XC2163 Series

ICs for use with 3rd Overtone Crystal Oscillators

◆**CMOS**
◆**Oscillation Frequency : 125MHz (max)**
◆**3-State Output**
◆**Built-in Oscillation Capacitor**
◆**Built-in Oscillation Feedback Resistor**
◆**Mini Mold SOT-26 Package**

■Applications

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

■General Description

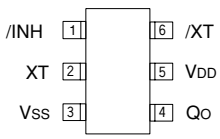
The XC2163 series are high frequency, low current consumption CMOS ICs with built-in crystal oscillator and divider circuits.
Output is selectable from any one of the following values for f0 : f0/1, f0/2, f0/4, f0/8.
With oscillation capacitors and a feedback resistors built-in, it is possible to configure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

■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 *
Ultra Small Package	: SOT-26 mini mold

* 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	Qo	Clock Output
5	VDD	Power Supply
6	/XT	Crystal Oscillator Connection (Output)

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

■/INH, QO Pin Function

/INH	Q0
"H"	Divider Output
"L"	High Impedance
OPEN	Divider Output

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

■Product Classification

●Ordering Information

XC2163 ①②③④⑤⑥

DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
①	Ratio Divider : C = f0/1 E = f0/4 D = f0/2 F = f0/8	④	Recommended Frequency Range & Rf, Cg, Cd values External Type:Z(refer to table 1) Built-in Type:(To Be Determined)
②	Output Capacity : 5 = 10TTL	⑤	Package : M = SOT-26
③	Duty Level : 1 = CMOS (V_{DD}/2) Note : TTL : 20MHz to 37MHz	⑥	Device Orientation : R = Embossed Tape (Standerd Feed) L= Embossed Tape (Reverse Feed)

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

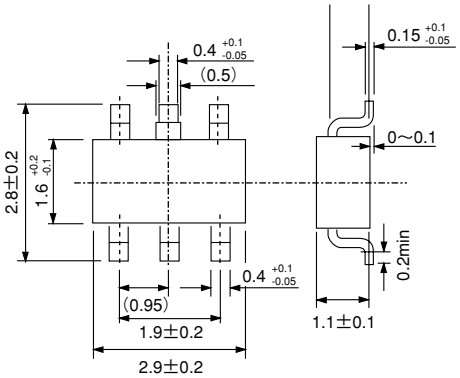
Note : We recommend that a damping resistor Rd be added between the /XT pin & the crystal oscillator pin in order to safeguard the crystal oscillator and improve oscillation stability.

Table 2: Frequency for Internal Type

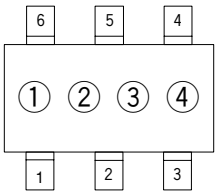
SYMBOL	5.0V TYPE			3.3V TYPE		
	Frequency Range	Rf	Cg/Cd	Frequency Range	Rf	Cg/Cd
A	-	-	-	108MHz ～ 125MHz	1.5kΩ	5.5pF
B	-	-	-	93MHz ～ 110MHz	1.7kΩ	6.5pF
C	108MHz ～ 125MHz	2.2KΩ	5.5pF	80MHz ～ 95MHz	2.2kΩ	5.5pF
D	95MHz ～ 110MHz	2.4KΩ	6.5pF	72MHz ～ 83MHz	2.4kΩ	6.5pF
E	80MHz ～ 97MHz	3.2KΩ	6.5pF	65MHz ～ 75MHz	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	11pF	-	-	-
L	40MHz ～ 48MHz	6.5KΩ	11pF	-	-	-

■Packaging Information

●SOT-26



■Marking



SOT-26
(TOP VIEW)

① Represents the Series name

MARK
6

② Represents the Divider Ratio

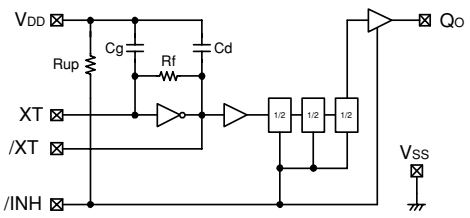
MARK	RATIO	MARK	RATIO
C	fo/1	E	fo/4
D	fo/2	F	fo/8

③ Represents Frequency & Rf, Cg & Cd Values

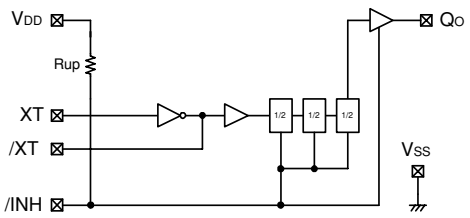
MARK	Frequency (MHz)	
	5.0V	3.3V
A	–	108~125
B	–	93~110
C	108~125	80~95
D	95~110	72~83
E	80~97	65~75
F	68~83	57~67
H	55~70	–
K	45~57	–
L	40~48	–
Z	External	

④ Represents the Assembly Lot No. (based on internal standards)

■Block Diagram



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
Continuous Total Power Dissipation	Pd	250 *	mW
Operating Ambient Temp.	Topr	-30～+80	℃
Storage Temp.	Tstg	-55～+125	℃

* when implemented on a glass epoxy PCB

■Electrical Characteristics

XC2163C51AMR: (Unless specified, V_{DD}=3.3V, Ta=25℃)

fosc=108MHz～125MHz

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
Consumption Current 1	I_{DD1}	/INH = OPEN, C_L = 15pF, f = 125MHz		18		mA
Consumption Current 2	I_{DD2}	/INH = 'L', f = 125MHz		5		μA
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	Measured Value		5.5		pF
	Cd	Measured Value		5.5		pF
Internal oscillation feedback resistance	Rf			1.5		MΩ
Output Off Leak Current	I_{OZ}	Qo pin, /INH = 'L'			10	μA

note) measured value

XC2163C51BMR: (Unless specified, V_{DD}=3.3V, No load, Ta=25℃)

fosc=93MHz～110MHz

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
Consumption Current 1	I_{DD1}	/INH = OPEN, C_L = 15pF, f = 110MHz		15		mA
Consumption Current 2	I_{DD2}	/INH = 'L', f = 110MHz		5		μA
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	Measured Value		6.5		pF
	Cd	Measured Value		6.5		pF
Internal oscillation feedback resistance	Rf			1.7		MΩ
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		MIN	TYP	MAX
Output Rise Time	tr	C_L=15pF, 0.1V_{DD}→0.9V_{DD}			1.5	
Output Fall Time	tf	C_L=15pF, 0.9V_{DD}→0.1V_{DD}			1.5	
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

■Electrical Characteristics

XC2163C51ZMR:（Unless specified, V_{DD}=5.0V, Ta=25℃）

fosc = 108MHz to 125MHz ; Rf = 1.6kΩ ; Cg = Cd = 10pF external

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
Consumption Current 1	I_{DD1}	/INH = OPEN, C_L = 15pF, f = 120MHz		31		mA
Consumption Current 2	I_{DD2}	/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

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

This data sheet is preliminary therefore, the contents can be changed without advance notice.

■Electrical Characteristics

XC2163C51ZMR: (Unless specified, V_{DD}=3.3V, Ta=25℃)

fosc = 108MHz to 125MHz : Rf = 3.9kΩ, Cg = Cd = 4pF external

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}	Q_O pin, V_{DD}=2.97V, I_{OH}=-8mA	2.2	2.4		V
'L' Level Output Voltage	V_{OL}	Q_O pin, V_{DD}=2.97V, I_{OL}=8mA		0.3	0.4	V
Consumption Current 1	I_{DD1}	/INH=OPEN, C_L=15pF, f=120MHz		15		mA
Consumption Current 2	I_{DD2}	/INH="L", f=100MHz		4		mA
Input pull up resistance 1	Rup1	/INH="L"	2.0	4.0	6.0	MΩ
Input pull up resistance 2	Rup2	/INH=0.7V_{DD}	70	140	250	kΩ
Output Off Leak Current	I_{OZ}	Q_O pin, /INH="L"			10	μA

■Switching Characteristics

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

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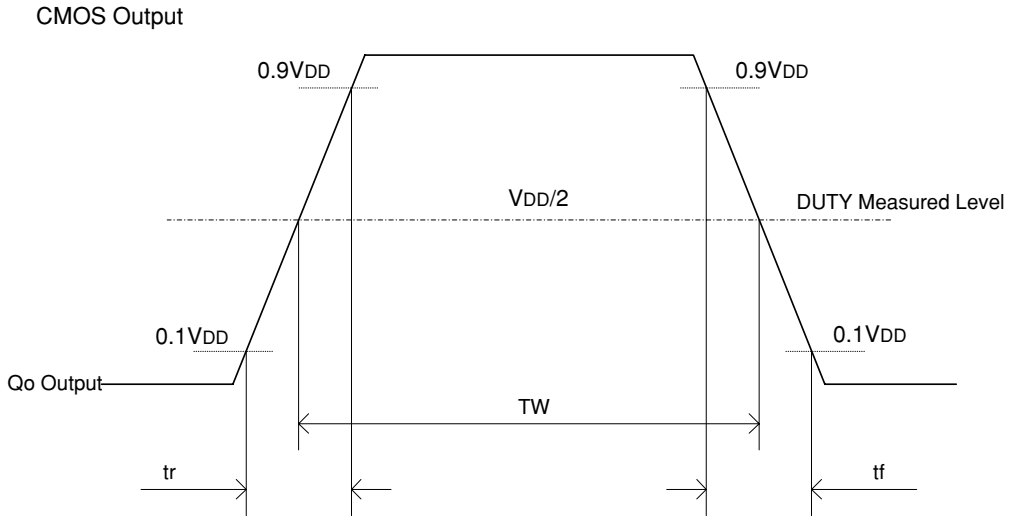
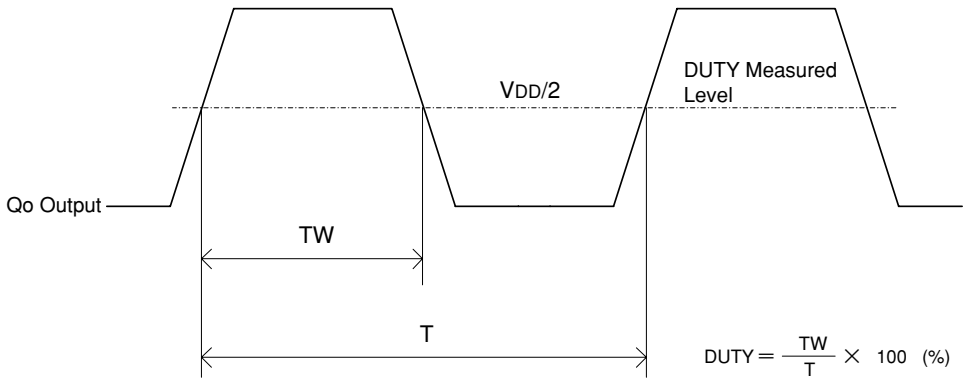
■Switching Characteristic Measurement Waveforms

(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