corner. Beta’s Zener diode is rotated 90 degrees from the configuration of Alpha’s. Probably, the Zener diode could have been placed farther away from its location in Alpha, but it is clear that this part of the chip was laid out and not cloned, so that the similarity between Alpha and Beta may well not be substantial for SCPA purposes.

Other circuitry
The remainder of the upper portion of each die is filled mainly with other circuitry shown in the schematic, and there is little similarity. This part of the circuit does not seem to involve any colorable chip piracy.

The similarity between Alpha and Beta is more in the floor plan than in the structure or layout within modules. Where there is similarity within modules, it generally seems to be dictated by function. In all, the main similarity is that in laying out Beta B seems to have taken some aspects of the Alpha floor plan that are arbitrary and a matter of designer choice. In this regard, Beta follows Alpha “needlessly,” or in what A’s counsel could call “slavishly.”

Was that action really needless? One consideration in second sourcing is satisfying the customer that the second chip is really compatible in form, fit, and function with the first chip. To some extent, unless the dies look alike, the customer may disbelieve the claim that the two chips are indeed compatible in form, fit, and function.

A further factor—that will probably tend to aid plaintiffs in infringement of mask work rights cases—is that many engineers do not believe in “reinventing the wheel.” If one of several possible layouts has already been adopted by the first source, there is a tendency for the second-source designer not to change the layout unless there is a good reason to do so (that is, a functional one).

As indicated in the earlier part of this series (see IEEE Micro, June 1986, pp. 79-83), there are three separate criteria for establishing reverse engineering as a defense in an infringement of mask work rights case. First, the defendant must show records proving a substantial expenditure of its money, toil, study, and so on. In this case B, the manufacturer of Beta, was prepared to do so.

Second, the two layouts must not be substantially identical. This test applies to the die as a whole and also to substantial parts within it, such as the power output section. Some problems are raised for B and the Beta chip by B’s “needless” duplications of Alpha’s layout, which may have resulted from these factors:
• a desire to pacify the customer, who is concerned that the two chips are indeed compatible in form, fit, and function;
• an engineer’s unwillingness to “reinvent the wheel”; and
• a rush to complete the layout and get the chip available for sale while there is still opportunity to become a second source.

The last point involves some questions about which data from B is unavailable, but the point is important. The legislative history of the SCPA indicates that one of the values it seeks to preserve is the innovator’s head start, in that a second comer’s cutting of corners by avoiding the innovator’s design time and expense is considered misappropriation of the innovator’s toll and investment.

For example, if A required six to eight months to lay the Alpha chip out and B needed only one to two months to lay the Beta chip out, it might suggest mis-appropriation to a jury or other fact finder. Hence, if that type of corner cutting to save time is the explanation for the “needless” duplications, it would point to chip piracy. On the other hand, if Beta’s designers were very inefficient and took nearly as long to duplicate Alpha as it took Alpha’s designers to lay Alpha out in the first place, it might suggest to a jury that Beta is the product of legitimate reverse engineering. There is a certain lack of logic to this, but that is how actual cases often seem to work.

The third and most difficult criterion to understand for reverse engineering is whether the second chip is an “original mask work.” Is Beta different enough from Alpha to satisfy this mysterious test? Is Beta more than trivially different from Alpha? For example, has Beta independent merit as a design—in regard to points such as the improved temperature-compensation resistor design at the lower left? B, the manufacturer of Beta, may, of course, challenge Alpha as lacking any more independent merit as a design than Beta has. It is uncertain whether that argument would get B any place.

The questions are sufficiently close in the case of Alpha and Beta to make it an appropriate example to illustrate some of the factors involved in developing either side of a case of infringement of mask work rights, particularly areas in which expert testimony should be developed.

Reader Interest Survey
Indicate your interest in this department by circling the appropriate number on the Reader Interest Card.
High 174   Medium 175   Low 176

Wondering where to get back issues?
Contact IEEE Computer Society, PO Box 80452, Worldway Postal Center, Los Angeles, CA 90080 for 1984 and 1985 issues of IEEE Micro.