



# Company Overview

Q2 2019

# About TXC

- **Founded in 1983** (Headquarter in Taiwan)
- **Listed in Taiwan Stock Exchange since 2000** (3042:TT)
- **Ranked #4 in Worldwide Crystal & Oscillator Market Shares** (2017 CS&A Market Report)
- **Ranked #3 in Crystal Market Shares** (2017 CS&A Market Report)
- **Industry 1<sup>st</sup> Ultra Stability SMD type SC-Cut OCXO for 5G Telecom** (Launched in 2017)
- **Industry 1<sup>st</sup> Active Low EMI CMOS Oscillator for Automotive** (Launched in 2018)
- **Industry 1<sup>st</sup> Miniature Combo Light Sensors by Ceramic Package** (Launched in 2013)

## Mission

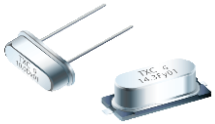
To achieve a Win-Win partnerships in the Supplier-TXC-Customer relationships

# Product Portfolios

## Timing and Sensors

### Timing (Crystals and Oscillators)

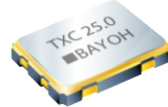
Metal Can



Glass Seal



Crystal Oscillators  
(XO)



SAW Oscillators  
(SO)



Seam Seal



Tuning Fork



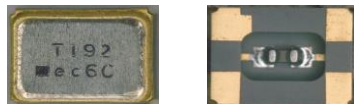
Voltage Controlled  
Oscillators  
(VCXO)



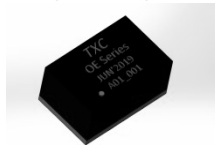
Temperature  
Compensated  
Oscillators  
(TCXO/S3TCXO)



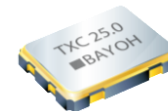
Temperature Sensor Crystal  
(TSX)



Oven Controlled  
Oscillators  
(OCXO)



Active Low EMI  
Oscillators  
(EMI XO)



### Sensors

Proximity Sensor



Color (RGB) and Proximity Sensor



PM 2.5 Sensor Module  
Coming in 2019 2H



# Manufacturing Facilities

## Economy of Scale Productions

1991



- MHz Crystal

- TSX

- OSC

- TCXO

- VCXO

- OCXO

- RTC

- **Sensors** (20M/m)

1999



- kHz/MHz Crystal

- TSX

- OSC

2013

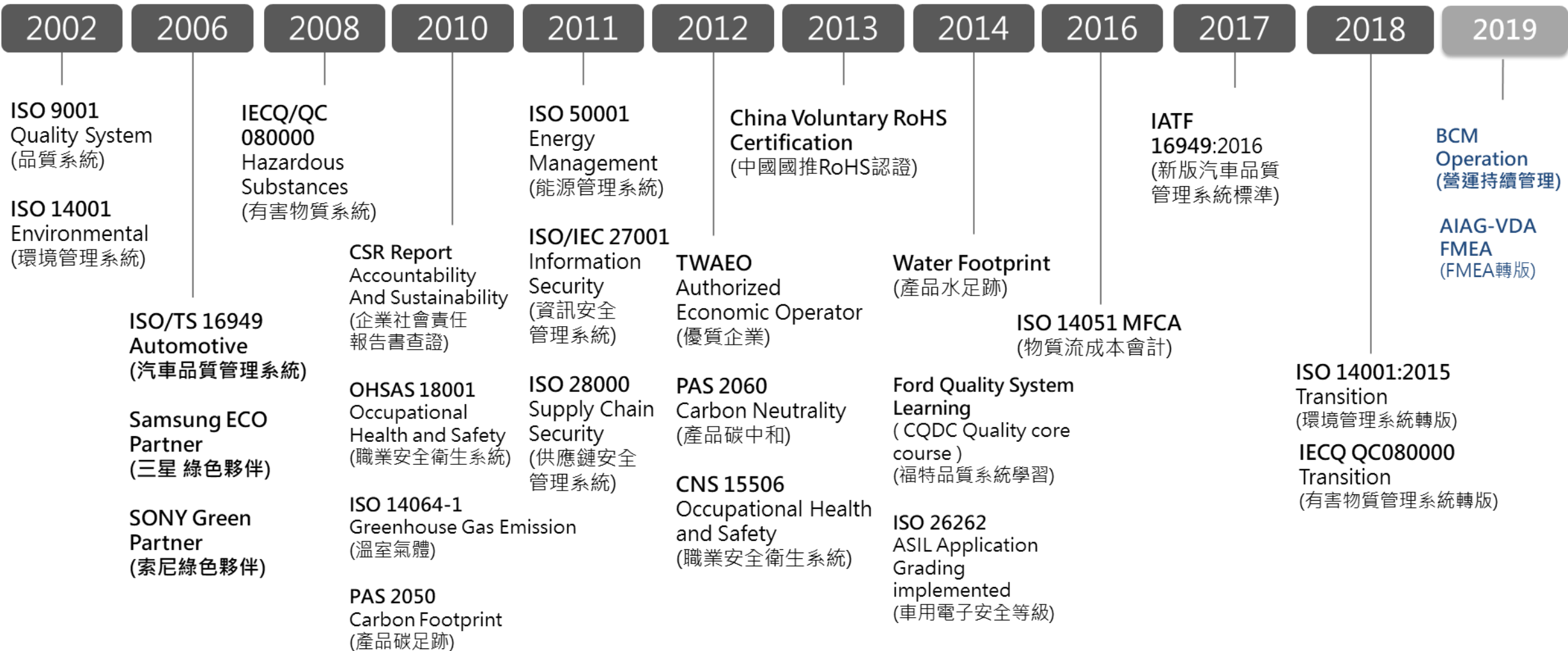


- MHz Crystal

- **3** manufacturing facilities
- **200+** automated production lines
- **320M+** monthly capacity (Timing Devices)
- **2** R&D centers (PCF, NGB)
- **400+** engineers

# Quality Management Systems

Quality always 1<sup>st</sup>



# Lean Management Systems

## Zero Risk Approach Methods

- ISO 28001 Supply Chain Security Management System
- Shop Floor Management System
- Equipment Management System

- Voice of Customer
- Circuit Matching
- ISO 26262 ASIL Concept



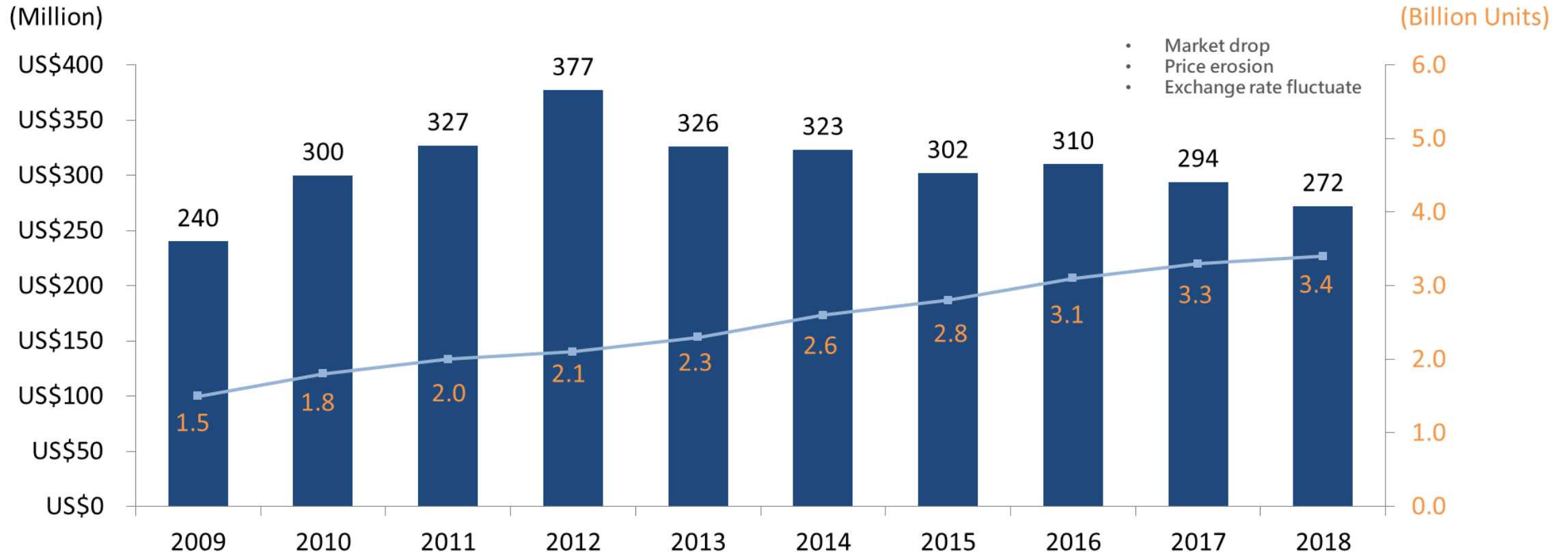
- Robust Design
- APQP System
- VDA4.2 & AIAG Based DFMEA

- ISO 9001 Certified
- Supplier Early Involvement
- Frequently Technology Communication

- AEC Q100/Q200 Reliability Test
- ISO 16750 Reliability Test
- MIL-STD 1916 Zero-Based Sampling Plans

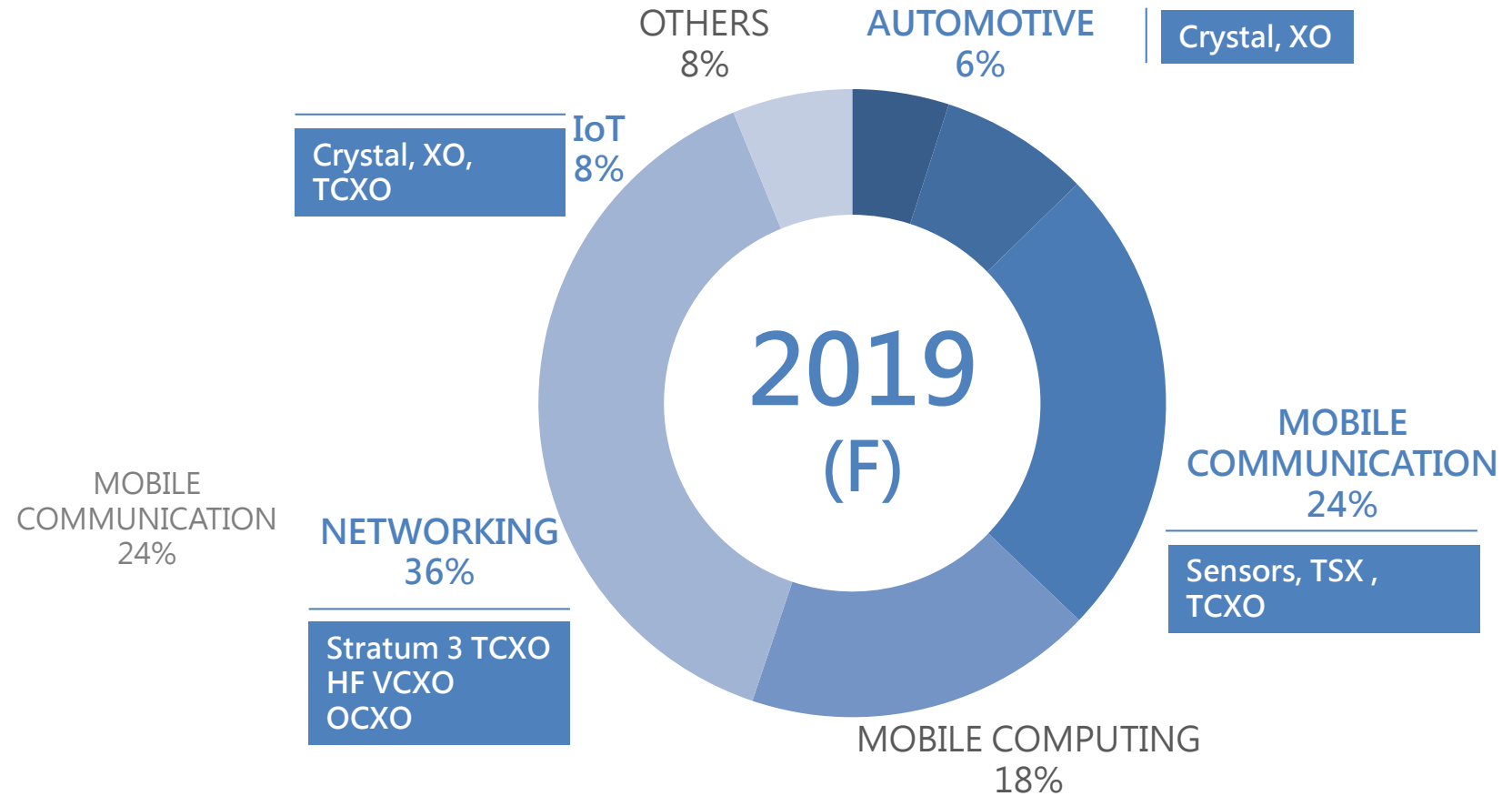
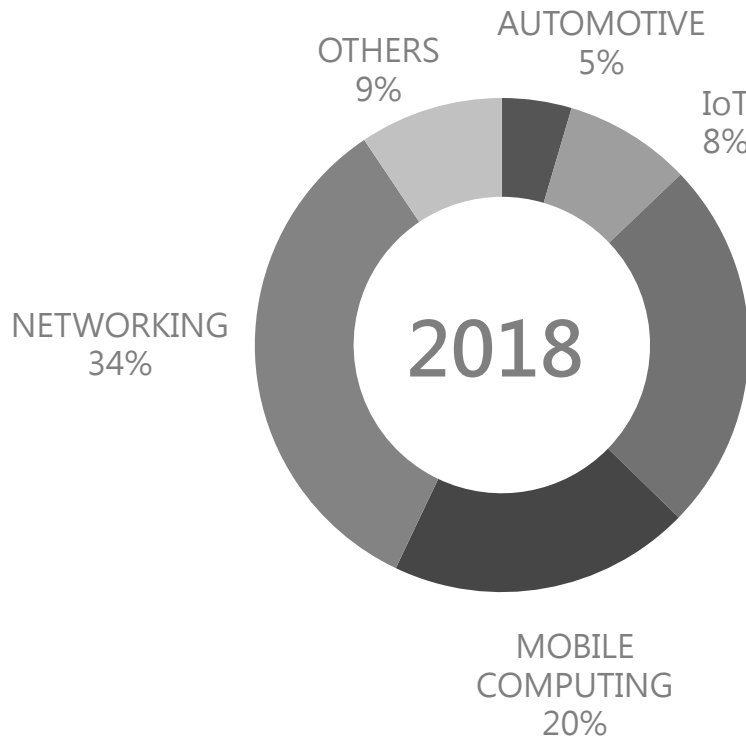
- VDA6.3 Production Management
- VDA4.2 & AIAG PFMEA
- PAT & SYA Control

# Sales & Shipping Records



# Sales by Segments

Actual and Forecast (F)





# Worldwide Timing Market Shares

## Strong Market Penetration

Source: CS&A 2018

2016 Rank	2017 Rank	Company Name	Revenue( M )			Market Share(%)	
			2016	2017	Percent Change	2016	2017
1	1	Seiko Epson	\$409	\$382	-6.6%	12.9%	11.7%
2	2	NDK	\$357	\$354	-0.8%	11.3%	10.8%
4	3	KCD	\$287	\$344	20.0%	9.1%	10.5%
3	4	TXC	\$310	\$294	-5.2%	9.8%	9.0%
5	5	KDS	\$212	\$205	-3.2%	6.7%	6.3%
7	6	Microsemi	\$80	\$168	110.0%	2.5%	5.1%
6	7	Siward	\$103	\$104	1.5%	3.2%	3.2%
10	8	MegaChips	\$73	\$103	41.1%	2.3%	3.1%
9	9	Hosonic	\$95	\$98	3.0%	3.0%	3.0%
8	10	Harmony	\$94	\$98	4.0%	3.0%	3.0%
Other Companies			\$1,146	\$1,120	-2.2%	36.2%	34.2%
Total Revenue			\$3,165	\$3,271	3.3%		

# Sales & Labs

Localized Service, Responsive and Dedicate



# New Product Introduction

# Internet of Things Solutions



Source: IDC, Cisco

**MHz Crystal**  
Miniature & Low Profile  
1.0x0.8x0.30 (mm)

WiFi, BT, BLE, NFC

**TSX (TH+Xtal)**  
Miniature & Low Profile  
1.6x1.2x0.55 (mm)

LTE, 5G Modem

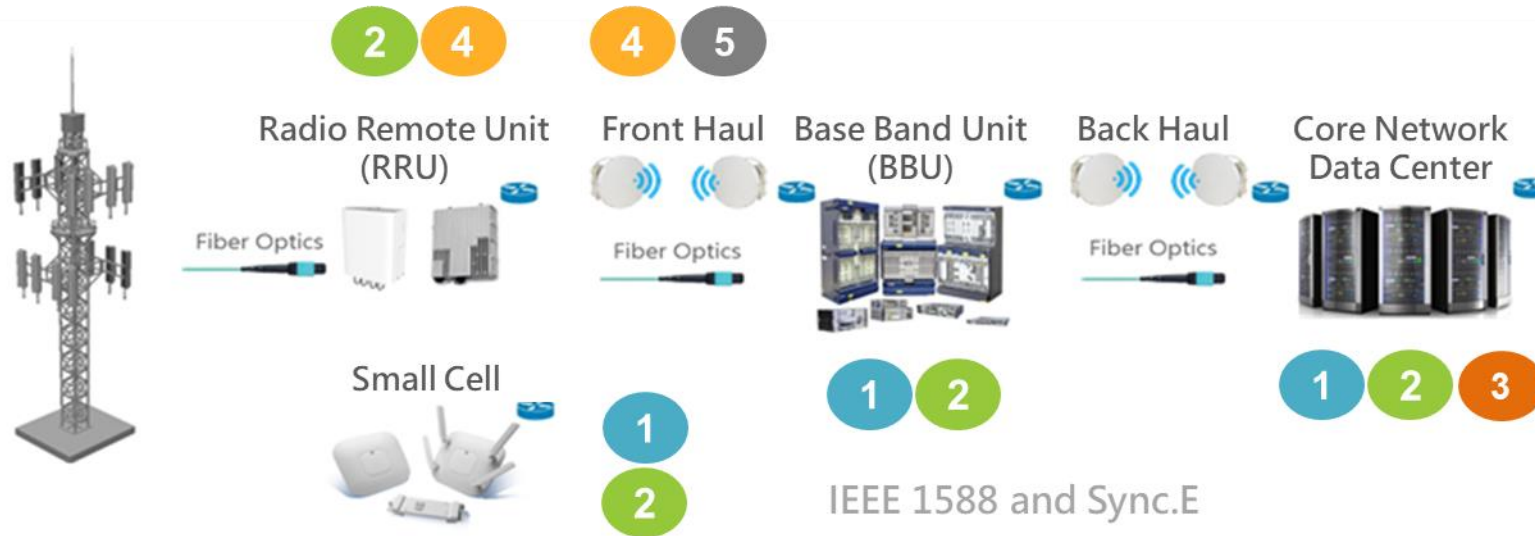
**OSC (Differential/CMOS/HCSL)**  
Low Phase Noise  $\leq -100\text{dBc/Hz}$  @ 10Hz;  
Miniature 2.5x2.0x0.75 (mm)

High Speed, Low Noise Transmission

**Active Low EMI CMOS OSC**  
Reduced Electromagnetic Interference  
Miniature 2.0x1.6x0.75 (mm)

\* ADAS, Camera Module

# Telecom and Networking Solutions



1

Ultra Stability SMD SC-Cut OCXO (9.7x7.5mm)+/-10ppb



2

Ultra Stability S3 TCXO (7.0x5.0mm, 5.0x3.2mm); +/-100ppb

3

High Frequency, XO/VCXO (7.0x5.0mm); Up to 2.1GHz, ultra low jitter 0.15pS

4

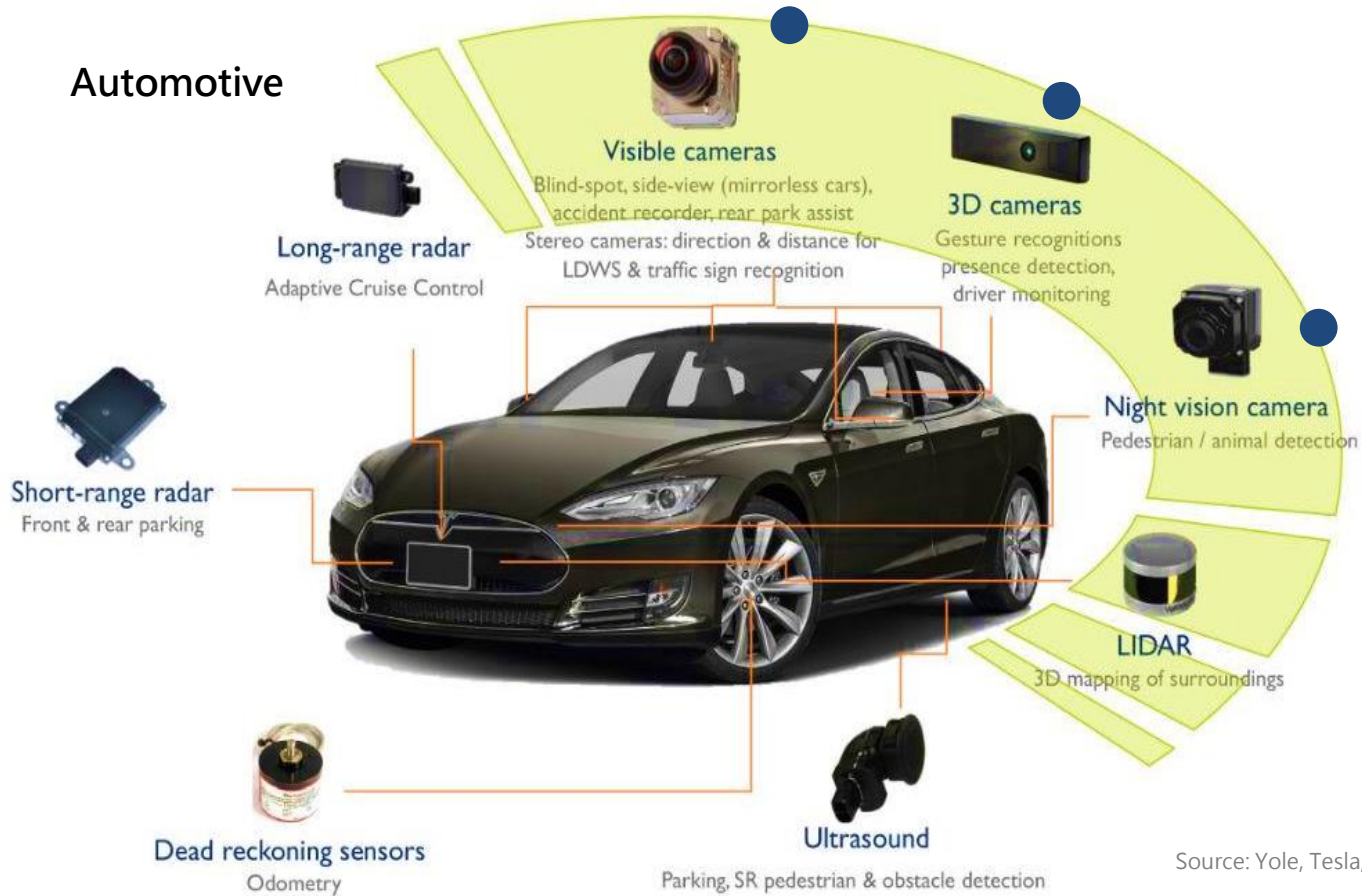
Ultra Low Phase Noise VCXO (3.2x2.5mm); Close-in phase noise -80dBc/Hz

5

High Frequency Crystal (MESA 3.2x2.5mm); 200MHz

# Automotive Imaging Solutions

## Automotive



## Active Low EMI OSC Module

Automotive G1  
2.5x2.0mm  
2.0x1.6mm



Source: Yole, Tesla, Sony



# Light Sensors

**Single Aperture  
Combo Light Sensor  
(ALS/RGB+PS)  
2.5x2.0mm**



**Slim Bezel  
Combo Light Sensor  
(ALS/RGB+PS)  
3.4x1.2mm**



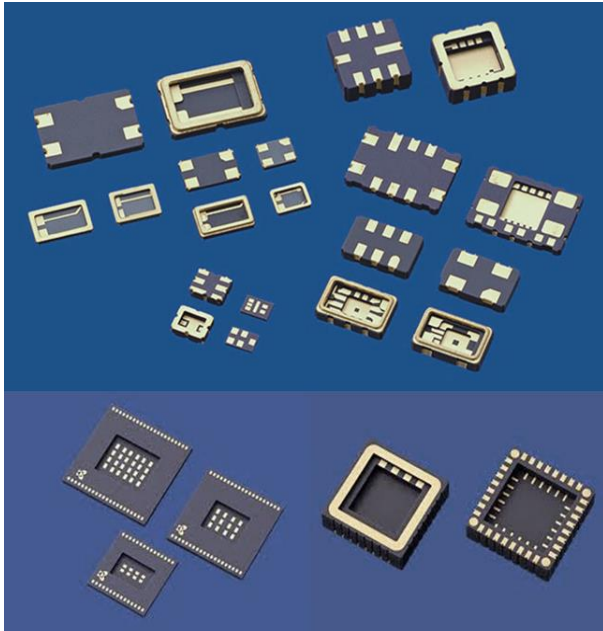
**Miniature  
Proximity Sensor  
2.0x1.6mm**



# Ceramic Package Solutions

## Ceramic Package Assembly & Contract Manufacturing

### Type of Ceramic Packages



Source: Kyocera

### Advantages of Ceramic Packaging

- Excellent mechanical stiffness, hardness and wear resistance
- Excellent isolators
- Coefficient of thermal expansion
- Good thermal conductivity, good thermal resistance
- High processing temperatures
- Ceramic Package is multilayer boards design, enable product stacking, integration, and miniaturization



# Thank You