

<b>Structure</b>	Silicon monolithic Integrated circuit
<b>Product</b>	Clock Generator
<b>Type</b>	<b>BU2280FV</b>
<b>Feature</b>	To generate clocks for DVD system To generate clocks by connecting crystal oscillator

#### ○Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Ratings	Unit
Supply voltage	VDD	-0.5 ~ 7.0	V
Input Voltage	VIN	-0.5 ~ VDD+0.5	V
Storage Temperature range	Tstg	-30 ~ 125	°C
Power dissipation	PD	630 <sup>*1</sup>	mW

<sup>\*1</sup> A measure value at mounting on 50×50×1.6mm glass epoxy substrate.

In the case of exceeding Ta=25°C, 6.3mW should be reduced per 1°C.

<sup>\*</sup> The radiation-resistance design is not carried out.

<sup>\*\*</sup> Operation is not guaranteed.

#### ○Operating Conditions (Ta=-5°C~+70°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	VDD	3.0	3.3	3.6	V
Input "H" Voltage	VIH	0.8VDD	-	VDD	V
Input "L" Voltage	VIL	0.0	-	0.2VDD	V
Output load	CL	0	-	15	pF

#### Application example

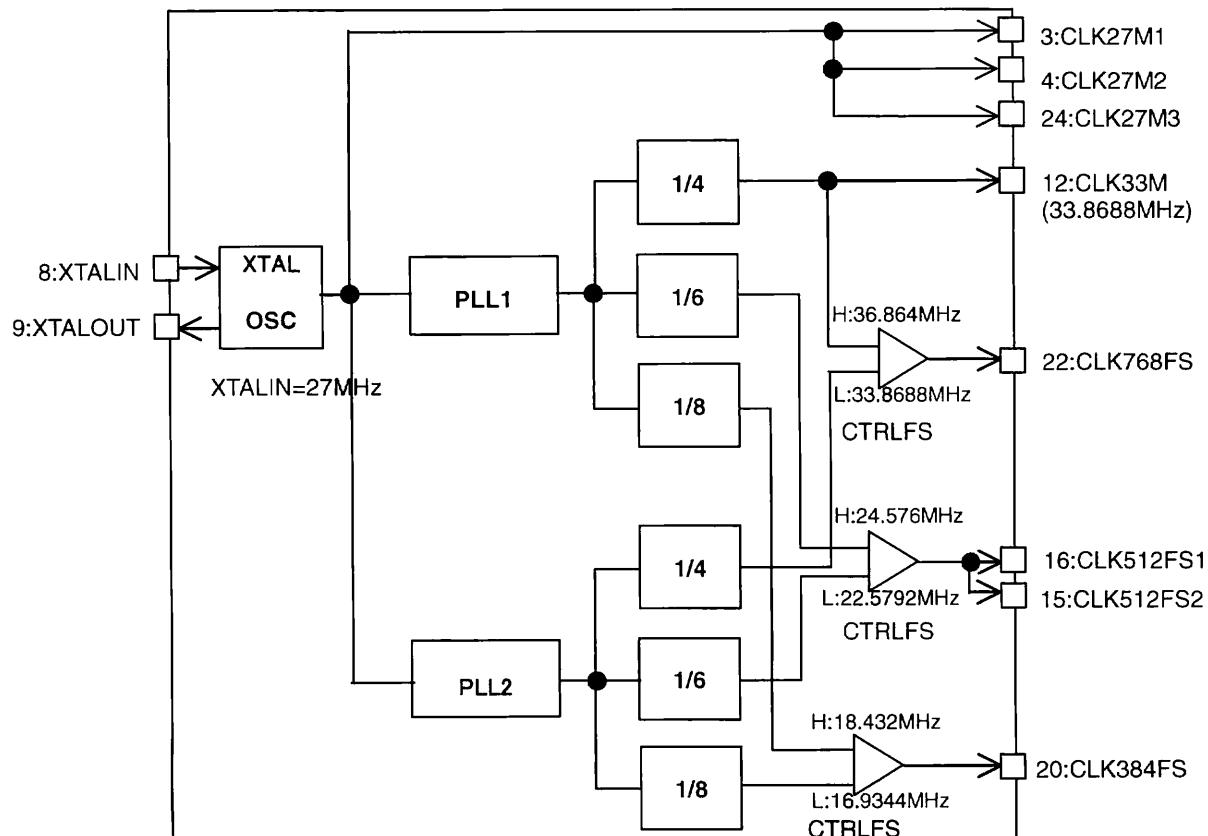
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## ○ Electrical Characteristics

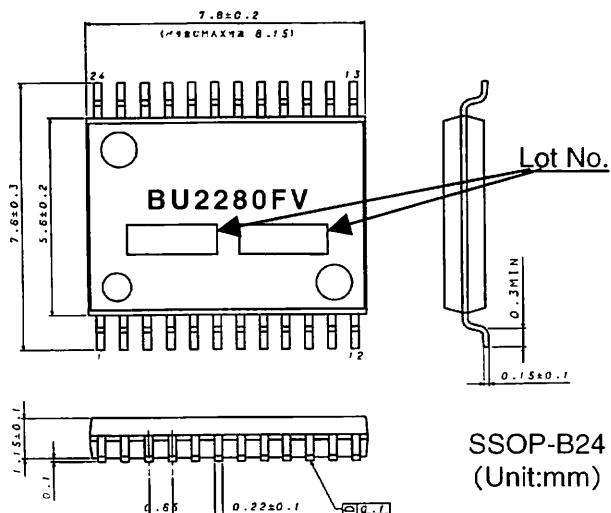
(VDD=3.3V, Ta=25°C, Crystal frequency=27MHz, at No Load, unless otherwise specified )

Parameter	Symbol	Limit			Unit	Conditions
		Min.	Typ.	Max.		
Output L voltage	VOL	—	—	0.4	V	IOH=4.0mA
Output H voltage	VOH	2.4	—	—	V	IOL=-4.0mA
Consumption current	IDD	—	30	50	mA	at No Load
CLK768FS	CLK768-44		33.8688		MHz	CTRLFS=L, XTAL X 3136/625/4
	CLK768-48		36.864		MHz	CTRLFS=H, XTAL X 2048/375/4
CLK512FS	CLK512-44		22.5792		MHz	CTRLFS=L, XTAL X 3136/625/6
	CLK512-48		24.576		MHz	CTRLFS=H, XTAL X 2048/375/6
CLK384FS	CLK384-44		16.9344		MHz	CTRLFS=L, XTAL X 3136/625/8
	CLK384-48		18.432		MHz	CTRLFS=H, XTAL X 2048/375/8
Duty	Duty	45	50	55	%	Measured at a voltage of 1/2VDD
Jitter 1	Jstd 1		100		psec	1sigma of short-term Jitter
Jitter 2	Jstd 2		400		psec	MIN-MAX value
Rise time	tr		2.5		nsec	Period of transition time required for the output reach 80% from 20% of VDD.
Fall time	tf		2.5		nsec	Period of transition time required for the output reach 20% from 80% of VDD.
Output Lock time	tLOCK			1	msec	

## ○ Block diagram



## ○Package outline, Appearance of Marker

SSOP-B24  
(Unit:mm)

## ○Pin Function

Pin No.	PIN NAME	Function
1	VDD1	Power supply for 27MHz
2	VSS1	GND for 27MHz
3	CLK27M1	27MHz Clock output terminal 1
4	CLK27M2	27MHz Clock output terminal 2
5	AVDD	Power supply for Analog block
6	AVDD	Power supply for Analog block
7	AVSS	GND for Analog block
8	XTALIN	Crystal input terminal
9	XTALOUT	Crystal output terminal
10	VSS2	GND for 33MHz
11	VDD2	Power supply for 33MHz
12	CLK33M	33.8688MHz Clock output terminal
13	VSS2	GND for 33MHz
14	VDD2	Power supply for 33MHz
15	CLK512FS2	512fs Clock output terminal 2(22.5792 or 24.576MHz)
16	CLK512FS1	512fs Clock output terminal 1(22.5792 or 24.576MHz)
17	DVSS	GND for Digital block
18	DVSS	GND for Digital block
19	DVDD	Power supply for Digital block
20	CLK384FS	384fs Clock output terminal (16.9344 or 18.432MHz)
21	OE	Output enable (L:disable,OPEN:enable) : with pull-up
22	CLK768FS	768fs Clock output terminal (33.8688 or 36.864MHz)
23	CTRLFS	FS select ( L:44.1KHz,H:48KHz) : with pull-up
24	CLK27M3	27MHz Clock output terminal 3

## ●Cautions on use (BU2280FV)

Basically, mount ICs to the printed circuit board for use. (If the ICs are not mounted to the printed circuit board, the characteristics of ICs may not be fully demonstrated.)

Mount 0.1 $\mu$ F capacitors in the vicinity of the IC PINs between 1PIN (VDD1) and 2PIN (VSS1), 5-6PIN (AVDD) and 7PIN (AVSS), 10PIN (VSS2) and 11PIN (VDD2), 13PIN (VSS2) and 14PIN (VDD2), 17-18PIN (DVSS) and 19PIN (DVDD), respectively.

For the fine-tuning of frequencies, insert several numbers of pF in the 8PIN and 9PIN to GND.

Depending on the conditions of the printed circuit board, mount an additional electrolytic capacitor between the power supply and GND terminal.

For EMI protection, it is effective to put ferrite beads in the origin of power supply to be fed to BU2280FV from the printed circuit board or to insert a capacitor (of 1 $\Omega$  or less), which bypasses high frequency desired, between the power supply and the GND terminal.

## ● Cautions on use (common)

### ( 1 ) Absolute Maximum Ratings

An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down devices, thus making impossible to identify breaking mode such as a short circuit or an open circuit. If any special mode exceeding the absolute maximum ratings is assumed, consideration should be given to take physical safety measures including the use of fuses, etc.

### ( 2 ) Operating conditions

These conditions represent a range within which characteristics can be provided approximately as expected. The electrical characteristics are guaranteed under the conditions of each parameter.

### ( 3 ) Reverse connection of power supply connector

The reverse connection of power supply connector can break down ICs. Take protective measures against the breakdown due to the reverse connection, such as mounting an external diode between the power supply and the IC's power supply terminal.

### ( 4 ) Power supply line

Design PCB pattern to provide low impedance for the wiring between the power supply and the GND lines. In this regard, for the digital block power supply and the analog block power supply, even though these power supplies has the same level of potential, separate the power supply pattern for the digital block from that for the analog block, thus suppressing the diffraction of digital noises to the analog block power supply resulting from impedance common to the wiring patterns. For the GND line, give consideration to design the patterns in a similar manner.

Furthermore, for all power supply terminals to ICs, mount a capacitor between the power supply and the GND terminal. At the same time, in order to use an electrolytic capacitor, thoroughly check to be sure the characteristics of the capacitor to be used present no problem including the occurrence of capacity dropout at a low temperature, thus determining the constant.

### ( 5 ) GND voltage

Make setting of the potential of the GND terminal so that it will be maintained at the minimum in any operating state. Furthermore, check to be sure no terminals are at a potential lower than the GND voltage including an actual electric transient.

### ( 6 ) Short circuit between terminals and erroneous mounting

In order to mount ICs on a set PCB, pay thorough attention to the direction and offset of the ICs. Erroneous mounting can break down the ICs. Furthermore, if a short circuit occurs due to foreign matters entering between terminals or between the terminal and the power supply or the GND terminal, the ICs can break down.

### ( 7 ) Operation in strong electromagnetic field

Be noted that using ICs in the strong electromagnetic field can malfunction them.

### ( 8 ) Inspection with set PCB

On the inspection with the set PCB, if a capacitor is connected to a low-impedance IC terminal, the IC can suffer stress. Therefore, be sure to discharge from the set PCB by each process. Furthermore, in order to mount or dismount the set PCB to/from the jig for the inspection process, be sure to turn OFF the power supply and then mount the set PCB to the jig. After the completion of the inspection, be sure to turn OFF the power supply and then dismount it from the jig. In addition, for protection against static electricity, establish a ground for the assembly process and pay thorough attention to the transportation and the storage of the set PCB.

### ( 9 ) Input terminals

In terms of the construction of IC, parasitic elements are inevitably formed in relation to potential. The operation of the parasitic element can cause interference with circuit operation, thus resulting in a malfunction and then breakdown of the input terminal. Therefore, pay thorough attention not to handle the input terminals, such as to apply to the input terminals a voltage lower than the GND respectively, so that any parasitic element will operate. Furthermore, do not apply a voltage to the input terminals when no power supply voltage is applied to the IC. In addition, even if the power supply voltage is applied, apply to the input terminals a voltage lower than the power supply voltage or within the guaranteed value of electrical characteristics.

### ( 10 ) Ground wiring pattern

If small-signal GND and large-current GND are provided, it will be recommended to separate the large-current GND pattern from the small-signal GND pattern and establish a single ground at the reference point of the set PCB so that resistance to the wiring pattern and voltage fluctuations due to a large current will cause no fluctuations in voltages of the small-signal GND. Pay attention not to cause fluctuations in the GND wiring pattern of external parts as well.

### ( 11 ) External capacitor

In order to use a ceramic capacitor as the external capacitor, determine the constant with consideration given to a degradation in the nominal capacitance due to DC bias and changes in the capacitance due to temperature, etc.

## Appendix

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