• A global semiconductor leader
• 2014 revenues of $7.40B

Approximately 43,600 employees worldwide
Approximately 8,700 people working in R&D
11 manufacturing sites
Over 75 sales & marketing offices

Listed on New York Stock Exchange, Euronext Paris and Borsa Italiana, Milano
Where you find us

Our automotive products are making driving safer, greener and more entertaining.

Our MEMS & Sensors are augmenting the consumer experience.

Our smart power products are allowing our mobile products to operate longer and making more of our energy resources.

Our digital consumer products are powering the augmented digital lifestyle.

Our Microcontrollers (MCU) are everywhere making everything smarter and more secure.

Our digital consumer products are powering the augmented digital lifestyle.
# General Purpose MCUs(*) 2014 Ranking

(*) without Automotive and Secure MCUs  
Source: IHS iSuppli CLT March 17th 2015

<table>
<thead>
<tr>
<th>2013 Rank</th>
<th>2014 Rank</th>
<th>Company Name</th>
<th>2013 Revenue ($)</th>
<th>2014 Revenue ($)</th>
<th>Revenue Percent Change</th>
<th>Revenue Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Renesas Electronics Corporation</td>
<td>1 499</td>
<td>1 465</td>
<td>-2.3%</td>
<td>18.0%</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Microchip Technology</td>
<td>1 001</td>
<td>1 093</td>
<td>9.2%</td>
<td>13.4%</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Atmel Corporation</td>
<td>874</td>
<td>916</td>
<td>4.8%</td>
<td>11.2%</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>STMicroelectronics</td>
<td>565</td>
<td>786</td>
<td>39.1%</td>
<td>9.7%</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Texas Instruments</td>
<td>650</td>
<td>730</td>
<td>12.3%</td>
<td>9.0%</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Freescale Semiconductor</td>
<td>503</td>
<td>556</td>
<td>10.5%</td>
<td>6.8%</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>NXP</td>
<td>248</td>
<td>361</td>
<td>45.6%</td>
<td>4.4%</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>Spansion</td>
<td>283</td>
<td>281</td>
<td>-0.7%</td>
<td>3.4%</td>
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<tr>
<td>9</td>
<td>9</td>
<td>Cypress Semiconductor</td>
<td>289</td>
<td>277</td>
<td>-4.2%</td>
<td>3.4%</td>
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<tr>
<td>11</td>
<td>10</td>
<td>Infineon Technologies</td>
<td>166</td>
<td>194</td>
<td>16.9%</td>
<td>2.4%</td>
</tr>
</tbody>
</table>

**Top 10 Companies**  
6 078 | 6 659 | 9.6% | 81.8%

**All Others**  
1 722 | 1 486 | -13.7% | 18.2%

**Total Semiconductor**  
7 800 | 8 145 | 4.4% | 100.0%
Today - STM32 portfolio positioning

More than 30 product lines

<table>
<thead>
<tr>
<th>High-performance</th>
<th>Mainstream</th>
<th>Ultra-low-power</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cortex-M0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cortex-M0+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cortex-M3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cortex-M4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cortex-M7</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
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<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>CoreMark</td>
<td>CoreMark</td>
<td>CoreMark</td>
<td>CoreMark</td>
<td>CoreMark</td>
</tr>
<tr>
<td>106</td>
<td>177</td>
<td>245(*)</td>
<td>75</td>
<td>93</td>
</tr>
<tr>
<td>48 MHz</td>
<td>72 MHz</td>
<td>72 MHz</td>
<td>32 MHz</td>
<td>32 MHz</td>
</tr>
<tr>
<td>38 DMIPS</td>
<td>61 DMIPS</td>
<td>90 DMIPS</td>
<td>26 DMIPS</td>
<td>33 DMIPS</td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
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<thead>
<tr>
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<tbody>
<tr>
<td>CoreMark</td>
<td>CoreMark</td>
<td>CoreMark</td>
<td>CoreMark</td>
</tr>
<tr>
<td>398</td>
<td>177</td>
<td>273</td>
<td>75</td>
</tr>
<tr>
<td>120 MHz</td>
<td>72 MHz</td>
<td>80 MHz</td>
<td>32 MHz</td>
</tr>
<tr>
<td>150 DMIPS</td>
<td>61 DMIPS</td>
<td>100 DMIPS</td>
<td>26 DMIPS</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>CoreMark</td>
<td>CoreMark</td>
<td></td>
</tr>
<tr>
<td>608</td>
<td>245(*)</td>
<td></td>
</tr>
<tr>
<td>180 MHz</td>
<td>72 MHz</td>
<td></td>
</tr>
<tr>
<td>225 DMIPS</td>
<td>90 DMIPS</td>
<td></td>
</tr>
</tbody>
</table>

(*) from CCM-SRAM

ARM® CORTEX® Processor Technology

STM32 F2
STM32 F3
STM32 F4
STM32 F7

10 YEARS COMMITMENT

1 082 CoreMark
216 MHz
462 DMIPS

273 CoreMark
80 MHz
100 DMIPS

245 CoreMark
72 MHz
90 DMIPS

93 CoreMark
32 MHz
33 DMIPS

75 CoreMark
32 MHz
26 DMIPS

177 CoreMark
72 MHz
61 DMIPS

106 CoreMark
48 MHz
38 DMIPS

398 CoreMark
120 MHz
150 DMIPS

608 CoreMark
180 MHz
225 DMIPS

STM32®

Life augmented
Examples of STM32 applications

- Motor Control
  - Appliances, User Interfaces
  - Connected appliances, e-Bike
- Audio decode & post processing
  - Voice recognition
- Embedded Color TFT
  - User Interfaces
- PC peripherals
- Lighting
- Wireless charger
- Home automation and security
- Wearable
- Sensor Hub
  - Mobile & Gaming
- Connected appliances, e-Bike
STM32 Microcontroller in Consumer

The Gear Fit, on the other hand, is using a more simple chip behind the scenes – the STM32F439, a Cortex-M4 chip that is more of a microcontroller than a full-blown processor, which is more than enough to power the real-time operating system running on the Gear Fit.

Update: ifixit published a full teardown of the Gear 2 which also shows the Exynos 3250 SoC.
STM32 Microcontroller in Consumer

Pebble Time TEARDOWN

Java on STM32 for IoT

- Smart Home
- Smart Vehicle
- Smart SOHO
- Smart Life Augmented
STM32 key features for IoT

- Diverse Connectivity
- Dedicated Security IPs
- High MCU Performance
- Low power solution
STM32 key features for IoT

1. Diverse Connectivity
2. Dedicated Security IPs
3. High MCU Performance
4. Low power solution

Connectivity:
- USB
- UART
- SPI
- CAN
- I2C
- Ethernet
- Analog

Applications:
- Smart Home
- Smart SOHO
- Smart Vehicle
- Smart Life Augmented
STM32 key features for IoT

- Diverse Connectivity
- Dedicated Security IPs
- High MCU Performance
- Low power solution

Smart Home

Smart Vehicle

Smart SOHO

Smart Life Augmented

AES

TRNG

HASH

MPU
STM32 key features for IoT

- Diverse Connectivity
- Dedicated Security IPs
- High MCU Performance
- Low power solution

Smart Home

Smart Vehicle

Diverse Connectivity

Dedicated Security IPs

High MCU Performance

Low power solution

ART

CCM

Cache

Cortex M4/M7
STM32 key features for IoT

- Diverse Connectivity
- Dedicated Security IPs
- High MCU Performance
- Low power solution

Smart Home

Smart Vehicle

Smart SOHO

Process
Design

Clocks
RTC

Smart Life Augmented
# Java ME Embedded

**Features at a Glance**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proven Java embedded platform based latest Java ME 8 standards</td>
<td>Highly optimized, robust multitasking Java Virtual Machine</td>
</tr>
<tr>
<td>Modular software platform, ideal for granular in-field upgrades</td>
<td>Fully headless operation with wired &amp; wireless connectivity</td>
</tr>
<tr>
<td>Remote software deployment and management</td>
<td>Versatile, cross-platform access to peripherals and networks</td>
</tr>
<tr>
<td>Multiple RTOS or bare metal supported</td>
<td>Scalable from microcontroller-class systems upwards</td>
</tr>
</tbody>
</table>

*ARM®*
What is Oracle Java ME Embedded?

• A modern, embedded Java software platform for small devices
  • Aligned with the Java 8 platform
  • Dedicated embedded features including
    • Robust multi-tasking execution
    • Comprehensive security
    • Remote software provisioning and management
    • Versatile connectivity, including cellular
    • Integration with peripheral devices

• Supports wide range of devices, from micro-controllers upwards
  • As little as 128 KB RAM and 1 MB Flash

• Brings the Java ecosystem and value-proposition to small devices
Java ME 8 Platform Overview

- **Java VM**: Java ME Connected Limited Device Configuration (CLDC) 8 (JSR 360)
- **Use Case Software (e.g.)**
  - Smart pen
  - Wireless module
  - Control unit
  - Smart meter
- **Additional APIs (Examples)**
  - Messaging
  - Wireless Communication
  - Protocols and Data Conversion
  - Security and Management
  - Additional Optional APIs
  - Vertical Specific APIs
  - Location
  - Web Services
  - Sensors
  - Additional Optional JSRs
- **On-Device I/O Access**
  - Device I/O API
  - Generic Connection Framework: GCF 8
  - Application Platform: Java ME Embedded Profile (MEEP) 8 (JSR 361)
- **Security and Trust Services**
  - SATSA (JSR 177)
Java for MCUs

• Java provides a high level uniform environment
  • Targets advanced embedded IoT applications
  • Large number of widely used APIs

• Rapid development and deployment
  • High level language
  • Code reuse
  • Flexible communications busses
  • Simplified OTA/field updates
Java for MCUs

- Current Java ME 8.1 is full stack on STM32F429 Eval board
- High level applications deployed over ethernet
- Some application development can now be done by Java developers with little or no embedded experience
MCU vs MPU

• MCUs can be used for endpoint or edge devices

• Expensive MPUs can be reserved for hub activities where MCU does not have compute power or connectivity bandwidth

• There is some overlap in needed capabilities – sometimes in MCU is all that’s needed

• MCU performance continually improving
  • MCU can handle many tasks that previously needed an MPU.
Java for MCUs

• High performance needed
  • Cortex M4F or M7

• Substantial memory requirements
  • STM32F4 and STM32F7 families meet this
  • Both have up to 2MB internal flash, 256KB internal SRAM
  • Both support external SDRAM, external NOR, NAND, QSPI flash, SRAM
  • Application Storage on SDCard or external flash
Development STM32429I-EVAL board example

- STM32F429
- 16 MB NOR Flash
- USB HS/FS
- Power from USB or power supply (included)
- ST-LINK/V2
- LCD
- Ethernet
- 2GB Micro SD
- Audio Codec & jack
- 32 MB external SDRAM & 2 MB external SRAM (Under the display)
Development Environment


- To load VM on board use STLink (STLink Utility, Keil, etc)

  - See Getting Started Guide for detailed instructions
STM32F469 Discovery Board

Key Features
• STM32F469ZIT6 microcontroller built-in 2 MByte Flash, 256 KByte RAM
• 2.4” QVGA TFT LCD
• SDRAM 64 Mbits
• L3GD20, ST MEMS motion sensor, 3-axis digital output gyroscope
• Six LEDs
• Two pushbuttons (user and reset)
• USB OTG with micro-AB connector
• Arduino Uno extension connector (Shield add-on)
• DSI Host Display controller

Salestype:
STM32F769I-DISCO
STM32F7 Discovery Board

Key Features

- STM32F746NGH6 built-in 1 Mbyte Flash + 340 Kbytes of RAM
- 4.3-inch 480x272 color LCD-TFT with capacitive touch screen
- Audio line in and line out jack
- Stereo speaker outputs
- 2 ST MEMS microphones
- SPDIF RCA input connector
- Two push buttons (user and reset)
- 128-Mbit Quad-SPI extra Flash memory
- 64-Mbit extra SDRAM
- microSD card connector
- USB OTG HS
- USB OTG FS
- Ethernet connector
- Arduino Uno V3 connectors

Salestype
STM32F746G-DISCO
Advantages of Developing with Java ME
Embedding future-proof solutions

- Robust and Secure
- Feature-rich
- In-Field updatability
- Low footprint / power aware
- Up-stack Value
- Economics of scale
- Platform independence
- Controlled app execution
- Wide API and protocol support
- Update function throughout lifetime
- Size-optimized features and APIs
- Build with commodity components
- Open, standardized, interoperable
- Platform independent applications
What security standards are used by Java? How STM32 support them?

- Secure code loading, verification, and execution (sandboxing)
- Managing access to protected functionality and resources (HW)
- Data encryption (protocols, connectivity)
STM32 security offering

- In addition to legacy security mechanisms offered by Cortex-M (like MPU or TrustZone-M), ST adds security features on STM32 portfolio:
  - Unique Identifiers, per chip
  - Watchdogs
  - Anti Tamper
    - Anti-tamper detection pins, Backup registers automatically erased at tampering
  - Flash Memory security
    - Read protection, Write protection, included ECC for error correction
  - PcRoP
    - Sectors of flash set as “execute only”, thus preventing the code to be read
  - Firewall
    - Even more restrictive than MPU and PcRoP. Made to protect a specific part of code or data. Flash Memory, and/or to protect data into the SRAM from the rest of the code executed outside the protected area.
  - True RNG, Hardware Hash and cryptographic means
    - Hardware: True RNG, MD5, SHA-1/2, AES-128/256
    - Software: ST provides a library optimized on STM32 to ensure efficient of lots of standards
  - Power Supply, Clock integrity and Temperature sensor systems
    - Ability to detect attacks in voltage, frequency or temperature
What are JAVA ME8 supported communications?

- Versatile and flexible networking and connectivity, including wireless support (3GPP, CDMA, WiFi)
- Improved access to peripheral devices through Device Access API
- Improved tooling support (Developer Agent, On-device Debugging, Memory Monitor, Network Monitor, CPU Profiler, Logging)
- New APIs for RESTful programming JSON API
- Async HTTP API OAuth 2.0 API
- JSR 75 (File Connection API), JSR 120 (Wireless Messaging API), JSR 172 (Web Services API), JSR 177 (Security and Trust Services API), JSR 179 (Location API) and JSR 280 (XML API)
What are the other major added benefits of developing with Java?

- Embedded C
- Limited flexibility, high cost
- H/W – S/W interdependencies
- Upgrade complexity
- Impact on security/integrity

- Embedded Java
- Extend lifetime, flexibility and value
- Cross-platform, modular S/W applications
- In field S/W upgrades keeping system integrity
- Partial Flash update by App
• STM32/Java ME8 ready for IoT market

• Get a feel of embedded apps by attending Hands-on Seminars:
  • http://www.st.com/web/en/seminar.html
Thank you