Ordering number : EN8219A

LC9247T

Monolithic Linear IC

CD-ROM Digital Servo RF IC

ON Semiconductor®

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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

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

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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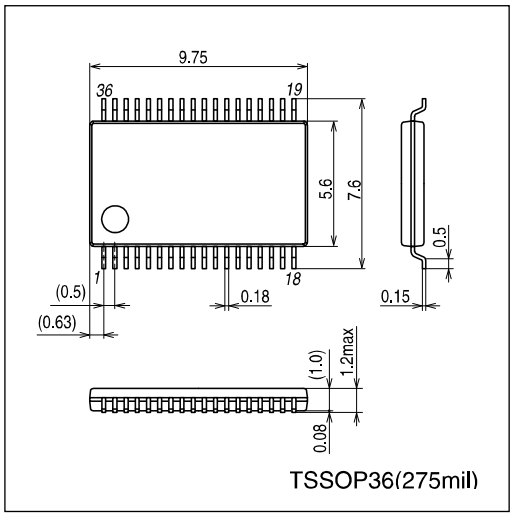
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
TE offset	TEost	The difference with VR2 for TE	-120	0	120	mV
TE gain 1	TEG1	E = V_{IN}, 10kHz, F = VR SGC = 1.3V, TBAL = VR2, GHS = 0V	13.0	15.5	18.0	dB
TE gain 2	TEG2	E = V_{IN}, 10kHz, F = VR SGC = 2V, TBAL = VR2, GHS = 0V	15.5	18.0	20.5	dB
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



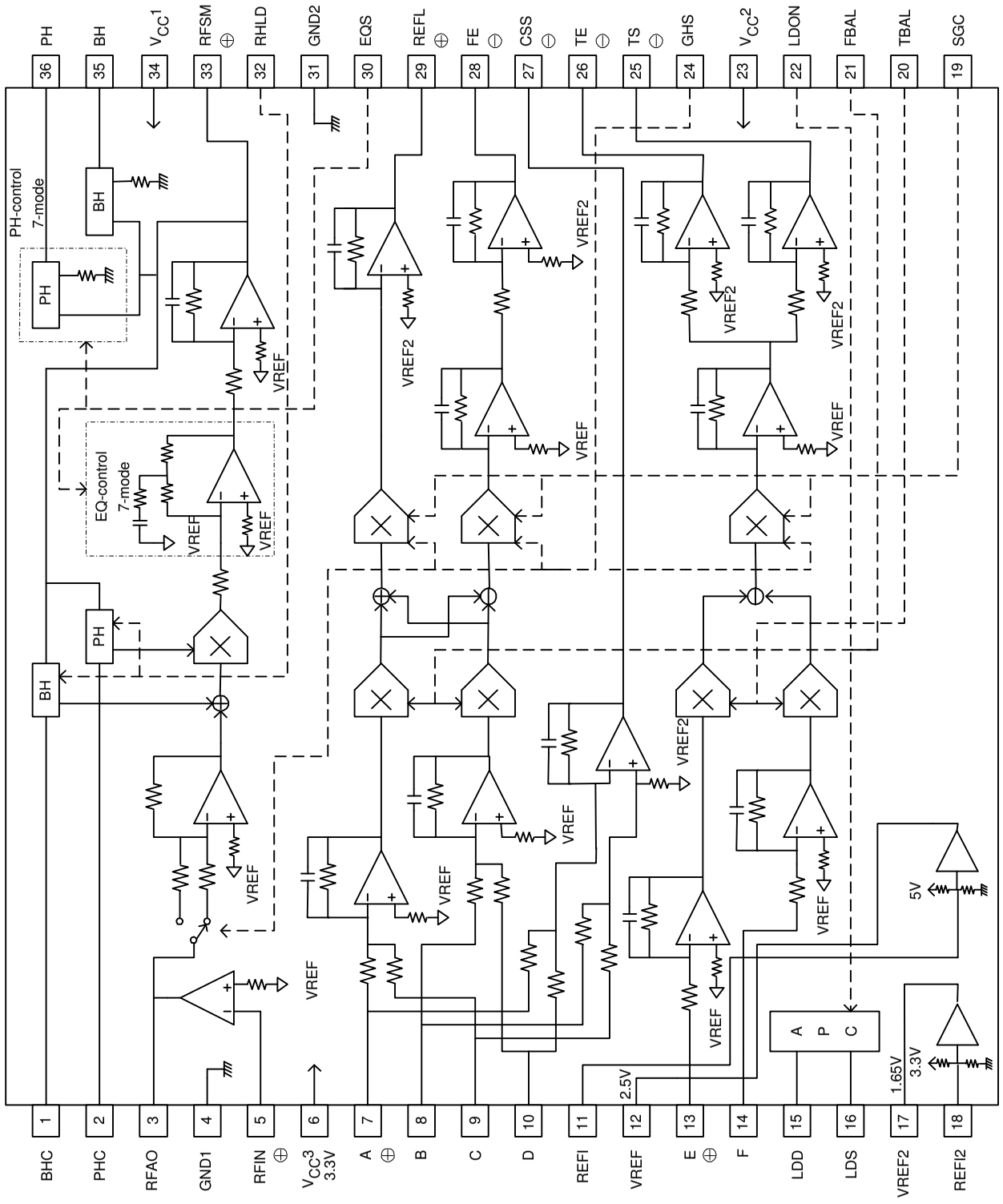
Pin Functions

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.