Corporate Profile

2014. Apr.

Koyo Precision Co., Ltd.

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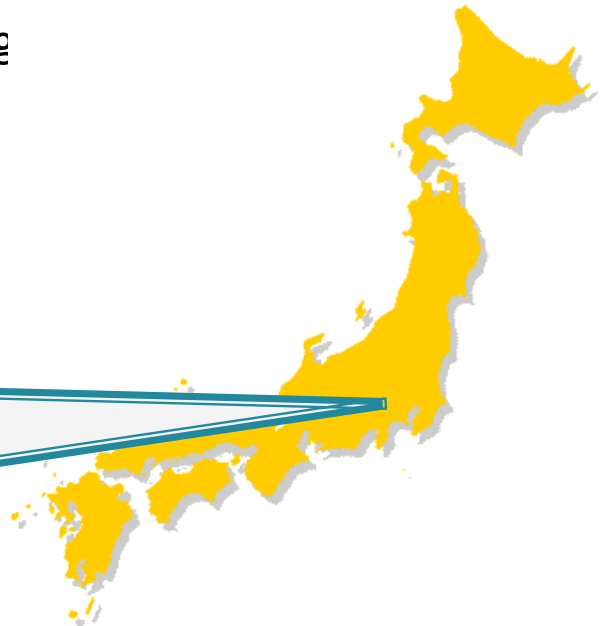
KOYO PRECISION CO.,LTD.

Plant – Fuji Yoshida

- **Nature** : Manufacturing
- **Location** : 4715 Koasumi, Fuji-Yoshida, Yamanashi, 403-0002 JAPAN
- **Employees** : 50
- **Plant Size** : 4,202 m^2
- **Establishment Date** : 1957
- **Quality Standard** : ISO9001: 2000
- **Role** : Crystal Oscillator Manufacturing
  R&D Proto-typing capability
  Quality Control
  Customization

Headquarter and Main Factory



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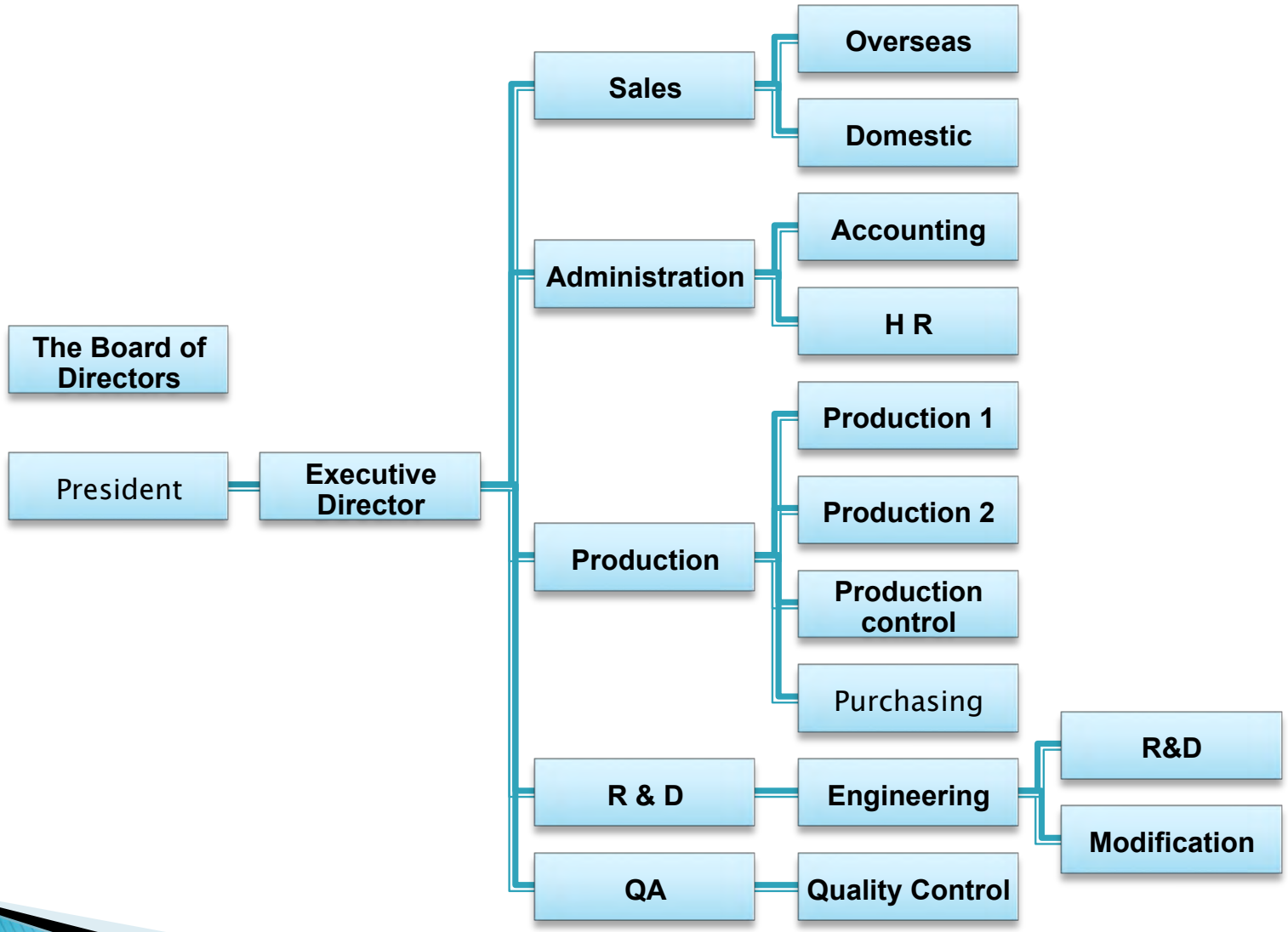
Corporate Organization



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Company History

- Nov 1957 : Founded as Koyo Juseki Seisakusho in Kanagawa
- Oct 1960 : Yamanashi Plant began operation
- Oct 1965 : Quartz Vibrator Formed
- Aug 1971 : Company Name changed to Koyo Precision Co., Ltd.
- Jul 1976 : Fujiyoshida Plant completed
- May 1984 : Crystal Oscillator Division began operation
- Dec 1984 : Asumi Plant Completed
- Sep 1990 : Asumi Plant became main factory
- Oct 1992 : Main office moved to Asumi (Current Location)
- Sep 2005 : Moved Crystal Polish process from to Asumi Plant
- Oct 2005 : Certified ISO9001

KOYO's Crystal Oscillator

1. Significant Quality & Reliability
   - Unique craftsmanship of Lapping Polishing
   - Ratio of returned unsold goods = less than 10 PPM
2. Short Lead Time
   - 4 weeks for 125 - 156MHz
   - 4 – 8 weeks for other frequency range, VCXO.
   - 4 – 6 weeks with 6 month rolling forecast
3. Customization capability
   - Ex) KCO-600 series by itself have over 1,000 combination patterns of specification; frequency, stability, size, operation temp etc.
4. Competitive Price

Product Features

- Lapping Polishing Technology
  - Enables high flatness of crystal surface that makes high frequency

①Super high frequency grinding (e.g. 250MHz)
②Stable Oscillation
③High reliability in high frequency level (above 100MHz)

- Application
  - HDD (Industrial / Enterprise) : Seagate/HP
  - Cloud computing (OCN/Wireless network, Ethernet) : Alcatel/Intel/ Samsung/CISCO/Nokia/Fujitsu/NEC
  - Base Station : Ericsson/Huawei/Nokia/Fujitsu
  - Multifunction Printer : Canon
  - Automation : Fanuc
  - CCD Camera : Toshiba

Product Features

Lapping Polishing Technology

Enables high flatness of crystal surface that makes high frequency

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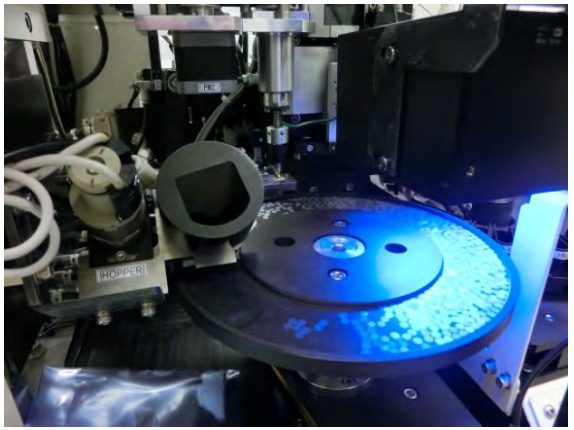
Blank process

- Incoming inspection
- Washing / Drying
- Measurement
- #10,000 Polishing
- Washing / Drying
- Measurement
- Inspection

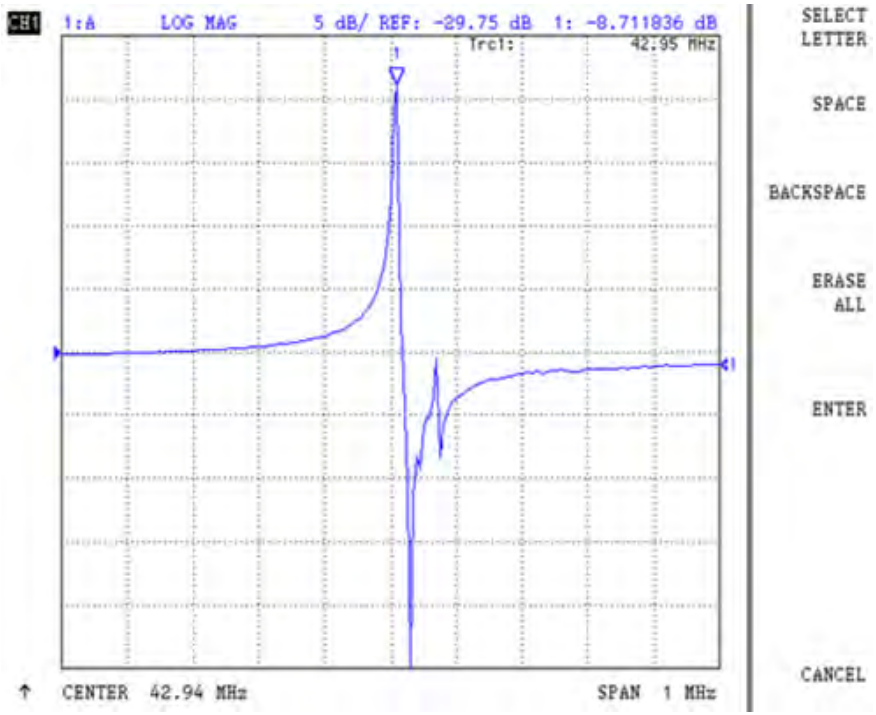
#10,000 Polish

Measurement

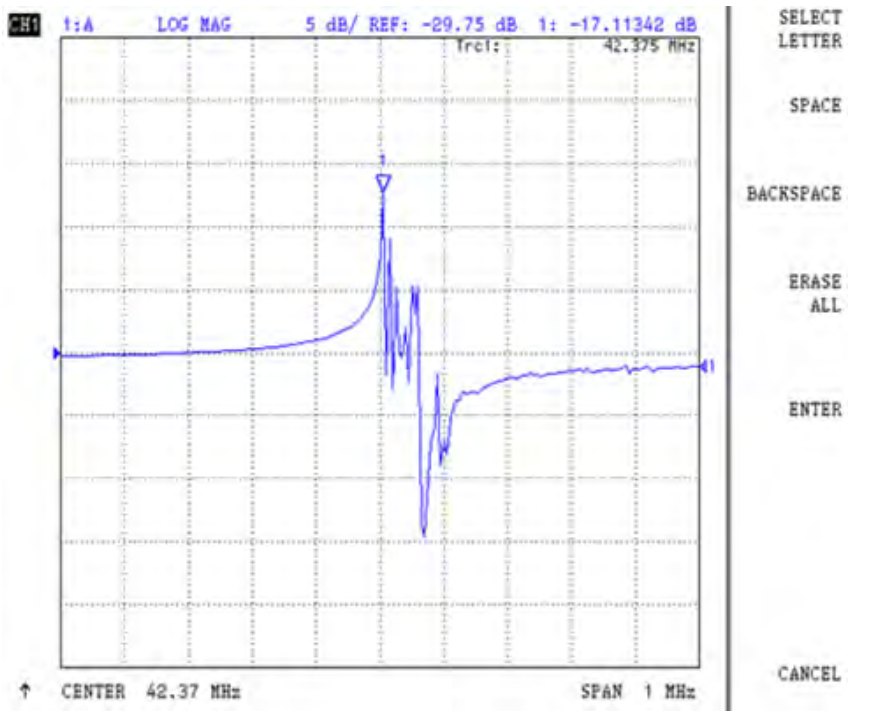


Resonant Characteristics - Comparison 1

Koyo #10,000 Polishing



Competitor's Polishing



※ High output level that reduces the amount of no-output defect

※ Less spurious prevents undesired timing of oscillation
=> Low failers after shipping

Koyo X'tal vs. PLL/SAW - Comparison 2

Characteristic of 3rd. Overtone

Comparing to over-200MH z using PLL or SAW、KOYO crystal has advantages as below

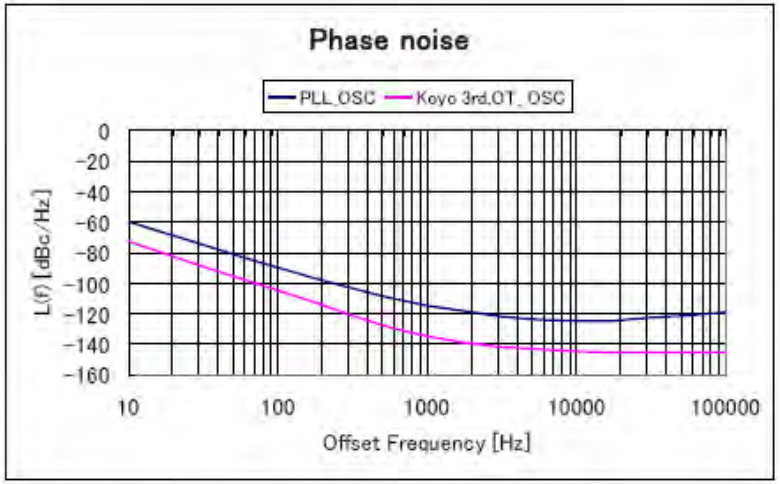
☐Vs PLL_OSC

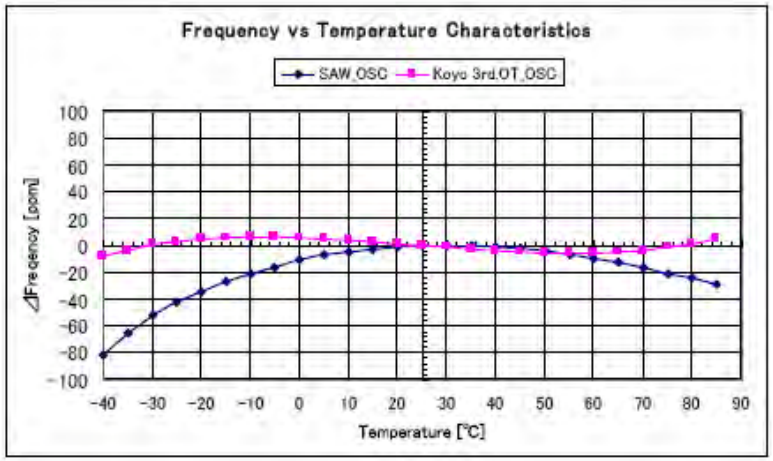
less noise and jitter deviation (More stability)

☐Vs SAW_OSC

less change in performance in different ranges of temperature

↓ 200.000MHz PECL_OSC





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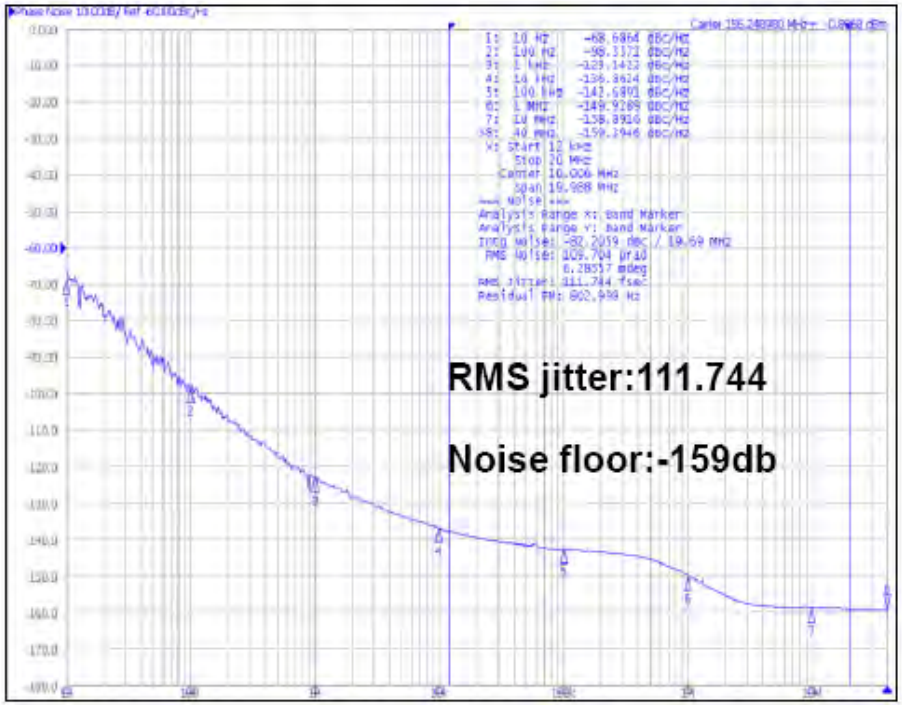
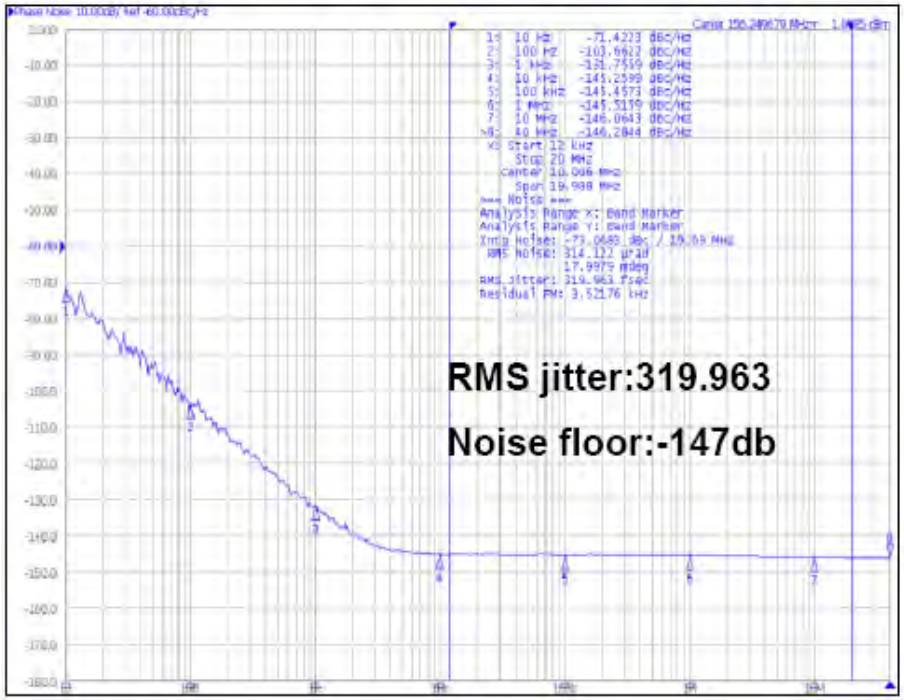
Phase Noise & Jitter Data

Low noise x'tal oscillator (156.25MHz)



Case 1: IC a

Standard x'tal oscillator (156.25MHz)



Case 1: IC b

※ able to provide the noise floor based on customer's request

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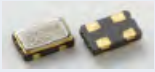
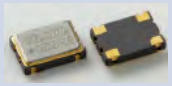
Product Range by Application

Crystal Clock Oscillators-CMOS series

Model	Frequency Range	Voltage	Size	Application
KCO-300 	1-133MHz	2.5V, 3.3V	3.2 × 2.5	CCD、FA control equipment
KCO-500 	1-200MHz	1.8V, 2.5V 3.3V	5.0 × 3.2	CCD
KCO-600 	1-220MHz	1.8, 2.5V 3.3V	7.0 × 5.0	HDD, Server

Product Range by Application-Cont'd

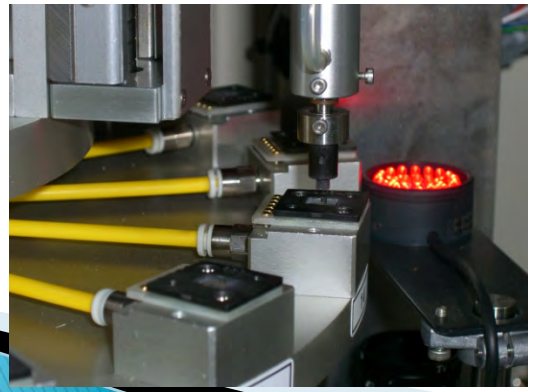
Crystal Clock Oscillators-LVPECL / LVDS output series

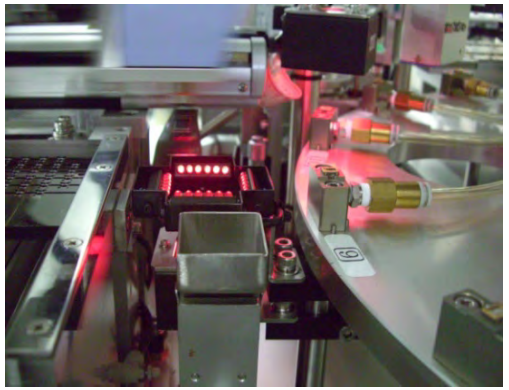
Model	Frequency Range	Voltage	Size	Application
KPO/KLO 500	1-312.50MHz	2.5V, 3.3V	5.0 × 3.2	Ethernet、GBEthernet DAC/ADC、FPGA Telecom
KPO/KLO 600	1-312.50MHz	2.5V, 3.3V	7.0 × 5.0	Cloud computing, Ethernet, DAC/ADC FPGA/Telecom
MPO/MLO 600	1-800MHz	3.3V	7.0 × 5.0	Ethernet、GBEthernet DAC/ADC、FPGA Telecom

Product Range by Application- Cont'd

Crystal Clock Oscillators-HCSL Output series

Model	Frequency Range	Voltage	Size	Application
KHO-500	27~170MHz	2.5V, 3.3V	5.0 × 3.2	PCI Express
KHO-600	27~170MHz	2.5V, 3.3V	7.0 × 5.0	PCI Express





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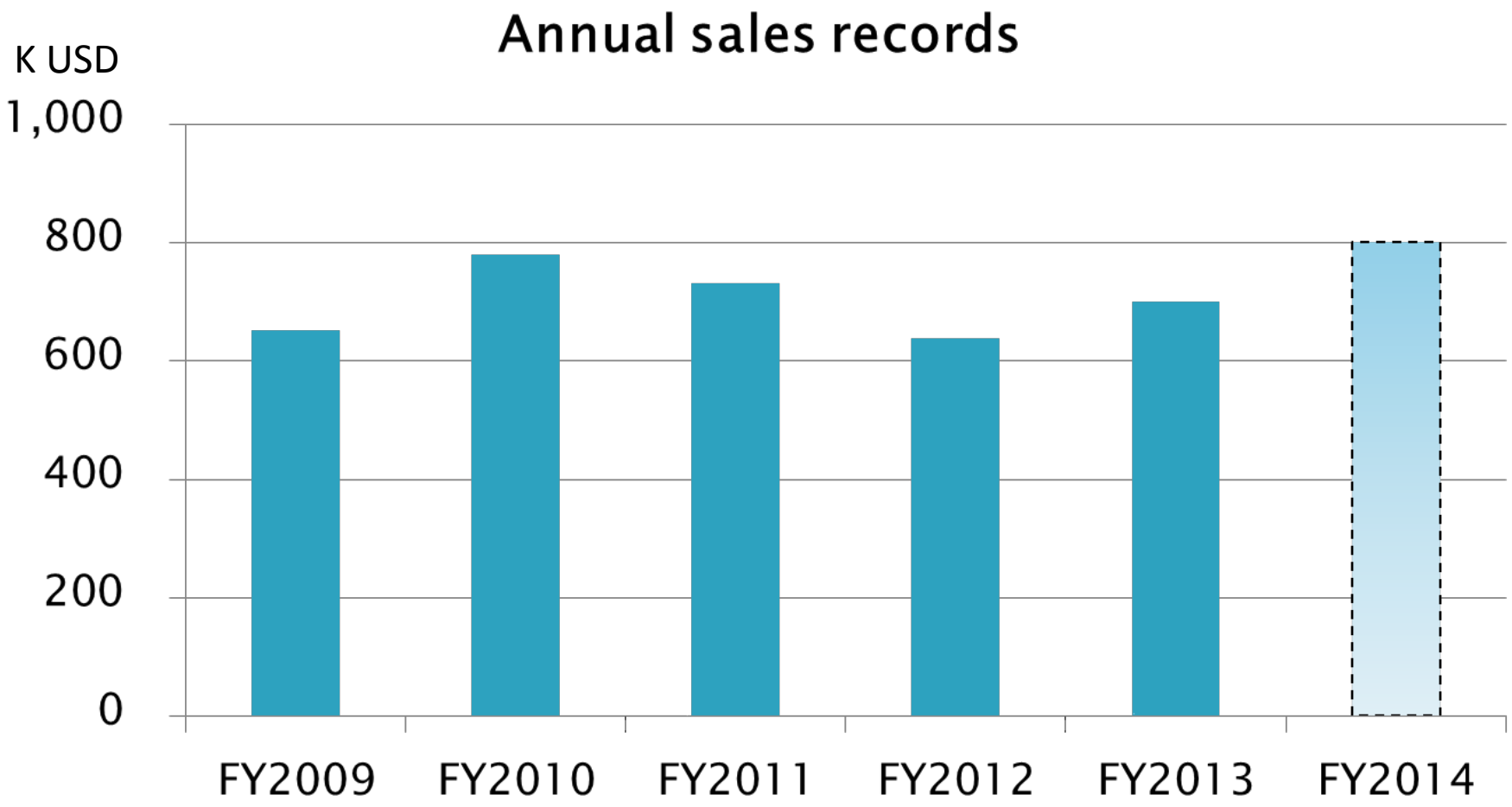
Product Range by Application- Cont'd

Voltage Controlled Crystal Oscillators

Model	Frequency Range	Voltage	Size	Application
KCV-600 (CMOS)	10–160MHz	3.3V	7.0 × 5.0	Telecom、STB、DVC
KPV/KLV 600 (Differential)	80–170MHz	3.3V	7.0 × 5.0	Base station
MPV/MLV 600 (Differential)	1–800MHz	2.5V, 3.3V	7.0 × 5.0	Telecom、STB、DVC

Sales Revenue



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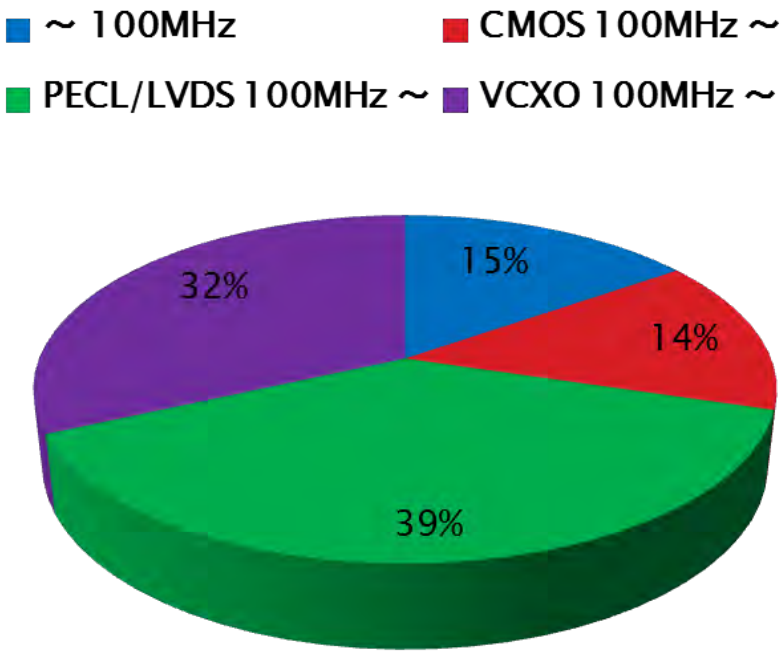
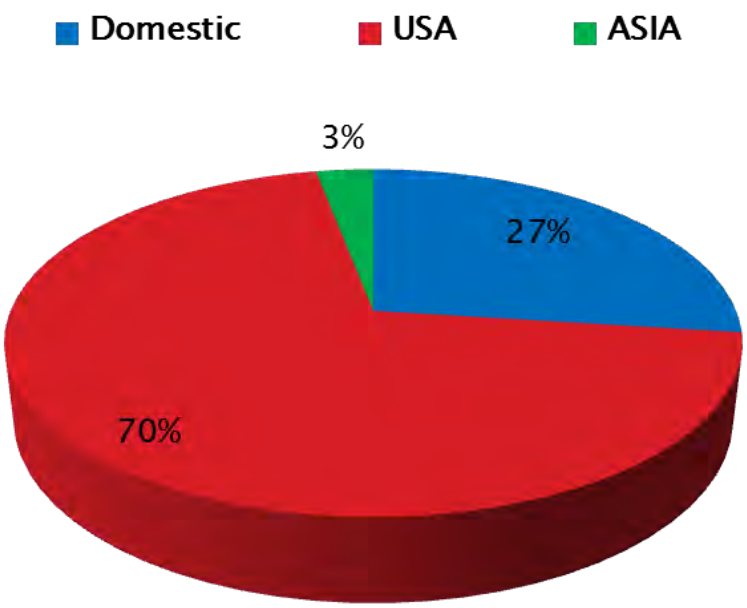
Major Production Frequency & Global Share

Sales ratio



Sales market area



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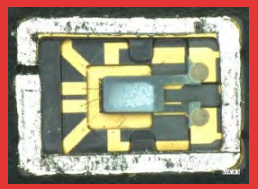
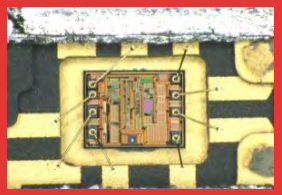
Technology Road Map

Higher Frequency → Smaller Size → High performance

KPV-500 (VCXO)	KPO/KLO-300 (LVDS, LVPECL)	KPV-600 (VCXO)
~153.60MHz	~ 170MHz	~122.88MHz
3.3V	3.3V	3.3V
5.0 x 3.2	3.2 x 2.5	7.0 x 5.0
LTE. Base station	Networking, Cloud Computing	Fundamental (+/- 100ppm) to 3rd Overtone (+/- 15ppm)

2014 (1H) 2014 (2H) 2015





Final Inspection

Appearance Test

Analysis

Storage

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Environmental Commitment

1. RoHS Environmental Standards	
Substance	Maximum Limit (ppm)
Cadmium (Cd)	100
Lead (Pb)	1000*
Mercury (Hg)	1000
Hexavalent Chromium (Cr6+)	1000
Poly Brominated Biphenyls (PBB)	1000
Poly Brominated Diphenyl Ethers (PBDE)	1000
* Maximum limit does not apply to applications for which exemptions have been granted by the RoHS Directive	

2. Halogen-Free	
Substance	Maximum Limit (ppm)
Bromine (Br)	900 ppm (0.09%)
Chlorine (Cl)	900 ppm (0.09%)
Total concentration of Chlorine (Cl) + Bromine (Br)	1500 ppm (0.15%)

3. Flame Retardants
Red Phosphorous ≤ 1000 ppm (0.1%)
Antimony Trioxide ≤ 1000 ppm (0.1%)
* Homogenous material is made up of one or more substances and it can not be mechanically disjointed into those difference substances. The term "Mechanically disjointed" means that the material can be separated by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes.

Koyo Precision provides comprehensive 3rd party testing data for compliance with RoHS, Restricted substances, REACH, Halogen Free and Flame Retardant

Our Valued Customers

Quality Promises & Certificates

- Optimized production processing route
- Reduce processing variation of parameters :Cpk >1.33
- Continuous Improvement L DoE, PFMEA, QFD
- Fast Response for abnormality during production
- Processing Tech, Reforming, Calibration
- Product Evaluation (Incoming & Outgoing materials inspection)
- Product Complaint Handling (6D report)

LRQA
Business Assurance

CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

KOYO PRECISION CO., LTD.
4715, Koasumi, Fujiyoshida-shi,
Yamanashi-ken, 403-0002
Japan

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standards:

ISO 9001:2008, JIS Q 9001:2008

The Quality Management System is applicable to:

Design, development and manufacture of crystal oscillators.

Approval Certificate No: VKA 4003990

Original Approval: 9 October 2007
Current Certificate: 9 October 2013
Certificate Expiry: 8 October 2016

Issued by: Lloyd's Register Quality Assurance Limited

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