台灣半導體股份有限公司
231 台北縣新店市北新路三段205號11樓
電話:886-2-8913-1588
傳真:886-2-8913-1788

TAIWAN SEMICONDUCTOR CO., LTD.
11F, No. 205 Sec. 3, Beishin RD.
Shindian Dist., New Taipei City, Taiwan, R.O.C. 231
Tel:886-2-8913-1588 Fax:886-2-8913-1788

PCN17023【Change of 13" Reel attachment method for SMD series】Comparison Report

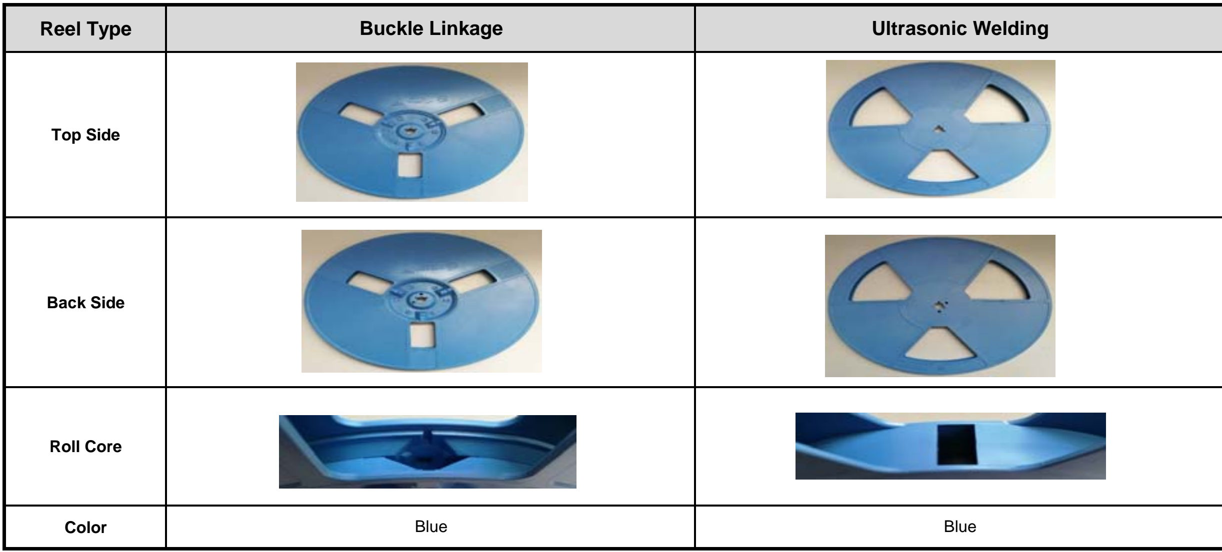
Prepared by Lucy
Checked by Reyn
Approved by Vince
Issued date at 2017/9/23
Reversion for A

****** The copyright of document and business secret belong to TSC, and no copies should be made without any permission ******

台灣半導體股份有限公司
231 台北縣新店市北新路三段205號11樓
電話:886-2-8913-1588
傳真:886-2-8913-1788

TAIWAN SEMICONDUCTOR CO., LTD.
11F, No. 205 Sec. 3, Beishin RD.
Shindian Dist., New Taipei City, Taiwan, R.O.C. 231
Tel:886-2-8913-1588 Fax:886-2-8913-1788

Comparison Report



Reel Type	Buckle Linkage	Ultrasonic Welding
Top Side		
Back Side		
Roll Core		
Color	Blue	Blue

Dimension

Buckle Linkage

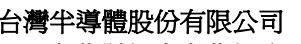
Reel Size	Tapy Size	A ±0.5	B (+0.3;-0)	C (+0.3;-0)	D (±2)	E (±2)	N ±0.3	G ±0.4	P ±0.5	Q ±1
13"	8mm	330	2.0	13.0	60	35	101.5	9	13	5
	12mm							13.0		
	16mm							17.5		

Ultrasonic Welding

	Tapy Size	ΦA ±0.5	ΦN ±0.5	B ±0.2	ΦC ±0.1	ΦE ±2	F ±2°	P ±0.5	Q ±1	W1 (+2;-0)
13"	8mm	330	100.0	2.3	13.3	270	64°	13	5	8.4
13"	12mm									12.4
13"	16mm									16.4

****** The copyright of document and business secret belong to TSC, and no copies should be made without any permission ******

TAIWAN SEMICONDUCTOR

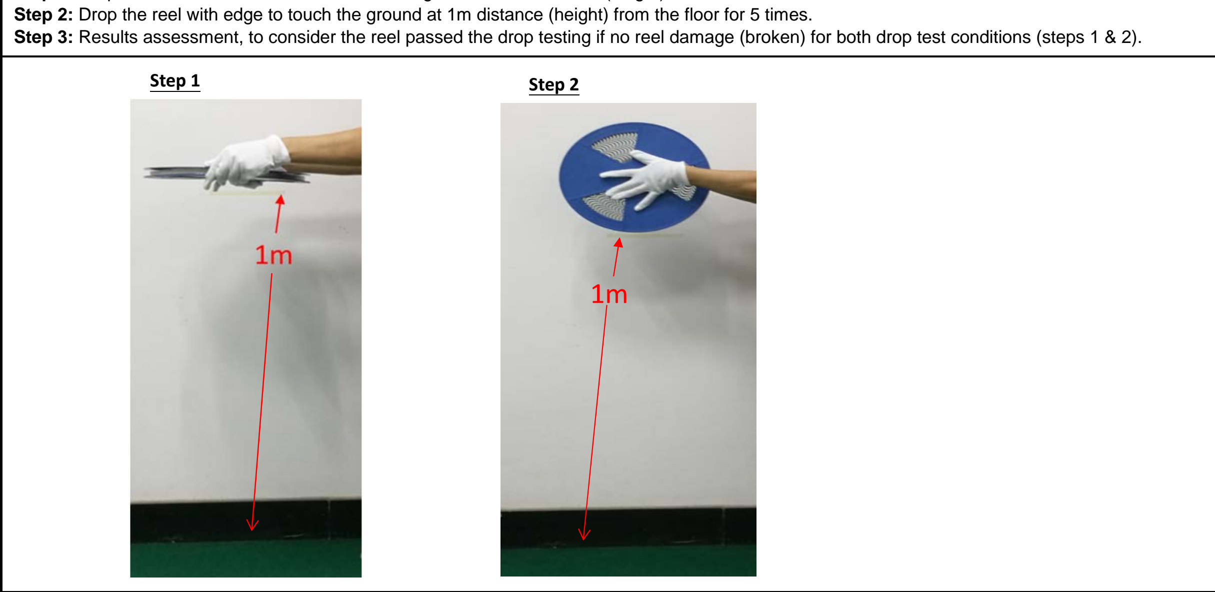

台灣半導體股份有限公司
231 台北縣新店市北新路三段205號11樓
電話:886-2-8913-1588
傳真:886-2-8913-1788

TAIWAN SEMICONDUCTOR CO., LTD.
11F, No. 205 Sec. 3, Beishin RD.
Shindian Dist., New Taipei City, Taiwan, R.O.C. 231
Tel:886-2-8913-1588 Fax:886-2-8913-1788

Comparison Report

Drop test method

Step 1: Drop the reel with side surface to touch the ground at 1m distance (height) from the floor for 5 times.
Step 2: Drop the reel with edge to touch the ground at 1m distance (height) from the floor for 5 times.
Step 3: Results assessment, to consider the reel passed the drop testing if no reel damage (broken) for both drop test conditions (steps 1 & 2).



Drop Test Results	Buckle Linkage	Ultrasonic Welding
Condition before drop testing		
Condition after drop testing	broken buckle	Good, not broken
Drop Test Result	Step 1. Passed, not broken after completing the drop testing (5 times) with side surface touching the ground. Step 2. Failed, broken after the 1st time drop with edge touching the ground.	Step 1. Passed, not broken after completing the drop testing (5 times) with side surface touching the ground . Step 2. Passed, not broken after completing the drop testing (5 times) with edge touching the ground .
Final Assessment	**FAILED, broken reel observed after step 2 drop testing.**	**PASSED, reel not broken after completing the 2-step drop testing.**

****** The copyright of document and business secret belong to TSC, and no copies should be made without any permission ******

Worked on: (Name, Function)	Max Mustermann
Date:	12/07/2017
PCN number:	PCN17023
Signature:	Henry,Dino,Joanne
For integrated circuits or discrete semiconductors select below:	AEC-Q101 Revision D

Form provided by ZVEI – Revision 3.0.5 – September 2016

Mark change with an "x"

ID	Assessment of impact on Supply Chain regarding following aspects - contractual agreements - technical interface of processability/manufacturability of customer - form, fit, function, quality performance, reliability **Type of change**	Remaining risks on Supply Chain? No	Remaining risks on Supply Chain? Yes	Understanding of semiconductors experts	Examples to explain	Evaluation level A / B / C (A: Application level, B: Boardlevel, C: Component level, *: Not relevant for qualification matrix)	Further applicable conditions	Remarks
	ANY							
SEM-AN-01	Any change with impact on agreed upon contractual agreements	P	P	Not relevant for technical evaluation.		*		
SEM-AN-02	Any change with impact on processability/manufacturabiliy at customer, which is not covered in the matrix below.	P	P	Any change which is not covered in the matrix below, but risk assessment at customer is recommended.		B		
	DATA SHEET							
SEM-DS-01	Change of datasheet parameters/electrical specification (min./max./typ. values) and/or AC/DC specification	P	P	Update of datesheet because of technical change of the product.	e.g. recomendations for pull-up/pull-down or NC pins, MSL	A		
SEM-DS-02	Correction of data sheet / errata	I	P	No technical change of the product, only correction in description (wording, drawing, …). **(I):** In case of editorial changes. **(P):** In case of impact on product integrity.	**(I):** e.g. correction of typo **(P):** e.g. datasheet correction because of new information about component behavior.	A		
SEM-DS-03	Specification of additional parameters	I	P	Description of a new not previously covered parameter. No technical change of the product. **(I):** Definition of new parameter which was not documented before. **(P):** Not known as single change. Only in combination with other changes.	**(I):** e.g. adding new tested parameter.	A		
	DESIGN							
SEM-DE-01	Design changes in active elements. [1])	P	P	Any device relevant changes in design / layout of elements with effect on data sheet [1]) **Not included:** Modification to adjust product parameter within specified process window and design rules.	e.g. change of ESD structure e.g. add / remove a transistor in layout	A	Please check if data sheet is affected **(SEM-DS-01)**.	
SEM-DE-02	Design changes in routing . [2])	P	P	Any change of wiring between elements in chip design / layout with effect on data sheet. [2]) **Not included:** Modification to adjust product parameter within specified design rules.	e.g. mask changes in metal fix for corrective action (based on external 8D report)	C	**A:** Impact on EMC behavior cannot be evaluated / excluded on component level. **A:** If impact on electrical funtion is not excluded on component level. Please check if data sheet is affected **(SEM-DS-01)**.	
SEM-DE-03	Die shrink [3])	P	P	Shrink of active area. [3]) **Not included:** sawing street/kerf/scribe line	Typical shrink of die.	A	Please check if change in process technology **(SEM-PW-09)** is also affected. In case of Cu wire product please consider AEC-Q006.	
SEM-DE-04	Firmware modification	I	P	Integrated software by design or memory as defined by supplier. **(I):** Firmware modification or update without effect of functional performance at the customer (bug fix). **(P):** Firmware modification or update with effect of functional performance at the customer.	**(I):** e.g. addition of Firmware opportunities **(P):** e.g. bug fix with impact on functional performance	A		
	PROCESS - WAFER PRODUCTION							
SEM-PW-01	New / change of wafer substrate material	P	P	New wafer material.	e.g. different wafer material to currently released material (like change from EPI material into non-EPI material)	C	In case of Cu wire product please consider AEC-Q006.	Qualification effort acc. AEC-Q100: see diffusion/doping
SEM-PW-02	New wafer diameter	P	P	Change of wafer diameter resulting in equipment and process changes.		C	Impact on changes in **SEM-PW-09** and/or **SEM-EQ-01**.	AEC-Q100: "For broad changes that involve multiple attributes (e.g., site, materials, processes), refer to section A1.3 of this appendix and section 2.3 of Q100, which allows for the selection of worst-case test vehicles to cover all the possible permutations."
SEM-PW-03	New final wafer thickness	P	P	Change in final wafer thickness.	e.g. change in final chip/die thickness	C	**A:** If thermal conductivity is affected (like MOSFET, IGBT, BGA package, stacked dies, …) **A:** If impact on EMC or ESD behavior cannot be evaluated / excluded on component level. In case of Cu wire product please consider AEC-Q006.	
SEM-PW-04	Change of electrically active doping/implantation element	P	P	Change in electrically active doping / implantation element resulting in a new technology.		A		
SEM-PW-05	Change of gate material / dielectrics	P	P	Change of gate material and / or gate dielectric material.		A		
SEM-PW-06	New / change of backside operation (grinding / metallization)	P	P	Change of bottom layer of die (between die and leadframe). Change in process, material, or dimensions necessary. Alternative see SEM-PW-03	e. g. change from Cr/NiV/Au to Cr/NiV/Ag	C	**A:** If thermal conductivity is affected (like MOSFET, IGBT, BGA package, stacked dies, …) **A:** If impact on EMC or ESD behavior cannot be evaluated / excluded on component level.	
SEM-PW-07	New / change of metallization / vias / contacts	P	P	Change in metallization of bondpads, material, layer thickness specifically for chip frontside and internal layers.	e. g. change from AlSiCu to AlCu e. g. change in over pad metallization	C	In case of Cu wire product please consider AEC-Q006.	
SEM-PW-08	New / change of passivation or die coating (without bare die)	P	P	Change of top layer on die (between mold compound and die).	e. g. addition of polyimide	C	Change of intrinsic mechanical stress might influence electrical function. In case of Cu wire product please consider AEC-Q006.	
SEM-PW-09	Change in process technology (e. g. process changes like lithography, etch, oxide deposition, diffusion, die back surface preparation/backgrind, ...)	--	P	**(--):** If the change in process technology does not influence the integrity of the final product. **(P):** If the change in process technology can influence the integrity of the final product.	**(--):** e.g. change from wet to dry etching. e. g. change from horizontal to vertical oven for oxidation **(P):** e.g. change of layer thickness	A	Please also check changes described under **EQUIPMENT**. Please check if change is described by specific type of change in this matrix.	Qualification effort depends on type of change.
SEM-PW-10	Process integrity: tuning within specification	--	P	Variation within process specification **(--):** If tuning within process specification does not influence the integrity of the final product. **(P):** If remaining risk on product specification is anticipated.	**(--):** e.g. process control	C	Please check if **DATA SHEET** is affected. Please check if **SEM-PW-09** is affected.	
SEM-PW-11	Change of wafer supplier.	--	P	**(--):** If no remaining risk in supply chain exist **(P):** If the change of wafer supplier can influence the integrity of the final product.	**(--):** e.g. change of wafer supplier with same material composition. e.g. same material composition and does not influence electrical behavior. **(P):** e.g. new supplier with impact on substrate material and / or electrical behavior.	C	Not on component, tested on test structure (typical for IC). Interaction on component level for discrete components expected. In case of SOI substrate HF properties have to be qualified. Please check if **SEM-PW-01** and **SEM-DS-01** is affected.	Qualification for IC & µ-Controller difficult on product level. Characterisation on wafer level only on test structure. AEC-Q100: "For broad changes that involve multiple attributes (e.g., site, materials, processes), refer to section A1.3 of this appendix and section 2.3 ofQ100, which allows for the selection of worst-case test vehicles to cover all the possible permutations."
SEM-PW-12	Change of specified wafer process sequence (deletion and/or additional process step)	--	P	Any change which is not covered by another type of change. Risk is to be assessed. **(--):** No Risk for Supply chain. **(P):** Risk for Supply chain (influence on product integrity)	**(--):** e.g. change of cleaning process in wafer production **(P):** e.g additional sinker implentation after standard implantation (to protect circuit against interference impulses).	C		
SEM-PW-13	Move of all or part of wafer fab to a different location/site/subcontractor	P	P	Wafer fab transition with additional changes (described above).	e.g. dual source / fab strategy	A	In case of Cu wire product please consider AEC-Q006.	AEC-Q100: "For broad changes that involve multiple attributes (e.g., site, materials, processes), refer to section A1.3 of this appendix and section 2.3 of Q100, which allows for the selection of worst-case test vehicles to cover all the possible permutations."
SEM-PW-14	Lithography	--	P	Change in process technique for lithographic process and material **(--):** If the change in process technology does not influence the integrity of the final product. **(P):** If the change in process technology can influence the integrity of the final product.	**(--):** e.g. exchange of defect mask **(P):** e.g. change from E-beam process to X-ray process e.g. change from contact into projection mode	C	Please also check changes described under **EQUIPMENT**.	
SEM-PW-15	Oxide / Interlayer Dielectric	--	P	Change in process technique for oxide / interlayer dielectric process **(--):** If the change in process technology does not influence the integrity of the final product. **(P):** If the change in process technology can influence the integrity of the final product.		A	Please also check changes described under **EQUIPMENT**.	
	BARE DIE							
SEM-BD-01	New final wafer thickness	P	P	Change in final wafer thickness.	Change in final chip/die thickness	A	In case of Cu wire product please consider AEC-Q006.	
SEM-BD-02	New / change of frontside metallization	P	P	Change in bondpads, material, pad pitch, surface changes, layer thickness	e. g. change from AlSiCu to AlCu e. g. change in over pad metalization	B	In case of Cu wire product please consider AEC-Q006.	
SEM-BD-03	New / change of backside metallization	P	P	Change of bottom layer of die (between die and leadframe). Change in process, material, or dimensions.	e. g. change from Cr/NiV/Au to Cr/NiV/Ag	A		
SEM-BD-04	Change of wafer setup or number of possible good dies on wafer.	I	P	Needed information for pick & place machine. **(I):** amount of possible good dies on wafer **(P):** influence on wafer setup and wafer mapping	**(I):** e.g. change from 350 to 240 good dies on wafer **(P):** e.g. information change for pick & place machine.	B		

Device evaluation

MATERIAL PERFORMANCE TEST RESULTS (on the basis of AEC-Q101 Revision D) includes e.g. small signal diodes (bipolar - and Schottky diodes), small signal transistors, MOSFETS, IGBTs, power diodes, … — additional to AEC-Q10x (Whisker test, Parameter-Analysis)

ID	Line evaluation (can be evaluated by data or addition site check)	AEC-Q101 Revision D	Check of specification (for raw material only)	External Visual EV 3	Parametric Verification PV 4	High Temperature Reverse Bias / AC blocking voltage / High Temperature Forward Bias / Steady State Operational HTRB ACBV HTFB SSOP 5abc	High Temp. Gate Bias HTGB 6	Temperature Cycle TC 7	Temperature Cycling Hot Test / TC Delamination Test / Wire Bond Integrity TC Hot TC Delam WBI 7ab	Unbiased Highly Accelerated Stress Test / Autoclave UHAST AC 8/alt	Highly Accelerated Stress Test / High Humidity High Temp. Reverse Bias / High Temperature High Humidity Bias HAST H3TRB HTHHB 9/alt/a	Intermittent Operational Life / Power and Temperature Cycle IOL PTC 10/alt	ESD Characterization ESD 11	Destruct. Phy. Analysis DPA 12	Physical Dimensions PD 13	Terminal Strength TS 14	Resistance to Solvents RTS 15	Constant Acceleration CA 16	Vibration Variable Frequency VVF 17	Mechanical Shock MS 18	Hermeticity HER 19	Resist. to Solder Heat RSH 20	Solderability SD 21	Thermal Resistance TR 22	Wire Bond Strength WBS 23	Wire Bond Shear BS 24	Die Shear DS 25	Unclamp.Induct.Switch UIS 26	Dielectric Integrity DI 27	Short Circuit Reliability Characterization SCR 28	Lead Free LF 29	Notes / Remarks	Whisker test (IEC 60068-T2-82, JEDEC JESD201)	Parameter-Analysis: Comparison of current with changed device characterization, electrical distribution
SEM-AN-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM-AN-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM-DS-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM-DS-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM-DS-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM-DE-01	-	•	-	-	•	•	•	3	-	-	-	•	E	3	-	-	-	-	-	-	-	-	-	-	-	-	-	M	-	•	-	-	-	•
SEM-DE-02	-	•	-	-	•	•	•	3	-	-	-	•	E	3	-	-	-	-	-	-	-	-	-	-	-	-	-	M	-	•	-	-	-	•
SEM-DE-03	-	•	-	-	•	•	-	•	-	-	-	•	E	•	-	-	-	-	-	-	-	•	-	•	-	-	•	M	-	•	-	F	-	•
SEM-DE-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM-PW-01	-	-	•	-	•	•	-	-	-	-	•	•	-	-	-	-	-	-	-	-	-	-	-	•	-	-	-	9, M	-	-	-	R	-	•
SEM-PW-02	•	•	-	-	•	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•
SEM-PW-03	-	•	-	-	•	•	-	•	•	-	-	•	-	•	-	-	-	-	-	-	-	X	-	•	•	•	-	-	-	-	-	F	-	•
SEM-PW-04	-	•	-	-	•	5,6,0	•	-	-	6	6	-	•	6	-	-	-	-	-	-	-	-	-	-	-	-	-	M	-	-	-	P, R	-	•
SEM-PW-05	-	•	-	-	•	•	•	•	-	-	-	-	E	•	-	-	-	-	-	-	-	-	-	-	-	-	-	M	•	•	-	P	-	•
SEM-PW-06	-	•	-	-	•	-	-	•	-	Z	•	•	-	-	-	-	-	-	-	-	-	•	-	•	-	-	•	-	-	-	-	-	-	•
SEM-PW-07	-	•	-	-	•	8	-	•	•	•	•	•	E	•	-	-	-	-	-	-	-	•	-	-	•	•	-	-	-	•	-	-	-	•
SEM-PW-08	-	•	-	-	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-	•
SEM-PW-09	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•
SEM-PW-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•
SEM-PW-11	-	•	•	-	•	•	-	-	-	-	•	•	-	-	-	-	-	-	-	-	-	-	-	•	-	-	-	9, M	-	-	-	R	-	•
SEM-PW-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM-PW-13	•	•	-	-	•	•	•	•	•	•	•	•	E	•	-	-	-	-	-	-	-	-	-	•	•	•	•	M	•	-	-	A,I,P,R,S	-	•
SEM-PW-14	-	•	-	-	•	4	4	-	-	-	6, 7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	P	-	•
SEM-PW-15	-	•	-	-	•	-	•	-	-	6	6	•	E	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-	-	-	•
SEM-BD-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•
SEM-BD-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM-BD-03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•
SEM-BD-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	SEM-BD-05	Change of optical appearance of wafer edge region (like imide coverage or edge exclusion)	I	P	Selection of dies in wafer edge region which have full electrical functionality. **(I):** in case of wafer edge is affected only **(P):** in case of single die is affected	**(I):** e.g. appearance of wafer edge (rounded instead of square) **(P):** e.g. polyimide as new coating on die	B		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	
	SEM-BD-06	Die scribe or separation	I	P	Needed information for sawing and pick & place machine. **(I):** If the change in sawing process does not influence the integrity of the final product. **(P):** in case if product is deliverd on wafer	**(I):** e.g. if product is delivered as known good die (in tape and reel) **(P):** e.g. information change for pick & place machine. e.g. information change for sawing machine.	B	Please check if **SEM-BD-04** is affected.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	SEM-BD-07	Die Preparation / Clean	--	P	Change in process technique for die preperation / cleaning **(--):** If the change in process does not influence the integrity of the final product. **(P):** If impact on product integrity is anticipated.	**(--):** e.g. change of cleaning time. **(P):** e.g. change in cleaning procedure after change of sawing equipment.	B	Please check if **SEM-BD-06** is affected.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	SEM-BD-08	New / change of passivation or die coating	P	P	Change of top layer on die.	e.g. additon of polyimide e.g. change of polyimide thickness	B	In case of Cu wire product please consider AEC-Q006.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	
		PROCESS - ASSEMBLY																																									
	SEM-PA-01	Change in critical dimensions of package	P	P	Change in dimensions of existing package.	e. g. changes in package dimensions (further development).	B		-	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•	B	H	H	H	H	•	•	•	-	-	•	-	•	•	-	-	-	-	
	SEM-PA-02	Change of leadframe base material	P	P	New leadframe material in new composition.	e. g. change from alloy42 to copper e. g. change between two different copper alloys	B	In case of Cu wire product please consider AEC-Q006.	-	•	•	•	-	-	-	•	•	•	•	•	-	-	•	•	-	-	-	-	H	•	•	•	2	-	•	-	-	•	-	A,F,X	G	-	
	SEM-PA-03	Change in leadframe dimensions	P	P	Change in leadframe dimensions which has impact to the specified electrical parameter acc. data sheet or specification (e.g. heat sink, pin dimensions, die paddle size, ...) **Not included:** Variation within specification.	e. g. change in lead frame geometry	B	ESD investigations are only necessary if internal ground and power supply connection of leadframe is affected. **A:** If impact on EMC behavior cannot be evaluated / excluded on component level. In case of Cu wire product please consider AEC-Q006.	-	•	-	-	-	-	-	•	-	-	•	•	-	-	•	-	-	-	-	-	H	-	-	•	-	-	•	-	-	•	-	-	-	-	
	SEM-PA-04	Change of lead frame finishing material / area (internal)	P	P	Change of surface material of die attach pad and second bond area (e.g. influence in adhesion to mold compound, wedge bond reliability)	e. g. change from Ag flash to NiP protection layer e. g. change from Ag spot to Au spot e. g. increase of silver plating area	C	In case of Cu wire product please consider AEC-Q006.	-	•	•	D	-	-	-	C	-	C	C	-	-	-	D	-	D	-	-	-	H	-	-	D	C	2,C	-	C	-	-	-	-	-	-	For wire bond strengh test: Pre- & Post-process change comparison to evaluate process change robustness (AEC-Q101).
	SEM-PA-05	Change of lead and heat slug plating material/plating thickness (external)	P	P	Change in material and / or process resulting in a new technology (e.g. pure tin).	e.g. change in heat slug stack e.g. change from Sn into Ni/Pd/Au e.g. change of layer thickness	B		-	-	•	•	-	-	-	-	-	-	-	-	-	-	•	-	•	-	-	-	H	-	•	-	-	-	-	-	-	-	-	-	-	-	
	SEM-PA-06	Bump Material / Metall System (internal)	P	P	Stack die or die to substrate (flip chip)	e. g. change to Pb-free material e. g. change of copper pillars	C		-	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	SEM-PA-07	Die attach material	P	P	Change of die attach material and / or process resulting in a new technology (e.g. soft solder, epoxy, etc)		C	**A:** If impact on EMC behavior cannot be evaluated / excluded on component level (if die attach has impact on electrical conductivity). In case of Cu wire product please consider AEC-Q006.	-	•	•	-	•	-	-	•	-	•	•	•	-	-	-	-	-	-	-	-	H	•	-	•	-	-	•	-	-	•	-	A,X	-	•	
	SEM-PA-08	Change of wire bonding	P	P	Material, diameter, change in bonding diagram and / or change in process resulting in a new technology.	e.g. change from Au to Cu material e.g. change from 25µm to 23µm diameter e.g. change from single to double bond e.g. change from stich bond to stich on ball bond.	C	**A:** In case of bond diagram change and EMC cannot be evaluated on component level. Please also check changes described under **SEM-EQ-01**. In case of Cu wire bonding please consider AEC-Q006.	•	•	•	-	•	-	-	•	•	-	•	•	-	•	-	-	-	-	-	-	-	•	-	-	•	•	-	-	-	•	-	-	-	•	Parameter Analysis: Strictly required only for Power devices. In general: Site audit for material change with impact on bondprocess (e.g. from Au to Cu) recommended. AEC-Q100: "For broad changes that involve multiple attributes (e.g., site, materials, processes), refer to section A1.3 of this appendix and section 2.3 of Q100, which allows for the selection of worst-case test vehicles to cover all the possible permutations."
	SEM-PA-09	Substrate / Interposer	P	P	Change of BGA substrate	e.g. changes in routing	B	**A:** Impact on EMC behavior cannot be evaluated / excluded on component level. **A:** If impact on electrical funtion is not excluded on component level. In case of Cu wire product please consider AEC-Q006.	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	SEM-PA-10	Die Overcoat / Underfill	--	P	Supporting layers for complex packages like flip chip and / or change in process resulting in a new technology. **(--):** If change does not influence the integrity of the final product. **(P):** If impact on product integrity is anticipated.	**(--):** e.g. change of dispensing speed **(P):** e.g. change of underfill material	C		-	-	-	-	-	•	•	•	-	•	•	•	-	•	-	-	-	-	-	-	H	-	-	-	•	-	-	-	-	-	-	-	-	-	
	SEM-PA-11	Change of mold compound / encapsulation material	P	P	Change of mold compound / encapsulation material.	e.g. change to green mold compound e.g. change of filler particles	B	**A:** impact on thermo mechanical stress caused by mismatch of mold compound, interconnecting technology and carrier is evident anticipated (specific for Power Devices). **A:** in case of high frequency signals (> 3GHz) it should be assessed if possible changes in permeability of mould compound could affect signal behaviour (e.g. digital signal processor). In case of Cu wire product please consider AEC-Q006.	-	•	•	•	•	•	•	•	•	•	•	•	-	•	•	-	B	-	-	-	H	•	•	•	-	-	-	-	•	-	-	A,F,#	-	-	
	SEM-PA-12	Change of hermetic sealing	P	P	Affected areas are material and process of hermetic (e.g. ceramic) packages, capped die and sealed devices (e.g. pressure sensors)	e.g. change of sealing material for RoHS	B	**A:** impact on EMC behavior cannot be evaluated / excluded on component level (if encapsulation / sealing has impact on electrical conductivity).	-	•	•	H	-	-	-	H	-	H	H	-	-	H	-	H	-	H	H	H	H	H	-	-	-	-	-	-	-	-	-	-	-	-	
	SEM-PA-13	Change of product marking	I	P	Change of marking on device and / or change in process resulting in a new technology.. **(I):** If change does not influence the integrity of the final product. **(P):** If impact on product integrity is anticipated.	**(I):** e.g. change of appearance (additional marking) **(P):** e.g. change from inked marking to laser marking e.g. marking of pin 1	B		-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	SEM-PA-14	Change in process technology (e.g. sawing, die attach, bonding, moulding, plating, trim and form, lead frame preperation, …)	--	P	**(--):** If the change in process technology does not influence the integrity of the final product. **(P):** If the change in process technology can influence the integrity of the final product.	**(P):** e.g. change from ball bond to stitch	B	Please also check changes described under **SEM-EQ-01**. Please check if change is described by specific type of change in this matrix.	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	SEM-PA-15	Process integrity: tuning within specification	--	P	Variation within process specification **(--):** If tuning within process specification does not influence the integrity of the final product. **(P):** If impact on product specification is anticipated.	**(--):** e.g. process control	C		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	SEM-PA-16	Change of direct material supplier	--	P	Change of suppliers for direct materials which are used in assembly process (BOM). **(--):** If change does not influence the integrity of the final product. **(P):** If impact on product integrity is anticipated.	**(--):** e.g. change of wire material supplier. **(P):** e.g. change to new mold compound supplier e.g. additional leadframe supplier with specific leadframe manufacturing technology	C	Please check if material is changed!	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	See change of material.
	SEM-PA-17	Change of specified-assembly process sequence (deletion and/or additional process step)	--	P	**(--):** no influence in final product integrity or *specified sequence* **(P):** influence in final product integrity or *specified sequence*	**(--):** e.g. additional cleaning step e.g. deletion of optical inspection **(P):** e.g. change lead finishing pre trim & form to post trim & form	C		-	-	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Qualification depends on specific change.
	SEM-PA-18	Move of all or part of assembly to a different location/site/subcontractor.	P	P	Assembly transfer or relocation	e.g. dual source / fab strategy	C	**A** or **B:** impact on other type of changes described under **PROCESS ASSEMBLY** and **SEM-EQ-01**. In case of Cu wire product please consider AEC-Q006.	•	•	-	•	•	•	•	•	•	•	•	•	-	•	•	•	•	-	-	H	H	•	•	-	•	•	•	-	-	-	-	A,I,S,X,#	G	•	Whisker tests have to be done on monitoring basis! AEC-Q100: "For broad changes that involve multiple attributes (e.g., site, materials, processes), refer to section A1.3 of this appendix and section 2.3 of Q100, which allows for the selection of worst-case test vehicles to cover all the possible permutations."
	SEM-PA-19	Die scribe or separation	--	P	Seperation process from single wafer to dies. **(--):** If the change in process does not influence the integrity of the final product. **(P):** If impact on product integrity is anticipated.	**(--):** e.g. change of kerf width **(P):** e.g. change from sawing to laser cut	C		-	•	-	-	•	-	-	•	-	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	SEM-PA-20	Die Preparation / Clean	--	P	Change in process technique for die preperation / cleaning **(--):** If the change in process does not influence the integrity of the final product. **(P):** If impact on product integrity is anticipated.	**(--):** e.g. change of cleaning time.	C		-	•	-	-	•	-	-	•	-	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	•	-	-	-	-	X	-	-	
	SEM-PA-21	Molding / Encapsulation process	--	P	Change in process technique for molding / encapsulation. **(--):** If the change in process does not influence the integrity of the final product. **(P):** If impact on product integrity is anticipated.	**(--):** e.g. tuning within process specification	C		-	•	-	•	-	•	•	•	•	•	•	•	-	•	•	-	B	-	-	-	H	•	•	-	-	-	-	-	-	-	-	A,#	-	-	
		PACKING/SHIPPING																																									
	SEM-PS-01	Packing/shipping specification change	P	P	Packing/shipping specification change.		*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-	
	SEM-PS-02	Dry pack requirements change	P	P	Change of dry pack requirements (e.g. change of MSL)		*		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-	
x	SEM-PS-03	Change of carrier (tray, reel)	P	P	Change of carrier (tray, reel)		B		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-	
	SEM-PS-04	Change of labelling	I	P	Change of labelling also on reel. **(I):** Change of material label without impact on barecode. **(P):** Changes of material label information which affects data processing at customer.	**(I)** e.g. additional information (RoHS stamp) **(P)** e.g. change of defined nomenclature for data processing	B		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-	
		EQUIPMENT																																									
	SEM-EQ-01	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	P	P	Change in process technique which is not already covered above.	Change from single wafer to batch process (e.g. over pad metalisation) e.g. dambar cutting (mechanical to laser cutting)	A		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	-	Affected process change is to check.
	SEM-EQ-02	Production from a new equipment/tool which uses the same basic technology (replacement equipment or extension of existing equipment pool) without change of process.	--	P	PCN required for dedicated equipment for sensitive component production. **(--):** If change does not influence the integrity of the final product. **(P):** If impact on product integrity is anticipated.	**(--):** e.g. extension of existing equipment pool **(P):** e.g. extension of dedicated equipment in case basic technology still need to be proven	C		-	-	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	•	
	SEM-EQ-03	Change in test equipment type that uses a different technology	P	P	Change in electrical wafer test equipment type and/or final test equipment type that uses a different technology (e.g. new test program, new tester interface, …).	e. g. change tester equipment from LTX to Teradyne	C		-	-	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	•	Gage R&R / delta correlation
		TEST FLOW																																									
	SEM-TF-01	Move of all or part of electrical wafer test and/or final test to a different location/site/subcontractor	P	P	Tester transfer or relocation. Check impact on SEM-AN-01	Dual source strategy	C		•	•	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	•	Gage R&R / delta correlation

		Q-GATE						
	SEM-QG-01	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)	--	P	e.g. test flow block, reduction from three temperature measurements to two temperature measurements, change in burn in / run in process. **(--):** If change does not influence the integrity of the final product. **(P):** If impact on product integrity is anticipated.	**(--):** e.g. test implemented without customer requirement **(P):** e.g. reduction from three temperature measurements to two temperature measurements e.g. change in burn in / run in process.	C	
		Tests, which should be considered for the appropriate process change.					A	
		Tests, which should be considered for the appropriate process change after selection of condition table.						
		Suppliers performed tests (mark with an 'X' for done or 'G' for generic)						
		Reason for exception of tests:						

SEM-QG-01	•	•	-	-	•	-	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-	-	•	Parameter Analysis: Delta correlation * For "burn in" changes ELFR recommended
Tests, which should be considered for the appropriate process change.	-	•	•	-	-	-	-	•	-	-	•	•	-	-	•	-	-	-	-	-	H	-	-	•	-	-	•	-	-	•	-	-	-	-	-
Tests, which should be considered for the appropriate process change after selection of condition table.	-	•	•	-	-	-	-	•	-	-	•	•	-	-	•	-	-	-	-	-	H	-	-	•	-	-	•	-	-	•	-	-	-	-	-
Suppliers performed tests (mark with an 'X' for done or 'G' for generic)																																			
Reason for exception of tests:																																			

--	Not required.
I	Information Note required.
P	PCN required.

A letter or "•" indicates that performance of that stress test should be considered for the appropriate process change.

	CONDITIONS	No
A	Acoustic Microscopy	
B	If not laser etched	
C	Only for Leadframe Plating change	
D	Only for Lead Finish change	
E	If Applicable	
F	Finite Element Analysis	
G	Generic Data available	
H	Hermetic device only	
I	Infant Mortality Rate	
M	Power MOS/IGBT devices only	
P	CV Plot (MOS only)	
R	Spreading Resistance Profile	
S	Steady State Mortality Rate	
X	X-Ray	
Z	For backside operation changes	
1	If bond pads are affected	
2	Verify #2 (package) post	
3	Only for changes at the periphery	
4	Only for oxide etches or etches prior to oxidation	
5	For source or channel region changes	
6	For field termination changes	
7	For passivation changes	
8	For contact changes	
9	For epitaxial changes	
0	Required for Schottky barrier changes.	
#	Glass Transition Temperature	
*	For "burn in" changes IOL or ELFR recommended	

=> Please mark 'NO' with 'x', default is 'YES'

Comments