XC2163 Series

ICs for use with 3rd Overtone Crystal Oscillators

■GENERAL DESCRIPTION

The XC2163 series are high frequency, low current consumption CMOS ICs with built-in crystal oscillator and divider circuits. Output is selectable from any one of the following values for f0: f0/1, f0/2, f0/4, f0/8.

With oscillation capacitors and a feedback resistors built-in, it is possible to configure a stable 3rd overtone oscillator using only an external crystal oscillator.

Also available is an external oscillation capacitor/external oscillation feedback resistor type, which makes oscillation frequency control possible.

■APPLICATIONS

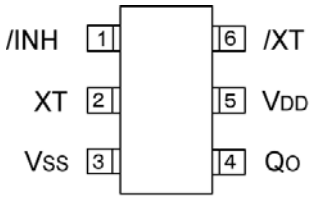
- ●Crystal Oscillation Modules
- ●Computer, DSP Clocks
- ●Communication Equipment
- ●Various System Clocks

■FEATURES

Oscillation Frequency : 40MHz ~ 125MHz
(Rf, Cg, Cd internal; 5.0V)
(3rd Overtone) : 57MHz ~ 125MHz
(Rf, Cg, Cd internal; 3.3V)
: 20MHz ~ 125MHz
(Rf, Cg, Cd external)
Divider Ratio : Selectable from f0/1, f0/2, f0/4, f0/8.
Output : 3-State
Operating Voltage Range : 3.3V ±10%, 5.0V ±10%
Low Current Consumption : Stand-by function included *
CMOS
Built-in Oscillation Capacitor
Built-in Oscillation Feedback Resistor
Package : SOT-26
Environmentally Friendly : EU RoHS Compliant, Pb Free

* Oscillation continues in stand-by mode

■PIN CONFIGURATION



SOT-26
(TOP VIEW)

■PIN ASSIGNMENT

PIN NUMBER	PIN NAME	FUNCTION
1	/INH	Stand-by Control*
2	XT	Crystal Oscillator Connection (Input)
3	VSS	GND
4	Q0	Clock Output
5	VDD	Power Supply
6	/XT	Crystal Oscillator Connection (Output)

* Stand-by control pin has a pull-up resistor built-in.

■/INH, Q0 PIN FUNCTION

/INH	"H" or OPEN	"L"(Stand-by)
Q0	Divider Output	High Impedance

"H" = High Level
"L" = Low Level

■PRODUCT CLASSIFICATION

●Ordering Information

XC2163①②③④⑤⑥-⑦(*1)

DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
①	Divider Ratio	C	: f0/1
		D	: f0/2
		E	: f0/4
		F	: f0/8
②	Output Capacity	5	: 10TTL
③	Duty Level	1	: CMOS (VDD/2) *TTL : 20MHz to 37MHz
④	Frequency Range & Rf, Cg, Cd Values	Z	: External type (refer to table 1)
		A～L	: Built-in type (refer to table 2)
⑤⑥-⑦	Packages Taping Type (*2)	MR-G	: SOT-26

(*1) The "-G" suffix indicates that the products are Halogen and Antimony free as well as being fully RoHS compliant.
(*2) The device orientation is fixed in its embossed tape pocket. For reverse orientation, please contact your local Torex sales office or representative. (Standard orientation: ⑤R-⑦, Reverse orientation: ⑤L-⑦)

Table 1: Frequency for External Type

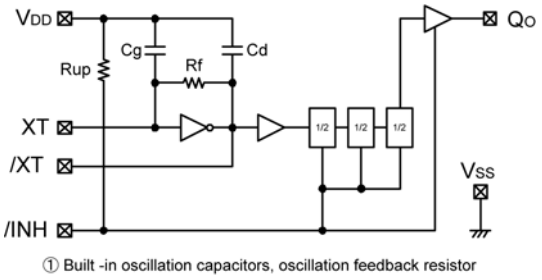
SYMBOL	5.0V TYPE			3.3V TYPE		
	FREQUENCY RANGE	Rf	Cg/Cd	FREQUENCY RANGE	Rf	Cg/Cd
Z	108MHz～125MHz	1.6kΩ	10pF	108MHz～125MHz	3.9kΩ	4pF
	93MHz～110MHz	2.4kΩ	10pF	95MHz～110MHz	2.4kΩ	7pF
	80MHz～95MHz	2.4kΩ	12pF	80MHz～97MHz	2.7kΩ	8pF
	68MHz～83MHz	2.4kΩ	15pF	68MHz～83MHz	2.7kΩ	10pF
	55MHz～70MHz	3.3kΩ	15pF	58MHz～70MHz	3.9kΩ	10pF
	45MHz～57MHz	3.3kΩ	20pF	50MHz～60MHz	3.9kΩ	12pF
	35MHz～47MHz	3.6kΩ	24pF	40MHz～52MHz	2.4kΩ	20pF
	28MHz～37MHz	4.7kΩ	27pF	33MHz～42MHz	3.6kΩ	20pF
	24MHz～30MHz	5.6kΩ	30pF	28MHz～35MHz	3.6kΩ	24pF
	20MHz～26MHz	6.8kΩ	33pF	24MHz～30MHz	3.9kΩ	27pF
	-	-	-	20MHz～26MHz	3.9kΩ	33pF

Note: We recommend that a damping resistor Rd be added between the /XT pin & the crystal oscillator pin in order to safeguard the crystal oscillator and improve oscillation stability.

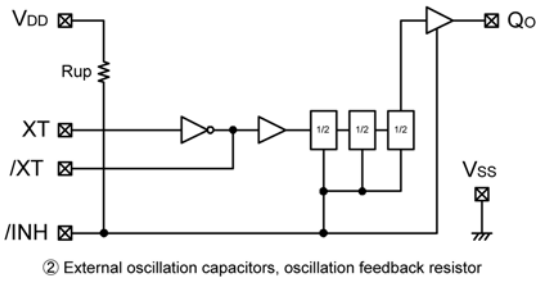
Table 2: Frequency for Built-In Type

SYMBOL	5.0V TYPE			3.3V TYPE		
	FREQUENCY RANGE	Rf	Cg/Cd	FREQUENCY RANGE	Rf	Cg/Cd
A	-	-	-	108MHz～125MHz	1.5kΩ	5.5pF
B	-	-	-	93MHz～110MHz	1.7kΩ	6.5pF
C	108MHz～125MHz	2.2kΩ	5.5pF	80MHz～95MHz	2.2kΩ	5.5pF
D	95MHz～110MHz	2.4kΩ	6.5pF	72MHz～83MHz	2.4kΩ	6.5pF
E	80MHz～97MHz	3.2kΩ	6.5pF	65MHz～75MHz	3.2kΩ	6.5pF
F	68MHz～83MHz	3.7kΩ	6.5pF	57MHz～67MHz	3.7kΩ	6.5pF
H	55MHz～70MHz	4.9kΩ	7.6pF	-	-	-
K	45MHz～57MHz	5.5kΩ	11.0pF	-	-	-
L	40MHz～48MHz	6.5kΩ	11.0pF	-	-	-

■BLOCK DIAGRAMS



① Built -in oscillation capacitors, oscillation feedback resistor



② External oscillation capacitors, oscillation feedback resistor

■ABSOLUTE MAXIMUM RATINGS

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	Pd	250 *	mW
Operating Temperature Range	Topr	-30～+80	℃
Storage Temperature Range	Tstg	-55～+125	℃

* When implemented on a glass epoxy PCB.

■ELECTRICAL CHARACTERISTICS

XC2163C51AMR

F_{OSC}=108MHz~125MHz

(Unless otherwise stated, V_{DD}=3.3V, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	STANDARD VALUE			UNITS
			MIN.	TYP.	MAX.	
Operating Voltage	V_{DD}		2.97	-	3.63	V
'H' Level Input Voltage	V_{IH}	/INH pin	2.4	-	-	V
'L' Level Input Voltage	V_{IL}	/INH pin		-	0.4	V
'H' Level Output Voltage	V_{OH}	Qo pin, V_{DD} =2.97V, I_{OH} = 8mA	2.2	2.4	-	V
'L' Level Output Voltage	V_{OL}	Qo pin, V_{DD} = 2.97V, I_{OL} = 8mA	-	0.3	0.4	V
Supply Current 1	$I_{DD}1$	/INH = OPEN, C_L = 15pF, f = 125MHz	-	18	-	mA
Supply Current 2	$I_{DD}2$	/INH = 'L', f = 125MHz	-	5	-	mA
Input Pull-Up Resistance 1	Rup1	/INH = 'L'	1.0	2.0	4.0	MΩ
Input Pull-Up Resistance 2	Rup2	/INH = 0.7V_{DD}	35	70	140	kΩ
Internal Oscillation Capacity	Cg	R&D Value	-	5.5	-	pF
	Cd	R&D Value	-	5.5	-	pF
Internal Oscillation Feedback Resistance	Rf		-	1.5	-	kΩ
Output Off Leak Current	I_{OZ}	Qo pin, /INH = 'L'	-	-	10	μA

Note) R&G value

XC2163C51BMR

F_{OSC}=93MHz~110MHz

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

PARAMETER	SYMBOL	CONDITIONS	STANDARD VALUE			UNITS
			MIN.	TYP.	MAX.	
Operating Voltage	V_{DD}		2.97	-	3.63	V
'H' Level Input Voltage	V_{IH}	/INH pin	2.4	-	-	V
'L' Level Input Voltage	V_{IL}	/INH pin	-	-	0.4	V
'H' Level Output Voltage	V_{OH}	Qo pin, V_{DD} = 2.97V, I_{OH} = 8mA	2.2	2.4	-	V
'L' Level Output Voltage	V_{OL}	Qo pin, V_{DD} = 2.97V, I_{OL} = 8mA	-	0.3	0.4	V
Supply Current 1	$I_{DD}1$	/INH = OPEN, C_L = 15pF, f = 110MHz	-	15	-	mA
Supply Current 2	$I_{DD}2$	/INH = 'L', f = 110MHz	-	5	-	mA
Input Pull-Up Resistance 1	Rup1	/INH = 'L'	1.0	2.0	4.0	MΩ
Input Pull-Up Resistance 2	Rup2	/INH = 0.7V_{DD}	35	70	140	kΩ
Internal Oscillation Capacity	Cg	R&D Value	-	6.5	-	pF
	Cd	R&D Value	-	6.5	-	pF
Internal Oscillation Feedback Resistance	Rf		-	1.7	-	kΩ
Output Off Leak Current	I_{OZ}	Qo pin, /INH = 'L'	-	-	10	μA

■SWITCHING CHARACTERISTICS

XC2163C51AMR/XC2163C51BMR

CMOS DUTY:V_{DD}=3.3V, Ta=25℃

PARAMETER	SYMBOL	CONDITIONS		STANDARD VALUE			UNITS
				MIN.	TYP.	MAX.	
Output Rise Time	tr	C_L=15pF, 0.1V_{DD}→0.9V_{DD}		-	1.5	-	ns
Output Fall Time	tf	C_L=15pF, 0.9V_{DD}→0.1V_{DD}		-	1.5	-	ns
Output Duty Cycle	DUTY	C51A	0.5V_{DD}, C_L=15pF, f=125MHz	45	-	55	%
		C51B	0.5V_{DD}, C_L=15pF, f=110MHz				
Output Disable Delay Time	tplz	C_L=15pF		-	-	100	ns

■ELECTRICAL CHARACTERISTICS (Continued)

XC2163C51ZMR

F_{OSC} = 108MHz to 125MHz; Rf = 1.6kΩ, Cg = Cd = 10pF external

(Unless otherwise stated, V_{DD}=5.0V, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	STANDARD VALUE			UNITS
			MIN.	TYP.	MAX.	
Operating Voltage	V_{DD}		4.5	-	5.5	V
'H' Level Input Voltage	V_{IH}	/INH pin	2.4	-	-	V
'L' Level Input Voltage	V_{IL}	/INH pin	-	-	0.4	V
'H' Level Output Voltage	V_{OH}	Qo pin, V_{DD} = 4.5V, I_{OH} = -16mA	3.9	4.2	-	V
'L' Level Output Voltage	V_{OL}	Qo pin, V_{DD} = 4.5V, I_{OL} = 16mA	-	0.3	0.4	V
Supply Current 1	$I_{DD}1$	/INH = OPEN, C_L = 15pF, f = 120MHz	-	31	-	mA
Supply Current 2	$I_{DD}2$	/INH = 'L', f = 120MHz	-	14	-	mA
Input Pull-Up Resistance 1	Rup1	/INH = 'L'	0.5	1.0	2.0	MΩ
Input Pull-Up Resistance 2	Rup2	/INH = 0.7V_{DD}	25	50	100	kΩ
Output Off Leak Current	I_{OZ}	Qo pin, /INH = 'L'	-	-	10	μA

■SWITCHING CHARACTERISTICS

XC2163C51ZMR

CMOS DUTY : V_{DD}=5.0V, Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	STANDARD VALUE			UNITS
			MIN.	TYP.	MAX.	
Output Rise Time	tr	C_L=15pF, 0.1V_{DD}→0.9V_{DD}	-	1.5	-	ns
Output Fall Time	tf	C_L=15pF, 0.9V_{DD}→0.1V_{DD}	-	1.5	-	ns
Output Duty Cycle	DUTY	0.5V_{DD}, C_L=15pF, f=120MHz	45	-	55	%
Output Disable Delay Time	tplz	C_L=15pF	-	-	100	ns
Output Enable Delay Time	tpzl	C_L=15pF	-	-	100	ns

The contents can be changed without advance notice.

■ELECTRICAL CHARACTERISTICS (Continued)

XC2163C51ZMR

F_{OSC}= 108MHz to 125MHz : Rf = 3.9kΩ, Cg = Cd = 4pF external

(Unless otherwise stated, V_{DD}=3.3V, Ta=25℃)

PARAMETER	SYMBOL	CONDITIONS	STANDARD VALUE			UNITS
			MIN.	TYP.	MAX.	
Operating Voltage	V_{DD}		2.97	-	3.63	V
'H' Level Input Voltage	V_{IH}	/I_{NH} pin	2.4	-	-	V
'L' Level Input Voltage	V_{IL}	/I_{NH} pin	-	-	0.4	V
'H' Level Output Voltage	V_{OH}	Qo pin, V_{DD} = 2.97V, I_{OH} = -8mA	2.2	2.4	-	V
'L' Level Output Voltage	V_{OL}	Qo pin, V_{DD} = 2.97V, I_{OL} = 8mA	-	0.3	0.4	V
Supply Current 1	$I_{DD}1$	/I_{NH} = OPEN, C_L = 15pF, f = 120MHz	-	15	-	mA
Supply Current 2	$I_{DD}2$	/I_{NH} = 'L', f = 100MHz	-	4	-	mA
Input Pull-Up Resistance 1	Rup1	/I_{NH} = 'L'	2.0	4.0	6.0	MΩ
Input Pull-Up Resistance 2	Rup2	/I_{NH} = 0.7V_{DD}	70	140	250	kΩ
Output Off Leak Current	I_{OZ}	Qo pin, /I_{NH} = 'L'	-	-	10	μA

■SWITCHING CHARACTERISTICS

XC2163C51ZMR

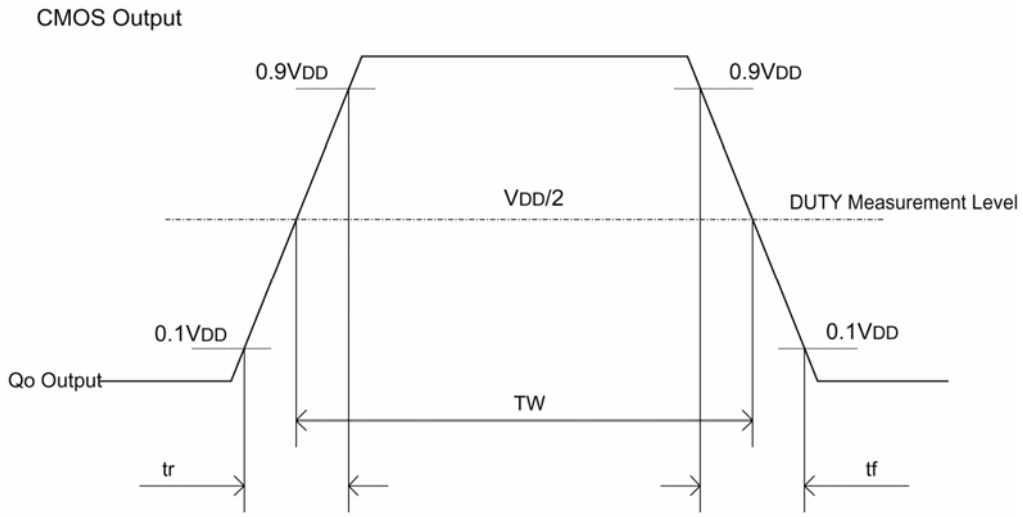
CMOS DUTY : V_{DD}=3.3V, Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	STANDARD VALUE			UNITS
			MIN.	TYP.	MAX.	
Output Rise Time	tr	C_L=15pF, 0.1V_{DD} ~ 0.9V_{DD}	-	1.5	-	ns
Output Fall Time	tf	C_L=15pF, 0.9V_{DD} ~ 0.1V_{DD}	-	1.5	-	ns
Output Duty Cycle	DUTY	0.5V_{DD}, C_L=15pF, f=120MHz	45	-	55	%
Output Disable Delay Time	tplz	C_L=15pF	-	-	100	ns
Output Enable Delay Time	tpzl	C_L=15pF	-	-	100	ns

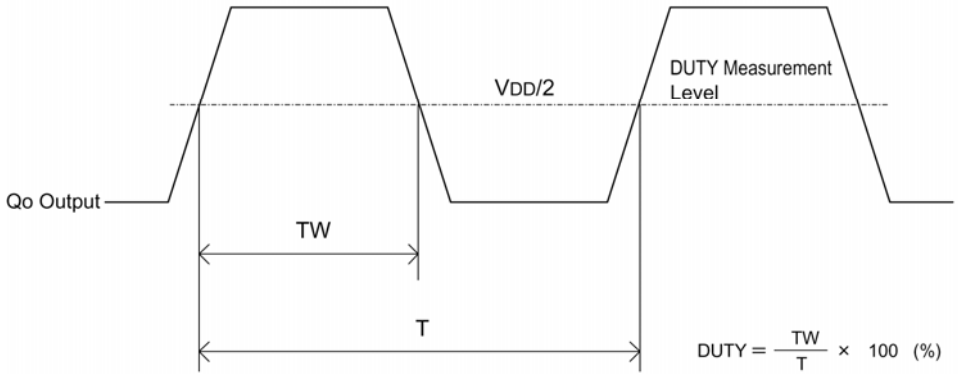
The contents can be changed without advance notice.

■SWITCHING CHARACTERISTICS MEASUREMENT WAVEFORMS

(1) Switching Time

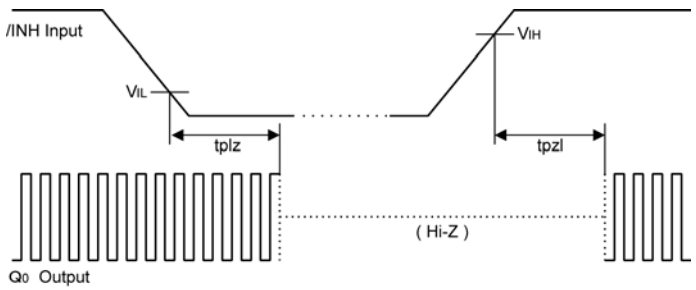


(2) Output Waveform Symmetry



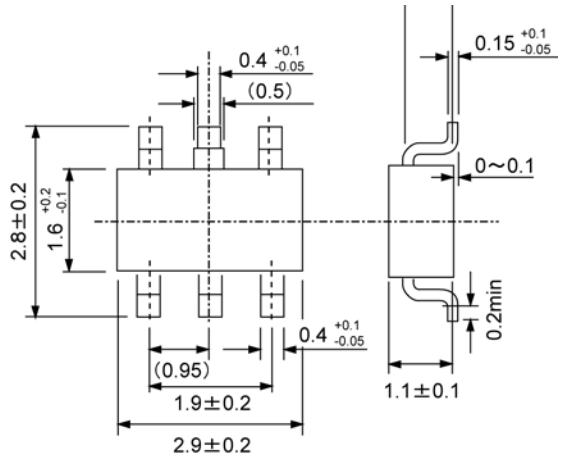
(3) Output Disable Delay Time, Output Enable Delay Time

*) /INH Pin Input Waveform　　tr = tf = less than 10ns

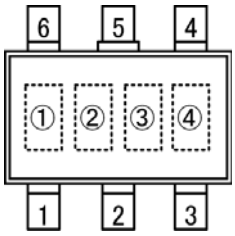


■PACKAGING INFORMATION

●SOT-26



■MARKING RULE



SOT-26
(TOP VIEW)

①Represents product series

MARK
6

②Represents divider ratio

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

③Represents frequency & Rf, Cg & Cd values

MARK	Frequency (MHz)	
	5.0V	3.3V
A	-	108~125
B	-	93~110
C	108~125	80~95
D	95~110	72~83
E	80~97	65~75
F	68~83	57~67
H	55~70	-
K	45~57	-
L	40~48	-
Z	External	

④Represents assembly lot number
(Based on internal standards)

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