

XC2173

Series



ICs for use with Crystal Oscillators (PLL built - in)

◆CMOS

◆Oscillation Frequency

: 10MHz ~ 25MHz

◆Output Frequency : 80MHz ~ 160MHz (5.0V)

: 50MHz ~ 125MHz (3.3V)

◆Divider Circuit & PLL Circuit Built-In

◆3-State Output

◆Oscillation Capacitor & Oscillation Feedback Resistor Built-In

◆Mini Mold SOT-26 Package

■General Description

The XC2173 series are high frequency, low power consumption CMOS ICs with built-in crystal oscillator, divider and clock multiplier PLL circuits. Output is selectable from any one of the following values for f_0 : $f_0 \times 5$, $f_0 \times 6$, $f_0 \times 7$, $f_0 \times 8$, $f_0/2$, $f_0/4$, $f_0/8$. With an oscillation capacitor & oscillation feedback resistor built-in, a stable oscillator circuit can be put together using only an external crystal oscillator. By connecting an external standard clock, the above mentioned output frequencies can be achieved.

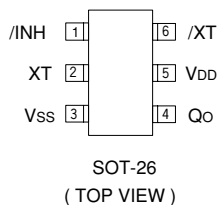
■Applications

- Crystal Oscillation Modules
- Computer, DSP Clocks
- Communication Equipment
- Various System Clocks

■Features

- Oscillation Frequency** : 10MHz ~ 25MHz
- Divider Ratio** : $f_0/2$, $f_0/4$, $f_0/8$
- Multiplier** : $f_0 \times 5$, $f_0 \times 6$, $f_0 \times 7$, $f_0 \times 8$
- Output** : 3-State
- Operating Voltage Range** : 3.3V \pm 10% and 5.0V \pm 10%
- Small Consumption Current** : Stand-by function included*
* oscillation continues in stand-by
- Ultra Small Package** : SOT-26 mini mold

■Pin Configuration



■Pin Assignment

PIN NUMBER	PIN NAME	FUNCTION
1	/INH	Stand-by control*
2	XT	Crystal Oscillator Connection (Input)
3	VSS	GND
4	Qo	Clock Output
5	VDD	Power Supply
6	/XT	Crystal Oscillator Connection (Output) / Standard Clock Input

* Stand-by control pin has pull-up resistor built-in.

■INH - B, QO Pin Function

/INH	Qo
"H"	Divider/Multiplier Output
"L"	High Impedance (Stand-by)
OPEN	Divider/Multiplier Output

"H" = High Level
"L" = Low Level

Product Classification

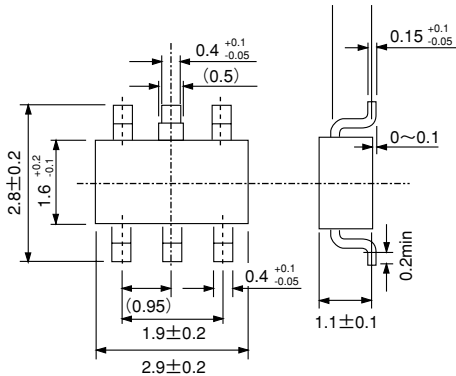
Ordering Information

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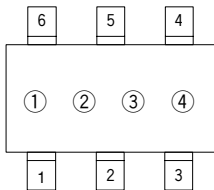
DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
a	Duty Level : C : CMOS (V _{DD} /2)	d	Input Oscillation Frequency Range 1 : 10MHz to 25MHz
b	Output Capacity : M : Multiplier Output D : Divider Output	e	Package : M = SOT-26
c	Multiplier Ratio or Divider Ratio 2 : f ₀ / 2 6 : f ₀ x 6 4 : f ₀ / 4 7 : f ₀ x 7 5 : f ₀ x 5 8 : f ₀ / 8 & f ₀ x 8	f	Device Orientation : R = Embossed Tape (Standard Feed) L = Embossed Tape (Reverse Feed)

Packaging Information

SOT-26



Marking



SOT-26
(TOP VIEW)

① Represents the Series name

MARK
7

② Represents the Output

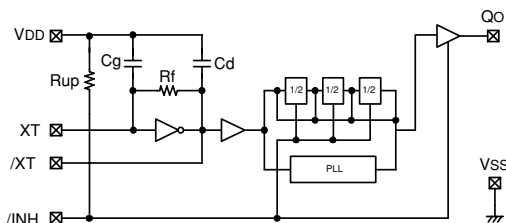
SYMBOL	OUTPUT
M	Multiplier
D	Divider

③ Represents the Multiplier and/or Divider Ratio

SYMBOL	M/D	SYMBOL	M/D
2	f ₀ /2	6	f ₀ x 6
4	f ₀ /4	7	f ₀ x 7
5	f ₀ /5	8	f ₀ /8 & f ₀ x 8

④ Represents the Assembly Lot No.
(based on internal standards)

Block Diagram



Absolute Maximum Ratings

PARAMETER	SYMBOL	CONDITIONS	UNITS
Supply Voltage	VDD	VSS-0.3~VSS+7.0	V
Input Voltage	VIN	VSS-0.3~VDD+0.3	V
Power Dissipation	Pd	250 (*3)	mW
Operating Ambient Temp.	Topr	-40~+85	°C
Storage Temp.	Tstg	-55~+125	°C

* When measured on a glass epoxy PCB

Electrical Characteristics

3.3V, f₀ x 8 multiplier (note 1)

T_a=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	VDD		2.97	3.3	3.63	V
'H' Level Input Voltage	V _{IH}		2.4			V
'L' Level Input Voltage	V _{IL}				0.4	V
'H' Level Output Voltage	V _{OH}	CMOS: V _{DD} =2.97V, I _{OH} =-8mA	2.47			V
'L' Level Output Voltage	V _{OL}	CMOS: V _{DD} =2.97V, I _{OL} =8mA			0.4	V
Consumption Current 1	I _{DD1}	/INH="OPEN", C _L =15pF, f=80MHz		10		mA
Consumption Current 2	I _{DD2}	/INH="L", C _L =15pF, f=80MHz		1		mA
Input pull up resistance 1	R _{up1}	/INH="L"	1.0	2.0	4.0	MΩ
Input pull up resistance 2	R _{up2}	/INH=0.7V _{DD}	35	70	140	kΩ
Internal Oscillation Capacitance	C _g	(note 3)		13		pF
	C _d	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R _f		0.3	1.0	2.0	MΩ
Output Off Leak Current	I _{oz}	/INH="L"			10	μA

5.0V, f₀ x 8 multiplier (note 2)

T_a=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	VDD		4.5	5.0	5.5	V
'H' Level Input Voltage	V _{IH}		2.4			V
'L' Level Input Voltage	V _{IL}				0.4	V
'H' Level Output Voltage	V _{OH}	CMOS: V _{DD} =4.5V, I _{OH} =-16mA	3.9	4.2		V
'L' Level Output Voltage	V _{OL}	CMOS: V _{DD} =4.5V, I _{OL} =16mA		0.3	0.4	V
Consumption Current 1	I _{DD1}	/INH="OPEN", C _L =15pF, f=160MHz		35		mA
Consumption Current 2	I _{DD2}	/INH="L", C _L =15pF, f=160MHz		5		mA
Input pull up resistance 1	R _{up1}	/INH="L"	0.5	1.0	2.0	MΩ
Input pull up resistance 2	R _{up2}	/INH=0.7V _{DD}	25	50	100	kΩ
Internal Oscillation Capacitance	C _g	(note 3)		13		pF
	C _d	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R _f		100	240	400	kΩ
Output Off Leak Current	I _{oz}	/INH="L"			10	μA

note 1 : The output frequency range is 80 MHz to 100MHz with a multiplier of f₀ x 8 at 3.3V

note 2 : The output frequency range is 80 MHz to 160MHz with a multiplier of f₀ x 8 at 5.0V

note 3 : measured value

3.3V, f₀ x 7 multiplier (note 1)

T_a=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V _{DD}		2.97	3.3	3.63	V
'H' Level Input Voltage	V _{IH}		2.4			V
'L' Level Input Voltage	V _{IL}				0.4	V
'H' Level Output Voltage	V _{OH}	CMOS: V _{DD} =2.97V, I _{OH} =-8mA	2.47			V
'L' Level Output Voltage	V _{OL}	CMOS: V _{DD} =2.97V, I _{OL} =8mA			0.4	V
Consumption Current 1	I _{DD1}	/INH="OPEN", C _L =15pF, f=70MHz		9		mA
Consumption Current 2	I _{DD2}	/INH="L", C _L =15pF, f=70MHz		1		mA
Input pull up resistance 1	R _{up1}	/INH="L"	1.0	2.0	4.0	MΩ
Input pull up resistance 2	R _{up2}	/INH=0.7V _{DD}	35	70	140	kΩ
Internal Oscillation Capacitance	C _g	(note 3)		13		pF
	C _d	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R _f		0.3	1.0	2.0	MΩ
Output Off Leak Current	I _{oz}	/INH="L"			10	μA

5.0V, f₀ x 7 multiplier (note 2)

T_a=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V _{DD}		4.5	5.0	5.5	V
'H' Level Input Voltage	V _{IH}		2.4			V
'L' Level Input Voltage	V _{IL}				0.4	V
'H' Level Output Voltage	V _{OH}	CMOS: V _{DD} =4.5V, I _{OH} =-16mA	3.9	4.2		V
'L' Level Output Voltage	V _{OL}	CMOS: V _{DD} =4.5V, I _{OL} =16mA		0.3	0.4	V
Consumption Current 1	I _{DD1}	/INH="OPEN", C _L =15pF, f=140MHz		28		mA
Consumption Current 2	I _{DD2}	/INH="L", C _L =15pF, f=140MHz		5		mA
Input pull up resistance 1	R _{up1}	/INH="L"	0.5	1.0	2.0	MΩ
Input pull up resistance 2	R _{up2}	/INH=0.7V _{DD}	25	50	100	kΩ
Internal Oscillation Capacitance	C _g	(note 3)		13		pF
	C _d	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R _f		100	240	400	kΩ
Output Off Leak Current	I _{oz}	/INH="L"			10	μA

note 1 : The output frequency range is 70 MHz to 100MHz with a multiplier of f₀ x 7 at 3.3V

note 2 : The output frequency range is 80 MHz to 160MHz with a multiplier of f₀ x 7 at 5.0V

note 3 : measured value

3.3V, f₀ x 6 multiplier (note 1)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V _{DD}		2.97	3.3	3.63	V
'H' Level Input Voltage	V _{IH}		2.4			V
'L' Level Input Voltage	V _{IL}				0.4	V
'H' Level Output Voltage	V _{OH}	CMOS: V _{DD} =2.97V, I _{OH} =-8mA	2.47			V
'L' Level Output Voltage	V _{OL}	CMOS: V _{DD} =2.97V, I _{OL} =8mA			0.4	V
Consumption Current 1	I _{DD1}	/INH="OPEN", C _L =15pF, f=60MHz		8		mA
Consumption Current 2	I _{DD2}	/INH="L", C _L =15pF, f=60MHz		1		mA
Input pull up resistance 1	R _{up1}	/INH="L"	1.0	2.0	4.0	MΩ
Input pull up resistance 2	R _{up2}	/INH=0.7V _{DD}	35	70	140	kΩ
Internal Oscillation Capacitance	C _g	(note 3)		13		pF
	C _d	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R _f		0.3	1.0	2.0	MΩ
Output Off Leak Current	I _{oz}	/INH="L"			10	μA

5.0V, f₀ x 6 multiplier (note 2)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V _{DD}		4.5	5.0	5.5	V
'H' Level Input Voltage	V _{IH}		2.4			V
'L' Level Input Voltage	V _{IL}				0.4	V
'H' Level Output Voltage	V _{OH}	CMOS: V _{DD} =4.5V, I _{OH} =-16mA	3.9	4.2		V
'L' Level Output Voltage	V _{OL}	CMOS: V _{DD} =4.5V, I _{OL} =16mA		0.3	0.4	V
Consumption Current 1	I _{DD1}	/INH="OPEN", C _L =15pF, f=120MHz		23		mA
Consumption Current 2	I _{DD2}	/INH="L", C _L =15pF, f=120MHz		5		mA
Input pull up resistance 1	R _{up1}	/INH="L"	0.5	1.0	2.0	MΩ
Input pull up resistance 2	R _{up2}	/INH=0.7V _{DD}	25	50	100	kΩ
Internal Oscillation Capacitance	C _g	(note 3)		13		pF
	C _d	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R _f		100	240	400	kΩ
Output Off Leak Current	I _{oz}	/INH="L"			10	μA

 note 1 : The output frequency range is 60 MHz to 100MHz with a multiplier of f₀ x 6 at 3.3V

 note 2 : The output frequency range is 80 MHz to 150MHz with a multiplier of f₀ x 6 at 5.0V

note 3 : measured value

3.3V, f₀ x 5 multiplier (note 1)

T_a=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V _{DD}		2.97	3.3	3.63	V
'H' Level Input Voltage	V _{IH}		2.4			V
'L' Level Input Voltage	V _{IL}				0.4	V
'H' Level Output Voltage	V _{OH}	CMOS: V _{DD} =2.97V, I _{OH} =-8mA	2.47			V
'L' Level Output Voltage	V _{OL}	CMOS: V _{DD} =2.97V, I _{OL} =8mA			0.4	V
Consumption Current 1	I _{DD1}	/INH="OPEN", C _L =15pF, f=50MHz		7		mA
Consumption Current 2	I _{DD2}	/INH="L", C _L =15pF, f=50MHz		1		mA
Input pull up resistance 1	R _{up1}	/INH="L"	1.0	2.0	4.0	MΩ
Input pull up resistance 2	R _{up2}	/INH=0.7V _{DD}	35	70	140	kΩ
Internal Oscillation Capacitance	C _g	(note 3)		13		pF
	C _d	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R _f		0.3	1.0	2.0	MΩ
Output Off Leak Current	I _{oz}	/INH="L"			10	μA

5.0V, f₀ x 5 multiplier (note 2)

T_a=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V _{DD}		4.5	5.0	5.5	V
'H' Level Input Voltage	V _{IH}		2.4			V
'L' Level Input Voltage	V _{IL}				0.4	V
'H' Level Output Voltage	V _{OH}	CMOS: V _{DD} =4.5V, I _{OH} =-16mA	3.9	4.2		V
'L' Level Output Voltage	V _{OL}	CMOS: V _{DD} =4.5V, I _{OL} =16mA		0.3	0.4	V
Consumption Current 1	I _{DD1}	/INH="OPEN", C _L =15pF, f=100MHz		23		mA
Consumption Current 2	I _{DD2}	/INH="L", C _L =15pF, f=100MHz		5		mA
Input pull up resistance 1	R _{up1}	/INH="L"	0.5	1.0	2.0	MΩ
Input pull up resistance 2	R _{up2}	/INH=0.7V _{DD}	25	50	100	kΩ
Internal Oscillation Capacitance	C _g	(note 3)		13		pF
	C _d	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R _f		100	240	400	kΩ
Output Off Leak Current	I _{oz}	/INH="L"			10	μA

note 1 : The output frequency range is 50 MHz to 100MHz with a multiplier of f₀ x 5 at 3.3V

note 2 : The output frequency range is 80 MHz to 125MHz with a multiplier of f₀ x 5 at 5.0V

note 3 : measured value

■ Switching Characteristics

3.3V

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Rise Time	tr	CL=15pF, 0.1VDD ~ 0.9VDD (note 1)		2.0		ns
Output Fall Time	tf	CL=15pF, 0.9VDD ~ 0.1VDD (note 1)		2.0		ns
Output DUTY Cycle	DUTY	CMOS: 0.5VDD, CL=15pF	45		55	%
Output Disenable (Delay Time)	tplz	CL=15pF (note 1)			100	ns
Output Enable (Delay Time)	tpzl	CL=15pF (note 1)			100	ns
Jitter	tj	1 σ (note 1)		50		ps

5.0V

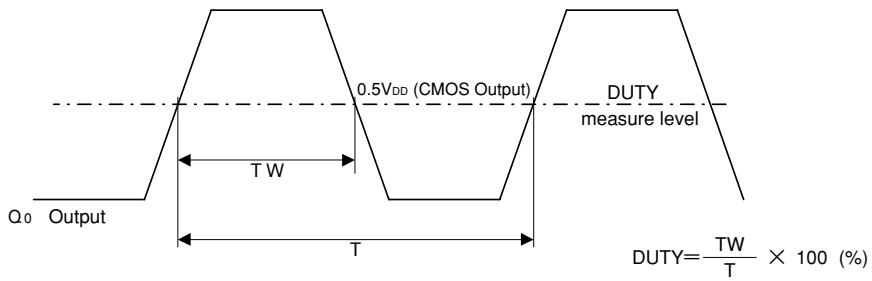
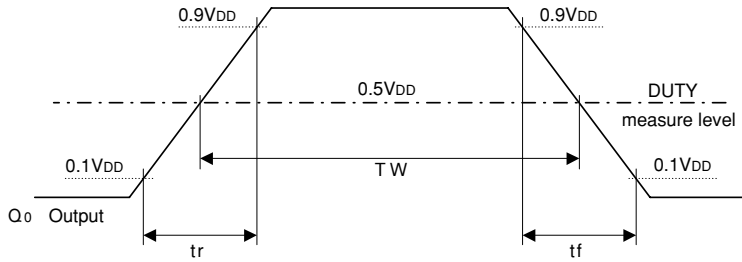
Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Rise Time	tr	CL=15pF, 0.1VDD ~ 0.9VDD (note 1)		1.5		ns
Output Fall Time	tf	CL=15pF, 0.9VDD ~ 0.1VDD (note 1)		1.5		ns
Output DUTY Cycle	DUTY	CMOS: 0.5VDD, CL=15pF	45		55	%
Output Disenable (Delay Time)	tplz	CL=15pF (note 1)			100	ns
Output Enable (Delay Time)	tpzl	CL=15pF (note 1)			100	ns
Jitter	tj	1 σ (note 1)		50		ps

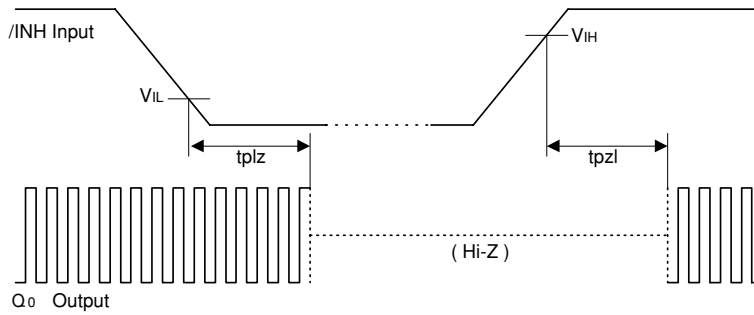
note 1 : measured value

Switching Characteristics

1) CMOS Level : tr, tf, Duty



2) Output Disable/Enable Delay Time



*) /INH pin input waveform : tr = tf = less than 10 ns