TECHNICAL OVERVIEW

MultiScope Application

For Infiniium Oscilloscopes

Product Overview

Today's oscilloscopes generally come with 2 or 4 analog channels. Some, like our Infiniium EXR and MXR Series, even come with 8 analog channels. But what if you need more? 12, 16, or more in one time coherent system? You could turn to digital channels – most oscilloscopes offer 16 of those. But you are limited to 1 bit of resolution, and can't see any details of your waveform. You can also leverage the trigger-in and trigger-out BNCs on most oscilloscopes, to daisy chain them together. That way when one scope triggers, they all trigger. But this can create significant delay between frames, and all the channels in your test system aren't presented on a single screen.

The optimal solution here is Keysight's Multiscope software, standard on all Infiniium oscilloscopes. With the purchase of a cabling kit, or using your own hardware you may have in the lab, multiple Infiniium oscilloscopes can be synchronized together to present up to 40 channels across 10 oscilloscopes on one user interface with minimal jitter from frame to frame.

This is done with a one-time synchronization step that removes the delay induced from the trigger in and trigger out connection and cabling, allowing for frame to frame jitter in the range of a few picoseconds, or less with the precision cal available on our higher performance models.

Automated calibration is available to allow channel correlation across frames down to less than 1 ps. All oscilloscopes connect to a control PC via LAN or USB. The PC runs Infiniium Offline and allows users to change settings on all oscilloscopes. The Infiniium application on the PC shows all waveforms and measurements and offers analysis in addition to controlling the oscilloscope settings. The leader oscilloscope can also work as the controller in the absence of a control PC.

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Features

- Standard feature on all Infiniium oscilloscopes with software version 6.30 or greater – only need to purchase cabling kits and Infiniium Offline, if controlling from a PC instead of the leader oscilloscope.

- Save costs by connecting up to 10 of your existing Infiniium Series oscilloscopes to achieve 40 channel acquisitions in a single timebase.

- Data is presented to the user on a control PC or the leader scope as if all oscilloscope channels existed on a single frame.

- Oscilloscopes can be used independently when four channels or fewer are needed.

- Application supports multiple frames using the same family of oscilloscopes (e.g. all UXR-Series scopes) or a heterogeneous combination of different oscilloscope families (e.g. one MXR-Series and one EXR-Series). Time-correlation precision depends on which frames are connected together.

Figure 1. An Infiniium EXR-Series and MXR-Series are connected and being controlled from a PC using D9010BSEO (Infiniium Offline).

MultiScope Software Architecture

Control PC

MultiScope is controlled by a PC installed with the Infiniium Offline analysis software, or the leader scope in the absence of a PC. Using a separate PC may be preferred from a usability standpoint, since this level of channel density may benefit from a higher resolution external display.

Infiniium gives you full flexibility on how channels are presented, allowing you to display up to 16 grids per window, up to 8 windows. There is full support of all measurements, functions, and analysis on all channels, letting you test at the comfort of your workbench.

The leader and the followers

The leader oscilloscope connects to the control PC via LAN or USB or can act as the controller in the absence of the PC. The one leader oscilloscope can connect one to nine followers. The connection between oscilloscopes is daisy chained with cables and splitters. MultiScope supports edge or glitch trigger on leader; other triggering modes (including InfiniiScan) are not supported. A one-time deskew eliminates frame-to-frame skew created by trigger daisy chain connection. Infiniium allows you to achieve ultra-low inter-scope intrinsic jitter with precision calibration, and a 10-MHz reference clock aligns sample for deep memory synchronization.

Figure 2. Infiniium S-Series oscilloscopes, daisy chained connection with power splitter and BNC cables.

Configuration Table and Specifications

Basic Specifications							Calibration Modes and Inter-Scope Intrinsic Jitter [2]		
Oscilloscope Family	Bandwidth	Max Sample Rate	Max Channels per Scope	Max No. of Frames	Sync Port	External Reference Quality	Manual	Basic	Precision
UXR-Series	10-110 GHz	256 GSa/s	4	10	Yes	100 MHz	Yes	No	Yes (0.02 ps)
MXR-Series	0.5-6 GHz	16 GSa/s	8	2	No	10 MHz	Yes	Yes (5 ps)	No
EXR-Series	0.5-2.5 GHz	16 GSa/s	8	2	No	10 MHz	Yes	Yes (5 ps)	No
Z-Series, or 90000 Q-Series	20-33 GHz	80 GSa/s	4	10	Yes	100 MHz	Yes	Yes (10 ps)	Yes [1] (0.15 ps)
	33 GHz	80 GSa/s	4	10	Yes				
	50-63 GHz	160 GSa/s	2	10	No				
V-Series or 90000 X-Series	8 -16 GHz	40 GSa/s	4	10	No	10 MHz	Yes	Yes (10 ps)	Yes [1] (0.5 ps)
	20-33 GHz	80 GSa/s	2	10					
S-Series	0.5-4 GHz	10 GSa/s	4	10	No	10 MHz	Yes	Yes (5 ps)	No
	6-8 GHz	20 GSa/s	2	10					
90000A-Series	2.5-13 GHz	40 GSa/s	4	10	No	10 MHz	Yes	Yes (5 ps)	No
9000-Series	600 MHz	5 GSa/s	4	10	No	10 MHz	Yes	Yes (N/A)	No
		10 GSa/s	2	10					
	1-4 GHz	10 GSa/s	4	10					
		20 GSa/s	2	10					

1. Precision calibration is available on 90000 Q- and Z-Series for up to 10 scopes and on 90000 X- and V-Series for up to 2 scopes
2. Inter-scope intrinsic jitter value is used to calculate MultiScope delta-time measurement accuracy.

Cable Kit Ordering Guide

Connecting two frames together is simple, with a single part number kit that gives you the cables and accessories required. To see the contents of these kits, visit the configuration guides linked at the end of this document.

Contact Keysight for guidance if you have a need for more than 2 frames with an EXR-Series, MXR-Series, or S-Series based system.

For 3 or more frames in a system, also reference the configuration guides, as methods vary from platform to platform, and depend on if the units are rackmounted, total quantity of oscilloscopes in the system, and other factors. Note that for the V-Series and 90000 Q-Series, the expansion kits listed aren't orderable parts – see the configuration guide for more details.

Oscilloscope Family	Two Frame Cable Kit	Expansion Kit(s)	Rackmount Kit(s)
UXR-Series	N2164A	N2165A	N2156A
MXR-Series EXR-Series	N2124A	Contact Keysight	MXR2RACK EXR2RACK
Z-Series 90000 Q-Series	N2104A (Rack mounted, can be expanded) N2105A (Stacked, not in a rackmount, will not be expanded)	N2106A (+1 Frame) N2107A (+1 Rack) N2122A (Deskew Kit)	N2759A
V-Series 90000 X-Series	N2123A	3VINRK (3 frame setup) PLUS1V (+1 Frame) PLUSRK (+1 Rack)	N5470A
S-Series 90000A Series 9000 Series	N2124A	Contact Keysight	N2902B (S, 9000) N5470A (90000A)

Related Literature

Type	Description / URL (click if viewing on a computer)	Pub Number
Configuration Guide	Configuring MultiScope for Infiniium EXR-Series, MXR-Series, and UXR-Series	9018-60072
Configuration Guide	Configuring MultiScope for Infiniium 9000, 90000, S-, V-, and Z-Series	9018-07088
Data Sheet	Infiniium EXR-Series (500 MHz to 2.5 GHz, 4 or 8 channel real time oscilloscope)	3120-1495
Data Sheet	Infiniium MXR-Series (500 MHz to 6 GHz, 4 or 8 channel real time oscilloscope)	7120-1115
Data Sheet	Infiniium UXR Series (10 GHz to 110 GHz, 1, 2 or 4 channel real time oscilloscope)	5992-3132

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