Organic Electronics Next Generation Displays Flexible Electronics Wearables

AIXTRON Investor Presentation

Opto & Power Electronics

Next Generation Displays SSL Adoption · UV-C Renewable Energy Power Management E-Mobility · Connectivity Our technology. Your future.

Memory & Logic

High Performance Computing Memory / Big Data Sensors - Smart Devices

SIXTRON

Graphene & Nanomaterials

Flexible Electronics Sensors · Energy Storage High Performance Computing Composites

IR Presentation – FY 2016 (FSE: AIXA, ISIN DE000A0WMPJ6)

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Forward-Looking Statements

This document may contain forward-looking statements regarding the business, results of operations, financial condition and earnings outlook of AIXTRON. These statements may be identified by words such as "may", "will", "expect", "anticipate", "contemplate", "intend", "plan", "believe", "continue" and "estimate" and variations of such words or similar expressions. These forward-looking statements are based on our current assessments, expectations and assumptions, of which many are beyond control of AIXTRON, and are subject to risks and uncertainties. You should not place undue reliance on these forward-looking statements. Should these risks or uncertainties materialize, or should underlying expectations not occur or assumptions prove incorrect, actual results, performance or achievements of AIXTRON may materially vary from those described explicitly or implicitly in the relevant forward-looking statement. This could result from a variety of factors, such as actual customer orders received by AIXTRON, the level of demand for deposition technology in the market, the timing of final acceptance of products by customers, the condition of financial markets and access to financing for AIXTRON, general conditions in the market for deposition plants and macroeconomic conditions, cancellations, rescheduling or delays in product shipments, production capacity constraints, extended sales and gualification cycles, difficulties in the production process, the general development in the semi-conductor industry, increased competition, fluctuations in exchange rates, availability of public funding, fluctuations and/or changes in interest rates, delays in developing and marketing new products, a deterioration of the general economic situation and any other factors discussed in any reports or other announcements, in particular in the chapter Risks in the Annual Report, filed by AIXTRON. Any forwardlooking statements contained in this document are based on current expectations and projections of the executive board based on information available the date hereof. AIXTRON undertakes no obligation to revise or update any forward-looking statements as a result of new information, future events or otherwise, unless expressly required to do so by law.

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Due to rounding, numbers presented throughout this presentation may not add up precisely to the totals indicated and percentages may not precisely reflect the absolute figures for the same reason.

Our registered trademarks: AIXACT[®], AIXTRON[®], Atomic Level SolutionS[®], Close Coupled Showerhead[®], CRIUS[®], Gas Foil Rotation[®], OVPD[®], Planetary Reactor[®], PVPD[®], TriJet[®], Optacap[™]



Our Vision

Technology. Materials. Performance.

Technology.

We are the **recognized technology leader**

in complex material deposition.

Materials.

We **enable our customers** to successfully shape the markets of the future, exploiting the potential offered by **new materials**.

Performance.

We deliver the performance driving economic success

through our expertise, our employees and the quality of our products.

Who we are



- Headquarters based in Herzogenrath, Germany
- Worldwide presence with 13 sales/representatives offices and production facilities
- Company founded in 1983 over 30 years of experience
- >700 employees

- Technology leader in deposition systems
- More than 3,000 deposition systems delivered all over the world
- State of the art R&D center and demo facilities
- Annual R&D budget of approx. € 55-65 Million



Global Presence





AIXTRON – Enabling an Innovative Future

UV LED)

New Complex Materials



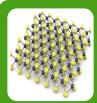
raniai pr	Compound Semiconductors • GaAs/ GaN (Sensors) • GaN/SiC (RF/Power – Mobile) • GaAs/InP (Laser - Datacom) • GaN (LED – LiFi, Micro-LED, UV L
	Silicon Semiconductors

Real-time Processing)



Organic

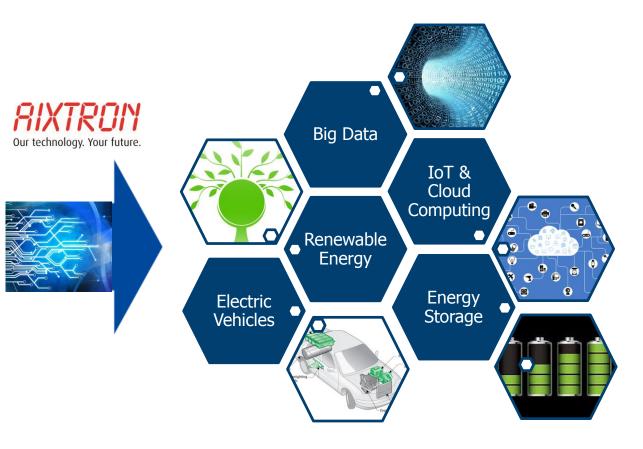
- Display, Lighting
- Flexible Electronics
- Organic Photovoltaics



Carbon Nano Structures

- Graphene (Energy Storage)
- 2D materials (Smart Sensors, Energy Storage)







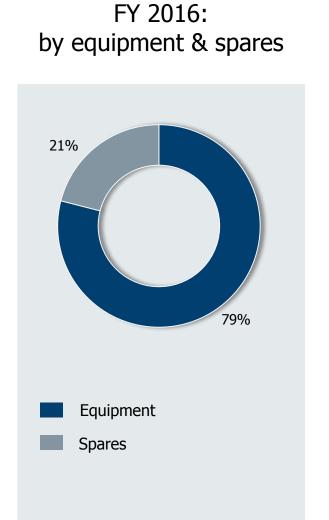
Our Technology Portfolio

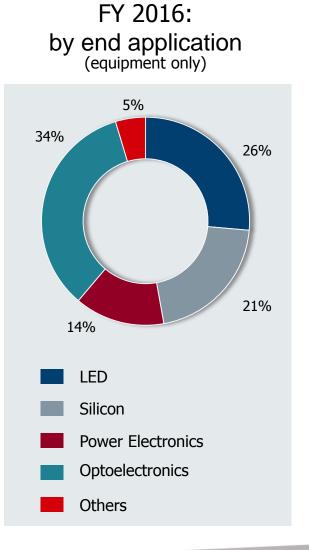
Compound Sem	iconductors	Silicon Semiconductors	Organic	Carbon
MO	CVD	ALD/MOCVD	OVPD [®] /PVPD [®] /TFE	PECVD
LEDs, Lasers and Optoelectronics	Power Management GaN / SiC	Silicon Semiconductors	Organic Electronics	Graphene, CNTs and CNWs
 LEDs for display: TVs, mobile phones, tablets, etc. LEDs for lighting LEDs for automotive LEDs for datacom Lasers for telecom, consumer electronics Photovoltaics 	 RF transistors AC-DC converters DC-DC converters Solar inverters Solar inverters Motor drives in industrial applications automotive and consumer electronics 	 DRAM Dielectric and Metal Electrode Flash Inter Poly Dielectric and Metals ReRAM and PCRAM Active element and Electrode Logic Gate stack Logic High Mobility Channel 	 OLEDs for display: TVs, mobile phones, tablets, etc. Thin Film Encapsulation OLEDs for lighting Organic, flexible electronics Organic Photovoltaics 	 Transistors Interconnects Flexible Electronics Energy Storage Sensors, etc.
000180000	m m m	Routh	OLED	
Increasing demand for Advanced Optoelectronics	New Applications driving Demand	Growth in NAND Flash driving Demand TFOS in Development	Proof of Concept with Relevant Customers	Increasing equipment demand expected by 2018 and beyond



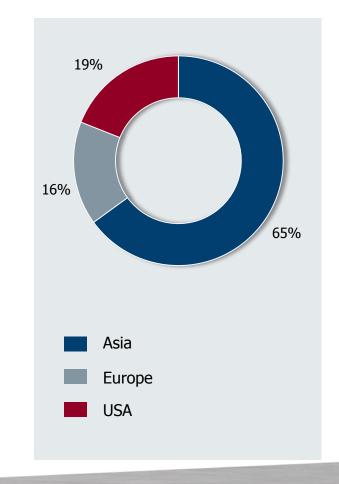
OPERATIONS

Revenue Analysis





FY 2016: by region





24 - Month Business Development



USD order intake and backlog were recorded at the prevailing budget rate (2016: $1.10 \in$) USD revenues were converted at the actual period average FX rate (2016: $1.11 \in$)

rixtron

Consolidated Income Statement*

(€ million)	FY/16	FY/15	+/-	Q4/16	Q4/15	+/-
Revenues	196.5	197.8	-1%	89.8	62.5	44%
Cost of sales	140.2	147.9	-5%	60.5	42.8	41%
Gross profit	56.3	49.8	13%	29.4	19.6	50%
Gross Margin	29 %	25%	4 рр	33%	31%	2 рр
Selling expenses	13.8	11.5	20%	4.8	2.6	85%
General & admin expenses	17.1	16.3	5%	5.0	4.2	19%
R&D	53.9	55.4	-3%	14.4	14.4	0%
Net other op.(income)/expenses	-7.2	-6.7	-7%	-2.7	0.0	n.m.
EBITDA	-7.9	-16.4	52%	12.5	1.3	862%
EBIT	-21.4	-26.7	20%	7.9	-1.5	n.m
EBIT Margin	-11%	-14%	3 рр	9%	-2%	11 pp
Result before tax	-21.0	-26.0	19%	7.9	-1.4	n.m
Pre-Tax Margin	-11%	-13%	2 рр	9%	-2%	11 pp
Net result	-24.0	-29.2	18%	6.4	-1.9	n.m
Net Return on Sales	-12%	-15%	3 рр	7%	-3%	10 pp

*) rounded figures; may not add up

RIXTRON

Consolidated Statement of Financial Position*

(€ million)	31/12/16	30/09/16	31/12/15
Property, plant & equipment	74.2	75.6	81.3
Goodwill	74.6	73.8	75.9
Other intangible assets	5.4	5.5	6.4
Others	2.4	3.6	3.9
Non-current assets	156.5	158.5	167.6
Inventories, WIP & Finished Goods	54.2	79.1	70.8
Trade receivables	60.2	30.4	26.0
Others	5.3	7.1	8.2
Cash & Cash Equivalents incl. CD	160.1	163.5	209.4
Current Assets	279.7	280.1	314.4
Shareholders' equity	369.7	359.9	396.5
Non-current liabilities	4.2	3.0	3.6
Trade payables	14.6	12.6	9.8
Advance payments from customers	26.1	41.3	24.0
Others	21.6	21.9	48.0
Current liabilities	62.3	75.8	81.8
Balance Sheet total	436.2	438.7	482.0

*) rounded figures; may not add up

RIXTRON

Consolidated Statement of Cash Flows*

(€ million)	FY/16	FY/15	Q4/16	Q3/16
Cash Flow from operating activities	-37.7	-45.7	-2.7	4.3
Cash Flow from investing activities	43.4	41.2	4.1	12.9
Cash Flow from financing activities	0.3	-0.1	0.1	0.2
Exchange rate changes	-2.3	4.3	1.2	-0.9
Net change in Cash & Cash Equivalents	3.7	-0.3	2.6	16.5
Cash & Cash Equivalents (beginning of period)	116.3	116.6	117.4	100.9
Cash & Cash Equivalents (end of period)	120.0	116.3	120.0	117.4
Change in Cash deposits	-52.8	-60.5	-6.3	-14.2
Free Cash Flow**	-42.9	-57.3	-4.9	3.0
Сарех	5.3	13.3	2.3	1.3

*) rounded figures; may not add up

**) Acquisition cost adjusted; Operating CF + Investing CF + Changes in Cash Deposits

Market Prospects

Short-Term

- Further increasing adoption of LEDs and specialty LEDs (in particular Red-Orange-Yellow, UV or IR) for Display and other applications
- Increased emergence of wide-band-gap GaN or SiC based devices for energy efficient power management and communications in automotive, consumer electronics and mobile applications
- Development of next generation NAND and DRAM memory devices
- Increasing emergence of compound semiconductor based laser devices for ultrafast data transfer and sensors in infrastructure and mobile applications
- Increasing emergence of compound semiconductor based sensor devices for autonomous driving

Mid- to Long-Term

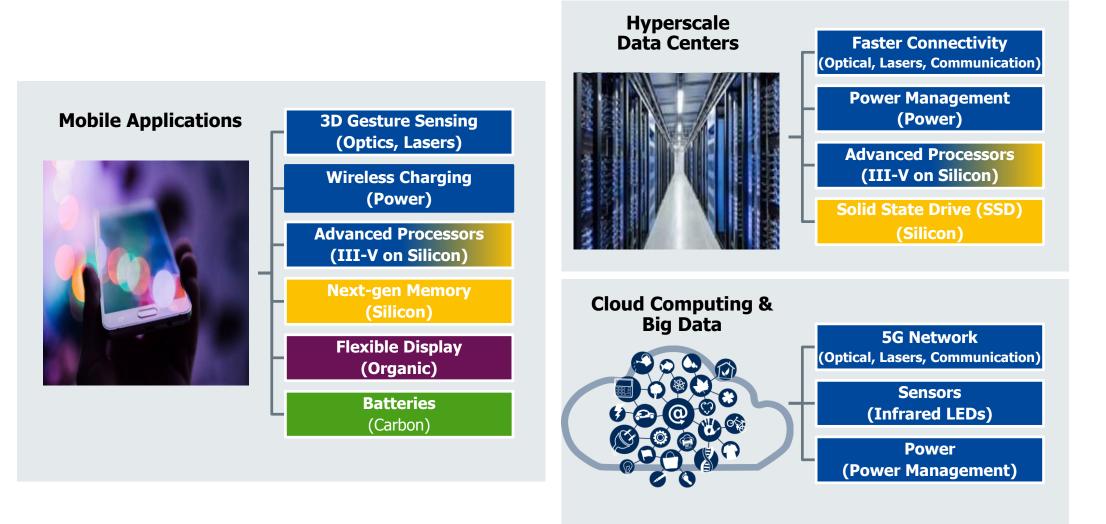
- Further progress in the development of GaN-on-Silicon LEDs and Wafer Level Packaging
- Development of new wide-band-gap applications such as RF and System-on-Chip with integrated power management
- Progress in the development of large area OLED devices requiring efficient deposition technologies
- Progress in the development of flexible and rigid OLED devices requiring thin-film encapsulation
- Increased development activity for specialized compound solar cell applications
- Increasing requirements for High-k and interconnect components, implying a new approach to production technologies
- Progress in the development of future logic chips applying wide band gap and high electron mobility materials (III-V-on-Silicon)
- Development of applications using Carbon Nanostructures (Carbon Nanotubes, Carbon Nanowires, Graphene)
- Development of alternative LED applications such as Visual Light Communication technology or Micro-LED Displays



Our technology. YOUR FUTURE.

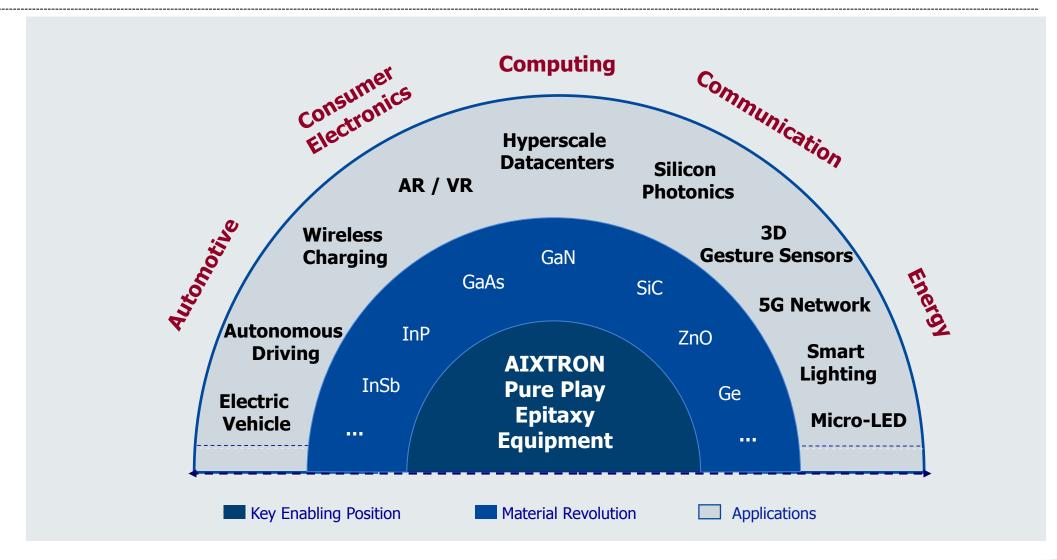


Compound Semiconductors – Enabling Breakthrough Technologies





AIXTRON – Enabling Emerging Global Mega Trends





AIXTRON – Enabling Emerging Global Mega Trends

RIXTRON

Key Enabling Position

- Growing Demand of MOCVD Equipment Driven by Increasing Adoption of High Performance III-V Materials
- Number 1 Position in Throughput per Yield Epitaxy Equipment: Enabling Emergence of New Applications
- Only Pure Play Epitaxy Equipment Company

Material Revolution

- Advanced III-V Compound Materials Enabled by MOCVD
- Established Material Library based on MOCVD Technology
- More than Moore:
 - Decade of Materials
- Moore's law Extension Enabled by III-V Materials

Applications for Global Mega Trends

- Global Megatrends in Mobility, Connectivity and Performance fueling Demand for Leading Edge Deposition Technology
- Industry Convergence: Automotive – Consumer Electronics – Communications
- New Application Features driving Advanced Optoelectronics Device Growth



Short Term: Compound Semiconductors in Next-Gen CE Applications

Source: Gartner; Credit Suisse, DB, Stifel

AIXINON Enables GaAs Applications					
RF Switches	RF Power transistors	6 HMIC Pin diode			
	MMIC	<u>3D gesture sensors</u>			
Base Station for		Iris scan			
3G / 4G		Proximity sensor			
Logic processor		Camera autofocus			
		Environmental scan			
AIXTRON	Nors First Ans Dar	HDMI interconnects			
also in	Hath Man Satro Al	Body functions			
OLED Flexible Display	Company DocuMent Prooffing P	Night vision camera			
<u>3D NAND</u> <u>1X DRAM</u>		Displays			
CNT based LiB	Poor ou bear	Camera Flash			
<u>RF</u> energy solution	MMIC on Fast ch	arger Pulsed power transistor			
<u>Base stat</u>	ion for 5G Wireles	ss PAs Noise cancelation GaN ICs			

AIXTRON Enables GaAs Applications

AIXTRON Enables GaN Applications

Potential CE markets (2017e)

~3bn units

- Smartphones: 1.55 bn units
- Laptops:

0.18 bn units

0.1 bn units

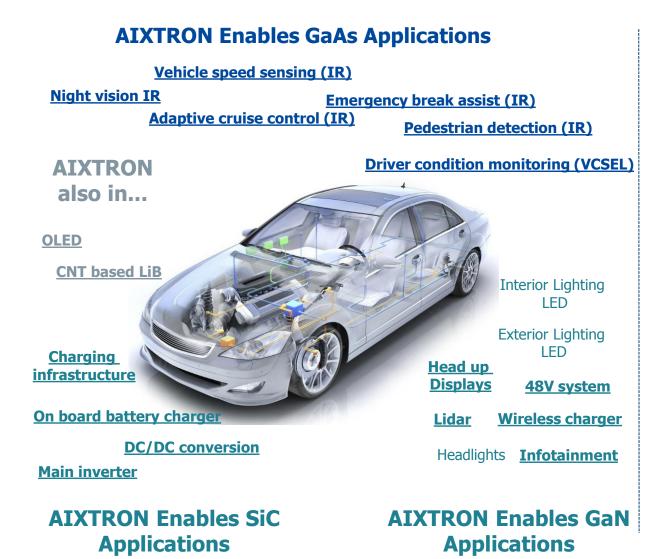
- Tablets:
 0.3 bn units
- Smartwatches:
- Wearables:
- 0.3 bn units
- TV: 0.25 bn units
- Others (DSC, Game consoles): 0.1bn

Customer profiles:

- Fragmented and global
- IDMs, PDM, foundries and start ups
- GaN MOCVD: 100+ players with epi capability
- GaAs MOCVD: 60+ players with epi capability
- CNT PECVD: shift toward commercial customers



Mid Term: Compound Semiconductors in Connected Vehicles



Source: Gartner; Baader, Bernstein, DB, Stifel

- Potential EV, BEV and PHEV
 ~ 4m units in 2020e
 - Power Semiconductor content per car internal combustion engine: \$50
 - Power Semiconductor content per car electrical vehicle: \$350

Potential ADAS

- ~ 25m units in 2019e
- Semiconductor content partially automated: sub \$100 per car
- Semiconductor content fully automated:\$580 per car

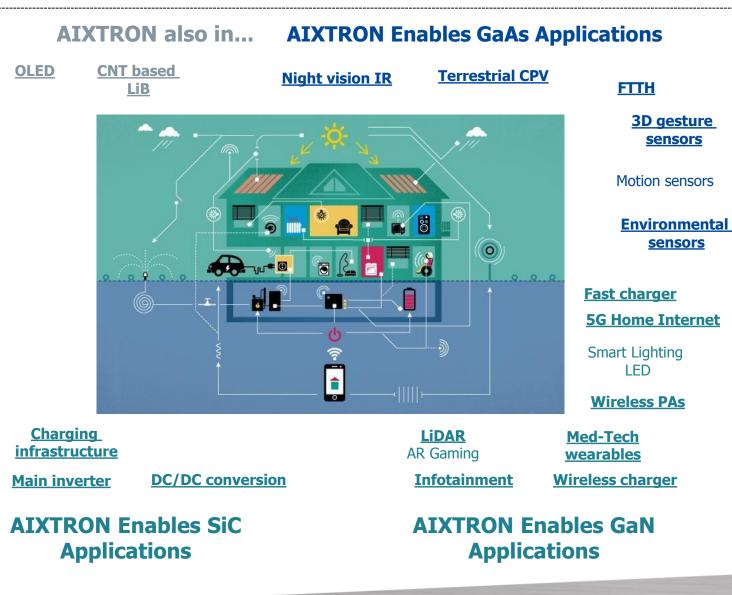
Customer profiles:

- Fragmented and global
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- GaN MOCVD: 100+ players with epi capability
- GaAs MOCVD: 60+ players with epi capability
- CNT PECVD: shift toward commercial customers



Potential New Applications

Long Term: Compound Semiconductors in Smart Homes



Source: Gartner; Credit Suisse, DB, Stifel

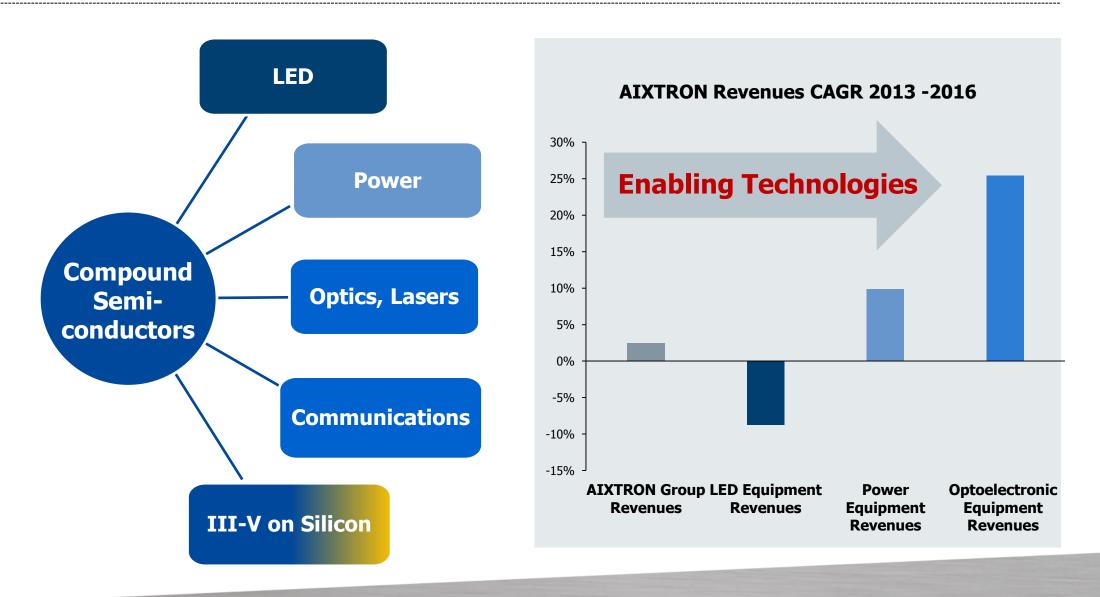
- Smart homes: Self-sufficient, environmentally friendly and connected
 - Smart sensing: motion, environmental sensors, microphones
 - Processing: low power, high performance, microcontroller
 - Connectivity: Sub-GHz, Bluetooth, WiFi
 - Energy management: digital power, energy harvesting
 - Applications:

 appliances, home control, household robots, smart lighting, home multimedia, smart door locks, EV chargers, smart meters, improved security



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Compound Semiconductors – Evolving Applications



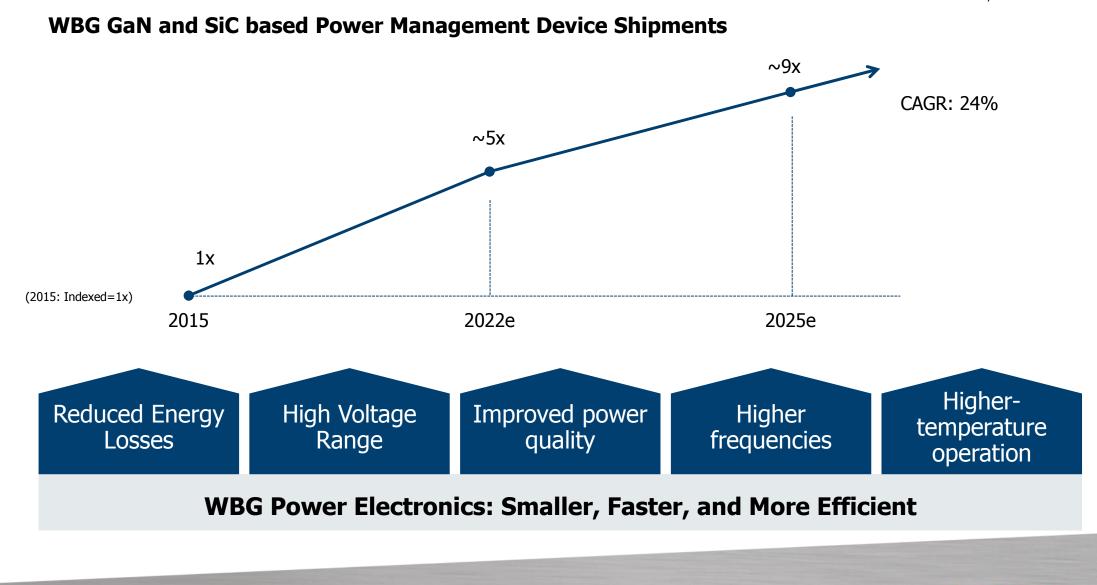
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Compound Semiconductors – Wide-Band-Gap (WBG) Power Electronics

Consumer Electro	nics & IT	Automotive	Energy	Industrial
Power Ma	anagement		Power Switching	
30V	600	v	1.2 kV	≥2kV
 Electronic appliances Computing Wireless charging Power supplies PFC 	 Infotainment GPS Connected car Autonomous driving EMI/EMC Adaptive cruise control 	 General automotive electronic HEV/EV Charging station Inverter / motor drives Converter Radar test applications 	 Power Grid / Smart meter / appliances Solar / Wind inverters Solar / Wind power DC distribution storage UPS 	 UPS Industrial machines Building Mining, oil, gas power generation Shipping/Rail
GaN	G	GaN / SiC		SiC
Volume segment	Niche segment			
				8IXT

Compound Semiconductors – Wide Band Gap (WBG) Power Electronics

Source: DOE, IHS 2016



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Silicon Semiconductors – Leading Edge Technologies

At the forefront to extend Moore's Law Logic transistor Interconnects Memory (MOCVD-III-V) (ALD) (Graphene/CNT) >5x ≤14nm Fab Capacities "More than Moore" ~1.1x **Total Fab Capacities** (2016: Indexed=1x) 2016 2020

Source: Gartner 2016

Silicon Semiconductors – ALD

Product Description – ALD

- 300mm ALD Technology
- QXP-8300 Mini-batch system
- High throughput : 2 Process Chambers 8 stations
- Up to 3 vaporizers and one bubbler
- Applications : DRAM, Logic and Flash High k Dielectric Metal electrode : ReRAM and PCRAM Active elements
- Proven in HVM with >40% lower CoO and >90% Uptime in DRAM and Flash Fabs

"Best-in class technology, state of the art deposition system, lowest CoO"

Product Features

- Up to 3 patented TriJet vaporizers
- Small volume confined process space ensure short ALD cycle time
- > 40 % less precursor consumption
- Efficient purge
- Isolated multi wafer processing with > 40% higher throughput
- Close Coupled Showerhead for uniform distribution
- Flexibility and ease of maintenance

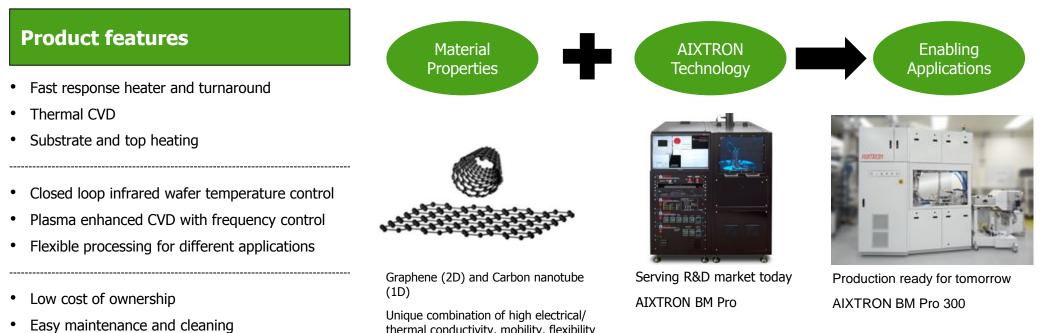




Carbon Nanomaterials – PECVD

Graphene and Carbon Nanotube Deposition Systems

- Proprietary thermal and plasma enhanced chemical vapor deposition technology ٠
- Excellent uniformity and reproducibility with fast turnaround cycle times ٠
- BM platform: BM R&D (2-inch), BM Pro (4-inch and 6-inch), BM GB (4-inch glovebox), BM HT (high temperature, 1,700C), BM300T (300mm) •
- Graphene and carbon nanotube films for electronics, energy storage, thermal management, sensors and flexible/transparent applications ٠

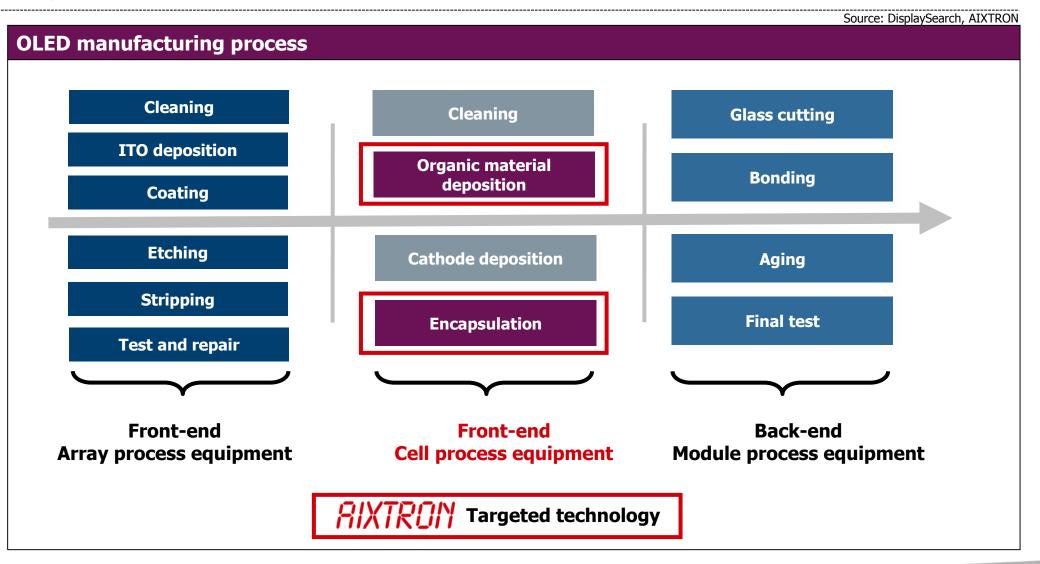


User management features and growth library

thermal conductivity, mobility, flexibility and transparency

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Organic Electronics – OVPD® + Encapsulation



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Organic Electronics – OVPD[®]

Product Description – OVPD

- Proprietary carrier-gas enhanced gas phase deposition approach for organic thin films
- Based on AIXTRON's core competence of carrier gas enhanced vapor phase deposition
- Free scalability: suitable for all relevant substrate generations
- Manufacturing technology applicable for OLED displays, OLED lighting, organic semiconductors, and organic photovoltaic
- Proprietary STExS[™] evaporation source technology: low thermal stress, high rates, continuous operation

"Disruptive deposition technology for cost efficient OLED manufacturing"

Product Features

- High deposition rates for high throughput
- Reduced thermal stress for organic materials
- High material utilization efficiency
- Flexible process control
- Simplified scaling due to
 - Close Coupled Showerhead and
 - Decoupled source technology
- Flexible integration solutions batch and inline
- Reduced number of deposition chamber and footprint
- Scalable: Available for substrate sizes up to Gen8.5 (=2.3 x 2.5 m²)



OVPD demonstrator OLAD (Organic Large Area Demonstrator) (optimized for Generation 8.5 substrate sizes)



Organic Electronics – OPTACAP[™] PECVD

Product Description – OptaCap[™] PECVD

- Proprietary PECVD technology based on linear plasma sources
- Based on AIXTRON's core competence of carrier gas enhanced vapor phase deposition
- Free scalability: suitable for all relevant substrate generations
- Manufacturing technology applicable for barrier applications, i.e. thin film encapsulation: highly flexible, low film stress, high transparent, high water and oxygen permeation barrier,

"Disruptive deposition technology for cost efficient deposition of flexible barrier films"

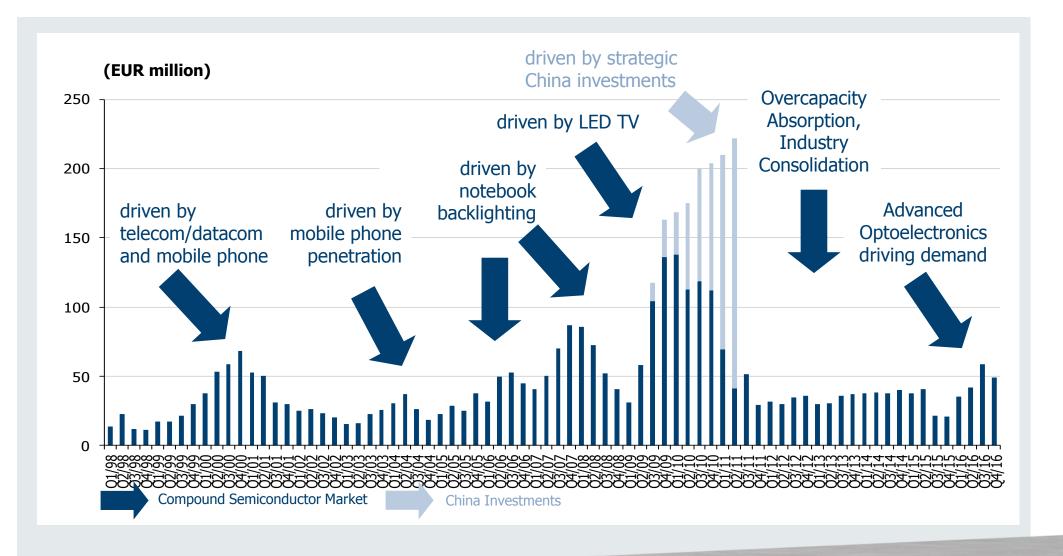
Product Features

- High deposition rates for high throughput
- Flexible process control
- Simplified scaling due to
 - Linear PECVD source technology
 - Multiple source configurations
- Scalable: Available for substrate sizes up to Gen3.5, future: up to Gen8.5
- Highly flexible SiNx-based barrier films at high rates
- Low temperature process (<80°) with low film stress





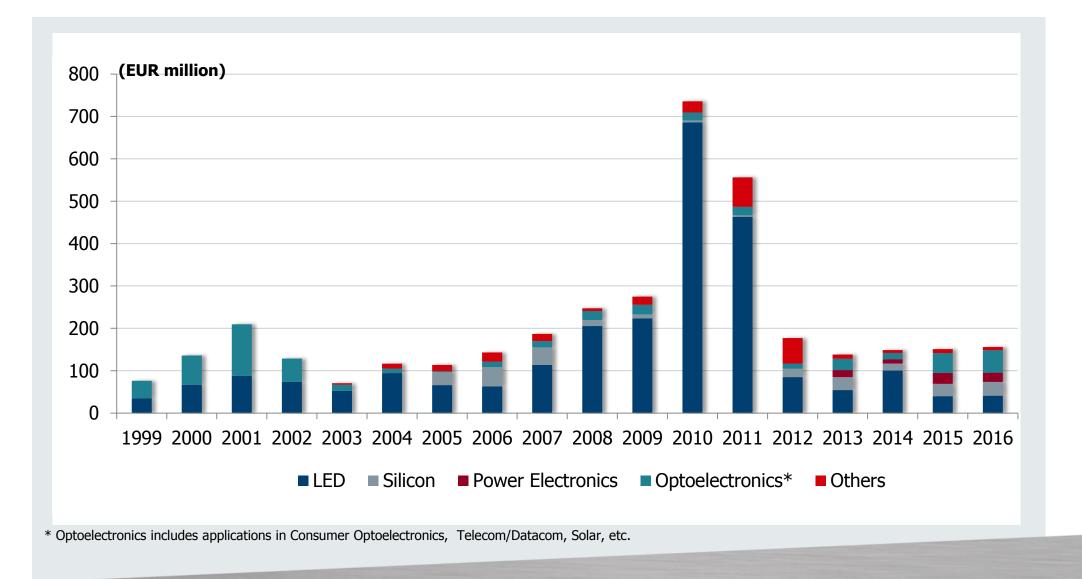
Equipment Order Intake per Quarter





OPERATIONS

Annual Equipment Revenues by Application (excl. spares)



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Consolidated Income Statement*

(€ million)	2016	2015	2014
Revenues	196.5	197.8	193.8
Cost of sales	140.2	147.9	154.1**
Gross profit	56.3	49.8	39.7**
Gross Margin	29%	25%	20%
Selling expenses	13.8	11.5	14.1**
General & admin expenses	17.1	16.3	19.3
R&D	53.9	55.4	66.7
Net other op.(income)/expenses	-7.2	-6.7	-2.2
EBITDA	-7.9	-16.4	-41.3
EBIT	-21.4	-26.7	-58.3
EBIT Margin	-11%	-14%	-30%
Result before tax	-21.0	-26.0	-57.1
Pre-Tax Margin	-11%	-13%	-29%
Net result	-24.0	-29.2	-62.5
Net Return on Sales	-12%	-15%	-32%

*) rounded figures; may not add up **) 2013 and 2014 figures changed to be comparable with 2015

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Consolidated Statement of Financial Position*

(€ million)	31/12/16	31/12/15	31/12/14
Property, plant & equipment	74.2	81.3	77.3
Goodwill	74.6	75.9	64.8
Other intangible assets	5.4	6.4	2.5
Others	2.4	3.9	4.6
Non-current assets	156.5	167.6	149.2
Inventories, WIP & Finished Goods	54.2	70.8	81.7
Trade receivables	60.2	26.0	26.3
Others	5.3	8.2	8.3
Cash & Cash Equivalents incl. CD	160.1	209.4	268.1
Current Assets	279.7	314.4	384.4
Shareholders' equity	369.7	396.5	415.7
Non-current liabilities	4.2	3.6	1.3
Trade payables	14.6	9.8	16.4
Advance payments from customers	26.1	24.0	66.9
Others	21.6	48.0	33.2
Current liabilities	62.3	81.8	116.5
Balance Sheet total	436.2	482.0	533.5

*) rounded figures; may not add up



Consolidated Statement of Cash Flows*

(€ million)	2016	2015	2014
Cash Flow from operating activities	-37.7	-45.7	-33.8
Cash Flow from investing activities	43.4	41.2	-23.2
Cash Flow from financing activities	0.3	-0.1	0.2
Exchange rate changes	-2.3	4.3	5.9
Net change in Cash & Cash Equivalents	3.7	-0.3	-50.9
Cash & Cash Equivalents (beginning of period)	116.3	116.6	167.5
Cash & Cash Equivalents (end of period)	120.0	116.3	116.6
Change in Cash deposits	-52.8	-60.5	9.9
Free Cash Flow**	-42.9	-57.3	-47.0
Сарех	5.3	13.3	13.4

*) rounded figures; may not add up **) Operating CF + Investing CF + Changes in Cash Deposits, adjusted for acquisition effects

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ABOUT AIXTRON

Global Presence



AIXTRON SE Headquarters Herzogenrath, Germany

Core of AIXTRON's activities is the Technology and R&D Center near Aachen.

Focus on engineering and process development in MOCVD and organic semiconductors.



AIXTRON Ltd. Cambridge, United Kingdom

Focus on key MOCVD reactor component technology, carbonbased nanotechnology systems, state of the art innovation and production of R&D tools.



AIXTRON Inc. Sunnyvale, California, USA

Focus on silicon applications for leading suppliers of DRAM and CMOS.



- April 25, 2017 Q1/2017 Results, Conference Call
- May 9, 2017
 Annual General Meeting, Aachen
- July 25, 2017 H1/2017 Results, Conference Call
- October 26, 2017 9M/2017 Results, Conference Call

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Thank you very much for your attention.

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