

ABSTRACT OF THE DISCLOSURE

A semiconductor memory device includes a first data input/output (I/O) pad, an X-ray detector and a second data I/O pad. The first data I/O pad receives a test signal. The X-ray detector is connected to the first data I/O pad, includes a bipolar junction transistor (BJT) in which a voltage between an input end and an output end changes according to a cumulative X-ray dosage to the semiconductor memory device, and generates a test result signal indicating the voltage between the input and output ends of the BJT based on the test signal. The second data I/O pad is connected to the X-ray detector and outputs the test result signal.

FIG. 1