Amkor Technologies Flip-Chip Package Assembly

Qualification Report

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Revision History

The following table shows the revision history for this document.

Date	Version	Revision
08/24/07	1.0	Initial Xilinx release.

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Amkor Technologies Flip-Chip Package Assembly Qualification

Overview

This report summarizes the Reliability Test results collected to date that were performed to qualify Amkor Technologies as an assembly site for Flip-Chip packaged devices.

All qualification lots completed reliability stress tests, except one Temperature Humidity Biased (THB) lot that completed 500 hours and passed at the post-electrical test. The THB lot is being continued to 1000 hours. When the 1000-hour data become available, this report will be updated with these additional data.

Qualification Objective

The objective of this qualification is to qualify Amkor Technologies as an assembly site for manufacturing the Flip-Chip packaged devices.

Qualification Matrix

Table 1: **Qualification Matrix**

Package Size	27 mm			31 mm	35 mm		40 mm	
Pin count	FF(G)672	FF(G)668	FF(G)676	FF(G)896	FF(G)1148	FF(G) 1152	FF(G)1513	FF(G)1517
XC2VP2	A							
XC2VP4	A							
XC2VP7	A			A				
XC2VP20				A		A		
XC2VP30				A		A		
XC2VP40					A	A		
XC2VP50					A	A (TV)		A
XC4VSX25		B						
XC4VSX35		B						
XC4VSX55					C			
XC4VFX12		B						
XC4VFX20	B							
XC4VFX40	B					C		
XC4VFX60	B					C		
XC4VFX100						C		D
XC4VFX140								D
XC4VLX15		B	B					
XC4VLX25		B	B					
XC4VLX40		B			C			
XC4VLX60		B (TV)			C			
XC4VLX80					C			
XC4VLX100					C (TV)		D	
XC4VLX160					D		D	
XC4VLX200							D (TV)	

In Table 1, the test vehicles marked with X (TV), where X = A, B, C, or D, were selected based on their similarity and die size. The packaged devices marked with A, B, C, and D are qualified by extension of A (TV), B (TV), C (TV), and D (TV) respectively.

Reliability Test Conditions and Results

The qualification vehicles were selected from several different product families as well as several different package sizes and pin counts for reliability tests. Table 2 provides a summary of the qualification.

Table 2: **Qualification Summary**

Test	Conditions	Test Vehicle	Lot Qty	Cum Device-Hr/Cyc	# of Failures
TC-B(1)	-55 to +125ºC	XC2VP50/FFG1152	2	145,000	0
		XC4VLX60/FFG668	1	82,000	0
		XC4VLX100/FFG1148	6	144,000	0
		XC4VLX200/FFG1513	1	75,000	0
THB(1)	85ºC, 85%RH, V_{DDMAX}	XC4VLX100/FFG1148	6	74,000	0
HTS(2)	T_A=150ºC	XC4VLX100/FFG1148	6	96,000	0
TH(1)	85ºC, 85%RH	XC4VLX100/FFG1148	6	90,000	0

Notes:

1. Level-4 preconditioning applied to THB and TC-B samples prior to the stress tests.
2. Reflow (3X) applied to HTS samples prior to the stress test.

Based on the data gathered thus far, XC2VP50/FFG1152 [A(TV)], XC4VLX60/FFG668 [B(TV)] and XC4VLX200/FFG1513 [D(TV)] have completed all the stress tests and met the requirements for production release. XC4VLX100/FFG1148 will be qualified pending the completion of a 1000-hour THB on 1 lot.

Environmental Stress Data

Table 3: **Environmental Stress Data**

Test	Conditions	Rel #	Device	Package	Samples	Duration	Fail Qty	
TC-B(1)	-55 to +125ºC	208207	XC2VP50	FFG1152	73	1,000 cycles	0	
		208307	XC2VP50	FFG1152	72	1,000 cycles	0	
		203807	XC4VLX60	FFG668	82	1,000 cycles	0	
		234207	XC4VLX200	FFG1513	75	1,000 cycles	0	
		213607	XC4VLX100	FFG1148	24	1,000 cycles	0	
		214007	XC4VLX100	FFG1148	24	1,000 cycles	0	
		214407	XC4VLX100	FFG1148	24	1,000 cycles	0	
		214807	XC4VLX100	FFG1148	24	1,000 cycles	0	
		215207	XC4VLX100	FFG1148	24	1,000 cycles	0	
		215607	XC4VLX100	FFG1148	24	1,000 cycles	0	
THB(1)	85ºC, 85%RH, V_{DDMAX}	213807	XC4VLX100	FFG1148	14	500 hrs(3)	0	
		214207	XC4VLX100	FFG1148	14	1,000 hrs.	0	
		214607	XC4VLX100	FFG1148	13	1,000 hrs.	0	
		215007	XC4VLX100	FFG1148	14	1,000 hrs.	0	
		215407	XC4VLX100	FFG1148	13	1,000 hrs.	0	
		215807	XC4VLX100	FFG1148	13	1,000 hrs.	0	

Table 3: **Environmental Stress Data *(Continued)***

Test	Conditions	Rel #	Device	Package	Samples	Duration	Fail Qty	
HTS(2)	T_A = 150ºC	213707	XC4VLX100	FFG1148	16	1,000 hrs.	0	
		214107	XC4VLX100	FFG1148	16	1,000 hrs	0	
		214507	XC4VLX100	FFG1148	16	1,000 hrs	0	
		214907	XC4VLX100	FFG1148	16	1,000 hrs	0	
		215307	XC4VLX100	FFG1148	16	1,000 hrs	0	
		215707	XC4VLX100	FFG1148	16	1,000 hrs	0	
TH(1)	85ºC, 85%RH, No bias	213907	XC4VLX100	FFG1148	15	1,000 hrs.	0	
		175807	XC4VLX100	FFG1148	15	1,000 hrs.	0	
		174707	XC4VLX100	FFG1148	15	1,000 hrs	0	
		215107	XC4VLX100	FFG1148	15	1,000 hrs	0	
		215507	XC4VLX100	FFG1148	15	1,000 hrs	0	
		215907	XC4VLX100	FFG1148	15	1,000 hrs	0	

Notes:

1. Level-4 preconditioning applied to THB and TC-B samples prior to the stress tests.
2. Reflow (3X) applied to HTS samples prior to the stress test.
3. The THB lot is being continued to 1,000 hours.