

**Automotive Qualification Results Summary of MSOP Package  
at UTAC Thailand (UT3)**

QUALIFICATION RESULTS			
TEST	SPECIFICATION	SAMPLE SIZE	RESULTS
Solder Heat Resistance (SHR)*	JEDEC/IPC <i>J-STD-020</i>	<b>30*11</b>	<b>Pass</b>
Autoclave (AC)*	JEDEC <i>JESD22-A102</i>	<b>16*77</b>	<b>Pass</b>
Unbiased Highly Accelerated Stress Test (UHAST)	JEDEC <i>JESD22-A118</i>	<b>16*77</b>	<b>Pass</b>
Highly Accelerated Stress Test (HAST)	JEDEC <i>JESD22-A110</i>	<b>27*77</b>	<b>Pass</b>
Temperature Cycle (TC)*	JEDEC <i>JESD22-A104</i>	<b>33*77</b>	<b>Pass</b>
Wire Bond Shear	AEC <i>Q100-001</i>	<b>2*5</b>	<b>Pass</b>
Post Temperature Cycle Wire Bond Pull	MIL-STD883 <i>Method 2011</i>	<b>5*5</b>	<b>Pass</b>
High Temperature Storage Life (HTSL)	JEDEC <i>JESD22-A103</i>	<b>17*45</b>	<b>Pass</b>
High Temperature Operating Life (HTOL)	JEDEC <i>JESD22-A108</i>	<b>10*77</b>	<b>Pass</b>
Early Life Failure Rate (ELFR)	AEC <i>Q100-008</i>	<b>9*800</b>	<b>Pass</b>

\* These samples were subjected to preconditioning (per J-STD-020 Level 1) prior to the start of the stress test. Level 1 preconditioning consists of the following: 1. Bake – 24 hours at 125°C; 2. Soak – unbiased soak for 168 hours at 85°C, 85%RH; 3. Reflow – three passes through a reflow oven with a peak temperature of 260°C. TC samples were subjected to wire-pull test after 500 cycles with results within specification limits.

# DeltaQualificationMatrix

## General

Short product and technology cycles as well as new environmental regulations frequently result in process and material changes of components, printed circuit boards, assembly techniques and circuit layout which have to be evaluated. The ZVEI "Guideline for Customer Notifications of Product and /or Process Changes (PCN) of Electronic Components specified for Automotive Applications" describes an appropriate methodology for dealing with changed electronic components. The qualification matrices in this guideline are recommendations for how to assess typical changes of electronic components. These recommendations promote an open risk-based discussion between supplier and customer regarding qualifications.

The DeltaQualificationMatrices were developed by the Industry Task Force Team "PCN DeltaQualificationMatrix" together with component experts from the ZVEI Working Group "PCN-Methodology". Actual content represents state-of-the-art technology and does not claim to be comprehensive. Deviation from proposed guideline should be mutually agreed as customer specific requirements have to be considered.

## DeltaQualificationMatrix Application (completion by component manufacturer)

- a) This table has to be used for changes only. The matrices are not applicable for new product, special qualifications (for instance for encapsulation of module) or Information Notes.
- b) If a change is not listed in this table, the qualification plan has to be defined and agreed between customer and supplier.
- c) The matrix for Active Components requires the user to choose between integrated circuits (AEC-Q100 Rev. H) and discrete semiconductors (AEC-Q101 Rev. D1) (cell D4).  
For Passive Components AEC-Q200 is used. For LED'S the AEC-Q102 is used.  
For Multi-Chip-Modules the AEC-Q104 is used.
- d) All changes as listed in the PCN have to be marked by a cross (x) in column B and will appear colored. The relevant reliability tests are then shown in "Tests, which should be considered for the appropriate process change".
- e) In "Tests, which should be considered for the appropriate process change after selection of condition table" is for modification of the found relevant tests under consideration of the weight of change.  
Related table "Conditions" has to be assessed per proposed letters with an (x).
- f) In "Suppliers performed tests" the component manufacturer documents the planned and performed tests.
- g) In case of deviations from tests, which should be considered this should be notified and commented by the component manufacturer in the area "Reason for exception of tests".  
Test results in form of generic data (G) are allowed when notified and justified.

### Evaluation Levels are categorized as follows

**"C: Component level":** The evaluation of a change at component has to be done by the component manufacturer at the component only. Generic data from other relevant evaluations can be used.

**"B: Board level":** The intended change described in the PCN may influence handling/processability/manufacturability of the component at the customer. Therefore, additional evaluation by the customer may be necessary.

**"A: Application level":** The intended change described in the PCN may influence the properties of the application (e.g. ECU). In addition to the evaluation under C or B the influence of the change in the application is evaluated by suitable investigations by the customer. It has to be considered whether the application / assembly requirements are already sufficiently safeguarded by other qualifications (application-specific risk assessment).

**" \*: Not relevant for qualification matrix":** Changes which fulfill neither A,B nor C definitions

### **Information Notes**

Changes indicated as "I" shall not be marked in the DeQuMa. For those changes the Information Note sheet shall be used. As the DeQuMa is desired for PCN only, a marking of "I"-changes would automatically influence evaluation level and test effort.

### **Important Notes**

- To use the matrices in the right form the ZVEI working group provides a Tutorial on its homepage (ZVEI-Tutorial )
- ID number: is a unique identification number for each indicated change defined in the ZVEI PCN DeltaQualificationMatrices. The same ID number is used in the PCN Form sheet to identify the change.
- Tests identified by the matrix have **to be considered** and checked if they are necessary to assess the specific change. Test modifications or generic data have to be justified in detail.
- "Further applicable conditions", comments and notes need attention, as they provide important hints and limitations.
- In order to use all functions in EXCEL, macros have to be allowed.

**Form provided by ZVEI - Revision 5.0 - Dezember 2021**





# History of DeQuMa

Version	Remarks
2.0	Revised by ZVEI PCN Methodology Workgroup in March 2015
2.1	Released March 2015
2.1.1	Active Components - delete write protection in comments
2.2	Solved problems with some ActiveX configurations
2.2.2	Solved Problems in Active Components
2.2.3	Solved Problems ActiveX, Active Components SEM-DE-02 (Design changes in routing) error fixed
2.2.4	Minor fixes
3.0	General Revision by ZVEI PCN Methodology Workgroup in June 2016 Changes are indicated by underlining in the read only version named Changes_DeQuMa_rev3_vs_rev2.xlsx
3.0.4	Expert Release
3.0.5	Fixing of macro bugs
3.1	Final Release (orthographic and punctuation corrections)
4.0	General Revision by ZVEI PCN Methodology Workgroup in July 2019. Muliti Chip Modules newly added to DeQuMa LED Components now based on the AEC Q102 Further Changes see separate PDF's <u>Excel-File</u> , where changes are indicated by underlining
4.1	LED worksheet: Content of columns had been swapped due to rearrangement and omission of columns.
5.0	General Revision by ZVEI PCN Methodology Workgroup in October 2021. Add MEMS pressure sensor







Mark changes  
with an 'X'Mark changes  
with an 'X'





[illegible]

Figure 1 "Y" indicates that performance of the given stress test should be considered for the appropriate process change. "N" indicates not recommended by 2-500		
	Stress/Process	Y/N
A	1. Process	
B	2. Process	
C	3. Only if Breakdown/Shutdown is available to help the test	
D	4. Process	
E	5. Only if Breakdown/Shutdown is available to help the test	
F	6. Process	
G	7. Only if Breakdown/Shutdown is available to help the test	
H	8. Process	
I	9. Only if Breakdown/Shutdown is available to help the test	
J	10. Process	
K	11. Process	
L	12. Process	
M	13. Process	
N	14. Process	
O	15. Process	
P	16. Process	
Q	17. Process	
R	18. Process	
S	19. Process	
T	20. Process	
U	21. Process	
V	22. Process	
W	23. Process	
X	24. Process	
Y	25. Process	
Z	26. Process	
AA	27. Process	
AB	28. Process	
AC	29. Process	
AD	30. Process	
AE	31. Process	
AF	32. Process	
AG	33. Process	
AH	34. Process	
AI	35. Process	
AJ	36. Process	
AK	37. Process	
AL	38. Process	
AM	39. Process	
AN	40. Process	
AO	41. Process	
AP	42. Process	
AQ	43. Process	
AR	44. Process	
AS	45. Process	
AT	46. Process	
AU	47. Process	
AV	48. Process	
AW	49. Process	
AX	50. Process	
AY	51. Process	
AZ	52. Process	
BA	53. Process	
BB	54. Process	
BC	55. Process	
BD	56. Process	
BE	57. Process	
BF	58. Process	
BG	59. Process	
BH	60. Process	
BI	61. Process	
BJ	62. Process	
BK	63. Process	
BL	64. Process	
BM	65. Process	
BN	66. Process	
BO	67. Process	
BP	68. Process	
BQ	69. Process	
BR	70. Process	
BS	71. Process	
BT	72. Process	
BU	73. Process	
BV	74. Process	
BW	75. Process	
BX	76. Process	
BY	77. Process	
BZ	78. Process	
CA	79. Process	
CB	80. Process	
CC	81. Process	
CD	82. Process	
CE	83. Process	
CF	84. Process	
CG	85. Process	
CH	86. Process	
CI	87. Process	
CJ	88. Process	
CK	89. Process	
CL	90. Process	
CM	91. Process	
CN	92. Process	
CO	93. Process	
CP	94. Process	
CQ	95. Process	
CR	96. Process	
CS	97. Process	
CT	98. Process	
CU	99. Process	
CV	100. Process	
CW	101. Process	
CX	102. Process	
CY	103. Process	
CZ	104. Process	
DA	105. Process	
DB	106. Process	
DC	107. Process	
DD	108. Process	
DE	109. Process	
DF	110. Process	
DG	111. Process	
DH	112. Process	
DI	113. Process	
DJ	114. Process	
DK	115. Process	
DL	116. Process	



Mark change  
with an "x"

Remar

ICM-0541	Change of the test equipment/testing process flow used by the supplier to ensure data consistency (e.g. introduction of additional measurement tools/blocks, replacement/environment of existing position or sampling)	-	P	e.g. test flow block, reduction from three temperature measurements to two temperature measurements change of bath / run-in process [2] Change adds reinforcement the strength of the test product [R] Improved product integrity is anticipated.	C	e.g. test implemented without customer measurement [R] e.g. reduction from three temperature [2] Change adds reinforcement the strength of the test product [R] Improved product integrity is anticipated.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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<b>n</b>	Not required
<b>i</b>	Information Note required.
<b>p</b>	PCN required.

CONDITIONS		Yes	No
A	die installation environment is clean		
B	For soldered assembly, new paste, time, temp, & flow to manufacturer specification in Q101		
C	101 - 01s no GA		
D	only for base die and change of mold compound		
E	base die sub-component only		
F	material is electrically tested to meet test surface		
G	For devices requiring PQP (equipment in Q100)		
H	As applicable for subcomponents with 1 MM SRAM or DRAM per AEC-100		
I	Test for failure that RRM requirement is 0.10mm		
J	For "burn in" channels IOL or ELFR recommended		

Mark change  
with an "x"

## INDUCTORS







[illegible]







CONDITIONS		No
A	Termination equipment only	<input type="checkbox"/>
C	Ceramics only	<input type="checkbox"/>

<b>B</b>	Component does (or changed to, changed required)	
<b>C</b>	Capacitive trimmers only	
<b>F</b>	Film products only	
<b>N</b>	Networks only	
<b>R</b>	Resistors only	
<b>S</b>	SMD components only	
<b>W</b>	Wirewound products only	
<b>Y</b>	Component not hermetically sealed	
<b>Note 1:</b>	For parts marked with rsk only. Laser and stamp marked parts shall be exempt.	
=> Please mark 'NO' with 'X', default is 'YES'		