

ATTACHMENT 3

AEC - Q102-003

OPTOELECTRONIC MULTICHIP MODULES (OE-MCM)

Automotive Electronics Council

Component Technical Committee

Acknowledgment

Any document involving a complex technology brings together experience and skills from many sources. The Automotive Electronics Council would especially like to recognize the following significant contributors to the revision of this document:

AEC Q102-003 Sub-Committee Members:

Philipp Plathner	ams OSRAM
Christian Jung	ams OSRAM
Markus Ritzer	ams OSRAM
Stefan Tuebel	ams OSRAM
Marcus Rühl	Continental Corporation
Mihai Sauciuc	Continental Corporation
Steven Bergeron	Cree-LED
Hartmut Wettengl	Dominant
Uwe Berger <i>[Q102 Team Leader]</i>	Hella
Ludger Kappius	Hella
Michael Holub	Lumileds
Doug Lesser	Lumileds
Mark Spencer	Lumileds
Mark Urlaub	Lumileds
Ebru Bakir Kandemir	Magneti Marelli
Bastian Kopp	Magneti Marelli
Saori Mitsuhashi	Nichia
Thomas Koschmieder	Veoneer
Maricel Wolfertz	Veoneer
Martin Gärtner	Vishay
Sergey Sheva	ZKW

Other Contributors:

Sridhar YC	Aptiv
Ulrich Abelein	Infineon Technologies
Peter Turlo	onsemi

Automotive Electronics Council
Component Technical Committee

NOTICE

AEC documents contain material that has been prepared, reviewed, and approved through the AEC Technical Committee.

AEC documents are designed to serve the automotive electronics industry through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining with minimum delay the proper product for use by those other than AEC members, whether the standard is to be used either domestically or internationally.

AEC documents are adopted without regard to whether or not their adoption may involve patents or articles, materials, or processes. By such action AEC does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the AEC documents. The information included in AEC documents represents a sound approach to product specification and application, principally from the automotive electronics system manufacturer viewpoint. No claims to be in conformance with this document shall be made unless all requirements stated in the document are met.

Inquiries, comments, and suggestions relative to the content of this AEC document should be addressed to the AEC Technical Committee on the link <http://www.aecouncil.com>.

Published by the Automotive Electronics Council.

This document may be downloaded free of charge, however AEC retains the copyright on this material. By downloading this file, the individual agrees not to charge for or resell the resulting material.

Printed in the U.S.A.
All rights reserved

Copyright © 2022 by the Automotive Electronics Council. This document may be freely reprinted with this copyright notice. This document cannot be changed without approval from the AEC Technical Committee.

METHOD – 003

OPTOELECTRONIC MULTICHIP MODULES (OE-MCM)

1. SCOPE

The qualification requirements for discrete optoelectronic semiconductors are specified in AEC-Q102. The qualification requirements for multichip modules (MCM) are specified in AEC-Q104. However, it does not cover all specifics for the qualification of optoelectronic MCMs (OE-MCMs). This document was created to specify additional and detailed requirements for OE-MCMs in accordance to AEC-Q104. While it is not possible to define general test conditions, covering the specifics of all feasible OE-MCMs, this document outlines how to identify appropriate test conditions.

IMPORTANT NOTE: Any single sub-component of the OE-MCM is not considered “AEC-qualified” if stress-tested only through the OE-MCM qualification.

1.1 Definition of an Optoelectronic Multichip Modules (OE-MCMs)

For the general definition of Multichip Modules, see AEC-Q104.

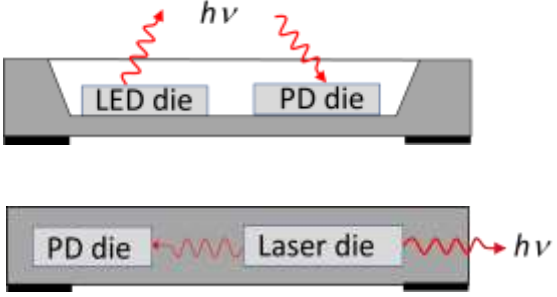
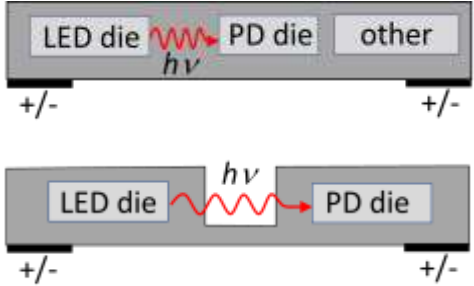
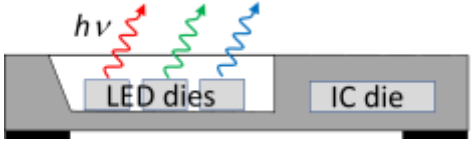
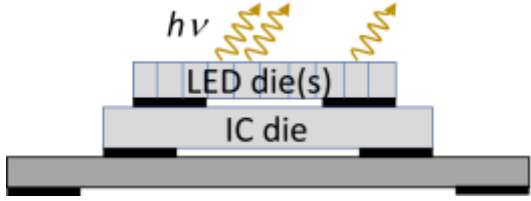
OE-MCMs consist of multiple active and/or passive sub-components including at least one optical sub-component interconnected to create a single complex circuit within a single MCM package that is intended for direct attachment to a printed circuit board (e.g., by soldering or gluing). Individual sub-components may be packaged (e.g., molded) and/or unpackaged (e.g., bare die) and are combined into a single package, so constructed that, for the purpose of specification, testing, qualification, commerce and maintenance, the package is considered to be indivisible.

Any integrated circuit (component), discrete semiconductor (component), passive electrical component or optoelectronic semiconductor (component), which is integrated into the OE-MCM package, is denoted as “sub-component of the OE-MCM”.

The primary purpose of an OE-MCM is the detection and/or emission of light but some OE-MCMs may use the optoelectronic functions only internally (e.g., optocoupler and light barriers). The following Table 1 gives a classification parts, considered to be OE-MCMs.

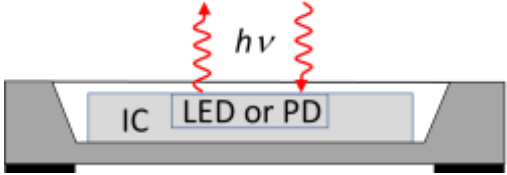
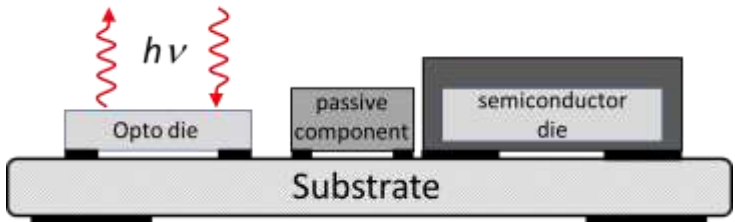
Automotive Electronics Council
Component Technical Committee

Table 1: Parts, Considered to be OE-MCMs
(Note: " $h\nu$ " denotes light in- and output)

Classification	Description & Example
OE-MCM type A	<p>MCM package containing separate optoelectronic dies from different families. (e.g., proximity sensor or laser with photo diode die for power/current control)</p> 
OE-MCM type B	<p>MCM package containing separate optoelectronic dies (different families) and other dies but no optical in- and output, only electrical (e.g., optocoupler or light barrier with LED and photo diode dies)</p> 
OE-MCM type C	<p>MCM package with separate optoelectronic and other dies (e.g., RGB-LEDs with integrated controller)</p> 
OE-MCM type D	<p>MCM package/PCB with inseparably connected optoelectronic and other dies (e.g., pixeled LEDs for matrix headlamp function)</p> 

Automotive Electronics Council
Component Technical Committee

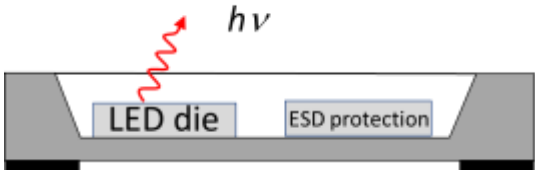
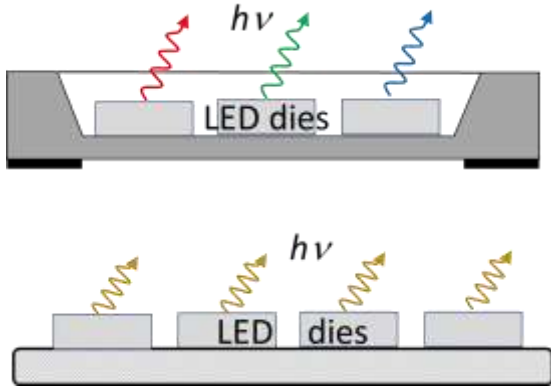
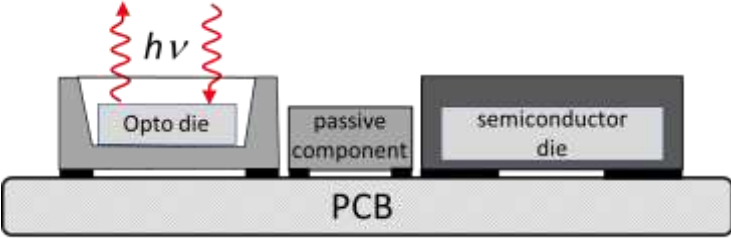

Table 1: Parts, Considered to be OE-MCMs (continued)
(Note: “ $h\nu$ ” denotes light in- and output)

Classification	Description & Example
OE-MCM type E	<p>Package with one die containing optoelectronic and other circuits</p> 
OE-MCM type F	<p>PCB / substrate with optoelectronic and other sub-components, not intended to be qualified individually. It is intended for direct attachment to a printed circuit board (e.g., by soldering or gluing) and sold as a component (e.g. some pulsed laser modules for LIDAR)</p>  <p>Note: in certain cases, it may be very difficult to make a clear differentiation to PCBAs, which are not covered by this document.</p>

Automotive Electronics Council
Component Technical Committee

Table 2: Parts, *Not* Considered to be OE-MCMs (Out of scope for this document)
(Note: “ $h\nu$ ” denotes light in- and output)

The following Table 2 shows examples of parts that are not considered to be an OE-MCM and are therefore out of scope of this document:

Example	Remark
<p>Package with optoelectronic dies and ESD protection (e.g., Zenerdiode)</p> 	<p>Classified as “normal” discrete optoelectronic component.</p> <p>Qualification already covered by AEC-Q102.</p>
<p>Package with multiple optoelectronic dies from the same type only (e.g., RGB-LEDs, Chip-on-board LEDs)</p> 	<p>Classified as “normal” discrete multichip optoelectronic component.</p> <p>Qualification already covered by AEC-Q102.</p>
<p>PCBA with packaged or unpackaged optoelectronic and other sub-components, possible to qualify individually</p>  <p>Note: in certain cases, it may be very difficult to make a clear differentiation to OE-MCMs type F.</p>	<p>Classified as PCBA. Out of scope of any AEC-Q specification.</p> <p>All sub-components shall be qualified regarding the appropriate AEC-Q norms. Additionally, the whole PCB shall be qualified according to customer requirements. This includes also the interconnection between the sub-components and the PCB.</p>
<p>LED only used as an indicator</p> 	<p>Functionality should be part of failure criteria within specification/datasheet. To be checked after Q100 qualification.</p>

Automotive Electronics Council
Component Technical Committee

2. QUALIFICATION OF A NEW OPTOELECTRONIC MULTICHIP MODULE

2.1 General Qualification Approach

The qualification of an OE-MCM should cover all failure modes of each single sub-component, the assembly into the module and the failure modes from the sub-component interactions as well. So, the qualification of an OE-MCM shall consist of at least all the necessary tests for the used sub-components. Some additional tests may need to be added, while some tests may be substituted. The resulting general qualification flow is shown in Figure 1.

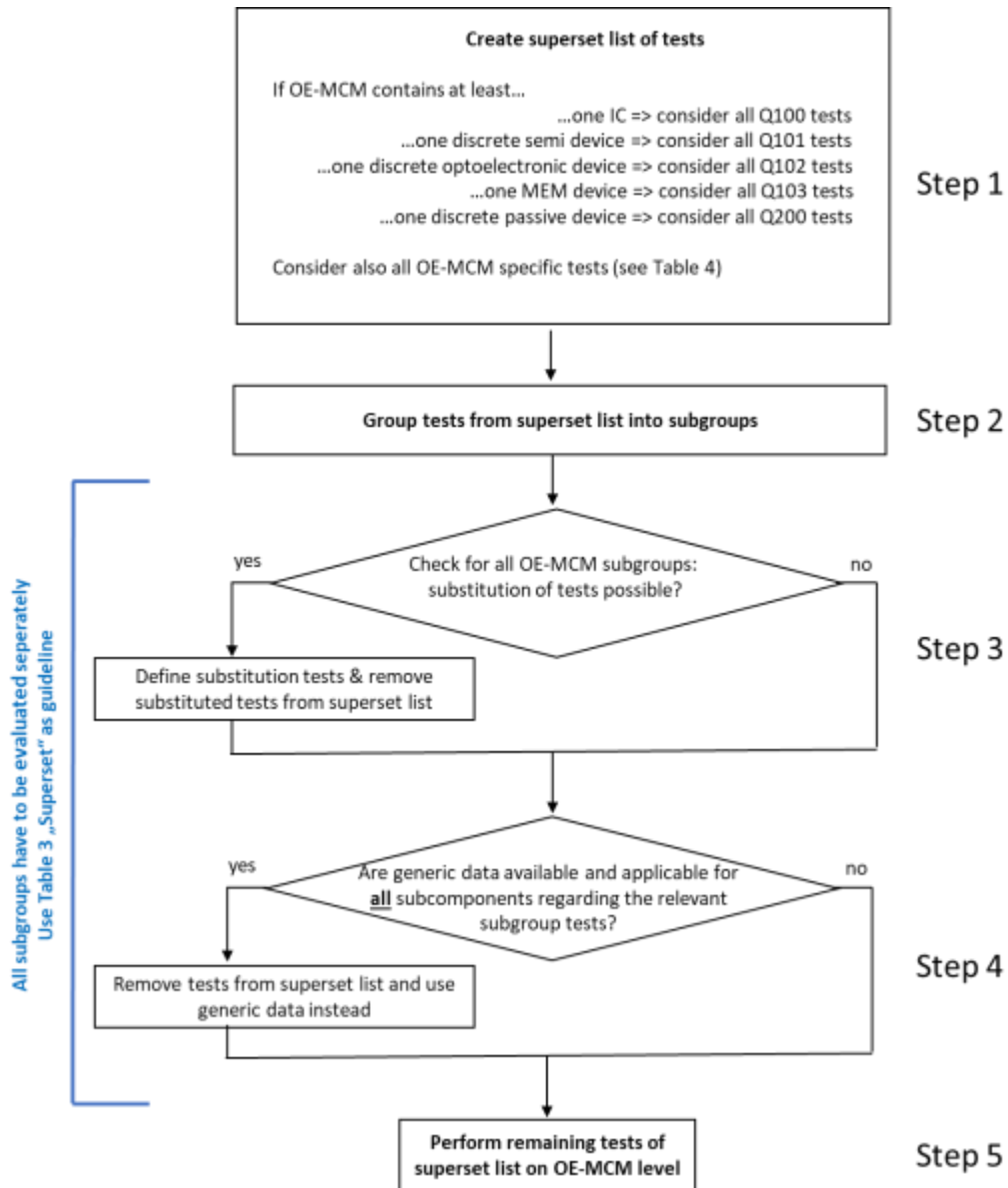


Figure 1: General Qualification Flow for Optoelectronic MCMs

Automotive Electronics Council

Component Technical Committee

Step 1

Create a superset of qualification tests for the completed OE-MCMs. If the OE-MCM contains at least one IC, Q100 tests shall be part of the superset. If it contains at least one discrete semiconductor device, all Q101 tests shall be additionally part of the superset. The same method applies to discrete optoelectronic devices (Q102), MEM devices (Q103), passive devices (Q200) and any other future component group, not mentioned here. Consider also all OE-MCM specific tests from group H (See also Section 2.2). All these tests within the created superset must be done for the OE-MCM, if not substituted in one of the following steps.

See also Section 2.1.1 “Important notes for creating the superset”.

Step 2

List the tests that target similar failure mechanisms into subgroups. Use Table 3 for guidance, but consider any new revision of a single AEC standard. This allows an easier identification which tests are redundant and may be substituted in the following steps.

Step 3

Identify redundant tests for all subgroups. Evaluate for every subgroup if one test can cover all test condition and the duration for all sub-components. If this is the case, only this test shall be done, all other tests from the test group can be omitted. Note that the test condition shall not exceed the module’s overall specification. Use Table 3 for guidance.

Step 4

Consider the use of generic data and test substitutes from sub-component level qualification testing. For example, generic data from AEC-Qxxx tests in other packages may be used; however, package relevant qualification tests must still be done on the completed OE-MCM level. Use Table 3 for guidance.

Testing on the sub-component level may be preferred in case not all sub-component functions can be addressed and measured in the completed OE-MCM. However, sub-component level testing may not be able to detect failure mechanisms and reliability problems arising from interactions between different sub-components. Testing on the sub-component level does not relieve the supplier from evaluating possible risks and ensuring the reliability of the sub-component in the completed OE-MCM. Additional tests may be needed. Possible interactions include:

- Homogeneous or inhomogeneous thermal stress
- Mechanical stress
- Photoelectric currents from LED radiation
- Reaction with outgassing materials from OE-MCM (VOC Volatile Organic Compounds)

Step 5

Perform all tests from the superset, that are not omitted during step 3 and 4, on OE-MCM level.

Automotive Electronics Council
Component Technical Committee

Figure 2 illustrates how the OE-MCM qualification approach covers the general relation between the different AEC standards, having overlapping tests:

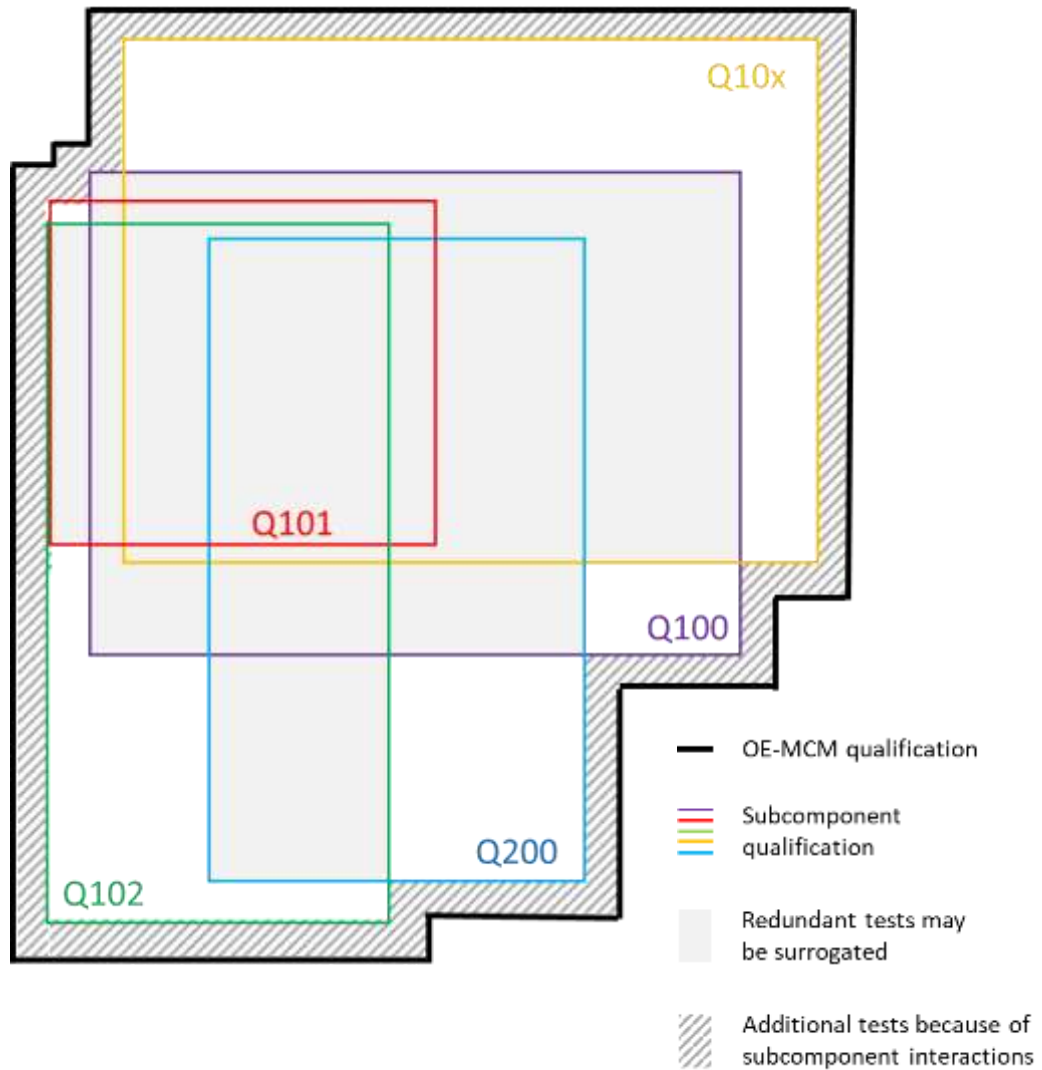


Figure 2: General relation between the different AEC standards and the qualification approach for OE-MCMs

Automotive Electronics Council
Component Technical Committee

Table 3: This table shows an extract of the superset of tests (Q100, Q101, Q102 and Q200) as mentioned in the general qualification flow (step 1 & 2). Additionally, a guideline is given if tests can be substituted (step 3) and if sub-component qualification data can be used as generic data (step 4). The complete superset Table is part of the *Combined Qualification Test Plan, Data Presentation and Superset Template* (see Section 2.6), which is available as a stand-alone document that can be downloaded at <http://www.aecouncil.com>.

		Requirements by AEC-Q102-003 Superset									
Group	Subgroup	AEC-Qxxx test reference	Test	If tests are done on OE-MCM level: Substitution of test within subgroup possible?	Generic data from subcomponent qualification (using different package) allowed? If no, only test on OE-MCM level allowed.	Additional remarks	SS/lot	# Lot			
A	A1	A1 Q100 A1	PC	Yes	No	Ensure that solder profile achieved maximum thermal stress allowed for OE-MCM. PC performed on surface mount parts (SMDs) prior to Tests A2, A3, A4, A5 only.	26	3			
A		A1 Q101 A1	PC								
A		A1 Q102 A1	PC								
A	A2	A2 Q100 A2	THB or HAST	Yes	No	Tests may be substituted within subgroup, but only 85°C/85%RH (THB, HTRB, WHTOL) allowed. Max. (stress) condition and test duration for all subcomponents to be chosen. Exceeding the overall OE-MCM specification is not required. Two different condition modes are required: a) To check the robustness against humidity related thermomechanical effects: drive the OE-MCM in a high power mode (e.g. by maximum current, applicable PWM and/or test pattern). On/off mode is optional. b) To check the robustness against migration effects: drive the OE-MCM in a low power mode (e.g. by minimum current, applicable PWM and/or test pattern). Note, that locally, a temperature increase >3°K may occur. Consider DPA and TEST requirements.	26	3			
A		A2 Q101 A2	HAST								
A		A2 Q101 A2 alt	H ³ TRB								
A		A2 Q102 A2a	WHTOL1								
A		A2 Q102 A2b	WHTOL2								
A		A2 Q102 A2c	H ³ TRB								
A		A2 Q200 7									
A		A2 Q200 7									
A	A3	A3 Q100 A3	AC or UHST or TH	Yes	No	Tests may be substituted within subgroup, but only 85°C/85%RH (TH) allowed because Autoclave and uHAST could violate OE-MCM specification and damage the OE-MCM. TH to be performed even if discrete actives are within OE-MCM. Consider TEST requirements.	26	3			
A		A3 Q101 A3	UHAST								
A		A3 Q101 A3 alt	AC								
A	A4	A4 Q100 A4	TC	Yes	No	Max. (stress) condition and test duration for all subcomponents to be chosen. Exceeding the overall OE-MCM specification is not required. Consider DPA. Consider wire pull after TC only if possible.	26	3			
A		A4 Q101 A4	TC								
A		A4 Q102 A4	TC								
A		A4 Q200 4									
A		A4 Q200 16									
A	A4a	A4a Q101 A4a	TCHT	No	No	No substitution because Q101 specific test; for Q100 covered by test A4.	26	3			
A		A4a Q101 A4a alt	TCDT								
A	A5	A5 Q100 A5	PTC	Yes	No	Test required only on OE-MCM with maximum rated power ≥ 1 watt or T _j ≥ 40°C or devices designed to drive inductive loads or LEDs or Laser components. Tests may be substituted within subgroup, but only PTC is allowed for LED and laser. Max. (stress) condition and test duration for all subcomponents to be chosen. Exceeding the overall OE-MCM specification is not required. On/off mode 2min or 5min allowed. Consider DPA and TEST requirements.	26	3			
A		A5 Q101 A5	IOL								
A		A5 Q101 A5 alt	PTC								
A		A5 Q102 A3a	PTC								
A		A5 Q102 A3b	IOL								
A	A6	A6 Q100 A6	HTSL	Yes	Yes	Only for information purpose to evaluate (wire) bonding strength. Note, that irrelevant new failure modes may occur if the overall OE-MCM specification is exceeded. These failures should not be considered as "not passed" if they are analyzed and verified to be caused by overstress only. Consider TEST requirements. Use of generic data from subcomponent qualification only allowed for active semiconductor if wire front- & backside metallization and wire bonding process is the same (same IMC formation).	15	3			
A		A6 Q200 3									

2.1.1 Important Notes for Creating the Superset

- Due to the huge variety of possible optoelectronic multichip modules, the superset stand-alone document (Table 3 shows an extract) may not be sufficient to cover each single device. For example, AEC-Q103 is not mentioned within the superset. If, for example, an OE-MCM contains MEM sub-components, the superset shall be created in the same method, considering also the AEC-Q103 tests.
- Some tests only apply for certain component types within AEC-Q standards. For example, AEC-Q102 LTOL only applies to laser components and not to LED components. In this case, AEC-Q102 LTOL does not need to be considered for OE-MCMs without laser components.
- Each AEC standard will be updated from time to time, which might have an effect on the superset. The supplier and the user shall use the current active version of superset which is part of the

Automotive Electronics Council

Component Technical Committee

Combined Qualification Test Plan, Data Presentation and Superset Template, available as a stand-alone document that can be downloaded at <http://www.aecouncil.com>. This stand-alone document should contain the current active versions of the AEC-Q standards. However, if there are newer versions of AEC-Q standards available but not already considered in the stand-alone superset document, the supplier and user shall consider the newer versions of AEC-Q standards and create a superset by following the same method as described in this Section. Any changes shall be clearly marked.

- For some tests it may be necessary to adjust the detailed operating condition for some OE-MCMs. For example, it may not be possible to operate all LED dies (pixel) simultaneously for OE-MCM type D because of thermal restrictions or due to a design concept of the OE-MCM. For guideline see column “Additional remark”. The detailed test condition must be documented and provided to the user.

Automotive Electronics Council
Component Technical Committee

2.2 Module Specific Tests

The following tests defined in Table 4 shall be done module level:

Table 4: Module Specific Qualification Test Methods

TEST GROUP H – MODULE SPECIFIC TESTS								
#	STRESS	ABV	NOTES	SAMPLE SIZE / LOT	NUMBER OF LOTS	ACCEPT CRITERIA	TEST METHOD (current revision)	ADDITIONAL REQUIREMENTS
H1	Board Level Reliability	BLR	D, G	See test method	See test method	See test method	IPC-9701A or AEC BLR	<p>BLR shall be performed for OE-MCMs (type F only) by testing: [1] (external) solder connections between the module substrate and user application PCB" and [2] internal solder connections between the module sub-component and module substrate.</p> <p>IPC-9701A should be used for BLR until an AEC BLR test methodology becomes available (released). Preferred condition: -40°/125°C (TC3) 3000 cycles (NTC-D) or >50% failed parts. When daisy chains are not available, dye penetrant analysis may be used as a substitute. Any solder-joint showing >=90% dye area coverage is considered a failure. Minimum 3 samples per read-point (0, 750 and every 250 cycles thereafter).</p> <p>Internal BLR can be substituted by performing the subgroup tests A4 (TC) and A5 (PTC, IOL) on OE-MCM level. The part shall be mounted on a PCB, no sockets allowed to use.</p> <p>External BLR gives a first indication that the solder-joints fulfill a sufficient lifetime requirement for a given application setup. External BLR can also be substituted by performing the subgroup tests A4 (TC) and A5 (PTC, IOL) on OE-MCM level if the used testboard fulfills the BLR requirements. The part shall be mounted (no sockets allowed to use) on an application related PCB. In this case, an extending of the test cycles for all or a subset of devices under test may be needed. Failure analysis must be undertaken to confirm that the solder-joints are the failure cause. An in-situ monitoring for the devices under test is preferred in place of read-point measurements.</p>

Automotive Electronics Council
Component Technical Committee

Table 4: Module Specific Qualification Test Methods (continued)

TEST GROUP H – MODULE SPECIFIC TESTS								
#	STRESS	ABV	NOTES	SAMPLE SIZE / LOT	NUMBER OF LOTS	ACCEPT CRITERIA	TEST METHOD (current revision)	ADDITIONAL REQUIREMENTS
H2	X-ray	XRAY	--	1	3	--	--	Required to document OE-MCM construction. Not a qualification test. Can be omitted if X-ray is done at DPA.
H3	Acoustic Microscope	AM	P	10	3	--	--	Only required for surface mount OE-MCMs that have monolithic construction (e.g., wire bonding encapsulated by opaque epoxy), which cannot be checked visually by microscope. Perform delamination check after PC. Delamination is not allowed, if it occurs in the area of wire bond interconnects or if it changes the thermal behavior of the OE-MCM in a way, that it is out of specification.

Notes:

- D Destructive test, OE-MCMs are not to be reused for qualification or production.
- G Generic data allowed.
- P Required for plastic packaged MCMs only.

Automotive Electronics Council

Component Technical Committee

2.3 Restriction for Use of Non-Automotive Sub-components

The use of non-automotive qualified stand-alone sub-components, which can be soldered, glued or mounted otherwise on a substrate, is not recommended. The use of non-automotive sub-components has to be declared in the CDC document. In case of use of non-automotive sub-component, the OE-MCM supplier has to ensure at minimum that automotive change management process (JESD46, for example, in liason with ZVEI PCN methodology) is also established at non-automotive sub-component supplier and will be regularly checked by process audits.

2.4 Failure Criteria

The following failure criteria apply for all OE-MCM testing and shall be documented in the test report:

- Non-compliance with the OE-MCM specification
- Drift of optical parameters (e.g., flux, color, luminance) according to AEC-Q102 for overall OE-MCM performance and for each individual die in case of multiple emitters and receivers.
- For some OE-MCMs (e.g., LEDs for high resolution headlamp matrix function), additional failure criteria may be negotiated between supplier and user mutually.

For BLR, there is no qualification criteria. For failure testing definition, see IPC9701A.

2.5 Sample Size

The supplier shall use at minimum the sample size, defined in the superset which is available as a stand-alone document that can be downloaded at <http://www.aecouncil.com>.

Note: For OE-MCMs with a very high complexity (e.g., LEDs for very high-resolution headlamp matrix function), leading to a very high qualification effort and cost, the sample size 3 x 26 pcs. may be reduced to minimum 3 x 10pcs. This requires a mutual agreement between supplier and user. Additionally, the sample size for test ELFR may be reduced for OE-MCMs with a very high complexity upon agreement between supplier and user.

2.6 Qualification Test Plan

The supplier should follow the requirements for creating a qualification test plan as stated in the AEC-Q102 Appendix 3. A qualification test plan template is available as a stand-alone document that can be downloaded at <http://www.aecouncil.com>.

2.7 Documentation of Qualification Results

The supplier should follow the requirements for the documentation of the qualification results as stated in the AEC-Q102 Appendix 4. Additionally, it is necessary to document the following items in the test report.

- Revision of Attachment AEC-Q102-003
- Revision of all AEC-Qxxx standards used for the creation of the superset (see Figure 1 – step 1)

A template for the documentation of the qualification results is available as a stand-alone document that can be downloaded at <http://www.aecouncil.com>.

3. CERTIFICATE DESIGN, CONSTRUCTION AND QUALIFICATION

The user should check the AEC website for the current active version of CDCQ.

Automotive Electronics Council
Component Technical Committee

4. REQUALIFICATION OF A CHANGED OE-MCM

Tables 5a-d are based on the Process Changes Qualification Guideline for MCM within AEC-Q104, combined with the superset (see Section 2.1) in order to cover the additional specifics of OE-MCMs.

Guidelines are given for type of changes in case generic data of sub-component are not sufficient to cover all effects on form, fit, function and reliability of whole OE-MCM. In case that the change only affects the sub-component w/o relevant interaction on the whole OE-MCM please refer to the specific requalification matrix of AEC Q100 / Q101 / Q102 / Q200.

Destructive Physical Analysis shall be done for the following tests:

- Group A2 tests (WHTOL et al.)
- Group A4 tests (TC)
- Group A5 tests (PTC/IOL)
- Group B1 tests (HTOL et al.)
- Group C14 test (H2S)
- Group C15 test (FMG)

Provide pictures if requested.

Note that some tests (e.g., Table 3: A1, C7, E1, E6, E11, F1 and F2) are not mentioned in Tables 5a-d.

The requalification matrix (Tables 5a-d) is available as a stand-alone document that can be downloaded at <http://www.aecouncil.com>.

LEGEND FOR TABLES 5a-d

- U Only for hermetic devices
- W Wafer site provided information
- X Only for the sub-component which AEC standard contain the relevant tests
- # Consider module level tests whose condition are affected by the change

Note: A letter or "●" indicates that performance of that stress test should be considered for the appropriate process change. Reason for not performing a considered test must be given in the qualification plan or results.

Automotive Electronics Council
Component Technical Committee

Table 5a: Process Change Guideline for OE-MCMs (Superset Test Group A & B only)

Table 3 superset number	A2	A3	A4	A4a	A5	A6	B1	B2	B3	B4	B5	
Table 3 subnorm	Q100 / Q101 / Q102	Q100 / Q101	Q100 / Q101 / Q102 / Q200	Q101	Q100 / Q101 / Q102	Q100 / Q200	Q100 / Q101 / Q102 / Q200	Q100	Q100	Q102	Q102	
Name of test	Temperature Humidity Bias (THB) / biased Highly Accelerated Stress Test (HAST) / Wet High Humidity High Temperature Reverse Bias (HTHRB) (including DPA)	Autoclave (AC) / Unbiased HAST (UHAST)	Temperature Cycling (TC) (including DPA) / Thermal Shock	Temperature Cycling Hot Test (TCHT) / TC Delamination Test (TCDT)	Power Temperature Cycling (PTC) / Intermittent Operational Life (IOL) (including DPA)	High Temperature Storage Life (HTSL) / High Temperature Exposure	High Temperature Operating Life (HTOL, HTOL 1/2) / High Temperature Reverse Bias (HTRB) / AC blocking voltage (ACBV) / Steady State Operational (SSOP) / High Temperature Gate Bias (HTGB) (including DPA)	Early Life Failure Rate (ELFR)	NVM Endurance, Data Retention and Operational Life (EDR)	Low Temperature Operating Life (LTOL)	Pulse Life Test (PLT)	
Type of change	THB / HAST / WHTOL / HTRB	AC / UHAST	TC	TCHT / TCDT	PTC / IOL	HTSL	HTOL / HTRB / ACPV / SSOP / HTGB	ELFR	EDR	LTOL	PLT	Remarks
ANY	-	-	-	-	-	-	-	-	-	-	-	-
Any change with impact on agreed upon technical contractual agreements	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Any change with impact on processability/manufacturability at customer, which is not covered in the matrix below.	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
DATA SHEET												
Change of datasheet parameters/electrical specification (min./max./typ. Values) and/or AC/DC specification	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Correction of data sheet / errata	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Specification of additional parameters	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
DESIGN												
Firmware modification	-	-	-	-	-	-	-	-	-	-	-	
Change that adds or subtracts sub-components from the module BOM	●	#	●	#	X	X	●	X	-	X	X	X only to be considered in case a sub component will be added to BOM
PROCESS - ASSEMBLY - MATERIALS												
Replacement of any sub-component by a Non-AEC qualified sub-component	●	#	●	#	X	X	●	X	X	X	X	Consider chapter "Restriction for Use of Non-Automotive Subcomponents"
Replacement of any sub-component by an AEC qualified sub-component	●	#	●	#	#	#	●	-	-	#	#	AEC qualification test results of the sub-component shall be submitted on request.
Replacement of any sub-component by an AEC qualified sub-component Critical characteristics of the OE-MCM (e.g. form, fit, function, yield and/or reliability) are not affected by the sub-component.	#	#	#	-	#	#	#	-	-	#	#	AEC qualification test results of the sub-component shall be submitted on request.
Change within an AEC sub-component that has been requalified Critical characteristics of sub-component are affected	●	#	●	#	#	#	●	-	-	#	#	AEC qualification test results of the sub-component shall be submitted on request.
Change within an AEC sub-component that has been requalified Critical characteristics of sub-component are not affected	#	#	#	#	#	#	#	-	-	#	#	

Automotive Electronics Council
Component Technical Committee

Table 5a: Process Change Guideline for OE-MCMs (Superset Test Group A and B only) (continued)

Table 3 superset number	A2	A3	A4	A4a	A5	A6	B1	B2	B3	B4	B5	
Table 3 subnorm	Q100 / Q101 / Q102	Q100 / Q101	Q100 / Q101 / Q102 / Q200	Q101	Q100 / Q101 / Q102	Q100 / Q200	Q100 / Q101 / Q102 / Q200	Q100	Q100	Q102	Q102	
Name of test	THB / HAST / WHTOL / HTRB	AC / UHAST	TC	TCHT / TCDT	PTC / IOL	HTSL	HTOL / HTRB / ACBV / SSOP / HTGB	ELFR	EDR	LTOL	PLT	Remarks
Type of change												
PROCESS - ASSEMBLY - MATERIALS (continued)												
Substrate change affecting module schematic (Changes to the internal dimensions and / or schematics)	#	#	#	#	#	#	#	#	-	#	#	
Change to the processes used in module assembly (e.g., pick & place, die attach, bonding, reflow, encapsulation, singulation, die overcoat, underfill, die preparation, die clean)	●	#	●	-	●	-	●	#	#	#	#	
Process integrity: tuning within specification	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to materials used in module assembly (e.g., adhesive, underfill, encapsulate, solder, epoxy, bump material, die attach material, bond wire, die overcoat, substrate, lead-frame base material)	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change of direct material supplier	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to assembly location (Move all or parts of production to a different assembly site)	●	●	●	-	●	-	●	X	-	X	X	Assembly transfer or relocation. Includes transfer as well as additional site e.g. dual source / fab strategy
Change of product marking	-	-	-	-	-	-	-	-	-	-	-	
Change or replacement of mechanical or optical components (e.g. lenses, pig-tail adapters)	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
EQUIPMENT												
Production from a new equipment/tool which uses a different basic technology or which due to its unique form or function can be expected to influence the integrity of the final product	-	-	-	-	-	-	-	-	-	-	-	Affected process change is to check.
Production from a new equipment/tool which uses the same basic technology (replacement equipment or extension of existing equipment pool) without change of process.	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to testing platform (Change in final test equipment type leading to a different test concept)	-	-	-	-	-	-	-	-	-	-	-	Gage R&R / delta correlation
PACKING/SHIPPING												
Packing/shipping specification change	-	-	-	-	-	-	-	-	-	-	-	
Dry pack requirements change	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change. Change of dry pack requirements e.g. shelf life change from 24 to 12 months
Change of carrier (tray, reel)	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change of labelling	-	-	-	-	-	-	-	-	-	-	-	
TEST FLOW												
Change to testing location (Move of all or part of the final test to a different test site)	-	-	-	-	-	-	-	-	-	-	-	Gage R&R / delta correlation
Q-GATE												
Change of the test coverage/testing process flow used by the supplier to ensure data sheet compliance (e.g. elimination/addition of electrical measurement/test flow block; relaxation/enhancement of monitoring procedure or sampling)	-	-	-	-	-	-	-	#	-	-	-	Parameter Analysis: Delta correlation # For "burn in" changes ELFR recommended

Automotive Electronics Council
Component Technical Committee

Table 5b: Process Change Guideline for OE-MCMs (Superset Test Group C only)

Table 3 superset number	C1	C2	C3	C4	C5	C6	C8	C9	C10	C11	C12	C13	C14	C15	C16		
Table 3 subnorm	Q100 / Q101 / Q102	Q100 / Q101 / Q102	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102 / Q200	Q100	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102	Q101 / Q200	Q101 / Q102 / Q200	Q101 / Q102	Q100 / Q101 / Q102	Q102	Q102	Q102	Q102 / Q200		
Name of test	Wire Bond Shear (WBS)	Wire Bond Pull (WBP)	Solderability (SD)	Physical Dimensions (PD)	Solder Ball Shear (SBS)	Lead Integrity (LI) / Terminal Strength (TS)	Die Shear (DS)	Resistance to Solvents (RTS)	Resistance to Solder Heat (RSH)	Thermal Resistance (TR)	Lead (Pb) Free (LF) or Whisker Growth (WG)	DEW	Hydrogen Sulfide (H2S) (including DPA)	Flow Mixed Gas (FMG) (including DPA)	Board Flex (BF)		
Type of change	WBS	WBP	SD	PD	SBS	LI / TS	DS	RTS	RSH	TR	LF / WG	DEW	H2S	FMG	BF	Remarks	
ANY																	
Any change with impact on agreed upon technical contractual agreements	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Any change with impact on processability/manufacturability at customer, which is not covered in the matrix below.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
DATA SHEET																	
Change of datasheet parameters/electrical specification (min./max./typ. Values) and/or AC/DC specification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Correction of data sheet / errata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Specification of additional parameters	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
DESIGN																	
Firmware modification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Change that adds or subtracts sub-components from the module BOM	-	-	-	-	-	-	#	-	-	-	-	X	X	X	X		X only to be considered in case a sub component will be added to BOM
PROCESS - ASSEMBLY - MATERIALS																	
Replacement of any sub-component by a Non-AEC qualified sub-component	#	#	#	#	#	#	#	#	X	X	#	X	X	X	X		Consider chapter "Restriction for Use of Non-Automotive Subcomponents"
Replacement of any sub-component by an AEC qualified sub-component	#	#	-	-	-	-	#	#	#	#	#	#	#	#	#		AEC qualification test results of the sub-component shall be submitted on request.
Replacement of any sub-component by an AEC qualified sub-component Critical characteristics of the OE-MCM (e.g. form, fit, function, yield and/or reliability) are not affected by the sub-component.	#	#	-	-	-	-	#	#	#	#	#	#	#	#	#		AEC qualification test results of the sub-component shall be submitted on request.
Change within an AEC sub-component that has been requalified Critical characteristics of sub-component are affected	#	#	-	-	-	-	#	#	#	#	#	#	#	#	#		AEC qualification test results of the sub-component shall be submitted on request.
Change within an AEC sub-component that has been requalified Critical characteristics of sub-component are not affected	#	#	-	-	-	-	#	-	#	#	#	-	-	-	#		

Automotive Electronics Council
Component Technical Committee

Table 5b: Process Change Guideline for OE-MCMs (Superset Test Group C only) (continued)

Table 3 superset number	C1	C2	C3	C4	C5	C6	C8	C9	C10	C11	C12	C13	C14	C15	C16		
Table 3 subnorm	Q100 / Q101 / Q102	Q100 / Q101 / Q102	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102 / Q200	Q100	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102	Q101 / Q200	Q101 / Q102 / Q200	Q101 / Q102	Q100 / Q101 / Q102	Q102	Q102	Q102	Q102 / Q200		
Name of test																	
Type of change	WBS	WBP	SD	PD	SBS	LJ / TS	DS	RTS	RSH	TR	LF / WG	DEW	H2S	FMG	BF	Remarks	
PROCESS - ASSEMBLY - MATERIALS (continued)																	
Substrate change affecting module schematic (Changes to the internal dimensions and / or schematics)	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	
Change to the processes used in module assembly (e.g., pick & place, die attach, bonding, reflow, encapsulation, singulation, die overcoat, underfill, die preparation, die clean)	#	#	#	-	#	-	#	#	#	#	-	#	#	#	#	#	
Process integrity: tuning within specification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to materials used in module assembly (e.g., adhesive, underfill, encapsulate, solder, epoxy, bump material, die attach material, bond wire, die overcoat, substrate, lead-frame base material)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change of direct material supplier	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to assembly location (Move all or parts of production to a different assembly site)	●	●	●	●	X	●	●	#	●	●	#	#	●	#	#	#	Assembly transfer or relocation. Includes transfer as well as additional site e.g. dual source / fab strategy
Change of product marking	-	-	#	-	-	-	-	#	-	-	-	-	-	-	-	-	
Change or replacement of mechanical or optical components (e.g. lenses, pig-tail adapters)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
EQUIPMENT																	
Production from a new equipment/tool which uses a different basic technology or which due to its unique form or function can be expected to influence the integrity of the final product	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Affected process change is to check.
Production from a new equipment/tool which uses the same basic technology (replacement equipment or extension of existing equipment pool) without change of process.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to testing platform (Change in final test equipment type leading to a different test concept)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Gage R&R / delta correlation
PACKING/SHIPPING																	
Packing/shipping specification change	-	-	#	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Dry pack requirements change	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Change of dry pack requirements e.g. shelf life change from 24 to 12 months
Change of carrier (tray, reel)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change of labelling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TEST FLOW																	
Change to testing location (Move of all or part of the final test to a different test site)	-	-	#	-	-	-	-	-	-	-	-	-	-	-	-	-	Gage R&R / delta correlation
Q-GATE																	
Change of the test coverage/testing process flow used by the supplier to ensure data sheet compliance (e.g. elimination/addition of electrical measurement/test flow block; relaxation/enhancement of monitoring procedure or sampling)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Parameter Analysis: Delta correlation # For "burn in" changes ELFR recommended

Automotive Electronics Council
Component Technical Committee

Table 5c: Process Change Guideline for OE-MCMs (Superset Test Group D and E only)

Table 3 superset number	D1	D2	D3	D4	D5	D6	E2	E3	E4	E5	E7	E8	E9	E10	E12		
Table 3 subnorm	Q100	Q100	Q100	Q100	Q100	Q101	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102	Q100	Q100 / Q101 / Q102 / Q200	Q100	Q100	Q100 / Q101	Q100	Q101		
Name of test	Electromigration (EM)	Time Dependent Dielectric Breakdown (TTDB)	Hot Carrier Injection (HCI)	Negative Bias Temperature Instability (NBTI)	Stress Migration (SM)	Dielectric Integrity (DI)	Electronic Discharge Human Body Model (ESD HBM)	Electronic Discharge Charged Device Model (ESD CDM)	Latch up (LU)	Electrical Distribution (ED) / Parametric Verification (PV)	Characterization (CHAR)	Electromagnetic Compatibility (EMC)	Short Circuit Characterization (SC)	Soft Error Rate (SER)	Undamped Inductive Switching (UIS)		
Type of change	EM	TTDB	HCI	NBTI	SM	DI	ESD HBM	ESD CDM	LU	ED / PV	CHAR	EMC	SC / SCR	SER	UIS	Remarks	
ANY																	
Any change with impact on agreed upon technical contractual agreements	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Any change with impact on processability/manufacturability at customer, which is not covered in the matrix below.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
DATA SHEET																	
Change of datasheet parameters/electrical specification (min./max./typ. Values) and/or AC/DC specification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Correction of data sheet / errata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Specification of additional parameters	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
DESIGN																	
Firmware modification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Change that adds or subtracts sub-components from the module BOM	-	-	-	-	-	-	•	•	•	•	•	•	-	X	-	-	X only to be considered in case a sub component will be added to BOM
PROCESS - ASSEMBLY - MATERIALS																	
Replacement of any sub-component by a Non-AEC qualified sub-component	X	X	X	X	X	X	•	X	X	•	X	X	X	X	X	#	Consider chapter "Restriction for Use of Non-Automotive Subcomponents"
Replacement of any sub-component by an AEC qualified sub-component	W	W	W	W	W	W	•	#	#	•	#	#	#	#	#	#	AEC qualification test results of the sub-component shall be submitted on request.
Replacement of any sub-component by an AEC qualified sub-component Critical characteristics of the OE-MCM (e.g. form, fit, function, yield and/or reliability) are not affected by the sub-component.	W	W	W	W	W	W	#	#	#	#	#	#	#	#	#	#	AEC qualification test results of the sub-component shall be submitted on request.
Change within an AEC sub-component that has been requalified Critical characteristics of sub-component are affected	W	W	W	W	W	W	•	#	#	•	#	#	#	#	#	#	AEC qualification test results of the sub-component shall be submitted on request.
Change within an AEC sub-component that has been requalified Critical characteristics of sub-component are not affected	W	W	W	W	W	W	#	#	#	#	#	#	-	-	-	-	

Automotive Electronics Council
Component Technical Committee

Table 5c: Process Change Guideline for OE-MCMs (Superset Test Group D and E only) (continued)

Table 3 superset number	D1	D2	D3	D4	D5	D6	E2	E3	E4	E5	E7	E8	E9	E10	E12	Remarks
Table 3 subnorm	Q100	Q100	Q100	Q100	Q100	Q101	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102	Q100	Q100 / Q101 / Q102 / Q200	Q100	Q100	Q100 / Q101	Q100	Q101	
Name of test	EM	TTDB	HCI	NBTI	SM	DI	ESD HBM	ESD CDM	LU	ED / PY	CHAR	EMC	SC / SCR	SER	UIS	
Type of change	EM	TTDB	HCI	NBTI	SM	DI	ESD HBM	ESD CDM	LU	ED / PY	CHAR	EMC	SC / SCR	SER	UIS	
PROCESS - ASSEMBLY - MATERIALS (continued)																
Substrate change affecting module schematic (Changes to the internal dimensions and / or schematics)	-	-	-	-	-	-	#	#	#	#	#	#	#	-	-	
Change to the processes used in module assembly (e.g., pick & place, die attach, bonding, reflow, encapsulation, singulation, die overcoat, underfill, die preparation, die clean)	-	-	-	-	-	-	-	-	-	#	#	-	-	-	-	
Process integrity: tuning within specification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to materials used in module assembly (e.g., adhesive, underfill, encapsulate, solder, epoxy, bump material, die attach material, bond wire, die overcoat, substrate, lead-frame base material)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change of direct material supplier	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to assembly location (Move all or parts of production to a different assembly site)	-	-	-	-	-	-	•	•	-	•	•	-	-	-	-	Assembly transfer or relocation. Includes transfer as well as additional site e.g. dual source / fab strategy
Change of product marking	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Change or replacement of mechanical or optical components (e.g. lenses, pig-tail adapters)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
EQUIPMENT																
Production from a new equipment/tool which uses a different basic technology or which due to its unique form or function can be expected to influence the integrity of the final product	-	-	-	-	-	-	-	-	-	•	•	-	-	-	-	Affected process change is to check.
Production from a new equipment/tool which uses the same basic technology (replacement equipment or extension of existing equipment pool) without change of process.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to testing platform (Change in final test equipment type leading to a different test concept)	-	-	-	-	-	-	#	#	-	•	•	-	-	-	-	Gage R&R / delta correlation
PACKING/SHIPPING																
Packing/shipping specification change	-	-	-	-	-	-	#	#	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Dry pack requirements change	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Change of dry pack requirements e.g. shelf life change from 24 to 12 months
Change of carrier (tray, reel)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change of labelling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TEST FLOW																
Change to testing location (Move of all or part of the final test to a different test site)	-	-	-	-	-	-	#	#	-	•	•	-	-	-	-	Gage R&R / delta correlation
Q-GATE																
Change of the test coverage/testing process flow used by the supplier to ensure data sheet compliance (e.g. elimination/addition of electrical measurement/test flow block; relaxation/enhancement of monitoring procedure or sampling)	-	-	-	-	-	-	-	-	-	•	•	-	-	-	-	Parameter Analysis: Delta correlation # For "burn in" changes ELFR recommended

Automotive Electronics Council
Component Technical Committee

Table 5d: Process Change Guideline for OE-MCMs (Superset Test Group G and H only)

Table 3 superset number	G1	G2	G3	G4	G5	G6	G7	H1	H2	H3	
Table 3 subnorm	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102	Q100 / Q101 / Q102	Q100	Q100	Q100	Q102-003	Q102-003	Q102-003	
Name of test	Mechanical Shock (MS)	Variable Frequency Vibration (VVF)	Constant Acceleration (CA)	Gross/Fine Leak (GFL) / Hermiticity (HER) / Hermetic Package Test	Package Drop (DROP)	Lid Torque (LT)	Internal Water Vapor (IWV)	Board Level Reliability (BLR)	X-ray (XRAY)	Acoustic Microscope (AM)	
Type of change	MS	VVF	CA	GFL / HER / MECH	DROP	LT	IWV	BLR	XRAY	AM	Remarks
ANY											
Any change with impact on agreed upon technical contractual agreements	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Any change with impact on processability/manufacturability at customer, which is not covered in the matrix below.	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
DATA SHEET											
Change of datasheet parameters/electrical specification (min./max./typ. Values) and/or AC/DC specification	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Correction of data sheet / errata	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Specification of additional parameters	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
DESIGN											
Firmware modification	-	-	-	-	-	-	-	-	-	-	
Change that adds or subtracts sub-components from the module BOM	#	#	#	U	-	-	-	#	#	#	X only to be considered in case a sub component will be added to BOM
PROCESS - ASSEMBLY - MATERIALS											
Replacement of any sub-component by a Non-AEC qualified sub-component	●	●	●	-	#	-	-	●	●	●	Consider chapter "Restriction for Use of Non-Automotive Subcomponents"
Replacement of any sub-component by an AEC qualified sub-component	#	#	#	-	#	-	-	●	●	●	AEC qualification test results of the sub-component shall be submitted on request.
Replacement of any sub-component by an AEC qualified sub-component Critical characteristics of the OE-MCM (e.g. form, fit, function, yield and/or reliability) are not affected by the sub-component.	#	#	#	-	#	-	-	#	#	#	AEC qualification test results of the sub-component shall be submitted on request.
Change within an AEC sub-component that has been requalified Critical characteristics of sub-component are affected	#	#	#	-	#	-	-	●	●	●	AEC qualification test results of the sub-component shall be submitted on request.
Change within an AEC sub-component that has been requalified Critical characteristics of sub-component are not affected	#	#	#	-	#	-	-	#	#	#	

Automotive Electronics Council
Component Technical Committee

Table 5d: Process Change Guideline for OE-MCMs (Superset Test Group G and H only) (continued)

Table 3 superset number	G1	G2	G3	G4	G5	G6	G7	H1	H2	H3	Remarks
Table 3 subnorm	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102 / Q200	Q100 / Q101 / Q102	Q100 / Q101 / Q102	Q100	Q100	Q100	Q102-003	Q102-003	Q102-003	
Name of test	MS	VVF	CA	GFL / HER / MECH	DROP	LT	IMV	BLR	XRAY	AM	
Type of change											
PROCESS - ASSEMBLY - MATERIALS (continued)											
Substrate change affecting module schematic (Changes to the internal dimensions and / or schematics)	#	#	#	#	#	#	#	#	#	#	
Change to the processes used in module assembly (e.g., pick & place, die attach, bonding, reflow, encapsulation, singulation, die overcoat, underfill, die preparation, die clean)	#	#	#	#	#	#	#	#	#	#	
Process integrity: tuning within specification	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to materials used in module assembly (e.g., adhesive, underfill, encapsulate, solder, epoxy, bump material, die attach material, bond wire, die overcoat, substrate, lead-frame base material)	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change of direct material supplier	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to assembly location (Move all or parts of production to a different assembly site)	●	●	●	●	#	-	-	●	●	●	Assembly transfer or relocation. Includes transfer as well as additional site e.g. dual source / fab strategy
Change of product marking	-	-	-	-	-	-	-	-	-	-	
Change or replacement of mechanical or optical components (e.g. lenses, pig-tail adapters)	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
EQUIPMENT											
Production from a new equipment/tool which uses a different basic technology or which due to its unique form or function can be expected to influence the integrity of the final product	-	-	-	-	-	-	-	-	-	-	Affected process change is to check.
Production from a new equipment/tool which uses the same basic technology (replacement equipment or extension of existing equipment pool) without change of process.	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change to testing platform (Change in final test equipment type leading to a different test concept)	-	-	-	-	-	-	-	-	-	-	Gage R&R / delta correlation
PACKING/SHIPPING											
Packing/shipping specification change	-	-	-	-	-	-	-	-	-	-	
Dry pack requirements change	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change. Change of dry pack requirements e.g. shelf life change from 24 to 12 months
Change of carrier (tray, reel)	-	-	-	-	-	-	-	-	-	-	Qualification effort depends on type of change.
Change of labelling	-	-	-	-	-	-	-	-	-	-	
TEST FLOW											
Change to testing location (Move of all or part of the final test to a different test site)	-	-	-	-	-	-	-	-	-	-	Gage R&R / delta correlation
Q-GATE											
Change of the test coverage/testing process flow used by the supplier to ensure data sheet compliance (e.g. elimination/addition of electrical measurement/test flow block; relaxation/enhancement of monitoring procedure or sampling)	-	-	-	-	-	-	-	-	-	-	Parameter Analysis: Delta correlation # For "burn in" changes ELFR recommended

Revision History

<u>Rev #</u>	<u>Date of change</u>	<u>Brief summary listing affected sections</u>
-	Aug. 28, 2022	Initial Release.