XC2301 Series

Tri-State Buffer ICs

TOREX

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

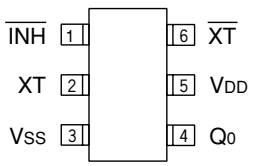
■General Description

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 ± 10%
Divider Ratio : Selectable from fin/1, fin/2, fin/4, fin/8
Output : 3-State
Ultra Small Package : SOT-26

■Pin Configuration



SOT-26
(TOP VIEW)

■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

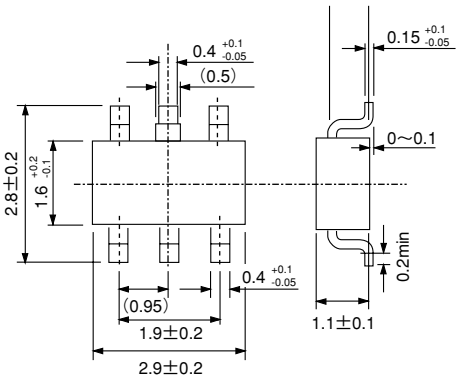
●Ordering Information

XC2301 ①②③④⑤⑥

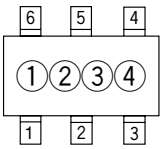
DESTINATION	DESCRIPTION	DESTINATION	DESCRIPTION
①	Duty Level C：CMOS(VDD/2)	④	V：Tri-state Buffer
②	5 ：(Fixed Number)	⑤	Package M：SOT-26
③	Divider Ratio : 1：Q0=fin/1　2：Q0=fin/2 4：Q0=fin/4　8：Q0=fin/8	⑥	Device Orientation R ：Embossed Tape (Standard Feed) L ：Embossed Tape (Reverse Feed)

■Packaging Information

●SOT-26



■Marking



SOT-26
(TOP VIEW)

①Represents the series name.

MARK
1

②Represents the Divider Ratio

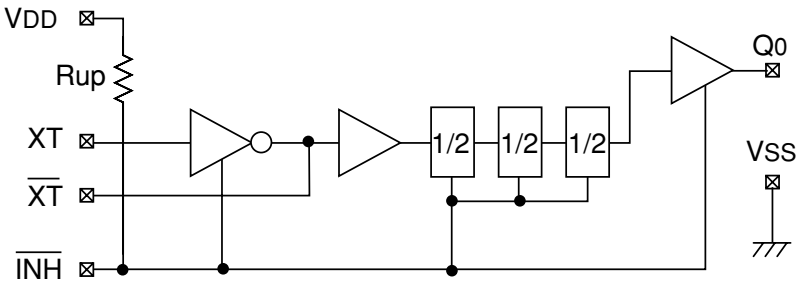
MARK	RATIO	MARK	RATIO
C	fin/1	E	fin/4
D	fin/2	F	fin/8

③Represents the Tri-state Buffer ICs

MARK
V

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

■Block Diagram



■Absolute Maximum Ratings

Ta=25℃

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	℃
Storage Temp.	Tstg	- 55 ~ + 125	℃

** When implemented on a glass epoxy PCB.

■Electrical Characteristics

●DC Electrical Characteristics

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

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, Ta=25℃)

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, Ta=25℃)

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

*1) 0.5V_{DD}

*2) 0.1V_{DD}→0.9V_{DD}

*3) 0.9V_{DD}→0.1V_{DD}

Reference Value : XC2301C52V (fQ0 = fin/2), XC2301C54V (fQ0=fin/4), XC2301C58V (fQ0=fin/8)
(Unless otherwise stated, V_{DD}=3.3V, No Load, Ta=25℃)

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

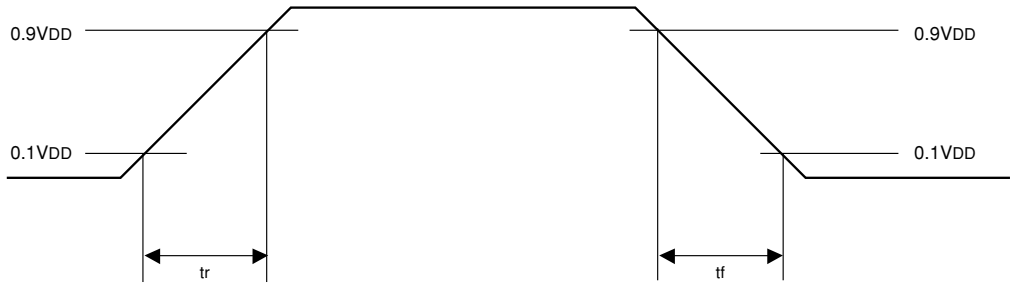
*1) 0.5V_{DD}

*2) 0.1V_{DD}→0.9V_{DD}

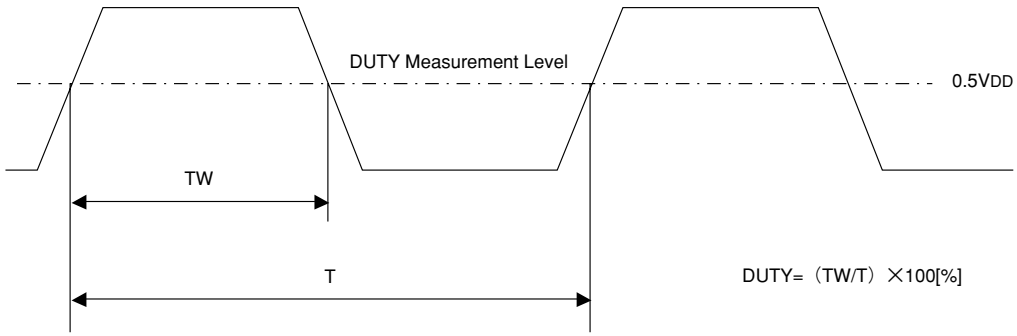
*3) 0.9V_{DD}→0.1V_{DD}

■Switching Waveforms

(1) Switching Time

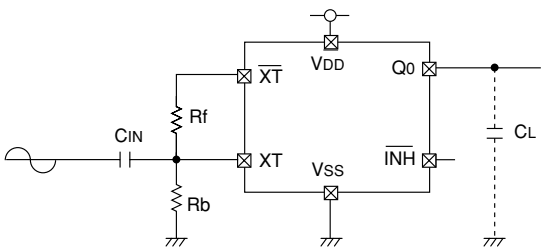


(2) Duty Cycle



■Supply Current, Duty Measurement Circuit

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



<Reference Peripheral Values : Rf, Rb, Cin >
VDD=3.3V, fin=160MHz, Vipp=0.5Vpp
CIN = 10000 [pF]
Rf = 51 [kΩ]
Rb = 360 [kΩ]