

Wireless Charging Bench Testing Complete, Proving Interoperability and Validating SAE TIR J2954™

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WARRENDALE, Pa. ([PRWEB](#)) December 14, 2016 -- [SAE International](#) is working to ensure that electric vehicle wireless power transfer systems from different manufacturers can interoperate seamlessly with each other to prepare for commercialization in 2020. Idaho National Laboratory (INL) and TDK R&D Corporation along with the US Department of Energy, automotive companies and suppliers have completed bench testing to support the SAE Technical Information Report (TIR) J2954™. SAE TIR J2954™ is a guideline for the wireless charging of plug-in electric vehicles that was published by the SAE International earlier this year.

The SAE TIR J2954™ provides guidance to ensure the performance and safety of Wireless Power Transfer (WPT) systems provided from one vendor as well as interoperability when parts of the system are provided from different vendors. For the first time, interoperability between both the Double D (DD) from Qualcomm and Circular Topologies has been demonstrated between 3.7 to 7.7 kW with efficiencies exceeding 85-90% under aligned conditions.

INL researchers contributed to the SAE J2954™ validation by testing wireless charging systems from three companies: Toyota, WiTricity, and Qualcomm in the summer and fall of 2016. The WiTricity system which was submitted in cooperation with Nissan, and the Qualcomm system which was submitted in cooperation with Jaguar-Land Rover, both operated at up to 7.7 kW. The results of the INL tests were reported to the SAE J2954™ Technical Committee in December and will be published in 2017.

Engineers from Toyota, Nissan, WiTricity, and Qualcomm collaborated with both INL and TDK on site in a series of tests on the interoperability of their respective wireless charging systems. The tests allowed those engineers to adjust their company's systems in real time to improve interoperability performance.

Wireless charging systems work by using electricity from the grid to generate an oscillating magnetic field that reaches upwards from a charging pad on the floor of the garage or parking space, to a power capture pad mounted to the undercarriage of the electric vehicle. This magnetic field transfers the energy from the ground pad to the vehicle, where it is converted to electric energy that charges the vehicle battery.

“Idaho National Laboratory has successfully validated SAE TIR J2954™ on the bench for test systems provided by the industry, which is an important milestone. This gives confidence in the interoperability, safety and performance values within this guideline,” said Richard “Barney” Carlson, an INL engineer who coordinated and managed the wireless charging test program.

The SAE TIR J2954™ also has a significant part of its content dedicated to Electromagnetic Compatibility (EMC) and Electromagnetic Field (EMF) validation of WPT systems. The same companies that underwent testing at INL continued their testing at TDK R&D Corporation's Texas based electromagnetics lab for this aspect of the evaluation. Tests on various configurations were carried out on an OATS (Open Area Test Site with metallic ground plane), on an OFTS (Open Field Test Site with real earth ground plane), and on an EMF planar scan range (for human exposure).

“Developing EMC and EMF standards and measurement methodologies is accompanied by the implicit responsibility of protecting incumbent services with the target of establishing sustainable limits that allow coexistence and maintain safe exposure levels for humans and medical devices. Part of this strategy involved establishing a relationship between the SAE J2954™ Taskforce and the American Association of Medical Instrumentation. To aid in this effort, TDK leveraged its broad expertise in high power, low frequency magnetic field EMC/EMF measurement experience along with the proper testing venues to accommodate the efficient collection of data across all of the participants WPT platforms,” remarked Robert Sutton (Senior VP TDK R&D), Co-Chair of the SAE J2954™ EMC/EMF Team.

The data will be used to further develop SAE J2954™ guidelines which will ensure that wireless charging systems entering the market meet established requirements for safety, efficiency, performance under real world parking behavior, and interoperability. Interoperability is viewed by the industry to be essential to broad scale adoption of wireless charging, as drivers expect any vehicle to be able to charge at any charging station. The bench testing at INL and TDK will help SAE develop the next phase of standardization.

“SAE J2954™ standardization enables any compatible vehicle to pull into a wireless power space have automated charging without doing anything -except parking-. Automated wireless charging can be done in conjunction with autonomous parking (for instance with autonomous vehicles.)

Interoperability between wireless power classes (up to 7.7kW) and different topologies (DD and Circular) was tested and proved possible to transfer power with efficiencies within range of SAE J2954™ performance guidelines. This is a real step towards commercialization. Idaho National Laboratory and TDK have provided the most complete test data to date in order to validate SAE J2954™ on the test bench. The next phase, Recommended Practice in 2017 will give guidance for wireless charging with autonomous parking and charging (up to 11kW) for the vehicle testing. Full vehicle test data will be needed before a J2954™ standard can be published in 2018. The national labs from the US DOE offer an ideal location to have this done,” stated Jesse Schneider, chair of the SAE J2954™ task force.

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Contact Information

Shawn Andreassi

SAE International

<http://www.sae.org>

+1 (724) 772-8522

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