

DATA SHEET

TDA1574 Integrated FM tuner for radio receivers

Product specification
File under Integrated Circuits, IC01

February 1985

Integrated FM tuner for radio receivers

TDA1574

GENERAL DESCRIPTION

The TDA1574 is a monolithic integrated FM tuner circuit designed for use in the r.f./i.f. section of car radios and home-receivers. The circuit comprises a mixer, oscillator and a linear i.f. amplifier for signal processing, plus the following additional features.

Features

- Keyed automatic gain control (a.g.c.)
- Regulated reference voltage
- Buffered oscillator output
- Electronic standby switch
- Internal buffered mixer driving.

QUICK REFERENCE DATA

Supply voltage range (pin 15)	V_P		7 to 16 V
Mixer input bias voltage (pins 1 and 2)	$V_{1, 2-4}$	typ.	1 V
noise figure	NF	typ.	9 dB
Oscillator output voltage (pin 6)	V_{6-4}	typ.	2 V
output admittance at pin 6 for $f = 108,7$ MHz	Y22	typ.	$1,5 + j2$ mS
Oscillator output buffer			
D.C. output voltage (pin 9)	V_{9-4}	typ.	6 V
Total harmonic distortion	THD	typ.	-15 dBC
Linear i.f. amplifier output voltage (pin 10)	V_{10-4}	typ.	4,5 V
noise figure at $R_S = 300 \Omega$	NF	typ.	6,5 dB
Keyed a.g.c. output voltage range (pin 18)	V_{18-4}		+ 0,5 to $V_P - 0,3$ V

PACKAGE OUTLINE

18-lead DIL; plastic (SOT102); SOT102-1; 1996 August 08.

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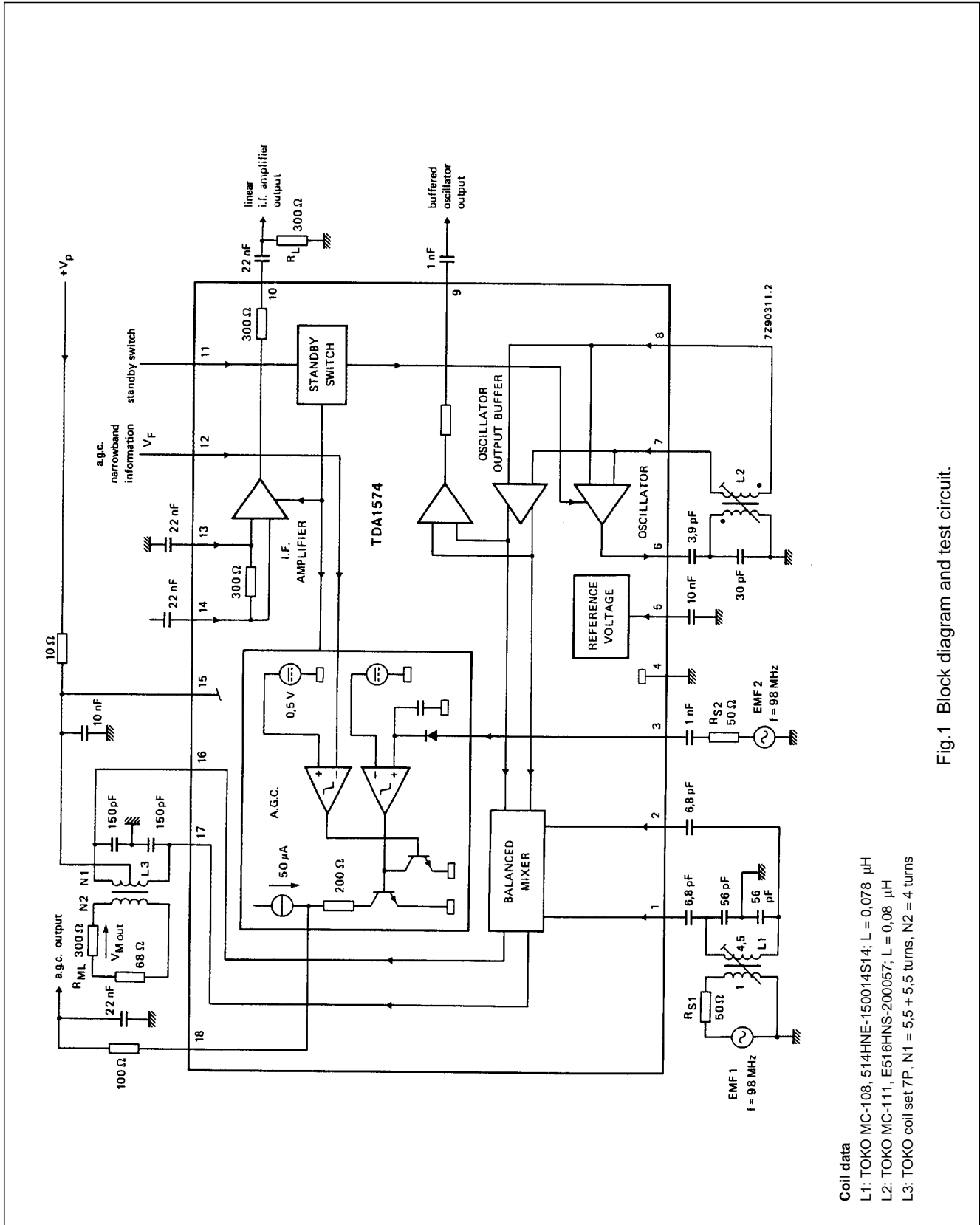


Fig.1 Block diagram and test circuit.

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FUNCTIONAL DESCRIPTION

Mixer

The mixer circuit is a double balanced multiplier with a preamplifier (common base input) to obtain a large signal handling range and a low oscillator radiation.

Oscillator

The oscillator circuit is an amplifier with a differential input. Voltage regulation is achieved by utilizing the symmetrical tanh-transfer-function to obtain low order 2nd harmonics.

Linear IF amplifier

The IF amplifier is a one stage, differential input, wideband amplifier with an output buffer.

Keyed AGC

The AGC processor combines narrow- and wideband information via an RF level detector, a comparator and an ANDing stage. The level dependent, current sinking output has an active load, which sets the AGC threshold.

The AGC function can either be controlled by a combination of wideband and narrowband information (keyed AGC), or by a wideband information only, or by narrowband information only. If only narrow-band AGC is wanted pin 3 should be connected to pin 5. If only wideband AGC is wanted pin 12 should be connected to pin 13.

RATINGS

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

Supply voltage (pin 15)	$V_P = V_{15-4}$	max.	18 V
Mixer output voltage (pins 16 and 17)	$V_{16, 17-4}$	max.	35 V
Standby switch input voltage (pin 11)	V_{11-4}	max.	23 V
Reference voltage (pin 5)	V_{5-4}	max.	7 V
Field strength input voltage (pin 12)	V_{12-4}	max.	7 V
Total power dissipation	P_{tot}	max.	800 mW
Storage temperature range	T_{stg}		-55 to + 150 °C
Operating ambient temperature range	T_{amb}		-40 to + 85 °C

THERMAL RESISTANCE

From junction to ambient (in free air)	$R_{th\ j-amb}$	=	80 K/W
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Note

All pins are short-circuit protected to ground.

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CHARACTERISTICS $V_P = V_{15-4} = 8,5 \text{ V}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$; measured in test circuit Fig.1; unless otherwise specified

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply (pin 15)					
Supply voltage	$V_P = V_{15-4}$	7	–	16	V
Supply current (except mixer)	$I_P = I_{15}$	16	23	30	mA
Reference voltage (pin 5)	V_{5-4}	3,9	4,1	4,4	V
Mixer					
<i>D.C. characteristics</i>					
Input bias voltage (pins 1 and 2)	$V_{1,2-4}$	–	1	–	V
Output voltage (pins 16 and 17)	$V_{16,17-4}$	4	–	35	V
Output current (pin 16 + pin 17)	$I_{16} + I_{17}$	–	4,0	–	mA
<i>A.C. characteristics ($f_i = 98 \text{ MHz}$)</i>					
Noise figure	NF	–	9	–	dB
Noise figure including transforming network	NF	–	11	–	dB
3rd order intercept point	EMF1_{IP3}	–	115	–	dB μV
Conversion power gain	G_P	–	14	–	dB
	$10 \log \frac{4 (V_{M(\text{out})} 10,7 \text{ MHz})^2}{(\text{EMF1 } 98 \text{ MHz})^2} \times \frac{R_{S1}}{R_{ML}}$				
Input resistance (pins 1 and 2)	$R_{1,2-4}$	–	14	–	Ω
Output capacitance (pins 16 and 17)	$C_{16,17}$	–	13	–	pF
Oscillator					
<i>D.C. characteristics</i>					
Input voltage (pins 7 and 8)	$V_{7,8-4}$	–	1,3	–	V
Output voltage (pin 6)	V_{6-4}	–	2	–	V
<i>A.C. characteristics ($f_{\text{osc}} = 108,7 \text{ MHz}$)</i>					
Residual FM (Bandwidth 300 Hz to 15 kHz); de-emphasis = 50 μs	Δf	–	2,2	–	Hz

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PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Linear i.f. amplifier					
<i>D.C. characteristics</i>					
Input bias voltage (pin 13)	V_{13-4}	–	1,2	–	V
Output voltage (pin 10)	V_{10-4}	–	4,5	–	V
<i>A.C. characteristics ($f_i = 10,7$ MHz)</i>					
Input impedance	R_{14-13}	240	300	360	Ω
	C_{14-13}	–	13	–	pF
Output impedance	R_{10-4}	240	300	360	Ω
	C_{10-4}	–	3	–	pF
Voltage gain	G_{VIF}	27	30	–	dB
$20 \log \frac{V_{10-4}}{V_{14-13}}$					
$T_{amb} = -40$ to $+85$ °C	ΔG_{VIF}	–	0	–	dB
1 dB compression point (r.m.s. value)					
at $V_P = 8,5$ V	$V_{10-4rms}$	–	750	–	mV
at $V_P = 7,5$ V	$V_{10-4rms}$	–	550	–	mV
Noise figure	NF	–	6,5	–	dB
at $R_S = 300 \Omega$					
Keyed a.g.c.					
<i>D.C. characteristics</i>					
Output voltage range (pin 18)	V_{18-4}	0,5	–	$V_{P-0,3}$	V
A.G.C. output current					
at $I_3 = \phi$ or $V_{12-4} = 450$ mV; $V_{18-4} = V_P/2$	$-I_{18}$	25	50	100	μA
at $V_{3-4} = 2$ V and $V_{12-4} = 1$ V; $V_{18-4} = V_{15-4}$	I_{18}	2	–	5	mA

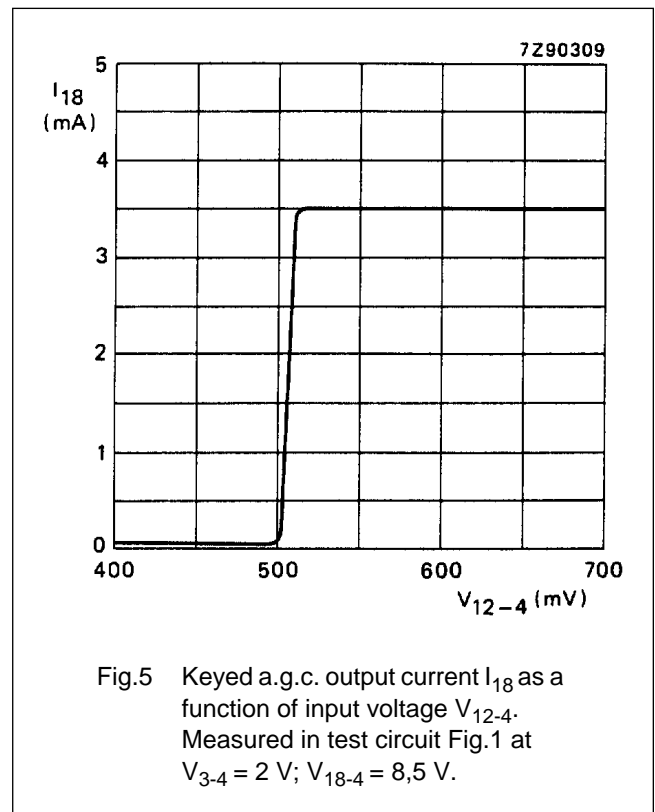
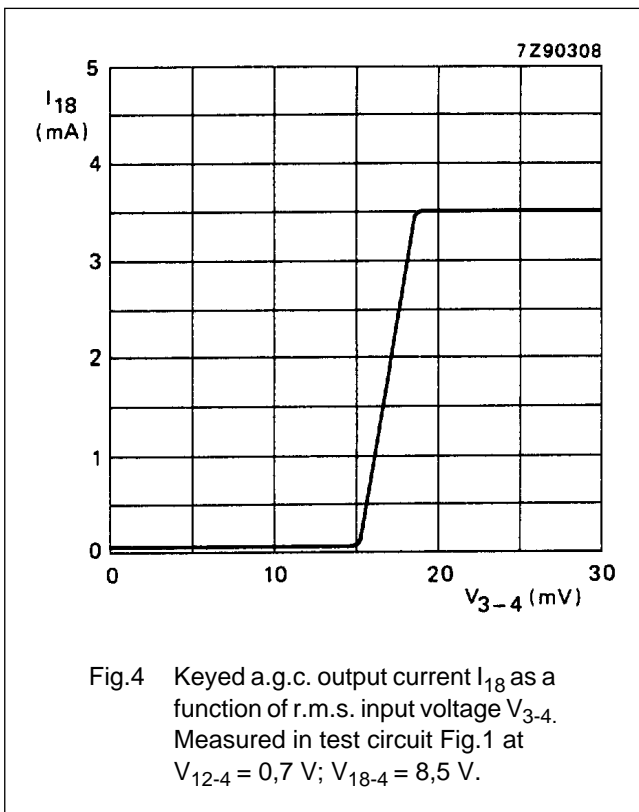
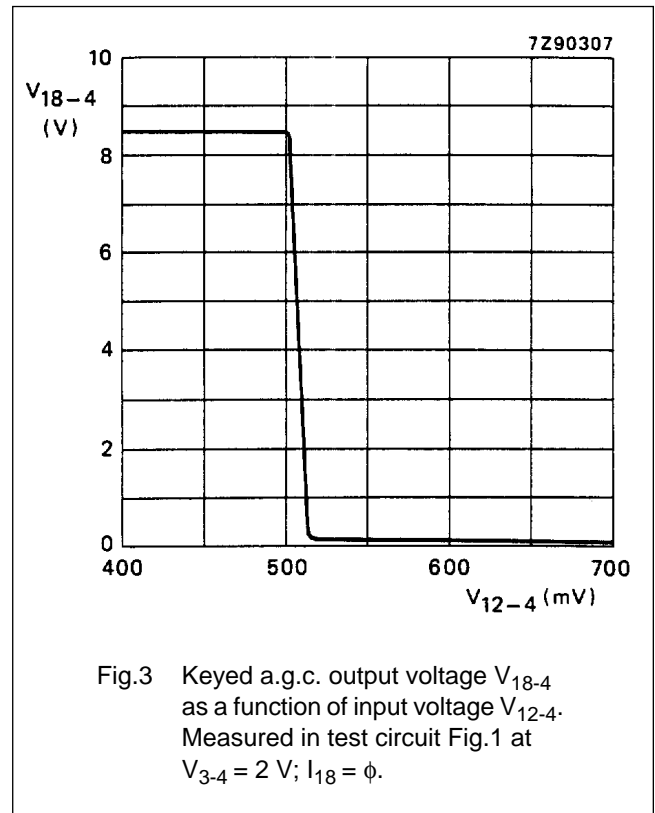
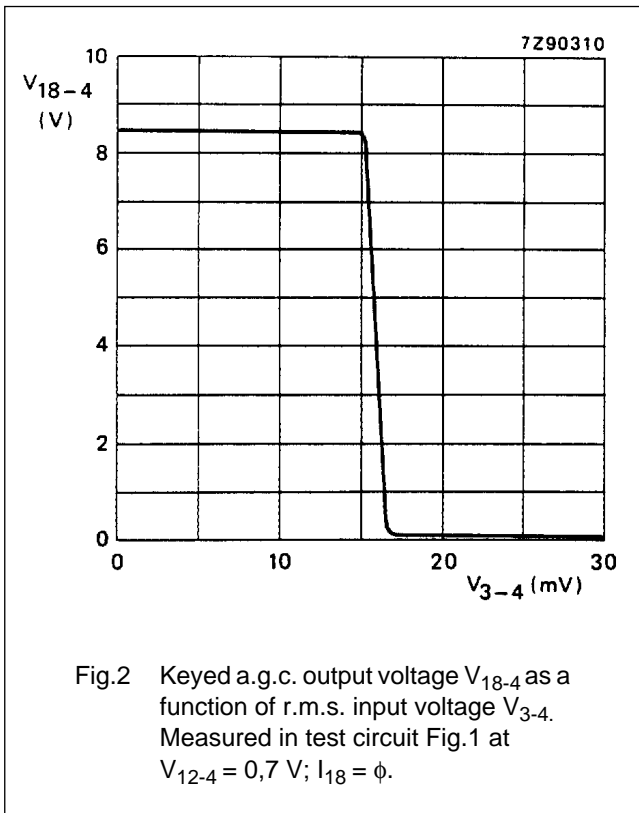
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PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Narrowband threshold					
at $V_{3-4} = 2 \text{ V}$; $V_{12-4} = 550 \text{ mV}$	V_{18-4}	–	–	1	V
at $V_{3-4} = 2 \text{ V}$; $V_{12-4} = 450 \text{ mV}$	V_{18-4}	$V_{P-0,3}$	–	–	V
<i>A.C. characteristics</i> ($f_i = 98 \text{ MHz}$)					
Input impedance					
	R_{3-4}	–	4	–	k Ω
	C_{3-4}	–	3	–	pF
Wideband threshold (r.m.s. value)					
(see figures 2, 3, 4 and 5)					
at $V_{12-4} = 0,7 \text{ V}$; $V_{18-4} = V_P/2$; $I_{18} = 0$	$EMF2_{rms}$	–	17	–	mV
Oscillator output buffer (pin 9)					
D.C. output voltage	V_{9-4}	–	6,0	–	V
Oscillator output voltage (r.m.s. value)					
at $R_L = \infty$; $C_L = 2 \text{ pF}$	$V_{9-4(rms)}$	–	110	–	mV
at $R_L = 75 \Omega$	$V_{9-4(rms)}$	30	50	–	mV
D.C. output impedance	R_{9-15}	–	2,5	–	k Ω
Signal purity					
Total harmonic distortion	THD	–	–15	–	dBC
Spurious frequencies					
at $EMF1 = 0,2 \text{ V}$; $R_{S1} = 50 \Omega$	f_S	–	–35	–	dBC
Electronic standby switch (pin 11)					
Oscillator; linear i.f. amplifier; a.g.c.					
at $T_{amb} = -40 \text{ to } +85 \text{ }^\circ\text{C}$					
Input switching voltage					
for threshold ON; $V_{18-4} = \geq V_P - 3 \text{ V}$	V_{11-4}	0	–	2,3	V
for threshold OFF; $V_{18-4} = \leq 0,5 \text{ V}$	V_{11-4}	3,3	–	23	V
Input current					
at ON condition; $V_{11-4} = 0 \text{ V}$	$-I_{11}$	–	–	150	μA
at OFF condition; $V_{11-4} = 23 \text{ V}$	I_{11}	–	–	10	μA
Input voltage					
at $I_{11} = \phi$	V_{11-4}	–	–	4,4	V

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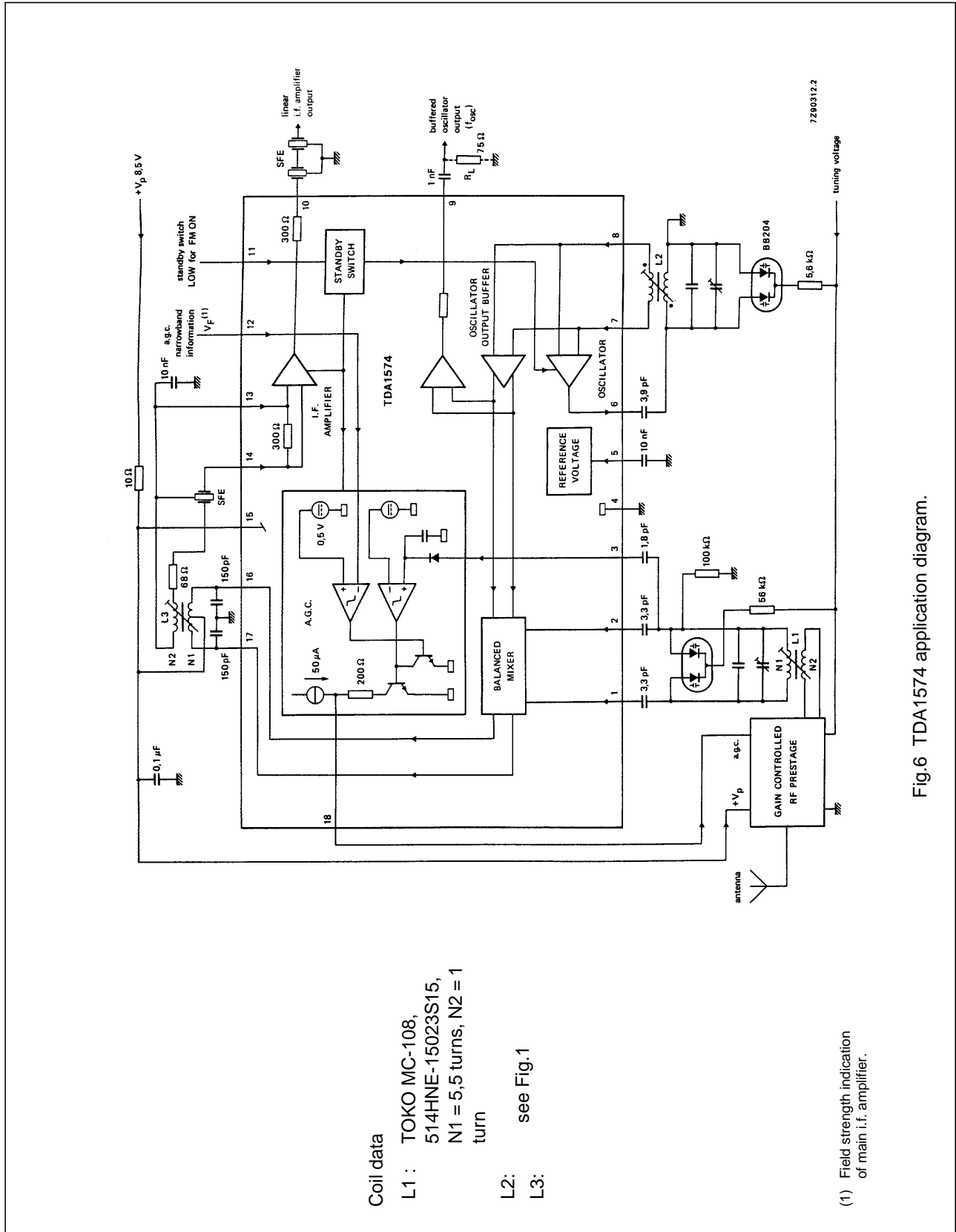
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APPLICATION INFORMATION



Coil data
 L1 : TOKO MC-108,
 514HNE-15023S15,
 N1 = 5.5 turns, N2 = 1
 turn

L2: see Fig. 1
 L3:

(1) Field strength indication
 of main i.f. amplifier.

Fig.6 TDA1574 application diagram.

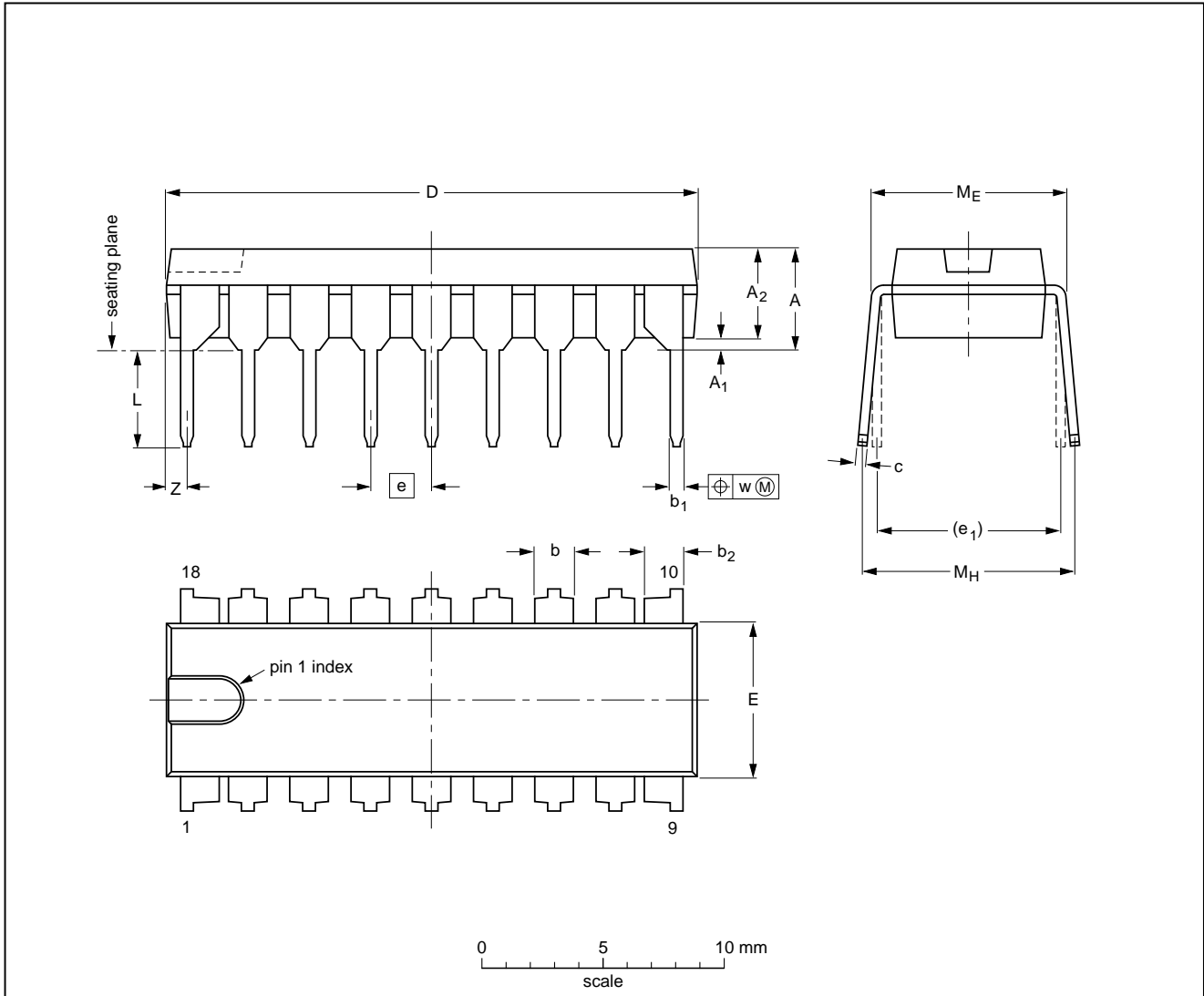
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PACKAGE OUTLINE

DIP18: plastic dual in-line package; 18 leads (300 mil)

SOT102-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A ₁ min.	A ₂ max.	b	b ₁	b ₂	c	D ⁽¹⁾	E ⁽¹⁾	e	e ₁	L	M _E	M _H	w	Z ⁽¹⁾ max.
mm	4.7	0.51	3.7	1.40 1.14	0.53 0.38	1.40 1.14	0.32 0.23	21.8 21.4	6.48 6.20	2.54	7.62	3.9 3.4	8.25 7.80	9.5 8.3	0.254	0.85
inches	0.19	0.020	0.15	0.055 0.044	0.021 0.015	0.055 0.044	0.013 0.009	0.86 0.84	0.26 0.24	0.10	0.30	0.15 0.13	0.32 0.31	0.37 0.33	0.01	0.033

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			
SOT102-1						93-10-14 95-01-23

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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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