

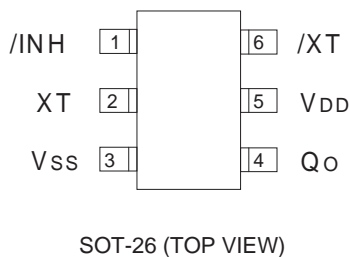
### Preliminary

- ◆ CMOS
- ◆ Oscillation Frequency 10MHz to 25MHz
- ◆ Output Frequency
  - 80MHz to 160MHz (5.0V)
  - 50MHz to 100MHz (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.

#### Pin Configuration



#### INH - B, Q0 Pin Function

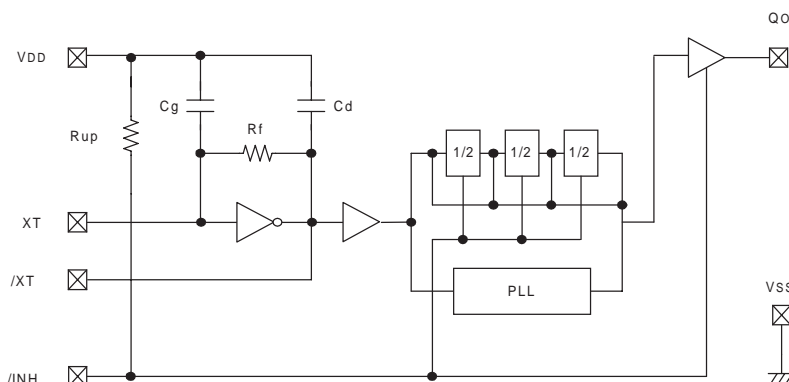
/INH	"H" or OPEN	"L" Stand-by
Q0	Divider / Multiplier Output	High Impedance

#### Absolute Maximum Ratings

PARAMETER	SYMBOL	CONDITIONS	UNITS
Supply Voltage	V <sub>DD</sub>	V <sub>SS</sub> - 0.3 to V <sub>SS</sub> + 7.0	V
Input Voltage	V <sub>IN</sub>	V <sub>SS</sub> - 0.3 to V <sub>DD</sub> + 0.3	V
Power Dissipation	P <sub>d</sub>	250 *	mW
Operating Ambient Temp.	T <sub>opr</sub>	-30 to +80	°C
Storage Temp.	T <sub>stg</sub>	-55 to +125	°C

\* When measured on a glass epoxy PCB

#### Block Diagram



#### Applications

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

#### Features

- Oscillation Frequency** : 10MHz to 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 intermittent in stand-by
- Ultra Small Package** : SOT - 26 (150mW) mini mold

#### 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 resistance built-in.

### Preliminary

#### ■ Electrical Characteristics

##### 3.3V, f<sub>0</sub> x 8 multiplier (note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V <sub>DD</sub>		2.97	3.3	3.63	V
'H' Level Input Voltage	V <sub>IH</sub>		2.4			V
'L' Level Input Voltage	V <sub>IL</sub>				0.4	V
'H' Level Output Voltage	V <sub>OH</sub>	CMOS : V <sub>DD</sub> = 2.97V, I <sub>OH</sub> = -8mA	2.47			V
'L' Level Output Voltage	V <sub>OL</sub>	CMOS : V <sub>DD</sub> = 2.97V, I <sub>OL</sub> = 8mA			0.4	V
Consumption Current 1	I <sub>DD1</sub>	/INH = OPEN, C <sub>L</sub> = 15pF, f = 80MHz		10		mA
Consumption Current 2	I <sub>DD2</sub>	/INH = 'L', C <sub>L</sub> = 15pF, f = 80MHz		1		mA
Input pull up resistance 1	R <sub>up1</sub>	/INH = 'L'	2.0	4.0	6.0	MΩ
Input pull up resistance 2	R <sub>up2</sub>	/INH = 0.7V <sub>DD</sub>	70	140	250	kΩ
Internal Oscillation Capacitance	C <sub>g</sub>	(note 3)		13		pF
	C <sub>d</sub>	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R <sub>f</sub>		0.3	1.0	2.0	MΩ
Output Off Leak Current	I <sub>oz</sub>	/INH = 'L'			10	μA

##### 5.0V, f<sub>0</sub> x 8 multiplier (note 2)

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

note 1 : The output frequency range is 80 MHz to 100MHz with a multiplier of f<sub>0</sub> x 8 at 3.3V

note 2 : The output frequency range is 80 MHz to 160MHz with a multiplier of f<sub>0</sub> x 8 at 5.0V

note 3 : measured value

## Preliminary

### ■ Electrical Characteristics

#### 3.3V, f<sub>0</sub> x 7 multiplier (note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V <sub>DD</sub>		2.97	3.3	3.63	V
'H' Level Input Voltage	V <sub>IH</sub>		2.4			V
'L' Level Input Voltage	V <sub>IL</sub>				0.4	V
'H' Level Output Voltage	V <sub>OH</sub>	CMOS : V <sub>DD</sub> = 2.97V, I <sub>OH</sub> = -8mA	2.47			V
'L' Level Output Voltage	V <sub>OL</sub>	CMOS : V <sub>DD</sub> = 2.97V, I <sub>OL</sub> = 8mA			0.4	V
Consumption Current 1	I <sub>DD1</sub>	/INH = OPEN, C <sub>L</sub> = 15pF, f = 70MHz		9		mA
Consumption Current 2	I <sub>DD2</sub>	/INH = 'L', C <sub>L</sub> = 15pF, f = 70MHz		1		mA
Input pull up resistance 1	R <sub>up1</sub>	/INH = 'L'	2.0	4.0	6.0	MΩ
Input pull up resistance 2	R <sub>up2</sub>	/INH = 0.7V <sub>DD</sub>	70	140	250	kΩ
Internal Oscillation Capacitance	C <sub>g</sub>	(note 3)		13		pF
	C <sub>d</sub>	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R <sub>f</sub>		0.3	1.0	2.0	MΩ
Output Off Leak Current	I <sub>oz</sub>	/INH = 'L'			10	μA

#### 5.0V, f<sub>0</sub> x 7 multiplier (note 2)

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

note 1 : The output frequency range is 70 MHz to 100MHz with a multiplier of f<sub>0</sub> x 7 at 3.3V

note 2 : The output frequency range is 80 MHz to 160MHz with a multiplier of f<sub>0</sub> x 7 at 5.0V

note 3 : measured value

### Preliminary

#### ■ Electrical Characteristics

##### 3.3V, f<sub>0</sub> x 6 multiplier (note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V <sub>DD</sub>		2.97	3.3	3.63	V
'H' Level Input Voltage	V <sub>IH</sub>		2.4			V
'L' Level Input Voltage	V <sub>IL</sub>				0.4	V
'H' Level Output Voltage	V <sub>OH</sub>	CMOS : V <sub>DD</sub> = 2.97V, I <sub>OH</sub> = -8mA	2.47			V
'L' Level Output Voltage	V <sub>OL</sub>	CMOS : V <sub>DD</sub> = 2.97V, I <sub>OL</sub> = 8mA			0.4	V
Consumption Current 1	I <sub>DD1</sub>	/INH = OPEN, C <sub>L</sub> = 15pF, f = 60MHz		8		mA
Consumption Current 2	I <sub>DD2</sub>	/INH = 'L', C <sub>L</sub> = 15pF, f = 60MHz		1		mA
Input pull up resistance 1	R <sub>up1</sub>	/INH = 'L'	2.0	4.0	6.0	MΩ
Input pull up resistance 2	R <sub>up2</sub>	/INH = 0.7V <sub>DD</sub>	70	140	250	kΩ
Internal Oscillation Capacitance	C <sub>g</sub>	(note 3)		13		pF
	C <sub>d</sub>	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R <sub>f</sub>		0.3	1.0	2.0	MΩ
Output Off Leak Current	I <sub>oz</sub>	/INH = 'L'			10	μA

##### 5.0V, f<sub>0</sub> x 6 multiplier (note 2)

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

note 1 : The output frequency range is 60 MHz to 100MHz with a multiplier of f<sub>0</sub> x 6 at 3.3V

note 2 : The output frequency range is 80 MHz to 150MHz with a multiplier of f<sub>0</sub> x 6 at 5.0V

note 3 : measured value

## Preliminary

### ■ Electrical Characteristics

#### 3.3V, f<sub>0</sub> x 5 multiplier (note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage	V <sub>DD</sub>		2.97	3.3	3.63	V
'H' Level Input Voltage	V <sub>IH</sub>		2.4			V
'L' Level Input Voltage	V <sub>IL</sub>				0.4	V
'H' Level Output Voltage	V <sub>OH</sub>	CMOS : V <sub>DD</sub> = 2.97V, I <sub>OH</sub> = -8mA	2.47			V
'L' Level Output Voltage	V <sub>OL</sub>	CMOS : V <sub>DD</sub> = 2.97V, I <sub>OL</sub> = 8mA			0.4	V
Consumption Current 1	I <sub>DD1</sub>	/INH = OPEN, C <sub>L</sub> = 15pF, f = 50MHz		7		mA
Consumption Current 2	I <sub>DD2</sub>	/INH = 'L', C <sub>L</sub> = 15pF, f = 50MHz		1		mA
Input pull up resistance 1	R <sub>up1</sub>	/INH = 'L'	2.0	4.0	6.0	MΩ
Input pull up resistance 2	R <sub>up2</sub>	/INH = 0.7V <sub>DD</sub>	70	140	250	kΩ
Internal Oscillation Capacitance	C <sub>g</sub>	(note 3)		13		pF
	C <sub>d</sub>	(note 3)		13		pF
Internal Oscillation Feedback Resistance	R <sub>f</sub>		0.3	1.0	2.0	MΩ
Output Off Leak Current	I <sub>oz</sub>	/INH = 'L'			10	μA

#### 5.0V, f<sub>0</sub> x 5 multiplier (note 2)

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

note 1 : The output frequency range is 50 MHz to 100MHz with a multiplier of f<sub>0</sub> x 5 at 3.3V

note 2 : The output frequency range is 80 MHz to 125MHz with a multiplier of f<sub>0</sub> x 5 at 5.0V

note 3 : measured value

### Preliminary

#### ■ Switching Characteristics

##### 3.3V

Ta = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Rise Time	tr	CL = 15pF, 0.1VDD to 0.9VDD (note 1)		2.0		ns
Output Fall Time	tf	CL = 15pF, 0.9VDD to 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 $\sigma$ (note 1)		50		ps

##### 5.0V

Ta = 25°C

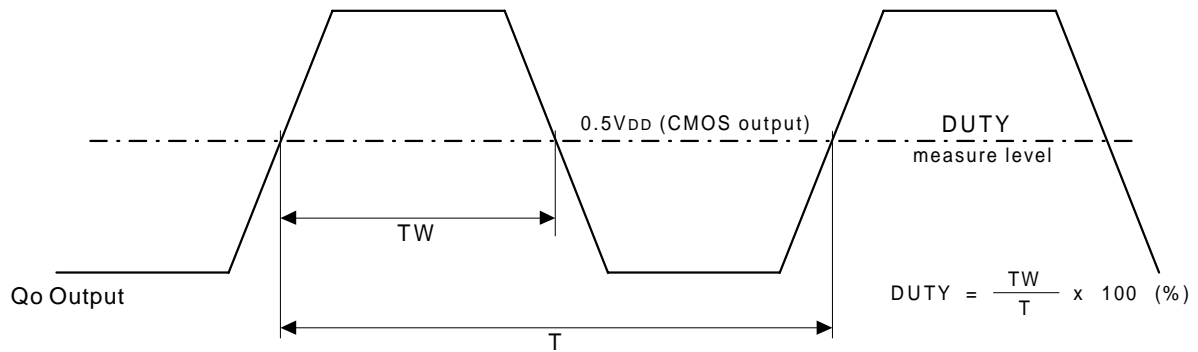
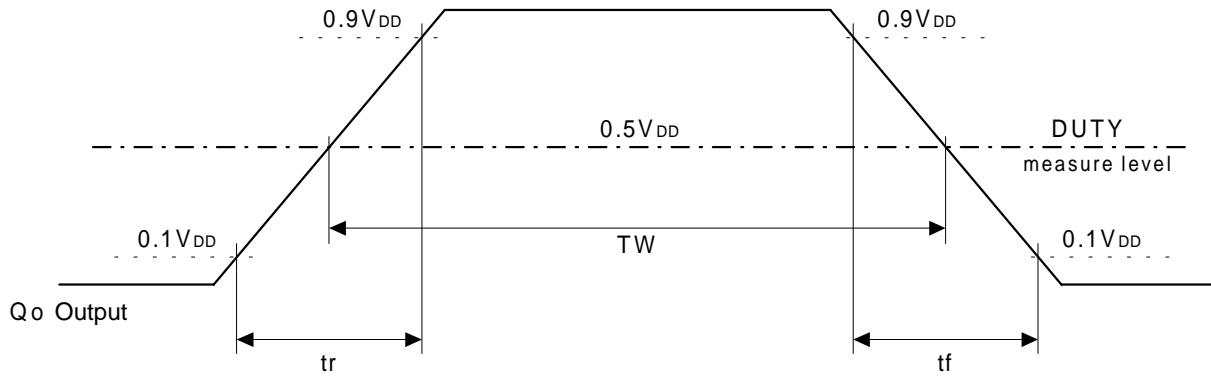
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Rise Time	tr	CL = 15pF, 0.1VDD to 0.9VDD (note 1)		1.5		ns
Output Fall Time	tf	CL = 15pF, 0.9VDD to 0.1VDD (note 1)		1.5		ns
Output DUTY Cycle	DUTY	CMOS : 0.5VDD, CL = 15pF	45		55	%
Output Disenable (Delay Time)	tplz	CL = 15pF (note 1)			100	ns
Output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

note 1 : measured value

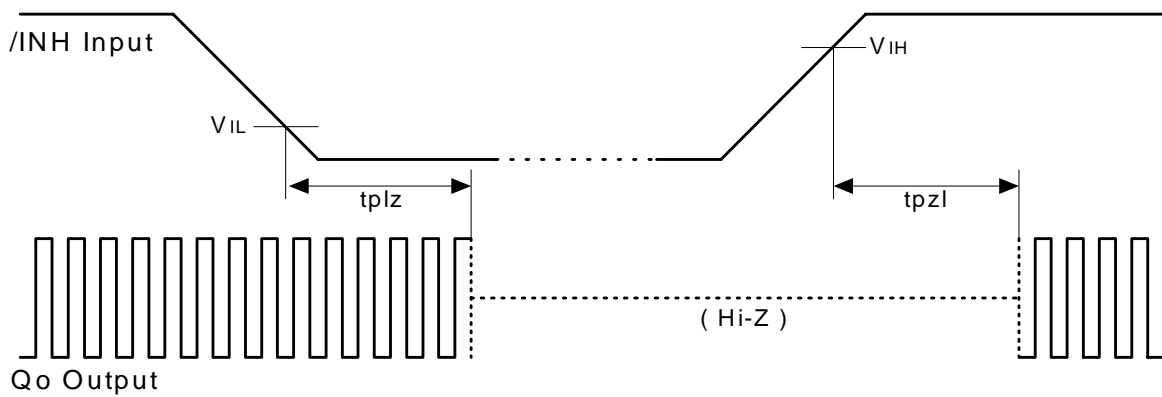
# Preliminary

## ■ Switching Characteristics

1) CMOS Level : tr, tf, Duty



2) Output Disable/Enable Delay Time



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

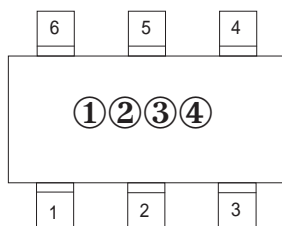
### Preliminary

#### ■ Ordering Information

XC2173 ① ② ③ ④ ⑤ ⑥

DESIGNATOR	SYMBOL	DESCRIPTION
①	C	CMOS ( $V_{DD}/2$ )
②	M	Multiplier Output
	D	Divider Output
③	Multiplier Ratio or Divider Ratio	
	2	$f_0 / 2$
	4	$f_0 / 4$
	5	$f_0 \times 5$
	6	$f_0 \times 6$
	7	$f_0 \times 7$
	8	$f_0 / 8$ & $f_0 \times 8$
④	Input Oscillation Frequency Range	
	1	10MHz to 25MHz
⑤	M	SOT-26 Package
⑥	R	Embossed Tape (orientation of device : right)
	L	Embossed Tape (orientation of device : left)

#### ■ Marking



SOT - 26  
(TOP VIEW)

① Represents Product Type  
\* To Be Determined

② Represents the Output

SYMBOL	OUTPUT
M	Multiplier
D	Divider

③ Represents the Multiplier and/or Divider Ratio

SYMBOL	M/D
2	$f_0/2$
4	$f_0/4$
5	$f_0/5$
6	$f_0 \times 6$
7	$f_0 \times 7$
8	$f_0/8$ & $f_0 \times 8$

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