From Technologies to IP Business Intelligence

# RF GaN Patent Landscape Analysis

0100101

November 2020



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American IP players	61
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#### For each country/area:

- Leading patent assignees
- Time evolution of patent publications from main assignees
- Geographic coverage of main assignees' IP portfolios
- Technology coverage of main assignees' IP portfolios

Focus on RF GaN IP portfolio owned by Cree, Intel, MACOM, Qorvo, NXP USA, Raytheon, Analog Devices, Qualcomm, Akoustis, BAE Systems, Thales, Ericsson, Ampleon, Sumitomo Electric, Fujitsu, Mitsubishi Electric, Toshiba, Air Water, CETC, Xidian University, HiWafer, Dynax, Hanhua, Nexgo, Boxin, Reactor Microelectronics, TUS-Semiconductor, JEC Electronics, Hatchip, Bosemi, China Mobile, Gaxtrem, HC Semitek, Jena Microelectronics, Jimaike Microelectronic, Yukai Electronic, Original Digital, Comba Telecom, Win Semiconductors, GlobalWafers, TSMC, ETRI, Samsung Electronics, RFHIC, Waveice, Wavepia, U-Tel.

#### SEGMENTATION

- Overview of patent families by segment
- Time evolution of patent publications for main segments
- Technology coverage of main assignees' IP portfolios
- Main patent applicants by value chain segment
- Main patent applicants by RF function and frequency band
- Matrix Technology vs RF device/Function/Frequency band
- Matrix Main issues vs Main segments

#### Technology GaN-on-X

- GaN-on-SiC
- GaN-on-Silicon
- GaN-on-Sapphire
- GaN-on-Diamond
- GaN-on-GaN

For each technology: leading patent applicants, main topics, and noteworthy recent patents.

#### RF devices

- Field effect transistors (FET, HEMT, HFET, Normally-off, etc.)
- Heterojunction bipolar transistors (HBT)
- RF diodes (Schottky, varactor, RTD, IMPATT, etc.)
- RF acoustic wave devices (SAW, TC-SAW, FBAR, BAW-SMR)

For each RF device: leading patent applicants, main topics, and noteworthy recent patents.

#### MMIC

- Leading patent applicants
- Noteworthy patents owned by Cree, Toshiba, Raytheon, Win Semiconductors, Qorvo, Northrop Grumman, BAE Systems, Tiger Mircrowave.

#### Circuit & Operating methods

- Leading patent applicants and time evolution of patent publications related to bias, protection, matching, and linearity.
- Noteworthy recent patents

#### Function

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- RF amplifier (PA, LNA, Doherty PA, switch-mode PA)
- RF switch
- RF filter

For each function: leading patent applicants, time evolution of patent publications, and noteworthy recent patents.

#### Frequency bands

- Leading patent applicants and time evolution of patent publications for Radio waves, Microwaves, mm-Waves and THz
- Patent applicants targeting 5G networks
- Noteworthy patents targeting 5G networks

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## **SCOPE OF THE REPORT**

### • This report provides a detailed picture of the patent landscape related to GaN-based RF electronics, covering the whole value chain:

- Substrates and Epitaxial structures, RF transistors (HEMT, HBT), RF diodes (varactor, RTD, IMPATT, etc.), RF acoustic wave devices (SAW, TC-SAW, FBAR, BAW-SMR), Integrated circuits (MMIC, RFIC, etc.), Circuitry & Operating methods (biasing, matching, protection, distortion compensation, etc.), Packaging, Modules & Systems (RF FE, PA assemblies, T/R, infrastructures, etc.).
- ✓ GaN-on-SiC, GaN-on-Silicon (incl. GaN-on-SOI), GaN-on-Sapphire, GaN-on-Diamond, GaN-on-GaN (incl. free-standing substrates).
- ✓ Power amplifiers (PA/LNA, Doherty, Switch-mode PA, etc.), RF switch, RF filters.
- ✓ Radio waves, Microwaves, mm-Waves, THz.
- We have selected and analyzed more than 6,300 patents and patent applications published worldwide up to August 2020, representing more than 3,000 patent families (inventions) relevant to the scope of this report.

### Included

- Patents describing GaN-based RF devices (HEMT, HBT, diodes, SAW, BAW, RFIC, MMIC, etc.) explicitly suitable for using in wireless communication, digital broadcasting, mobile communication base station, satellite ground station, aerospace, radar, electronic warfare equipment, military and space communication, etc.
- Patents pertained to GaN-based power amplifier (PA, LNA, Doherty PA, switch-mode PA, etc.), RF switch and RF filter (SAW, BAW, FBAR, etc.).
- Patents related to modules and systems which explicitly use GaN-based RF power devices (RF FE modules, PA assemblies, T/R, network infrastructures, etc.).
- Patents claiming GaN-based epitaxial structures with improved high-frequency characteristics and explicitly suitable for using in high power/high frequency applications (RF, microwaves, mm-waves).
- Patent claiming substrates or templates explicitly targeting GaN-based RF applications.

### Excluded

- Patents describing RF devices, modules or systems which can use WBG materials (SiC, GaN, etc.) without any embodiment or preferred solution on GaN.
- Patents related to GaN-based high-voltage electronics and power devices which have application value in electric power conversion and electric power control (power converter, power rectifier, power supply, etc.).
- Patents related to GaN-based optoelectronics and photonics (lightwaves), audio amplifiers, wireless charging technologies; etc.



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## **KEY FEATURES OF THE REPORT**

> The report provides essential patent data for GaN for RF electronics, from epitaxial structures to RF semiconductor devices, circuit package, modules and systems.

### > It provides in-depth patent analyses of key technologies and key players including:

- Main IP dynamics and key trends.
- IP leaders, most active players and newcomers.
- IP portfolio strength of key players, and their technology/application focus.
- Time evolution of patents filings by company, countries, and technology.
- Current legal status of patents.
- Joint developments, IP collaborations and IP transfers between key organizations.
- Insights into the status of RF GaN technologies, identifying trends for each technology/application.
- Key patents.
- This report also includes an extensive Excel database with the over 3,000 patent families analyzed in this study. This useful patent database allows for multi-criteria searches and includes patent publication numbers, hyperlinks to the original documents, priority date, title, abstract, patent assignees, patent's current legal status, and technological and application segments (epitaxial structure, RF transistors, RF diodes, RF acoustic wave devices, MMIC, GaN-on-SiC, GaN-on-Si, GaN-on-Diamond, PA, RF switch, RF filter, Microwaves, mm-waves, 5G, etc.).

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### KnowMade

### WHY STUDY THE PATENT LANDSCAPE



### Understanding the **competitive landscape** and **technology developments** from a **patent perspective**

- To provide overall dynamics of the field.
- To know the key IP players, their key patents, their IP/technology strategy and their future intents.
- To identify new players or companies that are under the radar.
- To follow the technology trends and identify emerging technologies.
- To **benchmark** patent portfolios and know competitors' **strengths** and **weaknesses**.
- To identify **strategic and technological paths** that players are following for technologies.
- To identify the **key patents** (seminal, blocking, valuable) and new solutions/technologies.
- To identify **free technologies** which can be used safely and mitigate the **risks of patent infringement**.
- To identify technologies to acquire and potential R&D partners



Very complementary to market research

Give an other point of view of the competitors, technologies and markets







## **IP Position of Key Players**

Strength of patent portfolios, Key IP players, Blocking potential, IP strategy, IP collaborations





Sections dedicated to American, European, Japanese, Chinese, Honk Kongese, Taiwanese, and Korean IP players



Focus on RF GaN IP portfolio owned by Cree, Intel, MACOM, Qorvo, NXP USA, Raytheon, Analog Devices, Qualcomm, Akoustis, BAE Systems, Thales, Ericsson, Ampleon, Sumitomo Electric, Fujitsu, Mitsubishi Electric, Toshiba, Air Water, CETC, Xidian University, HiWafer, Dynax, Hanhua, Nexgo, Boxin, Reactor Microelectronics, TUS-Semiconductor, JEC Electronics, Hatchip, Bosemi, China Mobile, Gaxtrem, HC Semitek, Jena Microelectronics, Jimaike Microelectronic, Yukai Electronic, Original Digital, Comba Telecom, Win Semiconductors, GlobalWafers, TSMC, ETRI, Samsung Electronics, RFHIC, Waveice, Wavepia, U-Tel.



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## **Segmentation**

### IP dynamics, Main patent assignees, Most active IP players, Main technical issues, Main trends

### Patents categorized in more than 25 segments:

- > Substrates and Epitaxial structures
- > RF transistors
  - HEMT
  - Normally-off
  - HBT
- **RF diodes** (varactor. RTD. IMPATT. etc.)
- > **RF acoustic wave devices** (SAW, TC-SAW, FBAR, BAW-SMR)
  - RF acoustic wave devices integrated with other technologies
- > Integrated circuits (MMIC. RFIC. etc.)
  - MMIC
- & Operating methods > Circuitry (biasing. matching, protection, distortion compensation. etc.)
- Packaging
- > Modules & Systems (RF FE, PA assemblies, T/R, infrastructures, etc.).
- ➢ GaN-on-SiC
- GaN-on-Silicon (incl. GaN-on-SOI)
- ➢ GaN-on-Sapphire
- > GaN-on-Diamond
- > GaN-on-GaN (incl. free-standing substrates).
- > Power amplifiers (PA/LNA, Doherty, Switchmode PA, etc.)
- > RF switch
- > RF filters
- Radio waves
- Microwaves
- > mm-Waves
- > TH<sub>7</sub>
- > 5G applications





### **Segmentation**

### For each segment: Key IP players, Main topics, Noteworthy recent patents





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### **Excel file with all patents analyzed in the report** Useful patent database allows multi-criteria searches

This report also includes an extensive Excel database with the over 3,000 patent families analyzed in this study. This useful patent database allows for multi-criteria searches and includes patent publication numbers, hyperlinks to the original documents, priority date, title, abstract, patent assignees, patent's current legal status, and technological and application segments (epitaxial structures, RF transistors, RF diodes, RF acoustic wave devices, MMIC, GaN-on-SiC, GaN-on-Si, GaN-on-Diamond, PA, RF switch, RF filter, Microwaves, mm-waves, 5G, etc.).

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(rans number menerum patontfamily)	Publication aumherr	Publication stage descriptions	Publication Satur (1111-101-00)	Original decoment (InktaPOF)	Application availar	Application Salar (1111-101-00)	Poincity analyses	Primrity dotor (1111-101-00)	Espected exploy datas (1111-111-00)	Legal ections	Logalstatur (Pending, Granted, Revolved, Espired, Lopred)	Grant data (1717-49-00)	Current wrigerer	lassatasr	English title	English abstract	Explick chainer	Cited patents - Standerfined publication	Citing patenty - Standerfined publication number	0ysical		01	Dector Observed	B	Accountin	Dector Reckenical	Electrical	€HT276. 2
81733974	CN207992166U	(U)Registered	2018-10-19	Oseo	CN201820470052	2018-03-30	CN201820470052	2018-03-30	2028-03-30	(CN207992166U) LEGAL DETAILS	GRANTED	2018-10-19	MICRIOJET	MO HAORAN HAN YONGLONG	(CN207992166U) Actuation of the	An actuator concormodule	(CN207992166U)							1		1		
\$1696900	CN103630703	(A) Published	2018-10-19	Quen	CN201810313555	2018-04-10	CN201810313555	2018-04-10	2038-04-10	(CN108680703)	PENDING		HANGZHOU DIANZI	DONGLINI	(CN108680703)	The prozent	(CN108680703)											
81658243	CN207964706U	(U)Registered	2018-10-12	Quen	CN201820378045	2010-03-20	CN201820378045	2010-03-20	2028-03-20	(CN207964706U)	GRANTED	2018-10-12	SUZHOU DAYS OF	MAHEPING	(CN207964706U)	The present utility	y (CN207964706U)			1			1					
81656295	CN207957757U	(U)Registered	2018-10-12	Quen	CN201820362729	2010-03-16	CN201820362729	2010-03-16	2020-03-16	(CN207957757U)	GRANTED	2010-10-12	SUZHOU TANTALUM	SHENFANGPING	(CN207957757U)	The present utility	(CH207957757U)	1										
\$1601996	TWM568366	(U)Registered	2018-10-11	Quen	TW2018107205868	2018-05-04	TW2018107205868	2018-05-04	2028-05-04	(TWM568366)	PENDING		MICRIOJET TECHNOLOGY	MOHAORAN	(TWM568366)	Gar-phare	(TWM568366)			1		1						
\$1601975	TWM568360	(U)Registered	2018-10-11	Quen	TW2018107206570	2018-05-18	TW2018107206570	2018-05-18	2028-05-18	(TWM568360)	PENDING		MICRIOJET	MO HAORAN CHEN SHICHANG	(TWM568360) Gardetecting	A que dotoction	(TWM568360)							1		1		
\$1601973	TWM568367	(U) Registered	2018-10-11	Ques	TW2018107205867	2018-05-04	TW2018107205867	2018-05-04	2028-05-04	(TWM568367)	PENDING		MICRIOJET	MOHAORAN	(TWM568367) Separating	Asoparation	(TWM568367)			1		1						
\$1601961	TWM568368	(U) Registered	2018-10-11	Onen	TW2018107209940	2018-07-20	TW2018107209940	2010-07-20	2028-07-20	(TWM568368) LEGAL DETAIL	PENDING		MICRIOJET	HUANG CHI-	(TWM568368) Operation device	An action device	(TWM568368)							1		1		
\$1601548	TW/637901	(B) Granted	2018-10-11	Onen	Pat	en	Town I al	nto	rm	ati	on	2018-10-11	TAIWAN CARBON	LIAO TURUAN CALFANGSONG	(TWI637901) Method of	A mothed for manufacturing	(TW1637901) 1. A methed for				5	Δσ	na	nte				
81574882	CN108627544	(A) Published	2018-10-09	Onen	CHEOTHOROSTE				2037-03-23	LEGAL DETAILS			ZHANGJIAGANG KANGDE XIN	LISN <sub>VE</sub>	(CN108627544) Flexible as certain	The present application	(CN108627544)					621	112	1169			1	
81574876	CN108627543	(A) Published	2012-10-09		CN20171-180271	2017-02-2	CN214710110274	2017/3-23		(CN108627543)	ublic		ZHANGJIAGANG	LI Shve	(CN108627543) Flexible gar correct	The present application	(CN100627543)	Cul	at vata	. О Г.	thur f		- noist	o vo /11	скат і	ирт\	Didda	
81568124	US20100292338	(AI) Applice	atesa	ing n	eamu	rsor	priori	гу/ар	plicat	.ion/p	ublic	ation	gran	HARTWELL PETER	(US20100292338)	The present invention relates	(US20180242338)	Sub	strate	SQE	oiwai	ers, m	ansist	ors (FI	EIVII, I	чвт),	Diode	S
\$1568124	W02018191009	(A1) Published application with	2010-10-10	Queo	W0US2018024565	- Tit	le, abs	stract	. clair	(WO2018191009)	PENDING		INVENSENSE ([US])	LIUFANG ((US))	(W02018191009) Garrenring	The present invention relates	(W02018191009) CLAIMS What is	US201 JP632( RP	D. Gu	nn. IN	1PATT	etc.).	Acou	stic w	ave de	vices	(SAW	
01566405	EP3315210	(A1) Application published with	2018-10-10	Ones	EP17164591	2017-04-03	EP17164591	2017-04-03	2037-04-03	(EP3385218) LEGAL DETAILS	PENDING		AMS ([AT])	FAES ALESSANDRO	(EP3385218) Semiconductor	Asomicanductar dovico (10)	(EP3385218) 1. Somicanductor	DE1020.0116353 US20160370242	-,				-					
\$1565916	DE102017205988	(A1) Doc. laid oper (First publication)	2018-10-11	Pater	nt app	lican	ts, cui	rrent	assig	nees, i	inven	tors	SIEMENS ([DE])	FLEISCHER MAXIMILIAN	(DE102017205988 )	The invention relates to a mobili	(DE102017205981	FBAH	<i>,</i> BAV	V-SIVII	<i>,</i> etc.	), Inte	grated	l Circu	iits, M	IMIC,	Circui	ts
\$1565916	W02010105157	(A1) Published	rrent	احتوما	statu	s of n	atent	e l'ara	nted	nond	ing e	vnira	d etc	FLEISCHER AXIMULIAN	(WO2018185157) Mubile device	The invention relates to a mobili	(W02018185157) • Claimy	US20150182146;U \$994	Oners	ting n	aetho	de Da	ckagir		odulos	8. SV	stame	
\$1565915	DE102017205982	(A1) Dec. (First publication)	irent	legal	Statu	s or p	atem	s (Bra	inteu,	penu	ing, e	spile	u, eic	(LOE)	(DE102017205982 )	The invention relater to a gar	(DE102017205903 )		opere	iting i	ietiio	us, ra	cnagii	ig, ivit	Juules	a Jy	stenns	
\$1565915	W02018185148	(A1) Published opplication with	2018-10-11	Quen	W0EP2018058583	2018-04-04	DE102017205982	2017-04-07	2020-10-07	(W02018185148) LEGAL DETAILS	PENDING		SIEMENS ([DE])	HEDLER HARRY ([DE])	(WO2018185148) Garzenzarhaving	The invention relates to a gas	(W02018185148) Claima	US20090243003; US201448				Cilico			Sound			
\$1565914	DE102017205987	(A1)Doc.laidapor (First publication)	2018-10-11	Qaan	DE102017205987	2017-04-07	DE102017205987	2017-04-07	2037-04-07	(DE102017205987 )	PENDING		SIEMENS ([DE])	HEDLER HARRY ([DE])	(DE102017205987 )	The invention relates to a mobili	(DE102017205903 )	Gar	v-on-3	SIC, Ga	an-on	-511100	n, Gal	v-on-s	Sappn	ire, G	ain-on	P
\$1565914	W02018185155	(A1) Published application with	2018-10-11	Quan	W0EP2018058592	2018-04-04	DE102017205987	2017-04-07	2020-10-07	(W02018185155) LEGAL DETAILS	PENDING		SIEMENS ([DE])	HEDLER HARRY ([DE])	(W02018185155) Mabile device	The invention relates to a mobili	(W02018185155) o Claimar	US20160202224;U S9664660				Dia	mond					
\$1565912	DE102017205985	(A1)Doc.laidapor (First publication)	2018-10-11	Quen	DE102017205985	2017-04-07	DE102017205985	2017-04-07	2037-04-07	(DE102017205905 )	PENDING		SIEMENS ([DE])	HEDLER HARRY ([DE])	(DE102017205985 )	Azubztrate structure (10) for	(DE102017205503			1								
\$1565912	W02018185159	(A1) Published application with	2018-10-11	Quen	W0EP2018058601	2018-04-04	DE102017205985	2017-04-07	2020-10-07	(W02018185159) LEGAL DETAILS	PENDING		SIEMENS ([DE])	HEDLER HARRY ([DE])	(WO2018185159) Substrate	Azubetrate etructure (10) fai	(W02018185159) Claimar	W0201424347 KR20090004279;		1	οΛ /Ι ΝΙ		witch		iltor			
\$1565805	DE102017205031	(A1) Doc. laid open (First publication)	2018-10-11	<u>Onen</u>	DE102017205831	2017-04-05	DE102017205031	2017-04-05	2037-04-05	(DE102017205831)	PENDING		ROBERTBOSCH ([DE])	CHRISTIAN	(DE102017205831)	) The invention provider a	(DE102017205131			1	AYLIN	A, NP	SVUILLI	, KF 1	incel			
\$1531715	TWM567862	(U) Registered utility model or	2018-10-01	Quen	TW2018107208152 U	2018-06-15	TW2018107208152 U	2010-06-15	2028-06-15	(TWM567862) LEGAL DETAILS	PENDING		MICRIOJET TECHNOLOGY	MO HAORAN HUANG, CHI-	(TWM567862) Gar detection	One kind of gar detection	(TWM567862) 1. Kindr of ear		CN103082524	-1:		N 41		1				
\$1520554	W02018180792	(A1) Published	2018-10-04	Onen	1/0JP2010011088	2018-03-20	JP2017063606	2017-03-28	2020-09-28	(W02018180792)	PENDING		FUJIFILM	Takahira Sana	(W02018180792)	The present	(W02018180792)		ка	alo wa	aves,	iviicro	waves	, mm-	-wave	S, I HZ	1	



## **ORDER FORM RF GaN**

### Patent Landscape Analysis – November 2020

Ref.:KM20008

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#### 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 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 4.6 In the case where, after inspection, it is acknowledged that the Products contain defects, the Seller by the other Party. cases where a new event or access to new contradictory information would require for the analyst extra undertakes to replace the defective products as far as the supplies allow and without indemnities or The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have 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 4.7 The deadlines that the Seller is asked to state for the mailing of the Products are given for information 9. GOVERNING LAW AND JURISDICTION Product's electronic delivery format is defective, the Seller undertakes to replace it at no charge to the only and are not guaranteed. If such deadlines are not met, it shall not lead to any damages or cancellation 9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract (orders) entered into 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 first down payment to the exclusion of any further damages. Products and their conformity to the order. Any claim for apparent defects or for non-conformity shall be 4.8 The Seller does not make any warranties, express or implied, including, without limitation, those of and Conditions. sent in writing to the Seller within 8 days of receipt of the Products. For this purpose, the Buyer agrees to saleability and fitness for a particular purpose, with respect to the Products. Although the Seller shall take

#### produce sufficient evidence of such defects

done by signing the purchase order which mentions "I hereby accept Knowmade's Terms and Conditions of delivery. Any Product returned to the Seller without providing prior information to the Seller as required guarantee that any Product will be free from infection. under article 2.5 shall remain at the Buyer's risk

"Intellectual Property Rights" ("IPR") means any rights held by the Seller in its Products, including any time to time. The effective price is deemed to be the one applicable at the time of the order

BIC or SWIFT code: CCBPERPPMAR

case the need of down payments will be mentioned on the order

particular written agreement. If the Buyer fails to pay within this time and fails to contact the Seller, the - Information storage and retrieval systems: latter shall be entitled to invoice interest in arrears based on the annual rate Refi of the «RCF» + 7 points in accordance with article L 441-6 of the French Commercial Code. Our publications (report, database, tool...) - use in any timesharing, service bureau, bulletin board or similar arrangement or public display: are delivered only after reception of the payment.

#### 4. LIABILITIES

4.1 The Buyer or any other individual or legal person acting on its behalf, being a business user buying the consequences in their entirety. 1.1 The Contracting Parties undertake to observe the following general conditions when agreed by the Products for its business activities, shall be solely responsible for choosing the Products and for the use and 6.4 The Buyer shall define within its company point of contact for the needs of the contract. This person will

4.2 The Seller shall only be liable for (i) direct and (ii) foreseeable pecuniary loss, caused by the Products or

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 may be borne by the Seller, following this decision. on the website. or in the Products:

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.

the liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product Buyer. initially ordered.

guaranteed for a maximum of two months starting from the delivery date. Any replacement is excluded for in due time. any event as set out in article 5 below.

information from the Seller. In such case only, the Buyer shall be entitled to ask for a reimbursement of its which shall have exclusive jurisdiction upon such issues.

reasonable steps to screen Products for infection of viruses, worms, Trojan horses or other codes "Acceptance": Action by which the Buver accepts the terms and conditions of sale in their entirety. It is 2.6 No return of Products shall be accepted without prior information to the Seller, even in case of delayed containing contaminating or destructive properties before making the Products available, the Seller cannot

#### 5. FORCE MAIEURE

The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from 3.1 Prices are given in the orders corresponding to each Product sold on a unit basis or corresponding to acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labor annual subscriptions. They are expressed to be inclusive of all taxes. The prices may be reevaluated from 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 convirgence under redistribute resell or publish the Product or any To ensure the payments, the Seller reserves the right to request down payments from the Buyer. In this 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

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

- 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

Buver and the Seller. Any additional, different, or conflicting terms and conditions in any other documents interpretations he makes of the documents it purchases, of the results he obtains, and of the advice and 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 accepts these conditions of sales when signing the purchase order which mentions "I hereby accept a) damages of any kind. including without limitation, incidental or consequential damages (including, but 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

7.2 In the event of breach by one Party under these conditions or the order, the non-breaching Party may b) any claim attributable to errors, omissions or other inaccuracies in the Product or interpretations 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

4.5 All the Products that the Seller sells may, upon prior notice to the Buyer from time to time be modified All the provisions of these Terms and Conditions are for the benefit of the Seller itself, but also for its use its best endeavours to inform the Buyer of an indicative release date and the evolution of the work in by or substituted with similar Products meeting the needs of the Buyer. This modification shall not lead to licensors, employees and agents. Each of them is entitled to assert and enforce those provisions against the

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

compensation of any kind for labor costs, delays, loss caused or any other reason. The replacement is accepted the latest version of these terms and conditions, provided they have been communicated to him

Buver provided that it is informed of the defective formatting within 90 days from the date of the original of the orders. exceeding [4] months from the stated deadline, without in application of these Terms and Conditions shall be settled by the French Commercial Courts of Grasse,

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



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