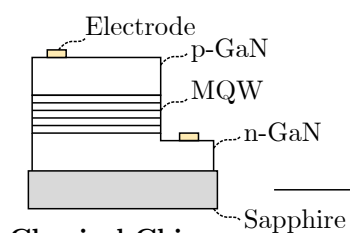
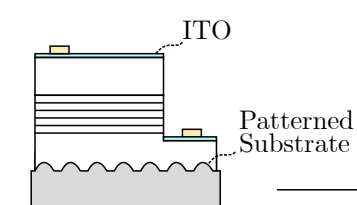


Panel A



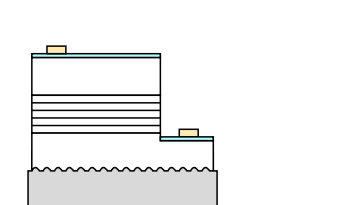
Classical Chip

Lateral Current Spreading
No Substrate Manipulation
No Surface Manipulation
Shown: Nichia, 1997



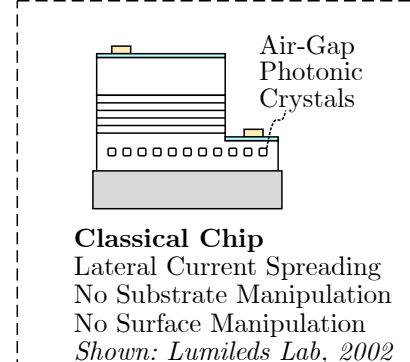
Classical Chip

Lateral Current Spreading
Patterned Sapphire Substrate
No Surface Manipulation
Shown: Nichia, 2012



Classical Chip

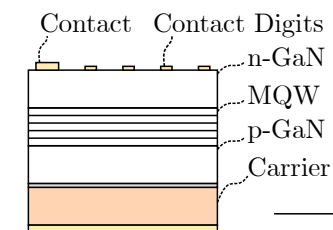
Lateral Current Spreading
Patterned Sapphire Substrate
No Surface Manipulation
Shown: Generic, 2015



Classical Chip

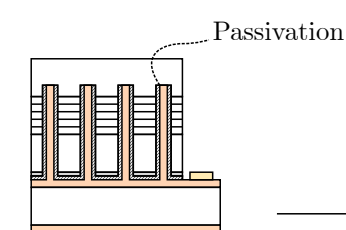
Lateral Current Spreading
No Substrate Manipulation
No Surface Manipulation
Shown: Lumileds Lab, 2002

Panel B



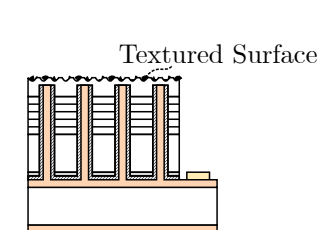
Vertical Chip

Osram Pre-UX:3 Technology
No Substrate Manipulation
No Surface Manipulation
Shown: Osram, 2000



Vertical Chip

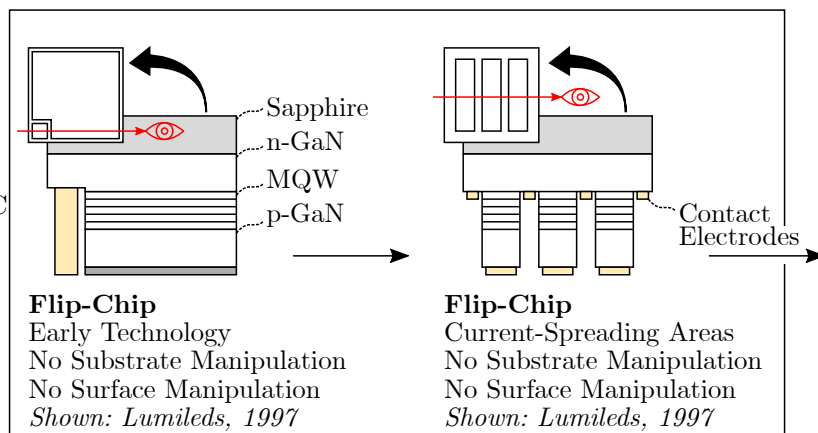
Osram UX:3 Technology
No Substrate Manipulation
(Likely) Textured Surface
Shown: Osram, 2007



Vertical Chip

Osram UX:3 Technology
Patterned Substrate
Textured Surface
Shown: Osram, 2014

Panel C

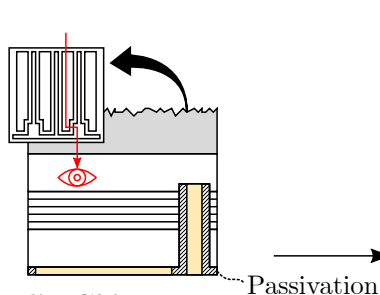


Flip-Chip

Early Technology
No Substrate Manipulation
No Surface Manipulation
Shown: Lumileds, 1997

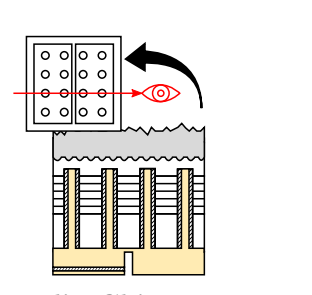
Flip-Chip

Current-Spreading Areas
No Substrate Manipulation
No Surface Manipulation
Shown: Lumileds, 1997



Flip-Chip

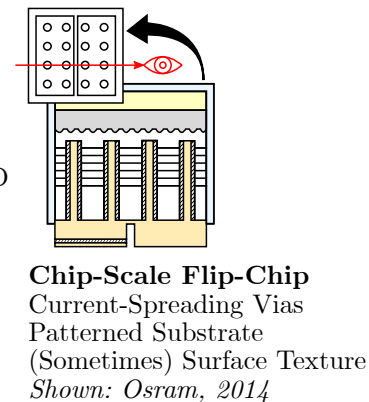
Current-Spreading Fingers
No Substrate Manipulation
Surface Texture
Shown: Lumileds, 1997



Flip-Chip

Current-Spreading Vias
Patterned Substrate
Surface Texture
Shown: Lumileds, 2014

Panel D



Chip-Scale Flip-Chip

Current-Spreading Vias
Patterned Substrate
(Sometimes) Surface Texture
Shown: Osram, 2014

Legend:

