Aerospace Products

Quality Flows

1. Introduction

Atmel facilities are certified according to the ISO9001 and ISO/TS 16949 international quality standards. ISO9001/ ISO/TS 16949 standards covers quality system from the design development of product through manufacturing and service.

For Space, Avionic and Military Projects, production screenings and qualification are compliant either with ESCC 9000 or MIL-PRF-38535.

Atmel is fully DSCC QML qualified for level Q (military) and V (space), effective December 1999. Qualification is granted up to 0.18 µm CMOS technology based products. RHA (Radiation Hardness Assurance) certification is valid from October 2000.

Atmel is ESCC qualified for MH1RT asic's according to ESCC 2549000 (ESCC QML) and has begun the certification and qualification process for ATC18RHA asic's.

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2. Quality Management System (QMS)

In order to improve the reading of its quality flows, Atmel has introduced some quality levels for both military and space flows.

2.1 Space Quality Flow

- Level A (SLA)
  - Compliant with Atmel QMS
  - Compliant with ESCC System
  - Compliant with MIL-PRF-38535 System
  - Screening compliant ESCC 9000
  - Screening compliant MIL-PRF-38535 QML-V
  - Procurement specification : ESCC Detail specification or SMD
- Level B (SLB)
  - Compliant with Atmel QMS
  - Screening equivalent to ESCC 9000
  - Screening equivalent to MIL-PRF-38535 QML-V
  - Procurement specification : Atmel Product Specification (PS)

2.2 Military Quality Flow

- Level A (MLA)
  - Compliant with Atmel QMS
  - Compliant with MIL-PRF-38535 System
  - Screening compliant MIL-PRF-38535 QML-Q
  - Procurement specification : SMD
- Level B (MLB)
  - Compliant with Atmel QMS
  - Screening equivalent to MIL-PRF-38535 QML-Q
  - Procurement specification : Atmel Product Specification (PS)
- Level C (MLC)
  - Compliant with Atmel QMS
  - Screening Atmel Military Temperature Range flow
  - Procurement specification : Atmel Datasheet

Table 2-1. Prototype Offering

	Standard Product	ASIC
Reference Document		
Procurement specification	Datasheet	Design Review Document
Wafer Fab		
Standard processes	X	X
Rad Tolerant processes	X	X
Probe Go-no-go	X	X
Assembly		
Package type	Multilayer	Multilayer
Test		
Test 25°C Go-no-go	X	X

Notes:
1. Samples are manufactured according to an engineering flow only. Wafers are electrically tested at room temperature only, and no inspection is performed during the assembly, which means that these prototypes are not suitable for any kind of qualification or flight use.
2. Atmel denies the right and will not accept any responsibility for prototypes used outside of the stated conditions and cannot provide device failure analysis in the event of any such issues occurring.

2.3 Space Projects

These flows apply to devices built with Radiation Tolerant or Radiation Hardened wafer fabrication processes.

Table 2-2. Space Projects

		MIL-LEVEL A	MIL-LEVEL B	SPACE-LEVEL A			SPACE-LEVEL B
	Applicable Specification	**compliant with QML-Q flow (1)**	**Compliant with Atmel QMS (3)**	**compliant with QML-V flow (1)**	**compliant with ESCC flow (1)**	**compliant with ESCC QML flow (1, 2)**	**Compliant with Atmel QMS (4)**
Reference Document							
MIL-PRF 38535		X	X	X	-	-	X
ESCC 9000		-	-	-	X	X	-
PID		-	-	-	X	X	-
Procurement specification		SMD (5)	Atmel product spec	SMD(5)	Detail Spec(6)	Detail Spec (6)	Atmel product spec
Traceability							
Process traceability		X	X	X	X	X	X
Lot traceability		X	X	X	X	X	X
Part traceability		-	-	X	X	X	X
Wafer Fab							
Radiation Tolerant process		X	X	X	X	X	X
Process monitoring review		X	X	X	X	X	X
Probe Go-no-go		X	X	X	X	X	X
Assembly							
Package type		Multilayer	Multilayer	Multilayer	Multilayer	Multilayer	Multilayer
Die inspection	MIL-STD 883 TM 2010 cond B	X	X	-	-	-	-
	MIL-STD 883 TM 2010 cond A and ESCC 2049000	-	-	X	X	X	X
Acceptance		-	-				
-Sem	ESCC 21400 MIL-STD 883 TM2018	-	-	X	X	X	X
-Wafer lot acceptance (7)		-	-	X	X	X	X
-Precap (8)		-	-	X	X	X	X
High temperature stabilization bake	MIL-STD 883 TM1008	-	-	X	X	X	X
Thermal Cycling	MIL-STD 883 TM1010 Cond C	X	X	X	X	X	X
Constant acceleration	MIL-STD 883 TM2001 Cond E	X	X	X	X	X	X

Table 2-2. Space Projects

		MIL-LEVEL A	MIL-LEVEL B	SPACE-LEVEL A			SPACE-LEVEL B
	Applicable Specification	**compliant with QML-Q flow (1)**	**Compliant with Atmel QMS (3)**	**compliant with QML-V flow (1)**	**compliant with ESCC flow (1)**	**compliant with ESCC QML flow (1, 2)**	**Compliant with Atmel QMS (4)**
Pind Test	MIL-STD 883 TM2020 Cond A	X	X	X	X	X	X
Fine leak (9)	MIL-STD 883 TM1014 cond A	X	X	X	X	X	X
Gross leak	MIL-STD 883 TM1014 Cond C	X	X	X	X	X	X
Serialisation		-	-	X	X	X	X
Rx	MIL-STD 883 TM2012	-	-	X	X	X	X
Test							
Test 25°C go-nogo		X	X	-	-	-	-
Test 25°C with record		-	-	X	X	X	X
Burn-in 125°C, 160h, VCC +10% (10)	MIL-STD 883 TM1015	X	X	-	-	-	-
Burn-in 125°C, 240h, VCC +10% (10)	MIL-STD 883 TM1015	-	-	X	X	X	X
Test –55, 25 and 125°C go-nogo		X	X	-	-	-	-
Test 25°C with record and drift		-	-	X	X	X	X
Test -55°C, +125°C with record		-	-	X	X	X	X
PDA		-	-	X (11)	X (12)	X (12)	X (11)
Fine leak (9)	MIL-STD 883 TM1014 cond A	X	X	X	X	X	X
Gross leak	MIL-STD 883 TM1014 Cond C	X	X	X	X	X	X
IVE	MIL-STD 883 TM2009 ESCC 2059000	X	X	X	X	X	X
Lot qualification							
electrical test		0/116 (14,15)	0/116 (14,15)	0/20 (14)	-	-	0/20 (14)
assembly test (13)	MIL-PRF 38535	0/5 (14)	0/5 (14)	0/4 (14)	0/5 (14, 16)	0/5 (17, 18)	0/4 (14)
life test	ESCC 9000	0/45 (17)	0/45 (17)	0/22 (14,19, 20)	0/15 (14, 16)	0/15 (17)	0/22 (14, 19, 20)
package test		0/53 (17)	0/53 (17)	0/53 (17)	0/30 (14, 16)	0/30 (17)	0/53 (17)
Radiation test	MIL-STD 883 TM 1019 ESCC 22900	-	-	0/22 (14,16)	0/22 (14,16)	0/22 (14, 16)	0/22 (14, 16)
delivery (21, 22)							
Certificate of Conformity		X	X	X	X	X	X
Data package		-	-	X	X	X	X

Note:
1. Alternative methods could be introduced after Space Agencies approval, Customer will be notified
2. For ESCC qualified products according to ESCC 2549000
3. Deviations possible against MIL-PRF 38535 QML Q flow
4. Deviations possible against MIL-PRF 38535 QML V and ESCC 9000 flows
5. For ASIC devices, dedicated AID has to be approved latest at Prototypes Approval
6. For ASIC devices, dedicated Asic specification has to be approved latest at Prototypes Approval
7. Wafer lot Acceptance includes Wafer thickness, Metallization thickness, SEM, Glassivation thickness, QBD (charge in oxide), Parametric tests Review and radiation test report if applicable.
8. Precap is carried out by Atmel Quality representative
9. Fine leak is done with 'fixed' method, A1 according to MIL-STD 883 TM1014
10. Alternative temperature and time combinations per MIL-STD 883 method 1015 are permissible
11. Rejects at room temperature taken in account. Limit at 5% with 3% functional
12. Rejects at three temperatures taken in account. Limit at 5%
13. For solderability test, for J and L lead packages, one lead on two is untested to avoid bridging during the test
14. lot by lot test
15. Alternative method may be introduced according to MIL-STD 883 TM 5005
16. If required in the Purchase Order
17. Periodic test
18. Solderability is performed lot by lot on 5 parts.
19. Test performed on 10% of the lot quantity, with 22# maximum and 5# minimum + periodic test with SEC
20. Alternative temperature and time combinations per MIL-STD 883 method 1005 are permissible
21. Parts packing compliant with ESCC 20600
22. Parts held for a period exceeding 36 months are re-screening as minimum versus Mil-M-38510.

2.4 Military Projects

These flows apply to devices built with standard fabrication processes.

Table 2-3. Military Projects

		MIL-LEVEL A	MIL-LEVEL B	MIL-LEVEL C
	Applicable Specification	**Compliant with QML-Q flow (1)**	**Compliant with Atmel QMS (2)**	
Reference Document				
MIL-PRF 38535		X	X	-
Procurement specification		SMD (3)	Atmel Product spec	Datasheet
Traceability				
Process traceability		X	X	X
Lot traceability		X	X	X
Part traceability		-	-	-
Wafer Fab				
Standard processes		X	X	X
Process monitoring review		X	X	X
Probe Go-no-go		X	X	X
Assembly				
Package type		Multilayer	Multilayer	Multilayer Seal glass
Die inspection				
	Atmel spec	-	-	AQL 0.4%
	MIL-STD 883 TM2010 Cond B	X	X	-
Thermal Cycling	MIL-STD 883 TM1010 Cond C	X	X	-
Constant acceleration	MIL-STD 883 TM2001 Cond E	X	X	-
Pind Test	MIL-STD 883 TM2020 Cond A	-	-	-
Fine leak (4)	MIL-STD 883 TM1014 cond A	X	X	X
Gross leak	MIL-STD 883 TM1014 Cond C	X	X	X
Test				
Test 25°C Go-no-go		X	X	-
Burn-in 150°C, 80h, VCC +10% (5)	MIL-STD 883 TM1015	X	X	-
Test 25°C Go-no-go		X	X	-
Test -55°C, +125°C Go-no-go		X	X	X
Fine leak (4)	MIL-STD 883 TM1014 Cond A	X	X	-
Gross leak	MIL-STD 883 TM1014 Cond C	X	X	-
IVE	MIL-STD 883 TM2009	X	X	X

Table 2-3. Military Projects (Continued)

		MIL-LEVEL A	MIL-LEVEL B	MIL-LEVEL C
	Applicable Specification	**Compliant with QML-Q flow (1)**	**Compliant with Atmel QMS (2)**	
Lot qualification				
electrical test	MIL-PRF 38535	0/116 (6, 7)	0/116 (6, 7)	-
assembly test (9)		0/5 (6)	0/5 (6)	-
life test		0/45 (8)	0/45 (8)	-
package test		0/53 (8)	0/53 (8)	-
Delivery (10)				
Certificate of Conformity		X	X	-

Note:
1. Alternative methods could be introduced after DSCC Agency approval, Customer will be notified
2. Deviations possible against MIL-PRF 38535 QML Q flow
3. For ASIC devices, dedicated AID has to be approved latest at Prototypes Approval
4. Fine leak is done with ‘fixed’ method, A1 according to MIL-STD 883 TM1014
5. Alternative temperature and time combinaisons per MIL-STD 883 method 1015 are permissible
6. Lot by lot test
7. Alternative method may be introduced according to MIL-STD 883 TM 5005
8. Periodic test
9. For solderability test, for J and L lead packages, one lead on two is untested to avoid bridging during the test
10. Parts held for a period exceeding 36 months are re-screening as minimum versus Mil-M-38510

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