



## PRODUCT CHANGE NOTIFICATION

PCN-000931

Date: OCT-20-2023

Change Details							
<b>Part Number(s) Affected:</b>  LCDA12C-1.TCT LCDA24C-1.TCT LCDA15C-1.TCT SR2.8.TCT SR3.3.TCT SLVE2.8.TCT SLVG2.8.TCT		<b>Customer Part Number(s) Affected:</b> <input checked="" type="checkbox"/> N/A					
<b>Description, Purpose and Effect of Change:</b>  Alternative lead frame qualification for SOT143 in Cirtek. This change is necessary for continued supply of the above listed Semtech Part Numbers currently built at Cirtek.  Detail: Semtech has qualified Ning-Bo from China as a new SOT143 lead frame supplier. POR lead frame supplier is PSMC from Korea has discontinued supply. There is no change on package form, fit, function, reliability or MSL 1 rating.. <table border="1" data-bbox="300 1360 1351 1444"><thead><tr><th>POR Lead Frame</th><th>New Lead Frame</th></tr></thead><tbody><tr><td>PSMC, Alloy42 lead frame</td><td>Ning-Bo, C194 CU lead frame</td></tr></tbody></table> The equipment models, process flow, and BOM remain unchanged. There was no change in test locations.				POR Lead Frame	New Lead Frame	PSMC, Alloy42 lead frame	Ning-Bo, C194 CU lead frame
POR Lead Frame	New Lead Frame						
PSMC, Alloy42 lead frame	Ning-Bo, C194 CU lead frame						
<b>Change Classification</b>	<input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor	<b>Impact to Form, Fit, Function</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
<b>Impact to Data Sheet</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<b>New Revision or Date</b>	<input checked="" type="checkbox"/> N/A				
<b>Impact to Performance, Characteristics or Reliability:</b> <ul style="list-style-type: none"><li>There is no impact to form, fit, function, performance, characteristics, or reliability of package.</li><li>There is no change in process and process equipment for the package.</li></ul>							



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**PCN-000931**

**Date: OCT-20-2023**

<b>Implementation Date</b>	<b>JAN-20-2024</b>	<b>Work Week</b>	<b>TBA</b>
<b>Last Time Ship (LTS)</b> Of unchanged product	<b>N/A</b>	<b>Affecting Lot No. / Serial No. (SN)</b>	<b>N/A</b>
<b>Sample Availability</b>	<b>Available upon request</b>	<b>Qualification Report Availability</b>	<b>May-30-2023</b>
<b>Supporting Documents for Change Validation/Attachments:</b> <ul style="list-style-type: none"><li>PCN-000931 From To Analysis – Qualify Ning-Bo Lead frame in Cirtek as PSMC is End of Life (EOL).</li></ul>			



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**PCN-000931**  
**To Qualify SOT143 Ning-Bo Lead frame (China) due to current source PSMC (Korea) has end of life its lead frame in Cirtek.**

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### Introduction



- ☐ Cirtek received the notification from their Current SOT143 lead frame supplier PSMC (Korea) that they have stop their business on manufacturing. As such, Cirtek have to qualify alternative source of SOT143 lead frame from Ning-Bo (China) which is been qualified by Cirtek.
- ☐ There is no change in Form, Fit and functions and package outlines.
- ☐ The change affect applicable to products:
  - a.) Lead frame part # ST04NG2106 – LCDA12C-1.TCT, LCDA24C-1.TCT, LCDA15C-1.TCT
  - b.) Lead frame part # ST04NG2104 – SR2.8.TCT, SR3.3.TCT, SLVE2.8.TCT and SLVG2.8.TCT
- ☐ Qualification Vehicles :  
REL Job under PRODDOC029425 – Passed with MSL 1 on 30<sup>th</sup> May 2023.
- ☐ Schedule for Implementation  
12<sup>th</sup> Dec 2023

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## PRODUCT CHANGE NOTIFICATION

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### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) with Assembly BOM – LDF #1 & #2



BOM	Material Comparison		Remarks
	PSMC (OLD - LDF#1) ST04IG2103	Ning-Bo (New - LDF#1) ST04NG2106	
Lead frame	Alloy42	A194 AgCu	Difference
Epoxy	84-1 LMIS R4	84-1 LMIS R4	Same
Wire	Au Wire 1.3mils	Au Wire 1.3mils	Same
Mold Compound	EME-G600	EME-G600	Same
Plating	100% Matte Tin Plating	100% Matte Tin Plating	Same

BOM	Material Comparison		Remarks
	PSMC (OLD - LDF#2) ST04NH2102	Ning-Bo (New - LDF#2) ST04NG2104	
Lead frame	Alloy42	A194 AgCu	Difference
Epoxy	84-1 LMIS R4	84-1 LMIS R4	Same
Wire	Au Wire 1.3mils	Au Wire 1.3mils	Same
Mold Compound	EME-G600	EME-G600	Same
Plating	100% Matte Tin Plating	100% Matte Tin Plating	Same

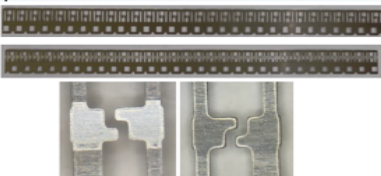
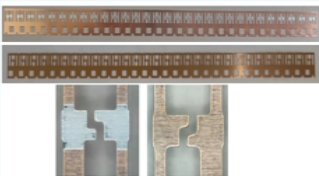




- There is no change in assembly BOM material except lead frame.
- New Lead frame material A194 AgCu is proven mass production material in Cirtek which is more than 10 years. Thus, it is low risk to use this material.

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### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) with MSDS and RoHs Report – LDF #1



	ST04IG2103 PSMC (Old)	ST04NG2106 Ning-Bo (New)	Remarks
Material	Alloy42	<u>AgCu</u>	Different
Lead frame Outlook			Same
MSDS	 MSDS for Leadframe PSMC A4	 MSDS Ning Bo C194	
ICP Test Report	 ICP report for PSMC Alloy42	 SGS report for NingBo LDF	

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## PRODUCT CHANGE NOTIFICATION

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Date: OCT-20-2023

### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) with MSDS and RoHs Report - LDF#2



	ST04NH2102 PSMC (Old)	ST04NG2104 Ning-Bo (New)	Remarks
Material	Alloy42	AgCu	Different
Lead frame Outlook			Same
MSDS	 MSDS for sadrframe PSMC A4	 MSDS Ning Bo C194	
ICP Test Report	 ICP report for PSMC Alloy42	 SGS report for NingBo LDF	

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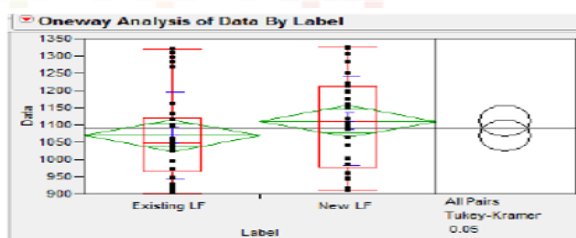
### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) in Die shear strength - LDF#1



Die attach photo on old LF



Die attach photo on new LF



#### Results:

- Both PSMC (Old) and Ning-Bo (New) Lead frame are meeting die shear minimum spec requirement of 320g.
- No significant difference in term of die shear strength for both PSMC (Old) and Ning-Bo (New).

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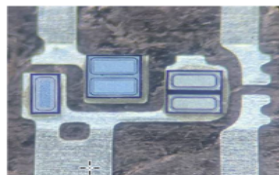
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## PRODUCT CHANGE NOTIFICATION

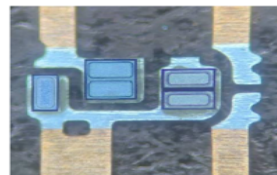
PCN-000931

Date: OCT-20-2023

### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) in Die shear strength – LDF #2

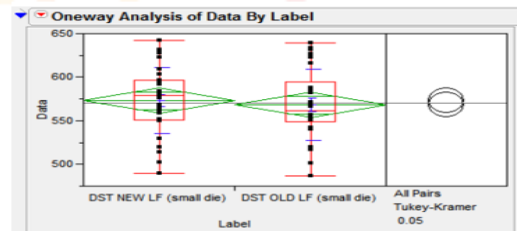


Die attach photo on old leadframe

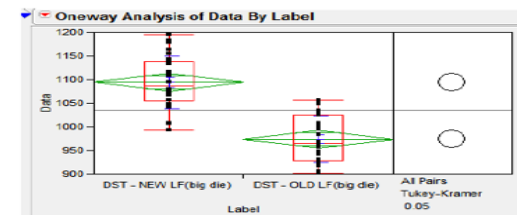


Die attach photo on new leadframe

#### Die Shear test for Small die



#### Die Shear test for Big die



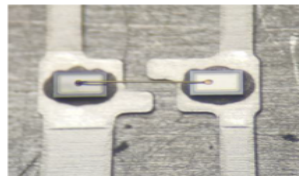
#### Results:

- Both PSMC (Old) and Ning-Bo (New) Lead frame are meeting die shear minimum spec requirement of 320g.
- No significant difference for smaller die in term of die shear strength.
- Ning-Bo (New) is having higher die shear force comparing to PSMC (old ) lead frame.

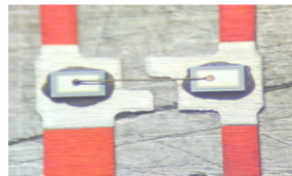
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### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) in Wire Pull Strength – LDF #1

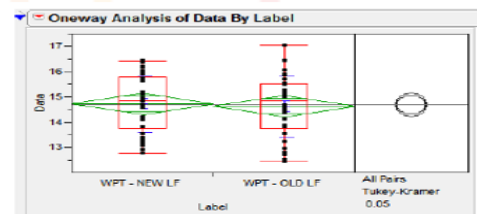


WB photo on old leadframe



WB photo on new leadframe

#### Wire Pull test



#### Results:

- Both PSMC (Old) and Ning-Bo (New) Lead frame are passing wire pull test.
- No significant difference for wire pull test for both PSMC (Old) and Ning-Bo (New)

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# PRODUCT CHANGE NOTIFICATION

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Date: OCT-20-2023

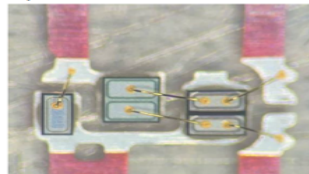
## Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) in Wire Pull Strength – LDF #2



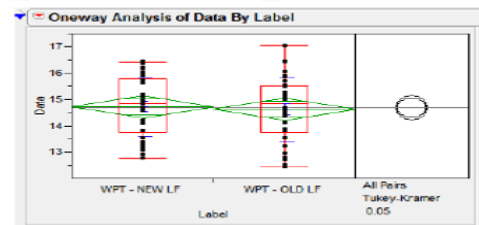
### Wire Pull test



WB photo on old leadframe



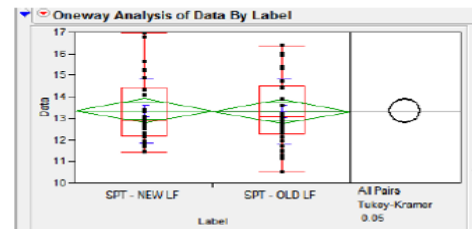
WB photo on new leadframe



### Results:

- Both PSMC (Old) and Ning-Bo (New) Lead frame are passing wire pull test.
- No significant difference for wire pull test for both PSMC (Old) and Ning-Bo (New)

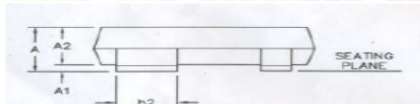
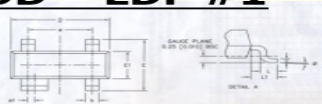
### Stitch Pull test



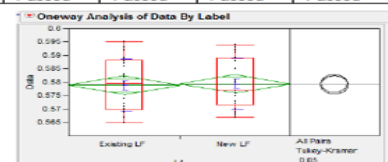
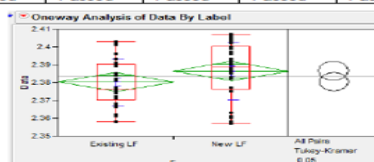
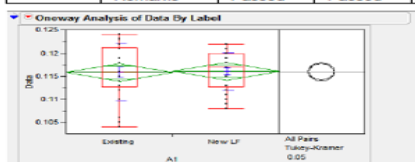
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## Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) on POD – LDF #1



	POD (in mm)	A	A1	A2	b	b2	c	D	E1	E	L	L1
PSMC, (Old)	Min	1.059	0.104	0.945	0.404	0.797	0.110	2.842	1.240	2.358	0.420	0.565
	Max	1.077	0.124	0.966	0.419	0.808	0.117	2.854	1.257	2.403	0.428	0.595
	Average	1.068	0.116	0.956	0.410	0.802	0.113	2.848	1.248	2.380	0.424	0.579
	Stdev	0.0055	0.0062	0.0066	0.0046	0.0034	0.0025	0.0036	0.0052	0.0131	0.0026	0.0097
	Specs	0.97 – 1.12	0.05 – 0.15	0.89 – 0.99	0.36 – 0.46	0.76 – 0.84	0.08 – 0.20	2.79 – 3.87	1.22 – 1.32	2.11 – 2.64	0.41 – 0.48	0.53 – 0.64
	Cpk	3.1722	1.6276	1.7400	3.5439	3.6933	4.5076	3.6652	1.8090	6.6042	1.7682	1.6678
	Remarks	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed
Ning-Bo, (New)	Min	1.058	0.108	0.944	0.402	0.798	0.110	2.844	1.240	2.357	0.420	0.567
	Max	1.076	0.122	0.965	0.418	0.805	0.117	2.851	1.255	2.407	0.428	0.594
	Average	1.067	0.116	0.956	0.409	0.802	0.113	2.847	1.249	2.387	0.424	0.579
	Stdev	0.0056	0.0041	0.0054	0.0048	0.0022	0.0023	0.0021	0.0037	0.0161	0.0026	0.0095
	Specs	0.97 – 1.12	0.05 – 0.15	0.89 – 0.99	0.36 – 0.46	0.76 – 0.84	0.08 – 0.20	2.79 – 3.87	1.22 – 1.30	2.11 – 2.64	0.41 – 0.48	0.53 – 0.64
	Cpk	3.1724	2.7634	2.1086	3.3697	5.929	4.8428	3.6982	2.5760	5.2511	1.8229	1.7398
	Remarks	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed



No Difference on dimensions between PSMC (Old) and Ning-Bo (New)

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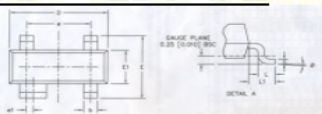
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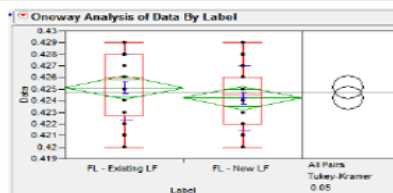
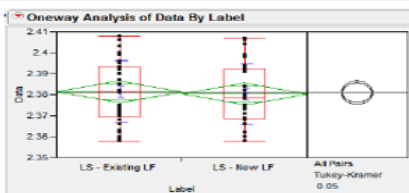
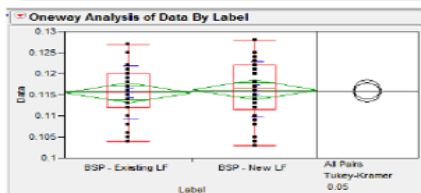
Date: OCT-20-2023

### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) on POD – LDF #2



Existing SOT-143, Alloy42, LF SS: 30 readings	POD (in mm)	A	A1	A2	b	b2	c	D	E1	E	L	L1
Min	1.058	0.104	0.946	0.402	0.795	0.109	2.846	1.238	2.358	0.420	0.562	
Max	1.079	0.127	0.964	0.419	0.808	0.118	2.852	1.256	2.408	0.429	0.596	
Average	1.0691	0.1155	0.9536	0.4111	0.8010	0.1132	2.8491	1.2482	2.3814	0.4251	0.5809	
Stdev	0.0057	0.0063	0.0047	0.0057	0.0036	0.0030	0.0022	0.0054	0.0149	0.0028	0.0098	
Specs	0.97 –	0.05 –	0.89 –	0.36 –	0.76 –	0.08 –	2.79 –	1.22 –	2.11 –	0.41 –	0.53 –	
Cpk	2.976	1.835	2.563	2.665	3.620	3.733	3.141	1.753	5.786	1.766	1.727	
Remarks	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed

New SOT-143, C194-H, LF SS: 30 readings	POD (in mm)	A	A1	A2	b	b2	c	D	E1	E	L	L1
Min	1.056	0.103	0.958	0.4	0.792	0.106	2.846	1.24	2.358	0.420	0.564	
Max	1.077	0.128	0.964	0.419	0.806	0.118	2.852	1.257	2.407	0.429	0.596	
Average	1.0689	0.1162	0.9527	0.4092	0.8002	0.1135	2.8497	1.2466	2.3804	0.4242	0.5813	
Stdev	0.0059	0.0066	0.0073	0.0063	0.0049	0.0029	0.0020	0.0050	0.0143	0.0028	0.0097	
Specs	0.97 –	0.05 –	0.89 –	0.36 –	0.76 –	0.08 –	2.79 –	1.22 –	2.11 –	0.41 –	0.53 –	
Cpk	2.872	1.709	1.714	2.607	2.719	3.788	3.351	1.759	6.053	1.702	1.767	
Remarks	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed








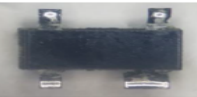


**No Difference on dimensions between PSMC (Old) and Ning-Bo (New)**

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### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) on Solderability Test – LDF #1



Solderability Test	Existing SOT-143, Alloy42, LF Top	Existing SOT-143, Alloy42, LF Bottom	New SOT-143, C-194-H, LF Top	New SOT-143, C-194-H, LF Bottom
0 hour SS: 7 units				
After 8 hours steam aging SS: 7 units				
Remarks	PASSED	PASSED	PASSED	PASSED

**Solderability Test is passed for both Lead frame supplier – PSMC and Ning-Bo.**  
**No Difference on Solderability test between PSMC (Old) and Ning-Bo (New)**

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Date: OCT-20-2023

### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) on Solderability Test – LDF #2



Solderability Test	Existing SOT-143, Alloy42, LF		New SOT-143, C-194-H, LF	
	Top	Bottom	Top	Bottom
0 hour SS: 7 units				
After 8 hours steam aging SS: 7 units				
Remarks	PASSED	PASSED	PASSED	PASSED

**Solderability Test is passed for both Lead frame supplier – PSMC and Ning-Bo.**  
**No Difference on Solderability test between PSMC (Old) and Ning-Bo (New)**

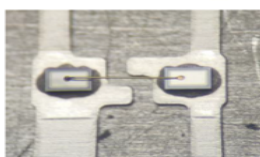
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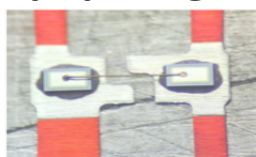
### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) on Process outlook – LDF #1



#### 1. Wire Bond Outlook - PSMC (Old) Vs Ning-Bo (New)

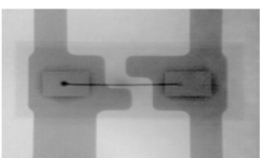


WB photo on old leadframe

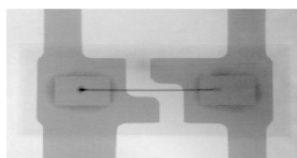


WB photo on new leadframe

#### 2. X-Ray Outlook - PSMC (Old) Vs Ning-Bo (New)



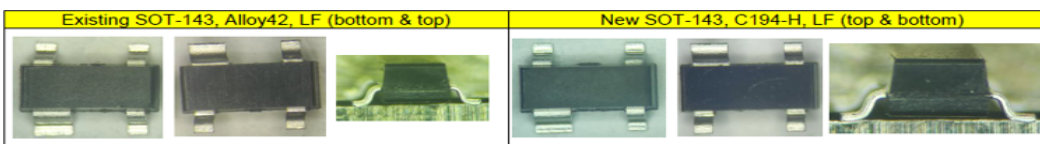
X-ray inspection of old LF



X-ray inspection of new LF

**No Difference on Outlook between PSMC (Old) and Ning-Bo (New)**

#### 3. Top, Bottom and Side View Outlook - PSMC (Old) Vs Ning-Bo (New)



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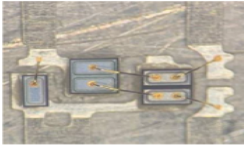
PCN-000931

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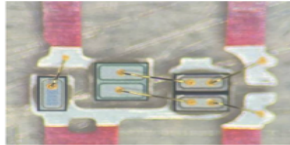
### Lead frame Comparison PSMC (Old) Vs Ning-Bo (New) on Process outlook – LDF #2



#### 1. Wire Bond Outlook - PSMC (Old) Vs Ning-Bo (New)

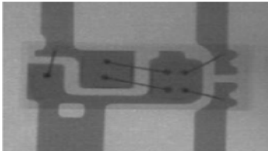


WB photo on old leadframe

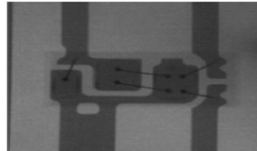


WB photo on new leadframe

#### 2. X-Ray Outlook - PSMC (Old) Vs Ning-Bo (New)



X-ray inspection of old leadframe samples



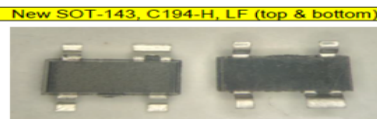
X-ray inspection of new leadframe samples

No Difference on Outlook between PSMC (Old) and Ning-Bo (New)

#### 3. Top and Bottom View Outlook - PSMC (Old) Vs Ning-Bo (New)



Existing SOT-143, Alloy42, LF (bottom & top)



New SOT-143, C194-H, LF (top & bottom)

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### Lead frame REL for PSMC (Old) Vs Ning-Bo (New) for both Lead frame part # 1 & 2



Lead frame Part #	REL Item	Conditions	Results
PSMC (OLD - LDF#1) ST04IG2103	Post Assembly CSAM		Passed
	Post Pre-Conditioning MSL 1 CSAM	85DegC/ 85RH, 168 hours, 3X IR @260 DegC	Passed
	AutoClave / PCT	121 DegC, 15psig, 100%RH, 96 hours	Passed
	Temperature Cycles	-65DegC / +150DegC, 500 cycles	Passed
Ning-Bo (New - LDF#1) ST04NG2106	Post Assembly CSAM		Passed
	Post Pre-Conditioning MSL 1 CSAM	85DegC/ 85RH, 168 hours, 3X IR @260 DegC	Passed
	AutoClave / PCT	121 DegC, 15psig, 100%RH, 96 hours	Passed
	Temperature Cycles	-65DegC / +150DegC, 500 cycles	Passed
Lead frame Part #	REL Item	Conditions	Results
PSMC (OLD - LDF#2) ST04NH2102	Post Assembly CSAM		Passed
	Post Pre-Conditioning MSL 1 CSAM	85DegC/ 85RH, 168 hours, 3X IR @260 DegC	Passed
	AutoClave / PCT	121 DegC, 15psig, 100%RH, 96 hours	Passed
	Temperature Cycles	-65DegC / +150DegC, 500 cycles	Passed
Ning-Bo (New - LDF#2) ST04NG2104	Post Assembly CSAM		Passed
	Post Pre-Conditioning MSL 1 CSAM	85DegC/ 85RH, 168 hours, 3X IR @260 DegC	Passed
	AutoClave / PCT	121 DegC, 15psig, 100%RH, 96 hours	Passed
	Temperature Cycles	-65DegC / +150DegC, 500 cycles	Passed

All the reliability assessment on the new Ning-Bo material were passed without failures.

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## PRODUCT CHANGE NOTIFICATION

**PCN-000931**

**Date: OCT-20-2023**

Quality Assurance		
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