Wireless Components

Multistandard VIF-PLL

TDA 6930 Version 1.0

Specification August 1999

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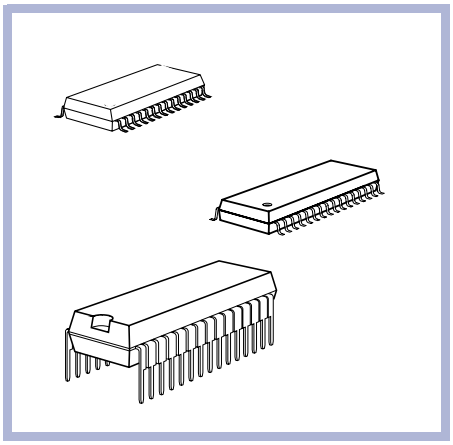
Product Info

General Description

The TDA 6930 is an integrated circuit for high class multistandard TV vision IF signal, sound IF signal and AM-Audio signal processing.
FM and NICAM sound IF carriers are converted to their intercarrier frequency.
All switching functions are controlled via open collector transistors.
Outputs for threshold controlled tuner AGC , digital tuning AFC , DF and AM-AF for all terrestrial standards are available.

Package



Features

- FPLL carrier regeneration from sound channel without nyquist slope for best sound S/N and pulse response
- Choice of 2 VIF / SIF switchable inputs
- intercarrier operation possible
- seperate AM-AF demodulator channel without external components
- VCO frequency switchable for L / L‘
- digital tuning AFC seperate adjustable for L‘
- parallel output of DF/Nicam and AM-AF
- L/L‘ peak white detector VIF-AGC with average controlled response, scrambling save for Canal +
- adjustable tuner AGC
- Low operating voltage of 7.5 V
- precision internal bandgap reference
- Fully ESD protected

Application

- Television sets
- VTR sets

Ordering Information

Type	Ordering Code	Package
TDA 6930X	Q67007-A5217 GEG	P-DSO-28
TDA 6931X	Q67007-A5229 GEG	P-DSO-32
TDA 6930S	Q67000-A5180	S-DIP-30

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2 Product Description

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2.1 Overview

The TDA 6930 is an integrated circuit for high class multistandard TV vision IF signal, sound IF signal and AM-Audio signal processing.

FM and NICAM sound IF carriers are converted to their intercarrier frequency. All switching functions are controlled via open collector transistors.

Outputs for threshold controlled tuner AGC , digital tuning AFC , DF and AM-AF for all terrestrial standards are available.

2.2 Features

- FPLL carrier regeneration from sound channel without nyquist slope for best sound S/N and pulse response
- Choice of 2 VIF / SIF switchable inputs
- intercarrier operation possible
- seperate AM-AF demodulator channel without external components
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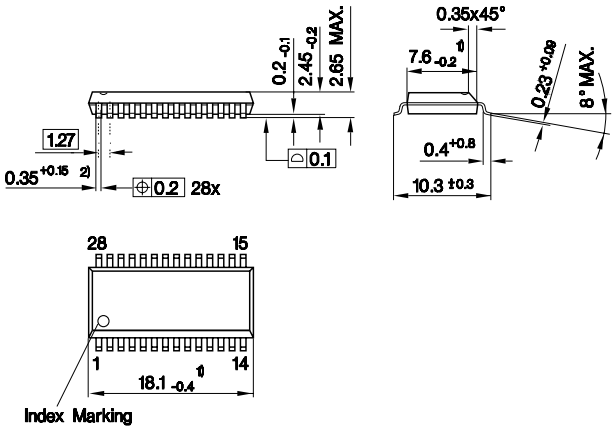
- adjustable tuner AGC
- Low operating voltage of 7.5 V
- precision internal bandgap reference
- Fully ESD protected

2.3 Application

- Television sets
- VTR sets

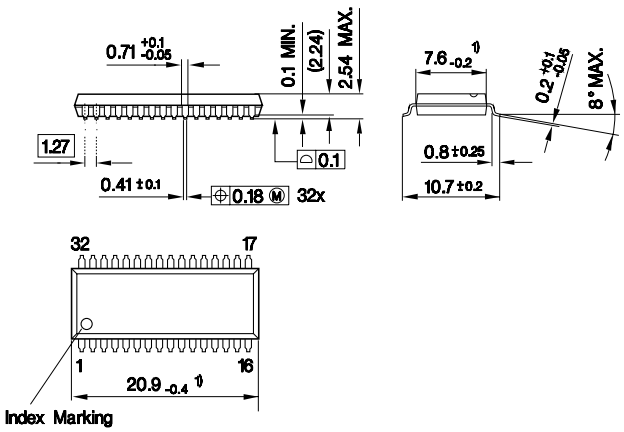
2.4 Package Outlines

P-DSO-28:



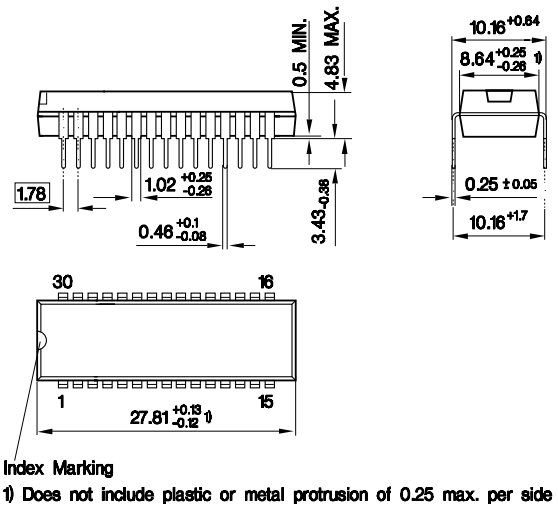
1) Does not include plastic or metal protrusion of 0.15 max. per side
2) Does not include dambar protrusion of 0.05 max. per side

P-DSO-32:



1) Does not include mold protrusion of 0.25 max. per side

S-DIP-30:



1) Does not include plastic or metal protrusion of 0.25 max. per side

3 Functional Description

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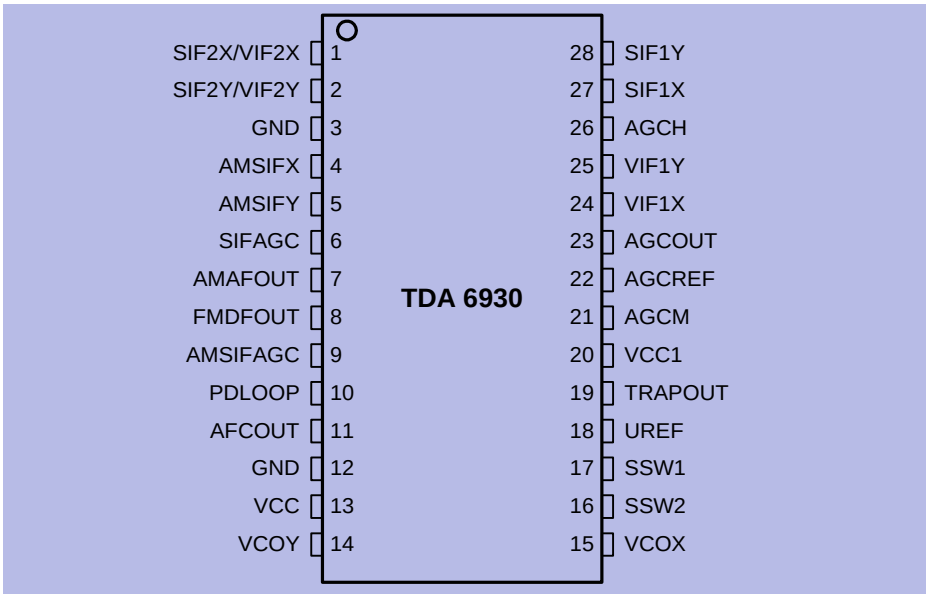
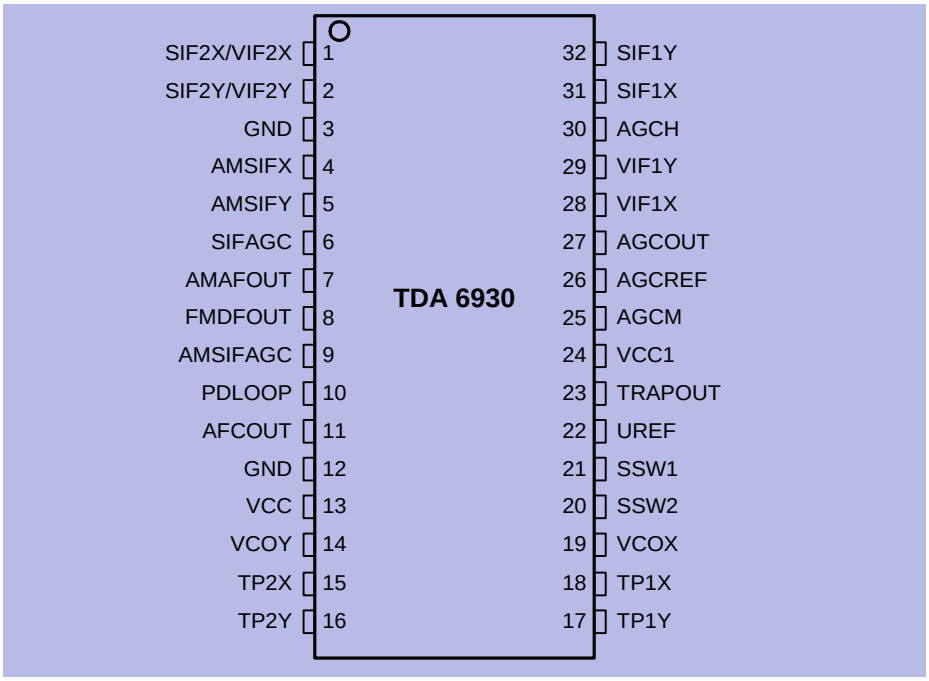
3.1 Pin Configuration



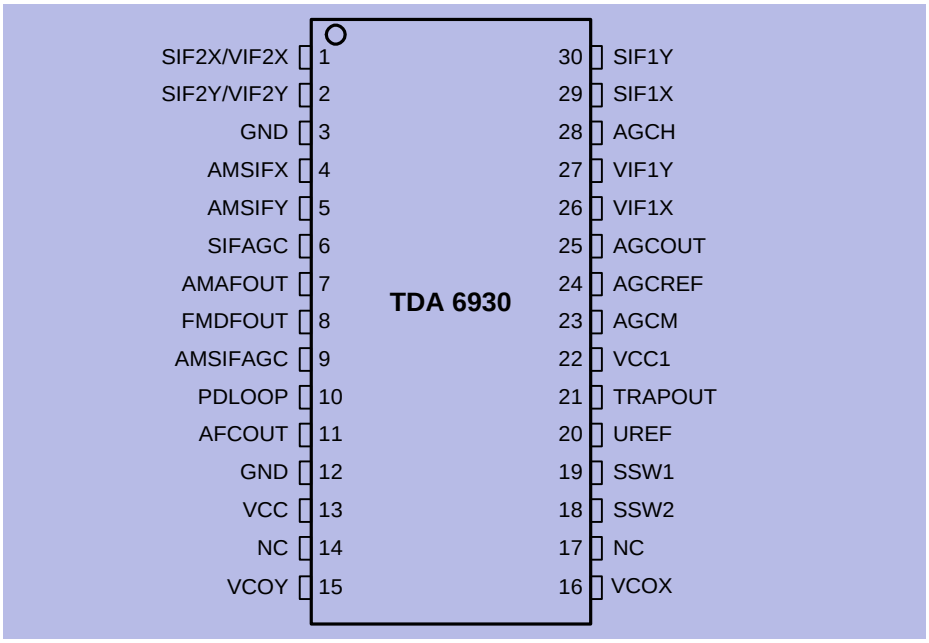
Pin_config_1.wmf

Figure 3-1 Pin Configuration P-DSO-28



Pin_config_2.wmf

Figure 3-2 Pin Configuration P-DSO-32



Pin_config_3.wmf

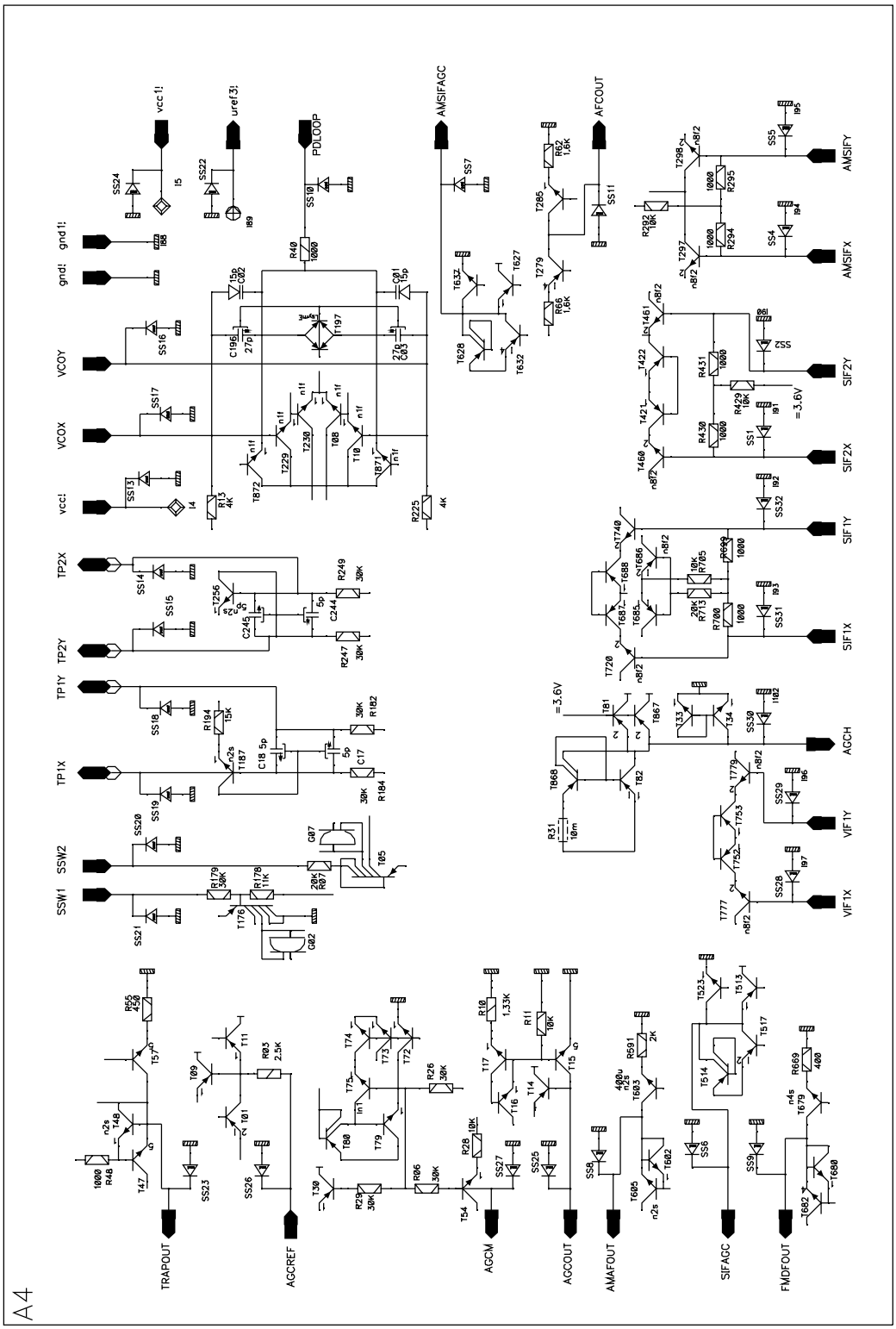
Figure 3-3 Pin Configuration S-DIP-30

3.2 Pin Definition and Function

Table 3-1 Pin Definition and Function

Symbol	Pin			Description
	P-DSO-28	P-DSO-32	S-DIP-30	
SIF2X/VIF2X	1	1	1	Sound IF2 / Carrier differential input signal Video IF2 / Carrier differential input signal
SIF2Y/VIF2Y	2	2	2	
GND	3	3	3	signal input ground
AMSIFX	4	4	4	AM Sound IF differential input signal
AMSIFY	5	5	5	
SIFAGC	6	6	6	FM Sound IF AGC capacitor
AMAFOUT	7	7	7	AM audio frequency output
FMDFOUT	8	8	8	FM / NICAM differential frequency output
AMSIFAGC	9	9	9	AM Sound IF AGC capacitor
PDLOOP	10	10	10	PLL loop filter
AFCOUT	11	11	11	AFC output
GND	12	12	12	power supply ground
VCC	13	13	13	positive power supply voltage
VCOY	14	14	15	VCO reference circuit for $2*f_{pc}$
TP2X	-	15	-	Differential low pass capacitor in automatic phase control circuit for video demodulator
TP2Y	-	16	-	
TP1Y	-	17	-	Differential low pass capacitor in automatic phase control circuit for video demodulator
TP1X	-	18	-	
VCOX	15	19	16	VCO reference circuit for $2*f_{pc}$
SSW2	16	20	18	standard switch
SSW1	17	21	18	
UREF	18	22	20	internal reference voltage capacitor
TRAPOUT	19	23	21	CVBS output signal
VCC1	20	24	22	analog small signal positive power supply voltage
AGCM	21	25	23	AGC average capacitor
AGCREF	22	26	24	tuner AGC takeover adjust
AGCOUT	23	27	25	tuner AGC output
VIF1X	24	28	26	Video IF1 / Carrier differential input signal
VIF1Y	25	29	27	
AGCH	26	30	28	Video IF AGC capacitor
SIF1X	27	31	29	Sound IF1 / Carrier differential input signal
SIF1Y	28	32	30	

3.3 Internal circuits



3.4 Functional Description (P-DSO-32)

- Inputs
  The input signal is distributed via the IF-MUX to the according amplifier channels.

  VIF-Mux
  Normaly VIF1 is used for video if input (filter with no sound carrier).
  A special mode with a secondary VIF input at SIF 2 is available. In this case the carrier recovery gets its input signal in any way from SIF1. For more Information see input selection logic-table in the application circuit section.
  In the also available Intercarrier mode for low cost application, all signals are transferred together via VIF1 or VIF2 input, depending on input switching logic.

  SIF-Mux
  SIF1 input is used for DF-sound and carrier recovery (double channel filter). For L‘ inverted sideband application SIF2 is used instead.

  AMSIF input is used for all AM sound norms with switchable input filter.

- IF gain controlled amplifier‘s
  The TDA 6930X incorporates a Video-IF demodulation part (VIF), a AM-sound demodulation part (AMSIF) and a Section for PIC-carrier recovery + FM/NICAM SIF conversion (SIF). Each path has its own four-stage capacitively coupled, gain controlled amplifier.

- AGC‘s
  Tuner AGC
  A delayed tuner AGC voltage is derived from the VIF-AGC via an inverting threshold amplifier (increasing VIF input voltage decreases the AGCOUT voltage). Its take over point with positiv control direction is set by means of a external potentiometer.
  To avoid regulation oszillation the input has a shared characteristic and the output is clamped to min 0.3 V which prevents for coming into gain control inversion at low regulation voltage levels in several tuner application.

  VIF AGCs
  The AGC for the video-IF-amplifier (VIF) has a peak detector for both kinds of modulation. An additional mean value detector will increase the control current for positive modulation if the input signal decreases more than ca. 15 dB. In this case a hysteresis keeps the high control current until the mean value increases by ca. 10 dB. This and an extremly large sample time prevents from AGC oszillation with critical signals.

  SIF / AMSIF AGC‘s
  The AGC‘s for the AM- sound section and PIC-carrier recovery +FM/NICAM section use envelope detectors with extremely low destortion for the SIF amplifiers.

They have a quick charge circuit which increases the charge current by a factor of 1500 if the mean value of the signal increases by more than 10 dB. The time constants of the AGCs can be set by the according external capacitor.

- FPLL

  FPLL carrier Recovery
  High perfomance in terms of FM sound, digital sound and videotext is obtained by means of a combined path for carrier recovery and FM/NICAM SIF (QPT). The input signal for this section is derived from the QPT SIF I/II input to overcome Nyquist slope distortions in all cases. For L'-applications the VCO frequency is switched internally, thus no external tank circuit switching is necessary. Adjustment of the tank circuit (only necessary for the AFC) is achieved by aligning the AFC voltage to a certain value except in L'-mode. In L'-mode the AFC needs to be adjusted via control voltage at pin SSW2.

  APC
  For best video demodulation a phase locked clean carrier is needed. Due to differences in the filter and amplifier characteristics of the amplifier channels it is necessary to align the phase of the recovered carrier to the incoming signal of VIF port . The possible phase control margin of the therefore used APC is +180 ° to -180 °.
  For best performance 2 external low pass capacitors are added at the P-DSO-32 package. In this case the APC is extremly stable at carrier zero time and over modulation. This feature is not available in the less than 32 pin packages .

  VCO
  The VCO consists of a temperature compensated stacked symmetrical ECL multivibrator and devider by 2 . The main tank circuit is aligned to twice of the recovery frequency. All internal signals are of symmetrical ECL type. This is necessary for small amplitudes with high temperature stability and low oscillator radiation.

- Video demodulation + output
  Video IF Demodulation
  A real synchronous demodulator receives an inphase carrier via the automatic phase control (APC) from the FPLL. Thus, low differential phase and gain, high intermodulation ratio und good impuls response is achieved withouth any aligment.

- DF-Mixer / FM sound conversion
  The SIF-Sound/PIC-carrier section gets its input signal from SIF1 except in L'-NICAM mode, then input SIF 2 is active. The SIF- signal is mixed with the 90°-carrier from the FPLL to generate the 2. sound IF at the according output (DF). This output is always active except in Mac standard, there both sound outputs are off.

- AM-Audio Sound demodulation
  The AM-sound section uses the envelope detector of the AGC to demodulate the AM sound signal. An optimized special AM-sound demodulator and the envelope detector garantee an extremely low AF output destortion. In case of L or L‘ standard the AM-AF output is active, in other standards this output is inactive.

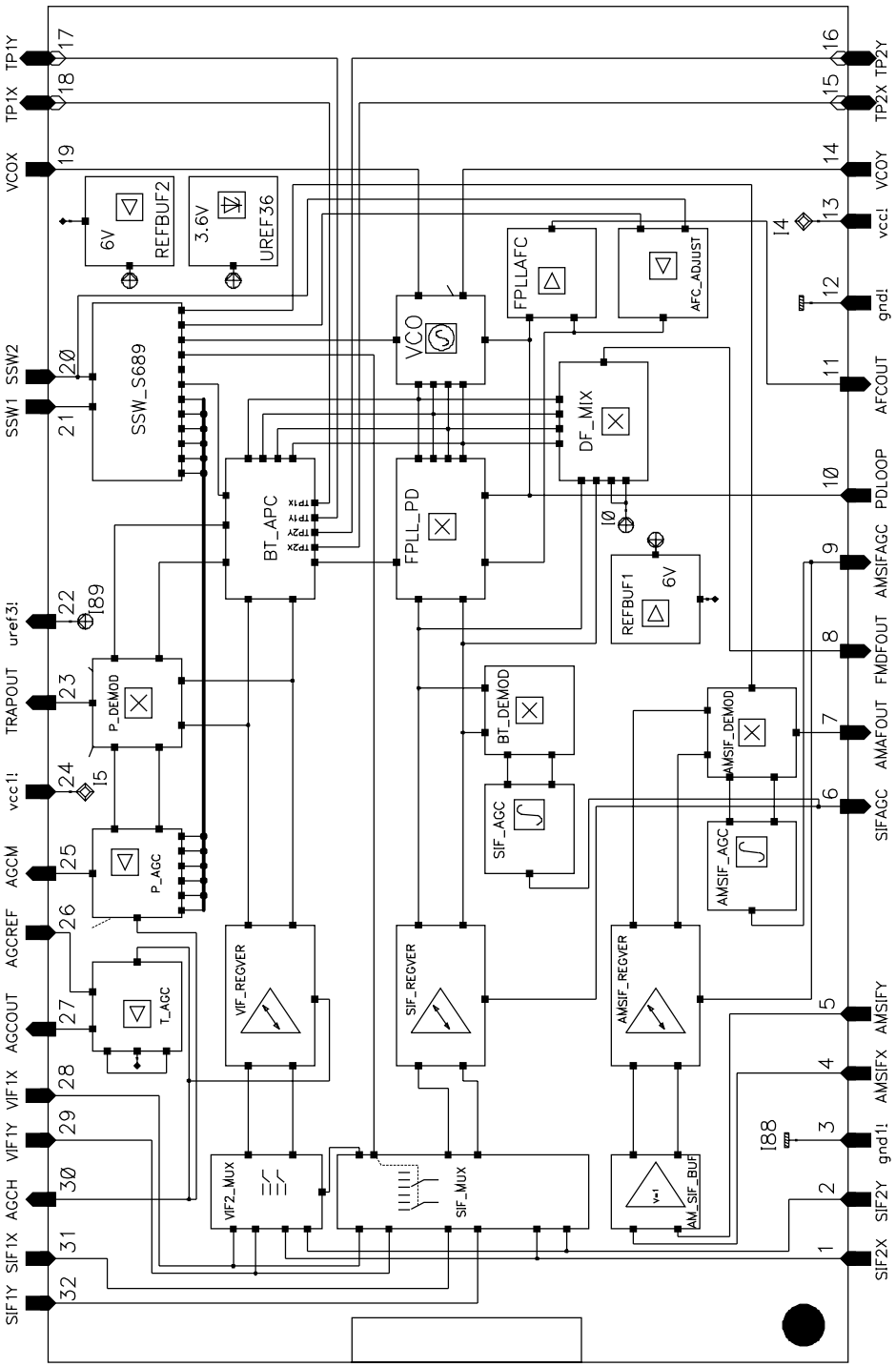
  According to the standard switches FM/NICAM and/or AM processing is performed.

- AFC + Adjust
  The AFC consists of a high inpedance input comparator who gets its control voltage from the loopfilter / VCO charge pump capacitor. Its OTA output voltage swing and gain can be controlled via the necessary external load resistors
  The adjust is controlled by norm switch inputs and is only aktive in L‘ mode. The operation is performed by controlling the reference input voltage of the AFC comparator.

- Switches
  The internal I^2L norm switch decoding logic is buffered by PNP comparator interfaces with hysteresis.
  Therefore the input signal voltage margin at SSW1 and SSW2 is 0 - vcc

- Voltage reference
  The reference voltage is performed by a temperature compensated bandgap structure with extremly low noise and high ripple rejection (PSSR). The reference voltage distribution is done by 3 buffer amplifiers with extremly high ripple rejection (PSSR).

3.5 Block Diagram (P-DSO-32)



Block.ps

Figure 3-4 Block Diagram (P-DSO-32)

4 Applications

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4.1 Circuits

4.1.1 Application Circuit P-DSO-28

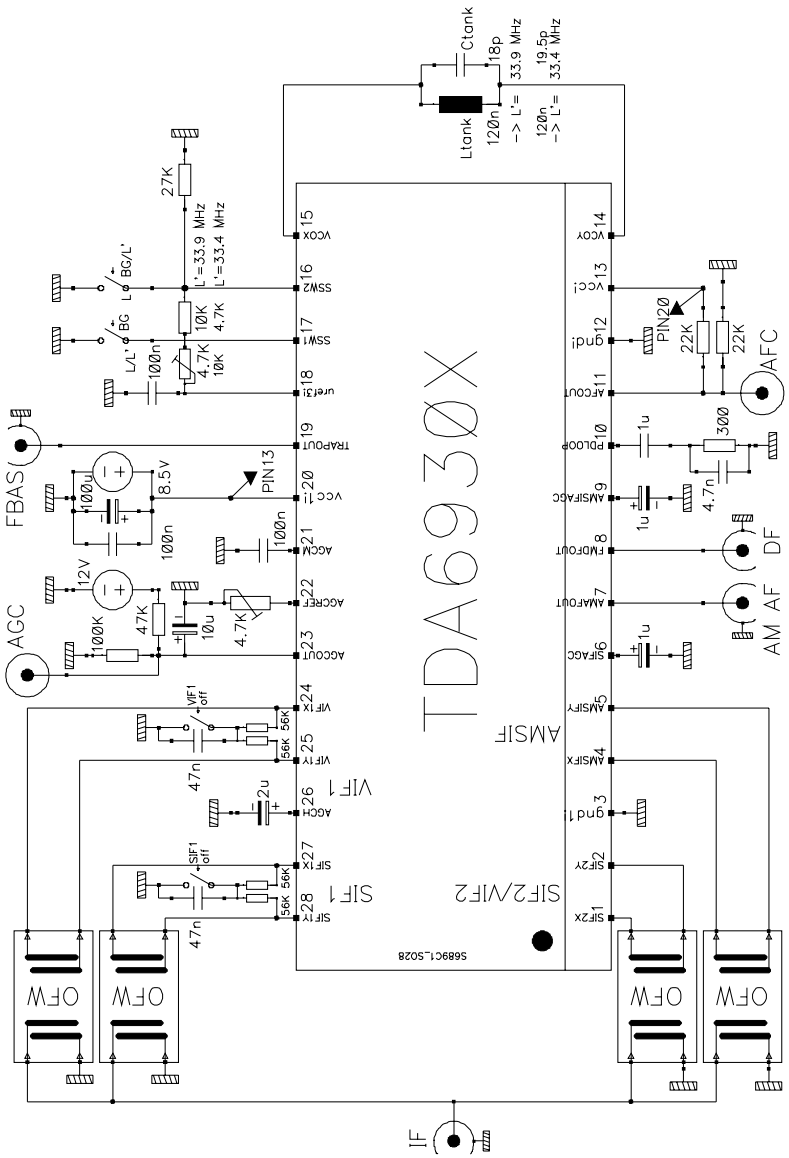

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Figure 4-1 Application Circuit P-DSO-28

4.1.2 Application Circuit P-DSO-32

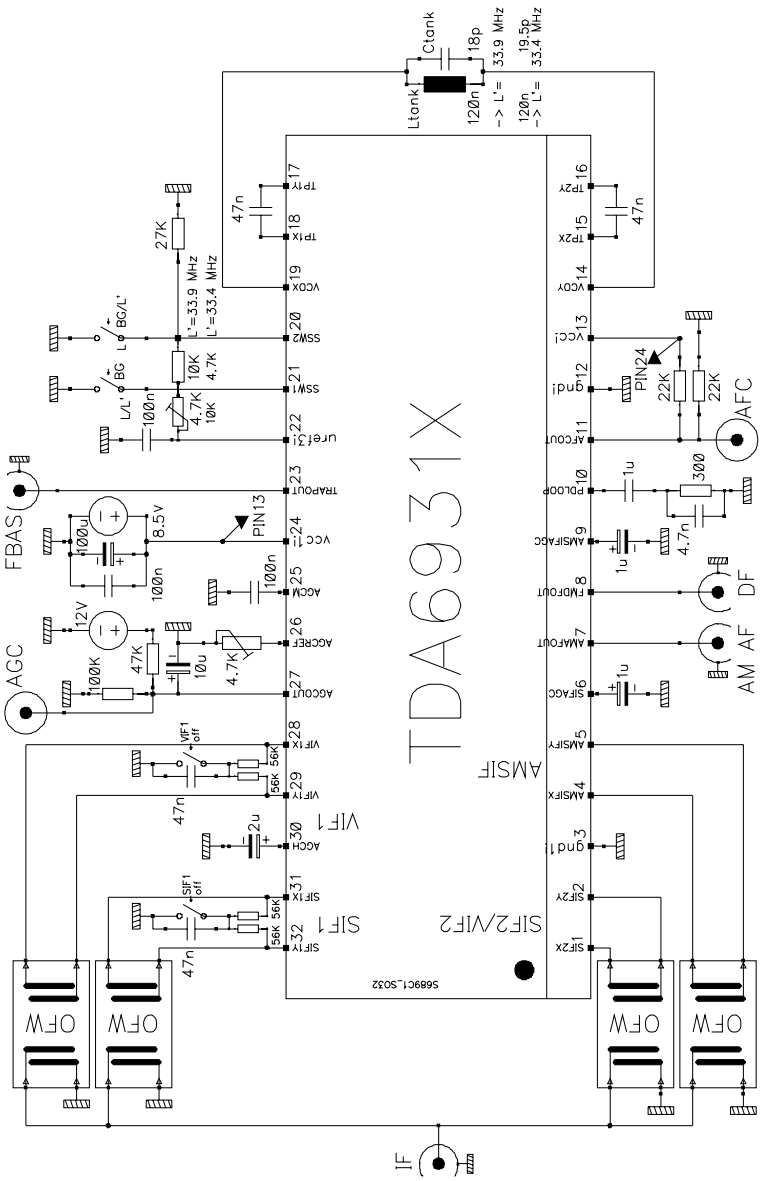

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Figure 4-2 Application Circuit P-DSO-32

4.1.3 Application Circuit S-DIP-30

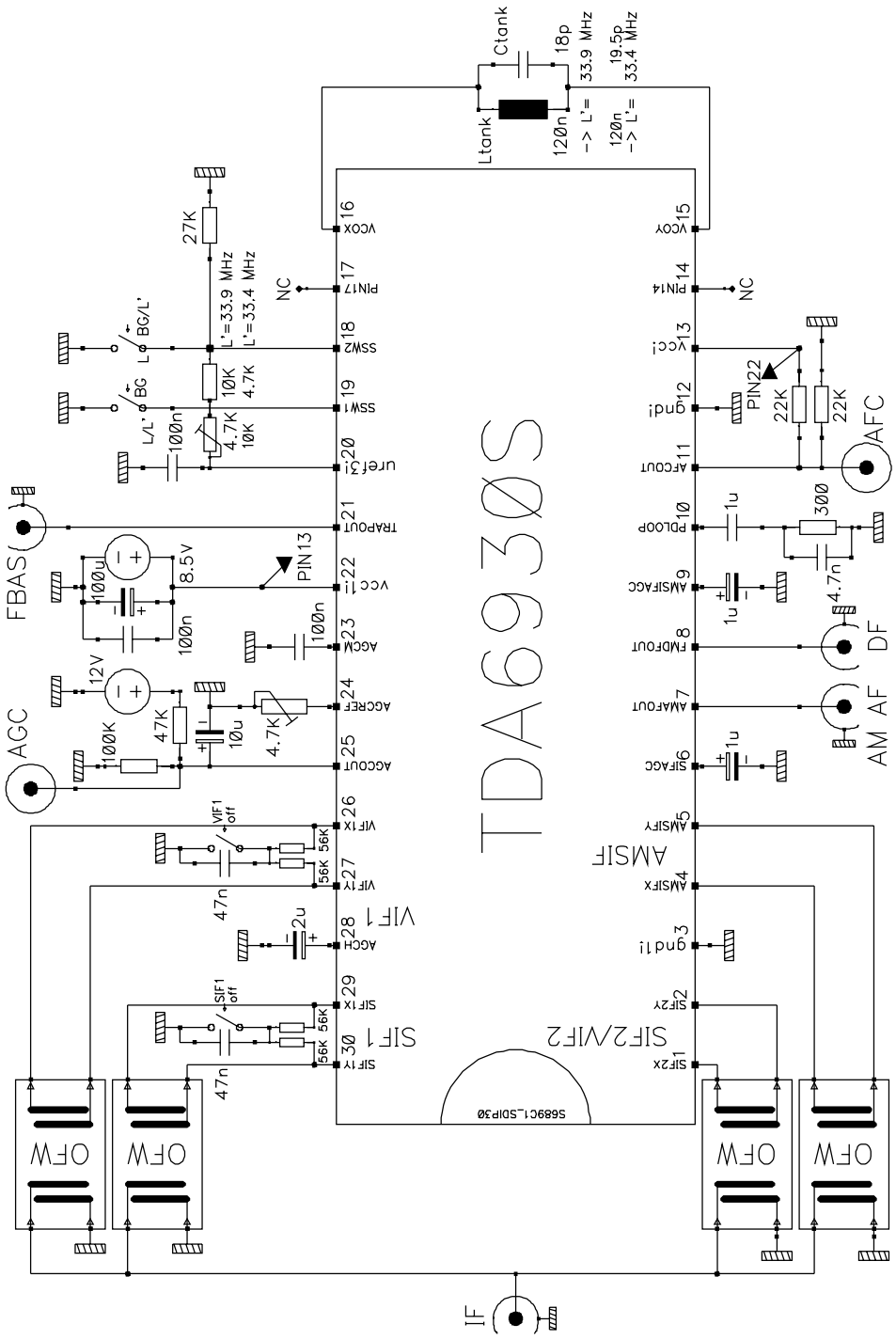

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Figure 4-3 Application Circuit S-DIP-30

4.2 Hints

table1: input selection logic

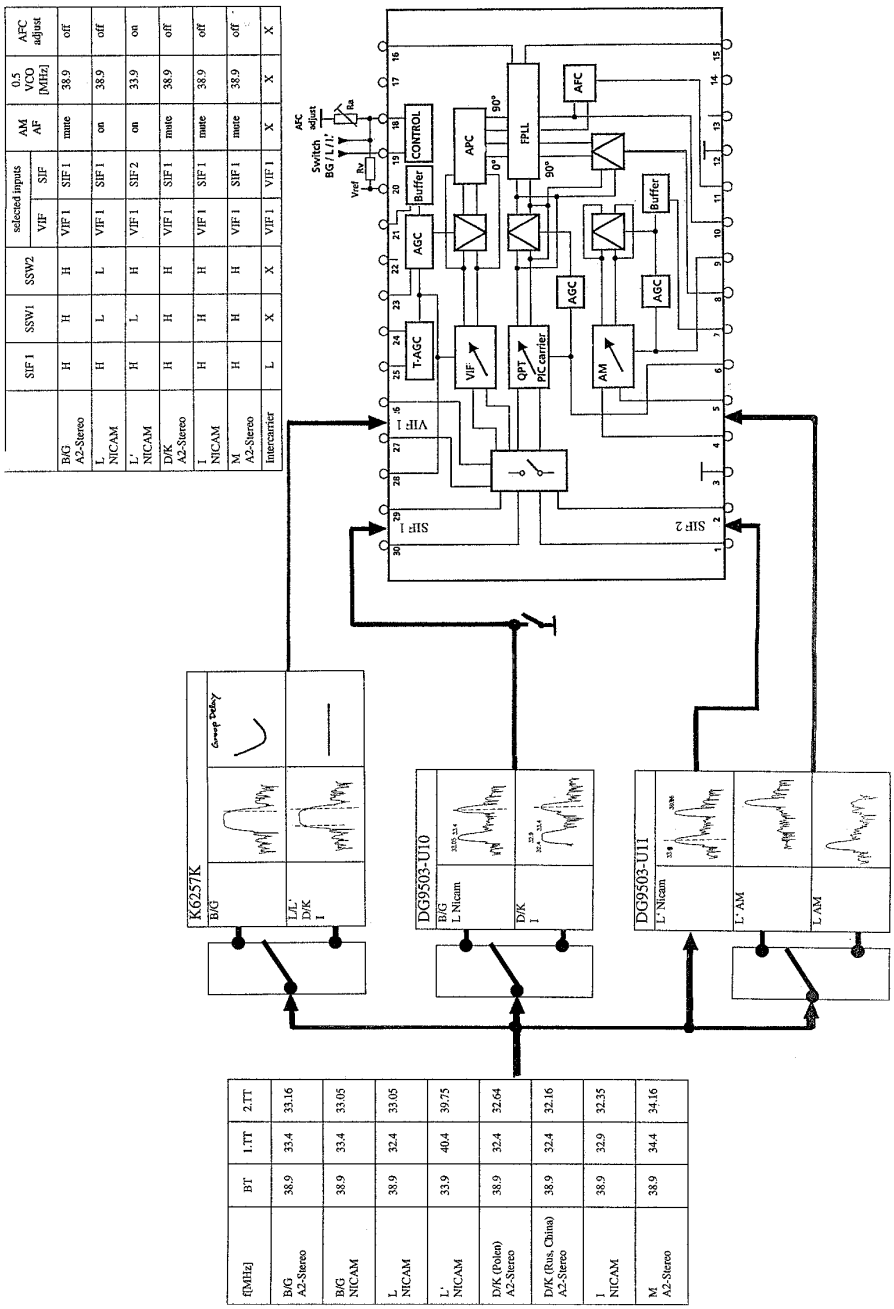
SIF1	VIF1	SSW1	SSW2	VCO* MHz	selected inputs[2]		modu-lation	AGC-type / ratio	AM AF	AFC adjust	norm	
					VIF	SIF						
H	H	H	H	38.9	VIF1	SIF1	neg.	syncpeak / 1:83	mute	off		BG
H	H	H	L	38.9	VIF1	SIF1	neg.	syncpeak,average / 1:8300	mute	off		(Mac)
H	H	L	H	33.9	VIF1	SIF2	pos.	whitepeak,average / 1:8300	on	on		L‘
H	H	L	L	38.9	VIF1	SIF1	pos.	whitepeak,average / 1:8300	on	off		L
H	L	H	H	38.9	VIF2	SIF1	neg.	syncpeak / 1:83	mute	off		BG
H	L	H	L	38.9	VIF2	SIF1	neg.	syncpeak,average / 1:8300	mute	off		(Mac)
H	L	L	H	33.9	VIF2	SIF1	pos.	whitepeak,average / 1:8300	on	on		L‘
H	L	L	L	38.9	VIF2	SIF1	pos.	whitepeak,average / 1:8300	on	off		L
L	H	H	H	38.9	VIF1	VIF1	neg.	syncpeak / 1:83	mute	off	intercarrier	BG
L	H	H	L	38.9	VIF1	VIF1	neg.	syncpeak,average / 1:8300	mute	off	intercarrier	(Mac)
L	H	L	H	33.9	VIF1	VIF1	pos.	whitepeak,average / 1:8300	on	on	intercarrier	L‘
L	H	L	L	38.9	VIF1	VIF1	pos.	whitepeak,average / 1:8300	on	off	intercarrier	L
L	L	H	H	38.9	VIF2	VIF2	neg.	syncpeak / 1:83	mute	off	intercarrier	BG
L	L	H	L	38.9	VIF2	VIF2	neg.	syncpeak,average / :8300	mute	off	intercarrier	(Mac)
L	L	L	H	33.9	VIF2	VIF2	pos.	whitepeak,average / 1:8300	on	on	intercarrier	L‘
L	L	L	L	38.9	VIF2	VIF2	pos.	whitepeak,average / 1:8300	on	off	intercarrier	L

* ..internal VCO : 2 2)..VIF = Vision-IF, SIF=Sound-IF + Carrier

S-DIP-30 : SIF1=pin29,30; SIF2=pin1,2; VIF1=pin26,27; VIF2=pin1,2; SSW1=pin19; SSW2=pin18

P-DSO-32 : SIF1=pin31,32; SIF2=pin1,2; VIF1=pin28,29; VIF2=pin1,2; SSW1=pin21; SSW2=pin20

4.2.1 Typical input-filter concept 1



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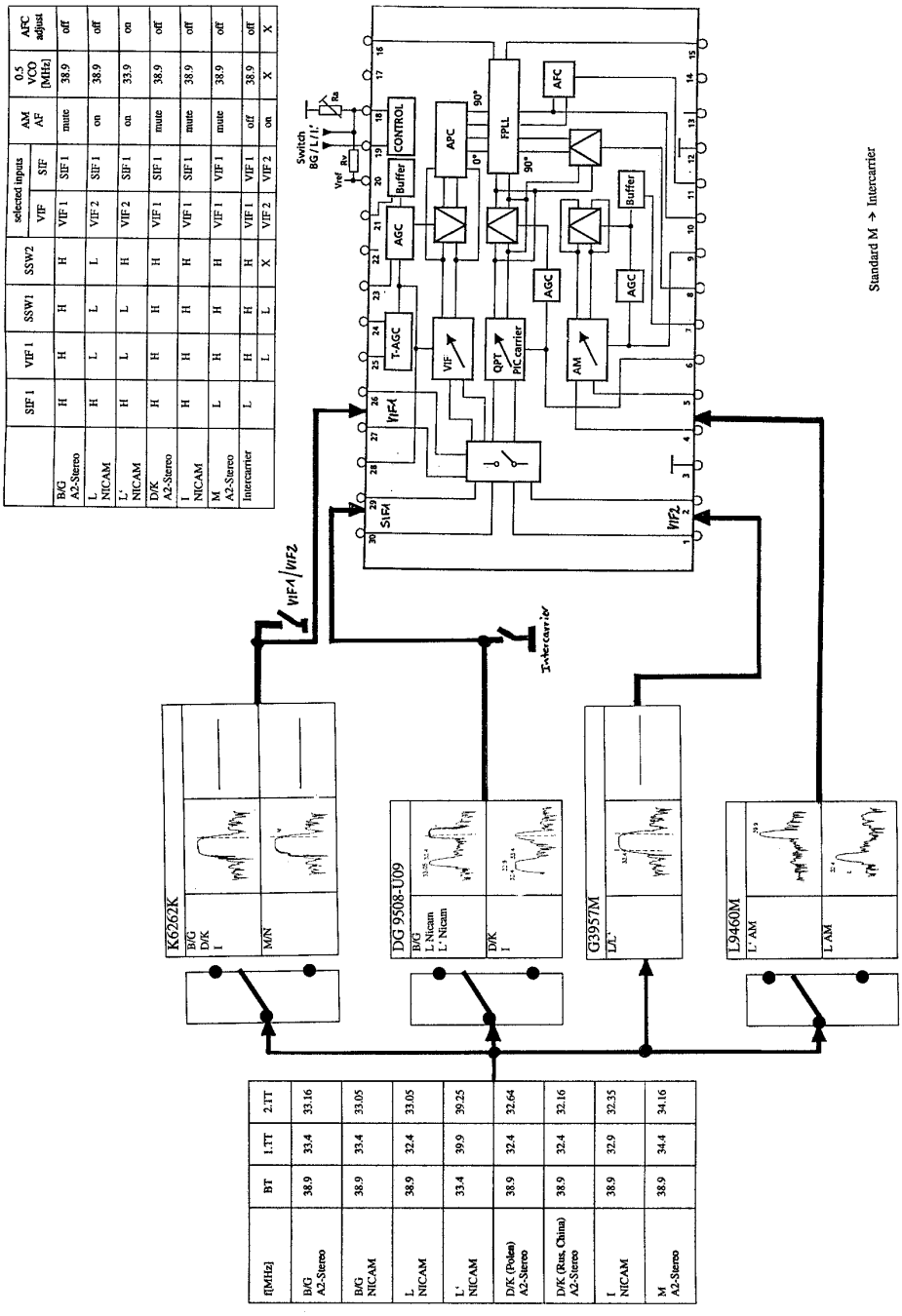
4.2.2 Typical input-filter concept 2



	SIF 1	VIF 1	SSW1	SSW2	selected inputs VIF	selected inputs SIF	AM AF	0.5 VCO [MHz]	AFC adjust
B/G A2-Stereo	H	H	H	H	VIF 1	SIF 1	mute	38.9	off
L NICAM	H	L	L	L	VIF 2	SIF 1	on	38.9	off
L' NICAM	H	L	L	H	VIF 2	SIF 1	on	33.9	on
D/K A2-Stereo	H	H	H	H	VIF 1	SIF 1	mute	38.9	off
I NICAM	H	H	H	H	VIF 1	SIF 1	mute	38.9	off
M A2-Stereo	L	H	H	H	VIF 1	VIF 1	mute	38.9	off
Intercarrier	L	H	H	H	VIF 1	VIF 1	off	38.9	off
		L	L	X	VIF 2	VIF 2	on	X	X

f[MHz]	BT	1.1T	2.1T
B/G A2-Stereo	38.9	33.4	33.16
B/G NICAM	38.9	33.4	33.05
L NICAM	38.9	32.4	33.05
L' NICAM	33.4	39.9	39.25
D/K (Polen) A2-Stereo	38.9	32.4	32.64
D/K (Rus, China) A2-Stereo	38.9	32.4	32.16
I NICAM	38.9	32.9	32.35
M A2-Stereo	38.9	34.4	34.16

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4.2.3 Application hints

Table 4-1 AFC adjust and VCO tank circuit dimension 1st VCO* (frequency = 38.9 MHz)				
2nd VCO frequency**	**Ra**	**Rb**	**Lc**	**Cc**
33.4 MHz	10k	4.7k	120nH	19.5pF
33.9 MHz	4.7k	10k	120nH	18pF

*) internal VCO : 2 frequency for any norm except L‘

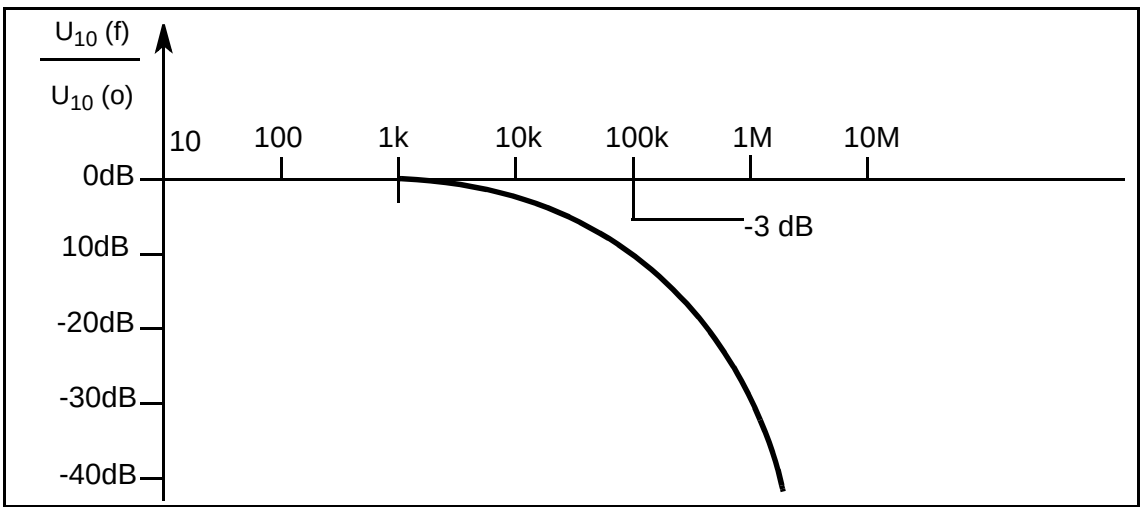
**) internal VCO : 2 frequency for L‘

■ **Application note 1 : Adjusting the tank circuit**

At the desired IF-frequency the AFC-output current has to be zero. Therefore the voltage at that pin will be Vs/2. This is achieved by adjusting 1st the coil, 2nd Ra for L‘ mode.
No further aligment e.g. for sound S/N is necessary.

■ **Application note 2 : FPLL, loopfilter response**

Measuring the frequency response of the loop.
The frequency response of the FPLL can be measured at the loopfilter output Pin 10. If a frequency modulated carrier is applied to the Picture carrier input the demodulated signal occures at Pin 10. Within its bandwidth the FPLL can track modulation frequencies, thus this frequencies can be measured there. The frequency response with the recommended loopfilter can be seen in the picture below.



Designing the frequency response
There should be no overshoot until 20 kHz. The bandwidth has to be high enough to control the destortions generated by the tuner. To reject intercarrier buzz at 250 kHz video modulation the loop filter response at that frequency should be as low as possible.

- Application note 3 : Equations

Resonance frequency : $fn = \frac{1}{2\pi}\sqrt{\frac{K_O\, K_{DI}}{C_{LF}}}$

Damping factor: $\nu = \pi\, fn\; C_{LF}\, R_{LF}$

Phase detector gain: $K_{OI} = 250\ \frac{\mu A}{rad}$

VCO-gain: $K_O = 2\pi\ 2\ \frac{MHz}{V}$

with tank circuit: 120 nH || 18 pF

Loopfilter capacitor: C_{LF} recommended $C_{LF} = 1\mu$

Loopfilter resistor: R_{LF} recommended $R_{LF} = 120\Omega$

A second capacitor in parallel with R_{LF} is recommend to reduce the response at 250 kHz $C_P = 4.7$ nF

Values:

With the recommend tank circuit and loopfilter

VCO range: $\Delta fpp = 4$ MHz

Resonance frequency: $fn = 9$ kHz

Damping factor: $\nu = 8.5$

Loop cut off frequency: $f_{-3dB} = 100$ kHz

5 Reference

Contents of this Chapter

5.1 Electrical Data

5.1.1 Absolute Maximum Ratings

WARNING

The maximum ratings may not be exceeded under any circumstances, not even momentarily and individually, as permanent damage to the IC will result.

Table 5-1 Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit	Remarks
		min	max		
Supply voltage	V_{cc}, V_{cc1}	0	10	V	
Supply voltage (S-DIP-30 only)	V_{cc}, V_{cc1}	0	12	V	
Output current (R_{Lmin} = 500 Ω)	ITRAPOUT	0	6	mA	
Output current (R_{Lmin} = 2 kΩ)	Iuref3!	0	3	mA	
Output current	IAGCOUT	0	25	mA	
Output voltages	VSIFAGC's	0	3.6	V	
Output voltage	VAGCOUT	0	12	V	
Output voltage	VAFCOUT	0	V_{cc}	V	
Output voltage	VDFOUT	0	V_{cc}	V	
Output voltage	VAFOUT	0	V_{cc}	V	
Output voltage	VAGCM	0	3.6 < V_{cc}	V	
Output voltage	VTRAPOUT	0	V_{cc}	V	
Output voltage	$V_{uref3!}$	0	7 < V_{cc}	V	
Input voltage	VAGCREF	0	3.6 < V_{cc}	V	
Input voltages	VVIF,SIF	0	V_{cc}	V	
Input voltages	VSSW	0	V_{cc}	V	
Input voltages	VTP	0	6 < V_{cc}	V	
Input voltages	VVCO	0	4.5 < V_{cc}	V	
Input voltage	VPDLOOP	0	6 < V_{cc}	V	

Table 5-1 Absolute Maximum Ratings (continued)

Parameter	Symbol	Limit Values		Unit	Remarks
		min	max		
ESD-voltage all pins HBM (R=1.5kΩ , C=100pF)	V_{ESD}	-4	4	kV	
Junction temperature	T_j		150	°C	
Storage temperatue	T_{stg}	- 40	125	°C	
Thermal resistance P-DSO28 (sys-air)	T_{thSA}		76	K/W	
Thermal resistance P-DSO32 (sys-air)	T_{thSA}		76	K/W	
Thermal resistance S-DIP30 (sys-air)	T_{thSA}		57	K/W	

All voltage values are referenced to ground, if not stated otherwise.

5.1.2 Operating Range

Within the operating range the IC operates as described in the circuit description. The AC / DC characteristic limits are not guaranteed.

Table 5-2 Operating Range

Parameter	Symbol	Limit Values		Unit	Test Conditions	L	Item
		min	max				
Supply voltage	V_{cc},V_{cc1}	7.5	10	V			
Supply voltage (S-DIP-30 only)	V_{cc}, V_{cc1}	7.5	12	V			
Tuner AGC supply voltage	V_{AGCOUT}	0.6	10	V			
IF-input frequency range VIF, SIF , AMSIF	f_{in}	12	60	MHz			
IF-input AC-voltages	V	50 μV_{rms}	120 mV_{rms}				
Ambient temperature during operation	T_A	-10	85	°C			

All voltage values are referenced to ground, if not stated otherwise.

5.1.3 AC/DC Characteristics

Table 5-3 AC/DC Characteristics with T_A 25 °C, V_{CC} = 8.5 V

	Symbol	Limit Values			Unit	Test Conditions	L	Item
		min	typ	max				
Power Supply								
Total current consumption	$I_{CC}+I_{CC1}$		90		mA	R_L>1MΩ,C_L<1.5pf		
Reference voltage	$V_{uref3!}$	5.7	6.0	6.3	V	R_L>1MΩ,C_L<1.5pf		
Reference voltage	$I_{uref3!}$			2	mA			
Norm switches								
H Level	V_{SSW}	2		5	V			
L Level	V_{SSW}	0		1	V			
external load at SSW2 if high	I_{SSW2}			1	%	of resistor devider current		
IF inputs								
DC level	V_{IF}	3.4	3.6	3.8	V	V_{IF}= 0 V_{pp}		
Mono / Intercarrieraktive	I_{SIF1}	100		400	µA	R_{Gnd} < 27 kΩ		
2nd. IF input VIF2 aktive	I_{VIF1}	100		400	µA	R_{Gnd} < 27 kΩ		
VCO								
Tank circuit, DC level	V_{VCO}		2.6		V			
Loopfilter voltage	V_{PDloop}	2.3		5	V	dependant on input frequency		
Peak - detector VIF-AGC								
Voltage range	V_{AGCH}	0		3.6	V	dependant on input amplitude		
AGC time constant B/G standard								
Charge current	I_{AGCH}		1		mA	V_{AGCH} = 2V, $V_{TRAPOUT}$ < 1.0V		
Discharge current	I_{AGCH}		12		µA	V_{AGCH} = 2V, $V_{TRAPOUT}$ > 2.0V		
Charge / discharge ratio	AGCH		83					

Table 5-3 AC/DC Characteristics with T_A 25 °C, V_{CC} = 8.5 V (continued)

	Symbol	Limit Values			Unit	Test Conditions	L	Item
		min	typ	max				
AGC time constant with L-Standard or Mac Standard								
Charge current	I_{AGCH}		1		mA	V_{AGCH} = 2V, $V_{TRAPOUT}$ > 3.0V		
Discharge current	I_{AGCH}		120		nA	V_{AGCH}=2V, $V_{TRAPOUT}$ = 2.5V		
Discharge current (under average control)	I_{AGCH}		100		µA	V_{AGCH} = 2V, $V_{TRAPOUT}$ < 1.0V		
Charge / discharge ratio	AGCH		8300					
Envelope - detector AGCs								
Voltage range	$V_{SIFAgcs}$	0.2		2.9	V	dependant on input amplitude		
Charge / discharge current	$\pm I_{SIFAgcs}$		1.5		µA	$V_{SIFAgcs}$ = 1.5 V		
Quick charge	$I_{SIFAgcs}$		1.5		mA	$V_{SIFAgcs}$ = 1.5 V		
Video output								
Output current	$- I_{Trapout}$		0.84		mA	V_{AGCM} = Vsync +0.7 V_{VIF} =Carrier nomod.		
Sync pulse level	$V_{Trapout}$		1.25		V			
White level	$V_{Trapout}$		2.75		V			
AM output								
DC level (L, L')	$V_{AMAFout}$	3.2	3.6	4.0	V	SC nomod.		
DC level (AM inactive)	$V_{AMAFout}$	high impedance						
DF output								
DC level	$V_{FMDFout}$	2.8	3.4	4.0	V			
Output current	$I_{FMDFout}$		2.5		mA	$V_{FMDFout}$ = DC level +0.7V		
AFC output								
Voltage range	V_{AFCout}	1V		V_S-1V	V			
Output current	I_{AFCout}		250		µA	$V_{AFC} = V_{cc} / 2$		
Voltage at centerfrequency	V_{AFCout}		V_{cc} / 2		V	1:1 V_{cc} devider		
Slope	I_{AFCout}		0.7		µA/kHz			
AFC - adjust	V_{SSW2}	3		5	V	switch at SSW2: high impedance		

Table 5-3 AC/DC Characteristics with T_A 25 °C, V_{CC} = 8.5 V (continued)

	Symbol	Limit Values			Unit	Test Conditions	L	Item
		min	typ	max				
Tuner AGC								
Max. output current max. 1ms	I_{AGCOUT}	10	18	30	mA	V_{AGCOUT} = 4V R_{AGCOUT} = 0 Ω		
Min. output current	I_{AGCOUT}	0		10	µA	V_{AGCOUT} = VCC1 V_{AGCREF} = max		
Output short current	I_{AGCOUT}	150	200	250	µA	V_{AGCOUT} = 0 V R_{AGCOUT} = ∞		
Min. output voltage	V_{AGCOUT}	0.2	0.3	0.5	V	R_{AGCOUT} = ∞		
IF inputs								
Control range	$\Delta V_{VIF,SIF}$	54	60		dB			
Min. input voltage	$V_{VIF,SIF}$		120	180	μV_{rms}	$V_{Trapout}$ = -3 dB		
AGC range	ΔV_{AMSIF}	54	60		dB			
Min. input voltage	V_{AMSIF}		120	180	μV_{rms}	$V_{AMAFout}$ = -3 dB		
Video output , VIF OFW G1962M sound shelf -20 dB								
Signal level	$V_{Trapout}$	1.25	1.5	1.75	V_{pp}	B/G norm		
Video bandwidth	f_{-1dB}	7	8		MHz	$V_{Trapout}$ = -1 dB		
Differrential Gain	DG		4		%	R_L>1MΩ,C_L<1.5pf		
Differrential Phase	DP		1.5		deg	R_L>1MΩ,C_L<1.5pf		
Intermodulation f_1 = 4.52MHz, PC modulated from black to white, f_2 = 5.50 MHz, SC -13 dB to unmodulated PC	@IM		62		dB	f = 980 KHz Levels at Trapout f_1 = - 2.0 dB f_2 = - 13 dB R_L>1MΩ,C_L<1.5pf		
Intermodulation f_1 = 4.4MHz, -13.2 dB to PC sync level, -10 dB to PC modulated from black to white, f_2 = 5.50 MHz, SC -7 dB to unmodulated PC	@IM		69		dB	f = 1.1 MHz Levels at IF input f_1 =-13.2dB to sync f_2 =-27 dB to PC R_L>1MΩ,C_L<1.5pf		
S/N CCIR Unified WTD S/N CCIR 567 Unweighted		60 55	65 59		dB dB	V_{IF} = max. black & white		
residual vision carrier	$V_{Trapout}$		500		μV_{rms}	R_L>1M,f=38.9MHz		
residual VCO carrier	$V_{Trapout}$		350		μV_{rms}	R_L>1M,f=77.8MHz		

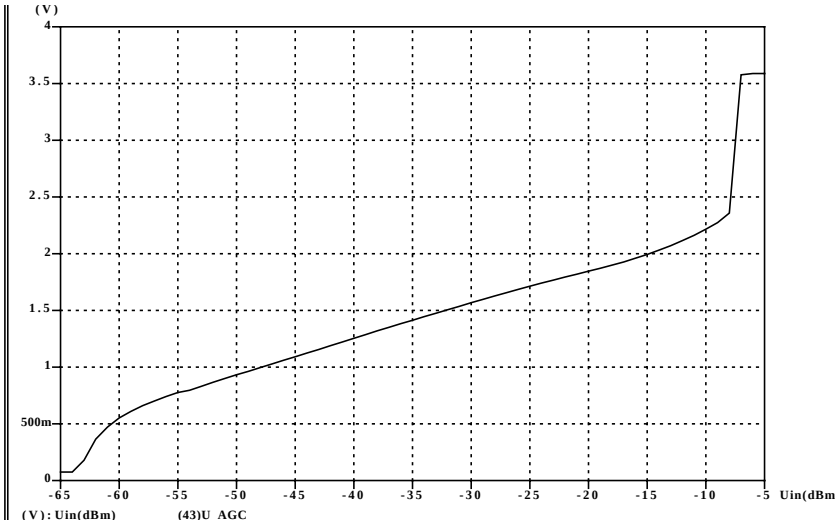
Table 5-3 AC/DC Characteristics with T_A 25 °C, V_{CC} = 8.5 V (continued)

	Symbol	Limit Values			Unit	Test Conditions	L	Item
		min	typ	max				
DF output								
Signal level Input wideband trans-former coupled	$V_{FMDFout}$		100		mV_{rms}	SC / PC= -13 dB PC nomod.		
Output current	$I_{FMDFout}$		2.5		mA	$V_{FMDFout}$ = DC level +0.7V		
S/N CCIR WTD			58		dB	PIC=FubK Pattern V_{IF} = max.		
AM output : no picture carrier , AM SIF OFW L9453M								
Signal level	$V_{AMAFout}$	700	900	1100	mV_{rms}	m = 80% , 1kHz		
THD total			0.25	0.5	%	m = 30% , 1kHz		
THD total			0.35	1.0	%	m = 80% , 1kHz		
S/N Quasi Peak CCIR WTD			60		dB	m = 80% , 1kHz $V_{AMAFout}$ = +3 dB		
AM output : picture carrier FubK modulation, AM SIF OFW L9453M								
Signal level	$V_{AMAFout}$	700	900	1100	mV_{rms}	m = 80% , 1kHz		
THD 2 x fo			0.1	0.25	%	m = 30% , 1kHz		
THD total			1.5	2.0	%	m = 30% , 1kHz		
THD 2 x fo			0.2	0.5	%	m = 80% , 1kHz		
THD total			0.7	1.5	%	m = 80% , 1kHz		
S/N Quasi Peak CCIR WTD			45		dB	m = 80% , 1kHz $V_{AMAFout}$ = +3 dB		

5.2 Electrical Diagramms

5.2.1 Typical VIF AGC voltage characteristic

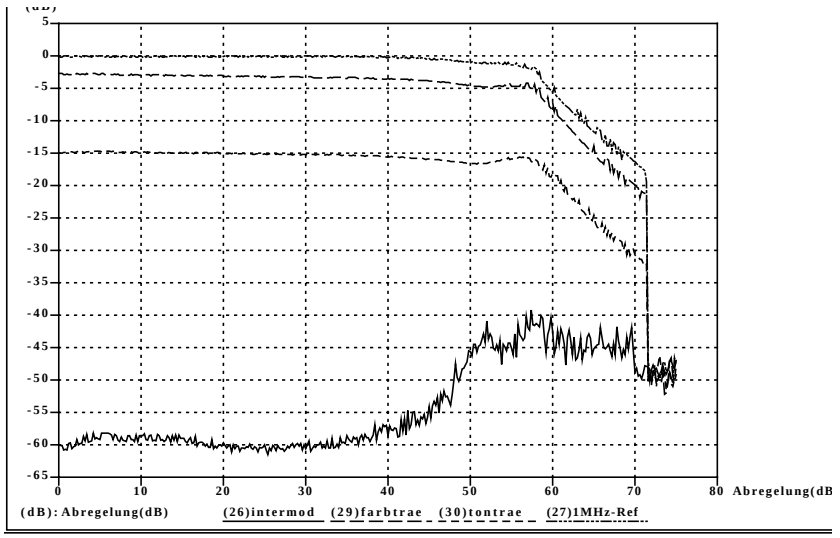
as a function of input signal



zfagc.eps

5.2.2 Typical VIF intermodulation

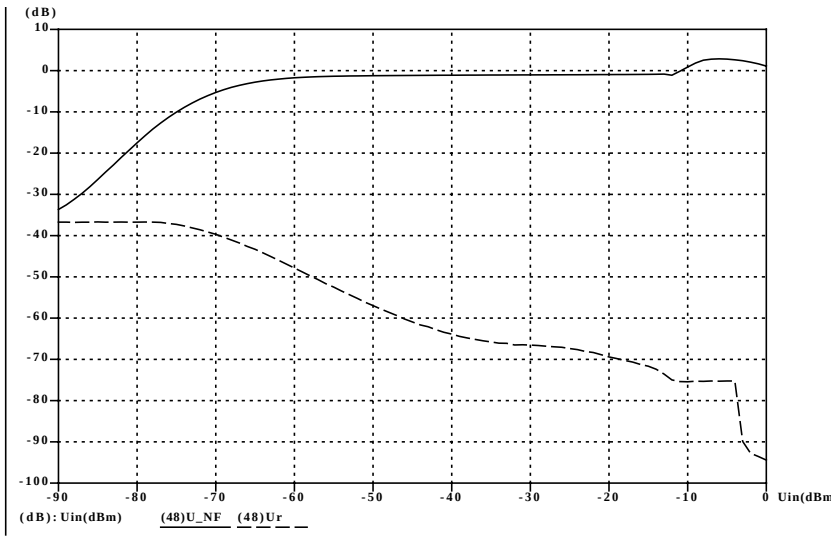
as a function of input signal



Intermod.eps

5.2.3 Typical AM AF S/N

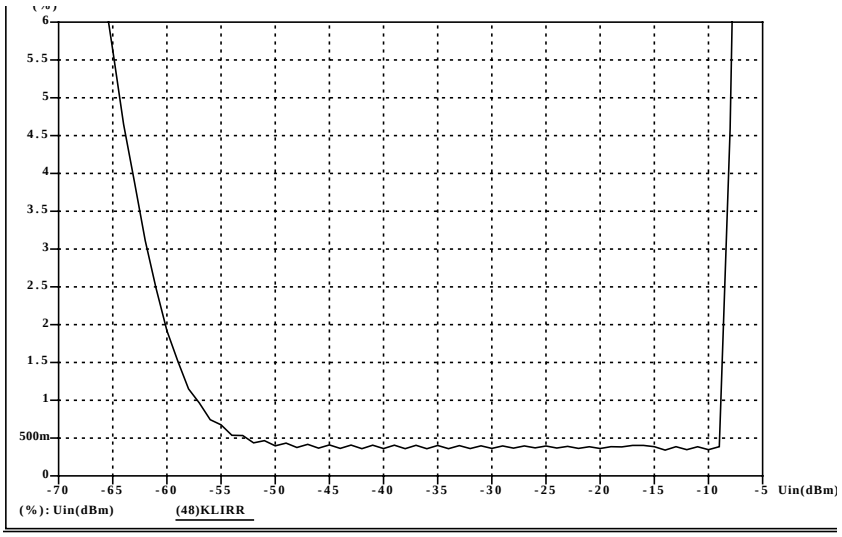
as a function of input signal



Amnfsn.eps

5.2.4 Typical AM Audio THD

as a function of input signal : m=80%



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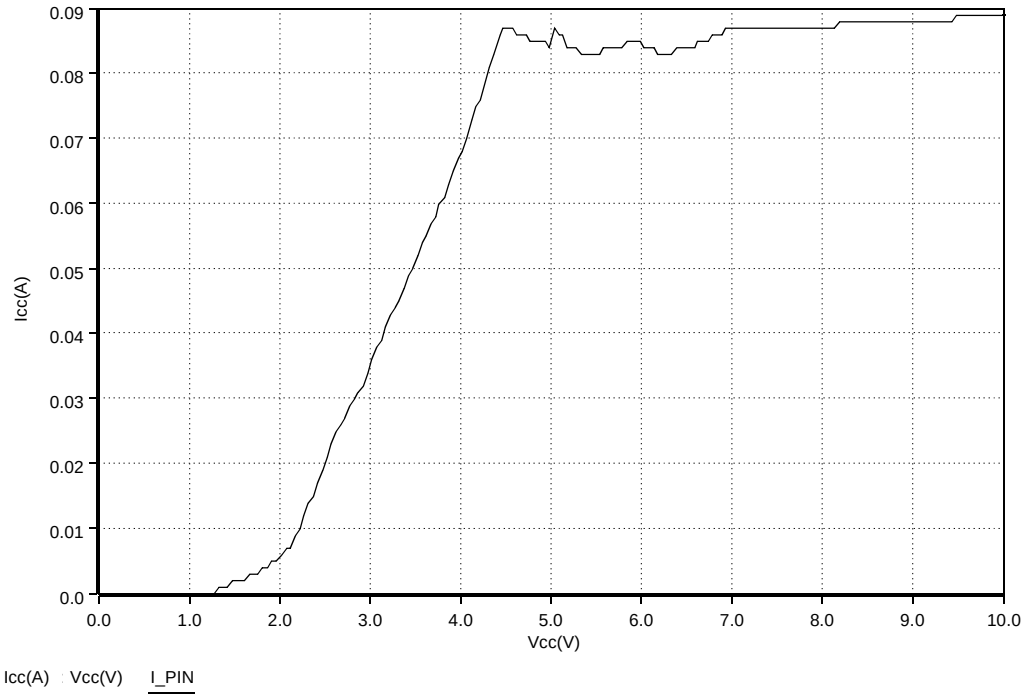
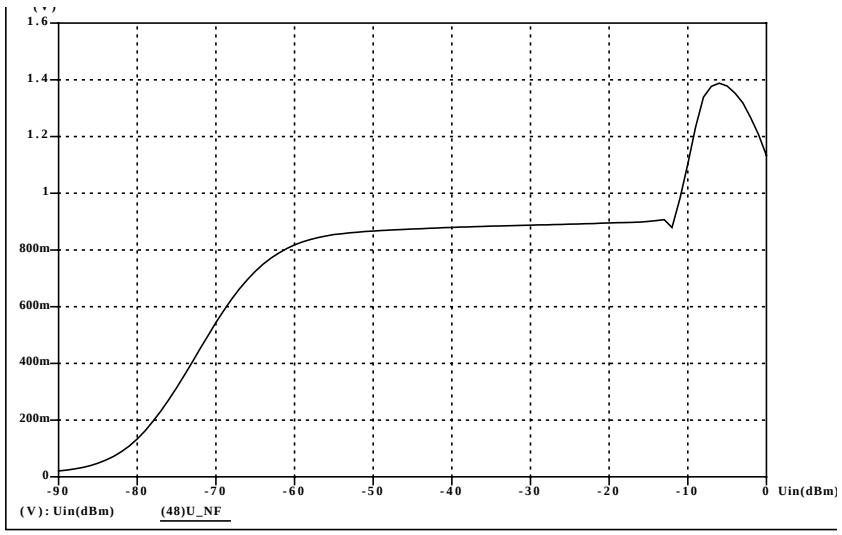
5.2.5 Typical DC-current consumption

as a function of VCC



5.2.6 Typical AF amplitude

as a function of input signal m=80%



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