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BCD platform technologies are rapidly changing the power IC landscape, says Petrov Group

Press release; Ricky Morris, DIGITIMES [Wednesday 3 March 2010]

The emergence of state-of-the-art BCD (Bipolar-CMOS-DMOS) platform technologies is having a far reaching effect on the analog/mixed-signal IC landscape, the Petrov Group has commented. This is especially so in the power IC market where the trend toward BCD technology platforms has accelerated since 2005.

> "The system-level benefits of the BCD technology platform are as substantial as the benefits of the past digital CMOS integration in terms of system cost-effectiveness, reliability, high performance, and programmability." noted Boris Petrov, president of the Petrov Group. "BCD platform technologies have been implemented in all end-application types, and across the entire analog domain and levels of integration – from single-function ICs to highly integrated SoC solutions. However, BCD is seeing dominant use in power ICs."

There are many misconceptions and disagreements about what is/is not a BCD process. The first step toward clarification, especially in power IC applications, is to consider the term BCD as short for BiCMOS plus DMOS, where BiCMOS is for mixed-signal and DMOS for power, according to Petrov.

> Further clarity comes from the recognition that there is a certain hierarchy from the BCD process and circuit design point of view, Petrov noted. Most important is DMOS which offers high reliability (e.g., no secondary breakdown as in Bipolar), lower power losses, high voltage, and other benefits. Meanwhile, CMOS (analog CMOS with capacitors, inductors, resistors, higher voltages, etc.) offers integration. Finally, Bipolar is a must for mixed-signal circuits; analog functions that require accuracy require bipolar devices, since Bipolar is synonymous with analog performance. Basic analog functions, such as voltage references, require precision enabled by Bipolar devices – for example, only Bipolar's base-emitter junction provides a perfect natural logarithmic function.

Several implementation options are available when utilizing BCD, Petrov pointed out. The oldest is a "Legacy BCD" introduced by STM in the early 1990s. It is a bipolar process based BCD with a buried layer, and an epi-layer on top. Although STM made a departure from Bipolar-based BCD in 1998, and despite its age, the bipolar-based Legacy BCD is still a very large and growing market – anchored in 0.5-micron and older nodes and simple high-performance single-function power ICs, Petrov noted.

> Implementation complexity starts with CMOS-based BCD, of which there are currently three basic options, Parasitic BCD using parasitic Bipolar devices, Makeshift BCD using CMOS-based Bipolar devices, and Technology-refined BCD.

In all CMOS-based BCD processes the state-of-the-art trend is toward modularity. One can take, for example, the "D" out, if DMOS devices are not needed. A modular BCD platform technology enables selective usage of a BiCMOS or BiCMOS-DMOS process. As a result, BCD platform technologies enable process consolidation which, in turn, leads to increased manufacturing efficacy. Process consolidation is very beneficial to foundries as production moves from 150mm (6-inch) wafers to 200mm (8-inch) and in 2011 to 300mm (12-inch) wafers; that is, migration to foundries is accelerating, Petrov pointed out.

> BCD platform technologies are now migrating from 0.35- and 0.25-micron nodes toward 0.18- and 0.13-micron nodes driven by an increasing trend toward integration of power management, mixed-signal, and sensor functions. BCD is starting to appear even in high volume power management units (PMU) tailored for handset application processors, noted Petrov.

The net result is an accelerating rise of CMOS-based modular BCD platform technologies, be they of the "parasitic," "makeshift," or "technology-refined" type. BCD platform technologies are rapidly changing the entire power IC landscape – regardless of whether they are identified as BCD platform technologies or not at all, noted Petrov. If a BCD technology is truly modular, one no longer really cares if it is called BCD or not.

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