Assistant Professor at Department of Electrical Engineering

Azad University, Science and Research Branch, Tehran, Iran

Behbod Ghalamkari

E-Mails:
ghalamkari@srbiau.ac.ir.
ghalamkari@gmail.com

ORCID code:
0000 0003 2148 9549

Research Interests

- Wave propagation and Scattering
- Antennas & EM Modeling
- RF & Microwave Circuits Design
- Computational and Applied EM
- Millimeter-Wave and THz

Languages

- English
- Persian

Google Scholar Metrics

link :
https://scholar.google.com/citations?hl=en-US&user=F8gu9tQAAAAJ

Education

2008 - 2013
✓ **Ph.D in Telecommunication Engineering (Field & Wave)**
- **Amirkabir University of Technology, Tehran, Iran**
- **Dissertation**: A Hybrid Inverse Scattering Method to Extract Characterization of a Rectangular Crack on a PEC Surface under a Dielectric Layer.
- Supervisor: Prof. Ahad Tavakoli
- GPA: 18.91/20

2005 - 2008
✓ **M.Sc. in Telecommunication Engineering (Field & Wave)**
- **Amirkabir University of Technology, Tehran, Iran**
- **Thesis**: Design & Implementation of Frequency Synthesizer for Multiport Receiver @ 24-29 GHz.
- Supervisors: Prof. Abbas Mohammadi
- Prof. Abdolali Abdipour
- GPA: 17.23/20

2001 - 2005
✓ **B.Sc.** in Electrical Engineering
- **Semnan University, Tehran, Iran**
- **Thesis**: Design & Implementation of Telephone Exchange IP-PBX

TECHNICAL SKILLS

- Several RF, microwave and antenna tests equipment.
- Professional Simulation Softwares
  CST, HFSS, Comsol FEKO, ADS, Protel DXP, AWR Microwave Office…
- Programming and Mathematics Tools
  Matlab, Maple, Mathematica, Pascal, Visual Basic, …

PUBLICATIONS

JOURNAL Papers

[1] S. Shakeri, M. Dousti, **B. Ghalamkari**" A Quad-Band DMS Loaded Bandpass Filter for Standard GPS, WiFi, WLAN, and WiMAX Applications", International Journal of RF and Microwave Computer-Aided Engineering, vol. XXX, p. XXX, 2022.

[2] P. Barati, **B. Ghalamkari**" Electromagnetic scattering of the PEMC strip located at the interface of topological insulator-dielectric by utilizing Kobayashi potential method", Engineering Analysis with Boundary Elements, vol. 135, p.258-265, 2022.

[3] A. Ashrafian, M. M-Taheri, M. N-Moghaddasi, M. Khatir, **B. Ghalamkari**, "A 57-64 GHz high-gain amplifier using ultra-wideband inductors in the IMNs and optimization by PCA and SDSM", Majlesi Journal of Electrical Engineering, vol. 15, no.4, 2021.

[4] M. Abioghli, A Keshtkar, M. Naser-Moghadasi, **B. Ghalamkari**," UWB Rectangular DRA Integrated with Reconfigurable Narrowband Antenna for Cognitive Radio Applications"IETE Journal of Research, vol. 67, no. 1, p. 139-147, 2021.

[5] H. Davoudabadifarahani, **B. Ghalamkari**, "Comment on Scattering of electromagnetic plane wave by an impedance strip embedded in homogeneous isotropic chiral medium", arXiv preprint arXiv:2109.04691 http://arxiv.org/abs/2109.04691

[6] A. Ashrafian, M. Mohammad-Taheri, M. Naser-Moghaddasi, M. Khatir, **B. ghalamkari**, "Planar circuit analysis of ultra-wideband millimeter-wave inductor using transmission line sections", International Journal of Circuit Theory and Applications, vol. 49, no. 10, p. 3378-3393, 2021.

[7] F. Rastegari, M. Dousti, **B. Ghalamkari**, "System design of a low-power non-coherent receiver to stimulate wireless nerve implants" Journal of Intelligent Procedures in Electrical Technology Communications, vol. 12, no. 46, p. 85-97, 2021. (in Persian)

[8] P. Barati, **B. Ghalamkari**, "Semi-analytical solution of electromagnetic scattering of a slit in PEC plane located in TI medium, Engineering Analysis with Boundary Elements, vol. 128, p. 35-41, 2021.

[9] S. Zandi-Pouryan, **B. Ghalamkari**, M Naser-Moghadasi, "Wideband log-periodic phase shifter", Int .J. of RF and Microwave Computer-Aided Eng., vol. 31, no.9 , 2021.

[10] F. Rastegari, M. Dousti, **B. Ghalamkari**, "A 0.75 V Sub-mW CMOS LNA employing transmitted signal suppression technique in a full-duplex wireless brain-machine interface transceiver", AEU-International Journal of Electronics and Communications 132, 153632, 2021.

[11] M. Abioghli, M. Naser-Moghadasi, Á. Keshtkar**, B. Ghalamkari**, "Cognitive Radio Applications and Tuning With Using Impedance Matching Circuit Design" Tabriz Journal of Electrical Eng. , vol. 50, no. 4, p. 1455-1461, 2021.

[12] P. Barati**, B. Ghalamkari**, “Semi-analytical solution of electromagnetic scattering of a slit in PEC plane located in TI medium”, Engineering Analysis with Boundary Elements, vol. 123, p. 62-69, 2021.

[13] M. Roohi, J. Mazloum, M. A. Pourmina, **B. Ghalamkari**, “Machine Learning Approaches for Automated Stroke Detection, Segmentation, and Classification in Microwave Brain Imaging Systems”, Progress In Electromagnetics Research C, vol. 116, p.193–205, 2021.

[14] P. Barati, **B. Ghalamkari**, “Analytical solution of electromagnetic scattering from PEMC strip located at TI medium”, Optik, vol. 123, 2021.

[15] H Davoudabadifarahani, **B. Ghalamkari**,” Rigorous electromagnetic scattering solution of a PEMC strip placed at interface of dielectric-chiral media using Kobayashi Potential”, Waves in Random and Complex Media, p.1-17, 2020.

[16] H. Davoudabadifarahani, **B. Ghalamkari**, “Closed-form formulas, zero RCS and Brewster angle conditions for interface of two different chiral media”The European Physical Journal Plus, vol. 135, no. 8, p.1-11, 2020.

[17] H. Davoudabadifarahani, **B. Ghalamkari**, “Correction to scattering of electromagnetic plane wave by a PEC strip in homogeneous isotropic chiral medium”, Journal of Electromagnetic Waves and Applications, p. 1-5, 2020.

[18] H. Davoudabadifarahani, **B. Ghalamkari**, “Analytical solution of electromagnetic scattering by PEMC strip embedded in chiral medium”, Engineering Analysis with Boundary Elements, vol. 113, p. 1-8, 2020.

[19] E. Amin, **B. Ghalamkari**, M. Naser-Moghadasi, “A novel wideband high-gain modified biquad dipole antenna”, International Journal of RF and Microwave Computer-Aided Engineering, vol. 30, no. 2, 2020.

[20] E. Amin, **B. Ghalamkari**, M. N. Moghadasi,” A Novel Ultra Wide-Band Dipole Antenna”JOURNAL OF IRANIAN ASSOCIATION OF ELECTRICAL AND ELECTRONICS ENGINEERS, vol. 16, no. 4, p. 27-33, 2020.

[21] S. Sedighi Maragheh, M. Dousti, M. Dolatshahi, **B. Ghalamkari**, “Tunable dual-band bandpass filter for multi-standard applications”, AEU-International Journal of Electronics and Communications, vol. 111, 152885, 2019.

[22] H. Davoudabadifarahani, **B. Ghalamkari**, “High efficiency miniaturized microstrip patch antenna for wideband terahertz communications applications”, Optik, vol. 194, 2019.

[23] E. Amin, **B. Ghalamkari**, M. N Moghadasi, “A Novel Dual-Band Dipole Antenna for WLAN and LTE Applications”, Wireless Personal Communications, vol. 108, no. 4, p. 2675-2683, 2019.

[24] S. Sedighi, M. Dousti, M. Dolatshahi, **B. Ghalamkari**, “A dual-mode tunable bandpass filter for GSM, UMTS, WiFi, and WiMAX standards applications”, International Journal of Circuit Theory and Applications, vol. 47, no. 4, p. 561-571, 2019.

[25] S. Efazati, **B. Ghalamkari**, P. Azmi, E. A. Jorswieck, "Quality of Service Performance Analysis of Relaying Networks With Multiple Buffer-Aided Relays", IEEE Transactions on Vehicular Technology, vol. 68, no. 4, p. 4016-4026, 2019.

[26] M. Abioghli, M. Naser-Moghadasi, Á. Keshtkar**, B. Ghalamkari**, "A Frequency Reconfigurable Band-notched UWB Dielectric Resonator Antenna with a Wide-tuning Range for Cognitive Radio Systems", IETE Journal of Research, p. 453-462, 2018.

[27] A. Jafargholi, A. Jafargholi, **B. Ghalamkari**, "Dual-Band Slim Microstrip Patch Antennas" IEEE Transactions on Antennas and Propagatio, vol. 66, no. 12, p. 6818-6825, 2018.

[28] M. Faridani, **B. Ghalamkari**, "Four-element lens array antenna for advanced point-to-(multi)point high-bandwidth wireless communication", Journal of Computational Electronics, vol. 17, no. 3, p. 1082-1089, 2018.

[29] S. Sedighi Maragheh, M. Dousti, M. Dolatshahi, **B. Ghalamkari**, "A novel dual-band tunable notch filter with controllable center frequencies and bandwidths", AEU-International Journal of Electronics and Communications, vol. 88, p. 70-77, 2018.

[30] F. Arpanaei, M. Shakeri, **B. Ghalamkari**, "An Improved and Novel De-Ramping Technique for Linear Frequency Modulated Continuous Wave Synthetic Aperture Radar", Journal of Telecommunication, Electronic and Computer Engineering (JTEC), vol. 8, no. 9, p. 53-60, 2016.

[31] **B. Ghalamkari**, A. Tavakoli, "A fast solution of TM wave scattering by a coated 2D partially filled rectangular crack", Journal of Electromagnetic Waves and Applications, vol. 30, no. 14, p. 1895-1908, 2016.

[32] M. Faridani, **B. Ghalamkari**, "A Dual Wideband Millimeter-Wave microstrip Antenna With Asymmetric Patch", International Journal of Advance Computational Engineering and Networking, vol. 4, no. 7, p. 51-53, 2016.

[33] **B. Ghalamkari**, A. Tavakoli, "A fast solution of TE wave scattering by a 2D partially dielectric filled and coated rectangular crack", Journal of Electromagnetic Waves and Applications, vol. 30, no. 7, p. 834-848, 2016.

[34] B Ghalamkari, A Tavakoli, M Dehmollaian, "A Fast Semianalytical Solution of a 2-D Dielectric-Filled and Coated Rectangular Groove", IEEE transactions on antennas and propagation, vol. 62, no. 10, p. 5099-5107, 2014.

[35] **B Ghalamkari**, A Tavakoli, M Dehmollaian, "Analytical Solution of Scattering by a 2D Dielectric Filled Crack in a Ground Plane Coated by a Dielectric Layer: TM Case.",Applied Computational Electromagnetics Society Journal, vol. 28, no. 6, 2013.

[36] **B Ghalamkari**, A Tavakoli, M Dehmollaian, "Analytical Solution of Scattering by a 2D Dielectric Filled Crack in a Ground Plane Coated by a Dielectric Layer: TE Case.", Applied Computational Electromagnetics Society Journal, vol. 27, no. 11, 2012.

CONFERENCE PAPERS

[37] S. Sedighi Maragheh, M. Dousti, M. Dolatshahi, **B. Ghalamkari**,"Adjustable band pass filter from 2/06 to 66.2 GHz with adjustable center frequency and bandwidth", Fifth National Conference on Electrical and Mechatronics Engineering, Najaf abad, Iran, 2019. (in Persian)

[38] E Amin, **B Ghalamkari**, M. N. Moghaddasi, "A novel dual-band dipole antenna for WLAN applications" Fourth International conference on Electrical and Computer Engineering, Iran, Tehran 2017.

[39] **B. Ghalamkari**," Electromagnetic Plane-Wave Scattering of a Coated and partially filled Rectangular Crack", Eighth International Symposium on Telecommunications (IST 2016), Iran, Telecommunication Research Center, 2016.

[40] **B. ghalamkari**, "Analytical solution of transverse electric wave scattering from a partial filled and hidden rectangular crack under a dielectric layer by the Kobayashi potential method", 1st International Conference on New Research Achivements in Electrical and Computer Engineering, Tehran, Iran, 2016. (in Persian)

[41] M. Shakeri, F. Arpanahi, **B. Ghalamkari**, "Study of Chirp Scaling Algorithm simulation in Synthetic aperture radar" The Second National Conference on Optimization in Science and Engineering, Mazandaran, Iran, 2016. (in Persian)

[42] E. Amin, **B. Ghalamkari**, "Study of field effect transistors based on CNFET carbon nanotubes in high frequency circuits and comparison with other types of transistors"1st Conference on New Perspective in Electrical and Computer Emgineering, Amirkabir University, Tehran Iran, 2016. (In Persian)

[43] E. Amin, **B. Ghalamkari**, "Comparison of Chirp Scaling Algorithm with other Conventional Compression Methods for Synthetic Aperture Radar Images"1st Conference on New Perspective in Electrical and Computer Emgineering, Amirkabir University, Tehran Iran, 2016. (In Persian)

[44] **B. Ghalamkari**, A. Tavakoli, M. Dehmollaian, "A closed form formula for determining the depth of a filled rectangular crack", Iranian Conference on Electrical Engineering, ICEE 2014 Iran, Tehran, Shahid Beheshti university, 2014. http://icee2014.sbu.ac.ir/Farsi/site/page?view=bestArticlesSelected as the Best Paper in Communication.

[45] **B. Ghalamkari**, A. Tavakoli, M. Dehmollaian, "Electromagnetic Plane-Wave Scattering of a Coated Rectangular Crack", IEEE 6th International Symposium on Telecommunications, IST 2012, Iran Telecommunication Research Center, Tehran, November, 2012.

[46] **B. Ghalamkari**, A. Tavakoli, M. Dehmollaian, "Scattering from Coated Cracks for Sub-millimeter Wave Applications",Second Conference on Millimeter Wave & Terahertz Technologies, mmwatt 2012, University of Tehran, Tehran, Iran, Dec 2012.

[47] **B. Ghalamkari**, A. Mohammadi, A. Abdipour, "Characterization of Traveling Wave Multiplier", IEEE International Conference on Circuits and Systems for Communications, ICCSC2008, shanghai, china, 2008.

[48] **B. Ghalamkari**, A. Mohammadi, A. Abdipour, "Design and Simulation of Active Frequency Tripler with Efficient and Low Spurious Response", IEEE International Conference on Microwave and Millimeter Wave Technology, ICMMT2008, pp.1780-1784 Nanjing, china, 2008.

[49] **B. Ghalamkari**, A. Mohammadi, A. Abdipour, "Design and Analysis of Traveling Wave Multiplier", 22th Iranian Conference on Electrical Engineering, ICEE2008 Iran, Tehran, Tarbiat Modares uni, 2008.

[50] **B. Ghalamkari**, J. S. Meiguni, "Design and Implementation of Telephone Exchange IP-PBX for using in Semnan University", 16th Iranian Conference on Electrical Engineering Iran, Isfahan Uni. of Technology, 2005.

BOOKS

1) Translated to Farsi: "Wireless Power Transfer via Radiowaves", Naoki Shinohara, John Wiley and Sons, 2014.

HONORS,GRANTS AND AWARDS

1) Ph.D. Dissertation Support Grant from the Iran Telecommunication Research Center (ITRC), 2011.
2) M.Sc. Thesis Support Grant from the Iran Telecommunication Research Center (ITRC), 2006
3) Agent of Radio Communication Center of Excellence, Amirkabir University In The Exhibition of 16^{th} Iranian Conference on Electrical Engineering Iran, Tehran, Tarbiat Modares uni, 2008.
4) Agent of Radio Communication Center of Excellence, Amirkabir University in the Exhibition of Production of 30 years of Centers of Excellence, Iran, Tehran, International Exhibition 2008.
5) Senior member in scientific committee of National Iranian Oil Company.
6) Best Paper Award in Communication. 22^{th} Iranian Conference on Electrical Engineering, ICEE2014 Iran, Tehran, Shahid Beheshti university, 2014.http://icee2014.sbu.ac.ir/Farsi/site/page?view=bestArticles

Reviewer of Journals

Journals

- Engineering Analysis with Boundary Elements
- International Journal of Circuit Theory and Applications
- Journal of Electromagnetic Waves and Applications
- Electronics MDPI
- Cogent Engineering
- International Journal of Engineering
- Journal of Iranian Association of Electrical and Electronics Engineers

TEACHING EXPERIENCES (From 2012 to present)

✓ ✓ Azad University (Science and Research Branch), Tehran, Iran 2014-Present

- **Graduate Courses**

  - Electromagnetic Waves Scattering
  - Advanced Electromagnetics
  - Advanced Mathematics
  - Satellite Communications
  - Active Microstrip Circuit Design
  - RF System Design
  - Computational Methods in EM

- **Undergraduate Courses**

  - Electromagnetic
  - Microwave I
  - Antenna I
  - Fields and waves
  - Mathematics Engineering

✓ Azad University (Central Branch), Tehran, Iran 2013-2016

- **Graduate Courses**

  - Satellite Communications
  - Advanced Electromagnetics

✓ Azad University (Shahr-e-Ray Branch), Tehran, Iran 2013-2015

- **Undergraduate Courses**
  - Electromagnetic
  - Mathematics Engineering

✓ Amirkabir University, Tehran, Iran 2012-2013

- **Undergraduate Courses**
  - Electromagnetic

RESAERCH EXPERIENCE

- **Analytical EM scattering Techniques**
  - Analytical solution of electromagnetic wave scattering from various structures by using **Kobayashi Potential (KP)** such as:
    - Analytical solution of EM scattering by a 2-D dielectric-filled and coated rectangular groove
    - Analytical solution of EM scattering by a 2-D Partially filled and coated rectangular groove
    - Inverse Scattering solution for estimating the characteristics of a filled rectangular groove
    - Analytical Scattering Solution of PEMC Strip Located on Lossy Dispersive Dielectric-Magnetic half-space Media
    - Analytical scattering solution of a PEMC strip located on a half space complex conjugate medium
    - Analytical solution of EM wave scattering from PEC strip located at the interface of dielectric-TI media
    - Analytical solution of EM scattering of a slit in PEC plane located in TI medium
    - EM scattering of the PEMC strip located at the interface of topological insulator-dielectric
    - Analytical scattering solution of a PEMC strip located in TI medium
    - Analytical Solution of EM Wave Scattering from PEMC Strip Placed at the Interface of Two Various Topological Insulator Media
    - Rigorous EM Scattering Solution from a Slit in an IBC Plate with Different Surface Impedances Placed between Two Different Chiral Media
    - Scattering of EM plane wave by a PEC strip in homogeneous isotropic chiral medium
    - Scattering of EM plane wave by an impedancestrip embedded in homogeneous isotropic chiral medium
    - Rigorous electromagnetic scattering solution of a PEMC strip placed at interface of dielectric-chiral media
    - Analytical Solution of EM Scattering by PEMC Strip Embedded in Chiral Medium
    - Analytical Solution of EM Scattering by a NID dielectric slab, and strip
    - Analytical Solution of EM plane wave scattering by a slit and strip embedded in an anisotropic plasma
    - Rigorous Solution of EM scattering by a 3-D Flanged Rectangular Waveguide
  - Analytical solution of electromagnetic wave scattering from various structures by using **Fourier Transform Method** such as:
    - EM Scattering from a filled and coated rectangular crack: TE & TM-Mode Analysis
    - EM Scattering from a filled and coated Bottle-shape crack: TE & TM-Mode Analysis
    - Analytical solution of Coupling through coaxial Array
    - Electromagnetic Transmission Through a Circular Aperture in a Thick Conducting Plane
    - Electromagnetic Transmission Through Multiple Circular Apertures in a Thick Conducting Plane
    - Electromagnetic Radiation of a Coaxial Cable With Narrow Slots
    - Electrostatic Transmission into Two Circular Apertures in a Thick Conducting Plane
    - Rigorous Solution of EM scattering by a 3-D rectangulat hole in a ground
  - Other Analytical solution of electromagnetic wave scattering :
    - Analytical solution of EM scattering by a 2-D Dielectric Coated Conducting Elliptic Cylinder by Mathieu functions
    - Analytical solution of EM scattering by Interface of Two Different Chiral Media
    - Analytical solution of EM scattering from a filled rectangular groove by using GTD technique
    - Modal Analysis of array of coated cylindrical ferrite

- Design, Simulation and Fabrication of various **High Frequency Structures**

- **Antennas and EM structures** :

  - UWB Rectangular DRA Integrated with Reconfigurable Narrowband Antenna for Cognitive Radio Applications
  - Reconfigurable Band-notched UWB DRA with a Wide-tuning Range for Cognitive Radio Systems
  - High Efficiency Miniaturized Microstrip Patch Antenna for Wideband Terahertz Communications Applications
  - Design and simulation of conformal wearable three-band patch antenna with frequency configurable and reduction of specific absorption rate using FSS in S band
  - A Glasses shaped Monopole Dual-Band Dipole Antenna for WLAN and LTE Applications
  - Wideband High-Gain Modified BiQuad Dipole Antenna
  - Metasurface structures for antenna RCS reduction in C band
  - HF Active Array Antenna for Using in Direction Finding System in 2-30MHz
  - Antenna and rectifier circuit for multi-band power harvesting system with optimal dimensions
  - Wideband and Multi Carrier CP Rectenna for Energy Harvesting Applications at GSM UMTS, LTE and 5G
  - Four-element lens array antenna for advanced point-to-multi point high-bandwidth wireless ommunication
  - Simulation and analysis of a multiband loop antenna for ultra-thin smartphones
  - Active Mutual Coupling Reduction in Electrically Small Array Antenna by Negative Impedance Converter
  - Yagi-uda THz Antenna
  - RCS Reduction by AMC structure 11-50 GHz
  - Dual Band Cassegrain Reflector Antenna with FSS sub reflector
  - Wide-band Octagon-Star Fractal Microstrip Patch Antenna for Terahertz Applications (0.6~11.5 THz)
  - Simulation and Fabrication of Loaded Dipole Antenna @ 30-512 MHz

- **Microwave Circuits** :

  - E-plane Waveguide Patterned Filters based on the Green equation
  - H-plane Waveguide Patterned Filters based on the Green equation
  - Directive S band Metamaterial coupler
  - 2x2 power divider based on patterned E-planes in rectangular structure using Green function (Ku Band)
  - Design, analysis, fabrication and measurement of Lumped Filter @ 330-400 MHz
  - Design, analysis, fabrication and measurement of *3 Multiplier @ 660-800 MHz
  - Design, analysis, fabrication and measurement of Lumped Filter @660-800 MHz
  - Design, analysis, fabrication and measurement of Microstrip Filter @ 1.98-2.4 GHz
  - Design, analysis, fabrication and measurement of Microstrip Filter @ 5.94-7.2 GHz
  - Design, analysis, fabrication and measurement of Microstrip Filter @ 11.88-14.4 GHz
  - Design, analysis, fabrication and measurement of Microstrip Filter @ 23.76-28.8 GHz
  - Simultaneous *2 and *3 FET multiplier in S Band
  - Fabrication and measurement a *2 Multiplier @ 330-400 MHz
  - Fabrication and measurement a *3 Multiplier @ 1.98-2.4 GHz
  - Fabrication and measurement a *2 Multiplier @ 5.94-7.2 GHz
  - Fabrication and measurement a *2 Multiplier @ 11.88-14.4 GHz
  - Design, analysis, fabrication and measurement of Step Attenuator @ DC-4GHz
  - Design, analysis, fabrication and measurement of Wideband Coupler @ 2-18 GHz
  - Asymetric Mushroom structures for fabricating Microwave Filters and Antennas
  - Multiband rectifier circuit for power harvesting with optimal dimensions (GPS, WLAN, UMTS, GSM 1800MHz)
  - Wideband and Multi Carrier CP Rectenna for Radio Frequency Energy Harvesting Applications dimensions (GSM, UMTS, LTE, 5G)

- Periodic EBG Microwave sensor for fat measurement of meat @ C Band
- Bandwidth Increasing and Flatness Improvement of Edge Coupled Line Filter by Cavity-Backed Technique and Resistive Cross Couplings (RCCs)
- A Quad-Band DMS Loaded Bandpass Filter for Standard GPS, WiFi, WLAN, and WiMAX Applications
- 5th degree narrow band coaxial cavity filter at 4 GHz frequency
- A dual-mode tunable bandpass filter for GSM, UMTS, WiFi, and WiMAX standards applications
- Highly Selective Differential-Mode Wideband Bandpass Filter (2-5GHz)
- Wideband log-periodic phase shifters (1.5-8 GHz)