XC2165 Series

ETR14007_002

ICs for use with low voltage Crystal Oscillators

■GENERAL DESCRIPTION

The XC2165 series is a CMOS IC operates in 1.5V to 3.6V with the built-in circuits for crystal oscillator and divider.
Output is selectable from any one of f0, f0/1, f0/2, f0/4 and f0/8.
With oscillation capacitors and a feedback resistor built-in, it is possible to configure a stable fundamental oscillator using only an external crystal.
In stand-by mode, oscillation stops completely and output pin Q0 becomes high impedance.
The XC2165 series is available in SOT-26 package.

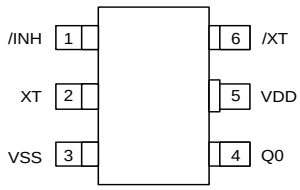
■APPLICATIONS

- ●Crystal oscillation modules
- ●Micro computers, DSP clocks
- ●Communication equipment
- ●Various system clocks
- ●Cellular and portable phones

■FEATURES

Oscillation Frequency	:	8MHz～120MHz (Fundamental)
Divider Ratio	:	f0/1, f0/2, f0/4, f0/8
Output	:	3-State
Operating Voltage Range	:	1.5V ~ 3.6V
Low Current Consumption	:	Stand-by function included
	:	30μA (MAX.) when stand-by
Built-in Capacitors Cg, Cd		
Built-in Feedback Resistor		
Operating Ambient Temperature	:	- 40℃~ + 85℃
Package	:	SOT-26
Environmentally Friendly	:	EU RoHS Compliant, Pb Free

■PIN CONFIGURATION



SOT-26 (TOP VIEW)

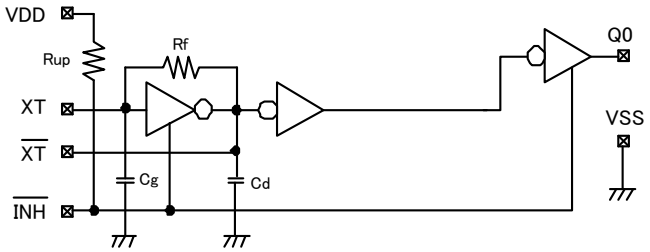
■PIN ASSIGNMENT

PIN NUMBER	PIN NAME	FUNCTIONS
1	/ INH	Stand-by Control *
2	XT	Crystal Oscillator Connection (Input)
3	V_{SS}	Ground
4	Q0	Clock Output
5	V_{DD}	Power Supply
6	/XT	Crystal Oscillator Connection (Output)

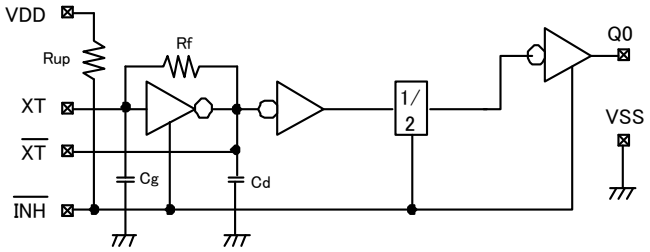
* Pull-up resistor is built-in to the stand-by control pin.

■BLOCK DIAGRAM

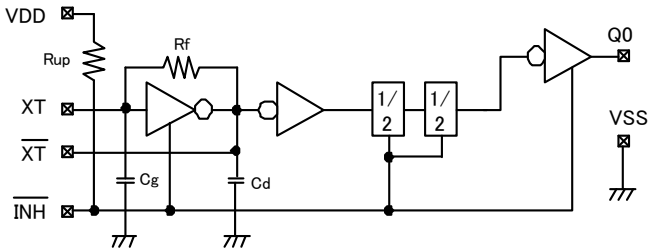
1). XC2165C21Axx/XC2165C21Bxx (fOSC = f0/1)



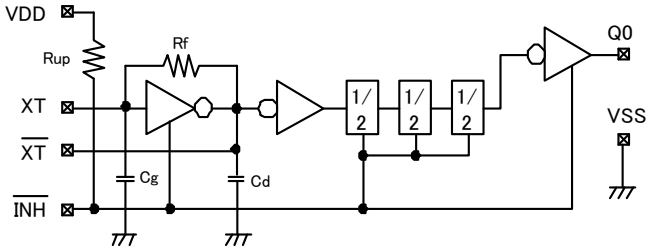
2). XC2165C22Axx/XC2165C22Bxx (fOSC = f0/2)



3). XC2165C24Axx/XC2165C24Bxx (fOSC = f0/4)



4). XC2165C28Axx/XC2165C28Bxx (fOSC = f0/8)



■PRODUCT CLASSIFICATION

●Ordering Information

XC2165 ①②③④⑤⑥-⑦

DESIGNATOR	ITEM	SYMBOL	DESCRIPTION
①	Duty Level	C	CMOS
②	Fixed Number	2	-
③	Divider Ratio	1	f0/1
		2	f0/2
		4	f0/4
		8	f0/8
④	Oscillation Frequency	A	8MHz ~ 70MHz
		B	16MHz ~ 120MHz
⑤⑥-⑦(*1)	Package(Order Unit)	MR	SOT-26(3,000/Reel)
		MR-G	SOT-26(3,000/Reel)

(*1) The “-G” suffix denotes Halogen and Antimony free as well as being fully RoHS compliant.

■PIN FUNCTION

/ INH	Q0
‘H’ or Open	Clock Output
‘L’	High Impedance

■ABSOLUTE MAXIMUM RATINGS

Ta=25℃

PARAMETER	SYMBOL	RATINGS	UNITS
Supply Voltage	V_{DD}	V_{SS} – 0.3 to V_{SS} + 7.0	V
/ INH Pin Voltage	V_{INH}	V_{SS} – 0.3 to V_{DD} + 0.3	V
Q0 Pin Voltage	V_{Q0}	V_{SS} – 0.3 to V_{DD} + 0.3	V
Q0 Output Current	I_{Q0}	± 50	mA
Power Dissipation	Pd	250	mW
Operating Ambient Temperature	Topr	- 40 to + 85	℃
Storage Temperature	Tstg	- 55 to + 125	℃

■DC ELECTRICAL CHARACTERISTICS

XC2165C2xAxx
1.8V Operation (Unless otherwise stated, V_{DD} = 1.8V, f0=70MHz, No Load, Ta = - 40℃ ~ + 85℃)

PARAMETER	SYMBOL	FUNCTION		MIN.	TYP.	MAX.	UNIT	CIRCUIT
Operating Voltage	V_{DD}			1.5	1.8	3.6	V	-
Crystal Oscillation Frequency	fo			8	-	70	MHz	-
Output Frequency	f_{OSC}	MIN : f0=8MHz, MAX : f0=70MHz, C_L=15pF	XC2165C21Axx	8	-	70	MHz	-
			XC2165C22Axx	4	-	35		
			XC2165C24Axx	2	-	17.5		
			XC2165C28Axx	1	-	8.75		
'H' Level Input Voltage	V_{IH}	/INH pin		$0.7V_{DD}$	-	-	V	1
'L' Level Input Voltage	V_{IL}	/INH pin		-	-	$0.3V_{DD}$	V	1
'H' Level Output Voltage	V_{OH}	Q0 pin, V_{DD}=1.5V, I_{OH}= - 2.0mA		1.0	1.1	-	V	2
'L' Level Output Voltage	V_{OL}	Q0 pin, V_{DD}=1.5V, I_{OL}= 2.0mA		-	0.3	0.4	V	2
Supply Current 1	I_{DD1}	/INH =Open, C_L=15pF	XC2165C21Axx	-	5.0	10.0	mA	3
			XC2165C22Axx	-	3.5	7.0		
			XC2165C24Axx	-	3.0	6.0		
			XC2165C28Axx	-	2.5	6.0		
Supply Current 2	I_{DD2}	/INH = 'L', f0 = 70MHz, C_L=15pF		-	15	30	μA	3
Input Pull-Up Resistance 1	Rup1	/INH = 'L'		0.8	2.0	6.0	MΩ	4
Input Pull-Up Resistance 2	Rup2	/INH = $0.7V_{DD}$		20.0	50.0	150.0	kΩ	4
Internal Oscillation Capacity	Cg			-	10(*)	-	pF	-
	Cd			-	10(*)	-	pF	-
Internal Oscillation Feedback Resistance	Rf			1.2	3.0	5.5	MΩ	5
Output Off Leak Current	Ioz	V_{DD}=3.6V, /INH = 'L'		-	-	1.0	μA	6

(*) Designed value

■AC ELECTRICAL CHARACTERISTICS

XC2165C2xAxx
1.8V Operation (Unless otherwise stated, V_{DD} = 1.8V, f0=70MHz, C_L=15pF, Ta = - 40℃ ~ + 85℃)

PARAMETER	SYMBOL	FUNCTION	MIN.	TYP.	MAX.	UNIT	CIRCUIT
Output Rise Time	tr	V_{DD}=1.8V, C_L=15pF (10% to 90%)	-	-	6.5(*)	ns	–
Output Fall Time	tf	V_{DD}=1.8V, C_L=15pF (10% to 90%)	-	-	6.5(*)	ns	–
Duty Cycle	DUTY	C_L=15pF @ $0.5V_{DD}$	40	-	60	%	7
Output Start Time	ton	f0=8MHz	-	-	4.0(*)	ms	–

(*) Designed value

■DC ECTRICAL CHARACTERISTICS (Continued)

XC2165C2xBxx
2.5V Operation (Unless otherwise stated, V_{DD} = 2.5V, f0=120MHz, No Load, Ta = - 40℃ ~ + 85℃)

PARAMETER	SYMBOL	FUNCTION		MIN.	TYP.	MAX.	UNIT	CIRCUIT
Operating Voltage	V_{DD}			1.8	2.5	3.6	V	-
Crystal Oscillation Frequency	fo			16	-	120	MHz	-
Output Frequency	f_{OSC}	MIN：f0=16MHz, MAX：f0=120MHz, C_L=5pF	XC2165C21Bxx	16	-	120	MHz	-
			XC2165C22Bxx	8	-	60		
			XC2165C24Bxx	4	-	30		
			XC2165C28Bxx	2	-	15		
'H' Level Input Voltage	V_{IH}	/INH pin		$0.7V_{DD}$	-	-	V	1
'L' Level Input Voltage	V_{IL}	/INH pin		-	-	$0.3V_{DD}$	V	1
'H' Level Output Voltage	V_{OH}	Q0 pin, V_{DD}=1.8V, I_{OH}= - 2.0mA		1.3	1.4	-	V	2
'L' Level Output Voltage	V_{OL}	Q0 pin, V_{DD}=1.8V, I_{OL}= 2.0mA		-	0.3	0.4	V	2
Supply Current 1	I_{DD1}	/INH =Open, f0=120MHz, C_L=5pF	XC2165C21Bxx	-	10.0	20.0	mA	3
			XC2165C22Bxx	-	T.B.D.	T.B.D.		
			XC2165C24Bxx	-	T.B.D.	T.B.D.		
			XC2165C28Bxx	-	T.B.D.	T.B.D.		
Supply Current 2	I_{DD2}	/INH = 'L', f0 = 120MHz, C_L=5pF		-	15.0	30.0	μA	3
Input Pull-Up Resistance 1	Rup1	/INH = 'L'		0.8	2.0	6.0	MΩ	4
Input Pull-Up Resistance 2	Rup2	/INH = $0.7V_{DD}$		20.0	50.0	150.0	kΩ	4
Internal Oscillation Capacity	Cg			-	10(*)	-	pF	-
	Cd			-	10(*)	-	pF	-
Internal Oscillation Feedback Resistance	Rf			1.2	3.0	5.5	MΩ	5
Output Off Leak Current	Ioz	V_{DD}=3.6V, /INH = 'L'		-	-	1.0	μA	6

(*) Designed value

■AC ECTRICAL CHARACTERISTICS (Continued)

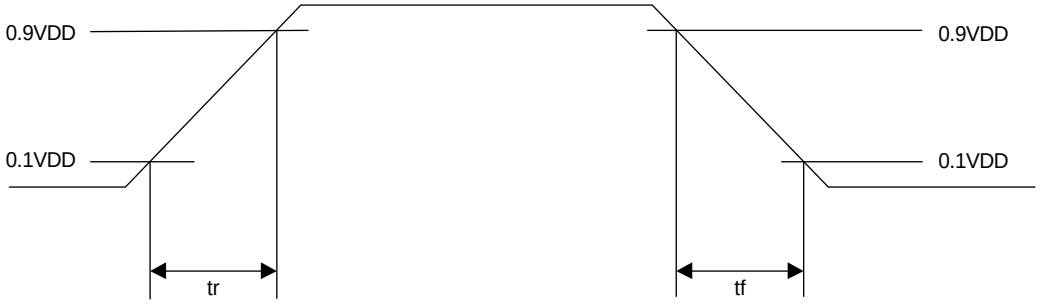
XC2165C2xBxx
2.7V Operation (Unless otherwise stated, V_{DD} = 2.7V, f0=120MHz, C_L=5pF, Ta = - 40℃ ~ + 85℃)

PARAMETER	SYMBOL	FUNCTION	MIN.	TYP.	MAX.	UNIT	CIRCUIT
Output Rise Time	tr	V_{DD}=2.5V, C_L=5pF (10% to 90%)	-	-	4.0(*)	ns	-
Output Fall Time	tf	V_{DD}=2.5V, C_L=5pF (10% to 90%)	-	-	4.0(*)	ns	-
Duty Cycle	DUTY	C_L=5pF @ $0.5V_{DD}$	40	-	60	%	7
Oscillation Start Time	tosc_on	f0=16MHz	-	-	3.0(*)	ms	-

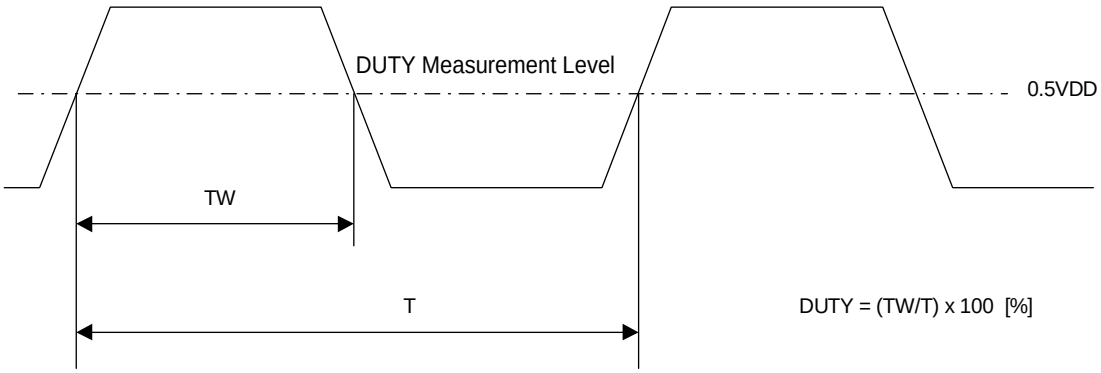
(*) Designed value

■SWITCHING CHARACTERISTICS MEASUREMENT WAVEFORMS

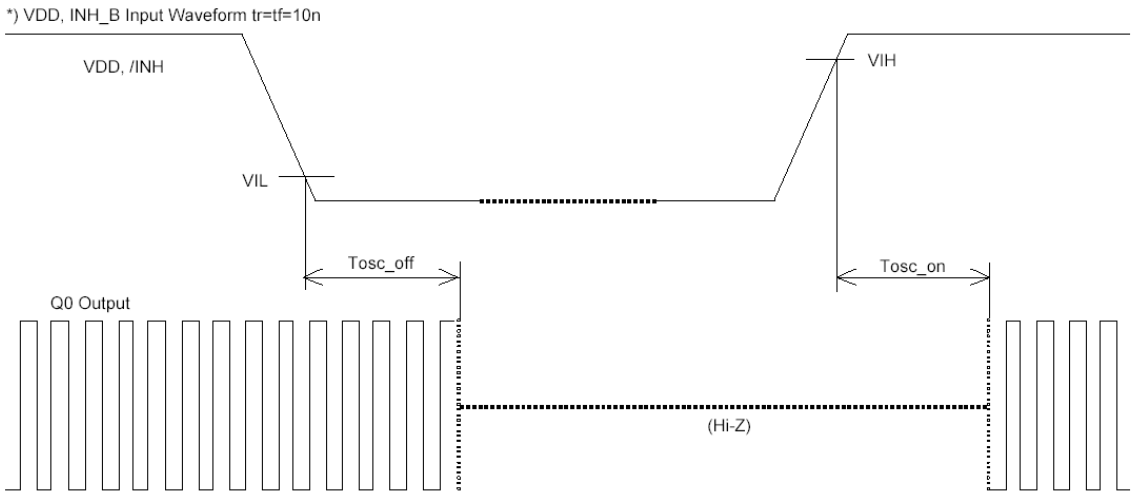
(1) Output Rise Time: tr / Output Fall Time: tf



(2) Duty Cycle

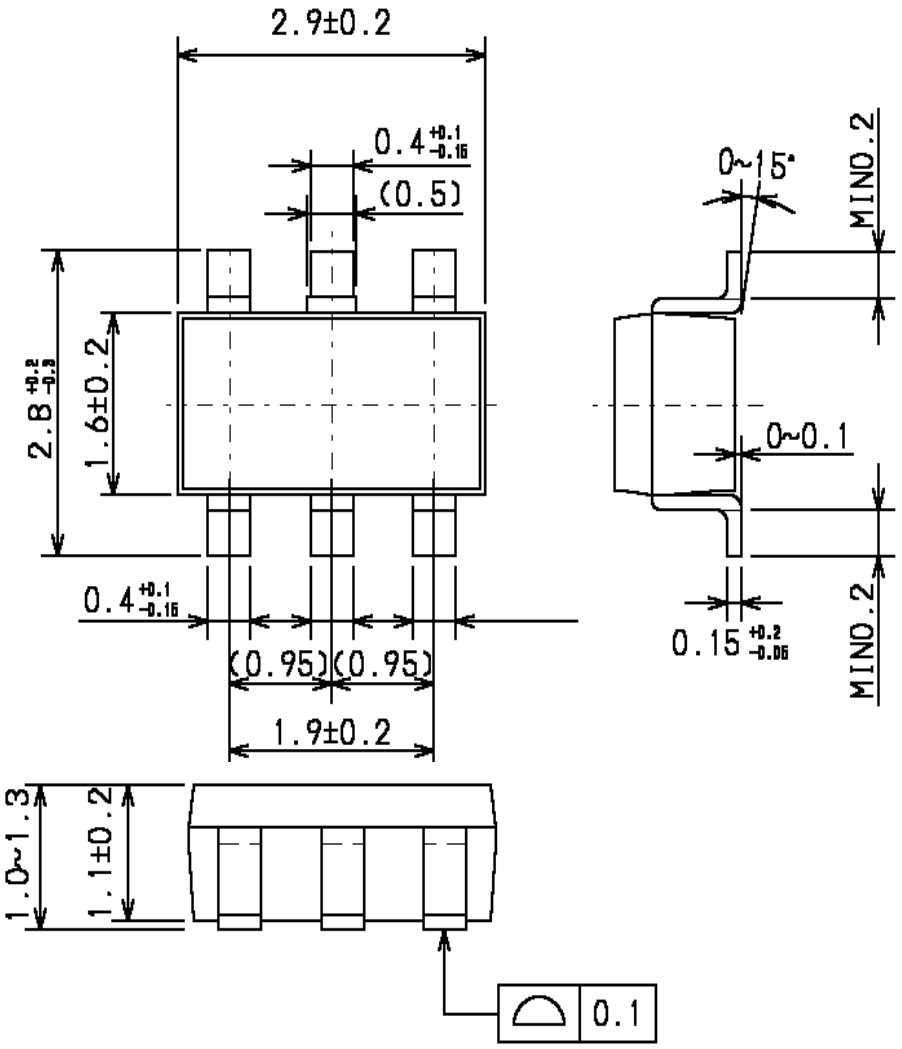


(3) Oscillation Start Time: tosc_on / Oscillation Stop Time: tosc_off

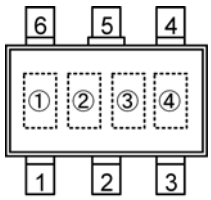


■PACKAGING INFORMATION

●SOT-26



■MARKING RULE



SOT-26 (TOP VIEW)

① represents product series (Fixed marking)

MARK	PRODUCT SERIES
5	XC2165 series

② represents oscillation frequency

MARK	OSCILLATION FREQUENCY
A	C2xA: 8MHz ~ 70MHz (Fundamental)
B	C2xB: 16MHz ~ 120MHz (Fundamental)

③ represents divider ratio

MARK	DEVIDER RATIO	MARK	DEVIDER RATIO
A	f0/1	B	f0/2
C	f0/4	D	f0/8

④ represents assembly lot number
(based on internal standards)

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