

# REALIZING A NEW NDK

**ANNUAL REPORT**

**2018**

Report for the Fiscal Year Ended March 31, 2018



A LEADER IN THE FIELD OF QUARTZ CRYSTAL ELECTRONIC COMPONENTS

**NIHON DEMPA KOGYO**

# PROFILE

Nihon Dempa Kogyo Co., Ltd. (NDK) was established in 1948 as a company specializing in the manufacturing of quartz crystal devices with a founding philosophy of “contributing to the prosperity of society and world peace through our service to customers.”

Since its establishment, NDK has provided support for the development of the electronics industry. NDK has become the leading company in its industry by accumulating technologies and meeting the diverse needs of its customers through integrated manufacturing, marketing, and innovative technology development.

In fiscal 2017 and fiscal 2018, we made active capital investments with the expectation that demand for crystals in smartphones would expand. However, subsequently, the number of crystal devices used in smartphones declined, and the rate of expansion in demand for these smartphones per se decreased markedly. As a consequence, we were left with excess capacity, recognized major impairment losses, and were obliged to show a net loss of more than ¥10 billion for the fiscal year.

We took these results most seriously and are working in earnest to restructure our management base to ensure that it can generate earnings. To implement this, we are endeavoring to build a new NDK that positions businesses based on 5G wireless communications systems (next-generation high-speed communication standard) as the pillars of our future growth and development. 5G-related businesses we are focusing on especially include Automated Driving / ADAS (Advanced Driver Assistance Systems), the Internet of Things (IoT), and Mobile Base Stations.

Moreover, we have reviewed our existing production systems, and, to increase productivity and raise cost-competitiveness, we will relocate a part of our mass-production lines from domestic to one of our foreign factories. Also, in order to cut fixed costs we will work to raise productivity by further automating production processes and streamlining our administrative functions. Similarly, by centralizing our materials procurement function in the Head Office, we will work aggressively to reduce materials costs.

We will implement these structural reforms immediately, and, as a manufacturer of crystal devices that control, select, and detect frequencies, we will continue to work to help in the creation of societies that are safe, secure, and comfortable.

## PRODUCT LINEUP



Synthetic Quartz Crystals



Crystal Units



Crystal Oscillators



Low-G Oscillators



Portable Ultrasonic Diagnostic Devices



Millimeter-Wave Sensors



Outgas Sensors



Frequency Synthesizers

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### Forward-Looking Statements

Statements made in this report with respect to our current plans, estimates, strategies, and beliefs and other statements that are not historical facts are forward-looking statements about our future performance. These statements are based on management's assumptions and beliefs in light of information currently available to it. We caution that a number of important risks and uncertainties could cause actual results to differ materially from those discussed in the forward-looking statements, and therefore you should not place undue reliance on them. You also should not rely on the belief that it is our obligation to update or revise any forward-looking statements, whether as a result of new information, future events, or otherwise. Risks and uncertainties that might affect us include, but are not limited to, fluctuation of currency exchange rates, overall supply and customer demand in the industry, product development and production capacities, performance of affiliated companies, and other risks and uncertainties.



**Toshiaki Takeuchi**

Representative Director & Chairman of the Board,  
President and CEO

# Carry out structural reform decisively with a resolve to realize a new NDK

## Reflecting on the Year Ended March 31, 2018

**NDK underwent aggressive capital investment in the fiscal year ended March 31, 2017, in preparation for expected demand for crystal devices that were expected to expand along with the advancement of high functionality in smartphones. However, following the capital investment, advances in IC development at semiconductor manufacturers resulted in a decrease in the number of crystal device parts used in smartphones. In addition, the demand for smartphones themselves dropped dramatically. As a consequence, we posted a large deficit exceeding ¥10 billion in the fiscal year ended March 31, 2018. We deeply apologize for any concern this caused to our shareholders.**

Following an extensive review to ensure a similar situation never occurs again, we are implementing initiatives with indomitable determination to rebuild the management base into one that can raise earnings.

First, we need to understand how we came to record this large deficit in excess of ¥10 billion in the fiscal year ended March 31, 2018. In the medium-term management plan for the fiscal year ended March 31, 2017, we anticipated that the number of crystal device parts mounted in smartphones would increase as smartphones become more sophisticated.

Moreover, we set up a growth strategy aiming at sales of ¥50 billion by expanding sales of surface acoustic wave (SAW) devices for the new mobile communications market, and we

conducted an investment program mainly to raise production capacity for temperature compensated crystal oscillators (TCXOs) and SAW devices. With sophisticated functions for smartphones advancing, it was judged to be a good opportunity to act, and, thus, the capital investment was carried out.

However, following the capital investment, advances in IC development at semiconductor manufacturers meant that the temperature correction function, which previously had been carried out by TCXOs, now became available on the IC side, and the use of crystal devices for smartphones transitioned from two TCXOs to a single crystal unit incorporating thermistors. Additionally, in connection with the demand for smartphones themselves dropping dramatically, the demand for TCXOs also decreased, and we were left with excess operating capacity.

Our SAW devices have gained the trust of our customers in network infrastructure markets such as base stations over many years. Despite this, in the state-of-the-art mobile communications market, the fast-paced competition in technology was more intense than we anticipated, and we were unable to respond effectively.

As a result, net sales in the fiscal year ended March 31, 2018, were ¥6 billion less than ¥50 billion we had planned.

In this way, sales for the mobile communications market were significantly lower than planned, and, due to a significant deterioration in profitability, we posted an impairment loss of ¥6.5 billion mainly on the production facilities for TCXOs and SAW devices used in smartphones.

In addition, as a result of recording a loss on the valuation of inventory, mainly products for smartphones, of approximately ¥1 billion, we recorded a final deficit exceeding ¥10 billion.

Meanwhile, in the automotive electronics market, the number of crystal units per automobile is increasing as a consequence of increases in the number of automobiles equipped with ADAS (Advanced Driver Assistance Systems) as well as an increase in the number of automobiles that make use of electronic components. As a result, we were able to raise sales as planned for the fiscal year ended March 31, 2018.

**Summary of Performance in FY2018**

(Millions of yen)

		①	②	③	④ = ② + ③	④ - ①
	FY2017 Full Year Result	FY2018 Full Year Outlook as of May 12	FY2018 Full Year Result	Temporary Factors	FY2018 Full Year Result (exclude temporary factors)	Change from Outlook as of May 12 (exclude temporary factors)
Net Sales	43,791	50,000	43,952	0	43,952	(6,048)
Operating Income/Loss	727	1,500	(9,618)	8,271	(1,347)	(2,847)
Income/Loss before Tax	472	1,400	(9,640)	8,271	(1,369)	(2,769)
Net Income/Loss	611	1,100	(10,202)	8,616	(1,586)	(2,686)
Exchange Rate (against U.S. dollar) (yen)	¥109.03	¥108.00	¥110.81	—	—	—

<Temporary factors included in profit/loss>

(Millions of yen)

Impairment losses	6,515
Inventory valuation losses/disposal losses	1,050
Legal settlement expenses	706
• Temporary factors in operating income/loss	8,271
Reversal of deferred tax assets, etc.	345
• Temporary factors in net income/loss	8,616

#### Outline of Structural Reforms

- **Target Markets**

5G-related business and high-value-added products  
Business in mobile communications and consumer markets will decrease

- **Restructure Production System**

Transfer a part of our mass-production lines to a foreign factory

- **Reducing Fixed Costs**

Automating production process and streamlining our administrative functions

- **Centralize Material Procurement Functions in Head Office**

- **Centralize Quality Assurance Functions in Head Office**

## Realizing a New NDK

**To rebuild the Company and realize a new NDK, we will carry out the following structural reforms.**

### 1. Target Markets

We will endeavor to build a new NDK that positions businesses based on 5G wireless communications systems as the pillars of our future growth and development.

We are focusing on, and will devote our resources to, 5G-related businesses such as automated driving, ADAS, IoT, and the base station market.

- **Automotive Electronics Market (including Automated Driving and ADAS)**

Due to advances in electrical devices and the practical use of automated driving features, it is expected that there is an increase in the number of automobiles equipped with ADAS and a dramatic increase in cameras, radar, and LiDAR (light detection and ranging) used in ADAS. Accordingly, we expect the number of crystal units per automobile to increase by more than 10%, against expected growth of around 3% in global automobile production. Currently, the average number of quartz devices used per automobile is about 30, and three years from now, the number of used devices will grow to about 40 per automobile.

With a market share in the automotive electronics market of more than 50%, we will continue to develop highly reliable products in response to our customers' needs.

- **IoT (Internet of Things)**

In the future, IoT will connect a diverse range of devices wirelessly, and it is crystals that are responsible for wireless communications functions.

In the year ending March 31, 2019, we expect an increase in the sales of products for IoT used in healthcare and logistics and the use of new crystal units for near-field communications (NFC) functions in the next models of high-end smartphones.

In healthcare, our crystal units are expected to be used in devices to monitor blood glucose levels. Our small crystal unit is a built-in part of the sensor, and since the sensor is disposed after only one to two weeks, a crystal unit is required each time, making for a product with great potential to drive demand for crystal units.

We expect significant demand for IoT devices in the future and will sell crystal units using a global network focused on standardized products.

- **Industrial Equipment Market (including 5G Base Stations)**

With 5G on the horizon, equipment for small cell base stations is expected to be improved to adapt to the increasing volume of data and faster communications speeds. Targeting these small cell base stations, we will prepare highly stable TCXO devices that can deal with a broader temperature variation from minus 40°C to plus 105°C. Also, it is indispensable for 5G macro base stations to minimize GPS-signal downtime caused by weather change or equipment malfunction. We are developing the world's highest performance class of a precision oven-controlled crystal oscillator (OCXO) that maintains the timing accuracy of the reference signal to within  $\pm 1 \mu\text{s}$  in eight hours.

Demand for crystal devices for base stations is expected to remain weak in fiscal 2019 ahead of the transition to 5G, but we expect that demand will increase from fiscal 2020, when 5G investment moves into full swing.

• **High-Value-Added Products (Ultrasonic Devices, Frequency Synthesizers, and Sensors)**

We are expanding our product range to include high-value-added products such as ultrasonic devices, frequency synthesizers, and sensors, all of which make use of our crystal device technology, and we are developing them into mainstay products that can secure profitable earnings in the future.

In ultrasonic devices, we are focusing on sales of compact mobile ultrasonic devices in anticipation of a dramatic increase in medical, nursing, and nursing care needs.

In frequency synthesizers, we are currently achieving sales for use in special equipment. In addition, we will focus on the development and sales of wireless communications devices, which make use of the Company's wireless communications technology.

In sensors, we started selling a water gauge that monitors the water level of rivers using millimeter wave sensors. In addition, we are expanding sales and marketing to resin and solvent manufacturers of our outgas sensors, a product developed jointly with the Japan Aerospace Exploration Agency (JAXA).

• **New Product Development (Vibration-Resistant TCXO Development)**

We developed a TCXO with more than 10 times the anti-vibration performance of an ordinary crystal unit. The transmission of vibration to the oscillator in various environments during system use of automobiles, IoT base stations, and drones will impair telecommunications quality. This product was developed to prevent this telecommunications impairment. This product offers clear superiority over the performance of MEMS oscillators, which until now had been out in front with anti-vibration features.

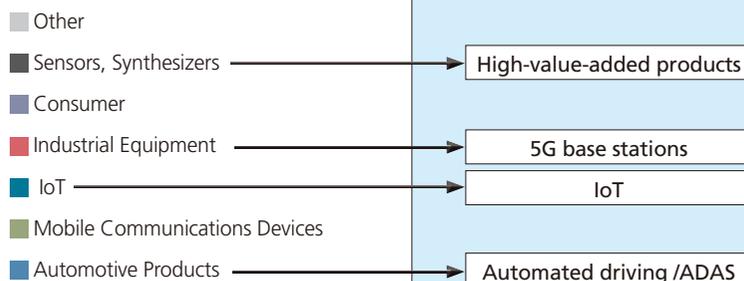
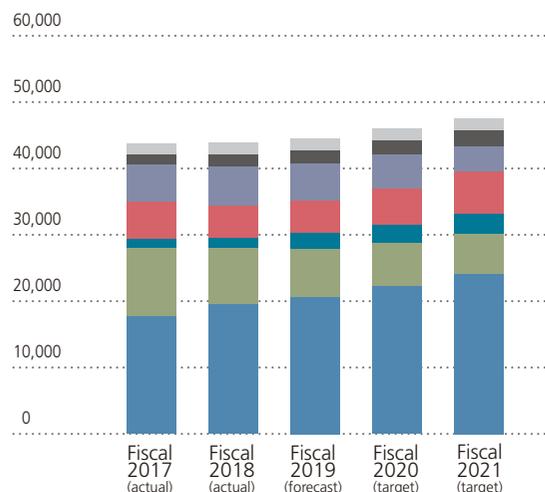
• **Mobile Communications and Consumer Market**

The smartphone market is maturing and the business for mobile communications will contract in the future. The business for the consumer market will also contract.

As a result, we will post consolidated net sales of ¥44.5 billion in fiscal 2019 and are targeting ¥46.0 billion in fiscal 2020 and ¥47.5 billion in fiscal 2021.

**Mid-Term Sales Target**

(Millions of yen)



**2. Restructure Production System**

We will review the current production system and transfer a part of production lines from Japanese factories to an overseas factory in a bid to raise production efficiency and cost-competi-

tiveness across the entire Group. More specifically, we will transfer our mass-production lines of components for automobiles, which we are producing at the Furukawa factory, to the Malaysian factory.

### 3. Reducing Fixed Costs

We will reduce fixed costs by enhancing productivity through measures such as automating the production process and promoting the streamlining of administrative departments.

### 4. Centralize Material Procurement Functions in Head Office

To reduce material costs, we launched a new procurement

division at the Head Office. The centralization of the Group's entire procurement business as a single division at the Head Office will strengthen cost reductions of material procurement.

### 5. Centralize Quality Assurance Functions in Head Office

In business for 5G-based systems including devices installed in automobiles, demand for quality is increasing more than ever.

To date, the Company has developed systems where each production subsidiary carried out quality assurance, but, in order to further enhance the system and guarantee high quality, we will integrate the quality assurance functions to the Head Office.

## Outlook for the Fiscal Year Ending March 31, 2019

### Carry out structural reforms aiming to return the Company to profitability in the fiscal year ending March 31, 2019

We expect that sales mainly for TCXO and SAW devices in the mobile communications sector will decline.

The sales for industrial equipment will also decline slightly due to a weak outlook for crystal unit demand for mobile phone base stations ahead of the move to 5G.

Sales of products for IoT used in areas such as healthcare and logistics are expected to increase, and sales of the Group as a whole are expected to be ¥44.5 billion, higher than the previous year. Depreciation and amortization expenses will decrease by ¥700 million from the previous fiscal year, reflecting the impairment losses recorded in the previous fiscal year.

Furthermore, as a result of implementing structural reforms, we anticipate operating income of ¥500 million in the fiscal year ending March 31, 2019.

We are planning capital expenditure investment of ¥2.9 billion to update production processes to improve productivity and streamline investment for automating production lines, mainly for equipment in the automotive electronics sector.

### Outlook for FY2019

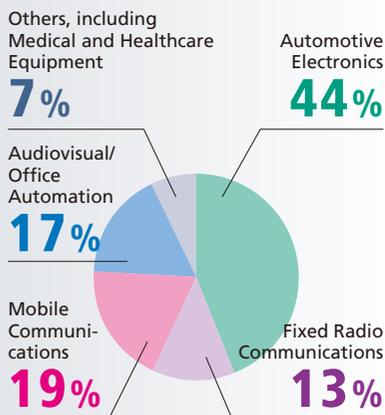
(Millions of yen)

	FY2018 Actual	FY2019 Outlook
Net Sales	43,952	44,500
Operating Income/Loss	(9,618)	500
Income/Loss before Tax	(9,640)	300
Net Income/Loss	(10,202)	200
Capital Investment	7,000	2,900
R&D Expenses	1,787	1,900
Exchange Rate (against U.S. dollar) (yen)	110.81	105.00

# BUSINESS OVERVIEW

## Principal Markets

### Percentage of Total Sales



### Number of Crystal Devices Used

### Outline of Business Results and Outlook

### Used in

## Automotive products

## Industrial equipment

### SAW devices

### Automotive Electronics



- Ultralow-priced models: 10 to 20
- Economy models: 30 to 40
- Luxury models: 70 to 100
- Average per vehicle regardless of model: about 30

- The number of crystal units per automobile increases by over 10% due to the increase of the ADAS equipment installed in automobiles, against growth of around 2-3% in global automobile production.  
As a result, sales grew steadily due to increasing demand for crystal products occurring in connection with the widespread use of communications and imaging systems for ADAS equipment.
- In the automobile industry, a large paradigm shift is under way symbolized by the acronym CASE (connectivity, autonomous, shared, electric). The crystal products that are used in each of these areas require a high degree of reliability. Accordingly, NDK pursues product development and design that take advantage of the Company's extensive experience accumulated thus far.

- Automobiles

### Fixed Radio Communications



- Mobile phone base stations
- Optical communications devices (each device: 1 to 10 or more)
- IoT base stations, Gateways: 2 to 4

- In the base station market, demand for crystal products remained slow due to the telecommunications equipment manufacturers holding off on capital investment ahead of the introduction of 5G. As a result, sales declined compared to the previous fiscal year. Currently, a rebound in demand is expected as standardization and planning for the practical implementation of full-scale 5G operations get under way in countries worldwide.
- Crystal products (OCXOs, TCXOs, VCXOs) for base stations and optical network devices require a range of important features including high accuracy, low jitter, high frequency, high heat resistance, and ultracompactness, all of which NDK is developing and selling in its products.
- We sell frequency synthesizers for special applications. In addition, NDK will focus on the development and sales of wireless communications equipment that makes use of the Company's wireless technology.

- Mobile phone base stations
- Optical communications devices
- Broadband telecommunications equipment
- Digital broadcasting equipment
- Measuring devices
- Satellites

## Devices for consumer products

## Ultrasonic/Sensors

### Mobile Communications



- Smartphones (2 to 6 crystal units and oscillators)

- A pause in growth in the smartphone market and slowing demand, mainly in China, caused sales to decline year on year.
- For crystals for smartphones, miniaturization is advancing, and NDK started mass production of 1612-sized crystal units incorporating thermistors and increased production of 1210-sized crystal units.

- Smartphones

### Audiovisual/Office Automation



- Laptop PCs: 3 to 4
- LCD TVs: 2 to 3
- Game consoles: 3 to 5
- Digital single-lens reflex cameras: 2 and 1 optical filter

- Sales of digital single-lens reflex cameras declined due to the market contracting. Despite this, sales increased year on year on the back of increased sales for IoT (wireless) for new applications.
- For IoT, we are focusing on procedures to be certified by semiconductor IC manufacturers in expectation of an increase in demand for BLE (Bluetooth Low Energy) and LPWA (Low Power Wide Area).

- PCs
- TVs
- Games
- Digital single lens reflex cameras
- IoT (Wireless communications)

### Medical and Healthcare Equipment



- Ultrasonic equipment: We are focusing on the development and sales of compact mobile ultrasonic sensors that can easily display images on a tablet in anticipation of a dramatic increase in medical, nursing, and nursing care needs.
- Gas sensors: Developed jointly with the Japan Aerospace Exploration Agency (JAXA), NDK launched sales of outgas sensors to resin and solvent manufacturers under the JAXA COSMODE brand. The outgas sensors measure gas emitted from materials used in such products as space probe telescopes.
- Millimeter-wave sensors: NDK launched a radio wave type water level gauge via a partner to monitor the water level of rivers.

- Ultrasonic probes
- Gas sensors
- Millimeter-wave sensors
- Biosensors

# CORPORATE GOVERNANCE

To continue to be a company that is “trusted and needed” for all its stakeholders, NDK positions corporate governance as its highest priority management issue. Accordingly, NDK is working to structure a corporate governance system that enhances the soundness, transparency, and efficiency of management.

## NDK’s Governance Structure

NDK adopts the Audit & Supervisory Board form of corporate governance and elects eight Directors and three Audit & Supervisory Board Members. To strengthen auditing and oversight functions, two of the Directors are Outside Directors and two of the Auditors are Outside Audit & Supervisory Board Members. All of these four Outside Directors and Outside Audit & Supervisory Board Members are independent, and none has served in Company subsidiaries or as major Company shareholders or major partners of the Company, and have been officially reported to the Tokyo Stock Exchange, Inc.

In addition, to accelerate management decision making and policy implementation, NDK introduced a Corporate Officer system in 2014.

## Design and Operation of Internal Controls

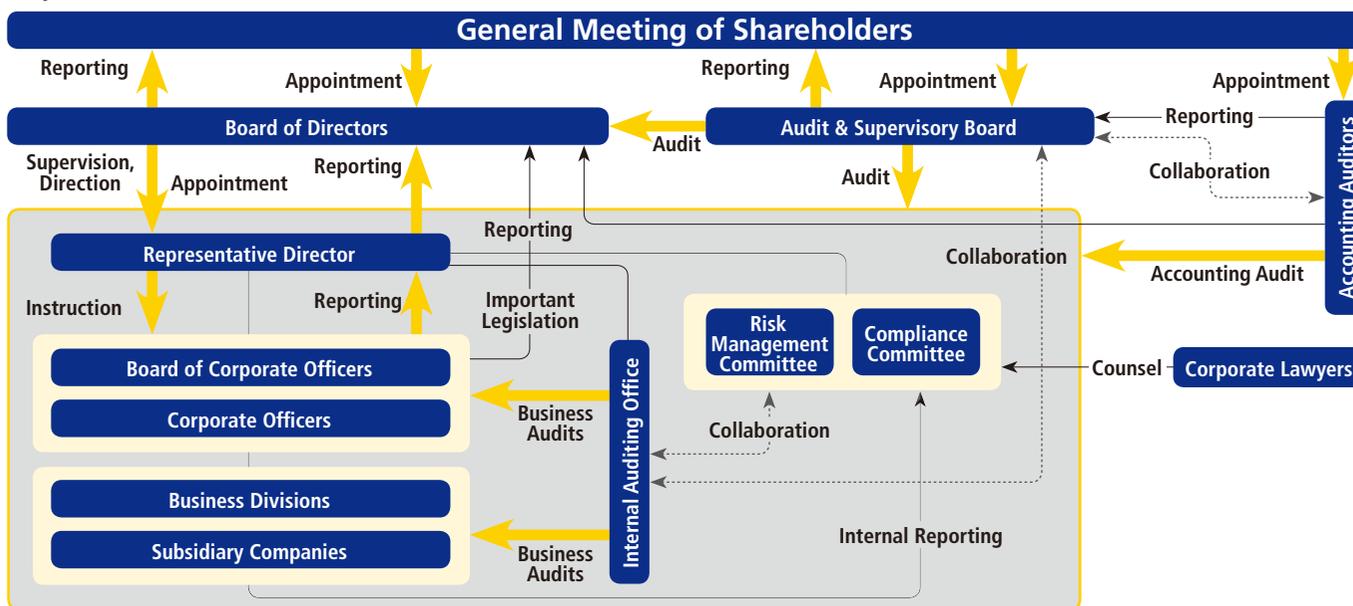
Regarding compliance, NDK has formed a Compliance Committee, and, by conducting compliance training for Directors and employees, works to establish and improve systems for maintaining compliance with laws and regulations. In addition, NDK has introduced internal reporting systems and has provided systems that gather, analyze, and make use of internal information regarding any violations of laws and regulations.

To manage risk, NDK has formed a Risk Management Committee, which is working to develop systems to prevent risks before they emerge and keep any losses that may occur to a minimum level.

### Status of Activities of Outside Directors and Outside Audit & Supervisory Board Members and Their Activities

Title	Name	Outside Director/Audit & Supervisory Board Member	Status of Activities	Directors' meetings attended	Audit & Supervisory Board meetings attended
Outside Directors	Takehiko Tatsuko	○	In the meetings of the Board of Directors, based on his abundant experience and broad knowledge as a corporate manager, Mr. Tatsuko accurately points to matters for discussion. He also raises issues and expresses his opinions appropriately from his wide perspective in the areas of financial accounting and personnel/labor matters. He, thereby, contributes to proper and accurate decision making.	17/17	—
	Hirofumi Shimada	○	In the meetings of the Board of Directors, based on his abundant experience and broad knowledge as a corporate manager, Mr. Shimada accurately points to risks from his wide perspective in management accounting and organizational management, raises issues, and expresses his opinions. He, thereby, contributes to proper and accurate decision making.	16/17	—
Outside Audit & Supervisory Board Members	Shoji Kenmochi	○	In the meetings of both the Board of Directors and the Audit & Supervisory Board, based on his abundant experience and broad knowledge, mainly as a licensed tax accountant, Mr. Kenmochi provides professional advice on points for attention related to tax matters, and asks questions and expresses his opinions appropriately regarding organizational management and personnel while providing examples of similar matters in other companies. He, thereby, provides advice that helps to secure the appropriateness and accuracy of decision making.	16/17	14/15
	Yorihisa Suwa	○	In the meetings of both the Board of Directors and the Audit & Supervisory Board, based on his abundant experience and broad knowledge, mainly as a corporate manager and technical expert, Mr. Suwa raises questions and expresses his opinions on management policy, business plans, quality assurance systems, cost reduction plans, and other matters. He, thereby, provides advice that helps to secure the appropriateness and accuracy of decision making.	17/17	15/15

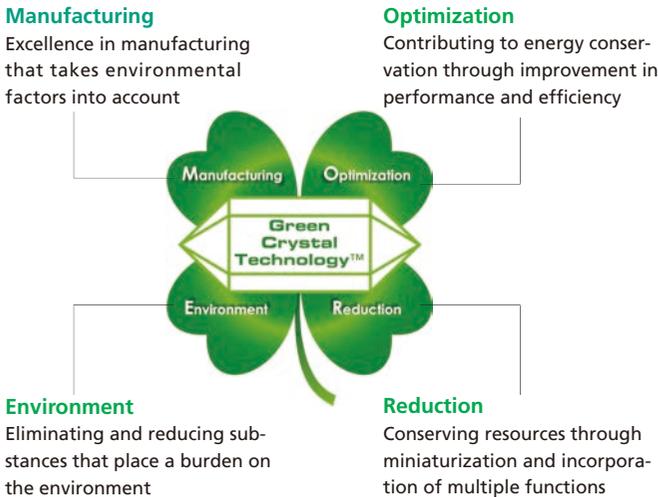
### Corporate Governance Structure



## Environmental Policy and Initiatives

NDK operates globally with the Corporate Philosophy of “NDK takes its part in protecting the environment and is fulfilling its social responsibilities.” To this end, NDK has structured a Companywide environmental management system and is pursuing activities to protect the global environment. The Company has due regard for the environment and does not select or use parts or materials that contain substances that are forbidden and/or place a burden on the environment at any stage of its activities. NDK is also compliant with environment-related laws in all countries where it operates as well as the requests of its customers, and has established a list of management standards for environment-related substances for responding to ELV, RoHS, REACH, and other directives and requirements. Initiatives based on NDK’s environmental management system include securing and operating under ISO 14001 certifications. Particularly regarding reduction of CO<sub>2</sub> greenhouse gas emissions, the Company has prepared a medium-term plan that includes targets for reducing emissions and is working to attain these goals. To respond to the environmental needs of society and reduce CO<sub>2</sub> emissions, NDK has established “Green Crystal Technology” (Chart 1) as the model concept for its crystal device development and works to apply cutting-edge technology to provide even more compact, lighter, and power-conserving devices.

Chart 1



## Environmental Performance

NDK is endeavoring to reduce the burden that its activities place on the environment and has prepared a medium-term plan that contains specific issues and sets objectives. NDK has earned a high appraisal for its environmental initiatives, and in June 2011 received an environmental rating from the Development Bank of Japan (DBJ), qualifying it to receive financing on preferential terms. Under this DBJ rating system, companies that have excellent environmental management receive ratings, and financing terms are set according to the level of the rating.

## Reducing CO<sub>2</sub> Emissions

Under the Saitama Prefecture Global Warming Strategy promotion ordinance, the goal was to reduce the basic CO<sub>2</sub> emission volume by 6% during the first period of the plan, which covered the years from fiscal 2012 to fiscal 2015. In October 2017, NDK received a Certificate of Attainment of CO<sub>2</sub> Emission Reduction under the Saitama Prefecture measures during the first period of the plan (fiscal 2012 to fiscal 2015). During the five-year period beginning with fiscal 2016, under the second period of the plan, the goal is to reduce CO<sub>2</sub> emissions by 13%. NDK is moving ahead with initiatives to attain the goal of the second period.



For more-detailed information, please read the CSR activities information at the following Internet address:  
<http://www.ndk.com/en/environment/>

## NDK Group Guidelines for Action

In December 2015, NDK prepared its NDK Group Code of Conduct, and it sets forth the necessary measures for NDK to contribute to the realization of a sustainable society.

This Code of Conduct was prepared based on NDK’s Corporate Philosophy and Ethical Standards. To maintain high ethical standards, the NDK Group companies, which bear social responsibility, have pledged that they will follow these guidelines. In addition, all the management and staff of the NDK Group understand these guidelines and are following them.

To put this code into practice, NDK provides compliance training for new employees and CSR training for all employees, and conducts a questionnaire survey among its business partners regarding their CSR initiatives. Moreover, the content of the NDK Group’s code follows the Code of Conduct established by the Responsible Business Alliance (RBA) and the Electronic Industry Citizenship Coalition (EICC). It is, therefore, not a set of codes for one company, but is applied to suppliers and other participants in NDK’s supply chain.

For more-detailed information, please read the “NDK Group Code of Conduct” at the following Internet address:  
[http://www.ndk.com/pdf/code\\_of\\_conducy\\_en.pdf](http://www.ndk.com/pdf/code_of_conducy_en.pdf)

# CORPORATE INFORMATION

## DIRECTORS, AUDIT & SUPERVISORY BOARD MEMBERS, AND CORPORATE OFFICERS

### Representative Director & Chairman of the Board, President and CEO

**Toshiaki Takeuchi**  
Representative Director and CEO

### Directors

**Hiromi Katoh**  
Executive Vice President  
General Manager of Administration Division

**Junichi Naruse**  
Executive Corporate Officer  
General Manager of Corporate Planning Office

**Reiji Fukuhara**  
Senior Corporate Officer  
General Manager of Sales & Customer Service Division

**Akio Noheji**  
Senior Corporate Officer  
General Manager of Corporate Production Division  
General Manager of Corporate Procurement Division

**Kazuo Akaike**  
Senior Corporate Officer  
General Manager of Engineering Division

**Takehiko Tatsuko**  
Outside Director

**Hirofumi Shimada**  
Outside Director  
Advisor of Nippon COMSYS Corporation

### Audit & Supervisory Board Members

**Shigeo Handa**  
Standing Audit & Supervisory Board Member

**Shoji Kenmochi**  
Outside Audit & Supervisory Board Member

**Yorihisa Suwa**  
Outside Audit & Supervisory Board Member

### Corporate Officers

**Nobumitsu Fujiwara**  
President of Suzhou NDK Co., Ltd.

**Hiroyuki Shinada**  
General Manager of Industrial Engineering Division

**Kouji Kubota**  
General Manager of Quality Assurance Department

**Michio Aoyama**  
Deputy General Manager of Administration Division

## INVESTOR INFORMATION (As of March 31, 2018)

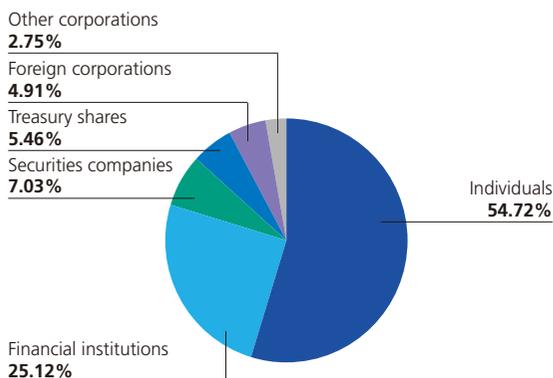
Date of Foundation : 1948

Share Capital : ¥10,649 million

Number of Shares of Common Stock : 20,757,905 shares  
(including 1,132,818 shares held in treasury)

Number of Shareholders : 10,141

### Distribution of Ownership among Shareholders: (On a number of shares basis)



### Major Shareholders:

Shareholding Name	Number of Shares Held	
	(Thousands)	Ratio
Japan Trustee Services Bank, Ltd. (Trust Account)	690	3.51%
Resona Bank, Ltd.	667	3.40%
Marusan Securities Co., Ltd.	658	3.35%
Toshiaki Takeuchi	623	3.17%
Saitama Resona Bank, Ltd.	610	3.10%
Hiroshi Takeuchi	528	2.69%
The Master Trust Bank of Japan, Ltd. (Trust Account)	349	1.77%
Japan Trustee Services Bank, Ltd. (Trust Account 5)	345	1.75%
The Bank of Tokyo-Mitsubishi UFJ, Ltd.	318	1.62%
Tokio Marine & Nichido Fire Insurance Co., Ltd.	315	1.60%

Notes: 1. The above list of major shareholders excludes treasury shares.  
2. Shareholding ratios are calculated with the outstanding shares excluding treasury shares.  
3. The Bank of Tokyo-Mitsubishi UFJ, Ltd., changed its corporate name as of April 1, 2018 to MUFG Bank, Ltd.

Stock Listing : First Section of the Tokyo Stock Exchange

Fiscal Year-End : March 31

General Meeting of Shareholders : June

# CORPORATE HISTORY

- 1948** • Founded as Nanbu Shoko Co., Ltd.
- 1949** • Started crystal unit production and sales
- 1950** • Changed the Company's name to Nihon Dempa Kogyo Co., Ltd.
- 1954** • Relocated to newly constructed Head Office and plant in Shibuya-ku, Tokyo
- 1959** • Started crystal filter production
- 1960** • Started crystal oscillator production
- 1962** • Started construction of Sayama Plant in Sayama, Saitama Prefecture
- 1963** • Started mass production of synthetic quartz crystals
  - Crystal cutting facility completed at the Sayama Plant
  - Began trading of NDK stock on the OTC market
- 1964** • Assembly line completed at the Sayama Plant
  - Opened Kansai Sales Office for sales in Osaka
- 1970** • Established production affiliate Hawk Denshi Co., Ltd., in Niigata Prefecture (converted to a subsidiary in 1990 and renamed Niigata NDK Co., Ltd., in 2005)
- 1975** • Opened representative sales office in California, U.S.A.
- 1976** • Established subsidiary Furukawa NDK Co., Ltd., in Miyagi Prefecture
- 1979** • Established subsidiary Asian NDK Crystal Sdn. Bhd. in Selangor, Malaysia
  - Established NDK America, Inc., in California, U.S.A., and dissolved representative sales office
- 1985** • Completed main building at Sayama Plant
- 1986** • Opened Chubu Sales Office for sales in Aichi Prefecture
  - Established production subsidiary Malaysian Quartz Crystal Sdn. Bhd. in Selangor, Malaysia (now NDK Quartz Malaysia Sdn. Bhd.)
  - Completed construction of new facilities at Sayama Plant
- 1988** • Established sales subsidiary NDK Europe Ltd. in the United Kingdom
- 1989** • Established production subsidiary Hakodate NDK Co., Ltd., in Hakodate, Hokkaido
- 1990** • Relocated Head Office functions to Shinjuku-ku, Tokyo
  - Listed NDK stock on the Second Section of the Tokyo Stock Exchange
- 1994** • Established production subsidiary Suzhou NDK Co., Ltd., in Suzhou, China
  - Established sales subsidiary NDK Italy Srl as a subsidiary of NDK Europe Ltd., which is a subsidiary of the parent company
  - ISO 9001 certification obtained
- 1995** • Established sales subsidiary NDK Electronics (HK) Limited in Hong Kong
- 1998** • QS-9000 certification obtained
  - Listed on the First Section of the Tokyo Stock Exchange
- 1999** • ISO 14001 certification obtained
- 2001** • Opened NDK Europe Ltd., German Office, for sales (functions transferred to NDK Germany GmbH upon the establishment of that company as a subsidiary of the parent company in 2008, opened and transferred functions to the German Office in March 2014, commenced NDK Germany GmbH liquidation procedures in April 2014)
- 2002** • Established production subsidiary NDK Crystal, Inc., in Illinois, U.S.A.
  - Established NDK Holdings USA, Inc., in Illinois, U.S.A. as an umbrella holding company holding 100% of the shares in NDK America, Inc., and NDK Crystal, Inc.
  - Established NRS Technologies Inc. in Hakodate, Hokkaido, as a joint venture with NEC
  - Established sales subsidiary NDK-Electronics Shanghai Co., Ltd.
- 2003** • Established NDK Crystal Asia Pte. Ltd. in Singapore as a sales subsidiary of Asian NDK Crystal Sdn. Bhd., which is a subsidiary of the parent company
- 2004** • Opened Chitose Technical Center in Chitose, Hokkaido
- 2005** • NRS Technologies Inc. was merged into Hakodate NDK Co., Ltd.
  - Head Office functions relocated to Sasazuka, Shibuya-ku, Tokyo
- 2006** • Registered Head Office moved from Nishihara, Shibuya-ku, Tokyo, to Sasazuka, Shibuya-ku, Tokyo
- 2008** • Quality Assurance Laboratory recognized by Japan Accreditation Board for Conformity Assessment as meeting the ISO/IEC 17025: 2005 international laboratory management standard
  - Obtained approval as a specified exporter from Tokyo Customs
- 2009** • Completed Laboratory ATOM, a new research facility, within the Sayama Plant
  - Established Suzhou NDK Trading Co., Ltd., in Suzhou, China as a subsidiary of Suzhou NDK Co., Ltd., which is a subsidiary of the parent company
- 2010** • NDK became the first company in Japan to adopt IFRS
- 2014** • Subsidiary NDK Italy Srl subsumed in a merger with subsidiary NDK Europe Ltd.
  - ISO 13485 certification obtained
- 2015** • Head Office functions relocated to Sasazuka, Shibuya-ku, Tokyo (within the same area before relocation)
- 2016** • Subsidiary NDK Crystal, Inc. merged with subsidiary NDK Holdings U.S.A., Inc.

## GUIDE TO NDK'S WEBSITE

<http://www.ndk.com/en/>



**NDK's Website offers investor relations (IR) materials along with other diverse information—such as explanations of our unique technologies—that will enable you to gain a deeper understanding of NDK.**

### CSR Activities

This section offers information about NDK's broad range of CSR activities, including environment conservation activities and approach towards labor safety and health.

### Investor Relations

This section offers such information as materials for explaining financial results, annual reports, etc.

### Event Information

This section offers information about NDK's participation in exhibitions.

# SIX-YEAR SUMMARY

Nihon Dempa Kogyo Co., Ltd. and Consolidated Subsidiaries  
For the years ended March 31

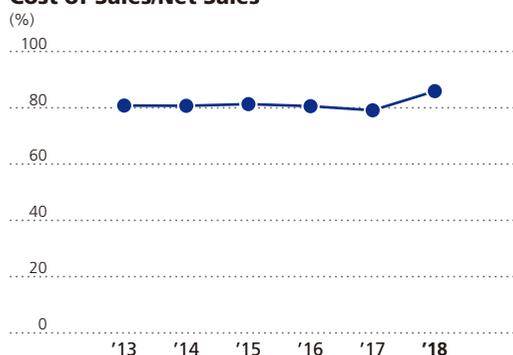
	Millions of yen						Thousands of U.S. dollars (Note)
	2018	2017	2016	2015	2014	2013	2018
Net sales	<b>¥ 43,952</b>	¥43,791	¥44,850	¥47,730	¥50,774	¥50,623	<b>\$413,704</b>
Cost of sales	<b>37,768</b>	34,620	36,137	38,801	40,978	40,752	<b>355,496</b>
Selling, general and administrative expenses	<b>6,642</b>	6,479	6,718	7,713	7,496	7,186	<b>62,518</b>
Research and development expenses	<b>1,787</b>	2,035	1,921	2,133	2,221	2,579	<b>16,820</b>
Operating (loss)/income	<b>(9,618)</b>	727	410	175	240	235	<b>90,530</b>
(Loss)/Income before income tax	<b>(9,640)</b>	472	102	359	191	(37)	<b>(90,737)</b>
Net (loss)/income	<b>(10,202)</b>	611	317	(569)	181	(289)	<b>(96,027)</b>
Net (loss)/income attributable to owners of the parent	<b>(10,202)</b>	611	317	(569)	181	(289)	<b>(96,027)</b>
Total comprehensive (loss)/income for the period	<b>(9,732)</b>	(72)	(1,414)	1,319	827	1,307	<b>(91,603)</b>
Total assets	<b>60,816</b>	68,830	67,966	71,670	76,218	71,367	<b>572,439</b>
Total equity	<b>15,108</b>	25,234	25,700	27,507	26,581	26,147	<b>142,206</b>
Depreciation and amortisation	<b>4,094</b>	3,641	3,558	3,809	3,923	3,425	<b>38,535</b>
Capital expenditures	<b>7,141</b>	6,779	2,099	2,024	2,733	4,736	<b>67,215</b>

Per Share Data:	Yen						U.S. dollars (Note)
	Net income/(loss):						
Basic	<b>¥(519.87)</b>	¥31.16	¥16.17	¥(29.00)	¥ 9.25	¥(14.75)	<b>\$(4.89)</b>
Diluted	—	—	—	—	—	—	—
Cash dividends applicable to the period	<b>10.00</b>	20.00	20.00	20.00	20.00	20.00	<b>0.09</b>

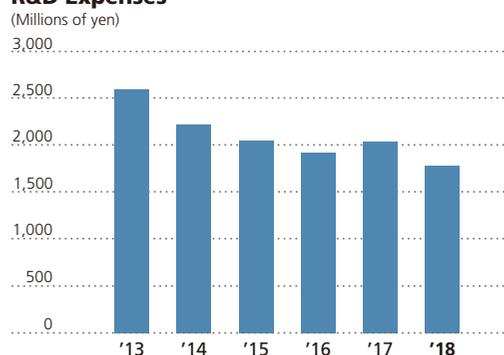
Notes: 1. Figures are presented in accordance with International Financial Reporting Standards. The U.S. dollar amounts represent translations of Japanese yen amounts at the rate of ¥106.24 to U.S.\$1.00, which was the rate prevailing on March 31, 2018.

2. The results for the year of 2014 are retrospective in line with changes in accounting policies.

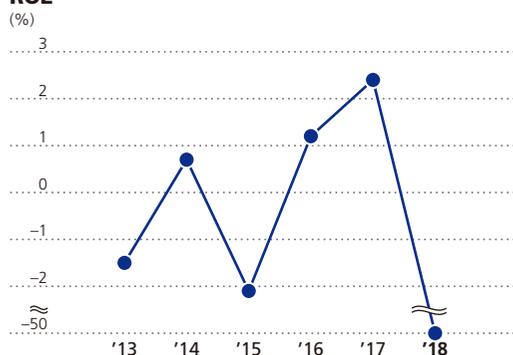
## Cost of Sales/Net Sales



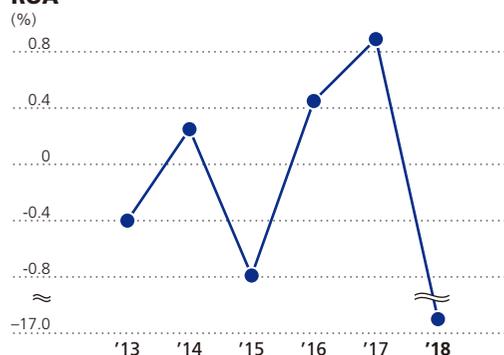
## R&D Expenses



## ROE



## ROA



# MANAGEMENT'S DISCUSSION AND ANALYSIS

## Outlook

During the year ended March 31, 2018, the global economy showed positive signs with a continued recovery in Japan backed by an upturn in exports and domestic demand; also, the United States maintained a steady economic recovery led by sustained domestic demand. In Europe also, the economy continued to grow influenced by a policy of monetary easing. China experienced stable economic growth with the real GDP growth rate in the high 6% range, reflecting strong exports to Europe and the United States. Meanwhile, we need to keep an eye on a succession of protectionist U.S. trade policies and their impact on the world economy.

In the Group's operating environment, the automotive electronics market tends to increase the number of crystal units per vehicle due to the advances in electronic devices and the number of vehicles equipped with ADAS (Advanced Driver Assistance Systems). Meanwhile, in the smartphone market, a pause in growth in production volume became clear. In the Chinese smartphone market, the excess production in the previous consolidated fiscal year became tangible in the current consolidated fiscal year, and this dragged out the process of inventory adjustment.

This reduced production was also manifest in the high-end models that major smartphone manufacturers introduced in the latter half of the year.

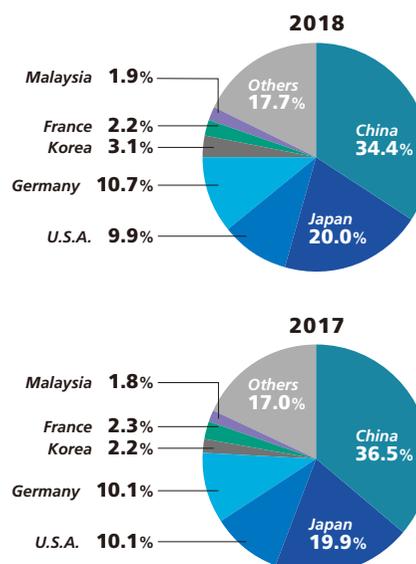
In these conditions, at the beginning of the year, the Group made plans premised on production increases by major smartphone manufacturers and emerging smartphone manufacturers in China. However, demand from both manufacturers stalled dramatically, resulting in sales projections in the mobile communications market being significantly lower than anticipated. Also, as a consequence of raising production capacity to meet the initial plan, costs increased and profitability deteriorated significantly. As a result, the Group posted a final deficit exceeding ¥10 billion, which included an impairment loss of ¥6.5 billion on the production facilities for temperature compensated crystal oscillators (TCXOs) and SAW devices used in smartphones.

## Results of Operations

Orders on a consolidated basis for the fiscal year declined 2.2%, to ¥43,459 million year on year, and consolidated net sales rose 0.4%, to ¥43,952 million.

The Group recorded an operating loss of ¥9,618 million in the fiscal year under review, compared to operating income of ¥727 million in the previous fiscal year, a loss before income tax of ¥9,640 million versus the previous year's income before income tax of ¥472 million, and the net loss for the period was ¥10,202 million, compared to net income of ¥611 million in the previous fiscal year.

## Sales by Customer-Based Geographic Area



## Sales by Product

Sales by product were as follows.

### (1) Quartz Crystal Units

In the automotive market, sales of quartz crystal units increased mainly due to ADAS equipment, such as cameras installed in vehicles. As a result, net sales rose 3.7% year on year, to ¥25,691 million.

### (2) Crystal Devices

In the mobile communications market, sales of TCXOs were weak, and crystal demand for mobile phone base stations was also weak ahead of the transition from 4G to 5G. As a result, sales of crystal devices declined. Net sales fell 7.8% year on year, to ¥13,888 million.

### (3) Other

As a result of sales of frequency synthesizers for special applications increasing, net sales rose 10.9% year on year, to ¥4,372 million.

## Performance by Customer-Based Geographic Area

Performance by customer-based geographic area was as follows.

### Japan

Sales of quartz crystal units for automotive electronics increased. As a result, net sales increased 0.9% year on year, to ¥8,801 million.

### Asia

Sales of TCXOs for mobile communications decreased. Sales of crystal oscillators declined as crystal demand for mobile phone base stations was weak ahead of the transition to 5G. As a result, net sales in China decreased 5.6% year on year, to ¥15,109 million; sales in South Korea increased 38.9%, to ¥1,359 million; sales in Malaysia increased 5.1%, to ¥848 million; and other areas decreased 0.3%, to ¥2,668 million.

### Europe

Sales of quartz crystal units for automotive electronics increased. As a result, net sales in Germany grew 6.8% year on year, to ¥4,714 million, with sales in France ¥986 million, down 1.0%, and sales in other regions in Europe ¥3,652 million, up 6.3%.

### North America

Sales of quartz crystal units for automotive electronics increased, but sales of SAW devices for mobile communications decreased. As a result, sales slipped 2.1% year on year, to ¥4,339 million in the United States, and in the rest of North America, sales declined 9.2% year on year, to ¥118 million.

### R&D Expenses

NDK engages in R&D programs aiming at establishing new technologies and manufacturing methods that will be the foundation for future products in the medium and long terms. To better meet customer crystal device needs, the Group is strengthening its R&D systems, with the Sayama Plant as its hub, and is conducting R&D to develop next-generation frequency control, selection, and detection devices as well as enhancing its design and process technologies, which form the core of its R&D.

R&D expenses on a consolidated basis during the fiscal year under review totaled ¥1,787 million.

### Financial Condition

At fiscal year-end, total assets were ¥60,816 million, a decrease of ¥8,014 million from the previous fiscal year-end. Factors contributing to this included a decrease of ¥6,498 million in cash and cash equivalents, an increase in inventories of ¥1,552 million, and a decrease in property, plant and equipment of ¥2,546 million.

Total liabilities were ¥45,708 million, an increase of ¥2,111 million from the previous fiscal year-end; principal factors included an increase of ¥1,996 million in loans and borrowings and an increase of ¥420 million in trade and other payables. Equity attributable to the owners of the Company amounted to ¥15,108 million, a decrease of ¥10,125 million, mainly due to a total comprehensive loss for the period of ¥9,732 million and ¥392 million in dividend payments from retained earnings.

As a result, the ratio of equity attributable to owners of the Company was 24.8%, 11.9 percentage points lower than at the previous fiscal year-end.

### Capital Financing and Cash Flow Analysis

The Group obtains funds for working capital and capital investments from internal sources and bank loans. Bank loans include short-term loans with periods of one year or less procured for working capital and longer-term loans for long-term funding, such as for production facilities. As of March 31, 2018, the Group had outstanding balances of short-term loans and borrowings of ¥7,274 million and long-term loans and borrowings of ¥22,571 million.

The balance of cash and cash equivalents on a consolidated basis at the end of the fiscal year under review amounted to ¥6,851 million, which was ¥6,498 million lower than at the end of the previous fiscal year. Factors positively influencing this change included a cash inflow of ¥11,500 million in proceeds from long-term loans and borrowings, impairment losses of property, plant and equipment, and goodwill of ¥6,515 million, and depreciation and amortisation of ¥4,094 million. Factors negatively influencing the balance included the repayment of long-term loans and borrowings of ¥10,100 million and purchase of property, plant and equipment of ¥7,317 million.

Free cash flow amounted to a negative ¥8,246 million, which was ¥6,451 million lower than in the previous fiscal year. This was because net cash used by operating activities was ¥915 million, and net cash used by investing activities amounted to ¥7,331 million.

Net cash used in operating activities was ¥915 million, an increase in cash used of ¥4,807 million compared to the previous fiscal year. Factors influencing this result were impairment losses of property, plant and equipment, and goodwill of ¥6,515 million, depreciation and amortisation of ¥4,094 million, a loss before income tax of ¥9,640 million, and an increase in inventories of ¥1,529 million.

Net cash used in investing activities was ¥7,331 million, which was ¥1,644 million more than in the previous fiscal year. This increase in cash used was influenced by purchase of property, plant and equipment of ¥7,317 million.

Net cash provided by financing activities was ¥1,671 million, ¥3,436 million larger than in the previous year. The major factors were proceeds from long-term loans and borrowings of ¥11,500 million and repayment of long-term loans and borrowings of ¥10,100 million.

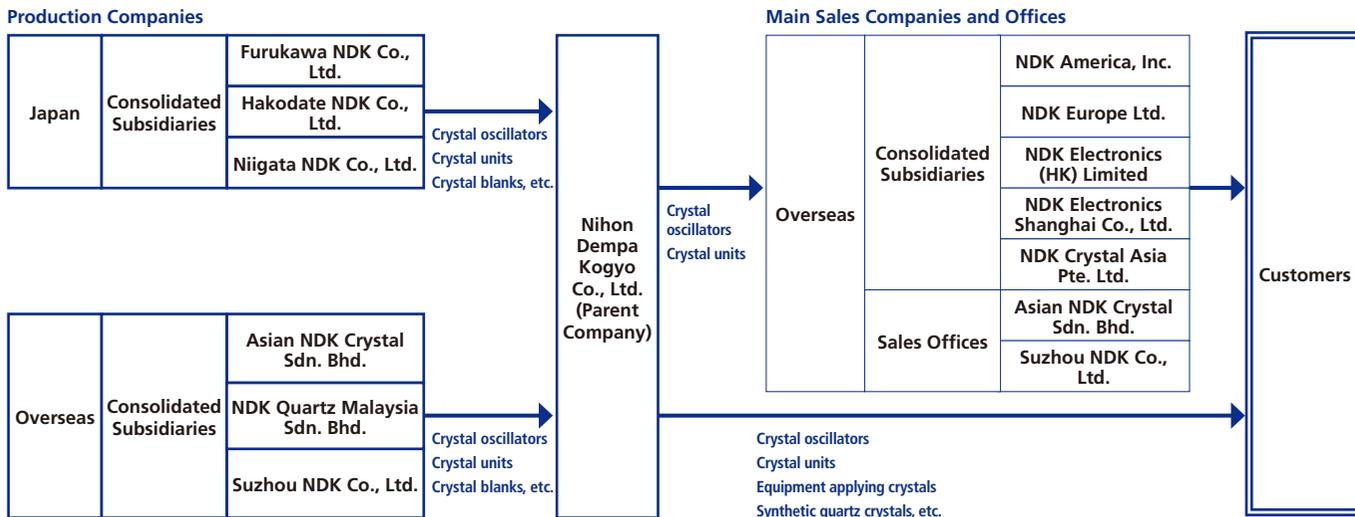
### Dividends

NDK regards returning profit to shareholders as a management priority and aims to maintain stable dividend payments while taking into account earnings, financial position, and other factors. NDK seeks to maintain a virtuous circle through a reasonable balance between the accumulation of retained earnings and shareholder dividend payments, and we are committed to further improving earnings performance by conducting R&D and capital investments that enable NDK to manufacture high-value-added and high-quality products that will effectively strengthen the Company's business structure.

Owing to the substantial net loss recorded in the year ended March 31, 2018, we regret that we have insufficient resources to pay dividends. As a consequence, the ¥10 per share interim dividend already paid becomes the total dividend for the fiscal year. Also, in the fiscal year ending March 31, 2019, we plan to cancel the interim dividend, and remain undecided on the year-end dividend.

# OVERVIEW OF THE NDK GROUP

The NDK Group is currently comprised of 14 companies, including the parent company in Japan, 3 subsidiaries in Japan, and 10 overseas subsidiaries. The Group engages in the integrated manufacturing and marketing of crystal devices (including crystal units and crystal oscillators), equipment applying crystals, synthetic quartz crystals, and crystal blanks.



## DIRECTORY

### HEAD OFFICE

#### Nihon Dempa Kogyo Co., Ltd.

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Shibuya-ku, Tokyo 151-8569, Japan  
Phone: 81-3-5453-6711  
E-Mail: irmaster@ndk.com

- Osaka Sales Office (in Osaka)
- Chubu Sales Office (in Aichi)
- Sayama Plant (in Saitama)
- Chitose Technical Center (in Hokkaido)

### DOMESTIC PRODUCTION SUBSIDIARIES

**Furukawa NDK Co., Ltd.** (in Miyagi)

**Hakodate NDK Co., Ltd.** (in Hokkaido)

**Niigata NDK Co., Ltd.** (in Niigata)

### OVERSEAS PRODUCTION SUBSIDIARIES

**Asian NDK Crystal Sdn. Bhd.**

**NDK Quartz Malaysia Sdn. Bhd.**

(in Malaysia)

**Suzhou NDK Co., Ltd.** (in Suzhou, China)

### OVERSEAS SALES SUBSIDIARIES

**NDK America, Inc.** (in Illinois, U.S.A.)

Phone: 1-847-852-4165

E-Mail: sales@ndkxtal.com

- Silicon Valley Office (in Northern California)  
Phone: 1-408-428-0800
- Western U.S. Regional Office (in Southern California)  
Phone: 1-949-444-3882
- Eastern U.S. Regional Office (in Pennsylvania)  
Phone: 1-717-497-8353

**NDK Europe Ltd.** (in U.K.)

Phone: 44-20-8547-0500

E-Mail: ndk@uk.ndk.com

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Phone: 33-1-60-95-0000  
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- Italy Office (in Italy)  
Phone: 39-02-9670-2920  
E-Mail: ndk@it.ndk.com
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Phone: 49-7261-4027-0  
E-Mail: ndk@uk.ndk.com

**NDK Electronics (HK) Limited**

(in Hong Kong, China)

Phone: 852-2956-3181

- Taipei Branch (in Taiwan)  
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E-Mail: sales@tp.ndk.com

### NDK Electronics Shanghai Co., Ltd.

(in Shanghai, China)

Phone: 86-21-6278-5115

E-Mail: ndkchina-m@sh.ndk.com

- Shenzhen Branch (in Shenzhen, China)  
Phone: 86-755-2218-2269  
E-Mail: sznnew@ndk.com

**Suzhou NDK Trading Co., Ltd.**

(in Suzhou, China)

Phone: 86-5126-8252071

E-Mail: ndkchina@sz.ndk.com

**NDK Crystal Asia Pte. Ltd.** (in Singapore)

Phone: 65-6298-9878

E-Mail: ndks@sin.ndk.com

### OVERSEAS SALES OFFICES

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(in Malaysia)

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Phone: 60-3-5192-3360  
E-Mail: ndk@my.ndk.com

**Suzhou NDK Co., Ltd.** (in Suzhou, China)

- Sales Department  
Phone: 86-5126-8252071

(As of August 1, 2018)



**Crystal Bridge to the Future**

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Printed in Japan