XC2163 Series

ICs for use with 3rd Overtone Crystal Oscillators

Preliminary

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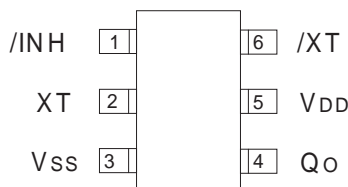◆ **Mini Mold SOT-26 Package**

■ 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 to 125MHz (Rf, Cg, Cd internal ; 5.0V)
(3rd Overtone) : 57MHz to 125MHz (Rf, Cg, Cd internal ; 3.3V)
: 20MHz to 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	Q0	Clock Output
5	VDD	Power Supply
6	/XT	Crystal Oscillator Connection (Output)

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

■ /INH, Q0 Pin Function

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

■ Absolute Maximum Ratings

PARAMETER	SYMBOL	CONDITIONS	UNITS
Supply Voltage	VDD	Vss - 0.3 to Vss + 7.0	V
Input Voltage	VIN	Vss - 0.3 to VDD + 0.3	V
Continuous Total Power Dissipation	Pd	250 *	mW
Operating Ambient Temp.	Topr	-30 to +80	℃
Storage Temp.	Tstg	-55 to +125	℃

* when implemented on a glass epoxy PCB

■ Block Diagram
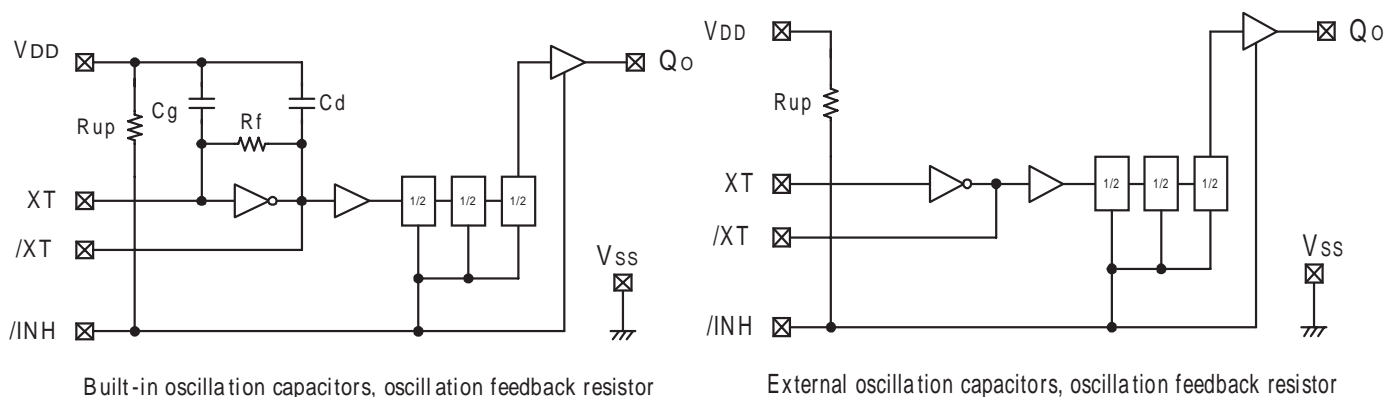
Built-in oscillation capacitors, oscillation feedback resistor

External oscillation capacitors, oscillation feedback resistor

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605

Preliminary

■ Electrical Characteristics

XC2163C51ZMR

(unless otherwise stated, V_{DD}=**5.0V**, Ta=25°C)

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
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	$I_{DD}1$	/INH = OPEN, C_L = 15pF, f = 120MHz		31		mA
Consumption 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	Ioz	Qo pin, /INH = 'L'			10	μA

■ Switching Characteristics

CMOS duty : V_{DD} = **5.0V**, Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Rise Time	tr	C_L = 15pF, 0.1V_{DD} to 0.9V_{DD}		1.5		ns
Output Fall Time	tf	C_L = 15pF, 0.9V_{DD} to 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

■ Electrical Characteristics

XC2163C51ZMR

(unless otherwise stated, V_{DD}=**3.3V**, Ta=25°C)

fosc = 108MHz to 125MHz ; Rf = **3.9kW** ; Cg = Cd = **4pF** external

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
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	$I_{DD}1$	/INH = OPEN, C_L = 15pF, f = 120MHz		15		mA
Consumption Current 2	$I_{DD}2$	/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	Ioz	Qo pin, /INH = 'L'			10	μA

■ Switching Characteristics

CMOS duty : V_{DD} = **3.3V**, Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Rise Time	tr	C_L = 15pF, 0.1V_{DD} to 0.9V_{DD}		1.5		ns
Output Fall Time	tf	C_L = 15pF, 0.9V_{DD} to 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

Preliminary

■ Switching Characteristic Measurement Waveforms

(1) Switching Time

CMOS Output

$0.9V_{DD}$ $0.9V_{DD}$

$V_{DD/2}$ DUTY Measured Level

$0.1V_{DD}$ $0.1V_{DD}$

TW

Qo Output

tr tf
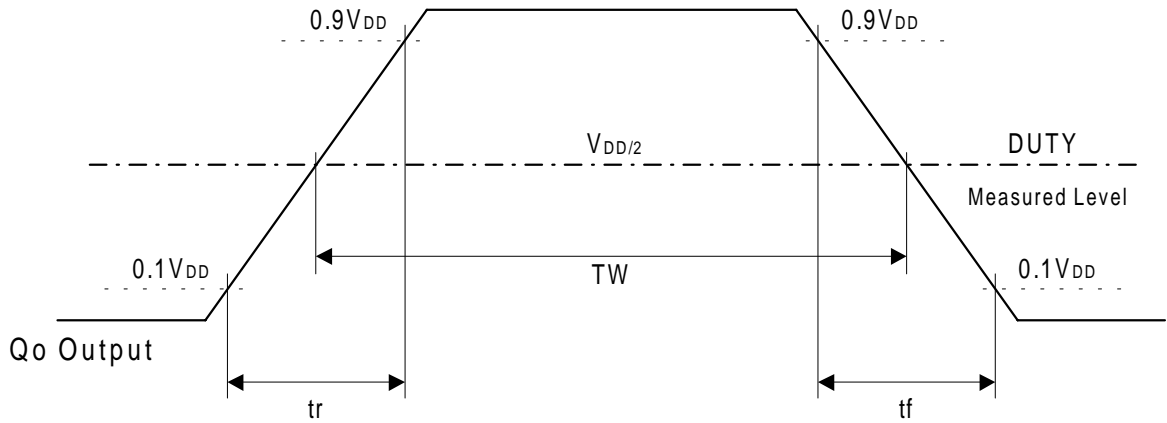
(2) Output Waveform Symmetry

$V_{DD/2}$ DUTY Measured Level

TW

Qo Output

T

$$DUTY = \frac{TW}{T} \times 100 \ (\%)$$

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TOREX
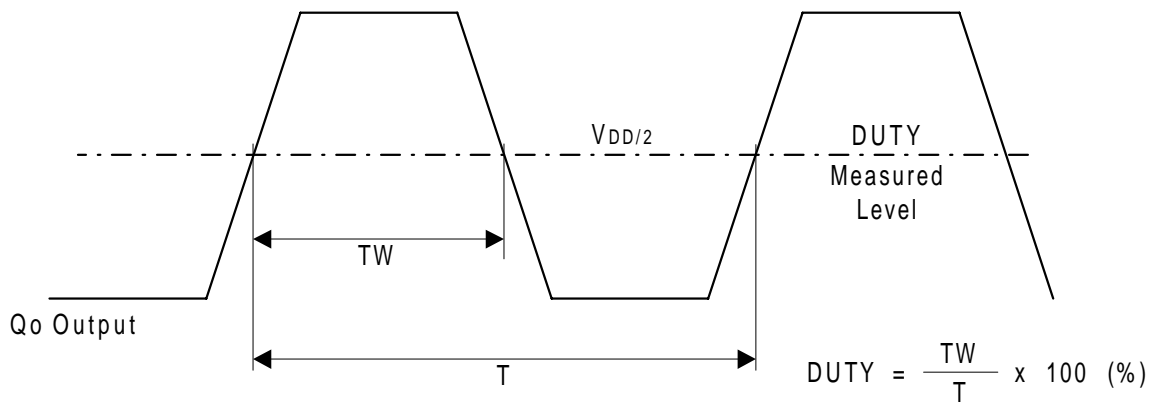
Preliminary

■ 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 (orientation of device : right) L= Embossed Tape (orientation of device : left)

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

■ Marking

```
  ┌──┐  ┌──┐  ┌──┐
  │ 6│  │ 5│  │ 4│
  ┌────────────────┐
  │                │
  │   ①②③④        │
  │                │
  └────────────────┘
  │ 1│  │ 2│  │ 3│
  └──┘  └──┘  └──┘
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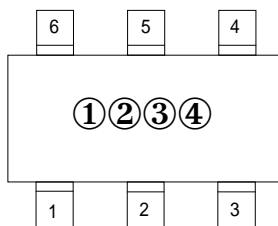
SOT-26
(TOP VIEW)

① **Represents Product Type**
  * To Be Determined

② **Represents the Divider Ratio**

MARK	RATIO	MARK	RATIO
C	f0/1	E	f0/4
D	f0/2	F	f0/8

③ **Represents Recommended Frequency & Rf, Cg & Cd Values**
  * To Be Determined

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