

PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data

1.1 Company		STMicroelectronics International N.V
1.2 PCN No.		ADG/21/12550
1.3 Title of PCN		STA8088x (V765) : BGA Laser Grooving Introduction
1.4 Product Category		See list
1.5 Issue date		2021-02-17

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	Lorenzo MOIOLI
2.1.2 Marketing Manager	Gianvito GIUFFRIDA
2.1.3 Quality Manager	Alberto MERVIC

3. Change

3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Methods	Process flow chart: Revision change in Process (process technology, sawing, die attach, plasma, capillary, marking, packing, labelling, transportation, etc..)	ST Subcontractor ASE (Taiwan)

4. Description of change

	Old	New
4.1 Description	Blade Grooving	Laser Grooving
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	No Impact	

5. Reason / motivation for change

5.1 Motivation	Quality Improvement: aimed to eliminate micro-stresses during wafer sawing, reducing possible peeling and/or micro-cracks along sawing street
5.2 Customer Benefit	QUALITY IMPROVEMENT

6. Marking of parts / traceability of change

6.1 Description	Internal traceability dedicated Finished Good Codes
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7. Timing / schedule

7.1 Date of qualification results	2021-02-09
7.2 Intended start of delivery	2021-04-30
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation

8.1 Description	12550 Validation.pdf	
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date 2021-02-17

9. Attachments (additional documentations)

12550 Public product.pdf
12550 Validation.pdf
12550 Details.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
	STA8088EXG	
	STA8088CFG	

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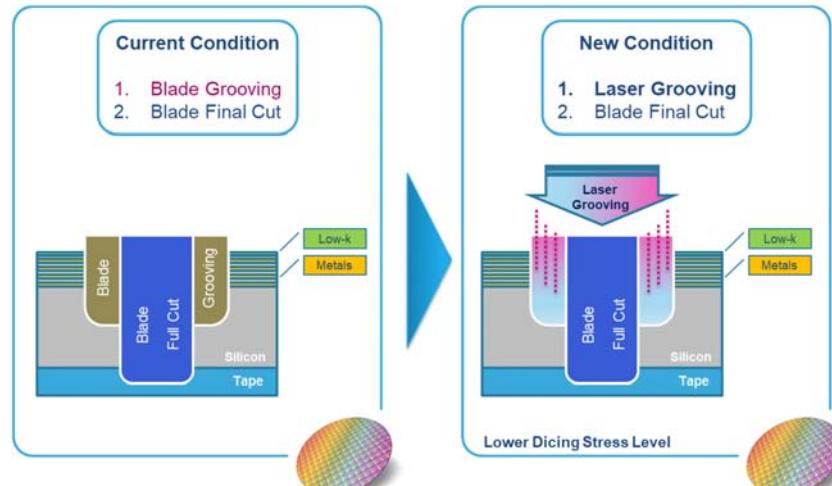
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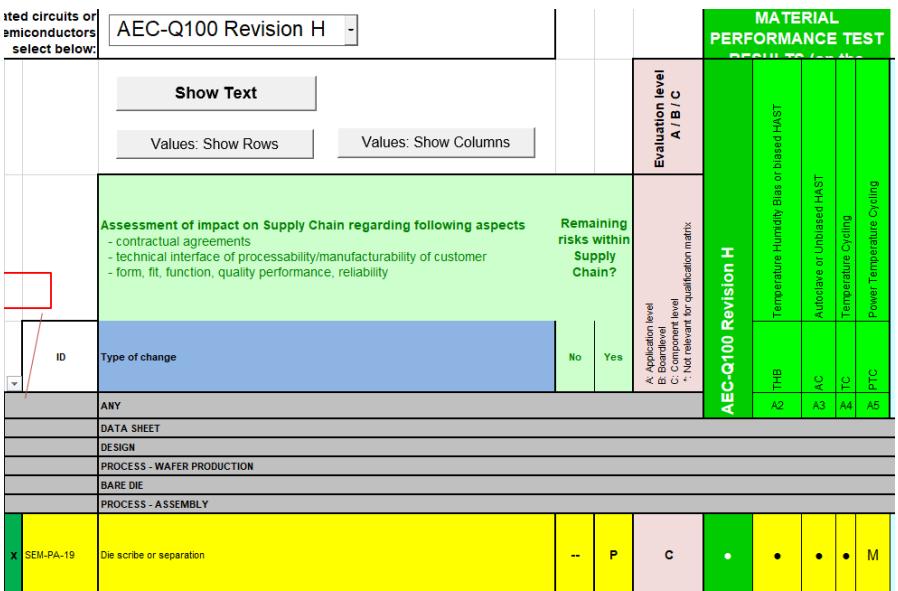
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PRODUCT/PROCESS CHANGE NOTIFICATION

TITLE	STA8088x (V765) : BGA Laser Grooving Introduction
IMPACTED PRODUCTS	ST silicon line V765 assembled in TFBGA 9x9x1.2 package
MANUFACTURING STEP	Assembly – Wafer sawing
INVOLVED PLANT	ST Subcontractor ASE (Taiwan)
CHANGE REASON	Quality Improvement: aimed to eliminate micro-stresses during wafer sawing, reducing possible peeling and/or micro-cracks along sawing street
CHANGE DESCRIPTION	<p>Current dicing technique is based on two mechanical sawing runs:</p> <ol style="list-style-type: none"> 1. first cut down to Low-k and metals level (grooving); 2. second cut down to complete silicon thickness (full cut). <p>To reduce mechanical stress on Low-k layers, grooving is performed through laser instead of mechanical blade. Second cut remains through mechanical blade (see below scheme).</p> 
TRACEABILITY	Internal traceability and Date Code

VALIDATION	<p>Validation has been performed through standard validation exercise according to ZVEI (AEC-Q100) recommendations. Following qualification plan has been executed:</p>																																																																																																													
	 <p>The screenshot shows the AEC-Q100 Qualification Plan tool interface. The 'Assessment of impact on Supply Chain' section lists aspects like contractual agreements, technical interface, and quality performance. The 'MATERIAL PERFORMANCE TEST' section shows results for various tests: THB (No), PTC (No), C (Yes), and M (Yes).</p> <table border="1" data-bbox="481 475 1379 1066"> <thead> <tr> <th colspan="2">Assessment of impact on Supply Chain regarding following aspects</th> <th colspan="2">Remaining risks within Supply Chain?</th> <th rowspan="2">Evaluation level A / B / C</th> <th colspan="5">MATERIAL PERFORMANCE TEST</th> </tr> <tr> <th colspan="2"> <ul style="list-style-type: none"> - contractual agreements - technical interface of processability/manufacturability of customer - form, fit, function, quality performance, reliability </th> <th>No</th> <th>Yes</th> <th>THB</th> <th>Temperature Humidity Bias or biased HAST</th> <th>AC</th> <th>Autoclave or Unbiased HAST</th> <th>TC</th> <th>Temperature Cycling</th> <th>PTC</th> </tr> </thead> <tbody> <tr> <td>ID</td> <td>Type of change</td> <td></td> <td></td> <td>A: Application level</td> <td></td> <td>A2</td> <td>A3</td> <td>A4</td> <td>A5</td> <td></td> </tr> <tr> <td></td> <td>ANY</td> <td></td> <td></td> <td>B: Boardlevel</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>DATA SHEET</td> <td></td> <td></td> <td>C: Component level</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>DESIGN</td> <td></td> <td></td> <td>Not relevant or qualification matrix</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>PROCESS - WAFER PRODUCTION</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>BARE DIE</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>PROCESS - ASSEMBLY</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>X</td> <td>SEM-PA-19</td> <td>Die scribe or separation</td> <td>--</td> <td>P</td> <td>C</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>M</td> </tr> </tbody> </table>	Assessment of impact on Supply Chain regarding following aspects		Remaining risks within Supply Chain?		Evaluation level A / B / C	MATERIAL PERFORMANCE TEST					<ul style="list-style-type: none"> - contractual agreements - technical interface of processability/manufacturability of customer - form, fit, function, quality performance, reliability 		No	Yes	THB	Temperature Humidity Bias or biased HAST	AC	Autoclave or Unbiased HAST	TC	Temperature Cycling	PTC	ID	Type of change			A: Application level		A2	A3	A4	A5			ANY			B: Boardlevel								DATA SHEET			C: Component level								DESIGN			Not relevant or qualification matrix								PROCESS - WAFER PRODUCTION											BARE DIE											PROCESS - ASSEMBLY										X	SEM-PA-19	Die scribe or separation	--	P	C	•	•	•	•	M
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REPORTS	<p>12550 Validation.pdf</p>																																																																																																													



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 : STA8088x (V765) : BGA Laser Grooving Introduction

PCN Reference : ADG/21/12550

Subject : Public Products List

Dear Customer,

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

STA8088CFGTR	STA8088CFGB	STA8088CFG
STA8088CEXGA	STA8088CFGBTR	STA8088CEXGATR
STA8088CEXGTR	STA8088CEXG	



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Reliability Report

V765

LG Qualification

General Information		Locations	
Product Line	V765BBQ	Wafer fab location	Crolles 300
Product Description	<i>Teseo2 – Fully integrated GPS receiver</i>	Assembly Plant	SC ASE – TAIWAN
Commercial Product	STA8088EXGA		
Product Group	ADG	Final Assessment	
Product division	MID	Reliability assessment	<i>Qualification Passed</i>
Silicon process technology	CMOS065		

DOCUMENT HISTORY

Version	Date	Author	Comment
1.0	24/09/2020	L. Cola	First Document release
1.1	22/12/2020	L. Cola	Qualification results update

RELEASED DOCUMENT

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1 RELIABILITY EVALUATION OVERVIEW

1.1 Objectives

Aim of this document is to report the reliability trials results of V765 Laser Groove (LG) qualification.

V765 is processed in CMOS065 diffused in Crolles300 and assembled in BGA 9x9 in ASE - TAIWAN subcontractor.

V765 assembled in BGA 9x9 is already automotive qualified and in mass production since September 2012 (Reliability Report RR013011AG6050).

Laser Groove is introduced on BGA 9x9 package with Crolles silicon: similarity data with V680 Laser Groove release applied, qualification is performed on 1 assy lots.

Similarity data from previous V765 qualification applied for trials not impacted by the Laser Groove introduction.

The qualification exercise is in respect of AEC-Q100 rev H specification.

1.2 Conclusions

All qualification trials have been completed with positive results on BGA 9x9 package. Neither functional nor parametric rejects were detected at final electrical testing. AEC-Q100 Grade 3 is granted on V765 assembled in BGA 9x9 package.

2 TRACEABILITY

2.1 Wafer fab information

DIE FEATURES	
Diffusion Site	Crolles 300
Wafer Diameter (inches)	12
Process Technology	CMOS C065

2.2 Package outline/Mechanical data

	BGA 9x9
Package Description	TFBGA 9Sq1.2 169 F13X13 P.65B.35
Assembly Site	SC ASE - TAIWAN
Die Attach material	Ablestick 2100A
Molding compound	Resin KYOCERA KE-G1250
Wires bonding materials/diameters	Gold wire / 0.6 mils

2.3 Final testing information:

PACKAGE FEATURES		
Electrical Testing manufacturing location	:	SC ASE TEST - TAIWAN
Tester	:	HP93000

3 RELIABILITY PLAN AND TESTS RESULTS

3.1 Conditions

Room test temperature is 25°C
 Hot test temperature is 85°C
 Cold test temperature is -40°C

3.2 Tables entry legend

Symbol	How to read
<input type="checkbox"/>	Action or condition has not to be considered
<input checked="" type="checkbox"/>	The action/condition has been done/applied during the trial
N.P.	The trial or readout is not in the Qualification Plan and thus has not been performed

3.3 Accelerated Environmental Stress Test (Q100 Group A)

N	TEST NAME	CONDITIONS [SPEC]	Step	Results	Notes
				Lot 1	
1	Pre Conditioning MSL 3	<p>[J-STD-020]</p> <p><input checked="" type="checkbox"/> Testing at Room</p> <p><input checked="" type="checkbox"/> Testing at Hot</p> <p><input type="checkbox"/> Testing at Cold*</p> <p><input checked="" type="checkbox"/> Sonoscan pre / post</p> <p><input type="checkbox"/> 100 Temperature Cycles</p> <p>24h bake@125°C, 192h@30°C/60%RH</p> <p>3x Reflow simulation 260°C Peak Temp</p>	Pre/Post	0 / 154	<p>Similarity data from V680 Laser Groove qualification (RR-2020-08-0006-DP)</p> <p>0 / 154 / 3</p> <p>*done only for CuPd qualification</p>
2	THB Temperature Humidity Bias	<p>[JESD22-A101/A110]</p> <p><input type="checkbox"/> AfterJedec PC MSL3</p> <p><input type="checkbox"/> Testing at Room</p> <p><input type="checkbox"/> Testing at Hot</p> <p><input type="checkbox"/> Testing at Cold</p> <p><input type="checkbox"/> WPT pre / post (first and second bond)</p> <p><input type="checkbox"/> WBS pre / post</p> <p><input type="checkbox"/> Visual Inspection*</p> <p><input type="checkbox"/> Cross section*</p> <p><input type="checkbox"/> Drift Analysis*</p> <p>Ta=85°C, 85%RH, 1000hrs</p>	1000 hrs	N.P.	<p>Similarity data from V765 Automotive qualification (RR013011AG6050)</p> <p>0 / 77 / 3</p> <p>*done only for CuPd qualification</p>

RELIABILITY REPORT

ADG – Q&R Digital
Products

RR-2020-08-0006-DP

V765 – Teseo2

3	THS Temperature Humidity Storage	[JESD22-A101/A110] <input type="checkbox"/> AfterJedec PC MSL3 <input type="checkbox"/> Testing at Room <input type="checkbox"/> Testing at Hot <input type="checkbox"/> Testing at Cold <input type="checkbox"/> WPT pre / post (first and second bond) <input type="checkbox"/> WBS pre / post <input type="checkbox"/> Visual Inspection* <input type="checkbox"/> Cross section* <input type="checkbox"/> Drift Analysis* Ta=85°C, 85%RH, 1000hrs	1000 hrs	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050) 0 / 77 / 3 <i>*done only for CuPd qualification</i>
4	AC Autoclave	[JESD22-A102/A118] <input type="checkbox"/> AfterJedec PC MSL3 <input type="checkbox"/> Testing at Room <input type="checkbox"/> Testing at Hot <input type="checkbox"/> Testing at Cold <input type="checkbox"/> WPT pre / post (first and second bond) <input type="checkbox"/> WBS pre / post* <input type="checkbox"/> Visual Inspection <input type="checkbox"/> Cross section* <input type="checkbox"/> Drift Analysis* P=2.08atm Ta=121°C, 96hrs	1000 hrs	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050) 0 / 77 / 3 <i>*done only for CuPd qualification</i>
5	TC Temperature Cycling	[JESD22-A104] <input checked="" type="checkbox"/> AfterJedec PC MSL3 <input checked="" type="checkbox"/> Testing at Room <input checked="" type="checkbox"/> Testing at Hot <input type="checkbox"/> Testing at Cold* <input checked="" type="checkbox"/> Sonoscan pre / post <input checked="" type="checkbox"/> WPT pre / post (first and second bond) <input checked="" type="checkbox"/> WBS pre / post <input type="checkbox"/> Visual Inspection* <input type="checkbox"/> Cross section* <input type="checkbox"/> Cratering test pre/post* <input type="checkbox"/> Drift Analysis* Ta=-50°C /+150 °C 1000 cyc	1000 cyc	0 / 77	Similarity data from V680 Laser Groove qualification (RR-2020-08-0006-DP) <i>*done only for CuPd qualification</i>

Auth: L. Cola

Approved: S. Testa

Date: 22/12/2020

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RELIABILITY REPORT

ADG – Q&R Digital
Products

RR-2020-08-0006-DP

V765 – Teseo2

6	PTC Power Temperature Cycle	[JESD22-A105] <input type="checkbox"/> After Jedec PC MSL3 <input type="checkbox"/> Testing at Room <input type="checkbox"/> Testing at Hot <input type="checkbox"/> Testing at Cold Ta=-40°C /+125 °C 1000 cyc	1000 cyc	N.A.	Not required on V765
7	HTSL High Temperature Storage Lifetime	[JESD22-A103] <input type="checkbox"/> After Jedec PC MSL3 <input type="checkbox"/> Testing at Room <input type="checkbox"/> Testing at Hot <input type="checkbox"/> Testing at Cold <input type="checkbox"/> Sonoscan pre / post <input type="checkbox"/> WPT pre / post (first and second bond) <input type="checkbox"/> WBS pre / post <input type="checkbox"/> Cross section* <input type="checkbox"/> Drift Analysis* Ta= 150°C 1000hrs	1000 hrs	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050) 0 / 45 / 3 *done only for CuPd qualification
8	uHAST Unbiased Accelerated Stress Test	[JESD22-A118] <input checked="" type="checkbox"/> After Jedec PC MSL3 <input checked="" type="checkbox"/> 100 Temperature Cycles <input checked="" type="checkbox"/> Testing at Room <input type="checkbox"/> Testing at Hot <input type="checkbox"/> Testing at Cold <input checked="" type="checkbox"/> WPT pre / post (first and second bond) <input checked="" type="checkbox"/> WBS pre / post Ta=130°C, 85%RH, 96hrs (192hrs robustness)	96 hrs	0 / 77	Similarity data from V680 Laser Groove qualification (RR-2020-08-0006-DP) 0 / 77 / 3 192 hrs performed as robustness check Similarity data from V680 Laser Groove qualification (RR-2020-08-0006-DP) 0 / 77 / 3 *done only for CuPd qualification

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Approved: S. Testa

Date: 22/12/2020

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3.4 Accelerated Lifetime Simulation Test (Q100 Group B)

Test			Step	Results	Notes
N	TEST NAME	CONDITIONS [SPEC]			
1	HTOL High Temp. Operating Life	<p>[JESD22-A108]</p> <p><input checked="" type="checkbox"/> After Jedec PC MSL3</p> <p><input checked="" type="checkbox"/> After 1k W/E cyc @125°C</p> <p><input checked="" type="checkbox"/> Testing at Room, Hot, Cold</p> <p><input checked="" type="checkbox"/> Drift Analysis on Key parameters at Room, Hot, Cold</p> <p>Ta=125°C, Tj=150°C VDD+20% 168hrs (1000hrs monitor)</p>	168 hrs	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050) 0 / 77 / 3
2	ELFR Early Life Failure Rate	<p>[AEC Q100-008]</p> <p><input checked="" type="checkbox"/> Testing at Room, Hot, Cold</p> <p>Ta= 125°C, Tj=150°C Bl+24 hrs</p>	Bl +24hrs	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050) 0 / 800 / 3

3.5 Package Assembly Integrity Test (Q100 Group C)

Test			Step	RESULTS	Notes
N	TEST NAME	CONDITIONS [SPEC]			
1	WBS Wire Bond Shear	[AEC Q100-001] At appropriate time interval for each bonder to be used 30 bonds x 5 devices	Final result	Done	Assy report
2	WBP Wire Bond Pull	[MIL-STD883 method 2011] 30 bonds x 5 devices	Final result	Done	Assy report
3	SD Solderability	[JEDEC JEDES22-B102] > 95% lead coverage	Final result	Done	Assy report
4	PD Physical Dimension	[JEDEC JEDES22-B100 and B108]	Final result	Done	Assy report
5	SBS Solder Ball Shear	[AEC Q100-010]	Final result	Done	Assy report
6	LI Lead Integrity	[JEDEC JEDES22-B105]	Final result	N.A.	Not applicable

3.6 Die Fabrication Reliability Test (Q100 Group D)

Test			Step	RESULTS	Notes
N	TEST NAME	CONDITIONS			
1	EM Electromigration	The data, test method, calculation and internal criteria should be available to the customer upon request for new technologies	Final result	DONE	CMOS C090 Process qualification
2	TDDB Time Dependent Dielectric Breakdown	The data, test method, calculation and internal criteria should be available to the customer upon request for new technologies	Final result	DONE	CMOS C090 Process qualification
3	HCI Hot Carrier Injection	The data, test method, calculation and internal criteria should be available to the customer upon request for new technologies	Final result	DONE	CMOS C090 Process qualification
4	NBTI Negative Bias Temperature Instability	The data, test method, calculation and internal criteria should be available to the customer upon request for new technologies	Final result	DONE	CMOS C090 Process qualification
5	SM Stress Migration	The data, test method, calculation and internal criteria should be available to the customer upon request for new technologies	Final result	DONE	CMOS C090 Process qualification

3.7 Electrical Verification Test (Q100 Group E)

Test			Step	RESULTS	Notes
N	TEST NAME	CONDITIONS [AEC Q100]			
1.a	ESD HBM	HBM = 2kV	Final result	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050)
1.b	ESD MM	MM = 200V	Final result	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050)
1.c	ESD CDM	CDM = 500V / 750V corner only	Final result	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050)
2	LU	Current Injection Power supply sequence Oversupply on power supply @Room & Hot	Final result	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050)
3	ED Electrical Distribution	[AEC Q100-009] <input type="checkbox"/> Testing at Room <input type="checkbox"/> Testing at Hot <input type="checkbox"/> Testing at Cold	Final result	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050)
4	FG Fault Grading	[AEC Q100-007] FG shall be = or > 90% for qual units	Final result	N.P.	Similarity data from V765 Automotive qualification (RR013011AG6050)
5	CHAR Characterization	[AEC Q103] Performed on new technologies and part families. <input type="checkbox"/> Testing at Room <input type="checkbox"/> Testing at Hot <input type="checkbox"/> Testing at Cold	Final result	N.A.	Similarity data from V765 Automotive qualification (RR013011AG6050)
6	GL Electrothermally-Induced Gate Leakage	[AEC Q100-006] Test before and after GL at room temperature within 96hours of GL stress completion	Final result	N.A.	Not required
7	EMC Electromagnetic Compatibility	[SAE J1752/3 – radiated Emission]	Final result	N.A.	Not required

3.8 Defect Screening Test (Q100 Group F)

Test			Step	RESULTS	Notes
N	TEST NAME	CONDITIONS			
1	PAT Process Average testing	[AEC Q101]	Final result	IMPLEMENTED	Implemented as per standard production flow
2	SBA Statistical Bin/Yield Analysis	[AEC Q102]	Final result	IMPLEMENTED	Implemented as per standard production flow

4 REVISION TRACKING

Rev 1.0

1. First document release