

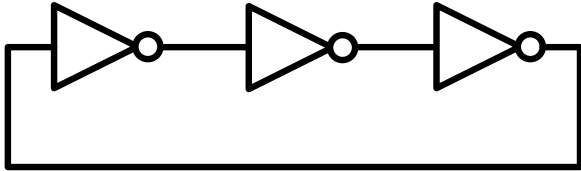
A PVT-robust Feedback Class-C VCO Using an Oscillation Swing Enhancement Technique

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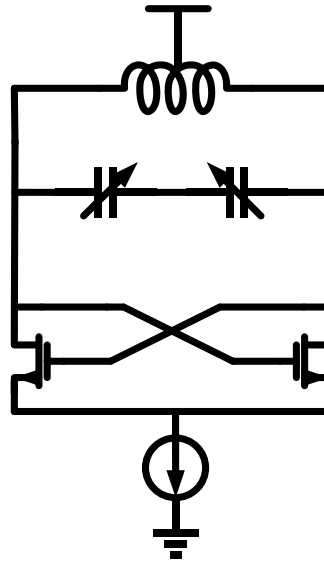
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Existing Topologies

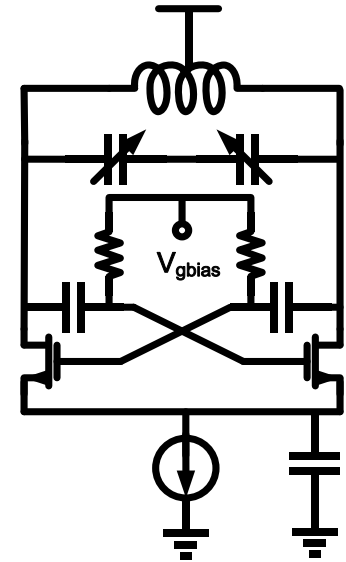
Ring Oscillator



LC-VCO



Class-C VCO



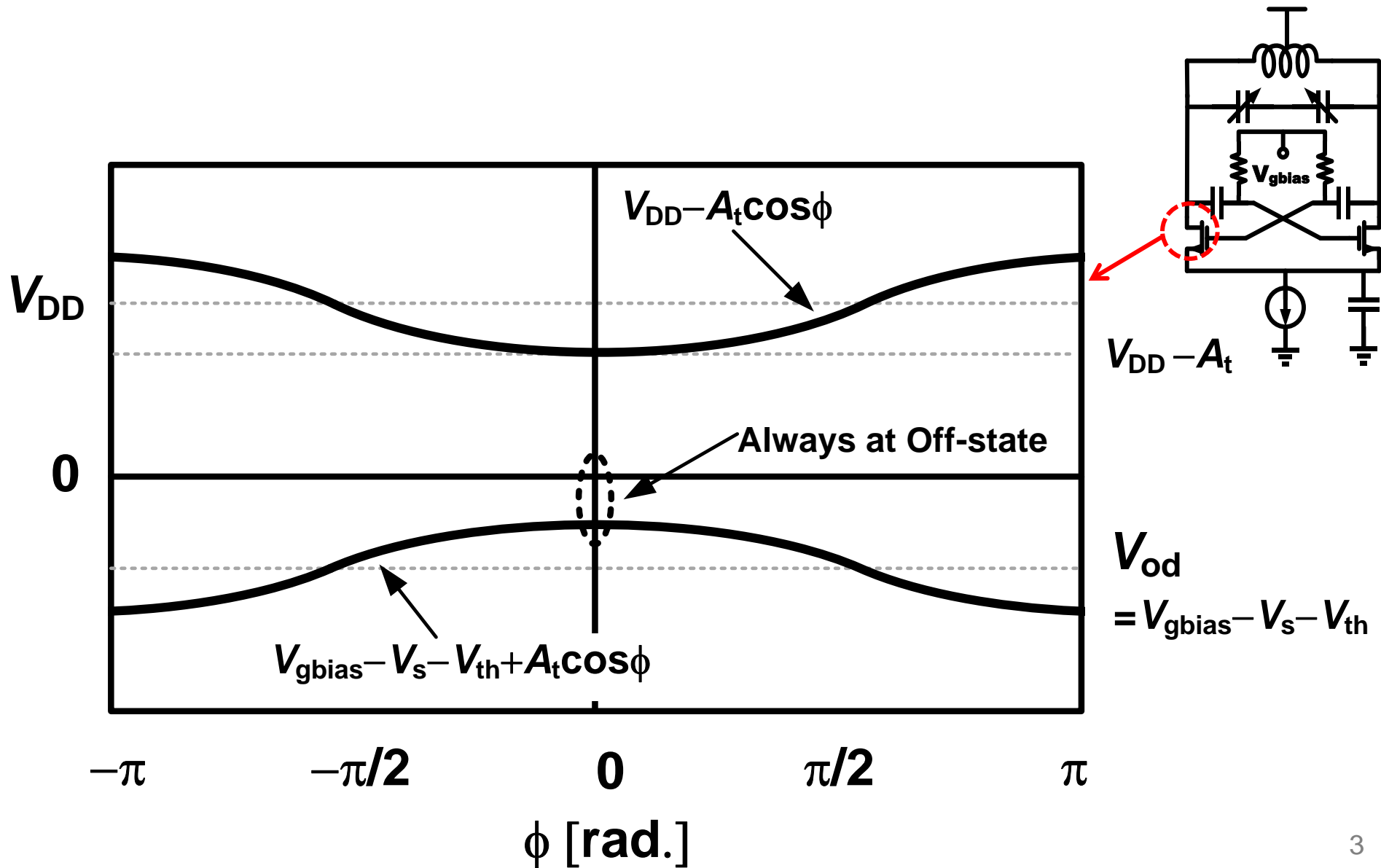
😊 Compact

- Suitable for **clock generation**

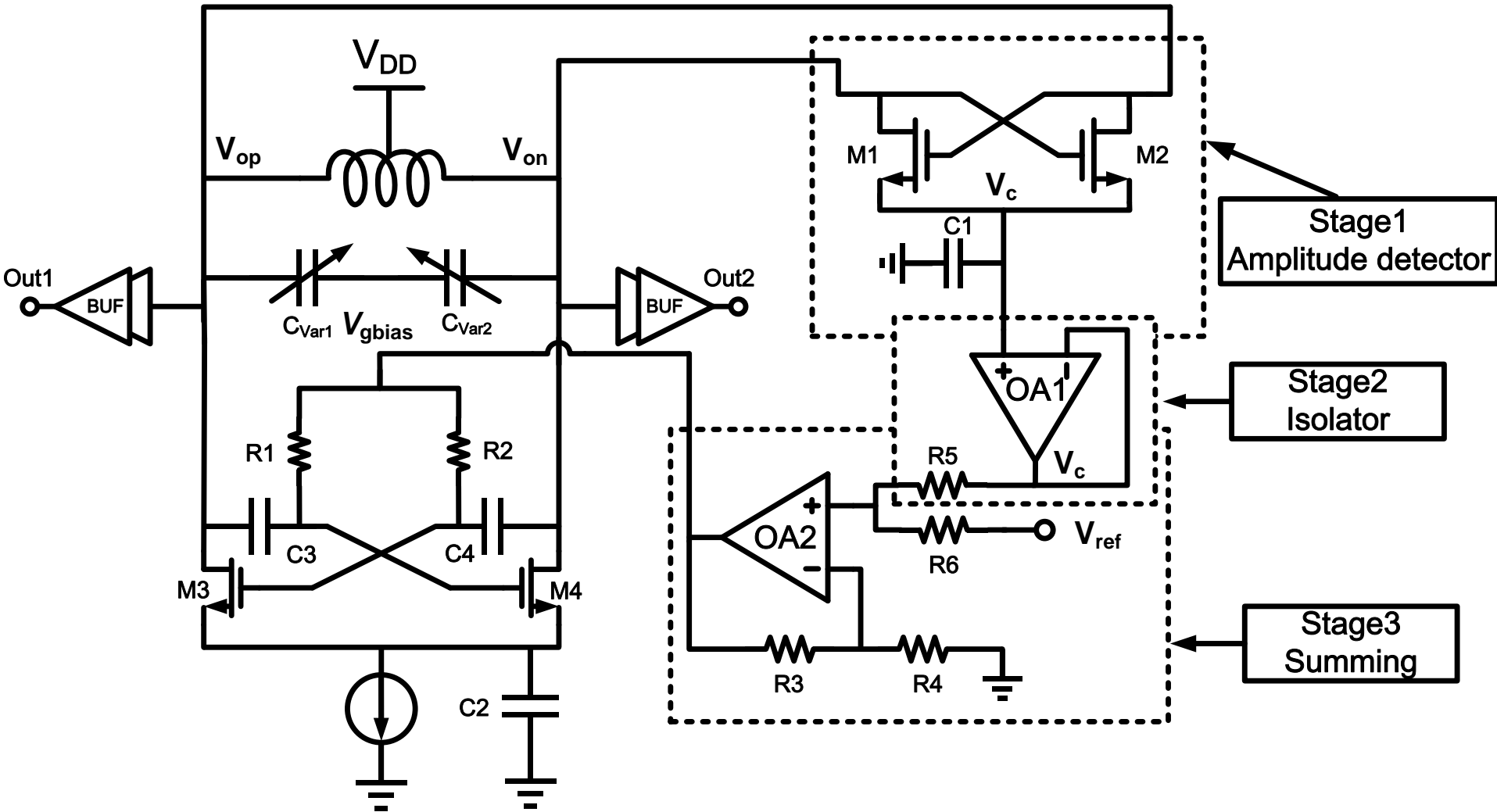
😊 Low phase noise

- Suitable for **frequency synthesis**

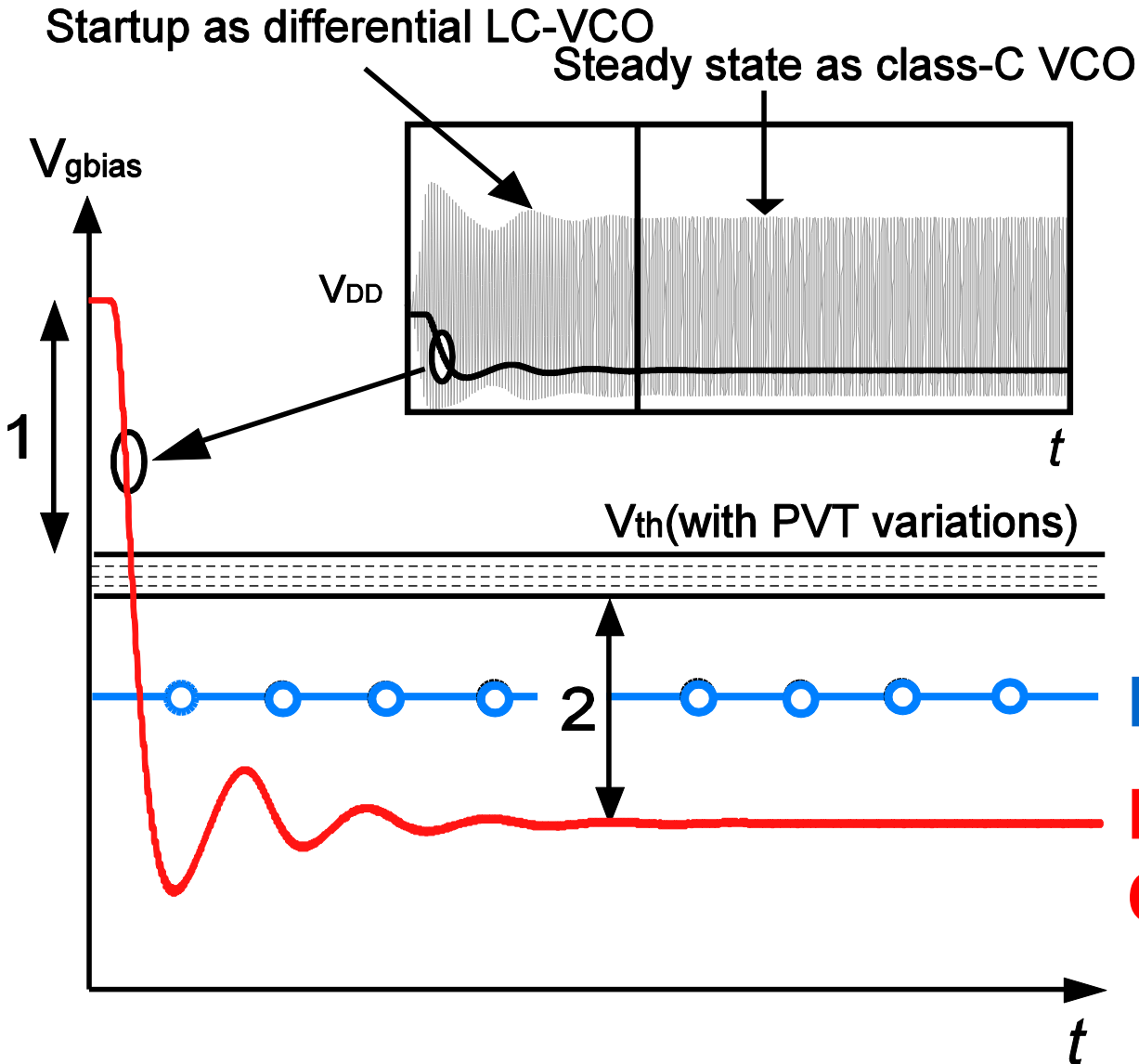
Startup Issue



Proposed Feedback Class-C VCO



Transient Simulation



1. Robust Startup

2. Enhanced Swing

Present Class-C

Proposed Feedback Class-C

Comparison and Conclusion

	CMOS Process	Topology	Freq./Offset Freq. [GHz/MHz]	Phase Noise [dBc/Hz]	Pdc [mW]	FOM [dBc/Hz]
[1]	0.13 μ m	class-C[single]	4.9/3	-130	1.3	-196
[2]	0.18 μ m	class-C[dual]	4.5/1	-109	0.16	-190
[3]	0.18 μ m	Transformer	3.8/1	-119	0.57	-193
Conv.	0.18 μ m	class-C[single]	4.84/1	-122	3.5	-190
Proposed		class-C[feedback]	4.84/1	-125	3.4	-193

[1]ISSCC 2008 [2] VLSIC 2009 [3] JSSC 2005

- The proposed VCO can be well suited for PVT-robustness PLLs in wireline and wireless systems.