JITTER FILTER

JFIL-200MF

USER'S MANUAL

Version 1.2

DIGITAL SIGNAL TECHNOLOGY, INC.
1-7-30, Higashi Benzai, Asaka, Saitama
351-0022, Japan
TEL 81-48-468-6094
FAX 81-48-468-6210
http://www.dst.co.jp/en

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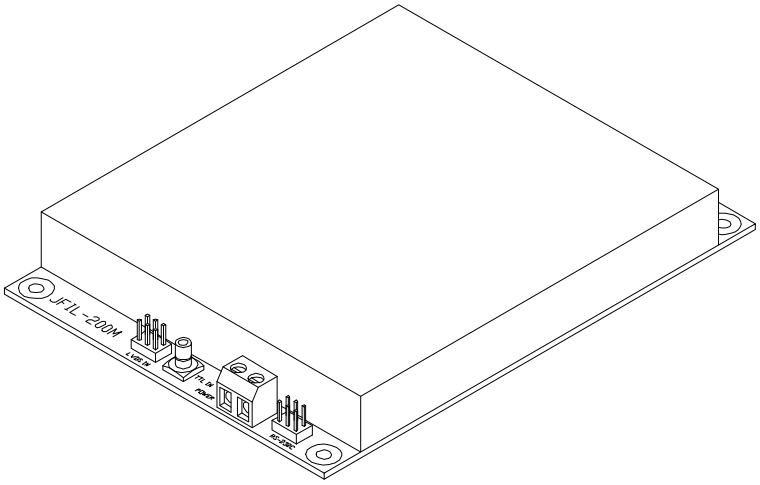
■Function description

Using high purity VCXO and its narrow band pass characteristics of PLL and DDS, JFIL-200MF can be able to filter clock jitter and spurious within the range of 10MHz ～ 200MHz. JFIL-200MF has one TTL (CMOS) logic or LVDS level input and one TTL level output and two LVDS level outputs. The output signal phase can be controlled in the range of 0～360° . The settings can be controlled by serial data and all setting parameters can be memorized into EEPROM. As an option, LVC-232C is available in case of connecting to PC communication port for your convenience.

■Contents of the package

・JFIL-200M ×1



・User's manual ×1

■Electric specification

・Power supply	+5V～+7V　1A
・Frequency range	10MHz～200MHz
・Frequency lock range	±30ppm
・Frequency resolution	1Hz
・Phase offset range	0～360°
・Phase resolution	1°
・Phase stability	10ps/℃
	(In case of 100MHz, it is equivalent to 9deg. from 25℃ to 50℃)
・Input level	TTL (CMOS) (+5V、+3.3V、HiZ、50Ω selectable)
	or LVDS
	With input threshold setting possible
・Output level	TTL (+5V、+3.3V selection possible 、50Ω drive possible) ×1
	LVDS ×2
・Spurious(except harmonics)	less than -40dBc
・Phase Noise	Refer to the graph on the next page
・PLL lock time	less than 200ms
・Interface	Asynchronous serial data 3V CMOS level
	An optional RS-232C level converter board is available.
	Connector: Pin Header (6pin) .

■Environmental condition

・operating temperature range	0℃ ～ +50℃

■Dimension

W135×H16.5×D100 (mm)

Phase Noise （typical ）

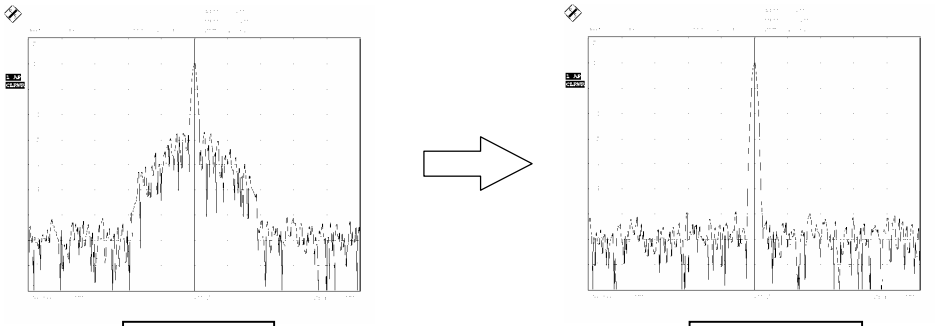
Measurement condition

Frequency	10MHz, 100MHz, 200MHz	
Input signal	Phase Modulation (0.5rad) by white noise source	

Measurement equipment

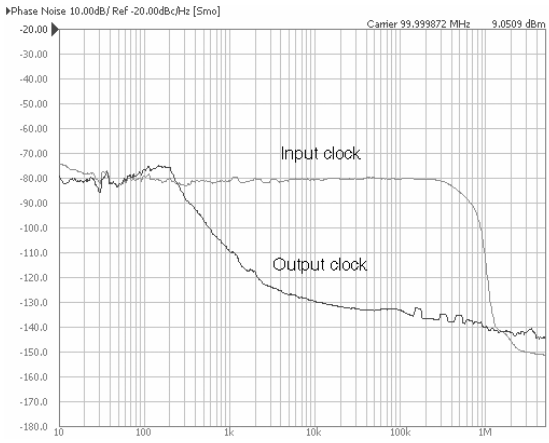
Signal source	Rohde & Schwarz	SME03
Phase noise	Agilent Technologies	E5052A
Spectrum		FSQ26

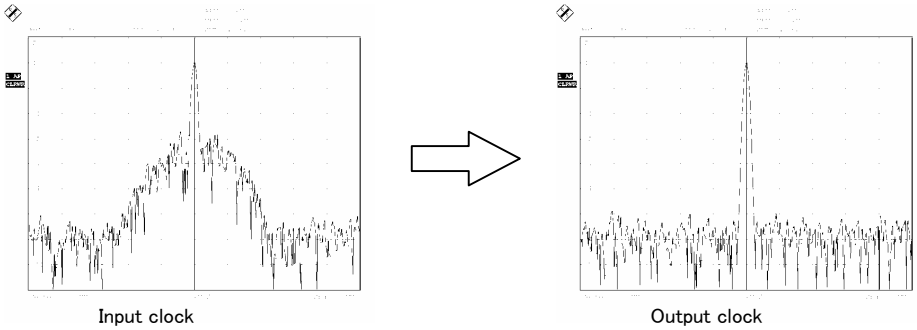
10MHz



Input clock　　Output clock

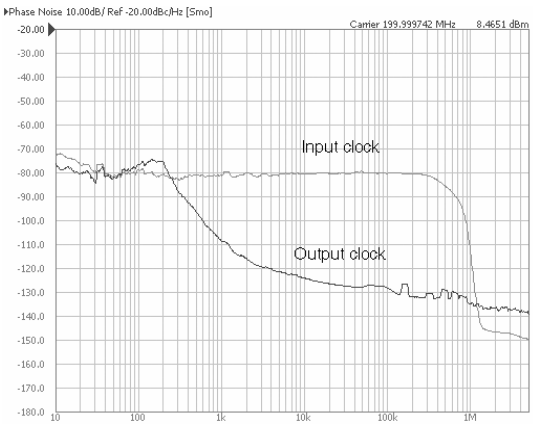
100MHz

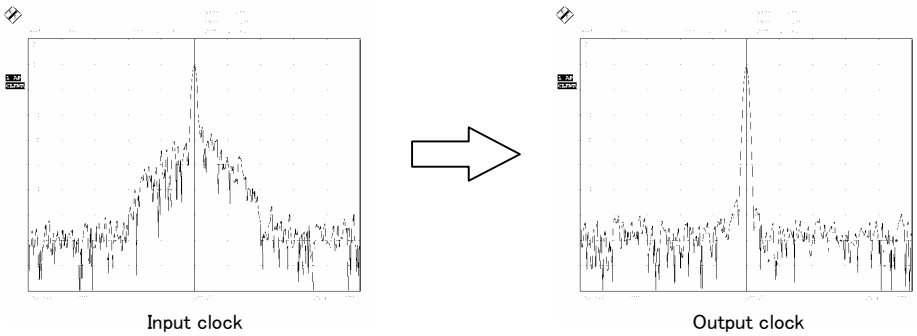




Input clock　　Output clock

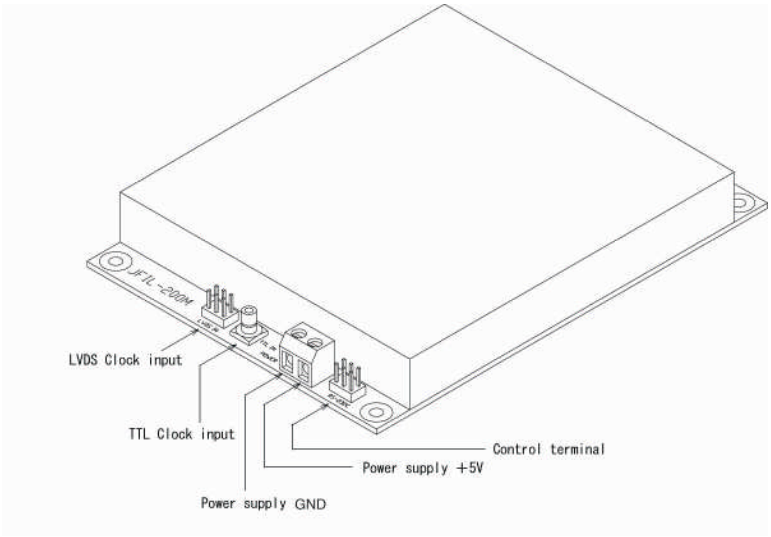
200MHz

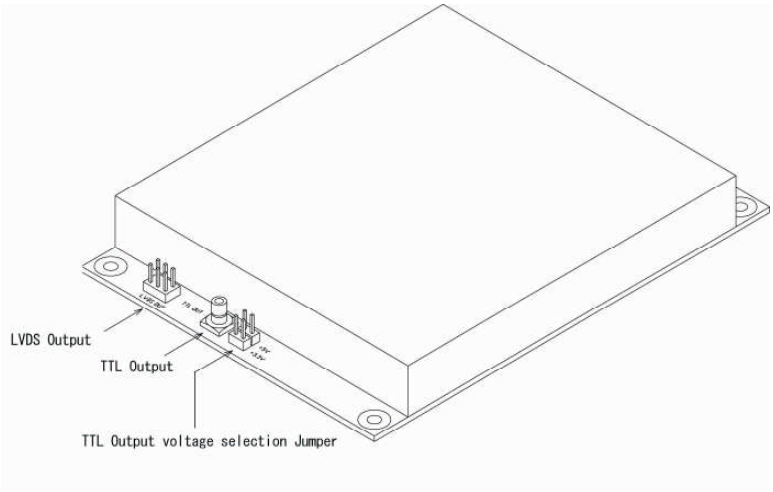




Input clock　　Output clock

■Connections





1. Power connector

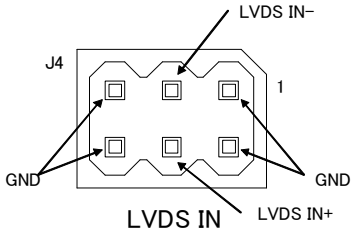
Pin1: +5V power supply connector

Connect +4.75～+7V power supply having more than 1A current capacity

Pin2: GND

Connect the ground of the power supply

2. LVDS clock input connector --- 2.54mm pitch 6 pin header terminal



3. TTL(C-MOS) clock input connector - SMB

+5V or +3.3V can be selected at the logic level.

HiZ or 50Ω can be selected for the input impedance by serial command.

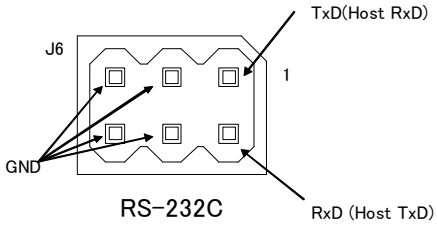
Threshold level can be adjusted by serial command.

4. Serial comm. port

This is a port for serial communication for setting frequency and so on.

Interface is 3V CMOS level, but RS-232C level converter is available as an option in order to connect to PC communication port.

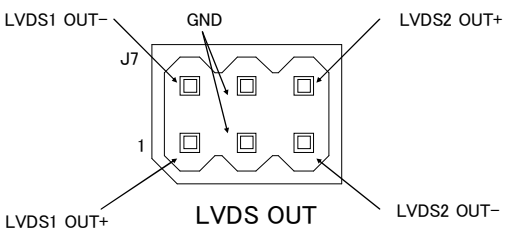
The connector is a 2.54mm pitch with 6pin header terminal. 1 pin is TxD and 2 pin is RxD as shown below.



5. LVDS output connector

This is a 2.54mm pitch 6 pin header terminal.

There are two LVDS outputs.



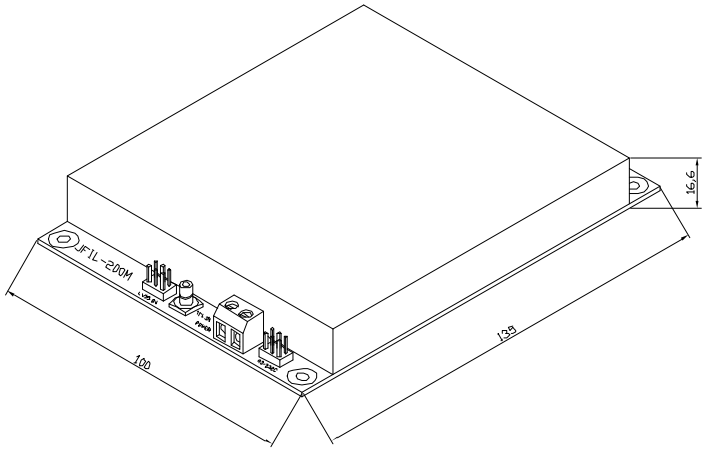
6. TTL output connector—SMB

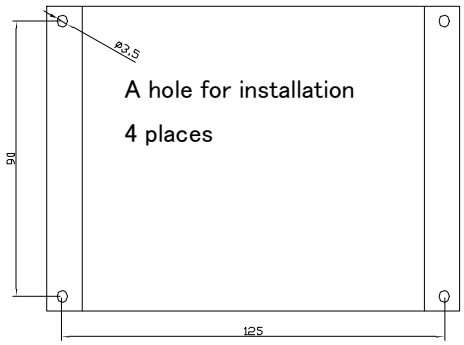
7. TTL output level selection pin

It can be selected the voltage of TTL output.

Short +5V(JP1) or +3.3V(JP2) with a jumper plug.

■Outline





■Communication interface requirements

Type of Communication	Asynchronous serial communication
Communication speed	9600BPS
Data length	8 bit
Stop bit	1 bit
Parity	none
Flow control	none

Pin assignment

pin#	signal	signal direction
1	TxD	JFIL→Terminal
2	RxD	←
3	GND	
4	GND	
5	GND	
6	GND	

The signal level of JFIL-200MF is CMOS +3.3V. When a serial port of PC is used, interface it with a level convert IC such as MAX3232E(MAXIM) or ADM3202(ANALOG DEVICES). For your convenience, the level converter board "LVC-232C" is available as an option.

■How to control

The following message is returned when JFIL-200MF is power on.

```
JFIL-200M  V1.0

STATUS
Current Frequency   =  10 000 000 Hz
TTL Out   Phase     =           0 Deg
LVDS1 Out Phase     =           0 Deg
LVDS2 Out Phase     =           0 Deg
VCO Control Voltage =        1.66 V
Input Signal        = TTL
Input Impedance     = 50ohm
Input Threshold     = 0.8 V

*
```

This is just an example. The status depends on how the unit has been set.

After the prompt "*" has been returned, the commands can be entered. There are two modes in command menu, main menu mode and sub menu mode. In main menu mode, the system control command such as frequency setting and phase setting can be done. In sub menu mode, input setting command such as a input signal, input impedance and input threshold can be set.

Enter space code (20hex) after each command then enter argument.
Then enter return key (0Dhex) as a delimiter.

■Main menu mode

```
MAIN MENU
F_xxx          = Frequency Set
P1_xxx         = TTL Out   Phase Set
P2_xxx         = LVDS1 Out Phase Set
P3_xxx         = LVDS2 Out Phase Set
V              = VCO Control Voltage Monitor
STS            = Status
SAVE           = SAVE
SUB            = SUB Mode Entry
HELP           = Command List
                 *1 _ = Space
                 *2 x = Parameters
```

1. F command – Frequency setting

The output frequencies can be set in 1Hz step within the range of 10MHz～200MHz. First enter "F", space code(20hex) and then frequency value. The frequency setting format is allowed in four different ways, MHz unit input, KHz unit input and Hz unit input. Add M or K after the setting value for distinguishing the unit. When the data has been set with MHz unit or KHz unit, each Hz part would be ignored. When JFIL-200MF received the data correctly, it returns VCO control voltage and "*"(2Ahex) as a prompt.

For example ***F 10M**
VCO Control Voltage = 1.65 V

Make sure the VCO control voltage is within the specified range (0.5V-2.5V).
When the data received incorrectly or some errors occurred during the transfer, "INVALID DATA" is returned. After the "*"(2Ahex) is returned, then you can enter the new command.
Each time the frequency data is set continuously, be sure "*"(2A hex) is returned after each command.

** Please note that even if the frequency is set beyond 200MHz, it would be accepted but the quality of the signal would not be guaranteed.
Here are some examples how to set frequencies. Please note hat under score "_" means SPACE (20hex) and (CR) means return code (0hex).

・How to set on MHz unit

F_100M (CR)

→100MHz (100,000,000Hz)

・How to set on KHz unit

F_20000K (CR)

→20000KHz (20MHz = 20,000,000.000Hz)

・How to set on Hz unit

F_123000000 (CR)

→123MHz (123,000,000.000Hz)

2. P1, P2, P3 command – To set Phase Offset

Phase offset can be set in 1° step within the range of 0° ～ 360° .

There are three phase commands P1, P2 and P3. "P1" is for TTL output, "P2" is for LVDS1 and "P3" is for LVDS2. Then, enter space code (20hex) and enter phase value.

When JFIL-200MF received the data correctly, it returns "*"(2A hex) as a prompt. When the data received incorrectly or some errors occurred during the transfer, "INVALID DATA" is returned. A new command or a revised command is required. Each time the phase data is set continuously, be sure "*"(2A hex) is returned after each command.

P1_90 (CR)

→TTL(CMOS)output phase offset will be moved from 0 to 90°

P2_180 (CR)

→LVDS1 output phase offset will be moved from 0 to 180°

3. V command – VCO control voltage is displayed. Refer to "Caution of Page 17 for more details.

4. STS command – The current status such as frequency, phase offset, VCO control voltage, Input signal, Input impedance and Input threshold is displayed as below.

```
STATUS
Current Frequency   =  10 000 000 Hz
TTL Out   Phase     =           0 Deg
LVDS1 Out Phase     =           0 Deg
LVDS2 Out Phase     =           0 Deg
VCO Control Voltage =        1.66 V
Input Signal        = TTL
Input Impedance     = 50ohm
Input Threshold     = 0.8 V
```

5. SAVE command – To memorize the setting value

The current frequency, phase offset, input signal, input impedance, input threshold can be memorized. If the command was completed, "Done" and "*" would be returned. When the power is on next time, the stored data can be output.

```
Done
*
```

After these commands was returned, then, turn the power off.

6. SUB command ---- To change the mode

To change the main mode to sub mode, or to put it back to main mode

EXIT (CR)

7. HELP command ---- All commands are displayed.

■Sub menu mode ---- To set input signals

```
SUB MENU
SEL_x               = Input Level      1:TTL(CMOS)  0:LVDS
Z_x                 = Input Impedance  1:HiZ  0:50ohm
TH_xxx              = Input Threshold  0.0 - 3.0
EXIT                = Return to Main
HELP                = Sub Command List
                      *1 _ = Space
                      *2 x = Parameters
SUB*
```

Note: In this sub menu mode, "**SUB***" is returned instead of "*"

1. SEL command ---- To select TTL or LVDS

"SEL 1" --- TTL(CMOS)
"SEL 0" --- LVDS

2. Z command ---- To select input impedance

"Z 1" --- High impedance
"Z 0" --- 50Ω

3. TH command ---- T set input signal threshold voltage

It can be set in 0.1V step within the range of 0.0～3.0V.

For example, TH_0.8(CR)

4. EXIT command ---- To end the sub mode

To end the sub mode and return to the main mode, this command is used.

5. HELP command ---- all sub mode commands are displayed.

■Cautions on setting

1. Frequency settings

As JFIL-200MF has quite narrow frequency lock range because of using TCXO, input correct frequency (within ±30ppm). Frequency value concludes from the VCO control voltage which is displayed with F command, V command and STS command. Set a correct frequency with VCO control voltage to be in the range of 0.50V～2.50V. Especially to make most of lock range, VCO control voltage can be set 1.65V (center value).

2. Phase offset settings

Phase offset can be set per each output. Please note that even though the phase offset was set 0(Zero), the phase difference from input wouldn't always be 0(Zero) because of JFIL-200M's nature quality. The phasing between LVDS and LVDS2 output has been finished, but the phasing between TTL and LVDS has not. Again, set each output phase offset.

3. Input threshold setting

Input signal threshold is 0.8V as a standard. The setting voltage can be changed according to the drive capacity but about ±0.2V error range may be occurred.

4. PLL lock time

After the signal was input, it would take maximum 200ms to reach lock status.

■Option

RS-232C level converter
LVC-232C

■ Handling Precautions

(1) Use the low noise power supply. When the switching power supply is used, use a noise filter to reduce switching noise though the power supply.

(2) The voltage will be dropped upon wiring from the power supply to JFIL-200MF as maximum 1A electrical current is running in JFIL-200MF. To apply more than 5V current is recommended .

(3) Pay attention airflow and thermal resistance when embedded to prevent not to raise temperature of the unit.