

XC2301

Series

Tri-State Buffer ICs



1

Preliminary

- ◆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

Max. Operating Frequency : 160MHz

Operating Voltage Range : 3.3V $\pm$ 10%

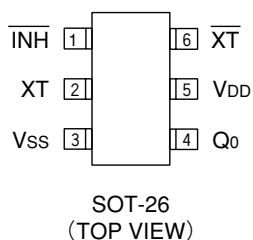
Divider Ratio : Selectable from fin/1, fin/2, fin/4, fin/8

Output : 3-State

Ultra Small Package : SOT-26

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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.

Function List

●/INH, Q0 Pin Function

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

Product Classification

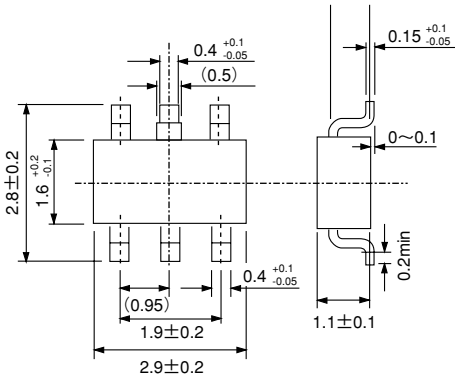
Ordering Information

XC2301 ①②③④⑤⑥

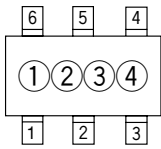
DESTINATION	DESCRIPTION	DESTINATION	DESCRIPTION
①	Duty Level C : CMOS($V_{DD}/2$)	④	V : Tri-state Buffer
②	5 : (Fixed Number)	⑤	Package M : SOT-26
③	Divider Ratio : 1 : $Q_0 = \text{fin}/1$ 2 : $Q_0 = \text{fin}/2$ 4 : $Q_0 = \text{fin}/4$ 8 : $Q_0 = \text{fin}/8$	⑥	Device Orientation R : Embossed Tape (Standard Feed) L : Embossed Tape (Reverse Feed)

Packaging Information

SOT-26



Marking



SOT-26
(TOP VIEW)

① Represents the series name.

MARK
1

② Represents the Divider Ratio

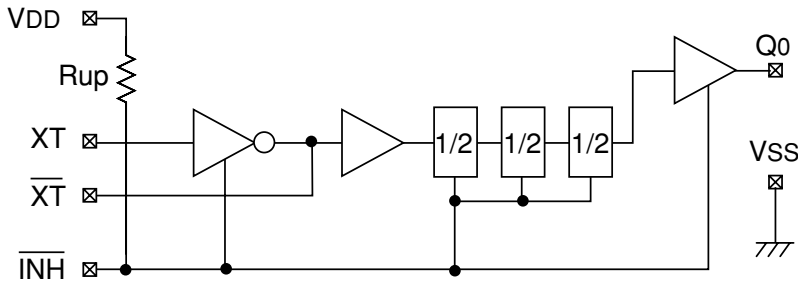
MARK	RATIO	MARK	RATIO
C	$\text{fin}/1$	E	$\text{fin}/4$
D	$\text{fin}/2$	F	$\text{fin}/8$

③ Represents the Tri-state Buffer ICs

MARK
V

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

■Block Diagram



■Absolute Maximum Ratings

Ta=25°C

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(**)	mW
Operating Ambient Temp.	Topr	- 40 ~ + 85	°C
Storage Temp.	Tstg	- 55 ~ + 125	°C

** When implemented on a glass epoxy PCB.

■Electrical Characteristics

●DC Electrical Characteristics

(Unless otherwise stated, VDD=3.3V, No Load, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Supply Voltage	VDD		2.97	3.30	3.63	V
Input Voltage "High"	VIH	/INH pin	2.4			V
Input Voltage "Low"	VIL	/INH pin			0.4	V
Output Voltage "High"	VOH	Q0 pin, VDD=2.97V, IOH= -8mA	2.2	2.4		V
Output Voltage "Low"	VOL	Q0 pin, VDD=2.97V, IOL=8mA		0.3	0.4	V
Supply Current 1	IDD1	/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	IDD2	/INH="L", fin=160MHz		4.5		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
Output Off Leak Current	IOZ	Q0 pin, /INH="L"			10	μA

●AC Electrical Characteristics

(Unless otherwise stated, $V_{DD}=3.3V$, No Load, $T_a=25^{\circ}C$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Maximum Operating Frequency	fmax		160			MHz

1 Reference Value : XC2301C51V ($fQ0 = fin/1$)

(Unless otherwise stated, $V_{DD}=3.3V$, No Load, $T_a=25^{\circ}C$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input amplitude	Vipp		0.5			Vpp
Output Duty Cycle (*1)	DUTY	fin=160MHz, CL=15pF, Vipp=1.0Vpp	40		60	%
		fin=125MHz, CL=15pF, Vipp=0.5Vpp				
		fin=70MHz, CL=30pF, Vipp=0.5Vpp				
Output Rise Time (*2)	tr	fin=160MHz, CL=15pF, Vipp=1.0Vpp		(1.7)	3.0	ns
		fin=70MHz, CL=30pF, Vipp=0.5Vpp		(2.7)	4.5	ns
Output Fall Time (*3)	tf	fin=160MHz, CL=15pF, Vipp=1.0Vpp		(1.7)	3.0	ns
		fin=70MHz, CL=30pF, Vipp=0.5Vpp		(2.7)	4.5	ns

*1) 0.5VDD

*2) 0.1VDD→0.9VDD

*3) 0.9VDD→0.1VDD

Reference Value : XC2301C52V ($fQ0 = fin/2$), XC2301C54V ($fQ0=fin/4$), XC2301C58V ($fQ0=fin/8$)

(Unless otherwise stated, $V_{DD}=3.3V$, No Load, $T_a=25^{\circ}C$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input amplitude	Vipp		0.5			Vpp
Output Duty Cycle (*1)	DUTY	fin=160MHz, CL=15pF, Vipp=1.0Vpp	45		55	%
		fin=125MHz, CL=15pF, Vipp=0.5Vpp				
		fin=70MHz, CL=30pF, Vipp=0.5Vpp				
Output Rise Time (*2)	tr	fin=160MHz, CL=15pF, Vipp=1.0Vpp		(1.7)	3.0	ns
		fin=70MHz, CL=30pF, Vipp=0.5Vpp		(2.7)	4.5	ns
Output Fall Time (*3)	tf	fin=160MHz, CL=15pF, Vipp=1.0Vpp		(1.7)	3.0	ns
		fin=70MHz, CL=30pF, Vipp=0.5Vpp		(2.7)	4.5	ns

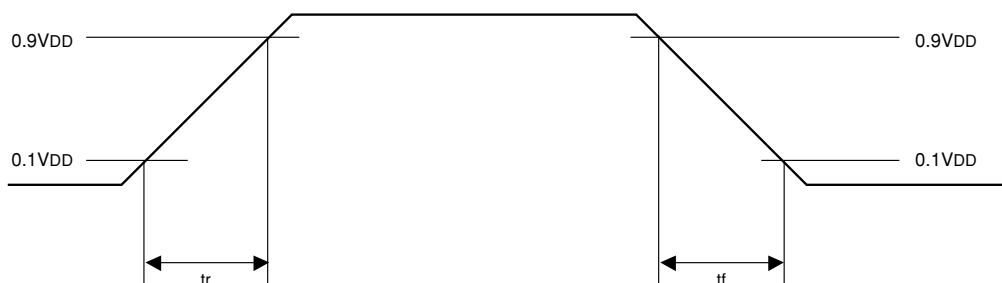
*1) 0.5VDD

*2) 0.1VDD→0.9VDD

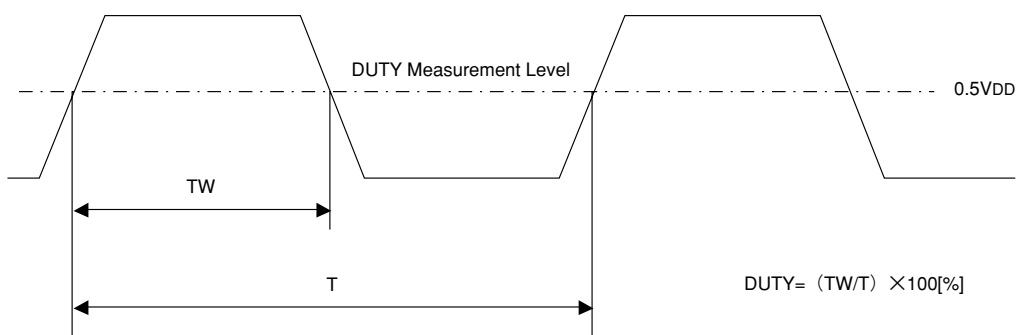
*3) 0.9VDD→0.1VDD

■ 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} >
 $V_{DD}=3.3V$, $f_{in}=160MHz$, $V_{ipp}=0.5V_{pp}$
 $C_{in} = 10000 [pF]$
 $R_f = 51 [k\Omega]$
 $R_b = 360 [k\Omega]$

