

SIEMENS AG

IC-SPECIFICATION

TDA 4362 X

Differences to the last edition

Last Edition: **DOK-Nr. V66047-S1603-C200-G1** date: **11.12.97**

Page 11: #P7: Test values and units changed
#P8: Test values and units changed
#P11: Test values changed, wrong values in previous version

Page 12: #P21,22: Min max values added
#P23: Load resistor added and values changed

TDA 4362 X**Table of Contents****AM- Updown - Conversion**

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This specification replaces the previous editions

DOK-Nr.	date	DOK-Nr.	date
V66047-S1603-C200-G1	11.12.97		

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TDA 4362 X

Functional Description, Application**Dual-Conversion-AM-Receiver**

The TDA 4362 X is an integrated Dual-Conversion- AM-Receiver for use in car radios.

The input signal passes a linear mixer for conversion into the 1.IF (~10 MHz) . Via an external bandpass-filter (CER-filter, quartz filter) the 1. IF is converted in a second linear mixer to the 2. IF (~450kHz).

After an external narrowband-selectivity (CER-filter) the 2. IF passes an automatic gain controlled amplifier and is then demodulated to the AF.

Features

- High flexibility with an external preamplifier stage
- Symmetrical or asymmetrical mixer input
- 2-Pin-Oscillator for the 1. LO
- 1. LO with LC-tank circuit
- 1. LO in 60 to 160 MHz range
- Low narrow band noise
- Divider for 1. LO by 6, 10
- Integrated AGC generation for the prestages
- Strictly symmetrical RF path
- Decoupled direct and divided counter outputs
- 2. LO with external source input
- Output for gain controlled 2. IF

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Circuit Description

The integrated circuit includes a 2-Pin oscillator (1.LO) with sym. input, buffered output and a double balanced mixer with symmetrical input. This stage converts the AM-Inputsignal to a 1. IF, which is much higher (~10 MHz) than the input frequencies. The 1. LO operates as a LC-varactor tuned oscillator in the same 100 MHz range like the FM-Tuner oscillator (e.g. TUA 4310 X) . So the same peripheral elements can be used.

Depending on the signal strength the prestage AGC controls a MOSFET-prestage amplifier.

The 1. IF passes an external selectivity and is then converted in a symmetrical double balanced mixer to the 2. IF.

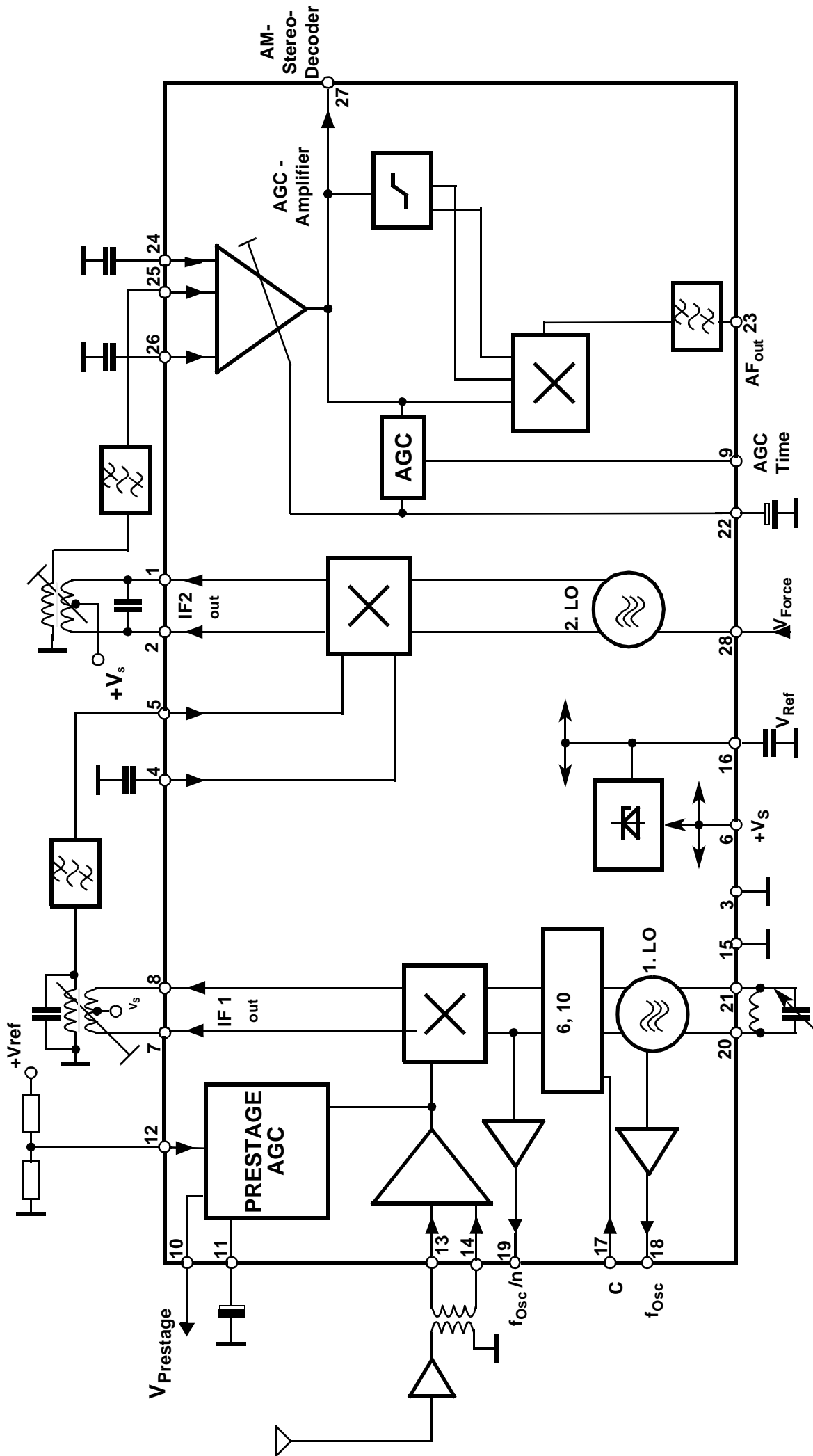
The 2. LO operates as an amplifier for an external forcing signal.

The 2. IF signal passes an automatic gain controlled IF amplifier and is then demodulated to the AF in a quasi-synchronous-demodulator.

For AM-Stereo application a gain controlled output of the 2. IF is available.

The TDA 4362 X is prepared to work with a PLL in the 100MHz range. When applied with a standard AM-PLL the oscillator frequency divided by 6 or 10 has to be used. In this case a higher phase noise is to be expected.

Block Diagram



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Pin Assignment**Pin configuration**

1. 2. Mixer output
2. 2. Mixer output
3. Ground (LF)
4. 2. Mixer input
5. 2. Mixer input
6. Supply voltage
7. 1. Mixer output
8. 1. Mixer output
9. AGC-time constant switch
10. Prestage voltage output
11. Prestage time constant
12. Prestage threshold
13. Mixer 1 input
14. Mixer 1 input
15. Ground
16. Reference voltage (RF)
17. Counter ratio C
18. Counter output direct
19. Counter output divided
20. Local oscillator
21. Local oscillator
22. LIF time constant
23. AF output
24. LIF input (blocked to LF GND)
25. LIF input active
26. LIF input (blocked to LF GND)
27. AM output
28. 2. LO force input

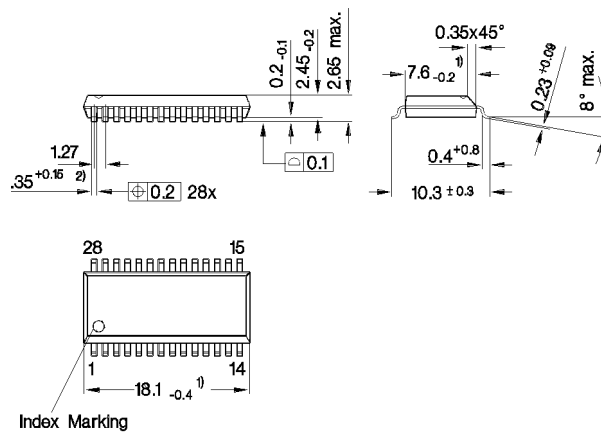
TDA 4362 X**Pin Description**

- Pin 1,2:** Open collector output of mixer 2 for the lower IF (~450 kHz)
- Pin 3:** GROUND: All LF blocking capacitors should be connected to this point.
- Pin 4,5:** Sym. mixer 2 input for the upper IF (~10.7 MHz). Asym. operation is possible. The input signal is converted to the lower IF corresponding the equation
- $$f_{LIF} = f_{UIF} - f_{2.LO}$$
- Pin 6:** Supply-voltage. This point is to be blocked to ground for AF and for RF-Signals
- Pin 7,8:** Sym collector output of the mixer 1. The external tank circuit is tuned to the upper IF.
- Pin 9:** DC-Voltage determines the AGC-Time. GND: normal mode Vref: fast mode
- Pin 10:** Buffered prestage AGC output
- Pin 11:** Blocking capacitor for the prestage AGC
- Pin 12:** DC-Voltage alters the threshold voltage of the prestage AGC-circuit.
- Pin 13,14:** Sym. input for the AM-Signal in the frequency range of 100 kHz to 160 MHz .
- Pin 15:** GROUND: All DC-Values are referred to this pin. All RF blocking capacitors should be connected to this point.
- Pin 16:** Output for the internal reference voltage. This pin is to be blocked with a ceramic capacitor to RF ground.
- Pin17:** Input for the frequency divider.
- Pin 18:** Buffered output for the oscillator frequency
- Pin 19:** Buffered output for the by n divided (n= 6 or 10) Oscillator frequency
- Pin 20,21:** The ext. LC-Circuit determines the oscillator frequency
- Pin 22:** Blocking capacitor for the IF-AGC-Circuit to suppress AF-frequencies
- Pin 23:** Buffered AF output
- Pin 24,25,26:** Input-Pins for the DC-coupled AGC-Amplifier 1.
- Pin 27:** Buffered output for the AGC-controlled lower IF-Signal. This pin is connected to the AM-Stereo-Decoder.
- Pin 28:** Input for the 2. Local oscillator (LO). The pin has to be forced with an ext. signal

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Package Outline

Plastic Package
P-DSO-28-1



- 1) Does not include plastic or metal protrusion of 0.15 max. per side
- 2) Does not include dambar protrusion

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Absolute Maximum Ratings

The maximal ratings may not be exceeded under any circumstances, not even momentarily and individually, as permanent damage to the IC will result.

#	Max. Ratings for ambient temperature T_{amb} -40°C to 85°C	Symbol	Min	Max	Units	Remarks
1	Supply voltage	V_6	0	13.2	V	
2	Reference voltage	V_{16}	0	5	V	
3	Reference current	I_{16}	0	1	mA	
4	Prestage threshold	V_{12}	0	5	V	
5	Mixer 1 input	V_{13}, V_{14}	0	5	V	
6	Logical divider input	V_{17}	0	13.2	V	
7	Counter output	V_{18}	0	13.2	V	
8	Divided counter output	V_{19}	0	13.2	V	
9	1.LO	V_{20}, V_{21}	0	5	V	
10	Time constant for 2 IF AGC	V_{22}	0	5	V	
11	Leakage current	I_{22}		1	uA	
12	AF-output	V_{23}	0	13.2	V	
14	AGC input	V_{24}, V_{25}, V_{26}	0	5	V	
15	AM-Stereo output	V_{27}	0	13.2	V	
16	2. LO input	V_{28}	0	5	V	
17	2. Mixer output	$V_{1,2}$	0	5	V	
18	2. Mixer input	$V_{4,5}$	0	5	V	
19	1. Mixer output	$V_{7,8}$	0	13.2	V	
20	AGC-Time	V_9	0	13.2	V	
21	Prestage AGC	V_{10}	0	13.2	V	
22	PrestageTime constante	V_{11}	0	13.2	V	
23	ESD voltage human body model 100 pF/1500 Ω	V_{ESD}	-2	+2	kV *)	
24	Thermal Resistance	R_{thSA}		76	k/W	

*) 2 kV ESD protection is not valid for pin 28

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Operational Range

Within the operational range the IC operates as described in the circuit description. The AC / DC characteristic limits are not guaranteed.

#	Parameter	Symbol	Min	Max	Units	Remarks
1	Supply Voltage	V_6	7.5	11	V	
2	Ambient temperature	T_{amb}	-40	+85	°C	

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AC / DC Characteristics

AC / DC characteristics involve the spread of values guaranteed within the specified supply voltage and ambient temperature range. Typical characteristics are the median of the production.

#	Parameter	Symbol	Test Conditions	Test Circuit	Min	Typ	Max	Units
Supply voltage			$V_S=8.5V$					
Ambient temperature			$T_{amb}= 25\text{ }^\circ\text{C}$					
			$f_{IF1}= 10.7\text{ MHz}$					
			$f_{IF2}= 450\text{ kHz}$					
			$f_i= 1\text{ MHz}$					
1	Current consumption	I_{6+} $I_{1+I_{2+}}$ I_{7+I_8}	$n=10$	1	50	62	77	mA
Mixer 1								
2	Interceptpoint 3. Order	IP3	$ V_{13}-V_{14} $	Lab		130		dBuV
3	Mixer gain	v	$20\lg V_5 / V_{13}-V_{14} $	1	0	2	4	dB
4	Max. input voltage		$ V_{13}-V_{14} $ for -1 dB compression	1			600	mV _{pp}
5	Noise figure (10 MHz)	F		Lab			10	dB
1. LO								
6	Frequency range	$f_{1.LO}$		Lab	60		160	MHz
7	Counter output	V_{18}	$R_L=330\Omega$	1	70	100		mV _{rms}
8	Divided counter output	V_{19}	$R_L=330\Omega$	1	35	50		mV _{rms}
9	Output impedance	R_{ex18}		Lab		330		Ω
10	Output impedance	R_{ex19}		Lab		330		Ω
Converter								
11	Mixer gain	V		1	2	5	8	dB
12	Noise figure	F		Lab			10	dB
2. LO								
13	Frequency range	$f_{2.LO}$		1	25			MHz
14	External force voltage	V_{28}		1	60			mV _{rms}
Prestage AGC output								
15	AGC-Voltage	U_{10}	$ V_{13}-V_{14} =0\text{mV}_{rms}$	1	6.3	7.2	V_S	V
16	AGC-Voltage	U_{10}	$ V_{13}-V_{14} =400\text{mV}_{rms}$	1		0.7	1	V
17	Integrator current	I_{11}^*	$ V_{13}-V_{14} =0\text{mV}_{rms}$	1		-30		uA
18	Integrator current	I_{11}^*	$ V_{13}-V_{14} =200\text{mV}_{rms}$	1		30		uA

*) integrator currents are measured between the output pin (- Pole of the measurement equipment) and a voltage source with a value of $3V_{DC}$ (+ Pole).

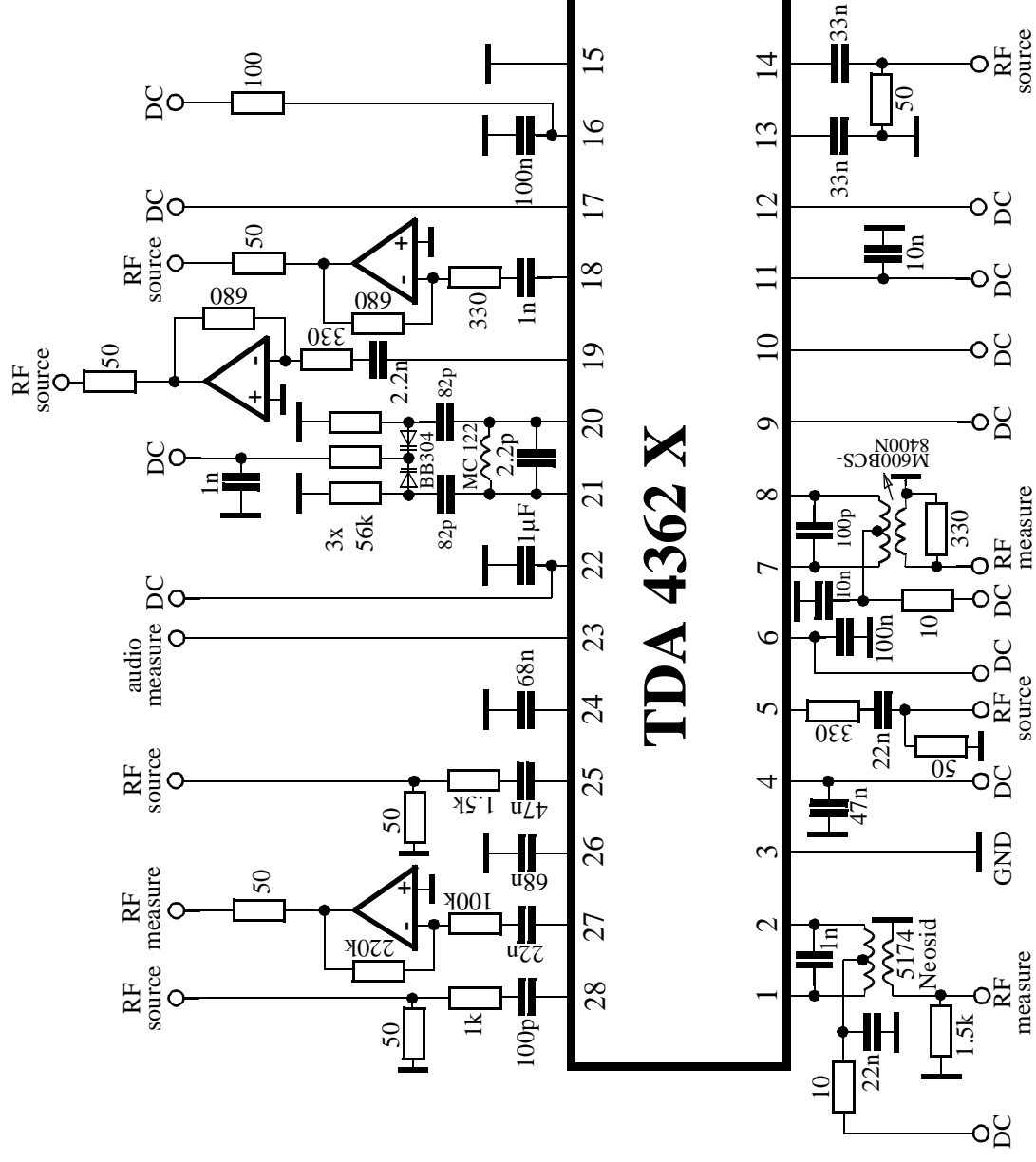
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AC / DC Characteristics

AC / DC characteristics involve the spread of values guaranteed within the specified supply voltage and ambient temperature range. Typical characteristics are the median of the production.

#	Parameter	Symbol	Test Conditions	Test Circuit	Min	Typ	Max	Units
AGC-Amplifier			$V_i = V_{25} - V_{26} $					
19	AGC-Range			1	60	66		dB
20	AGC-Voltage	V_{22}	$V_i = 0 \text{ mV}_{\text{rms}}$	1		0.6	1	V
21	AGC-Voltage	V_{22}	$V_i = 500 \mu\text{V}_{\text{rms}}$	1	1.1	1.45	1.8	V
22	AGC-Voltage	V_{22}	$V_i = 30 \text{ mV}_{\text{rms}}$	1	2.7	3.1	3.7	V
23	reg. output voltage	V_{27}	$R_L = 100\text{k}\Omega$	1	48	60		mV_{rms}
24	Input sensitivity	V_i	$V_{23} 100\text{mV} - 3\text{dB}$	1		100		μV_{rms}
25	AGC-current	I_{22}	$V_i = 100\text{mV}_{\text{rms}}$ AGC=fast	1	400	500	650	μA
26	AGC-current	I_{22}	$V_i = 0\text{mV}_{\text{rms}}$ AGC=fast	1	-400	-500	-650	μA
27	AGC-current	I_{22}	$V_i = 100\text{mV}_{\text{rms}}$ AGC=slow	1	15	25	35	μA
28	AGC-current	I_{22}	$V_i = 0\text{mV}_{\text{rms}}$ AGC=slow	1	-13	-25	-33	μA
AM-Demodulator			$V_i = V_{25} - V_{26} $					
29	AF output voltage	V_{23}	$m=0.3$	Lab		180		mV_{rms}
30	AF output voltage	V_{23}	$m=0.8$	1	400	480	560	mV_{rms}
31	Total harm. distortion	k	$V_i = 10 \text{ mV}_{\text{rms}}, m=0.8$	1		1	1.7	%
32	Input voltage for S+N/N=6 dB	V_i	$m=0.3$	Lab	10			μV_{rms}
33	Input voltage for S+N/N=26 dB	V_i	$m=0.3$	Lab	100			μV_{rms}
34	S+N/N		$V_i = 10 \text{ mV}, m=0.8$	1	58	64		dB
35	AF-Linearity	ΔV_{23}	$100\mu\text{V}/100 \text{ mV}$	1			3	dB
Divider Ratio								
36	Input voltage "L"	V_{17}	divide by 10	1	0		1.5	V
37	Input voltage "H"	V_{17}	divide by 6	1	3.0		V_S	V
AGC-Times								
38	Fast	V_9		1	2.0		V_S	V
39	Slow	V_9		1	0		0.7	V
Reference voltage								
40	Reference voltage	V_{16}		1	4.5	4.8	5.1	V

Test Circuit



Application Circuit

AM dual conversion receiver

