NXP Semiconductors
Assembly Operations-PL Bipolar

Self Qualification Report

NUR460/SOD141 Package qualification in subcontractor GoodArk
(Qual Plan ref. 1410)

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1. Introduction

This qualification report is to release SOD141 package which will be used for product NUR460.

The NUR460 process flow is designed to give a 300um thick epi diode with solderable front metal suitable for assembly in DO-201A(SOD141) package at GoodArk sub-contractor. This is a new process flow for DJLN but solderable front metal has been used on devices manufactured at the Manchester bipolar waferfab some years earlier. The basis of the process flow was the glass passivated BYV25-600 and all trials used this mask set and settings from the standard process flow where possible. It is assembled in Suzhou Goodark's Axial lead product line.

GoodArk is a leading company to produce Diodes and Rectifier in China. The factory is located in Hi-tech Industry District, west side of SuZhou. GoodArk package family covers Axial lead, SMx, Mini-Bridge, TO220 family and QFN.

GoodArk had got ISO9000, ISO14000, QS9000,OHSAS18000,TS16949 certification.

Regarding to this SOD141 package qualification, we use GoodArk standard Axial lead process and BOM.

2. Material details

Assembly material

Lead Wire	Solder chip	Molding compound	Plating	Marking Ink
Bare copper 1,21mm SHANGHAI SHANXIN	Pb92.5Sn5Ag2.5 CoiningMartin Oud Coining	EME-110G Halogen free Sumikon	Pure Tin YUNNAN TIN	UV ink, Grey, Bon Mark

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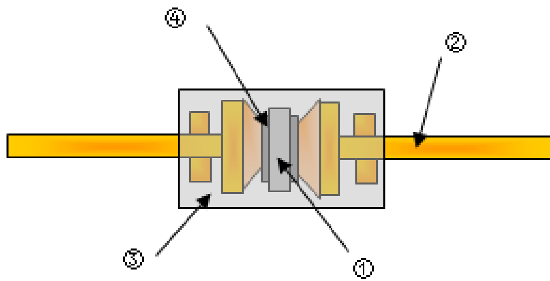
3. Constructional Details of Test vehicles

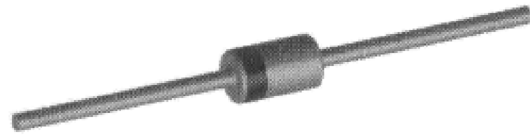
3.1 Test vehicles

Trail No.	Trail 2: Jan 17,2011		
Test Lot	F3C8874W3-1	F3C8874W3-2	F3C8875W7
Overall yield	96.05%	96.72%	97.21%
Product	NUR460	NUR460	NUR460
Assembly site	GoodArk	GoodArk	GoodArk

3.2 Package structure:



① Dice
② Lead Wire (With plating)
③ Molding Compound
④ Solder Chip



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4. Reliability Test Program

The reliability qualification test matrix can be found in Section 5.
In this section the reliability tests are described in detail. These tests are stated in NXP Semiconductors Quality and Reliability Specification (NX2-00001)

4.1 Reliability Test Descriptions

Test	Description
Static High Temperature Life (SHTL)	1000 hours – Tj = max operating temp, Reverse Bias = 80% rated voltage. Test before, at 168, 500 hours & 1000 hours.
Temperature Cycle (TMCL)	1000 cycles at -55°C to 150°C. Test before, at 100, 500 & 1000 cycles
Unbiased Highly Accelerated Stress Test (UHST)	96 hours at Ta = 130°C, RH = 85% Test before & after AC.
High Temperature, Humidity & Reverse Bias (THBS)	1000 hours at Tj = 85°C, RH = 85%, Reverse Bias = 80% rated voltage. Test before, at 168, 500 hours.
Thermal Fatigue (TFAT)	10000 cycles, Tj = 25ºC to 105ºC, ∆Tj ≥ 100ºC, Id = 3.2A & Ton =80s Toff = 140s (derate to avoid thermal runaway) Test before, at 5000 cycles & 10000 cycles
High Temperature Storage (HTSL)	1000 hours at Ta = 150°C Test before, at 168, 500 hours & 1000 hours.

4.2 Construction Analysis Tests Descriptions

In addition to the reliability evaluation, qualification lots will be subjected to Construction Analysis.
Abbreviations used in the tables:

- External Visual (EV)
- Physical Dimensions (PD)
- Terminal Strength (TS)
- Solderability (SD)
- Wire pull force (WB)

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5. Self-qualification results.

Numbers in format x / y ; x= number of failures, y=sample size ed

TT10490006YRB. LIS

5.1 High Temperature, Humidity & Reverse Bias (THBS)
1000 hours at Tj = 85°C, RH = 85%, Reverse Bias = 80% rated voltage .
Test before, at 168, 500 &1000 hours.

Package	**Product**	**Batch**	**THBS**	**THBS**	**THBS**
			168h	**500h**	**1000h**
SOD141	NUR460	F3C8874W3-1	0/75	0/75	0/75
SOD141	NUR460	F3C8874W3-2	0/75	0/75	0/75
SOD141	NUR460	F3C8875W7	0/74	0/74	0/74

5.2 Unbiased Highly Accelerated Stress Test (UHST)
96 hours at Ta = 130°C, RH = 85%
Test before & after AC.

Package	**Product**	**Batch**	**UHST**
			96h
SOD141	NUR460	F3C8874W3-1	0/79
SOD141	NUR460	F3C8874W3-2	0/80
SOD141	NUR460	F3C8875W7	0/80

5.3 Temperature Cycle (TMCL)
1000 cycles at -55°C to 150°C. Test before, at 100, 500 & 1000 cycles

Package	**Product**	**Batch**	**TMCL**	**TMCL**	**TMCL**
			100cycle	**500 cycle**	**1000 cycle**
SOD141	NUR460	F3C8874W3-1	0/80	0/80	0/80
SOD141	NUR460	F3C8874W3-2	0/80	0/80	0/80
SOD141	NUR460	F3C8875W7	0/80	0/80	0/80

5.4 Static High Temperature Life (SHTL)
1000 hours – Tj = max operating temp, Reverse Bias = 80% rated voltage.
Test before, at 168, 500 hours & 1000 hours.

Package	**Product**	**Batch**	**SHTL**	**SHTL**	**SHTL**
			168h	**500h**	**1000h**
SOD141	NUR460	F3C8874W3-1	0/50	0/50	0/50
SOD141	NUR460	F3C8874W3-2	0/50	0/50	0/50
SOD141	NUR460	F3C8875W7	0/50	0/50	0/50

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5.5 Thermal Fatigue (TFAT)

10000 cycles, ΔTj =100ºC,
Id = 3.2A, Ton=80sec Toff=140sec
Test before, at 5000 cycles & 10000 cycles

Package	**Product**	**Batch**	**TFAT**	**TFAT**
			5000cycle	**10000cycle**
SOD141	NUR460	F3C8874W3-1	0/80	0/80
SOD141	NUR460	F3C8874W3-2	0/80	0/80
SOD141	NUR460	F3C8875W7	0/80	0/80

5.6 High Temperature Storage (HTSL)

1000 hours at Ta = 150°C Test before, at 168, 500 hours & 1000 hours.

Package	**Product**	**Batch**	**HTSL**	**HTSL**	**HTSL**
			168h	**500h**	**1000h**
SOD141	NUR460	F3C8874W3-1	0/80	0/80	0/80
SOD141	NUR460	F3C8874W3-2	0/80	0/80	0/80
SOD141	NUR460	F3C8875W7	0/79	0/79	0/79

5.7 Construction Analysis Tests

Numbers in format x / y ; x= number of failures, y=sample size tested

5.7.1 Wire pull force test:

Pull Force (>=2.5Kg)			
No.	F3C8874-1	F3C8874-2	F3C8875
MAX	6.8	6.9	6.5
MIN	4	4.3	4.2
AVG	5.494	5.484	5.436
result	pass	pass	pass

5.7.2 Package outline dimension check:

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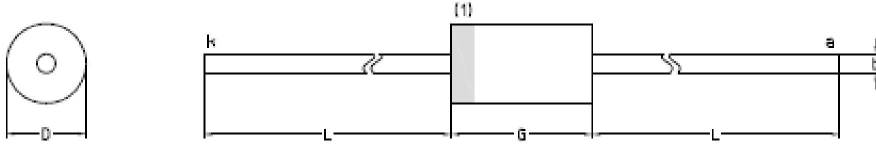

Dimensions

UNIT	b	D	G	L
mm	1.30 1.18	5.3 4.8	9.6 7.2	25.4

No.	F3C8874-1				F3C8874-2				F3C8875			
	Lead Length (mm)	Body Length (mm)	Body Diameter(mm)	Wire Diameter (mm)	Lead Length(mm)	Body Length(mm)	Body Diameter(mm)	Wire Diameter(mm)	Lead Length (mm)	Body Length (mm)	Body Diameter (mm)	Wire Diameter(m
MAX	26.33	9.180	5.190	1.234	26.36	9.190	5.190	1.238	26.35	9.180	5.190	1.237
MIN	26.30	9.100	5.130	1.224	26.31	9.100	5.150	1.226	26.31	9.100	5.150	1.224
AVG	26.31	9.130	5.161	1.228	26.33	9.139	5.168	1.231	26.33	9.129	5.168	1.230

5.8 Final test yield summary

Test Lot	TT10490009Y	TT10490010Y	TT10490014Y
	F3C8874W3-1	F3C8874W3-2	F3C8875W7
Test yield	96.20%	96.83%	97.35%

5.9 Mechanical test:

5.9.1 Solderability, ESD & teminal strength test

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Test	Test Reference	SS / Lot	Result	Test condition	Remark
ESD Characterization Human Body Model	JESD22-A114E	3 x 10 / group	-2000V:0/30 -4000V:1/30 -8000V: 0/29	HBM:±2000V ±4000V ±8000V	
ESD Characterization Machine Model	JESD22-A115A	3 x 10 / group	>400V	MM: ±200V ±400V	
Terminal Strength	MIL-STD-750 Method 2036	3 x 50	PASS	2.5kgf in axial lead direction,10S	
Resistance to Solder Heat	JESD22 B-106	3 x 30	PASS	260℃*10S	
Solderability	JESD22 B-102	3 x 10	PASS	245±5℃*5S	
Solderability with Aging 16 hour dry bake	JESD22 B-102	3 x 10	PASS	245±5℃*5S OVEN TEMP 150℃	
Soderability with Aging 8 hour steam age	JESD22 B-102	3 x 10	PASS	245±5℃*5S 85℃*85％RH	

6. Marking

The marking method is just as below picture

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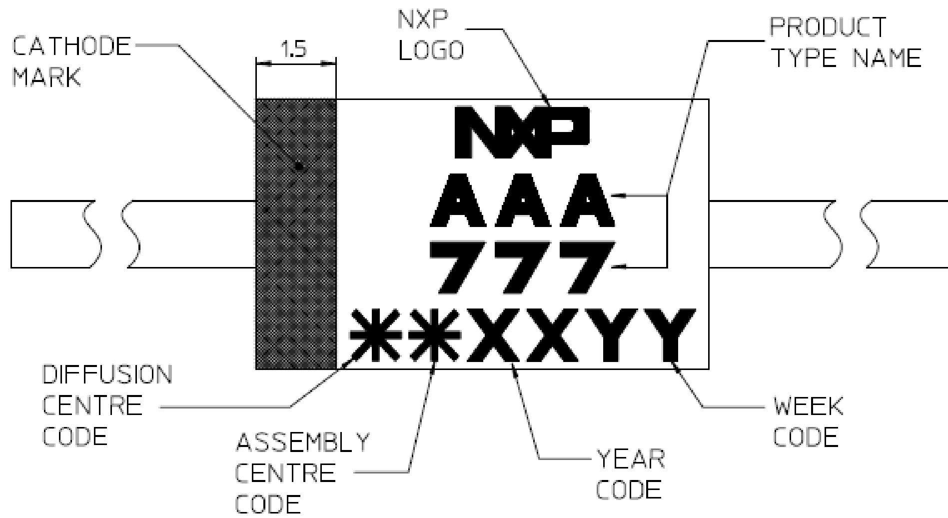

7. Conclusions

According to the assembly trail and life test result, the SOD141 package can meet all the requirement of product NUR460, and is ready to release.
And GoodArk had also proved that it has enough capability for this package and product production.

8. Document Revision Sheet

REVISION SHEET			
DATE	REV	DESCRIPTION	AUTHOR
2011-05-20	01	Self Qualification report SOD141 package releasing	Brian Xie

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