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.

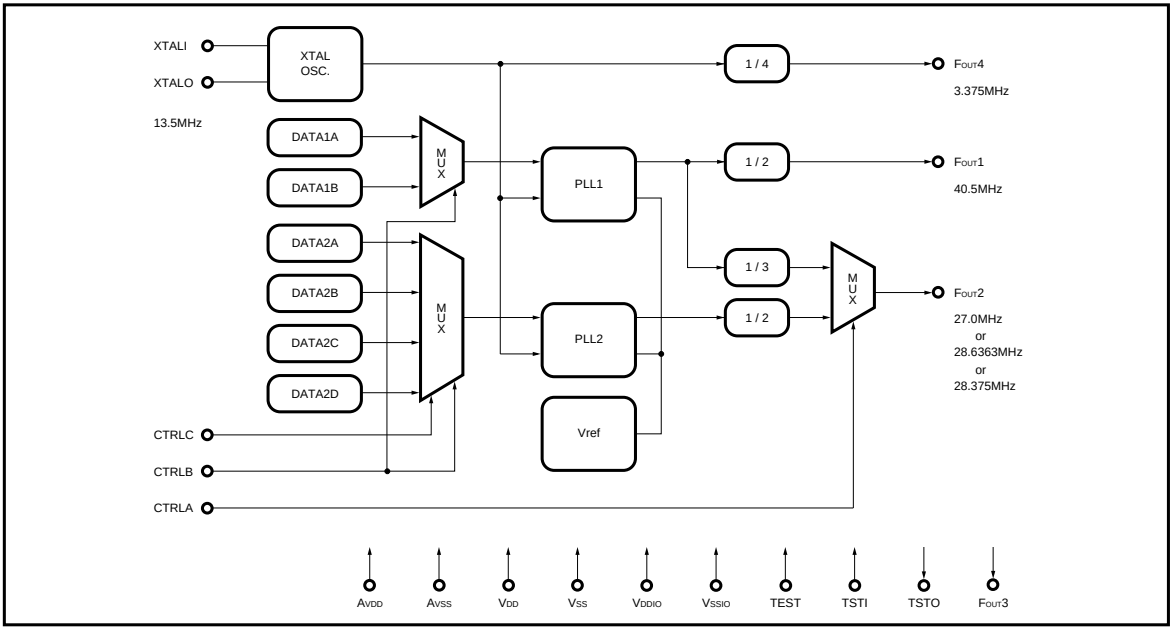
●Applications

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 Vss when the IC is in the normal mode (used for testing)	A
9	V_{SS}	Digital ground	—
10	A_{VSS}	Analog ground	—
11	$F_{OUT}3$	Not used (open when the IC is in the normal mode)	B
12	V_{SSIO}	I / O ground	—
13	$F_{OUT}2$	Clock output 2	B
14	TEST	Setting the test mode (connect to Vss when the IC is in the normal mode)	A
15	$F_{OUT}1$	Clock output 1	B
16	V_{DDIO}	I / O V_{DD}	—
17	$F_{OUT}4$	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	Pd	450	mW
Operating temperature	Topr	– 5 ~ + 70	°C
Storage temperature	Tstg	– 25 ~ + 125	°C

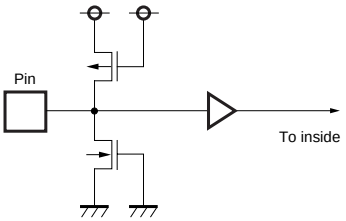
∗ Reduced by 4.5 mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta = 25°C)

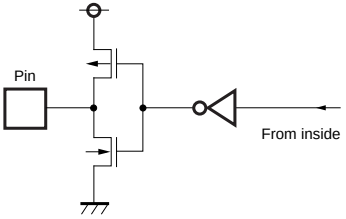
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{DD}, A_{VDD}, V_{DDIO}	4.75 ~ 5.25	V
Input high level voltage	V_{IH}	$0.8V_{DD}$ ~ V_{DD}	V
Input low level voltage	V_{IL}	0.0 ~ $0.2V_{DD}$	V
Operating temperature	Topr	– 5 ~ + 70	°C

●Input / output circuits

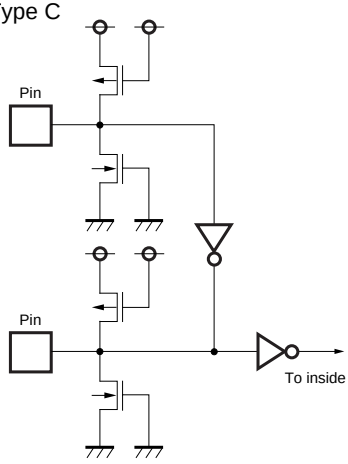
Type A



Type B



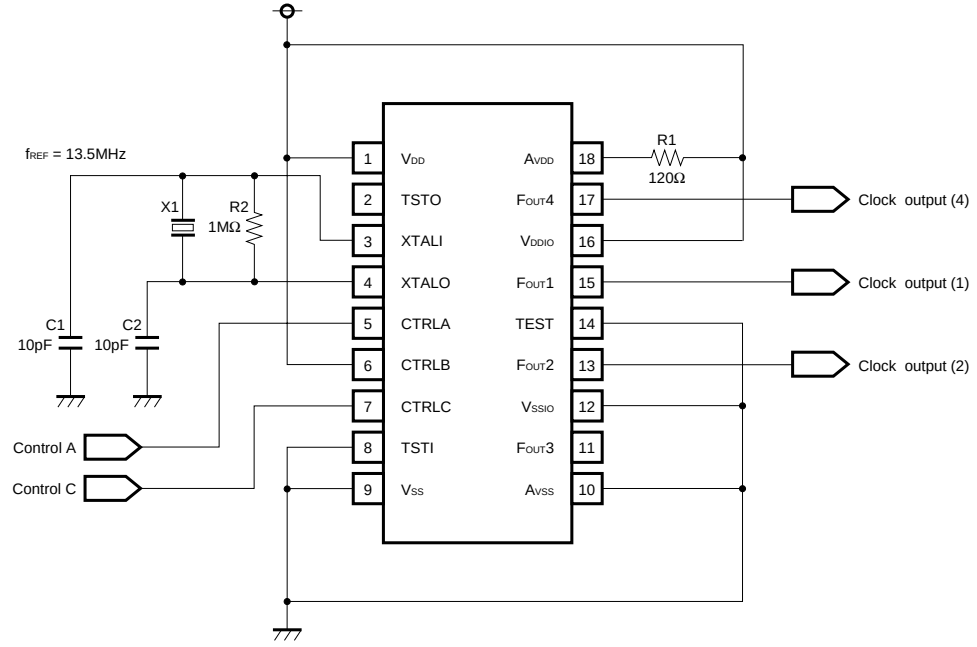
Type C



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

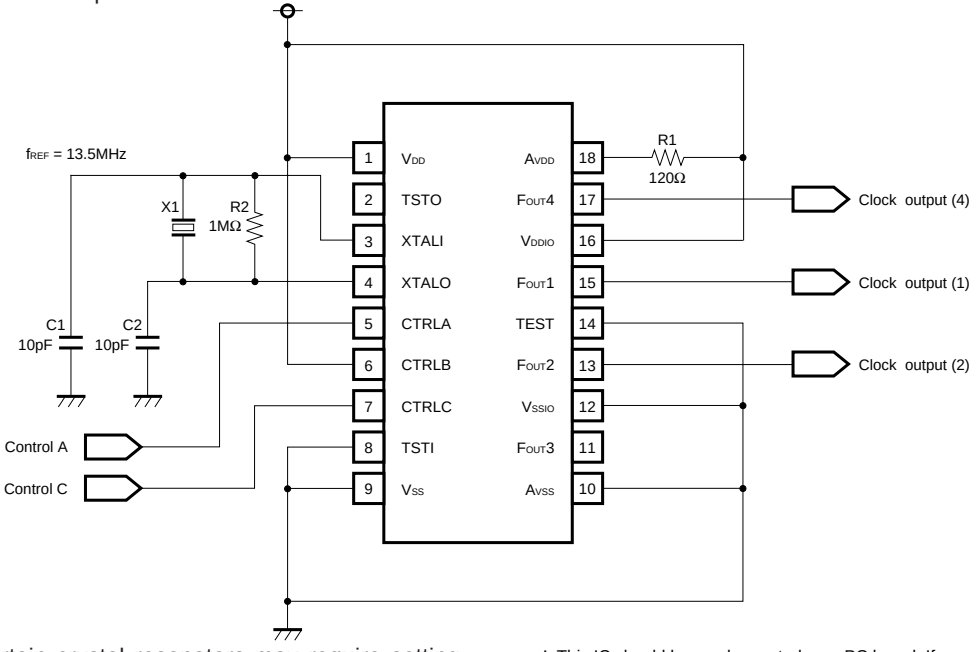
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input current, low level	I_{IL}	– 300.0	0.0	300.0	µA	—
Input current, high level	I_{IH}	– 300.0	0.0	300.0	µA	—
Input voltage, low level	V_{IL}	—	—	1.0	V	—
Input voltage, high level	V_{IH}	4.0	—	—	V	—
Output voltage, low level	V_{OL}	—	—	0.5	V	I_{OL} = 4.0mA
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	$f_1 = f_{REF} \times 96 / 16 / 2$
Output frequency (2)	f_{2A}	—	27.000	—	MHz	$f_{2A} = f_{REF} \times 96 / 16 / 3$ CTRLA = H, CTRLB = H, CTRLC = H
	f_{2B}	—	28.375	—	MHz	$f_{2B} = f_{REF} \times 227 / 54 / 2$ CTRLA = L, CTRLB = H, CTRLC = L
	f_{2C}	—	28.636	—	MHz	$f_{2C} = f_{REF} \times 140 / 33 / 2$ CTRLA = L, CTRLB = H, CTRLC = H
Output frequency (4)	f_4	—	3.375	—	MHz	$f_4 = f_{REF} \times 1 / 4$
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	$f_{1B} = f_{REF2} \times 98 / 35 / 2$
Output frequency (2)	f_{2D}	—	27.000	—	MHz	$f_{2D} = f_{REF2} \times 98 / 35 / 3$ CTRLA = H, CTRLB = L, CTRLC = H
	f_{2E}	—	28.636	—	MHz	$f_{2E} = f_{REF2} \times 80 / 20 / 2$ CTRLA = L, CTRLB = L, CTRLC = H
Output frequency (4)	f_{4B}	—	3.579	—	MHz	$f_{4B} = f_{REF2} \times 1 / 4$

●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

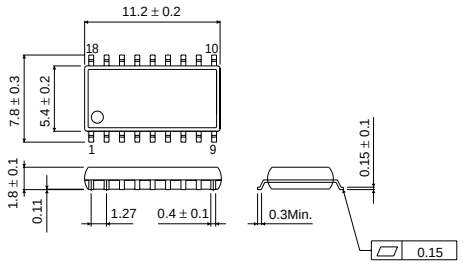
R1: To keep the voltage of A_{VDD} effectively low, and to enhance signal stability by separating A_{VDD} and D_{VDD} with an impedance. Be sure to attach.

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)



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