



Microneedles for drug delivery

Patent Landscape Analysis

2020

SAMPLE

Picture: Joseluissc3

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We Know Technology, We Know Patents

INTRODUCTION

Scope of the report

- This report provides a detailed picture of the patent landscape for Microneedles for Drug Delivery.
- This report covers **patents published worldwide up to Mars 2020**.
- About **2,450 relevant patent families** have been selected and analyzed in this report.

Included in the report

- ✓ Microneedles for all type of drug delivery and applications (cosmetic and therapeutic)
- ✓ All type of microneedles:
 - ✓ Applicators (Patch, Array, etc...)
 - ✓ Coated
 - ✓ Hollow
 - ✓ Solid
 - ✓ Soluble
 - ✓ Hydrogel
 - ✓ Porous

Not included in the report

- X Microneedles for transdermal sampling biological fluid
- X Microneedles for transdermal monitoring
- X Microneedles for transdermal sensing
- X Simple Packaging for microneedles.
- X Other device for drug delivery

INTRODUCTION

Key features of the report

- **Essential patent data for Microneedles for Drug Delivery.**
- **In-depth patent analyses of key technologies and key players** including:
 - Time evolution of patent publications and countries of patent filings;
 - Current legal status of patents;
 - Ranking of main patent applicants;
 - Joint developments and IP collaboration network of main patent applicants;
 - Key patents;
 - Relative strength of main companies IP portfolio; and
 - Matrix patent applicants/technology issues for main IP players.
- **IP profiles presentation of 12 key players**, including key patents, technological issues, partnerships, IP strength: TOPPAN PRINTING, HISAMITSU PHARMACEUTICAL, LG HOUSEHOLD & HEALTH CARE, 3M, FUJIFILM, JOHNSON & JOHNSON, BECTON DICKINSON & COMPANY, CORIUM, etc.



INTRODUCTION

Key features of the report

- **Excel database** comprising all analyzed patents of the report is provided.
- This **patent database** allows multi-criteria searches, including:
 - Patent publication number
 - Hyperlinks to the original documents
 - Priority date
 - Title
 - Abstract
 - Patent assignees
 - Technical segmentation
 - Legal status for each member of the patent family.
- The findings, interpretations and conclusions expressed in this report are entirely those of Knowmade and may not constitute or imply endorsement by a decision-making body such as a court of law or a patent office. Any assessment of the effect or scope of pending applications or granted patents reflects our own views and these are not necessarily those of a Patent Attorney. Should confirmation of our assessment in this respect be required, we recommend you to seek the advice of a national Patent Attorney.



Patent Landscape Overview

Patent assignees, IP dynamics, patent legal status, patent geographical coverage

SAMPLE

PATENT LANDSCAPE OVERVIEW

Time Evolution of Patent Publications



PATENT LANDSCAPE OVERVIEW

Main Patent Assignees



Ranking of patent assignees / Number patent families

PATENT LANDSCAPE OVERVIEW

Countries of Patent Filings (1/2)



3d) Number of patent families for each country of protection = (3d) Number of patent families of first publication - (3d) Number of patent families of first filing

Note: This distribution by country was country codes from patents/patent application numbers for the published members of each family. A country is considered as a country of filing for a patent family if at least one member of the family has been published in this country. For example, if a patent family has 3-15 patents and 2 JP patents, results will show 1 patent family for United States and 1 patent family for Japan. The international (PCT) and European (EPO) patent applications may encompass various countries.

First filing patent applications related to microneedles for drug delivery are mainly filed in the US (633 patent families) and in Asian countries (China 585, Japan 522 and South Korea 466). Interestingly, Europe does not appear as an important territory of first filing depicting the low representation of EP assignees in the field.

The high number of patent families (585) firstly published as international application (WO) shows a strong internationalization strategy of the patent rights in this technical field.

The main countries of protection are China, Japan, US, Europe and South Korea. These territories appear to be strategic for the applicants.

PATENT LANDSCAPE OVERVIEW

Mapping of Main Current Patent Holders



PATENT LANDSCAPE OVERVIEW

Time Evolution by Country



2018, the patenting activity significantly increases in the US. Later in 2013-2014, number of PCT, China became the top filing country between 2013-2014 (788 patent families published), as Chinese companies and universities.

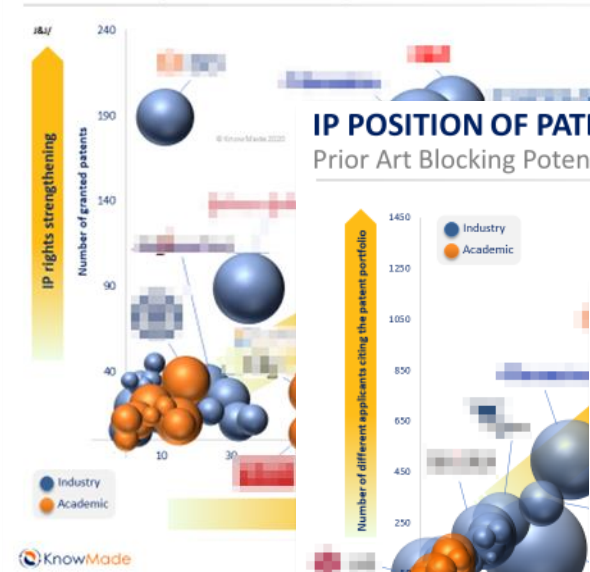
Patent Portfolios Benchmarking: Beyond the Quantity

Who has the best patent portfolio?

SAMPLE

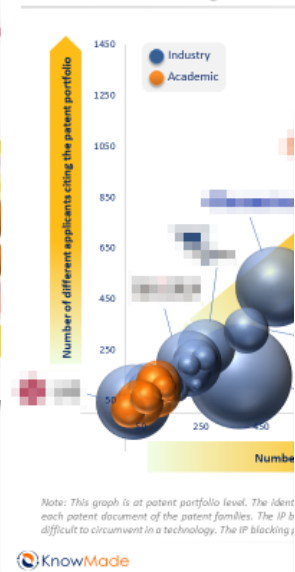
IP POSITION OF PATENT APPLICANTS

IP Leadership of Patent Assignees



IP POSITION OF PATENT APPLICANTS

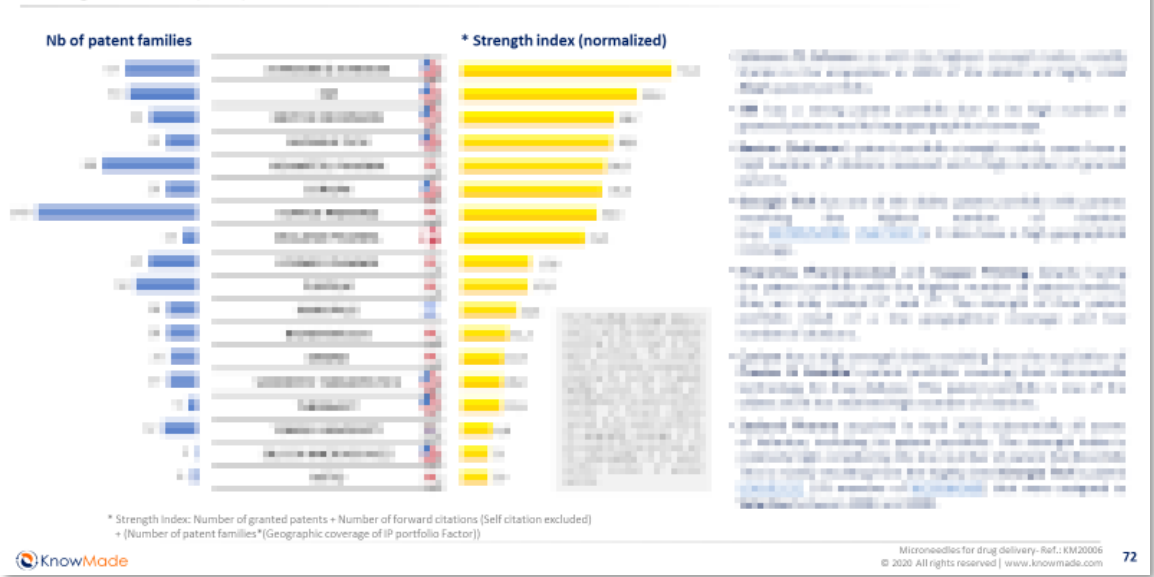
Prior Art Blocking Potential



Note: This graph is at patent portfolio level. The IP is difficult to circumvent in a technology. The IP blocking potential is high.

IP POSITION OF PATENT APPLICANTS

Strength Index (2/2)



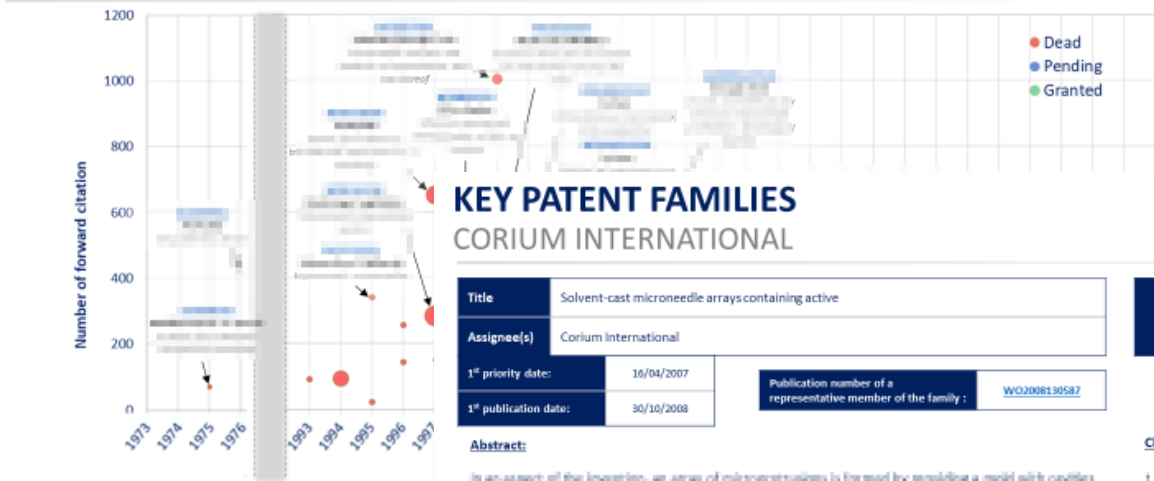
Key patent families

Identification of the patent families with the higher impact

SAMPLE

KEY PATENTS

Patent Forward Citation Analysis (1/2)



This graph shows the main cited patent families according to where patent family members were published.

Granted: At least one family member is a **granted patent** (in the green).

Pending: At least one family member is a **pending patent application** (in the blue).

Dead: All family members are lapsed/revoked/expired patents (in the red).



Abstract:

In an aspect of the invention, an array of microprojections is formed by providing a mold with cavities corresponding to the negative of the microprojections, casting atop the mold a first solution comprising a biocompatible material and a solvent, removing the solvent, casting a second solution atop the first said solution, removing the solvent from the second solution, and assembling the resulting array from the mold. The first solution preferably contains an active ingredient.

Key figures:

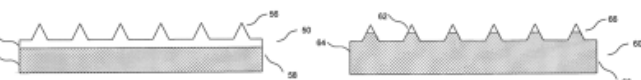


Figure 5A depicts schematically in cross-section two overlapping microneedle arrays of the invention.

In microneedle array 52, there is a base 54 and a plurality of microprojections such as 56. The microneedle array comprises two layers: 52 and 54 (shaded). As may be seen, the microprojections themselves extend entirely within layer 52, so that layer 54 does not contain any microprojections.

In microneedle array 60 there is also a plurality of microprojections such as 64. The microneedle array comprises two layers: 60 and 62 (shaded). However, in array 60 the layer 62 encompasses only a portion of the microprojections which comprises their tips or distal ends. The layer 60 encompasses the portions of the microprojections not contained in layer 62 and also encompasses the totality of the base 66.



Legal status	Granted	US, AU		
	Pending	EP, US		
		Received citation count	121	
		Number of citing assignees	61	

Claims (US9452280 Granted claims):

1. A method of making a microstructure array, comprising: dispensing onto a mold having an array of microstructure cavities a formulation comprising a polymer, a therapeutic agent and a solvent, said formulation being dispensed in an amount sufficient to at least partially fill the microstructure cavities, said dispensing being carried out in presence of a gas having a solubility in the formulation or the mold that is greater than the solubility of air in the formulation or the mold; drying the formulation; and assembling from the mold a microstructure array.

US10238848 (Granted claims):

1. A microneedle array, comprising: an approximately planar base and a plurality of microprojections, wherein the microprojections comprise at least a first and a second layer arranged roughly parallel to the plane of the planar base, the first and second layers formed of different polymers, the first layer is contained in a distal end of the microprojections and comprised of (i) a biodegradable polymer, (ii) one or more components to facilitate biodegradation selected from sugars, sugar alcohols, cyclodextrins and water-swelling polymers, and (iii) an active ingredient, wherein a ratio of weight percent of the biodegradable polymer to weight percent of the one or more components to facilitate biodegradation is in the range of about 5.25:1 to about 1:3.75.

What are the key IP players for each segments?

SAMPLE

Main Assignees by Technology

[illegible]

Please note that a patent family can be part of multiple segments.

Microneedles for drug delivery- Ref.: KM20006
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Main Assignees by Application



Microneedles for drug delivery- Ref.: KM20006
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Microneedle application: Cosmetic



Microneedles for drug delivery- Ref.: KM20006
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Useful patent database allows multi-criteria searches



ORDER FORM

Microneedles for drug delivery

Patent Landscape Analysis – August 2020

Ref.:KM20006



SHIP TO

Name (Mr/Ms/Dr/Pr):

Job Title:

Company:

Address:

City:

State:

Postcode/Zip:

Country:

VAT ID Number for EU members:

Tel:

Email:

Date:

PAYMENT METHODS

Check

To pay your invoice using a check, please mail your check to the following address:

KnowMade S.A.R.L.
2405 route des Dolines
06902 Valbonne Sophia Antipolis
FRANCE

Money Transfer

To pay your invoice using a bank money wire transfer please contact your bank to complete this process. Here is the information that you will need to submit the payment:

Payee: KnowMade S.A.R.L.
Bank: Banque Populaire Méditerranée, CAP 3000 Quartier du lac, 06700 St Laurent du Var, France
IBAN: FR76 1460 7003 6360 6214 5695 139
BIC/SWIFT: CCBPFRPPMAR

Paypal

In order to pay your invoice via PAYPAL, you must first register at www.paypal.com. Then you can send money to the KnowMade S.A.R.L. by entering our E-mail address contact@knowmade.fr as the recipient and entering the invoice amount.

RETURN ORDER BY

E-mail: contact@knowmade.fr

Mail: KnowMade S.A.R.L., 2405 route des Dolines, 06902 Valbonne Sophia Antipolis, FRANCE

PRODUCT ORDER

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I hereby accept Knowmade's Terms and Conditions of Sale

Signature:

Terms and Conditions of Sales

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2.1 Products are sent by email to the Buyer:

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- within a reasonable time for Products ordered prior to their effective release. In this case, the Seller shall use its best endeavours to inform the Buyer of an indicative release date and the evolution of the work in progress.

2.2 Some weeks prior to the release date the Seller can propose a pre-release discount to the Buyer.

The Seller shall by no means be responsible for any delay in respect of article 2.2 above, and including in cases where a new event or access to new contradictory information would require for the analyst extra time to compute or compare the data in order to enable the Seller to deliver a high quality Products.

2.3 The mailing of the Product will occur only upon payment by the Buyer, in accordance with the conditions contained in article 3.

2.4 The mailing is operated through electronic means either by email via the sales department. If the Product’s electronic delivery format is defective, the Seller undertakes to replace it at no charge to the Buyer provided that it is informed of the defective formatting within 90 days from the date of the original download or receipt of the Product.

2.5 The person receiving the Products on behalf of the Buyer shall immediately verify the quality of the Products and their conformity to the order. Any claim for apparent defects or for non-conformity shall be

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2.6 No return of Products shall be accepted without prior information to the Seller, even in case of delayed delivery. Any Product returned to the Seller without providing prior information to the Seller as required under article 2.5 shall remain at the Buyer’s risk.

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3.1 Prices are given in the orders corresponding to each Product sold on a unit basis or corresponding to annual subscriptions. They are expressed to be inclusive of all taxes. The prices may be reevaluated from time to time. The effective price is deemed to be the one applicable at the time of the order.

3.2 Payments due by the Buyer shall be sent by cheque payable to Knowmade, PayPal or by electronic transfer to the following account:

Banque Populaire Méditerranée, CAP 3000 Quartier du lac, 06700 St Laurent du Var, France

BIC or SWIFT code: CCBPFRPPMAR

IBAN: : FR76 1460 7003 6360 6214 5695 139

To ensure the payments, the Seller reserves the right to request down payments from the Buyer. In this case, the need of down payments will be mentioned on the order.

3.3 Payment is due by the Buyer to the Seller within 30 days from invoice date, except in the case of a particular written agreement. If the Buyer fails to pay within this time and fails to contact the Seller, the latter shall be entitled to invoice interest in arrears based on the annual rate Refi of the «BCE» + 7 points, in accordance with article L. 441-6 of the French Commercial Code. Our publications (report, database, tool...) are delivered only after reception of the payment.

3.4 In the event of termination of the contract, or of misconduct, during the contract, the Seller will have the right to invoice at the stage in progress, and to take legal action for damages.

4. LIABILITIES

4.1 The Buyer or any other individual or legal person acting on its behalf, being a business user buying the Products for its business activities, shall be solely responsible for choosing the Products and for the use and interpretations he makes of the documents it purchases, of the results he obtains, and of the advice and acts it deduces thereof.

4.2 The Seller shall only be liable for (i) direct and (ii) foreseeable pecuniary loss, caused by the Products or arising from a material breach of this agreement

4.3 In no event shall the Seller be liable for:

a) damages of any kind, including without limitation, incidental or consequential damages (including, but not limited to, damages for loss of profits, business interruption and loss of programs or information) arising out of the use of or inability to use the Seller’s website or the Products, or any information provided on the website, or in the Products;

b) any claim attributable to errors, omissions or other inaccuracies in the Product or interpretations thereof.

4.4 All the information contained in the Products has been obtained from sources believed to be reliable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such information, which cannot be guaranteed to be free from errors.

4.5 All the Products that the Seller sells may, upon prior notice to the Buyer from time to time be modified by or substituted with similar Products meeting the needs of the Buyer. This modification shall not lead to the liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product initially ordered.

4.6 In the case where, after inspection, it is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without indemnities or compensation of any kind for labor costs, delays, loss caused or any other reason. The replacement is guaranteed for a maximum of two months starting from the delivery date. Any replacement is excluded for any event as set out in article 5 below.

4.7 The deadlines that the Seller is asked to state for the mailing of the Products are given for information only and are not guaranteed. If such deadlines are not met, it shall not lead to any damages or cancellation of the orders, except for non-acceptable delays exceeding [4] months from the stated deadline, without information from the Seller. In such case only, the Buyer shall be entitled to ask for a reimbursement of its first down payment to the exclusion of any further damages.

4.8 The Seller does not make any warranties, express or implied, including, without limitation, those of

saleability and fitness for a particular purpose, with respect to the Products. Although the Seller shall take reasonable steps to screen Products for infection of viruses, worms, Trojan horses or other codes containing contaminating or destructive properties before making the Products available, the Seller cannot guarantee that any Product will be free from infection.

5. FORCE MAJEURE

The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labor difficulties, equipment failure, late deliveries by suppliers or other difficulties which are beyond the control, and not the fault of the Seller.

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6.1 All intellectual property rights attached to the Products are and remain the property of the Seller and are protected under French and international copyright law and conventions.

6.2 The Buyer agreed not to disclose, copy, reproduce, redistribute, resell or publish the Product, or any part of it to any other party other than employees of its company. The Buyer shall have the right to use the Products solely for its own internal information purposes. In particular, the Buyer shall therefore not use the Product for purposes such as:

- Information storage and retrieval systems;

- Recordings and re-transmittals over any network (including any local area network);

- use in any timesharing, service bureau, bulletin board or similar arrangement or public display;

- Posting any Product to any other online service (including bulletin boards or the Internet);

- Licensing, leasing, selling, offering for sale or assigning the Product.

6.3 The Buyer shall be solely responsible towards the Seller of all infringements of this obligation, whether this infringement comes from its employees or any person to whom the Buyer has sent the Products and shall personally take care of any related proceedings, and the Buyer shall bear related financial consequences in their entirety.

6.4 The Buyer shall define within its company point of contact for the needs of the contract. This person will be the recipient of each new report in PDF format. This person shall also be responsible for respect of the copyrights and will guaranty that the Products are not disseminated out of the company.

7. TERMINATION

7.1 If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Buyer shall indemnify the Seller for the entire costs that have been incurred as at the date of notification by the Buyer of such delay or cancellation. This may also apply for any other direct or indirect consequential loss that may be borne by the Seller, following this decision.

7.2 In the event of breach by one Party under these conditions or the order, the non-breaching Party may send a notification to the other by recorded delivery letter upon which, after a period of thirty (30) days without solving the problem, the non-breaching Party shall be entitled to terminate all the pending orders, without being liable for any compensation.

8. MISCELLANEOUS

All the provisions of these Terms and Conditions are for the benefit of the Seller itself, but also for its licensors, employees and agents. Each of them is entitled to assert and enforce those provisions against the Buyer.

Any notices under these Terms and Conditions shall be given in writing. They shall be effective upon receipt by the other Party.

The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have accepted the latest version of these terms and conditions, provided they have been communicated to him in due time.

9. GOVERNING LAW AND JURISDICTION

9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract (orders) entered into in application of these Terms and Conditions shall be settled by the French Commercial Courts of Grasse, which shall have exclusive jurisdiction upon such issues.

9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and Conditions.

KNOWMADE

Company presentation

Technology Intelligence and IP Strategy consulting company

Electronics | Telecommunications | Photonics | Life Sciences | Healthcare | Agri-Food

Executive team



Dr Nicolas Baron
CEO and co-founder of Knowmade.

He manages the development and strategic orientation of the company and personally leads the Electronics & Telecom department. He holds a PhD in physics from the University of Nice Sophia-Antipolis, and a Master degree in Intellectual Property Strategies and Innovation from the European Institute for Enterprise and Intellectual Property (IEEPI Strasbourg), France.



Dr Brice Sagot
CTO and co-founder of Knowmade.

He manages the development of IP analysis tools and methodologies, and personally leads the Life Sciences & Healthcare department. He holds a PhD in molecular biology from the University of Nice Sophia-Antipolis, France.

Founded in 2009

Headquartered in Sophia Antipolis (France)



Sophia Antipolis



Global presence, with an established base of more than 100 customers worldwide

KNOWMADE PURPOSE

Turning **patents** and **scientific information** into **business-oriented report** for **decision makers** working in **R&D, Innovation Strategy, Intellectual Property, and Marketing**

Competitive landscape | Technology trends | Opportunities / Risks | R&D and IP strategy



Assert your patents
Defend your position in case of licensing/litigation
Evaluate the risks to infringe patents

Understand, anticipate and evaluate the competitive landscape and current technology developments

Improve your R&D strategy
Identify and get access to external innovation

MAIN FIELDS OF EXPERTISE

RF & Wireless

- RF devices
- Front end modules
- Antenna & Networks



Advanced Packaging
Innovative Materials
AI & Computing

Power

- Power electronics
- Batteries
- Energy management



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