

## BCDR Calculator program ver. 1.5.2

### PC requirements

OS: Windows 10, 64 bit, Professional

Interface to control the VNA: Either USB-GPIB (82357B), USB-TMC or LAN

One free USB 2.0 port for MAC address license dongle (USB-LAN adapter)

Free disk space > 400 MB

Keysight IO Library version 18.1 or later

Appropriate MATLAB Runtime is installed during the program installation. Remove old MATLAB runtime version from the PC before program installation.

Supported analyzer: N52xxA/B PNA series network analyzer, FW A.09.80.20 or later

The screenshot displays the BCDR Calculator (rev.1.5.2) interface. The main window is divided into several sections:

- VNA setup:** Includes "Full band setup" (Start freq: 5 GHz, Stop freq: 67 GHz, Num. of freq.: 1001 points, IFBW: 300 Hz, Power: -5 dBm) and "Segment setup" (Segment span ratio: 3%, Points per segment: 1001 points, IFBW of segment: 100 Hz). It also has checkboxes for "Recall user preset" and "Multi samples (Auto segment sweep setup)", a "Segment sweep" dropdown, and a "VNA setup" button.
- Tools:** Contains buttons for "Edit segment", "Coupling setup", and "Update wind2 trace".
- Save/Load VNA state:** Contains buttons for "Save VNA state" and "Load VNA state".
- Sample & Resonator parameters:** Includes fields for Sample Thickness (t): 0.498 mm, Disk Diameter (D): 14.931 mm, Disk Thickness (tc): 0.06 mm, and Conductivity ( $\sigma$ ): 5.63  $10^7$  S/m. A "Frequency-dependent conductivity" button is also present.
- Measurement setup:** Includes fields for File name prefix (mat1), Directory name (20200827), Vendor (agilent), and Visa address (TCPIP0:146.208.54). It also has a dropdown for "Uncertainty analysis" set to "Not performed".
- Measurement control:** Includes a "Calc" dropdown set to "S21" and buttons for "Meas. & Calc.", "Calc. Only", "Meas. Only", and "Recall Data".
- Permittivity vs Frequency:** A graph showing Frequency (GHz) on the y-axis (ranging from 10 to 70) and Permittivity on the x-axis (ranging from 2 to 10). The graph title is "Permittivity vs Frequency" and "t=0.498 mm, D=14.931 mm". It displays several curves representing different materials, with a dashed line indicating the "Radiation limit". A "Calculate" button is located below the graph.
- Multilayer option:** Includes an "Analysis" button.