



PRODUCT/PROCESS CHANGE NOTIFICATION

PCN APM/10/5738
Notification Date 07/14/2010

**Assembly and Testing capacity expansion, for SO-8L,
SO-14L and SO-16L packages at the ASE-Shanghai (China)
Subcontractor plant,including ECOPAK 2**

Table 1. Change Implementation Schedule

Forecasted implementation date for change	26-Sep-2010
Forecasted availability date of samples for customer	07-Jul-2010
Forecasted date for STMicroelectronics change Qualification Plan results availability	07-Jul-2010
Estimated date of changed product first shipment	13-Oct-2010

Table 2. Change Identification

Product Identification (Product Family/Commercial Product)	see attached list
Type of change	Package assembly material change
Reason for change	to improve service and ECOPAK Program implementation
Description of the change	To respond the ever increasing demand for the products housed in the a.m. packages, ST is glad to announce the expansion of capacity by using the ASE-Shanghai (China) Subcontractor factory. The ASE-Shanghai plant, will produce parts according to the ST Ecopack2 (also called "Halogen Free") requirements for the SO-8, SO-14 and SO-16 packages. Samples : MC4558CDT, LM324DT , LM339DT and ULQ2003D1013TR are available right now for immediate customer qualification, while the availability of other samples will be granted from July 2010 on-wards, upon request.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	"G" letter marked on top of the package
Manufacturing Location(s)	

DOCUMENT APPROVAL

Name	Function
Giuffrida, Antonino	Division Marketing Manager
Cali, Paolo	Division Product Manager
Vitali, Gian Luigi	Division Q.A. Manager

WHAT:

To respond the ever increasing demand for the products housed in the a.m. packages, ST is glad to announce the expansion of capacity by using the ASE-Shanghai (China) Subcontractor factory. The ASE-Shanghai plant, will produce parts according to the ST Ecopack^{®2} (also called "Halogen Free") requirements for the SO-8, SO-14 and SO-16 packages,

For the complete list of the part numbers affected by the change, please refer to the attached Products list.

Samples : MC4558CDT, LM324DT , LM339DT and ULQ2003D1013TR are available right now for immediate customer qualification, while the availability of other samples will be granted from July 2010 onwards, upon request.

WHY:

- To improve service to ST Customers
- To continue in the implementation of the Ecopack Program, the voluntary ST program to remove polluting and hazardous substances from all its products..

HOW:

By expanding capacity according the ST quality and reliability standard.
The changed here reported will not affect the electrical, dimensional and thermal parameters keeping unchanged all information reported on the relevant product's datasheets.
There are as well no modifications in the packing modes nor in the standard delivery quantities either.

Qualification program and results:

The qualification program consists mainly of comparative electrical characterization and reliability tests. Please refer to Appendix 1 for all the details.

WHEN:

The implementation of the new material set will be completed within September 2010

Marking and traceability:

Unless otherwise stated by customer specific requirement, the traceability of the parts assembled with the new material set will be ensured by the "G" letter marked on top of the package (beside the ST logo) and by the Q.A. number.

Lack of acknowledgement of the PCN within 30 days will constitute acceptance of the change.
After acknowledgement, lack of additional response within the 90 day period will constitute acceptance of the change (Jedec Standard No. 46-C).
In any case, first shipments may start earlier with customer's written agreement.



<h2 style="margin: 0;">External Reliability Evaluation Report</h2> <p style="margin: 0; background-color: yellow; padding: 2px;">Qualification type: Additional subcontractor for SOIC Narrow package</p>

General Information	
Product Line	: 4558, 0124, 0339
Product Description	: op amp, Comparator
Commercial Product	: MC4558CDT, LM324DT, LM339DT
Product division/BU	: High rel & std products
Package	: SO8 and SO14
Technology process	: Bipolar
Process	: Bip111
Jedec MSL	: MSL 1

Locations	
Wafer fab location	Ang Mo Kio
EWS plant location	Ang Mo Kio
Assembly plant location	ASE Shanghai
Final test plant location:	ASE Shanghai

DOCUMENT APPROVAL LIST

NAME	FUNCTION	DATE	VISA
Francoise Paccard	QA MSH Grenoble	24/06/2010	

DISTRIBUTION LIST

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A. Chassagneux	Operation MSH GNB		
M. Mouhoub	Operation MSH GNB		
J. Camiolo	Marketing Std prod.		
S. Repellin	Operation MSH GNB		
N. Bancheri	Operation MSH GNB		

DOCUMENT HISTORY

Version	Date	Pages	Author	Comment
A	24/06/2010		JM Bugnard	Intermediate results

Note: This report is a summary of the reliability trials performed in good faith by STMicroelectronics in order to evaluate the potential reliability risks during the product life using a set of defined test methods.
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1 RELIABILITY and qualification evaluation overview

1.1 Objectives

Aim of this report is to present the results of the reliability evaluations performed on MC4558CD, LM324D, and LM339D test vehicles to qualify additional production line for AMPS (Analog, mixed product and services) produced in So narrow package in ASE Shanghai.

1.2 Conclusion

All results are inside ST specification and the plan to achieve qualification exercise is described in below sections. All partial results are within ST specification and risky production authorized.

2 DEVICES TRACEABILITY

2.1 Devices description

MC4558CD: The MC4558 is a high performance monolithic dual operational amplifier.

The circuit combines all the outstanding features of the MC1458 and, in addition possesses three times the unity gain bandwidth of the industry standard.

LM324D: These circuits consist of four independent, high gain, internally frequency-compensated operational amplifiers. They operate from a single power supply over a wide range of voltages.

Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

LM339D: These devices consist of four independent precision voltage comparators with an offset voltage specifications as low as 5mV max for LM339, LM239 and LM139. All these comparators were designed specifically to operate from a single power supply over a wide range of voltages.

Operation from split power supplies is also possible.

These comparators also have a unique characteristic in that the input common-mode voltage range includes ground even though operated from a single power supply voltage.

2.2 Wafer fabrication information

	TV1	TV2	TV3
Line	4558	124	339
Sales Type	MC4558CDT	LM324DT	LM339DT
FE process	Bipolar	Bipolar	Bipolar
Package	SO8	SO14	SO14
Die size (µm)	1570 x 1080	1430 x 1360	1100x1090
Die thickness (µm)	280	280	280
Metallization	AlSiCu	AlSiCu	AlSiCu
Passivation	Nitride	Nitride	Nitride
Back side	Raw Silicon	Raw Silicon	Raw Silicon



1.3 Assembly information

	Current process	Modified process
Assembly location	ST Bouskoura/ ST Muar/	ASE Shanghai (additional)
Die attach	Hitachi 4900ST10 ABLEstick 8290	Hitachi EN -4900GC
Wire	Gold 1 and 0.8mils	Gold 0.8 mils
Leadframe	Copper 94x125 / 85x85 90x130 / 90x90 / 60x60 95x130mils	SO8: 70x73.5mils SO14: 90x120mils
Molding compound	Nitto MP8000CH4-2A Sumitomo G600	Hitachi CEL-9240HF10AK
Lead finishing	NiPdAu	Sn
Wafer thickness	280	280

3 Reliability Tests results

3.1 Test vehicle

Lot#	Process/ Package	Product Line	Comments
1	Bipolar /SO8	4558	
2	Bipolar /SO14	0124	
3	Bipolar /SO14	0339	

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

3.2 Test plan and results summary

Shenzhen reliability laboratory

Tests	Conditions	Step	TV1	TV2	TV3	comment
		Line	4558	0124	0339	
Report reference			GNBL1022002	GNBL1019003	GNBL1019002	
Die oriented tests						
HTB	Tj=125°C Vs=absolute max rating JESD22 A-108		Ta=125	Ta=125	Ta=125	
		168h	0/78	0/78	0/78	
		500h	0/78	0/78	0/78	
		1000h	W027	0/78	0/78	
Package oriented tests						
MSL	Preconditioning Jedec level 1 3 IR reflow 260°C		0/22	0/22	0/22	No delamination at die resin interface
THB	Ta=85C RH=85% Vs=nominal	168h	0/78	0/78	0/78	
		1000h	W028	W027	W029	
AC	Ta=121C P=2atm JESD22 A-102	168h	0/78	0/78	0/78	
		240h	0/78	0/78	0/78	
TMC	Ta=-65/+150C JESD22 A-104	100cy	0/78	0/78	0/78	
		500cy	0/78	0/78	0/78	
		1000cy	W029	W027	W027	
Other tests						
WBS	5 units minimum 30 bonding AECQ100-001			0/30	0/30	See chapter 6.1
WBP	5 units minimum 30 bonding			0/30	0/30	See chapter 6.2
PD	Physical dimension on 5 units			0/5	0/5	See chapter 6.3



4 Annexes

4.1 Tests Description

Test name	Description	Purpose
Die Oriented		
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.
Package Oriented		
AC autoclave	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
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.

5 GLOSSARY

ESD	Electro Static Discharge
ELFR	Early Life Failure Rate
GL	Gate Leakage
HTB	High Temperature Bias
HTRB	High Temperature Reverse Bias
HTS	High Temperature Storage
T.H.B.	Temperature Humidity Bias
T.C.	Thermal Cycle
P.P.	Pressure Pot
P.C.	Preconditioning
	Environmental sequence

Env. Seq.

WBS	Wire Bond shear
WBP	Wire bond Pull
SD	Solderability
PD	Physical dimension

6 Construction analysis

6.1 Ball Shear (5 units minimum 30 bonding AECQ100-001)

value in g

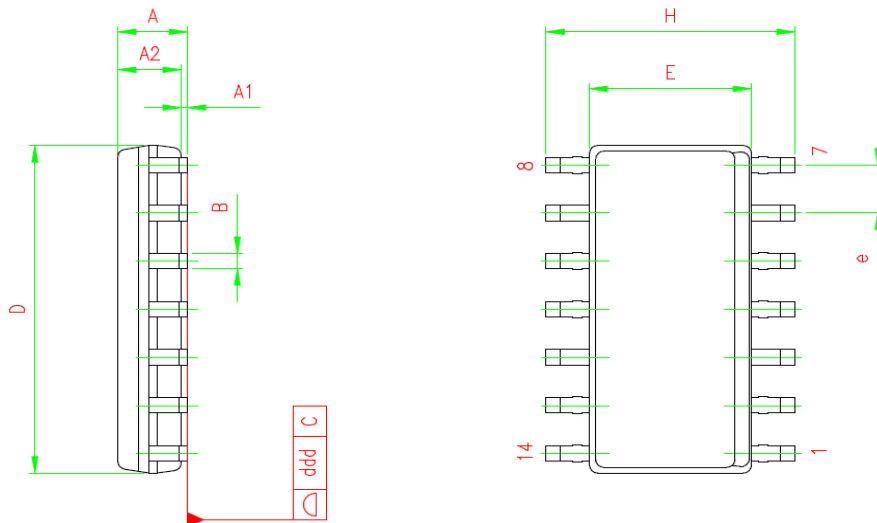
	TV1	TV2	TV3
Mean		29.9	29
Max		32.5	32.8
Min		27.7	24.8
Stddev		1.36	2.16
Cpk		4.92	3.24

6.2 Bond Pull (5 units minimum 30 bonding AECQ100-001)

value in g

	TV1	TV2	TV3
Mean		4.8	5
Max		5.4	5.8
Min		4.15	4.5
Stddev		0.35	0.31
Cpk		2.14	2.10

6.3 Physical dimension



TV2:

		A	A1	D	H
SPEC	MIN	1.350	0.100	8.550	5.800
	MAX	1.750	0.250	8.750	6.200
ACTUAL	1	1.504	0.161	8.618	5.949
	2	1.436	0.155	8.602	5.948
	3	1.486	0.151	8.602	5.945
	4	1.475	0.146	8.617	5.942
	5	1.481	0.164	8.612	5.958
	MIN	1.436	0.146	8.602	5.942
	MAX	1.504	0.164	8.618	5.958
	MEAN	1.476	0.155	8.610	5.948

	STD	0.025	0.007	0.008	0.006
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TV3:

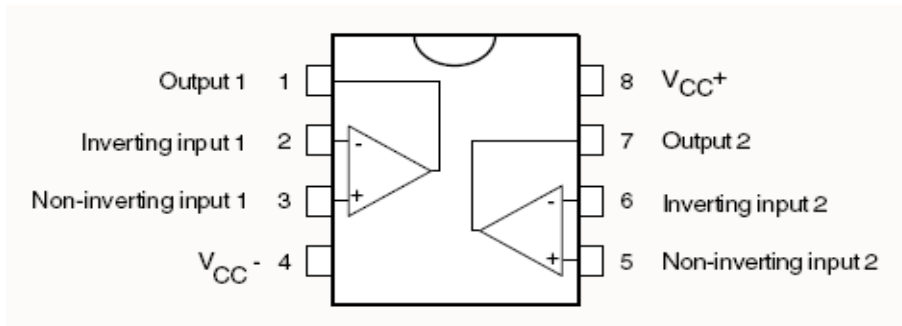
		A	A1	D	E
SPEC	MIN	1.350	0.100	8.550	5.800
	MAX	1.750	0.250	8.750	6.200
ACTUAL	1	1.421	0.130	8.620	5.943
	2	1.535	0.123	8.618	5.962
	3	1.464	0.119	8.629	6.017
	4	1.486	0.105	8.613	5.941
	5	1.499	0.106	8.623	5.938
	MIN	1.421	0.105	8.613	5.938
	MAX	1.535	0.130	8.629	6.017
	MEAN	1.481	0.117	8.621	5.960
	STD	0.042	0.011	0.006	0.033

7 Annex

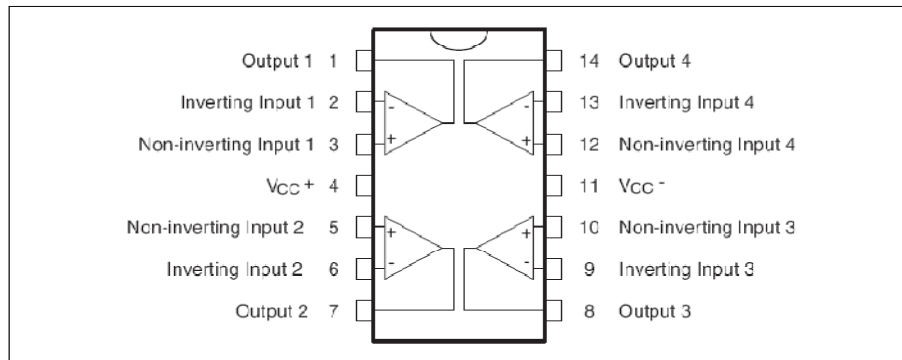
7.1.1 Pin connection

Pin Connection top view:

TV1

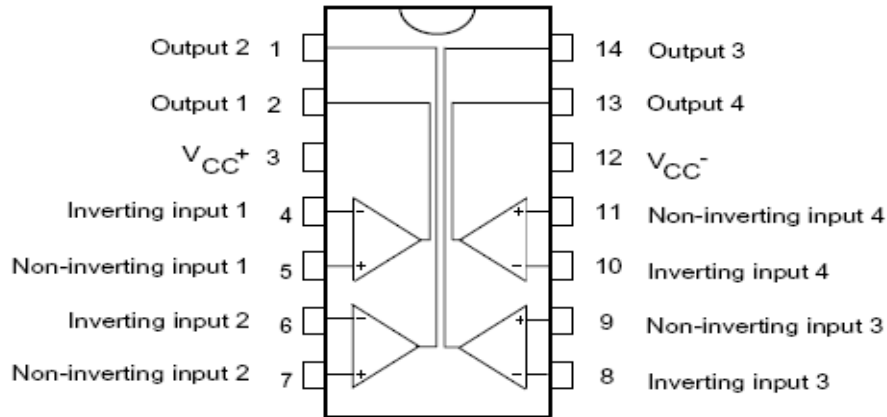


TV2:



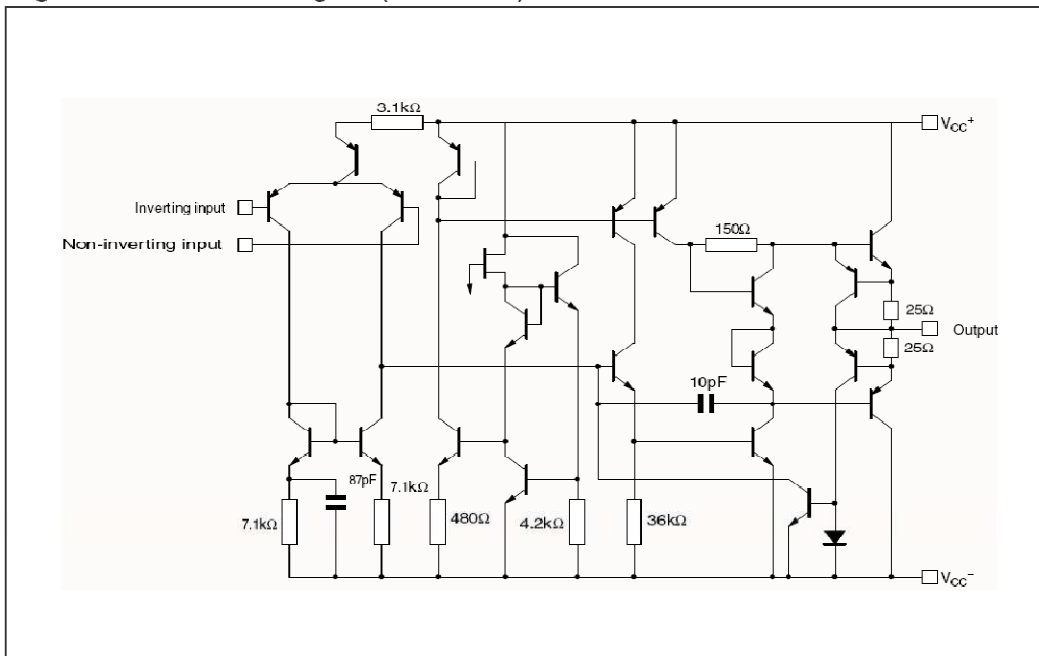


TV3

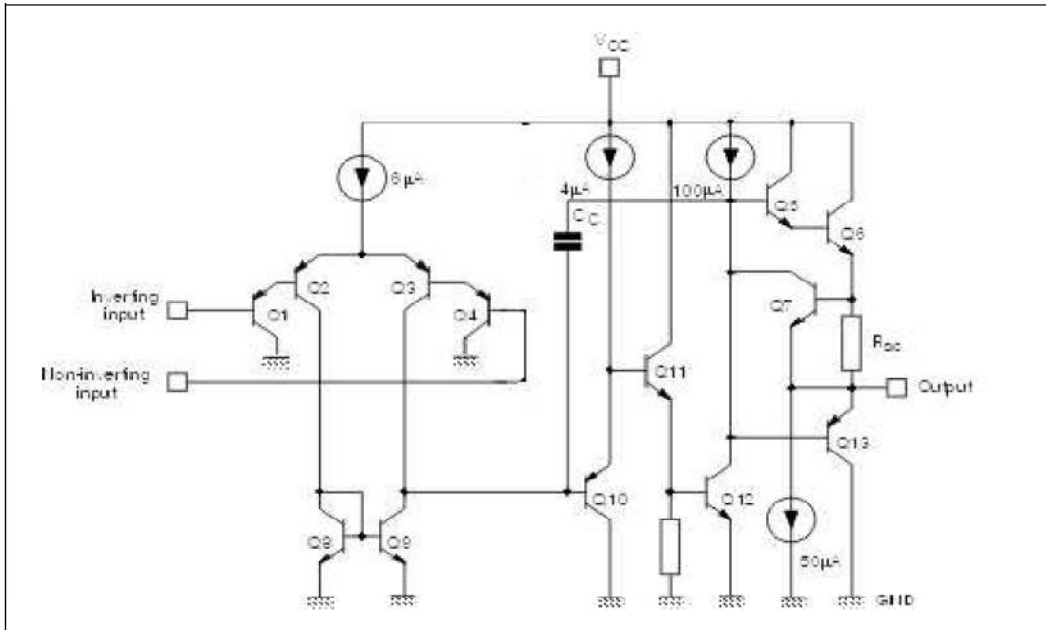


6.1.2 Typical application schematic

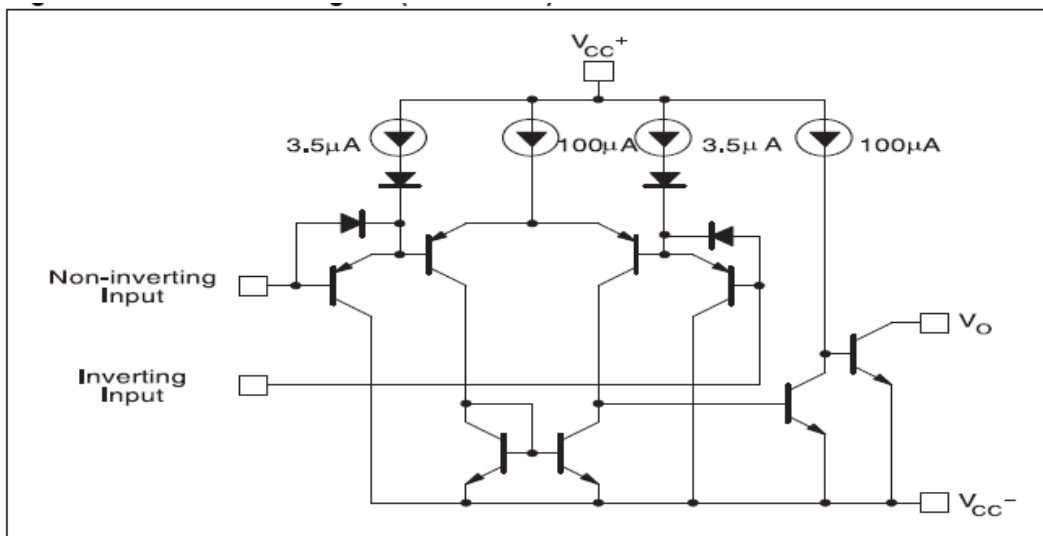
TV1



TV2:



TV3:

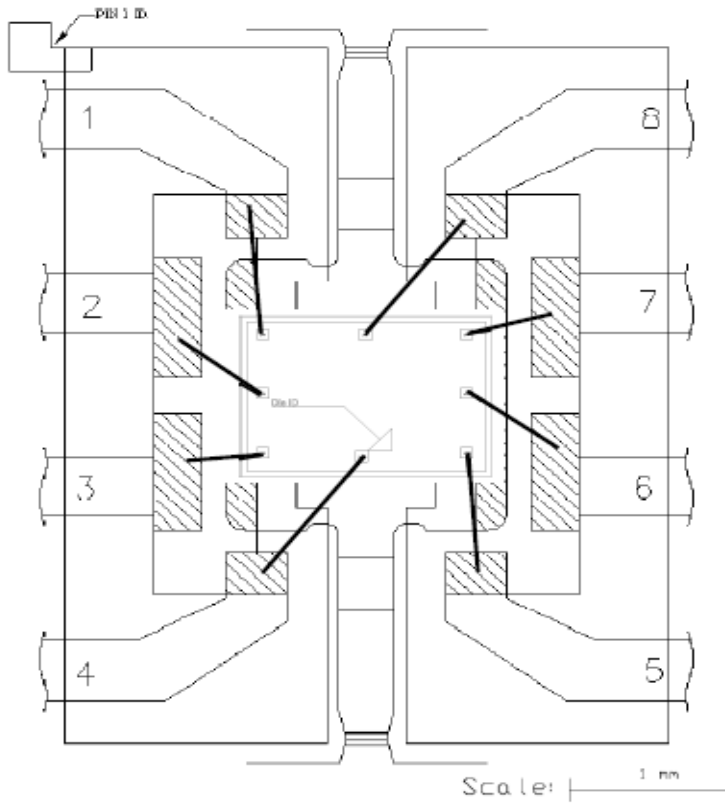




6.1.3 Bonding diagram

TV1:

FRAME PAD: 70×73.5 mils
 1.780×1.868 mm

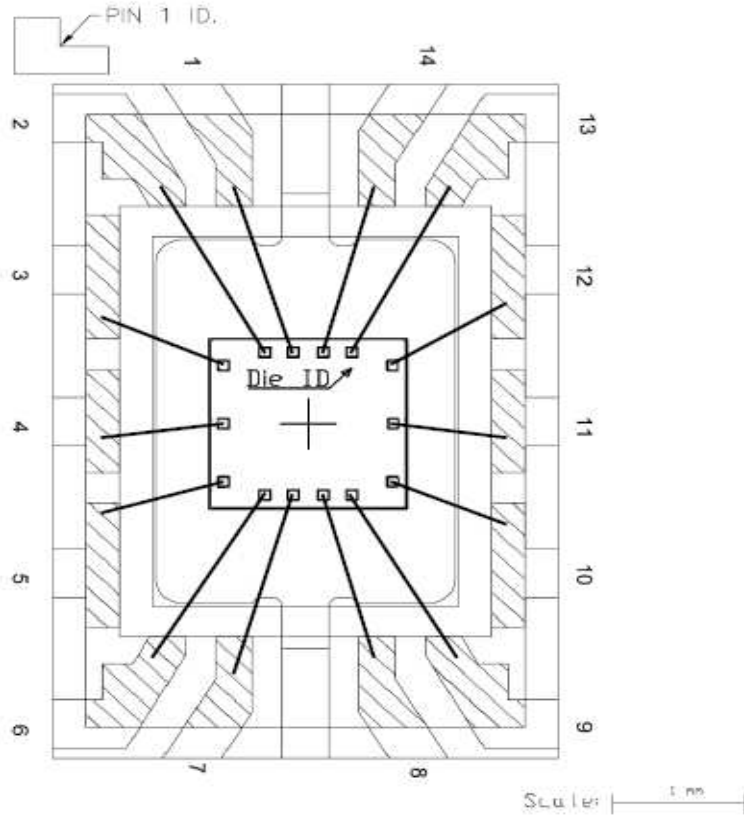




TV2:

Die Size: 1100x1090microns

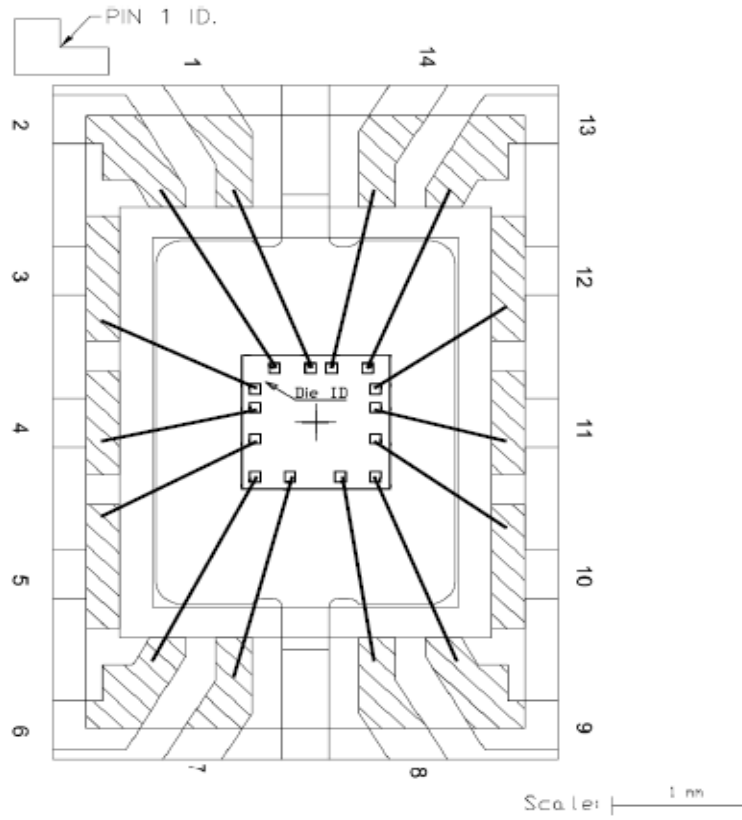
FRAME PAD: 90 x 120 mils
2.286 x 3.048 mm

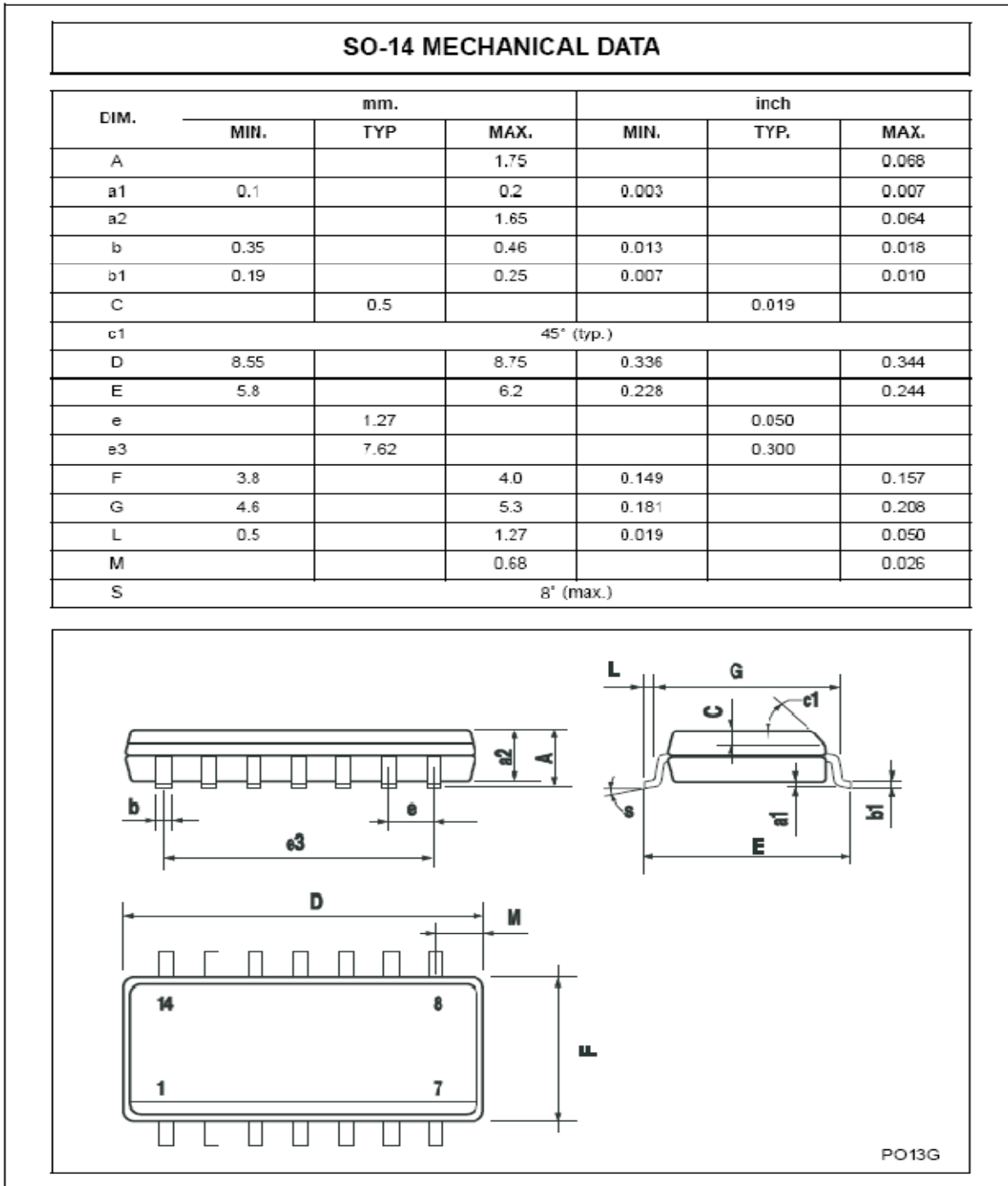




TV3:

FRAME PAD: 90 x 120 mils
2.286 x 3.048 mm



6.1.4 Package outline/Mechanical data


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