Electric Vehicle Charger

An electric vehicle charger is a piece of equipment that connects an electric vehicle (EV) to a source of electricity to recharge electric cars, neighborhood electric vehicles, and plug-in hybrids. Some charging stations have advanced features such as smart metering, cellular capability, and network connectivity, while others are more basic.

Charging stations are also called electric vehicle supply equipment (EVSE) and are provided in municipal parking locations by electric utility companies or at retail shopping centers by private companies. These stations provide special connectors that conform to the variety of electric charging connector standards.

Different types of EVSE provide different speeds of charging. Level 1 charging stations use a 120 volt (V), alternating-current (AC) plug and require a dedicated circuit, offering about 5 miles of range for every hour of charging. Level 2 stations charge through a 240V, AC plug and require home charging or public charging equipment to be installed. Level 2 stations provide 10 to 20 miles of range for every hour of charging. Level 2 chargers are the most common and charge at approximately the same rate as a home system.

Level 3 chargers are also known as DC fast chargers. Level 3 uses a 480V, direct-current (DC) plug. They bypass the onboard charger and provide DC electricity to the battery via a special charging port. DC Fast Chargers provide up to 40 miles of range for every 10 minutes of charging but are not compatible with all vehicles. Additionally, some propriety charging stations, such as the Supercharger, are designed for significantly higher-speed charging.

As demand grows for more publicly accessible charging stations, there is a greater need for equipment that supports faster charging at higher voltages and currents that are not currently available from residential ESVE. Globally, the number of electric vehicle networks is increasing to provide a system of publicly accessible charging stations for EV recharging. Governments, automakers and charging infrastructure providers have forged agreements to create these networks. *See Figure 1 below.*

The key components needed to make an EV charger are an EMI filter, Rectifier, Power Switching Unit, HF Inverter, and another Rectifier and filter to convert the signal back to DC. *See Figure 2 below.*

A charger converts the AC signal to DC signal using a rectifier and filter. An EMI filter suppresses the incoming electromagnetic interference from the mains line by using X2 and Y2 capacitors. Then the rectifier converts the AC signal into pulsating DC signal and the PFC circuit also maintains the power factor. Next in power switching, it increases the level of the input signal from the rectifier. Next, the DC link capacitor links the power switching and High-Frequency inverter. Next, the HF inverter converts DC signal to AC signal. Lastly, the rectifier and filter converts back the high-frequency AC signal to DC signal. In the end, capacitor C8 is an electrolytic capacitor which reduces pulsating signal. After the output signal, there is a feedback loop that controls the output of the charger after the battery is fully charged.

Figure 1

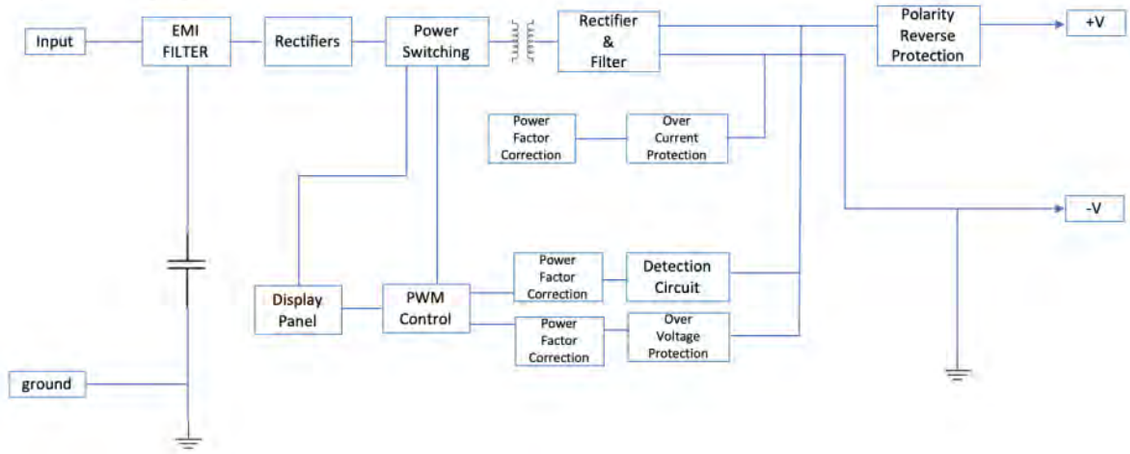
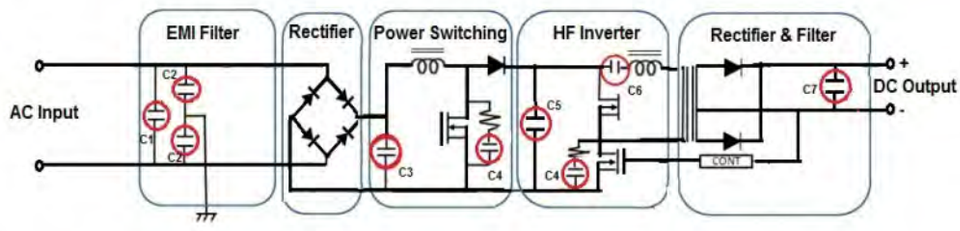


Figure 2



C1: X2 Capacitor
C2: Y2 Capacitor
C3: PFC Capacitor
C4: Snubber Capacitor
C5: DC Link Capacitor
C6: Resonant Capacitor
C7: Electrolytic Capacitor

Electric Vehicle Charger

Deki Capacitors Range For Electric Vehicle (EV) Charger Application

Series Name	Deki Series Code	Capacitance Range	Rated Voltage
Interference Suppression Capacitor Class X2	07, 20	0.01 to 10 µF	275 VAC, 310 VAC
High Capacitance Stability Interference Suppression Capacitor Class X2 Humidity Resistant Grade	151	0.01 to 10 µF	275 VAC, 310 VAC
Interference Suppression Capacitor Class Y2	33, 133	0.00022 to 0.033 µF	305 VAC
Metallized Polypropylene Film Capacitor (MPP-AC)	17, 22, 112	0.01 to 2.2 µF	275 VAC - 440 VAC
Metallized Polypropylene High Capacitance Stability Film Capacitor (MPP-AC-S)	117, 122	0.022 to 2.2 µF	305 VAC - 500 VAC
Metallized Polyester High Capacitance Stability Film Capacitor	23, 24	0.1 to 1 µF	310 VAC
Metallized Polypropylene DC Link Capacitor	91	1 to 120 µF	450 VDC - 1100 VDC
AC & Pulse Metallized Polypropylene Film Capacitor (PP/MPP)	63, 68	0.0068 to 0.47 µF	1000 VDC - 2000 VDC
Metallized Polypropylene IGBT Snubber Capacitor	121, 150	0.047 to 10 µF	700 VDC - 3000 VDC

For details regarding Deki's electric energy meter capacitors, please contact shariq@dekielectronics.com