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**

■Applications

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

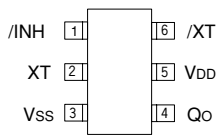
■General Description

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 f0 :
f0 x 5, f0 x 6, f0 x 7, f0 x 8, f0/2, f0/4, f0/8. 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.

■Features

Oscillation Frequency : 10MHz ~ 25MHz
Divider Ratio : f0/2, f0/4, f0/8
Multiplier : f0 x 5, f0 x 6, f0 x 7, f0 x 8
Output : 3-State
Operating Voltage Range : 3.3V ±10% and 5.0V ±10%
Small Consumption Current : Stand-by function included*
* oscillation continues in stand-by
Ultra Small Package : SOT-26 mini mold

■Pin Configuration



SOT-26
(TOP VIEW)

■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	Q0
"H"	Divider/Multiplier Output
"L"	High Impedance (Stand-by)
OPEN	Divider/Multiplier Output

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

■Product Classification

●Ordering Information

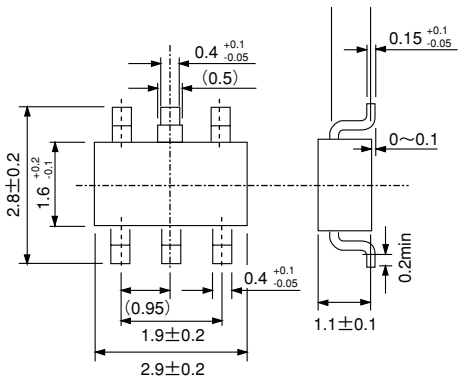
X C 2 1 7 3 ①②③④⑤⑥

a b c d e f

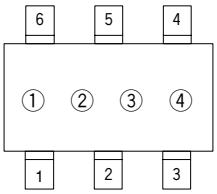
DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
a	Duty Level : C : CMOS (VDD/2)	d	Input Oscillation Frequency Range 1 : 10MHz to 25MHz
b	Output Capacity : M: Multiplier Output D : Divider Output	e	Package : M = SOT-26
c	Multiplier Ratio or Divider Ratio 2 : f0 / 2 6 : f0 x 6 4 : f0 / 4 7 : f0 x 7 5 : f0 x 5 8 : f0 / 8 & f0 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

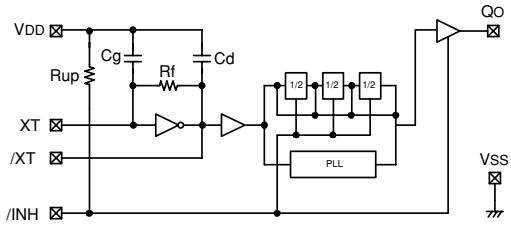
SYMBOL	OUTPUT
M	Multiplier
D	Divider

③ Represents the Multiplier and/or Divider Ratio

SYMBOL	M/D	SYMBOL	M/D
2	f0/2	6	f0 x 6
4	f0/4	7	f0 x 7
5	f0/5	8	f0/8 & f0 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	℃
Storage Temp.	Tstg	-55～+125	℃

* When measured on a glass epoxy PCB

■Electrical Characteristics

3.3V, f0 x 8 multiplier (note 1)

Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	VDD		2.97	3.3	3.63	V
'H' Level Input Voltage	VIH		2.4			V
'L' Level Input Voltage	VIL				0.4	V
'H' Level Output Voltage	VOH	CMOS: VDD=2.97V, IOH=-8mA	2.47			V
'L' Level Output Voltage	VOL	CMOS: VDD=2.97V, IOL=8mA			0.4	V
Consumption Current 1	IDD1	/INH="OPEN", CL=15pF, f=80MHz		10		mA
Consumption Current 2	IDD2	/INH="L", CL=15pF, f=80MHz		1		mA
Input pull up resistance 1	Rup1	/INH="L"	1.0	2.0	4.0	MΩ
Input pull up resistance 2	Rup2	/INH=0.7VDD	35	70	140	kΩ
Internal Oscillation Capacitance	Cg	(note 3)		13		pF
	Cd	(note 3)		13		pF
Internal Oscillation Feedback Resistance	Rf		0.3	1.0	2.0	MΩ
Output Off Leak Current	Ioz	/INH="L"			10	μA

5.0V, f0 x 8 multiplier (note 2)

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PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	VDD		4.5	5.0	5.5	V
'H' Level Input Voltage	VIH		2.4			V
'L' Level Input Voltage	VIL				0.4	V
'H' Level Output Voltage	VOH	CMOS: VDD=4.5V, IOH=-16mA	3.9	4.2		V
'L' Level Output Voltage	VOL	CMOS: VDD=4.5V, IOL=16mA		0.3	0.4	V
Consumption Current 1	IDD1	/INH="OPEN", CL=15pF, f=160MHz		35		mA
Consumption Current 2	IDD2	/INH="L", CL=15pF, f=160MHz		5		mA
Input pull up resistance 1	Rup1	/INH="L"	0.5	1.0	2.0	MΩ
Input pull up resistance 2	Rup2	/INH=0.7VDD	25	50	100	kΩ
Internal Oscillation Capacitance	Cg	(note 3)		13		pF
	Cd	(note 3)		13		pF
Internal Oscillation Feedback Resistance	Rf		100	240	400	kΩ
Output Off Leak Current	Ioz	/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)

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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	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=70MHz		9		mA
Consumption Current 2	$I_{DD}2$	/INH="L", C_L=15pF, f=70MHz		1		mA
Input pull up resistance 1	Rup1	/INH="L"	1.0	2.0	4.0	MΩ
Input pull up resistance 2	Rup2	/INH=0.7V_{DD}	35	70	140	kΩ
Internal Oscillation Capacitance	Cg	(note 3)		13		pF
	Cd	(note 3)		13		pF
Internal Oscillation Feedback Resistance	Rf		0.3	1.0	2.0	MΩ
Output Off Leak Current	Ioz	/INH="L"			10	μA

5.0V, f0 x 7 multiplier (note 2)

Ta=25℃

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	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=140MHz		28		mA
Consumption Current 2	$I_{DD}2$	/INH="L", C_L=15pF, f=140MHz		5		mA
Input pull up resistance 1	Rup1	/INH="L"	0.5	1.0	2.0	MΩ
Input pull up resistance 2	Rup2	/INH=0.7V_{DD}	25	50	100	kΩ
Internal Oscillation Capacitance	Cg	(note 3)		13		pF
	Cd	(note 3)		13		pF
Internal Oscillation Feedback Resistance	Rf		100	240	400	kΩ
Output Off Leak Current	Ioz	/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)

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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	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=60MHz		8		mA
Consumption Current 2	$I_{DD}2$	/INH="L", C_L=15pF, f=60MHz		1		mA
Input pull up resistance 1	Rup1	/INH="L"	1.0	2.0	4.0	MΩ
Input pull up resistance 2	Rup2	/INH=0.7V_{DD}	35	70	140	kΩ
Internal Oscillation Capacitance	Cg	(note 3)		13		pF
	Cd	(note 3)		13		pF
Internal Oscillation Feedback Resistance	Rf		0.3	1.0	2.0	MΩ
Output Off Leak Current	Ioz	/INH="L"			10	μA

5.0V, f0 x 6 multiplier (note 2)

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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	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=120MHz		23		mA
Consumption Current 2	$I_{DD}2$	/INH="L", C_L=15pF, f=120MHz		5		mA
Input pull up resistance 1	Rup1	/INH="L"	0.5	1.0	2.0	MΩ
Input pull up resistance 2	Rup2	/INH=0.7V_{DD}	25	50	100	kΩ
Internal Oscillation Capacitance	Cg	(note 3)		13		pF
	Cd	(note 3)		13		pF
Internal Oscillation Feedback Resistance	Rf		100	240	400	kΩ
Output Off Leak Current	Ioz	/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)

Ta=25℃

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	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=50MHz		7		mA
Consumption Current 2	$I_{DD}2$	/INH="L", C_L=15pF, f=50MHz		1		mA
Input pull up resistance 1	Rup1	/INH="L"	1.0	2.0	4.0	MΩ
Input pull up resistance 2	Rup2	/INH=0.7V_{DD}	35	70	140	kΩ
Internal Oscillation Capacitance	Cg	(note 3)		13		pF
	Cd	(note 3)		13		pF
Internal Oscillation Feedback Resistance	Rf		0.3	1.0	2.0	MΩ
Output Off Leak Current	Ioz	/INH="L"			10	μA

5.0V, f0 x 5 multiplier (note 2)

Ta=25℃

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	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=100MHz		23		mA
Consumption Current 2	$I_{DD}2$	/INH="L", C_L=15pF, f=100MHz		5		mA
Input pull up resistance 1	Rup1	/INH="L"	0.5	1.0	2.0	MΩ
Input pull up resistance 2	Rup2	/INH=0.7V_{DD}	25	50	100	kΩ
Internal Oscillation Capacitance	Cg	(note 3)		13		pF
	Cd	(note 3)		13		pF
Internal Oscillation Feedback Resistance	Rf		100	240	400	kΩ
Output Off Leak Current	Ioz	/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

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

5.0V

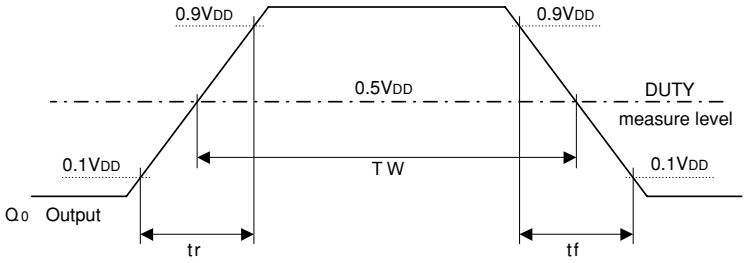
Ta=25℃

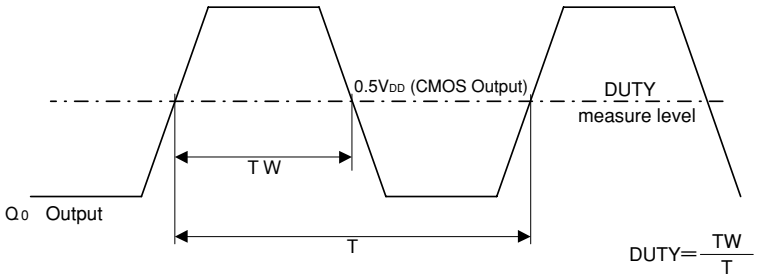
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Rise Time	tr	C_L=15pF, 0.1V_{DD} ~ 0.9V_{DD} (note 1)		1.5		ns
Output Fall Time	tf	C_L=15pF, 0.9V_{DD} ~ 0.1V_{DD} (note 1)		1.5		ns
Output DUTY Cycle	DUTY	CMOS: 0.5V_{DD}, C_L=15pF	45		55	%
Output Disenable (Delay Time)	tplz	C_L=15pF (note 1)			100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

note 1 : measured value

■Switching Characteristics

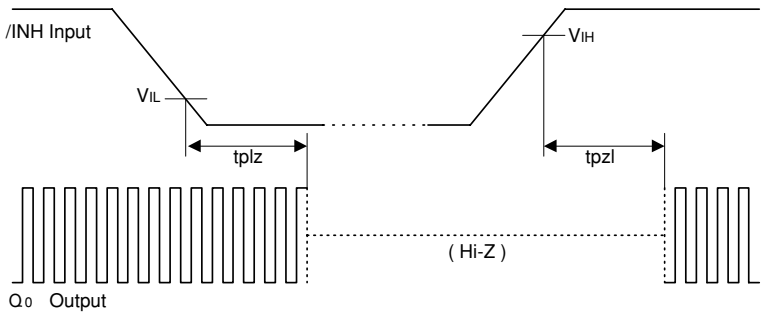
1) CMOS Level : tr, tf, Duty





$$DUTY = \frac{TW}{T} \times 100\ (\%)$$

2) Output Disable/Enable Delay Time



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