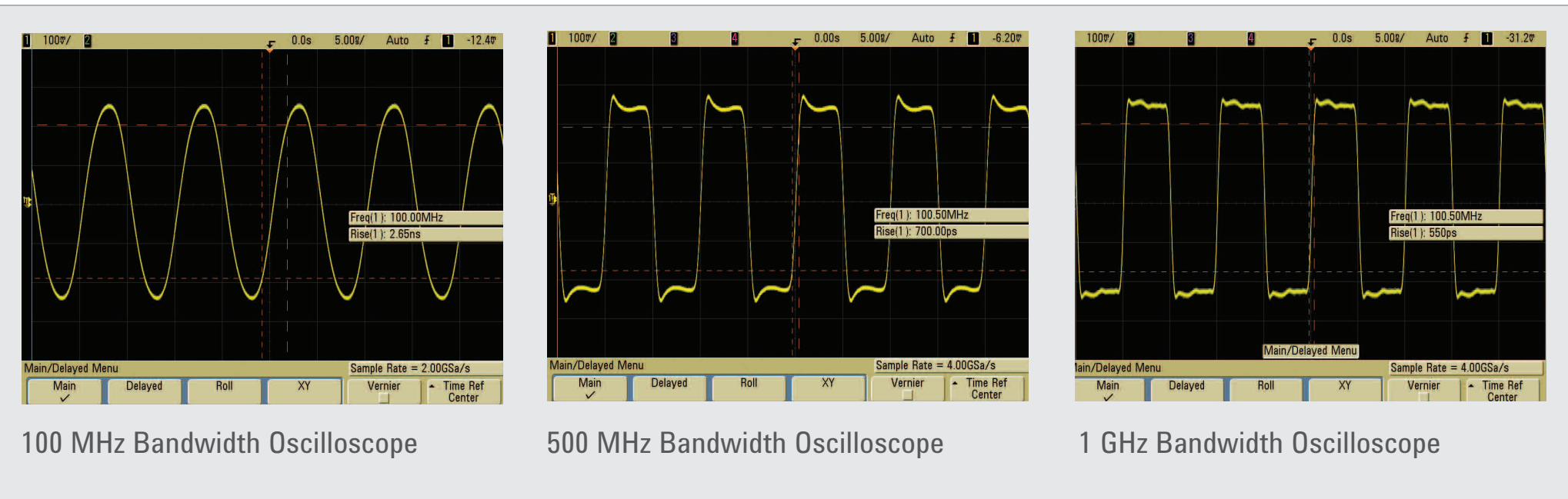


Digital Oscilloscope. Main Characteristics

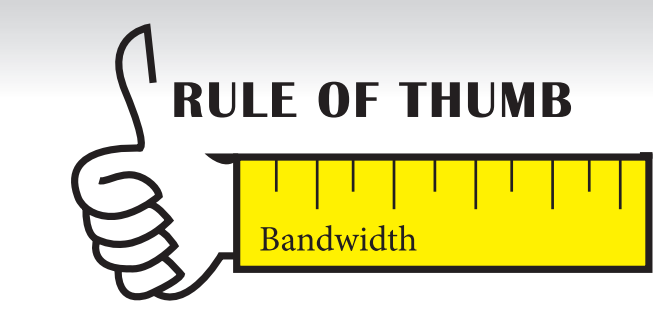
www.agilent.com/find/scopes

1. Bandwidth

Signal: 100 MHz Square Wave



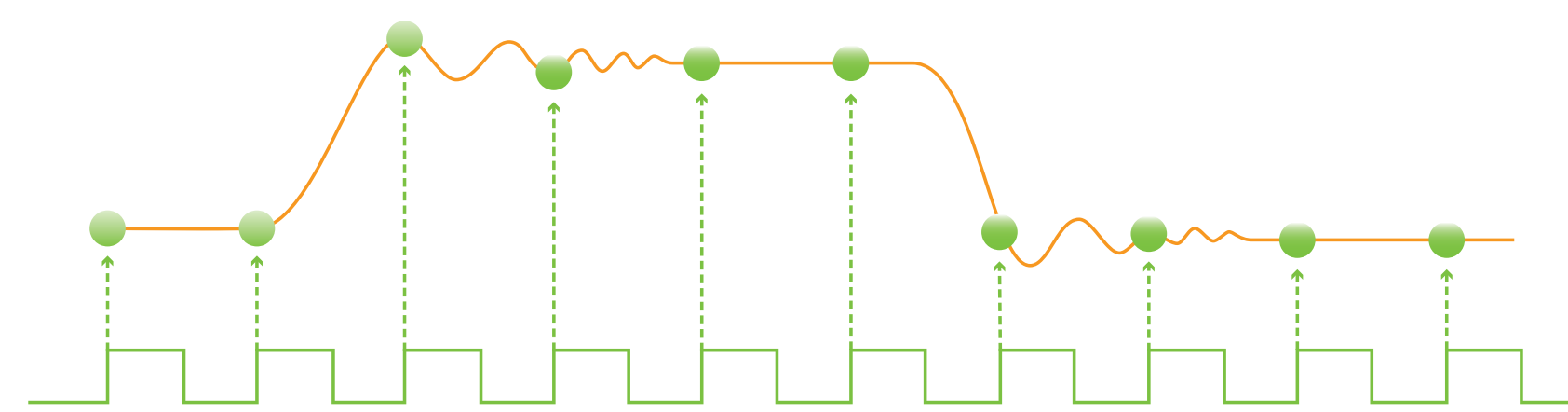
100 MHz Bandwidth Oscilloscope 500 MHz Bandwidth Oscilloscope 1 GHz Bandwidth Oscilloscope



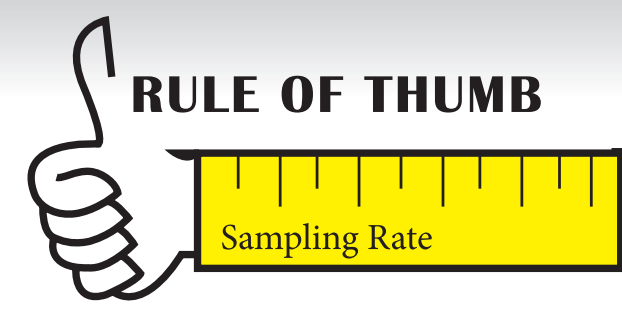
RULE OF THUMB
Suggested Bandwidth = 5 x Clock rate
It captures up to the 5th harmonic with minimum signal attenuation.

2. Sample Rate

Real-time (or Single-shot) Sampling Mode



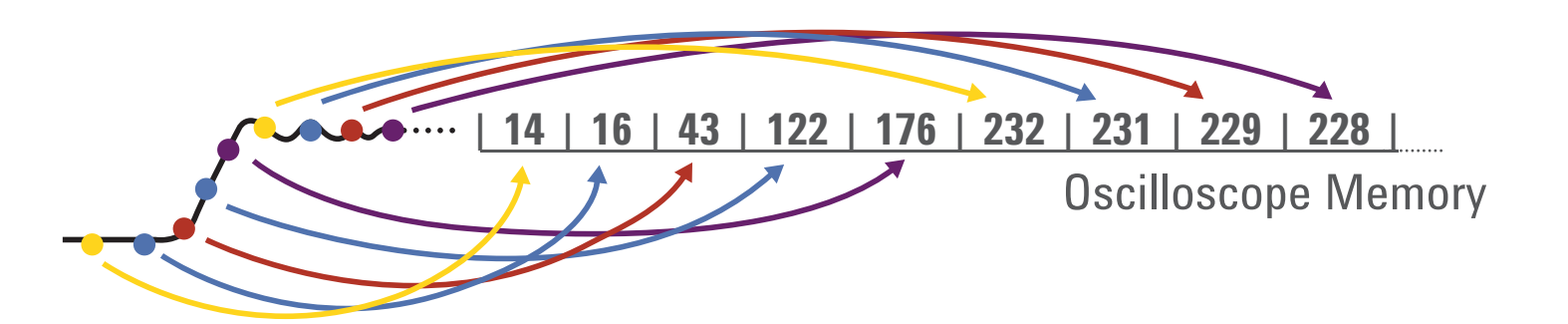
Suitable for repetitive and non-repetitive signals.
All samples are taken from a single trigger event.
Sin(x)/x digital filtering accurately reconstructs shape of the digitized waveform.



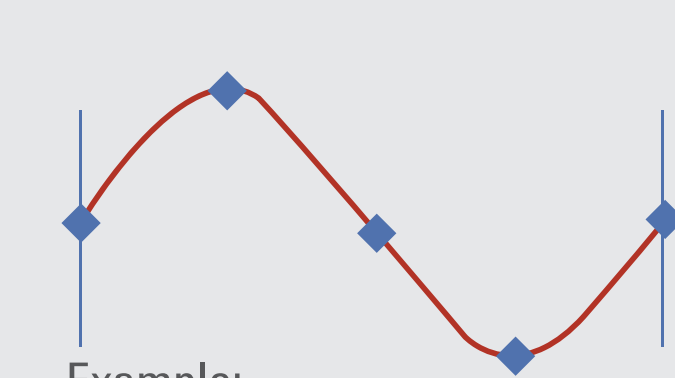
RULE OF THUMB
In practice: equally spaced sample rate $\geq 4 \times$ bandwidth
In theory, according to Nyquist:
equally spaced sampling rate $> 2 \times$ maximum frequency.

3. Memory Depth

Acquisition memory is the place where the digitized samples are stored.

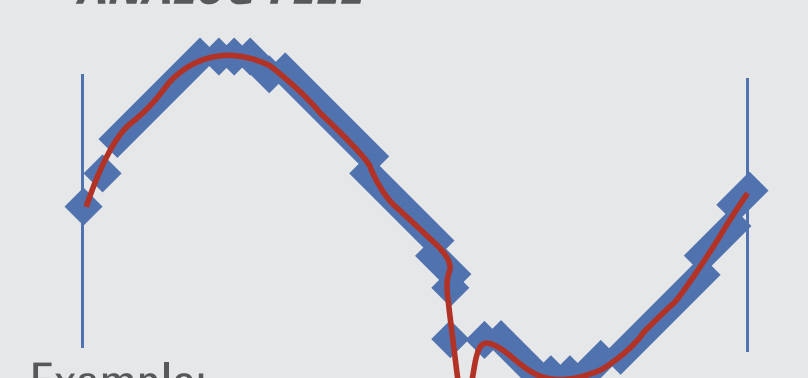


Shallow memory oscilloscope



Example:
1s acquisition
Sampled points: 5 points
Samples Resolution: 200 ms

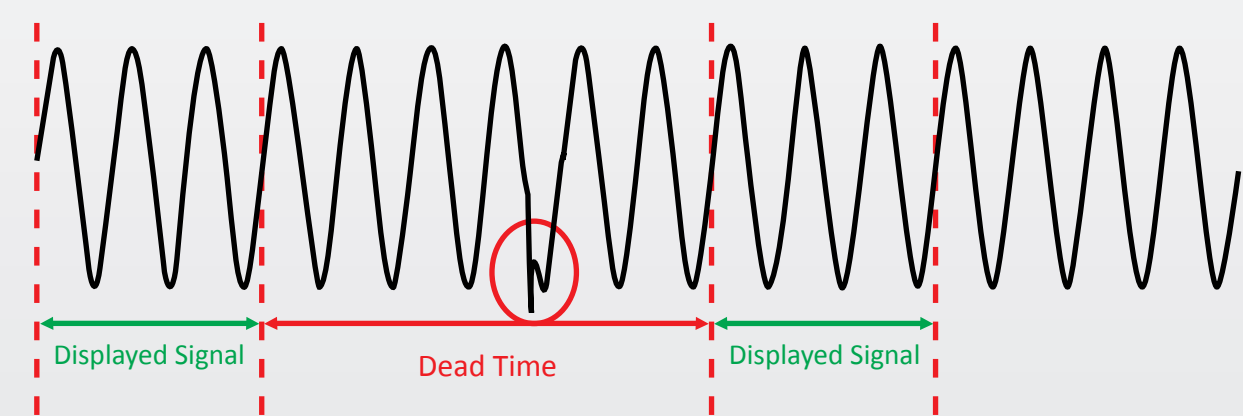
Megazoom memory oscilloscope - "ANALOG FEEL"



Example:
1s acquisition
Sampled points: 50 points
Samples Resolution: 20 ms

4. Waveform update rate

When oscilloscopes are processing data, they cannot capture and display signals. Processing time is known as dead-time.

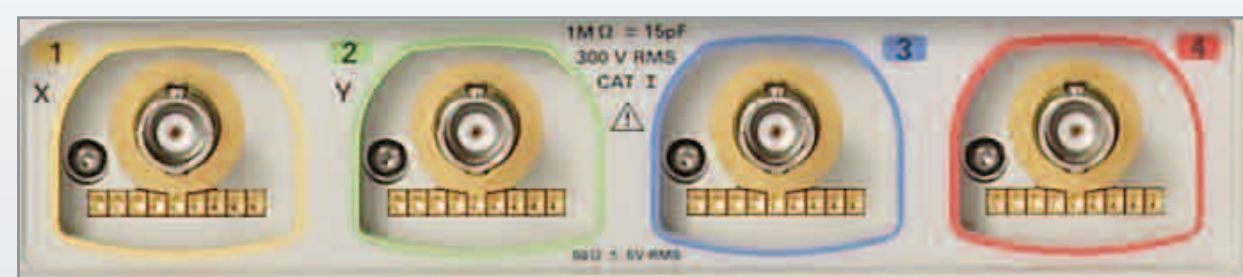


In order to capture an infrequent signal, check if the oscilloscope slows down when you use features like measurements and memory depth. The higher the waveform update rate in deep memory, the better the scope.

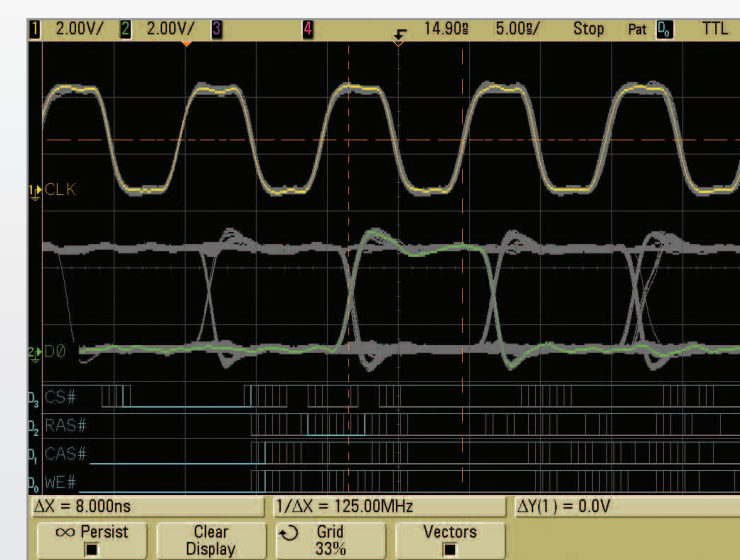


5. Number of Channels

2 or 4 analog channel oscilloscopes are easy to find. Oscilloscopes with more than 4 channels are rare and expensive.



To get more than 4 channels, use an MSO (Mixed Signal Oscilloscope), with 8 or 16 digital channels in addition to 2 or 4 analog channels.



6. Probes

The oscilloscope probe is an integral part of the measurement system. They are classified as:

A) High-impedance passive probes



Benefits: durability, high voltage levels, high input resistance, affordable and general purpose.
Trade-offs: limited bandwidth, high input capacitance.

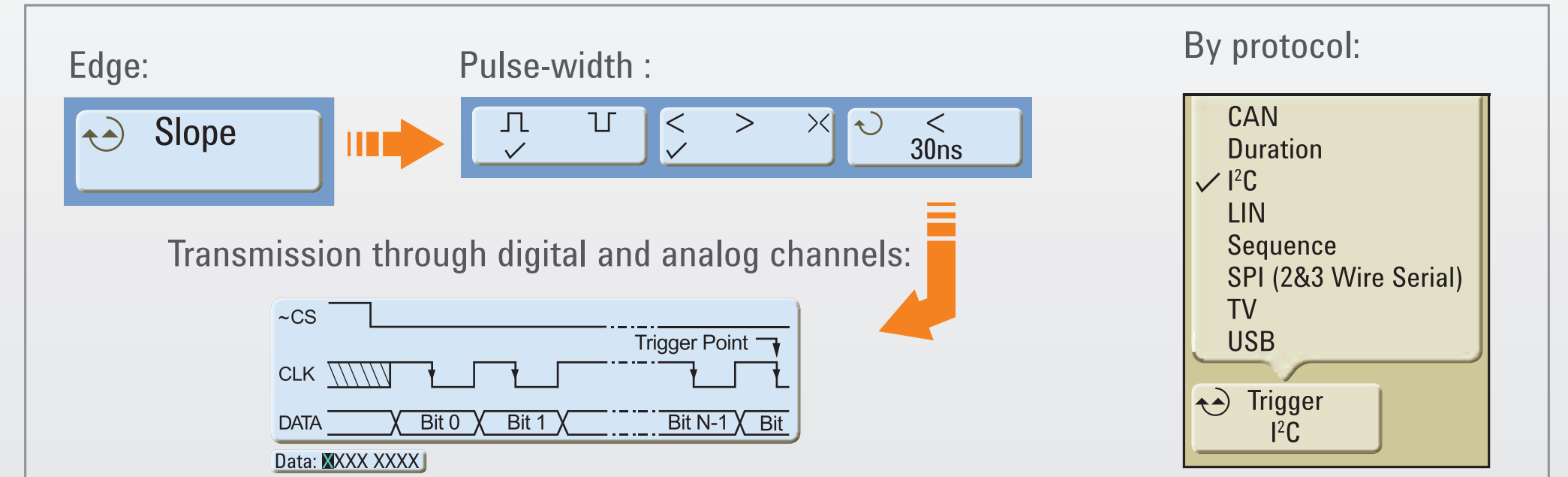
B) High-bandwidth active probes



Benefits: high bandwidths, low input capacitance, documented accessories.
Trade-offs: less durable, more expensive, lower voltage levels.

7. Trigger

There is a specific control that allows you to tell the oscilloscope under what conditions you want to start an acquisition. This control is called trigger. Many types of trigger can be used to start the capture.



8. Connectivity

The oscilloscope communicates with computers and printers in two ways:

- A) Legacy: via GPIB interface and/or RS-232
- B) New: USB and LAN



	InfiniVision MSO/2000 X Series	InfiniVision MSO/3000 X Series	InfiniVision MSO/DSO7000B Series	InfiniVision MSO/DSO9000A Series
Bandwidth	from 70MHz to 200MHz	from 100MHz to 500MHz	from 100MHz to 1GHz	from 600MHz to 4GHz
Sample rate	up to 2GSa/s	up to 4GSa/s	up to 4GSa/s	up to 20GSa/s
Memory depth	100kpts	up to 4Mpts	up to 8Mpts	up to 1Gpts
Waveform update rate	50,000 wf/s	1 million wf/s	100,000 wf/s	400 wf/s at 10Mpts deep memory
Number of analog channels	2 or 4	2 or 4	2 or 4	4
Number of digital channels	8	16	16	16
Test probes	High-impedance only	High-impedance and Active	High-impedance and Active	High-impedance and Active
Connectivity	Standard USB, LAN/VGA or optional GPIB	Standard USB, LAN/VGA or optional GPIB	Standard USB, LAN and XGA, optional GPIB	Standard USB, LAN and XGA, optional GPIB



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Printed in United States, May 2011
PosterScope
5990-8202EN