

December 7, 2020  
Diamond Electric Holdings Co., Ltd.

## **Diamond Electric Holdings Develops 7.4 kW Vehicle-to-Everything (V2X) Onboard Charger with World's Highest Power Density**

### **- 1.2 kW/L V2X OBC Accelerates Penetration of Onboard V2G -**

Diamond Electric Holdings (DIAMOND), which holds two core companies, Diamond Electric and Tabuchi Electric, announced on December 7 that it has developed a 7.4 kW vehicle-to-everything (V2X, X stands for Grid, Home, and Load) onboard charger (OBC) with the world's highest power density (\*1) as high as 1.2 kW/L (\*2). This product utilizes the battery of the plug-in electric vehicle (BEV/PHEV) to provide grid services, serve demand response, and provide backup power in an outage. This product complies with UL 9741 to meet America's market which leads the making of onboard V2G regulation. The compliance and the high power density facilitate the onboard V2X application of this product.

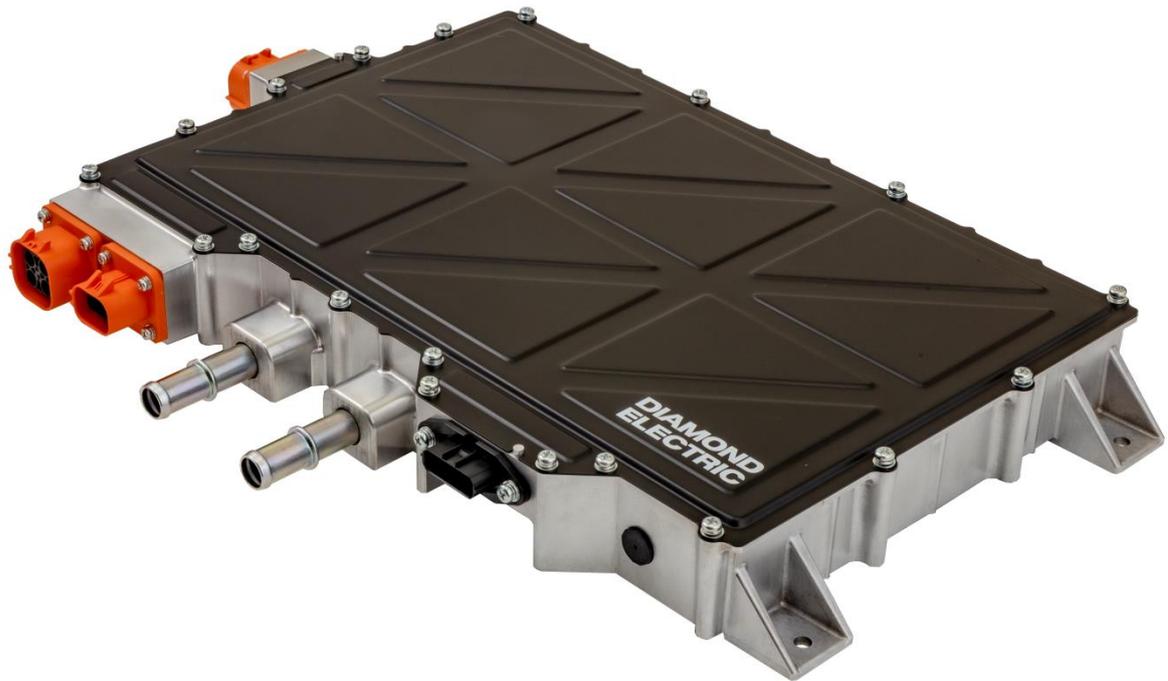
The stabilization of the grid is key to the spread of BEV/PHEV and renewable energy. Vehicle-to-grid (V2G) is a significant solution as it enables the BEV/PHEV's onboard battery to provide power to stabilize the grid through a bidirectional charger. Furthermore, vehicle-to-home (V2H) and vehicle-to-load (V2L) has attracted attention in recent years for its ability utilizing the BEV/PHEV's onboard battery as anytime backup power. The OBC with grid-interconnection capability is essential for penetration of V2X which embraces V2G, V2H and V2L.

In response, DIAMOND has developed a 7.4 kW V2X OBC with the world's highest power density as high as 1.2 kW/L, power conversion efficiency up to 96.3% (\*3), three-wire single-phase system compatibility, and 4 kV isolation performance. Furthermore, the product is UL 9741 compliant. These features facilitate the V2X OBC implementation on EV/PHEV.

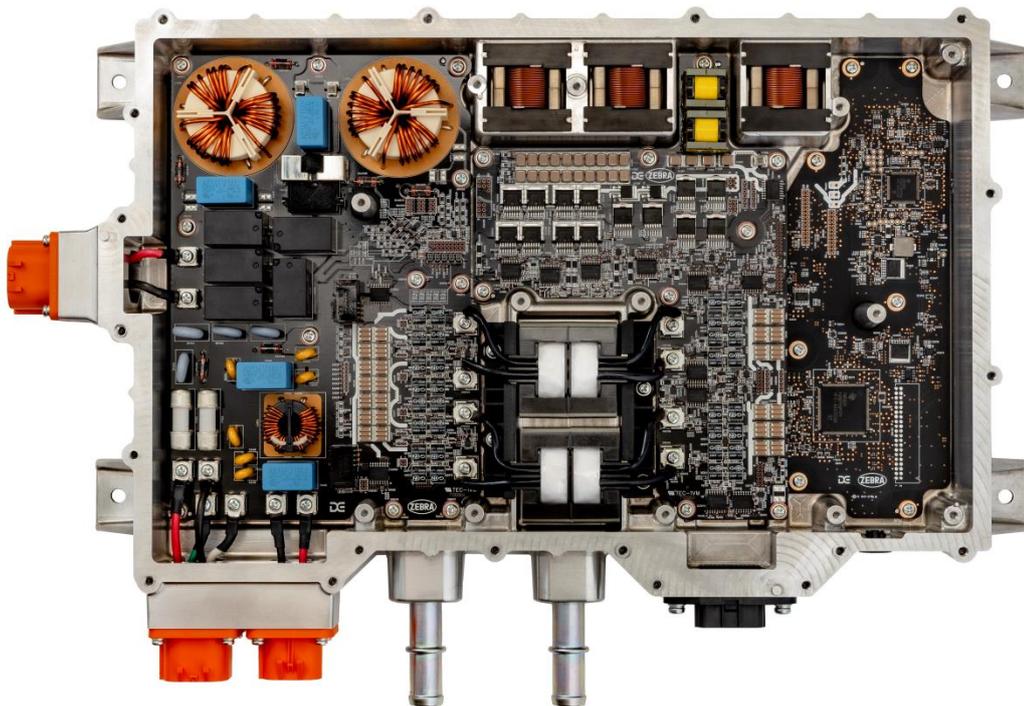
DIAMOND owes the features to the Diamond Electric's proprietary ultra-compact isolated bidirectional DCDC converter and inverter utilizing GaN and SiC which have been developed since 2017 and its expertise on design and manufacturing of automotive electrification products and to Tabuchi Electric's 20+ years of experiences on grid interconnection with high power quality.

#### Notes:

- (\*1) As of November 2020, investigated by Diamond Electric
- (\*2) Calculated by the enclosure size excluding connectors
- (\*3) Measured including EMC components



With cover



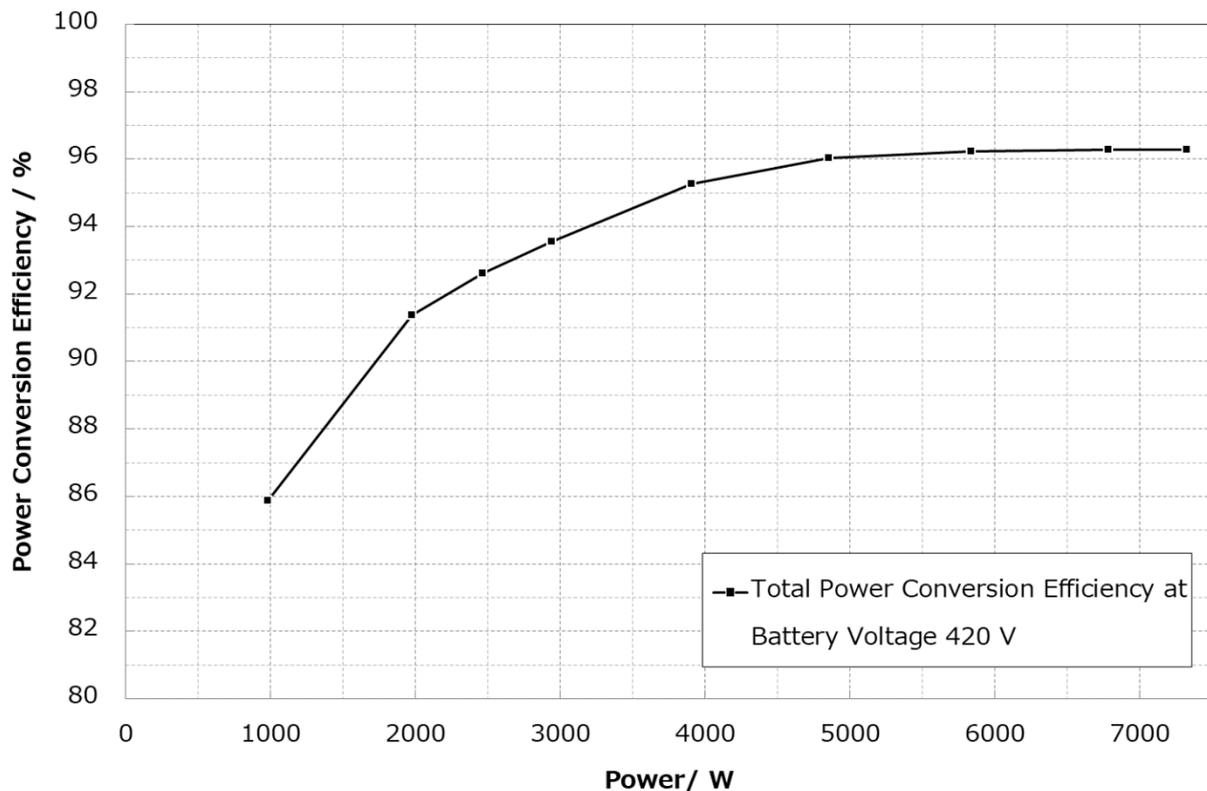
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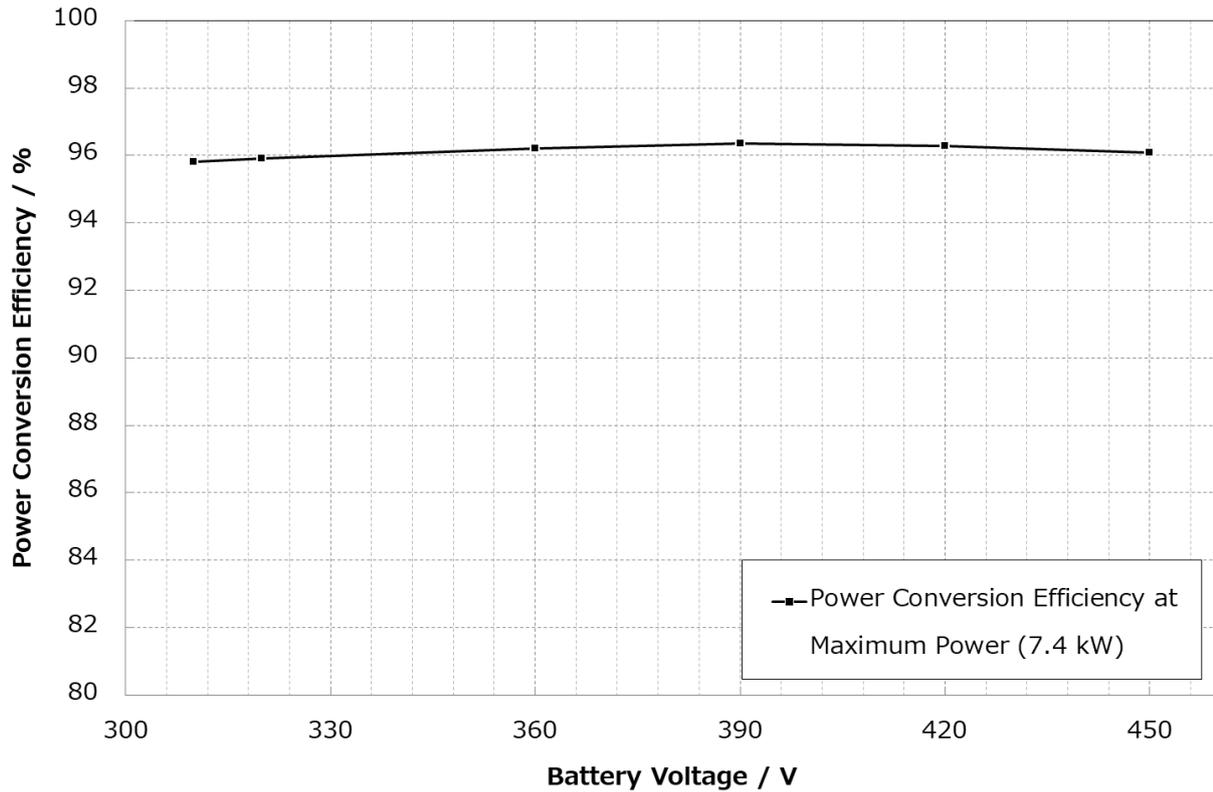
### Expected applications

- Onboard charger for BEV/PHEV
- Stationary hybrid inverter system

**Product specifications:**

|  |   |
|--|---|
| <b>Dimension (Enclosure size)</b>          | 426 x 261 x H55 mm  |
| <b>Charge Power</b>                        | 7.4 kW  |
| <b>Discharge Power</b>                     | 7.0 kVA at three-wire single phase (240 V)<br>3.6 kVA at two-wire single phase (120 V)  |
| <b>Battery Voltage</b>                     | 150 to 450 V  |
| <b>Isolation Withstand Voltage</b>         | Enclosure to primary (AC side): 2.5 kV/min.<br>Enclosure to secondary (battery side): 4 kV/min.<br>Primary to secondary: 4 kV/min.  |
| <b>Operation Modes</b>                     | V2G: Grid-interconnection (grid-following) current control mode<br>V2H: three-wire single phase voltage control mode; provides power to home<br>V2L: two-wire single phase voltage control mode; provides power to appliances |
| <b>Maximum Power Conversion Efficiency</b> | 96.3% including EMC components  |
| <b>Power Factor</b>                        | Variable  |
| <b>Cooling</b>                             | Liquid-cooling  |
| <b>Product Standards</b>                   | UL 9741, SAE J1772 <i>compliant</i>   |





#### **About Diamond Electric Holdings Co., Ltd.**

Diamond Electric Holdings, listed on the Tokyo Stock Exchange (6699), holds two core companies, Diamond Electric Mfg. Co., Ltd. and Tabuchi Electric Co., Ltd. Diamond Electric is a leading manufacturer of ignition coils for automobiles, operating for more than 80 years. Tabuchi Electric is a leading manufacturer of solar and hybrid inverters. Those two companies work together to develop products to realize Diamond Electric Holdings' new vision, "Connect Automotive and Home with 'Monozukuri/Manufacturing'," to contribute the development of customers and to the enrichment of society, as stated in its mid-term business plan "Re-Ignite".

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