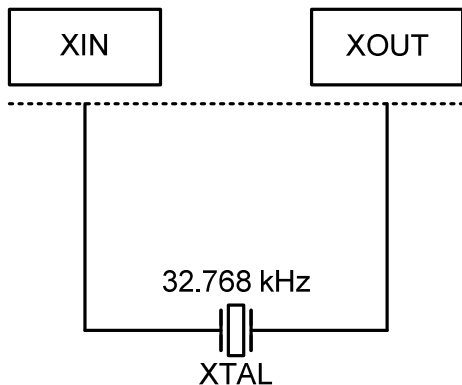


Pierce Oscillator

Design and Crystal Recommendations

Texas Instruments
MSP430x2xx Family

MSP430x2xx Family



Oscillator Design Check

Test Conditions		
Power Supply Voltage V_{DD}	≥ 1.8	V
Load Capacitors	Integrated	pF
Oscillator Setting C_X^1	8.5	pF
Results		
Effective Load Capacitance	12.2	pF
Oscillation Allowance	500	k Ω
Oscillator Output Voltage AC	90	mV _{RMS}
Drive Level	0.030	μ W
Startup Time	450	ms
Overtone Mode Suppression	Safe	----

Recommendation

Crystal		
Crystal Type Metal-can	MS3V-T1R	
Crystal Type Ceramic	CC7V-T1A	
Frequency	32.768	kHz
Tolerance	+/-20	ppm
Oscillator Design		
Oscillator Setting	C_X^1	1 5.5 8.5 11 pF
XCAPx		0 1 2 3 ----
Load Capacitance	C_L	5.0 9.0 12.5 14.5 pF

¹ C_X corresponds to parameter $C_{L,eff}$ (Integrated Effective Load Capacitance, LF mode).

Recommendations

- **Recommended "Oscillator Setting":** $C_{L,eff} = 8.5$ pF Corresponding crystal's C_L : 12.5 pF.
- **Alternative "Oscillator Setting":** $C_{L,eff} = 5.5$ pF Corresponding crystal's C_L : 9.0 pF.
- The 1 pF and 11 pF settings are not recommended to use with a quartz crystal.

Remarks

- All load capacitors C_{XIN} and C_{XOUT} (represented by $C_{L,eff}$) are integrated and selectable (Oscillator Setting).
- The 32.768 kHz crystal must be connected to XIN and XOUT pins and the crystal's ESR constraints have to be respected.
- The PCB traces should be designed as short as possible to avoid additional load capacitance and to minimize external interferences.

Date: July 2009

Revision N°: 2.0

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