

Tri-State Buffer ICs

■ 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.

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

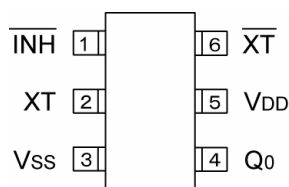
■ APPLICATIONS

- VCXO modules
- Crystal oscillator modules

■ FEATURES

Max. Operating Frequency	: 70MHz
Operating Voltage Range	: 3.3V±10%, 5.0V±20%
Divider Ratio	: fin/1
Output	: 3-State
CMOS Low Power Consumption	
Built-In Input Amplifier	
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	Ground
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

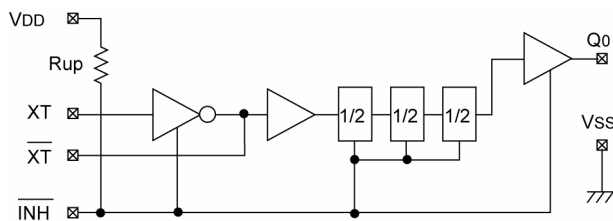
PRODUCT CLASSIFICATION

Ordering Information

XC2300 ①②③④⑤⑥

DESTINATOR	DESCRIPTION	SIMBOL	DESCRIPTION
①	Duty Level	C	: CMOS ($V_{DD}/2$)
②	Fixed Number	2	: -
③	Divider Ratio	1	: $Q0 = \text{fin}/1$
④	Output	V	: Tri-state buffer
⑤	Package	M	: SOT-26
⑥	Device Orientation	R	: Embossed tape, standard feed
		L	: Embossed tape, reverse feed

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

$T_a = 25^\circ\text{C}$

PARAMETER	SYMBOL	CONDITIONS	UNITS
Supply Voltage	V_{DD}	$V_{SS} - 0.3 \sim V_{SS} + 7.0$	V
Input Voltage	V_{IN}	$V_{SS} - 0.3 \sim V_{DD} + 0.3$	V
Power Dissipation	P_d	250(**)	mW
Operating Temperature Range	T_{opr}	$-40 \sim +85$	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	$-55 \sim +125$	$^\circ\text{C}$

** 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	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}	Q0 pin, $V_{DD}=4.5V$, $I_{OH}=-8mA$		3.9	4.2	-	V
Output Voltage "Low"	V_{OL}	Q0 pin, $V_{DD}=4.5V$, $I_{OL}=8mA$		-	0.3	0.4	V
Supply Current 1	I_{DD1}	/INH=OPEN, Q0=OPEN Fin=70MHz	XC2300C21V (fin/1)	-	21.0	-	mA
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	$M\Omega$
Input Pull-Up Resistance 2	Rup2	/INH=0.7 V_{DD}		50	100	200	$k\Omega$
Output Off Leak Current	I_{OZ}	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	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}	Q0 pin, $V_{DD}=4.5V$, $I_{OH}=-4mA$		2.2	2.4	-	V
Output Voltage "Low"	V_{OL}	Q0 pin, $V_{DD}=4.5V$, $I_{OL}=4mA$		-	0.3	0.4	V
Supply Current 1	I_{DD1}	/INH =OPEN, Q0=OPEN Fin=50MHz	XC2300C21V (fin/1)	-	8.0	-	mA
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	$M\Omega$
Input Pull-Up Resistance 2	Rup2	/INH =0.7 V_{DD}		70	130	250	$k\Omega$
Output Off Leak Current	I_{OZ}	Q0 pin, /INH ="L"		-	-	10	μA

ELECTRICAL CHARACTERISTIC (Continued)

● 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)	V _{ipp}		0.5	-	-	V _{pp}
Output Duty Cycle (*1)	DUTY	f _{in} =70MHz, C _L =15pF, V _{ipp} =0.5V _{pp}	45	-	55	%
Output Rise Time (*2)	t _r	f _{in} =70MHz, C _L =15pF, V _{ipp} =0.5V _{pp}	-	(3.0)	5.0	ns
Output Fall Time (*3)	t _f	f _{in} =70MHz, C _L =15pF, V _{ipp} =0.5V _{pp}	-	(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, $T_a=25^\circ C$)

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)	V _{ipp}		0.5	-	-	V _{pp}
Output Duty Cycle (*1)	DUTY	f _{in} =50MHz, C _L =15pF, V _{ipp} =0.5V _{pp}	45	-	55	%
Output Rise Time (*2)	t _r	f _{in} =50MHz, C _L =15pF, V _{ipp} =0.5V _{pp}	-	(4.0)	8.0	ns
Output Fall Time (*3)	t _f	f _{in} =50MHz, C _L =15pF, V _{ipp} =0.5V _{pp}	-	(2.0)	8.0	ns

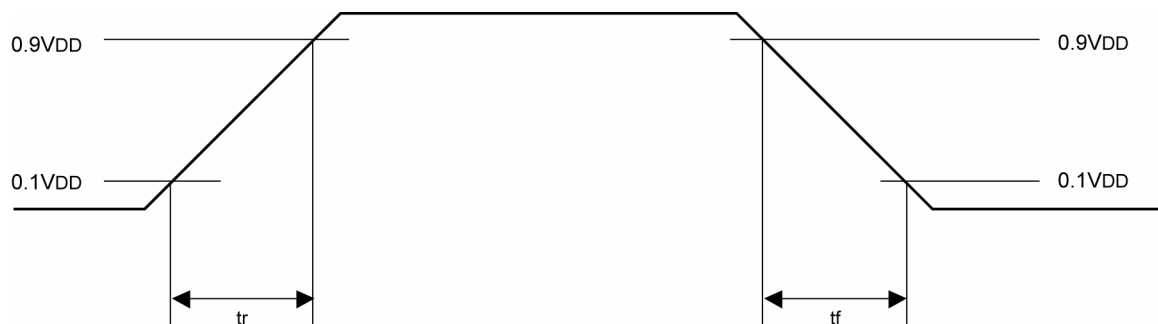
*1) 0.5V_{DD}

*2) 0.1V_{DD}→0.9V_{DD}

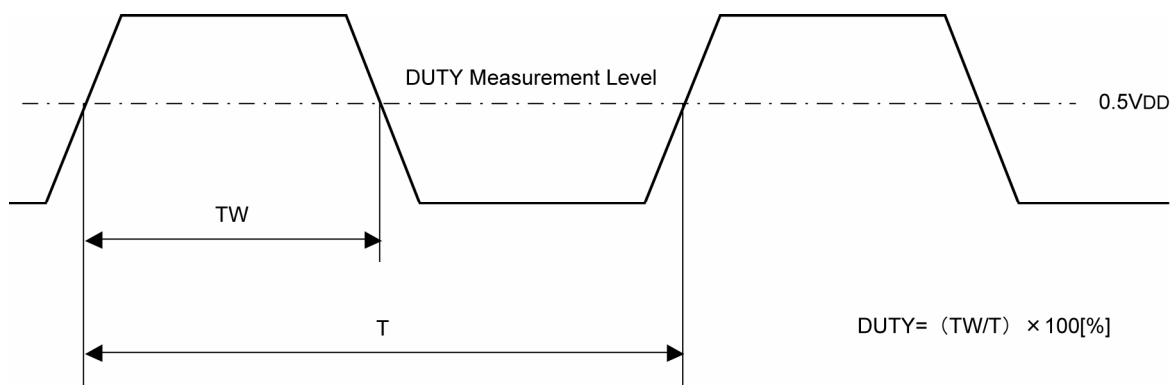
*3) 0.9V_{DD}→0.1V_{DD}

SWITCHING WAVEFORMS

(1) Switching Time



(2) Duty Cycle



SUPPLY CURRENT, DUTY TEST 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 Ω]

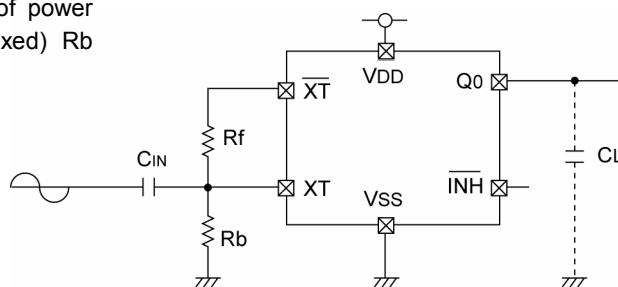
$R_b = 720$ [k Ω]

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

$C_{IN} = 10000$ [pF]

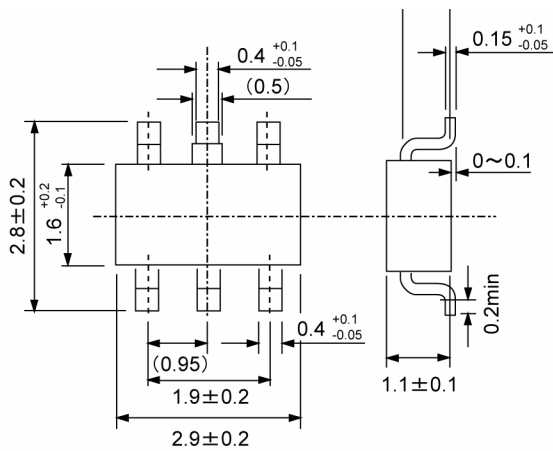
$R_f = 100$ [k Ω]

$R_b = 820$ [k Ω]



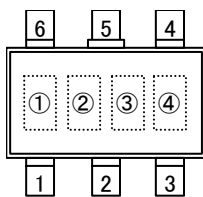
PACKAGING INFORMATION

● SOT-26



MARKING RULE

● SOT-26



SOT-26
(TOP VIEW)

① Represents product series

MARK	PRODUCT SERIES
0	XC2300xxxxxx

② Represents divider ratio

MARK	RATIO
C	fin/1

③ Represents tri-state buffer ICs

MARK
V

④ Represents assembly lot number
(Based on internal standards)

1. The products and product specifications contained herein are subject to change without notice to improve performance characteristics. Consult us, or our representatives before use, to confirm that the information in this catalog is up to date.
2. We assume no responsibility for any infringement of patents, patent rights, or other rights arising from the use of any information and circuitry in this catalog.
3. Please ensure suitable shipping controls (including fail-safe designs and aging protection) are in force for equipment employing products listed in this catalog.
4. The products in this catalog are not developed, designed, or approved for use with such equipment whose failure of malfunction can be reasonably expected to directly endanger the life of, or cause significant injury to, the user.
(e.g. Atomic energy; aerospace; transport; combustion and associated safety equipment thereof.)
5. Please use the products listed in this catalog within the specified ranges.
Should you wish to use the products under conditions exceeding the specifications, please consult us or our representatives.
6. We assume no responsibility for damage or loss due to abnormal use.
7. All rights reserved. No part of this catalog may be copied or reproduced without the prior permission of Torex Semiconductor Ltd.

TOREX SEMICONDUCTOR LTD.