

50 Documents

Publication numbers	Title	Current assignees
WO201600787 A1	Methods, devices, and computer programs for compensating nonlinearities of a communication channel	SES
WO200744957 A2	Closed-loop receiver feedback pre-distortion	VIASAT
WO201177249 A2	High efficiency, remotely reconfigurable remote radio head unit system and method for wireless communications	DALI SYSTEMS
CN1604577 A	Transmission device with adaptive digital predistortion, transceiver with transmission device, and method for operating a transmission device	INFINEON TECHNOLOGIES
US20050195919 A1	Digital predistortion system and method for high efficiency transmitters	POWERWAVE TECHNOLOGIES
CN102511153 A	Method and device for generating microwave predistortion signal	HUAWEI TECHNOLOGIES
US20070129027 A1	Method and system to improve transmitter linearization	NAVINI NETWORKS, ...
US6462617 B1	Method and apparatus for calculating the predistortion function from a power amplifier model	LUCENT TECHNOLOGIES
EP2991221 A1	Receivers for digital predistortion	ANALOG DEVICES
CN102510765 A	Method and apparatus for adjusting predistortion coefficients	HUAWEI TECHNOLOGIES
WO200105026 A1	A wideband digital predistortion linearizer for nonlinear amplifiers	WINTEGRA, ...
WO201678038 A1	Pre-distortion processing device and method	HUAWEI TECHNOLOGIES
WO2011103822 A2	Digital analog predistortion processing apparatus, signal transmission system and signal transmission method	HUAWEI TECHNOLOGIES
CN103051574 A	Digital predistortion processing method and system	DATANG MOBILE COMMUNICATIONS EQUIPMENT
CN102651634 A	Joint adaptive bias point adjustment and digital pre-distortion for power amplifier	INTEL MOBILE COMMUNICATIONS TECHNOLOGY, ...
US20080152037 A1	Method and system for baseband predistortion linearization in multi-channel wideband communication systems	DALI WIRELESS
US20120200355 A1	Digital predistortion of a power amplifier for signals comprising widely spaced carriers	POWERWAVE TECHNOLOGIES
US20050157814 A1	Wideband enhanced digital injection predistortion system and method	POWERWAVE TECHNOLOGIES
DE102005013880 B3	Method for predistortion of a signal, and a transmitting device having digital predistortion, in particular for mobile radio	INTEL
EP2876853 A1	Extended bandwidth adaptive digital pre-distortion with reconfigurable analog front-ends	BLACKBERRY

Publication numbers	Title	Current assignees
US20140347126 A1	Linearization of intermodulation bands for concurrent dual-band power amplifiers	ERICSSON
CN103107967 A	Method and system for updating predistortion coefficient	DATANG MOBILE COMMUNICATIONS EQUIPMENT
US20120154038 A1	Multi-band wide band power amplifier digital predistortion system	DALI SYSTEMS
US20150311927 A1	Multicarrier successive predistortion for digital transmission	HUGHES NETWORK SYSTEMS
US20090146736 A1	Baseband-derived rf digital predistortion	DALI SYSTEMS
US20050249309 A1	Device for processing radio transmission data with digital predistortion	INTEL
US20030197558 A1	Adaptive predistortion system and a method of adaptively predistorting a signal	LSI LOGIC, ...
US20110121897 A1	Measurement and correction of residual nonlinearities in a digitally predistorted power amplifier	POWERWAVE TECHNOLOGIES
US20150071382 A1	Digital pre-distortion transmitter and method for controlling the same	FUJITSU
JP2005110284 A	Transmission device with digital predistortion, and method for regulating predistortion in a transmission device	INFINEON TECHNOLOGIES
WO201029690 A1	Distortion compensation amplification device	HITACHI KOKUSAI ELECTRIC
US20050001684 A1	Digital predistortion system and method for correcting memory effects within an rf power amplifier	POWERWAVE TECHNOLOGIES
CN101022434 A	The predistortion apparatus, transmitter and the method	HUAWEI TECHNOLOGIES
US9306506 B1	Apparatus and methods for dual loop power amplifier digital pre-distortion systems	ANALOG DEVICES
US20150054585 A1	Pre-distortion method, associated apparatus and non-transitory machine readable medium	REALTEK SEMICONDUCTOR
US20170005627 A1	Moving mean and magnitude dual path digital predistortion	XILINX
US20120064847 A1	Systems and methods for spurious emission cancellation	INTEL
WO2008102943 A1	Repeating system and method for cancellation of feedback interference signal with pre-distortion function	FUJITSU NETWORK SOLUTIONS
US9787335 B1	Method and apparatus for determining validity of samples for digital pre-distortion apparatus	KMW, ...
US7058369 B1	Constant gain digital predistortion controller for linearization of non-linear amplifiers	WINTEGRA, ...
WO201674218 A1	Analog predistorter core module and analog predistorter system	HUAWEI TECHNOLOGIES
CN105634415 A	Digital predistortion system and method used for amplifying	DALI SYSTEMS

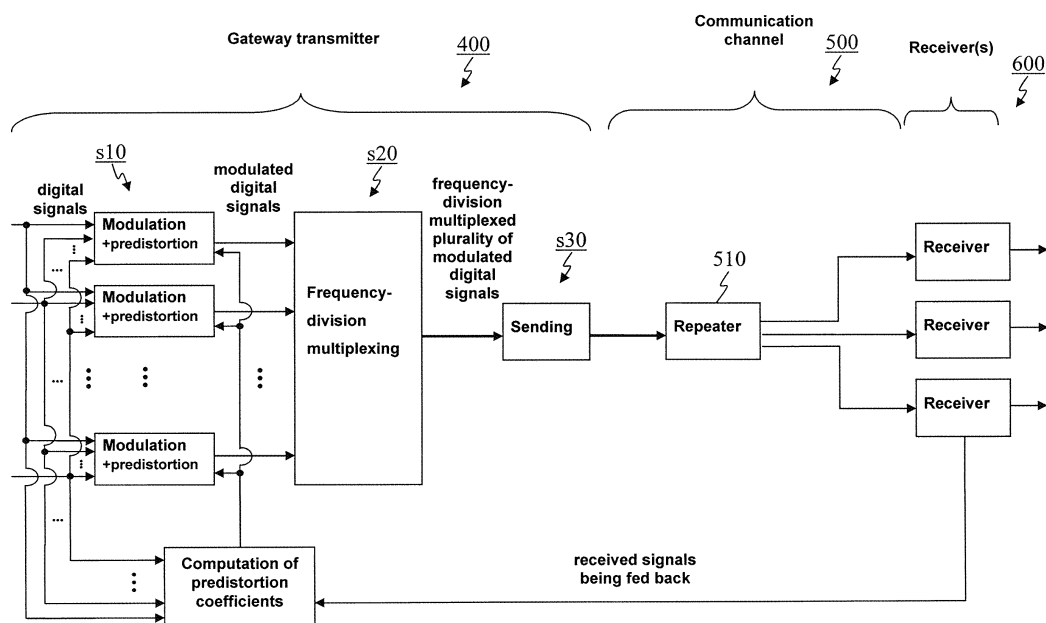
Publication numbers	Title	Current assignees
	signal	
US20030222712 A1	Signal predistortion using a combination of multiple predistortion techniques	LUCENT TECHNOLOGIES, ...
WO9933170 A1	Method and apparatus for wideband predistortion linearization	ERICSSON
CA2903606 A1	System and method for digital predistortion	HONEYWELL INTERNATIONAL
US20150098521 A1	System and method for pre-distortion and iterative compensation for nonlinear distortion in system employing ftn symbol transmission rates	HUGHES NETWORK SYSTEMS
DE102005013881 A1	Method for signal processing and a transmitting device with digital predistortion, in particular for mobile radio	INFINEON TECHNOLOGIES
US9813085 B1	Closed loop digital pre-distortion	QUALCOMM
US20140050281 A1	Method and apparatus for controlling update of digital pre-distortion coefficient	FUJITSU
WO2008154077 A1	Digital hybrid mode power amplifier system	DALI SYSTEMS

Family 1/50 - FAMPAT - ©Questel

Title

(EP3164959)

Methods, devices, and computer programs for compensating nonlinearities of a communication channel

Images**Publication data including kind & date**

WO2016000787	A1	2016-01-07	WO201600787
BR112017000048	A1	2017-01-17	BR112017000048
AU2014399359	A1	2017-01-19	AU2014399359
EP3164959	A1	2017-05-10	EP3164959
US2017163465	A1	2017-06-08	US20170163465
BR112017000048	A2	2017-10-31	BR112017000048
EP3164959	B1	2018-02-14	EP3164959
DK3164959	T3	2018-03-19	DK3164959T

**Abstract**

(EP3164959)

A method, carried out by a gateway transmitter (400), aims at compensating the nonlinearities of a communication channel (500) comprising a repeater (510). A plurality of digital signals is modulated (s10) on a plurality of carriers, wherein symbols of the constellation diagram used for modulation of each carrier are distorted in accordance with a pre-distortion function. The modulated signals are then frequency division multiplexed (s20), and sent (s30) for transmission, through the communication channel (500), to at least one receiver (600). The pre-distortion function involves a plurality of polynomial functions, each of which taking as input the symbols from all the carriers. The polynomial functions' coefficients, called "pre-distortion coefficients", are computed according to a direct learning approach, performed jointly for the plurality of carriers. The pre-distortion coefficients are iteratively updated based on received signals being fed back from a receiver (600). The invention also relates to transmitters and computer programs.

Inventors

PIAZZA ROBERTO

MYSORE RAMA RAO BHAVANI SHANKAR

OTTERSTEN BJORN

Latest standardized assignees - inventors removed

SES

Application dates

2014-07-04

2014-07-04

2014-07-04

2014-07-04

2014-07-04

2014-07-04

Publication dates

2016-01-07

2017-01-17

2017-01-19

2017-05-10

2017-06-08

2017-10-31

2018-02-14

2018-03-19

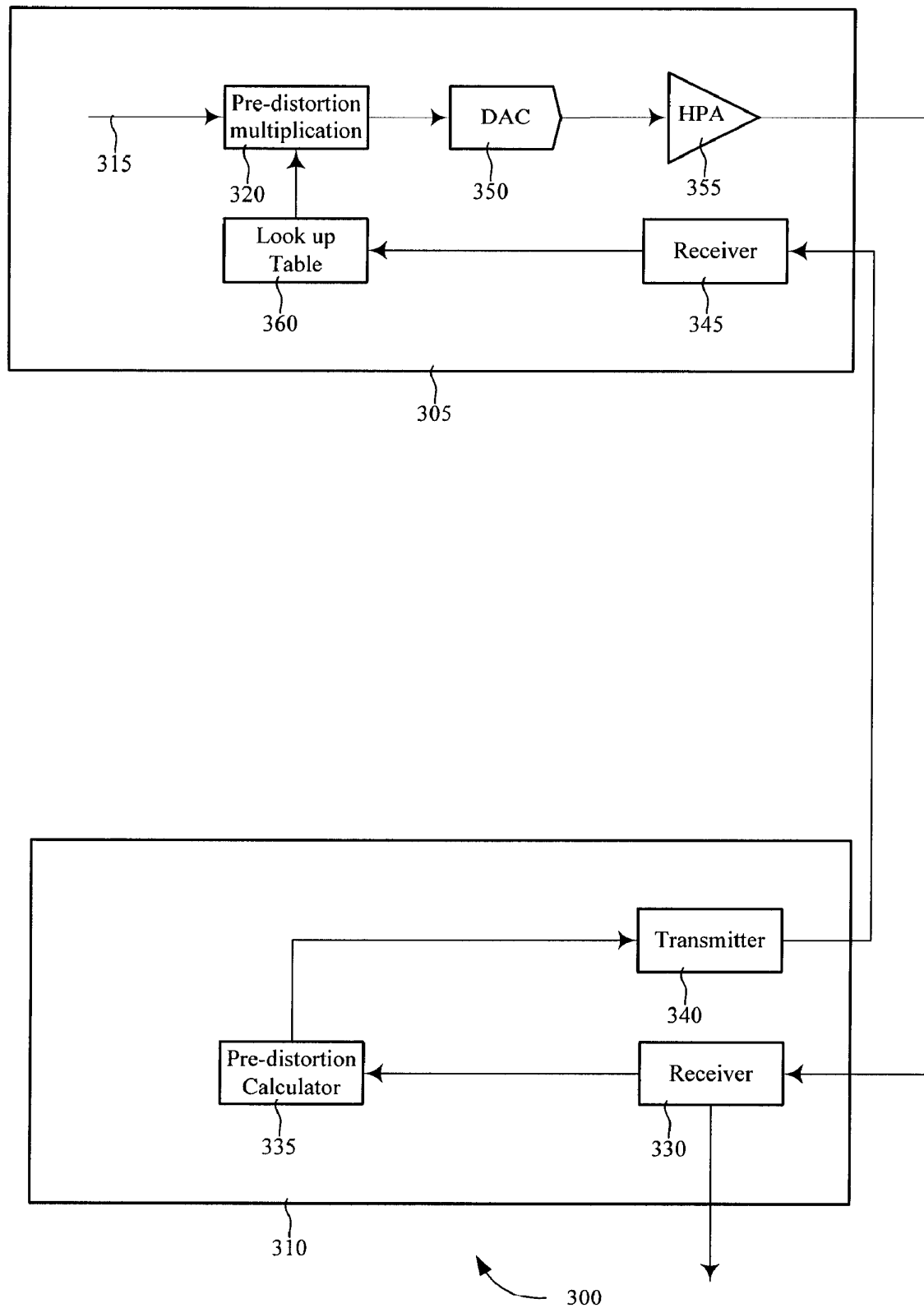
Family 2/50 - FAMPAT - ©Questel

Title

(EP1935128)

Closed-loop receiver feedback pre-distortion

Images



Publication data including kind & date

WO2007044957	A2	2007-04-19	WO200744957
CA2625814	A1	2007-04-19	CA2625814
US2007153884	A1	2007-07-05	US20070153884
WO2007044957	A3	2007-11-22	WO200744957
EP1935128	A2	2008-06-25	EP1935128
IL190782	A	2008-11-03	IL-190782
IL190782	B	2012-11-29	IL-190782
US8385391	B2	2013-02-26	US8385391
EP1935128	A4	2013-12-11	EP1935128



Abstract

(EP1935128)

Methods and systems for calculating pre-distortion coefficients in a closed-loop communication system are presented. Transmission terminals that include high power amplifiers are difficult to operate at or near the saturation point without transmitting signals with nonlinear distortions. By pre-distorting the signal prior to amplification the transmitted nonlinear distortions may be decreased. A closed-looped pre-distortion system may include a receiver that calculates the pre-distortion coefficients and transmits these coefficients back to the transmitter. These coefficients may be stored in a pre-distortion coefficient lookup table and may be updated by the receiver terminal.

Inventors

BALASUBRAMANIAN RAMA

MILLER MARK J

PATEROS CHARLES N

Latest standardized assignees - inventors removed

VIASAT

Application dates

2006-10-12

2006-10-13

2006-10-13

2006-10-13

2006-10-13

Publication dates

2007-04-19

2007-04-19

2007-07-05

2007-11-22

2008-06-25

2008-11-03

2012-11-29

2013-02-26

2013-12-11

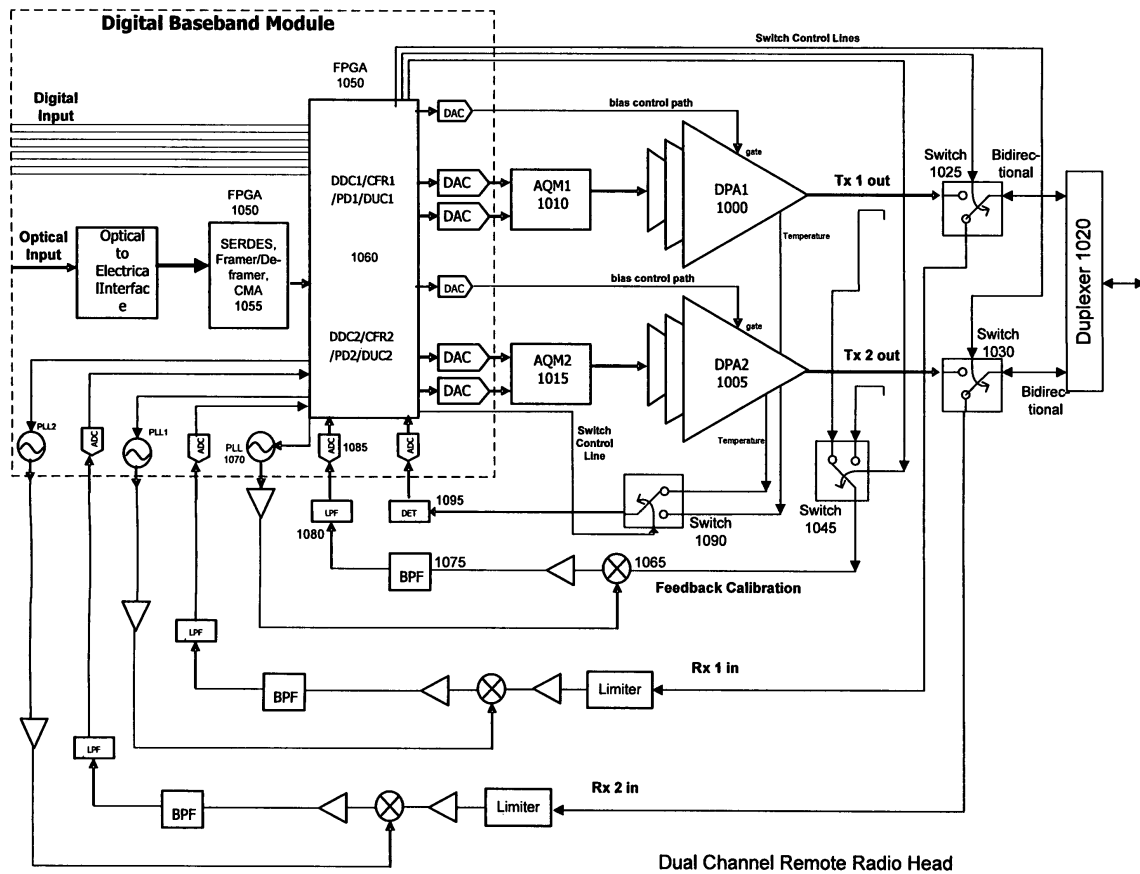
Family 3/50 - FAMPAT - ©Questel

Title

(EP3110231)

High efficiency, remotely reconfigurable remote radio head unit system and method for wireless communications

Images



Publication data including kind & date

WO20111077249	A2	2011-06-30	WO2011177249
WO20111077247	A2	2011-06-30	WO2011177247
WO20111077246	A2	2011-06-30	WO2011177246
US20111158081	A1	2011-06-30	US20110158081
US20111156815	A1	2011-06-30	US20110156815
WO2011098861	A1	2011-08-18	WO201198861
WO2011077249	A3	2011-08-18	WO2011177249
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WO2011077246	A3	2011-08-18	WO2011177246
WO2011098861	A8	2011-09-22	WO201198861
WO2011077249	A8	2011-09-22	WO2011177249
WO2011077247	A8	2011-09-22	WO2011177247
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WO2011077249	A8	2011-11-10	WO2011177249
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US2012155572	A1	2012-06-21	US20120155572
KR20120106868	A	2012-09-26	KR20120106868
KR20120108026	A	2012-10-04	KR20120108026
EP2517353	A2	2012-10-31	EP2517353
EP2524568	A1	2012-11-21	EP2524568
CN102870494	A	2013-01-09	CN102870494
CN102939716	A	2013-02-20	CN102939716
CN102948081	A	2013-02-27	CN102948081
CN102948071	A	2013-02-27	CN102948071
JP2013515423	A	2013-05-02	JP2013515423



JP2013515424	A	2013-05-02	JP2013515424				
US8542768	B2	2013-09-24	US8542768				
IN6164/CHENP/2012	A	2013-11-29	IN2012CN06164				
IN6163/CHENP/2012	A	2013-11-29	IN2012CN06163				
US2014079153	A1	2014-03-20	US20140079153				
US8730786	B2	2014-05-20	US8730786				
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US8804870	B2	2014-08-12	US8804870				
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US2015010110	A1	2015-01-08	US20150010110				
US2015080054	A1	2015-03-19	US20150080054				
US9048797	B2	2015-06-02	US9048797				
JP5744910	B2	2015-07-08	JP5744910				
US9106453	B2	2015-08-11	US9106453				
JP5761646	B2	2015-08-12	JP5761646				
US2015382363	A1	2015-12-31	US20150382363				
US2015381217	A1	2015-12-31	US20150381217				
CN102939716	B	2016-02-03	CN102939716B				
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CN102870494	B	2016-04-20	CN102870494B				
CN102948081	B	2016-06-01	CN102948081B				
CN102948071	B	2016-06-22	CN102948071B				
EP2524568	B1	2016-08-31	EP2524568				
EP3068047	A2	2016-09-14	EP3068047				
CN106160674	A	2016-11-23	CN106160674				
EP3110231	A1	2016-12-28	EP3110231				
EP3068047	A3	2017-03-01	EP3068047				
KR101763970	B1	2017-08-14	KR101763970				
HK1224439	A1	2017-08-18	HK1224439				
US9814053	B2	2017-11-07	US9814053				
HK1232372	A1	2018-01-05	HK1232372				
KR101815329	B1	2018-01-05	KR101815329				
US9866414	B2	2018-01-09	US9866414				
KR20180004314	A	2018-01-10	KR20180004314				

Abstract

(EP3110231)

A multiple-channel remote radio head unit for wireless communications is disclosed, comprising: a plurality of power amplifiers, each receiving an input signal and each providing as an output an amplified representation of the received input signal; a plurality of feedback paths, wherein each feedback path in the plurality of feedback paths provides a feedback signal that includes a representation of a characteristic of a power amplifier of the plurality of power amplifiers; digital logic for processing signals; a feedback switch for selecting one of the feedback signals for connection to the digital logic to generate predistortion compensation signals for each of the plurality of power amplifiers; a plurality of circulators, each coupled to the output of a power amplifier of the plurality of power amplifiers; a duplexer coupled to the plurality of circulators; and a plurality of receiver switches, each coupled to a circulator of the plurality of circulators, that selectively couples a respective circulator to the digital logic to reduce insertion loss between the plurality of power amplifiers and the duplexer.

Inventors

STAPLETON SHAWN PATRICK

KIM WAN JONG

XIAO YING

CHO KYOUNG JOON

Latest standardized assignees - inventors removed

DALI SYSTEMS

Application dates

2010-12-21

2010-12-21

2010-12-21

2010-12-21

2010-12-21

2010-12-21

2010-12-21

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2014-07-18

2014-07-21

2015-05-04

2015-06-30

2016-11-01

2017-06-14

Publication dates

2011-06-30

2011-06-30

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2017-08-18
2017-11-07
2018-01-05

2018-01-05

2018-01-09

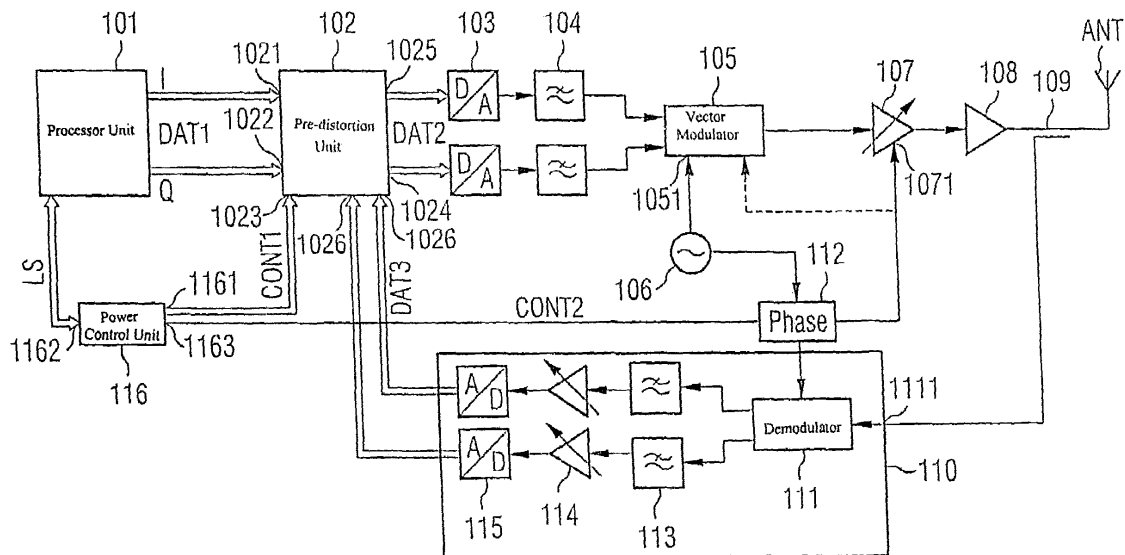
2018-01-10

Family 4/50 - FAMPAT - ©Questel

Title

(US7372918)

Transmission device with adaptive digital predistortion, transceiver with transmission device, and method for operating a transmission device

Images**Publication data including kind & date**

CN1604577	A	2005-04-06	CN1604577
US2005105642	A1	2005-05-19	US20050105642
DE102004047724	A1	2005-05-25	DE102004047724
US7372918	B2	2008-05-13	US7372918

**Abstract**

(US7372918)

The invention provides a transmission device having adaptive digital predistortion, which has a transmission path and a feedback path. The transmission path contains a predistortion unit which takes a derived control signal (LS) and baseband signals applied to the input side as a basis for calculating the address of a predistortion coefficient (KOEFF 1) stored in a memory and logically combines this predistortion coefficient with the applied baseband signals in a complex multiplication unit. The use of complex coefficients and of the complex multipliers allows compensation both for AM/AM distortion and for AM/PM distortion in an amplifier device connected downstream of the predistortion unit. Usefully, the feedback path of the transmission device with digital adaptive predistortion can also be implemented using the reception device in a transceiver.

Inventors

MUELLER JAN-ERIK

CEYLAN NAZIM

Latest standardized assignees - inventors removed

INFINEON TECHNOLOGIES

Application dates

2004-09-30

2004-09-30

2004-09-30

Publication dates

2005-04-06

2005-05-19

2005-05-25

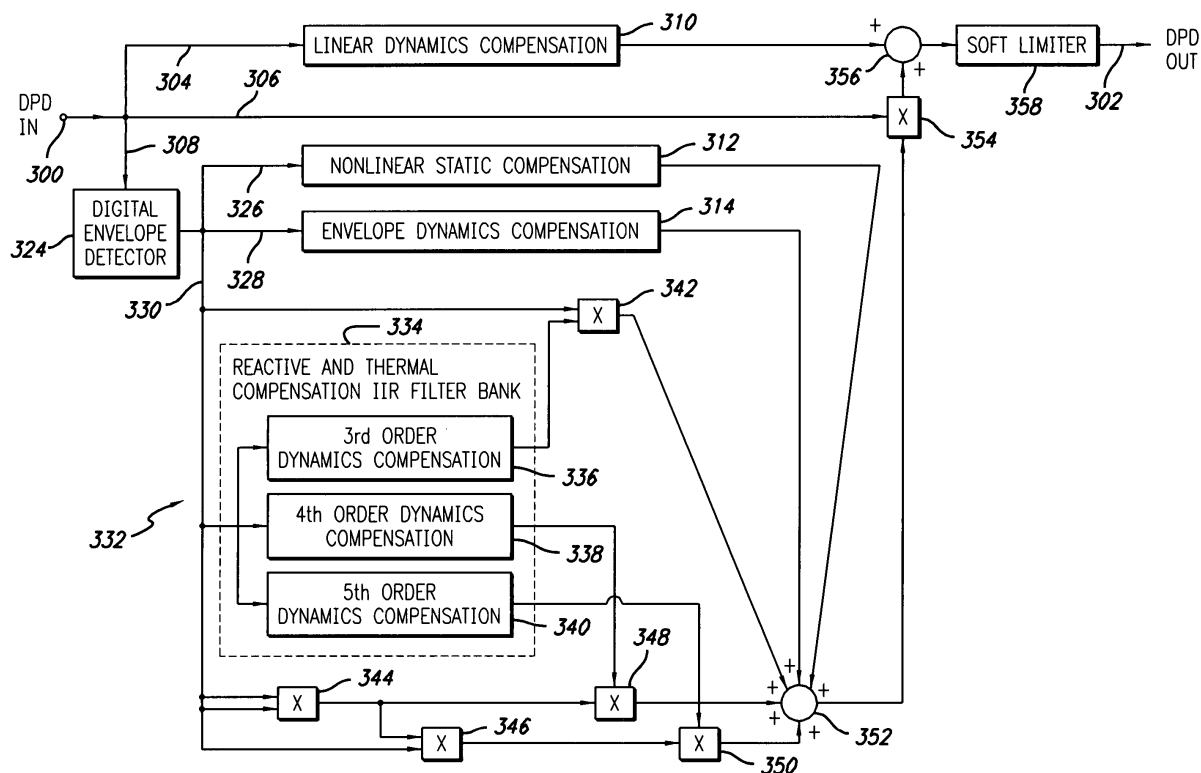
2008-05-13

Family 5/50 - FAMPAT - ©Questel

Title

(EP2521260)

Digital predistortion system and method for high efficiency transmitters

Images**Publication data including kind & date**

US2005195919	A1	2005-09-08	US20050195919
WO2005091865	A2	2005-10-06	WO200591865
CA2557334	A1	2005-10-06	CA2557334
KR20060116252	A	2006-11-14	KR20060116252
EP1749359	A2	2007-02-07	EP1749359
WO2005091865	A3	2007-06-14	WO200591865
IN3659/CHENP/2006	A	2007-07-06	IN2006CN03659
KR100802353	B1	2008-02-13	KR100802353
US7336725	B2	2008-02-26	US7336725
CN101156159	A	2008-04-02	CN101156159
EP1749359	A4	2010-05-19	EP1749359
CN101156159	B	2010-09-01	CN101156159B
EP1749359	B1	2012-09-26	EP1749359
EP2521260	A1	2012-11-07	EP2521260
CA2557334	C	2013-01-08	CA2557334

**Abstract**

(EP2521260)

A system for digitally linearizing the nonlinear behaviour of RF high efficiency amplifiers employing baseband predistortion

techniques is disclosed. The system provides additive or multiplicative predistortion of the digital quadrature (I/Q) input signal in order to minimize distortion at the output of the amplifier (100, 200). The predistorter (108, 202) uses a discrete-time polynomial kernel to model the inverse transfer characteristic of the amplifier (100, 200), providing separate and simultaneous compensation for nonlinear static distortion, linear dynamic distortion and nonlinear dynamic effects including reactive electrical memory effects. Compensation for higher order reactive and thermal memory effects is embedded in the nonlinear dynamic compensation operation of the predistorter in an IIR filter bank (334). A predistortion controller (420, 520) periodically monitors the output of the amplifier (100, 200) and compares it to the quadrature input signal to compute estimates of the residual output distortion of the amplifier. Output distortion estimates are used to adaptively compute the values of the parameters of the predistorter (108, 202) in response to changes in the amplifier's operating conditions (temperature drifts, changes in modulation input bandwidth, variations in drive level, aging, etc). The predistortion parameter values computed by the predistortion controller are stored in non-volatile memory and used in the polynomial digital predistorter. The digital predistortion system of the invention may provide broadband linearization of highly nonlinear and highly efficient RF amplification circuits including, but not limited to, dynamic load modulation amplifiers.

Inventors

COVA ARMANDO

Latest standardized assignees - inventors removed

POWERWAVE TECHNOLOGIES

Application dates

2005-02-22

2005-02-23

2005-02-23

2005-02-23

2005-02-23

2005-02-23

2006-10-02

2006-10-03

Publication dates

2005-09-08

2005-10-06

2005-10-06

2006-11-14

2007-02-07

2007-06-14

2007-07-06

2008-02-13

2008-02-26

2008-04-02

2010-05-19

2010-09-01

2012-09-26

2012-11-07

2013-01-08

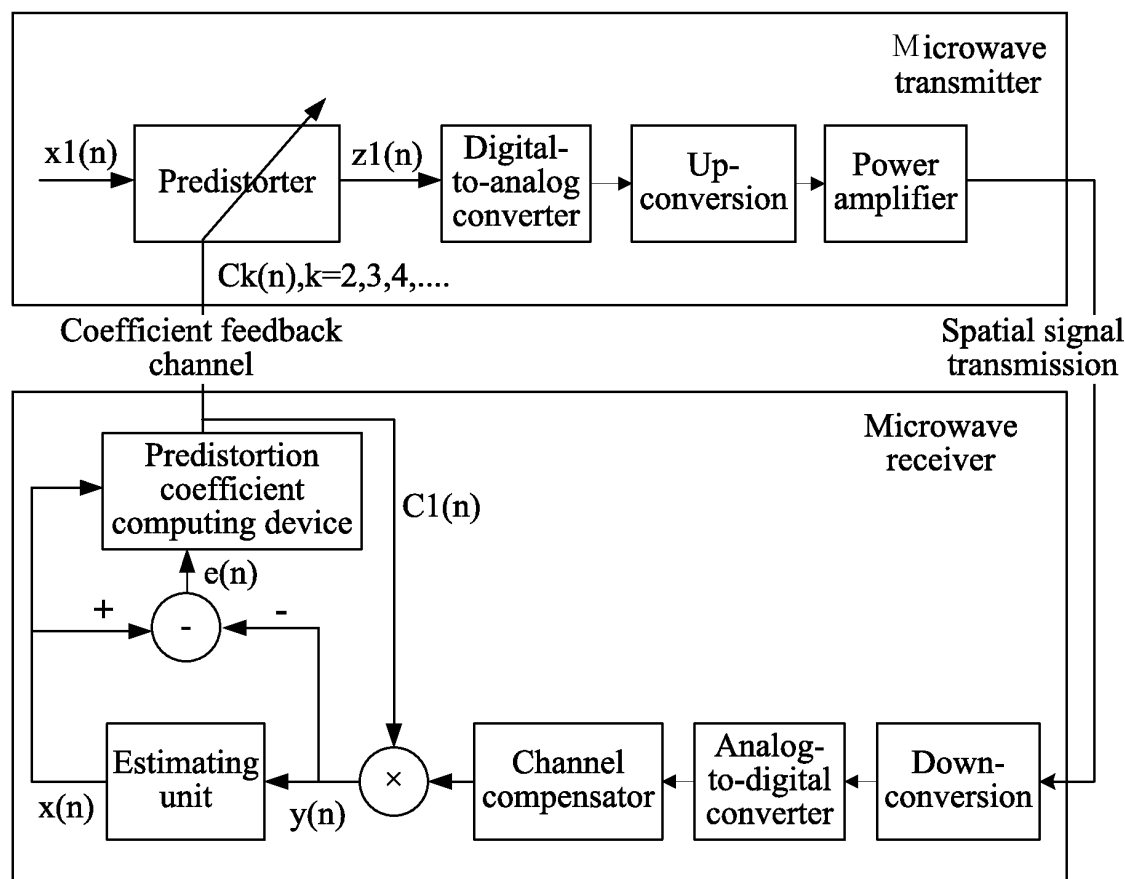
Family 6/50 - FAMPAT - ©Questel

Title

(EP2770684)

Method and device for generating microwave predistortion signal

Images



Publication data including kind & date

CN102511153	A	2012-06-20	CN102511153
WO2012163054	A1	2012-12-06	WO2012163054
EP2770684	A1	2014-08-27	EP2770684
CN102511153	B	2014-09-03	CN102511153B
US2014247906	A1	2014-09-04	US20140247906
EP2770684	A4	2014-10-29	EP2770684
US9008153	B2	2015-04-14	US9008153
EP2770684	B1	2016-02-10	EP2770684



Abstract

(EP2770684)

Embodiments of the present invention disclose a microwave predistorted signal generating method and apparatus. A microwave receiver receives a first received signal that has undergone analog-to-digital conversion; performs channel compensation on the first received signal, to obtain a second received signal; estimates a first transmitted signal according to the second received signal, where the first transmitted signal is a transmitted signal of a microwave transmitter before digital-to-analog conversion; performs predistortion coefficient computation according to the second received signal and the first transmitted signal; performs, by using a first-order coefficient obtained through the predistortion coefficient computation, linear distortion compensation on the second received signal that is before the first transmitted signal is estimated; and sends other predistortion coefficients except for the first-order coefficient to the microwave transmitter, so that the microwave transmitter performs non-linearity predistortion on a transmitted signal. The first received signal is a signal that has undergone analog-to-digital conversion, that is to say, a receiving channel of the microwave receiver may be used to receive the first received signal without requiring the microwave receiver to add an extra channel, so the cost may be reduced.

Inventors

PANG YANZHAO

SHI HUAPING

CHEN SONG

Latest standardized assignees - inventors removed

HUAWEI TECHNOLOGIES

Application dates

2011-11-16

2011-11-16

2011-11-16

2014-05-16

Publication dates

2012-06-20

2012-12-06

2014-08-27

2014-09-03

2014-09-04

2014-10-29

2015-04-14

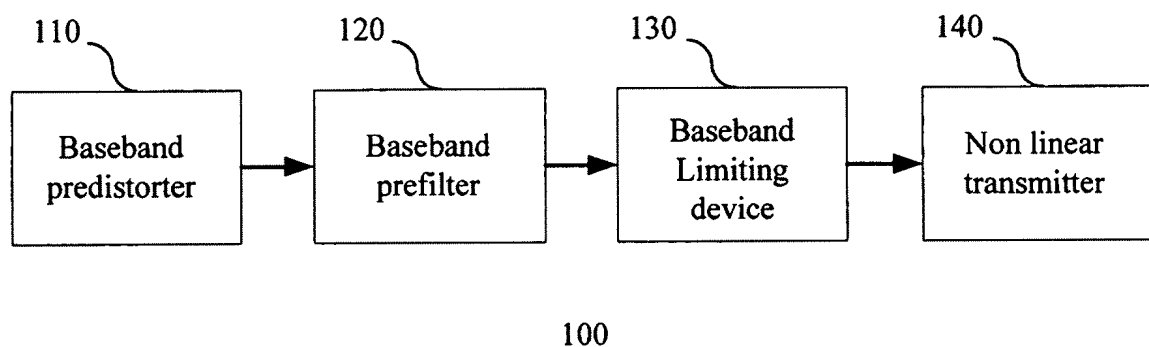
2016-02-10

Family 7/50 - FAMPAT - ©Questel

Title

(WO200767778)

Method and system to improve transmitter linearization

Images**Publication data including kind & date**

US2007129027	A1	2007-06-07	US20070129027
WO2007067778	A2	2007-06-14	WO200767778
WO2007067778	A3	2008-12-31	WO200767778
US7657237	B2	2010-02-02	US7657237

**Abstract**

(WO200767778)

The present invention discloses a method and system to compensate for the nonlinearity of the wireless transmitter. The method includes sending a predetermined input bit stream to the power amplifier, calculating the coefficients of the polynomial representing the response curve of the power amplifier and generating the predistortion coefficients of the polynomial representing the response curve of the predistorter. The method linearizes the response curve of the transmitter chain of a wireless station.

Inventors

JIN HANG

JIANG JING

GRABNER JOHN

Latest standardized assignees - inventors removed

NAVINI NETWORKS

CISCO TECHNOLOGY

Application dates

2006-12-04

2006-12-07

Publication dates

2007-06-07

2007-06-14

2008-12-31

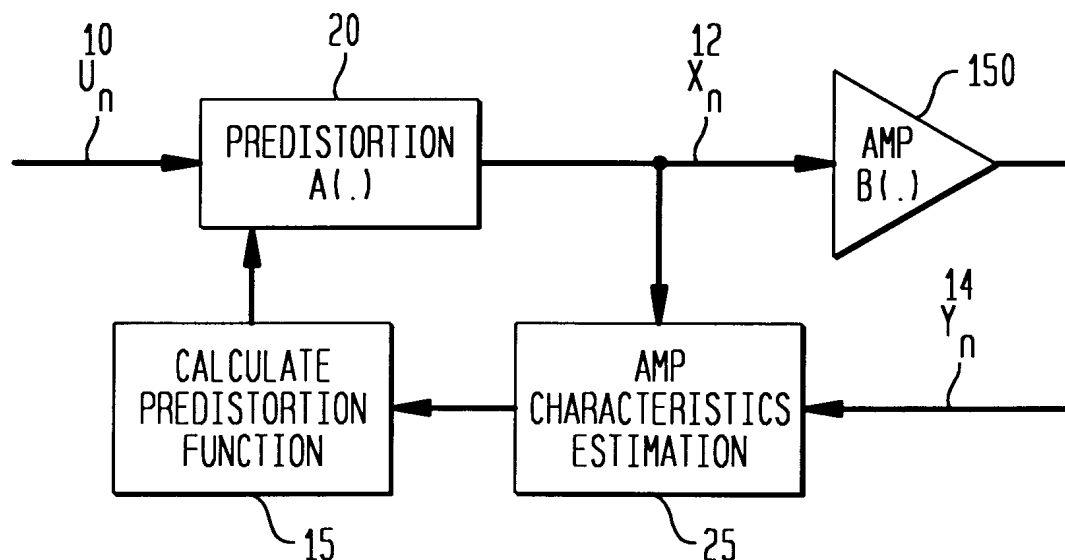
2010-02-02

Family 8/50 - FAMPAT - ©Questel

Title

(US6462617)

Method and apparatus for calculating the predistortion function from a power amplifier model

Images**Publication data including kind & date**[US6462617](#)

B1 2002-10-08 US6462617

**Abstract**

(US6462617)

Disclosed is an apparatus and method for calculating a predistortion function from power amplifier characteristics. A predistortion module generates a predistorted signal in response to an input signal and predistortion coefficients received from a predistortion function calculating module. The predistortion function calculating module generates the predistortion coefficients in response to the given amplifier characteristics. Polynomial fitting is used to obtain the predistortion coefficients. In particular, the input signal is represented by single or multiple sectors having multiple points and then predistortion coefficients are calculated for each sector.

Inventors

KIM JAEHYEONG

Latest standardized assignees - inventors removed

LUCENT TECHNOLOGIES

Application dates

2001-06-08

Publication dates

2002-10-08

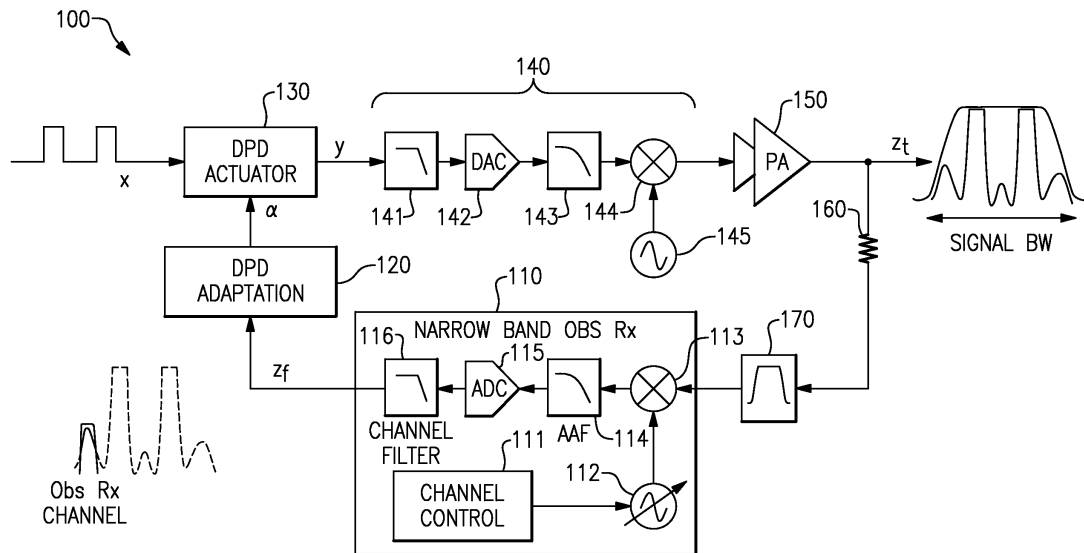
Family 9/50 - FAMPAT - ©Questel

Title

(EP2991221)

Receivers for digital predistortion

Images



Publication data including kind & date

EP2991221	A1	2016-03-02	EP2991221
US2016065147	A1	2016-03-03	US20160065147
CN105391459	A	2016-03-09	CN105391459
US9735741	B2	2017-08-15	US9735741



Abstract

(EP2991221)

Aspects of this disclosure relate to a receiver for digital predistortion (DPD). The receiver includes an analog-to-digital converter (ADC) having a sampling rate that is lower than a signal bandwidth of an output of a circuit having an input that is predistorted by DPD. DPD can be updated based on feedback from the receiver. According to certain embodiments, the receiver can be a narrowband receiver configured to observe sub-bands of the signal bandwidth. In some other embodiments, the receiver can include a sub-Nyquist ADC.

Inventors

PRATT PATRICK JOSEPH
TURNER RONALD D
BRANNON JOSEPH B

Latest standardized assignees - inventors removed

ANALOG DEVICES

Application dates

2014-08-28

2015-08-14

2015-08-17

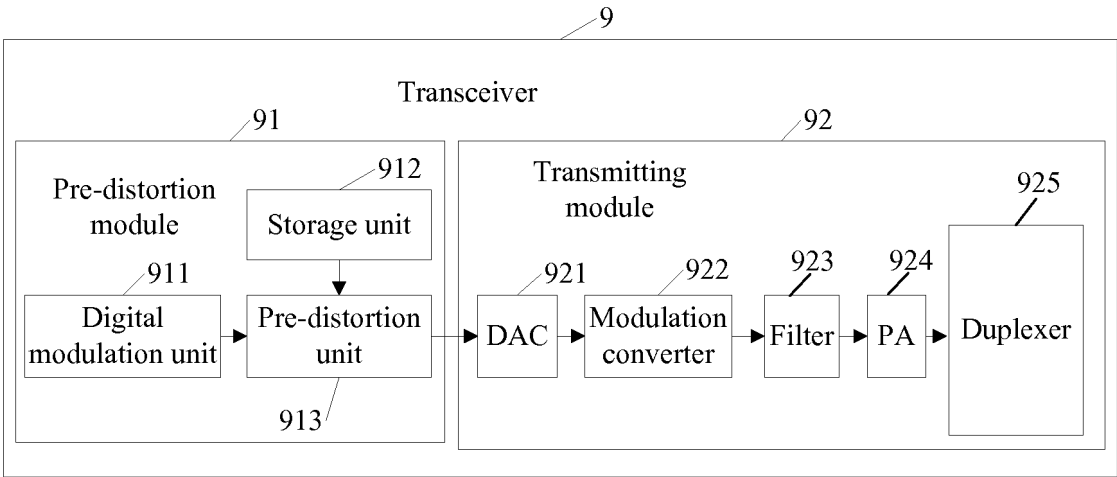
Publication dates

2016-03-02
2016-03-03
2016-03-09
2017-08-15

Family 10/50 - FAMPAT - ©Questel

Title
(EP2779555)
Method and apparatus for adjusting predistortion coefficients

Images



Publication data including kind & date

CN102510765	A	2012-06-20	CN102510765
WO2013078587	A1	2013-06-06	WO201378587
CN102510765	B	2014-09-03	CN102510765B
EP2779555	A1	2014-09-17	EP2779555
US2014269973	A1	2014-09-18	US20140269973
EP2779555	A4	2015-01-28	EP2779555
EP2779555	B1	2016-04-13	EP2779555
US9479368	B2	2016-10-25	US9479368



Abstract

(EP2779555)

Embodiments of the present invention disclose a method for adjusting a pre-distortion coefficient, which includes: adjusting a pre-distortion coefficient corresponding to a transmit power currently set by a transmitting end; analyzing signal received quality reports which are obtained respectively according to the pre-distortion coefficients before adjustment and after adjustment and are fed back by a receiving end, to determine a variation situation of signal received quality of the receiving end; if the signal received quality becomes better, using the pre-distortion coefficient after adjustment as the pre-distortion coefficient corresponding to the transmit power currently set by the transmitting end, and then returning to the step of adjusting a pre-distortion coefficient corresponding to a transmit power currently set by a transmitting end; and if the signal received quality becomes worse, using the pre-distortion coefficient before adjustment as the pre-distortion coefficient corresponding to the transmit power currently set by the transmitting end. The embodiments of the present invention further disclose an apparatus for adjusting a pre-distortion coefficient. The present invention can be adopted to overcome problems that a pre-distortion effect is affected by temperature and PA aging when an open-loop pre-distortion coefficient is adopted, and that a high cost is caused when a closed-loop pre-distortion coefficient is adopted.

Inventors

MA XINYUE

XUE WEI

WANG TIANXIANG

DENG XIANGDONG

Latest standardized assignees - inventors removed

HUAWEI TECHNOLOGIES

Application dates

2011-11-28

2011-11-28

2011-11-28

2014-05-27

Publication dates

2012-06-20

2013-06-06

2014-09-03

2014-09-17

2014-09-18

2015-01-28

2016-04-13

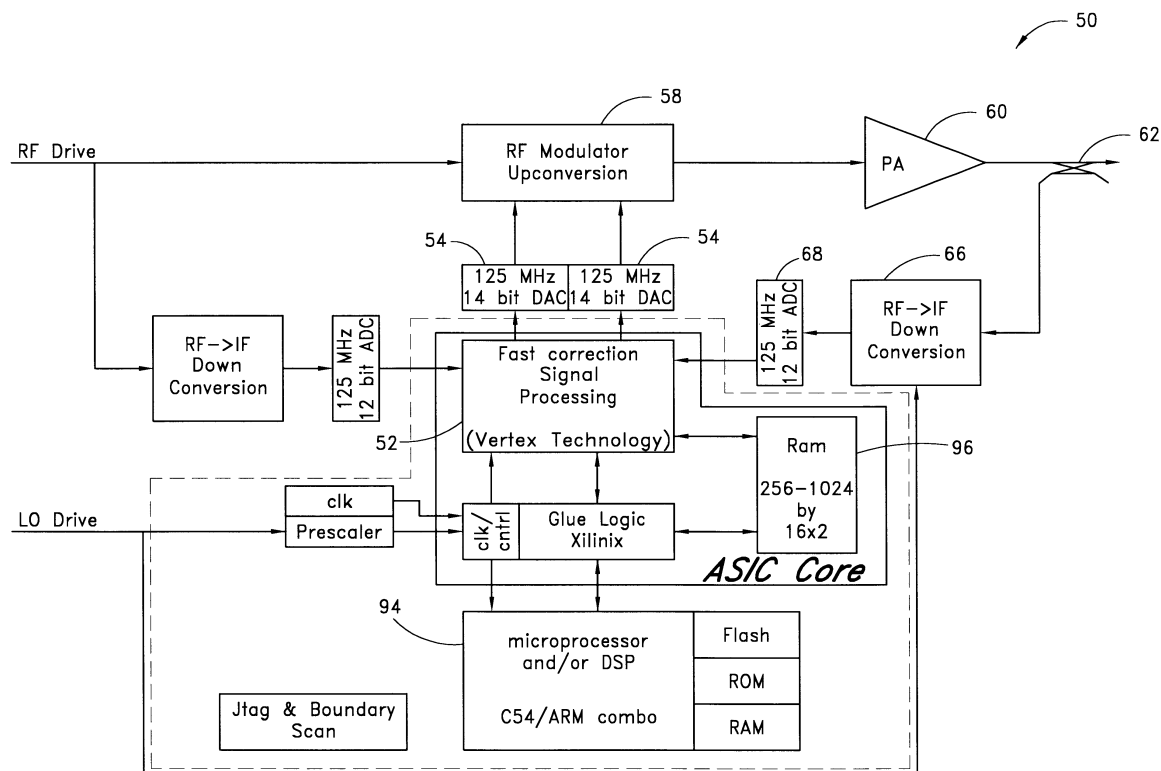
2016-10-25

Family 11/50 - FAMPAT - ©Questel

Title

(EP1280273)

A wideband digital predistortion linearizer for nonlinear amplifiers

Images**Publication data including kind & date**

WO200105026	A1	2001-01-18	WO200105026
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AU6009400	A	2001-01-30	AU200060094
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WO200108297	A1	2001-02-01	WO200108297
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WO200108296	A1	2001-02-01	WO200108296				
WO200108295	A1	2001-02-01	WO200108295				
WO200108294	A1	2001-02-01	WO200108294				
AU6009300	A	2001-02-13	AU200060093				
AU5840800	A	2001-02-13	AU200058408				
AU5840500	A	2001-02-13	AU200058405				
AU6309300	A	2001-02-13	AU200063093				
WO200108295	A8	2001-11-08	WO200108295				
US2001050592	A1	2001-12-13	US20010050592				
US2002008578	A1	2002-01-24	US20020008578				
US6342810	B1	2002-01-29	US6342810				
US6356146	B1	2002-03-12	US6356146				
EP1196988	A1	2002-04-17	EP1196988				
EP1196986	A2	2002-04-17	EP1196986				
US2002044014	A1	2002-04-18	US20020044014				
EP1203445	A1	2002-05-08	EP1203445				
EP1203444	A1	2002-05-08	EP1203444				
US6388513	B1	2002-05-14	US6388513				
EP1205024	A1	2002-05-15	EP1205024				
US6459334	B2	2002-10-01	US6459334				
US6476670	B2	2002-11-05	US6476670				
EP1280273	A2	2003-01-29	EP1280273				
EP1280273	A3	2003-02-05	EP1280273				
US6587514	B1	2003-07-01	US6587514				
US6697436	B1	2004-02-24	US6697436				
EP1205024	B1	2004-09-15	EP1205024				
EP1203445	B1	2004-09-15	EP1203445				
EP1203444	B1	2004-09-15	EP1203444				
US6798843	B1	2004-09-28	US6798843				
AT276604	T	2004-10-15	ATE276604				
AT276603	T	2004-10-15	ATE276603				
AT276602	T	2004-10-15	ATE276602				
DE60013856	D1	2004-10-21	DE60013856				
DE60013852	D1	2004-10-21	DE60013852				
DE60013851	D1	2004-10-21	DE60013851				

Abstract

(EP1280273)

A predistortion system comprises a digital compensation signal processing component (DCSP) (52) which predistorts a wideband input transmission signal to compensate for the frequency and time dependent AM-AM and AM-PM distortion characteristics of a non-linear amplifier (64). The DCSP (52) comprises a data structure (52H) in which each element stores a set of compensation parameters (preferably including FIR filter coefficients) for predistorting the input transmission signal. The parameter sets are preferably indexed within the data structure (52H) according to multiple signal characteristics, such as instantaneous amplitude and integrated signal envelope, each of which corresponds to a respective dimension of the data structure (52H). To predistort the input transmission signal, an addressing circuit (52C-52G) digitally generates a set of data structure indices from the input transmission signal, and the indexed set of compensation parameters is loaded into a compensation circuit (52A, 52B) which digitally predistorts the input transmission signal. This process of loading new compensation parameters into the compensation circuit (52A, 52B) is preferably repeated every sample instant, so that the predistortion function varies from sample-to-sample. The sets of compensation

parameters are generated periodically and written to the data structure (52H) by an adaptive control processing and compensation estimator (ACPCE) (70) that performs a non-real-time analysis of amplifier input and output signals. The ACPCE (70) also implements various system identification processes for measuring the characteristics of the power amplifier (64) and generating initial sets of filter coefficients. In an antenna array embodiment (Figures 33 and 34), a single ACPCE (70) generates the compensation parameters sets for each of multiple amplification chains (64) on a time-shared basis. In an embodiment (Figure 32) in which the amplification chain (64) includes multiple nonlinear amplifiers (60A) that can be individually controlled (e.g., turned ON and OFF) to conserve power, the data structure (52H) separately stores compensation parameter sets for each operating state of the amplification chain (64) (Fig.3). <IMAGE>

Inventors

WRIGHT ANDREW S

YEE PAUL V

HUNG CHUNG Y KEVIN

BENNETT STEVEN J

Latest standardized assignees - inventors removed

WINTEGRA

MAXLINEAR ASIA SINGAPORE PTE

Application dates

2000-06-16

2000-06-16

2000-06-19

2000-06-19

2000-06-19

2000-07-13

2000-07-13

2000-07-13

2000-07-13

2000-07-13

2000-07-13

2000-07-13

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2000-07-13

2000-07-13

2000-07-13

2001-07-05

2001-07-05

2001-07-05

Publication dates

2001-01-18

2001-01-30
2001-02-01
2001-02-01
2001-02-01
2001-02-01
2001-02-13
2001-02-13
2001-02-13
2001-02-13
2001-11-08
2001-12-13
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2002-01-29
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2002-04-17
2002-04-18
2002-05-08
2002-05-08
2002-05-14
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2003-07-01
2004-02-24
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2004-10-15
2004-10-15
2004-10-21
2004-10-21
2004-10-21

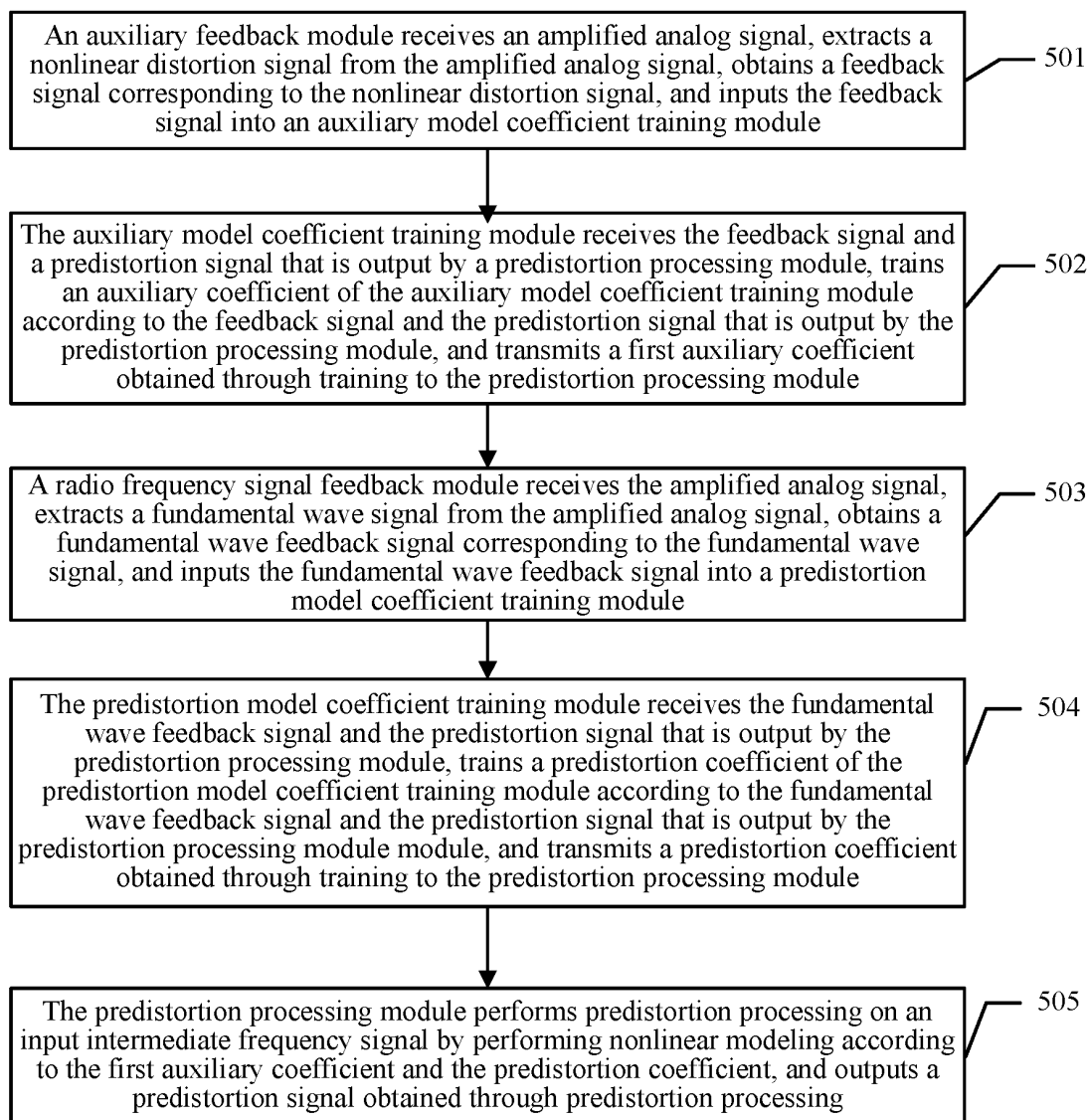
Family 12/50 - FAMPAT - ©Questel

Title

(EP3208938)

Pre-distortion processing device and method

Images



Publication data including kind & date

WO2016078038	A1	2016-05-26	WO201678038
CN107078702	A	2017-08-18	CN107078702
EP3208938	A1	2017-08-23	EP3208938
US2017257251	A1	2017-09-07	US20170257251
EP3208938	A4	2017-10-18	EP3208938



Abstract

(EP3208938)

The present invention provides a predistortion processing apparatus and method. The apparatus includes: an auxiliary feedback module, configured to: extract a nonlinear distortion signal from an analog signal, and input an obtained feedback signal corresponding to the nonlinear distortion signal into an auxiliary model coefficient training module; the auxiliary model coefficient training module, configured to: train an auxiliary coefficient according to the feedback signal and a predistortion signal, and transmit a first auxiliary coefficient obtained through training to a predistortion processing module; a radio frequency signal feedback module, configured to extract a fundamental wave feedback signal; a predistortion model coefficient training module, configured to: train a predistortion coefficient according to the predistortion signal and the fundamental wave feedback signal, and transmit an obtained predistortion coefficient to the predistortion processing module; the predistortion processing module, configured to: perform predistortion processing on an input intermediate frequency signal by performing nonlinear modeling according to the first auxiliary coefficient and the predistortion coefficient, and output a predistortion signal obtained through predistortion processing.

Inventors

ZHAO YANQING

YU CHUNLEI

TIAN TINGJIAN

Latest standardized assignees - inventors removed

HUAWEI TECHNOLOGIES

Application dates

2014-11-19

2014-11-19

2014-11-19

2017-05-19

Publication dates

2016-05-26

2017-08-18

2017-08-23

2017-09-07

2017-10-18

Family 13/50 - FAMPAT - ©Questel

Title

(EP2698958)

Digital analog predistortion processing apparatus, signal transmission system and signal transmission method

Images

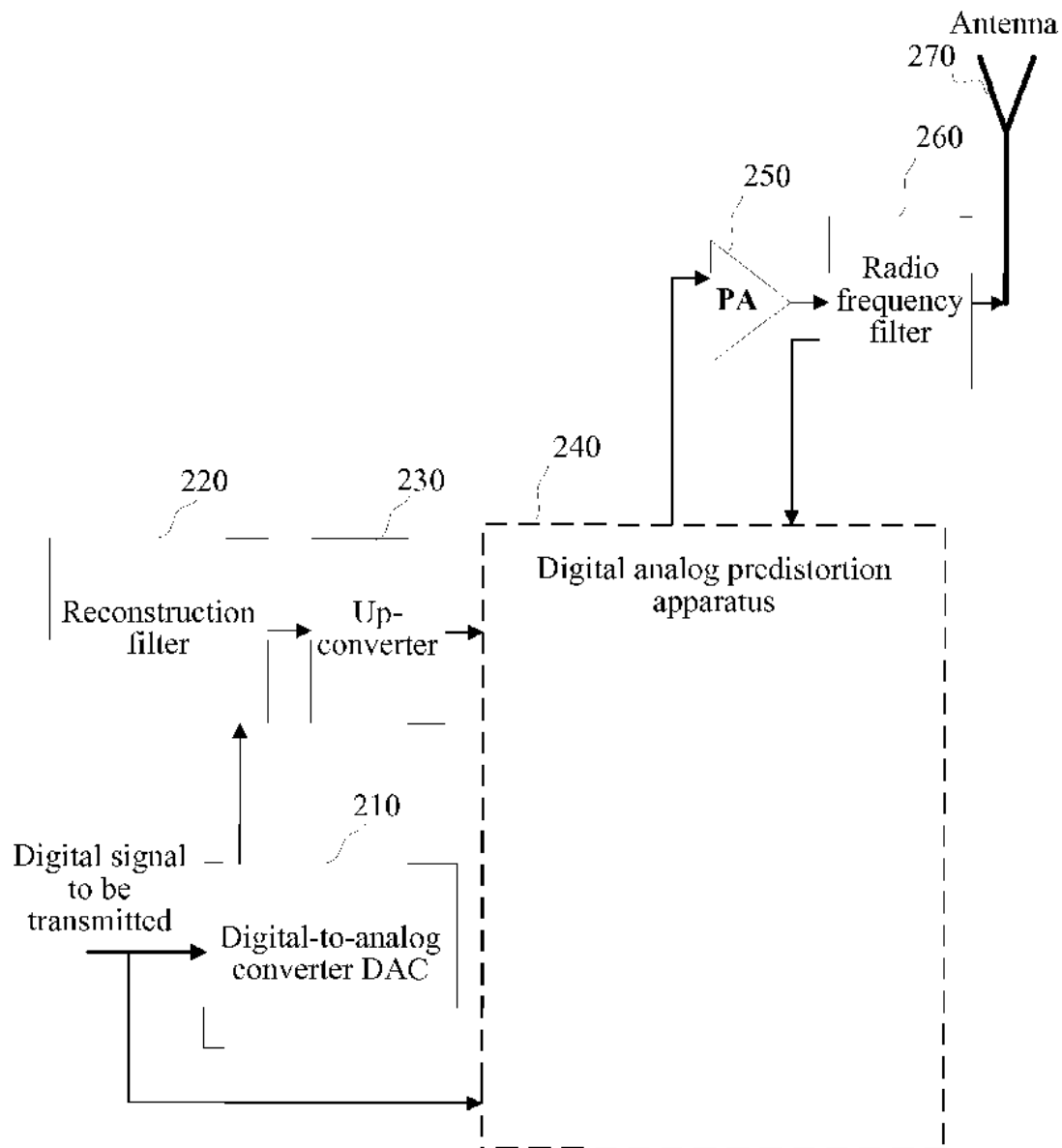


FIG. 2-a

Publication data including kind & date

WO2011103822	A2	2011-09-01	WO2011103822
CN102204200	A	2011-09-28	CN102204200
WO2011103822	A3	2012-03-22	WO2011103822
EP2698958	A2	2014-02-19	EP2698958
EP2698958	A4	2014-05-14	EP2698958

**Abstract**

(EP2698958)

A digital analog predistortion processing apparatus, a signal transmission system, and a signal transmission method are disclosed. A signal transmission system includes: a digital-to-analog converter, configured to perform digital-to-analog conversion on a digital signal to be transmitted; a reconstruction filter, configured to filter out a digital mirror in a signal output by the digital-to-analog converter after the digital-to-analog conversion, and output a low-frequency or intermediate-frequency analog signal; an up-converter, configured to up-convert the low-frequency or intermediate-frequency analog signal output by the reconstruction filter, and output a radio frequency signal; a digital analog predistortion apparatus, configured to perform, according to a predistortion coefficient, analog predistortion processing on the radio frequency signal output by the up-converter, and output a predistortion radio frequency signal; an amplifier, configured to amplify the predistortion radio frequency signal, and output a distortionless radio frequency signal; and a radio frequency filter,

configured to perform radio frequency filtering on the distortionless radio frequency signal and transfer the distortionless radio frequency signal after the radio frequency filtering to an antenna for transmission. Solutions of embodiments of the present invention can reduce the high performance requirement of signal predistortion processing on components of the transmission system, thereby reducing the device cost.

Inventors

YE SIQING

WANG WEI

ZHU ERNI

XU SHAOFENG

Latest standardized assignees - inventors removed

HUAWEI TECHNOLOGIES

Application dates

2011-04-18

2011-04-18

2011-04-18

Publication dates

2011-09-01

2011-09-28

2012-03-22

2014-02-19

2014-05-14

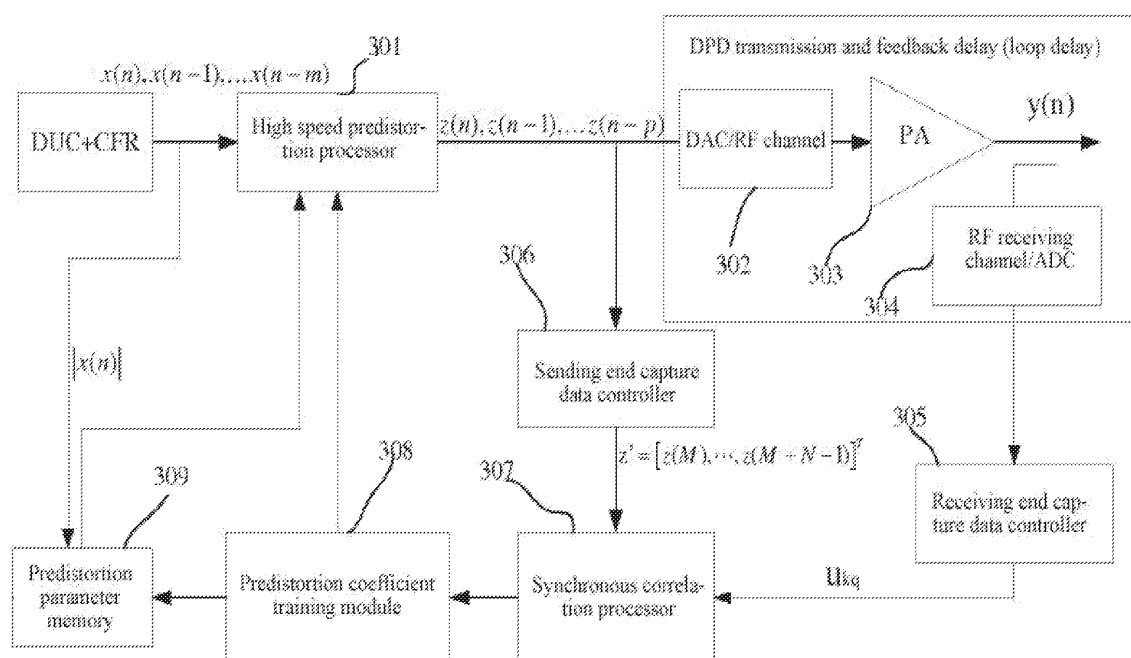
Family 14/50 - FAMPAT - ©Questel

Title

(EP2947833)

Digital predistortion processing method and system

Images



Publication data including kind & date

CN103051574	A	2013-04-17	CN103051574
WO2014110961	A1	2014-07-24	WO2014110961
EP2947833	A1	2015-11-25	EP2947833



US2015358039	A1	2015-12-10	US20150358039
CN103051574	B	2016-05-11	CN103051574B
EP2947833	A4	2016-08-17	EP2947833
US9450621	B2	2016-09-20	US9450621

**Abstract**

(EP2947833)

The present invention discloses a digital predistortion processing method and system. The method includes: extracting a predistortion parameter corresponding to an input signal from a predistortion coefficient parameter list to perform predistortion processing on the input signal to obtain a forward sending signal; performing power amplification processing on the forward sending signal to obtain an output signal; collecting the output signal to obtain a feedback signal; collecting the forward sending signal after delaying for a preset number of sampling points to obtain a reference signal; performing synchronous correlation calculation on the reference signal and the feedback signal to calibrate the feedback signal; training a predistortion coefficient according to the reference signal and the calibrated feedback signal; and forming a predistortion coefficient parameter list according to the predistortion coefficient and the amplitude of the input signal. In this embodiment, the transmission signal is delayed for a preset number of sampling points to greatly perfect the radio frequency index ACPR.

Inventors

XIONG JUN

ZHANG YONGLI

XUE BIN

Latest standardized assignees - inventors removed

DATANG MOBILE COMMUNICATIONS EQUIPMENT

Application dates

2013-01-16

2013-12-25

2013-12-25

2013-12-25

Publication dates

2013-04-17

2014-07-24

2015-11-25

2015-12-10

2016-05-11

2016-08-17

2016-09-20

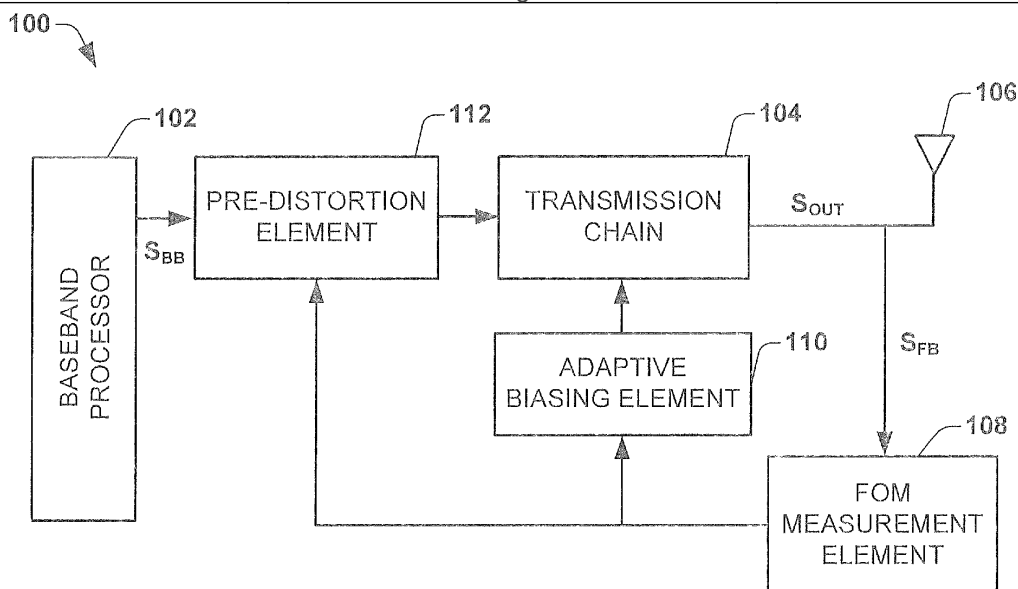
Family 15/50 - FAMPAT - ©Questel

Title

(US8908751)

Joint adaptive bias point adjustment and digital pre-distortion for power amplifier

Images

**Publication data including kind & date**

CN102651634	A	2012-08-29	CN102651634
DE102012202992	A1	2012-08-30	DE102012202992
US2012219048	A1	2012-08-30	US20120219048
KR20120098506	A	2012-09-05	KR20120098506
KR101289983	B1	2013-08-07	KR101289983
US8908751	B2	2014-12-09	US8908751
CN102651634	B	2015-05-20	CN102651634B

**Abstract**

(US8908751)

One embodiment of the present invention relates to a method and apparatus are provided herein for reducing the power consumption of a transmission chain while maintaining an acceptable figure of merit (e.g., linearity). In one embodiment, an adaptive biasing element is configured to perform adaptive biasing to reduce current consumption of a transmission chain by adjusting the operating point of one or more transmission chain elements (e.g., power amplifier, mixer, etc.). However, since adaptive biasing may reduce the linearity of a transmitted signal, its use is limited by the degradation of figure of merit caused by the introduced non-linearities. Accordingly, a pre-distortion element may be configured to perform adaptive digital pre-distortion (DPD) on a transmission chain input signal to account for non-linearities generated through the adaptive biasing, therefore allowing the adaptive biasing to further reduce the current consumption while maintaining an acceptable figure of merit.

Inventors

CAMUFFO ANDREA
GOE CHI-TAO
SOGL BERNHARD
PINARELLO SANDRO
MUELLER JAN-ERIK
SHUTE NICK

Latest standardized assignees - inventors removed

INTEL MOBILE COMMUNICATIONS TECHNOLOGY
INFINEON TECHNOLOGIES
INTEL

Application dates

2011-02-28
2012-02-27

2012-02-28

2012-02-28

Publication dates

2012-08-29

2012-08-30

2012-08-30

2012-09-05

2013-08-07

2014-12-09

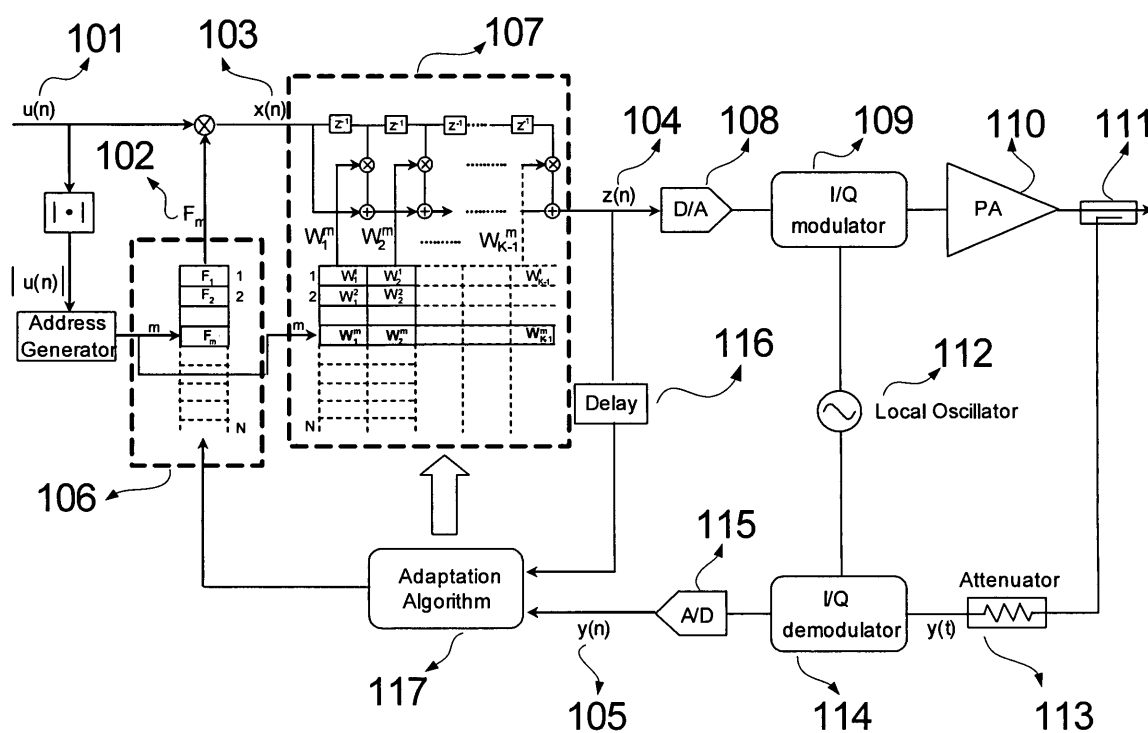
2015-05-20

Family 16/50 - FAMPAT - ©Questel

Title

(EP2106648)

Method and system for baseband predistortion linearization in multi-channel wideband communication systems

Images**Publication data including kind & date**

US2008152037	A1	2008-06-26	US20080152037
WO2008078195	A2	2008-07-03	WO200878195
EP2106648	A2	2009-10-07	EP2106648
KR20100014339	A	2010-02-10	KR20100014339
JP2010518660	A	2010-05-27	JP2010518660
IN4344/CHENP/2009	A	2010-06-11	IN2009CN04344
WO2008078195	A3	2011-03-17	WO200878195
CN102017553	A	2011-04-13	CN102017553
US8149950	B2	2012-04-03	US8149950
US2012147993	A1	2012-06-14	US20120147993
JP5236661	B2	2013-07-17	JP5236661
US8509347	B2	2013-08-13	US8509347



US2013315291	A1	2013-11-28	US20130315291				
EP2106648	A4	2014-03-26	EP2106648				
KR20140091616	A	2014-07-21	KR20140091616				
US8855234	B2	2014-10-07	US8855234				
CN102017553	B	2014-10-15	CN102017553B				
CN104202279	A	2014-12-10	CN104202279				
US2015092830	A1	2015-04-02	US20150092830				
HK1205382	A1	2015-12-11	HK1205382				
US9246731	B2	2016-01-26	US9246731				
US2016269210	A1	2016-09-15	US20160269210				
IN283900	B	2017-06-09	IN-283900				
US9913194	B2	2018-03-06	US9913194				

Abstract

(EP2106648)

An efficient baseband predistortion linearization method for reducing the spectral regrowth and compensating memory effects in wideband communication systems using effective multiplexing modulation technique such as wideband code division multiple access and orthogonal frequency division multiplexing is disclosed. The present invention is based on the method of piecewise pre-equalized lookup table based predistortion, which is a cascade of a lookup table predistortion and piecewise pre-equalizers, to reduce the computational complexity and numerical instability for desired linearity performance with memory effects compensation for wideband transmitter systems. Therefore, the present invention could reduce the computational load, which saves hardware resources in an implementation and improve performance, in terms of adjacent channel power ratio.

Inventors

KIM JONG-HEON

CHO KYOUNG-JOON

KIM WAN-JONG

STAPLETON SHAWN PATRICK

Latest standardized assignees - inventors removed

DALI WIRELESS

Application dates

2007-12-20

2007-12-20

2007-12-20

2007-12-20

2007-12-20

2007-12-20

2007-12-20

2007-12-20

2007-12-20

2012-02-24

2013-05-03

2014-09-08

2015-06-08

2016-01-08

Publication dates

2008-06-26

2008-07-03

2009-10-07

2010-02-10
 2010-05-27
 2010-06-11
 2011-03-17
 2011-04-13
 2012-04-03
 2012-06-14
 2013-07-17
 2013-08-13
 2013-11-28
 2014-03-26
 2014-07-21
 2014-10-07
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 2018-03-06

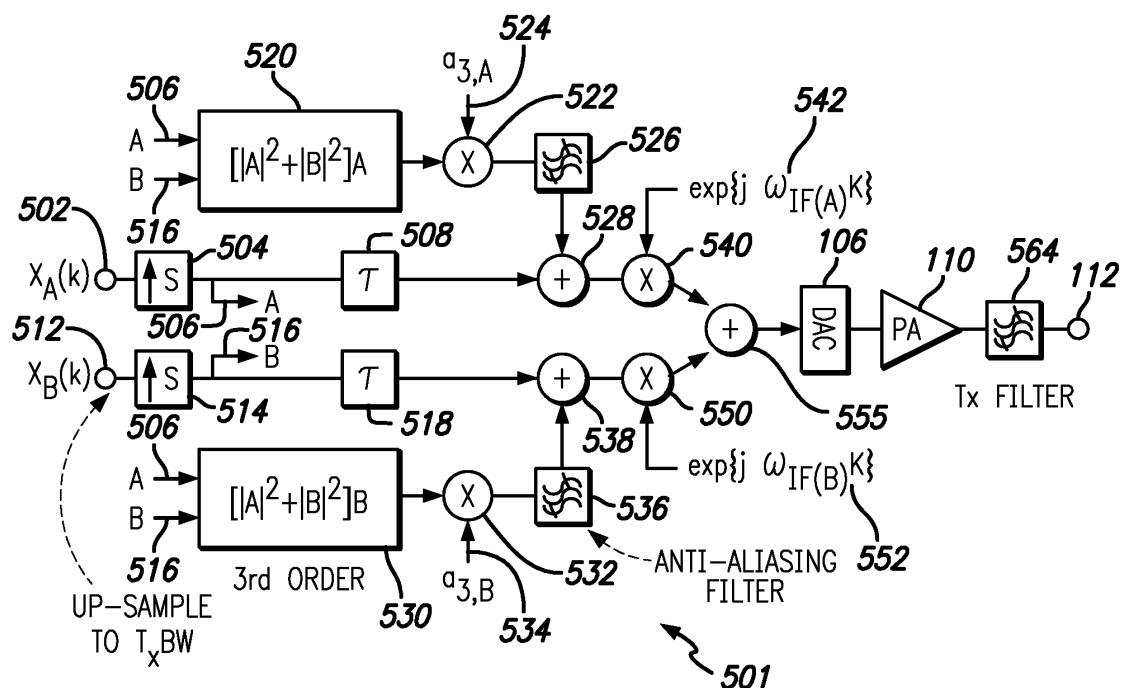
Family 17/50 - FAMPAT - ©Questel

Title

(US9184710)

Digital predistortion of a power amplifier for signals comprising widely spaced carriers

Images



Publication data including kind & date

US2012200355 A1 2012-08-09 US20120200355
 US9184710 B2 2015-11-10 US9184710



Abstract

CN101040502	B	2011-03-09	CN101040502B
EP1738511	B1	2012-10-31	EP1738511
EP2521261	A1	2012-11-07	EP2521261



Abstract

(EP2521261)

A system for digitally linearizing the nonlinear behaviour of RF high efficiency amplifiers employing baseband predistortion techniques is disclosed. The system provides additive or multiplicative predistortion of the digital quadrature (I/Q) input signal in order to minimize distortion at the output of the amplifier. The predistorter (108) uses a discrete-time polynomial kernel to model the inverse transfer characteristic of the amplifier (100), providing separate and simultaneous compensation for nonlinear static distortion, linear dynamic distortion and nonlinear dynamic effects including reactive electrical memory effects. Compensation for thermal memory effects also is embedded in the nonlinear dynamic compensation operation of the predistorter (108) and is implemented parametrically using an autoregressive dynamics tracking mechanism. A predistortion controller (420) periodically monitors the output of the amplifier (100) and compares it to the quadrature input signal to compute estimates of the residual output distortion of the amplifier (100). Output distortion estimates are used to adaptively compute the values of the parameters of the predistorter (108) in response to changes in the amplifier's operating conditions (temperature drifts, changes in modulation input bandwidth, variations in drive level, aging, etc). The predistortion parameter values computed by the predistortion controller are stored in non-volatile memory and used in the polynomial digital predistorter (108). The digital predistortion system of the invention may provide broadband linearization of highly nonlinear and highly efficient RF amplification circuits including, but not limited to, dynamic load modulation amplifiers.

Inventors

COVA ARMANDO

CARICHNER SCOTT

Latest standardized assignees - inventors removed

POWERWAVE TECHNOLOGIES

Application dates

2005-01-14

2005-01-18

2005-01-18

2005-01-18

2005-01-18

2006-08-21

Publication dates

2005-07-21

2005-08-04

2006-10-23

2007-01-03

2007-01-18

2007-09-19

2007-12-28

2008-04-29

2010-05-26

2011-03-09

2012-10-31

2012-11-07

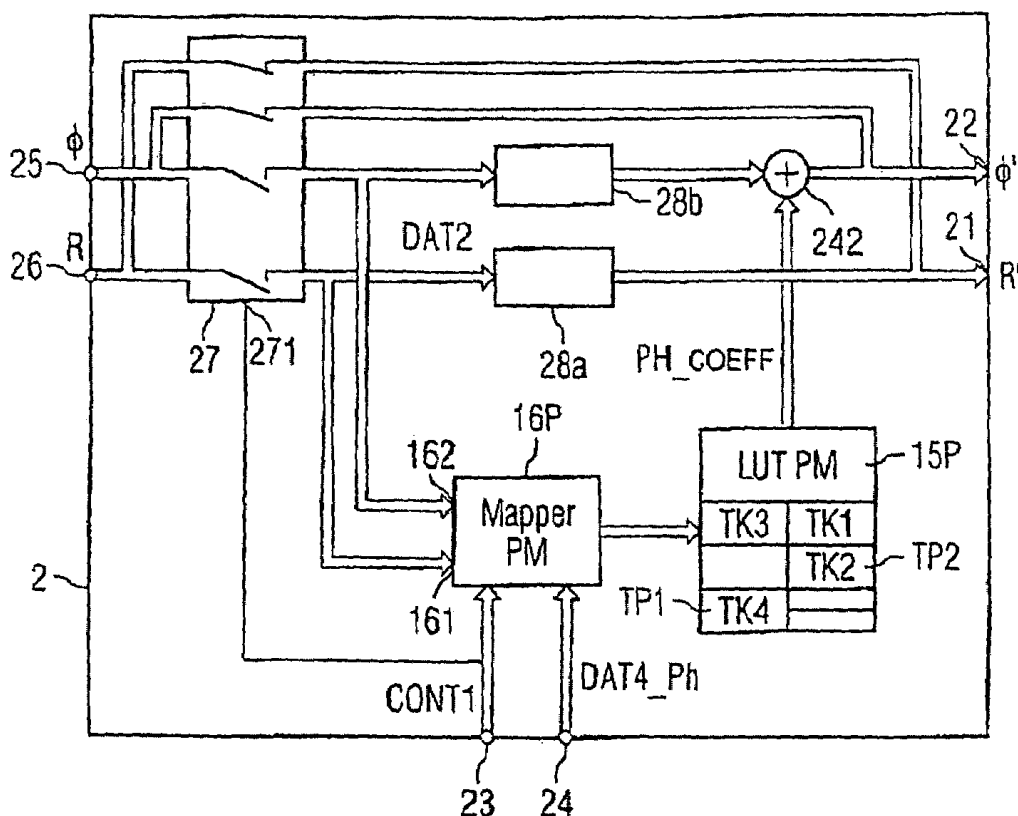
Family 19/50 - FAMPAT - ©Questel

Title

(US7577408)

Method for predistortion of a signal, and a transmitting device having digital predistortion, in particular for mobile radio

Images



Publication data including kind & date

DE102005013880	B3	2006-04-20	DE102005013880
US2006229036	A1	2006-10-12	US20060229036
US7577408	B2	2009-08-18	US7577408



Abstract

(US7577408)

A method is proposed for signal processing with predistortion. An amplifier circuit is provided for this purpose, whose operating states are characterized by at least one characteristic variable. A digital modulation signal having two components (R, ϕ), as well as a power word (LS), derived from the first component (R), are produced, and an operating state of the at least one amplifier circuit is then determined by recording of the characteristic variable. The power word (LS) is compared with the reference value and used to decide whether to predistort the first and/or the second component. A table with various predistortion coefficients is selected from at least two tables, depending on the operating state of the amplifier circuit. One predistortion coefficient is then determined from the selected table with the produced power word (LS) and the first component (R), and the predistortion coefficient is used for predistortion.

Inventors

MUELLER JAN-ERIK
CEYLAN NAZIM

Latest standardized assignees - inventors removed

INTEL

Application dates

2005-03-24
2006-03-24

Publication dates

2006-04-20

2006-10-12

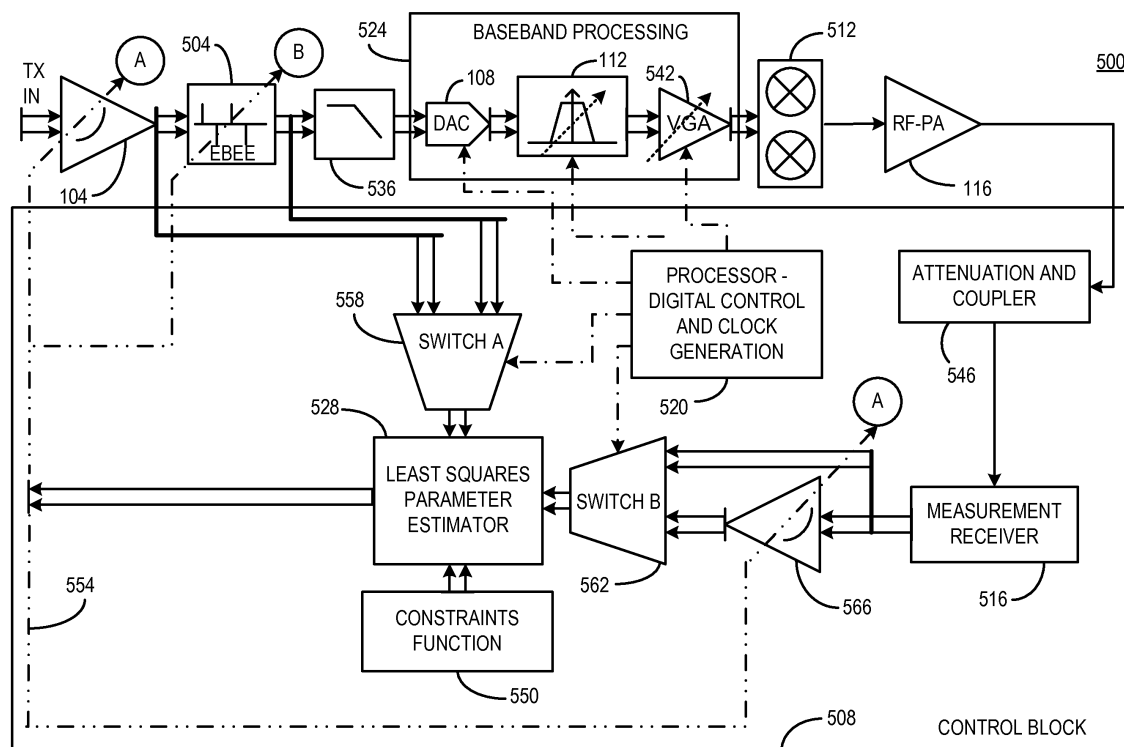
2009-08-18

Family 20/50 - FAMPAT - ©Questel

Title

(EP2876853)

Extended bandwidth adaptive digital pre-distortion with reconfigurable analog front-ends

Images**Publication data including kind & date**[EP2876853](#)

A1 2015-05-27 EP2876853

[US2015146769](#)

A1 2015-05-28 US20150146769

[US9191250](#)

B2 2015-11-17 US9191250

**Abstract**

(EP2876853)

A pre-distortion method. A signal to be transmitted Tx is pre-distorted to compensate for nonlinearities of a transmitter. The pre-distorted signal is filtered by an EBEE filter and a baseband filter. The EBEE filter has a filter characteristic of that cancels the baseband filter response over the range of frequencies from a first corner frequency of the baseband filter to a frequency of $N \cdot f_B$ where N is a highest order of distortion component being cancelled and f_B is the bandwidth of the original signal to be transmitted. This abstract is not to be considered limiting, since other embodiments may deviate from the features described in this abstract.

Inventors

OMER MOHAMMAD

DEVISON STEPHEN ARNOLD

HOLISAZ HAMED

KRAVETS OLEKSIY

Latest standardized assignees - inventors removed

BLACKBERRY

Application dates

2013-11-26

2014-11-26

Publication dates

2015-05-27

2015-05-28

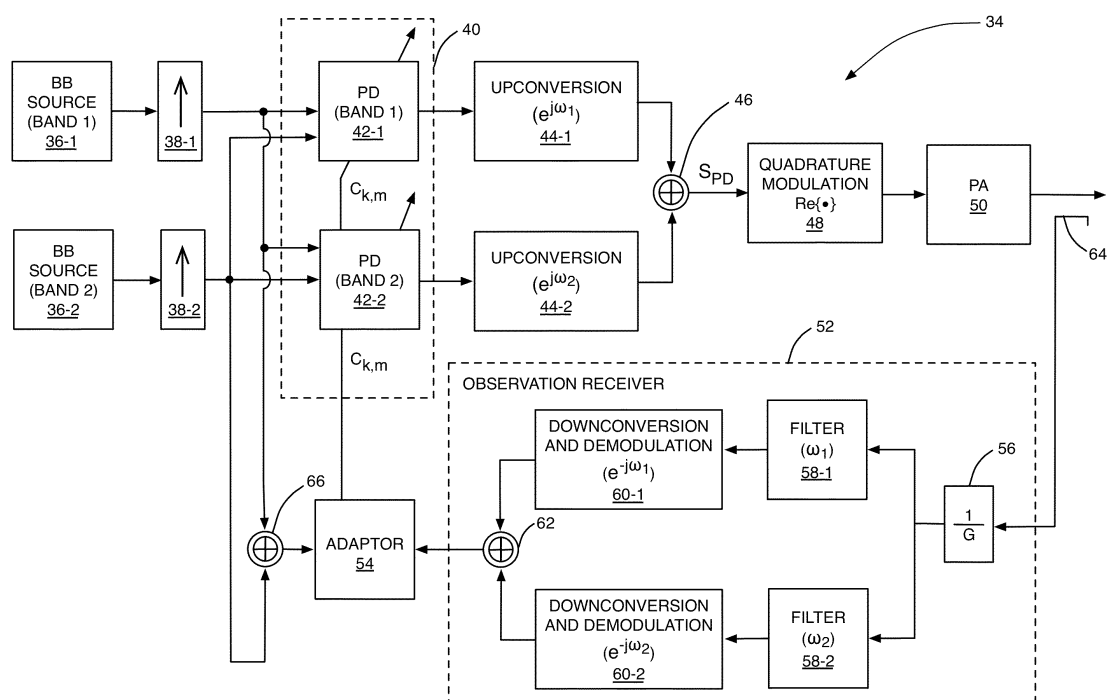
2015-11-17

Family 21/50 - FAMPAT - ©Questel

Title

(EP3000180)

Linearization of intermodulation bands for concurrent dual-band power amplifiers

Images**Publication data including kind & date**

US2014347126	A1	2014-11-27	US20140347126
WO2014188293	A2	2014-11-27	WO2014188293
WO2014188294	A2	2014-11-27	WO2014188294
WO2014188293	A3	2015-01-22	WO2014188293
WO2014188294	A3	2015-01-22	WO2014188294
US2015049841	A1	2015-02-19	US20150049841
CN104885369	A	2015-09-02	CN104885369
EP2923444	A2	2015-09-30	EP2923444
CN105229927	A	2016-01-06	CN105229927
US9252718	B2	2016-02-02	US9252718
EP3000180	A2	2016-03-30	EP3000180
US9385762	B2	2016-07-05	US9385762
CN105229927	B	2018-01-30	CN105229927B

**Abstract**

(EP3000180)

Systems and methods are disclosed for digital predistortion for a concurrent multi-band transmitter that compensates for both in-band and out-of- band intermodulation products according to a memory polynomial based baseband model. In one embodiment, a concurrent multi-band transmitter includes a digital predistortion subsystem, power amplifier circuitry, and an adaptation subsystem. The digital predistortion subsystem includes multiple digital predistorters configured to process digital input signals for frequency bands of a concurrent multi-band signal to provide predistorted digital input signals each being for a different one of the frequency bands of the concurrent multi-band signal and one or more intermodulation distortion compensation signals each being for a different one of one or more intermodulation distortion frequency bands. The adaptation subsystem is configured to adaptively configure the plurality of digital predistorters according to a memory polynomial based digital baseband model of the digital predistorters.

Inventors

LAPORTE PIERRE-ANDRE

ROLLINS MARK EDWARD

CAO HAIYING

Latest standardized assignees - inventors removed

ERICSSON

Application dates

2013-08-19

2013-12-02

2014-05-02

2014-05-02

2014-05-02

2014-05-02

2014-05-02

2014-05-02

Publication dates

2014-11-27

2014-11-27

2014-11-27

2015-01-22

2015-01-22

2015-02-19

2015-09-02

2015-09-30

2016-01-06

2016-02-02

2016-03-30

2016-07-05

2018-01-30

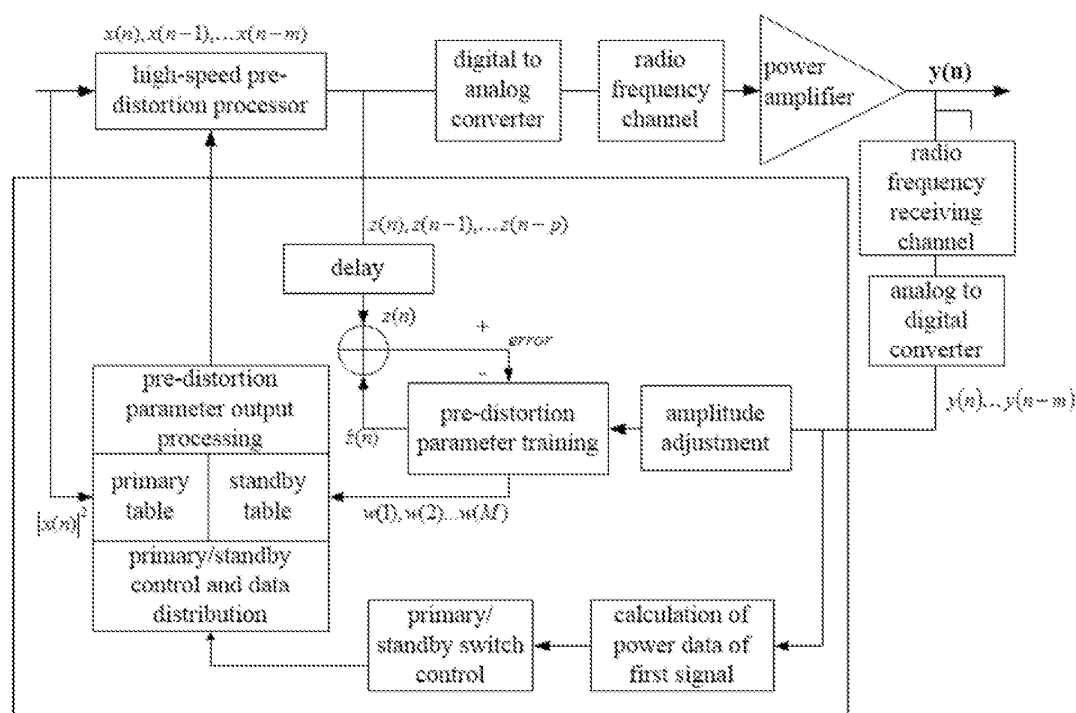
Family 22/50 - FAMPAT - ©Questel

Title

(EP2938034)

Method and system for updating predistortion coefficient

Images



Publication data including kind & date

CN103107967	A	2013-05-15	CN103107967
WO2014114170	A1	2014-07-31	WO2014114170
EP2938034	A1	2015-10-28	EP2938034
US2015358922	A1	2015-12-10	US20150358922
CN103107967	B	2016-02-03	CN103107967B
US9445375	B2	2016-09-13	US9445375
EP2938034	A4	2016-09-28	EP2938034
EP2938034	B1	2018-03-07	EP2938034



Abstract

(EP2938034)

Disclosed is a method and a system for switching pre-distortion coefficients, which is used to solve the problem of interference with neighbor cells due to the inferior pre-distortion coefficients. The method comprises: presetting a primary table and a standby table, wherein the primary table stores default pre-distortion coefficients and the standby table stores updated pre-distortion coefficients; when a data source of a pre-distortion processor adopts the standby table, adopting the updated pre-distortion coefficients to perform parameter output processing to acquire pre-distortion parameters, and conveying the pre-distortion parameters and an input signal to the pre-distortion processor to process to acquire pre-distortion signals; conveying the pre-distortion signals through various signal processors to acquire a first signal, and determining the power data of the first signal; if the power data of the first signal is more than or equal to a setting range, continuing to adopt the standby table as the data source of the pre-distortion processor; and if the power data of the first signal is less than setting range, switching the data source of the pre-distortion processor to the primary table.

Inventors

XIONG JUN

DUAN TAO

SUN HUARONG

XIAO PENG

WANG CE

WANG JIELI

Latest standardized assignees - inventors removed

DATANG MOBILE COMMUNICATIONS EQUIPMENT

Application dates

2013-01-25

2013-12-30

2013-12-30

2013-12-30

Publication dates

2013-05-15

2014-07-31

2015-10-28

2015-12-10

2016-02-03

2016-09-13

2016-09-28

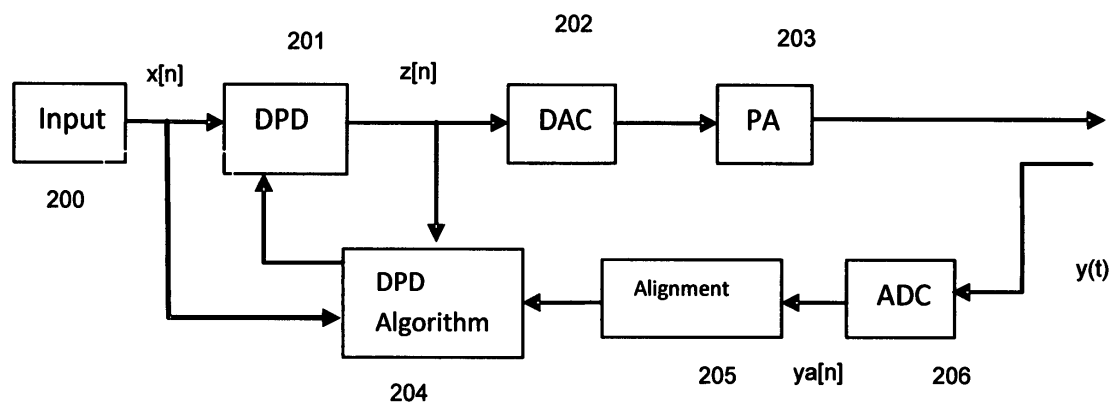
2018-03-07

Family 23/50 - FAMPAT - ©Questel

Title

(US9379745)

Multi-band wide band power amplifier digital predistortion system

Images

Digital Predistortion Block Diagram

Publication data including kind & date

US2012154038	A1	2012-06-21	US20120154038
US8351877	B2	2013-01-08	US8351877
US2013094612	A1	2013-04-18	US20130094612
US8467747	B2	2013-06-18	US8467747
US2013251066	A1	2013-09-26	US20130251066
US8903337	B2	2014-12-02	US8903337
US2015171899	A1	2015-06-18	US20150171899
US9379745	B2	2016-06-28	US9379745



[US2017047952](#)

A1 2017-02-16 US20170047952

Abstract

(US9379745)

A high performance and cost effective method of RF-digital hybrid mode power amplifier systems with high linearity and high efficiency for multi-frequency band wideband communication system applications is disclosed. The present disclosure enables a power amplifier system to be field reconfigurable and support multiple operating frequency bands on the same PA system over a very wide bandwidth. In addition, the present invention supports multi-modulation schemes (modulation agnostic), multi-carriers and multi-channels.

Inventors

KIM WAN-JONG

CHO KYOUNG-JOON

STAPLETON SHAWN PATRICK

Latest standardized assignees - inventors removed

DALI SYSTEMS

Application dates

2010-12-21

2012-12-04

2013-05-15

2014-11-25

2016-06-13

Publication dates

2012-06-21

2013-01-08

2013-04-18

2013-06-18

2013-09-26

2014-12-02

2015-06-18

2016-06-28

2017-02-16

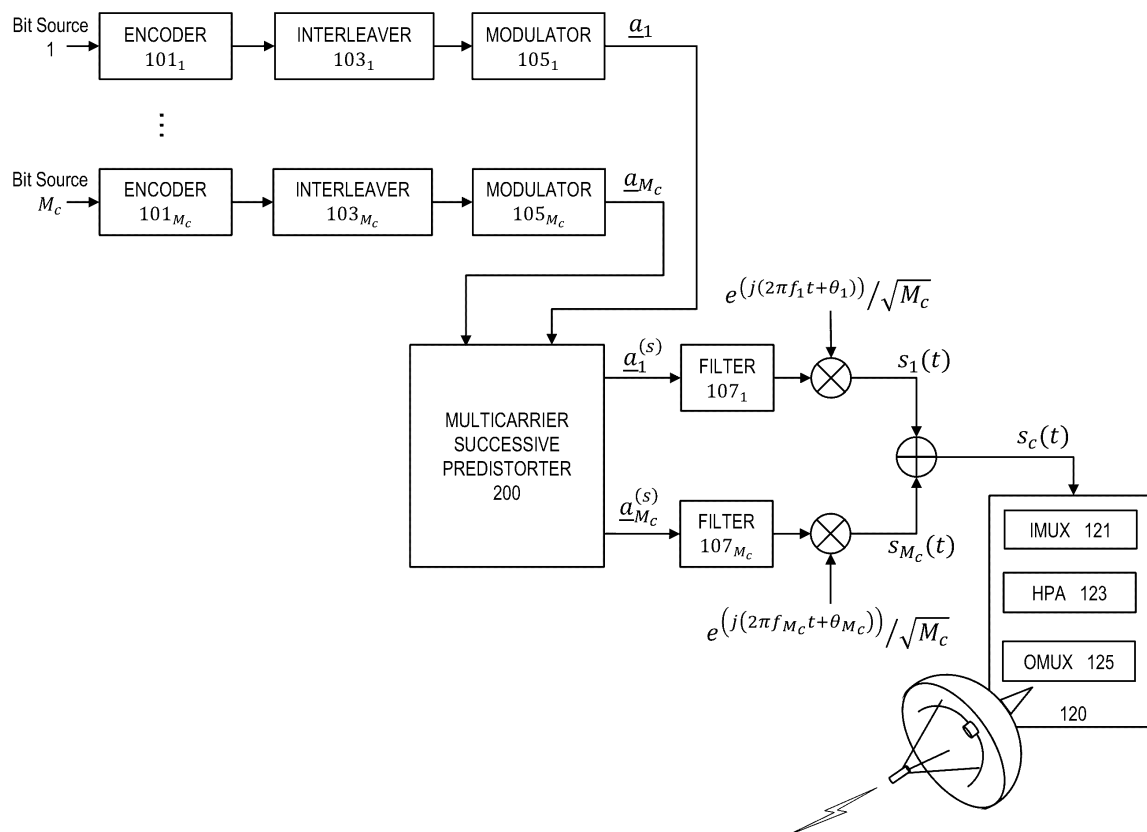
Family 24/50 - FAMPAT - ©Questel

Title

(EP3155776)

Multicarrier successive predistortion for digital transmission

Images



Publication data including kind & date

US2015311927	A1	2015-10-29	US20150311927
WO2015192112	A2	2015-12-17	WO2015192112
WO2015192112	A3	2016-03-10	WO2015192112
US9614554	B2	2017-04-04	US9614554
EP3155776	A2	2017-04-19	EP3155776
EP3155776	A4	2018-02-21	EP3155776



Abstract

(EP3155776)

An approach for improved compensation for nonlinear distortion in multicarrier satellite systems is provided. Source reflecting encoded and modulated sequences of source data symbols are received. Each source signal is predistorted, and a transmit filter is applied to each predistorted source signal. Each filtered signal is translated to a carrier frequency, and the translated signals are combined into a composite signal for transmission via a multicarrier transponder. The final predistorted version of each source signal is generated via an iterative process of a number of stages, wherein, for a given stage and for each source signal, the process comprises: receiving a prior predistorted version of each source signal from a preceding stage; processing each prior predistorted source signal based on all of the received prior predistorted source signals, wherein the processing is performed based on a characterization of one or more characteristics of the multicarrier satellite transponder.

Inventors

BEIDAS BASSEL
SESHADRI ROHIT IYER
BECKER NEAL

Latest standardized assignees - inventors removed

HUGHES NETWORK SYSTEMS

Application dates

2015-06-12
2015-06-12
2015-06-12

Publication dates

2015-10-29

2015-12-17

2016-03-10

2017-04-04

2017-04-19

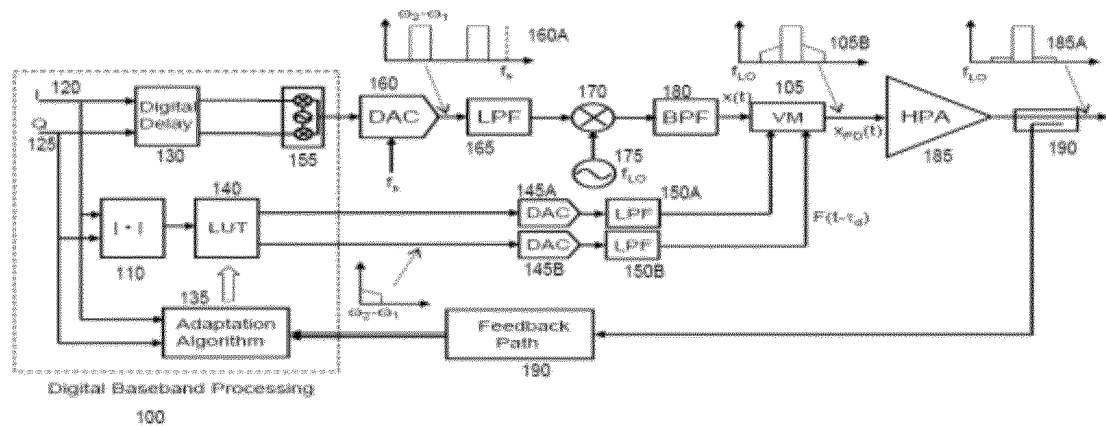
2018-02-21

Family 25/50 - FAMPAT - ©Questel

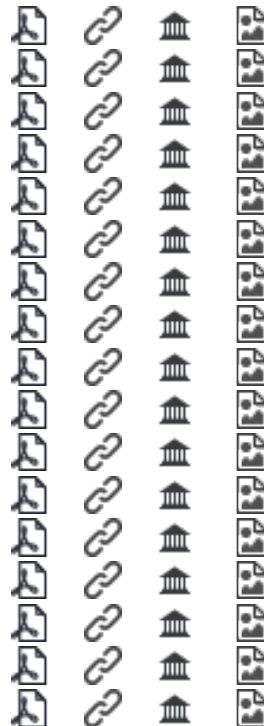
Title

(EP2248255)

Baseband-derived rf digital predistortion

Images**Publication data including kind & date**

US2009146736	A1	2009-06-11	US20090146736
WO2009109808	A2	2009-09-11	WO2009109808
KR20100108546	A	2010-10-07	KR20100108546
EP2248255	A2	2010-11-10	EP2248255
IN4196/CHENP/2010	A	2011-01-07	IN2010CN04196
JP2011511493	A	2011-04-07	JP2011511493
WO2009109808	A3	2011-04-28	WO2009109808
CN102150361	A	2011-08-10	CN102150361
US8213884	B2	2012-07-03	US8213884
US2012230382	A1	2012-09-13	US20120230382
US8401499	B2	2013-03-19	US8401499
JP5250636	B2	2013-07-31	JP5250636
US2013214861	A1	2013-08-22	US20130214861
US8548403	B2	2013-10-01	US8548403
EP2248255	A4	2014-05-28	EP2248255
KR101669173	B1	2016-10-25	KR101669173
CN102150361	B	2016-11-09	CN102150361B

**Abstract**

(EP2248255)

A baseband-derived RF predistortion system using a lookup table having coefficients extracted at baseband and then applied at RF by means of a vector modulator. The architecture combines the narrowband advantage of envelope predistortion with the accuracy of baseband predistortion, and including compensation for memory effects. A polynomial-

based alternative is also described.

Inventors

KIM WAN JONG

STAPLETON SHAWN PATRICK

Latest standardized assignees - inventors removed

DALI SYSTEMS

Application dates

2008-12-08

2008-12-08

2008-12-08

2008-12-08

2008-12-08

2008-12-08

2010-07-06

2012-05-25

2013-02-25

Publication dates

2009-06-11

2009-09-11

2010-10-07

2010-11-10

2011-01-07

2011-04-07

2011-04-28

2011-08-10

2012-07-03

2012-09-13

2013-03-19

2013-07-31

2013-08-22

2013-10-01

2014-05-28

2016-10-25

2016-11-09

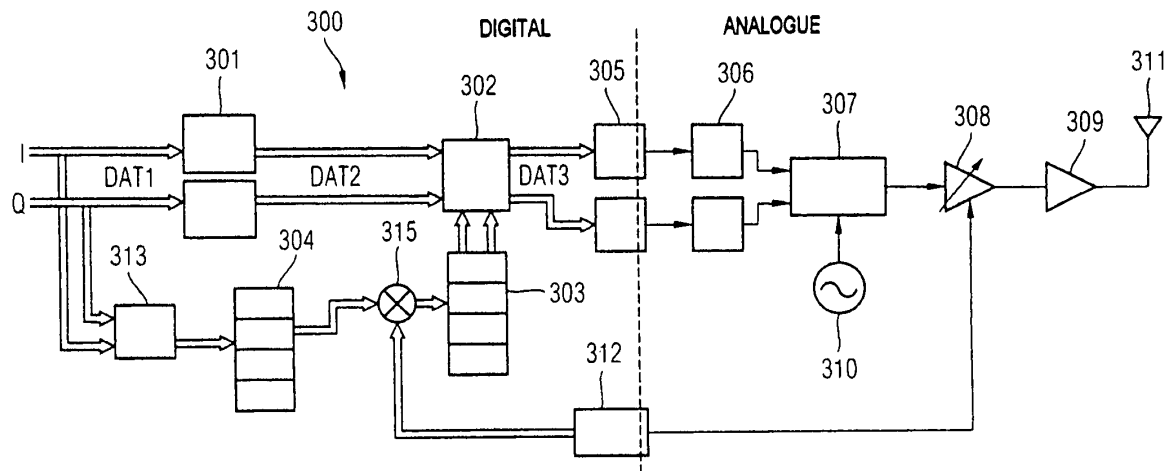
Family 26/50 - FAMPAT - ©Questel

Title

(US8155238)

Device for processing radio transmission data with digital predistortion

Images



Publication data including kind & date

US2005249309	A1	2005-11-10	US20050249309
DE102004019984	A1	2005-11-17	DE102004019984
DE102004019984	B4	2006-06-29	DE102004019984
US8155238	B2	2012-04-10	US8155238



Abstract

(US8155238)

A device for processing data which is to be transmitted by radio, with the data to be transmitted being in the form of a digital baseband signal (DAT1), has a filter unit (301) for pulse shaping and oversampling of the digital baseband signal (DAT1), a predistortion unit (302, 303) for predistortion of the filtered and oversampled digital baseband signal (DAT2), and a control unit (304, 313) for controlling the predistortion unit (302, 303) as a function of the digital baseband signal (DAT1).

Inventors

MUELLER JAN-ERIK

CEYLAN NAZIM

Latest standardized assignees - inventors removed

INTEL

Application dates

2004-04-23

2005-04-22

Publication dates

2005-11-10

2005-11-17

2006-06-29

2012-04-10

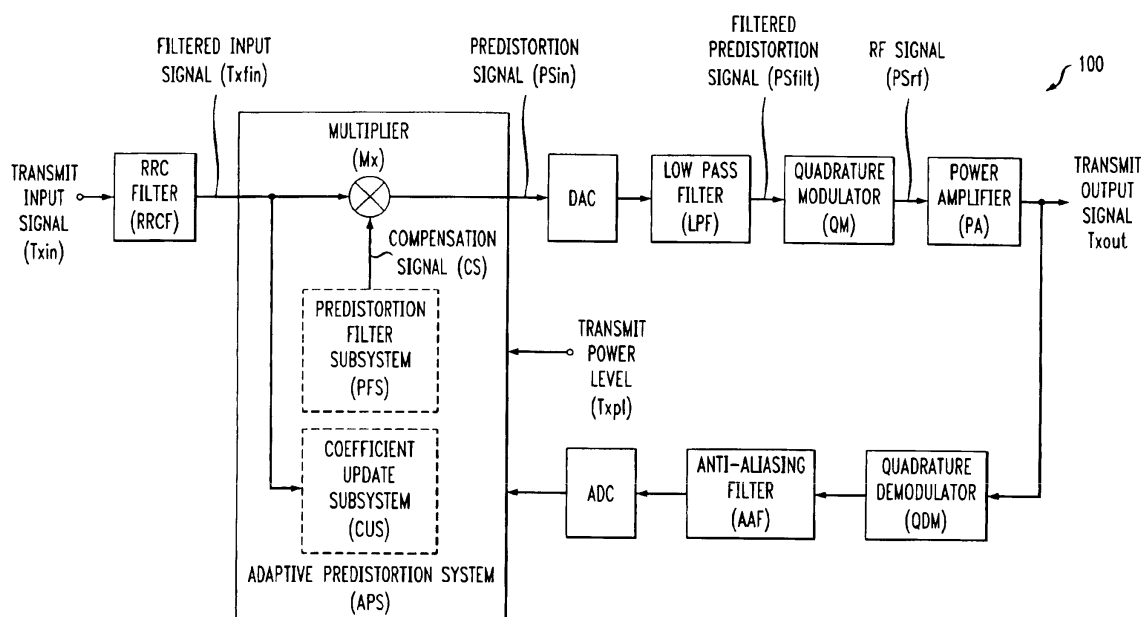
Family 27/50 - FAMPAT - ©Questel

Title

(US6853246)

Adaptive predistortion system and a method of adaptively predistorting a signal

Images



Publication data including kind & date

[US2003197558](#)

A1 2003-10-23

US20030197558

[US6853246](#)

B2 2005-02-08

US6853246



Abstract

(US6853246)

An adaptive predistortion system for use with a power amplifier having a nonlinear amplification characteristic and a method of adaptively predistorting a signal is provided. In one embodiment, the adaptive predistortion system includes a coefficient update subsystem coupled to an output of the power amplifier and configured to update a set of predistortion coefficients using an iterative process based on an output signal of the power amplifier. Additionally, the adaptive predistortion system includes a predistortion filter subsystem coupled to the coefficient update subsystem and configured to employ the set of predistortion coefficients to reduce a level of distortion associated with the nonlinear amplification characteristic.

Inventors

BAUDER RUEDIGER

KIM YOUNG M

YAN QING

YIIN JEFFREY L

Latest standardized assignees - inventors removed

LSI LOGIC

AVAGO TECHNOLOGIES

Application dates

2002-04-18

Publication dates

2003-10-23

2005-02-08

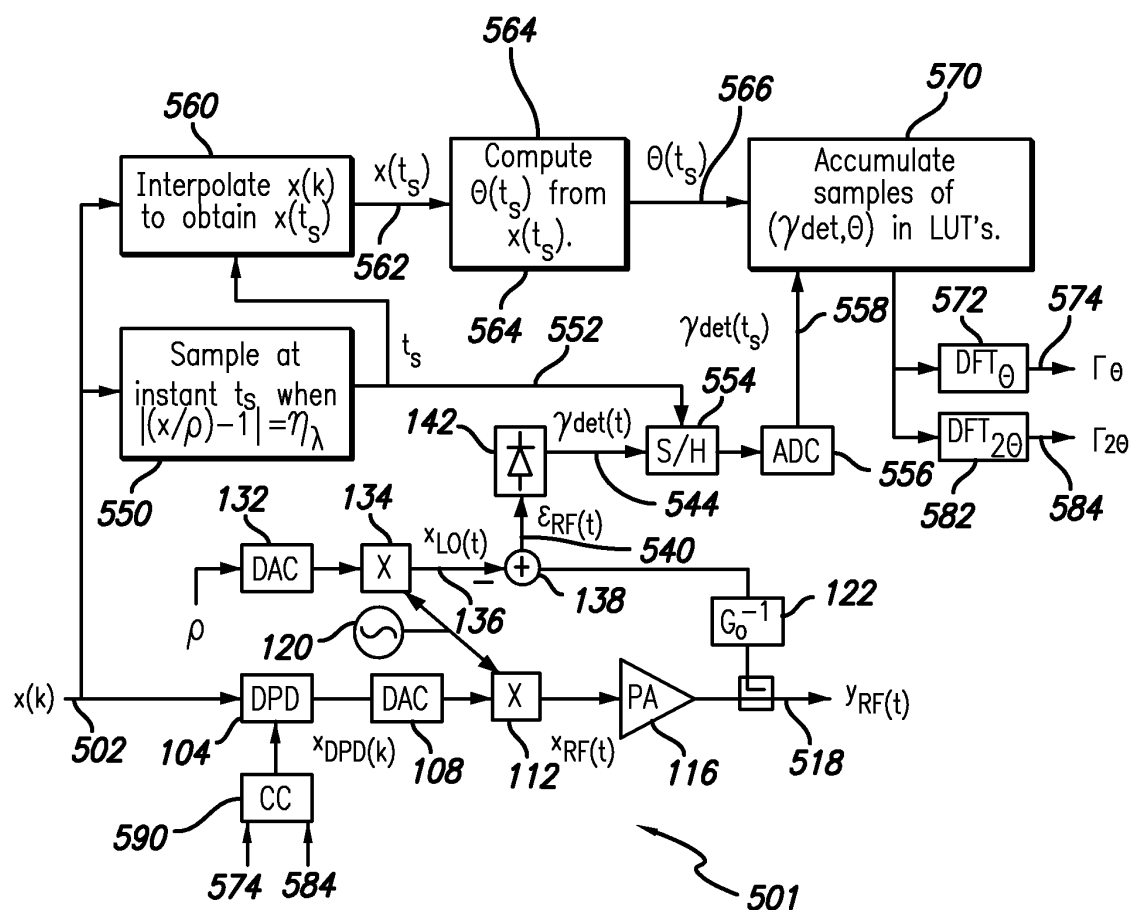
Family 28/50 - FAMPAT - ©Questel

Title

(US8354884)

Measurement and correction of residual nonlinearities in a digitally predistorted power amplifier

Images



Publication data including kind & date

US2011121897

A1 2011-05-26

US20110121897

US8354884

B2 2013-01-15

US8354884



Abstract

(US8354884)

A reduced cost method for the measurement and correction of residual nonlinearities in a digitally predistorted transmitter is disclosed. Systems employing predistorters and power amplifiers are calibrated by processing actual input and output signals during the normal operation of the systems. The systems correct memoryless nonlinearities as well as both memoryless and memory based nonlinearities.

Inventors

BRAITHWAITE RICHARD NEIL

Latest standardized assignees - inventors removed

POWERWAVE TECHNOLOGIES

Application dates

2010-11-19

Publication dates

2011-05-26

2013-01-15

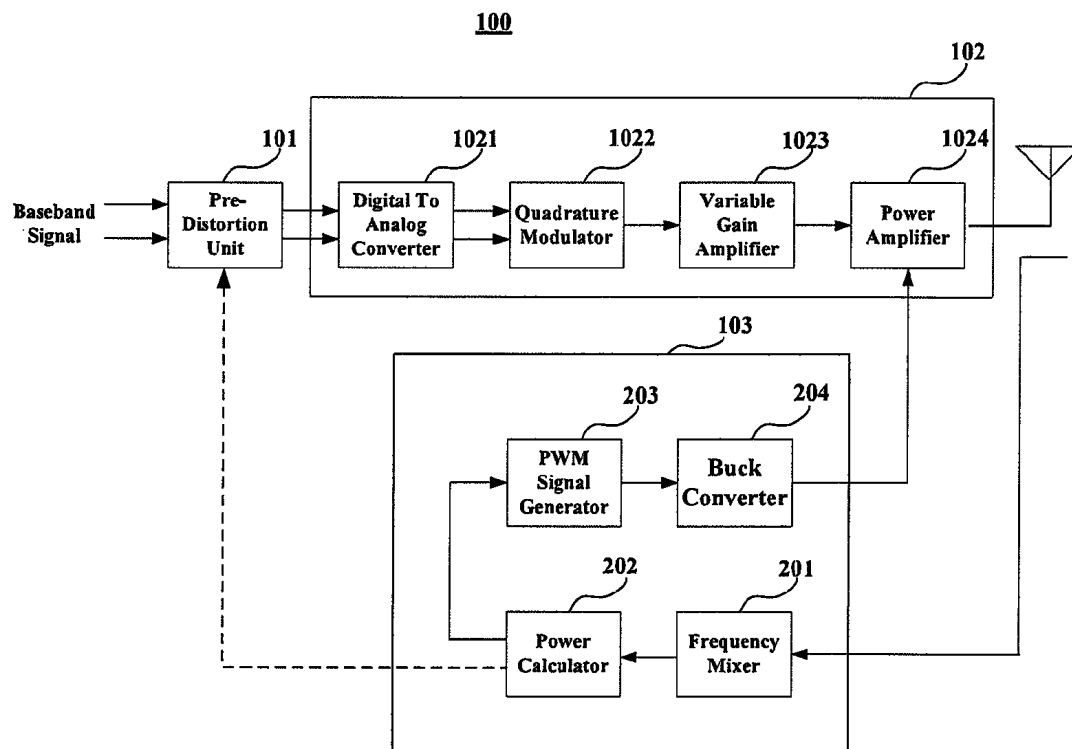
Family 29/50 - FAMPAT - ©Questel

Title

(US9225363)

Digital pre-distortion transmitter and method for controlling the same

Images



Publication data including kind & date

US2015071382	A1	2015-03-12	US20150071382
JP2015056900	A	2015-03-23	JP2015056900
CN104468437	A	2015-03-25	CN104468437
US9225363	B2	2015-12-29	US9225363
CN104468437	B	2017-11-14	CN104468437B



Abstract

(US9225363)

The present disclosure provides a digital pre-distortion transmitter and a method for controlling the same, which increase the efficiency of the power amplifier and improve the linearity of the transmitter. The digital pre-distortion transmitter includes: a pre-distortion unit configured to update a pre-distortion coefficient required by pre-distortion processing, and perform the pre-distortion processing on a baseband signal; a signal process and transmit unit configured to perform signal processing on the pre-distortion-processed baseband signal and transmission thereof; and a feedback signal process unit configured to process a feedback signal of the signal transmitted by the signal process and transmit unit, so as to supply a dynamic drain voltage to a power amplifier in the signal process and transmit unit by using the processed feedback signal; and, the pre-distortion unit updates the pre-distortion coefficient by using the feedback signal processed by the feedback signal process unit.

Inventors

WU DONGLIN

WU JIE

CHEN PEI

ZHOU JIANMIN

IWAMATSU TAKANORI

Latest standardized assignees - inventors removed

FUJITSU

Application dates

2013-09-12

2014-08-29

2014-09-09

Publication dates

2015-03-12

2015-03-23

2015-03-25

2015-12-29

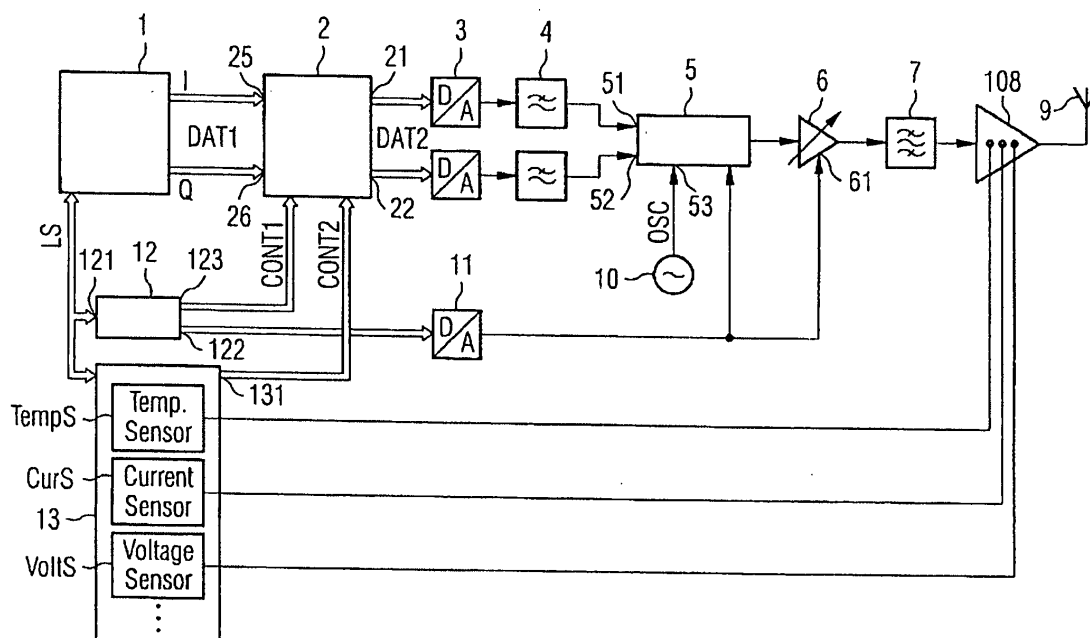
2017-11-14

Family 30/50 - FAMPAT - ©Questel

Title

(US20050111574)

Transmission device with digital predistortion, and method for regulating predistortion in a transmission device

Images**Publication data including kind & date**

JP2005110284	A	2005-04-21	JP2005110284
US2005111574	A1	2005-05-26	US20050111574
DE102004047684	A1	2005-06-23	DE102004047684
JP4044086	B2	2008-02-06	JP4044086
DE102004047684	B4	2008-09-11	DE102004047684

**Abstract**

(US20050111574)

One or more aspects of the present invention relate to a transmission device having a digital predistortion unit which has a control input to which a control signal (CONT 1) is applied. The control signal is output by a power control unit which evaluates a power control signal (LS). The predistortion unit distorts a baseband signal which is to be transmitted whenever the linearity of a power amplifier can no longer be observed at the currently required power without predistortion. To this end, the baseband signal is multiplied in complex fashion by a predistortion coefficient which is dependent on the level of the baseband signal.

Inventors

MULLER JAN-ERIK

CEYLAN NAZIM

Latest standardized assignees - inventors removed

INFINEON TECHNOLOGIES

Application dates

2004-09-28

2004-09-30

2004-09-30

Publication dates

2005-04-21

2005-05-26

2005-06-23

2008-02-06

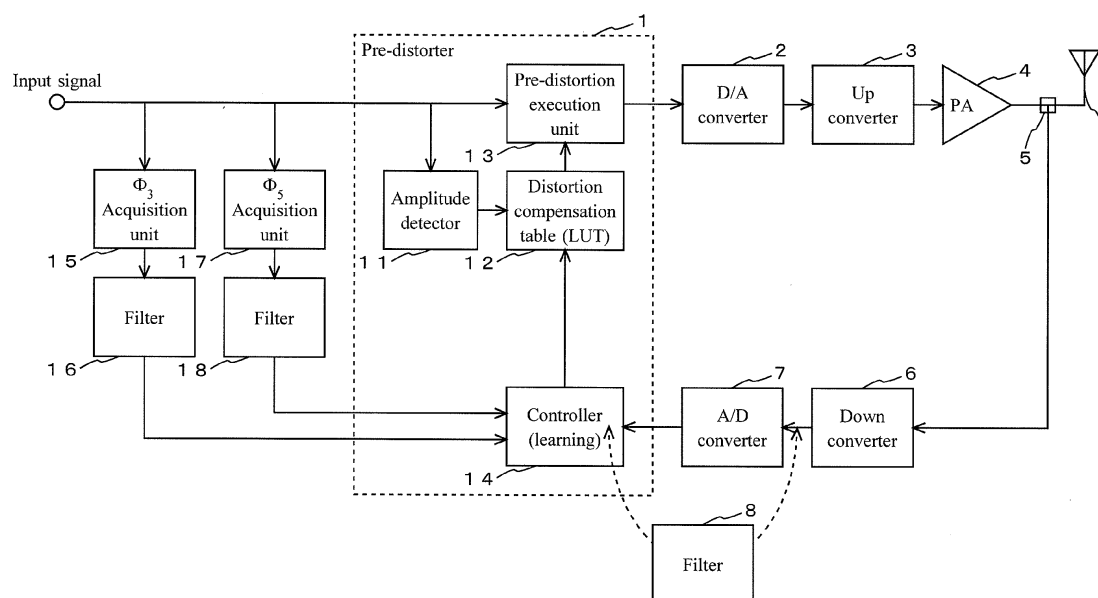
2008-09-11

Family 31/50 - FAMPAT - ©Questel

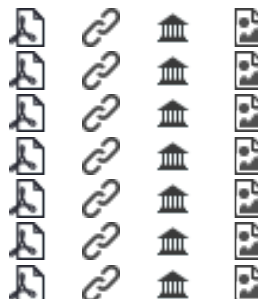
Title

(WO201029690)

Distortion compensation amplification device

Images**Publication data including kind & date**

WO2010029690	A1	2010-03-18	WO201029690
JP2010068142	A	2010-03-25	JP2010068142
CN102106079	A	2011-06-22	CN102106079
US2011163806	A1	2011-07-07	US20110163806
US8334723	B2	2012-12-18	US8334723
JP5205182	B2	2013-06-05	JP5205182
CN102106079	B	2014-01-29	CN102106079B

**Abstract**

(WO201029690)

Disclosed is a more efficient distortion compensation amplification device with a pre-distorter (1). A level detection means (11) detects a signal level. A correspondence memory means (12) outputs distortion compensation coefficients in response

to the signal level.A pre-distortion execution means (13) imparts distortion having the inverse characteristics to a signal.A filter means (8) outputs the distorted signal component from a feedback signal of the output of an amplifier (4).A correspondence acquisition means (14) updates the coefficients for training to construct a function which imparts the inverse characteristics so that the distorted signal component becomes smaller.Orthogonal polynomials are used in the function which imparts the inverse characteristics.Each orthogonal function is the sum of the products of the functions of the input signal and the parameters.The parameter values are set so that the orthogonal functions are mutually orthogonal when the function, which is obtained by applying a filter having the same characteristics as the filter means (8) to the function of the input signal, is replaced by a function of the input signal constructed by the orthogonal functions.

Inventors

HONGO NAOKI

Latest standardized assignees - inventors removed

HITACHI KOKUSAI ELECTRIC

Application dates

2008-09-09

2009-08-24

2009-08-24

2009-08-24

Publication dates

2010-03-18

2010-03-25

2011-06-22

2011-07-07

2012-12-18

2013-06-05

2014-01-29

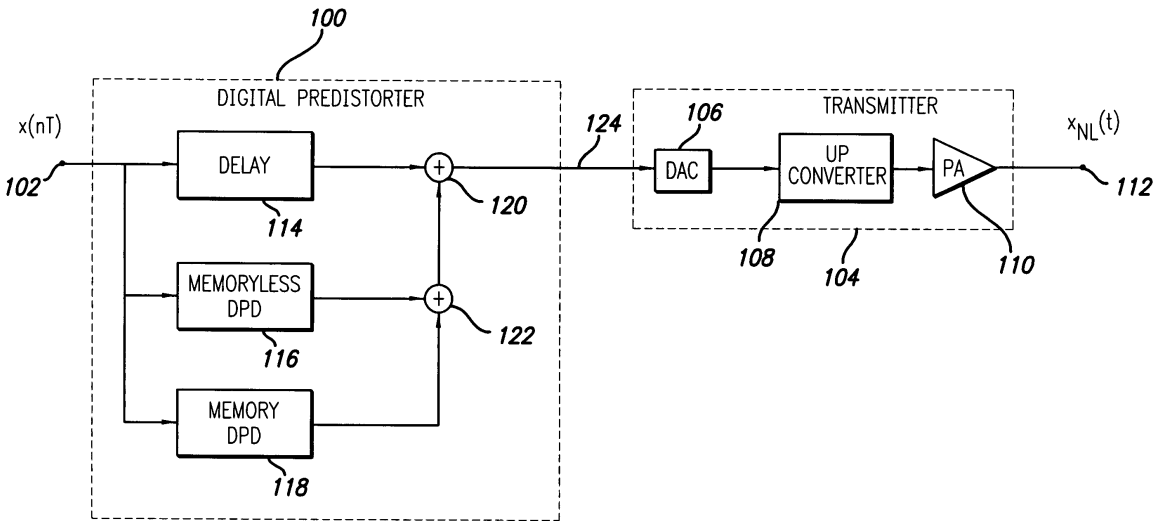
Family 32/50 - FAMPAT - ©Questel

Title

(EP1645094)

Digital predistortion system and method for correcting memory effects within an rf power amplifier

Images



Publication data including kind & date

US2005001684	A1	2005-01-06	US20050001684
WO2005008883	A2	2005-01-27	WO200508883
WO2005008883	A3	2005-08-11	WO200508883



KR20060026480	A	2006-03-23	KR20060026480				
EP1645094	A2	2006-04-12	EP1645094				
CN1833418	A	2006-09-13	CN1833418				
US7149257	B2	2006-12-12	US7149257				
KR100837743	B1	2008-06-13	KR100837743				
CN1833418	B	2010-06-16	CN1833418B				
EP1645094	A4	2011-12-28	EP1645094				

Abstract

(EP1645094)

A system and method of correcting memory effects present within power amplifiers using digital predistortion and an improved power amplifier system employing digital predistortion are disclosed. Nonlinearities within a power amplifier (110) having an input derived from a digital signal are compensated by injecting a digital correction signal prior to the power amplifier (110). A system and method for modeling the distortion created by power amplifier (110) memory effects and generating the desired digital predistortion correction signal are disclosed.

Inventors

BRAITHWAITE RICHARD NEIL

Latest standardized assignees - inventors removed

POWERWAVE TECHNOLOGIES

Application dates

2004-06-30

2004-07-01

2004-07-01

2004-07-01

2006-01-03

Publication dates

2005-01-06

2005-01-27

2005-08-11

2006-03-23

2006-04-12

2006-09-13

2006-12-12

2008-06-13

2010-06-16

2011-12-28

Family 33/50 - FAMPAT - ©Questel

Title

(WO2008116402)

The predistortion apparatus, transmitter and the method

Images

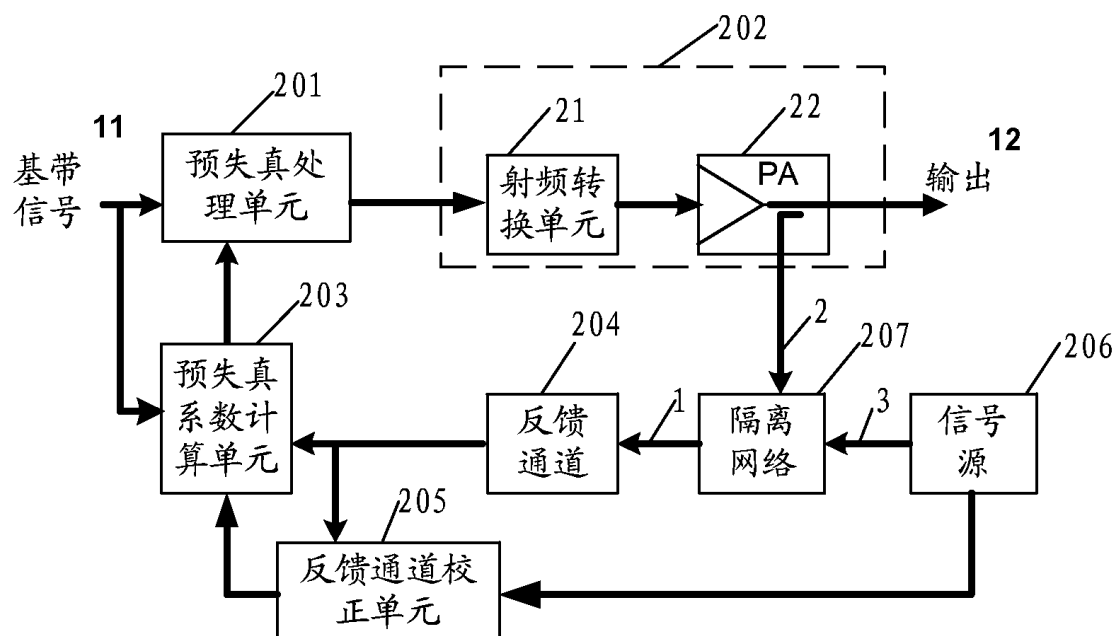


图 1 /Fig. 1

11 BASEBAND SIGNAL

12 OUTPUT

201 PREDISTORTION PROCESS UNIT

21 RF CONVERSION UNIT

203 PREDISTORTION COEFFICIENT CALCULATION UNIT

204 FEEDBACK CHANNEL

205 FEEDBACK CHANNEL CORRECTION UNIT

206 SIGNAL SOURCE

207 ISOLATION NETWORK

Publication data including kind & date

CN101022434	A	2007-08-22	CN101022434
WO2008116402	A1	2008-10-02	WO2008116402
CN100556015	C	2009-10-28	CN100556015C

**Abstract**

(WO2008116402)

A predistortion apparatus includes a predistortion process unit, a transmitting channel, a predistortion coefficient calculation unit, a feedback channel, a signal source, and a feedback channel correction unit. The feedback channel correction unit obtains the distortion coefficient of the feedback channel according to the test signal generated by the signal source and the test signal passing the feedback channel. The predistortion coefficient calculation unit generates the predistortion coefficient according to the input signal and the signal passing the feedback channel which is that the part of the signals outputted by the transmitting channel and the distortion coefficient of the feedback channel. A predistortion method and the transmitter improve the predistortion precision due to considering the distortion characteristic of the feedback channel when calculating the predistortion coefficient.

Inventors

YE SIQING

Latest standardized assignees - inventors removed

HUAWEI TECHNOLOGIES

Application dates

2007-03-27

2008-02-03

Publication dates

2007-08-22

2008-10-02

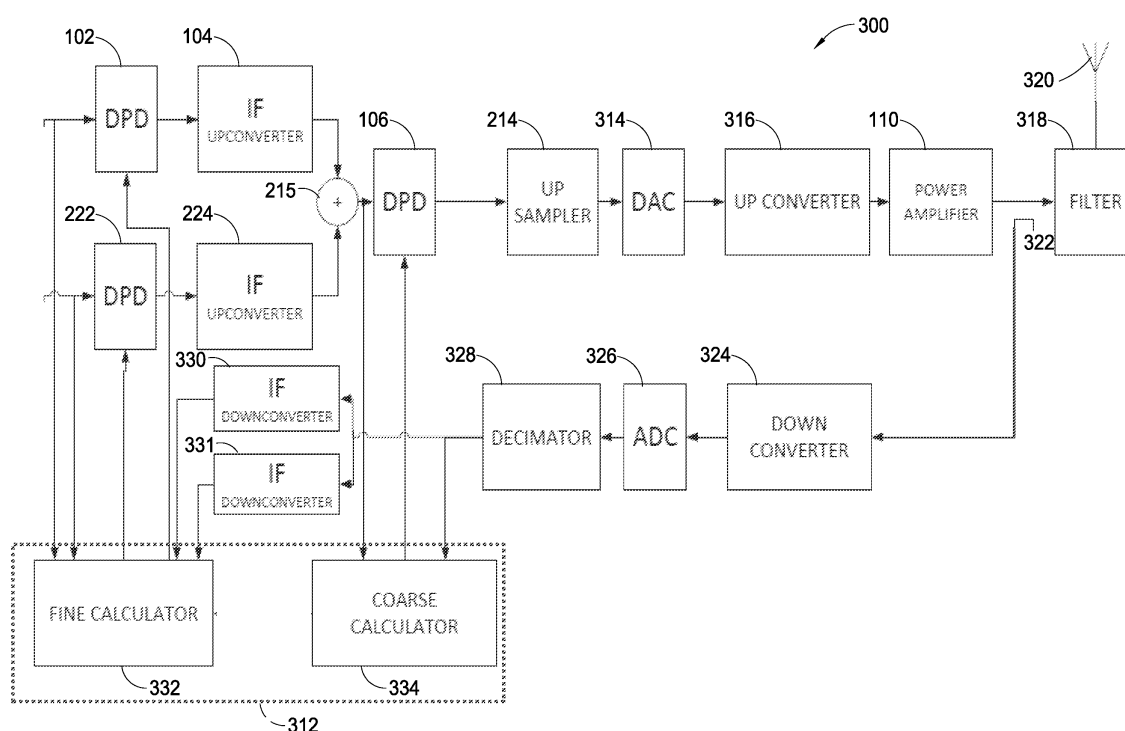
2009-10-28

Family 34/50 - FAMPAT - ©Questel

Title

(US9306506)

Apparatus and methods for dual loop power amplifier digital pre-distortion systems

Images**Publication data including kind & date**

US9306506	B1	2016-04-05	US9306506
DE102015119904	A1	2016-05-25	DE102015119904
CN105634414	A	2016-06-01	CN105634414

**Abstract**

(US9306506)

Apparatus and methods for dual loop power amplifier digital pre-distortion systems are disclosed. In certain implementations, a dual DPD system includes a first digital pre-distorter (DPD) and a second DPD. A digital IF upconverter electrically coupled between the first and second DPDs separates the DPD system into independently controlled fine and coarse sections. The adaptive adjustment processor can be used to modify or pre-distort input signals in order to compensate for the power amplifier nonlinearity. It also controls the fine DPD section to correct an RF output signal single-band adjacent channel leakage ratio (ACLR), while it controls the coarse DPD section to correct an RF output signal dual band intermodulation distortion (IMD).

Inventors

ZHANG YONG

BRANNON JOSEPH BRAD

OATES JOHN P

MAN GUANGHUA

COLANGELO GINA G

Latest standardized assignees - inventors removed

ANALOG DEVICES

Application dates

2014-11-24

2015-11-17

2015-11-17

Publication dates

2016-04-05

2016-05-25

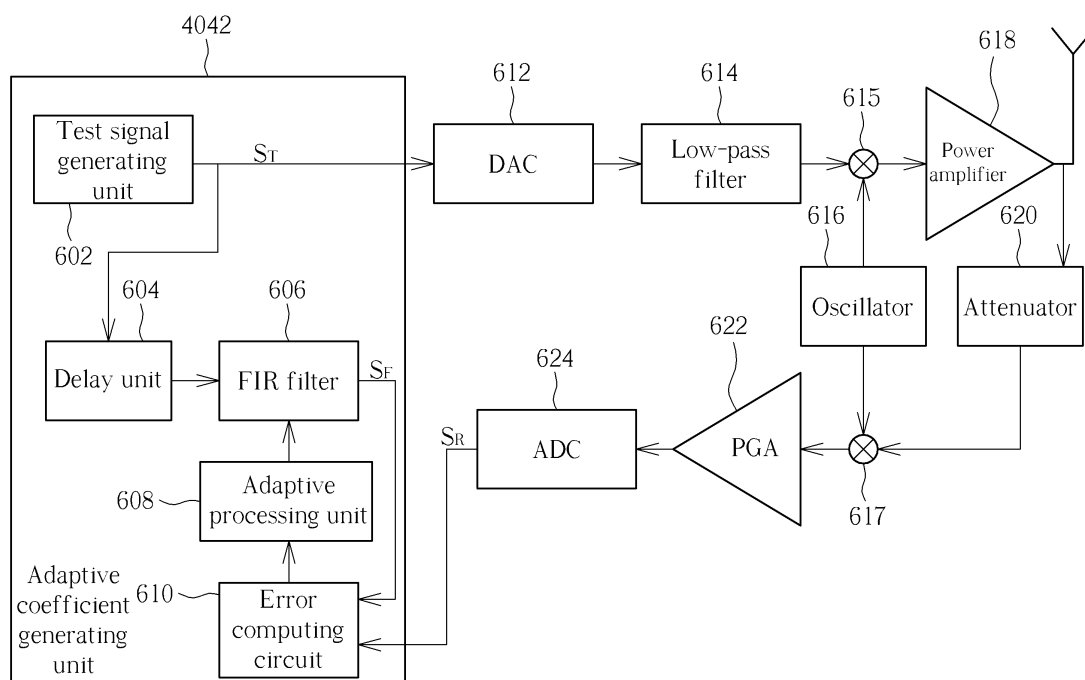
2016-06-01

Family 35/50 - FAMPAT - ©Questel

Title

(US9450544)

Pre-distortion method, associated apparatus and non-transitory machine readable medium

Images**Publication data including kind & date**

US2015054585	A1	2015-02-26	US20150054585
TW201509118	A	2015-03-01	TW201509118
CN104426823	A	2015-03-18	CN104426823
TWI536731	B	2016-06-01	TWI536731
US9450544	B2	2016-09-20	US9450544
CN104426823	B	2017-10-24	CN104426823B

**Abstract**

(US9450544)

A pre-distortion method includes: receiving an input data; and obtaining a pre-distortion output by inputting the input data into a pre-distortion function, wherein the pre-distortion function is determined according to a following power amplifier; and multiplying a reciprocal of a pre-distortion ratio of the output of the power amplifier to the input data by the output of the power amplifier. A pre-distortion apparatus includes a receiver, a pre-distortion unit and a gain compensating unit. The receiver is utilized for receiving an input data. The pre-distortion unit is utilized for obtaining a pre-distortion output by inputting the input data into a pre-distortion function, wherein the pre-distortion function is determined according to a following power amplifier. The gain compensating unit is utilized for multiplying a reciprocal of a pre-distortion ratio of the output of the power amplifier to the input data by the output of the power amplifier.

Inventors

CHANG YUAN-SHUO

Latest standardized assignees - inventors removed

REALTEK SEMICONDUCTOR

Application dates

2013-08-20

2013-11-07

2014-08-12

Publication dates

2015-02-26

2015-03-01

2015-03-18

2016-06-01

2016-09-20

2017-10-24

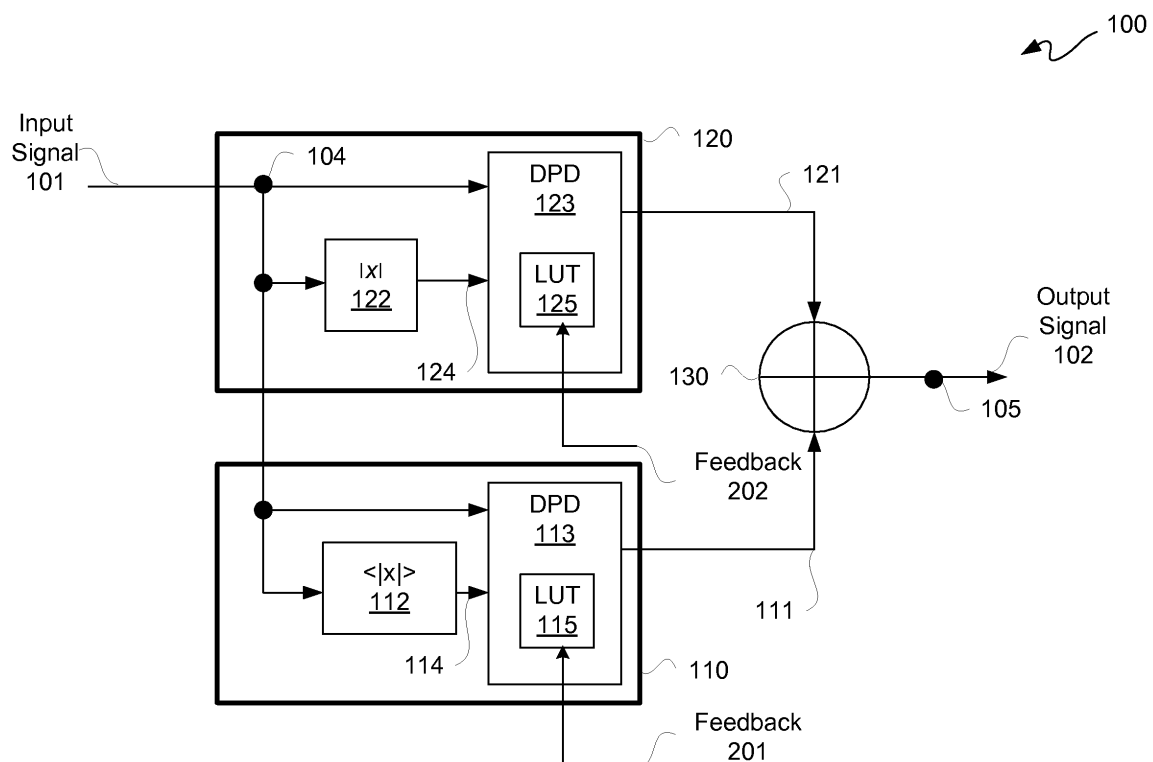
Family 36/50 - FAMPAT - ©Questel

Title

(WO201703534)

Moving mean and magnitude dual path digital predistortion

Images



Publication data including kind & date

US2017005627	A1	2017-01-05	US20170005627				
WO2017003534	A1	2017-01-05	WO201703534				
US9590567	B2	2017-03-07	US9590567				
KR20180025948	A	2018-03-09	KR20180025948				
CN107810601	A	2018-03-16	CN107810601				

Abstract

(WO201703534)

An apparatus (100) relates generally to preconditioning an input signal (101).In this apparatus, a first digital predistortion module (110) and a second digital predistortion module (120) are for receiving the input signal (101) for respectively providing a first predistorted signal (111) and a second predistorted signal (121).A combiner (130) is for combining the first predistorted signal (111) and the second predistorted signal (121) for providing an output signal (102).The first digital predistortion module (110) includes a moving mean block (112) for receiving the input signal (101) for providing a moving mean signal (114).The first digital predistortion module (110) further includes a digital predistorter (113) for receiving the input signal (101) and the moving mean signal (114) for providing the first predistorted signal (111).

Inventors

ZHAO HONGZHI

DICK CHRISTOPHER H

Latest standardized assignees - inventors removed

XILINX

Application dates

2015-07-02

2016-03-31

2016-03-31

2016-03-31

Publication dates

2017-01-05

2017-01-05

2017-03-07

2018-03-09

2018-03-16

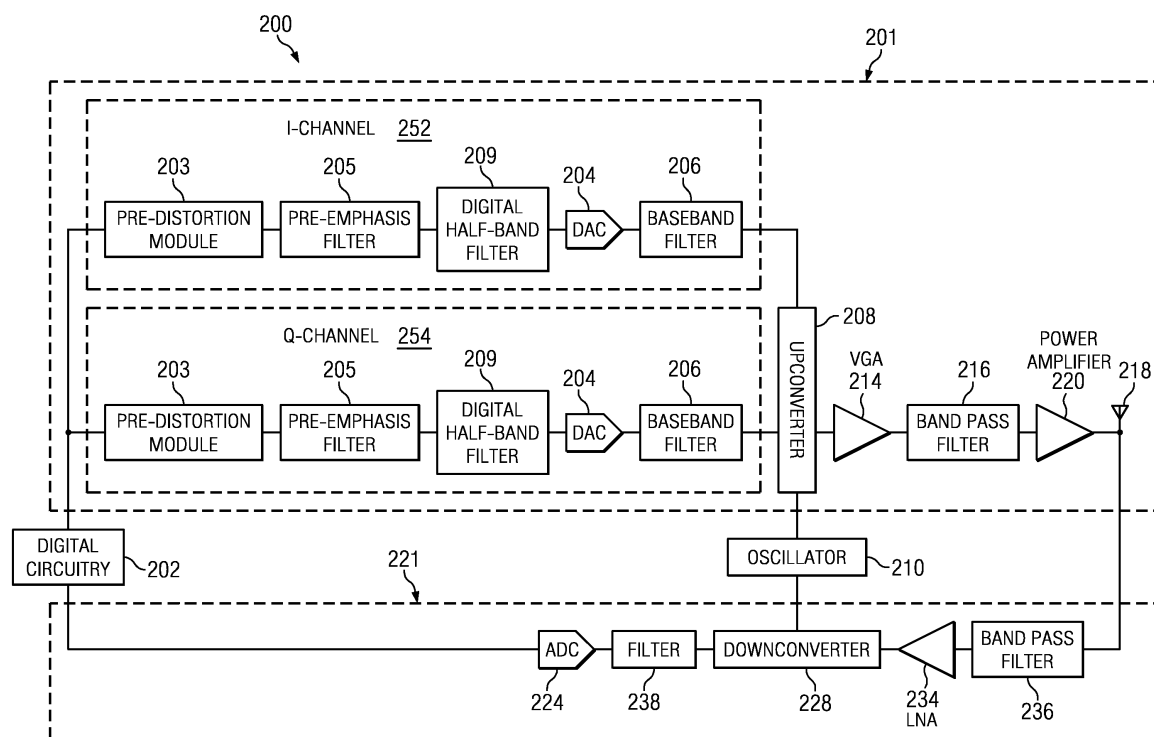
Family 37/50 - FAMPAT - ©Questel

Title

(EP2432131)

Systems and methods for spurious emission cancellation

Images



Publication data including kind & date

US2012064847	A1	2012-03-15	US20120064847
EP2432131	A2	2012-03-21	EP2432131
KR20120029327	A	2012-03-26	KR20120029327
JP2012065318	A	2012-03-29	JP2012065318
US8204456	B2	2012-06-19	US8204456
CN102751999	A	2012-10-24	CN102751999
KR101196519	B1	2012-11-01	KR101196519
EP2432131	A3	2015-01-14	EP2432131
CN102751999	B	2015-04-29	CN102751999B
JP5864176	B2	2016-02-17	JP5864176
EP2432131	B1	2017-03-15	EP2432131



Abstract

(EP2432131)

In accordance with some embodiments of the present disclosure, a method may include digitally pre-distorting a digital baseband signal with an opposite phase of a C-IM3 distortion term such that the pre-distortion and C-IM3 distortion cancel each other out in a transmitter. The method may also include digitally conditioning the pre-distorted digital signal in order to provide a flat amplitude response of a composite filter comprising a baseband filter and a digital half-band filter of the transmitter, and to provide a linear phase response for the composite filter.

Inventors

XU BING

TANG CLIVE

RAHMAN MAHIBUR

Latest standardized assignees - inventors removed

INTEL

Application dates

2010-09-15

2011-09-08

2011-09-08

2011-09-14

2011-09-15

Publication dates

2012-03-15

2012-03-21

2012-03-26

2012-03-29

2012-06-19

2012-10-24

2012-11-01

2015-01-14

2015-04-29

2016-02-17

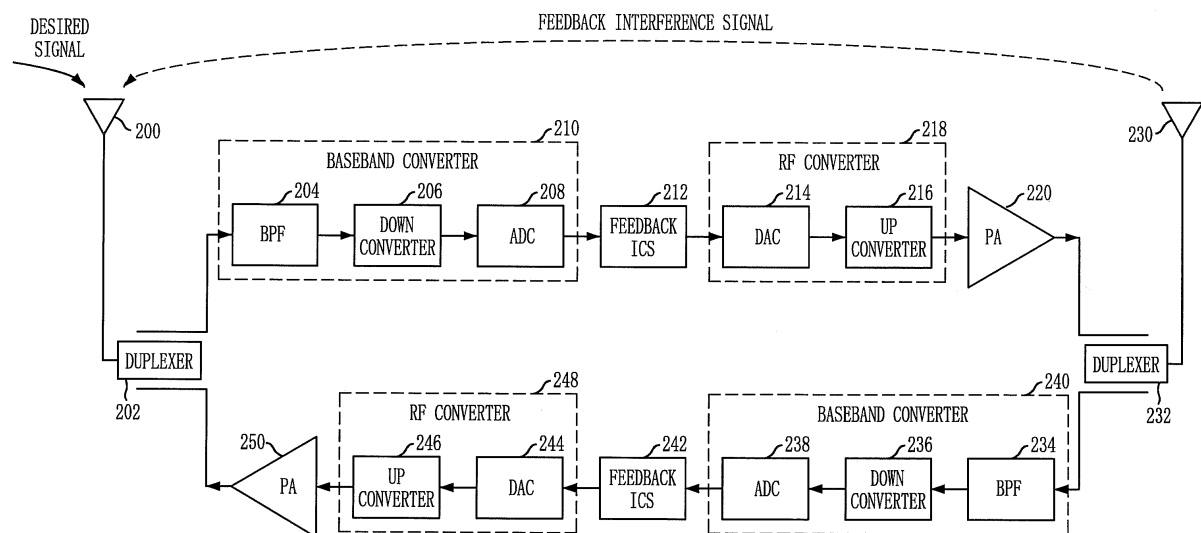
2017-03-15

Family 38/50 - FAMPAT - ©Questel

Title

(WO2008102943)

Repeating system and method for cancellation of feedback interference signal with pre-distortion function

Images**Publication data including kind & date**

WO2008102943	A1	2008-08-28	WO2008102943
US2010109771	A1	2010-05-06	US20100109771
JP2010517404	A	2010-05-20	JP2010517404
JP4762348	B2	2011-08-31	JP4762348
US8344800	B2	2013-01-01	US8344800

**Abstract**

(WO2008102943)

There is provided a repeating system for cancellation of a feedback interference signal, including: a PA (Power Amplifier) for power-amplifying an output signal; a feedback ICS (Interference Cancellation System) for canceling a feedback interference signal and detecting a residual error; a pre-distorter for compensating for an error of the PA by applying pre-distortion and compensating for the residual error by using information on the residual error detected by the feedback ICS to linearize the characteristic of the PA; and a control unit for controlling the feedback ICS and the pre-distorter.

Inventors

BAIK SUNG-JUN

CHOI JOONG-HAN

Latest standardized assignees - inventors removed

FUJITSU NETWORK SOLUTIONS

Application dates

2007-10-31

2007-10-31

2007-10-31

Publication dates

2008-08-28

2010-05-06

2010-05-20

2011-08-31

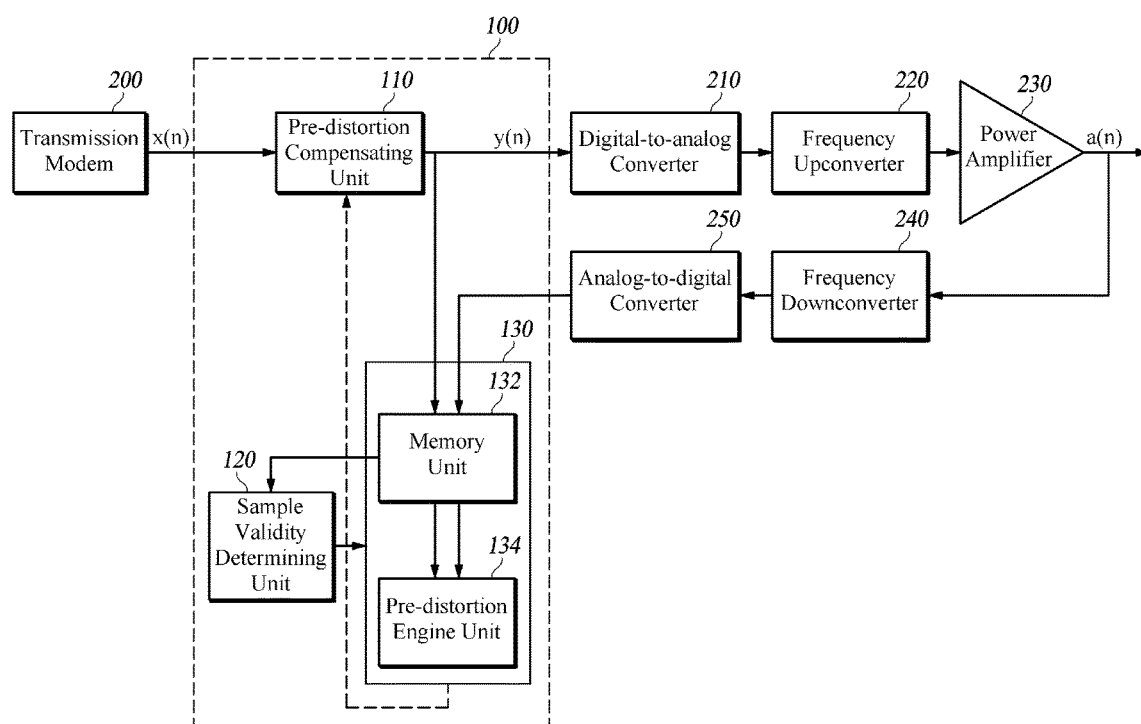
2013-01-01

Family 39/50 - FAMPAT - ©Questel

Title

(EP3249809)

Method and apparatus for determining validity of samples for digital pre-distortion apparatus

Images**Publication data including kind & date**

US9787335	B1	2017-10-10	US9787335
EP3249809	A1	2017-11-29	EP3249809
WO2017204390	A1	2017-11-30	WO2017204390
CN107425863	A	2017-12-01	CN107425863
KR20170132026	A	2017-12-01	KR20170132026

**Abstract**

(EP3249809)

A method and an apparatus for determining validity of samples for a digital pre-distortion apparatus is disclosed. It is an object of at least one embodiment to provide a method and an apparatus for determining validity of samples for a digital

pre-distortion apparatus that is configured to compensate for nonlinearity of a power amplifier in an efficient manner by accurately estimating a pre-distortion coefficient with a low-capacity memory.

Inventors

JEONG BAEMOOK

YUN MINSEON

JEONG EUIRIM

LEE KWANG-PYO

KIL HAENG-BOK

JO SUNGMI

Latest standardized assignees - inventors removed

KMW

HANBAT NATIONAL UNIVERSITY INDUSTRY ACADEMIC COOPERATION FOUNDATION

Application dates

2016-05-23

2016-05-30

2016-06-07

2016-07-22

2017-04-27

Publication dates

2017-10-10

2017-11-29

2017-11-30

2017-12-01

2017-12-01

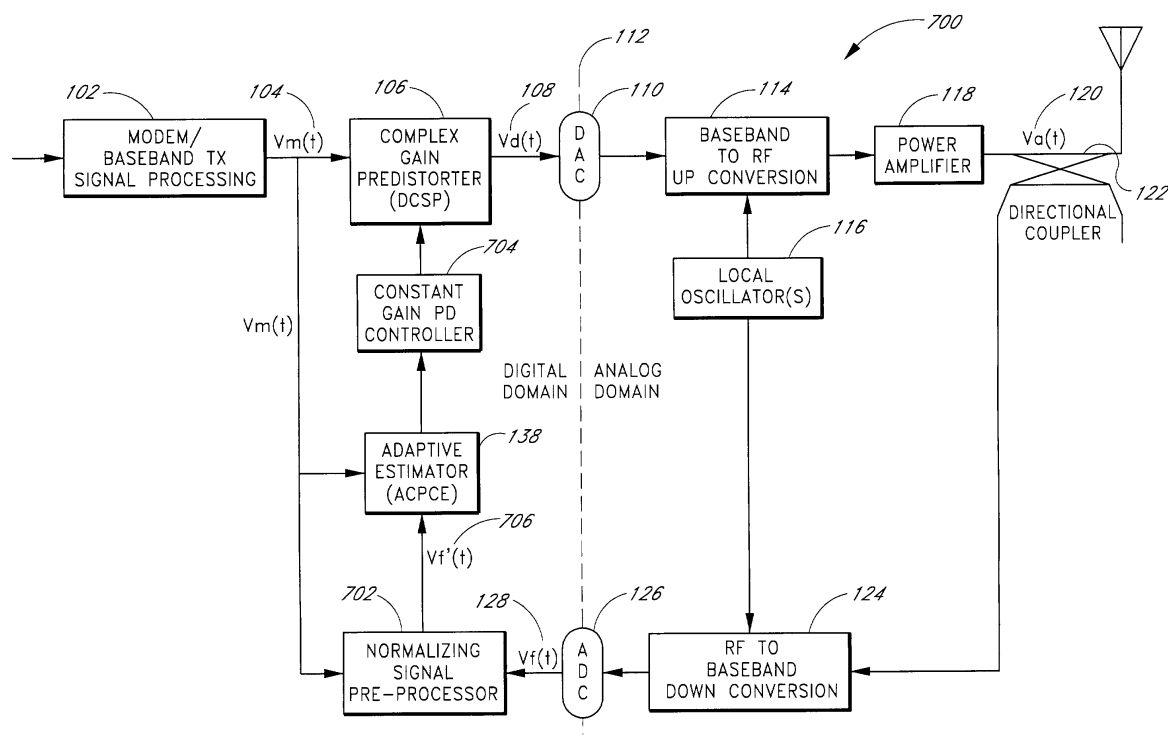
Family 40/50 - FAMPAT - ©Questel

Title

(US7904033)

Constant gain digital predistortion controller for linearization of non-linear amplifiers

Images



Publication data including kind & date

US7058369	B1	2006-06-06	US7058369
US7177603	B1	2007-02-13	US7177603
US7200367	B1	2007-04-03	US7200367
US7260365	B1	2007-08-21	US7260365
US7295815	B1	2007-11-13	US7295815
US7340223	B1	2008-03-04	US7340223
US7904033	B1	2011-03-08	US7904033



Abstract

(US7904033)

The invention is related to methods and apparatus for controlling and adapting a digital predistortion linearizer for amplification of bandlimited signals using non-linear amplifiers. The control method advantageously permits the predistortion function applied by a predistortion entity to provide a relatively constant gain. This attribute is advantageous for operation within cellular radio systems, which often employ digital power control systems. However, the disclosed techniques can also be applicable to virtually any type of digital predistortion for which an input signal or reference signal to be amplified is predistorted in a manner that is complementary to the distortion induced by a non-linear amplifier. Embodiments of the invention advantageously enhance the practicality of using digital linearization and predistortion amplification techniques. Embodiments of the invention can automatically adjust the characteristics of a predistorted signal so that a deviation from overall linearity is compensated and subsequently reduced while maintaining a nearly constant gain attribute.

Inventors

WRIGHT ANDREW S

HO DEREK J W

KLIJSEN BARTHOLOMEUS T W

Latest standardized assignees - inventors removed

WINTEGRA

MAXLINEAR ASIA SINGAPORE PTE

Application dates

2002-11-21

2006-03-29

2006-03-29

2006-03-29

2006-03-29

2006-03-29

2007-02-26

Publication dates

2006-06-06

2007-02-13

2007-04-03

2007-08-21

2007-11-13

2008-03-04

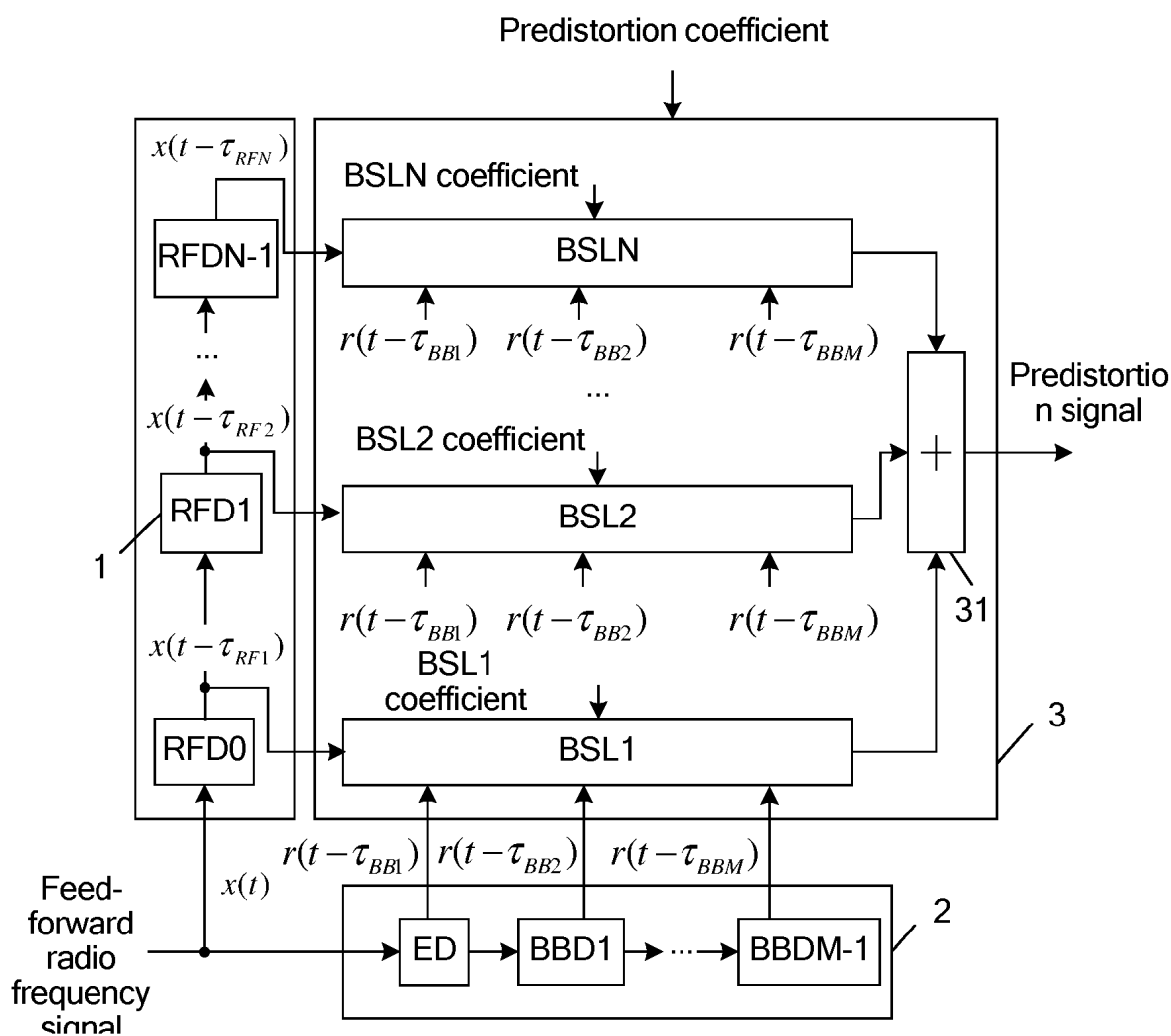
2011-03-08

Family 41/50 - FAMPAT - ©Questel

Title

(EP3197113)

Analog predistorter core module and analog predistorter system

Images**Publication data including kind & date**[WO2016074218](#)

A1 2016-05-19

[WO201674218](#)[KR20170068549](#)

A 2017-06-19

[KR20170068549](#)

EP3197113	A1	2017-07-26	EP3197113				
US2017237455	A1	2017-08-17	US20170237455				
CN107078980	A	2017-08-18	CN107078980				
EP3197113	A4	2017-10-18	EP3197113				
JP2017534224	A	2017-11-16	JP2017534224				
US9893748	B2	2018-02-13	US9893748				

Abstract

(EP3197113)

The present invention discloses an APD core module and an APD system and pertains to the communications field. The APD core module includes a radio frequency delay module, an envelope module, and a contact matrix module. The radio frequency delay module is configured to receive a feed-forward radio frequency signal, generate multiple radio frequency delay signals with different delays according to the feed-forward radio frequency signal, and output each radio frequency delay signal to the contact matrix module. The envelope module is configured to receive the feed-forward radio frequency signal, perform envelope detection on the feed-forward radio frequency signal to obtain multiple envelope signals with different delays, and output each envelope signal to the contact matrix module. The contact matrix module is configured to receive each radio frequency delay signal, each envelope signal, and a predistortion coefficient from exterior, and generate a predistortion signal according to the predistortion coefficient, each radio frequency delay signal, and each envelope signal. According to the present invention, distortion generated by a PA can be effectively offset.

Inventors

YE SIQING

WANG JINMING

ZHU ERNI

WANG CHEN

YOU LAN

Latest standardized assignees - inventors removed

HUAWEI TECHNOLOGIES

Application dates

2014-11-14

2014-11-14

2014-11-14

2014-11-14

2014-11-14

2017-05-03

Publication dates

2016-05-19

2017-06-19

2017-07-26

2017-08-17

2017-08-18

2017-10-18

2017-11-16

2018-02-13

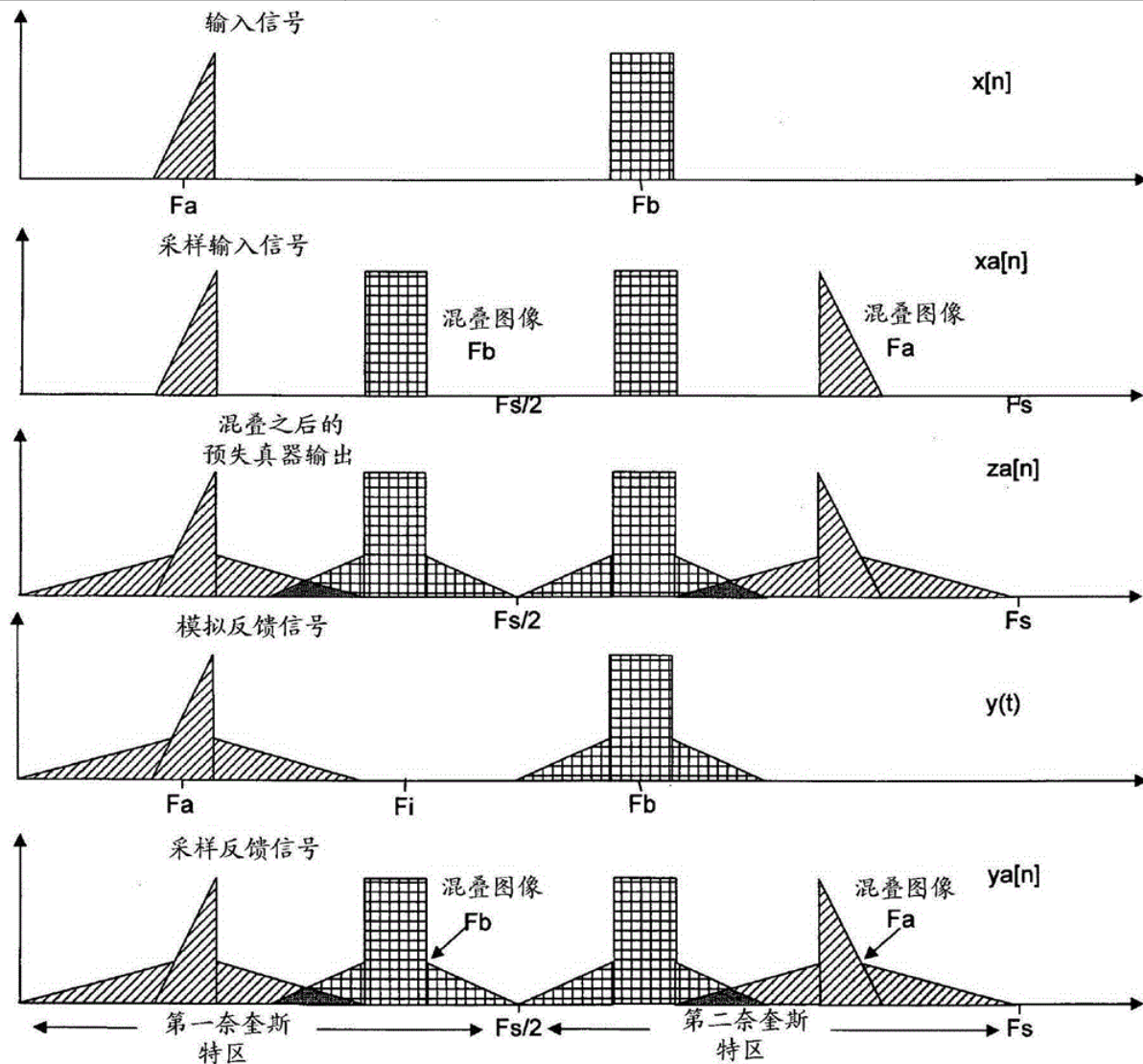
Family 42/50 - FAMPAT - ©Questel

Title

(CN105634415)

Digital predistortion system and method used for amplifying signal

Images



Publication data including kind & date

CN105634415

A 2016-06-01 CN105634415



Abstract

(CN105634415)

Disclosed are a digital predistortion system and a method used for amplifying signals. A multi-band digital predistortion system comprises a multi-band input signal, at least a power amplifier, input aliasing logic, a feedback signal exported from amplification output, and predistortion logic responding to aliasing images. Each frequency band uses spaced frequency as center, and the bandwidth of each frequency band is basically smaller than the frequency space among the frequency bands. The power amplifier is used to provide amplification output including distortion performance. The input aliasing logic is used to generate an aliasing image of each frequency band. The aliasing image of the first frequency band is in a Nyquist zone, and the aliasing image of the second frequency band is in another Nyquist zone. The Nyquist zone and each of the other Nyquist zones have width of half of the sampling frequency of the input signal. The feedback signal comprises expression of at least a part of the predistortion performance. The predistortion logic is used to generate a predistortion factor which makes the output of the power amplifier linearized.

Inventors

KIM WAN JONG

CHO KYOUNG JOON

STAPLETON SHAWN PATRICK

Latest standardized assignees - inventors removed

DALI SYSTEMS

Application dates

2010-12-21

Publication dates

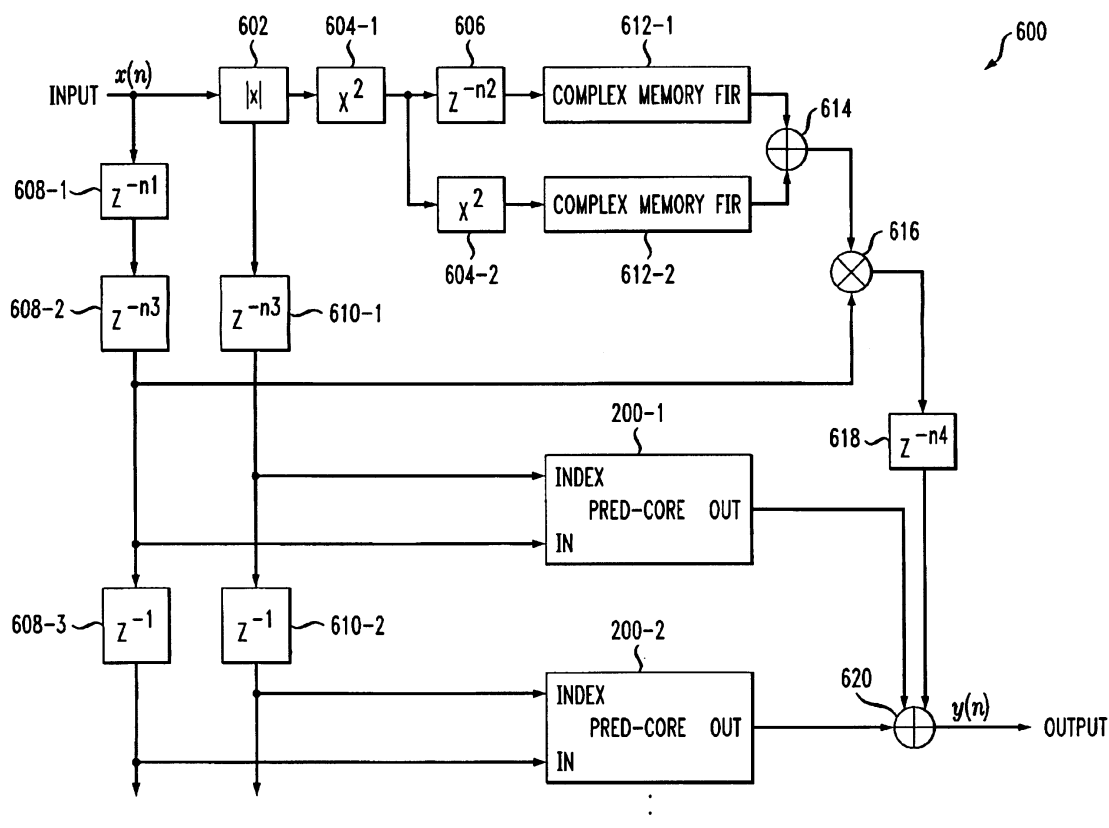
2016-06-01

Family 43/50 - FAMPAT - ©Questel

Title

(US6794939)

Signal predistortion using a combination of multiple predistortion techniques

Images**Publication data including kind & date**[US2003222712](#)

A1 2003-12-04

US20030222712

[US6794939](#)

B2 2004-09-21

US6794939

**Abstract**

(US6794939)

A signal is predistorted by producing a first set of sample values using a first predistortion technique, producing a second set of sample values using a second predistortion technique different than the first predistortion technique, and combining the first and second sets of sample values to produce a predistorted signal. At least one of the first and second predistortion techniques produce the corresponding set of sample values based at least in part on a plurality of past time spaced input samples relative to a current time spaced input sample. By way of example, the first predistortion technique may be configured to produce sample output values each of which is dependent on one of a plurality of time spaced input samples and independent of any other time spaced input sample, and the second predistortion technique may be configured to produce sample output values each of which is dependent on (i) at least one of a plurality of past time spaced input samples and (ii) a current time spaced input sample, and independent of any other time spaced input sample.

Inventors

KIM JAEHYEONG

MA ZHENGXIANG

MORGAN DENNIS RAYMOND

Latest standardized assignees - inventors removed

LUCENT TECHNOLOGIES

ALCATEL LUCENT

Application dates

2002-05-31

Publication dates

2003-12-04

2004-09-21

Family 44/50 - FAMPAT - ©Questel

Title

(EP1042864)

Method and apparatus for wideband predistortion linearization

Images

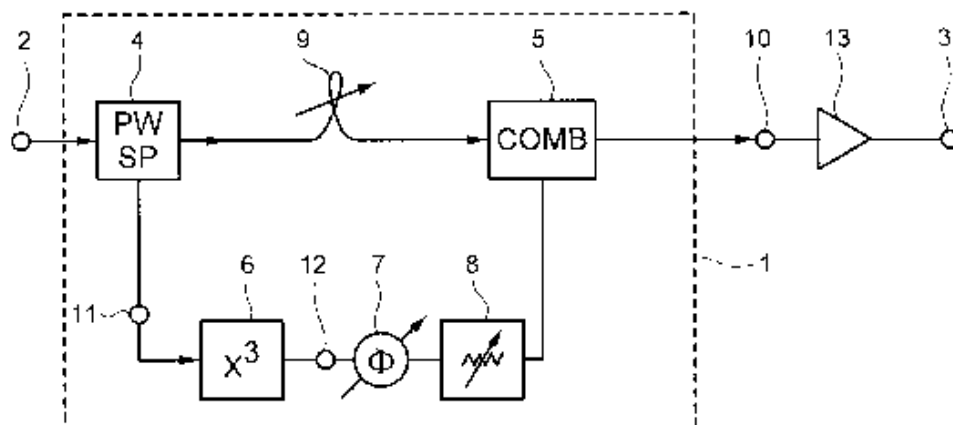


FIG. 1A
(PRIOR ART)

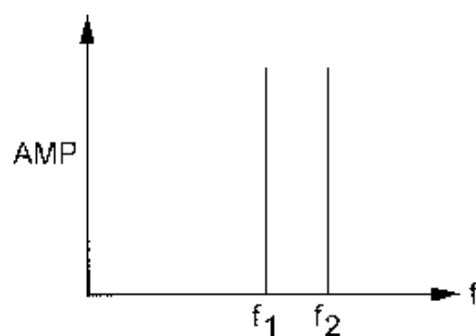


FIG. 1B
(PRIOR ART)

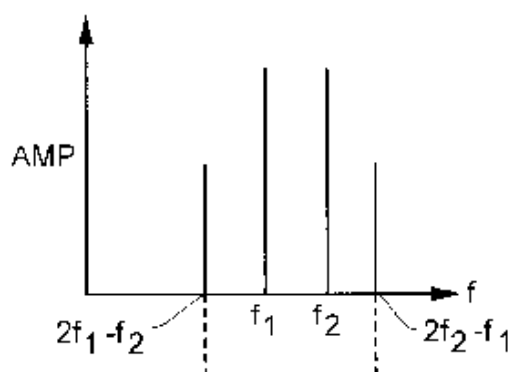


FIG. 1C
(PRIOR ART)

Publication data including kind & date

WO9933170	A1	1999-07-01	WO9933170
AU1994199	A	1999-07-12	AU9919941
US6075411	A	2000-06-13	US6075411
TW399364	B	2000-07-21	TW-399364
EP1042864	A1	2000-10-11	EP1042864
ID25667	A	2000-10-19	ID--25667
CN1285089	A	2001-02-21	CN1285089
KR20010033417	A	2001-04-25	KR20010033417
AR015506	A1	2001-05-02	AR--15506
EE200000371	A	2001-10-15	EE200000371



JP2001527312	A	2001-12-25	JP2001527312				
AU752058	B2	2002-09-05	AU-752058				
CN1203611	C	2005-05-25	CN1203611C				
IN0108/MUMNP/2000	A	2005-07-15	IN2000MN00108				
EP1042864	B1	2005-11-02	EP1042864				
DE69832198	D1	2005-12-08	DE69832198				
KR100535273	B1	2005-12-09	KR100535273				
IN207890	B	2007-08-10	IN-207890				
JP4279453	B2	2009-06-17	JP4279453				

Abstract

(EP1042864)

A predistortion signal is generated which compensates for third order and higher order intermodulation distortion over a wideband. The predistortion signal is applied to an input radio frequency signal, for example a multi-tone radio frequency signal. The predistortion signal is a low order polynomial having adjustable coefficients. The predistortion signal can compensate for intermodulation products produced by a nonlinear amplifier, and the polynomial coefficients can be adjusted based on the difference between the amplifier output and the input radio frequency signal.

Inventors

BRIFFA MARK

BERGSTEN PAER

Latest standardized assignees - inventors removed

ERICSSON

Application dates

1997-12-22

1998-12-15

1998-12-22

1998-12-22

1998-12-22

1998-12-22

1998-12-22

1998-12-22

1998-12-22

1998-12-22

1998-12-22

2000-06-20

2000-06-21

Publication dates

1999-07-01

1999-07-12

2000-06-13

2000-07-21

2000-10-11

2000-10-19

2001-02-21

2001-04-25

2001-05-02

2001-10-15

2001-12-25

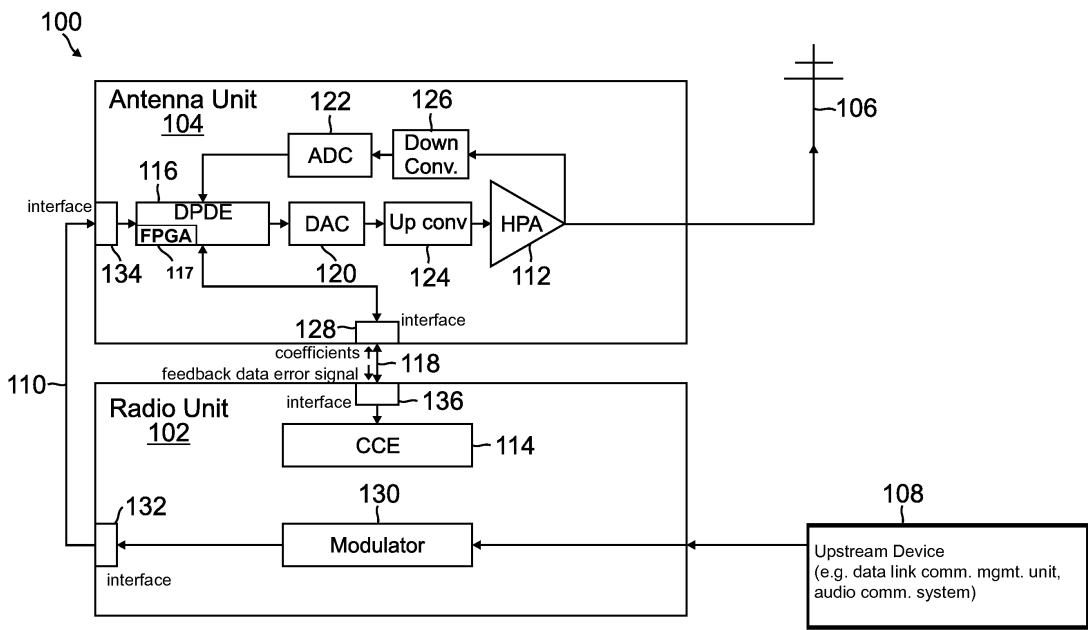
2002-09-05

2005-05-25
2005-07-15
2005-11-02
2005-12-08
2005-12-09
2007-08-10
2009-06-17

Family 45/50 - FAMPAT - ©Questel

Title
(EP2999115)
System and method for digital predistortion

Images



Publication data including kind & date

CA2903606	A1	2016-03-16	CA2903606
US2016080009	A1	2016-03-17	US20160080009
CN105429602	A	2016-03-23	CN105429602
EP2999115	A1	2016-03-23	EP2999115
US9379744	B2	2016-06-28	US9379744



Abstract

(EP2999115)

The radio system comprises a radio unit and an antenna unit coupled to the radio unit. The antenna unit is physically separate and located remote from the radio unit. The antenna unit further comprises a digital pre-distortion engine configured to pre-distort a modulated digital data signal; a digital to analog converter configured to convert the pre-distorted digital data signal to a pre-distorted analog data signal; and a power amplifier configured to amplify the pre-distorted analog data signal which distorts the pre-distorted analog data signal. The distortion introduced by the power amplifier is opposite to the pre-distortion introduced by the digital pre-distortion engine such that the pre-distortion introduced by the digital pre-distortion engine approximately cancels the distortion introduced by the power amplifier. The radio unit further comprises a coefficient computation engine configured to calculate coefficients used by the digital pre-distortion engine to pre-distort the modulated digital data signal.

Inventors

BILEK JAN

MALAGA ALFONSO

ZARUBA RADEK

STENCEL VIT

MLASKAC MARTIN

Latest standardized assignees - inventors removed

HONEYWELL INTERNATIONAL

Application dates

2014-09-16

2015-09-08

2015-09-15

2015-09-15

Publication dates

2016-03-16

2016-03-17

2016-03-23

2016-03-23

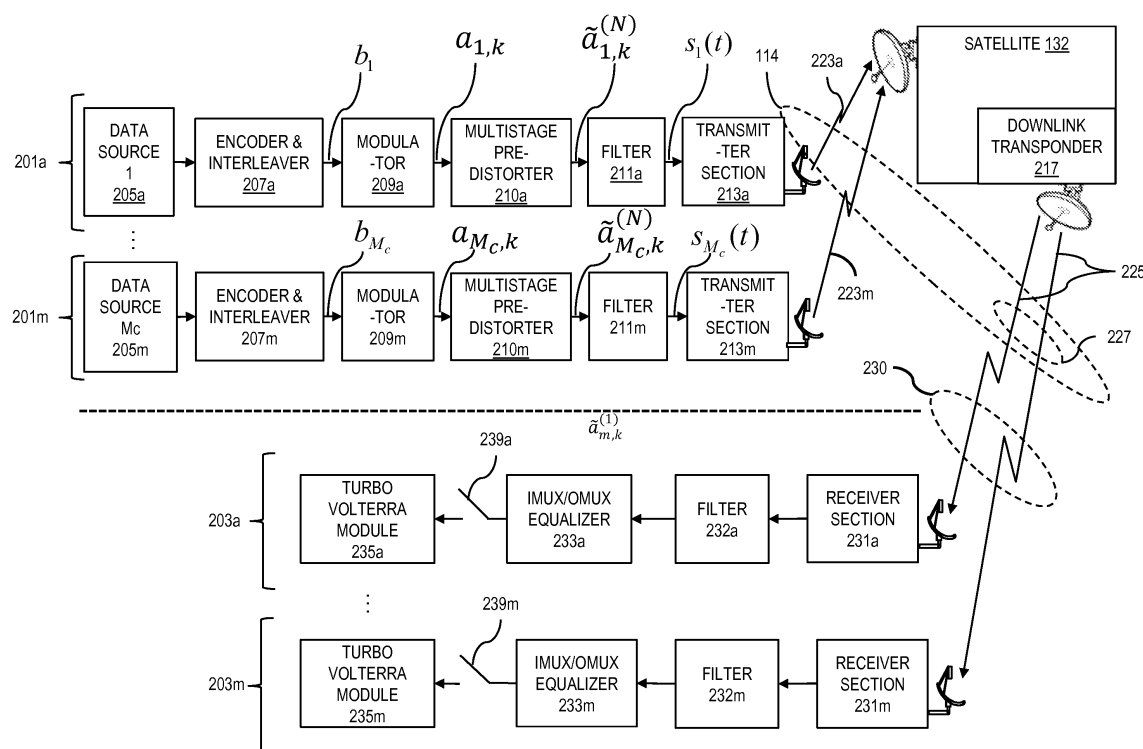
2016-06-28

Family 46/50 - FAMPAT - ©Questel

Title

(EP3055962)

System and method for pre-distortion and iterative compensation for nonlinear distortion in system employing ftn symbol transmission rates

Images**Publication data including kind & date**

US2015098521

A1 2015-04-09

US20150098521

WO2015054437

A1 2015-04-16

WO201554437



US9203450	B2	2015-12-01	US9203450				
US2016087712	A1	2016-03-24	US20160087712				
EP3055962	A1	2016-08-17	EP3055962				
US9515723	B2	2016-12-06	US9515723				
EP3055962	A4	2017-06-14	EP3055962				

Abstract

(EP3055962)

A signal transmission approach comprises encoding a source signal (comprising a plurality of source symbols) to generate a corresponding encoded signal. The encoded signal is modulated by mapping each source symbol to a respective signal constellation point of an applied signal constellation to generate a modulated signal. The modulated signal is pre-distorted based on a distortion estimate to generate a pre-distorted signal. The pre-distorted signal is filtered to generate a filtered signal. The filtered signal is frequency translated and amplified to generate a transmission signal for transmission via an uplink channel of a satellite communications system. To increase throughput, the source signal is processed through the apparatus and the resulting transmission signal is generated at a Faster-than-Nyquist (FTN) symbol rate and with a tight frequency roll-off. The modulated signal is pre-distorted based on a distortion estimate relating to the nonlinearity and the filters applied before and/or after the pre-distorter.

Inventors

BEIDAS BASSEL

SEHADRI ROHIT LYER

EROZ MUSTAFA

LEE LIN-NAN

Latest standardized assignees - inventors removed

HUGHES NETWORK SYSTEMS

Application dates

2014-10-08

2014-10-08

2014-10-08

2015-11-30

Publication dates

2015-04-09

2015-04-16

2015-12-01

2016-03-24

2016-08-17

2016-12-06

2017-06-14

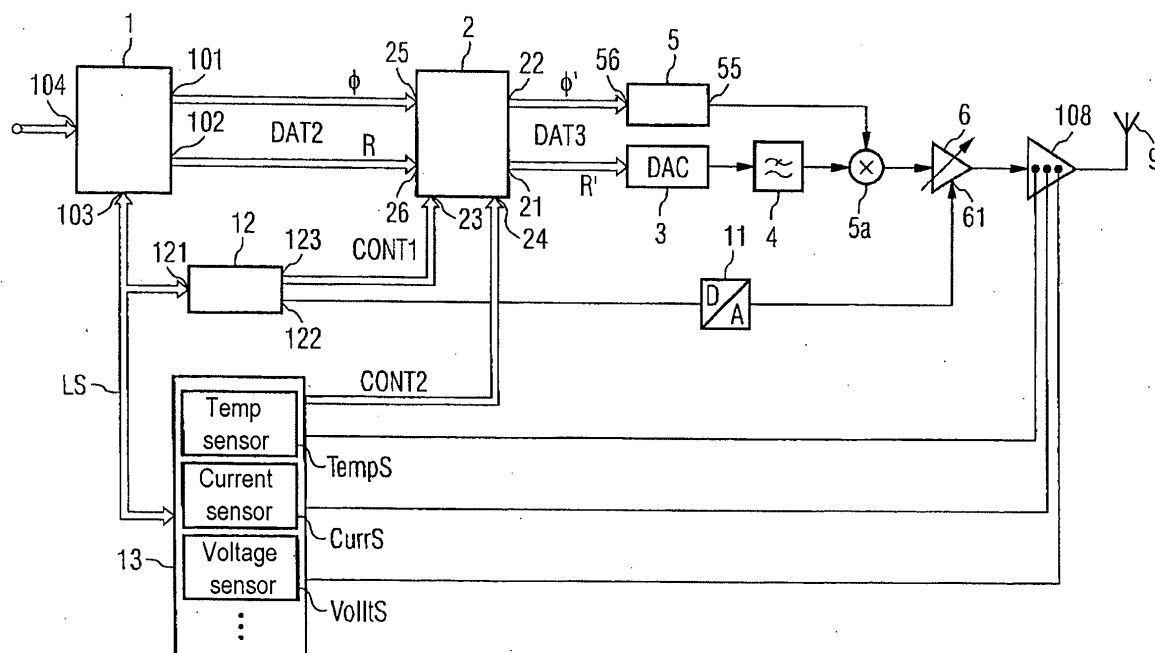
Family 47/50 - FAMPAT - ©Questel

Title

(US20060226903)

Method for signal processing and a transmitting device with digital predistortion, in particular for mobile radio

Images



Publication data including kind & date

DE102005013881	A1	2006-09-28	DE102005013881
US2006226903	A1	2006-10-12	US20060226903



Abstract

(US20060226903)

A transmitting device with digital predistortion is disclosed. The device produces a power word derived from an amplitude component of a digital modulation signal and a desired output power. The power word is compared with a limit value, and depending on the result, one pair of predistortion coefficients is selected and distortion of a first and second component of the digital modulation signal is thus carried out. The phase and the amplitude of a carrier signal are then modulated with the distorted components. Selective distortion of the modulation signal is carried out by comparison of the power word with a limit value, when the signal quality or the linearity of the modulated carrier signal falls below a predetermined limit value. Otherwise, the predistortion unit can be switched off, and the power consumption can thus be reduced.

Inventors

MULLER JAN-ERIK
CEYLAN NAZIM

Latest standardized assignees - inventors removed

INFINEON TECHNOLOGIES

Application dates

2005-03-24
2006-03-24

Publication dates

2006-09-28
2006-10-12

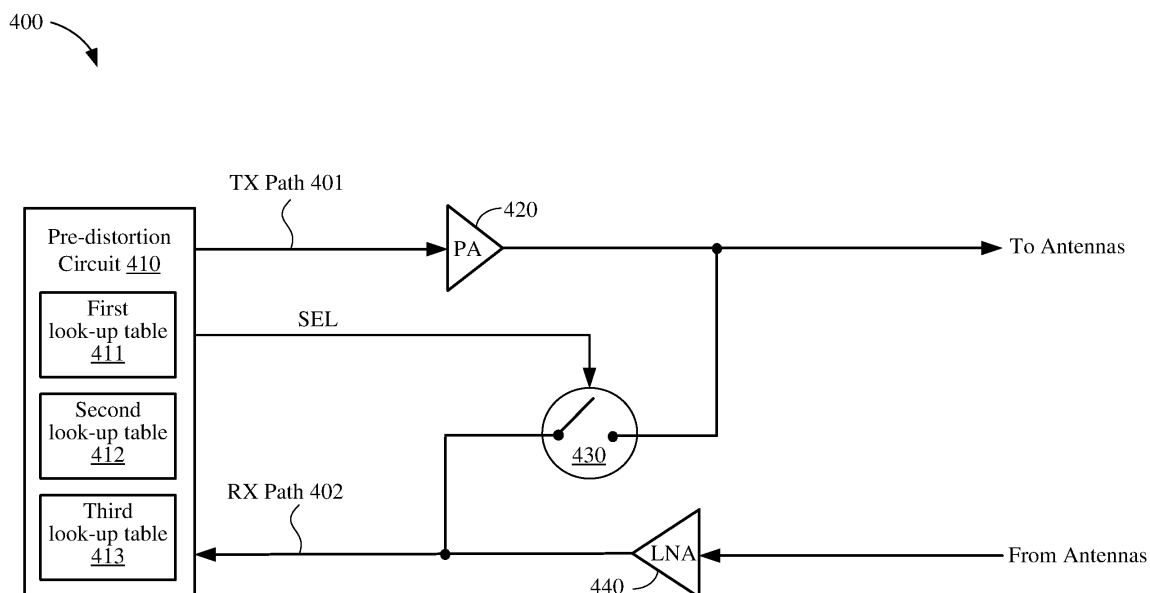
Family 48/50 - FAMPAT - ©Questel

Title

(WO201857215)

Closed loop digital pre-distortion

Images



Publication data including kind & date

[US9813085](#)

B1 2017-11-07

US9813085

[WO2018057215](#)

A1 2018-03-29

WO201857215



Abstract

(WO201857215)

A system and method for calibrating digital pre-distortion in a wireless device (400). A pre-distortion circuit (410) may output a first training signal while a power amplifier (420) of the wireless device (400) is on, to generate a first feedback signal. The first feedback signal may be fed back to the pre-distortion circuit (410) via a receive path (402) of the wireless device (400). The pre-distortion circuit (410) may output a second training signal while the power amplifier (420) is off, to generate a second feedback signal. The second feedback signal may be fed back to the pre-distortion circuit (410) via the receive path (402). The pre-distortion circuit (410) may then determine one or more pre-distortion coefficients based on the first and second feedback signals.

Inventors

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Latest standardized assignees - inventors removed

QUALCOMM

Application dates

2016-09-23

2017-08-23

Publication dates

2017-11-07

2018-03-29

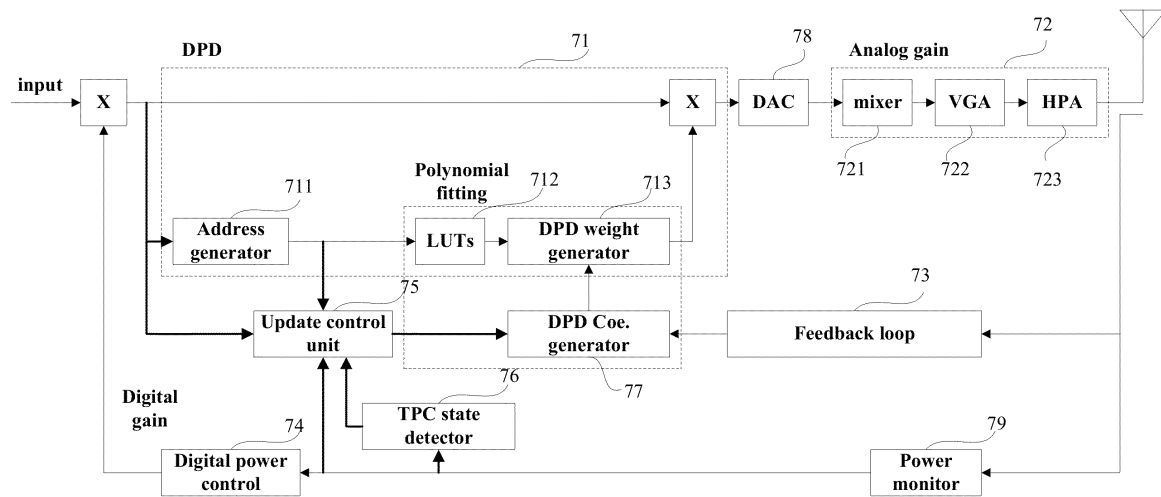
Family 49/50 - FAMPAT - ©Questel

Title

(US9036736)

Method and apparatus for controlling update of digital pre-distortion coefficient

Images



Publication data including kind & date

US2014050281	A1	2014-02-20	US20140050281
JP2014039260	A	2014-02-27	JP2014039260
CN103634252	A	2014-03-12	CN103634252
US9036736	B2	2015-05-19	US9036736
CN103634252	B	2016-08-17	CN103634252B



Abstract

(US9036736)

A method and apparatus for controlling update of digital pre-distortion (DPD) coefficient is provided. The apparatus is applicable to a digital power control system, wherein the apparatus comprises: an update controlling unit configured to determine a group of fully-trained DPD coefficients among a plurality of DPD coefficients; and a DPD coefficient generating unit configured to update adaptively the group of fully-trained DPD coefficients according to the result of judgment of the update controlling unit. The DPD coefficients are allowed to be updated after being judged as being able to be fully trained according to power distribution information of DPD input signals, or according to address distribution information of an LUT, or according to average power of output of an HPA; otherwise, they may not be updated, thereby efficiently preventing DPD abnormality resulted from unfull training of coefficients in being updated.

Inventors

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Latest standardized assignees - inventors removed

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Application dates

2012-08-20

2013-08-15

2013-08-20

Publication dates

2014-02-20

2014-02-27

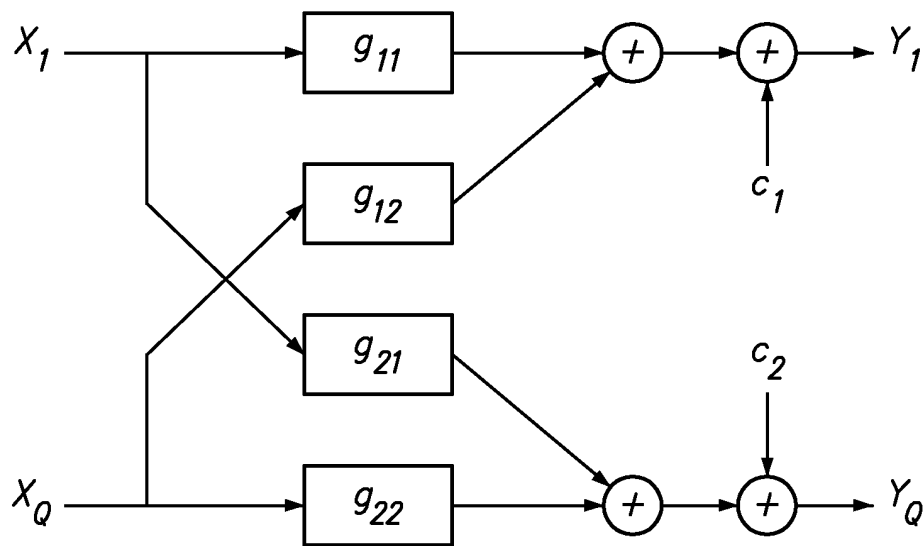
2014-03-12

2015-05-19

2016-08-17

(EP2143209)

Digital hybrid mode power amplifier system

Images**FIG. 10***Analog Quadrature Modulator Compensation structure***Publication data including kind & date**

WO2008154077	A1	2008-12-18	WO2008154077
EP2143209	A1	2010-01-13	EP2143209
KR20100017270	A	2010-02-16	KR20100017270
CN101720528	A	2010-06-02	CN101720528
IN7544/DELNP/2009	A	2010-07-09	IN2009DN07544
JP2010525758	A	2010-07-22	JP2010525758
CN101720528	B	2014-03-19	CN101720528B
EP2143209	A4	2014-05-07	EP2143209
KR20140110992	A	2014-09-17	KR20140110992
JP5591106	B2	2014-09-17	JP5591106
KR101503548	B1	2015-03-24	KR101503548
KR101688710	B1	2016-12-22	KR101688710

**Abstract**

(EP2143209)

A RF-digital hybrid mode power amplifier system for achieving high efficiency and high linearity in wideband communication systems is disclosed. The present invention is based on the method of adaptive digital predistortion to linearize a power amplifier in the RF domain. The power amplifier characteristics such as variation of linearity and asymmetric distortion of the amplifier output signal are monitored by the narrowband feedback path and controlled by the adaptation algorithm in a digital module. Therefore, the present invention could compensate the nonlinearities as well as memory effects of the power amplifier systems and also improve performances, in terms of power added efficiency, adjacent channel leakage ratio and peak-to-average power ratio. The present disclosure enables a power amplifier system to be field reconfigurable and

support multi-modulation schemes (modulation agnostic), multi-carriers and multi-channels. As a result, the digital hybrid mode power amplifier system is particularly suitable for wireless transmission systems, such as base-stations, repeaters, and indoor signal coverage systems, where baseband I-Q signal information is not readily available.

Inventors

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Latest standardized assignees - inventors removed

DALI SYSTEMS

Application dates

2008-04-23

2008-04-23

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2008-04-23

2008-04-23

2008-04-23

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2010-06-02

2010-07-09

2010-07-22

2014-03-19

2014-05-07

2014-09-17

2014-09-17

2015-03-24

2016-12-22