

Choosing a Crystal for VersaClock® 7 Devices

This application note describes the crystal specifications requirements of VersaClock 7 devices. A list of recommended crystals and the vendors that can supply them is also provided.

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1. Introduction

The VersaClock 7 RC310xxA/RC210xxA family relies on a crystal as the reference to the analog PLL. To achieve optimum performance for a given application, the selection of the crystal must consider the nature of the application as well as the specifications of the devices. For more details on the requirements for selecting a crystal for timing applications, see the [Choosing the Right Crystal for Clocking Devices](#) application note. This application note describes the requirements for selecting a crystal for the RC210xxA and RC310xxA family of devices. Refer to the latest datasheets ([RC210xxA](#) and [RC310xxA](#)) for up-to-date specifications of the VersaClock 7 crystal input.

2. VersaClock 7 External Crystal Characteristics

Table 1 shows the specifications for the crystal characteristics of the VersaClock 7 family of devices. To ensure stable operation of the crystal oscillator circuitry of the device, choose a crystal with specifications that fall within the requirements of the device.

Table 1. External Crystal Characteristics

Symbol	Parameter	Conditions	Minimum	Typical	Maximum	Unit
-	Resonance Mode	-	Fundamental			-
$f_{INXTAL}^{[1]}$	Crystal input frequency	Fundamental mode	8	-	80	MHz
ESR ^[1]	Equivalent Series Resistance	$8MHz \leq f_{INXTAL} \leq 12MHz, C_L = 12pF.$	-	-	120	Ω
		$12MHz \leq f_{INXTAL} \leq 28MHz, C_L = 12pF.$	-	-	80	
		$28MHz \leq f_{INXTAL} \leq 54MHz, C_L = 12pF.$	-	-	50	
		$54MHz \leq f_{INXTAL} \leq 80MHz, C_L = 8pF.$	-	-	50	
$C_o^{[1]}$	Shunt Capacitance	-	-	7	-	pF
$C_L^{[1]}$	Load Capacitance	-	6	8	12	
Drive ^[1]	Drive Level	-	-	-	100	μW

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Symbol	Parameter	Conditions	Minimum	Typical	Maximum	Unit
F_{TOL}	Frequency Tolerance	Center frequency at 25°C.	-	-	[2]	ppm
F_{STAB}	Frequency Stability	Over Operating Temperature Range with respect to F_{TOL} .	-	-		
Aging	Per Year	-	-	-		

1. These parameters are required regardless of the crystal used.
2. These parameters are customer/application dependent. Common maximum values are $F_{TOL} = \pm 20\text{ppm}$, and Aging = $\pm 5\text{ppm}/10\text{years}$. These parameters can be adjusted to meet particular requirements.

3. List of Acceptable Crystals

Table 2 provides a list of crystals that would be acceptable for applications using a VersaClock 7 device. The selection of the crystal frequency will depend on the application. For a clock synthesizer with outputs set at 100MHz, a 50MHz crystal would be recommended.

Table 2. Acceptable Crystals for VersaClock 7 Applications

Manufacturer	Part Number	Frequency (MHz)	ESR (Ω)	C_L (pF)	Drive Level Rating (μW)	Frequency Tolerance (ppm)	Frequency Stability (ppm)	Aging (ppm/year at 25°C)	Temp Range (°C)
Specification	-	8–80	50 ($f > 28\text{MHz}$)	8–12	100	-	-	-	-40 to 85
NDK	NX2016SA-80M	80	50	8	200	± 15	± 50	± 3	-40 to 125
NDK	NX2016SA-50M	50	50	8	200	± 15	± 15	± 3	-40 to 125
TXC [1]	8Y80072011	80	40	8	300	-5 to 12	-15 to 12	± 1	-40 to 85
TXC [1]	8Y78172002	78.125	40	8	300	-5 to 12	-15 to 12	± 1	-40 to 85
TXC [1]	8Y73072002	73	40	8	300	-5 to 12	-15 to 12	± 1	-40 to 85
TXC [1]	8Y68072001	68	40	8	300	-5 to 12	-15 to 12	± 1	-40 to 85
TXC [1]	8Y62572002	62.5	40	8	300	-5 to 12	-15 to 12	± 1	-40 to 85
TXC [1]	8Y60072005	60	40	8	300	-5 to 12	-15 to 12	± 1	-40 to 85
TXC [1]	7M54072002	54	50	8	100	± 12	± 15	± 3	-40 to 85
TXC [1]	7M50070021	50	50	10	200	± 15	± 20	± 3	-40 to 85
Abracon	ABM11W-50.0000MHZ-8-R50-D3Y-T3	50	50	8	100	± 25	± 30	± 2	-40 to 85
Raltron	RH100-50.000-8-F-2030-EXT-TR	50	50	8	200	± 20	± 30	± 2	-40 to 85
KYOCERA	CX3225SB54000	54	50	8	100	± 10	± 15	± 1	-30 to 85
KYOCERA	CX2016SA50000	50	50	8	200	± 15	± 50	-	-40 to 125
ECS	ECS-500-8-37-AGN-TR	50	50	8	100	± 25	± 30	± 5	-40 to 85
Taitien	XXDBPLNANF-40.000000	40	50	12	200	± 10	± 15	± 3	-40 to 85
Taitien	XXCCCLNANF-49.152000	49.152	50	10	200	± 20	± 20	± 3	-40 to 85

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Manufacturer	Part Number	Frequency (MHz)	ESR (Ω)	C _L (pF)	Drive Level Rating (μ W)	Frequency Tolerance (ppm)	Frequency Stability (ppm)	Aging (ppm/year at 25°C)	Temp Range (°C)
Taitien	XXCBPLNANF-50.000000	50	50	10	200	± 10	± 15	± 3	-40 to 85

1. Can be ordered directly from the vendor.

4. Revision History

Revision	Date	Description
1.01	May 24, 2023	Updated list of acceptable crystals in Table 2.
1.00	Nov 4, 2022	Initial release.

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