

PCN Assessment Sheet Tutorial

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■ Overview

PCN Assessment Sheet is a tool that describes the evaluation level and tests for changes in the manufacturing process.

- Used as a communication tool for semiconductor makers, ECU makers, and Car makers.
- This document follows the international standards (such as AEC Q10x, IEC 60810, and ZVEI).

The evaluation item matrix which is based on the ZVEI – Delta Qualification Matrix (DeQuMa) is to identify the impact by the change points and evaluation items.

Base on the following contents, it will clarify the scope of evaluation required for change approval and applicable tested product(s).

- Connection between the change points from 4M1E point of view and evaluation items
- Visualization of the impact of the changes on ECU and systems in the table “Confirmation of design changes due to product changes”
- Connection between evaluation results / production results under changed manufacturing conditions and evaluation items required for PCN.
- Connection between combination element, actual result, failure mechanism, representative product, and evaluation items

■ Purpose

- Optimization of evaluation item selection based on failure risk due to the process change
- Throughput improvement, man-hour reduction for PCN preparation by using a common form
- Reduction of time and effort required for PCN evaluation

PCN Assessment Sheet

Application		PCN		Change items												Check items		Results				
Reason of change	Production experience in transfer site	Technical aspect	Change details	Content	Man		Machine		Material		Method		Instrument		Any correction to mitigate the change risk in production (JIT/700a/No)	Form (Dimension)	Characteristics (ex. Mechanical strength)	Initial Process Study (PS)	Measurement/Spurious Analysis (MSA)			
					Operator skill level (operation) (No/Yes)	Tool change (No/Yes)	Material change (No/Yes)	Process change (No/Yes)	Characteristics change (No/Yes)	Any correction to mitigate the change risk in production (JIT/700a/No)												
Description Guide		Select item from publication	Use item from publication menu for "Change details" if "Others" is selected, describe details in "Additional comment for change contents"		Describe "Y (Change)", "Y (Stabilized)" or "N (No change)" for change or experiment status (Describe explanation for change contents with number "Y/N", if additional comment is needed)												Items to be shown up along with "Technical aspect"				Describe expected completion schedule if "No problem" is selected, specify the reference date when	
Visible product supply	Production experience for Automotive products production - Over 10 Mpcu	84 content	No change		Y	Y (Stabilized)	Y	Y (Stabilized)	Y	Y (Stabilized)	Y	Y (Stabilized)	Y	Y (Stabilized)	Y	No	No change dimension, wire flow, approval		No problem	No problem		
		Wire bonding	Change bonding wire material (change No. ex. Cu)		Y	Y (Stabilized)	Y	Y (Stabilized)	Y	Y (Stabilized)	Y	Y (Stabilized)	Y	Y (Stabilized)	Y	Y	Y	Y	Y	Y	Y	
Additional comment for change contents				14 All Regional Automotive production	Comments: "OAT Plant B" is added to the current assembly plant A. Plant B is ISO 9001 certified, long business relations with the OAT and outsourcing management has been implemented. Equivalent Process/Machines except the wire material change.												Expected completion date				Expected completion date	
				14 All Regional Automotive production	Comments: Equivalent testing system is available.												No problem				No problem	
				14 All Regional Automotive production	Comments: Bonding wire material is changed from Au to Cu. Dedicated bonding machine is used for Cu wire. Not new technology. Over 1 billion parts of products with this material change have been shipped and no problem defect related with this Cu wire has occurred up to today.												No problem				No problem	
				14 All Regional Automotive production	Comments: Same 020 Character is used.												No problem				No problem	
				14 All Regional Automotive production													No problem				No problem	

“1. Confirmation of changes points due to production related changes”

This section is to identify the technical aspects and change points from 4M1E point of view and to confirm its process capability.

This section is to clarify the impact by the change points from product specification point of view and to confirm the equivalency on electronic characteristics.

2b. Confirmation of interaction of combined changes and selection of qualification test items”

This section is to identify qualification test items and reason of selection for representative qualification product(s) and to confirm the required qualification test results.

PCN evaluation can be OK only when process capability results for 1, equivalency on electronic characteristics for 2, and qualification test results selected by 2b are all OK.

2a

2b. Verification of combination risk and definition of evaluation items [BE]

2b

1. Confirmation of changes points due to production related changes (1/2) PCN Assessment Sheet

*There are two types of PCN Assessment Sheets: “Front End” and “Back End (includes Test and following process) “. Make sure to use the applicable sheet.

PCN Assessment Sheet (BE)

ApplicationPCN1-11-6

1. Verification of Change point for production (BE)

Reason of change	Production experience in transfer site	Technical aspect	Change details	Comment	change items									
					Man		Machine		Material		Method		Environment	
					Operator skill degradation (Yes/No)	Comment	Tool change (Yes/No)	Comment	change (Yes/No)	Comment	change (Yes/No)	Comment	change (Yes/No)	Comment
1-2	1-3	1-4	1-5		Describe "C (Change)", "E (Equivalent)" or "N (No change)" for change or experienced status (Describe explanation for change contents with number (*#), if additional comment is needed)									
Description Guide		Select from pulldown	Use item from pulldown menu for "Change details" If "Others" is selected, describe details in "Additional comment for change contents"											
Stable product supply	Production experience for Automotive products yyyy/mm ~ Over xx Mpcs	BE_common	Site change	*1	E (Equivalent)	*2	E (Equivalent)	*1	C (Change)	*3	C (Change)	*3	E (Equivalent)	*4
		Wire_bonding	Change bonding wire material change (Au => Cu)	*3	E (Equivalent)	*2	C (Change)	*3	C (Change)	*3	C (Change)	*3	E (Equivalent)	*4
		1-7	Additional comment for change contents		<div><div>(a) Experienced Automotive production</div><div>*1 Comment: OSAT (plant B) is added to the current assembly plant A. Plant B is IATF 16949 certified. Long business relations with the OSAT and outsourcing management has been implemented. Equivalent Process/Machines except the wire material change.</div><div>*2 (a) Experienced Automotive production</div><div>Comment: Equivalent training system is available.</div><div>(a) Experienced Automotive production</div><div>*3 Comment: Bonding wire material is changed from Au to Cu. Dedicated bonding machine is used for Cu wire. Not new technology. Over 1 billion parts of products with the same process/package with Cu wire have been shipped and no quality defect related with the Cu wire has occurred as of</div><div>(a) Experienced Automotive production</div><div>*4 Comment: Same ISO cleanliness standard</div></div>									

- 1-1) Select “PCN” or “PCI” referring to the “List” sheet
- 1-2) Select “Reason of Change” from the drop-down lists. If “Others” is selected, add a comment No. in 1-5) & 1-6) and write explanatory comments on 1-7).
- 1-3) Write production experience
- 1-4) Select “Technical aspect” from the drop-down lists. If there is no applicable one, select “Others” and write change details in the 1-7) “additional comment”.
- 1-5) Select “Change details” from the drop-down lists. If additional explanation is required, add a comment No. and write comments on 1-7).
- 1-6) As to 4M1E change points, select from “C” for Change “E” for Equivalent “No” for No-change Refer to the “4M1E STD” sheet for each definition.
- 1-7) Write additional comments for 1-2 to 1-6. Link each comment No. to the No. added in 1-5) and/or 1-6). If “E” for Equivalent is selected in 1-6), make sure to write its justification.

*The above is a sample from the “Back End” sheet

1. Confirmation of changes points due to production related changes (2/2) PCN Assessment Sheet

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1-8) If “Any correction to mitigate the change risk in product” occurs, select “Yes”, if not select “No”. Add comment in 1-9) if additional explanation is required by adding a comment No.

1-9) Add explanations for 1-8)

1-10) Select from the drop-down lists which link with the selected “Technical aspect”.

1-11) If “C” or “E” is selected in 1-6), process capability results need to be submitted as summarized evidence documents. (Also refer to the “Example#1” Sheet”)

If the result is not yet available at the time of planning announcement, write the expected completion date. If already completed, write the reference document name and page #.

2. Confirmation of design changes due to production changes

2a. Verification of Change point for design (BE)

Function	Specification category	Item	Parameter	Specification change	Comment	Need of change impact verification	Comment	Need of correction impact verification	Comment	Assessment item	Assessment result
				(Yes/No)		(Yes/No)		(Yes/No)		Electrical characterization	Electrical characterization
Electrical characterization	Specification	AC	Frequency	No		No		No		Yes	*1 OK
		DC	Output	No		No		No		Yes	*1 OK
			Breakdown voltage	No		No		Yes	*1 OK		
			Leakage	No		No		Yes	*1 OK		
		Flash memory characterization	Write/erase time	No		No		No			
	Data retention time		No		No		No				
	Reference	EMC	Equivalency	No		No		No		Yes	*2 OK
Additional explanation	*1	Electrical Characterization data is confirmed and the data is attached for your review.									
	*2	EMC evaluation was performed due to the wire material change and the result is attached for your review.									

2a-1) Write other critical parameter from the Data Sheet besides the electrical characteristics (AC, DC) if any. (Add more depending on the change points and the subject product)

2a-2) If any specification change occurs on the parameter, select “Yes”, if not select “No”. If “Yes” is selected, add a comment No. and write explanation in 2a-7).

2a-3) If the process change affect the parameter, select “Yes”, if not select “No”.

2a-4) If “Any correction to mitigate the change risk in product” occurs in 1-8), select “Yes” in the applicable parameter. If not applicable, select “No”. If no correction in 1-8), “No” should be selected in all items.

2a-5) If electrical characterization is confirmed using samples, select “Yes” in the applicable parameter. If not, select “No”.

2a-6) If “Yes” is selected in any parameter in 2a-5), write electrical characterization results selecting by “OK” or “NG”.
The actual confirmation results need to be submitted as summarized evidence documents.
If the result is not yet available at the time of planning announcement, provide the expected completion date.

2a-7) If “Yes” is selected in 2a-2) to 2a-5), add a comment No. in the applicable item and provide additional explanation in 2a-7).

2b. Confirmation of interaction of combined changes and selection of qualification test items (1/2) N Assessment Sheet

2b. Verification of combination risk and definition of evaluation items (BE)

2b-1

2b-2

2b-3

2b-4

2b-5

Technical aspect	Changes			Combination risk	Combination experience (X: Experienced, -: No experience for combination)	Failure mechanism	Representative product	
	Site	4M1E	OR				Condition to define the representative product	Representative product
BE_common	X	X		X	Total Reliability Package dimension	Assembly failure	N/A	N/A
Wire_bonding	X	X		X	IMC Lead frame Molding	Assembly failure	N/A	N/A
						Wire pull/shear failure	Same assembly line/Same package/Same materials/bigger business volume	Product A
						Wire peel failure		Product A
						Corrosion		Product A

↑ Check if site change: X
↑ Check if there is change: X
↑ Check if Yes: X
↑ OR for site, 4M1E, correction

DeQuMa ID referenced =>

PCN-Delta-Qualification-Matrix-ZVEI-4_1.xlsm

Change of wire bonding	SEM-PA-08
Move all or parts of production to a different assembly site.	SEM-PA-18
Production from a new equipment/tool which used the same	SEM-EQ-02
Evaluation items aft	
Comment	

- 2b-1) Manually copy the “technical aspect” selected in 1-4)
- 2b-2) Site: if site changes, write “X”
4M1E: If any “C” is applicable in the section 1, write “X”
Correction: If any “Yes” is applicable in the section 1, write “X”
OR: If any “X” is applicable in the 3 times, write “X”
- 2b-3) Write all possible combination risk for each “technical aspect”
- 2b-4) If the combinations has production experience, write “X”, if none, write “-”.
- 2b-5) Write failure mechanism
- 2b-6) In case of qualification by similarity using a representative product, write the selecting condition.
- 2b-7) In case of qualification by similarity using a representative product, write the representative product type/part number.

