Ordering number : ENA0638

SANYO Semiconductors
DATA SHEET

LA7358 — Monolithic Linear IC For VCR SECAM Chroma Signal Processor

Overview

LA7358 is a VCR-use SECAM chroma signal processor.

Function

- 4.3MHz BPF
- 1.1MHz BPF
- Limiter
- AGC (in PB mode)
- 4-divide circuit
- 4-fold circuit
- 2.2MHz BPF
- Automatic adjustment BELL filter
- SECAM detector
- Sync gate

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		7.0	V
Allowable power dissipation	Pd max	Ta ≤ 70°C*	600	mW
Operating temperature	Topr		-15 to +70	°C
Storage temperature	Tstg		-40 to +150	°C

* Mounted on a board. 114.3×76.1×1.6mm^3 Glass epoxy

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		5.0	V
Operating supply voltage range	V_{CC} op		4.8 to 5.5	V

SANYO Semiconductor Co., Ltd.
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Electrical Characteristics Ta = 25°C, V_{CC} = 5V

Parameter	Symbol	Input	Test point	Conditions	Ratings			Unit
					min	typ	max	
REC mode current drain	$I_{CC}R$	S15	A22	V5 = V6 = 0V, V16 = 0V, S27 = Comp.Sync S15 = Colour bar signal (Fig.1)	50	70	90	mA
4.3MHz BPF characteristics (1)	VF4C	S15	T17	V5 = V6 = 5V, V16 = 0V, S27 = Comp.Sync S15 = sine wave (200mVp-p, f = 4.286MHz)	145	180	215	mVp-p
4.3MHz BPF characteristics (2)	GF4L1	S15	T17	Same as above, Note that S15 = sine wave (200mVp-p, f = 1.1MHz) referenced (0dB) to VFNC4		-30	-20	dB
4.3MHz BPF characteristics (3)	GF4L2	S15	T17	Same as above, Note that S15 = sine wave (200mVp-p, f = 2.2MHz) referenced (0dB) to VFNC4		-10	-5	dB
4.3MHz BPF characteristics (4)	GF4H	S15	T17	Same as above, Note that S15 = sine wave (200mVp-p, f = 7.5MHz) referenced (0dB) to VFNC4		-30	-20	dB
REC BELL center frequency	FBLR1	S15	T21	V5 = 0V, V16 = 0V, SW21B = ON S16 = sine wave (200mVp-p, f = 4 to 5MHz) S27 = Comp.Sync (Note1)	4.243	4.286	4.329	MHz
REC BELL charecterictics (1)	VBLRC	S15	T21	Same as above, Note that S15 = sine wave (200mVp-p, f = FBLR1)	200	250	300	mVp-p
REC BELL characteristics (2)	GBLRL	S15	T21	Same as above, Note that S15 = sine wave (200mVp-p, f = 3.8MHz) referenced (0dB) to VBLRC.	-14	-11	-8	dB
REC BELL characteristics (3)	GBLRH	S15	T21	Same as above, Note that S15 = sine wave (200mVp-p, f = 4.8MHz) referenced (0dB) to VBLRC.	-14	-11	-8	dB
REC mode killer operation level	GKLR	S15	T26	V5 = V6 = 0V, V17 = 0V, SW21B = ON, V23 = 3.4V, V24 = 3.7V S15 = SECAM color bar signal (level variable) S27 = Comp.Sync (Note2)	-28	-23	-18	dB
REC EQ center frequency	FEQR1	S21	T11	SW1 = ON, V1 = 5V, V5 = V6 = 0V, V16 = 0V, S21 = sine wave (200mVp-p, f = 4 to 5MHz) SW21A = SW21B = ON, S27 = Comp.Sync (Note3)	1.0608	1.0715	1.0822	MHz
REC EQ characteristics (1)	VEQRC	S21	T11	Same as above, Note that S21 = sine wave (200mVp-p, f = FEQR1×4)	65	85	105	mVp-p

Continued on next page.

Continued from preceding page.

Parameter	Symbol	Input	Test point	Conditions	Ratings			Unit
					min	typ	max	
REC EQ characteristics (2)	GEQRL	S21	T11	SW1 = ON, V1 = 5V, V5 = V6 = 0V, V16 = 0V, S21 = sine wave (200mVp-p, f = 3.8MHz) referenced (0dB) to VEQRC. SW21A = SW21B = ON, S27 = Comp.Sync	8	11	14	dB
REC EQ characteristics (3)	GEQRH	S21	T11	Same as above, Note that S21 = sine wave (200mVp-p, f = 4.8MHz) referenced (0dB) to VEQRC.	8	11	14	dB
REC chroma signal output level	VOR	S15	T11	SW1 = ON, V1 = 5V, V5 = V6 = 0V, V16 = 0V S21 = sine wave (200mVp-p, f = 4.4MHz) SW21B = ON, S27 = Comp.Sync	80	110	140	mVp-p
REC chroma signal output unwanted spectrum (1)	GSR1	S15	T11	Same as above, Note that S21 = sine wave (200mVp-p, f = 4.4MHz) Measure 2.2MHz component at T11. Referenced (0dB) to VOR.		-30	-20	dB
REC chroma signal output unwanted spectrum (2)	GSR2	S15	T11	Same as above, Note that S21 = sine wave (200mVp-p, f = 4.4MHz) Measure 3.3MHz component at T11. Referenced (0dB) to VOR.		-30	-20	dB
PB mode current drain	$I_{CC}P$	S13	A22	V5 = V6 =0V, V16 = 5V, S27 = Comp.Sync S13 = sine wave (50mVp-p, f = 1.0715MHz)	60	80	100	mA
AGC control characteristics (1)	VAGC	S13	T11	V6 = 5V, SW8B = ON, V16 = 5V, S27 = Comp.Sync S14 = sine wave (50mVp-p, f = 1.0715MHz)	90	120	150	mVp-p
AGC control characteristics (2)	GAGC1	S13	T11	Same as above, Note that S13 = sine wave (100mVp-p, f = 1.0715MHz) referenced (0dB) to VAGC.	-1	0	1	dB
AGC control characteristics (3)	GAGC2	S13	T11	Same as above, Note that S13 = sine wave (25mVp-p, f = 1.0715MHz) referenced (0dB) to VAGC.	-1	0	1	dB
1.1MHz BPF characteristics (1)	GF1L	S13	T11	V6 = 5V, SW14 = ON, V14 = V14R (Note4) S13 = sine wave (50mVp-p, f = 500kHz), V16 = 5V, S27 = Comp.Sync, referenced (0dB) to VAGC.	-3	0	3	dB
1.1MHz BPF characteristics (2)	GF1H1	S13	T11	Same as above, Note that S13 = sine wave (50mVp-p, f = 2.2kHz), referenced (0dB) to VAGC.		-30	-20	dB

Continued on next page.

Continued from preceding page.

Parameter	Symbol	Input	Test point	Conditions	Ratings			Unit
					min	typ	max	
1.1MHz BPF characteristics (3)	GF1H2	S13	T11	V6 = 5V, SW14 = ON, V14 = V14R(Note4) S13 = sine wave (50mVp-p, f = 3.3kHz), referenced (0dB) to VAGC. V16 = 5V, S27 = Comp.Sync		-35	-25	dB
PB EQ centre frequency	FEQP1	S13	T8	V6 = 0V, SW8B = ON, SW14 = ON, V14 = V14R (Note4), V16 = 5V S13 = sine wave (50mVp-p, f = 1 to 1.2MHz) S27 = Comp.Sync (Note5)	1.0608	1.0715	1.0822	MHz
PB EQ characteristics (1)	VEQPC	S13	T8	Same as above, Note that S13 = sine wave (50mVp-p, f = FEQP1)	120	150	180	mVp-p
PB EQ characteristics (2)	GEQPL	S13	T8	Same as above, Note that S13 = sine wave (50mVp-p, f = 950kHz), referenced (0dB) to VEQP.	-14	-11	-8	dB
PB EQ charateristics (3)	GEQPH	S13	T8	Same as above, Note that S13 = sine wave (50mVp-p, f = 1.2kHz), referenced (0dB) to VEQP.	-14	-11	-8	dB
PB BELL centre frequency	FBLP1	S8	T17	SW1 = ON, V1 = 5V, V5 = V6= 0V, SW8A = SW8B = ON, V16 = 5V S27 = Comp.Sync S8 = sine wave (200mVp-p, f = 1 to 1.2MHz) (Note6)	4.243	4.286	4.329	MHz
PB BELL characteristics (1)	VBLPC	S8	T17	Same as above, Note that S8 = sine wave (200mVp-p, f = FBLP1×1/4)	65	85	105	mVp-p
PB BELL characteristics (2)	GBLPL	S8	T17	Same as above, Note that S8 = sine wave (200mVp-p, f = 950kHz), referenced (0dB) to VBLPC.	8	11	14	dB
PB BELL characteristics (3)	GBLPH	S8	T17	Same as above, Note that S8 = sine wave (200mVp-p, f = 1.2kHz), referenced (0dB) to VBLPC.	8	11	14	dB
PB chroma signal output level	VOP	S13	T17	SW1 = ON, V1 = 5V, V5 = V6 = 0V, V16 = 5V, S13 = sine wave (50mVp-p, f = 1.1MHz) SW8B = ON, S27 = Comp.Sync	130	160	190	mVp-p

Continued on next page.

Continued from preceding page.

Parameter	Symbol	Input	Test point	Conditions	Ratings			Unit
					min	typ	max	
PB chroma signal output unwanted spectrum (1)	GSP1	S13	T17	SW1 = ON, V1 = 5V, V5 = V6 = 0V, V16 = 5V, S13 = sine wave (50mVp-p, f = 1.1MHz) SW8B = ON, S27 = Comp.Sync Measure 2.2MHz component at T17. Referenced (0dB) to VOP.		-25	-15	dB
PB chroma signal output unwanted spectrum (2)	GSP2	S13	T17	Same as above, Note that S13 = sine wave (50mVp-p, f = 1.1MHz) Measure 3.3MHz component at T17. Referenced (0dB) to VOP.		-20	-10	dB
CLK input level	VCLK	S2		f = 4.433619MHz	100	200	800	mVp-p
Sync signal input threshold level	VTHS	S27			1.8	2	2.2	V
REC mode sync gate start time (MUTE OFF)	TRGB	S27	T11	SW1 = ON, V1 = 5V, V5 = V6 = 0V, V16 = 0V, S15 = sine wave (200mVp-p, 4.286MHz) SW21B = ON, S27 = Comp.Sync (Note7)	-0.3	0.2	0.7	μs
REC mode sync gate start time (MUTE ON)	TRGBM	S27	T11	Same as above, Note that SW2 = ON	1.5	2	2.5	μs
REC mode sync gate release time	TRGE	S27	T11	Same as above.	4.5	5.0	5.5	μs
REC mode mute setting resistance	VTSP2	S15	T17	(Note8)	10	20	30	kΩ
PB mode sync gate start time	TPGB	S27	T17	SW1 = ON, V5 = V6 =0V, SW8B = ON, S13 = sine wave (50mVp-p, f = 1.0715MHz) V16 = 5V, S27 = Comp.Sync (Note9)	1.5	2	2.5	μs
PB mode sync gate release time	TPGE	S27	T17	Same as above.	4.5	5.0	5.5	μs
BGP start time	TBGB	S27	T26	V5 = 0V, V6 = 5V, SW21B = ON, V16 = 0V S27 = Comp.Sync (Note10)	6.4	6.55	6.7	μs
BGP width	TBGW	S27	T26	Same as above.	2.3	2.5	2.7	μs
SECAM detection output resistance	R26		T26	SW25 = ON, V25 = 5V (Note11)	7	10	13	kΩ
REC mode SECAM detection characteristics (1)	VSCMR1	S15	T26	V5 = V6 =0V, V17 = 0V, SW21B = ON, S27 = Comp.Sync S15 = SECAM colour bar signal (Note12)	4.5			V
REC mode SECAM detection characteristics (2)	VSCMR2	S15	T26	Same as above, Note that S15 = PAL colour bar signal (Note13)			0.5	V
PB mode phase detection output differential voltage (1)	VSCPD1	S13	T23 T24	V5 = V6 = 0V, SW8B = ON, V16 = 5V, S27 = Comp.Sync, S13 = sine wave (50mVp-p, f = 1.0625/1.1016MHz) (Note14)	150	180		mV
PB mode phase detection output differential voltage (2)	VSCPD2	S14	T25 T26	Same as above, Note tha S13 = sine wave (50mVp-p, f = 627kHz) (Note14)			100	mV
PB mode phase detection output differential voltage (3)	VSCPD3	S14	T25 T26	Same as above, Note tha S13 = sine wave (50mVp-p, f = 0.7/1.04MHz) (Note14)			100	mV

Continued on next page.

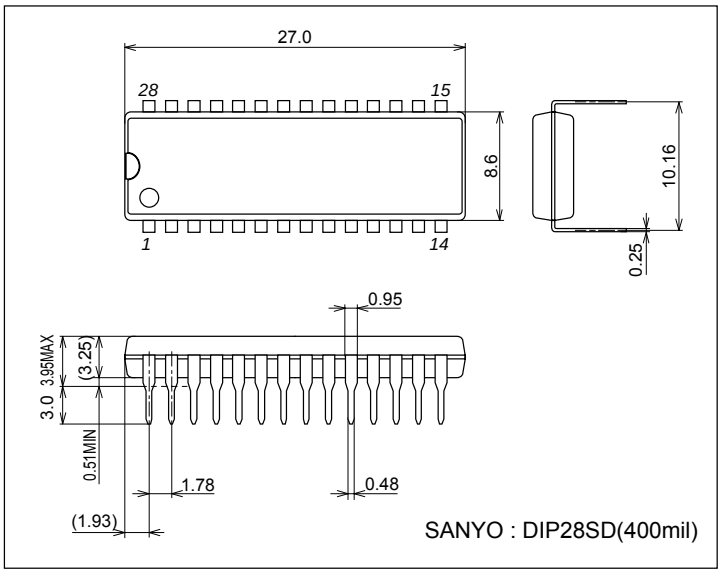
Continued from preceding page.

Parameter	Symbol	Input	Test point	Conditions	Ratings			Unit
					min	typ	max	
PB mode SECAM detection characteristics (1)	VSCMP1	V23 V24	T26	V16 = 5V, SW23 = SW24 = ON (Note15)	4.5			V
PB mode SECAM detection characteristics (2)	VSCMP2	V23 V24	T26	Same as above.			0.5	V
PB mode SECAM detection characteristics (3)	VSCMP3	V23 V24	T26	Same as above.			0.5	V
SECAM detection comparator threshold voltage	VTCOMP	V25	T26	SW25 = ON	3.2	3.5	3.8	V
REC/PB control threshold voltage	VTRP	V16			2.3	2.5	2.7	V
Forced SECAM mode threshold voltage	VTHSM	V1	T17	V16 = 0V, SW25 = ON, V25 = 3V S27 = Comp.Sync, S15 = sine wave (200mVp-p, f = 4.286MHz)			4	V
Forced MUTE mode threshold voltage	VTHMM	V1	T18	Same as above.	1			V
Reference voltage	VREG	V12	T12		4.1	4.3	4.5	V

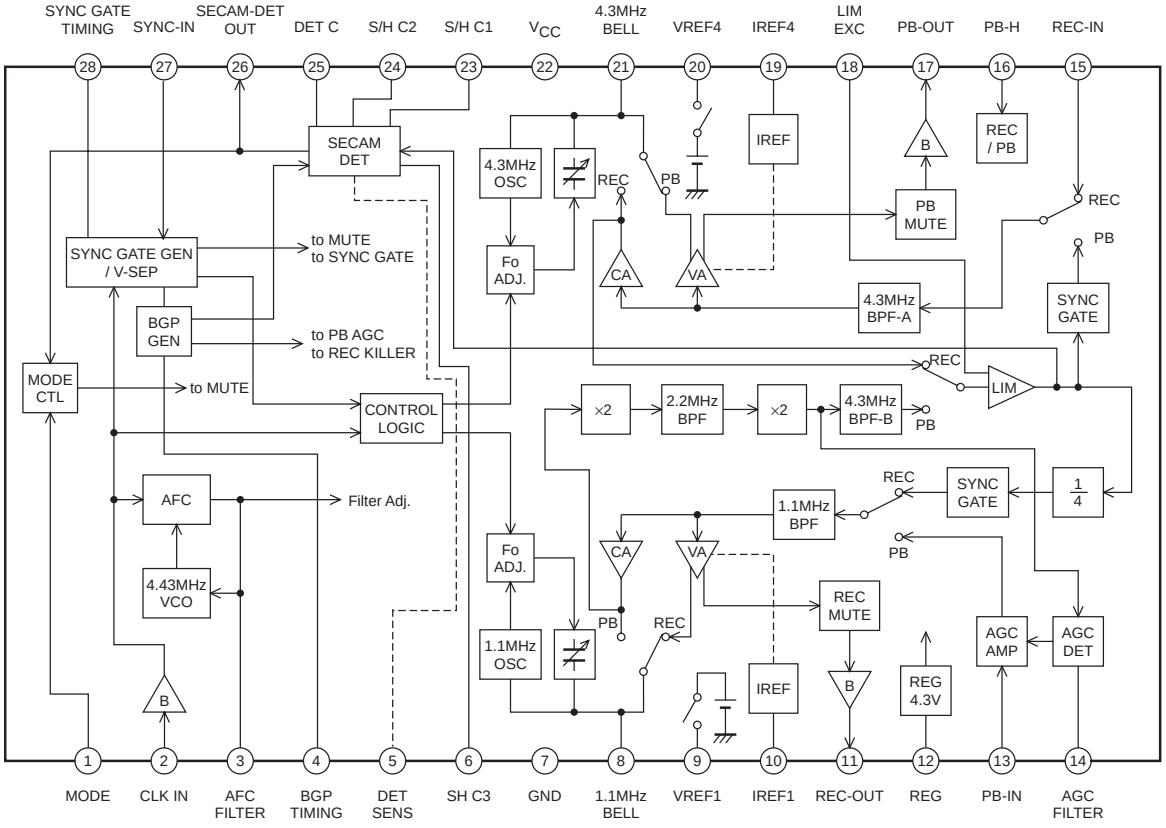
Package Dimensions

unit : mm (typ)

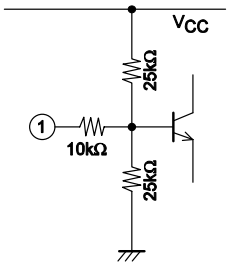
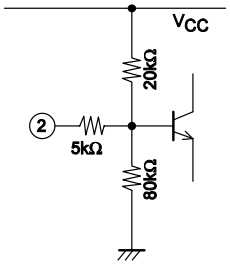
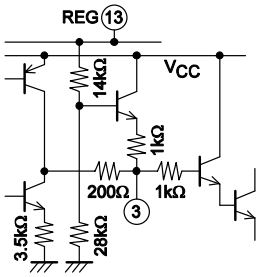
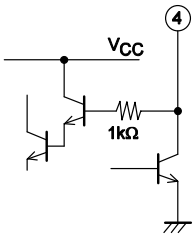
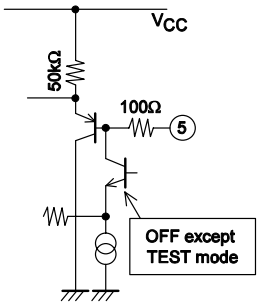
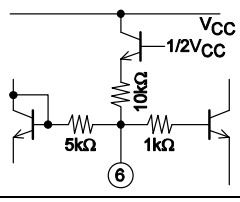
3270A



Block Diagram and Application Circuit Example

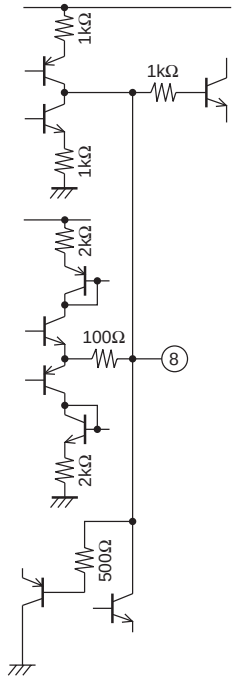
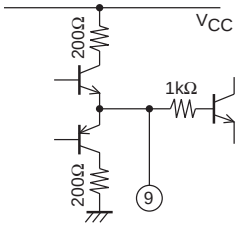
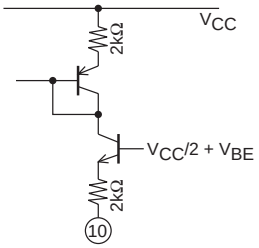
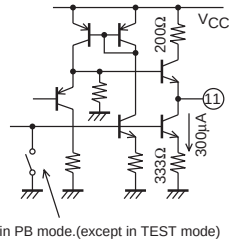


Pin Function

Pin No.	Pin name	Function	DC voltage	Signal wave form	Equivalent circuit
1	MODE IN		2.5V	DC	
2	CLK IN		4.0V	≥100mVp-p 4.433619MHz	
3	AFC-FILTER		3.5V	DC	
4	BGP TIMING		1 to 5V	5V 0V 15.625MHz	
5	DET SENSE	An adjusting sensitivity terminal for SECAM detecting circuit.	Add DC voltage of 2V to 4V.	DC	
	VCO OUT	TEST MODE	4.9V (TEST mode: connect 1kΩ between V_{CC}.)	5V 4.9V 4.43MHz	
	TEST CTL	A setting terminal for TEST mode.	Add DC voltage of 4.5V to V_{CC}.	DC	
6	SH3	A terminal for holdinglimiter voltage of phase detection output of SECAM detection.	3.1V	DC	

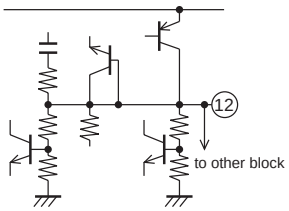
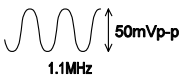
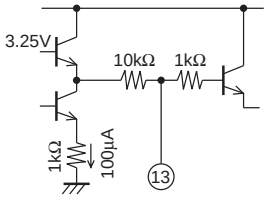
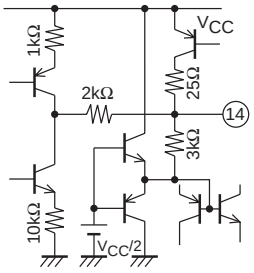
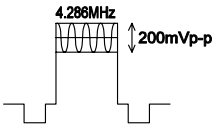
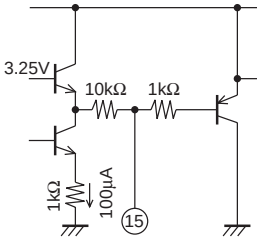
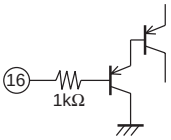
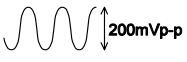
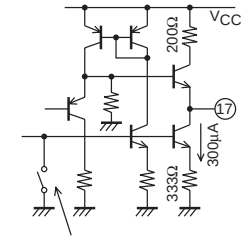
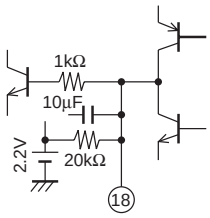
Continued on next page.

Continued from preceding page.

Pin No.	Pin name	Function	DC voltage	Signal wave form	Equivalent circuit
7	GND		0V		
8	BELL1	A terminal for connecting filter of current Amp. Operate in PB mode	2.5V	200mVp-p Center frequency 1.1MHz	
		A terminal for connecting filter of voltage Amp. Operate in REC mode	2.5V	Center frequency 1.1MHz	
		Operate during automatic adjusting BELL-filter (a part of V period).	2.5V	300mVp-p Center frequency 1.1MHz	
9	VREF1	Occur voltage in PB mode and BELL-filter automatic adjusting mode.	2.5V	DC	
10	IREF1	Setting reference current (Adjusting gain of BELL-filter output)	2.3V	DC	
11	REC-OUT		REC : 2.5V PB : OPEN	200mVp-p Center frequency 1.1MHz	 ON in PB mode.(except in TEST mode)

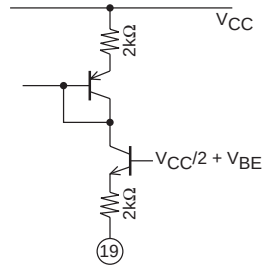
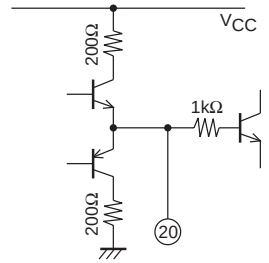
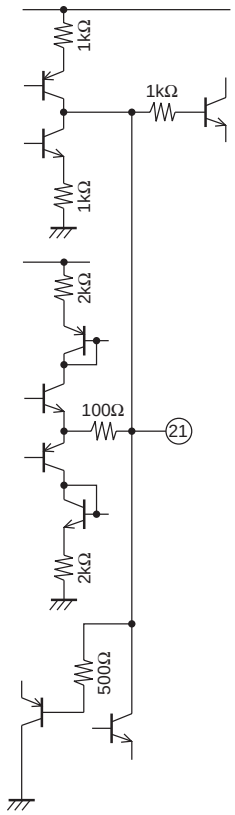
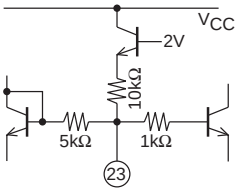
Continued on next page.

Continued from preceding page.

Pin No.	Pin name	Function	DC voltage	Signal wave form	Equivalent circuit
12	REG-4.2V	A terminal of reference voltage output.	4.2V	DC	
13	PB-IN		2.5V		
14	AGC-FILTER	PB MODE REC MODE KILLER-FILTER	$V_{CC}/2$ ±VBE	DC	
15	REC-IN		2.5V		
16	PB/REC mode	VTH=$V_{CC}/2$ selecting control	0 to V_{CC}	DC	
17	PB-OUT		B : 2.5V REC : OPEN		
18	LIM-EXC		2.3V	DC	

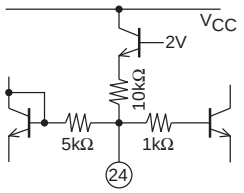
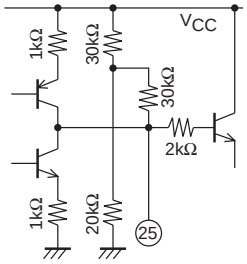
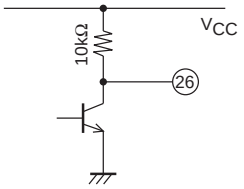
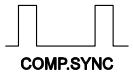
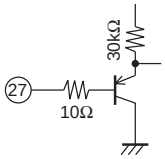
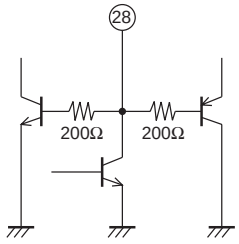
Continued on next page.

Continued from preceding page.

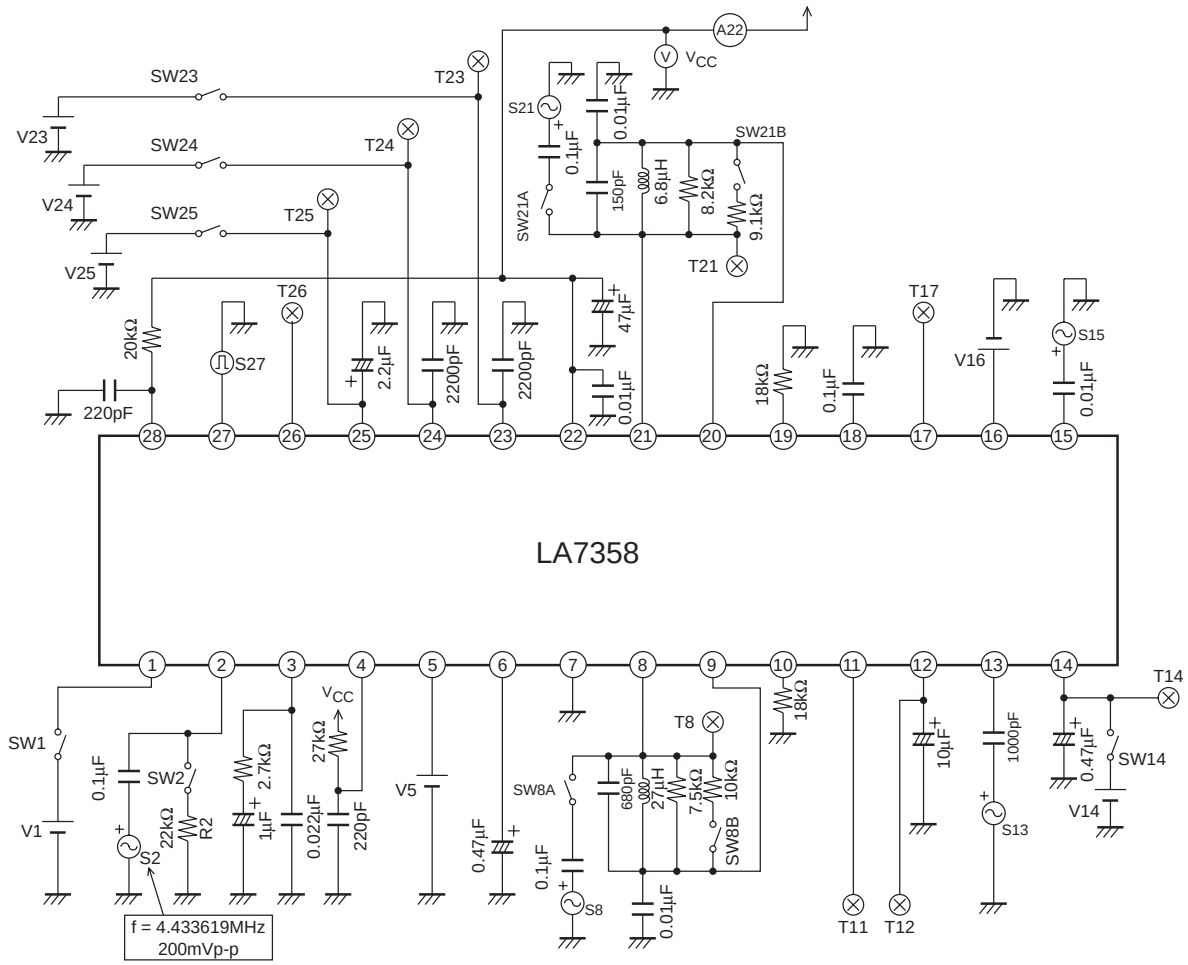
Pin No.	Pin name	Function	DC voltage	Signal wave form	Equivalent circuit
19	IREF4	Setting reference current (adjusting gain of BELL-filter output).	2.3V	DC	
20	VREF4	Occur voltage in PB mode and BELL-filter automatic adjusting mode.	2.5V	DC	
21	BELL4 (REC mode)	A terminal for connecting filter of current Amp. Operate in REC mode	2.5V	 Center frequency 4.3MHz	
		Operate in PB mode a terminal for connecting filter of voltage Amp.	2.5V	 Center frequency 4.3MHz	
		Operate during adjusting automatic BELL-filter (a part of V period).	2.5V	 Center frequency 4.3MHz	
22	V_{CC}		5V	DC	
23	SHC1	A terminal of sample & HOLD.	2.5V	DC (when connecting condensor)	

Continued on next page.

Continued from preceding page.

Pin No.	Pin name	Function	DC voltage	Signal wave form	Equivalent circuit
24	SHC2	A terminal of sample & HOLD.	2.5V	DC (when connecting condensor)	
25	DETC		2 to 5V	DC	
26	SECAM DET OUT (Generally)	Operate except in TEST mode.	0 to 5V	DC (0V or 5V)	
	BGP MONITOR (TEST mode)	Operate in TEST mode.			
27	SYNC IN		Threshold voltage 2.0V		
28	RC DELAY		0 to 5V		

Test Circuits



Supplemental Description

(Note 1) REC mode BELL centre frequency (1) (FBLR1) / (2) (FBLR2) :
Input a sine wave (200mVp-p, 4 to 5MHz) to S15 and measure the amplitude at pin 21 using an FET probe.
Assign to FBLR1 / FBLR2 the frequency at S15 when the amplitude is maximized.

(Note 2) REC mode killer operating level (GKLR) :
Input a colour bar signal (Fig. 1) to S15 and take 0dB as the color signal level.
Gradually decrease the color signal level at S15 and assign to GKLR [dB] the level at S15 when the voltage at T26 becomes 2.5V or less, provided that the sync signal at pin 27 lags that at S15 by 1.1µs.

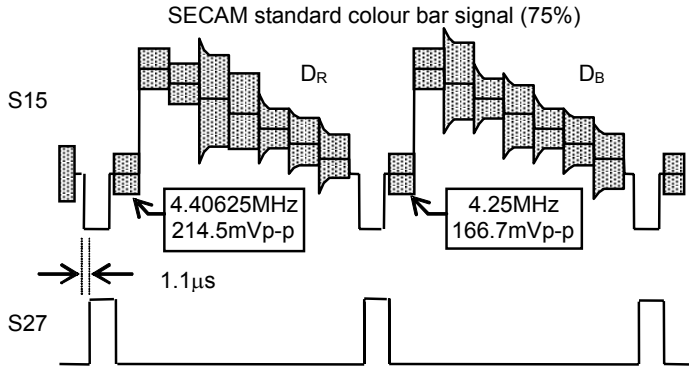


Fig.1

(Note 3) REC EQ centre frequency (1) (FEQR2) / (2) (FEQR2) :
Observe the waveform at T11when S21sine wave (200mVp-p, 4 to 5MHz) is input and assign to FBLR1 / FBLR2 the frequency at T11when the amplitude is minimized.

(Note 4) Assign to V14 the voltage at the time of VAGC measurement.

(Note 5) PB EQ centre frequency (1) (FEQP1) / (2) (FEQP2) :
Input a sine wave (50mVp-p, 1 to 1.2MHz) to S13 and assign to FEQP1 / FEQP2 the frequency at S13 when the signal level at T8 is maximized.

(Note 6) PB BELL centre frequency (1) (FBLP1) / (2) (FBLP2) :
Input a sine wave (200mVp-p, 1 to 1.2MHz) to S8 and assign to FBQP1 / FBQP2 the frequency at S8 when the signal level at T17 is minimized.

(Note 7) REC mode sync gate start time, release time (TRGB, TRGBM, TRGE) :
Input Comp. sync to S27 and take the sync gate start time (TRGB) as the time from when the signal at T11 attenuates until the signal at S27 rises and the sync gate release time (TRGE) as the time from when take TRGBM as the sync gate start time when muting in turned on with a resistor connected to GND at SW2 = ON. (See Fig. 2)

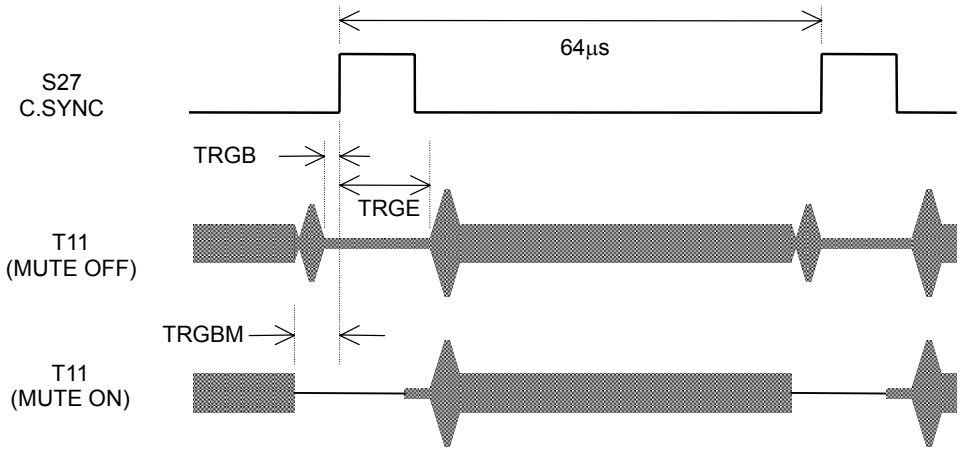


Fig.2 REC mode sync gate timing

(Note 8) REC mode mute setting resistance :
R2 value used to set T11 (MUTE-SW ON) state in REC mode in Fig.2.

(Note 9) PB mode sync gate start time, release time (TRGB, TPGE) :
Input Comp.sync to S27 and take the sync gate start time (TRGB) as the time from when the signal at T17 attenuates until the horizontal sync signal rises until the signal at T17 starts increasing.

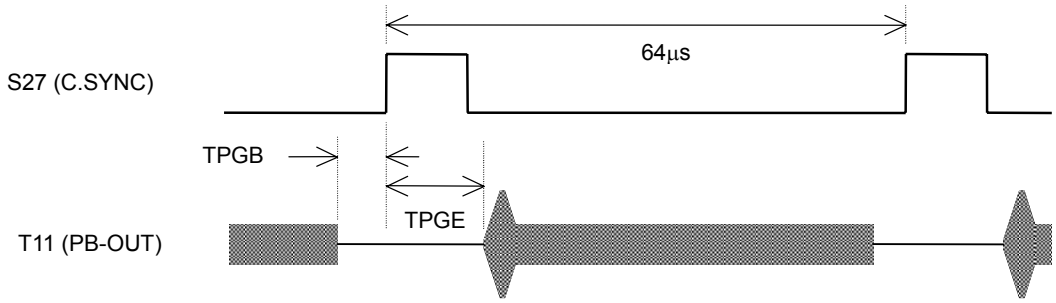


Fig.3 Sync gate timing

(Note 10) BGP start time, BGP width. (See Fig. 4)

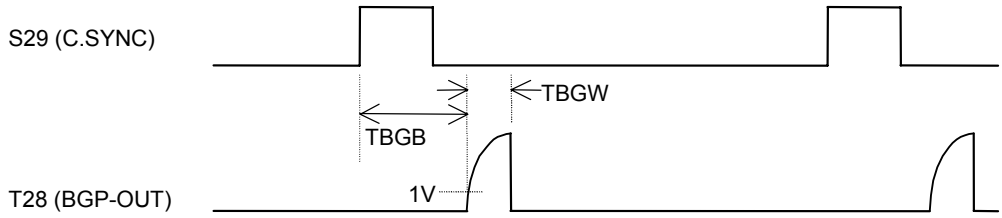


Fig.4 BGP timing

(Note 11) Assign to V26 as when generating 100μA of current from pin 26 by adding 5V to pin 25 and take "H" as detection output at pin 26 is :

$$R26 = \frac{5 - V_{26}}{100 \times 10^{-5}}$$

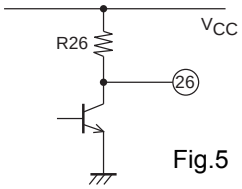


Fig.5

(Note 12) The sync signal at pin 27 must lag the SECAM colour bar signal synchronization by 1.1μs. (See Fig. 1)

(Note 13) The sync signal at pin 27 must lag the PAL colour bar signal synchronization by 1.1μs. (See Fig. 6)

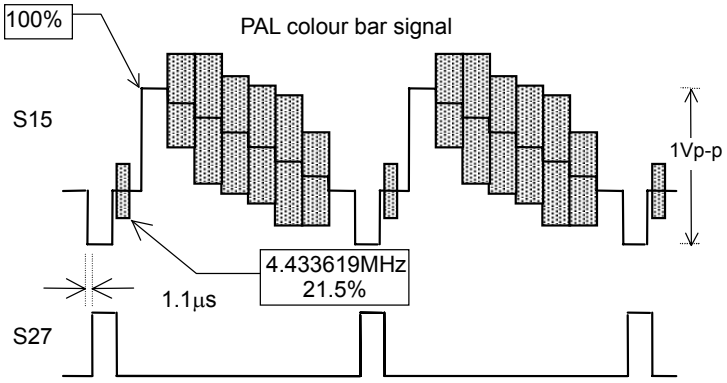


Fig.6

(Note 14) PB mode phase detection output differential voltage :

VSAPD1: Assign to VPD1 the DC voltage at pin 23 when a sine wave of 1.0625MHz is input to pin 13 and VPD2 the DC voltage at pin 24 when a sine wave of 1.1016MHz is input.

VSCPD1 = VPD2-VPD1

VSAPD2: Assign to VPD3 and VPD4 the voltage at pin 23 and pin 24, respectively, when a sine wave of 627kHz is input to pin 13.

VSCPD2 = VPD4-VPD3

VSCPD3: Assign to VPD5 the DC voltage at pin 23 when a sine wave of 0.7MHz is input to pin 13 and VPD6 the DC voltage at pin 24 when a sine wave of 1.04MHz is input.

VSCPD3 = VPD6-VPD5

(Note 15) PB mode SECAM detection characteristics VSCMP1/VSCMP2 :

VSCMP1: Apply the above-mentioned VPD1 and VPD2 to pin 23 and pin 24, respectively and then measure the voltage at T26.

VSCMP2: Apply the above-mentioned VPD3 and VPD4 to pin 23 and pin 24, respectively and then measure the voltage at T26.

VSCMP3: Apply the above-mentioned VPD5 and VPD6 to pin 23 and pin 24, respectively and then measure the voltage at T26.