#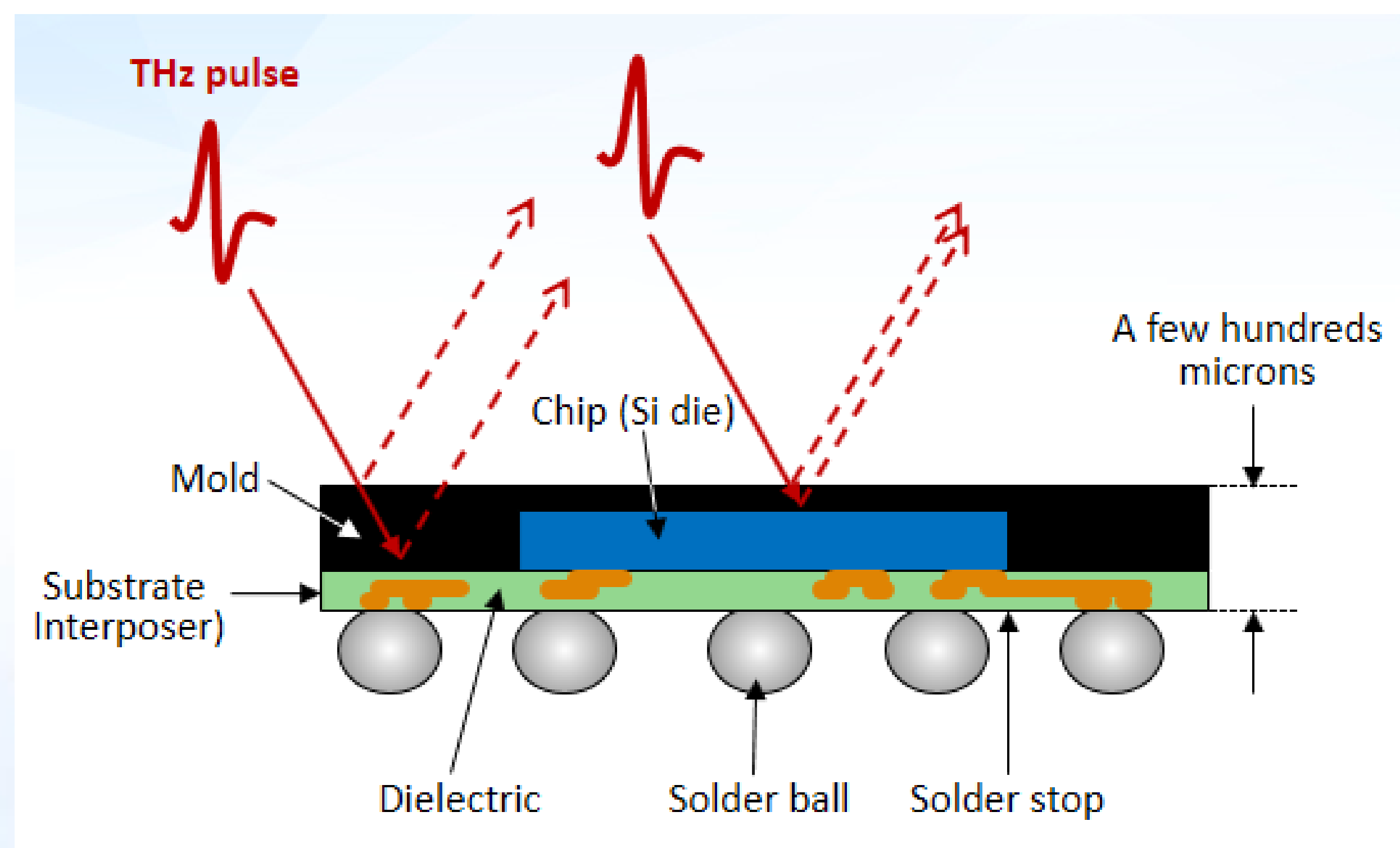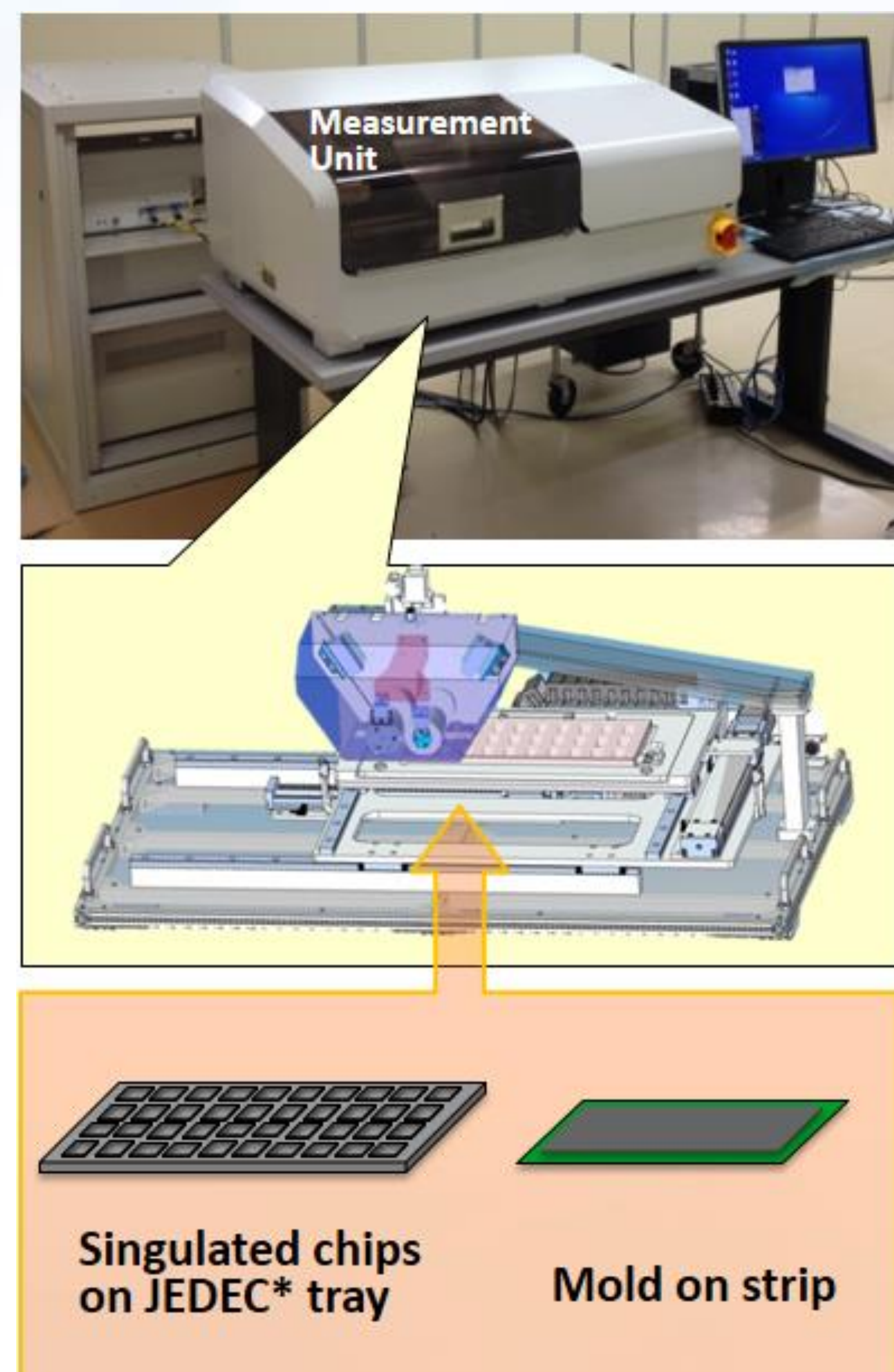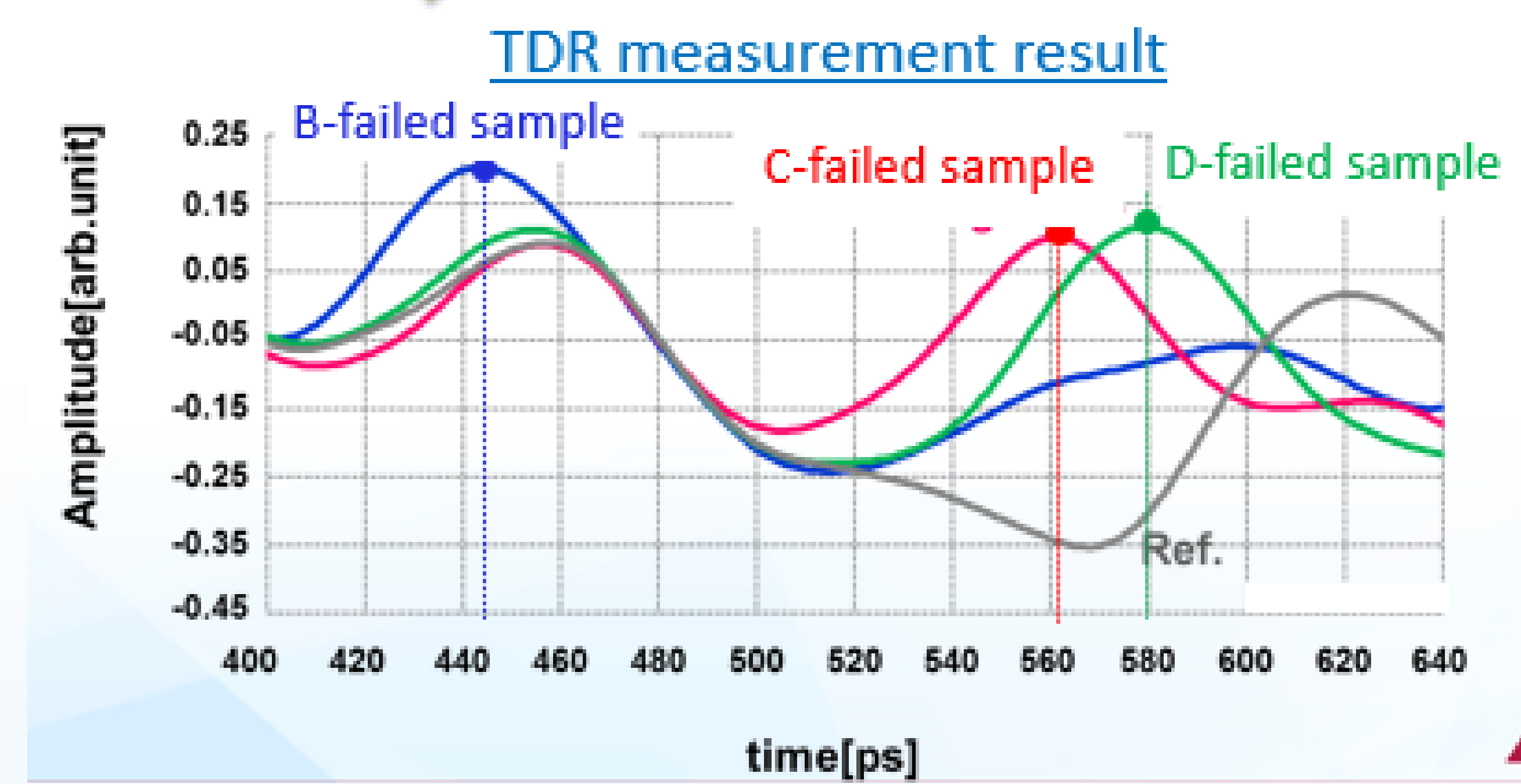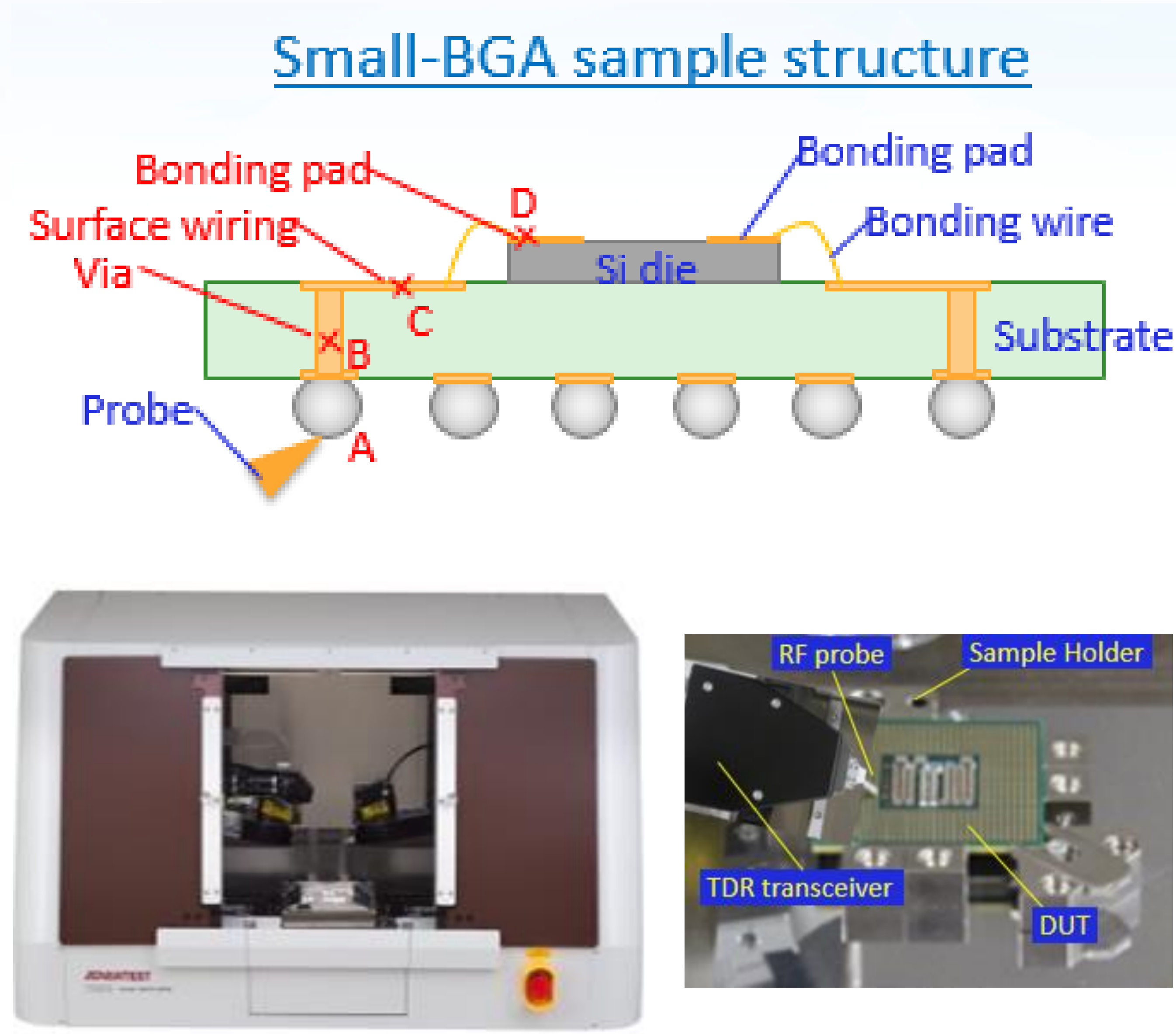 Examination of Advanced Technologies in Characterization, Diagnostics, and Verification at Different Stages in the Manufacturing Lifecycle of Packaged IC Devices



## Mold Characterization
### THz Time of Flight



**Mold Thickness Accuracy 3um**

## Electrical Diagnostics
### THz TDR



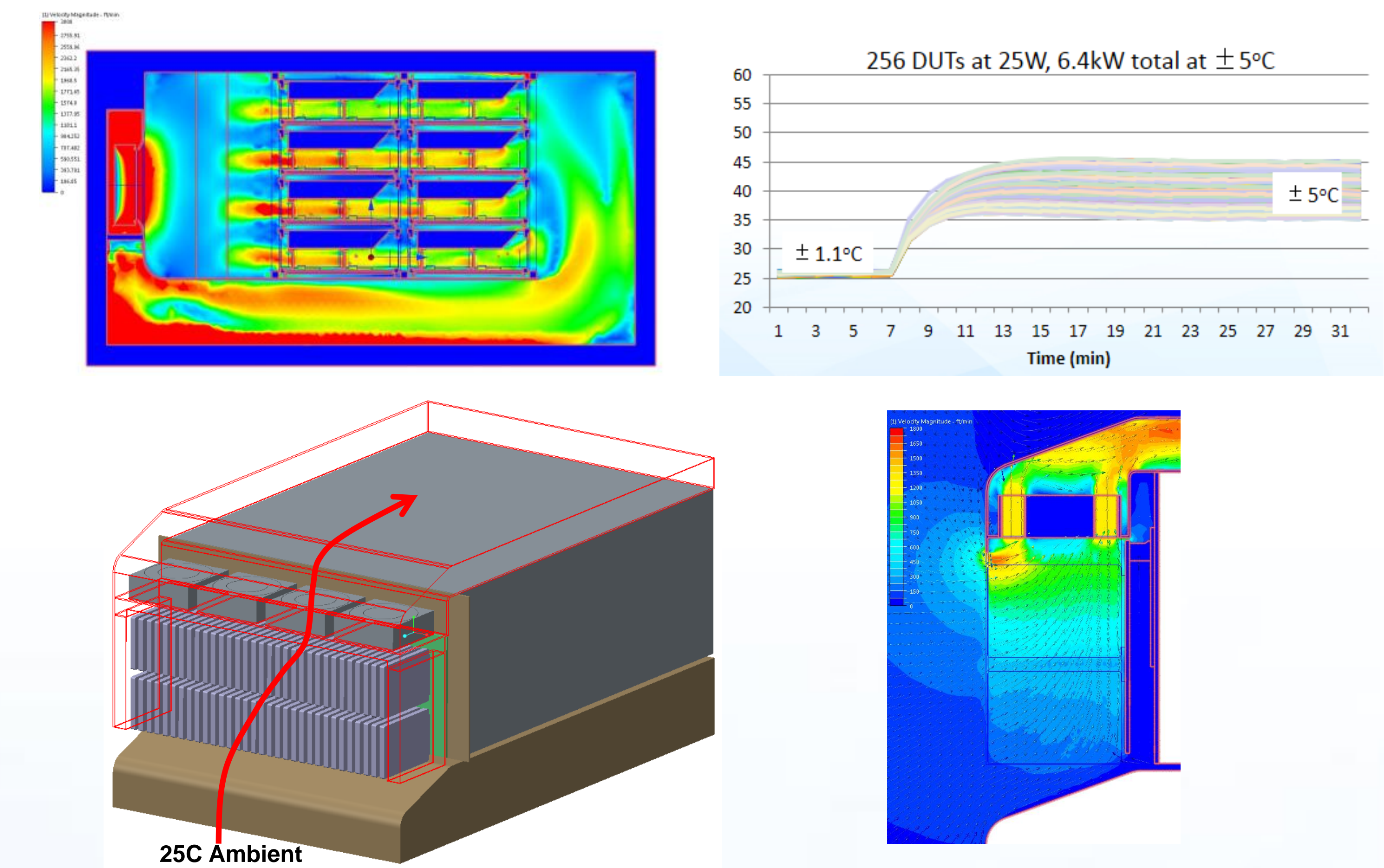**Fault Isolation Accuracy 5um**

## System Level Test
### Endurance & Production

$$Stress\ Test\ Time \propto \frac{1}{Stress\ Temperature}$$

Endurance test requires thermal accuracy and stability

$$t_f = Ae^{E_A/kT}$$

Arrhenius Equation
(Temperature Dependent Time to Fail)

$t_f$: time to fail  **A**: acceleration factor  **$E_A$**: activation energy;
**T**: temperature  $k$: Boltzmann's constant



**Active Cooling for Endurance, Closed-loop Ambient for Production**