Figure 6-3. Crystal Oscillator Connections

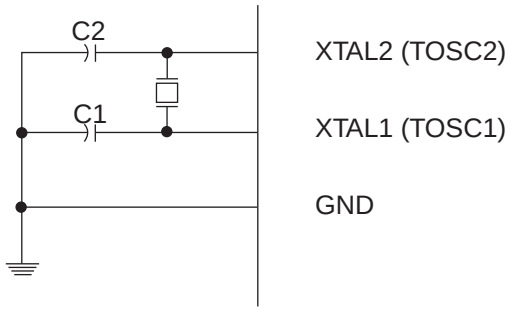

Table 6-6. Start-up Times for the Full Swing Crystal Oscillator Clock Selection

Oscillator Source / Power Conditions	Start-up Time from Power-down and Power-save	Additional Delay from Reset (V_{CC} = 5.0V)	CKSEL0	SUT1..0
Ceramic resonator, fast rising power	258 CK	14CK + 4.1 ms[1]	0	00
Ceramic resonator, slowly rising power	258 CK	14CK + 65 ms[1]	0	01
Ceramic resonator, BOD enabled	1K CK	14CK[2]	0	10
Ceramic resonator, fast rising power	1K CK	14CK + 4.1 ms[2]	0	11
Ceramic resonator, slowly rising power	1K CK	14CK + 65 ms[2]	1	00
Crystal Oscillator, BOD enabled	16K CK	14CK	1	01
Crystal Oscillator, fast rising power	16K CK	14CK + 4.1 ms	1	10
Crystal Oscillator, slowly rising power	16K CK	14CK + 65 ms	1	11

Notes:
1. These options should only be used when not operating close to the maximum frequency of the device, and only if frequency stability at start-up is not important for the application. These options are not suitable for crystals.
2. These options are intended for use with ceramic resonators and will ensure frequency stability at start-up. They can also be used with crystals when not operating close to the maximum frequency of the device, and if frequency stability at start-up is not important for the application.