

A Standardized And Modular DC Link Capacitor Design For xEV Traction Inverters

[TDK's](#) xEVCap is a standardized and modular dc link capacitor design for powertrain inverters in passenger cars, commercial and off-highway vehicles, and machinery tools. The film capacitors based on this design are available in rated voltages ranging from 500 to 920 V, in different connection styles and mechanical dimensions (see the figure and the table).

Typically, such capacitor designs are fully customized, making the development time-consuming and practical only in large production volumes. In addition, if the customer requirements change during the project, this can further increase the time required for capacitor development and thus delay the overall project.

However, with the scalable and modular xEVCap, TDK helps inverter designers meet varying capacitance and current requirements at lower volumes while saving valuable time, according to the vendor. This approach also reduces costs by utilizing standardized capacitor modules, which minimizes the variety of components that need to be stocked.

To meet different capacitance and current requirements, multiple xEVCaps can be easily connected in parallel. The complete capacitance range complies with the automotive standards AEC-Q200 rev. E and IEC TS 63337:2024.

The xEVCap is available in two connection styles: the B25654A*001 has lead wires for soldering to busbars or PCBs, while the B25654A*002 has flat terminals for welding or screwing to busbars. Each variant is available in multiple different mechanical versions and voltage levels. The mechanical versions are 85 x 47 x 40.5 mm (L x W x H), 97.5 x 35.5 x 42.5 mm, and 109 x 47 x 40.5 mm.

Corresponding with rated voltages, components for 500 V, 650 V, 850 V, and 920 V are available. Depending on the rated voltages, the capacitances range from 60 μ F up to 270 μ F. All xEVCaps are included in TDK's CLARA (Capacitor Life And Rating Application) tool, which simulates the components electrically and thermally under different operating conditions. STEP files and SPICE models for the components are available for download.

For a limited time, the applied voltage can exceed the rated voltage. For example, the 850-V types can withstand 890 V for 100 hours at +105°C and surge voltages of up to 1200 V. Rated currents range from 35 A to 60 A (at 10 kHz) with ESL values of 14 nH or 17 nH (at 1 MHz). The operating temperature range is -40°C to +105°C.

For more information see the xEVCap [page](#). To select a capacitor for your application, see [CLARA](#).



Figure. Dc link capacitor designs for traction inverters are traditionally fully customized, making the development time-consuming and practical only for large quantities. With the scalable and modular xEVCap, TDK can help inverter designers meet varying capacitance and current requirements at lower volumes while saving valuable time to market.

Table. Key data for the xEVCap dc link capacitors.

| Ordering code | Rated voltage V_R (V) | Nominal capacitance C_N (μ F) (120 Hz) | Rated currents I_{max} (A) | Dimensions (mm) (L x W x H) |
|---------------|----------------------------|--|---------------------------------|--------------------------------|
| B25654A5207K* | 500 | 200 | 40 | 85 x 47 x 40.5 |
| B25654A5277K* | 500 | 270 | 50 | 109 x 47 x 40.5 |
| B25654A6117K* | 650 | 115 | 60 | 97.5 x 35.5 x 42.5 |
| B25654A6137K* | 650 | 130 | 42 | 85 x 47 x 40.5 |
| B25654A6177K* | 650 | 175 | 55 | 109 x 47 x 40.5 |
| B25654A8806K* | 850 | 80 | 56 | 97.5 x 35.5 x 42.5 |
| B25654A8107K* | 850 | 100 | 40 | 85 x 47 x 40.5 |
| B25654A8137K* | 850 | 135 | 50 | 109 x 47 x 40.5 |
| B25654A9606K* | 920 | 60 | 55 | 97.5 x 35.5 x 42.5 |
| B25654A9756K* | 920 | 75 | 35 | 85 x 47 x 40.5 |
| B25654A9117K* | 920 | 110 | 45 | 109 x 47 x 40.5 |

*: 001 (Wire lead); 002 (Flat terminals)