



Features

- Wide range of operating supply voltage: 1.6V to 5.5V
- Low crystal drive current oscillation for miniature crystal units
- -45 to 125°C operating temperature range
- Crystal frequency (10MHz~60MHz)
- Very low standby current
- 50±5% output duty cycle
- 50pF output drive capability (2.25~5.5V)
- 15pF output drive Capability (1.6~5.5V)
- SMD3225-6pin

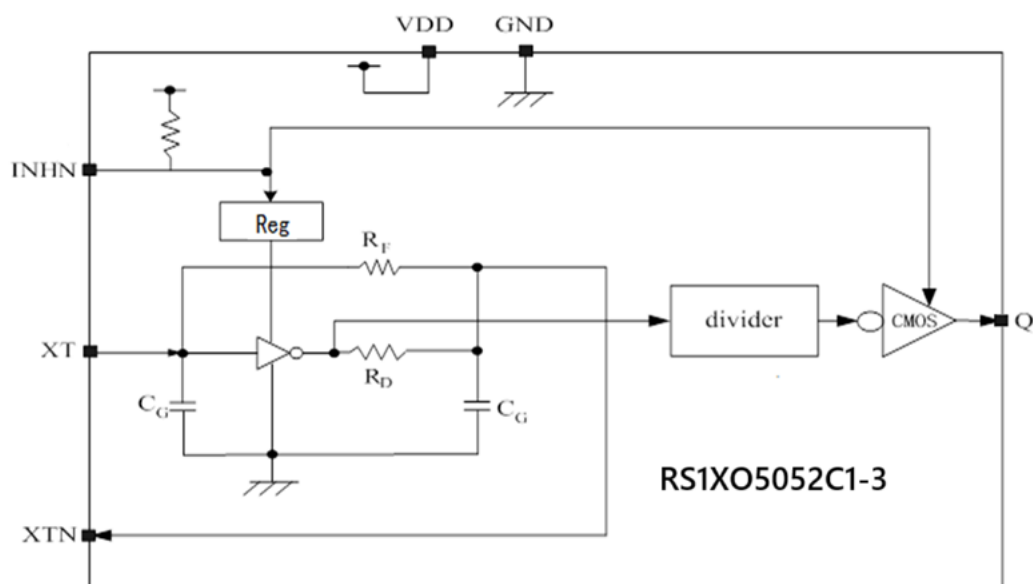
Description

The RS1XO5052C1-3 is miniature crystal oscillator module ICs. The oscillator circuit stage has constant current drive, significantly reducing current consumption and crystal current, compared with existing devices, and significantly reducing the oscillator characteristics supply voltage dependency.

Ordering Information

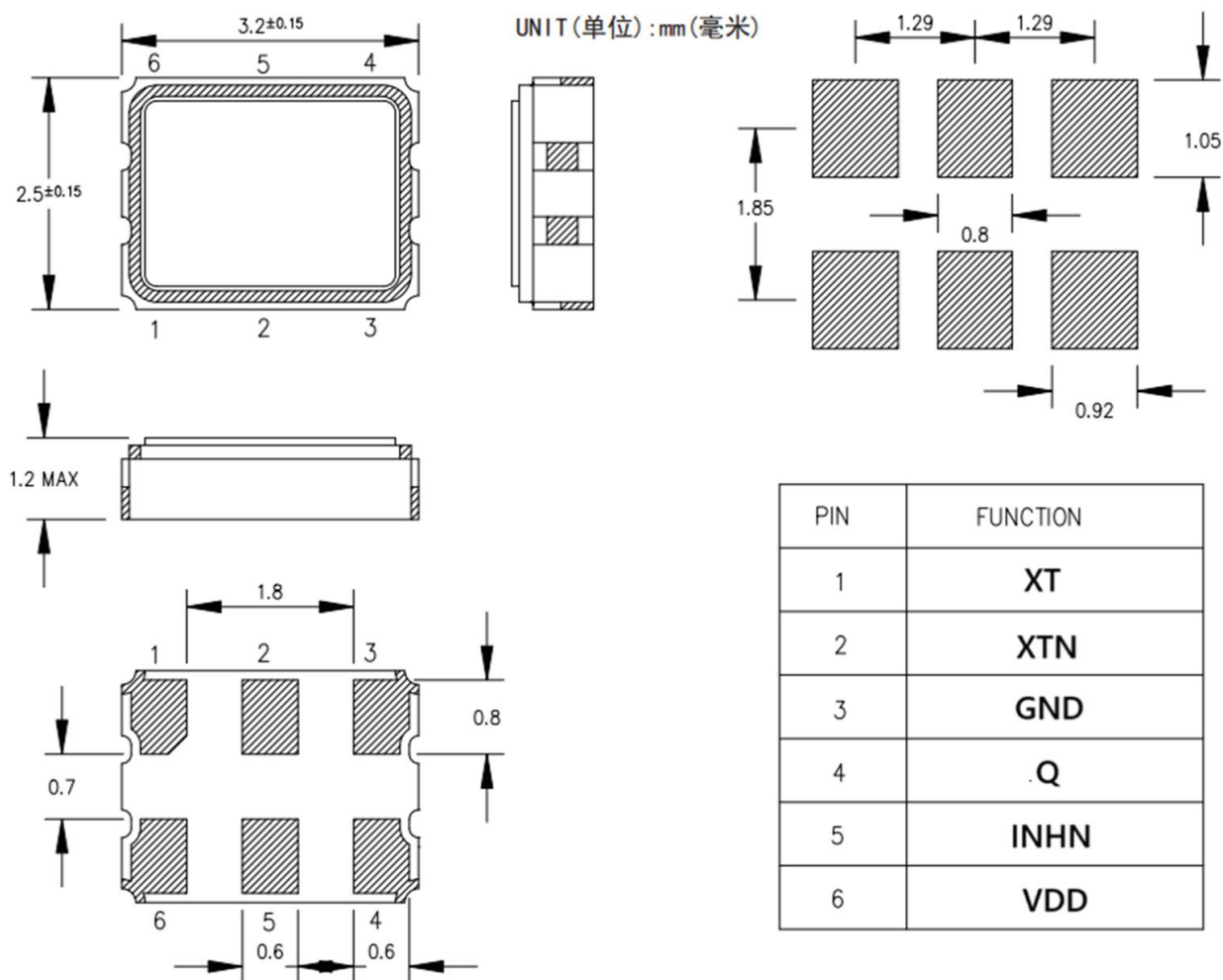
Part no.	Package type
RS1XO5052C1-3	SMD3225-6pin

Block Diagram





Pad Configuration



Pad Description

Sym.	Type	Description	
XTN	O	Amplifier output.	Crystal oscillator connected between XT and XTN
XT	I	Amplifier input.	
INHN	I	Output state control input. Output High when LOW. Power-saving pull-up resistor built-in.	
V _{DD}	P	Supply voltage	
GND	P	Ground	
Q	O	Output.	



Maximum Ratings

Storage Temperature	-65°C to +150°C
Supply Voltage to Ground Potential (V_{DD} to GND)	-0.5V to +7.0V
DC Input (All Other Inputs except V_{DD} & GND) ...	-0.5V to $V_{DD} + 0.5V$
DC Output	-0.5V to $V_{DD} + 0.5V$
DC Output Current (Q output)	20mA

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Function Description

Standby Function

When INHN goes LOW, the oscillator stops and the output on Q becomes high impedance.

INHN	Q	Oscillator
HIGH (or open)	output frequency	Normal operation
Low	High impedance	Stopped

Power-saving Pull-up Resistor

The INHN pin pull-up resistance R_{UP1} or R_{UP2} changes in response to the input level (HIGH or LOW). When INHN is tied LOW level, the pull-up resistance is large (R_{UP1}), reducing the current consumed by the resistance. When INHN is left open circuit, the pull-up resistance is small (R_{UP2}), which increases the input susceptibility to external noise. However, the pull-up resistance ties the INHN pin HIGH level to prevent external noise from unexpectedly stopping the output.

Recommended Operating Conditions

(GND=0V, unless otherwise noted.)

Sym.	Parameter	Conditions	Min	Typ.	Max	Unit
V_{DD}	Supply voltage	-	1.6	-	5.5	V
T_A	Operating temperature	-	-45		+125	°C
f_0	Oscillation frequency	-	10		60	MHz



DC Electrical Characteristics

RS1XO5052C1-3 ($V_{DD} = 1.6$ to $5.5V$, $T_A = -45$ to $125^{\circ}C$, unless otherwise noted.)

Parameter	Sym	Conditions		Min	Typ.	Max	Unit
HIGH-level output voltage	V _{OH}	I _{OH} =1mA		V _{DD} -0.4	-	-	V
LOW-level output voltage	V _{OL}	I _{OL} =1mA		-	-	0.4	
HIGH-level input voltage	V _{IH}	OE Measurement		0.7V _{CC}	-	-	V
LOW-level input voltage	V _{IL}	OE Measurement		-	-	0.4	
Operating current	I _{DD}	V _{DD} =1.8V(25MHz), no loading		-	0.65	1.3	mA
Operating Current	I _{DD}	V _{DD} =3.0V(25MHz), no loading		-	1.4	2.8	mA
Operating Current	I _{DD}	V _{DD} =1.8V(25MHz),15pf loading		-	1.3	2.0	mA
Operating Current	I _{DD}	V _{DD} =3.0V(25MHz),15pf loading		-	2.5	3.5	mA
Standby Current	I _{sb}	OE=off				10	uA
OE pull-up resistance	R _{PULL}	V _{DD} = 3.3V		-	2	-	MΩ
Output leakage current	I _Z	OE=OFF	V _O =V _{DD}	-	-	10	μA

AC Characteristics

RS1XO5052C1-3, $T_A=-45$ to $125^{\circ}C$ unless otherwise noted

Parameter	Sym	Condition	Min	Typ.	Max	Unit
Output Disable Delay	T_{OD}	Output Disable Function (OE)	-	-	100	ns
Output Enable Delay	T_{STR}	Output Enable Function (OE)	-	-	2	ms
Output rise time	T_R	$C_L=15pf$, $0.1V_{DD}$ to $0.9V_{DD}$ $V_{DD}=3.3V$	-	1.6	2.5	ns
Output fall time	T_F	$C_L=15pf$, $0.1V_{DD}$ to $0.9V_{DD}$ $V_{DD}=3.3V$	-	1.6	2.5	ns
Output duty cycle	Duty	$T_A=25^{\circ}C$, $C_L=15pF$	45	50	55	%
V_{DD} Sensitivity		Frequency vs. $V_{DD} \pm 10\%$	-1.5	-	+1.5	ppm
OSC frequency range	f_R	Fundamental Crystal	10		60	MHz

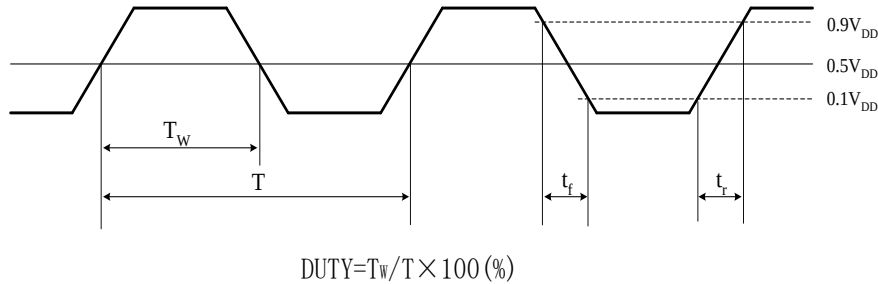
Crystal Specifications

Parameters	Sym	Conditions	Min	Typ.	Max	Units
Fundamental Crystal Resonator Frequency	F_{XIN}	-	10		60	MHz
Maximum Sustainable Drive Level		-	-	-	200	μW
Operating Drive Level		-	-	30	-	μW
Crystal Shunt capacitance	C_O	-	-	-	4	pF
Effective Series Resistance, Fundamental, 10-60MHz	ESR	-	-	-	40	Ω

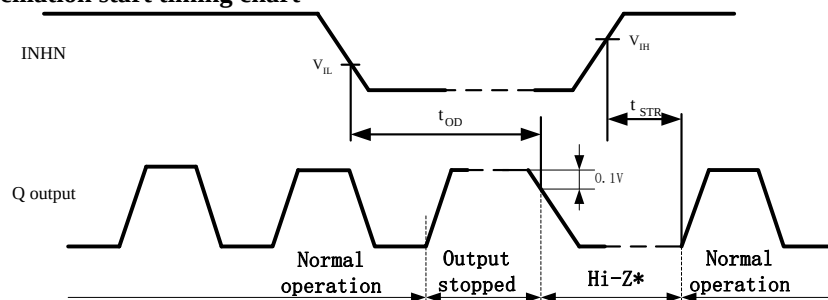


AC Electrical Characteristics

Output switching waveform



Output disable and oscillation start timing chart



When INHN goes HIGH to LOW, the Q output goes HIGH once and then becomes high impedance.

When INHN goes LOW to HIGH, the Q output from high impedance to normal output operation when the oscillation starts (oscillation is detected)

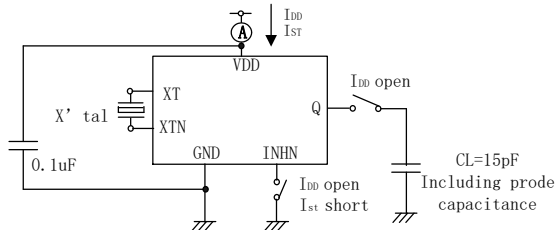
*: the high –impedance interval in the figure is shown as a LOW level due to the 1K Ω pull-down resistor connected to the Q pin(see “Measurement circuit 2” in the “Measurement circuits” section)



Measurement Circuit

Measurement cct1

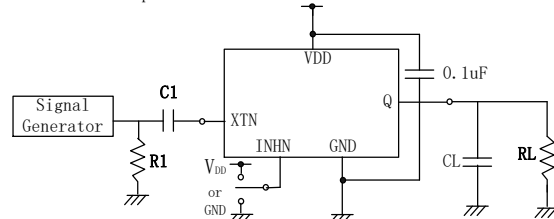
Measurement parameter: I_{DD} , I_{ST} , Duty, t_r , t_f



Note: The AC characteristics are observed using an oscilloscope on pin Q

Measurement cct2

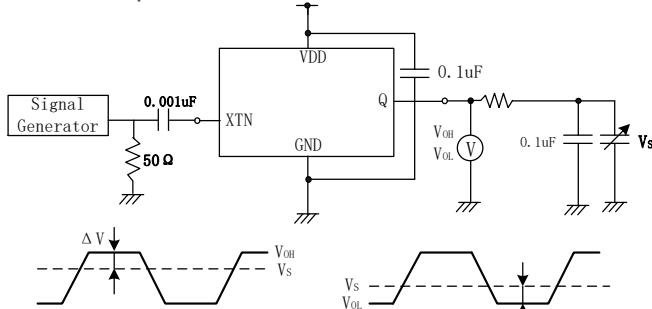
Measurement parameter: t_{DD}



XTN input signal: 1Vp-p, sine wave
C1: 0.001uF CL: 15pF
R1: 50 Ω RL: 1K Ω

Measurement cct3

Measurement parameter: V_{OH} , V_{OL}



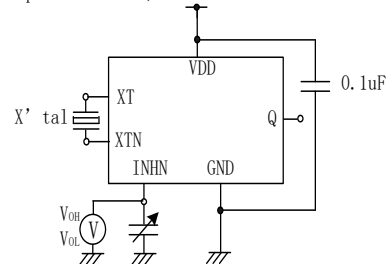
V_S adjusted such that $\Delta V = 50 \times I_{OH}$

V_S adjusted such that $\Delta V = 50 \times I_{OL}$

XTN input signal: 1Vp-p, sine wave

Measurement cct4

Measurement parameter: V_{IH} , V_{IL}



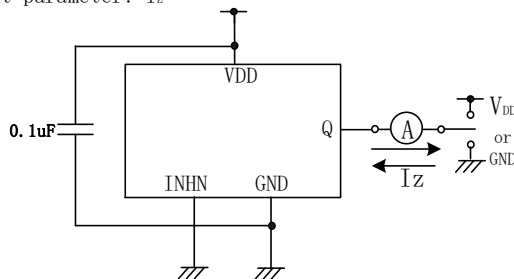
V_{IH} : Voltage is 0V to V_{DD} transition that changes the output state.

V_{IL} : Voltage is V_{DD} to 0V transition that changes the output state.

INHN has an oscillation stop function

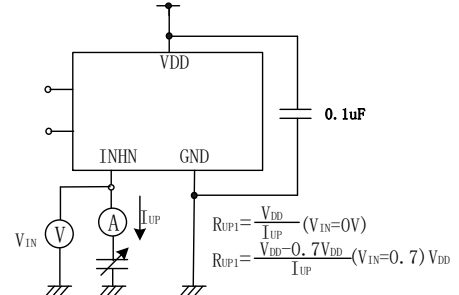
Measurement cct5

Measurement parameter: I_Z



Measurement cct6

Measurement parameter: R_{UP1} , R_{UP2}



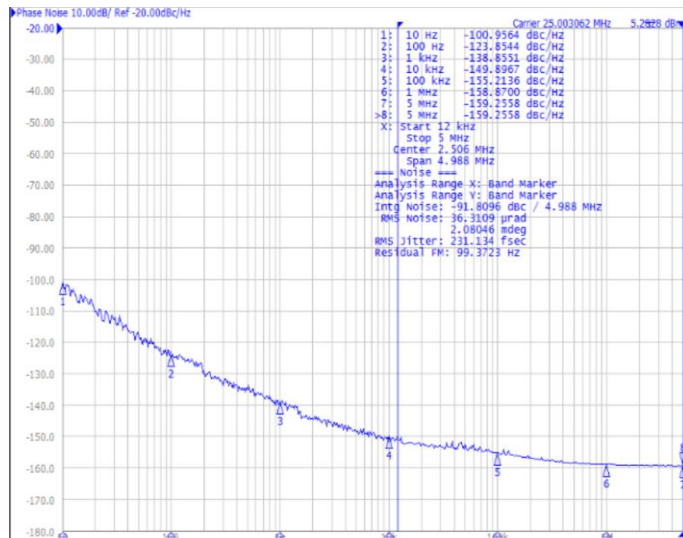
$$R_{UP1} = \frac{V_{DD}}{I_{UP}} (V_{IN} = 0V)$$

$$R_{UP1} = \frac{V_{DD} - 0.7V_{DD}}{I_{UP}} (V_{IN} = 0.7 V_{DD})$$

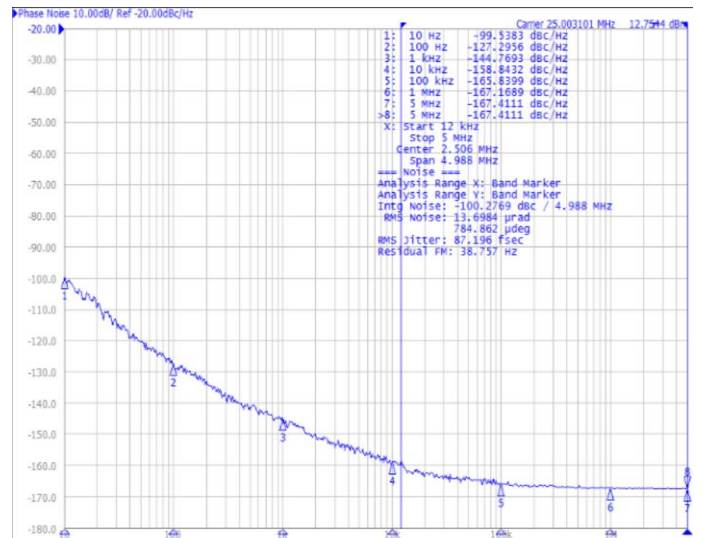


Phase noise test figures:

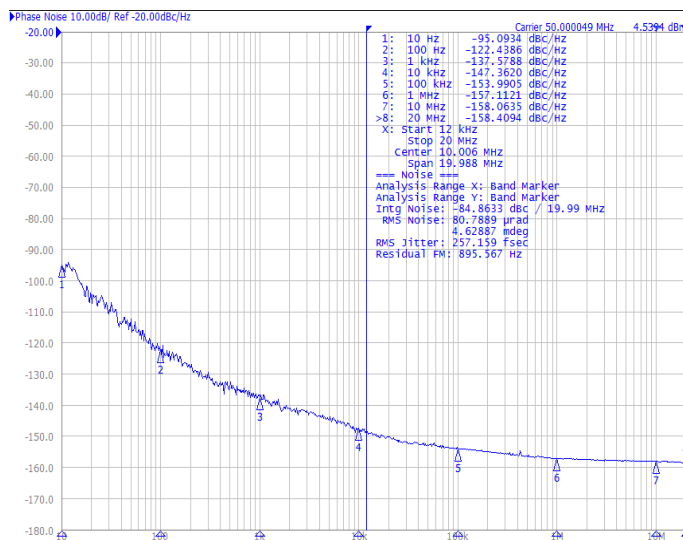
25MHz/15pf/1.8V



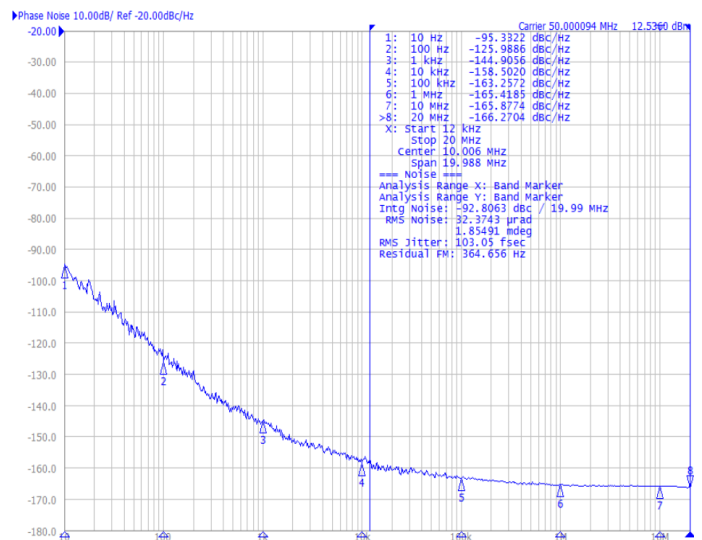
25MHz/15pf/3.3V



50MHz/15pf/1.8V



50MHz/15pf/3.3V





Revision History

Revision	Description	Date
1.0	Initial release	2025/5/26