AM Receiver Circuit

Technology: Bipolar

Features

- Controlled RF preamplifier
- Multiplicative balanced mixer
- Separate oscillator with amplitude control
- IF amplifier with gain control
- Balanced full-wave detector
- Audio preamplifier
- Internal AGC voltage
- Amplifier for field-strength indication
- Electronic stand-by on/off switch

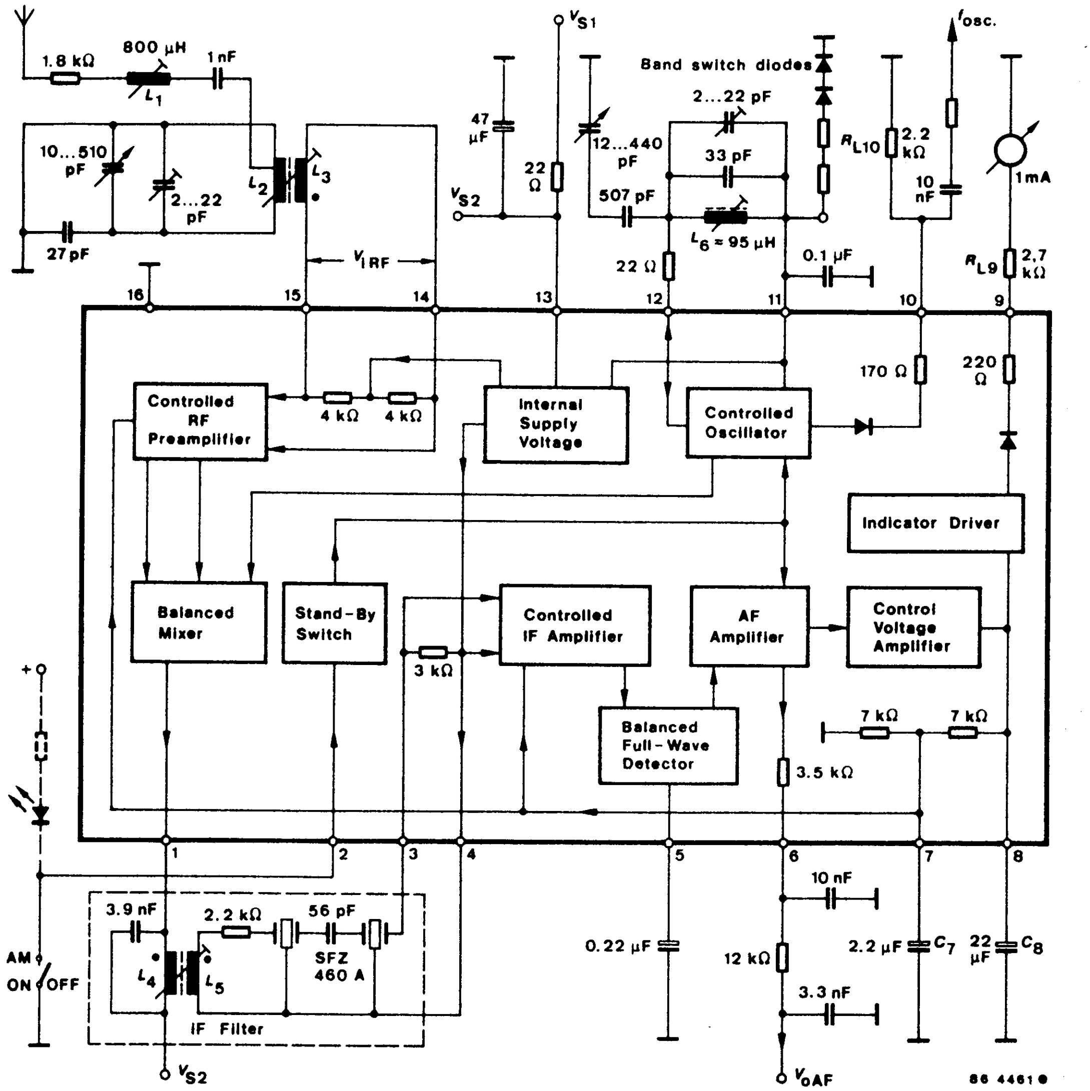


Figure 1. Block diagram and application circuit

Absolute Maximum Ratings

Reference point pin 16, unless otherwise specified

Parameters		Symbol	Value	Unit
Supply voltage	Pin 13	V_S	20	V
Voltage on Pin 2		V_2	0 to 20	V
RF inputs Voltages Reference point 15	 Pin 14 Pin 14 Pin 14 Pin 15 Pin 15	 $\pm V_{i\ 14/15}$ V_i $-V_i$ V_i $-V_i$	 12 V_s 0.6 V_i 0.6	 V V V V V
RF inputs Currents	 Pin 14, 15	 $\pm I_i$	 200	 mA
Ambient temperature range		T_{amb}	– 30 to + 80	°C
Storage temperature range		T_{stg}	– 55 to + 150	°C

Electrical Characteristics

V_S = 8.5 V, reference point pin 16, f_{IRF} = 1MHz, R_G = 50 Ω, f_{mod} = 0.4 kHz, m = 30%, f_{IF} = 460 kHz, T_{amb} = + 25 °C, unless otherwise specified

Parameters	Test Conditions / Pin	Symbol	Min	Type	Max	Unit
Supply voltage range	Pin 13	V_S	7.5	18		V
Supply current,	without load, I_L = 0 (Pin 11) Pin 13	I_S		23	30	mA
RF preamplifier and mixer						
DC input voltages	Pin 14, 15	V_i		$V_S/2$		V
Input impedances	V_{iRF} < 300 µV, Pin 14,15 V_{iRF} > 10 mV, Pin 14, 15	R_i C_i R_i C_i		5.5 25 8.0 22		kΩ pF kΩ pF
Output impedance	Pin 1	R_O C_O	500	 6.0		kΩ pF
Maximum conversion conductance	$I_{O\ 1\ IF}/V_{iRF}$	ΔS_M			6.5	mA/V
Maximum IF output voltage	Pin 1	$V_{OIF(PP)}$			5.0	V
Output current	Pin 1	I_O		1.2		mA
Preamplifier control range		S_M		30		dB
Max. RF input voltage	Pin 14, 15	$V_{i(PP)}$			2.5	V
Oscillator						
Frequency range	Pin 12	f_{OSC}	0.6		60	MHz
Oscillator circuit impedance range	Pin 12	Z_{LOSC}	0.5		200	kΩ

Parameters	Test Conditions / Pin	Symbol	Min	Type	Max	Unit
Controlled oscillator amplitude	Pin 12	V_{OSC}		130	150	mV
DC output voltage	I_L = 0 V Pin 11	V_O		6 $V_{BE(4V)}$		V
Output load current range	Pin 11	$-I_L$			20	mA
Output resistance	I_L = 5 ± 0.5 mA, Pin 11	R_O		25		Ω
Oscillator frequency output Pin 10						
Output voltage	R_{L10} = 4.7 kΩ	$V_{O(PP)}$		320		mV
Output resistance		R_O		170		Ω
Allowable output current		$I_{O(P)}$			3	mA
IF amplifier an AF stage						
DC input voltages	Pin 3, 4	V_i		2		V
Input impedance	Pin 3	R_i C_i	2.4	3 7	3.9	kΩ pF
Max. IF input voltage	m = 80%, d = 3% Pin 3	V_i		90		mV
Control range	V_{0AF} = –6 dB	ΔV_i	61			dB
Audio output voltage	Pin 6 V_i = 1 mV (Pin 3), without load	V_O		310		mV
Audio output resistance	Pin 6	R_O		3.5		kΩ
Field-strength indication Pin 9						
DC indicator voltages	R_{L9} = 2.7 kΩ, V_i = 0 V_i = 500 mV	 V_O V_O	 0 2.5	 2.8	 140 3.1	 mV V
Output current capability		$-I_O$	2.0			mA
Output resistance	$-I_0$ = 0.5 mA	R_O		220		Ω
Reverse voltage at the output	AM switch-Off, ± I_0 ≦ 1 µA	V_O		6		V
Stand-by switch Pin 2						
Switching voltage		V_i		2.75		V
Required control voltage	AM ON AM OFF	V_i V_i [1]	 3.5		2	V
Input current	AM on, switching current AM off, reverse current ($V_2 = V_3$)	$-I_i$ $\pm I_i$			200 10	µA

[1] or open input

Operating Conditions

V_S = 8.5 V, f_{iRF} = 1 MHz, f_{mod} = 0.4 kHz, m = 30%, T_{amb} = 25°C, reference point Pin 16, see figure 2, unless otherwise specified

Parameters	Test Conditions / Pin	Symbol	Min	Type	Max	Unit
RF input voltages	(S + N)/N = 6 dB = 26 dB = 46 dB	V_{iRF}		1.5 15 150		µV
RF input for agc operation		V_{iRF}		30		µV
Control range for (Reference value V_i = 500 mV)	ΔV_0 = 6 dB ΔV_0 = 1 dB	ΔV_{iRF}		91 86		dB
Maximum RF input voltage	d = 3%, m = 80% d = 3%, m = 30% d = 10%, m = 30%	V_{iRF}		0.5 0.7 0.9		V
Audio output voltage	V_1 = 1 mV V_2 = 4 µV, m = 0.8	V_{0AF}		310 (± 2 dB) 130 (± 3.5 dB)		mV
RF input voltage	V_{0AF} = 60 mV	V_{iRF}		5.5		µV
Total distortion of audio output voltage	m = 80%, V_i = 1 mV V_i = 500 mV	d		0.5 3.0		%
Signal plus noise to noise ratio of audio output voltage	V_i = 1 mV	$\frac{(S + N)}{N}$		50		dB
IF bandwidth (–3 dB)		B_{iF}		4.6		kHz
IF selectively	$\Delta f = \pm$ 9 kHz $\Delta f = \pm$ 36 kHz	S_{iF}		30 60		dB

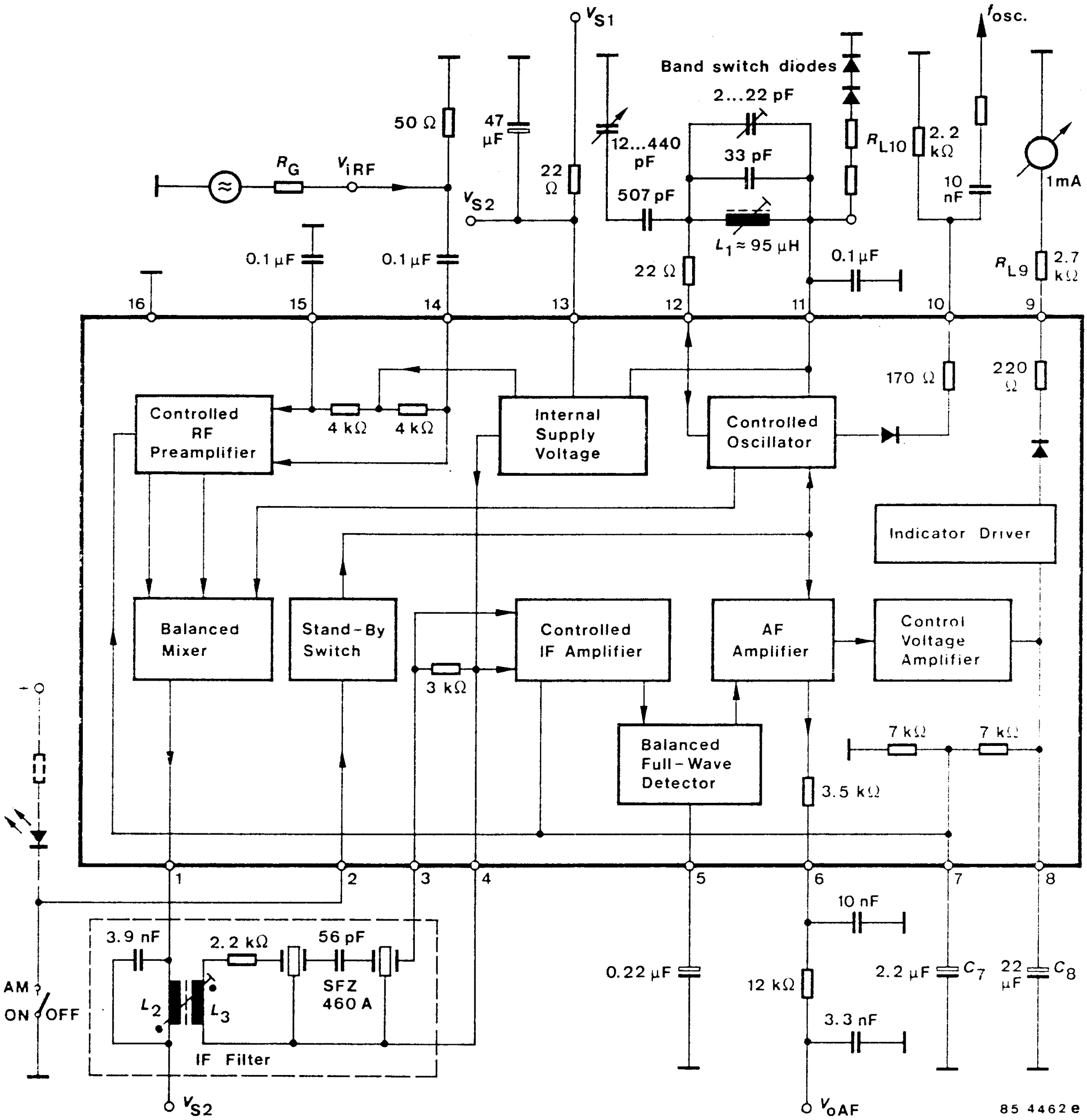
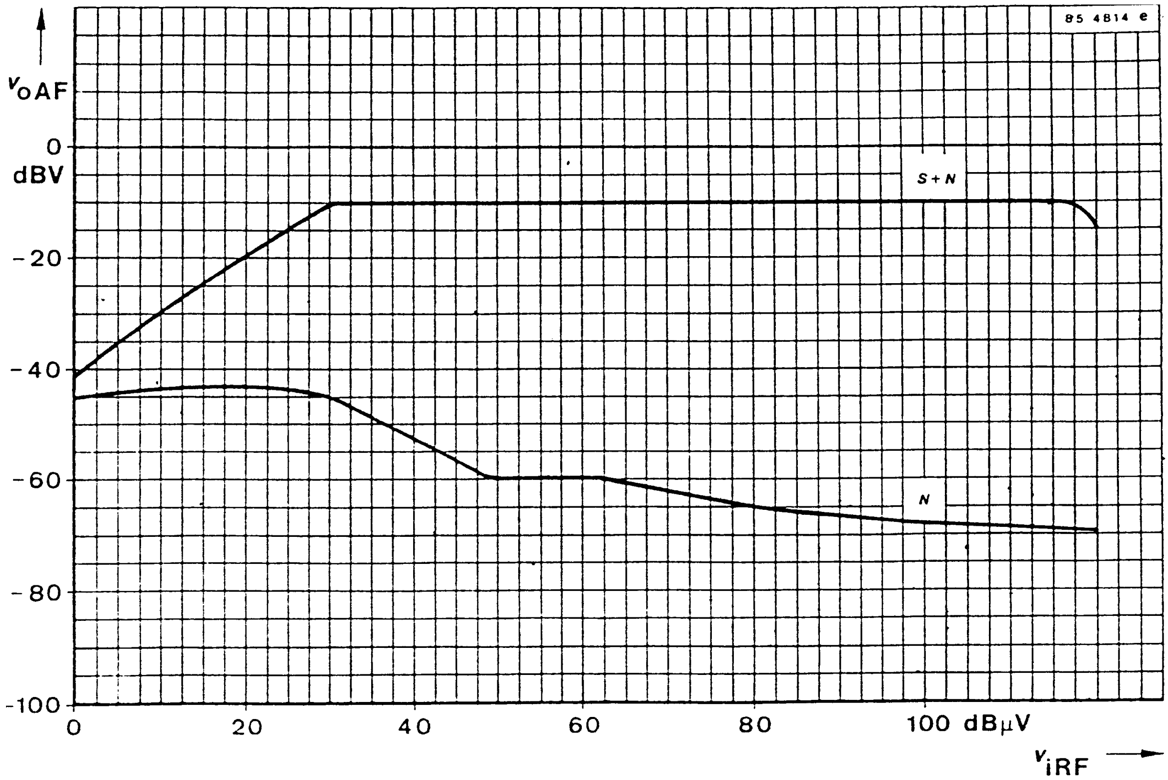
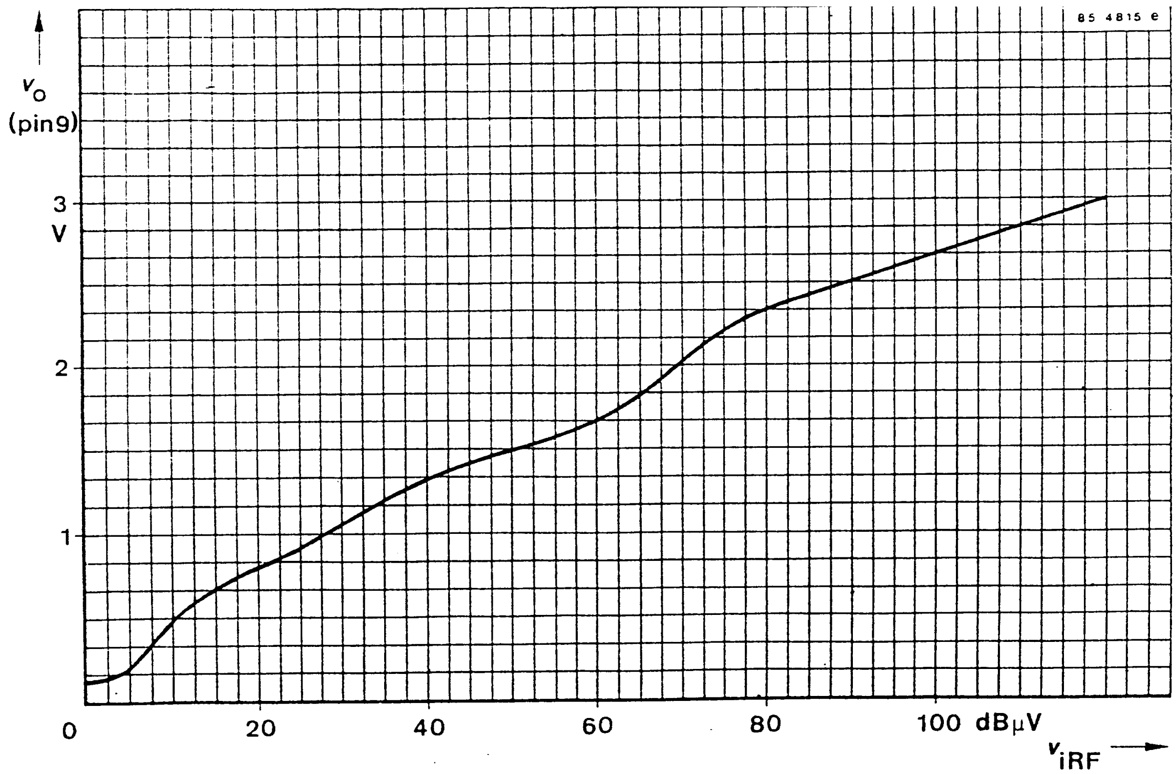
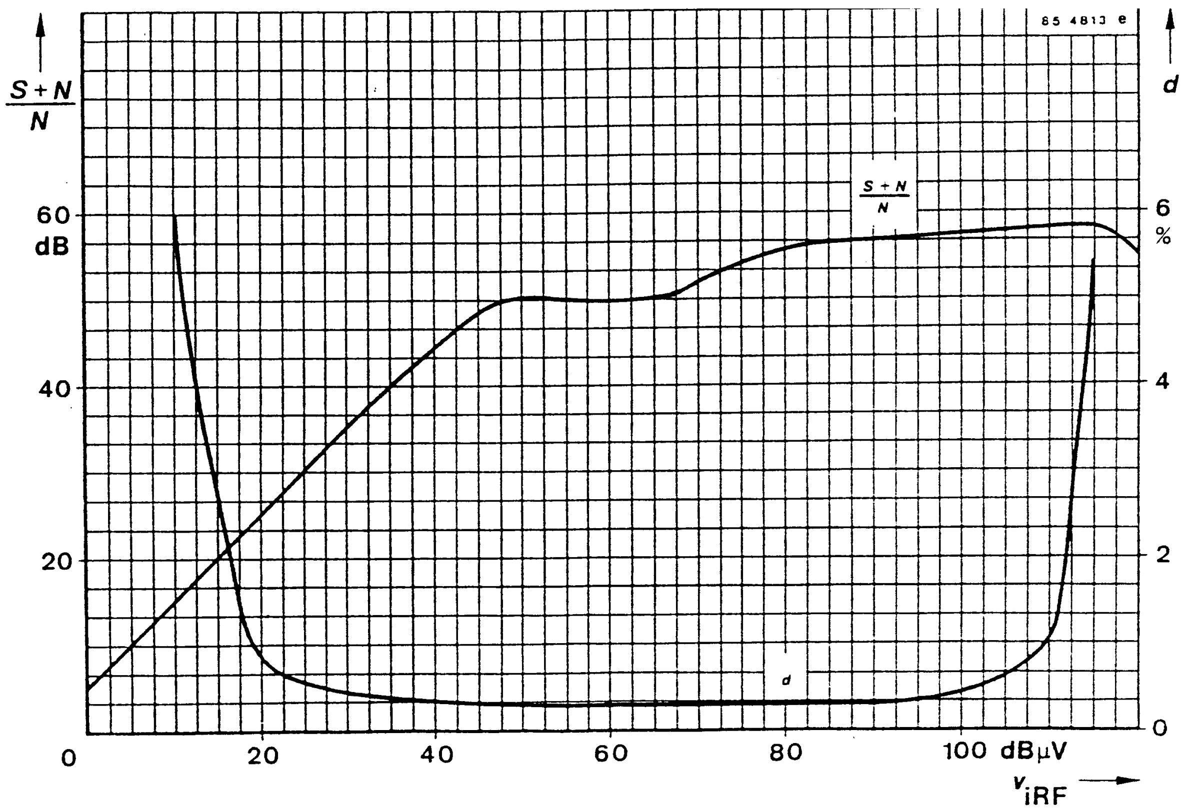


Figure 2. Test circuit

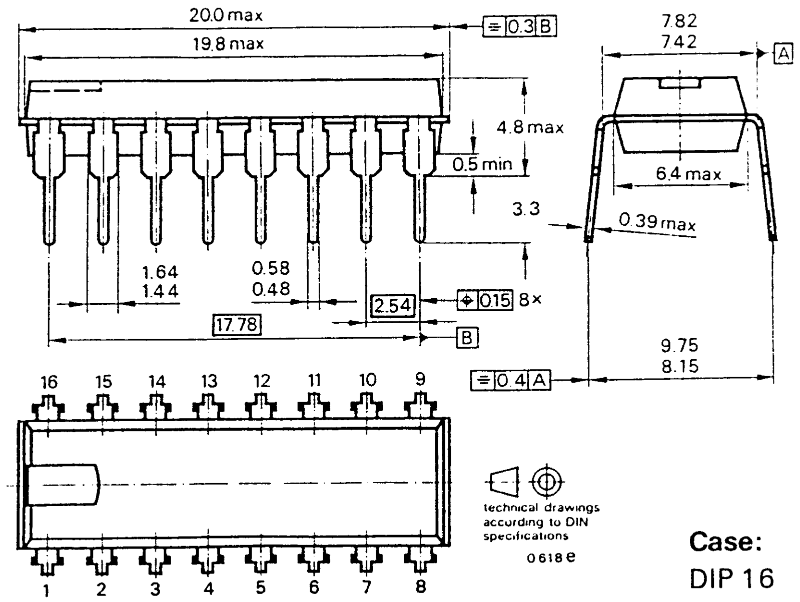

85 4814 e
v_{OAF}
0
dBV
-20
-40
-60
-80
-100
S + N
N
0
20
40
60
80
100 dBμV
v_{iRF}


85 4815 e
v_O
(pin9)
3
V
2
1
0
20
40
60
80
100 dBμV
v_{iRF}



Dimensions in mm

Package: 16-pin dual inline plastic



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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