XC2165 Series

ETR1407_001

ICs for use with low voltage Crystal Oscillators

Preliminary

■GENERAL DESCRIPTION

The XC2165 series are CMOS ICs operates from supply voltage range from 1.5V to 3.6V 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 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 in the state of high impedance.
The XC2165 series are integrated into SOT-26 packages.
The series is also available in chip form.
resistance and ultra high-speed switching characteristics.
Two FET devices are built into the one package.
Because high-speed switching is possible, the IC can be efficiently set thereby saving energy.
The small SOP-8 package makes high density mounting possible.

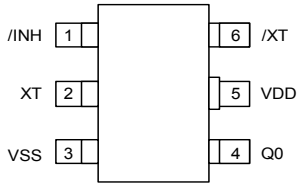
■APPLICATIONS

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

■FEATURES

Oscillation Frequency : C2xA series
8MHz ~ 70MHz (Fundamental)
: C2xB series
16MHz ~ 120MHz (Fundamental)
Divider Ratio : Selectable from f0/1, f0/2, f0/4, f0/8
Output : 3-State
Operating Voltage Range : 1.5V ~ 3.6V
(C21B series: 1.8V ~ 3.6V)
Low Current Consumption : Stand-by function included
30 μA (MAX.) when stand-by
Chip Form (size) : 800 × 1200 μm
Built-in Capacitors Cg, Cd
Built-in Feedback Resistor
Ultra Small Package : SOT-26

■PIN CONFIGURATION



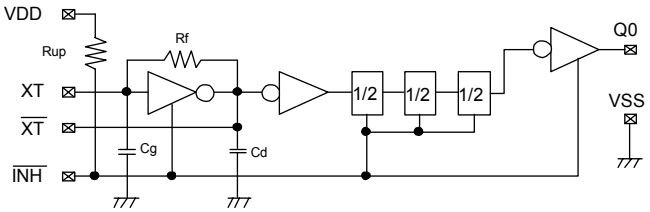
SOT-26 (TOP VIEW)

■PIN ASSIGNMENT

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

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

■BLOCK DIAGRAM



■/ INH, Q0 PIN FUNCTION

/ INH	Q0
'H' or Open	Clock Output
'L'	High Impedance

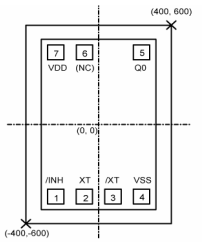
■PRODUCT CLASSIFICATION

●Ordering Information

XC2165 ①②③④⑤⑥

DESIGNATOR	DESCRIPTION	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
⑤	Chip Form & Package Type	C	: Chip form
		M	: SOT-26 package
⑥	Device Orientation	T	: Chip tray
		R	: Embossed tape, standard feed
		L	: Embossed tape, reverse feed
		W	: Wafer

■PAD LAYOUT



Size (Chip) : 800×1200μm
Thickness (Chip) : 200±20μm
Backside (Chip) : GND level
Aperture (Pad) : 90×90μm

■PAD DIMENSIONS

Unit: μm

PIN NUMBER	PIN NAME	FUNCTION	PAD DIMENSIONS	
			X	Y
1	/ INH	Stand-by Control*	- 236	- 436
2	XT	Crystal Oscillation Connection (Input)	- 79	- 436
3	/ XT	Crystal Oscillation Connection (Output)	79	- 436
4	VSS	Ground	236	- 436
5	Q0	Clock Output	236	436
6	(NC)	No Connection	- 78	436
7	VDD	Power Supply	- 236	436

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

■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	150 *	mW
Operating Temperature Range	Topr	- 40 to + 85	℃
Storage Temperature Range	Tstg	- 65 to + 150 (chip form)	℃
		- 55 to + 125 (SOT-26)	

* SOT-26 Package: When implemented on a glass epoxy PCB.

■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
Operating Voltage	V_{DD}			1.5	1.8	3.6	V
Crystal Oscillation Frequency	Fosc			8	-	70	MHz
'H' Level Input Voltage	V_{IH}	/INH pin		0.7V_{DD}	-	-	V
'L' Level Input Voltage	V_{IL}	/INH pin		-	-	0.3V_{DD}	V
'H' Level Output Voltage	V_{OH}	Q0 pin, V_{DD}=1.5V, I_{OH}= - 2.0mA		1.0	1.1	-	V
'L' Level Output Voltage	V_{OL}	Q0 pin, V_{DD}=1.5V, I_{OL}= 2.0mA		-	0.3	0.4	V
Supply Current 1	I_{DD1}	/INH =Open, f0=70MHz, C_L=15pF	XC2165C21Axx	-	5.0	10.0	mA
			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
Input Pull-Up Resistance 1	Rup1	/INH = 'L'		0.8	2.0	6.0	MΩ
Input Pull-Up Resistance 2	Rup2	/INH = 0.7V_{DD}		20	50	150	kΩ
Internal Oscillation Capacity (*)	Cg	(*)		-	10	-	pF
	Cd	(*)		-	10	-	pF
Internal Oscillation Feedback Resistance	Rf			1.2	3.0	5.5	MΩ
Output Off Leak Current	Ioz	V_{DD}=3.6V, /INH = 'L'		-	-	1.0	μA

(*) Designed value

■SWITCHING CHARACTERISTICS

XC2165C2xAxx

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

PARAMETER	SYMBOL	FUNCTION	MIN.	TYP.	MAX.	UNIT
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
Output Duty Cycle	DUTY	C_L=15pF @ 0.5V_{DD}	40	-	60	%
Oscillation Start Time (*)	Tosc_on	f0=8MHz	-	-	4.0	ms

(*) Designed value

■ELECTRICAL 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
Operating Voltage	V_{DD}			1.8	2.5	3.6	V
Crystal Oscillation Frequency	Fosc			16	-	120	MHz
'H' Level Input Voltage	V_{IH}	/INH pin		0.7V_{DD}	-	-	V
'L' Level Input Voltage	V_{IL}	/INH pin		-	-	0.3V_{DD}	V
'H' Level Output Voltage	V_{OH}	Q0 pin, V_{DD}=1.8V, I_{OH}= - 2.0mA		1.3	1.4	-	V
'L' Level Output Voltage	V_{OL}	Q0 pin, V_{DD}=1.8V, I_{OL}= 2.0mA		-	0.3	0.4	V
Supply Current 1	I_{DD1}	/INH =Open, f0=120MHz, C_L=5pF	XC2165C21Bxx	-	10.0	20.0	mA
			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
Input Pull-Up Resistance 1	Rup1	/INH = 'L'		0.8	2.0	6.0	MΩ
Input Pull-Up Resistance 2	Rup2	/INH = 0.7V_{DD}		20	50	150	kΩ
Internal Oscillation Capacity (*)	Cg	(*)		-	10	-	pF
	Cd	(*)		-	10	-	pF
Internal Oscillation Feedback Resistance	Rf			1.2	3.0	5.5	MΩ
Output Off Leak Current	Ioz	V_{DD}=3.6V, /INH = 'L'		-	-	1.0	μA

(*) Designed value

T.B.D.: To be determined

■SWITCHING CHARACTERISTICS (Continued)

XC2165C2xBxx

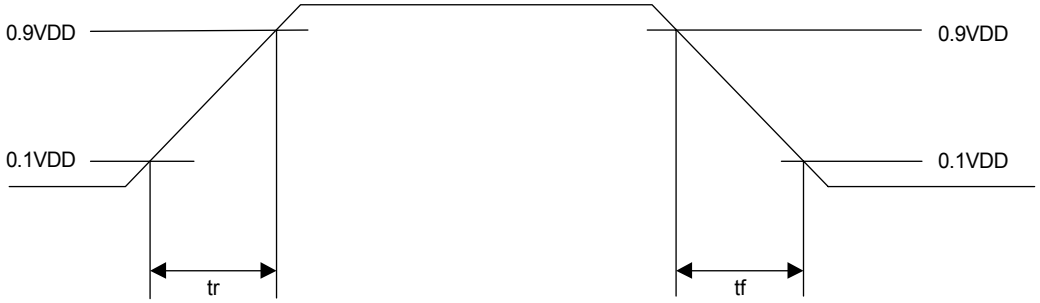
2.5V Operation (Unless otherwise stated, V_{DD} = 2.5V, f0=120MHz, CL=5pF, Ta = - 40℃ ~ + 85℃)

PARAMETER	SYMBOL	FUNCTION	MIN.	TYP.	MAX.	UNIT
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
Output Duty Cycle	DUTY	C_L=5pF @ 0.5V_{DD}	40	-	60	%
Oscillation Start Time (*)	Tosc_on	f0=16MHz	-	-	3.0	ms

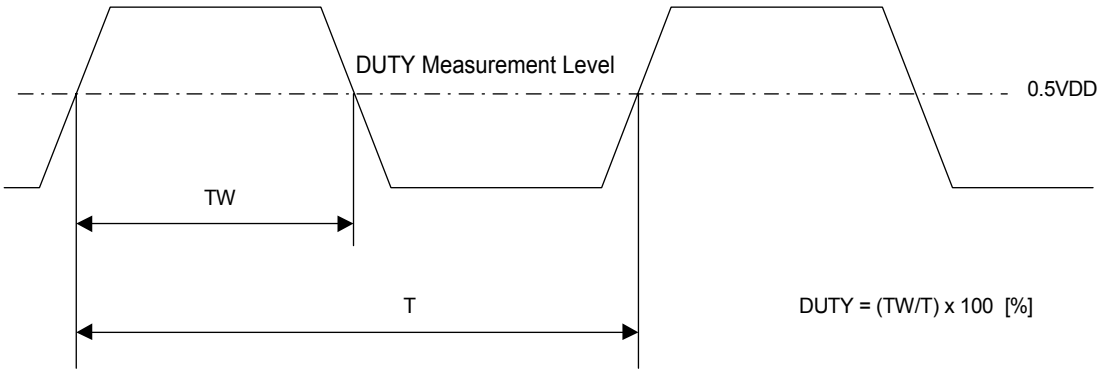
(*) Designed value

■SWITCHING CHARACTERISTICS MEASUREMENT WAVEFORMS

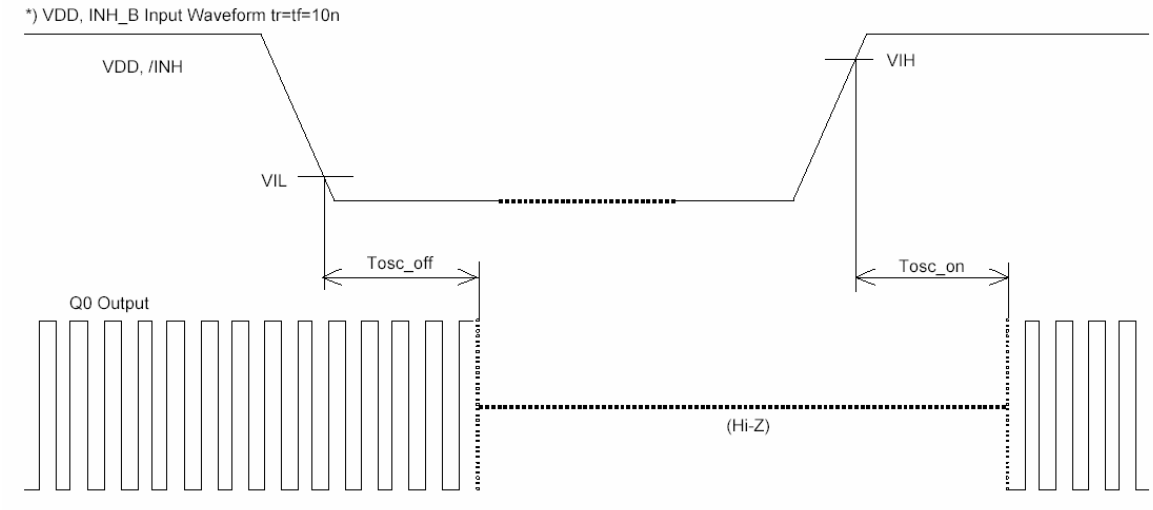
(1) Output Rise Time: Tr / Output Fall Time: Tf



(2) Duty Cycle

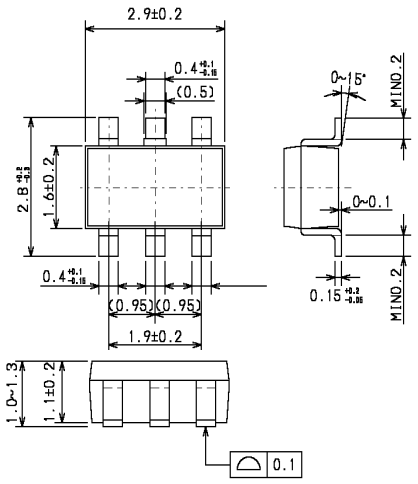


(3) Oscillation Start Time: Tosc_on / Oscillation Stop Time: Tosc_off

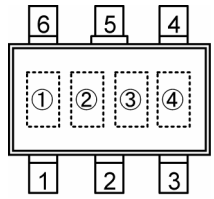


■PACKAGING INFORMATION

●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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