

The power of the ECL circuit slightly increases at lower temperatures, which can be explained as the increase in transistor V_{BE} that is necessary to maintain a fixed current through the device. Calculation according to Ref.[7] and experiments in Ref.[2] confirm it, too. How to decrease the power and the delay will be critical points for the improvement of low temperature ECL circuits.

V. Conclusions

The DC characteristics of silicon bipolar transistors and ECL circuits operating at low temperatures are analyzed theoretically and experimentally. Two new model parameters $D_1(T)$ and $D_2(T)$ are introduced into SPICE II BJT model to obtain its extended accuracy in the low temperature range. Expressions describing the voltage transfer and noise immunity characteristics are derived, which are the base for further analysis and design of low temperature ECL circuits.

References

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Correction of errors in 13(1996)1

- (1) The graphs in Fig.2(p.34) and the graphs in Fig.3 (p.36) should be changed over.
- (2) In the last row of p.34, "...equals to q_2 ", "to" should be canceled.
- (3) In the 8th row of p.35, "...in Subsection III.1, in Eq.(6), for computing..." should be changed to "...in Subsection III.1, Eq.(6) for computing...".
- (4) In References (p.39), Ref.[3] and Ref.[4] should be changed over.