



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

ODI RESUME

Investigation: EA 20-003
Prompted by: PE20-010
Date Opened: 11/12/2020
Investigator: Ajit Alkondon **Reviewer:** Jeff Quandt
Approver: Stephen Ridella
Subject: Loss of rearview camera

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: Tesla, Inc.
Products: MY2012-2018 Tesla Model S & MY2016-2018 Model X vehicles
Population: 158,716
Problem Description: Failure of the touchscreen results in loss of rear camera image display when reverse gear is selected, resulting in reduced rear visibility when backing. Failure of touchscreen also impacts HVAC (defogging) ability, and audible chimes relating to ADAS, Autopilot and turn signals.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	537	2,399	2,936
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
Fatality Incidents:	0	0	0
Other*:	0	12,523	12,523

*Description of Other: Includes 7,777 warranty claims and 4,746 non-warranty claims of MCU replacements.

ACTION / SUMMARY INFORMATION

Action: An Engineering Analysis has been opened.

Summary:

On June 22, 2020, the Office of Defects Investigations (ODI) opened Preliminary Evaluation PE20-010 to investigate incidents of media control unit (MCU) failures resulting in loss of rearview camera in model year (MY) 2012-2015 Tesla Model S vehicles equipped with the NVIDIA Tegra 3 processor with an integrated 8GB eMMC NAND flash memory device. EMMC NAND flash devices have a finite lifespan based upon the number of program/erase (P/E) cycles. The subject MCU allegedly fails prematurely due to memory wear-out of the eMMC NAND flash. Tesla used the same MCU with the Tegra 3 processor in approximately 159 thousand 2012-2018 Model S and 2016-2018 Model X vehicles built by Tesla through early-2018. In response to ODI's Information Request (IR) for PE20-010, Tesla provided ODI with 2,399 complaints and field reports, 7,777 warranty claims, and 4,746 non-warranty claims related to MCU replacements. The data show failure rates over 30 percent in certain build months and accelerating failure trends after 3 to 4 years-in-service.

According to Tesla, for subject vehicles equipped with the NVIDIA Tegra 3 processor with an integrated 8GB eMMC NAND flash memory device, the eMMC NAND cell hardware can fail when reaching lifetime wear, for which the eMMC controller has no available blocks to recover. With this failure mode, the only recovery available is a replacement of the eMMC device, achieved by physical part replacement of either the MCU assembly or visual control module subcomponent. Tesla provided the effects of MCU failure on vehicle function which result in loss of rearview/backup camera, loss of HVAC (defogging) setting controls (if the HVAC status was OFF status prior to failure.) There is also an impact on the advanced driver assistance support (ADAS), Autopilot system, and turn signal functionality due to the possible loss of audible chimes, driver sensing, and alerts associated with these vehicle functions. There are precedents for addressing defects that result in loss of either backup camera, defogging, or turn signal functions under

safety recalls.

Tesla has implemented certain Over-The-Air or OTA updates to subject vehicles to mitigate the effects of MCU failure. These updates include firmware changes to reduce memory usage of the subject memory card, improve eMMC error correction and storage management strategies, changing the control logic for turn signal activation, and defaulting the HVAC system to Auto (71.6F) for drives after MCU failure to address windshield defogging. Tesla indicated that the MCU failures are likely to continue to occur in subject vehicles as vehicles continue to operate and use available memory in the 8GB eMMC NAND flash memory until 100% of units have failed.

An Engineering Analysis has been opened to further assess the scope, frequency, and safety-related consequences of the alleged defect.

The VOQs associated with the opening of this investigation are in the attachment to this resume.

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