FM IF Amplifier with Demodulator for Radio Receivers

TDA 1047

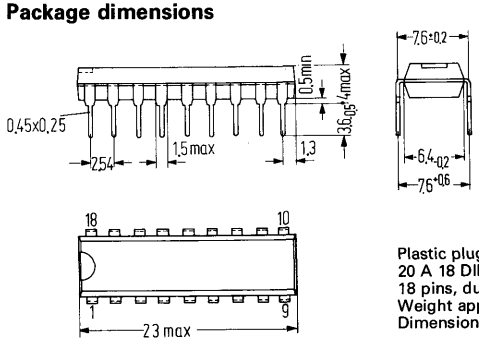
Preliminary data

TDA 1047 is a monolithic, symmetrical, 8-stage amplifier with symmetrical coincidence demulator designed for amplification, limiting and demodulation of frequency-modulated signals, especially suited for the FM-IF part of radio sets. The TDA 1047 offers provisions for the feeding of an amplitude indicator, either positive or negative going mono-stereo voltage, AFT output (push-pull-current output) with automatic switch-off, squelch adjustable for more than 40 dB range of input signal and depending on detuning.

- Excellent limiting qualities
- Excellent frequency stability of demodulator characteristic
- Large range of operating voltage between 4 and 18V
- Low current consumption
- Externally adjustable squelch
- Few peripheric components

Type	Ordering code
TDA 1047	Q67000-A1091

Package dimensions



Plastic plug-in package
20 A 18 DIN 41866
18 pins, dual-in-line
Weight approx. 1.3 g
Dimensions in mm

Absolute maximum ratings

Operating voltage	V_{12}	18	V
Thermal resistance	R_{thsa}	120	K/W
Junction temperature	T_j	150	°C
Storage temperature	T_s	–40 to +125	°C

Range of operation

Operating voltage	V_{12}	4 to 18	V
Frequency	f	0 to 15	MHz
Ambient temperature in operation	T_{amb}	–25 to +85	°C

Preliminary data

Electrical characteristics (V_{cc} = 12V; T_{amb} = 25°C; f_i = 10.7 MHz; f_{mod} = 1 kHz; Δf = ±75 kHz) **according to application circuit**

Current consumption (I_{14} = 0)	I_{12}	12	mA
Voltage for field strength indicator (R_{14} = 3.3 kΩ)			
V_i = 160 mV_{eff}	V_{14}	2.5	V
V_i = 16 μV_{eff}	V_{14}	10	mV
Maximum current	I_{14}	3.6	mA
Voltage for squelch adjustment (approx. log.)			
V_i = 8 mV_{eff}	V_{15}	0	V
V_i = 16 μV_{eff}	V_{15}	2.5	V
Maximum current	I_{15}	3.6	mA
AF output DC voltage	V_7	2.1	V
AF output voltage (V_i = 10 mV)	V_7	300	mV_{eff}
Internal DC voltage of output emitter follower	I_7	200	µA
Total harmonic distortion (V_i = 10 mV)	THD	.4	%
Input voltage for limiting	V_i	30	µV
Input resistance	R_{i18}	≥ 10	kΩ
AF output resistance[1]) (emitter follower output)	R_{q7}	≤1	kΩ
Threshold of detuning-depending squelch (referring to f = 10.7 MHz)	Δf	±100	kHz
Switch off voltage for AFT	ΔU_2	≥20	mV_{op}
Input resistance	R_{i2}	100 (>40)	kΩ
Voltage for AFT off	V_3	≥.8	V
IF output voltage for limiting	V_{8-11}	500	mV_{pp}
Input resistance for demodulator circuit	R_{9-10}	5.4	kΩ
Recommended volt. for demod. circuit[2])	V_{9-10}	500	mV
Threshold for AF off	V_{13}	.85	V
AF on	V_{13}	.6	V
Internal resistance for AF switch off time constant	R_{q6}	500	Ω

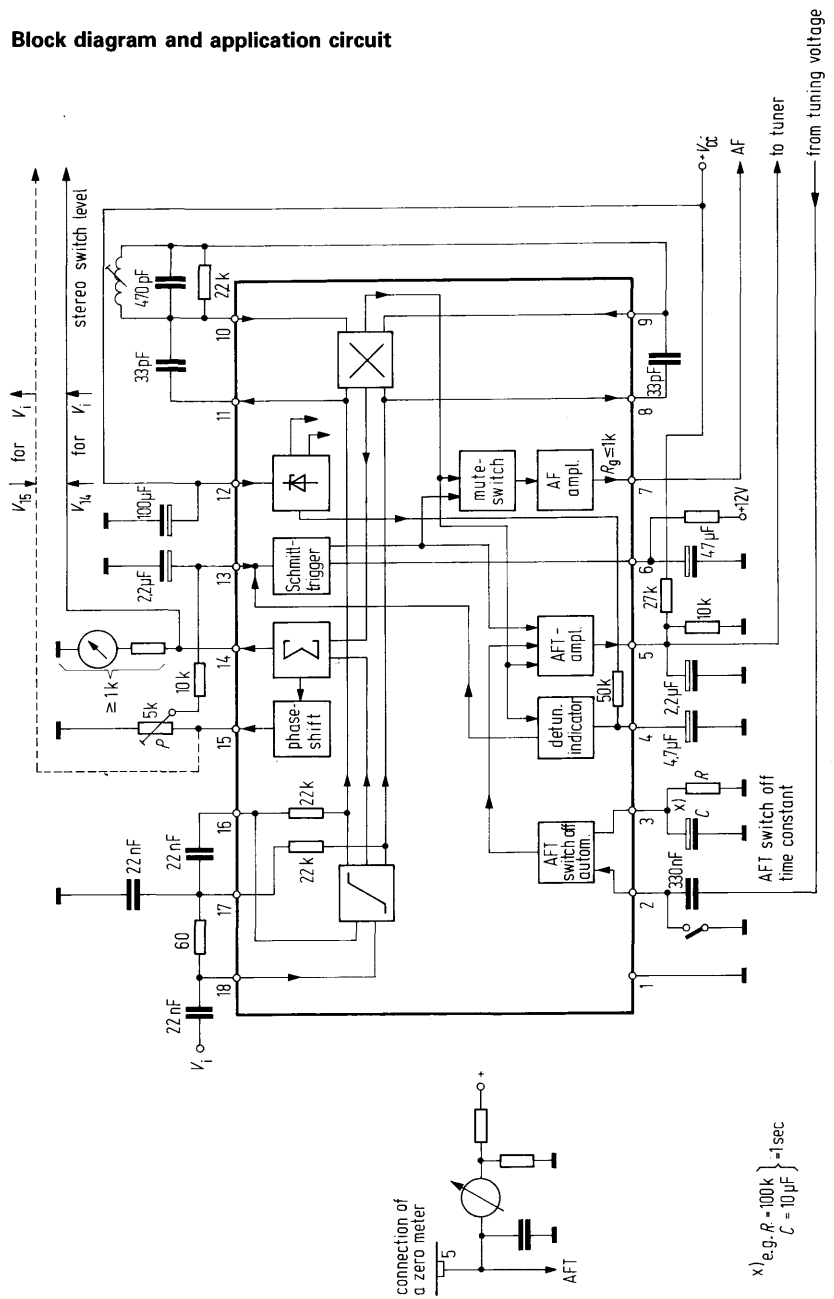
[1]) The output resistance R_{q7} can be reduced by connecting of a resistor of at least 2.7 kΩ between pin 7 and ground.
[2]) The recommended voltage at the demodulator circuit V_{9-10} can be adjusted by the capacitors C_{8-9} and C_{10-11}, which are also influencing the voltages V_{14} and V_{15}.

If the slider of potentiometer P is grounded, the field-strength-dependent squelch is switched off.
If pin 13 is grounded, both the field-strength- and the detuning-dependent squelch are switched off.
The noise level between the transmitters becomes more or less audible, when pin 6 is loaded with a resistance to +12 V in case of "squelch on". Noise attenuation increases with the size of the resistance ($R \geq 10$ kΩ).

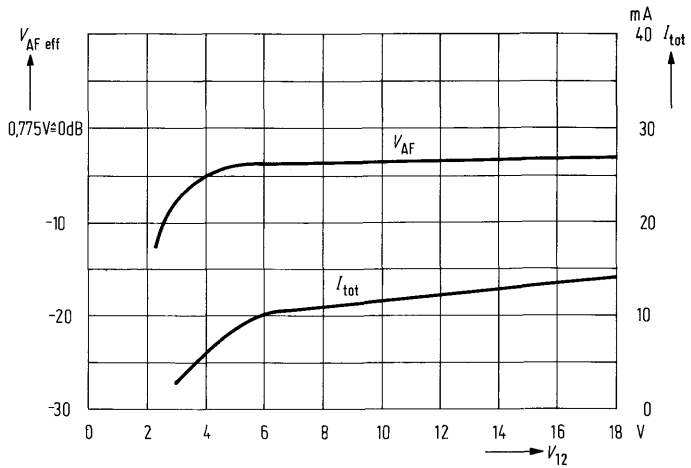
Pin connections

Pin 1 Ground
2 Sensor input for AFT switch off
3 AFT switch off time constant
4 Low-pass capacitor for detuning-dependent AF switch off
5 AFT output (push-pull output)
6 Low-pass capacitor for suppression of switch off clicks in case of detuning and insufficient field strength
7 AF output (emitter follower with constant-current source)
8 Output of limiter amplifier
9, 10 Phase shifting circuit
11 Output of limiter amplifier
12 Positive operating voltage
13 Input for amplitude-dependent switch off
14 Instrument connection and stereo switching voltage (positive going)
15 Squelch and stereo switching voltage (negative going)
16, 17 Feedbacks for IF amplifier
18 IF input

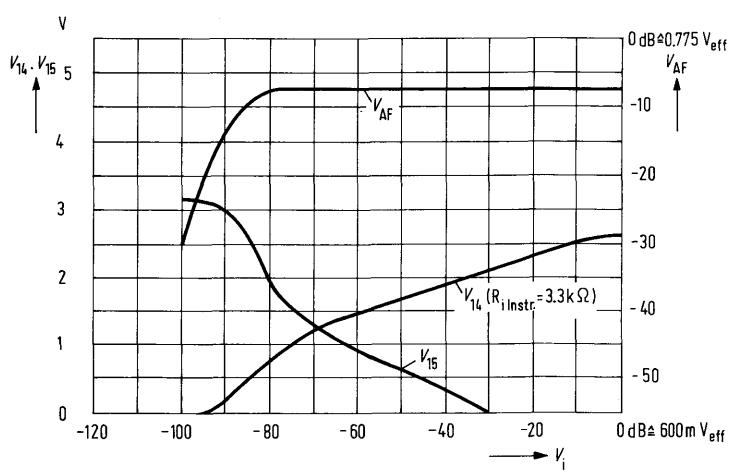
Block diagram and application circuit



AF output voltage, total current consumption vs operating voltage
V_{IIF} = 60 mV_{eff} wide band, pin 13 to ground, V_{9-10} = 500 mV_{pp}



AF output-, indicator-, squelch-voltage vs input voltage
V_{12} = 15 V, f = 10.7 MHz, Δf = ±75 kHz, f_{mod} = 1 kHz,
V_{9-10} = 500 mV_{pp}, wide band measured by 100 nF, THD = .4%



AF output voltage, noise voltage versus input voltage
f = 10.7 MHz, Δf = ±75 kHz, V_{12} = 15 V