2014 Tesla Model S 85 kWh

Advanced Vehicle Testing – Baseline Vehicle Testing Results

VEHICLE SPECIFICATIONS[1]

Vehicle Features
VIN: 5YJSA1H14EFP34500
EPA Class: Large Car
Seatbelt Positions: 5
Type: BEV
CARB Credit[2]: Type III ZEV
EPA Fuel Economy:
94 MPGe (City)
97 MPGe (Highway)
95 MPGe (Combined)
EPA Range: 265 miles
On-board Charger: 10 kW

Electric Motor
Type: AC Synchronous
Maximum Power: 270 kW
Maximum Torque: 440 Nm

Transmission
Type: Single Speed
Layout: Rear Wheel Drive
Gear Ratio: 9.73:1

Battery
Manufacturer: Tesla Motors
Chemistry: Lithium-ion
Cathode Material: Nickel-Cobalt-Aluminum
Cell Type: 18650
Number of Cells/Modules: 7,104 cells/16 modules
Cell Configuration: 6 Cells in Series, 74 in Parallel per Module
Rated Pack Energy: 85 kWh
Pack Weight: 545 kg
Pack Specific Energy: 156 Wh/kg
Pack Location: Between front and rear wheels, below passenger compartment
Thermal Management: Active, Liquid-Cooled

Weights
Design Curb Weight: 4,647 lb
Delivered Curb Weight: 4,514 lb
Distribution F/R: 48%/52%
GVWR: 5,710 lb
GAWR F/R: 2,813 lb/3,307 lb
Max. Payload: 1,080 lb

Dimensions
Wheelbase: 116.5 in
Track F/R: 65.4 in/66.9 in
Length/Width: 196.0 in/86.2 in
Height: 56.5 in

Tires
Manufacturer: Michelin
Model: Primacy MXM4
Size: 245/45R19
Pressure F/R: 45 psi/45 psi
Spare Installed: N/A - Tire sealant and inflator

NOTES:
1. Vehicle specifications were supplied by the manufacturer, measured, or derived from a literature review.
2. The vehicle was classified as a Type III ZEV by the California Air Resources Board (CARB).

PERFORMANCE STATISTICS[1]

TRACK TESTING[2]

Acceleration 0-60 mph[3]

Measured Time: 5.5 s

Performance Goal: ≤ 13.5 s

Peak DC Power from Battery: 274.6 kW

Maximum Speed

At ¼ Mile: 101.5 mph

Maximum Speed[4]: 125.3 mph

Performance Goal: ≥ 90 mph at 1-mile mark

Braking from 60-0 mph at 100% SOC[5]

Measured Time: 3.4 s

Distance: 131 ft

Braking from 60-0 mph at 50% SOC[5]

Measured Time: 3.2 s

Distance: 128 ft

"Standard" Deceleration 60-10 mph[6]

Measured Time: 14.7 s

Distance: 770 ft

Peak DC Power into Battery: 61.9 kW

Total DC Energy into Battery: 169 Wh

"Low" Deceleration 60-10 mph[6]

Measured Time: 26.3 s

Distance: 1,354 ft

Peak DC Power into Battery: 31.3 kW

Total DC Energy into Battery: 151 Wh

NOTES:

1. Performance numbers based on "Standard" vehicle mode. Performance numbers are averages from multiple tests. Electricity values are DC values unless otherwise indicated.
2. Vehicle track testing normally occurs when the vehicle has achieved its "break-in mileage" of between 4,000 to 6,000 miles. The test vehicle was not purchased for the AVTE program but was instead rented for the duration of the track testing. The beginning test mileage was 14,703 miles. The track testing is performed at the delivered curb weight plus 332 ± 10 lb (including driver and test equipment), for a test weight of 4,851 lb, distributed in a manner similar to the original curb loading of the vehicle. Track testing took place between August 26 and August 30, 2015. The ambient temperatures ranged from 27 °C to 32 °C. No accessories were used except for headlights as required by track regulation. The results provided are from multiple runs unless otherwise indicated; if taken from a single run, the result is the maximum value over the set of runs.
3. The acceleration is measured from the point at which the vehicle begins to move. The peak power value was taken from a single run.
4. The maximum speed was reached before the one-mile mark.
5. Controlled braking on dry surface. Peak brake power was not captured for this vehicle.
6. Coasting in drive on dry surface. Test run data were cut off when the vehicle reached 10 mph, as vehicle creep speeds are typically below this threshold. The peak power into the battery value and total energy into the battery results were both taken from a single (but different) run. Modes labeled as "Standard" and "Low" are options available for this vehicle.

Values in red indicate that the Performance Goal was not met.

CONSTANT-SPEED RANGE AND CHARGE TESTING IN CHARGE-DEPLETING MODE[1]

	45 mph Test[2]	60 mph Test[3]	70 mph Test[4]
Average DC power out of battery at speed (kW):	8.7	14.8	21.0
(A) DC energy out of battery at set speed (kWh)[5,7,9]:	70.6	68.7	68.6
(A+) Total DC energy out of battery (kWh)[5,7,9]:	71.8	69.9	69.8
Battery capacity discharge at set speed (Ah):	201.6	197.4	198.2
(B) Range at set speed (mi)[6,8,10]:	366.4	280.3	228.1
(C) Post-test charge AC energy from EVSE @ 240 V to onboard charger (kWh):	80.0	79.0	78.8
(D) Post-test charge DC energy into battery from onboard charger (kWh):	72.4	71.5	71.9
Post-test charge duration (HH:MM):	11:13	11:02	10:59
AC electricity consumption rate (Wh/mi)[11]:	215	277	340
DC electricity consumption rate (Wh/mi)[12]:	193	245	301
(A+/D) Battery Roundtrip Efficiency[13]:	99%	98%	97%
(D/C) On-Board Charger Efficiency[14]:	91%	91%	91%
(A+/C) Overall Trip Efficiency[15]:	90%	88%	89%

NOTES:

1. See Note 1 and Note 2 on page 2. The vehicle is accelerated to the desired speed and then cruise control is used to maintain the speed. Due to safety concerns of driving a test vehicle with such a large range continuously, periodic driver exchanges were performed; additional ESS energy throughput was minimized as much as possible. Range is considered reached when the vehicle is no longer capable of maintaining a speed that is 2 mph lower than the set speed. Battery temperature data were not captured for this vehicle.
2. During the 45 mph range test, the average ambient temperature was 31 °C. During the post-test charge, the average ambient temperature was 31 °C.
3. During the 60 mph range test, the average ambient temperature was 33 °C. During the post-test charge, the average ambient temperature was 33 °C.
4. During the 70 mph range test, the average ambient temperature was 27 °C. During the post-test charge, the average ambient temperature was 30 °C.
5. In addition to the energy discharged from the battery during the 45 mph test, energy was discharged during the drive from the test prep area to the point at which the vehicle test speed is achieved and maintained. After the range at 45 mph was completed, there is ESS energy throughput during the drive to return the vehicle to the test prep area and the EVSE unit for the post-test charge. The pre-test drive required 0.49 kWh, the driver exchanges when the vehicle slowed to zero then returned to speed required 0.73 kWh, while the post-test drive required 0.002 kWh. These energy inputs can be added to the energy consumed during the range test **(A)** to obtain the total output from the battery (71.8 kWh, denoted as **(A+)**) that is used in the calculations discussed in Notes 13 and 15.
6. In addition to the range measured for the 45 mph test, the pre-test drive required 1.23 miles from the test prep area to the point at which the vehicle test speed is achieved and maintained. The driver exchanges of the vehicle slowing to zero then returning to speed required 2.63 miles. After the range at 45 mph was completed, the post-test drive required an additional drive of 0.86 miles for the vehicle to come to a stop to be transported to the test prep area and the EVSE unit for the post-test charge. These distances can be added to the distance traveled during the range test **(B)** to obtain the total distance traveled (371.1 miles). However, the energy consumption values consider only the distance traveled during the test itself, or value **(B)**.
7. In addition to the energy discharged from the battery during the 60 mph test, energy was discharged during the drive from the test prep area to the point at which the vehicle test speed is achieved and maintained. After the range at 60 mph was completed, there is still ESS energy throughput during the drive to return the vehicle to the test prep area and the EVSE unit for the post-test charge. The pre-test drive required 0.60 kWh, the driver exchange when the vehicle slowed to zero then returned to speed required 0.54 kWh, while the post-test drive required 0.03 kWh. These energy inputs can be added to the energy consumed during the range test **(A)** to obtain the total output from the battery (69.9 kWh, denoted as **(A+)**) that is used in the calculations discussed in Notes 13 and 15.
8. In addition to the range measured for the 60 mph test, the pre-test drive required 1.35 miles from the test prep area to the point at which the vehicle test speed is achieved and maintained. The driver exchange of the vehicle slowing to zero then returning to speed required 1.55 miles. After the range at 60 mph was completed, the post-test drive required an additional drive of 0.98 miles for the vehicle to come to a stop to be transported to the test prep area and the EVSE unit for the post-test charge. These distances can be added to the distance traveled during the range test **(B)** to obtain the total distance traveled (284.2 miles). However, the energy consumption values consider only the distance traveled during the test itself, or value **(B)**.
9. In addition to the energy discharged from the battery during the 70 mph test, energy was discharged during the drive from the test prep area to the point at which the vehicle test speed is achieved and maintained. After the range at 70 mph was completed, there is still ESS energy throughput during the drive to return the vehicle to the test prep area and the EVSE unit for the post-test charge. The pre-test drive required 0.73 kWh, the driver exchange when the vehicle slowed to zero then returned to speed required 0.50 kWh, while the post-test drive returned 0.06 kWh. These energy inputs can be added to the energy consumed during the range test **(A)** to obtain the total output from the battery (69.8 kWh, denoted as **(A+)**) that is used in the calculations discussed in Notes 13 and 15.
10. In addition to the range measured for the 70 mph test, the pre-test drive required 1.76 miles from the test prep area to the point at which the vehicle test speed is achieved and maintained. The driver exchange of the vehicle slowing to zero then returning to speed required 0.82 miles. After the range at 70 mph was completed, the post-test drive required an additional drive of 0.68 miles for the vehicle to come to a stop to be transported to the test prep area and the EVSE unit for the post-test charge. These distances can be added to the distance traveled during the range test **(B)** to obtain the total distance traveled (231.3 miles). However, the energy consumption values consider only the distance traveled during the test itself, or value **(B)**.
11. The AC electricity consumption rate is calculated by dividing the DC electricity consumption rate (in Wh/mi) by the Overall Trip Efficiency for that particular speed.
12. The DC electricity consumption rate is calculated by dividing the DC energy from the battery as the set speed **(A)** by the range at the set speed **(B)**.

13. Battery Roundtrip Efficiency is calculated by dividing the DC energy out of the battery **(A+)** by the DC energy from the on-board charger into the battery **(D).**
14. On-Board Charger Efficiency is calculated by dividing the DC energy from the on-board charger into the battery **(D)** by the AC energy from the EVSE **(C).**
15. Overall Vehicle Efficiency is calculated by dividing the DC energy out of the battery **(A+)** by the AC energy from the EVSE **(C)**.

As a production vehicle, this vehicle is assumed to meet all Federal Motor Vehicle Safety Standards (FMVSS) for Battery Electric Vehicles.

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