Ordering number : EN8219A

SANYO Semiconductors
DATA SHEET

LA9247T — Monolithic Linear IC CD-ROM Digital Servo RF IC

Overview

The LA9247T is a CD-ROM digital servo RF IC that supports speeds up to 52×.

Functions

- RF amplifier (with AGC), RF gain amplifier (supports playback of CD-RW discs).
- RF equalizer circuit (with 7 modes), RF hold function.
- PH/BH detection, FE amplifier, REFL amplifier, TE amplifier.
- Servo signal VCA circuit (balance adjustment, SGC adjustment), midpoint servo (CSS) amplifier.
- APC circuit (with laser power amplifier function), sleep function.

Specifications

Maximum Ratings at Ta = 25°C, Pin 4, 31 = GND

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		7.0	V
Allowable power dissipation	Pd max		300	mW
Operating temperature	Topr		-25 to +70	°C
Storage temperature	Tstg		-40 to +150	°C

Operating Conditions at Ta = 25°C, Pin 4, 31 = GND

Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	V_{CC}		5.0	V
Allowable operating voltage range	V_{CC} op		4.5 to 5.5	V

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

Operating Characteristics at Ta = 25°C, V_{CC} (pin 23, 34) = 5V, $V_{CC}3$ (pin 6) = 3.3V, GND (pin 4, 31) = 0 V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CC}	No signal	24	36	48	mA
Current drain (sleep mode)	$I_{CC}S$	No signal, EQS = 0V	1.5	5	8.5	mA
Reference voltage	VR		2.3	2.5	2.7	V
Reference voltage	VR2		1.5	1.65	1.8	V
Preamp offset	RFAOost	The difference with VR for RFAO	-120	0	120	mV
RF no signal voltage	RFSM	RFIN = VR	1.6	1.9	2.2	V
RF gain (min)	RFG1	GHS = 0V	0	2.5	5.0	dB
RF gain (max)	RFG2	GHS = 0V	14.5	16.5	18.5	dB
RF gain (UP)	RFRW	GHS = 3.3V	+10.5	+14.0	+17.5	dB
RFEQ - normal	RFEQN	The difference in RFSM when RFIN is 100mVp-p, f = 1MHz and 100mVp-p, f = 100kHz. EQS = 3.3V	+0.5	+2.75	+5.0	dB
RFEQ-CAV1	RFEQ1	The difference in RFSM when RFIN is 100mVp-p, f = 2.4MHz and 100mVp-p, f = 100kHz. EQS = 2.7V	+0.5	+2.75	+5.0	dB
RFEQ-CAV2	RFEQ2	The difference in RFSM when RFIN is 100mVp-p, f = 4.3MHz and 100mVp-p, f = 100kHz. EQS = 2.2V	+0.5	+2.75	+5.0	dB
RFEQ-CAV3	RFEQ3	The difference in RFSM when RFIN is 100mVp-p, f = 8MHz and 100mVp-p, f = 100kHz. EQS = 1.8V	+0.5	+2.75	+5.0	dB
RFEQ-CAV4	RFEQ4	The difference in RFSM when RFIN is 100mVp-p, f = 12MHz and 100mVp-p, f = 100kHz. EQS = 1.5V	+0.5	+2.75	+5.0	dB
RFEQ-CAV5	RFEQ5	The difference in RFSM when RFIN is 100mVp-p, f = 24MHz and 100mVp-p, f = 100kHz. EQS=1.1V	+0.5	+2.75	+5.0	dB
RFEQ-CAV6	RFEQ6	The difference in RFSM when RFIN is 100mVp-p, f = 35MHz and 100mVp-p, f = 100kHz. EQS = 0.7V	+0.5	+2.75	+5.0	dB
RF hold	RFHLD	RFIN: 1.5Vp-p, f = 100kHz, RHLD = 3.3V	-13.5	-11.0	-8.5	dB
PH	PH	RFIN = VR	0.65	0.9	1.15	V
BH	BH	RFIN = VR	0.65	0.9	1.15	V
ΔBHL (frequency characteristics)	ΔBHL	RFIN = VR, ΔBHL = BH (600kHz) - BH (10kHz) EQS = 2.7V or 3.3V	-5.5	-3.0	-0.5	dB
ΔBHH (frequency characteristics)	ΔBHH	RFIN = VR, ΔBHH = BH (100kHz) - BH (10kHz) EQS = 2.2V, 1.8V, 1.5V, 1.1V, 0.7V	-5.5	-3.0	-0.5	dB
REFL offset	REFLost	The difference with VR2 for REFL	-120	0	120	mV
REFL gain 1	REFL1	A, B, C, D = V_{IN}, 10kHz, SGC = 1.3V, FBAL = VR2, GHS = 0V	8.5	11	13.5	dB
REFL gain 2	REFL2	A, B, C, D = V_{IN}, 10kHz, SGC = 2V, FBAL = VR2, GHS = 0V	15.5	18.0	20.5	dB
REFL gain UP	REFLGUP	GHS = 3.3V	+10.5	+14.0	+17.5	dB
ΔREFL (frequency characteristics)	ΔREFL	A, C = V_{IN}, B, D = VR SGC = VR2, FBAL = VR2, GHS = 0V ΔREFL = REFL (100kHz) - REFL (10kHz)	-8.5	-6.0	-3.5	dB
FE offset	FEost	The difference with VR2 for FE	-120	0	120	mV
FE gain 1	FEG1	A, C = V_{IN}, 10kHz, B, D = VR SGC = 1.3V, FBAL = VR2, GHS = 0V	8.5	11.0	13.5	dB
FE gain 2	FEG2	A, C = V_{IN}, 10kHz, B, D = VR SGC = 2V, FBAL = VR2, GHS = 0V	15.5	18.0	20.5	dB
FE balance 1	FBAL1	A, C = V_{IN}, 10kHz, B, D = VR SGC = VR2, FBAL = 1.3V, GHS = 0V	15.5	18.0	20.5	dB
FE balance 2	FBAL2	A, C = V_{IN}, 10kHz, B, D = VR SGC = VR2, FBAL = 2V, GHS = 0V	12.0	14.5	17.0	dB
FE gain UP	FEGUP	GHS = 3.3V	+10.5	+14.0	+17.5	dB
ΔFE (frequency characteristics)	ΔFE	A, C = V_{IN}, B, D = VR SGC = VR2, FBAL = VR2, GHS = 0V ΔFE = FE (130kHz) - FE (10kHz)	-8.5	-6.0	-3.5	dB

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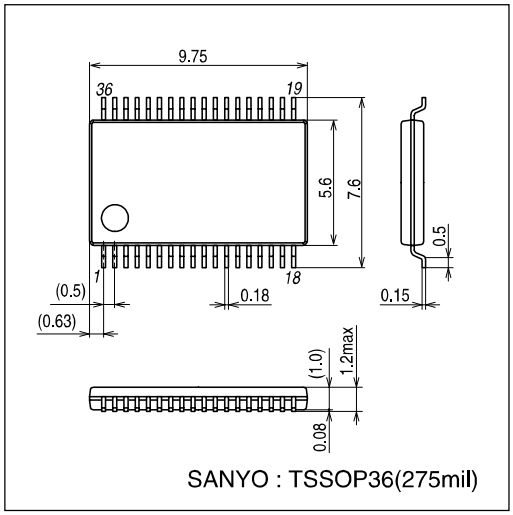
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
TE offset	TEost	The difference with VR2 for TE	-120	0	120	mV
TE gain 1	TEG1	E = V_{IN}, 10kHz, F = VR SGC = 1.3V, TBAL = VR2, GHS = 0V	13.0	15.5	18.0	dB
TE gain 2	TEG2	E = V_{IN}, 10kHz, F = VR SGC = 2V, TBAL = VR2, GHS = 0V	15.5	18.0	20.5	dB
TE balance 1	TBAL1	E = V_{IN}, 10kHz, F = VR SGC = VR2, TBAL = 1.3V, GHS = 0V	15.5	18.0	20.5	dB
TE balance 2	TBAL2	E = V_{IN}, 10kHz, F = VR SGC = VR2, TBAL = 2V, GHS = 0V	13.0	15.5	18.0	dB
TE gain UP	TEGUP	GHS = 3.3V	+10.5	+14.0	+17.5	dB
ΔTE (frequency characteristics)	ΔTE	E = V_{IN}, 10kHz, F = VR2 SGC = VR2, FBAL = VR2, GHS = 0V ΔTE = TE (150kHz) - TE (10kHz)	-8.5	-6.0	-3.5	dB
TS offset	TSost	The difference with VR2 for TS	-120	0	120	mV
TS gain 1	TSG1	E = V_{IN}, 10kHz, F = VR SGC = VR2, TBAL = VR2, GHS = 0V	13.0	15.5	18.0	dB
TS gain 2	TSG2	E = V_{IN}, 10kHz, F = VR SGC = 1.3V, TBAL = VR2, GHS = 0V	9.0	11.5	14.0	dB
TS balance 1	TSBAL1	E = V_{IN}, 10kHz, F = VR SGC = VR2, TBAL = 1.3V, GHS = 0V	14.0	16.5	19.0	dB
TS balance 2	TSBAL2	E = V_{IN}, 10kHz, F = VR SGC = VR2, TBAL = 2V, GHS = 0V	11.5	14.0	16.5	dB
TS gain UP	TSGUP	GHS = 3.3V	+10.5	+14.0	+17.5	dB
ΔTS (frequency characteristics)	ΔTS	E = V_{IN}, F = VR SGC = VR2, FBAL = VR2, GHS = 0V ΔTS = TS (250kHz) - TS (10kHz)	-8.5	-6.0	-3.5	dB
CSS gain	CSS	A, D = V_{IN}, 10kHz, B, C = VR SGC = VR2, FBAL = VR2, GHS = 0V	14.0	16.5	19.0	dB
ΔCSS (frequency characteristics)	ΔCSS	A, D = V_{IN}, B, C = VR SGC = VR2, FBAL = VR2, GHS = 0V ΔCSS = CSS (100kHz) - CSS (10kHz)	-5.5	-3.0	-0.5	dB
APC reference voltage 1	LDSL	The LDS voltage such that LDD becomes 3V LDON = 0V	160	190	220	mV
APC reference voltage 2	LDSH	The LDS voltage such that LDD becomes 3V LDON = 3.3V	180	230	280	mV
APC off voltage	LDD	LDON = VR	3.9	4.3	5	V

Package Dimensions

unit : mm

3253B



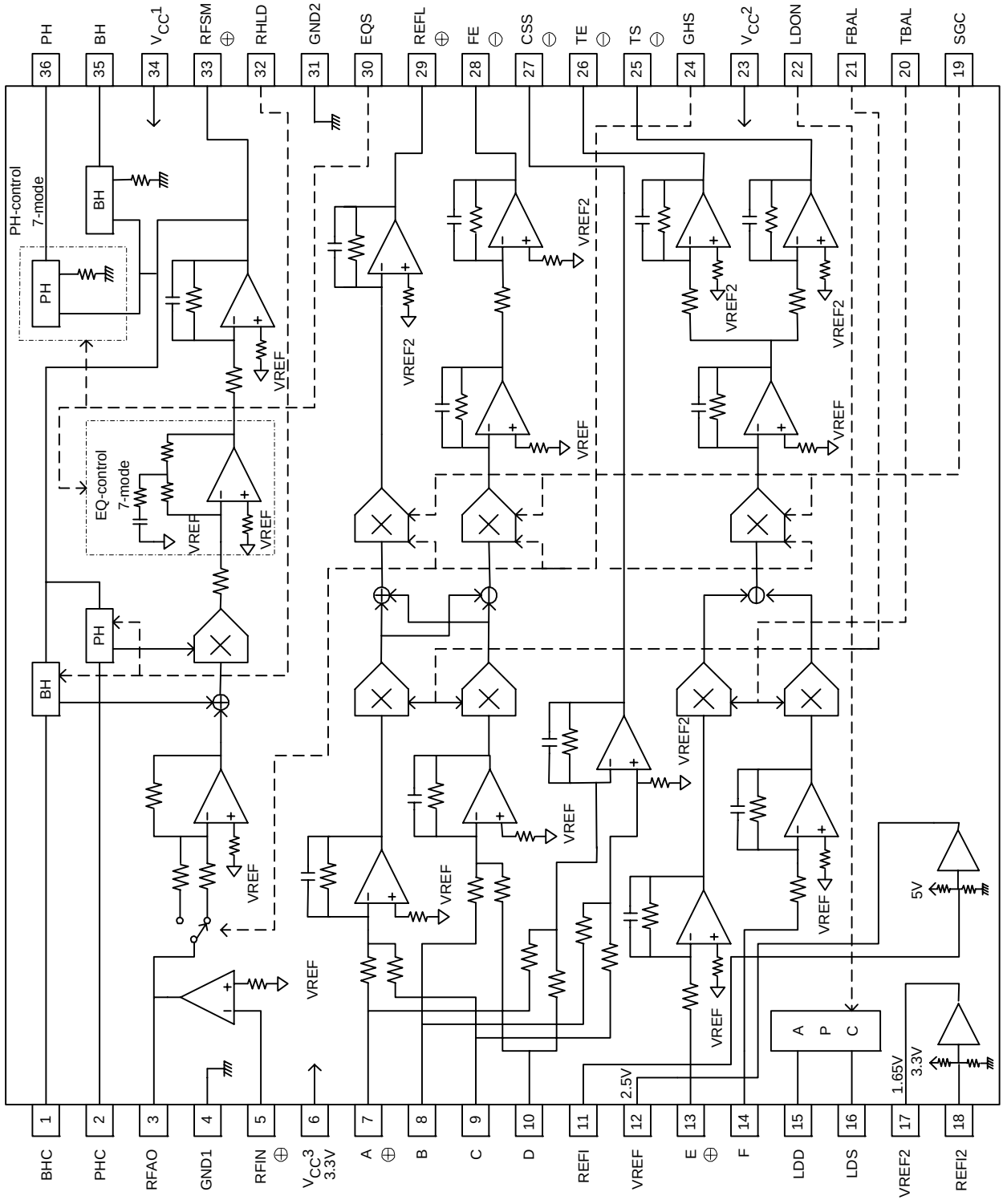
Pin Functions

Pin No.	Symbol	I/O	Description
1	BHC		RF AGC detection bottom hold capacitor connection
2	PHC		RF AGC detection peak hold capacitor connection
3	RFAO	O	RF amplifier output
4	GND1	I	RF signal system ground
5	RFIN	I	Pickup voltage output connection. Inputs the RF addition signal from the pickup.
6	$V_{CC}3$	I	3.3V system V_{CC}
7	A	I	Pickup voltage output connection. Generates the FE, REFL, and CSS signals.
8	B	I	Pickup voltage output connection. Generates the FE, REFL, and CSS signals.
9	C	I	Pickup voltage output connection. Generates the FE, REFL, and CSS signals.
10	D	I	Pickup voltage output connection. Generates the FE, REFL, and CSS signals.
11	REFI		Reference voltage bypass capacitor connection
12	VREF	O	Reference voltage output (Vref1 = 2.5V)
13	E	I	Pickup voltage output connection. Generates the TE and TS signals.
14	F	I	Pickup voltage output connection. Generates the TE and TS signals.
15	LDD	O	APC circuit output
16	LDS	I	APC circuit input
17	VREF2	O	Reference voltage output (Vref2 = 1.65V)
18	REFI2		Reference voltage bypass capacitor connection
19	SGC	I	Servo gain control (FE, TE, TS, and REFL signals)
20	TBAL	I	TE balance adjustment (TE and TS signals)
21	FBAL	I	FE balance adjustment (FE signal)
22	LDON	I	Laser on/off, laser power increase control
23	$V_{CC}2$	I	Servo signal system V_{CC} (5V)
24	GHS	I	RF and servo signal gain switch (0dB or +14dB)
25	TS	O	TS signal (used for the TES signal) output (to the DSP)
26	TE	O	TE signal output (to the DSP)
27	CSS	O	Center servo signal output (to the DSP)
28	FE	O	FE signal output (to the DSP)
29	REFL	O	Reflection signal output (to the DSP)
30	EQS	I	RF equalizer and PH detection time constant control
31	GND2	I	Servo signal system ground
32	RHLD	I	RF hold control
33	RFSM	O	EFM signal output (to the DSP)
34	$V_{CC}1$	I	RF signal system V_{CC} (5V)
35	BH	O	RF bottom hold signal output (to the DSP)
36	PH	O	RF peak hold signal output (to the DSP)

Usage Notes

The signal levels of the inputs to the A (pin 7), B (pin 8), C (pin 9), D (pin 10), E (pin 13), and F (pin 14) pins must be set up to be above the reference voltage (VREF).

Block Diagram



⊕⊖ ← These symbols indicate the phase relationship.