Teguh Firmansyah <teguhfirmansyah@untirta.ac.id>

IEEE Access - Manuscript ID Access-2020-17873

2 pesan

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31-Mar-2020

Dear Mr. wibisono:

Your manuscript entitled "A highly independent multiband bandpass filter using a multi-coupled line stub-SIR with folding structure" has been successfully submitted online and is presently being given full consideration for publication in IEEE Access.

As noted during the submission of your manuscript, IEEE Access is a fully open access journal. Open Access provides unrestricted access to peer-reviewed articles via IEEE Xplore. In lieu of paid subscriptions, authors are required to pay an article processing charge of $1,750 after the article has been accepted for publication.

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At this time, we kindly request your assistance in helping us improve IEEE Access by taking this QUICK 4-QUESTION SURVEY in the following link: https://research.ieee.org/jfe/form/SV_7R63xmcN4etQVEx

Thank you again for submitting your manuscript to IEEE Access.

Sincerely,

IEEE Access Editorial Office

IEEE Access <onbehalfof@manuscriptcentral.com> 1 April 2020 pukul 06.53
Balas Ke: ieeeaccess@ieee.org
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Your manuscript entitled "A highly independent multiband bandpass filter using a multi-coupled line stub-SIR with folding structure" has been successfully submitted online and is presently being given full consideration for publication in IEEE Access.

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[Kutipan teks disembunyikan]

Teguh Firmansyah <teguhfirmansyah@untirta.ac.id>

IEEE Access - Decision on Manuscript ID Access-2020-17873

2 pesan

IEEE Access <onbehalfof@manuscriptcentral.com> 14 April 2020 pukul 22.57
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Cc: raghvendra.chaudhary@gmail.com, raghvendra@iitism.ac.in, teguhfirmansyah@untirta.ac.id, mudrikalaydrus@yahoo.com, yuyuwahyusr@gmail.com, eko@eng.ui.ac.id, gunawan@eng.ui.ac.id

14-Apr-2020

Dear Mr. wibisono:

Your manuscript entitled "A highly independent multiband bandpass filter using a multi-coupled line stub-SIR with folding structure" has been accepted for publication in IEEE Access. The comments of the reviewers who reviewed your manuscript are included at the foot of this letter. We ask that you make changes to your manuscript based on those comments, before uploading final files.

However, NO CHANGES to the author list or the references will be permitted.

Finally, please improve the English grammar and check spelling, as it is only lightly edited before publication.

Once you have updated your article accordingly, please send all final versions of your files through the “Awaiting Final Files” queue in your Author Center on ScholarOne Manuscripts. Once you have completed the submission of your final files you will not be able to make changes until you have received your page proofs from IEEE.

Please submit all of the following in the list below and note that all files intended for publication need to be uploaded during this step, even if some files are unchanged from your previous submission (including multimedia videos). If all files are not submitted with final files, it will delay the publication of your article, or result in certain files not being published.

1) Manuscript in MS Word or LaTex.
2) A PDF of the final manuscript in double column, single-spaced format named "FINAL Article.pdf". If not used already, templates can be found at: http://ieeeauthorcenter.ieee.org/?s=IEEE+Access+templates
3) Biographies and author photos in MS Word.
4) Figures/photos saved as separate PDF, Word, .eps, .ps, or .tiff files (if not embedded in the source file)
5) A Graphical Abstract (GA) which provides a concise, visual summary of the findings of your article. The GA should be a figure, image, or multimedia video from the accepted article. If you submitted a video with your article submission, this will automatically become the GA, and a still image will be required to act as an overlay. As a reminder, you must submit the video again with your final files or it will not be published with your article. For more information on the GA, please go to: http://ieeeaccess.ieee.org/submitting-an-article/#GraphicalAbstracts
6) A Word file that indicates: a) the file name(s) of the GA and overlay (if applicable), b) a caption for the GA that should not exceed 60 words.

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Thank you for your fine contribution. On behalf of the Editors of IEEE Access, we look forward to your continued contributions to IEEE Access.

Sincerely,
Dr. Raghvendra Kumar Chaudhary
Associate Editor, IEEE Access
raghvendra.chaudhary@gmail.com, raghvendra@iitism.ac.in

Reviewer(s)' Comments to Author:

Reviewer: 1

Recommendation: Accept (minor edits)

Comments:
The paper is well organized and presented well. But authors may clear few points
1) How coupling matrices in Table1, Table2 and Table 3 are obtained for different filters? There are no references mentioned.

2) Fig.4 shows that the coupling coefficient is around 0.111 for s1 =0.5mm which is used for physical realization. But in the coupling matrix in table 1 source to resonator 1 coupling coefficient is around 0.5795 which can't be achieved even at s1=1.5mm. And the graph starts showing saturation beyond s1=1.25mm.There are also large value of coupling value for example source to resonator 1 coupling is 6.058 in table 3. So the author may explain how the coupling coefficients in the matrix are obtained physically.

Additional Questions:
Does the paper contribute to the body of knowledge?: Yes it contributes.

Is the paper technically sound?: Yes the paper is technically sound

Is the subject matter presented in a comprehensive manner?: yes It was presented well.

Are the references provided applicable and sufficient?: papers on coupling matrix are missing.

Reviewer: 2

Recommendation: Accept (minor edits)

Comments:
Concern # 1: The organization of the manuscript is very well. However, there are few typo mistakes like, Coupling matriks model, substrate integrated waveguide (SAW), low-isolation interband (ISO).
Concern # 2 : The title of reference no. 12 is incomplete.
Concern # 3: The results of simulated and measured dual-band BPFs shown in Table 5, it is not clear why comparison of transmission zeros (Isolation interband) for simulated is at 2.25GHz but for measured is at 2.24 GHz.

Additional Questions:
Does the paper contribute to the body of knowledge?: yes

Is the paper technically sound?: yes

Is the subject matter presented in a comprehensive manner?: yes

Are the references provided applicable and sufficient?: N.A.

Reviewer: 3

Recommendation: Accept (minor edits)

Comments:
The author addressed all the quires.

Additional Questions:
Does the paper contribute to the body of knowledge?: yes

Is the paper technically sound?: yes

Is the subject matter presented in a comprehensive manner?: yes

Are the references provided applicable and sufficient?: NA

If you have any questions, please contact article administrator: Miss Mansi Kukreti m.kukreti@ieee.org

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Teguh Firmansyah <teguhfirmansyah@untirta.ac.id> 16 April 2020 pukul 10.44
Kepada: Jun KONDOH <kondoh.jun@shizuoka.ac.jp>

Dear Prof Kondoh sensei,

This is my last paper (before joint as a student at Shizuoka University).
The data was taken from the 1st year research at Universitas Indonesia
with supported by Gunawan Wibisono sensei (UI QQ Research Grand 2019)
The topic is focused on highly independent multiband bandpass, which
was accepted yesterday (April 15, 2020) by IEEE Access IF = 4.09.

Best regards,
Firmansyah.

---------- Forwarded message ----------
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yuyuwahyusr@gmail.com, eko@eng.ui.ac.id, gunawan@eng.ui.ac.id

14-Apr-2020

Dear Firmansyah,
[Kutipan teks disembunyikan]
[Kutipan teks disembunyikan]

IEEE Access Firmansyah.pdf
3532K

Original Manuscript ID: Access-2019-25443

Original Article Title: "A highly independent multiband bandpass filter using a multi-coupled line stub-SIR with folding structure"

To: IEEE Access Editor

Re: Response to reviewers

Dear Editor,

Thank you for allowing a resubmission of our manuscript, with an opportunity to address the reviewers' comments.

We are uploading (a) our point-by-point response to the comments (below) (response to reviewers), (b) an updated manuscript with yellow highlighting indicating changes, and (c) a clean updated manuscript without highlights (PDF main document).

We hope that this paper can be assigned to the same reviewers.

Best regards,

Gunawan Wibisono et al.
Universitas Indonesia
Depok Campus, 16424 Depok, Jawa Barat, Indonesia
Email : gunawan@eng.ui.ac.id

Response Letter

Manuscript ID Access-2019-25443

Title :
A highly independent multiband bandpass filter using a multi-coupled line stub-SIR with folding structure

Authors :
Teguh Firmansyah,(Member, IEEE), Mudrik Alaydrus,(Senior Member, IEEE), Yuyu Wahyu, (Member, IEEE), Eko Tjipto Rahardjo, (Member, IEEE) and Gunawan Wibisono, (Member, IEEE)

First of all, we would like to thank the reviewers for their in-depth and constructive reviews of our manuscript and the editor for his careful reading and suggestion to resubmit our manuscript. In this revised version of the manuscript, we did our best to address all comments raised by the reviewers. A detailed item-by-item response to each of the reviewers' points is presented below.

Reviewer 1

Concern # 1:
This paper proposed a highly independent multiband BPF, which can generate a highly independent inter passband. This paper can be accepted with minor revision.

Author response:
Many thanks to the reviewer for this positive feedback.

Concern # 2:
In line 57, the resonator C is embedded at the center of resonator B, not 'A' as described in the paper.

Author response: We apologize for this error, and we have corrected the text as suggested by the reviewer.

Author action: We updated the manuscript by yellow highlight, as shown on page 2, line 5.

Concern # 3:
Most of the equations are well known for the researchers, please simplify the derivation process.

Author response: We agree with the referee that most of the equations are well known.
We have removed the unnecessary derivation process of the equation suggested by reviewer.

Author action: We updated the manuscript by yellow highlight as shown on page 7 line 32 (for equation no.16) and page 8 line 1 (for equation no. 17)

Reviewer 2

Concern # 1:

The manuscript is written well and discussion related to the subject matter is presented in a comprehensive manner.

Author response: Many thanks to the reviewer for this positive feedback and fruitful discussion.

Concern # 2:

Section III (D) should be discussed in detail as per as folding structure is concerned. Because of folding, there may be coupling between resonators B1 B2 C1 C2. Detailed discussion related to coupling mechanism/principle should be discussed.

Author response: As suggested by the reviewer. We have extended the coupling mechanism by using the coupling matrix and the value of the coupling matrix, as shown in Table 8 and Figure 27.

TABLE 8. Coupling matrix of miniaturized independent multiband BPF

M_{MN}	$M=S$	$M=1$	$M=2$	$M=3$	$M=4$	$M=5$	$M=6$	$M=7$	$M=8$	$M=L$
$N=S$	0	4.930	0	0	0	0	0	1.114	0	6.202
$N=1$	4.930	76.672	34.705	64.511	0	0	-1.954	0	0	0
$N=2$	0	34.705	0	59.158	0	0	0	0	0	0
$N=3$	0	64.511	59.158	0	0	0	0	0	0	0
$N=4$	0	0	0	0	0	-78.887	0.044	0	0	0
$N=5$	0	0	0	0	-78.887	0	8.937	0	0	0
$N=6$	0	-1.954	0	0	0.044	8.937	0.156	0	0	-2.522
$N=7$	1.114	0	0	0	0	0	0	0	0.273	0
$N=8$	0	0	0	0	0	0	0	0.273	0	-0.616
$N=L$	6.202	0	0	0	0	0	-2.522	0	-0.616	0

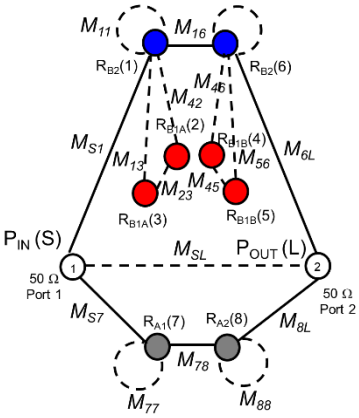


FIGURE 27. Coupling matrix

Author action: As suggested by the reviewer. We updated the manuscript by yellow highlight as shown on page 14 line 1-13

Concern # 3:

Minor typos are there, kindly go through the manuscript and correct.

Author response: We appreciate the reviewer's comments.

Author action: We have re-read and reviewed the entire text. We hope that all minor typos have been deleted. For the information, we also use AJE as a professional proofread, which is recommended by IEEE.

Reviewer 3

Concern # 1:

The manuscript based on multiband bandpass filter using a multi-coupled line stub-SIR with folding structure is an interesting topic, and the organization of the manuscript is very well.
Author response:

Author response: Many thanks to the reviewer for this positive feedback.

Concern # 2 :

The concept of stepped impedance resonator (SIR) is very well known for multiband operations, which is addressed by many authors previously. The novelty of the proposed filter is missing.

Author response:
The significant contributions of this paper are as follows.

1) Most previous studies have focused on multiband BPF design [8]-[30] without considering the independence of inter-passbands. As a novelty, We focus on highly independent multiband BPF. This structure is making each passband response highly independent, where each band of multiband BPF can be controlled and adjusted separately.
2) The important feature of multicoupled line stub-SIR with a folding resonator structure is its highly independent performance with a simple structure and it can be easily analyzed and manufactured.
3) The three passband frequencies could be tuned independently and separately, as shown by the independent response of the insertion loss $|S_{21}|$ and the reflection coefficients $|S_{11}|$ at each passband and by the different direction of the surface current flows.
4) The folding structure method successfully reduces the multiband BPF dimensions by over 61.29 %, which makes the proposed multiband BPF very compact. The multiband BPF has a size of 0.32 λ_G x 0.31 λ_G. After the folding structure was applied, the multiband BPF size became 0.32 λ_G x 0.12 λ_G, where λ_G is the wavelength of the fundamental frequency
5) The proposed multiband BPF has performance advantages such as an excellent insertion loss $|S_{21}|$, a reflection coefficient $|S_{11}|$ with good transmission zeros and an isolation interband. The validity of the performance is shown by the excellent agreement between the simulated and measured results**.**
6) Finally, the proposed multiband BPF structure can be applied for 5G communication at 3.5 GHz.

Author action: As suggested by the reviewer. We updated the manuscript by yellow highligt as shwon in page 2 line 22

Concern # 3 :

The section B and section C has been already explained by many authors so, in my point of view no need to explain it again.

Author response: We agree with the referee, however, to make a more comprehensive discussion and clear explanations, so we explained all the multiband BPF structure.

Concern # 4 :

If possible author have to incorporate coupling mechanism.

Author response: As suggested by the reviewer, we have provided a coupling mechanism with the coupling matrix and the comparison of the result. The details explanation as follows;

For single-band BPF :

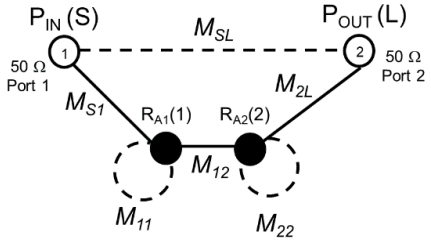
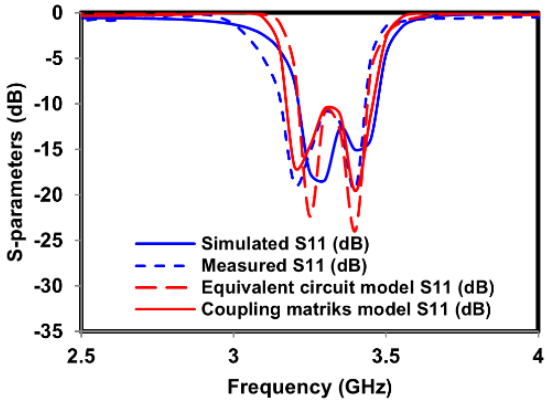


TABLE 1. Coupling matrix of single-band BPF structure

M_{MN}	$M = S$	$M = 1$	$M = 2$	$M = L$
$N = S$	0	0.5795	0	0.1535
$N = 1$	0.5795	0.1377	-0.5833	0
$N = 2$	0	-0.5833	0.1377	0.5795
$N = L$	0.1535	0	0.5795	0



Author action: We updated the manuscript by yellow highlight as shown on page 4 line 5

For dual-band BPF :

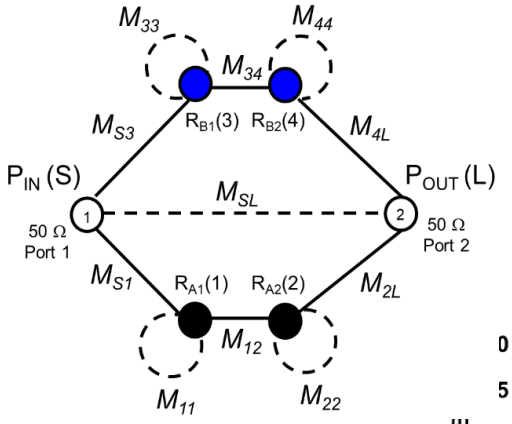
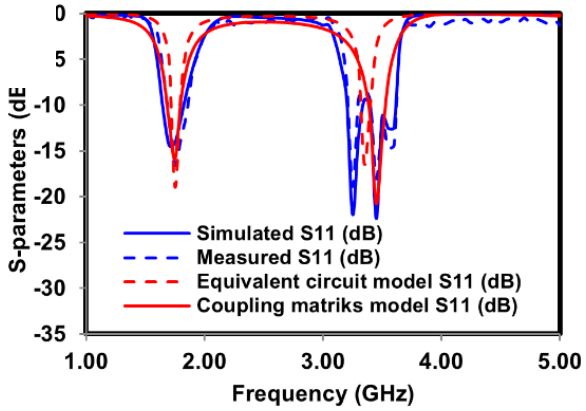


TABLE 2. Coupling matrix of dual-band BPF structure

M_{MN}	$M = S$	$M = 1$	$M = 2$	$M = 3$	$M = 4$	$M = L$
$N = S$	0	0.299	0	-0.264	0	0.103
$N = 1$	0.299	0.380	0.707	0	0	0
$N = 2$	0	0.707	-1.030	0	0	0.932
$N = 3$	-0.264	0	0	-26.271	-51.382	0
$N = 4$	0	0	0	-51.382	-103.010	-0.699
$N = L$	0.103	0	0.932	0	-0.699	0



Author action: We updated the manuscript by yellow highlight as shown on page 6 line 17

For multi-band BPF :

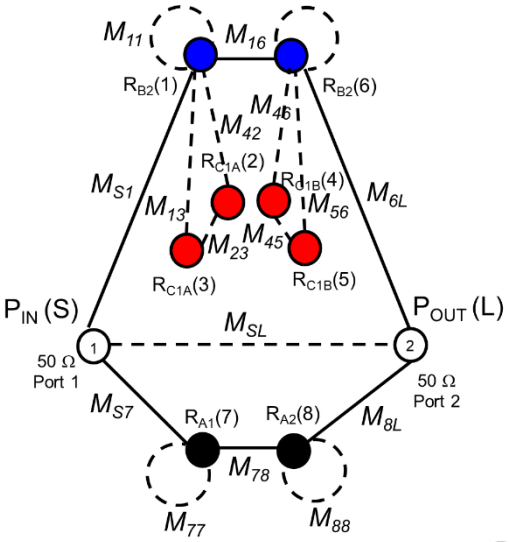
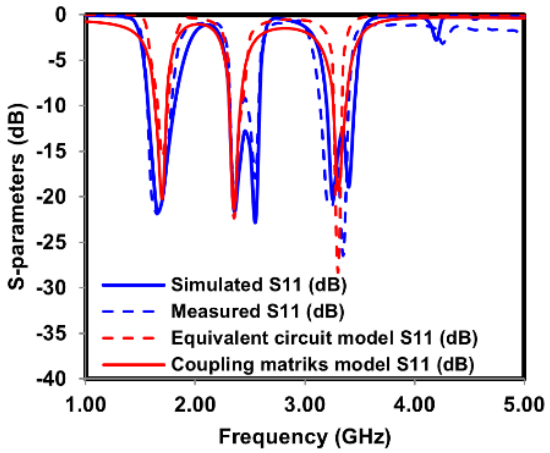


TABLE 3. Coupling matrix of multi-band BPF structure

M_{MN}	$M=S$	$M=1$	$M=2$	$M=3$	$M=4$	$M=5$	$M=6$	$M=7$	$M=8$	$M=L$
$N=S$	0	6.058	0	0	0	0	0	0.906	0	5.547
$N=1$	6.058	83.428	61.748	70.393	0	0	-2.073	0	0	0
$N=2$	0	61.748	0	103.026	0	0	0	0	0	0
$N=3$	0	70.393	103.026	0	0	0	0	0	0	0
$N=4$	0	0	0	0	0	-7.265	0.047	0	0	0
$N=5$	0	0	0	0	-7.265	0	1.788	0	0	0
$N=6$	0	-2.073	0	0	0.047	1.1788	0.0714	0	0	-2.004
$N=7$	0.906	0	0	0	0	0	0	0	0.207	0
$N=8$	0	0	0	0	0	0	0	0.207	0	-0.369
$N=L$	5.547	0	0	0	0	0	-2.004	0	-0.369	0



Author action: We updated the manuscript by yellow highlight as shown on page 7 line 38

For miniaturized multi-band BPF :

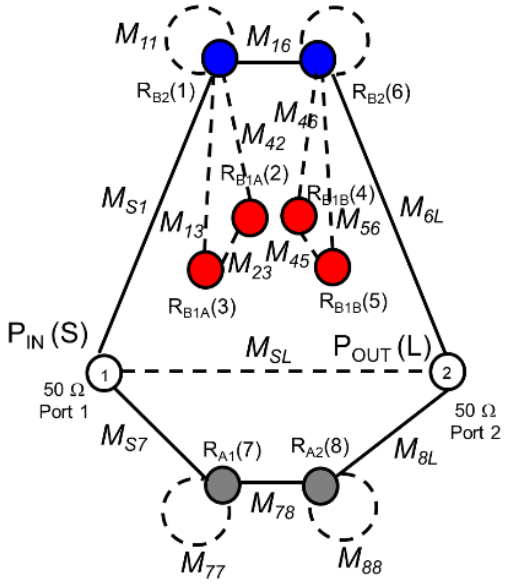
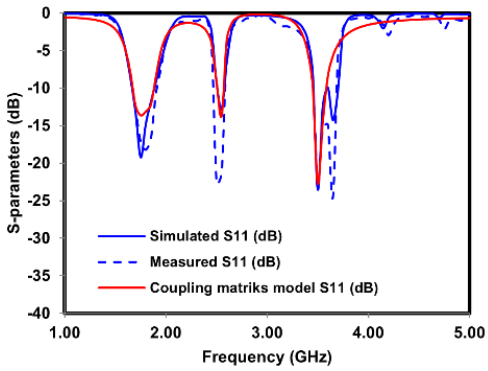


TABLE 8. Coupling matrix of miniaturized independent multiband BPF

M_{MN}	$M=S$	$M=1$	$M=2$	$M=3$	$M=4$	$M=5$	$M=6$	$M=7$	$M=8$	$M=L$
$N=S$	0	4.930	0	0	0	0	0	1.114	0	6.202
$N=1$	4.930	76.672	34.705	64.511	0	0	-1.954	0	0	0
$N=2$	0	34.705	0	59.158	0	0	0	0	0	0
$N=3$	0	64.511	59.158	0	0	0	0	0	0	0
$N=4$	0	0	0	0	0	-78.887	0.044	0	0	0
$N=5$	0	0	0	0	-78.887	0	8.937	0	0	0
$N=6$	0	-1.954	0	0	0.044	8.937	0.156	0	0	-2.522
$N=7$	1.114	0	0	0	0	0	0	0	0.273	0
$N=8$	0	0	0	0	0	0	0	0.273	0	-0.616
$N=L$	6.202	0	0	0	0	0	-2.522	0	-0.616	0



Author action: We updated the manuscript by yellow highlight as shown on in page 14 line 1

Concern # 5 :

The author has to explain the reason why measured S11 is more simulated S11.

Author response: Many thanks to the reviewer for fruitful discussion. We realize that simulations are made ideal conditions with a variety of approaches. Several things cannot be done with simulations, including homogeneity of the substrate, the lack of solder, and the loss of connectors and cables. We hope this result does not reduce our main proposal for designing an independent multi-band BPF.

Concern # 6

The proposed filter has been designed using RT/Duroid 5880 substrate but still the performance (i.e. Insertion loss and return loss) is not so good in terms of filter, is there any specific reason behind it.

Author response: Thank you for the in-depth review. The use of RT/duroid 5880 laminates substrate is expected to increase the performance. So, we decided to re-fabricated and re-measured it with a low loss connector and cables. The results obtained are better than the previous results. We hope that even if there is a shift, it still be within acceptable limits.

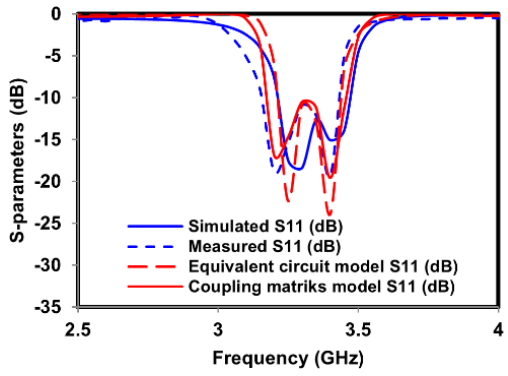
Concern # 7

The equivalent circuit model of the proposed circuits is not match with simulated and measured result.

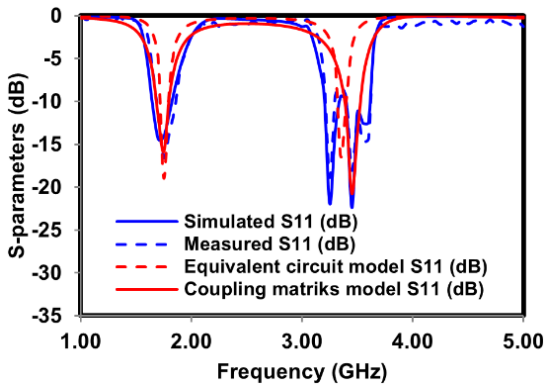
Author response:

We appreciate the reviewer's comments. Although the equivalent circuit model of the proposed circuits is slightly not matched, We realize that results are still within acceptable limits. We hope it does not reduce the main novelty of the paper, which is focused on highly independent multiband BPF, where each band of multiband BPF can be controlled and adjusted separately. Besides that, we also add matrix coupling analysis to enrich the discussion.

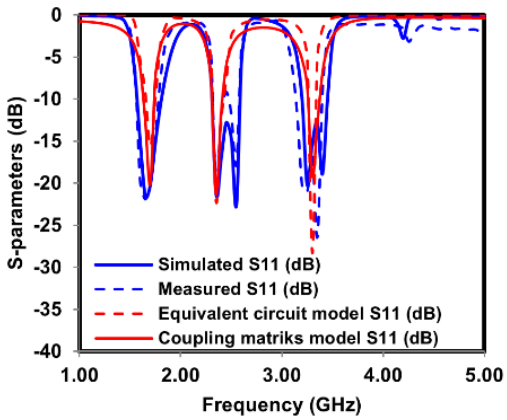
Single band BPF



Dual-band BPF



Multiband BPF



Reviewer 4

Concern # 1

The authors present a multiband bandpass filter using a multi-coupled line stub-SIR with folding structure. The manuscript is well written. However technically, the stubs have been well adopted for the multiband BPF designs in the past. So, the novelty as well as contribution of this work is marginal.

Author response: Many thanks to the reviewer for fruitful discussion.
The significant contributions of this paper are as follows.

1) Most previous studies have focused on multiband BPF design [8]-[30] without considering the independence of inter-passbands. As a novelty, We focus on highly independent multiband BPF. This structure is making each passband response highly independent, where each band of multiband BPF can be controlled and adjusted separately.
2) The important feature of multicoupled line stub-SIR with a folding resonator structure is its highly independent performance with a simple structure and it can be easily analyzed and manufactured.
3) The three passband frequencies could be tuned independently and separately, as shown by the independent response of the insertion loss $|S_{21}|$ and the reflection coefficients $|S_{11}|$ at each passband and by the different direction of the surface current flows.
4) The folding structure method successfully reduces the multiband BPF dimensions by over 61.29 %, which makes the proposed multiband BPF very compact. The multiband BPF has a size of 0.32 λ_G x 0.31 λ_G. After the folding structure was applied, the multiband BPF size became 0.32 λ_G x 0.12 λ_G, where λ_G is the wavelength of the fundamental frequency
5) The proposed multiband BPF has performance advantages such as an excellent insertion loss $|S_{21}|$, a reflection coefficient $|S_{11}|$ with good transmission zeros and an isolation interband. The validity of the performance is shown by the excellent agreement between the simulated and measured results**.**
6) Finally, the proposed multiband BPF structure can be applied for 5G communication at 3.5 GHz.

Author action: As suggested by the reviewer. We updated the manuscript by yellow highlight as shown on page 2 line 22

Concern # 2

Normally, fc and λg are used to define cutoff frequency and guided wavelength not for fundamental frequency.

Author response:

Many thanks to the reviewer for this fruitful discussion. We realize some references to use *fc and λg are used to define cutoff frequency and guided wavelength*. However, in terms of RF electronics, some references, for example [26][28][34][35] are used *fc* and *λg* for center frequency and the wavelength of the fundamental frequency. We hope this does not cause the main problem as long as we state the meaning of the symbol.

[26] D. Lu, N. S. Barker, and X. H. Tang, "Compact and independently-design tri-band bandpass filter with bandwidth and return loss control," *Electron. Lett.*, vol. 52, no. 24, pp. 7–8, 2016, doi: 10.1049/el.2016.3247.

[28] N. Kumar and Y. K. Singh, "Compact tri-band bandpass filter using three stub-loaded open-loop resonator with wide stopband and improved bandwidth response," *Electron. Lett.*, vol. 50, no. 25, pp. 50–51, 2014, doi: 10.1049/el.2014.3425.

[34] Y. Feng *et al.*, "Tri-band superconducting bandpass filter with controllable passband specifications," *Electron. Lett.*, vol. 50, no. 20, pp. 1456–1457, 2014, doi: 10.1049/el.2014.2352.

[35] L. Gao, X. Y. Zhang, B. J. Hu, and Q. Xue, "Novel multi-stub loaded resonators and their applications to various bandpass filters," *IEEE Trans. Microw. Theory Tech.*, vol. 62, no. 5, pp. 1162–1172, 2014, doi: 10.1109/TMTT.2014.2314680.

Concern # 3

In Fig. 3 (b) even and odd mode frequency response is presented graphically only analysis part is missing.

Author response: As suggested by the reviewer, we have included the analysis part.

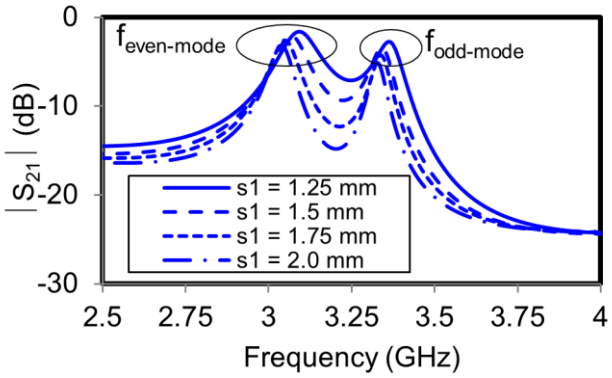


Fig 3(b) shows the simulated results of odd-mode and even-mode frequency of $|S_{21}|$ with varied gaps (s_1). The resonant frequencies (f_C) value are determined by odd-mode resonant frequency ($f_{odd\text{-}mode}$) and even-mode resonant frequency ($f_{even\text{-}mode}$). Usually, the $f_{odd\text{-}mode}$ is higer than $f_{even\text{-}mode}$ and the resonant frequencies (f_C) is in the middle of the $f_{odd\text{-}mode}$ and $f_{even\text{-}mode}$. It can be seen that the $f_{odd\text{-}mode}$ and $f_{even\text{-}mode}$ excitations are shifted by different gap values (s_1). However, the resonant frequencies (f_C) remains stable, indicating that the gap variations do not affect the f_C values.

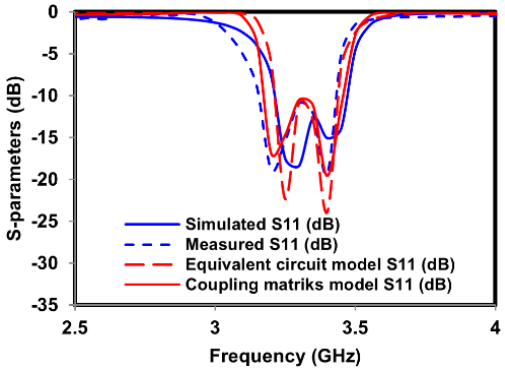
Author action: We updated the manuscript by yellow highlight as shown in page 3 line 44.

Concern # 4

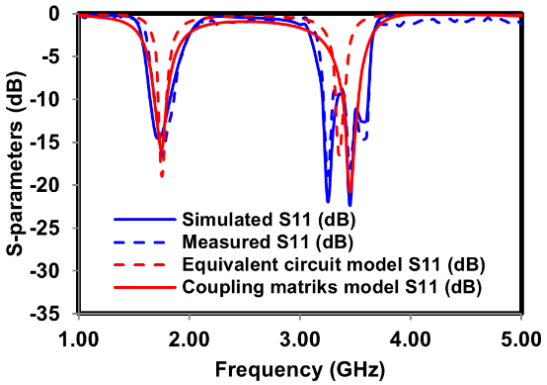
The equivalent circuit model is not match with simulated and measured result.

Author response: We appreciate the reviewer's comments. Although the equivalent circuit model of the proposed circuits is slightly not matched, We realize that results are still within acceptable limits. We hope it does not reduce the main novelty of the paper, which is focused on highly independent multiband BPF, where each band of multiband BPF can be controlled and adjusted separately. Besides that, we also add matrix coupling analysis to enrich the discussion.

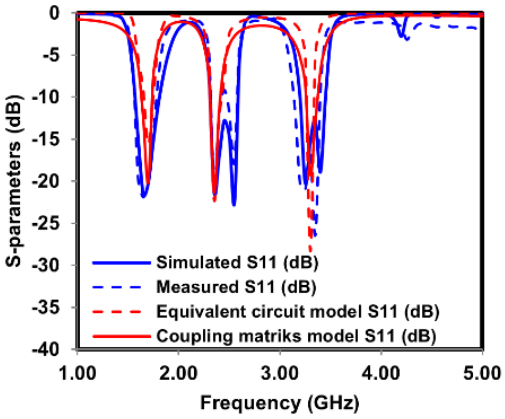
Single band BPF



Dual-band BPF



Multiband BPF



Concern # 5

In measured results, almost 2dB ripple observed in the passband, which may degrade the filter response.

Author response: Thank you for the in-depth review. We decided to re-fabricated and re-measured it with a low loss connector and cables. The results obtained are better than the previous results. We hope that even if there is a shift, it still be within acceptable limits.

Concern # 6

There are so many references where it is found that the proposed filter response is not so much good compared to other reported filters.

Author response: We appreciate the reviewer's comments. Most previous studies have focused on multiband BPF design [8]-[30] without considering the independence of inter-passbands. As a novelty, We focus on highly independent multiband BPF. This structure is making each passband response highly independent, where each band of multiband BPF can be controlled and adjusted separately.

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14-Apr-2020

Dear Firmansyah,

Your manuscript entitled "A highly independent multiband bandpass filter using a multi-coupled line stub-SIR with folding structure" has been accepted for publication in IEEE Access. The comments of the reviewers who reviewed your manuscript are included at the foot of this letter. We ask that you make changes to your manuscript based on those comments, before uploading final files.

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Teguh Firmansyah <teguhfirmansyah@untirta.ac.id>

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On page(s): 0
Print ISSN: 2169-3536
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