Edition 5.0
Jan. 2000

Fujitsu PLL Frequency Synthesizer

Evaluation Tool (Version 5.0)

User's Manual

FUJITSU LIMITED

CONTENTS

CHAPTER 1. HARDWARE DESCRIPTION

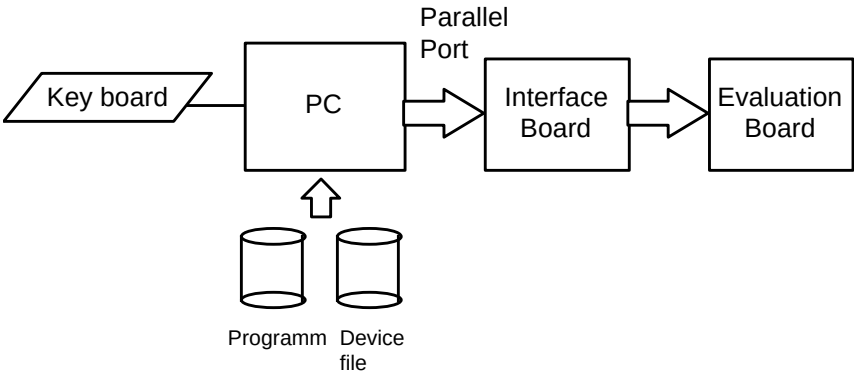
1.1. INTRODUCTION

This evaluation tool is designed to demonstrate the operation of the FUJITSU MB15xx series PLL frequency synthesizers. It will allow the user to investigate the operation capability of the IC and modify the loop parameters.

1.2. HARDWARE SETUP

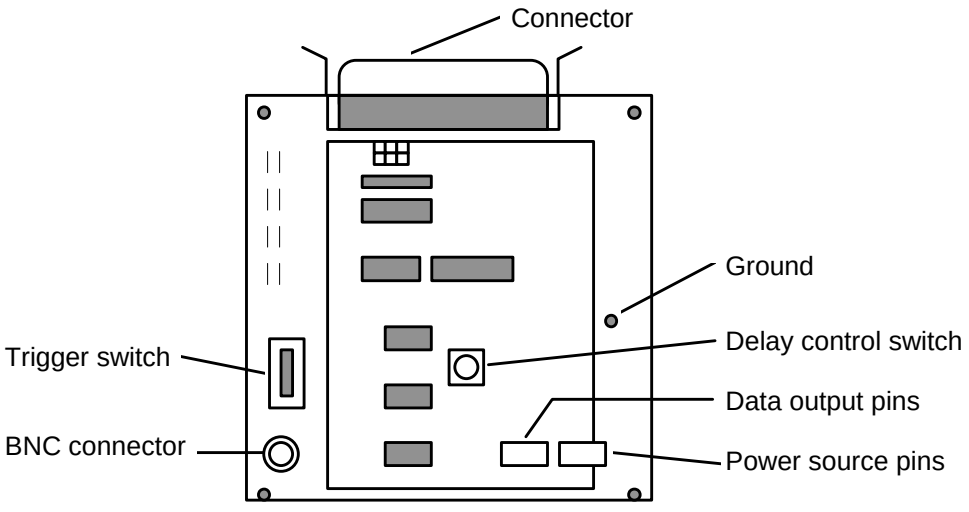
This programming tool enables you to control FUJITSU PLL frequency synthesizers via a personal computer. The personal computer is connected to the interface board via a parallel port. The programming software installed generates signals to the interface board. Then, the signals are converted into control signals and sent to an IC on the evaluation board.

Fig.1.1 Hardware constructure (image)



1.3. INTERFACE BOARD DESCRIPTION

Fig. 1.2 The interface board top view P/No. : MB1500EB00

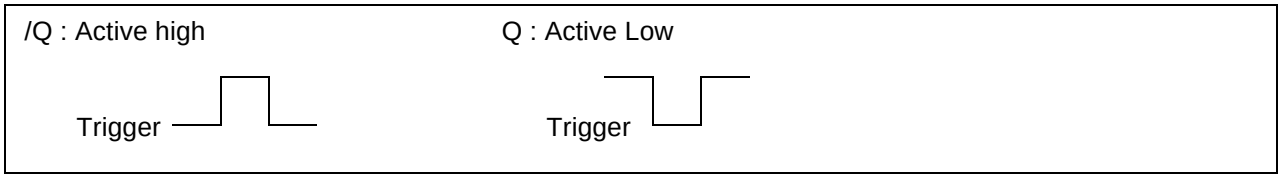


Connectors

The personal computer and the interface board is connected with a cable. The connector should have 25-pin[connector for the personal computer's printer port and 36-pin connector for the interface port.

Trigger Switch

Logical level of the trigger signal can be switched by the trigger switch.



BNC Connector

This connector should be connected to a time interval analyzer. A trigger signal is output through this connector.

Delay Control Switch

The delay time between the trigger signal and the last LE signal outputs can be adjusted by the delay control switch. Turning the white screw part, the delay time can be adjusted in the range from 5μs to 600μs.

Data Output Pin

Connect one side of the three wire (white, blue and yellow) connector to the data output pins on the interface board. The other side is connected to the data input pins on the evaluation board.

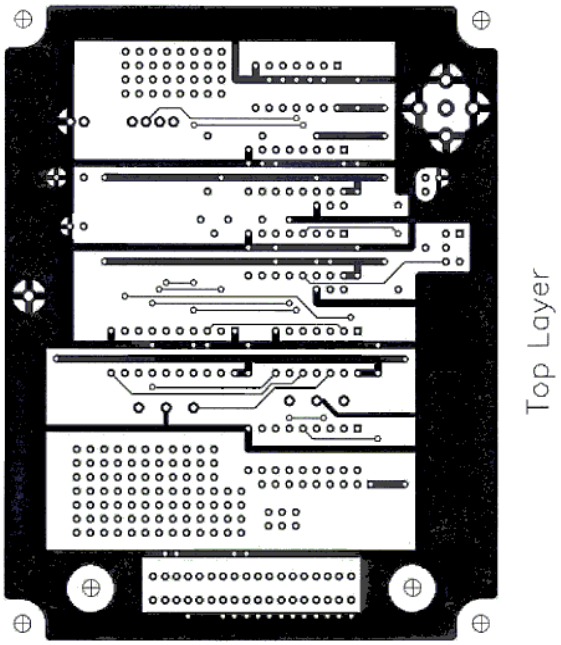
Power Source Pin

Connect two wire (red and black) connector to the power source pins, and the other side to ground and Vcc respectively. (Vcc = 3V to 5V (needs to be as same as supply voltage for the IC))

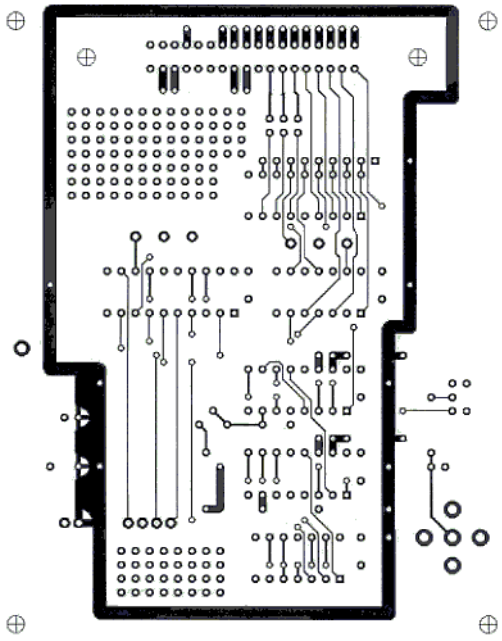
Ground

Connect to ground.

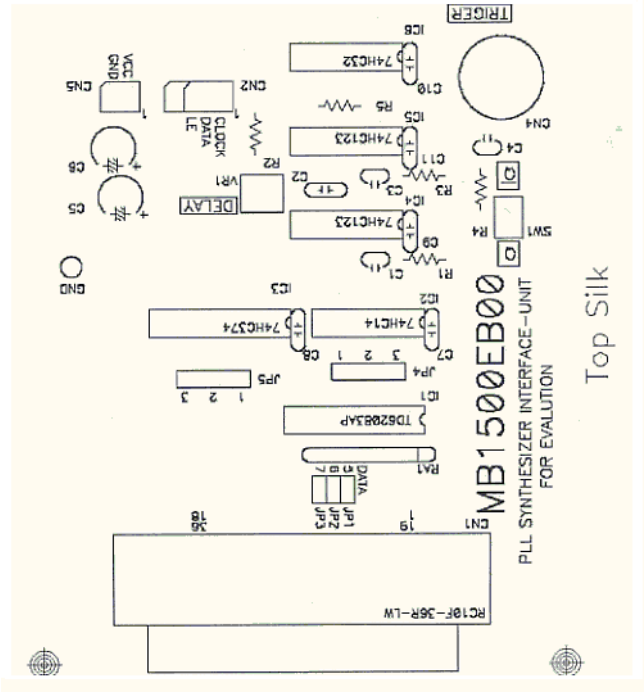
1.4.INTERFACE BOARD LAYOUT



Top Layer



Bottom Layer



CHAPTER 2. SOFTWARE DESCRIPTION

2.1. Windows95 VERSION

2.1.1. STANDARD SYNTHESIZERS (except for MB15E/FxxSL series)

2.1.1.1. INTRODUCTION

This program is designed to demonstrate the operation of the Fujitsu PLL frequency synthesizers. It will allow the user to investigate the operation capability of the IC and modify the loop parameters.

2.1.1.2. USED ENVERNOMENT

OS: Windows95

2.1.1.3. CONTENTS

FiPLL.exe : Execution file to evaluate PLL series.

fjPLL.ini : Initialization file

fjpll.vxd : Virtual device driver

Applied device

MB15E03, MB15E03L, MB15E05, MB15E05L, MB15E06, MB15E07, MB15E07L, MB1516A, MB1517A, MB15A01, MB15A02, MB15A16, MB15A17, MB15F02, MB15F02L, MB15F03, MB15F03L, MB15F04. MB15F05, MB15F05L, MB15B03, MB15U10, MB1551, MB15C03, MB15C03, MB15U32

(The device file has to be housed in the directory "LIB" that locates under the same directory as FjPLL.exe does. Do not change a name of the directory "LIB".)

Only the device file for MB15U10, name its suffix as DT2.

Name suffix for other device files as DT1.

2.1.1.4. SET UP

This programming tool consists of an interface board, a RF evaluation board and programming software.

1.Connect a parallel cable from the interface board to a printer port of a personal computer.

2.Connect the data input wire (three-wire; blue, yellow and white) from the interface board to

the Data, Clock and LE pins on the evaluation board. (Refer to CHAPTER 1.)

3.Insert the floppy disk into the floppy disk drive on the personal computer.

4.Change a disk drive from the current drive to the floppy disk drive.

2.1.1.5. HOW TO USE THE PROGRAM

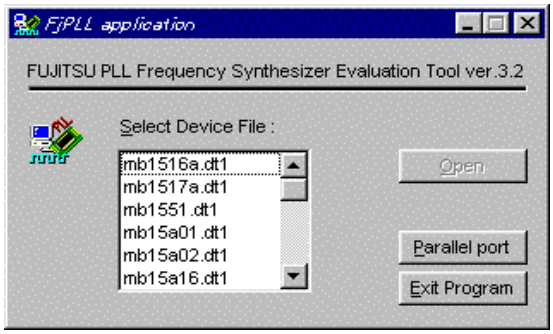
2.1.1.5.1. STARTING THE PROGRAM

Double clicking the FjPLL.exe on the windows explorer, and run the program. When you run the program using a floppy disk, please release a protector of the floppy disk. If a write protect is valid, the following message is appeared and the program does not run.

2.1.1.5.2. SETTING THE TEST CONDITIONS

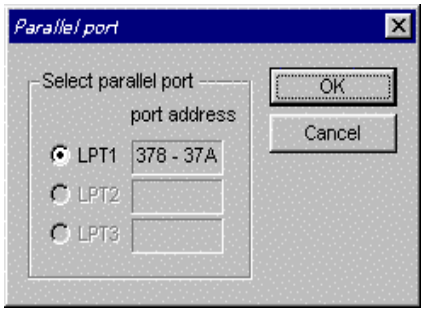
The following window is opened on executing the FjPLL.exe.

1. Clicking exit program button, this program is quit.



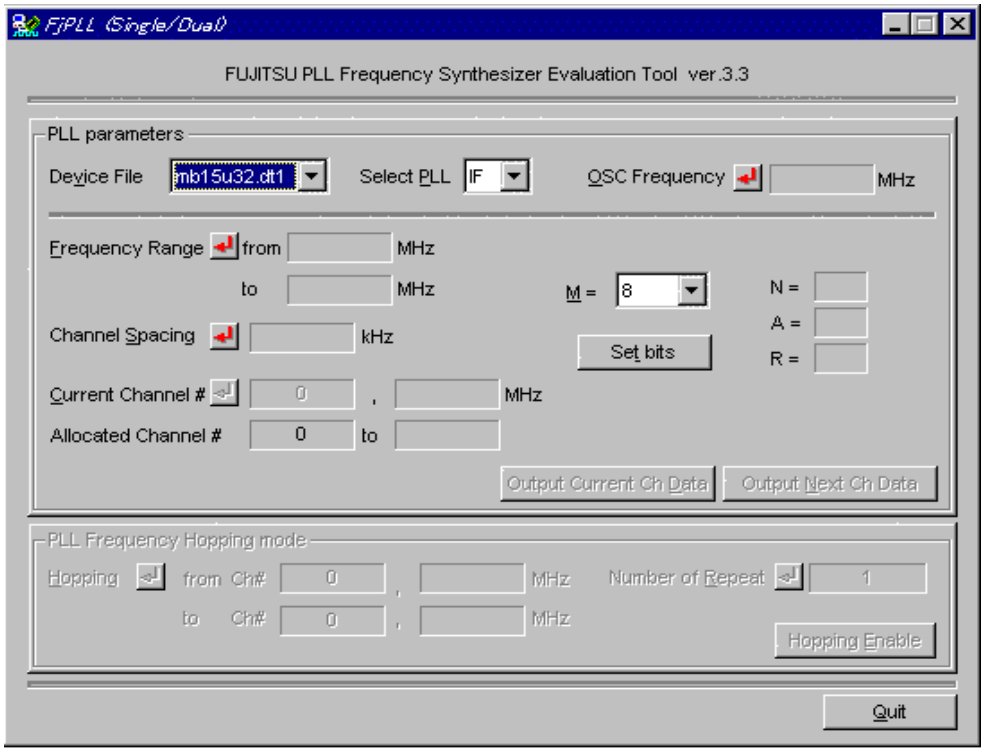
2. Click the parallel port button and select a used port.

As is indicated below, you can select only valid parallel port.



3. Select the device file and then click the button "OPEN".

The below shown parameter setting dialog window is opened. An usable parameter is different by the device file. Set each parameter.



Only for a programmable parameter, button becomes valid. Click each value. button and input data. If any of the parameter is not filled in, you can not go to the next step.

FjPLL dialog Parameter setting

OSC Frequency input : ALT + O
* Input a positive value

Frequency Range input : ALT + F
* The value in the column "From" must be a positive number and less than that in the column "To".

Channel Spacing input : ALT + S
* Input a positive value.

Current Channel input : ALT + C
* Input an integer(0 or more)

Hopping Channel input : ALT + H
* The value in the column "From CH#" must be an integer(0 more) and less than the value in the column "To CH#".

Number of repeat input : ALT + E
* Input an integer(1 or more)

Note : As regards "Frequency Range" value,
in the case that the display of data and real data differ, please confirm the value.
The value be inputed in conformity with the calculation "[(MxN)+A] x fr(channel spacing)".

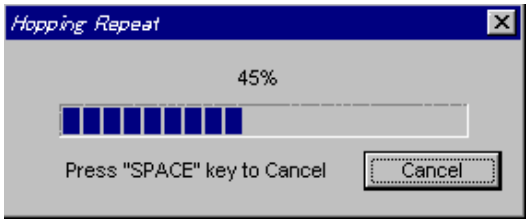
2.1.1.5.3. MEASUREMENT

After test conditions are entered, the measurement can be done by sending the serial data to the testing sample via the interface board.

Hopping enable progress -- ALT + E

Hopping is repeated at designated time by "Number of repeat"

It can be cancelled using a space key.



Click the button "Output current Ch Data", then the value of the present channel is automatically calculated and output through the port. Click the button "Output Next Ch Data", then the value of the next channel is automatically calculated and output through the port.

In the both cases, serial data and an trigger is output.

If the calculation is failed, the PLL Frequency Hopping mode can not be selected. Set parameters correctly.

2.1.1.5.4. OHTERS

When any of OSC Frequency, Frequency Range and Channel Spacing is changed, the PLL Frequency Hopping mode can not be selected. In that case, click the button "Output Current Ch Data".

There is not a function to save the set data.

Certainly house the device files in the LIB directory that locates in the same directory as FjPLL.exe.

Do not change the name of LIB directory.

Only the device file for MB15U10, name its suffix as DT2. Name suffix for other device files as DT1.

Apply DOS 8.3 type for the name of the device file.

2.1.2. STANDARD SYNTHESIZERS (MB15E/FxxSL/F7xSP series)

2.1.2.1. INTRODUCTION

This program is designed to demonstrate the operation of PLL(MB15E/FxxSL series). It will allow the user to investigate the operation capability of the IC and modify the loop parameters.

2.1.2.2. USED ENVERNOMENT

OS: Windows95

2.1.2.3. CONTENTS

FiPLL.exe : Execution file to evaluate PLL series.
MB15ExxSL series -- version. 3.4.1
MB15FxxSL,F7xSP series -- version 3.3.2

fjPLL.ini : Initialization file

fjpll.vxd : Virtual device driver

Applied device

Version 3.4.1 -- MB15E03SL, MB15E05SL, MB15E07SL,

Version 3.3.2 -- MB15F02SL, MB15F03SL, MB15F07SL, MB15F08SL

(The device file has to be housed in the directory "LIB" that locates under the same directory as FjPLL.exe does. Do not change a name of the directory "LIB".).

2.1.2.4. SET UP

This programming tool consists of an interface board, a RF evaluation board and programming software.

1.Connect a parallel cable from the interface board to a printer port of a personal computer.

2.Connect the data input wire (three-wire; blue, yellow and white) from the interface board to

the Data, Clock and LE pins on the evaluation board. (Refer to CHAPTER 1.)

3.Insert the floppy disk into the floppy disk drive on the personal computer.
4.Change a disk drive from the current drive to the floppy disk drive

2.1.2.4. HOW TO USE THE PROGRAM

It conforms to chapter 2.1.1.5.

The bit configuration differs from MB15E/Fxx and MB15E/FxxL series.

3.EVALUATION BOARD DESCRIPTION

3.1. OVERVIEW

Some synthesizers are pin compatible or similar pin assignment, so that an evaluation board is used for several PLLs. The below table shows PLL part number and corresponding evaluation board numbers.

Table.1 P/No. of synthesizers and corresponding Evaluation board.

Part No	PKG type	Eval. board No.	Part No.	PKG type	Eval. board No.
MB15Axx series			**MB15Fxx series**		
MB15A01/ A02/A03	SSOP-16	MB1500EB01	MB15F02/ F02L/F02SL	SSOP-16	MB1500EB13
MB1516A	SSOP-16	MB1500EB01		Bump Chip Carrier-16	MB1500EB13B
MB15A16	SSOP-16	MB1500EB01	MB15F03/ F03L/F03SL	SSOP-16	MB1500EB13
MB1517A	SSOP-16	MB1500EB01		Bump Chip Carrier-16	MB1500EB13B
MB15A17	SSOP-16	MB1500EB01	MB15F06	SSOP-16	MB1500EB13
MB15Bxx series			MB15F07SL	SSOP-16	MB1500EB13
MB15B01	SSOP-20	MB1500EB11		Bump Chip Carrier-16	MB1500EB13B
MB15B03	SSOP-16	MB1500EB13	MB15F08SL	SSOP-16	MB1500EB13
MB15B11/ B13	SSOP-20	MB1500EB11		Bump Chip Carrier-16	MB1500EB13B
MB15Exx series			**MB15Uxx series**		
MB15E03/ E03L/E03SL	SSOP-16	MB1500EB01	MB15U10	SSOP-20	MB1500EB12
	Bump Chip Carrier-16	MB1500EB01B	MB15U32	SSOP-20	MB1500EB14
MB15E05/ E05L/E05SL	SSOP-16	MB1500EB01	**MB15Cxxx series**		
	Bump Chip Carrier-16	MB1500EB01B	MB15C101	SSOP-8	MB1500EB02
MB15E06	SSOP-16	MB1500EB01		Bump Chip Carrier-16	MB1500EB02B
MB15E07/ E07L/E07SL	SSOP-16	MB1500EB01	MB15C103	SSOP-8	MB1500EB02
	Bump Chip Carrier-16	MB1500EB01B		Bump Chip Carrier-16	MB1500EB02B
MB15F7xSP series					
MB15F72SP /F73SP/ F78SP	TSSOP-20	MB1500EB16			
	Bump Chip Carrier-20	MB1500EB16B			

There are some components attached on a board. They are used for every synthesizers in common, and not so much influence to loop characteristics (except for low pass filter components.) Accordingly, additional components such as VCO, a reference oscillator, optimized loop filter etc. should be properly arranged by customers according to application.

3.2. EVALUATION BOARD DESCRIPTION
3.2.1 MB1500EB01

Fig.3.1 MB1500EB01 circuit image

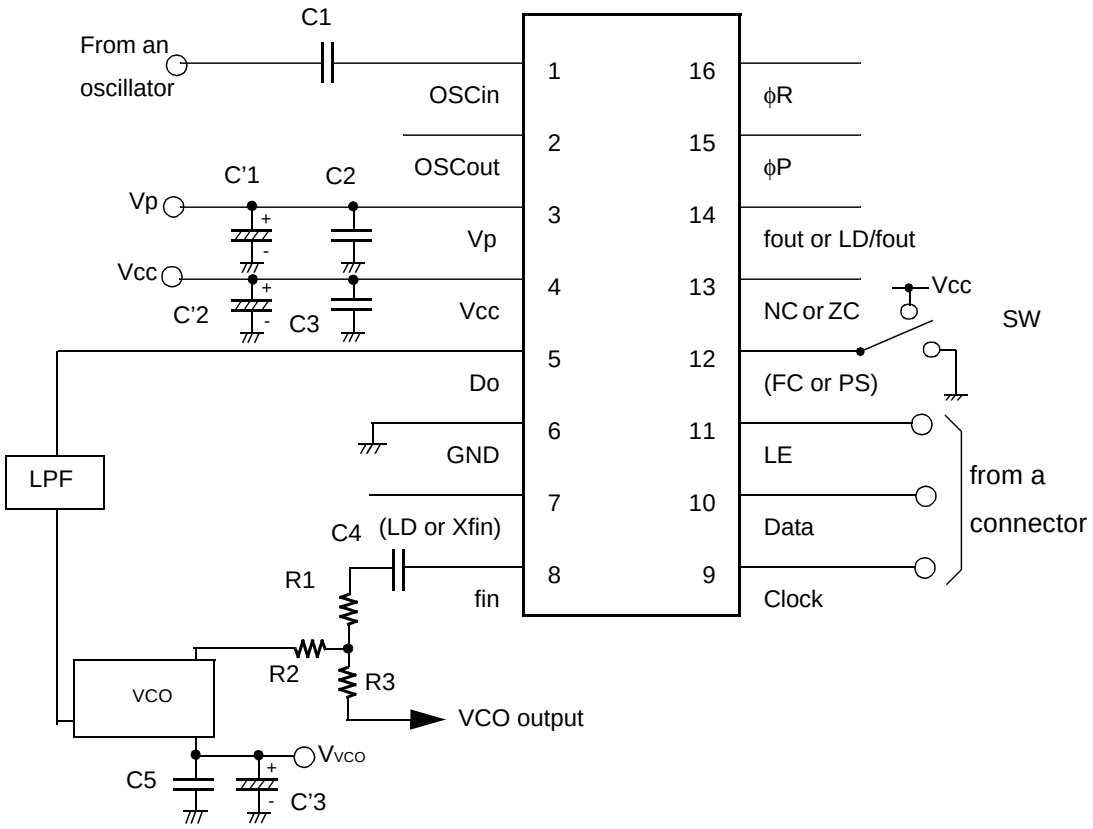
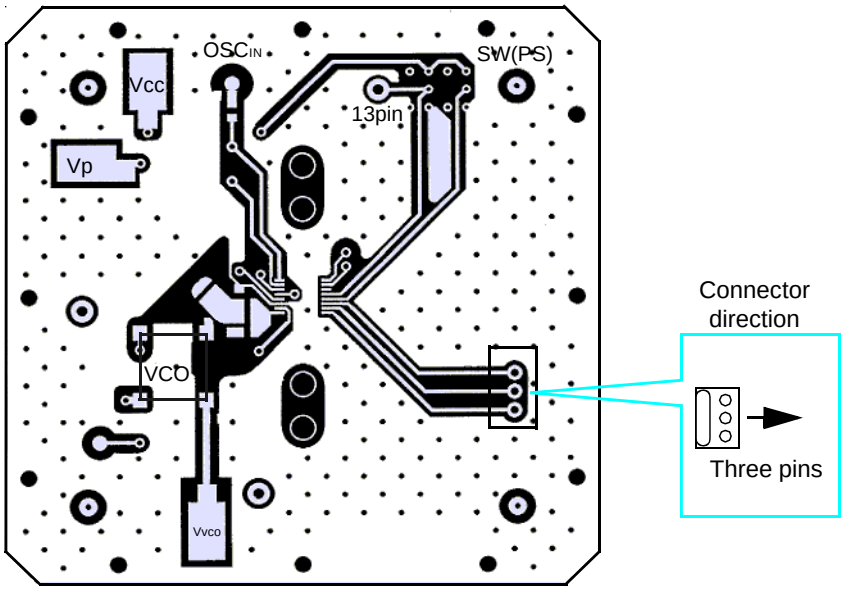


Table.2 Components list on the evaluation board

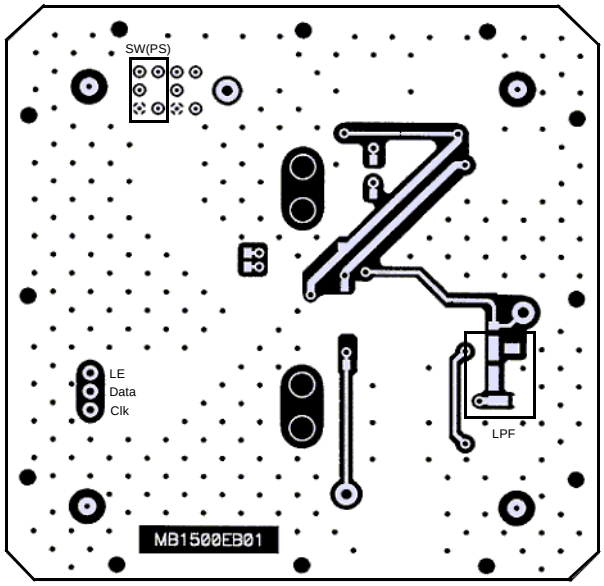
No.	Symbol	Value	No.	Symbol	Value
1	C1	1000pF	9	R1	18Ω
2	C2	0.1μF	10	R2	18Ω
3	C3	0.1μF	11	R3	18Ω
4	C4	1000pF	12		
5	C5	0.1μF	13		
6	C'1	10μF	14		
7	C'2	10μF	15		
8	C'3	10μF	16		

Fig.3.2 MB1500EB01 board layout

(Top view)



(Bottom view)



3.2.2 MB1500EB01B

Fig.3.3 MB1500EB01B circuit image

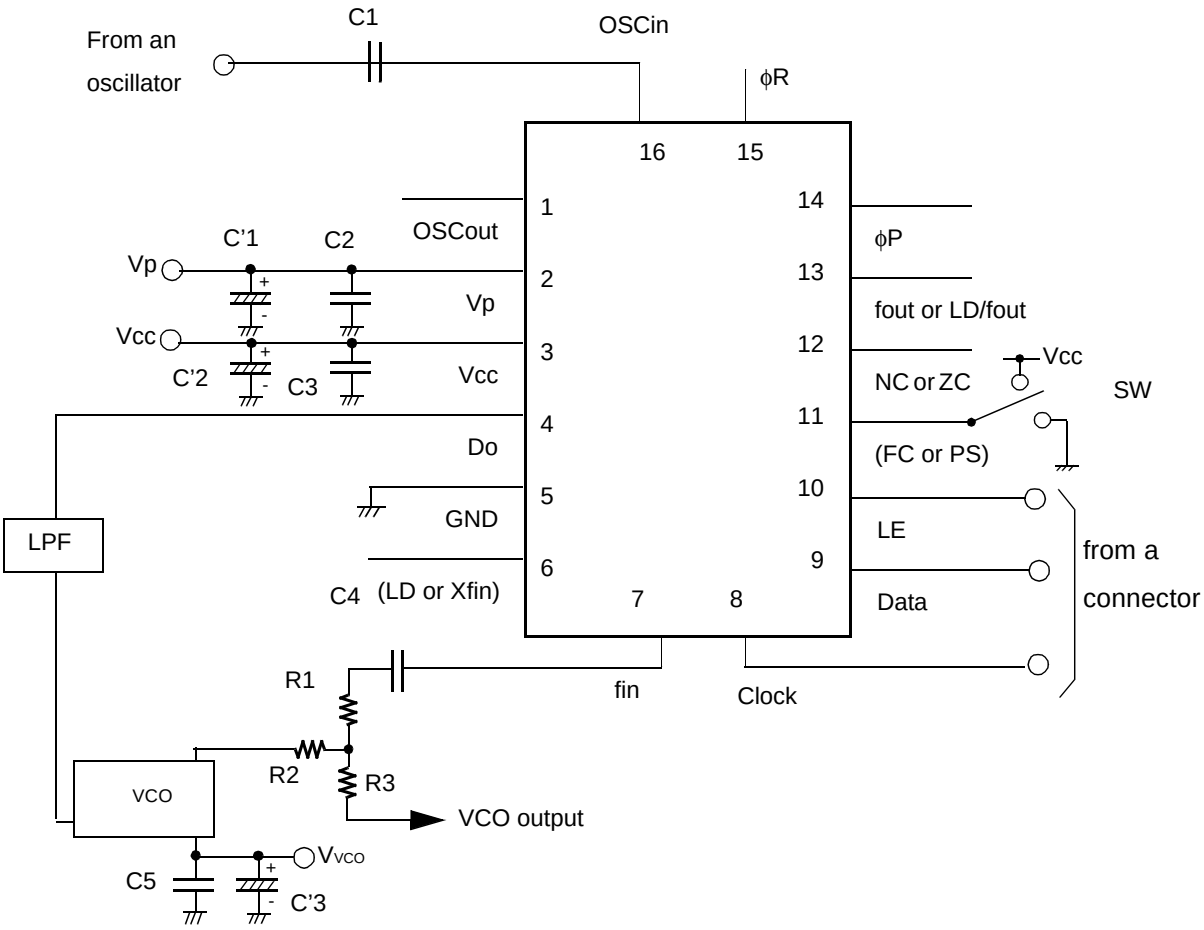
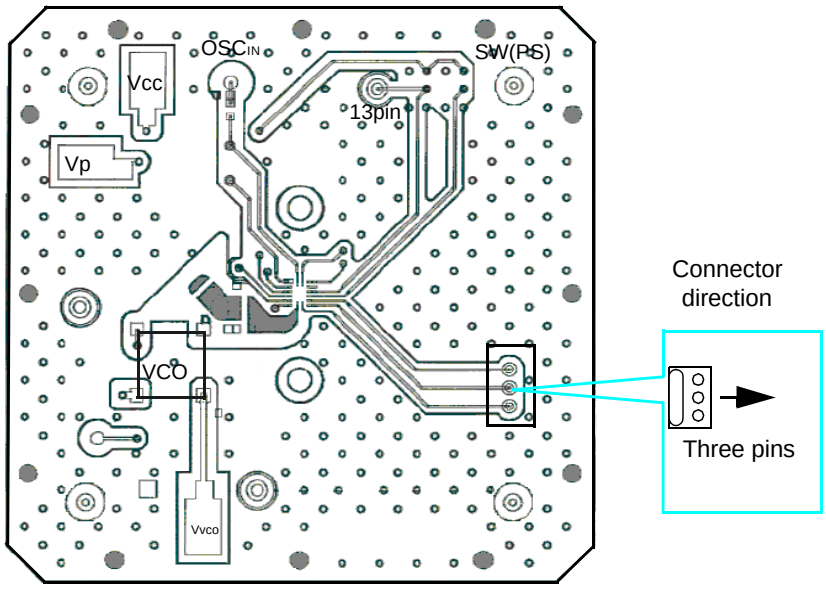


Table.2 Components list on the evaluation board

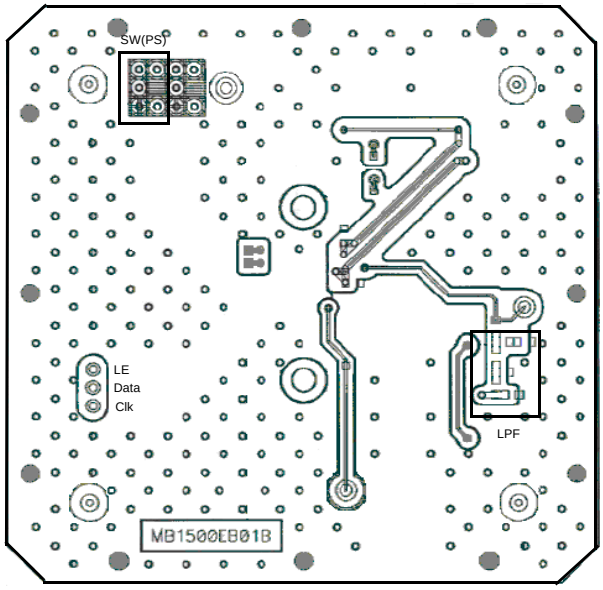
No.	Symbol	Value	No.	Symbol	Value
1	C1	1000pF	9	R1	18Ω
2	C2	0.1μF	10	R2	18Ω
3	C3	0.1μF	11	R3	18Ω
4	C4	1000pF	12		
5	C5	0.1μF	13		
6	C'1	10μF	14		
7	C'2	10μF	15		
8	C'3	10μF	16		

Fig.3.4 MB1500EB01B board layout

(Top view)



(Bottom view)



3.2.3 MB1500EB02

Fig.3.5 MB1500EB02 circuit image

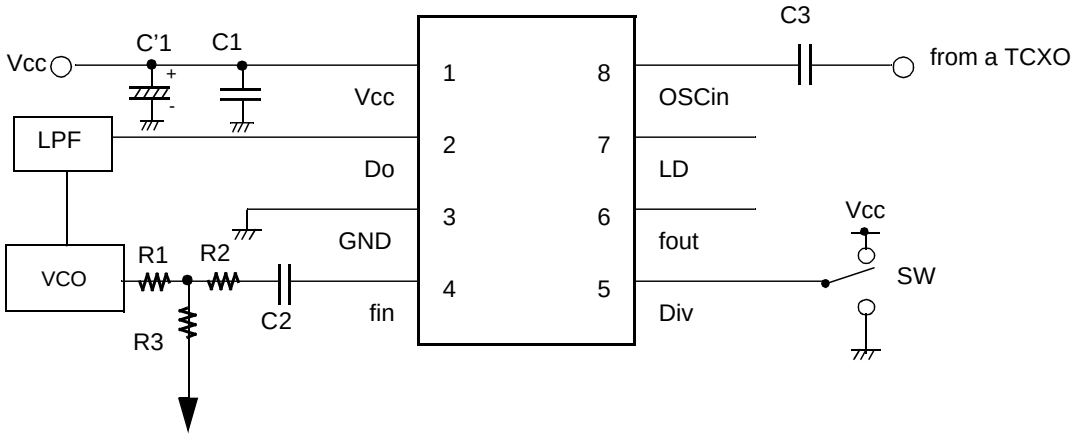
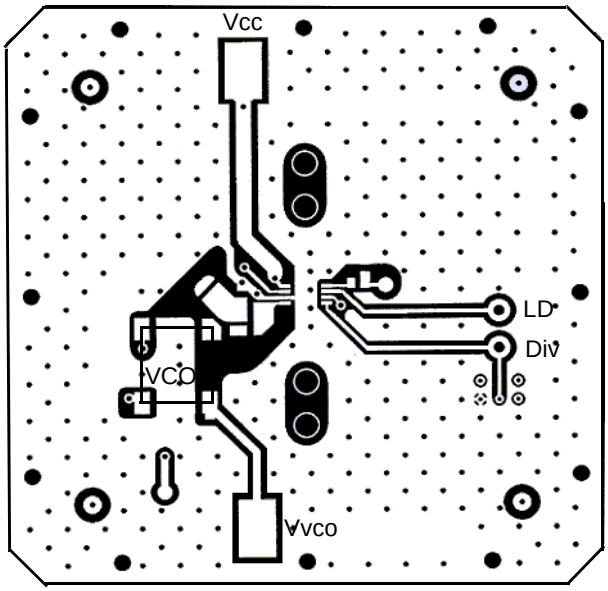


Table.3 Components list on the evaluation board

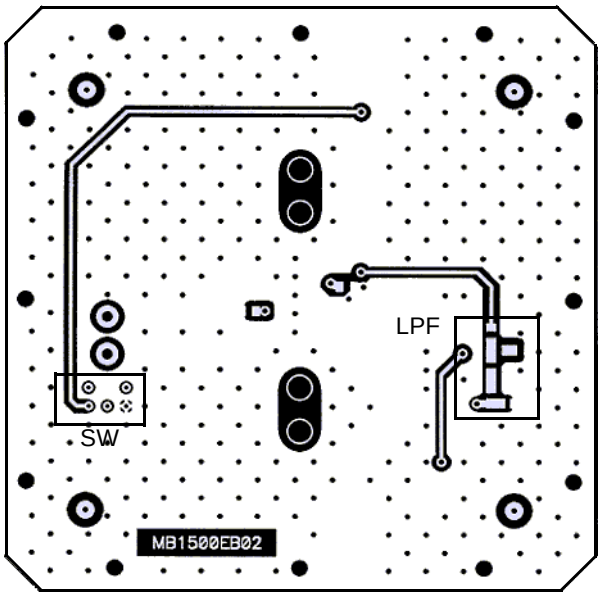
No.	Symbol	Value	No.	Symbol	Value
1	C1	0.1μF	5	R1	18Ω
2	C2	1000pF	6	R2	18Ω
3	C3	1000pF	7	R3	18Ω
4	C'1	10μF			

Fig.3.6 MB1500EB02 board layout

(Top view)



(Bottom view)



3.2.4 MB1500EB11

Fig.3.7 MB1500EB11 circuit image

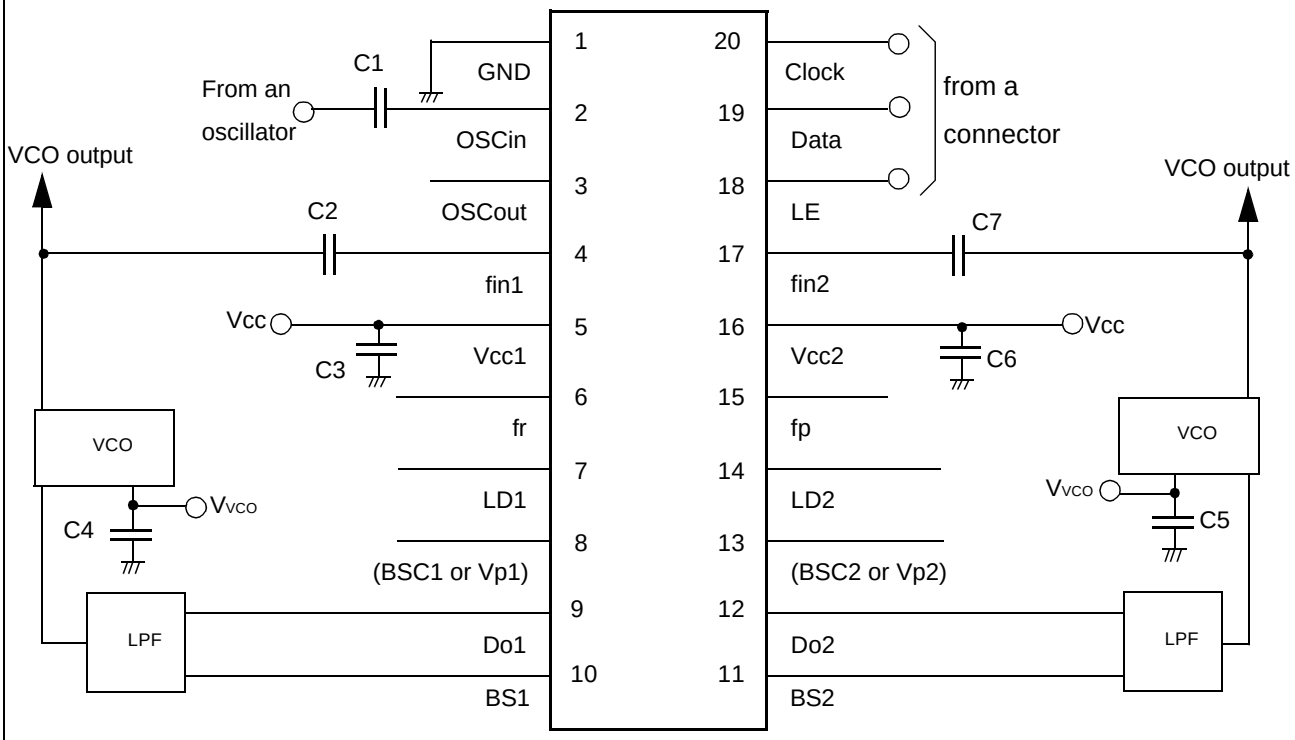
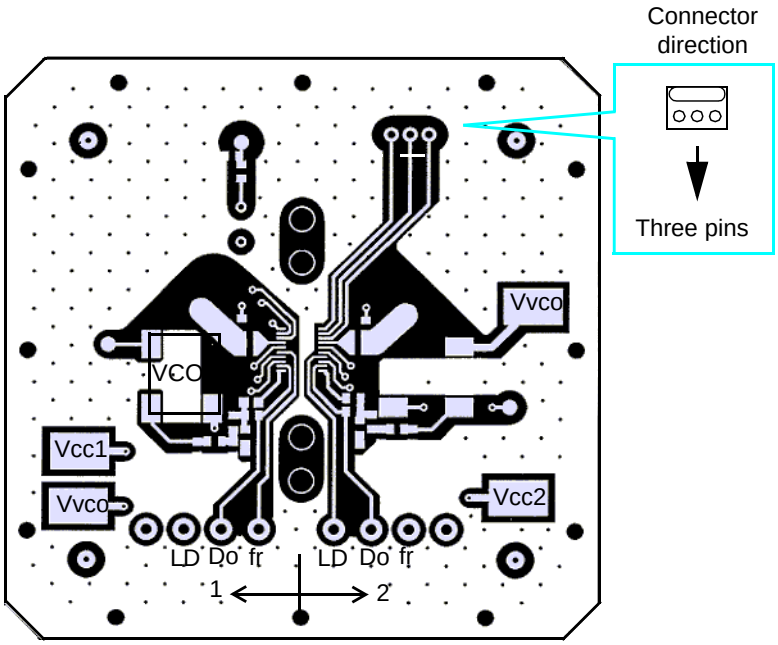


Table.4 Components list on the evaluation board

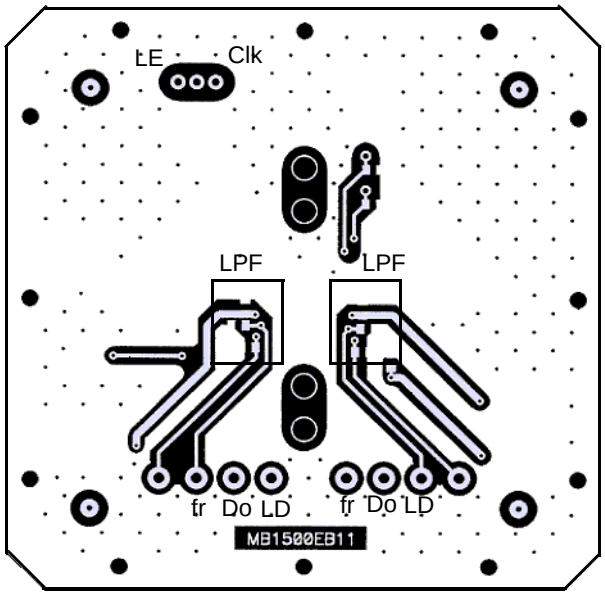
No.	Symbol	Value	No.	Symbol	Value
1	C1	1000pF			
2	C2	1000pF			
3	C3	0.1µF			
4	C4	0.1µF			
5	C5	0.1µF			
6	C6	0.1µF			
7	C7	1000pF			

Fig.3.8 MB1500EB11 board layout

(Top view)



(Bottom view)



3.2.5 MB1500EB12

Fig.3.9 circuit image

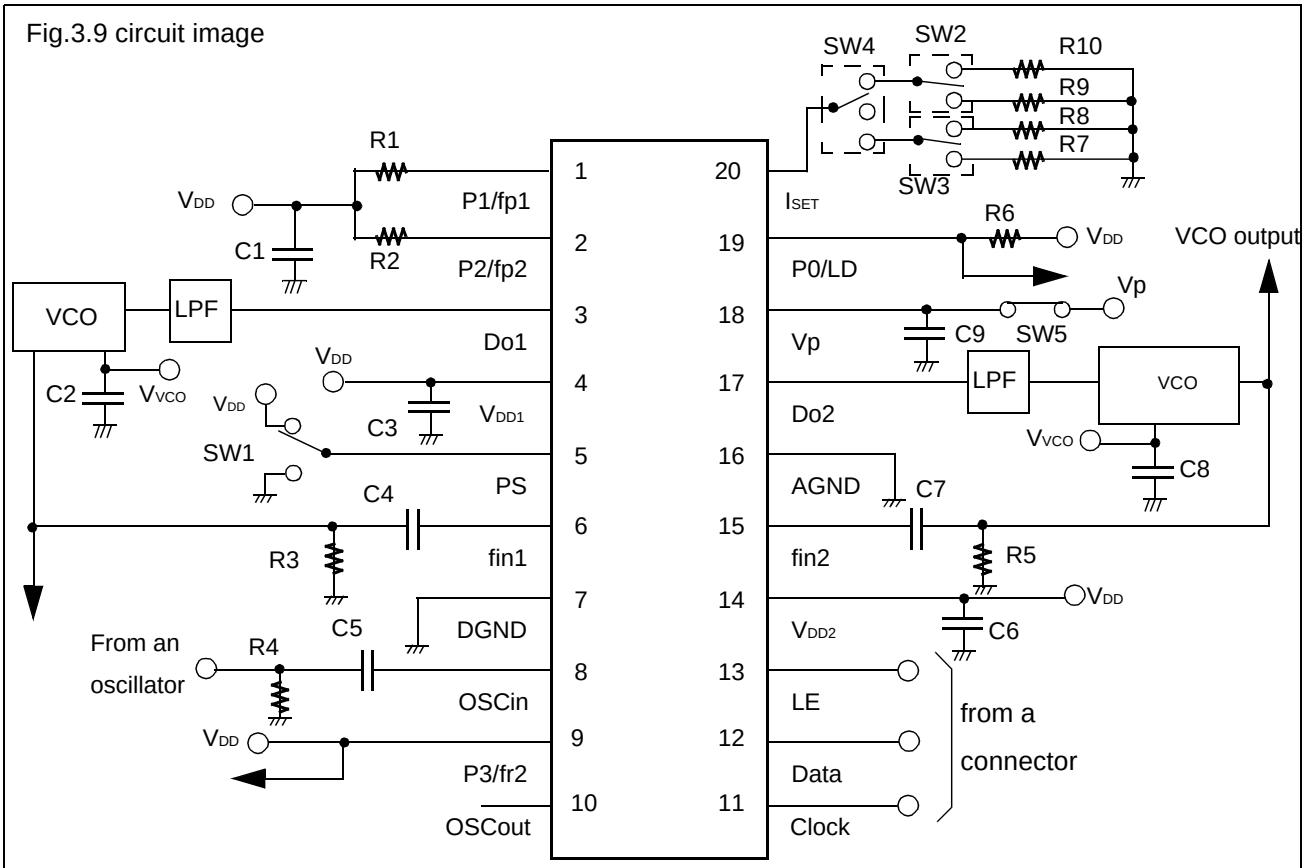
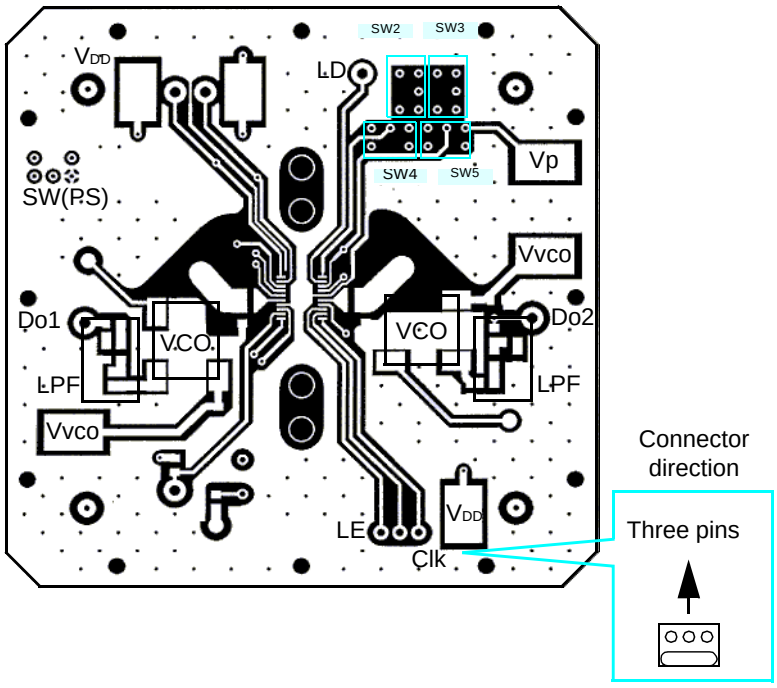


Table.5 Components list on the evaluation board

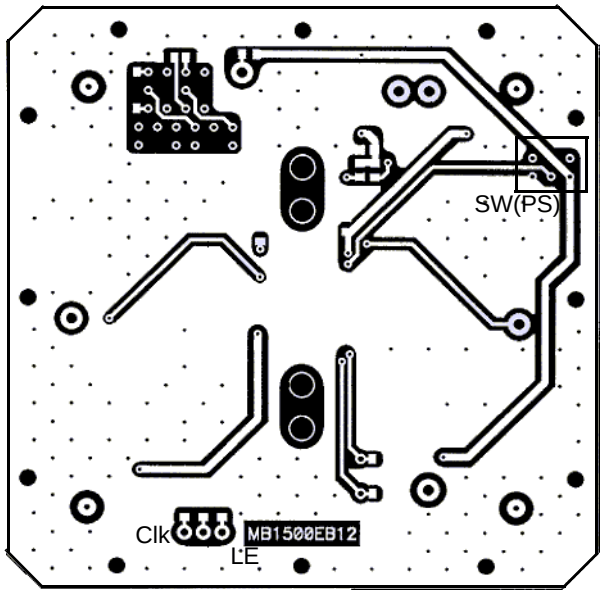
No.	Symbol	Value	No.	Symbol	Value
1	C1	0.1µF	11	R2	2.2kΩ
2	C2	0.1µF	12	R3	51Ω
3	C3	0.1µF	13	R4	51Ω
4	C4	1000pF	14	R5	51Ω
5	C5	1000pF	15	R6	2.2kΩ
6	C6	0.1µF	16	R7	62kΩ
7	C7	1000pF	17	R8	15kΩ
8	C8	0.1µF	18	R9	12kΩ
9	C9	0.1µF	19	R10	5.1kΩ
10	R1	2.2kΩ			

Fig.3.10 MB1500EB12 board layout

(Top view)



(Bottom view)



3.2.6 MB1500EB13

Fig.3.11 MB1500EB13 circuit image

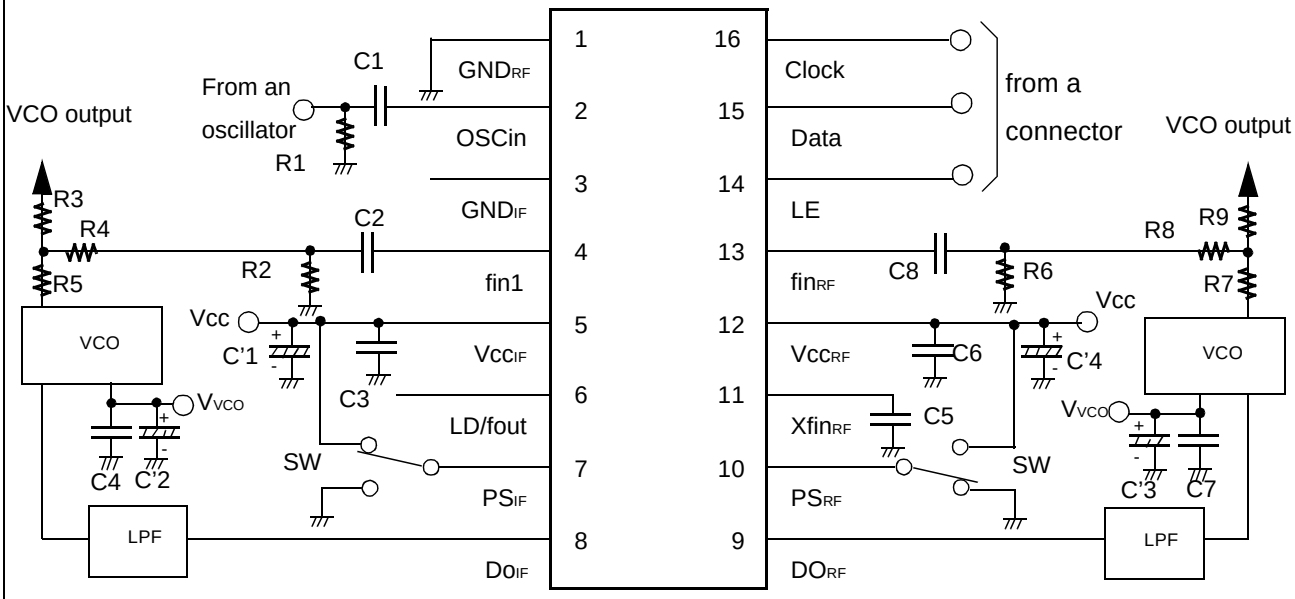
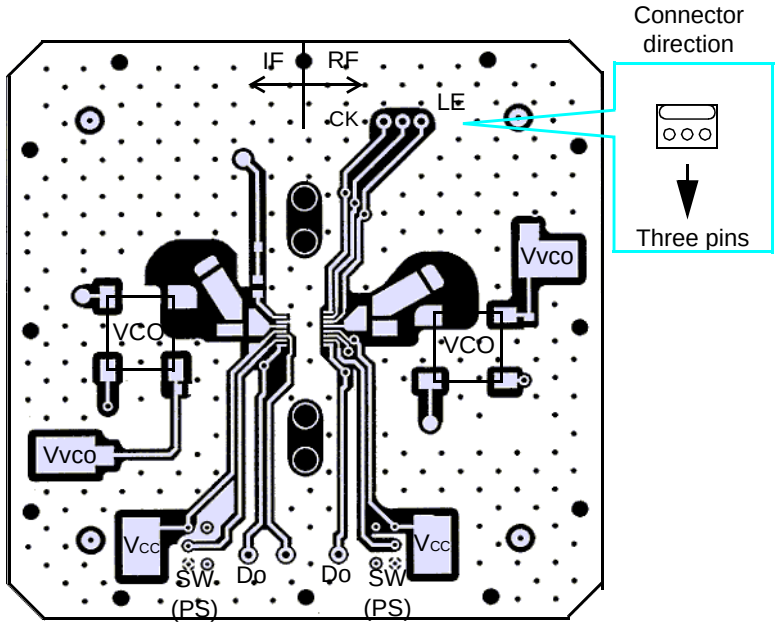


Table.6 Components list on the evaluation board

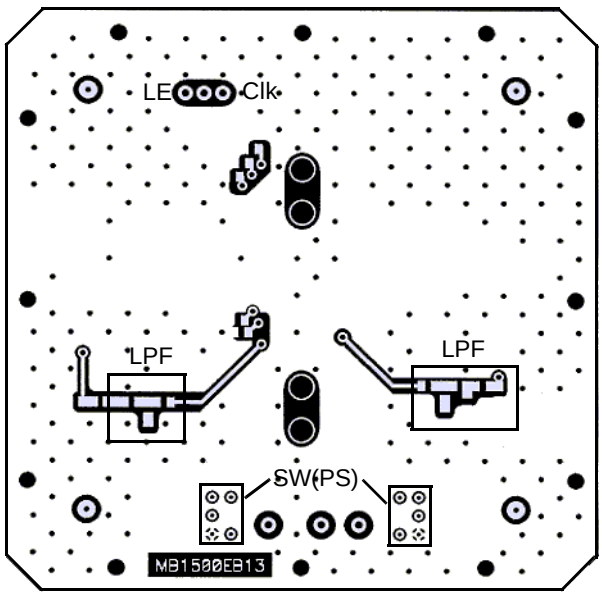
No.	Symbol	Value	No.	Symbol	Value
1	C1	1000pF	13	R1	51Ω
2	C2	1000pF	14	R2	51Ω
3	C3	0.1µF	15	R3	18Ω
4	C4	0.1µF	16	R4	18Ω
5	C5	1000pF	17	R5	18Ω
6	C6	0.1µF	18	R6	51Ω
7	C7	0.1µF	19	R7	18Ω
8	C8	1000pF	20	R8	18Ω
9	C'1	10µF	21	R9	18Ω
10	C'2	10µF			
11	C'3	10µF			
12	C'4	10µF			

Fig.3.12 MB1500EB13 board layout

(Top view)



(Bottom view)



3.2.7 MB1500EB13B

Fig.3.13 MB1500EB13B circuit image

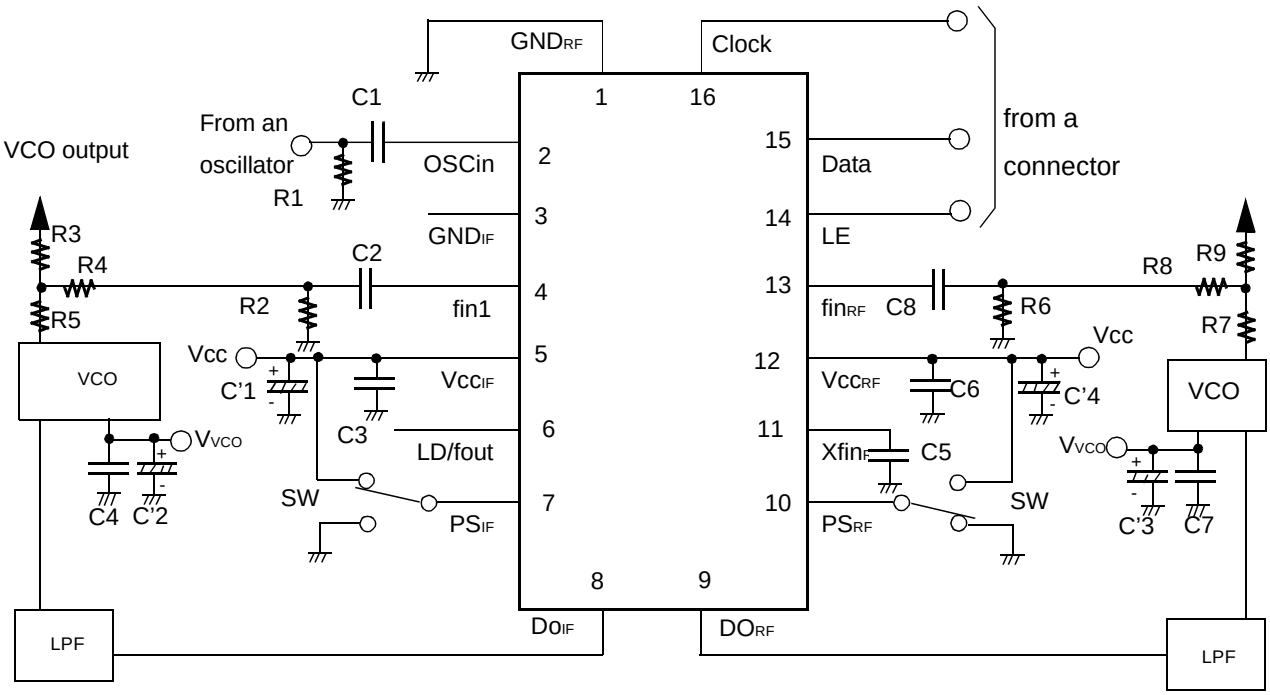
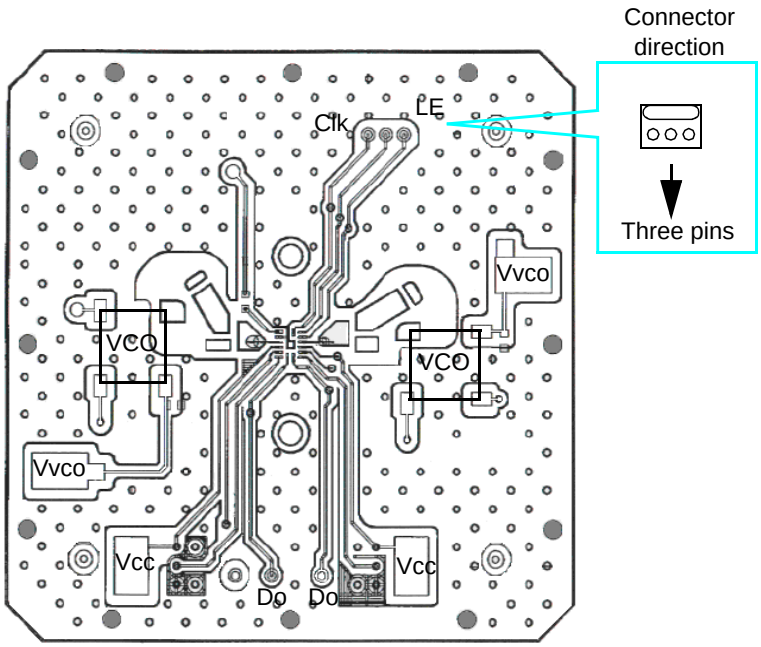


Table.7Components list on the evaluation board

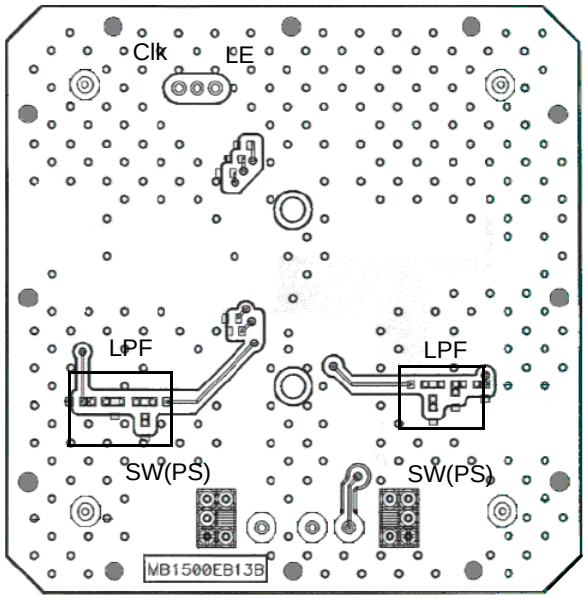
No.	Symbol	Value	No.	Symbol	Value
1	C1	1000pF	13	R1	51Ω
2	C2	1000pF	14	R2	51Ω
3	C3	0.1µF	15	R3	18Ω
4	C4	0.1µF	16	R4	18Ω
5	C5	1000pF	17	R5	18Ω
6	C6	0.1µF	18	R6	51Ω
7	C7	0.1µF	19	R7	18Ω
8	C8	1000pF	20	R8	18Ω
9	C'1	10µF	21	R9	18Ω
10	C'2	10µF			
11	C'3	10µF			
12	C'4	10µF			

Fig.3.14 MB1500EB13B board layout

(Top view)



(Bottom view)



3.2.8 MB1500EB14

Fig.3.15 MB1500EB14 circuit image

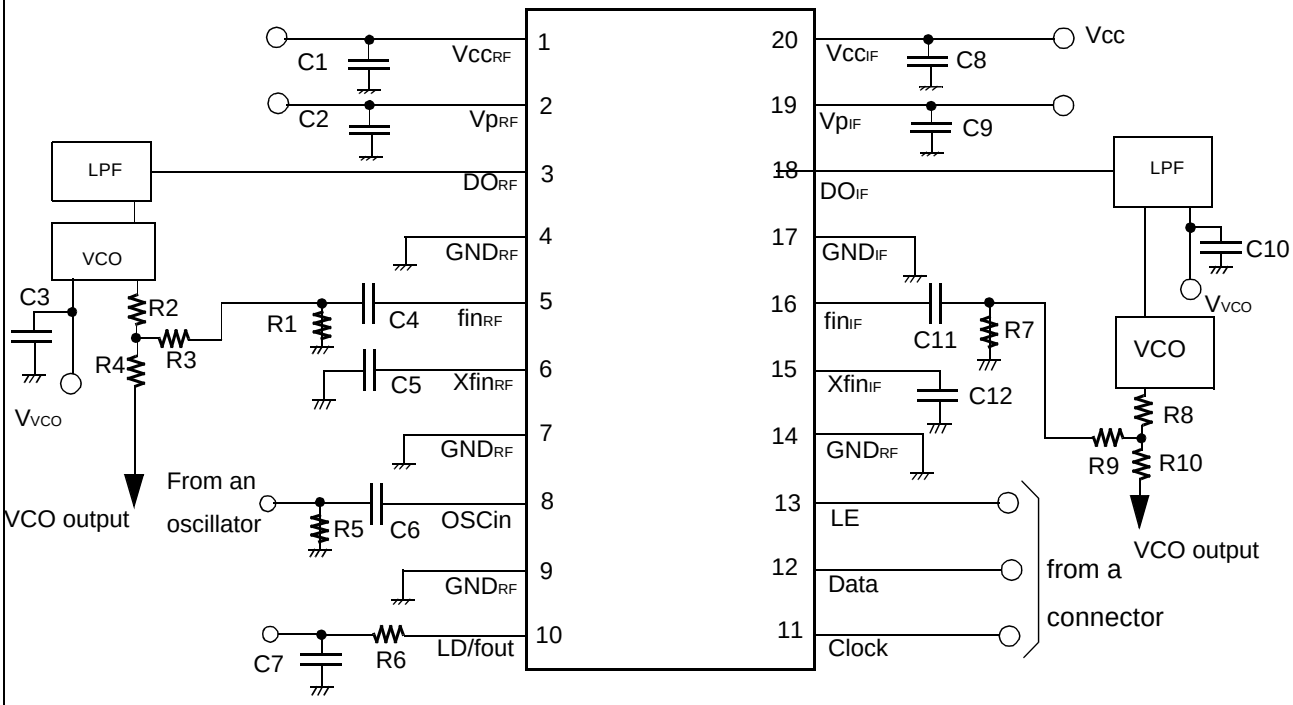
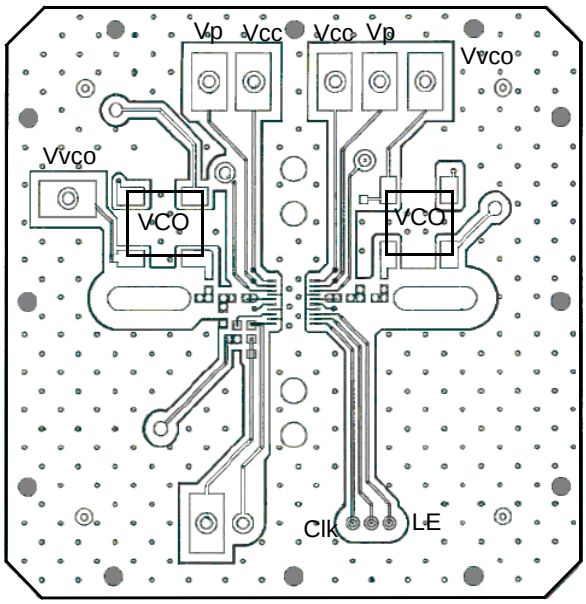


Table.8 Components list on the evaluation board

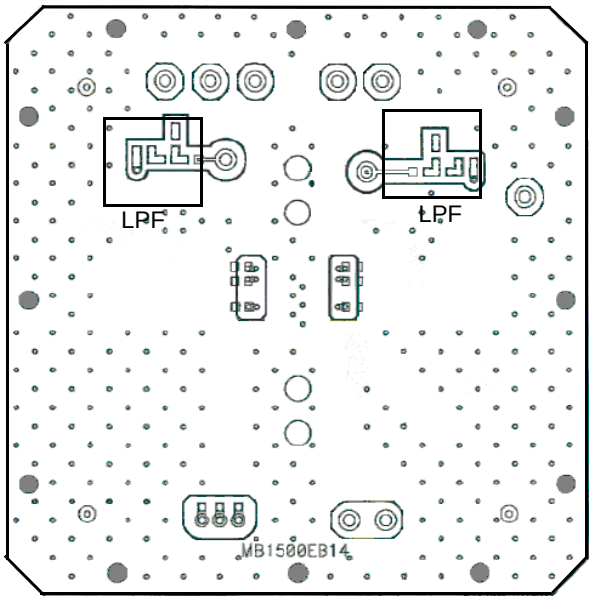
No.	Symbol	Value	No.	Symbol	Value
1	C1	0.1µF	13	R1	51Ω
2	C2	0.1µF	14	R2	18Ω
3	C3	0.1µF	15	R3	18Ω
4	C4	1.0nF	16	R4	18Ω
5	C5	1000pF	17	R5	51Ω
6	C6	1.0nF	18	R6	2KΩ
7	C7	0.1µF	19	R7	51Ω
8	C8	0.1µF	20	R8	18Ω
9	C9	0.1µF	21	R9	18Ω
10	C10	0.1µF	22	R10	18Ω
11	C11	1.0nF			
12	C12	1000pF			

Fig.3.16 MB1500EB14 board layout

(Top view)



(Bottom view)



3.2.9 MB1500EB16

Fig.3.17 MB1500EB16 circuit image

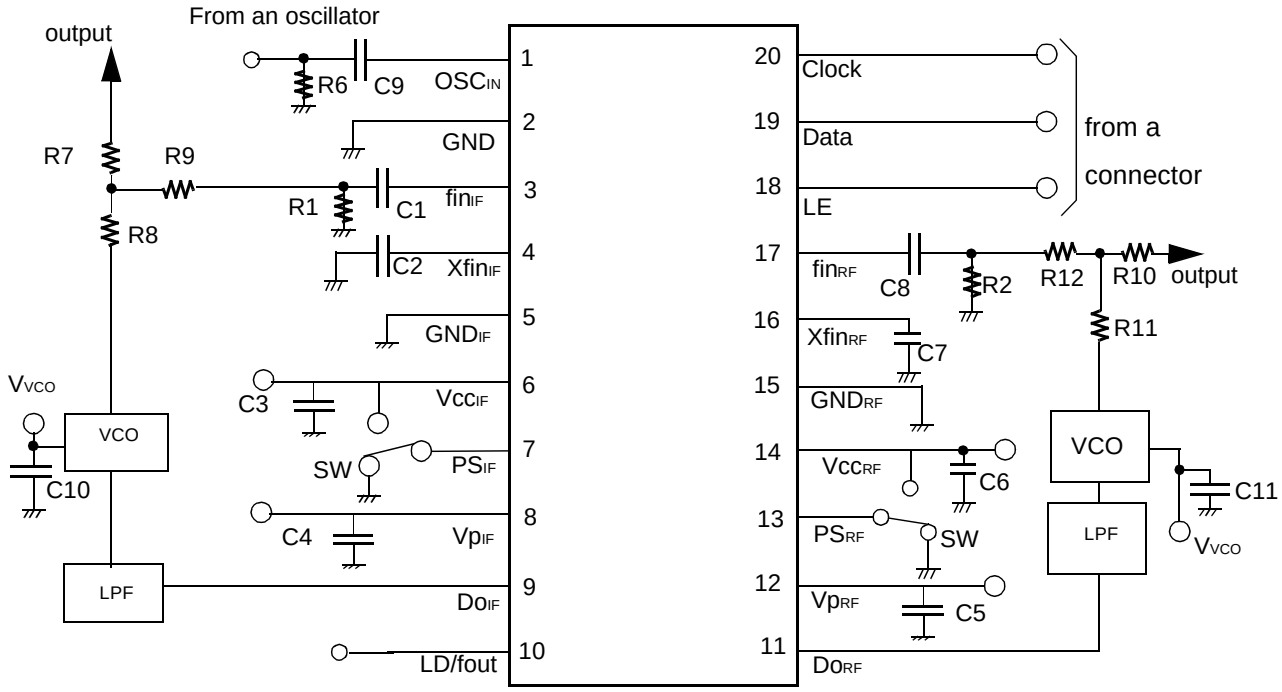
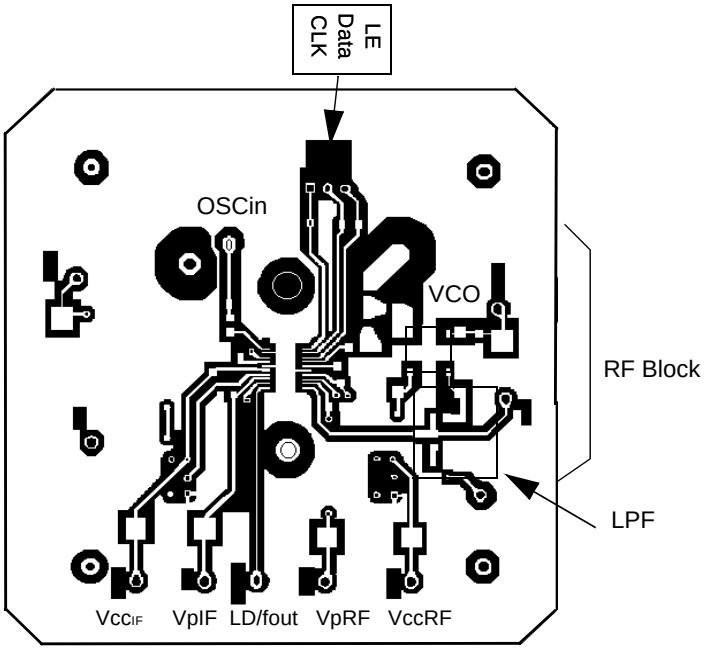


Table.9 Components list on the evaluation board

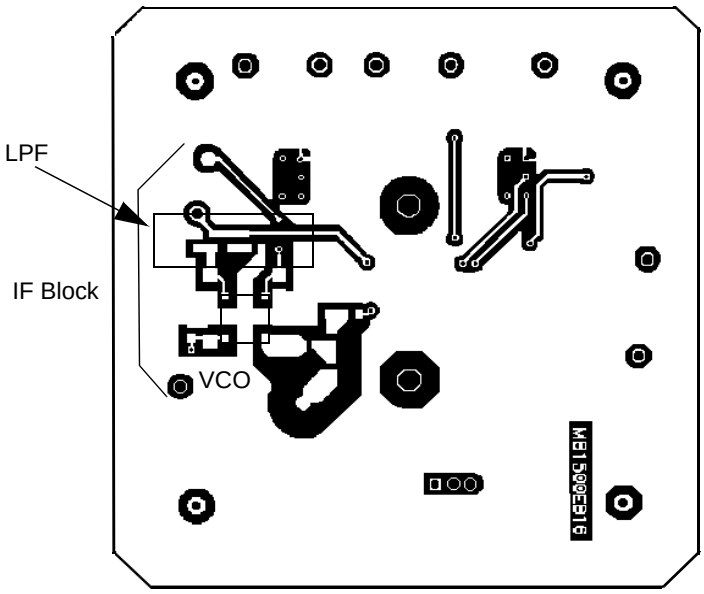
No.	Symbol	Value	No.	Symbol	Value
1	C1	1000pF	13	R1	51Ω
2	C2	1000pF	14	R2	51Ω
3	C3	10µF	15	R3	18Ω
4	C4	10µF	16	R4	18Ω
5	C5	10µF	17	R5	18Ω
6	C6	10µF	18	R6	51Ω
7	C7	1000pF	19	R7	18Ω
8	C8	1000pF	20	R8	18Ω
9	C9	1000pF	21	R9	18Ω
10	C10	10µF	22	R10	18Ω
11	C11	10µF	23	R11	18Ω
			24	R12	18Ω

Fig.3.18 MB1500EB16board layout

(Top view)



(Bottom view)



3.2.10 MB1500EB16B

Fig.3.19 MB1500EB16B circuit image

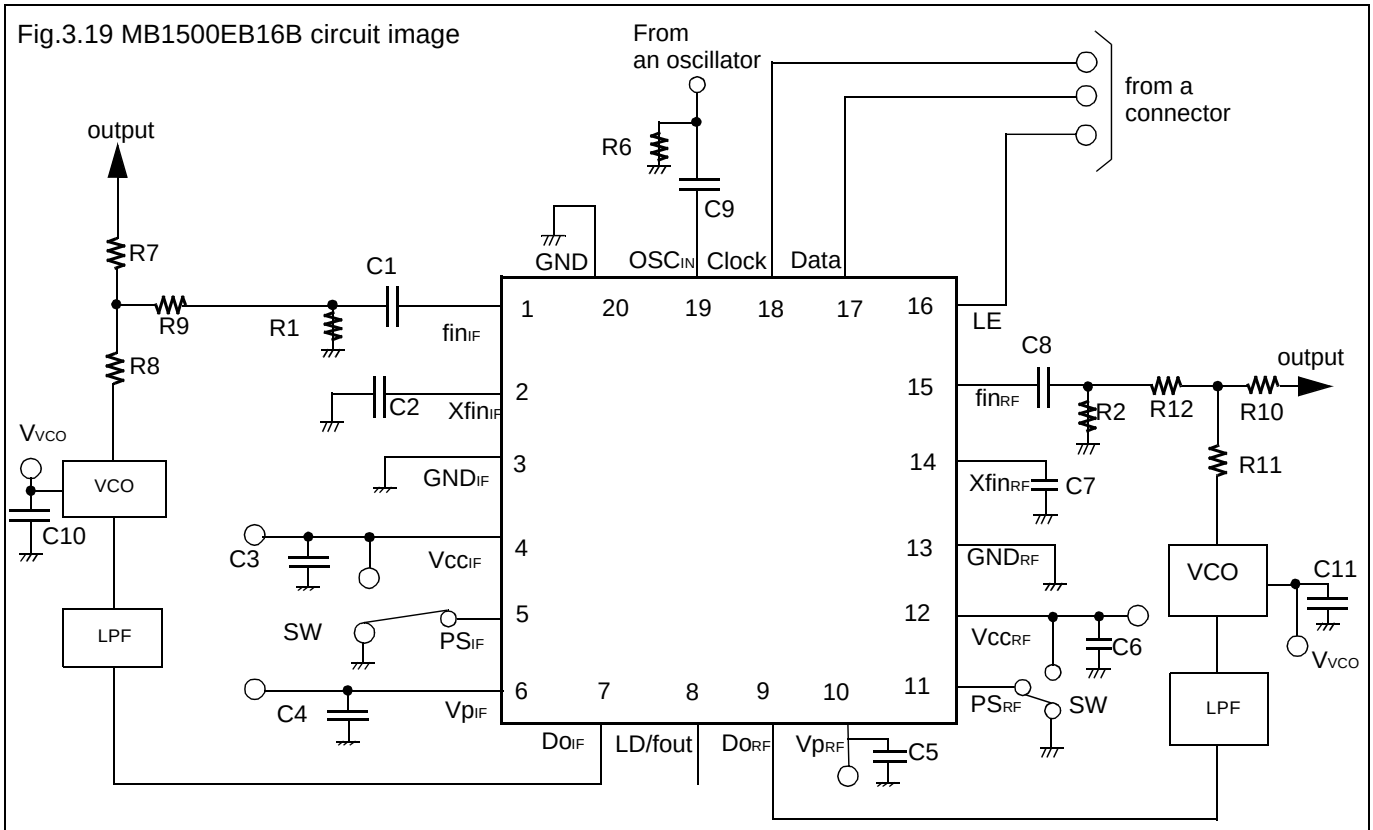
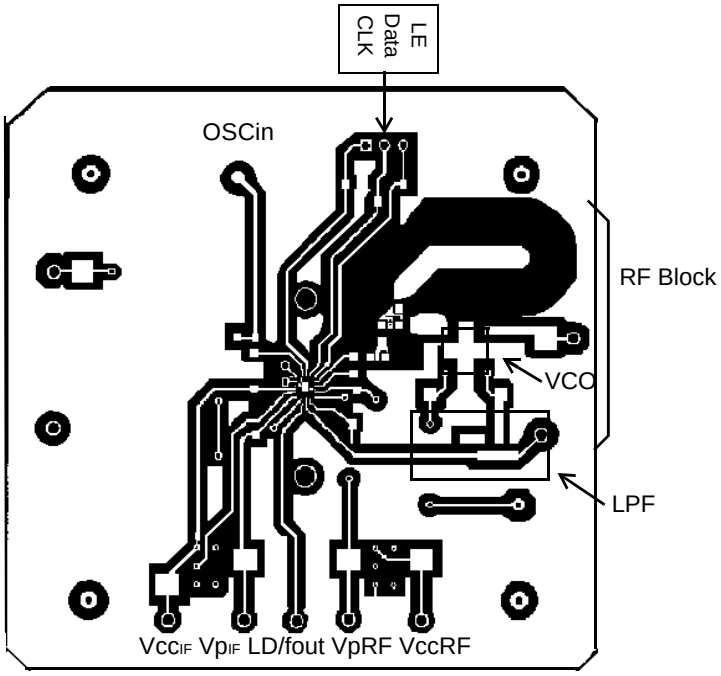


Table.10 Components list on the evaluation board

No.	Symbol	Value	No.	Symbol	Value
1	C1	1000pF	13	R1	51Ω
2	C2	1000pF	14	R2	51Ω
3	C3	10µF	15	R3	18Ω
4	C4	10µF	16	R4	18Ω
5	C5	10µF	17	R5	18Ω
6	C6	10µF	18	R6	51Ω
7	C7	1000pF	19	R7	18Ω
8	C8	1000pF	20	R8	18Ω
9	C9	1000pF	21	R9	18Ω
10	C10	10µF	22	R10	18Ω
11	C11	10µF	23	R11	18Ω
			24	R12	18Ω

Fig.3.20 MB1500EB16board layout

(Top view)



(Bottom view)