Tektronix

Automotive Power Switching

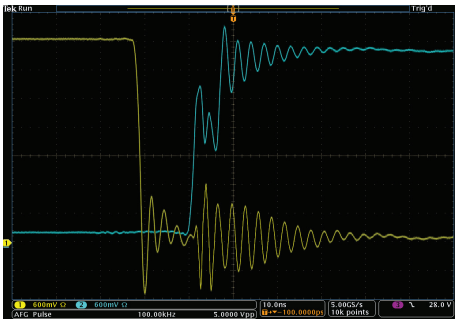
See More, Understand More, Reduce Risk.

Design for Longevity

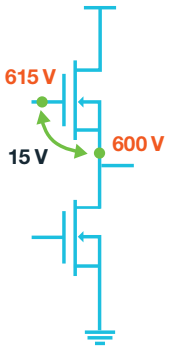
Automotive electronics have demanding operating environments and long product lifecycles – make sure you fully understand performance to reduce the risk of product failure.

When designing and validating systems or circuits involving vehicle power trains (such as regenerative braking, on-board charging, traction motors or inverters), you need to evaluate and understand the performance of AC to DC, DC to DC, or DC to AC converters. Fundamental to the operation of the converter is how the switching system interacts with the associated transformers, inductors and capacitors to be able to provide reliable, efficient power conversion. Failure to identify the effects of ripple and high-frequency noise can cause intermittent system failure.

Block diagram of a switched power system



With 1 GHz of bandwidth IsoVu Probes give you greater insight into switching behavior.



Isolate and measure small voltage differences between two high-voltage points.

Low-voltage ripple or high-frequency harmonics can cause a range of intermittent failure mechanisms in both the sub-system being validated and other systems within the vehicle. Intermittent failures are hard to track down and can delay projects significantly.

When choosing the correct instrument to validate performance, it is important that you consider the instrument's sensitivity. You need to measure low-level ripple and have the bandwidth to see high-frequency distortions such as harmonics. The 6 Series Mixed-Signal Oscilloscope with the new Tektronix TEK061 front-end ASICs provides this capability. With a bandwidth of up to 8 GHz, it has the frequency range to measure multiple harmonics.

Measurements such as efficiency, harmonics and ripple are made easy using the 6 Series MSO Advanced Power Measurement and Analysis software.

Identify the smallest signal with the industry-leading sensitivity of the 6 Series MSO.

Debugging high-voltage switching systems requires isolated probes that can measure small voltage differences across two high-voltage lines. Probes cannot interfere with the circuit's performance when making a measurement. And the probes must have sufficient bandwidth to visualize transient behaviors that will ultimately cause output distortion.

The IsoVu® probe is an isolated measurement system that can measure small differential voltages with 1 GHz of bandwidth. The unique isolation properties of the IsoVu probe ensure a correct measurement can be made, especially with compound semiconductors such as GaN and SiC, with a bandwidth of up to 1 GHz.

IsoVu Probes

5/6 SERIES MSO (OPTIONAL ADVANCED POWER MEASUREMENT AND ANALYSIS SOFTWARE)

Model	Analog Bandwidth	Sample Rate	Record Length	Analog Channels
High-Sensitivity Wide Bandwidth				
MSO64	Up to 8 GHz	25 GS/s	62.5 - 250 Mpoints	4
High Channel Density				
MSO56	350 MHz - 2 GHz	6.25 GS/s	62.5 Mpoints - 125 Mpoints	6
MSO58	350 MHz - 2 GHz	6.25 GS/s	62.5 Mpoints - 125 Mpoints	8
High Sensitivity/High Channel Density				
MSO58LP	1 GHz	6.25 GS/s	125 Mpoints	8

ISOVU PROBES

Model	Bandwidth	Differential Voltage	Common Mode Voltage	Common Mode Rejection Ratio
TIVH02	200 MHz	± 2500 V	≤ 60 kV	DC: > 160 dB 100 MHz: 100 dB 200 MHz: 100 dB
TIVH02L	200 MHz	± 2500 V	≤ 60 kV	DC: > 160 dB 100 MHz: 100 dB 200 MHz: 100 dB
TIVH05	500 MHz	± 2500 V	≤ 60 kV	DC: > 160 dB 100 MHz: 100 dB 500 MHz: 80 dB
TIVH05L	500 MHz	± 2500 V	≤ 60 kV	DC: > 160 dB 100 MHz: 100 dB 500 MHz: 80 dB
TIVH08	800 MHz	± 2500 V	≤ 60 kV	DC: > 160 dB 100 MHz: 100 dB 800 MHz: 75 dB
TIVH08L	800 MHz	± 2500 V	≤ 60 kV	DC: > 160 dB 100 MHz: 100 dB 800 MHz: 75 dB
TIVM1	1 GHz	± 50 V	≤ 60 kV	DC: > 160 dB 100 MHz: 120 dB 1 GHz: 80 dB
TIVM1L	1 GHz	± 50 V	≤ 60 kV	DC: > 160 dB 100 MHz: 120 dB 1 GHz: 80 dB

10/18 SMD 46A-61494-0