OSC20 - CMOS Crystal Oscillator 20MHz

Process

C35 (0.35µm)

Key Features

- Small Area 0.070 mm²
- Size x = 210 µm, y = 335 µm
- Supply Voltage 3.0 to 3.6V
- $T_{junction}$ -40 to 125°C
- Power Down Mode
- Internal capacitors
- Pad limited layout

Description

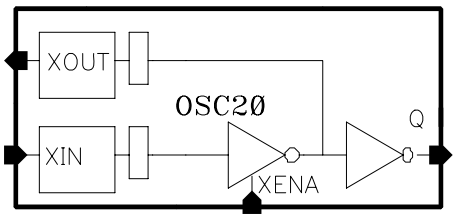
OSC20 is a quartz crystal oscillator for a frequency range from 1MHz to 20MHz. ESD Protection (typ. 200 Ohm) and Load Capacitors (typ. 4.7pF) are included in the cell.

When using a quartz crystal, connect it to the pins XIN and XOUT.

OSC20 may also be driven by a signal at XIN without using a quartz crystal.

For loads > 1pF an additional driver at Q is needed!

Symbol



Pinlist

Pin	Description	Type
Q	Oscillator Output	Digital
XIN	Crystal Terminal In	Digital
XOUT	Crystal Terminal Out	Digital
XENA	Enable Not	Digital

TECHNICAL DATA FOR 3.3V SUPPLY

($T_{junction}$ = -40 to 125°C, VDDA=+3.0V to +3.6V, unless otherwise specified)

POWER REQUIREMENTS

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VDD	Pos. Digital Supply Voltage		3.0	3.3	3.6	V
VSS	Neg. Digital Supply Voltage		0	0	0	V
IDD	Supply Current Digital	20MHz		470	630	µA
Pdiss_tot	Total Power Consumption	20MHz		1.6	2.3	mW

DC PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Gm	Small Signal Trans Conductance		830	1600	2740	µS
Rds	Small Signal Output Resistance		6.1	15.7	40.8	kOhm

TRANSIENT PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
TR	Rise Time	unloaded	1.4	2.3	4.4	ns
KTR	Rise Scaling Factor		1.0	1.4	2.4	ns/pF
TF	Fall Time	unloaded	1.2	1.6	2.5	ns
KTF	Fall Scaling Factor		1.0	1.4	2.5	ns/pF

TRUTH TABLE

Inputs		Outputs	
XENA	XIN	XOUT	Q
High	X	X	Low
Low	Crystal	Crystal	Oscillating
Low	Low	Floating	Low
Low	High	Floating	High

Gm results for typ. XTAL Data

HC49 XTAL DATA @ max Rds=40.8kOhm, R(ESD Protection)=200Ohm

Frequency	Cload**	ESR	C0	CXTAL	Gm min	Gm opt	Gm max
[MHz]	[pF]	[Ohm]	[pF]	[fF]	µS	µS	µS
6	10+4.7*	90	7	4	274	2350	38900
10	6.8+4.7*	90	7	3	536	2800	22400
20	6.8+4.7*	50	7	2	1860	6200	30400

HC49 XTAL DATA @ max Rds=40.8kOhm, R(ESD Protection)=200Ohm

Frequency	Cload**	ESR	C0	CXTAL	Gm min	Gm opt	Gm max
[MHz]	[pF]	[Ohm]	[pF]	[fF]	µS	µS	µS
6	4.7*	90	7	4	93	509	4000
10	4.7*	90	7	3	222	845	3800
20	4.7*	50	7	2	567	1750	6300

HC49 XTAL DATA @ max Rds=40.8kOhm, R(ESD Protection)=200Ohm

Frequency	Cload**	ESR	C0	CXTAL	Gm min	Gm opt	Gm max
[MHz]	[pF]	[Ohm]	[pF]	[fF]	µS	µS	µS
20	4.7*	20	7	2	308	1750	17600

* internal
** Cload at XIN and XOUT

Important Notes
For proper working of the oscillator: Gm min (XTAL) must be at least 3 times lower (margin during start up) than Gm min (oscillator).
In order to verify the correct behaviour of the oscillator, transient simulation (real equivalent circuit diagram of XTAL + oscillator) has to be done.

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