

Title (en)  
RADIO FREQUENCY PHASE SHIFTING DEVICE

Title (de)  
FUNKFREQUENZPHASENVERSCHIEBUNGSVORRICHTUNG

Title (fr)  
DISPOSITIF DE DÉCALAGE DE PHASE DE FRÉQUENCE RADIO

Publication  
**EP 3609017 A1 20200212 (EN)**

Application  
**EP 18187483 A 20180806**

Priority  
EP 18187483 A 20180806

Abstract (en)  
A phase shifting device with a linear transmission line (4) comprises a first electrode (5) and a second electrode (6) that are spaced at a distance to each other, wherein a tunable dielectric material is arranged between the first electrode (5) and the second electrode (6). The transmission line (4) comprises several overlapping sections (12), wherein an overlapping area (10) of the first electrode (5) overlaps an overlapping area (11) of the second electrode (6) in order to provide for a parallel plate capacitor area (13) that affects the phase of an electromagnetic signal that propagates along the transmission line (4). The first electrode (5) and the second electrode (6) are electrically connected to a bias voltage source, whereby the first electrode (5) is connected to a first bias electrode (15) which is connected to the bias voltage source, and whereby the second electrode (6) is connected to a second bias electrode (16) which is connected to the bias voltage source, whereby the first and second bias electrodes (15, 16) consists of a material with a lower electrical conductivity than that of the first and second electrode (5, 6).

IPC 8 full level  
**H01P 1/18** (2006.01)

CPC (source: EP)  
**H01P 1/184** (2013.01); **H01Q 3/36** (2013.01); **H01Q 21/061** (2013.01)

Citation (applicant)  
• EP 2761693 A1 20140806 - TECH UNIVERSITÄT DARMSTADT [DE], et al  
• EP 2956986 B1 20170201 - UNIV DARMSTADT TECH [DE]

Citation (search report)  
• [X1] EP 2768072 A1 20140820 - TECH UNIVERSITÄT DARMSTADT [DE]  
• [A] JP 2003008310 A 20030110 - SUMITOMO ELECTRIC INDUSTRIES  
• [X1] HU WENJUAN ET AL: "Liquid crystal varactor loaded variable phase shifter for integrated, compact, and fast beamsteering antenna systems", 2014 9TH EUROPEAN MICROWAVE INTEGRATED CIRCUIT CONFERENCE, EUROPEAN MICROWAVE ASSOCIATION - EUMA, 6 October 2014 (2014-10-06), pages 660 - 663, XP032712469, DOI: 10.1109/EUMIC.2014.6997943  
• [X1] JEREMIAH P. TURPIN ET AL: "Reconfigurable and Tunable Metamaterials: A Review of the Theory and Applications", INTERNATIONAL JOURNAL OF ANTENNAS AND PROPAGATION, vol. 11, no. 4, 22 May 2014 (2014-05-22), pages 836 - 18, XP055307748, ISSN: 1687-5869, DOI: 10.1155/2014/429837  
• [X1] ONUR HAMZA KARABEY ET AL: "Tunable loaded line phase shifters for microwave applications", MICROWAVE SYMPOSIUM DIGEST (MTT), 2011 IEEE MTT-S INTERNATIONAL, IEEE, 5 June 2011 (2011-06-05), pages 1 - 4, XP032006583, ISBN: 978-1-61284-754-2, DOI: 10.1109/MWSYM.2011.5972634

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CN111176036A; CN115176382A; CN114759322A; CN115152089A; US11799179B2; EP3835853A4; WO2023174372A1; WO2022160157A1; WO2023141854A1

Designated contracting state (EPC)  
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

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BA ME

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**EP 3609018 A1 20200212**; EP 3609017 A1 20200212

DOCDB simple family (application)  
**EP 19190405 A 20190806**; EP 18187483 A 20180806