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Press release

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STMicroelectronics Reveals Advanced Silicon-Carbide Power Devices to Accelerate Automotive Electrification

- *Complete set of devices allows full conversion of auto power modules to silicon carbide (SiC) for greater vehicle range, convenience, and reliability*
- *Advanced 6-inch wafer capability and process to bring superior SiC offer to carmakers and automotive suppliers*
- *AEC-Q101 qualification program to complete in early 2017, ready for new OEM product launches*

Geneva, May 16, 2016 – STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronic applications, has announced advanced high-efficiency power semiconductors for Hybrid and Electric Vehicles (EVs) with a timetable for qualification to the automotive quality standard AEC-Q101.

In EVs and hybrids, where better electrical efficiency means greater mileage, ST's latest silicon-carbide (SiC) technology enables auto makers to create vehicles that travel further, recharge faster, and fit better into owners' lives. A leader in silicon carbide, ST is among the first to present new-generation rectifiers and MOSFETs for high-voltage power modules and discrete solutions addressing all the vehicle's main electrical blocks. These include the traction inverter, on-board battery charger, and auxiliary DC-DC converter.

Today's power modules typically rely on standard silicon diodes and Insulated Gate Bipolar Transistors (IGBTs). Silicon carbide is a newer, wide-bandgap technology that allows smaller device geometries capable of operating well above the 400V range of today's electric and hybrid drivetrains. The smaller SiC diode and transistor structures present lower internal resistance and respond more quickly than standard silicon devices, which minimize energy losses and allow associated components to be smaller, saving even more size and weight.

"Major carmakers and automotive Tier-1s are now committing to silicon-carbide technology for future product development to leverage its higher aggregate efficiency compared to standard silicon in a wide range of operating scenarios," said Mario Aleo, Group Vice President and General Manager, Power Transistor Division, STMicroelectronics. "Our SiC devices have demonstrated superior performance and

reached an advanced stage of qualification as we support customers preparing to launch new products in the 2017 timeframe."

ST has been among the first companies to produce silicon-carbide high-voltage MOSFETs, with its first 1200V SiC MOSFET introduced back in 2014, achieving industry-leading 200°C rating for more efficient and simplified designs.

The Company is using the industry's most advanced processes to fabricate SiC MOSFETs and diodes on 4-inch wafers. In order to drive down the manufacturing costs, improve the quality, and deliver the large volumes demanded by the auto industry, ST is scaling up its production of SiC MOSFETs and diodes to 6-inch wafers, and is on schedule to complete both conversions by the end of 2016.

ST has already qualified its 650V SiC diodes to AEC-Q101, and will complete qualification of the latest 650V SiC MOSFETs and 1200V SiC diodes in early 2017. The qualification of the new-generation 1200V SiC MOSFETs will be completed by the end of 2017.

The STPSC20065WY 650V SiC diode is in full production now in DO-247. The range also includes lower current ratings and smaller form-factor TO-220 package options. The STPSC10H12D 1200V SiC diode is sampling now to lead customers in the TO-220AC package and goes to production this month, with volume production of the automotive-grade version planned for Q4 2016. Multiple current ratings from 6A to 20A and packaging options will also be available.

The SCTW100N65G2AG 650V SiC MOSFET is sampling now to lead customers in the HiP247 package. It will ramp up in volumes in H1 2017. To enable more compact designs, a 650V SiC MOSFET in the surface-mount H2PAK will also be qualified to AEC-Q101 in H1 2017.

For further information on ST's portfolio of SiC devices please refer to www.st.com/sicmos for MOSFETs or www.st.com/auto-sic-diodes for diodes.

Technical Notes:

Using ST's 650V SCTW100N65G2AG SiC MOSFET in the EV/HEV main inverter (typical frequencies up to 20kHz) increases the efficiency compared with an equivalent IGBT solution by up to 3%. This dramatic improvement translates into longer battery life and autonomy, and a smaller and lighter power unit with lower cooling requirements. The SiC MOSFET reduces power losses in the inverter (up to 80% lower at light/medium load), enabling designers to use higher switching frequencies for more compact designs. Additionally, a SiC-based solution offers highly robust intrinsic-body diodes, eliminating the need for the freewheeling diodes necessary with IGBTs, further saving cost, size, and weight.

In other EV/HEV applications like the OBC (On-Board Charger) and DC-DC Converter, the inherently faster switching performance of SiC, compared with standard silicon devices, allows much higher switching frequencies, thus reducing the size of passive components. Furthermore, the SiC MOSFET increases design flexibility as it can be used in diverse topologies.

Advances such as these are helping to propel the state of the art in hybrid and electric vehicles. Moreover, ST's advanced manufacturing processes deliver advantages over competing SiC devices, such as superior stability over a wide operating temperature range, which means more dependable vehicle performance and range.

ST's SiC MOSFETs, housed in a proprietary high-thermal-efficiency HiP247™ package, also feature the industry's highest junction-temperature rating of 200°C and show a very small variation of the on-state resistance even at high temperatures. This leads to higher system efficiency, which reduces cooling requirements and PCB form factors simplifying thermal management.

The new 650V and 1200V SiC diodes from ST have the best-in-class forward voltage drop (V_F) among all devices in the market today, which minimizes the amount of energy dissipated as heat by EV/HEV power converters. These excellent thermal properties help to further improve overall vehicle reliability.

About STMicroelectronics

ST is a global semiconductor leader delivering intelligent and energy-efficient products and solutions that power the electronics at the heart of everyday life. ST's products are found everywhere today, and together with our customers, we are enabling smarter driving and smarter factories, cities and homes, along with the next generation of mobile and Internet of Things devices.

By getting more from technology to get more from life, ST stands for life.augmented.

In 2015, the Company's net revenues were $6.90 billion, serving more than 100,000 customers worldwide. Further information can be found at www.st.com.

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