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T-77-07-13

Video or Sound IF with FPLL, MAC-State

TDA 6050

Bipolar IC

Features

- Active multistandard video or sound IF with FPLL demodulator
- 12 MHz bandwidth
- MAC - statel

P-DIP-20

Type	Ordering Code	Package
TDA 6050	Q67000-A5084	P-DIP-20

Circuit Description

The IF-circuit consists of a four-stage capacitively coupled and symmetrically designed controlled amplifier and a real synchronous demodulator with a FPLL-carrier regeneration. Two IF-inputs can be selected for applications with different SAWs. The main performance of the device is the very low differential phase DP and gain DG combined with an excellent intermodulation ratio. The positive video or sound output is used to derive the IF and tuner control voltage. The AGC-threshold is set by means of a potentiometer. Dependent on the modulation polarity the video signal and the AGC are switched over. MAC-state can be selected by an additional signal.

Application

Multistandard TV/VTR and cable converters with mono or stereo applications.

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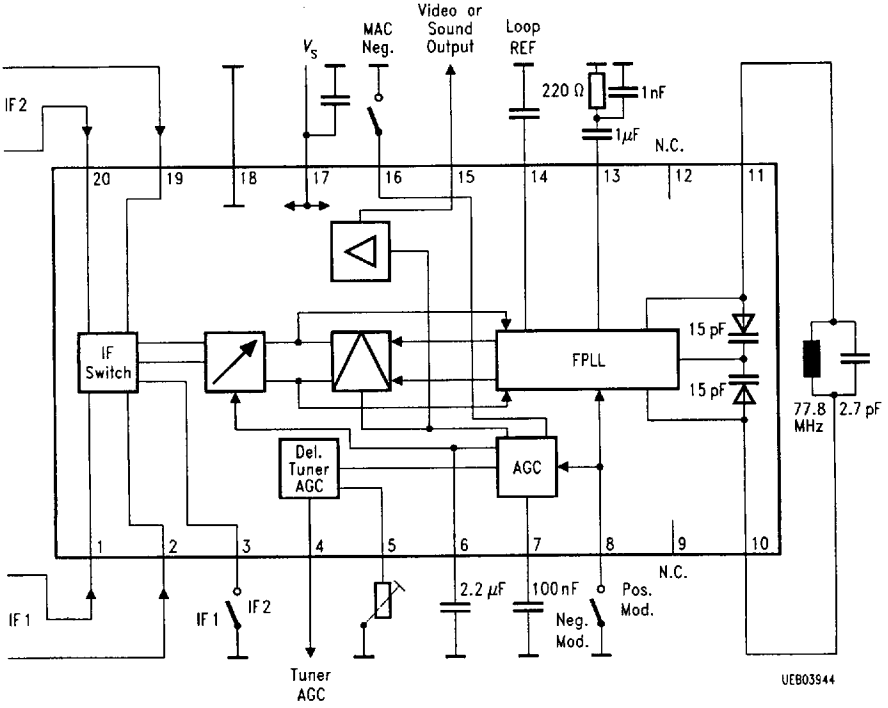
Pin Functions

Pin No.	Function
1	IF-input 1a
2	IF-input 1b
3	IF-switch
4	Tuner AGC-output
5	Tuner AGC-threshold
6	Main AGC-time constant
7	Mean value AGC-time constant
8	Positive/negative modulation switch
9	N.C.
10	FPLL-VCO (2 × video carrier)
11	FPLL-VCO (2 × video carrier)
12	N.C.
13	FPLL-loop filter
14	FPLL-loop reference
15	Video or sound output
16	MAC-standard switch
17	+ V_S supply voltage
18	Ground
19	IF-input 2a
20	IF-input 2b



Block Diagram

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Absolute Maximum Ratings
T_A = 0 to 70 °C

Parameter	Symbol	Limit Values		Unit
		min.	max.	
Supply voltage	V_{17}	0	13.2	V
Junction temperature	T_j		150	°C
Storage temperature	T_{stg}	– 40	125	°C
Thermal resistance (system - air)	$R_{th\,SA}$		70	K/W

Operating Range

Supply voltage	V_{17}	10.8	13.2	V
Supply voltage delayed tuner AGC	V_5	0.8	12	V
IF-frequency range	f_{IF}	12	80	MHz
Ambient temperature during operation	T_A	– 10	85	°C

DC-Characteristics
T_A = 0 to 85 °C; V_S = 12 V

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Total current consumption	$-I_{17}$		51		mA	
IF-input	V_1, V_2, V_{19}, V_{20}	5.7	6.0	6.3	V	
IF-switch	$\pm I_3$	160	210	260	µA	V_3 = 0 V, 5 V
H or open = IF 1	V_3	2.0		5.0	V	
L = IF 2	V_3	0.0		1.0	V	
Standard switch	$\pm I_8$ $\pm I_{16}$	160	210	260	µA	V_8, V_{16} = 0 V, 5 V
H-level	V_8, V_{16}	2		5	V	
L-level	V_8, V_{16}	0		1	V	
B/G-standard						V_8 = H V_{16} = H
L-standard						V_8 = L V_{16} = H
MAC-standard						V_8 = H V_{16} = L

AGC-Voltage

Min. AGC	V_6	0.0	0.1	0.5	V	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 0Vrms
Max. AGC	V_6		2.8	4.0	V	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 150 mVrms

AGC-Time Constant with Neg. Modulation

Charge current	I_6	1.1	1.4	1.9	mA	V_6 = 2.0 V, $V_{15} \leq$ 3.2 V
Discharge current	$-I_6$	13	18	23	µA	V_6 = 2.0 V, $V_{15} \geq$ 4.2 V
Charge/discharge ratio	ΔI_6	55	82	140		

AGC-Time Constant with Pos. Modulation

Charge current	I_6	1.1	1.4	1.9	mA	V_6 = 2.0 V, $V_{15} \geq$ 7.0 V
Discharge current	$-I_6$	0.15	0.25	0.35	µA	V_6 = 2.0 V, 5.2 V < V_{15} < 6.5 V
Discharge current (Average control)	$-I_6$	70	85	120	µA	V_6 = 2.0 V, V_{15} < 3.9 V
Charge/discharge ratio	ΔI_6	4000	5600	9000		

Mean Value Generation with Pos. Modulation

White level	V_7	4.9	5.7	6.5	V	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 10 mVrms
Zero carrier level	V_7	3.3	3.7	4.1	V	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 0 Vrms

DC-Characteristics (cont'd)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Tuner AGC-threshold	V_5	4.4	4.7	5.0	V	$R_{5\text{-}18} \rightarrow \infty$
	I_5	650	850	1050	µA	$V_5 = 0$
	V_6	2.8	3.1	3.4	V	$R_{5\text{-}18} = 10\ k\Omega$
	V_6	0.3	0.4	0.5	V	$R_{5\text{-}18} = 10\ \Omega$
Tuner AGC-current max. 1 ms	$-I_4$	10	18	30	mA	$V_4 = 0.5\ V_{17}$, $V_5 = 0.75$ V $V_{1\text{-}2}$, $V_{19\text{-}20} = 100$ mVrms
	$-I_4$	0		10	µA	$V_4 = 0.5\ V_{17}$, $V_5 = 4$ V $V_{1\text{-}2}$, $V_{19\text{-}20} = 10$ mVrms

FPLL

VCO-tank circuit	V_{10}, V_{11}		3		V	
Loop reference	V_{14}	3.2	3.8	4.4	V	

Video Output Negative Modulation

Output current	$-I_{15}$	1.9	2.5	3.3	mA	$V_{15} = 5.0$ V, $V_{1\text{-}2}$, $V_{19\text{-}20} =$ 10 mVrms, no modulation to
	I_{15}	4.0			mA	ground via $R = 500\ \Omega$
Sync pulse level	V_{15}	3.3	3.7	4.1	V	$V_{1\text{-}2}$, $V_{19\text{-}20} = 10$ mVrms, no modulation
Zero carrier level	V_{15}	6.3	7.0	7.7	V	$V_6 = 3$ V, $V_{1\text{-}2}$, $V_{19\text{-}20} =$ 0 Vrms

Video Output Positive Modulation (L-standard)

White level	V_{15}	6.0	6.7	7.4	V	$V_{1\text{-}2}$, $V_{19\text{-}20} = 10$ mVrms, no modulation
Zero carrier level	V_{15}	3.3	3.7	4.1	V	$V_6 = 3$ V, $V_{1\text{-}2}$, $V_{19\text{-}20} =$ 0 Vrms

AC-Characteristics
T_A = 0 to 85 °C; V_S = 12 V

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Min. IF-input voltage (min. AGC)	$V_{1\text{-}2}$, $V_{19\text{-}20}$		45	60	µVrms	
Max. IF-input voltage (max. AGC)	$V_{1\text{-}2}$, $V_{19\text{-}20}$	90	100		mVrms	
IF-control range	ΔV	63	70		dB	
Video output	V_{15}	2.7	3.0	33	Vpp	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 10 mVrms $R_{15\text{-}18}$ = 1.5 kΩ
Changes via control range	ΔV_{15}		3	6	%	Control range = 55 dB
Changes via supply voltage range	ΔV_{15}		2	4	%	10.8 V < V_{17} < 13.2 V

FM / NICAM-(QPS) Application

Data are compatible to video application

AM-Application

Sound output	V_{15}	2.7	3.0	3.3	Vrms	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 10 mVrms m = 80%; $R_{15\text{-}18}$ = 1.5 kΩ
Total harmonic destortion	THD		0.5	1	%	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 1 mVrms, m = 30%
			1	2.5	%	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 1 mVrms, m = 80%
Min. IF-input voltage (min. AGC)	$V_{1\text{-}2}$		45	80	µVrms	f = 32 MHz, m = 80 %, circuit tuned to FM-applications (best S/N in B/G-standard)

AC-Characteristics (cont'd)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Design Notes						
IF-input resistance symmetrical	$R_{1\text{-}2}$, $R_{19\text{-}20}$	1.5	2	2.5	kΩ	
IF-input capacitance symmetrical	$C_{1\text{-}2}$, $C_{19\text{-}20}$		2	5	pF	
VCO-voltage	$V_{10\text{-}11}$		700		mVpp	
Video or sound output resistance	R_{15}		70	125	Ω	
Video noise voltage ratio	S/N		60		dB	CCIR Rec 567-1
Video bandwidth	$B_{-3\,dB}$	12			MHz	
Differential gain Differential phase	DG DP			5 2.5	% °	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 10 mVrms $V_{1\text{-}2}$, $V_{19\text{-}20}$ = 10 mVrms
Intermodulation ratio f_{IM} = 1.07 MHz = $f_{IT} - f_{FT}$ sound porch = – 20 dB	a_{IM}		60		dB	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 10 mVrms
Intercarrier noise	S/N		54		dB	$V_{1\text{-}2}$, $V_{19\text{-}20}$ = 10 mVrms, CCIR 468 FuBK, m = 100 % sound porch = – 13 dB
Varactor diode Varactor diode	$C_{10,11}$ $C_{10,11}$		15 7		pF pF	V_{13} = 2.5 V V_{13} = 4.9 V

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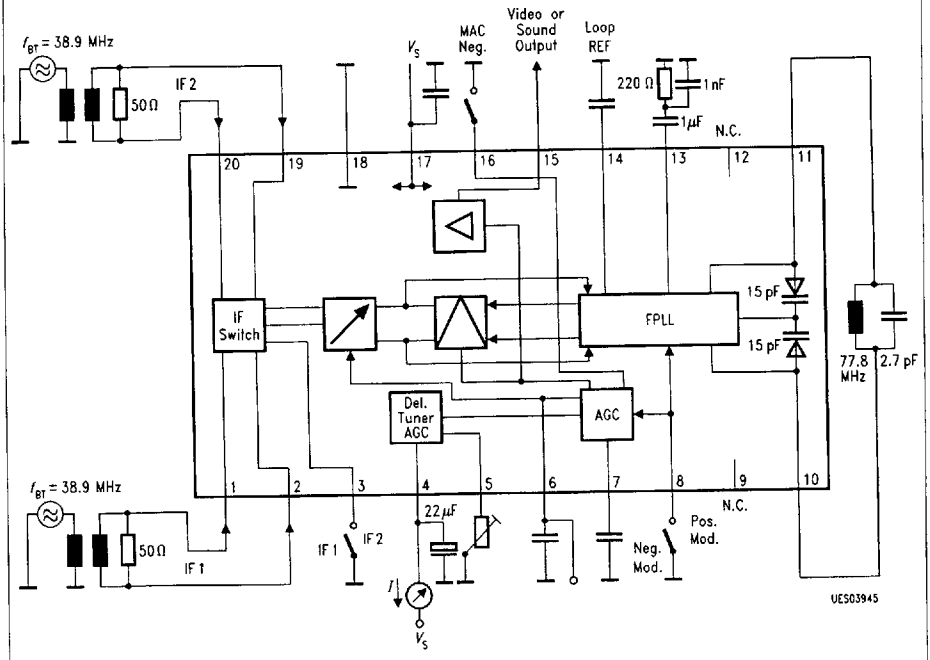
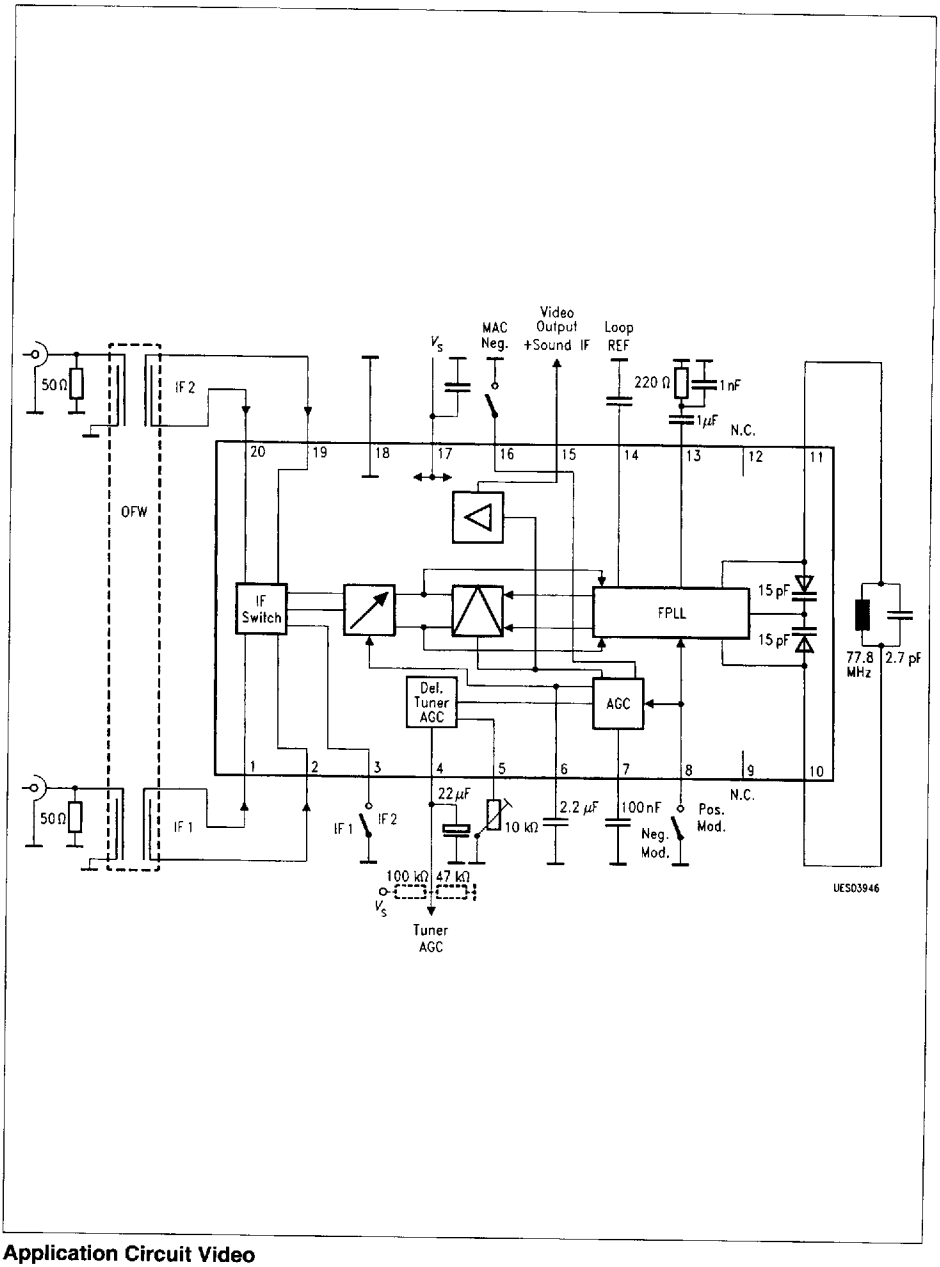


Test Circuit



Application Circuit Video

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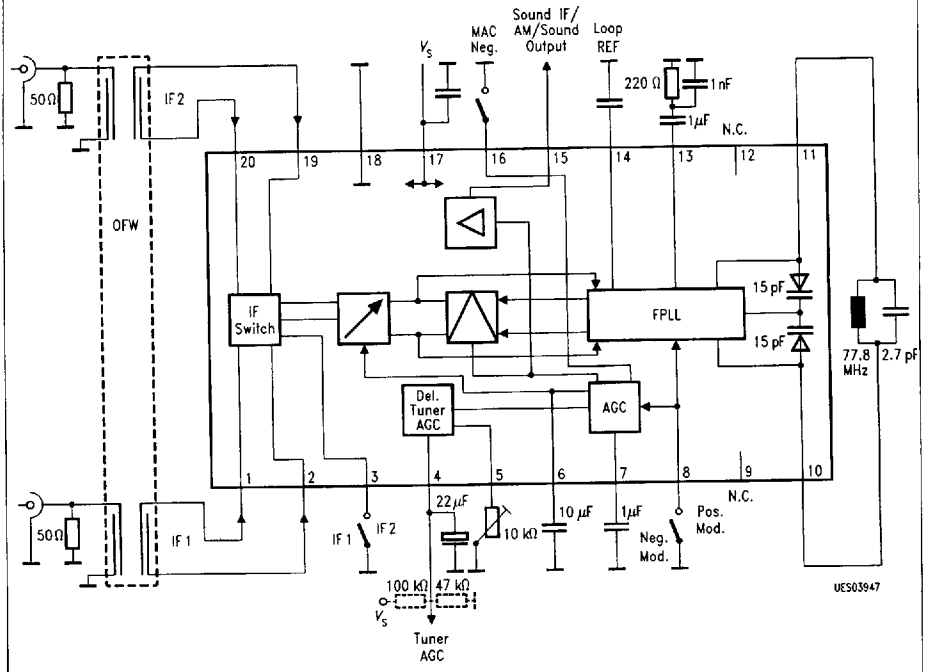

Application Circuit Audio