Engineering Village

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1.

Accession number: 14663133

Title: **Programmable capacitors developed at NIST**

Authors: Koffman, A.D.[1]; Lee, R.D.[1] ; Lee, L.[1] ; Shields, S.H.[1] ; Liu, Z.[2] ; Wang, Y.[1]

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Material Identity Number: YXB4-1901-856

Abstract: NIST has produced several digitally programmable capacitance standards based on a modification of a fixed commercial fused-silica capacitance standard. The commercial device consists of 23 capacitors of roughly binary values that have been configured to combine via computer control to produce any capacitance value in the range from about 0.1 fF to 110 pF, with sub-femtofarad resolution. Upon placing the device in a custom enclosure inside an air bath, the shortterm capacitance stability achieved using a commercial capacitance bridge is approximately 5.0×10^{8} pF over the full capacitance range.

Number of references: 1

Inspec controlled terms: bridge circuits - capacitance measurement - capacitors - measurement standards

Uncontrolled terms: capacitance bridge - short-term capacitance stability - air bath - subfemtofarad resolution - computer control - commercial fused-silica capacitance standard - digitally programmable capacitance standard - NIST - programmable capacitor - capacitance 0.1 pF to 110 pF

Inspec classification codes: A0630L Measurement of basic electric and magnetic variables - A0620H Measurement standards and calibration - B7310J Impedance and admittance measurement - B2130 Capacitors - B7130 Measurement standards and calibration

Numerical data indexing: capacitance 1.0E-13 1.1E-10 F

Treatment: Practical (PRA)

Discipline: Physics (A); Electrical/Electronic engineering (B)

DOI: 10.1109/CPEM.2014.6898467

Database: Inspec

IPC Code: G01D18/00

- SECTION G PHYSICS
- MEASURING counting ; TESTING
- MEASURING NOT SPECIALLY ADAPTED FOR A SPECIFIC VARIABLE; ARRANGEMENTS FOR MEASURING TWO OR MORE VARIABLES NOT COVERED BY A SINGLE OTHER SUBCLASS; TARIFF METERING APPARATUS; MEASURING OR TESTING NOT...
- **Testing or calibrating of apparatus or arrangements provided for in groups**

G01R27/00

- SECTION G PHYSICS
- MEASURING counting ; TESTING
- MEASURING ELECTRIC VARIABLES; MEASURING MAGNETIC VARIABLES measuring physical variables of any kind by conversion into electric variables, see Note (4 following the title of class ; measuring...
- **Arrangements for measuring resistance, reactance, impedance, or electric characteristics derived therefrom**

G01R27/26

- SECTION G PHYSICS
- MEASURING counting ; TESTING
- MEASURING ELECTRIC VARIABLES; MEASURING MAGNETIC VARIABLES measuring physical variables of any kind by conversion into electric variables, see Note (4 following the title of class ; measuring...
- Arrangements for measuring resistance, reactance, impedance, or electric characteristics derived therefrom
- Measuring real or complex resistance, reactance, impedance, or other two-pole characteristics derived therefrom, e.g. time constant by measuring phase angle only
- **Measuring inductance or capacitance; Measuring quality factor, e.g. by using the resonance method; Measuring loss factor; Measuring dielectric constants**

G12B13/00

- SECTION G PHYSICS
- INSTRUMENT DETAILS
- DETAILS OF INSTRUMENTS, OR COMPARABLE DETAILS OF OTHER APPARATUS, NOT OTHERWISE PROVIDED FOR

- **Calibrating of instruments or apparatus calibrating of measuring instruments**

H01G4/00

- SECTION H ELECTRICITY
- BASIC ELECTRIC ELEMENTS
- CAPACITORS; CAPACITORS, RECTIFIERS, DETECTORS, SWITCHING DEVICES, LIGHT-SENSITIVE OR TEMPERATURE-SENSITIVE DEVICES OF THE ELECTROLYTIC TYPE selection of specified materials as dielectric ; capacitors...
- **Fixed capacitors; Processes of their manufacture electrolytic capacitors 2**