

**LA7337**

## SECAM-Format VCR Chroma Signal-Processing Circuit

### Overview

The LA7337 is an IC that implements SECAM-format VCR signal processing in a single chip. It incorporates band-pass filters and a SECAM discrimination circuit on chip and features automatic adjustment of the bell filter for a reduced number of external components and adjustment-free circuit operation.

### Features

- All required filters, except for the bell filter, incorporated on chip.
- Automatic adjustment of the bell filter  $f_0$  parameter
- Built-in SECAM discrimination circuit

### Functions

- 4.3-MHz and 1.1-MHz band-pass filters, limiter, AGC (in playback mode)
- Divide-by-four circuit, 4× frequency multiplier circuit, 2.2-MHz band-pass filter
- Bell filter  $f_0$  automatic adjustment circuit, SECAM discrimination circuit
- Sync gate

### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

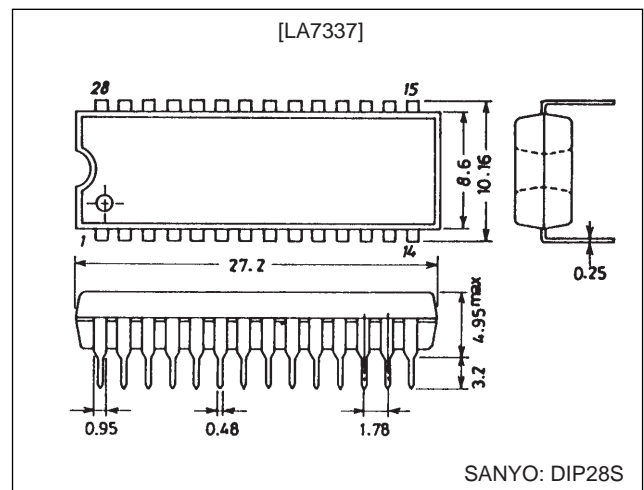
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		7	V
Allowable power dissipation	$P_d \text{ max}$	$T_a \leq 70^\circ\text{C}$	600	mW
Operating temperature	$T_{opr}$		-15 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +150	$^\circ\text{C}$

#### Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		5	V
Operating supply voltage range	$V_{CC \text{ op}}$		4.8 to 5.5	V

### Package Dimensions

unit: mm

**3063-DIP28S**

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Operating Characteristics at Ta = 25°C, V<sub>CC</sub> = 5 V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Record mode current drain	I <sub>CCR</sub>	V5 = V6 = 0 V, V16 = 0 V, S27 = composite sync., S15 = color bar signal	50	70	90	mA
4.3-MHz band-pass filter characteristics (1)	V <sub>F4C</sub>	V6 = 5 V, V16 = 0 V, S27 = composite sync. S15 = sine wave (200 mVp-p, f = 4.286 MHz)	145	180	215	mVp-p
4.3-MHz band-pass filter characteristics (2)	G <sub>F4L1</sub>	As above, except S15 = sine wave (200 mVp-p, f = 1.1 MHz), taking V <sub>F4C</sub> as the reference (0 dB)		-30	-20	dB
4.3-MHz band-pass filter characteristics (3)	G <sub>F4L2</sub>	As above, except S15 = sine wave (200 mVp-p, f = 2.2 MHz), taking V <sub>F4C</sub> as the reference (0 dB)		-10	-5	dB
4.3-MHz band-pass filter characteristics (4)	G <sub>F4H</sub>	As above, except S15 = sine wave (200 mVp-p, f = 7.5 MHz), taking V <sub>F4C</sub> as the reference (0 dB)		-30	-20	dB
Record mode bell filter center frequency (1)	F <sub>BLR1</sub>	V5 = V6 = 0 V, V16 = 0 V, SW21B = on, S15 = sine wave (200 mVp-p, f = 4 to 5 MHz), S27 = composite sync.	4.243	4.286	4.329	MHz
Record mode bell filter center frequency (2)	F <sub>BLR2</sub>	As above, except V5 = 4 V.	4.493	4.536	4.579	MHz
Record mode bell filter characteristics (1)	V <sub>BLRC</sub>	V5 = V6 = 0 V, V16 = 0 V, SW21B = on, S15 = sine wave (200 mVp-p, f = F <sub>BLR1</sub> ), S27 = composite sync.	200	250	300	mVp-p
Record mode bell filter characteristics (2)	G <sub>BLRL</sub>	As above, except S15 = sine wave (200 mVp-p, f = 3.8 MHz), taking V <sub>BLRC</sub> as the reference (0 dB)	-14	-11	-8	dB
Record mode bell filter characteristics (3)	G <sub>BLRH</sub>	As above, except S15 = sine wave (200 mVp-p, f = 4.8 MHz), taking V <sub>BLRC</sub> as the reference (0 dB)	-14	-11	-8	dB
Record mode killer operating level	G <sub>KLR</sub>	V5 = V6 = 0 V, S15 = a SECAM color bar signal (variable level), V16 = 0 V, SW21B = on, V23 = 3.4 V, V24 = 3.7 V, S27 = composite sync.	-28	-23	-18	dB
Record equalization center frequency (1)	F <sub>EQR1</sub>	SW1 = on, V1 = 5 V, V5 = V6 = 0 V, V16 = 0 V, S21 = sine wave (200 mVp-p, f = 4 to 5 MHz), SW21A = SW21B = on, S27 = composite sync.	1.0608	1.0715	1.0822	MHz
Record equalization center frequency (2)	F <sub>EQR2</sub>	As above, except V6 = 4 V	1.0788	1.0895	1.1002	MHz
Record equalization characteristics (1)	V <sub>EQRC</sub>	SW1 = on, V1 = 5 V, V5 = V6 = 0 V, V16 = 0 V, S21 = sine wave (200 mVp-p, f = F <sub>EQR1</sub> × 4), SW21A = SW21B = on, S27 = composite sync.	65	85	105	mVp-p
Record equalization characteristics (2)	G <sub>EQRL</sub>	As above, except S21 = sine wave (200 mVp-p, f = 3.8 MHz), taking V <sub>EQRC</sub> as the reference (0 dB)	8	11	14	dB
Record equalization characteristics (3)	G <sub>EQRH</sub>	As above, except S21 = sine wave (200 mVp-p, f = 4.8 MHz), taking V <sub>EQRC</sub> as the reference (0 dB)	8	11	14	dB
Record chrominance signal output level	V <sub>OR</sub>	SW1 = on, V1 = 5 V, V5 = V6 = 0 V, V16 = 0 V, S15 = sine wave (200 mVp-p, f = 4.4 MHz), SW21B = on, S27 = composite sync.	80	110	140	mVp-p
Record chrominance signal output unnecessary spectrum (1)	G <sub>SR1</sub>	As above, except measure the 2.2 MHz component in the T11 signal. Taking V <sub>OR</sub> as the reference (0 dB).		-30	-20	dB
Record chrominance signal output unnecessary spectrum (2)	G <sub>SR2</sub>	As above, except measure the 3.3 MHz component in the T11 signal. Taking V <sub>OR</sub> as the reference (0 dB).		-30	-20	dB
Playback mode current drain	I <sub>CCP</sub>	V5 = V6 = 0 V, V16 = 5 V, S27 = composite sync., S13 = sine wave (50 mVp-p, f = 1.0715 MHz)	60	80	100	mA
AGC control characteristics (1)	V <sub>AGC</sub>	V6 = 5 V, SW8B = on, V16 = 5 V, S27 = composite sync., S13 = sine wave (50 mVp-p, f = 1.0715 MHz)	90	120	150	mVp-p
AGC control characteristics (2)	G <sub>AGC1</sub>	As above, except S13 = sine wave (100 mVp-p, f = 1.0715 MHz) Taking V <sub>AGC</sub> as the reference (0 dB).	-1	0	+1	dB
AGC control characteristics (3)	G <sub>AGC2</sub>	As above, except S13 = sine wave (25 mVp-p, f = 1.0715 MHz) Taking V <sub>AGC</sub> as the reference (0 dB).	-1	0	+1	dB
1.1-MHz band-pass filter characteristics (1)	G <sub>F1L</sub>	V6 = 5 V, SW14 = on, V14 = V14R, S13 = sine wave (50 mVp-p, f = 500 kHz), V16 = 5 V, S27 = composite sync., taking V <sub>AGC</sub> as the reference (0 dB).	-3	0	+3	dB
1.1-MHz band-pass filter characteristics (2)	G <sub>F1H1</sub>	As above, except S13 = sine wave (50 mVp-p, f = 2.2 MHz) Taking V <sub>AGC</sub> as the reference (0 dB).		-30	-20	dB
1.1-MHz band-pass filter characteristics (3)	G <sub>F1H2</sub>	As above, except S13 = sine wave (50 mVp-p, f = 3.3 MHz) Taking V <sub>AGC</sub> as the reference (0 dB).		-35	-25	dB

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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Playback equalization center frequency (1)	F <sub>EQP1</sub>	V6 = 0 V, SW8B = on, SW14 = on, V14 = V14R, S13 = sine wave (50 mVp-p, f = 1 to 1.2 MHz), V16 = 5 V, S27 = composite sync.	1.0608	1.0715	1.0822	MHz
Playback equalization center frequency (2)	F <sub>EQP2</sub>	As above, except V6 = 4 V	1.0788	1.0895	1.1002	MHz
Playback equalization characteristics (1)	V <sub>EQPC</sub>	V6 = 0 V, SW8B = on, SW14 = on, V14 = V14R, S13 = sine wave (50 mVp-p, f = F <sub>EQP1</sub> ), V16 = 5 V, S27 = composite sync.	120	150	180	mVp-p
Playback equalization characteristics (2)	G <sub>EQPL</sub>	As above, except S13 = sine wave (50 mVp-p, f = 950 kHz), taking V <sub>EQP</sub> as the reference (0 dB).	-14	-11	-8	dB
Playback equalization characteristics (3)	G <sub>EQPH</sub>	As above, except S13 = sine wave (50 mVp-p, f = 1.2 MHz), taking V <sub>EQP</sub> as the reference (0 dB).	-14	-11	-8	dB
Playback bell center frequency (1)	F <sub>BLP1</sub>	SW1 = on, V1 = 5 V, V5 = V6 = 0 V, SW8A = SW8B = on, V16 = 5 V, S27 = composite sync., S8 = sine wave (200 mVp-p, f = 1 to 1.2 MHz),	4.243	4.286	4.329	MHz
Playback bell center frequency (2)	F <sub>BLP2</sub>	As above, except V5 = 4 V	4.493	4.536	4.579	MHz
Playback bell characteristics (1)	V <sub>BLPC</sub>	SW1 = on, V1 = 5 V, V5 = V6 = 0 V, SW8A = SW8B = on, S8 = sine wave (200 mVp-p, f = F <sub>BLP</sub> × 1/4), V16 = 5 V, S27 = composite sync.	65	85	105	mVp-p
Playback bell characteristics (2)	G <sub>BLPL</sub>	As above, except S8 = sine wave (200 mVp-p, f = 950 kHz), taking V <sub>BLPC</sub> as the reference (0 dB).	8	11	14	dB
Playback bell characteristics (3)	G <sub>BLPH</sub>	As above, except S8 = sine wave (200 mVp-p, f = 1.2 MHz), taking V <sub>BLPC</sub> as the reference (0 dB).	8	11	14	dB
Playback chrominance signal output level	V <sub>OP</sub>	SW1 = on, V1 = 5 V, V5 = V6 = 0 V, V16 = 5 V, S13 = sine wave (200 mVp-p, f = 1.1 MHz), SW8B = on, S27 = composite sync.	130	160	190	mVp-p
Playback chrominance signal output unnecessary spectrum (1)	GSP1	As above, except measure the 2.2 MHz component in the T17 signal. Taking V <sub>OP</sub> as the reference (0 dB).		-25	-15	dB
Playback chrominance signal output unnecessary spectrum (2)	GSP2	As above, except measure the 3.3 MHz component in the T17 signal. Taking V <sub>OP</sub> as the reference (0 dB).		-20	-10	dB
CLK input level	V <sub>CLK</sub>	f = 4.433619 MHz	100	200	800	mVp-p
Synchronizing signal input threshold level	V <sub>THS</sub>		1.8	2	2.2	V
Record mode sync gate start time (muting off)	T <sub>RGB</sub>	SW1 = on, V1 = 5 V, V5 = V6 = 0 V, V16 = 0 V, S15 = sine wave (200 mVp-p, f = 4.286 MHz), SW21B = on, S27 = composite sync.	-0.3	+0.2	+0.7	μs
Record mode sync gate start time (muting on)	T <sub>RGBM</sub>	As above, except SW2 = on	1.5	2	2.5	μs
Record mode sync gate release time	T <sub>RGE</sub>	As above	4.5	5.0	5.5	μs
Record mode mute setting resistance	VTSP2		10	20	30	kΩ
Playback mode sync gate start time	T <sub>PGB</sub>	SW1 = on, V5 = V6 = 0 V, SW8B = on, S13 = sine wave (50 mVp-p, f = 1.0715 MHz), V16 = 5 V, S27 = composite sync.	1.5	2	2.5	μs
Playback mode sync gate release time	T <sub>PGE</sub>	As above	4.5	5.0	5.5	μs
BGP start time	T <sub>BGB</sub>	V5 = 0 V, V6 = 5 V, SW21B = on, V16 = 0 V, S27 = composite sync.	6.0	6.5	7.0	μs
BGP amplitude	T <sub>BGW</sub>	As above	2.0	2.5	3.0	μs
SECAM discriminator output resistance	R26	SW25 = on, V25 = 5 V	7	10	13	kΩ
Record mode SECAM discriminator characteristics (1)	V <sub>SCMR1</sub>	V5 = V6 = 0 V, V16 = 0 V, SW21B = on, S27 = composite sync., S15 = SECAM color bar signal	4.5			V
Record mode SECAM discriminator characteristics (2)	V <sub>SCMR2</sub>	As above, except S15 = PAL color bar signal			0.5	V

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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Playback mode phase detector output difference voltage (1)	V <sub>SCPD1</sub>	V5 = V6 = 0 V, SW8B = on, V16 = 5 V, S27 = composite sync., S13 = sine wave (50 mVp-p, f = 1.0625/1.1016 MHz)	150	180		mV
Playback mode phase detector output difference voltage (2)	V <sub>SCPD2</sub>	As above, except S13 = sine wave (50 mVp-p, f = 627 kHz)			100	mV
Playback mode SECAM discriminator characteristics (1)	V <sub>SCMP1</sub>	V16 = 5 V, SW23 = SW24 = On	4.5			V
Playback mode SECAM discriminator characteristics (2)	V <sub>SCMP2</sub>	V16 = 5 V, SW23 = SW24 = On			0.5	V
SECAM discriminator comparator threshold voltage	V <sub>TCOMP</sub>	SW25 = On	3.2	3.5	3.8	V
Record/playback control threshold voltage	V <sub>TRP</sub>		2.3	2.5	2.7	V
Forced SECAM mode threshold voltage	V <sub>THSM</sub>	V16 = 0 V, SW25 = on, V25 = 3 V, S27 = composite sync., S15 = sine wave (200 mVp-p, f = 4.286 MHz)			4	V
Forced mute mode threshold voltage	V <sub>THMM</sub>	V16 = 0 V, SW25 = on, V25 = 4 V, S27 = composite sync., S15 = sine wave (200 mVp-p, f = 4.286 MHz)	1			V
Reference voltage	V <sub>REG</sub>		4.1	4.3	4.5	V

### Standard Input Signal Levels

REC-IN (pin 15)	The 200 mVp-p ID component
PB-IN (pin 13)	50 mVp-p

### Internal filter group delay times (reference values)

1.1 MHz BPF	460 ns (PB) 430 ns (REC)
2.2 MHz BPF	180 ns
4.3 MHz BPF A	230 ns
4.3 MHz BPF B	170 ns

### [Record/playback mode settings]

Pin 16 = low → record mode

Pin 16 = high → playback mode

### [Bell filter offset adjustment]

Increasing the pin 6 voltage increases the 1.1-MHz bell filter center frequency ( $f_0$ ).

Increasing the pin 5 voltage increases the 4.3-MHz bell filter center frequency ( $f_0$ ).

### [Test mode settings]

The IC enters test mode if pin 6 is set to 5 V. The pin 5, 11, 17, and 26 outputs behave as follows in this mode.

Pin 5: The 4.43-MHz VCO output appears (However, note that a load of about 1 k $\Omega$  is required between this pin and V<sub>CC</sub>.)

Pin 11: The 1.1-MHz band-pass filter output appears.

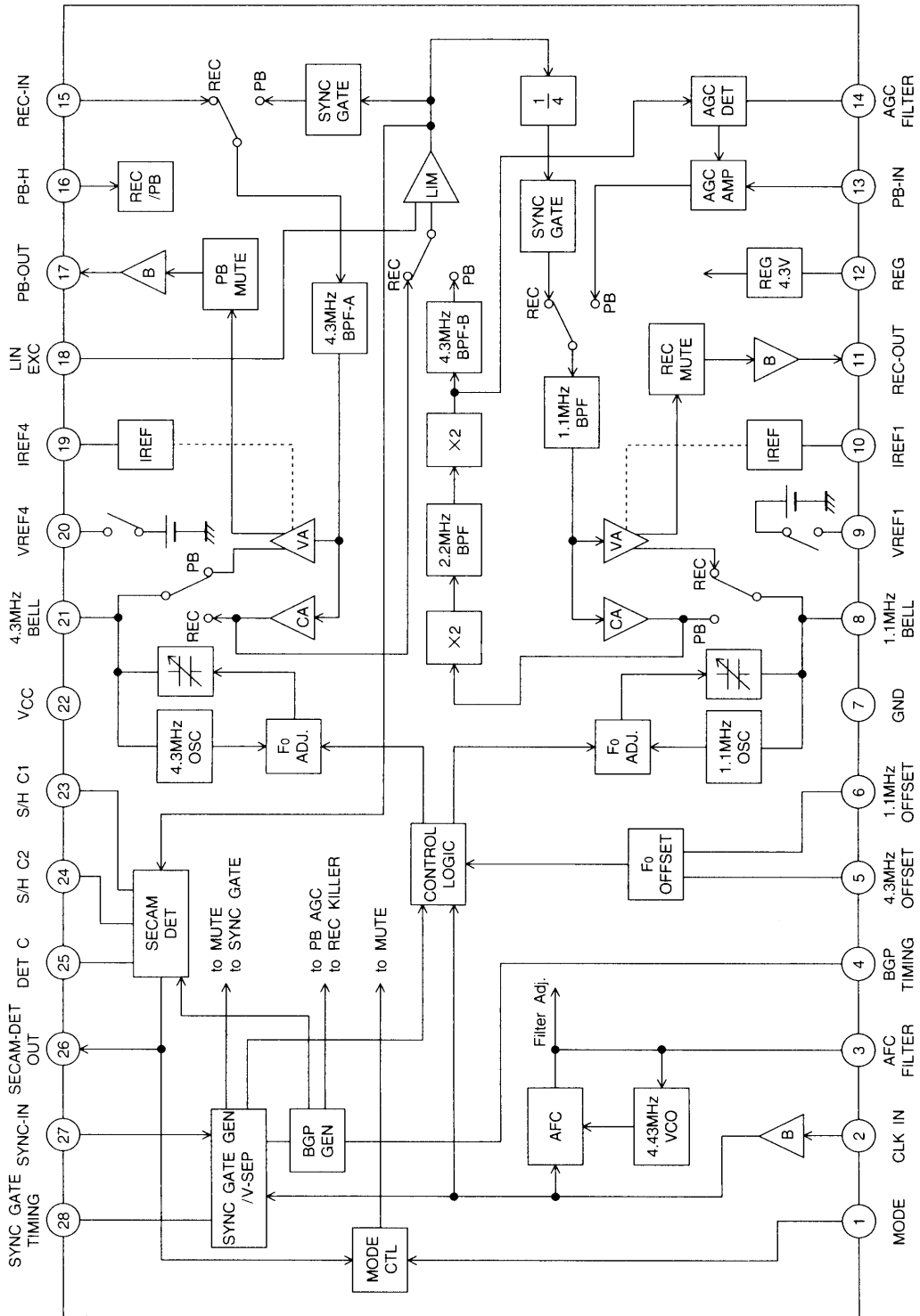
Pin 17: The 4.3-MHz band-pass filter output appears.

Pin 26: The BGP (used for SECAM discrimination, playback AGC, and record killer) can be monitored.

### [Muting control table]

Voltage applied to pin 1	Output signal mode (pins 17 and 11)
4 V or higher	Forced SECAM
Open	AUTO (Uses the output of the internal discriminator)
1 V or lower	Forced mute mode

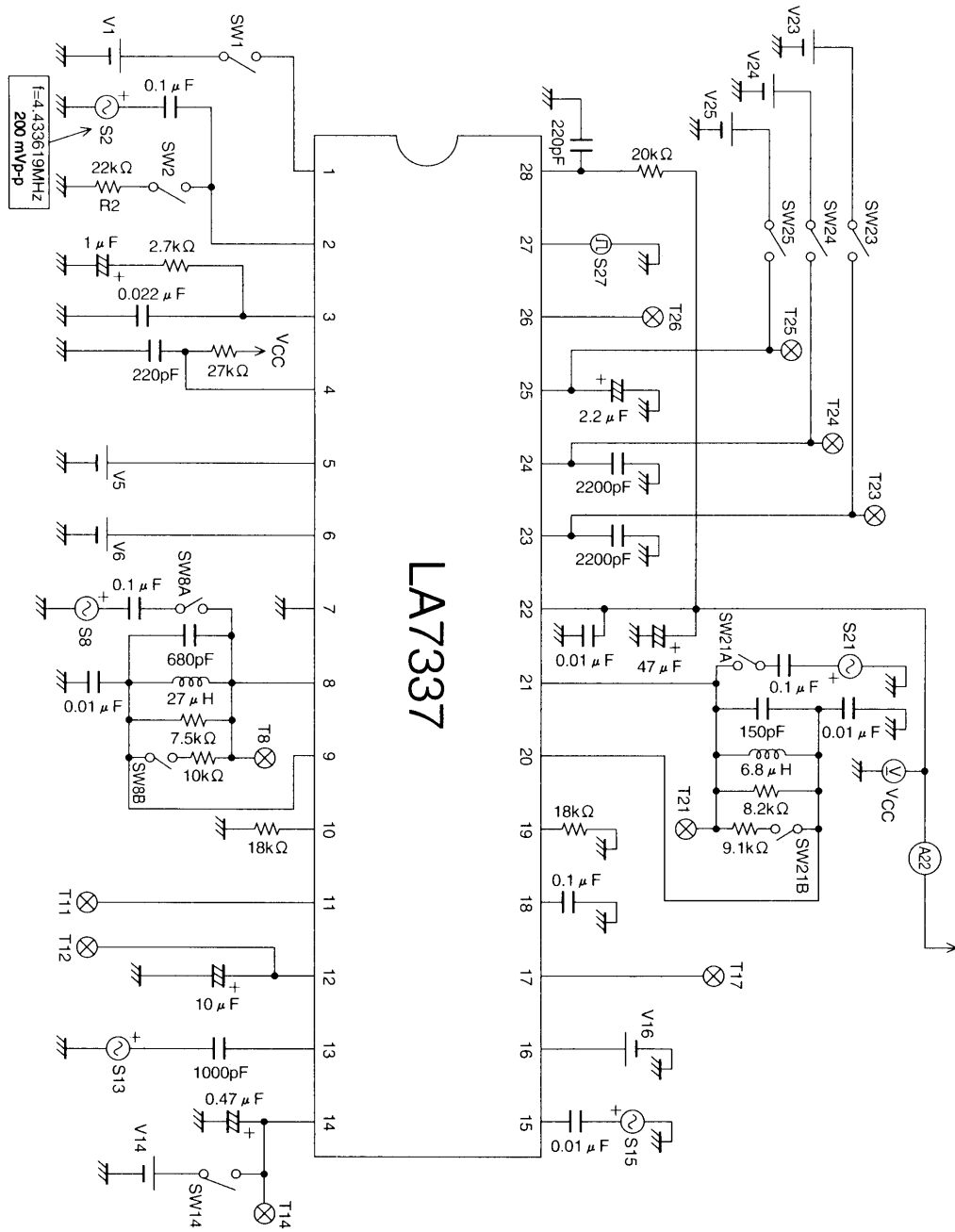
Block Diagram



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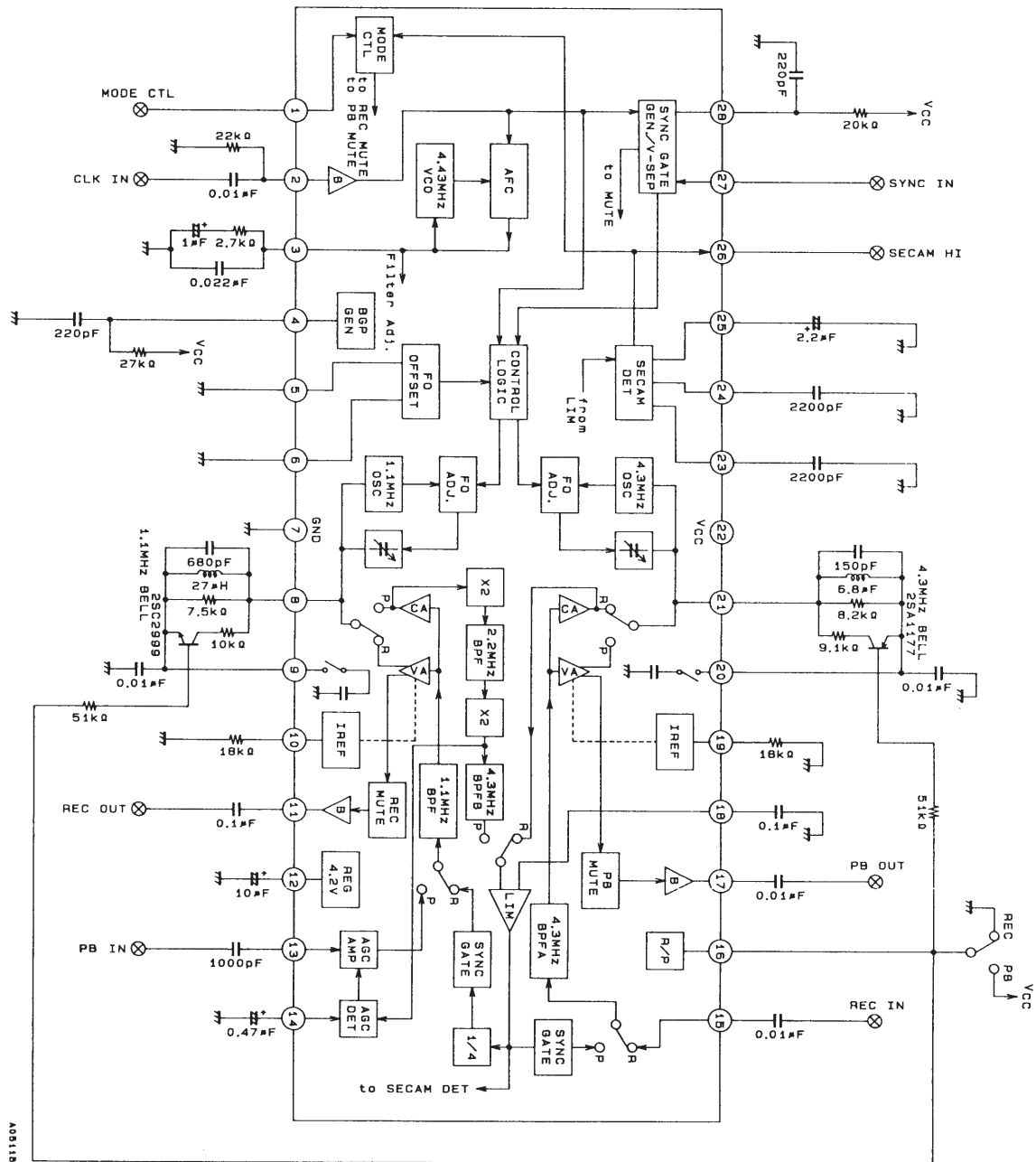
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Test Circuit Diagram



Note: Use an FET probe when measuring T8, T21, and BGP.

Test Circuit Diagram



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