

**Bump Site Transfer and Qualification of Select 6L and 8L SOT23  
Flip Chip on Lead Packages**

**Automotive Qualification Plan Summary for  
6-SOT\_23 at CARSEM**

| <b>TEST</b>  | <b>SPECIFICATION</b>          | <b>SAMPLE SIZE</b> | <b>EXPECTED COMPLETION DATE</b> |
|--|-------------------------------|--------------------|---------------------------------|
| Temperature Cycle (TC)*  | JEDEC <i>JESD22-A104</i>      | 3 x 77             | Sept 2018                       |
| Solder Heat Resistance (SHR)*                                    | JEDEC/IPC <i>J-STD-020</i>    | 3 x 11             | Sept 2018                       |
| High Temperature Storage Test (HTS)                              | JEDEC <i>JESD22-A103</i>      | 1 x 77             | Sept 2018                       |
| Temperature, Humidity and Bias Test (THB)*                       | JEDEC <i>JESD22-A101</i>      | 3 x 77             | Sept 2018                       |
| Unbiased Highly Accelerated Stress Test (UHAST)*                 | JEDEC <i>JESD22-A118</i>      | 3 x 77             | Sept 2018                       |
| Electrostatic Discharge <i>Field Induced Charge Device Model</i> | ANSI/ESDA/JEDEC <i>JS-002</i> | 3/voltage          | Sept 2018                       |

\* These samples will be subjected to preconditioning (per J-STD-020 Level 3) prior to the start of the stress test. Level 3 preconditioning consists of the following: 1. Bake – 24 hours at 125°C; 2. Soak – unbiased soak for 192 hours at 30°C, 60%RH; 3. Reflow – three passes through a reflow oven with a peak temperature of 260°C. TC samples will be subjected to wire-pull test after 500 cycles where results should be within specification limits.

**Bump Site Transfer and Qualification of Select 6L and 8L SOT23  
Flip Chip on Lead Packages**

**Qualification Plan Summary for  
SOT at CARSEM**

| <b>TEST</b>  | <b>SPECIFICATION</b>               | <b>SAMPLE SIZE</b> | <b>EXPECTED COMPLETION DATE</b> |
|--|------------------------------------|--------------------|---------------------------------|
| Temperature Cycle (TC)*  | JEDEC <i>JESD22-A104</i>           | 3 x 77             | Sept 2018                       |
| Solder Heat Resistance (SHR)*                                    | JEDEC/IPC <i>J-STD-020</i>         | 3 x 11             | Sept 2018                       |
| Temperature, Humidity and Bias Test (THB)*                       | JEDEC <i>JESD22-A101</i>           | 3 x 77             | Sept 2018                       |
| High Temperature Storage (HTS)                                   | JEDEC <i>JESD22-A103</i>           | 1 x 77             | Sept 2018                       |
| Electrostatic Discharge <i>Field Induced Charge Device Model</i> | ANSI/ESDA/JEDEC <i>JS-002-2014</i> | 3/voltage          | Sept 2018                       |

\* Preconditioned per JEDEEC/IPC J-STD0020.

PCN 18\_0064

**PCN Title: Bump Site Transfer and Qualification of Select 6L and 8L SOT23 Flip Chip on Lead Packages**

| <b>Change Items</b> | <b>From</b>  | <b>To</b>   |
|---------------------|--|---|
| Bumping Site        | Amkor Taiwan (AT5)   | Chipbond, Taiwan (CB4)  |
| Die Level Bumping   | High Lead Bumping  | Cu Pillar/SnAg Bumping  |
| Assembly            | High Lead bumped die Flip Chip on Lead assembly with Solder Screen Printing on leadframe step before Flip Chip attachment on leadframe | Cu Pillar/SnAg bumped die Flip Chip on Lead assembly process where the Solder Screen Printing on leadframe step is replaced with Flux Dip step before Flip Chip attachment on the leadframe |

**Bump Site Transfer and Qualification of Select 6L and 8L SOT23 Flip Chip on Lead Packages**

**Automotive Qualification Results Summary for  
SOT at CARSEM**

| TEST   | SPECIFICATION                      | SAMPLE SIZE | RESULT          |
|--|------------------------------------|-------------|-----------------|
| Temperature Cycle (TC)*  | JEDEC <i>JESD22-A104</i>           | 3 x 77      | PASS            |
| Solder Heat Resistance (SHR)*                                    | JEDEC/IPC <i>J-STD-020</i>         | 3 x 11      | PASS            |
| Temperature, Humidity and Bias Test (THB)*                       | JEDEC <i>JESD22-A101</i>           | 3 x 77      | PASS            |
| High Temperature Storage (HTS)                                   | JEDEC <i>JESD22-A103</i>           | 1 x 77      | PASS            |
| Unbiased Highly Accelerated Stress Test (UHAST)*                 | JEDEC <i>JESD22-A118</i>           | 3 x 77      | PASS            |
| Electrostatic Discharge <i>Field Induced Charge Device Model</i> | ANSI/ESDA/JEDEC <i>JS-002-2014</i> | 3/voltage   | PASS<br>+/1250V |

\* These samples will be 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.

# DeltaQualifikationsMatrix

## Allgemeines

Kurze Produkt- und Technologiezyklen elektronischer Bauelemente sowie neue Umweltauflagen (Bleiverbot, Flammschwermetalle, ...) führen häufig zu prozeß- und werkstofftechnischen Änderungen an Bauelementen, Leiterplatten, Verbindungstechnik und Schaltung, welche evaluiert werden müssen. Eine geeignete Methodik zur Handhabung von Änderungen an elektronischen Bauelementen beschreibt die ZVEI "Guideline for Customer Notifications of Product and /or Process Changes (PCN) of Electronic Components specified for Automotive Applications". Ein wesentlicher Teil dieser Guideline sind die hier vorliegenden Matrizen, welche sich als Empfehlungen für die Evaluierung von typischen Änderungen an elektronischen Bauelementen verstehen. Dies sollte Teil des offenen und risikobewussten Dialoges zwischen Lieferant und Kunden sein. Diese DeltaQualifikationsMatrizen wurden durch den IndustrieArbeitskreis "PCN DeltaQualifikationsMatrix" und den Bauteilexperten des ZVEI Arbeitskreis "PCN-Methodik" erarbeitet. Der Inhalt wurde basierend auf dem aktuellen Stand der Technik erstellt und erhebt keinen Anspruch auf Vollständigkeit. Im Einzelfall ist ggf. ein abweichendes Vorgehen abzustimmen, da kundenspezifische Vereinbarungen zur Qualifikation zu berücksichtigen sind.

## Anwendung der DeltaQualifikationsMatrix (auszufüllen durch den Bauelementhersteller)

- Diese Tabelle ist **nur** bei Änderungen anzuwenden. Neuqualifikationen und Sonderqualifikation (z.B. Verguß von Modulen) sowie Information Notes bleiben von diesen Matrizen unberührt.
- Ist eine Änderung in dieser Tabelle nicht aufgeführt, so ist der Qualifikationsumfang zwischen Kunde und Lieferant abzustimmen.
- Die Matrix der Aktiven Bauelemente ist so aufgebaut, dass zwischen integrierten Halbleitern (AEC-Q100 Rev.H) und diskreten Halbleitern (AEC-Q101 Rev. D1) auszuwählen ist (Zeile D4). Für Passive Bauelemente gilt die AEC-Q200. Für LED's gilt die IEC 60810.
- Alle** Änderungen in der PCN sind in der Spalte B durch ein Kreuz (x) zu markieren und werden dadurch farblich hervorgehoben. Sofern dies geschehen ist, werden im Feld "*Tests, which should be considered for the appropriate process change*" (Zeile 83 für Aktive Bauelemente, Zeile 466 für Passive Bauelemente oder in Zeile 77 für LED's) alle in Betracht zu ziehenden Zuverlässigkeitstests angezeigt.
- In "*Tests, which should be considered for the appropriate process change after selection of condition table*" (Zeile 85 für Aktive Bauelemente, Zeile 468 für Passive Bauelemente oder Zeile 79 für LED's) wird die Anpassung der in Betracht zu ziehenden Tests in Folge der Relevanz bezüglich der Änderung berücksichtigt. Dazu ist die Tabelle "Conditions" entsprechend der Auswahl (A/B/C) mit einem (x) zu bewerten.
- In "*Suppliers performed tests*" (Zeile 87 für Aktive Bauelemente, Zeile 470 für Passive Bauelemente oder Zeile 81 für LED's) dokumentiert der Bauelementhersteller die durchgeführten bzw. geplanten Tests.
- Falls von der Testempfehlung abgewichen wird, so sollten diese Abweichungen vom Bauelementhersteller angezeigt und kommentiert werden. Hierzu ist der Bereich "*Reason for exception of tests*" (Zeile 89 für Aktive Bauelemente, Zeile 472 für Passive Bauelemente oder Zeile 83 für LED's) zu verwenden. Werden die in Betracht zu ziehenden Tests durch generische Daten (**G**) belegt, ist dies ebenfalls hier anzuzeigen und zu begründen.

## Die Einstufung des Untersuchungslevel erfolgt in folgende Kategorien

- "C: Component level"**: Die Evaluierung der Änderung am Bauelement ist durch Untersuchungen **ausschließlich** am Bauelement beim Bauelementhersteller durchführbar. Zur Evaluierung der Änderung dürfen Ergebnisse aus bereits durchgeführten Untersuchungen herangezogen werden, wenn diese zu einem ähnlichen Bauelement bereits vorliegen (**Generische Daten**).
- "B: Board level"**: Die beschriebene Änderung hat möglicherweise Einfluss auf die Verarbeitbarkeit des Bauelementes im Steuergerät. Die Evaluierung der Änderung wird wie unter C beim Bauelementhersteller durchgeführt. Zusätzlich ist durch den Kunden/Steuergerätehersteller die Verarbeitbarkeit zu prüfen, die z.B. abhängig von der Änderung, Zuverlässigkeitsuntersuchungen auf applikationsrelevanten Testboards erfordert.
- "A: Application level"**: Die beschriebene Änderung hat möglicherweise Einfluss auf die Applikation/ das Steuergerät. Die Evaluierung der Änderung wird wie unter C oder B durchgeführt. Zusätzlich ist vom Kunden/Steuergerätehersteller der Einfluss der Änderung im Steuergerät durch geeignete Untersuchungen zu bewerten. Dieses Vorgehen ist mit dem OEM abzustimmen. Hierbei ist zu berücksichtigen, ob die Steuergeräte- / Baugruppenanforderungen durch andere Qualifikationen bereits hinreichend abgesichert sind (**applikationsspezifische Risikobetrachtung**).
- "\* : Not relevant for qualification matrix"**: Änderung(en), die nicht in A, B oder C eingestuft werden können und somit nicht relevant für die DeQuMA sind.

## Information Notes

Änderungen die nur eine Information Note benötigen (bei der Bewertung Risk on Supply Chain als "I" gekennzeichnet), dürfen nicht in der DeQuMa angekreuzt werden, da Sie ansonsten den erforderlichen Evaluierungslevel verfälschen. Für als "I" bewertete Änderungen ist das Information Note Formblatt zu verwenden.

# DeltaQualificationMatrix

## General

Short product and technology cycles as well as new environmental regulations („Pb-free", flame retardants, ...) 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)

- 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.
- If a change is not listed in this table, the qualification plan has to be defined and agreed between customer and supplier.
- 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 IEC 60810 is used.
- 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*" (row 83 for Active Components, row 466 for Passive Components, respectively in row 77 for LED's).
- In "*Tests, which should be considered for the appropriate process change after selection of condition table*" (see row 85 for Active Components, row 468 for Passive Components, or row 79 for LED's) 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).
- In "*Suppliers performed tests*" (here row 87 for Active Components, row 470 for Passive Components, or row 81 for LED's) the component manufacturer documents the planned and performed tests.
- 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*" (see row 89 for Active Components, row 472 for Passive Components, or row 83 for LED's). 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 level by the component manufacturer is sufficient. Generic data from other relevant evaluations can be used.
- "B: Board level"**: The intended change described in the PCN may influence processability / manufacturability of the component at board level. Therefore additional evaluation by customer may be necessary, for example reliability tests on application relevant testboards, depending on change.
- "A: Application level"**: The intended change described in the PCN may influence the properties of the application (e.g. Electronic Control Unit). 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. The scope of the evaluation has to be aligned with the OEM. 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 InformationNote 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.

#### Wichtige Hinweise

- Zur formgerechten Anwendung der DeltaQualifikationsMatrizen steht auf der Homepage des ZVEI AK ein Tutorial bereit (ZVEI-Tutorial).
- ID Nummer: ist eine eindeutige Identifikationsnummer für jede angegebene Änderung, die in den ZVEI PCN DeltaQualifikationsMatrizen identifiziert ist. Die gleiche ID Nummer wird zur Identifizierung der Änderung im PCN Form Sheet verwendet.
- Die mittels Matrix identifizierten Tests sind **in Betracht zu ziehen**, d.h. es ist zu prüfen, ob der jeweilige Test für die spezifische Änderung in dieser Form notwendig ist. Abweichungen oder generische Daten sind im Detail zu begründen.
- Die Spalte "Further applicable conditions", Bemerkungen und Fußnoten sind unbedingt zu beachten, da sie wichtige Hinweise und Einschränkungen enthalten.
- Zur Nutzung aller Funktionen muss in Excel die Anwendung von Makros freigegeben sein.

#### 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 3.1 - December 2016

## 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<br>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)  |







|                                |                |
|--------------------------------|----------------|
| Worked on:<br>(Name, Function) | Max Mustermann |
| Date:                          |                |
| PCN number:                    |                |
| Signature:                     |                |

Form provided by: 2020 - Revision 1.1 - December 2019

Max change with all

Selection of component

| AEC-Q000 Revision D<br>Check requirement<br>(if not marked as 'N') | Further applicable conditions |   | Risk assessment depending on change for each application | Device evaluation<br>additional to AEC-Q200 Revision D |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    | Additional to AEC-G200 | Remarks |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     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|--|-------------------------------|---|--|--|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|------------------------|---------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----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|  | 1                             | 2 |  | 3  | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |                        |         | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1079 | 1080 | 1081 | 1082 | 1083 | 1084 | 1085 | 1086 | 1087 | 1088 | 1089 | 1090 | 1091 | 1092 | 1093 | 1094 | 1095 | 1096 | 1097 | 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 | 1109 | 1110 | 1111 | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 | 1120 | 1121 | 1122 | 1123 | 1124 | 1125 | 1126 | 1127 | 1128 | 1129 | 1130 | 1131 | 1132 | 1133 | 1134 | 1135 | 1136 | 1137 | 1138 | 1139 | 1140 | 1141 | 1142 | 1143 | 1144 | 1145 | 1146 | 1147 | 1148 | 1149 | 1150 | 1151 | 1152 | 1153 | 1154 | 1155 | 1156 | 1157 | 1158 | 1159 | 1160 | 1161 | 1162 | 1163 | 1164 | 1165 | 1166 | 1167 | 1168 | 1169 | 1170 | 1171 | 1172 | 1173 | 1174 | 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 | 1186 | 1187 | 1188 | 1189 | 1190 | 1191 | 1192 | 1193 | 1194 | 1195 | 1196 | 1197 | 1198 | 1199 | 1200 | 1201 | 1202 | 1203 | 1204 | 1205 | 1206 | 1207 | 1208 | 1209 | 1210 | 1211 | 1212 | 1213 | 1214 | 1215 | 1216 | 1217 | 1218 | 1219 | 1220 | 1221 | 1222 | 1223 | 1224 | 1225 | 1226 | 1227 | 1228 | 1229 | 1230 | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 | 1256 | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 | 1269 | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 | 1282 | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 | 1295 | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 | 1308 | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 | 1321 | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 | 1334 | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 | 1347 | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 | 1360 | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 | 1373 | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 | 1386 | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 | 1399 | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 | 1412 | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 | 1425 | 1426 | 1427 | 1428 | 1429 | 1430 | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 | 1443 | 1444 | 1445 | 1446 | 1447 | 1448 |





| Req. category        | Req. ID  | Req. description  | Req. type | Req. priority | Req. status  | Req. impact  | Req. risk                            | Req. effort | Req. cost | Req. time | Req. complexity | Req. visibility | Req. scope | Req. effort | Req. cost | Req. time | Req. complexity | Req. visibility | Req. scope |  |
|----------------------|--|---|-----------|---------------|--|--|--------------------------------------|-------------|-----------|-----------|-----------------|-----------------|------------|-------------|-----------|-----------|-----------------|-----------------|------------|--|
| Proc. equipment      | PAS-FLM-03   | Change in process technology or manufacturing method - Welding  | -         | P             | P  | Change of welding, bending or bending process  | e.g. change of tempering temperature | C           |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-04   | Process change using other equipment  | -         | P             | P  | Transfer with process specification  | e.g. process control                 | C           |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PACKING / SHIPPING - NEW MATERIAL, CRITICAL DIMENSIONS |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-01   | Packing / shipping specification change (lossing of tolerances)   | P         | P             | Change of packing specification  | e.g. number of pieces on reel  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-02   | Dry pack requirements change  | P         | P             | Change of drypack requirements   | e.g. change of MSL, e.g. change of pack sensitive (PC, MSB)  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-03   | Change of carrier (dry, roll)   | P         | P             | Change of carrier  | e.g. change for material, e.g. change by geometry  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PACKING / SHIPPING - VISUAL INSPECTION                 |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-01   | Change of labeling  | I         | P             | Change of labeling, also on reel   | B: e.g. without information (flat) stamp<br>P: e.g. change of customer specific information  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-02   | Change of product marking   | I         | P             | Marking on device  | e.g. change of marking<br>e.g. change of marking<br>e.g. change of marking   | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-03   | Change of packaging specification   | P         | P             | Change in packing specification which also includes the material of the packaging  | e.g. change of documentation in packing specification  | -                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | LOGISTICS / CAPACITY / TESTING - EQUIPMENT             |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-01   | Production from a new equipment which uses a different technology or which due to its unique form or function can be expected to enhance the quality of the final product                       | P         | P             | Change to process technique which is already covered alone<br>Note: Expansion of the product covered by the bill requires also a PCR   | e.g. implementation of new techs   | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-02   | Production from a new equipment which uses the same basic technology (replacement equipment or extension of existing equipment)   | -         | P             | PCR required for dedicated equipment for sensitive component production  | e.g. extension of existing machine capacity  | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-03   | Change in final test equipment type that uses a different technology  | P         | P             | Change of final test equipment which uses different technology<br>PCR required for dedicated equipment for sensitive parameters  | e.g. change of water platform  | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | LOGISTICS / CAPACITY / TESTING - PROCESS FLOW          |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-01   | Manufacturing site transfer or replacement of a part of production process to a different location  | P         | P             | Change of manufacturing site<br>Note: Replacement of the part of production is not affected  | Movement or transfer of manufacturing site or process steps to a different location  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-02   | Elimination or addition of a manufacturing process step   | -         | P             | Change of manufacturing process sequence   | e.g. wetting / cleaning process<br>e.g. change of order of processes   | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | LOGISTICS / CAPACITY / TESTING - COATING               |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | PAS-FLM-01   | Change of wet coating used by the supplier to ensure that compliance (e.g., microstructural) of electrical environmental test track, release/recovery period of remaining procedure or warranty | -         | P             | Change of wet coating  | e.g. change from 100% to sample inspection<br>e.g. wet coating, reduction from flow to flow<br>e.g. change in test volume in process | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| Proc. equipment      | QUARTZ CRYSTAL / SAW                                   |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-01   | Any change with respect to special customer characteristics/contractual agreements  | P         | P             |  | Not relevant for technical evaluation  | *                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-02   | Any change with respect to processability/manufacturability at customer, which is not covered in the contract   | P         | P             |  | Technical interface means component terminals  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | DATA SHEET   |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-01   | Change of distributed parameter electrical specification (res, induct, capacit, and / or ACDC specification)  | P         | P             | Change of application relevant parameters<br>Not included: External changes  | e.g. tighter of electrical parameter distribution  | A                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-02   | Correction of data sheet  | I         | P             | Technical change of the product, with correction in description (writing, drawing, ...)<br>B: in case of external changes<br>P: in case of internal changes (PCR)  | e.g. data sheet correction because of new information about component behavior   | A                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-03   | Specification of additional parameters  | I         | P             | Specification of a new not previously covered parameter<br>No technical change of the product<br>B: no influence<br>P: Risk assessment depending on change the each application to provide position of additional parameters (see below) | e.g. adding new (tested) parameter   | A                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | MATERIAL   |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-01   | Change of material composition - Quartz Blank   | P         | P             | A change of Quartz Blank is a change of Quartz Blank   |  | A                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-02   | Change of material composition - Base   | P         | P             | Changing of the material of the base   | e.g. change from ceramic to epoxy  | A                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-03   | Change of material composition - Lead / Termination   | P         | P             | Change of Lead/Termination   | e.g. change of plating finish (e.g. Au, Ni/Cr)   | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-04   | Change of material composition - Sealing  | P         | P             | Change of Glass Seal   | e.g. change to lead free glass   | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-05   | Change of material composition - Cap / Cap  | P         | P             | Change of the material of the cap  | e.g. change from metal to ceramic material   | A                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-06   | Change of material composition - Blank Support  | P         | P             | Change of Blank Support  | e.g. change of glass (Glenac or Glast)<br>e.g. change metal (copper, lead, nickel)   | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-07   | Change of material composition - Chermist   | P         | P             | Change of Chermist   | e.g. change to green mold compound<br>e.g. change of filler particles  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-08   | Change of material composition - Case Sealing   | P         | P             | Change of Case Sealing. Change of material for case sealing<br>Material for components with ceramic base and metal case  | e.g. change from solder paste to adhesive glue   | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-09   | Change of material composition - Electrode  | P         | P             | Change of Electrode material on crystal blank  | e.g. change from Au to Ag  | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-10   | Change of material composition - Insulator  | P         | P             | Change of Insulator<br>Cap (if needed) (see below)<br>Not relevant for typical SMC   | e.g. insulating plate under crystal<br>e.g. Glass sealing for leads  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-11   | Change of material composition - Masking  | P         | P             | Change of masking material   | e.g. change of ink<br>e.g. chemical to environmentally friendly  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-12   | Change of supplier of material  | -         | P             | Change to a new or additional material supplier or component manufacturer  | e.g. for 2nd source purpose  | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | DESIGN   |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-01   | Change of termination, surface finish, shape, color, appearance or dimension structure - Base   | I         | P             | Change of Base design  | e.g. due to re-manufacturing purpose   | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-02   | Change of termination, surface finish, shape, color, appearance or dimension structure - Lead / Termination   | I         | P             | Change of Lead/Termination design. Change of geometry or terminal part of lead form  | e.g. change lead design to improve reliability   | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-03   | Change of termination, surface finish, shape, color, appearance or dimension structure - Cap / Cap  | I         | P             | Change of Cap/Case design  | e.g. due to re-manufacturing purpose   | A                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-04   | Change of termination, surface finish, shape, color, appearance or dimension structure - Package  | I         | P             | Change of Package (Material). Change the design of the package<br>Not relevant for typical SMC   | e.g. change from welded device to glued device (case sealing)  | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-05   | Change of termination, surface finish, shape, color, appearance or dimension structure - Insulator  | I         | P             | Change of Insulator design<br>Cap (if needed) (see below)<br>Not relevant for typical SMC  | e.g. change dimension of blank, lead, plates, electrode design   | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-06   | Change of inner construction - Quartz Blank   | -         | P             | Change of Quartz Blank design  | e.g. change design of glass blank  | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-07   | Change of inner construction - Blank Support  | -         | P             | Change of Blank Support design   | e.g. change design of glass blank<br>e.g. change design of metal supporter   | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | FINISHING  |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-01   | Change in process technology or manufacturing method - Quartz Blank   | -         | P             | Change of Quartz Blank process   | e.g. change of cutting or beveling technology  | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-02   | Change in process technology or manufacturing method - Blank Etching / Cleaning   | -         | P             | Change of Blank Etch/Clean process (using different / new technology)  | e.g. change from liquid etch to plasma etching   | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-03   | Change in process technology or manufacturing method - Electrode Formation  | -         | P             | Change of Electrode Formation process  | e.g. change from evaporation to sputtering   | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-04   | Change in process technology or manufacturing method - Trimming   | -         | P             | Change of blank trim process (Method of trim technology, sawing)   | e.g. change from evaporation to ion beam   | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-05   | Change in process technology or manufacturing method - Bonding / Anisotropy   | -         | P             | Change of Blank bonding / anisotropy process. Change of method how apply conductive material to base or blank  | e.g. change from solder paste to adhesive glue<br>e.g. change from ball to wire bond   | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-06   | Change in process technology or manufacturing method - Cap / Cap Attaching  | -         | P             | Change of Cap/Case attaching process   | e.g. change of the attach method<br>e.g. change from ball to wire bond   | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-07   | Change in process technology or manufacturing method - Masking  | -         | P             | Change of Masking process. Not relevant for typical SMC  | e.g. change of overall process parameter   | B                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-08   | Change in process technology or manufacturing method - Marking  | -         | P             | Change of Marking process  | e.g. change from steel marking to laser marking<br>e.g. change of appearance (additional marking)                                    | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-09   | Change in process technology or manufacturing method - Aging  | -         | P             | Change of Aging process. Typically not relevant for quartz crystals  | If aging is done e.g. change of time or temperature  | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PAS-QIA-10   | Process change, testing with specification  | -         | P             | Transfer with process specification  | e.g. process control   | C                                    |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |
| QUARTZ CRYSTAL / SAW | PACKING / SHIPPING - NEW MATERIAL, CRITICAL DIMENSIONS |   |           |               |  |  |                                      |             |           |           |                 |                 |            |             |           |           |                 |                 |            |  |











