CMC 中微腾芯

WUXI CMC ELECTRONICS CO.,LTD

企业愿景：成为国内集成电路检测行业的领航者

企业使命：科技创新　融合发展　追求卓越

企业价值观：诚信、品质、奋进、共赢

AEC-Q100 RELIABILITYTESTREPORT

QR-TC-17

Device Name	:	Integrared circuit
Sample Model	:	FM33LG046A(FM33LG026A)
Batch Number	:	C5B05N1G/C5B12NAG/C5B12NLG
Manufacturer	:	Shanghai Fudan Microelectronics Group Co.,Ltd
Certification Grade	:	Grade 2: -40℃~105℃
Humidity Sensitivity Level	:	MSL=3

WE HEREBY CERTIFY THAT:

The test(s) shown in the attachment were conducted according to the indicating procedures. We assume full responsibility for the accuracy and completeness of these tests and vouch for the qualifications of all personnel performing them.

Post	Name	Signature	Data
Testing Engineer	**ZhijingXu**		**2022/08/19**
Inspection Engineer	**Yongjun XU**		**2022/08/19**

Wuxi CMC Electronics CO.,Ltd

NOTES

1. The report is invalid without company seal or report seal.
2. The report is invalid without signatures of testing person、auditors and approver.
3. The report is invalid with any scrawl.
4. Partial copy of the report is unallowed without approving.
5. If test devices come from customers' samples, our company only be responsible of the samples, the results only could explain the quality of samples.
6. If you have any objection to the test results, please appeal to our company within one month from the date of receipt of the report, and attach the original report, otherwise it will not be accepted.

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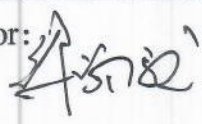
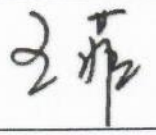
Catalogue

1. Test Report

Device Name	Integrared circuit	Sample Model	FM33LG046A (FM33LG026A)
Package Type	LQFP64	Sample Batch Number	C5B05N1G C5B12NAG C5B12NLG
Manufacturer	Shanghai Fudan Microelectronics Group Co.,Ltd		
Test Category	AEC Q100 Reliability Test	Sample Source	Customer sample delivery
Test Start Date	2022/06/01	Test End Date	2022/08/15
Inspection Standard	AEC Q100-Rev-H-2014 JEDEC MIL-STD-883-2-2019		
Results and Conclusions	The test samples were carried out according to the entrusted test scheme with reference to AEC-Q100-Rev-H-2014 as shown in Table 3, and the test progress is normal. The result : PASS.		
Comment	/		
Sign	Editor:  Date: 2022.8.19	Examiner:  Date: 2022.8.19	Approver:  Date: 2022.8.19

2. Reliability test summary

2.1 SampleInformation

Table 1: Sample Information

Lot#	Batch Number	Supplier Wafer Fabrication	Supplier Wafer Test	Supplier Assembly Site	Supplier Final Test Site
1	C5B05N1G	Samsung ElectronicsCO.,Ltd	Wuxi CMC Electronics CO.,Ltd	Tongfu Microelectronics Co.,Ltd	Wuxi CMC Electronics CO.,Ltd
2	C5B12NAG				
3	C5B12NLG				

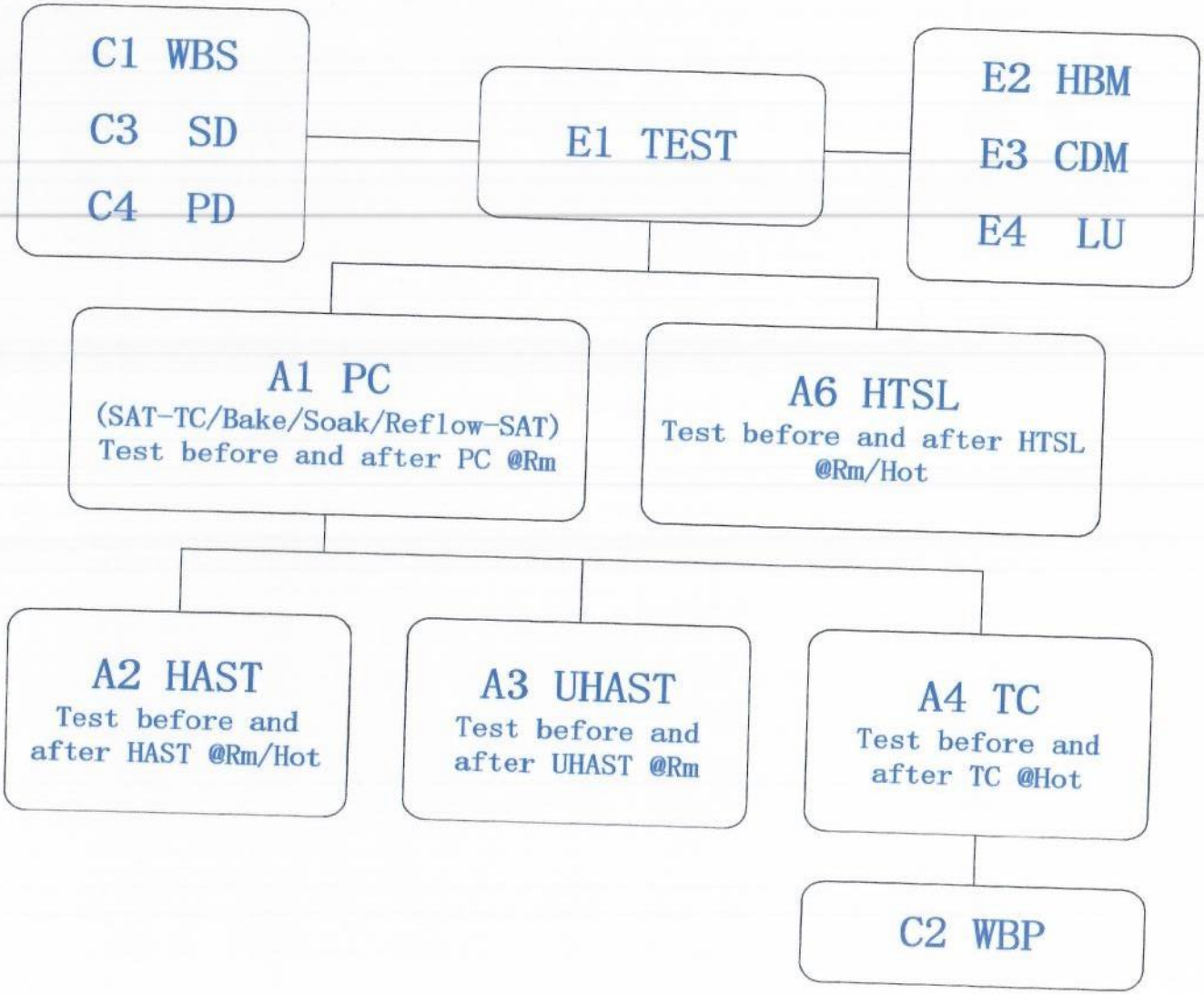
Item	Vendor	Material type
Lead Frame	SHS	C7025 173x173mil
Molding Compound	SHOWA DENKO	CEL-8240HF10-CWK
Wire	Nippon	Φ20 μ m EX1P
Epoxy/DAF	Sumitomo	CRM-1076WA-B

2.2 Description ofProduct

Table 2: Description of Product

ProductModel	Package Type	Operating temperature range	Mosiure sensitivity Level	Automotive Temperature Grade
FM33LG046A (FM33LG026A)	LQFP64	-40℃~105℃	MSL=3	Grade 2

2.3 Test Flow


C1 WBS
C3 SD
C4 PD
E1 TEST
E2 HBM
E3 CDM
E4 LU
A1 PC
(SAT-TC/Bake/Soak/Reflow-SAT)
Test before and after PC @Rm
A6 HTSL
Test before and after HTSL
@Rm/Hot
A2 HAST
Test before and
after HAST @Rm/Hot
A3 UHAST
Test before and
after UHAST @Rm
A4 TC
Test before and
after TC @Hot
C2 WBP

2.4 Test Result Summary

Table 3: Test Result Summary

TEST GROUP A-ACCELERATED ENVIRONMENT STRESS TESTS									
Group	Test Description	ABV	Test Method	Test Condition	#Lots	Total # Units	Result	Conclusion	Remark
A1	Pre-conditioning	PC	JESD22-A113 JEDEC J-STD-020	SAT-TC/Bake/Soak/Reflow-SAT	3	3*231	0/693	Pass	/
A2	Biased HAST	HAST	JESD22-A110	Ta=130℃,85%RH, Vd= 5.5V,96hrs	3	3*77	0/231	Pass	/
A3	Unbiased HAST	UHAST	JESD22-A118	Ta=130℃,85%RH, 96hrs	3	3*77	0/231	Pass	/
A4	Temperature Cycling	TC	JESD22-A104	Ta=-50℃to +150℃,500 cycles,	3	3*77	0/231	Pass	/
A6	High Temperature Storage Life	HTSL	JESD22-A103	Ta=150℃, 500hrs	1	1*45	0/45	Pass	/

TEST GROUP C-PACKAGE ASSEMBLY INTEGRITY TESTS									
Group	Test Description	ABV	Test Method	Test Condition	#Lots	Total # Units	Result	Conclusion	Remark
C1	Wire Bond Shear	WBS	AEC-Q100-001	Bond 2.3mil	1	5	0/5	Pass	C_{pk}: 6.26
C2	Wire Bond Pull	WBP	MIL-STD-883 Method2011	Wire Cu 20um（0.8mil）	1	5	0/5	Pass	C_{pk}: 4.25
C3	Solderability	SD	JESD22-B102	8 hour water vapor aging prior to test Ta=245±5℃, Infiltration time 5± 0.5s	1	15	0/15	Pass	>95% Lead coverage
C4	Physical Dimensions	PD	JESD22-B100 JESD22-B108	Test to spec	3	3*10	0/30	Pass	$C_{pk(min)}$: 1.74

TEST GROUP E-ELECTRICAL VERIFICATION TESTS									
Group	Test Description	ABV	Test Method	Test Condition	#Lots	Total # Units	Result	Conclusion	Remark
E1	Pre and post stress electrical test	Test	Test to spec	Test to spec	3	All	0/all	Pass	/
E2	Electrostatic Discharge Human Body Model	HBM	AEC Q100-002	±2000V	1	3	0/3	Pass	/
E3	Electrostatic Discharge Charged Device Model	CDM	AEC Q100-011	All pins:±500V; Corner pins:±750V	1	3	0/3	Pass	/
E4	Latch-Up	LU	AEC Q100-004	±100mA; 1.5x power source overvoltage	1	6	0/6	Pass	/

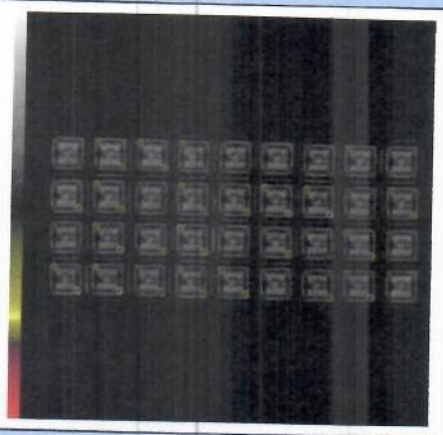
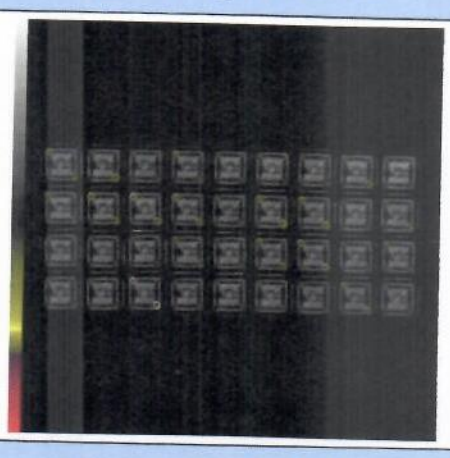
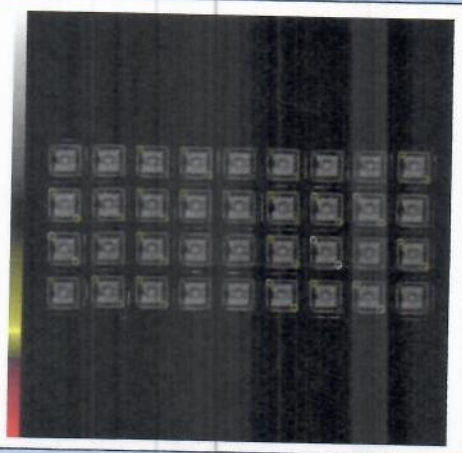
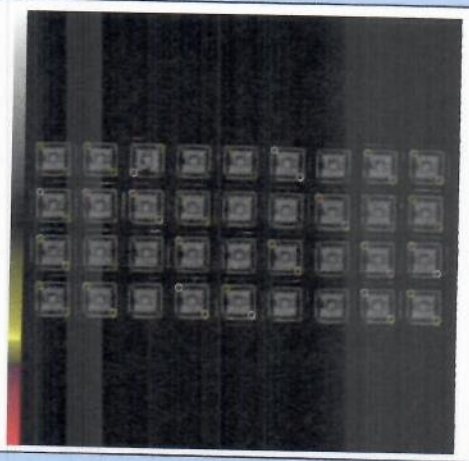
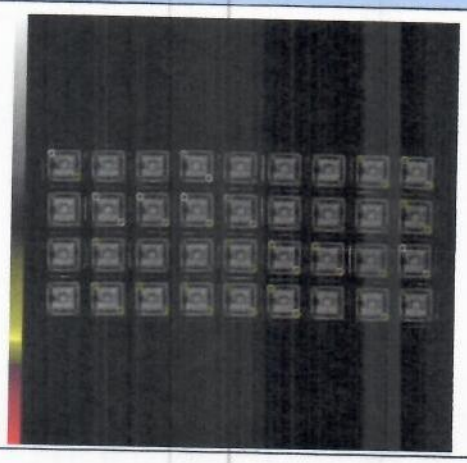
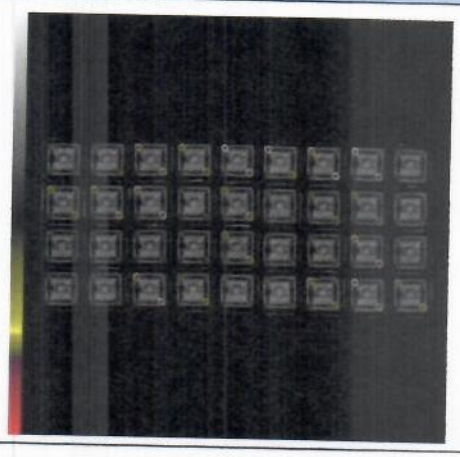
3. Test Equipment

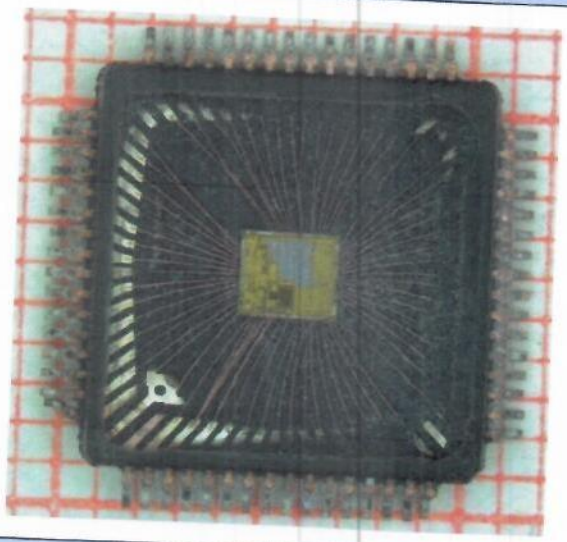
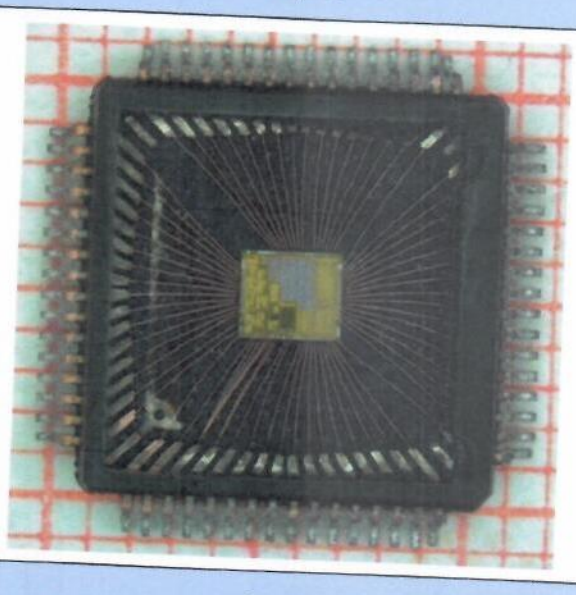
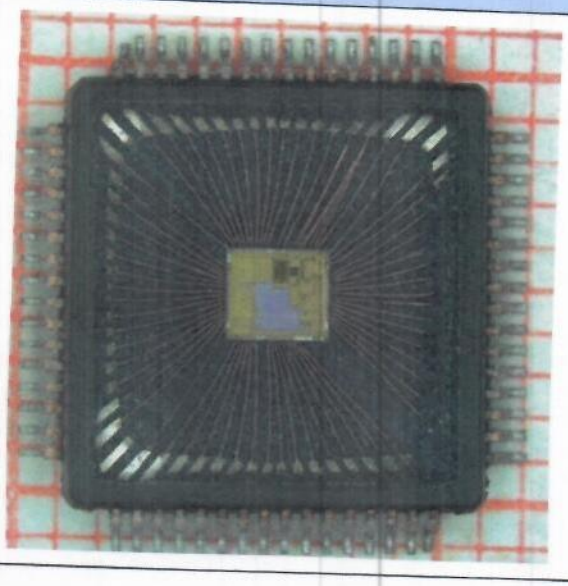
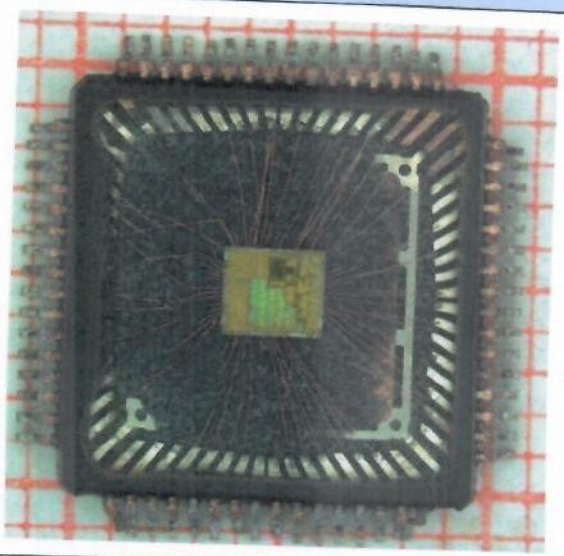
Table 4: Test Equipment Information

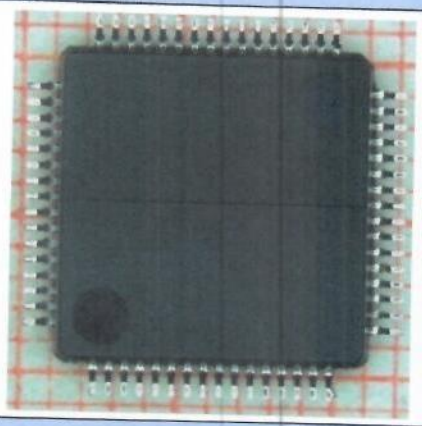
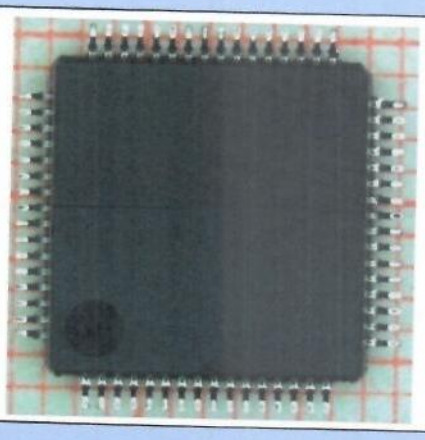
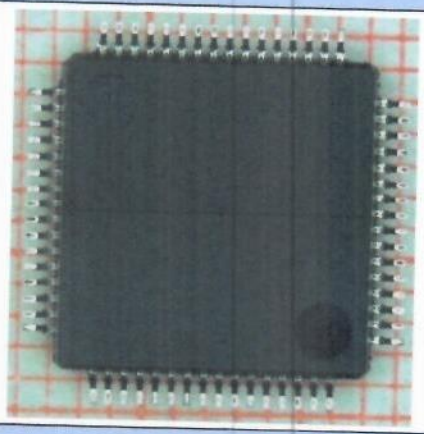
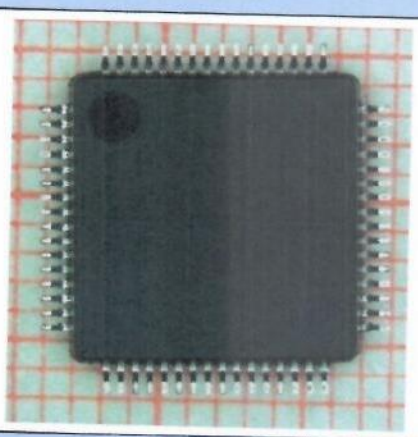
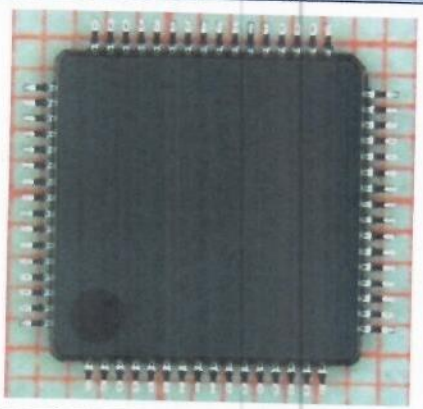
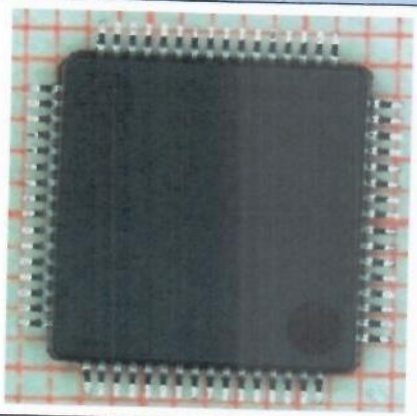
No.	Equipment Nr.	Equipment Name	Model Nr.	Effective period of measurement
1	0030-003157	High temperature test chamber	GPH-20	2021.11.08 – 2022.11.07
2	0030-003158	High temperature test chamber	GPH-20	2021.11.08 – 2022.11.07
3	7824	Reflow soldering machine	TNV25-308EN-P	2022.04.19 – 2023.04.18
4	58226220300010	Fast temperature change test chamber	VT³ 7012S2	2021.07.12 – 2022.07.11 2022.06.27 – 2023.06.26
5	8112180014	Humidity Chamber	SETH-A-100L	2022.04.19 – 2023.04.18
6	1807768445	Strong acceleration humidity box	PC-422R8D	2021.08.15 – 2022.08.14 2022.08.08 – 2023.08.07
7	2006770978	Strong acceleration humidity box	PC-422R8D	2021.08.15 – 2022.08.14 2022.08.08 – 2023.08.07
8	800543010737120001	DC power supply	IT6952A	2021.07.12 – 2022.07.11 2022.06.20 – 2023.06.19
9	C1504243003	Electronic digital calliper	0-150mm	2022.05.24 – 2023.05.23
10	745499001	Tensile shear force tester	Dage-4000	2021.09.06 – 2022.09.05
11	743302001	Three dimensional measuring microscope	107JPCV	2021.09.26 – 2022.09.25
12	653421101	Solderability tester	ST88	2022.03.14 – 2023.03.13
13	742215101	Electrostatic discharge and lock-in effect test system	MK.2 SE	2022.04.27 – 2023.04.26
14	1504205	CDM electrostatic discharge tester	Orion2-HR	2022.04.28 – 2023.04.27
15	14180	Ultrasonic microscope	D9600Z	/

4. Test process photos

Table 5: Test process photos

SAT	
C5B05N1G_SAT before PC	C5B05N1G_SAT after PC
	
C5B12AG_SAT before PC	C5B12AG _SAT after PC
	
C5B12NLG _SAT before PC	C5B12NLG _SAT after PC
	

Decap	
Graph 1	Graph 2
	
Graph 3	Graph 4
	

Solderability	
Graph 1	Graph 2
	
Graph 3	Graph 4
	
Graph 3	Graph 4
	

5. Test raw data

Test data sent by email.

6. Appendix

Appendix1: Wire Bond Pull Data

Appendix2: Wire Bond Shear Data

Appendix3: Physical Dimensions Data

Appendix1: Wire Bond Pull Strength Data

Sample Model	Sample Batch Number	Wire type	Wire diameter
FM33LG046A(FM33LG026A)	C5B05N1G	Cu	0.8mil

Wire Bond Pull Data （SPEC: ≥1.5g）						
Sample#	1#					
Wire#	Wire1	Wire2	Wire3	Wire4	Wire5	Wire6
Data	4.561	4.264	4.080	4.465	4.003	4.725
Broken point position	2	2	2	2	2	2
Result:	Pass	Pass	Pass	Pass	Pass	Pass
Sample#						
Wire#	Wire1	Wire2	Wire3	Wire4	Wire5	Wire6
Data	4.340	4.311	4.628	4.195	4.1795	4.678
Broken point position	2	2	2	2	2	2
Result:	Pass	Pass	Pass	Pass	Pass	Pass
Sample#						
Wire#	Wire1	Wire2	Wire3	Wire4	Wire5	Wire6
Data	4.195	4.678	4.468	4.140	4.368	4.140
Broken point position	2	2	2	2	2	2
Result:	Pass	Pass	Pass	Pass	Pass	Pass
Sample#						
Wire#	Wire1	Wire2	Wire3	Wire4	Wire5	Wire6
Data	4.368	4.787	4.401	4.628	4.303	4.440
Broken point position	2	2	2	2	2	2
Result:	Pass	Pass	Pass	Pass	Pass	Pass
Sample#						
Wire#	Wire1	Wire2	Wire3	Wire4	Wire5	Wire6
Data	4.633	4.814	4.278	4.298	4.103	4.604
Broken point position	2	2	2	2	2	2
Result:	Pass	Pass	Pass	Pass	Pass	Pass

Appendix2: Wire Bond Shear Data

Sample Model	Sample Batch Number	Bond diameter
FM33LG046A(FM33LG026A)	C5B05N1G	2.0mil

Wire Bond Shear Data （SPEC: ≥5.7 g）						
Sample#	1#					
Bond #	Bond1	Bond2	Bond3	Bond4	Bond5	Bond6
Data	23.229	22.879	24.476	23.046	22.667	24.928
Result:	Pass	Pass	Pass	Pass	Pass	Pass
Sample#	2#					
Bond #	Bond1	Bond2	Bond3	Bond4	Bond5	Bond6
Data	25.536	25.141	25.033	22.691	22.811	22.628
Result:	Pass	Pass	Pass	Pass	Pass	Pass
Sample#	3#					
Bond #	Bond1	Bond2	Bond3	Bond4	Bond5	Bond6
Data	24.762	22.930	23.765	23.177	23.302	22.111
Result:	Pass	Pass	Pass	Pass	Pass	Pass
Sample#	4#					
Bond #	Bond1	Bond2	Bond3	Bond4	Bond5	Bond6
Data	22.603	24.007	22.081	22.977	22.477	24.581
Result:	Pass	Pass	Pass	Pass	Pass	Pass
Sample#	5#					
Bond #	Bond1	Bond2	Bond3	Bond4	Bond5	Bond6
Data	23.741	23.022	24.298	23.974	23.508	23.611
Result:	Pass	Pass	Pass	Pass	Pass	Pass

Appendix3: Physical Deminsion Data

Sample Model		FM33LG046A (FM33LG026A)		Sample Batch Number		C5B05N1G		Package Type		LQFP64	
Sample ID	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	CPK
A	1.50	1.48	1.49	1.51	1.48	1.50	1.51	1.48	1.49	1.48	2.93
b	0.22	0.22	0.22	0.21	0.22	0.22	0.22	0.22	0.21	0.22	17.23
C	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	15.71
E	11.99	11.99	11.99	11.99	12.00	12.00	11.99	12.00	11.97	11.98	6.72

Sample Model		FM33LG046A (FM33LG026A)		Sample Batch Number		C5B12NAG		Package Type		LQFP64	
Sample ID	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	CPK
A	1.48	1.50	1.48	1.48	1.47	1.47	1.49	1.49	1.48	1.49	4.11
b	0.22	0.22	0.22	0.23	0.22	0.22	0.22	0.23	0.23	0.22	2.97
C	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.15	0.15	0.16	1.74
E	11.98	11.96	11.96	11.97	11.96	11.96	11.96	11.97	11.97	11.96	7.78

Sample Model		FM33LG046A (FM33LG026A)		Sample Batch Number		C5B12NLG		Package Type		LQFP64	
Sample ID	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	CPK
A	1.49	1.49	1.46	1.49	1.49	1.46	1.47	1.48	1.50	1.47	2.83
b	0.22	0.21	0.22	0.22	0.22	0.23	0.21	0.22	0.21	0.21	1.83
C	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	$2.27*10^{14}$
E	11.98	11.98	12.00	11.99	11.97	11.96	11.98	11.96	11.98	12.00	4.24

___END_