

# DATA SHEET

## **TDA2654** Vertical deflection circuit

Product specification  
File under Integrated Circuits, IC02

November 1982

## Vertical deflection circuit

## TDA2654

### DESCRIPTION

The TDA2654 is a monolithic integrated circuit for vertical deflection in monochrome and tiny-vision colour television receivers.

The circuit incorporates the following functions:

- Oscillator
- Synchronization circuit
- Blanking pulse generator
- Sawtooth generator
- S-correction and linearity circuit
- Comparator and drive circuit
- Output stage
- Flyback dissipation limiting circuit
- Supply for pre-stages via internal voltage divider
- Thermal protection circuit
- Controlled switch-on

### QUICK REFERENCE DATA

Supply voltage range (ref. to tab = ground)	$V_P$	10 to 35	V
Output current (peak-to-peak value)	$I_{g(p-p)}$	max. 2	A
Total power dissipation	$P_{tot}$	max. 5	W
Operating junction temperature	$T_j$	max. 150	°C
Thermal resistance from junction to tab	$R_{th\ j-tab}$	= 12	°C/W

### PACKAGE OUTLINE

9-lead SIL; plastic (SOT110B); SOT110-1; 1996 November 20.

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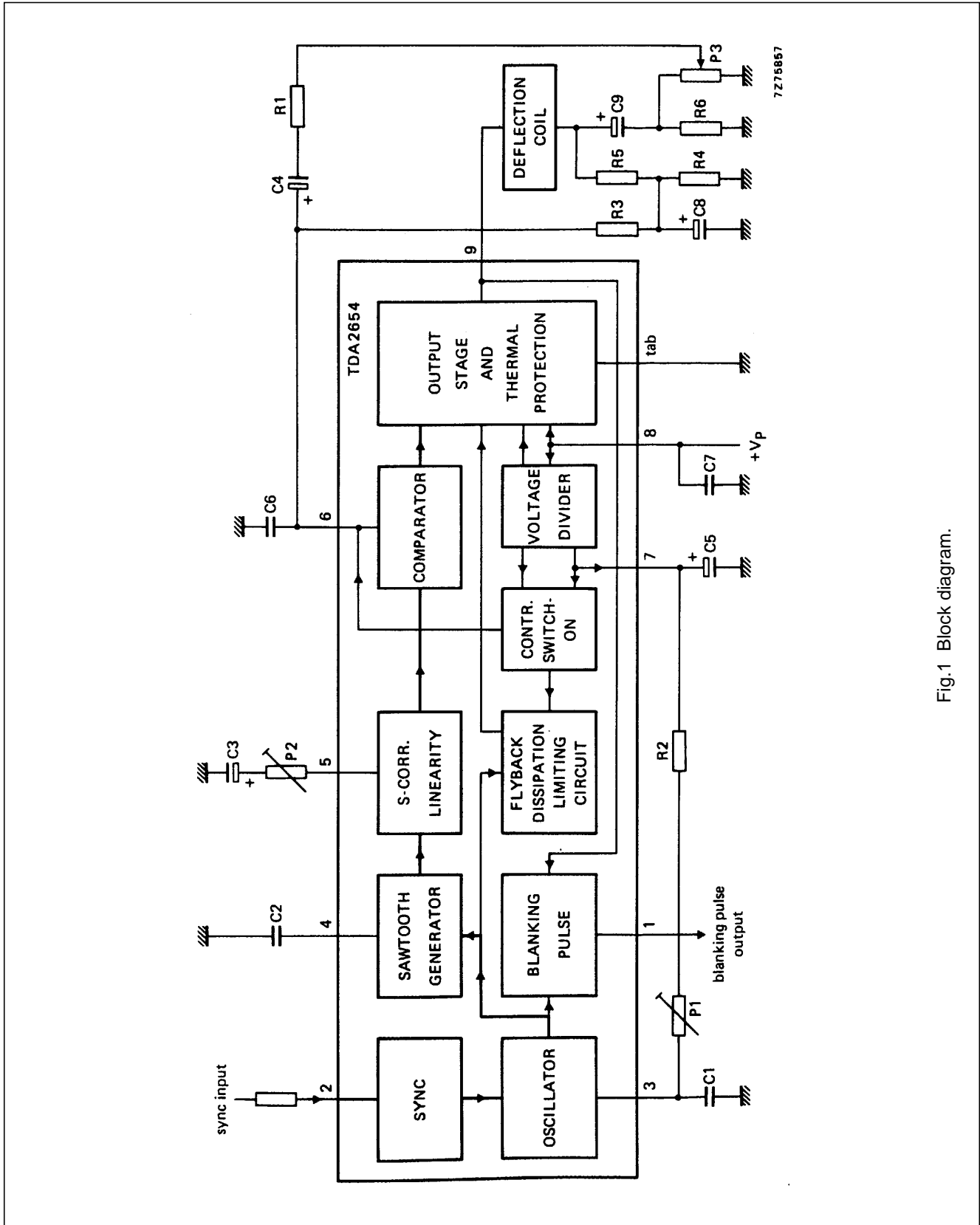


Fig.1 Block diagram.

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**RATINGS**

Limiting values in accordance with the Absolute Maximum System (IEC 134)

All voltages and currents refer to the tab (ground) connection.

**Voltages**

Pin 2	$V_2$	max.	5	V
Pin 3	$V_3$	max.	17	V
Pin 4	$V_4$	max.	17	V
Pin 5	$V_5$	max.	6	V
Pin 6	$V_6$	max.	13	V
Pin 7	$V_7$	max.	18	V
Pin 8	$V_8 (V_P)$	max.	35	V

**Currents**

Pin 1	$+I_1$	max.	1	mA
	$-I_1$	max.	5	mA
Pin 2	$I_2$	max.	2,5	mA
Pin 3	$I_3$	max.	30	mA
Pin 4	$I_4$	max.	30	mA
Pin 5	$\pm I_5$	max.	1	mA
Pin 6	$\pm I_6$	max.	3	mA
Pin 9 (repetitive)	$\pm I_9$	max.	1	A
Pin 9 (non-repetitive)	$\pm I_9$	max.	1,5	A
Total power dissipation (see also Fig.2)	$P_{tot}$	max.	5	W
Storage temperature	$T_{stg}$		-25 to + 150	°C
Operating junction temperature	$T_j$	max.	150	°C

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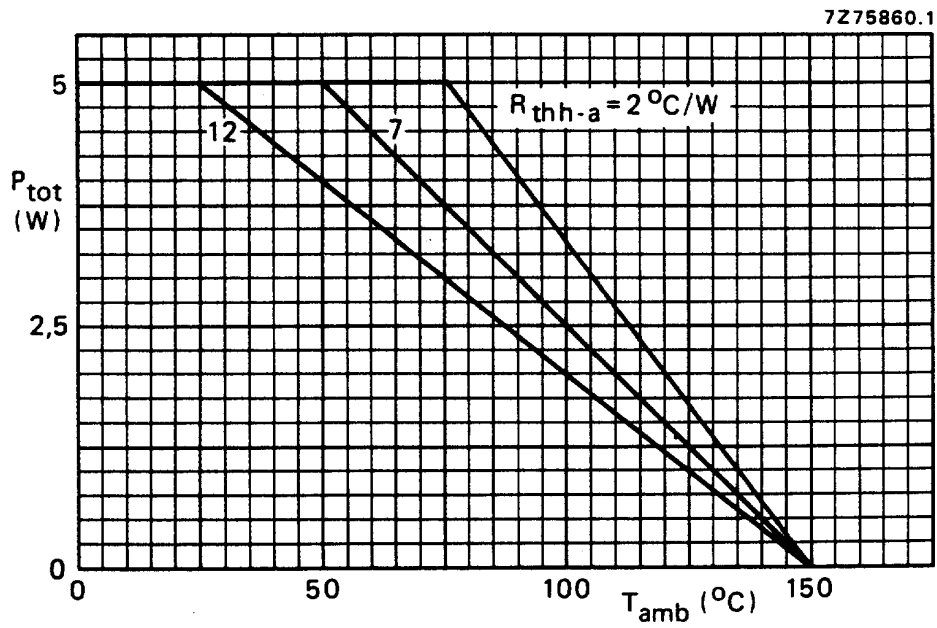


Fig.2 Total power dissipation. The graph takes into account an  $R_{th\ tab-h} = 1\text{ }^{\circ}\text{C/W}$  which is to be expected when the tab is connected to a heatsink with one 3 mm bolt, without using heatsink compound.  $R_{th\ j-tab} = 12\text{ }^{\circ}\text{C/W}$ .

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**CHARACTERISTICS**T<sub>amb</sub> = 25 °C unless otherwise specified; voltages and currents ref. to tab (ground)

			monochrome (Fig.3)	tiny-vision colour (Fig.4)	
Supply voltage (pin 8)	V <sub>P</sub>	typ.	25	31	V
Supply current (pin 8)	I <sub>P</sub>	typ.	165	150	mA
Total power dissipation	P <sub>tot</sub>	typ.	3,1	3,5	W
Output voltage (peak-to-peak value)	V <sub>9(p-p)</sub>	typ.	22	28	V
Blanking pulse; I <sub>1</sub> = 1 mA	V <sub>1</sub>	typ.	11,5	14,5	V
Blanking pulse duration	t <sub>p</sub>	typ.	1,3	1,4	ms
D.C. input voltage (pin 6)	V <sub>6</sub>	typ.	3,4	4,4	V
Deflection current (peak-to-peak value)	I <sub>9(p-p)</sub>	typ.	1,1	0,92	A
Flyback time	t	typ.	1,3	1,32	ms
Free running oscillator frequency	f <sub>osc</sub>	typ.	46	46	Hz
Oscillator thermal drift		typ.	-0,01	-0,01	Hz/°C
Oscillator voltage shift		typ.	-0,13	-0,12	Hz/V
Tracking range oscillator		typ.	18	18	%
Synchronization input voltage	V <sub>2</sub>	>	1	1	V
Voltage divider ratio	V <sub>7</sub> /V <sub>8</sub>	typ.	0,52	0,52	
Input resistance pin 7	R <sub>7</sub>	typ.	2,8	2,8	kΩ
Recommended thermal resistance of heatsink for T <sub>amb</sub> up to 70 °C	R <sub>th h-a</sub>	<	13	10	°C/W

**PINNING**

1. Blanking pulse output
2. Synchronization input
3. Oscillator timing network
4. Sawtooth generator
5. S-correction and linearity control
6. Feedback input
7. Voltage divider
8. Positive supply
9. Output

Tab. Negative supply (ground)

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### APPLICATION INFORMATION (see also Fig.1)

#### The function is described against the corresponding pin number

##### 1. Blanking pulse output

When the IC is adjusted on a free running frequency of 46 Hz the internal blanking pulse generator delivers a blanking pulse with a duration between 1,2 ms and 1,5 ms. The circuit is, however, made such that when the flyback time of the deflection current is longer, the blanking pulse corresponds to the flyback time. The output voltage is also high when the voltage at pin 9 is lower than nominal 5 V. An external blanking circuit is recommended when tiny-vision receivers are operated from a car-battery.

##### 2. Synchronization input

The oscillator has to be synchronized by a positive-going pulse. The circuit is made such that synchronization is inhibited during the flyback time.

##### 3. Oscillator

The oscillator frequency is set by the potentiometer P1 and resistor R2 between pins 3 and 7 and capacitor C1 between pin 3 and ground. For 50 Hz systems the free running frequency is preferably adjusted to 46 Hz.

##### 4. Sawtooth generator

This pin supplies the charging and discharging currents of the capacitor between pin 4 and ground (C2).

##### 5. S-correction and linearity control

The amount of S-correction can be set by the value of C3. For 110° deflection coils, e.g. AT1040/15, a capacitor of 15  $\mu$ F will give the right value for S-correction. For 90° deflection systems (e.g. AT1235/00) a nearly linear deflection current is required, this can be achieved by increasing C3 to 100  $\mu$ F. The linearity can be adjusted by potentiometer P2.

##### 6. Output current feedback

To this pin is applied a part of the output current measured across R6 and superimposed on a d.c. voltage derived from the voltage across the output coupling capacitor. This signal is compared with the internal reference sawtooth. The internal reference sawtooth has an amplitude of about 0,6 V peak to peak and a d.c. level of about 3,4 V, for a supply voltage of 25 V at pin 8.

##### 7. Internal voltage divider decoupling

The voltage on this pin is about half the supply voltage at pin 8 and is applied to the bases of emitter followers supplying the pre-stages of the IC. This voltage controls the amplitude of the internal reference sawtooth. In this way tracking with the line deflection system is achieved when the supply voltage at pin 8 is derived from the line output transformer.

##### 8. Positive supply

The value depends on the deflection coil.

##### 9. Output

The deflection coil is connected to ground via coupling capacitor C9 and current sensing resistor R6. The line frequency superimposed on the output voltage may be too high due to the current feedback system. The line frequency ripple can be decreased by connecting a resistor across the deflection coil. The flyback time can be influenced by the resistor divider (R4, R5) for the d.c. feedback to pin 6. It should be noted that the output voltage shows a negative swing of about 1 V during the first (positive current) part of the flyback.

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### Tab

The tab is used as negative supply (ground) connection. Therefore, the tab should be well connected to the negative side of the power supply.

### Controlled switch-on

This feature is achieved by charging the a.c. coupling capacitor (C4; connected to pin 6) from an internal current source of about 2 mA (voltage limited to maximum 15 V) for a short period after switch-on. The charging time can be influenced by the value of C5 (connected to pin 7). Discharging of C4 results in a slowly increasing deflection current after a delay of about 1 second. The blanking voltage at pin 1 is high during this delay.



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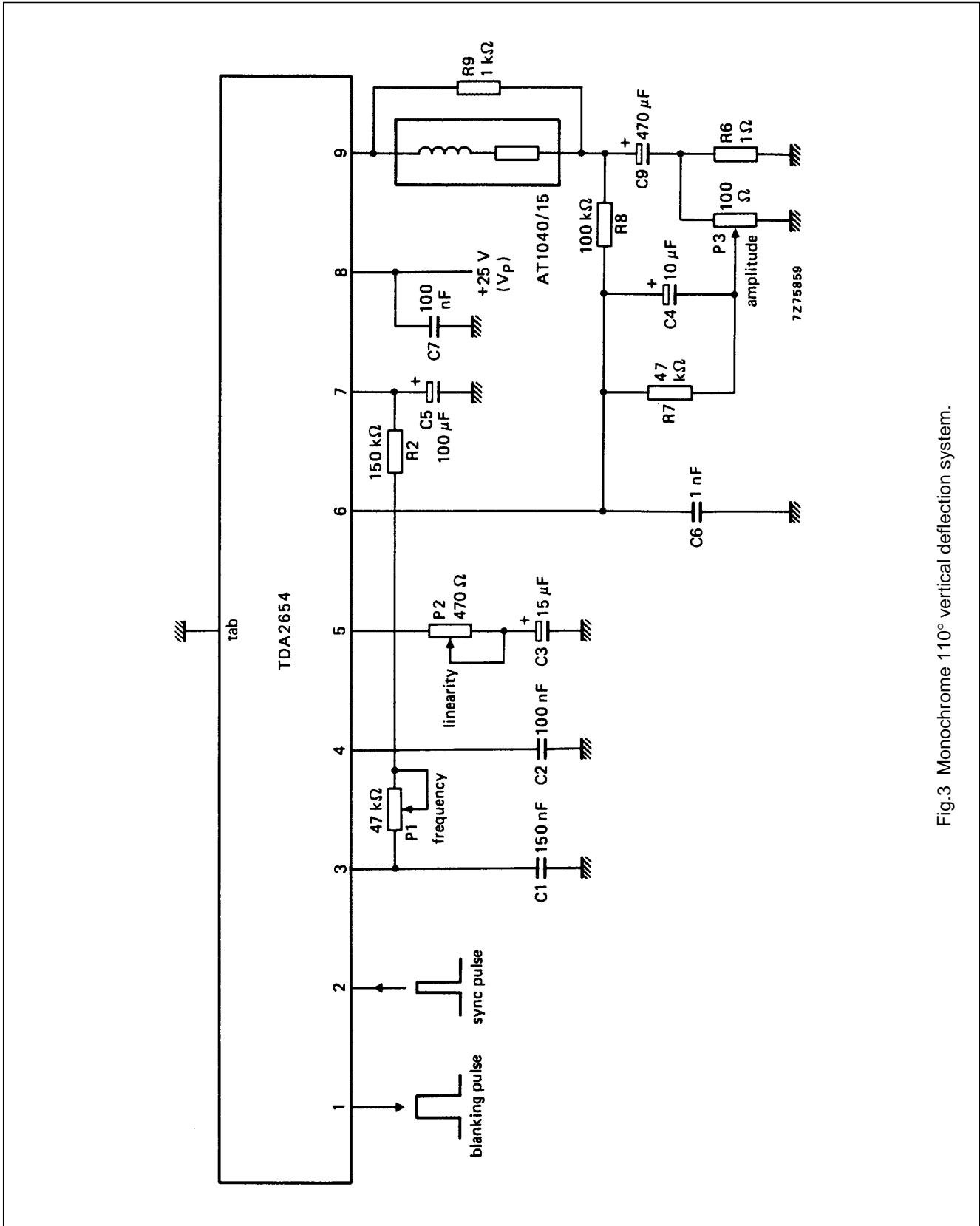
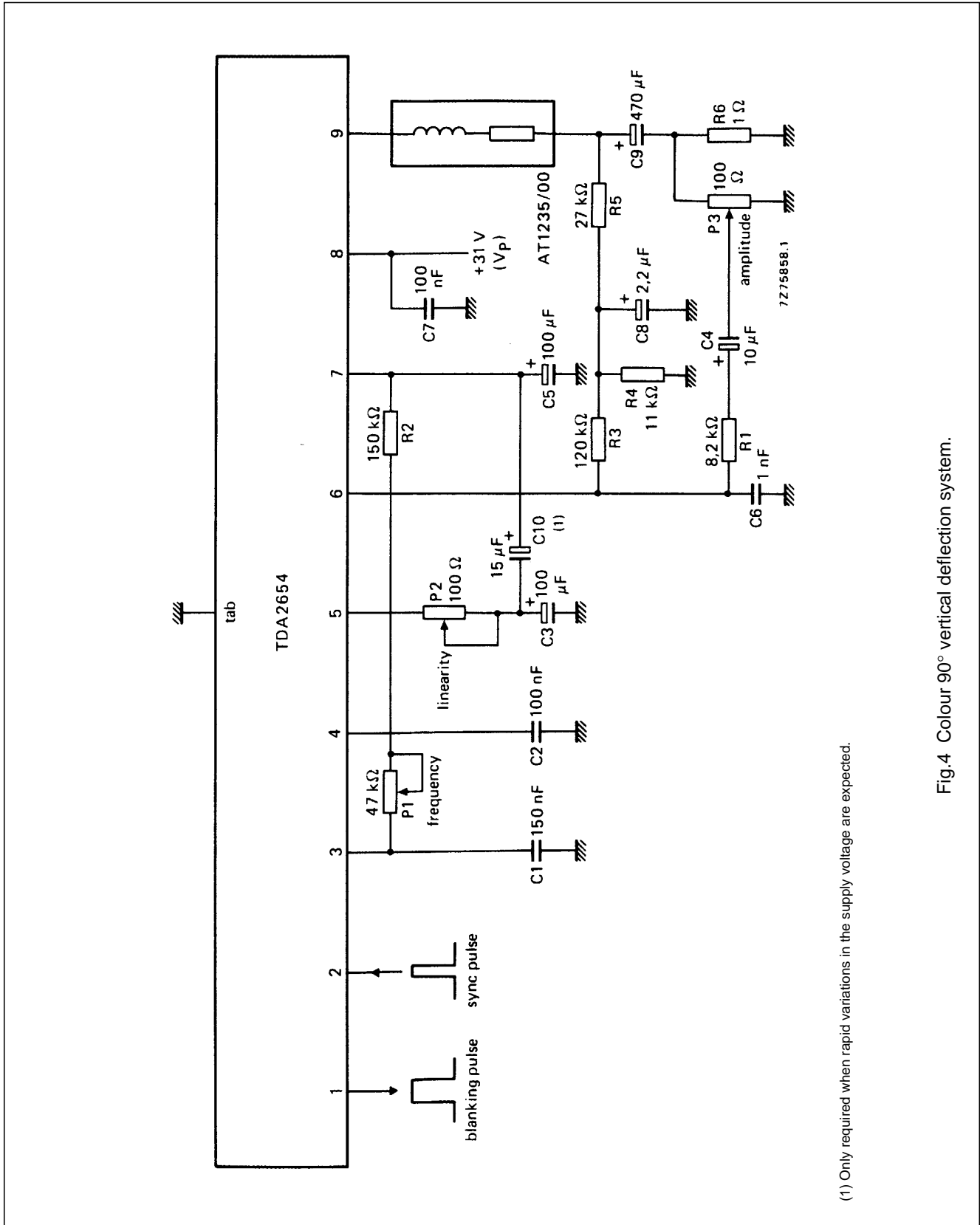


Fig.3 Monochrome 110° vertical deflection system.

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(1) Only required when rapid variations in the supply voltage are expected.

Fig.4 Colour-90° vertical deflection system.

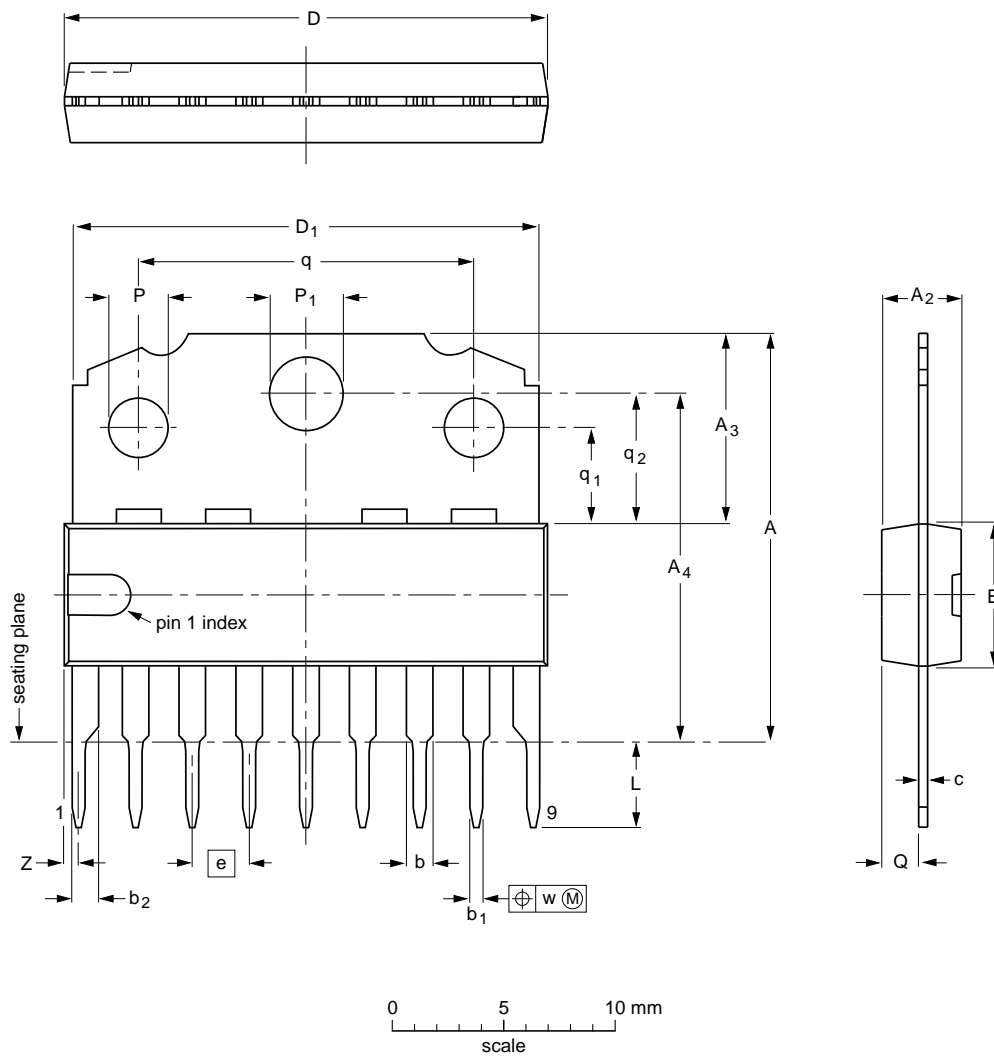
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PACKAGE OUTLINE

SIL9MPF: plastic single in-line medium power package with fin; 9 leads

SOT110-1



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>2</sub> max.	A <sub>3</sub>	A <sub>4</sub>	b	b <sub>1</sub>	b <sub>2</sub>	c	D <sup>(1)</sup>	D <sub>1</sub>	E <sup>(1)</sup>	e	L	P	P <sub>1</sub>	Q	q	q <sub>1</sub>	q <sub>2</sub>	w	Z <sup>(1)</sup> max.
mm	18.5 17.8	3.7	8.7 8.0	15.8 15.4	1.40 1.14	0.67 0.50	1.40 1.14	0.48 0.38	21.8 21.4	21.4 20.7	6.48 6.20	2.54	3.9 3.4	2.75 2.50	3.4 3.2	1.75 1.55	15.1 14.9	4.4 4.2	5.9 5.7	0.25	1.0

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT110-1						92-11-17 95-02-25

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### SOLDERING

#### Introduction

There is no soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and surface mounted components are mixed on one printed-circuit board. However, wave soldering is not always suitable for surface mounted ICs, or for printed-circuits with high population densities. In these situations reflow soldering is often used.

This text gives a very brief insight to a complex technology. A more in-depth account of soldering ICs can be found in our "IC Package Databook" (order code 9398 652 90011).

#### Soldering by dipping or by wave

The maximum permissible temperature of the solder is 260 °C; solder at this temperature must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.

The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified maximum storage temperature ( $T_{stg\ max}$ ). If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

#### Repairing soldered joints

Apply a low voltage soldering iron (less than 24 V) to the lead(s) of the package, below the seating plane or not more than 2 mm above it. If the temperature of the soldering iron bit is less than 300 °C it may remain in contact for up to 10 seconds. If the bit temperature is between 300 and 400 °C, contact may be up to 5 seconds.

### DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

### LIFE SUPPORT APPLICATIONS

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