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Seoul Semiconductor patent auction analysis reveals a mixed bag of assets

Seoul Semiconductor [recently dipped its toes](#) into the sales side of the patent market with an announcement that it will be auctioning off two patent packages – one at the end of this month and the other in January. The divestitures are part of a new strategy which will see the company slimming its portfolio to reinvest resources in developing modern technologies and strengthening its core business areas.

The 5G and LED portfolios are significantly different in terms of quality when measured by market coverage and technology relevance. However, each has its own strengths and anyone from large corporates to smaller players could be getting in on the action.

What's for sale?

Seoul Semiconductor is selling its two packages through the German IP transactions firm GoodIP:

- The first portfolio on the market was acquired when Seoul Semiconductor [purchased](#) Sensor Electronic Technology in 2015 through its affiliate Seoul Viosys. It contains 98 patent assets related to gallium nitride RF semiconductors and is being advertised as a 5G patent portfolio.
- The second holding consists of 177 rights developed in-house by Seoul Semiconductor and includes patents relating to LEDs.

[PatentSight](#) used the [5G](#) and [LED](#) auction listings on GoodIP's website to conduct an analysis of the portfolios, with the results being presented by patent family.

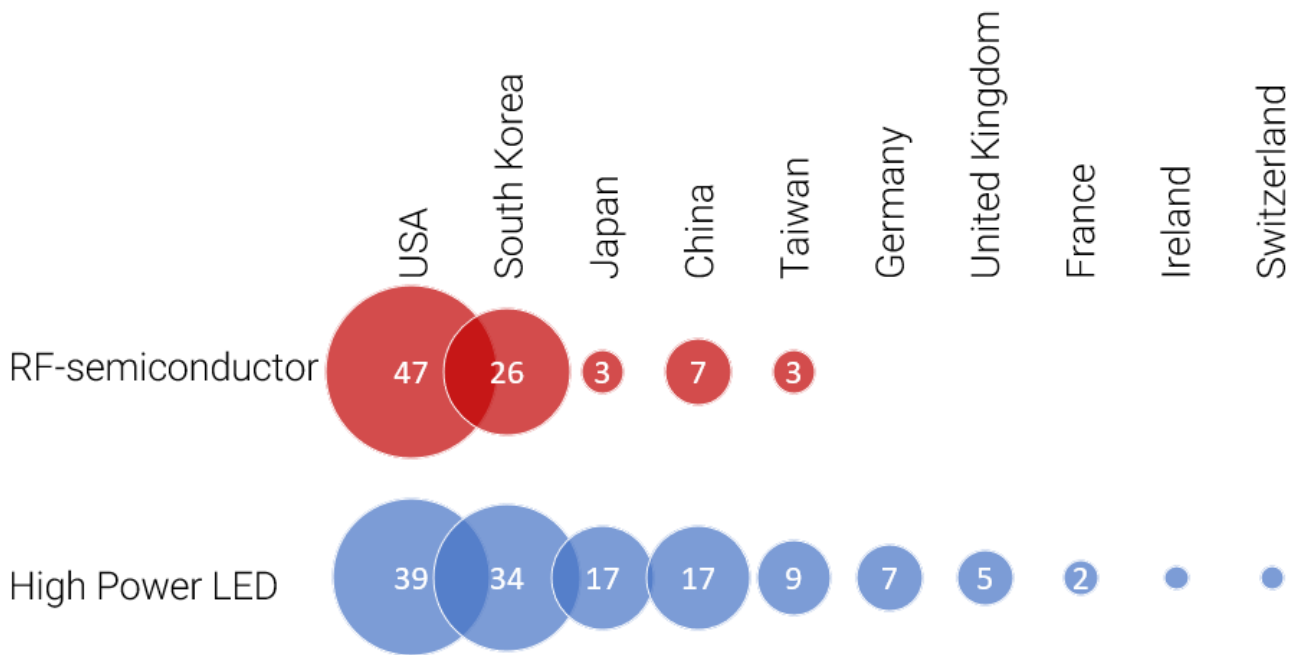
The 5G and LED portfolios are of similar size when defined by simple patent family. However, there seems to be a stark difference in quality (see graph below). "The 'RF-semiconductor' portfolio is of a much lower quality than the 'high power LED' portfolio, with a Competitive Impact of around 1 and 6 respectively," says PatentSight consultant William Mansfield. The Competitive Impact tool considers the technology relevance and market coverage of a portfolio. Its value is stated relative to other patents in the field, where 1 represents the global average.



Portfolio's of Seoul Semiconductors, defined from auction listing
Source: PatentSight Business Intelligence Platform www.patentsight.com

Source: PatentSight

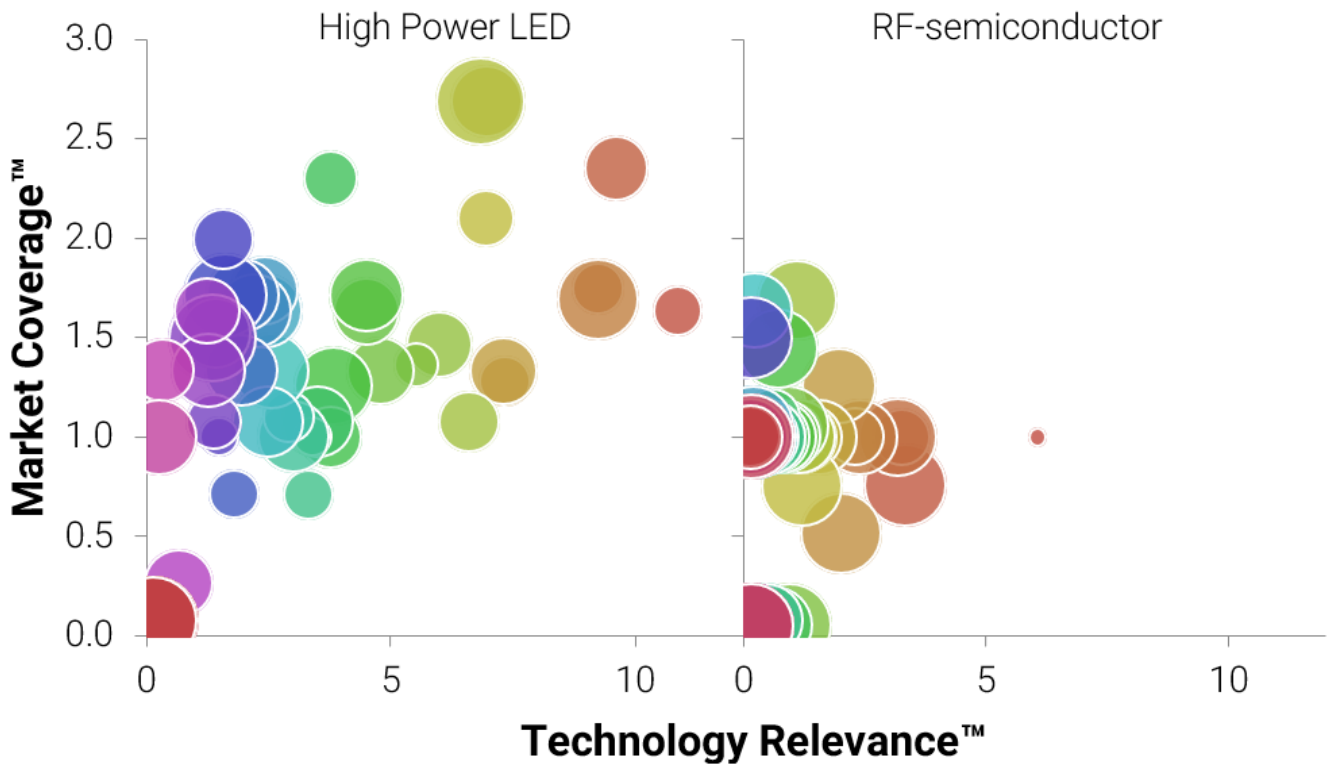
Both portfolios have higher levels of protection in the US and Asia (see graph below). The lack of coverage in Europe may limit the number of companies interested in acquiring the assets.



Portfolio's of Seoul Semiconductors, defined from auction listing, number of patents families protected at each authority. Source: PatentSight Business Intelligence Platform www.patentsight.com

Source: PatentSight

The graph below analyses the two sub-components of the Competitive Impact score, market coverage (scope of protection) and technology relevance (citations-based metric), where each bubble represents an individual patent family. The RF-semiconductor portfolio has relatively low market coverage and technology relevance levels. There is a stand out patent with a technology relevance of around six. However, the bubble size represents the remaining lifetime, meaning that this asset will expire in about a year.



Portfolio's of Seoul Semiconductors, defined from auction listing. Individual patent families along with their Market Coverage, Technology Relevance, and Remaining Lifetime (bubble size). Source: PatentSight Business Intelligence Platform www.patentsight.com

Source: PatentSight

Mansfield conducted a further analysis of citations to get an understanding of which companies may be interested in making a bid (see chart below). Cree Inc has cited both portfolios significantly, but also listed are LG Innotek, Osram and Infineon.

High Power LED		RF-semiconductor	
Citing Owner	Number of Citing Patents	Citing Owner	Number of Citing Patents
LG Innotek	94	Cree Inc	25
Cree Inc	51	Infineon	16
Osram	47	Transphorm	14
Samsung	46	Toshiba	11
Epistar	33	Hong Kong Univ. of Sci. & Tech.	6
Foxconn	33	Intel	6

Portfolio's of Seoul Semiconductors, defined from auction listing. Owners with most active patents citing the whole portfolios. Source: PatentSight Business Intelligence Platform www.patentsight.com

Source: PatentSight

Assessing citations at a portfolio level gives a good overview of the potentially interested parties, but analysis by patent family gives far better insight (see chart below). Lighting Science is an example. "It is a smaller player with a modest patent portfolio that has heavily cited the US8016443 patent family, with more than 50% of all the citations coming from this company. Whilst a single citation does not necessarily indicate patents are directly building on one another, when this level of a citation relationship is observed it becomes much more likely," says Mansfield.

The top patents cited by Cree Inc and Infineon within the RF-semiconductor portfolio have a remaining lifetime of less than a year. This fast approaching expiration date is likely to make these rights less attractive and may mean that Transphorm has more vested interest.

High Power LED

Patent Family	Remaining Lifetime (years)	Total Citations Received	Top Citing Owner	No. of citing active patent families
US8016443.B2	8.4	60	Lighting Science	31 (52%)
US7286296.B2	5.4	204	QuarkStar	17 (8%)
US7737463.B2	5.8	122	Cree Inc	16 (13%)
US7286296.B2	5.4	204	3M	15 (7%)

RF-semiconductor

Patent Family	Remaining Lifetime (years)	Total Citations Received	Top Citing Owner	No. of citing active patent families
US6690042.B2	0.8	97	Cree Inc	21 (22%)
US7655962.B2	7.2	36	Transphorm	14 (39%)
US6690042.B2	0.8	97	Infineon	9 (9%)
US9647103.B2	7.4	27	Transphorm	5 (19%)

Portfolio's of Seoul Semiconductors, defined from auction listing. Selected patents with most citations from single owners, top citing owner, number of active patents of this owner citing the patent, as absolute and percentage of total citations received. Source: PatentSight Business Intelligence Platform www.patentsight.com

Source: PatentSight

Market Position

“When observing the IP landscape of the LED market, Seoul Semiconductor has its highest ranking of Patent Influence in four segments chemistry (particularly gallium), ultraviolet, packaging, and LED (drivers, systems, applications),” says Martin Bijman, the director of intellectual property products at [TechInsights](#). Patent Influence is a weighted measure of portfolio strength that rewards early patents in each segment, as opposed to simply providing patent counts.

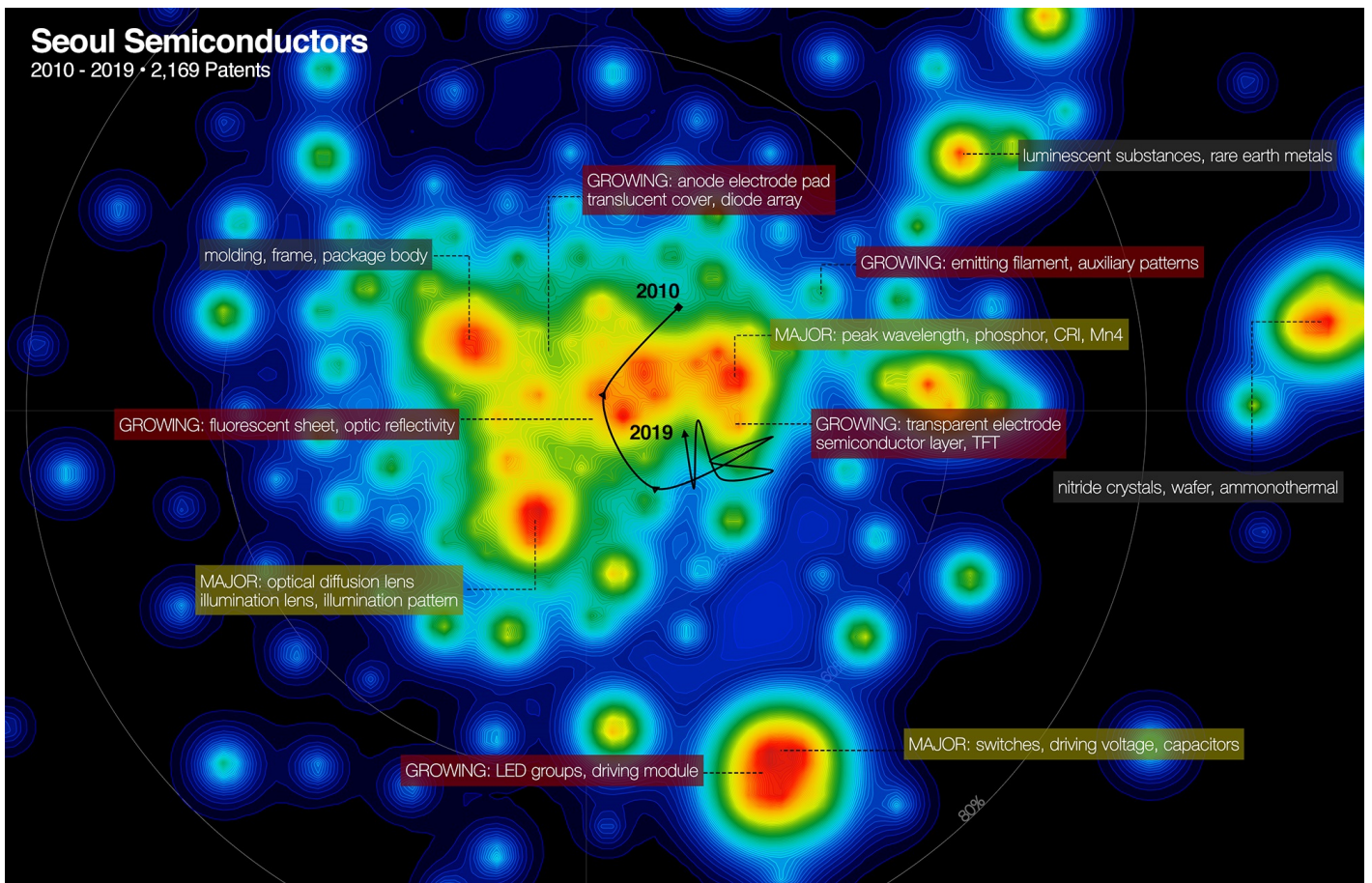
The 55 gallium nitride US assets up for auction are likely to come from the atomic groups, gallium, carbide segment of the table below (shown on line 2), where TechInsights identified 51 assets. “It appears this portfolio would be of interest considering it has some early patents in the segment, and is ranked fourth in Patent Influence after Cree (49%), Toyoda Gosei (14%), and Samsung (12%),” says Bijman. While this is a slightly different interpretation to PatentSight’s, it is worth noting that a different dataset is being used, as well as a different measurement. The data pulled by Bijman shows that Sensor Electronic Technology was an innovator in the space because of the early date of the patents.

Segment	Count of all patents in Segment	Seoul Semiconductor				LED market	
		Patents in Segment	Percentile of earliest patent in Segment	Influence Score weighing early patents higher	Influence Rank in Segment	Top Influence Company in Segment	Patent Influence
epitaxial	572	55	17%	6.0%	6	Epistar	20%
atomic groups, gallium, carbide barrier, well	491	51	7%	7.0%	4	Cree	49%
nitride layer	436	36	3%	7.7%	8	Nichia	19%
cladding, superlattice	380	24	3%	5.5%	8	Cree	18%
semiconductor sequence	200	5	22%	1.4%	10	Samsung	31%
compound, selected, substituted	423	5	23%	0.9%	9	Osram Licht	74%
organic	313	22	6%	5.7%	5	Samsung	59%
phosphor, particle, fluorescent	298	17	10%	5.2%	6	Osram Licht	32%
wavelength conversion	704	40	2%	6.3%	5	Nichia	24%
ultraviolet LED and applications	664	43	1%	6.5%	7	Osram Licht	34%
electrode, conductive	186	111	10%	45%	1	Seoul Semi	45%
pad, bump	2494	61	2%	1.8%	10	Epistar	22%
package, surface, stack	642	22	10%	2.8%	7	Samsung	42%
package, encapsulations	532	19	15%	2.5%	7	Samsung	35%
component, assembly	743	62	6%	11%	4	Samsung	25%
component, radiate	467	14	11%	5.0%	3	Osram Licht	75%
laser	435	12	4%	3.4%	7	Osram Licht	53%
PCB, LED systems	677	31	3%	4.5%	7	Osram Licht	21%
driver circuit	344	28	2%	16%	4	Osram Licht	26%
lens, board, heat	651	62	4%	9.2%	3	Osram Licht	48%
lighting products	1160	90	4%	8.0%	4	Osram Licht	30%
	976	20	2%	3.4%	9	Nichia	30%
	13788						

Source: TechInsights

The purpose of this auction, according to Seoul Semiconductor president and CEO Chung Hoon Lee, is to reduce the size of the company's patent portfolio and reinvest the profits for the development of new technologies. The Korean company is expecting the LED market to be worth \$22 billion by 2022 and it will be a continuous focus for the business, according to its [Q4 2018 earnings release](#). It also predicted that new opportunities will arise within the Red & LED Driver market.

Analysis conducted by [Valuenex](#) shows that 'LED groups, driving module' is indeed a growing area within Seoul Semiconductor's portfolio (see image below). Other areas of increased focus are: fluorescent sheet and optic reflectivity; anode electrode pad translucent cover and diode array; emitting filament and auxiliary patterns; and transparent electrode semiconductor layer and TFT.



Source: Valuenex; see full size image [here](#)

IAM says:

The takeaways from this week’s data are twofold. First is the make-up of the LED market “top influence company in the segment” provided by TechInsights. The list is dominated by Asian companies, with Cree featuring as the only American manufacturer.

Second is the composition of the two portfolios put up for sale by the Korean LED maker. The assets in each package are strikingly different in terms of market coverage and technology relevance, but it is worth noting that this will not determine how fast they sell and for what price. It is not known how these assets will play into a business’s strategy, and it may be that an American company needs certain patents to target rivals in Asian jurisdictions - or vice versa. As ever, the value of patents is subjective and will change depending on the hands they are in.

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