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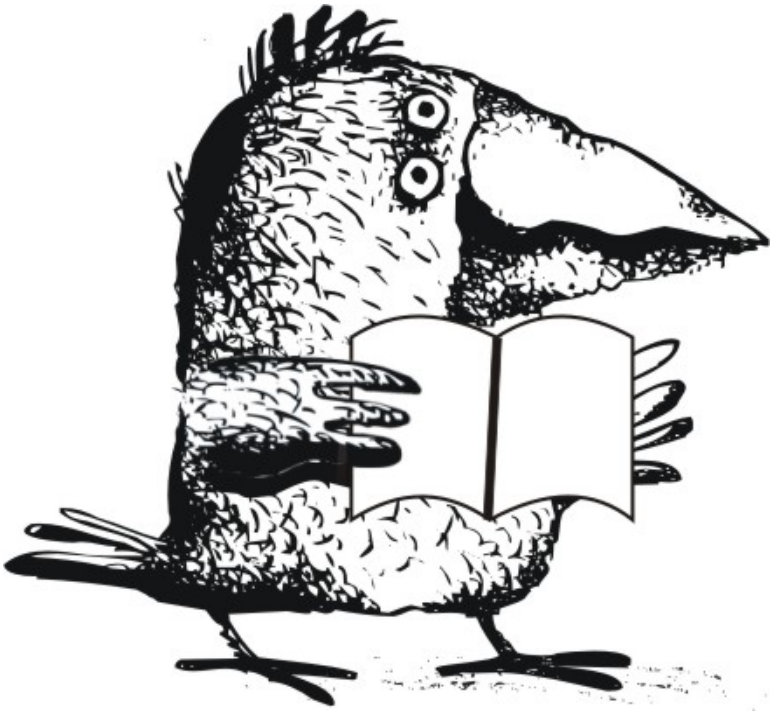

BOOK of ABSTRACTS

8th International School and Conference on Optoelectronics, Photonics, Engineering and Nanostructures

May 25-28, 2021 • Saint Petersburg, Russia

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НАУЧНЫЙ ЦЕНТР МИРОВОГО УРОВНЯ
«ПЕРЕДОВЫЕ ЦИФРОВЫЕ ТЕХНОЛОГИИ»

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Crystal growth and structural properties of semiconductor materials and nanostructures

Electric, Magnetic and Microwave Devices

Other Aspects of Nanotechnology

Study of characteristics of n-p-n type bipolar power transistor in small-sized metalpolymeric package type SOT-89

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Abstract. In this study the input and output characteristics of silicon n-p-n type medium power bipolar junction transistors KT242A91 made by the "GROUP KREMNY EL" in small-sized metalpolymeric package (SOT-89) have been obtained. It is shown that established characteristics for KT242A91 transistor correspond to similar transistor's characteristics.

1. Introduction

Widely known that the bipolar power junction transistors are key component of power semiconductor electronics devices that is primarily used as a switch [1]. It should be noted that at present the modern electronics industry produces a wide range of bipolar transistors of various ratings and in various packages type [2]. Moreover, modern production tends to miniaturize the component base without losing its power characteristics and therefore power electronic industry comes down to use of small type of metalpolymeric package such as SOT (Small Outline Transistor), QFN (Quad Flat No-leads) and others [2]. However, in Russia at this time moment there is no serial production of bipolar junction transistors in small type of metalpolymeric package (SOT-89, SOT-23 etc.). Therefore, recently by electronic company the «GROUP KREMNY EL» (Bryansk, Russia) the production of for power electronics components (SiC Schottky diodes, bipolar junction transistors etc.) in small type of metalpolymeric packages type began within the framework of import substitution program. For instance, in our previous studies it is established that some characteristics of the SiC Schottky type diodes made in small type of metalpolymeric packages [3] are comparable with the same similar types. In presented study the main goal is establish characteristics of n-p-n type bipolar junction transistor in small-sized (SOT-89) type of metalpolymeric package made by «GROUP KREMNY EL».

2. Materials and methods

In experiments was tested the following silicon medium power n-p-n type bipolar junction transistor KT242A91 (JSC «GRUPPA KREMNY EL», Bryansk, Russia) in small-sized SOT package type (SOT-89) which is analogous to a similar transistor BCX56 (Nexperia, Netherlands [4]). For measuring the characteristics were used a programmable source AKIP 1144-160-40, Tektronix MDO3102 two-channel oscillograph (bandwidth 1 GHz, refresh rate 5 GS/s) and Fluke 8845A digital multimeter.

3. Results and discussion

In Figure 1 is shown the output characteristic for silicon medium power n-p-n type bipolar junction transistor KT242A91 in small-sized (SOT-89) type package obtained at temperature of 20^{o}C. As can be seen from Figure 1 the produced transistor KT242A91 operates with collector current up to 1 A that corresponds to a similar transistor BCX56 (1 A [4]). In Figure 1 for comparison also presented data for original medium power n-p-n type bipolar junction transistor BCX56 (Nexperia [4]) for analogous

base currents (I_B=10 mA and I_B=20 mA). Estimation of current gain for transistor KT242A91 give us values from 40 to 180, which corresponds to a same transistor BCX56 (40-250 [4]). In Figure 2 presents the input characteristic of n-p-n type bipolar junction transistor KT242A91.

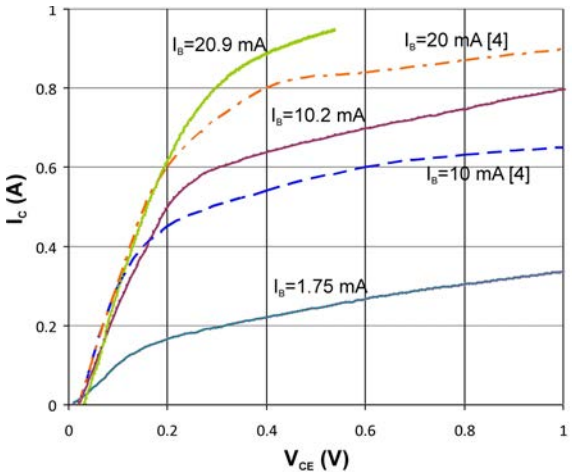

Figure 1. Output characteristics of n-p-n type bipolar junction transistor KT242A91 in small-sized SOT-89 type package.

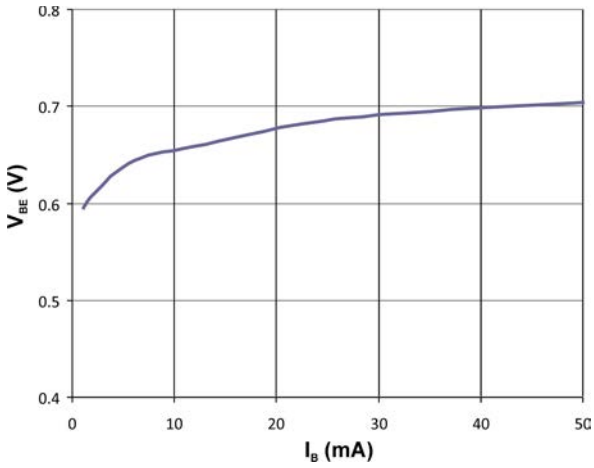

Figure 2. Input characteristics of n-p-n type bipolar junction transistor KT242A91 in small-sized SOT-89 type package (V_{CE}=0 V).

Thus, analysis of experimental results for silicon medium power n-p-n type bipolar junction transistor KT242A91 made by «GROUP KREMNY EL» shows that obtained characteristics corresponds to data for similar BCX56 (Nexperia) transistor.

4. Conclusions

The input and output characteristics of silicon medium power n-p-n type bipolar junction transistor KT242A91 made by «GROUP KREMNY EL» in small-sized (SOT-89) type package have been obtained. It has been established that the studied characteristics correspond to the Nexperia's analogue.

Acknowledgements

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