

XC2300

Series

Tri-State Buffer ICs



1

Preliminary

- ◆CMOS Low Power Consumption
- ◆Maximum Operating Frequency : 70MHz
- ◆Built-In Input Amplifier
- ◆3-State Output
- ◆Divider Circuit
- ◆Mini Mold SOT-26 Package

Applications

- VCXO Modules
- Crystal Oscillator Modules

General Description

The 2300 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 : 70MHz

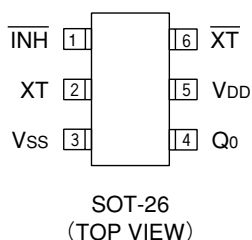
Operating Voltage Range : 3.3V $\pm 10\%$, 5.0V $\pm 20\%$

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.

Function List

●/INH, Q0 Pin Function

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

Product Classification

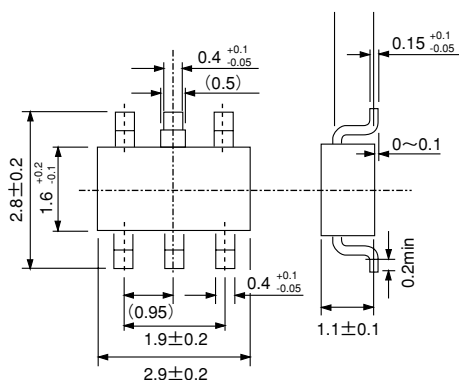
Ordering Information

XC2300 ①②③④⑤⑥

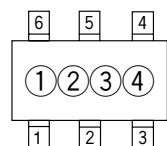
DESTINATION	DESCRIPTION	DESTINATION	DESCRIPTION
①	Duty Level C : CMOS($V_{DD}/2$)	④	V : Tri-state Buffer
②	2 : (Fixed Number)	⑤	Package M : SOT-26
③	Divider Ratio : 1 : $Q_0 = \text{fin}/1$ 2 : $Q_0 = \text{fin}/2$ 4 : $Q_0 = \text{fin}/4$ 8 : $Q_0 = \text{fin}/8$	⑥	Device Orientation R : Embossed Tape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

Packaging Information

SOT-26



Marking



SOT-26
(TOP VIEW)

① Represents the series name.

MARK
0

② Represents the Divider Ratio

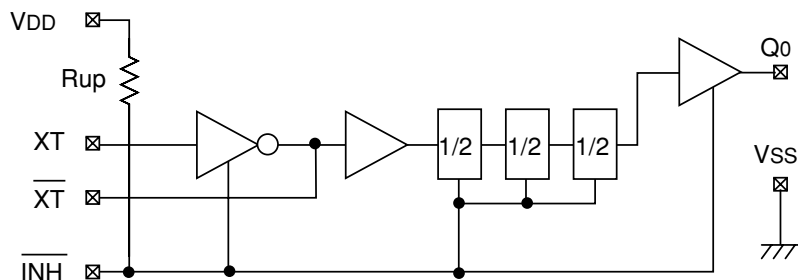
MARK	RATIO	MARK	RATIO
C	$\text{fin}/1$	E	$\text{fin}/4$
D	$\text{fin}/2$	F	$\text{fin}/8$

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

5.0V operation

(Unless otherwise stated, $V_{DD}=5.0V$, No Load, $T_a=25^{\circ}C$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Supply Voltage	VDD		4.0	5.0	6.0	V
Input Voltage "High"	V _{IH}	/INH pin	2.4			V
Input Voltage "Low"	V _{IL}	/INH pin			0.4	V
Output Voltage "High"	V _{OH}	Q0 pin, VDD=4.5V, I _{OH} = -8mA	3.9	4.2		V
Output Voltage "Low"	V _{OL}	Q0 pin, VDD=4.5V, I _{OL} =8mA		0.3	0.4	V
Supply Current 1	IDD1	/INH=OPEN, Q0=OPEN, Fin=70MHz	XC2300C21V(fin/1)		21.0	mA
			XC2300C22V(fin/2)		19.0	
			XC2300C24V(fin/4)		17.0	
			XC2300C28V(fin/8)		15.0	
Supply Current 2	IDD2	/INH="L", fin=70MHz		0.05		mA
Input Pull-Up Resistance 1	Rup1	/INH="L"	2.0	4.0	8.0	MΩ
Input Pull-Up Resistance 2	Rup2	/INH=0.7VDD	50	100	200	kΩ
Output Off Leak Current	IOZ	Q0 pin, /INH="L"			10	μA

3.3V operation

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Supply Voltage	VDD		2.97	3.30	3.63	V
Input Voltage "High"	V _{IH}	/INH pin	2.4			V
Input Voltage "Low"	V _{IL}	/INH pin			0.4	V
Output Voltage "High"	V _{OH}	Q0 pin, VDD=4.5V, I _{OH} = -4mA	2.2	2.4		V
Output Voltage "Low"	V _{OL}	Q0 pin, VDD=4.5V, I _{OL} =4mA		0.3	0.4	V
Supply Current 1	IDD1	/INH=OPEN, Q0=OPEN, Fin=50MHz	XC2300C21V(fin/1)		8.0	mA
			XC2300C22V(fin/2)		7.0	
			XC2300C24V(fin/4)		6.0	
			XC2300C28V(fin/8)		5.0	
Supply Current 2	IDD2	/INH="L", fin=50MHz		0.05		mA
Input Pull-Up Resistance 1	Rup1	/INH="L"	4.0	7.0	14.0	MΩ
Input Pull-Up Resistance 2	Rup2	/INH=0.7VDD	70	130	250	kΩ
Output Off Leak Current	IOZ	Q0 pin, /INH="L"			10	μA

●AC Electrical Characteristics

5.0V operation

(Unless otherwise stated, $V_{DD}=5.0V$, No Load, $T_a=25^{\circ}C$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Maximum Operating Frequency	fmax		70			MHz

5.0V operation (reference value)

(Unless otherwise stated, $V_{DD}=5.0V$, No Load, $T_a=25^{\circ}C$)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input amplitude (SIN wave)	Vipp		0.5			Vpp
Output Duty Cycle (*1)	DUTY	fin=70MHz, CL=15pF, Vipp=0.5Vpp	45		55	%
Output Rise Time (*2)	tr	fin=70MHz, CL=15pF, Vipp=0.5Vpp		(3.0)	5.0	ns
Output Fall Time (*3)	tf	fin=70MHz, CL=15pF, Vipp=0.5Vpp		(1.5)	5.0	ns

*1) 0.5VDD

*2) 0.1VDD→0.9VDD

*3) 0.9VDD→0.1VDD

3.3V operation

(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		50			MHz

3.3V operation (reference value)

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input amplitude (SIN wave)	Vipp		0.5			Vpp
Output Duty Cycle (*1)	DUTY	fin=50MHz, CL=15pF, Vipp=0.5Vpp	45		55	%
Output Rise Time (*2)	tr	fin=50MHz, CL=15pF, Vipp=0.5Vpp		(4.0)	8.0	ns
Output Fall Time (*3)	tf	fin=50MHz, CL=15pF, Vipp=0.5Vpp		(2.0)	8.0	ns

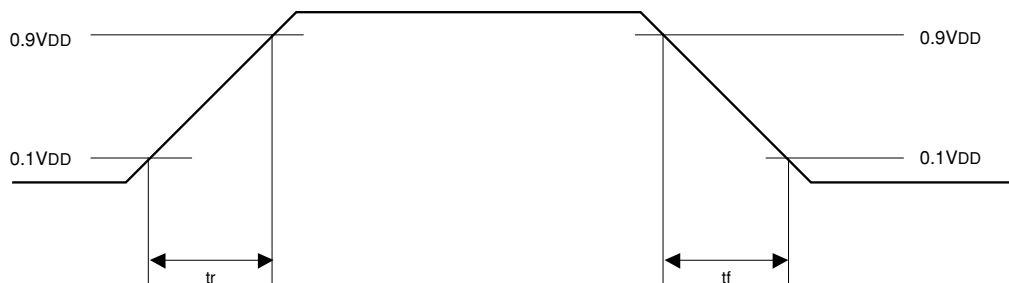
*1) 0.5VDD

*2) 0.1VDD→0.9VDD

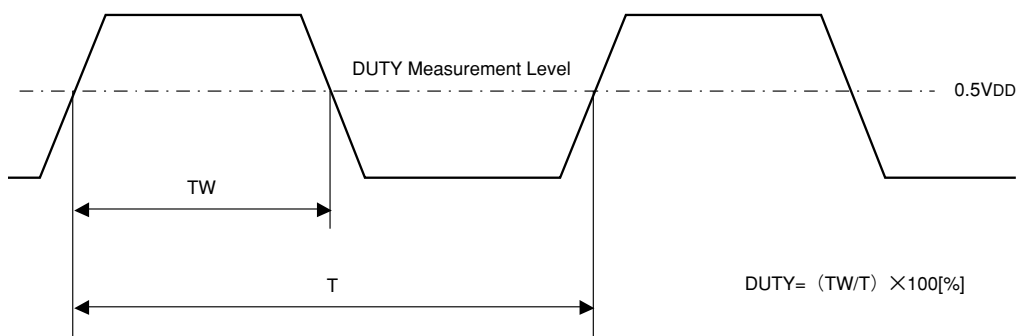
*3) 0.9VDD→0.1VDD

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} >

$V_{DD}=5.0V$, $f_{in}=70MHz$, $V_{ipp}=0.5V_{pp}$

$C_{in} = 10000 [pF]$

$R_f = 100 [k\Omega]$

$R_b = 720 [k\Omega]$

$V_{DD}=3.3V$, $f_{in}=50MHz$, $V_{ipp}=0.5V_{pp}$

$C_{in} = 10000 [pF]$

$R_f = 100 [k\Omega]$

$R_b = 820 [k\Omega]$

