

Clock generator for video CD systems

BU2173F

The BU2173F is an IC that generates the CPU clock signal, system clock signal and video clock signal used in video CD systems. A single crystal resonator can generate three different oscillation frequencies.

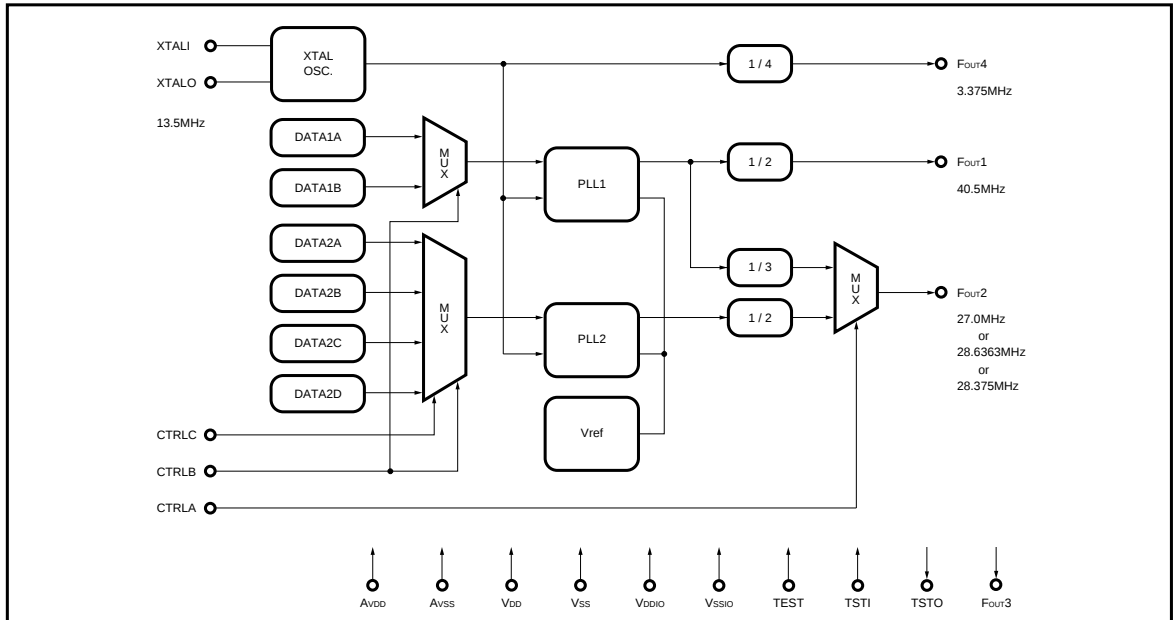
●Applications

Video CD systems

●Features

- 1) Three frequency clock signals can be generated with a single attached crystal resonator.
- 2) Two internal PLL channels.
- 3) Internal loop filter, eliminating the need to attach a loop.
- 4) Single 5.0V power supply.
- 5) SOP 18-pin package.

●Block diagram



●Pin description

Pin No.	Pin name	Function	Type
1	V _{DD}	Digital V _{DD}	—
2	TSTO	Open in the normal mode (used for testing)	B
3	XTALI	Reference oscillation input	C
4	XTALO	Reference oscillation output	C
5	CTRLA	GD-G / VCD clock switching	A
6	CTRLB	Stays at the high level when the IC is in the normal mode	A
7	CTRLC	CD-G PAL / NTSC clock switching	A
8	TSTI	Connect to V _{SS} when the IC is in the normal mode (used for testing)	A
9	V _{SS}	Digital ground	—
10	A _{VSS}	Analog ground	—
11	F _{OUT3}	Not used (open when the IC is in the normal mode)	B
12	V _{SSIO}	I / O ground	—
13	F _{OUT2}	Clock output 2	B
14	TEST	Setting the test mode (connect to V _{SS} when the IC is in the normal mode)	A
15	F _{OUT1}	Clock output 1	B
16	V _{DDIO}	I / O V _{DD}	—
17	F _{OUT4}	Clock output 4	B
18	A _{VDD}	Analog V _{DD}	—

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{DD}	− 0.3 ~ + 7.0	V
Power dissipation	P _d	450	mW
Operating temperature	T _{opr}	− 5 ~ + 70	°C
Storage temperature	T _{stg}	− 25 ~ + 125	°C

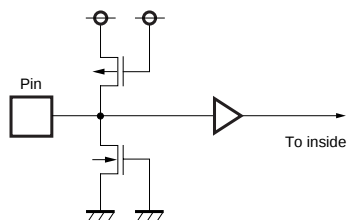
* Reduced by 4.5 mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta = 25°C)

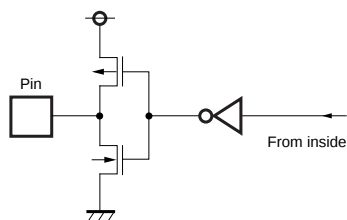
Parameter	Symbol	Limits	Unit
Power supply voltage	V _{DD} , A _{VDD} , V _{DDIO}	4.75 ~ 5.25	V
Input high level voltage	V _{IH}	0.8V _{DD} ~ V _{DD}	V
Input low level voltage	V _{IL}	0.0 ~ 0.2V _{DD}	V
Operating temperature	T _{opr}	− 5 ~ + 70	°C

● Input / output circuits

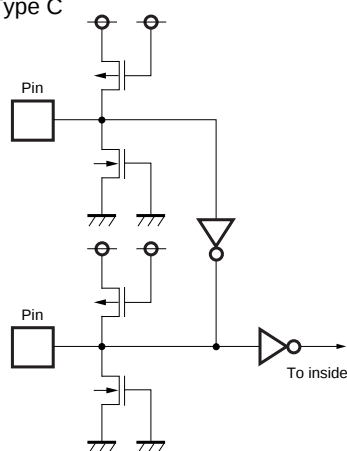
Type A



Type B

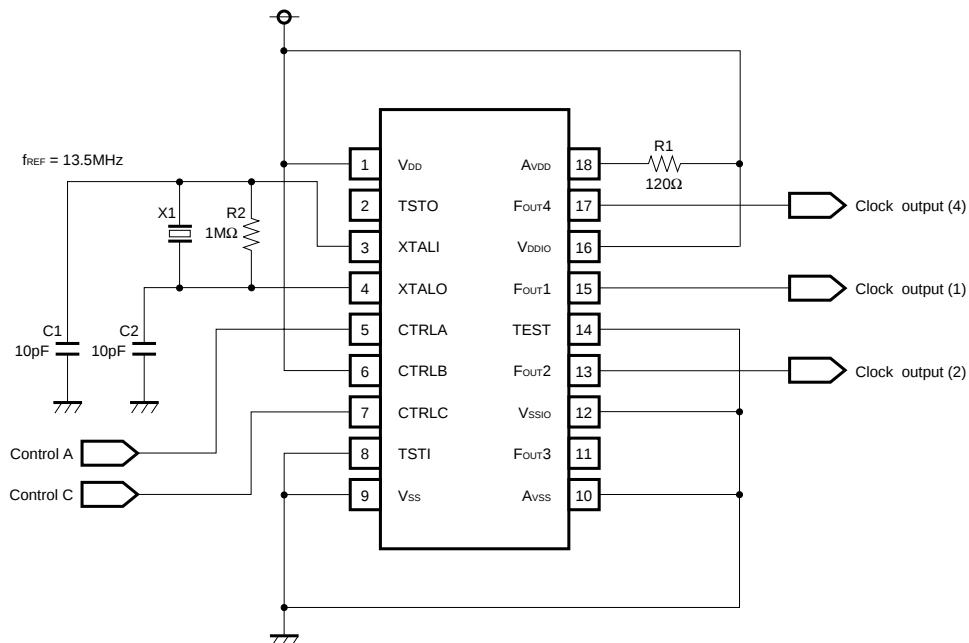


Type C

● Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{DD} = 5.0V, A_{VDD} = 5.0V, I_OV_{DD} = 5.0V)

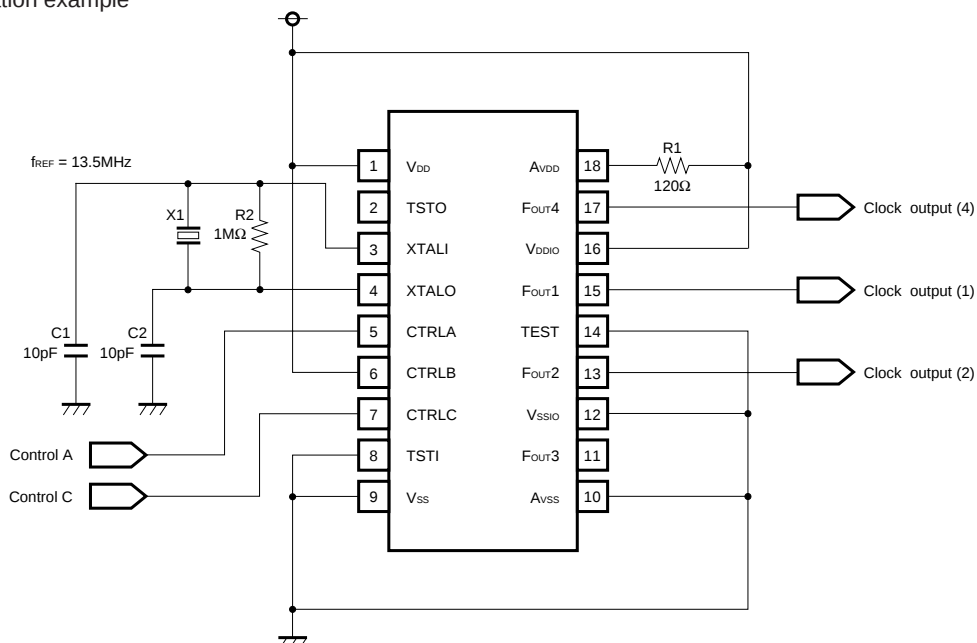
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input current, low level	I _{IL}	-300.0	0.0	300.0	μA	—
Input current, high level	I _{IH}	-300.0	0.0	300.0	μA	—
Input voltage, low level	V _{IL}	—	—	1.0	V	—
Input voltage, high level	V _{IH}	4.0	—	—	V	—
Output voltage, low level	V _{OL}	—	—	0.5	V	I _{OL} = 4.0mA
Output voltage, high level	V _{OH}	2.4	—	—	V	I _{OH} = -4.0mA
Operating supply current	I _{DD}	—	30	50	mA	f _{XTAL} = 13.5 MHz, no load
Reference frequency	f _{REF}	—	13.5	—	MHz	Use with CTRLB at the high level
Output frequency (1)	f ₁	—	40.5	—	MHz	f ₁ = f _{REF} × 96 / 16 / 2
Output frequency (2)	f _{2A}	—	27.000	—	MHz	f _{2A} = f _{REF} × 96 / 16 / 3 CTRLA = H, CTRLB = H, CTRLC = H
	f _{2B}	—	28.375	—	MHz	f _{2B} = f _{REF} × 227 / 54 / 2 CTRLA = L, CTRLB = H, CTRLC = L
	f _{2C}	—	28.636	—	MHz	f _{2C} = f _{REF} × 140 / 33 / 2 CTRLA = L, CTRLB = H, CTRLC = H
Output frequency (4)	f ₄	—	3.375	—	MHz	f ₄ = f _{REF} × 1 / 4
Jitter		—	1.0	—	ns	Measure at f _{2A} , f _{2B} , f _{2C} (reference)
Reference frequency (2)	f _{REF2}	—	14.318	—	MHz	Use with CTRLB at the low level
Output frequency (1)	f _{1B}	—	40.5	—	MHz	f _{1B} = f _{REF2} × 98 / 35 / 2
Output frequency (2)	f _{2D}	—	27.000	—	MHz	f _{2D} = f _{REF2} × 98 / 35 / 3 CTRLA = H, CTRLB = L, CTRLC = H
	f _{2E}	—	28.636	—	MHz	f _{2E} = f _{REF2} × 80 / 20 / 2 CTRLA = L, CTRLB = L, CTRLC = H
Output frequency (4)	f _{4B}	—	3.579	—	MHz	f _{4B} = f _{REF2} × 1 / 4

● Measurement circuit



Note: Certain crystal resonators may require setting XTALI and XTALO to the optimum allowable values.

● Application example



Note: Certain crystal resonators may require setting XTALI and XTALO to the optimum allowable values.

* This IC should be used mounted on a PC board. If mounted in a socket, characteristics of the IC may be adversely affected.

●Attached components

- R1: To keep the voltage of A_{VDD} effectively low, and to enhance signal stability by separating A_{VDD} and D_{VDD} with an impedance. Be sure to attach.
- R2: Needed to provide a feedback resistance for the crystal resonator
- C1 / C2: When f_0 must be adjusted according to the crystal resonator used, or when the crystal resonator results in unnecessary oscillation points, attach a PF and adjust according to the value for this capacitor.
- X1: Use a crystal resonator with an oscillation frequency of 13.5 MHz or 14.318 MHz.

●External dimensions (Units: mm)

