



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



1200 New Jersey Avenue SE.  
Washington, DC 20590

JUL 16 2019

**CERTIFIED MAIL**  
**RETURN RECEIPT REQUESTED**

Wayne Gates, Director  
Engineering and Design Analysis  
Hyundai Motor America  
10550 Talbert Avenue  
Fountain Valley, CA 92708

NEF-103no  
EA19-001

Dear Mr. Gates:

This letter is to inform you that the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) has opened an Engineering Analysis (EA) 19-001 to investigate allegations of the failure of the airbag control units (ACUs) supplied by ZF-TRW (ZF) in certain Hyundai vehicles identified in Attachment One, and to request certain information.

For all manufacturers believed to be using the subject ACU, this office has investigated more than 15 incidents where the frontal airbags did not deploy in a medium or high severity frontal collision. All of these incidents were identified through proactive efforts conducted by NHTSA, primarily by staff working at the Vehicle Research and Test Center in East Liberty, Ohio (and therefore no Vehicle Owner Questionnaire report numbers are identified). Assessment of these incidents found that at least five of the vehicles experienced confirmed damage to the vehicle electrical system during the crash, which produced electrical overstress (EOS) damage to an internal ACU component, specifically an application specific integrated circuit (ASIC) denominated DS84. In these confirmed incidents, the EOS failure of the DS84 ASIC subsequently prevented deployment of one or more air bags, and/or other restraint system components during the crash event.

Unless otherwise stated in the text, the following definitions apply to these information requests:

- **Subject Vehicles:** All Hyundai vehicles equipped with the Subject Component manufactured for sale or lease in the United States, including, but not limited to, the District of Columbia, and current U.S. territories and possessions.
- **Subject Component:** All Airbag Control Units manufactured by ZF-TRW (ZF), or any ACUs derived from ZF design(s) manufactured by any Alternate Supplier that contain the DS84 ASIC.

- **Supplier:** ZF (including all predecessor corporate entities) and all alternate suppliers identified in response 1(d).
- **Alternate Supplier:** Any supplier manufacturing ACU units derived from any ZF ACU design which incorporates the DS84 ASIC.
- **Crash Event:** A single or related series of crashes occurring within a time span of 1 minute or less.
- **Alleged Defect:** Failure of the ACU to maintain full operational function during a crash event due to ACU reset or shutdown from electrical overstress damage to the DS84 ASIC, or an ACU reset caused by electrical transients entering the ACU on any of the DS84 ASIC communications lines to satellite crash sensors.

Indications typically associated with the alleged defect include, but are not limited to:

- A. A non-deployment frontal crash event resulting in fatal and/or serious injury (AIS Code 3 or above);
  - B. Inability to establish communication with the ACU in post-crash assessment;
  - C. One or more Event Data Recorder (EDR) record(s) was found to be incomplete for the most recent crash event;
  - D. The ACU is missing one or more crash record(s) for the most recent crash event;
  - E. Hyundai's decision to submit the ACU to ZF and/or an Alternate Supplier for inspection and analysis;
  - F. Identification of physical EOS damage to the DS84 ASIC;
  - G. Measurement of resistance from Vcc to ground on the ACU below 1(one) kilo-ohm; and/or
  - H. Identification of any post-crash fault codes, as provided in response 9, that are associated with a shutdown or reset of the ACU during a crash event.
- **Hyundai:** Hyundai Motor America, all of its past and present officers and employees, whether assigned to its/their principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of Hyundai (including all business units and persons previously referred to), who are or, in or after January 2008; were involved in any way with any of the following related to the alleged defect in the subject vehicles:
    - a. Design, engineering, analysis, modification or production (e.g. quality control);
    - b. Testing, assessment or evaluation;
    - c. Consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or

- d. Communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers.
- **Document:** “Document(s)” is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all non-identical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by Hyundai, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a non-identical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, “document(s)” also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by Hyundai or not. If a document is not in the English language, provide both the original document and an English translation of the document.
  - **Other Terms:** To the extent that they are used in these information requests, the terms “claim,” “consumer complaint,” “dealer field report,” “field report,” “fire,” “fleet,” “good will,” “make,” “model,” “model year,” “notice,” “property damage,” “property damage claim,” “rollover,” “type,” “warranty,” “warranty adjustment,” and “warranty claim,” whether used in singular or in plural form, have the same meaning as found in 49 CFR 579.4.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Insofar as Hyundai has previously provided a document to ODI, Hyundai may produce it again or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the organization of this information request letter (including all individual requests and subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

Please repeat the applicable request verbatim above each response. After Hyundai's response to each request, identify the source of the information and indicate the last date the information was gathered.

1. State, by model and model year, the number of subject vehicles Hyundai has manufactured for sale or lease in the United States. Separately, for each subject vehicle manufactured to date by Hyundai, state the following:
  - a. Make;
  - b. Model;
  - c. Model Year;
  - d. Supplier of the subject component (ZF or Alternate Supplier); and
  - e. The part number(s) (service and engineering) of the subject component.

Provide the table in Microsoft Access 2010, or a compatible format, entitled "PRODUCTION DATA."

2. State, by model and model year the number of each of the following, received by Hyundai, or of which Hyundai is otherwise aware, which relate to, or may relate to, the alleged defect in the subject vehicles:
  - a. Consumer complaints, including those from fleet operators;
  - b. Field reports, including dealer field reports;
  - c. Reports for ACUs returned from the field or from test vehicles;
  - d. Reports involving a crash, injury or fatality;
  - e. Property damage claims;
  - f. Third-party arbitration proceedings where Hyundai is or was a party to the arbitration; and
  - g. Lawsuits, both pending and closed, in which Hyundai is or was a defendant or codefendant.

For subparts "a" through "g" state the total number of each item (e.g., consumer complaints, field reports, etc.) separately. Multiple incidents involving the same vehicle are to be counted separately. Multiple reports of the same incident are also to be counted separately (i.e., a consumer complaint and a field report involving the same incident in which a crash occurred are to be counted as a crash report, a field report and a consumer complaint).

In addition, for items “d” through “g” provide a summary description of the alleged problem and causal and contributing factors and Hyundai’s assessment of the problem, with a summary of the significant underlying facts and evidence. For items “f” and “g,” identify the parties to the action, as well as the caption, court, docket number, and date on which the complaint or other document initiating the action was filed.

3. Separately, for each item (complaint, report, claim, notice, or matter) within the scope of your response to Request No. 2, state the following information:
  - a. Hyundai’s file number or other identifier used;
  - b. The category of the item, as identified in Request No. 2 (i.e., consumer complaint, field report, etc.);
  - c. Vehicle owner or fleet name (and fleet contact person), street address, email address and telephone number;
  - d. Vehicle’s VIN;
  - e. Vehicle’s make, model and model year;
  - f. Vehicle’s mileage at time of incident;
  - g. Incident date;
  - h. Report or claim date;
  - i. Whether a crash is alleged;
  - j. Whether property damage is alleged;
  - k. Number of alleged injuries, if any;
    - i) The AIS score of the injuries; and
    - ii) Description of injury and location.
  - l. Number of alleged fatalities, if any;
  - m. Supplier of the Subject Component; and
  - n. All applicable indicators for the Alleged Defect (items A through H, as identified above).

Provide this information in Microsoft Access 2010, or a compatible format, entitled “REQUEST NUMBER TWO DATA.”

4. Produce copies of all documents related to each item within the scope of Request No. 2. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method Hyundai used for organizing the documents. Describe in detail the search methods and search criteria used by Hyundai to identify the items in response to Request No. 2.
5. Describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, “actions”) that relate to, or may relate to, the alleged defect in the subject vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, Hyundai. For each such action, provide the following information:
  - a. Action title or identifier;
  - b. The actual or planned start date;
  - c. The actual or expected end date;
  - d. Brief summary of the subject and objective of the action;

- e. Engineering group(s)/supplier(s) responsible for designing and for conducting the action;  
and
- f. Brief summary of the findings and/or conclusions resulting from the action.

For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action.

6. Testing by multiple parties indicates that negative voltage transients, with respect to chassis ground, on the satellite sensor signal wires are capable of producing the EOS damage to the DS84 ASIC which leads to resets and/or shutdown of the ACU during crash events. Separately from Response 5, describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, "actions") that relate to, or may relate to, the alleged defect which evaluates performance of the Subject Component ACU designs and/or peer ACU designs, from any ACU supplier including ZF, for transient voltage susceptibility on the satellite crash sensor, battery power, or ground wires, that have been conducted, are being conducted, are planned, or are being planned by, or for, Hyundai. For each such action, provide the following information:
  - a. Action title or identifier (can be cross referenced to actions provided in Response 5);
  - b. The actual or planned start date;
  - c. The actual or expected end date;
  - d. Brief summary of the subject and objective of the action;
  - e. Engineering group(s)/supplier(s) responsible for designing and for conducting the action;
  - f. Copies of all procedures used to conduct the tests, along with a list of test equipment utilized for the tests; and
  - g. A summary of the findings and/or conclusions resulting from the action.

For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action.

7. For every Subject Component ACU design which shares a similar satellite sensor protection design (i.e. equivalent circuit protection devices providing similar levels of negative transient protection), and for each ACU design or modified design (including intermediated harnesses) used as a remedy repair for vehicles previously recalled for the Alleged Defect, provide the following:
  - i) A simplified ACU circuit showing the protection devices for each satellite sensor line along with any current limiting devices incorporated into the ACU power circuitry separate from the satellite sensor communications lines. Additionally, the data sheet for each device shown in the circuit diagram shall be included with this submission.
  - ii) The level of negative transient protection specified, in both voltage level and duration at that voltage level. If available, include a voltage versus duration curve (i.e. the envelope) depicting the protection capability. If the negative transient protection has been evaluated using a different electrical measurement/metric (i.e. current, power, or

other parameter), provide a detailed explanation of the parameter used and provide duration and parameter versus duration information as requested above for voltage.  
 iii) All actions identified in Response 6(a) which apply to each particular ACU design.

8. Provide the following information for each unique part number identified in response 1(e):
  - a. Original design specification sent to supplier;
  - b. All modifications or changes made by, or on behalf of, Hyundai in the design, material composition, manufacture, quality control, supply, or installation of the subject component, from the start of production to date, which relate to, or may relate to, the alleged defect in the subject vehicles;
  - c. The date or approximate date on which the modification or change was incorporated into vehicle production;
  - d. A detailed description of the modification or change;
  - e. Whether the modified component can be interchanged with earlier production components; and
  - f. The applicable simplified circuit identified in Response 7.

Also, provide the above information for any modification or change that Hyundai is aware of which may be incorporated into vehicle production within the next 120 days.

9. For the subject vehicles, provide for each model and model year, a list of all possible fault codes and/or diagnostic trouble codes stored in the ACU or other modules located anywhere on the vehicle which could be associated with the alleged defect. For each fault code provide:
  - a. The identifier for the code;
  - b. The module or other hardware which contains the code;
  - c. A description of the code;
  - d. The conditions which result in the code being set; and
  - e. The tools, software, and procedures required to download the code.
10. Produce engineering drawings, photos, and/or documents for each unique design version of the Subject Vehicles related to the electrical wiring configurations forward of the firewall:
  - a. Original design specification;
  - b. Modified design specification;
  - c. Location(s) of the front impact sensors; and
  - d. Description of every unique bundle cross-section including:
    - i) Descriptions of each wire in the bundle cross-section;
    - ii) Indicate whether the wire is connected to the ACU and whether the wire also connects to a DS84 ASIC
    - iii) The voltage and current load specifications for each wire;
    - iv) Description of any electrical shielding techniques applied to a wire or a sub-group of wires (twisted pair, foil shielding, etc.)

Also, provide the above information for any modification or change that Hyundai is aware of which may be incorporated into vehicle production within the next 120 days.

11. Furnish Hyundai's assessment of the alleged defect in the subject vehicle, including:
- a. The causal or contributory factor(s);
  - b. The failure mechanism(s);
  - c. The failure mode(s);
  - d. Any prior safety recalls Hyundai has conducted to address EOS related failures of the subject ACU, the remedy that was utilized in that recall action, and how, in Hyundai's assessment, that action addresses any residual risk of an EOS failure of the DS84 ASIC;
  - e. The risk to motor vehicle safety that it poses; and
  - f. What warnings, if any, the operator and the other persons both inside and outside the vehicle would have that the alleged defect was occurring or subject component was malfunctioning.

### **Legal Authority for This Request**

This letter is being sent to Hyundai pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49 and to request reports and the production of things. It constitutes a new request for information.

### **Civil Penalties**

Hyundai's failure to respond promptly and fully to this letter could subject Hyundai to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. (Other remedies and sanctions are available as well.) The Vehicle Safety Act, as amended, 49 U.S.C. § 30165(a)(3), provides for civil penalties of up to \$21,780 per violation per day, with a maximum of \$108,895,910 for a related series of daily violations, for failing or refusing to perform an act required under 49 U.S.C. § 30166. See 49 CFR 578.6 (as amended by Fixing America's Surface Transportation Act (the "FAST Act"), Pub. L. 114-94, § 24110(a)(2), 129 Stat. 1312 (Dec. 4, 2015)). This includes failing to respond completely, accurately, and in a timely manner to ODI information requests.

If Hyundai cannot respond to any specific request or subpart(s) thereof, please state the reason why it is unable to do so. If on the basis of attorney-client, attorney work product, or other privilege, Hyundai does not submit one or more requested documents or items of information in response to this information request, Hyundai must provide a privilege log identifying each document or item withheld, and stating the date, subject or title, the name and position of the person(s) from, and the person(s) to whom it was sent, and the name and position of any other recipient (to include all carbon copies or blind carbon copies), the nature of that information or material, and the basis for the claim of privilege and why that privilege applies.

### **Confidential Business Information**

**All business confidential information must be submitted directly to the Office of Chief Counsel as described in the following paragraph and should not be sent to this office.** In addition, do not submit any business confidential information in the body of the letter submitted



to this office. Please refer to EA19-001 in Hyundai's response to this letter and in any confidentiality request submitted to the Office of Chief Counsel.

If Hyundai claims that any of the information or documents provided in response to this information request constitute confidential commercial material within the meaning of 5 U.S.C. § 552(b)(4), or are protected from disclosure pursuant to 18 U.S.C. § 1905, Hyundai must submit supporting information together with the materials that are the subject of the confidentiality request, in accordance with 49 CFR Part 512, as amended, to the Office of Chief Counsel (NCC-100), National Highway Traffic Safety Administration, Room W41-227, 1200 New Jersey Avenue, S.E., Washington, D.C. 20590. Hyundai is required to **submit two copies of the documents containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted.** Please remember that the phrase "ENTIRE PAGE CONFIDENTIAL BUSINESS INFORMATION" or "CONTAINS CONFIDENTIAL BUSINESS INFORMATION" (as appropriate) must appear at the top of each page containing information claimed to be confidential, and the information must be clearly identified in accordance with 49 CFR 512.6. If you submit a request for confidentiality for all or part of your response to this IR, that is in an electronic format (e.g., CD-ROM), your request and associated submission must conform to the new requirements in NHTSA's Confidential Business Information Rule regarding submissions in electronic formats. See 49 CFR 512.6(c) (as amended by 72 Fed. Reg. 59434 (October 19, 2007)).

If you have any questions regarding submission of a request for confidential treatment, contact Daniel Rabinovitz, Trial Attorney, Office of Chief Counsel at Daniel.Rabinovitz@dot.gov or (202) 366-8534.

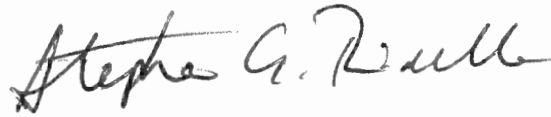
### **Due Date**

Hyundai's response to this letter, in duplicate, together with a copy of any confidentiality request, must be submitted to this office by **August 30, 2019**. Hyundai's response must include all non-confidential attachments and a redacted version of all documents that contain confidential information. If Hyundai finds that it is unable to provide all of the information requested within the time allotted, Hyundai must request an extension from Paul Simmons at (202) 366-2315 no later than five business days before the response due date. If Hyundai is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information Hyundai then has available, even if an extension has been granted.

Please send email notification to Nathan Ong at Nathan.Ong@Dot.Gov and to ODI\_IRresponse@dot.gov when Hyundai sends its response to this office and indicate whether there is confidential information as part of Hyundai's response.

If you have any technical questions concerning this matter, please call Nathan Ong of my staff at (202) 366-1661.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen A. Ridella". The signature is written in a cursive style with a large, prominent initial 'S'.

Stephen Ridella, Ph.D.

Director

Office of Defects Investigation

## Attachment One – EA19-001 Hyundai

The Make, Model, and Model Year vehicles listed in the table below are the subject vehicles for this information request.

<b>MFG</b>	<b>Make</b>	<b>Model</b>	<b>Model Year</b>
<b>Hyundai</b>	Hyundai	Sonata	2013 to 2019
	Hyundai	Sonata Hybrid	2013 to 2019