

Monolithic Integrated Circuit

Description

The integrated circuit, U2841B, is designed as a single FM-IF-amplifier and demodulator for TV sound processing with SCART switches and AF control in bipolar technology.

Features

- IF input provided for operating with ceramic filters
- Minimum total harmonic distortion
- Low power consumption
- Operates alternatively with 5 V or 12 V supply voltage
- Demodulator provided for operating with ceramic resonator or coil
- SCART AF input / AF output
- Wide volume control range
- ESD protected

Block Diagram

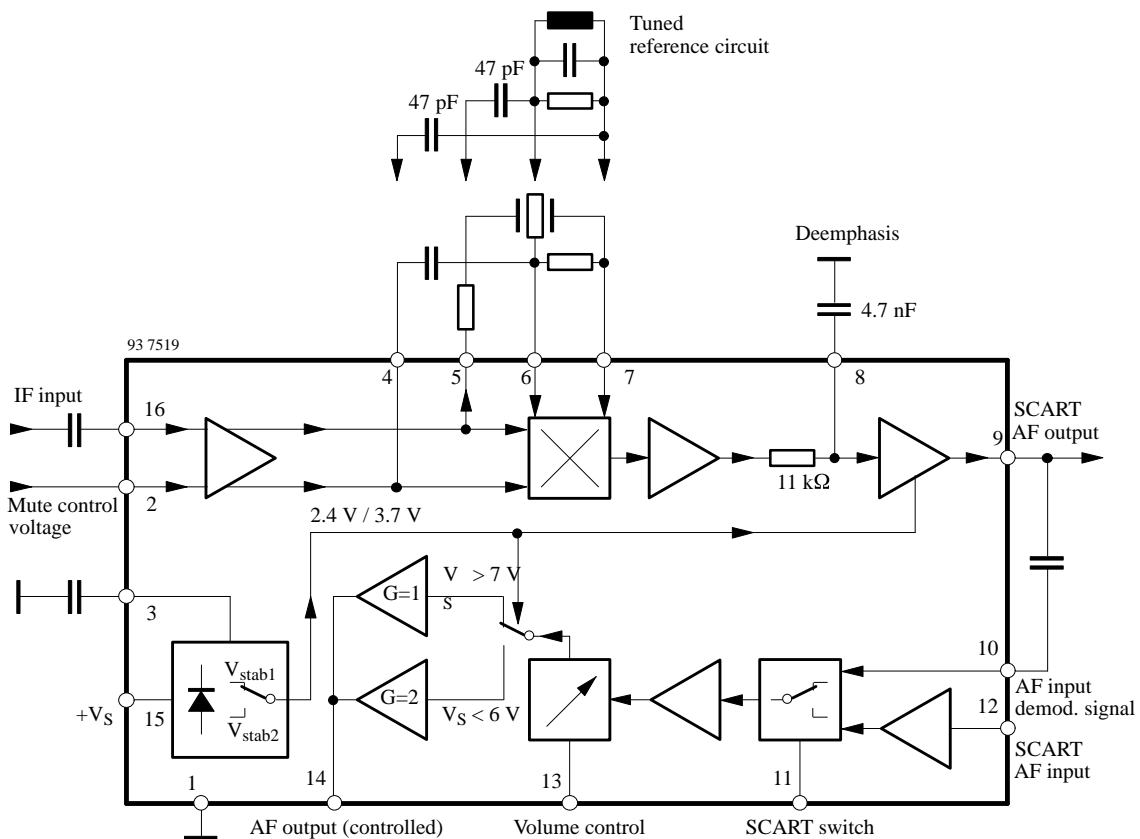
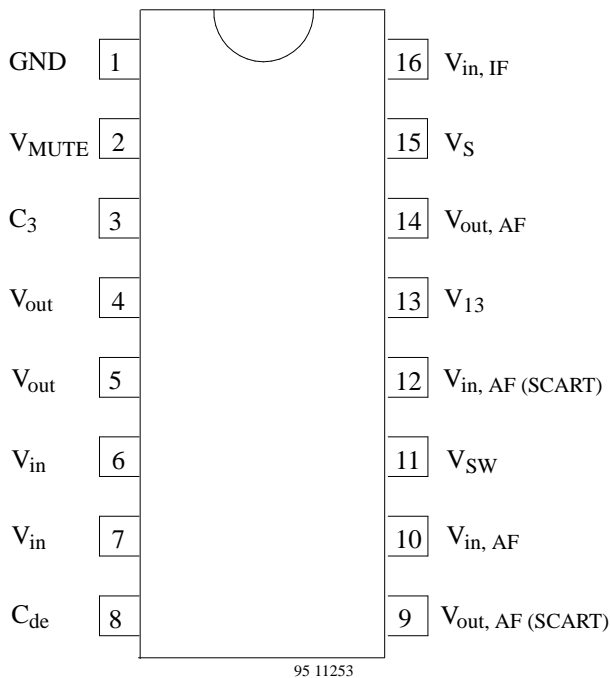


Figure 1.

Pin Description



| Pin | Symbol | Function |
|------|-----------------------|--|
| 1 | GND | Ground |
| 2 | V_{MUTE} | Mute control voltage |
| 3 | C_3 | Capacitor (internal reference voltage) |
| 4, 5 | V_{out} | Limiter amplifier output |
| 6, 7 | V_{in} | Reference circuit (demodulator) |
| 8 | C_{de} | Deemphasis |
| 9 | $V_{out, AF (SCART)}$ | AF output (SCART) |
| 10 | $V_{in, AF}$ | AF input (demodulated signal) |
| 11 | V_{SW} | SCART switch |
| 12 | $V_{in, AF (SCART)}$ | AF input (SCART) |
| 13 | V_{13} | Volume control |
| 14 | $V_{out, AF}$ | AF output, controlled |
| 15 | V_S | Supply voltage |
| 16 | $V_{in, IF}$ | FM IF input |

Circuit Description

The bipolar circuit U2841B contains the complete FM intercarrier sound processing (mono) with additional AF volume control, SCART switches and external mute control. The circuit operates alternatively with 5 V or 12 V supply voltage.

Circuit operation is as follows:

Through an external ceramic bandpass filter, which is tuned to the sound carrier frequency, the intercarrier signal is fed via a 9-stage limiting amplifier to the FM demodulator. This quadrature demodulator works alternatively with an external L-C reference circuit or with a ceramic resonator.

The AF signal is available at Pin 9 (AF output – SCART), and via the SCART switch and volume control at Pin 14

(AF output – controlled). The demodulated AF signal at Pin 10 (AF input – demodulator signal) or an external signal at Pin 12 (AF input – SCART) will be selected by the SCART switch and supplied to the volume control.

In dependence on supply voltage the gain of controlled AF output (Pin 14) will be switched over:

- Supply voltage range $4.7 < V_S < 6.0$ V:
gain of AF output amplifier $G = 2$.
In this case the AF input signal at Pin 12 (SCART input) must be reduced by a voltage divider.
- Supply voltage range $7.0 < V_S < 12.5$ V:
gain of AF output amplifier $G = 1$.

Absolute Maximum Ratings

Reference point Pin 1, unless otherwise specified

| Parameters | Symbol | Value | Unit |
|--|-----------|-------------|------|
| Supply voltage Pin 15 | V_S | 12.5 | V |
| Supply current Pin 15 | I_S | 33 | mA |
| External voltage Pins 2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 14 and 16 | V_{ext} | 5 | V |
| External voltage Pin 11 | V_{ext} | V_S | V |
| Junction temperature | T_j | 125 | °C |
| Ambient temperature | T_{amb} | -25 to +85 | °C |
| Storage temperature | T_{stg} | -25 to +125 | °C |

Thermal Resistance

| Parameters | Symbol | Value | Unit |
|------------------|------------|-------|------|
| Junction ambient | R_{thJA} | 90 | K/W |

Electrical Characteristics

$T_{amb} = 25^\circ\text{C}$, $V_S = 12\text{ V}$, reference point Pin 1, unless otherwise specified

| Parameters | Test Conditions / Pins | Symbol | Min | Typ | Max | Unit |
|--|--|----------|------------|------------|-------------|---------------|
| Supply voltage | Pin 15 | V_S | 4.7 7.0 | | 6.0 12.5 | V |
| Supply current | $V_S < 6\text{ V}$ Pin 15 $V_S > 7\text{ V}$ | I_S | | 22 28 | | mA |
| IF frequency range | Pin 16 | f_{IF} | 3.5 | | 12 | MHz |
| DC output voltage | $V_S < 6\text{ V}$ Pins 9 and 14 $V_S > 7\text{ V}$ | V_{DC} | | 2.4 3.7 | | V |
| AF output voltage | $f_{mod} = 1\text{ kHz}$ Pins 9 and 14 $\Delta_f = \pm 30\text{ kHz}$ | V_{AF} | | 600 | | mV |
| Total harmonic distortion | $f_{mod} = 1\text{ kHz}$ Pins 9 and 14 $\Delta_f = \pm 30\text{ kHz}$ | T_{HD} | | 0.5 | | % |
| Input limiting voltage | AF output sign -3 dB Pin 16 | V_{in} | | 150 | | μV_{eff} |
| AM suppression | $V_{in} = 20\text{ mV}$, Pins 4 and 5 $f = 5.5\text{ MHz}$ $f_{mod} = 1\text{ kHz}$ Reference signal: $\Delta_f = \pm 30\text{ kHz}$ Test signal: $m = 30\%$ | G_{AM} | | 60 | | dB |
| Input resistance | Pin 16 | R_{in} | | 820 | | Ω |
| Allowable external load resistor, AF output | Pins 9 and 14 | R_L | 3 | | | k Ω |
| Control range AF volume control | $V_{13} = 0 - 4\text{ V}$ Pin 14 | A | | 80 | | dB |
| Gain between SCART input and controlled AF output | $V_S < 6\text{ V}$ Pins 12 - 14 $V_S > 7\text{ V}$ | G | | 6 0 | | dB |

| Parameters | Test Conditions / Pins | Symbol | Min | Typ | Max | Unit |
|---|-----------------------------------|---------------|-----|-----|-------|-----------|
| Max. SCART input voltage | $V_S < 6\text{ V}$ Pins 10 and 12 | $V_{in\ max}$ | 1 | | | V_{eff} |
| | $V_S > 7\text{ V}$ | | 2 | | | |
| Max. AF output voltage (controlled output) | $V_S < 6\text{ V}$ Pins 10 and 12 | $V_{AF\ max}$ | 1 | | | V_{eff} |
| | $V_{13} = 4\text{ V}$ | | 2 | | | |
| | $V_S > 7\text{ V}$ | | 2 | | | |
| Control voltage (SCART switch) | Record Pin 11 | V | 0 | | 2 | V |
| | Play Pin 11 | | 4 | | V_S | |
| Control voltage (MUTE switch) | Mute on Pin 2 | V | 0 | | 2 | V |

Circuits

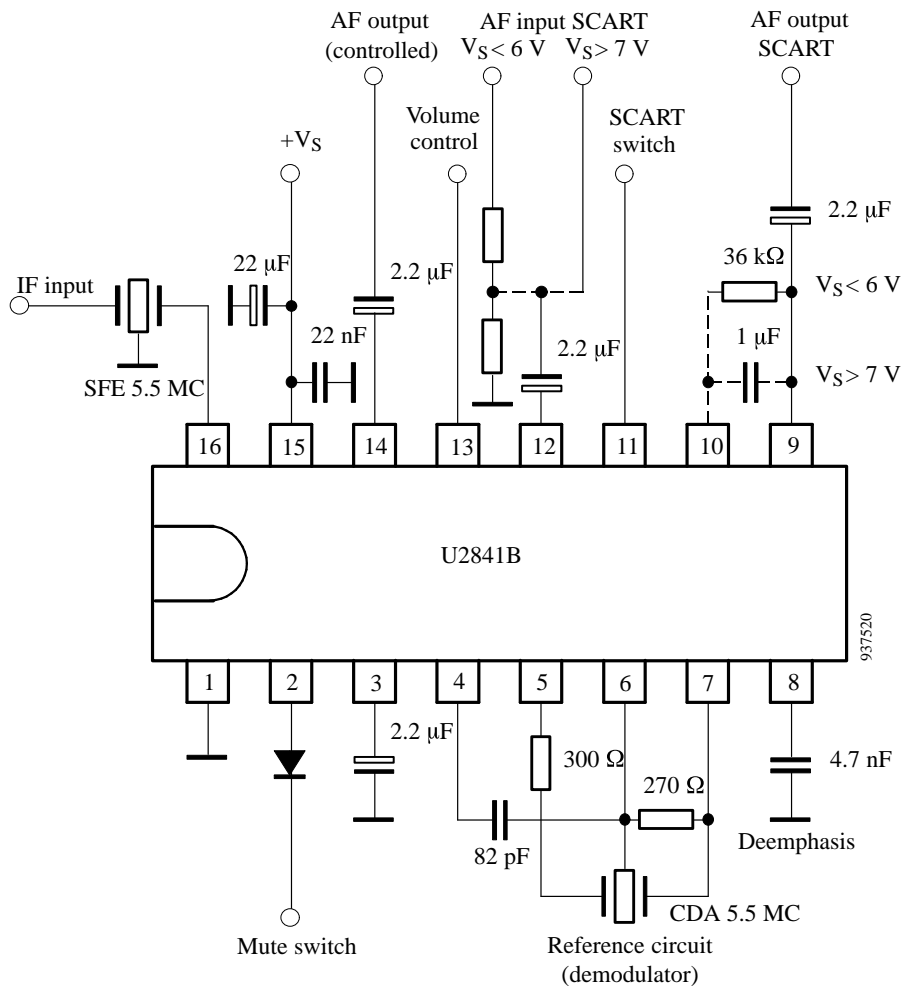


Figure 2. Test circuit

Internal Pin Circuit Diagrams

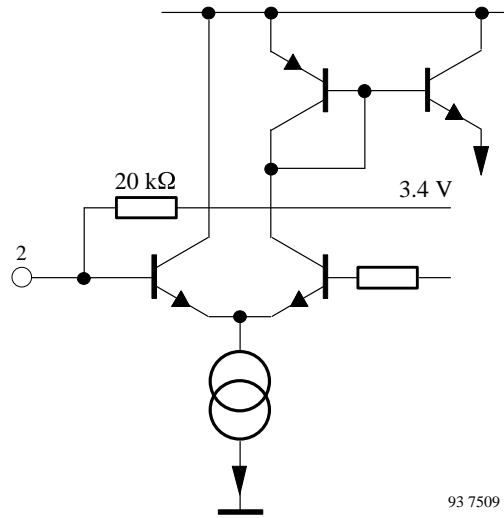


Figure 3. Pin 2: Mute switch

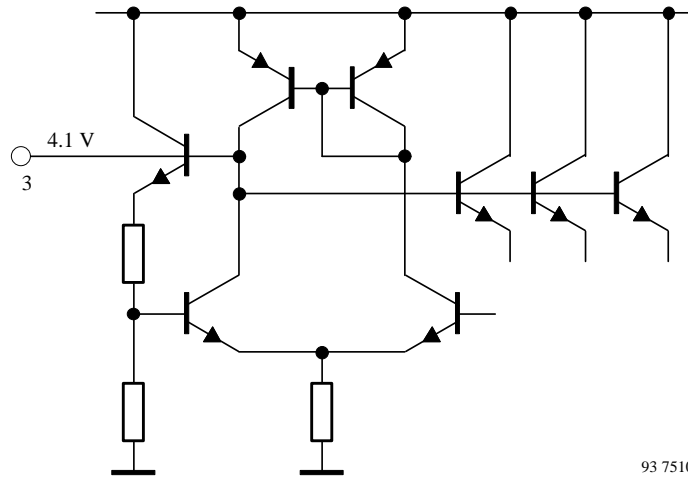


Figure 4. Pin 3: Internal reference voltage

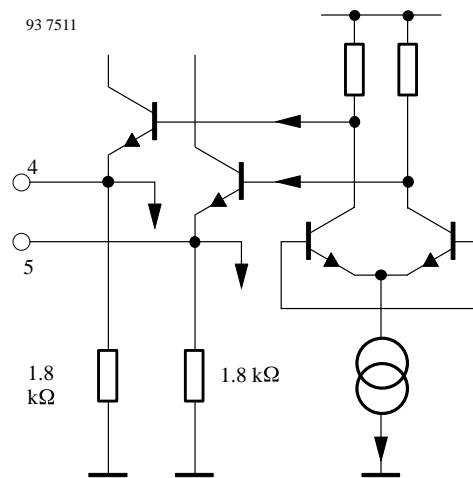


Figure 5. Pin 4, 5: Limiter amplifier output

Internal Pin Circuit Diagrams (continued)

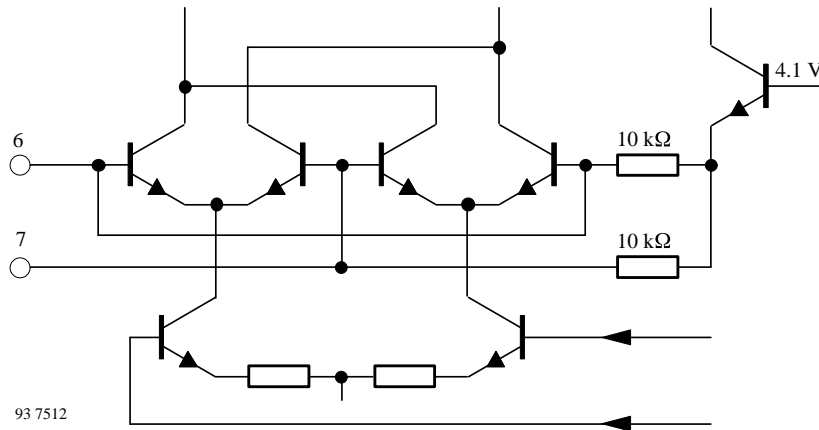


Figure 6. Pin 6, 7: Reference circuit, demodulator

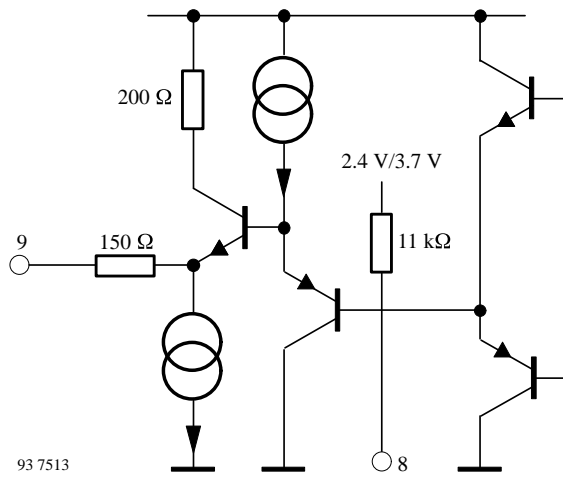


Figure 7. Pin 8, 9: Deemphasis and AF output (SCART)

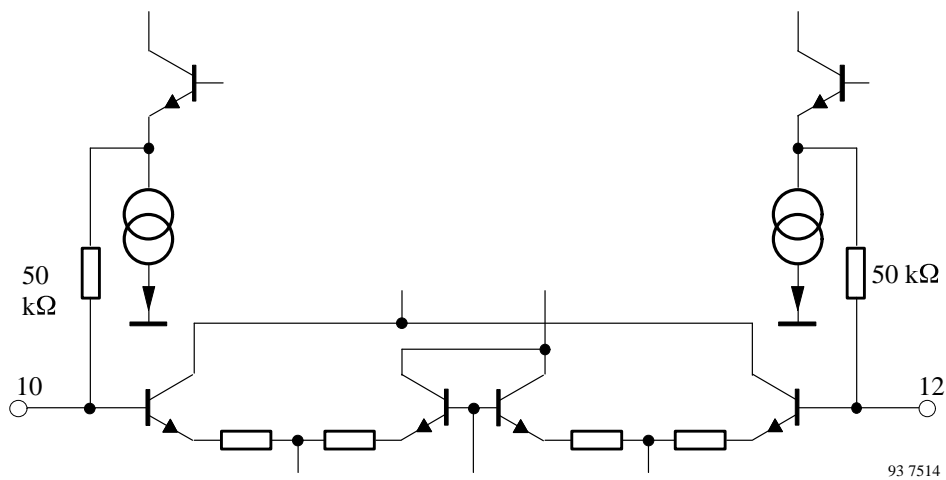


Figure 8. Pin 10, 12: AF input (demod. signal) and AF input (SCART)

Internal Pin Circuit Diagrams (continued)

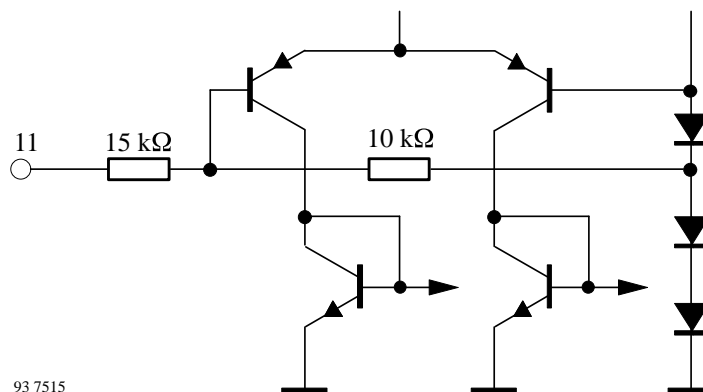


Figure 9. Pin 11: SCART switch

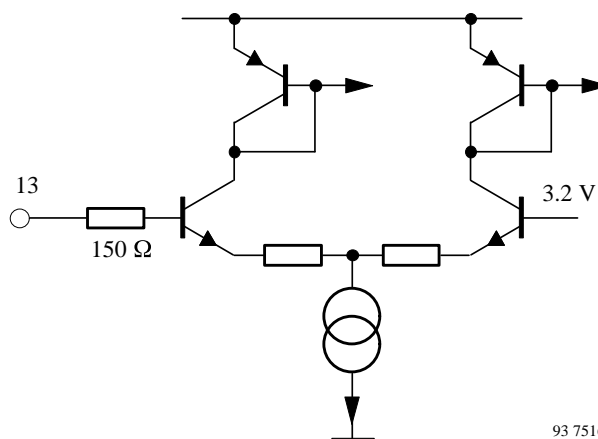


Figure 10. Pin 13: Volume control

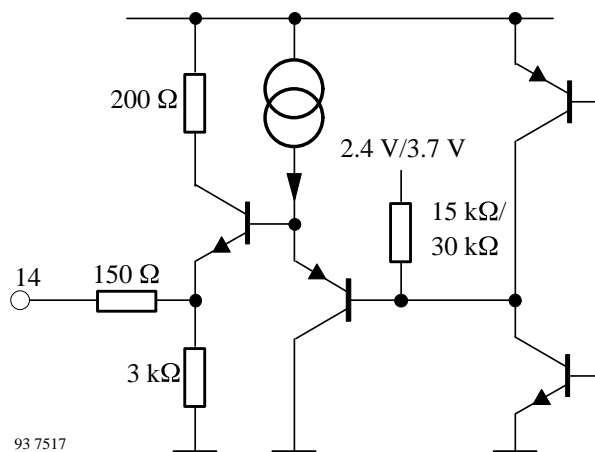


Figure 11. Pin 14: AF output (controlled)

Internal Pin Circuit Diagrams (continued)

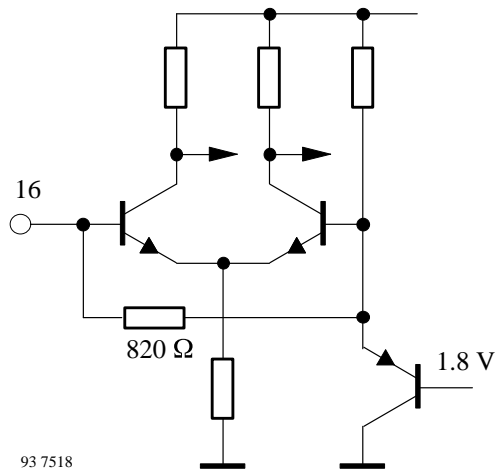
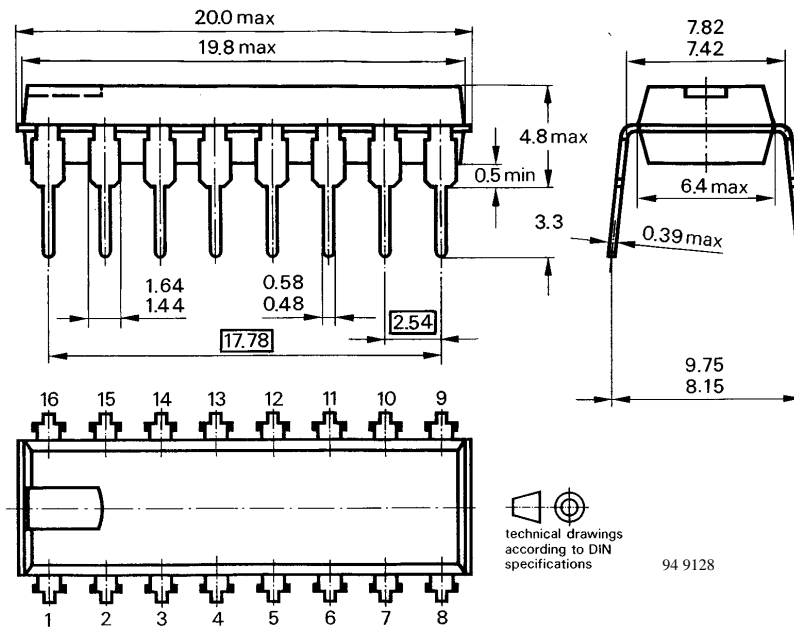


Figure 12. Pin 16: IF input

Dimensions in mm

Package: DIP16



Ozone Depleting Substances Policy Statement

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

TEMIC can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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