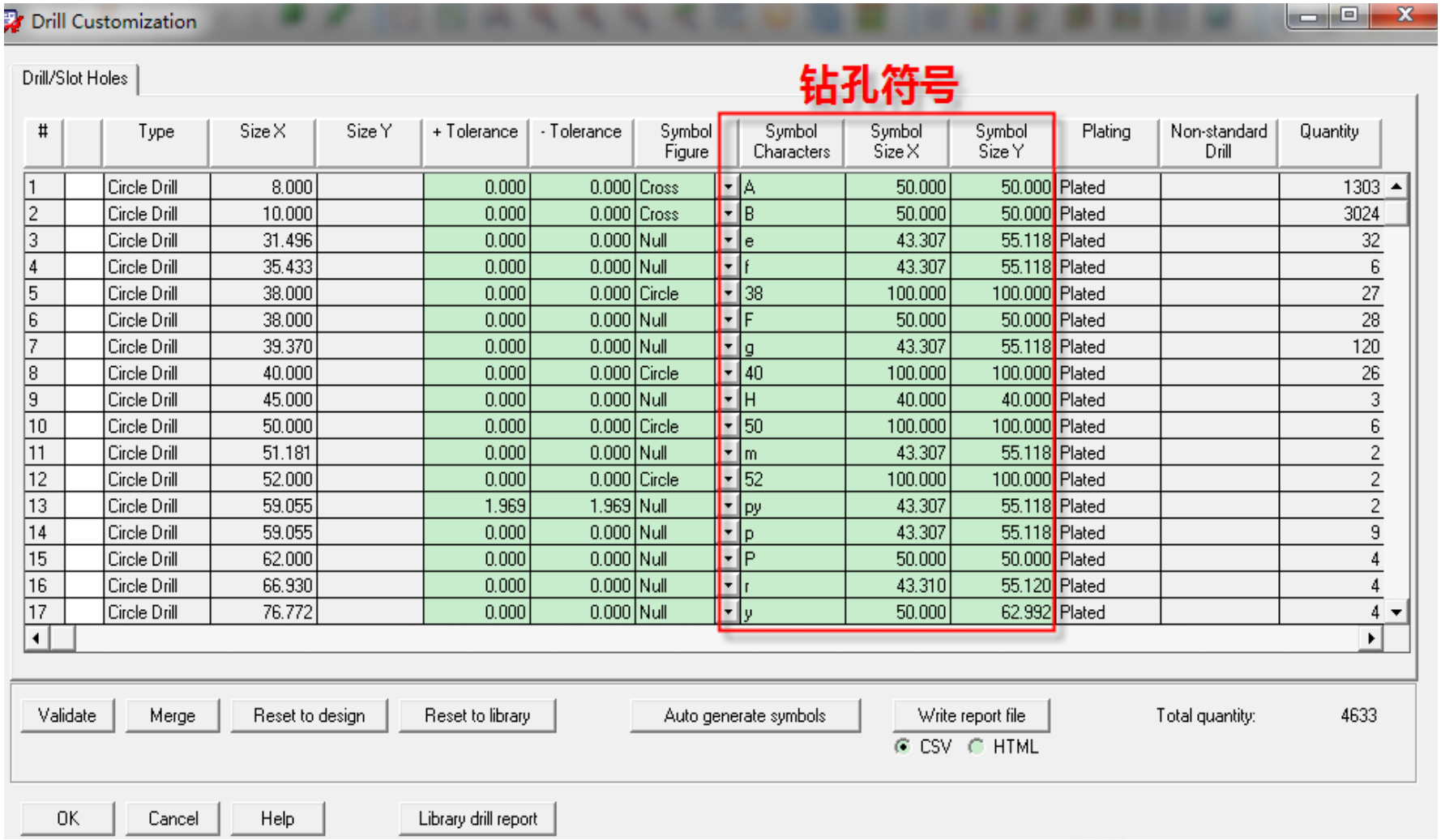
DRILL CHART: TOP to BOTTOM

ALL UNITS ARE IN MILS

FIGURE	SIZE	TOLERANCE	PLATED	QTY
+	8.0	+0.0/-0.0	PLATED	1303
+	10.0	+0.0/-0.0	PLATED	3024
+	31.496	+0.0/-0.0	PLATED	32
+	35.433	+0.0/-0.0	PLATED	6

光绘输出——钻孔文件

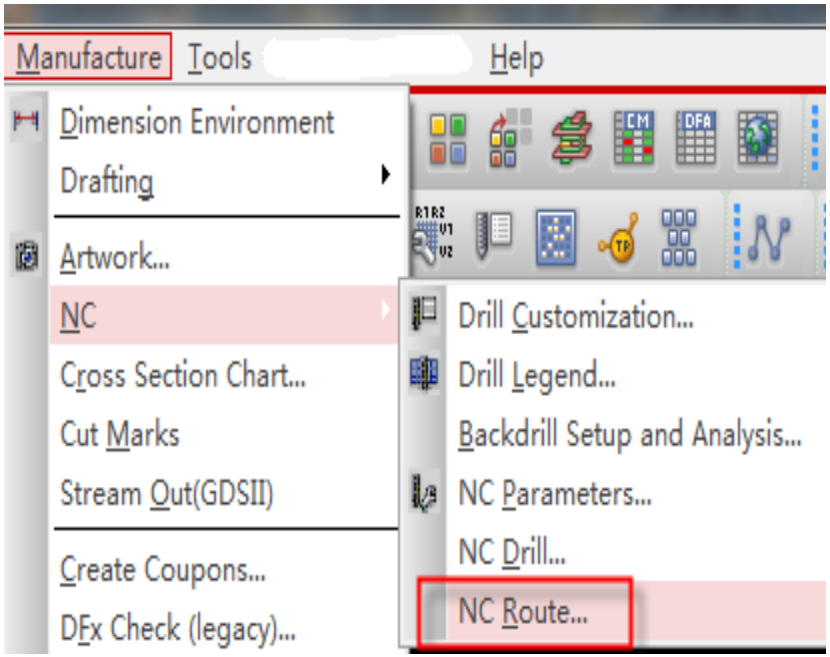
- 生成钻孔表

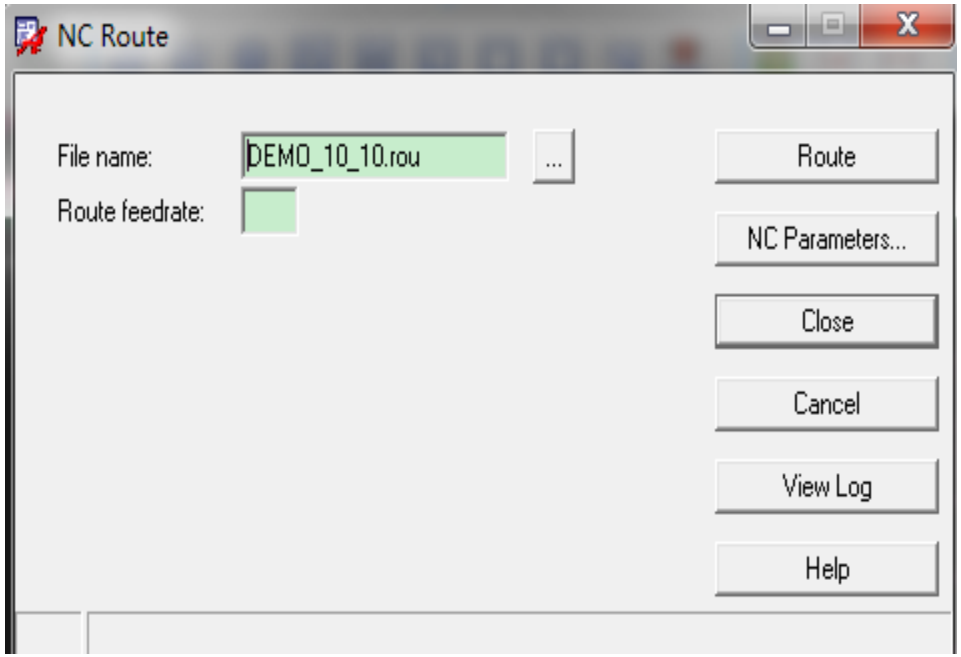


#		Type	Size X	Size Y	+ Tolerance	- Tolerance	Symbol Figure	Symbol Characters	Symbol Size X	Symbol Size Y	Plating	Non-standard Drill	Quantity
1		Circle Drill	8.000		0.000	0.000	Cross	A	50.000	50.000	Plated		1303
2		Circle Drill	10.000		0.000	0.000	Cross	B	50.000	50.000	Plated		3024
3		Circle Drill	31.496		0.000	0.000	Null	e	43.307	55.118	Plated		32
4		Circle Drill	35.433		0.000	0.000	Null	f	43.307	55.118	Plated		6
5		Circle Drill	38.000		0.000	0.000	Circle	38	100.000	100.000	Plated		27
6		Circle Drill	38.000		0.000	0.000	Null	F	50.000	50.000	Plated		28
7		Circle Drill	39.370		0.000	0.000	Null	g	43.307	55.118	Plated		120
8		Circle Drill	40.000		0.000	0.000	Circle	40	100.000	100.000	Plated		26
9		Circle Drill	45.000		0.000	0.000	Null	H	40.000	40.000	Plated		3
10		Circle Drill	50.000		0.000	0.000	Circle	50	100.000	100.000	Plated		6
11		Circle Drill	51.181		0.000	0.000	Null	m	43.307	55.118	Plated		2
12		Circle Drill	52.000		0.000	0.000	Circle	52	100.000	100.000	Plated		2
13		Circle Drill	59.055		1.969	1.969	Null	py	43.307	55.118	Plated		2
14		Circle Drill	59.055		0.000	0.000	Null	p	43.307	55.118	Plated		9
15		Circle Drill	62.000		0.000	0.000	Null	P	50.000	50.000	Plated		4
16		Circle Drill	66.930		0.000	0.000	Null	r	43.310	55.120	Plated		4
17		Circle Drill	76.772		0.000	0.000	Null	y	50.000	62.992	Plated		4

光绘输出——钻孔文件

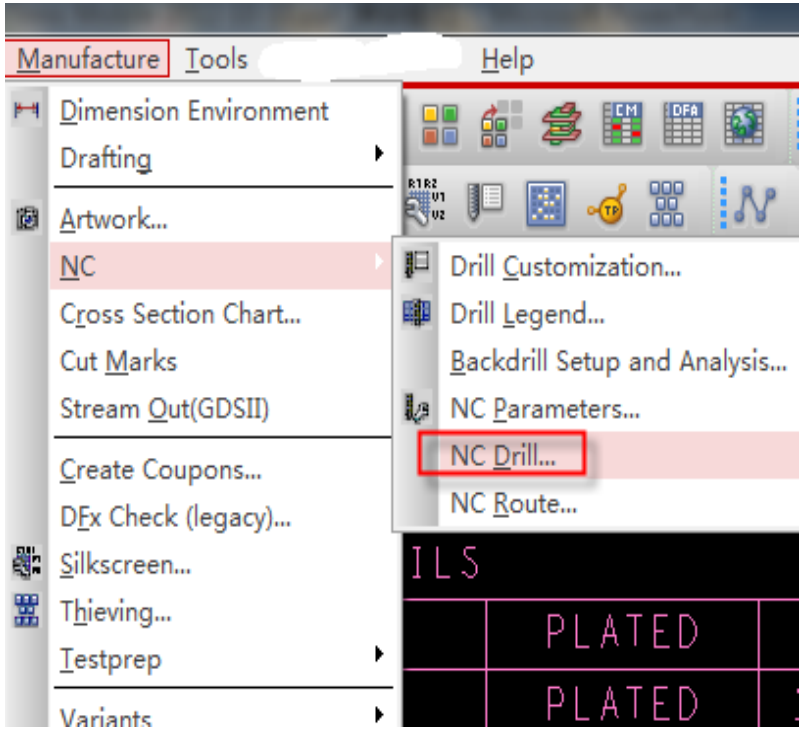
- 生成钻孔表（**NC-Router**）
  - **NC-Router功能对铣刀加工的异形孔支持更好**

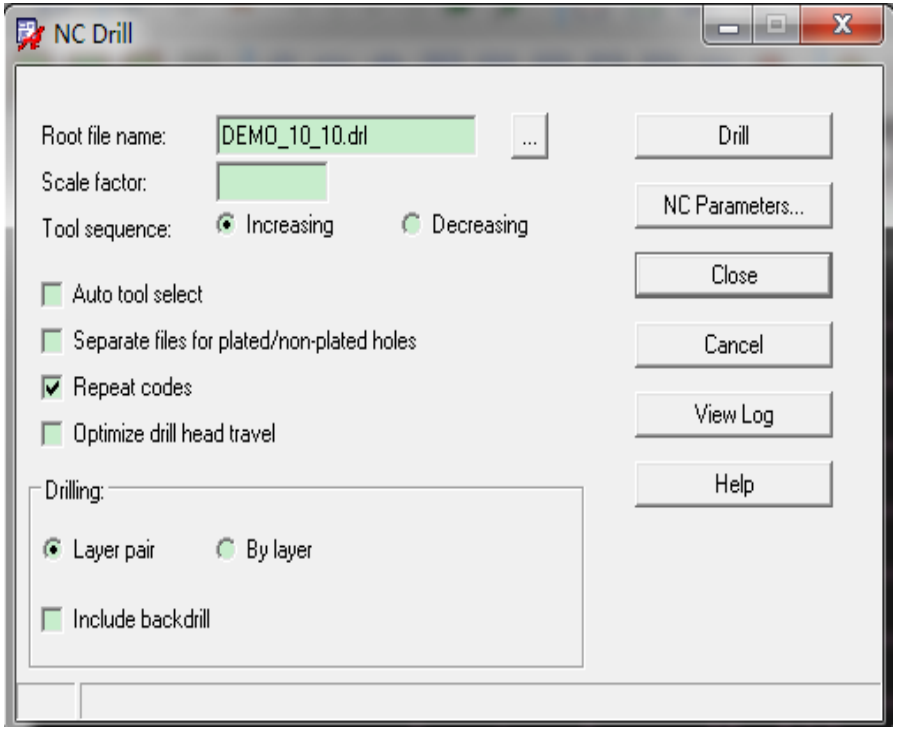


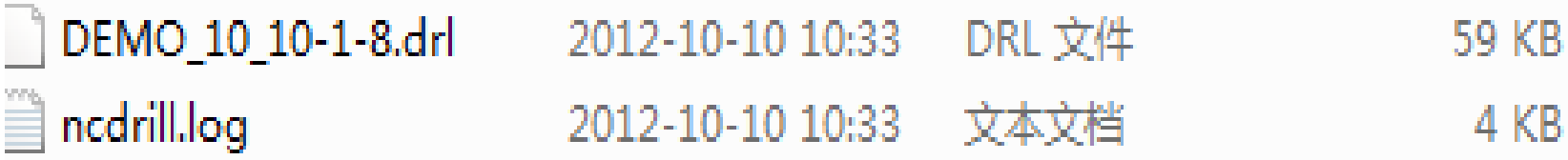


光绘输出——钻孔文件

- 钻孔文件生成

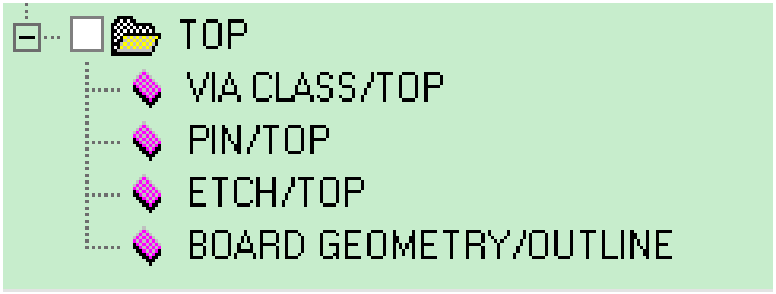


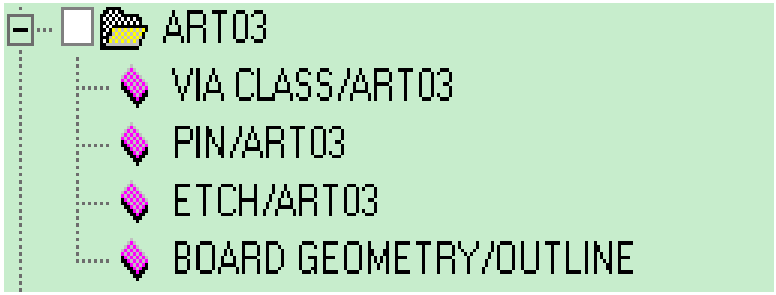




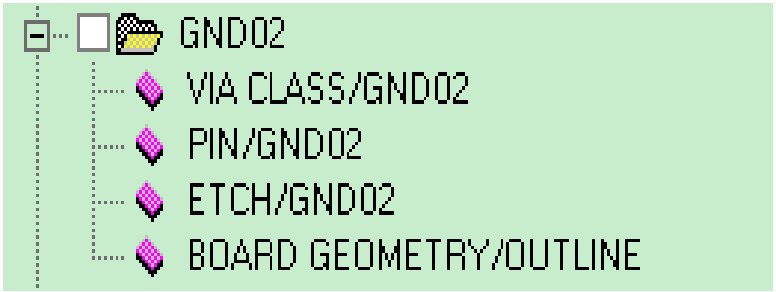
光绘输出——CAM输出

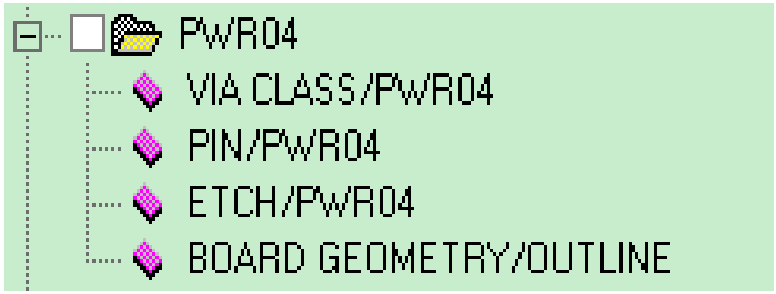
- 层命名及层的内容
  - 布线层





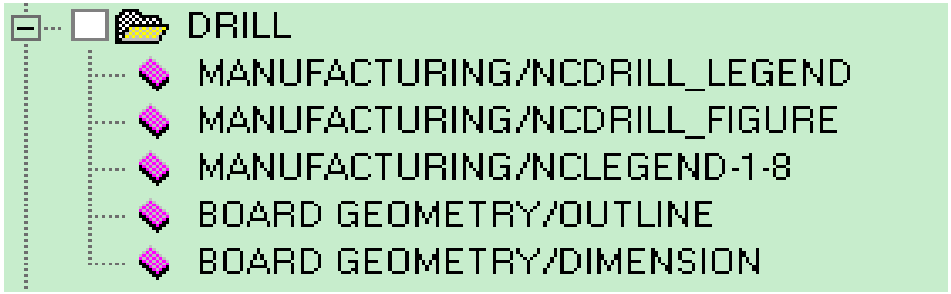
  - 平面层



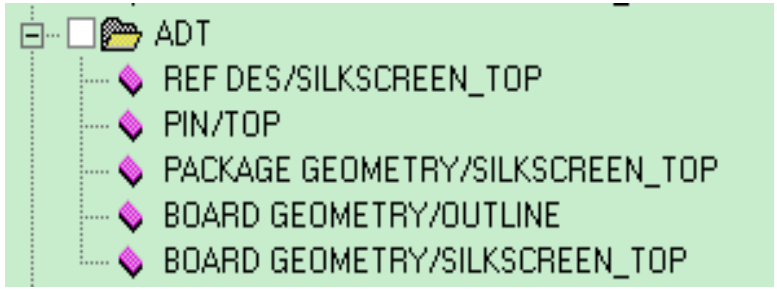


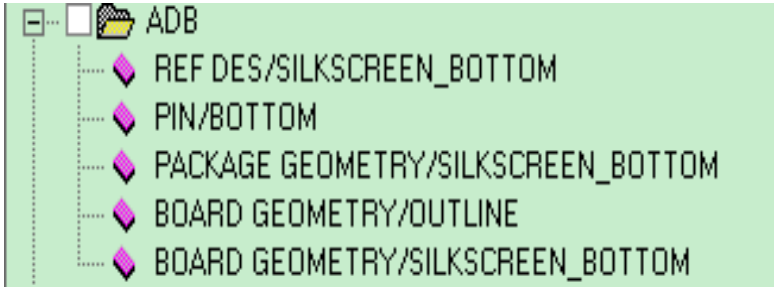
光绘输出——CAM输出

- 层命名及层的内容
  - 钻孔层



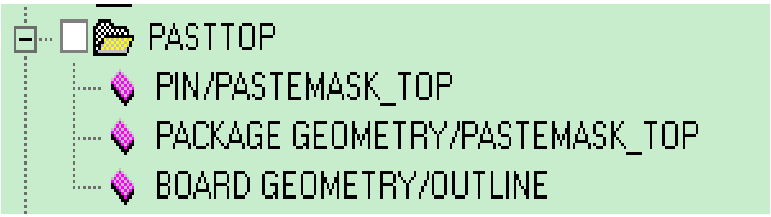
  - 装配层

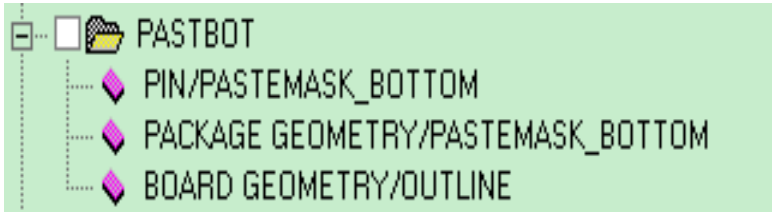




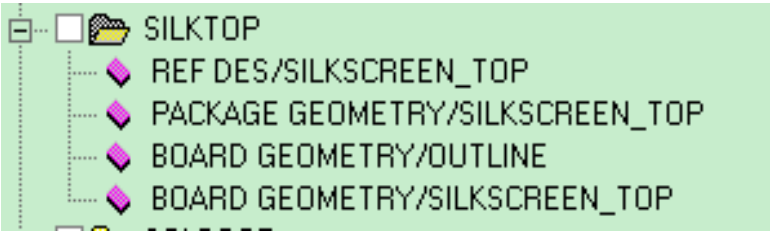
光绘输出——CAM输出

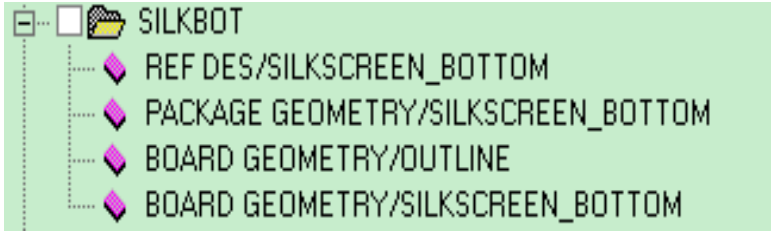
- 层命名及层的内容
  - 钢网层





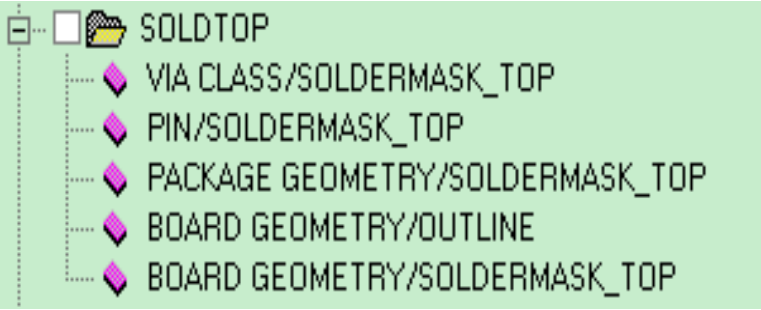
  - 丝印层

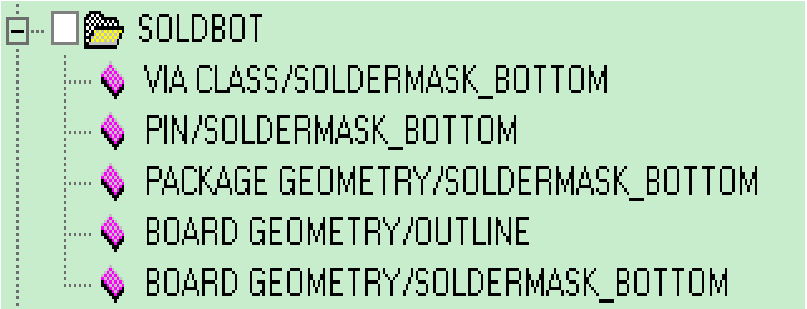




光绘输出——CAM输出

- 层命名及层的内容
  - 阻焊层

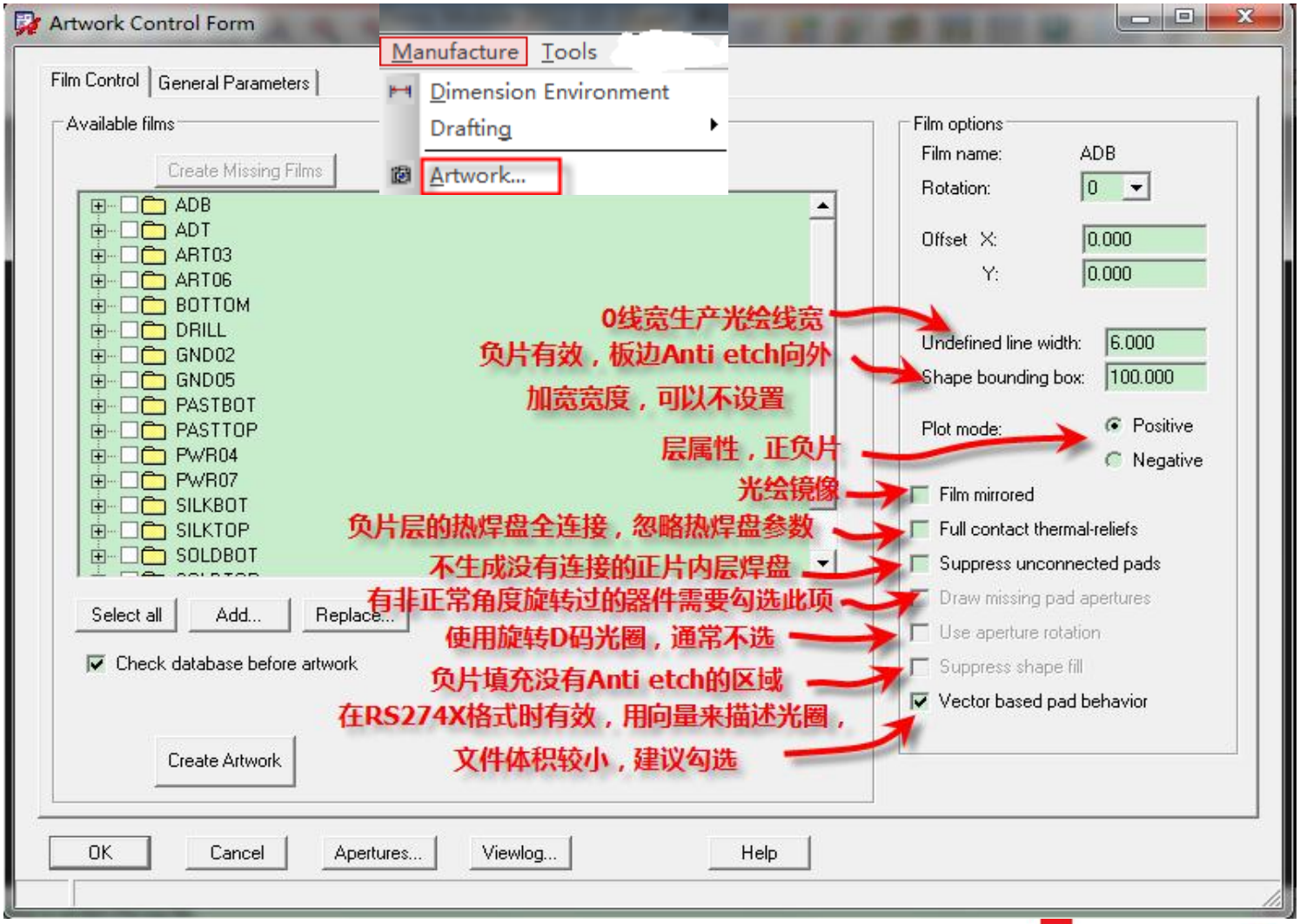




- 光绘文件格式
  - **Gerber6x00即为RS-274-D:D码格式**
  - **GerberRS274X:X码格式，其中包括了D码的光圈参数和光绘图形信息，无需另外的D码光圈文件。若PCB设计中采用了真实的Flash器件，需要在光绘中反映出Flash的效果则选择此项。**

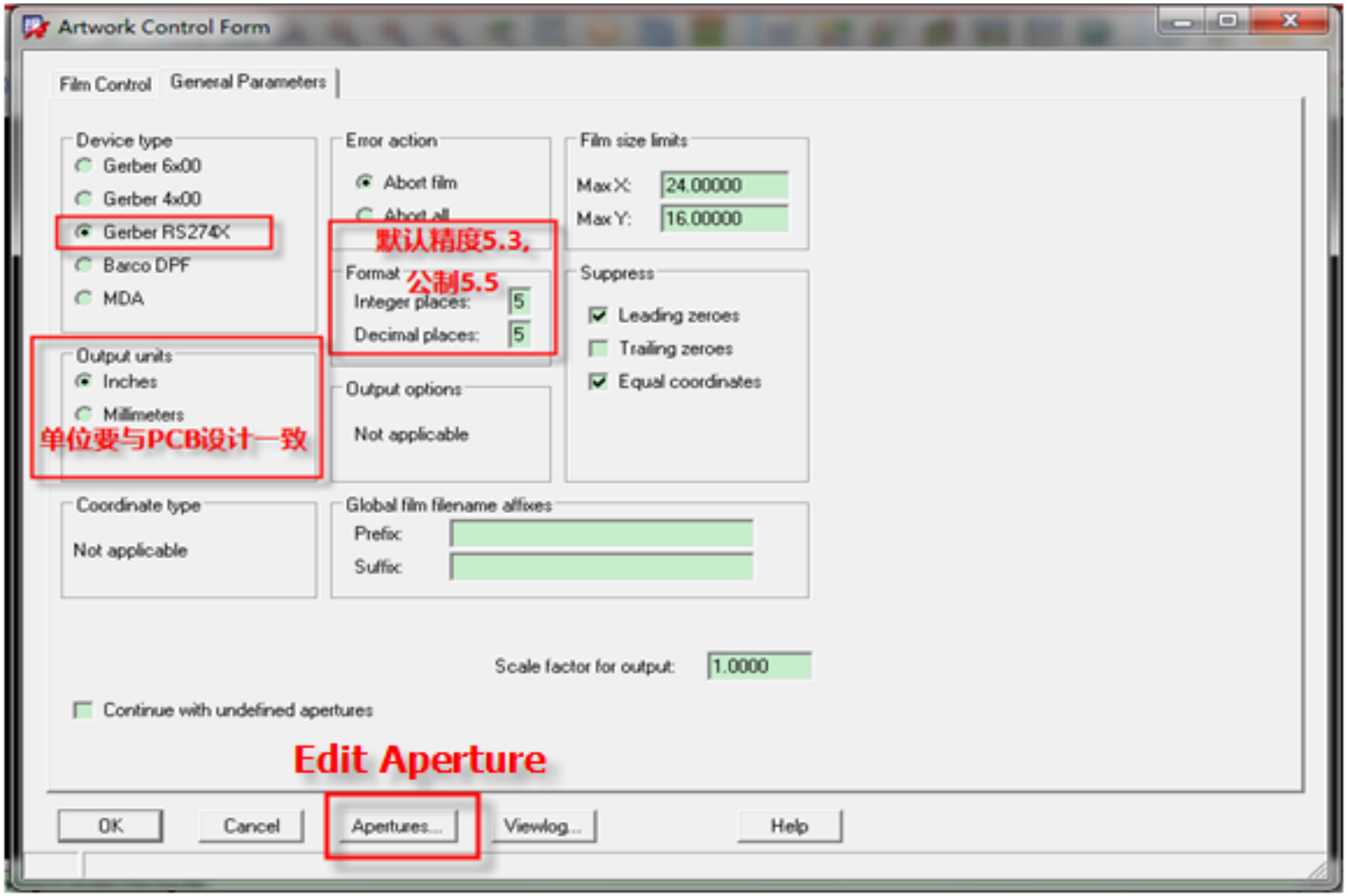
光绘输出——CAM输出

- **Artwork光绘设置**



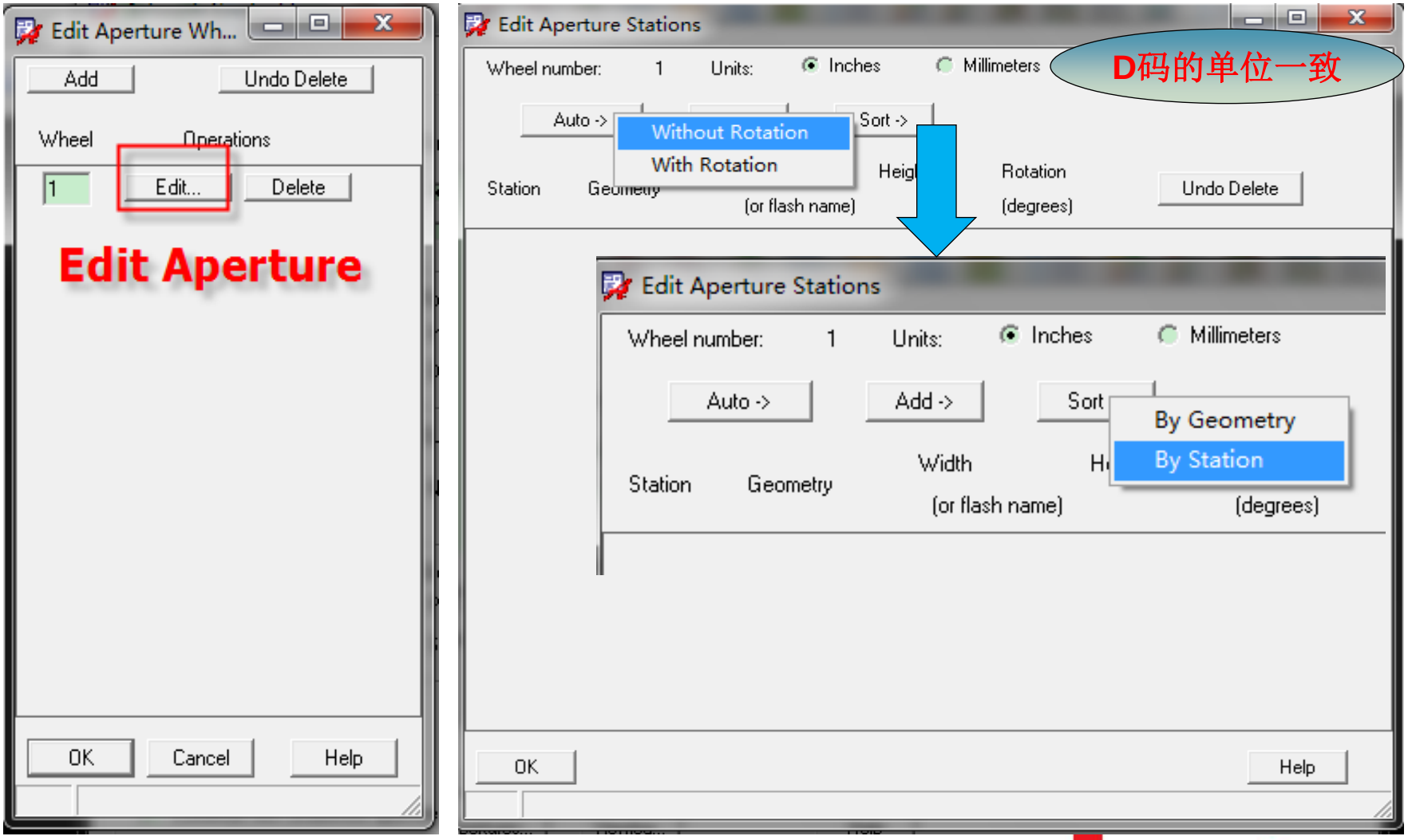
光绘输出——CAM输出

- **Artwork光绘设置**



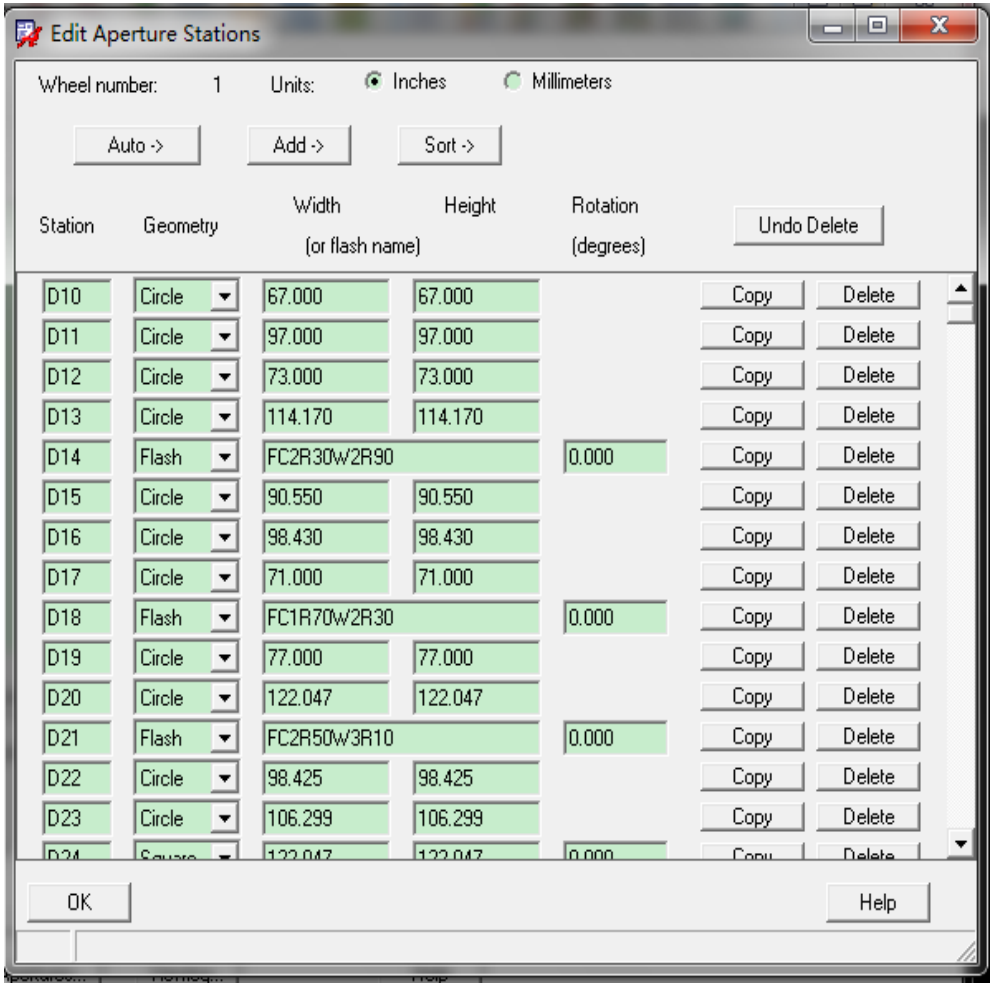
光绘输出——CAM输出

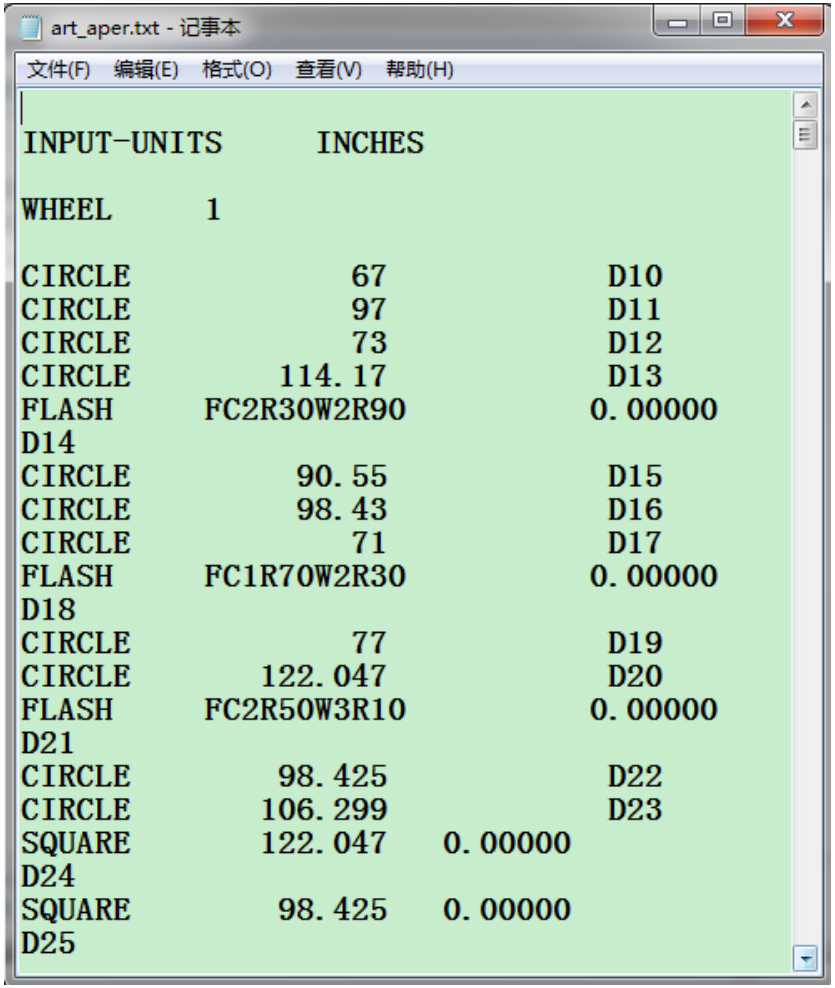
- **Artwork光绘设置**



光绘输出——CAM输出

- **Artwork光绘设置**

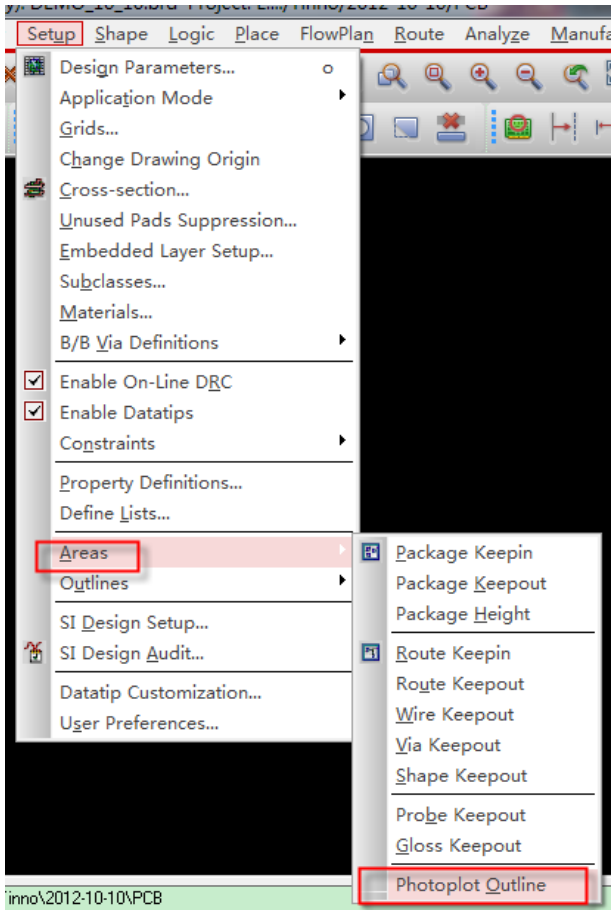


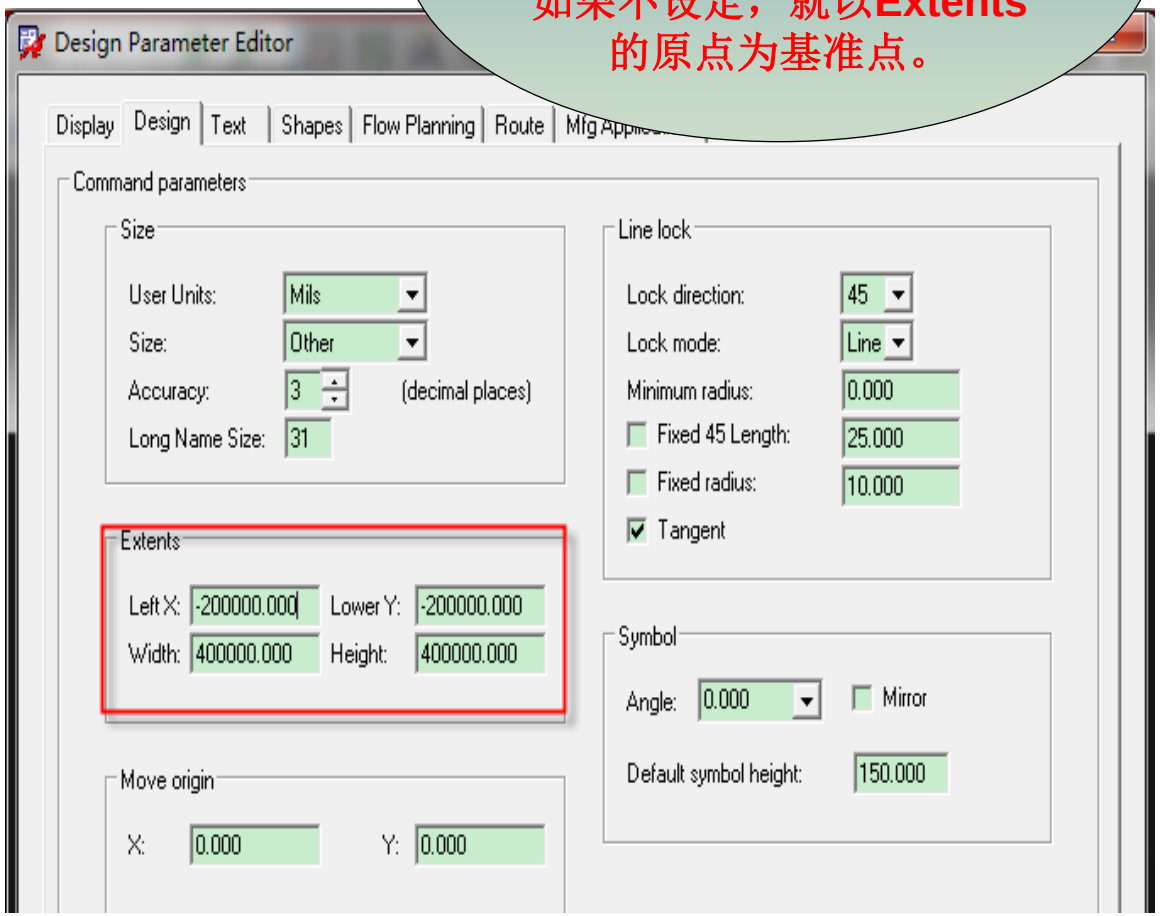


光绘输出——CAM输出

- **Artwork光绘设置**
  - 光绘范围（**Photoplot outline**）

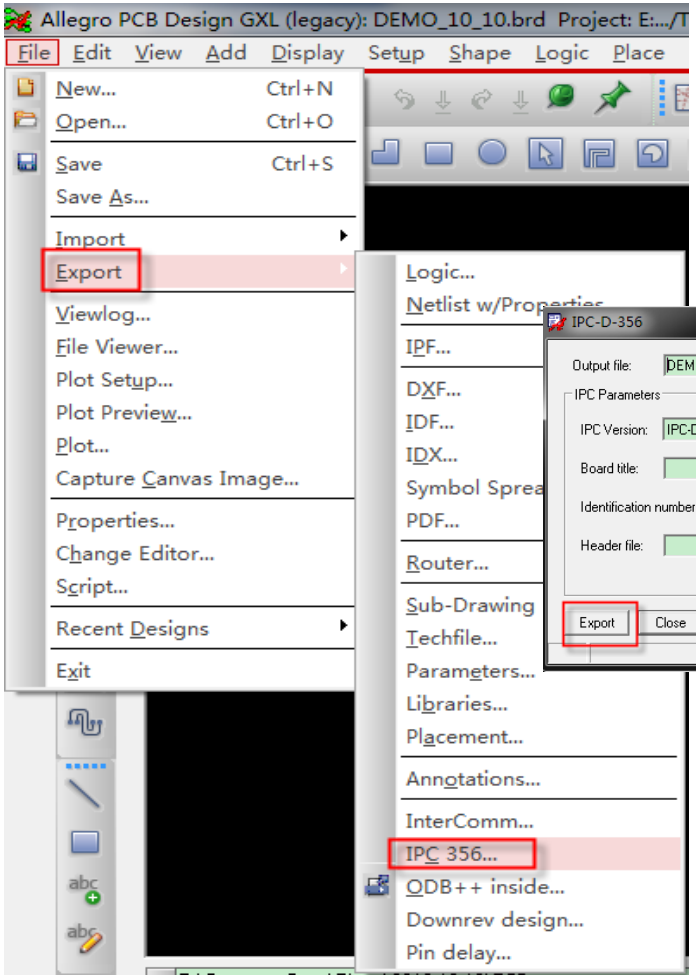
如果设定**Photoplot outline**，对**Artwork**旋转、镜像时，将以**Photoplot outline**的中心为基准点，如果不设定，就以**Extents**的原点为基准点。





光绘输出——其他

- **Valor检查所需文件**
  - **Valor是通过光绘文件和网表文件（IPC356）来进行检查**

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P  VER IPC-D-356A
C
C  IPC-D-356 Ouptut File from Allegro
C  IPC File Date: Wed Oct 10 12:06:32 2012
C  Login Name:    ausbendu


                        DEMO_10_10.brd
Status:      UP TO DATE
ure:         mils
e Accuracy: 3
ch Layers:  8
ess(mils):  54.140000
nts(mils):  -200000000  -200000000  200000000  200000000


INFORMATION
C
C     Layer       Layer            Layer              Film  Layer
C     Name        Material         Type               Type  Number
C  ------------------------------------------------------------
C  TOP           COPPER           CONDUCTOR          POS     1
C  GND02         COPPER           PLANE              NEG     2
C  ART03         COPPER           CONDUCTOR          POS     3
C  PWR04         COPPER           PLANE              NEG     4
C  GND05         COPPER           PLANE              NEG     5
C  ART06         COPPER           CONDUCTOR          POS     6
C  PWR07         COPPER           PLANE              NEG     7
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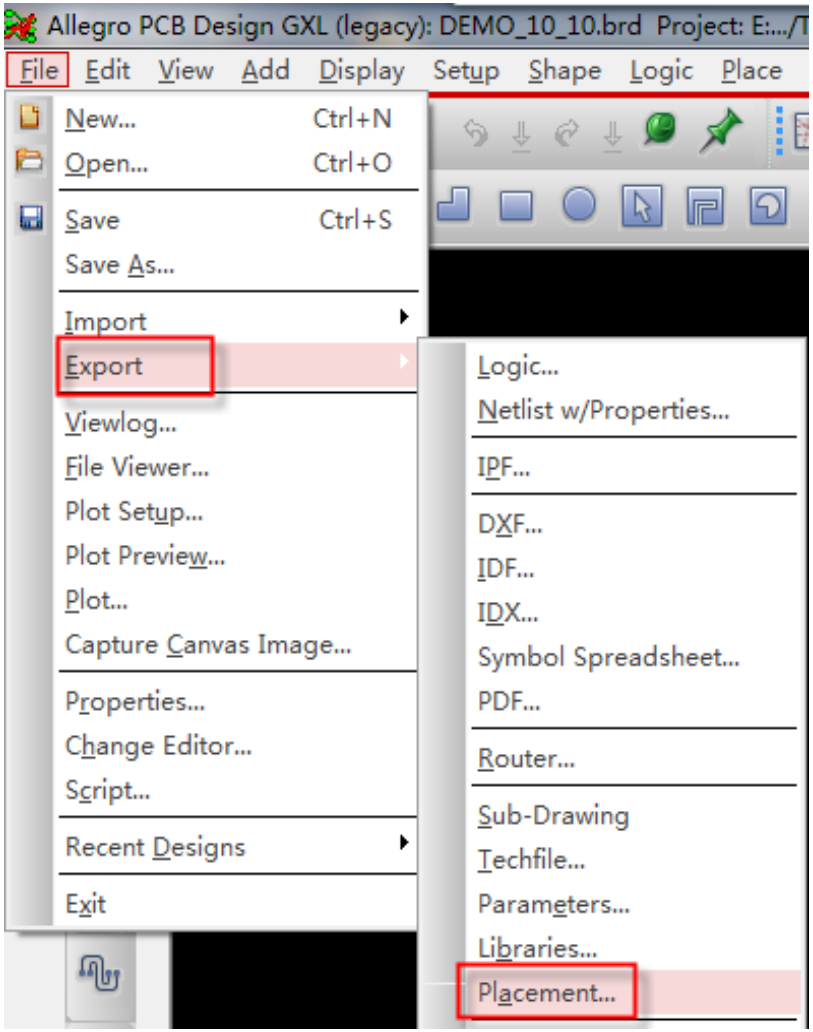
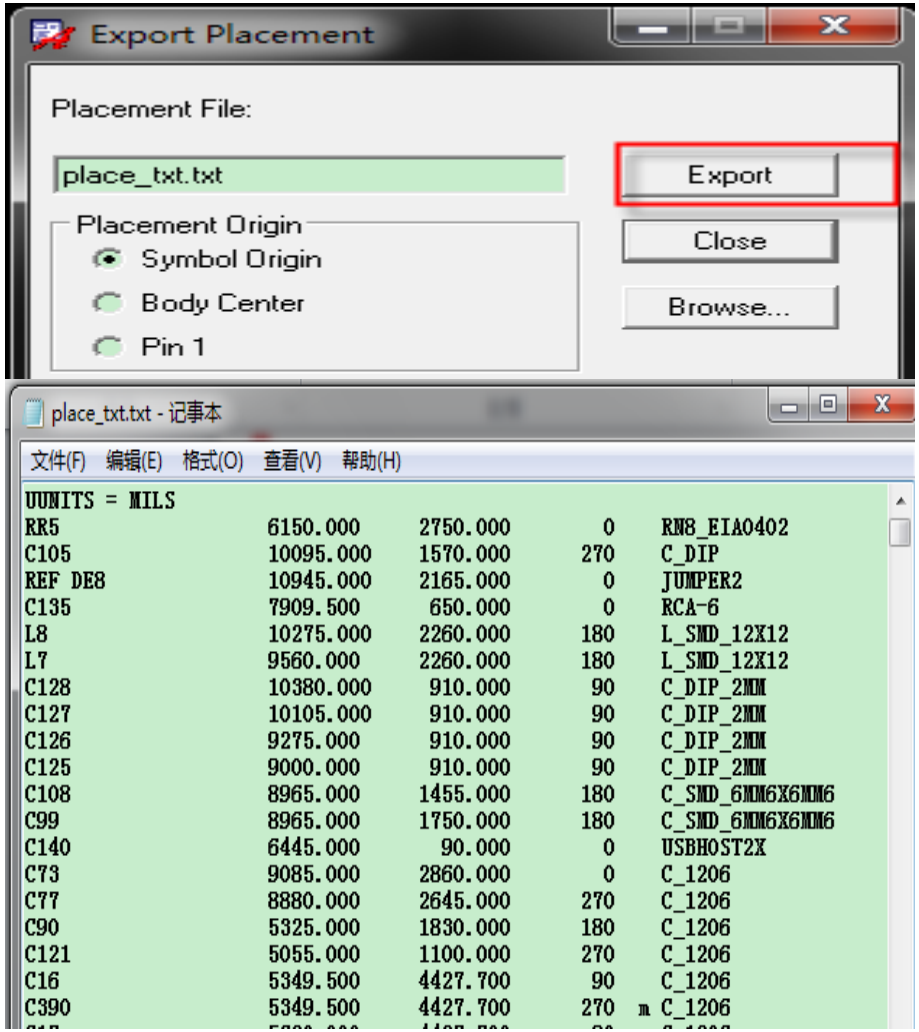
光绘输出——其他

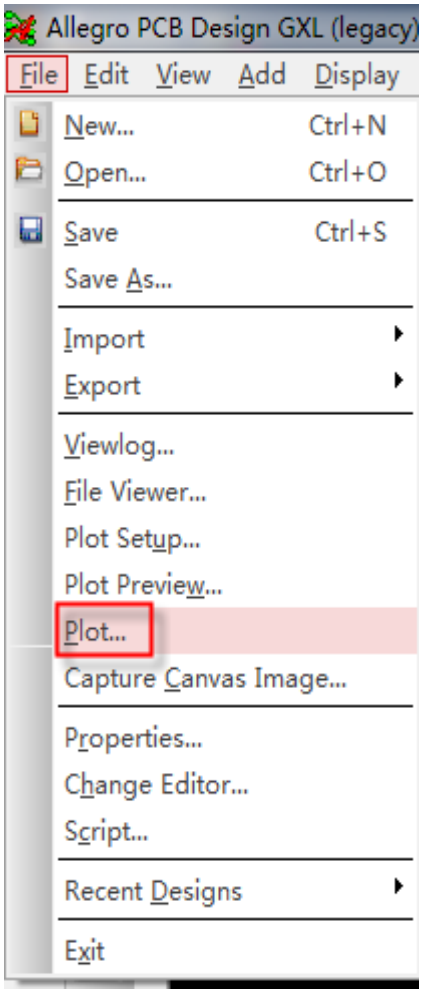
- **SMT所需坐标文件**

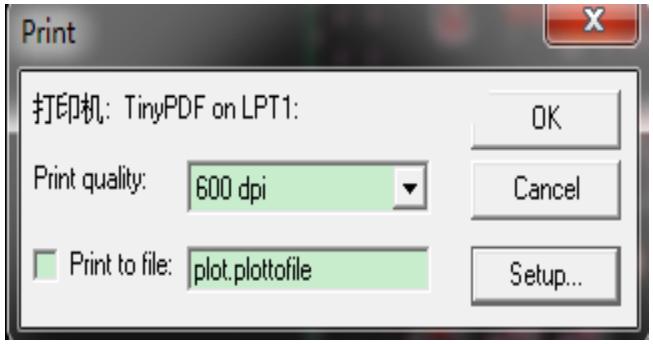




光绘输出——其他

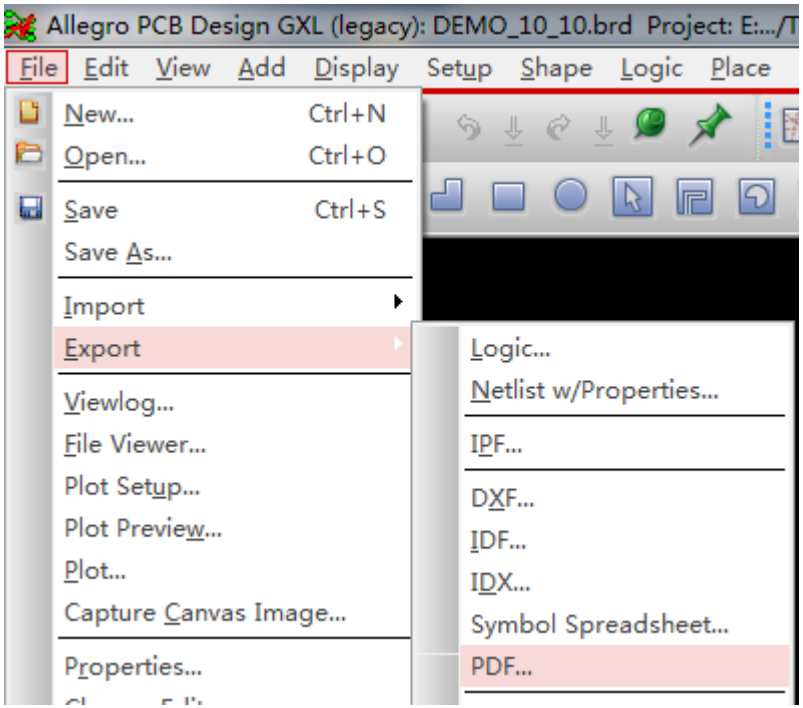
- 打印PDF

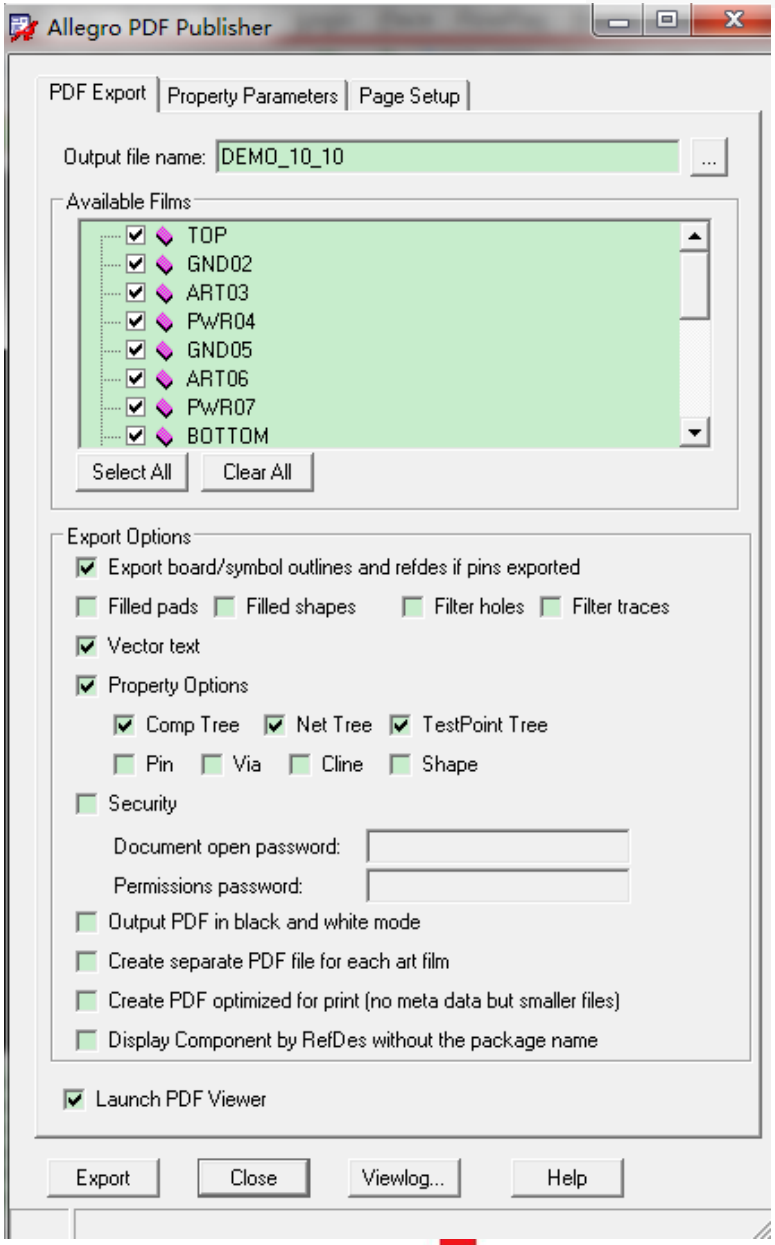




光绘输出——其他

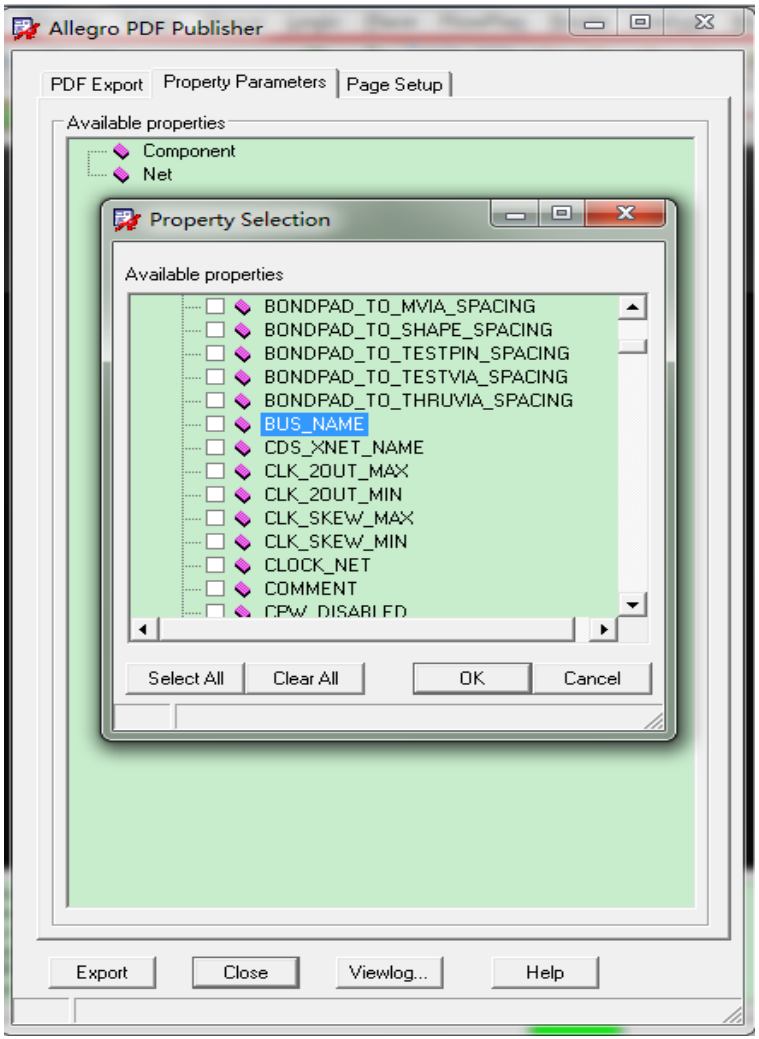
- 打印PDF（新版功能）

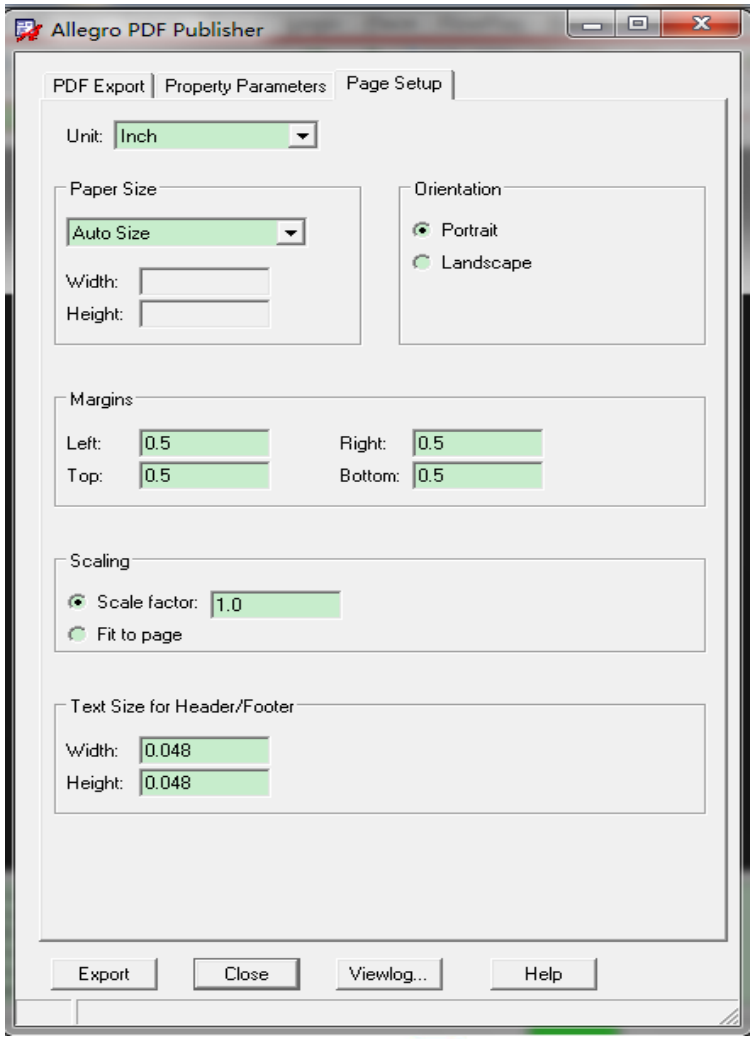




光绘输出——其他

- 打印PDF（新版功能）





Q&A

- Q&A
- Summary

Thank you!

Oct 10，2012
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ausbendu@comtech.com.cn