Agilent
Signal Reception and A/V Functionalities Test in TV Manufacturing

Application Note

Agilent Technologies

Introduction

The first stage of tv manufacturing testing is to test the TV's connectivity with the external signal sources. The connectivity tests measures TV's ability to tune to radio frequency (RF), TV signal inputting from the RF coaxial input (ANT IN), and direct video and audio inputs from multiple connection interfaces. Each of the connections must be tested before moving on to the next stage.

Figure 1 shows the typical types of connectors on a TV panel, such as HDMI, component video, S-Video input, and multiple pairs of composite audio/video input and outputs.

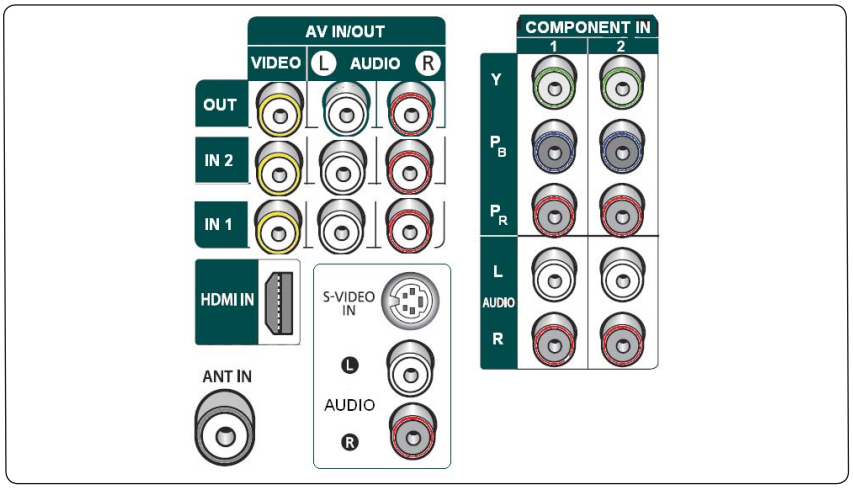

Figure 1. Typical types of TV connectors

Audio/Video Test

Figure 2 shows the setup for audio/video (AV) testing. This test verifies that the analog composite video (CVBS) input/output connections, component video input connection, S-video input connection, HDMI, and all the corresponding stereo audio input or output are working properly.

The tests are straightforward. Video test signals are input to video input interfaces and the output on the TV display is visually checked for any picture disturbance. The composite video OUT condition is tested by routing the input test signal to an external test monitor. The test monitor must display picture as with quality as good as the TV under test. Similarly, audio signals are send to the audio inputs and the audio output is checked with an oscilloscope and by operator's judgment on the speaker sound quality.

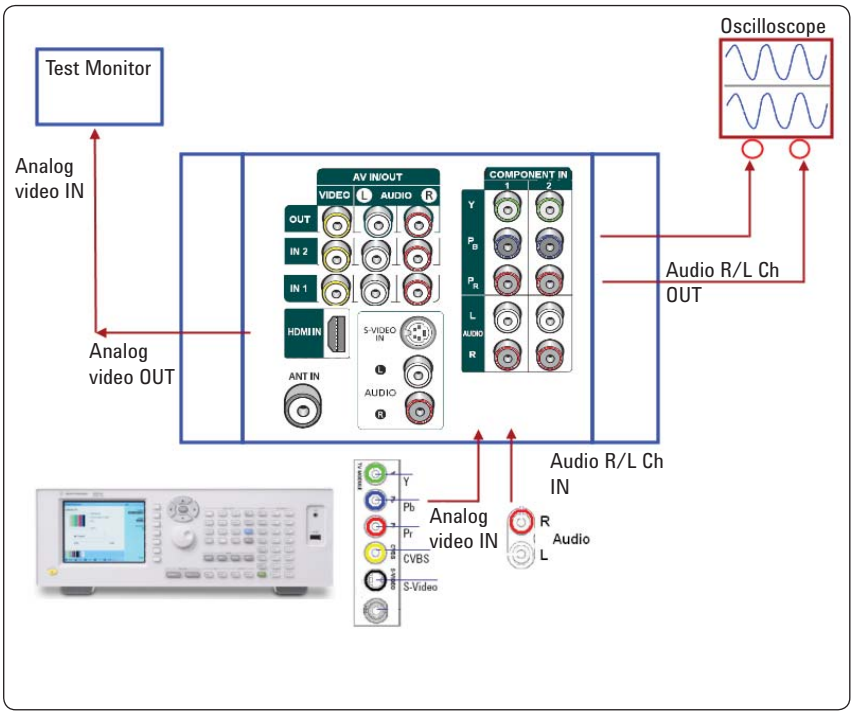

Figure 2. The diagram for AV test setup

Video Test

The Agilent U8101A display tester (Figure 3) with configurable plug-in cards offers multiple video signal types and connections in a single instrument. Four out of five available plug-in card slots can be configured for analog TV card, analog RGB card, digital visual interface (DVI) card, and high-definition multimedia interface (HDMI) card. The analog TV card provides all commonly used analog video signal interfaces: CVBS, Components video and S-Video while the HDMI and DVI cards provide digital video signals.

Test video patterns generated from individual cards are fed into appropriate video input connections of the TV under test.

With the various test signal inputs from the displayer tester, the test operator can select each of the TV video input in turn. The quality of the displayed picture will be visually checked to ensure there is no defect. Display defects such as flickering, snowing, must not be present.

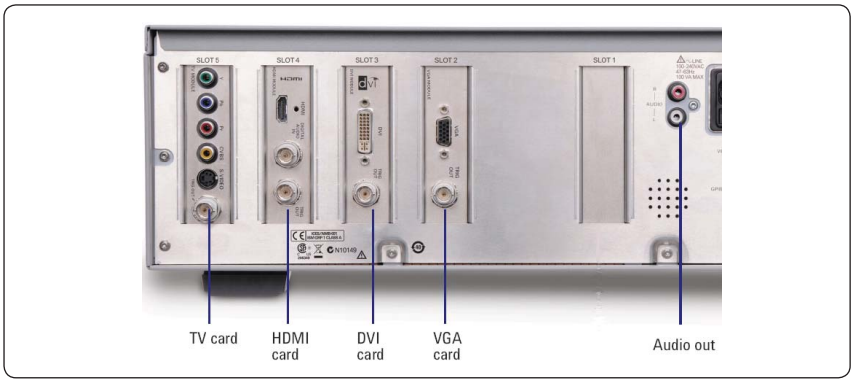

Figure 3. U8101A display tester with configurable plug-in cards

Audio Test

In addition to video output, the U8101A display tester is equipped with two-channel audio output providing sine wave of 20 Hz to 20 kHz with amplitude up to 2 Vp-p.

Audio input into the TV under test is typically set to 1 kHz and 10 kHz. Two channel audio outputs (left and right) from the TV are fed into two channels of an oscilloscope for measurement. The measurement parameters of interest are audio amplitude and phase relationship between the two channels, as shown in Figure 4. Both channels must be in the same phase.

Agilent DSO3000 Series two-channel oscilloscopes offer large color screen displays with built-in measurement functions at affordable prices that are well-suited to the application. The mask test (Figure 5 on the following page), feature of the scopes allows you to define test limits and automatically produce test result of pass or fail. This feature helps to eliminate operator error in judging the test result.

Another type of audio test performed on TV speaker is to sweep tones across ranges of frequencies and listen to the speaker for any torn sound.

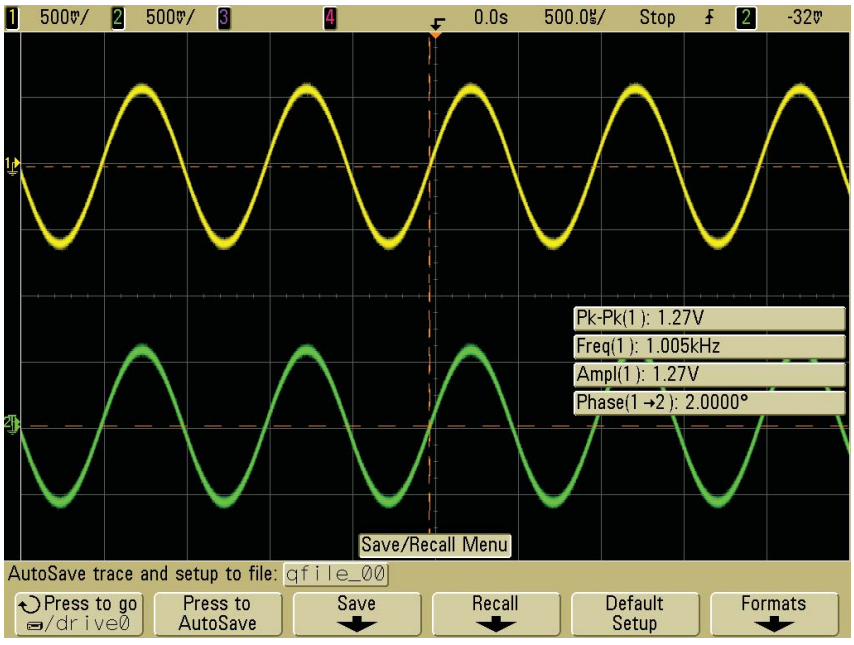

Figure 4. Oscilloscope with built in Vp-p and phase relationship measurement

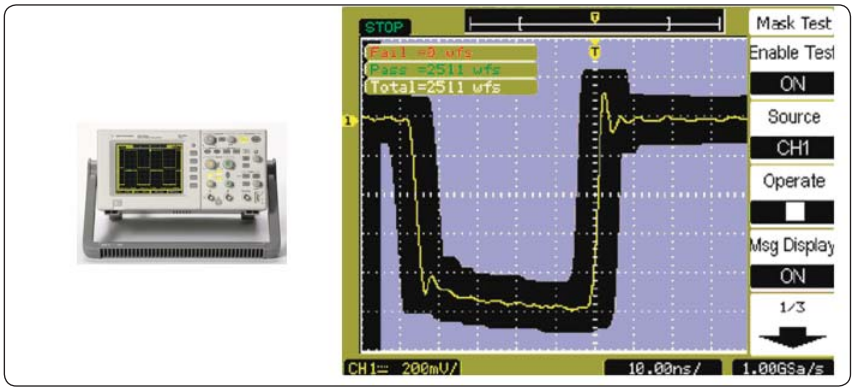

Figure 5. The DSO3000 Series two-channel oscilloscopes with mask test feature that automatically compares incoming signals with predefined mask (limits) and indicates fail or pass

Antenna RF Input Test

This test verifies the functionality of a TV with a TV's tuner in tuning to different channels and its reception capability. Together with an external modulator, the U8101A display tester can be configured to provide multiple analog TV standard signals to coaxial RF input of the TV.

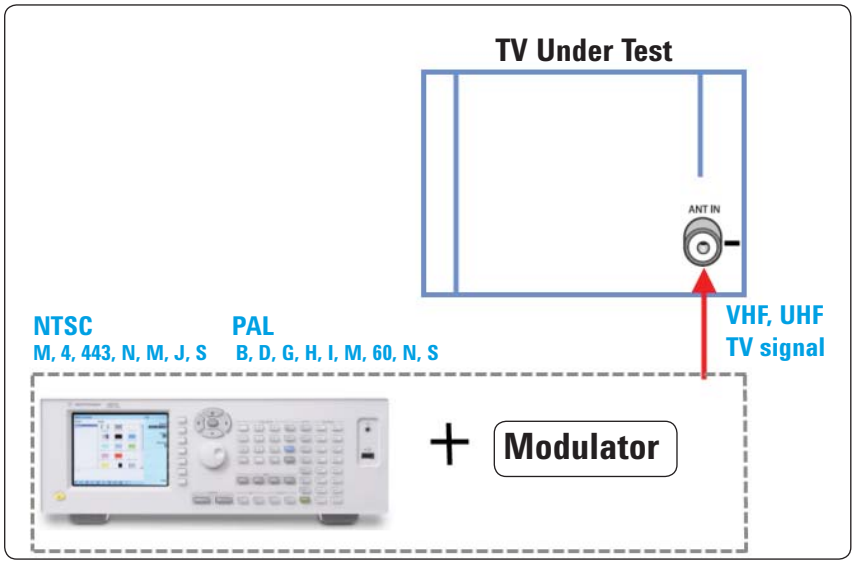

Figure 6. Antenna RF input test setup

Summary

AV testing on modern cathode ray tube (CRT) or liquid crystal display (LCD) TVs involves checking a broad range of analog and digital video and audio connections. The Agilent U8101A display tester provides more options and flexible ways to supply the broad range of video connections in a single instrument. Two-channel audio outputs of the display tester provide necessary tones for TV speakers and audio line-out checking. In addition, mask testing with the Agilent DSO3000 Series also eases production audio line-out checking by providing an automatic test limit.

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