Ford Motor Company
OCT 13, 2023
23V-687
23S56

Manufacturer Information :

Manufacturer Name : Ford Motor Company Address : 330 Town Center Drive Suite 500 Dearborn MI 48126-2738 Company phone : 1-866-436-7332

Population :

Number of potentially involved : 34,762 Estimated percentage with defect : 100 %

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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

23V-687

Vehicle Information :	
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Vehicle 1:	2021-2022 Ford Mustang	g Mach-E	
Vehicle Type :	LIGHT VEHICLES		
Body Style :	ALL		
Power Train :	HYBRID ELECTRIC		
Descriptive Information :	Fhe recalled Bussed Elec LK98-10C666-AB were in out of production on 05/	trical Center parts NK48-10 ntroduced into production o 24/2022.	0C666-AA, NK48-10C666-BA, or on 05/27/2020 and were taken
	Affected vehicles are equ	ipped with the extended ra	nge battery.
	These vehicles are not pr this action to specific veh line (1-866-436-7332) or specific information rega Information System (OAS	roduced in VIN order. Inform nicles can best be obtained b r by contacting a local Ford rding the vehicles from the SIS) database.	nation as to the applicability of oy either calling Ford's toll-free or Lincoln dealer who can obtain Ford On-line Automotive Service
Production Dates ·	MAY 27 2020 - MAY 24 3	2022	
VIN Range 1:B	egin : NR	End: NR	☐ Not sequential
Description of Defect :			
Description of the Defect	: Direct Current ("DC") cause the high voltage lead to arcing and def result in a contactor t closed.	fast charging and repeated e battery main contactors to formation of the electrical c hat is prevented from closin	wide open pedal events can o overheat. Overheating may ontact surfaces, which can ng or a contactor that welds
FMVSS 1	: NR		
FMVSS 2	2: NR		
Description of the Safety Risk	: An overheated contac	ctor that is prevented from	properly closing while
The inf	ormation contained in this re	eport was submitted pursuant t	o 49 CFR §573

23V-687

Description of the Safety Risk :	driving can result in a loss of motive power, which can increase the risk of a crash.
Description of the Cause :	The high voltage battery Bussed Electrical Center (BEC) main contactor design and part-to-part variation is not robust to heat generated from multiple wide- open pedal and DC Fast-Charge events. Damage to the Extended Range and GT contactors caused by heat and accumulated wear during customer usage prior to the software update may reduce the effectiveness of the software deployed with 22S41. If the contactors are damaged, the contactors may be prevented from properly closing or weld closed when driving.
Identification of Any Warning that can Occur :	For those vehicles that previously received the 22S41 remedy, in most cases, the software will proactively detect damage to the contactors and display a warning to the customer.
	If the contactors weld closed while driving, there will be no immediate effect on vehicle operation. Upon the next key cycle, a wrench light will be illuminated, vehicle diagnostics will set a DTC and vehicle will not start.
	If the contactors are prevented from properly closing while driving, vehicle diagnostics will set a DTC, a wrench light will be illuminated, the vehicle will display "Stop Safely Now" and the vehicle will immediately lose motive power. The vehicle will coast to a stop, and all 12V systems including power brakes and steering will remain functional.
Involved Components :	
Component Name 1 : 1	Bussed Electrical Center
Component Description : 1	BEC – Extended Range RWD
Component Part Number : 1	NK48-10C666-AA
Component Name 2 : 1	Bussed Electrical Center
Component Description : 1	BEC – Extended Range AWD
Component Part Number : 1	NK48-10C666-BA
Component Name 3 : 1	Bussed Electrical Center
Component Description : 1	BEC – GT
Component Part Number : 1	LK98-10C666-AB

Supplier Identification :

Component Manufacturer

Name :TE ConnectivityAddress :Blvd. Industrial Norte #23 & Blvd. Solid
Hermosillo Foreign States 83118Country :Mexico

Chronology:

Chronology is provided as an attachment

Description of Remedy :

Description of Remedy Program :	Owners will be directed to take their vehicle to a Ford or Lincoln dealer to complete a replacement of the Bussed Electrical Center (BEC) also referred to as the High Voltage Battery Junction Box (HVBJB) as per workshop manual. There will be no charge for this service.
	Ford provided the general reimbursement plan for the cost of remedies paid for by vehicle owners prior to notification of a safety recall in May 2023. The ending date for reimbursement eligibility is estimated to be March 31, 2024.
	Ford will forward a copy of the notification letters to dealers to the agency when available.
How Remedy Component Differs from Recalled Component :	The updated BEC (NK48-10C666-AC, NK48-10C666-BC, LK98-10C666-AD) design has flat contact surfaces and the groove on the movable contactor surface is removed.
Identify How/When Recall Condition was Corrected in Production :	The updated BEC hardware design was introduced into production on May 25, 2022.

Recall Schedule :

Description of Recall Schedule :	Notification to dealers is expected to occur on October 16, 2023. Mailing of owner notification letters is expected to begin October 30, 2023 and is expected to be completed by November 10, 2022
Planned Dealer Notification Date :	OCT 16, 2023 - OCT 16, 2023
Planned Owner Notification Date :	OCT 30, 2023 ⁻ NOV 10, 2023

* NR - Not Reported

23S56 - Certain 2021-22 model Ford Mustang Mach-E vehicles – High Voltage Battery Main Contactor Failure

Chronology of Defect: Submitted 13-Oct 2023

On **June 3**, **2022**, Ford's Field Review Committee (FRC) approved a Field Service Action (FSA) 22S41 to address potential high voltage battery main contactor over-heating concerns on certain 2021-2022 Mustang Mach-E vehicles. The service fix for 22S41 is for dealers to update Secondary On-Board Diagnostic Control Module (SOBDMC) and the Battery Energy Control Module (BECM) software. The updated SOBDMC software monitors contactor temperature and intelligently reduces battery power to prevent further damage to the contactor. The updated BECM software monitors contactor resistance to identify a damaged contactor and will issue a diagnostic trouble code (DTC) and reduce vehicle power to prevent further damage.

At the time of this FSA approval, Ford's Critical Concern Review Group (CCRG) and Electrical Propulsion Engineering (EPE) teams judged the BECM and SOBDMC software updates to be an acceptable method of preventing the safety risk associated with a loss of motive power. The software update addressed the risk of loss of motive power by monitoring contactor resistance. Customers would receive a warning (described above) when resistance was measured higher than the threshold. In addition to this warning, the software would reduce power to prevent further damage to the contactors and address the risk of loss of motive power. The customer would still be able to accelerate to highway speeds safely with this power derate. This approach was also reviewed with the National Highway Traffic Safety Administration (NHTSA) at this time.

August - October 2023:

On **August 17, 2023**, National Highway Traffic Safety Administration (NHTSA) informed Ford that they had opened a Recall Query to assess the remedy of FSA 22S41. Specifically, for vehicles that alleged a loss of motive power after the completion of 22S41. Ford opened an investigation in CCRG to manage the Recall Query response to NHTSA.

In reviewing updated field data as part of Ford's ongoing monitor of recall effectiveness, CCRG and EPE reassessed their previous recommendations. Based on the new assessment, Extended Range and GT will receive a replacement Bussed Electrical Center (BEC) also referred to as the High Voltage Battery Junction Box (HVBJB).

The CCRG is not recommending any additional action on the Standard Range variants previously included in 22S41 because the Standard Range variation will see much less power at the contactors and has a much lower probability of latent contactor damage. Field data received after the completion of 22S41 shows that the remedy addressed the risk of loss of motive power for the Standard Range variants.

As of **October 4, 2023**, Ford is aware of 107 instances of high voltage contactor over-heating that resulted in a loss of motive power after completion of 22S41. 100 of these instances are on Extended Range or GT variants.

Ford is not aware of any accidents or injuries related to this concern.



ODI RESUME

US Dopartmont	Investigation:	RQ 23-004		
	Date Opened:	08/17/2023		
or iransportation	Investigator:	Jayson Winick	Reviewer:	Peter Kivett
National Highway	Approver:	Tanya Topka		
Traffic Safety	Subject:	High Voltage Battery Contacto	or Failure	
Administration				

MANUFACTURER & PRODUCT INFORMATION

Manufacturer:	Ford Motor Company
Products:	2021-2022 Ford Mustang Mach E
Population:	64,727 (Estimated)

Problem Description: High voltage battery contactors may overheat resulting in a loss of motive power.

FAILURE REPORT SUMMARY			
	ODI	Manufacturer	Total
Complaints:	12	TBD	12
Crashes/Fires:	0	TBD	TBD
Injury Incidents:	0	TBD	TBD
Number of Injuries:	0	TBD	TBD
Fatality Incidents:	0	TBD	TBD
Number of Fatalities:	0	TBD	TBD
Other*:	44	Confidential	Confidential

*Description of Other: Early Warning Reporting Field Reports

ACTION / SUMMARY INFORMATION

Action: Open this Recall Query (RQ)

Summary:

On June 10, 2022, Ford Motor Company (Ford) issued a safety recall (NHTSA Recall 22V-412) on 48,924 model year (MY) 2021-2022 Ford Mustang Mach-E vehicles produced from May 27, 2020, to May 24, 2022. This recall addressed high voltage battery main contactors that may overheat from direct current ("DC") fast-charging and repeated wide-open pedal events. Overheating may lead to arcing or deformation of the electrical contact surfaces, which may result in a contactor that remains open or a contactor that welds closed. An overheated contactor that opens while driving may result in an immediate loss of motive power without re-engagement, increasing the risk of a crash.

The Office of Defects Investigation (ODI) has opened this Recall Query (RQ) after receiving 12 consumer complaints alleging a high voltage battery main contactor failure in MY 2021-2022 Ford Mach-E vehicles (subject vehicles) that were included in Recall 22V-412 and remedied prior to the reported incidents. The remedy in this recall was a Secondary On-Board Diagnostic Control Module (SOBDMC) software update to monitor contactor temperature and reduce battery power to prevent damage to the contactor, and a Battery Energy Control Module (BECM) software update to monitor contactor resistance to identify an overheated contactor and reduce vehicle power to prevent further damage.

Following the recall, Ford issued Technical Service Bulletin TSB 23-2020, to replace the High Voltage Battery Junction Box (HVBJB) on the subject vehicles. Consumers who experienced loss of motive power after receiving the recall remedy reported that their vehicle had the HVBJB replaced, as outlined in TSB 23-2020, to properly remedy the failure of the contactors. This RQ has been opened to assess the remedy of Recall 22V-412.

The ODI complaints cited above can be viewed at NHTSA.gov under the following ODI identification numbers: 11472202, 11475350, 11477025, 11479095, 11479421, 11485995, 11493140, 11510437, 11511316, 11517977, 11525550, 11526050.

Manufacturer Name :Ford Motor CompanySubmission Date :JUN 10, 2022NHTSA Recall No. :22V-412Manufacturer Recall No. :22S41

Manufacturer Information :

Manufacturer Name : Ford Motor Company Address : 330 Town Center Drive Suite 500 Dearborn MI 48126-2738 Company phone : 1-866-436-7332

Population :

Number of potentially involved : 48,924 Estimated percentage with defect : 100 %

Vehicle Information :

Vehicle 1:	2021-2022 Ford Mustang Mach-E		
Vehicle Type :	LIGHT VEHICLES		
Body Style :	ALL		
Power Train :	NR		
Descriptive Information :	The recalled Secondary On-Board Diagnostic Control Module (SOBDMC) and the Battery Energy Control Module (BECM) software were introduced into production on 05/27/2020 and was taken out of production on 05/24/2022.		
	These vehicles are not produced in VIN order. Information as to the applicability of this action to specific vehicles can best be obtained by either calling Ford's toll-free line (1-866-436-7332) or by contacting a local Ford or Lincoln dealer who can obtain specific information regarding the vehicles from the Ford On-line Automotive Service Information System (OASIS) database.		
Production Dates :	MAY 27. 2020 - MAY 24. 2022		
VIN Range 1: H	Begin : NR End : NR		
Description of Defect :			
Description of the Defec	t: Direct Current ("DC") fast charging and repeated wide open pedal events can cause the high voltage battery main contactors to overheat. Overheating may lead to arcing and deformation of the electrical contact surfaces, which can result in a contactor that remains open or a contactor that welds closed.		
FMVSS	1: NR		
FMVSS	2: NR		
Description of the Safety Ris	k : An overheated contactor that opens while driving can result in a loss of motive power, which can increase the risk of an accident.		

Description of the Cause : The design and part-to-part variation of the high voltage battery main

The information contained in this report was submitted pursuant to 49 CFR \$573



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Identification of Any Warning that can Occur :	contactor is not robust to the heat generated during DC fast charging and multiple wide open pedal events. If the contactor opens while driving, a powertrain malfunction warning light will be illuminated and the vehicle will display "Stop Safely Now' in the cluster when the vehicle experiences an immediate loss of motive power. Should the contactors weld closed while driving, a powertrain malfunction warning light will be illuminated on the next drive cycle, along with a no start condition.
nvolved Components :	
Component Name 1 : S	Secondary On-Board Diagnostic Control Module Softw
Component Description : I	R19 – 3P AWD
Component Part Number : I	LJ98-14G069-FR
Component Name 2 : S	Secondary On-Board Diagnostic Control Module Softw
Component Description : I	R19 – 3P RWD
Component Part Number : I	LJ98-14G069-ER
Component Name 3 : S	Secondary On-Board Diagnostic Control Module Softw
Component Description : I	R19 – 4P AWD
Component Part Number : I	LJ98-14G069-DR
Component Name 4 : S	Secondary On-Board Diagnostic Control Module Softw
Component Description : I	R19 – 4P RWD
Component Part Number : 1	LJ98-14G069-CR
Component Name 5 : S	Secondary On-Board Diagnostic Control Module Softw
Component Description : I	R30 – 3P AWD
Component Part Number · 1	J98-14G069-FS

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Component Name 6 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R30 – 3P RWD
Component Part Number :	L 198-14G069-FS
component i al transfer .	
Component Name 7:	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R30 – 4P AWD
Component Part Number :	LJ98-14G069-DS
Component Name 8:	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R30 – 4P RWD
Component Part Number :	LJ98-14G069-CS
Component Name 9:	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R31/R32 – 3P AWD
Component Part Number :	LJ98-14G069-FT
Component Name 10 :	Secondary On Roard Diagnostic Control Module Softw
Component Description :	
Component Part Number :	LJ98-14G069-ET
Component Name 11:	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R31/R32 – 4P AWD
Component Part Number :	LJ98-14G069-DT
Component Name 12 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R31/R32 – 4P RWD
Component Part Number :	LJ98-14G069-CT

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Component Name 13:	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R33 – 3P AWD
Component Part Number :	LJ98-14G069-FU
Component Name 14 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R33 – 3P RWD
Component Part Number :	LJ98-14G069-EU
Component Name 15 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R33 – 4P AWD
Component Part Number :	LJ98-14G069-DU
Component Name 16 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R33 – 4P RWD
Component Part Number :	LJ98-14G069-CU
Component Name 17:	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R41 – 3P AWD
Component Part Number :	LJ98-14G069-AXB
Component Name 19.	Secondary On Board Diagnostic Control Module Softw
Component Description :	PA1 2D DWD
Component Dest Number	К41 - 51 КWD LIOS 140060 А7Р
component rait Number.	LJJ0-14000J-ALD
Component Name 19:	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R41 – 4P AWD
Component Part Number :	LJ98-14G069-BBB

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Component Name 20:	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R41 – 4P RWD
Component Part Number :	LJ98-14G069-BDB
Component Name 21 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R42/R43 – 3P AWD
Component Part Number :	LJ98-14G069-AXC
Component Name 22 :	Secondary Un-Board Diagnostic Control Module Softw
Component Description :	R42/R43 – 3P RWD
Component Part Number :	LJ98-14G069-AZC
Component Name 23 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R42/R43 – 4P AWD
Component Part Number :	LJ98-14G069-BBC
Component Name 24	Secondary On Roard Diagnostic Control Madule Softw
Component Name 24:	DA9 / DA2 AD DWD
Component Description :	R4Z/R43 - 4P RWD
Component Part Number :	LJ98-14G069-BDC
Component Name 25 .	Secondary On Board Diagnostic Control Module Softw
Component Description :	P44 2D AWD
Component Description :	
component Part Number :	ЦЭО-14000Э-АЛЛ
Component Name 26 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R44 – 3P RWD
Component Part Number :	LJ98-14G069-AZD

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Component Name 27: Secondary On-Board Diagnostic Control Module Softw Component Description: R44 - 4P AWD Component Name: LJ98-14G069-BBD Component Name: Secondary On-Board Diagnostic Control Module Softw Component Description: R44 - 4P RWD Component Part Number: LJ98-14G069-BDD Component Name: Secondary On-Board Diagnostic Control Module Softw Component Name: LJ98-14G069-ADD Component Name: LJ98-14G069-AXE Component Name: LJ98-14G069-AXE Component Name: LJ98-14G069-AXE Component Name: LJ98-14G069-AXE Component Part Number: LJ98-14G069-AXE Component Part Number: LJ98-14G069-AZE Component Name: Secondary On-Board Diagnostic Control Module Softw Component Part Number: LJ98-14G069-BBE Component Name: Secondary On-Board Diagnostic Control Module Softw Component Name: Secondary On-Board Diagnostic Control Module Softw Component Name: LJ98-14G069-BBE Component Name: LJ98-14G069-BBE Component Name: Secondary On-Board Diagnostic Control Module Softw Component Name: <td< th=""><th></th><th></th></td<>				
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Component Part Number : LJ98-14G069-AXF	Component Description :	R44 SR2/SR3 – 3P AWD		
	Component Part Number :	LJ98-14G069-AXF		

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Component Name 34 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R44 SR2/SR3 – 3P RWD
Component Part Number :	LJ98-14G069-AZF
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Component Name 35:	Secondary Un-Board Diagnostic Control Module Softw
Component Description :	R44 SR2/SR3 – 4P AWD
Component Part Number :	LJ98-14G069-BBF
Component Name 36 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R44 SR2/SR3 – 4P RWD
Component Part Number :	LJ98-14G069-BDF
Component Name 37 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R44 SR4 – 3P AWD
Component Part Number :	LJ98-14G069-AXG
Component Name 38 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R44 SR4 – 3P RWD
Component Part Number :	L 198-14G069-A7G
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Component Name 39 :	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R44 SR4 – 4P AWD
Component Part Number :	LJ98-14G069-BBG
Component Name 40:	Secondary On-Board Diagnostic Control Module Softw
Component Description :	R44 SR4 – 4P RWD
Component Part Number :	LJ98-14G069-BDG

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Component Name 41 :	Battery Energy Control Module Software		
Component Description :	R19/R30 – 3P		
Component Part Number :	LJ98-14C197-AF		
Component Name 42 :	Battery Energy Control Module Software		
Component Description :	R19/R30 – 4P		
Component Part Number :	LJ98-14C197-BF		
0 IN 40			
Component Name 43:	Battery Energy Control Module Software		
Component Description :	R31/R32/R33 – 3P		
Component Part Number :	LJ98-14C197-AG		
Component Name 44 :	Battery Energy Control Module Software		
Component Description :	R31/R32/R33 - 4P		
Component Part Number :	LJ98-14C197-BG		
Component Name 45 :	Battery Energy Control Module Software		
Component Description :	R41/R42 – 3P		
Component Part Number :	LJ98-14C197-AH		
Component Name 46 ·	Battery Energy Control Module Software		
Component Description ·	R41/R42 – 4P		
Component Part Number :	LJ98-14C197-BH		
0			
Component Name 47:	Battery Energy Control Module Software		
Component Description :	K43/K44 - 3P		
Component Part Number :	NJ98-14C197-AA		

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Component Name 48 :	Battery Energy Control Module Software
Component Description :	R43/R44 - 4P
Component Part Number :	NJ98-14C197-BA

Component Name 49:	Battery Energy Control Module Software
Component Description :	R44 SR1/SR2/SR3/SR4 - 3P
Component Part Number :	NJ98-14C197-AB

Component Name 50 :	Battery Energy Control Module Software
Component Description :	R44 SR1/SR2/SR3/SR4 - 4P
Component Part Number :	NJ98-14C197-BB

Supplier Identification :

Component Manufacturer

Name : Ford Motor Company Address : One American Road Dearborn Michigan 48126 Country : United States

Chronology:

On April 12, 2022, an issue pertaining to high voltage battery main contactor overheating was brought to Ford's Critical Concern Review Group for review.

In April and May of 2022, Ford investigated warranty claims to quantify performance differences between vehicle variants. Ford conducted a read-across of other vehicle lines utilizing high voltage battery contactors.

Between July 13, 2021 and May 31, 2022, there have been 286 warranty claims in North America related to an open or welded contactor. Ford is aware of one VOQ alleging a no-start and listing DTCs related to this concern.

On June 3, 2022, Ford's Field Review Committee reviewed the concern and approved a field action.

Ford is not aware of any reports of accident or injury related to this condition.

Part	573	Safety	Recall	Report
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Description of Remedy :	
Description of Remedy Program :	The remedy for this program is a Secondary On-Board Diagnostic Control Module (SOBDMC) and Battery Energy Control Module (BECM) software update. Ford is anticipated to begin Over-The-Air (OTA) deployment to update the SOBDMC an BECM software for affected vehicles in July 2022. Alternatively, owners will have the option to take their vehicle to a Ford or Lincoln dealer to complete the software update. There will be no charge for this service.
	Ford provided the general reimbursement plan for the cost of remedies paid for by vehicle owners prior to notification of a safety recall in May 2021. The ending date for reimbursement eligibility is estimated to be January 31, 2023
	Ford will forward a copy of the notification letters to dealers to the agency when available.
How Remedy Component Differs from Recalled Component :	The updated SOBDMC software (LJ98-14G069-AXG, LJ98-14G069-AZG, LJ98-14G069-BBG, LJ98-14G069-BDG) will monitor contactor temperature and intelligently reduce battery power to prevent damage to the contactor. The updated BECM software (NJ98-14C197-AE, NJ98-14C197-BD) will monitor contactor resistance to identify an overheated contactor and reduce vehicle power to prevent further damage.
Identify How/When Recall Condition was Corrected in Production :	The updated SOBDMC software and BECM software was introduced into production on May 25, 2022.
Recall Schedule :	
Description of Recall Schedule :	Notification to dealers is expected to occur on June 13, 2022. Mailing of owner notification letters is expected to begin July 18, 2022 and is expected to be completed by July 22, 2022.
Planned Owner Notification Date :	JUL 18, 2022 - JUL 22, 2022

* NR - Not Reported