



**AKM Semiconductor, Inc.**

## About AKM

**A corporation focused on the emerging information-communications society.**

Since its establishment in 1983, Asahi Kasei Microsystems has based its corporate operation and development in two fast-growing areas vital to the growth of information and communication systems custom and application-specific LSIs. It has, in particular, developed CMOS technology for circuits that were generally considered impossible to implement in CMOS form, and rapidly expanded the development and application of this technology. This has led to world leading design and process technologies for high quality, low power consumption products for communications and multimedia applications. That family now includes analog-digital mixed circuit ICs for mobile communications equipment, A/D and D/A converters based on Delta-Sigma self-calibration technology, and data storage ICs incorporating lossless data compression and error correction technology.

The underlying corporate tenet at AKM is the development of technology, production, and products conducive to the human well-being and to the creation of an environment for life and livelihood of true value. As a vital, energetic corporation driven by the constant development of technology and its application to the growth of the information-communications society, AKM will continue to meet the rising expectations of its customers and the end users.

## AKM: People and Facilities

### Marketing and Sales

The increasingly accelerating wave of technical innovation. The diversifying demands of the end-user market. In the midst of this stream, it is the Marketing & Sales Center that supports the planning, marketing, selling and developing of new products to meet the system needs of our customers.

Here we proceed to produce business by comprehensively judging customers' requests with Asahi Kasei Microsystems' technical strength, development speed, and cost-handling power. Since the foundation of Asahi Kasei Microsystems, a culture of "Close to Customers" and "Proposal Type Product Development" has taken root from the expansion of business centered on customized large-scale integration.

Without stopping short at our existing business, we will advance together with our customers into the future, seeking to open up new areas of business and continuing to take up the challenge at home and abroad.

## Design and Development

This is the starting point for AKM's acclaimed ASIC DSPs incorporating original AKM algorithms and for many other AKM products known around the world for their "mixed signal circuit technology". The center itself is known for its atmosphere of free-flowing creativity, unrestrained by conventional preconceptions, and for its wealth of experience and know-how gained in the course of constant breakthroughs made in over 300 custom designs.



The center creates core technologies in a dynamic process that includes participation in international symposia, joint development with overseas partners, and the fusing of AKM technology and concepts with those introduced from other sources. Its high design and development speed and product quality are the result of the AKM "top-down design" techniques and longstanding policies such as the provision of a workstation for every person in the center. In both hardware and software, and in its free atmosphere unrestricted by conventional frames of thought, the center is now working to meet new needs and performance levels, including systemization of higher levels of integration and lower operating voltage and current levels.

## Nobeoka Manufacturing Facility

The Nobeoka LSI Plant, AKM's first facility for large-scale production, began commercial shipment of LSIs in October 1993. Located along the Hohri River, one of the cleanest in Japan, the plant is highly renowned as the source of a wide variety of digital-analog mixed-signal LSIs for specialized applications. In addition to its excellent location, it benefits from the inherent safety and functionality in plant design



that comes from the plant engineering expertise of a parent company with industrial chemistry at its core. The production systems and equipment are among the world's most advanced, with a 0.1µm

Class 1 clean room including below-floor space for support apparatus to manufacture products which meet the world's highest quality standards.



With the motto, "Customer satisfaction comes first", the plant's staff strive to promptly meet our customers' quality requirements through incessant legwork. Its corps of highly experienced and strongly motivated engineers continuously work to develop new testing techniques which ensure the highest level of product quality, and to develop proprietary new production processes which enable high speed and low power dissipation demand. World-leading examples include the combination of digital-analog CMOS and EEPROM technologies for ASIC EEPROMs, and processes such as silicon-on-sapphire which employ specialized substrate materials.



# Quality Assurance

The Asahi Kasei Group, to which Asahi Kasei Microsystem Co., Ltd. (AKM) belongs, has been striving to become a corporation that evolves and grows by transforming itself in step with the times under the following philosophy:

“A corporation that looks to the future and seeks to improve the Quality of Life in the 21st century through the introduction of technologies for ‘life’ and ‘living’”

Asahi Kasei Group strives to contribute to the advances in the 21st century through the development and implementation of technology that will make life easier and more convenient.

AKM is committed to becoming an “innovative company” that refuses to be bound by current restrictions and seeks to contribute to the advancement of communications through the introduction of advanced semiconductor and LSI technologies and products.

AKM’s management and quality policy is to:

“Provide reliable high-quality products to customers”

Under this policy, every employee at AKM from the president on down is committed to quality assurance activities that span the complete product cycle from initial planning through development, design, mass-production, and shipment and constantly strives to improve by making quality, reliability, and customer satisfaction our number one priority.



As with our introduction of our CMOS digital/analog mixed-signal IC process, we strive to develop the latest technologies into innovative products that will meet our customers’ needs. In this process as well we never lose sight of our quality and reliability goals.

Based on the above quality policy, AKM has implemented a quality and reliability system that meets the international quality assurance standard ISO9000 series, and achieved ISO9001 certification in June 1995 [certifying organization: Japan Quality Assurance Organization, certification registration No. JQA-0899]. We are building a system that can reliably create high-quality, high-reliability products and at the same time working hard to constantly improve quality and reliability that are reassuring to customers under the “Better Quality” motto.



ISO 9001 Certified  
JQA-0899



# AKM's Approach to Quality

AKM's approach to quality is based on the following concepts:

- Meet customers' quality requirements.

Maintain a quality level that is high enough to satisfy a broad spectrum of market needs.

We use custom specification documents that specify customers' quality requirements (in the case of custom products) and specification documents such as product data sheets (in the case of standard products) to ensure that our products satisfy the specified quality level. At the same time, we make the utmost effort to assure that the delivered products achieve their full performance under the actual application environment.

There is no question that the best approach to maintain and improve product quality is to establish a quality system in which quality is designed in from the beginning, and to enhance quality awareness at all stages of the production cycle. By refining its quality assurance system and information network, AKM has built an organization that always stays current on quality and reliability issues, and is also trying to maintain and improve quality level through the use of a small circle concept at its production sites. Also, when manufacturing has been outsourced, AKM has established close working relationships with subcontractors through joint engineering meetings and other cooperative activities.

As the performance of electronic systems increase and their size and application scopes widen in the current market, the performance requirements for semiconductor integrated circuits become continually more stringent.

AKM is taking the following steps to cope with this trend:

- Incorporating solid quality and reliability at the development and design stage.
- Promoting quality improvement by thoroughly investigating failure modes.

## AKM Timeline

- 1983 Founded as Asahi Microsystems Inc., a joint venture of Asahi Kasei Corporation and AMI Inc. of the U.S., following acquisition of 50% interest in AMI Japan subsidiary of AMI; entry into CMOS IC operations centering on ASIC.
- 1984 The Design and Development Center is established in Atsugi, Japan.
- 1986 Asahi Kasei acquires the remaining shares of Asahi Microsystems.
- The company adopts the name of Asahi Kasei Microsystems Co., Ltd.
- 1987 Atsugi wafer fabrication facility opens.
- 1991 Asahi Kasei establishes the LSI Research and Development Laboratory.
- 1993 Nobeoka wafer fabrication facility opens.
- 1995 AKM receives ISO 9001 certification.
- AKM Semiconductor Inc. and AKM DesignTek begin operations in the U.S.
- 1996 European office opens in London.
- 1999 AKM Nobeoka Facilities receives ISO 14001 certification.
- 2002 Asahi Kasei Microsystems Kyusyu Co., Ltd. is established in Kyusyu, Japan.
- 2003 AKM became a subsidiary of Asahi Kasei EMD Co. with subdivision of Asahi Kasei Co..

# AKM Technology Brief

Energy, vitality, know-how, and creativity have brought advances that make AKM the leader in key communications and multimedia IC technologies.

AKM has become a world leader in two key technologies for communications and multimedia digital-analog mixing and ASIC DSP by early perception of the technological needs at the leading edge and rapid development of systems of high added value that effectively anticipate these needs. Development work is unrestrained by conventional methods or boundaries. AKM seeks and works closely in technological alliance with leading experts and organizations at home and abroad. Its engineers participate globally in leading scientific and technological symposia. It incorporates the most advanced process and development equipment and systems available, from around the world, to provide ICs that meet the emerging needs. It is a corporation focused on the future, and united in its purpose.

In Conceptualization, know-how, and innovation emerging from the stimulus and synthesis of knowledge and experience in many fields.

The Asahi Kasei Group, with fields of business ranging from basic chemicals to pharmaceuticals and from polymers and apparel to luxury homes, is recognized in each field for its distinctive approach to business and operations and its tradition of original research, development, and innovation often leading to concepts and technologies that overturn the parameters of conventional wisdom. AKM, ever since its inception, stands out even among the members of this group, for bold planning and flexible operation that break the conventional mold, and for its strength in high-level technologies and their synthesis.

## FIELDS OF APPLICATION

### COMMUNICATIONS

- Mobile phones
- RF circuits
- Temperature compensated crystal oscillators
- PBX/KTS
- Transmission equipment

### MULTIMEDIA

- Professional audio
- Video cameras
- A/V receivers
- Car audio
- Set-top boxes
- Optical disk drive systems
- Consumer entertainment products
- Media players

## CORE TECHNOLOGIES

### ANALOG

- CMOS mixed-signal design
- Delta-Sigma self-calibration data converters
- Switched capacitor / continuous time filters
- Microphone amplifiers
- Phase-locked loops

### DIGITAL

- Audio DSP
- 32 bit RISC core

## PROCESS TECHNOLOGY

- Sub-micron analog CMOS (to 0.18 $\mu$ )
- EEPROM
- BiCMOS

# AKM Applications Overview

## WIRELESS COMMUNICATION

AKM has earned a reputation for outstanding analog-digital mixed signal technology, securing a leading share of the world market for mobile communications ICs. AKM products featuring high performance, high integration, and low power consumption are used in a broad range of cellular and cordless phone applications. Development is ongoing for next generation products which meet the emerging needs for greater speed, performance, and precision in mobile communications.

- Digital cellular phone ICs (PDC, cdmaOne, W-CDMA)
- Analog cellular phone ICs (AMPS, E/TACS, NMT)
- Analog/digital cordless phone ICs
- CTCSS encoders/decoders

## WIRED COMMUNICATION

Chips which enable reduced packaging space and decreased noise are essential to meet the growing demand for smaller, higher performance communications equipment. AKM offers a variety of products for a wide range of applications, including transmission equipment, Central Office exchange system, PBX/KTS, and ISDN, featuring AKM's outstanding analog-digital mixed signal technology and low power consumption. Leading communications companies throughout the world have chosen to employ AKM products, recognizing that they provide the best long-term solutions.

- Multi-channel transceivers for transmission equipment (NTT/T1/E1/T3/E3)
- TCM transceivers for PBX/KTS
- ISDN ICs (LT, NT transceivers, TA CODECs)
- Dual/quad PCM CODECs

## AUDIO

A higher level of voice processing performance is expected for cutting-edge multimedia applications. AKM's high performance digital audio products have proven to meet these expectations, and are used in multimedia applications throughout the world. AKM is supporting the advancement of next-generation digital audio performance through the development of products which meet the needs for low power consumption, high quality audio solutions with its delta-sigma and self-calibration technologies backed by vital experience and know-how.

- Consumer audio ADCs, DACs, CODECs
- PC audio ADCs, DACs, CODECs
- Sound field DSPs
- Digital audio interfaces
- USB audio ICs

## IMAGE PROCESSING

AKM's rich variety of image processors for image scanners, FAX machines, digital copiers, and multi-function peripherals meet a wide range of high-precision, high-resolution image processing needs. The lineup also includes video ADCs for high-pixel-count CCDs, ADCs for high-speed signal conversion, and ICs with NTSC/PAL signal processing inputs and outputs. AKM's cutting-edge image processing ICs are expanding the possibilities for development of new, high performance multimedia equipment.

- FAX, MFP ICs
- Image scanner, digital copier ICs
- Video ICs

## DATA STORAGE

The spread of the Internet is rapidly expanding the need for high-capacity, high-speed data storage systems. With its world-leading high-speed analog CMOS and lossless data compression core technologies, AKM provides products for a wide variety of storage systems.

- Read/write channel ICs for optical disk drives
- Lossless data compression ICs for tape streamers
- Lossless image data compression ICs

## CRYSTAL OSCILLATOR IC'S

Main clock modules of digital cellular and digital cordless phones conventionally require several discrete parts, including a thermistor as a temperature sensor, and a variable diode as an oscillator. Analog Temperature Compensated Crystal Oscillator (TCXO) ICs from AKM provide a compact, 1-chip solution that meets the need for clock modules, as portable handsets become progressively smaller.

- TCXO ICs
- Clock drivers

## SPECIALTY MEMORY

AKM employs the most advanced technologies and systems available, for the design and development of special memory ICs that meet the ever-increasing need for higher-level integration, noise margins, endurance cycles, and speed, reduced size and power consumption, and small-lot, large-variety production. It is recognized both at home and abroad, as a world leader in product development time and product quality.

- EEPROMs
- ASIC EEPROMs

## RADIO FREQUENCY IC'S

AKM has expanded its product portfolio with the development of radio frequency(RF)ICs using Si-bipolar technology, including single-chip GSM-RFICs, cdmaOne Tx/Rx chip sets, and IS136(TDMA)-RFIC. AKM is presently developing next-generation RFICs with innovative architectures that will meet emerging communications needs.

- Digital cellular phone RFICs (IS136, cdma-One, and others)
- Low power wirelesses
- PLL synthesizers

## CUSTOM IC'S

AKM responds quickly and effectively to the needs of domestic and overseas customers, in a broad range of designs and variations, based on its wealth of design experience, CMOS analog-digital mixed IC development capability, and total CAD system. Its development techniques and comprehensive capabilities are most clearly typified in the system-on-a-chip solutions of its full-custom ICs.