

Electronic signals fly through the wires, while abnormal signals and crosstalk keep the late-night debugging engineers crazy. How to catch them quickly and keep annoying anomalies out of sight? UltraAcquire may be a good idea.

What is UltraAcquire mode

UltraAcquire mode is a special sampling mode designed by RIGOL to satisfy the user's ability to capture transient signals and allow the user to quickly trace back anomalies within historical waveforms.

Simply put, it is to freeze, store, and play back.

Through this series of operations, DHO4000 and DHO1000 series oscilloscopes achieved a transient capture rate of 1,500,000 wfms/s. After triggering, the abnormal signal is captured and stored at high speed for subsequent playback and analysis.



Figure 1 Transient capture rate of 1,500,000 wfms/s.

How does UltraAcquire work

Due to the limitation of basic operating principles of the digital oscilloscope, the sampling deadband is always a pain point. For entry and mid-range digital oscilloscopes, it is difficult to accelerate the whole digital signal sampling and display process with huge computing power, so we have a new option for users— UltraAcquire.

The diagram below show you how UltraAcquire mode works:

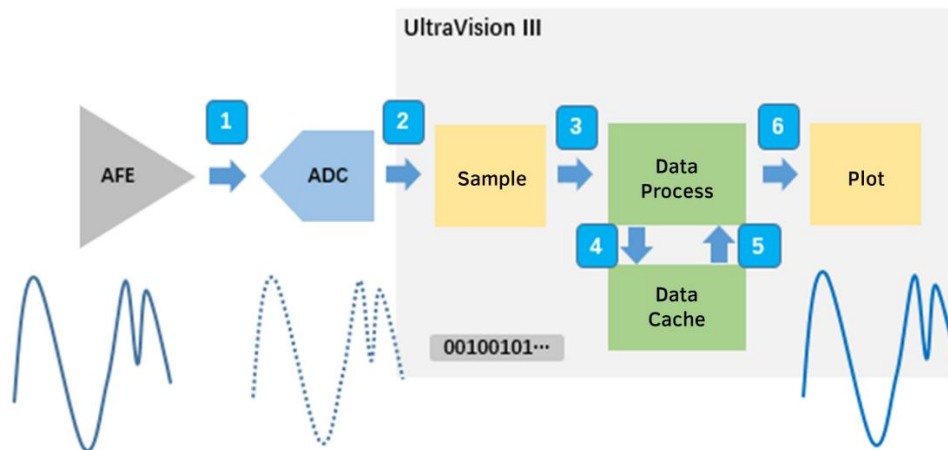
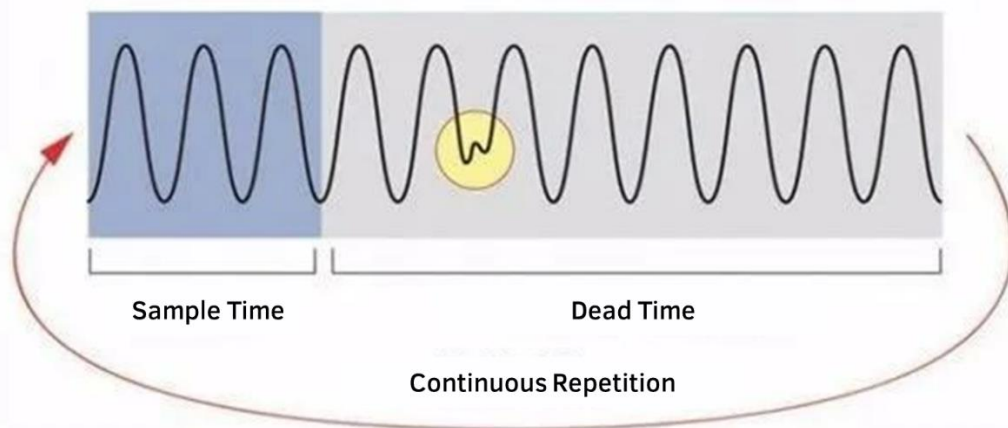
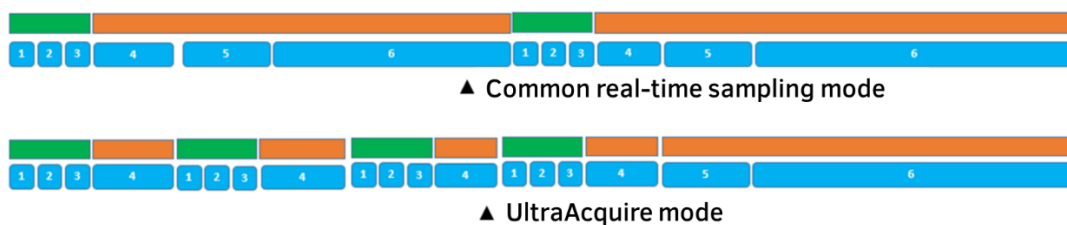


Figure 2 Block diagram of UltraAcquire

In common real-time sampling mode, the oscilloscope will operate as shown below:



Through the color division in the diagram below, you can compare and understand the difference between the two operating modes of the oscilloscope:



The orange area of the figure represents the dead time and green represents the sample time. In the common real-time sampling process, the digital oscilloscope will follow the process of 1, 2, 3, 4, 5, 6, then the dead time to the total time is a fixed percentage, that is:

$$\text{Orange Zone} / (\text{Orange Zone} + \text{Green Zone})$$

We can see that the orange area is much larger than the green area, and the digital oscilloscope does have a deadband ratio like this. But if we put the time-consuming process 5 and process 6 after a series of repeated 1, 2, 3, 4 combinations, the deadband ratio will decrease. In addition, with the increase of the number of repetition groups, the proportion of deadband will be reduced to close to the operation combination of only 1, 2, 3 and 4, which can greatly shorten the dead zone time, in other words, increase the waveform capture rate.

The implementation of UltraAcquire Mode

Consistent with the DS70000 Series, the DHO Series oscilloscopes deliver fast cycle and accurate capture of waveforms from sampling to digital triggering to storage with their powerful sampling and trigger units.



Figure 3 DHO4000 Series

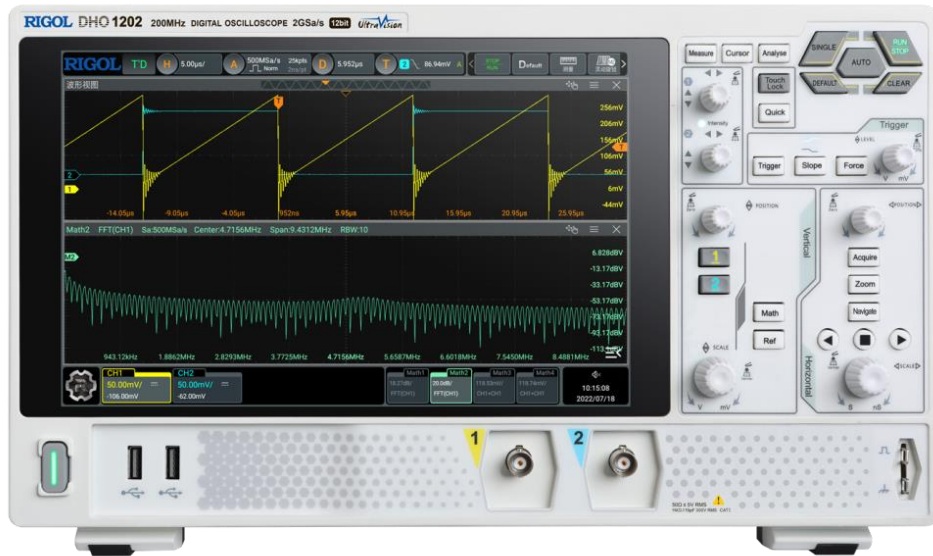


Figure 4 DHO1000 Series

Benefits of UltraAcquire mode

Abnormal signals, burrs, variations in power loads... these are the signals that engineers hate. In order to catch these signals quickly and accurately and conduct playback or analysis, UltraAcquire mode, which has ultra-high waveform capture rate plus waveform playback function, comes into being and becomes the "time domain microscope" for engineers -- condensation time and infinite amplification.

Below is a schematic diagram of capturing an occasional burr in a burst using the DHO4000 Series Oscilloscope in both normal digital phosphor mode and UltraAcquire mode:



Figure 5 Digital phosphor mode



Figure 6 UltraAcquire Mode

The comparison of the two mode demos shows that in UltraAcquire mode of DHO, abnormal signals cannot be hidden.

Whether it is troubleshooting anomalies caused by the instantaneous increase in the power consumption of IOT devices when sending and receiving data, or troubleshooting crosstalk signals in digital systems, UltraAcquire of DHO series can provide 5 presentation modes, helping you choose the most direct way to playback and analyze the waveform

captured by each frame, so as to find and solve problems.

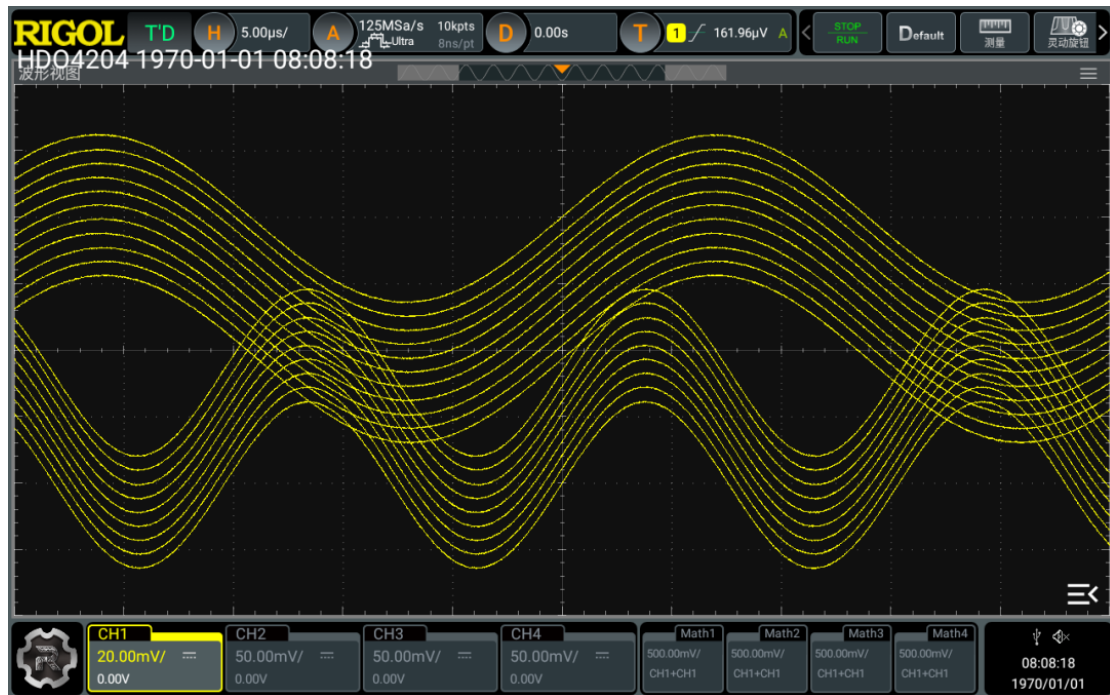


Figure 7 Waterfall



Figure 8 Adjacent



Figure 9 Perspective

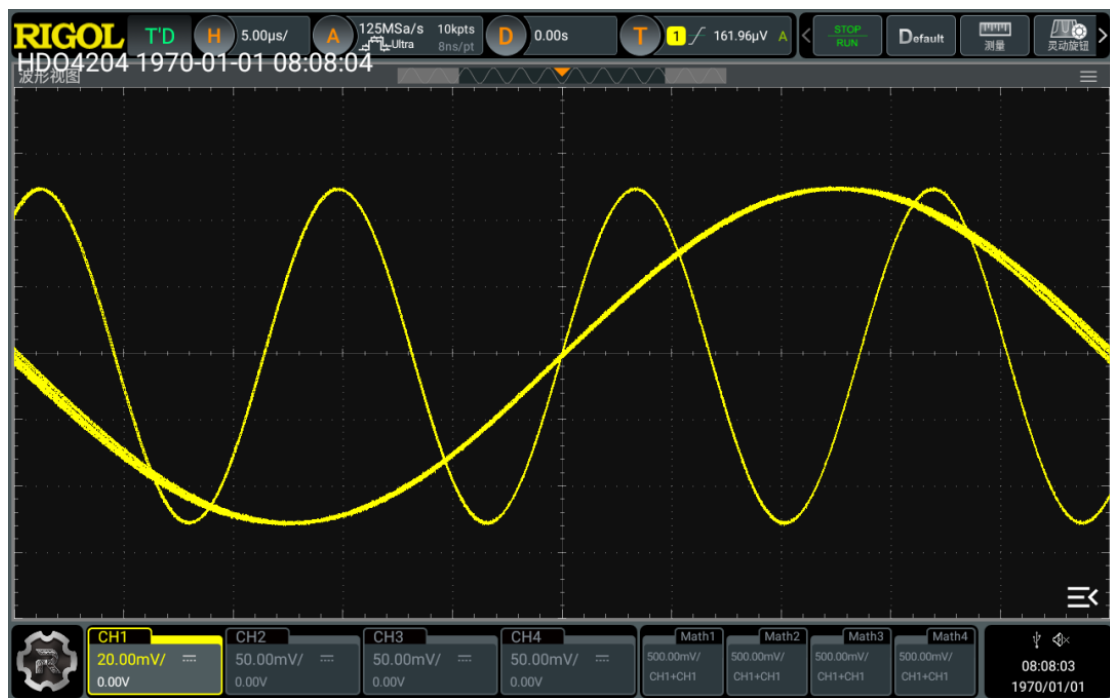


Figure 10 Overlay

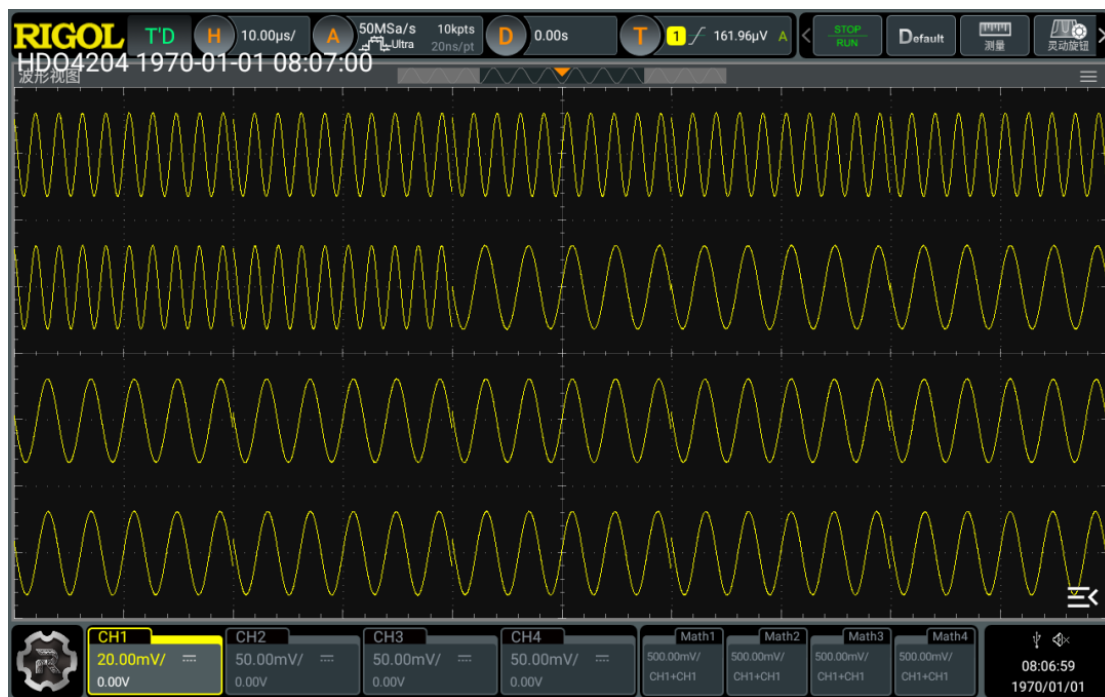


Figure 11 Mosaic

Summary

RIGOL DHO Series high-resolution digital oscilloscopes provide a high waveform capture rate of up to 1,500,000 wfms/s via UltraAcquire, helping to quickly acquire and store waveforms, and providing search and navigation capabilities.

In addition, DHO series achieves a high resolution of 12bit and covers bandwidth from 70MHz to 800MHz, with real-time sampling rates of up to 4GSa/s and background noise of up to 18μVrms. DHO will meet a wider range of test requirements and test scenarios.