



# AEC-Q100 Reliability Qual Report

Product Series: CA-IF1042XX-Q1

Report Version: V1.2

Reference Doc.: AEC-Q100-REV-H

Qualification Lab: Chinaisti (Shanghai) Testing Technology Co., LT

# Catalogue

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## 1 Summary

Chipanalog product quality and reliability test is a risk mitigation process designed to ensure the lifetime of device in customer application. There are a variety of methods for evaluating semiconductor wafer fabrication process and package-level reliability, which may include accelerated environmental test conditions followed by reduction to actual use conditions. The manufacturability assessment of chips includes verifying a robust assembly process, continuity of product production, and ensuring availability. According to the AEC-Q100 standards and procedures, the product evaluation of Chipanalog conforms to industry standard test methods.

## 2 Product Series List

<b>Product Series</b>	<b>CA-IF1042XX</b>
Package	SOIC8(S)
Part NO.	CA-IF1042S-Q1/CA-IF1042VS-Q1

**Note:** Based on AEC-Q100 Qualification family rule, the family qualification may be applied to similar components with the same fabrication process, design rules, and similar circuits.

## 3 Production Information

### 3.1 Fab information

<b>Fab site</b>	GF
<b>Wafer ID</b>	Earth
<b>Die Tech.</b>	BCDXXX

### 3.2 Package information

<b>Assembly site</b>	UNIMOS
<b>FT site</b>	UNIMOS
<b>Package</b>	SOIC8 (S)
<b>Lead Frame</b>	Cu
<b>Bond wire</b>	20um Au
<b>MSL level</b>	MSL1
<b>Operation Temp.</b>	Grade 1 (-40°C - 125°C)

## 4 Reliability Qualification Plan

Group	Item	Refer.	Test condition	QTY	Remark
<b>Test Group A – Accelerated Environment Stress Tests</b>					
A1	PC	J-STD-020 JESD22-A113	Preconditioning: (Test @ Rm) SMD only; Moisture Preconditioning for THB/HAST, AC/UHST, TC, &PTC; Peak Reflow Temp =260°C	Min. MSL = 3	
A2	THB/BHAST	JESD22-A101 JESD22-A110	THB: 85°C, 85%RH 1000hrs. (Test @ Rm/Hot) BHAST: 130°C, 85%RH 96hrs. (Test @ Rm/Hot)	3*77pcs	
A3	AC/TH/UHAST	JESD22-A102 JESD22-A118 JESD22-A101	AC: 121°C, 100%RH 96hrs. (Test @ Rm) TH: 85°C, 85%RH 1000hrs. (Test @ Rm) UHAST: 130°C, 85%RH 96hrs. (Test @ Rm)	3*77pcs	
A4	TC	JESD22-A104	TC: -65°C-150°C, 500cycles (Test @Rm/ Hot)	3*77pcs	
A5	PTC	JESD22-A105	PTC: -65°C-125°C, 1000cycles (Test @ Rm/Hot)	NA	Not Applicable
A6	HTSL	JESD22-A103	HTSL: Ta=150°C, 1000hrs (Test @ Rm/Hot)	1*45pcs	
<b>Test Group B – Accelerated Lifetime Simulation Tests</b>					
B1	HTOL	JESD22-A108	HTOL: Ta=125°C, Vcc=5V, 1000hrs (Test @ Rm/Cold/Hot)	3*77pcs	
B2	ELFR	AEC-Q100-008	ELFR: Ta=125°C, Vcc=5V, 48hrs (Test @ Rm/Hot)	3*800pcs	
B3	EDR	AEC-Q100-005	EDR: (Test @ Rm/Hot)	NA	Not Applicable
<b>Group C – Package Assembly Integrity Tests</b>					
C1	WBS	AEC-Q100-001 AEC-Q003	Wire Bond Shear Test: (Cpk > 1.67)	30wire from 5pcs	
C2	WBP	MIL-STD883 AEC-Q003	Wire Bond Pull: (Cpk > 1.67); Each bonder used	30wire from 5pcs	
C3	SD	JESD22-B102 JSTD-002D	Solderability: (>95% coverage) 8hr steam aging prior to testing	1*15pcs	
C4	PD	JESD22-B100 JESD22-B108 AEC-Q003	Physical Dimensions: (Cpk > 1.67)	3*10pcs	
C5	SBS	AEC-Q100-010 AEC-Q003	Solder Ball Shear: (Cpk > 1.67); 5 balls from min. of 10 devices	NA	Not Applicable
C6	LI	JESD22 B105	Lead Integrity: (No lead cracking or breaking); Through-hole only; 10 leads from each of 5 devices	NA	Not Applicable

Group	Item	Refer.	Test condition	QTY	Remark
<b>Test Group D - Die Fabrication Reliability Tests</b>					
D1	EM	JESD61	Electromigration		
D2	TDDB	JESD35	Time Dependent Dielectric Breakdown		
D3	HCI	JESD60 & 28	Hot Carrier Injection		
D4	NBTI	JESD90	Negative Bias Temperature Instability		
D5	SM	JESD61, 87, & 202	Stress Migration		
<b>Group E- Electrical Verification</b>					
E1	TEST	per datasheet	Pre and Post Stress Electrical Test:	all	
E2	HBM	AEC Q100-002	HBM: 500V,1KV,2KV,6KV(Test @ Rm/Hot);	3pcs/voltage level	
E3	CDM	AEC-Q100-011	CDM: 250V,500V,750V,1KV,2KV(Test @ Rm/Hot);	3pcs/voltage level	
E4	LU	AEC-Q100-004	Latch-Up: (Test @ Rm/Hot)	1*6pcs	
E9	EMC	SAE J1752/3	Electromagnetic Compatibility (Radiated Emissions)	1*1pcs	

## 5 Reliability Test Report

Group	Item	Test Condition	QTY	Lot NO.	Result
<b>Test Group A - Accelerated Environment Stress Tests</b>					
A1	PC	MSL 1	Min. MSL = 3	149AC01	Pass
				149AC02	Pass
				149AC03	Pass
A2	BHAST	130°C, 85%RH 96hrs. Vcc=5.5V	3*77pcs	149AC01	Pass
				149AC02	Pass
				149AC03	Pass
	DPA-BHAST	DPA after BHAST 96hrs	1*10pcs	149AC01	Pass
	THB	85°C,85%RH 1000hrs, Vcc=5.5V	1*77pcs	149AC01	Pass
	DPA-THB	DPA after THB 1khrs	1*10pcs	149AC01	Pass
A3	UHAST	130°C, 85%RH 96hrs.	3*77pcs	149AC01	Pass
				149AC02	Pass
				149AC03	Pass
A4	TC	-65°C-150°C, 500/1000cycles	3*77pcs	149AC01	Pass
				149AC02	Pass
				149AC03	Pass
	DPA-TCT	DPA after TCT500/1000cycles	1*10pcs	149AC01	Pass
	SAT-TCT	SAT after TC1000cycles	3*77pcs	/	Pass
A6	HTSL	Ta=150°C, 1000hrs/2000hrs	1*45pcs	149AC01	Pass
<b>Test Group B - Accelerated Lifetime Simulation Tests</b>					
B1	HTOL	Ta=125°C, 1000hrs/2000hrs, Vcc=5.5V, TTL 信号输入, F=5Mbps.	3*77pcs	149AC01	Pass
				149AC02	Pass
				149AC03	Pass
B2	ELFR	ELFR: Ta=150°C, Vcc=5.5V, 24hrs TTL 信号输入, F=5Mbps.	3*800pcs	149AC01	Pass
				149AC02	Pass
				149AC03	Pass
<b>Group C - Package Assembly Integrity Tests</b>					
C1	WBS	Wire Bond Shear Test: (Cpk > 1.67)	30wire from 5pcs	149AC01	Pass, CPK=2.56
C2	WBP	Wire Bond Pull: (Cpk > 1.67); Each bonder used	30wire from 5pcs	149AC01	Pass, CPK=6.04
C3	SD	Solderability: (>95% coverage) 8hr steam aging prior to testing	1*15pcs	149AC01	Pass
C4	PD	Physical Dimensions: (Cpk > 1.67)	3*10pcs	149AC01	Pass
				149AC02	Pass
				149AC03	Pass
<b>TEST GROUP D - Die Fabrication Reliability Tests</b>					
D1	EM	Electromigration			
D2	TDDB	Time Dependant Dielectric Breakdown			
D3	HCI	Hot Carrier Injection			
D4	NBTI	Negative Bias Temperature Instability			
D5	SM	Stress Migration			
<b>Group E- Electrical Verification</b>					
E1	TEST	Pre and Post Stress Electrical Test:	all	all	Pass
E2	HBM	HBM: 500V,1KV,2KV,6KV (Test @ Rm/Hot);	3pcs/voltage level	149AC03	Pass 8KV class 3B
E3	CDM	CDM: 250V,500V,750V,1KV,2KV(Test @ Rm/Hot);	3pcs/voltage level	149AC03	Pass 2KV class C6
E4	LU	Latch-Up: (Test @ Rm/Hot)	1*6pcs	149AC03	Pass, class II A
E9	EMC	Electromagnetic Compatibility (Radiated Emissions)	1*1pcs	149AC03	参考附录 1

## 6 MTBF&FIT

Supporting Data									MTBF (Hrs.)	FIT
Test Temp.	Test Voltage	Duration	QTY	Fail QTY	Operation Temp	Operation Voltage	Active energy (eV)	Confidence level		
125°C	5.5V	2000hrs	240	0	55°C	5V	0.7	60%	9.43E+07	10.60
150°C	5.5V	24hrs	2400	0	55°C	5V	0.7	60%		

## 7 Conclusion

All above test items conform to AEC-Q100 standard and test execute by 3<sup>rd</sup> Lab Chinaisti (Shanghai) Testing Technology Co., LT. CA-IF1042XX-Q1 series products meet all test requirements, and all reliability test results are acceptable.

## Statement

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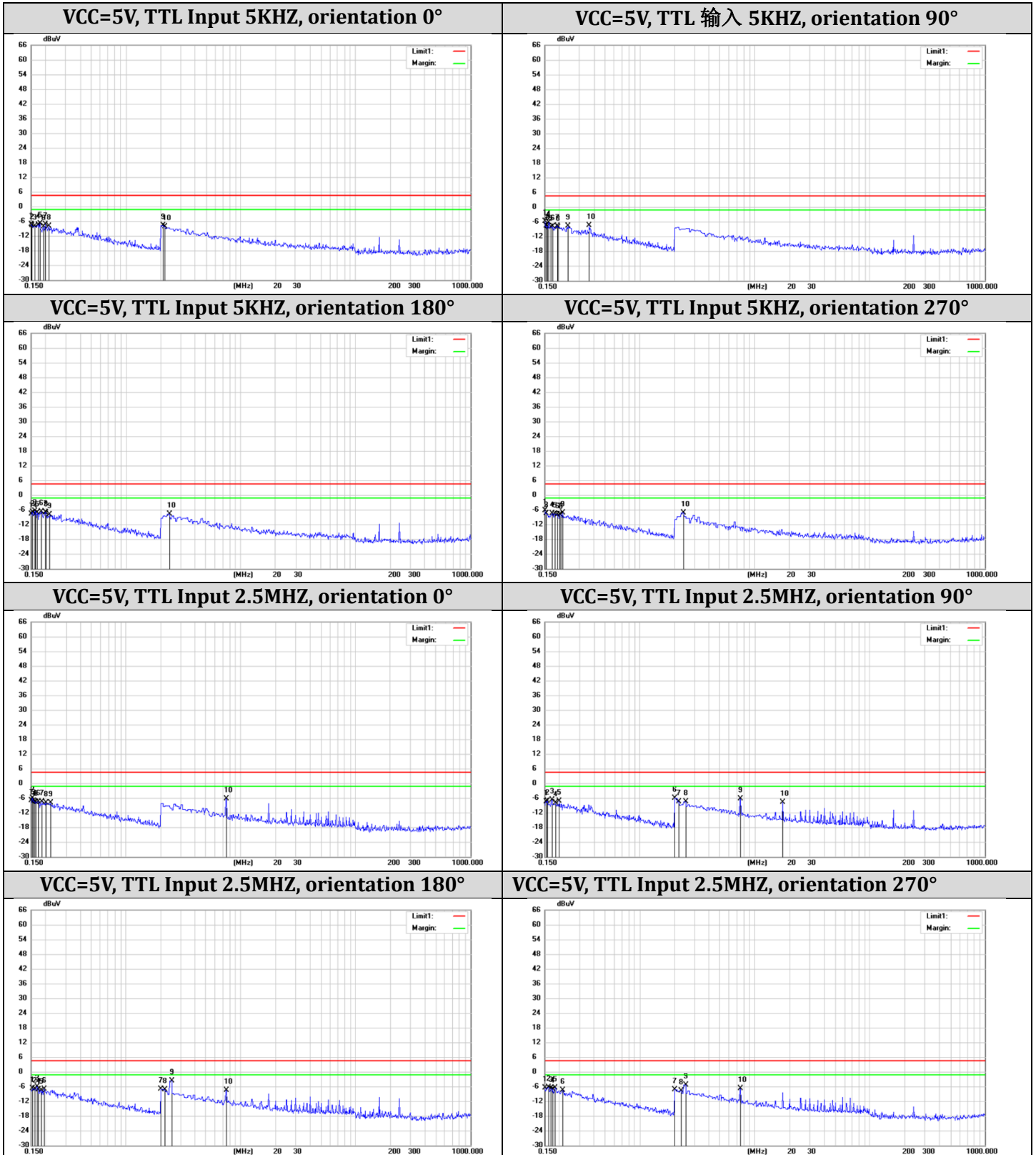
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## Version History

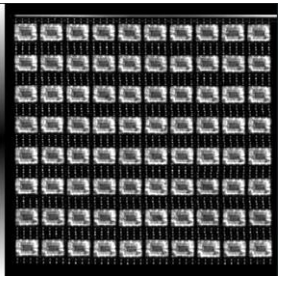
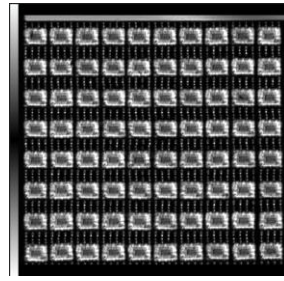
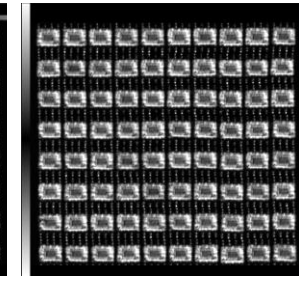
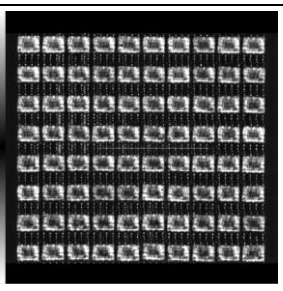
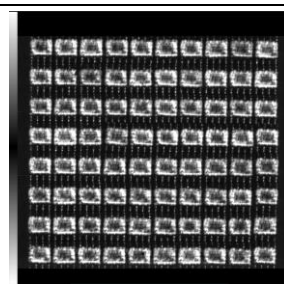
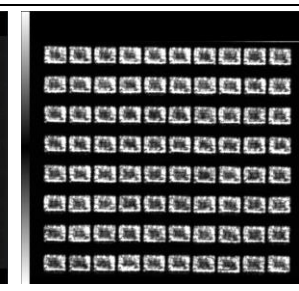
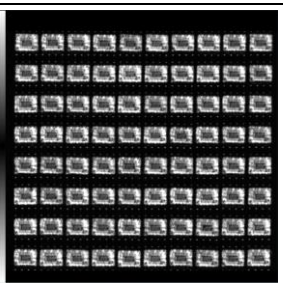
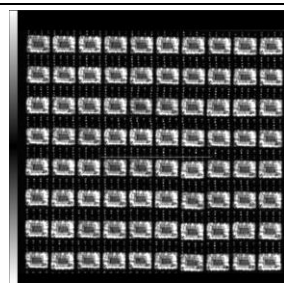
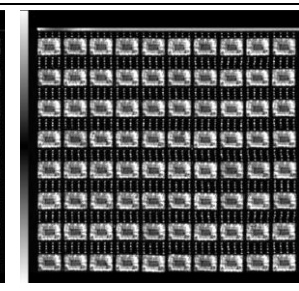
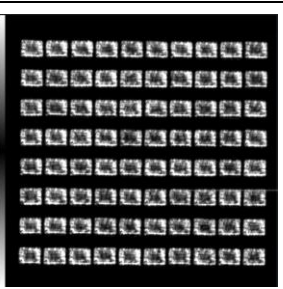
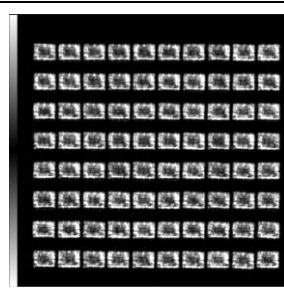
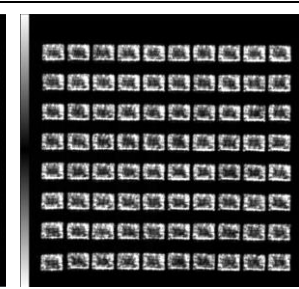
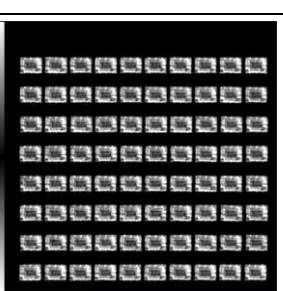
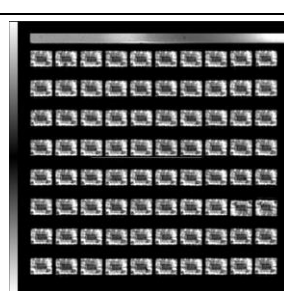
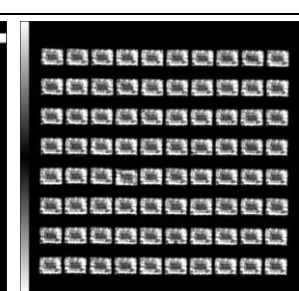
Version	Change reason	Release Date
V1.0	Initial	July. 2022
V1.1	Update robustness result: 1. HTOL 2khrs test result; 2. TCT 1000cycle test result; 3. HTSL 2khrs test result; 4. THB 1000hrs test result.	Sep. 2022
V1.2	1. Add DPA result post BHAST/THB/TCT1000; 2. Add SAT result post TCT1000.	Oct. 2022



### Appendix1 : EMC Test Result



**Appendix2 : SAT result before and post MSL1**

<p><b>Lot 1 pre-MSL</b></p>					
<p><b>Lot 1 post-MSL</b></p>					
<p><b>Lot 2 pre-MSL</b></p>					
<p><b>Lot 2 post-MSL</b></p>					
<p><b>Lot 3 pre-MSL</b></p>					
<p><b>Lot 3 post-MSL</b></p>		