XPEEDIC
ACCELERATE YOUR IC DESIGN

XFILTER

Turnkey Filter Solution for RF Front-End Module Designs

Highlights

1. RF front-end for 5G NR requires integrated filters with wide bandwidth, deep rejection, high power handling, low cost, and flexibility for various deployments. To meet such diversified demands, various types of filter technologies are required including SAW, BAW, LTCC, IPD and etc.

2. XFilter, Xpeedic's turnkey filter solution, offers one-stop customized design services to RF front-end module and system customers in the mobile and IoT market for their filter needs.

3. XFilter offers a broad portfolio of diversified filter technologies including IPD, SAW, BAW, and hybrid.

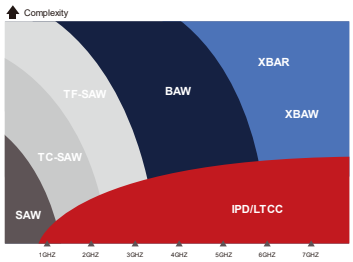
4. XFilter has a proven track record in delivering the best filters to those RF front-end module and system customers. The total of volume production has exceeded **one billion units**.

5. XFilter takes advantages of Xpeedic's own dedicated EDA flow to achieve quick turnaround time and first-pass design success.

Unique Turnkey Filter Solution

- One-stop shop for your filter needs
- Strong foundry ecosystem partnership
- Filter-on-demand customized filter design

Diversified Filter Technologies



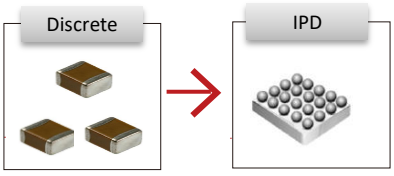
IPD BAW SAW

- Support multiple filter technologies with design capability and foundry resources

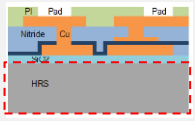
IPD-Integrated Passive Device

IPD advantages over discrete

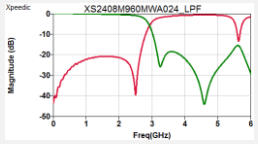
- Miniaturization
- High consistency
- Low cost
- High integration



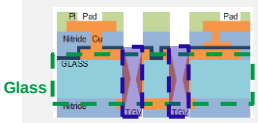
High resistivity silicon (HRSi) based IPD



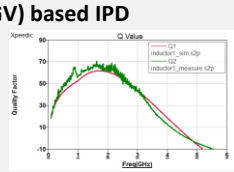
High Resistivity Silicon (HRSi)



Through-glass-via (TGV) based IPD

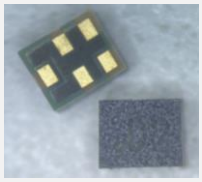


Through Glass Via (TGV)

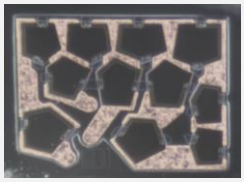


Acoustic Filter

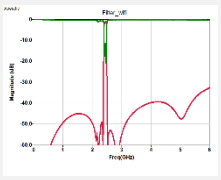
Typical FBAR Device
Sharp rejection and narrow bandwidth



Xpeedic FBAR device, packaged



Xpeedic FBAR wifi filter die



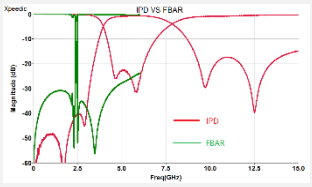
Xpeedic FBAR wifi filter performance

Hybrid Filter

IPD
Flexibility
Wider bandwidth

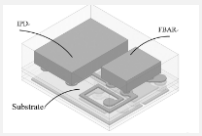
FBAR
Very high Q
Deep/sharp rejection
Narrow bandwidth

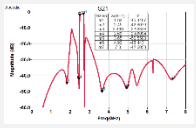
IPD+FBAR
To bring together flexibility, high Q and great power rate



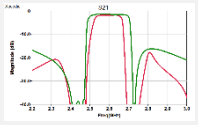
Hybrid filter solution –N41

IPD+FBAR -> wideband N41 filter
- IPD helps get wider bandwidth with k_{eff}^2~0.6 AlN FBAR
- IPD helps get 20dB more harmonic rejection
- IPD helps get higher power rate with lower acoustic loss

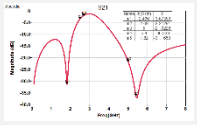




IPD+FBAR N41 filter



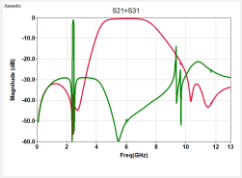
FBAR alone vs. FBAR+IPD

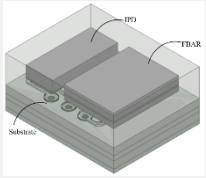


IPD helps out-of-band rejection

Hybrid filter solution –Antenna Multiplexer

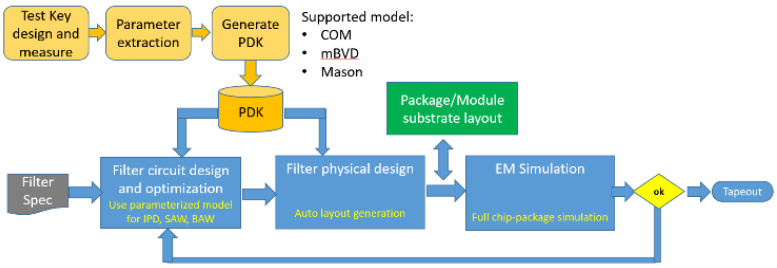
- IPD+FBAR -> Antenna Multiplexer
- 2.5GHz/5GHz wifi diplexer
- FBAR -> 2.5GHz narrow band filtering
- IPD -> 5GHz wide band filtering





Dedicated EDA Flow for Filter Designs

- PDK model generation with various acoustic models being supported
- Circuit and EM simulation
- Auto layout generation
- Co-simulation (circuit-EM, die-package)



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