Company Profile
1. Company History

- **1992.2**
  - Established SAMKYUNG CERAMICS CO., LTD. and produced NTC thermistors

- **1994.8~1996.2**
  - Performed the research project  
    〈HIGH TEMPERATURE SENSOR FOR AUTOMOBILE〉 in collaboration with Korea Institute of Ceramic Engineering & Technology (KICET)

- **1997.5~2000.12**
  - Performed the research project  
    〈DEVELOPMENT OF HIGH PRECISION CHIP THERMISTOR〉 in collaboration with KICET

- **1997.10**
  - Performed the research project  
    〈DEVELOPMENT OF HIGH PRECISION CHIP THERMISTOR〉 in collaboration with KICET
  - Patent (No. 132158)  
    〈LOW TEMPERATURE NTC THERMISTOR INCLUDING POWDER COMPOSITION AND PROCESSING FOR MANUFACTURING〉
• Achieved ISO 9001 Certification

• Achieved UL(E200822) Recognition

• Patent (No. 0164802) 〈MIXING MACHINE FOR SILICONE RESIN〉

• Patent (No. 0187191) 〈CHIP ELEMENT INSERTING MACHINE〉
• Patent (No. 0187626) 〈CHIP ELEMENT SORTING MACHINE〉

• Patent (No. 0294906) 〈ASSEMBLING EQUIPMENT FOR THERMISTOR SENSORS〉
• Performed the research project
  〈CHIP TRIMMER CAPACITORS INCLUDING SINTERING TECHNOLOGY AND PROCESSING FOR MANUFACTURING〉
in collaboration with KICET

• Recognized as PROMISING SMALL AND MEDIUM ENTERPRISE by Government.(No. 2001-024)

• Recognized as Venture Company.(No. 002162533-4068)

• Approval for CLEAN FACTORY by Korea Labor Government(No.30,396)

• Award One Million Dollar Trade Tower by Korea President
2. Organization

- R&D Center
  - NTC
  - PTC
  - TRIMMER
  - SENSOR

- PRODUCT
  - CERAMIC
    - 1Team
    - 2Team
    - 3Team
    - 4Team

- ASSEMBLY
  - 1Team
  - 2Team
  - 3 Team

- MANAGING
  - MARKETING
    - 1Team
    - 2Team
    - 3 Team

- Q/M Division
  - QC
  - QA

- Auditor & Advisor

CEO
3. Products

• ELECTRONIC COMPONENTS
  - NTC DISC THERMISTOR
    for Temperature Sensing and Temperature Compensation
• ELECTRONIC COMPONENTS

- **NTC CHIP THERMISTOR**

  Chip thermistor is a high-precision thermal sensing device featuring an extremely small B-value tolerance and resistance. When used as a temperature gauge, thermistor requires no adjustment between the control circuit and the sensor. This insures a temperature precision ±0.3°C. Temperature indicator and control instruments are now available for use with the thermistor.
• ELECTRONIC COMPONENTS

  ▪ NTC SMD THERMISTOR

  **Features**
  - Small size, low capacitance at 40MHz (below 3pF)
  - Corresponding to the high B value
  - Strong against electostatic discharge
  - Excellent in cost-performance
  - High accuracy and high environmental resistance due to polymer coating process
  - Lead free solder
• ELECTRONIC COMPONENTS

- PTC SMD THERMISTOR

**Features**
- Suitable for miniaturizing due to small size SMD type
- Fast response for overheating sensing with an accuracy $\pm 3^\circ C$
- Contact noise & trouble free due to surface mounted
- Excellent environmental reliability resulted from our original coating process on chip body [Patent pending]
- Lead is not contained in terminations

**Applications**
- Overheat protection for power transistor and power-ICs
- Inverter circuit for LCD backlight
- AC adapter of Lap-Top Computer
- DC/DC converter in LCD driving circuit
• ELECTRONIC COMPONENTS

- **NTC POWER THERMISTOR**

  The POWER THERMISTOR is a device for suppressing inrush current to an electric circuit. Circuits including electric bulbs or capacitors induce a inrush current more than 100 times the normal current when the circuit switch is turned on. The POWER THERMISTOR in the circuits protects electric equipments from being damaged by limiting the inrush current.
• ELECTRONIC COMPONENTS

  ▪ NTC DIODE THERMISTOR

  **Features**
  • As being sealed into the glass, you may use them free from care under any bad environment of having oil vapor at high temperature
  • Due to its small size and light weight, automatic placement into the printed board could be easily made
  • Owing to its DHD construction, it carries mechanical strength
  • As the production line being mechanized, it enjoys high productivity. Therefore, you will be satisfied with the price, quality and delivery

  **Applications**
  • Thermal sensor for household appliances such as rice-cooker, electronic range, oven, etc
  • Thermal sensor for industrial products such as medicines, chemicals, food, etc.
• ELECTRONIC COMPONENTS

  ▪ NTC CHIP IN GLASS THERMISTOR

    The Glass chip type thermistor is sealed in glass, Heat resistive and highly stable. Economical to use in large or small quantities. Suitable for instruments and other applications requiring low power and high reliability.

NTC CHIP IN GLASS THERMISTOR
16PG ~ 17PG
• ELECTRONIC COMPONENTS

- PTC THERMISTOR

Applications

- The typical standard PTC has an extremely high temperature coefficient of resistance at and above the switch temperature, this characteristic makes it ideal for various temperature sensing applications, especially over-temperature detection.
• ELECTRONIC COMPONENTS

  ▪ THERMISTOR SENSORS

  Sensors utilizes thermo resistance characteristics of NTC and PTC thermistors integrated with a heat-sensitive ceramic semiconductor element. The element resistance changes according to the ambient temperature, and this change is than converted into electrical signals and used to detect temperature changes.

  Features
  • Featuring chip and disc type elements, these thermistor sensors are highly reliable, and designed to have shapes and structures corresponding to application purposes.
• ELECTRONIC COMPONENTS

□ CHIP TRIMMER CAPACITOR

SAMKYUNG’s chip trimmer capacitor, SBCT 03/05/06 series have been developed for higher density surface mounting in electronic devices, and suited to miniature, low profile capacitors with many useful features. SBCT series are designed for easy handling and is available with a variety of adjustment with excellent electrical specifications.

Features
• Miniature and low profile capacitors with external dimensions
• Mountable by an automatic placer
• Reflow soldering applicable
• Easy adjustment using a conventional screwdriver
• Sturdy mechanical structure against vibration or shock
• Applications for Hybrid IC and micromodule / Portable radio and Portable cassette tape player / TV and VTR / Audio Equipment / Paging System / Electronic Equipment
• ELECTRONIC COMPONENTS
  ▪ HUMIDITY SENSOR
### 4. Samkyung Products Line-up

#### Passive Control
- **NTC DISC THERMISTOR**
  - For temperature sensing/for temperature compensation
- **NTC CHIP THERMISTOR**
  - Frame lead type, straight lead type, forming lead type
- **NTC SMD THERMISTOR**
  - 1005 type, 1608 type, 2012 type
- **PTC SMD THERMISTOR**
  - Suitable for miniaturizing circuits due to small size SMD
- **NTC POWER THERMISTOR**
  - Straight lead type, forming lead type forming short type

#### Dynamic Control
- **NTC DIODE THERMISTOR**
  - Glass sealed type superior to anti-environmental feature
- **NTC CHIP IN GLASS THERMISTOR**
  - Sealed in glass, heat resistive and stable
- **PTC THERMISTOR**
  - For temperature sensing lead type

#### Develop Control
- **THERMISTOR SENSORS**
  - NTC / PTC sensor
- **CHIP TRIMMER CAPACITOR**
  - SBCT 03 series / SBCT 05 series / SBCT 06 series
- **HUMIDITY SENSOR**
  - HS-01 type, HS-02 type
5. Manufacturing Process

- Raw material Preparation
  - Ceramic Powder
  - Binder
  - Solvent

- Packaging & Out-Going
- OQC Inspection
- Screening
- Plating (Ni, Sn)

- Ball Milling/Mixing
- Green Tape Casting
- Sheet stack
- Pattern Printing
- Stacking & Alignment

- Lamination (Heating & Pressing)
- Chip Cutting
- Tumbling

- Ag firing
- 1st Termination
- Binder Burn-out & Co-Firing

SAMKYUNG CERAMICS
## 6. Technology

<table>
<thead>
<tr>
<th>Classification</th>
<th>Feature</th>
<th>Advantage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>− Patent : 6cases</td>
<td>New concept product</td>
<td></td>
</tr>
<tr>
<td></td>
<td>− Invention : 4 cases</td>
<td>Cost down &amp; Customer satisfaction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Patent right</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Patent : 6cases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Invention : 4 cases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTC Thermistor</td>
<td>▪ Raw mat’l over 40 type</td>
<td>High reliability</td>
<td>All product series satisfy EU RoHS</td>
</tr>
<tr>
<td></td>
<td>▪ SMD(1005,1608,2012) &amp; DIP lead type</td>
<td>High reliability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Temp compensation</td>
<td>Compatible for wide range of B value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Over current detection&amp;protect circuit</td>
<td>High stability of soldering due to apply plating method to termination</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ High reliability</td>
<td>Green product</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Low leakage current &amp; High realiability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Excellent protect ability against ESD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ There is no Non-asymmetrical degradation like Bi–type compotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Green product</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ High stability of soldering due to apply plating method to termination</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ All product series satisfy EU RoHS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trimmer Capacitor</td>
<td>▪ High Q product design</td>
<td>Green product</td>
<td>All product series satisfy EU RoHS</td>
</tr>
<tr>
<td></td>
<td>▪ High Q product design</td>
<td>High reliability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ High Q product design</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ High Q product design</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SAMKYUNG CERAMICS**
<table>
<thead>
<tr>
<th>Classification</th>
<th>Feature</th>
<th>Advantage</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| ▪ Jointherm™   | ▪ Temperature sensing module (NTC Thermistor applied)  
▪ Fast response time & low power loss  
▪ Maintain high precision & reliability | ▪ In a short time, Users could be develop the new application because samkyung supply the sensor method kit at an early stage  
▪ In case of mass product, samkyung will supply some advantage to user’s convenience | ▪ Keep the competitive position due to using own component  
▪ Addition new function to mobile phone & launch new market  
▪ Satisfy EU RoHS |
| ▪ Sensors      | ▪ Industrial Electronic equipment  
▪ Consumer Electronic equipment  
▪ Home appliances and others | ▪ High quality and lower prices  
▪ Green product | ▪ All product series satisfy EU RoHS  
▪ UL non-flammability  
▪ Lowest price of existing product |
| ▪ Etc.         | ▪ New product design & development for customer’s satisfaction | | ▪ Under development some product besides MACF |
7. Application field

Application field

- Mobile phone [CDMA/GSM] & PDA
- LAN Card/Backlight Inverter
- DVD/MP3
- 2nd Battery Protection
- Computer
- LCD Monitor/ Digital TV
Worldwide Leader in Electronic Components

Human
Customer Satisfaction
Profits for Stockholders
Employee Satisfaction

Confidence
Creation of entrepreneurship
based on trust & reliance

Technology
Value creation through
the source technology

8. Vision
<table>
<thead>
<tr>
<th>Domestic</th>
<th>Overseas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samsung Electronics – Battery chargers</td>
<td>Katri (HK)</td>
</tr>
<tr>
<td>LG Electronics – Mobile phone (GSM / CDMA)</td>
<td>Samsung (China)</td>
</tr>
<tr>
<td>LG MRO</td>
<td>LG (China)</td>
</tr>
<tr>
<td>Hyundai Elec.</td>
<td>Hyundai (China)</td>
</tr>
<tr>
<td>Daewoo Electronics</td>
<td>Huichang Sensor (China)</td>
</tr>
<tr>
<td>Kia motors</td>
<td>Uppermost Elec. (Taiwan)</td>
</tr>
<tr>
<td>Hyundai Motors</td>
<td>De Amertek (USA)</td>
</tr>
<tr>
<td></td>
<td>STRIP’S d.o.o. (Europe)</td>
</tr>
</tbody>
</table>