

# Change of Terminal Plating of NEC/TOKIN Chip Ta Capacitor

- Introduction of Lead-free Products -

September 2002  
NEC Electronics (Europe) GmbH

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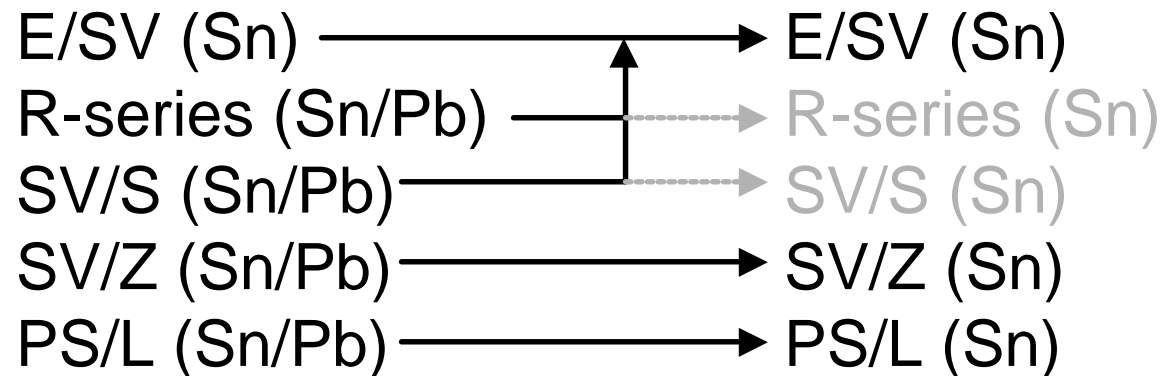
- Description of change
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- Conclusion

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- Solderability and Joint Strength Comparison
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## What product?



- R and SV/S series will be changed to E/SV series.
- SV/Z and PS/L series will not change, but terminal plating will be changed to Sn.

# Reason of Change

## Why?

In order to meet growing demand for environmental-consciousness, NEC would like eliminate Pb from terminal plating.

NEC believe this will contribute customers to develop Pb-free products, which will be welcome in near future.

# Schedule & Identification of Change

## Schedule

- from January 2003 production-lots

## Identification of R, SV/Z, SV/S and PS/L series

- Lot. number (6 - 9 digits) can identify Lead-free or not.
- From appearance, it is very difficult to identify whether Lead-free or not.

# Solderability and Reliability

## How about solderability and joint strength of Lead-free terminal capacitors?

- Same as conventional Sn/Pb plating capacitors (Please see supplement).

## Reliability of electrical characteristics?

- Same reliability as conventional Sn/Pb plating parts (Please see CMG-E-32436)

# Conclusions

NEC believes that Lead-free terminal capacitor have the same characteristics as conventional capacitor. And it has the same mechanical strength and electrical reliability.

So, we highly appreciate understanding on our Lead-free terminal introduction from January 2003.

For further questions, please contact us.

# Supplement 1

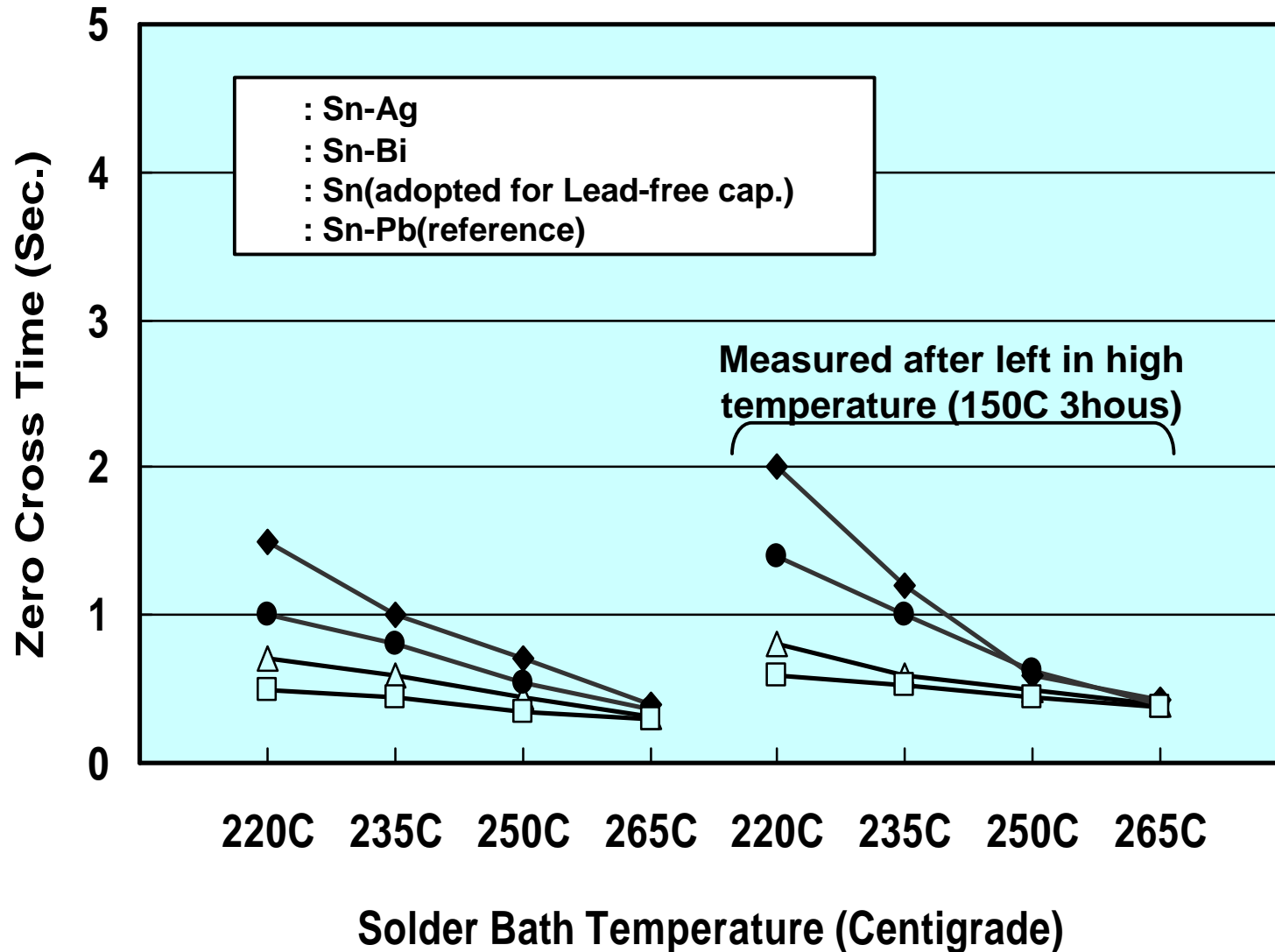
- Solderability and Joint Strength Comparison -

# 1. Objectives

- Confirmation of solder wetting rate
- Confirmation of joint reliability

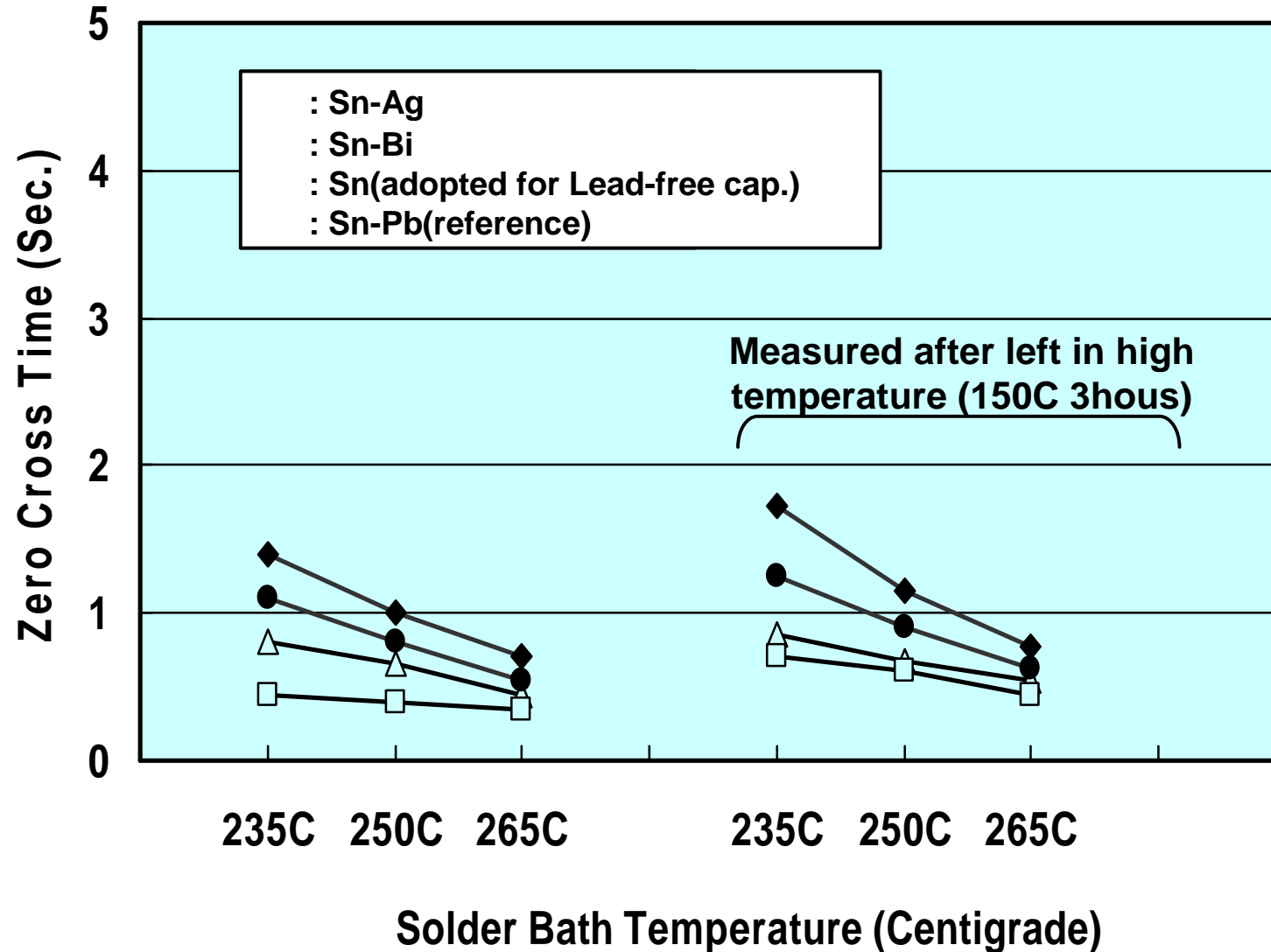
# 2-1. Solder Wetting Rate

-SnPb eutectic solder bath-



# 2-2. Solder Wetting Rate

-SnAuCu solder bath-



# 3. Joint Strength Evaluation Conditions

## Evaluated Parts

- SVSP0J106M: Sn/Pb (90%/10%) Terminal Plating
- ESVP0J106M: Sn (100%) Terminal Plating

# 4. Mounting / Evaluation Conditions

## Mounting Conditions

- 1) Air reflow only
- 2) Air reflow to Air reflow
- 3) Air reflow to Air flow (solder bath temperature: 250C)
- 4) Air reflow to Air flow (solder bath temperature: 270C)

## Equipment and Set-up Conditions

Reflow Equipment: REF-1 (by Panasonic)

- Please refer to the following pages for the temperature profile.

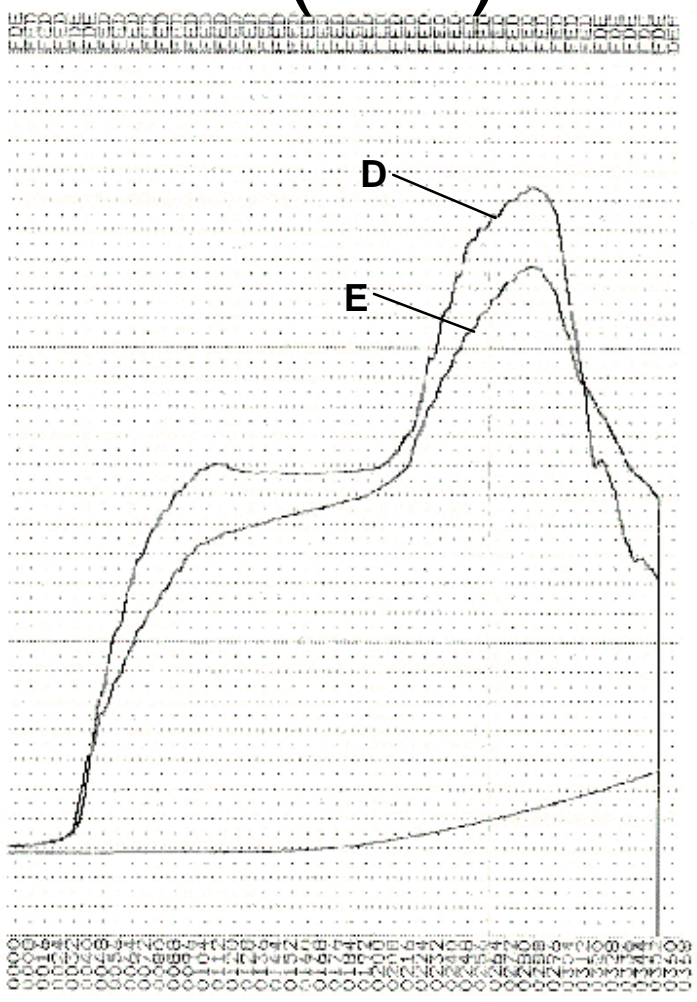
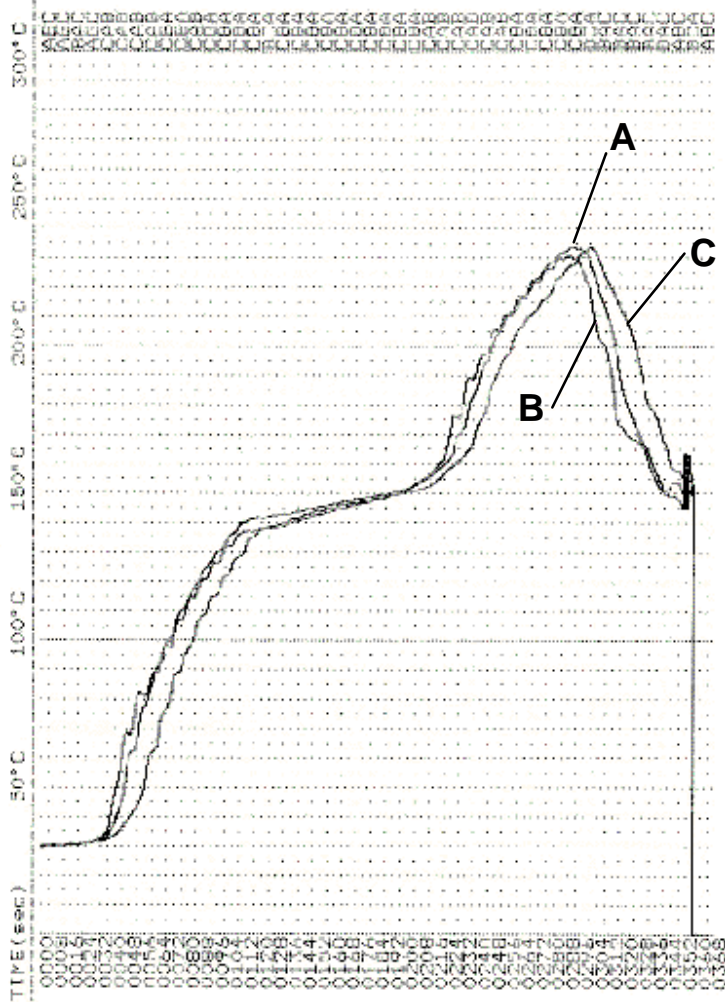
Flow Equipment: SND-300N2 (by Senju Metal Industry, at NEC Shizuoka)

- Pre-heat temperature: 280C (100C on the bottom side of PWB)
- Solder bath temperature: 250C / 270C
- Conveyer speed: 1m/min.
- Please refer to the following pages for the temperature profile.

## Temperature Conditions after Mounting

- Temperature cycle (-40C to +125C, 500 cycles)
- High temperature (+125C, 500 hours)

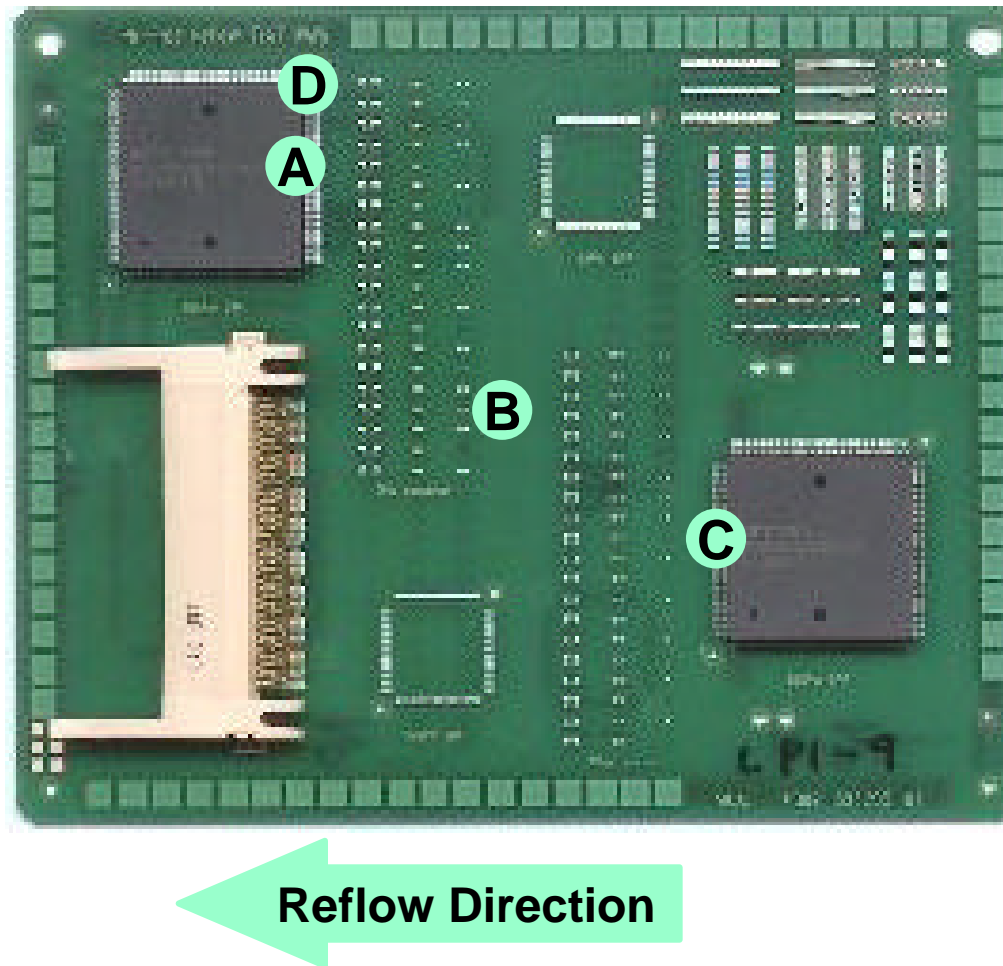
# Reflow Profile (first)



Time (sec)	Temp (°C)	Temp (°F)
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000001	25.00	77.00
000002	25.00	77.00
000003	25.00	77.00
000004	25.00	77.00
000005	25.00	77.00
000006	25.00	77.00
000007	25.00	77.00
000008	25.00	77.00
000009	25.00	77.00
000010	25.00	77.00
000011	25.00	77.00
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000013	25.00	77.00
000014	25.00	77.00
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000016	25.00	77.00
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000329	25.00	77.00
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000331	25.00	77.00
000332	25.00	77.00
000333	2	



# Measuring Points of Temperature



# 5. Joint Strength Test

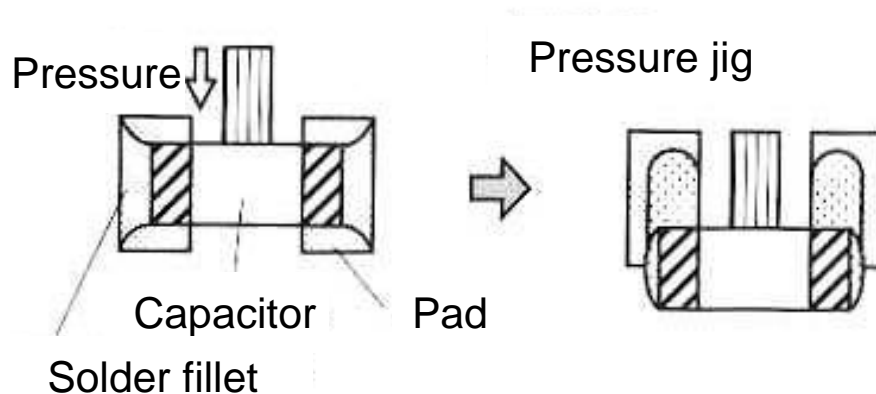
## Joint Strength Measurement

### - Shearing Test with

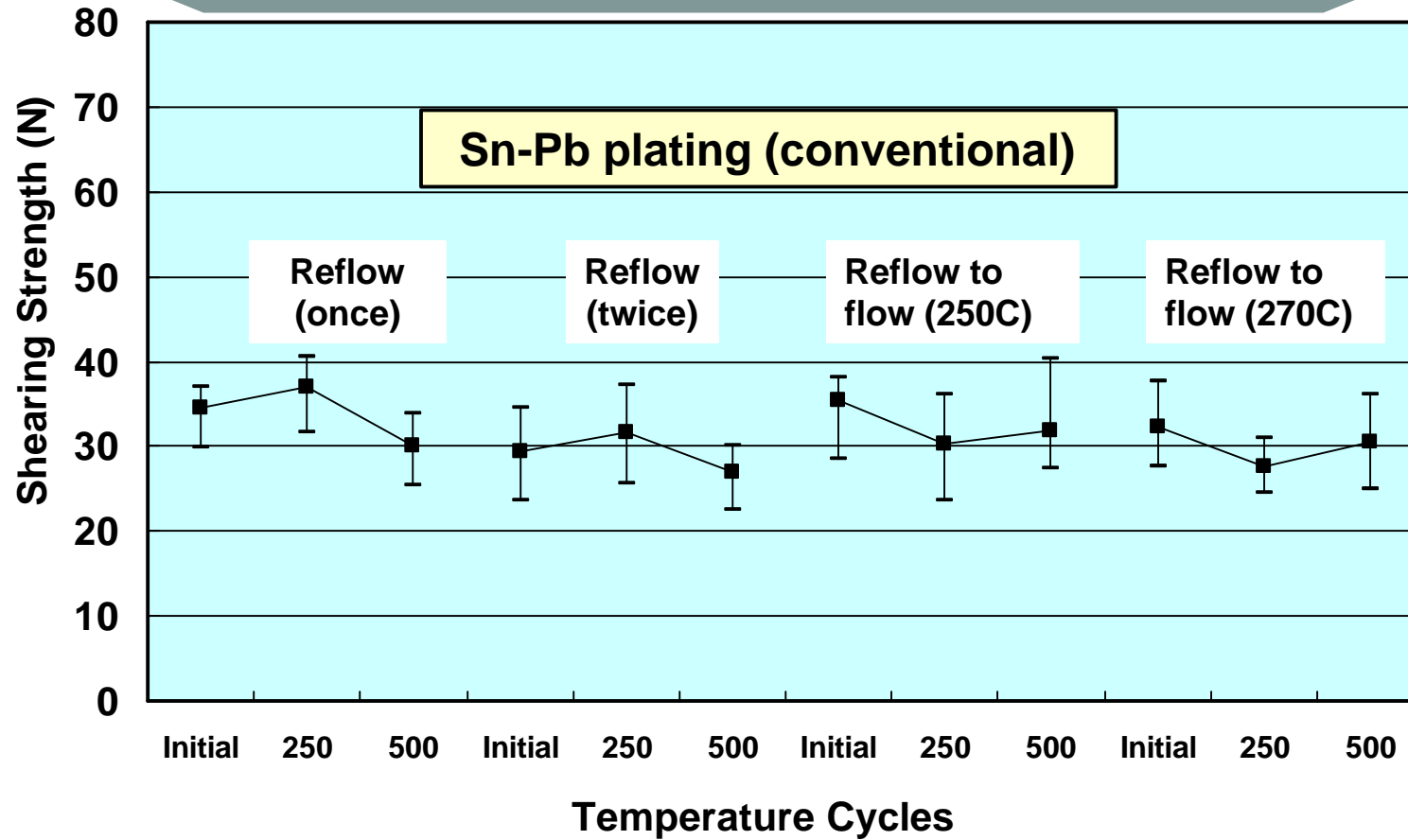
- 1) Temperature cycle: -40C to +125C, 30min., 500 cycle)
- 2) High temperature storage: +125C, 500 hours)

Shearing speed: 10mm/min.

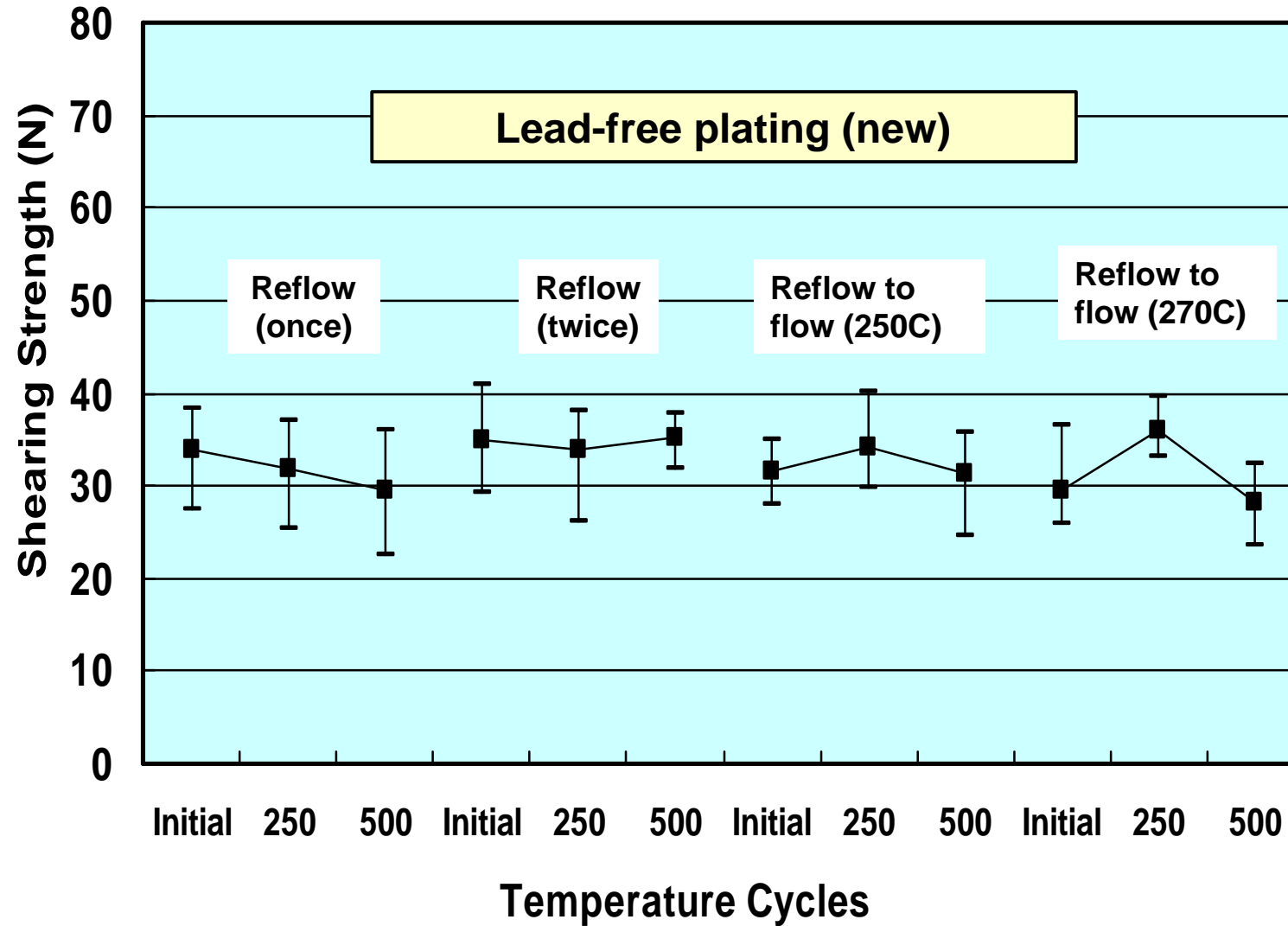
Sample quantity: 11(each condition)



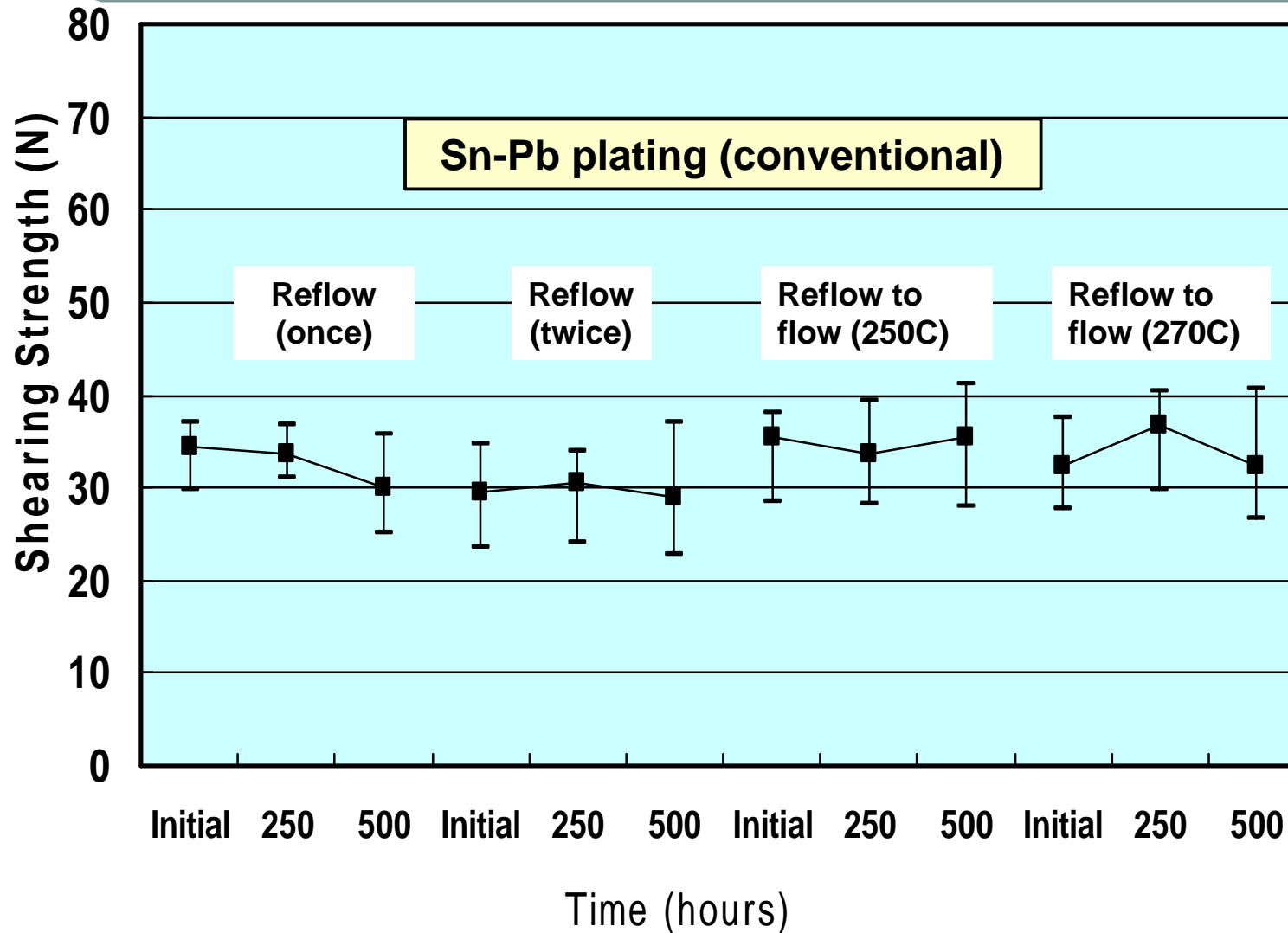
# Joint Strength (with Temperature Cycle)



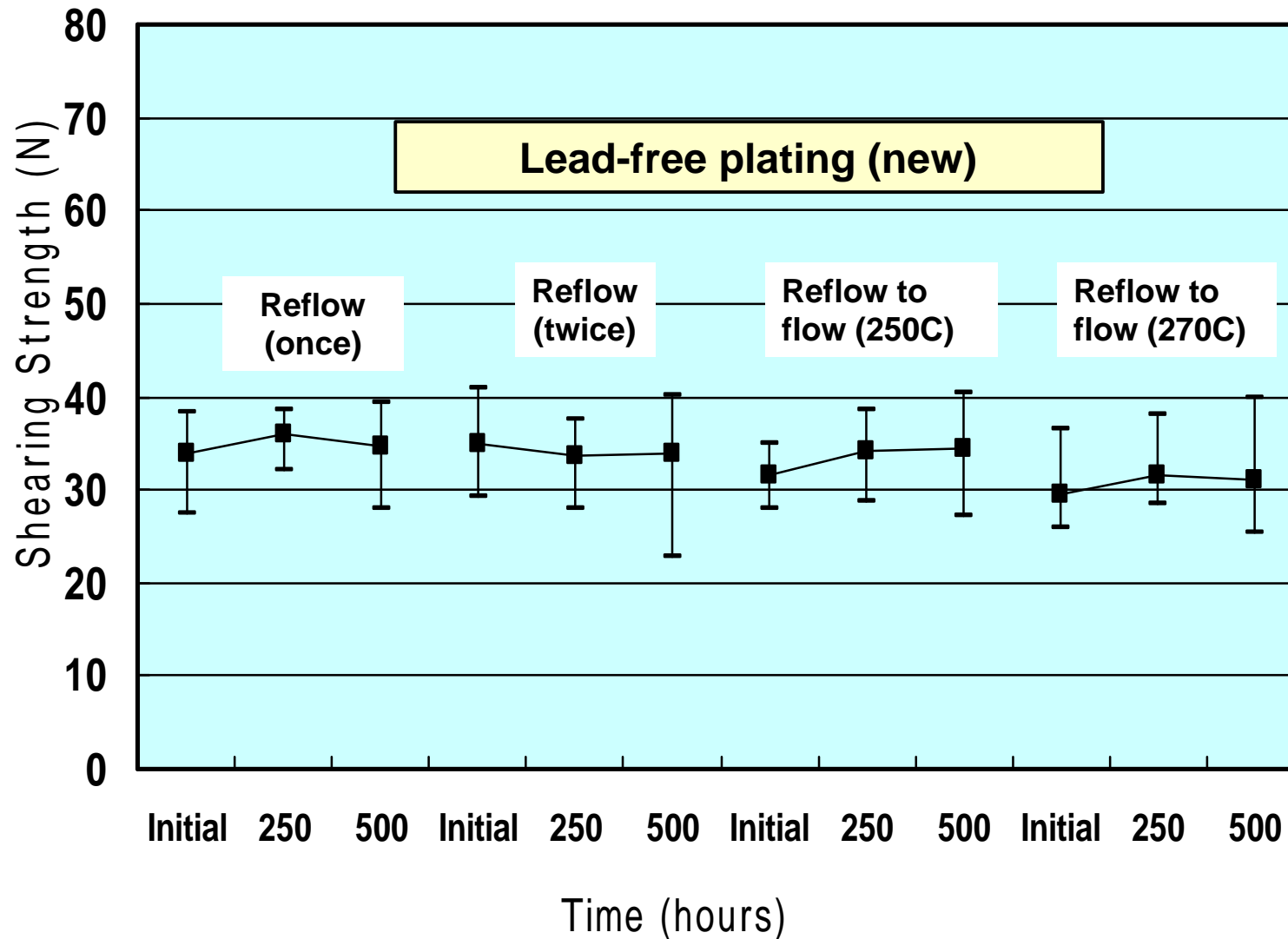
# Joint Strength (with Temperature Cycle)



## Joint Strength (with High Temperature Storage)



# Joint Strength (with High Temperature Storage)



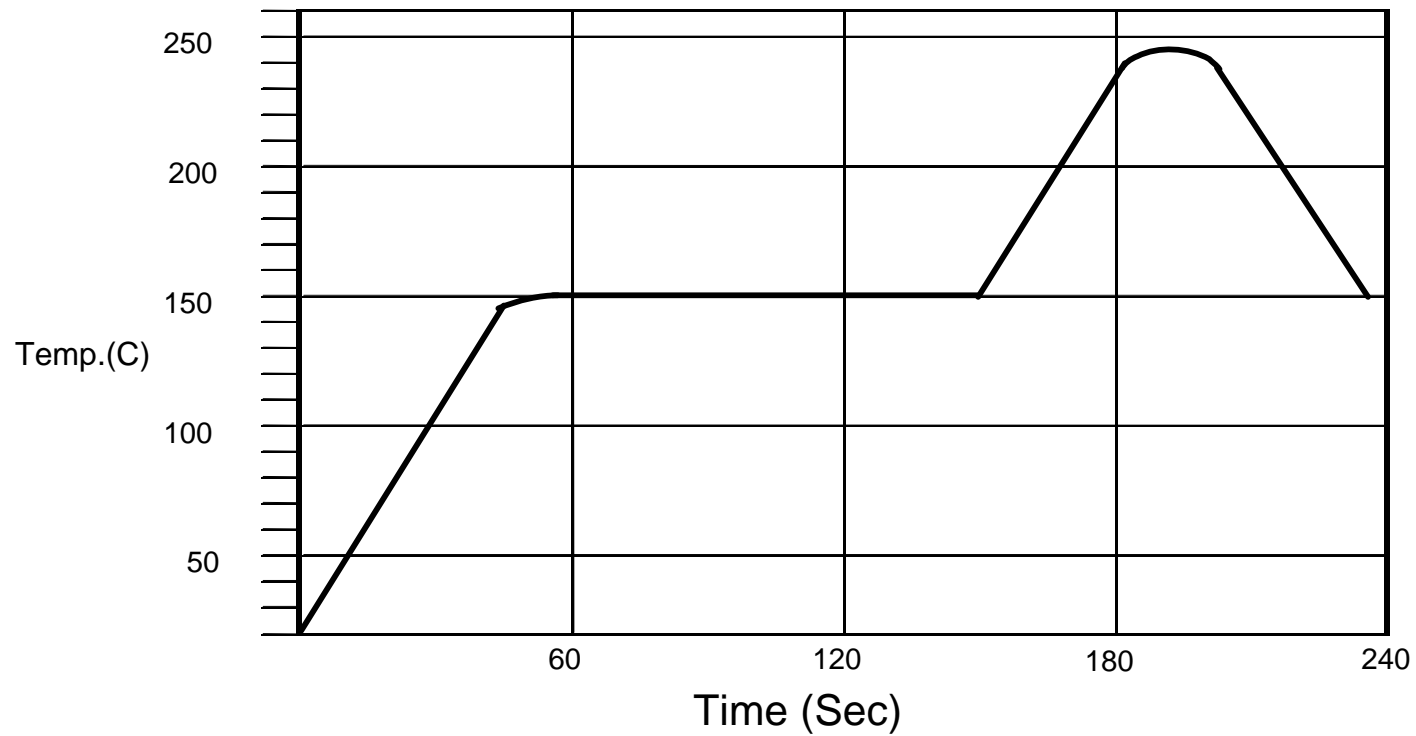
## Conclusions

1. Tin(Sn) plating terminal shows better solder wetting rate results than other lead-free plating terminals, where conventional Sn/Pb plating terminal shows slightly better results.
2. Tin(Sn) plating terminal shows almost no deterioration of the resistance to the shearing force after 500 cycles of temperature cycling, or after 500 hours of high temperature. There are no significant differences between Tin plating and conventional Sn/Pb plating, or among various mounting conditions.

# Supplement 2

- Recommended Reflow Profile -

## Recommended Reflow profile for Lead-free Terminal Chip Ta Capacitors



### Recommendation

Pre-heat; 150 - 180C, 90sec Max

Soldering; 245C peak

Temp. over 230C, 20sec Max