Toshiba Electronic Device Solutions Corporation

Corporate profile

Company name: Toshiba Electronic Device Solutions Corporation
Headquarters: 580-1 Horikawa-cho, Saiwai-ku, Kawasaki-shi, Kanagawa Prefecture, 212-8520
Founded: April 1, 2019
President and CEO: Hirohito Taneda
Capital: 500 million yen (100% owned by Toshiba Electronic Devices & Storage Corporation)
Net sales: Approx. 8.4 billion yen (FY2019)
Employees: Approx. 500 (as of April 2020)
Affiliates:
- NEXTY System Design Corporation
- Toshiba Nanoanalysis Corporation
- Zhonzhi Software System Engineering (Shanghai) Co., Ltd.

Offices

- Headquarters: 580-1 Horikawa-cho, Saiwai-ku, Kawasaki-shi, Kanagawa Prefecture
- MC Office: 1 Komukai Toshiba-cho, Saiwai-ku, Kawasaki-shi, Kanagawa Prefecture
- Chubu Office: JR Gate Tower, 30th Floor, 1-1-3 Meieki, Nakamura-ku, Nagoya-shi, Aichi Prefecture
- Kansai Office: Umeda Hankyu Building Office Tower, 27th Floor, 8-1 Kakuda-cho, Kita-ku, Osaka-shi, Osaka Prefecture
- Oita Office: 3500 Oaza Matsuoka, Oita-shi, c/o Japan Semiconductor Corporation Oita Operations, Oita Prefecture
Business outline

- Design, manufacturing, and sales promotion of electronic devices and their components (discrete semiconductors, system LSIs, etc.); related software development and sales; related business

Organizational structure / responsibilities

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<thead>
<tr>
<th>Toshiba Electronic Devices &amp; Storage Corporation</th>
<th>Toshiba Electronic Device Solutions Corporation</th>
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<tbody>
<tr>
<td>Corporate Staff</td>
<td>Corporate planning, export control, quality engineering, IT, administration, and finance</td>
</tr>
<tr>
<td>Semiconductor Device Business Development Div.</td>
<td>reporting, technical information, and market research of technology trends</td>
</tr>
<tr>
<td>System Solution Div.</td>
<td>System solution development and digital marketing</td>
</tr>
<tr>
<td>Discrete Semiconductor Engineering Div.</td>
<td>Design, development, assembly, and support for mass production of</td>
</tr>
<tr>
<td>System LSI Development Div.</td>
<td>Toshiba discrete products</td>
</tr>
<tr>
<td>Test &amp; Analysis Div.</td>
<td>System LSI development, library development, and in-house development of image ICs</td>
</tr>
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TOSHIBA

Toshiba Electronic Device Solutions Corporation

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TEL: +81-44-331-7800   FAX: +81-44-511-1061
E-mail: TEDS-soumu@ml.toshiba.co.jp
Technical support for Toshiba discrete products and system LSI products

Technical support and technical information
- Technical support; support for customer system development (information on new products and product development trends); solution proposals
- Technical information including peripheral technologies (reference tools, application notes, etc.)
- Support for simulation analysis (thermal and circuit simulations), 3D model data, and analysis-related Spice parameters

Support for exhibitions
- Publicizing products through exhibitions and product briefings, etc.

Market research for technical trend
- Market research of system trends and next generation product plans

Customer Support

Offices in Japan

Chubu office
JR Gate Tower, 30th Floor, 1-1-3 Meieki, Nakamura-ku, Nagoya-shi, Aichi Prefecture

Kansai office
Umeda Hankyu Building Office Tower, 27th Floor, 8-1 Kakuda-cho, Kita-ku, Osaka-shi, Osaka Prefecture

Toshiba Electronics Korea Corporation (Seoul)
Toshiba Electronic Device Solutions Corporation
Toshiba Electronic Components Taiwan Corporation (Taipei)
Toshiba Devices & Storage (Shanghai) Co. Ltd.
Toshiba Electronics Asia, Ltd. (Hong Kong)
Toshiba Electronics Asia (Singapore) Pte. Ltd.
Solutions and technical support for customer system development

- Planning, development, and customer support of discrete and MCU products that are main parts in each system

Solutions and technologies to support the customer’s entire system development

<table>
<thead>
<tr>
<th>Development phases</th>
<th>Concept and parts selection</th>
<th>Board and software development</th>
<th>System development and test</th>
<th>Mass production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution: Hardware</td>
<td>Evaluation board and starter kit</td>
<td>Reference design (Circuit diagram, parts list, layout)</td>
<td></td>
<td></td>
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<tr>
<td>Software</td>
<td>Sample software (Standard software)</td>
<td></td>
<td>Sample software (Application software)</td>
<td></td>
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<tr>
<td>Document</td>
<td>Datasheets, catalogs, Web contents (Videos, e-learning, etc.)</td>
<td>Application notes (Board design guide, etc.)</td>
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<tr>
<td>Technical support</td>
<td>Seminars, reference model development support</td>
<td>Software development support</td>
<td>Test support (Function test)</td>
<td>Analysis support</td>
</tr>
</tbody>
</table>

Device solutions through collaboration between “discrete products” and “MCU products”

The most advanced system solution is developed by combining “discrete products” and “MCU products”.

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Design and development (Toshiba discrete products)

Circuit design, layout design, test, and mass-production start

- **IC circuit design and layout design**
  Software-based circuit and layout design
  Mask data for IC wafer manufacturing is created by the following process:
  conceptual design (functional design) with product specifications → operating simulation → layout design

- **IC test engineering**
  Functional verification with IC tester, probe card design, and test program in various languages

- **Mass-production ramp-up / assembly process**
  Mass-production ramp-up and production engineering for assembly process
Entire processes from specifications design to implementation are supported by abundant SoC development expertise cultivated as IDM(*1).

Latest design method and know-how contribute to designs and development with short TAT.

SoC development results

<table>
<thead>
<tr>
<th>Development results</th>
<th>Abundant SoC development results</th>
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<tbody>
<tr>
<td>Fabrication</td>
<td>TSMC, GF, UMC, and JSC(*2)</td>
</tr>
<tr>
<td>Process</td>
<td>To 5 nm</td>
</tr>
<tr>
<td>Scale</td>
<td>150 M gates</td>
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<tr>
<td>Frequency</td>
<td>1GHz</td>
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<td></td>
<td>Image processing</td>
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<td></td>
<td>Micro controllers (Arm®/DSP)</td>
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<td></td>
<td>MFPs (Control chips)</td>
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<td></td>
<td>Road traffic system (Automotive LSIs)</td>
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<td></td>
<td>Memory cards (Internal bridge circuits)</td>
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<td></td>
<td>Image sensors (Image processing control)</td>
</tr>
</tbody>
</table>

*1: IDM = Integrated Device Manufacturing

*2: JSC = Japan Semiconductor Corporation

Abundant development results by fabrication, advanced process, large-scale SoC, and high frequency

Digital design engineering

Proposals for design development flows and design engineering of SoC digital products

Analog design engineering

Library development results

Process support results

<table>
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<th>Process support results</th>
<th>Abundant development results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabrication</td>
<td>TSMC, UMC, JSC(*1) (CMOS, CD, BiCD)</td>
</tr>
<tr>
<td>Process</td>
<td>To 16nm</td>
</tr>
<tr>
<td>Related products</td>
<td>SoC, ASIC, linear sensors, area sensors</td>
</tr>
</tbody>
</table>

*1: JSC = Japan Semiconductor Corporation

Inquiries

Marketing div.
skaiki@ml.tosmec.toshiba.co.jp
Tel +81-44-548-2130

Toshiba Electronic Device Solutions Corporation
Failure analysis

Failure analysis service

Outline of failure analysis
Through-out service from characteristics evaluation through physical analysis with only IC specifications, a test board, and a test program. Accumulated expertise in analysis equipment and failure estimation (pointing-out of defect area) help realize short TAT and 80% or more failure part elucidation rate.

- Primary report: less than 5 days
- Elucidation rate: 80% or more
- Product type: logic/analog/memory
- Support of every tester, analysis equipment
- Consistent analysis from characteristics evaluation through physical analysis

Analysis solutions

- Upon request for semiconductor failure analysis, consistent analysis solutions: characteristics evaluation -> non-destructive analysis -> specifying failure part -> physical analysis
- Upon request for operation failure analysis, tester-linked analysis solutions by direct docking of the tester and analysis equipment
- Upon request for yield improvement, consistent response: evaluation -> analysis -> improvement consulting service
- Failure analysis through ultimate narrowing down of defect area

TOSHIKA
Toshiba Electronic Device Solutions Corporation
Toshiba Electronic Devices & Storage Group Vision

Our semiconductor and storage products will always be a driving force to change the world

Toshiba Electronic Devices and Storage, together with our customers, will accelerate our future journey.

We aim to be a company that will be chosen for our pioneering technology and spirit embedded in our products.