

# Improved Low Cost Triple CRT Driver



## CVA2411TX

### FEATURES

- Ease of Use
- Small Heat Sink
- OSD Option
- EMI Control Option
- Excellent Gray Scale Linearity

### APPLICATIONS

- CRT Displays for 1280 x 1024 Resolution with Pixel Clock Frequency up to 160MHz

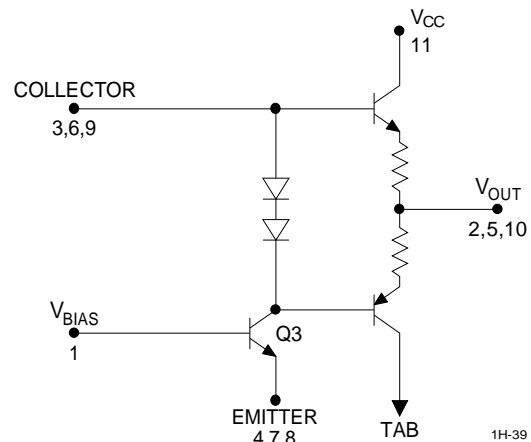
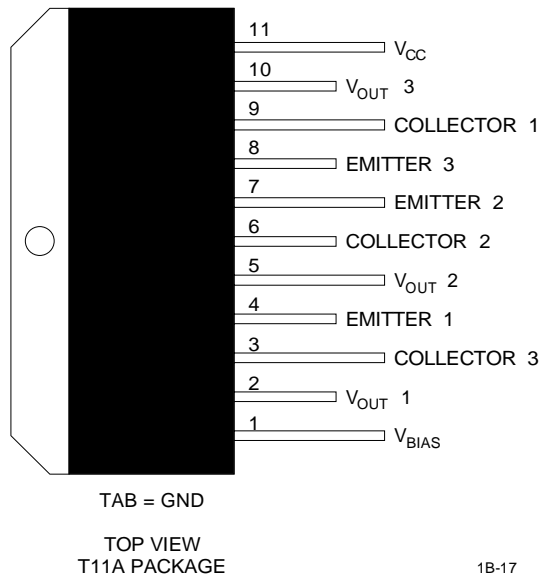
### DESCRIPTION

The CVA2411TX is an improved low cost version that features excellent gray scale linearity with no crossover distortion and less EMI for 69kHz (horizontal scanning frequency) monitors. The CVA2411TX can be used with pre-amplifiers where the common emitter transistor is part of the pre-amp. With this device, OSD, peaking coil, and peaking capacitor can be available. A very small heat sink is required to pick-up ground from the standard TO220 package Tab. With 65MHz bandwidth, the device is an ideal low cost solution for 14", 15" and 17" monitors.

### ORDERING INFORMATION

| Part      | Package | Temperature     |
|-----------|---------|-----------------|
| CVA2411TX | T11A    | -20°C to +100°C |

### CONNECTION DIAGRAM AND SIMPLIFIED SCHEMATIC



**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage . . . . . 95V  
 Storage Temperature . . . . . -25°C to +125°C  
 Maximum Current (Q3) . . . . . 60mA

Operating Temperature . . . . . -20°C to +100°C  
 Lead Temperature . . . . . +300°C

**AC/DC CHARACTERISTICS**  $T_{CASE} = +25^{\circ}C$ 

| SYMBOL              | CHARACTERISTICS                                       | MIN | TYP | MAX  | UNITS |
|---------------------|---|-----|-----|------|-------|
| BV <sub>CEO</sub>   | Collector-Emitter Breakdown Voltage ( $I_c = 1mA$ )   | 95  |     |      | V     |
| BV <sub>CBO</sub>   | Collector-Base Breakdown Voltage ( $I_c = 100\mu A$ ) | 100 |     |      | V     |
| BV <sub>EBO</sub>   | Emitter-Base Breakdown Voltage ( $I_E = 100\mu A$ )   | 3   |     |      | V     |
| H <sub>FE</sub>     | DC Current Gain ( $I_c = 50mA$ )                      | 25  | 35  |      | —     |
| V <sub>BES</sub>    | Base-Emitter Saturation Voltage                       |     |     | 0.95 | V     |
| V <sub>CES</sub>    | Collector-Emitter Saturation Voltage                  |     |     | 0.3  | V     |
| V <sub>BE(ON)</sub> | Base-Emitter ON Voltage                               | 0.6 |     |      | V     |
| I <sub>CEO</sub>    | Collector Cut-Off Current                             |     |     | 100  | nA    |
| C <sub>ob</sub>     | Output Capacitance                                    |     | 3   |      | pF    |
| C <sub>cb</sub>     | Junction Capacitance                                  |     | 2   |      | pF    |
| C <sub>ib</sub>     | Input Capacitance                                     |     | 8   |      | pF    |
| f <sub>t</sub>      | Current Gain Bandwidth Product ( $I_c = 35mA$ )       |     | 150 |      | MHz   |

**AC/DC CHARACTERISTICS of Amplifier** (See test circuit)  $T_{CASE} = +25^{\circ}C$ ,  $V_{CC} = 80V$ ,  $V_{IN} = 3.2V$ , unless otherwise specified.

| SYMBOL           | CHARACTERISTICS                                      | MIN | TYP | MAX | UNITS |
|------------------|--|-----|-----|-----|-------|
| I <sub>CC</sub>  | Supply Current                                       |     | 30  | 38  | mA    |
| V <sub>OUT</sub> | Output Voltage, $V_{IN} = 3.6V$                      |     | 45  | 52  | V     |
| A <sub>v</sub>   | Gain   |     | 13  | 15  | V/V   |
| T <sub>r</sub>   | Rise Time, $V_{OUT} = 45V_{P-P}$ , $C_{LOAD} = 10pF$ |     | 9.5 | 11  | ns    |
| T <sub>f</sub>   | Fall Time, $V_{OUT} = 45V_{P-P}$ , $C_{LOAD} = 10pF$ |     | 8   | 9   | ns    |
| Overshoot        |  |     | 5   |     | %     |

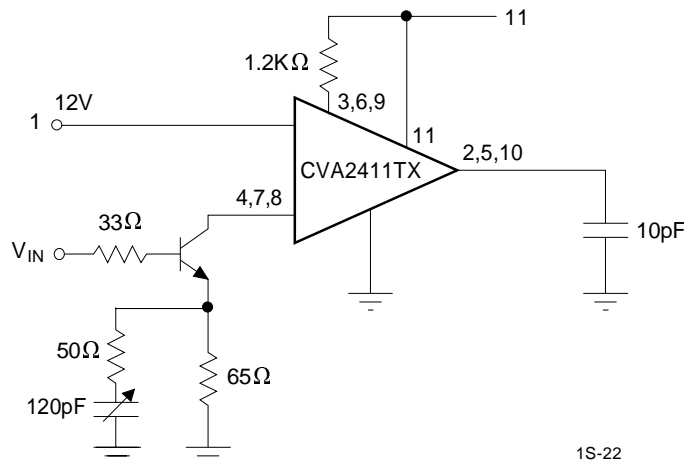
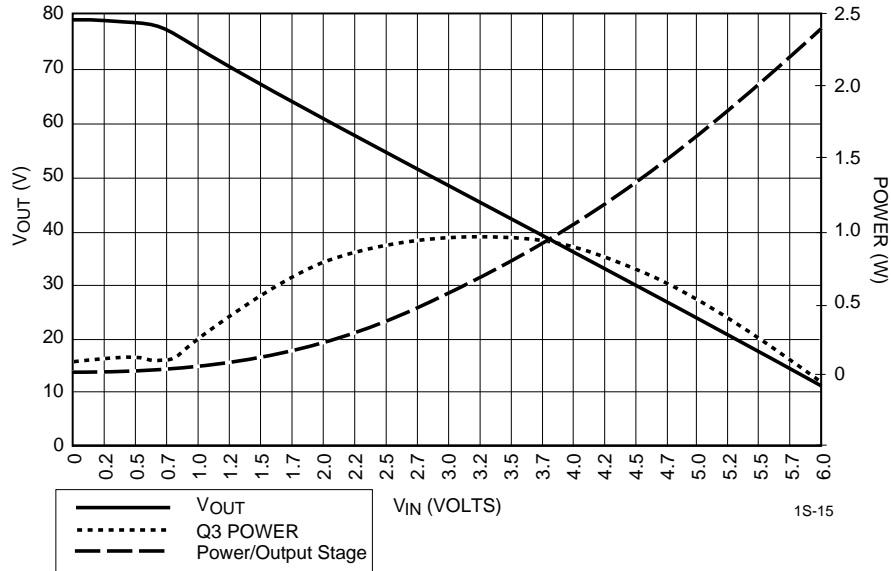
**FIGURE 1. TEST CIRCUIT**


FIGURE 3. CVA2411TX TRANSFER CHARACTERISTICS



**APPLICATION INFORMATION**

The CVA2411TX consists of three identical transistor arrays that includes cascode transistor, push pull output stage and biased diodes for no cross-over distortion. This design technique makes the CVA2411TX an ideal candidate for a CRT driver application. Used with an external emitter follower, such as the 2N2369, and a load resistor (~1.2KΩ, 3W), the CVA2411TX works well in a 69kHz (1280 x 1024 non-interlaced) monitor application.

For power and cost effective applications, CVA2411TX is the ideal solution. The CVA2411TX requires a very small heat sink as the majority of the power is dissipated in load resistors. The emitter peaking option maximizes the high frequency gain.

In the following pages a full schematic and the picture of a demo board are provided, demonstrating that the CVA2411TX works well for 69kHz monitors. See characteristics taken at the cathode of the monitor.

**Thermal Considerations**

The transfer characteristics of the CVA2411TX application (Figure 2.) are shown in Figure 3. Since this is a class A input stage, power supply current increases as the input signal increases and consequently power dissipation also increases.

The CVA2411TX cannot be used without a heat sink as the tab is grounded and also the case temperature should be maintained at less than 100°C. Under white screen condition, i.e. 25V output, dissipation is 0.6W/channel. Under gray level conditions C<sub>L</sub> = 8pf, V<sub>OUT</sub> = 45<sub>P-P</sub>, the dissipation is 1.6W/channel. If the maximum expected ambient temperature is +50°C, then a heat sink is needed with thermal resistance equal to or less than:

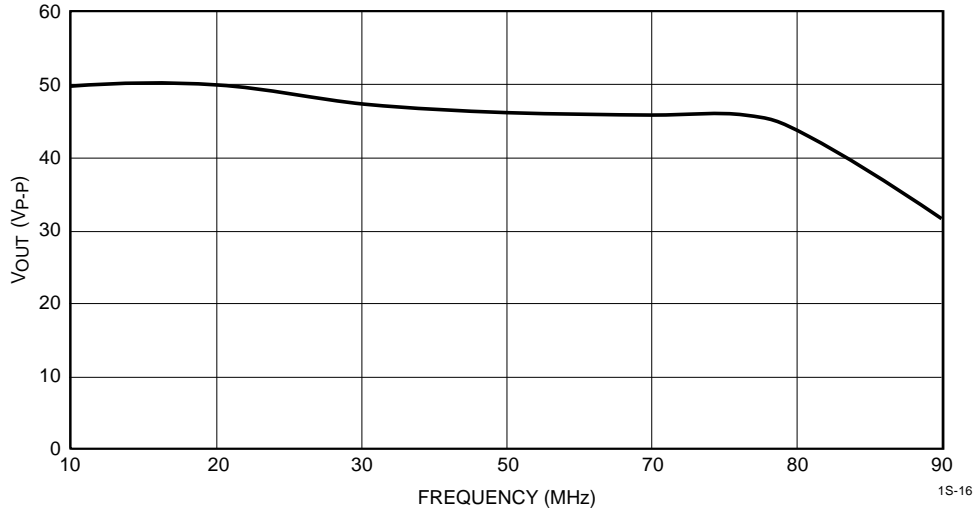
$$R_{th} = \frac{(100 - 50^{\circ}C)}{4.8W} = 10.4^{\circ}C/W$$

The CVA2411TX maximum load is 600Ω to ground or V<sup>+</sup>.

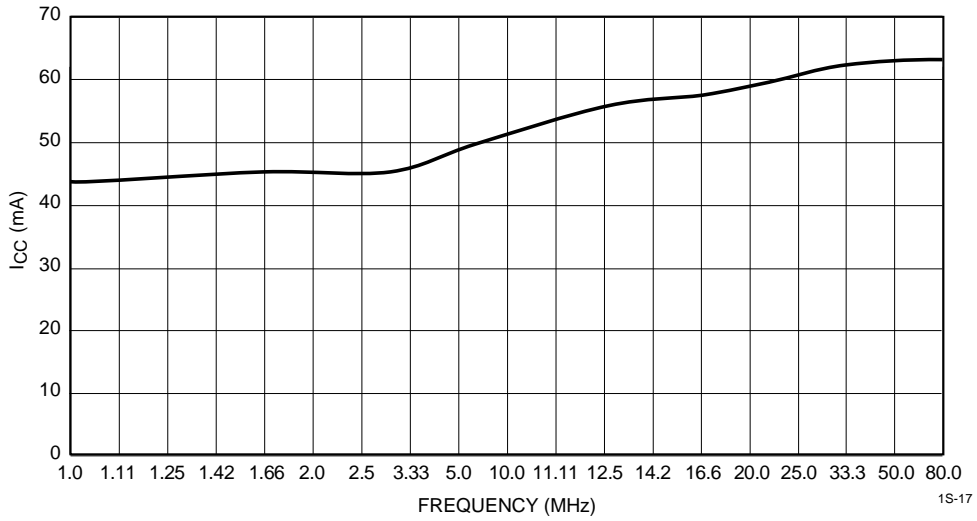
The output of CVA2411TX is not short circuit proof. Any resistance to V<sup>+</sup> or Ground should be more than 600Ω.

**TYPICAL CHARACTERISTICS**

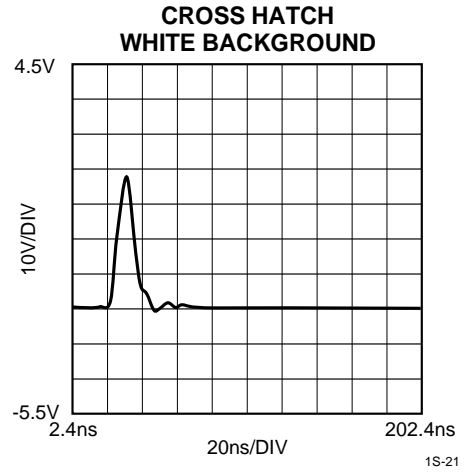
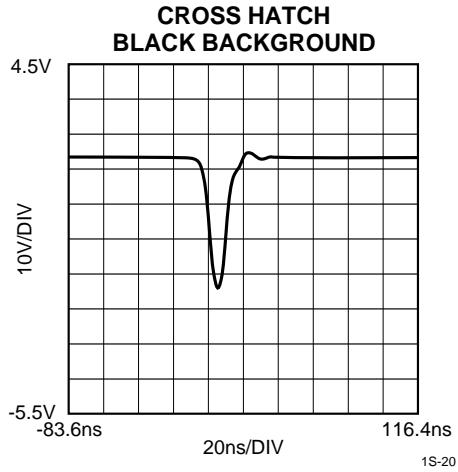
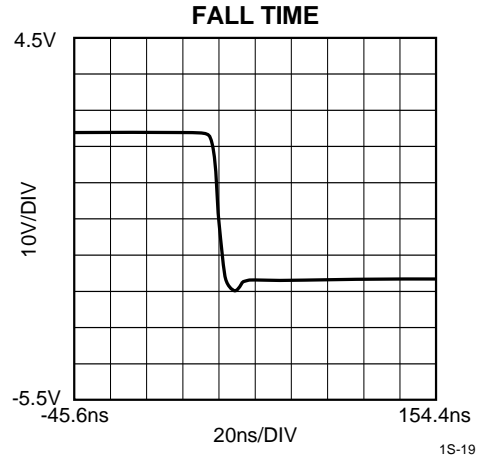
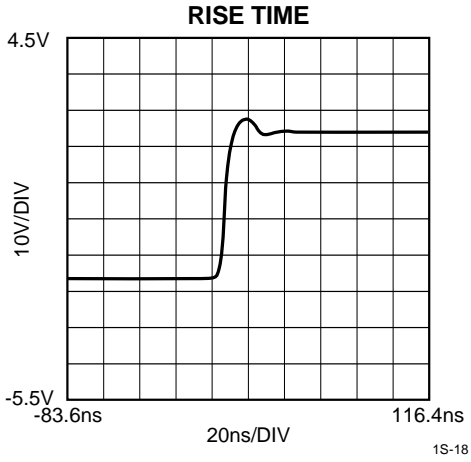
**V<sub>OUT</sub> vs FREQUENCY**



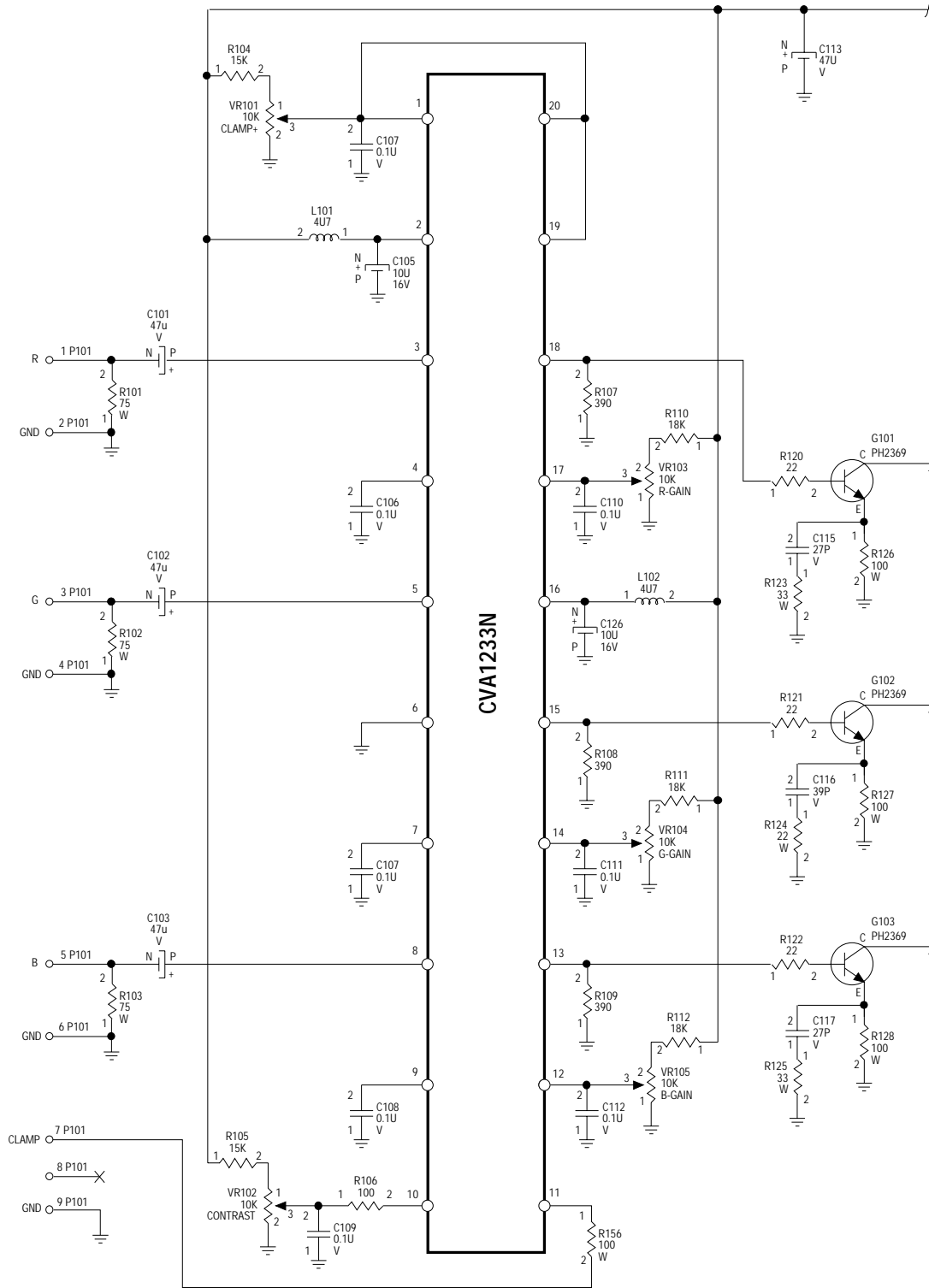
**I<sub>CC</sub> vs FREQUENCY**



TYPICAL CHARACTERISTICS (continued)

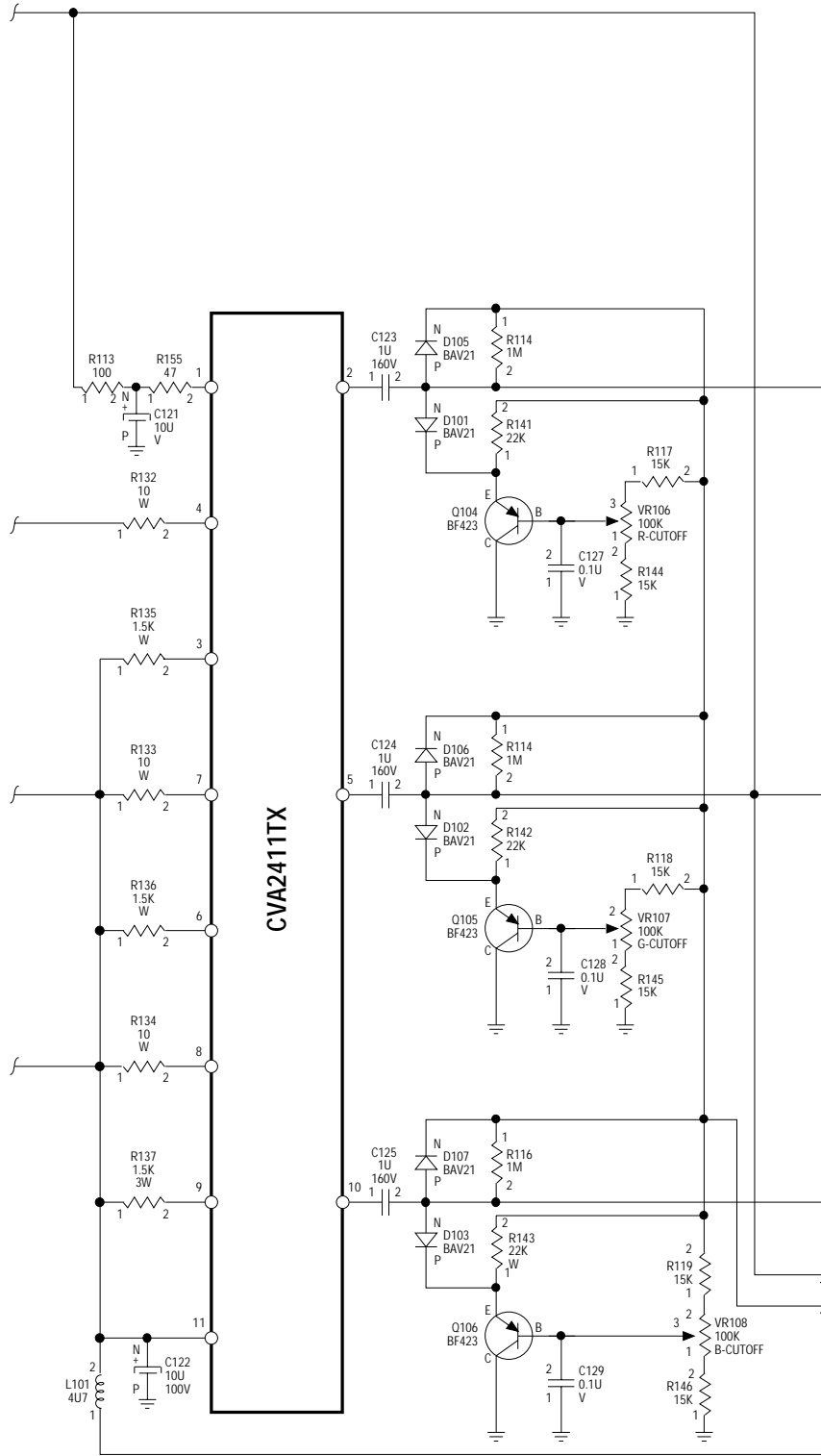


**TYPICAL APPLICATION**



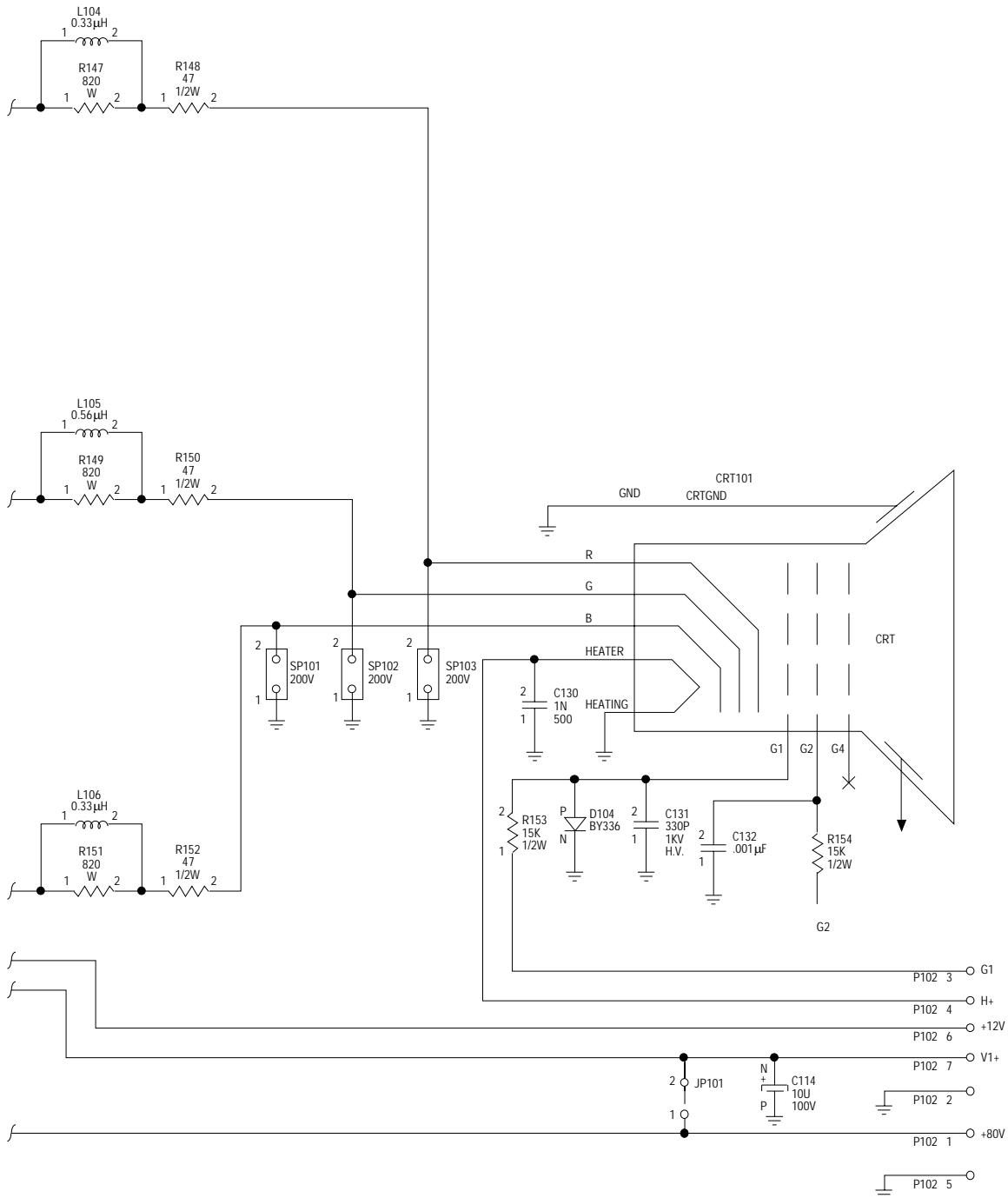
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TYPICAL APPLICATION (continued)



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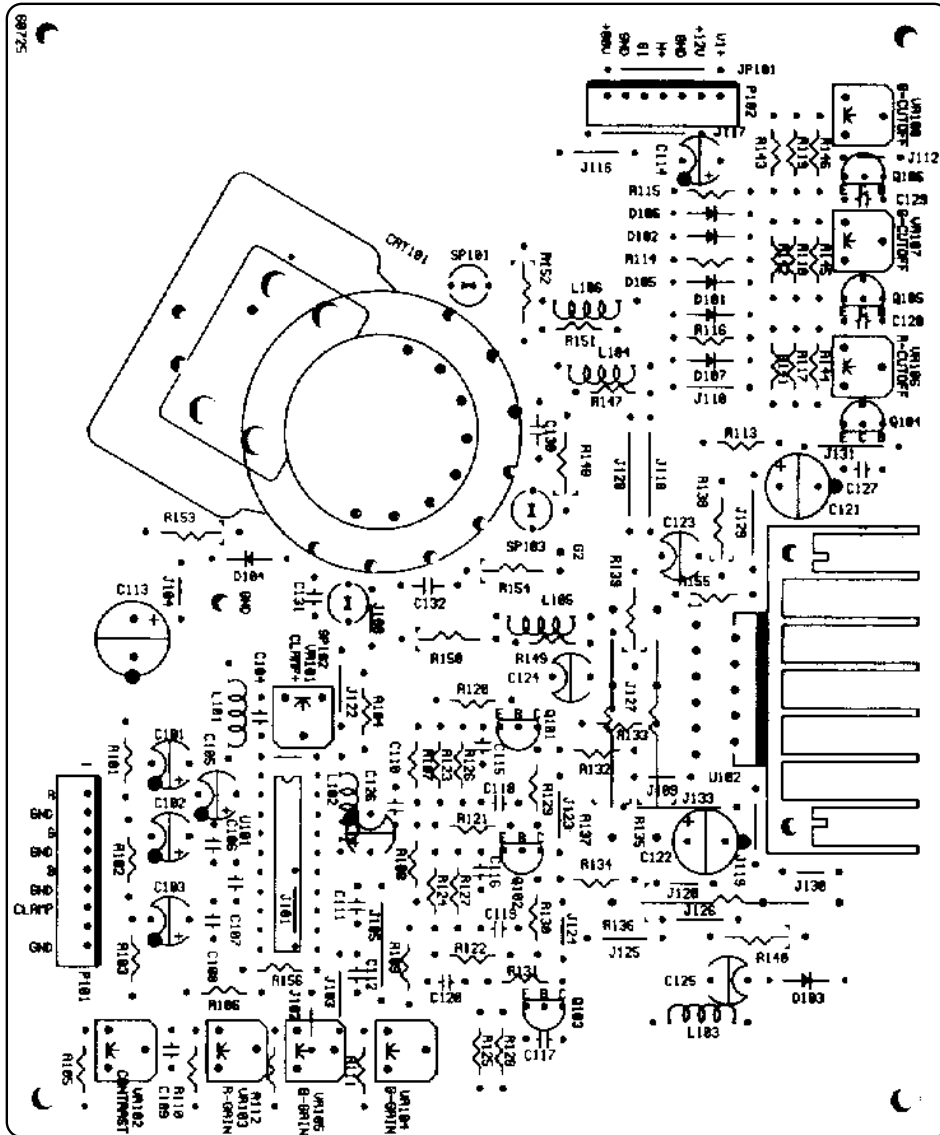
**TYPICAL APPLICATION (continued)**



1S-23C



CIRCUIT BOARD



CIRCUIT BOARD

