DC Fast Charging at Different Temperatures for the 2014 BMW i3 EV

The ambient air temperature around the car may heat or cool an electric vehicle's (EV's) battery pack when it is not being used. The temperature of the battery pack at the start of a direct current (DC) fast charge can make an impact on how long it takes to fast charge EVs. For this reason, testing was performed to determine how fast DC fast charging can recharge EVs when they have been sitting for 24 hours at 0, 25, and 50° C (32, 77, and 122° F) temperatures.

The testing measured the battery state of charge (SOC) after 30 minutes, total charge time and electricity used, and how much electricity was used by the vehicle's battery climate control system (BCCS) to heat or cool the battery during DC fast charging events. The testing results and highlights are listed below and the full testing report can be found at: https://avt.inl.gov/sites/default/files/pdf/fsev/2014i3DCFCAtTempBOT.pdf.

These tests were performed as part of the U.S. Department of Energy's Advanced Vehicle Testing Activity (http://avt.inl.gov), which is conducted by Idaho National Laboratory and the Intertek Center for Evaluation of Clean Energy Technology.

Lithium-ion NMC
Battery type

18.8 kWh
Total capacity

Active - Refrigerant
Battery climate control system

81 miles
EPA estimated range

Four
Test vehicles

September 2015
Date tested

0° C (32° F)	25° C (77° F)	50° C (122° F)
41.4% Average SOC at 30 minutes	**81.3%** Average SOC at 30 minutes	**0.0%** Average SOC at 30 minutes
121 minutes Average charge duration	**76 minutes** Average charge duration	**0 minutes** Average charge duration
18.2 kWh Average DC charge electricity	**19.0 kWh** Average DC charge electricity	**0 kWh** Average DC charge electricity
0.33 kWh Average electricity used by the BCCS during charge events	**0.51 kWh** Average electricity used by the BCCS during charge events	**0 kWh** Average electricity used by the BCCS during charge events

Idaho National Laboratory

For more information, visit avt.inl.gov

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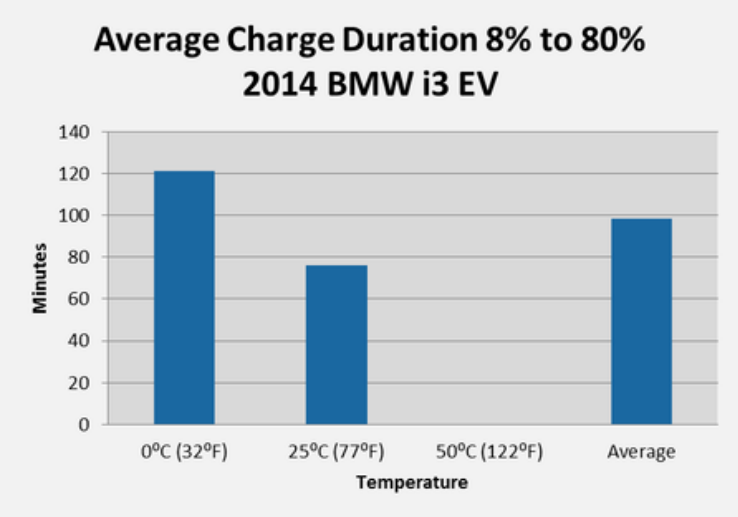
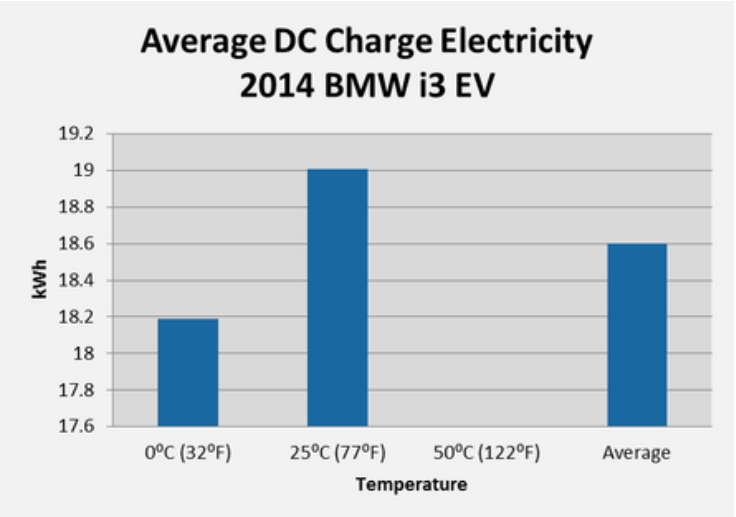
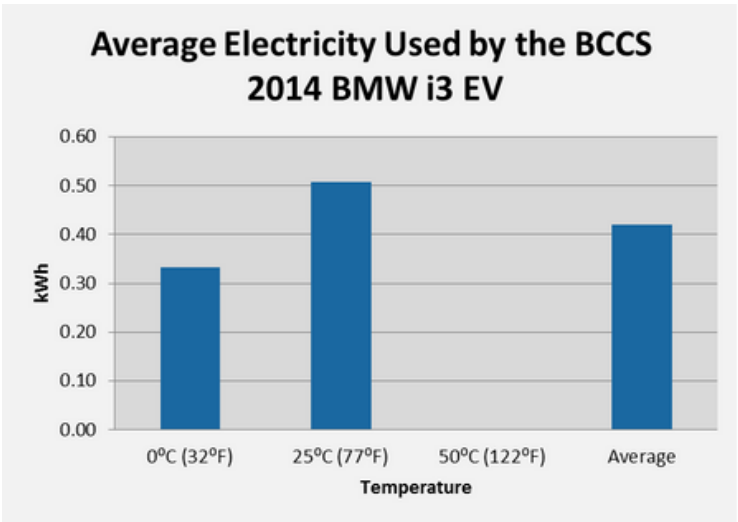
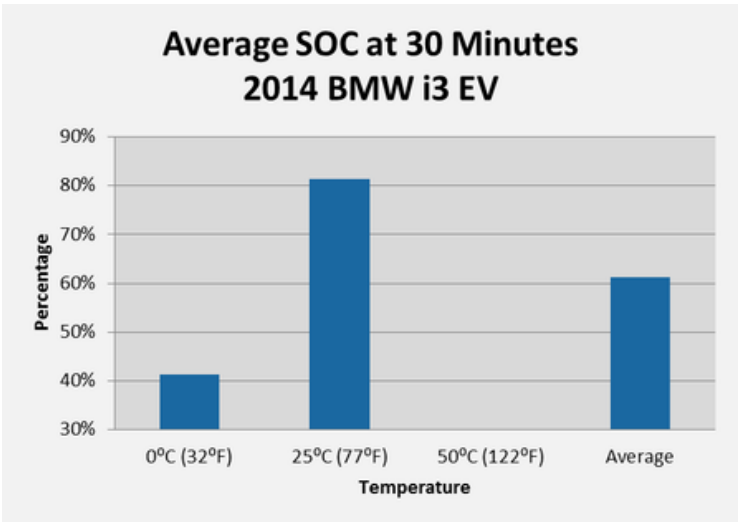
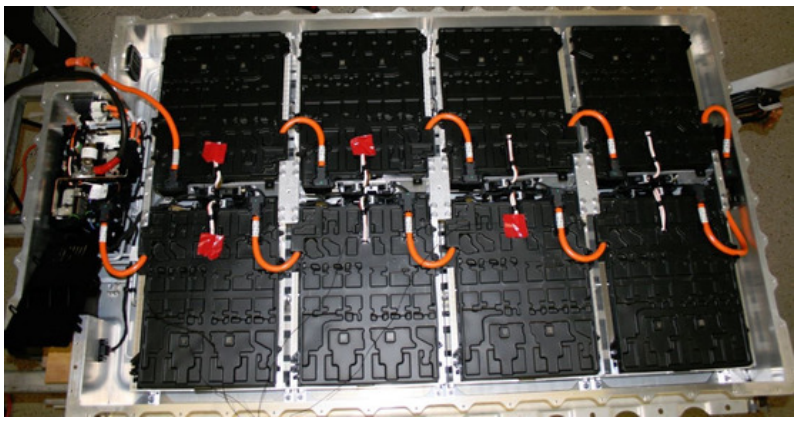








NOTE: During testing, fast charging at 50 °C DC was not able to be conducted due to the vehicle preventing the charge event from occurring.



2014 BMW i3 battery pack top view when removed from the vehicle