Measurement, Debug and Analysis for Embedded Automotive Designs

Tektronix®

Embedded Systems

Improving Automotive Ecology, Safety, and Comfort

Intelligent embedded systems are the new driving force in today's automotive designs. The latest safety and efficiency technologies are made possible by the incorporation of an extensive variety of complex embedded devices that make thousands of decisions per second. Whether you're designing a system to simply adjust a mirror, or one to monitor and control a parallel hybrid power system, embedded systems technologies play a role.

The use of embedded devices and the need to communicate vital information throughout the vehicle has increased the complexity of vehicle designs and the test processes needed to debug and verify these designs.

Tektronix test and measurement instruments and software for automotive designs enable you to keep pace with new technologies and standards.

By providing comprehensive views and advanced analysis capability for various power, control and communication systems within a vehicle, Tektronix solutions can reduce your development time by increasing productivity.

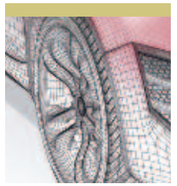
Oscilloscopes, specialty probes, expert power measurement software, logic analyzers, signal generators, and real-time spectrum analyzers are among the variety of tools that help put new automotive products on the road sooner.

Pervasive Automotive Electronics

Enabled By Embedded Systems Technologies

Digital Analysis

Using Electronic Control Units (ECUs) to control both essential and non-essential automobile systems is becoming the new industry standard. Based on digital technology, these ECUs require a deeper understanding of complex timing and signal integrity issues.



Digital RF

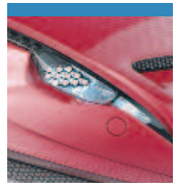
The use of TPMS and RFID systems within an automobile for safety and security systems has created the need to develop and measure real-time RF systems that can efficiently monitor vehicle operation and status.

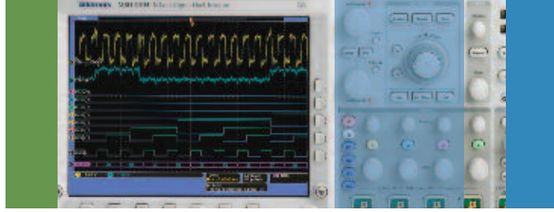
Power System

With the need for more energy efficient automobiles, power systems have become more complex. Hybrid and clean burning diesel technologies require advanced electronic control systems to ensure safe and environmentally responsible operation.

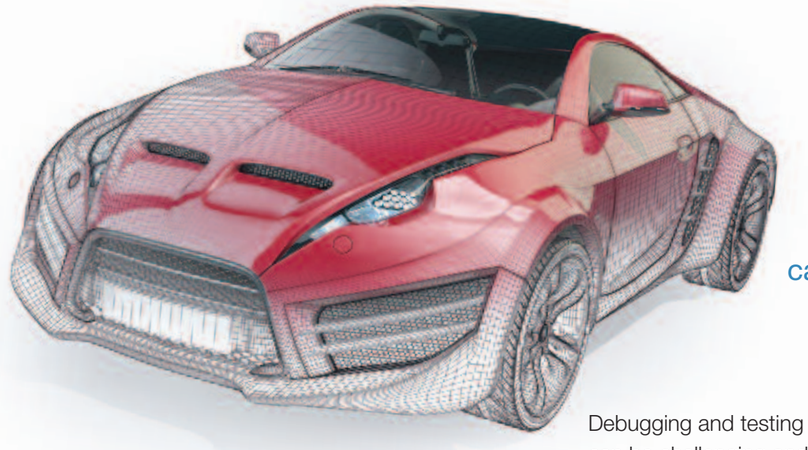
Automotive Network

The increasing use of LANs has added new design challenges as various serial data technologies and applications such as CAN, LIN, MOST, and FlexRay are integrated into automotive designs.





Automotive Network



infotainment
drive assistant systems
car-to-car communications
suspension control
x-by-wire control

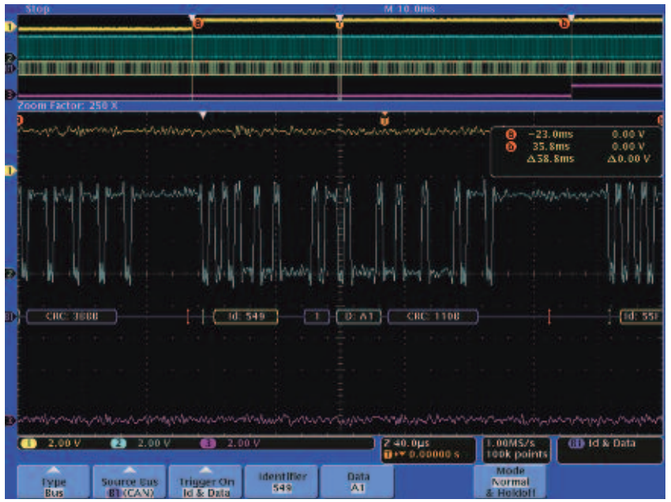
Distributed control and safety systems in today's modern vehicles are made possible by the use of multiple bus systems. These integrated bus systems must interact with the environment and communicate vital information throughout the entire vehicle.

The latest automotive designs utilize several different technologies and protocols, such as CAN, LIN, MOST, and FlexRay, which must coexist within the network.

Debugging and testing this type of network topology can be challenging and time consuming. You need tools that can quickly and easily decode the various network protocols and time correlate network communication data with external events triggered by sensors or transducers.

Tektronix instruments are used as the primary test device for analyzing automotive distributed networks. These tools can automatically decode standard automotive buses and provide protocol level views of data sequences. Mixed Signal Oscilloscopes and logic analyzers also provide innovative trouble-shooting capabilities and comprehensive support for monitoring, triggering, and decoding small parallel buses. Tektronix instruments ensure measurement confidence and support your need to more efficiently debug and test automotive designs.

Automatically decode serial bus information in correlation to the live signal in an easy to read format



Capture long record lengths and analyze specific bus events in an event table listing

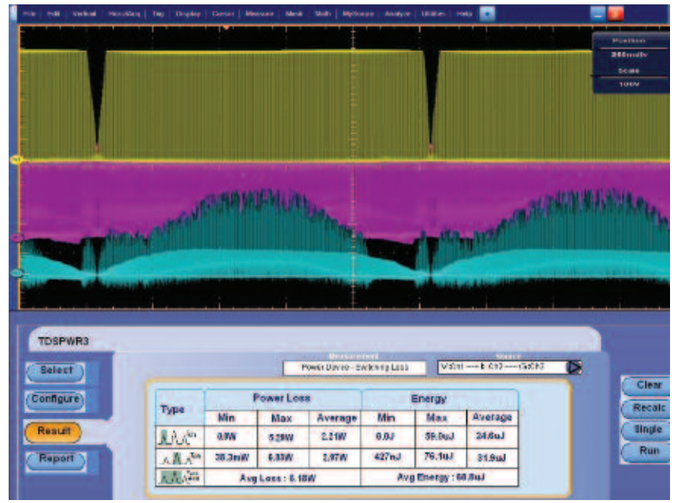
Power System

hybrid motor
electronic power steering
LED headlight lamps

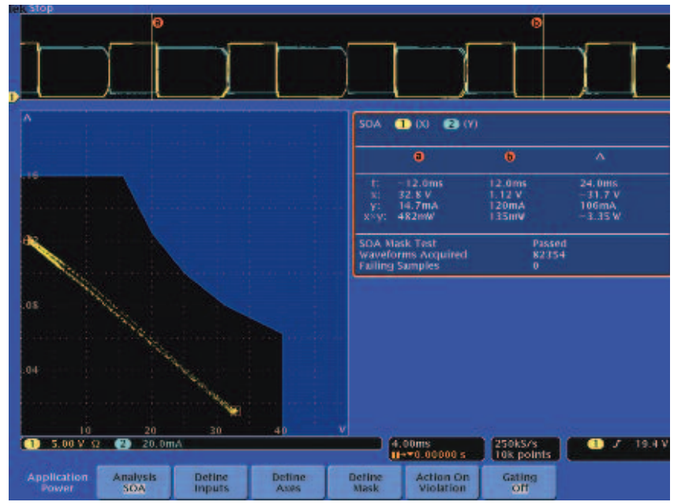
Hybrid vehicle development, more efficient power trains, and technologies like Electric Power Steering (EPS) have created the need for comprehensive test tools that can quickly and easily test the power systems within an automobile.

Power efficiency in electronic switching and magnetic devices, safe operating limits and system responses to changing loads and RF transients are just a few of the key measurements surrounding today's automotive designs.

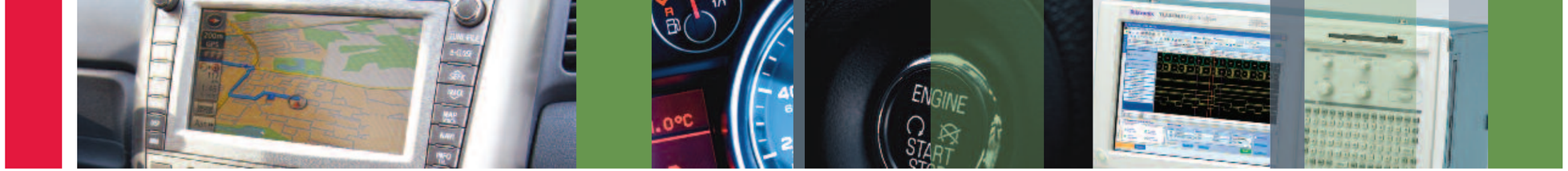
The Tektronix power analysis toolset includes oscilloscopes, high voltage/current probes and power application software that enable automation of standard power measurements, analysis of circuit operation, and generation of reports in industry accepted formats saving time and effort as well as speeding development times.



Measure the min, max and average power loss of your switching devices and magnetic components



The Safe Operating Area (SOA) plot is a graphical technique for evaluating a switching device to ensure that it is not being stressed beyond its maximum specifications



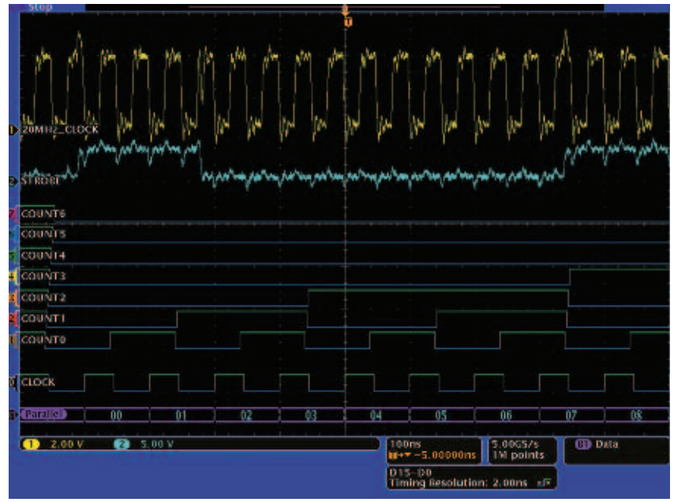
Digital Analysis

electronic control units
entertainment systems
safety systems
head up display

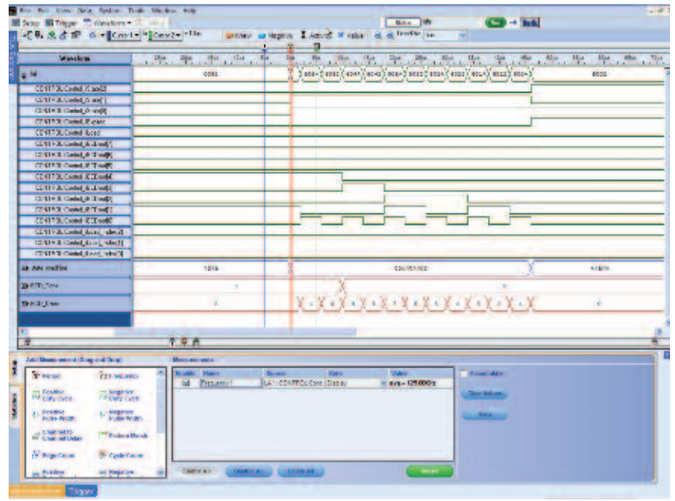
It has been estimated that electronics account for approximately 25 percent of the value of today's automobile. This figure is estimated to rapidly increase to nearly 40 percent in the future. The average new car comes with a variety of Electronic Control Units (ECUs) managing everything from safety and stability to entertainment. These ECUs can include any combination of memory, microprocessors (μP), microcontrollers (μC), and/or digital signal processors (DSP). Effective debug of ECU designs, including FPGA debug, requires a comprehensive toolset that not only provides a way to visualize digital signal operation but also delivers time correlated views of both digital and analog information.

Tektronix solutions can provide digital representations of a large number of signals allowing you to make precise timing measurements, identify signal integrity issues, perform margin testing, as well as monitor and time correlate multiple system buses providing total system visibility.

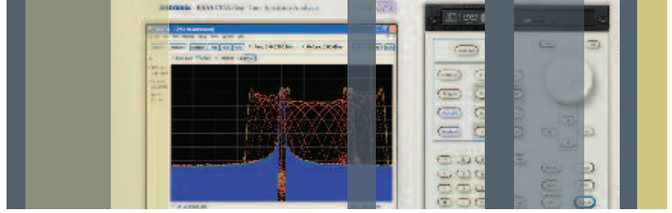
The ability to present a variety of views and different levels of abstractions of both hardware and software information gives you a comprehensive view of system operation, which allows you to quickly interpret testing results.



Visualize digital signal operation with time correlated views of both digital and analog information on a Mixed Signal Oscilloscope



Instantly move probe points without recompiling your design and correlate internal FPGA signal activity to board-level signals



Digital RF

TPMS/RFID/NFC/ short range wireless sensor technologies

bluetooth / wireless standard connectivity

remote keyless entry / security technologies

EMI / noise / interference diagnostics and trouble-shooting

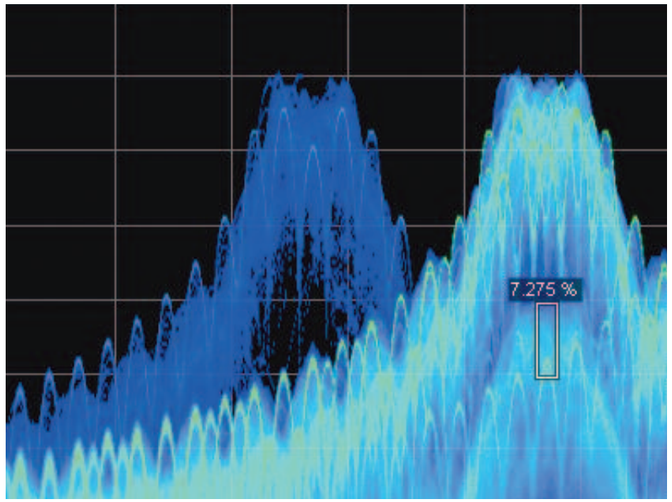
New safety and monitoring system technologies in the automotive design arena have moved towards RF and wireless as the enabling technology.

Tire pressure monitoring, keyless entry, and immobilizer systems are examples of technologies containing RF signals that are often triggered by external events which create profiles that are intermittent in nature; present one moment, absent the next, and variable over time.

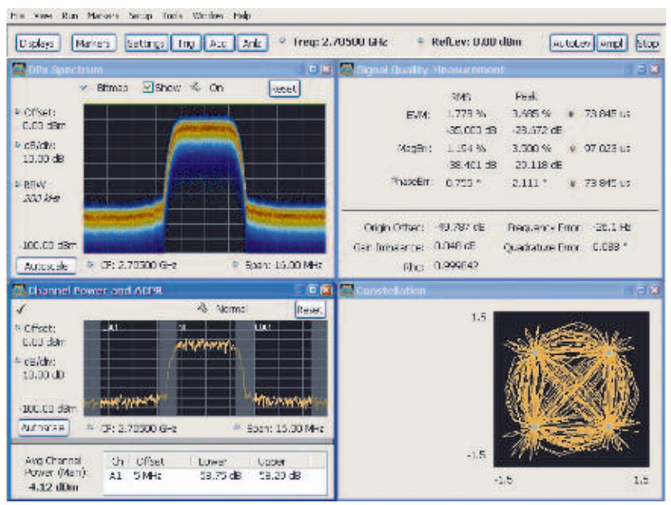
These transient, infrequent signals are difficult to discover and measure using traditional spectrum analysis tools. Tektronix' range of real-time signal analyzers, with DPX® technology, acquire up to 292,000 spectrum measurements per second, compared to 50-100 with a traditional spectrum analyzer. DPX® technology enables fast discovery, triggering, capturing and analysis of time-varying signals in correlated multi-domains (Time, Frequency, Amplitude, Pulse, Modulation, and Phase).

The Tektronix portfolio also offers the latest innovations when dealing with embedded RF designs, with mixed RF, analog and digital technologies. Tektronix designed the world's first Mixed Domain Oscilloscopes (MDO), which includes a dedicated and integrated spectrum analyzer input channel, providing time-correlation of spectrum analysis with 4 channels of analog and 16 channels of digital, making it the ideal mixed-domain trouble-shooting and system verification tool for the automotive industry.

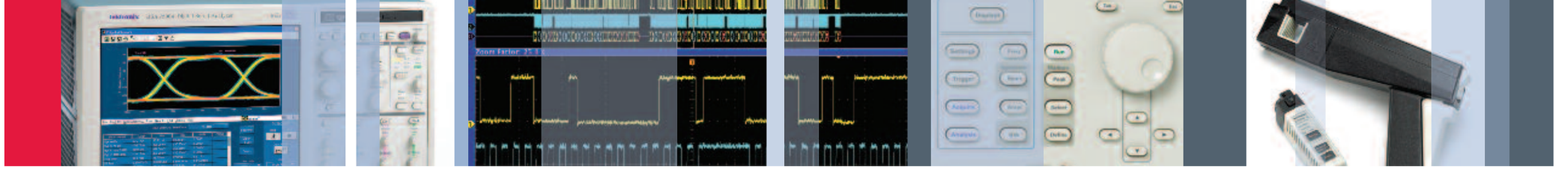
Tektronix signal generators also play an important role in automotive electronics design and debug by providing you with the ability to exercise your designs under “real-world” conditions. Arbitrary waveform and function generators are used to recreate the most complex signals that are a part of today’s complex, mixed signal automotive environment.



Unique DPX® density triggering, enabling triggering on random, infrequent interfering events



DPX® real-time signal analysis, acquiring 292,000 color graded spectrums per second, with multi-domain correlated analysis



Breakthrough Solutions

for the Latest Automotive Designs

A new generation of Tektronix test and measurement instruments and software has been designed to help automotive engineers deal with embedded systems measurement challenges. These breakthrough solutions include the latest digital and Mixed Signal Oscilloscopes, Mixed Domain Oscilloscopes, logic analyzers, signal generators, real-time spectrum analyzers, specialty probes and much more. Taken together, these next generation Tektronix instruments and application software solutions comprise a new, efficient test bench for embedded systems designers.

Oscilloscopes

See the rich and detailed signal information you need to detect errors and speed your work competently and efficiently. Our oscilloscopes offer features to ensure you are getting the product to meet your design and test requirements.

Mixed Domain Oscilloscopes

Capture time-correlated analog, digital and RF signals for a complete system view, helping you to rapidly solve complicated design issues. It delivers the functionality of an oscilloscope and a spectrum analyzer in a single instrument.

Logic Analyzers

Capture and analyze the source of elusive problems that threaten your product development schedules. Our breakthrough digital analysis tools provide the speed and visibility you need with ease of use, featuring the familiar Windows-based desktop and OpenChoice networking and analysis functionality.

Signal Generators

Easily generate real-world signals: analog, digital or mixed signals, ideal or distorted signals. Our signal generators provide superior performance and feature sets that deliver unrivaled usability, functionality and versatility to shorten your development and test cycles.

Real-Time Spectrum Analyzers

Discover the problem the instant the signal changes, trigger on the change, capture the signal seamlessly, and analyze the effects of the changes in a single time-correlated view. Our real-time spectrum analyzers enable you to see frequency and amplitude change over time to help you define issues and solve problems faster.

Probes & Accessories

Ensure your data to your measurement tool is accurate. We offer probing solutions, application specific software, plus a wide range of other accessories for a total solution to your measurement needs.

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Contact List Updated 10 February 2011

For Further Information

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**

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