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Stamped spring probe pins and Coax socket manufacturing at low cost

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Objectives

- Rules to make Coax socket performing at high frequency

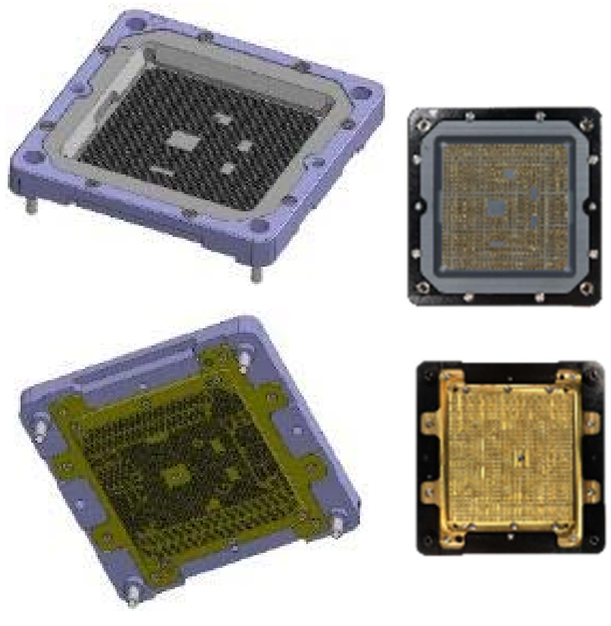
(Not all of Coax socket demonstrate high performance.)

- To make Coax socket at low cost
- To make coax socket for finer pitch, 0.35 mm pitch
- Signal integrity meeting -1 db @ 73 GHz

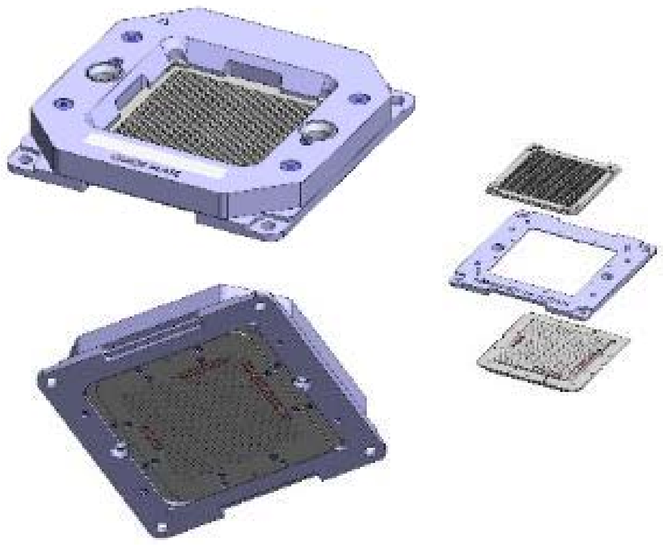
Design considerations

- Selection of pin for signal and ground
- Isolation between signal pins and housing design
- Housing design for ground pins – Ground pad with ground pins embedded

Various kinds of Coax socket



Coax socket with isolation inserts



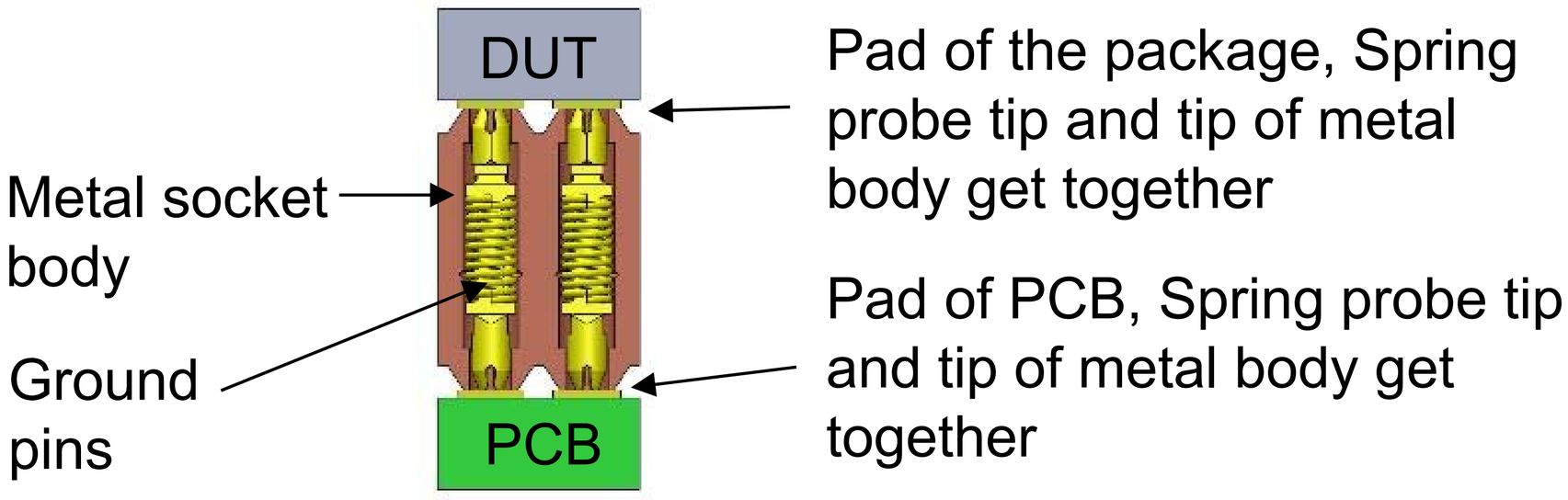
Partial coax sockets

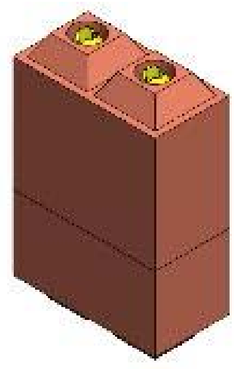
Coax socket without any isolation insert

Major consideration in selection of spring probe pin

- **Signal pin : Selection of a pin with high signal integrity is critical**
- **Ground pin : High current carrying is not critical, but preferred**
- **High pin count socket needs a longer pin : Need a pin structure to maintain high performance in spite of longer length**

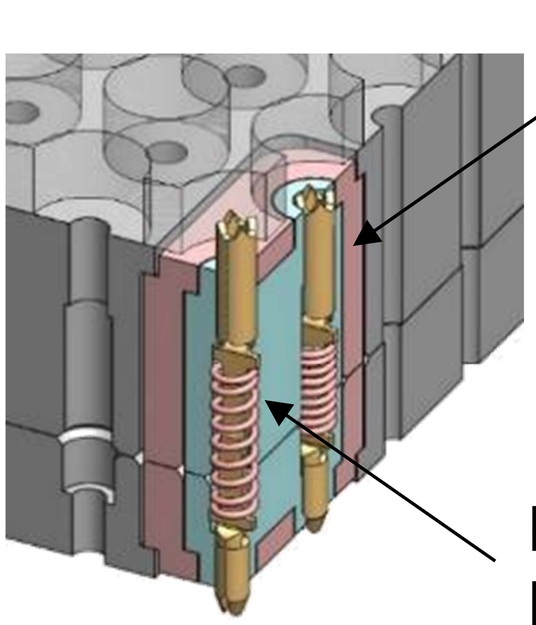
Ground pads embedded with ground pins





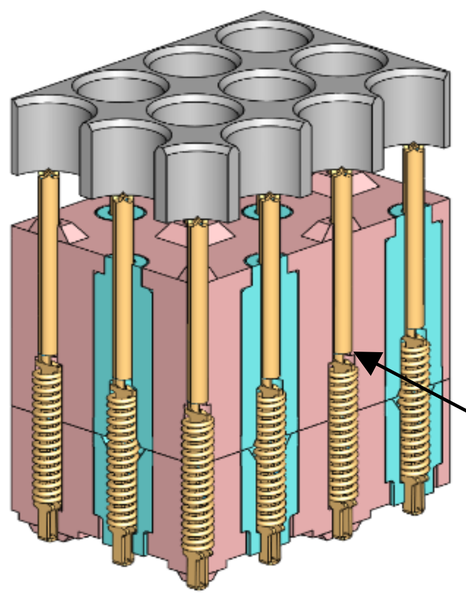
Differential signaling

Shall <u>not</u> have metal isolation wall between signal pins

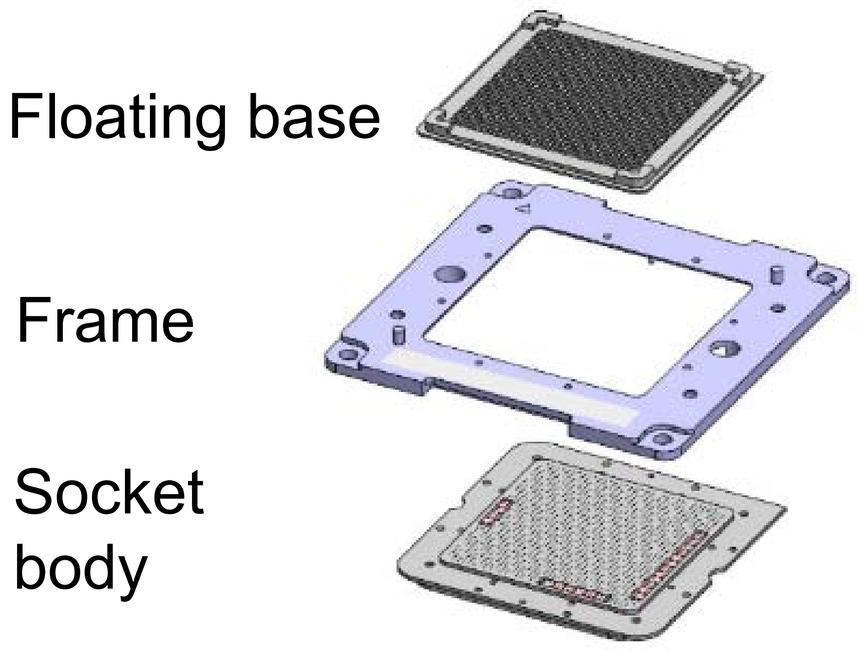


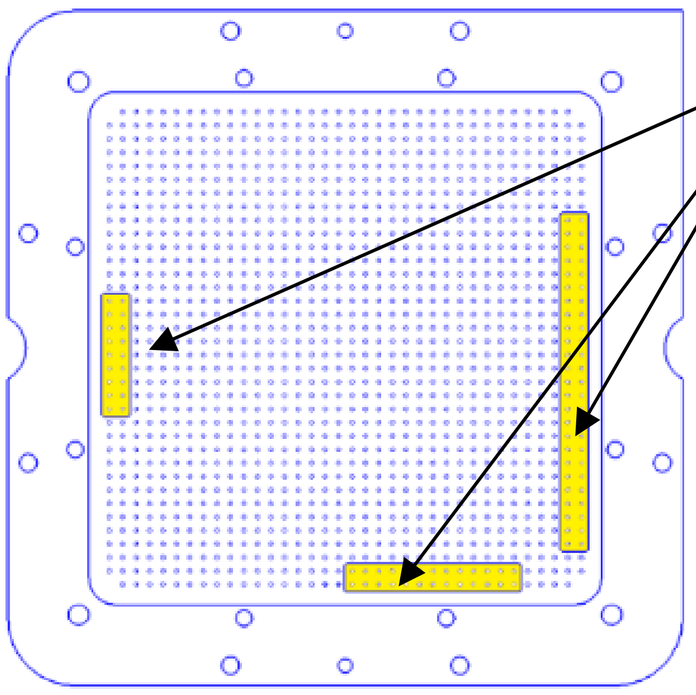
Single ended signaling

Shall have metal Isolation wall (grounded wall) between signal pins



Partial coax socket





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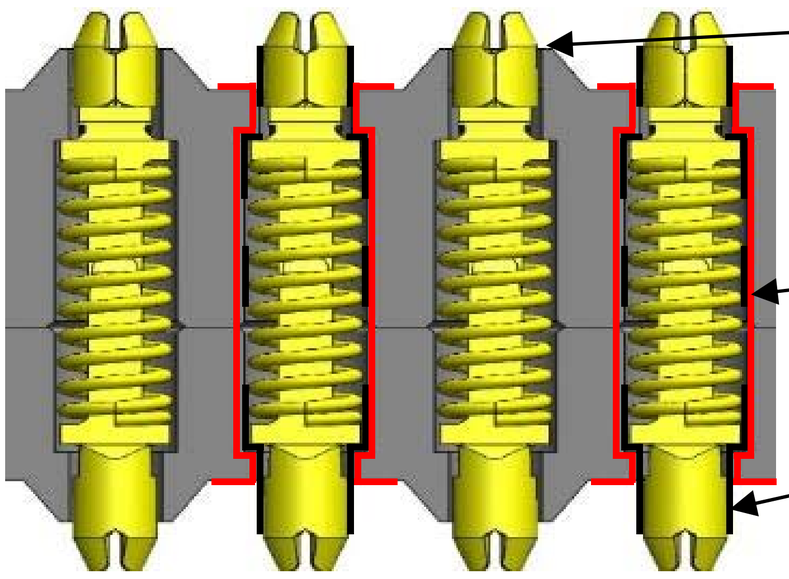
Coax socket with isolation coats for finer pitch

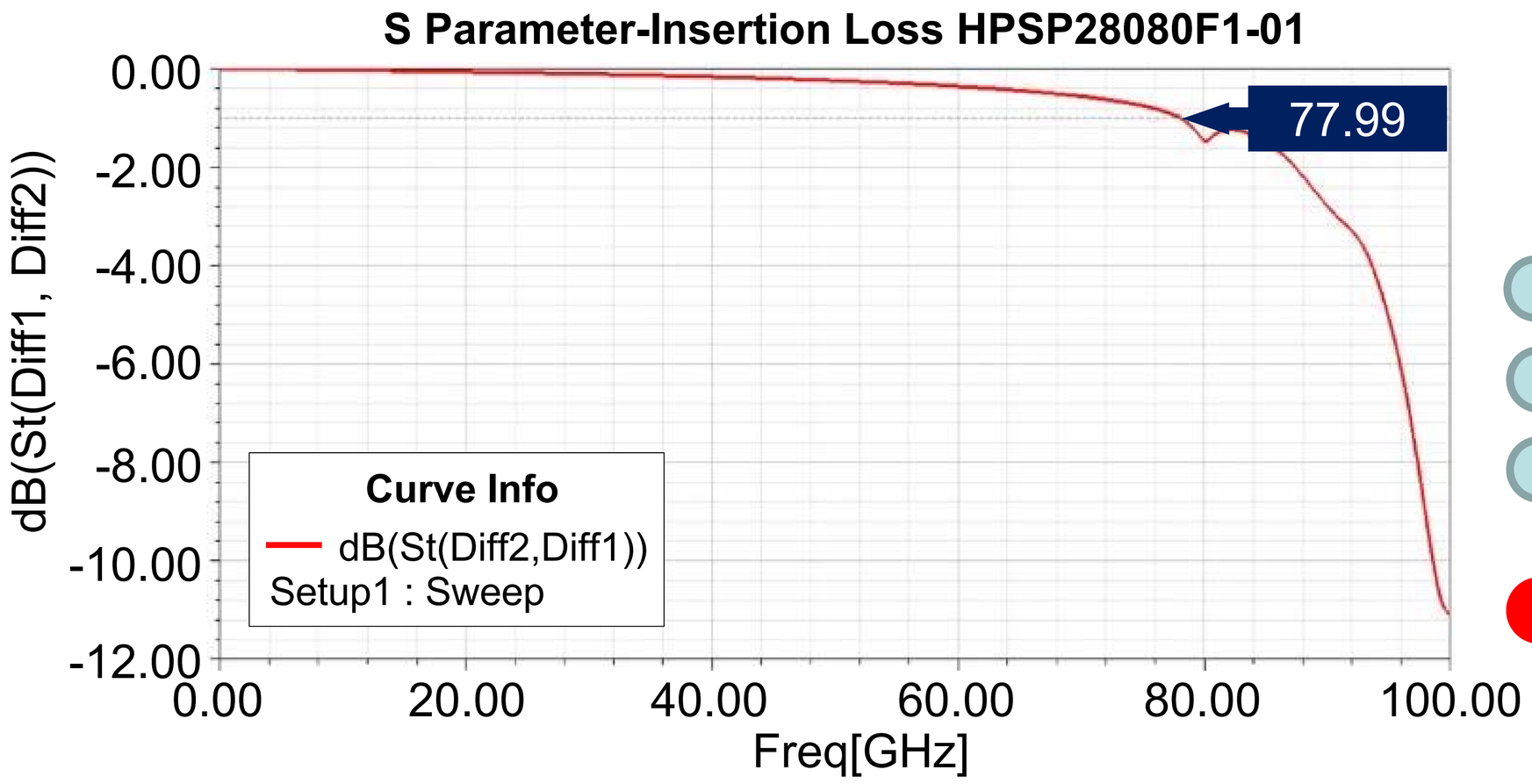


Top/bottom tips of socket body gold plated (Grounding) – Yellow color

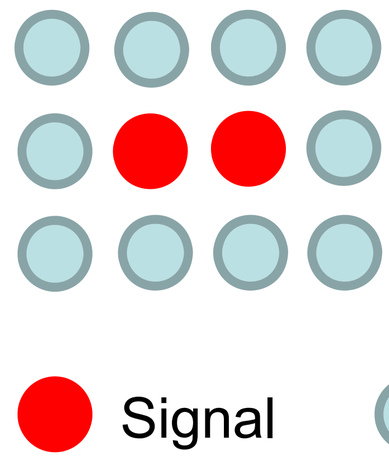
Inside of hole for signal pins shall have isolation coating – Red color

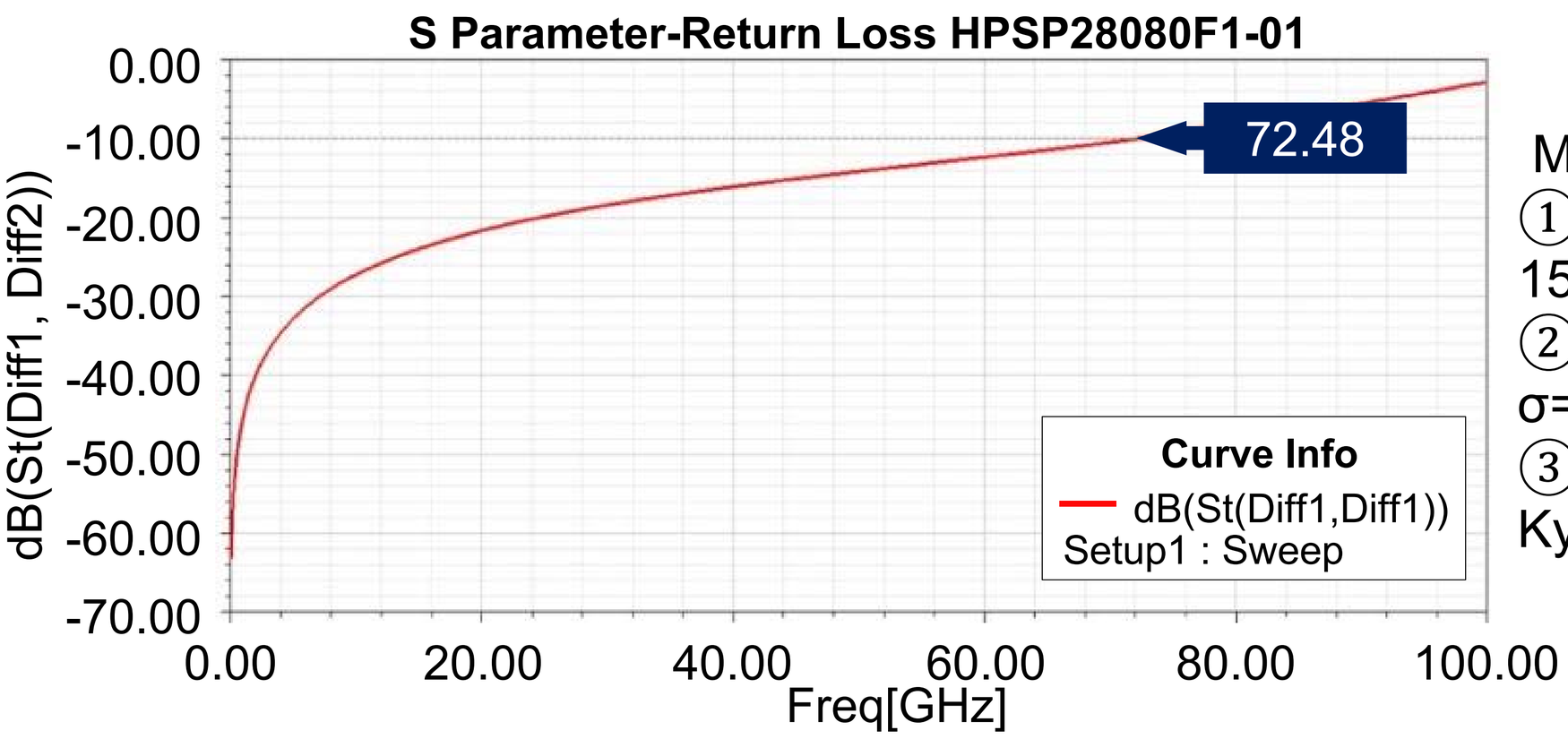
Side contact part of spring probe pin shall have isolation coating – Black color

Signal integrity at High test speed (-1db@78GHz insertion loss)



Pattern ; Differential signaling





Material selection

① Contact: BeCu17200 1/2H 15% IACS(σ=8.7X10^6 S/m)

② Spring: SWP-H, σ=4.9X10^6 S/m

③ Housing: Ceramic PEEK Kyron 2204, ε_r = 3.5

Summary and the next step

- Selection of high performance spring probe pin is critical
- Should be no metal wall between signal pins at differential signaling
- Should be metal between single ended signaling
- For a coax socket without isolation inserts, further experiments and reliability test are needed ; by June of 2019

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