XC2300 Series

Tri-State Buffer ICs

TOREX

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.

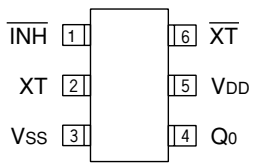
Output can be selected from any one of the following values for fin (input frequency) : fin/1, fin/2, fin/4, fin/8.

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

■Features

Max. Operating Frequency : 70MHz
Operating Voltage Range : 3.3V ±10%, 5.0V ±20%
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

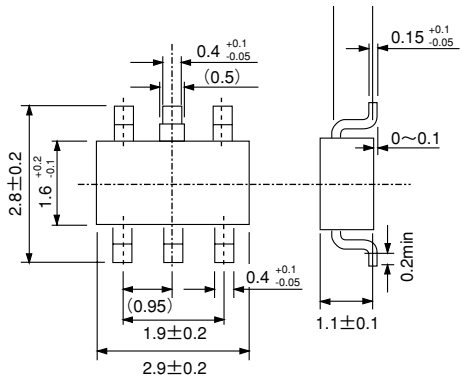
●Ordering Information

XC2300 ①②③④⑤⑥

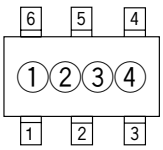
DESTINATION	DESCRIPTION	DESTINATION	DESCRIPTION
①	Duty Level C：CMOS(VDD/2)	④	V：Tri-state Buffer
②	2：(Fixed Number)	⑤	Package M：SOT-26
③	Divider Ratio : 1：Q0=fin/1　2：Q0=fin/2 4：Q0=fin/4　8：Q0=fin/8	⑥	Device Orientation R：Embossed Tape (Standard Feed) L：Embossed Tape (Reverse Feed)

■Packaging Information

●SOT-26



■Marking



SOT-26
(TOP VIEW)

① Represents the series name.

MARK
0

② Represents the Divider Ratio

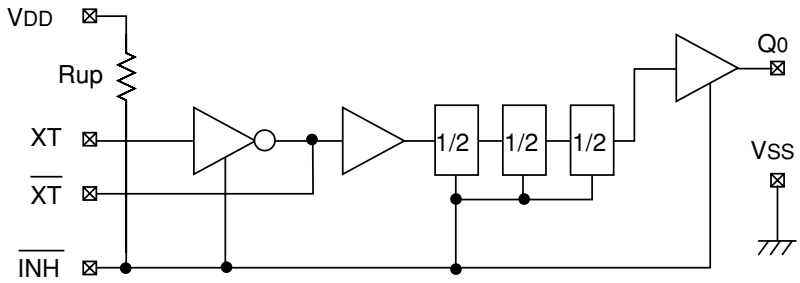
MARK	RATIO	MARK	RATIO
C	fin/1	E	fin/4
D	fin/2	F	fin/8

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℃

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

5.0V operation
(Unless otherwise stated, V_{DD}=5.0V, No Load, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Operating Supply Voltage	V_{DD}			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}	Q_0 pin, V_{DD}=4.5V, I_{OH}= -8mA		3.9	4.2		V
Output Voltage "Low"	V_{OL}	Q_0 pin, V_{DD}=4.5V, I_{OL}=8mA			0.3	0.4	V
Supply Current 1	I_{DD1}	/INH=OPEN, Q_0=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	I_{DD2}	/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=0.7V_{DD}		50	100	200	kΩ
Output Off Leak Current	I_{OZ}	Q_0 pin, /INH="L"				10	μA

3.3V operation
(Unless otherwise stated, V_{DD}=3.3V, No Load, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Operating Supply Voltage	V_{DD}			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}	Q_0 pin, V_{DD}=4.5V, I_{OH}= -4mA		2.2	2.4		V
Output Voltage "Low"	V_{OL}	Q_0 pin, V_{DD}=4.5V, I_{OL}=4mA			0.3	0.4	V
Supply Current 1	I_{DD1}	/INH=OPEN, Q_0=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	I_{DD2}	/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=0.7V_{DD}		70	130	250	kΩ
Output Off Leak Current	I_{OZ}	Q_0 pin, /INH="L"				10	μA

●AC Electrical Characteristics

5.0V operation
(Unless otherwise stated, V_{DD}=5.0V, No Load, Ta=25℃)

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, Ta=25℃)

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

*1) 0.5V_{DD}
*2) 0.1V_{DD}→0.9V_{DD}
*3) 0.9V_{DD}→0.1V_{DD}

3.3V operation
(Unless otherwise stated, V_{DD}=3.3V, No Load, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Maximum Operating Frequency	fmax		50			MHz

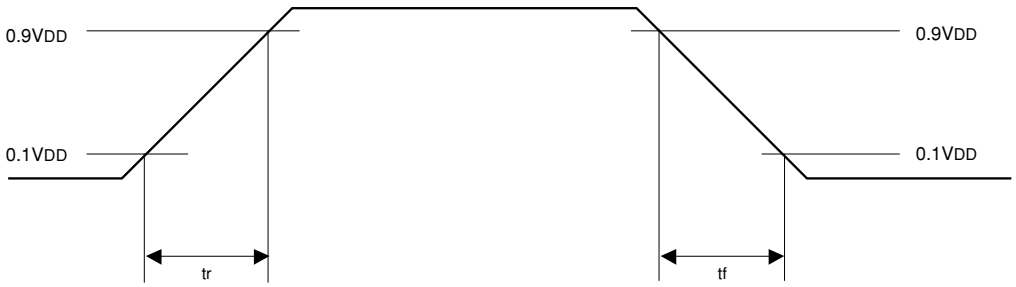
3.3V operation (reference value)
(Unless otherwise stated, V_{DD}=3.3V, No Load, Ta=25℃)

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

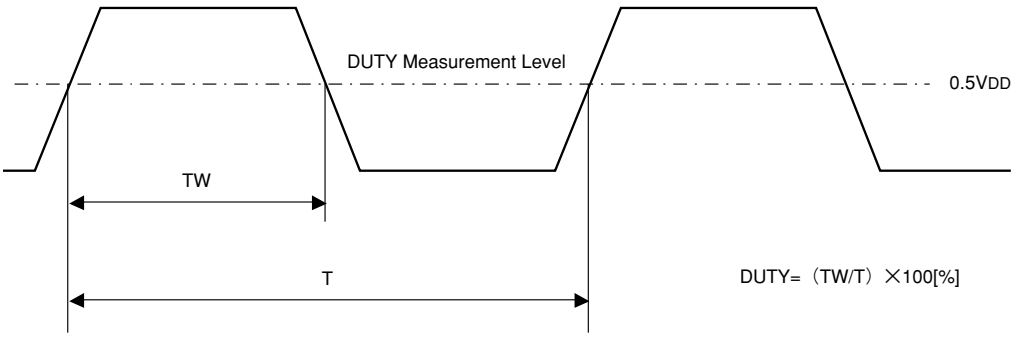
*1) 0.5V_{DD}
*2) 0.1V_{DD}→0.9V_{DD}
*3) 0.9V_{DD}→0.1V_{DD}

■Switching Waveforms

(1) Switching Time

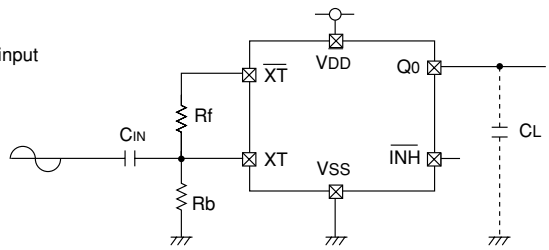


(2) Duty Cycle



■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=5.0V、fin=70MHz、Vipp=0.5Vpp
CIN = 10000 [pF]
Rf = 100 [kΩ]
Rb = 720 [kΩ]

VDD=3.3V、fin=50MHz、Vipp=0.5Vpp
CIN = 10000 [pF]
Rf = 100 [kΩ]
Rb = 820 [kΩ]