GM	WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW16552

Semiconductor Change Process Specification

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This standard defines the GM Supplier Hardware Change Management Process for Semiconductor Part Changes. This process is the means by which the Electrical Component/Subsystem Supplier shall propose changes directly to GM, or to GM and GM's Integration Supplier when there is an Integration Supplier, due to Unexpected Part Shortages, part "end of life", part modifications, etc. This process does not apply to changes, made due to a change request from GM, that affect functions or features, changes to correct non-compliances, etc. The Electrical Component/Subsystem Supplier is defined as a supplier who receives electrical requirements from GM.

The Supplier Hardware Change Management Process for Semiconductor Part Changes is to be used as a method for communicating the technical viability of a change proposal for any electrical component/subsystem. Any approval authority stated herein shall apply only to the technical element of the proposed change. This process does not replace the Engineering Work Order (EWO) or any other GM cost and investment process where the supplier receives authorization to change piece price, investment, etc. Also, this process does not replace any Production Part Approval Process (PPAP) or supplier quality requirements and processes**.**

1.2 Applicability. This specification describes the process a supplier shall use to request approval for a semiconductor part change that may occur during normal production. This process includes the following:

a. Information that shall be included with the request, including supplier tasks to be completed prior to submitting the request.

b. Timing of information submittal, approval, completion of testing, and change in parts of delivered GM components.

c. Types of Semiconductor changes and the typical testing required based on the change including electrical behavior, environmental testing and Electromagnetic Compatibility (EMC) testing.

1.3 Remarks. Within this document the following conventions are applied:

The word "**Shall**" shall be used in the following ways:

a. To state a binding requirement, which is verifiable by external manipulation and/or observation.

b. To state a binding requirement upon a requirement's document that is verifiable through a review of the document.

The word "**Must**" shall be used to state a binding requirement which will have a corresponding Electronic Control Unit (ECU) document or Component Requirements Document. These requirements will be verified as part of the component verification.

The word "**Should**" denotes a preference or desired conformance.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

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2.2 GM Standards/Specifications.

GMW3059 GMW3097 GMW3172

3 Test Preparation and Evaluation

3.1 Resources. Not applicable.

3.1.1 Facilities. Not applicable.

3.1.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.1.2 Equipment. Not applicable.

3.1.3 Test Vehicle/Test Piece. Not applicable.

3.1.4 Test Time. Not applicable.

3.1.5 Test Required Information. Not applicable.

3.1.6 Personnel/Skills. Not applicable.

3.2 Preparation. Not applicable.

3.3 Conditions. Not applicable.

3.3.1 Environmental Conditions. Not applicable.

3.3.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

3.4 Instructions. Not applicable.

3.5 Data. Not applicable.

3.6 Safety.

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

3.7 Documentation. Samples of components or material released to this standard shall be tested for conformity with the requirements of this standard and approved by the responsible GM Department prior to the start of delivery of production level components or materials.

Any change to the component or material, e.g., design, function, properties, manufacturing process and/or location of manufacture requires a new release of the product. It is the sole responsibility of the supplier to provide the customer, unsolicited, with documentation of any change or modification to the product/process, and to apply for a new release.

If not otherwise agreed to, the entire verification test shall be repeated and documented by the supplier prior to start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.7.1 Test Results. Not applicable.

4 Requirements and Procedure

4.1 Timing. The supplier shall inform GM Engineering as soon as the potential for a parts shortage or change exists. GM Engineering will work with the supplier to approve alternate parts, to help create a validation plan to verify the alternate part meets the requirements, and to establish any necessary tracking information. When necessary, GM Engineering may help find other sources for the part.

4.2 Information to Include in Change Request. The supplier shall provide all of the following information to GM Engineering when requesting approval to change a part.

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4.2.1 Part Projected to Run Short, Reach "End of Life" or Be Modified During Component Lifetime, etc.

4.2.1.1 Complete Part Number. The supplier shall provide the complete tiered supplier's part number for the part including all prefixes and suffixes used when ordering this part.

4.2.1.2 Part Data Sheet. The supplier shall provide a complete data sheet for the tiered supplier's part. The supplier shall also provide all application notes, change notices, etc., that are available for this part.

4.2.1.3 Parts Source. The supplier shall indicate from whom they purchase this part whether it is the manufacturer or a distributer. If the supplier purchases this part from a distributer, they shall include the distributer's name and the number used to order this part.

4.2.2 Reason for Part Change Request. The supplier shall provide a detailed explanation of why the original part is not available whether it is due to a temporary shortage, a change is being made to the part, a plant had a spill, etc.

4.2.3 Components Impacted. The supplier shall provide a list of all components that they produce for GM that includes this part and the number of pieces of this part required for each one.

4.2.4 Amount of Projected Shortage. If this request is because it is expected that there will not be sufficient quantities of the current part available, the supplier shall provide information on the expected number of parts required and the expected number of parts available per week, or day when available, for the period of the projected shortage.

4.2.5 Proposed Date of Change. The supplier shall provide the proposed date of change when they plan to start shipping components with the recommended replacement part.

4.2.5.1 Date of Replacement Part Availability. The supplier shall provide the date that the proposed replacement part will be fully qualified and available from the semiconductor supplier.

4.2.5.2 Last Order Date of Current Part. The supplier shall provide the last date that the current part can be ordered from the semiconductor supplier. The supplier shall also state if this part is available as a "one time buy" where they indicate the number of parts they will need over a specific period of time.

4.2.6 Recommended Replacement Part. The supplier shall provide the following information for any recommended replacement parts that they are proposing.

4.2.6.1 Recommended Replacement Part Number. The supplier shall provide the complete tiered supplier's part number for the recommended replacement part including all prefixes and suffixes that would be used when ordering this part.

4.2.6.2 Recommended Replacement Part Data Sheet. The supplier shall provide a complete data sheet for the recommended replacement part. The supplier shall also provide all application notes, change notices, etc., that are available for this part.

4.2.6.3 Variation on Original Part. Is this a variation on the original part? This would be a part from the same family with different parameters, i.e., different tolerance, different temperature rating, different fabrication, etc.

4.2.6.4 Original and Recommended Replacement Part Materials. The supplier shall provide details on all materials in the original part and in the recommended replacement part including encapsulation material type and coefficient of thermal expansion, terminal plating material and thickness, lead frame material and thickness, bonding material, etc.

4.2.6.5 Industry Qualification Test Results for the Recommended Replacement Part. The supplier shall provide the qualification test results for the recommended replacement part, e.g., test results per Automotive Electronics Council (AEC) qualification standards, or equivalent industry standards, EMC test results per CISPR25, etc.

4.2.6.6 Recommended Replacement Part Used in Other Components for GM or Other Original Equipment Manufacturer (OEM). Is this recommended replacement part used on other components? If yes, provide the following information**.**

a. Is this component in production? If yes, when did production start?

b. Describe the way in which this recommended replacement part is used in the other component.

c. Describe the process that is used to attach the recommended replacement part to the Printed Circuit Board (PCB) in the other component including solder alloy composition, solder profile, soldering method, PCB material type, and location on the PCB.

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d. Describe the characteristics of the recommended replacement part including terminal plating material and thickness.
e. Describe the orientation of the component in the vehicle where the recommended replacement part is used.
f. Electromagnetic Compatibility (EMC) (similar to GMW3097) test results and test plans for the component which uses this recommended replacement part. Provide the GM approval numbers for test plan and data when available.
g. Environmental (similar to GMW3172) test results for the component which uses this recommended replacement part.
h. Electrical behavior test results for the component which uses this recommended replacement part.

4.2.6.7 Testing Performed on Recommended Replacement Part. The supplier shall provide the test plan and results of all testing that have been done using the recommended replacement part in the affected component.

4.2.6.8 Known Errata and Workarounds.

4.2.6.8.1 Tiered Supplier Errata and Workaround Documents. The supplier shall provide all existing tiered supplier Errata and Workaround documents.

4.2.6.8.2 Suppliers Analysis of Errata and Workarounds. The supplier shall provide an analysis of the impact of the Errata and Workarounds to the behavior of the component and shall detail any hardware or software changes required to mitigate these Errata and Workarounds.

4.2.6.8.3 Original Part Errata and Workarounds. If the original part which is being replaced had any Errata or Workarounds that the recommended replacement part does not have, the supplier shall detail any hardware or software changes required to remove the Workarounds.

4.2.7 Electrical Behavior Analysis of Change. The supplier shall provide a detailed analysis of the behavior of the recommended replacement part in the circuit compared to the behavior in the circuit of the component which already uses this recommended replacement part. Also, include power dissipation, operating voltage range, current carrying capability, slew rate, ability to meet the requirements in the Component Technical Specification (CTS), etc.

4.2.8 Continuous Improvement. Is the Component subject to continuous improvement? If yes, explain the continuous improvement.

Is the circuit that includes the recommended replacement part subject to continuous improvement due to a previous deviation? If yes, explain the continuous improvement.

4.2.9 Software Changes Required by Change. The supplier shall detail any software changes required to effectively use the recommended replacement part. Software Changes may require additional revalidation that is out of scope for this document. This additional validation will be determined by GM Engineering.

4.2.10 PCB Changes Required by Change. The supplier shall detail any PCB changes required to effectively use the recommended replacement part. PCB Changes may require additional revalidation that is out of scope for this document. This additional validation will be determined by GM Engineering.

4.2.11 Schematic Modification. The supplier shall provide a schematic that clearly shows the parts to be changed and the replacement parts with enough detail to understand functionality.

4.2.12 Test Plan. The supplier shall provide a proposed test plan including tests to be performed, proposed, scheduled test dates, testing locations, etc.

4.3 Testing to be Performed. The following tests are those that are likely to be required by GM Engineering based on the type of change being made and should be included in the test plan provided; however, GM Engineering reserves the right to require additional tests based on the specific change proposed.

In the event that the affected Component is subject to annual revalidation, every effort should be made to delay the proposed change so that it can be included in the scheduled annual revalidation.

4.3.1 Electrical Behavior Tests. Paragraphs 4.3.1 and 4.3.2 specify which changes may not require and which are likely to require electrical testing or analysis to determine if the change is acceptable. The type of electrical testing or analysis that is required for different electrical circuit applications is also included.

4.3.1.1 Types of Change Requests. The recommended replacement part may be a part from another supplier; it may be a different part number from the same supplier; or it may be a modification to the existing part by the supplier. The various changes are listed in 4.3.1.1.1 thru 4.3.1.1.3.

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