MAXEYE TECHNOLOGIES

In-Vehicle Infotainment Test Solution

AST-1000

## All-in-One RF Signal Source for Infotainment

The only RF solution designed for Radio, Navigation, Video and Connectivity testing!

Automotive Infotainment System

Automotive infotainment system is growing rapidly because of the advancement in technology. More and more new technologies and devices are integrated into the system. Connected automotive infotainment is becoming a must have feature for car manufacturers.

One of the major challenges in the infotainment system testing is the ever-growing number of standards and protocols that are in place for audio and video broadcast, navigational standards and cellular standards. This involves being able to validate the device under test's capability with each standard individually, forcing the test platform to be flexible enough to do so.
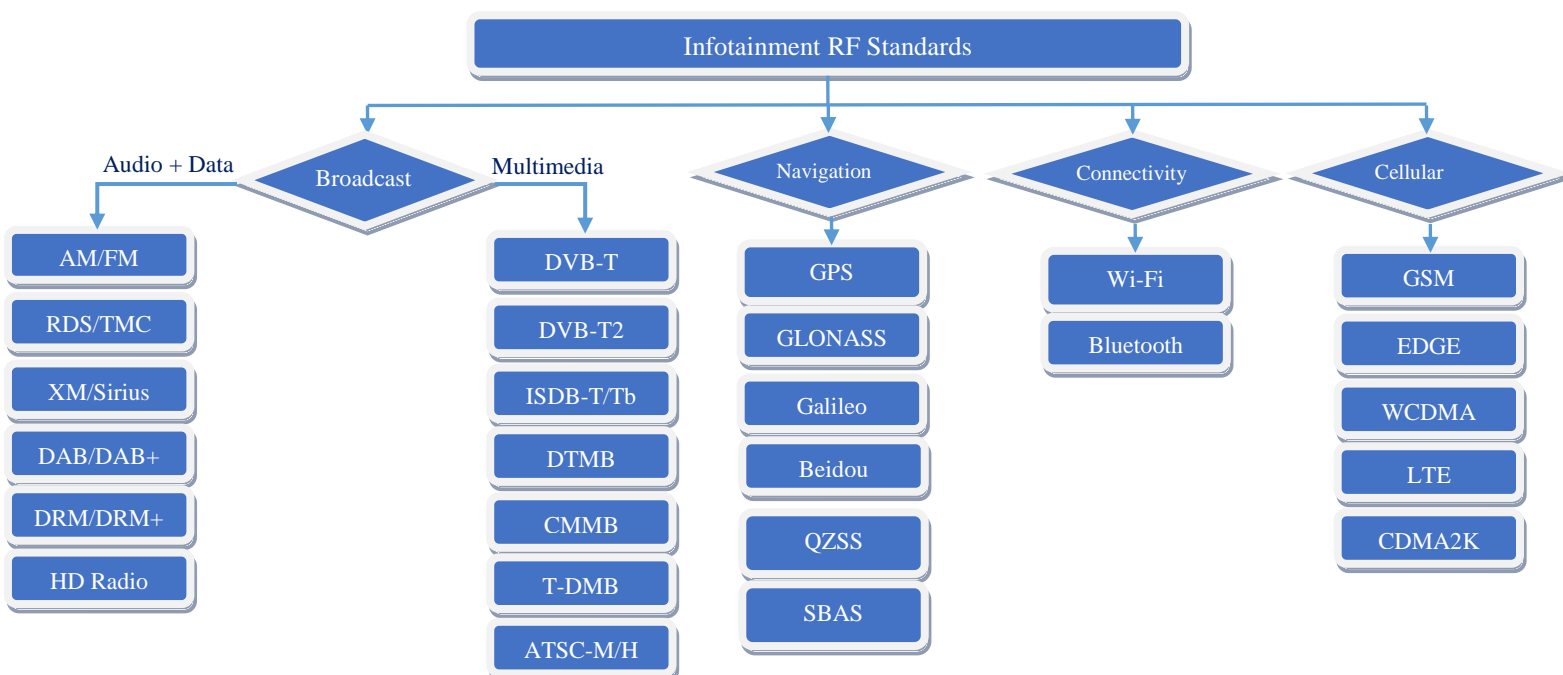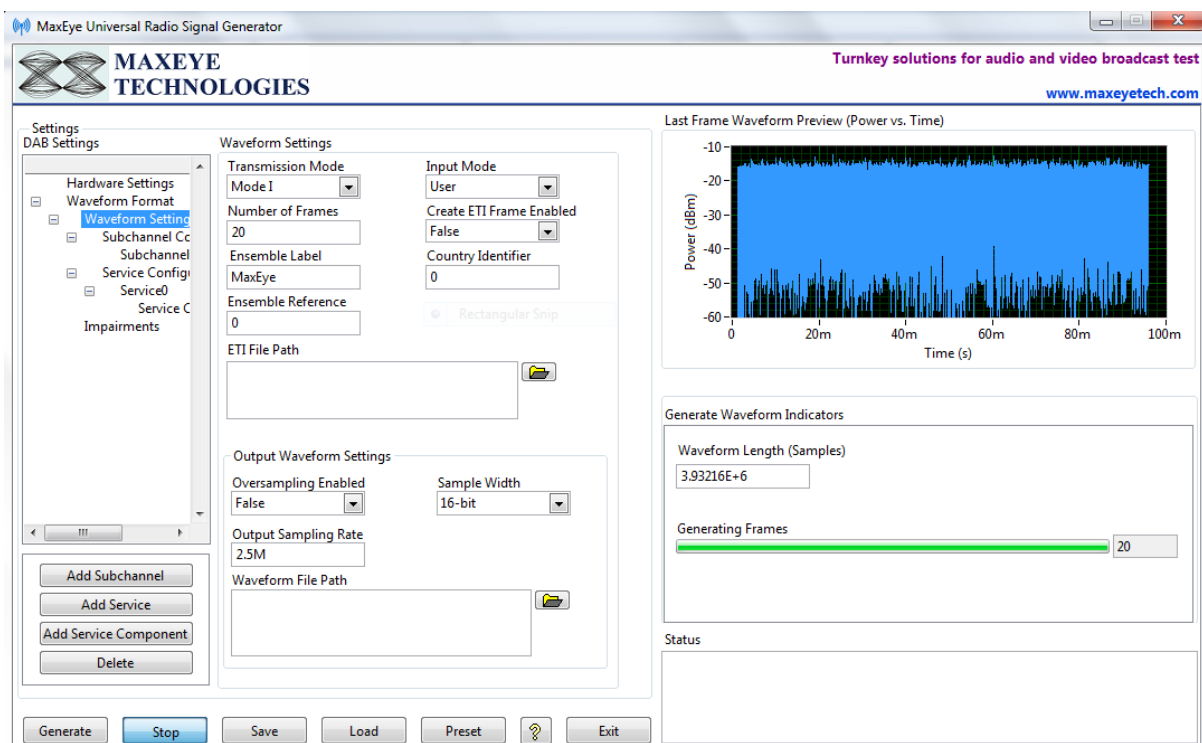

Most of the infotainment tests are functional tests which require multiple carriers to be generated to validate the functionality of the infotainment RF tuner. For example to validate the channel search functionality, the test system should be capable of generating multiple carriers. Traditional instruments are capable of generating only one standard and only one carrier can be generated at a time and do not have the flexibility to adapt to the newer standards.

In-Vehicle Infotainment Test Solution

MaxEye In-Vehicle Infotainment test solution is powered by National Instruments PXI Platform, Universal Radio Signal Generation Software and LabVIEW Add-on toolkits. NI PXI platform combined with powerful software toolkits and APIs enable engineers to perform complicated tests on the many different I/O types at the same time using one chassis.

The National Instruments PXI platform is ideal because of the modular hardware platform that can be reconfigured with key software tools. For example, the same vector signal generator from National Instruments can be used to simulate GPS signals and can then be re-programmed to broadcast and simulate digital video broadcast, or DAB.

IVI Test Requirements and MaxEye Test Solution

Sl.no	Module	Test Requirement	Test Solution	
			Hardware	Software
1	Analog Radio (AM/FM/RDS/TMC)	Multi carrier Signal Generation with different Standard Formats	AST-1000/NI PXIe 5672/ 5840	MaxEye AM/FM/RDS/TMC Signal generation toolkit
2	Digital Audio Broadcasting (DAB/DAB+/DRM/DRM+/HD Radio/XM/ SIRIUS)	Multi carrier Signal Generation with different Standard Formats	AST-1000/NI PXIe 5672/ 5673E/ 5840/ 5644R/5645R/ 5646R	MaxEye DAB/DAB+/DMB Signal generation toolkit MaxEye DRM/DRM+ Signal generation toolkit
3	Digital Video Broadcasting (DVB-T/DVB-T2/DMB/DTMB/ CMMB/ ATSC/ISDB-T/Tb)	Multi carrier Signal Generation with different Standard Formats	AST-1000/NI PXIe 5672/ 5673E/ 5840/ 5644R/5645R/ 5646R	MaxEye DVB Signal generation toolkits (All standards supported, separate toolkit for each standard)
4	In-Car Wireless Connectivity (WLAN/ Bluetooth)	RF Signal Generation with different Standard Formats	AST-1000/Android Phone	MaxEye Bluetooth Test Automation Software MaxEye WLAN Test Automation Software
5	Navigation Systems (GPS / GLONASS/Galileo/ Beidou/QZSS)	RF Signal Generation with Single and Multiple Satellite Simulation	AST-1000/ 5644R/ 5645R/ 5646R	GNSS Signal Generation Software
6	Mobile Radio Communication (GSM/GPRS/WCDMA/CDMA2K/ LTE)	RF Signal Generation with different Standard Formats	AST-1000/NI PXIe 5672/ 5673E/ 5840/ 5644R/5645R/ 5646R	NI GSM/EDGE Measurement Suite NI WCDMA Measurement Suite NI LTE Measurement Suite
7	Audio	Audio Signal Generation Audio Quality Tests	NI PXIe 4463 NI PXIe 4464	MaxEye Audio Quality Analysis Toolkit
8	Video (HDMI/DVI/LVDS/MOST)	Video Quality Tests	NI PXIe 1491 PXIe-6161	NI Vision Development Module
9	Automotive Protocols (CAN/LIN/FlexRay)	Simulation and Testing of the interfaces	NI PXI 8513/2 NI PXI 8516/2 NI PXI 8517/2	NI X-NET Driver Software

RF Tuner Test

With the traditional approach to automotive infotainment RF tuner testing the test engineers need multiple instruments to generate different broadcast and navigational standards. The universal radio signal generator platform based on NI PXI hardware and software toolkits powered by LabVIEW enables testing all the functional and performance tests using single PXI hardware.


FM   GPS

Traffic Message Alert in Navigation Map

Navigations Standards Test

Key Features

- Accurate GNSS simulator with an easy to use Graphical User Interface

- Versatile, Scalable and Simple: the right GNSS instrument choice from R&D to Production

- Support for Multi-Constellation and Multi-Frequency Bands

- Real time generation of up to 72 satellites using 2 RF channels and 36 satellites using single RF channel

- Satellite based augmentation system supported (EGNOS, WAAS)

- Real-Time Scenario Simulation: Static, Dynamic Trajectory, NMEA and KML file

- Atmospheric Modelling: Ionosphere and Troposphere influences. Multiple models available (IONEX Grid, MOPS, Klobuchar)

- Real-time satellite power level and on/off control

Constellation band		1	2	3	4
GPS		L1 C/A	L2C	L5	
GLONASS		G1	G2		
Galileo		E1		E5a/E5b	E6
Beidou		B1		B2	
SBAS		SBAS			

Basic offer
Extension

Can bus data acquisition

GNSS signals

GNSS Simulation

Fields Tests & Simulations
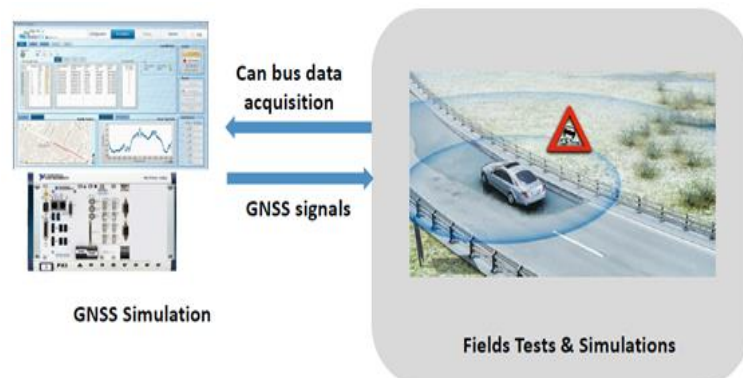
Audio and Video Test

The introduction of new digital audio and video technologies—such as surround sound, encryption schemes, Full HD video has made multimedia test applications increasingly more complex. MaxEye Technologies audio and video test solution is built using various PXI modules such as Dynamic Signal Analyzer (DSA), Dynamic Signal Generator (DSG), HDMI and LVDS analyzer.
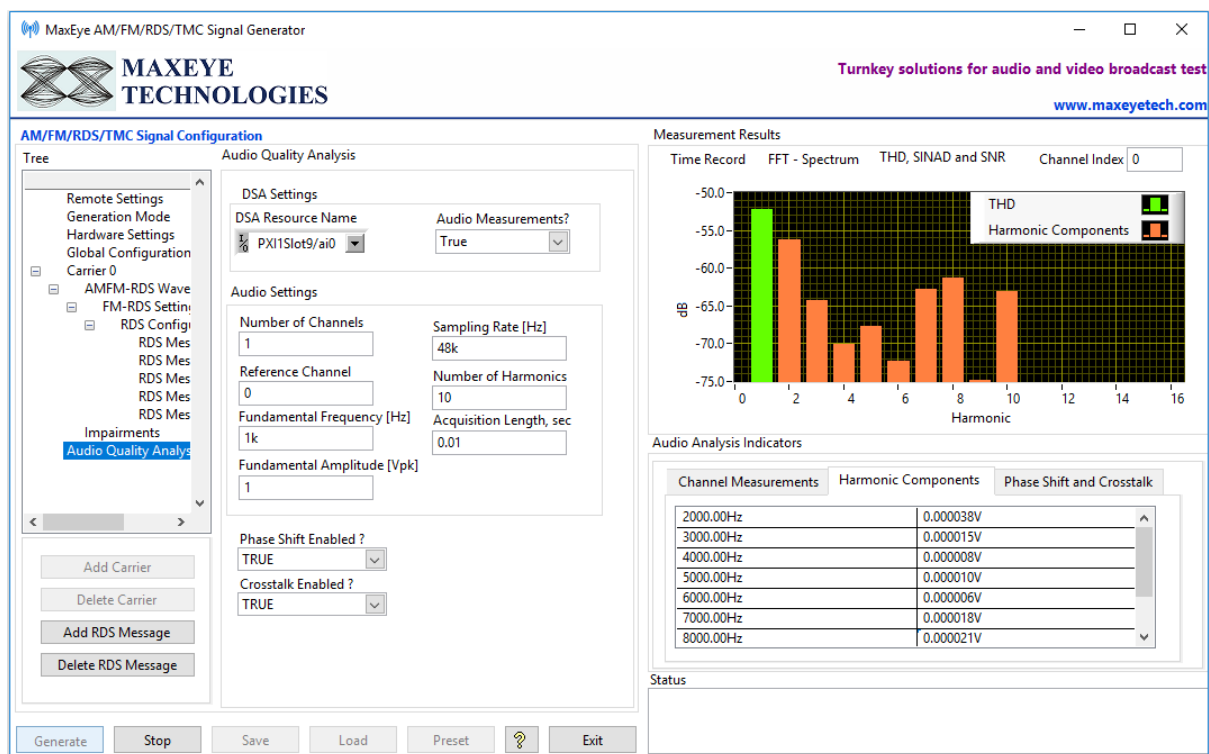
Automotive Protocols Test

The NI-XNET driver software is a combination of accelerated Controller Area Network (CAN), Local Interconnect Network (LIN), and FlexRay interfaces; an optimized driver; easy-to-use APIs; and configuration and debug utilities. With NI-XNET interfaces, you can develop applications for prototyping, simulating, and testing CAN, LIN, and FlexRay networks faster and more easily in NI LabVIEW.
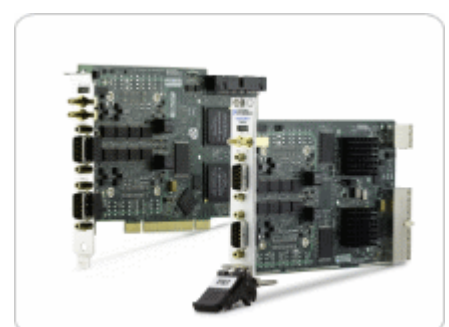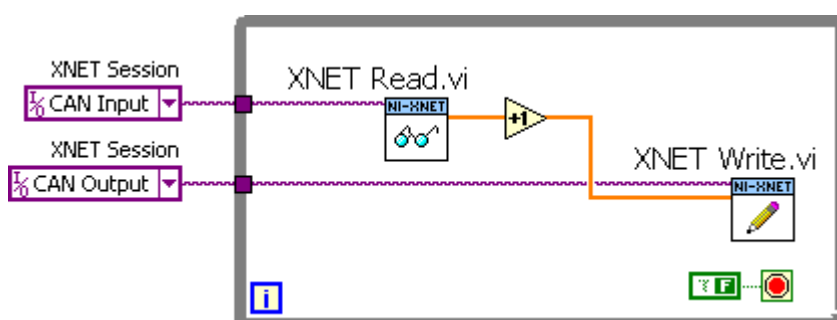
HMI Test

The complexity of infotainment HMI software is growing with functionalities and complexity of infotainment systems very strongly . A user interface giving a faultless experience is one of the most important requirements of today's infotainment systems. Traditionaly HMI tests are done manually and it takes significant time during design validation and production.

Our infotainment HMI testing is customized and the complete testing is automated using NI LabVIEW and TestStand software platform.

Advantages of our solution

Traditional Instruments	NI PXI Platform (Software Defined Instrumentation)
Multiple Instruments – separate instrument for each test	All-in-one Infotainment Test solution using Single PXI Instrument
Hardware upgrade – Requires new instrument for every new feature	Same PXI instrument can be upgraded with new PXI modules
Complex Test software architecture required to handle multiple instruments	Relatively simple test software architecture, all the modules are connected to the PXI controller through PXI backplane.
Complicated test setup because of cable connections and switching the connections during test automation requires external switches	Simple test setup
Supports generation of only one carrier at a time this limits the number of test cases that can be executed. Requires additional hardware for each carrier.	Single hardware capable of generating multiple carriers enables tests like TMC, Traffic announcement, channel search, up/down, channel selection, Alternate Frequency tests, HMI tests etc.,
Requires technical support and calibration services from multiple vendors	MaxEye will be the single point of contact for all hardware and software support and services
Difficult to replicate the test setup for multiple locations	Simple test setup and easy to replicate in multiple locations
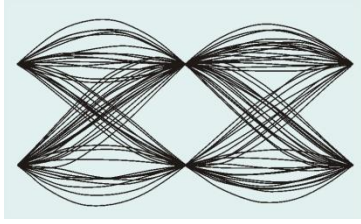
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About MaxEye Technologies

MAXEYE Technologies founded in 2011, is a privately held company based in Bengaluru and Chennai, India, Silver Alliance Partner of National Instruments. We are a Test and Measurement company, specialized in providing turnkey solutions, products and consulting services. We have strong expertise in providing Test and Measurement solutions for Automotive Infotainment, ADAS and IOT devices testing and ATE Development.

The name "MaxEye" comes from Communication Engineering. Our logo symbolizes the Eye Diagram. The Eye Diagram is a Signal display pattern in which the digital signal in the receiver is repetitively sampled. The pattern appears like a series of eyes between two parallel rails. This pattern is usually used to diagnose the timing synchronization in a digital receiver. An open eye pattern corresponds to minimal signal distortion or in other words can conclude a near perfect time synchronization. A clear open eye pattern is also called "MaxEye".

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