

Advanced Packaging

Patent Monitoring Service

Get up-to-date data on Advanced Semiconductor Packaging patent activity:
New patent applications, patents newly granted, expired or abandoned patents, latest patent transfers, patent litigations and oppositions

SERVICE OUTLINE

- Patent monitoring service
- **Advanced Packaging**
- **Excel file** quarterly updated
- **Quarterly PDF report**
- Access to **IP analyst** (100h per year)
- €30,000 for **annual subscription**

KEY FEATURES OF THE SERVICE

Every quarter an up-to-date **Excel database** including:

- **New patents** applications
- Patent applications newly **granted**
- **Expired** or **abandoned** patents
- **Transfer** of IP rights (re-assignment, licensing) and **IP collaborations** (co-filings)
- Patent **litigations** and **oppositions**.
- Patents **categorized by packaging technologies**: Fan-Out packaging (wafer level, panel level), 2.5D & 3D packaging (interposer, bridge, hybrid bonding, 3D-stacked memory)

Every quarter a **PDF report** including:

- **Key fact & figures** of the quarter
- **Graphs and comments** covering the patent landscape evolutions
- A close look at the **key IP players** and **technologies**

Access to and **IP analyst** for 100h per year:

- **Q&A sessions** and **discussions** with our IP analysts regarding quarterly report results, trends, analyses, specific patented technologies, or companies' IP portfolios in the field of **Advanced Packaging**.

OBJECTIVES OF THE SERVICE

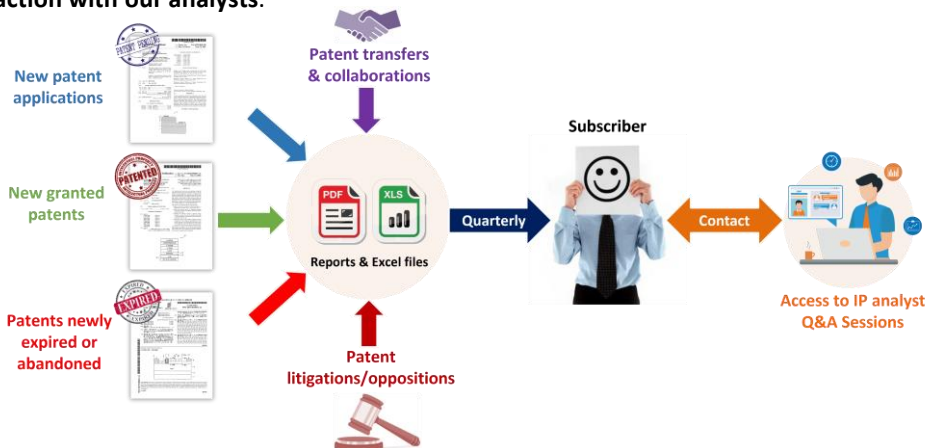
- Get a clearer view of the **technology evolution**
- Track your **competitors** and identify the **newcomers**
- Early detect **opportunities** and **risks**
- Take advantage of **free technologies**

2.5D/3D stacking and fan-out WLP are promising solutions to meet the needs of the semiconductor packaging market. It is crucial to monitor patent activity and IP strategies of key semiconductor packaging players.

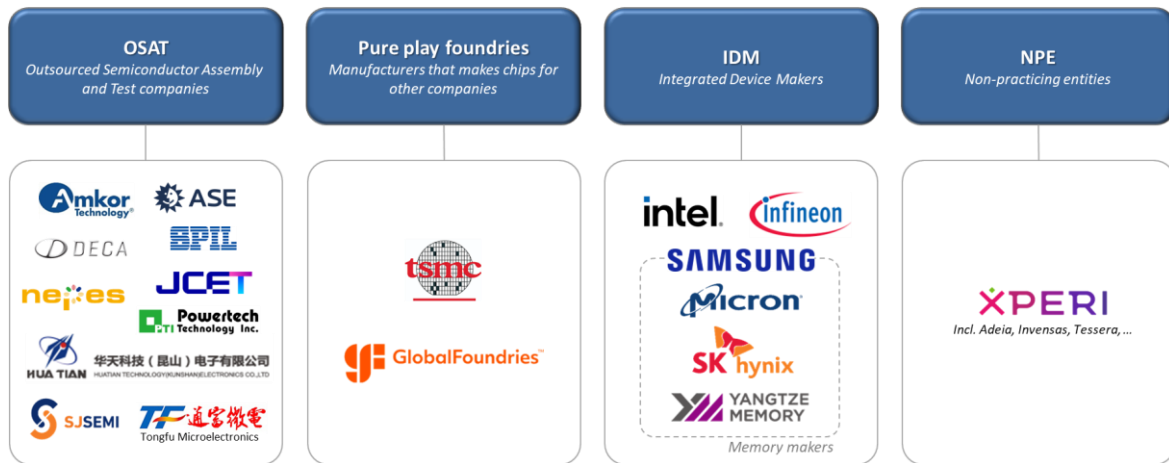
In the semiconductor industry, there is a growing demand for integrating more compute and memory within a single package in order to achieve smaller form factors and improve product performance. However, Moore's Law becomes increasingly difficult to achieve as node advancement reaches its limits. As a result, the process of chip miniaturization has been slowing down. **Advanced packaging techniques**, such as **2.5D & 3D stacking**, and **fan-out wafer level packaging**, have emerged as crucial solutions to meet the needs of the semiconductor industry. These new approaches allow for the integration of multiple dies into a single package, with the possibility of combining mature and advanced nodes, and they have supplemented the dominant flip-chip (FC) and wire-bond (WB) technologies. The roadmap for these **advanced packaging technologies** is challenging and the supply chain is becoming increasingly competitive, with the demand for high-density fan-out (HD FO) redistribution layers (RDLs), high-density input/output interconnections (I/O), and advanced interconnect technologies such as silicon interposer, embedded bridge, hybrid bonding, and chiplets approach. The market for **2.5/3D packaging** shows the most potential for growth, with 3D SoC technology growing the most driven by the increasing popularity of hybrid bonding for chiplets 3D integration. In the fan-out WLP industry, the segment experiencing the highest growth is the ultra-high density fan-out (UHD FO), which has emerged as a more cost-effective solution compared to silicon interposers. Semiconductor packaging was primarily performed by OSATs such as **ASE/SPIL, Amkor, JCET**, etc. and they continue to play an important role in this field. However, it is **TSMC, Samsung and Intel** that have been developing innovative 2.5D/3D packaging solutions such as silicon interposer, embedded bridge, and hybrid bonding. By offering advanced back-end solutions and using their front-end capabilities, these companies poised to influence future technology and intellectual property (IP) developments in this area.

In this context, it is crucial to monitor patent activity and intellectual property (IP) strategies of key players. Such knowledge can assist in understanding your competitors' R&D roadmap and strategies, evaluate the risks, and detect business opportunities. The **Advanced Packaging Patent Monitor** gives periodic insights on the IP activity of a selection of key companies: **TSMC, Intel, Samsung, Amkor, ASE, SPIL, JCET, Deca, Nepes, Powertech (PTI), SJSemi, Tongfu (TFME), Huatian, Infineon, Micron, SK Hynix, YMTC, GlobalFoundries, and Xperi/Adeia**.

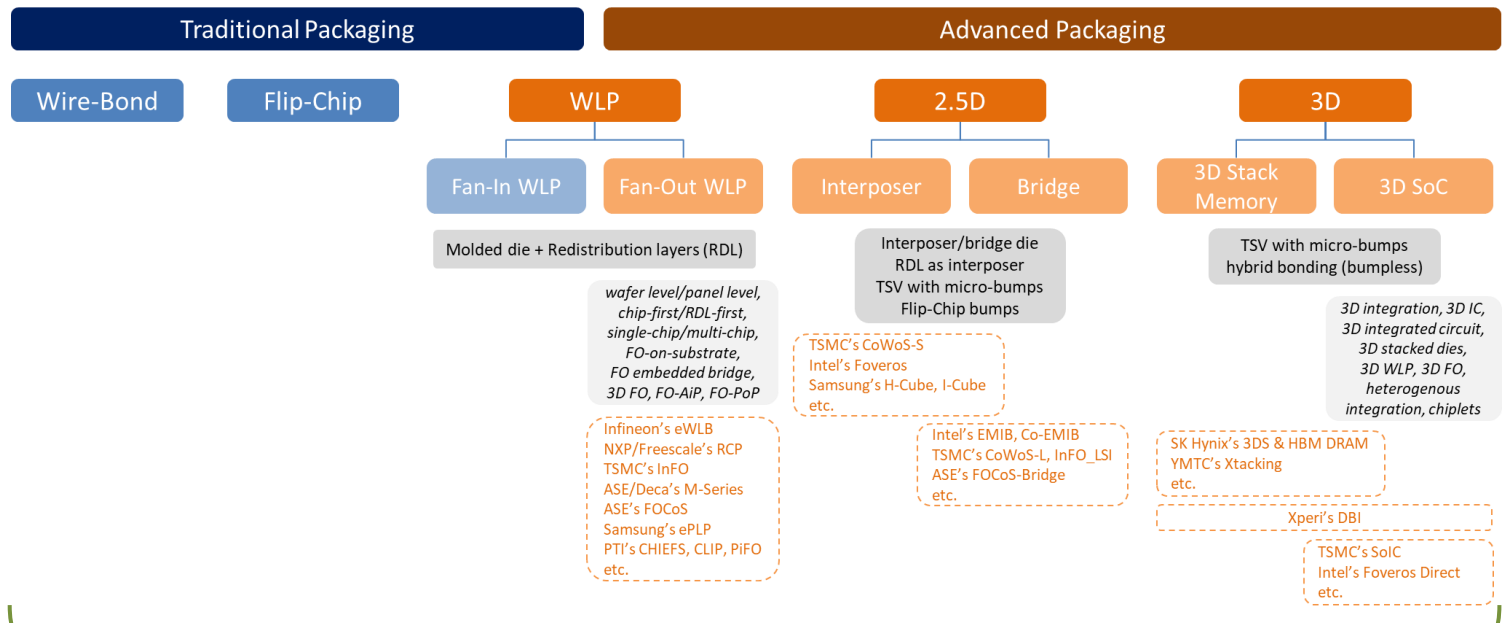
The Advanced Packaging patent monitoring service allows you to take advantage of a **quarterly-updated Excel database** and benefit from both **quarterly analysis reports** and **direct interaction with our analysts**.



A selection of key players from a market or IP perspective



All packaging-related patents



All packaging-related patents are included in the Excel database

The Excel file includes new patent applications, new granted patents, patents expired/abandoned, patent transfers (re-assignment, licensing), and patent litigation/opposition.

This useful Excel file with hyperlinks to updated online database allows for multi-criteria searches, including patent number and publication date, patent assignees, patent's legal status, and specific segments.

Patent activity related to Fan-Out WLP and 2.5D/3D packaging are specifically analyzed in the quarterly report

The patents are categorized by packaging technologies:

- Fan-Out packaging (incl. FO 2.5D/3D and FO PoP)
 - FO wafer level
 - FO panel level
- 2.5D/3D packaging
 - Silicon interposers and embedded bridges
 - Hybrid Bonding (i.e., bumpless direct Cu/SiO2 bonding)
 - 3D-stacked memory (excl. multiple single memory cells fabricated on a same wafer)

The quarterly PDF reports provide the IP trends over the last three months, with a close look at patented technologies of key companies.

Direct access to IP analysts offers you on-demand Q&A sessions and discussions regarding the quarterly report results, trends, specific patented technologies, or companies' patent portfolios in the field of semiconductor packaging

BENEFITS OF THE PATENT MONITORING SERVICE

Keep a watch on your competitors' IP activities and their future intentions.

With the help of the patent monitoring service, you will be aware of your competitors' current patenting activities, their IP dynamics, patent transfers including acquisitions and licenses, patent litigation, technology development and R&D strategies. You will also be able to early detect new entrants in your business area.

Keep track of the latest technology developments and be ahead of technology trends.

By keeping note of any recent patent filings, you can track the newest innovations in the field. You will get details on claimed inventions and you can follow technology developments. New technical solutions could inspire and improve your R&D activity.

Prevent registration of IP rights that may be harmful to your business.

You will obtain information on patent applications filed even before exclusive rights have been granted and you can react in time to prevent registration of IP rights that may be harmful to your business.

React in time to infringements and mitigate legal risks.

Monitoring newly-issued patents allows you to regularly assess your freedom-to-operate, ensuring your products or processes are not covered by patents, and thus that they can be manufactured, sold or used safely without infringing valid IP rights owned by others.

Take advantage of free technologies and decrease R&D project risks.

By tracking both expired patents and abandoned patents, you will be able to identify inventions entering the public domain that you can use safely for your development.

Understand the current IP trends and IP strategy of competitors

On a quarterly basis, the report will provide the IP trends over the three last months, with a close look to key IP players and key patented technologies. Main patent applicants and their inventions, blocking patents, promising patents and key patents newly expired or abandoned will be highlighted.

Access to the IP analyst

Take advantage of direct interaction with our analysts by phone call and/or email and get specific input for specific patented technologies and company IP portfolios through Q&A session and open discussion (100h per year).

Quarterly database IP activity of the quarter

Patent information
(Assignees, numbers, dates, title, abstract, claims, legal status, hyperlink to updated online database)

Patent segmentation

- Identify easily and efficiently
 - New patents applications
 - Patents newly granted
 - Patents expired or abandoned
 - Transfer of IP rights
 - Patent litigation

Quarterly report

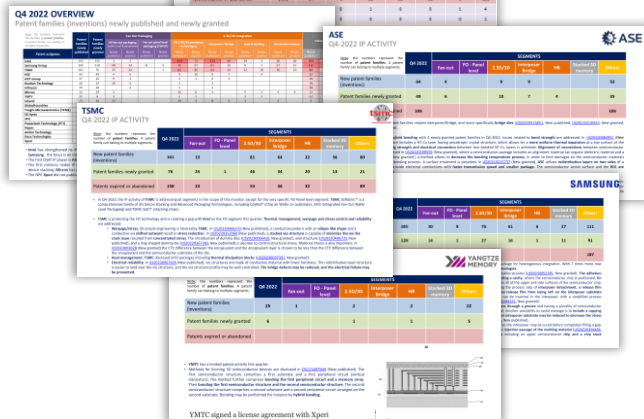
Key fact & figures of the quarter



The patents are **manually categorized in technical segments** using keyword analysis of patent title, abstract and claims, in conjunction with expert review of the subject-matter of inventions.

Access to IP analyst

Q&A session and open discussion



Q&A sessions and discussions with our IP analysts regarding quarterly report results, trends, analyses, specific patented technologies, or companies' IP portfolios in the field of the Patent Monitor.

ORDER FORM

Advanced Packaging

Patent Monitoring Service

Annual subscription: quarterly Excel file, quarterly report and access to analyst for one year

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:

PRODUCT ORDER

€30,000 Quarterly Excel file, quarterly report and access to analyst for one year.

For price in dollars, please use the day's exchange rate.
For French customer, add 20% for VAT.

The PDF report and the Excel file are electronically delivered every quarter (4 Excel files, 4 PDF reports).

I hereby accept Knowmade's Terms and Conditions of Sale

SIGNATURE:

PAYMENT METHODS

Check

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

KnowMade S.A.R.L.
2405 route des Dolines
06560 Valbonne Sophia Antipolis
FRANCE

Money Transfer

To pay your invoice by bank money wire transfer, please contact your bank to complete the process. Here is the information required for submitting payment:

Payee: KnowMade S.A.R.L.
Bank: Banque Populaire Méditerranée, CAP 3000 Quartier du lac, 06700 St Laurent du Var
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. You can then send money to KnowMade S.A.R.L. by entering our email address (contact@knowmade.fr) as the recipient, and inputting the invoice amount.

RETURN ORDER BY

E-mail: contact@knowmade.fr

Mail: Knowmade, 2405 route des Dolines, Le Drakkar D108, 06560 Valbonne Sophia Antipolis, FRANCE

ABOUT KNOWMADE

Knowmade is a technology intelligence and IP strategy consulting company specialized in analyzing patents and scientific publications. The company helps innovative companies, investors, and R&D organizations to understand competitive landscape, follow technological evolutions, reduce uncertainties, and identify opportunities and risks in terms of technology and intellectual property.

Knowmade's analysts combine their strong technology expertise and in-depth knowledge of patents with powerful analytics tools and methodologies to turn patent information and scientific literature into actionable insights, providing high added value reports for decision makers working in R&D, innovation strategy, intellectual property, and marketing. Our experts provide prior art search, patent landscape analysis, freedom-to-operate analysis, IP due diligence, and monitoring services.

Knowmade has a solid expertise in Compound Semiconductors, Power Electronics, Batteries, RF Technologies & Wireless Communications, Solid-State Lighting & Display, Photonics, Memories, MEMS & Sensors, Semiconductor Packaging, Medical Devices, Medical Imaging, Microfluidics, Biotechnology, Pharmaceuticals, and Agri-Food.

TERMS AND CONDITIONS OF SALES

Definitions

“Acceptance”: Action by which the Buyer accepts the terms and conditions of sale in their entirety. It is done by signing the purchase order which mentions “I hereby accept Knowmade’s Terms and Conditions of Sale”.

“Buyer”: Any business user (i.e. any person acting in the course of its business activities, for its business needs) entering into the following general conditions to the exclusion of consumers acting in their personal interests.

“Contracting Parties” or “Parties”: The Seller on the one hand and the Buyer on the other hand.

“Intellectual Property Rights” (“IPR”) means any rights held by the Seller in its Products, including any patents, trademarks, registered models, designs, copyrights, inventions, commercial secrets and know-how, technical information, company or trading names and any other intellectual property rights or similar in any part of the world, notwithstanding the fact that they have been registered or not and including any pending registration of one of the above mentioned rights.

“License”: For the reports and databases, 2 different licenses are proposed. The buyer has to choose one license:

1. Single user license: a single individual at the company can use the report.
2. Corporate license: the report can be used by unlimited users within the company. Subsidiaries are not included.

“Products”: Reports are established in PowerPoint and delivered on a PDF format and the database may include Excel files.

“Seller”: Based in Sophia Antipolis (France headquarters), Knowmade is a technology intelligence company specialized in the research and analysis of scientific and technical information. We provide patent landscapes and scientific state of the art with high added value to businesses and research laboratories. Our intelligence digests play a key role to define your innovation and development strategy.

1. Scope

1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Buyer and the Seller. Any additional, different, or conflicting terms and conditions in any other documents issued by the buyer at any time are hereby objected to by the seller, shall be wholly inapplicable to any sale made hereunder and shall not be binding in any way on the seller.

1.2 This agreement becomes valid and enforceable between the Contracting Parties after clear and non-equivocal consent by any duly authorized person representing the Buyer. For these purposes, the Buyer accepts these conditions of sales when signing the purchase order which mentions “I hereby accept Knowmade’s Terms and Conditions of Sale”. This results in acceptance by the Buyer.

1.3 Orders are deemed to be accepted only upon written acceptance and confirmation by the Seller, within [7 days] from the date of order, to be sent either by email or to the Buyer’s address. In the absence of any confirmation in writing, orders shall be deemed to have been accepted.

2. Mailing of the Products

2.1 Products are sent by email to the Buyer:

- within [1] month from the order for Products already released; or

- 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 sent in writing to the Seller within 8 days of receipt of the Products. For this purpose, the Buyer agrees to produce sufficient evidence of such defects.

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.

3. Price, invoicing and payment

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

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.

6. Protection of the Seller's IPR

6.1 All the IPR 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.