

AM Receiver for AM Stereo

TDA 4010

Preliminary Data

Bipolar IC

Features

- Internal demodulation
- Search tuning stop signal
- Low total harmonic distortion
- Minimal IF leakage at the AF output
- 2-stage integrated low pass
- Standard IF-output

| Type | Ordering Code | Package |
|----------|---------------|----------|
| TDA 4010 | Q67000-A8074 | P-DIP-18 |

Circuit Description

Compared to TDA 4001 the TDA 4010 is an extended AM-receiver. This type is suitable for applications in car radios.

The IF-output V_{OIF} is at pin 15.

The monolithic integrated bipolar receiver has been designed to convert, amplify and demodulate AM-signals. In addition, the component provides a search tuning pulse.

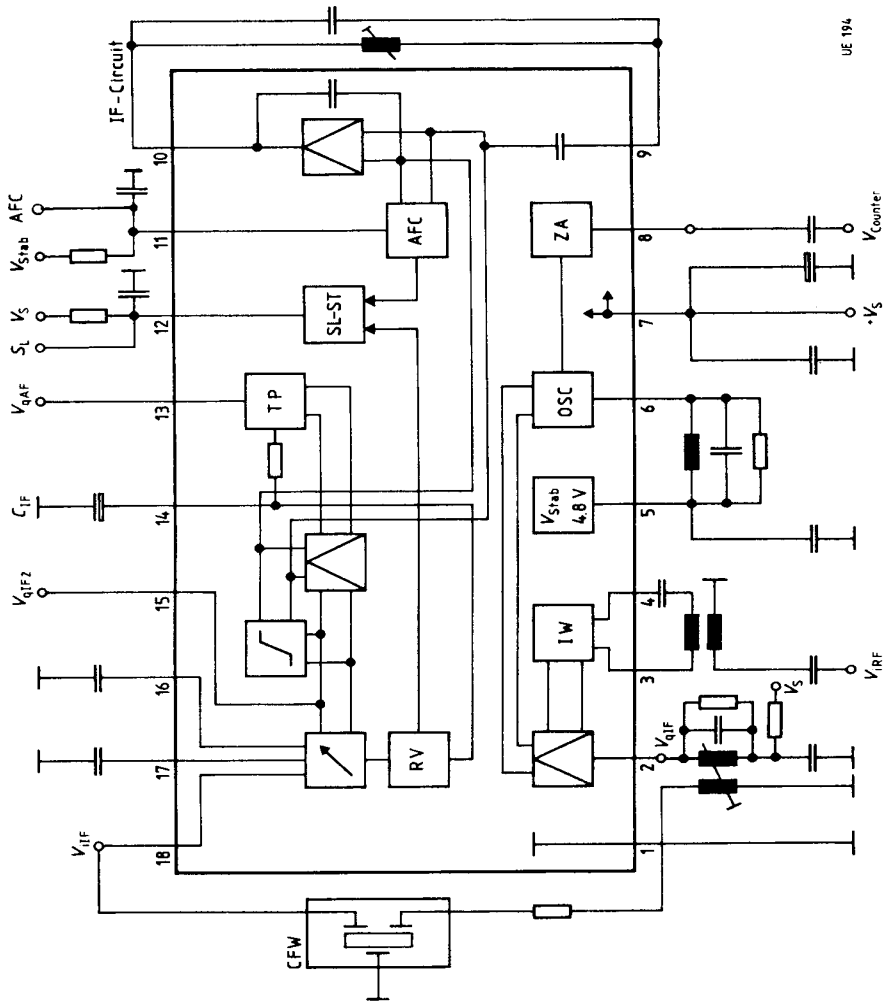
The search tuning stop pulses are processed from the input signal.

The standard AM-IF signal is available at the output of the IF-receiver.

The impedance converter forwards the input signal V_{IRF} to the symmetrical double balanced mixer. Subsequently the signal is converted to IF with the amplitude-controlled oscillator. An external filter forwards the IF signal to the controlled IF amplifier. The amplifier IF signal and the carrier signal will be converted to AF in the subsequent synchronous demodulator. The 2-stage low pass filter forwards the available AF to the AF output.

Via an additional limiter amplifier (LA), the AF uses the carrier signal to control the coincidence demodulator (CD). The output signal of the coincidence demodulator provides the stop pulse during exact tuning and sufficient field strength.

Block Diagram



Pin Functions

| Pin No. | Function |
|---------|-------------------------------------|
| 1 | Ground |
| 2 | Mixer output, IF circuit |
| 3 | RF-input |
| 4 | RF-input |
| 5 | V _{Stab} |
| 6 | Oscillator |
| 7 | Supply voltage |
| 8 | Counter output |
| 9 | FM-demodulator circuit IF circuit |
| 10 | FM-demodulator circuit IF circuit |
| 11 | AFC-output |
| 12 | Search tuning stop output |
| 13 | AF-output |
| 14 | IF-time constant |
| 15 | Controlled IF-output |
| 16 | IF-operating point follow up device |
| 17 | IF-operating point follow up device |
| 18 | IF-input |

Absolute Maximum Ratings $T_A = 25\text{ °C}$

| Parameter | Symbol | Limit Values | | Unit |
|----------------------|-----------|--------------|------|------|
| | | min. | max. | |
| Operating voltage | V_S | | 16.5 | V |
| Current consumption | I_S | | 33 | mA |
| Junction temperature | T_j | | 150 | °C |
| Storage temperature | T_{stg} | – 40 | 125 | °C |

Thermal Resistance

| | | | | |
|--------------|--------------|--|----|-----|
| Chip ambient | $R_{th\ SU}$ | | 78 | K/W |
| Chip package | $R_{th\ SG}$ | | | |

Operating Range

| | | | | |
|-------------------|-------|------|----|----|
| Operating voltage | V_S | 7 | 15 | V |
| Temperature range | T_A | – 25 | 85 | °C |

Characteristics $V_S = 12\text{ V}; T_A = 25\text{ }^{\circ}\text{C}$

| Parameter | Symbol | Limit Values | | | Unit | Test Condition |
|---|-------------------|--------------|------------|----------|--|---|
| | | min. | typ. | max. | | |
| Current consumption | I_S | 9 | 15 | 30 | mA | |
| Reference voltage | V_{Stab} | 4.2 | 4.8 | 5.4 | V | |
| IF-output voltage | $V_{Q\text{ IF}}$ | 600 | 800 300 | 1000 | mV _{rms} mV _{rms} | $m = 0.8$ $m = 0.3$ |
| Total harmonic distortion | THD | $m = 0.8$ | | 2.5 1 | % % | $m = 0.8$ $m = 0.3$ |
| IF-output voltage | $V_{Q\text{ IF}}$ | | | 3 | dB | $20 \lg(V_{QNF}/30\text{mV}_0)$ $V_{QNF}/1\text{mV}$ |
| Input sensitivity | $V_{\text{I RF}}$ | 30 | 30 | | μV_{rms} | V_{QNF} for $V_{\text{IHF}} = 1\text{mV} - 3\text{dB}$ |
| Signal-to-noise ratio | $\frac{S+N}{N}$ | | 6 | | dB | $m = 0.3$ $V_{\text{IHF}} = 10\text{ }\mu\text{V}_{\text{rms}}$ |
| Signal-to-noise | $S+N$ | 44 | 46 | | dB | $m = 0.3$ $V_{\text{IHF}} = 1\text{mV}$ |
| Oscillator voltage | V_{OSC} | | 100 | | mV _{pp} | |
| Counter output voltage | V_{OC} | | | 100 | mV _{pp} | |
| Control range ($\Delta V_{Q\text{IF}} = 6\text{dB}$) | a | 60 | | | dB | |
| 3dB limit frequency of the integrated TP | f_g | | 5 | | kHz | |

Characteristics (cont'd) $V_S = 12\text{ V}$; $T_A = 25\text{ }^\circ\text{C}$

| Parameter | Sym- bol | Limit Values | | | Unit | Test Condition |
|--|------------------|--------------|---------|-----------|-------------------|--|
| | | min. | typ. | max. | | |
| IF-suppression | α_{IF} | | 40 | | dB | |
| Conversion gain | V_m | | 30 | | dB | |
| IF-output pin 15 | V_{QIF} | 8 | 10 | 22 | mV _{rms} | 1M Ω /1.5pF |
| AFC-offset current without signal | I_{AFC} | | | ± 25 | μA | |
| AFC-offset current over control range | ΔI_{AFC} | | | ± 25 | μA | |
| AFC-current | I_{AFC} | ± 60 | | ± 100 | μA | $f_{IF} = 1\text{MHz} \pm 3\text{kHz}$ |
| SLS-output voltage | V_{12} | | | 0.4 | V | $f_{IF} = 455\text{kHz}$ |
| SLS-output voltage | V_{12} | 11 | | | V | $f_{IF} = 0\text{V}$ |
| SLS-output voltage | V_{12} | 11 | | | V | $f_{IF} > 455\text{kHz} + 3\text{kHz}$ |
| SLS-output voltage | V_{12} | 11 | | | V | $f_{IF} > 455\text{kHz} - 3\text{kHz}$ |
| Input impedance | Z_{IRF} | | 10/1.5 | | k Ω /pF | pin 3, 4 |
| Input impedance | Z_{IRF} | | 3.3/1.5 | | k Ω /pF | pin 18 |

