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**HUGHES**

AIRCRAFT COMPANY

## STANDARD CELL CIRCUITS

MICROELECTRONICS CENTER

Hughes offers standard cell circuit solutions in a  $3\mu$  silicon gate, single metal process, and a  $2\mu$  silicon gate, double metal process. Standard cells can be implemented using the cell library exclusively or by combining cells with special function blocks in a custom fashion. This gives the designer the greatest flexibility in technology with the advantage of the shorter implementation time of the semicustom solution.

The standard cell library consists of over 135 SSI and MSI components. Included are the bulk of 74HCXXX equivalents as well as a host of buffer options. Cells are fully SPICE characterized and documented in the cell library databook. Therein, information is given on general operation and truth table, function and schematic diagrams, propagation delay over various capacitive loads, and performance de-rating curves for both temperature and voltage. The cell library is being updated and added to on a regular basis.

In addition to the digital cells of the library, it is also possible to select among a number of different analog functions. These functions are used as blocks that are added around the digital cells in a custom circuit fashion. The analog cells are fully laid out and characterized and ready for inclusion into the semicustom solution.

Standard cell implementation is fully supported by automated design tools. Mentor workstations are used for schematic capture, logic simulation and test vector generation. The circuit description is then sent to Hughes for automated layout and placement. Results are used to verify logic and performance of the circuit prior to mask making and fabrication.

Packaging for the standard cell circuits can be chosen from a number of different standard types and may include custom tooling when required. DIPs, flat packs, pin grid arrays and leadless chip carriers are among the more common selections. Custom packages are also available. Please consult factory.

Military screening is determined from source control drawings. Commercial and industrial flows are outlined in this CMOS databook.

### Combined Digital and Analog Modem Chip

