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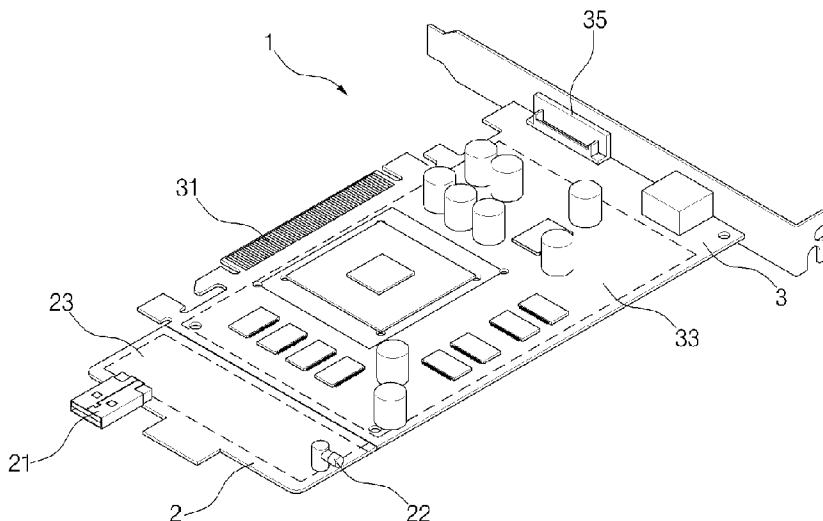
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: GRAPHIC CARD HAVEING A DMB FUNCTION



(57) Abstract: The present invention relates to a graphic card and, more particularly, to a graphic card having a terrestrial Digital Multimedia Broadcasting (DMB) function, which can stimulate the proliferation of a desktop type computer market through the basic installation of a graphic card having a digital media broadcasting function at the time of designing a desktop type computer system, enables terrestrial DMB to be viewed using an existing computer by replacing an existing graphic card with only the graphic card, rather than replacing the entire computer with new one, can stably receive power from the main board of a computer in a universal serial bus communication manner, and can improve channel selectivity and also can completely overcome the problem of phase delay by converting a carrier into an intermediate frequency signal and then converting the intermediate frequency signal into baseband signals. The present invention provides a graphic card, the graphic card including a graphic unit that is responsible for computer graphic processing, wherein the graphic card is configured such that a terrestrial DMB unit for receiving terrestrial DMB is integrated with the graphic unit.

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Description

GRAPHIC CARD HAVING A DMB FUNCTION

Technical Field

- [1] The present invention relates to a graphic card and, more particularly, to a graphic card having a terrestrial digital multimedia broadcasting function, which can stimulate the proliferation of a desktop type computer market through the basic installation of a graphic card having a digital media broadcasting function at the time of designing a desktop type computer system, enables terrestrial digital multimedia broadcasting to be viewed using an existing computer by replacing an existing graphic card with only the graphic card, rather than replacing the entire computer with new one, can stably receive power from the main board of a computer in a universal serial bus communication manner, and can improve channel selectivity and also can completely overcome the problem of phase delay by converting a carrier into an intermediate frequency signal and then converting the intermediate frequency signal into baseband signals.

Background Art

- [2] Digital Multimedia Broadcasting (DMB) is a broadcasting service that modulates various multimedia signals, such as audio signals and video signals, in a digital manner and provides the multimedia signals to a fixed or portable receiver for vehicles, and is called 'handheld TeleVision (TV).' Such DMB is classified as satellite DMB and terrestrial DMB, and the present application is related to terrestrial DMB. In this case, the term "terrestrial DMB" refers to a broadcasting service that enables broadcasting signals to be transmitted via a terrestrial base station on the earth and to be received by a portable receiver.

Disclosure of Invention

Technical Problem

- [3] An object of the present invention is to provide a graphic card, in which a terrestrial DMB function is embedded based on the fact that a graphic card must be basically installed in a desktop type computer as a basic requirement, thus making it possible for terrestrial DMB to be received by the desktop type computer through the installation of only the graphic card.
- [4] Another object of the present invention is to provide a graphic card, in which a terrestrial DMB unit is embedded in the graphic card, which must be basically installed in a desktop type computer, so that terrestrial DMB can be received by allowing a user, who has previously purchased a desktop computer, to easily replacing an existing graphic card with only the graphic card.

- [5] A further object of the present invention is to provide a graphic card, in which a terrestrial DMB unit is embedded in the graphic card, which must be basically installed in a desktop type computer, so that terrestrial DMB can be received by allowing a user, who newly purchases a desktop computer, to install only the graphic card, with the result that the computer market can be stimulated.
- [6] Yet another object of the present invention is to provide a graphic card, which enables terrestrial DMB content, which is received by a desktop type computer, to be stored in memory, thus providing an environment in which new content can be processed and produced.
- [7] Still another object of the present invention is to provide a graphic card, which converts a broadcasting signal, which is received by a terrestrial DMB unit, into an intermediate frequency signal and then converts the intermediate frequency signal into baseband signals, thus increasing channel selectivity and preventing phase delay.

Advantageous Effects

- [8] The present invention has an effect in that a terrestrial DMB function is embedded based on the fact that a graphic card must be basically installed in a desktop type computer as a basic requirement, so that terrestrial DMB can be received by the desktop type computer through the installation of only the graphic card.
- [9] The present invention has an effect in that a terrestrial DMB unit is embedded in the graphic card, which must be basically installed in a desktop type computer, so that terrestrial DMB can be received by allowing a user, who has previously purchased a desktop computer, to easily replacing an existing graphic card with only the graphic card.
- [10] The present invention has an effect in that a terrestrial DMB unit is embedded in the graphic card, which must be basically installed in a desktop type computer, so that terrestrial DMB can be received by allowing a user, who newly purchases a desktop computer, to install only the graphic card, with the result that the computer market can be stimulated.
- [11] The present invention has an effect in that terrestrial DMB content received by a desktop type computer is stored in memory, so that an environment in which new content can be processed and produced can be provided.
- [12] The present invention has an effect in that a broadcasting signal received by a terrestrial DMB unit is converted into an intermediate frequency signal and then the intermediate frequency signal is converted into baseband signals, so that channel selectivity can be increased and phase delay can also be prevented.

Brief Description of the Drawings

- [13] FIG. 1 is a plain view of a graphic card according to an embodiment of the present

invention;

[14] FIG. 2 is a block diagram of the graphic card shown in FIG. 1;

[15] FIG. 3 is a block diagram of the terrestrial DMB unit of the graphic card, which is shown in FIG. 1;

[16] FIG. 4 is a block diagram of the DMB front-end module of the terrestrial DMB unit, which is shown in FIG. 3; and

[17] FIG. 5 is a block diagram of the graphic unit of the graphic card shown in FIG. 1.

Best Mode for Carrying Out the Invention

[18] In order to accomplish the above objects, the present invention is implemented using the following embodiments.

[19] According to a first embodiment of the present invention, the present invention provides a graphic card, the graphic card including a graphic unit that is responsible for computer graphic processing, wherein the graphic card is configured such that a terrestrial DMB unit for receiving terrestrial DMB is integrated with the graphic unit.

[20] According to a second embodiment of the present invention, the terrestrial DMB unit includes an antenna for receiving a terrestrial broadcasting signal transmitted from a terrestrial base station; and a USB port for transmitting an output signal of the terrestrial DMB unit to the main board of a computer, and receiving power from the main board.

[21] According to a third embodiment of the present invention, the terrestrial DMB unit includes a DMB front-end module for converting a high-frequency signal, which is received from a terrestrial base station, into an intermediate frequency signal; an intermediate frequency processing unit for receiving the intermediate frequency signal, transmitted from the DMB front-end module, and eliminating Direct Current (DC) components from the received intermediate frequency signal; and a baseband processing unit for receiving a signal transmitted from the intermediate frequency processing unit, converting the received signal into a digital signal, and demodulating the digital signal into video, audio and data signals.

[22] According to a fourth embodiment of the present invention, the DMB front-end module includes a band selection filter for filtering only a signal having a desired frequency band; a low noise amplifier for amplifying a signal that has passed through the band selection filter; an image rejection filter for filtering out an image frequency from a signal output from the low noise amplifier; a mixer for converting a high-frequency signal, which is output from the image rejection filter, into the intermediate frequency signal; a local oscillator for oscillating a local oscillator frequency signal; a channel selection filter for selecting only a desired channel from the intermediate frequency signal, which is output from the mixer, through band-pass filtering; and an

intermediate frequency amplifier for amplifying an intermediate frequency signal that has passed through the channel selection filter.

- [23] According to a fifth embodiment of the present invention the graphic unit includes a graphic engine for performing various types of computer graphic processing; a display engine for receiving data from the graphic engine and displaying the received data; and a host interface for providing an interface between a main board and the graphic engine.

Mode for the Invention

- [24] The present embodiments are described in detail with reference to the accompanying drawings, prior to the description of the present invention.
- [25] The graphic card 1 of the present invention includes a terrestrial DMB unit 2 and a graphic unit 3. The terrestrial DMB unit 2 and the graphic unit 3 are integrated on a single board. Accordingly, a user can view terrestrial DMB on a desktop type computer by replacing the user's existing graphic card with the graphic card of the present invention. Furthermore, the desktop type computer market can be expanded because a person who newly purchases a computer can view terrestrial DMB only using the graphic card of the present invention.
- [26] The terrestrial DMB unit 2 includes an antenna connector 22, which is configured such that an antenna, used to receive a terrestrial broadcasting signal transmitted from a terrestrial base station, is connected thereto, a terrestrial DMB unit 23, which is configured to perform signal processing on the signal received by the antenna, and a USB port 21, which is electrically connected to a main board to thus receive power from the main board and is responsible for performing communication so that the processed terrestrial broadcasting signal is transmitted to the main board.
- [27] The terrestrial broadcasting signal, transmitted from the terrestrial base station, is a high-frequency signal, so that a filter having a high Q value is required in order to select only a desired channel while directly converting this high-frequency signal into baseband signals. Accordingly, in order to overcome the above-described problem of channel selectivity, the two-step process of converting the received terrestrial broadcasting signal into an intermediate frequency signal and then converting the intermediate frequency signal into baseband signals is performed, and thus high channel selectivity can be realized using only a filter having a low Q value. Further, the high-frequency signal has a very short wavelength, and thus when it passes through various circuit stages, in addition to a filter, undesirable artifacts are generated due to phase delay. Accordingly, if the high-frequency signal is lowered to an intermediate frequency, the wavelength thereof is lengthened, and thus the problem related to the phase delay can be largely mitigated. For this reason, it is necessary to perform the

two-step conversion process.

[28] Referring to FIG. 3, the terrestrial DMB unit 23 includes a DMB front-end module 231, an intermediate frequency processing unit 235, and a baseband processing unit 237.

[29] The DMB front-end module 231 converts a high-frequency signal, that is, a Radio Frequency (RF) signal (for example, a signal within 174 to 240 MHz), which is received from the terrestrial base station, into an Intermediate Frequency (IF) signal (for example, a signal of 38.912 MHz). Referring to FIG. 4, the DMB front-end module 231 includes a band selection filter 2311 for passing only a signal having a desired frequency band therethrough by filtering out garbage frequencies from the high-frequency signals received from the antenna, a low noise amplifier 2313 for amplifying the signal that has passed through the band selection filter 2311, an image rejection filter 2317 for removing an image frequency from a signal output from the low noise amplifier 2313, a mixer 2319 for generating an intermediate frequency signal by mixing a high-frequency signal, which is output from the image rejection filter 2317, with a Local Oscillator (LO) frequency signal, which is oscillated by a local oscillator 2331 and is locked by a Phase Locked Loop (PLL) 2333, a channel selection filter 2323, for selecting only a desired channel from the intermediate frequency signal, which is output from the mixer 2319, through band-pass filtering, and an intermediate frequency amplifier 2325 for amplifying the intermediate frequency signal that has passed through the channel selection filter 2323. According to another embodiment, the DMB front-end module 231 may further include a well-known Surface Acoustic Wave (SAW) filter 2327, to accurately divide the intermediate frequency signal, which is amplified by the intermediate frequency amplifier 2325, into predetermined bands for respective channels, or may be configured such that a gain detector 2321 for detecting the gain of the intermediate frequency signal, output through the output terminal of the mixer 2319, is added to the output terminal of the mixer, and a high-frequency gain controller 2315 for controlling a high-frequency gain under the control of the gain detector is provided between the output terminal of the low noise amplifier 2313 and the input terminal of the image rejection filter 2317. Furthermore, in order to control the gain of the intermediate frequency signal, which is output from the intermediate frequency amplifier 2325, a gain detector 2335 and an intermediate frequency gain controller 2329 may be additionally provided. The DMB front-end module functions to convert a high-frequency signal into an intermediate frequency signal. Accordingly, as long as a method or construction other than the above-described method implements the above-described function of the present invention, this should also be understood to be a modified example of the present invention.

[30] The intermediate frequency processing unit 235 receives the intermediate frequency

signal, which is output from the DMB front-end module 231, and eliminates DC components from the received intermediate frequency signal.

[31] The baseband processing unit 237 receives the intermediate frequency signal, which is an analog signal, and converts the received intermediate frequency signal into a digital signal, demodulates the digital signal into video, audio and data signals (baseband signals), and transmits the demodulated signals to the main board 5 via the USB port 21. Here, the video signal follows MPEG-4AVC (alias, H264) compression standard, the audio signal follows technologies, such as MUSICAM, MPEG4/BSAC and MPEG/Layer2, and the data signal follows technologies, such as Program Associated Data (PAD), Non-Program Associated Data (NPAD), Transparent Data Channel (TDC), Multimedia Object Transfer (MOT), Broadcast WebSite (BWS), and Internet Protocol (IP)-Tunning. Since these technologies are already well-known, a detailed description thereof is omitted.

[32] According to another embodiment of the present invention, the terrestrial DMB unit 23 may additionally include memory 239. The memory 239 is connected to the output terminal of the baseband processing unit, and thus may store therein the baseband signals (video, audio and data signals) output from the baseband processing unit 237. When a request for rebroadcasting subsequently occurs, in response to a request from the user, the pieces of stored data are transmitted to a display 4 via the main board 5 and the graphic unit, and thus may be viewed and may also be used later to create another piece of content through reprocessing.

[33] Referring to FIG. 5, the graphic processing unit 3 includes a graphic engine 331 for more realistically processing various types of multimedia data transmitted from the main board 5, a display engine 333 for providing an interface with the display 4 to receive the multimedia data processed by the graphic engine 331 and transmit the received multimedia data to the display 4, and a host interface 335 for providing an interface between the main board 5 and the graphic engine 331. Since the above-described graphic processing unit is generally a well-known technology, additional description thereof is omitted.

[34] The operation of the graphic card of the present invention is described below.

[35] First, the connection unit 31 of the graphic card 1 is inserted into a slot of the main board 5 and thus maintains an electrical connection state with the main board 5. Furthermore, the USB port 21 of the terrestrial DMB unit 2 is electrically connected to the main board 5 via a dedicated cable, and the display 4 is electrically connected to the connector 35 of the graphic unit 3.

[36] When the power of the computer is turned on, after the installation of the graphic card in the desktop type computer has been completed as described above, the antenna of the terrestrial DMB unit 2 of the graphic card 1 starts to receive a terrestrial high-

frequency signal from the base station. The received signal is sequentially converted into an intermediate frequency signal and baseband signals in the terrestrial DMB unit 23 and, thereafter, is transmitted to the main board 5 via the USB port 23. Thereafter, the received signal is graphically processed by the graphic unit 3, and is then displayed on the display 4. Furthermore, in the case where the memory 239 is additionally provided in the terrestrial DMB unit 1, various types of terrestrial broadcasts are stored, and thus may be later rebroadcast and be viewed or may be processed into new content using various edit programs.

[37] Although the embodiments of the present invention have been described in detail, as described above, various changes and modifications that are included within the scope of the technical spirit of the present invention should be construed as being included in the present invention.

Claims

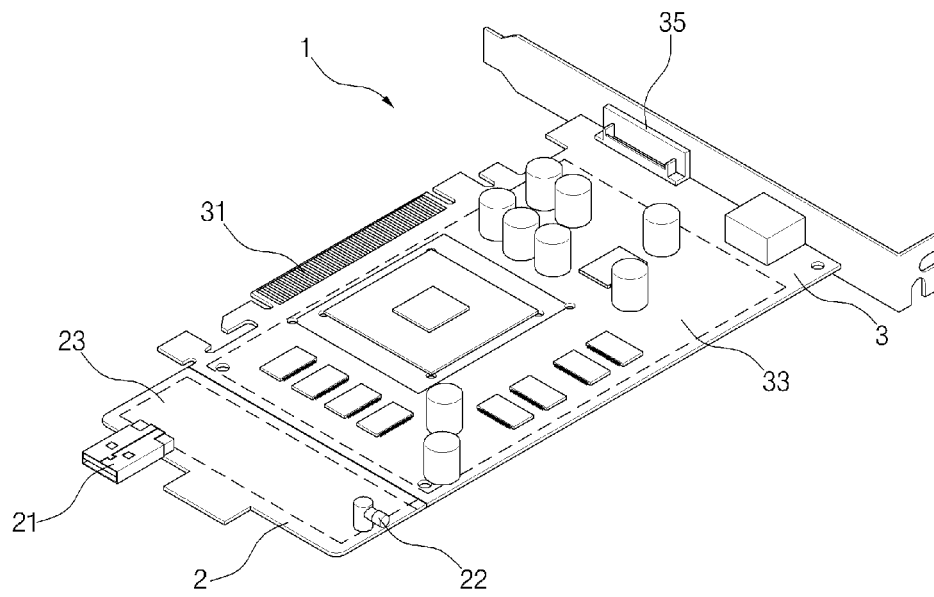
- [1] A graphic card, the graphic card comprising a graphic unit that is responsible for computer graphic processing, wherein:
the graphic card is configured such that a terrestrial Digital Multimedia Broadcasting (DMB) unit for receiving terrestrial DMB is integrated with the graphic unit.
- [2] The graphic card according to claim 1, wherein the terrestrial DMB unit comprises:
an antenna for receiving a terrestrial broadcasting signal transmitted from a terrestrial base station; and
a Universal Serial Bus (USB) port for transmitting an output signal of the terrestrial DMB unit to a main board of a computer, and receiving power from the main board.
- [3] The graphic card according to claim 1, wherein the terrestrial DMB unit comprises:
a DMB front-end module for converting a terrestrial high-frequency signal, which is received from a terrestrial base station, into an intermediate frequency signal;
an intermediate frequency processing unit for receiving the intermediate frequency signal, transmitted from the DMB front-end module, and eliminating Direct Current (DC) components from the received intermediate frequency signal; and
a baseband processing unit for receiving a signal transmitted from the intermediate frequency processing unit, converting the received signal into a digital signal, and demodulating the digital signal into video, audio and data signals.
- [4] The graphic card according to claim 3, wherein the DMB front-end module comprises:
a band selection filter for filtering only a signal having a desired frequency band;
a low noise amplifier for amplifying a signal that has passed through the band selection filter;
an image rejection filter for filtering out an image frequency from a signal output from the low noise amplifier;
a mixer for converting a high-frequency signal, which is output from the image rejection filter, into the intermediate frequency signal;
a local oscillator for oscillating a local oscillator frequency signal;
a channel selection filter for selecting only a desired channel from the intermediate frequency signal, which is output from the mixer, through band-pass

filtering; and

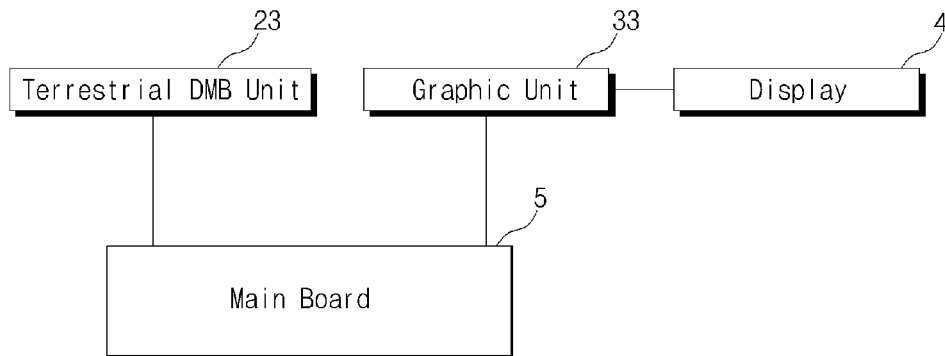
an intermediate frequency amplifier for amplifying an intermediate frequency signal that has passed through the channel selection filter.

- [5] The graphic card according to claim 1, wherein the graphic unit comprises:
a graphic engine for performing various types of computer graphic processing;
a display engine for receiving data from the graphic engine and displaying the received data; and
a host interface for providing an interface between a main board and the graphic engine.

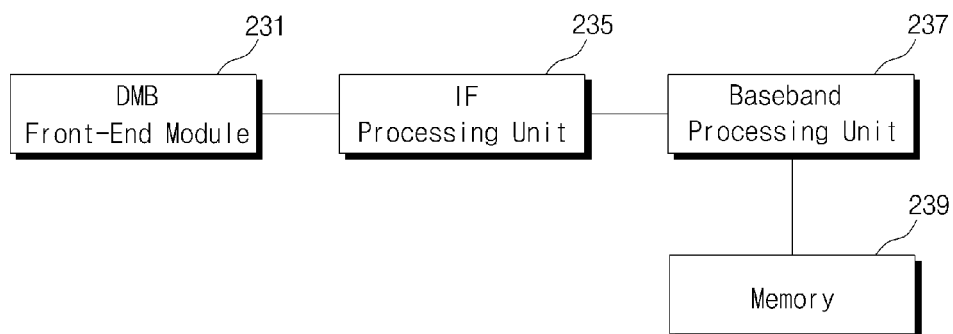
[Fig. 1]



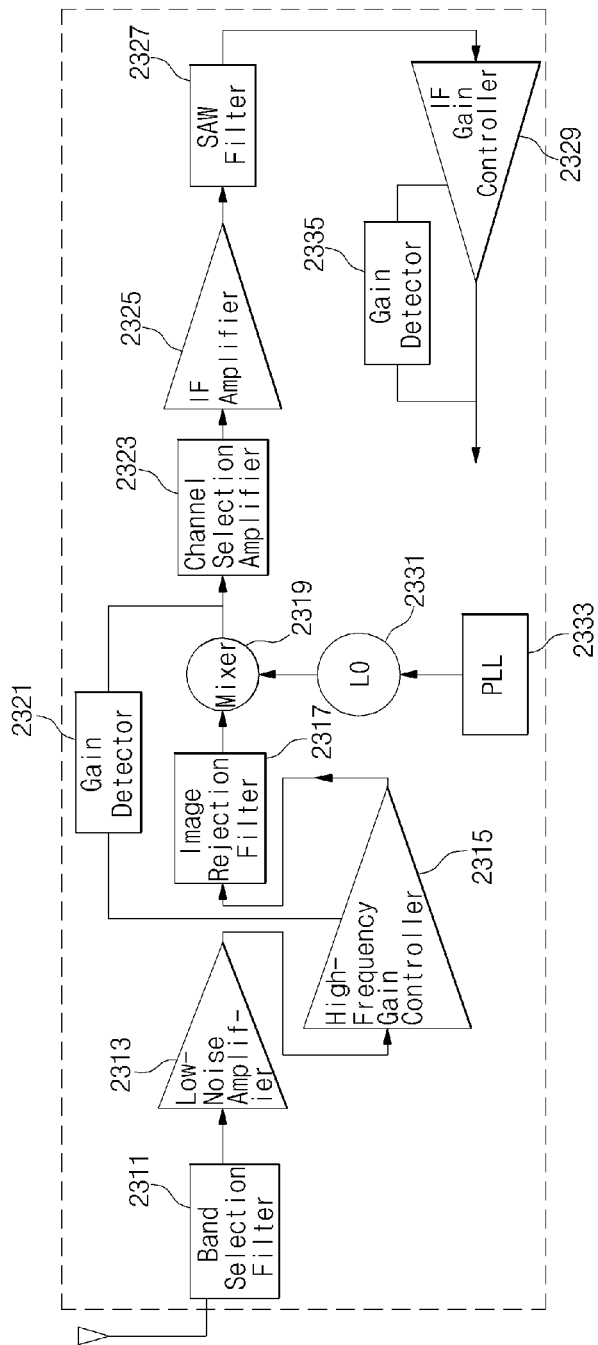
[Fig. 2]



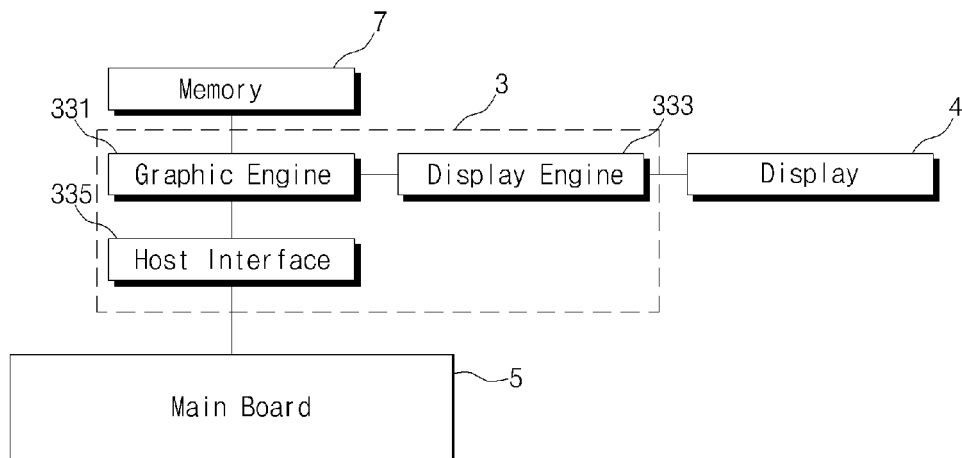
[Fig. 3]



[Fig. 4]



[Fig. 5]



A. CLASSIFICATION OF SUBJECT MATTER**G06F 1/00(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8: G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility Models since 1975

Japanese Utility Models and application for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal) 'DMB', 'Digital Multimedia Broadcasting', 'graphic card', 'terrestrial DMB reception card',

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 1020050037776 A (LG ELECTRONICS INC.) 25 APRIL 2005 See the abstract, claim 1 and figure 1.	1-5
Y	KR 1020040100171 A (JONG-BU KIM et al.) 02 DECEMBER 2004 See the abstract, claims 1-6 and figure 1.	1-5
A	US 2005/0060744 A1 (JUN KIM et al.) 17 MARCH 2005 See the abstract, paragraphs [0009]-[0018] and figure 1.	1-5
A	US 2005/0210504 A1 (JUN-WON KO et al.) 22 SEPTEMBER 2005 See the abstract, paragraphs [0018]-[0021] and figure 4.	1-5



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

30 AUGUST 2007 (30.08.2007)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/002170

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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