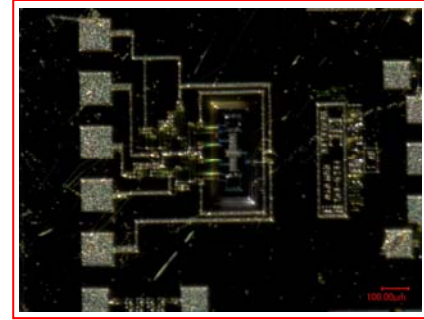
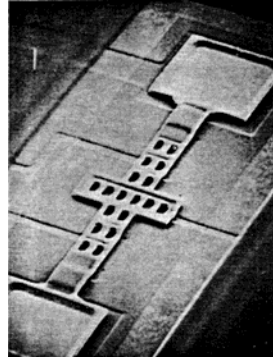
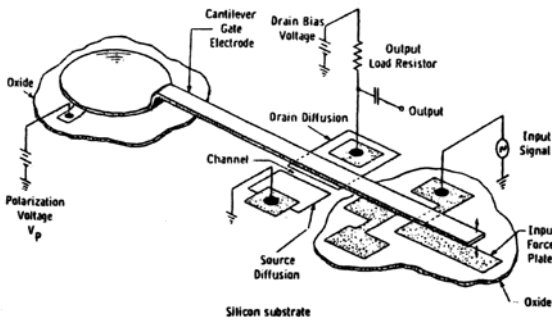


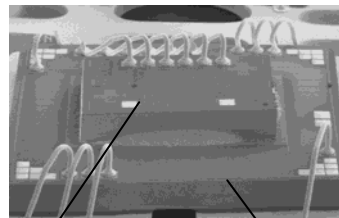
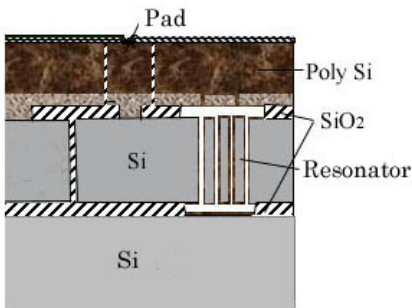
MEMS Resonator (USA)



Resonant gate transistor (Westing house) Resonant micro-bridge (U.C.Berkeley)

Reference : H.C.Nathanson et.al. The resonant gate transistor, IEEE Trans. on Electron Devices, ED-14 (1967) 117-133

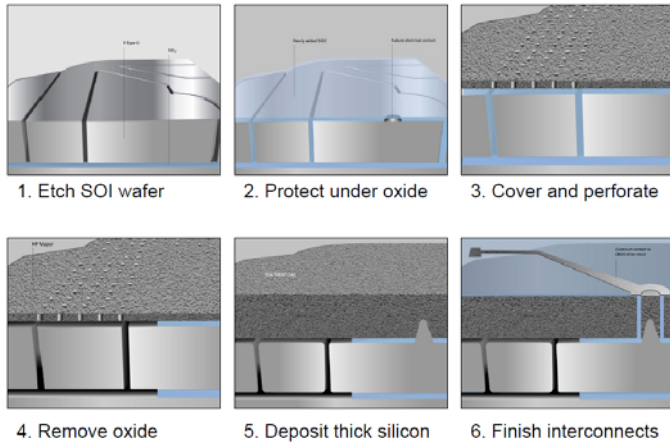
R.T.Howe and R.S.Muller, Resonant-Microbridge Vapor Sensor, IEEE Trans. on Electron Devices, ED-33 (1986) pp.499-506



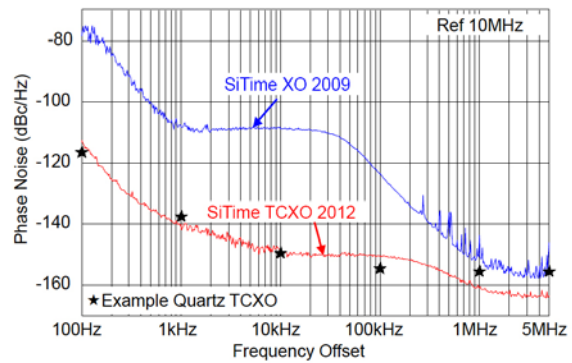
MEMS resonator chip Circuit chip

mm	7.0	5.0	3.5	3.2	2.5	2.0	2.0	1.5
	X 5.0	X 3.2	X 3.0	X 2.5	X 2.0	X 1.6	X 1.2	X 0.8
Single-Ended XO, VCXO, TCXO, DCXO								
Differential XO, VCXO, TCXO, DCXO								
Clock Generator								

MEMS oscillator (SiTime)



100x Lower Phase Noise in 3 Years



Guest Paper

Precision Silicon MEMS resonators versus traditional Quartz

Dr. Esashi Masayoshi
Tohoku University Professor

John McDonald
SiTime Corporation Vice-President

An infrared top view photo of SiTime Corporation's MEMS First™ resonator as seen through the 200mm SOI CMOS wafer. This resonator is integrated in the SIF6002 and SIF11xx oscillator product families.

Silicon MEMS Timing Solutions

FASTEST GROWING SEMICONDUCTOR COMPANY

Deloitte North American Technology Fast 500™

Silicon Always Wins



Highest Performance, Best Reliability, Smallest, Lowest Cost

Vacuum Tubes		→		
Film Cameras		→		
Disk Storage		→		
Quartz Timing		→		

Reference : M.Lutz, A.Partridge, P.Gupta, N.Buchan, E.Klassen, J.McDonald and K.Petersenand, MEMS Oscillators for High Volume Commercial Applications, Technical Digest of Transducers' 07 (2007) pp.49-52