Camera, display and multimedia testing on automotive in-vehicle infotainment (IVI) systems

Automotive **I**nfotainment **T**esting

Current trend

Modern day cars are designed not only to look sleek and stylish, but also to be safe and comfortable. The safety features are intended for people both inside and outside of the car. Today's automobiles are equipped with a ton of sensors for driver assistance. An upward trend in the car industry is the use of an increasing number of cameras in the car for safety purposes.

Feeding the driver with more information about the surroundings is essential when backing up and pulling out of tight parking positions. Parking assistance cameras or rear view cameras are now mandatory in all new cars in the U.S. and Canada. They not only ensure safety, they also provide extra convenience when the parking pilot is activated.

Many of the newer models also optionally offer a 360° bird's eye panoramic view of the car. This is achieved with four cameras: 180° cameras are installed on the two side mirrors, and two other wide view cameras are mounted at the front and rear of the car. All these cameras and other additional entertainment modules are fed into the multimedia interface and the results are displayed on the infotainment screen.

Another noticeable trend in the industry is the digitization of the dashboard display. The traditional analog gauge-based displays for the speedometer and other instrumentation are being replaced by an electronic instrument cluster, a.k.a. the digital dashboard.

Challenges

Infotainment head units are now running an increasing number of video-intensive applications. The manufacturers of such devices as well as OEMs need to make sure they perform properly.

The test approach can be categorized as follows:
ı Camera testing
ı Display testing
ı Multimedia interface testing

Camera testing requirements
ı Support of various resolutions up to 4k
ı Testing of analog and digital physical interfaces
ı Color reproduction, sharpness
ı Linearity, noise, response, etc.

Display testing reqirements
ı Car dashboard and infotainment system
ı Rear seat entertainment display
ı Standard and user-defined screen resolution
ı Test disciplines (contrast, gamma, gamut, viewing angle)

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Multimedia interface testing requirements

❙ Ensuring interoperability
❙ Implementation in accordance with technology specification
  ▪ Video format support
  ▪ Audio format support
  ▪ Video quality testing
  ▪ Interface protocol compliance

Rohde & Schwarz solution

The R&S®VTE video tester is a test and measurement instrument that can generate and analyze digital video and audio signals. This makes the R&S®VTE a key piece of equipment for tackling in-vehicle interface, display and camera testing challenges.
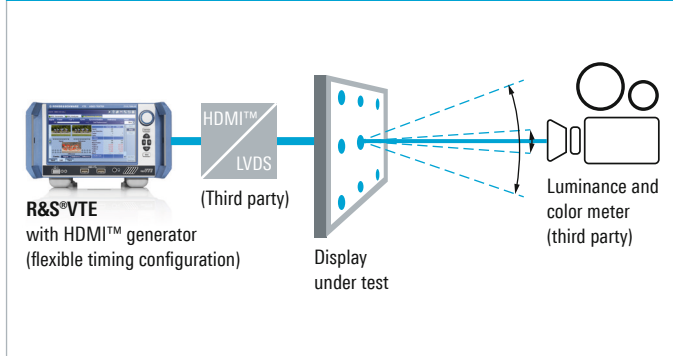
The R&S®VTE supports the following tests for camera video analysis:
❙ Measurement of timing/level on digital or analog component/composite signals
❙ Chrominance measurements to determine color
❙ Automated measurements for: timing, level, linear and non-linear distortions, noise and jitter
❙ Hot plug detection (HPD) feature

For display testing, the R&S®VTE offers:
❙ Static pattern generation
❙ Extensive signal pattern library that includes pluge, noise, colors, multiburst, 3D crosstalk, 3D contrast and SMPTE
❙ All CEA-861F (VIC1 TO VIC107) and VESA video formats up to 4k resolution
❙ Generation of nonstandard signals for
  ▪ Timing adjustment
  ▪ InfoFrame adaptation (also supporting HDR meta data signaling)
❙ Uncompressed moving picture playout

Display testing with the R&S®VTE video tester

R&S®VTE
with HDMI™ generator
(flexible timing configuration)

Display under test

Luminance and color meter (third party)

A/V distortion analysis on the R&S®VTE can be used with all common A/V interfaces and associated signal formats and screen resolutions. The input standards that can be tested include:
❙ HDMI™ version 1.4 and 2.0 (6G), resolution up to 4k (4096 × 2160 pixel), 8 × audio (PCM up to 48 kHz)
❙ HDCP 2.2
❙ Analog A/V: composite (PAL, NTSC)
❙ User-defined video formats

Other digital interfaces such as LVDS and DisplayPort can be accommodated using external signal converters that support HDMI™. This makes it possible to analyze the LVDS output, for example.

See also

www.rohde-schwarz.com/product/VTE

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R&S®VTE video tester.

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