TDA1470

# LINEAR INTEGRATED CIRCUIT

## TV VERTICAL DEFLECTION SYSTEM

The TDA 1470 is a monolitic integrated circuit in a 16-lead dual in-line plastic package with or without external bar. It is intended for direct driving of colour TV yokes, but it offers a wide application range also in BW TVs, monitors and displays.
The functions incorporated are:

- Synchronization circuit
- Oscillator and ramp generator
- Power amplifier with high current capability
- Flyback generator
- Voltage regulator

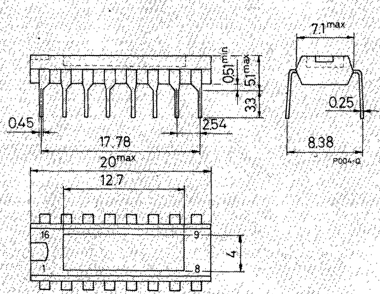
## ABSOLUTE MAXIMUM RATINGS

| | | | |
|---|---|---|---|
| $V_s$ | Supply voltage at pin 3 | 35 | V |
| $V_{14}, V_{16}$ | Flyback peak voltage | 60 | V |
| $V_7, V_8$ | Power amplifier input voltage | +10 | V |
| | | -0.5 | V |
| $I_o$ | Output peak current (non repetitive) at $t = 2$ ms | 3 | A |
| $I_o$ | Output peak current at $f = 50$ Hz, $t \leq 10\ \mu s$ | 3.5 | A |
| $I_o$ | Output peak current at $f = 50$ Hz, $t > 10\ \mu s$ | 2 | A |
| $I_2$ | Pin 2 D.C. current at $V_{16} < V_3$ | 100 | mA |
| $I_2$ | Pin 2 peak to peak flyback current for $f = 50$ Hz, $t_{fly} \leq 1.5$ ms | 3 | A |
| $I_{11}$ | Pin 11 current | 20 | mA |
| $P_{tot}$ | Maximum power dissipation at $T_{case} \leq 75°C$ | 25 | W |
| $T_{stg}, T_j$ | Storage and junction temperature | -40 to 150 | °C |

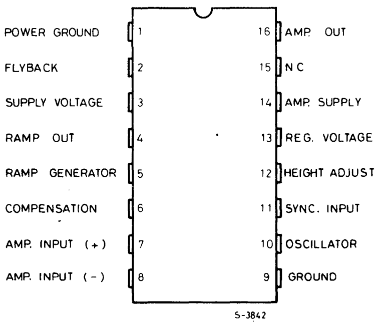
**ORDERING NUMBER:** TDA 1470

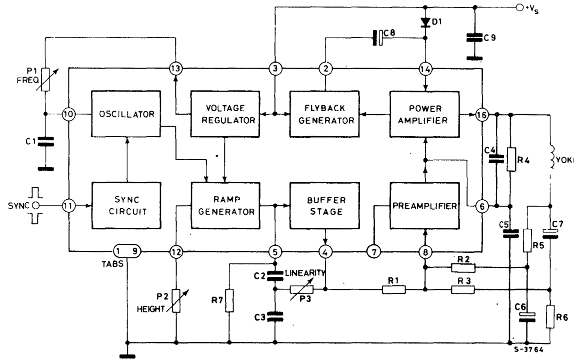
## MECHANICAL DATA

Dimensions in mm



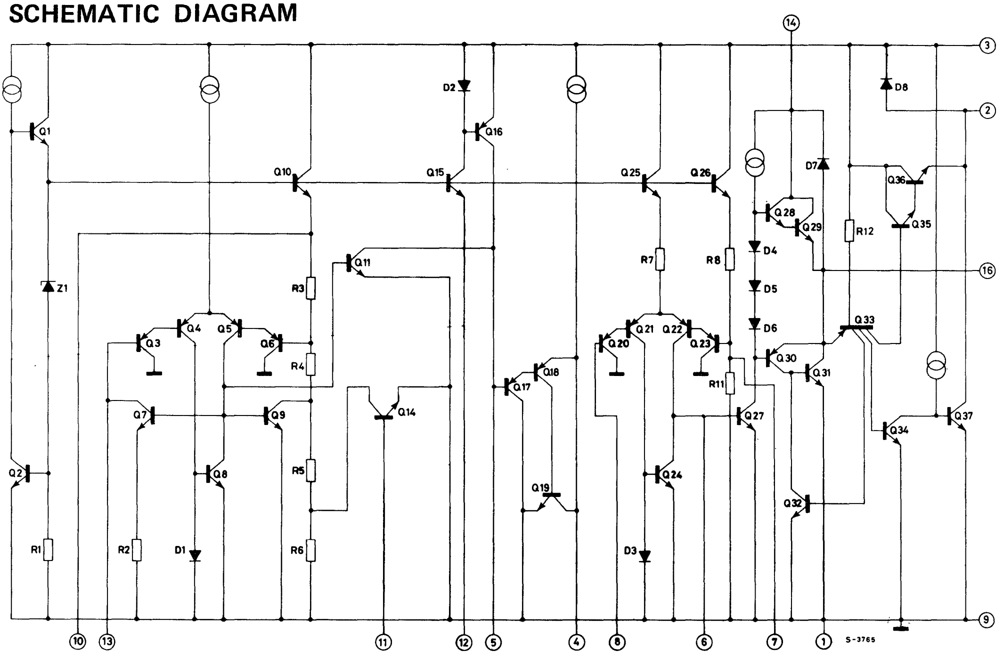
## CONNECTION AND BLOCK DIAGRAMS
(top view)




The copper slug is electrically connected to pin 9 (substrate)

## SCHEMATIC DIAGRAM



## THERMAL DATA

| | | | | |
|---|---|---|---|---|
| $R_{th\ j\text{-}case}$ | Thermal resistance junction-case | max | 3 | °C/W |

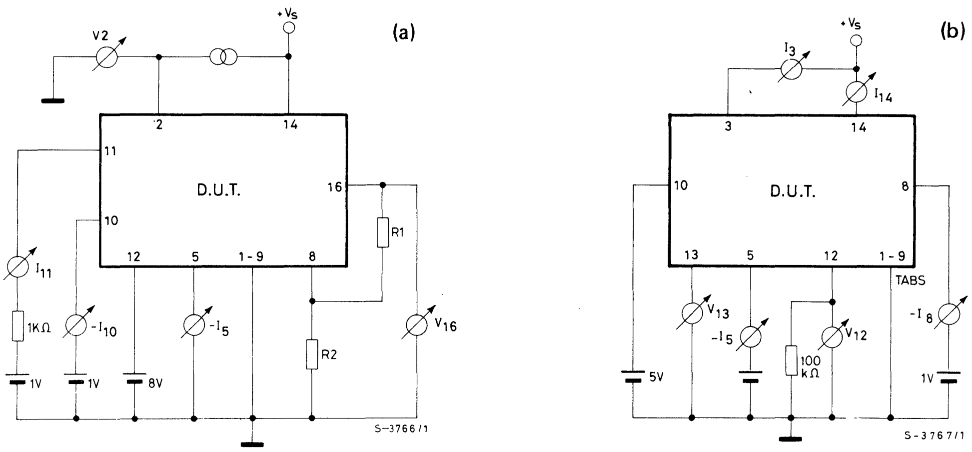
## DC ELECTRICAL CHARACTERISTICS (Refer to the DC test circuits, $V_s = 35V$, $T_{amb} = 25°C$, unless otherwise specified)

| | Parameter | Test conditions | Min. | Typ. | Max. | Unit | Fig. |
|---|---|---|---|---|---|---|---|
| $I_3$ | Pin 3 quiescent current | $I_2 = 0$ | | 7 | | mA | 1b |
| $I_{14}$ | Pin 14 quiescent current | $I_{16} = 0$ | | 10 | | mA | 1b |
| $-I_{10}$ | Oscillator bias current | $V_{10} = 1V$ | | 0.1 | | μA | 1a |
| $-I_8$ | Amplifier input bias current | $V_8 = 1V$ | | 1 | | μA | 1b |
| $-I_5$ | Ramp generator bias current | $V_5 = 0V$ | | 0.02 | | μA | 1a |
| $-I_5$ | Ramp generator current | $V_5 = 0V$ $I_{12} = 20\ \mu A$ | | 20 | | μA | 1b |
| $\frac{\Delta I_5}{I_5}$ | Ramp generator linearity | $\Delta V_5 = 0$ to $12V$ $I_{12} = 20\ \mu A$ | | 0.2 | 1 | % | 1b |
| $V_s$ | Supply voltage range(pin 3) | | 10 | | 35 | V | – |
| $V_4$ | Pin 4 saturation voltage to ground | $I_4 = 1\ mA$ | | 1 | 1.4 | V | – |
| $V_2$ | Pin 2 saturation voltage to ground | $I_2 = 10\ mA$ | | 0.5 | | V | 1a |
| $V_{16}$ | Quiescent output voltage | $V_s = 10V$ $R_1 = 10K\Omega$ $R_2 = 10\ K\Omega$ | 4.15 | 4.45 | 4.73 | V | 1a |
| | | $V_s = 35V$ $R_1 = 30\ K\Omega$ $R_2 = 10\ K\Omega$ | 8.3 | 8.9 | 9.45 | V | 1a |
| $V_{16L}$ | Output saturation voltage to ground | $-I_{16} = 0.8A$ | | 1.3 | | V | 1c |
| | | $-I_{16} = 1.5A$ | | 1.7 | | V | 1c |

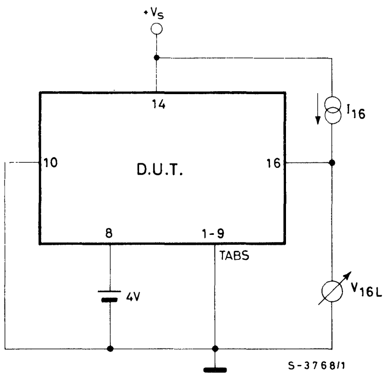
## D.C. ELECTRICAL CHARACTERISTICS (continued)

| Parameter | | Test conditions | Min. | Typ. | Max. | Unit | Fig. |
|---|---|---|---|---|---|---|---|
| $V_{16H}$ | Output saturation voltage to supply | $I_{16}$= 0.8A | | 1.9 | | V | 1d |
| | | $I_{16}$= 1.5A | | 2.3 | | V | 1d |
| $V_{13}$ | Regulated voltage at pin 13 | | 6.1 | 6.5 | 6.9 | V | 1b |
| $V_{12}$ | Regulated voltage at pin 12 | $I_{12}$= 20 $\mu$A | 6.2 | 6.5 | 7 | V | 1b |
| $\frac{\Delta V_{13}}{\Delta V_s}$; $\frac{\Delta V_{12}}{\Delta V_s}$ | Regulated voltages drift | $\Delta V_s$= 10 to 35V | | 1 | | mV/V | 1b |
| $V_7$ | Amplifier input reference voltage | | 2.07 | 2.2 | 2.3 | V | |

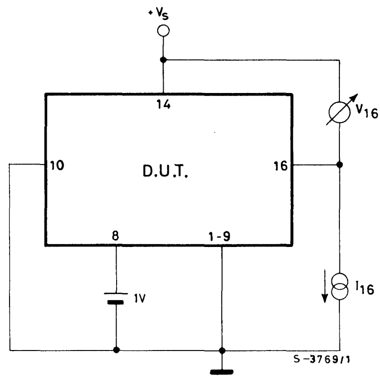
Fig. 1 - DC test circuits



(c)




(d)




**AC ELECTRICAL CHARACTERISTICS** (Refer to the AC test circuit f = 50 Hz, $V_s$ = 24V, unless otherwise specified)

| | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_s$ | Operating supply voltage | $I_{y\,max}$= 2.2 App | | 24 | | V |
| $I_s$ | Supply current | $I_y$ = 2 App | | 270 | | mA |
| $I_{11}$ | Sync. input current | | 500 | | | $\mu$A |
| $V_{16}$ | Flyback voltage | $I_y$ = 2 App | | 49 | | V |
| $V_{10}$ | Peak to peak oscillator sawtooth voltage | | | 2.4 | | V |
| $t_{fly}$ | Flyback time | $I_y$ = 2 App | | 0.6 | | ms |
| $f_o$ | Free running frequency | $R_1+P_1$ = 300 K$\Omega$<br>$C_2$ = 100 nF | | 44 | | Hz |
| | | $R_1+P_1$ = 260 K$\Omega$<br>$C_2$ = 100 nF | | 52 | | Hz |
| $\Delta f$ | Synchronization range | $I_{11}$= 500 $\mu$A | 14 | | | Hz |
| $\frac{\Delta f}{\Delta V_s}$ | Frequency drift vs. supply voltage | $V_s$= 10 to 35V | | 0.005 | | Hz/V |
| $\frac{\Delta f}{\Delta T_{tab}}$ | Frequency drift vs. tab temperature | $T_{amb}$= 40 to 120 °C | | 0.01 | | Hz/°C |

Fig. 2 - AC Test circuit

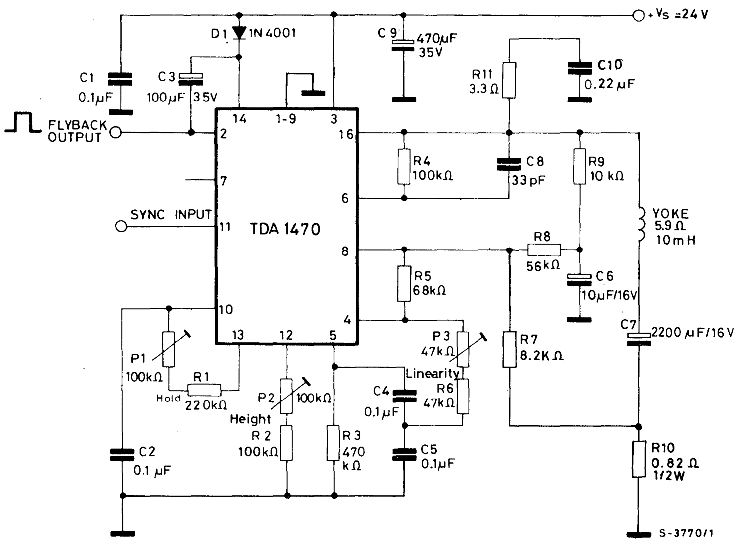



Fig. 3 - Relative output voltage drift vs. supply voltage

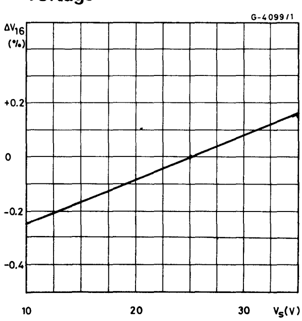



Fig. 4 - Relative output voltage drift vs. case temperature

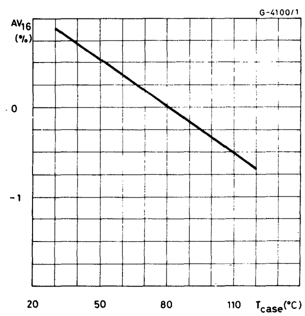



Fig. 5 - Output saturation voltage vs. output current

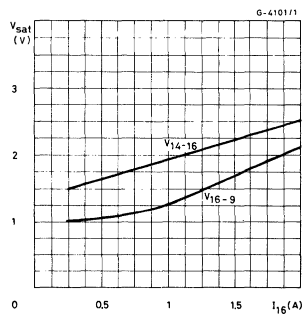
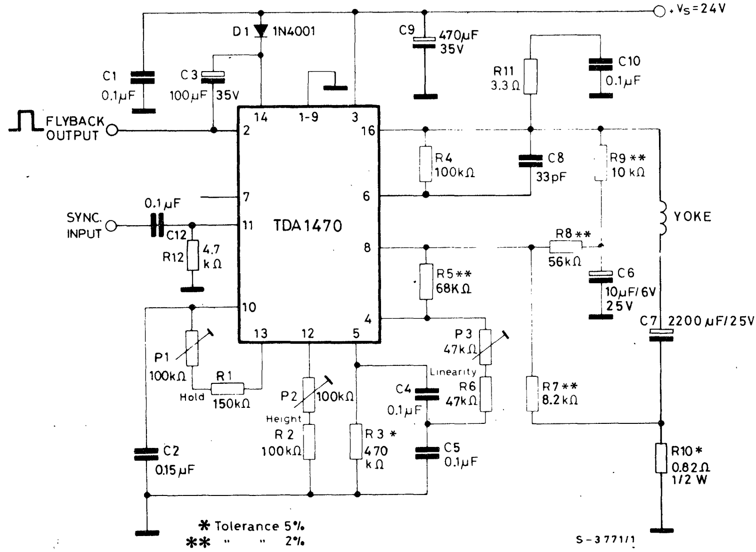


Fig. 6 - Application circuit for large screen 110° TVC set ($R_y$ = 5.9Ω; $L_y$ = 10 mH; $I_y$ = 1.95 App)

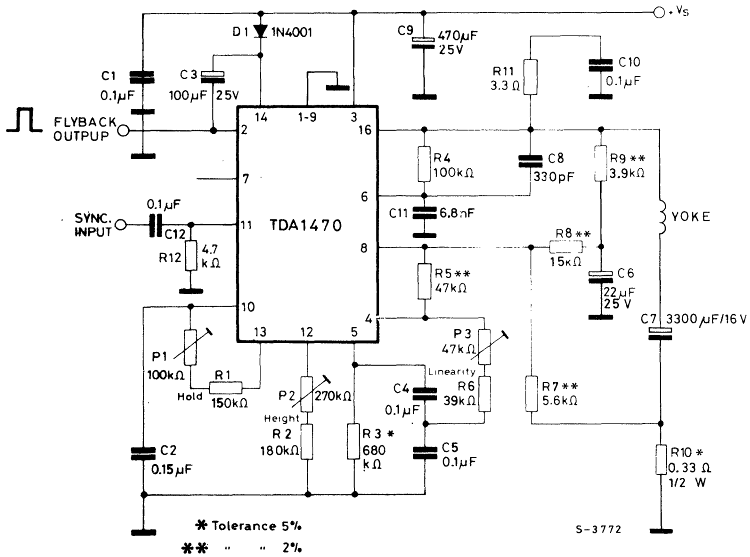



## Typical performance

| | | | |
|---|---|---|---|
| $V_s$. | Operating supply voltage | 24 | V |
| $I_s$ | Supply current | 300 | mA |
| $t_{fly}$ | Flyback time | 0.7 | ms |
| $P_d$ | TDA 1470 power dissipation | 4 | W |
| $I_y$ | Maximum scanning current | 2.3 | App |

For safe operation up to $T_{amb}$ = 60°C a heatsink of $R_{th}$ = 7°C/W is required.

Fig. 7 - Application circuit for PIL 26" -110° parallel connected ($R_y$ = 2.5Ω ; $L_y$ = 6.6 mH; $I_y$ = 2.36 App)

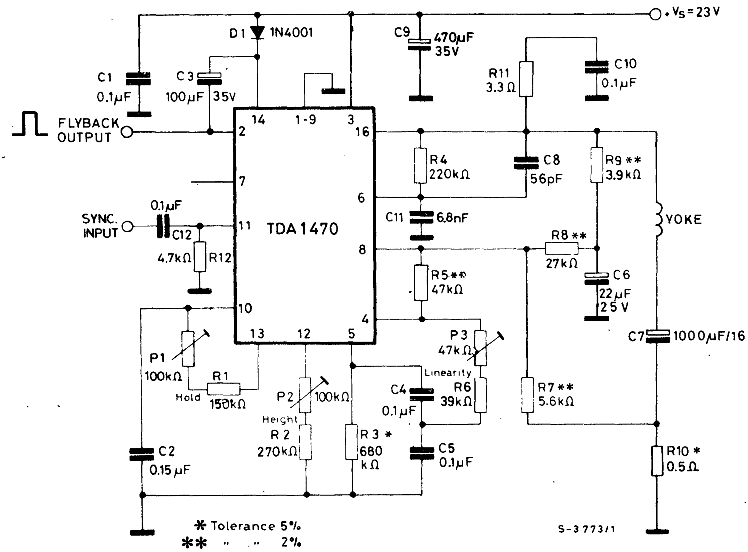



## Typical performance

| | | | |
|---|---|---|---|
| $V_s$ | Operating supply voltage | 16 | V |
| $I_s$ | Supply current | 345 | mA |
| $t_{fly}$ | Flyback time | 0.85 | ms |
| $P_d$ | TDA 1470 power dissipation | 3.5 | W |
| $I_y$ | Maximum scanning current | 2.5 | App |

For safe operation up to $T_{amb}$ = 60°C a heatsink of $R_{th}$ = 8 °C/W is required.

Fig. 8 - Application circuit for PIL 26" -110° series connected ($R_y = 9.7\Omega$; $L_y = 26.4$ mH; $I_y = 1.18$ App)

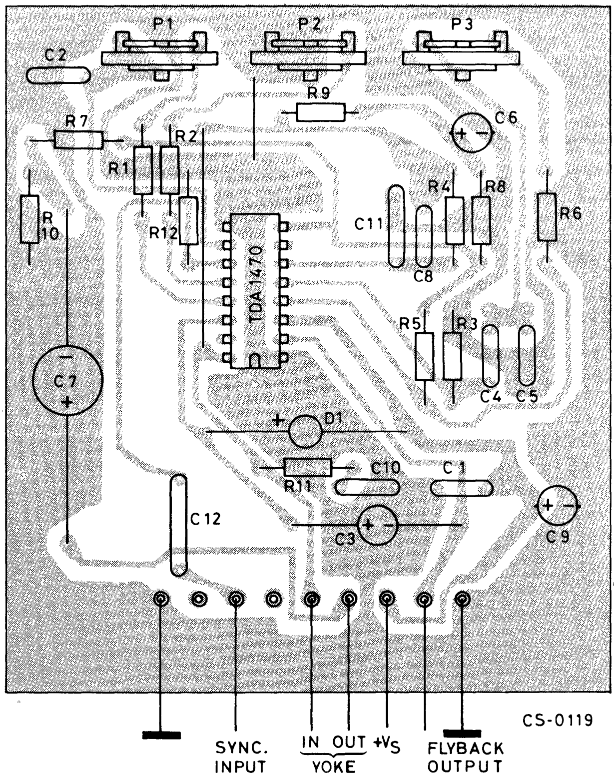



## Typical performance

| | | | |
|---|---|---|---|
| $V_s$ | Operating supply voltage | 23 | V |
| $I_s$ | Supply current | 185 | mA |
| $t_{fly}$ | Flyback time | 1 | ms |
| $P_d$ | TDA 1470 power dissipation | 2.8 | W |
| $I_y$ | Maximum scanning current | 1.4 | App |

For safe operation up to $T_{amb} = 60°C$ a heatsink of $R_{th} = 10$ °C/W is required.

Fig. 9 - P.C. board and component layout (Application circuits of fig. 6, 7 and 8)




## MOUNTING INSTRUCTIONS

The power dissipated in the circuit must be removed by adding an external heatsink as shown in fig. 10. The system for attaching the heatsink is very simple; it uses a plastic spacer which is supplied with the device on request (TDA 1470 F2).
Thermal contact between the copper slug (of the package) and the heatsink is guaranteed by the pressure which the screws exert via the printed circuit board; this is due to the particular shape of the spacer.

Note: The most negative supply voltage is connected to the copper slug, hence to the heatsink (because it is in contact with the slug).

Fig. 10 - Mounting system example (TDA 1470)