

PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data

1.1 Company	 STMicroelectronics International N.V
1.2 PCN No.	MDG/23/14099
1.3 Title of PCN	Implementation of a PBO (Polybenzoxazole) protective layer over product passivation for STM8A (AUTOMOTIVE) listed products
1.4 Product Category	STM8A
1.5 Issue date	2023-06-22

2. PCN Team

2.1 Contact supplier	
2.1.1 Name	ROBERTSON HEATHER
2.1.2 Phone	+1 8475853058
2.1.3 Email	heather.robertson@st.com
2.2 Change responsibility	
2.2.1 Product Manager	Ricardo Antonio DE SA EARP
2.2.2 Marketing Manager	Veronique BARLATIER
2.2.3 Quality Manager	Pascal NARCHE

3. Change

3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Wafer Fab (Process)	Change of top layer on die	ST Singapore

4. Description of change

	Old	New
4.1 Description	The wafer passivation layer has no protective layer.	Implementation of a PBO (Polybenzoxazole) protective layer on top of the wafer passivation layer is proposed to customer.
4.2 Anticipated Impact on form, fit, function, quality, reliability or processability?	Reliability will be improved - PBO is a stress relief coating used as a protective layer for passivation layer.	

5. Reason / motivation for change

5.1 Motivation	Part of the strategy is to eradicate passivation damage on dice. A protective layer (PBO) on top of product passivation to be implemented to further reduce the baseline defectiveness level, and to protect versus possible quality excursions.
5.2 Customer Benefit	QUALITY IMPROVEMENT

6. Marking of parts / traceability of change

6.1 Description	traceability ensured by ST internal tools
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7. Timing / schedule

7.1 Date of qualification results	2023-09-07
7.2 Intended start of delivery	2023-09-07
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation

8.1 Description	14099 MDG-MCD_PBO_Implementation_Plan and context.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2023-06-22

9. Attachments (additional documentations)

14099 Public product.pdf
14099 MDG-MCD_PBO_Implementation_Plan and context.pdf

10. Affected parts		
10. 1 Current		10.2 New (if applicable)
10.1.1 Customer Part No	10.1.2 Supplier Part No	10.1.2 Supplier Part No
	STM8AF6226TCSSSY	
	STM8AF6246TASSSY	
	STM8AF6246TCSSSX	
	STM8AF6246TCSSSY	
	STM8AF6246TDSSSX	
	STM8AF6246TDSSSY	
	STM8AF6246UAY	
	STM8AF6246UCX	
	STM8AF6246UCY	
	STM8AF6246UDY	
	STM8AF6248TAY	
	STM8AF6248TCY	
	STM8AF6248TDY	
	STM8AF6266ITCX	
	STM8AF6266ITCY	
	STM8AF6266TAX	
	STM8AF6266TAY	
	STM8AF6266TCX	
	STM8AF6266TCY	
	STM8AF6266TDX	
	STM8AF6266TDY	
	STM8AF6266UCX	
	STM8AF6266UCY	
	STM8AF6268TAY	
	STM8AF6268TCX	
	STM8AF6268TCY	
	STM8AF6268TDY	
	STM8AF6366TCY	

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Public Products List

Public Products are off the shelf products. They are not dedicated to specific customers, they are available through ST Sales team, or Distributors, and visible on ST.com

PCN Title : Implementation of a PBO (Polybenzoxazole) protective layer over product passivation for STM8A (AUTOMOTIVE) listed products

PCN Reference : MDG/23/14099

Subject : Public Products List

Dear Customer,

Please find below the Standard Public Products List impacted by the change.

STM8AF6266ITCX	STM8AF6268TAX	STM8AF6246ITDY
STM8AF6246UAX	STM8AF6268TCY	STM8AF6246UCY
STM8AF6266TCY	STM8AF6266TCX	STM8AF6246ITDX
STM8AF6266TAX	STM8AF6248TCX	STM8AF6248TDX
STM8AF6226TASSSX	STM8AF6246UDY	STM8AF6268TDY
STM8AF6246TCSSSY	STM8AF6268TAY	STM8AF6266TAY
STM8AF6266TDY	STM8AF6226TASSSY	STM8AF6266UCX
STM8AF6266TDX	STM8AF6248TCY	STM8AF6246UDX
STM8AF6246TCSSSX	STM8AF6246ITCY	STM8AF6246UAY
STM8AF6366TCY	STM8AF6268TCX	STM8AF6366TCX
STM8AF6266ITCY	STM8AF6268TDX	STM8AF6246TASSSX
STM8AF6246TDSSSX	STM8AF6248TDY	STM8AF6246ITCX
STM8AF6248TAY	STM8AF6246TDSSSY	STM8AF6246UCX
STM8AF6246TASSSY		

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PBO implementation context and reliability plan



Passivation Damage Eradication Plan

The continuous improvement plan for eradication of passivation damage applied in these years on 8bit MCUs was focusing of 3 key areas of the manufacturing flow:

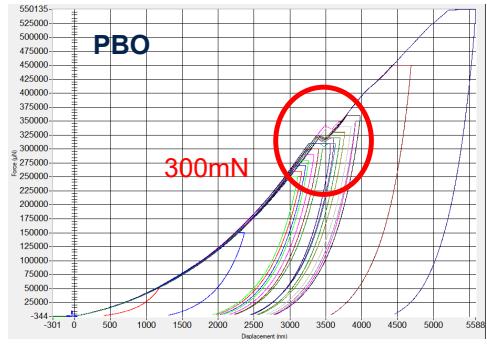
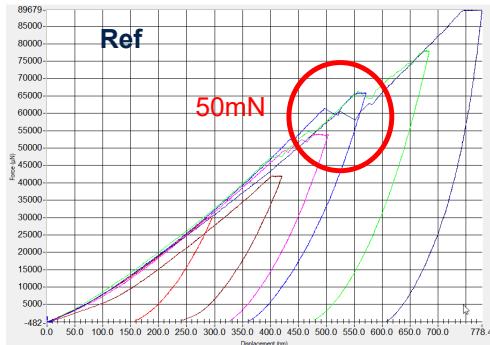
- Wafer transportation
- Automatic Visual Inspection (AVI)
- Removal of manual wafer handling steps during assembly

The various identified and implemented improvement actions were able to **significantly reduce** the ppm level of this failure mode **but not to eradicate** it.

A **breakthrough** to further reduce the baseline defectiveness level, and to protect versus possible quality excursions, **must** therefore go through an **intrinsic product robustness** improvement action: the implementation of a polyimide protection layer (**PBO**) over product passivation.

Polyimide (PBO) benefits

- The use of polyimide, as robustness improvement vs mechanical damages on die surface, is well known in semiconductor industry.
- ST has a large experience in polyimide on smart power products and on sensitive digital technologies, with very positive results for protection against passivation scratches/squashes failure modes, without any drawback
- Dedicated characterization by Nano-indentation results on M10 wafer are showing 6x gain (from 50mN to 300mN) on the force needed to break passivation.



PBO characteristics

The PBO selected for MDG/MCD 8bit MCUs is the one already in volume production in the manufacturing plant (AMK)

	Thickness on product	CTE ppm/DegC	Tg (DegC)	Elongation %	Tensile Strength Mpa	Modulus Gpa	Current Production Status
Hitachi Dupont HD8820	6 um	60	280	100	140	2.1	In AMK on BCD1,2,3,4,5,6; PowerMOS, ViPower, HCMOS4, BICMOS4 technologies

F9GO1 PBO introduction – STM8A-32K Qualification plan



- Qualification plan for STM8A-32K
 - Package oriented trials planned on 3 lots and die oriented trials on 1 lot

Muar Assy site					
Trial	Trial step 1	Conditions	Trial step 2	Conditions Q100	LQFP48 7x7
AC	Precond.	MSL3, 3xReflow	Pressure Pot	96hrs @ 121C, 2.08 atm	77x3
TC	Precond.	MSL3, 3xReflow	Thermal Cycles	2000cyc @ -50/150C	77x3
THB	Precond.	MSL3, 3xReflow	Biased Humid chamber	1000hrs @ 85C, 85% RH	77x3
HTSL	High Temperature Storage Life	150°C	--	2000hrs @ 150°C	77x3
HTOL	High Temperature Operating Life	1000h, Tamb 150°C Vdd 2.2V	--	--	77x1
HTDR	Flash W/E	100kcyc @150°C	Bake	1000hrs@150°C	77x1
ELFR	Early Life Failure Rate	48h, Tamb 150°C Vdd 2.2V	--	--	800x1
ESD	HBM CDM LU	4000V 500V-750V 150°C	--	--	3x1 3x1 6x1
ED/Char	ED at 3T	--	--	--	30x1

Thank you

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