FTO Search - Sample

Amplifier Circuit

Immunis Info Services Pvt Ltd

www.immunisip.com
www.immunisdrawings.com

Hyderabad, Telangana, India- 500085

CONFIDENTIAL AND PROPRIETARY

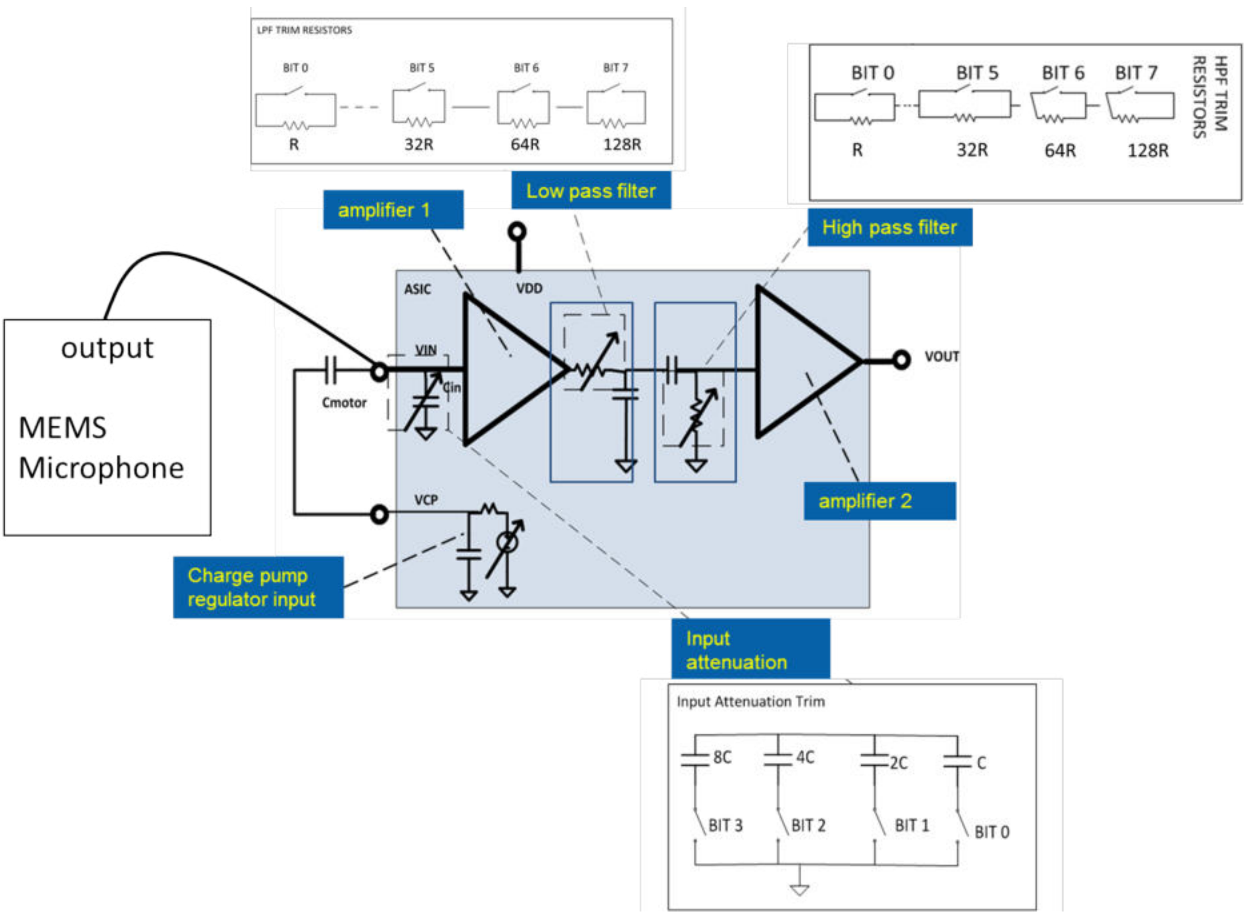
OBJECTIVE OF THE SEARCH

This search report aims at finding out any granted patent or published patent application in US, and EP similar to the technology described in the project description documents provided.

The main objectives of the investigations featured in this report are:

(i) To capture patents, patent applications that could be related and impacting to the reference technology, described in the disclosure that addresses:

An amplifier circuit for a MEMS microphone in which the phase characteristic of the MEMS microphone is trimmed (or calibrated or tuned) by adjusting a low pass filter and a high pass filter at an output (VOUT) of the amplifier circuit.



The input (VIN) to the amplifier circuit is coupled to an electrical signal output from the MEMS microphone. In applications where multiple MEMS microphones are used (e.g., for sound source directionality determination), the phase characteristics of the MEMS microphones must be the same (since directionality is determined by differences in the phases of the electrical signals produced by two or more microphones). As such, the phase is adjusted by selectively switching on-and-off one or more resistors in a series of resistors of the low pass filter and high pass filter. The low pass filter provides coarse adjustment while the high pass filter provides fine adjustment. The phase adjustment is a final production process performed on each MEMS microphone, where the switching configurations are permanently stored in memory (not shown) before delivery to customers.

<u>Features of the amplifier circuit</u>

- Low pass filter is trimmed (adjusted, calibrated, tuned) via adjustable binary weighted resistors
    1. Low pass filter changes phase within a decade of low pass filter corner
    2. Can also be used to set magnitude of response at a specific frequency (i.e., to give -10 dB at 20 kHz relative to 1 kHz sensitivity)
- High pass filter is trimmed (adjusted, calibrated, tuned) via adjustable binary weighted resistors during manufacture
    3. High pass filter tuning is used to tightly set the phase at a specific frequency (i.e., 200 Hz by changing the high pass filter corner)
- Input to the amplifier circuit can attenuated via adjustable binary weighted capacitors
- Voltage charge pump is tuned via an adjustable charge pump voltage

METHODOLOGY

The methodology for the freedom-to-operate study included the following steps provided in the table:

Task	Process	Output
Step 1: Technology Study	Identifying technical features of the subject of the invention disclosed	A set of key features of the invention disclosed
Step 2: Identification of the keywords for finalizing search strategy	a. Identifying a set of key words and their synonyms for each key feature identified in step 1 b. Construction of key string around the key features identified	A list of patents and patent application related to the field of invention under study
Step 3: Analysis of Patent and patent applications documents identified in step 2	a. Screening of set of identified patents and patent application on the basis of title, abstract, field of invention, summary and claims to eliminate the patents and patent applications which are not related to the field of invention b. Detailed claim analysis of the identified related patents	A list of related patents and patent applications
Step 4: Identification of Additional Patents and patent applications	a. Use of backward and forward citations search and analysis b. Inventor and assignee identification in the related patents and patent applications; and search based on them	An additional list of patents and patent applications related to the field of invention

	c. Classification search	
Step 5: Analysis of the patents identified in step 4	Repeating steps 3a and 3b for the additional list identified in step 4	An additional list of related patents and patent applications
Step 6: Legal status of the related patents and patent applications	Current status (Live or Abandoned)	

KEYWORDS:

S. No	Concept	Keywords
1	Amplifier Circuit	Amplifying Circuit, Amplifier
2	Mems	Micro-Electro-Mechanical System, Microelectromechanical System, Micro-Electro-Mechanical Systems, Mechanical and Electro-Mechanical Elements, Microsystems Technology, Micromachined Devices
3	Microphone	Mic, Acoustic Device, Earphone, Earplug, Microphone, Hearing Aid, Auditory System, Hearing Apparatus, Hearing System, Auditory Device, Listening Device
4	Trimmed	Calibrated, Tuned, Attenuated
5	Adjusting	Modulating, Corrective
6	Low Pass Filter	Low Pass Frequency
7	High Pass Filter	High Pass Frequency
8	Electrical Signal	Signal
9	Phase Characteristics	Phase Adjustment
10	Switching	Shift, Change
11	Resistors	Series of Resistors, Ohmic Impedance
12	Specific Frequency	10 Db at 20 Khz Relative To 1 Khz Sensitivity, 200 Hz
13	Binary Weighted Capacitors	Binary Algorithm
14	Voltage Charge Pump	Charge Pump Voltage, Voltage Pump
15	Corner Filter	Corner Frequency

SUMMARY OF RESULTS

- We have performed comprehensive searches to locate the patent references claiming on the proposed concept
- This search report includes **9** related patent applications and patents, their details have been provided below
- All references are hyperlinked. Please click on the reference for complete details
- Text highlighted in colour is just for your quick reference. Please open the reference for complete information
- Expiry dates provided are just for information purpose. No decision should be taken based on that.
- Information for "one member per family" been provided for most of the references. Please check the Family member section for complete family information

Please click on the patent number to view full text.

Result#	Publication Number	Legal Status	Estimated Expiry
1.	US9787320B1	No maintenance fees are due at this time	March 9, 2037
2.	US2018146286 (A1)	Non- final rejection mailed	November 17, 2037 (If Granted)
3.	US8610477B2	No maintenance fees are due at this time	June 28, 2025
4.	US7715579B2	Maintenance fee has already been paid.	March 8, 2029
5.	US2018167730 (A1)	Application Published	December 12, 2036 (If Granted)
6.	US9800227B1	No Maintenance fees are due at this time.	August 12, 2036
7.	US8295512B2	Maintenance fee has already been paid	July 15, 2027
8.	WO2017167879A1	PCT Application published	
9.	US9612119B2	No Maintenance fees are due at this time.	November 5, 2034

RESULTS

Result # 1

Patent/Publication No.	US9787320B1
Title of the Invention	**Methods and apparatus for an analog-to-digital converter**
Inventor(s)	Akinobu ONISHI
Assignee	Semiconductor Components Industries LLC
Priority date	2016-09-27
Filing date	2017-03-09
Publication date	2017-10-10
Legal Status	No maintenance fees are due at this time
Estimated Expiry	March 9, 2037
Family Members	CN107872229 (A) US9628101 (B1)
Abstract	Various embodiments of the present technology may comprise a method and apparatus for an analog-to digital converter (ADC). Methods and apparatus for an ADC according to various aspects of the present invention may operate in conjunction with a reference voltage that varies according to the frequency of a timing signal. By varying the reference voltage according to the frequency of the timing signal, the ADC generates a digital output having a substantially fixed voltage regardless of the frequency of the timing signal.
Related Claims	1. An integrated circuit capable of receiving an input signal with a first voltage range, comprising: a phase generator configured to generate a timing signal; a reference voltage generator responsive to the phase generator and configured to generate a reference voltage comprising a magnitude that is inversely proportional to a frequency of the timing signal; and an analog-to-digital converter with an adjustable full scale voltage, coupled to the reference voltage generator and responsive to the reference voltage; wherein: the adjustable full scale voltage is adjusted to substantially match the first voltage range; and the analog-to-digital converter transmits a digital value with a substantially constant voltage.

	2.The integrated circuit of claim 1, further comprising a resistive element and a capacitive element coupled in series and coupled to an input terminal of the analog-to digital converter. 3.The integrated circuit of claim 1, wherein the analog-to-digital converter further comprises a digital circuit coupled to an output terminal of the delta-sigma modulator, comprising a decimation filter and a high-pass filter. 7. The integrated circuit of claim 1, wherein the secondary circuit comprises a switched-capacitor resistor comprising a switching device and a capacitor. 8. The integrated circuit of claim 7, wherein the secondary circuit comprises a low-pass filter coupled to the switched-capacitor resistor and a current mirror. 14. A system, comprising: **a micro electro-mechanical device; a circuit coupled to the micro electro-mechanical device, comprising: a phase generator configured to generate a timing signal;** **a reference voltage generator, coupled to the phase generator, configured to generate a reference voltage that is inversely proportional to the frequency of the timing signal;** **an analog-to-digital converter coupled to the reference voltage generator, and configured to: receive an input signal, with a first voltage range, from the micro electro-mechanical device;** **operate according to the reference voltage;** **output a digital value that is substantially fixed regardless of the frequency of the timing signal;** **wherein a full scale voltage range of the analog-to-digital converter is adjusted according to the reference voltage.** 15. The system of claim 14, wherein the micro electro-mechanical device comprises a microphone.

Result # 2

Patent/Publication No.	US2018146286 (A1)
Title of the Invention	**PHASE CORRECTING SYSTEM AND A PHASE CORRECTABLE TRANSDUCER SYSTEM**
Inventor(s)	LAFORT ADRIANUS MARIA DE ROO DION IVO
Assignee	SONION NEDERLAND*
Priority date	2017-11-17
Filing date	2017-11-17
Publication date	2018-05-24
Legal Status	Non- final rejection mailed
Estimated Expiry (If granted)	November 17, 2037
Family Members	EP3324645 (A1)
Abstract	A phase correcting system for connection with a transducer. The phase correction may take place before amplifying the output of the transducer. The phase correction system comprises a circuit configured to low-pass filter an input and feed the output to the non-signal terminal of the transducer. This circuit may comprise a transconductance amplifier.
Related Claims	1. **A phase correcting system** comprising: - a first input terminal and a second input terminal both being configured to be connected to terminals of a transducer, - a first transport element configured to receive a signal from the first input terminal and feed a corresponding signal to an output terminal, and – a feedback element having: - a feedback entry conductor connected to the first transport element, - a feedback exit conductor connected to the second input terminal, and – a circuit configured to receive a first signal from the feedback entry conductor and output, on the feedback exit conductor, a second signal as a low pass filtered first signal, the circuit having a variable cut-off frequency of the low pass filtering. 2. A system according to claim 1, wherein the cut-off frequency is 200Hz or lower.

	3. A system according to any of the preceding claims, further comprising a capacitor connected between the feedback exit conductor and a predetermined voltage. 6. A system according to any of the preceding claims, further comprising a filter adjusting input connected to the circuit for receiving an adjustment signal adjusting the cut-off frequency. 8. A transducer system according to claim 7, further comprising a first voltage supply connected to output a first voltage to the first input terminal, the first transport element comprising a first capacitor. 13. An assembly of transducer systems according to claim 7, wherein each transducer system has a filter adjusting input connected to the circuit for receiving an adjustment signal adjusting the cut-off frequency and where each transducer system receives a different adjustment signal on the filter adjusting input.

Result # 3

Patent/Publication No.	US8610477B2
Title of the Invention	**Wideband analog phase shifter**
Inventor(s)	Michael Koechlin, Cemin Zhang
Assignee	HITTITE MICROWAVE CORP
Priority date	2010-05-03
Filing date	2011-05-03
Publication date	2013-12-17
Legal Status	No maintenance fees are due at this time
Estimated Expiry	June 28, 2025
Family Members	US20110267119A1
Abstract	A phase shifter includes a low-pass filter, a high-pass filter, and an all-pass filter coupled in series between an RF input terminal and an RF output terminal of the phase shifter, at least one of the filters being tunable, controlling the phase of an input signal over a wide range of frequencies.
Related Claims	1. A phase shifter, comprising: an RF input terminal; an RF output terminal; a tunable low-pass filter, a tunable high-pass filter, and a tunable all-pass filter coupled in series between the low-pass filter and the high-pass filter, one of the low-pass filter and the high-pass filter coupled to the RF input terminal and the other coupled to the RF output terminal, said filters being responsive to a DC tuning signal for controlling the phase of an RF signal over a wider range of frequencies. 19. A phase locked oscillator, comprising: an amplifier for providing an output signal; a prescaler responsive to the amplifier for providing a divided output signal; a phase detector responsive to a reference signal and the prescaler for providing a control signal representative of the phase difference between the reference signal and the signal from the prescaler; and a loop filter responsive to the phase detector for filtering the control signal to provide a filtered control signal; and

	an analog phase shifter responsive to the loop filter for controlling the oscillator frequency and phase, the phase shifter including: an RF input terminal; an RF output terminal; a low-pass filter, a high-pass filter, and an all-pass filter coupled in series between the RF input and the RF output terminals of the phase shifter, said filters tunable for controlling the phase of a signal over a wide range of frequencies.

Result # 4

Patent/Publication No.	US7715579B2
Title of the Invention	**Tone control circuit for hearing aid and the like**
Inventor(s)	Kenjiro Owada, Takashi Kuno, Masahiko Ohgushi
Assignee	Mimy Electronics Co Ltd
Priority date	2005-11-03
Filing date	2005-11-03
Publication date	2010-05-11
Legal Status	Maintenance fee has already been paid.
Estimated Expiry	March 8, 2029
Family Members	US20070098186A1
Abstract	A tone control circuit includes a capacitor-resistor circuit; a resistor-capacitor circuit which is connected to the capacitor-resistor circuit; and a variable resistor which is connected between the resistor-capacitor circuit and capacitor-resistor circuit or a connecting point of both circuits. The variable resistor controls tone easily at high and low frequencies without change of the loudness when voice is output.
Related Claims	1. **A tone control circuit for a hearing aid for receiving an input signal and providing a tone adjusted output signal, comprising: a control circuit signal input for receiving the input signal;** **an inverting amplifier having an inverting input and an amplifier output which outputs said tone adjusted output signal;**

	a low pass filter series circuit having a low pass filter input terminal, a low pass filter output terminal, and a low pass filter control node; **said low pass filter series circuit including a low pass filter fixed resistor connected in series with a low pass filter capacitor at a low pass filter series connection node, wherein: said low pass filter fixed resistor has a first low pass filter resistor terminal forming said low pass filter input terminal;** **said low pass filter fixed resistor has a second low pass resistor terminal connected in common with a first low pass filter capacitor terminal of said low pass filter capacitor at said low pass filter series connection node;** **said low pass filter series connection node is said low pass filter control node; and** **said first low pass filter capacitor has a second low pass filter capacitor terminal forming said low pass filter output connected to said amplifier output;** **a high pass filter series circuit having a high pass filter input terminal, a high pass filter output terminal, and a high pass filter control node;** **said high pass filter series circuit including a high pass filter fixed resistor connected in series with a high pass filter capacitor at a high pass filter series connection node, wherein: said high pass filter fixed resistor has a first high pass filter resistor terminal forming said high pass filter output terminal and connected to said amplifier output;** **said high pass filter fixed resistor has a second high pass resistor terminal connected in common with a first high pass filter capacitor terminal of said high pass filter capacitor at said high pass filter series connection node;** **said high pass filter series connection node is said high pass filter control node; and** said first high pass filter capacitor has a second high pass filter capacitor terminal forming said high pass filter input terminal; said low pass filter series circuit being connected in parallel to said high pass filter series circuit by parallel connections including said low pass filter input terminal being connected to said high pass filter input terminal, and said low pass filter

	output terminal being connected to said high pass filter output terminal; a filter control circuit having a first control input terminal connected to said low pass filter control node, a second control input terminal connected to said high pass filter control node, and said filter control circuit including a variable resistor having: a fixed resistance outside of said low pass filter series circuit and outside of said high pass filter series circuit, said fixed resistance having a first terminal connected to said high pass filter control node and a second terminal connected to said low pass filter control node; a wiper contact displaceable along said fixed resistance from a first position to a second position on said fixed resistance; and a wiper contact terminal of said wiper contact connected to the inverting input of said inverting amplifier; and said filter control circuit being configured such that: varying a position of said wiper contact along said fixed resistance in a first direction toward said high pass filter control node operates to simultaneously effect an increase in treble amplitude and a decrease in bass amplitude in said tone adjusted output signal; varying a position of said wiper contact in a second direction along said fixed resistance toward said low pass filter control node operates to simultaneously effect a decrease in treble amplitude and an increase in bass amplitude in said tone adjusted output signal; and said tone adjusted output signal is a treble dominated and bass diminished signal when said wiper is at said first position relative to said tone adjusted output signal output when said wiper contact is at a midpoint position, and a bass dominated and treble diminished signal when said wiper is at said second position relative to said tone adjusted output signal output when said wiper contact is at said midpoint position. 6. The tone control circuit of claim 5, wherein said high pass filter fixed resistor has said second high pass resistor terminal directly connected in common with said first high pass filter capacitor terminal of said high pass filter capacitor at said high pass filter control node.

	7. The tone control circuit of claim 6, wherein said parallel connections include: said second high pass filter capacitor terminal at said high pass filter input terminal being directly connected to said first low pass filter resistor terminal at said low pass filter input terminal; and said first high pass filter resistor terminal at said high pass filter output terminal being directly connected to said second low pass filter capacitor terminal at said low pass filter output terminal.

Result # 5

Patent/Publication No.	US2018167730 (A1)
Title of the Invention	**MICROELECTROMECHANICAL SYSTEMS (MEMS) MICROPHONE FEEDBACK FILTERING**
Inventor(s)	PARKER JEREMY MICHAEL
Assignee	INVENSENSE*
Priority date	2016-12-12
Filing date	2016-12-12
Publication date	2018-06-14
Legal Status	Application Published
Estimated Expiry (if Granted)	December 12, 2036
Family Members	None
Abstract	Feedback filtering for microelectromechanical systems (MEMS) sensors is described. An exemplary MEMS sensor system or apparatus can comprise a MEMS sensor and an associated integrated circuit (IC) or portions there of that facilitate shaping MEMS sensor frequency response by controlling or filtering a feedback signal. In addition, various methods of controlling or filtering a feedback signal for MEMS sensor are described.
Related Claims	1. An apparatus, comprising: electrical circuitry configured to receive an electrical signal from a first portion of a microelectromechanical systems (MEMS) sensor and generate an output signal associated with the first portion of the MEMS sensor;

	a feedback component configured to generate a feedback signal based on the output signal for a second portion of the MEMS sensor; and at least one filter component configured to filter the feedback signal for the second portion of the MEMS sensor. 8. The apparatus of claim 1, wherein the feedback component comprises an amplifier component configured to generate an inverted output signal based on the output signal and associated with the feedback signal. 9. The apparatus of claim 1, wherein the **at least one filter component comprises at least one of a low pass filter component, a high pass filter component, a band pass filter component, or a band stop filter component.** 10. The apparatus of claim 9, **wherein the MEMS sensor comprises a MEMS microphone sensor and wherein the at least one filter component comprises the high pass filter component configured to have a cutoff frequency of less than or equal to about 19 kiloHertz (kHz).** **12. The apparatus of claim 11, wherein the MEMS sensor comprises a MEMS ultrasound sensor, wherein the low pass filter component is configured to have a corner frequency of greater than or equal to about 20 kiloHertz (kHz).** 16. The apparatus of claim 1, **wherein the at least one filter component comprises at least one adjustable filter parameter.** 17. The apparatus of claim 1, **further comprising: a filter control component configured to at least one of switch the at least one filter component between an on state and an off state or modify performance of the at least one filter component.**

Result # 6

Patent/Publication No.	US9800227B1
Title of the Invention	**Active bandpass filter circuit with adjustable resistance device and adjustable capacitance device**
Inventor(s)	SOVERO EMILIO A [US] KANG JONGCHAN [US] AHMED MOHIUDDIN [US]
Assignee	BOEING
Priority date	2016-08-12
Filing date	2016-08-12
Publication date	2017-10-24
Legal Status	No Maintenance fees are due at this time
Estimated Expiry	August 12, 2036
Family Members	CN107733399 (A) EP3285397 (A1) JP2018067907 (A) KR20180018305 (A)
Abstract	In an illustrative example, a device includes an operational amplifier of an active bandpass filter circuit. The device further includes an adjustable resistance device configured to adjust a center frequency associated with the active bandpass filter circuit. The device further includes an adjustable capacitance device configured to adjust the center frequency and a bandwidth associated with the active bandpass filter circuit.
Related Claims	1.A device comprising: **an operational amplifier of an active bandpass filter circuit, the operational amplifier including a first output and a second output;** **an adjustable resistance device coupled to the operational amplifier and configured to adjust a center frequency of the active bandpass filter circuit;** and **an adjustable capacitance device coupled to an input of the operational amplifier and to the first output of the operational amplifier, the adjustable capacitance device configured to adjust the center frequency and a bandwidth of the active bandpass filter circuit.** 6. The device of claim 1, wherein **the adjustable resistance device is configured to adjust the center frequency by a first amount, wherein the adjustable capacitance device is**

	further configured to adjust the center frequency by a second amount that is less than the first amount, and wherein the adjustable capacitance device is in a feedback loop of the operational amplifier.

Result # 7

Patent/Publication No.	US8295512B2
Title of the Invention	**Microphone with voltage pump**
Inventor(s)	DERUGINSKY MICHAEL, FUERST CLAUS ERDMANN, SHAJAAN MOHAMMAD, SASSENE DAIFI
Assignee	ANALOG DEVICES*
Priority date	2003-12-01
Filing date	2008-05-19
Publication date	2012-10-23
Legal Status	Maintenance fee has already been paid.
Estimated Expiry	July 15, 2027
Family Members	CN100581032 © CN1938927 (A) EP1690332 (A1) JP2007512793 (A) KR20060126526 (A) US2007160234 (A1) US2008219474 (A1) US7391873 (B2) WO2005055406 (A1)
Abstract	An integrated circuit configured to provide a microphone output signal, comprising: a preamplifier coupled to receive an input signal, generated by either a first microphone member or a second microphone member, where one of the members is movable relative to the other microphone member; a voltage pump to output a pumped voltage; and a low-pass filter coupled to filter the pumped voltage from the voltage pump and to provide a bias voltage to either microphone member.
Related Claims	1.An integrated circuit configured to provide a microphone output signal, comprising: a preamplifier coupled to receive an input signal, generated by either a first microphone member or a second microphone member, where one of the members is movable relative to the other microphone member; a voltage pump to output a pumped voltage; and

	a low-pass filter coupled to filter the pumped voltage from the voltage pump and to provide a bias voltage to either the first or second microphone member. 2.An integrated circuit according to claim 1, comprising a capacitor coupled to diminish a DC voltage level at the input of the preamplifier. 10. An integrated circuit according to claim 8 where the preamplifier has a transfer function, in the frequency domain, with a zero and a pole; wherein the pole is located in the range 0.1 Hz to 50 Hz or 0.1 Hz to 100 Hz or 0.1 to 200 Hz. 30. A microphone according to claim 28, where the microphone is a MEMS microphone. 31. The integrated circuit according to claim 1, wherein the preamplifier, voltage pump and at least a portion of the low-pass filter are embodied on a single semiconductor substrate for integration with a microphone element.

Result # 8

Patent/Publication No.	WO2017167879A1
Title of the Invention	**Mems microphone and method for operating the same**
Inventor(s)	Sebastian WALSER, Christian Siegel, Matthias Winter
Assignee	TDK CORPORATION
Priority date	2016-03-31
Filing date	2017-03-30
Publication date	2017-10-05
Legal Status	Wipo Publication
Family Members	DE102016105923 (A1)
Abstract	The invention relates to a MEMS microphone, comprising an ASIC (AS) with a programmable internal memory (IM) and a MEMS sensor (MS). Operating parameters, which correspond to a plurality of defined operating states (M1, M2, M3) for the control of the MEMS sensor (MS) and/or the processing of the signal conducted from the sensor to the

	ASIC (AS), can be stored in the internal memory. The microphone can be switched into a selected operating state via a control line for the ASIC.
Related Claims	1.the microphone of an ASIC (aa) and a MEMS sensor (MS), wherein the ASIC comprises a programmable internal memory (IM) has, wherein a plurality of defined operating states according to the operating parameters in the internal memory (mi, M2, M3) for driving the MEMS sensor (MS) and/or Processing the sensor to the ASIC (aa) directed Signal can be stored, wherein the microphone is connected to a control line connected to a selected operating state for the ASIC may. Microphone according to one of the preceding claims, wherein the MEMS sensor (MS) a capacitive MEMS sensor is a capacitive MEMS sensor voltage to be applied to the operational parameters can be stored on the applied BIAS voltage. 8. the method of operating a microphone, wherein a MEMS microphone (MIC) is used, an ASIC (aa) with a programmable internal memory (IM) has, wherein in the internal memory of the MEMS microphone of calibrated operational parameters for a plurality of defined Operating states (mi, M2, M3) are stored,

	wherein the operating parameter, in order to adjust the desired properties of the MEMS microphone in different operating states required by, are determined in a prior test wherein the environmental parameters are adapted to read out or operating parameters for a desired operating state by means of a control line from the internal to a memory and the corresponding operation state is set.

Result # 9

Patent/Publication No.	US9612119B2
Title of the Invention	**Integrated inertial sensing device**
Inventor(s)	Sanjay Bhandari, Ali J. Rastegar, Sudheer S. Sridharamurthy
Assignee	Mcube Inc
Priority date	2013-01-22
Filing date	2014-01-17
Publication date	2017-04-04
Legal Status	No Maintenance fees are due at this time
Estimated Expiry	November 5, 2034
Family Members	US2015276405 (A1) US2015276406 (A1) US2017082438 (A1) US9513122 (B2)
Abstract	A system can include a MEMS gyroscope having a MEMS resonator overlying a CMOS IC substrate. The CMOS IC substrate can include an AGC loop circuit coupled to the MEMS gyroscope. The AGC loop acts in a way such that generated desired signal amplitude out of the drive signal maintains MEMS resonator velocity at a desired frequency and amplitude. A benefit of the AGC loop is that the charge pump of the HV driver inherently includes a 'time constant' for charging up of its output voltage. The system incorporates the Low pass functionality in to the AGC loop without requiring additional circuitry.
Related Claims	1. A system comprising an integrated MEMS gyroscope architecture, the system comprising: a substrate member having a surface region; a CMOS IC layer overlying the surface region, the CMOS IC layer having a CMOS surface region, the CMOS IC layer having: a drive loop, the drive loop including a first Charge

	Sense Amplifier (CSA_DRV), a first phase shifter (PS0), a first comparator, and an high-voltage (HV) driver; an Automatic Gain Control (AGC) loop circuit, the AGC loop circuit including, the first comparator, a rectifier, a proportional-integral-derivative (PID) controller, the high-voltage (HV) driver, and a charge pump coupled in series in a loop, wherein an input of the first comparator is coupled to the rectifier and an output of the first comparator is coupled to the HV driver; and a sense path having a second Charge Sense Amplifier (CSA_SNS), a first Programmable Gain Amplifier (PGA1), a mixer, a second Programmable Gain Amplifier (PGA2), a Low Pass Filter (LPF), an A/D converter (ADC), and digital processing circuits; a MEMS gyroscope overlying the CMOS surface region, the MEMS gyroscope electrically coupled to the drive loop and the sense path, the MEMS gyroscope electrically coupled to the AGC loop circuit through the drive loop; and metal shielding within a vicinity of the MEMS gyroscope configured to reduce parasitic effects. 4. The system of claim 1 further comprising a programmable phase-shifter coupled to the comparator to adjust a phase difference optimally to compensate for analog phase shifts.

Additional Results

EP3200345A1: Amplifier circuit for amplifying an output signal of a capacitive sensor

Family Member: WO2017129396 A1

Abstract
An amplifier circuit (AC) for amplifying an output signal (OS) of a capacitive sensor (M) comprises a first input terminal (AIN) to receive the output signal (OS) of the capacitive sensor (M) and a second input terminal (BIN) to receive a bias voltage (Vbias) of the capacitive sensor (M). The amplifier circuit (AC) comprises an amplifier (A) for amplifying the output signal (OS) and a control circuit (CF) arranged in a feedback loop (FL) of the amplifier (A) being configured to control a DC voltage level at an input connection (A1) of the amplifier (A). A bias voltage sensing circuit (BVS) senses a change of the level of the bias voltage (Vbias) at the second input terminal (BIN) and changes the bandwidth of the feedback loop (FL) in dependence on the sensed change of the level of the bias voltage (Vbias).

US9866959B2: Self-biasing output booster amplifier and use thereof

Family Member: EP3197046 (A1) US2017215006 (A1)

Abstract
A self-biasing output booster amplifier having an input amplifier stage, an output amplifier stage being operatively connected to an output of the input amplifier stage, and first and second current copying circuits. The second current copying circuit is biased from an output of the self-biasing output booster amplifier. The first and second current copying circuits are configured to copy at least a portion of the current through the output amplifier stage. The sum of the output of the second current copying circuit and the output of the output amplifier stage provides the output current of the self-biasing output booster amplifier, Finally, the input amplifier stage is biased from the output of the second current copying.

US20180034431A1: Integrated Circuit Arrangement for a Microphone, Microphone System and Method for Adjusting One or More Circuit Parameters of the Microphone System

Family Member: CN107408921 (A) DE112015006229 (T5) EP3262849 (A1) JP2018511219 (A) WO2016134788 (A1)

Abstract
An integrated circuit arrangement for a microphone, a microphone system and a method for adjusting circuit parameters of the microphone are disclosed. In an embodiment an integrated circuit includes an amplifier circuit with a first switchable network circuit for adjusting an amplifier current of the amplifier circuit, the first switchable network circuit comprising a plurality of switches (SW1, . . . ,SWx) each coupled with a first control port of the first switchable network circuit and a control unit coupled with the first control port of the first switchable network circuit and

configured to control a setting of the respective switches (SW1, . . . ,SWx) of the first switchable network circuit.

US8861765B2: Microphone component and method for operating same

Family Member: CN102301741 (A) CN102301741 (B) DE102009000950 (A1) EP2392147 (A1) EP2392147 (B1) EP2392148 (A1) EP2392148 (B1) JP2012517131 (A) JP5409811 (B2) KR101592063 (B1) KR20110116024 (A) TW201043047 (A) US2012057721 (A1) US2012076339 (A1) US8885849 (B2) WO2010086206 (A1) WO2010086240 (A1)

Abstract
A system and method are described for reducing the current consumption of a microphone component without adversely affecting performance. The system includes a micromechanical microphone capacitor, an acoustically inactive compensation capacitor, an arrangement for applying a high-frequency sampling signal to the microphone capacitor and for applying the inverted sampling signal to the compensation capacitor, an integrating operational amplifier which integrates the sum of the current flow through the microphone capacitor and the current flow through the compensation capacitor as a charge amplifier, a demodulator, which is synchronized with the sampling signal, for the output signal of the integrating operational amplifier, and a low-pass filter which uses the output signal of the demodulator to obtain a microphone signal that corresponds to the changes in capacitance of the microphone capacitor. The sampling signal is composed of a periodic sequence of sampling pulses and pause times. In addition, at least one first switching element is provided which reduces the current flow through the integrating operational amplifier during the pause times. The low-pass filter has a “sample-and-hold” characteristic so that during the pause times the low-pass filter in each case stores the output signal of the integrating operational amplifier averaged over the preceding sampling operation.

KEY – STRINGS AND SEARCH SCOPE

The search is performed on Orbit database, USPTO, Espacenet, and Google patent.
The search is performed for patent applications and granted patents for US, WO, EP, 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, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR

FIELD OF THE SEARCH

Source	Jurisdiction	Query
Orbit	ALL	((amplifier circuit)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ICLM/ADB/KEYW/TX AND (trimm+ or calibrat+ tun+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (low pass filter)/TI/AB/IW/CLMS/TX/KEYW/ICLM/ADB/OBJ/DESC/ODES AND (high pass filter)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (US)/PN AND APD >= 1995-06-01
Orbit	US	((amplifier)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ICLM/ADB/KEYW/TX AND (trimm+ or calibrat+ tun+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (low pass filter)/TI/AB/IW/CLMS/TX/KEYW/ICLM/ADB/OBJ/DESC/ODES AND (high pass filter)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (US)/PN AND APD >= 1995-06-01
Orbit	US	((amplifier)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ICLM/ADB/KEYW/TX AND (trimm+ or calibrat+ tun+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (low pass filter)/TI/AB/IW/CLMS/TX/KEYW/ICLM/ADB/OBJ/DESC/

		ODES AND (high pass filter)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (US)/PN AND APD >= 1995-06-01
Orbit	US	((amplifier)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ICLM/ADB/KEYW/TX AND (adjust+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass filter) and (high pass filter))/TI/AB/IW/CLMS/TX/KEYW/ICLM/ADB/OBJ/DESC/ODES AND (resistor)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (US)/PN AND APD >= 1995-06-01
Orbit	US	((amplifier)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ICLM/ADB/KEYW/TX AND (adjust+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass filter) and (high pass filter))/TI/AB/IW/CLMS AND (resistor)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (US)/PN AND APD >= 1995-06-01
Orbit	EP	((amplifier)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ICLM/ADB/KEYW/TX AND (adjust+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass filter) and (high pass filter))/TI/AB/IW/CLMS/TX/KEYW/ICLM/OBJ/DESC/ODES/ADB AND (resist+ or capacit+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (EP)/PN AND APD >= 1995-06-01
Orbit	US, EP, WO	((amplifier)/TI/AB/IW/CLMS AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (adjust+ OR corr+ or trimm+ or calibrat+ tun+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass filter) and (high pass filter))/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (resist+ or

		capacit+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN
Orbit	US, EP, WO	((amplifier)/TI/AB/IW/CLMS AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (adjust+ OR corr+ or trimm+ or calibrat+ tun+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass filter) and (high pass filter))/TI/AB/IW/CLMS AND (resist+ or capacit+)/TI/AB/IW/CLMS AND (phase)/TI/AB/IW/CLMS) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN AND PD >= 1995-06-01
Orbit	US, EP, WO	((circuit)/TI/AB/IW/CLMS AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (adjust+ OR corr+ or trimm+ or calibrat+ tun+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass filter) and (high pass filter))/TI/AB/IW/CLMS AND (resist+ or capacit+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN AND PD >= 1995-06-01
Orbit	US, EP, WO	((circuit)/TI/AB/IW/CLMS AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (adjust+ OR corr+ or trimm+ or calibrat+ tun+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass filter) and (high pass filter))/TI/AB/IW/CLMS AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN AND PD >= 1995-06-01

Orbit	US, EP, WO	((circuit)/TI/AB/IW/CLMS AND (microphone)/TI/AB/IW/CLMS AND (adjust+ OR corr+ or trimm+ or calibrat+ tun+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass) and (high pass))/TI/AB/IW/CLMS AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/TX/ICLM/KEYW/ADB/OBJ/DESC/ODES) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN AND PD >= 1995-06-01
Orbit	US, EP, WO	((amplifier circuit)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (microphone or Mic or acoustic device or earphone or Hearing aid or auditory system or Hearing apparatus or hearing system or hearing device or auditory device or Listening device)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (shift+ OR SWITCH+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((pump) AND ((low pass) and (high pass)))/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN AND PD >= 1995-06-01
Orbit	US, EP, WO	((amplifier)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS OR Micro-Electro-Mechanical System OR Microelectromechanical)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (microphone or Mic or acoustic device or earphone or Hearing aid or auditory system or Hearing apparatus or hearing system or hearing device or auditory device or Listening device)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (shift+ OR

		SWITCH+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (((low pass) and (high pass)))/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN AND PD >= 1995-06-01
Orbit	US, EP, WO	((amplif+)/TI/AB/IW/CLMS AND (MEMS OR Micro-Electro-Mechanical System OR Microelectromechanical)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (microphone or Mic or acoustic device or earphone or Hearing aid or auditory system or Hearing apparatus or hearing system or hearing device or auditory device or Listening device)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (shift+ OR SWITCH+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (((low pass) and (high pass)))/TI/AB/IW/CLMS) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN AND PD >= 1995-06-01
Orbit	US, EP, WO	((amplifier)/TI/AB/IW/CLMS AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((high pass filter) and (low pass filter))/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (resistor)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((on and-off) or (on OR off))/TI/AB/IW/CLMS) AND (EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN AND APD >= 1995
Orbit	US, EP, CA, AU, WO	((amplifier)/TI/AB/IW/CLMS AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((high pass filter) and (low pass filter))/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND

		(resistor)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS) AND (EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR)/PN AND APD >= 1995
Orbit	US, WO	((amplifier)/TI/AB/IW/CLMS AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((high pass filter) and (low pass filter))/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (resistor or capaci+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS) AND (US OR WO)/PN AND APD >= 1995
Orbit	US, WO	((amplif+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((high pass filter or high pass frequency) and (low pass filter or low pass frequency))/TI/AB/IW/CLMS AND (resistor or capaci+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS) AND (US OR WO)/PN AND APD >= 1995
Orbit	US, WO	((amplif+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((high pass filter or high pass frequency) and (low pass filter or low pass frequency))/TI/AB/IW/CLMS AND (resistor or capaci+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR OR AU OR CA)/PN AND APD >= 1995
Orbit	US, EP, WO	((MEMS)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (high pass filter or high pass frequency)/TI/AB/IW/CLMS AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICL

		M/KEYW/TX AND (low pass filter or low pass frequency)/TI/AB/IW/CLMS AND (resistor or capaci+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX) AND (US OR WO OR EP OR AL OR AT OR BE OR BG OR CH OR CY OR CZ OR DE OR DK OR EE OR ES OR FI OR FR OR GB OR GR OR HR OR HU OR IE OR IS OR IT OR LI OR LT OR LU OR LV OR MC OR MK OR NL OR NO OR PL OR PT OR RO OR RS OR SE OR SI OR SK OR SM OR TR OR AU OR CA)/PN
Orbit	ALL	((amplif+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass) and (high pass))/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS OR Micro-Electro-Mechanical System OR Microelectromechanical)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (shift+ OR SWITCH+)/TI/AB/IW/CLMS AND (phase or resist+ or capaci+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (microphone)/TI/AB/IW/CLMS)
Orbit	ALL	((amplif+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass) and (high pass))/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS OR Micro-Electro-Mechanical System OR Microelectromechanical)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (phase or resist+ or capaci+)/TI/AB/IW/CLMS AND (microphone)/TI/AB/IW/CLMS)
Orbit	ALL	((amplif+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass) and (high pass))/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (MEMS OR Micro-Electro-Mechanical System OR Microelectromechanical)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (resist+ or capaci+)/TI/AB/IW/CLMS AND (phase)/TI/AB/IW/CLMS AND (microphone)/TI/AB/IW/CLMS)
Orbit	ALL	((amplif+)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND ((low pass) or (high pass))/TI/AB/IW/CLMS AND (MEMS OR Micro-Electro-Mechanical System OR Microelectromechanical)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX AND (resist+ or capaci+ or impedance or ohmic)/TI/AB/IW/CLMS AND (phase)/TI/AB/IW/CLMS AND (microphone)/TI/AB/IW/CLMS/DESC/ODES/OBJ/ADB/ICLM/KEYW/TX)

Disclaimer:

- Whilst we have carried out these searches with great care, we make no guarantee or warranty on the accuracy, completeness, reliability, or suitability of their results, since they may be subject to errors or omissions that do not depend on our part.

- This is just a sample output.