

The present invention relates to a circuit board with an oscillator and a modulator or demodulator.

Such arrangements are used for example in video recorders in order to convert a video- and sound-frequency signal, scanned from a magnetic tape, into a frequency which can be processed by the high-frequency circuits in a television receiver in order thus to be able to reproduce a reproducible image on the screen of the television receiver. The modulator consists of two diodes to which on the one hand a carrier frequency of a few 100 MHz generated by an oscillator and on the other hand the video- and sound-frequency signal are applied. To avoid undesired couplings by interference radiation from the oscillator, the latter must be well screened to prevent the oscillator frequency from entering the numerous inductive elements, such as air core coils and transformer. Normally a ferrite transformer is used for the output-coupling of the oscillator frequency. The transformer must be adjusted so as to be precisely symmetrical in order to input-couple secondary-side, symmetrical oscillator oscillations into the modulator circuit. The oscillator frequency must be precisely adjusted. The screening of the oscillator normally is carried out with the aid of screening caps which are arranged on both sides of the carrier board. This results not only in adjustability but also a high mechanical outlay.

For example, a tuner for satellite broadcast reception is known (JP 1106630 of 24.4.89). The latter is constructed in microstrip technology, i.e. the oscillating circuits are constructed in the form of printed conductors, in association with a capacitance coating arranged on the other side of a circuit board.

It is also known to construct a voltage-controlled oscillator in accordance with microstrip technology in such

manner (GB 118 392 A). Here again the coating serves as capacitance for the oscillating circuit and not to screen the oscillator oscillations from a modulator.

The aim of the invention is to provide a modulator arrangement with a large tuning range of the modulation frequency and with good constancy of the degree of modulation while avoiding elements to be adjusted, whereby the production of such an arrangement can be automated.

This aim is fulfilled in that the oscillating circuit of the oscillator is constructed in accordance with printed circuitry technology with an inductance in association with a capacitance diode, where the printed inductance is coupled to a likewise printed inductance of the modulator, and that in the region of the oscillator and the mixer on the opposite side of the circuit board a conductive surface connected to reference potential is provided for the screening of the oscillations generated by the oscillator, which conductive surface is connected via through-contact points to conductive surfaces arranged in the region of the oscillator and modulator on the other side of the circuit board, whereby the input-coupling of oscillator oscillations to the modulator output is prevented.

In the following an exemplary embodiment of the invention will be described making reference to the drawing wherein:

Figure 1 illustrates the arrangement in a circuit;

Figure 2 illustrates an example for a video-sound modulator;

Figure 3 illustrates an example for a video-sound demodulator.

The invention will be described in the form of the example of a video-sound modulator making reference to Figure 1. The circuit is arranged on a circuit board clad on both sides. The oscillator, which is referenced 1 in its entirety, comprises a transistor 16, the collector of which is connected via a feedback capacitor 17 to an oscillator oscillating circuit which consists of an inductance 6, designed in printed circuitry technology, and a capacitance diode 7 in series with a capacitor 18. The connection point between the capacitance diode 7 and the capacitor 18 is connected via a capacitor 19 to the emitter of the transistor 16, the base of which is connected to reference potential via the parallel arrangement of a capacitor 20 and a resistor 21. Via the resistor 22 the base bias voltage is applied to the transistor 16. The tuning voltage UA generated by a PLL circuit 2 is fed via the resistor 23 to the capacitance diode 7. The frequency of the oscillator 1 is generated in stable fashion by a crystal 3 and can be adjusted by data input in the case of DAT. The crystal 3 simultaneously serves as reference for a further PLL circuit 4 which is used to generate the tuning voltage UA for the tuner 5 of the video recorder. The frequency generated by the oscillator 1 is output-coupled via a printed inductance 6'. The inductance 6, together with the capacitance diode 7 and the capacitor 18, forms the frequency-determining element of the oscillator 1. As the output-coupling in printed circuitry technology can be established in an extremely precise fashion, a large frequency range of 600 to 850 MHz can also be covered and is therefore ideally suited for large-scale production. Due to the construction in printed circuitry technology, the balancing can also be precisely preset with the result that adjustment can be omitted. The video- and sound- IF input signal (4.5 MHz to 6.5 MHz) is fed via the socket 15 to the two modulator diodes 8, 8'. The converted signal is fed via a capacitor 9

and a separating stage 10 to the output 11, from which it can be tapped as antenna signal for a television receiver.

The screening of the oscillator 1 takes place particularly advantageously as follows. On that side of the circuit board opposite the conductor paths provided with the components is arranged an electrically conductive surface 12 which is connected to reference potential and which is bordered by the broken line. The shading shown in the corners of the outlined area is to characterise the electrically conductive surface 12. In the region of this surface 12 the circuit board possesses a plurality of through-contact points 13 which are electrically connected to symbolically indicated conductor paths 14 on the opposite side of the circuit board and which are embedded in the conductor paths of the printed circuit. Since, due to the use of printed circuitry technology, no air core coils and no transformer are used, the conductive surface 12 results in very good screening vis-a-vis the magnetic field of the oscillator oscillations. The stray field is short-circuited by the conductor paths 14 and the conductive surface 12.

The arrangement of the printed modulator- and oscillator circuit (24, 1) is illustrated in the upper part of Figure 2. The electrically conductive surface arranged on the other side of the circuit board is outlined by the border 12. The through-contact points 13 can be seen, these permitting through-contacting of the upper side of the circuit board to its lower side. Those conductive surfaces which are contacted with the lower side are shown shaded. Thus the zones connected to reference potential are formed on the upper side. The lower part of Figure 2 illustrates the surface which is arranged on the lower side of the circuit board, as if viewed from above through the circuit board. If this surface is moved under the upper part of

Figure 2, the points 13 of the surface 12 coincide with the points 13 in the printed circuit.

Figure 3 illustrates the arrangement for a video-sound demodulator. The carrier-frequency, modulated signal here is fed to the input 11 and is applied via the amplifier 10 to the demodulator diodes 8, 8'. The demodulated signal can be tapped from the output 15.

Claims

1. A circuit board with an oscillator and a modulator or demodulator, wherein the oscillating circuit of the oscillator is constructed in accordance with printed circuitry technology with a printed inductance in connection with a capacitance diode, characterised in that the inductance (6) of the oscillator oscillating circuit is coupled to a printed inductance (6') of the modulator (8, 8'), and that for the screening of the oscillations generated by the oscillator (1) in the region of the oscillator (1) and the modulator or demodulator (8, 8', 6') on the opposite side of the circuit board there is arranged a conductive surface (12) which carries reference potential and which is electrically conductively connected to conductive surfaces (14) arranged in the region of the oscillator (1) and in the region of the modulator or demodulator (24) on the other side of the circuit board, whereby the input-coupling of oscillator oscillations to the modulator output is prevented.
2. A circuit board as claimed in Claim 1, characterised in that the electrically conductive connection between the layer (12) and the layers (14) is established by means of one or more through-contacts via through-contact points (13).
3. A circuit board as claimed in Claim 1 or 2, characterised in that it is provided for a video-sound modulator in a video recorder.
4. A circuit board as claimed in Claim 1 or 2, characterised in that it is provided for a video-sound modulator in a stand-alone decoder.