

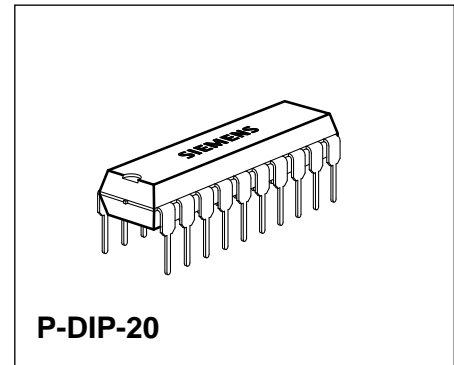
## Video IF with FPLL, MAC State

TDA 6050-5

Bipolar IC

### Features

- Active multistandard video IF with FPLL demodulator
- 12-MHz bandwidth
- MAC state



Type	Ordering Code	Package
TDA 6050-5	Q67000-A5123	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 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.

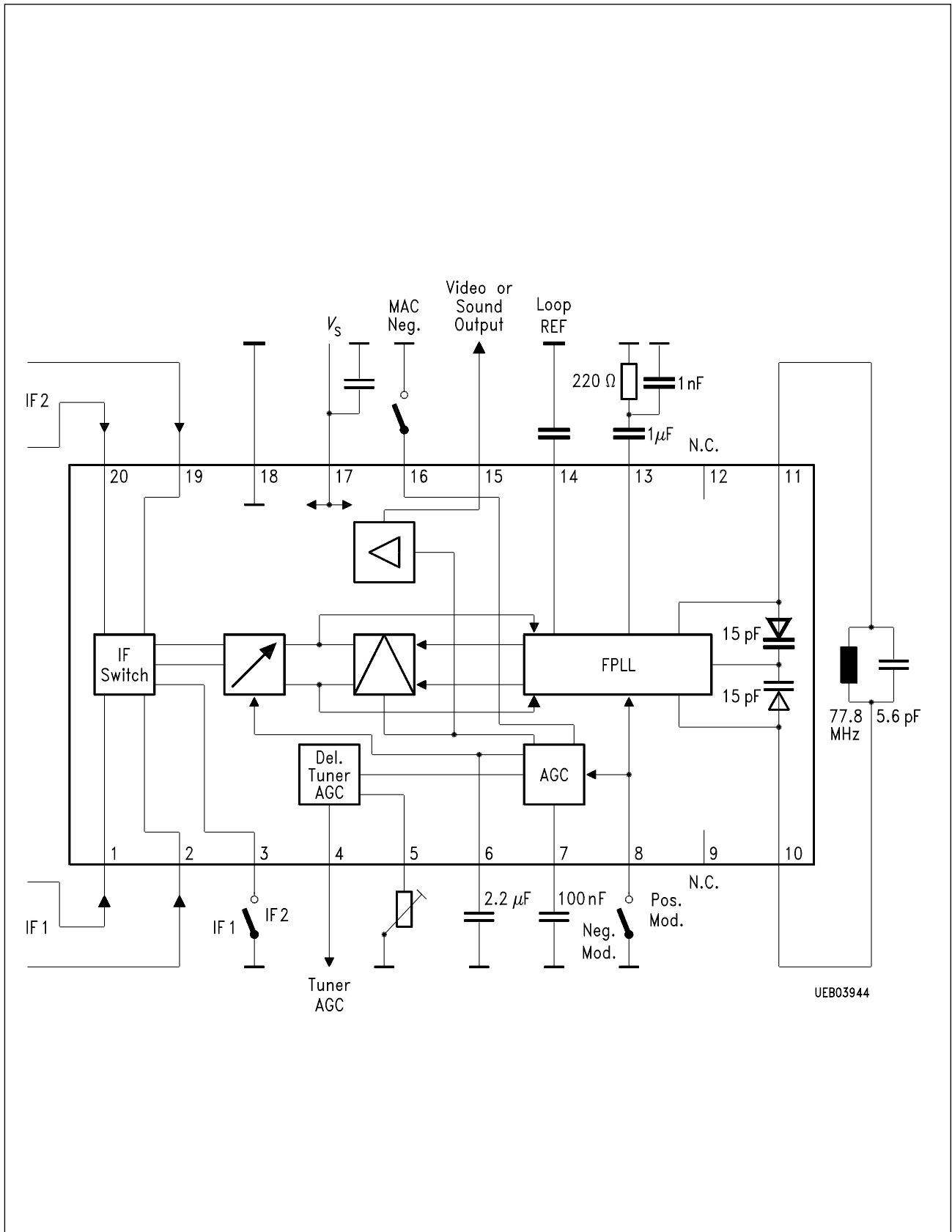
### Application

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 output
16	MAC-standard switch
17	+ $V_S$ supply voltage
18	Ground
19	IF input 2a
20	IF input 2b



Block Diagram

**Absolute Maximum Ratings** $T_A = 0$  to  $70\text{ °C}$ 

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)	$R_{th SA}$		60	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  $85\text{ }^\circ\text{C}$ ;  $V_S = 12\text{ V}$

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 H or open = IF 1 L = IF 2	$\pm I_3$ $V_3$ $V_3$	120 2.0 0.0	210	260 5.0 1.0	$\mu\text{A}$ V V	$V_3 = 0\text{ V}, 5\text{ V}$
Standard switch  H level L level	$\pm I_8$ $\pm I_{16}$ $V_8, V_{16}$ $V_8, V_{16}$	120  2 0	210	260  5 1	$\mu\text{A}$  V V	$V_8, V_{16} = 0\text{ V}, 5\text{ V}$
B/G standard L standard MAC standard						$V_8 = \text{H } V_{16} = \text{H}$ $V_8 = \text{L } V_{16} = \text{H}$ $V_8 = \text{H } V_{16} = \text{L}$

## AGC Voltage

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

## AGC-Time Constant with Neg. Modulation

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

## AGC-Time Constant with Pos. Modulation

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

## Mean Value Generation with Pos. Modulation

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

## 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	$R_{5-18} \rightarrow \infty$
	$I_5$	650	850	1050	$\mu\text{A}$	$V_5 = 0$
	$V_6$	2.8	3.1	3.4	V	$R_{5-18} = 10 \text{ k}\Omega$
	$V_6$	0.3	0.4	0.5	V	$R_{5-18} = 10 \text{ }\Omega$
Tuner AGC current max. 1 ms	$-I_4$	10	18	30	mA	$V_4 = 0.5 V_{17}, V_5 = 0.75 \text{ V}$ $V_{1-2}, V_{19-20} = 100 \text{ mVrms}$
	$-I_4$	0		10	$\mu\text{A}$	$V_4 = 0.5 V_{17}, V_5 = 4 \text{ V}$ $V_{1-2}, V_{19-20} = 10 \text{ mVrms}$

## FPLL

VCO-tank circuit	$V_{10}, V_{11}$		3		V	
Loop reference	$V_{14}$	3.4	3.8	4.1	V	

## Video Output Negative Modulation

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

## Video Output Positive Modulation (L standard)

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

## 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)	$V_{1-2}, V_{19-20}$		45	60	$\mu$ Vrms	
Max. IF-input voltage (max. AGC)	$V_{1-2}, V_{19-20}$	90	100		mVrms	
IF-control range	$\Delta V$	63	70		dB	
Video output	$V_{15}$	2.7	3.0	3.3	Vpp	$V_{1-2}, V_{19-20} = 10$ mVrms $R_{15-18} = 1.5$ k $\Omega$
Changes via control range	$\Delta V_{15}$		3	6	%	Control range = 55 dB
Changes via supply voltage range	$\Delta V_{15}$		2	4	%	$10.8$ V < $V_{17}$ < $13.2$ V

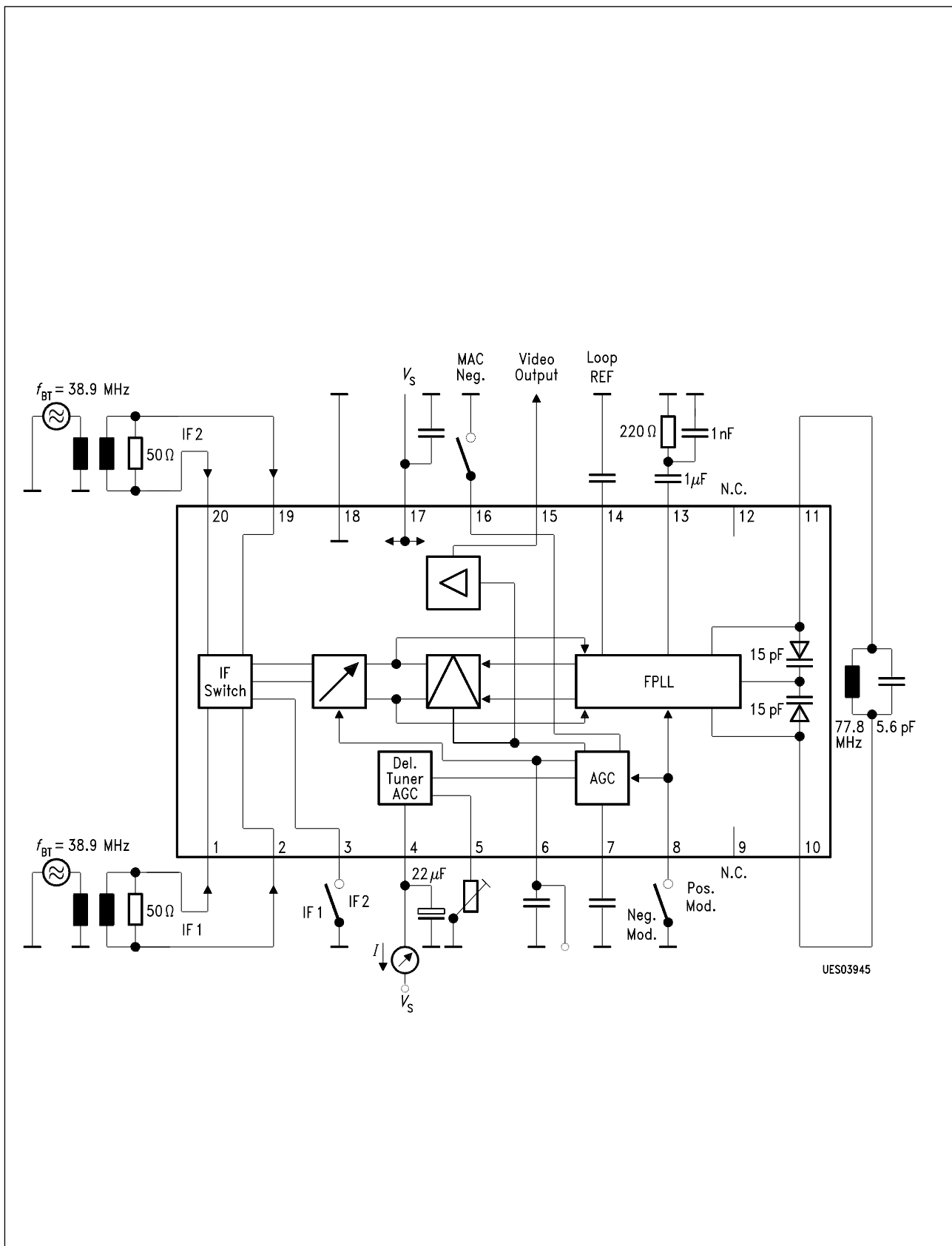
## AC Characteristics (cont'd)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		

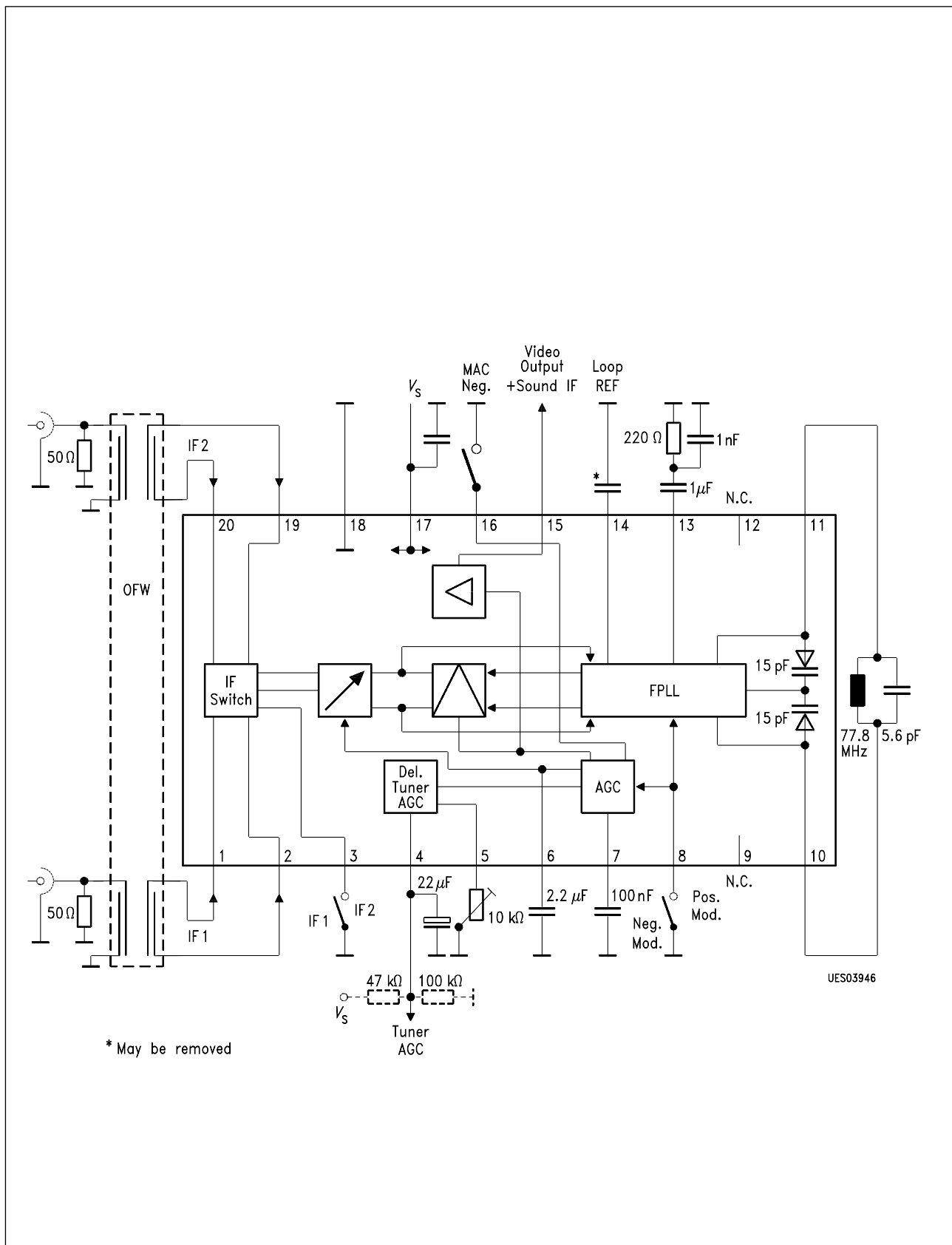
### Design Notes

IF-input resistance symmetrical	$R_{1-2}, R_{19-20}$	1.5	2	2.5	k $\Omega$	
IF-input capacitance symmetrical	$C_{1-2}, C_{19-20}$		2	5	pF	
VCO voltage	$V_{10-11}$		700		mVpp	
Video output resistance	$R_{15}$		70	125	$\Omega$	
Video noise voltage ratio	$S/N$		60		dB	CCIR Rec 567-1
Video bandwidth	$B_{-3\text{ dB}}$	12			MHz	
Differential gain	$DG$			5	%	$V_{1-2}, V_{19-20} = 10\text{ mVrms}$
Differential phase	$DP$			2.5	$^{\circ}$	$V_{1-2}, V_{19-20} = 10\text{ mVrms}$
Intermodulation ratio $f_{IM} = 1.07\text{ MHz} = f_{TT} - f_{FT}$ sound porch = -20 dB	$a_{IM}$		60		dB	$V_{1-2}, V_{19-20} = 10\text{ mVrms}$
Intercarrier noise	$S/N$		54		dB	$V_{1-2}, V_{19-20} = 10\text{ mVrms}$ , CCIR 468 FuBK, $m = 100\%$ sound porch = -13 dB
Varactor diode	$C_{10, 11}$		15		pF	$V_{13} = 2.5\text{ V}$
Varactor diode	$C_{10, 11}$		7		pF	$V_{13} = 4.9\text{ V}$





Test Circuit



## Application Circuit Video