ILA5737D

Low-power high-frequency triple (metric waves, microwaves) mixer-oscillator for video equipment

IC ILA5737D is monolithic microcircuit, low-power high-frequency triple (metric waves, microwaves) mixer-oscillator for video equipment used in TV tuners and videotape recorder tuners. IC does assignment, matching, filtration and amplification of IF from TV signal applied from on-air within three tunable frequency ranges.

Functions

does assignment and amplification of IF from TV signal applied from on-air within three tunable frequency ranges.

Features.

- Implemented in plastic small-size 24-pin SSOP-case with external lead pitch 0,65mm;
- supply voltage 4.5 to 5.5V;
- consumption current 42 to 58 mkA;
- operation temperature range - 20ºC ≤ Tamb ≤ 80ºC;
- used frequency channels correspond to european standards with the following radio-frequency ranges:
  48.25 MHz to 168.25 MHz;
  175.25 MHz to 447.25 MHz;
  455.25 MHz to 855.25 MHz
- when using the corresponding external interconnection circuit, they are suitable for construction of all-channel tuners NTSC (USA and Japan).
- allows the designer to make economic and small-size 3-bands tuner;

Using ILA5737D time of tuner fabrication may be considerably reduced. Temperature compensation of reference voltage.

Pinout

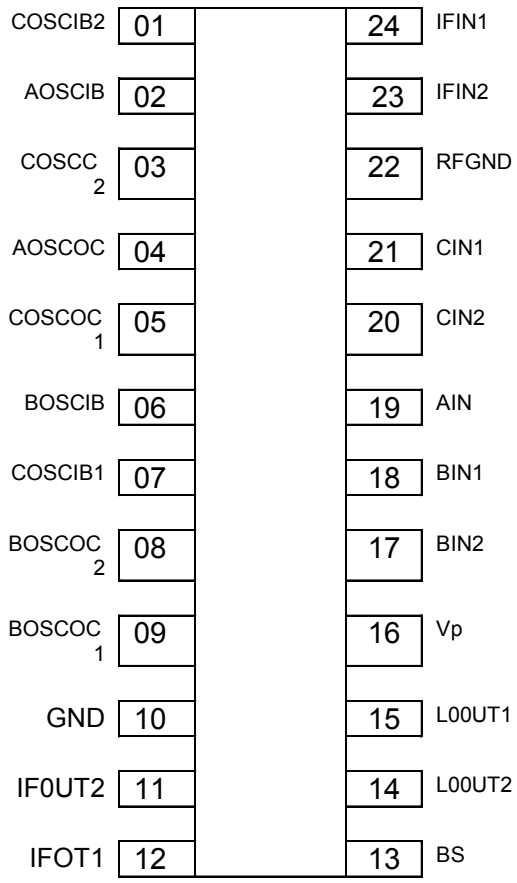

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Table 1. Maximum ratings

Parameter, symbol, unit	Maximum ratings		Absolute maximum ratings	
	min	max	min	max
Supply voltage, Vp V	0	5,0	-0,3	7,0
Switching voltage, Vsw V			-0,3	7,0
Maximum voltage on each output with series resistor 22kOhm, Vn (max) V				35
Output current of each output on ground, Io mA				-10
Maximum time of short-circuit (all pins) tsc(max)				10
Storage temperature range, Tstg, °C	-	-	-55	+125
Ambient operation temperature, Tамb °C	-20	80		
Junction temperature, Tj, °C	-		-	150
Temperature resistance case – ambient, Rth j-a, K/W	-	120		

Table 2. Electrical parameters of IC ILA5737 (-20ºC ≤ Tatm. ≤ + 80ºC)

Parameter, unit	Symbol	Test conditions	**Value**		Note
			min	max	
Supply voltage, V	**Vp**		4,5	5.5	
Consumption current, mA	**Ip**	4,5V ≤ Vp ≤ 5,5V	42	58	
Switching voltage dependent on supply voltage, V	**Vsw**	Band A	0	0,18Vp	
		Band B	0,26Vp	0.47Vp	
		Band C	0,55Vp	Vp	
Switching current, mkA	**Isw**	Band A		2	
		Band B		10	
		Band C		25	
Band A mixer					
Bands mixer, МГц	tRF		41	171	
Voltage amplification ratio, dB	Gv	f_{RF}=50MHz	20,5	25,5	
		f_{RF}=170MHz	20,5	25,5	
Noise factor, dB	NF	f_{RF}=50MHz		9	
		f_{RF}=170MHz		10	
Input voltage level invoking frequency rise in the channel for 10kHz, dBmV	**Vi**	f_{RF}=170MHz	96		
Band A oscillator					
Frequency range, MHz	fosc	0,45V<Vt<28V	41	171	
Frequency shift, kHz	fshift	ΔVp=5%		53	
Sensitivity to supply voltage ripple, mV	Vripple	Fosc=80MHz 4,75V<Vp<5,25V	20		
		Fosc=210MHz 4,75V<Vp<5,25V	20		

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Table 2 continued

Band B mixer					
Frequency range, MHz	tRF		166	451	
Voltage amplification ratio, dB	Gv	f_{RF}=170MHz	31	37	
		f_{RF}=450MHz	31	37	
Noise factor, dB	NF	f_{RF}=170MHz		10	
		f_{RF}=450MHz		10	
Input voltage level invoking frequency rise in the channel for 10kHz, dBmV	Vi	f_{RF}=450MHz	112		
Band B oscillator					
Frequency range, MHz	fosc	0,45V<Vt<28V	205	490	
Frequency shift, kHz	fshift	0,45V<Vt<28V	205	490	
Sensitivity to supply voltage ripple, mV	Vripple	ΔVp=5%		53	
		Fosc=250MHz 4,75V<Vp<5,25V	20		
		Fosc=4900MHz 4,75V<Vp<5,25V	20		
Band C mixer					
Frequency range, MHz	tRF		446	861	
Voltage amplification ratio, dB	Gv	f_{RF}=450MHz	31	37	
		f_{RF}=860MHz	31	37	
Noise factor, dB	NF	f_{RF}=450MHz		11	
		f_{RF}=860MHz		11	
Input voltage level invoking frequency rise in the channel for 10kHz, dBmV	Vi	f_{RF}=860MHz	91		
Band C oscillator					
Frequency range, MHz	fosc	0,45V<Vt<28V	485	900	
Frequency shift, kHz	fshift	ΔVp=5%		53	
Sensitivity to supply voltage ripple, mV	Vripple	Fosc=485MHz 4,75V<Vp<5,25V	20		
		Fosc=900MHz 4,75V<Vp<5,25V	18		
Heterodyne output					
Output voltage, dBmkV	Vo	RL=50Ohm 0V<Vt<35V	80	100	

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Schematics features of IC ILA5737D are the following:

- Electronic band switch;
- Buffered output of local oscillator
- Voltage regulator, with inhibited frequency zone for oscillator stability;
- Filter preamplifier on SAW with low output full resistance for direct filter control on SAW;
- External IF filter between mixer output and IF amplifier input;
- Mixer balanced with input implemented as per the circuit with common emitter for band A (one output);
- Two-input oscillator for band A;
- Mixer balanced with input implemented as per the circuit with common base for bands B and C (balanced input);
- 3-output oscillator for band B;
- 4-output oscillator for band C.

Table 3. Description of pins in ILA5737D (for 24-pin package of SSOP type)

Pin number	Pin description
01	Base 2 of oscillator input of band C
02	Base of oscillator input of band A
03	Collector 2 of band C output
04	Collector of band A output
05	Collector 1 of band C output
06	Base of oscillator input of band B
07	Base 1of oscillator input of band C
08	Collector 2 of band B output
09	Collector 1 of band B output
10	Common output
11	Output 2 of IF amplifier
12	Output 1 of IF amplifier
13	Input of band switch
14	Output 2 of amplifier heterodyne
15	Output 1 of amplifier heterodyne
16	Supply voltage
17	Input 2 of band B
18	Input 1 of band B
19	Input of band A
20	Input 2 of band C
21	Input 1 of band C
22	Common output for HF inputs
23	Input 2 of IF filter
24	Input 1 of IF filter

Table 4. Typical values of external components parameters for application in test circuitry in figure 2.

Element symbol	Nominal	Element symbol	Nominal
C1	82 pF	C31	1 nF
C2	5.6 pF	C32	1 nF
C3	100 pF	C33	1 nF
C4	82 pF	C34	2,2 mkF
C5	1 pF	C35	4,7 nF
C6	2 pF	D1	BB132
C7	2 pF	D2	BB134
C8	2 pF	D3	BB133
C9	2 pF	L1	7.5 turns(d=3mm)
C10	1 pF	L2	2.5 turns(d=3.5mm)
C11	3,3 pF	L3	1.5 turns(d=2.5mm)
C12	3,3 pF	L4	2.5 turns(d=3mm)
C13	4,7 pF	L5	5.5 turns(d=2.5mm)
C14	1 nF	L6	3*5 turns
C15	1 nF	L7	2 turns
C16	39 pF	L8	5.5 turns(d=2.5mm)
C17	39 pF	L9	12.5 turns(d=5mm)
C18	68 pF	L10	2.2mkH
C19	68 pF	R1	47 kOhm
C20	1 nF	R2	22 kOhm
C21	1 nF	R3	22 kOhm
C22	1 nF	R5	27 kOhm
C23	1 nF	R6	27 kOhm
C24	1 nF	R7	10 kOhm
C25	2,2 nF	R8	50 kOhm
C26	1 nF	R9	4,7 kOhm
C27	1 nF	R10	100 kOhm
C28	1 nF	R11	27 kOhm
C29	1 nF	R12	15 kOhm
C30	1 nF		

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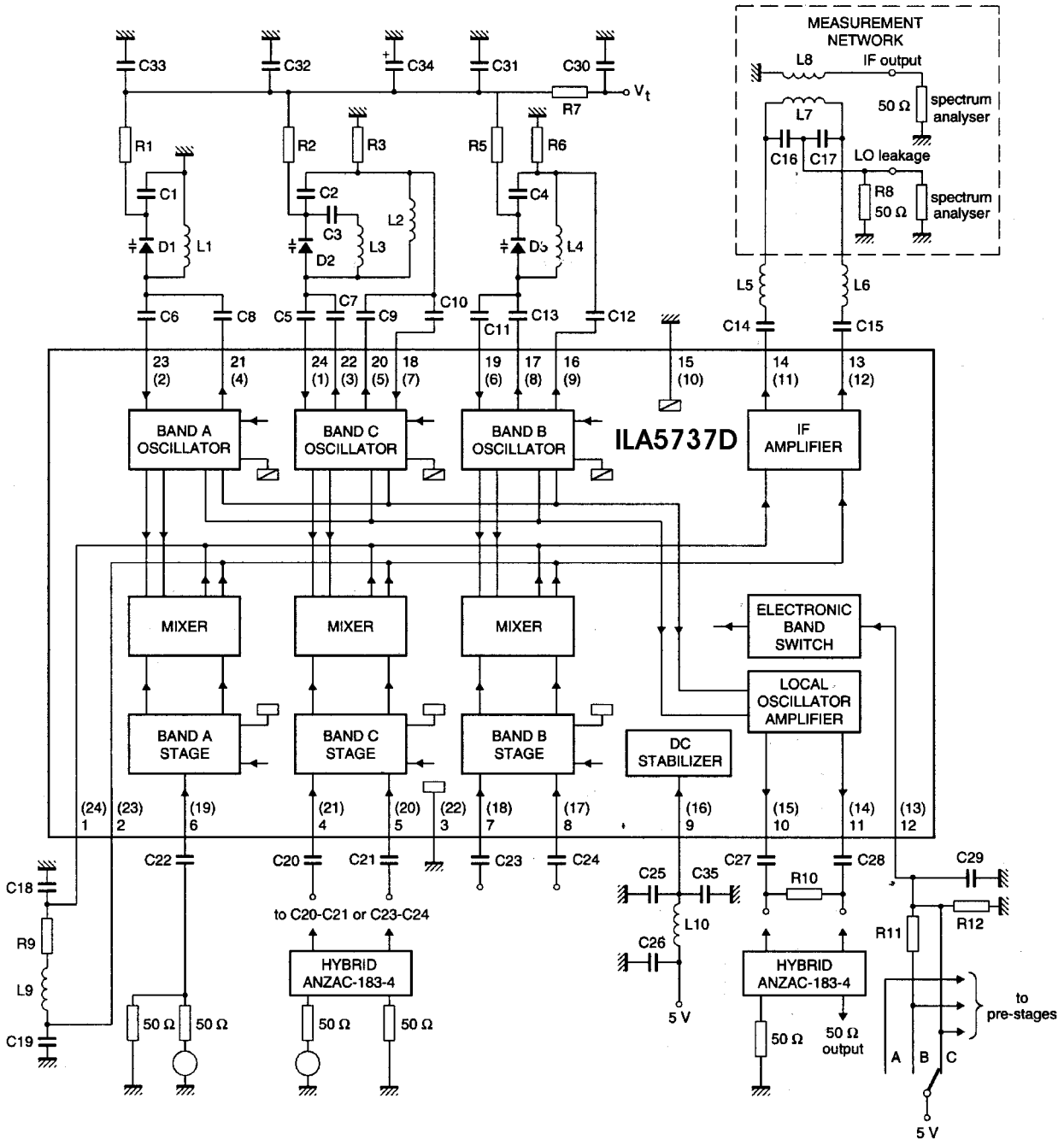
Fig.2. Measurement circuitry of ILA5737D



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