

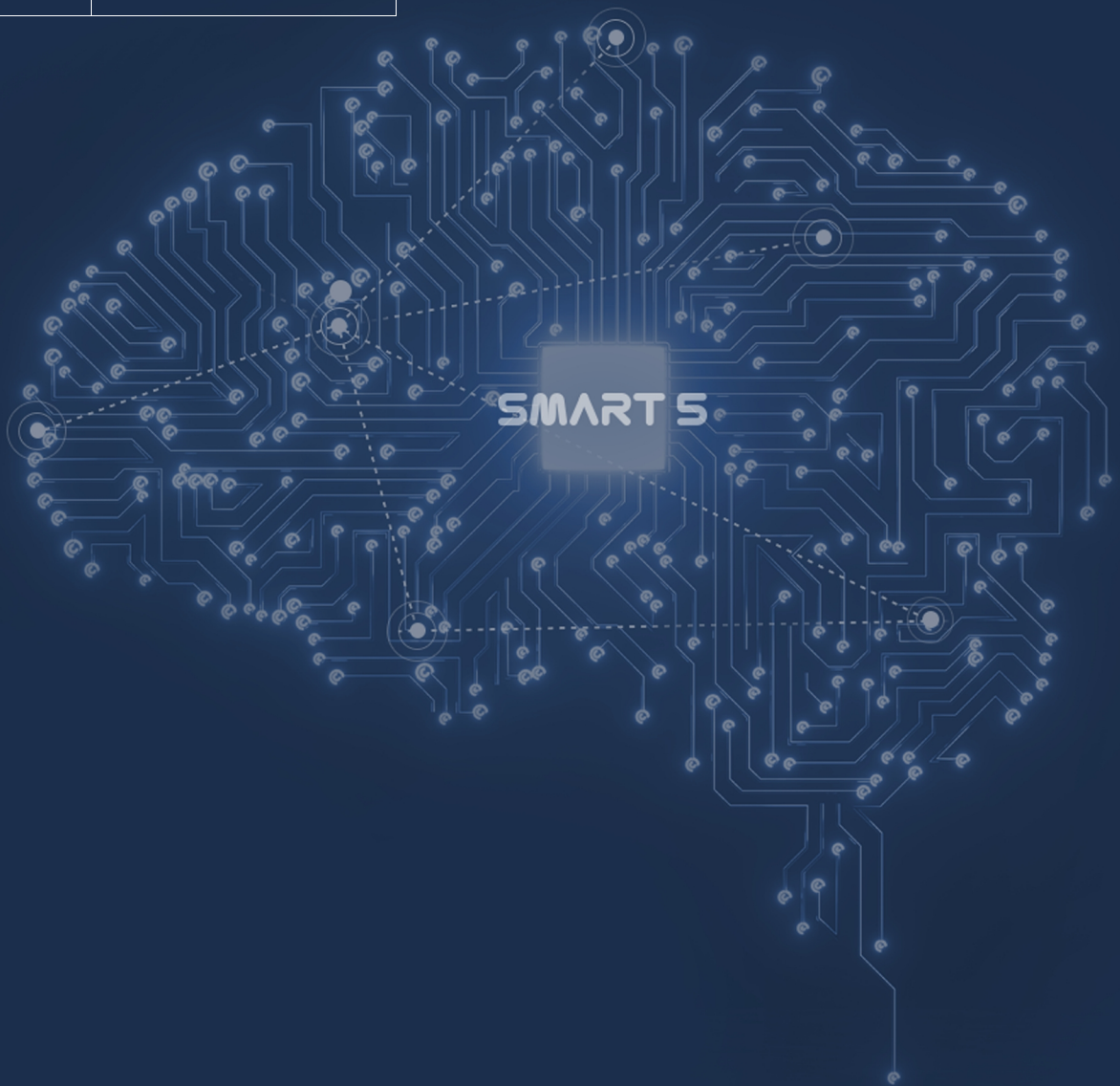
SMART 5

Patent Valuation Report

Patent No. : KR-10-1059525

Title of Invention : APPARATUS FOR STABILIZING VOLTAGE AND ELECTRIC
DISTRIBUTION BOARD BOX USING THE SAME

Valuation Date	2025-10-25
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Introduction to SMART5

- ※ SMART5 objectively evaluates the excellence of patent by patent information extracted from patent specification, bibliographical information, and administration information.
- ※ SMART5 Valuation Grade conducts by professional survey-based structural equating model and multiple regression model concerning the significance of patent information; the result provides as Standard + Nine by WIPO IPC.

Valuation Report Construction

※ SMART5 Valuation Report consists of the following contents.



1 Patent Summary & Valuation Result

Bibliographical information & abstract of valuation subject patent, valuation grade, percentage

2 IP Right Valuation Analysis

IP Right Valuation Index Grade, Valuation Factor Information, Mean Comparison Result with the upper/lower grade

3 Technology Valuation Analysis

Technology Valuation Index Grade, Valuation Factor Information, Mean Comparison Result with the upper/lower grade

4 Usability Valuation Analysis

Usability Valuation Index Grade, Valuation Factor Information, Mean Comparison Result with the upper/lower grade

5 APPENDIX

Percentage ratio per IPC, instructions about valuation models, etc.

- representative claimed invention & drawing, IF/H-index, license information, etc.

[Notice]

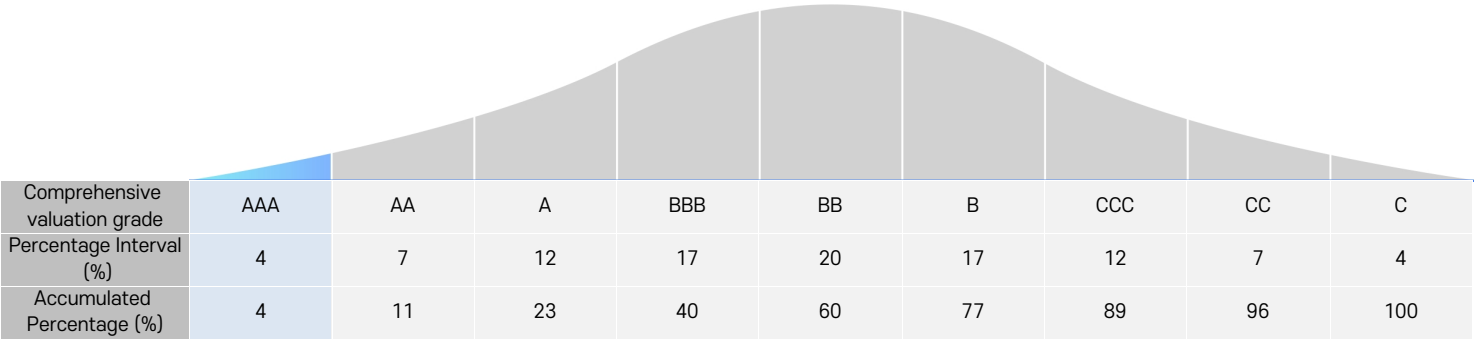
- * The valuation grade of this report calculates by structural equating model and multiple regression model based on valuation factors confirmed through domestic and overseas patent professionals' repetitive verifications based on objective information from the patent office and patent information supply institutes.
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[General Review]

Patent No. 10-1059525, "APPARATUS FOR STABILIZING VOLTAGE AND ELECTRIC DISTRIBUTION BOARD B..." evaluated as AAA grade(upper 3.3% level) by the comprehensive valuation in the "electric/electronic/IT" technology patent .IP Right index might be on the highest level to maintain the exclusive position at patent dispute with the 3rd party in the relevant technical field. The technology Value index might be on a the average level to lead or accord with the tendency to technology in the relevant technical field. Usability index might be in a the highest level of business use degree and possibility.

AAA

[Grade Distribution]



※ For the whole patent in the technology field registered currently, valuation grade grants by the above percentage.

Patent Outline

Patent Application No.	10-1059525 10-2010-0082432
Technology Field	electric/electronic/IT
Title of Invention	APPARATUS FOR STABILIZING VOLTAGE AND ELECTRIC DISTRIBUTION BOARD B...
Assignee Applicant	(주)제라 나영재, 이선은, 장미숙
Application Registration Termination	2010-08-25 2011-08-19 2030-08-25

[Abstract]

본 발명은 스마트 전압 안정화 장치 및 이를 이용한 전기 분배전반에 관한 것으로, 한전 측으로부터 공급되는 교류전압을 멀티탭 트랜스포머와 다접점 스위치 및 소정 제어수단을 통해 안정적으로 조절하여 부하 측으로 공급할 수 있도록 한 스마트 전압 안정화 장치 및 이를 이용한 전기 분배전반을 제공함에 목적이 있다. 이를 위해, 본 발명에 따른 스마트 전압 안정화 장치는, 한전 측으로부터 공급되는 교류전압을 안정적으로 제어하여 분기스위치 측으로 출력시키기 위한 전압 안정화 장치에 있어서, 한전 측으로부터의 전력이 인입되는 주차단기에 연결되며, 입력되는 전압 범위에 따라 권선된 1차측 코일부와, 설정된 기준 전압과 비교한 후 그 차이만큼 승압 또는 감압할 수 있도록 권선된 다수 개의 탭으로 이루어진 2차측 코일부를 포함하는 토로이드형의 멀티탭 트랜스포머와; 상기 멀티탭 트랜스포머의 각 탭이 각각 연결되도록 다수 개의 접점이 구비된 상태에서, 외부 제어신호에 따라 그 중 한 개의 접점이 선택적으로 부스바와 연결되면서 자동으로 조절된 전압을 분기스위치 측으로 공급하도록 이루어진 다접점 스위치 및; 공급되는 전압의 평균 값 및 이에 따라 분석된 변압 값이 설정 저장된 상태에서, 상기 주차단기를 통해 입력되는 전압 값의 범위에 ...

Valuation Grades Verification Method per Valuation Index

[Testing Hypothesis about the mean comparison of valuation factors]

- * SMART5 grade evaluates based on valuation factors extracted from various patent data then suggests the testing hypothesis result about the mean comparison of valuation factors as the grounds of the evaluated grade.
- * The testing hypothesis by the mean comparison is an objective method to confirm the significant difference of valuation factor values between valuation subject patent and upper (if in A grade range, lower) patent
- * The value of the different degrees is called t-statistic; p.value is the statistical indication. As the t-statistic is greater, the difference is higher; if the p.value is lower than 0.05, there is a significant difference in valuation factors.

※ The comprehensive valuation grade does not mean the total value of each detailed valuation index grade; it has the difference of the absolute value of each detailed index.

[Mean comparison subject in valuation factors]

Valuation Subject Patent grade	Mean comparison range
A grade range (AAA~A)	B grade range (BBB~B)
B grade range (BBB~B)	A grade range (AAA~A)
C grade range (CCC~C)	B grade range (BBB~B)

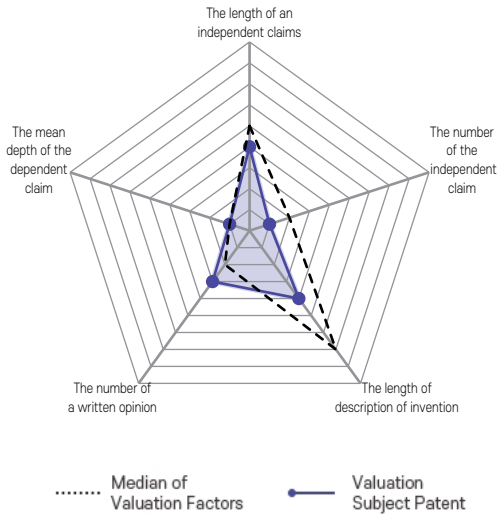
[Hypothesis Setting]

- * null hypothesis (H0) and alternative hypothesis (H1) concerning the mean comparison are as follows;
H0: In valuation factors, the mean of the upper/lower patent group is the same as the mean of the valuation patent subject.
H1: In valuation factors, the mean of the upper/lower patent group is greater/less than the mean of the valuation patent subject.
- * If p.value < 0.05, In valuation factors, the median of upper/lower patent group is significantly greater/less than the mean of valuation patent subject.

AAA

The exclusive position maintenance degree of Valuation Subject Patent at patent dispute with the 3rd party

Valuation Subject Patent conducted mean comparison (T-test) with patents in IP Right B grade(range BBB~B); the result showed significant difference at 95% confidence level. Based on such difference, IP Right valuation grade was evaluated lower than AAA grade (upper 0.8%); therefore, the maintenance level to occupy the exclusive position might be the highest at patent dispute with the 3rd party in the relevant technical field. The length of an independent claim has 242 characters. The number of the independent claim is 1. The number of divisional application benefit claims is 0. The number of written opinions is 2. The mean depth of the dependent claim is 2.

[IP Right valuation factors Summary Statistics]

Valuation factors	Valuation Subject Patent	B grade range(BBB~B) Summary Statistics						Mean comparison	
		Mean	Min Value	Lower 25%	50%	Upper 25%	Max Value	t-statistic ¹⁾	P.Value ²⁾
The length of an independent claims	242	334.69	9	160	259	409	34003	137.02	0.00***
The number of the independent claims	1	2.41	1	1	2	3	33	501.48	0.00***
The length of description of invention	1804	4517.92	52	2370	3589	5505	366629	342.50	0.00***
The number of a written opinion	2	1.12	0	1	1	1	8	735.97	0.00***
The mean depth of the dependent claim	2	2.37	0	2	2.3	2.6	16	266.68	0.00***

▷ IP Right influences on the above five and others valuation factors.

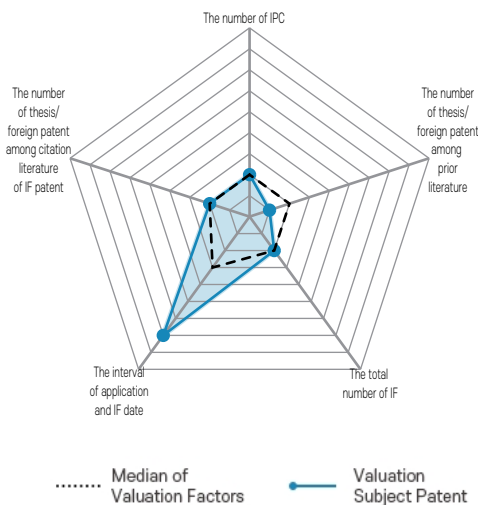
▷ *P.Value<0.05, ** P.Value<0.01, ***P.Value<0.001

Technology Valuation Analysis

BB

Valuation Subject Patent Level to lead or accord with the technical trend

Valuation Subject Patent conducted mean comparison (T-test) with patents in Technology Value A grade range(AAA~A); the result showed significant difference at 95% confidence level. Based on such difference, the Technology valuation grade was evaluated lower than BB(upper 48.5%); therefore, the level to lead or accord with the tendency of technology might be the average. The number of IPC is 2. The number of thesis/foreign patents among prior literature is 0. The total number of IF is 1. The interval of application and IF date is 1983days. The number of thesis/foreign patents among citation literature of IF patent is 1case.

[Technology Value valuation factors Summary Statistics]

Valuation factors	Valuation Subject Patent	A grade range(AAA~A) Summary Statistics						Mean comparison	
		Mean	Min Value	Lower 25%	50%	Upper 25%	Max Value	t-statistic	P.Value
The number of IPC	2	1.53	1	1	1	2	9	196.07	0.00***
The number of thesis/foreign patent among prior literature	0	2.08	0	1	2	3	76	341.39	0.00***
The total number of IF	1	1.95	0	0	1	2	88	107.28	0.00***
The interval of application and IF date	1983	2248.93	0	1253	1951	3032	7002	56.57	0.00***
The number of thesis/foreign patent among citation literature of IF patent	1	2.43	0	0	1	3	211	81.87	0.00***

▷ Technology Value influences on the above five and others valuation factors.

▷ *P.Value<0.05, ** P.Value<0.01, ***P.Value<0.001

1) t-statistic is the value from the result of statistical comparison of the mean of Valuation Subject Patent and upper/lower range patents

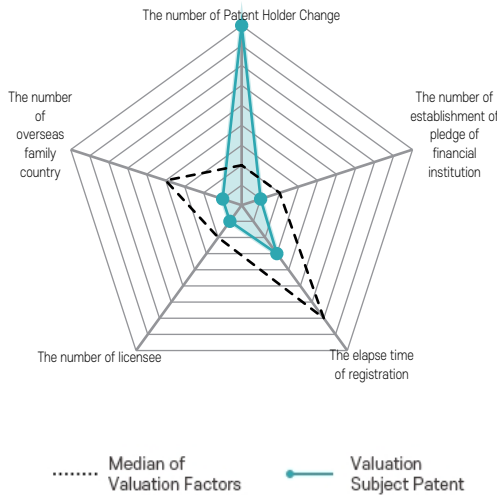
2) p-value means the difference measured in the upper/lower range. As the difference is higher, the statistic is less. Especially, if p-value<0.05, the mean of Valuation Subject Patent and upper/lower range patents has a significant difference.

AAA

The Use Degree and Possibility of Valuation Subject Patent in Business

Valuation Subject Patent conducted mean comparison (T-test) with patents in Usability B grade range(BBB~B); the result showed significant difference at 95% confidence level. Based on such difference, the Usability valuation grade was evaluated lower than the AAA grade(upper 0.1%); therefore, the Use Degree and Possibility of Valuation Subject Patent in Business might be in the highest level. The number of Patent Holder Change is 11cases. The number of the establishment of a pledge of the financial institution is 0. The elapse time of registration is 15years. The number of the licensee is 0. The number of the overseas family country is 0.

[Usability valuation factors Summary Statistics]



Valuation factors	Valuation Subject Patent	B grade range(BBB~B) Summary Statistics						Mean comparison	
		Mean	Min Value	Lower 25%	50%	Upper 25%	Max Value	t-statistic	P.Value
The number of Patent Holder Change	11	0.19	0	0	0	0	6	12044.37	0.00***
The number of establishment of pledge of financial institution	0	0.02	0	0	0	0	6	70.50	0.00***
The elapse time of registration	15	6.38	1	3	5	9	20	1000.75	0.00***
The number of licensee	0	0.01	0	0	0	0	79	24.36	0.00***
The number of overseas family country	0	1.17	0	0	1	2	4	451.19	0.00***

▷ Usability influences on the above five and others valuation factors.

▷ *P.Value<0.05, ** P.Value<0.01, ***P.Value<0.001

Percentage Ratio Analysis per WIPO Technology Classification

Valuation Index	High classification level (electric/electronic/IT) [480,993]	Middle classification level (electronic device/energy) [115,721]
Comprehensive Valuation	3.3 %	1.8 %
IP Right	0.8 %	0.3 %
Technology Value	48.5 %	29.9 %
Usability	0.1 %	0.1 %

* In Comprehensive Valuation, the ratio of electric/electronic/IT ranks at the upper 3.3%.

[Percentage Ratio Analysis per IPC]

H	ELECTRICITY	323,354 cases
H02	GENERATION, CONVERSION, OR DISTRIBUTION OF ELECTRIC POWER	35,596 cases
H02J	GENERATION, CONVERSION, OR DISTRIBUTION OF ELECTRIC POWER	8,480 cases

Valuation Index	H	H02	H02J
Comprehensive Valuation	2.1 %	0.7 %	1.8 %
IP Right	1.0 %	0.2 %	0.5 %
Technology Value	45.5 %	27.0 %	45.6 %
Usability	0.1 %	0.0 %	0.0 %

* In Comprehensive Valuation, the ratio of 'electric/electronic/IT' ranks at the upper 2.1%.

* Based on the Valuation Result of the relevant model to WIPO Technology Classification, upper ratio analysis result per IPC

APPENDIX II

[Valuation Subject Country]



[Information supplier & valuation cycle]

Valuation information Supplier	Valuation cycle
MOIP	* Patent Initial Valuation Date : Date of Patent + 2 months later
USPTO	
EPO	
IPPH	* Valuation Cycle: Monthly
JPO	
Standard Patent Center	

Valuation Date	Valuation Result update date of every month		
Report Valuation Date	Patent Valuation Report Preparation Date by customer's demand		
Valuation Model	KR CN	Construction by Structural Equation Model based on experts' survey research result about Patent information significance	
		Structural Equation Model - a method to analyze the causality of multiple independent variables and dependent variables by model combined confirm factor analysis and path analysis	
	US EU JP	Construction of key valuation factors per valuation index by Multiple Regression Analysis Model utilized a dependent variable.	
		Multiple Regression Analysis - a method to analyze the correlated degree of a dependent variable and more than two independent variables	
WIPO Technology Classification	WIPO classifies Technology Classification by electricity/electronic/IT, machinery, instrument, chemical and provides a table of the relevant Technology Classification and IPC code mapping.		
Stanine Ratio	Stanine (Standard + nine) - 9 grades by the ratio determined as a kind of a normalization criterion score.		

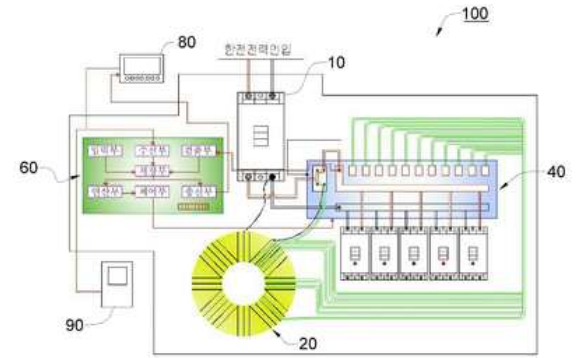
[Notice]

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[Representative claimed invention]

한전 측으로부터 공급되는 교류전압을 안정적으로 제어하여 분기스위치 측으로 출력시키기 위하여, 한전 측으로부터의 전력이 인입되는 주차단기에 연결되며, 입력되는 전압 범위에 따라 권선된 1차측 코일부와, 설정된 기준 전압과 비교한 후 그 차이만큼 승압 또는 감압할 수 있도록 권선된 다수 개의 탭으로 이루어진 2차측 코일부를 포함하는 토로이달형의 멀티탭 트랜스포머와; 상기 멀티탭 트랜스포머의 각 탭이 각각 연결되도록 다수 개의 접점이 구비된 상태에서, 외부 제어신호에 따라 그 중 한 개의 접점이 선택적으로 부스바와 연결되면서 자동으로 조절된 전압을 분기스위치 측으로 공급하도록 이루어진 다점접 스위치 및; 공급되는 전압의 분포도로 얻어진 평균 값 및 이를 기초로 설정된 변압 값이 저장된 상태에서, 상기 주차단기를 통해 입력되는 전압 값의 범위에 기초하여 상기 다점접 스위치가 동작되면서 정격전압을 출력시키도록 소정 제어신호를 인가하는 제어수단을 포함하여 구성된 전압 안정화 장치에 있어서, 상기 다점접 스위치는, MCCB로부터 전원이 공급되며 바이패스 모드 및 전압조절 모드로 선택적으로 절환되는 연동스위치와, 상기 멀티탭 트랜스포머의 2차측 코일부에 구비된 다수 개의 탭이 각각 대응되게 연결된 상태로 나란히 배열되어 구성되는 다수 개의 접점과, 상기 연동스위치 또는 임의의 접점을 통해 공급되는 전력을 부하 측으로 전달하도록 상기 다수 개의 접점과 일정 간격 이격된 상태로 평행하게 설치되는 부스바와, 상기 부스바 및 나란히 배열된 다수 개의 접점 사이의 공간부에 설치되는 사각타입의 나사피치를 갖는 샤프트와, 상기 샤프트의 일측에 설치되어 상기 제어수단으로부터의 제어신호에 의해 구동되면서 상기 샤프트가 회전 동작되도록 하는 엔코더를 장착한 구동모터로 이루어진 드라이버 및, 샤프트에 설치된 상태에서 상기 드라이버의 구동에 따른 샤프트의 회전에 의해 이동되면서 임의의 접점과 부스바를 상호 연결시켜 해당 접점의 전력이 부스바 측으로 공급되도록 하는 스위치헤드를 포함하여 구성된 것;을 특징으로 하는 스마트 전압 안정화 장치.

[Representative drawing]



[The information of IF]

No.	Application No.	Title of Invention	IPC	Application Date	Applicant	Assignee
1	1020160011722	Load measuring apparat...	G01R 31/40	2016.01.29	주식회사 케이지에스	주식회사 케이지에스

[The information of thesis/foreign patent among IF prior literature]

No.	IF Application No.	Information of prior literature [paper/foreign patent]
1	1020160011722	US20140091762 A1

[The information of thesis/foreign patent among prior literature]

No.	prior literature (thesis/foreign Patent No.)

[Judgment Information]

No.	Judgment No.	Case Indication	Claim/Withdrawal	Judgment Confirmation Status	Confirmation Result	Claimant

[License Information]

No.	Initiation	Termination	License area	License content