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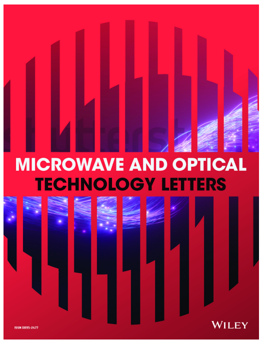

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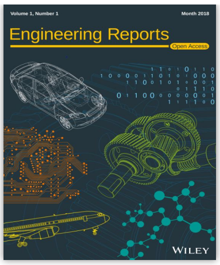

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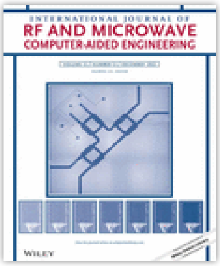

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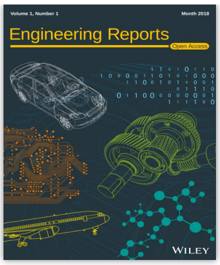

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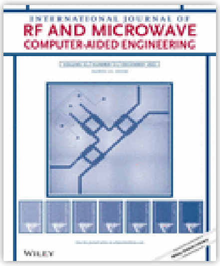

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Dual-wideband band pass filter using folded cross-stub stepped impedance resonator

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Abstract

In this letter, a dual-wideband band pass filter (DW-BPF) using cross-stub stepped impedance resonator (CS-SIR) was simulated, fabricated, and measured accordingly. The CS-SIR was used to replace the conventional half-wavelength open stub resonators. Compare to the conventional resonator, the CS-SIR resonator has a wider fractional bandwidth and ease of fabrication. Furthermore, the DB-BPF was fabricated on microstrip with $\varepsilon_r = 4.4$, $h = 0.8$ mm, and tan $\delta = 0.0265$. The DW-BPF with CS-SIR achieves transmission-coefficients/fractional-bandwidth of 0.22 dB/94.19% and 1.87 dB/33.52% at 1.14 GHz and 2.31 GHz, respectively. In order to reduce the filter size, a folded CS-SIR (FCS-SIR) was also proposed. As a result, this BPF size was reduced to 53%, with the BPF size of 0.30 λ_G^2 and 0.14 λ_G^2 for DW-BPF with CS-SIR and DW-BPF with folded CS-SIR, respectively. The λ_G is the wavelength at the first frequency. Further, the DW-BPF with FCS-SIR achieves transmission coefficients/fractional bandwidth of 0.19 dB/89.08% and 1.29 dB/31.90% at 1.21 GHz and 2.41 GHz, respectively. Measured results are in a very good agreement with the simulated results.

KEYWORDS

dual-wideband band pass filter, stepped impedance resonator, transmission zero

1 | INTRODUCTION

A dual-band band pass filter (DB-BPF) is an important component of a radio transceiver for reducing interference and noise at two frequency bands simultaneously.[1] Therefore, the pursuit of a DB-BPF with good-performances has become a key trend in the field of research. A variety of design

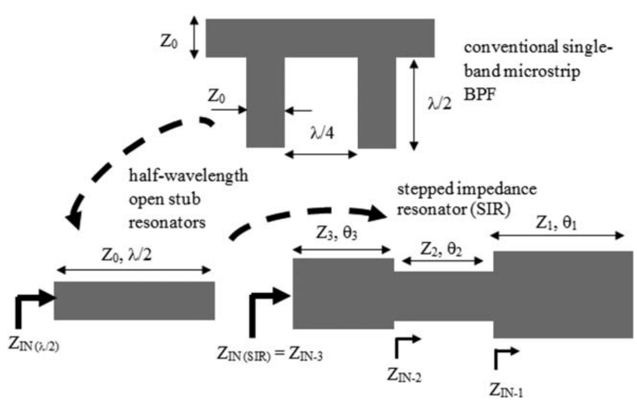

FIGURE 1 The conventional half-wavelength open stub resonator replaced by stub-stepped impedance resonator

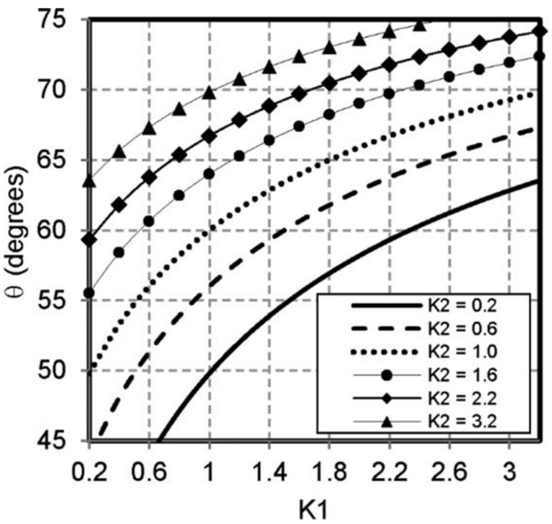

FIGURE 2 The relationship between impedance ratio (K_1, K_2) and electrical length (θ)

techniques is frequently used for DB-BPF design such as square loop dual mode resonator,[2] defected ground structure (DGS),[3,4] spiral resonators,[5] defected stepped impedance resonator (Defected-SIR),[6,7] slotted stepped impedance resonator (Slotted-SIR),[8] multilayer stepped impedance resonator (Multilayer-SIR),[9,10] meandering stepped impedance resonators (Meandering-SIR),[11] stub-loaded stepped impedance resonator (Stub-loaded SIR),[12] and coupled stepped impedance resonator (Coupled-SIR).[13] However, the DB-BPFs proposed by[1–13] still possess a complex geometry and achieve a narrow bandwidth.

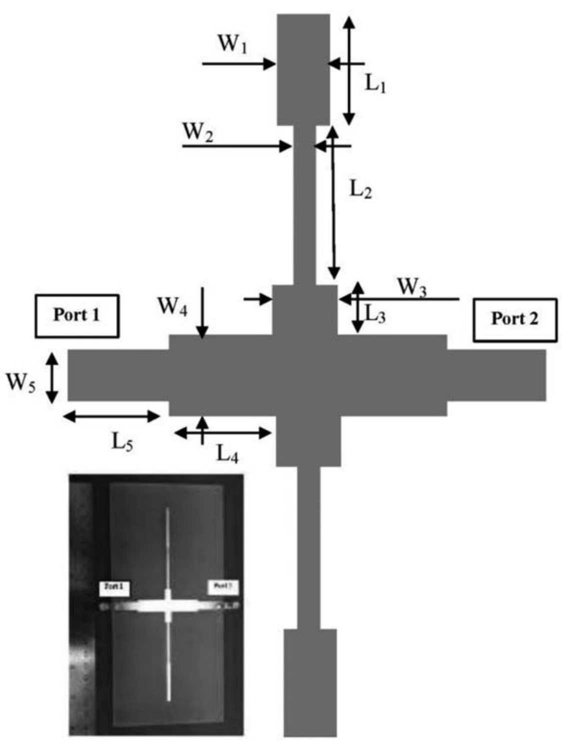

FIGURE 3 The layout and photograph of the design DW-BPF using CS-SIR

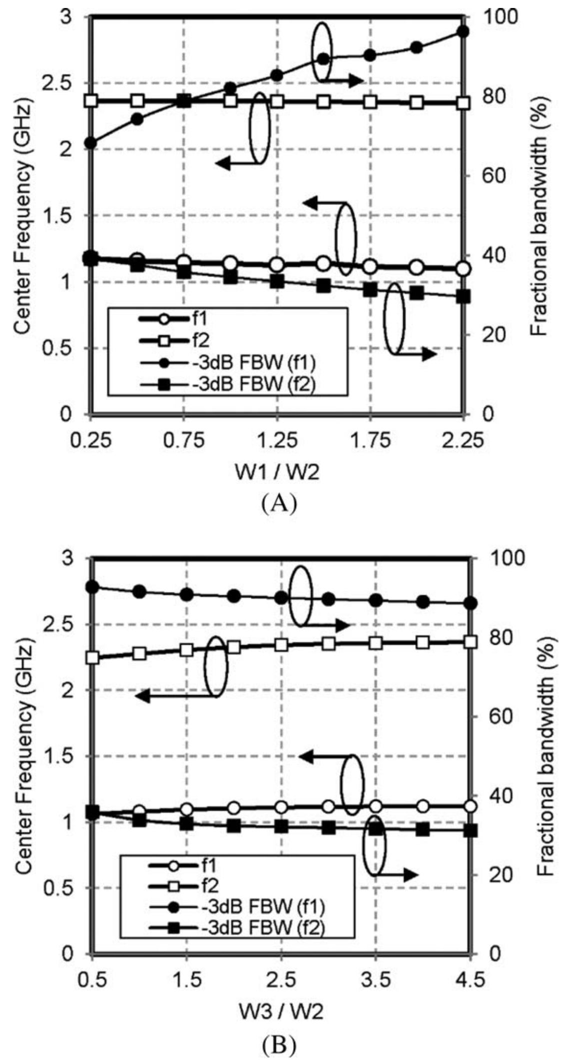

FIGURE 4 (A) The dependency of the center frequency and fractional bandwidth on the impedance ratio (W_1/W_2). (b) The stability of the center frequency and fractional bandwidth on the impedance ratio (W_3/W_2)

As a novelty in this letter, we propose a dual-wideband band pass filter (DW-BPF) using cross-stub stepped impedance resonator (CS-SIR). Figure 1 shows a CS-SIR which was used to replace the conventional half-wavelength open stub resonators. A folded CS-SIR (FCS-SIR) was also proposed to reduce the filter size. Thus, the BPF size is reduced to 53%. The proposed design could be validated by simulations and measurements. This letter is organized as follows: Section 2 briefly describes the design of the proposed DW-BPF using CS-SIR, Section 3 presents the simulated and experimental results, and finally, Section 4 concludes this research.

2 | PROPOSED DUAL-WIDEBAND BAND PASS FILTER

A half-wavelength open stub resonator structure was commonly used to design the conventional single-band

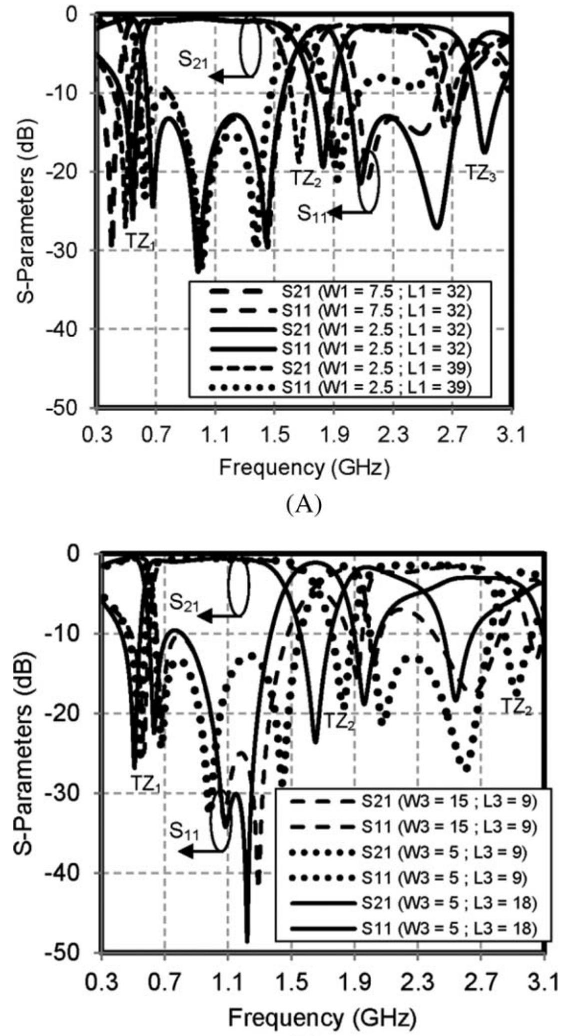

FIGURE 5 (A) Transmission coefficients (S_{21}) and reflection coefficients (S_{11}) response with varied W_1 and L_1. (B) Transmission coefficients (S_{21}) and reflection coefficients (S_{11}) response with varied W_3 and L_3

microstrip BPF.[1] In this letter, the half-wavelength open stub resonator is converted to the stub stepped impedance resonator as shown in Figure 1. The CS-SIR structure consists of three transmission lines having different characteristic impedances Z_N (N = 1,2,3) with corresponding electrical lengths θ_N (N = 1,2,3), respectively. Analyzing the input impedance $Z_{IN(SIR)}$ of the stepped impedance resonator section, the following equations can be derived:

$$Z_{IN(1)} = -jZ_1 \cot\theta_1 \tag{1}$$

$$Z_{IN(2)} = Z_2 \frac{Z_{IN(1)} + jZ_2 \tan\theta_2}{Z_2 + jZ_{IN(1)} \tan\theta_2} \tag{2}$$

$$Z_{IN(SIR)} = Z_{IN(3)} = Z_3 \frac{Z_{IN(2)} + jZ_3 \tan\theta_3}{Z_3 + jZ_{IN(2)} \tan\theta_3} \tag{3}$$

Equation (3) can also be expressed as:

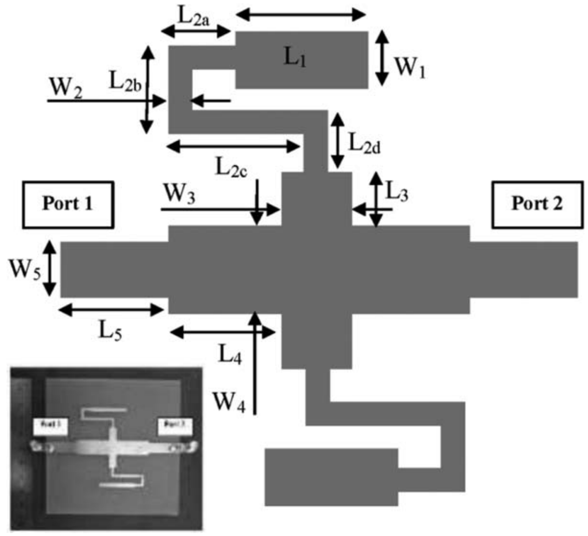

FIGURE 6 The layout and photograph of the design DW-BPF using folded CS-SIR (FCS-SIR)

$$Z_{IN(SIR)} = Z_1 \frac{Z_2(-jZ_3 \cot\theta_3 + jZ_2 \tan\theta_2) + jZ_1 \tan\theta_1 (Z_2 + Z_3 \cot\theta_3 \tan\theta_2)}{Z_1 Z_2 + Z_1 Z_3 \cot\theta_3 \tan\theta_2 + Z_2 Z_3 \cot\theta_3 \tan\theta_1 - Z_2^2 \tan\theta_2 \tan\theta_1} \tag{4}$$

The resonant frequencies can be extracted from admittance condition $Y_{IN(SIR)} = 0$ or impedance condition $Z_{IN(SIR)} = \infty$.[1] This can be obtained when:

$$Z_2^2 \tan\theta_3 \tan\theta_1 \tan\theta_2 - Z_1 Z_2 \tan\theta_3 - Z_1 Z_3 \tan\theta_2 - Z_2 Z_3 \tan\theta_1 = 0 \tag{5}$$

with the Z_N (N = 1,2,3) and θ_N (N = 1,2,3) stand for the characteristic impedance and electrical length, respectively. For the same electrical length $\theta_1 = \theta_2 = \theta_3 = \theta$, the resonance condition can also be shortened as follows:

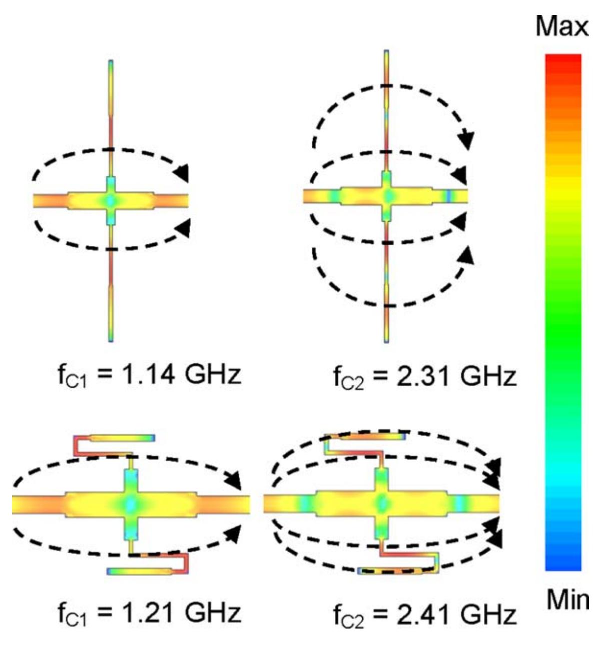

FIGURE 7 The surface current of the DW-BPF with CS-SIR and FCS-SIR. [Color figure can be viewed at wileyonlinelibrary.com]

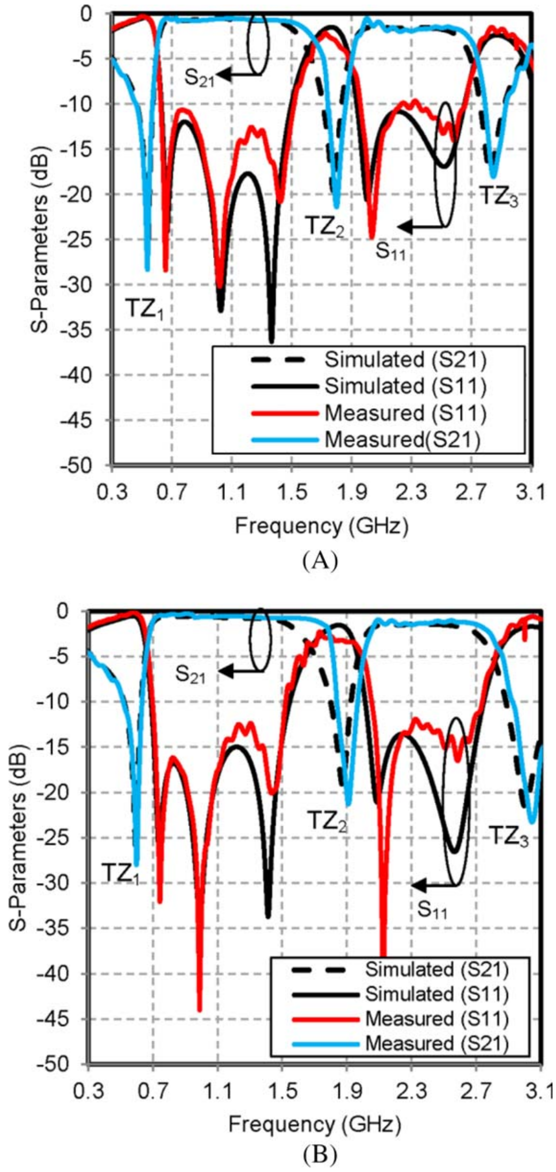

FIGURE 8 (A) Comparison between simulated and measured results of DW-BPF using CS-SIR. (B) Comparison between simulated and measured results of DW-BPF using FCS-SIR. [Color figure can be viewed at wileyonlinelibrary.com]

$$\tan^3\theta - K_1\tan\theta - K_1K_2\tan\theta - K_2\tan\theta = 0 \quad (6)$$

which can also be expressed as:

$$\tan\theta\left(\tan\theta + \sqrt{K_1 + K_1K_2 + K_1}\right)\left(\tan\theta - \sqrt{K_1 + K_1K_2 + K_1}\right) = 0 \quad (7)$$

where the impedance ratio K_N (1,2) is defined by:

$$K_1 = \frac{Z_1}{Z_2}, \text{ and} \quad (8)$$

$$K_2 = \frac{Z_3}{Z_2} \quad (9)$$

respectively. Equation (4) shows that the resonator provides two resonating frequencies. Therefore, the resonator serves as a dual mode resonator to produce two resonant frequencies. The relationship of K_1, K_2, and θ is shown in Figure 2.

3 | RESULTS AND DISCUSSION

Figure 3 shows the schematic of the design DW-BPF using CS-SIR. The DW-BPF was fabricated on microstrip with $\varepsilon_r = 4.4$, $h = 0.8$ mm, and $\tan\delta = 0.0265$. The DW-BPF consists of input/output port (*I*/*O*) line and two stub-SIR placed in a crossed manner. The DW-BPF was simulated using advanced design system (ADS) software, whereby an RS-ZVA vector network analyzer (VNA) was used to test the fabricated prototype of DW-BPF. The dimensions are given as follows (all in millimeters): $L_1 = 32$, $L_2 = 35$,

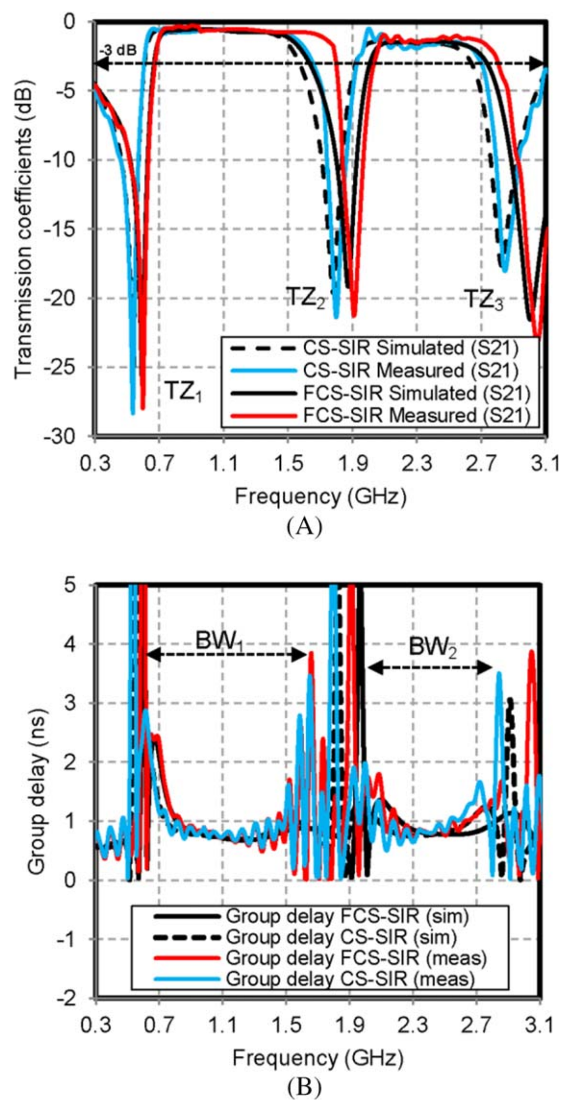

FIGURE 9 (A) Comparison of transmission coefficients (S_{21}) between DW-BPF using CS-SIR and DW-BPF using FCS-SIR. (B) Comparison of group delays (GDs). [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 1 Summary of the proposed dual-wideband BPF comparison

Ref.	Method	Center frequency (GHz)	Transmission coefficients (dB)	–3 dB FBW (%)
[2]	Square loop dual mode resonator	3.45/6.65	0.70/1.20	14.49/8.27
[3]	Defected ground structure (DGS)	4.60/7.30	0.34/0.35	3.87/2.12
[4]	Defected ground spiral resonator	1.87/2.43	2.00/2.00	4.50/3.30
[5]	Four spiral resonators	1.80/2.40	1.6/2.5	5.60/3.00
[6]	Defected stepped impedance resonator (Defected-SIR)	2.35/3.15	0.50/1.5	3.90/2.80
[7]	Defected stepped impedance resonator (Defected-SIR)	1.85/2.35	0.50/1.00	5.50/4.50
[8]	Slotted stepped impedance resonator (Slotted-SIR)	2.40/3.50	1.80/2.9	4.10/1.40
[9]	Multilayer stepped impedance resonator (Multilayer-SIR)	2.45/5.80	1.35/0.98	3.06/2.16
[10]	Multilayer stepped impedance resonator (Multilayer-SIR)	2.40/5.20	1.20/1.50	5.40/7.30
[11]	Meandering stepped impedance resonators (Meandering-SIR)	2.40/5.25	0.72/2.10	8.33/3.85
[12]	Stub-loaded stepped impedance resonator (Stub-loaded SIR)	2.40/5.20	1.20/2.00	8.00/5.00
[13]	Coupled stepped impedance resonator (Coupled-SIR)	2.4/3.8	0.50/1.00	8.33/5.26
This Work	Cross-stub stepped impedance resonator (CS-SIR)	1.14/2.31	0.22/1.87	94.19/33.52
	Folded cross-stub stepped impedance resonator (FCS-SIR)	1.21/2.41	0.19/1.29	89.08/31.90

L_3 = 9.0, L_4 = 23, L_5 = 21, W_1 = 2.5, W_2 = 1.5, W_3 = 5.0, W_4 = 10, and W_5 = 7.0.

The dependency of the center frequency and fractional bandwidth on the impedance ratio (W_1/W_2) is given in Figure 4A. The figure shows that by increasing the impedance ratio (W_1/W_2), the center frequencies will be stable. However, increasing impedance ratio (W_1/W_2) would raise the fractional bandwidth. Figure 4B also shows the stability of the center frequency and fractional bandwidth on the variance of impedance ratio (W_3/W_2). The chart shows that both center frequency and fractional bandwidth were not changed significantly. Figure 5A and B shows transmission coefficients (S_{21}) and reflection coefficients (S_{11}) in response to varied W_1, W_3, L_1, and L_3.

In order to reduce the filter size, a folded CS-SIR (FCS-SIR) was proposed as shown in Figure 6. The dimensions are given as follows (all in millimeters): L_1 = 32, L_{2a} = 5, L_{2b} = 5, L_{2c} = 20, L_d = 5, L_3 = 9.0, L_4 = 23, L_5 = 21, W_1 = 2.5, W_{2a} = W_{2b} = W_{2c} = W_{2d} = 1.5, W_3 = 5.0, W_4 = 10, and W_5 = 7.0. As a result, this BPF size was reduced to 53%. Furthermore, both DW-BPF using CS-SIR and folded CS-SIR (FCS-SIR) were accomplished with two pass bands. Figure 7 shows the surface current at filter with CS-SIR and FCS-SIR. It shows that the first center frequency will obtain maximum value of surface current at transmission line 2 (W_2, L_2) and the second center frequency will obtain maximum value of surface current at transmission line 1 (W_1, L_1) and transmission line 3 (W_3, L_3).

Figure 8A shows a comparison between simulated and measured of DW-BPF using CS-SIR. A DW-BPF with CS-SIR achieves transmission-coefficients/fractional-bandwidth of 0.22 dB/94.19% and 1.87 dB/33.52% at 1.14 GHz and 2.31 GHz, respectively. The transmission zeros (TZ) of this filter are −28.29 dB, −21.36 dB, and −18.02 at 0.53 GHz, 1.79 GHz, and 2.86 GHz, respectively. Furthermore, Figure 8B shows a comparison between simulated and measured of

DW-BPF using FCS-SIR. A DW-BPF with FCS-SIR achieves transmission coefficients/fractional bandwidth of 0.19 dB/89.08% and 1.29 dB/31.90% at 1.21 GHz and 2.41 GHz, respectively. The transmission zeros (TZ) of this filter are −27.94 dB, −21.25 dB, and −23.25 at 0.59 GHz, 1.90 GHz, and 3.04 GHz, respectively. Figure 9A shows a comparison of transmission coefficients (S_{21}) between DW-BPF using CS-SIR and DW-BPF using FCS-SIR. The measured group delays (GDs) of all pass bands below 5 ns are also depicted in Figure 9B. Table 1 summarizes the comparison of the proposed dual band BPF. Finally, the measured results are in a very good agreement with the simulated results.

4 | CONCLUSION

This letter proposes a dual-wideband band pass filter (DW-BPF) using cross-stub stepped impedance resonator (CS-SIR). The CS-SIR was used to replace the conventional half-wavelength open stub resonators. In order to reduce the filter size, a folded CS-SIR (FCS-SIR) also was proposed. As a result, this BPF size is reduced to 53%. Measured results are in a very good agreement with the simulated results. In comparison with the previous works, both of BPF using CS-SIR and BPF using FCS-SIR could produce wider bandwidth, good transmission coefficients, and ease of fabrication.

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Journal's performance

Journal Impact Factor

The Journal Impact Factor (JIF) is a journal-level metric calculated from data indexed in the Web of Science Core Collection. It should be used with careful attention to the many factors that influence citation rates, such as the volume of publication and citations characteristics of the subject area and type of journal. The Journal Impact Factor can complement expert opinion and informed peer review. In the case of academic evaluation for tenure, it is inappropriate to use a journal-level metric as a proxy measure for individual researchers, institutions, or articles. Learn more

2021 JOURNAL IMPACT FACTOR

1.311

View calculation

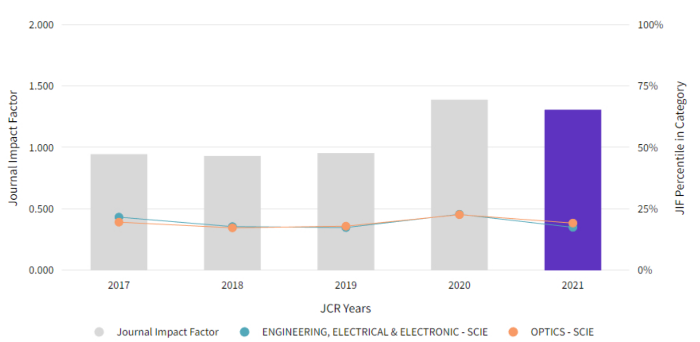
JOURNAL IMPACT FACTOR WITHOUT SELF CITATIONS

1.175

View calculation

Journal Impact Factor Trend 2021

Export



View all years

Journal Impact Factor contributing items

Export

Citable items (1,218) | Citing Sources (314)

TITLE	CITATION COUNT
Tri-core photonic crystal fiber based refractive index dual sensor for salinity and temperature detection	27
Tunable, reconfigurable, and programmable metamaterials	16
High energyLiDARsource for long distance, high resolution range imaging	15
Ultrawideband elliptical microstrip antenna for terahertz applications	15
High-isolation conjoined loop multi-input multi-output antennas for the fifth-generation tablet device	13
Dual band transparent antenna for wireless MIMO system applications	12
Stub loaded, low profile UWB antenna with independently controllable notch-bands	12
Wideband circular cavity-backed slot antenna with conical radiation patterns	11
A new class of wideband microstrip falcate patch antennas with reconfigurable capability at circular-polarization	10
Flexible CPW fed transparent antenna for WLAN and sub-6 GHz 5G applications	10

View All in Web of Science

Journal Citation Indicator (JCI)

Export

0.38

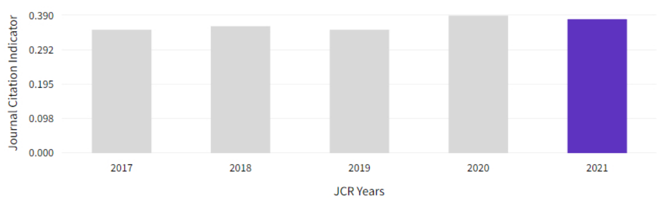
The Journal Citation Indicator (JCI) is the average Category Normalized Citation Impact (CNCI) of citable items (articles & reviews) published by a journal over a recent three year period. The average JCI in a category is 1. Journals with a JCI of 1.5 have 50% more citation impact than the average in that category. It may be used alongside other metrics to help you evaluate journals. Learn more

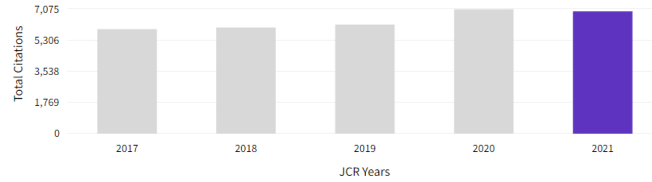
Total Citations

Export

6,957

The total number of times that a journal has been cited by all journals included in the database in the JCR year. Citations to journals listed in JCR are compiled annually from the JCR years combined database, regardless of which JCR edition lists the journal.





View all years

Citation distribution

Export

The Citation Distribution shows the frequency with which items published in the year or two years prior were cited in the JCR data year (i.e., the component of the calculation of the JIF). The graph has similar functionality as the JIF Trend graph, including hover-over data descriptions for each data point, and an interactive legend where each data element's legend can be used as a toggle. You can view Articles, Reviews, or Non-Citable (other) items to the JIF numerator. Learn more

ARTICLE CITATION MEDIAN

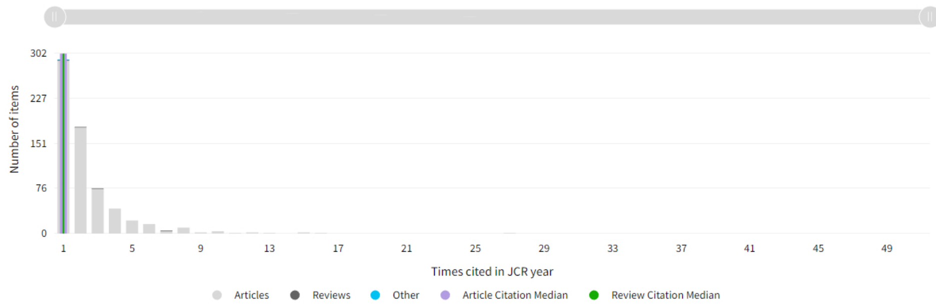
1

REVIEW CITATION MEDIAN

1

UNLINKED CITATIONS

51



TIMES CITED

0

ARTICLES

560

REVIEWS

3

OTHER

10

Open Access (OA)

Export

The data included in this tile summarizes the items published in the journal in the JCR data year and in the previous two years. For example, in the 2020 JCR data, released in June 2021, the Open Access (OA) data show the publication model (Gold OA or subscription) of materials published in 2018, 2019 and 2020, and citations in 2020 to these items. This three-year set of published items is used to provide descriptive analysis of the content and community of the journal. Learn more

Items

TOTAL CITABLE
1,579

% OF CITABLE OA
1.14%

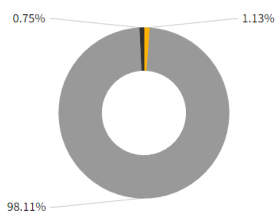
CITABLE

GOLD OPEN ACCESS
18 / 1.13%

SUBSCRIPTION AND FREE TO READ
1,561 / 98.11%

NON-CITABLE

OTHER (NON CITABLE ITEMS)
12 / 0.75%



Citations*

TOTAL CITABLE
1,651

% OF CITABLE OA
0.97%

CITABLE

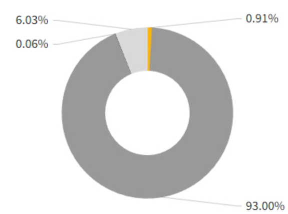
GOLD OPEN ACCESS
16 / 0.91%

SUBSCRIPTION AND FREE TO READ
1,635 / 93.00%

NON-CITABLE

OTHER (NON CITABLE ITEMS)
1 / 0.06%

UNLINKED CITATIONS
106 / 6.03%



*Citations in 2021 to items published in [2019 - 2021]

Rank by Journal Impact Factor

Journals within a category are sorted in descending order by Journal Impact Factor (JIF) resulting in the Category Ranking below. A separate rank is shown for each category in which the journal is listed in JCR. Data for the most recent year is presented at the top of the list, with other years shown in reverse chronological order. Learn more

EDITION
Science Citation Index Expanded (SCIE)

CATEGORY
ENGINEERING, ELECTRICAL & ELECTRONIC

228/276

JCR YEAR	JIF RANK	JIF QUARTILE	JIF PERCENTILE
2021	228/276	Q4	17.57
2020	211/273	Q4	22.89
2019	220/266	Q4	17.48
2018	219/266	Q4	17.86
2017	204/260	Q4	21.73

EDITION
Science Citation Index Expanded (SCIE)

CATEGORY
OPTICS

82/101

JCR YEAR	JIF RANK	JIF QUARTILE	JIF PERCENTILE
2021	82/101	Q4	19.31
2020	77/99	Q4	22.73
2019	80/97	Q4	18.04
2018	79/95	Q4	17.37
2017	76/94	Q4	19.68

Rank by Journal Citation Indicator (JCI)

Journals within a category are sorted in descending order by Journal Citation Indicator (JCI) resulting in the Category Ranking below. A separate rank is shown for each category in which the journal is listed in JCR. Data for the most recent year is presented at the top of the list, with other years shown in reverse chronological order. Learn more

CATEGORY

ENGINEERING, ELECTRICAL & ELECTRONIC

244/344

JCR YEAR	JCI RANK	JCI QUARTILE	JCI PERCENTILE
2021	244/344	Q3	29.22
2020	215/319	Q3	32.76
2019	221/318	Q3	30.66
2018	213/312	Q3	31.89
2017	216/306	Q3	29.58

CATEGORY

OPTICS

82/118

JCR YEAR	JCI RANK	JCI QUARTILE	JCI PERCENTILE
2021	82/118	Q3	30.93
2020	78/115	Q3	32.61
2019	81/114	Q3	29.39
2018	78/108	Q3	28.24
2017	79/106	Q3	25.94

Citation network

Cited Half-life

6.0 years

The Cited Half-Life is the median age of the items in this journal that were cited in the JCR year. Half of a journal's cited items were published more recently than the cited half-life.

TOTAL NUMBER OF CITES

6,957

NON SELF-CITATIONS

6,436

SELF-CITATIONS

521

Citing Half-life

5.9 years

The Citing Half-Life is the median age of items in other publications cited by this journal in the JCR year.

TOTAL NUMBER OF CITES

8,125

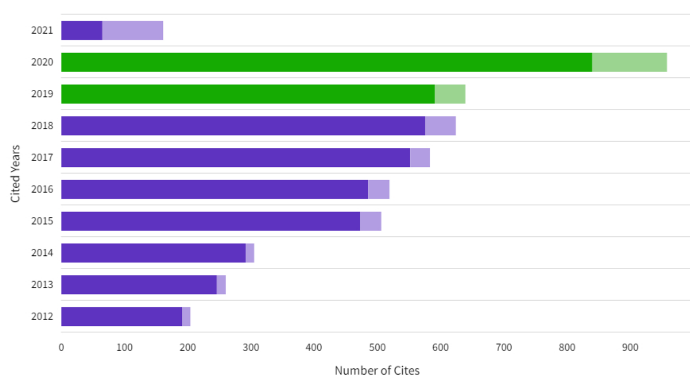
NON SELF-CITATIONS

7,604

SELF-CITATIONS

521

Cited Half-life Data | Citing Half-life Data



- Non-self citations: citations to the journal from the items in other sources
- Citations to items in the journal from items in the same journal
- Citations used to calculate the Impact Factor

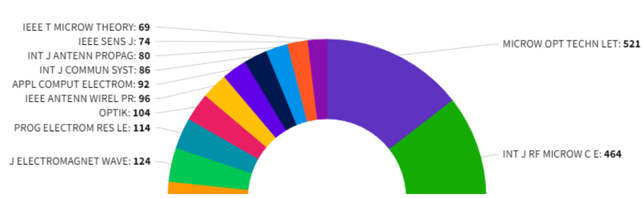
Export

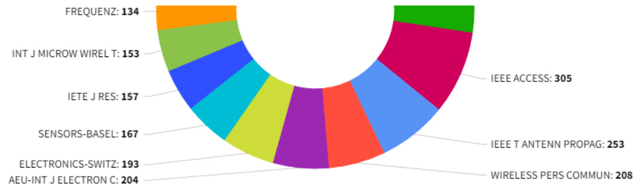
CITED YEAR	# OF CITES FROM 2021	CUMULATIVE %	# OF CITING SOURCES
All years	6,957 citations	100.00%	694 sources
2021	161 citations	2.31%	40 sources
2020	958 citations	16.08%	230 sources
2019	639 citations	25.27%	195 sources
2018	624 citations	34.24%	162 sources
2017	583 citations	42.62%	159 sources
2016	519 citations	50.08%	160 sources
2015	506 citations	57.35%	156 sources
2014	305 citations	61.74%	128 sources
2013	260 citations	65.47%	103 sources
2012	204 citations	68.41%	99 sources
Older	2,198 citations		

Journal Citation Relationships

Cited Data | Citing Data

Top 20 journals citing MICROW OPT TECHN LET by number of citations





Content metrics

Source data

This tile shows the breakdown of document types published by the journal. Citable Items are Articles and Reviews. For the purposes of calculating JIF, a JCR year considers the publications of that journal in the two prior years. Learn more

361 total citable items

	ARTICLES	REVIEWS	COMBINED(C)	OTHER DOCUMENT TYPES(O)	PERCENTAGE
NUMBER IN JCR YEAR 2021 (A)	347	14	361	1	100%
NUMBER OF REFERENCES (B)	7,006	1,119	8,125	0	100%
RATIO (B/A)	20.2	79.9	22.5	0.0	

Average JIF Percentile

Export

The Average Journal Impact Factor Percentile takes the sum of the JIF Percentile rank for each category under consideration, then calculates the average of those values. Learn more

ALL CATEGORIES AVERAGE
18.44

EDITION
Science Citation Index Expanded

ENGINEERING, ELECTRICAL & ELECTRONIC
17.57

OPTICS
19.31

Contributions by organizations

Export

Organizations that have contributed the most papers to the journal in the most recent three-year period. Learn more

RANK	ORGANIZATION	COUNT
1	UNIVERSITY OF ELECTRONIC SCIENCE & TECHNOLOGY OF CHINA	77
2	XIDIAN UNIVERSITY	75
3	INDIAN INSTITUTE OF TECHNOLOGY SYSTEM (IIT SYSTEM)	56
4	SOUTHEAST UNIVERSITY - CHINA	44
5	CHINESE ACADEMY OF SCIENCES	43
6	NATIONAL INSTITUTE OF TECHNOLOGY (NIT SYSTEM)	39
7	SOUTH CHINA UNIVERSITY OF TECHNOLOGY	36
8	BEIJING UNIVERSITY OF POSTS & TELECOMMUNICATIONS	26
-	NANJING UNIVERSITY OF POSTS & TELECOMMUNICATIONS	26
-	TIANJIN UNIVERSITY	26

Contributions by country/region

Export

Countries or Regions that have contributed the most papers to the journal in the most recent three-year period. Learn more

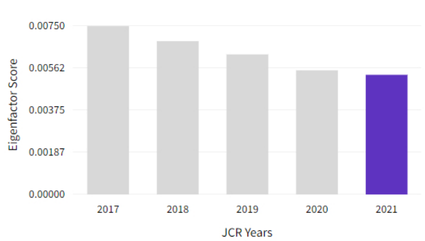
RANK	COUNTRY / REGION	COUNT
1	CHINA MAINLAND	707
2	India	246
3	South Korea	174
4	USA	82
5	Iran	59
6	Taiwan	55
7	Turkey	53
8	Malaysia	43
9	Pakistan	36
10	Canada	34

Additional metrics

Eigenfactor Score

0.00533

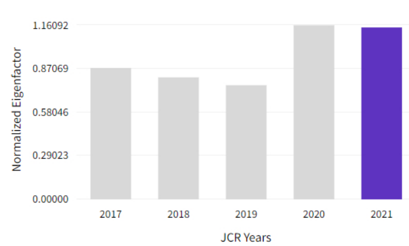
The Eigenfactor Score is a reflection of the density of the network of citations around the journal using 5 years of cited content as cited by the Current Year. It considers both the number of citations and the source of those citations, so that highly cited sources will influence the network more than less cited sources. The Eigenfactor calculation does not include journal self-citations. Learn more



Normalized Eigenfactor

1.14627

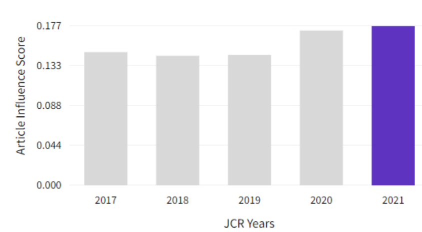
The Normalized Eigenfactor Score is the Eigenfactor score normalized, by rescaling the total number of journals in the JCR each year, so that the average journal has a score of 1. Journals can then be compared and influence measured by their score relative to 1. Learn more



Article influence score

0.177

The Article Influence Score normalizes the Eigenfactor Score according to the cumulative size of the cited journal across the prior five years. The mean Article Influence Score for each article is 1.00. A score greater than 1.00 indicates that each article in the journal has above-average influence. Learn more



Print screen : List jurnal sudah di scopus-author

Scopus

Search   Sources   SciVal

This author profile is generated by Scopus. Learn more

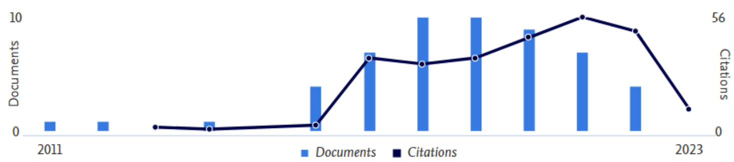
Firmansyah, Teguh

Universitas Sultan Ageng Tirtayasa, Serang, Indonesia   54971241500   https://orcid.org/0000-0002-9000-9337   View more

273	54	10
Citations by ***218 documents***	Documents	*h*-index View *h*-graph

Set alert   Save to list   Edit profile   More

Document & citation trends



Analyze author output   Citation overview

Most contributed Topics 2017–2021

Stepped Impedance Resonator; Bandpass Filters; Compact
10 documents

Multiple-Input Multiple-Output (MIMO); Antenna; Antenna Arrays
3 documents

Radio over Fiber; Sidebands; Optics
2 documents

View all Topics

Firmansyah, Teguh   Set alert   Save to list   More

54 documents

Export all   Save all to list   Sort by Cited by (highest)

View list in search results format

View references

Set document alert

Article

Dual-wideband band pass filter using folded cross-stub stepped impedance resonator

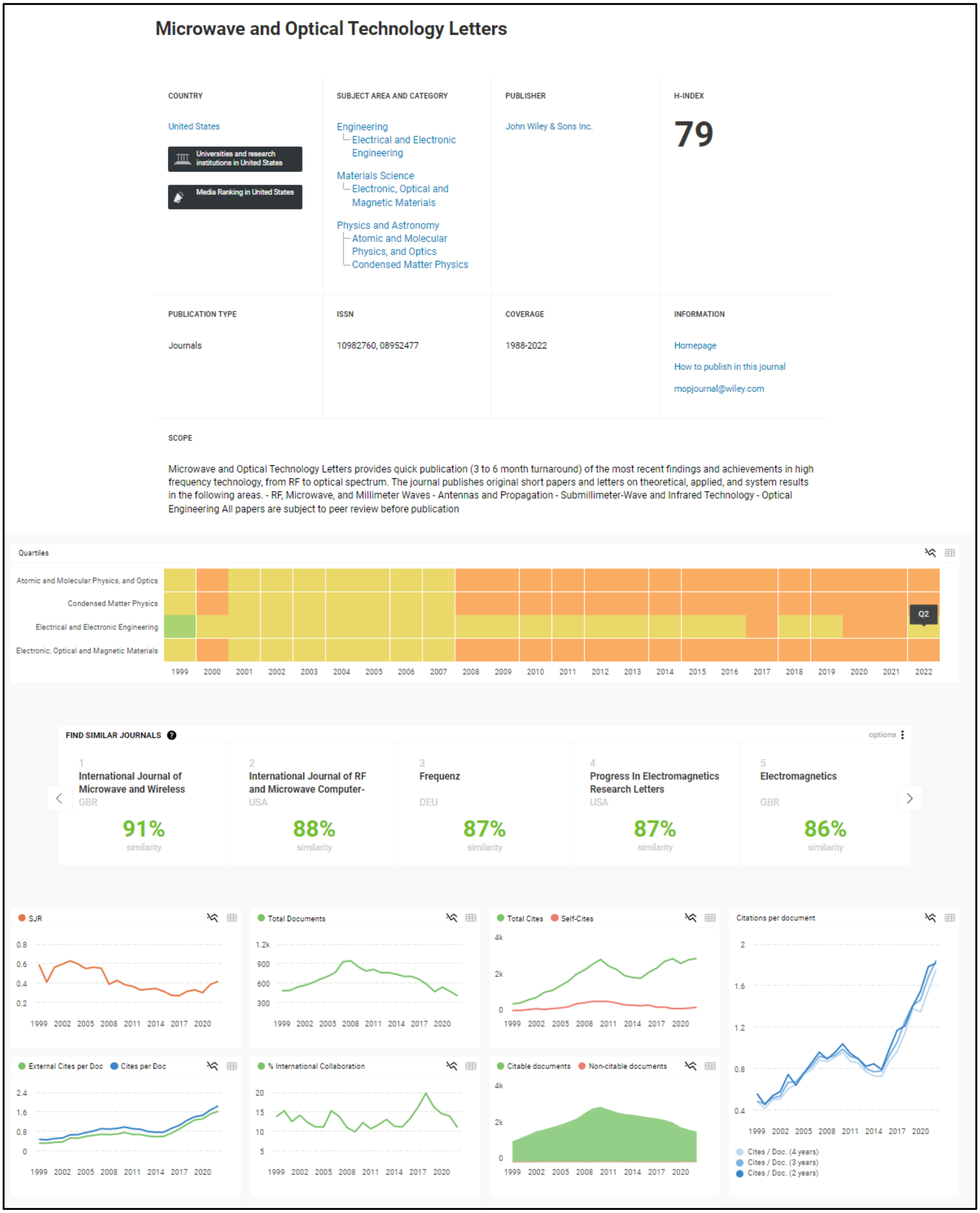
Firmansyah, T., Praptodinoyo, S., Wiryadinata, R., ...Alaydrus, M., Wibisono, G.

Microwave and Optical Technology Letters, 2017, 59(11), pp. 2929–2934

26
Citations

Show abstract   View at Publisher   Related documents

Print screen : SCIMAGO dan Quartil nya :



Microwave and Optical Technology Letters

COUNTRY	SUBJECT AREA AND CATEGORY	PUBLISHER	H-INDEX
United States Universities and research institutions in United States Media Ranking in United States	Engineering └ Electrical and Electronic Engineering Materials Science └ Electronic, Optical and Magnetic Materials Physics and Astronomy ├ Atomic and Molecular Physics, and Optics └ Condensed Matter Physics	John Wiley & Sons Inc.	79

PUBLICATION TYPE	ISSN	COVERAGE	INFORMATION
Journals	10982760, 08952477	1988-2022	Homepage How to publish in this journal mopjournal@wiley.com

SCOPE

Microwave and Optical Technology Letters provides quick publication (3 to 6 month turnaround) of the most recent findings and achievements in high frequency technology, from RF to optical spectrum. The journal publishes original short papers and letters on theoretical, applied, and system results in the following areas. - RF, Microwave, and Millimeter Waves - Antennas and Propagation - Submillimeter-Wave and Infrared Technology - Optical Engineering All papers are subject to peer review before publication