

Probleme de fiabilitate ale diodelor cu siliciu realizate prin tehnologia bipolară

Marius BĂZU¹, Titu BĂJENESCU²

¹ Institutul Național de Cercetare Dezvoltare în Microtehnologie, București, România; ² C.F.C., La Conversion, Elveția
maris.bazu@imt.ro

Abstract

The main characteristics of the silicon diodes achieved by bipolar technology are described, followed by the typical failure mechanisms, which are identified and explained. In each case, corrective actions are suggested, aimed to reduce the failure risks and to improve the reliability of the electronic systems made by using these silicon diodes.

Keywords: silicon diodes, failure mechanism, corrective actions, reliability.

References:

- [1] Băzu M. și T. Băjenescu, T., Failure Analysis. A Practical Guide for Manufacturers of Electronic Components and Systems, J. Wiley & Sons: Chichester, 2011.
- [2] Băjenescu T. și M. Băzu, Component Reliability for Electronic Systems, Artech House: Boston and London, 2010.
- [3] Li Chuang, X., Electronic Technology Co., Ltd., Oct. 9, 2009, <http://www.aviation-lcelectronics.com/readnews.asp?id=19>.
- [4] Obreja, V. V. N. ș.a., „Reverse Leakage Current Instability of Power Fast Switching Diodes Operating at High Junction Temperature,” 36th IEEE Power Electronics Specialists Conference PESC '05, June 2005, pp. 537-540.
- [5] Zener, C., „A Theory of Electrical Breakdown Voltage of Solid Dielectrics“, Proceedings of the Royal Society, London, Series A, Vol. 145, No. 855, 1934, pp. 523–529.
- [6] McKay, K.G., „Avalanche Breakdown in Silicon“, Physical Review, Vol. 94, No. 4, 1954, pp. 877–884.
- [7] Zhuang, Y. și L. Du, „1/f Noise as a Reliability Indicator for Subsurface Zener Diodes“, Microelectronics Reliability, Vol. 42, Issue 3, 2002, pp. 355-360.
- [8] Satoh, H., „Transient Temperature Response of Avalanche Diodes Against Lightning Surges“, Electronics and Communications in Japan (Part II: Electronics), Vol. 72, Issue 120, 2007, pp. 33-39.
- [9] Huang, A.Q., V. Temple, Y. Liu și Y. Li, „Analysis of the Turn-Off Failure Mechanism of Silicon Power Diode“, Solid-State Electronics, Vol. 47, Issue 4, 2003, pp. 727-739.
- [10] Corvasce, C., Mobility and Impact Ionization in Silicon at High Temperature, Ph. D. Thesis, ETH Zurich, 2006.
- [11] Mahajan, S.V., Electro-Thermal Simulation Studies of Single-Event Burnout in Power Diodes, Ph. D. Thesis, Vanderbilt University, 2006. <http://sameer-mahajan.com/research.aspx>.
- [12] Obreja, V.V.N., „Transient Surge Voltage Suppressors and Their Performance in Circuit Over-Voltage Protection“, IEEE International Semiconductor Conference CAS 2008, October 13-15, Sinaia, Romania, pp. 321-324.