
COMPANY PRESENTATION
OF

NAKAGAWA ELECTRONICS LIMITED

NKG

**YOUR RELIABLE SOURCE FOR ALL TYPES OF
FREQUENCY CONTROL PRODUCTS**

COMPANY INTRODUCTION

- ❑ **NAKAGAWA ELECTRONICS LIMITED WAS ESTABLISHED IN 1985.**
- ❑ **THE COMPANY IS PRIVATELY OWNED WITH HEADQUARTER IN HONG KONG.**
- ❑ **NAKAGAWA STARTED WITH TRADING OF QUARTZ CRYSTAL UNITS AND GOT INVOLVED INTO MANUFACTURING IN 1989 WITH A PLANT IN ZHOUSHAN ISLAND.**
- ❑ **IN THE FOLLOWING YEARS MORE FREQUENCY CONTROL PRODUCTS WERE ADDED SO THAT A MORE BROAD LINE OF PRODUCTS COULD BE OFFERED.**
- ❑ **A NEW MANUFACTURING PLANT WAS OPENED IN SUZHOU CITY, JIANGSU PROVINCE MOVING IN 2006 INTO A NEW FACILITY.**
- ❑ **DEMAND FOR STRONGER COST REDUCTION ESPECIALLY FOR MANUFACTURED PRODUCTS LEAD INTO THE DECISION TO MANUFACTURE PRODUCTS IN PARTNERSHIP WITH OTHER COMPANIES, EITHER BY COMBINING THE EQUIPMENT OF BOTH PARTNERS IN ORDER TO PRODUCE LARGER QTY OR BY INVESTING INTO THE PARTNERS MANUFACTURING EQUIPMENT AND GAIN FROM REDUCED COST.**

OUR PRODUCT LINES

- TODAY'S MAJOR PRODUCT LINES ALL OFFERED IN VARIOUS SMD AND THD PACKAGES.



- OTHER AVAILABLE PRODUCTS SO THAT CUSTOMER CAN GET ALL FROM ONE SOURCE ARE:

Ceramic Resonators and Ceramic Filters; Ceramic Discriminators; Ceramic Traps; Dielectric Resonators; Dielectric Filters; Dielectric Duplexer; SAW Resonators and SAW Filters.

OUR PRODUCTS – QUARTZ CRYSTAL

QUARTZ CRYSTALS

- SMD CRYSTALS IN SMALLEST SIZE 1.6X1.2 UP TO 7X5MM.
- 4 PAD AND 2 PAD VERSIONS.
- AVAILABLE IN HIGHLY RELIABLE SEAM SEAL PACKAGES AND LOW COST CEMENT SEAL OR GLASS SEAL PACKAGES (DEPENDING ON SIZE).
- WIDE FREQUENCY RANGE IN FUNDAMENTAL MODE AND 3RD OVERTONE AS WELL.
- TOLERANCES AND STABILITY OVER OPERATING TEMPERATURE RANGE FROM 10PPM UP TO 100PPM.



- METAL CAN PACKAGES HC-49/S AND HC-49/U AS WELL UM-1 AND UM-5 IN THRU-HOLE AND SMD FORMED PACKAGE VERSIONS.
- MINIATURE 49/S TYPE BECOMES AVAILABLE TOO.
- ALL PACKAGE TYPES AVAILABLE WITH GROUND LEAD (3RD LEAD) AND CUSTOMIZED LEAD LENGTH.
- SOME MODELS IN 4 PAD SMD VERSIONS.
- AT-CUT CRYSTAL IN CYLINDRICAL PACKAGES.
- FUNDAMENTAL MODE AND UP TO 7TH OVERTONE.

OUR PRODUCTS – CRYSTAL OSCILLATORS

CLOCK
OSCILLATORS

VCXO

- VARIOUS CERAMIC SMD PACKAGES RANGING FROM 2.0x1.6 UP 5.0x7.0MM.
- THRU HOLE DIP-14 AND DIP-8 AS WELL A 9x14 PLASTIC MOLDED PACKAGE.
- WIDE FREQUENCY RANGE FROM 1MHZ UP TO 800MHZ (DEPENDING ON MODEL).
- OUTPUT WAVEFORM HCMOS, PECL, LDVS AND SINE WAVE ARE AVAILABLE.
- SUPPLY VOLTAGE CAN RANGE FROM 1.8V_{DC} UP TO 5.0V_{DC} FOR ALMOST ALL TYPES.
- TIGHT STABILITIES OF 20PPM OVER -20 TO +70°C AND OVER -40 TO +85°C.
- SPECIAL SPREAD SPECTRUM CLOCK OSCILLATORS FOR LOW EMI REQUIREMENTS.



TCXO
VCTCXO

- VARIOUS CERAMIC SMD PACKAGES RANGING FROM 2.5x2.0 UP 5.0x7.0MM.
- PCB BASED SMD PACKAGES FROM 5x7 TO 9x14 AND THRU HOLE DIP-14 PACKAGE.
- FREQUENCY RANGE UP TO 60MHZ FOR SINE WAVE OR HCMOS OUTPUTS.
- TIGHT STABILITIES DOWN TO STRATUM 3 LEVEL WITH OVERALL STABILITY <4.6PPM.

OUR PRODUCTS – OCXO



- SMD PACKAGES ARE PCB BASED IN SIZES OF 14X9, 25X22 AND 26X26MM.
- THRU-HOLE PACKAGES IN DIP-14, 20X20, 25X25 AND 36X27MM AVAILABLE.
- FREQUENCY FROM 5MHZ TO 100MHZ FOR SINE WAVE OR HCMOS OUTPUTS.
- UNITS CAN BE WITH ADDITIONAL FREQUENCY ADJUSTMENT FUNCTION AND REFERENCE VOLTAGE OUTPUT TO SETUP THE CONTROL FUNCTION.
- SUPPLY VOLTAGES OF $3.3V_{DC}$, $5.0V_{DC}$ OR $12V_{DC}$ ARE COMMON.

- STABILITIES FROM 20 TO 100PPB AVAILABLE
- OPERATING TEMPERATURE RANGES (TYPICALLY USED): $-10 \sim +70^{\circ}\text{C}$, $-30 \sim +85^{\circ}\text{C}$, $-40 \sim +85^{\circ}\text{C}$
- AGING PER DAY 0.5PPB TO 5PPB
- FREQUENCY TOLERANCE (@+25C) 50 TO 100PPB
- TIGHT STABILITIES BY UTILIZING SC-CUT CRYSTAL, AT-CUT CRYSTAL IS USED FOR LOW COST ALTERNATIVE



OUR PRODUCTS – OTHERS

TUNING FORKS

- HIGHLY RELIABLY CERAMIC SMD PACKAGES RANGING FROM 2.0X1.2 UP 4.9X1.8MM.
- VARIOUS PLASTIC MOLDED PACKAGES IN SIZES FROM 6.0X1.4 UP TO 12.5X4.6MM.
- TRADITIONAL CYLINDRICAL METAL PACKAGES IN 5X1.4, 2X6 AND 3X8MM INCLUDING VERSION WITH CUT LEADS AND SMD FORMED LEADS WITH OR WITHOUT AN SMD JACKET (CLIP).



CERAMIC RESONATOR

CERAMIC FILTER



- CERAMIC RESONATORS AND FILTERS BEING AVAILABLE IN VARIOUS SMD SIZES (DEPENDING ON FREQUENCY) AND IN THE TRADITIONAL THRU-HOLE PACKAGES EITHER RESIN ENCAPSULATED OR IN PLASTIC HOUSING.

TECHNOLOGY ROADMAP

CLOCK OSCILLATORS

- DIFFERENTIAL OUTPUT CLOCKS (LVPECL AND LVDS) IN 5X3.2MM SMD PACKAGE.
 - Extend frequency range up to 800MHz by using programmable clock IC.
 - Setup full scale manufacturing capability in Q3/2015.
- DIFFERENTIAL OUTPUT CLOCKS (LVPECL AND LVDS) IN 3.2X2.5MM SMD PACKAGE.
 - Extend frequency range up to 800MHz by using programmable clock IC.
 - Setup full scale manufacturing capability in Q4/2015.
- SPREAD SPECTRUM OUTPUT CLOCKS IN 3.2X2.5MM SMD PACKAGE. (FOR LOW EMI)
 - Prepare full scale manufacturing capability in Q3/2015.

VCXO

- SMALLER SIZE VCXO IN 2.5X2.0 (4 PADS) SMD CERAMIC PACKAGE.
 - Complete development of this item in Q3/2015..
 - Setup manufacturing capability for up to 500k/m in Q4/2015..

TCXO VCTCXO

- TCXO / VCTCXO IN 2.0X1.6 (4 PADS) SMD CERAMIC PACKAGE.
 - Developing these item for frequency range up to 52MHz in Q1/20156.
 - Setup manufacturing capability 2016..

SALES REGIONS



**CHINA
PACIFIC-ASIA
REGION**

60%



**CANADA
USA**

25%



**EUROPE
MIDDLE
EAST**

15%

SALES NETWORK

 **DIRECT SALES TO ALL MAJOR CUSTOMERS.**



www.NKG-USA.COM

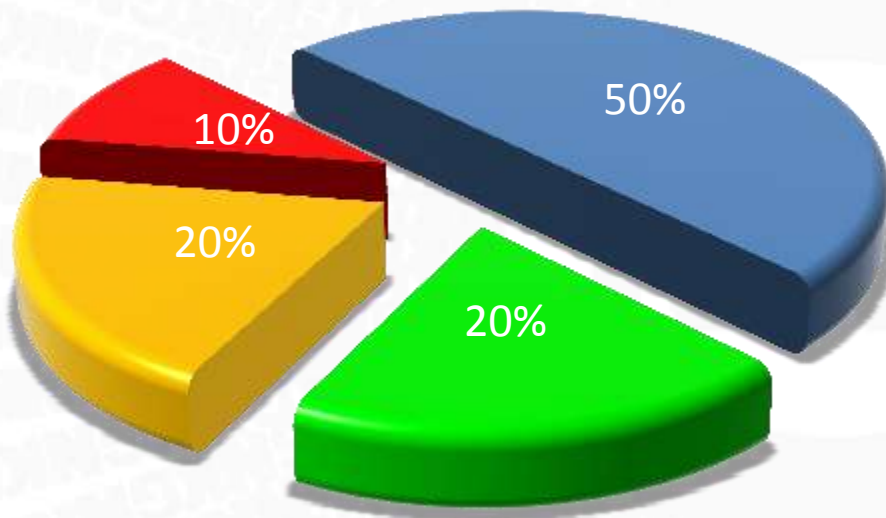
**NKG-USA SALES
COORDINATED BY
FITEN CONSULTING.**

DISTRIBUTORS.

 **NKG SHENZHEN AND SUZHOU OFFICES.**

 **SALES THRU VARIOUS REPRESENTATIVES
AND DISTRIBUTORS.**

MARKETS SERVED



☒ COMPUTERS & PERIPHERALS

- MICROCONTROLLER, MOTHERBOARDS
- HARD DRIVES, USD THUMB DRIVES
- PRINTERS, OFFICE HARDWARE

☑ COMMUNICATIONS

- WIMAX, WLAN, BLUETOOTH
- GIGABIT ETHERNET, SONET
- BASE STATIONS, AUDIO/VIDEO TELEPHONY

☒ CONSUMER ELECTRONICS

- GPS, PDAS, MP3, PORTABLE DEVICES
- PHOTO CAMERAS AND VIDEO CAMERAS
- AUDIO AND VIDEO EQUIPMENT

☒ INDUSTRIAL

- MEDICAL EQUIPMENT, TEST EQUIPMENT
- POWER METERS, SECURITY DEVICES
- CONTROLLERS, SPS, AUTOMATION DEVICE

CUSTOMERS, CEMs AND OEMs

- **ACS**
- **AMD / ATI**
- **ASUS**
- **BYD**
- **CELESTICA**
- **DJI**
- **FLEXTRONICS**
- **HARMAN**
- **JETTA**
- **KONE**
- **LINEAR**
- **LOJACK**
- **MSI**
- **NVIDIA**
- **PC PARTNER**
- **PEGATRON**
- **SKYWORTH**
- **V-TECH**
- **WINCOR-NIXDORF**
- **WONG'S**

CUSTOMER RELATIONS MANAGEMENT

■ SALES

- FAST RESPONSE TO CUSTOMER DEMANDS.
- COMPETITIVE PRICING.
- ALTERNATIVES AVAILABLE.

■ QUALITY

- EXCEED CUSTOMER'S EXPECTATIONS.
- VERY LOW DPPM.
- 8D FAILURE ANALYSIS, NEXT DAY RESPONSE.



■ SERVICE

- ON TIME DELIVERY.
- PAINLESS SAMPLING.
- FLEXIBLE PULL IN AND PULL OFF CAPABILITY.

■ SUPPORT

- PROFESSIONAL ENGINEERING AVAILABLE.
- BOARD MATCHING TEST.
- TECHNICAL TRAINING.

ENGINEERING SUPPORT

- ❑ **PROFESSIONAL ENGINEERING PERSONNEL WITH OVER 30 YEARS EXPERIENCE IN THE FIELD.**
- ❑ **ENGINEERING LABS LOCATED IN MAIN MARKETS CHINA AND USA AS WELL.**
- ❑ **ADVANCED BOARD TESTING CAPABILITY FOR CUSTOMER'S APPLICATION.**
THESE INCLUDE:
 - FREQUENCY MATCHING TEST TO ENSURE CRYSTAL WORKS AT DESIRED FREQUENCY, INCLUDING SUGGESTION FOR CHANGES IF THESE ARE NEEDED.
 - DETERMINATION OF CIRCUIT'S NEGATIVE RESISTANCE AND CIRCUIT MARGIN INCLUDING SUGGESTION FOR CHANGES IF SEEN NECESSARY.
 - DETERMINATION OF DRIVE LEVEL THAT OSCILLATOR PROVIDES FOR THE CRYSTAL.
- ❑ **TRAINING AT CUSTOMER'S SITE FOR GENERAL INTRODUCTION OF FREQUENCY CONTROL COMPONENTS AND TRAINING FOR ABOVE MENTIONED BOARD TESTS.**
- ❑ **ON SITE TROUBLESHOOTING TO HELP SOLVING PRODUCTION PROBLEMS.**
- ❑ **SUPPORT DURING PROTOTYPE RUNS AT CUSTOMER'S SITE.**

QUALITY SYSTEM

☐ **WE ARE COMMITTED TO DELIVER PRODUCTS THAT EXCEED THE CUSTOMER'S EXPECTATIONS.**

IN ORDER TO ACHIEVE THIS WE SET OUR AIMS AND SYSTEM REQUIREMENTS AS:

- OUR HONG KONG HEADQUARTER OFFICE OPERATES UNDER ISO 9001 AND 14000.
- OUR MANUFACTURING SITES OPERATE UNDER ADVANCED STANDARDS BY UTILIZING ADDITIONAL SYSTEMS SUCH AS TS 16949 AND QC080000.
- EVEN THERE IS MAY NO SPECIFIC SYSTEM, BUT PROCEDURES BE IN PLACE TO FOLLOW THE AIMS OF THE ELECTRONIC INDUSTRY CODE OF CONDUCT (EICC).

MANUFACTURING SITES HAVE PASSED CORRESPONDING EHS AUDITS ALREADY.

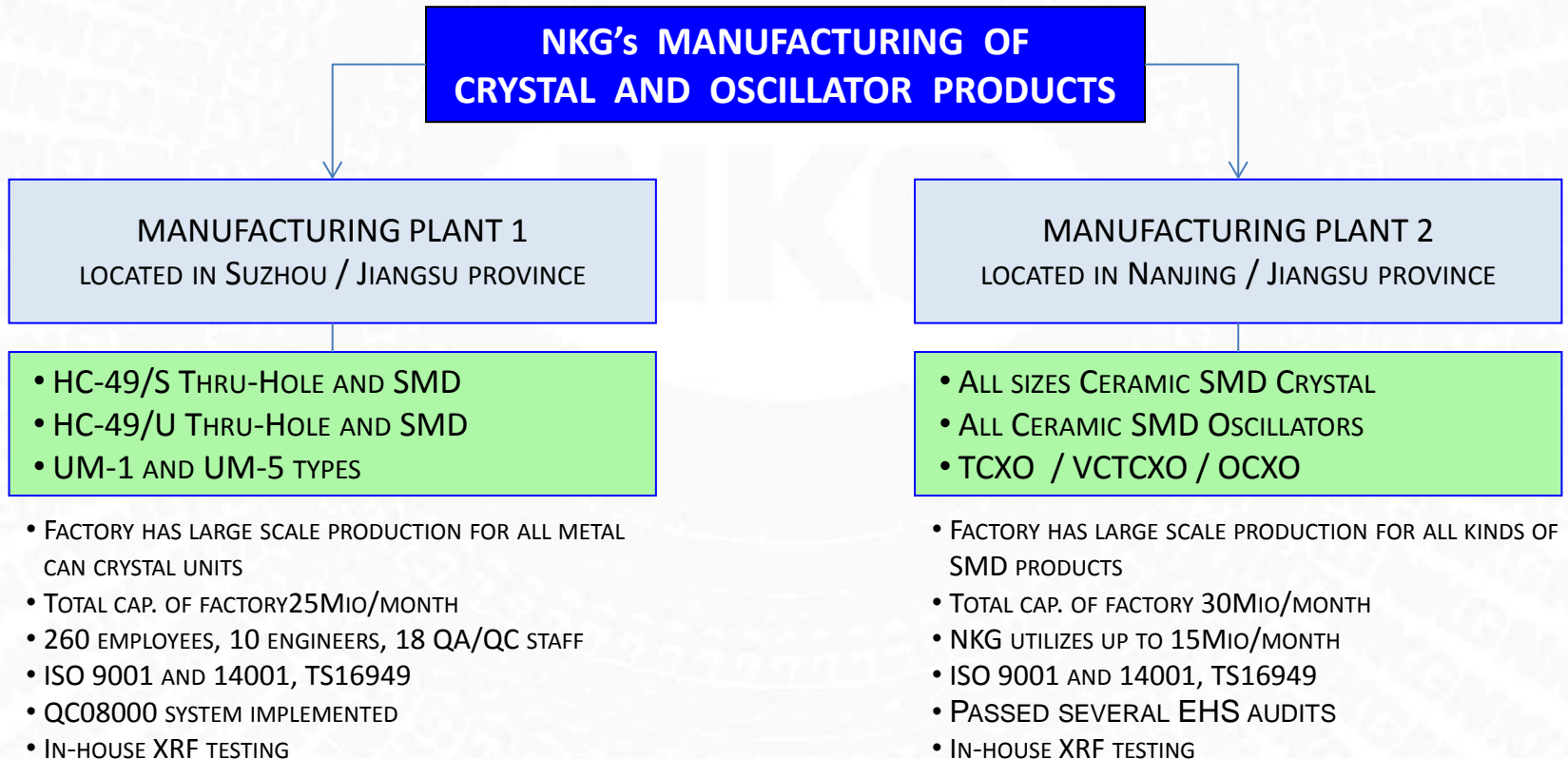
- **WE ARE COMMITTED TO THE RESTRICTED USE OF CONFLICT METALS AND HAVE DRIVEN INVESTIGATIONS TOGETHER WITH OUR SUPPLIERS IN ORDER TO VERIFY NON-USE OF RESTRICTED SOURCES.**

PRODUCT'S ENVIRONMENTAL COMPLIANCE

- WE OFFER ROHS COMPLIANT PRODUCTS SINCE 2004, MAJORITY FULLY COMPLIANT.**
- A VERY FEW ITEMS ARE FALLING UNDER ROHS EXEMPTIONS FOR WHICH WE CLAIM:**
 - EXEMPTION 7(a) FOR Pb CONTAINED IN HIGH MELTING POINT SOLDER ALLOY, THIS USED IN CERTAIN TYPES OF SMD TUNING FORK CRYSTALS AND SPECIAL HIGH END OSCILLATORS FOR TELECOM.
 - EXEMPTION 7(c)-I FOR Pb CONTAINED IN PIEZOELECTRIC DEVICES (USED IN CERAMIC RESONATORS AND FILTERS) AND IN GLASS COMPOUND (USED IN GLASS SEAL SMD CRYSTAL).
- OUR PRODUCTS ARE HALOGEN-FREE PER IPC J-STD-709, VERIFIED SINCE 2008.**
- WE ARE CONTINUOUSLY MONITORING FOR UPDATES OF REACH'S LIST OF SVHCs IN ORDER TO ENSURE THAT ALL OUR PRODUCTS REMAIN COMPLIANT.**
- IN 2008 WE OBTAINED CONFIRMATION THAT ALL OUR PRODUCT BE FREE OF PFOS/PFOA.**
- NONE OF OUR PRODUCTS USES PVC OR PHTHALATES IN PLASTIC LIKE ENCAPSULATIONS.**
- OUR ENVIRONMENTAL COMPLIANCE INCLUDES PACKAGING MATERIALS AS WELL.**
- IN HOUSE XRF TESTING IS MANDATORY AT ALL OUR MANUFACTURING SITES.**

MANUFACTURING

- ❑ **NKG HAS BEEN FOLLOWING THE COMMON TREND AND COMBINED ITS MANUFACTURING EQUIPMENT WITH ANOTHER COMPANY IN ORDER TO PRODUCE PARTS MORE EFFICIENT AND FOR LESS COST (DUE TO LARGER QTY).**



MANUFACTURING

MANUFACTURING PLANT 1
LOCATED IN SUZHOU / JIANGSU
PROVINCE

- HC-49/S THRU-HOLE AND SMD
- HC-49/U THRU-HOLE AND SMD
- UM-1 AND UM-5 TYPES

- ❑ TWO LARGE SCALE MANUFACTURING LINES FOR METAL CAN CRYSTALS.
- ❑ AUTOMATED MANUFACTURING EQUIPMENT REDUCING THE TIME FOR PRODUCTS BEING EXPOSED TO THE ENVIRONMENT.
- ❑ TS 16949 CERTIFIED, ISO 9001 / 14001.



MANUFACTURING

MANUFACTURING PLANT 2
LOCATED IN NANJING / JIANGSU
PROVINCE

- ALL SIZES CERAMIC SMD CRYSTAL
- ALL CERAMIC SMD OSCILLATORS
- TCXO / VCTCXO / OCXO

- ❑ LARGE SIZE ENTERPRISE WITH MASS MANUFACTURING FOR ALL CERAMIC PACKAGE SMD CRYSTAL AND OSCILLATORS INCLUDING VCXO AND TCXO.
- ❑ HIGH END PRODUCT LINES FOR OCXO AND SOPHISTICATED PERSONNEL.
- ❑ HIGHLY AUTOMATED PRODUCTION LINES, MAINLY JAPANESE EQUIPMENT.
- ❑ ONE CLASS 5K CLEAN ROOM ALL OTHERS ARE CLASS 10K.
- ❑ TS 16949 CERTIFIED, ISO 9001 AND 14001 CERTIFIED.
- ❑ IMPLEMENTED PROCEDURES TO COMPLY TO ELECTRONIC INDUSTRY CODE OF CONDUCT (EICC) AND PASSED SEVERAL EHS AUDITS.





**THANK YOU FOR YOUR ATTENTION,
YOU MAY LIKE TO VISIT OUR WEBSITE TO
GET MORE INFORMATION AND DETAILS
ON OUR PRODUCTS.**

END

NAKAGAWA ELECTRONICS LIMITED
BLOCK A, UNIT 1-2, 7/F., HOI LUEN IND. CENTRE, 55 HOI YUEN ROAD,
KWUN TONG, KOWLOON, HONGKONG

TEL.: +852 2389 9201
FAX: +852 2341 0001
E-MAIL: sales@nkg.com.hk

SHENZHEN NAKAGAWA OFFICE:
深圳中川晶体电子有限公司
广东省深圳市福田区八卦一路鹏盛年华B栋1508栋, 518 029

TEL.: +86 (0)755 2598 2648
FAX: +86 (0)755 2598 2390
E-MAIL: sales_sz@nkg.cn

SUZHOU NAMEI OFFICE:
苏州纳美电子有限公司
江苏省苏州工业园区苏虹中路39号, 215 021

TEL.: +86 (0)512 8818 7890
FAX: +86 (0)512 8818 7889
E-MAIL: sales_nm@nkg.cn