APPLICATION NOTE	Prepared by	[illegible handwritten signatures]	Rev		
	Approved by	[illegible handwritten signature] '03-7/14			

Subject About Outer Lead Pb-free Solder Plate of DIP-IPM

Contents

1. Pb-free type solder plating outer lead of DIP-IPM

In order to prevent the environment pollution caused by the melted Pb material from discarded electronic machines and devices, a world wide movement of enhancing regulation on utilization of Pb material and compulsory of Pb recycle is being carried out remarkably. To correspond such a times trend, Mitsubishi semiconductor is now concentrating on developing Pb-free type devices. Mitsubishi DIP-IPM is now being changed to use Pb-free solder plate for its outer lead. Table 1 shows the schedule, and Table 2 shows the applied type name, respectively. We will gradually replace Pb type with Pb-free type of our products manufactured after April 2004.

The solder material for outer lead plating is Sn-Cu type.

Traditional Pb-type products will be continuously parallel manufactured for a certain period according to customer's requirement even after mass production of Pb-free type.

2. Schedule of Sample A

Sample A is available from Sept., 2003, MP from April 2004.

3. Schedule of Sample B

Currently, sample B is scheduled to be available from Oct., 2003, and MP from May, 2004. However, the lead shape is now under evaluation which is estimated to finish by the end of Aug. 2003. Therefore, there is possibility that the above schedule might be revised at that time according to the evaluation result. We will make prompt announcement if there is any revision.

Table 1 Schedule for Pb-free type products

Item	June '03	~	Sept. '03	Oct. '03	~	Apr. '04	May '04	~	Oct. '04
1.Pb-free Lead									
• Sample Schedule									
Package A			→						
Package B				→					
• MP									
Package A						→			
Package B							→		

Table 2 Package and the corresponding type name

Package Category		Device Type Name
Package A	Large DIP-IPM	PS202XX-XX, PS204XX-XX, PS212XX-XX, PS214XX-XX
	Mini DIP-IPM	PS203XX-XX, PS213XX-XX, PS215XX-XX
Package B	Large DIP-IPM	PS218XX

4. About Lead Shape Change of the Outer Lead Pb-free Solder Plating type Product

(1) Since it is difficult to guarantee sufficient solderability for the current shape lead in practical mounting operation with Pb-free solder comparing to traditional Sn-Pb solder, the lead shape has to be modified (reducing the thermal capacity) so as to ensure sufficient solderability. Please refer to Table 3 for the information of the modification.

(2) For the lead shape change of package B, presently, it is with the same consideration as that of package A. The lead shape will be finally determined by the end of Aug. 2003. We will inform customers as soon as the lead shape is fixed.

Table 3 Index of lead shape change of package A and B

Package A	Large DIP-IPM	Fig.1-1, Fig.1-2 (P.3/5)
	Mini DIP-IPM	Fig.2-1, Fig.2-2 (P.4/5)
Package B	Large DIP-IPM	Fig.3-1, Fig.3-2 (P.5/5)

5. About Type Name Change

Device type name will be changed together with the change of lead shape. The new type name is such defined that a suffix "–P" is added to the current type name, as shown in Table 4.

Table 4 Example of changed type name

Original Type Name	Revised Type Name
PS21244	PS21244-P

6.About the Solderability of Using Traditional Sn-Pb Solder

It is possible for outer lead Pb-free type product to be mounted with traditional Sn-Pb solder under approximate same soldering condition.

7. Operation condition in using Pb-free solder

Table 5 shows the recommended soldering condition in using Pb-free solder for package A. For package B, the soldering condition is now under evaluation. We will report the result after evaluation.

Table 5-1 Recommended soldering condition (PS202XX-XX, PS204XX-XX, PS212XX-XX, PS214XX-XX)

	Condition
Solder Temperature	250～255℃
Contacting Time With Solder Flow	3～4sec.
Pre-heating Temperature	105～110℃ (Temperature at PCB surface close to lead)

Table 5-2 Recommended soldering condition (PS203XX-XX, PS213XX-XX, PS215XX-XX)

	Condition
Solder Temperature	250～255℃
Contacting Time With Solder Flow	4～5sec.
Pre-heating Temperature	110～120℃ (Temperature at PCB surface close to lead)

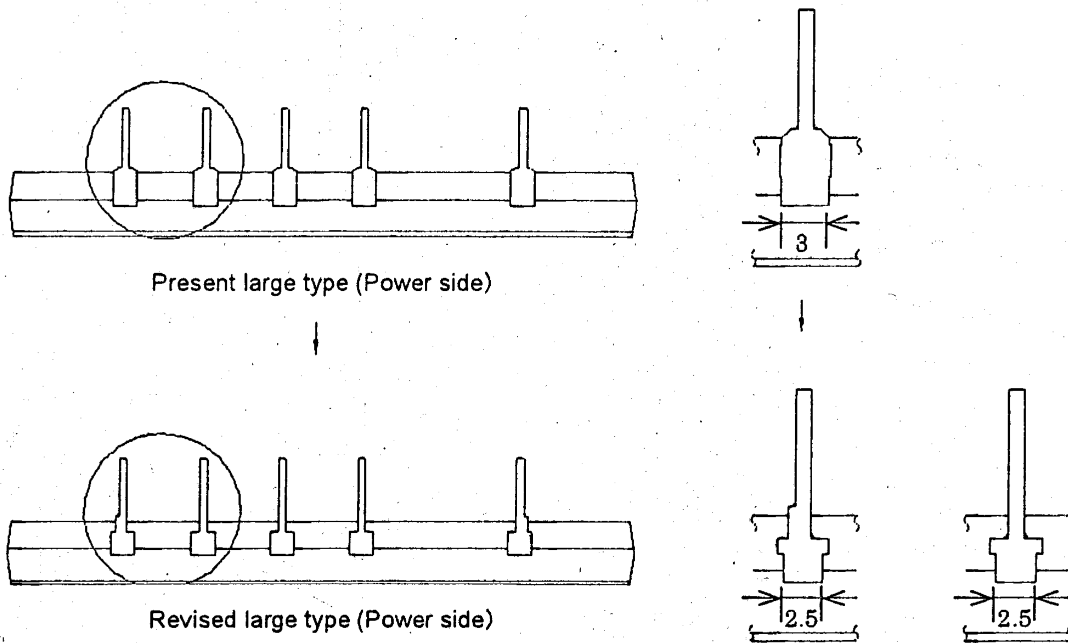

Fig.1-1 Package A: Lead shape change of large type DIP-IPM (Power-side)

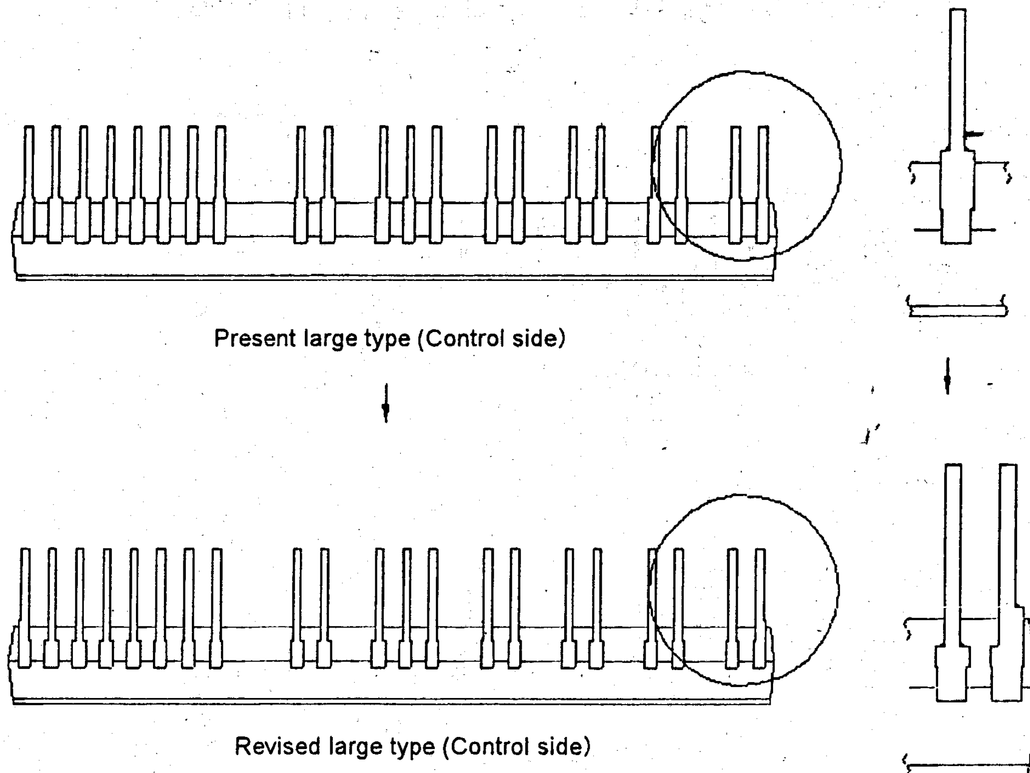

Fig.1-2 Package A: Lead shape change of large type DIP-IPM (Control-side)

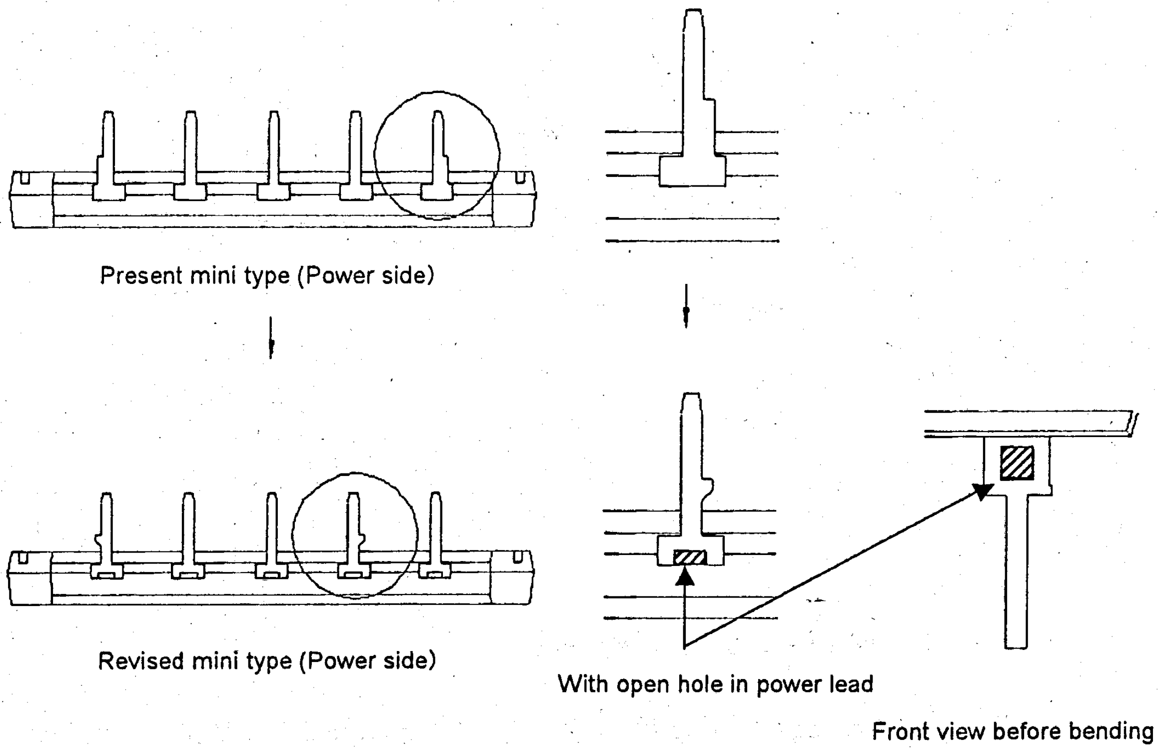

Fig.2-1 Package A: Lead shape change of mini DIP-IPM (Power-side)

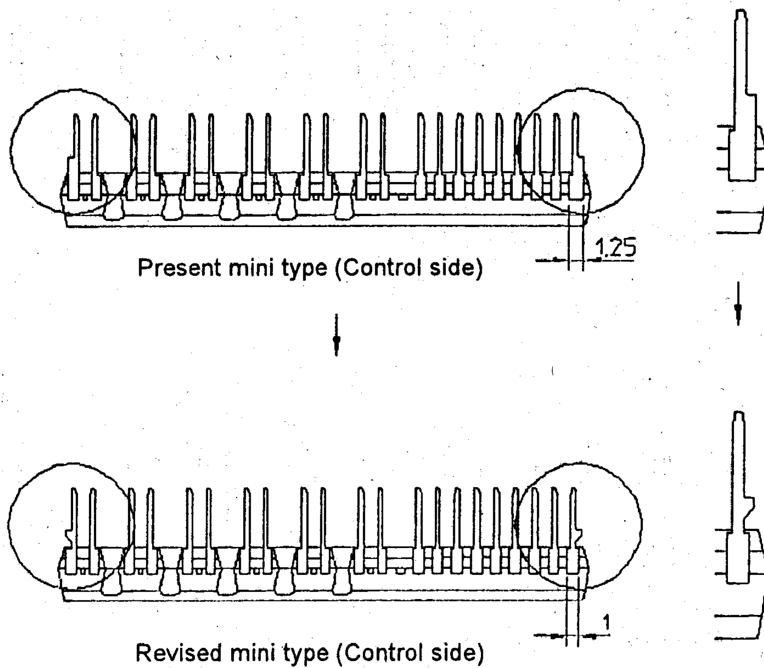

Fig.2-2 Package A: Lead shape change of mini DIP-IPM (Control-side)

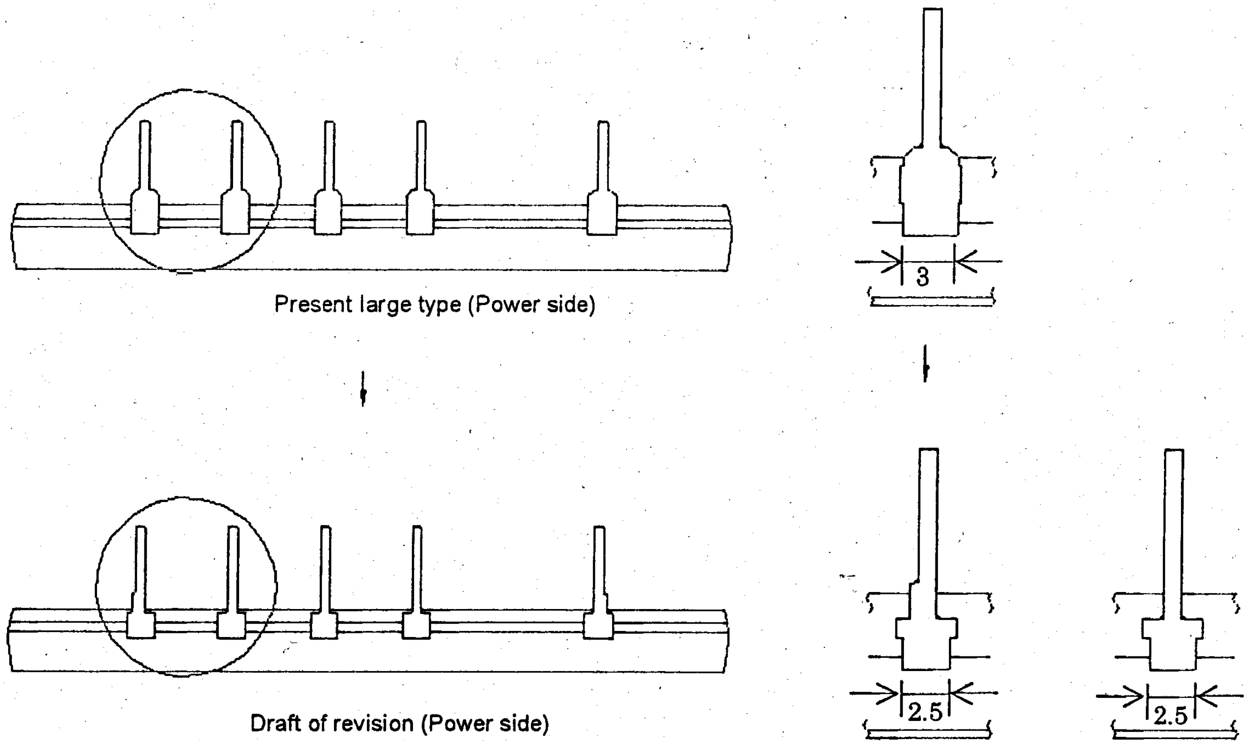

Fig.3-1 Package B: Draft of lead shape change for large type DIP-IPM (Power-side)

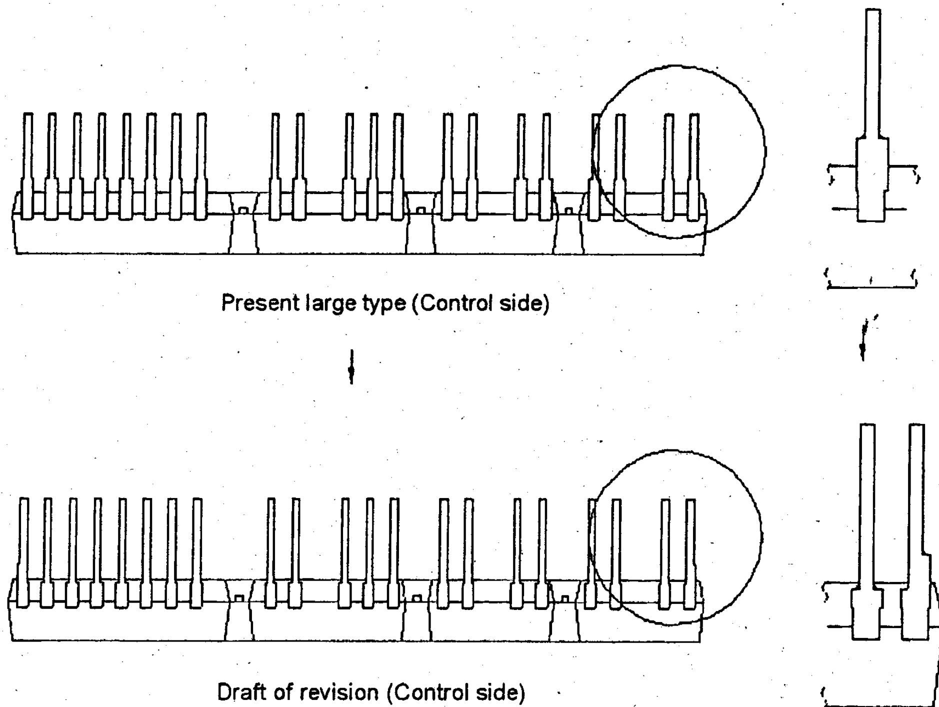

Fig.3-2 Package B: Draft of lead shape change for large type DIP-IPM (Control-side)