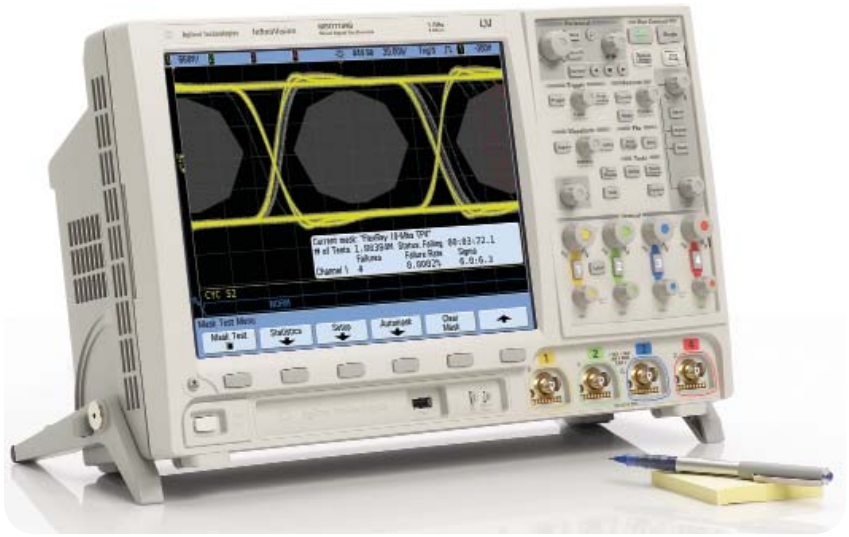
Mask/Waveform Limit Testing For Agilent InfiniiVision Series Oscilloscopes

Data Sheet

Test waveforms to specified standards in seconds instead of hours using hardware-accelerated mask testing

Features

- Test up to 270,000 waveforms per second with the industry's fastest hardware-accelerated mask testing technology
- Automatic mask creation using input standard
- Easily download multi-region masks and setups based on industry standards
- Detailed pass/fail statistics
- Test to high-quality standards based on sigma
- Multiple user-selectable test criteria



If you need to validate the quality and stability of your electronic components and systems, Agilent's mask test option for InfiniiVision Series oscilloscopes can save you time and provide pass/fail statistics almost instantly. The mask test option offers a fast and easy way to test your signals to specified standards, as well as the ability to uncover unexpected signal anomalies, such as glitches. Mask testing on other oscilloscopes is usually based on software-intensive processing technology, which tends to be slow. Agilent's InfiniiVision scopes mask test option is based on hardware-accelerated technology, meaning that InfiniiVision Series oscilloscopes can perform up to 270,000 real-time waveform pass/fail tests per second. This makes your testing throughput orders of magnitude faster than you can achieve on other oscilloscope mask test solutions.

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Using AutoMask

Figure 1 shows an example where we automatically created a pulse-shaped mask using an input signal standard. You can easily specify horizontal and vertical tolerance bands in either divisions or absolute volts and seconds. We set up the mask test to run continuously in order to accumulate valid pass/fail statistics. In this example, we quickly detected an infrequent glitch. After running the test for just a few seconds, the mask test statistics showed that the scope performed the pass/fail mask test on more than 1,000,000 waveforms and detected 39 errors for a computed error rate of 0.0036%. In addition, we can see that this particular signal has a sigma quality relative to the mask tolerance of approximately 5.4 σ.

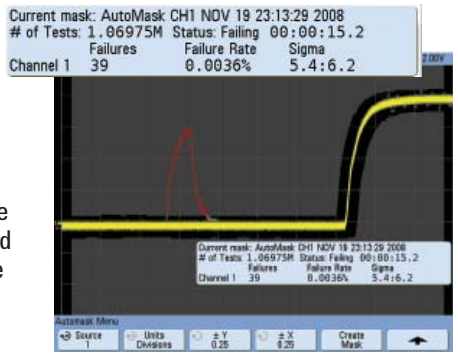

Figure 1: Mask testing uncovers an infrequent signal anomaly.

Importing an industry-standard mask

Figure 2 shows an example of an eye-diagram mask test. This particular 8-bit multi-polygon mask is based on a published standard and was created on a PC using a simple text editor. We then imported the mask and setup parameters into the scope via a USB memory stick. We set up the test criteria to "stop-on-error". In this measurement example, the first violation of the mask occurred after testing more than 44,000 waveforms (350,000 bits tested).

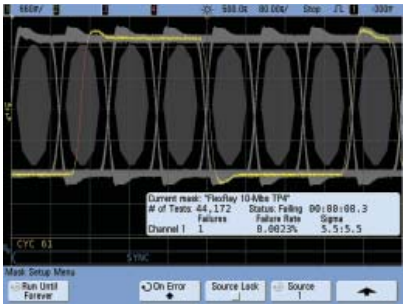

Figure 2: Testing an eye-diagram with an imported industry-standard mask.

Multiple test criteria

When setting up your specific mask test criteria, you can choose from multiple options including:

- Run forever (with accumulated pass/fail statistics)
- Run until a specified number of tests
- Run until a specified time duration
- Run until a maximum ideal sigma standard
- Stop-on-failure
- Save-on-failure
- Print-on-failure
- Trigger out-on-failure or on-pass

Six Sigma mask testing

Agilent InfiniiVision Series scopes are the first in the industry that can report mask test pass/fail statistics in sigma quality. InfiniiVision's fast acquisition and waveform mask test rate of up to 270,000 waveforms/sec makes this possible and for the first time, practical. If waveform failures follow a random/Gaussian failure distribution, Six Sigma quality represents approximately three failures/defects or fewer out of a test sample of 1,000,000. InfiniiVision Series scopes can test up to a Six Sigma standard in as little as 1.1 seconds. To learn more about waveform mask testing to Six Sigma quality standards, refer to the application note," Evaluating Oscilloscope Mask Testing for Six Sigma Quality Standards" listed at the end of this document.

Performance Characteristics

Mask test source	Analog channels 1, 2, 3, or 4
Maximum test rate	5000, 6000, 7000 Series: Up to 100,000 waveforms tested per second 3000 X-Series: Up to 270,000 waveforms tested per second 2000 X-Series: Up to 50,000 waveforms tested per second
Acquisition modes	Real-time sampling–non-averaged, Real-time sampling–averaged
Mask creation	
Automask-divisions	+/- X divisions, +/- Y divisions
Automask-absolute	+/- X seconds, +/- Y volts
Mask file import	Up to 8 failure regions (created in text editor)
Mask scaling	Source lock on (mask automatically re-scales with scope settings) Source lock off (mask scaling fixed relative to display when loaded or created)
Test criteria	Run until forever, Minimum number of tests, Minimum time, Minimum sigma,
Action on error	Stop acquisitions, save image, print, perform measurements
Trigger output	On error, On pass
Statistics display	Number of tests, Number of failures (for each channel tested), Failure rate (for each channel tested), Test time (hours – minutes – seconds), Sigma (actual versus maximum without failures)
Display formats	Mask – translucent gray, Failing waveform segments – red, Passing waveform segments – channel color
Save/recall	4 non-volatile internal registers (.msk format), USB memory stick (.msk format)

Ordering Information

The mask/waveform limit test option is compatible with all Agilent InfiniiVision Series oscilloscopes.

InfiniiVision model	Mask test options
2000 X-Series	DSOXMASK
3000 X-Series	DSOXMASK
5000,60000, and 7000 Series	N5455A

Related Agilent literature

Publication Title	Publication Type	Publication Number
Agilent 7000B Series InfiniiVision Oscilloscopes	Data sheet	5990-4769EN
Agilent 3000 X-Series InfiniiVision Oscilloscopes	Data sheet	5990-6619EN
Agilent 2000 X-Series InfiniiVision Oscilloscopess	Data sheet	5990-6618EN
Agilent InfiniiVision Series Oscilloscope Probes and Accessories	Data sheet	5968-8153EN
Evaluating Oscilloscope Mask Testing for Six Sigma Quality Standards	Application note	5990-3200EN
Evaluating Oscilloscopes for Best Waveform Update Rates	Application note	5989-7885EN
FlexRay Physical Layer Eye-diagram Mask Testing	Application note	5990-4923EN

To download these documents, insert the publication number in the URL:
http://cp.literature.agilent.com/litweb/pdf/xxxx-xxxxEN.pdf

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