APPLICATION FOR EXTENSION OF ESCC TECHNOLOGY FLOW APPROVAL

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Component Title: **Integrated Circuits, Silicon, Monolithic, CMOS, Cell-Based Array, based on Type ATMX150RHA**

Appl. No. **359B**

Executive Member: **CNES** Date: **15/11/2023**

Technology Flow submitted for Extension of Qualification Approval: 1

SUMMARY DESCRIPTION	TEST STRUCTURES	COMPONENTS PROPOSED FOR QUALIFICATION
ATMX150RHA ASICs	**002OP**	**ATMX150RHA ASICs addition of 5 IP's** **- REG200RHA Regulator** **- MUX8RHA Multiplexer** **- OSCRC10MRHA Oscillator** **- PLL400MRHA PLL** **- BG1V2RHA bandgap**

2 Component Manufacturer
MICROCHIP TECHNOLOGY NANTES (ex-ATMEL NANTES)

3 Location of Manufacturing Plant(s)
MCHP Nantes (design & test)
UMC Taïwan (wafer fab)
MMT Thailand (assembly)
HCM La Rochelle (column mounting)

4 Date of original qualification approval:
Date: **28/05/2021**
Certificate Ref No. **359A**

5 ESCC Specifications used for Maintenance testing:
Generic: **9000** Issue: **11**
Detail(s): **9202/083** Issue: **4**

6 Deviations to LVT testing and Detail Specification used:
No ☒ Yes ☐ (supply details in Box 15)
Deviation from current Specifications:
No ☒ Yes ☐ (Supply details)

7 Qualification Extension Report reference and date:
ATMX150RHA ESCC QML - qualification maintenance request 2023-06 rev2

8 Summary of procurement or equivalent test results during current validity period in support of this application (those to ESCC listed first)

Customer	Component	LVT	Date code	Quantity Delivered
See Qualification Extension report				
		-		

9 **PID** changes since last maintenance of qualification
None ☒
Minor* ☐
Major* ☐ *Provide details in box: **19**

10 Current **PID** Verified by: **D. Dangla, CNES**
Name of Excutive Representative
Ref No: **ATMX150RHA PID 0037 – Rev F – 08/11/2023**
Ref No: **MMT PID FOR MCHP NANTES – 1G-QM-0105 – 04/02/2019**
Ref No:

11 Current Manufacturing facilities surveyed by: **S. Hernandez, ESA and D. Dangla, CNES** (Name of Executive Representative) on **14/09/2022** (Date)

Satisfactory: Yes ☒ No ☐ Explain

Report Reference: **DTN QE EC 2022-13648 CR-ESCC QML survey MCHP-14.15092022**

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Failure Analysis, DPA, NCCS available: Yes ☒ No ☐ (Supply data)

Ref. No's and purposes: **2CMIC301 delay of extension of qualification approval CLOSED**

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The undersigned hereby certifies on behalf of the ESCC Executive - that the above information is correct; - that the appropriate documentation has been evaluated; - that full compliance to all ESCC requirements is evidence (except as stated in box 15;) - that the reports and data are available at the ESCC Executive and therefore applies on behalf of CNES as the responsible Executive Member for ESCC qualification status to be extended to the component(s) listed herein.

Date: **15/11/2023**

Gianandrea Quadri

G. QUADRI, CNES

(Signature of the Executive Coordinator)

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Continuation of Boxes above:

Box 1:

(1) As detailed in QCI-39010-002, for this mixed-signal ASIC platform, in addition to the the full-digital technology evaluation circuit (002OP/002MS) submitted to a life test on an annual basis, if an ASIC includes a pre-qualified analog block, the ASIC itself will be submitted to a dedicated life test.

(2) As stated in QCI-39010-002, when no production on a package family, no monitoring is required and shall restarted when production will restart. Nevertheless, in case of prolonged stoppage of one package family production, the TRB shall assess the need for additional verifications before restart.

Box 7:

ESCC QML qualification of UMC 8C wafer fab with MMT assembly based on: ATMX150RHA ESCC QML - qualification maintenance request 2023-06 rev2 and associated reports:

- ATMX150RHA Process Identification Document - PID0037 revF

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Non compliance to ESCC requirements:

No.:	Specification	Paragraph	Non compliance

16

Additional tasks required to achieve full compliance for ESCC qualification or rationale for acceptability of noncompliance:

None

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Executive Manager Disposition

Application Approval: Yes ☒ No ☐

Action / Remarks:

Date:

B. Schade: Head of the Product Assurance and Safety Department

ANNEX 1: LIST OF TESTS DONE TO SUPPORT EXTENSION OF QUALIFICATION

Tests conducted in compliance with:

- ESCC 9000 generic specification; Chart F4 (for ESCC/QPL parts);
- or PID-TFD **ATMX150RHA PID 0037 – Rev F** (for ESCC/QML parts)

Tests vehicle identification/description:

002OP **CQFP-352**	**Standard Evaluation Circuit (SEC)** **002OP has been designed in compliance with the requirements of the MIL-PRF38535 §H.3.4.3. and contains:** **- Transistors to cover a domain up to 22 Mgates (equiv. NAND2)** **- Thick top metal layer to avoid voltage drop issues** **- Set of compiled memory blocks with and without EDACs** **- Shift registers chains** **- PLL PLL300MRHA** **002OP shall be embarked on all Multi-Project-Wafer (MPW) without or with thick Metal option and shall monitor this technology option.** • **Die Size 169mm²** • **Package R-CQ352_T** • **Die Attach JM7000** • **Wires (nature, diameter) AlSi, 25µm**

Detail Specification reference: **9202/083**

CQFP flat-substrate package family - ESCC periodicity of 2 years: Data from 2 lots presented over this 2 years period.

ADG Microchip periodicity of 26 weeks (environmental/mechanical sub-group) and each assembly lot (assembly capability sub-group).

Subgroup	Test	Tick when done	Conditions	Date Code Diffusion Lot	Tested Qty	No. of Rejects	Comments if not performed. Comments on Rejection
Environmental/Mechanical Subgroup	Mechanical Shock	☒	MIL-STD-883, Test Method 2002B	DC2146 S8Q72A25WS (CQFP144) DC2247 QQFGSA25S9 (CQFP144) Coverage → 2447	15	0	
	Vibration	☒	MIL-STD-883, Test Method 200A		15	0	
	Constant Acceleration	☒	MIL-STD-883, Test Method 2001D		15	0	
	Seal (Fine and Gross Leak)	☒	MIL-STD-883, Test Method 1014 A&C		15	0	
	Intermediate and End-Point Electrical Measurements	☒	Intermediate and End-Point Electrical Measurements in the Device Specification		15	0	
	External Visual Inspection	☒	ESCC Basic Specification No. 2059000		15	0	MIL-STD-883, Test Method 2009
	Thermal Shock	☒	MIL-STD-883. Test Method 1011C		15	0	
	Temperature Cyling	☒	MIL-STD-883 Test Method 1010C		15	0	
	Moisture Resistance	☒	MIL-STD-883, Test Method 1004		15	0	
	Seal (Fine and Gross Leak)	☒	MIL-STD-883, Test Method 1014 A&C		15	0	
	Intermediate and End-Point Electrical Measurements	☒	Intermediate and End-Point Electrical Measurements in the Device Specification		15	0	
	External Visual Inspection	☒	ESCC Basic Specification No. 2059000		15	0	MIL-STD-883, Test Method 2009

Subgroup	Test	Tick when done	Conditions	Date Code Diffusion Lot	Tested Qty	No. of Rejects	Comments if not performed. Comments on Rejection
Assembly Capability Subgroup	Terminal Strength (**)	☒	MIL-STD-883, Test Method 2004	DC2146 S8Q72A25WS (CQFP144) DC2247 QQFGSA25S9 (CQFP144) Coverage → 2447	3	0	
	Internal Visual Inspection (*)	☒	ESCC Basic Specification No. 2049000		4	0	MIL-STD-883 Test Method 2010A
	Bond Strength (*)	☒	MIL-STD-883 Test Method 2011		4	0	(*) Done on each assembly lot (**) Subgroup D2
	Substrate Attach Strength (*)	☒	MIL-STD-883 Test Method 2027		3	0	
	Permanence of Marking (*)	☒	MIL-STD-883 Test Method 2015		3	0	
	Solderability (*)	☒	MIL-STD-883 Test Method 2003		3	0	

Note: CCGA flat-substrate package family: no manufacturing over the period

Subgroup	Test	Tick when done	Conditions	Date Code Diffusion Lot	Tested Qty	No. of Rejects	Comments if not performed. Comments on Rejection
Endurance Subgroup	Operating Life	☒	MIL-STD-883, Test Method 1005	2000h @125°C	15	0	
	Intermediate and End-Point Electrical Measurements	☒	Intermediate and End-Point Electrical Measurements in the Device Specification	002OP / DK88K.1 21Q2 A68BRA25Y2 002OP / DL5RS.1 22Q2 A5XHCA2AG2	15	0	
	Seal (Fine and Gross Leak)	☒	MIL-STD-883, Test Method 1014 A&C		15	0	
	External Visual Inspection	☒	ESCC Basic Specification No. 2059000	Coverage → Q2/2023	15	0	MIL-STD-883, Test Method 2009
	Bond Strength after Life-Test	☒	MIL-STD-883, Test Method 2011	2# 002OP-F-04 DK88K.1 A68BRA25Y2 21Q2 (CQFP-352) + 2# 002OP-F-01 DL5RS.1 A5XHCA2AG2 22Q2 (CQFP-352) Coverage → Q2/2023	4	0	Sampling: 4 parts - 25% of wires on each parts, 426 wires in total

NOTES ON THE COMPLETION OF THE APPLICATION FORM FOR ESCC QUALIFICATION EXTENSION APPROVAL

ENTRIES

Form heading	shall indicate: - the title of the component as given in its detail specification or the name of the series, family; - the Executive Member; - the entering date; - the certificate number and its sequential suffix.
Box 1	shall provide details given in the table; in particular there shall be listed: - the variants or range of variants; - the range of components (the ESCC code is recommended to indicate the values or values range, the tolerance, the voltage, etc); the designation given in the detail specification as 'base on'; - under Test Vehicle enter either an ESCC code or the specific characteristic capable of identifying the component tested (e.g., voltage of coil for a relay); - under component similar enter a cross if relevant.
Box 2; 3 and 4	As per QPL entry; otherwise, an explanation of the changes must be supplied.
Box 5	Will show the ESCC Generic and Detail specifications, including issue number and revision letter, current at the time the tests reported were performed. If the specifications are different from those current on the date of the application, see Box 6.
Box 6	Will show the deviations from the Generic and Detail Specifications listed in Box 5, in particular deviations from testing. In case of deviations this must be listed in Box 15. In case the referenced specification in Box 5 have currently a different issue and/or revision indicate also whether the test data deviates or not from such current documents.
Box 7	Must reference the report(s) supplied in support of the application.
Box 8	Should provide the details of procurement to the full ESCC System, documentation of all of which should already have been delivered to the ESCC Executive under the terms of the relevant Generic Specification. An appropriate table has been drawn in this box.
Box 9	If the PID evolved after the Original Qualification or after the last Extension of Qualification, adequate details of such evolution shall be provided together with the reasons for the changes. Major changes shall be clearly marked.
Box 10	Identify the current PID issue status, date and actual date of verification. The date of verification of the current PID should be arranged as close as possible to the required date of extension.
Box 11	This box can be completed only after a physical visit to the plant to confirm that no unexplained changes occurred and that the practices, procedures, material, etc. used in manufacturing the components are as described in the PID. This survey shall be carried out in accordance with the requirements of ESCC Basic Specification No. 20200 and its findings shall be recorded.
Box 12	Provide details of, or reference to, any Destructive Physical Analysis (DPA) and Failure Analysis reports as well as any Nonconformance(s) (NCCS) occurred during the qualification validity period, stating if established corrective action have produced satisfactory results.
Box 13	Enter only the name of the Executive Member (i.e., CNES, DLR, ESTEC, etc.) and the signature of the responsible Executive Coordinator.
Box 14	To be used when there is a need to expand any of the boxes from 1 through 12. Identify box affected and reference the Box 14 in the relevant Box. Box 14 can be broken into 14a, 14b, etc. if several boxes have to be expanded.
Box 15	Fill in Table as requested.
Box 16	Any additional action deemed necessary by the Executive Member to bring the submitted data to a standard likely to be accepted by the ESCC Executive should be listed herein or the reason(s) to accept the noncompliance.
Box 17	All Executive Manager recommendations on the application itself, special conditions or restrictions, modifications of the QPL or QML entry, letters to the manufacturer, etc. shall be entered clearly in Box 19, signed by the representative for ESA, and dated.
Box 18	Fill in Table as requested.
Box 19	Confidential Details of PID changes including those of a confidential nature, shall be provided.
Box 20	State noncompliance with reference to specification(s) and paragraph(s). To simplify reference in Box 16 each nonconformance shall be sequentially numbered. If relevant state 'None'.
Box 21	Any additional action deemed necessary by the Executive Member to bring the submitted data to a standard likely to be accepted by the ESCC Executive should be listed herein or the reason(s) to accept the noncompliance.
Box 22	Additional Comments.