XC2173 Series

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

■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.

■APPLICATIONS

●Crystal oscillation modules

●Computer, DSP clocks

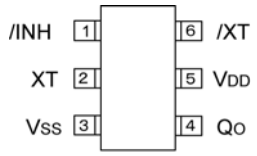
●Communication equipment

●Various system clocks

■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
CMOS
Output Frequency : 80MHz ~ 160MHz (5.0V)
: 50MHz ~ 125MHz (3.3V)
Divider Circuit & PLL Circuit Built-In
Oscillation Capacitor & Oscillation Feedback Resistor Built-In
Package : SOT-26
Environmentally Friendly : EU RoHS Compliant, Pb Free

■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	Q0	Clock Output
5	VDD	Power Supply
6	/XT	Crystal Oscillator Connection (Output) /Standard Clock Input

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

■INH, Q0 PIN FUNCTION

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

"H" = High level
"L" = Low level

■PRODUCT CLASSIFICATION

●Ordering Information

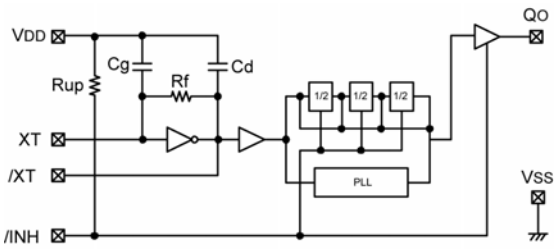
XC2173①②③④⑤⑥-⑦(*1)

DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
①	Duty Level	C	: CMOS (VDD/2)
②	Output Capacity	M	: Multiplier output
		D	: Divider output
③	Multiplier or Divider Ratio	2	: f0 / 2
		4	: f0 / 4
		5	: f0 x 5
		6	: f0 x 6
		7	: f0 x 7
		8	: f0 / 8 & f0 x 8
④	Input Oscillation Frequency	1	: 10MHz ~ 25MHz
⑤⑥-⑦	Packages Taping Type (*2)	MR-G	: SOT-26

(*1) The "-G" suffix indicates that the products are Halogen and Antimony free as well as being fully RoHS compliant.

(*2) The device orientation is fixed in its embossed tape pocket. For reverse orientation, please contact your local Torex sales office or representative. (Standard orientation: ⑤R-⑦, Reverse orientation: ⑤L-⑦)

■BLOCK DIAGRAM



■ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	CONDITIONS	UNITS
Supply Voltage	V_{DD}	V_{SS}-0.3～V_{SS}+7.0	V
Input Voltage	V_{IN}	V_{SS}-0.3～V_{DD}+0.3	V
Power Dissipation	Pd	250 (*)	mW
Operating Temperature Range	Topr	-40～+85	℃
Storage Temperature Range	Tstg	-55～+125	℃

* When measured on a glass epoxy PCB

■ELECTRICAL CHARACTERISTICS

3.3V, f0 x 8 multiplier (*1)

Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating Voltage	V_{DD}		2.97	3.30	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
Supply Current 1	$I_{DD}1$	/I_{NH}="OPEN", C_L=15pF, f=80MHz	-	10	-	mA
Supply Current 2	$I_{DD}2$	/I_{NH}="L", C_L=15pF, f=80MHz	-	1	-	mA
Input Pull-Up Resistance 1	Rup1	/I_{NH}="L"	1.0	2.0	4.0	MΩ
Input Pull-Up Resistance 2	Rup2	/I_{NH}=0.7V_{DD}	35	70	140	kΩ
Internal Oscillation Capacitance	Cg	(*3)	-	13	-	pF
	Cd	(*3)	-	13	-	pF
Internal Oscillation Feedback Resistance	Rf		0.3	1.0	2.0	MΩ
Output Off Leak Current	I_{OZ}	/I_{NH}="L"	-	-	10	μA

5.0V, f0 x 8 multiplier (*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
Supply Current 1	$I_{DD}1$	/I_{NH}="OPEN", C_L=15pF, f=160MHz	-	35	-	mA
Supply Current 2	$I_{DD}2$	/I_{NH}="L", C_L=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=0.7V_{DD}	25	50	100	kΩ
Internal Oscillation Capacitance	Cg	(*3)	-	13	-	pF
	Cd	(*3)	-	13	-	pF
Internal Oscillation Feedback Resistance	Rf		100	240	400	kΩ
Output Off Leak Current	I_{OZ}	/I_{NH}="L"	-	-	10	μA

*1: Output frequency range is 80 MHz to 125MHz with a multiplier of f0 x 8 at 3.3V

*2: Output frequency range is 80 MHz to 160MHz with a multiplier of f0 x 8 at 5.0V

*3: R&D value

■ELECTRICAL CHARACTERISTICS (Continued)

3.3V, f0 x 7 multiplier (*1)

Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating Voltage	V_{DD}		2.97	3.30	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
Supply Current 1	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=70MHz	-	9	-	mA
Supply 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	(*3)	-	13	-	pF
	Cd	(*3)	-	13	-	pF
Internal Oscillation Feedback Resistance	Rf		0.3	1.0	2.0	MΩ
Output Off Leak Current	I_{OZ}	/INH="L"	-	-	10	μA

5.0V, f0 x 7 multiplier (*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
Supply Current 1	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=140MHz	-	28	-	mA
Supply 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	(*3)	-	13	-	pF
	Cd	(*3)	-	13	-	pF
Internal Oscillation Feedback Resistance	Rf		100	240	400	kΩ
Output Off Leak Current	I_{OZ}	/INH="L"	-	-	10	μA

*1 : Output frequency range is 70 MHz to 125MHz with a multiplier of f0 x 7 at 3.3V

*2 : Output frequency range is 80 MHz to 160MHz with a multiplier of f0 x 7 at 5.0V

*3 : R&D value

■ELECTRICAL CHARACTERISTICS (Continued)

3.3V, f0 x 6 multiplier (*1)

Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating Voltage	V_{DD}		2.97	3.30	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
Supply Current 1	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=60MHz	-	8	-	mA
Supply 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	(*3)	-	13	-	pF
	Cd	(*3)	-	13	-	pF
Internal Oscillation Feedback Resistance	Rf		0.3	1.0	2.0	MΩ
Output Off Leak Current	I_{OZ}	/INH="L"	-	-	10	μA

5.0V, f0 x 6 multiplier (*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
Supply Current 1	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=120MHz	-	23	-	mA
Supply 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	(*3)	-	13	-	pF
	Cd	(*3)	-	13	-	pF
Internal Oscillation Feedback Resistance	Rf		100	240	400	kΩ
Output Off Leak Current	I_{OZ}	/INH="L"	-	-	10	μA

*1: Output frequency range is 60 MHz to 125MHz with a multiplier of f0 x 6 at 3.3V

*2: Output frequency range is 80 MHz to 150MHz with a multiplier of f0 x 6 at 5.0V

*3:R&D value

■ELECTRICAL CHARACTERISTICS (Continued)

3.3V, f0 x 5 multiplier (*1)

Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating Voltage	V_{DD}		2.97	3.30	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
Supply Current 1	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=50MHz	-	7	-	mA
Supply 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	(*3)	-	13	-	pF
	Cd	(*3)	-	13	-	pF
Internal Oscillation Feedback Resistance	Rf		0.3	1.0	2.0	MΩ
Output Off Leak Current	I_{OZ}	/INH="L"	-	-	10	μA

5.0V, f0 x 5 multiplier (*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
Supply Current 1	$I_{DD}1$	/INH="OPEN", C_L=15pF, f=100MHz	-	23	-	mA
Supply 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	(*3)	-	13	-	pF
	Cd	(*3)	-	13	-	pF
Internal Oscillation Feedback Resistance	Rf		100	240	400	kΩ
Output Off Leak Current	I_{OZ}	/INH="L"	-	-	10	μA

*1: Output frequency range is 50 MHz to 125MHz with a multiplier of f0 x 5 at 3.3V

*2: Output frequency range is 80 MHz to 125MHz with a multiplier of f0 x 5 at 5.0V

*3: R&D value

■SWITCHING CHARACTERISTICS

3.3V

Ta=25℃

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

5.0V

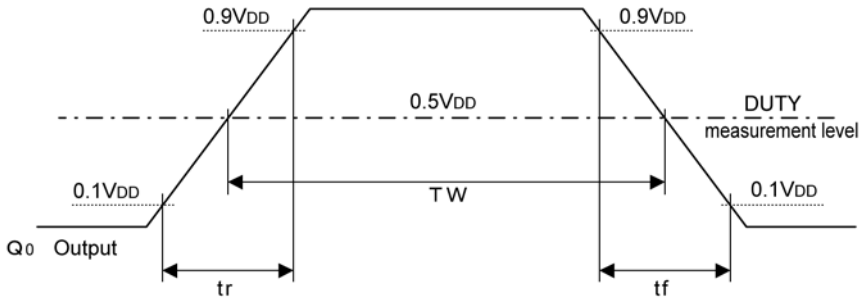
Ta=25℃

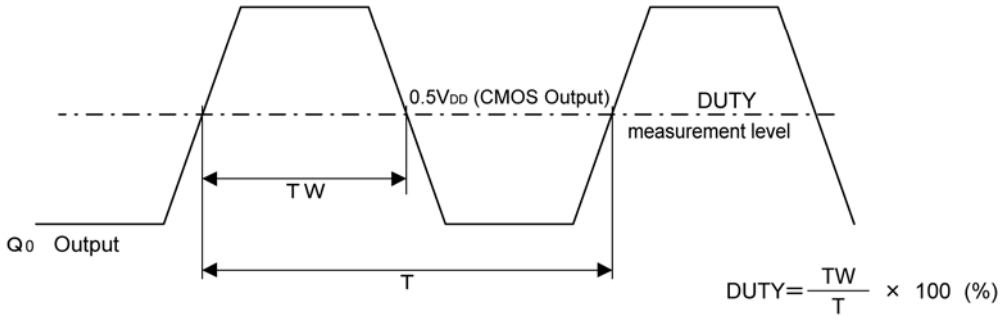
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Output Rise Time	tr	C_L=15pF, 0.1V_{DD} ~ 0.9V_{DD} (*1)	-	1.5	-	ns
Output Fall Time	tf	C_L=15pF, 0.9V_{DD} ~ 0.1V_{DD} (*1)	-	1.5	-	ns
Output DUTY Cycle	DUTY	CMOS: 0.5V_{DD}, C_L=15pF	45	-	55	%
Output Disable Delay Time	tplz	C_L=15pF (*1)	-	-	100	ns
Output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

*1 : R&D value

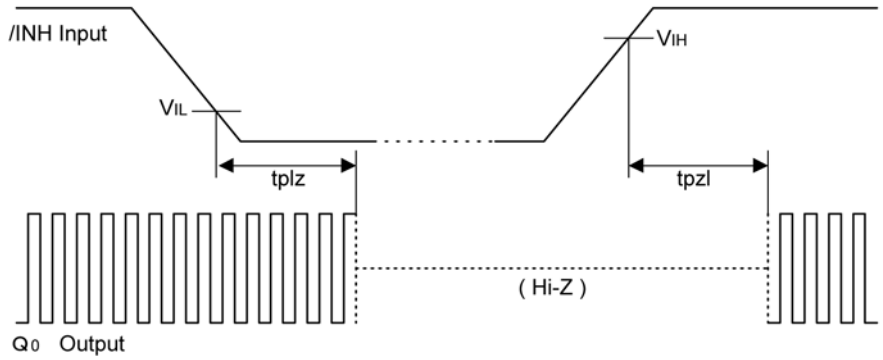
■SWITCHING CHARACTERISTICS

1) CMOS Level: tr , tf , Duty





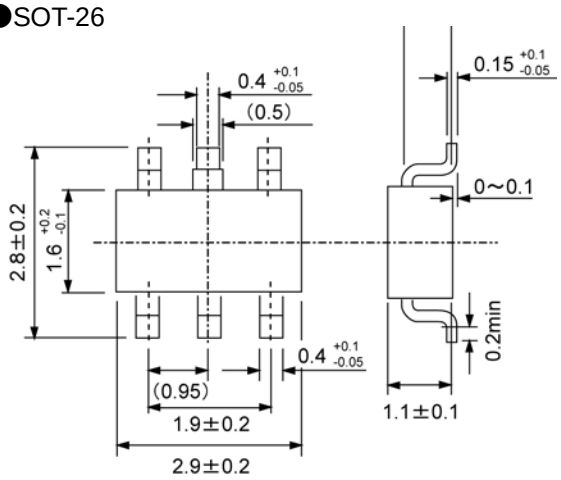
2) Output Disable/Enable Delay Time



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

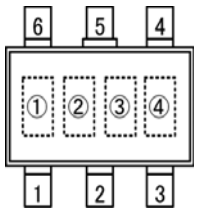
■PACKAGING INFORMATION

●SOT-26



■MARKING RULE

●SOT-26



SOT-26
(TOP VIEW)

①Represents product series

MARK
7

②Represents output

MARK	OUTPUT
M	Multiplier
D	Divider

③Represents multiplier and/or divider ratio

MARK	RATIO	MARK	RATIO
2	f0/2	6	f0 x 6
4	f0/4	7	f0 x 7
5	f0/5	8	f0/8 & f0 x 8

④Represents assembly lot number.
(Based on internal standards)

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