Teststructure Pad Layout Considerations for TLP

https://www.hppi.de/

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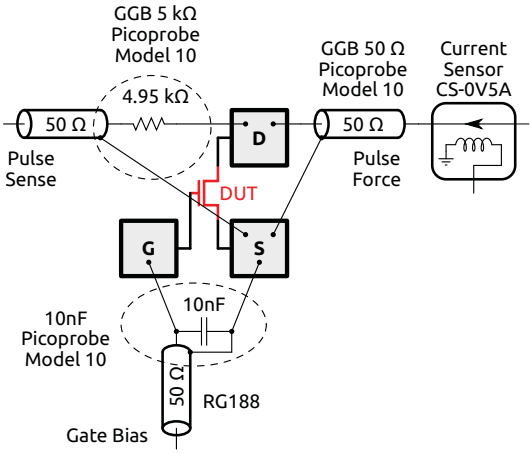
Type 1

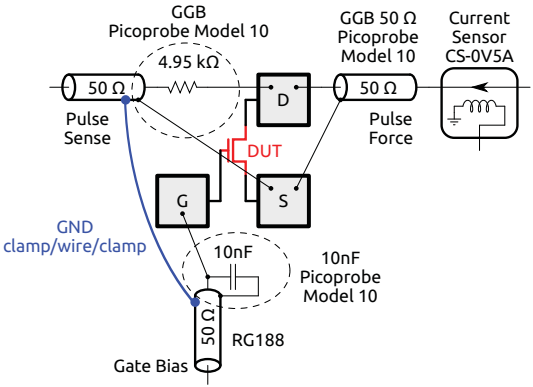
Kelvin pulse force/sense + gate bias



- classical 3 pads arrangement
- 3 micropositioners in T-configuration
- can be fixed or flex pitch
- challenge: 3 needles on source pad and 2 needles on drain pad
- therefore pads should be minimum 100 µm x 100 µm

Type 1A

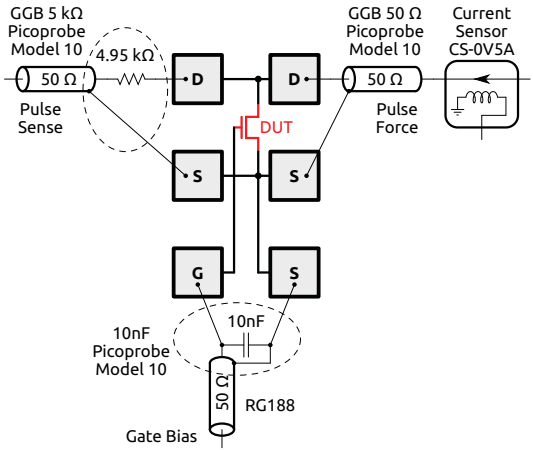
Kelvin pulse force/sense + gate bias



- gate bias GND is tapped to pulse sense GND
- therefore no gate bias GND bouncing because of no current in the pulse sense GND
- 2 needles on drain and source pad
- pads should be minimum 80 µm x 80 µm

Type 2

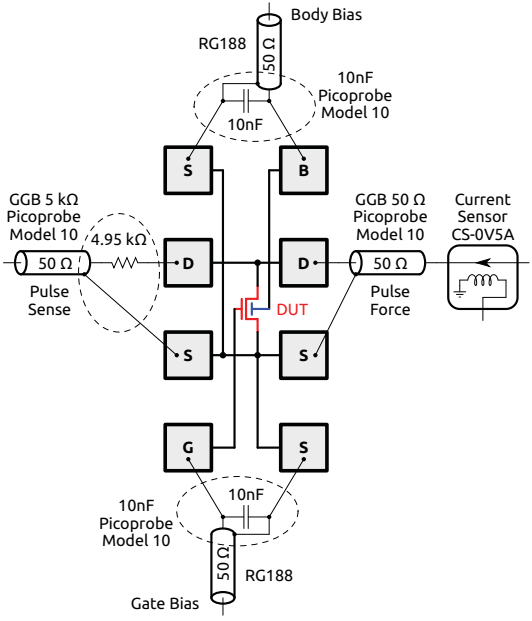
Kelvin pulse force/sense + gate bias



- better than type 1
- only 1 needle per pad
- decouple gate from drain (hot side)
- can be fixed or flex pitch

Type 3

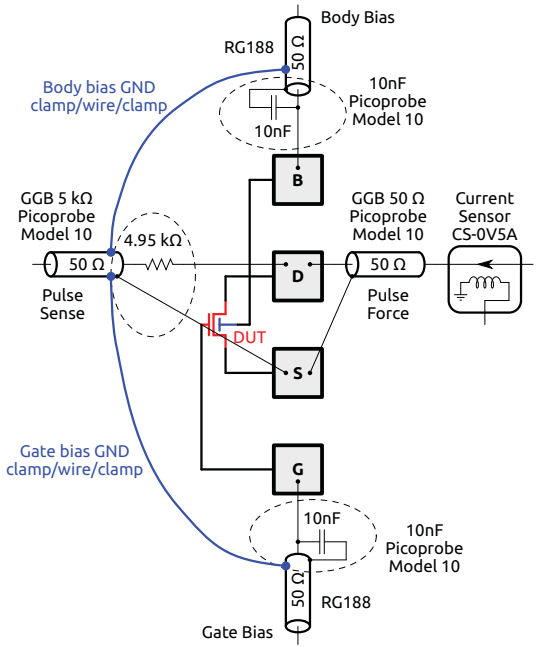
Kelvin pulse force/sense + gate bias + body bias



- gate and body bias
- can be fixed or flex pitch
- advantage: orthogonal directions of 4 micropositioners
- drawback: 8 pads and parasitic wiring

Type 4

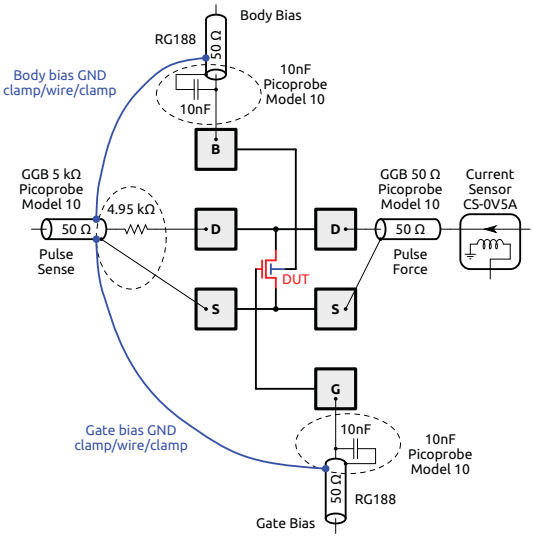
Kelvin pulse force/sense + gate bias + body bias



- gate and body bias
- gate bias GND and body bias GND are tapped to pulse sense GND
- therefore no gate or body bias GND bouncing because of no voltage drop in the pulse sense GND
- less chip area consumption

Type 4A

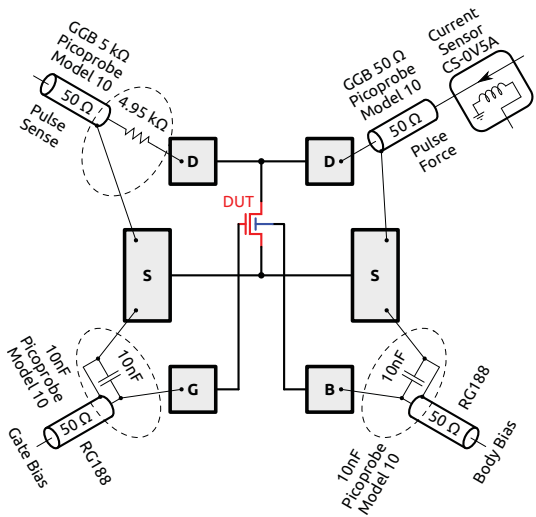
Kelvin pulse force/sense + gate bias + body bias



- gate and body bias
- only one needle per pad
- gate bias GND and body bias GND are tapped to pulse sense GND
- therefore no gate or body bias GND bouncing because of no voltage drop in the pulse sense GND
- can be string together to save area

Type 5

Kelvin pulse force/sense + gate bias + body bias



- gate and body bias
- enlarged and exposed source pads
- works on all probe stations, because of only east/west and no north/south arrangement of micropositioners
- fixed pitch probes preferred

Conclusions

- type 2 and 3 are useful for convenient probing also at fixed pitch
- type 4 is most area efficient
- type 4A is better because of one needle per pad
- type 5 is universal and works on all type of probe stations and avoids additional GND clamps