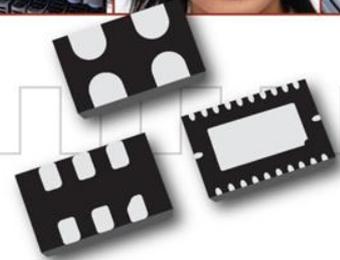




# μPower MEMS Oscillator for Wearables, IoT and Mobile

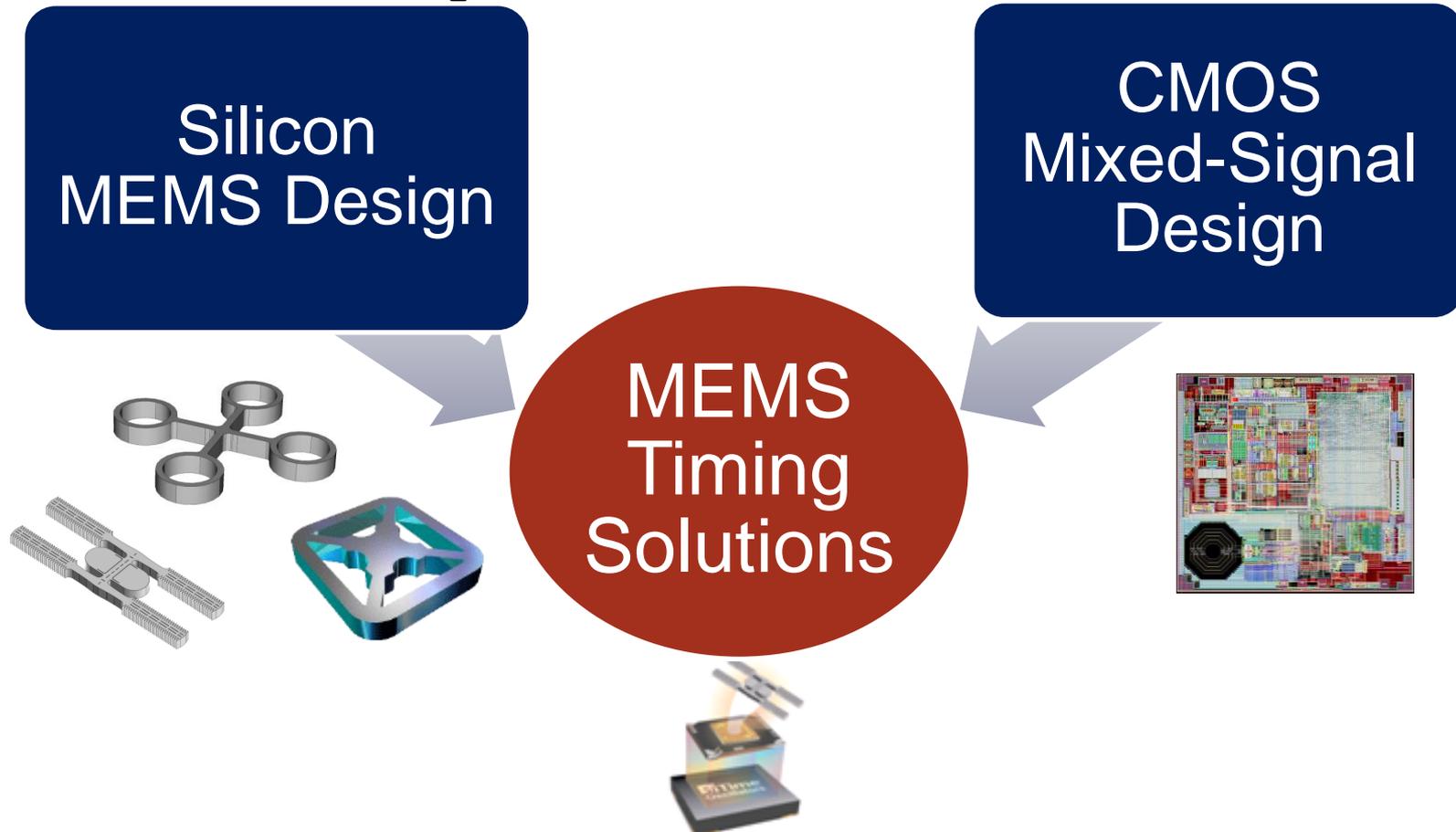
May 2015



The Smart Timing Choice™

# SiTime Overview

- Fabless Analog IC company, Founded in 2005
- Mass production since 2007, 270MU shipped to date
- The leader in MEMS-based silicon timing, with 80% market share
- SiTime's mixed-signal and MEMS IP is 100% designed in-house



# SiTime – The Leader in MEMS Timing



## Market Leader

270 MU Shipped, 100 Major OEMs  
80% Share of MEMS Timing



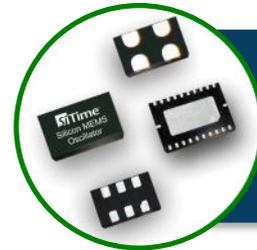
## Technology Leader

100 Patents – MEMS, Analog, Packaging  
2 Year Lead



## Quality Leader

1.6 DPPM, Lifetime Warranty  
Zero MEMS Failures



## Product Leader

Programmable – 200K Part Numbers  
Best Size, Stability, Power

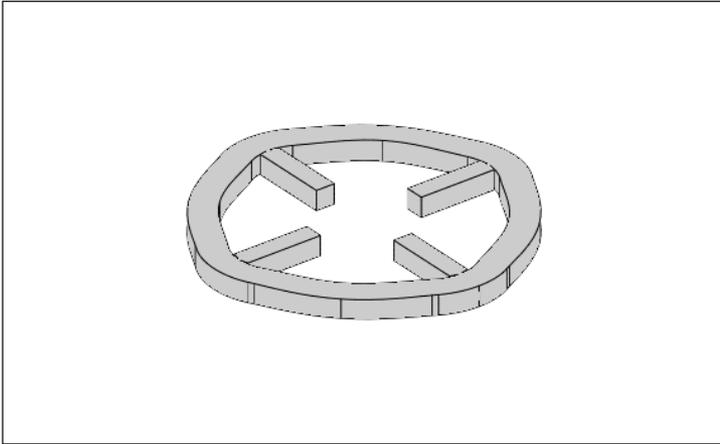
# SiTime Uses Existing Global Semiconductor Infrastructure



- Locations
- Fabrication (MEMS: Bosch, Tower-Jazz, Analog: TSMC)
- Assembly (Carsem, UTAC, ASE)
- Direct Sales

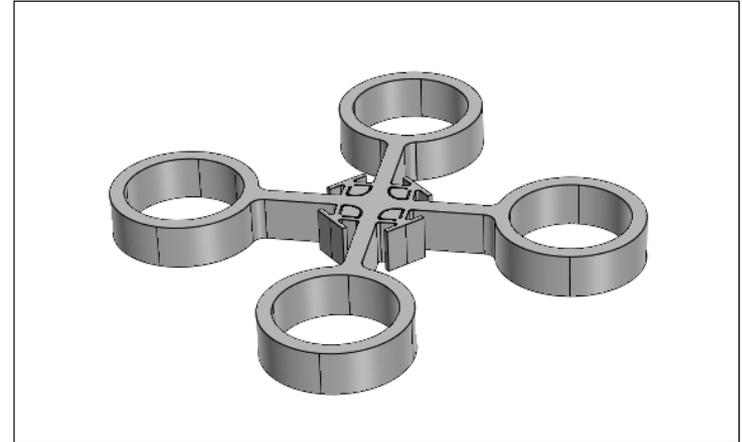
# MEMS Resonators For All Clocking

## 5 MHz Resonator



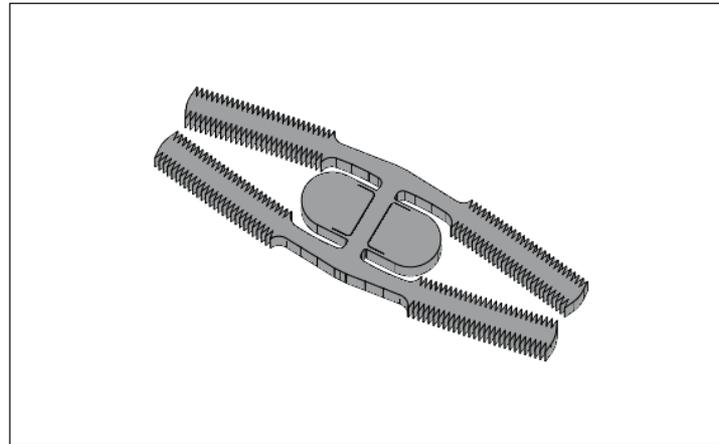
- 5MHz resonator
- In Production since 2007

## 48 MHz Resonator



- <1ps phase jitter
- In production since 2011

## 524 kHz Resonator



- For timekeeping, RTC,  $\mu$ Power MHz
- In Production since 2010

# MEMS Timing is a Perfect Fit for Wearables, IoT, Mobile



# The First $\mu$ Power MHz Oscillator for Wearables, IoT, Mobile

**90% Lower Power**  
**40% Smaller**  
**70% Lighter**

**Compared to quartz**

# SiT8021 – World's Smallest, Lowest Power MHz Oscillator



## μPower MHz Oscillator

40% SMALLER • 90% LOWER POWER



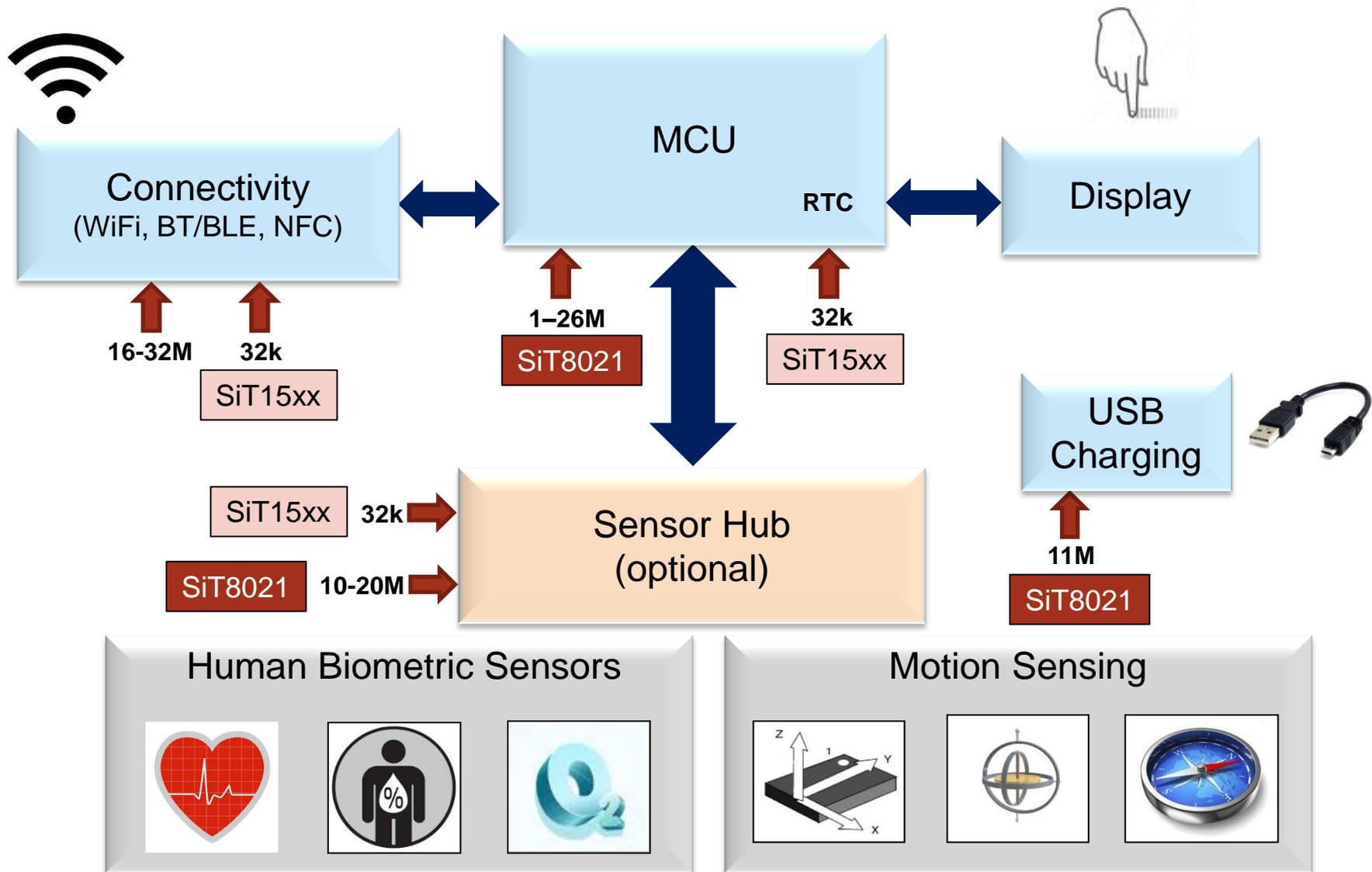
Frequency Range	Frequency Stability	Supply Voltage	Package	Temp. Range	Active Current	Resume Time	Output
1 - 26 MHz	100 PPM	1.8 V ±10%	1.5 x 0.8mm CSP	-40 to +85 C	100 μA @ 3.072 MHz	5 ms	LVCMOS

# MEMS Solves Pain Points in Wearables, Mobile, IoT – Not Possible from Quartz

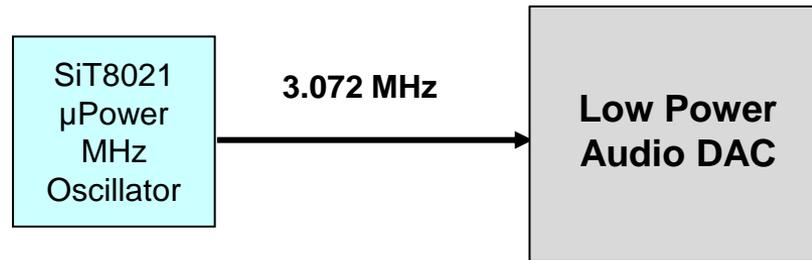


<b>Customer Requirements</b>	<b>MEMS Features</b>
Lowest Power	100 $\mu$ A – 90% lower than MHz quartz XO
Smallest Size	1.5 x 0.8 mm CSP – 40% smaller than quartz
Low frequencies for MCU power savings	< 5 MHz output in small packages Not available from quartz
Lightweight	70% lighter than quartz
Minimize number of components	Programmable drive strength for driving multiple loads
Shortest lead time supply continuity	Semiconductor supply chain

# A SiTime Oscillator for Every Block in Wearables and IoT



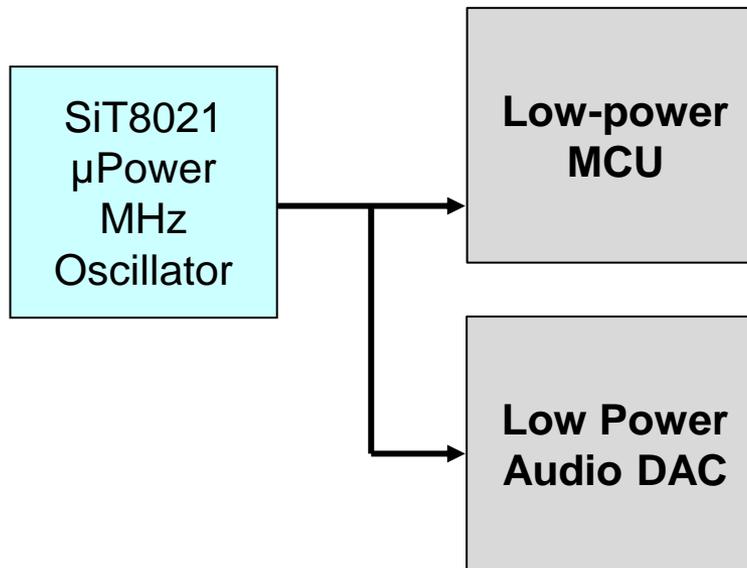
# SiT8021 Extends Battery Power by 24 Hours in Portable Audio Applications



	SiT8021	Quartz XO
Active IDD - Oscillator	100 $\mu$ A	2.5 mA
Power consumption – DAC + Oscillator + Amp	30 mW	34 mW
Effective battery life	202 hour	177 hours

Note: This assumes 2000 mAH Li-Ion battery typically used in portable devices

# SiT8021 Drives Multiple Loads and Reduces BOM



- SiTime's SiT8021 drives 2 loads and eliminates 2<sup>nd</sup> XO or XTAL
- Saves space, cost

# Complete MEMS Timing Portfolio for Mobile, Wearable and IoT

Intro Year → 2013

2014

2015

2012

32 kHz XO  
and XTAL  
Replacement

32 kHz  
TCXO

μPower  
XO

Low  
Power  
XO

**SiT1532**  
32.768 kHz  
1508 CSP  
1.2 to 3.63V

**SiT1552**  
32.768 kHz  
1.5 to 3.63V

**SiT8021**  
1-26 MHz  
100-200 μA

**SiT1602**  
3.75-77.76 MHz  
3.1-4.9 mA

**SiT1533**  
32.768 kHz  
2012 SMD  
1.2 to 3.63V

**SiT8008**  
1-137 MHz  
3.1-5.9 mA

**SiT1534**  
1 Hz-32.768 kHz  
1.2 to 3.63V

**SiT8003XT**  
0.25mm thin  
1-110 MHz  
3.1-6.6 mA

 NanoDrive™ output for lowest power

 LVCMOS output

# Tens of Millions of MEMS Oscillators to Ship in 2015 in Wearables, IoT, Mobile



MHz for Tablet



kHz TCXO  
for Smart Watch



kHz & MHz for Fitness  
and Health Monitoring



kHz & MHz for  
Portable Audio



kHz for IoT  
Chipsets



kHz and MHz for  
Wireless IPCAM

- First  $\mu$ Power MHz oscillator for Wearables, Mobile and IoT
  - 90% lower power
  - 40% smaller
  - 70% lighter
- Expands MEMS timing portfolio for Wearables, Mobile, IoT
- Silicon MEMS Quality and Reliability
  - 1.6 DPPM failure rate, 30x better than quartz
  - 20k g shock resistance, 70 g vibration resistance



LIFETIME  
WARRANTY