PRODUCT / PROCESS CHANGE NOTIFICATION

1. PCN basic data	
1.1 Company	STMicroelectronics International N.V
1.2 PCN No.	AMS/23/14249
1.3 Title of PCN	Additional production site (HEFEI TONGFU MICROELEC) for Analog products assembled in SO14 package.
1.4 Product Category	Pls refer to the Products List.
1.5 Issue date	2023-08-07

2. PCN Team	
2.1 Contact supplier	
2.1.1 Name	Bassel RAHIL
2.1.2 Phone	
2.1.3 Email	bassel.rahil@st.com
2.2 Change responsibility	
2.2.1 Product Manager	Marcello SAN BIAGIO
2.1.2 Marketing Manager	Salvatore DI VINCENZO
2.1.3 Quality Manager	Jean-Marc BUGNARD

3. Change		
3.1 Category	3.2 Type of change	3.3 Manufacturing Location
Transfer	Product transfer from one site to another site, even if test or process line is qualified	Tongfu Hefei (China)

4. Description of change		
	Old	New
4.1 Description	SO14 Analog products assembled in ST Bouskoura (Morocco) and ATX Shanghai.	SO14 Analog assembled in ST Bouskoura (Morocco) ATX Shanghai and Tongfu Hefei (additional production site).
4.2 Anticipated Impact on form,fit, function, quality, reliability or processability?	No Impact	

5. Reason / motivation for change	
5.1 Motivation	The notified transfer of selected Analog products assembled in SO14 will assure a second sourcing and capacity increase.
5.2 Customer Benefit	CAPACITY INCREASE

6. Marking of parts / traceability of change	
6.1 Description	new internal sales type

7. Timing / schedule	
7.1 Date of qualification results	2023-10-13
7.2 Intended start of delivery	2023-10-31
7.3 Qualification sample available?	Upon Request

8. Qualification / Validation			
8.1 Description	14249 Preliminary Report on SO14.pdf		
8.2 Qualification report and qualification results	Available (see attachment)	Issue Date	2023-08-07

9. Attachments (additional documentations)
14249 Public product.pdf 14249 Preliminary Report on SO14.pdf

10. Affected parts		
10. 1 Current		10.2 New (if applicable)
10.1.1 Customer Part No	10.1.2 Supplier Part No	10.1.2 Supplier Part No
LF247DT	LF247DT	
LF347DT	LF347DT	
LM124DT	LM124DT	
25-136384	LM139ADT	
LM224DT	LM224DT	
11940BM06SM1	LM224DT	
LM239ADT	LM239ADT	
LM239DT	LM239DT	
11940BM12SM1	LM239DT	
34286SM	LM239DT	
4418966391-R	LM239DT	
LM2901DT	LM2901DT	
1532649610002	LM2901DT	
LM2902DT	LM2902DT	
33514018	LM2902DT	
125C0194	LM2902DT	
LM324DT	LM324DT	
12353611	LM324DT	
32.40.02.037	LM324DT	
N40-0324	LM324DT	
LM339ADT	LM339ADT	
34071SM	LM339ADT	
LM339DT	LM339DT	
EMEUA00052	LM339DT	
27665SM	LM339DT	
113803	LM339DT	
37-014002-01	LM339DT	
N40-0339LF	LM339DT	
TL074ACDT	TL074ACDT	
TL074CDT	TL074CDT	
SCCI021700	TL074CDT	
TL074IDT	TL074IDT	
TL084AIDT	TL084AIDT	
TL084BCDT	TL084BCDT	
	TL084BIDT	
TL084CDT	TL084CDT	
TL084IDT	TL084IDT	

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PCN Title : Additional production site (HEFEI TONGFU MICROELEC) for Analog products assembled in SO14 package.

PCN Reference : AMS/23/14249

Subject : Public Products List

Dear Customer,

Please find below the Standard Public Products List impacted by the change.

LM339DT	LM239ADT	TL084AIDT
LM224DT	LF347DT	LM2902DT
LM124DT	TL074ACDT	TL084CDT
TL084BIDT	TL074CDT	TL074IDT
LM239DT	TL074BCDT	TL084IDT
LM139ADT	LM339ADT	LM2901DT
LM324DT	TL084BCDT	LF247DT
TL084ACDT		

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PRODUCT/PROCESS
CHANGE NOTIFICATION

PCN AMS/23/14249

Analog, MEMS & Sensors (AMS)

Additional production site (HEFEI TONGFU MICROELEC) for Analog products assembled in SO14 package

WHAT:

On top of existing production site SO14 for Analog products ST Microelectronics is proud to announce and additional production site for this package in HEFEI TONGFU MICROELEC

Please find more information related to material change in the table here below

Material	Current process	Modified process	Comment
Diffusion location	ST Singapore	ST Singapore	No change
Assembly location	ST Bouskoura, ATX Shanghai	HEFEI TONGFU MICROELEC ST Bouskoura, ATX Shanghai	
Molding compound	Sumitomo G700KC Hitachi CEL-9240HF10AK	Sumitomo G700QB Sumitomo G700KC Hitachi CEL-9240HF10AK	
Die attach	Ablestick 8601-S25 Hitachi EN4900G	Henkel 8200T Ablestick 8601-S25 Hitachi EN4900G	
Leadframe	Copper	Copper	
Plating	Matte Sn	Matte Sn	
Wire	Copper 1mil Copper Pd coated 1 mil	Copper 1mil Copper Pd coated 1 mil	

WHY:

The purpose of the extension to additional site for SO14 in Hefei Tongfu for Analog products is to provide a better support to our customers by enhancing the manufacturing process for higher volume production.

HOW:

The qualification program consists mainly of comparative electrical characterization and reliability tests.

You will find here after the qualification test plan which summarizes the various test methods and conditions that ST uses for this qualification program.

WHEN:

The new material set will be implemented in Q4/2023 in Hefei Tongfu.

Marking and traceability:

Unless otherwise stated by customer's specific requirement, the traceability of the parts assembled with the new material set will be ensured by new internal sales type, date code and lot number.

The changes here reported will not affect the electrical, dimensional and thermal parameters keeping unchanged all the information reported on the relevant datasheets.

There is -as well- no change in the packing process or in the standard delivery quantities.
Shipments may start earlier with the customer's written agreement.

Qualification plan

New assy plant Hefei Tongfu

General Information	
Product Line	0084, 0339
Product Description	General purpose JFET quad operational amplifiers, Low-power quad voltage comparators
P/N	TL084CDT, LM339DT
Product Group	Analog
Product division	General Purpose Analog
Package	SO14
Silicon Process technology	JFET, Bipolar

Locations	
Wafer fab	ST Singapore
Assembly plant	Hefei Tongfu
Reliability Lab	Grenoble, Hefei Tongfu

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TABLE OF CONTENTS

1 APPLICABLE AND REFERENCE DOCUMENTS

Document reference	Short description
JESD47	Stress-Test-Driven Qualification of Integrated Circuits

2 GLOSSARY

DUT	Device Under Test
PCB	Printed Circuit Board
SS	Sample Size

3 RELIABILITY EVALUATION OVERVIEW

3.1 Objectives

The objective of this qualification is to qualify a plant Hefei Tongfu, for SO14 package for general purpose analog products
The line under qualification will serve several part numbers.
The qualification plan is based on the similarity and based on the JESD47 specification.

3.2 Expectation

Qualification Plan requirements have to be fulfilled without exception. It is stressed that reliability tests have to show that the devices behave correctly against environmental tests (no failure). Moreover, the stability of electrical parameters during the accelerated tests have to demonstrate the ruggedness of the products and safe operation, which is consequently expected during their lifetime.

4 DEVICE CHARACTERISTICS

4.1 Device description

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TL084,

General purpose JFET quad

Features

- Wide common-mode (up to V_{CC}^+) and differential voltage range
- Low input bias and offset current
- Output short-circuit protection
- High input impedance JFET input stage
- Internal frequency compensation
- Latch up free operation
- High slew rate: 16 V/µs (typical)

(Thin sl

Description

The TL084, TL084A, and TL084B are high-speed, JFET input, quad operational amplifiers incorporating well matched, high voltage JFET

(Pl

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LM13

Low-power qua

D
SO14
(plastic micropackage)

P
TSSOP14
(thin shrink small outline package)

Features

- Wide single supplies for ±18 V
- Very low su of supply vo
- Low input bi
- Low input of
- Low input of
- Input comm ground
- Low output : (I_{SINK} = 4 m
- Differential i supply volta
- TTL, DTL, E outputs

Construction note

	New Plant Qualification	
	P/N TL084CDT	P/N: STMPS2141MTR
Wafer/Die fab. information		
Wafer fab manufacturing location	ST Singapore	ST Singapore
Technology	JFET	Bipolar
Process family	Bipolar	Bipolar
Die finishing back side	Raw Silicon	Raw Silicon
Die size	2480x1460 µm²	2198x0698µm²
Passivation type	SiN (nitride)+ PVAPOX	SiN (nitride)
Wafer Testing (EWS) information		
Electrical testing manufacturing location	ST SINGAPORE	ST SINGAPORE
Assembly information		
Assembly site	Hefei Tongfu	Hefei Tongfu
Package description	SO14	SO14
Molding compound	Sumitomo EME-G700QB	Sumitomo EME-G700QB
Frame material	Copper	Copper
Die attach process	Glue	Glue
Die attach material	Ablestik - 8200T-	Ablestik - 8200T -
Wire bonding process	Wire	Wire
Wires bonding materials/diameters	Copper 1.0mil coated	Copper 1.0mil coated
Lead finishing process	Copper	Copper
Lead finishing/bump solder material	Sn	Sn
Final testing information		
Testing location	Hefei Tongfu	Hefei Tongfu

5 TESTS RESULTS SUMMARY

5.1 Test vehicle

Lot #	Process/ Package	Product Line	Comments
1	SO14/JFET	0084	
2	SO14/JFET	0084	
3	SO14/JFET	0084	
4	SO14/ BIPOLAR	0339	
5	SO14/ BIPOLAR	0339	
6	SO14/ BIPOLAR	0339	

Detailed results in below chapter will refer to P/N and Lot #.

5.2 Test plan summary

See below number of units planned by trial

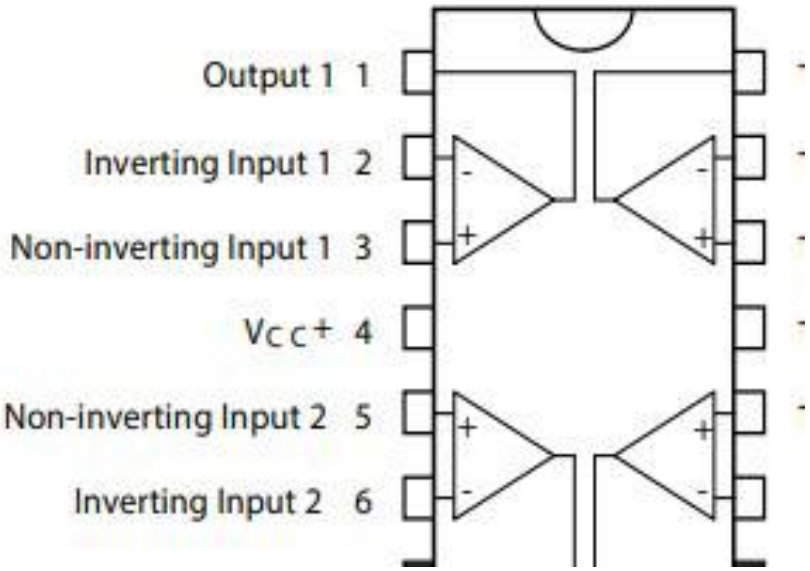
Test	PC	Std ref.	Conditions	SS	Steps	Failure/SS							Note
						Lot 1 0084	Lot 2 0084	Lot 3 0084	Lot 4 0339	Lot 5 0339	Lot6 0339		
HTOL	N	JESD22 A-108	Ta=125°C, BIAS		168 H	77							
					500 H	77							
					1000 H	77							
HTSL	N	JESD22 A-103	Ta = 150°C		168 H	77	77	77	77	77	77		
					500 H	77	77	77	77	77	77		
					1000 H	77	77	77	77	77	77		
PC		JESD22 A-113	Drying 24 H @ 125°C Store 168 H @ Ta=85°C Rh=85% Over Reflow @ Tpeak=260°C 3 times		Final	22	22	22	22	22	22		For SAM evaluation
UHAST	Y	JESD22 A-102	85%RH / Ta=130°C		96 H	77	77	77	77	77	77		
TC	Y	JESD22 A-104	Ta = -65°C to 150°C		100 cy	77	77	77	77	77	77		
					200 cy	77	77	77	77	77	77		
					500 cy	77	77	77	77	77	77		
THB	Y	JESD22 A-101	Ta = 85°C, RH = 85%, BIAS		168 H	77	77		77				
					500 H	77	77		77				
					1000 H	77	77		77				

6 ANNEXES

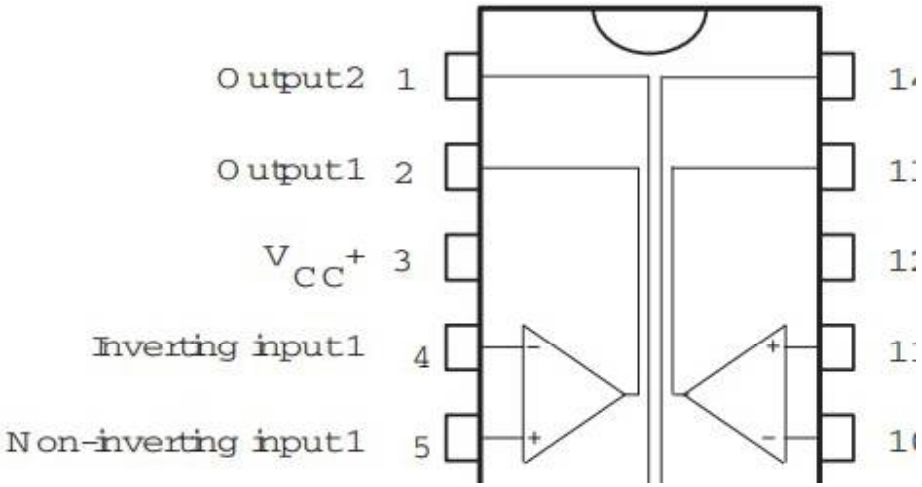
6.1 Device details

6.1.1 Pin connection

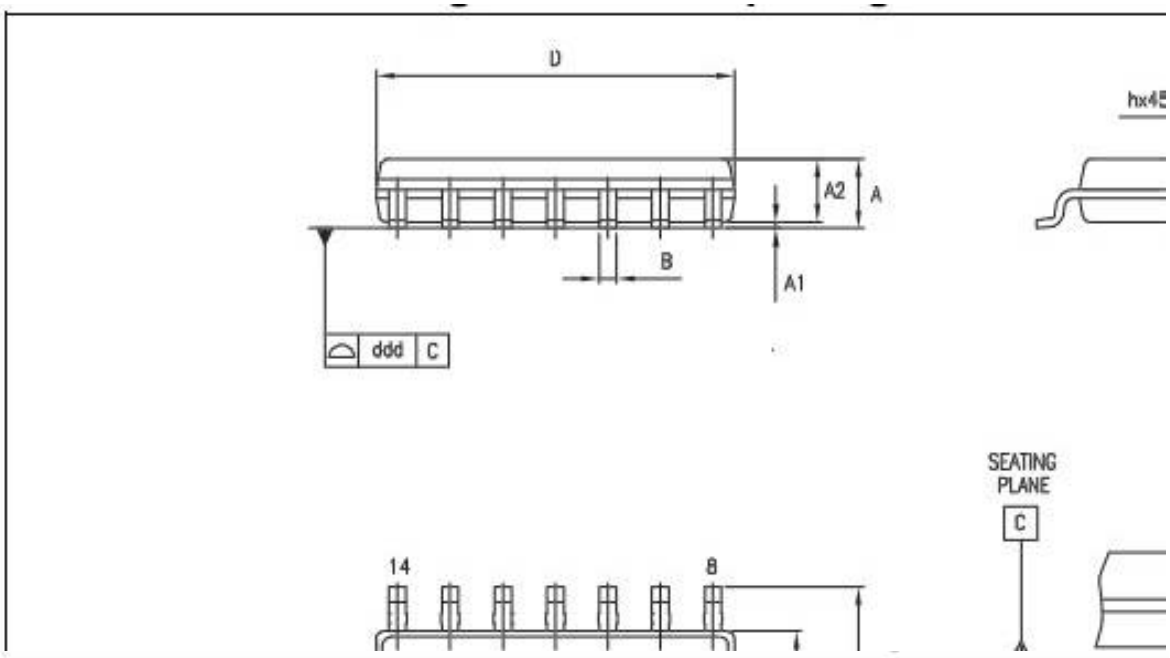
0084



0339



6.1.2 Package outline/Mechanical data



Dimensions				
Ref.	Millimeters			
	Min.	Typ.	Max.	Min.
A	1.35		1.75	0.05
A1	0.10		0.25	0.004
A2	1.10		1.65	0.04
B	0.33		0.51	0.01
C	0.19		0.25	0.007
D	8.55		8.75	0.33
E	3.80		4.0	0.15
		1.27		

6.2 Tests Description

Test name	Description	Purpose
Die Oriented		
HTOL Higt Temperature Operating Life **HTB** High Temperature Bias	The device is stressed in static or dynamic configuration, approaching the operative max. absolute ratings in terms of junction temperature and bias condition.	To determine the effects of bias conditions and temperature on solid state devices over time. It simulates the devices' operating condition in an accelerated way. The typical failure modes are related to, silicon degradation, wire-bonds degradation, oxide faults.
HTSL High Temperature Storage Life	The device is stored in unbiased condition at the max. temperature allowed by the package materials, sometimes higher than the max. operative temperature.	To investigate the failure mechanisms activated by high temperature, typically wire-bonds solder joint ageing, data retention faults, metal stress-voiding.
ELFR Early Life Failure Rate	The device is stressed in biased conditions at the max junction temperature.	To evaluate the defects inducing failure in early life.
Package Oriented		
PC Preconditioning	The device is submitted to a typical temperature profile used for surface mounting devices, after a controlled moisture absorption.	As stand-alone test: to investigate the moisture sensitivity level. As preconditioning before other reliability tests: to verify that the surface mounting stress does not impact on the subsequent reliability performance. The typical failure modes are "pop corn" effect and delamination.
AC Auto Clave (Pressure Pot)	The device is stored in saturated steam, at fixed and controlled conditions of pressure and temperature.	To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity.
TC Temperature Cycling	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere.	To investigate failure modes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system. Typical failure modes are linked to metal displacement, dielectric cracking, molding compound delamination, wire-bonds failure, die-attach layer degradation.
THB Temperature Humidity Bias	The device is biased in static configuration minimizing its internal power dissipation, and stored at controlled conditions of ambient temperature and relative humidity.	To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence.
Other		
ESD Electro Static Discharge	The device is submitted to a high voltage peak on all his pins simulating ESD stress according to different simulation models. **CBM**: Charged Device Model **HBM**: Human Body Model **MM**: Machine Model	To classify the device according to his susceptibility to damage or degradation by exposure to electrostatic discharge.

Annex 1: preliminar results

Wire pull test
TL084CDT

Value in gram									
16.41	15.50	16.23	15.30	14.74	15.44	15.60	15.86	14.87	15.13
14.73	14.43	15.64	16.64	14.91	14.97	16.58	15.65	16.11	14.84
15.55	14.48	14.02	15.59	16.36	14.81	15.09	14.99	14.98	15.60
Min	4g								

LM339DT

Value in gram									
14.70	14.55	14.75	15.73	15.91	14.78	14.44	15.29	16.70	14.88
14.32	14.61	14.99	15.91	15.48	14.63	15.46	16.17	15.27	14.72
14.78	14.66	15.05	15.23	14.62	14.95	14.52	15.89	16.18	14.84
Min	4g								

Wire shear test
TL084CDT

Value in gram									
38.51	40.21	37.89	35.90	37.78	35.81	40.24	35.85	37.27	39.39
37.75	36.78	35.95	37.80	38.87	36.74	36.53	38.76	37.83	38.05
41.09	35.98	36.77	35.75	35.91	41.15	41.54	37.93	39.43	34.77
Min	25g								

LM339DT

Value in gram									
32.69	35.96	33.55	37.17	34.77	36.50	34.42	38.13	34.40	36.02
34.42	33.89	35.81	35.62	34.89	32.83	33.85	36.55	34.89	34.70
33.91	34.52	35.20	36.60	35.68	34.71	38.02	37.11	38.24	34.76
Min	25g								

Conclusion: in line with ST specification

Package dimension

Items	spec	1	2	3	4	5	6	7	8	9	10
A: Pkg thickness (total)	1.35-1.75	1.649	1.679	1.669	1.683	1.676	1.654	1.679	1.658	1.669	1.670
A1 : stand-off	0.1-0.25	0.141	0.154	0.140	0.139	0.157	0.139	0.154	0.144	0.138	0.150
A2: Pkg thickness (body)	1.10-1.65	1.445	1.466	1.451	1.459	1.435	1.442	1.447	1.467	1.455	1.447
b: lead width	0.33-0.51	0.404	0.413	0.400	0.411	0.399	0.408	0.403	0.410	0.396	0.412
c: lead thickness	0.19-0.25	0.201	0.201	0.211	0.211	0.202	0.208	0.204	0.208	0.211	0.213
D : pkg length (total)	8.55-8.75	8.657	8.657	8.624	8.653	8.640	8.650	8.660	8.646	8.658	8.634
E : pkg width (total)	5.8-6.2	5.979	6.020	6.009	5.987	5.993	5.986	6.002	5.979	6.001	6.018
E1: pkg width (body)	3.8-4.0	3.914	3.903	3.923	3.925	3.918	3.901	3.901	3.890	3.910	3.908
e: lead pitch	1.27 typ	1.262	1.271	1.270	1.262	1.283	1.279	1.267	1.267	1.275	1.276
L: foot length	0.4-1.27	0.590	0.591	0.609	0.607	0.603	0.586	0.607	0.610	0.582	0.609
K: foot angle	0-8	5.3	4.39	4.96	4.2	3.8	4.49	4.6	3.85	4.47	4.48

Conclusion: in line with ST specification.