

Quasi-Split-Sound Processing and AM-Demodulator

Description

The U4454B quasi-split-sound processor is a bipolar integrated circuit for all FM-TV standards and NICAM sound systems. For FM/NICAM the IC operates as

QSS-mixer. In case of AM sound the circuit can be used as AM demodulator.

Features

- PLL intercarrier-mixer for all FM standards (incl. NICAM sound system)
- High grade signal processing for FM/NICAM sound systems
- Also suitable as AM-demodulator
- Gain controlled wideband amplifier
- AGC operates as a peak- and mean-level detector
- High input sensitivity
- Wide supply voltage range (6.8 V up to 13 V)
- Low power consumption
- ESD protection

Case: 16-pin DIL plastic

Block Diagram

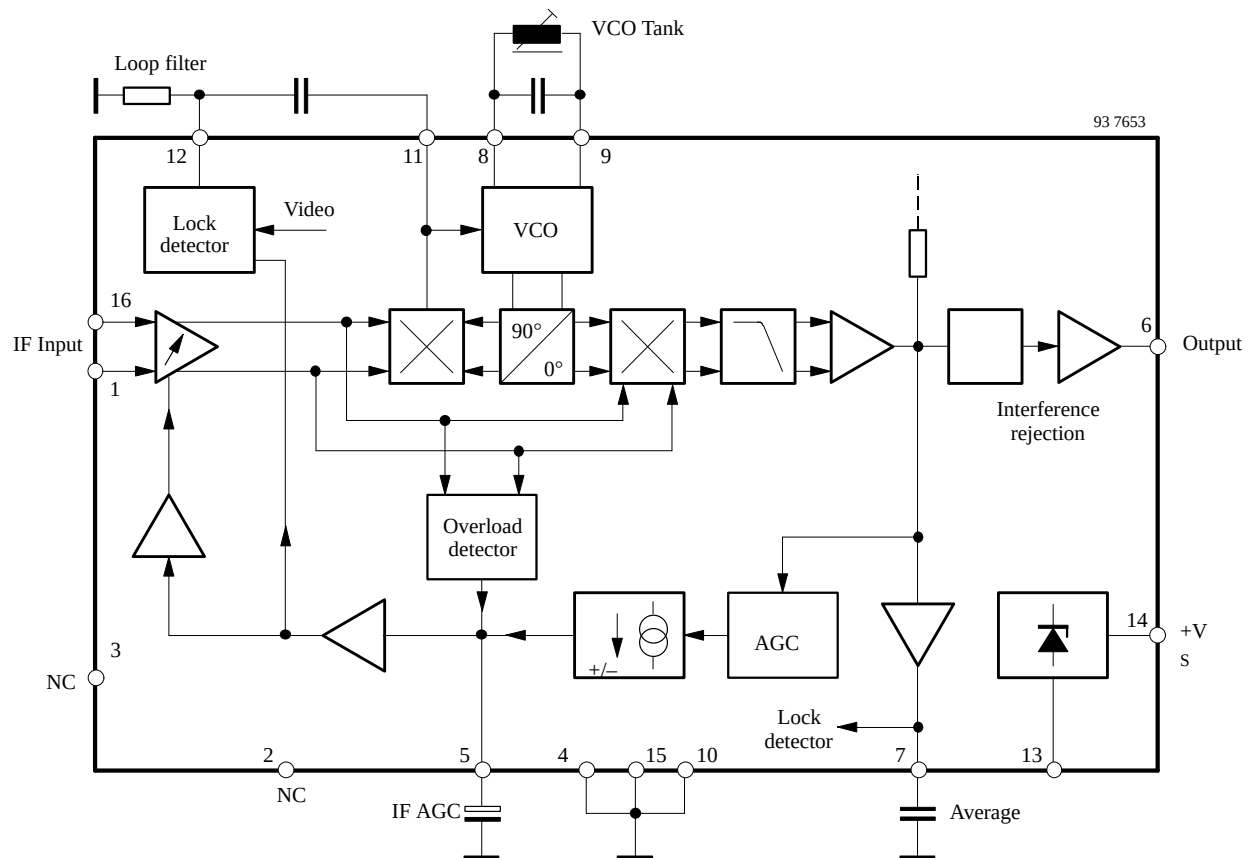
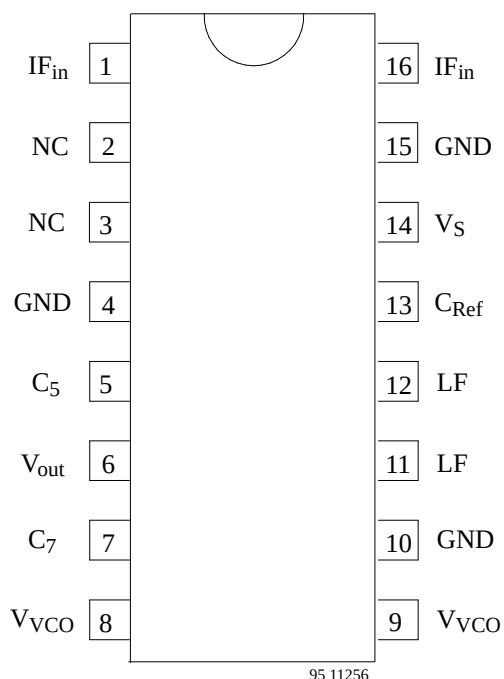


Figure 1.

Pin Description



Pin	Symbol	Function
1	IF _{in}	IF input
2	NC	Not connected
3	NC	Not connected
4	GND	Ground
5	C ₅	IF-AGC time constant
6	V _{out}	Output for AM (audio frequency) or FM (intercarrier frequency)
7	C ₇	Averaging value (IF-AGC function)
8	V _{VCO}	VCO circuit
9	V _{VCO}	VCO circuit
10	GND	Ground
11	LF	PLL loop filter
12	LD	PLL time constant switch
13	C _{Ref}	Reference voltage (internal use only)
14	V _S	Supply voltage
15	GND	Ground
16	IF _{in}	IF input

Absolute Maximum Ratings

Reference point Pin 4, unless otherwise specified

Parameters	Symbol	Value	Unit
Supply voltage Pin 14	V _S	6.8 to 13.0	V
Supply current Pin 14	I _S	55	mA
Output current Pin 6	I _{out}	5.0	mA
Maximum power dissipation	P	720	mW
Junction temperature	T _j	+125	°C

Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient note 1	R _{thJA}	60	K/W
Ambient temperature	T _{amb}	−25 to +85	°C
Storage temperature	T _{stg}	−25 to +125	°C

Electrical Characteristics

$V_s = 8\text{ V}$, $T_{amb} = 25^\circ\text{C}$, reference point Pin 4, unless otherwise stated

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
DC-supply Pin 14						
Supply voltage		V_s	6.8	8.0	13.0	V
Supply current		I_s		45	55	mA
IF-amplifier Pins 1–16						
Input sensitivity RMS value	change of output signal at Pin 6: –3 dB	V_{in}		80	120	μV_{RMS}
Input impedance		R_{in}		1.2		k Ω
Input capacitance		C_{in}		2		pF
IF-AGC Pins 5 and 7						
IF gain control range		G_v	60	66		dB
AGC capacitor		C_5		4.7		μF
Average capacitor		C_7		0.33	1.0	μF
PLL Pins 8–9, 11 and 12 see note 2						
PLL capture range		Δf_{cap}		± 1.5		MHz
VCO-tuning range		Δf_{vco}		3.0		MHz
VCO-tuning sensitivity		$\Delta f / \Delta u$	3.0	4.5		kHz/mV
FM-mode: Inter-carrier mixer operation Pin 6 see note 3						
DC output voltage	$V_5 = 4.5\text{ V}$, $v_{in} = 0$	V_{DC}		4.2		V
Output resistance		R_{out}		100		Ω
Sound IF output voltage	$V_{in} = 10\text{ mV}$	V_{out}	80	120	180	mV_{RMS}
5.50 MHz output voltage		V_{out}	35	55	80	mV_{RMS}
5.74 MHz output voltage						
Weighted signal to noise ratio: (CCIR 468)	ref. signal: $v_{in} = 10\text{ mV}$, $f_{\text{dev}} = \pm 30\text{ kHz}$, $f_{\text{mod}} = 1\text{ kHz}$, measured with FM demo- dulator U2831B, standard B/G modulated IF signal (residual carrier 10%);					
Black screen: 1. Channel		S/N		62		dB
2. Channel		S/N		60		dB
Grid pattern: 1. Channel		S/N		52		dB
2. Channel		S/N		50		dB
Grey screen 50%:						
1. Channel		S/N		59		dB
2. Channel		S/N		58		dB

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
AM mode:						
	Pin 6		see note 4			
DC output voltage	$V_5 = 4.5 \text{ V}$, $v_{in} = 0$	V_{DC}		4.2		V
Output resistance		R_{out}			100	Ω
AF output voltage		$V_{o,AF}$	420	560	750	mV _{RMS}
Total harmonic distortion	$m = 80\%$ $f_{mod} = 40 \text{ Hz}$ $f_{mod} = 1 \text{ kHz}$ $f_{mod} = 12.5 \text{ kHz}$	THD			3	%
Signal to noise ratio	Reference: $m = 54\%$ $f_{mod} = 1 \text{ kHz}$ 22 kHz low pass	S/N		65		dB
Ripple rejection	Pin 15/Pin 7			28		dB

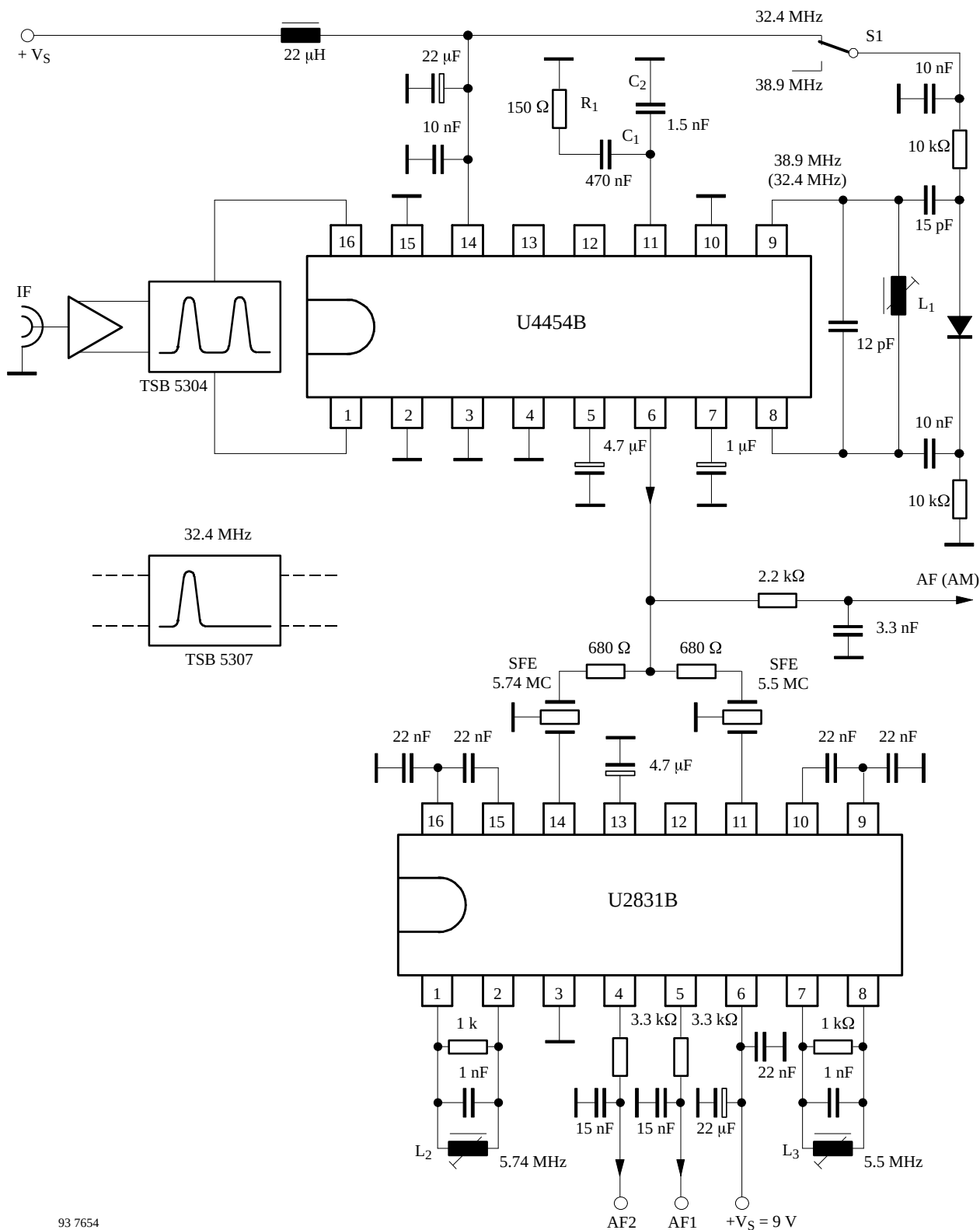
Notes

- When soldered to PCB
- With: VCO-capacitor: $C_{VCO} = 22 \text{ pF}$;
Loop filter: $R_1 = 150 \Omega$, $C_1 = 470 \text{ nF}$, $C_2 = 1.5 \text{ nF}$
- Picture carrier $PC = 38.9 \text{ MHz}$; sound carrier
 $SC_1 = 33.4 \text{ MHz}$, $SC_2 = 33.16 \text{ MHz}$; $PC/SC_1 = 13 \text{ dB}$;
 $PC/SC_2 = 20 \text{ dB}$; PC unmodulated (equivalent to
sync peak level
- Sound carrier $SC = 32.4 \text{ MHz}$, modulated with
 $f_{mod} = 1 \text{ kHz}$, $m = 54\%$, $V_{in} = 10 \text{ mV}$

Alignment of the VCO

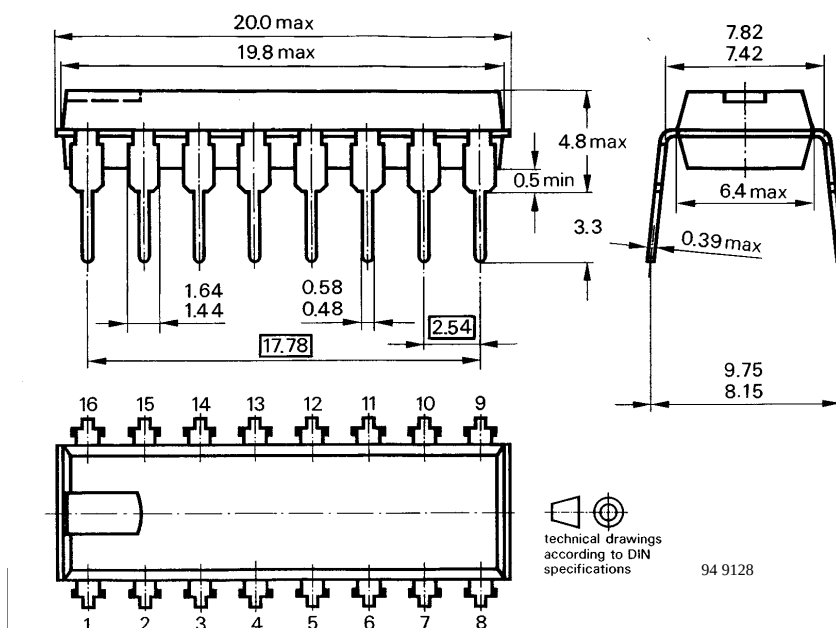
- Apply 4.5 V to Pin 5, to disable the broadband amplifier.
- Measure the dc-voltage at Pin 11 (phase detector).
- Apply a 38.9 MHz unmodulated carrier signal to the IF input (Pins 1–16); adjust the input level so that the AGC voltage at Pin 5 is between 2.5 V and 3.3 V.
- Adjust the VCO circuit until Pin 11 has the same dc-voltage as measured in step 2.
- Step 1–4 is a coarse alignment but sufficient for AM-mode. For sound optimum in FM-mode adjust for the minimum buzz at critical test pattern (grid pattern) in the second sound channel.

Typical Application Circuit



Dimensions in mm

Package: DIP16



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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.

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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.

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