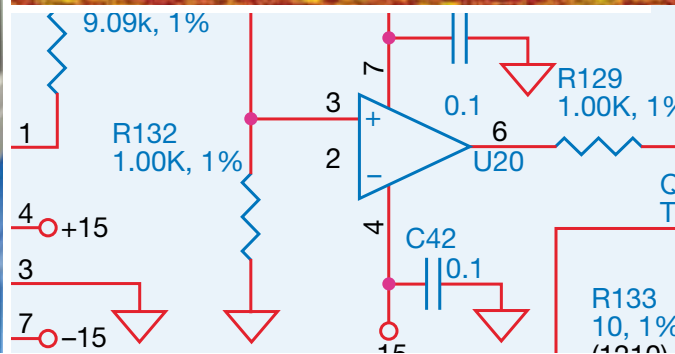
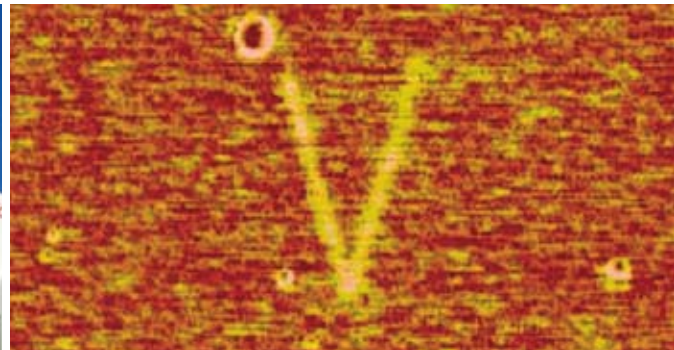


diSAM™ III and diSAM™ V Signal Access Modules

The ultimate flexibility for custom experimentation.



The signal access modules provide access to the signals between the controller and microscope, enabling thousands of possibilities for creative experiments.

- Inject user sensor signals for imaging
- Control your SPM with a custom feedback loop
- Monitor raw, unprocessed signals from your microscope
- Pre-process signals for custom measurement or control
- Provide custom signals to tip or sample
- Control piezo positions with access to high voltage piezo drives



Solutions for a nanoscale world.™

Signal Access Modules

The Signal Access Modules (SAM™) are in-line hardware accessories that allow access or interruption of signals between Dimension™, EnviroScope™, BioScope™, or MultiMode™ scanning probe microscopes (SPMs) and their NanoScope® controllers. Signals can be injected, tapped, and modified as they flow between the SPM and the controller. Signal access is very useful for advanced experimentation and diagnostic evaluation because it gives researchers the open architecture they need to conduct innovative experiments.

ACCESS INPUT AND OUTPUT SIGNALS

Whatever a particular custom application requires—from routing analog signals to a user-designed detector, to injecting a custom tapping vibration signal, to syncing with or modifying Z piezo position—the SAM provides flexible and convenient access to the needed signals. Two different SAMs fit the various combinations of controller and SPM:

- SAM III: Works with the MultiMode, PicoForce, and EnviroScope and all SPMs using NanoScope Controllers prior to the NanoScope V. Since the signals between the controller and the SPM are already ground referenced, this is a passive device.
- SAM V: Works with the Dimension and Bioscope SPMs using NanoScope V controllers. The SAM V contains active electronics to convert the differential signals between these SPMs and the NanoScope V to ground referenced signals.

Both SAMs provide fifty ground referenced BNC connectors and twenty-five hardware switches to access signals between the NanoScope controller and the SPM. Twenty additional BNCs and ten hardware switches provide access to Application Module signals. Small experiments can be conveniently powered using $\pm 15V$ and $+5V$ supplies from the controller. Each signal can be monitored, modified, or generated externally, and then routed into the system. Since every line is individually switchable, user specified external signals can replace any of the standard signals.

UNLIMITED APPLICATIONS

The SAM makes customizing the SPM a straightforward endeavor, providing the means to conduct experiments with a wide range of advanced scanning probe microscopy modes, including:

- NSOM (Near-field Scanning Optical Microscopy)
- SThM (Scanning Thermal Microscopy)
- PSTM (Photon Scanning Tunneling Microscopy)
- LTG (Light-modulated Tunneling Gap)
- UFM (Ultrasonic Force Microscopy)
- BEEM (Ballistic Electron Emission Microscopy)
- SEPM (non-interleaved surface potential)

MICROSCOPE RELATED SIGNALS

Analog data inputs to controller

- SAM III: In0 (the main analog data input), Aux A, B, C, and D (Aux signals are multiplexed in NS3a. Aux signals in NS4 and NS3a with ADC5 option are independently read in real-time). All lines are $\pm 10V$.
- SAM V: Vertical, Lateral, In1b, SUM, STM. All lines are $\pm 12V$.

Low-voltage analog outputs

- SAM III: Ana 1, 2, 3, 4. Bias, and LV Z.
- SAM V: Tip Bias, Sample Bias, DDS1 (tapping piezo drive), DDS2, Output 1 & 2 (programmable), X, Y, Z Sensors, LV Z.

All lines are $\pm 10V$, 10mA except Ana 2 and LV Z which are $\pm 12V$, 10mA. LV Z is a low-voltage version of the Z-piezo drive.

High-voltage outputs

- Bipolar piezo drive X, -X, Y, -Y, Z, -Z, plus Ana2 (HV) $\pm 220V$, 35mA (SAM III: 70mA).

Ana2 (HV) is a high-voltage version of Ana2 above.

Digital outputs

- D1, D0: TTL (transistor-transistor logic) 0–3.3V (SAM III: 5V). Used for digital communication or end of line/frame pulses
- SAM III: A, B, C, D are OCL (open collector logic), 500mA max digital outputs used for motor control and data transmission.

Misc

- SAM III: Z-modulation injection point: $\pm 10V$ used to add signals to the Z-piezo control voltage
- SAM V: Dig In is a TTL input
- $\pm 15V$ supply, 100mA (SAM III: 300mA with NSIIIa/Quadrex, 500mA with NSIIIa/Extender, 750mA with NSIVa)
- $+5V$ supply, 500mA

APPLICATION MODULE RELATED SIGNALS

Inputs to controller from Application Module

- SAM III: Four $\pm 10V$ signals
- SAM V: Four $\pm 12V$ signals

Outputs from controller to Application Module

- SAM III: Six analog signals ($\pm 10V$).
- SAM V: Three $\pm 10V$ and one $\pm 12V$ analog signals, plus two TTL signals.



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