



AEC-Q100 Qualification Report

Product Series: CA-IS1311G-Q1

Report Version: V1.0

Reference Doc.: AEC-Q100-REV-H

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1. Overview

Reliability testing of microelectronic products is a risk mitigation process designed to ensure the service life of device in customer applications. Semiconductor wafer manufacturing process and package-level reliability can be assessed in a variety of ways and may include accelerated environmental test conditions. Chipanalog evaluates manufacturability of the device to verify a robust silicon and assembly flow to ensure continuity of supply to customers. Chipanalog qualifies new devices, significant changes, and product families based on AEC-Q100.

2. Part Number List

Package Type	Part Number
SOIC8-WB(G)	CA-IS1311G-Q1

Note: AECQ-100 provides the guideline for the use of generic data to accelerate and streamline the qualification process. Products sharing the same major product, process and materials elements may be categorized in a product qualification family.

3. Production Information

3.1. Wafer information

Fab site	SMIC
Wafer	KUAFU, PANLONG, FUXI
Fab Process	18BCD

3.2. Package information

Assembly site	JCET
FT site	JCET
Package	SOIC8-WB(G)
Lead Frame	Cu
Bond wire	20um Au
MSL level	MSL3
Operation Temp.	Grade 1(-40°C - 125°C)

4. Reliability Qualification Plan

Test Group A-Accelerated Environment Stress Tests					
Group	Item	Refer.	Test condition	QTY	Remark
A1	PC	J-STD-020 JESD22-A113	Test @ Rm, SMD only, Moisture Preconditioning before THB/BHAST, AC/UHAST, TC, and PTC stress, MSL = 3, Peak Reflow Temp = 260°C	77 pcs*3 lots	
A2	BHAST	JESD22-A110	130°C, 85% RH, V _{cc1} = 5.5V, V _{cc2} = 5.5V, 96 hrs (Test @ Rm/Hot)	77 pcs*3 lots	
A3	UHAST	JESD22-A101	130°C, 85% RH, 96 hrs (Test @ Rm)	77 pcs*3 lots	
A4	TC	JESD22-A104	-65°C-150°C, 500 cycles (Test @Rm/Hot)	77 pcs*3 lots	
A5	PTC	JESD22-A105	-40°C-125°C, 1000 cycles (Test @ Rm/Hot)	NA	
A6	HTSL	JESD22-A103	T _a = 150°C, 1000 hrs (Test @ Rm/Hot)	45 pcs*1 lot	
Test Group B-Accelerated Lifetime Simulation Tests					
Group	Item	Refer.	Test condition	QTY	Remark
B1	HTOL	JESD22-A108	T _a = 125°C, V _{cc1} = 5.5V, V _{cc2} = 5.5V, 1000 hrs (Test @ Rm/Cold/Hot)	77 pcs*3 lots	
B2	ELFR	AEC-Q100-008	T _a = 125°C, V _{cc1} = 5.5V, V _{cc2} = 5.5V, 48 hrs (Test @ Rm/Hot)	800 pcs*3 lots	
B3	EDR	AEC-Q100-005	Test @ Rm/Hot	NA	
Group C-Package Assembly Integrity Tests					
Group	Item	Refer.	Test condition	QTY	Remark
C1	WBS	AEC-Q100-001 AEC-Q003	Cpk > 1.67, T0 samples	30 bonds from 5 pcs	
C2	WBP	MIL-STD883 AEC-Q003	Cpk > 1.67, T0 samples	30 bonds from 5 pcs	
C2	WBP	MIL-STD883 AEC-Q003	0 fails, post-TC samples	30 bonds from 5 pcs	
C3	SD	J-STD-002	> 95% coverage, 8hr steam aging prior to testing	15 pcs*1 lot	
C4	PD	JESD22-B100 JESD22-B108 AEC-Q003	Cpk > 1.67	10 pcs*3 lots	
C5	SBS	AEC-Q100-010 AEC-Q003	Cpk > 1.67, 5 balls from min. of 10 devices	NA	
C6	LI	JESD22-B105	10 leads from each of 5 devices	NA	

Test Group D-Die Fabrication Reliability Tests					
Group	Item	Refer.	Test condition	QTY	Remark
D1	EM	JESD61	---	---	Done by Fab
D2	TDDDB	JESD35	---	---	Done by Fab
D3	HCI	JESD60 & 28	---	---	Done by Fab
D4	BTI	JESD90	---	---	Done by Fab
D5	SM	JESD61, 87, & 202	---	---	Done by Fab
Group E-Electrical Verification Tests					
Group	Item	Refer.	Test condition	QTY	Remark
E1	TEST	per datasheet	Pre and Post Stress Electrical Test	All	
E2	HBM	AEC Q100-002	$\pm 500V$, $\pm 1KV$, $\pm 2KV$, $\pm 4KV$ (Test @ Rm/Hot)	3 pcs*1 lot	
E3	CDM	AEC-Q100-011	$\pm 250V$, $\pm 500V$, $\pm 750V$, $\pm 2KV$ (Test @ Rm/Hot)	3 pcs*1 lot	
E4	LU	AEC-Q100-004	125°C, I-trigger $\pm 200mA$ (Test @ Rm/Hot)	3 pcs*1 lot	
E5	ED	AEC-Q100 009 AEC-Q003	Test at room, cold, hot temperature	30 pcs*3 lot	
E9	EMC	SAE J1752/3	Electromagnetic Compatibility (Radiated Emissions)	1 pcs*1 lot	
E10	SC	AEC-Q100-012	/	NA	
E11	SER	JESD89-1/-2/-3	/	NA	
E12	LF	AEC-Q005	/	2 pcs*3 lots	
Group S-Special Requirement Tests					
S1	BLR-Bending	JESD22-B113	Align with customer	NA	
S2	BLR-Drop	JESD22-B11	Align with customer	NA	
S3	BLR-TC	IPC-9701	Refer test requirement	NA	
S4	BLR-Vibration	JESD22-B103	Refer test requirement	NA	

Note: Group E6, E7 and Group F are not reliability related items. Group G are not applicable to non-hermetic packaged devices.

5. Reliability Test Results

Test Group A–Accelerated Environment Stress Test					
Group	Item	Test Condition	QTY	Lot NO.	Result
A1	PC	Test @ Rm, SMD only, Moisture Preconditioning before BHAST, UHAST, TC stress, MSL = 3, Peak Reflow Temp = 260°C	240 pcs*3 lots	2352A	Pass
				2401A	Pass
				2402A	Pass
A2	BHAST	130°C, 85% RH, V _{cc1} = 5.5V, V _{cc2} = 5.5V, 96 hrs	80 pcs*3 lots	2352A	Pass
				2401A	Pass
				2402A	Pass
A3	UHAST	130°C, 85% RH, 96 hrs	80 pcs*3 lots	2352A	Pass
				2401A	Pass
				2402A	Pass
A4	TC	-65°C-150°C, 500 cycles	80 pcs*3 lots	2352A	Pass
				2401A	Pass
				2402A	Pass
A6	HTSL	T _a = 150°C, 1000 hrs	50 pcs*1 lot	2352A	Pass
Test Group B–Accelerated Lifetime Simulation Tests					
Group	Item	Test Condition	QTY	Lot NO.	Result
B1	HTOL	T _a = 125°C, 1000 hrs, V _{cc1} = 5.5V, V _{cc2} = 5.5V	80 pcs*3 lots	2352A	Pass
				2401A	Pass
				2402A	Pass
B2	ELFR	T _a = 125°C, 1000 hrs, V _{cc1} = 5.5V, V _{cc2} = 5.5V	800 pcs*3 lots	2405A	Pass
				2406A	Pass
				2407A	Pass
Group C–Package Assembly Integrity Tests (SOIC16-WB &SOIC14-WB)					
Group	Item	Test Condition	QTY	Lot NO.	Result
C1	WBS	Cpk > 1.67, Each bonder used, T0 samples	30 bonds from 5 pcs	2352A	Cpk=2.221
C2	WBP	Cpk > 1.67, each bonder used, T0 samples	30 bonds from 5 pcs	2352A	Cpk=2.038
C2	WBP	0 fails, Each bonder used, post-TC samples	30 bonds from 5 pcs	2352A	Cpk=2.479
C3	SD	>95% coverage, 8 hrs steam aging prior to testing	15 pcs*1 lot	2352A	Pass
C4	PD	Cpk > 1.67	10 pcs*3 lots	2352A	Pass
				2401A	Pass
				2402A	Pass
TEST GROUP D–Die Fabrication Reliability Tests					

Group	Item	Test Condition	ADDITIONAL REQUIREMENTS		
D1	EM	---	The Die Fabrication Reliability Tests are carried out by every fabrication site. The data, test method, calculations and internal criteria are available to the customer upon request.		
D2	TDDDB	---			
D3	HCI	---			
D4	NBTI	---			
D5	SM	---			
Group E-Electrical Verification Tests					
Group	Item	Test Condition	QTY	Lot NO.	Result
E1	TEST	Pre and Post Stress Electrical Test	All	All	Pass
E2	HBM	$\pm 500V$, $\pm 1KV$, $\pm 2KV$, 4KV (Test @ Rm/Hot)	3 pcs*1 lot	2310A	3A
E3	CDM	$\pm 250V$, $\pm 500V$, $\pm 750V$, $\pm 2KV$ (Test @ Rm/Hot)	3 pcs*1 lot	2310A	C3
E4	LU	125°C, I-trigger $\pm 200mA$ (Test @ Rm/Hot)t	3 pcs*1 lot	2310A	Class II A
E5	ED	Test at room, cold, hot temperature, Cpk>1.67 where applicable	30 pcs* 3lot	2352A 2401A 2402A	Pass
E9	EMC	Electromagnetic Compatibility (Radiated Emissions)	1 pcs*1 lot	2402A	Refer to Appendix 1
E12	LF	SOIC8-WB	Refer to JCET SOP8 Tin Whisker report		

6. MTTF&FIT

Supporting Data (Ea = 0.7 eV, Confidence Level = 60%)							MTTF (hrs)	FIT
Test Temp.	Test Voltage	Duration	QTY	Fail QTY	Operation Temp.	Operation Voltage	3.02E+07	33.10
125°C	5.5V	1000 hrs	240	0	55°C	5.5V		
125°C	5.5V	48 hrs	2400	0	55°C	5.5V		

Note: The FIT data is generated based on Arrhenius model and voltage acceleration model.

7. Conclusion

CA-IS1311G-Q1 series products are qualified according to AEC-Q100 standard.

Disclaimer

This information is provided to assist customers in design and development. It could change for technology innovation without notice.

The devices are shipped after passing final test. Customers are responsible to conduct sufficient engineering and additional qualification testing to determine whether a device is suitable for use in their applications.

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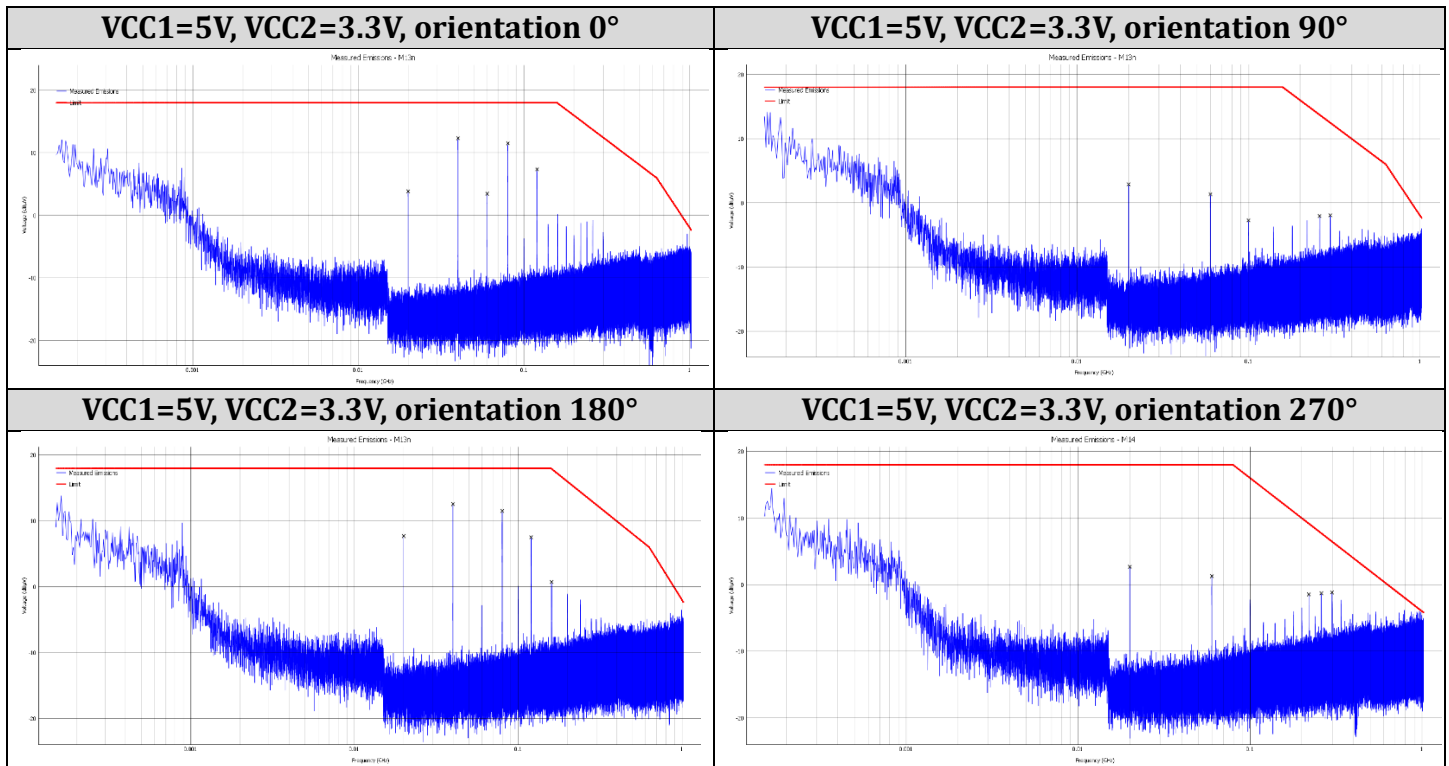
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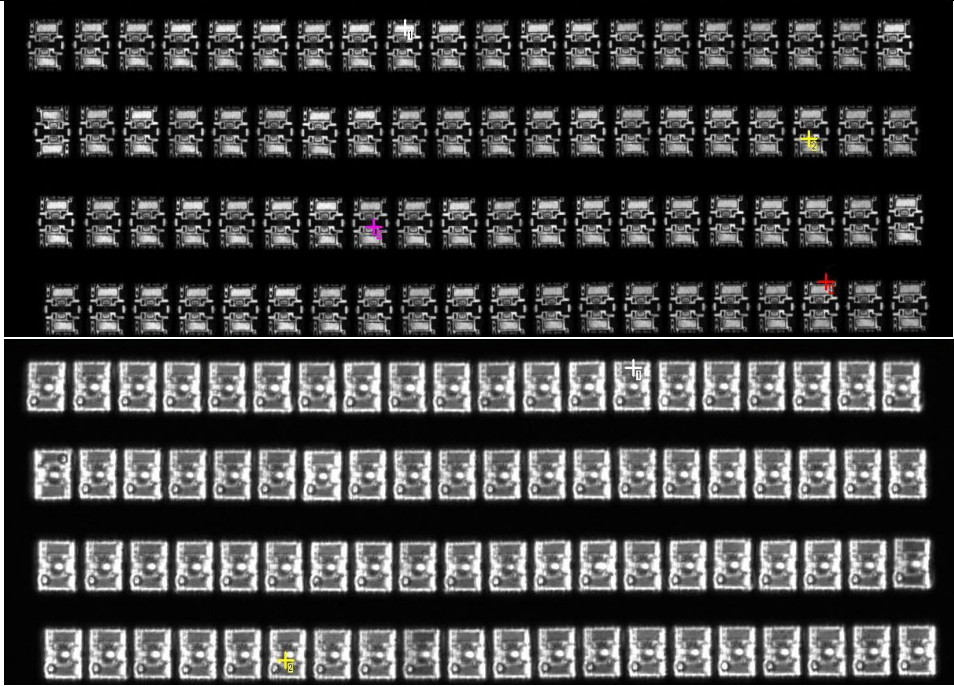
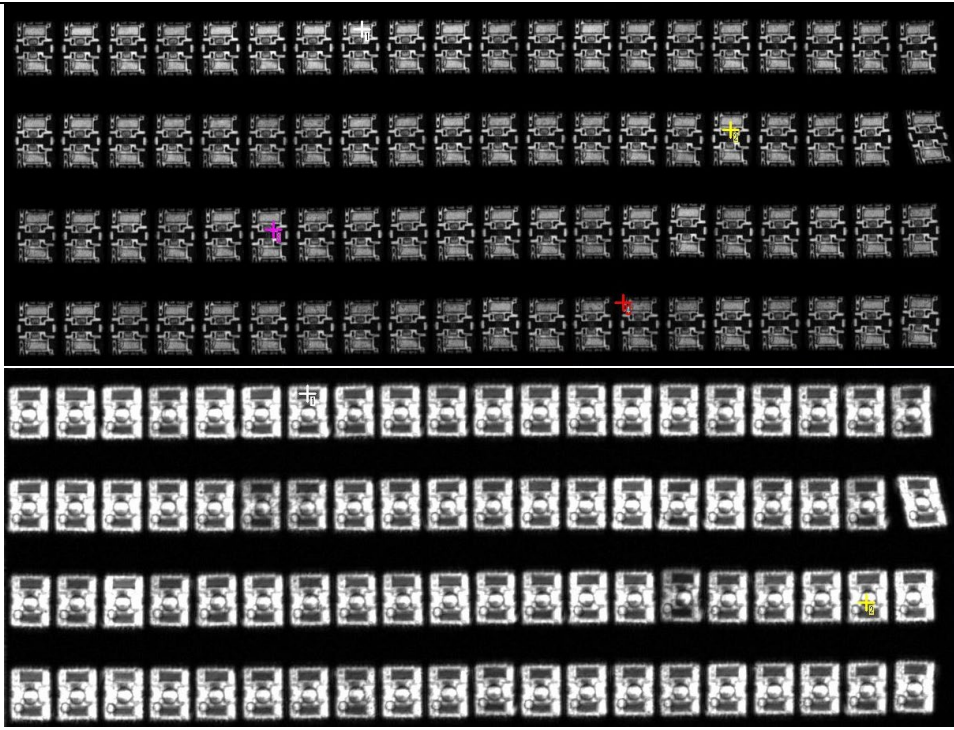
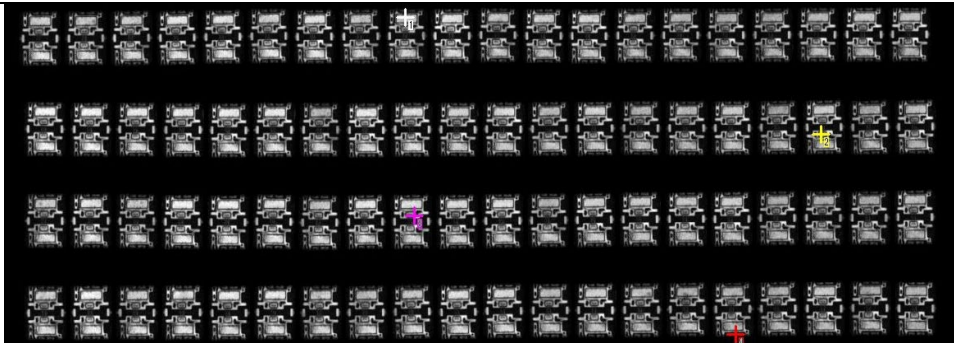
Revision History

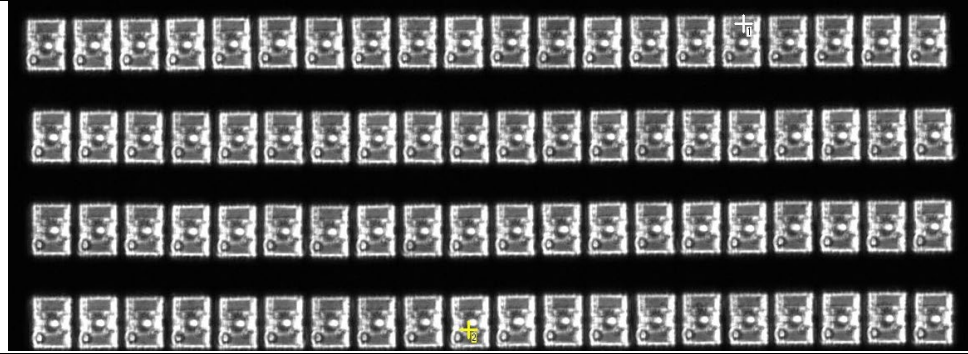


Revision	Change Log	Date
V1.0	Initial release	May, 2024

Appendix 1: EMC Test Results



Appendix 2: SAT Test Results

<p>Lot 1 pre-MSL</p>	 <p>This section displays two rows of microscopic images for Lot 1 pre-MSL. The top row shows a grid of components with several defects marked: a yellow cross in the 10th column of the 2nd row, a pink cross in the 10th column of the 3rd row, and a red cross in the 15th column of the 4th row. The bottom row shows another grid of components with a yellow cross in the 10th column of the 4th row.</p>	
<p>Lot 1 post-MSL</p>	 <p>This section displays two rows of microscopic images for Lot 1 post-MSL. The top row shows a grid of components with a yellow cross in the 10th column of the 2nd row, a pink cross in the 10th column of the 3rd row, and a red cross in the 15th column of the 4th row. The bottom row shows another grid of components with a yellow cross in the 10th column of the 4th row.</p>	
<p>Lot 2 pre-MSL</p>	 <p>This section displays two rows of microscopic images for Lot 2 pre-MSL. The top row shows a grid of components with a yellow cross in the 10th column of the 2nd row, a pink cross in the 10th column of the 3rd row, and a red cross in the 15th column of the 4th row. The bottom row shows another grid of components with a yellow cross in the 10th column of the 4th row.</p>	

	 A grid of 160 microchips arranged in 4 rows and 40 columns. A yellow crosshair is visible on the chip in the 4th row, 25th column.	
<p>Lot 2 post-MSL</p>	 A grid of 160 microchips arranged in 8 rows and 20 columns. A yellow crosshair is on the 2nd row, 19th column. A pink crosshair is on the 3rd row, 10th column. A red crosshair is on the 4th row, 18th column. A white crosshair is on the 5th row, 10th column. A yellow crosshair is on the 7th row, 15th column.	
<p>Lot 3 pre-MSL</p>	 A grid of 160 microchips arranged in 8 rows and 20 columns. A yellow crosshair is on the 2nd row, 19th column. A pink crosshair is on the 3rd row, 10th column. A red crosshair is on the 4th row, 1st column. A white crosshair is on the 5th row, 10th column. A yellow crosshair is on the 7th row, 15th column.	

Lot 3
post-MSL

