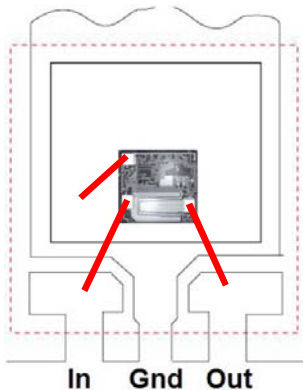
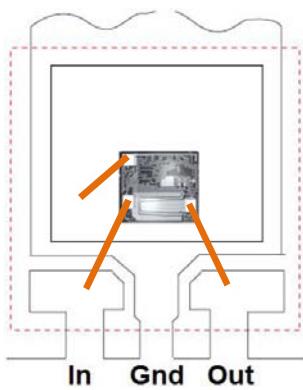


Bond wire material change from Au to Cu
comparison report
Involved regulators: TS7805CZ thru TS7824CZ series

Prepared by Owen Wang
Checked by Ben Wang
Approved by Quayer Chen
Issued date at 6th Dec., 2013
Reversion for A

Comparison report (TS7805CZ thru TS7824CZ)

Construction compared:

	Before	After	Result
Die structure	silicon wafer 7800M	silicon wafer 7800M	a) Outside appearance has no change. b) Bond wire material change from Au to Cu
Sketch	 <p style="text-align: center;">In Gnd Out</p>	 <p style="text-align: center;">In Gnd Out</p>	

Raw material composition compared:

	Before	After
Mold compound material	RoHs compound	RoHs compound
Bone wire material	Au	Cu
Lead frame material	Cu	Cu
Die attach material	Soft solder (Pb92.5%/Tin5%/Ag2.5%)	Soft solder (Pb92.5%/Tin5%/Ag2.5%)
plating material	Pure Tin	Pure Tin

Dimension compared:

	Before	After
Die size	1.58 x 1.4	1.58 x 1.4
Bond wire diameter size	Au wire 2mil	Cu wire 1.5mil

Comparison report (TS7805CZ thru TS7824CZ)

Electrical characteristics compared:

Test condition/Specification		TS7805CZ		Result
		Before	After	
Outout Voltage Vin = 10V, Iout = 500mA	Mean	4.96026	4.9441	The electrical characteristics drift seen is in normal process distribution.
	Sigma	0.04496	0.0538	
Line Regulation Vin = 7.5V ~ 25V, Iout = 500mA	Mean	-0.04826	0.0929	
	Sigma	0.00259	0.0042	
Load Regulation Vin = 10V, Iout = 10mA ~ 1A	Mean	0.00165	0.0274	
	Sigma	0.00195	0.0539	
Quiescent Current Vin = 7.5V ~ 25V, Iout = 10mA	Mean	0.00268	0.0020	
	Sigma	0.09413	0.0002	
Quiescent Current Change 10mA ≤ Iout ≤ 1A, 7.5V ≤ Vin ≤ 25V	Mean	-0.04733	0.0114	
	Sigma	0.15274	0.0535	
Voltage Drop Vin = 7.5V, Io = 1A	Mean	2.54172	2.6124	
	Sigma	0.04471	0.0539	

Production Part Approval - Material, Performance Test Results Discrete Semiconductor Component Qualification Plan

Customer P/N :	TS7912CZ	Product Engineer :	Kai
Customer Spec. # :	N/A	General Specification :	JESE47D
Supplier Name :	Taiwan Semiconductor Corp.	Supplier Manufacturing Site :	Subcontractor
Supplier Generic P/N :	TO-220 1.0Amps	Required PPAP Submission Date :	6-May-2013
Supplier Internal P/N :	TS7905CZ thru TS7912CZ	Family Type :	Linear Voltage Regulator
Reason for Qual. :	Bond wire material change from Au to Cu		

Item	Test	Test Condition	Exceptions	Est. Start	Est. Comp.	# Lots	S.S.	Remarks
1	Electrical Test	Electrical characterization	@25°C	10-Apr-13	10-Apr-13	ALL	76	ACC
2	External Visual	Inspect device construction, marking and workmanship	N/A	10-Apr-13	10-Apr-13	ALL	76	ACC
3	Temperature Humidity Bias	Ta = 85°C, R.H. = 85%	500hrs	10-Apr-13	3-May-13	1	22	ACC
4	Temperature Cycle	Ta = -55°C to 150°C	500cycles	10-Apr-13	25-Apr-13	1	22	ACC
5	High Temperature Storage	Ta = 150 + 10/-0°C	1000hrs	10-Apr-13	22-May-13	1	22	ACC
6	Solderability	245 ± 5°C	10sec	10-Apr-13	12-Apr-13	1	10	ACC
7	Bond Pull Strength	> 6g	N/A	10-Apr-13	10-Apr-13	1	5	ACC
8	Bond Shear	> 45g	N/A	10-Apr-13	10-Apr-13	1	5	ACC
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Comment :

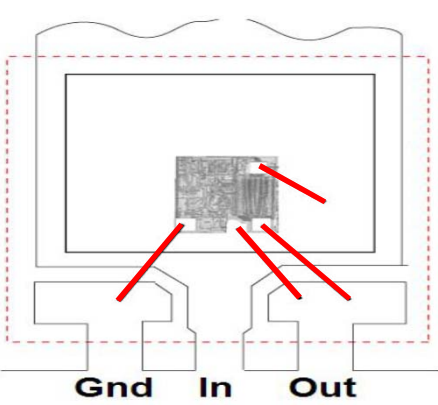
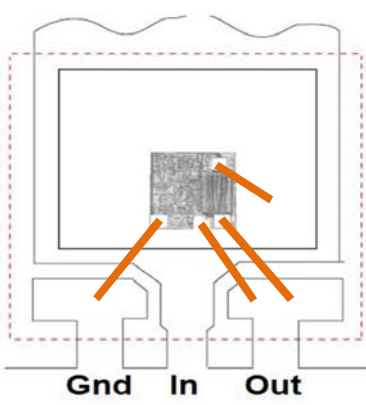
Prepared by :	Mr. Yen	Approved by :	Mr. Tung
Date :	4-Jun-13	Date :	4-Jun-13
Title :	Quality supervisor	Title :	Quality leader

Bond wire material change from Au to Cu
comparison report
Involved regulators: TS7905CZ thru TS7912CZ series

Prepared by Owen Wang
Checked by Ben Wang
Approved by Quayer Chen
Issued date at 6th Dec., 2013
Reversion for A

Comparison report (TS7905CZ thru TS7912CZ)

Construction compared:

	Before	After	Result
Die structure	silicon wafer 7900M	silicon wafer 7900M	a) Outside appearance has no change. b) Bond wire material change from Au to Cu
Sketch			

Raw material composition compared:

	Before	After
Mold compound material	RoHs compound	RoHs compound
Bone wire material	Au	Cu
Lead frame material	Cu	Cu
Die attach material	Soft solder (Pb92.5%/Tin5%/Ag2.5%)	Soft solder (Pb92.5%/Tin5%/Ag2.5%)
plating material	Pure Tin	Pure Tin

Dimension compared:

	Before	After
Die size	1.75 x 1.55	1.75 x 1.55
Bond wire diameter size	Au wire 1.5mil	Cu wire 1.5mil

Comparison report (TS7905CZ thru TS7912CZ)

Electrical characteristics compared:

Test condition/Specification		TS7905CZ		Result
		Before	After	
Outout Voltage Vin = -10V, Iout = 500mA	Mean	-4.91884	-4.9976	The electrical characteristics drift seen is in normal process distribution.
	Sigma	0.05039	0.0538	
Line Regulation Vin = -7.5V ~ -25V, Iout = 500mA	Mean	0.04390	0.0019	
	Sigma	0.00178	0.0012	
Load Regulation Vin = -10V, Iout = 10mA ~ 1A	Mean	-0.00034	0.0245	
	Sigma	0.00925	0.0012	
Quiescent Current Vin = -7.5V ~ -25V, Iout = 10mA	Mean	0.00398	0.0044	
	Sigma	0.00017	0.0002	
Quiescent Current Change 10mA ≤ Iout ≤ 1A, -7.5V ≤ Vin ≤ -25V	Mean	-0.04049	0.0396	
	Sigma	0.00001	0.0000	
Voltage Drop Vin = -7.5V, Io = 1A	Mean	2.48000	2.5092	
	Sigma	0.04945	0.0535	

Production Part Approval - Material, Performance Test Results Discrete Semiconductor Component Qualification Plan

Customer P/N :	TS7912CZ	Product Engineer :	Kai
Customer Spec. # :	N/A	General Specification :	JESE47D
Supplier Name :	Taiwan Semiconductor Corp.	Supplier Manufacturing Site :	Subcontractor
Supplier Generic P/N :	TO-220 1.0Amps	Required PPAP Submission Date :	6-May-2013
Supplier Internal P/N :	TS7905CZ thru TS7912CZ	Family Type :	Linear Voltage Regulator
Reason for Qual. :	Bond wire material change from Au to Cu		

Item	Test	Test Condition	Exceptions	Est. Start	Est. Comp.	# Lots	S.S.	Remarks
1	Electrical Test	Electrical characterization	@25°C	10-Apr-13	10-Apr-13	ALL	76	ACC
2	External Visual	Inspect device construction, marking and workmanship	N/A	10-Apr-13	10-Apr-13	ALL	76	ACC
3	Temperature Humidity Bias	Ta = 85°C, R.H. = 85%	500hrs	10-Apr-13	3-May-13	1	22	ACC
4	Temperature Cycle	Ta = -55°C to 150°C	500cycles	10-Apr-13	25-Apr-13	1	22	ACC
5	High Temperature Storage	Ta = 150 + 10/-0°C	1000hrs	10-Apr-13	22-May-13	1	22	ACC
6	Solderability	245 ± 5°C	10sec	10-Apr-13	12-Apr-13	1	10	ACC
7	Bond Pull Strength	> 6g	N/A	10-Apr-13	10-Apr-13	1	5	ACC
8	Bond Shear	> 45g	N/A	10-Apr-13	10-Apr-13	1	5	ACC
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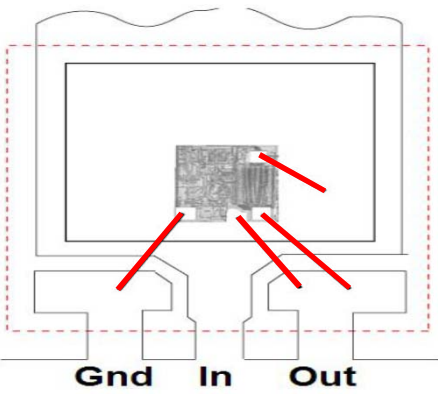
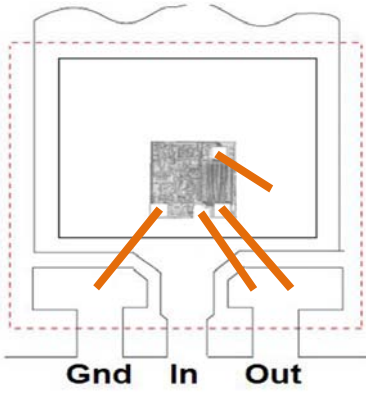
Prepared by :	Mr. Yen	Approved by :	Mr. Tung
Date :	4-Jun-13	Date :	4-Jun-13
Title :	Quality supervisor	Title :	Quality leader

**Bond wire material change from Au to Cu
comparison report**
Involved regulators:
TS79M05CZ thru TS79M12CZ series

Prepared by Owen Wang
Checked by Ben Wang
Approved by Quayer Chen
Issued date at 6th Dec., 2013
Reversion for A

Comparison report (TS79M05CZ thru TS79M12CZ)

Construction compared:

	Before	After	Result
Die structure	silicon wafer 7900M	silicon wafer 7900M	a) Outside appearance has no change. b) Bond wire material change from Au to Cu
Sketch			

Raw material composition compared:

	Before	After
Mold compound material	RoHs compound	RoHs compound
Bone wire material	Au	Cu
Lead frame material	Cu	Cu
Die attach material	Soft solder (Pb92.5%/Tin5%/Ag2.5%)	Soft solder (Pb92.5%/Tin5%/Ag2.5%)
plating material	Pure Tin	Pure Tin

Dimension compared:

	Before	After
Die size	1.75 x 1.55	1.75 x 1.55
Bond wire diameter size	Au wire 1.5mil	Cu wire 1.5mil

Comparison report (TS79M05CZ thru TS79M12CZ)

Electrical characteristics compared:

Test condition/Specification		TS79M05CZ		Result
		Before	After	
Outout Voltage Vin = -10V, Iout = 500mA	Mean	4.99240	4.9792	The electrical characteristics drift seen is in normal process distribution.
	Sigma	0.31463	0.5583	
Line Regulation Vin = -7.5V ~ 25V, Iout = 500mA	Mean	0.03201	0.0222	
	Sigma	0.02263	0.0261	
Load Regulation Vin = -10V, Iout = 10mA ~ 1A	Mean	0.08621	0.1642	
	Sigma	0.16250	0.0224	
Quiescent Current Vin = -7.5V ~ -25V, Iout = 10mA	Mean	0.00572	0.0046	
	Sigma	0.00452	0.0016	
Quiescent Current Change 10mA ≤ Iout ≤ 1A, -7.5V ≤ Vin ≤ -25V	Mean	0.00802	0.0014	
	Sigma	0.00170	0.0139	
Voltage Drop Vin = -7.5V, Io = 1A	Mean	1.36626	2.0396	
	Sigma	0.24560	0.4494	

Production Part Approval - Material, Performance Test Results Discrete Semiconductor Component Qualification Plan

Customer P/N :	TS7912CZ	Product Engineer :	Kai
Customer Spec. # :	N/A	General Specification :	JESE47D
Supplier Name :	Taiwan Semiconductor Corp.	Supplier Manufacturing Site :	Subcontractor
Supplier Generic P/N :	TO-220 1.0Amps	Required PPAP Submission Date :	6-May-2013
Supplier Internal P/N :	TS7905CZ thru TS7912CZ	Family Type :	Linear Voltage Regulator
Reason for Qual. :	Bond wire material change from Au to Cu		

Item	Test	Test Condition	Exceptions	Est. Start	Est. Comp.	# Lots	S.S.	Remarks
1	Electrical Test	Electrical characterization	@25°C	10-Apr-13	10-Apr-13	ALL	76	ACC
2	External Visual	Inspect device construction, marking and workmanship	N/A	10-Apr-13	10-Apr-13	ALL	76	ACC
3	Temperature Humidity Bias	Ta = 85°C, R.H. = 85%	500hrs	10-Apr-13	3-May-13	1	22	ACC
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5	High Temperature Storage	Ta = 150 + 10/-0°C	1000hrs	10-Apr-13	22-May-13	1	22	ACC
6	Solderability	245 ± 5°C	10sec	10-Apr-13	12-Apr-13	1	10	ACC
7	Bond Pull Strength	> 6g	N/A	10-Apr-13	10-Apr-13	1	5	ACC
8	Bond Shear	> 45g	N/A	10-Apr-13	10-Apr-13	1	5	ACC
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Comment :

Prepared by :	Mr. Yen	Approved by :	Mr. Tung
Date :	4-Jun-13	Date :	4-Jun-13
Title :	Quality supervisor	Title :	Quality leader