

Brief Description of Circuit Functions

The brief ckt. description of V20 **107E5 17” Monitor**

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1. GENERAL DESCRIPTION

The new refreshed V20 using conventional 17" CRT, it is so-called "Digital Controlled Auto-scan Color Display Monitor" with high resolution, which can operate at horizontal scan frequency from 29KHz up to 72KHz, and the vertical scan frequencies can operate from 50 to 160 Hz.

The monitors are equipped with a micro-controller, which is adjustable for all modes by OSD control,

The monitors comply with TCO03/MPRIII low emission standard and also fulfill E2000 automatic power saving requirements; to reduce power consumption less than 1 watts in power saving mode, the monitor also can comply with VESA standard and energy star computer program initiated by the EPA.

2. DESCRIPTION OF CIRCUIT DIAGRAM

This description mainly introduces the functions including power supply, horizontal / vertical deflection, video amplifier, micro-controller, etc.

A. POWER SUPPLY

The monitor is designed to adopt switching mode power supply which can operate mains input from 90VAC to 264VAC, this switching power supply apply an IC TEA1507 controller, that power MOSFET is packed inside as well. The control scheme transforms a switching converter from a voltage source into a multi-output voltage, the control concept is exhibited many desirable properties such as inherent over-load protection, stable and fast system response, the maximum output power capability is up to 90 watts for different models, then a power limiting circuit is added for different power delivery and safety reasons, on main power supply circuit, secondary feedback via a photo-coupler is used to obtain a stable output voltage, the secondary outputs supply all necessary voltages for deflection and video and micro-controller.

In order to meet the power consumption less 1 watts @ off mode, introduction the new controller IC TEA1507, this design has been considered and executed in low and high mains voltage.

All rectified diodes on secondary site are without lead frame (heat-sink), it gains some cost saving in thermal design, but the turn ratios of main transformer should be fixed to maintain a adequate voltage derating of primary switching MOSFET and secondary +50V rectified diode 31DF4.

This monitor can save power consumption while no sync pulses and automatically recover to normal power on when sync signals are detected by micro-controller, the power saving off mode still exist in new designed monitors but suspend / stand-by mode are deleted.

During Off mode operation, all the output voltages of main power are reduced, only the required voltage of micro-controller is supplied by burst mode, then it will be used to restart the main power while monitor wake-up is required. The monitor will also operate in burst mode with active CPU while the power switch is in off position (power LED dark). Power consumption is in that case also less than 1W.

B. HORIZONTAL DEFLECTION / VERTICAL DEFLECTION / EHT GENERATOR

HORIZONTAL DEFLECTION:

The heart of horizontal/vertical deflection controller is TDA9112A, which can offer a complete and efficient small signal sync processing for auto-sync monitors, all functions are controlled via I2C bus.

This controller provides sync processing, which can accept separate and composite (H+V) input signals, a very short settling time after mode change for protection of external power components has been taken into account.

The TDA9112A provides extensive functions like a flexible B+ controller block of H-deflection and a geometry control with facilities, leading to excellent picture quality, this device also can directly drive the vertical deflection output stage, the line driver stage, the E/W output stage and all controls are tracked with the incoming frequencies, picture can be adjusted along horizontal direction by H-shift control,

Horizontal size, east/west, trapezoid. Constant EHT over frequency is obtained by varying the supply voltage of H-deflection circuit via boost converter, 2 or 3 S-capacitors plus power MOSFET switches and DC controlled linearity coil are designed for optimal screen linearity.

VERTICAL DEFLECTION:

The majority of vertical deflection function is integrated by two ICs: TDA9112A and TDA8172.

The TDA9112A takes care of sync polarity correction, automatic catching and holding of the vertical oscillator, generation of saw-tooth drive current for vertical output and vertical s-correction, and generation of a correct V-blanking pulse for video blanking during vertical retrace lines.

The TDA8172 is a DC-coupled vertical deflection booster with single ended input signals is suitable for color monitor. The output stage has thermal and soar protection, and high linear saw-tooth signal amplification to obtain the required vertical deflection current.

EHT generation section

The combined circuit is used to generate required extra high voltage for CRT, the transformer (LOT) transfers the voltage to required anode voltage and rest secondary output voltages.

The adjustable focus (F1, F2) and screen (G2) voltages are internally derived from the anode voltage, other secondary windings are used to generate the voltages for G1, also provides dynamic focus on F2 to get a good focus performance.

For safety reasons, x-ray protection circuit is included, that TDA9112A will shut down EHT generator if the anode voltage exceeds a certain value (28kV).

The horizontal output drive pulse will be latched to shut down the EHT generator when the voltage at pin X-RAY (pin25) of the sync-processor TDA9112A (7501) exceeds the threshold 8V. An auxiliary winding of the line output transformer, which voltage is proportional to the EHT voltage, is built to monitor the EHT voltage. Under normal working, the auxiliary voltage is around 57V while the EHT is 25 KV. Vx-ray of the sync-processor is provided by dividing the auxiliary voltage via a divider composed of R3524 (100k $\pm 1\%$) and R3523 (14K $\pm 1\%$). The X-ray protection circuit is activated when Vx-ray (Vpin 2) reaches 8V which is given by the aux. voltage 63.5V. Tolerance analysis has shown that the worst case EHT shut-down condition will not exceed 29.5kV.

C. VIDEO AMPLIFIER & DDC2B

VIDEO AMPLIFIER:

The video circuit mainly consists of pre-amplifier LM1237, LM2466 post amplifier and AC coupling application; the video DC level restoration and gain at cathode are controlled via I2C bus & software.

The red, green and blue video signals are amplified by pre-amplifier and post-amplifier, then AC coupled to CRT cathodes, three cut-off adjustments are provided to set the video black level at cathode for all three guns, three individual gain adjustments are also provided to adjust the white balance, both cut-off and gain controls are digital control via micro-controller.

For the beam current limit and preventing the local doming, the beam current limit will automatically reduce the video swing in case the beam current exceeds certain level.

A spot-killer circuit is also added to prevent the CRT damage due to spot burn out when the set is switched off.

DDC 2B:

Via SDA and SCL, the data about the information of the monitor, including the serial number, production Codes, CRT type and applicable timings are stored in the EEPROM, to avoid picture interference, the reading and writing processes are executed via I²C.

DDC information exchange will also be active while monitor is powered down. In this case, the PC delivers a 5V supply via I/F cable pin 9 to the CPU and EEPROM.

D. MICRO-CONTROLLER

GENERAL DESCRIPTION:

The Weltrend ET62P2 micro-controller is used to control all required functions of monitors, the preset data are stored in EEPROM M24C16, the most important point is used “ interrupt “ to do the fast detect of mode change, then the MCU deliver a good protection behavior for horizontal output transistor during mode change.

HARDWARE DEFINITION:

a) KEY BOARD

There are four keypads at the front of monitor for the OSD control.

- Power key: Switches the CPU in power-off state

- Enter: To confirm the entrance or exit from the OSD window and selected parameters.

- “+” : To select the parameters and adjust the parameter which are chosen from OSD.

- “-” : To select the parameters and adjust the parameter which are chosen from OSD.

b) OSD will disappear and SAVE AUTOMATICALLY after non-operation.

c) Software will control the DPMS according to the SYNC status.

Block Diagram

107E5 electrical block diagram

