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

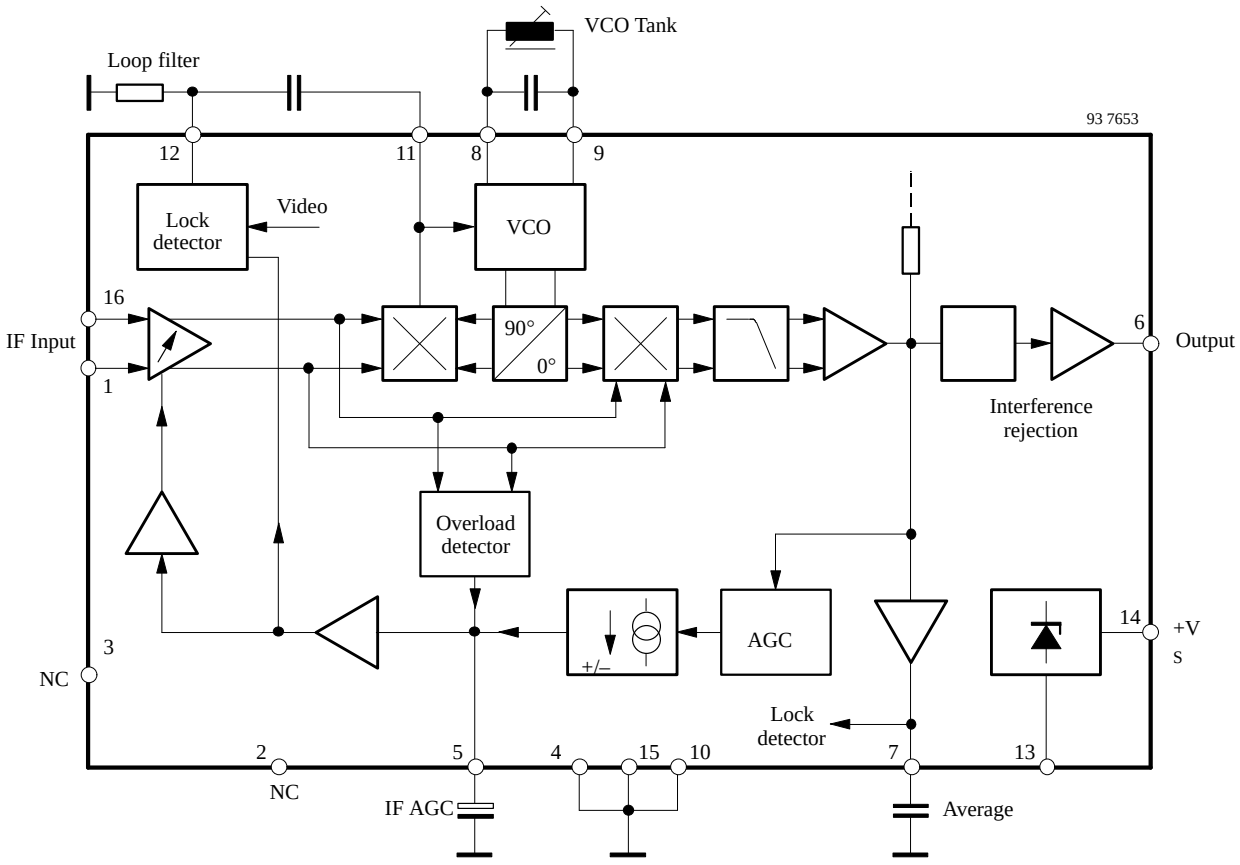
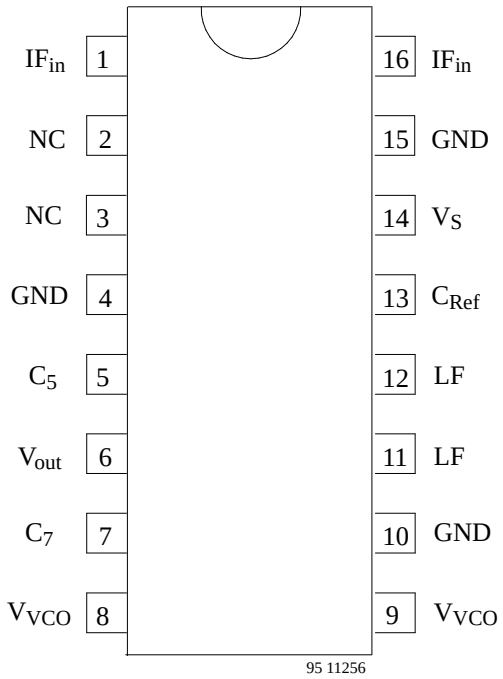


Figure 1.

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

Vs = 8 V, T_{amb} = 25°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		kΩ
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: Intercarrier mixer operation	**Pin 6**	**see note 3**				
DC output voltage	V_5 = 4.5 V, v_{in} = 0	V_{DC}		4.2		V
Output resistance		R_{out}		100		Ω
Sound IF output voltage 5.50 MHz output voltage 5.74 MHz output voltage	V_{in} = 10 mV	 V_{out} V_{out}	 80 35	 120 55	 180 80	 mV_{RMS} mV_{RMS}
Weighted signal to noise ratio: (CCIR 468)	ref. signal: v_{in} =10 mV, f_{dev} = ±30 kHz, f_{mod} = 1 kHz, measured with FM demodulator 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 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 Hz f_{mod} = 1 kHz f_{mod} = 12.5 kHz	THD			3	%
Signal to noise ratio	Reference: m = 54% f_{mod} = 1 kHz 22 kHz low pass	S/N		65		dB
Ripple rejection	Pin 15/Pin 7			28		dB

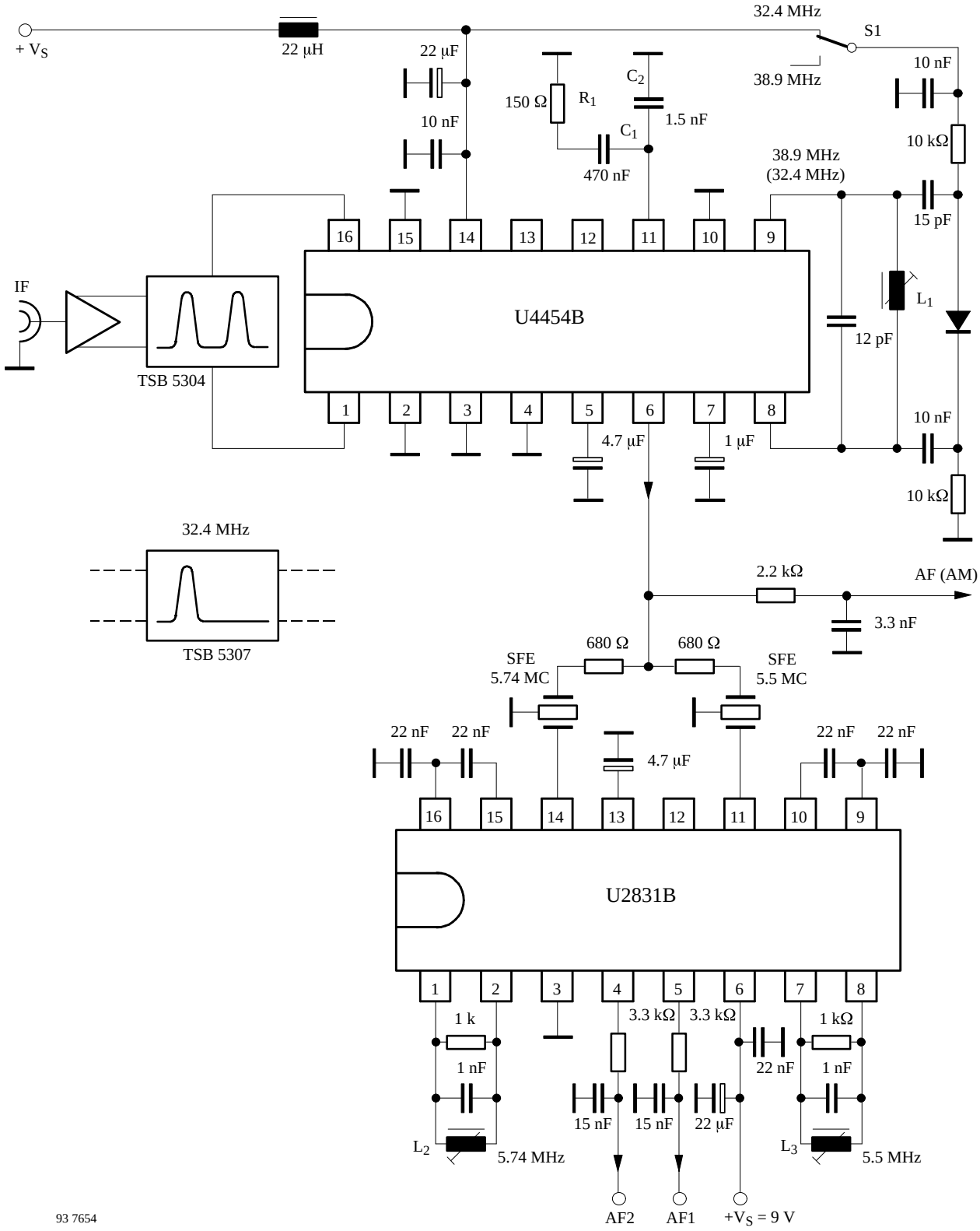
Notes

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

Alignment of the VCO

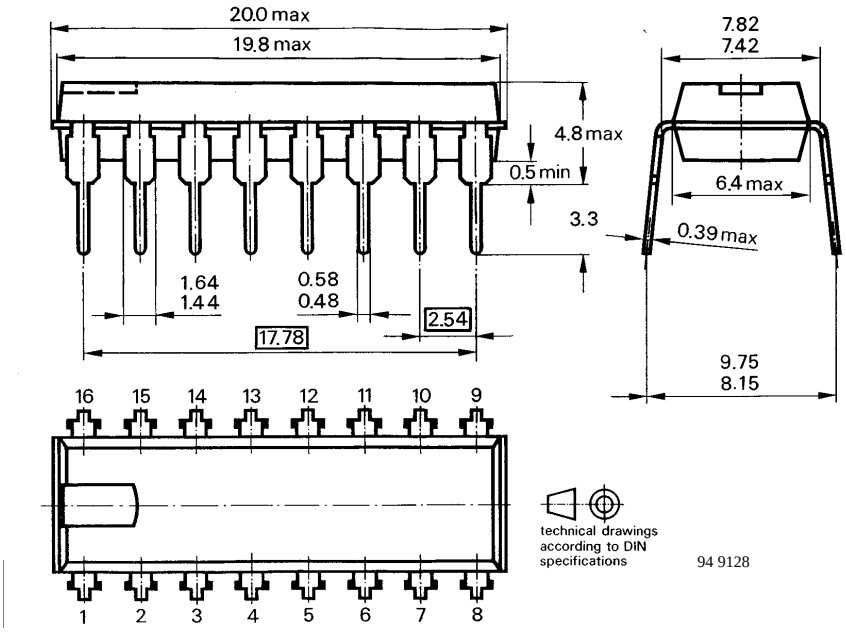
1. Apply 4.5 V to Pin 5, to disable the broadband amplifier.
2. Measure the dc-voltage at Pin 11 (phase detector).
3. Apply a 38.9 MHz unmodulated carrier signal to the IF input (Pins 1–16); adjust the input level so that the AGC voltage at Pin 5 is between 2.5 V and 3.3 V.
4. Adjust the VCO circuit until Pin 11 has the same dc-voltage as measured in step 2.
5. 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



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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