

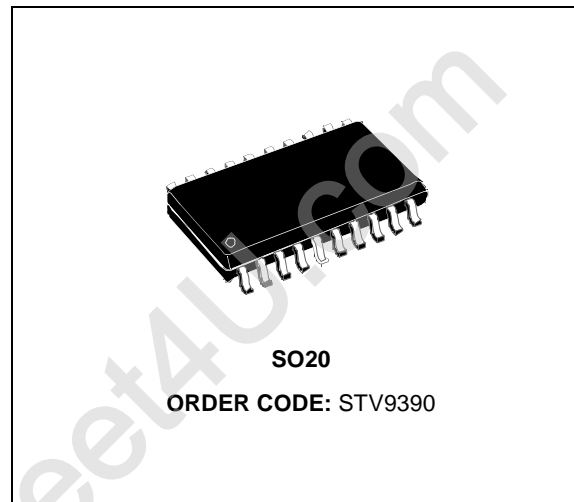


## STV9390

# 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 2.2 APP
- SUITABLE FOR DC COUPLING APPLICATION
- FEW EXTERNAL COMPONENTS
- PROTECTION AGAINST LOW  $V_{cc}$

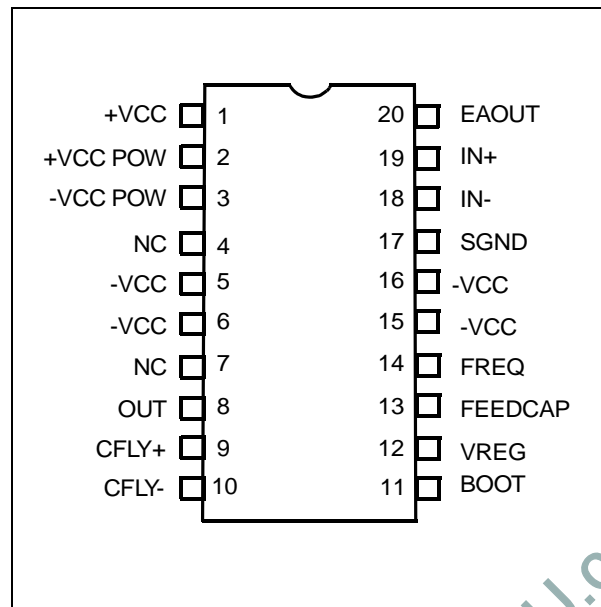


### DESCRIPTION

Designed for monitors and TVs, the STV9390 is a class-D vertical deflection booster assembled in SO20 Package.

It operates with supplies up to +/- 18V, provides up to 2.2 App output current to drive the yoke. The internal flyback generator avoids the need for an extra power supply.

### PIN CONNECTION



Version 2.0

## 1 PIN FUNCTIONS

Pin Number	Name	Function
1	+VCC	Positive supply
2	+VCCPOW	Positive power supply
3	-VCCPOW	Negative power supply
4	NC	Not connected
5	-VCC	Negative supply
6	-VCC	Negative supply
7	NC	Not connected
8	OUT	PWM output
9	CFLY+	Flyback capacitor
10	CFLY-	Flyback capacitor
11	BOOT	Bootstrap capacitor
12	VREG	Internal voltage regulator
13	FEEDCAP	Feed-back integrating capacitor
14	FREQ	Frequency setting resistor
15	-VCC	Negative supply
16	-VCC	Negative supply
17	SGND	Signal ground
18	IN-	Error amplifier inverting input
19	IN+	Error amplifier non-inverting input
20	EAOUT	Error amplifier output

## 2 FUNCTIONAL DESCRIPTION

The STV9390 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 an 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.

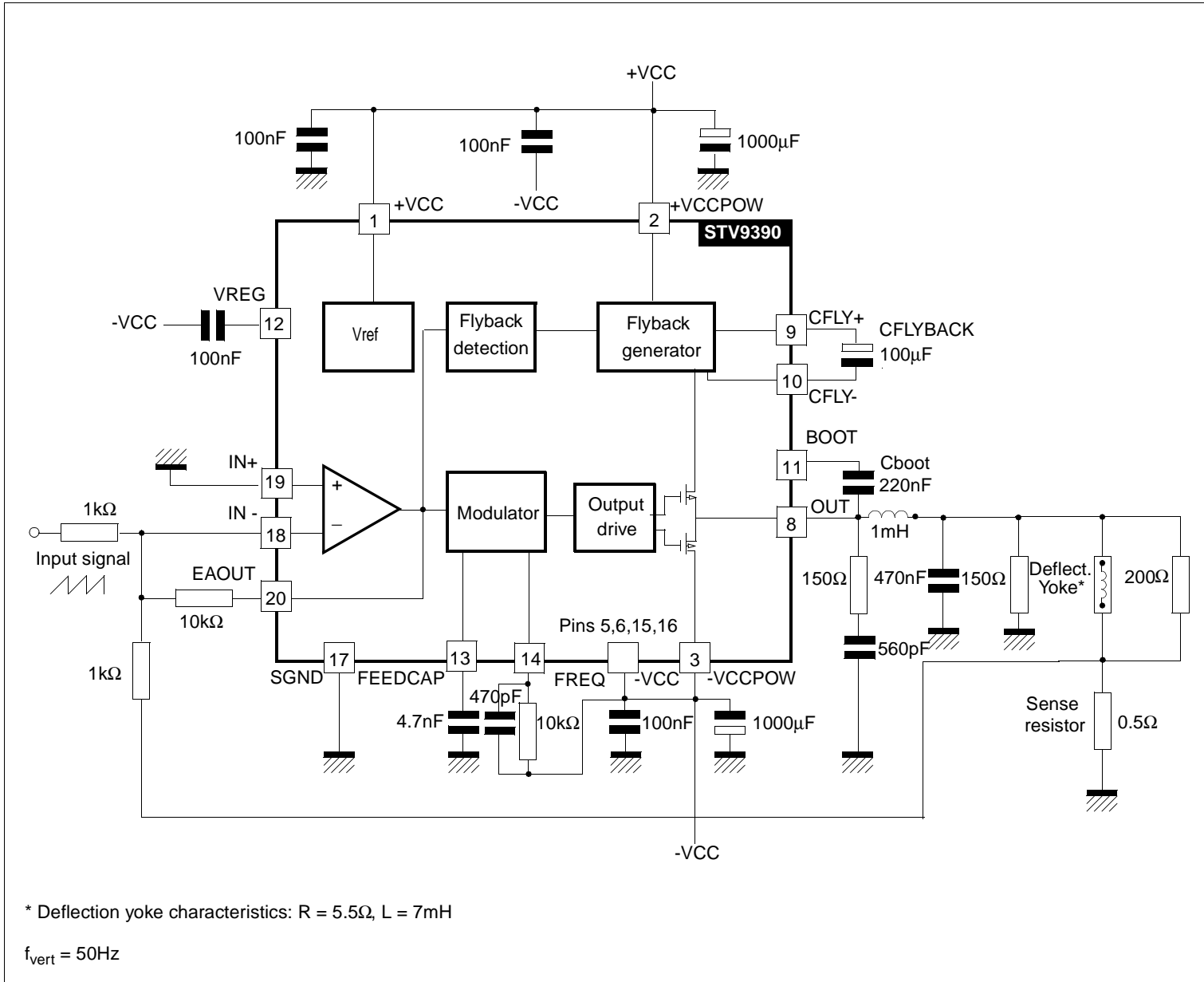


Figure 1. Test and Application Circuit

### 3 ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
VCC	DC Supply Voltage	±20	V
T <sub>stg</sub> , T <sub>j</sub>	Storage and Junction Temperature	-40 to +150	°C
T <sub>op</sub>	Operating Temperature Range	0 to +70	°C
VESD	ESD Susceptibility - Human Body Model (100 pF discharge through 1.5 kΩ)	±2	kV
I <sub>out</sub>	Output current	±1.6	A
V <sub>out</sub>	Maximum output voltage (pin 8) with respect to -V <sub>cc</sub> (pins 5, 6, 15, 16) and during flyback (see <a href="#">Note 1</a> )	80	V

Note: 1 During the flyback with V<sub>cc</sub>=±18V, the maximum output voltage (pin 8) is close to 72V, with respect to -V<sub>cc</sub> (pins 5, 6, 15, 16).

### 4 THERMAL DATA

Symbol	Parameter	Value	Unit
R <sub>th j-amb</sub>	Thermal resistance Junction to ambient	78	°C/W

Pins 5, 6, 15, 16 are internally connected together and participate to heat evacuation.

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

T<sub>amb</sub> = 25°C unless otherwise specified, V<sub>cc</sub> = ±12V, f<sub>vert</sub>=50Hz

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
+V <sub>cc</sub>	Positive supply range		+10		+18	V
-V <sub>cc</sub>	Negative supply range		-18		-10	V
ΔV <sub>cc</sub>	Maximum recommended difference between +V <sub>cc</sub> and  -V <sub>cc</sub>				±4	V
V <sub>cc_start</sub>	Low V <sub>cc</sub> detection			±6.5		V
I <sub>q</sub>	Quiescent supply current	Input voltage = 0		14		mA
I <sub>y</sub>	Maximum vertical yoke current	<a href="#">Note 2</a>			±1.1	A
I <sub>13</sub> , I <sub>12</sub>	Amplifier Input bias current			-0.1		μA
V <sub>OS</sub>	Output Offset voltage	<a href="#">Note 3</a>	-50		+50	mV
SVR	Supply voltage rejection	<a href="#">Note 4</a>		82		dB
Fly <sub>thr</sub>	Flyback detection threshold (positive slope)	V(20)		1.5		V
Fly <sub>thf</sub>	Flyback detection threshold (negative slope)	V(20)		0.5		V
P <sub>d</sub>	Integrated circuit Dissipated power	<a href="#">Note 5</a>		0.9		W
F <sub>sw</sub>	Switching frequency	R <sub>freq</sub> = 10kΩ	120	140	160	kHz
F <sub>sw - op</sub>	Switching frequency operative range		100		200	kHz
R <sub>freq</sub>	Frequency controller resistor range	Pin 14	7	10	14	kΩ

*Note:* 2 The maximum vertical yoke current is dependent on ±V<sub>CC</sub>. The maximum current as function of ±V<sub>CC</sub> is given in [Table 1](#)

*Note:* 3 Input voltage = 0, measured after the filter (e.g. across the 470 nF filter capacitor)

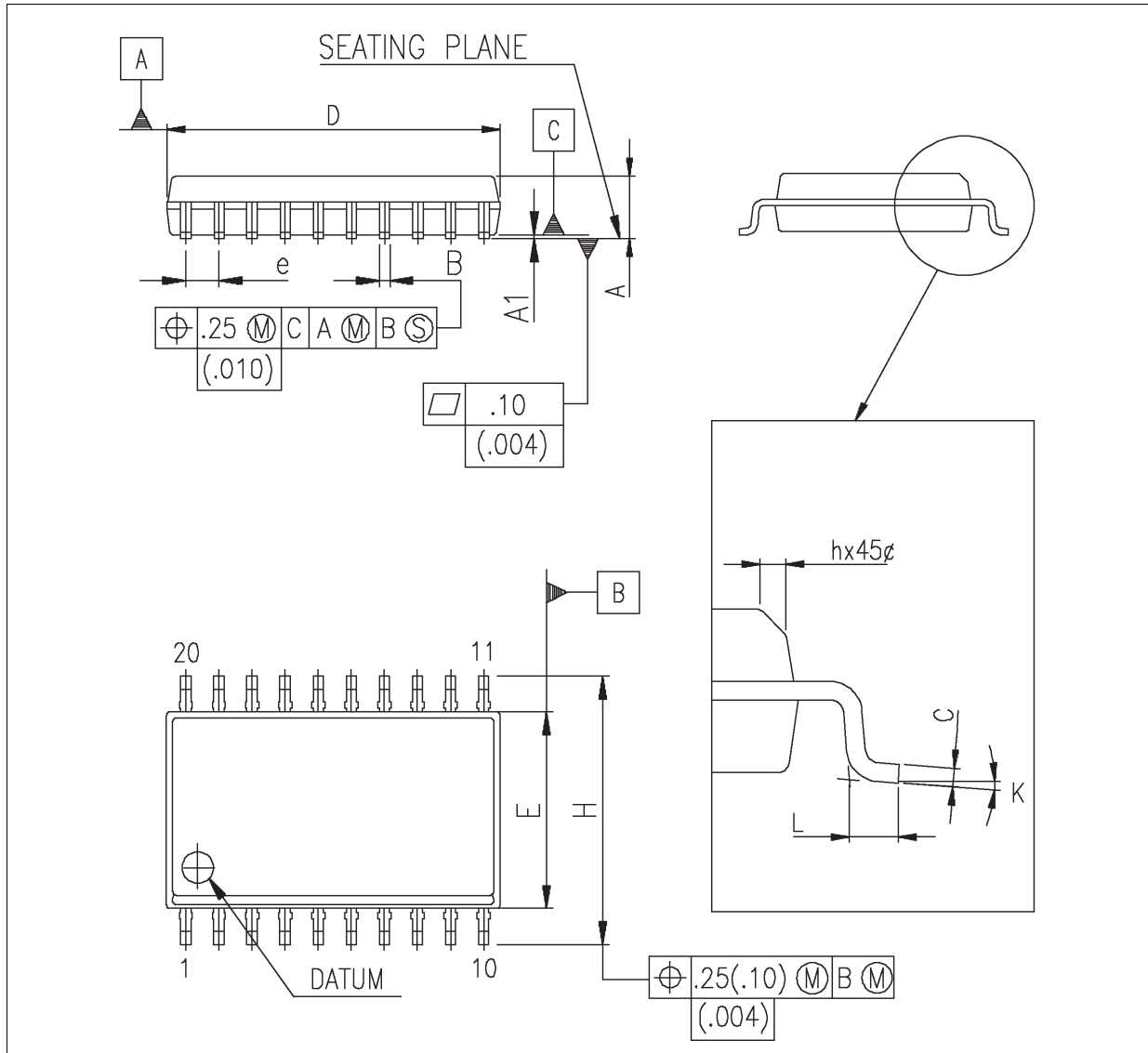
*Note:* 4 Supply rejection of the positive or negative power supply. V<sub>cc</sub> ripple = 1V<sub>pp</sub>, f = 100Hz, measured on the sense resistor.

*Note:* 5 Power dissipated in the circuit in the case of the application from [Figure 1](#) and the current in the deflection yoke adjusted to 2.2A<sub>pp</sub>. The corresponding power dissipated in the vertical deflection yoke is 2.25W.

**Table 1. Maximum yoke current as function of ±V<sub>CC</sub>**

Symbol						Unit
±V <sub>CC</sub>	±10 to 14	±15	±16	±17	±18	V
I <sub>y</sub>	±1.1	±1.05	±1.0	±0.95	±0.85	A

6 PACKAGE MECHANICAL DATA



	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.35		2.65	0.96		0.100
A1	0.10		0.30	0.004		0.012
B	0.33		0.51	0.015		0.019
C	0.23		0.32	0.009		0.013
D	12.6		13.00	0.504		0.52
E	7.40		7.60	0.296		0.304
e		1.27			0.051	
H	10.00		10.65	0.400		0.426
h	0.25		0.75	0.01		0.03
L	0.40		1.27	0.016		0.051
K	0°		8°			

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