

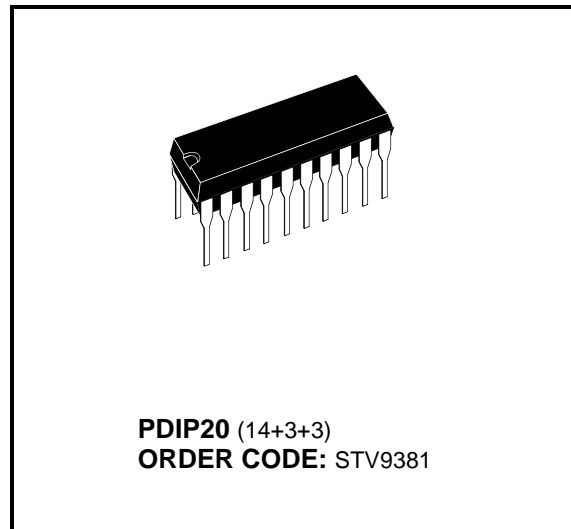


STV9381

CLASS-D VERTICAL DEFLECTION AMPLIFIER FOR TV AND MONITOR APPLICATION

FEATURES

- HIGH EFFICIENCY POWER AMPLIFIER
- NO HEATSINK
- SPLIT SUPPLY
- INTERNAL FLYBACK GENERATOR
- OUTPUT CURRENT UP TO 3 APP
- SUITABLE FOR DC COUPLING APPLICATION
- FEW EXTERNAL COMPONENTS
- PROTECTION AGAINST LOW V_{CC}

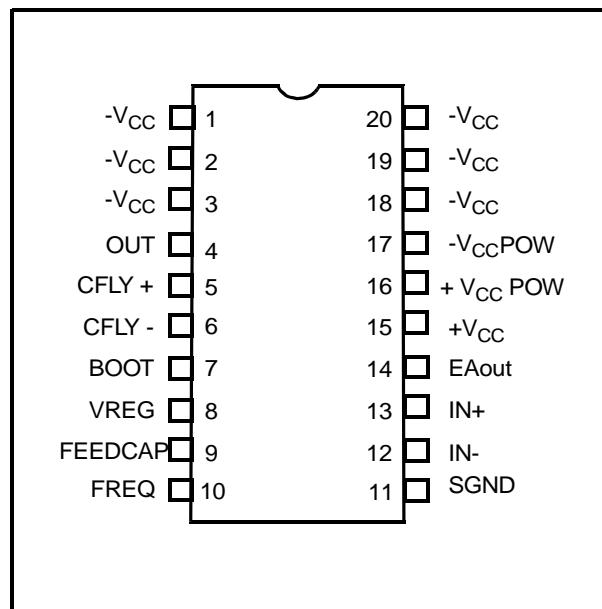


DESCRIPTION

Designed for monitors and TVs, the STV9381 is a class-D vertical deflection booster assembled in PDIP20 Package.

It operates with supplies up to +/- 18V, provides up to 3 App output current to drive the yoke. The internal flyback generator avoids the need for an extra power supply.

PIN CONNECTION



Version 3.0

1 PIN FUNCTIONS

| Pin Number | Name | Function |
|------------|--------------|-------------------------------------|
| 1 | $-V_{CC}$ | Negative supply |
| 2 | $-V_{CC}$ | Negative supply |
| 3 | $-V_{CC}$ | Negative supply |
| 4 | OUT | PWM Output |
| 5 | CFLY+ | Flyback capacitor |
| 6 | CFLY- | Flyback capacitor |
| 7 | BOOT | Bootstrap capacitor |
| 8 | VREG | Internal voltage regulator |
| 9 | FEEDCAP | Feed-back integrating capacitor |
| 10 | FREQ | Frequency setting resistor |
| 11 | SGND | Signal Ground |
| 12 | IN- | Error amplifier inverting input |
| 13 | IN+ | Error amplifier non-inverting input |
| 14 | EA out | Error amplifier output |
| 15 | $+V_{CC}$ | Positive supply |
| 16 | $+V_{CC}POW$ | Positive Power supply |
| 17 | $-V_{CC}POW$ | Negative Power supply |
| 18 | $-V_{CC}$ | Negative supply |
| 19 | $-V_{CC}$ | Negative supply |
| 20 | $-V_{CC}$ | Negative supply |

2 FUNCTIONAL DESCRIPTION

The STV9381 is a vertical deflection circuit operating in class D. The class D is a modulation method where the output transistors work in switching mode at high frequency. The output signal is restored by filtering the output square wave with an external LC filter. The major interest of this IC is the low power dissipation comparatively to traditional amplifiers operating in class AB, eliminating the need of a heatsink.

Except for the output stage which uses the class D modulation, the circuit operation is similar to the one of a traditional linear vertical amplifier.

A reference signal (sawtooth) has to be applied to the circuit which can accept a differential or single ended signal. This sawtooth is amplified and applied as a current to the deflection yoke. This current is measured by means of a low value resistor. The resulting voltage is used as a feed-back signal to guarantee the conformity of the yoke current with the reference input signal.

The overvoltage necessary for a fast retrace is obtained with a chemical capacitor charged at the power supply voltage of the circuit. At the flyback moment this capacitor is connected in series with the output stage power supply. This method, used for several years with the linear vertical boosters and called "internal flyback" or "flyback generator", avoids the need of an additional power supply, while reducing the flyback duration.

The circuit uses a BCD process that combines Bipolar, CMOS and DMOS devices. DMOS transistors are used in the output stage due to the absence of second breakdown.

Figure 1. Test and application circuit

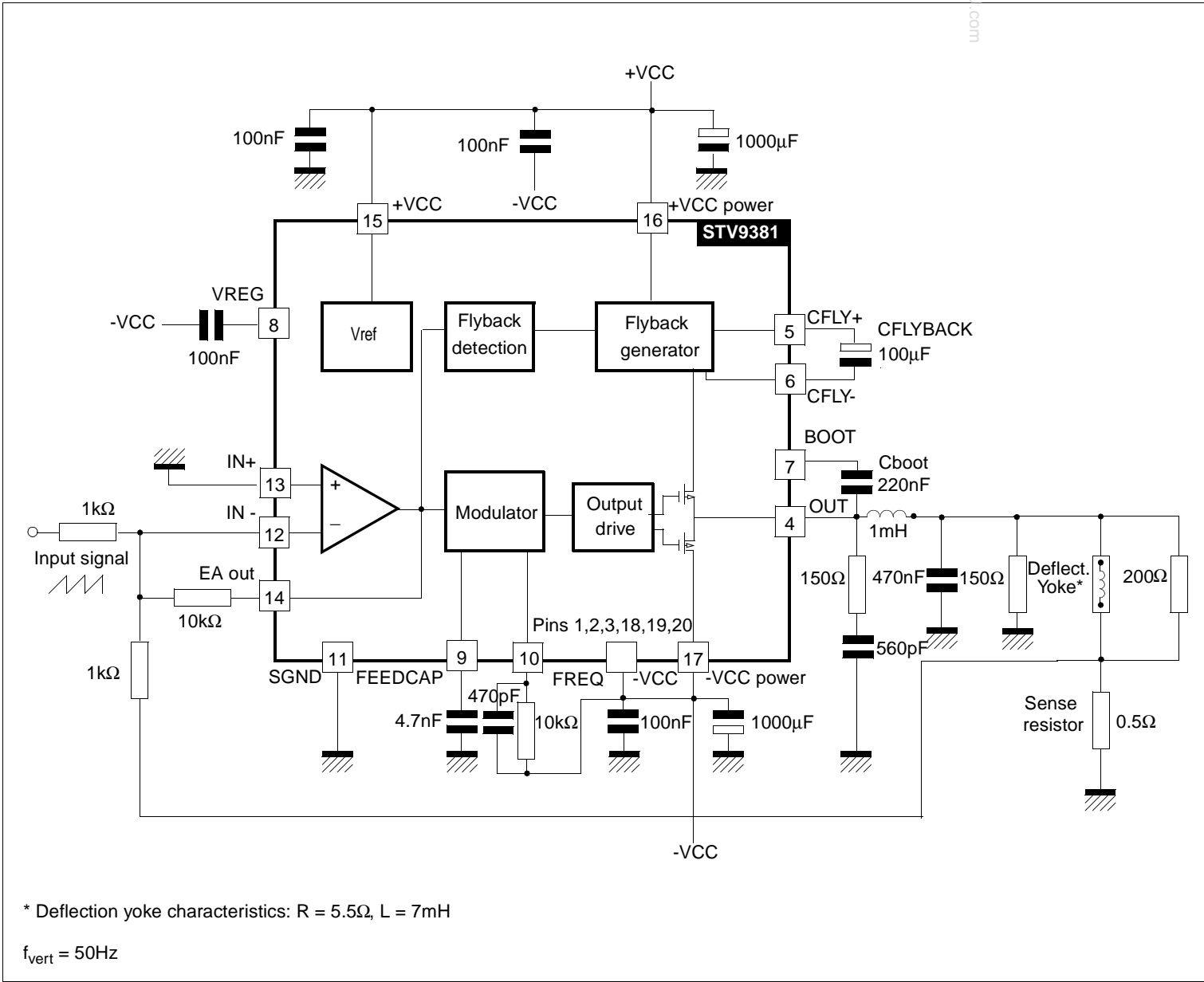
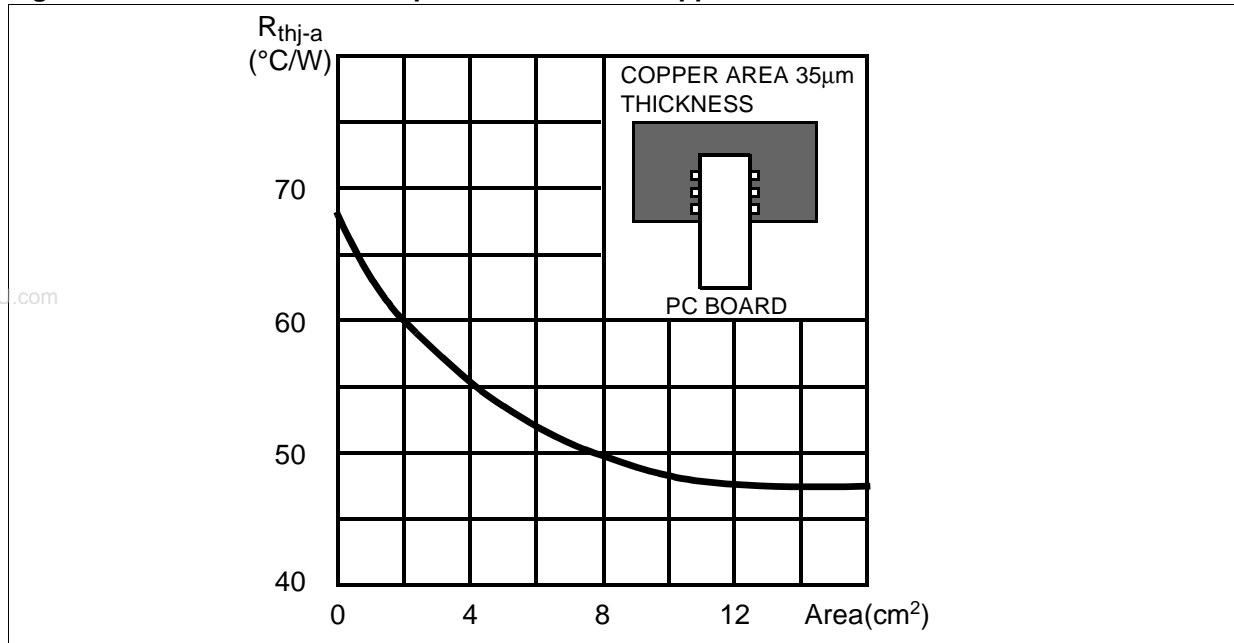


Figure 2. Rth with “on board” Square Heatsink vs. copper area



3 ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------------------------------|--|-------------|------|
| VCC | DC Supply Voltage | ±20 | V |
| T _{stg} , T _j | Storage and Junction Temperature | -40 to +150 | °C |
| T _{op} | Operating Temperature Range | 0 to +70 | °C |
| VESD | ESD Susceptibility - Human Body Model (100 pF discharge through 1.5 kΩ) | ±2 | kV |
| I _{out} | Output current | ±2 | A |
| V _{out} | Maximum output voltage (pin 4) with respect to -Vcc (pins 1, 2, 3, 18, 19, 20) and during flyback (see Note 1) | 80 | V |

Note: 1 During the flyback with Vcc=±18V, the maximum output voltage (pin 4) is close to 72V, with respect to -Vcc (pins 1, 2, 3, 18, 19, 20).

4 THERMAL DATA

| Symbol | Parameter | Value | Unit |
|-----------------------|--|-------|------|
| R _{th j-amb} | Thermal resistance Junction to ambient | 70 | °C/W |

Pins 1, 2, 3, 18, 19, 20 are internally connected together and participate to heat evacuation.

5 ELECTRICAL CHARACTERISTICS (refer to Figure 1 on page 3)

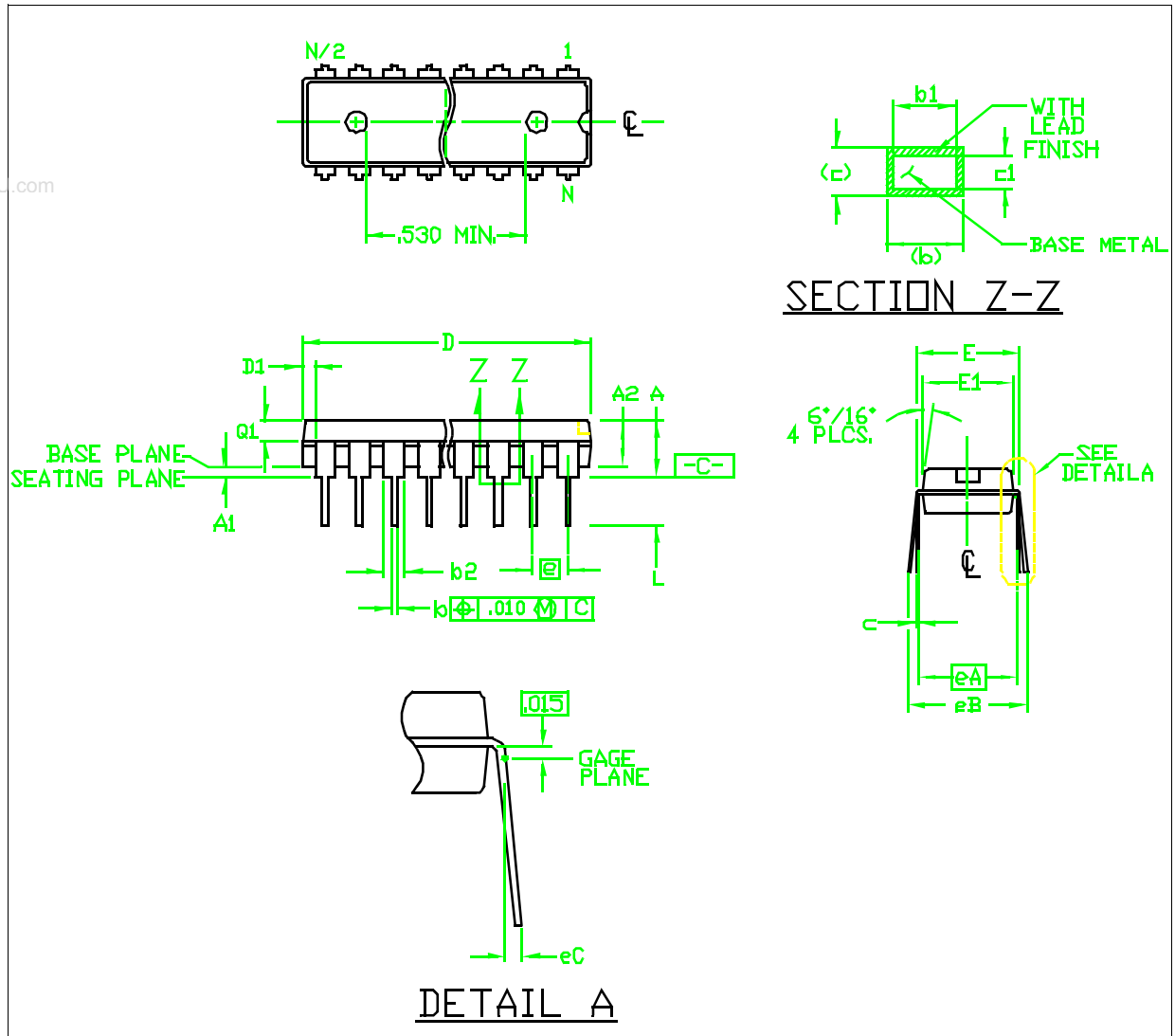
Tamb = 25°C unless otherwise specified, Vcc = ±12V, f_{vert}=50Hz

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|-----------------------------------|---|--------------------------|------|------|------|-------|
| +Vcc | Positive supply range | | +10 | | +18 | V |
| -Vcc | Negative supply range | | -18 | | -10 | V |
| ΔVcc | Maximum recommended difference between +Vcc and -Vcc | | | | ±4 | V |
| V _{cc_start} | Low Vcc detection | | | ±6.5 | | V |
| I _q | Quiescent supply current | Input voltage = 0 | | 14 | | mA |
| I _y | Maximum vertical yoke current | | | | ±1.5 | A |
| I ₁₃ , I ₁₂ | Amplifier Input bias current | | | -0.1 | | μA |
| V _{OS} | Output Offset voltage | Note 2 | -50 | | +50 | mV |
| SVR | Supply voltage rejection | Note 3 | | 82 | | dB |
| Fly _{thr} | Flyback detection threshold (positive slope) | V(14) | | 1.5 | | V |
| Fly _{thf} | Flyback detection threshold (negative slope) | V(14) | | 0.5 | | V |
| F _{sw} | Switching frequency | R _{freq} = 10kΩ | 120 | 140 | 160 | kHz |
| F _{sw - op} | Switching frequency operative range | | 100 | | 200 | kHz |
| R _{freq} | Frequency controller resistor range | Pin 10 | 7 | 10 | 14 | kΩ |

Note: 2 Input voltage = 0, measured after the filter (e.g. across the 470 nF filter capacitor)

Note: 3 Supply rejection of the positive or negative power supply. Vcc ripple =1Vpp, f=100Hz, measured on the sense resistor.

6 PACKAGE MECHANICAL DATA



| Dimensions | Millimeters | | | Inches | | | Notes |
|------------|-------------|--------|--------|--------|-------|-------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| A | | | 5.334 | | | 0.210 | 3 |
| A1 | 0.381 | | | 0.015 | | | 3 |
| A2 | 2.921 | 3.302 | 4.953 | 0.115 | 0.130 | 0.195 | |
| b | 0.381 | 0.457 | 0.559 | 0.015 | 0.018 | 0.022 | |
| b1 | 0.356 | 0.457 | 0.508 | 0.014 | 0.018 | 0.020 | |
| b2 | 1.397 | 1.524 | 1.651 | 0.055 | 0.060 | 0.065 | 8 |
| c | 0.203 | 0.254 | 0.305 | 0.008 | 0.010 | 0.012 | |
| c1 | 0.203 | 0.254 | 0.279 | 0.008 | 0.010 | 0.011 | |
| D | 26.035 | 26.162 | 26.289 | 1.025 | 1.030 | 1.035 | 4 |

| Dimensions | Millimeters | | | Inches | | | Notes |
|------------|-------------|-------|--------|--------|-------|-------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| D1 | 0.762 | 0.889 | 1.016 | 0.030 | 0.035 | 0.040 | 4 |
| E | 7.62 | | 8.255 | 0.300 | | 0.325 | 5 |
| E1 | 6.096 | 6.401 | 6.604 | 0.240 | 0.252 | 0.260 | 4 |
| e | | 2.54 | | | 0.100 | | |
| eA | | 7.62 | | | 0.300 | | 5 |
| eB | | | 10.922 | | | 0.430 | 6 |
| eC | 0.000 | | 1.524 | 0.000 | | 0.060 | 6 |
| L | 3.175 | | 3.429 | 0.125 | | 0.135 | 3 |
| N | 20 | | | 20 | | | 7 |
| Q1 | 1.397 | 1.524 | 1.651 | 0.055 | 0.060 | 0.065 | |

Note: 3 Dimensions A, A1 & L are measured with the package seated in JEDEC seating plane gauge GS-3

Note: 4 Dimensions D, D1 and E1 are to be measured at maximum material condition but do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.010 inch /0.254 mm

Note: 5 E and eA measured with the leads constrained to be perpendicular to datum -c-

Note: 6 eB and eC are measured at the lead tips with the leads unconstrained

Note: 7 N is the maximum of number of lead positions

Note: 8 b2 maximum dimension does not include DAMBAR protrusions. DAMBAR protrusions shall not exceed 0.010inch / 0.25mm

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