## *npn* BIPOLAR JUNCTION TRANSISTOR TECHNOLOGY

**Major Processing Steps for a Junction Isolated BJT Technology**

Start with a $p$ substrate.

1. Implantation of the buried $n^+$ layer
2. Growth of the epitaxial layer
3. $p^+$ isolation diffusion
4. Base $p$-type diffusion
5. Emitter $n^+$ diffusion
6. $p^+$ ohmic contact
7. Contact etching
8. Metal deposition and etching
9. Passivation and bond pad opening

## Implantation of the Buried Layer (Mask Step 1)

Objective of the buried layer is to reduce the collector resistance.

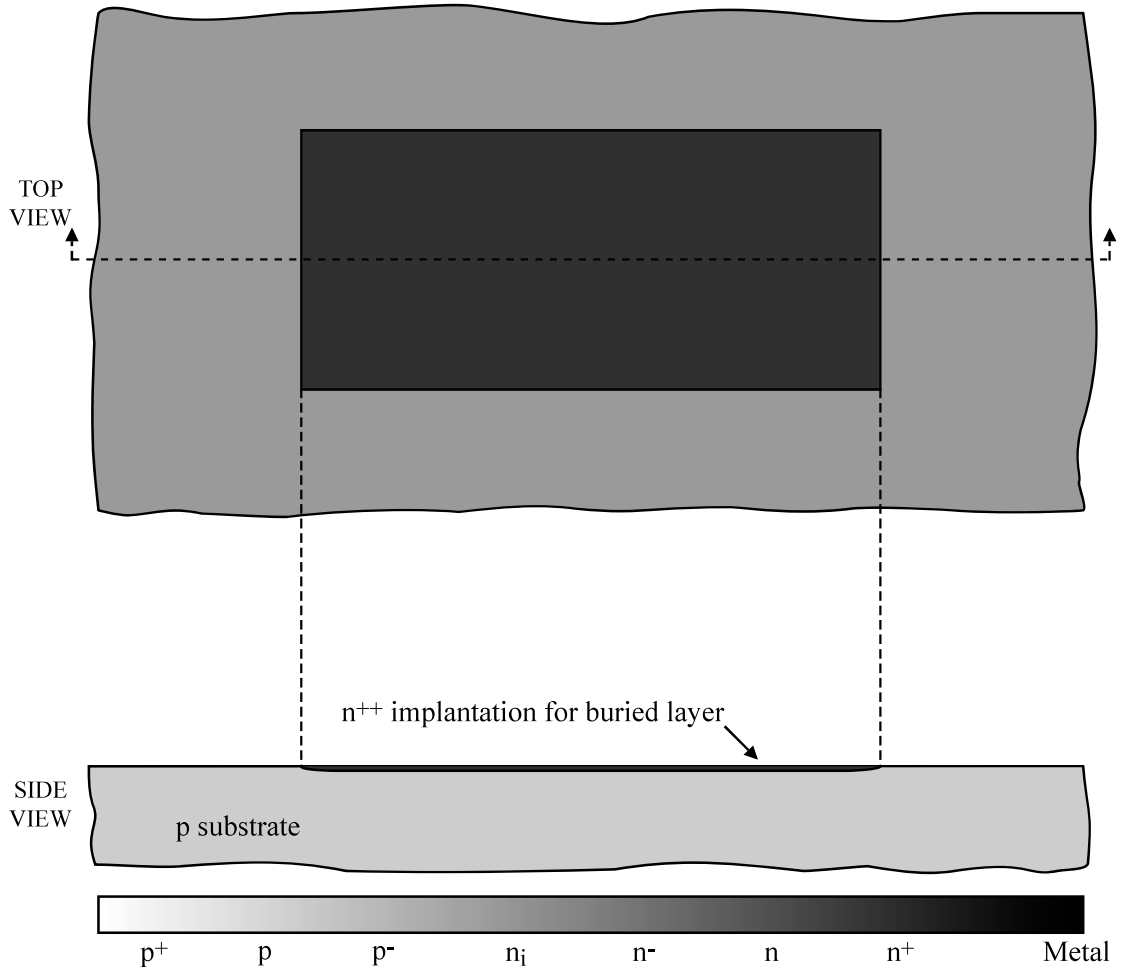


Fig.2.4-1

## Epitaxial Layer (No Mask Required)

The objective is to provide the proper *n*-type doping in which to build the *npn* BJT.

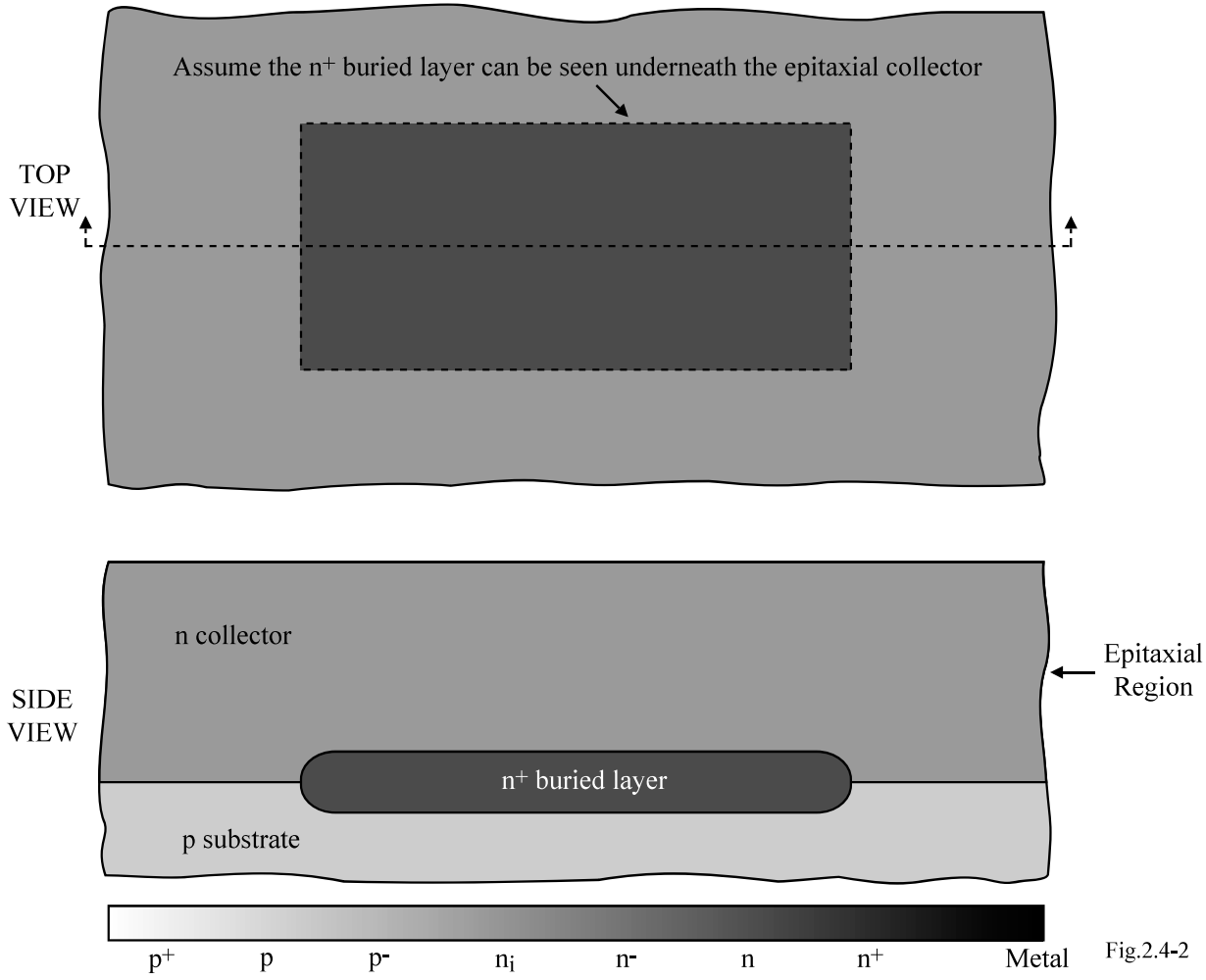


Fig.2.4-2

## $p^+$ isolation diffusion (Mask Step 2)

The objective of this step is to surround (isolate) the *npn* BJT by a $p^+$ diffusion. These regions also permit contact to the substrate from the surface.

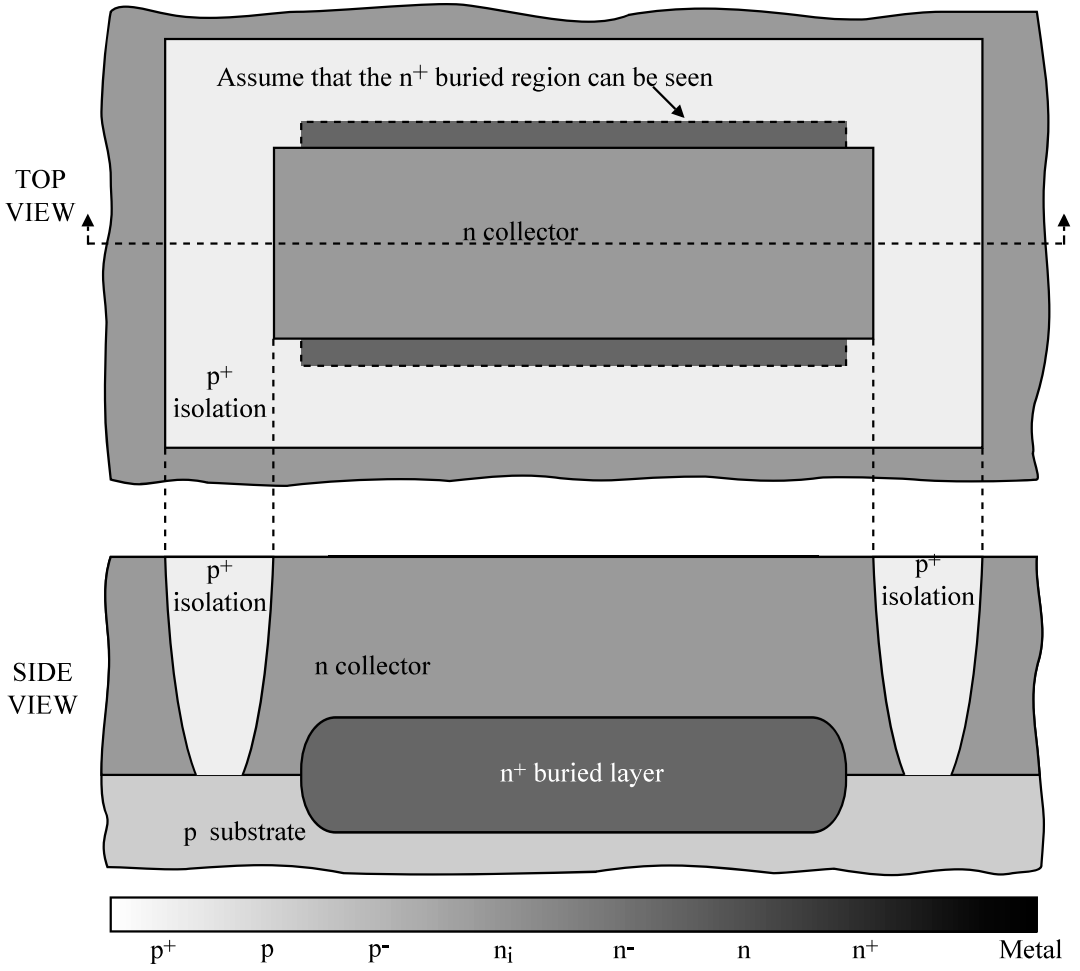


Fig.2.4-3

 

**Base *p*-type diffusion (Mask Step 3)**

The step provides the *p*-type base for the *npn* BJT.

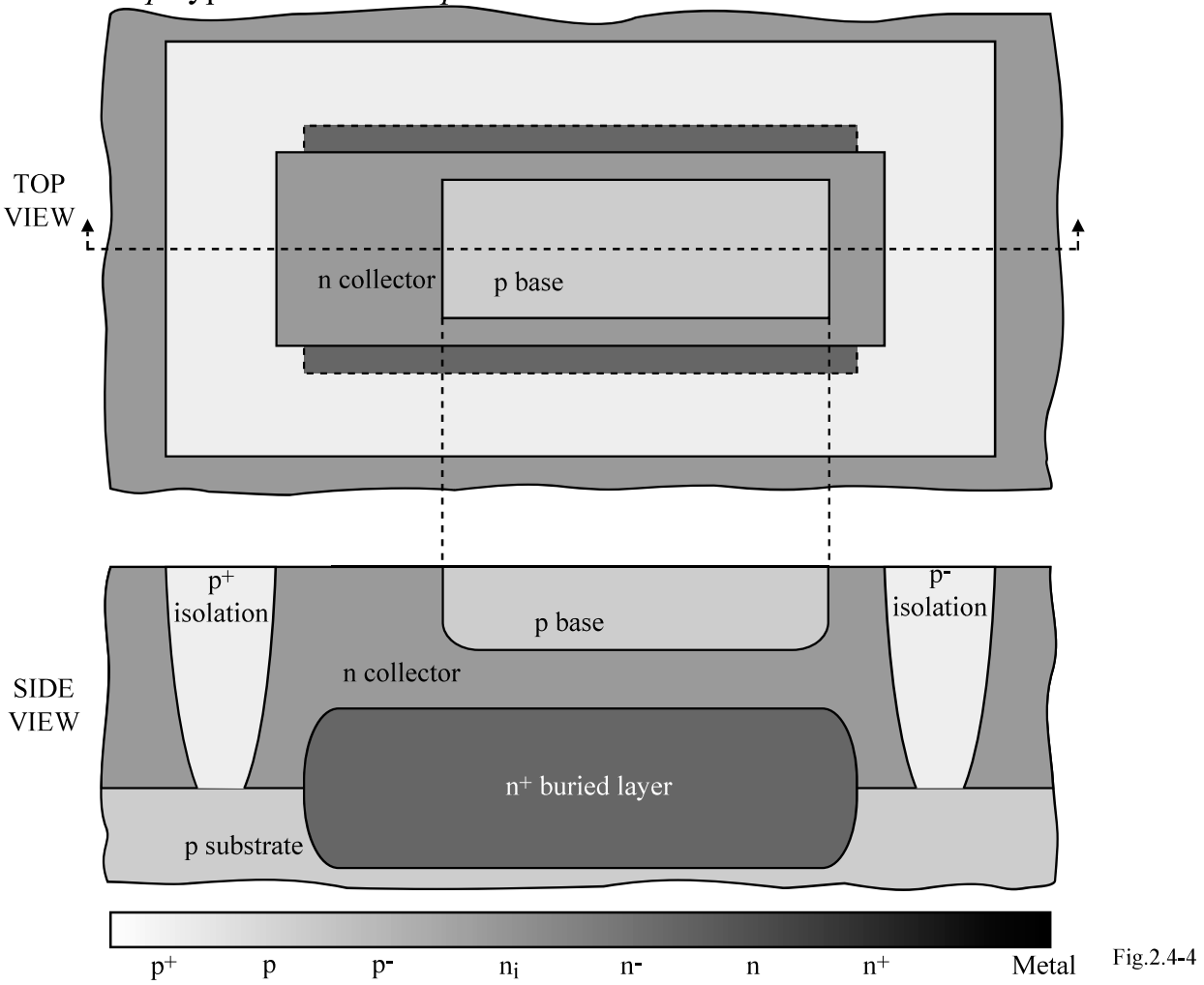


Fig.2.4-4

## Emitter $n^+$ diffusion (Mask Step 4)

This step implements the $n^+$ emitter of the *npn* BJT and the ohmic contact to the collector.

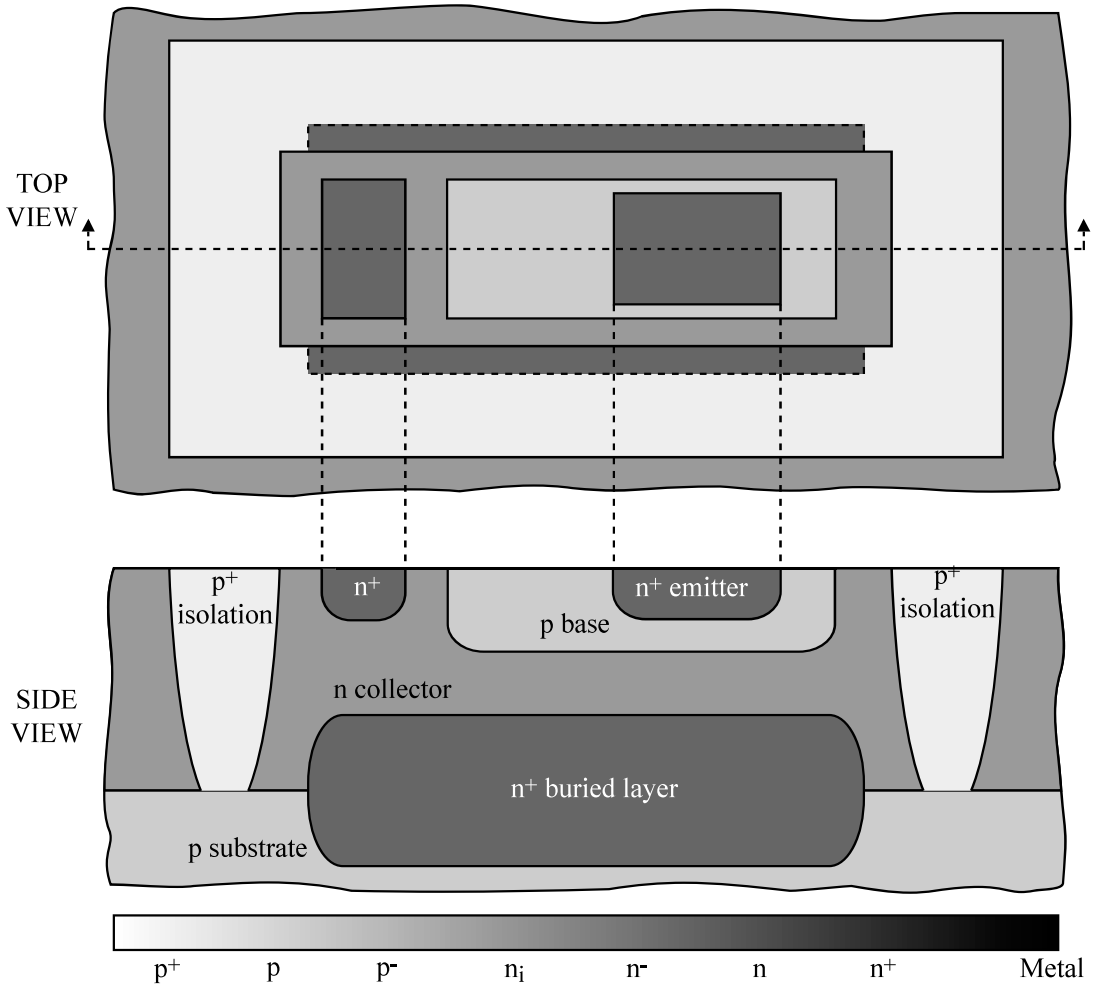


Fig.2.4-5

## $p^+$ ohmic contact (Mask Step 5)

This step permits ohmic contact to the base region if it is not doped sufficiently high.

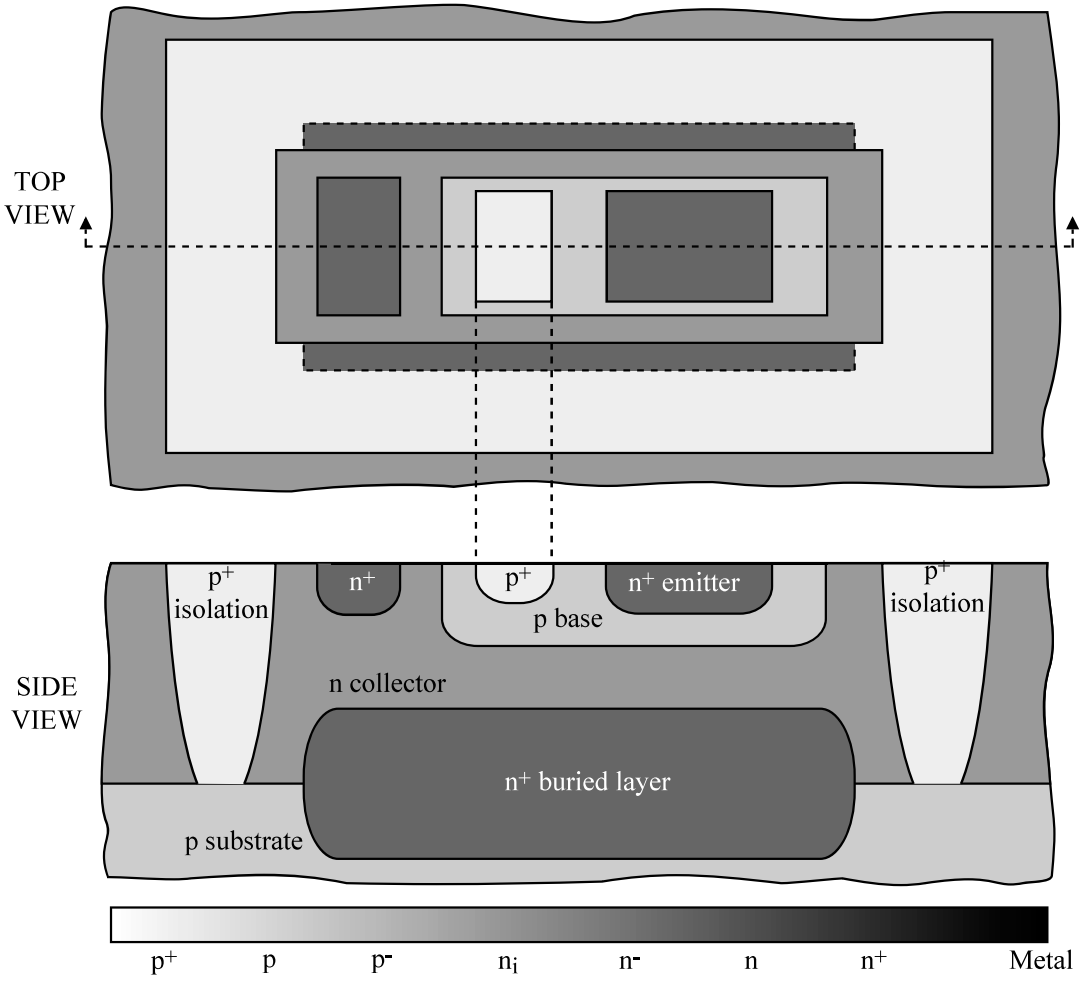


Fig.2.4-6

## Contact etching (Mask Step 6)

This step opens up the areas in the dielectric area which metal will contact.

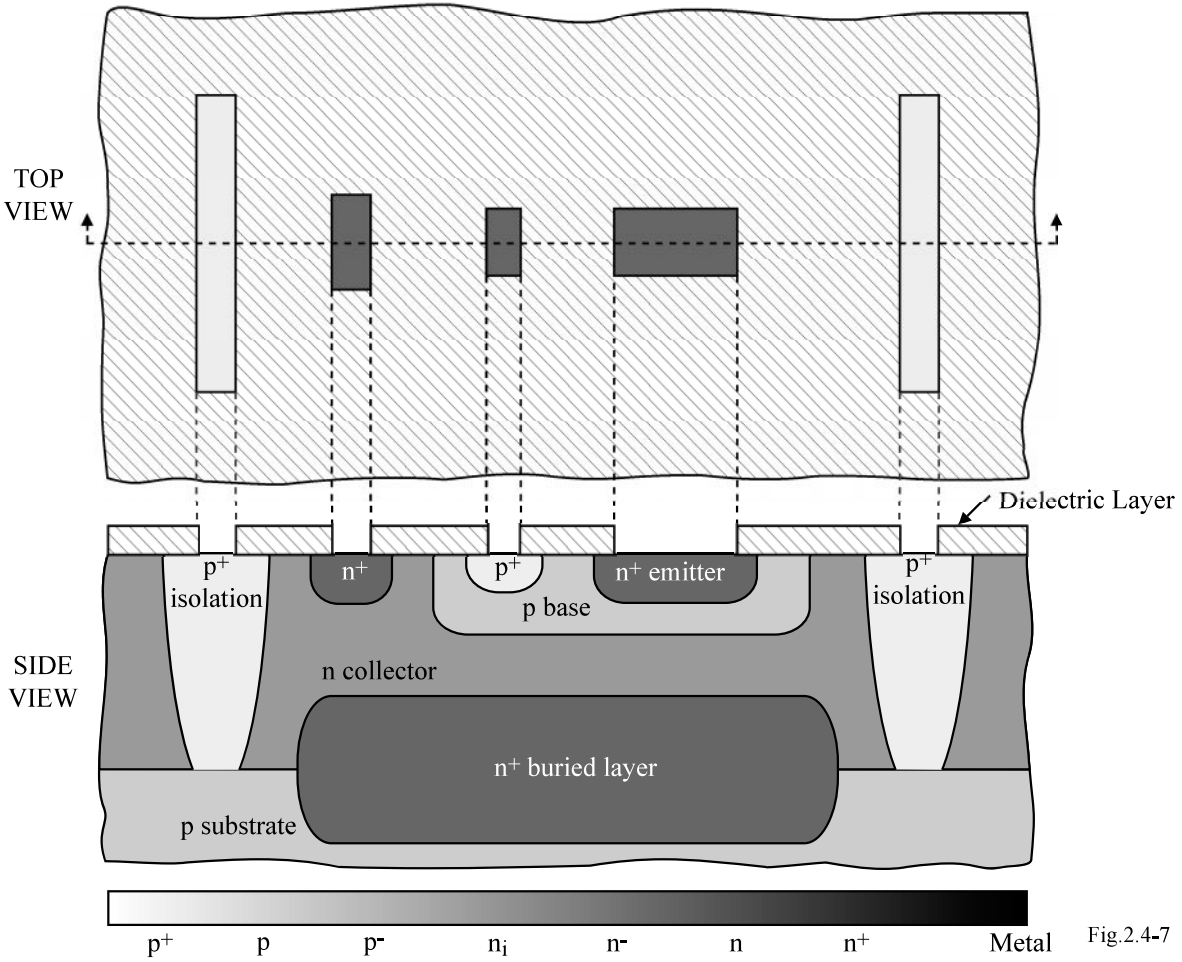


Fig.2.4-7

**Metal deposition and etching (Mask Step 7)**

In this step, the metal is deposited over the entire wafer and removed where it is not wanted.

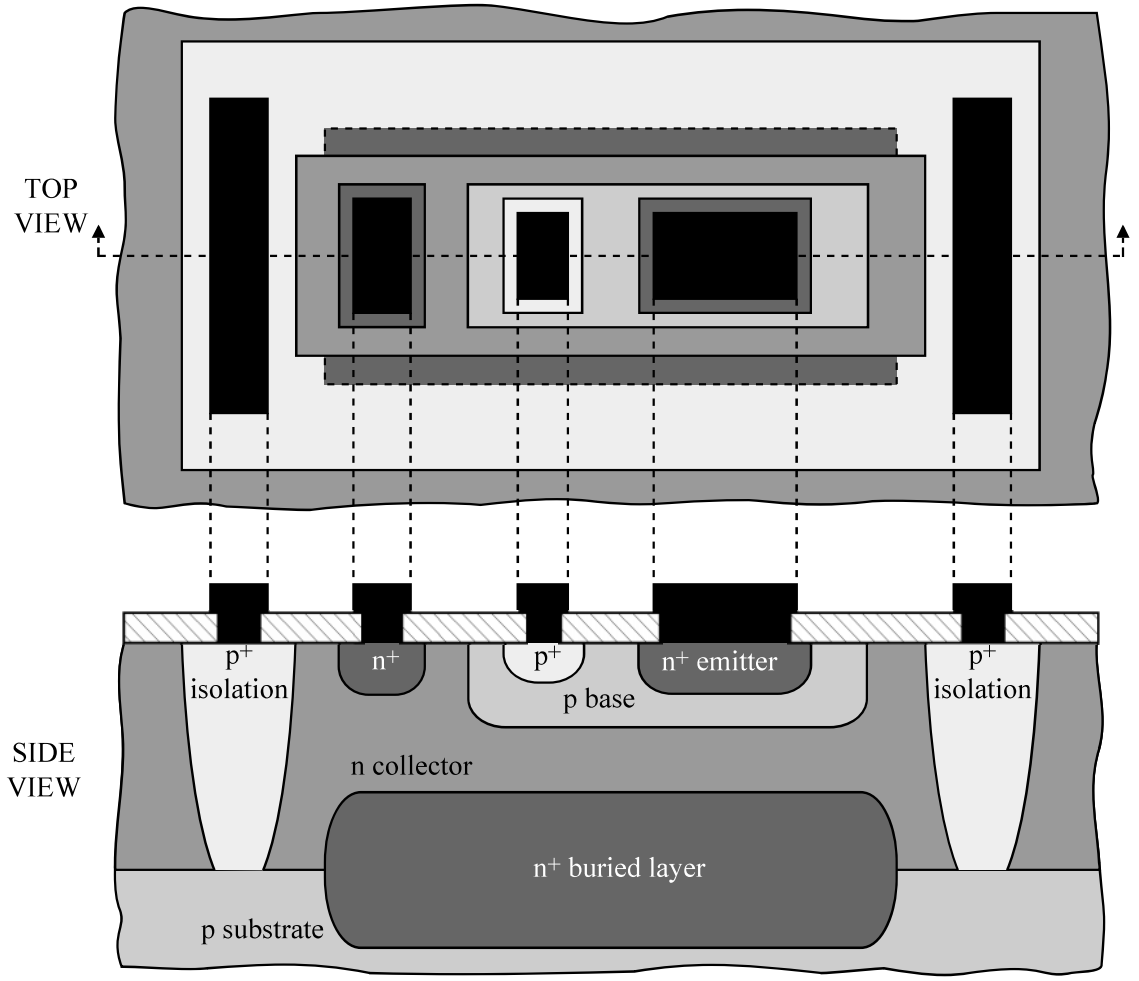


Fig.2.4-8

**Passivation (Mask Step 8)**

Covering the entire wafer with glass and opening the area over bond pads (which requires another mask).

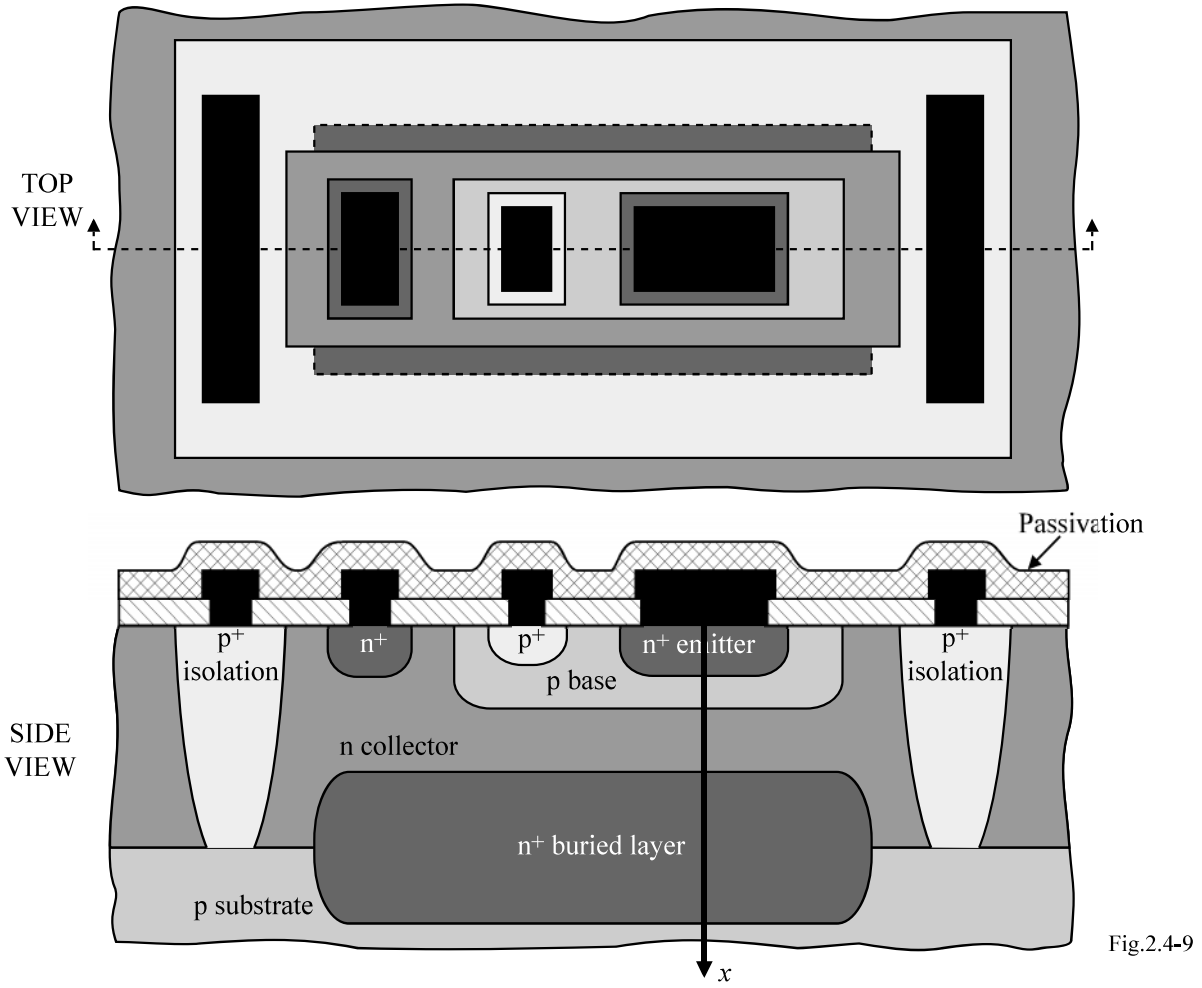


Fig.2.4-9