



U.S. Department  
of Transportation  
**National Highway  
Traffic Safety  
Administration**

# ODI RESUME

**Investigation:** DP 19-005  
**Prompted by:**  
**Date Opened:** 10/01/2019 **Date Closed:** 09/28/2021  
**Investigator:** Kareem Habib **Reviewer:** Gregory Magno  
**Approver:** Stephen Ridella  
**Subject:** Battery Management Software Updates

## MANUFACTURER & PRODUCT INFORMATION

**Manufacturer:** Tesla, Inc.  
**Products:** 2012-2016 Model S with subject firmware installed  
**Population:** 61,781  
**Problem Description:** The petitioner alleges that software updates to the battery management system of certain Tesla vehicles were made in response to a potential defect that could result in a non-crash vehicle fire.

## FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
<b>Complaints:</b>	0	0	0
<b>Crashes/Fires:</b>	0	0	0
<b>Injury Incidents:</b>	0	0	0
<b>Fatality Incidents:</b>	0	0	0
<b>Other*:</b>	59	0	0

\*Description of Other: Complaints alleging loss of available miles or charging capabilities in the subject vehicles.

## ACTION / SUMMARY INFORMATION

**Action:** This defect petition has been denied.

### Summary:

In a letter dated September 17, 2019, Mr. Edward Chen petitioned the NHTSA to initiate a defect investigation of certain Tesla Model S and Model X vehicles that received revised battery management software in one or more over-the-air (OTA) updates from Tesla, beginning in May 2019. The petitioner bases his request on vehicle fires that took place worldwide and OTA software updates Tesla made to the Battery Management System (BMS) of certain Tesla vehicles that resulted in loss of available vehicle mileage range and increased charging durations.

On October 1, 2019, the Office of Defects Investigation (ODI) opened DP19-005 to evaluate the petitioner's request. Information provided by Tesla in response to ODI's information request letter for DP19-005 indicated that a firmware update that may limit maximum voltage was installed in certain MY 2012 through 2016 Model S vehicles (subject vehicles). The voltage limiting firmware is a dynamic algorithm that is enabled in vehicles with high Supercharging use histories, which contributes to high usage stress to the high-voltage (HV) battery. Tesla sold approximately 61,781 subject vehicles in the United States and, through August 2021, the voltage limiting firmware had been enabled in approximately 2,062 vehicles. Through December 2020, ODI identified 59 complaints from consumers alleging reductions in battery capacity (52) or charging speed (7) in the subject vehicles. Log data from these vehicles showed that the voltage limiting firmware had been enabled in about 58 percent (30 of 52) of the complaints alleging range loss. Subsequent updates have restored some or all of the battery capacity to vehicles affected by the voltage limiting firmware coupled with updates enhancing BMS battery brick monitoring algorithms. None of the complaint vehicles have reported any thermal incidents or other safety hazards related to the HV battery.

The five non-crash fires referenced in the petition include two fires that occurred in China in early 2019 involving vehicles that: 1) had recently completed Supercharging sessions; 2) were at a high state-of-charge (SOC) of the HV

battery; 3) were parked with the battery cooling system shutoff; and 4) had histories of high-stress usage for the HV batteries. The three fires that occurred outside China did not involve the same fact patterns regarding vehicle state and charging history. The two fires that occurred in the United States include one involving a vehicle with no Supercharging history that was driving when the fire occurred and another in which the origin of the fire was external to the HV battery. The fifth fire, which also originated external to the HV battery, involved a vehicle in Germany that had been parked at a low SOC for an extended period. To date, incidents of fires involving parked vehicles with recent Supercharging and histories of high-stress use have only been observed in China, where high-stress use factors appear to be more common.

NHTSA is authorized to issue an order requiring notification and remedy of a defect if the Agency's investigation shows a defect in the design, construction, or performance of a motor vehicle that presents an unreasonable risk to safety. 49 U.S.C. §§ 30102(a)(9), 30118. Given the absence of any incidents in the United States related to fast charging, and the absence of any such incidents globally since May 2019, it is unlikely that an order concerning the notification and remedy of a safety-related defect would be issued due to any investigation opened as a result of granting this petition. Therefore, upon full consideration of the information presented in the petition, and the potential risks to safety, the petition is denied. The denial of this petition does not foreclose the Agency from taking further action if warranted, or the potential for a future finding that a safety-related defect exists based upon additional information the Agency may receive. See Docket No. NHTSA-2020-0104

The ODI reports (VOQs) cited in the closing resume for DP19-005 can be viewed at NHTSA.gov under the following reference numbers (duplicate complaints for common VINs are shown in parentheses after the original VOQ):

Subject vehicles with voltage limiting firmware enabled: 11365200, 11338434 (11351644), 11311548, 11309908, 11309324, 11300363, 11291614, 11288980, 11288294, 11287032 (11287033 & 11339078), 11281892, 11280841, 11279353, 11277777, 11277666, 11267674, 11267632, 11267572, 11267402, 11266876 (11267646), 11266874, 11266565, 11266553, 11266445, 11266422, 11266175, 11254112 (11281919), 11246771, 11246770, 11240787 (11243758)

Subject vehicles with voltage limiting firmware not enabled (through July 28, 2020): 11361320, 11326489, 11326369, 11321453, 11316609, 11316041, 11310706, 11309743, 11307994, 11306594, 11302790, 11299296, 11288358, 11282366, 11278185, 11277660, 11271662, 11271284, 11269580, 11269564, 11267744, 11267565, 11267545, 11267520, 11267407, 11267406, 11266515, 11266418, 11266126 (1126760)

Vehicles that did not receive the subject firmware update (equipped with different battery cell type): 11282613, 11271201, 11267723, 11267560, 11267543, 11266807