

Tri-State Buffer ICs

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.

APPLICATIONS

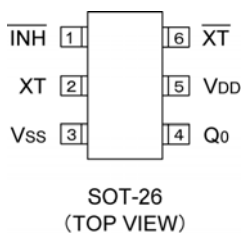
VCXO Modules

Crystal Oscillator Modules

FEATURES

- Maximum Operating Frequency** : 160MHz
- Operating Voltage Range** : 3.3V ± 10%
- Divider Ratio** : Selectable from fin/1, fin/2, fin/4, fin/8
- Output** : 3-State
- CMOS Low Power Consumption**
- Built-In Input Amplifier**
- Package** : SOT-26
- Environmentally Friendly** : EU RoHS Compliant, Pb Free

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.

/INH, Q0 PIN FUNCTION

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

PRODUCT CLASSIFICATION

Ordering Information

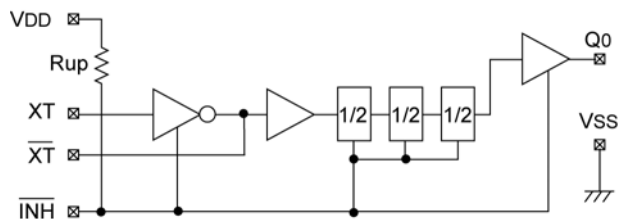
XC2301 - (*)

DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
	Duty Level	C	: CMOS (VDD/2)
	Fixed Number	5	: -
	Divider Ratio	1	: Q0=fin/1
		2	: Q0=fin/2
		4	: Q0=fin/4
		8	: Q0=fin/8
	Output	V	: Tri-state buffer
-	Packages Taping Type (*)	MR-G	: SOT-26

(*) The "-G" suffix indicates that the products are Halogen and Antimony free as well as being fully RoHS compliant.

(*) The device orientation is fixed in its embossed tape pocket. For reverse orientation, please contact your local Torex sales office or representative. (Standard orientation: R- , Reverse orientation: L-)

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Ta=25

PARAMETER	SYMBOL	CONDITIONS	UNITS
Supply Voltage	V _{DD}	V _{SS} - 0.3 ~ V _{SS} + 7.0	V
Input Voltage	V _{IN}	V _{SS} - 0.3 ~ V _{DD} + 0.3	V
Power Dissipation	P _d	250(**)	mW
Operating Temperature Range	T _{opr}	- 40 ~ + 85	
Storage Temperature Range	T _{stg}	- 55 ~ + 125	

** When implemented on a glass epoxy PCB.

ELECTRICAL CHARACTERISTICS

DC Electrical Characteristics

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

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}	Q0 pin, $V_{DD}=2.97V$, $I_{OH}=-8mA$	2.2	2.4	-	V	
Output Voltage "Low"	V_{OL}	Q0 pin, $V_{DD}=2.97V$, $I_{OL}=8mA$	-	0.3	0.4	V	
Supply Current 1	I_{DD1}	/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	I_{DD2}	/INH = "L", fin = 160MHz	-	4.5	-	mA	
Input Pull-Up Resistance 1	R_{up1}	/INH = "L"	1.0	2.0	4.0	M	
Input Pull-Up Resistance 2	R_{up2}	/INH = 0.7 V_{DD}	35	70	140	k	
Output Off Leak Current	IOZ	Q0 pin, /INH = "L"	-	-	10	μA	

AC Electrical Characteristics

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

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum Operating Frequency	f_{max}		160	-	-	MHz

 Reference Value : XC2301C51V ($f_{Q0} = fin/1$), XC2301C52V ($f_{Q0} = fin/2$)

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

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Amplitude	V_{ipp}		0.5	-	-	Vpp
Output Duty Cycle (*1)	DUTY	fin = 160MHz, $C_L=15pF$, $V_{ipp}=1.0V_{pp}$	40	-	60	%
		fin = 125MHz, $C_L=15pF$, $V_{ipp}=0.5V_{pp}$				
		fin = 70MHz, $C_L=30pF$, $V_{ipp}=0.5V_{pp}$				
Output Rise Time (*2)	t_r	fin = 160MHz, $C_L=15pF$, $V_{ipp}=1.0V_{pp}$	-	(1.7)	3.0	ns
		fin = 70MHz, $C_L=30pF$, $V_{ipp}=0.5V_{pp}$	-	(2.7)	4.5	ns
Output Fall Time (*3)	t_f	fin = 160MHz, $C_L=15pF$, $V_{ipp}=1.0V_{pp}$	-	(1.7)	3.0	ns
		fin = 70MHz, $C_L=30pF$, $V_{ipp}=0.5V_{pp}$	-	(2.7)	4.5	ns

 *1) 0.5 V_{DD}

 *2) 0.1 V_{DD} 0.9 V_{DD}

 *3) 0.9 V_{DD} 0.1 V_{DD}

 Reference Value : XC2301C54V ($f_{Q0}=fin/4$), XC2301C58V ($f_{Q0}=fin/8$)

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

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Amplitude	V_{ipp}		0.5	-	-	Vpp
Output Duty Cycle (*1)	DUTY	fin = 160MHz, $C_L=15pF$, $V_{ipp}=1.0V_{pp}$	45	-	55	%
		fin = 125MHz, $C_L=15pF$, $V_{ipp}=0.5V_{pp}$				
		fin = 70MHz, $C_L=30pF$, $V_{ipp}=0.5V_{pp}$				
Output Rise Time (*2)	t_r	fin = 160MHz, $C_L=15pF$, $V_{ipp}=1.0V_{pp}$	-	(1.7)	3.0	ns
		fin = 70MHz, $C_L=30pF$, $V_{ipp}=0.5V_{pp}$	-	(2.7)	4.5	ns
Output Fall Time (*3)	t_f	fin = 160MHz, $C_L=15pF$, $V_{ipp}=1.0V_{pp}$	-	(1.7)	3.0	ns
		fin = 70MHz, $C_L=30pF$, $V_{ipp}=0.5V_{pp}$	-	(2.7)	4.5	ns

 *1) 0.5 V_{DD}

 *2) 0.1 V_{DD} 0.9 V_{DD}

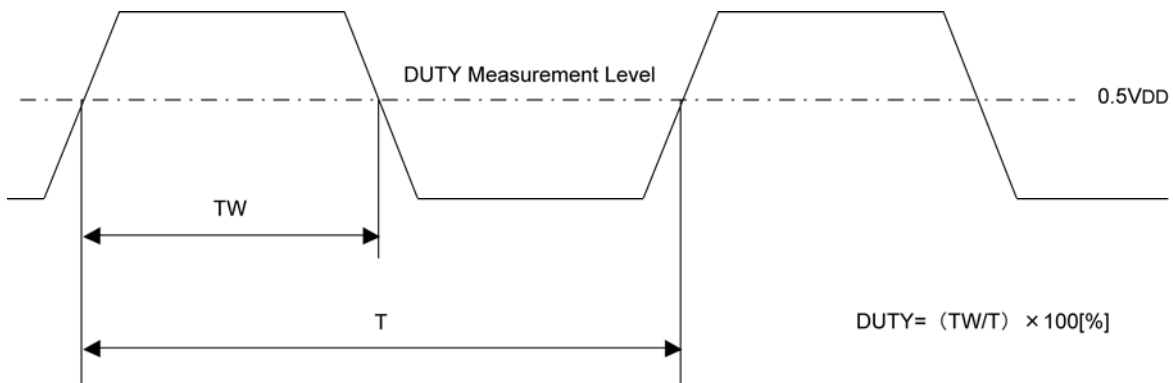
 *3) 0.9 V_{DD} 0.1 V_{DD}

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.

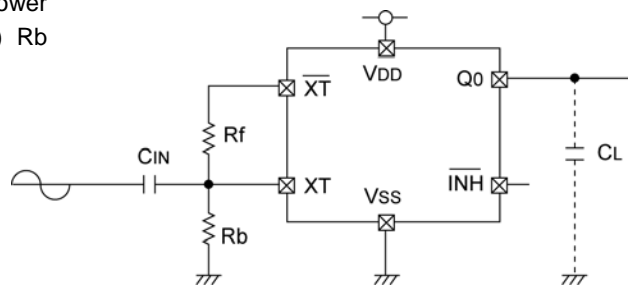
<Reference Peripheral Values: R_f , R_b , C_{IN} >

$V_{DD}=3.3V$, $f_{in}=160MHz$, $V_{ipp}=0.5V_{pp}$

$C_{IN} = 10000 [pF]$

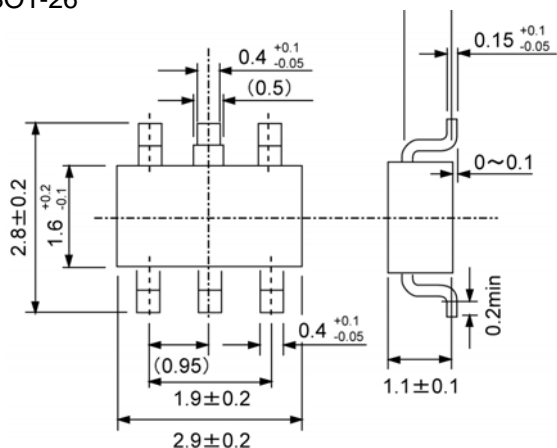
$R_f = 51 [k \]$

$R_b = 360 [k \]$



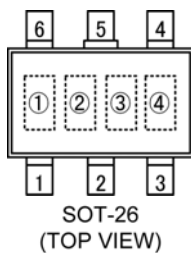
PACKAGING INFORMATION

SOT-26



MARKING RULE

SOT-26



Represents product series

MARK	PRODUCT SERIES
1	XC2301xxxxxx

Represents divider ratio

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

Represents tri-state buffer ICs

MARK
V

Represents assembly lot number
(Based on internal standards)

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