



**DipTrace.**

© 2010 Novarm Ltd.

<b>I</b>	<b>4</b>
<b>II</b>	<b>4</b>
1	6
2	9
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4	28
5	30
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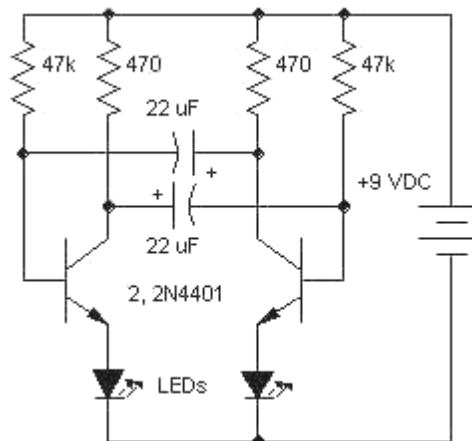
**V****DipTrace****211**

## 1

, , DipTrace.  
 , -  
 : [support@diptrace.com](mailto:support@diptrace.com).  
 DipTrace . 2.1.0.2 (19 2010 ).

## 2

DipTrace.  
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 DipTrace schematic → DipTrace schematic → DipTrace →  
 Schematic



DipTrace Schematic

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# OpenGL.

# OpenGL.

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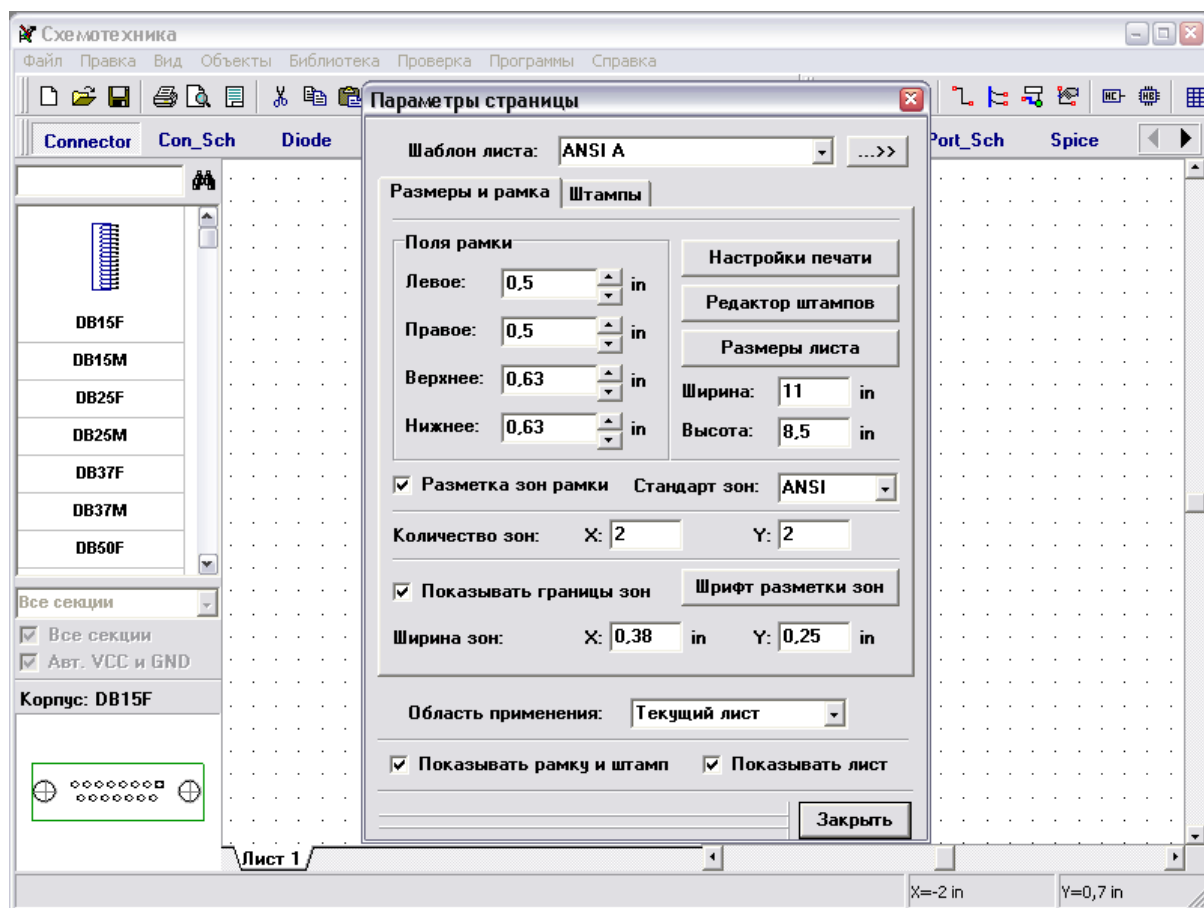
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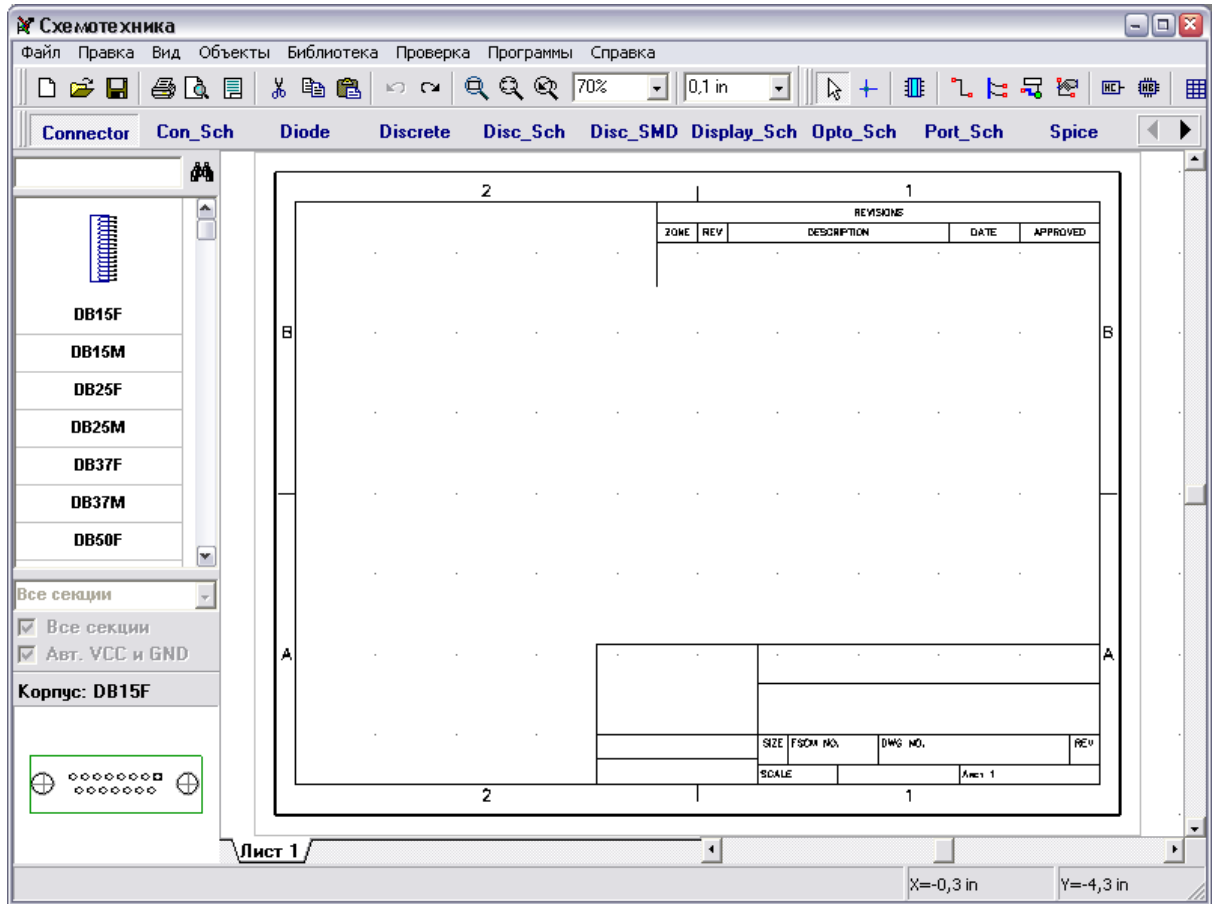
,

2

## 2.1

“ANSI A”





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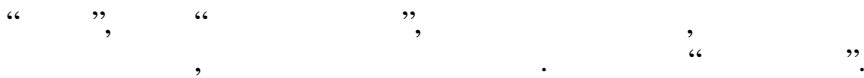
),

“12”.

“OK”



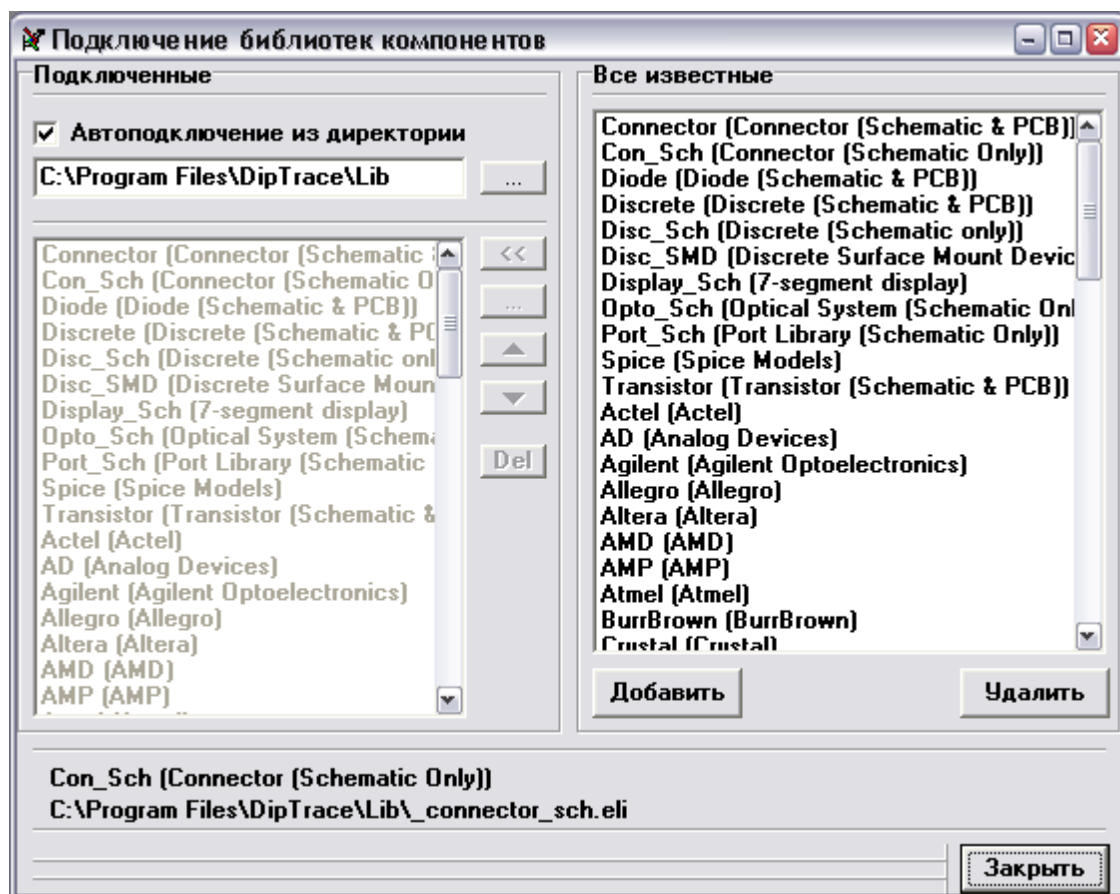




## 2.2

## PCB Layout,

“ / ”.



“No Library File”,

DipTrace

1.

“Lib”,

2.

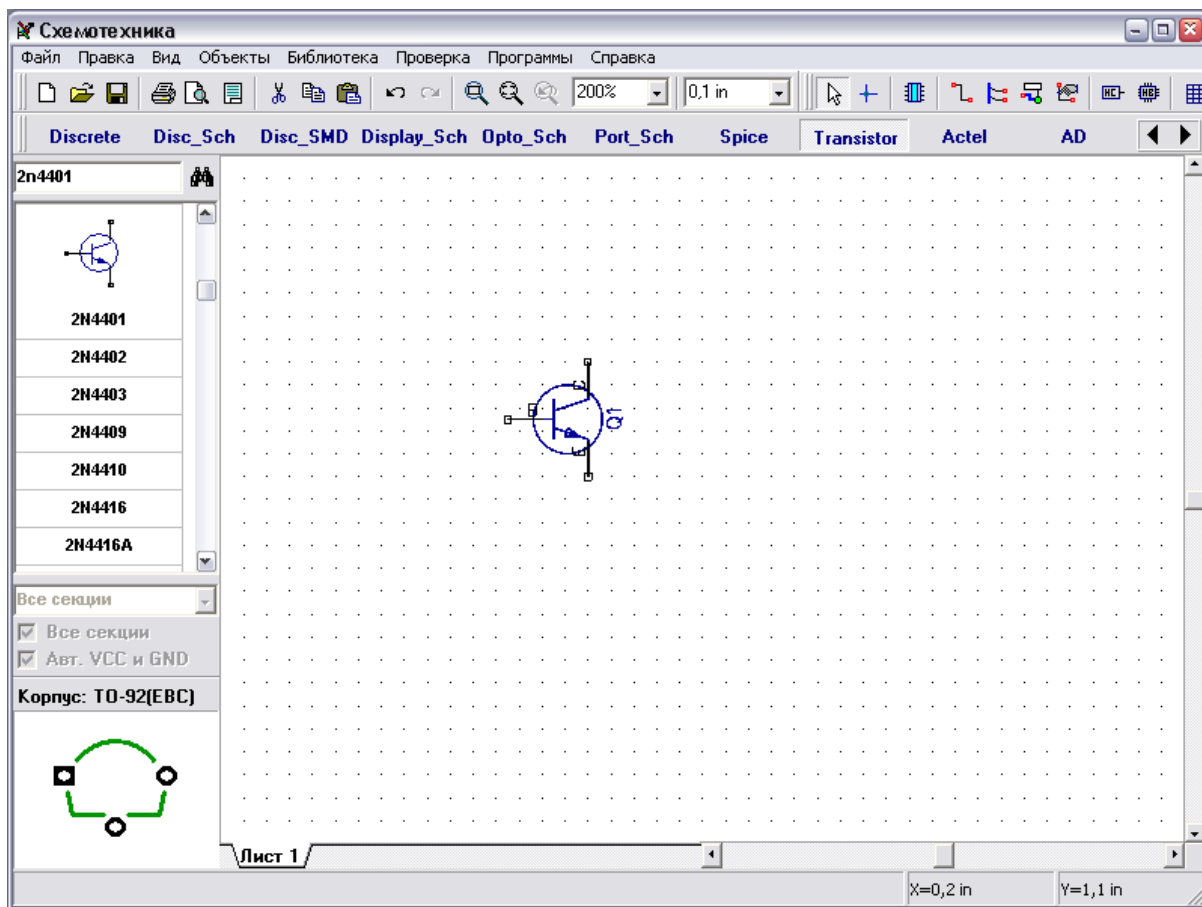
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## 2.3

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 ( 0.05)  
 Ctrl+ ( ).  
 Ctrl- ,  
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 “Transistors”.  
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 2N4401,  
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“Ctrl”,

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“Ctrl”,

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Q1.

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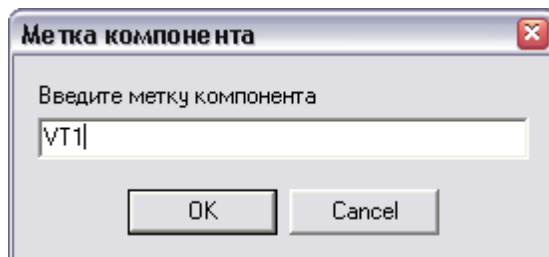
(

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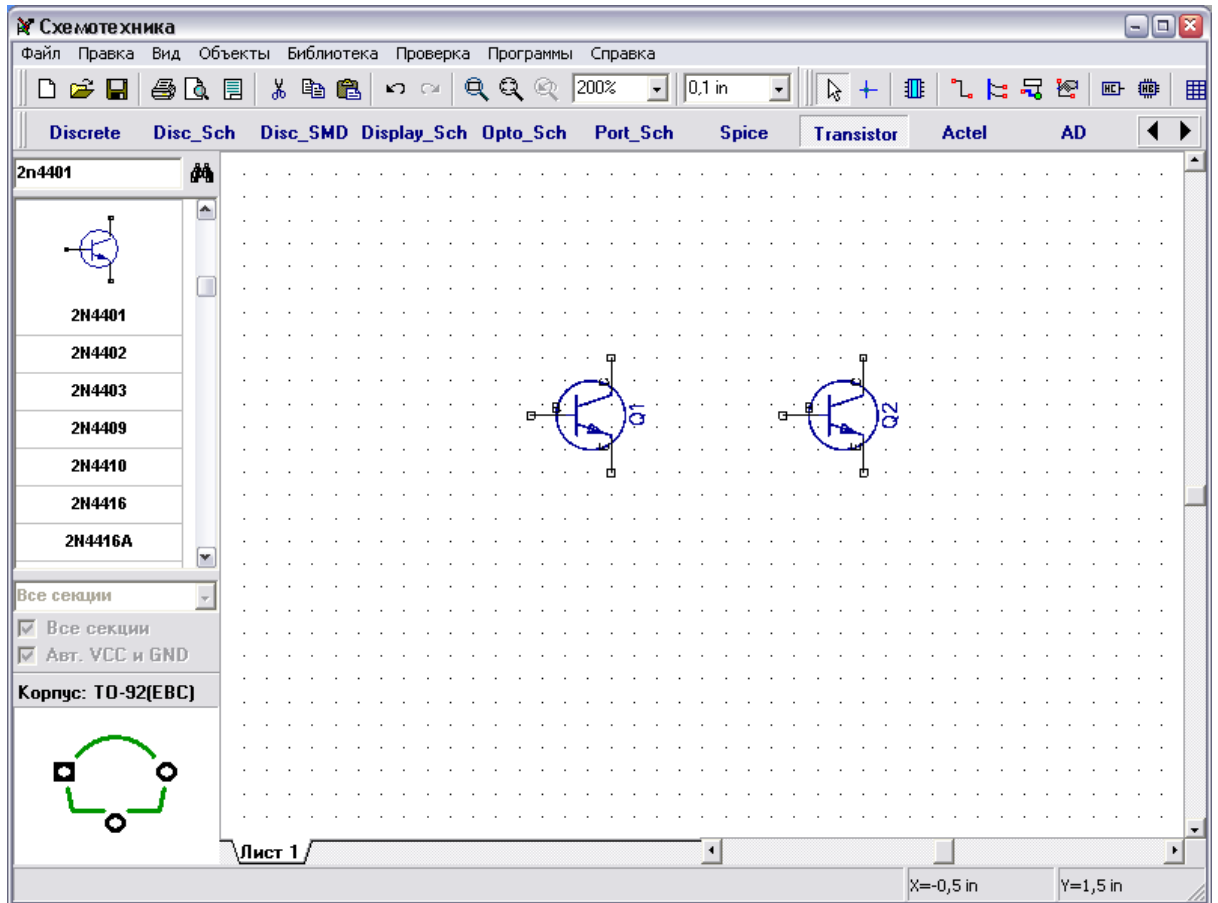
“VT1”.

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“2N4401”

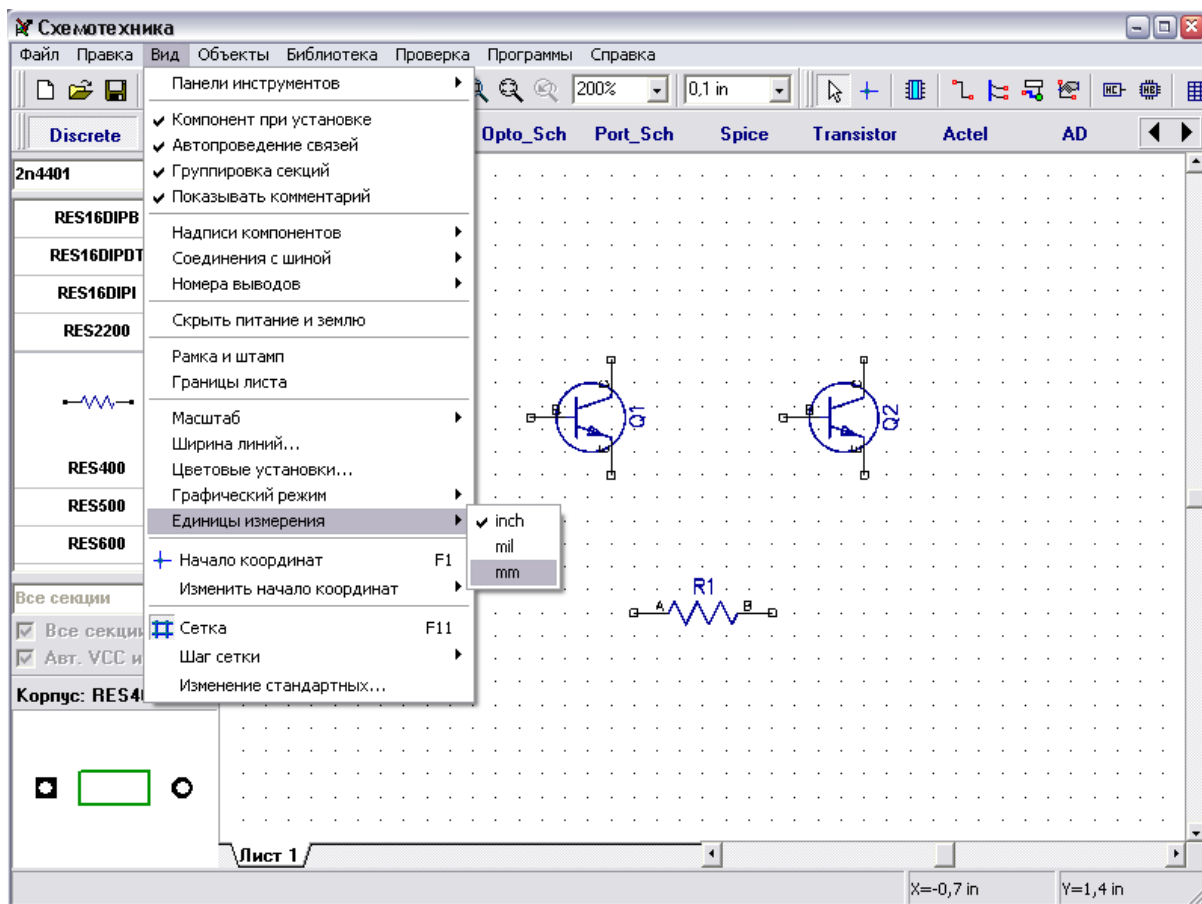


“Discrete”

RES400

400

“ / / mm”

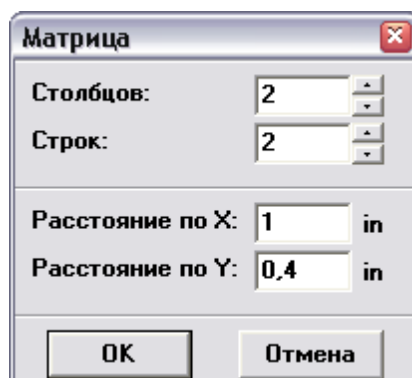


4

Q1

Q2,

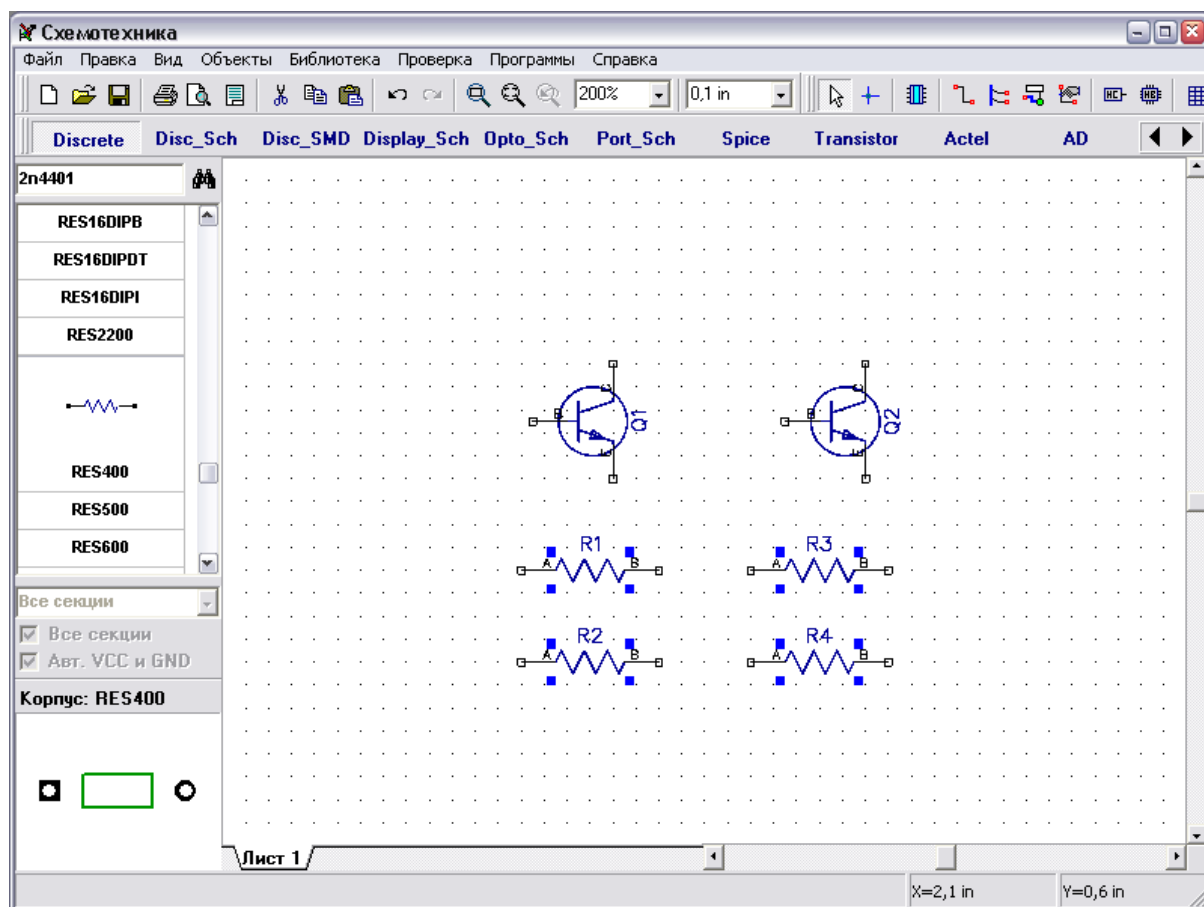
1. “ / ” , “ / ”  
“ ”
2. “ ”. “ / ”  
“ ( “Ctrl+M”).



“ ” ( “2” “2” “4” ) ( 1

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“OK”.



90 ,

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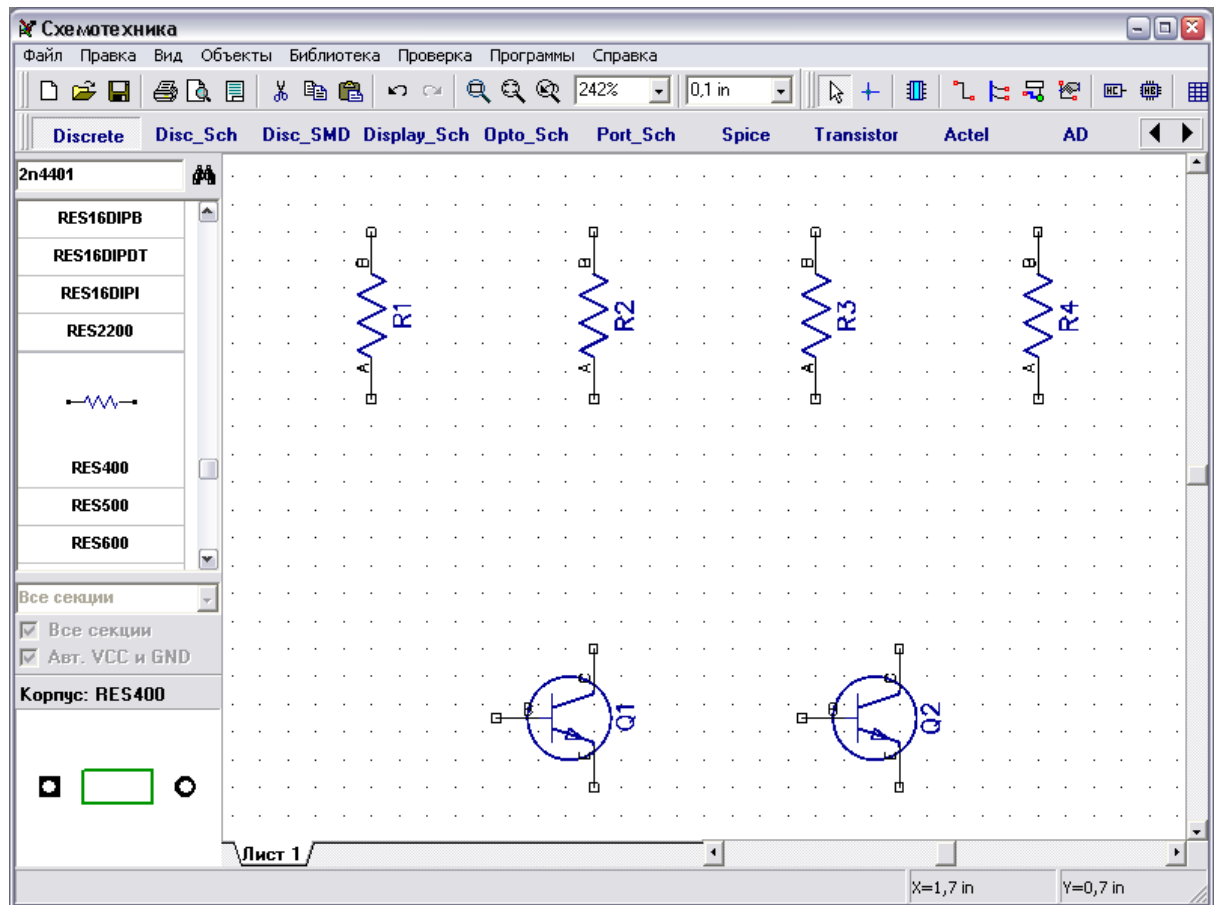
“R”

“

“ ”

“Shift”

9



: Q1 Q2,

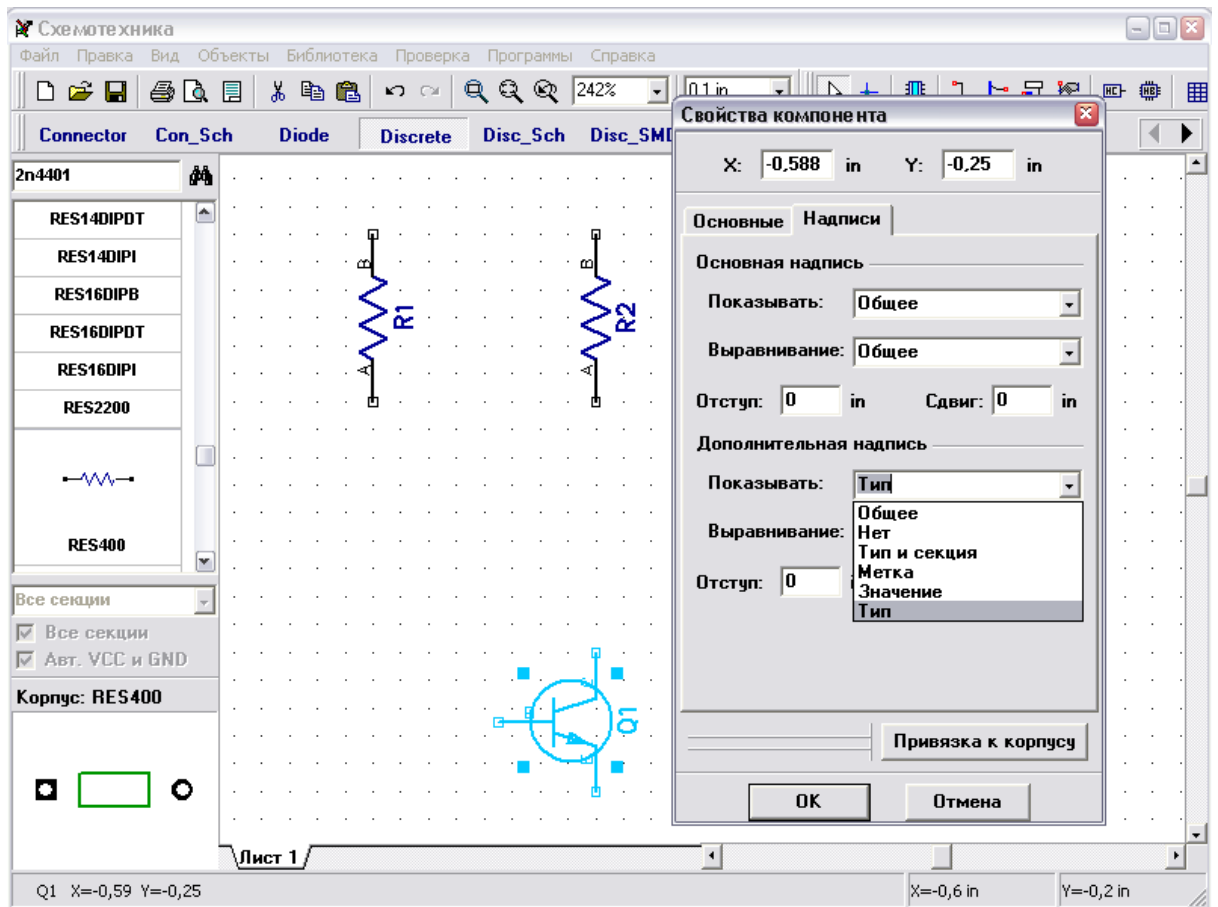
“ ”

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( )

“OK”

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“ ”

(B, C, E)

/ ” “ /

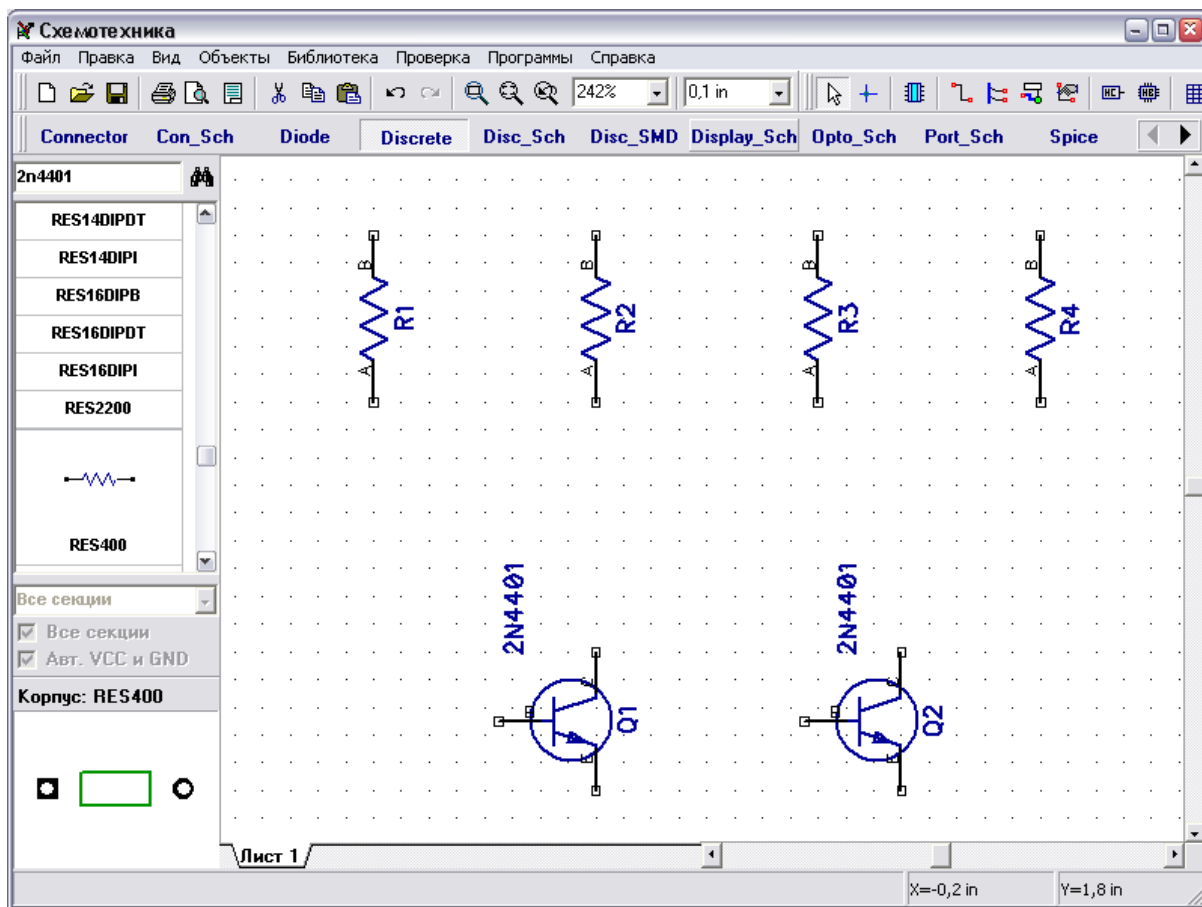
“F10”,

“R” “ ”

“ / ”

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“ / ”

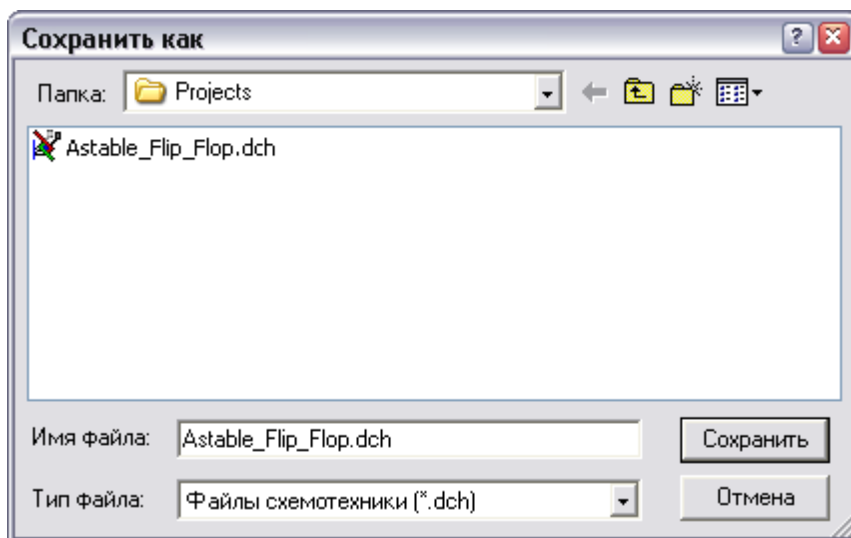
50 “ ”

“ ” : “ / ”

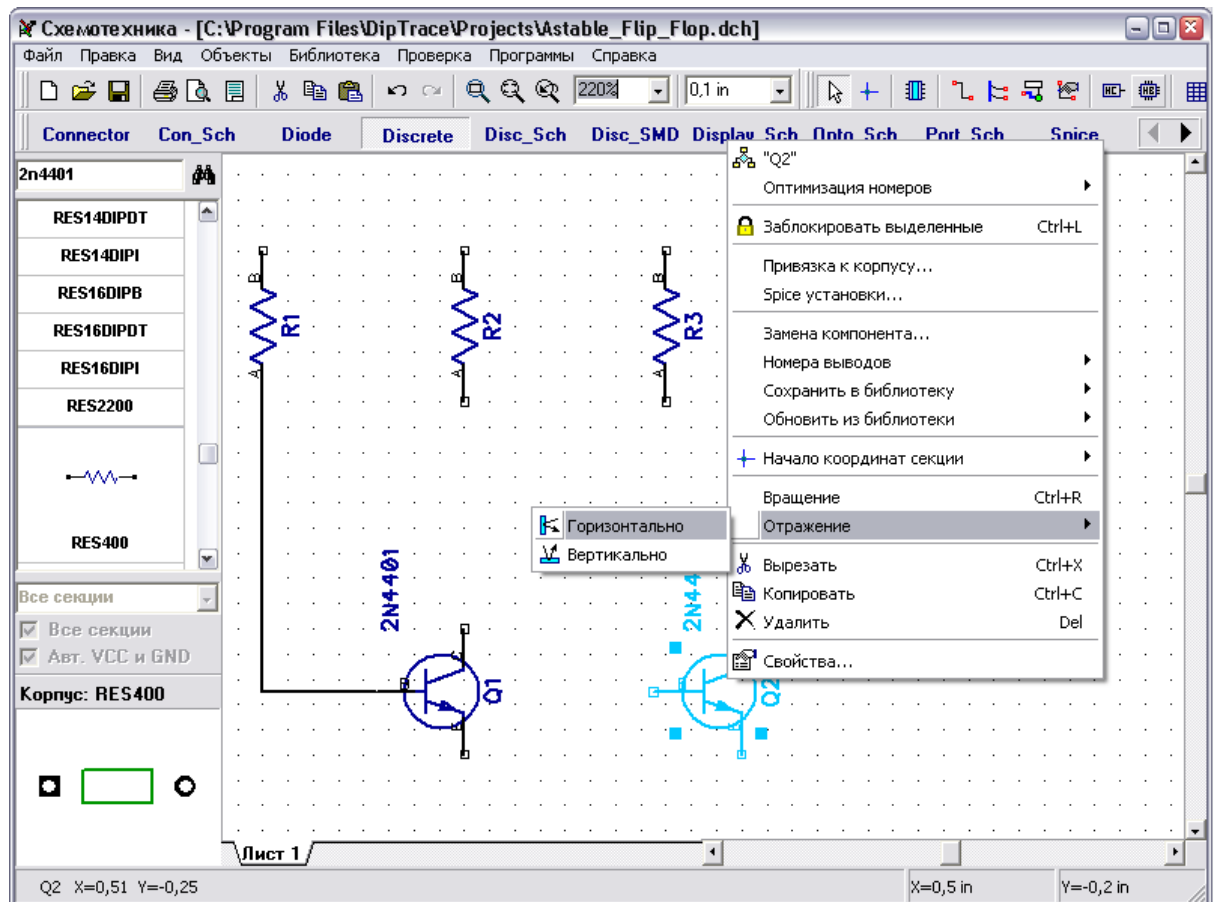
“ ”

“ ” “Ctrl+S”.

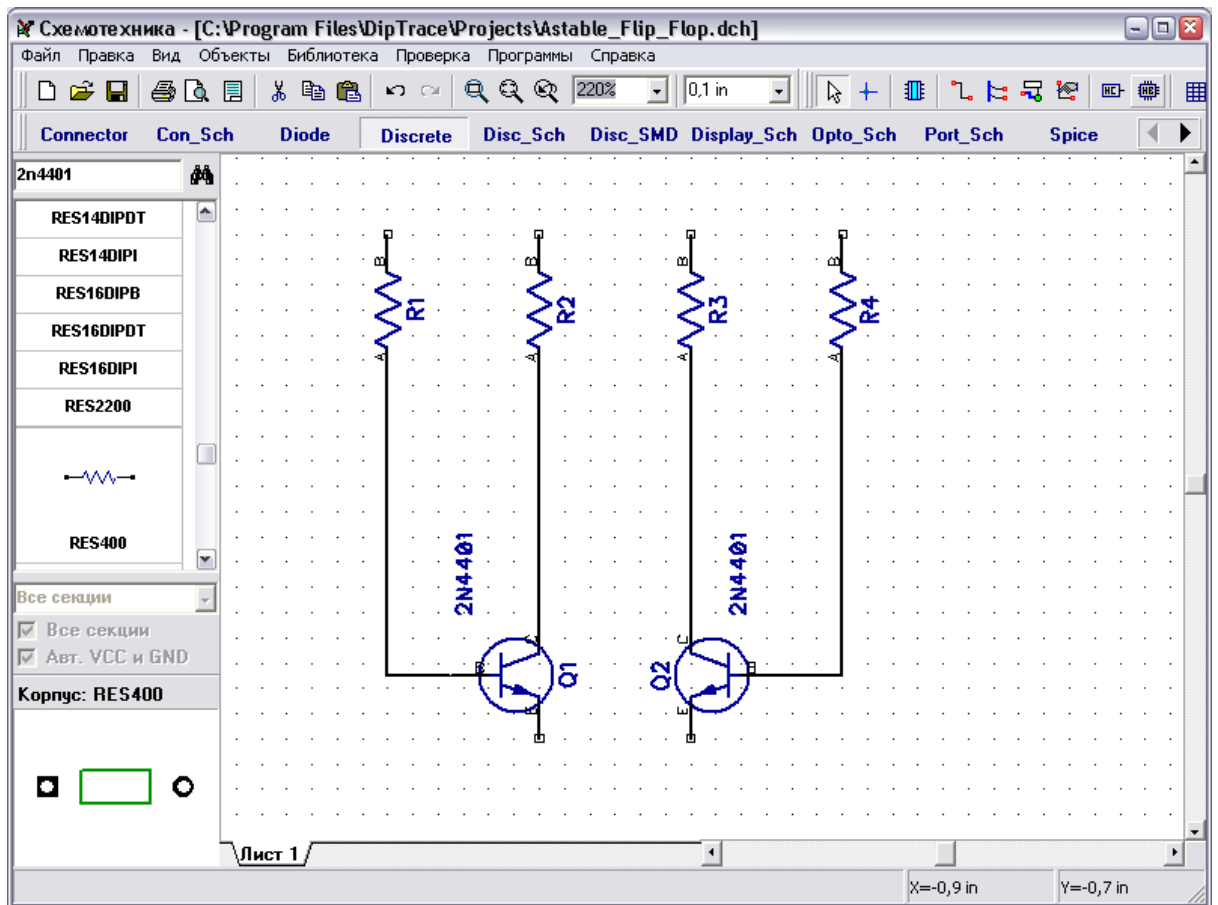
“ / ”



R1 Q1  
Q1.  
R1 Q2  
“ / ”

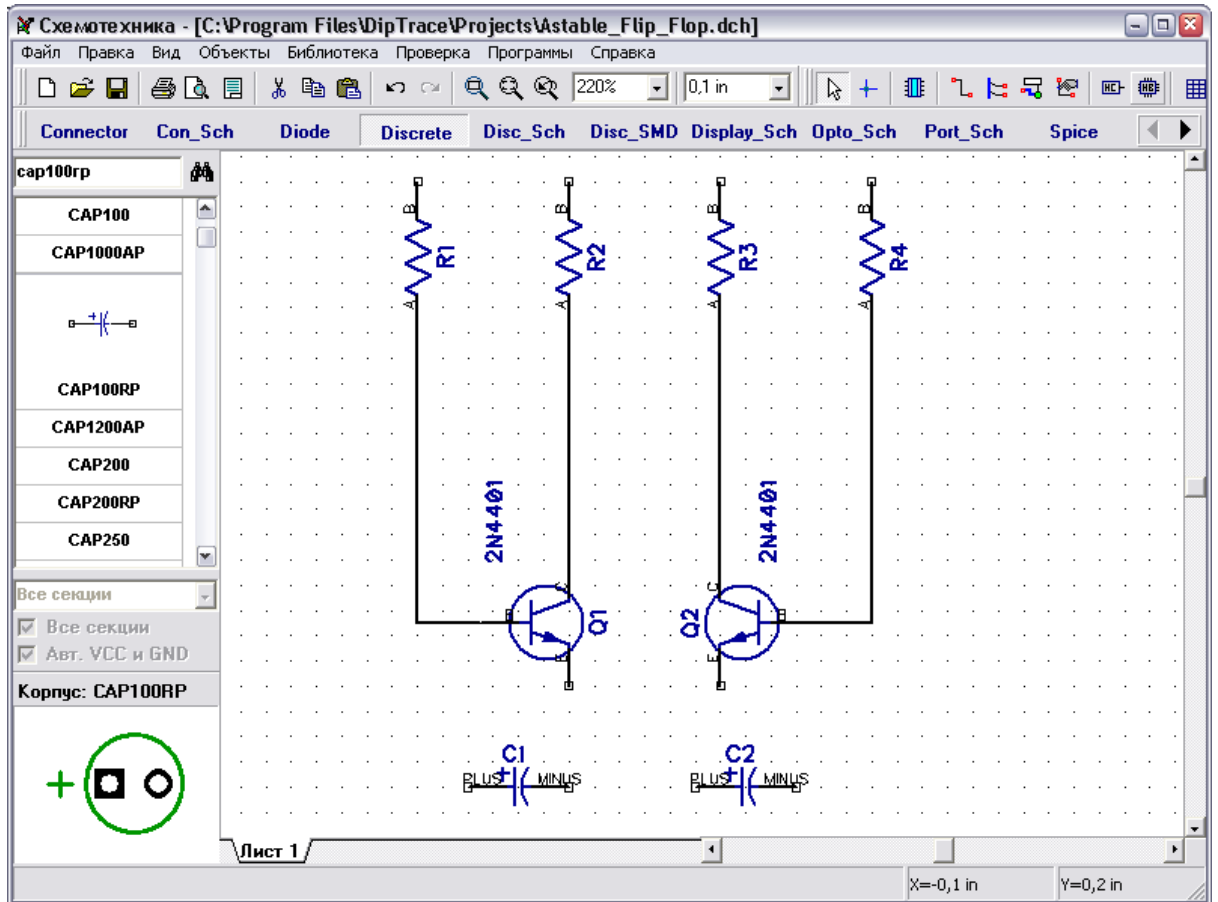


R4 Q2, R2 Q1 R3 Q2.



CAP100RP

"Discrete"



C2,

2,

“

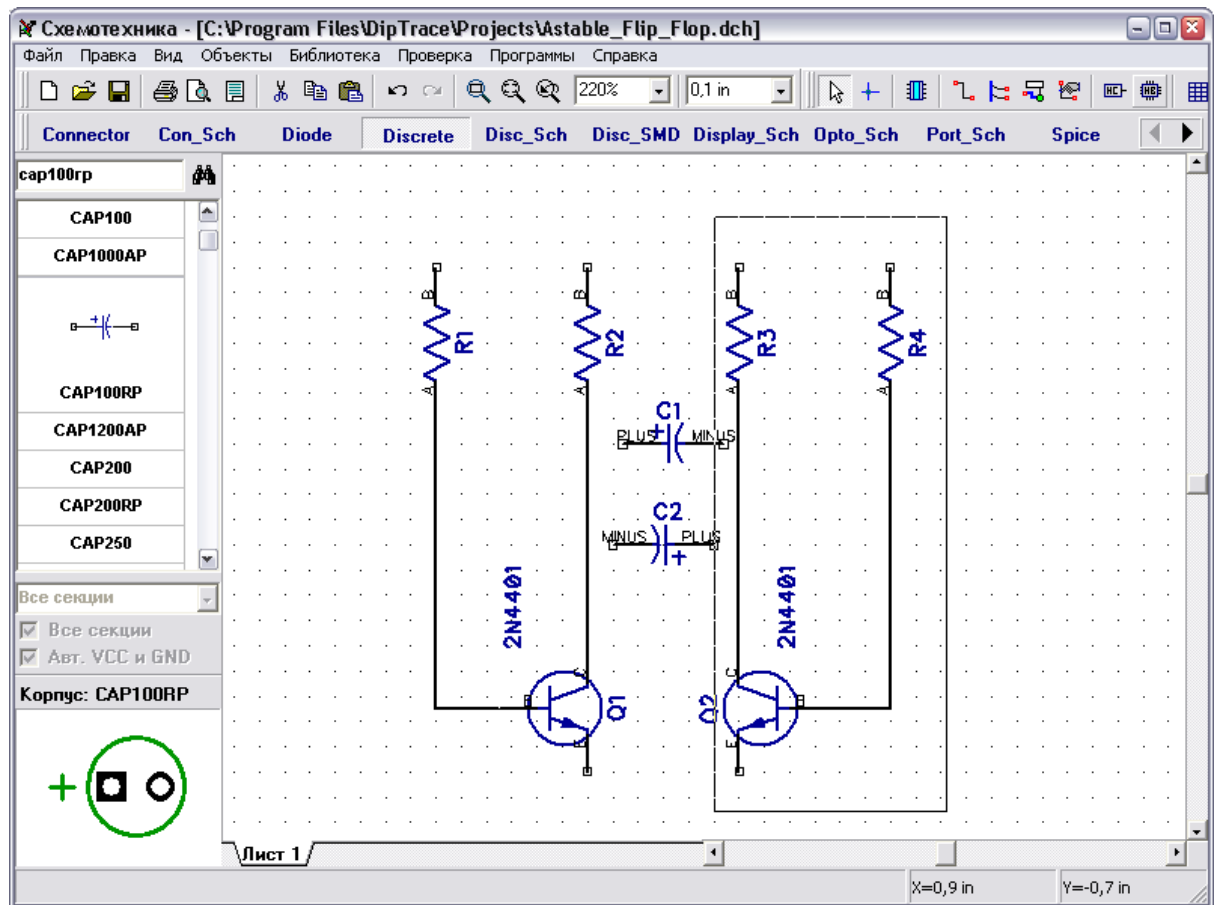
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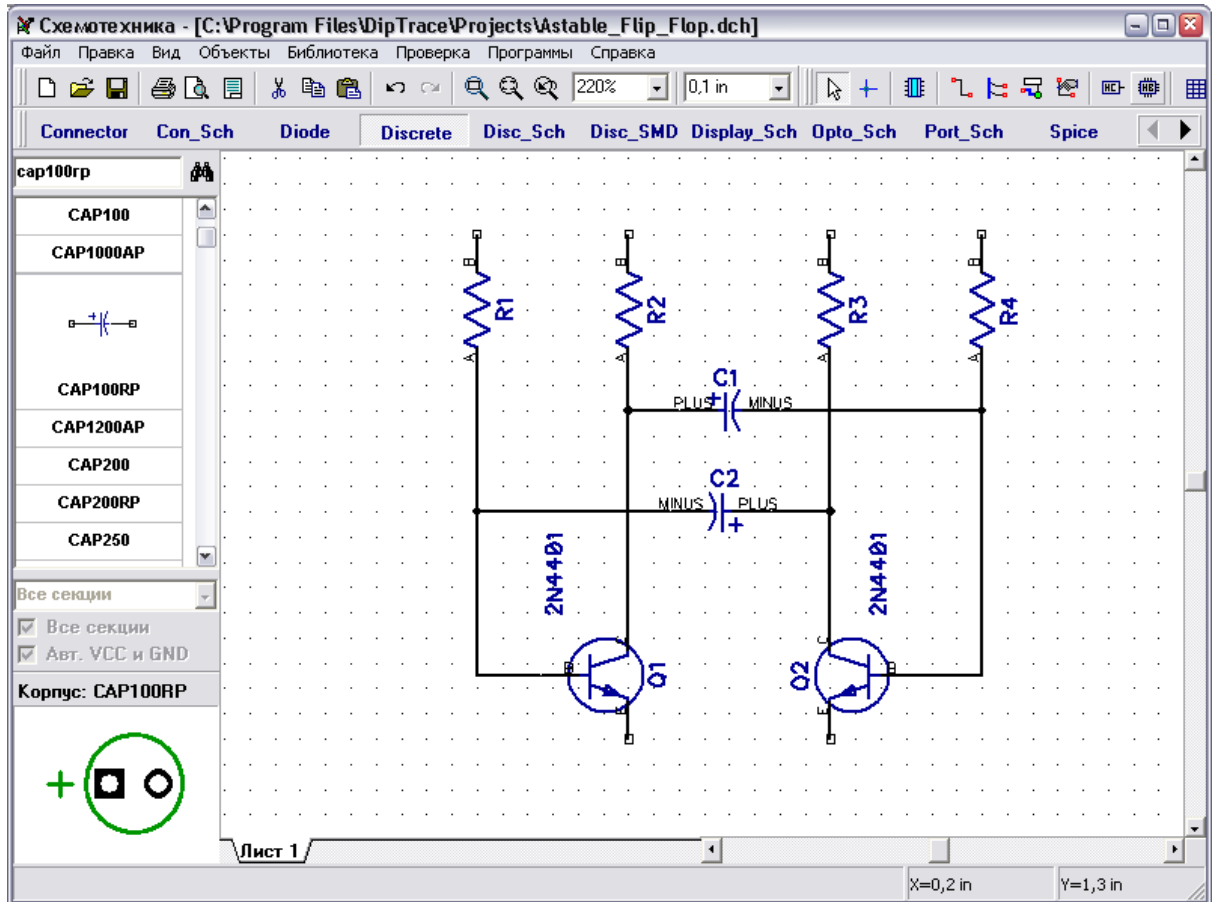
C1 C2

Q1 Q2

Q2, R3, R4



C1 (+),  
 R2 (A) Q1 (C)  
 2 Q1 Q2.



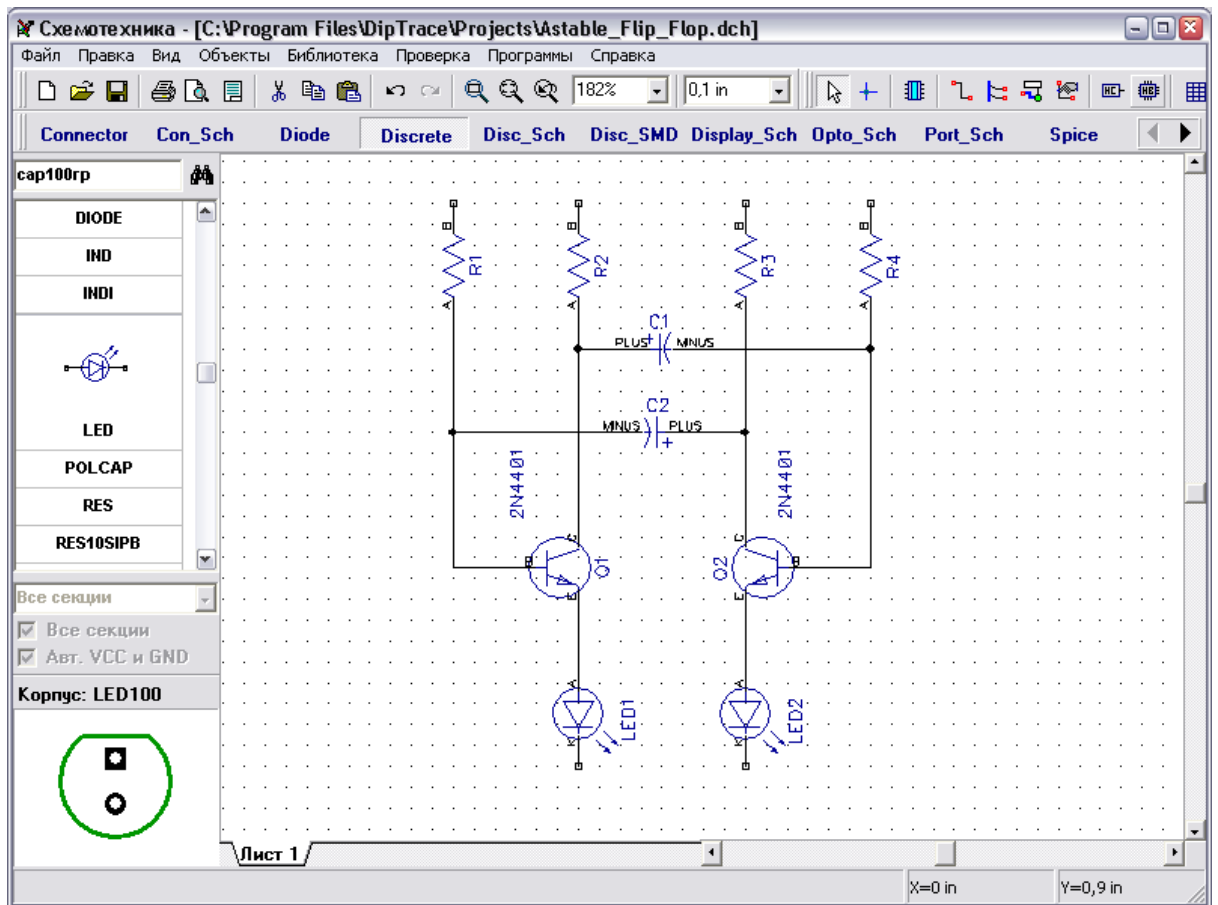
LED  
 “LED1” “LED2”,

“R”

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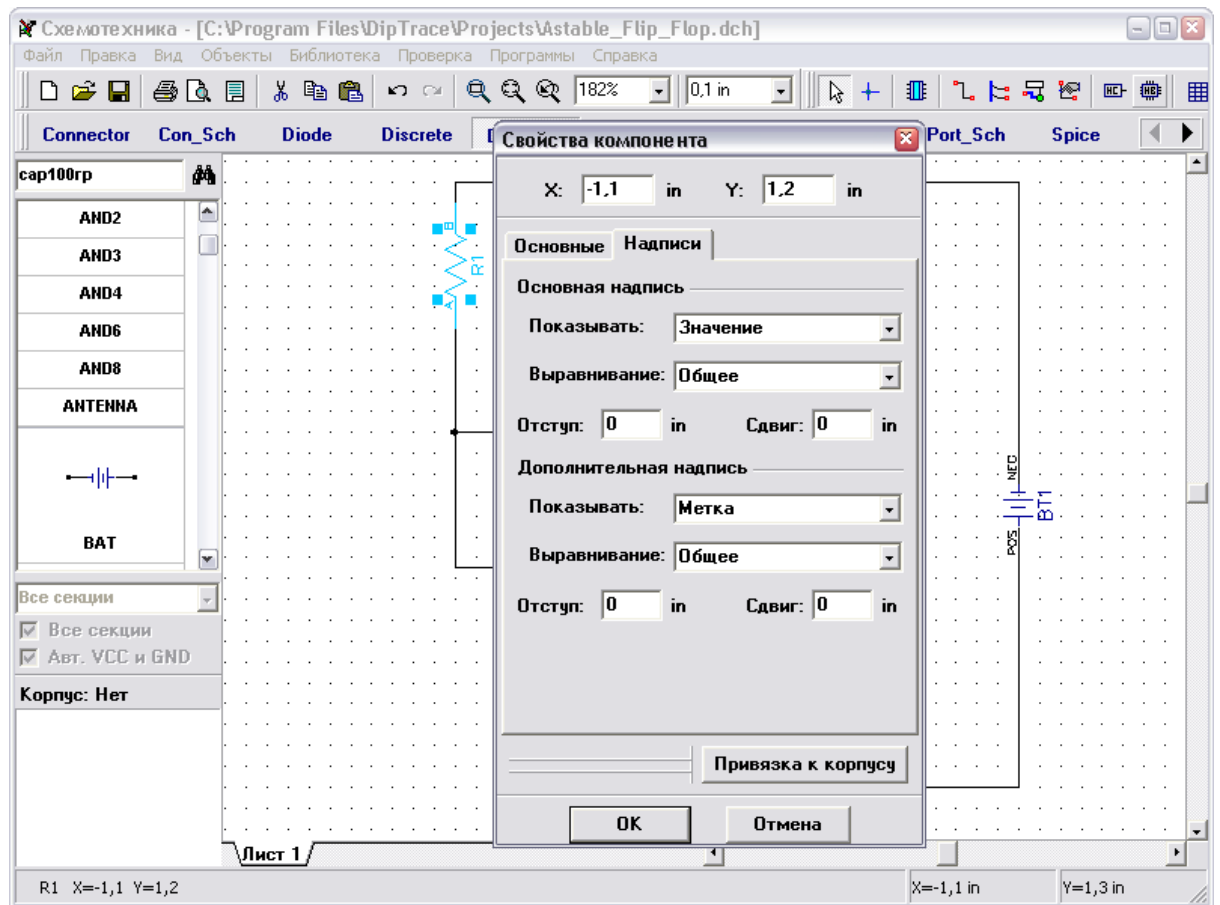
“Disc\_Sch”.

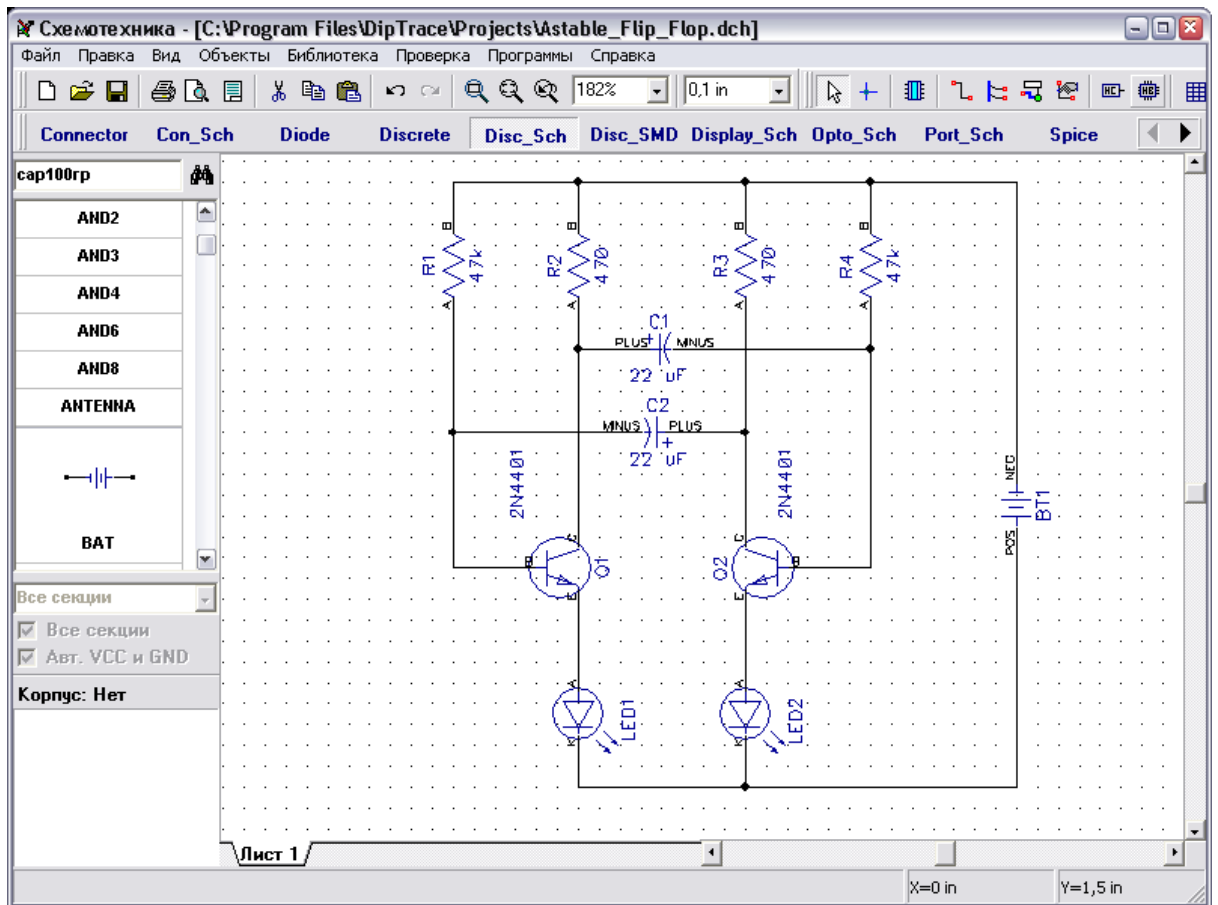
(

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“Disc\_Sch”. \*Sch

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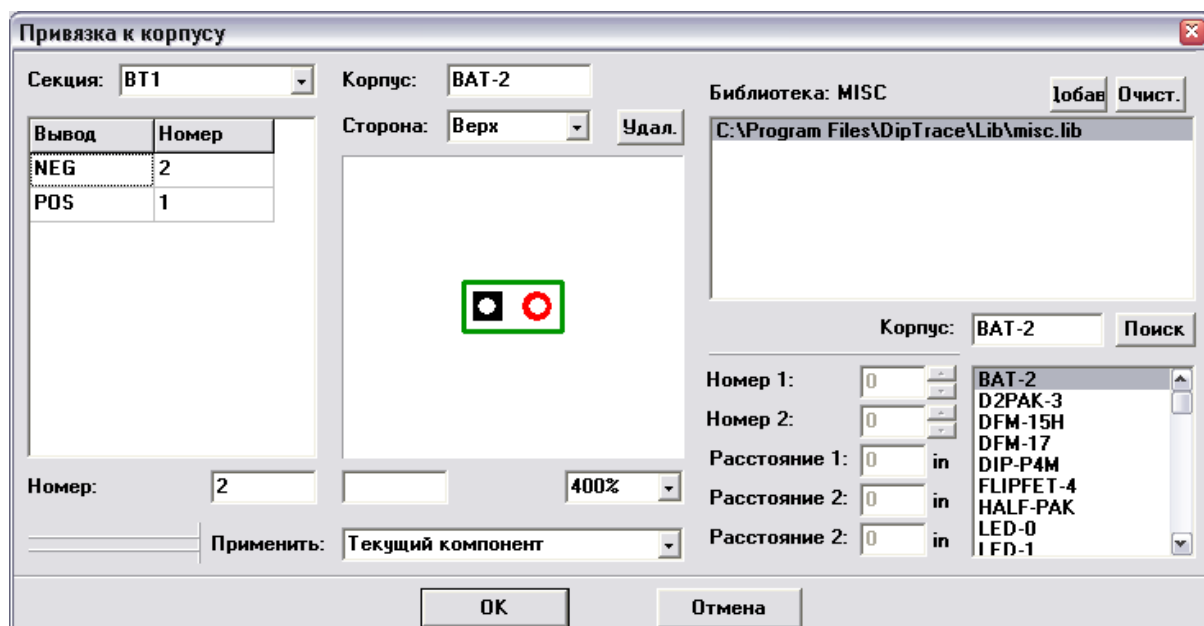
“Add”

“< >:\Program Files\DipTrace\Lib”).

“misc.lib”.

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“Ctl+S”.

BMP

JPG

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BMP/JPG

## 2.4

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### PCB Layout.

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“Ctrl+B”

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## PCB Layout

Win 98/ME

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## PCB Layout

\*.dch

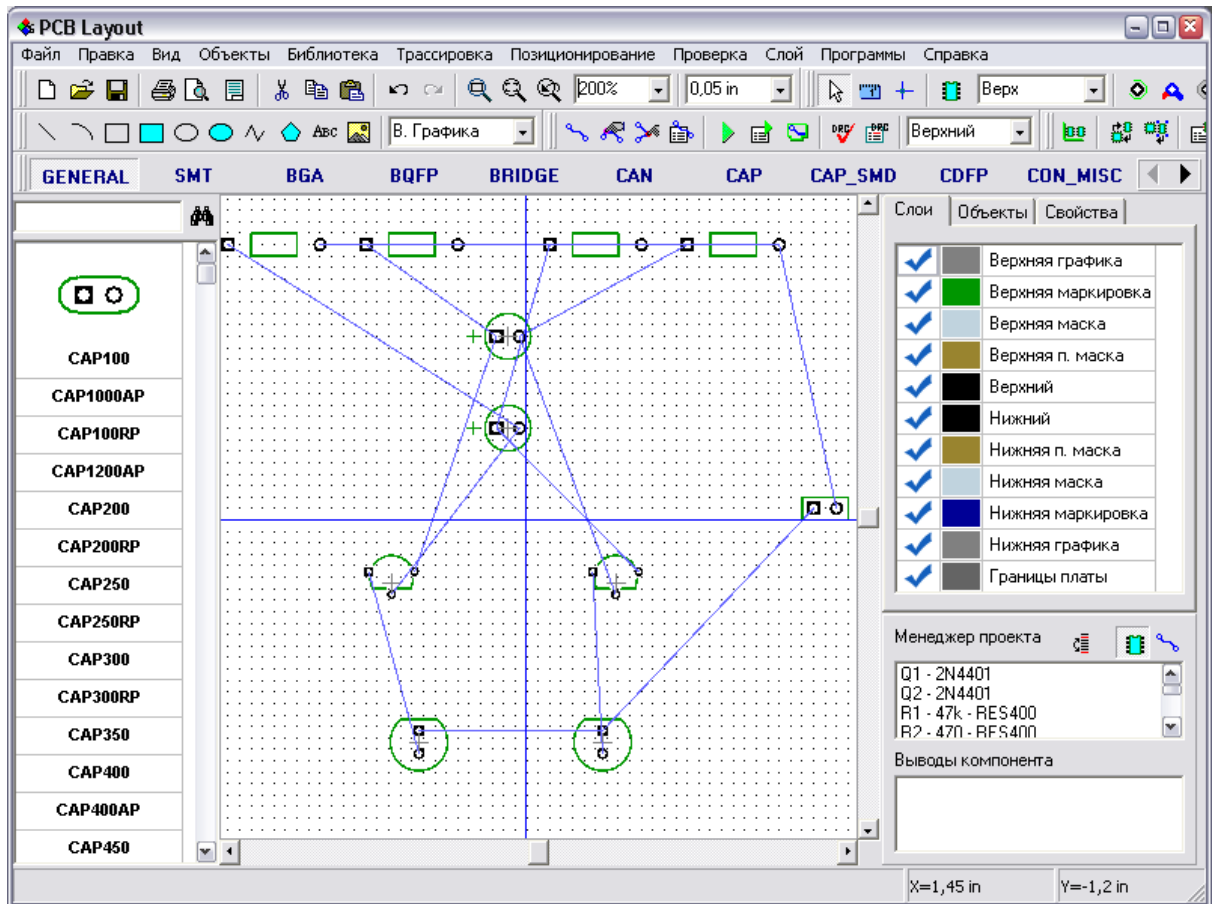
Win NT/2000/XP/Vista/7

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“ / Netlist”  
 . DipTrace  
 Tango, PADS, P-CAD, . . .

DipTrace PCB Layout

F3,

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 90  
 “ ” “R”

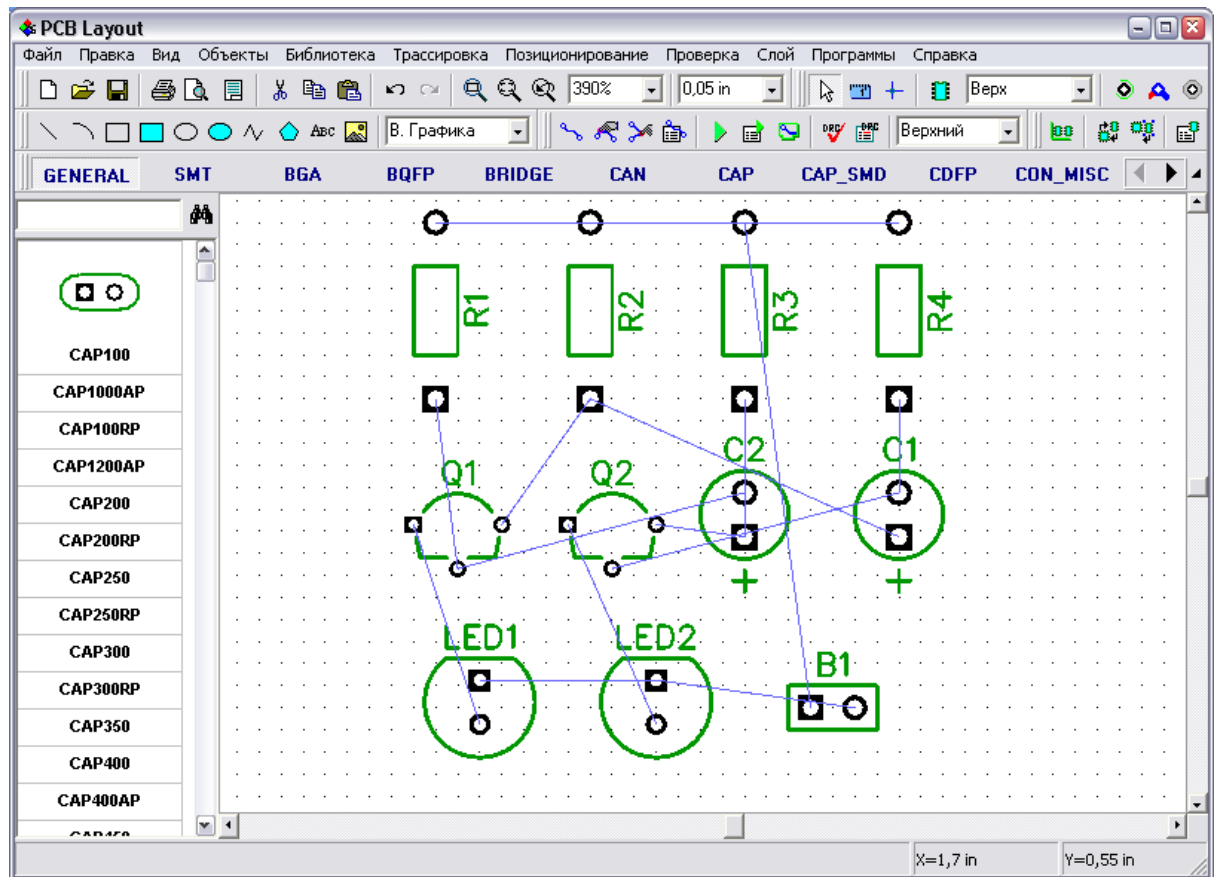
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## 2.5

### 2.5.1

PCB layout : “ /  
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 True Type ( / / ).  
 :  
 “F10” “ / / . / , ”  
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 “ / / ”  
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 "F12".

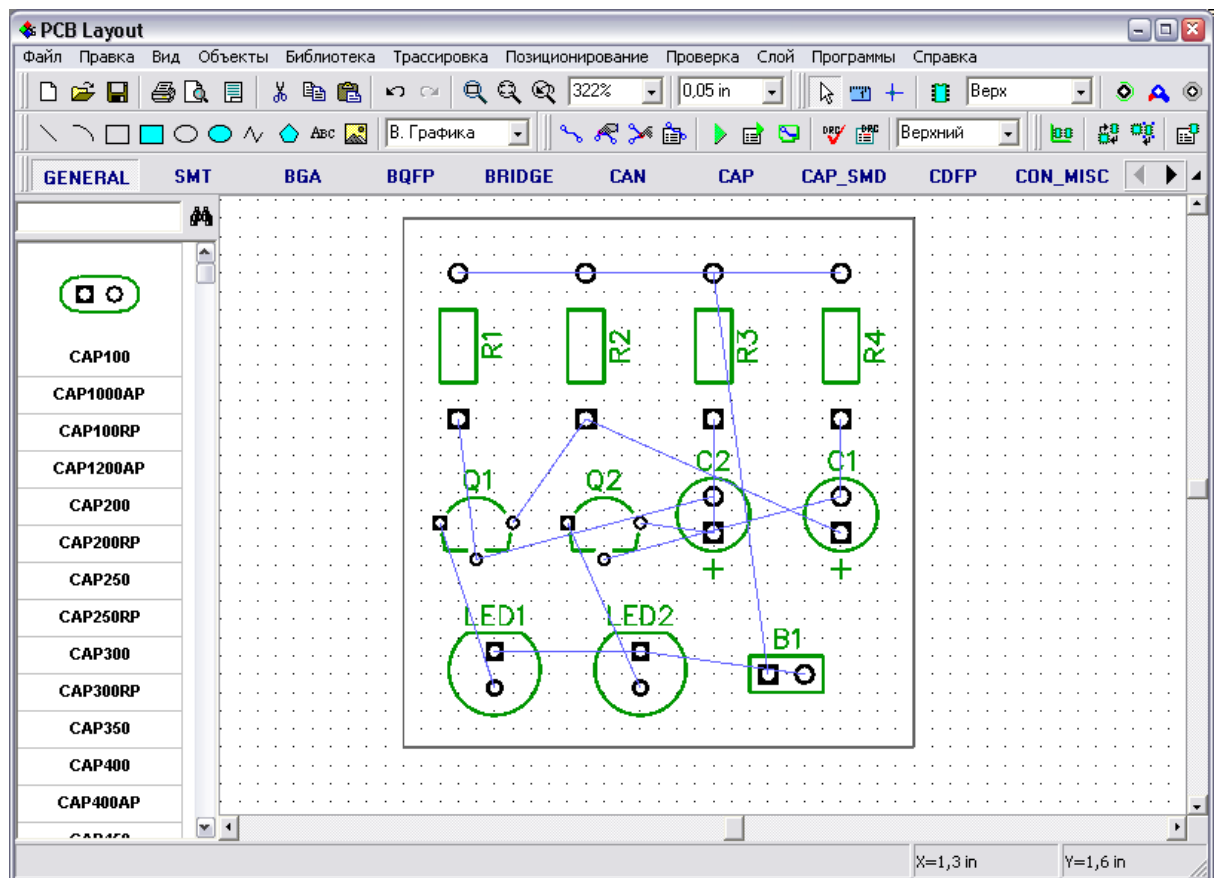


/

, R4 – B),







**Границы платы**

Вершины

1	-	X=0,15	Y=1,6
2	-	X=1,55	Y=1,6
3	-	X=1,55	Y=0,15
4	-	X=0,15	Y=0,15

☐ Относительно

X: 0 in

Y: 0 in

☐ Дуга

Добавить

Вставить

Удалить

☐ Создание прямоугольной платы

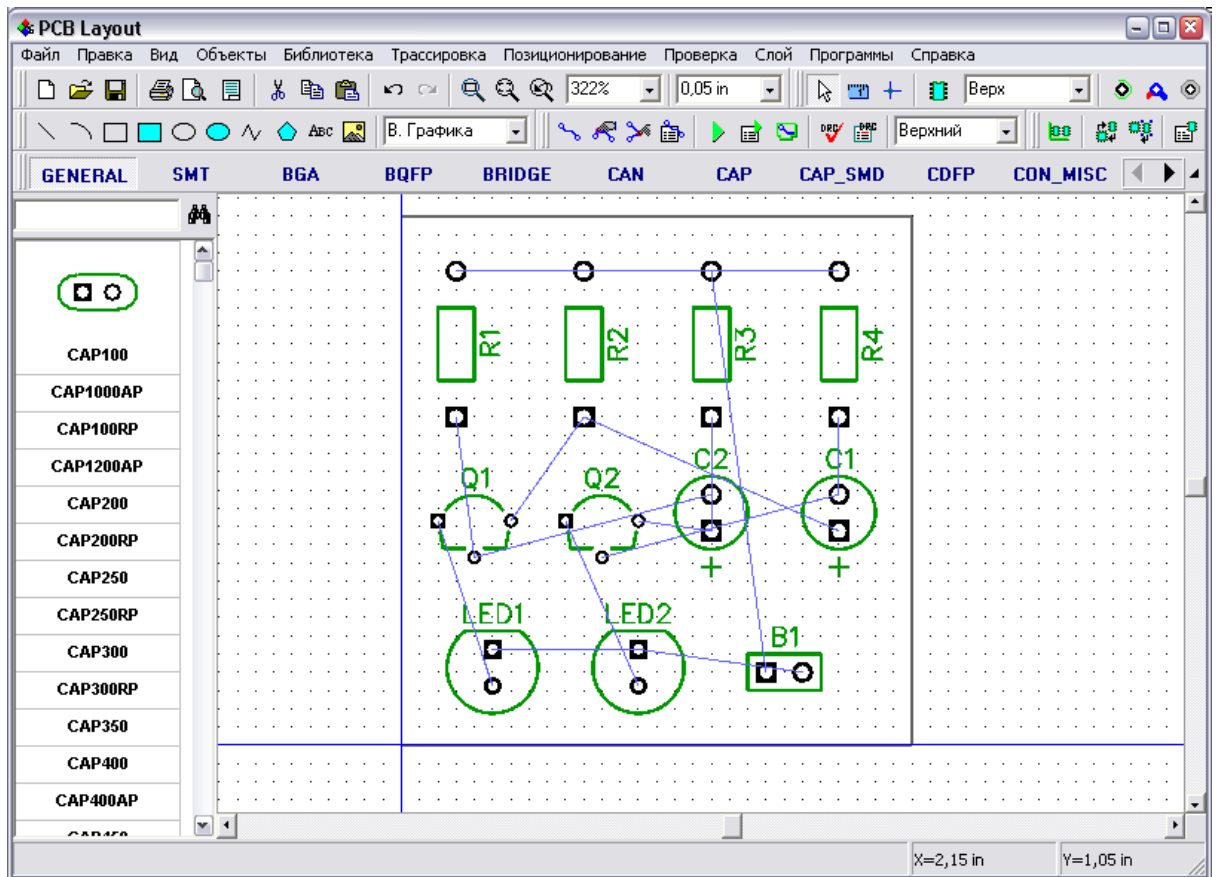
☐ Создание круглой платы

☐ Создать прямоугольную плату с закруглениями

Ширина: 0 in      Высота: 0 in

Радиус: 0 in

OK      Отмена



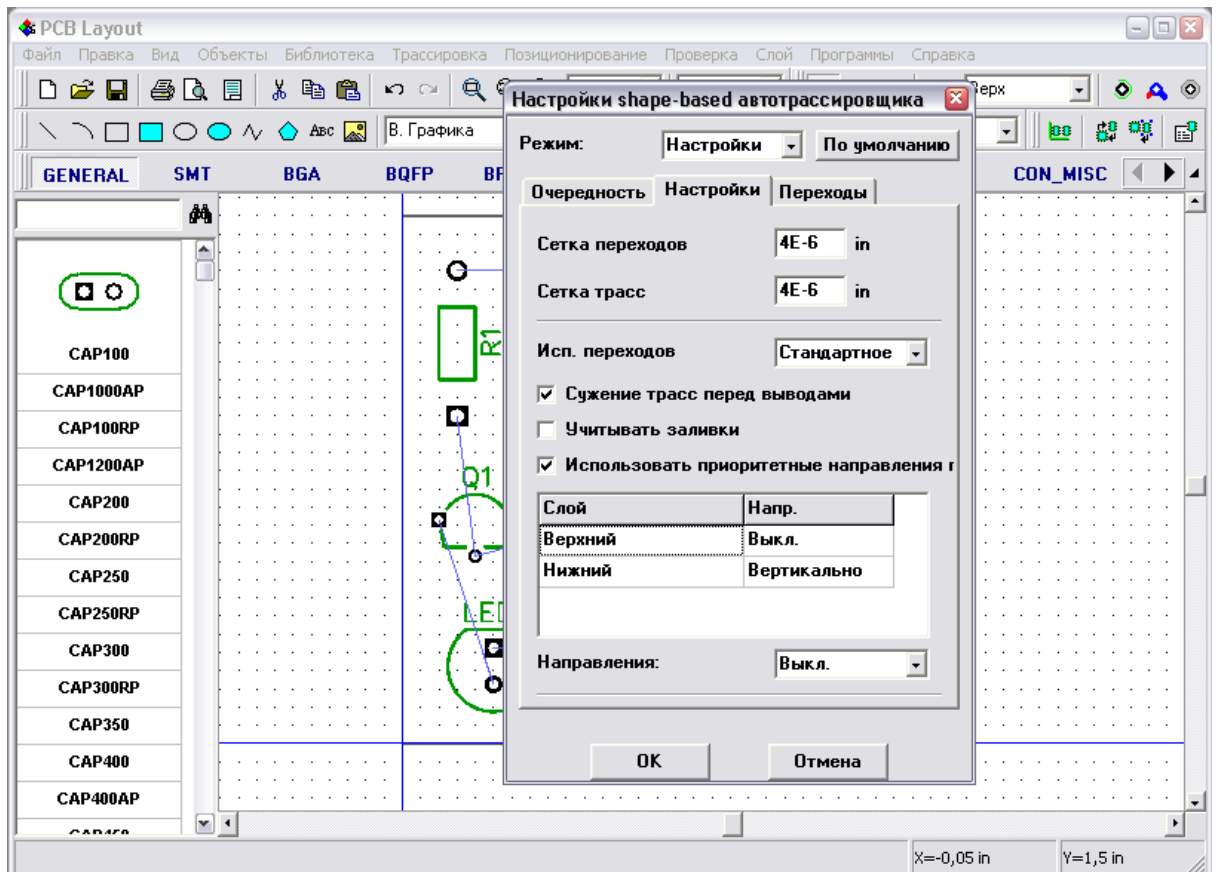
## 2.5.2

. DipTrace

shape-based  
PCB

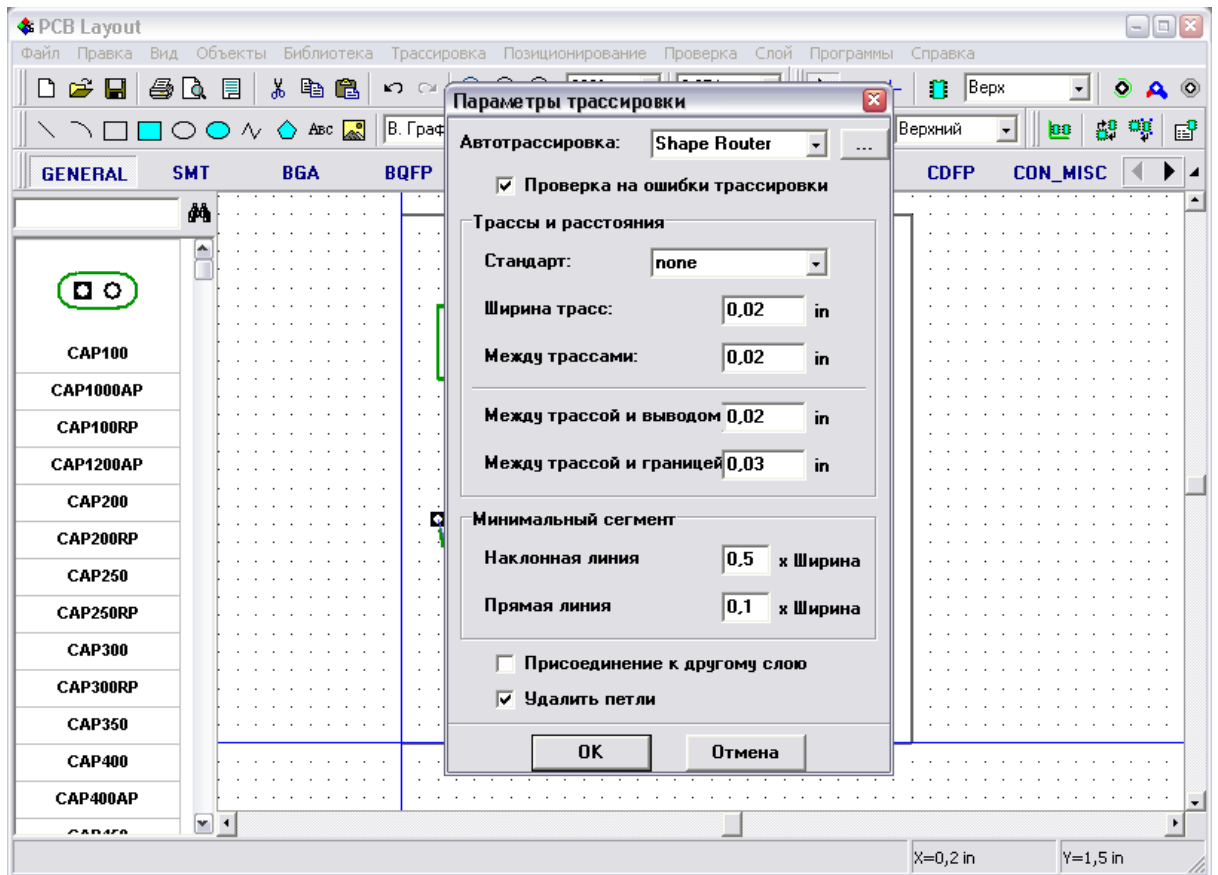
"shape-based"

(  
shape-based



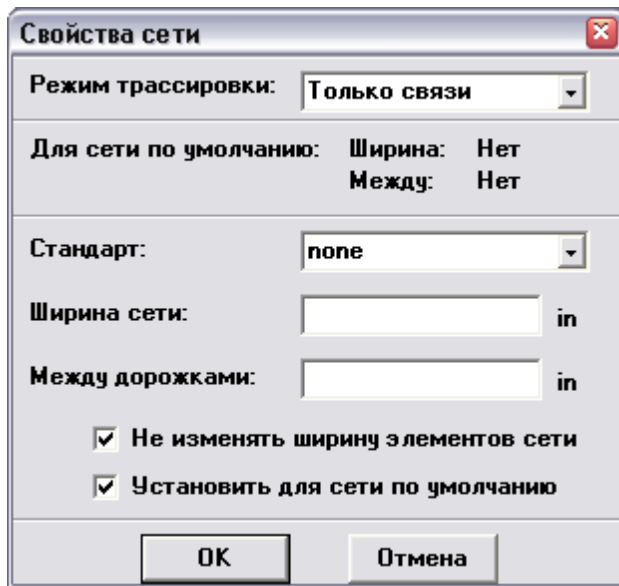
OK,

" / "

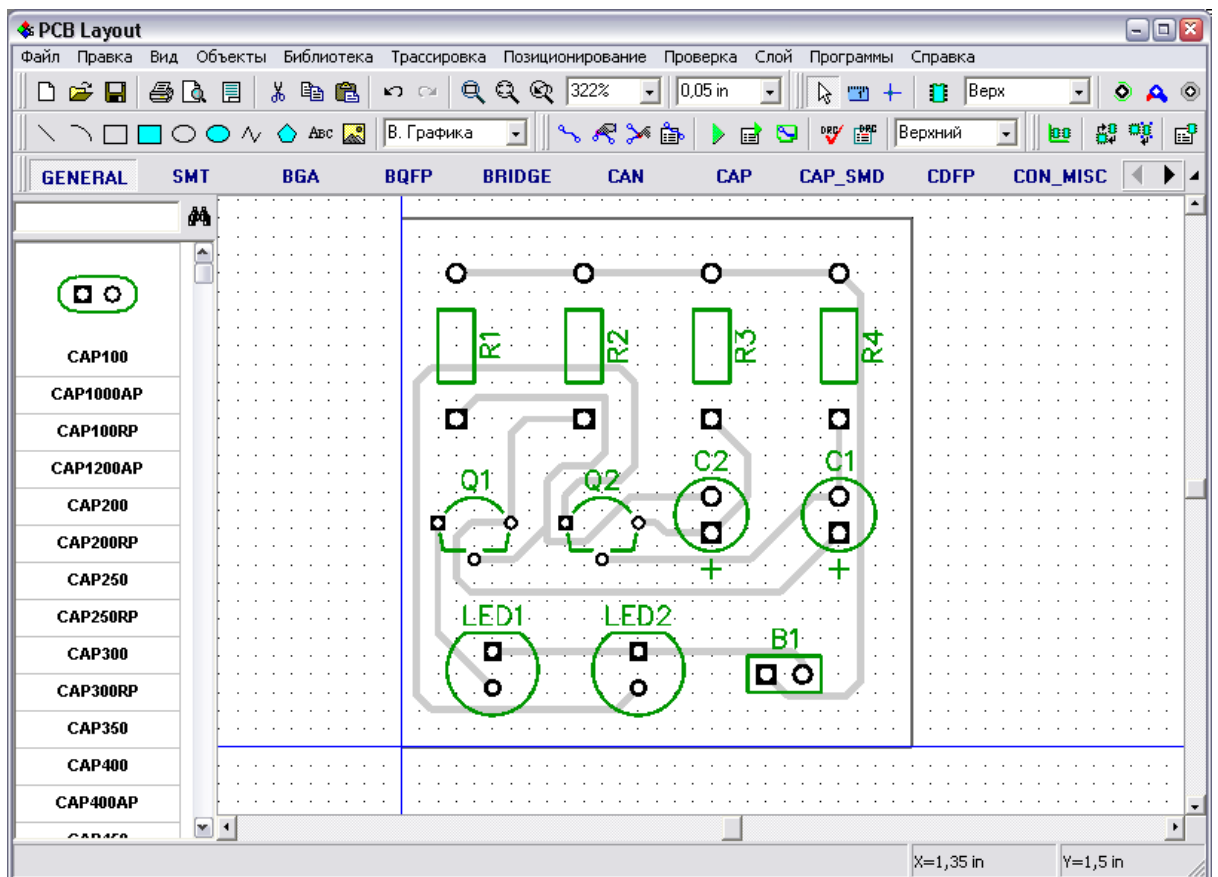


0.02 (0,508 )

“OK”



: “ / ”,



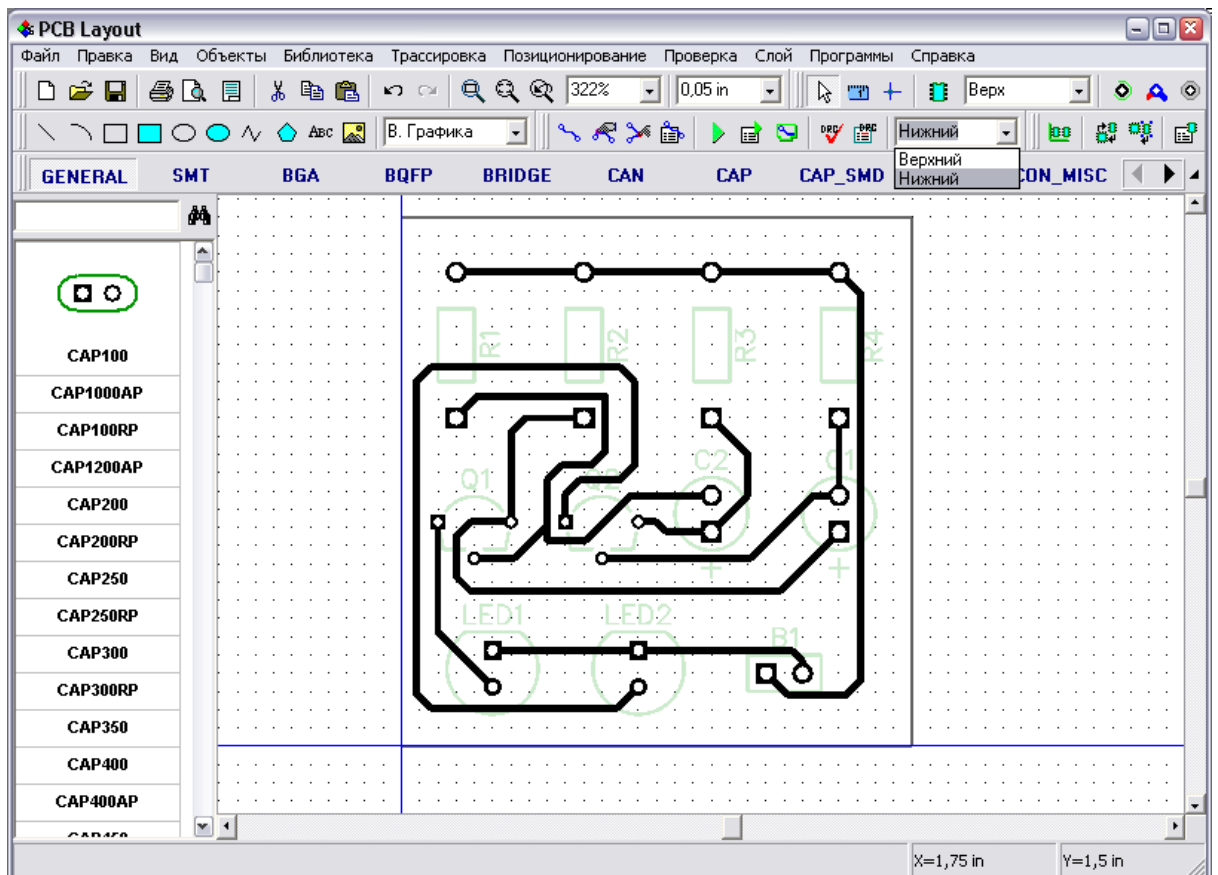
(DRC)

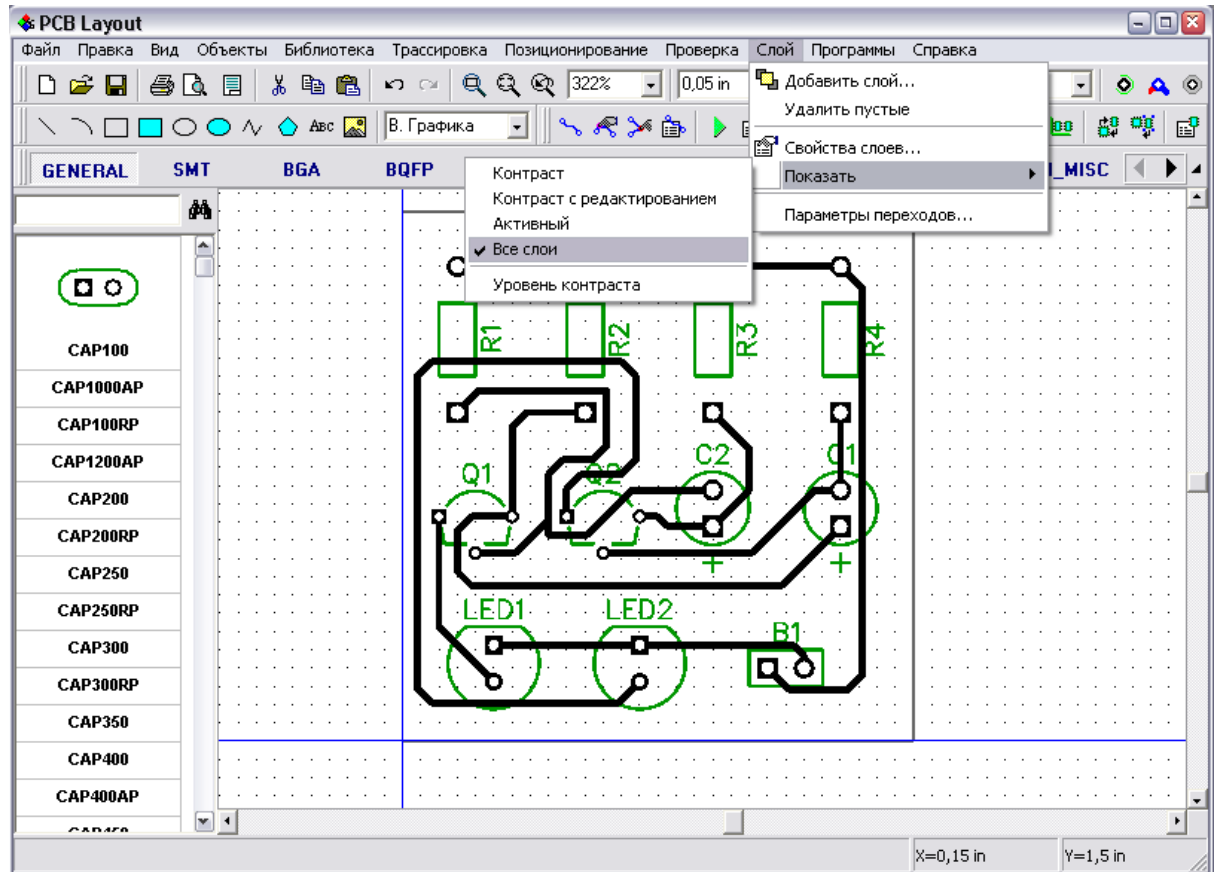
, DRC ( “ / ”,

“ / ” .  
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 ( “ / ” ) .  
 “ ”(2.5.14),  
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 2.5.3 – 2.5.13.

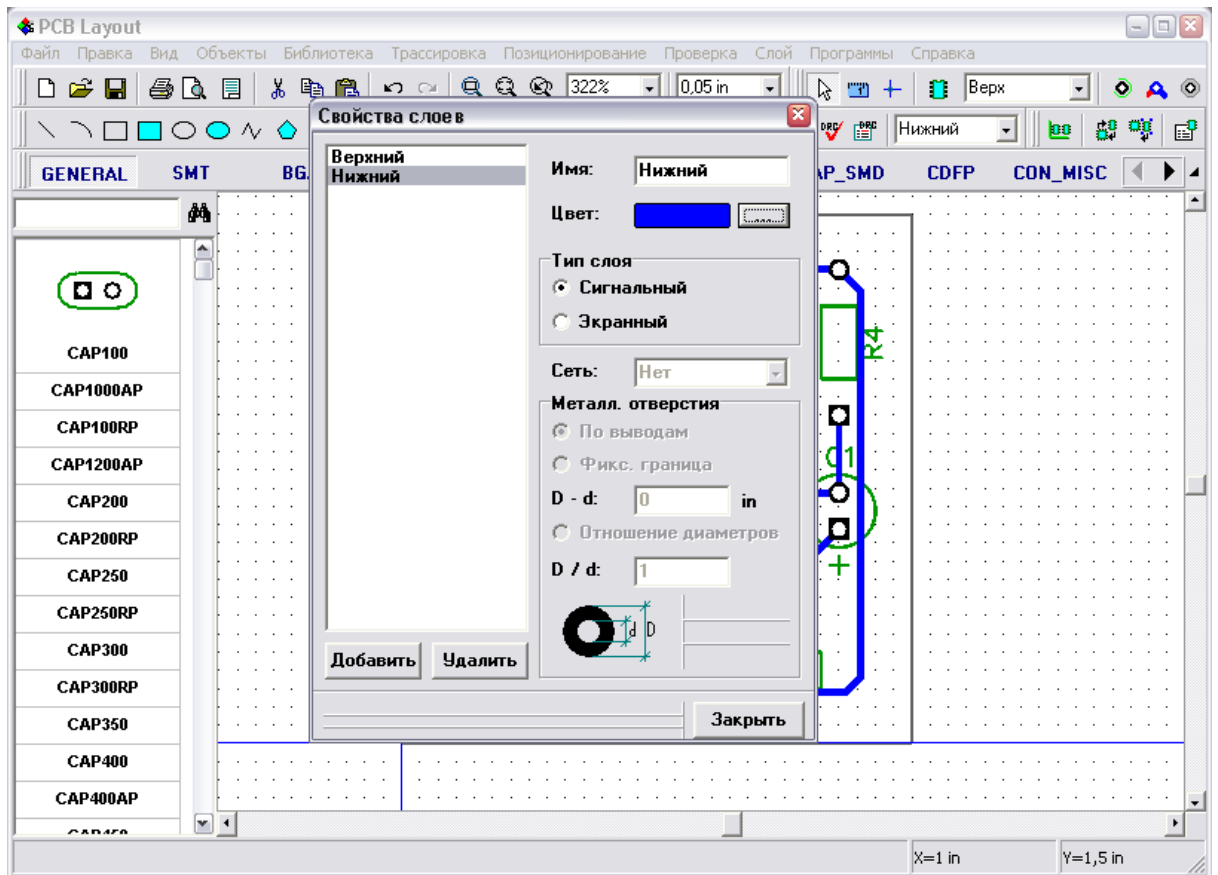
## 2.5.3

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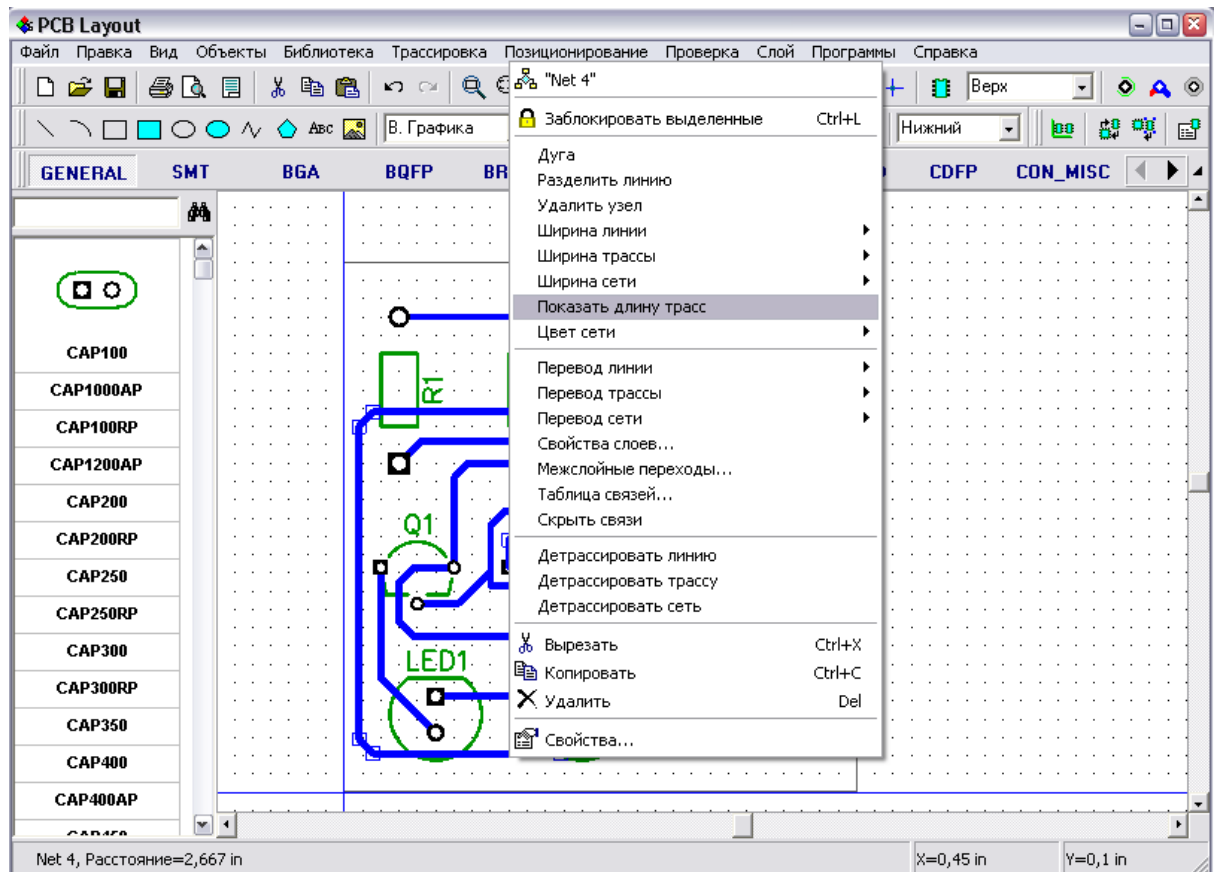
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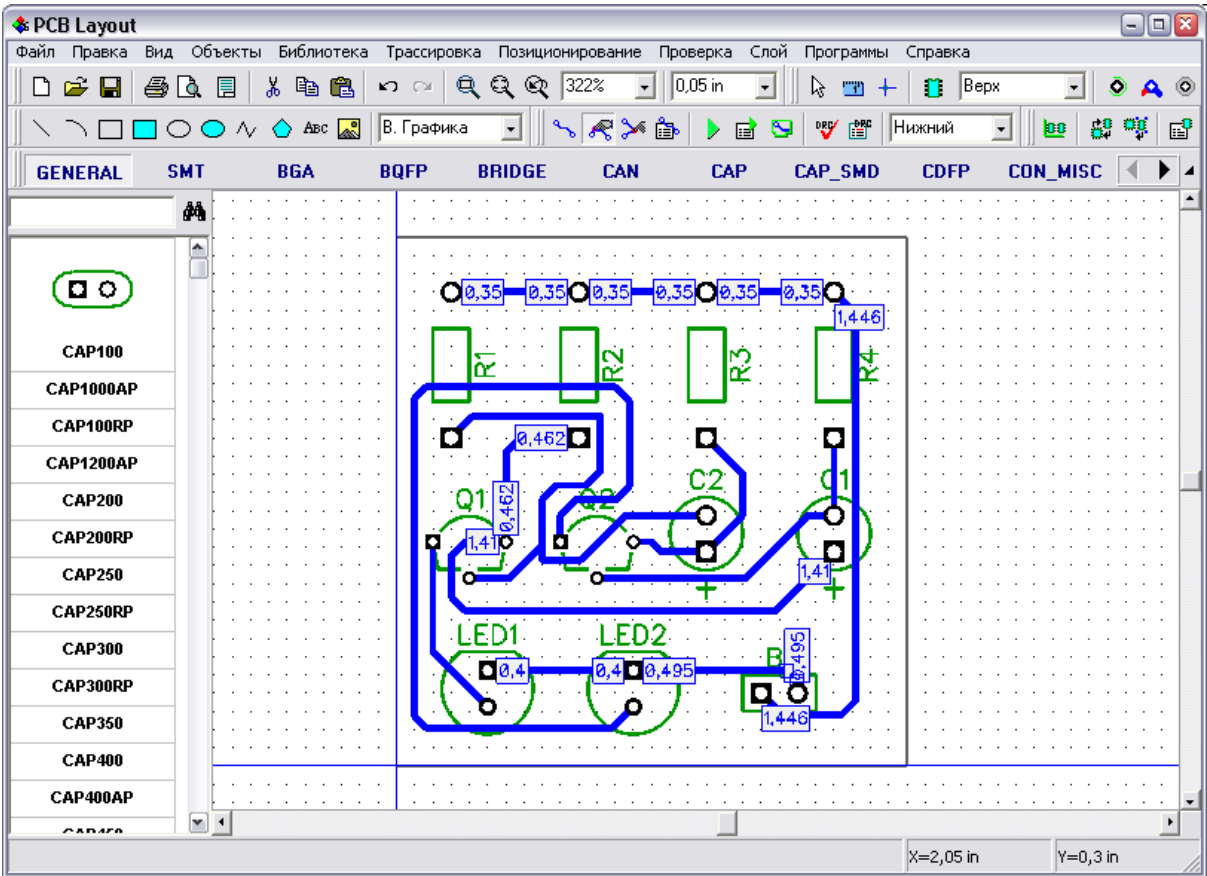
## 2.5.4

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Ctrl “ ”).

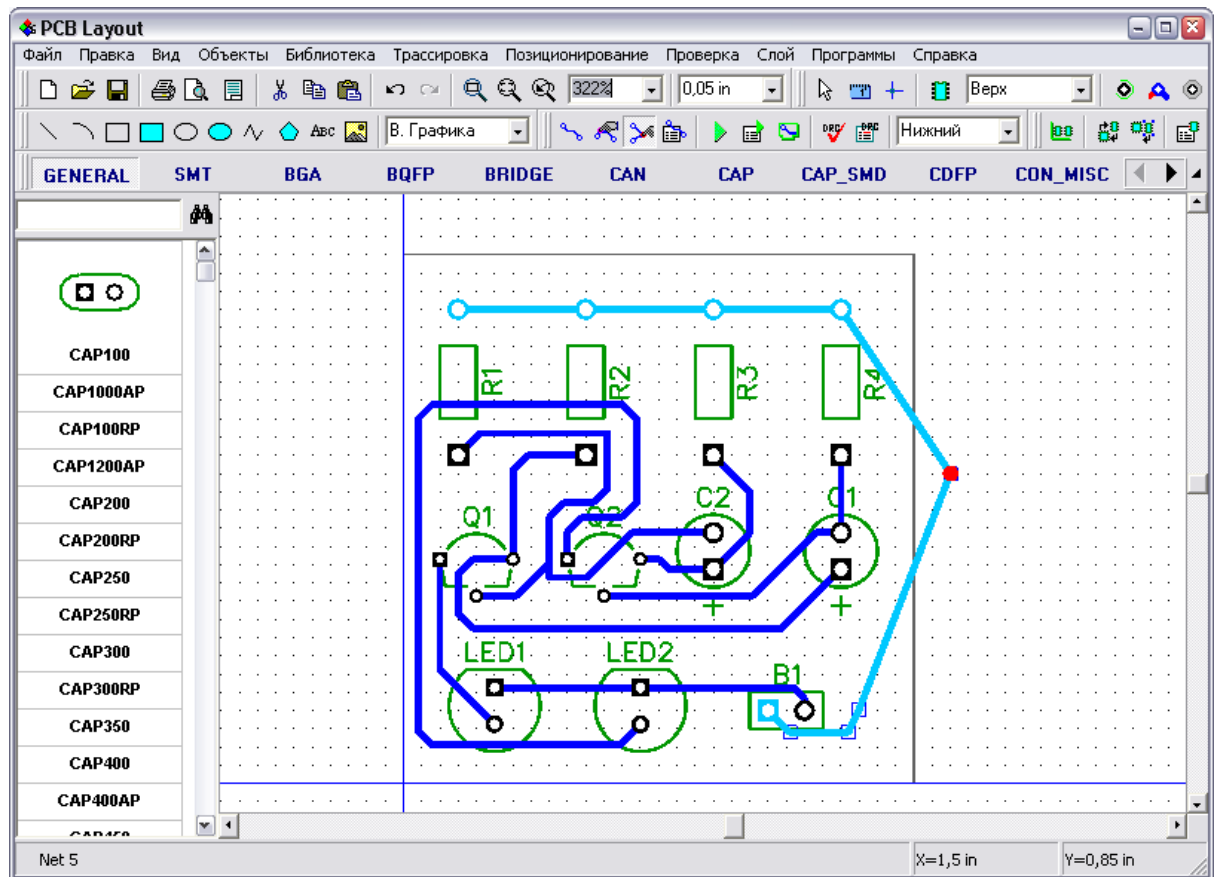




“ ” ’ ( - )

### 2.5.5

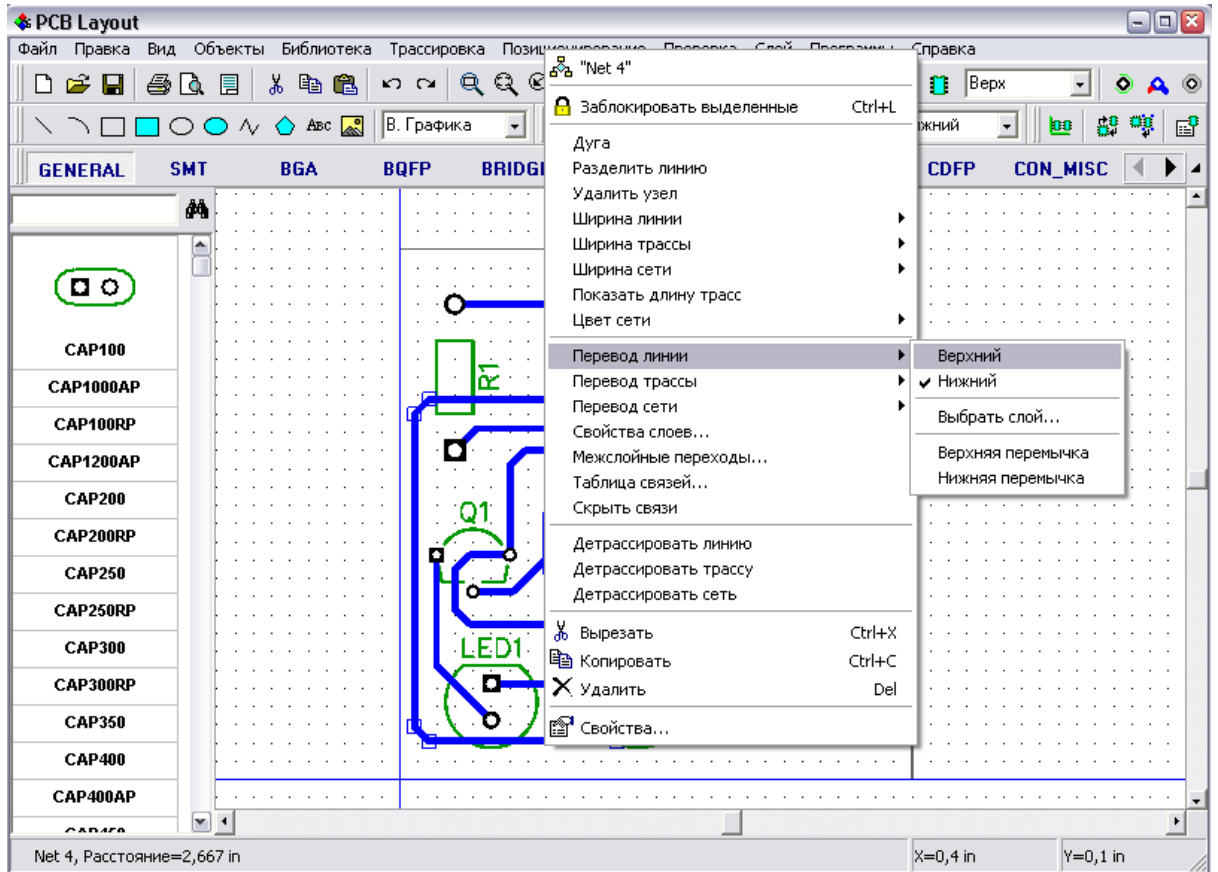
( 90 45 ), 90  
 DipTrace  
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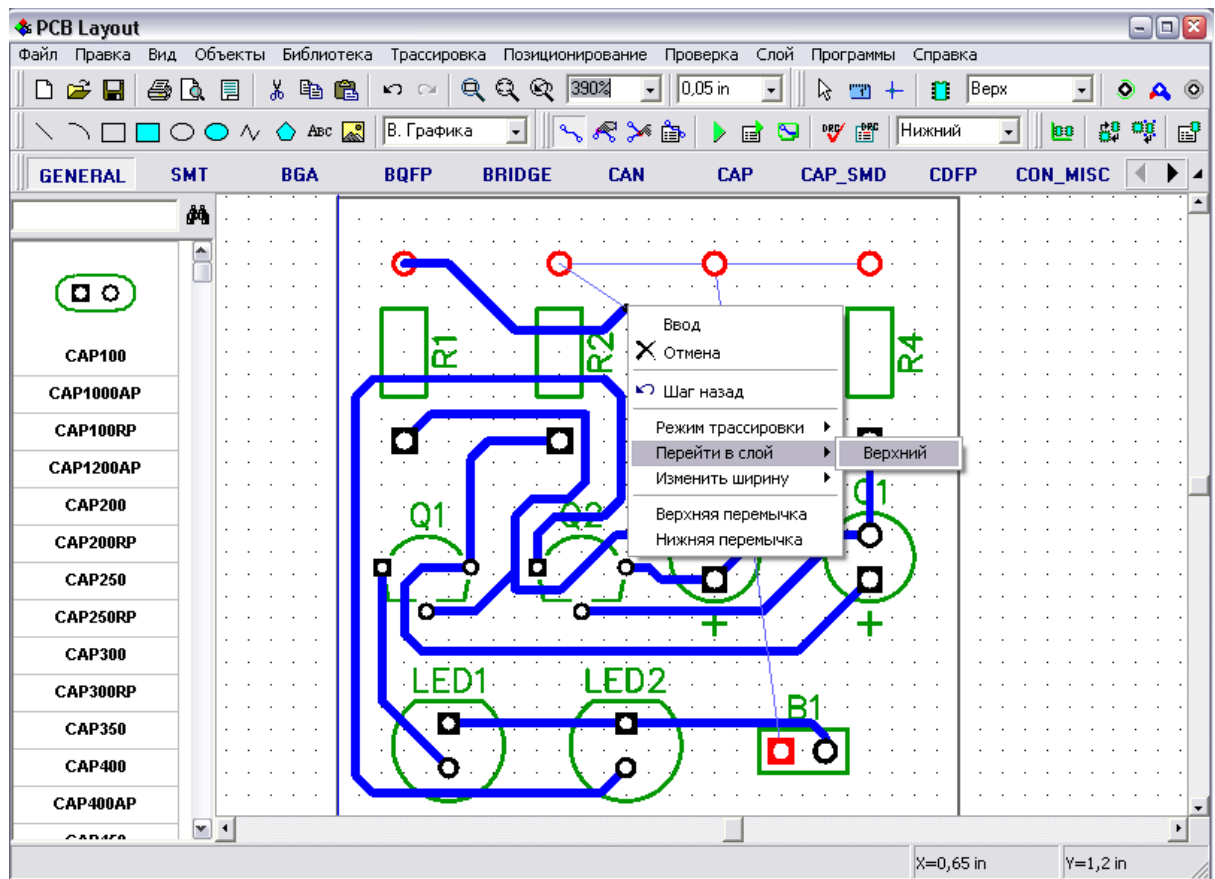


Ctrl+ Ctrl-

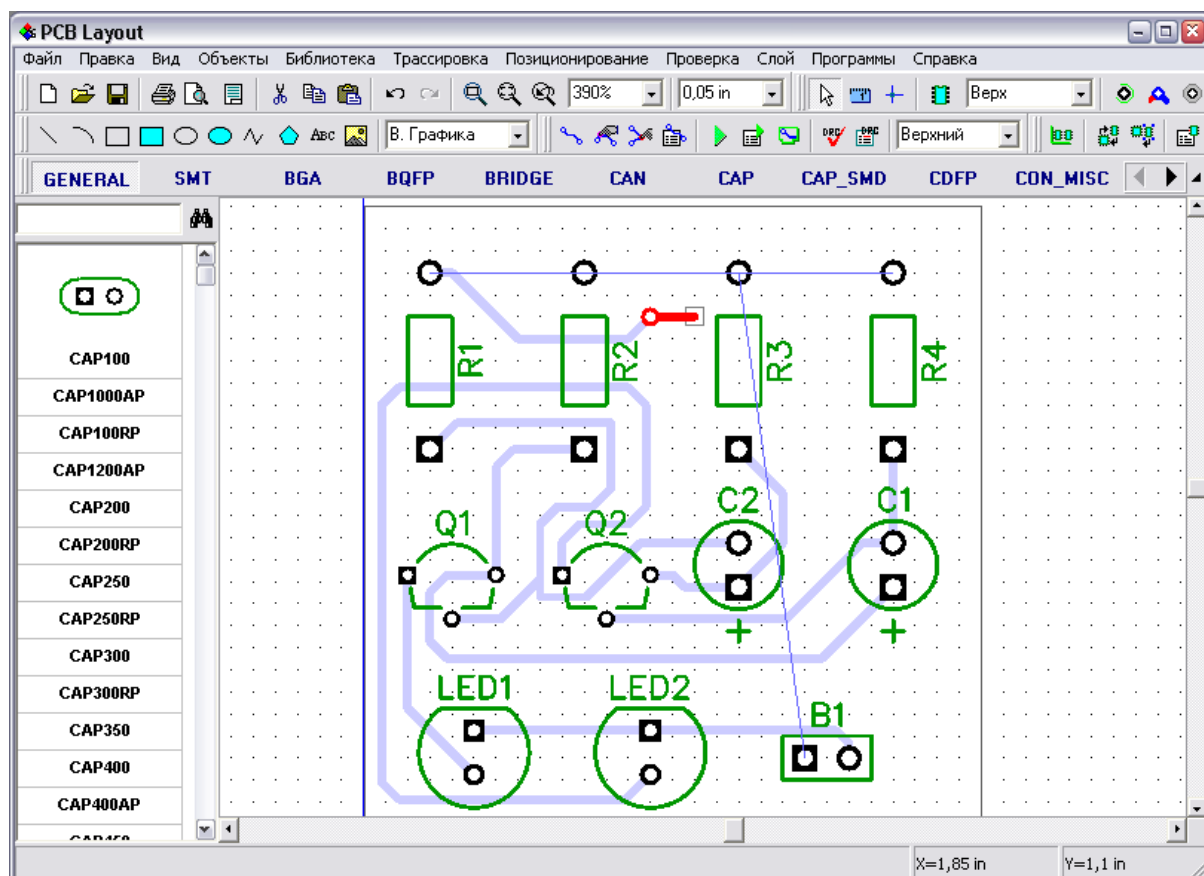
“F11”

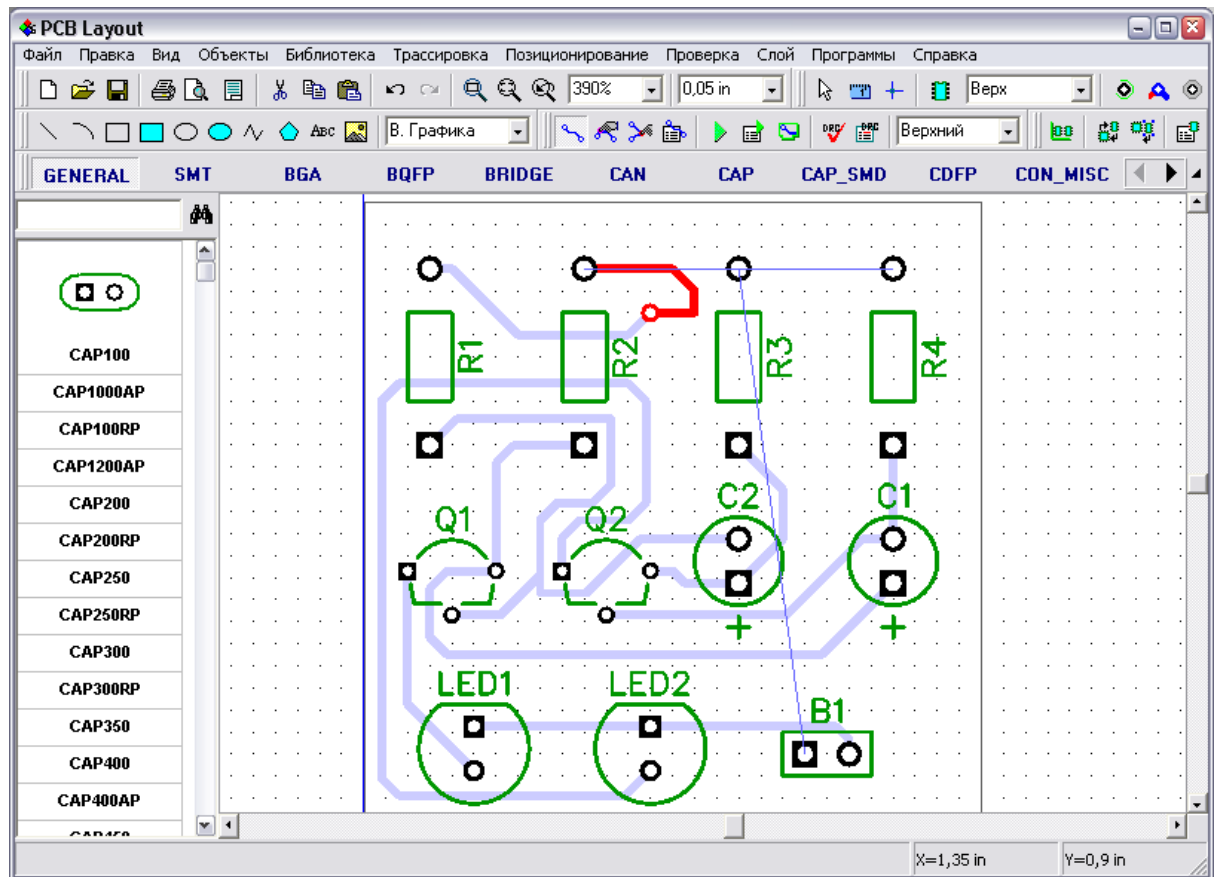
DipTrace





(            ),  
 “            ”            ,            ‘Enter’.



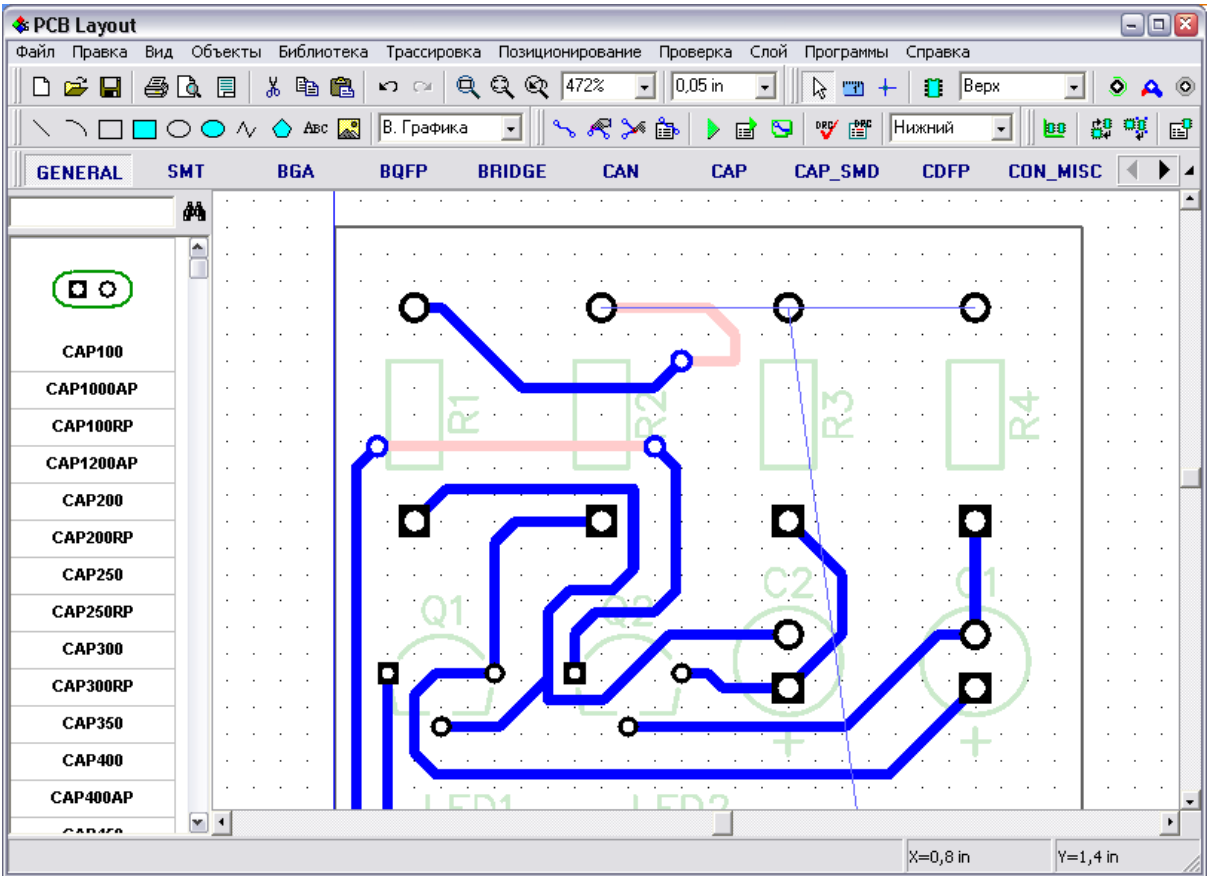


## 2.5.6

DipTrace

DipTrace

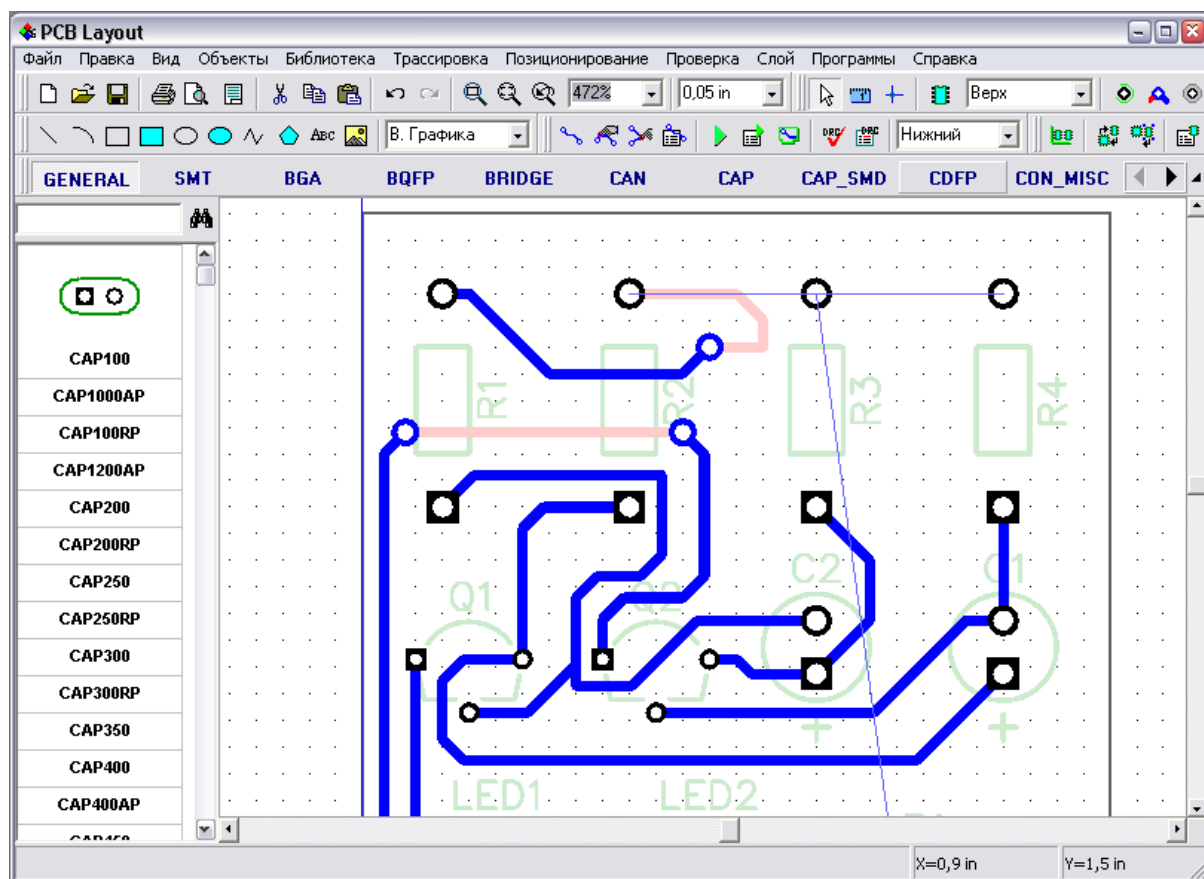




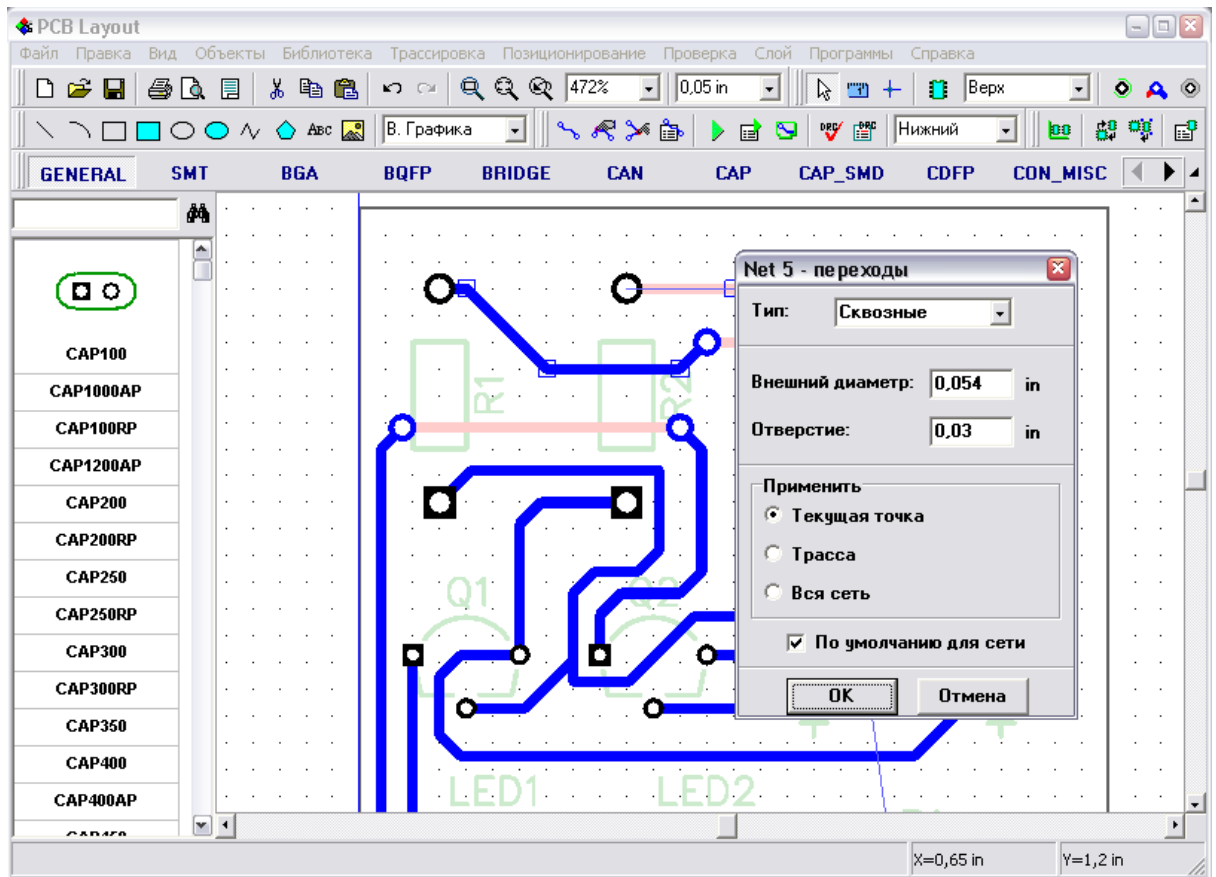
“ /

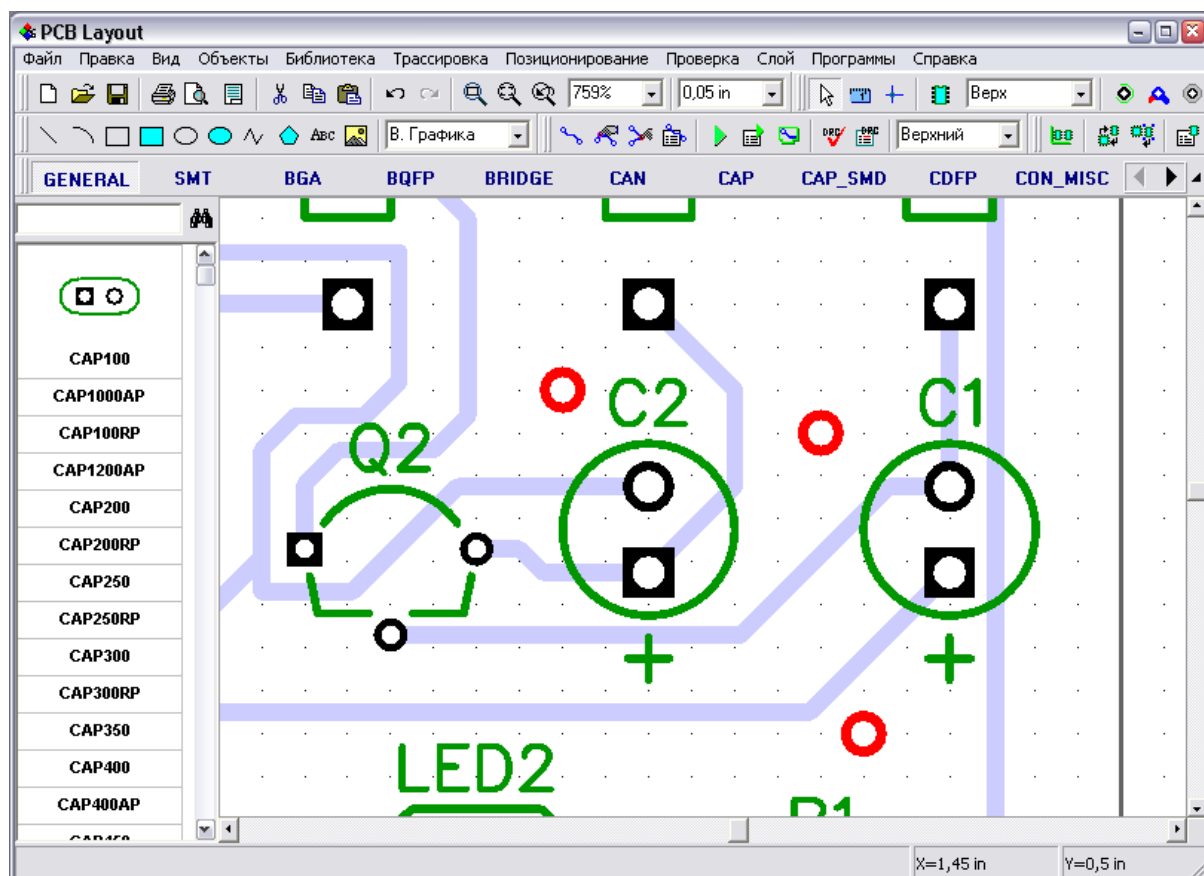
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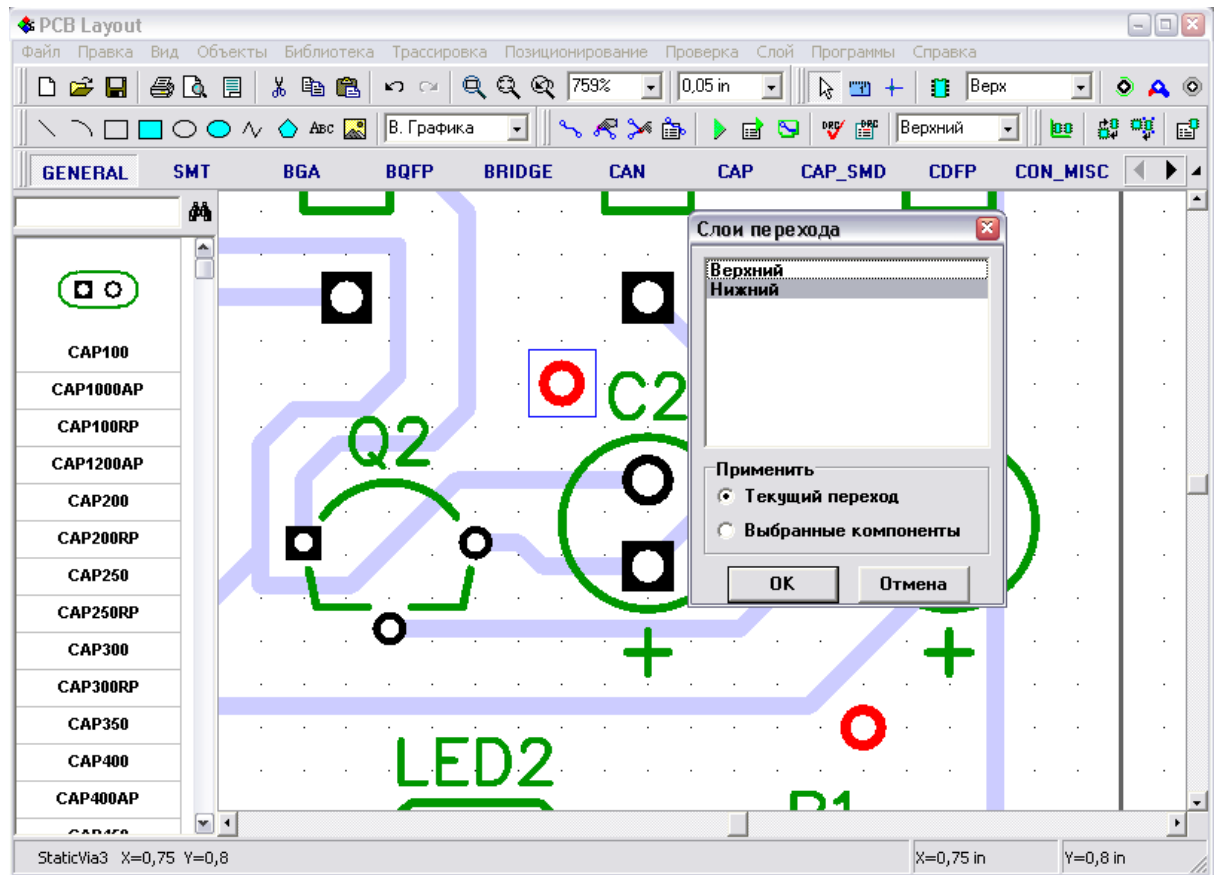
“OK”



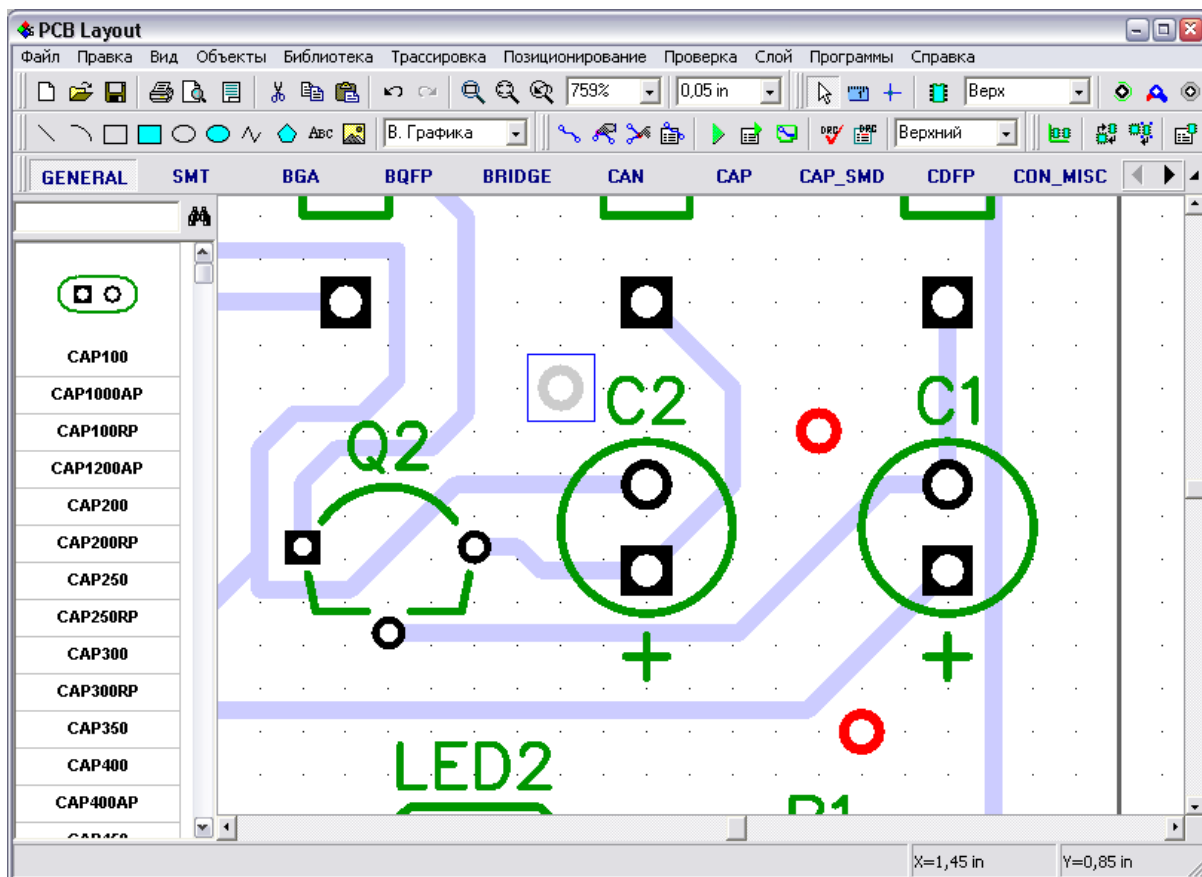
“OK”







OK.



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” “ / ” :

“ ” / .

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## 2.5.7

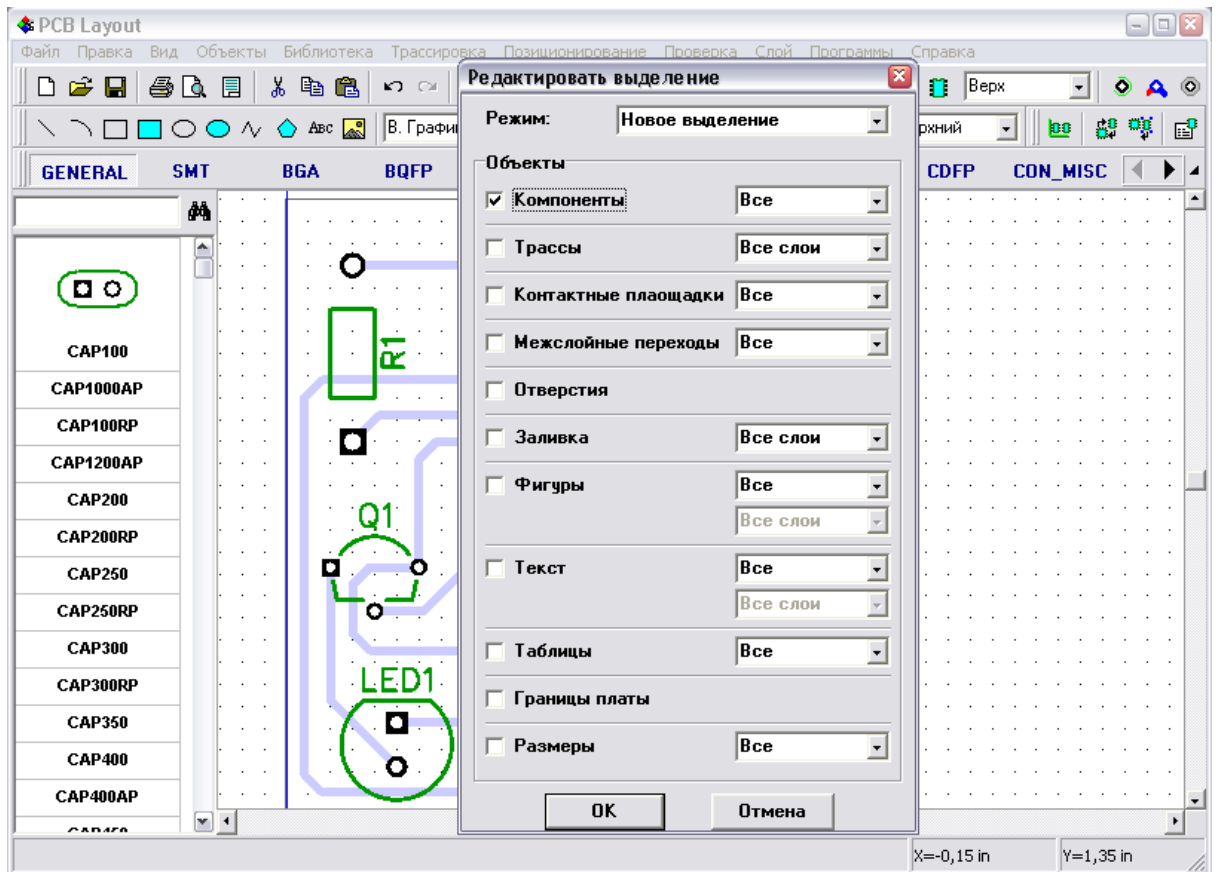
/

..

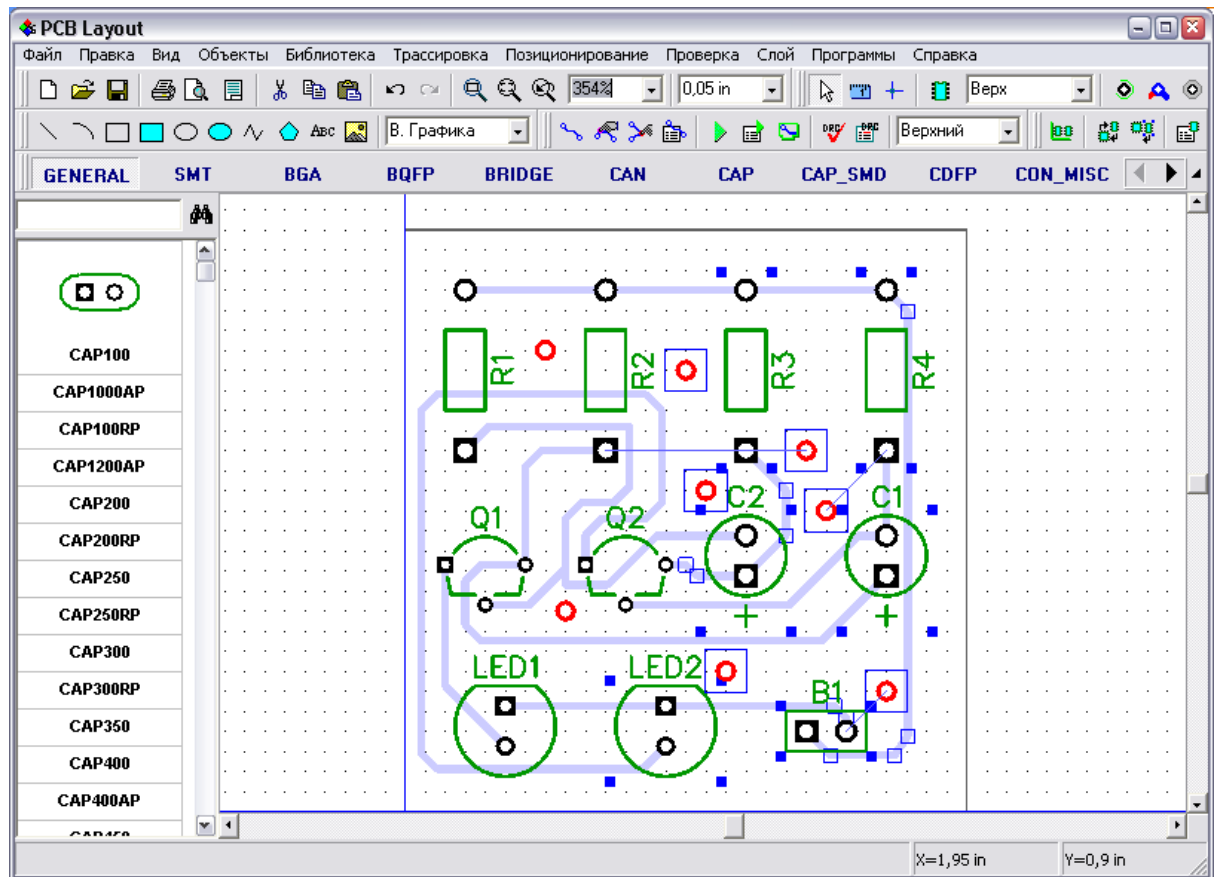
Ctrl,

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»

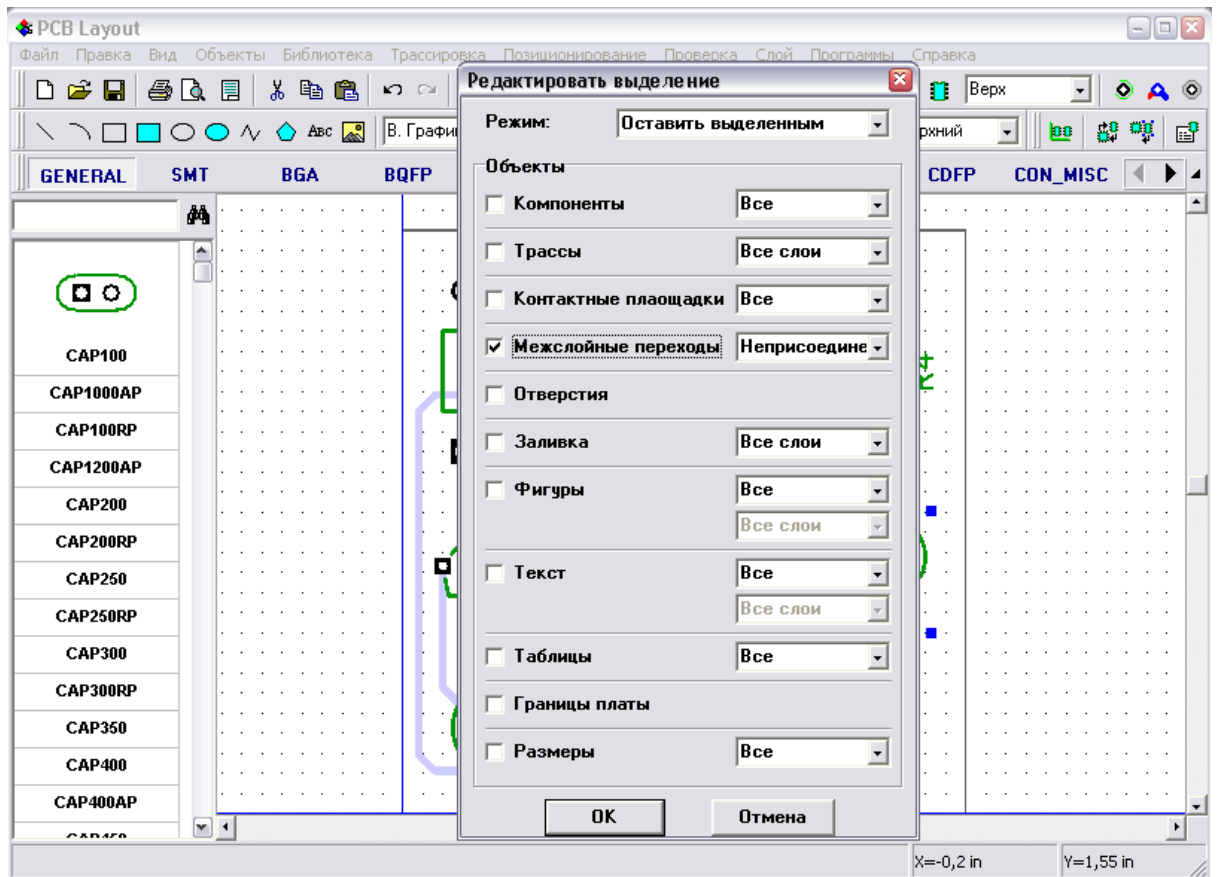


OK.



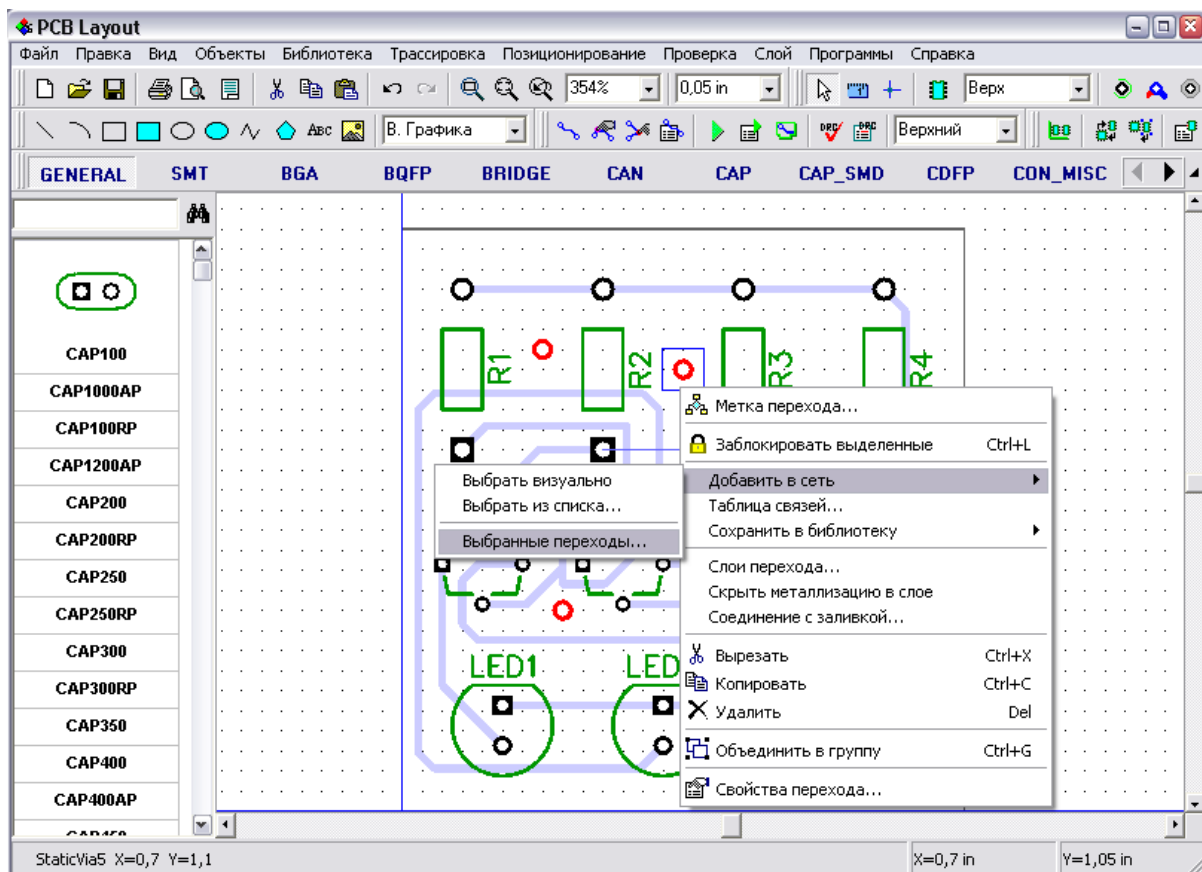
, « / »  
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OK

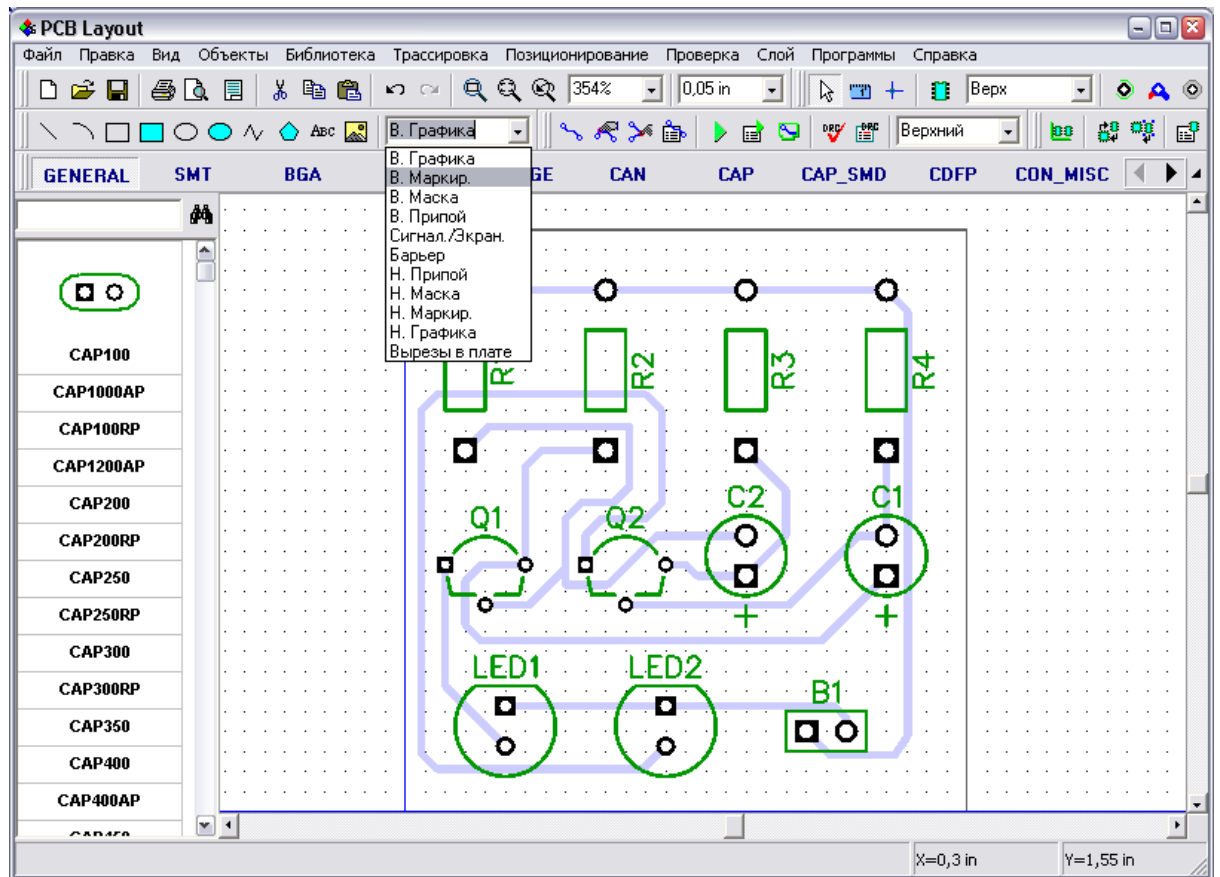
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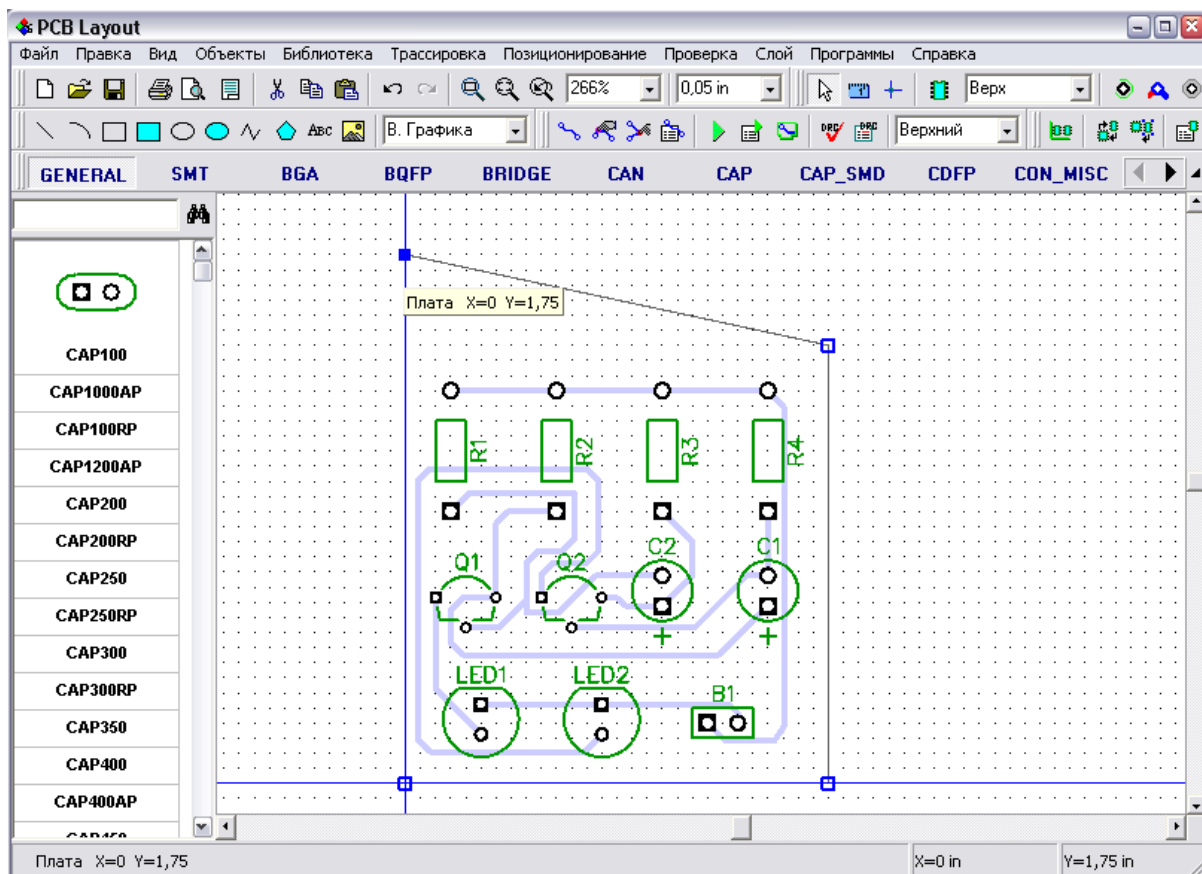


OK.

## 2.5.8

В меню **Файл** выбрать **Сохранить** (или нажать клавишу **Ctrl+S**).  
 В появившемся диалоговом окне **Сохранить** выбрать тип файла **DXF**.  
 В появившемся диалоговом окне **Сохранить** выбрать путь к файлу и нажать **ОК**.  
 В меню **Файл** выбрать **Печать** (или нажать клавишу **Ctrl+P**).  
 В появившемся диалоговом окне **Печать** выбрать тип файла **Bmp** или **Jpeg**.  
 В появившемся диалоговом окне **Печать** выбрать путь к файлу и нажать **ОК**.  
 В меню **Файл** выбрать **Печать** (или нажать клавишу **Ctrl+P**).  
 В появившемся диалоговом окне **Печать** выбрать тип файла **Gerber**.  
 В появившемся диалоговом окне **Печать** выбрать путь к файлу и нажать **ОК**.



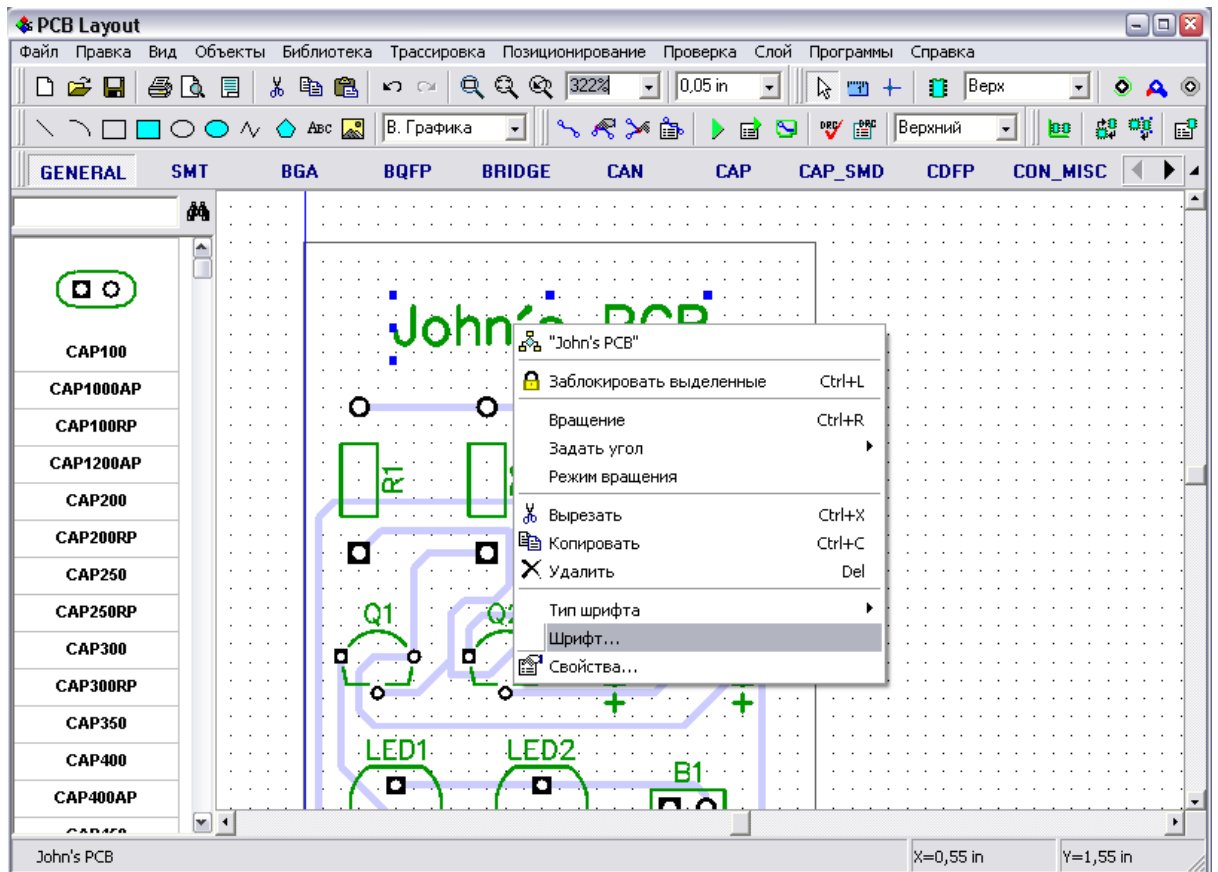


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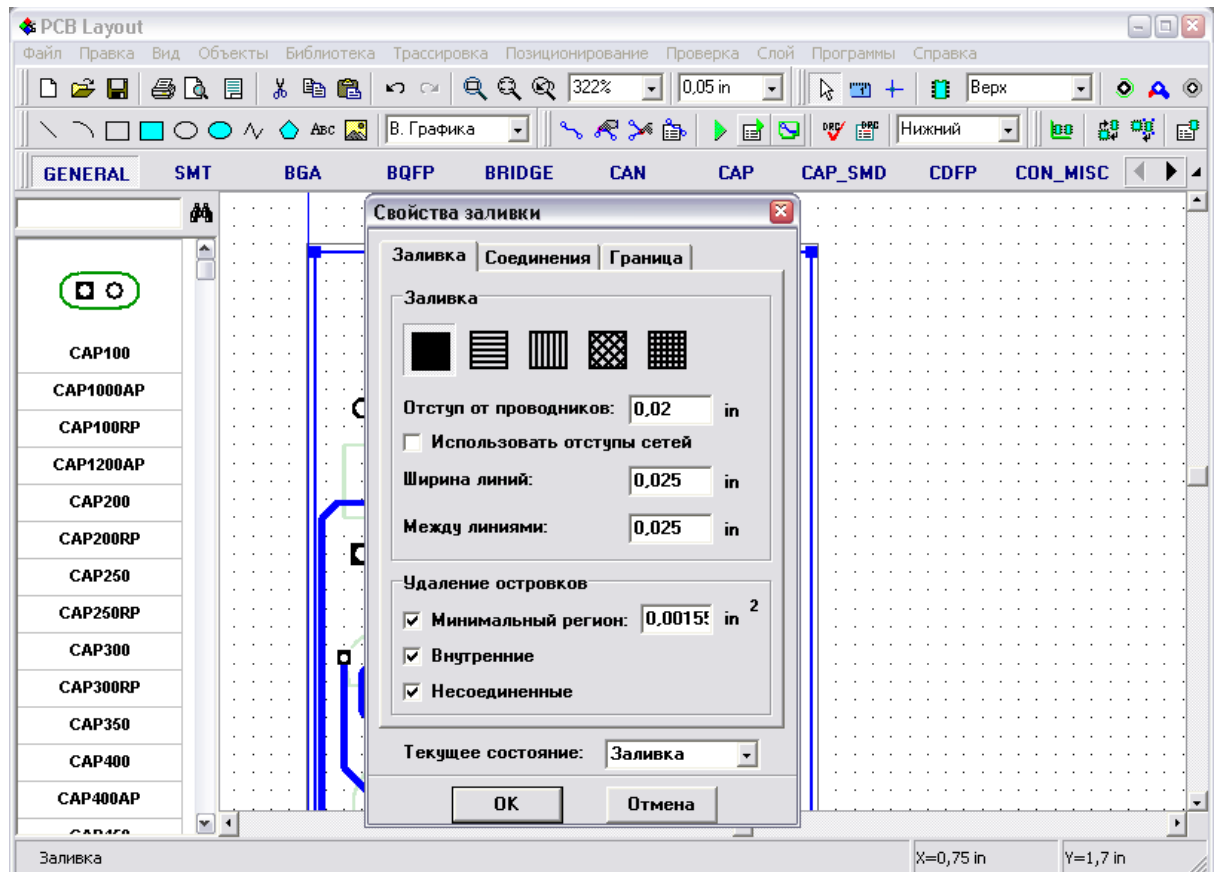
,  
/ " " ( "Abc"),  
"Enter"

" / " / . "

Gerber . True Type  
( )



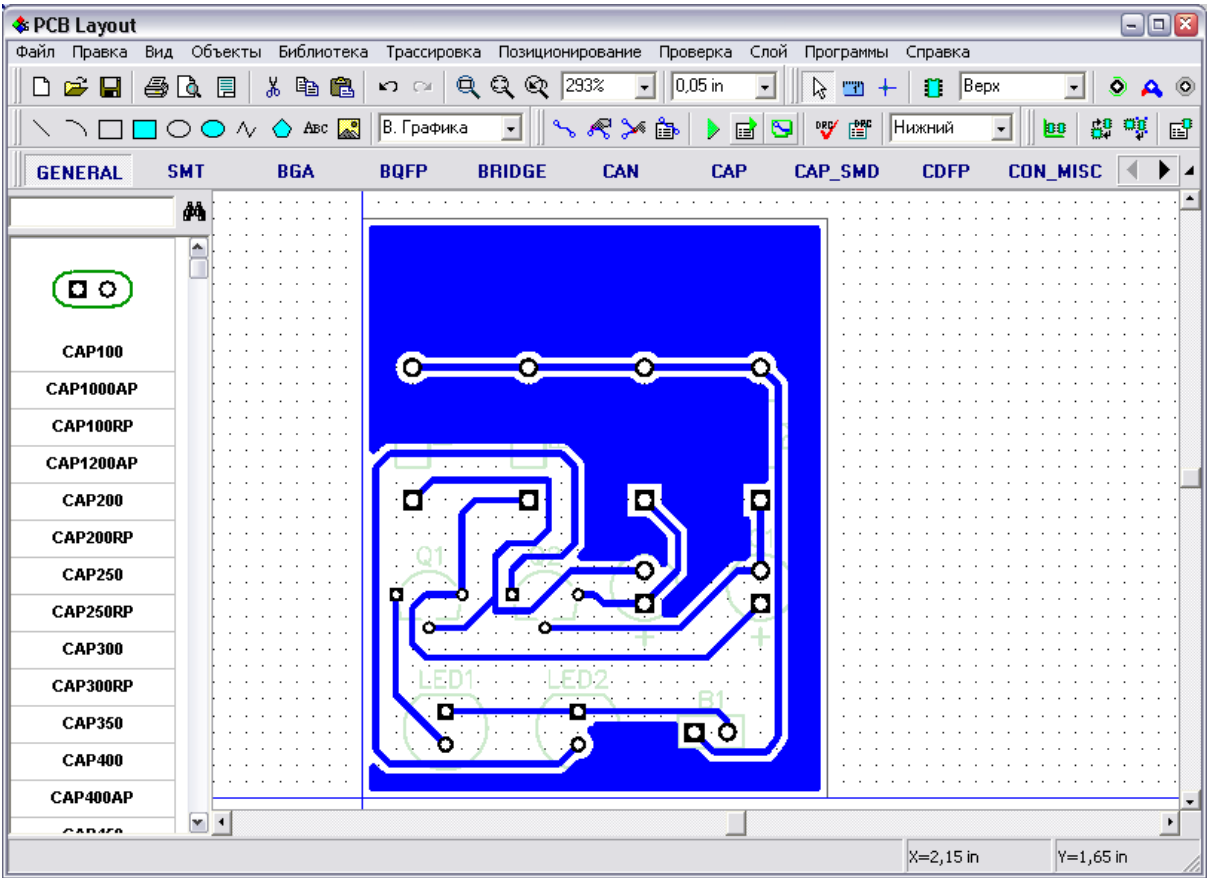
## 2.5.9

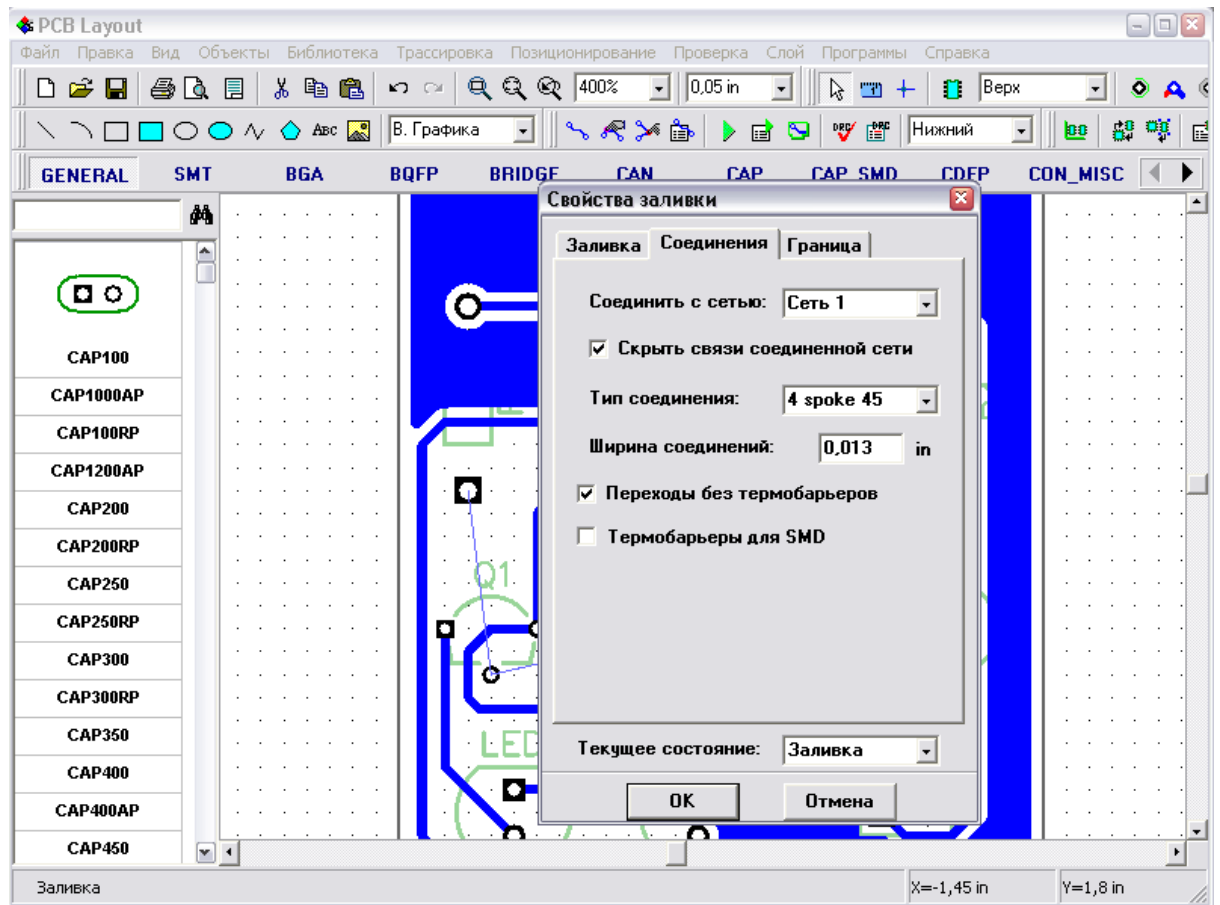


DipTrace shape-based

“OK”

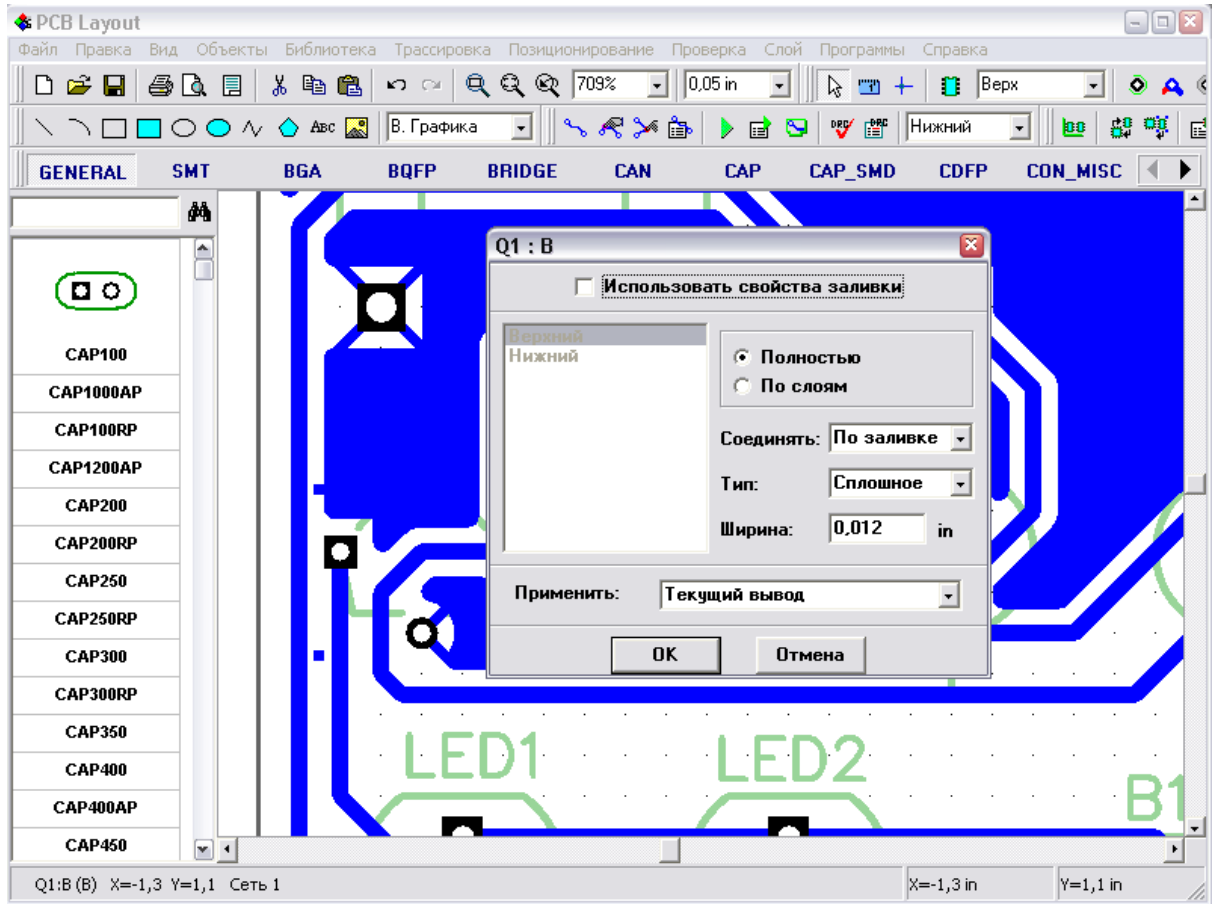
“OK”



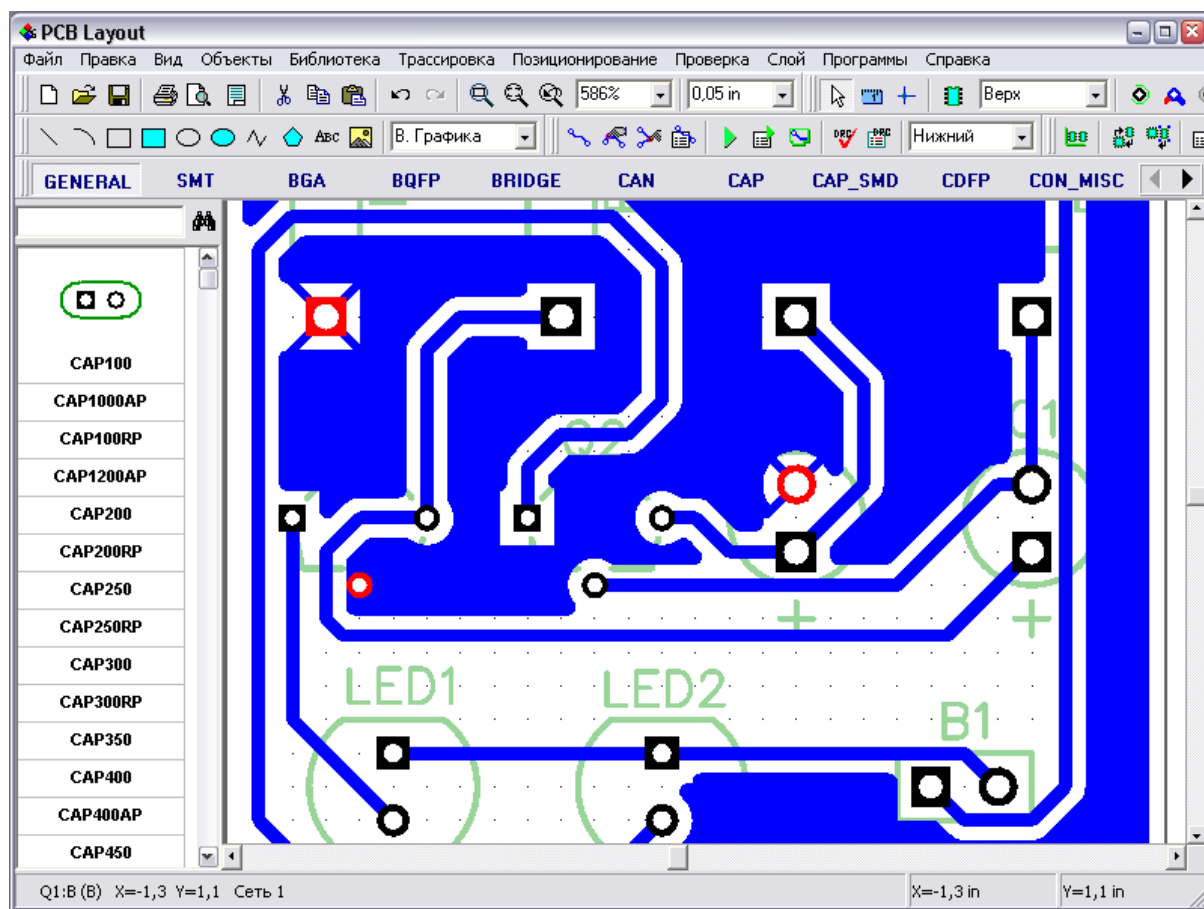


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 -  
 SMD  
 ( " SMD" " )  
 ,  
 " ( ),  
 " , Q1:B





Q1:B

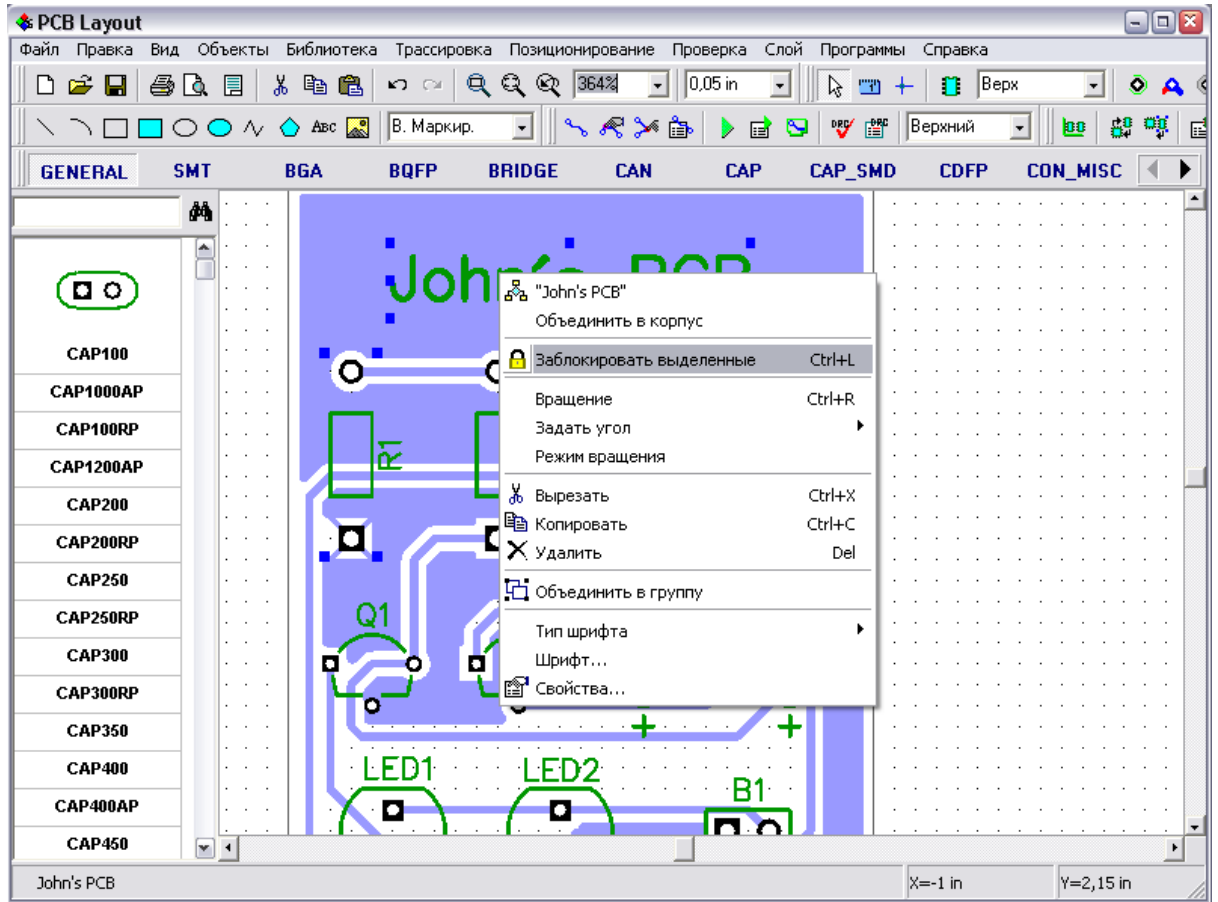


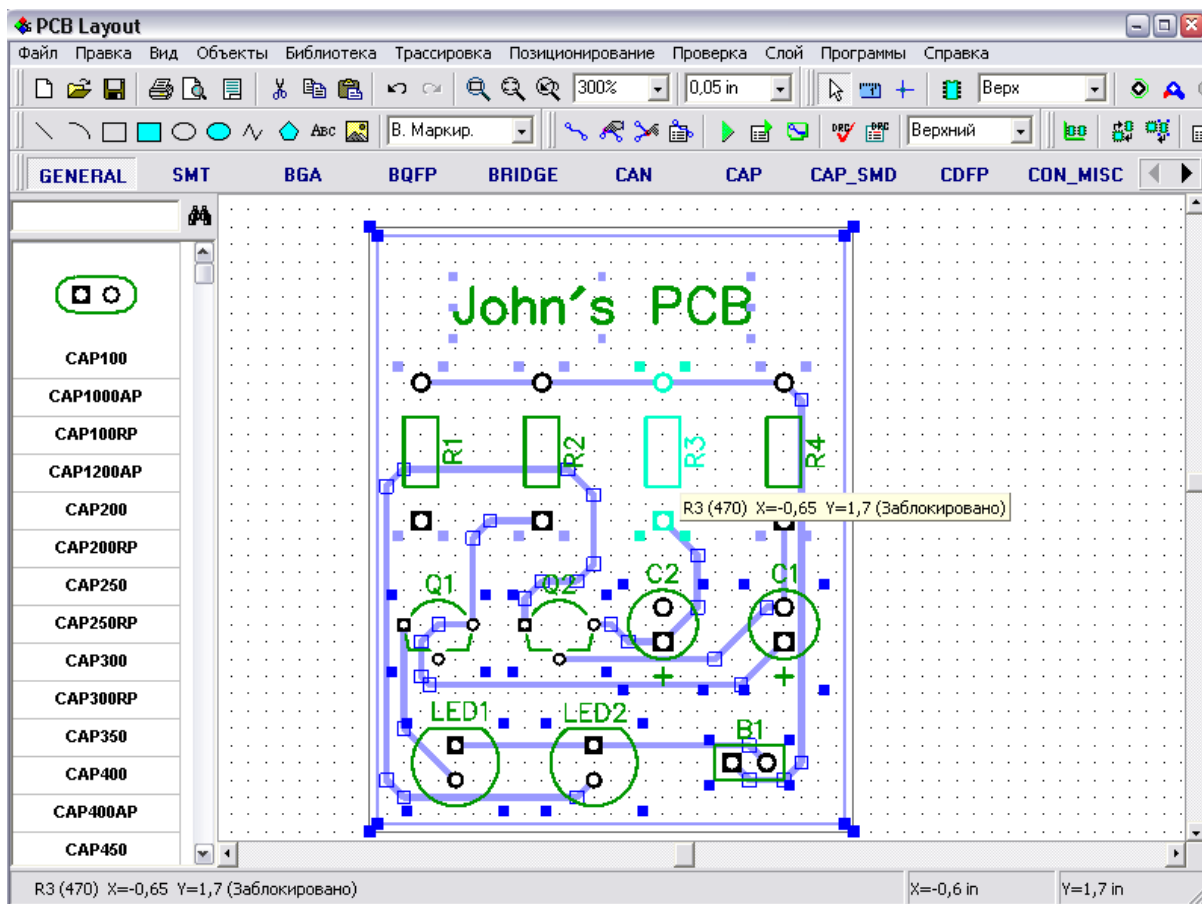
, SMD

( IV ) shape-based

## 2.5.10

DipTrace



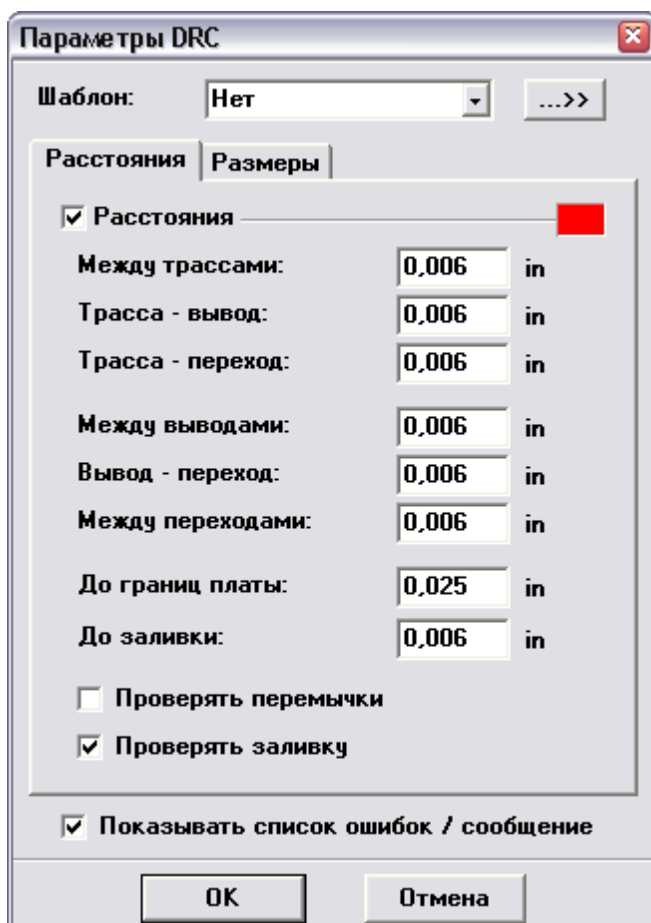


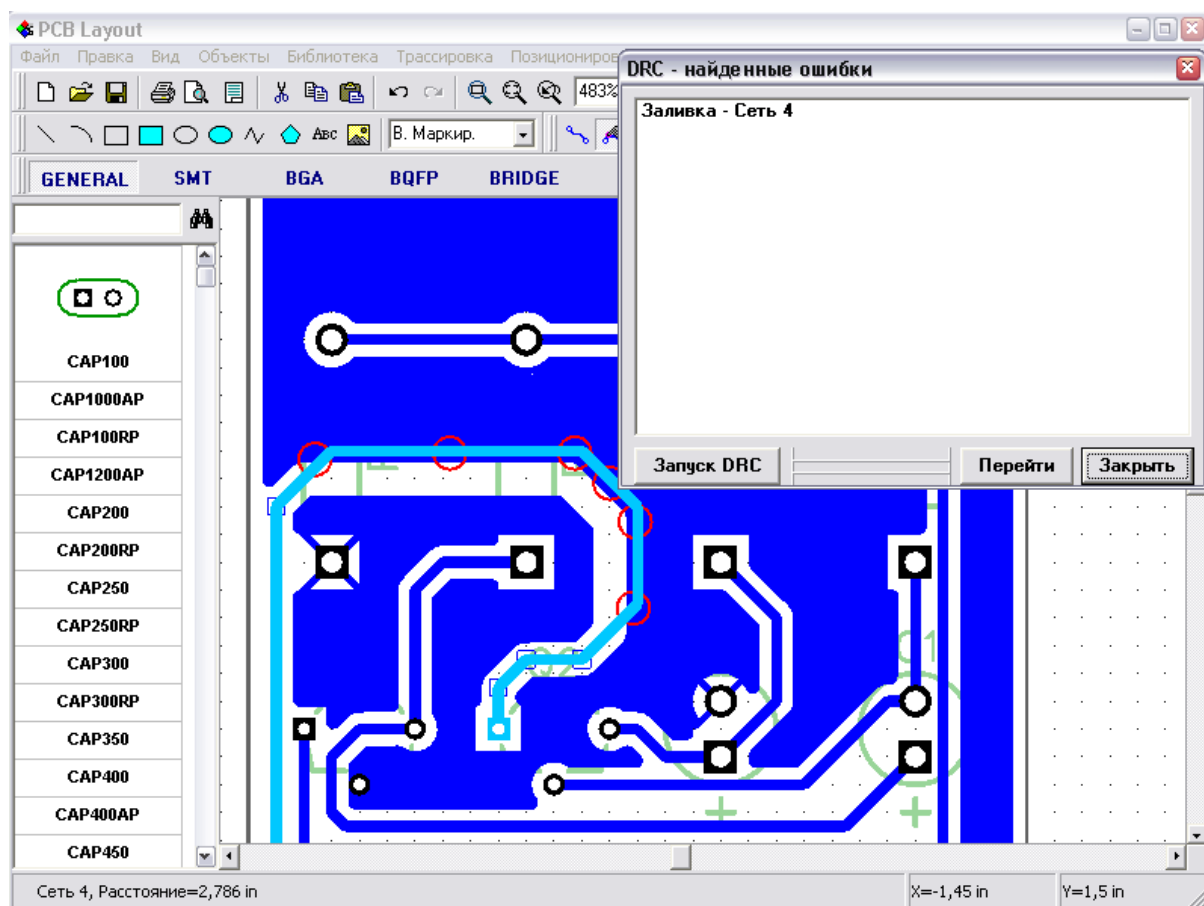
,  
 “ / ” : Ctrl+A  
 Ctrl+Alt+L.  
 “ / ”  
 ,  
 “ / ”  
 / ”

## 2.5.11

DipTrace

“ ”  
 DRC,  
 DRC  
 ,  
 “DRC” “ /  
 “ ” “ /





(  
1280x1024

,  
(  
800x600

DRC,

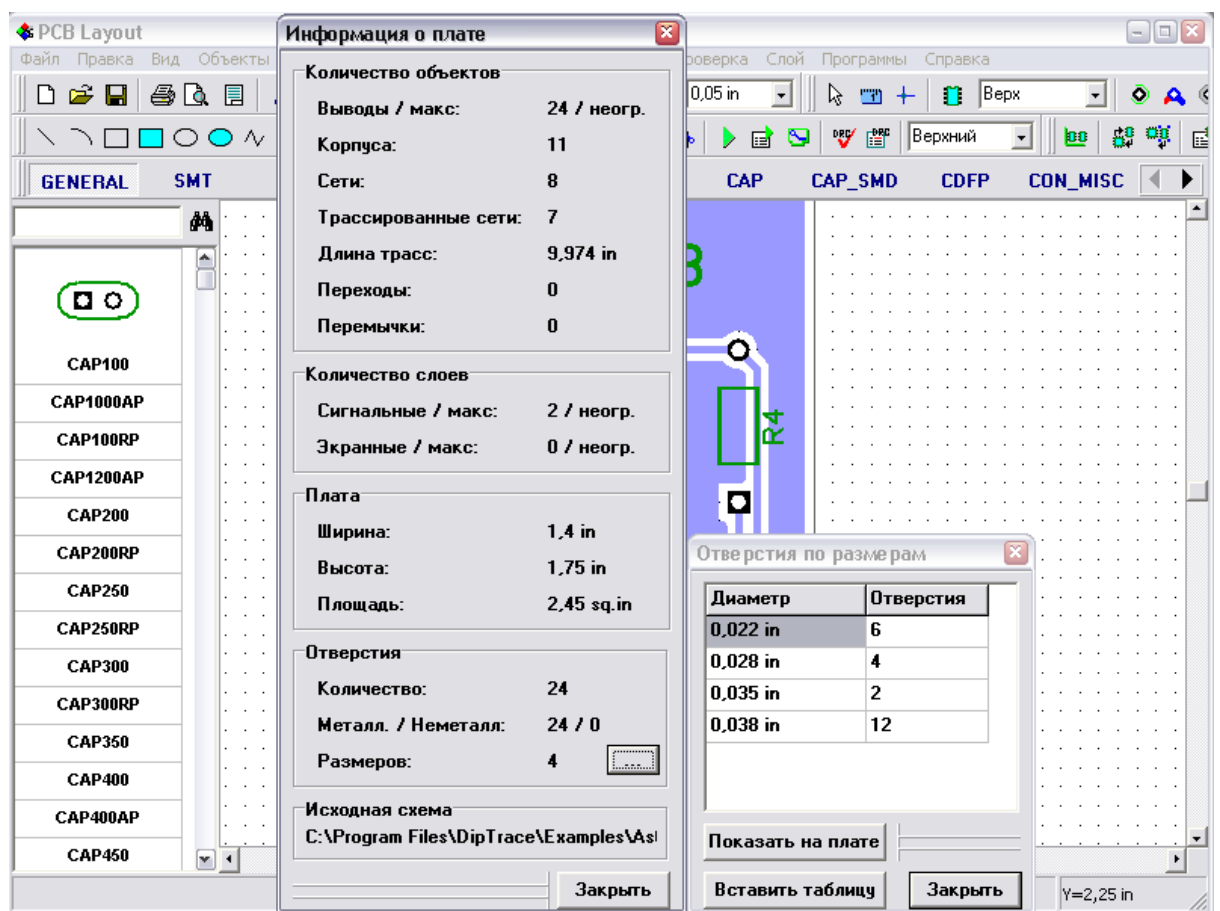
DRC

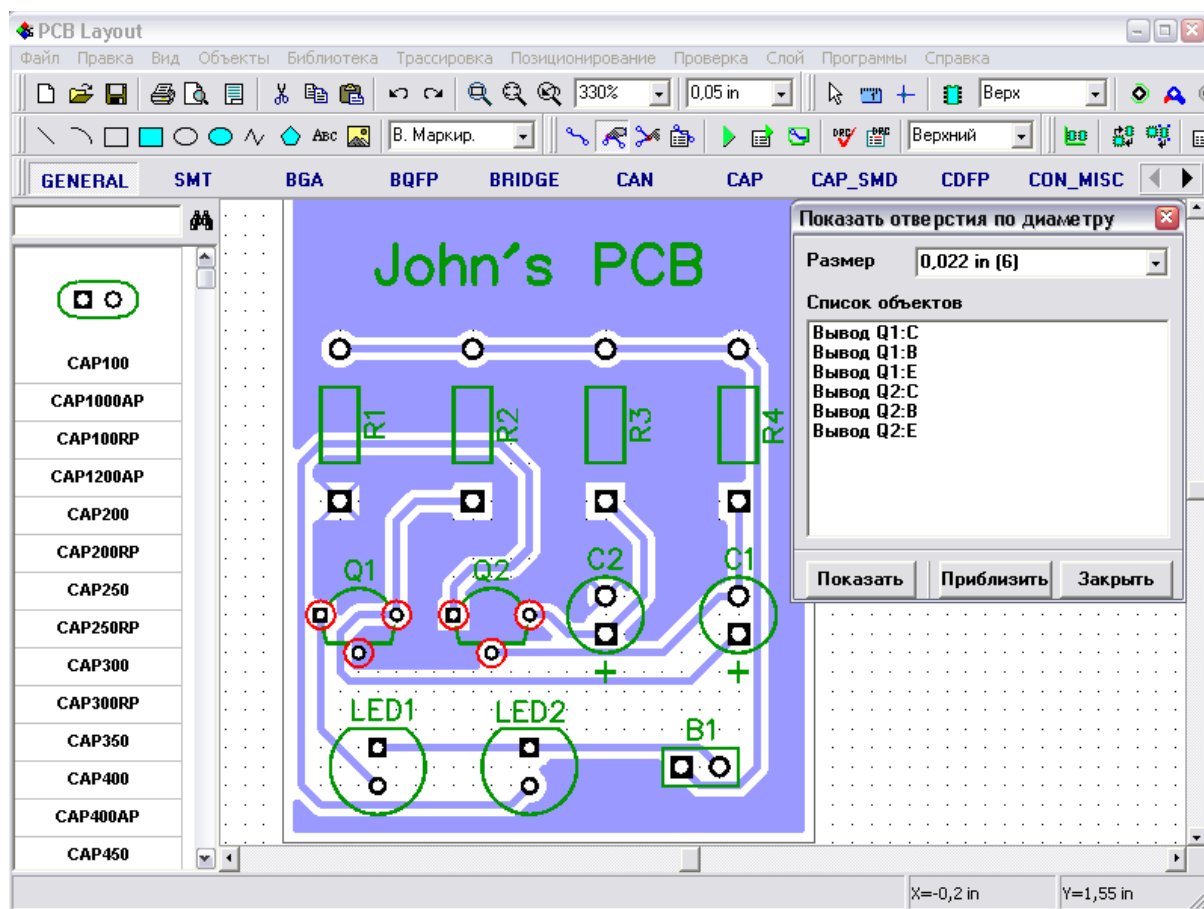
“ / ” OK.

“ / ”

DRC

## 2.5.12





" 1"

(F9).

"

"

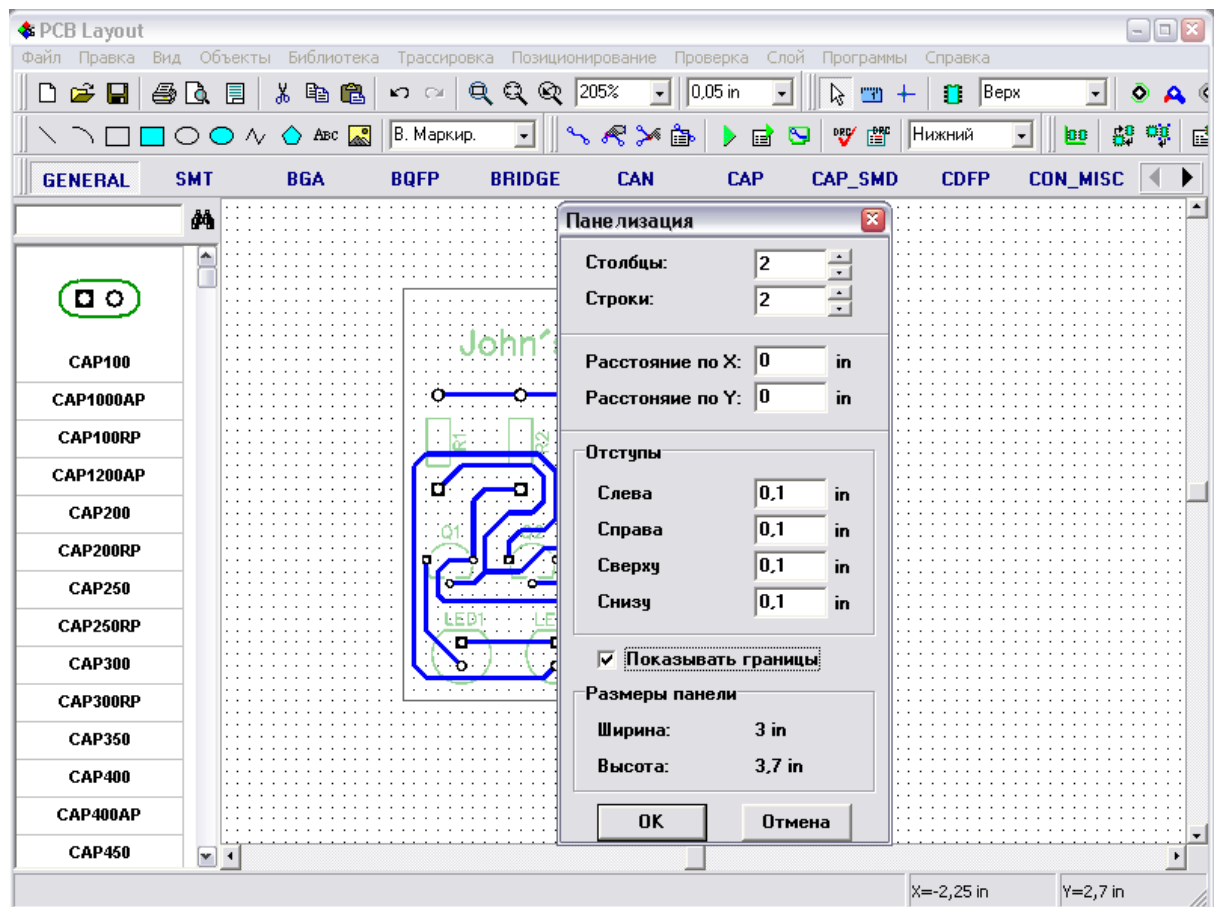
" / /

### 2.5.13

DipTrace,

" /





4

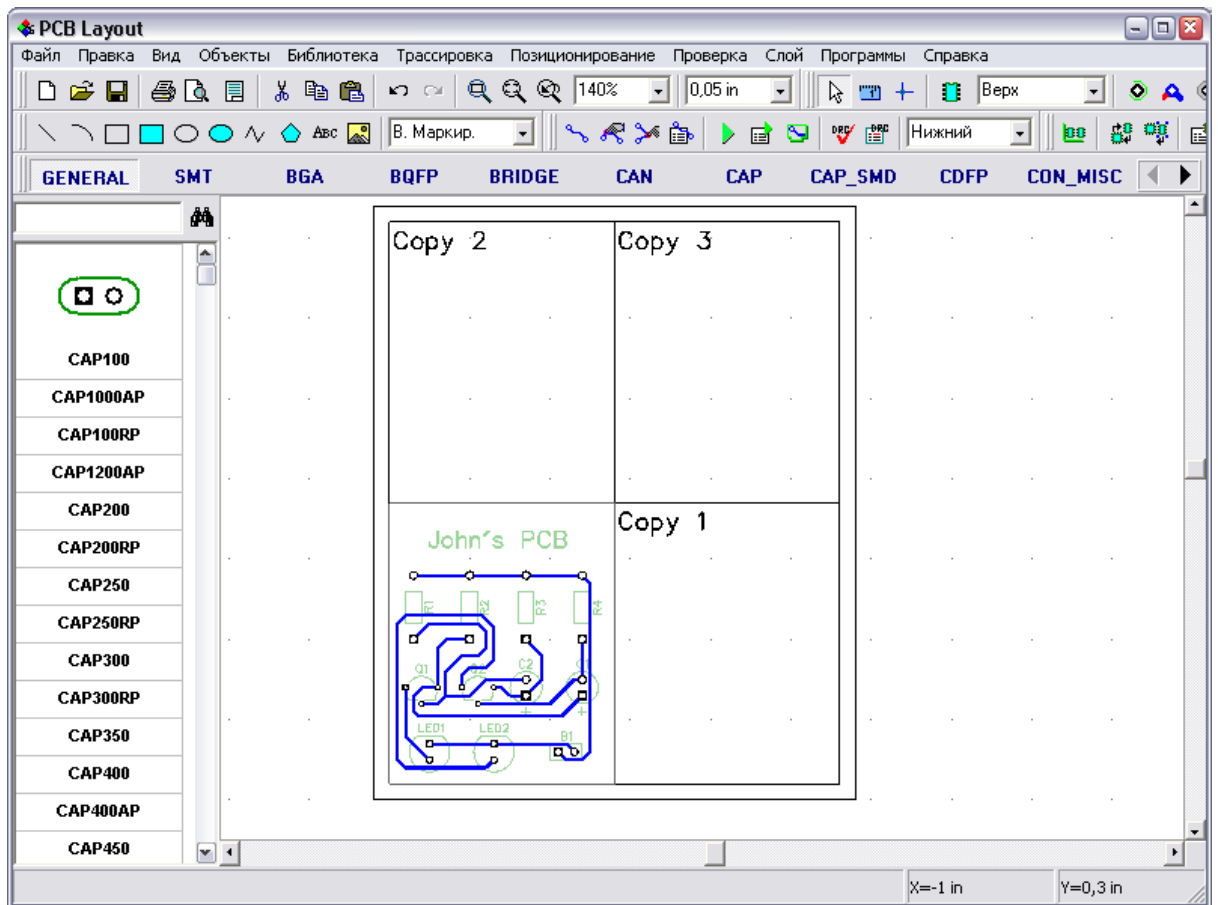
2 2.

0,1

"

"

:



“Copy #”,

Gerber/ Dxf/ NC drill,

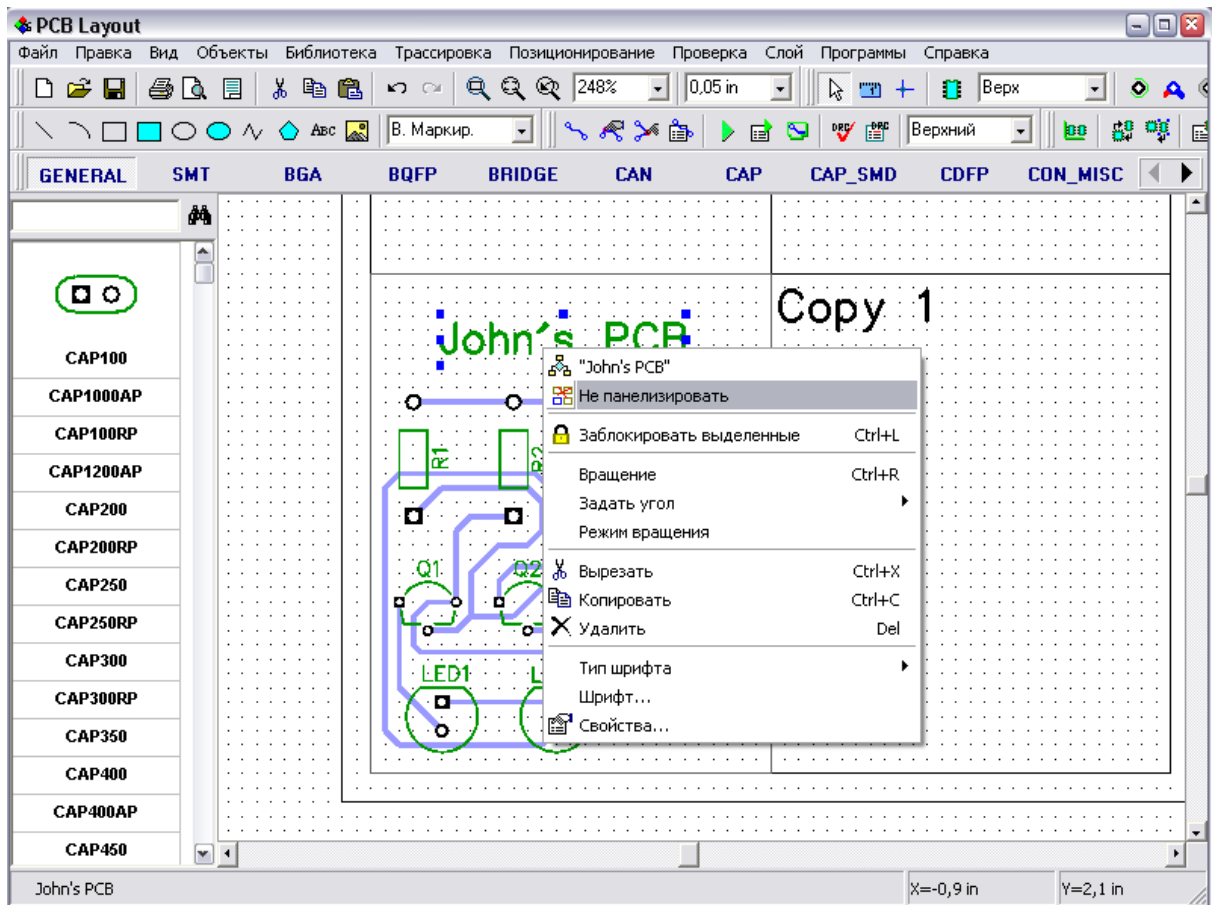
).

"

"

,

,



" /

"

.

1 ( ).

:

" /

"

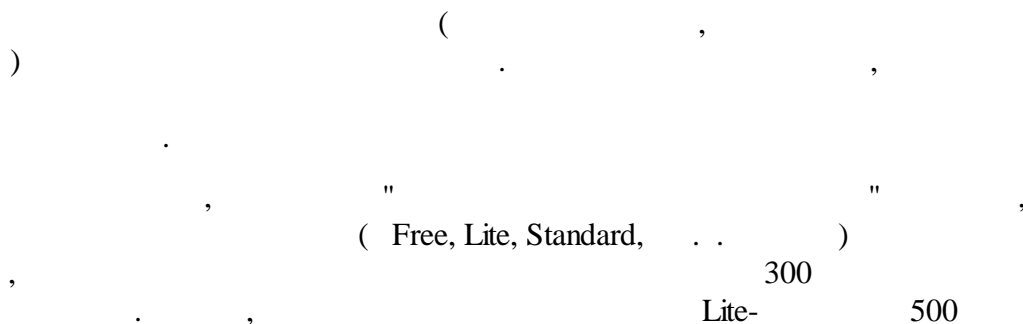
(Ctrl+A),  
Ctrl+C

,

(

)

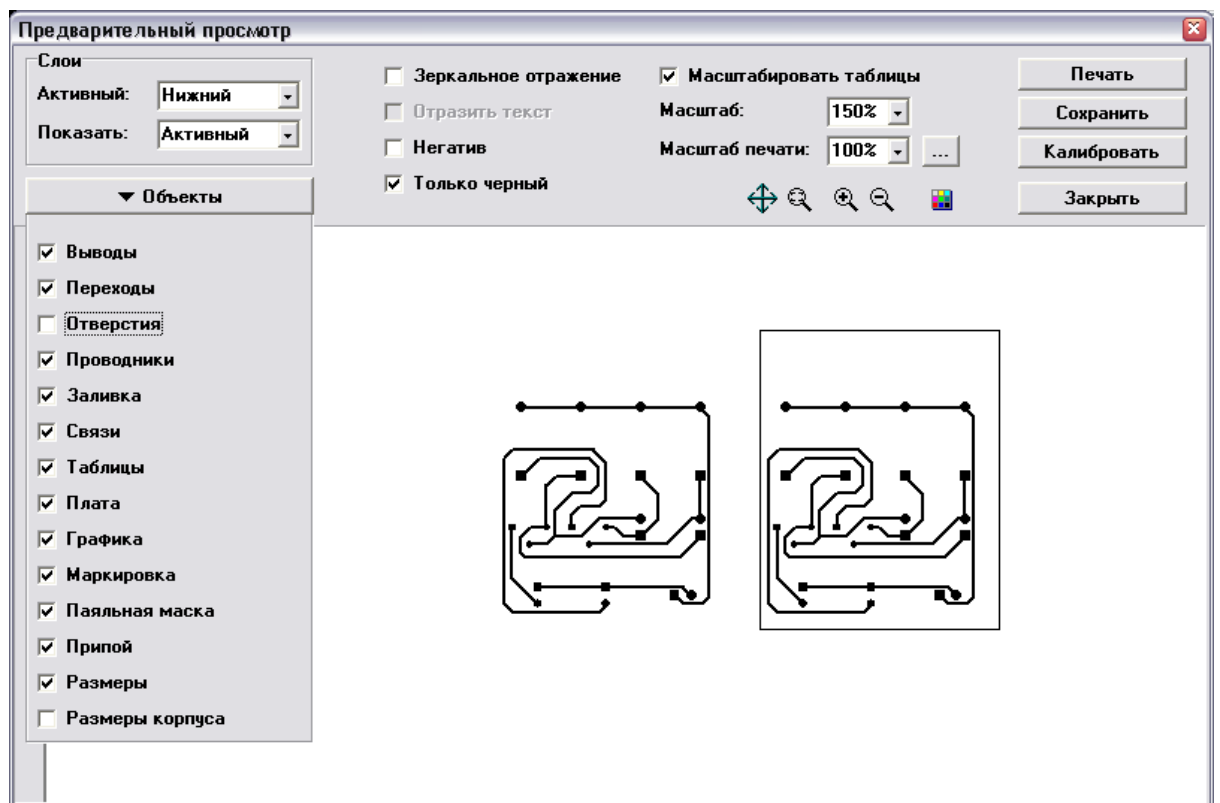
.



support@dipttrace.com.

### 2.5.14

“ANSI A”



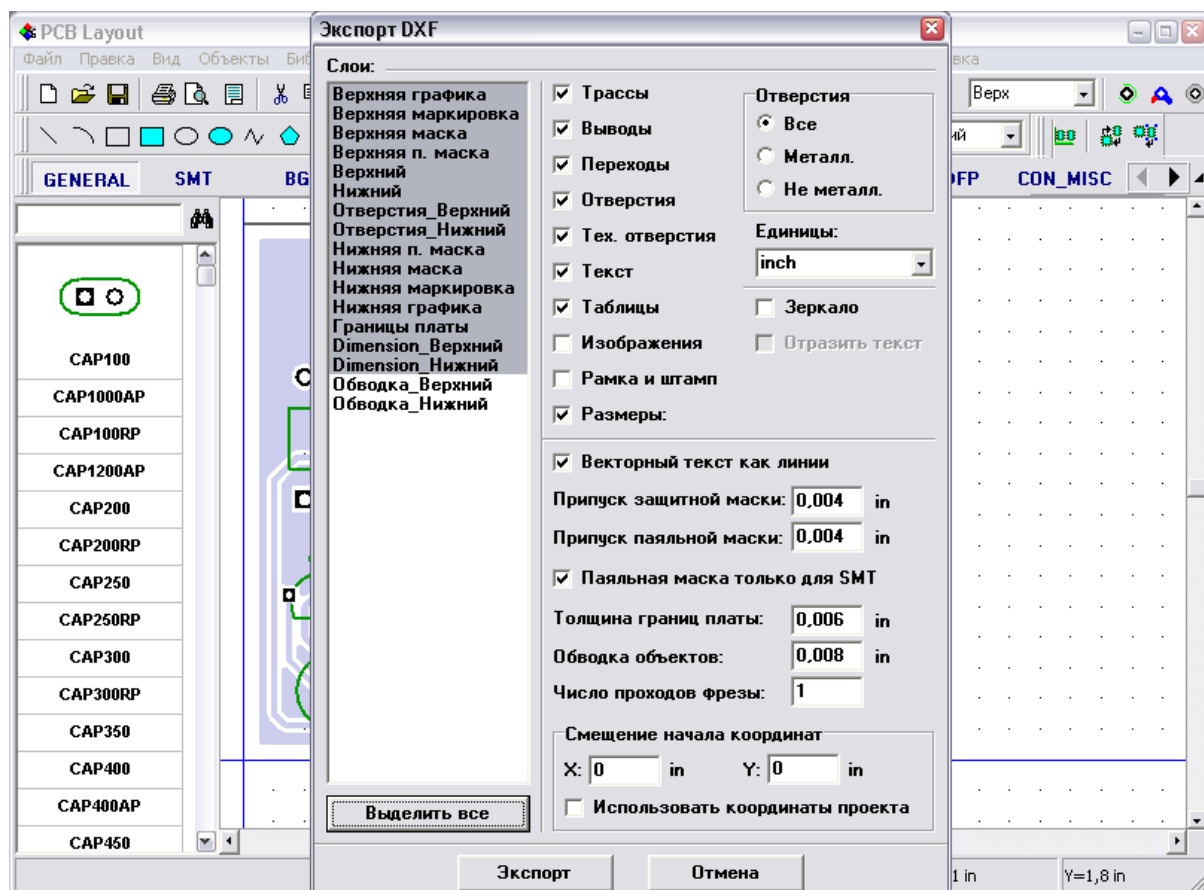
: - .  
 , -  
 .  
 , .

## 2.6

### 2.6.1

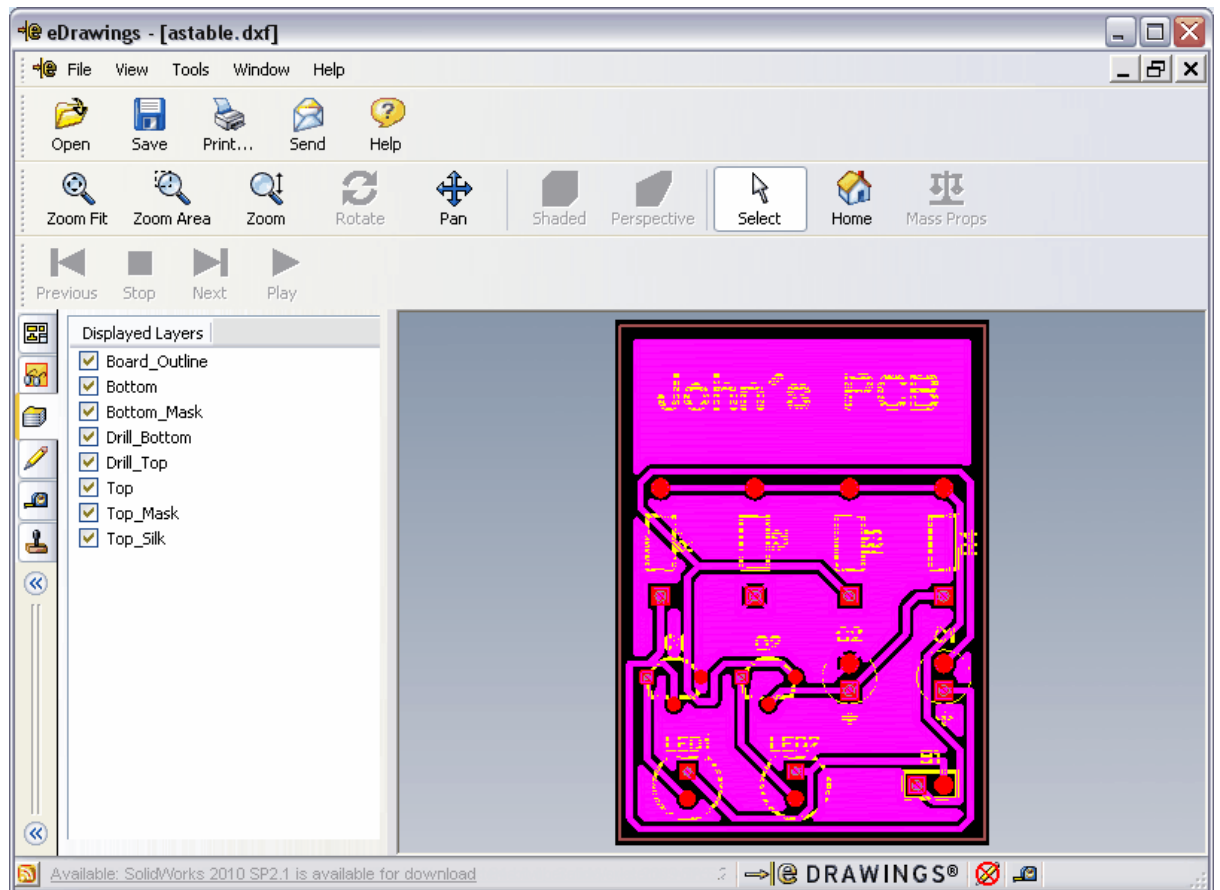
#### DXF

CAD, CAM , DXF  
 AutoCad DipTrace,  
 AutoCad.  
 , DXF c  
 DXF G-code,  
 ACE Converter ( ).  
 “ / / DXF”  
 “ DXF” -  
 “ - ” “  
 , - “Ctrl”,  
 /  
 DXF,  
 “ ”



AutoCad

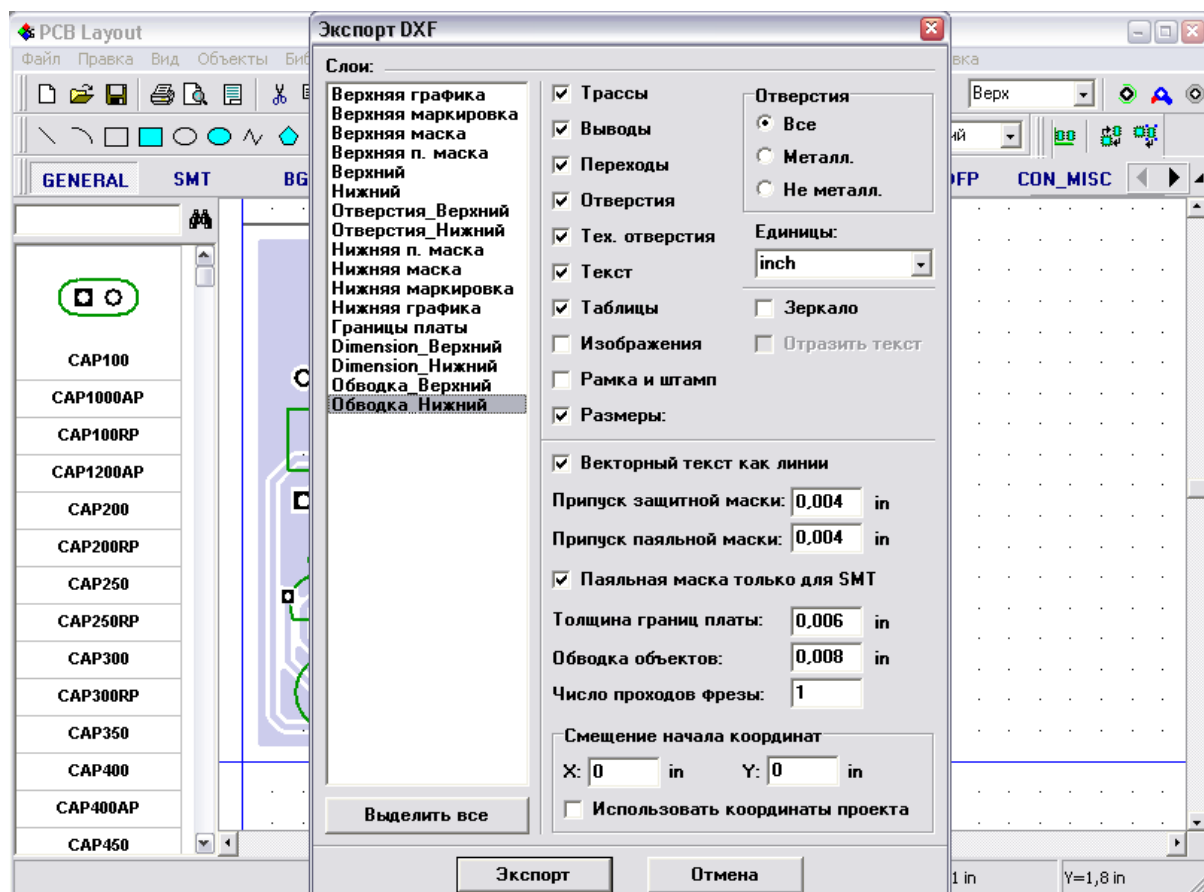
DXF.



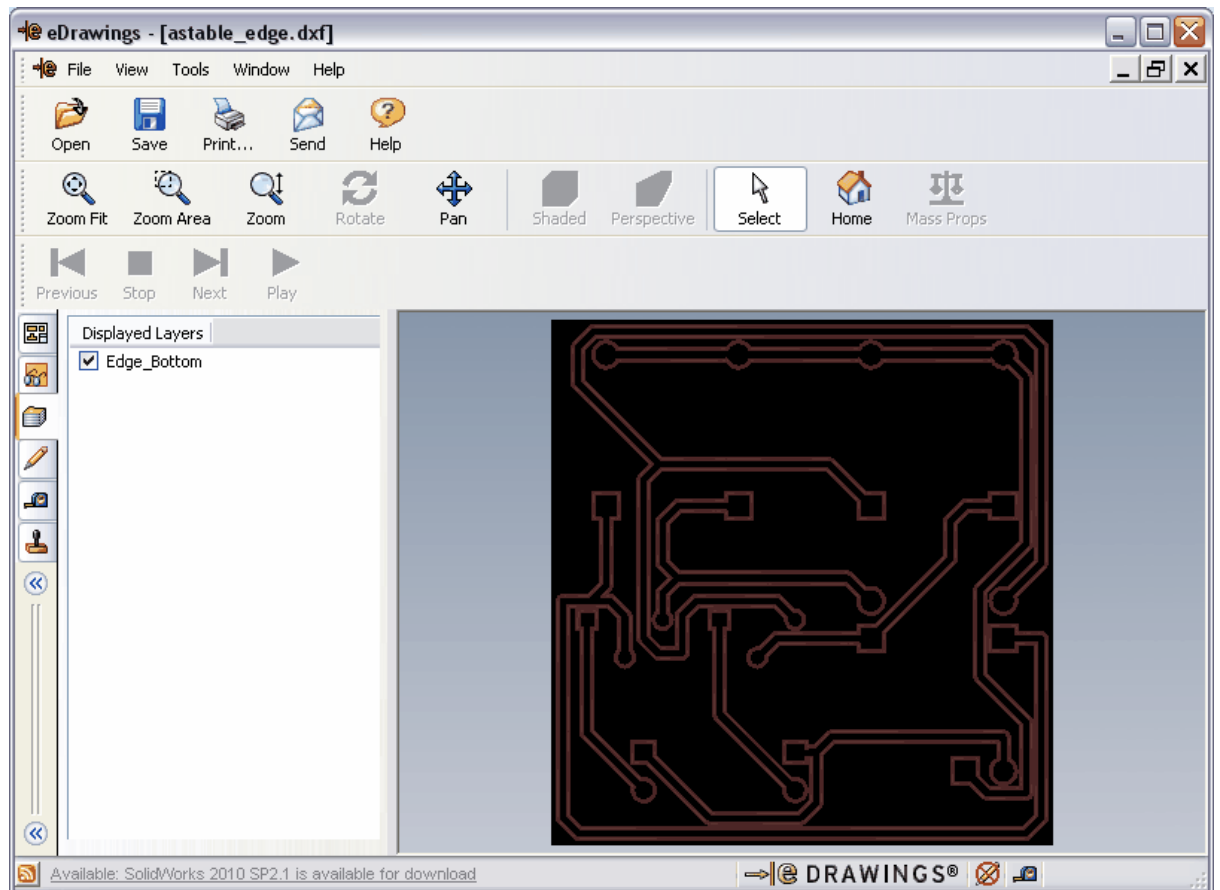
DipTrace.

" / " ( " 1" , " DXF  
 "). ,  
 " / DXF" DXF.  
 " \_ " ( " \_  
 ). " \_  
 ,  
 " "





AutoCad



DipTrace

DipTrace

CAD

CAM

DXF G-code,

ACE converter.

" 1",

## 2.6.2 Gerber Output

" / / Gerber"  
( "Ctrl" "Shift" )  
"

( ,  
, . )

1. 

:-

"/ , " , , " / , " ( , " / ).
2. 

:-

( , ) . True Type ( , ), " ( ).
3. 

:-

Gerber + , , " , , " , " , " .
4. 

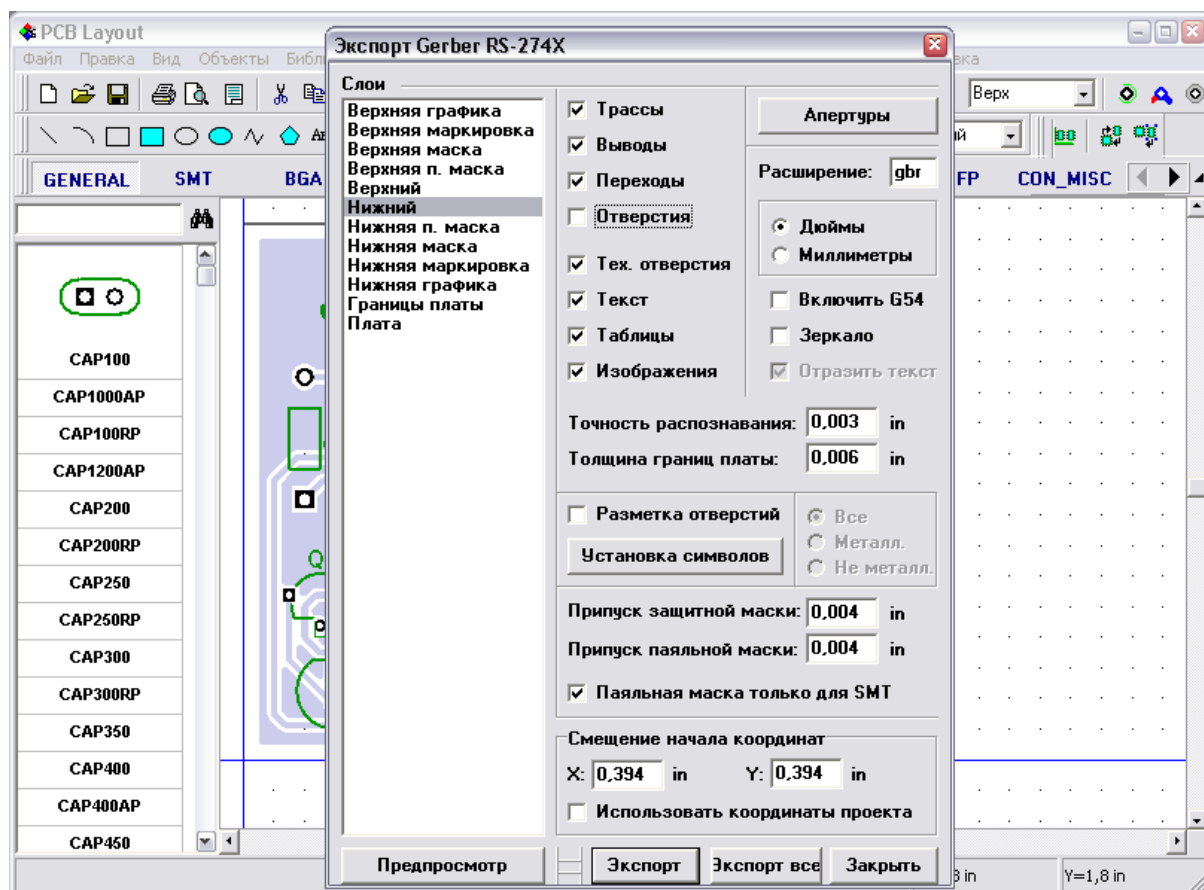
:-

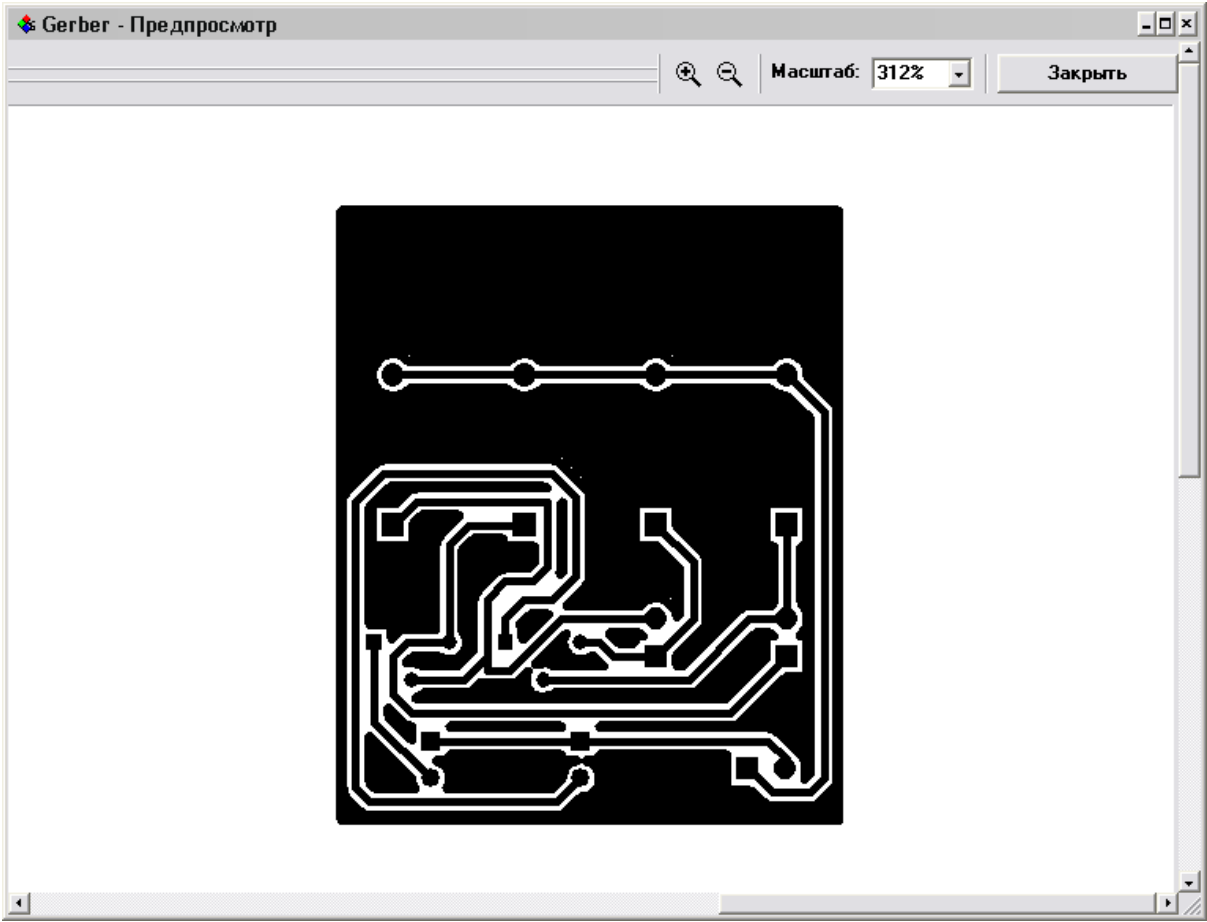
" SMT".
5. 

( , . ) - , " , " , " , " , Gerber : .
6. 

:- , , " / , " ( , ") .
7. 

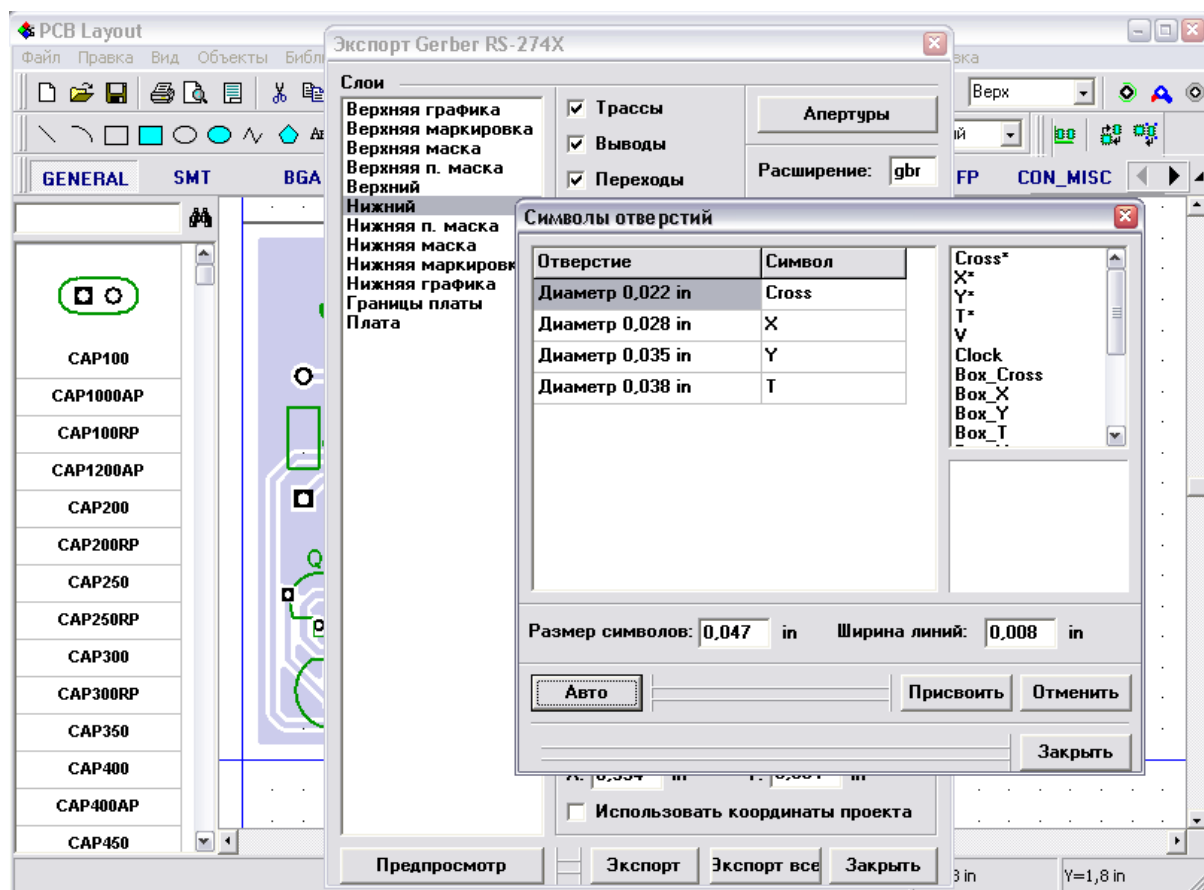
:- , .

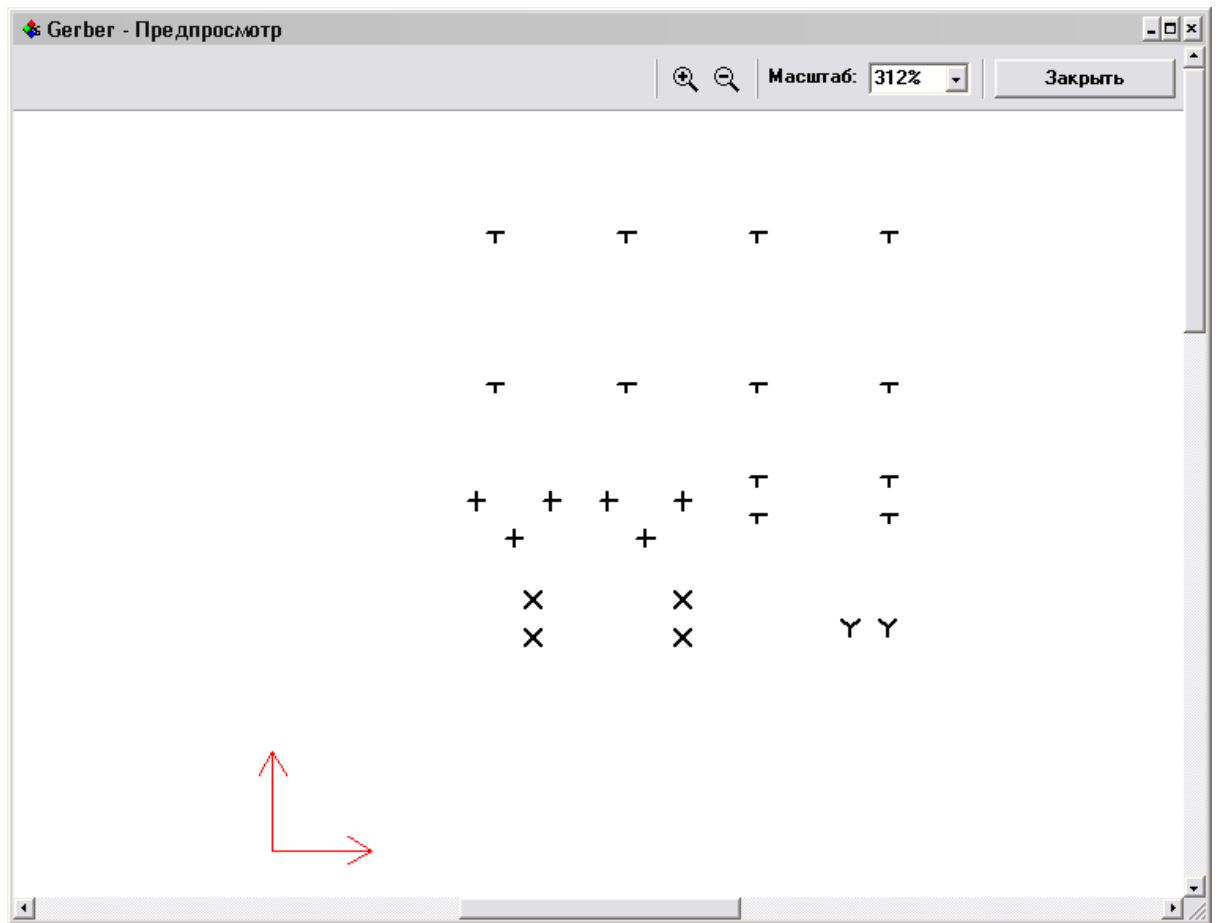




DXF, Gerber, N/C drill “Pick and Place”

( , DipTrace ) (“ ” ( ) Gerber, “ 4mil). ( , 0,5 mil. “ ” . , . Gerber . DipTrace Gerber (“ ” “ ” “ ” ), “ ” “ ” , Gerber “ ” “ ” , , Gerber “ ” “ ” , , )





Gerber

274X .

CAM

Gerber,

Pentalogix Viewmate, . .  
274X.

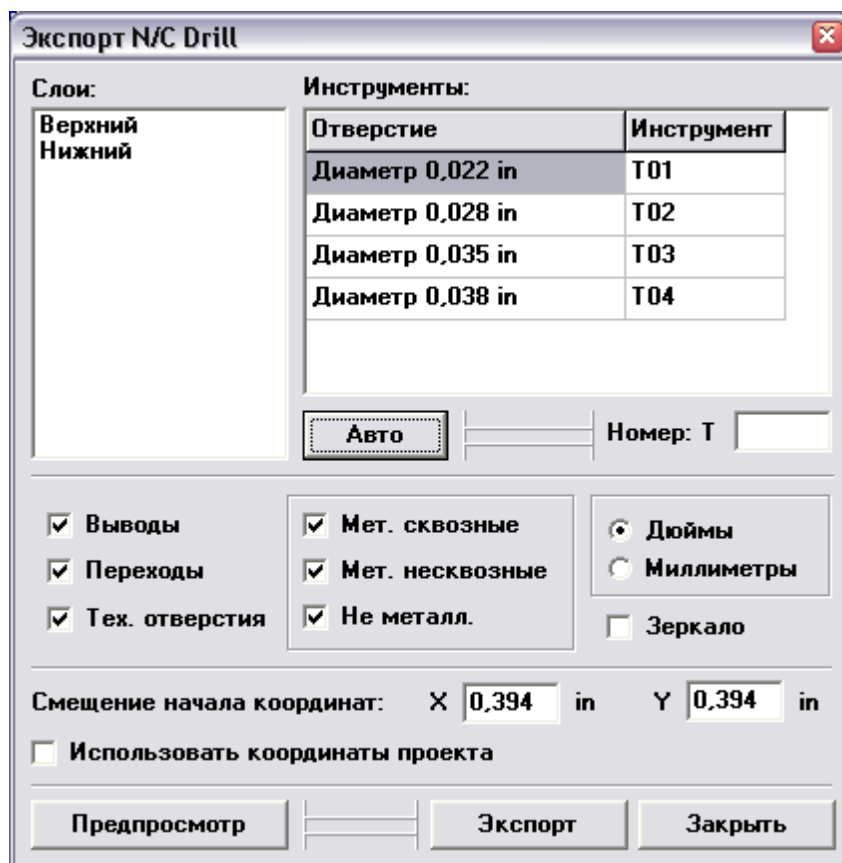
RS-

RS-

### 2.6.3

### N/C drill

N/C Drill “ / / N/C\_Drill”  
“ ”  
“ ”  
( drill.txt drill.drl). , “ ” “ ”  
, ( ,  
, ,  
, .



DipTrace.

P.S.

2

### 3

#### 3.1

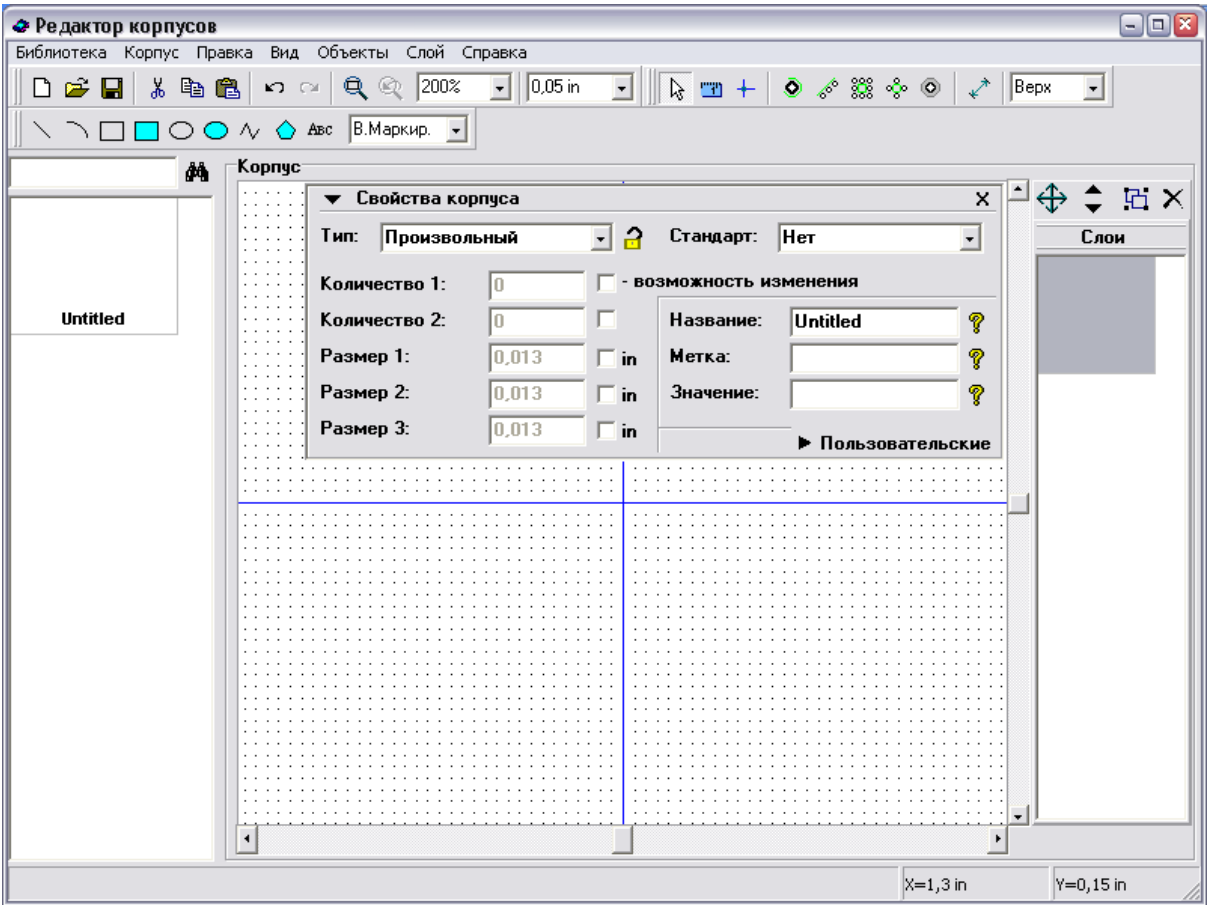
DipTrace  
DipTrace -> Pattern Editor.



3.1.1

“F1”.

“X”



“+” “-”, ( )

3.1.2

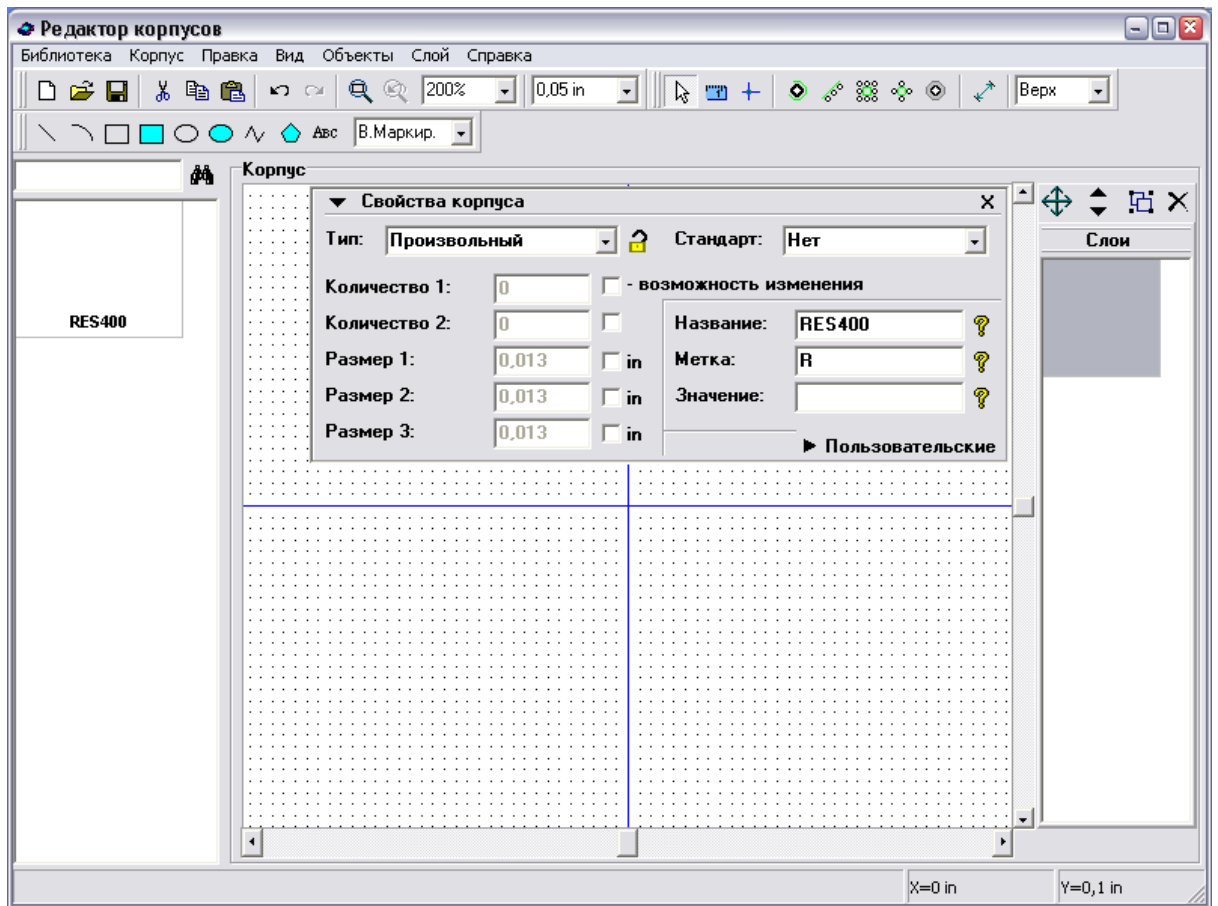
400

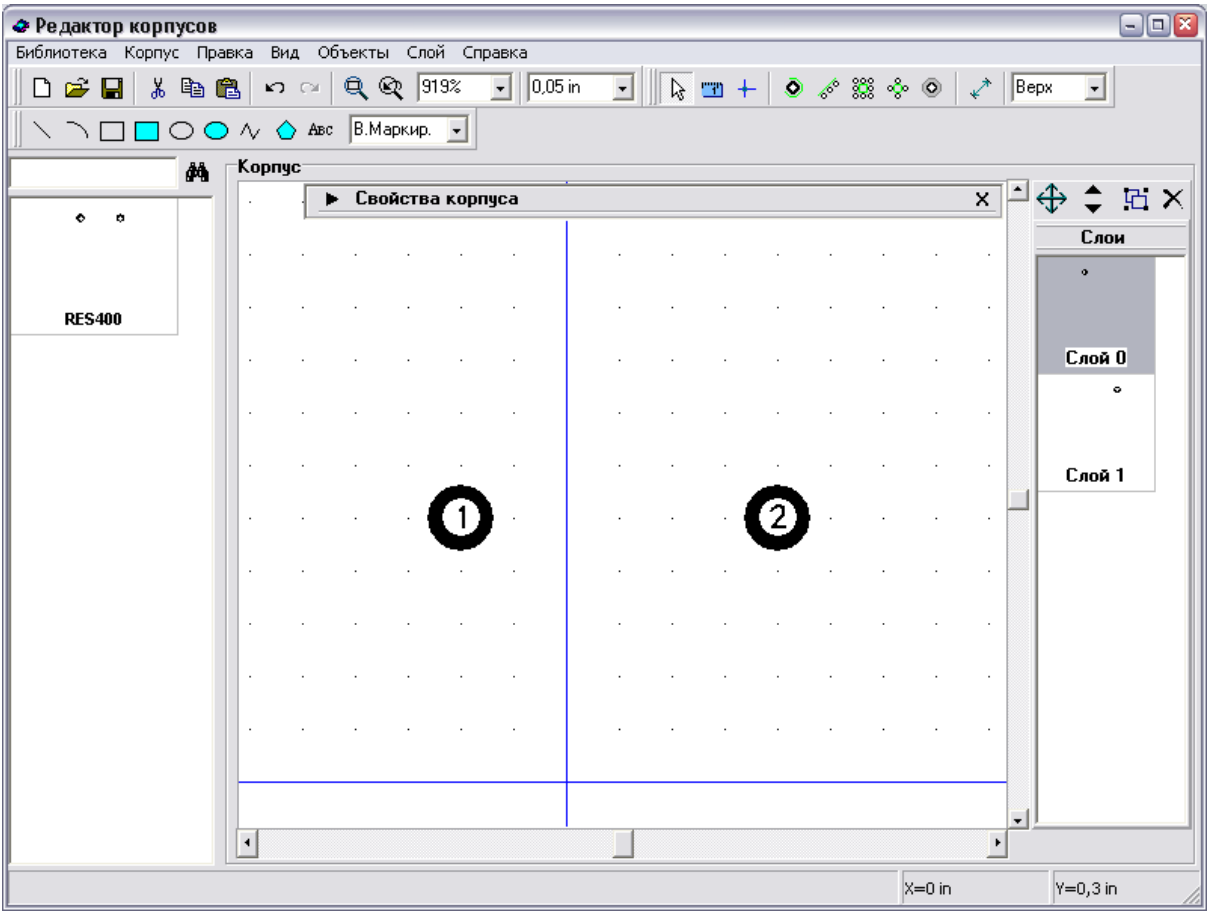
“RES 400”

“R”

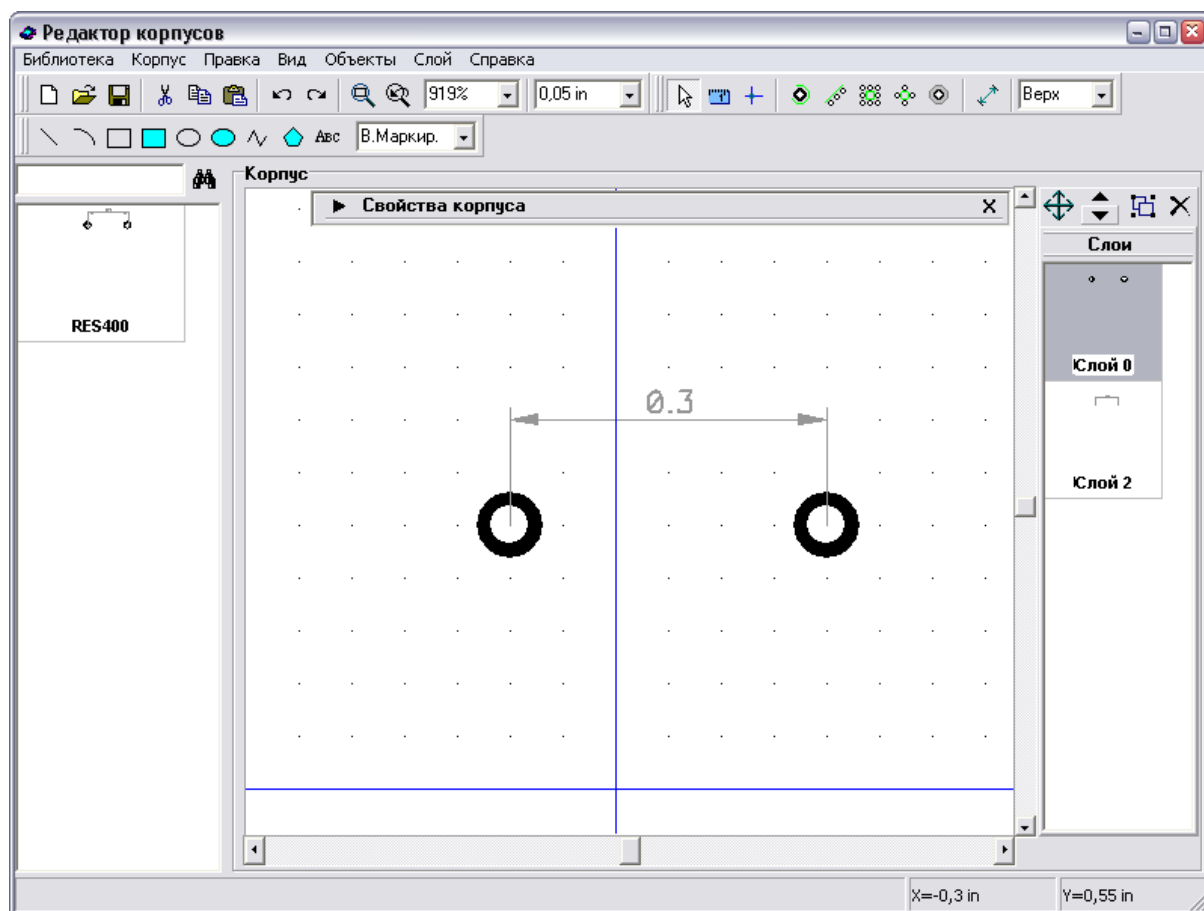
R1, R2, R3 . .

“U”





“ ” \_ , , ( 300 , 400). , “ / / ” , , , . , ,



),

( , ,

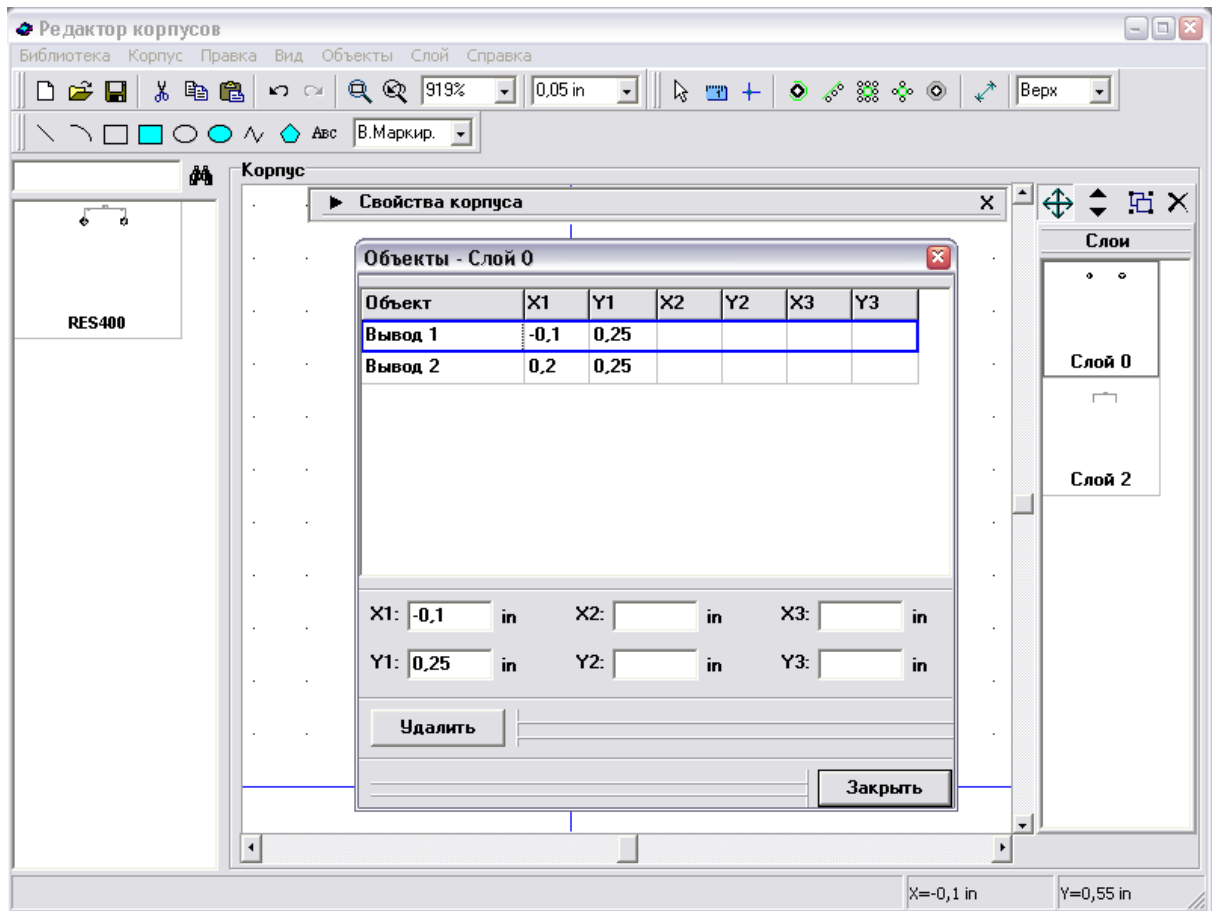
" "

( " 0", " 1"

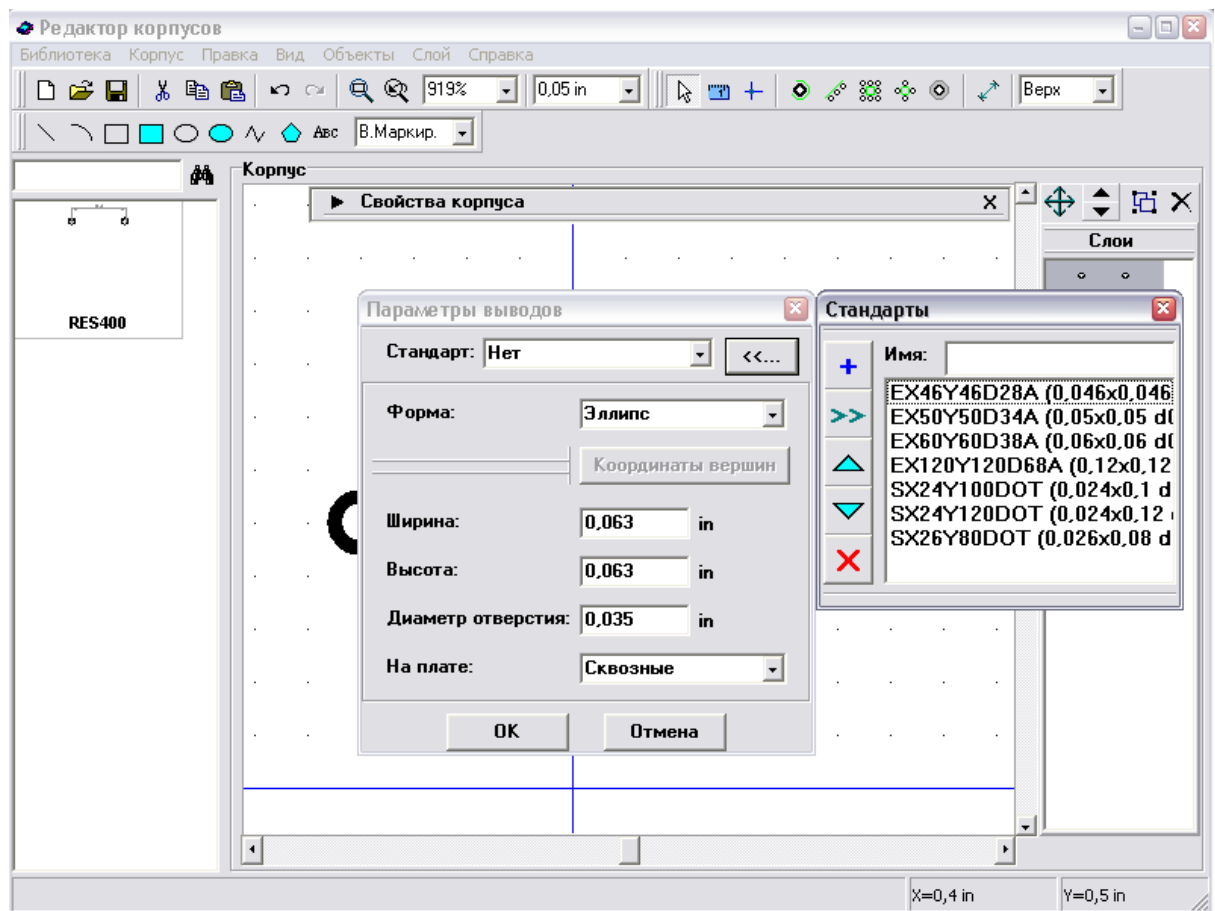
“ / ”

“ ”

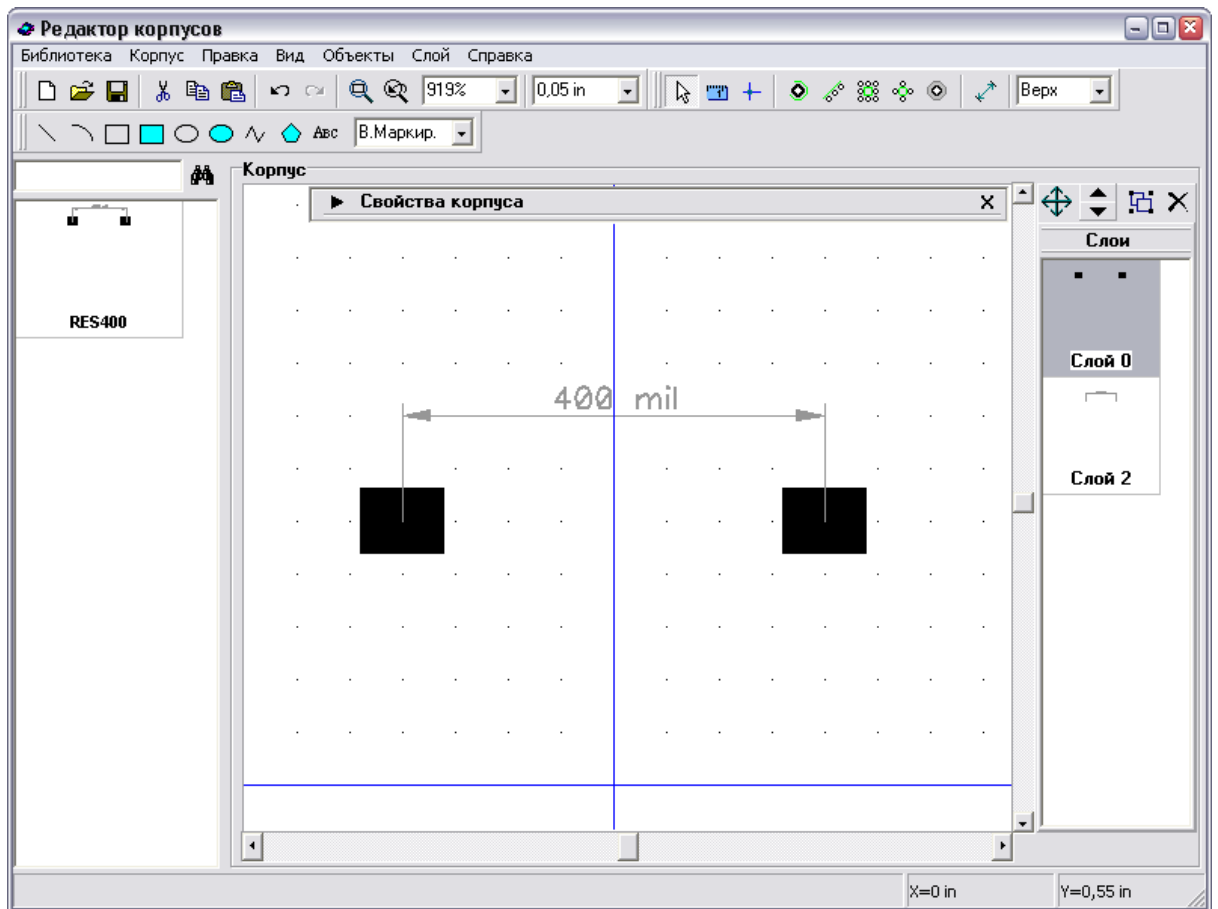
“ ”



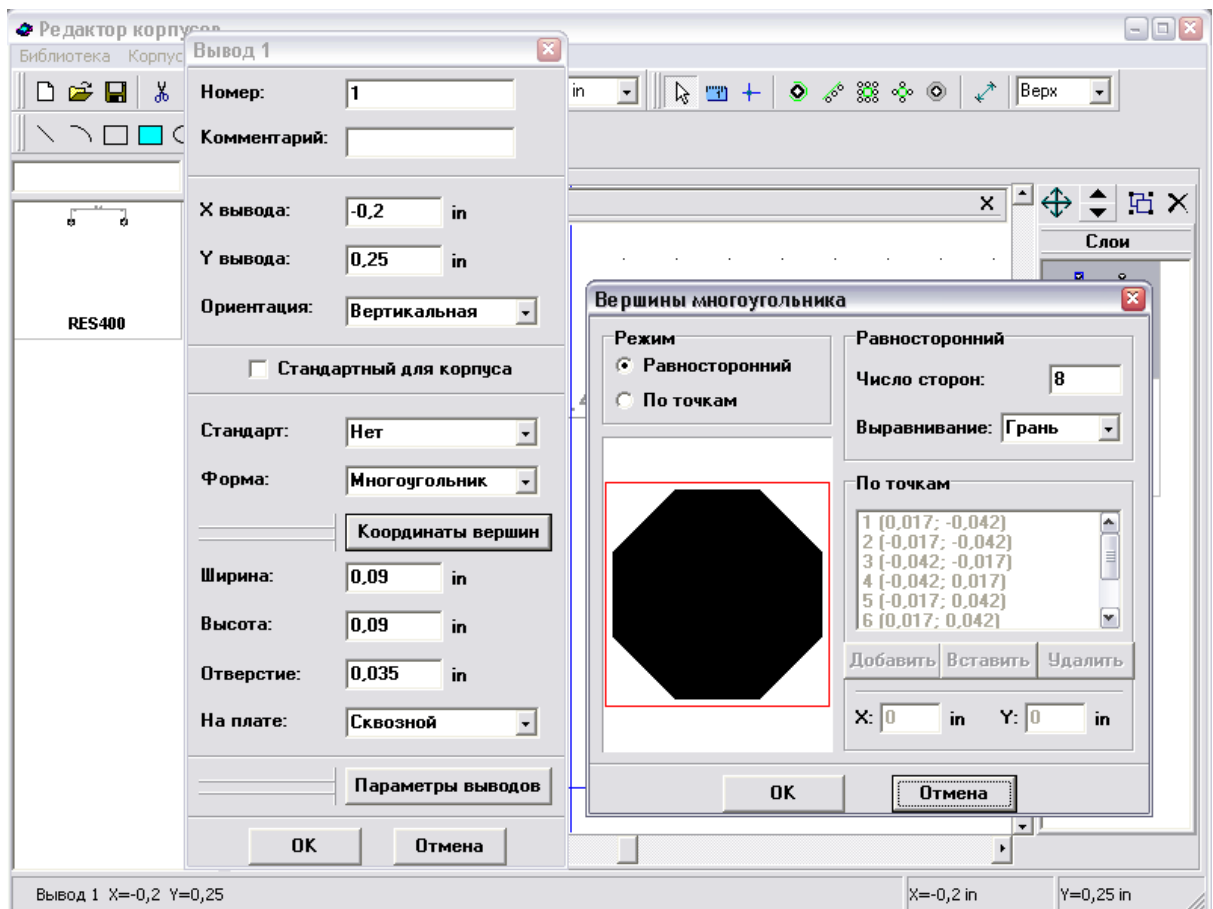
PCB Layout.



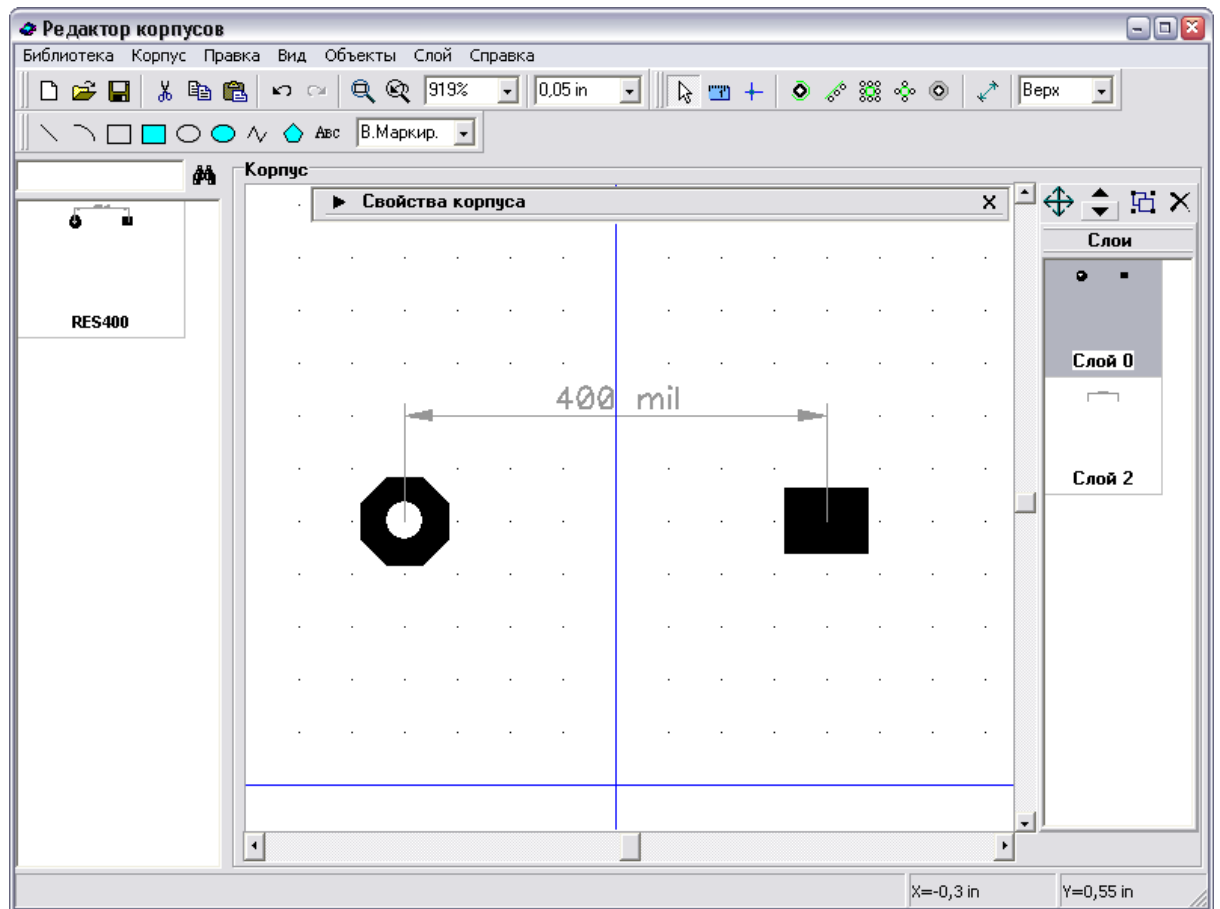
“2” , “ ” , “ ” , “OK” .



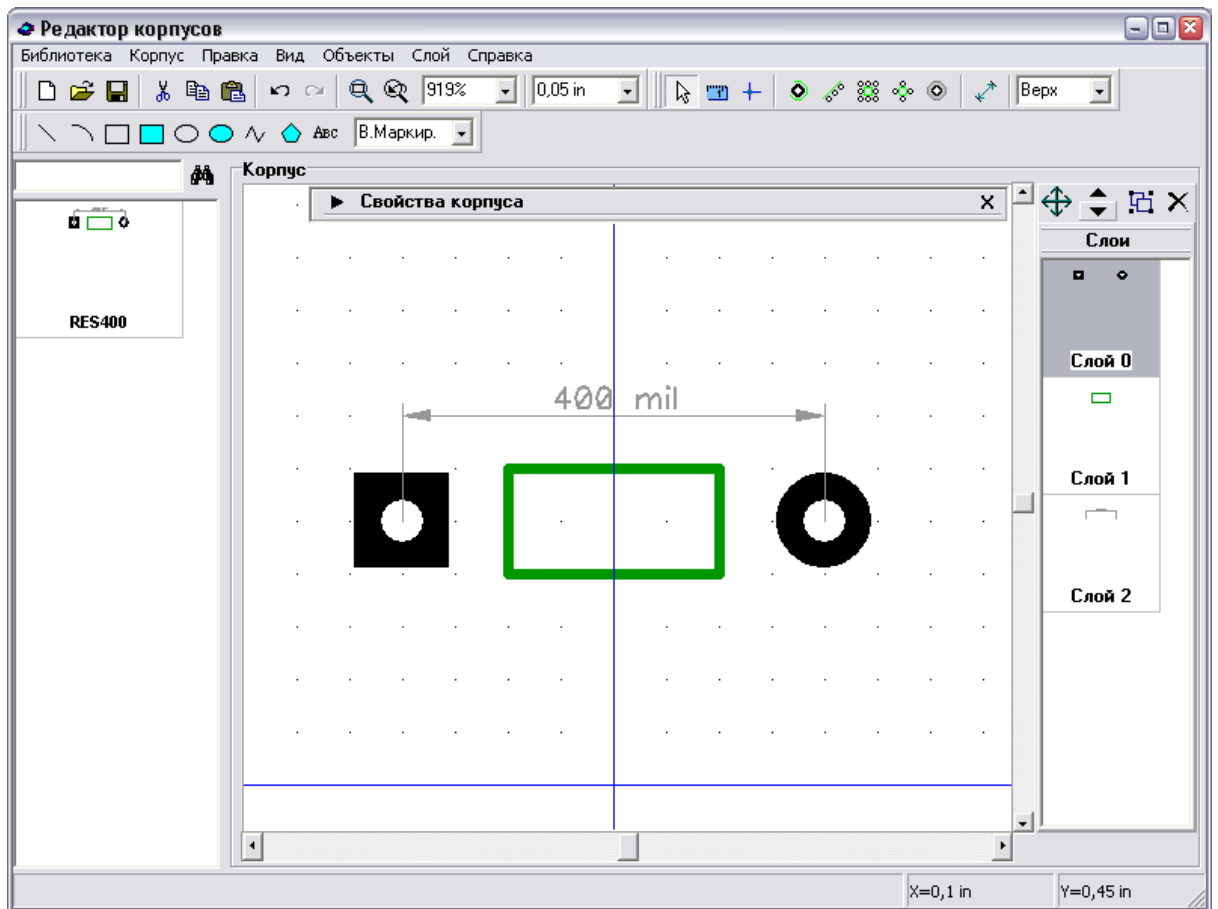
, . .  
 ( ,  
 ). ,  
 " "  
 ,  
 ( " " ).  
 .  
 , " ( ,  
 " "  
 ).  
 " " "  
 " "  
 " , " "  
 "0,09", " "  
 "1", " " "OK"  
 .







, : - 2.25 2.25,  
 , 1 ; - 2.25 2.25,  
 , 1 “ ”,  
 .  
 . (btw we moved drawing panel to the bottom-left as it was not visible with 800x600):



“ ”).

“ ”( “ 1”

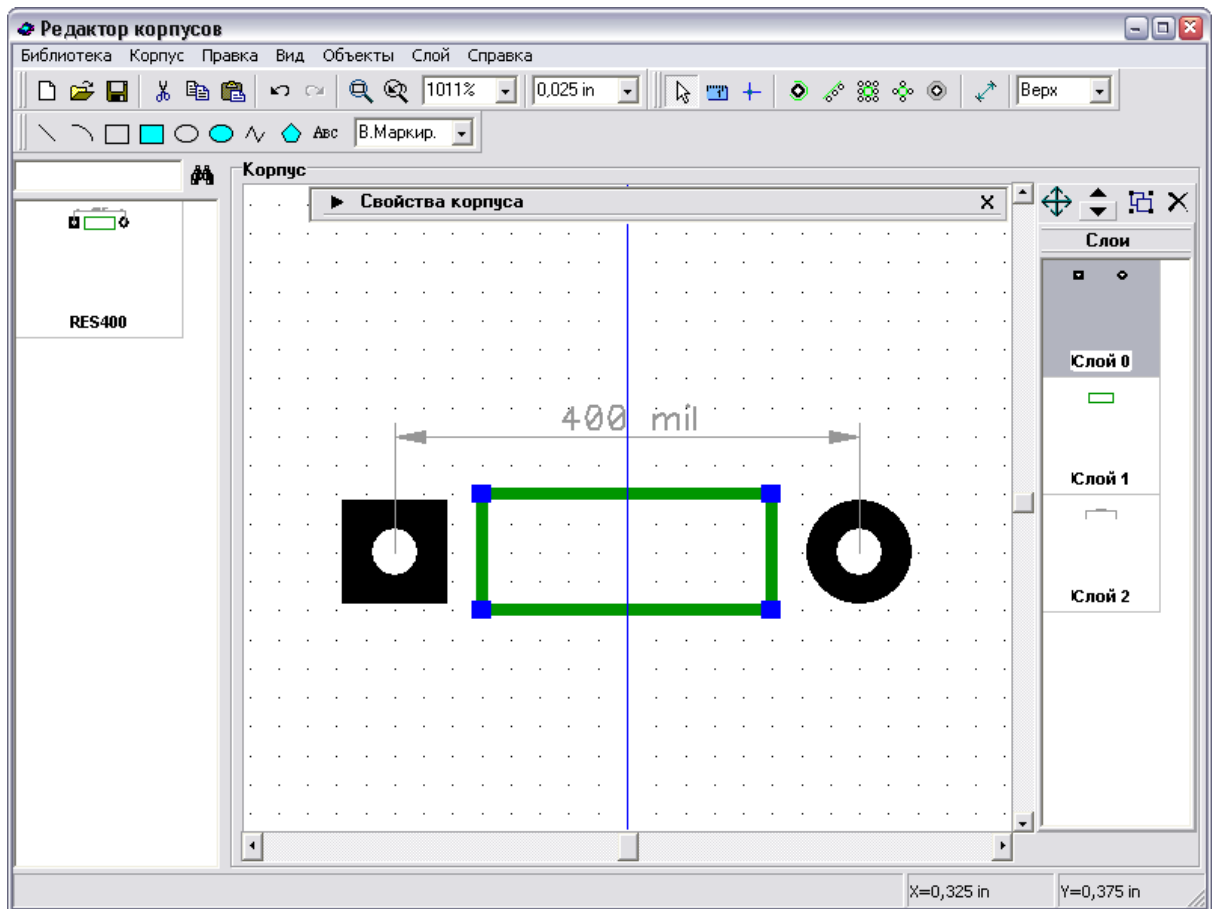
), “

“Ctrl+”,

“0.635 ”(

).

( ).

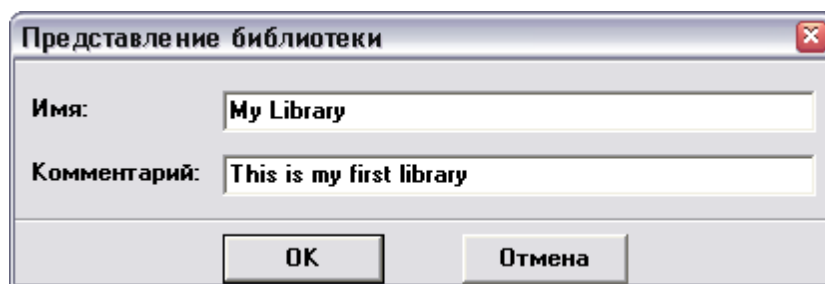


"Ctrl+Alt+C".

“ / ” “ / ” ,  
 “ / ”  
 , ( ) (

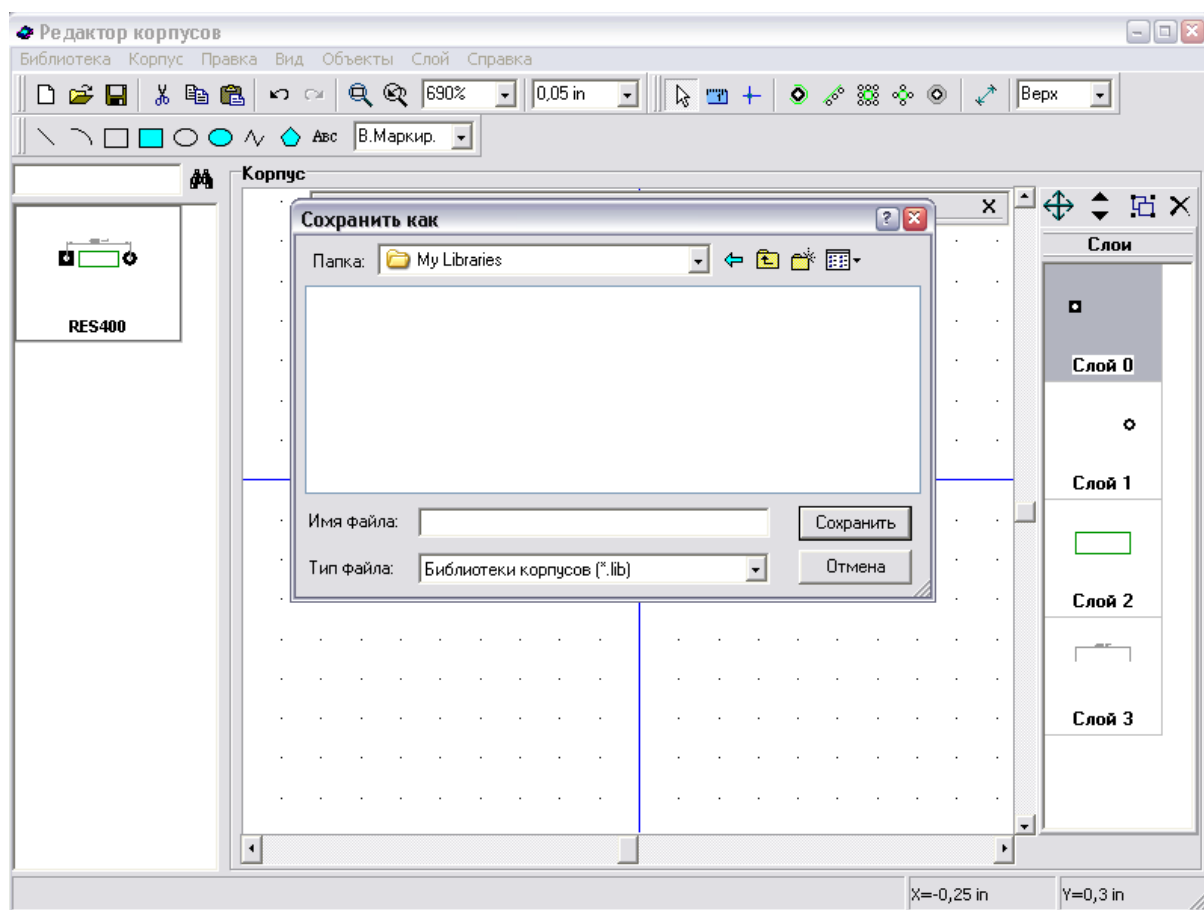
### 3.1.3

“ / ” ( ) ,  
 “ / ” ( ) ,  
 “OK”.  
 PCB Layout,



Program Files/DipTrace/Lib”  
"My Libraries"

/DipTrace".

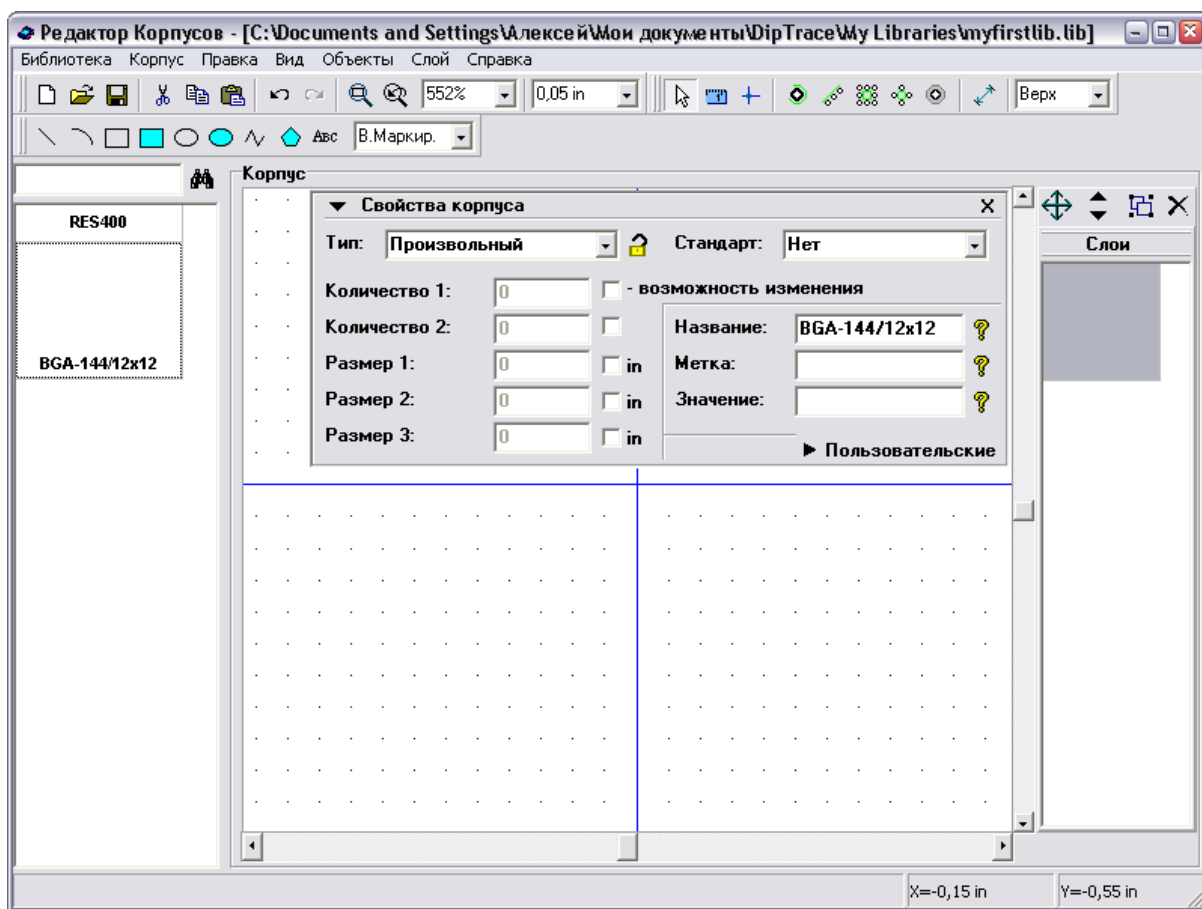


### 3.1.4

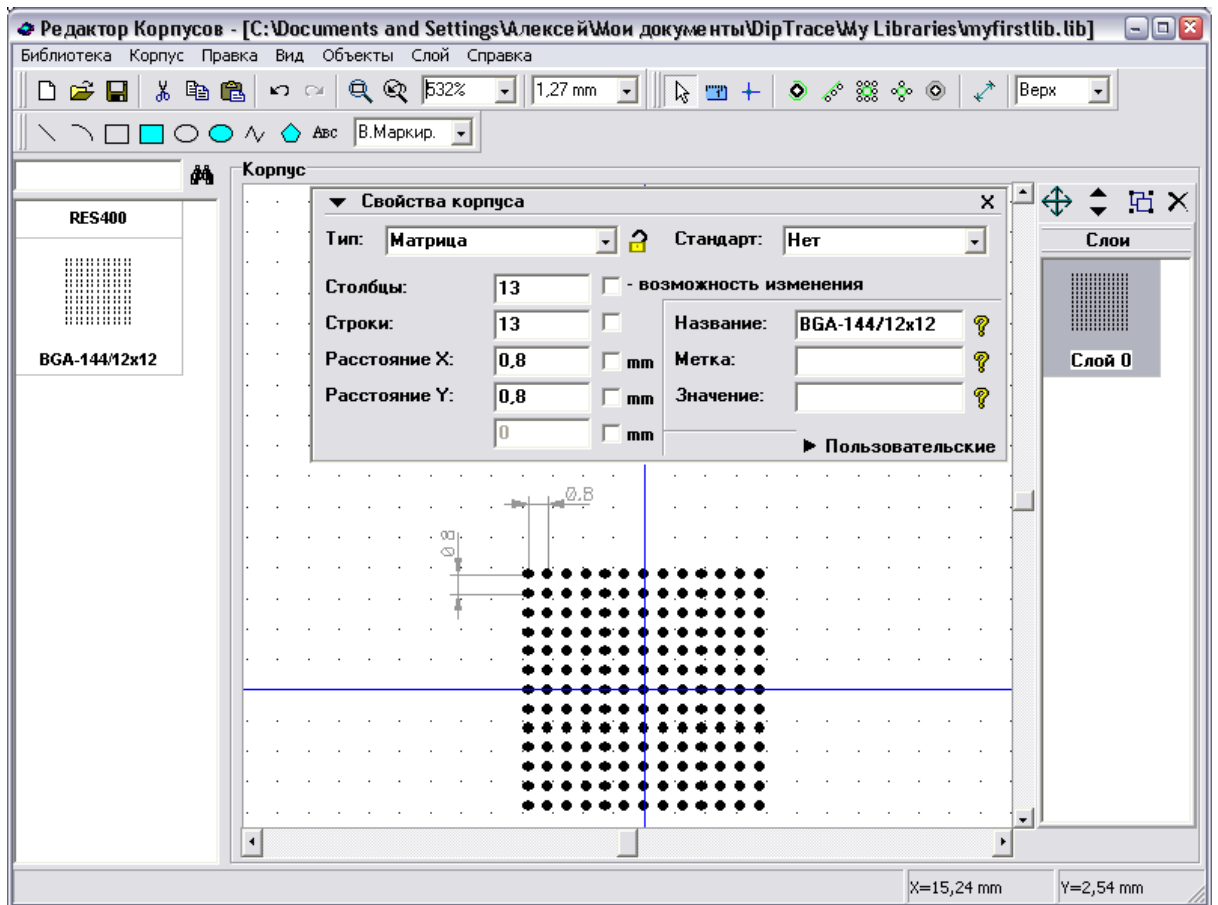
### BGA-144/12x12

144/12x12

BGA-



" " ( / / mm).  
 " / " : 0.45", " : 0.45", " : 0", " : " : " :  
 " : 13", " : 13", " X: 0.8", " Y: 0.8".  
 13 13 , .



"

"

,

,

,

(

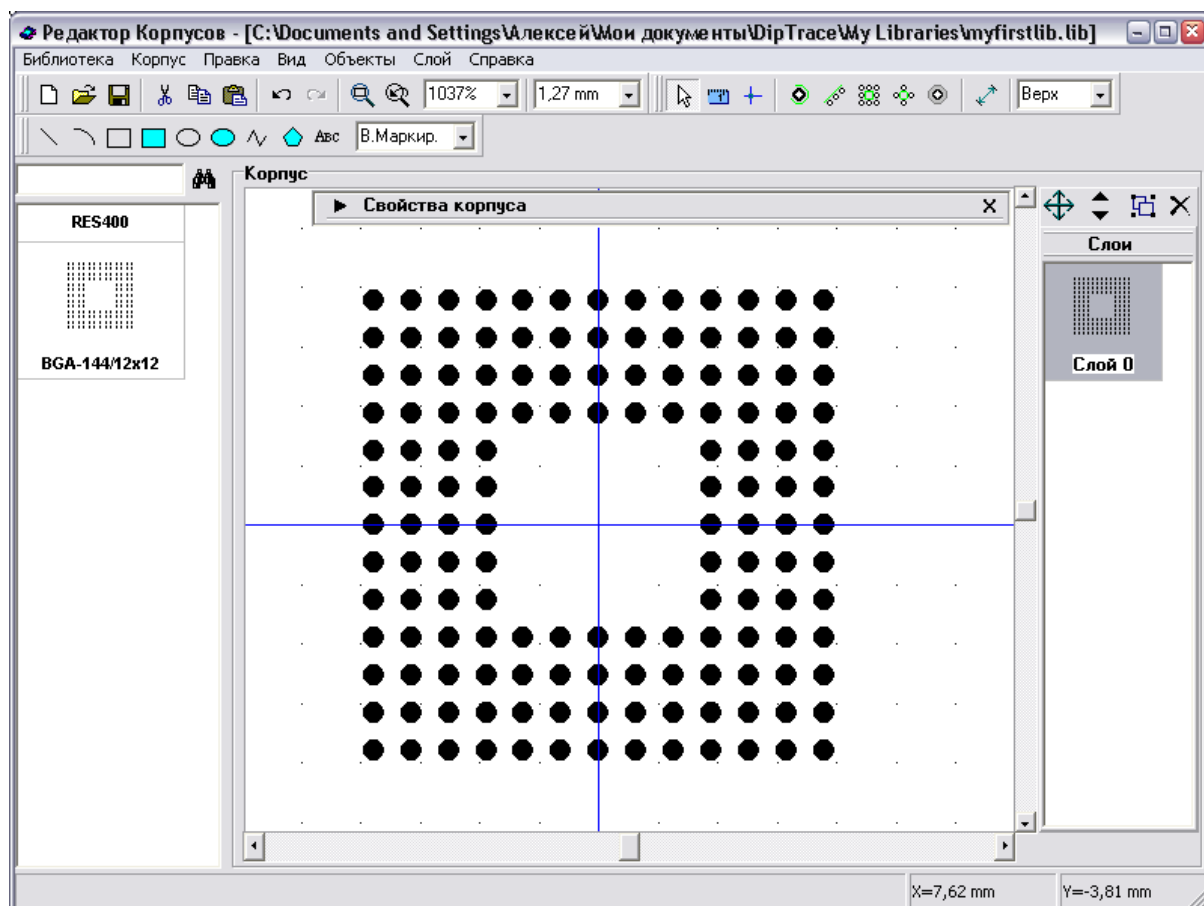
).

BGA-144/12x12

( 5 5), (

,

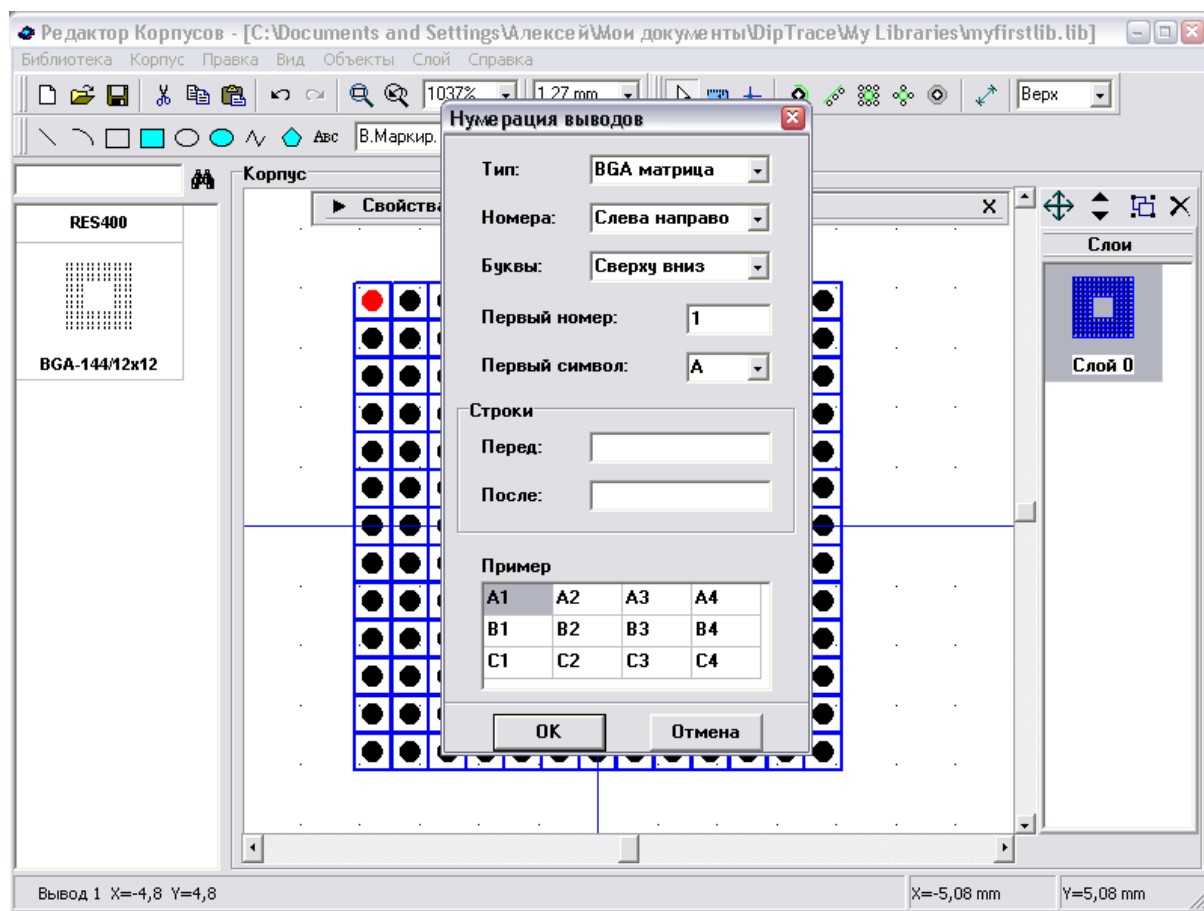
) "Delete".



" / " / "

1 169, BGA "A1, A2 . .",  
 (Ctrl+A), "

" : BGA ",



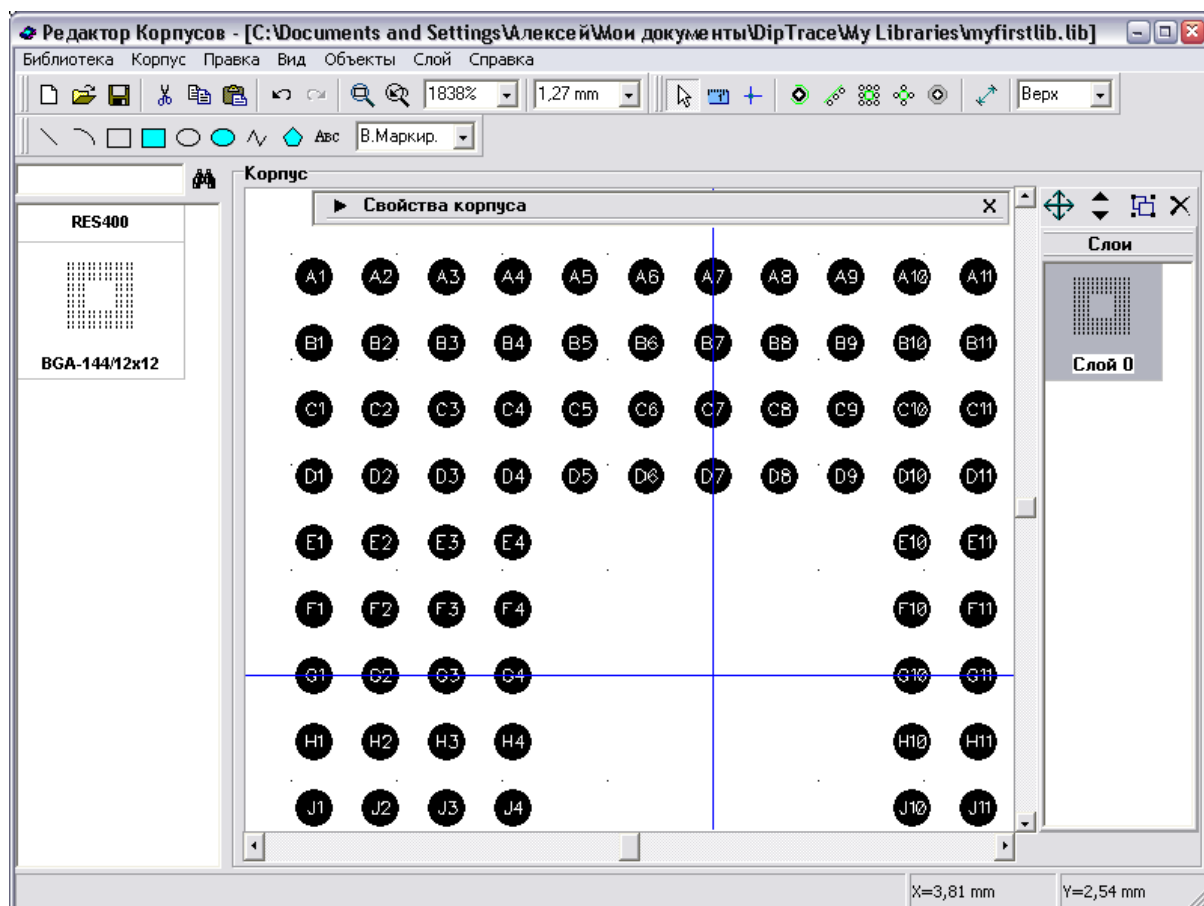
BGA.

(QFP, QFN)

4-

(PLCC). 1



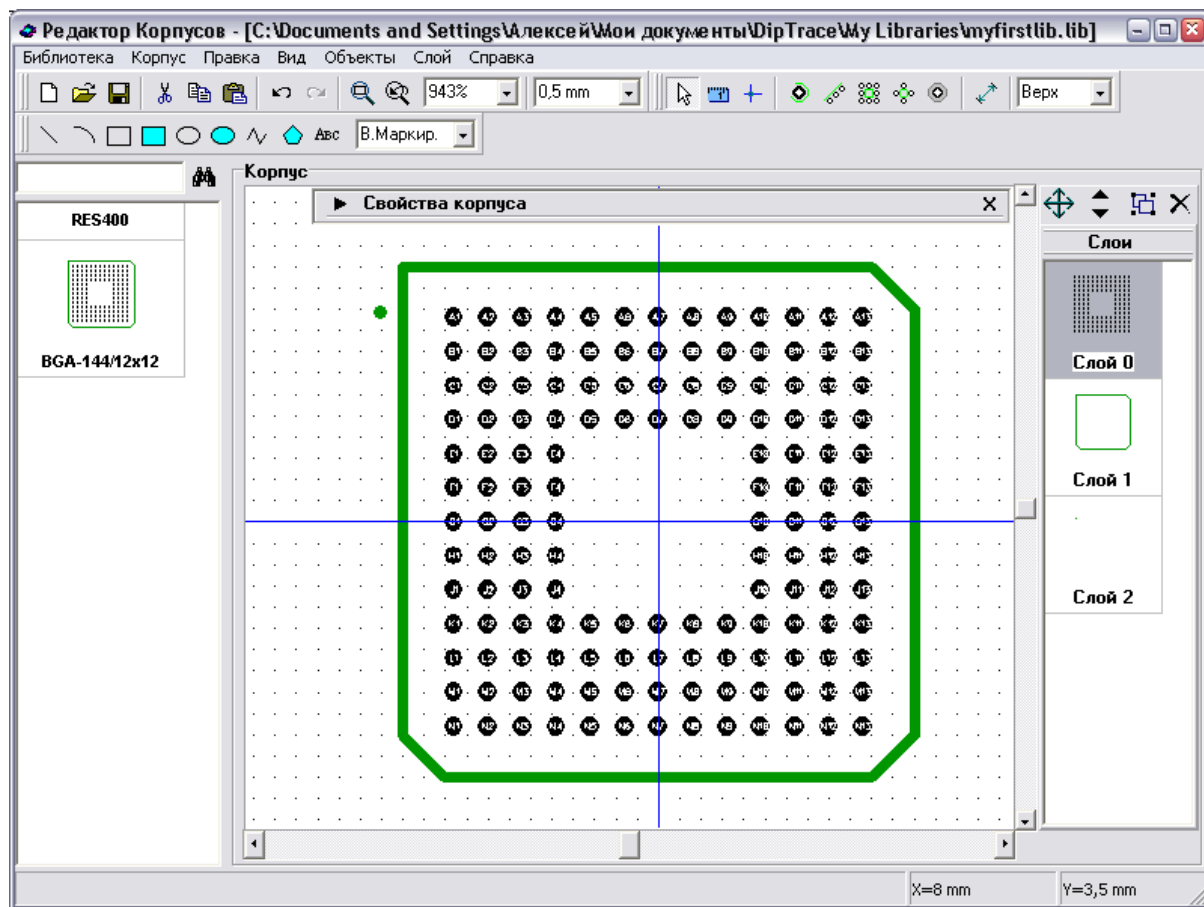


"F11".

"Ctrl+", "Ctrl-"

(

).



BGA

,

Ctrl+S

"

"

.

### 3.1.5

### SOIC-28

Microchip

PIC18F24K20

SOIC-28.

SOIC-28.

"

),

("

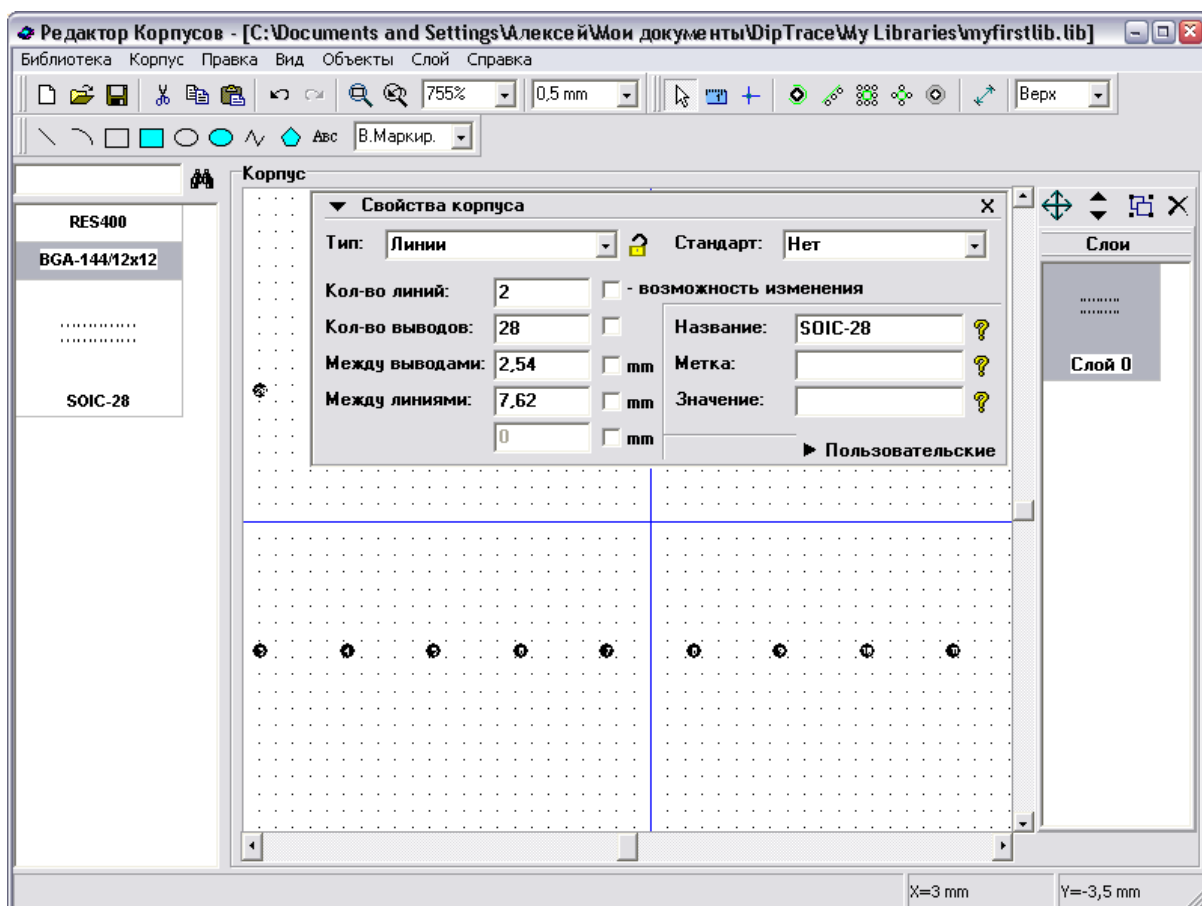
/

" : "

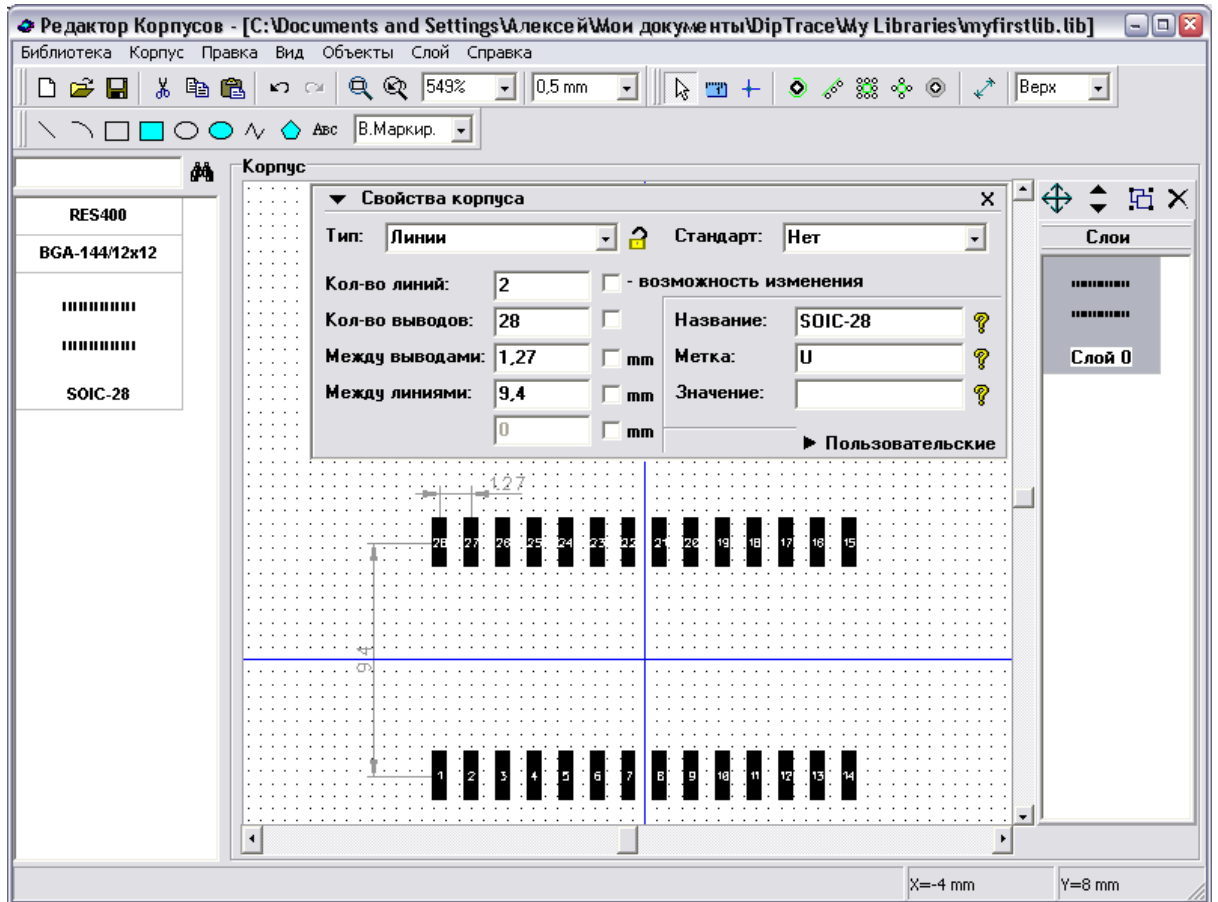
"

-

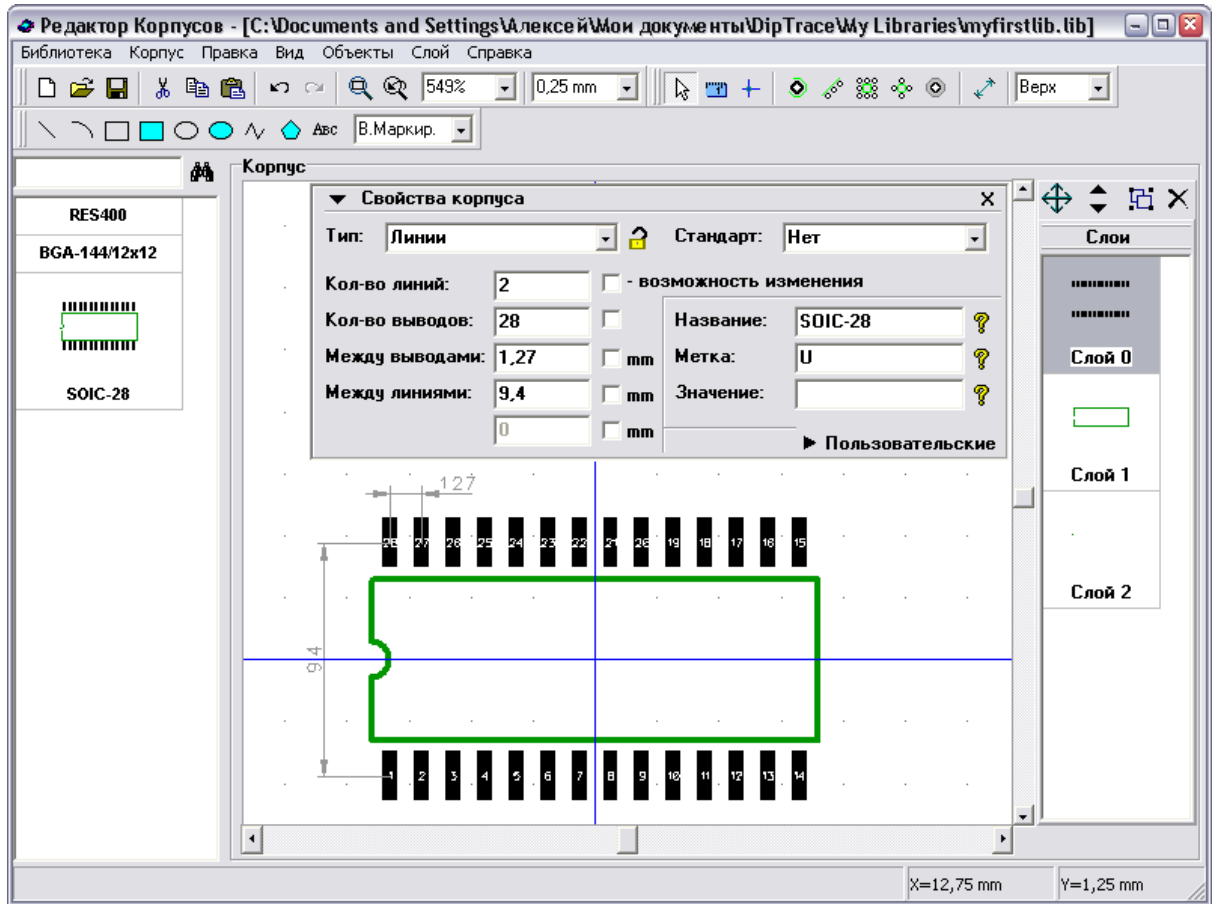
:28".



SOIC-28 (DipTrace), <http://www.microchip.com/packaging>, SOIC-28 (7.50 mm) (150 : 0.6", " 2", " : 9.4", " : 1.27".



(F11)



"PIC18F24K20"

:" / "

Ctrl+Alt+R.

### 3.1.6

DipTrace PCB Layout

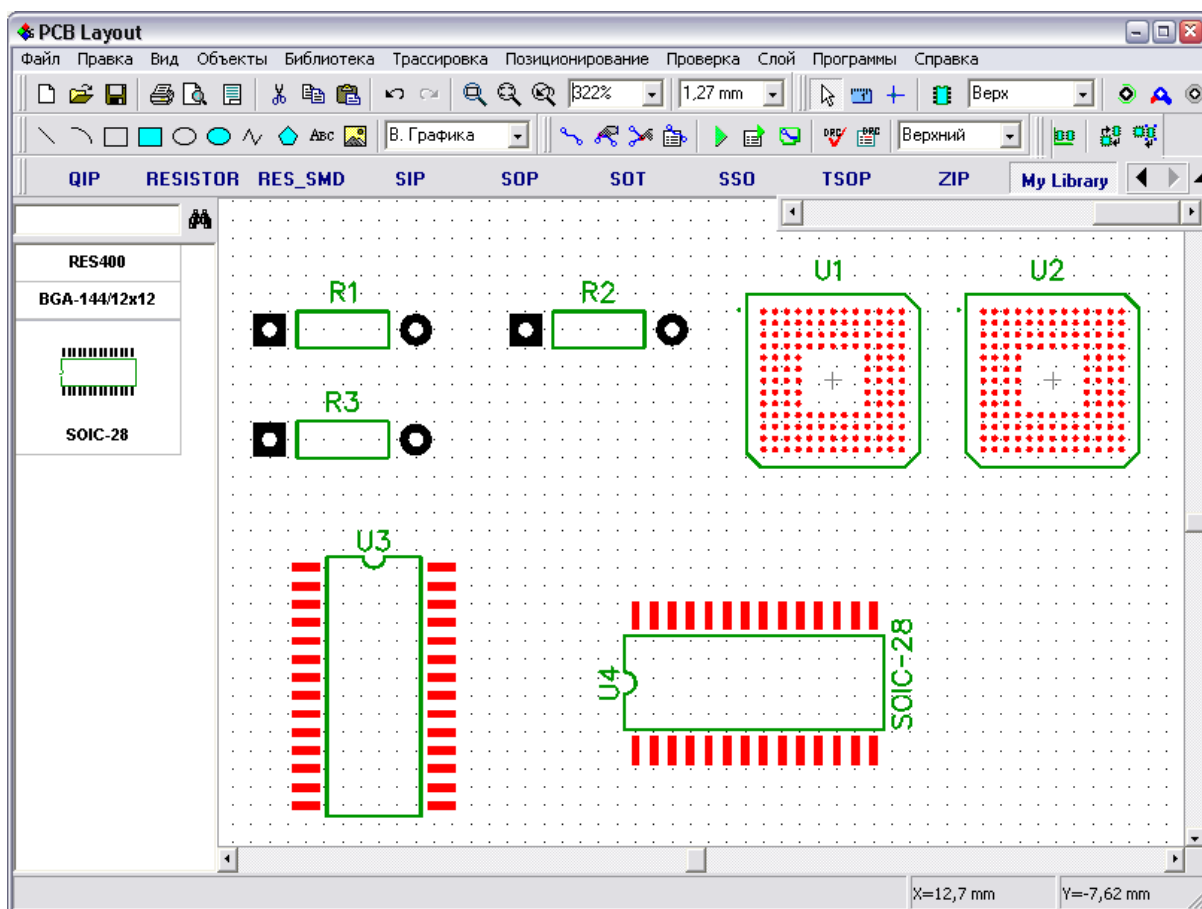
->

->

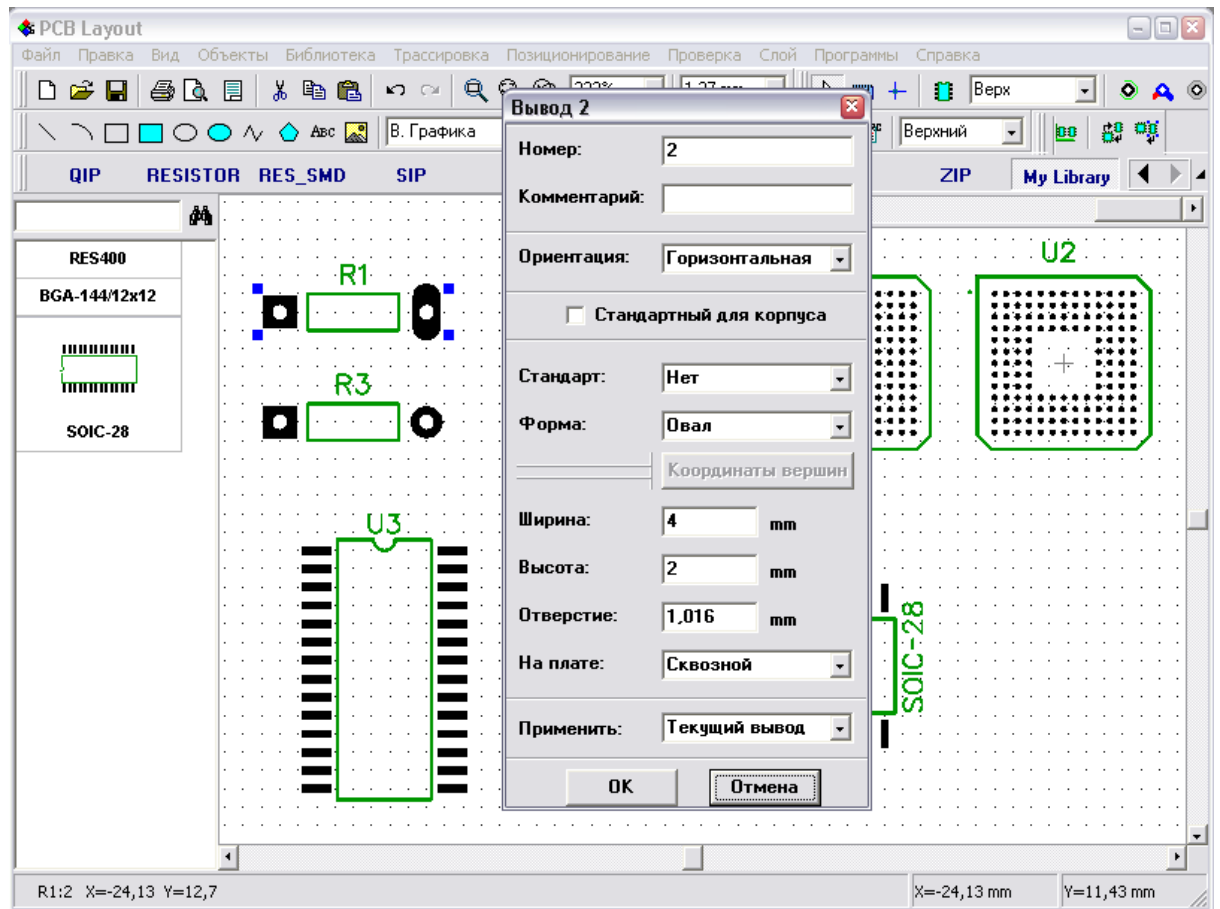
DipTrace -> PCB Layout.

“ / ” ,  
“ ”  
“...”,  
“OK”. “My Library”





.  
 (F3 / " , "  
 ,  
 , " / "  
 ,  
 " - " , (  
 ).  
 SMD ,  
 ,  
 ,  
 ), " "



),  
 " :  
 " .  
 . .  
 ,  
 .

## 3.2

DipTrace , . . -> -> DipTrace ->  
 ) (

### 3.2.1

“ / ”  
 F1 /  
 ( 4 : ( -



), , . ( ).

“ ” “ ” .

“ ” “ ” .

“ ” (

, ). , ,

, (

).

:

( - ), 2- (

), 2- ( + )

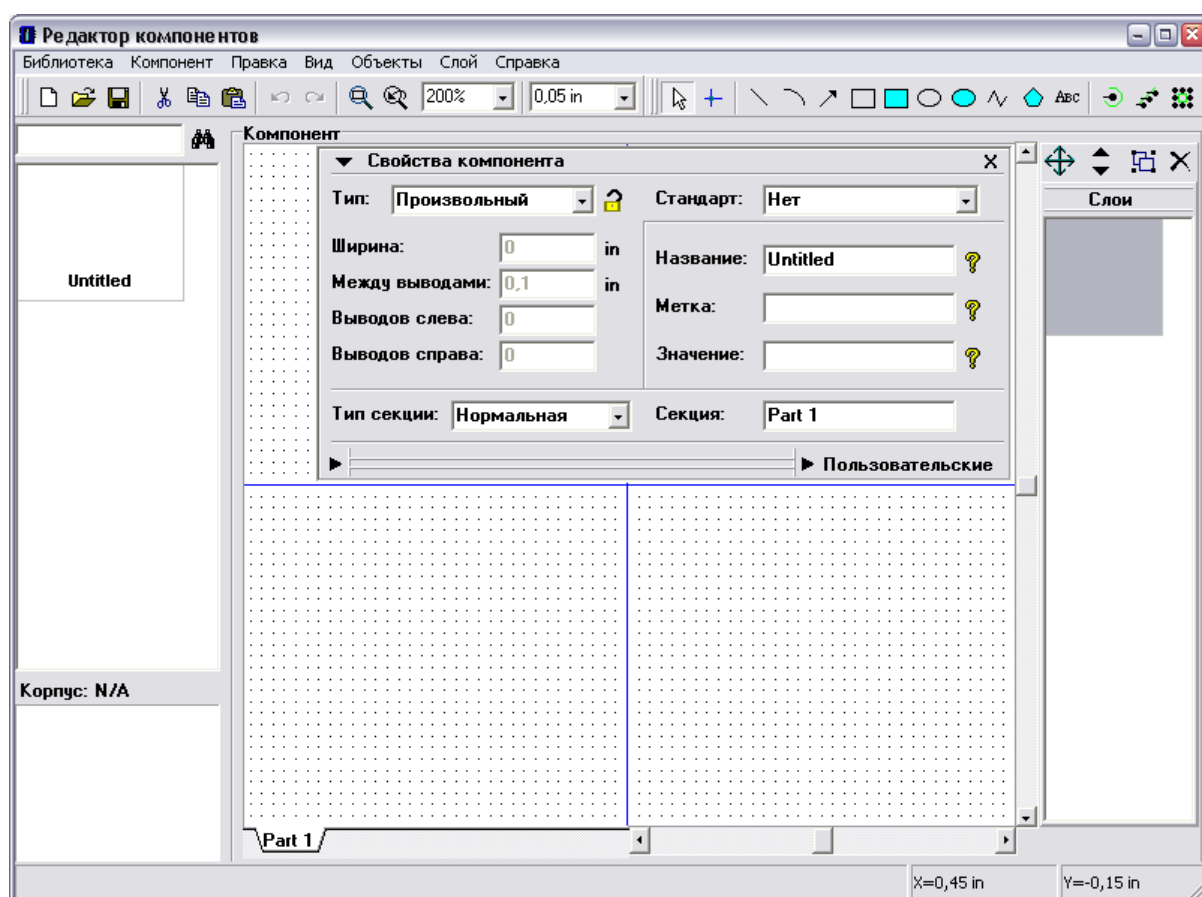
4- ( 4- + ) .

: " " "

" "

.

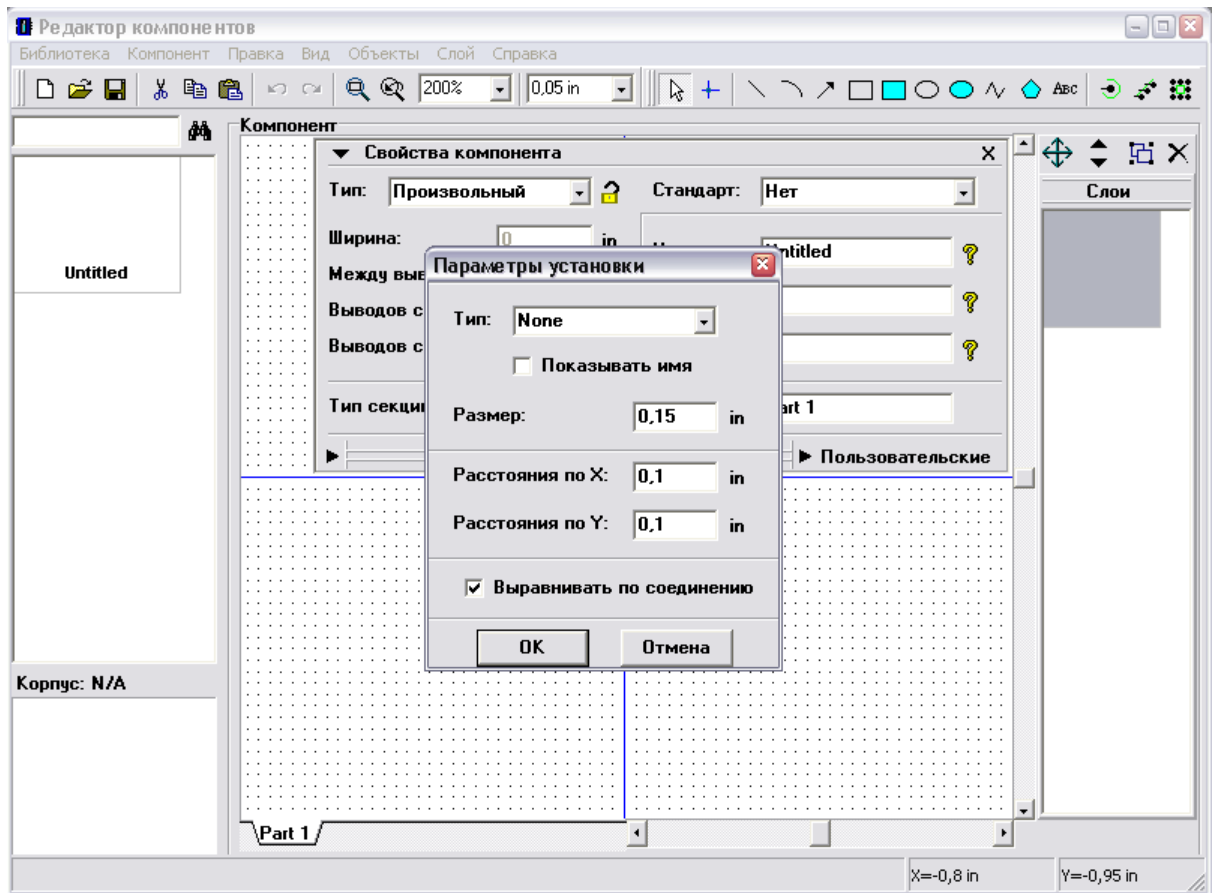
, GND VCC.



“ / ”

, , X, Y

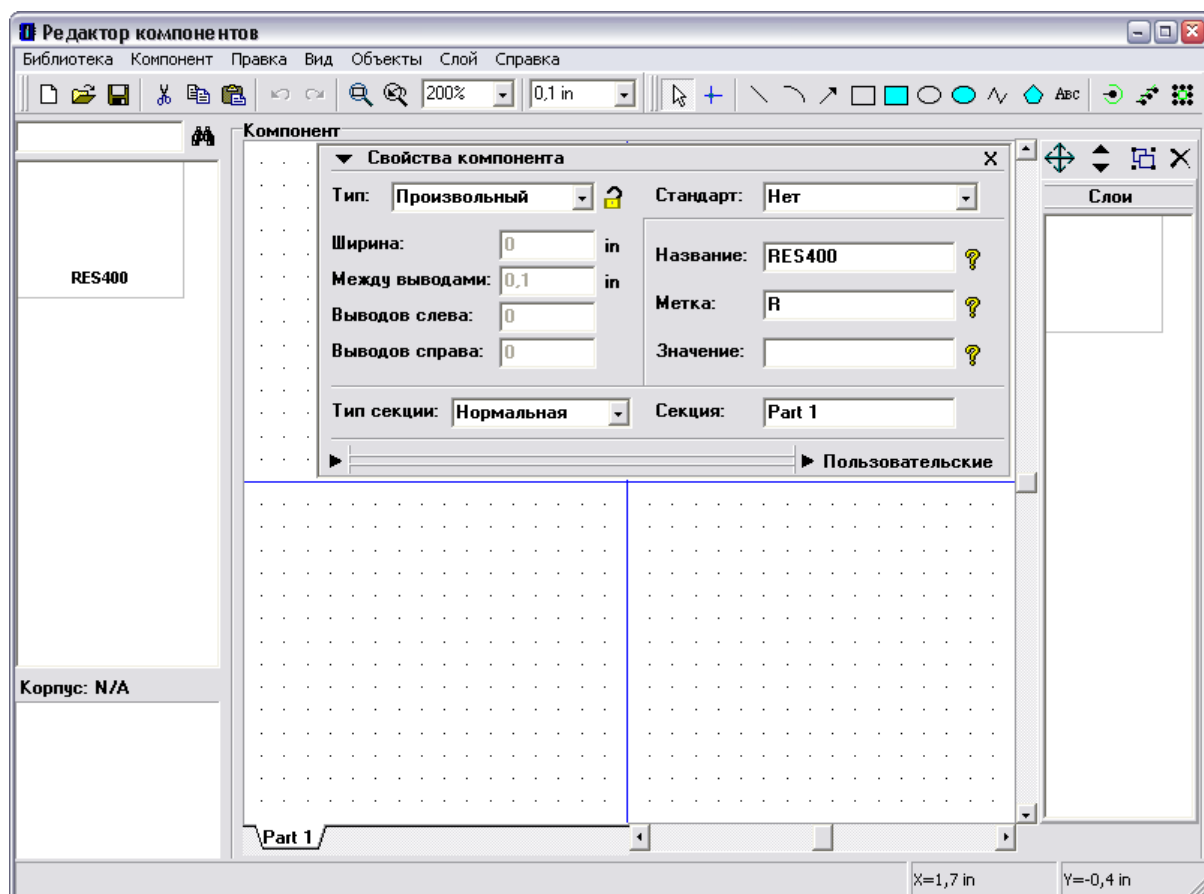
,



0.1

### 3.2.2

, “ ”



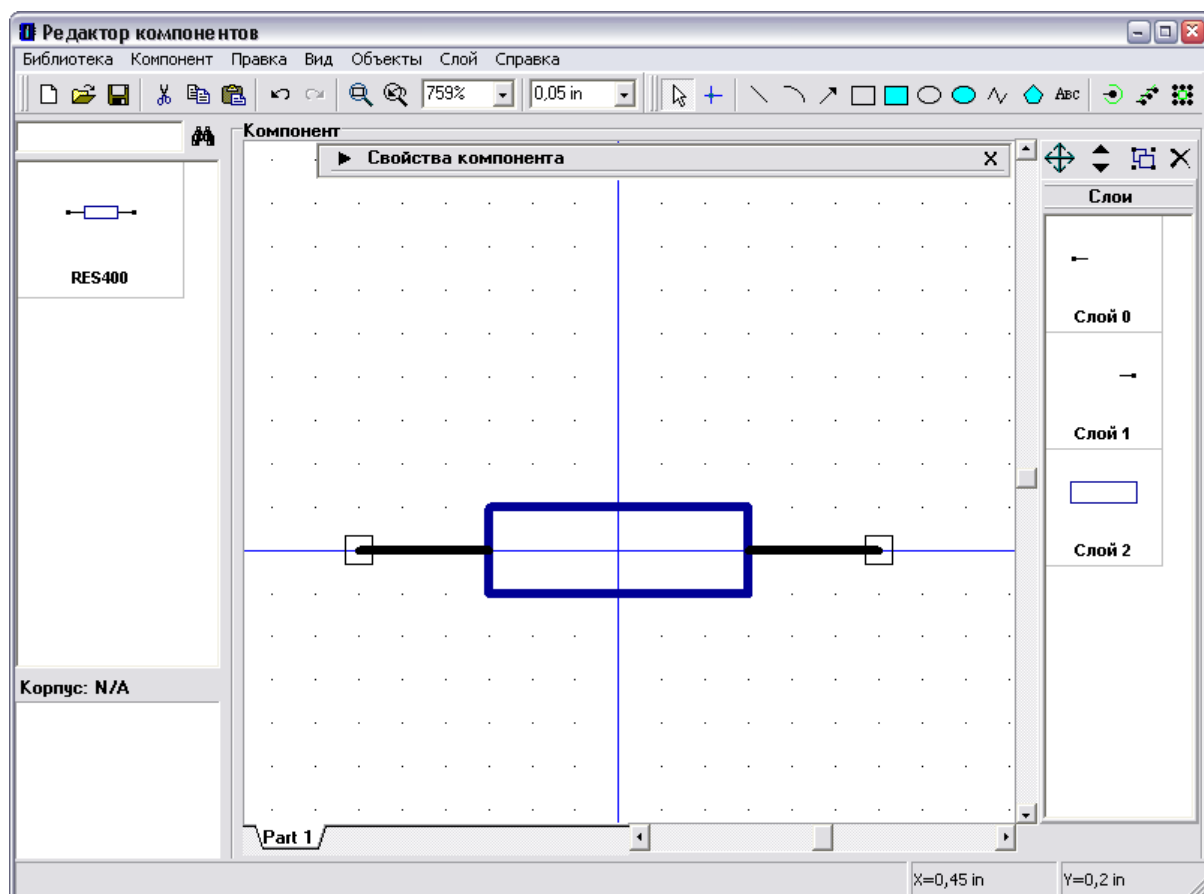
“ ” ,

180 : “Ctrl+R” .

“ ” .

0.1,

0.05 (Ctrl+, Ctrl- ).



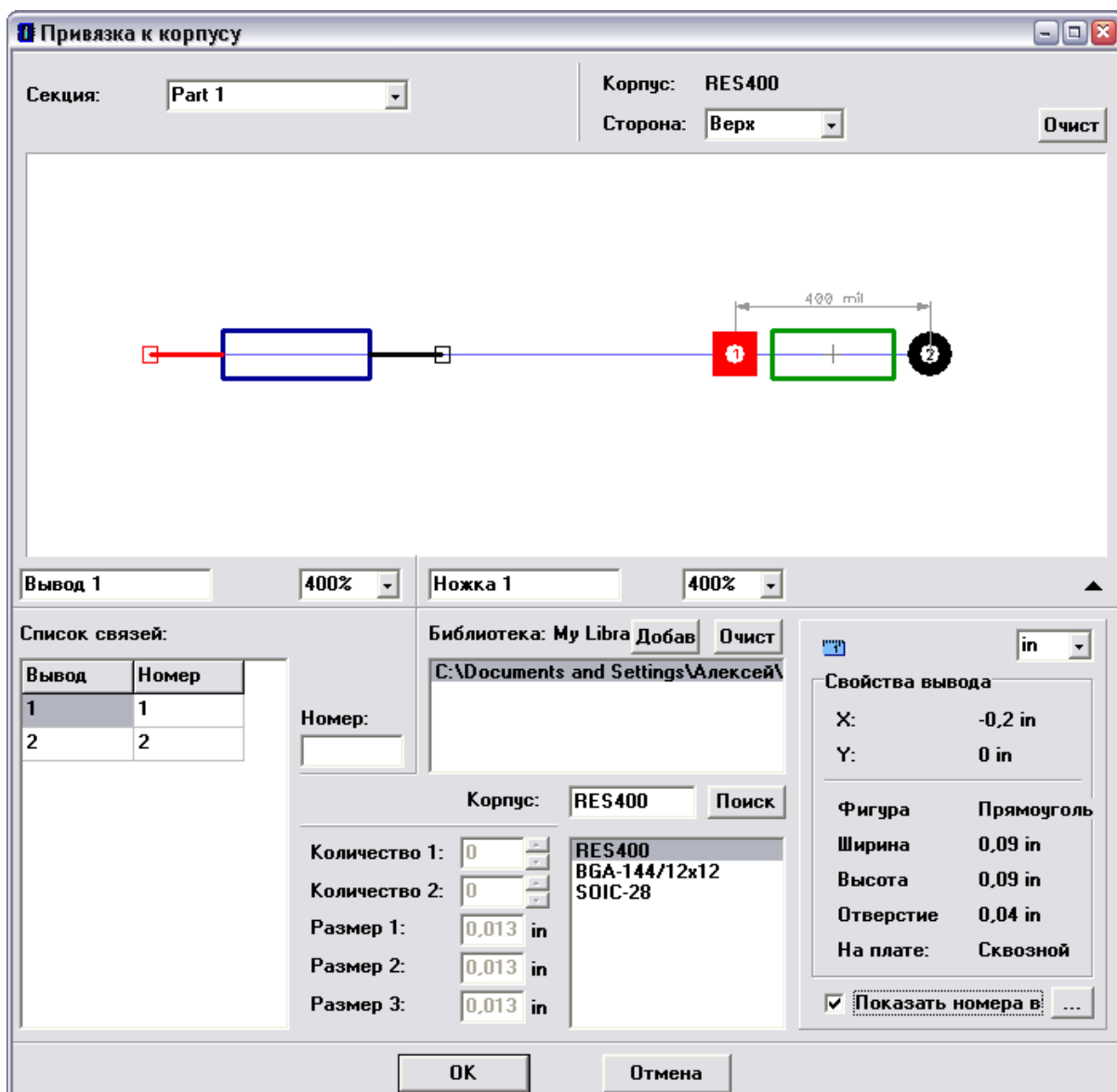
“ / ”

“Add”

“RES 400”

( ).

“OK”



“ / ” ) (

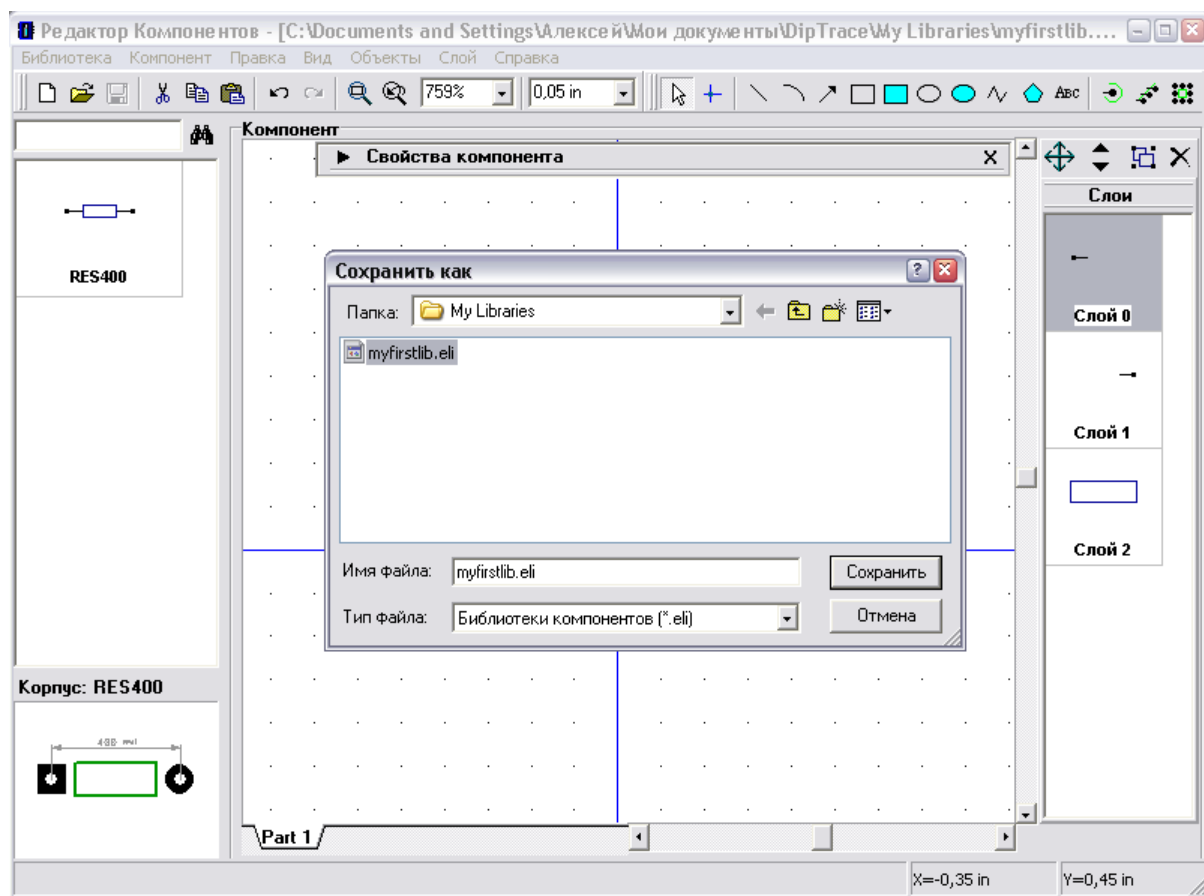
PCB.

“ /

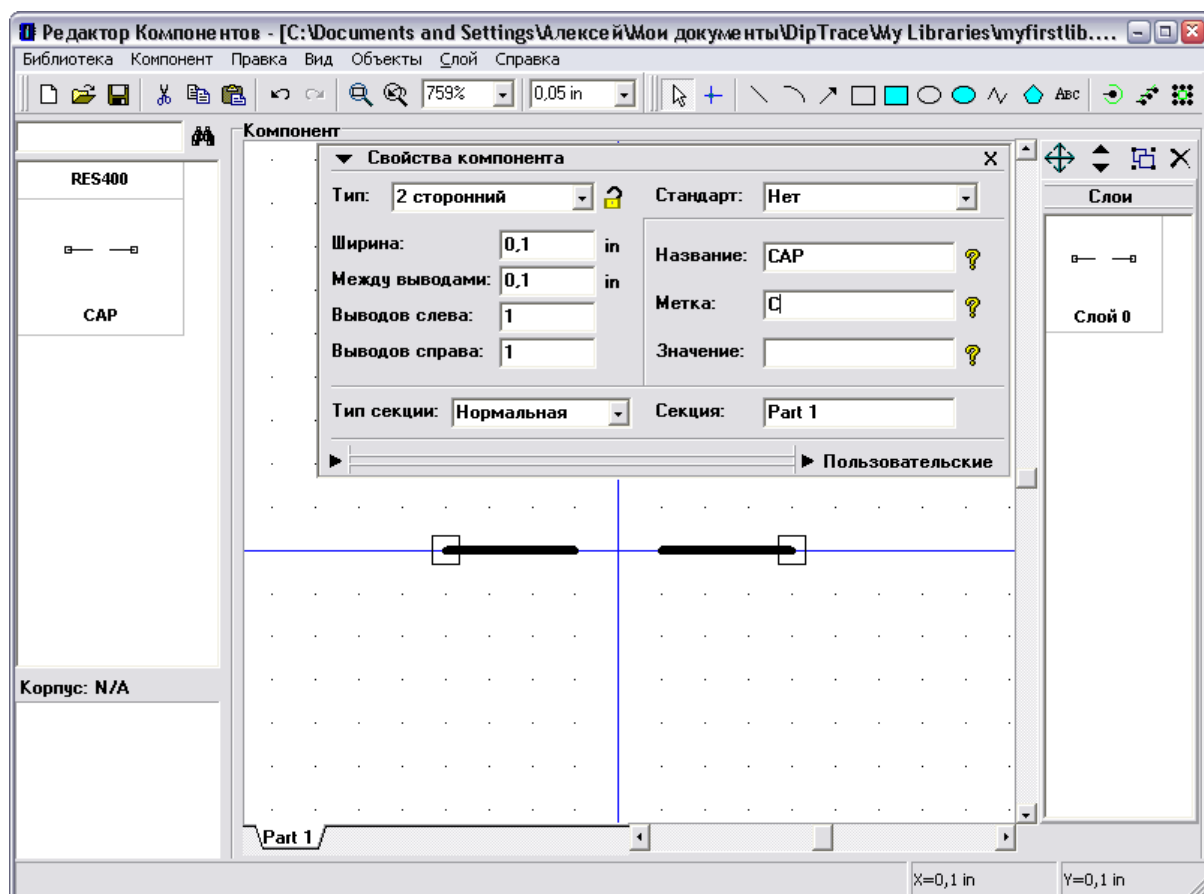
“My Library” “This is my first

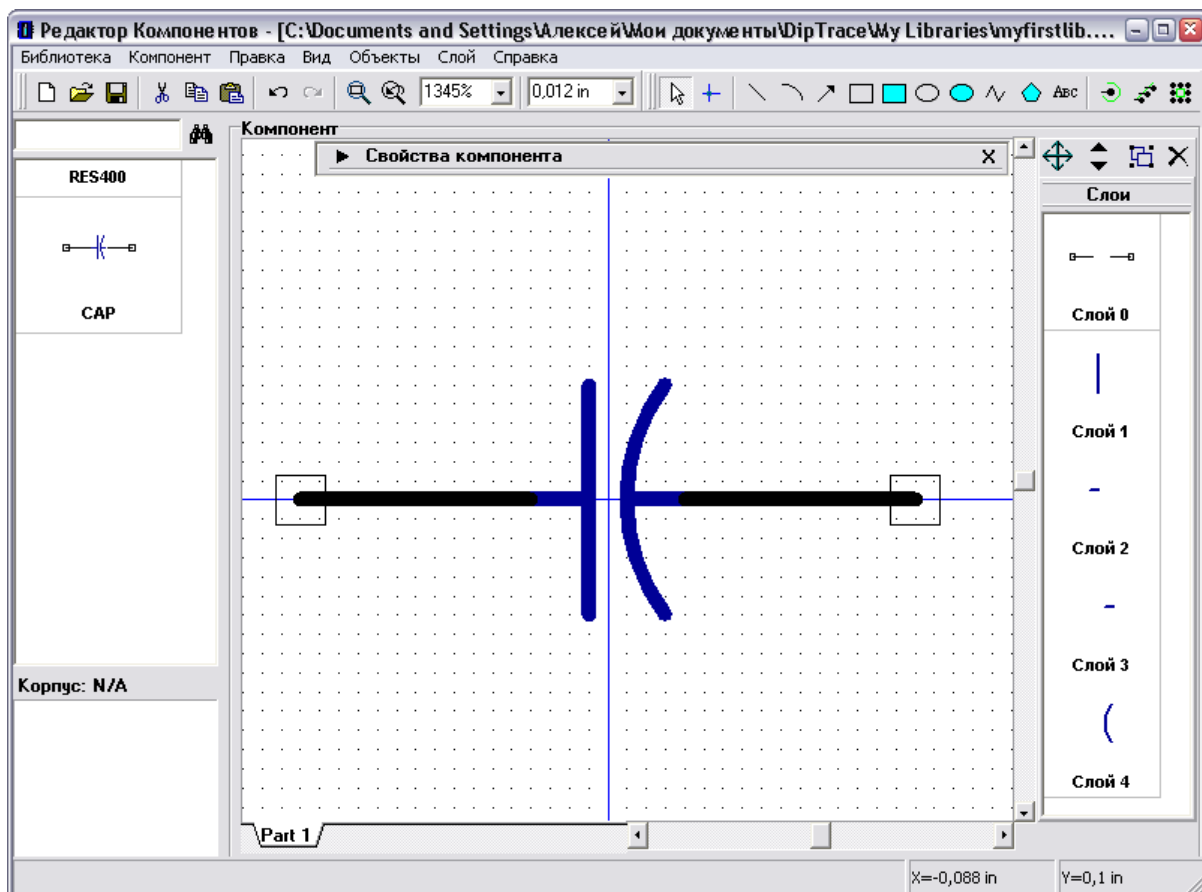
component library” ( , . . . ) .

“ ”



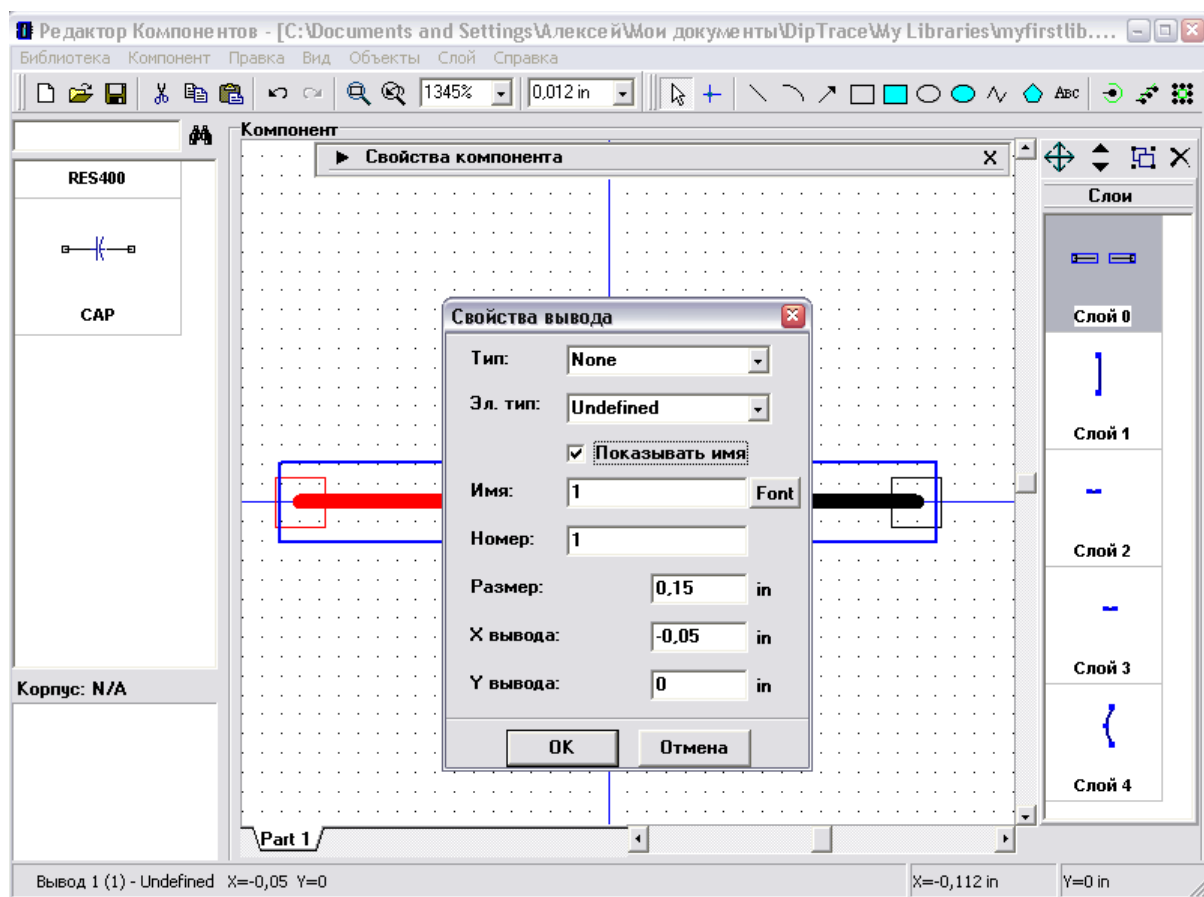
### 3.2.3





“Ctrl+A”),  
 “ ”  
 “OK”

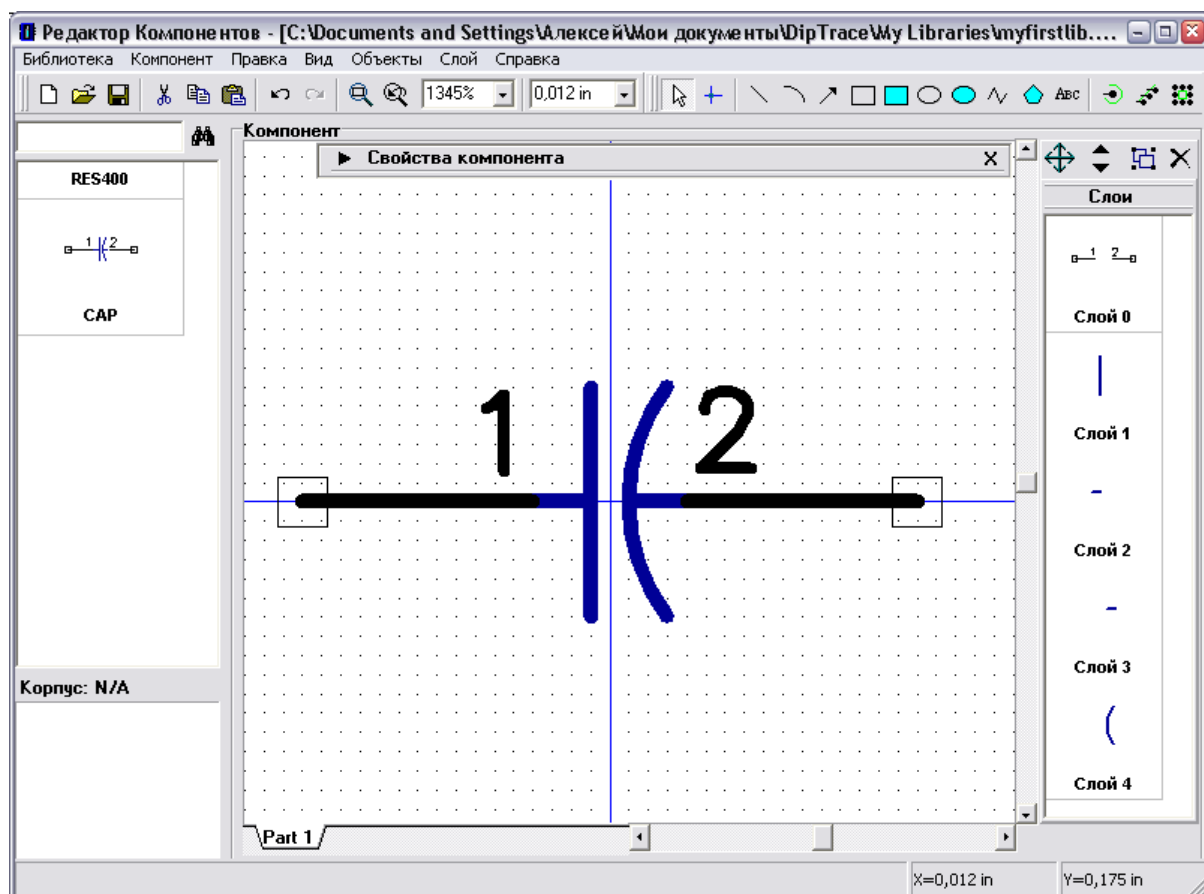




“Undefined”

,  
,  
( . ).  
(ERC)

F10.



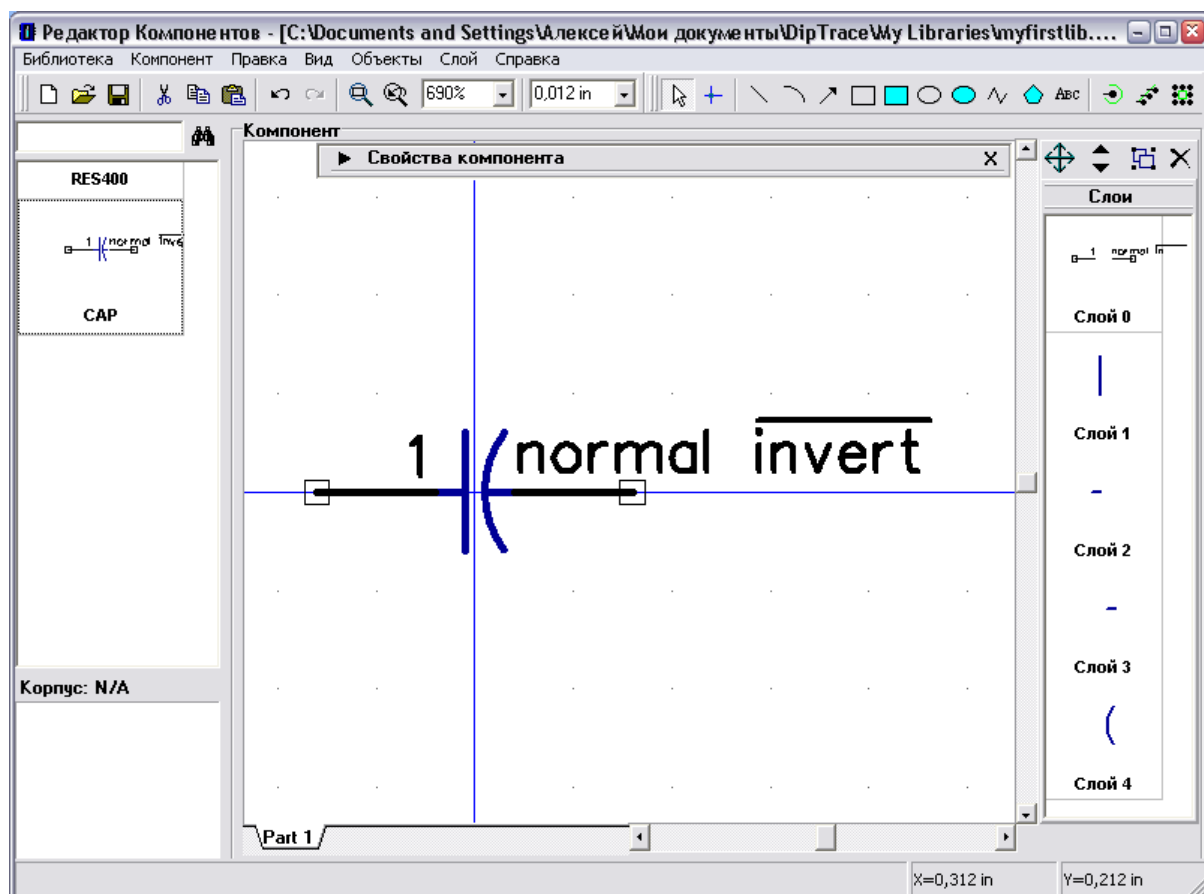
, ( ),

”~”

,

,

“OK”



,  
 ,  
 ,  
 ,  
 .  
 “ / ”  
 , “2” “2”,  
 : ( , )  
 “ ”,  
 , ( . ” ),  
 , “ ”.

Таблица выводов

Секция: Part 1

Имя	Номер	X	Y	Размер	Тип	Ел. тип	Show Name
1	1	-0,05	0	0,15	None	Passive	Нет
2	2	0,05	0	0,15	None	Passive	Нет

Добавить Удалить

Имя: 1 X: -0,05 in Тип: None Размер: 0,15 in  
Номер: 1 Y: 0 in Эл. тип: Passive ☐ Показывать имя

Закрыть

(“ / “ ”)

“ ”

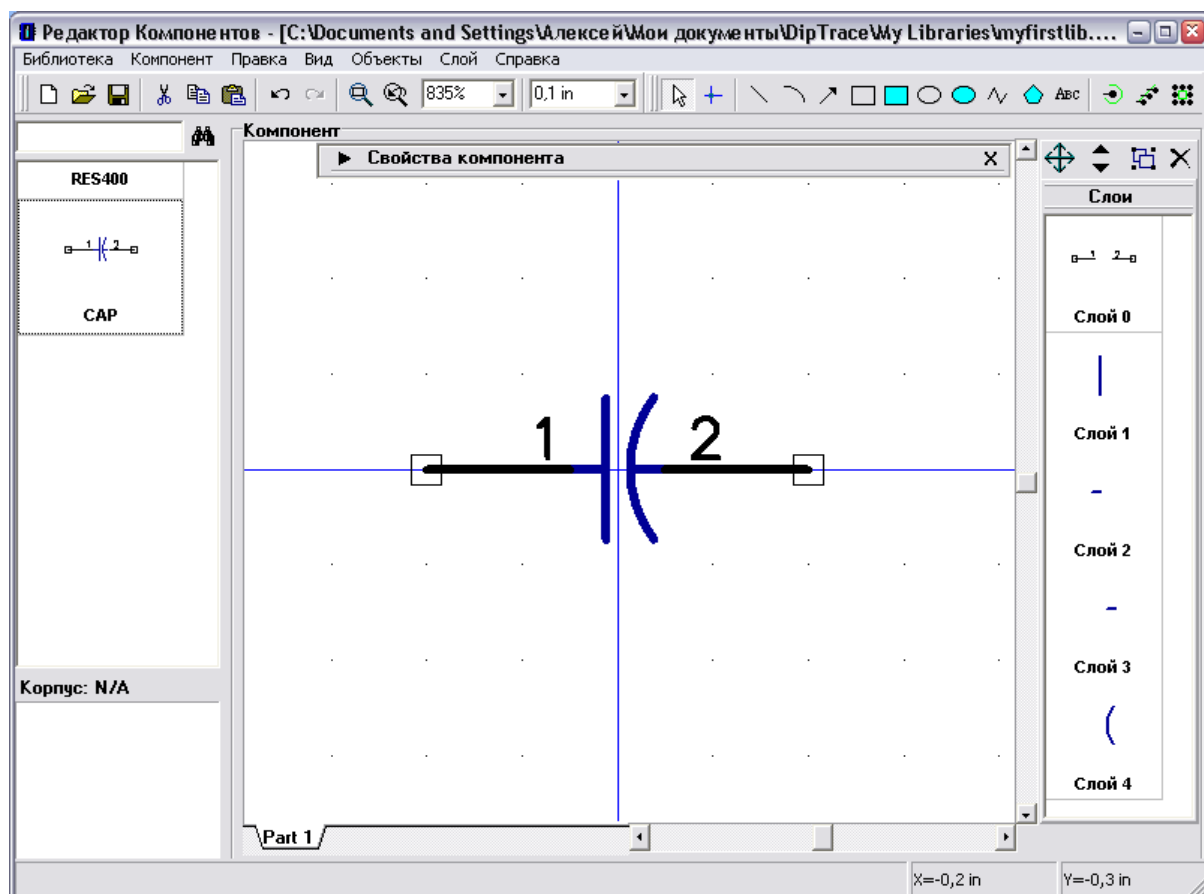
.

,

.

,

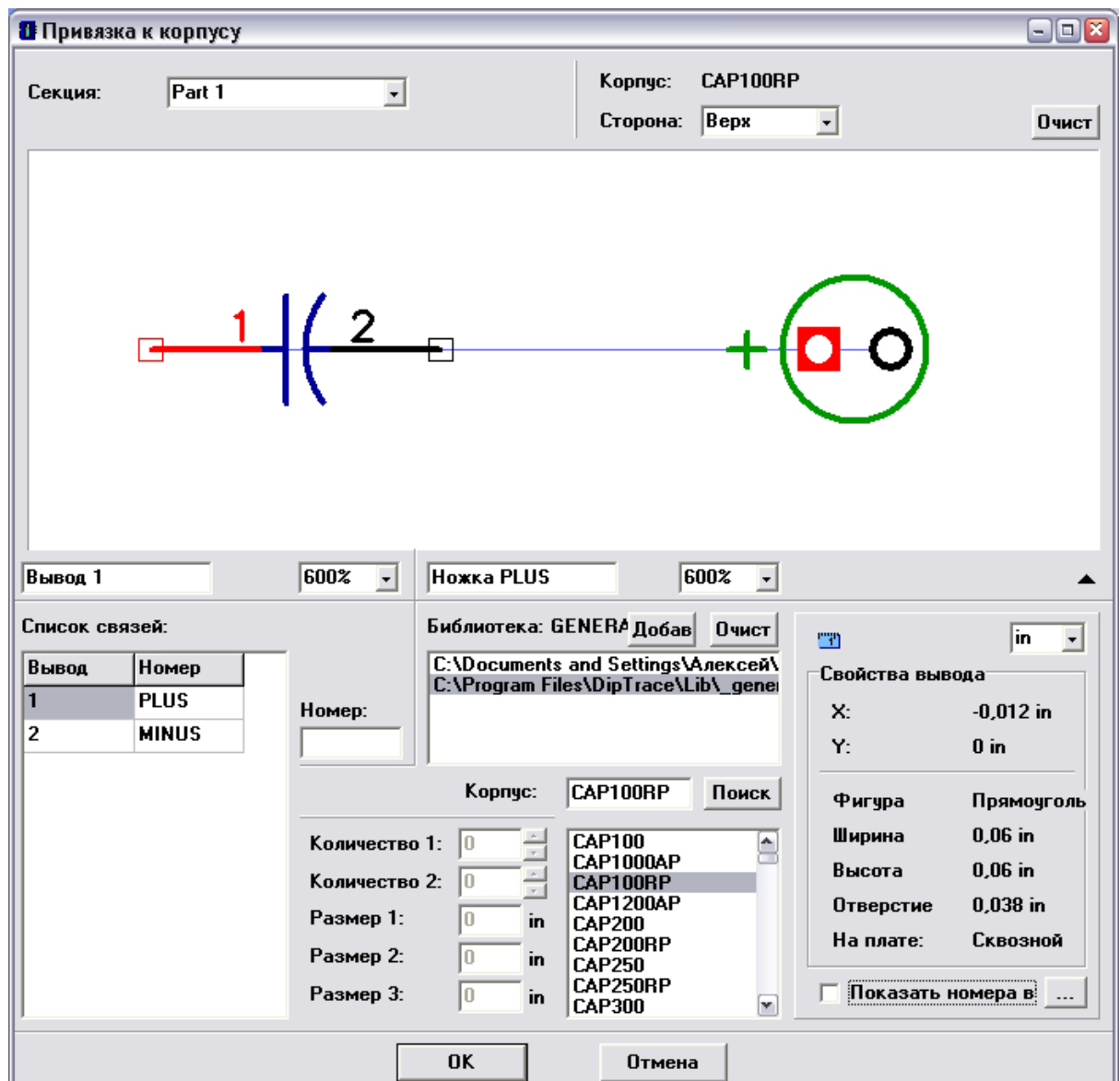
(F10).



— “ /

”

“Capacitor”



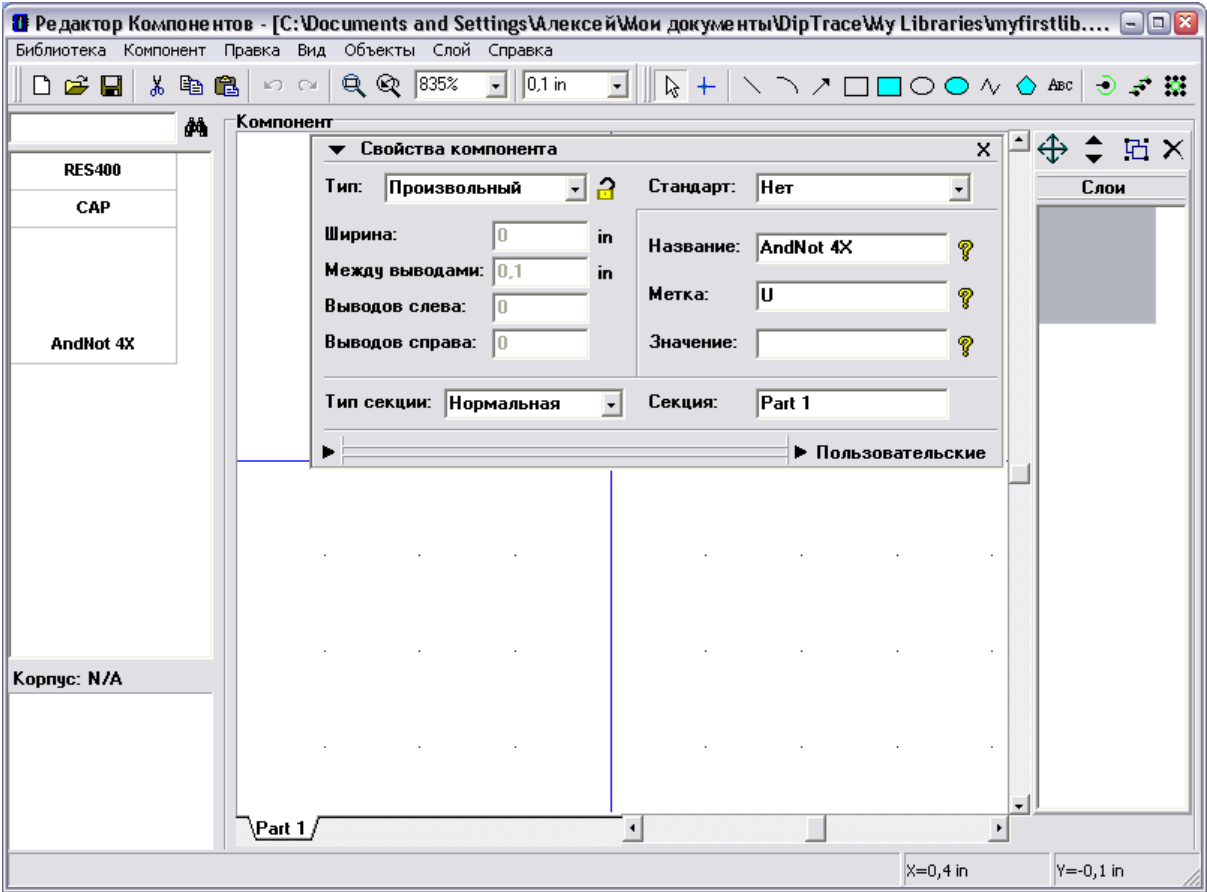
## 3.2.4

“ - ”.

DIP14.

”

,



- " "

" "

,

.

-

. DipTrace

( ).

,

:

,

;

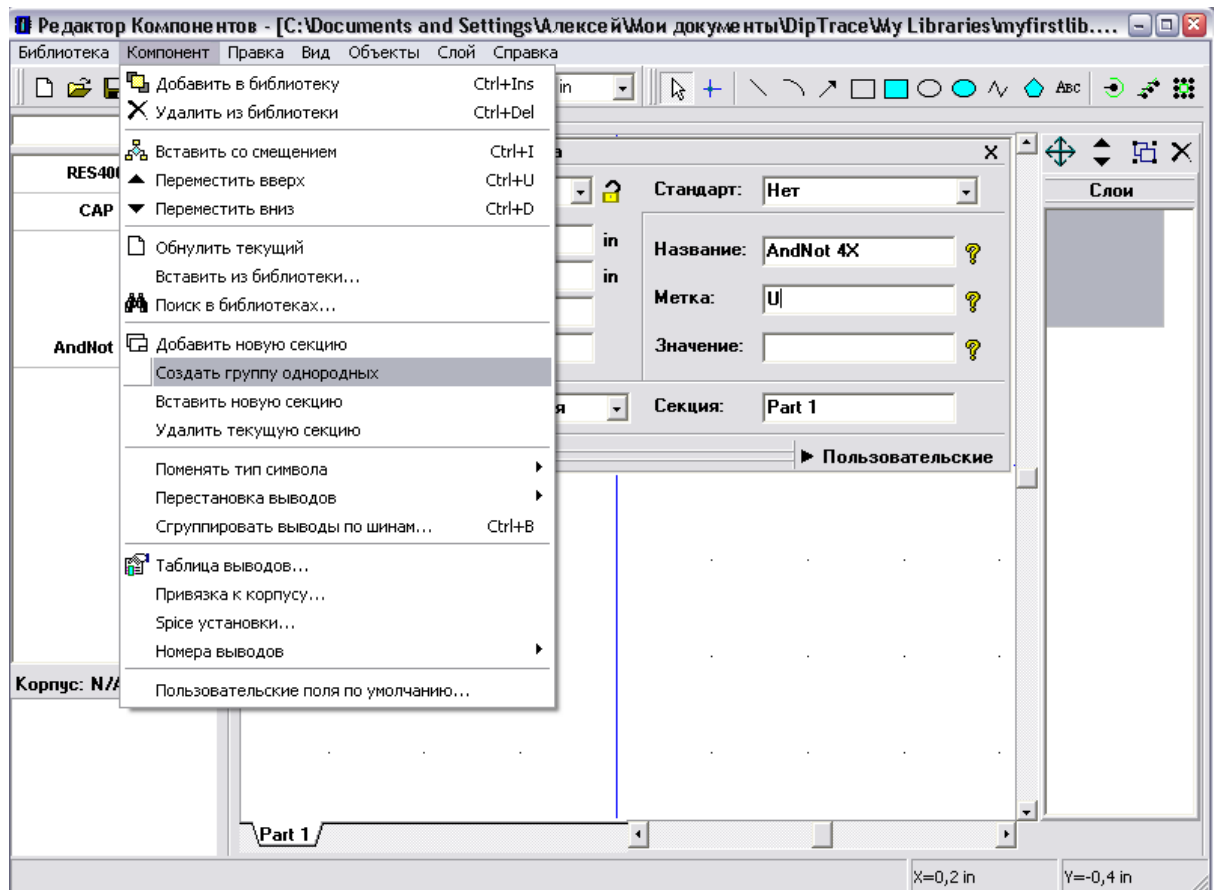
.

4 “ - ” 1 .

“ / ” ,

“4” “OK” .

.



: Part 1 (1), Part 1 (2), Part 1 (3) and Part 1 (4)

“AN”.

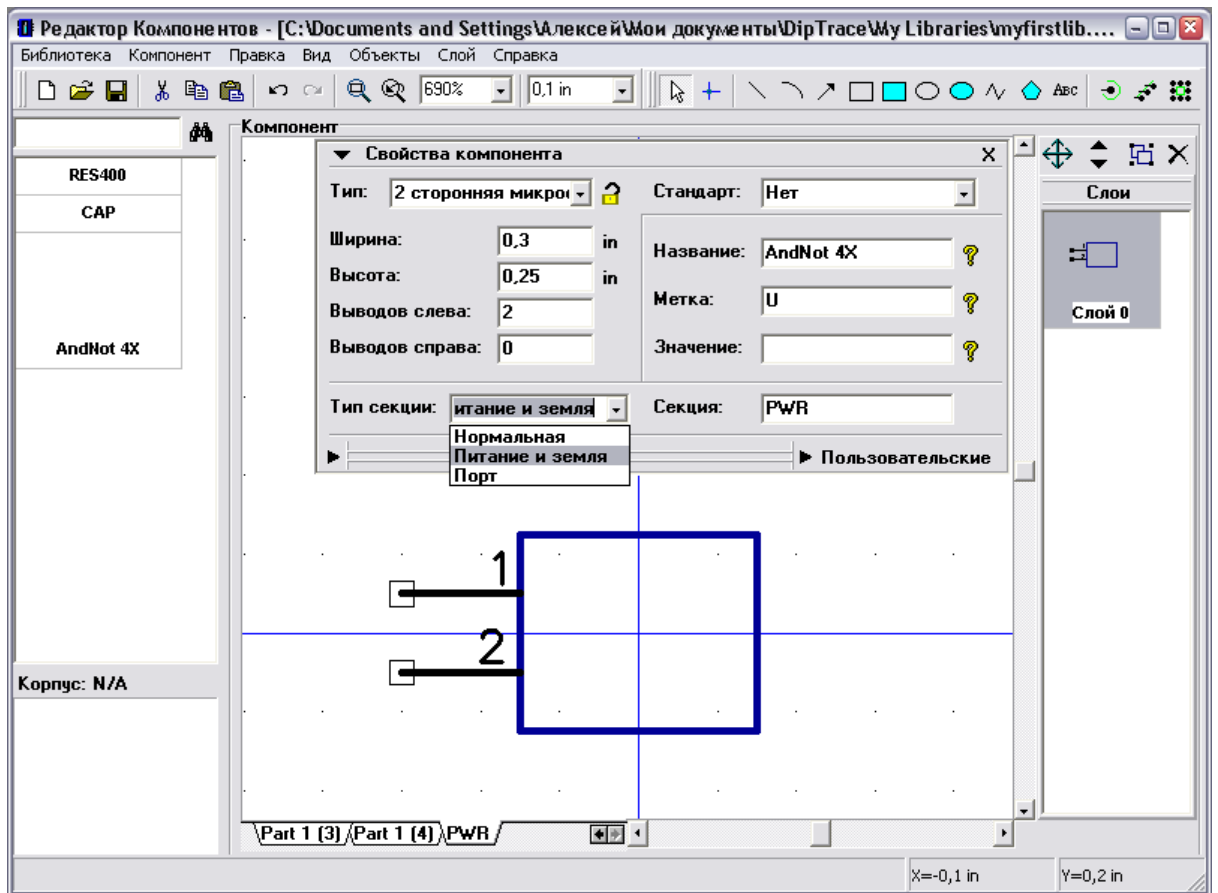
“PWR”.

“AN”.

“2.54” , – “2”, – “0”.

– “7.62” , “





“Power” “VCC” “GND”, “14” “7”,  
 “ ” “ ” “ ”  
 “ ” “ ” “ ”

Таблица выводов

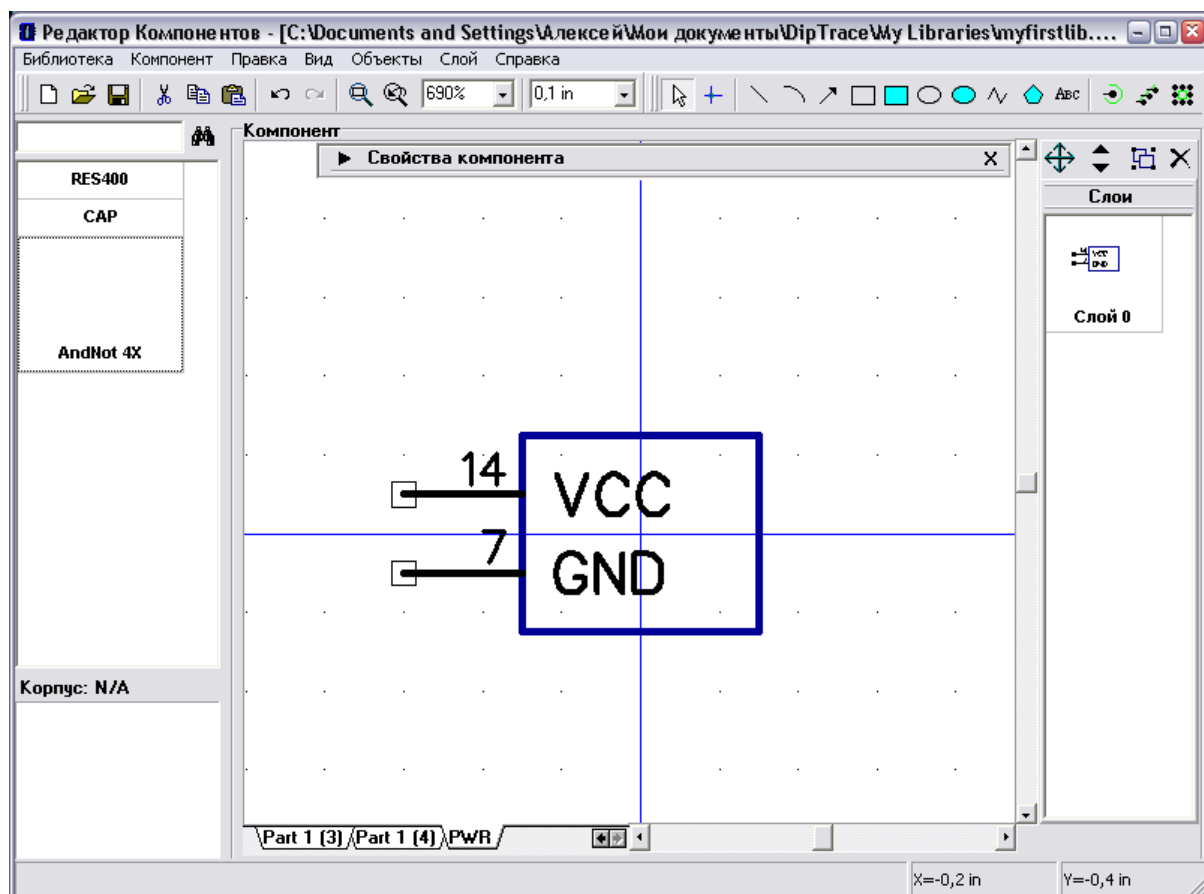
Секция: PWR

Имя	Номер	X	Y	Размер	Тип	Ел. тип	Show Name
VCC	14	-0,15	0,05	0,15	None	Power	Да
GND	7	-0,15	-0,05	0,15	None	Power	Да

Добавить Удалить

Имя: VCC X: -0,15 in Тип: None Размер: 0,15 in  
Номер: 14 Y: 0,05 in Эл. тип: Power ☒ Показывать имя

Заккрыть



AN,

: - "2-

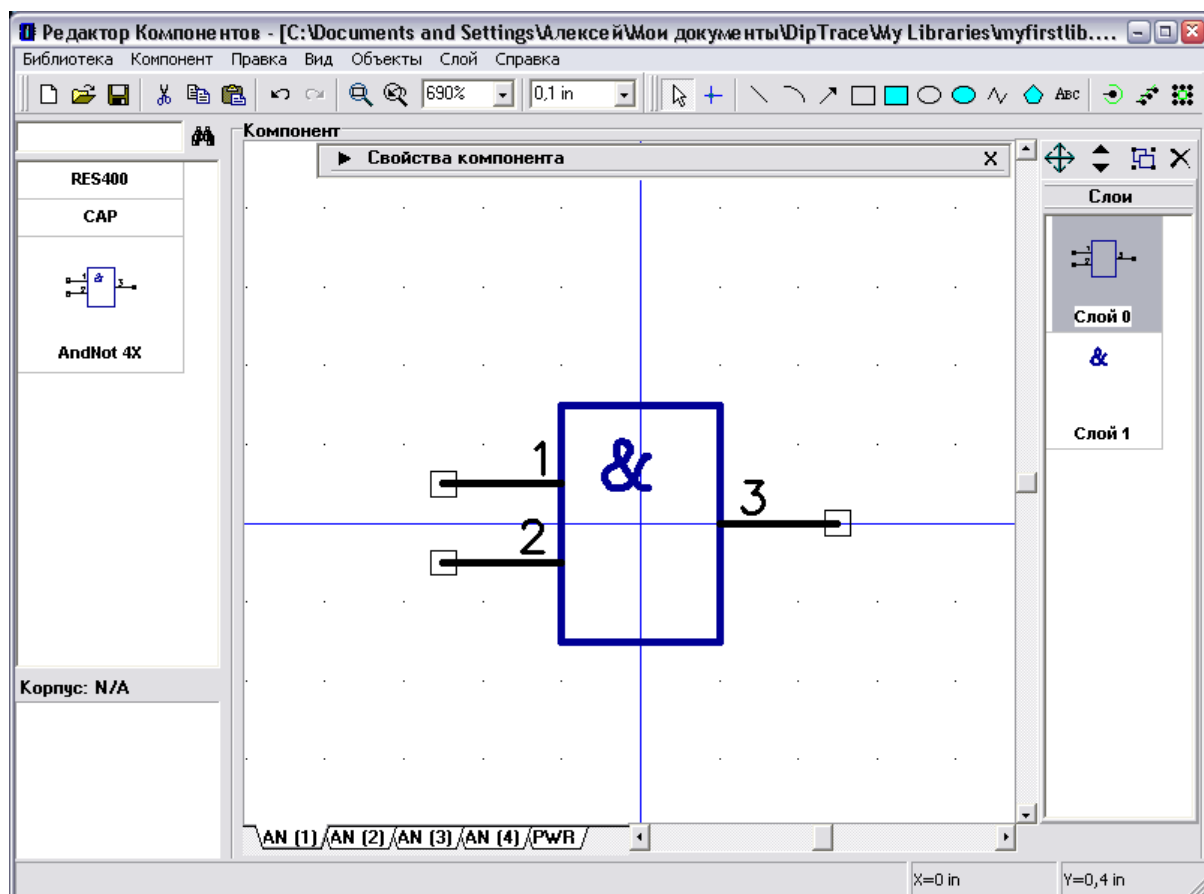
– "2.54" , – "2",

– "5.08" ,

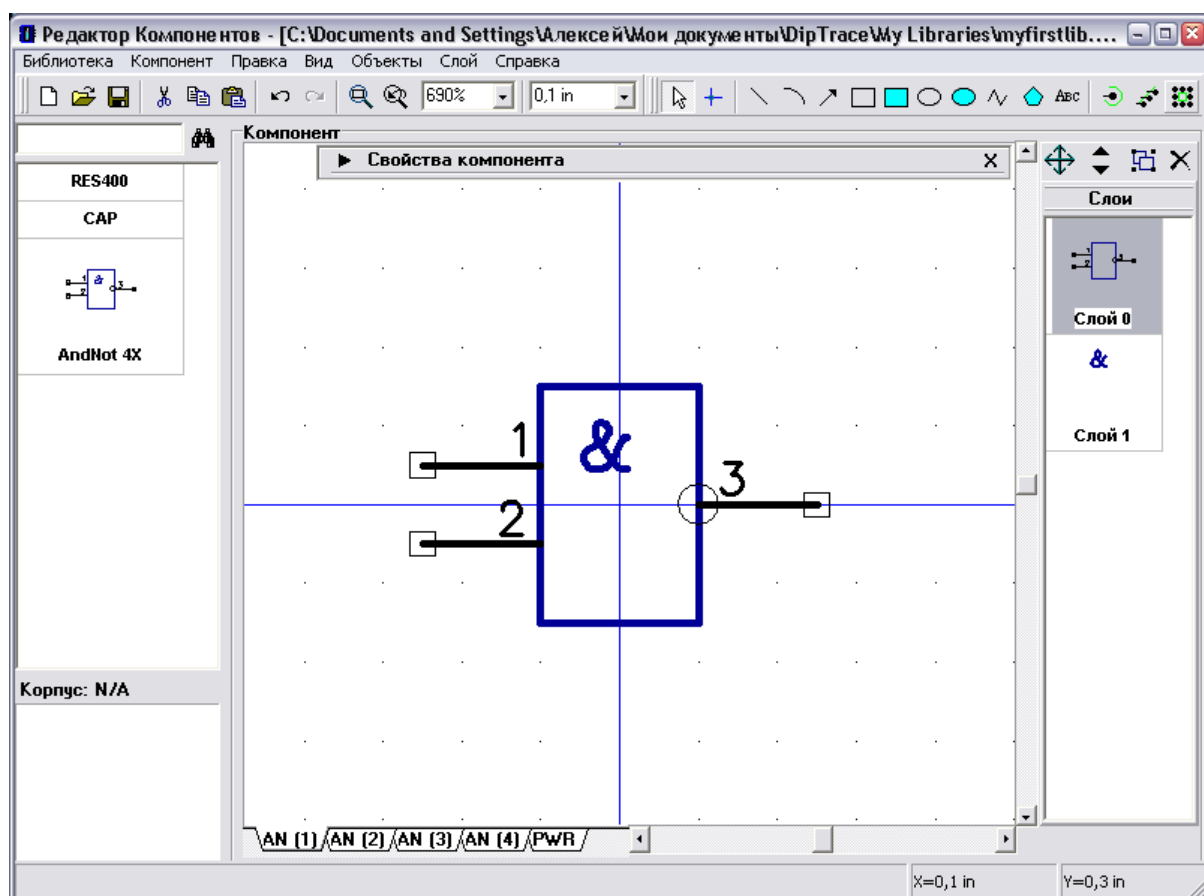
– "1".

“ ”

“&”, “Enter”



“ - ”,  
 “Dot”  
 “Dot” “ ”,  
 “OK”  
 “AN”.  
 AN (3) AN (4)  
 ).



AN.

Таблица выводов

Секция: AN (4)

Имя	Номер	X	Y	Размер	Тип	Ел. тип	Show Name
1	1	-0,1	0,05	0,15	None	Input	Нет
2	2	-0,1	-0,05	0,15	None	Input	Нет
3	3	0,1	0	0,15	Dot	Output	Нет

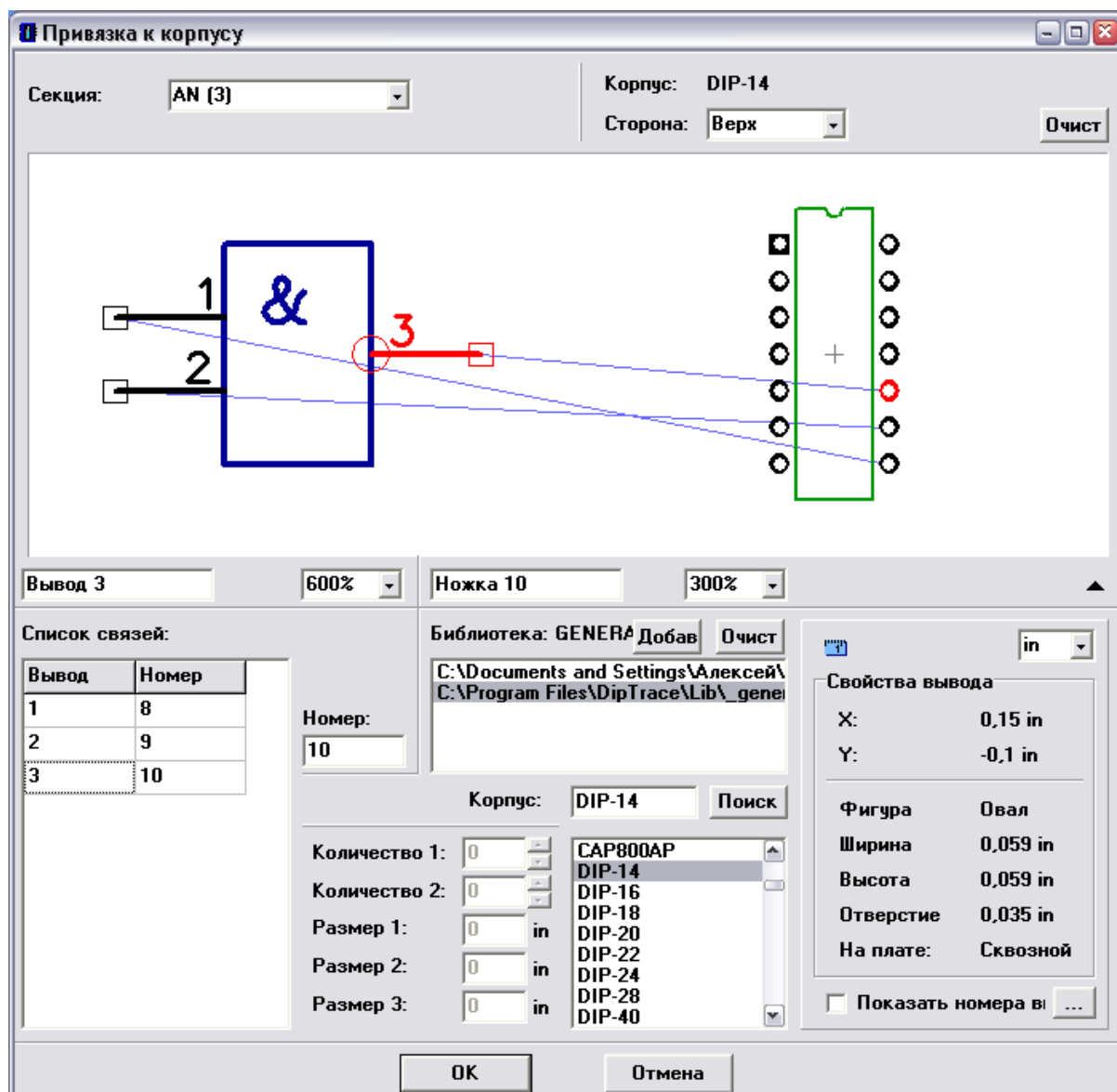
Добавить Удалить

Имя: 1 X: -0,1 in Тип: None Размер: 0,15 in  
 Номер: 1 Y: 0,05 in Эл. тип: Input ☐ Показывать имя

Заккрыть

“Output”) , (“Input”  
 (ERC).

“ / ”  
 “\_general.lib” DIP-14  
 , . .  
 ( “OK”  
 ) , .



## 3.2.5

## PIC18F24K20

PIC18F24K20

SOIC-28.

"Datasheets"

<http://www.microchip.com>,

"PIC18F24K20"

<http://www1.microchip.com/downloads/en/DeviceDoc/41303G.pdf>,: <http://www1.microchip.com/downloads/en/>

"Pin Diagrams" ( 5

),

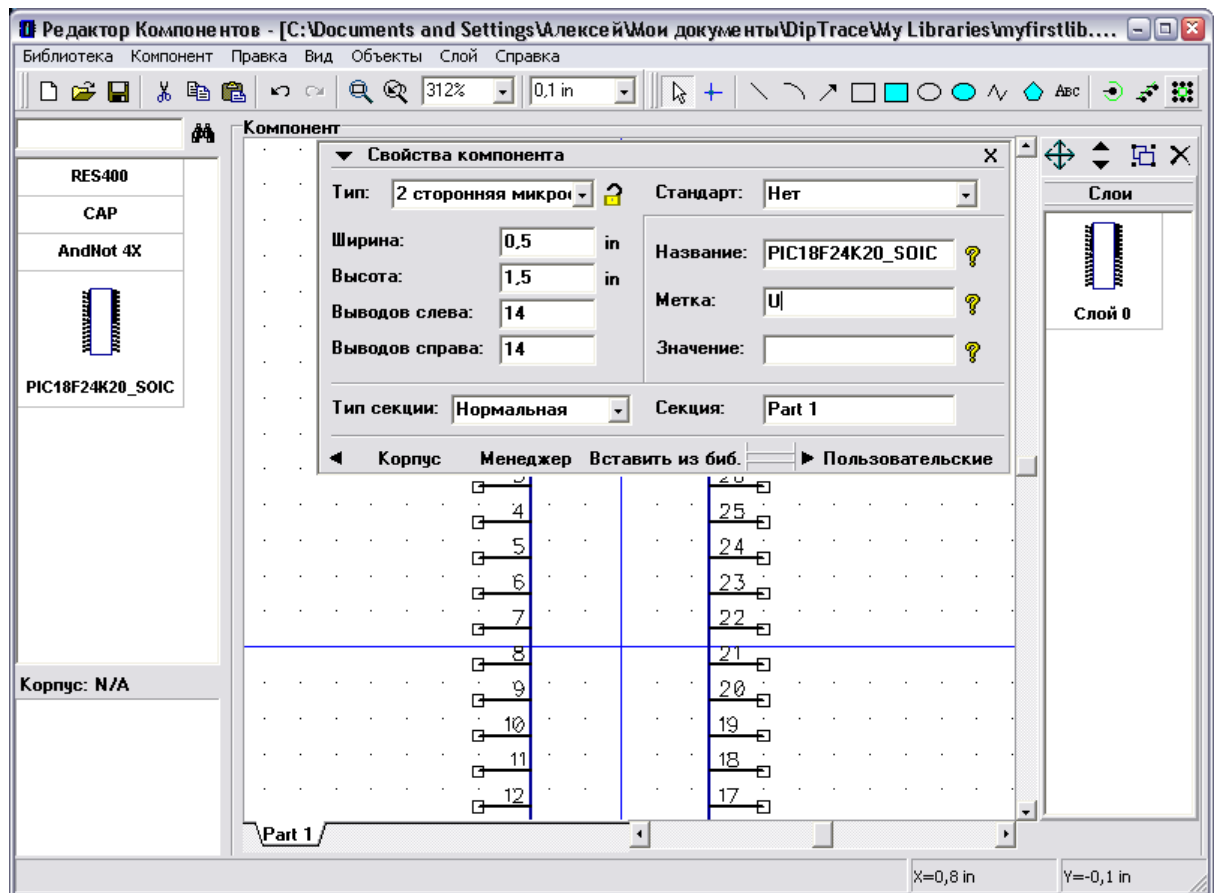
(Ctrl+Insert),

" :2-

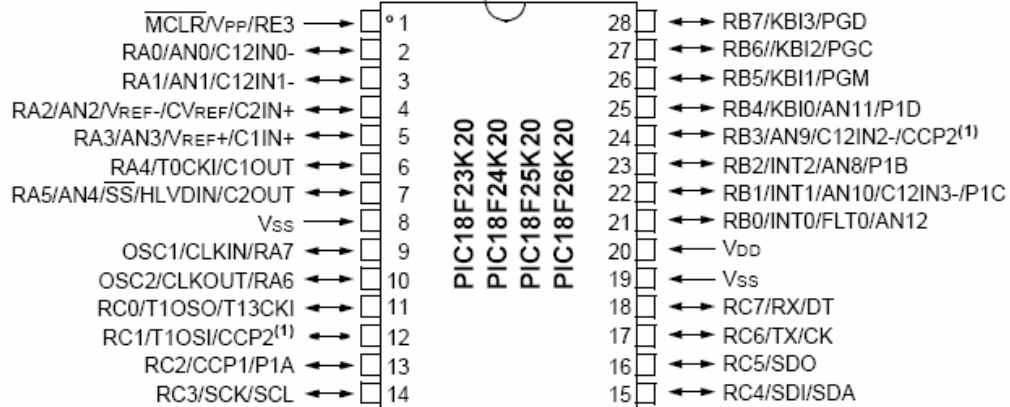
", "

: 14", "

: 14",







**Pin Manager**

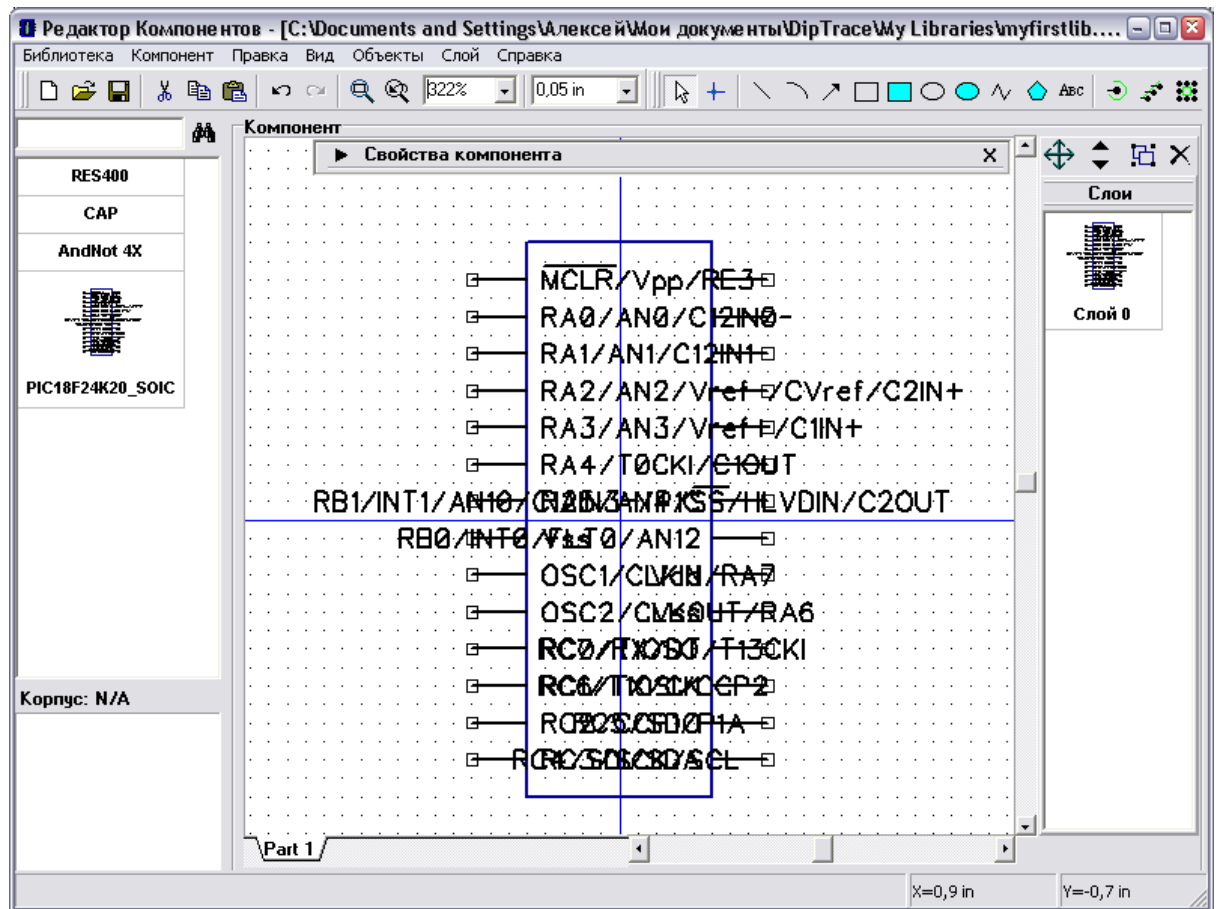
Part: **Part 1**

Name	Number	X	Y	Length	Type	Electric	Show Name
~MCLR~/Vpp/RE3	1	-0.25	0.65	0.15	None	Power	No
RA0/AN0/C12IN0-	2	-0.25	0.55	0.15	None	Undefined	No
RA1/AN1/C12IN1-	3	-0.25	0.45	0.15	None	Undefined	No
RA2/AN2/Vref-/CVref/C2IN+	4	-0.25	0.35	0.15	None	Undefined	No
RA3/AN3/Vref+/C1IN+	5	-0.25	0.25	0.15	None	Undefined	No
RA4/T0CKI/C1OUT	6	-0.25	0.15	0.15	None	Undefined	No
RA5/AN4/~SS~/HLVDIN/C2OUT	7	-0.25	0.05	0.15	None	Undefined	No
Vss	8	-0.25	-0.05	0.15	None	Power	No

**Add** **Delete**

Name: **Vss** X: **-0.25** in Type: **None** Length: **0.15** in  
 Number: **8** Y: **-0.05** in Electric: **Power** ☐ Show Name

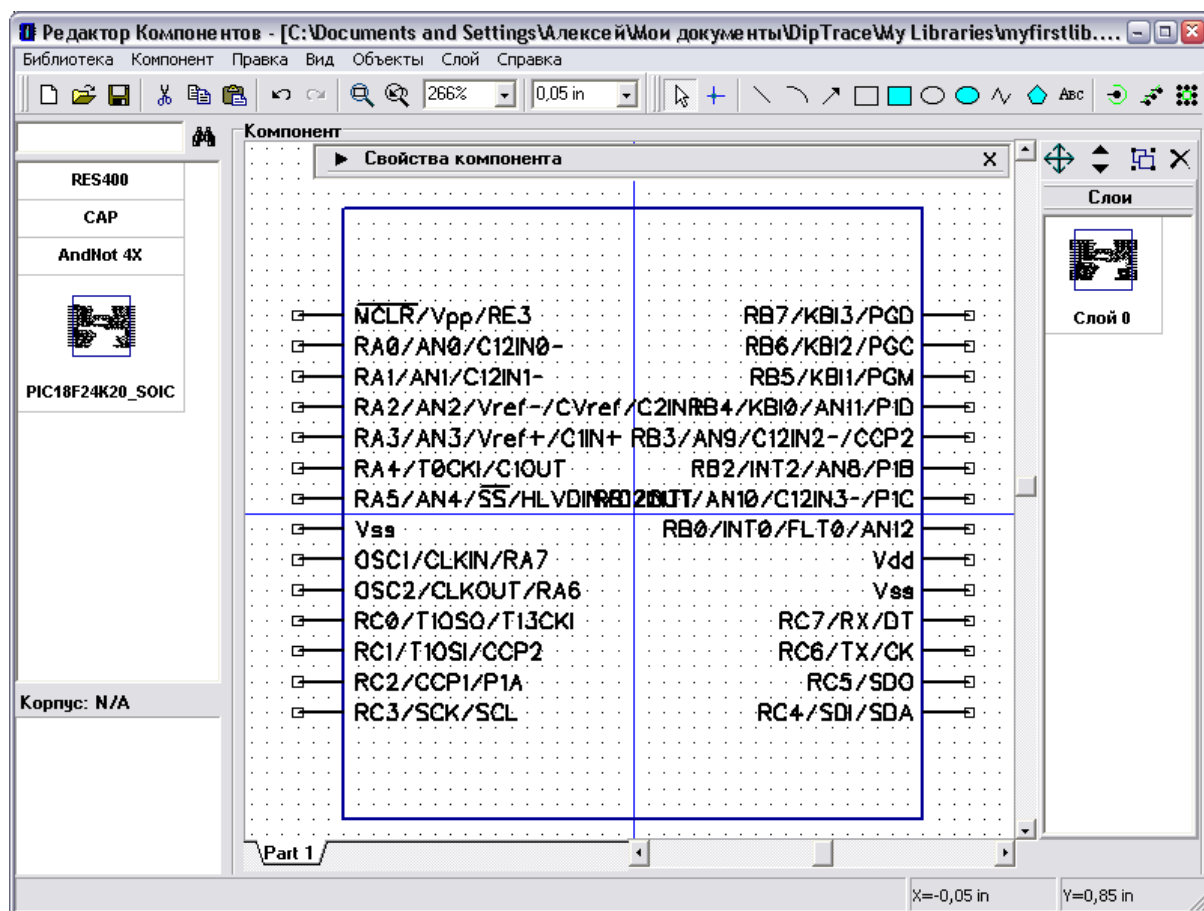
**Close**



"1.9"

"2".

0.05

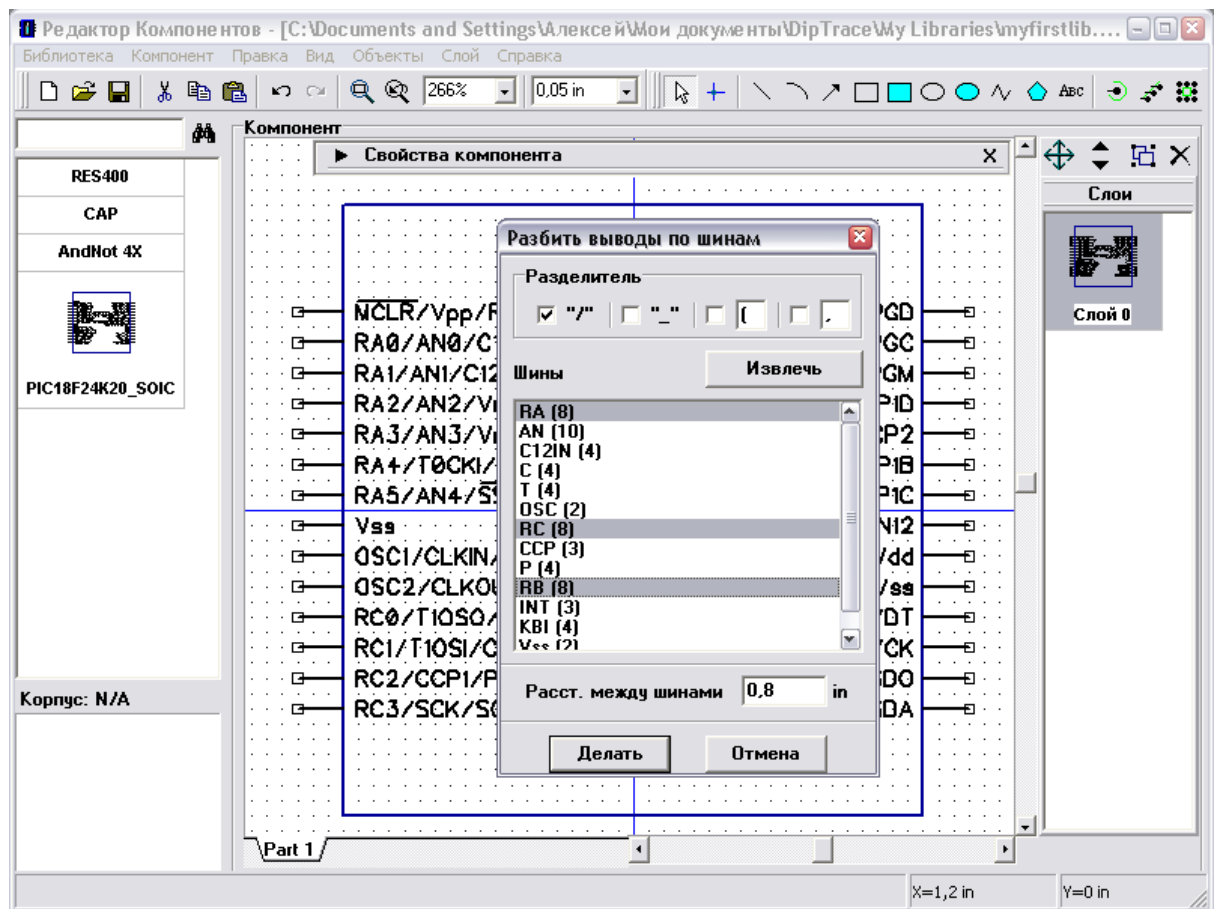


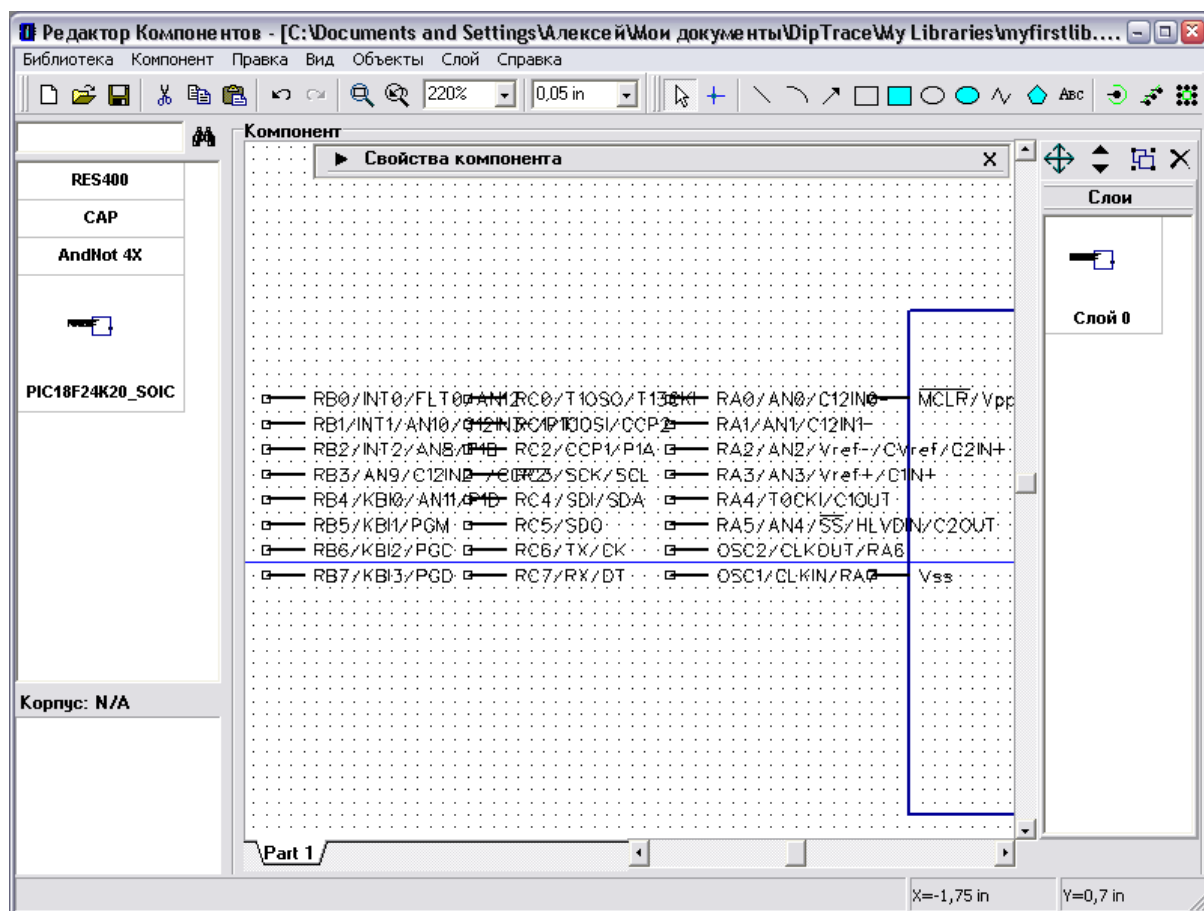
" / " :

"/

RA, RB RC

"Ctrl".

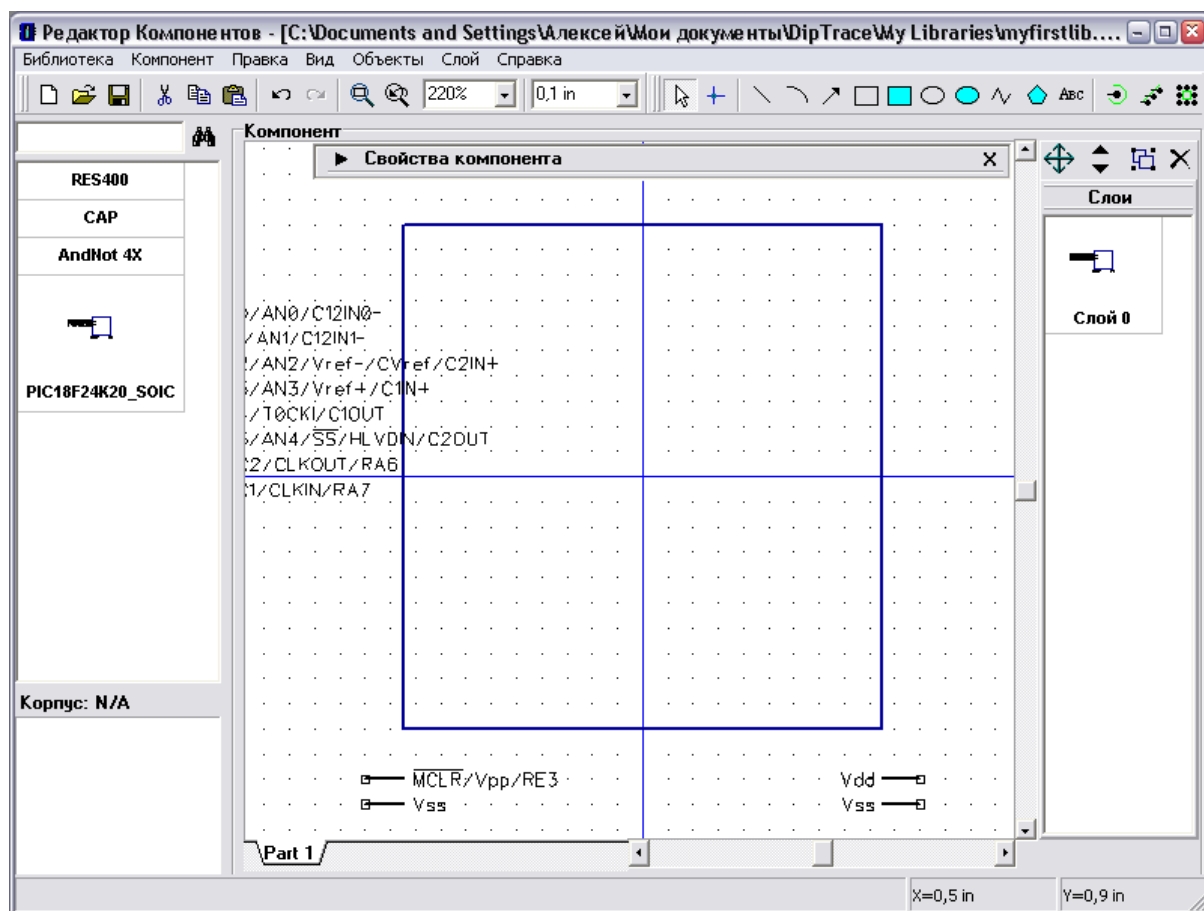




"Ctrl"

(4

),



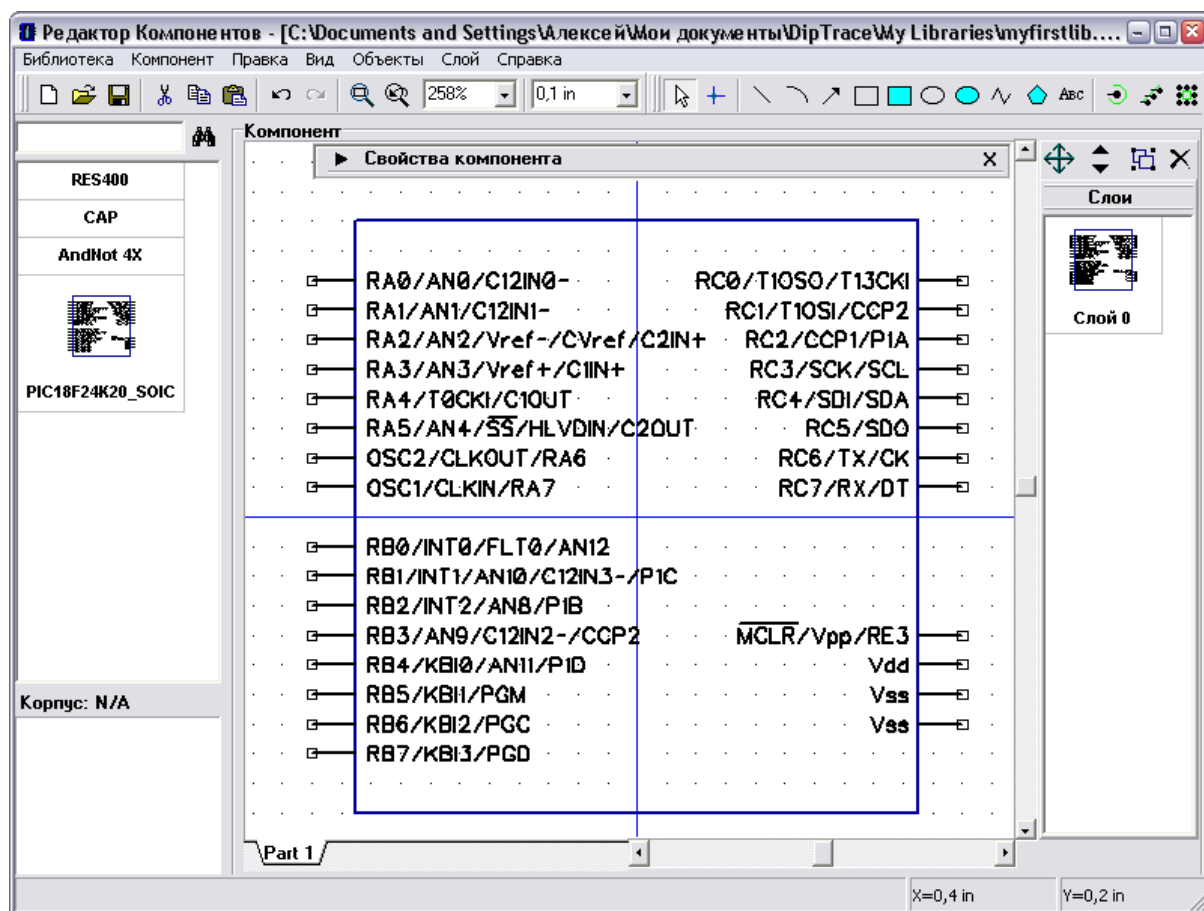
"Shift+F" , . Shift+R ,

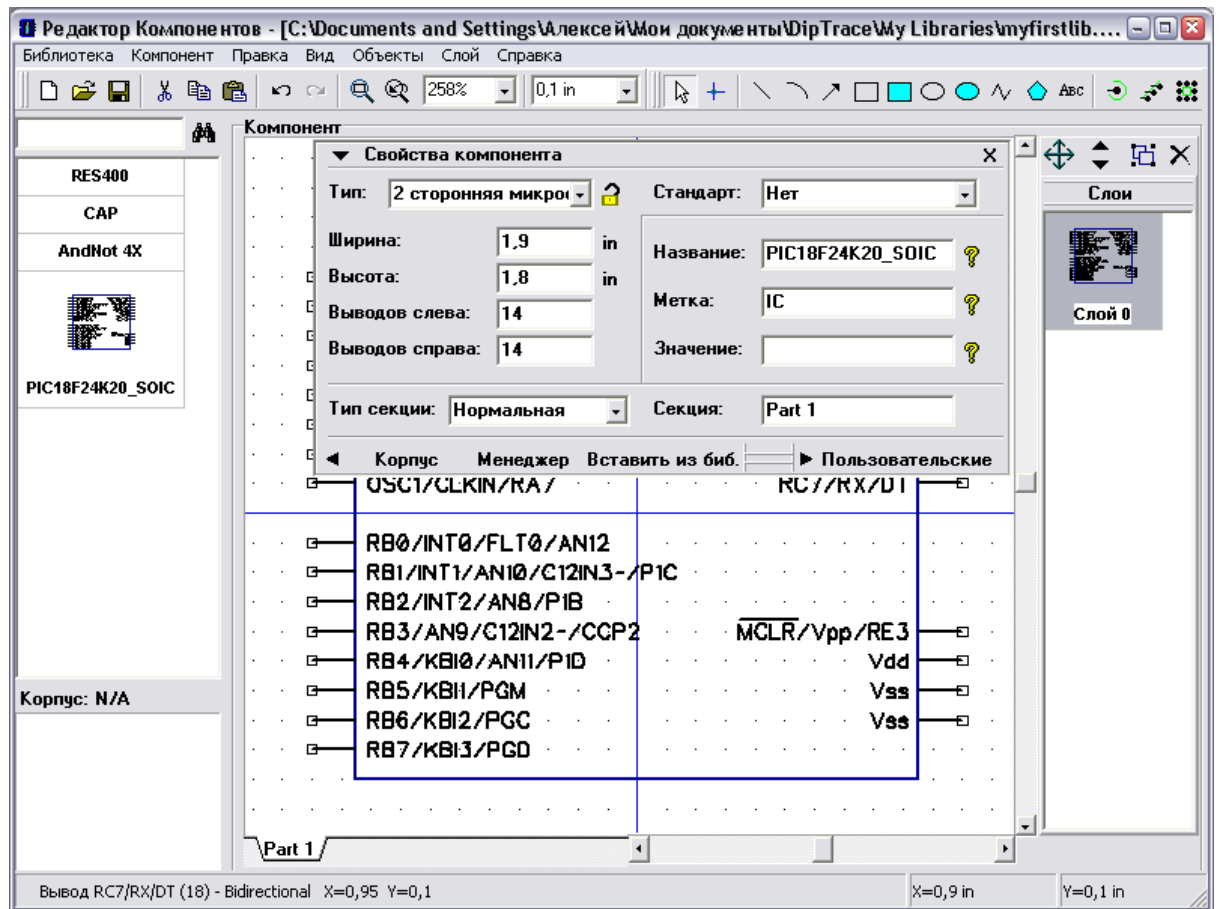
( , ) .

(R

).

:

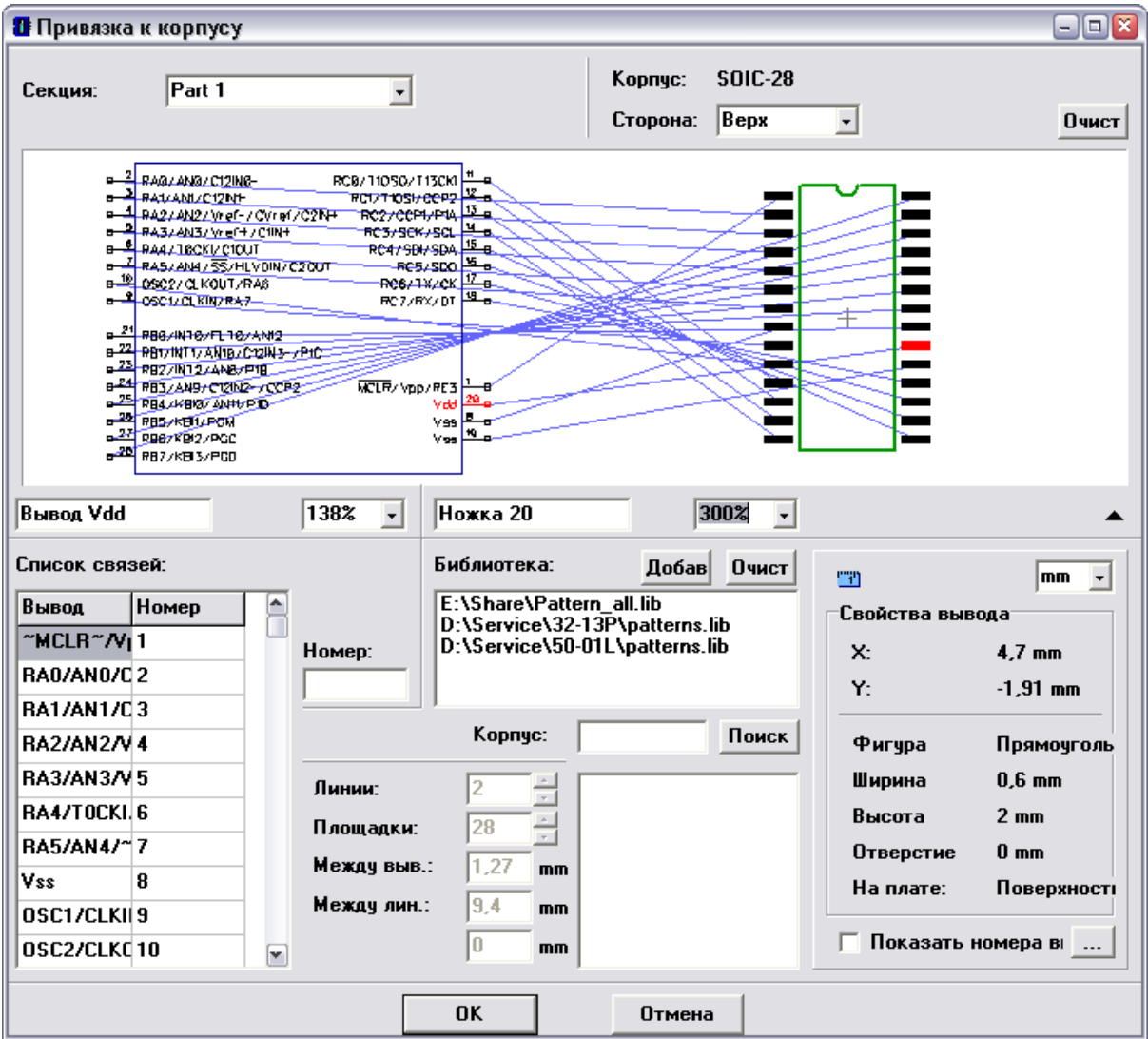




SOIC-28

"SOIC-28"





PIC18F24K20 !

### 3.2.6

**VCC    GND**

VCC GND,

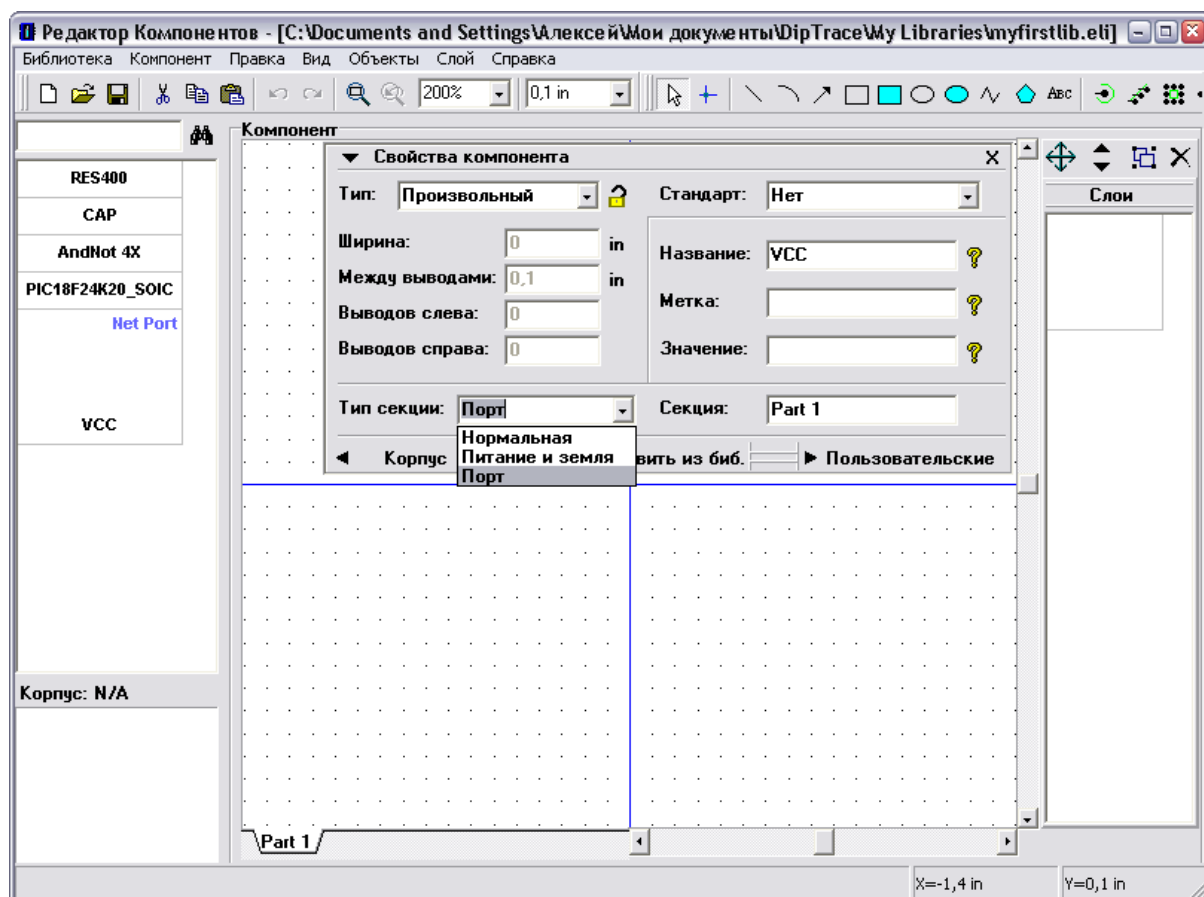
“ ”

“ / ”

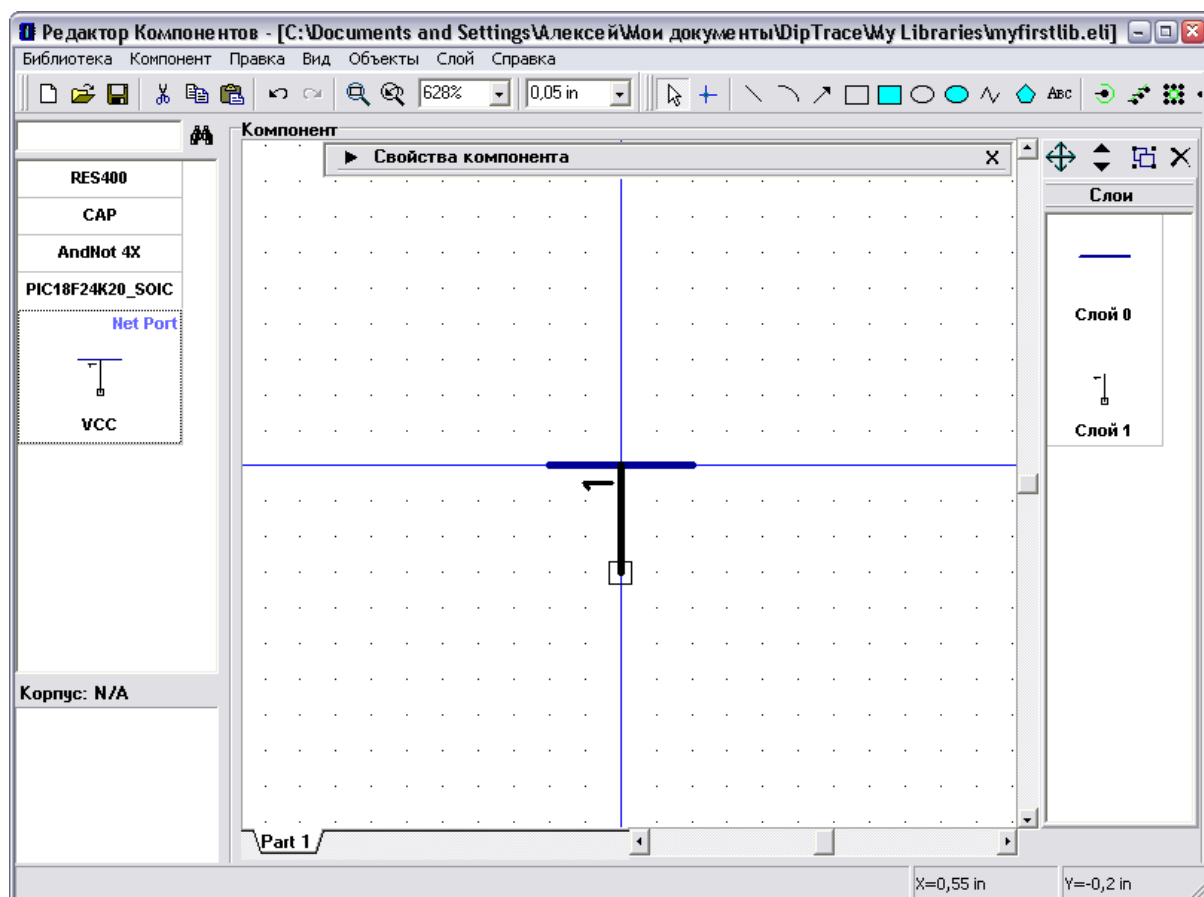
“ ”

“VCC”

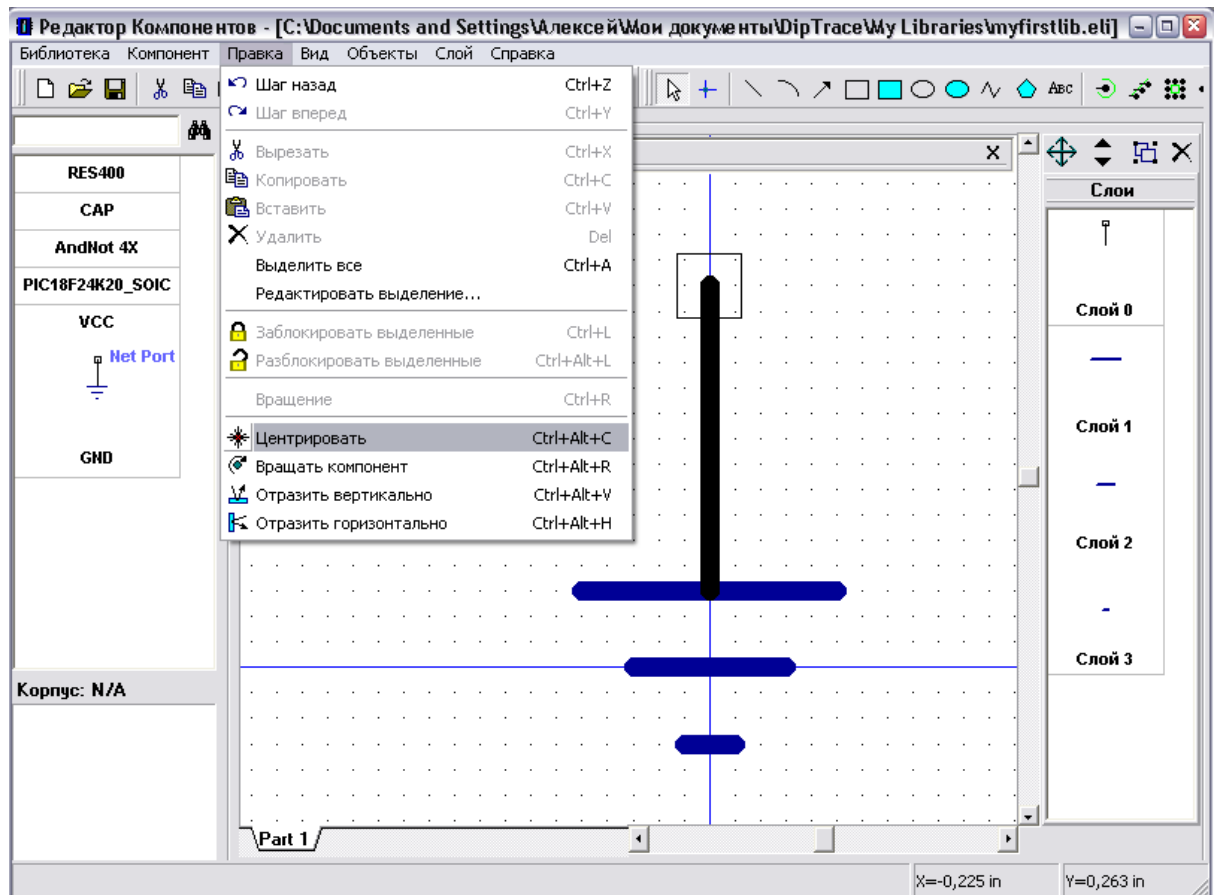
“Net Port”



“ ”  
 ,  
 ( “Ctrl+R”).  
 “ ”  
 0.05



“ / / ”  
 VCC  
 (Ctrl+Insert) CND  
 “ / ” "Ctrl+Alt+C" GND,  
 0.0125  
 GND.



### 3.2.7

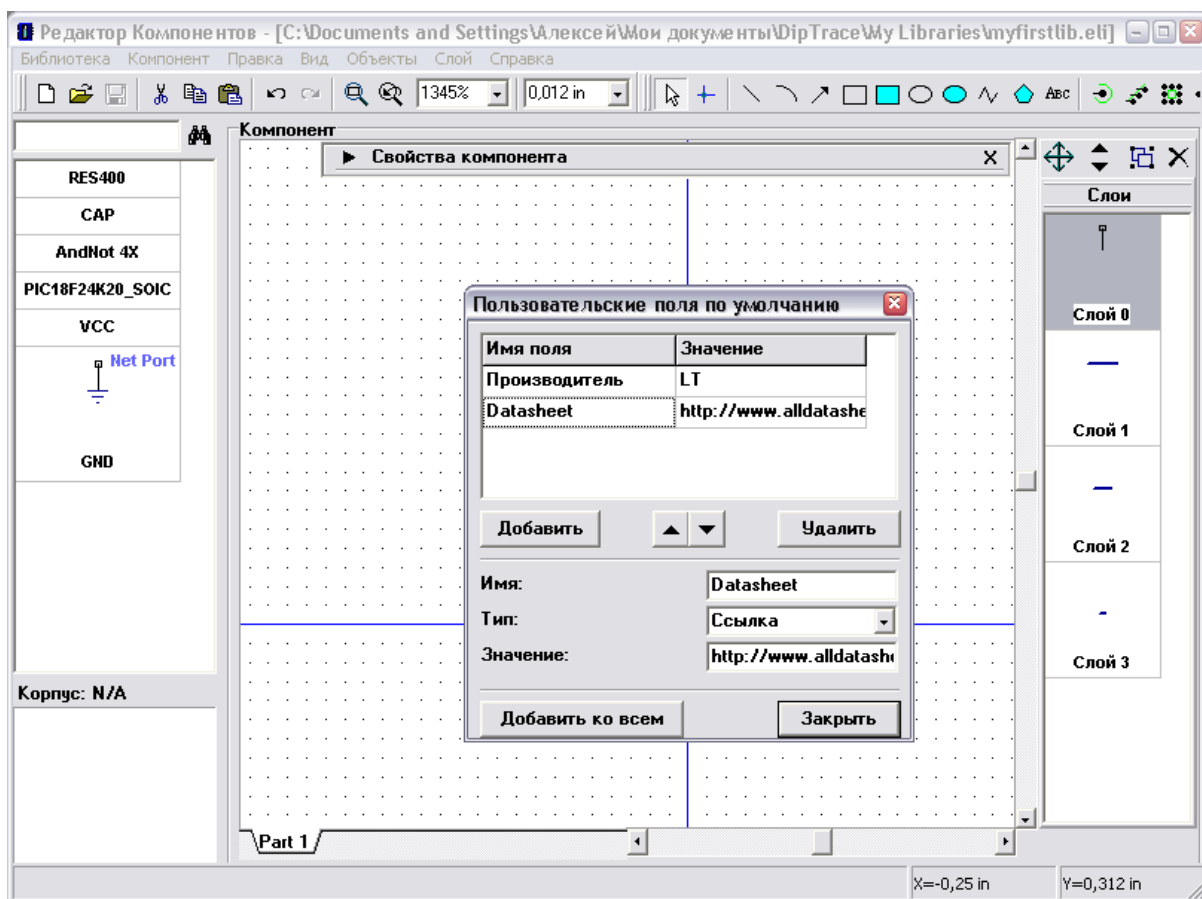
DipTrace

: , datasheet,

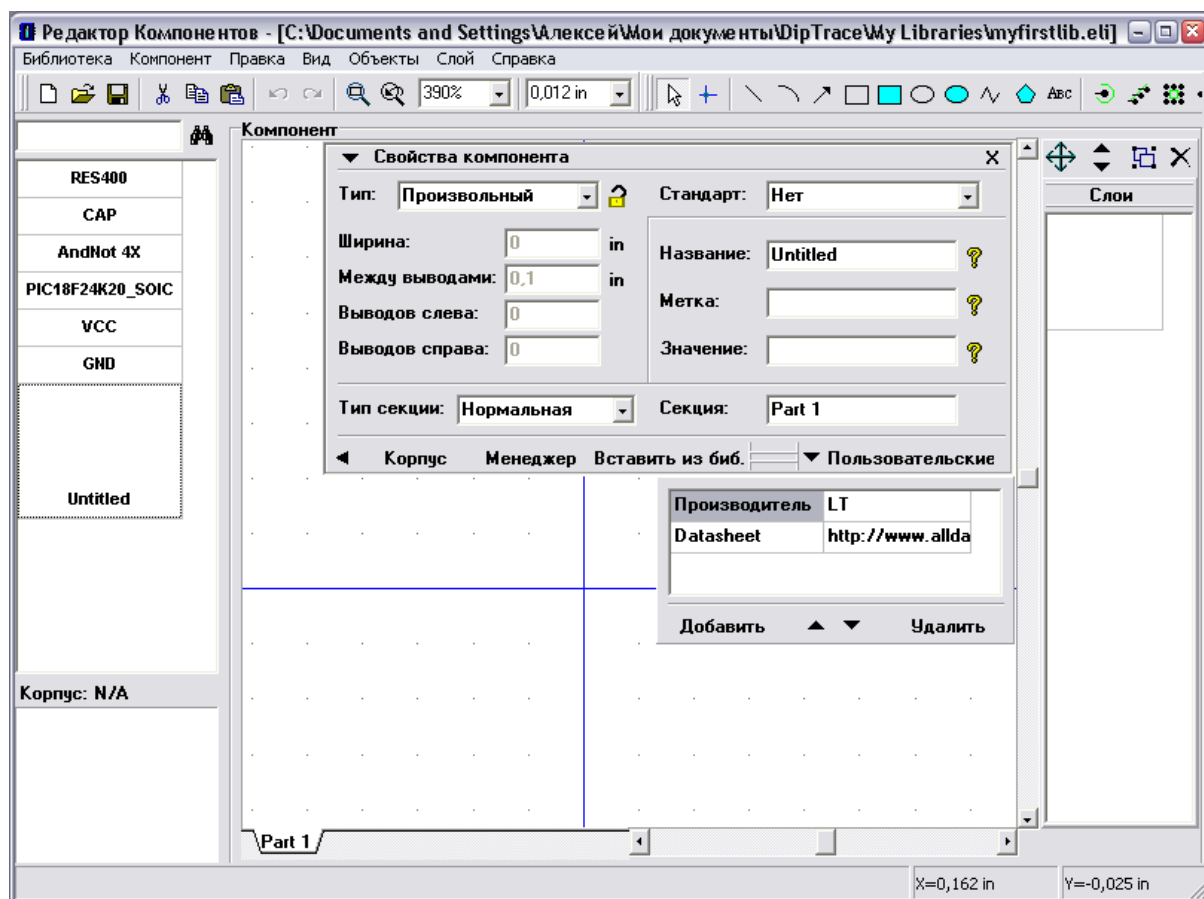
“ / ”

LT, “ ” “Linear Technology”

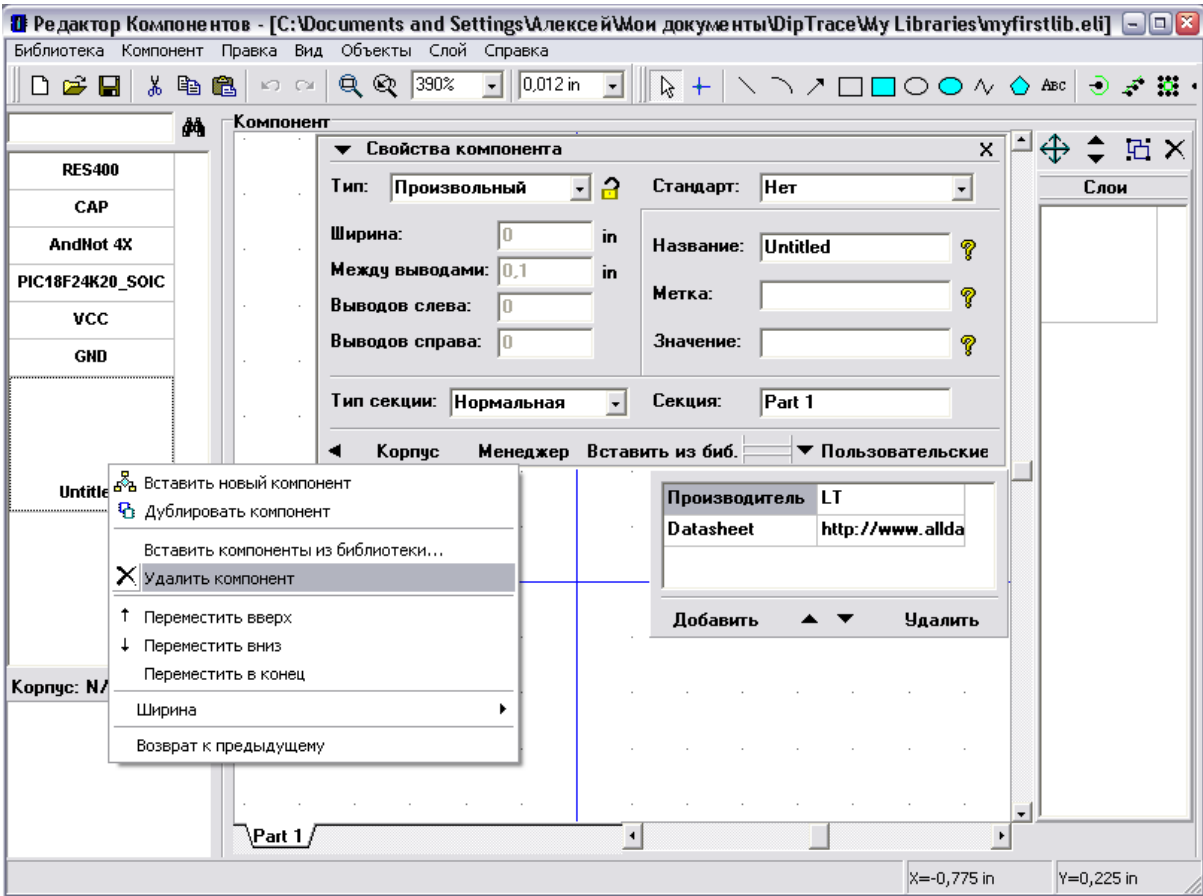
Manufacturer Datasheet: “ ”  
 “ ” “ ” “ ”  
 “ Datasheet ” “ ”  
 “ ” “ ”



“Ctrl+Ins”



“Ctrl+Del”

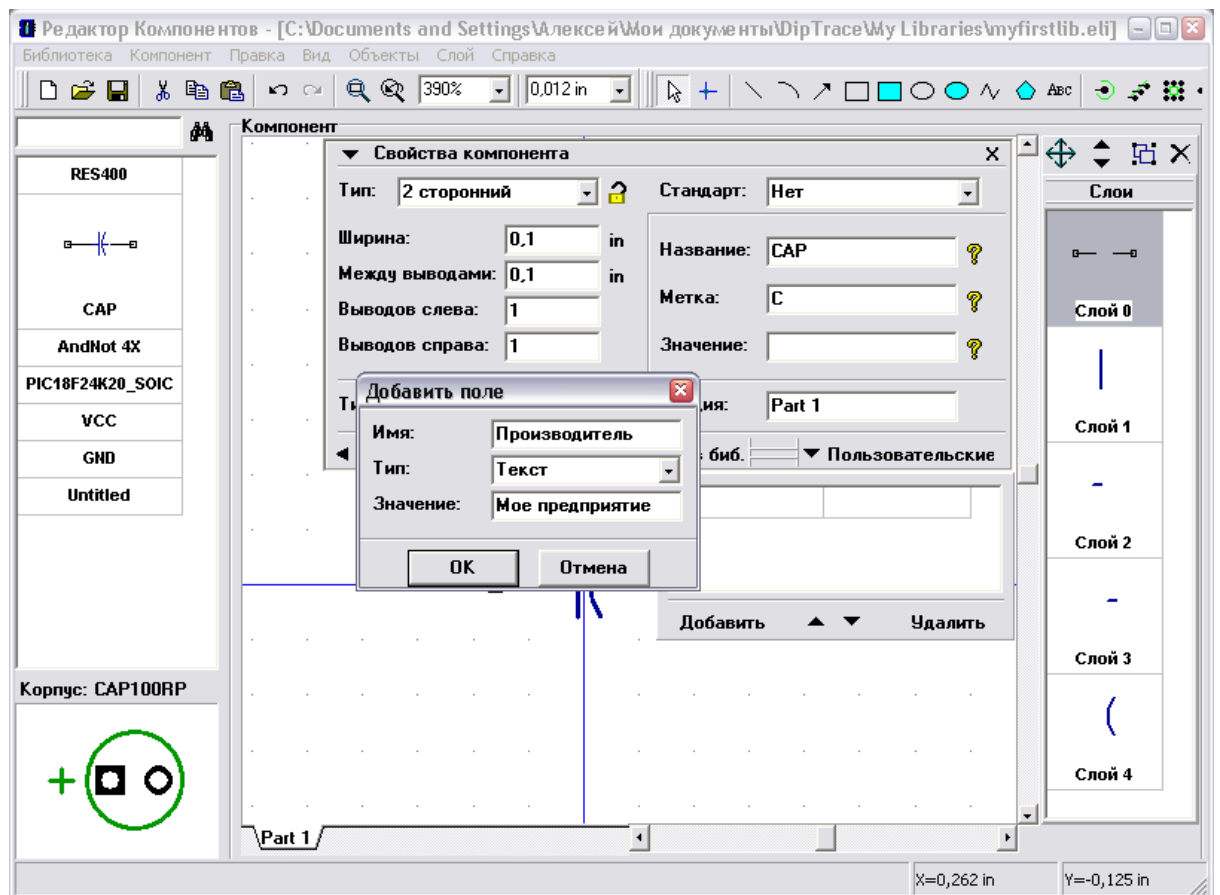


“ ”

“ ” “ ” “ :

” “ ”, “OK”.

Enter                      Esc



“Web-site”

, “ : ”

- .

### 3.2.8 Spice

DipTrace LT Spice,

. ,

CAP

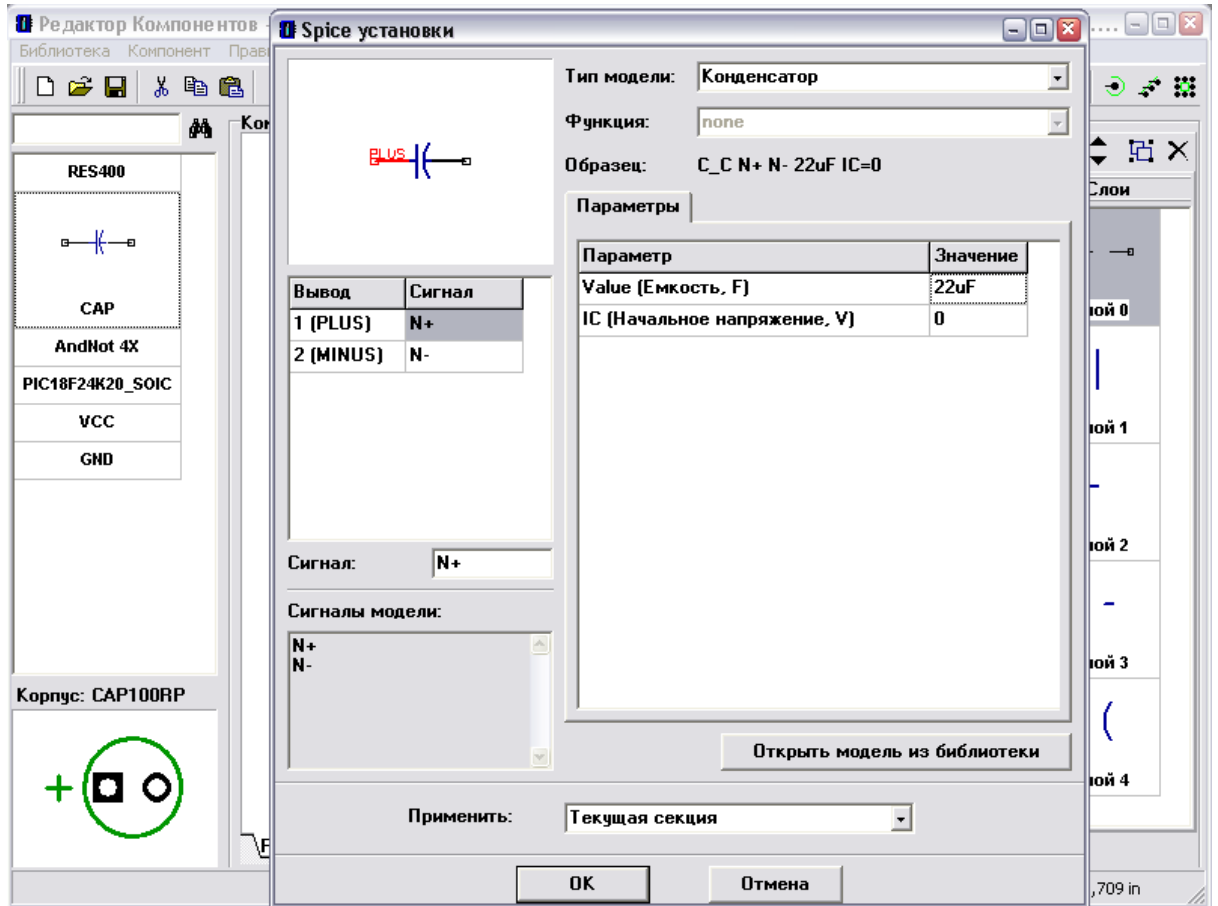
Spice.

, “ / Spice ” : Value ( “1uF”) :

, “ ” spice . ,

( ) .





( , ),

( , spice )

Spice).

SubSkt, /

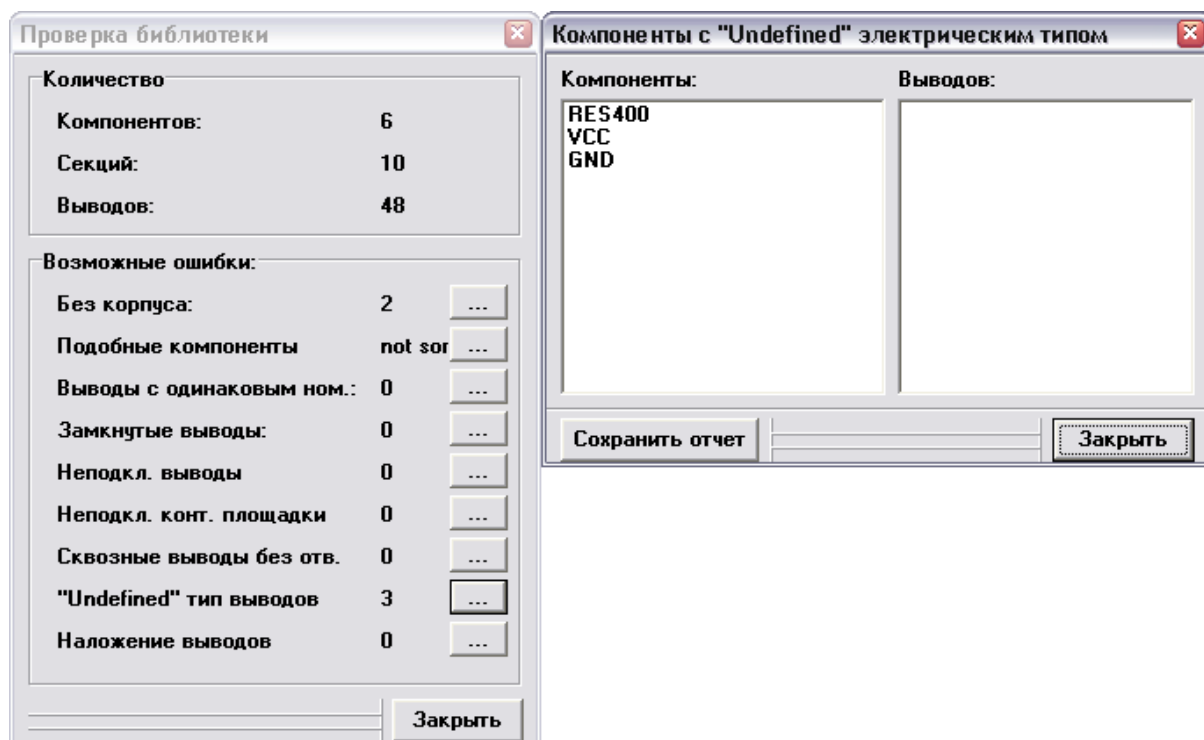
“ ” spice

DipTrace.

spice .

OK spice ,

### 3.2.9



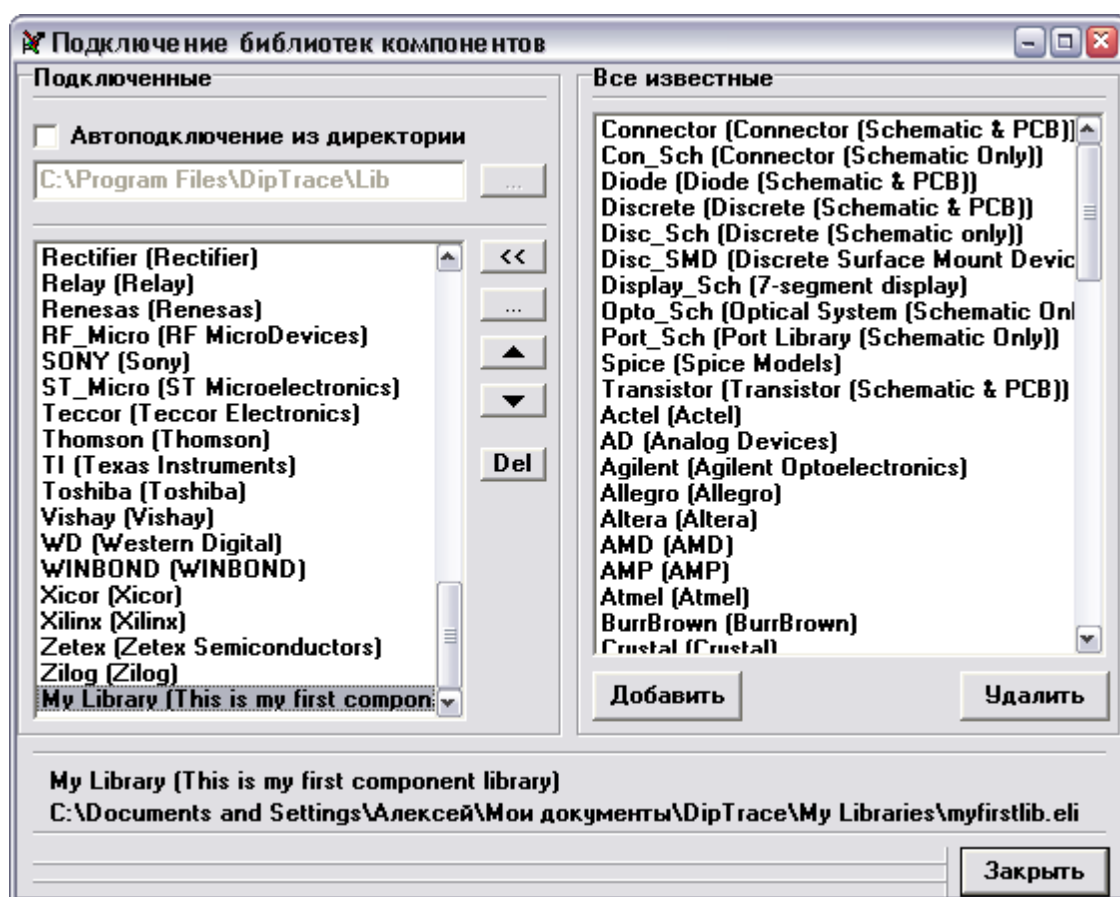
1. -  
 , ,  
 .
2. -  
 ,  
 (" / "),  
 .
3. -  
 ( ). 99%  
 "..."  
 .
4. -  
 .
5. -  
 ,  
 .
6. - (
7. - , SMD

8. "Undefined"

9.

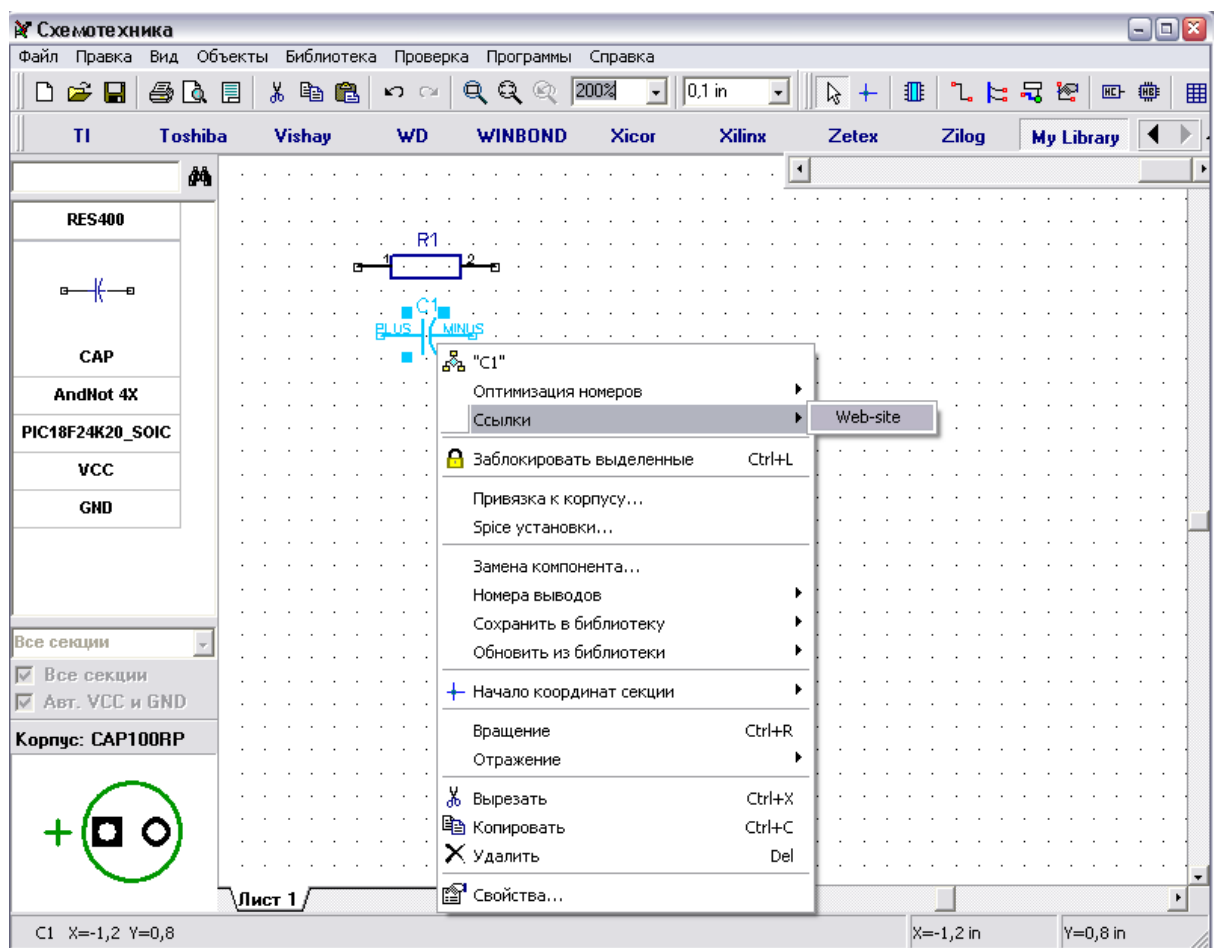
### 3.2.10

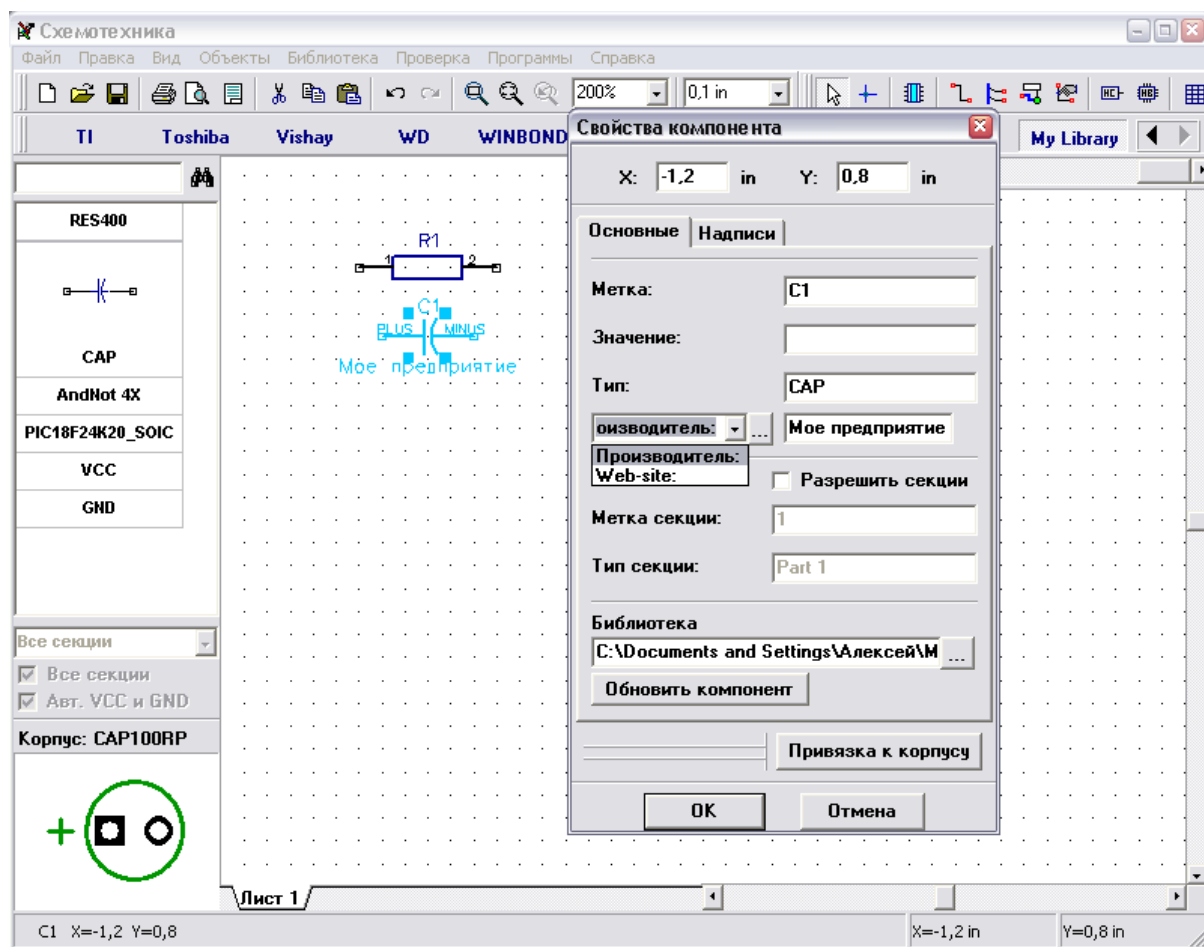
-> Schematic. , . . . -> c -> DipTrace  
 “ , / ”  
 “ ” “ ... ”



F1

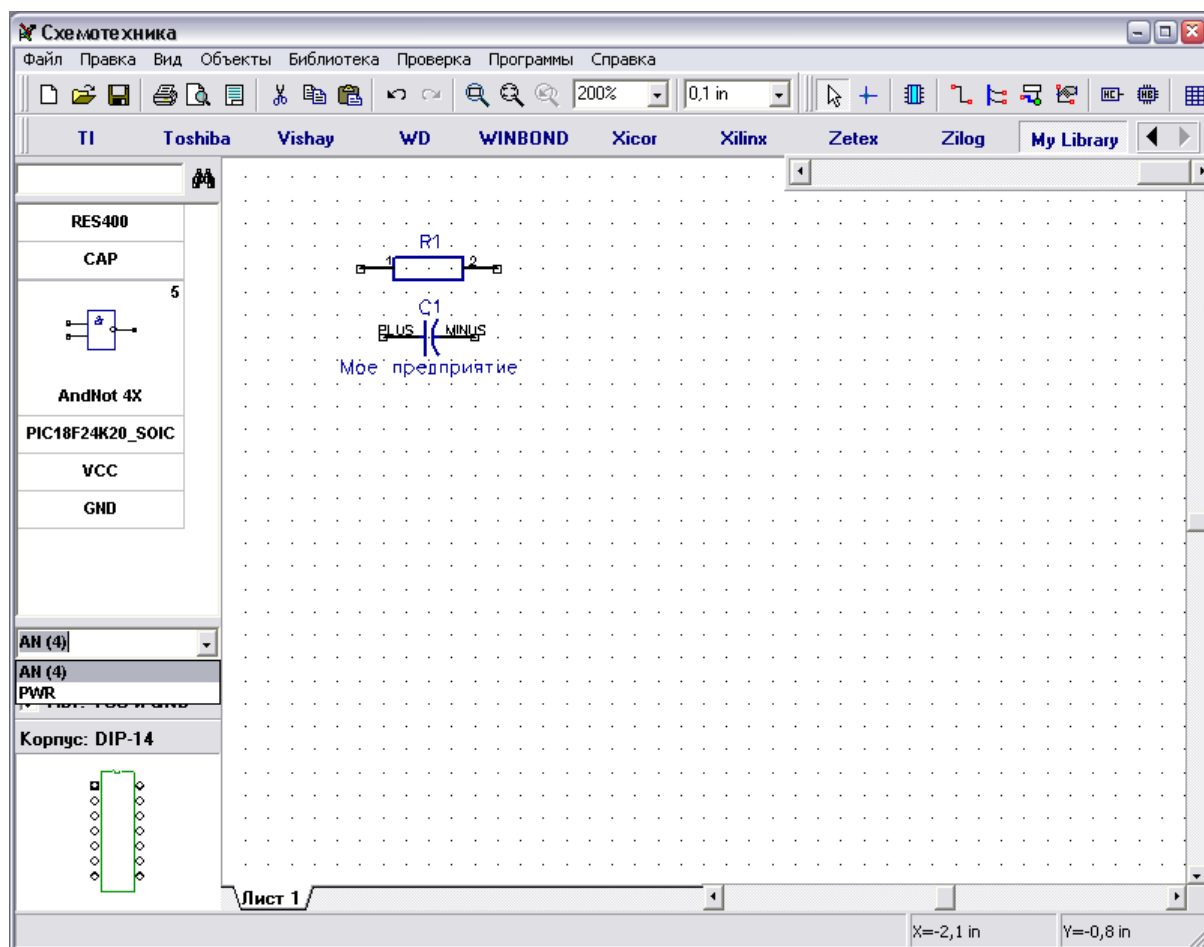
“My Library”.



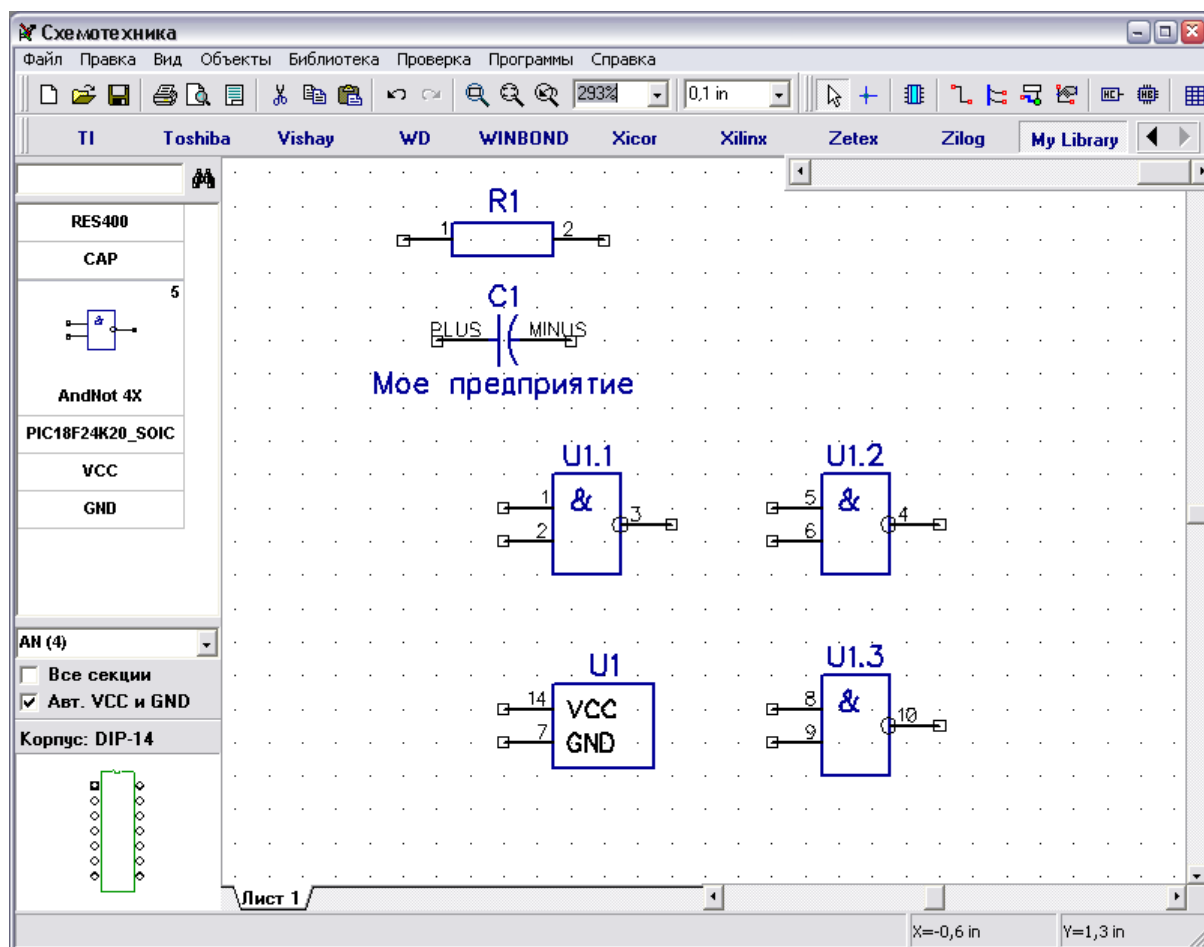


GND”)

VCC



“AN (4)”



AN,

(IC1 IC2)

VCC

GND.

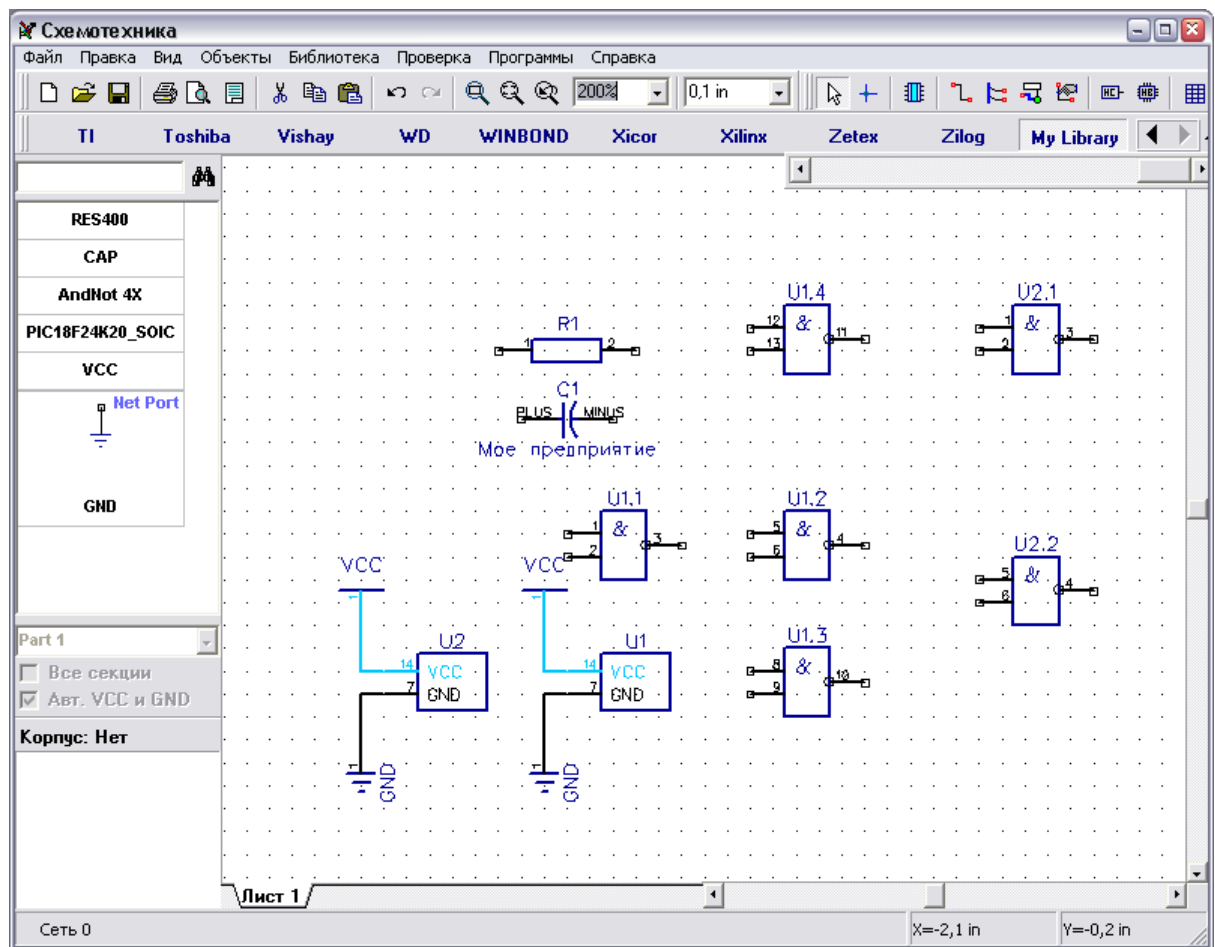
(

“ ”

).

VCC

GND



VCC,

“ ”

,

“

”

(

,

“

”)

-

,

“

”

.

(

,

“

”

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“

”

“

”);

(

“

”

“

”

“

”)

(

“

”

).

VCC, GND (

), CLK . .

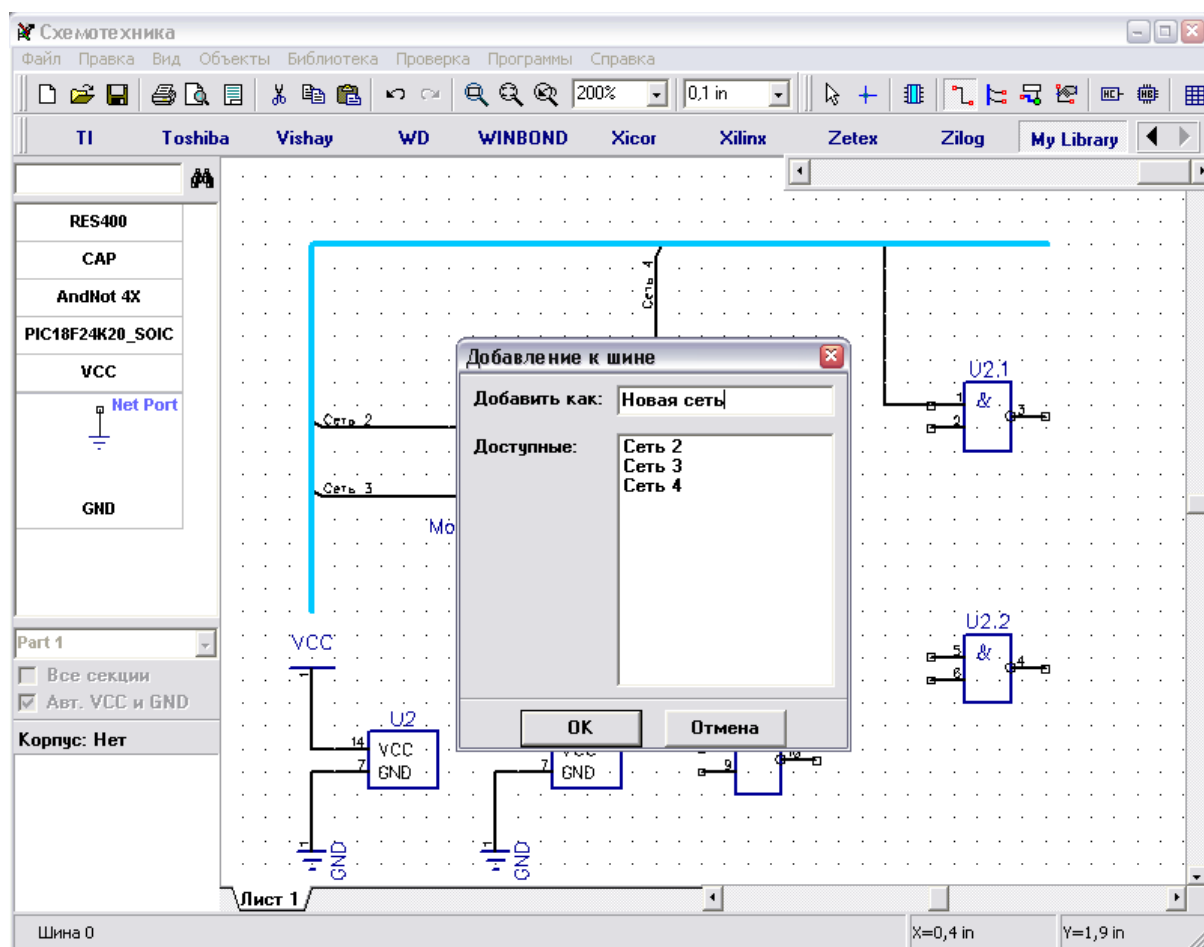


## 4

DipTrace,

## 4.1

## 4.1.1

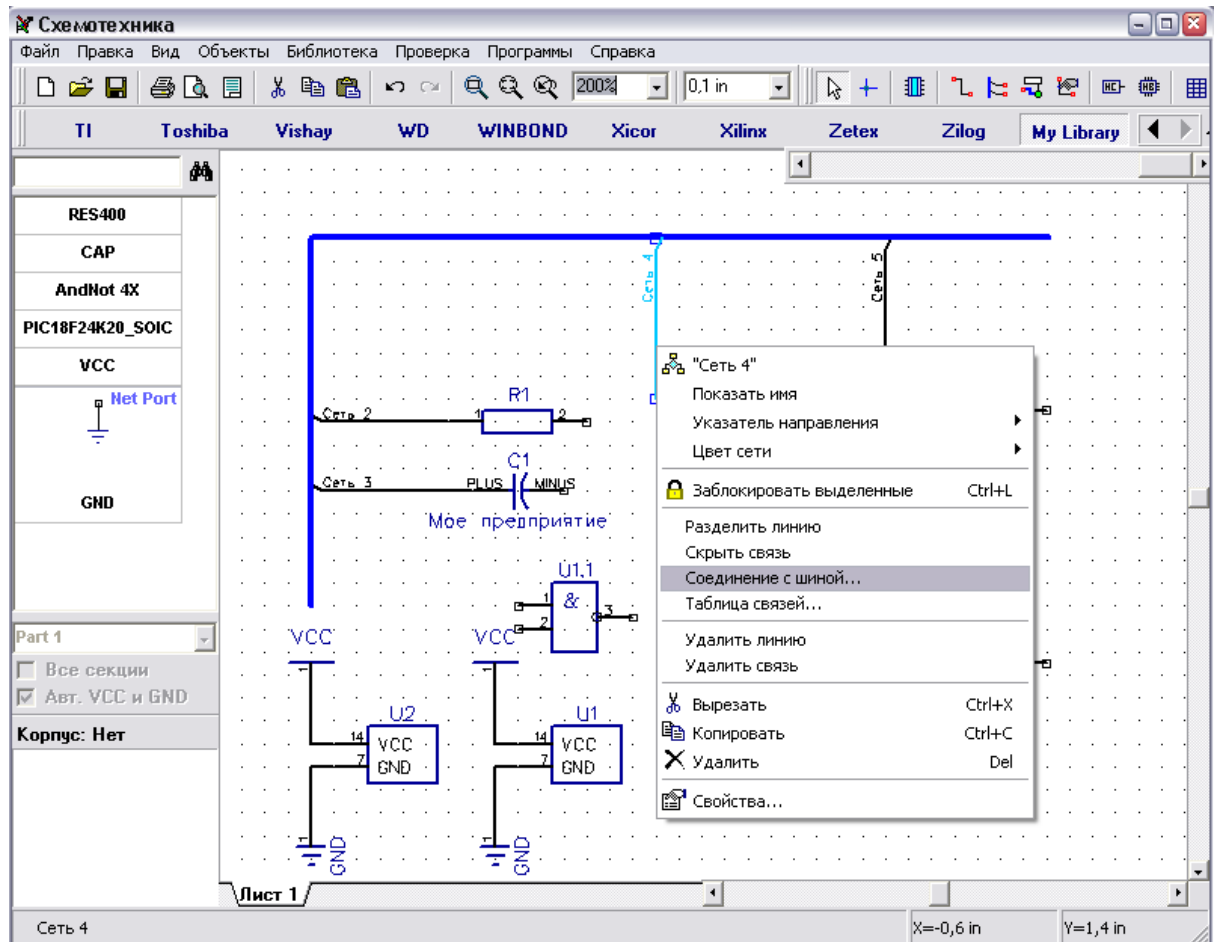


“

4 “ 4” “ 2” “C1:1”

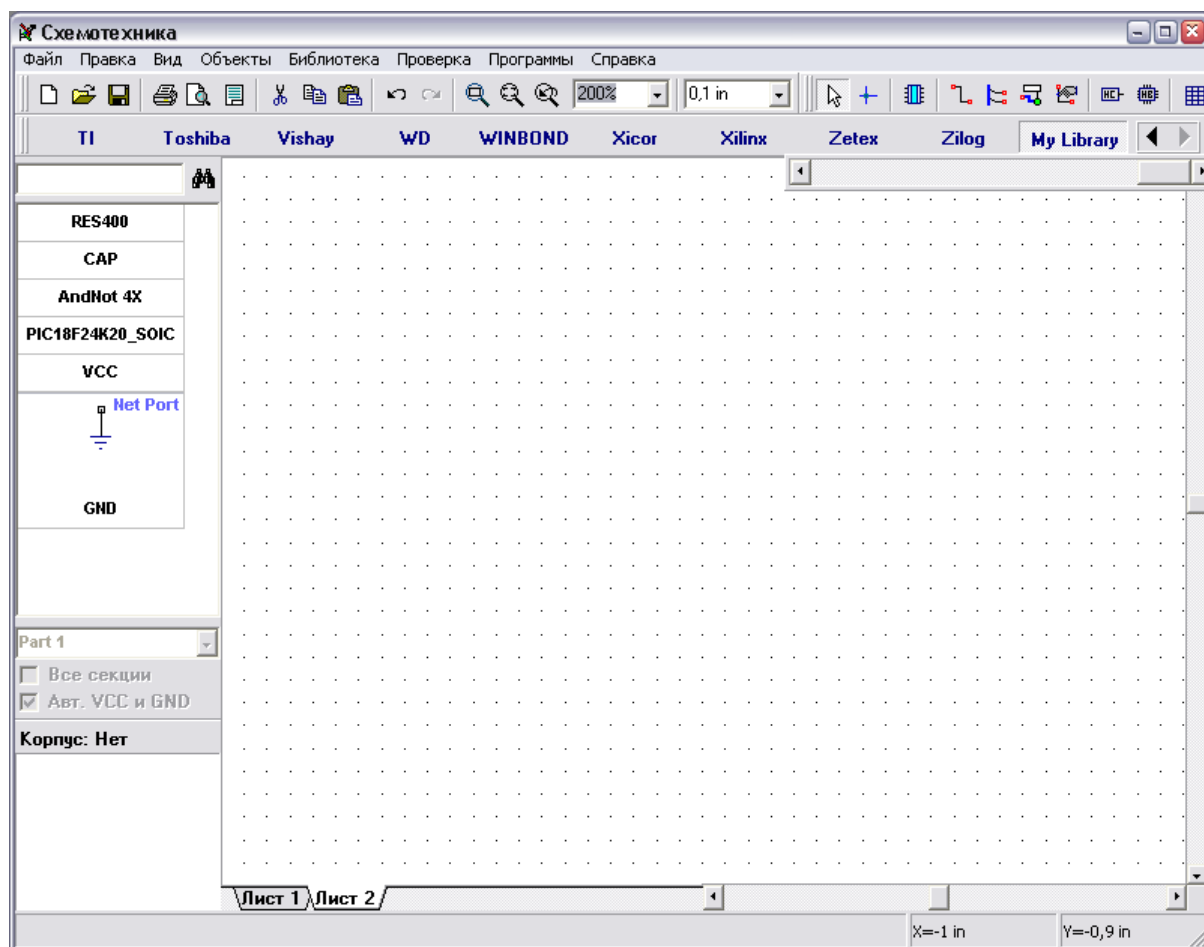
“IC2.2 : 5”

“ / ”

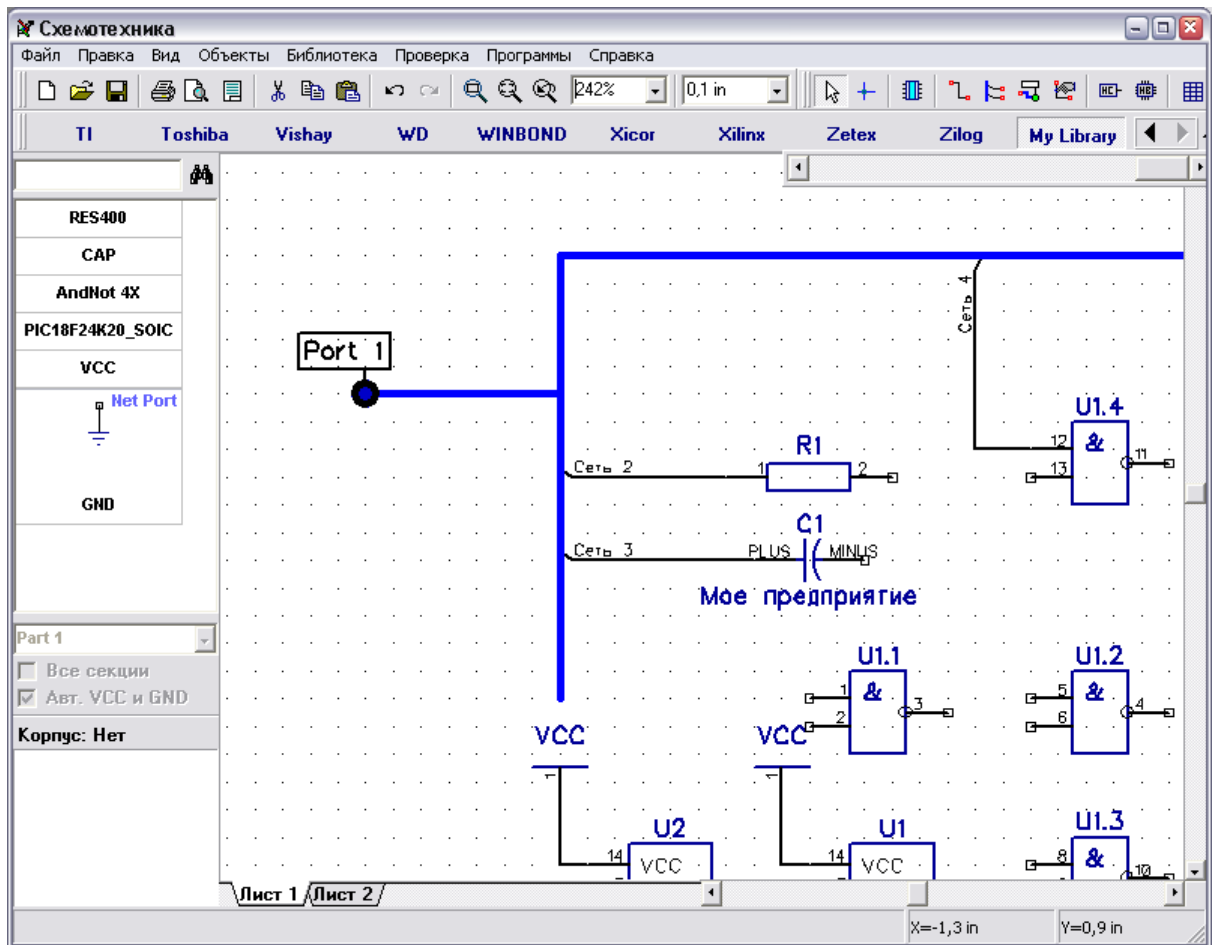


“Ctrl+Ins”.

“ 2”.

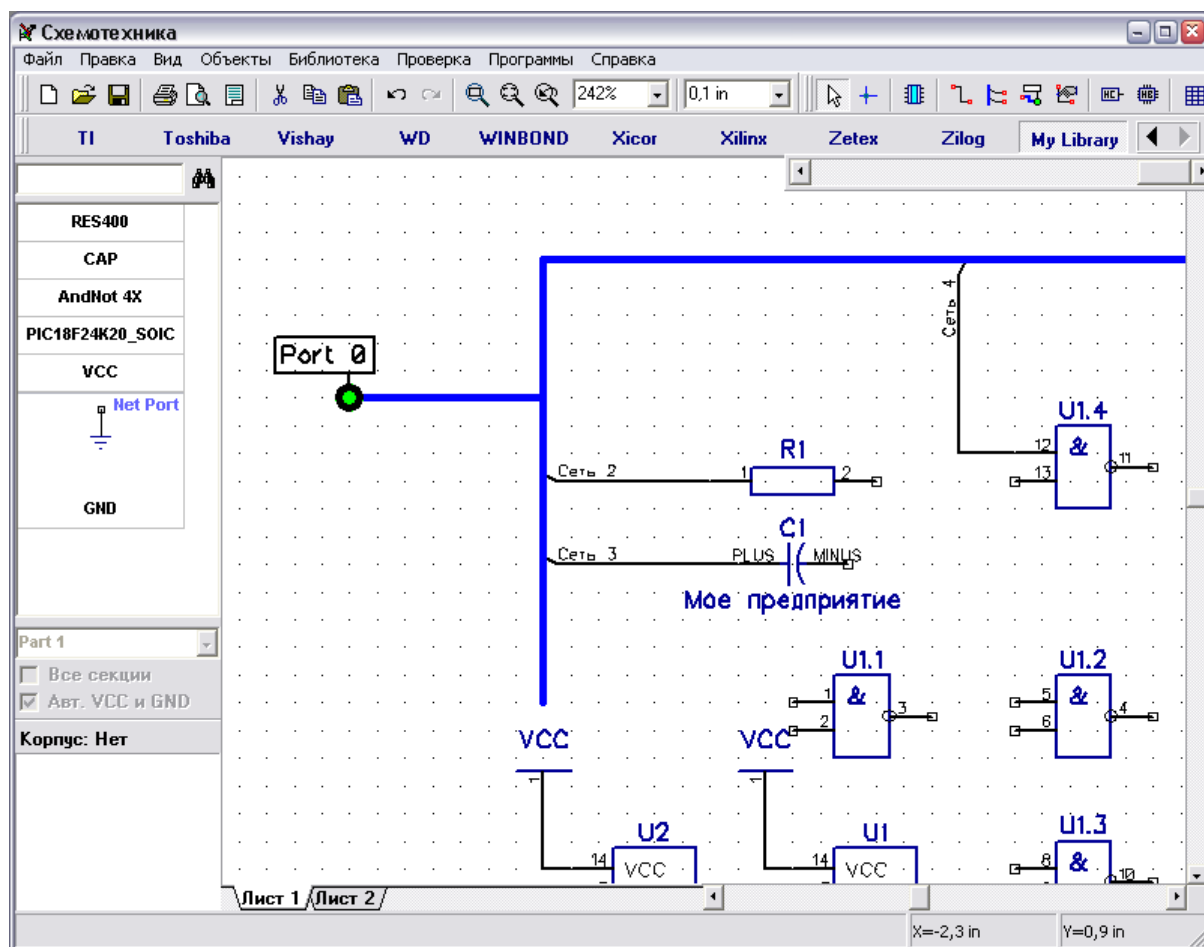


,  
 .  
 “ ”  
 ( “Port 0”),  
 “ 1”, , ( :  
 “Port 1”).  
 “ ”,  
 ,  
 .



“Port 1”,

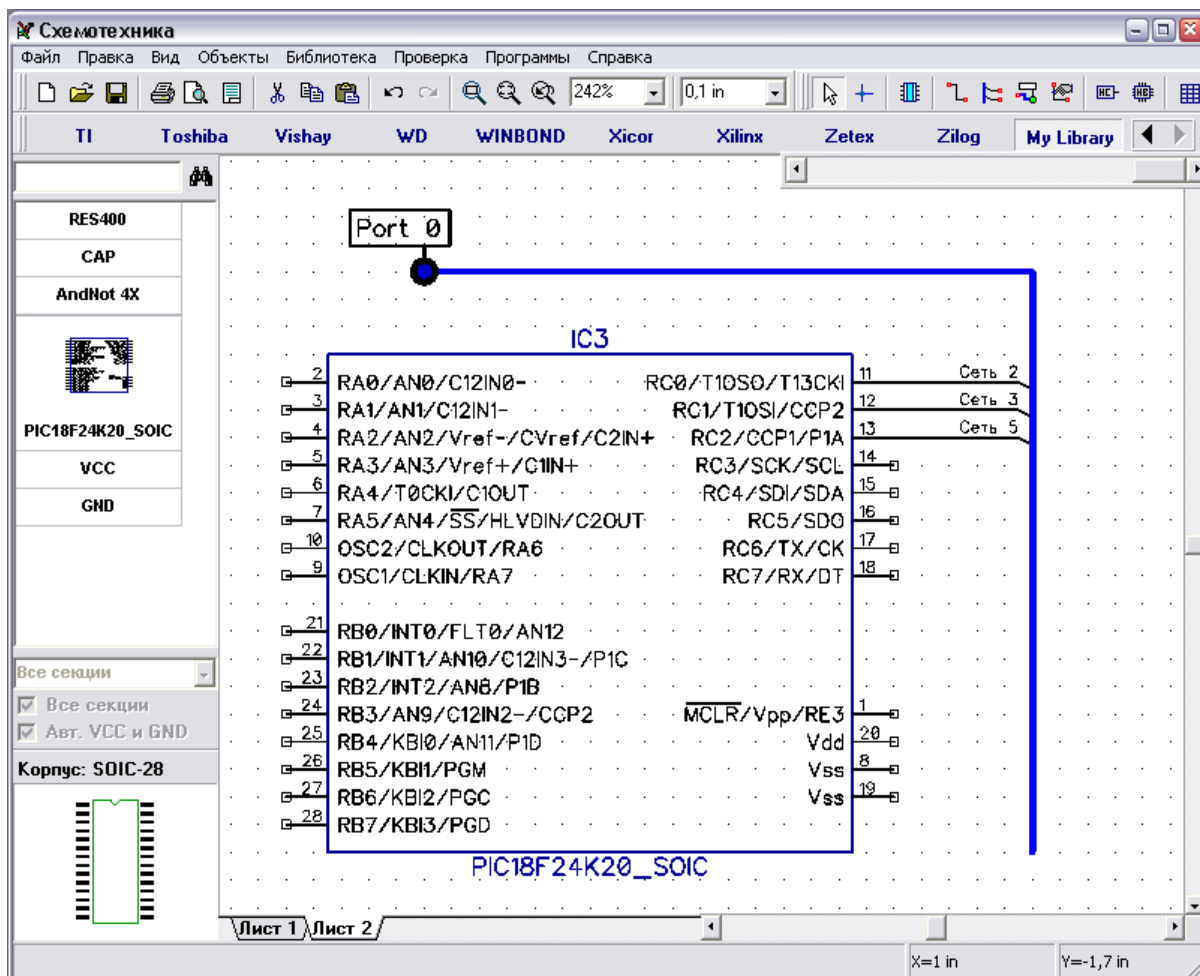
“Port 0”.



“ 2” , “Port 0”.

, , , 1, . .

“ 2” “ 3” , .



## 4.1.2

VCC GND.

“Port\_Sch”

),

“Port 8”

Port 8,

Port 8.

Port 8

“1” Port 8,

Port 8.

),

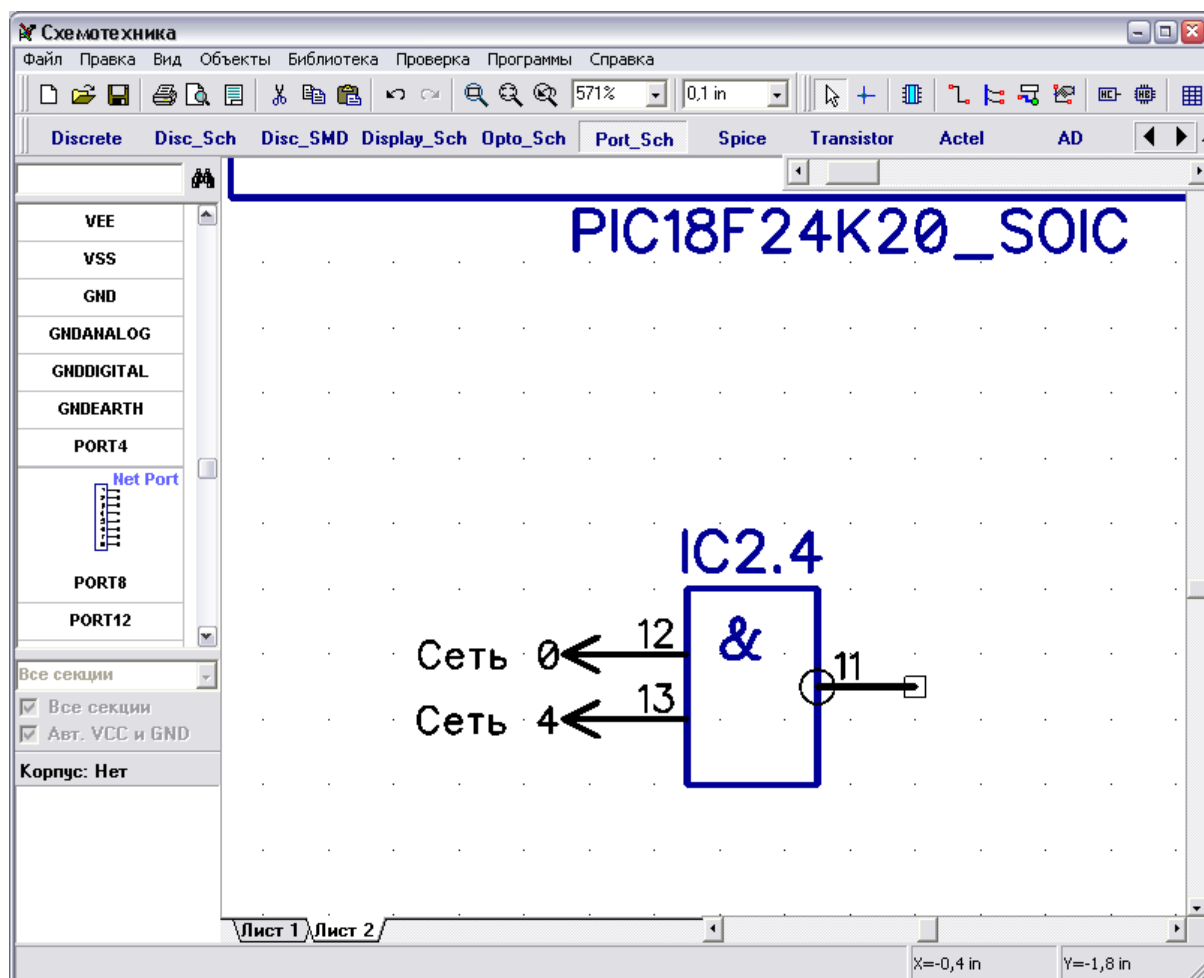
).

Port 8

( . .

(

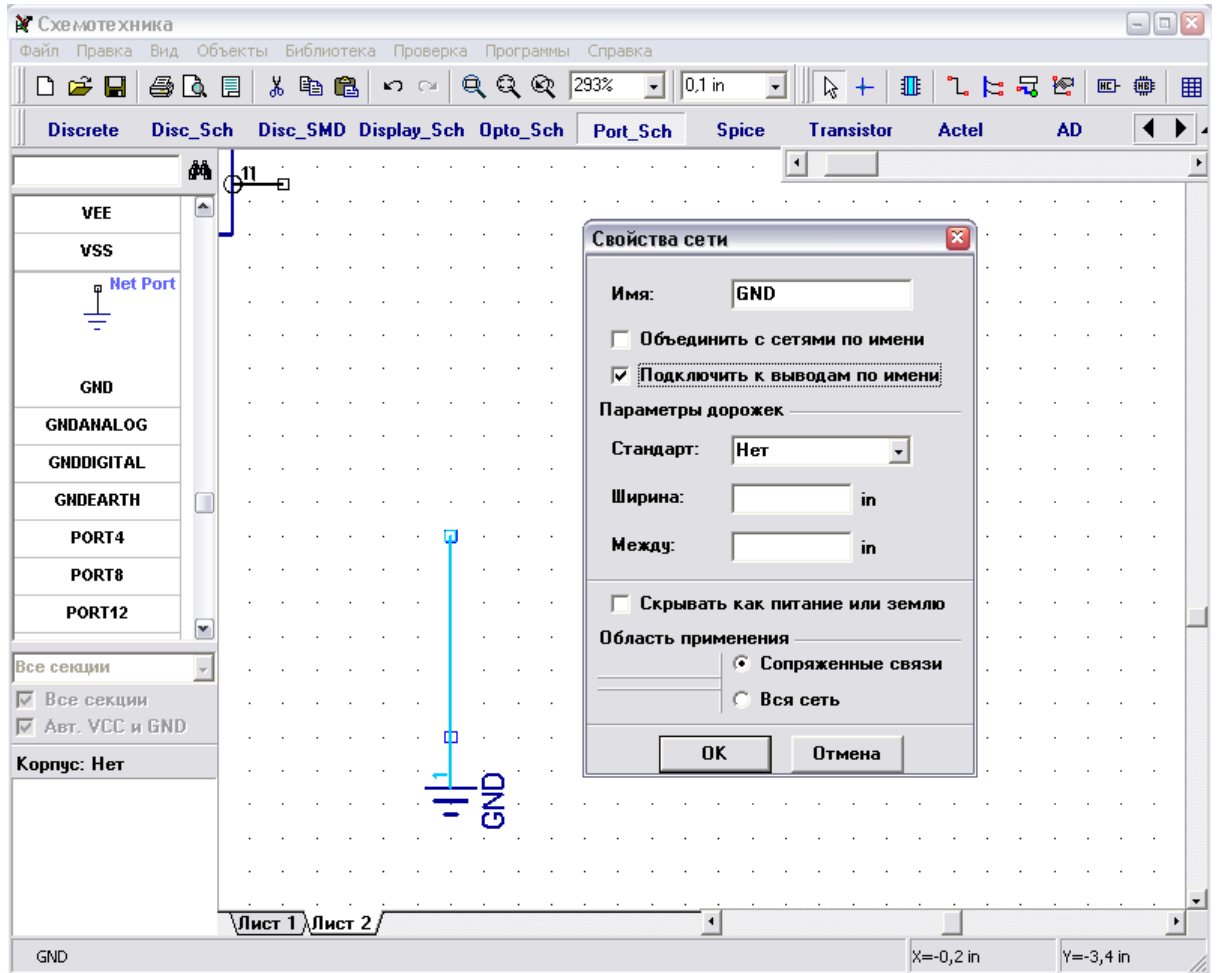




GND,

“Enter”.



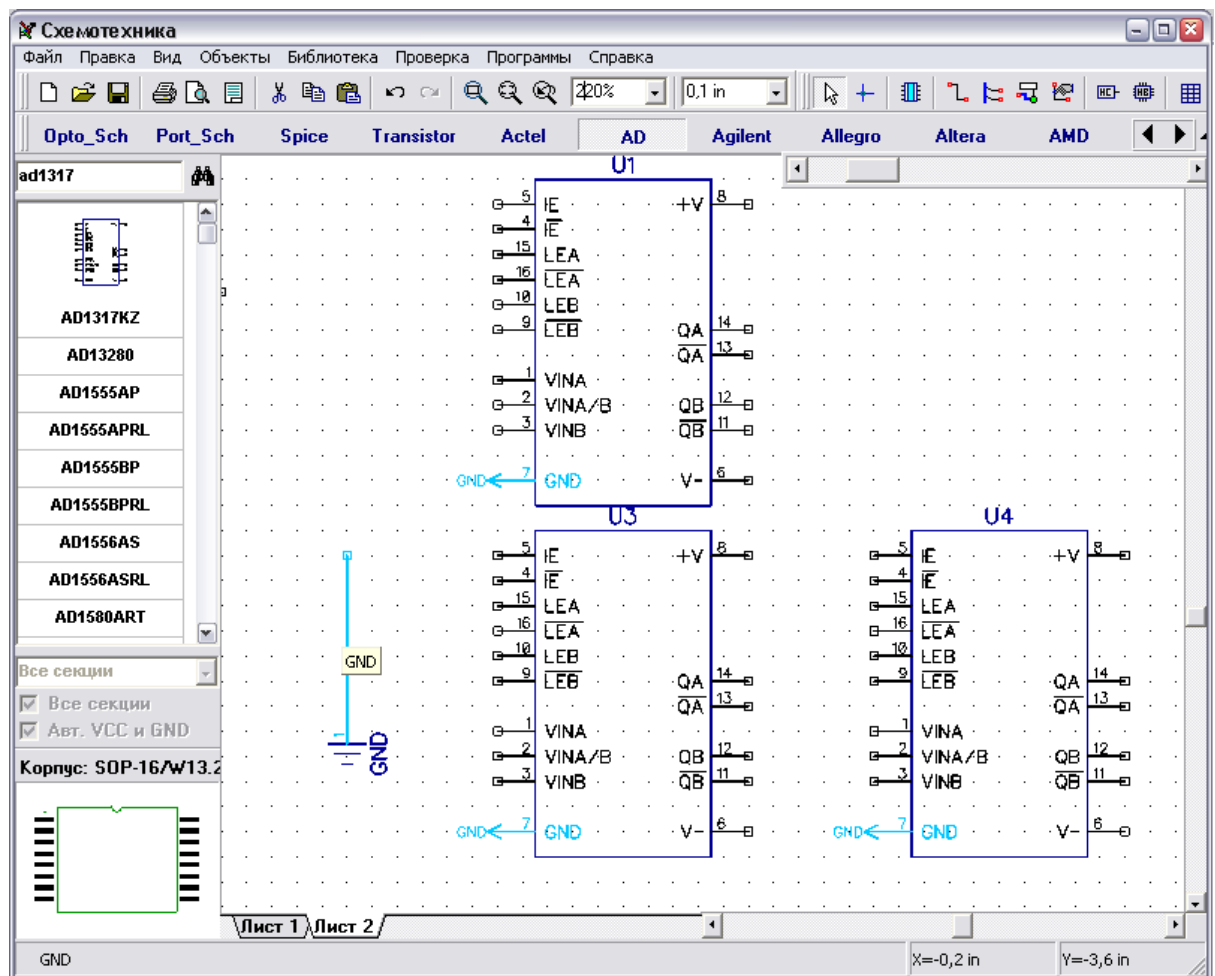


“ ” “OK”

“AD1317” Analog Devices (AD) “AD1317KZ” ( )

“ ”

(CLK)



## 4.1.4

## PCB Layout

“ / ”

“ / ” PCB Layout.

,

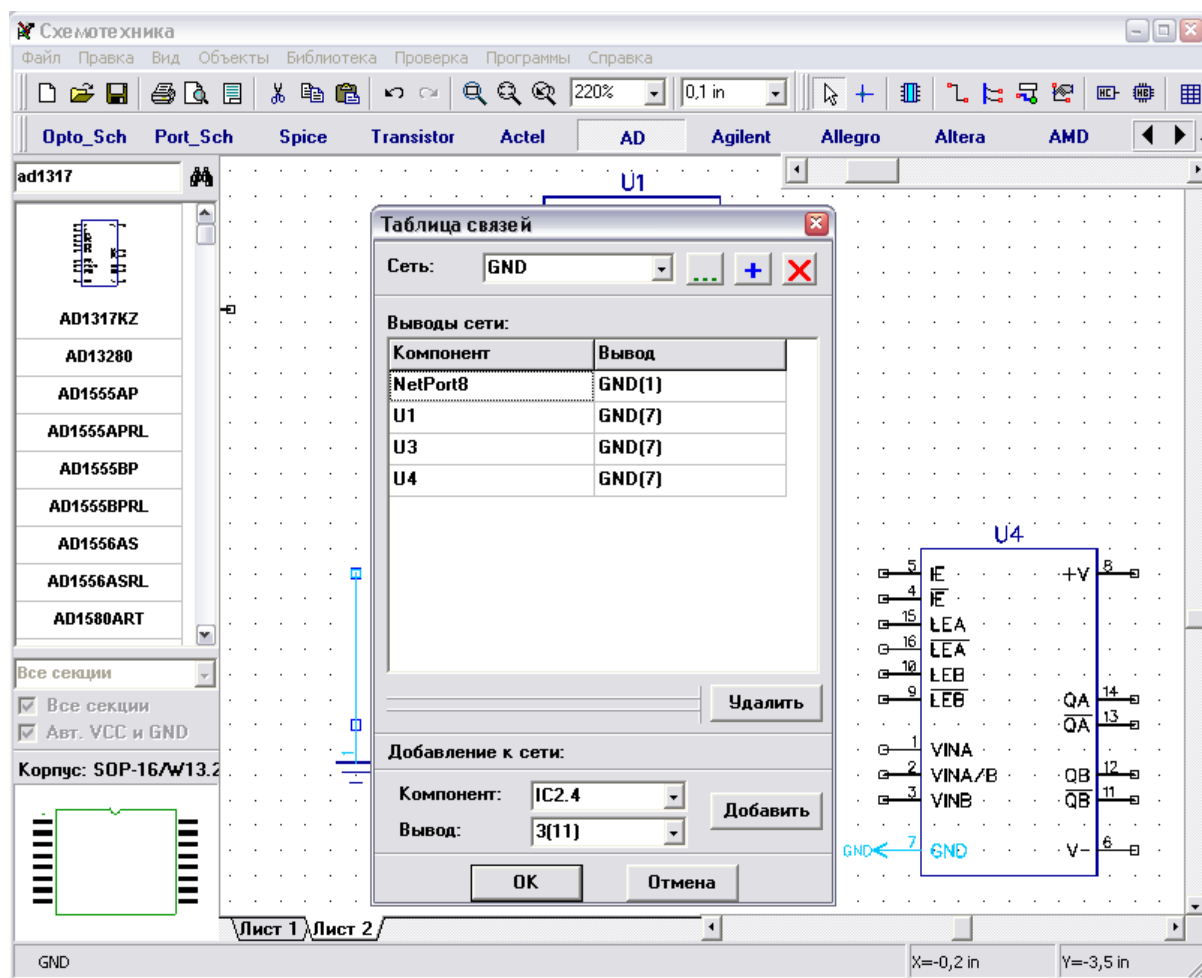
,

“ ”.

,

( “...” “X” ).

“+”.



“OK”

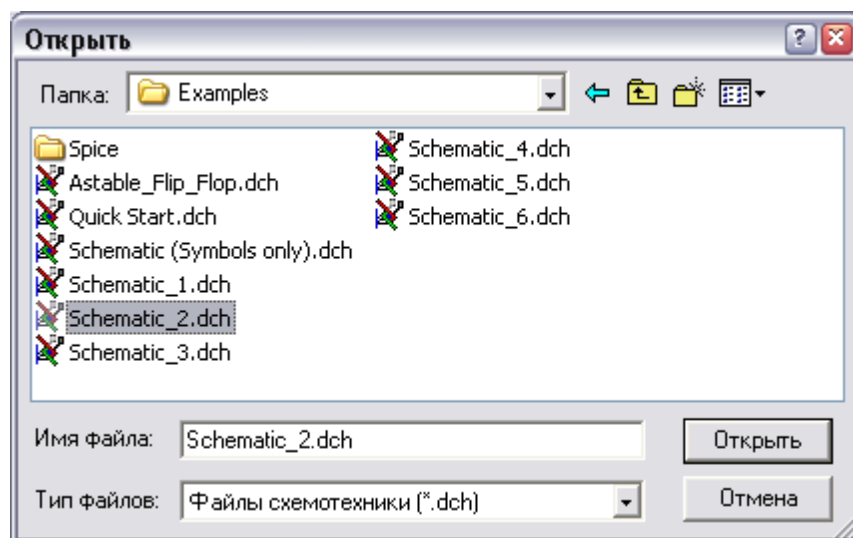
“ ”

## 4.2

DipTrace / Examples”

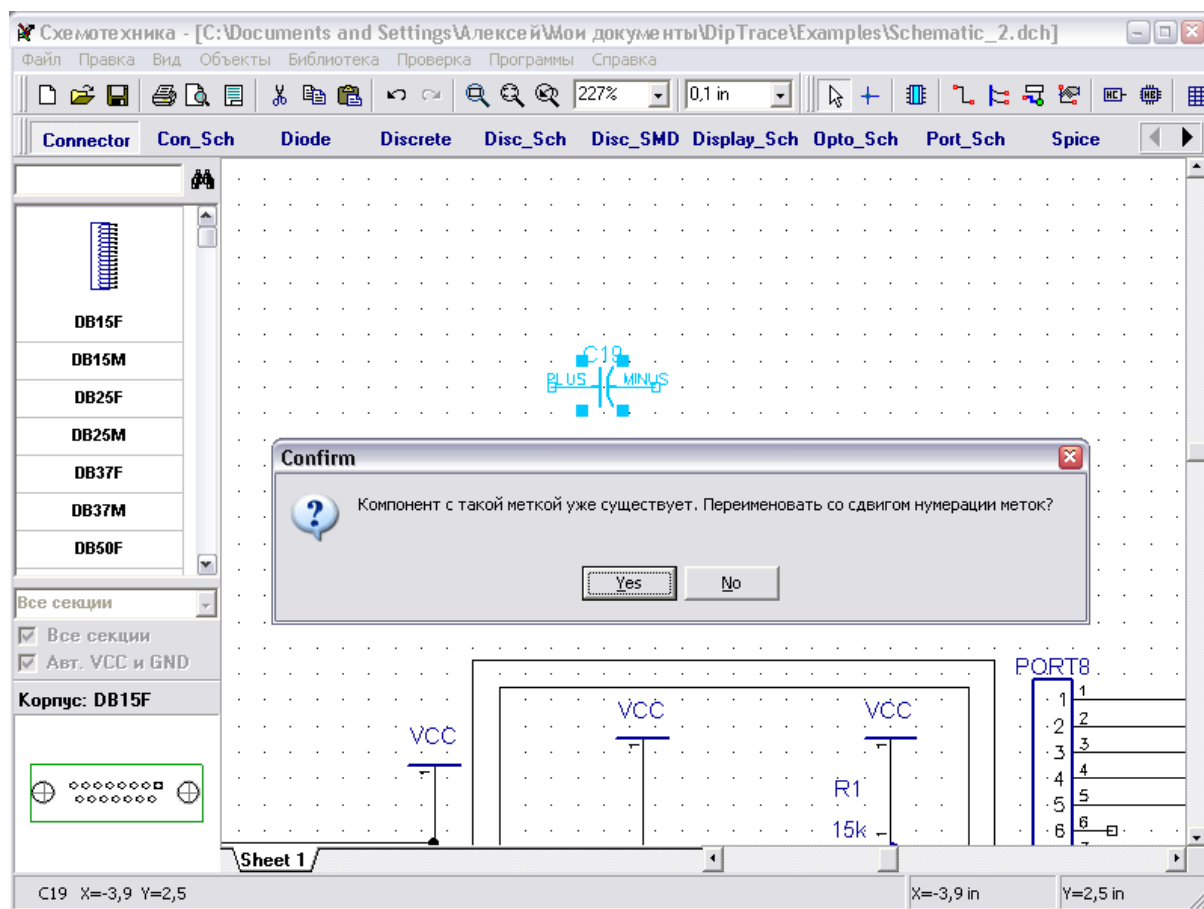
Schematic\_2.dch

“C:/Program files /  
DipTrace.



“C5” “OK”.

“Yes”



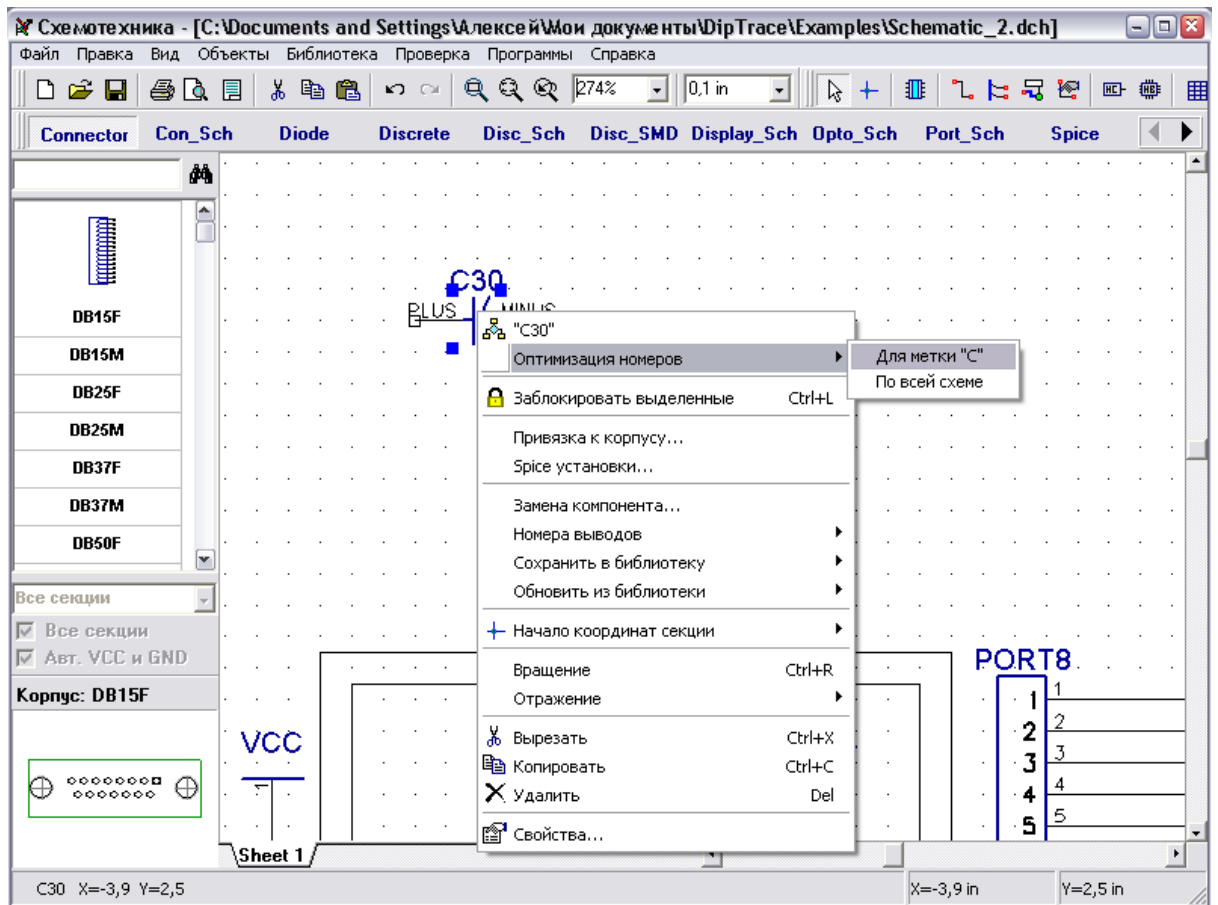
5, 5 6 . . 18 – 19.  
19 ,

5.

C5 C30,  
– C5 C25-C29 .

( 29) “  
/ ” - 30 24. ?

C6-C24 C5-C23, C30 C24.



PCB Layout,

PCB\_2

8 10

28

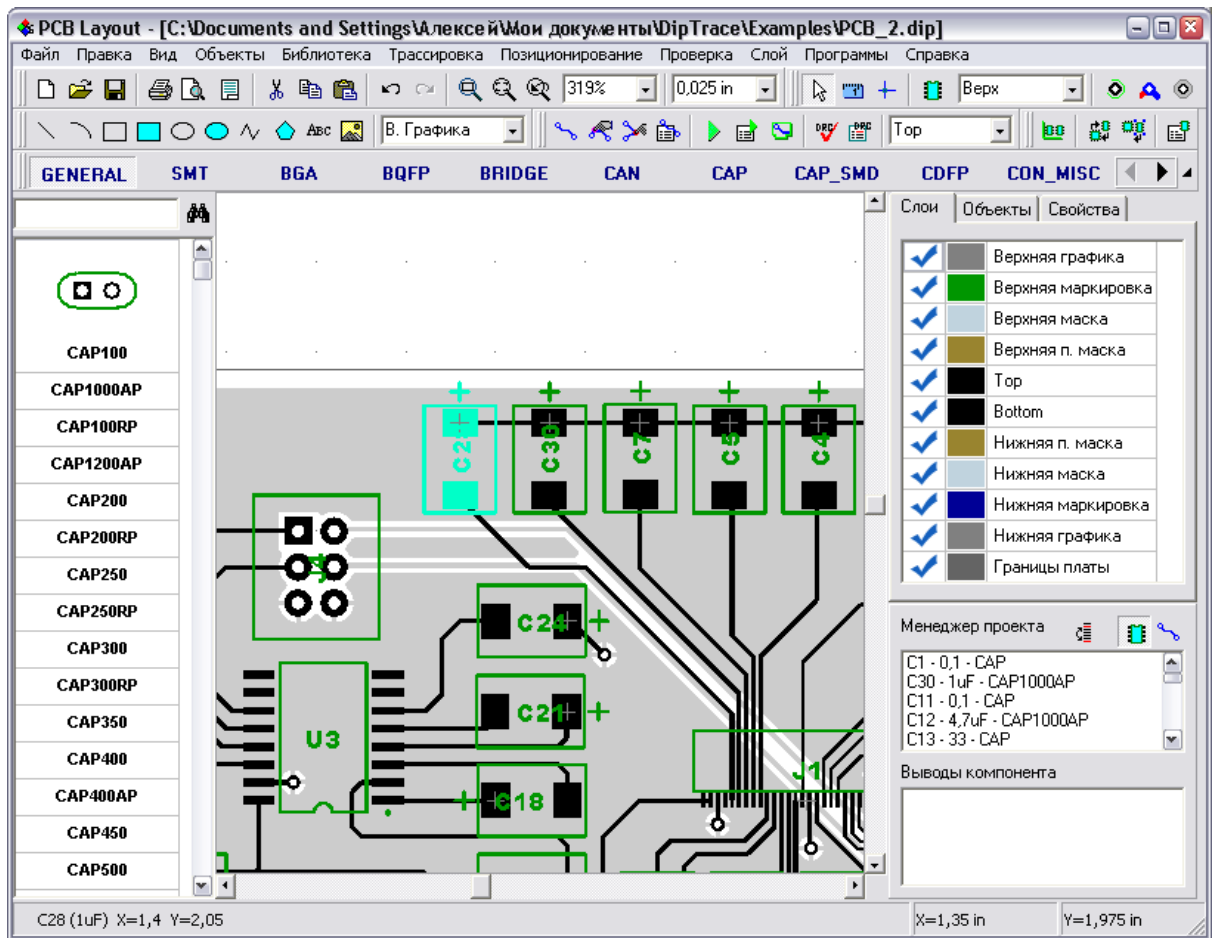
30 (

).

“

/

”



PCB Layout

PCB Layout,

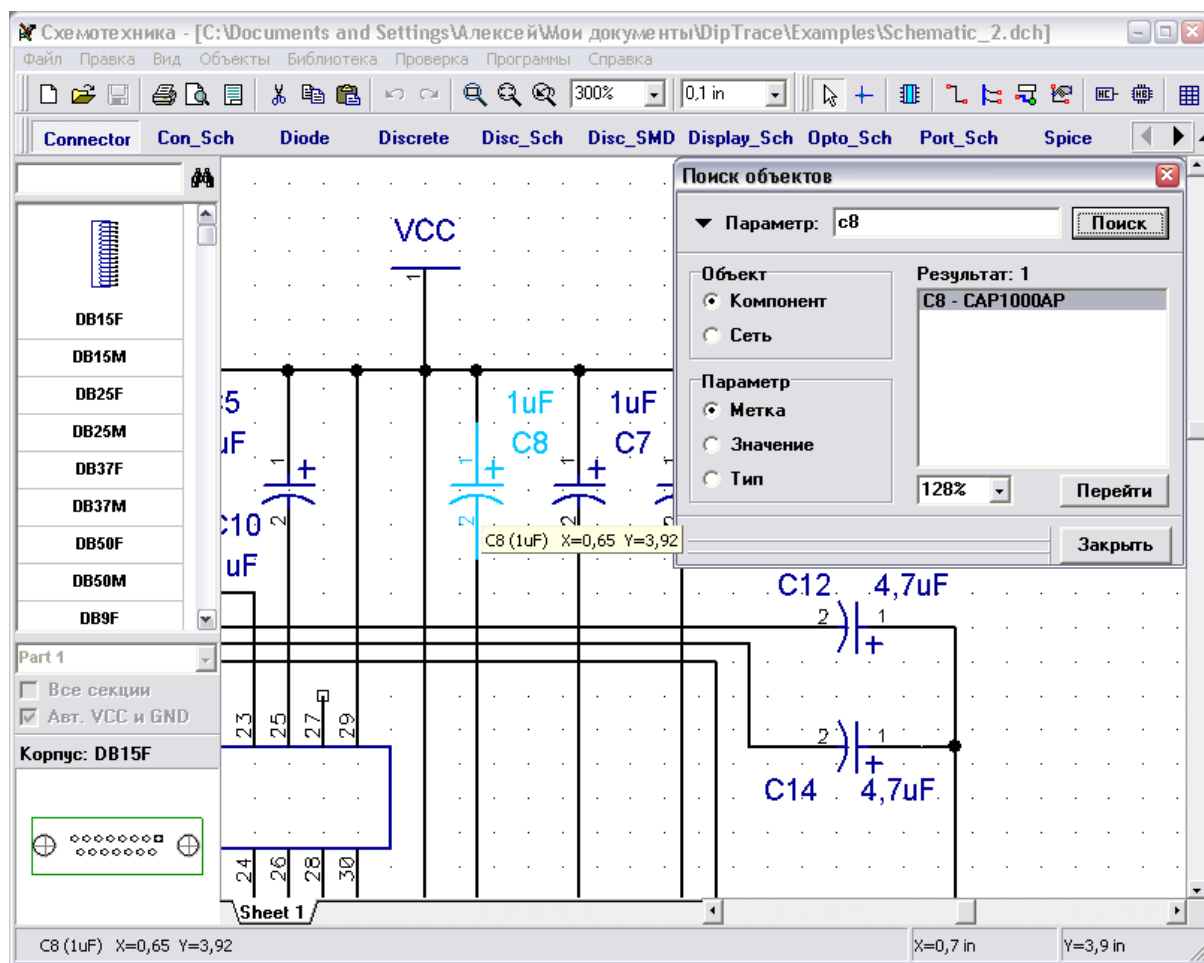
“ / ” ,  
Windows 98/Me).

Schematic\_2.dch

C8 C10,

Ctrl+F

( “ / ” ). “ 8”  
“Enter” , 8 .



8 10.

PCB\_2

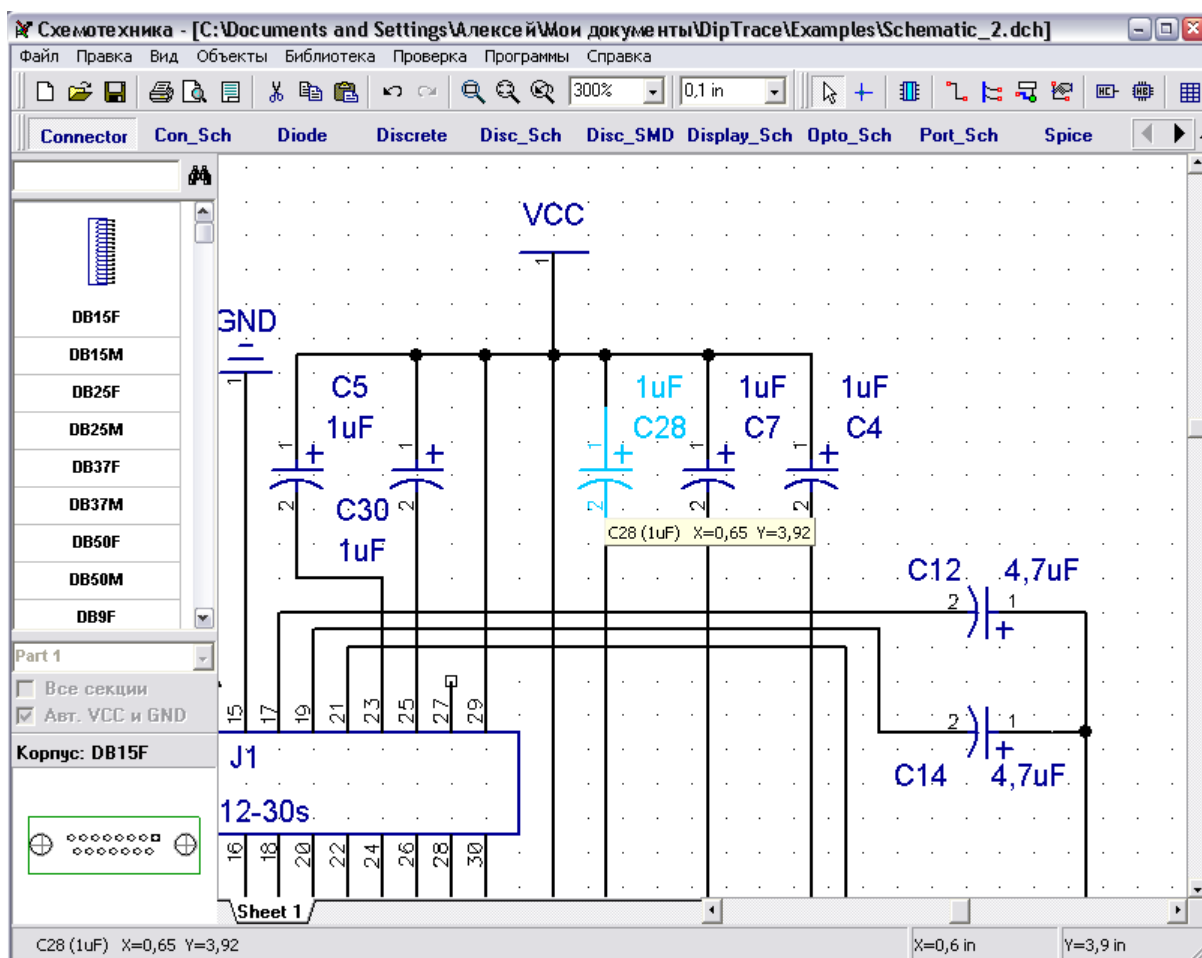
Schematic\_2,

( )

“ / ” “ ”, PCB,

( C28 C30 )  
PCB.





### 4.3

Diptrace

( 98000 2.1)

DipTrace

“ / ”

“232” “ ” “ ”

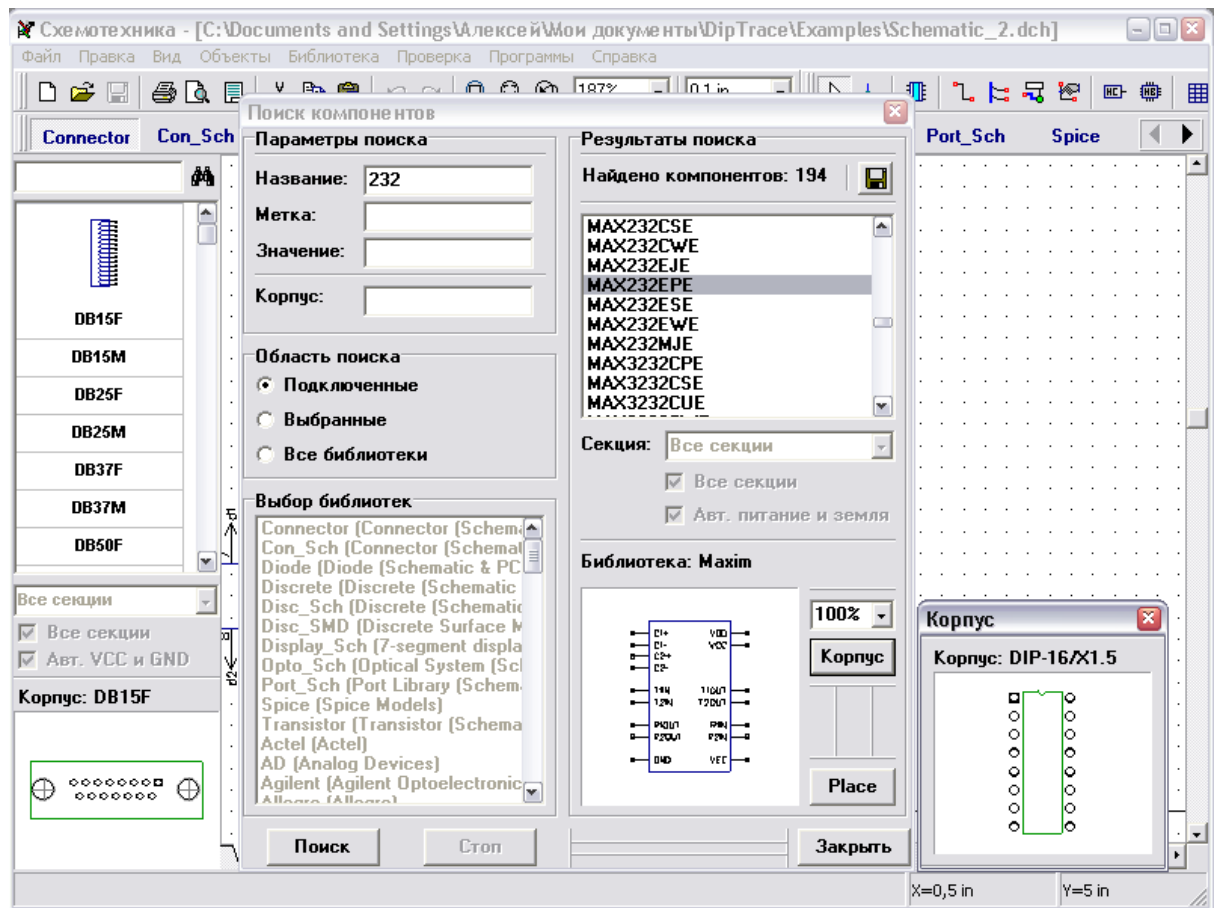
194

“232”

“ ”

(

“ ”).



PCB Layout

## 4.4

(ERC)

(ERC)

Schematic\_2.dch

Examples.

ERC,

**Правила связи выводов**

Passive											
Input											
Output											
Bidirectional											
Open High											
Open Low											
Passive High											
Passive Low											
3 State											
Power											
	Undefined	Passive	Input	Output	Bidirectional	Open High	Open Low	Passive High	Passive Low	3 State	Power

**Проверка**

☒ Тип выводов

☒ Несоединенные

☒ Только один вывод

☒ Короткое замыкание

☒ Нет ошибки  
☐ Предупреждение  
☐ Ошибка

**Выводы для КЗ**

Питание: V\*

Земля: GND\*

Проверка

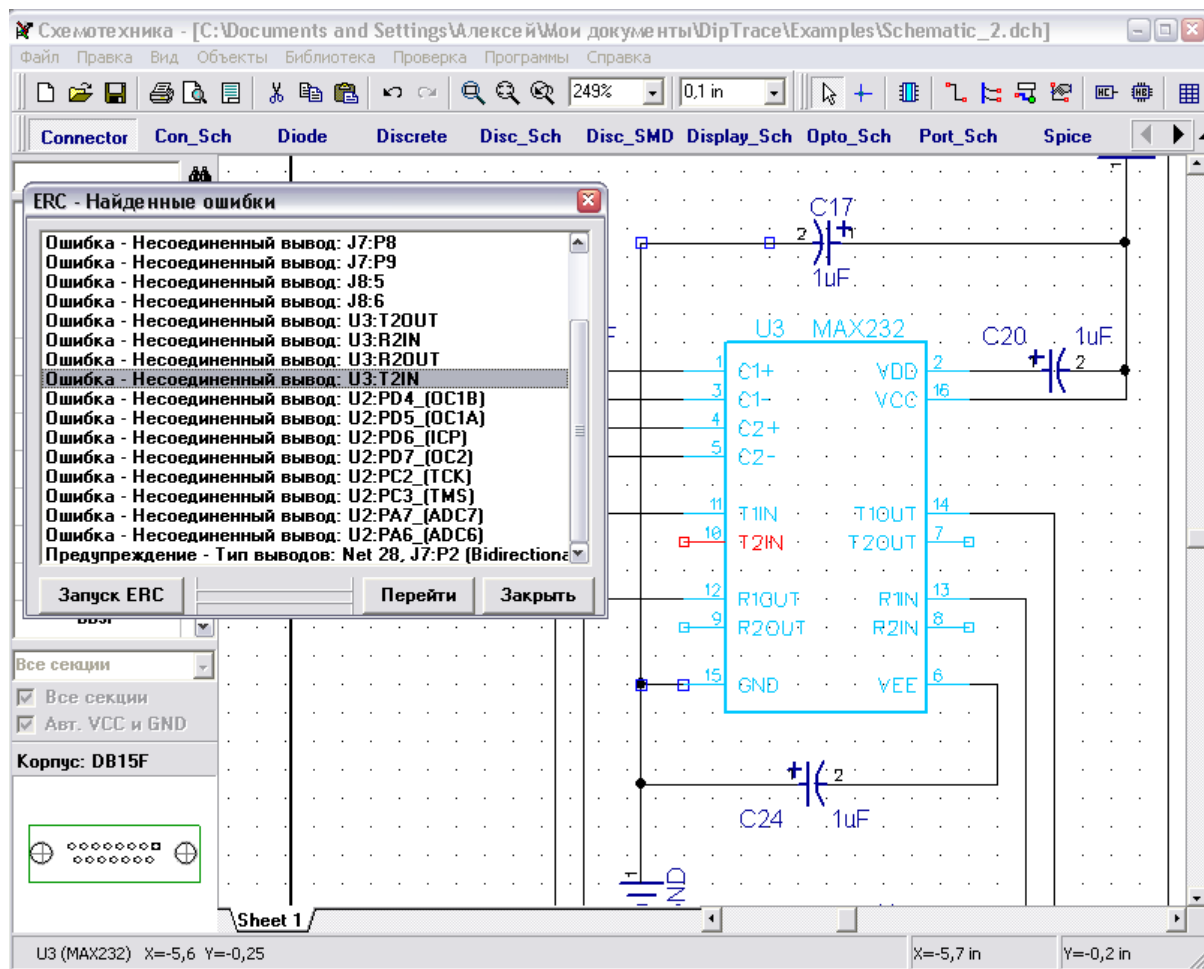
OK Отмена

“OK”

Schematic\_2,

“Bidirectional to Output”.

ERC



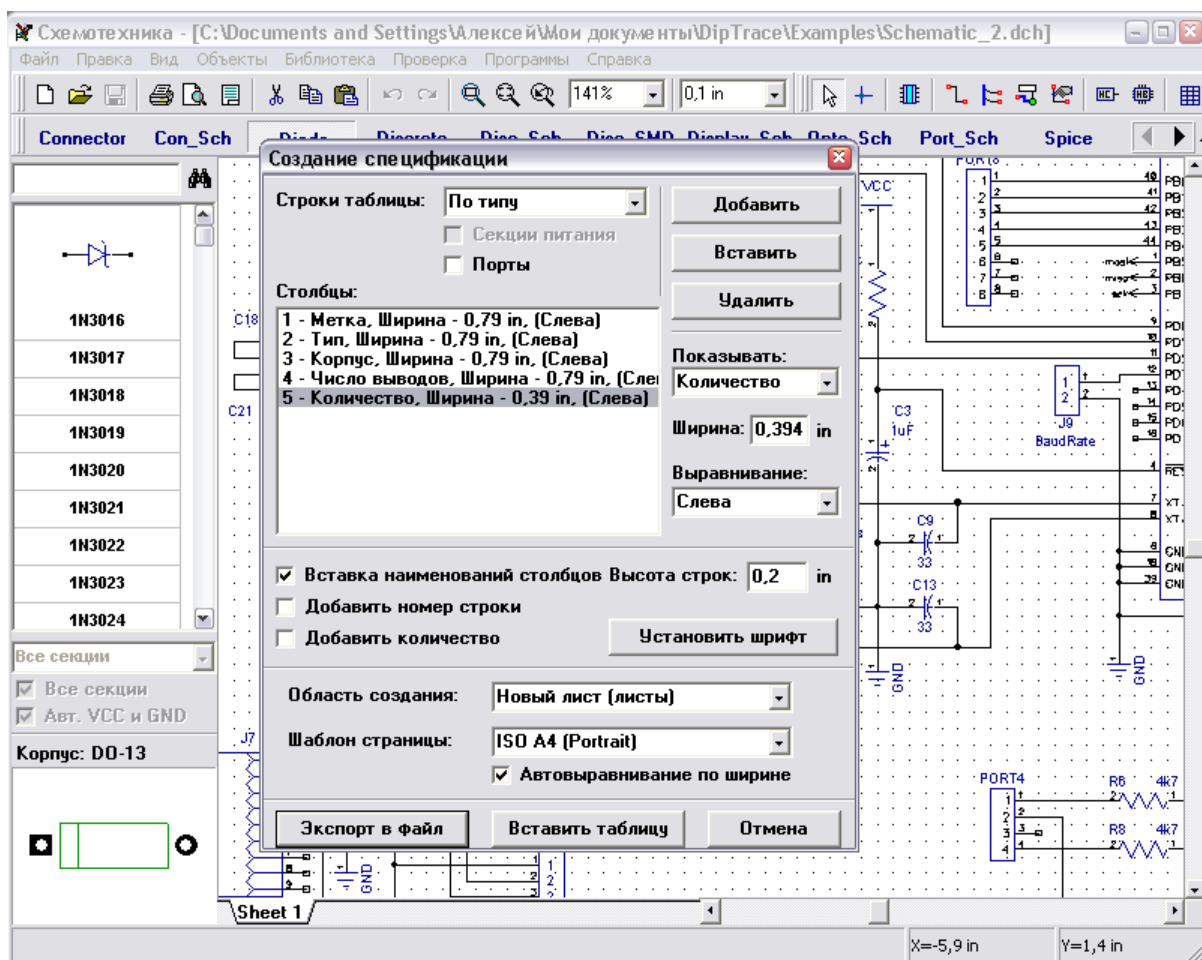
ERC.

## 4.5 (BOM)

Excel CSV

ISO

A4

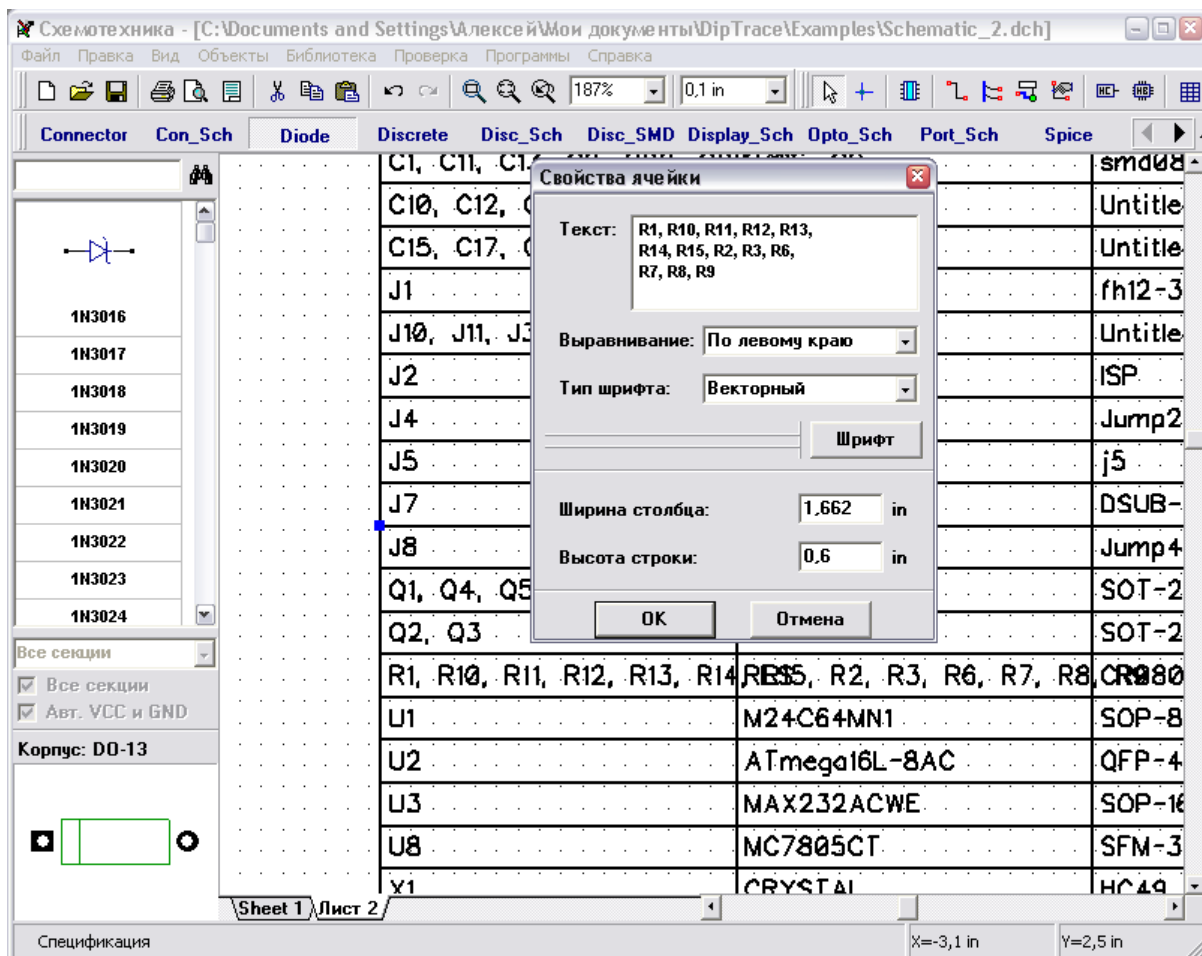


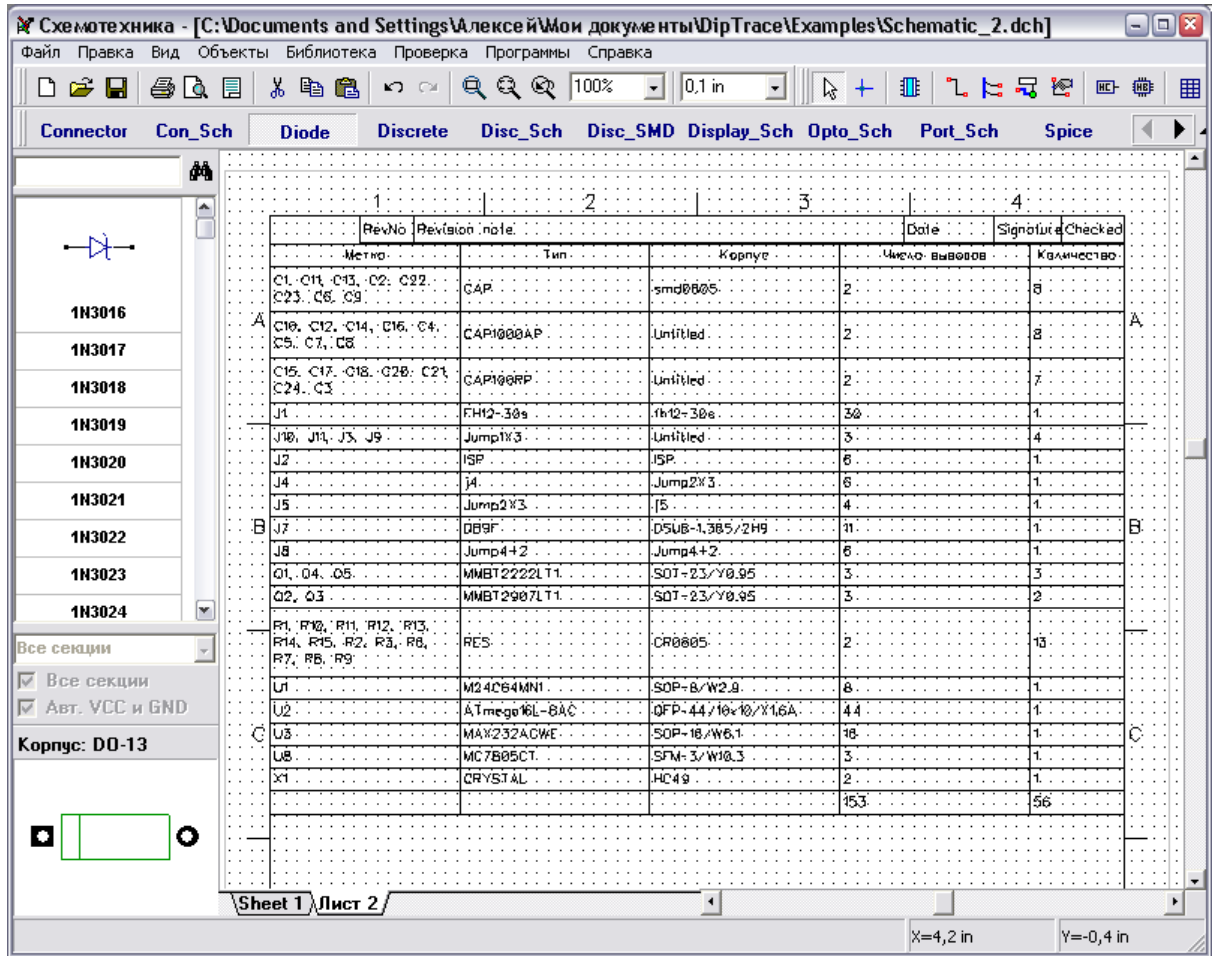
“ 2”,

“ / ”

( )

,





“ , : “ ” :

“ ” :

(

).

BOM

(

PCB Layout

Excel CSV

:

“ ”

## 4.6

/

DipTrace

,

,

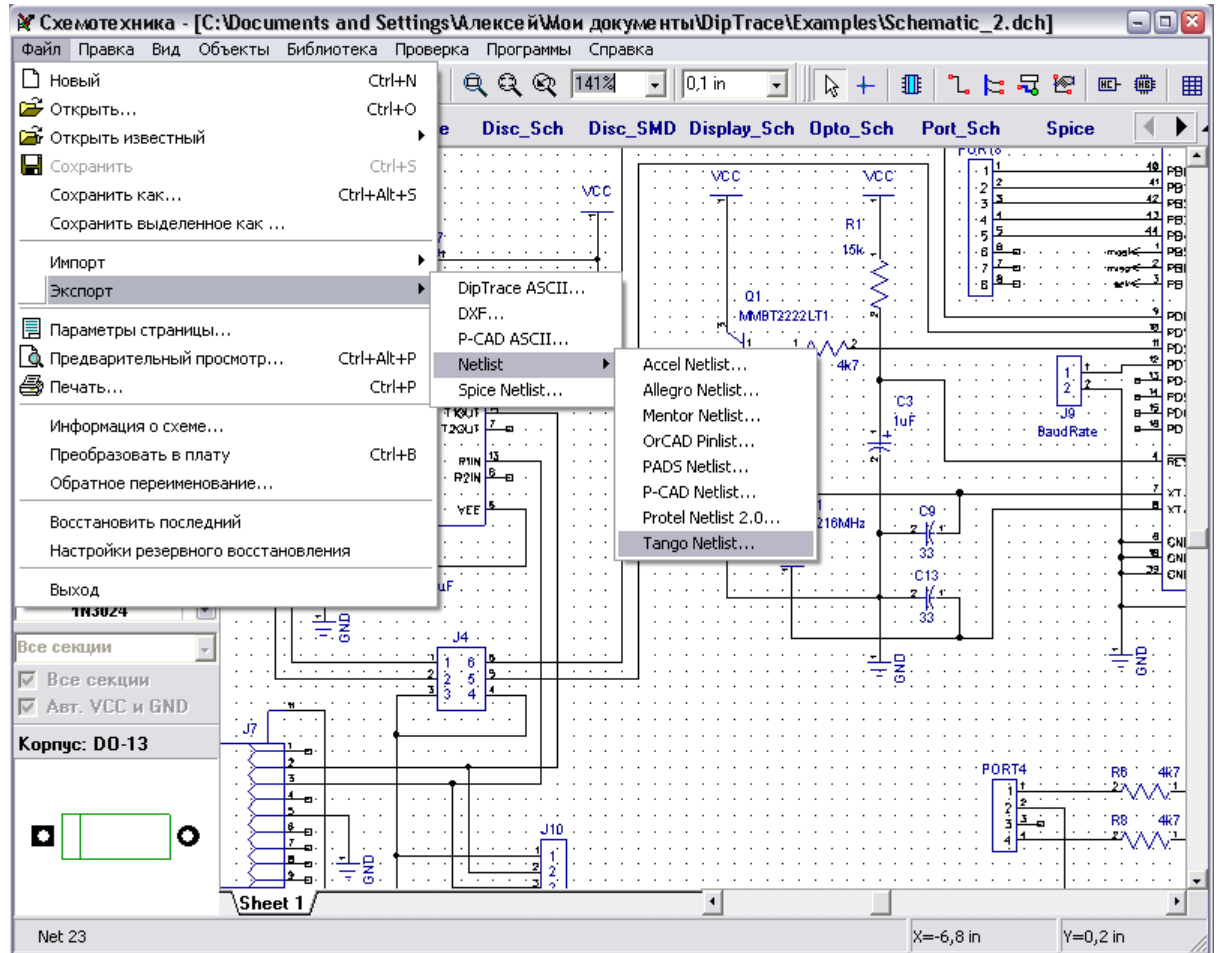
( )

Schematic

\

\ Netlist

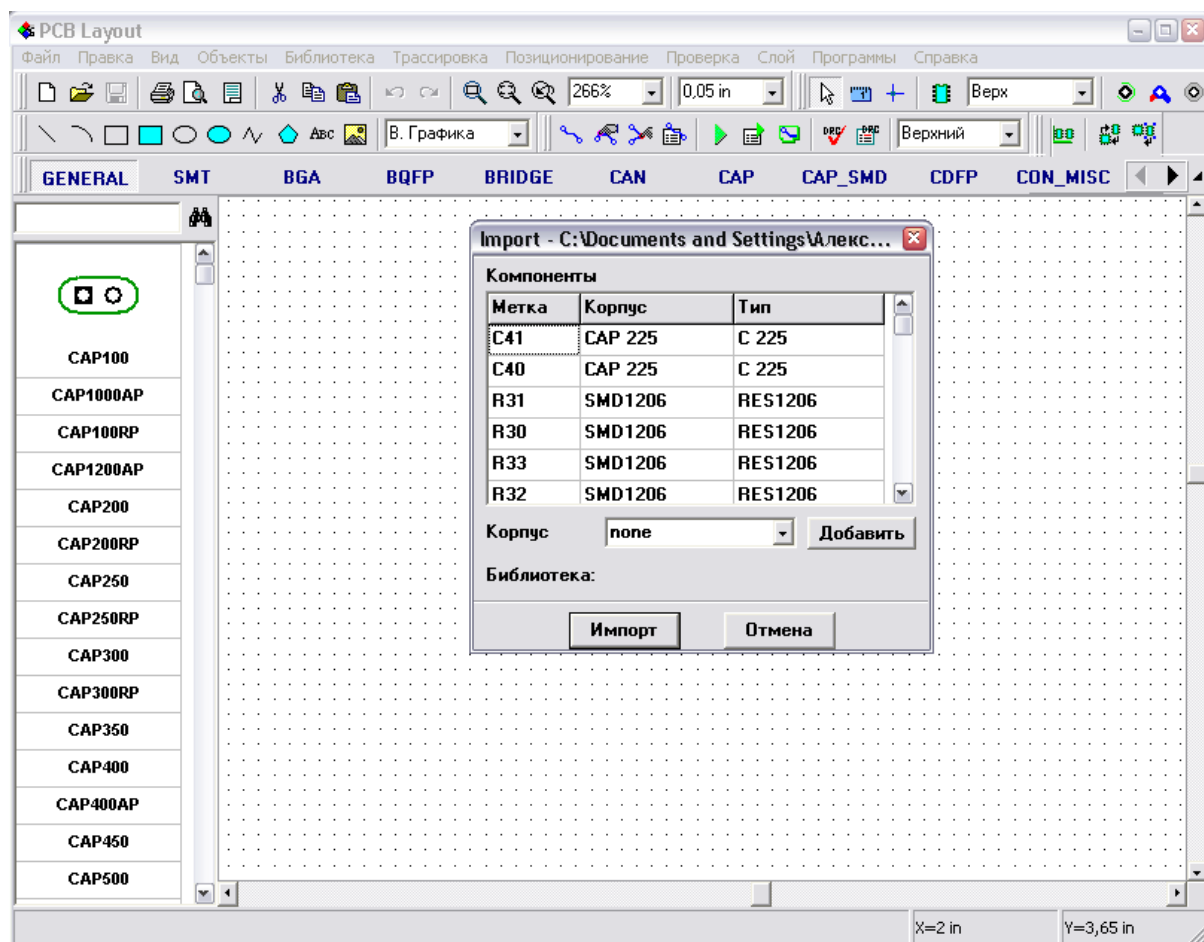
,



PCAD.  
Import \ Netlist \ Tango,  
files / DipTrace / Examples”

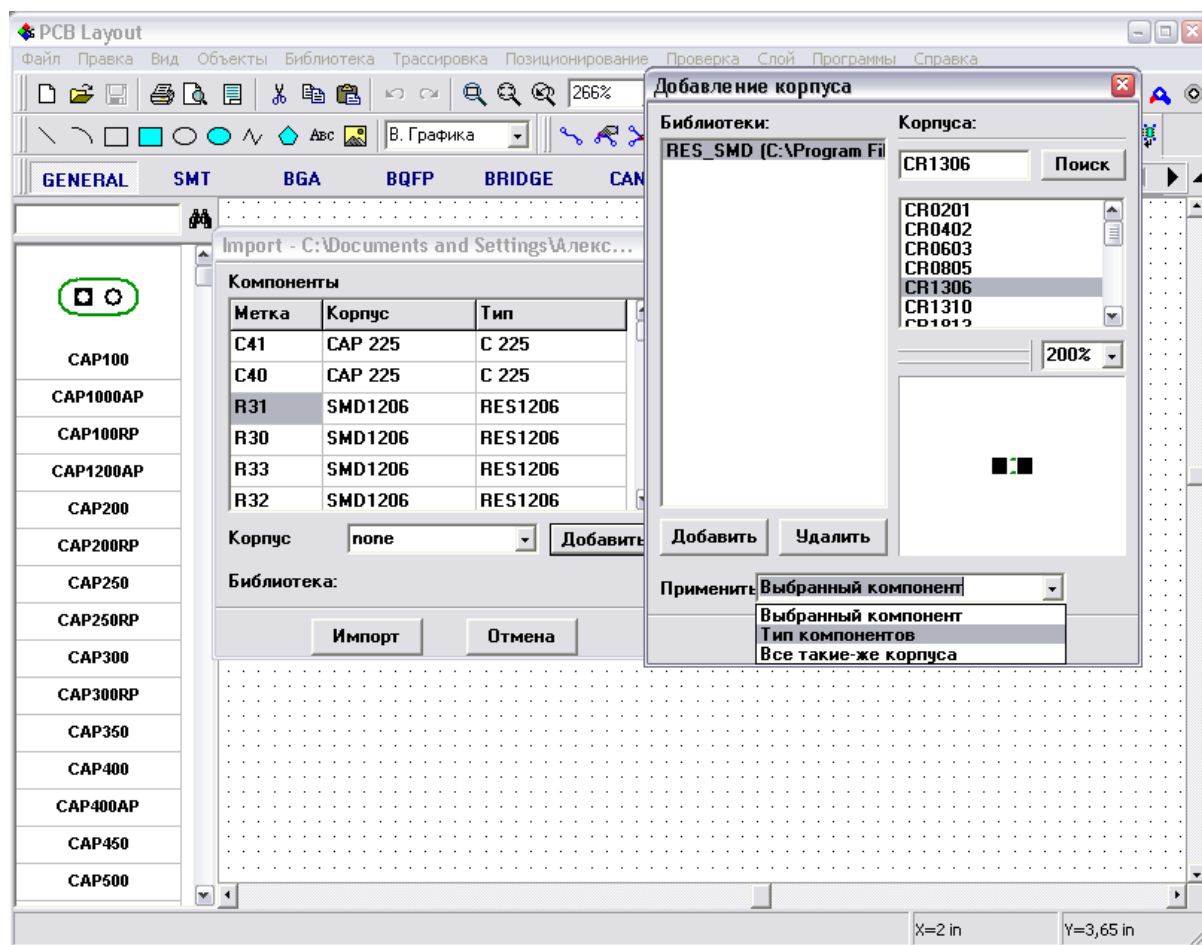
Tango-  
PCB Layout  
File \  
: tango\_1.net “C: / Program  
DipTrace.





,  
 ,  
 ,  
 “ ”  
 ,  
 C41, CAP 225, none.  
 DipTrace.  
 (  
 )  
 ,  
 Add  
 .  
 ,  
 OK.  
 41,  
 Pattern Library.  
 ,  
 ,  
 “ ”  
 ,  
 ,  
 ,  
 ,  
 “ ”  
 .

“Yes” , “No”



## 4.7 Spice

DipTrace

Spice

LT Spice.

LT Spice

“My Documents / DipTrace / Examples / Spice / Astable\_Flip\_Flop\_Spice.dch”.

C2

"Spice"

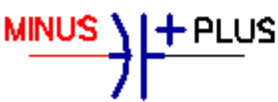
"

: "Capacitor",

22uF)

Spice.

Spice установки



Тип модели: Конденсатор  
 Функция: none  
 Образец: C\_C2 N+ N- 22uF IC=0

Параметры

Параметр	Значение
Value (Capacity, F)	22uF
IC (Initial voltage, V)	0

Вывод      Сигнал  
 PLUS (PLUS) N+  
 MINUS (MIN) N-

Сигнал: N-

Сигналы модели:

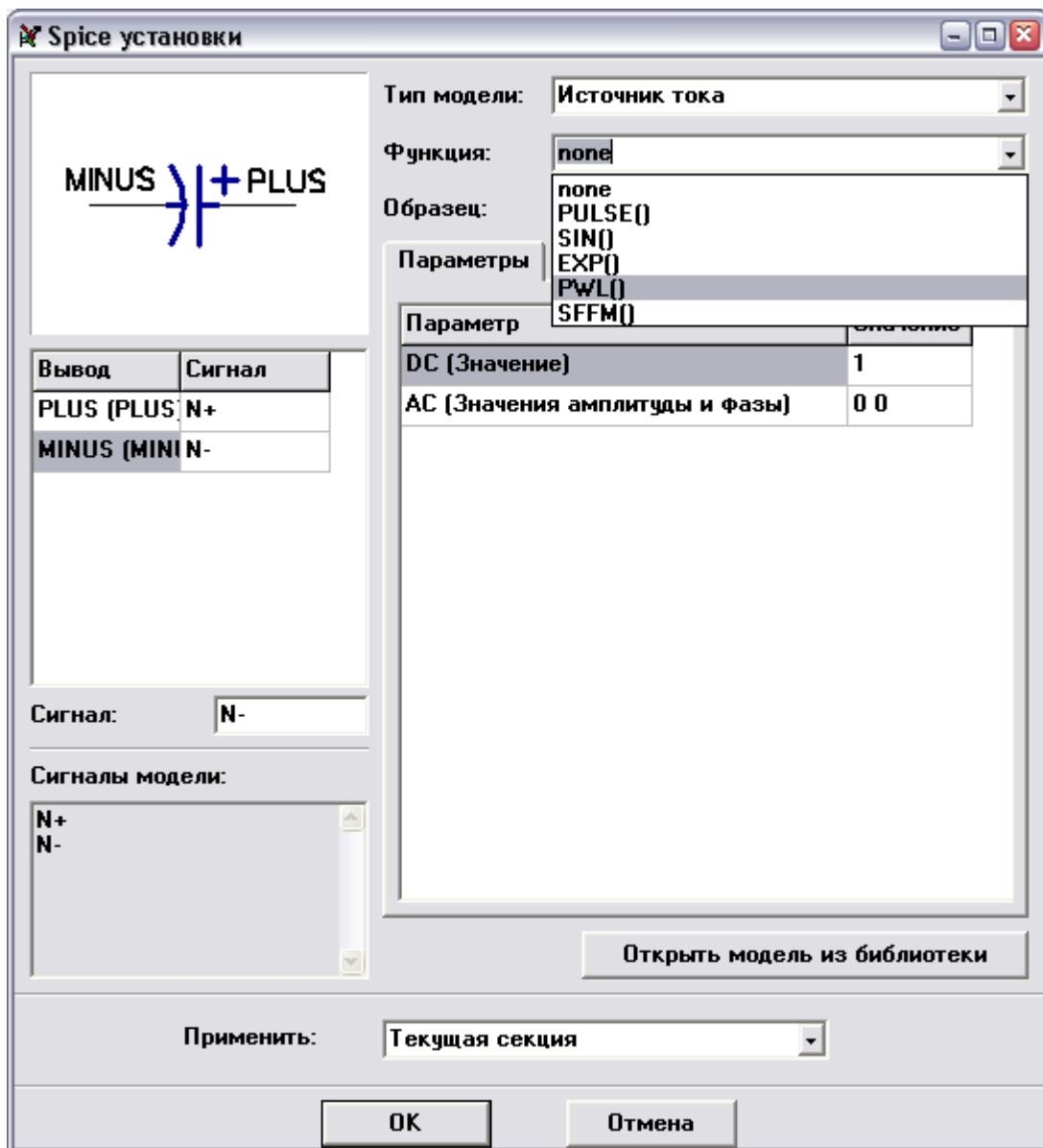
N+  
N-

Открыть модель из библиотеки

Применить: Текущая секция

OK      Отмена

PWL:



OK.

( , . ).

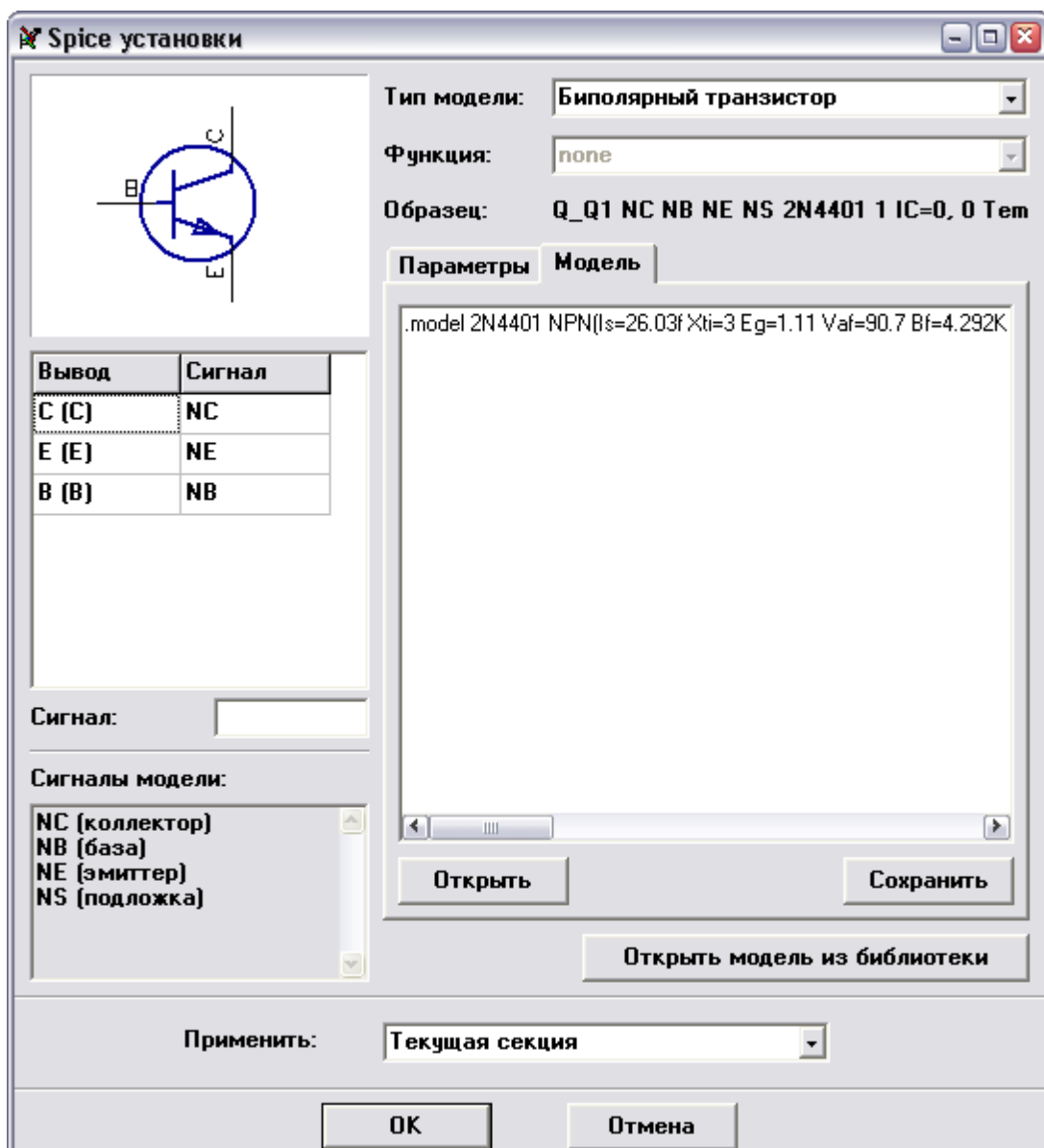
Spice

OK.

Q1

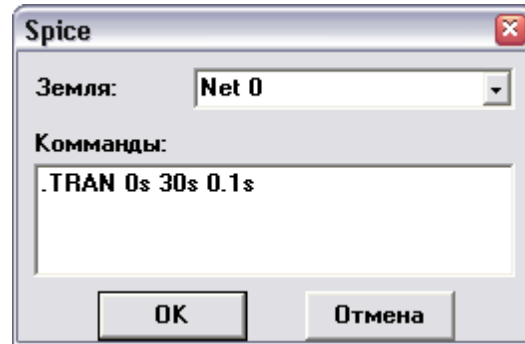
"Spice

spice



( " , spice DipTrace  
"). OK

, , spice ,  
B1 spice .  
( )  
PULSE, Pulse V2=5, Pulse PW=20s, Pulse PER=30s.  
OK, 5V  
20 , 10 , ..  
" / / Spice netlist"  
GND ( )  
“.TRAN 0s 30s 0.1s”  
0 30 0.1 , /  
LTSpice. .cir .



LT Spice.

: <http://www.linear.com/designtools/software/switchercad.jsp>

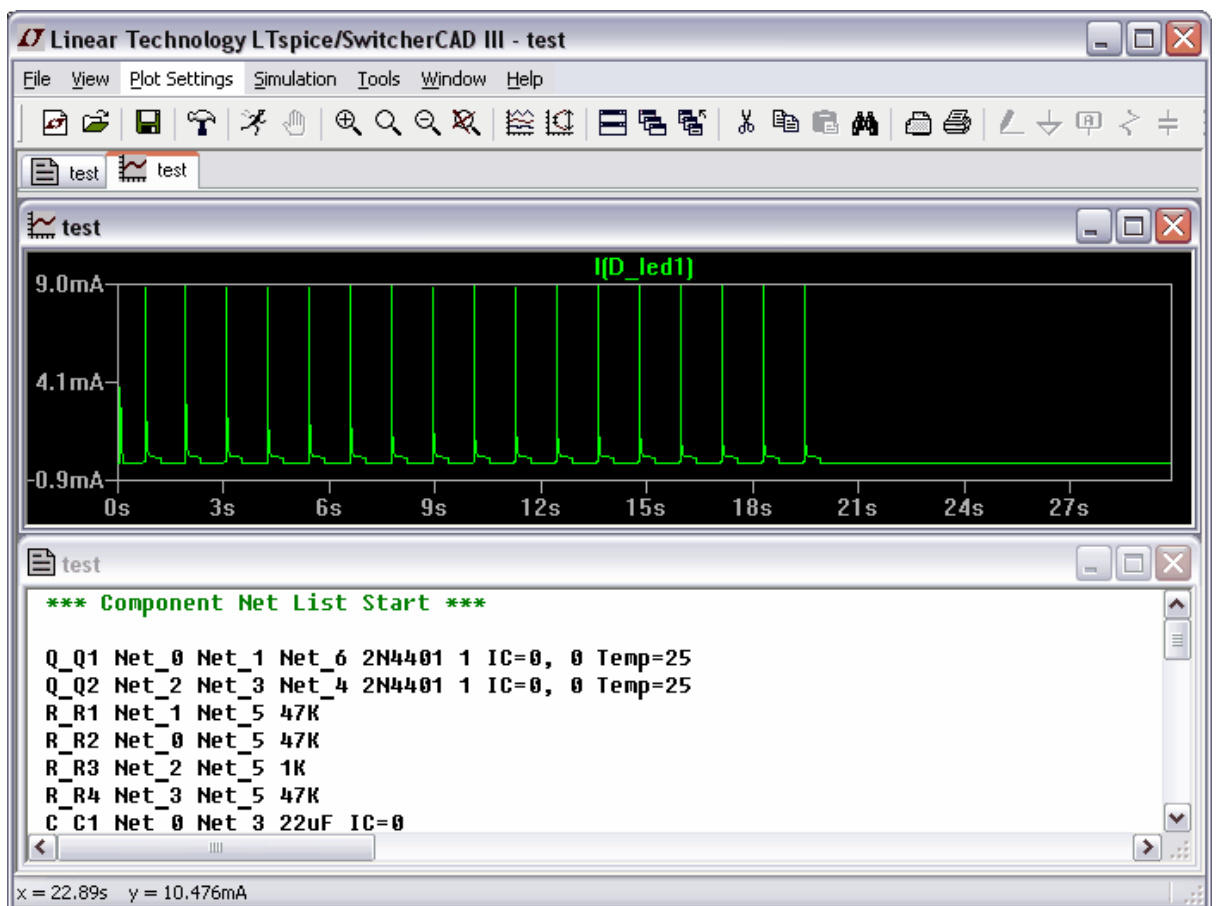
File/Open LTSpice .cir - ,

( , ). -

“Simulate/Run”

Plot Settings/Visible Traces led1. -

:



LED1.

20 ,

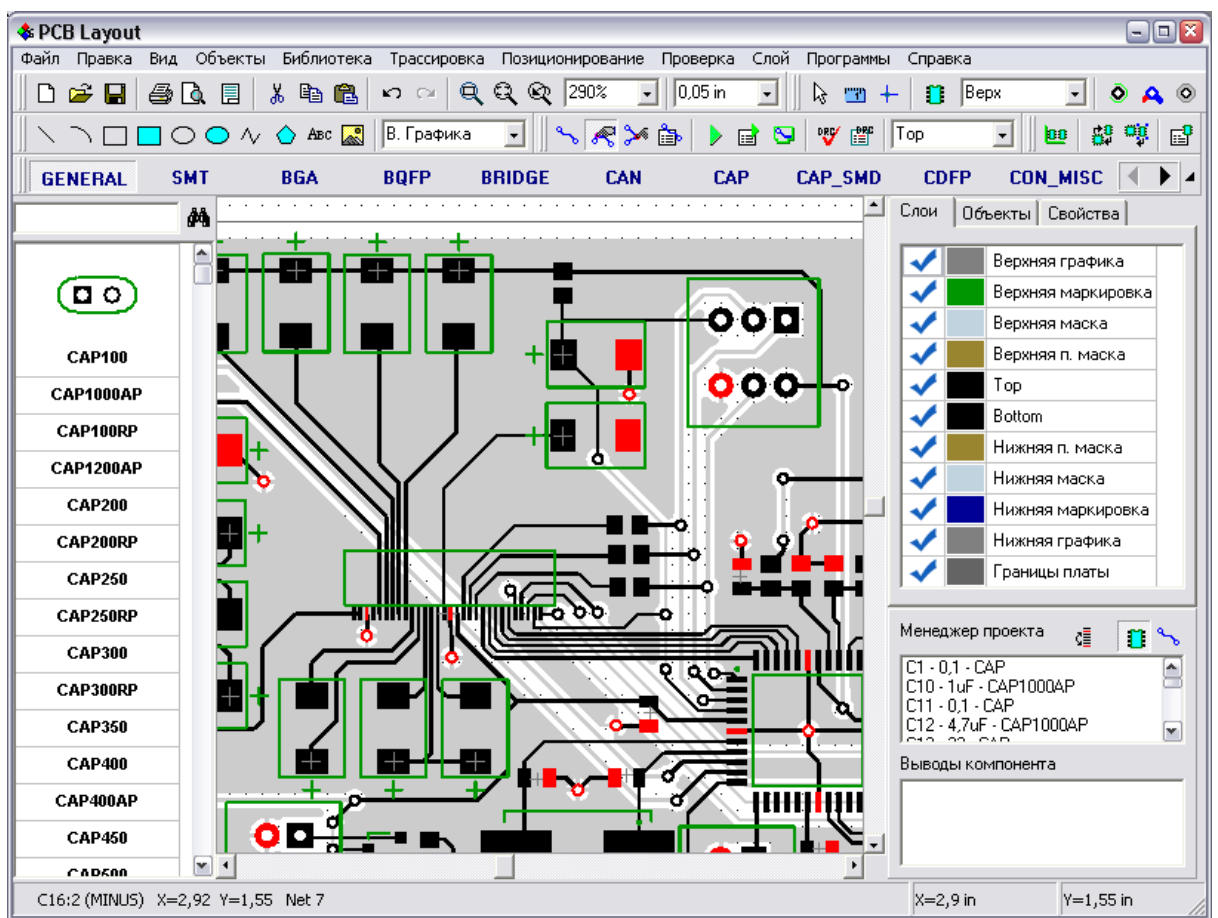
10 .

...

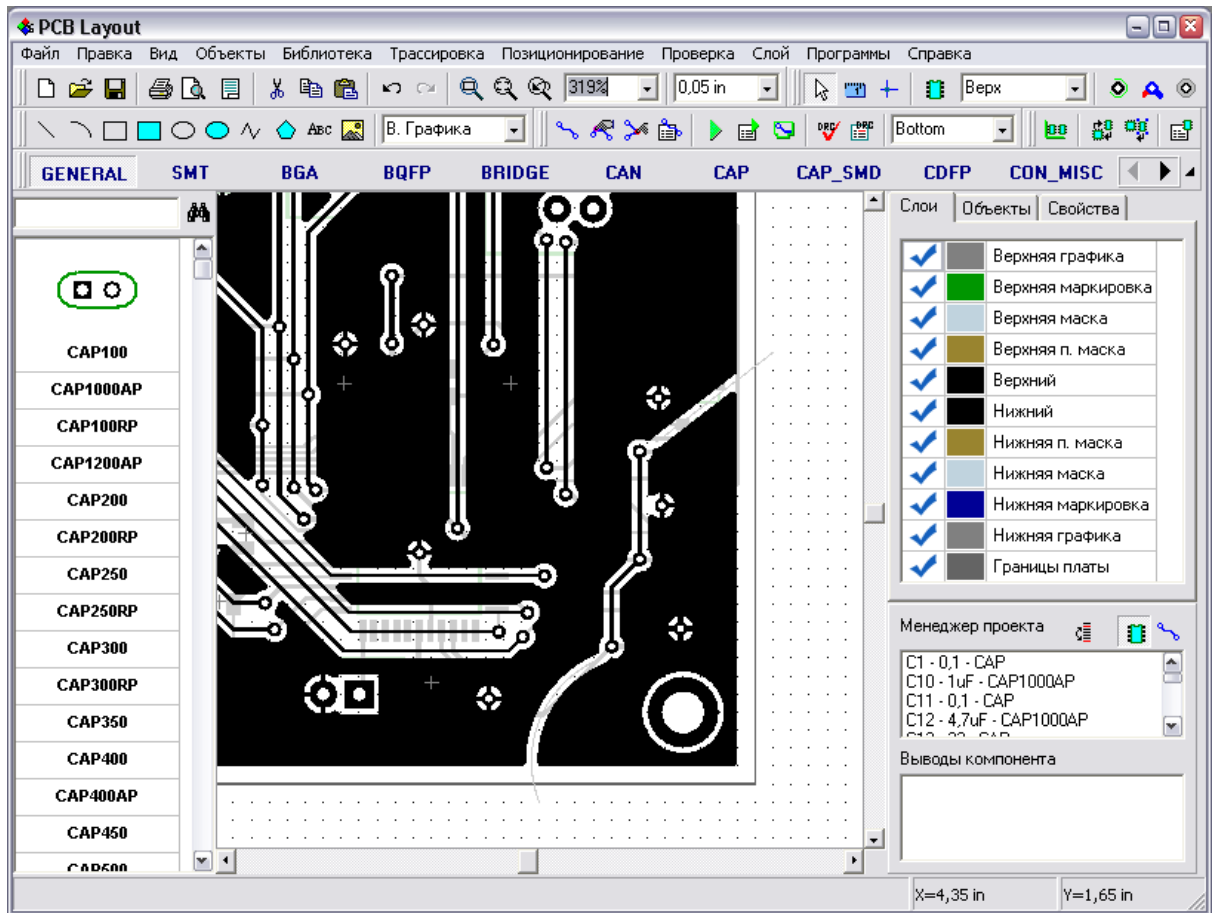
## 4.8

PCB Layout “PCB\_2.dip”,  
 “C: / Program files / DipTrace / Examples”

Bottom, C16:2  
 ).



Bottom



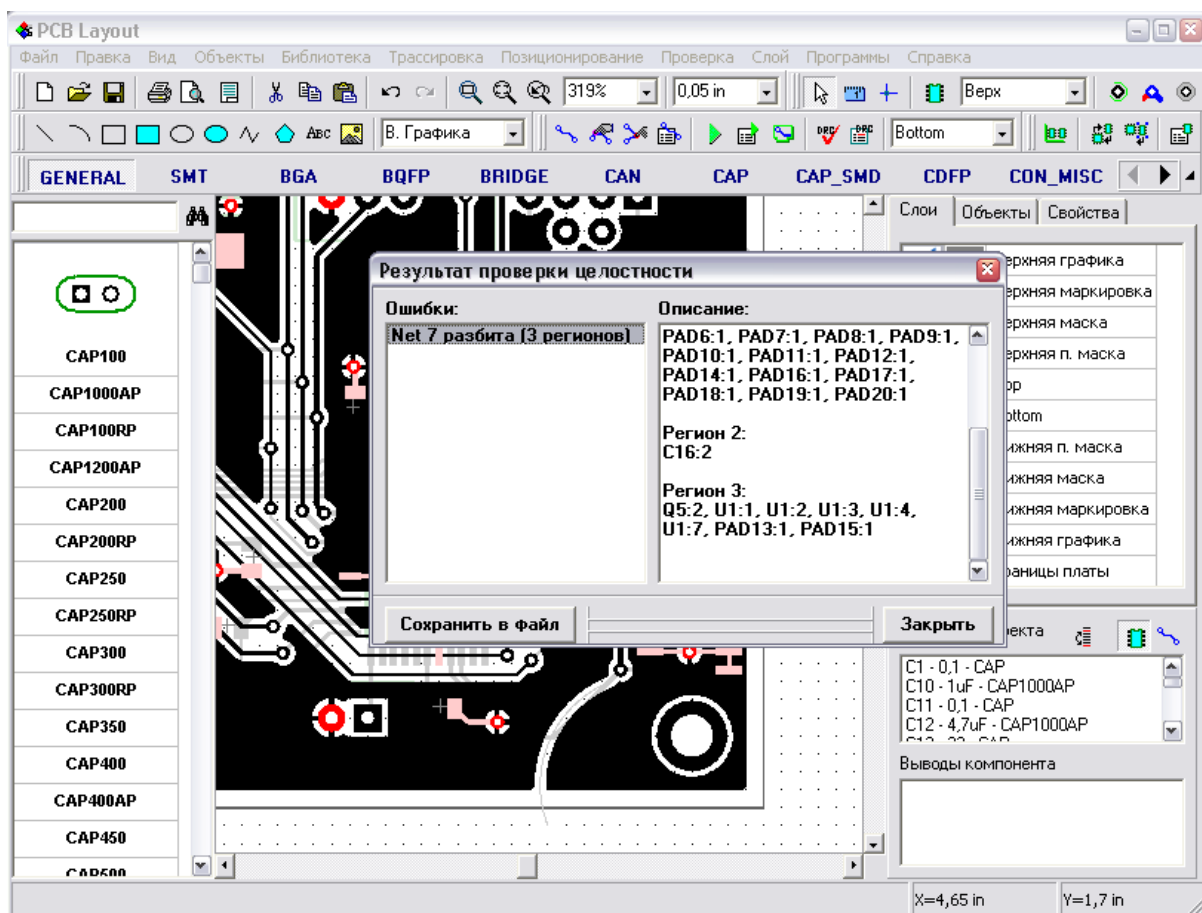
3

Net 7:

- C16:2 (

)

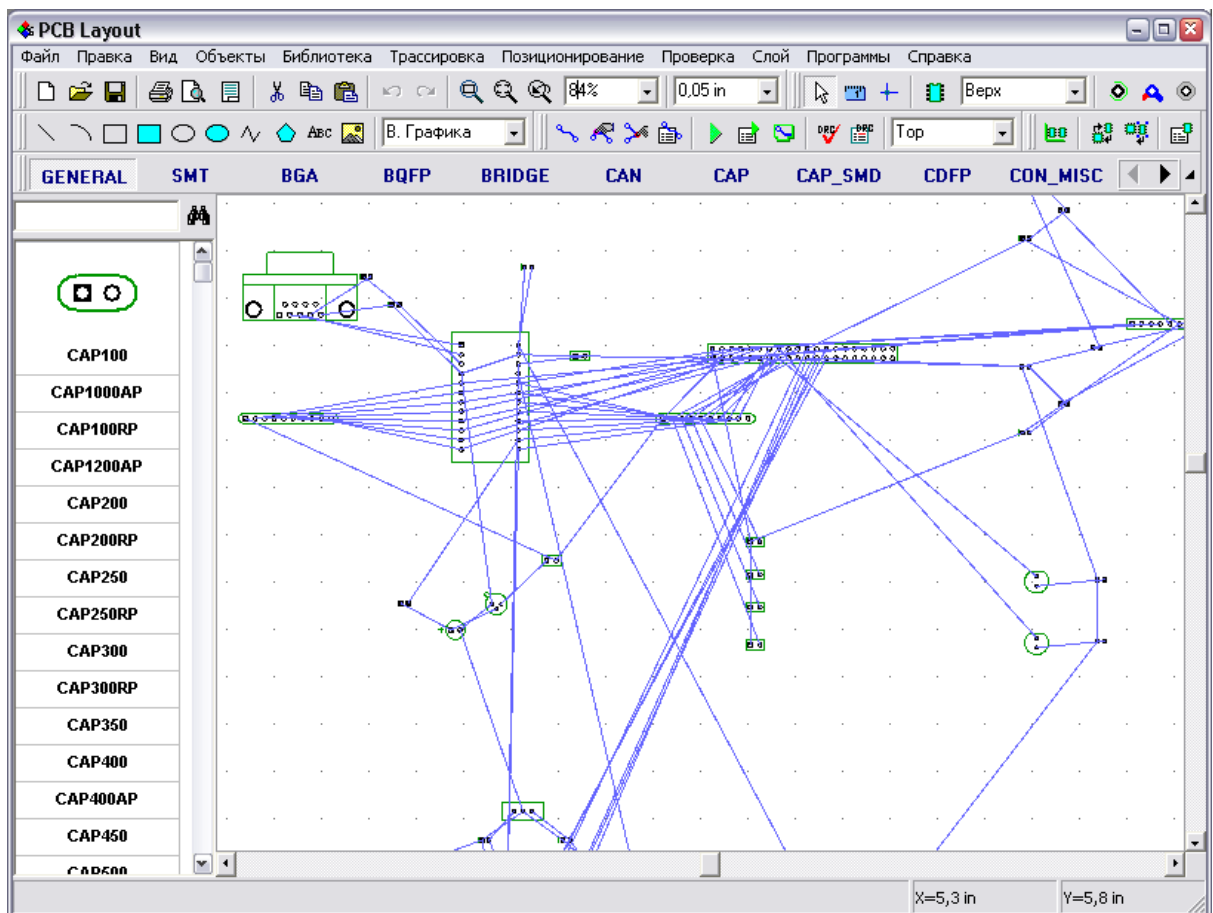




## 4.9

1.40, DipTrace

, PCB Layout, « / » “C:/Program files/  
DipTrace/Examples/Schematic\_4.dch”. -



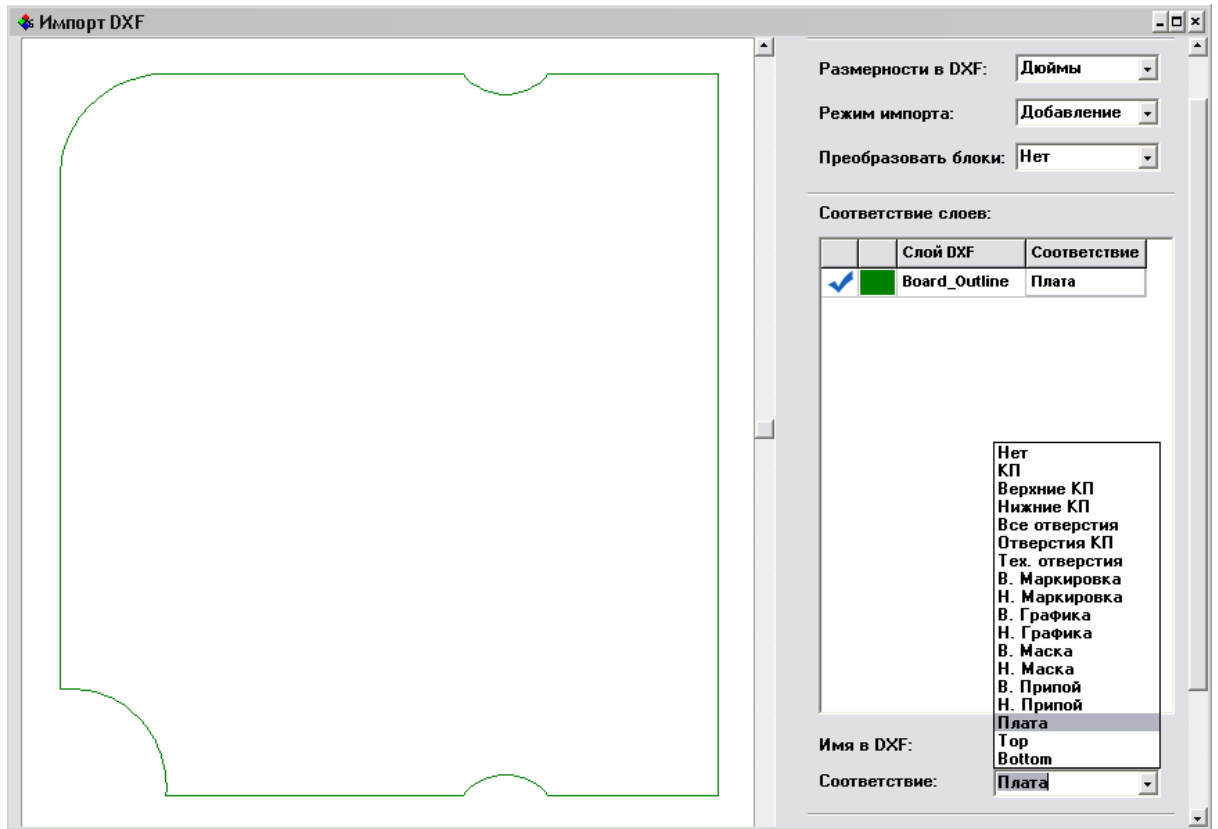
DXF.

“ / / DXF”

C:/Program files/DipTrace/Examples/outline.dxf.

DXF

“Board Outline”

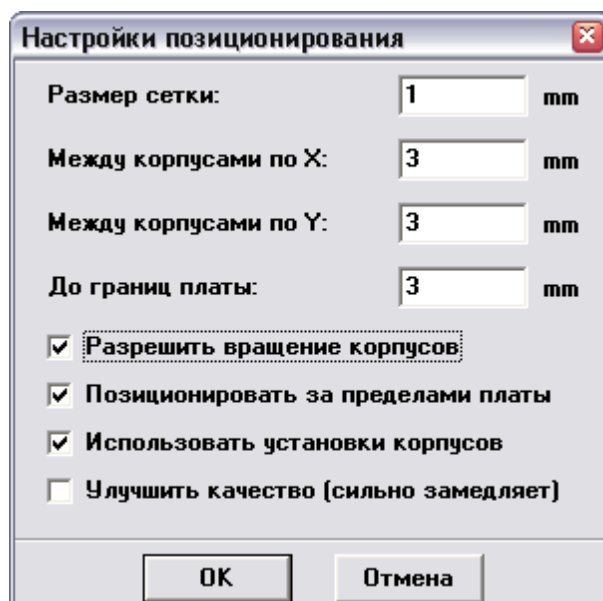


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DXF — , -

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OK

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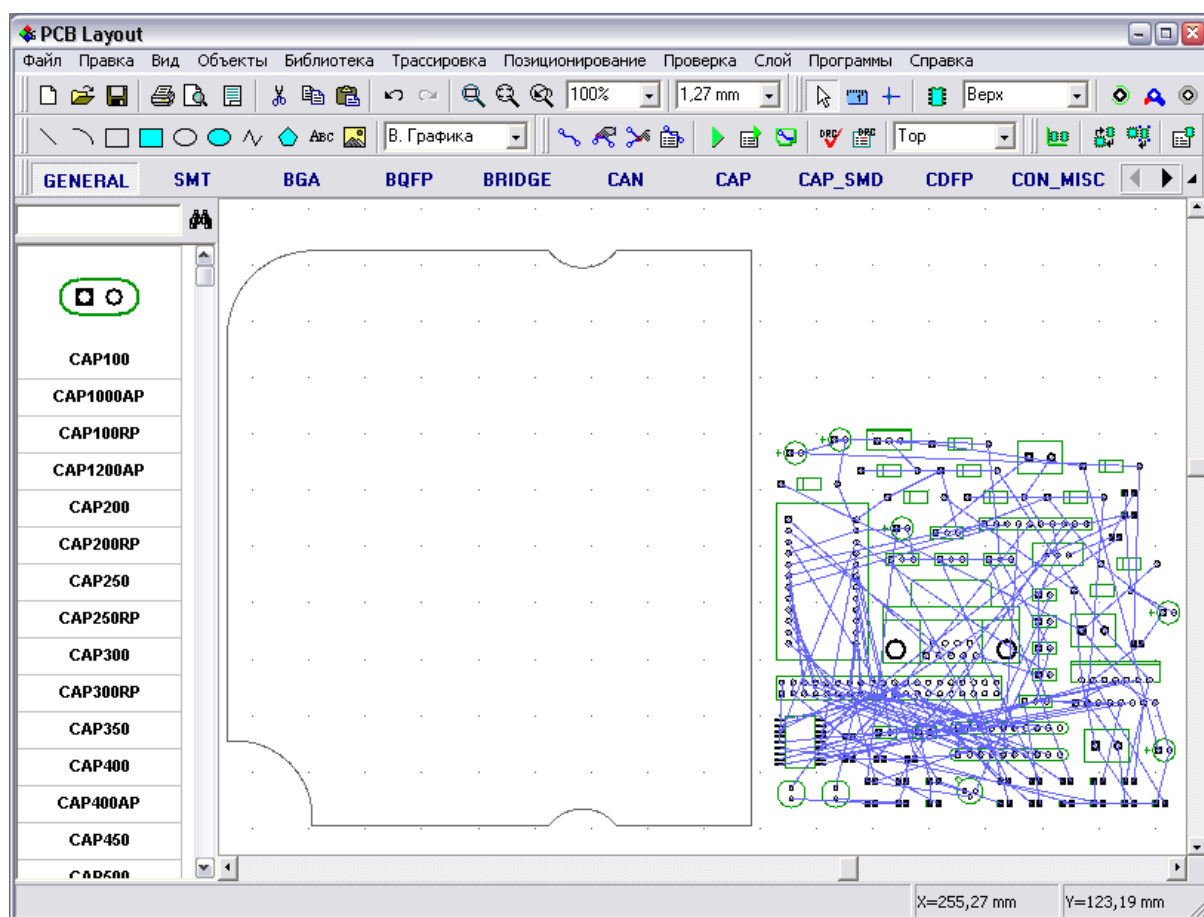
»

«

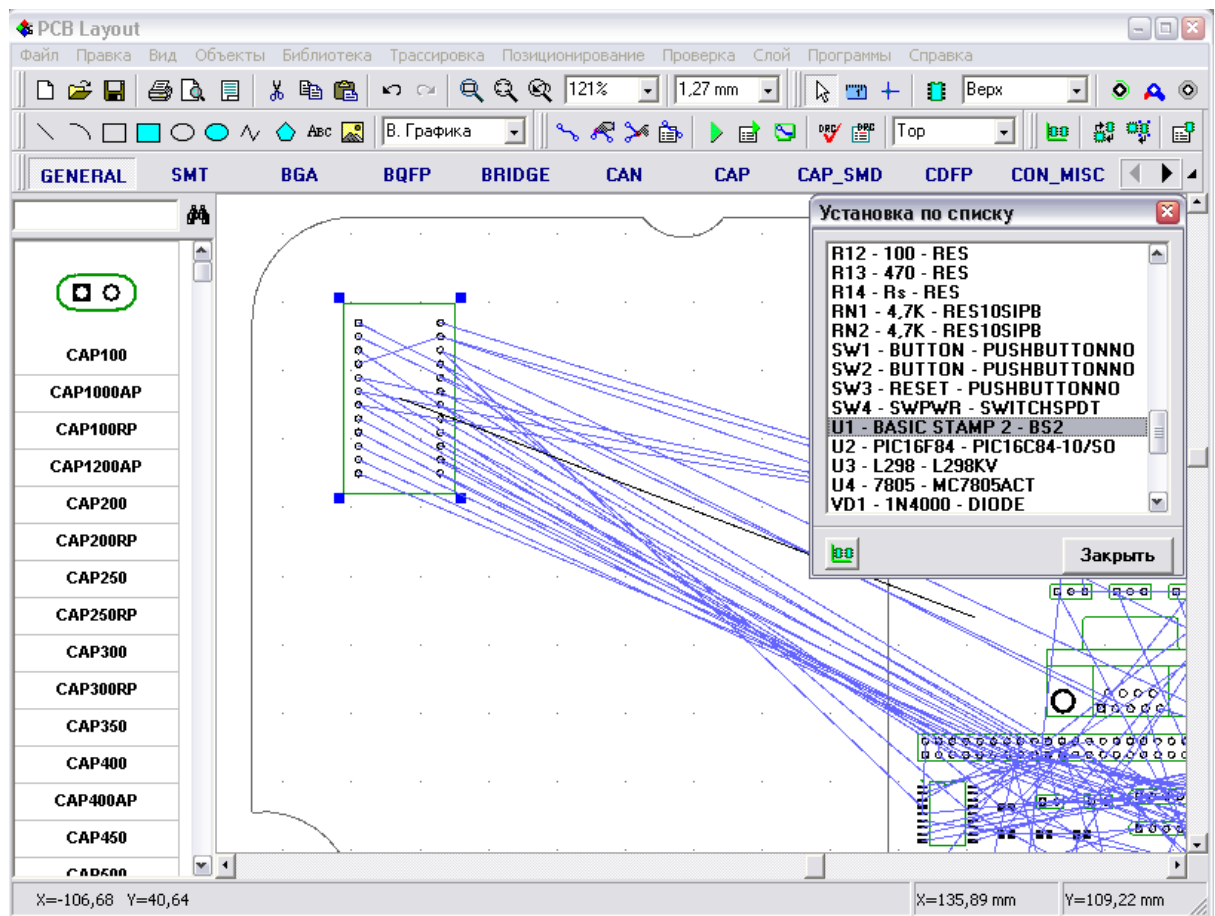
/

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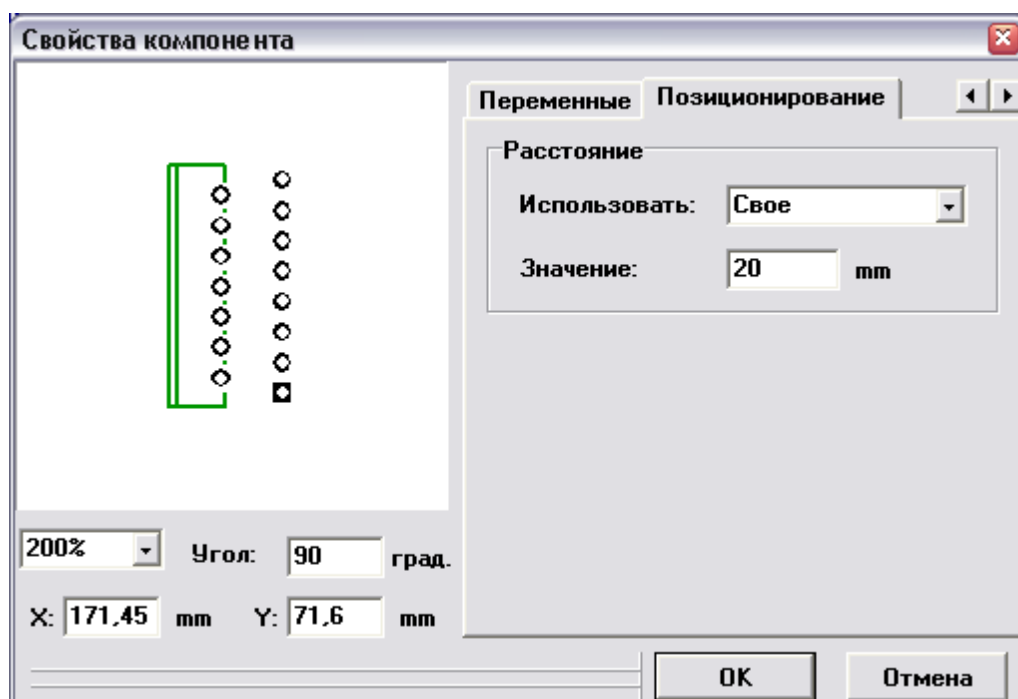
.



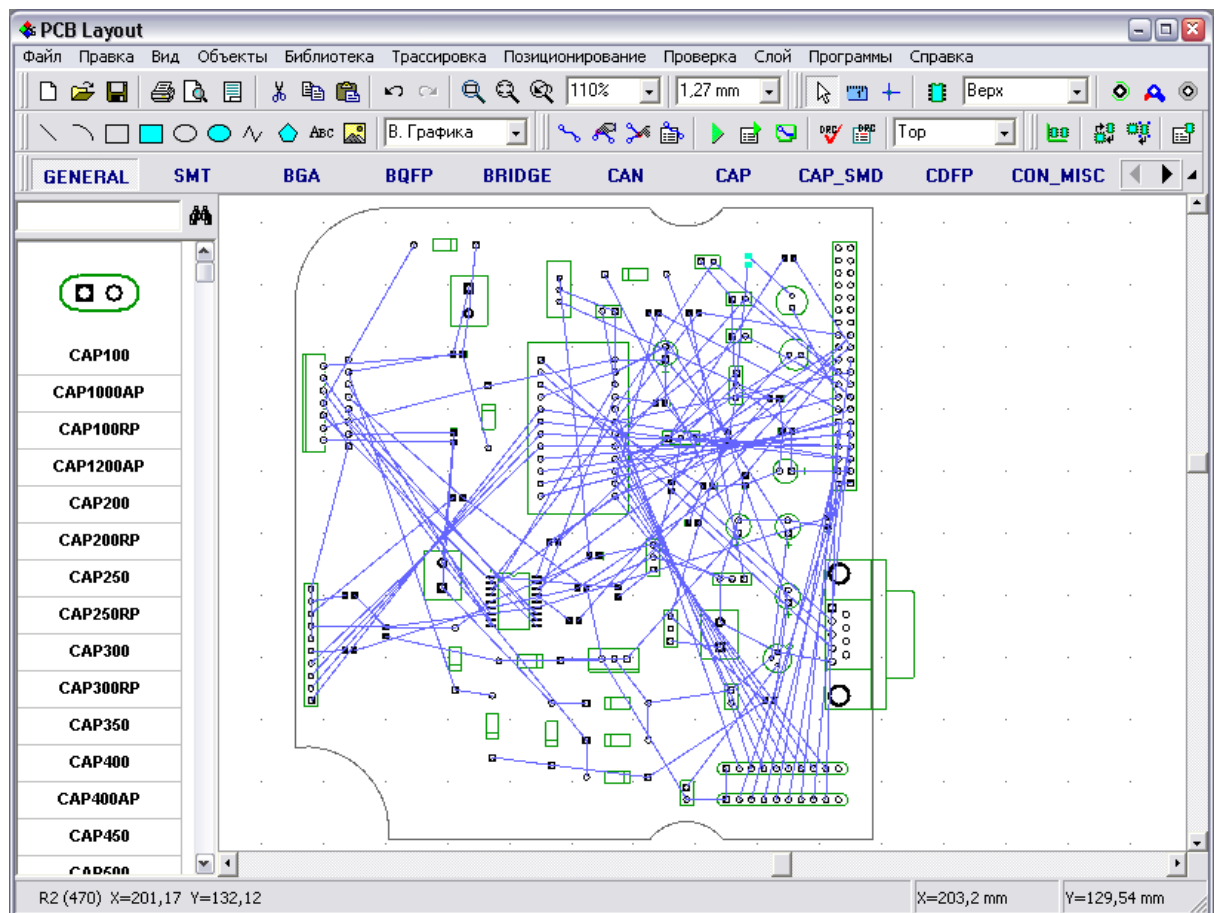
« / » ( , )  
( , )  
,



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U2, U3, J1, J8, J12, RN1 RN2  
,  
,  
(Ctrl+L), U3.  
« », > : :20 (  
20 ). OK, U3  
U3 .



5  
 . « / »,  
 « X» « Y» 5 ,  
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 « 20 U3. ,  
 OK  
 « - »  
 « / -  
 »  
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U3

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" / "

, 0.4 , 0.4 ,

0.3 , , "Shape Router"

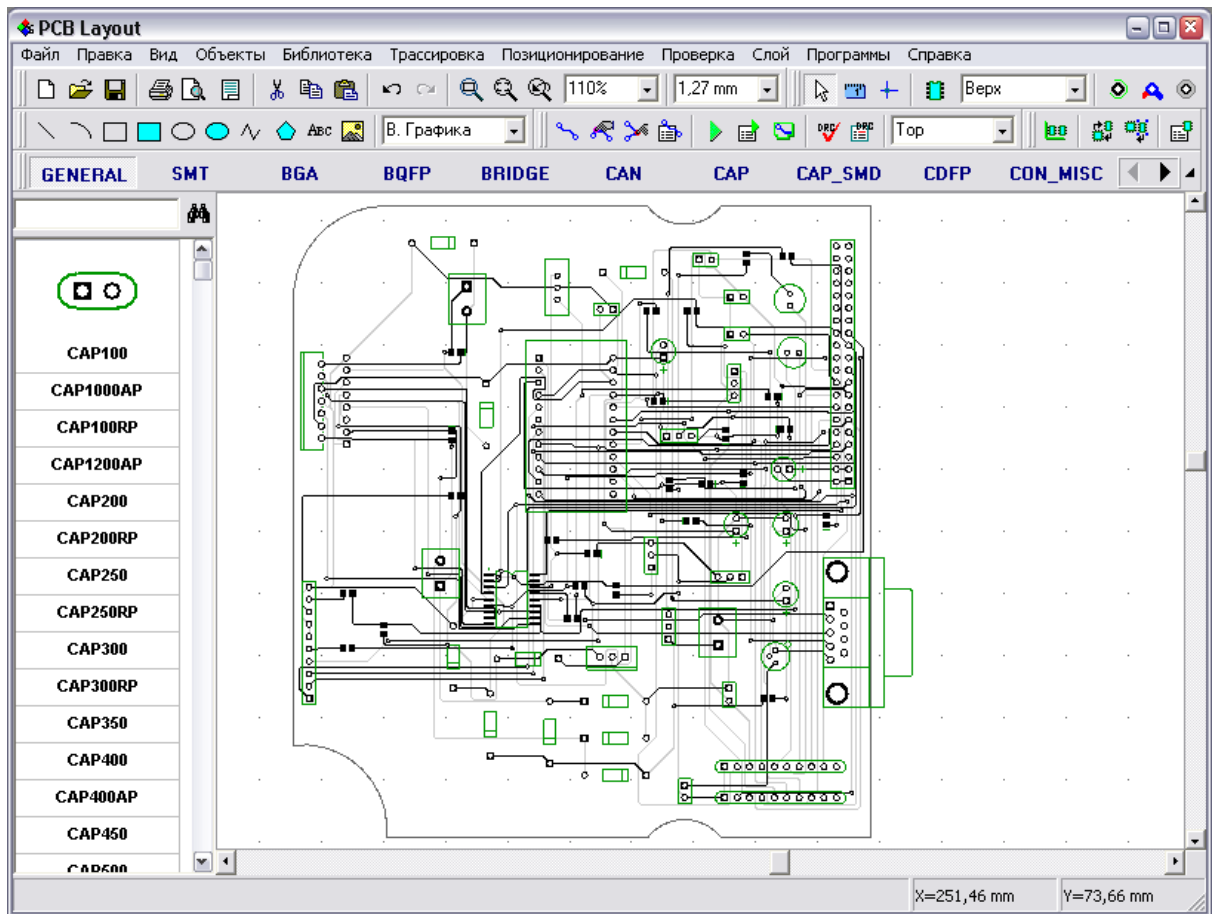
,

" "

1.2 0.6 ). F9

:





PCB Layout.

## 4.10

fanout

smt –

BGA, SOIC, QFP . . .

PCB Layout

« / »

«SMT»

LLC20

«BGA»

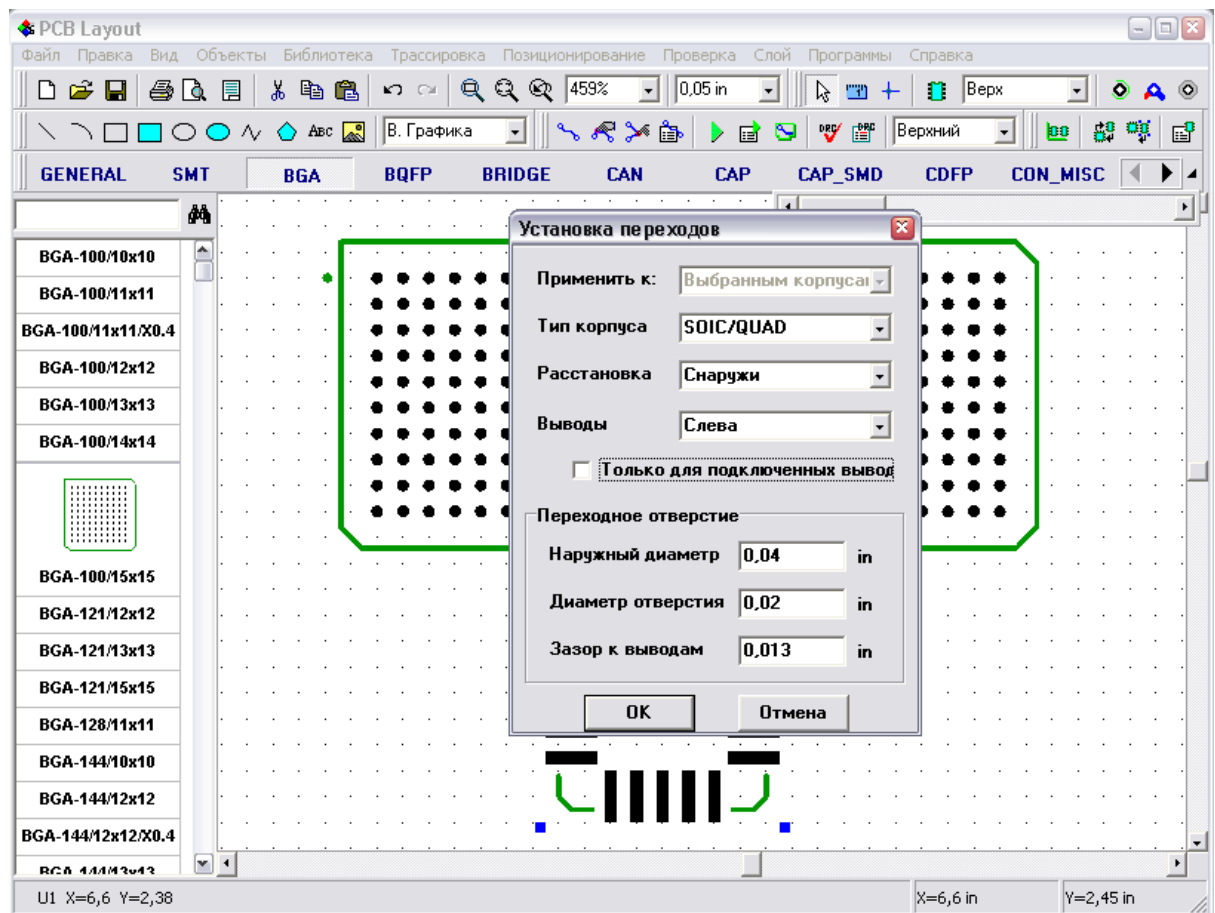
BGA-100/15x15.

(Ctrl+T) .

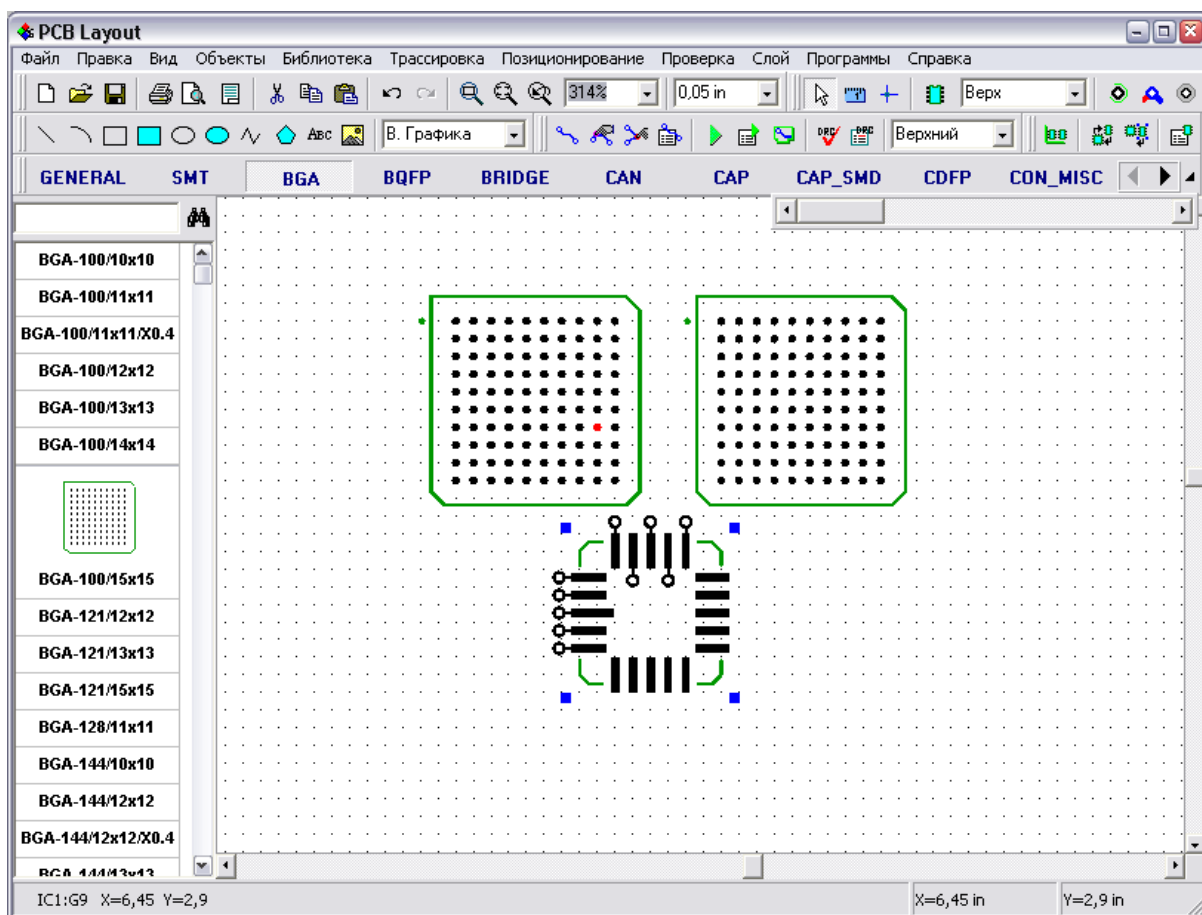
LLC

LLC

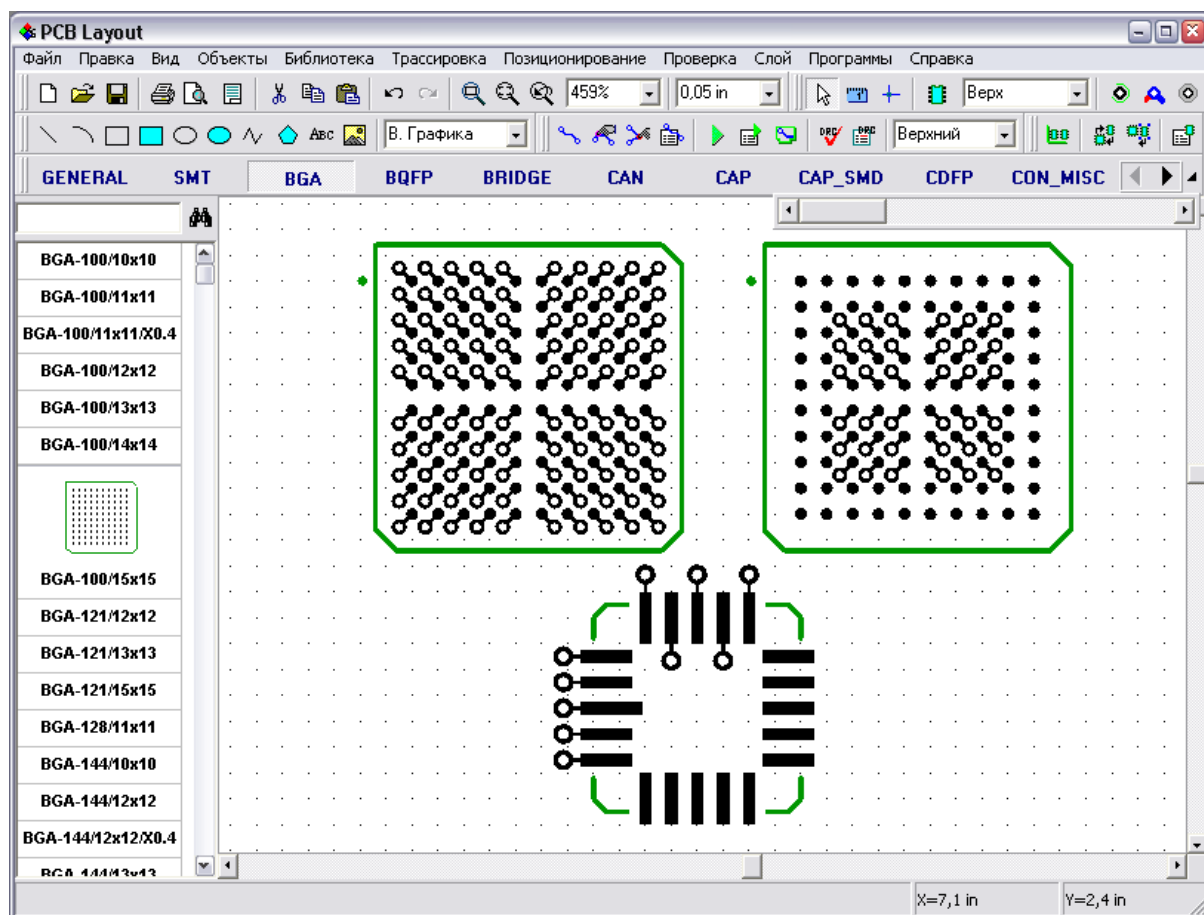
0.04 0.02 in  
OK.



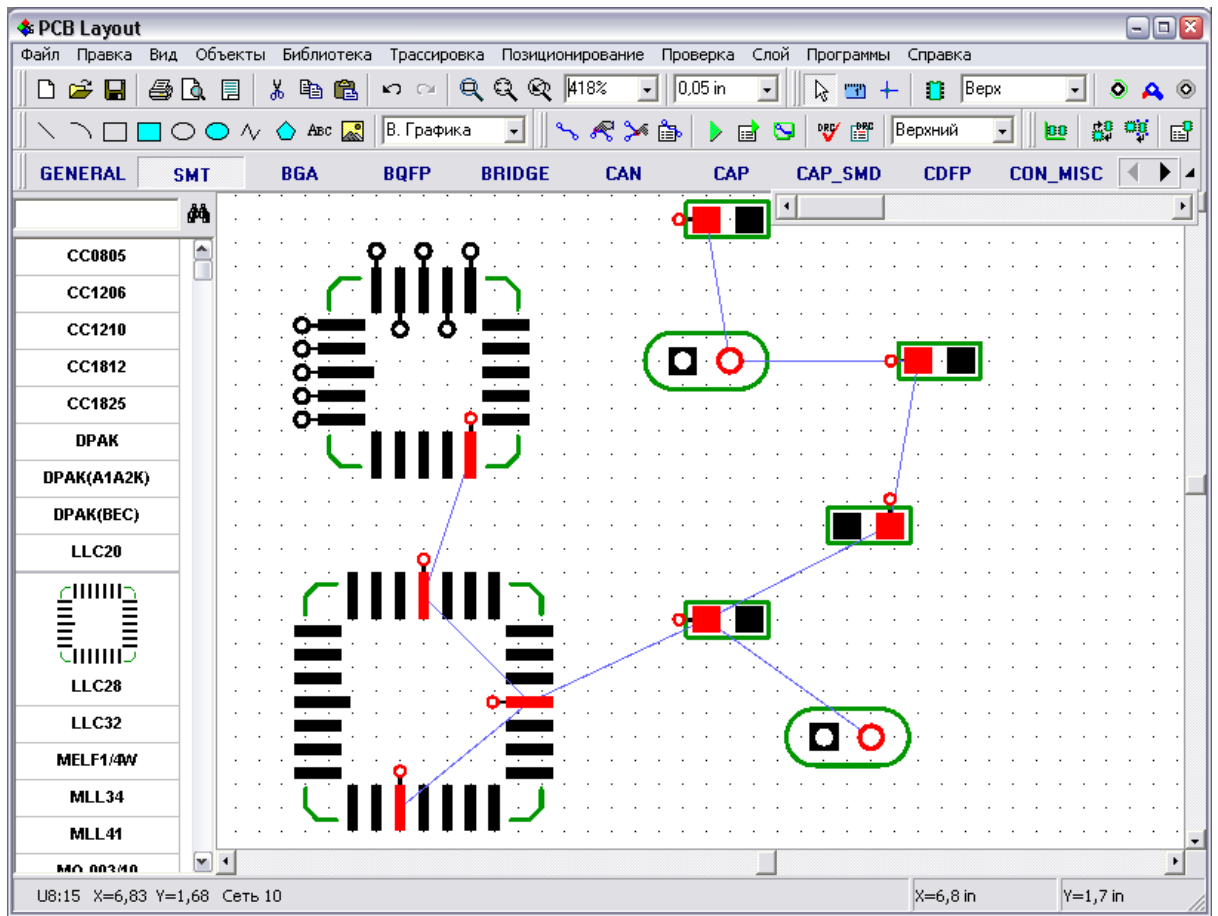
OK.



« BGA . BGA » -  
 : BGA — ,  
 0,03 in 0,15 in, OK.  
 , : BGA — .



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 SMD  
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 (,  
 GND,  
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 OK.  
 »



SMD

GND

## 4.11

DipTrace

( 2 ( DB15F).

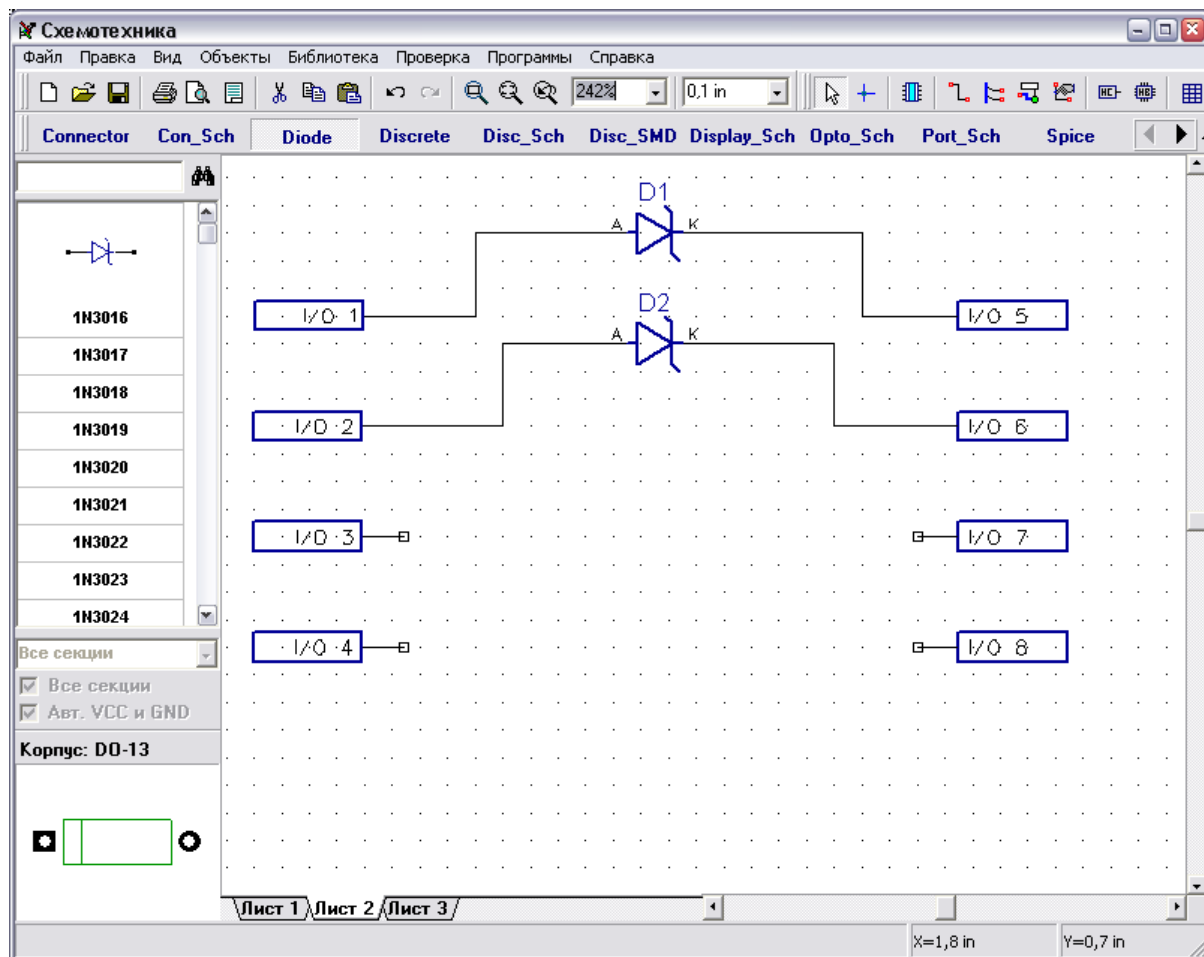
«HC».

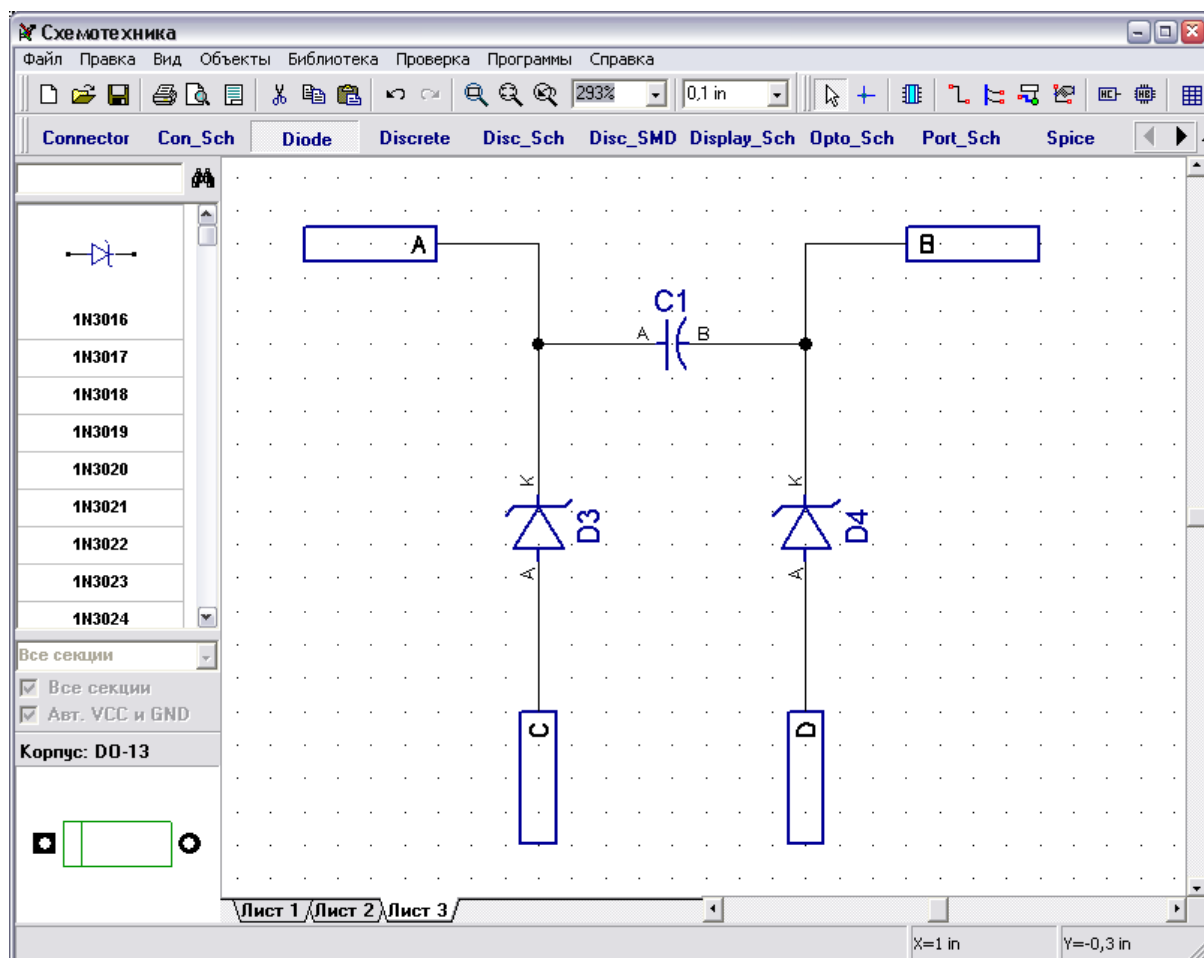
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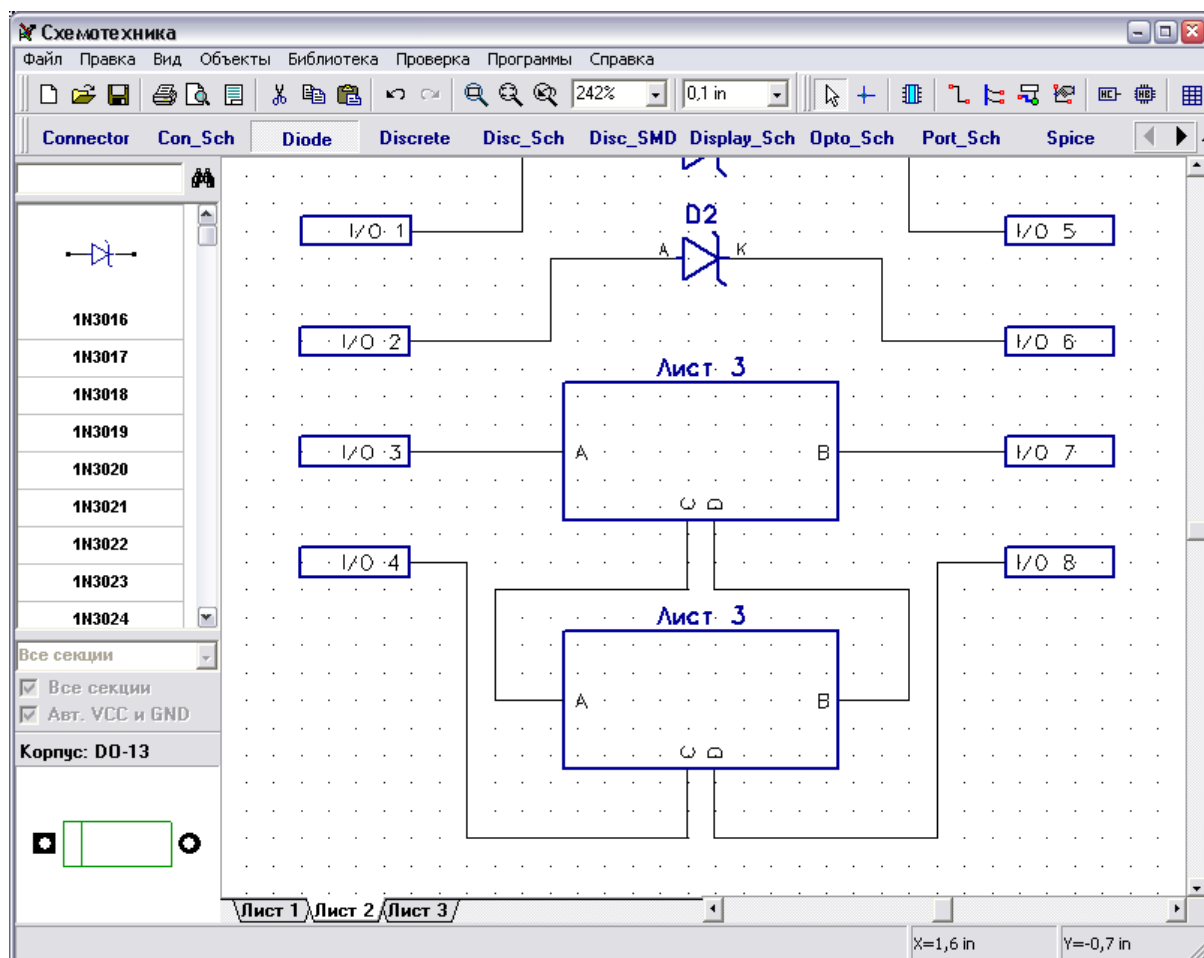
4





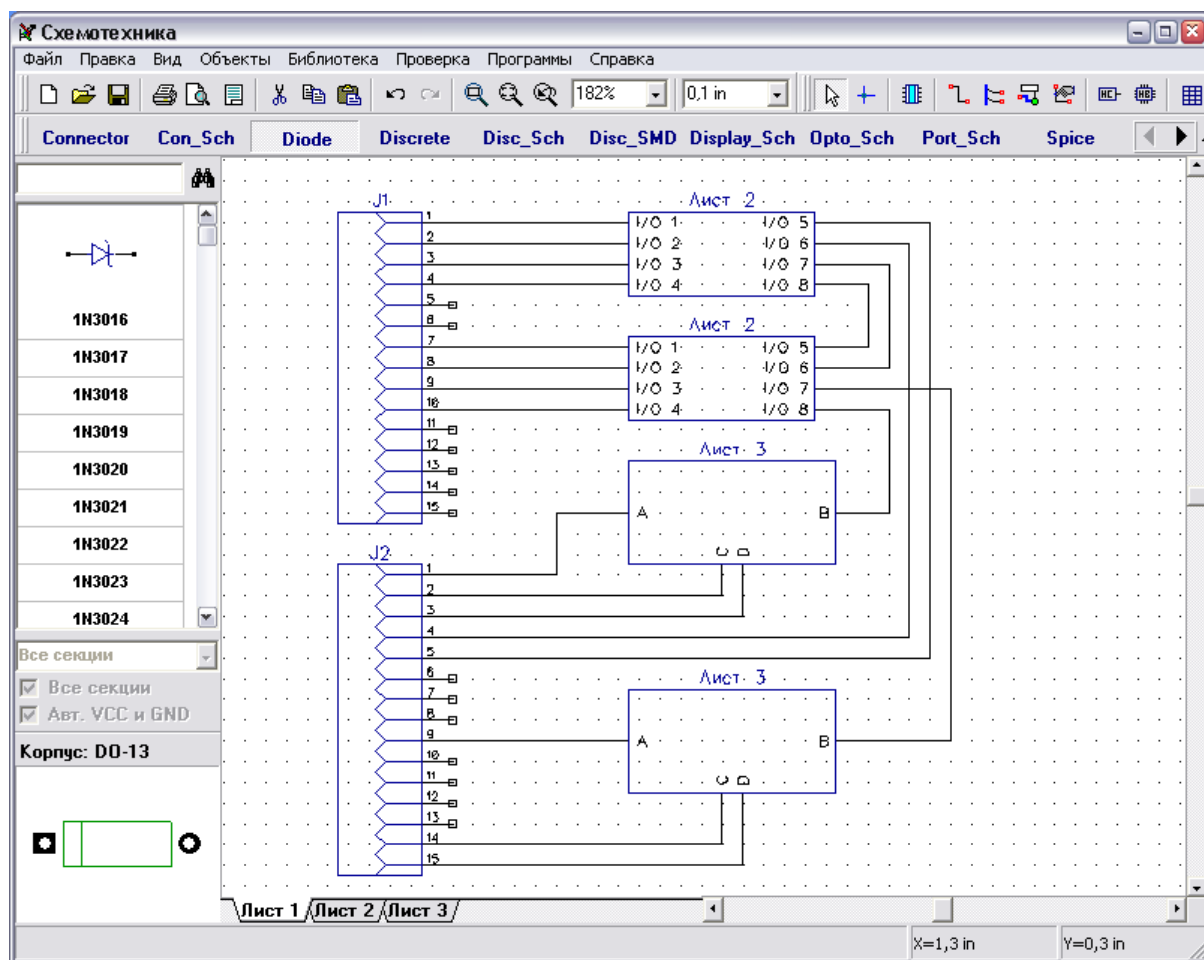
DipTrace

« / / » « 3 » « HB »  
 « 2 »  
 . PCB Layout  
 « 3 »



(  
).





PCB.

Ctrl+B. PCB

Layout

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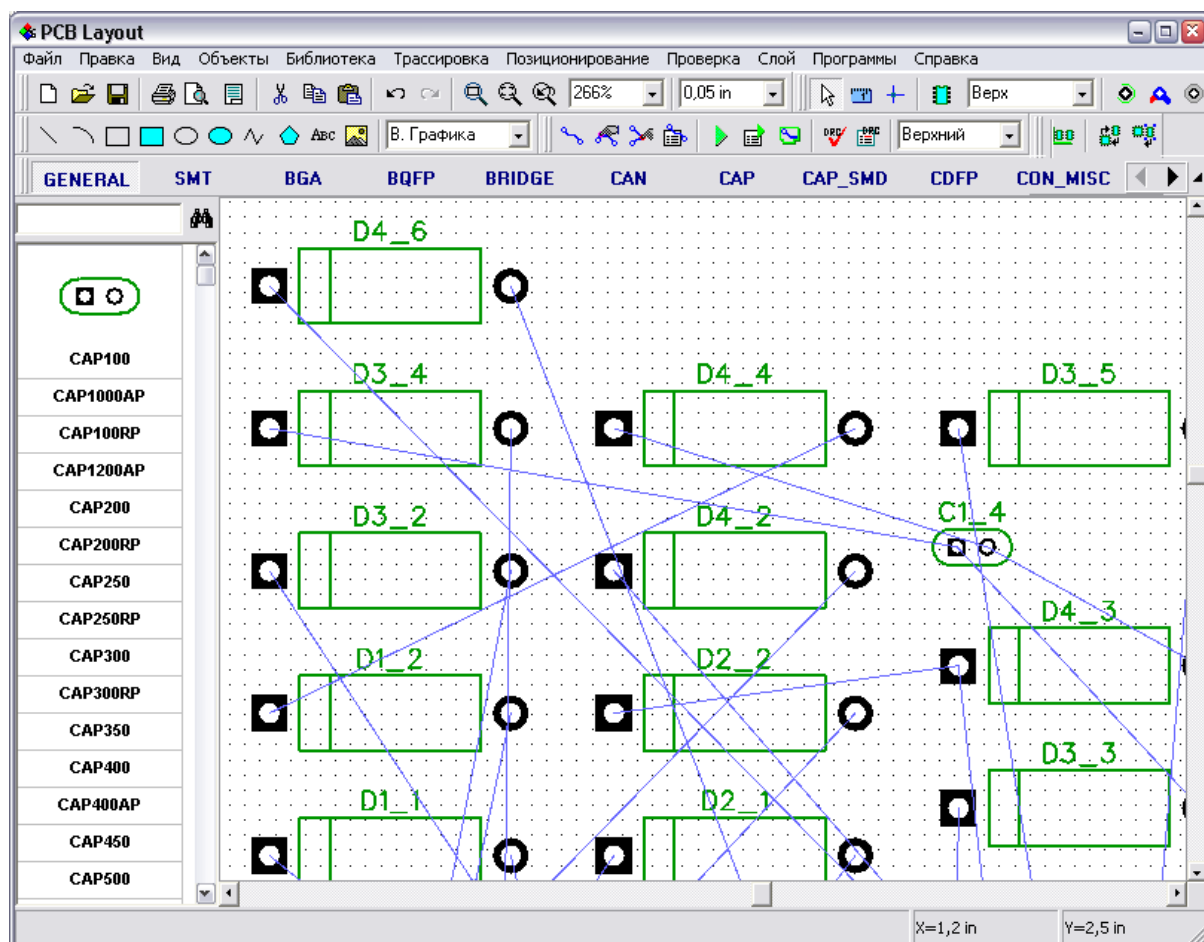
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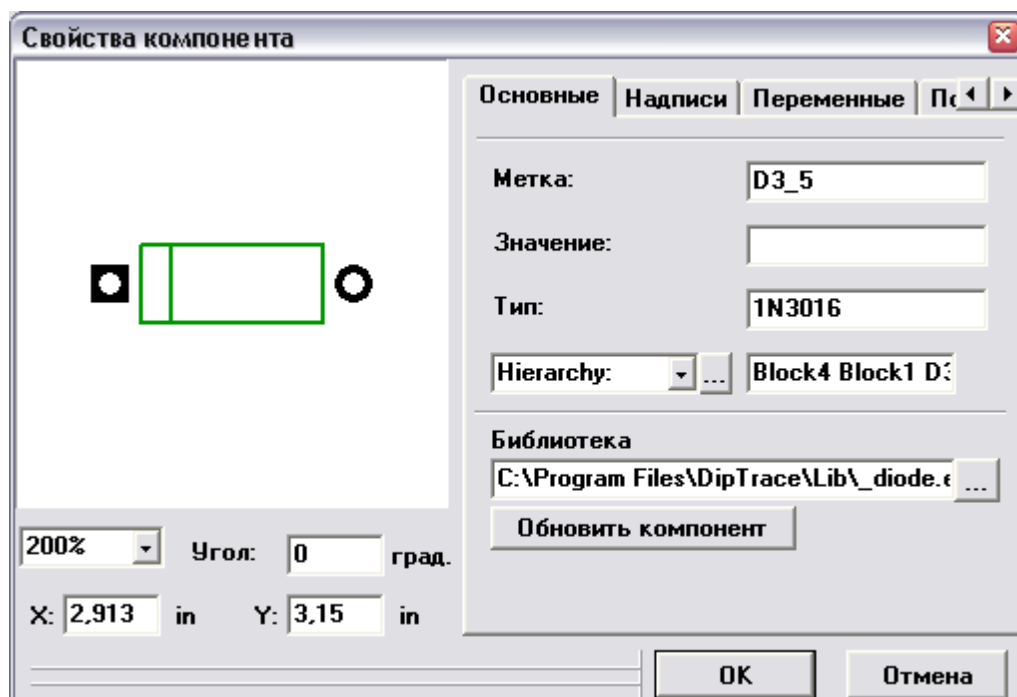
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« ».

PCB

ID



( / ) . .

## 5 DipTrace

[support@diptrace.com](mailto:support@diptrace.com)

DipTrace  
[yahoo.com/group/diptr](http://yahoo.com/group/diptr)

DipTrace,  
DipTrace Community at Yahoo!: <http://groups.>

[php](#)

DipTrace : <http://www.diptrace.com/download.>

(“ / ”)

DipTrace on-line : <http://www.diptrace.com/order.php>