

AN5177NK

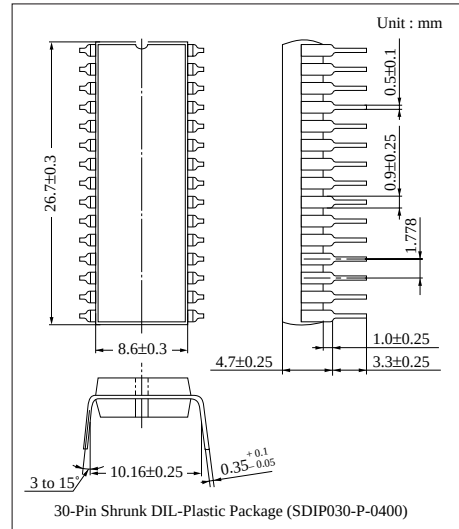
VIF/SIF Signal Processor IC for TV and VCR

■ Overview

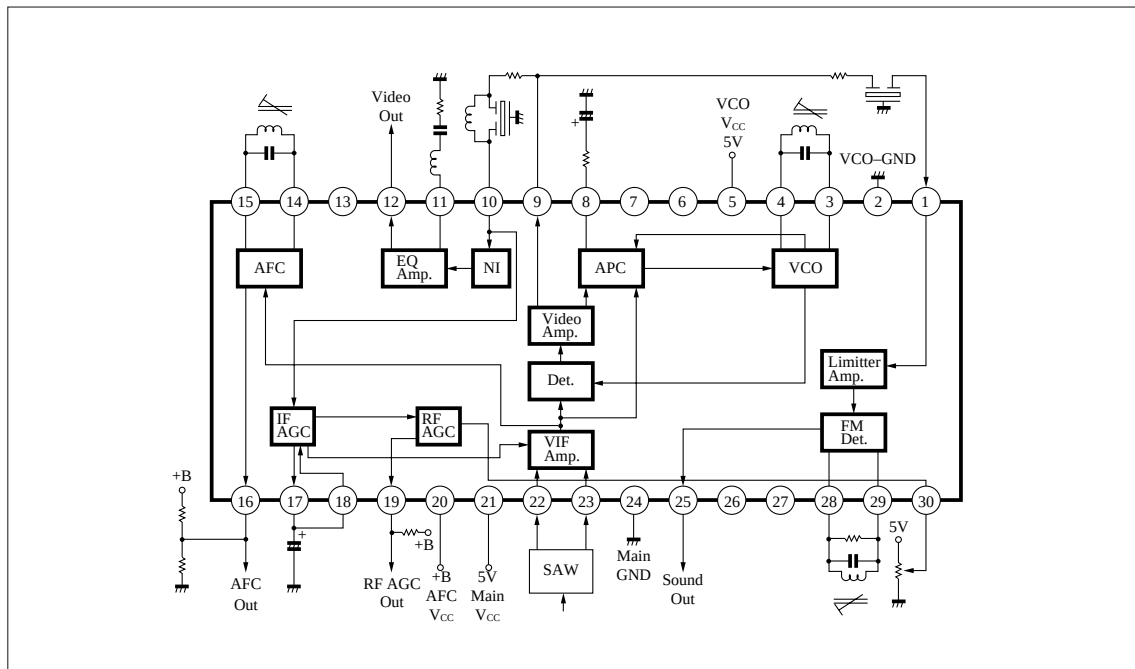
The AN5177NK is a VIF/SIF signal processor IC for TV and VCR.

■ Features

- PLL full-synchronization detection
- An equalization amplifier for improved frequency characteristics built-in
- Low operating voltage : $V_{CC}=5.0V$ (typ.)



■ Block Diagram



■ Pin Descriptions

Pin No.	Pin name	Pin No.	Pin name
1	SIF input	16	AFC output
2	GND	17	IF AGC filter
3	VCO coil	18	IF AGC filter
4	VCO coil	19	RF AGC output
5	Power supply	20	AFC output power supply
6	NC	21	Power supply
7	NC	22	VIF input
8	APC filter	23	VIF input
9	VIF detection output	24	GND
10	NOISE INVERTER input	25	Audio output
11	Frequency characteristics Adj.	26	NC
12	Video output	27	NC
13	NC	28	SIF coil
14	AFC coil	29	SIF coil
15	AFC coil	30	RF AGC DELAY Adj.

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	$V_{5, 21-2, 24}$ 6.0	V
		$V_{20-2, 24}$ 12.5	
Supply current	I_{CC}	100	mA
Circuit current	I_9	- 8 to + 1	mA
	I_{12}	- 5 to + 0.2	mA
	I_{19}	0 to + 2.0	mA
	I_{25}	- 2.5 to + 0.2	mA
Power dissipation ^{Note 2)}	P_D	600	mW
Operating ambient temperature ^{Note 1)}	T_{opr}	- 20 to + 70	°C
Storage temperature ^{Note 1)}	T_{stg}	- 55 to + 150	°C
Circuit voltage	$V_{19-2, 24}$	0 to 12.5	V

Note 1) $T_a=25^{\circ}\text{C}$ except operating ambient temperature and storage temperature.

Note 2) Allowable power dissipation of the package at $T_a=70^{\circ}\text{C}$.

■ Recommended Operating Range ($T_a=25^{\circ}\text{C}$)

Parameter	Symbol	Range
Operating supply voltage range	V_{CC1} ($V_{5, 21-2, 24}$)	4.5V to 5.5V
	V_{CC2} ($V_{20-2, 24}$)	V_{CC1} to 12.2V

■ Electrical Characteristics (Ta=25±2°C)

Parameter	Symbol	Condition	min	typ	max	Unit
VIF AMP DET Section						
Video detection output	V_{O12}	Typical color signal (white color contained) $m=87.5\%$, $v_{in}=80\text{dB}\mu$	1.9	2.2	2.5	V_{P-P}
Video frequency characteristics (1)	$f_{C(1)}$	Attenuation value at 8MHz	-6.0	-2.5	+1.0	dB
Synchronous peak voltage	V_P		0.9	1.1	1.3	V
PLL Section						
APC pull-in range <h>	f_{ph}		1.2	—	—	MHz
APC pull-in range <l>	f_{pl}		—	—	-1.2	MHz
VCO control sensitivity	β	$V_8=2.0$ to 2.2V	2.5	4.0	5.5	kHz/mV
APC detection sensitivity	μ_{APC}	$f=f_0\pm 500\text{kHz}$	0.2	0.3	0.4	mV/kHz
AGC Section						
IF AGC filter charge current	I_{17C}		-20.0	-10.0	-5.0	μA
IF AGC filter discharge current	I_{17D}		400	550	700	μA
RF AGC operating sensitivity	$v_{RF\ AGC}$		0	1.5	3.0	dB
RF AGC pin current (1)	$I_{19(1)}$		—	—	1.38	mA
RF AGC pin current (2)	$I_{19(2)}$		-0.15	0	0.15	mA
AFC Section						
AFC discrimination sensitivity (1)	μ_{1AFC}	$R_L=68\text{k}\Omega/82\text{k}\Omega$	25	35	45	mV/kHz
AFC offset current (1)	$I_{16(1)}$		-17	-1	15	μA
AFC offset current (2)	$I_{16(2)}$		-12	+7	+26	μA
AFC maximum output voltage	V_{CC2} $-V_{16max.}$	$f=f_0-500\text{kHz}$	-0.9	-0.65	0	V
AFC minimum output voltage	$V_{16min.}$	$f=f_0+500\text{kHz}$	0	0.5	0.8	V
SIF Section						
Sound detection output	V_{O25}	$f_0=4.5\text{MHz}$, $v_{in}=100\text{dB}\mu$ $\Delta f=\pm 25\text{kHz}$, $f_m=400\text{Hz}$ $RD=6.8\text{k}\Omega$	240	300	360	mVrms
DC Characteristics						
Circuit current $\left(\begin{smallmatrix} \text{Pin5, Pin20} \\ \text{Pin21} \end{smallmatrix} \right)$	$I_{5+20+21}$		41	59	77	mA
SIF input pin voltage	V_1		4.9	5.0	5.1	V
VCO coil pin voltage	$V_{3,4}$		1.3	1.9	2.4	V
APC filter pin voltage	V_8		1.6	2.1	2.6	V
VIF detection output pin voltage	V_9		1.95	2.5	2.95	V
Video output pin voltage	V_{12}		3.4	3.9	4.4	V
AFC coil pin voltage	$V_{14,15}$		2.1	2.5	2.9	V
VIF input pin voltage	$V_{22,23}$		2.65	2.95	3.25	V
Audio output pin voltage	V_{25}		1.4	1.9	2.4	V
SIF coil pin voltage	$V_{28,29}$		2.4	3.0	3.7	V
VIF AMP DET Section						
Input sensitivity	v_{SV}	$V_{O12}=-3\text{dB}$	—	(45)	(48)	dB μ
Maximum tolerant input	$v_{max.v}$		(97)	(102)	—	dB μ
Video frequency characteristics (2)	$f_{C(2)}$	$V_{O12}=-3\text{dB}$	(7)	(9)	(11)	MHz
SN ratio	S/N		(50)	(55)	—	dB
Differential gain	DG		—	(2)	(5)	%
Differential phase	DP		—	(2)	(5)	deg
Black noise detection level	DV_{BN}	$V_{BN}-V_P$	(-0.9)	(-0.7)	(-0.5)	V
Black noise clamp level	DV_{BNC}	$V_{BNG}-V_P$	(0.5)	(0.8)	(1.1)	V

Note) The characteristics value in parentheses is not a guaranteed value, but reference one on design.

■ Electrical Characteristics (cont.) (Ta=25±2°C)

Parameter	Symbol	Condition	min	typ	max	Unit
White noise clamp level	ΔV_{WNC}	$V_{WNG} - V_P$	(1.9)	(2.2)	(2.5)	V
Intermodulation	IM		(43)	(49)	—	dB
Input resistance (Pin22)	R_{i22}		—	(1.1)	—	k Ω
Input capacitance (Pin22)	C_{i22}		—	(3.2)	—	pF
Output resistance (Pin9)	R_{o9}		—	(30)	—	Ω
Output resistance (Pin12)	R_{o12}		—	(10)	—	Ω

PLL Section

VCO maximum variable range (1)	Δf_{VU}	$V_8 = 1.0V$	(1.5)	—	—	MHz
VCO maximum variable range (2)	Δf_{VD}	$V_8 = 3.4V$	—	—	(2.0)	MHz
VCO frequency SW ON drift	Δf_{VON}	3 minute after SW ON	(−0.1)	(0)	(+0.1)	MHz
VCO frequency temperature drift	Δf_{VT}	−20°C to +70°C	—	(−0.3)	—	MHz
VCO reference oscillation level	v_{VCO}		(100)	(106)	(112)	dB μ
VCO 2nd harmonics level	v_{VCO2}		—	(70)	—	dB μ

AGC Section

RF AGC Delay point temperature drift	Δv_{RFDI}	−20°C to +70°C	—	(+2)	—	dB
Noise canceller operation voltage (W)	$\Delta V_{NC(W)}$	$V_{NC(W)} - V_P$	(2.9)	(3.2)	(3.5)	V
Noise canceller operation voltage (B)	$\Delta V_{NC(B)}$	$V_{NC(B)} - V_P$	(−0.9)	(−0.7)	(−0.5)	V

AFC Section

AFC defeat SW operation voltage	V_{AFC-SW}		(0.6)	(0.9)	(1.2)	V
AFC discrimination sensitivity (2)	μ_{2AFC}	$v_{in} = 71dB\mu$	(10)	(18)	(24)	mV/kHz
AFC offset current (3)	$I_{16(3)}$		(−11)	(+8)	(+28)	μA

SIF Section

Input limiting voltage	$v_i(lim)$	$V_{025} = -3dB$	—	(46)	—	dB μ
AM rejection ratio (1)	AMR (1)	$v_{in} = 100dB\mu$	(45)	(60)	—	dB
AM rejection ratio (2)	AMR (2)	$v_{in} = 80dB\mu$	(30)	(35)	—	dB
Total harmonics distortion	THD		(0)	(0.3)	—	%
Input resistance (Pin1)	R_{i1}	$f = 4.5MHz$	—	(1.0)	—	k Ω
Input capacitance (Pin1)	C_{i1}	$f = 4.5MHz$	—	(8.0)	—	pF
Detector input resistance (Pin28)	R_{i28}	$f = 4.5MHz$	—	(3.5)	—	k Ω
Detector input capacitance (Pin28)	C_{i28}	$f = 4.5MHz$	—	(25)	—	pF
Output resistance (Pin25)	R_{o25}	$f = 500kHz$	—	(500)	—	Ω

Note) The characteristics value in parentheses is not a guaranteed value, but reference one on design.