

# XC2301

## Series

### Tri-State Buffer ICs



CMOS Low Power Consumption  
 Maximum Operating Frequency : 160MHz  
 Built-In Input Amplifier  
 3-State Output  
 Divider Circuit  
 Mini Mold SOT-26 Package

## APPLICATIONS

VCXO Modules  
 Crystal Oscillator Modules

## GENERAL DESCRIPTION

The 2301 series are a group of high frequency, CMOS low power tri-state buffer ICs with input amplifier, divider and output tri-state buffer circuits built-in.

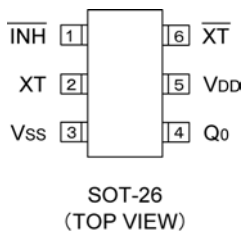
Output can be selected from any one of the following values for fin (input frequency) : fin/1, fin/2, fin/4, fin/8.

The series is available in an ultra small SOT-26 package.

## FEATURES

**Maximum Operating Frequency** : 160MHz  
**Operating Voltage Range** : 3.3V ± 10%  
**Divider Ratio** : Selectable from  
 fin/1, fin/2, fin/4, fin/8  
**Output** : 3-State  
**Ultra Small Package** : SOT-26

## PIN CONFIGURATION



## PIN ASSIGNMENT

PIN NUMBER	PIN NAME	FUNCTION
1	/INH	Stand-by Control (*)
2	XT	Clock Input
3	Vss	GND
4	Q0	Clock Output
5	VDD	Power Supply
6	/XT	Feedback Resistor Connection (Output)

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

## / INH, Q0 PIN FUNCTION

/INH	Q0
"H" or OPEN	Clock Output
"L"	High Impedance

## PRODUCT CLASSIFICATION

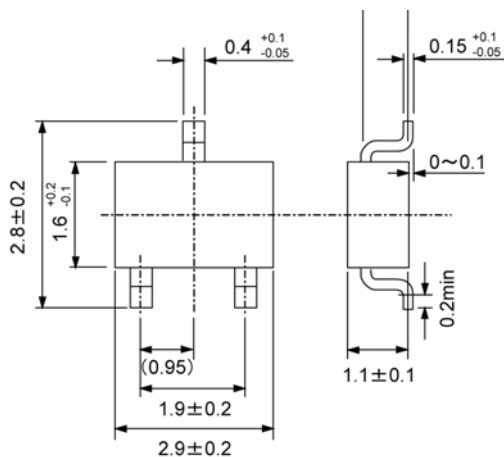
Ordering Information

### XC2301

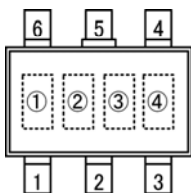
DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
	Duty Level	C	: CMOS ( $V_{DD}/2$ )
	Fixed Number	5	: -
	Divider Ratio	1	: $Q0=fin/1$
		2	: $Q0=fin/2$
		4	: $Q0=fin/4$
		8	: $Q0=fin/8$
	Output	V	: Tri-state buffer
	Package	M	: SOT-26
	Device Orientation	R	: Embossed tape, Standard feed
		L	: Embossed tape, Reverse feed

## PACKAGING INFORMATION

SOT-26



## MARKING RULE



SOT-26  
(TOP VIEW)

Represents series series

MARK	PRODUCT SERIES
1	XC2301*****

Represents divider ratio

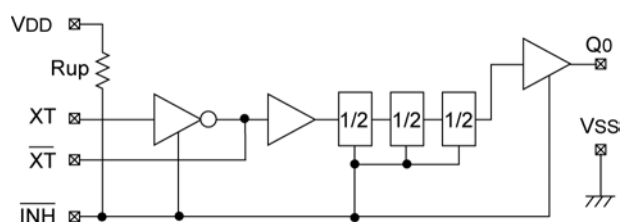
MARK	RATIO	MARK	RATIO
C	$fin/1$	E	$fin/4$
D	$fin/2$	F	$fin/8$

Represents tri-state buffer ICs

MARK
V

Represents assembly lot number  
(Based on internal standards)

## BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

Ta=25

PARAMETER	SYMBOL	CONDITIONS	UNITS
Supply Voltage	V <sub>DD</sub>	V <sub>SS</sub> - 0.3 ~ V <sub>SS</sub> + 7.0	V
Input Voltage	V <sub>IN</sub>	V <sub>SS</sub> - 0.3 ~ V <sub>DD</sub> + 0.3	V
Power Dissipation	P <sub>d</sub>	250(**)	mW
Operating Temperature Range	T <sub>opr</sub>	- 40 ~ + 85	
Storage Temperature Range	T <sub>stg</sub>	- 55 ~ + 125	

\*\* When implemented on a glass epoxy PCB.

## ELECTRICAL CHARACTERISTICS

### DC Electrical Characteristics

(Unless otherwise stated, V<sub>DD</sub>=3.3V, No Load, Ta=25 )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Operating Supply Voltage	V <sub>DD</sub>		2.97	3.30	3.63	V	
Input Voltage "High"	V <sub>IH</sub>	/INH pin	2.4	-	-	V	
Input Voltage "Low"	V <sub>IL</sub>	/INH pin	-	-	0.4	V	
Output Voltage "High"	V <sub>OH</sub>	Q0 pin, V <sub>DD</sub> =2.97V, I <sub>OH</sub> = -8mA	2.2	2.4	-	V	
Output Voltage "Low"	V <sub>OL</sub>	Q0 pin, V <sub>DD</sub> =2.97V, I <sub>OL</sub> =8mA	-	0.3	0.4	V	
Supply Current 1	I <sub>DD1</sub>	/INH=OPEN, Q0=OPEN Fin=160MHz	XC2301C51V(fin/1)	-	13.0	-	mA
			XC2301C52V(fin/2)	-	9.0	-	
			XC2301C54V(fin/4)	-	7.0	-	
			XC2301C58V(fin/8)	-	6.0	-	
Supply Current 2	I <sub>DD2</sub>	/INH="L", fin=160MHz	-	4.5	-	mA	
Input Pull-Up Resistance 1	R <sub>up1</sub>	/INH="L"	1.0	2.0	4.0	M	
Input Pull-Up Resistance 2	R <sub>up2</sub>	/INH=0.7V <sub>DD</sub>	35	70	140	k	
Output Off Leak Current	IOZ	Q0 pin, /INH="L"	-	-	10	μA	

## ELECTRICAL CHARACTERISTICS (Continued)

### AC Electrical Characteristics

(Unless otherwise stated, V<sub>DD</sub>=3.3V, No Load, Ta=25 )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum Operating Frequency	f <sub>max</sub>		160	-	-	MHz

Reference Value : XC2301C51V (f<sub>Q0</sub> = f<sub>in</sub>/1), XC2301C52V (f<sub>Q0</sub> = f<sub>in</sub>/2)

(Unless otherwise stated, V<sub>DD</sub>=3.3V, No Load, Ta=25 )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Amplitude	V <sub>ipp</sub>		0.5	-	-	V <sub>pp</sub>
Output Duty Cycle (*1)	DUTY	fin=160MHz, CL=15pF, V <sub>ipp</sub> =1.0V <sub>pp</sub>	40	-	60	%
		fin=125MHz, CL=15pF, V <sub>ipp</sub> =0.5V <sub>pp</sub>				
		fin=70MHz, CL=30pF, V <sub>ipp</sub> =0.5V <sub>pp</sub>				
Output Rise Time (*2)	tr	fin=160MHz, CL=15pF, V <sub>ipp</sub> =1.0V <sub>pp</sub>	-	(1.7)	3.0	ns
		fin=70MHz, CL=30pF, V <sub>ipp</sub> =0.5V <sub>pp</sub>	-	(2.7)	4.5	ns
Output Fall Time (*3)	tf	fin=160MHz, CL=15pF, V <sub>ipp</sub> =1.0V <sub>pp</sub>	-	(1.7)	3.0	ns
		fin=70MHz, CL=30pF, V <sub>ipp</sub> =0.5V <sub>pp</sub>	-	(2.7)	4.5	ns

\*1) 0.5V<sub>DD</sub>

\*2) 0.1V<sub>DD</sub> 0.9V<sub>DD</sub>

\*3) 0.9V<sub>DD</sub> 0.1V<sub>DD</sub>

Reference Value : XC2301C54V (f<sub>Q0</sub>=f<sub>in</sub>/4), XC2301C58V (f<sub>Q0</sub>=f<sub>in</sub>/8)

(Unless otherwise stated, V<sub>DD</sub>=3.3V, No Load, Ta=25 )

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Amplitude	V <sub>ipp</sub>		0.5	-	-	V <sub>pp</sub>
Output Duty Cycle (*1)	DUTY	fin=160MHz, CL=15pF, V <sub>ipp</sub> =1.0V <sub>pp</sub>	45	-	55	%
		fin=125MHz, CL=15pF, V <sub>ipp</sub> =0.5V <sub>pp</sub>				
		fin=70MHz, CL=30pF, V <sub>ipp</sub> =0.5V <sub>pp</sub>				
Output Rise Time (*2)	tr	fin=160MHz, CL=15pF, V <sub>ipp</sub> =1.0V <sub>pp</sub>	-	(1.7)	3.0	ns
		fin=70MHz, CL=30pF, V <sub>ipp</sub> =0.5V <sub>pp</sub>	-	(2.7)	4.5	ns
Output Fall Time (*3)	tf	fin=160MHz, CL=15pF, V <sub>ipp</sub> =1.0V <sub>pp</sub>	-	(1.7)	3.0	ns
		fin=70MHz, CL=30pF, V <sub>ipp</sub> =0.5V <sub>pp</sub>	-	(2.7)	4.5	ns

\*1) 0.5V<sub>DD</sub>

\*2) 0.1V<sub>DD</sub> 0.9V<sub>DD</sub>

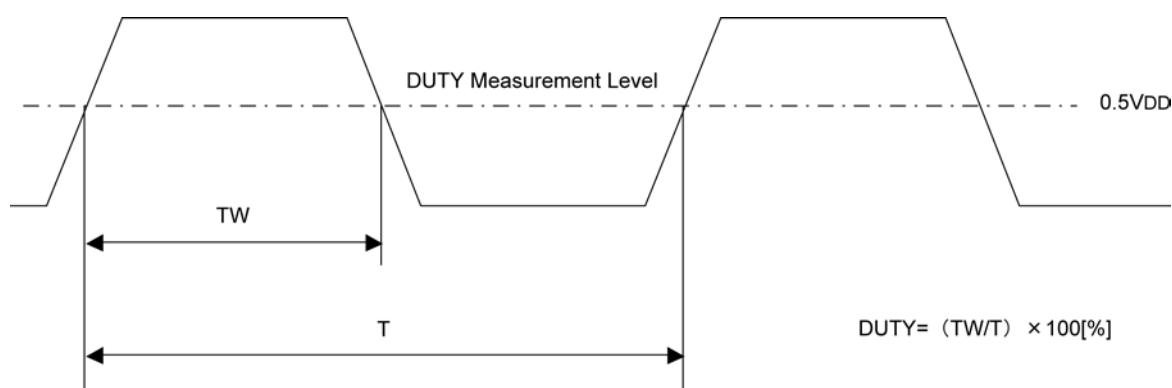
\*3) 0.9V<sub>DD</sub> 0.1V<sub>DD</sub>

## SWITCHING WAVEFORMS

### (1) Switching Time



### (2) Duty Cycle



## SUPPLY CURRENT, DUTY MEASUREMENT CIRCUIT

- \*) The feedback resistor (fixed)  $R_f$  must be connected.
- \*) When the duty needs to be adjusted because of power supply and/or input amplitude, duty resistor (fixed)  $R_b$  should be connected.

<Reference Peripheral Values :  $R_f$ ,  $R_b$ ,  $C_{in}$  >

$V_{DD}=3.3V$ ,  $f_{in}=160MHz$ ,  $V_{ipp}=0.5V_{pp}$

$C_{in} = 10000 [pF]$

$R_f = 51 [k]$

$R_b = 360 [k]$

