

## VERTICAL DEFLECTION CIRCUIT

### GENERAL DESCRIPTION

The TDA2655B is a monolithic integrated circuit for vertical deflection in colour television receivers with 90° picture tubes.

### Features

- Synchronization circuit
- Vertical oscillator; 50/60 Hz switch
- Sawtooth generator with buffer stage
- Preamplifier with fed-out inputs
- Output stage with thermal and short-circuit protection
- Flyback generator
- Blanking pulse generator with guard circuit
- Voltage stabilizer
- Frequency detector with memory and storage

### QUICK REFERENCE DATA

For 90° deflection; measured with respect to cooling fin (ground)

|                                                       |                     |      | concept 1* | concept 2* |    |
|-------------------------------------------------------|---------------------|------|------------|------------|----|
| System supply voltages                                | V <sub>P1</sub>     | typ. | 22         | 22         | V  |
|                                                       | V <sub>P2</sub>     | typ. | 12         | —          | V  |
| System supply currents                                | I <sub>P1</sub>     | typ. | 135        | 140        | mA |
|                                                       | —I <sub>P2</sub>    | typ. | 8          | —          | mA |
| Deflection current<br>(peak-to-peak value)            | I <sub>g(p-p)</sub> | typ. | 450        | 450        | mA |
| Synchronization input voltage<br>(peak-to-peak value) | V <sub>5(p-p)</sub> | min. | 1          | 1          | V  |

\*Concept 1: with two supply voltages ; concept 2: with one supply voltage. (See also Figs 2 and 3).

### PACKAGE OUTLINE

12-lead DIL; plastic with metal cooling fin (SOT150).



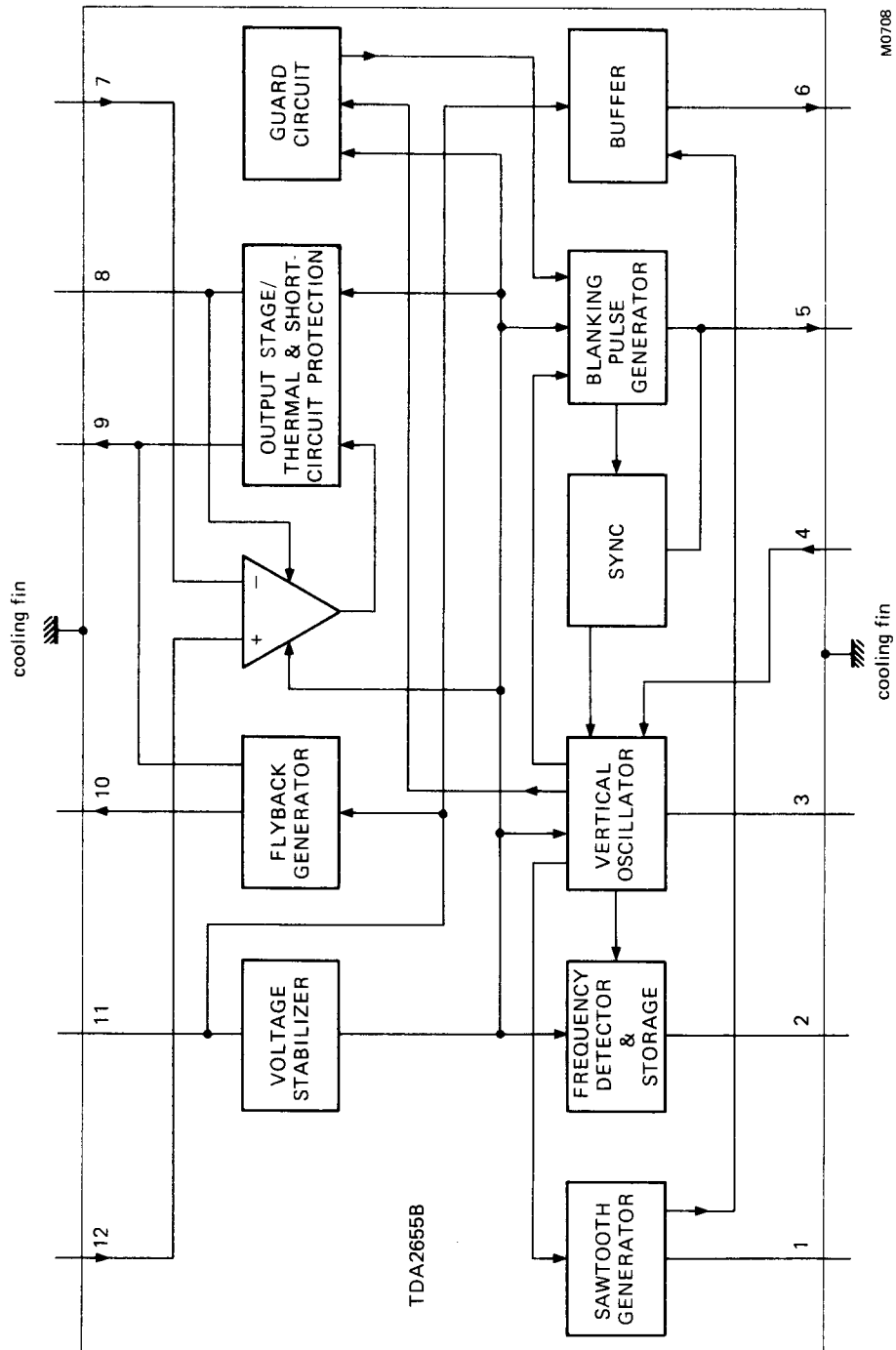


Fig. 1 Block diagram.

**RATINGS**

Limiting values in accordance with the Absolute Maximum System (IEC134)

**Voltages**

with respect to cooling fin (ground)

|                                     |                |      |    |   |
|-------------------------------------|----------------|------|----|---|
| Supply voltage (pin 11)             | $V_{11} = V_p$ | max. | 40 | V |
| Supply voltage output stage (pin 8) | $V_8$          | max. | 60 | V |
| Pin 9                               | $V_9$          | max. | 60 | V |
|                                     | $-V_9$         | max. | 0  | V |
| Pin 10                              | $V_{10}$       | max. | 40 | V |
| Pin 3                               | $V_3$          | max. | 7  | V |
| Pin 1                               | $V_1$          | max. | 40 | V |
| Pin 6                               | $V_6$          | max. | 7  | V |
| Pins 7 and 12                       | $V_7; V_{12}$  | max. | 24 | V |

**Currents**

|                              |                                                            |      |     |    |
|------------------------------|------------------------------------------------------------|------|-----|----|
| Pin 10                       | $I_{10}$                                                   | max. | 1,2 | A  |
|                              | $-I_{10}$                                                  | max. | 1,5 | A  |
| Pin 5                        | $\pm I_5$                                                  | max. | 10  | mA |
| Pin 2                        | $I_2$                                                      | max. | 3   | mA |
| Pin 1                        | $I_1$                                                      | max. | 50  | mA |
|                              | $-I_1$                                                     | max. | 0,1 | mA |
| Pin 6                        | $-I_6$                                                     | max. | 5   | mA |
| Pin 4                        | $-I_4$                                                     | max. | 1   | mA |
| Pin 8, pin 9 and cooling fin | internally limited by the short-circuit protection circuit |      |     |    |

**Temperatures**

|                                     |                                                            |                         |  |  |
|-------------------------------------|------------------------------------------------------------|-------------------------|--|--|
| Total power dissipation             | internally limited by the short-circuit protection circuit |                         |  |  |
| Storage temperature range           | $T_{stg}$                                                  | -55 to +150 °C          |  |  |
| Operating ambient temperature range | $T_{amb}$                                                  | 0 °C to limiting values |  |  |

**PINNING**

| pin number | function                              | pin number | function                        |
|------------|---------------------------------------|------------|---------------------------------|
| 1.         | sawtooth capacitor                    | 7.         | feedback input                  |
| 2.         | frequency storage information         | 8.         | positive supply of output stage |
| 3.         | oscillator capacitor                  | 9.         | output                          |
| 4.         | oscillator resistor (adjustment)      | 10.        | flyback generator output        |
| 5.         | synchronization input/blanking output | 11.        | positive supply ( $V_p$ )       |
| 6.         | sawtooth buffer stage output          | 12.        | preamplifier input              |

**CHARACTERISTICS**

$V_P = 22\text{ V}$ ;  $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ ; these characteristics are measured with respect to cooling fin (ground), unless otherwise specified.

| parameter                                                                                         | symbol                                | min.          | typ.          | max. | unit            |
|---------------------------------------------------------------------------------------------------|---------------------------------------|---------------|---------------|------|-----------------|
| <b>Supply voltage/output stage</b>                                                                |                                       |               |               |      |                 |
| Supply voltage                                                                                    | $V_{11} = V_P$                        | 9             | —             | 30   | V               |
| Output voltage<br>at $I_g = 0,75\text{ A}$                                                        | $V_g$                                 | —             | 1,2           | 1,4  | V               |
| at $-I_g = 0,75\text{ A}$                                                                         | $V_g$                                 | $(V_P - 1,9)$ | $(V_P - 1,7)$ | —    | V               |
| Flyback generator output voltage<br>at $I_{10} = 0,75\text{ A}$                                   | $V_{10}$                              | —             | $(V_P - 2,0)$ | —    | V               |
| Supply currents (without load)                                                                    |                                       |               |               |      |                 |
| pin 11                                                                                            | $I_{11}$                              | —             | 10            | —    | mA              |
| pin 8                                                                                             | $I_8$                                 | —             | 3             | —    | mA              |
| Output current                                                                                    | $\pm I_g$                             | —             | —             | 1,2  | A               |
| Flyback generator peak current                                                                    | $\pm I_{10}$                          | —             | —             | 1,2  | A               |
| <b>Feedback</b>                                                                                   |                                       |               |               |      |                 |
| Preamplifier quiescent input<br>currents                                                          | $-I_7 = -I_{12}$                      | —             | 0,1           | —    | $\mu\text{A}$   |
| <b>Synchronization</b>                                                                            |                                       |               |               |      |                 |
| Sync input voltage range                                                                          | $V_5$                                 | 1,0           | —             | —    | V               |
| Synchronizing range                                                                               |                                       | —             | 28            | —    | %               |
| <b>Oscillator/sawtooth generator</b>                                                              |                                       |               |               |      |                 |
| Frequency setting input voltage                                                                   | $V_4$                                 | 6             | —             | 9    | V               |
| Sawtooth generator output voltage<br>(peak value)                                                 | $V_{1(m)}$                            | 0             | $(V_P - 2)$   | —    | V               |
| Sawtooth generator output current                                                                 | $I_1$                                 | —             | —             | 30   | mA              |
| Sawtooth generator leakage current                                                                | $-I_1$                                | 2             | —             | —    | $\mu\text{A}$   |
| Oscillator temperature dependency<br>$T_{\text{case}} = 20\text{ to }100\text{ }^{\circ}\text{C}$ | $(\Delta f/f)/\Delta T_{\text{case}}$ | —             | $10^{-4}$     | —    | $\text{K}^{-1}$ |
| Oscillator voltage dependency<br>$V_P = 10\text{ to }30\text{ V}$                                 | $(\Delta f/f)/\Delta V_P$             | —             | $10^{-3}$     | —    | $\text{V}^{-1}$ |
| <b>Blanking pulse generator</b>                                                                   |                                       |               |               |      |                 |
| Output voltage (at $I_5 = 1\text{ mA}$ )                                                          | $V_5$                                 | —             | 20            | —    | V               |
| Output resistance                                                                                 | $R_5$                                 | —             | 410           | —    | $\Omega$        |
| Output current (at $V_P = 21\text{ V}$ )                                                          | $-I_5$                                | —             | —             | 5    | mA              |
| Blanking pulse duration at 50 Hz<br>sync                                                          | $t_b$                                 | 1,33          | 1,4           | 1,47 | ms              |
| <b>50/60 Hz frequency detector</b>                                                                |                                       |               |               |      |                 |
| Output saturation voltage<br>(LOW level for 50 Hz)                                                | $V_2$                                 | —             | 1             | —    | V               |
| Leakage current                                                                                   | $I_2$                                 | —             | 1             | —    | $\mu\text{A}$   |

| parameter                           | symbol        | min. | typ.        | max. | unit |
|-------------------------------------|---------------|------|-------------|------|------|
| <b>Buffer stage</b>                 |               |      |             |      |      |
| Output voltage                      | $V_{6(m)}$    | 0    | $(V_P - 1)$ | —    | V    |
| Output current                      | $-I_6$        | —    | —           | 4    | mA   |
| <b>Thermal resistance</b>           |               |      |             |      |      |
| From junction to case (cooling fin) | $R_{th\ j-c}$ | —    | —           | 15   | K/W  |
| <b>Junction temperature</b>         |               |      |             |      |      |
| Switching point thermal protection  | $T_j$         | 142  | 150         | 158  | °C   |

**APPLICATION INFORMATION**

The following application data is obtained from measurements made on the circuits shown in Figs 2 and 3, application circuits for 90° deflection systems. Measurements are made with respect to the cooling fin (ground).

|                                                   |                   |      | Fig. 2<br>concept 1* | Fig. 3<br>concept 2* |     |
|---------------------------------------------------|-------------------|------|----------------------|----------------------|-----|
| System supply voltages                            | $V_{P1}$          | typ. | 22                   | 22                   | V   |
|                                                   | $V_{P2}$          | typ. | 12                   | —                    | V   |
| Supply currents                                   | $I_{P1}$          | typ. | 135                  | 140                  | mA  |
|                                                   | $-I_{P2}$         | typ. | 8                    | —                    | mA  |
| Output voltage (d.c. value)                       | $V_g$             | typ. | 12,2                 | 13,8                 | V   |
| Output voltage (peak-to-peak value)               | $V_{g(p-p)}$      | typ. | 42                   | 43                   | V   |
| Output current (peak value)                       | $-I_{g(m)}$       | typ. | 450                  | 450                  | mA  |
| Deflection current (peak-to-peak value)           | $I_{defl\ (p-p)}$ | typ. | 850                  | 850                  | mA  |
| Flyback time                                      | $t_{fl}$          | typ. | 0,9                  | 1,0                  | ms  |
| Oscillator frequency adjustment<br>without sync   | $f_o$             | typ. | 46,5                 | 46,5                 | Hz  |
| Total power dissipation per package<br>(see note) | $P_{tot}$         | max. | 1,8                  | 1,8                  | W   |
| Ambient temperature                               | $T_{amb}$         | max. | 70                   | 70                   | °C  |
| Thermal resistance<br>(junction to ambient)       | $R_{th\ j-a}$     | max. | 40                   | 40                   | K/W |

\*Concept 1 : with two supply voltages; concept 2 : with one supply voltage.

**Note**

Calculated with  $\Delta V_{P1}$  of +5% and  $\Delta R_{defl}$  of -7%.

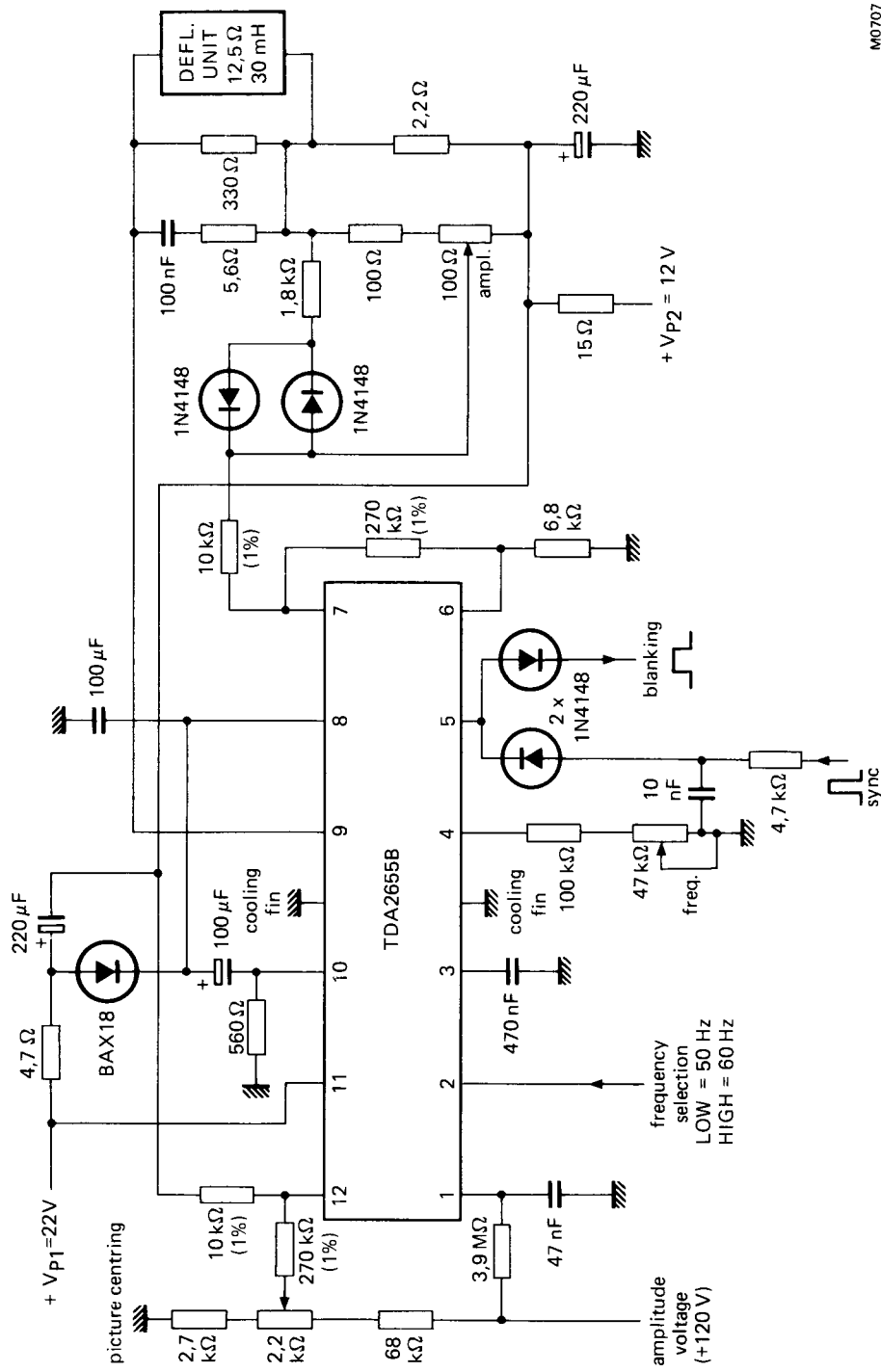


Fig. 2 Typical application circuit with two supply voltages; for use with 90° picture tubes.

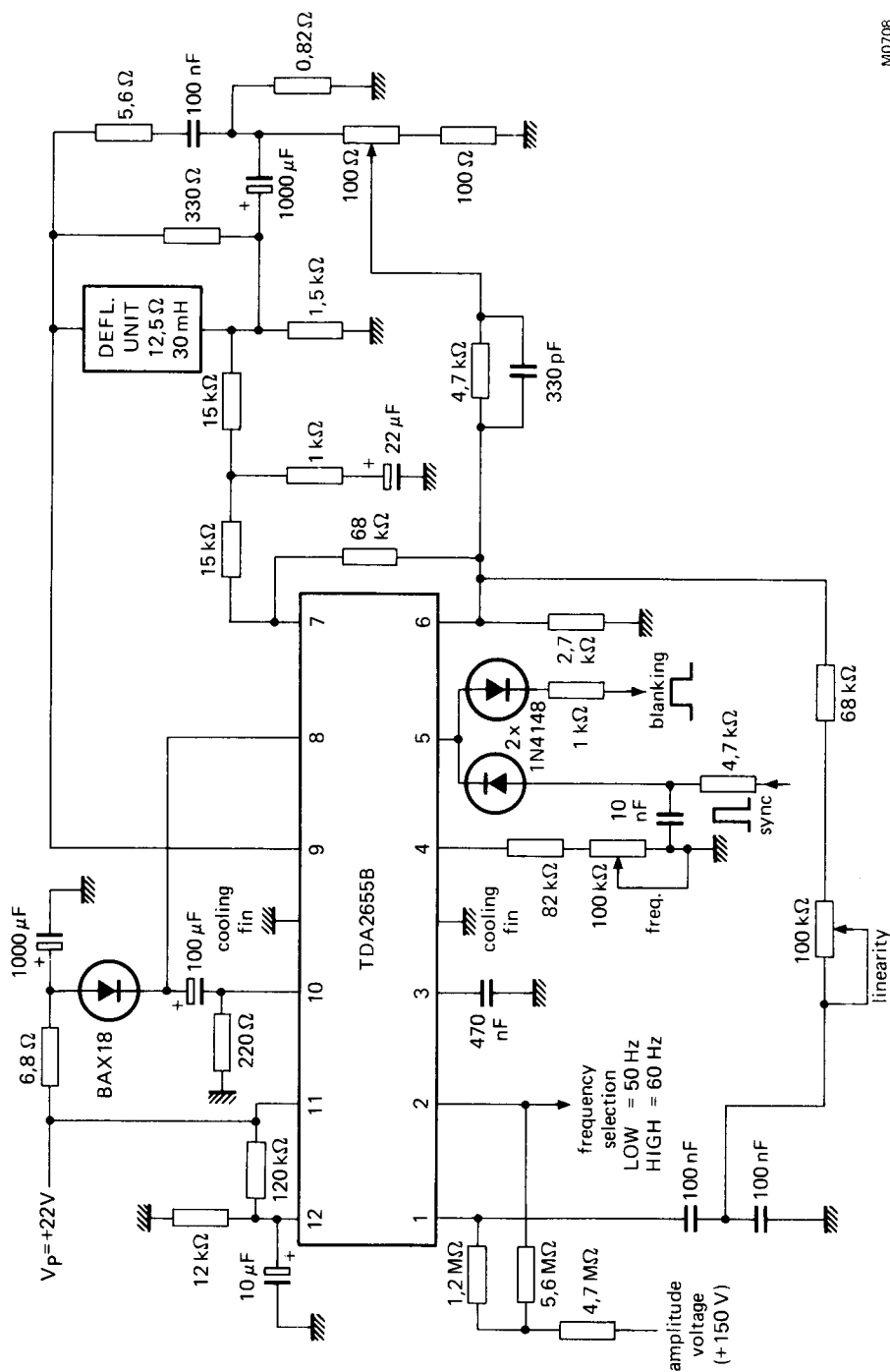


Fig. 3 Typical application circuit for a single supply voltage; for use with 90° picture tubes.