NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY U.S. DEPARTMENT OF COMMERCE

Josephson Voltage Standard

Patent 11,557,708
Reference No. 19-035US1

Technology Partnership Office
licensing@nist.gov

Description

Problem

There needs to be a Josephson voltage standard (JVS) with multiple independent simultaneous voltage outputs. It needs to provide two or more voltage references that are generated simultaneously from the instrument. This concept would circumvent the need for two or multiple systems for applications that require fixed or variable voltage ratios, or dual signals.

Invention

It was determined that a device having simultaneous voltage reference signals would be useful for many measurement and calibration activities. A JVS advantageously having multiple output leads would meet this criterion, and provide such voltage references without the need for multiple systems. Therefore, this invention is not limited to only two independent voltage outputs but can be generalized to any number of voltage outputs as required by the application. The implementation encompasses either a single chip design with multiple voltage taps or the use of multiple independent circuits/devices located within a single cryogenic vessel. The output voltages can be of fixed ratio, independently programmable, or frequency/phase locked for ac, power, and impedance applications.

Benefits

Competitive Advantage

Simplifies by at least a factor of two the complexity of JVS systems when a voltage ratio is needed
Avoids the need to duplicate JVS systems if more than one voltage output is required for an application, thus reducing the complexity and the costs
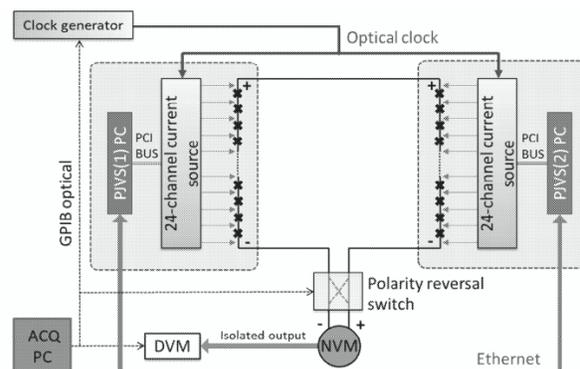*Provides self-calibration capabilities by use of simultaneous voltage outputs*

Commercial Application

Generation of simultaneous voltage references
Ratio and phase standard calibrations
Reference voltage with arbitrary phase and amplitude for electric power standard calibration
Impedance ratio measurement

An automated comparison measurement between two PJVS systems using an analog nanovoltmeter