台灣半導體股份有限公司
231 台北縣新店市北新路三段205號11樓
電話:886-2-8913-1588
傳真:886-2-8913-1788

TAIWAN SEMICONDUCTOR CO., LTD.
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PCN19001【TO-92 package of plating process changed from hang plating to solder dipping】Comparison Report

Prepared by:Yanting Liu
Checked by:Aiping Zhang
Approved by: Jojo Zhang
Issued date at:2018.9.26
Version for:A

Customer Feedback/Approval Form

Title of PCN:			
TO-92 package of plating process changed from hang plating to solder dipping			
Customer PCN No.		**Supplier PCN No.**	**PCN19001**
Please check the appropriate box below:			

Form provided by ZVEI - Revision 3.0.0

☐	**1. Feedback**	**date:**	
☐	**We agree with this proposed change for the parts as listed in chapter '11. Affected parts'. Approval letter will be sent in written form.**		
☐	**We agree with this proposed change schedule and will start with the PCN process. Approval letter will be sent in written form after evaluation.**		
☐	**We disapprove because:**		
☐	**Remark:**		

☐	**2. Feedback**	**date:**	
☐	**We acknowledge qualification / validation as assigned in chapter 8 of the PCN.**		
☐	**We need more information:**		
☐	**We need the following samples:**		
☐	**Estimated closing date for PCN:**		

☐	**Final Feedback/Approval**	**date:**	

Sender:	
Company:	

Name:	
Address/Location:	
Signature:	
Date:	

Please return to: [your Sales partner]	
Name:	
Address/Location:	
Phone:	
Fax:	
Email:	

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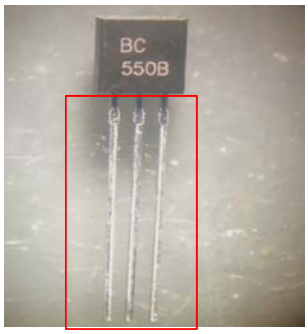
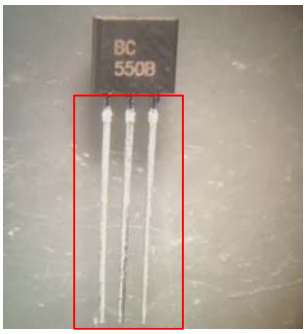
Comparison Report

External marking summary:

	Before Hang plating process	After Dip soldering process	Result
External			Dip soldering is relatively bright.

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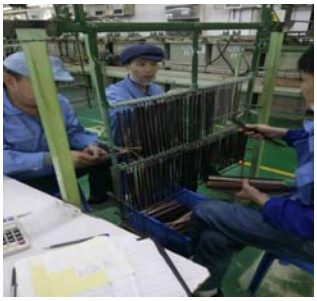
Comparison Report

Process Comparison

<table>
<tr><th></th><th>Before
Hang plating process</th><th>After
Dip soldering process</th><th>Result</th></tr>
<tr><td>The production process</td><td>Die sawing→ Die Bonding →Wire bonding →Molding → Curing→Trimming→Cutting→Electroplating → Marking → Trimming→Testing & Taping twice</td><td>Die sawing→ Die Bonding →Wire bonding →Molding → Curing→Trimming→Cutting→Dip soldering→ Marking → Trimming→Testing & Taping twice</td><td rowspan="3">Different plating method:
a. The method of hang plating is immersed in the whole, and the Soldering time is 25±5min.
b. the method of dip soldering is soaked the pins, and the level of the flux is closed to the product's plastics case, and the soaking time is 4 ±1 seconds.</td></tr>
<tr><td>Plating technology</td><td>
<table>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Acid cleaning</td><td>Cleaning</td><td>Electrolyte</td><td>Cleaning</td><td>oxalate</td></tr>
<tr><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>1# Cleaning</td><td>2# Cleaning</td><td>3# Cleaning</td><td>Pre-plating</td><td>Bright tin</td></tr>
<tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr>
<tr><td>1# Cleaning</td><td>2# Cleaning</td><td>neurtraliz</td><td>Cleaning</td><td>Hot water</td></tr>
<tr><td>16</td><td>17</td><td>18</td><td></td><td></td></tr>
<tr><td>Feeding</td><td>solder stripping</td><td>Cleaning</td><td></td><td></td></tr>
</table>
</td><td>
<table>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Soaking flux</td><td>Pre-temperature</td><td>dip soldering</td><td>ultrasonic cleaning</td><td>1# washing</td></tr>
<tr><td>6</td><td>7</td><td>8</td><td></td><td></td></tr>
<tr><td>2# washing</td><td>Hot water washing</td><td>Drying</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Picture</td><td>  </td><td>  </td></tr>
</table>

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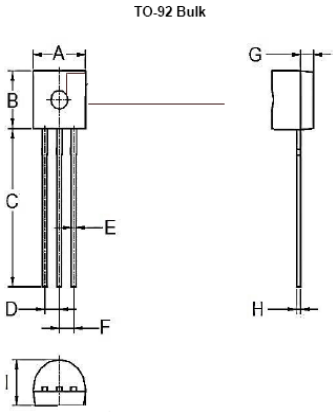
Comparison Report

Physical Dimensions dimensions summary:



DIM.	Unit(mm)		Unit(inch)	
	Min	Max	Min	Max
A	4.40	5.10	0.173	0.201
B	4.30	4.70	0.169	0.185
C	12.50	14.50	0.492	-
D	1.17	1.37	0.046	0.054
E	0.35	0.55	0.014	0.022
F	1.17	1.37	0.046	0.054
G	0.59	1.40	0.023	0.055
H	0.29	0.51	0.011	0.020
I	3.30	4.10	0.130	0.161

	LSL (mm)	USL (mm)	Items	Before Hang plating process	After Dip soldering process	Result
A	4.40	5.10	MAX	4.65	4.62	Have no difference
			AVG.	4.60	4.58	
			MIN	4.54	4.56	
B	4.30	4.70	MAX	4.59	4.63	
			AVG.	4.55	4.58	
			MIN	4.51	4.55	
C	12.50	14.50	MAX	14.34	14.18	
			AVG.	13.89	13.93	
			MIN	13.75	13.73	
D	1.17	1.37	MAX	1.32	1.31	
			AVG.	1.26	1.26	
			MIN	1.20	1.20	
E	0.35	0.55	MAX	0.44	0.40	
			AVG.	0.39	0.38	
			MIN	0.36	0.36	
F	1.17	1.37	MAX	1.24	1.24	
			AVG.	1.21	1.21	
			MIN	1.18	1.19	
G	0.59	1.40	MAX	1.20	1.20	
			AVG.	1.18	1.17	
			MIN	1.15	1.14	
H	0.29	0.51	MAX	0.37	0.37	
			AVG.	0.34	0.34	
			MIN	0.32	0.32	
I	3.30	4.10	MAX	3.56	3.58	
			AVG.	3.53	3.55	
			MIN	3.52	3.53	

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Comparison report

Parametric comparison:

	ITEM		VCBO(V)	VCEO(V)	VEBO(V)	ICBO(nA)	IEBO(nA)	HFE	Result
	TEST Condition		IC=100uA	IC=10uA	IE=100uA	VCB=30V	VEB=5V	VCE= 5V, IC= 2mA	
	SPEC.		＞50V	＞45V	＞6V	＜15nA	＜100nA	200＜HFE＜450	
Before	Hang plating process	MIN	156.30	77.26	10.82	0.00	0.00	340.30	All meet TSC Spec
		MAX	160.70	79.62	10.87	0.24	0.18	384.00	
		AVG.	157.54	78.90	10.85	0.07	0.08	357.61	
After	Dip soldering process	MIN	155.00	77.84	10.82	0.06	0.00	341.20	
		MAX	157.20	79.82	10.86	0.47	0.45	375.40	
		AVG.	156.27	78.81	10.84	0.23	0.11	354.51	

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Comparison Report

Coating Comparison

	Items	Before Hang plating process	After Dip soldering process	Result
Sn(%)	MAX	100	100	Hang plating and dip soldering process have differences in tin layer thickness, but all meet TSC Solderability & Whisker specfication.
	AVG.	100	100	
	MIN	100	100	
Sn(um)	Spec	3~20	3~20	
	MAX	9.92	4.49	
	AVG.	8.65	4.04	
	MIN	7.54	3.25	

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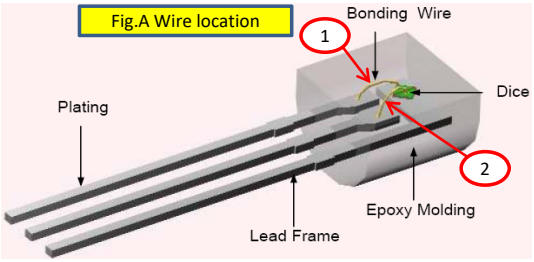
Comparison Report

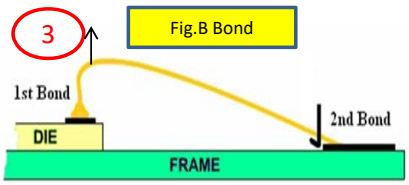
Wire Bond & Die Shear Strength & Wire Bond Shear Comparison

Unit (gf)

	Location		Sample Size	Count	Before Hang plating process	After Dip soldering process	Spec.	Remark
Wire Bond Strength Wire 0.80mil	Wire 1	bond 3	5pcs	MIN	8.978	8.864	≥5g	Have no difference
				MAX	9.566	9.676		
				AVG.	9.238	9.224		
				CPK	7.238	4.981		
	Wire 2	bond 3		MIN	8.584	8.620	≥5g	
				MAX	9.478	9.642		
				AVG.	9.011	9.139		
				CPK	3.714	4.223		
Die Shear Strength	Die		5pcs	MIN	274.860	306.540	≥120g	Have no difference
				MAX	380.580	388.880		
				AVG.	318.784	348.748		
				CPK	1.837	2.264		
Wire Bond Shear Wire 0.80mil	Wire 1		5pcs	MIN	33.506	34.710	≥17g	Have no difference
				MAX	42.768	41.488		
				AVG.	37.944	38.414		
				CPK	2.231	3.111		
	Wire 2			MIN	36.950	37.900	≥17g	Have no difference
				MAX	43.902	41.460		
				AVG.	40.489	39.816		
				CPK	2.782	6.310		

Location Picture：





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PCN19001_Involved P/N list

Family	Package	TSC P/N	New TSC P/N
NPN Bipolar Transistor	TO-92	BC337-16 A1	No Change
NPN Bipolar Transistor	TO-92	BC337-16 A1G	No Change
NPN Bipolar Transistor	TO-92	BC337-16 B1	No Change
NPN Bipolar Transistor	TO-92	BC337-16 B1G	No Change
NPN Bipolar Transistor	TO-92	BC337-16-B0 A1	No Change
NPN Bipolar Transistor	TO-92	BC337-16-B0 A1G	No Change
NPN Bipolar Transistor	TO-92	BC337-16-B0 B1	No Change
NPN Bipolar Transistor	TO-92	BC337-16-B0 B1G	No Change
NPN Bipolar Transistor	TO-92	BC337-25 A1	No Change
NPN Bipolar Transistor	TO-92	BC337-25 A1G	No Change
NPN Bipolar Transistor	TO-92	BC337-25 B1	No Change
NPN Bipolar Transistor	TO-92	BC337-25 B1G	No Change
NPN Bipolar Transistor	TO-92	BC337-25-B0 A1	No Change
NPN Bipolar Transistor	TO-92	BC337-25-B0 A1G	No Change
NPN Bipolar Transistor	TO-92	BC337-25-B0 B1	No Change
NPN Bipolar Transistor	TO-92	BC337-25-B0 B1G	No Change
NPN Bipolar Transistor	TO-92	BC337-40 A1	No Change
NPN Bipolar Transistor	TO-92	BC337-40 A1G	No Change
NPN Bipolar Transistor	TO-92	BC337-40 B1	No Change
NPN Bipolar Transistor	TO-92	BC337-40 B1G	No Change
NPN Bipolar Transistor	TO-92	BC337-40-B0 A1	No Change
NPN Bipolar Transistor	TO-92	BC337-40-B0 A1G	No Change
NPN Bipolar Transistor	TO-92	BC337-40-B0 B1	No Change
NPN Bipolar Transistor	TO-92	BC337-40-B0 B1G	No Change
NPN Bipolar Transistor	TO-92	BC338-16 A1	No Change
NPN Bipolar Transistor	TO-92	BC338-16 A1G	No Change
NPN Bipolar Transistor	TO-92	BC338-16 B1	No Change
NPN Bipolar Transistor	TO-92	BC338-16 B1G	No Change
NPN Bipolar Transistor	TO-92	BC338-16-B0 A1	No Change
NPN Bipolar Transistor	TO-92	BC338-16-B0 A1G	No Change
NPN Bipolar Transistor	TO-92	BC338-16-B0 B1	No Change
NPN Bipolar Transistor	TO-92	BC338-16-B0 B1G	No Change
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NPN Bipolar Transistor	TO-92	BC338-25 B1G	No Change
NPN Bipolar Transistor	TO-92	BC338-25-B0 A1	No Change
NPN Bipolar Transistor	TO-92	BC338-25-B0 A1G	No Change
NPN Bipolar Transistor	TO-92	BC338-25-B0 B1	No Change
NPN Bipolar Transistor	TO-92	BC338-25-B0 B1G	No Change
NPN Bipolar Transistor	TO-92	BC338-40 A1	No Change
NPN Bipolar Transistor	TO-92	BC338-40 A1G	No Change
NPN Bipolar Transistor	TO-92	BC338-40 B1	No Change
NPN Bipolar Transistor	TO-92	BC338-40 B1G	No Change
NPN Bipolar Transistor	TO-92	BC338-40-B0 A1	No Change
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NPN Bipolar Transistor	TO-92	BC546A A1G	No Change
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NPN Bipolar Transistor	TO-92	BC546A B1G	No Change
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NPN Bipolar Transistor	TO-92	BC546B B1G	No Change
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NPN Bipolar Transistor	TO-92	BC546C A1G	No Change
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NPN Bipolar Transistor	TO-92	BC547B A1	No Change

NPN Bipolar Transistor	TO-92	BC547B A1G	No Change
NPN Bipolar Transistor	TO-92	BC547B B1	No Change
NPN Bipolar Transistor	TO-92	BC547B B1G	No Change
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NPN Bipolar Transistor	TO-92	BC548A A1G	No Change
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NPN Bipolar Transistor	TO-92	BC548A B1G	No Change
NPN Bipolar Transistor	TO-92	BC548B A1	No Change
NPN Bipolar Transistor	TO-92	BC548B A1G	No Change
NPN Bipolar Transistor	TO-92	BC548B B1	No Change
NPN Bipolar Transistor	TO-92	BC548B B1G	No Change
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NPN Bipolar Transistor	TO-92	BC549B A1G	No Change
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NPN Bipolar Transistor	TO-92	BC550B B1G	No Change
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NPN Bipolar Transistor	TO-92	KTC3198-Y-B0 B1G	No Change
Thyristor	TO-92	MCR100-3 A1	No Change
Thyristor	TO-92	MCR100-3 A1G	No Change
Thyristor	TO-92	MCR100-3 B1	No Change
Thyristor	TO-92	MCR100-3 B1G	No Change
Thyristor	TO-92	MCR100-4 A1	No Change
Thyristor	TO-92	MCR100-4 A1G	No Change
Thyristor	TO-92	MCR100-4 B1	No Change
Thyristor	TO-92	MCR100-4 B1G	No Change
Thyristor	TO-92	MCR100-5 A1	No Change
Thyristor	TO-92	MCR100-5 A1G	No Change
Thyristor	TO-92	MCR100-5 B1	No Change
Thyristor	TO-92	MCR100-5 B1G	No Change
Thyristor	TO-92	MCR100-6 A1	No Change
Thyristor	TO-92	MCR100-6 A1G	No Change
Thyristor	TO-92	MCR100-6 B1	No Change
Thyristor	TO-92	MCR100-6 B1G	No Change

Thyristor	TO-92	MCR100-7 A1	No Change
Thyristor	TO-92	MCR100-7 A1G	No Change
Thyristor	TO-92	MCR100-7 B1	No Change
Thyristor	TO-92	MCR100-7 B1G	No Change
Thyristor	TO-92	MCR100-8 A1	No Change
Thyristor	TO-92	MCR100-8 A1G	No Change
Thyristor	TO-92	MCR100-8 B1	No Change
Thyristor	TO-92	MCR100-8 B1G	No Change