APPLICATION FOR EXTENSION OF ESCC QUALIFICATION APPROVAL

Page 1

Component Title: **Integrated Circuits, Silicon, Monolithic, 35KLUT Radiation-Hardened FPGA (NG-Medium CQFP-352)**

Appl. No. **382A**

Executive Member: **CNES** Date: **19/02/2025**

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Components (including series and families) submitted for Extension of Qualification Approval:

ESCC COMPONENT NO.	VARIANTS	RANGE OF COMPONENTS	BASED ON	TEST VEHICLE / S	COMPONENT SIMILAR
9304/010 issue 4	01	**Integrated Circuits, Silicon Monolithic, 35KLUT Radiation-Hardened FPGA**	**ST C65SPACE ASIC platform technology**	**NX1H35AS in CQFP-352 package (NG-MEDIUM)**	

2 Component Manufacturer

NanoXplore

3 Location of Manufacturing Plant(s)

NanoXplore (design)
ST Crolles (foundry)
Chipbond Taïwan (OPM (Over Pad Metallization))
ST Rennes (assembly)
ST Grenoble (test)
ST Grenoble + ST Rennes (space qualification)

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Date of original qualification approval:
Date: **31/08/2022**

Certificate Ref No. **382**

5 ESCC Specifications used for Maintenance of qualification testing:

Generic: **9000** Issue: **11**

Detail(s): **9304/010** 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:

"VOQ_2022_2024_C65SPACE_NX1H35AS-v2.pdf" document and associated reports

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

Project Name	Testing Level	LAT	Date code	Quantity Delivered

9 **PID** changes since start of qualification

None ☐

Minor* ☒

Major* ☐

*Provide details in box: 19

10 Current **PID** Verified by: **CNES**

Name of Excutive Representative

Ref No: **ST012008 ESCC PID GENERIQUE (8097046.pdf)**

Ref No: **PID for ASICs C65S WB and FC (DM00508779.pdf)ST Crolles PID (DM00408351.pdf)Chipbond Wafer Specification (DM00593640.pdf)Dice Layout PID (DM00508782.pdf)**

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Current Manufacturing facilities surveyed by: **ESA and CNES** on **12/07/2023**

(Name of Executive Representative) (Date)

Satisfactory: Yes ☒ No ☐ Explain MoM Quality Meeting held on the 12th of July 2023 (B2015)

Report Reference: CR-Activités ST Juillet 2023

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

Ref. No's and purposes: **NCCS 2CSTM301 - ESA Logo – CLOSED**
NCCS 2CSTM401 - TID RAD LETTER MARKING – CLOSED
NCCS 2CSTM402 - NG-Medium Qualified Flow Issue – 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: **19/02/2025**

Fontaine Lya — Signature numérique de Fontaine Lya Date : 2025.02.19 15:20:06 +01'00'

L. FONTAINE, CNES
(Signature of the Executive Coordinator)

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Continuation of Boxes above:

Box 7:
"VOQ_2022_2024_C65SPACE_NX1H35AS-v2.pdf" document and associated reports:
8097046.pdf (ESCC PID GENERIQUE)
DM00508779.pdf (PID for ASICs C65S WB and FC)
DM00408351.pdf (ST Crolles PID)
DM00593640.pdf (Chipbond Wafer Specification)
DM00508782.pdf (Dice Layout PID)
escc9304010iss4.pdf (ESCC Detail Specification No. 9304/010) (NG-Medium Product)
escc9202086iss2.pdf (ESCC Detail Specification No. 9202/086) (Technology Flow ST CMOS RH 65nm ASIC PLATFORM)
DC2414A_SPCNGFPC532E_33220F0V01_SG1_SG3
- Chart F2 and F3:
  - o 33220F0VRR_Chart_F2_F3.pdf
  - o Electrical data (33229F0VRR):
    - 33229F0VRR_Chart_F3_ElecData_FT1_AMBIANT.csv
    - 33229F0VRR_Chart_F3_ElecData_FT1_HOT.csv
    - 33229F0VRR_Chart_F3_ElecData_FT1_COLD.csv
    - 33229F0VRR_Chart_F3_ElecData_BIA_AMBIANT.csv
    - 33229F0VRR_Chart_F3_ElecData_BIH_HOT.csv
    - 33229F0VRR_Chart_F3_ElecData_BIC_COLD.csv
    - 33229F0VRR_Chart_F3_DriftReport.pdf
  - o 33229F0V01_Chart_F2_F3.pdf
  - o Electrical data:
    - 33229F0V01_Chart_F3_ElecData_FT1_AMBIANT.csv
    - 33229F0V01_Chart_F3_ElecData_FT1_HOT.csv
    - 33229F0V01_Chart_F3_ElecData_FT1_COLD.csv
    - 33229F0V01_Chart_F3_ElecData_BIA_AMBIANT.csv
    - 33229F0V01_Chart_F3_ElecData_BIH_HOT.csv
    - 33229F0V01_Chart_F3_ElecData_BIC_COLD.csv
    - 33229F0V01_Chart_F3_DriftReport.pdf
- Chart F4 (SG1 and SG3):
  - o 33229F0V01_Chart F4_SG1_SG3.pdf
  - o Electrical data:
    - 33229F0VRM_Chart_F4_ElecData_SG1_Environmental.csv
    - 33229F0VRN_Chart_F4_ElecData_SG1_Mechanical.csv

DC2309A_SPCNGFPC532E_33220F0VZX_SG2
- Chart F2 and F3:
  - o 33220F0VZX_Chart_F2_F3.pdf
  - o Electrical data:
    - 33229F0VZX_Chart_F3_ElecData_FT1_AMBIANT.xlxs
    - 33229F0VZX_Chart_F3_ElecData_FT1_HOT.xlsx
    - 33229F0VZX_Chart_F3_ElecData_FT1_COLD.xlsx
    - 33229F0VZX_Chart_F3_ElecData_BIA_AMBIANT.xlsx
    - 33229F0VZX_Chart_F3_ElecData_BIH_HOT.xlsx
    - 33229F0VZX_Chart_F3_ElecData_BIC_COLD.xlsx
    - 33229F0VZX_Chart_F3_DriftReport.pdf
- Chart F4 (SG2):
  - o 33229F0VZX_Chart_F4_SG2.pdf
  - o Electrical data:
    - 33229F0VZQ_Chart_F4_ElecData_T0_Amb.csv
    - 33229F0VZQ_Chart_F4_ElecData_T0_Hot.csv
    - 33229F0VZQ_Chart_F4_ElecData_T0_Cold.csv
    - 33229F0VZQ_Chart_F4_ElecData_500h_Amb.csv
    - 33229F0VZQ_Chart_F4_ElecData_500h_Hot.csv
    - 33229F0VZQ_Chart_F4_ElecData_500h_Cold.csv
    - 33229F0VZQ_Chart_F4_ElecData_1000h_Amb.csv

- 33229F0VZQ_Chart_F4_ElecData_1000h_Hot.csv
- 33229F0VZQ_Chart_F4_ElecData_1000h_Cold.csv
- 33229F0VZQ_Chart_F4_ElecData_2000h_Amb.csv
- 33229F0VZQ_Chart_F4_ElecData_2000h_Hot.csv
- 33229F0VZQ_Chart_F4_ElecData_2000h_Cold.csv
- 33229F0VZQ_Chart_F4_DriftReport.pdf

Sales listing.xlsx

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Non compliance to ESCC requirements:

No.:	Specification	Paragraph	Non compliance

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

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Executive Manager Disposition

Application Approval: Yes ☒ No ☐

Action / Remarks:

Date: 31-03-2025

A. Zadeh: Head of Avionics and EEE Division, Electrical Department

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

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Tests conducted in compliance with:

- ESCC 9000 generic specification; Chart F4 (for ESCC/QPL parts);
- Or PID-TFD [redacted] (for ESCC/QML parts)

Tests vehicle identification/description:

NX1H35AS CQFP-352 with Ceramic Tie Bar Gold Wire-Bonded	NX1H35AS has been designed in compliance with ST C65Space libraries and design rules for custom cells. The qualification has been performed with flight models from 1 diffusion lot. See “VOQ_2022_2024_C65SPACE_NX1H35AS-v2.pdf” document and associated reports

Detail Specification reference: **9304/010**

NX1H35AS in CQFP-352 package :

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	Thermal Shock	⊠	MIL-STD-883. Test Method 1011	NX1H35AS-CQFP352 Cut 1.2 Diffusion Lot: VQ128380 Assembly Lot: 33229F0VRM Date code: 2414A	15	0	
	Temperature Cyling	⊠	MIL-STD-883 Test Method 1010		15	0	
	Moisture Resistance	⊠	MIL-STD-883, Test Method 1004		15	0	
	Seal (Fine and Gross Leak)	⊠	MIL-STD-883, Test Method 1014		15	0	
	Intermediate and End-Point Electrical Measurements	⊠	Intermediate and End-Point Electrical Measurements in the Device Specification		12	0	For the Moisture resistance test, we are supposed to do it on components whose leads have been arched. To do this, we have to cut the tie bar of the CQFP352. The problem is that once we have cut the tie-bar, we are no longer able to do the electrical test in socket. So we indicated in §2.1.1.2 in escc9304010iss4.pdf (ESCC Detail Specification No. 9304/010) (NG-Medium Product) to arch the leads on 3 components instead of 15 and to switch to electrical testing only 12 parts with tie bar (same sampling and philosophy as in QML).
	External Visual Inspection	⊠	ESCC Basic Specification No. 20500 / 2059000		15	0	MIL-STD-883, Test Method 2009
	Mechanical Shock	⊠	MIL-STD-883, Test Method 2002	NX1H35AS-CQFP352 Cut 1.2 Diffusion Lot: VQ128380 Assembly Lot: 33229F0VRN Date code: 2414A	15	0	
	Vibration	⊠	MIL-STD-883, Test Method 2007		15	0	
	Constant Acceleration	⊠	MIL-STD-883, Test Method 2001		15	0	
	Seal (Fine and Gross Leak)	⊠	MIL-STD-883, Test Method 1014		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. 20500 / 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	Permanence of Marking	⊠	ESCC Basic Specification No. 24800	NX1H35AS-CQFP352 Cut 1.2 Diffusion Lot: VQ128380 Assembly Lot: 33229F0VRP Date code: 2414A	NA	NA	Not Applicable on Laser Marking
	Terminal Strength	⊠	MIL-STD-883, Test Method 2004 Cond. B2		3	0	As described in §2.1.1.2 (a) in escc9304010iss4.pdf (ESCC Detail Specification No. 9304/010) (NG-Medium Product)
	Internal Visual Inspection	⊠	ESCC Basic Specification No. 2049000		5	0	MIL-STD-883 Test Method 2010A
	Bond Strength	⊠	MIL-STD-883 Test Method 2011		5	0	
	Die Shear	⊠	MIL-STD-883 Test Method 2019		4	0	

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	NX1H35AS-CQFP352 Cut 1.2 Diffusion Lot: VQ128380 Assembly Lot: 33229F0VZQ Date code: 2309A 2000h @125°C @Ta = +25°C @Tj Max = +125°C @Tc = -55°C Vccmax	15	0	
	Intermediate and End-Point Electrical Measurements	☒	Intermediate and End-Point Electrical Measurements in the Device Specification		15	0	
	Seal (Fine and Gross Leak)	☒	MIL-STD-883, Test Method 1014		15	0	
	External Visual Inspection	☒	ESCC Basic Specification No. 2059000		15	0	MIL-STD-883, Test Method 2009

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.