XC25BS6 Series

Divider Signal Output Clock Generator ICs with Built-In Crystal Oscillator Circuit

September 17, 2003 V1

Preliminary

- CMOS — Low Power Consumption
- Low Operating Supply Voltage — 2.3V (MIN.)
- Output Frequency — 32.768kHz
- Oscillation Frequency — 2MHz ~ 36MHz (fundamental)
- Built-In Divider Circuit — Selectable from divisions of 1024, 512, 256, 128
- Output — 3-State
- Ultra Small Package — SOT-26
- Chip Form

APPLICATIONS

- Crystal Oscillation Modules
- Clocks for Micro-computers, DSPs, etc.
- Communication Equipment
- Various System Clocks
- Clock Time-Base

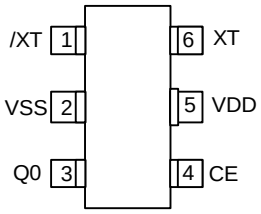
GENERAL DESCRIPTION

The XC25BS6 is a low operating voltage, low current consumption series of CMOS ICs with built-in crystal oscillator and divider circuits designed for clock generators. Oscillation capacitors Cg and Cd are externally set up.
Output is selectable from any one of the following values for f0:f0/1024, f0/512, f0/256, and f0/128.
With oscillation feedback resistors built-in, it is possible to configure a stable fundamental oscillator using about 10pF of external oscillation capacitor and an external crystal.
The series has a stand-by function. The oscillation completely stops in the stand-by state and output will be one of high-impedance.

FEATURES

Oscillation Frequency	2MHz ~ 36MHz (fundamental) - Oscillation feedback resistor built-in - External oscillation capacitor
Divider Ratio	f0/1024, f0/ 512, f0/256, f0/128
Output	3-State
Operating Supply Voltage Range	2.3 ~ 4.0V
Supply Current	0.5μA (MAX.) when stand-by mode
Chip Form	Chip size 1.3 x 0.8mm
Package	SOT-26 mini mold

PIN CONFIGURATION

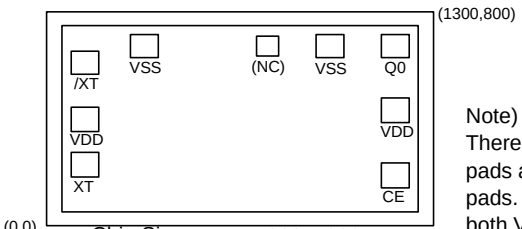


PIN ASSIGNMENT

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

* The stand-by control pin (pin #4) has a pull-down resistor built-in.

PAD LAYOUT FOR CHIP FORM



Chip Size : 1300 x 800μm
Chip Thickness : 280±20μm
Chip Back : VDD level
Pad Aperture : 88 x 88 μm

Note)
There are two VSS pads and two VDD pads. Please connect both VSS pads to GND, and connect both VDD pads to a power supply.

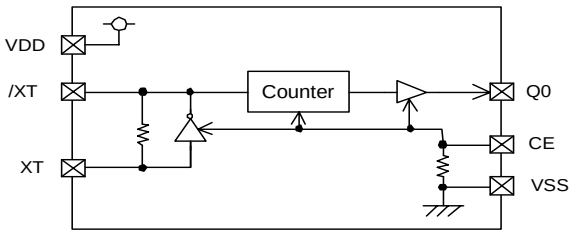
PAD LOCATIONS

(Unit:μm)

PIN NUMBER	PIN NAME	FUNCTIONS	PAD DIMENSIONS X	PAD DIMENSIONS Y
1	/ XT	Crystal Oscillator Connection (Output)	128.0	610.0
2	VSS	Ground	328.0	672.0
3	(NC)	No Connection	741.0	672.0
4	VSS	Ground	952.0	672.0
5	Q0	Clock Output	1172.0	672.0
6	VDD	Power Supply	1172.0	430.0
7	CE	Stand-by Control *	1172.0	189.0
8	XT	Crystal Oscillator Connection (Input)	128.0	187.0
9	VDD	Power Supply	128.0	399.0

* The stand-by control pin (pin #4) has a pull-down resistor built-in.

BLOCK DIAGRAM



CE, Q0 PIN FUNCTION

CE	Q0
'H'	Clock Output
'L' or Open	High Impedance

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■ ABSOLUTE MAXIMUM RATINGS

Ta=25°C

PARAMETER	SYMBOL	RATINGS	UNITS
Supply Voltage	VDD	VSS -0.3 ~ VSS +7.0	V
CE Pin Voltage	VCE	VSS -0.3 ~ VDD +0.3	V
Q0 Pin Voltage	VQ0	VSS -0.3 ~ VDD +0.3	V
Q0 Output Current	IQ0	± 50	mA
Continuous Power Dissipation	Pd	150 **	mW
Operating Temperature Range	Topr	- 40 ~ + 85	°C
Storage Temperature Range	Tstg	- 65 ~ + 150 (Chip Form) - 55 ~ + 125 (SOT-26)	°C

** SOT-26 package, When implemented on a glass epoxy PCB.

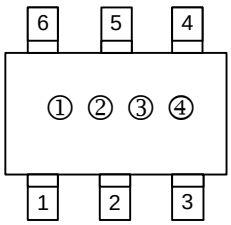
■ PRODUCT CLASSIFICATION

❍ Ordering Information

XC25BS6 ①②③④⑤

DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
①②③	Divider Ratio: 128 = 128 divider 256 = 256 divider 512 = 512 divider A24 = 1024 divider	④	Package: C : Chip Form W : Wafer Form M : SOT-26
		⑤	Device Orientation: R : Embossed Tape : Standard Feed L : Embossed Tape : Reverse Feed T : Chip Tray W : Wafer

■ MARKING RULE



① Represents XC25BS6 Series

MARK	Product Name
B	XC25BS6

② Represents XC25BS6 Series

MARK	Product Name
6	XC25BS6

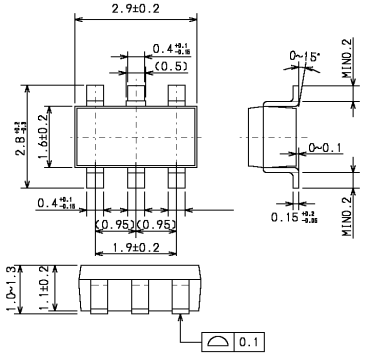
③ Represents divider ratio

MARK	Divider Ratio	MARK	Divider Ratio
1	f0/128	2	f0/256
5	f0/512	A	f0/1024

④ Represents the assembly lot no.
(Based on internal standards)

■ PACKAGING INFORMATION

❍ SOT-26



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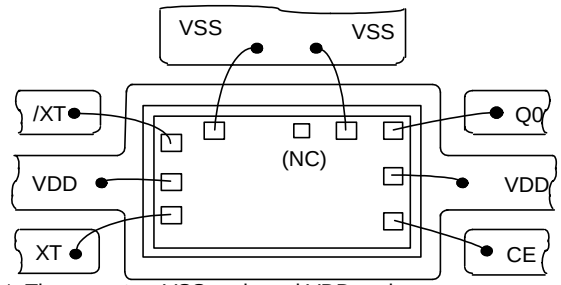
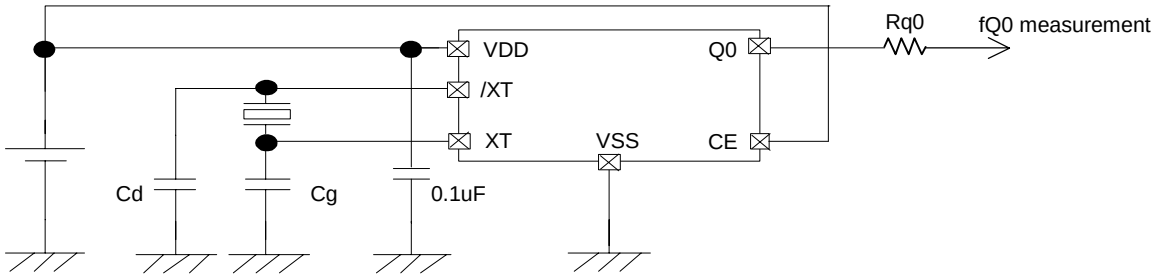
■ WIRE BONDING CONNECTION



* There are two VSS pads and VDD pads.
Please connect both VSS pads to GND, and connect both VDD pads to a power supply.

■ TYPICAL APPLICATION CIRCUIT



* Please use oscillation capacitors Cg, Cd =10pF externally

* The same power supply can be used for VDD and CE.

■ NOTES ON USE

(1) The oscillation circuit of this IC does not have internal oscillation capacitors.
Please make the oscillation circuitry using an external crystal transducer and oscillation capacitors Cg and Cd.

*) A higher harmonic wave oscillation may occur without Cg and Cd.

*) Cg and Cd can be connected either to GND or VDD. (Cg and Cd in the above circuit example are connected to GND.)

*) It is recommended to use around for 10pF of Cg and Cd. For trimmer capacitors, 10pF as a standard value is appropriate.

*) The crystal oscillation frequency should be measured at the output of the Q0 pin.
When a probe is directly connected to the XT pin or the /XT pin, oscillation frequency will change and a precise value can not be taken.

(2) Please insert a by-pass capacitor of 0.1μF between VDD and GND.

(3) The use of a matching resistor Rq0 of 50Ω connected in series to the Q0 pin is recommended in order to counter unwanted radiations.

(4) Please place a by-pass capacitor and the matching resistor as close to the IC as possible. If the by-pass capacitor is placed away from the IC, it may cause abnormal oscillation. If the matching resistor is placed away from the IC, it may cause unwanted radiations in the pattern between the Q0 pin and the resistor.

(5) When the CE pin is not controlled by external signals, please connect the CE pin to VDD power supply.

*) When the CE pin is not connected, the IC goes into stand-by mode due to the internal pull-down resistor.

(6) As for the supply voltage, it is recommended to apply a low noise power supply, such as a series regulator. Using a power supply like a switching regulator might lead to an unstable oscillation jitter which in turn may lead the oscillation frequency to fluctuate due to the ripple of the switching regulator.

■ DC ELECTRICAL CHARACTERISTICS

XC25BS6xxxxx — 3.0V Operation (unless otherwise stated, VDD=3.0V, fOSC=16MHz, No load, Ta=25°C)

PARAMETER	SYMBOL	FUNCTIONS		STANDARD VALUE MIN	STANDARD VALUE TYP	STANDARD VALUE MAX	UNIT
Operating Supply Voltage	VDD			(2.3)	3.0	4.0	V
Crystal Oscillation Frequency	fOSC	Cf=Cd=10pF (External)		2	-	36	MHz
H Level Output Voltage	VOH	VDD=2.7V, IOH= - 4mA		2.3	-	-	V
L Level Output Voltage	VOL	VDD=2.7V, IOL=4mA		-	-	0.4	V
Supply Current 1	IDD1	CE=3.0V	fOSC=4MHz, XC25BS6128	-	(0.4)	(0.8)	mA
			fOSC=8MHz, XC25BS6256	-	(0.5)	(1.0)	
			fOSC=16MHz, XC25BS6512	-	(0.8)	(1.6)	
			fOSC=36MHz, XC25BS6A24	-	(1.0)	(1.8)	
Supply Current 2	IDD2	CE=0V		-	-	0.5	μA
CE H Level Voltage	VCEH			2.4	-	-	V
CE L Level Voltage	VCEL				-	0.6	V
CE Pull-Down Resistance 1	Rp1	CE=3.0V		0.5	1.6	3.0	MΩ
CE Pull-Down Resistance 2	Rp2	CE=0.3V		22	55	90	KΩ
Internal Oscillation Feedback Resistance	Rf	XT Pin, CE=/XT=3.0V		0.2	0.5	1.0	MΩ
Output Disable Leakage Current	IOZ	Q0 Pin, VDD=4.0V, CE=0V		-	-	0.5	μA

* External oscillation capacitor

■ AC ELECTRICAL CHARACTERISTICS

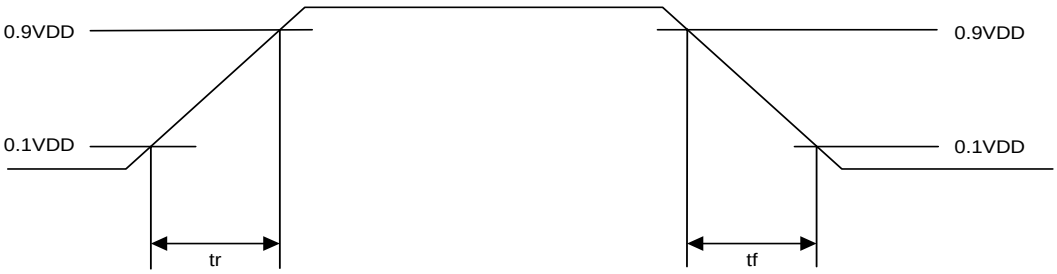
XC25BS6xxxxx — 3.0V Operation (unless otherwise stated, VDD=3.0V, fOSC=16MHz, CL=15pF, Ta=25°C)

PARAMETER	SYMBOL	FUNCTIONS	STANDARD VALUE MIN	STANDARD VALUE TYP	STANDARD VALUE MAX	UNIT
Output Rise Time	Tr	VDD=3.0V (10% to 90%) *1	-	10	15	ns
Output Fall Time	Tf	VDD=3.0V (10% to 90%) *1	-	10	15	ns
Duty Cycle	DUTY		45	50	55	%
Output Start Time	Ton	*1	-	-	3.0	ms

*1 R&D guarantee

■ AC ELECTRICAL CHARACTERISTICS MEASUREMENT WAVE FORMS

(1) Output Rise Time , Output Fall Time



(2) Duty Cycle