Ridgetop Group Inc

SJ BIST™ Overview

SJ BIST™ for Mission-Critical Electronics

Breakthrough in Solder Joint Intermittent Fault Detection

Preventing Impending FPGA Failures

Intermittent and catastrophic faults in electronic control systems can now be prevented with Ridgetop Group's SJ BIST. The SJ BIST (Solder Joint Built-In Self-Test™) technology accurately detects and reports instances of high resistance, including intermittent opens, in Field Programmable Gate Arrays (FPGAs).

Solder joints are subject to mechanical failure; they inevitably suffer damage from thermal and vibrational stresses, causing troublesome intermittent connections between components on the boards. The ability to measure, detect, and predict solder aging and the resultant failure of electronic modules is a true advancement in electronics reliability.

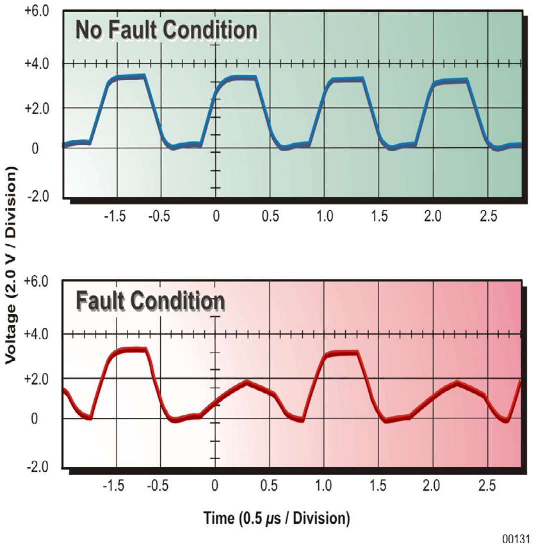
Ridgetop's specialty? Determining the extent of aging and degradation, and rooting out troublesome intermittencies.

As the world leader in electronic prognostics, Ridgetop Group provides a range of effective solutions for critical systems. These include award-winning, non-intrusive methods of determining state of health (SoH) and remaining useful life (RUL) for five levels of electronic system designs.

Our insertion tools and related libraries support implementations from the die-level, through package, board, module and system-level solutions.

Unique In-Situ Testing in Operating Circuits

Before SJ BIST, the only way to check programmed FPGAs for faults was to take them offline for testing and x-rays. These methods raise maintenance costs and often result in "no trouble found" or "could not duplicate" diagnoses. SJ BIST is installed in your operating components, and predicts when a component is likely to fail — with **zero false alarms.**



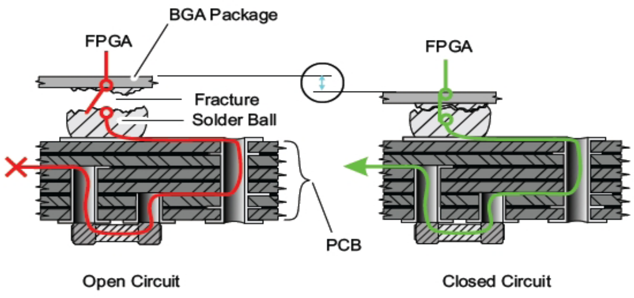
No-Fault and Fault Conditions
in SJ BIST Two-Port Test;
Fault Shows 150 Ω Resistance at 1 MHz

FEATURES AND BENEFITS

- Detects damage prior to catastrophic failure of FPGA
- Independently tested and verified
- Works with new processes and equipment
- Endorsed by leading automotive and aerospace customers

Benefits	Specific Effects
Customized Built-In Self-Test Solutions	
Starting with predesigned Intellectual Property (IP) blocks from the Sentinel Silicon™, InstaBIST™, and InstaCell™ libraries, Ridgetop customizes built-in self-testing to particular customer requirements.	• Services provided by Ridgetop assure successful implementation • Exceptional opportunities to reduce testing costs and improve product quality
Faults Detected in Operating Microcontroller Applications	
SJ BIST replaces offline, full-functional testing and statistical degradation models with real-time, direct monitoring for FPGAs in the field. Its sensitivity is at least as low as 100 ohms, which compares favorably with a manufacturing reliability standard of 300 ohms.	• No downtime for testing • Great savings in maintenance and inventory costs • Minimal power requirement — for example, 150 mW to monitor eight pins • Fast test time
Proven, Definitive Results	
SJ BIST has been independently validated on multiple FPGAs and ball grid array (BGA) packages, in multiple applications. It improves fault coverage without significantly increasing the complexity of the system.	• Provided as an IP core, incorporated into existing self-test backbone • Supports condition-based maintenance (CBM) • Detects damage prior to catastrophic failure of FPGA

Intermittent Signal Failures



Intermittent signal failures are caused by solder ball fractures that periodically open and shut, as shown at left.

Vibration, motion, thermal, and other stresses cause conditions where a solder ball can move enough to open or shut a fracture.

Certificate No. 1107004