

Applications of Physic in Mechanical and Material Engineering

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Experimental verification of semiconductor diode aging based on thermal analyzes and numerical methods

Analyzed system and working conditions

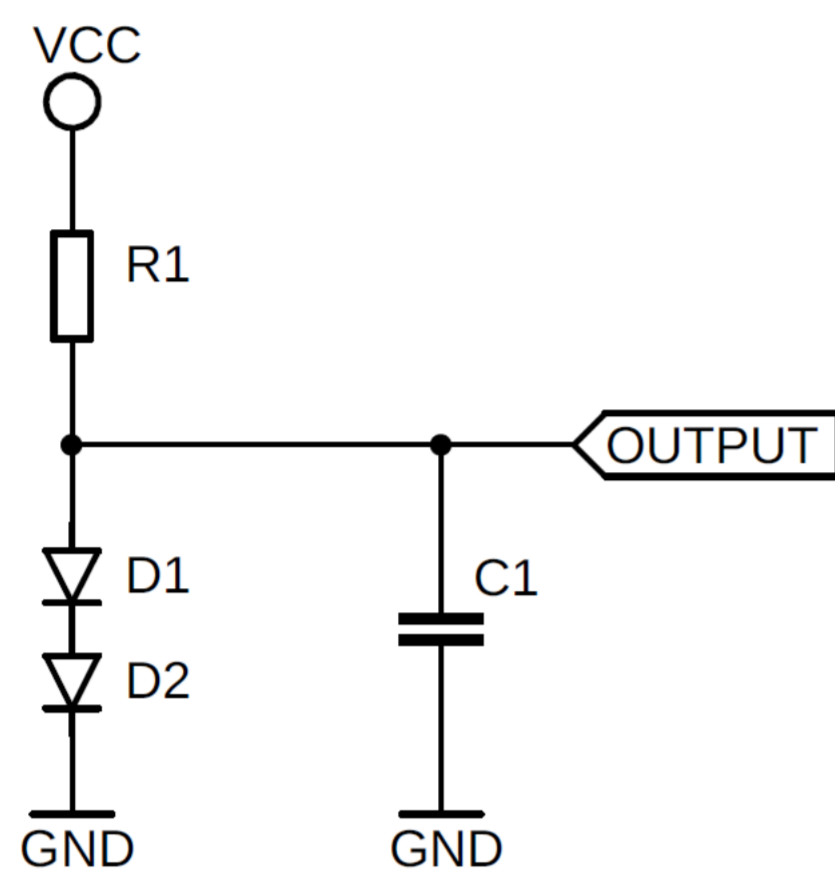


Fig.1. Circuit diagram

This article describes an experimental verification of the aging of semiconductor diodes in order to determine their technical condition and current characteristics after 15 years of use.

The analyzed semiconductor diode ultimately works in the temperature sensor module, transmitting information to the microcontroller about the operating temperature of the motor at which this module is installed.

Table 1 Analyzed types of diode

Supplier	Series	Package
Vishay	BAV99	SOT23
NXP	BAV99W	SOT323
Onsemi	BAV99W	SOT323

Experimental measurement

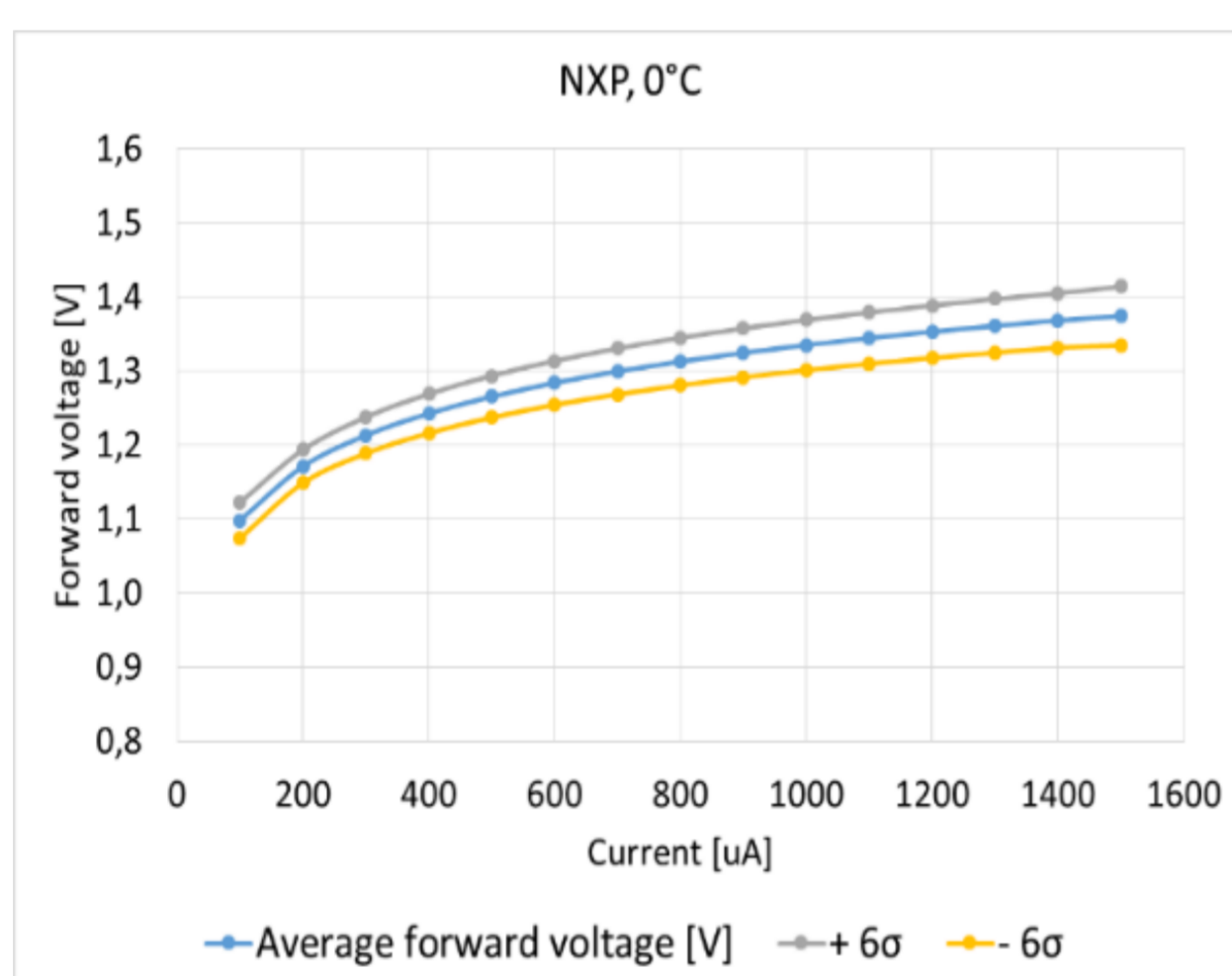


Fig.2. Example of results of the test – NXP 0 °C

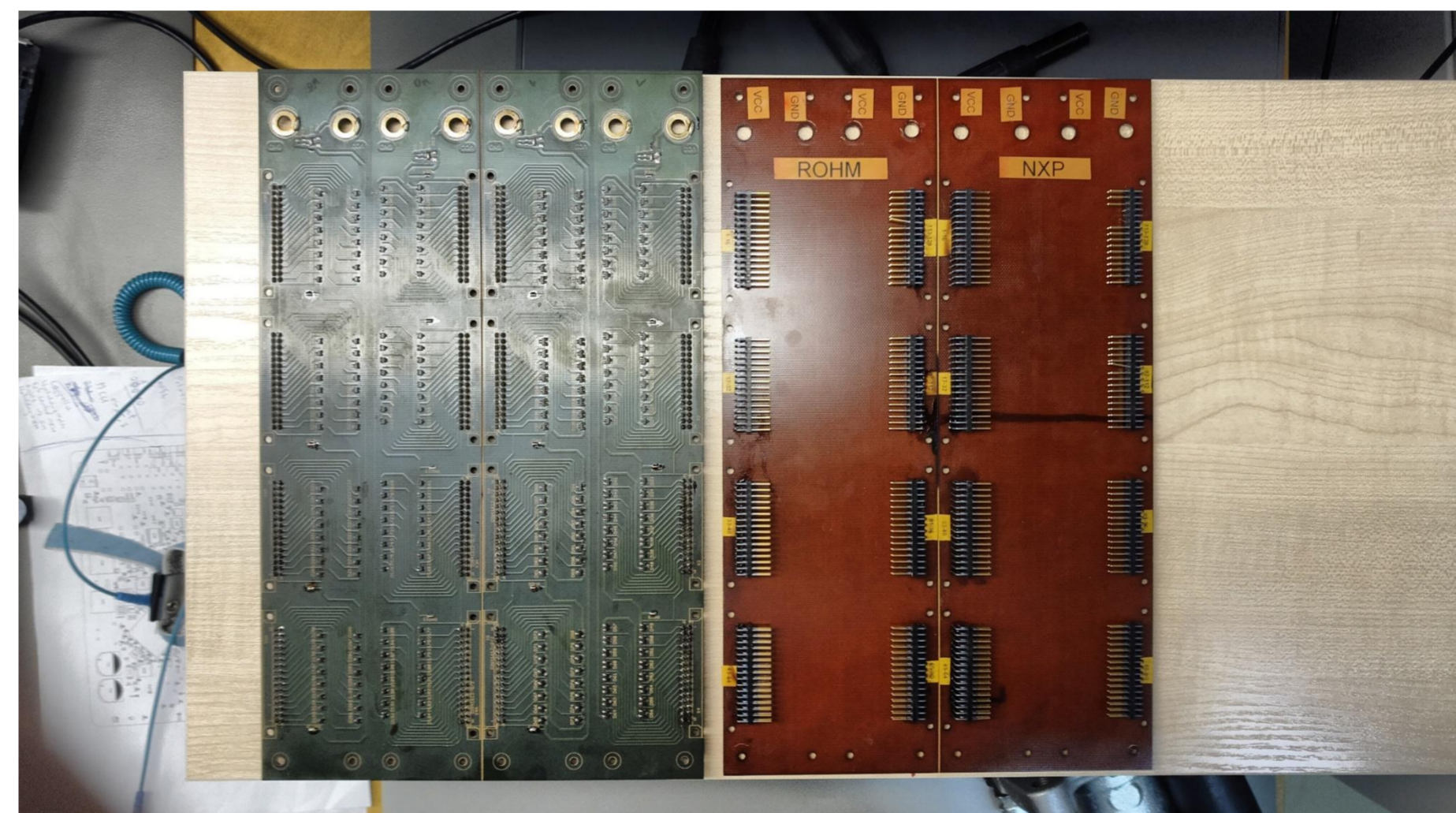


Fig 4: Test setup overview

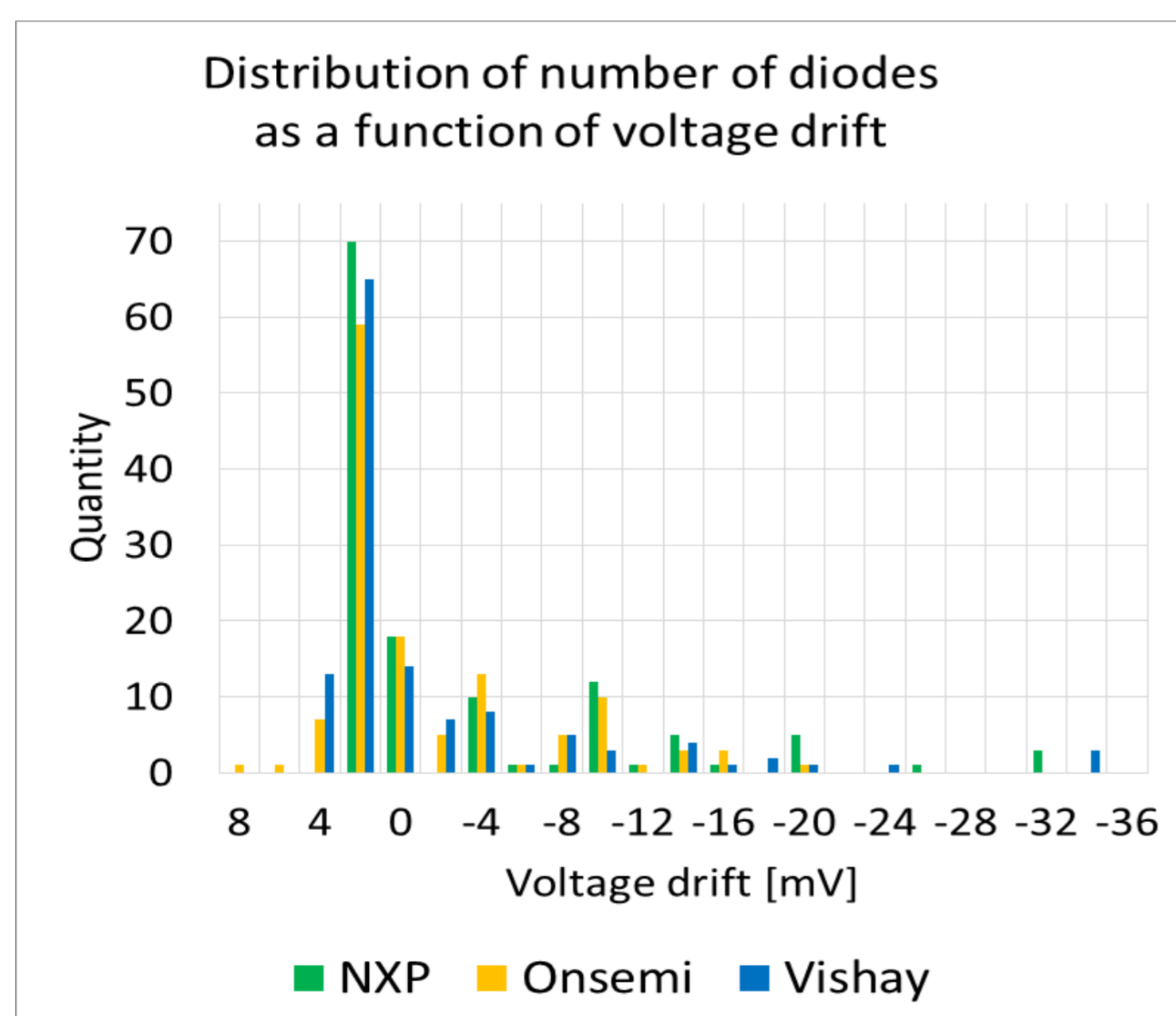


Fig.3. Distribution of number of diodes as a function of voltage drift

Resistance of parts before and after the simulation

	Average voltage [V]		Std. deviation [mV]	
	Before	After	Before	After
NXP	1,5276	1,5233	5,239	7,8031
Onsemi	1,4841	1,4816	1,702	5,2859
Vishay	1,5130	1,5103	1,207	7,5302