The Celeron should have never been made a dual core. The Pentium Dual-core was the Celeron version of a dual core (A Pentium Dual-core is just a Core 2 with less L2 cache). Now, you have two Celerons, the actual Celeron and the Pentium Dual-core. The latter comes with L2 cache in sizes of 2MB or 3MB total, or 1MB or 1.5MB per core, and the actual Celeron comes with 1MB L2 cache total, or 512k per core.

Since there were small differences between 2MB and 4MB L2 cache, and even larger differences between 2MB and 4MB, you can imagine the hurt such a low cache puts on the architecture. That being said, they aren't bad chips, but considering the very small cost difference between a dual core Celeron and a Pentium Dual-core, there's no reason to go with the former. The cost difference between the single core Celeron and the Pentium Dual-core was generally small anyway. Intel simply made it dual core to complete their whole lineup to multi-core.