

## INTRODUCTION

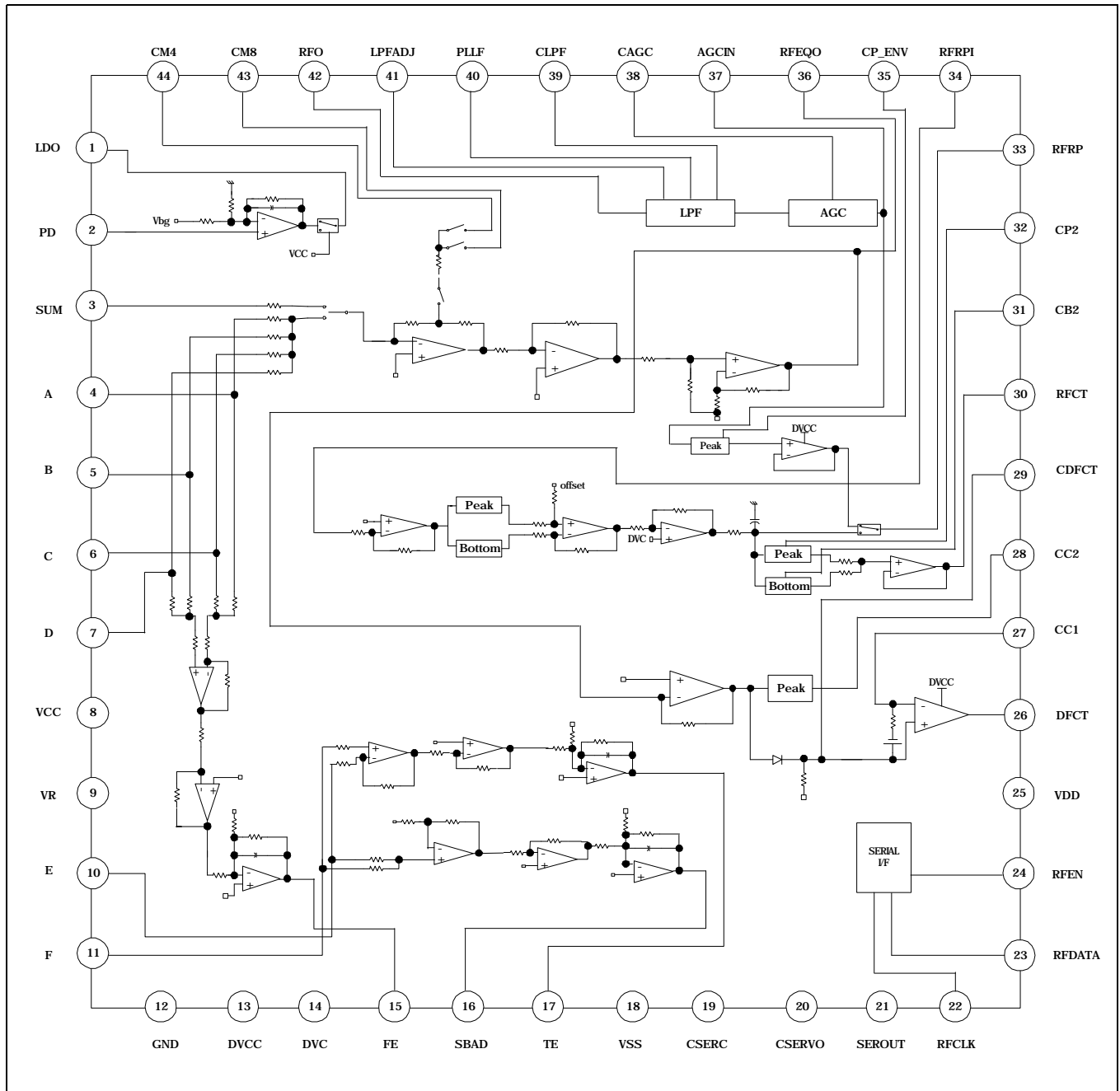
CD-ROM 48X RF AMP Chip is RF pre signal processor and processes signals from optical pick-up. This chip processes main signal through summing amp, AGC block, EQ block, and generates SERVO error signals for SERVO control. It can playback CD-ROM and CD-RW disc.

## MAIN FEATURES (FEATURES, CHARACTERISTICS)

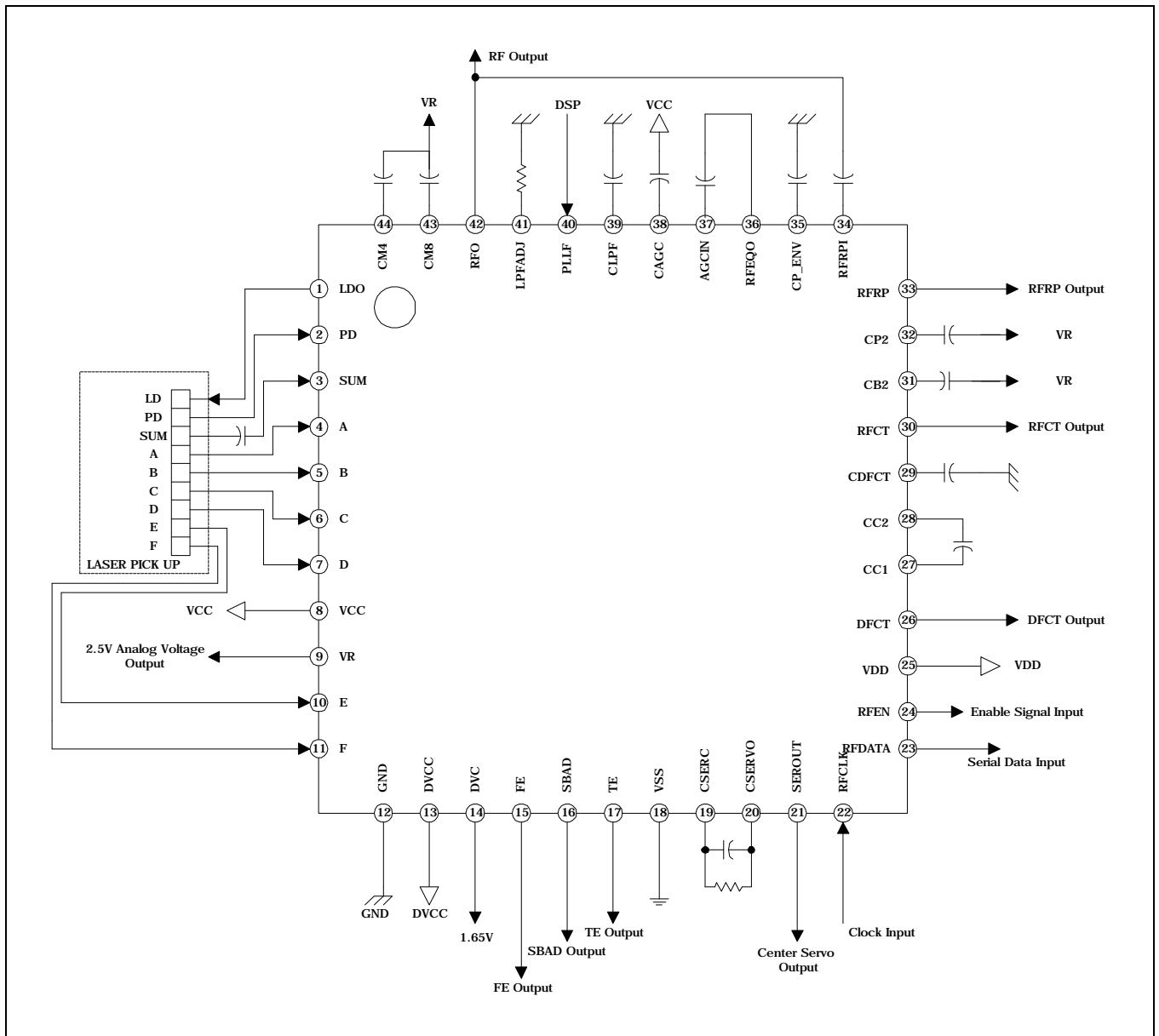
- CD-ROM 48X
  - 1, 4, 8: CLV mode
  - Maximum Speed of 48X: CAV mode
- Support CD-R/RW disc
- RF Amp & Equalizer
- Focus Error Amp
- Tracking Error Amp (3-Beam)
- Mirror (RFCT, RFRP) Signal Detection
- Defect Signal Detection
- Built-in AGC Function
- ALPC (Automatic Laser Power Control) Block
- Built-in RF Envelop Detector
- SBAD Signal Generation
- Signal Generation for Center Position Servo
- Built-in Serial Interface Port
- Power Down Mode

**BLOCK DIAGRAM**

**Internal Block Diagram**



External Application



**PIN DESCRIPTION**

No	Name	I/O	Description	Related Block
1	LDO	O	Output of ALPC block	ALPC
2	PD	I	Input for ALPC block	ALPC
3	SUM	I	Input for ABCD signal	RFSUM
4	A	I	Input for A signal	RFSUM
5	B	I	Input for B signal	RFSUM
6	C	I	Input for C signal	RFSUM
7	D	I	Input for D signal	RFSUM
8	VCC	P	Power input for Analog Block	Analog
9	VR	O	2.5V Reference voltage output	Bias
10	E	I	Input for E signal	TE Amp
11	F	I	Input for F signal	TE Amp
12	GND	P	Ground for Analog Block	Analog
13	DVCC	P	Power input for Digital Block	DSP
14	DVC	O	1.65V Reference Voltage output	Bias
15	FE	O	Focus Error signal output	FE Amp
16	SBAD	O	Sub Beam ADD output	SBAD
17	TE	O	Tracking Error signal output	TE Amp
18	VSS	P	Digital GND	Digital
19	CSERC	I	Time constant setting for center position servo	SERVO
20	CSERVO	O	Time constant setting for center position servo	SERVO
21	SEROUT	O	Error signal output for center position servo	SERVO
22	RFCLK	I	Clock input for serial interface	S I/F
23	RFDATA	I	Data input for serial interface	S I/F
24	RFEN	I	Data Enable input for serial interface	S I/F
25	VDD	P	Digital VDD	Digital
26	DFCT	O	Defect Detection Comparator output	DFCT
27	CC1	O	Bottom Hold output of Defect detection Amp	DFCT
28	CC2	I	DFCT Bottom Hold	DFCT
29	CDFCT	I	Capacitor for DFCT Bottom Hold	DFCT
30	RFCT	O	RFCT output , ENV output	Mirror
31	CB2	O	Capacitor for RFRP, RFCT	Mirror

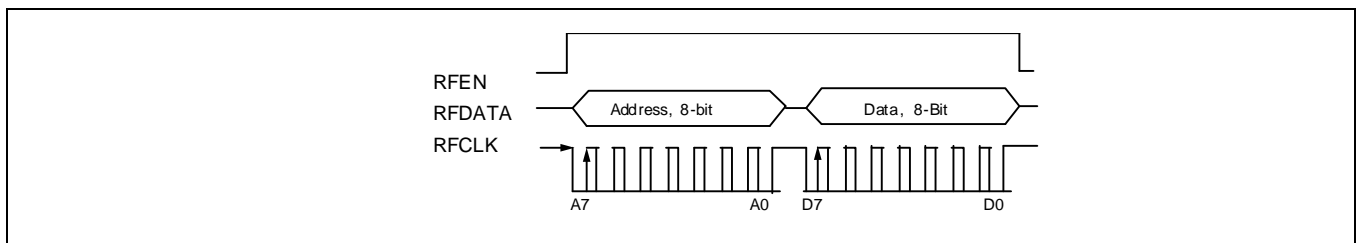
**PIN DESCRIPTION** (Continued)

No	Name	I/O	Description	Related Block
32	CP2	O	Capacitor for RFRP, RFCT	Mirror
33	RFRP	O	RFRP output	Mirror
34	RFRPI	I	Input for MIRR	MIRR
35	CP_ENV	I	Capacitor for Envelope Hold	ENV
36	RFEQO	O	Summing and EQ signa of A,B,C,DI	RFSUM
37	AGCIN	I	Input for AGC	AGC
38	CAGC	I	Hold Capacitor for AGC	AGC
39	CLPF	I	LPF output buffer REF connecting pin	AGC
40	PLL F	I	RF Frequency control for wide band PLL	EQ
41	LPFADJ	O	LPF Frequency select for wide band PLL	EQ
42	RFO	O	RF Signal Output	RFSUM
43	CM8	O	EQ Boost frequency for 8X speed	EQ
44	CM4	O	EQ Boost frequency for 4X speed	EQ

**SERIAL INTERFACE**

**Serial Interface Timing Graph**

- The Serial Interface controls the Disc type, Speed, AGC, and Laser Diode On/Off.
- The Timing Diagram of the Serial Interface is shown below:



- RFCLK : Clock synchronized with data from MICOM
- RFDATA : Address and Data from MICOM
- RFEN : Indicates Data is Enabled

Control signals generated from each Address are as below:

- ADDRESS 01H;  
: RFEQ\_SEL  
: ABCD\_ATT
- ADDRESS 02H;  
: EQG\_CEN  
: AGC\_LVL  
: C48\_SEL  
: CAV\_SEL
- ADDRESS 03H;  
: AGCON  
: AGCIN\_Z  
: GAIN\_PLLF  
: PUP\_SEL
- ADDRESS 04H;  
: TE\_LPF  
: TE\_ATT
- ADDRESS 05H;  
: DFCT\_CNST  
: FE\_LPF  
: FE\_ATT
- ADDRESS 06H;  
: SERVO\_OFST
- ADDRESS 07H;  
: TBAL
- ADDRESS 08H;  
: RFRP\_FREQ  
: RFRP\_TH  
: DFT\_TH
- ADDRESS 09H;  
: SBAD\_ATT  
: RFRP\_ATT1
- ADDRESS 0AH;  
: LD\_ON
- ADDRESS 0BH;  
: RFRP\_SEL
- ADDRESS 0FH;  
: MODE\_SEL  
: PDmode

**Table 1. Address Number**

	7	6	5	4		3	2	1	0
ADD 01H	0	0	0	0		0	0	0	1
ADD 02H	0	0	0	0		0	0	1	0
ADD 03H	0	0	0	0		0	0	1	1
ADD 04H	0	0	0	0		0	1	0	0
ADD 05H	0	0	0	0		0	1	0	1
ADD 06H	0	0	0	0		0	1	1	0
ADD 07H	0	0	0	0		0	1	1	1
ADD 08H	0	0	0	0		1	0	0	0
ADD 09H	0	0	0	0		1	0	0	1
ADD 0AH	0	0	0	0		1	0	1	0
ADD 0BH	0	0	0	0		1	0	1	1
ADD 0FH	0	0	0	0		1	1	1	1

**Serial Interface**

- **Address: 01H**

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	RFEQ_SEL				RSV	ABCD_ATT		
Initial Value	1	0	0	1	0	0	1	0

RFEQ\_SEL (D7 - D4): EQ Mode

D7	D6	D5	D4	RF EQ SELECT
0	0	0	0	32X
0	0	0	1	26X
0	0	1	0	21X
0	0	1	1	19X
0	1	0	0	16X
0	1	0	1	13X
0	1	1	0	11X
0	1	1	1	8X(CAV)
1	0	0	0	8X(CLV)
1	0	0	1	4X
1	0	1	0	1X

ABCD\_ATT (D2 - D0): ABCD attenuate gain select

D2	D1	D0	MODE
0	0	0	- 6dB
0	0	1	- 2.5dB
0	1	0	0dB
0	1	1	2dB
1	0	0	3.5dB
1	0	1	5dB
1	1	0	6dB

- Address : 02H

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	RSV	EQG_CEN			C48_SEL	CAV_SEL	AGC_LVL	
Initial Value	0	0	1	0	0	0	0	1

EQG\_CEN (D6 - D4): Center gain fine control of EQ boost gain select

D6	D5	D4	CENTER BOOST GAIN
0	0	0	3.5dB
0	0	1	4.5dB
0	1	0	5.5dB
0	1	1	6.5dB
1	0	0	7dB
1	0	1	7.5dB

C48\_SEL (D3) : 4X, 8X select

0 : 4X

1 : 8X

CAV\_SEL (D2) : CAV, CLV select

0 : CAV mode

1 : CLV mode

AGC\_LVL (D1 - D0): Output level select of AGC Amp

D1	D0	LEVEL
0		0.75V
0	1	1.0V
1		1.25V
1	1	1.5V



• Address : 03H

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	AGCON	AGCIN_Z			PUP_SEL	GAIN_PLLF		
Initial Value	1	0	0	1	1	0	1	1

AGC ON (D7)

- 1 : AGC ON
- 0 : AGC OFF

AGCIN\_Z (D6 - D4): Input Impedance select of RF AGC

D6	D5	D4	IMPEDANCE
0	0	0	240kΩ
0	0	1	60kΩ
0	1	0	40kΩ
0	1	1	30kΩ
1	0	0	20kΩ
1	0	1	15kΩ
1	1	0	10kΩ

PUP\_SEL (D3) : RF\_SUM or A, B, C, D select

- 0 : RF\_SUM Pick\_Up
- 1 : ABCD\_Pick\_Up

GAIN\_PLLF (D2 - D0): Peak Frequency Change Sensitivity Select of RF\_EQ. according to PLLF's Voltage

D2	D1	D0	Frequency Change Sensitivity according to PLLF Voltage
0	0	0	- 6dB
0	0	1	- 4dB
0	1	0	- 2dB
0	1	1	0dB
1	0	0	2dB
1	0	1	4dB
1	1	0	6dB

- Address : 04H

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	RSV		TE_LPF		RSV	TE_ATT		
Initial Value	0	0	0	0	0	0	1	0

TE\_LPF (D5 - D4): TE LPF frequency select

D5	D4	MODE
0	0	40 kHz
0	1	80 kHz
1	0	120kHz
1	1	360kHz

TE\_ATT (D2 - D0): TE attenuate gain select

D2	D1	D0	MODE
0	0	0	- 6 dB
0	0	1	- 2.5 dB
0	1	0	0 dB
0	1	1	1.5 dB
1	0	0	2.5 dB
1	0	1	3.5 dB
1	1	0	5 dB
1	1	1	6 dB

- Address : 05H

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	DFCT_CNST		FE_LPF		RSV	FE_ATT		
Initial Value	0	0	0	0	0	0	1	0

DFCT\_CNST (D7 - D6): Short time constant of defect detect block select

D7	D6	DEFECT
0	0	100 $\mu$ S/V
0	1	25 $\mu$ S/V
1	0	12.5 $\mu$ S/V
1	1	5.6 $\mu$ S/V

FE\_LPF (D5 - D4): FE LPF frequency select

D5	D4	MODE
0	0	40 kHz
0	1	80 kHz
1	0	120kHz
1	1	360kHz

FE\_ATT (D2 - D0): FE attenuate gain select

D2	D1	D0	MODE
0	0	0	- 6 dB
0	0	1	- 2.5 dB
0	1	0	0 dB
0	1	1	1.5 dB
1	0	0	2.5 dB
1	0	1	3.5 dB
1	1	0	5 dB
1	1	1	6 dB

FE ATT Gain

- **Address : 06H**

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	SERVO_OFST							
Initial Value	1	0	0	0	0	0	0	0

SERVO\_OFST (D7 - D0): Center position servo offset level  
 At '00', output of OFFSET is Min. At 'FF', output of OFFSET is Max.

- **Address : 07H**

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	TBAL							
Initial Value	1	0	0	0	0	0	0	0

TBAL (D7 - D0): Output voltage swing level is below when Input conditions are  
 E : 100mVpp 1kHz  
 F : -100mVpp 1kHz

TBAL	Output Voltage Level
00	1.25 Vpp
80	1 Vpp
FF	0.85 Vpp

• Address : 08H

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	RFRP_FREQ		DFT_TH			RFRP_TH		
Initial Value	0	0	0	0	0	0	1	1

RFRP\_RFEQ (D7 - D6): RFRP PEAK-BOTTOM HOLD Frequency Select

D7	D6	RFRP_FREQ	RFRP_LPF
0	0	40 kHz	80 kHz
0	1	80 kHz	160kHz
1	0	120 kHz	240kHz
1	1	360 kHz	720kHz

DFT\_TH (D5 - D3): DEFECT Slicer Level Select

D5	D4	D3	SLICE LEVEL
0	0	0	50mV
0	0	1	100mV
0	1	0	200mV
0	1	1	300mV
1	0	0	400mV
1	0	1	500mV
1	1	0	600mV
1	1	1	700mV

RFRP\_TH (D2 - D0): RFRP Level Selec

D2	D1	D0	OFFSET LEVEL
0	0	0	-300mV
0	0	1	-200mV
0	1	0	- 100mV
0	1	1	0mV
1	0	0	100mV
1	0	1	200mV
1	1	0	300mV

- Address : 09H

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	RSV	RFRP_ATT1			RSV	SBAD_ATT		
Initial Value	0	0	1	0	0	0	1	0

RFRP\_ATT1 (D6 - D4): RFRP Output Level Select

D6	D5	D4	MODE
0	0	0	- 200mVpp
0	0	1	- 100mVpp
0	1	0	0mVpp
0	1	1	100mVpp
1	0	0	200mVpp

\* When 1Vpp, 7% modulation, 10kHz carrier input, output Vpp change amount.

SBAD\_ATT (D2-D0): SBAD Output Gain Select

D2	D1	D0	MODE
0	0	0	- 6 dB
0	0	1	- 2.5 dB
0	1	0	0 dB
0	1	1	1.5 dB
1	0	0	2.5 dB
1	0	1	3.5 dB
1	1	0	5 dB
1	1	1	6 dB

- Address : 0AH

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	RSV							LD_ON
Initial Value	0	0	0	0	0	0	0	1

LD\_ON (D0) : LD On/Off Select

0 : LD OFF

1 : LD ON

• Address : 0BH

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	RSV							RFRP_SEL
Initial Value	0	0	0	0	0	0	0	0

RFRP\_SET (D0): RFRP Block Output Select

D0	OUTPUT
0	RFRP, RFCT
1	ENVELOPE

• Address : 0FH

DATA	D7	D6	D5	D4	D3	D2	D1	D0
Function	RSV			MODE_SEL	RSV			PDmode
Initial Value	0	0	0	1	0	0	0	1

MLDE\_SEL (D4) : CD-ROM, CD-RW Select

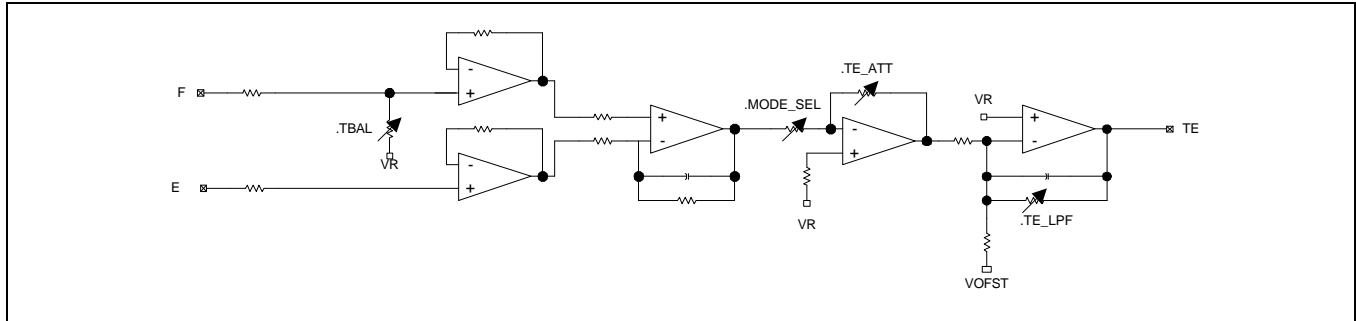
- 0 : CD-RW
- 1 : CD-ROM

PDmode (D0) : Power Down Mode On/Off Select

- 0 : Power Down Mode
- 1 : Normal Mode

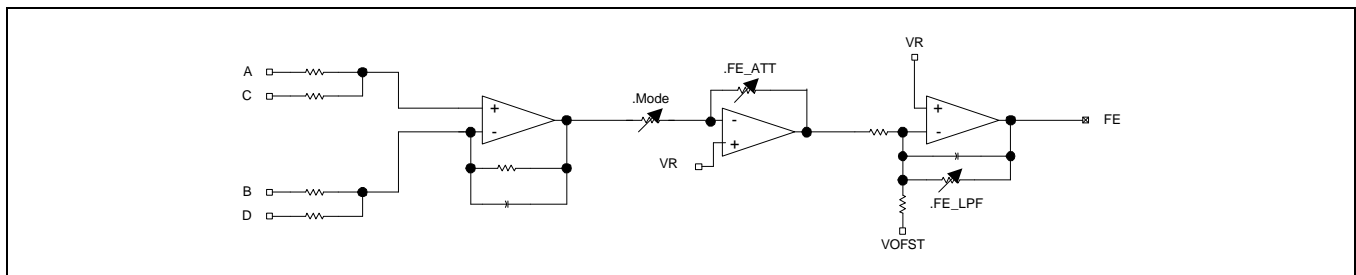
## BLOCK DESCRIPTION

### Tracking Error Amp



- The Gain of the E, F signals are controlled by the Tracking Balance signal(TBAL).
- The output of TE AMP is expressed by  $-K(E-F)$ .
- CD-ROM or CD-RW operation is selected by CDRW signal.
- Output stage is compatible to 3.3 V Servo operation.

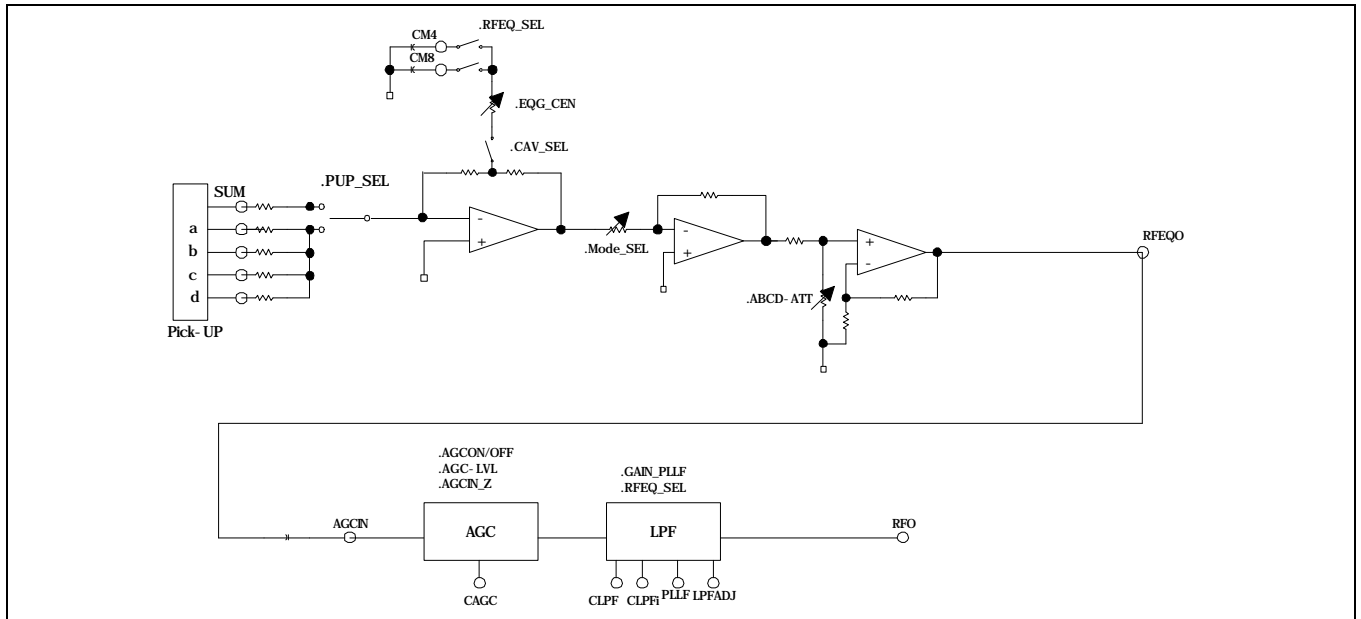
### Focus Error Amp



- The Gain of the input signals A, C and B, D can be adjusted by the Focus Balance signal.
- FE signal is expressed by  $-K \{(PAC) - (PBD)\}$ .
- CD-ROM or CD-RW operation is selected by CDRW signal.
- Output stage is compatible to 3.3 V Servo operation.

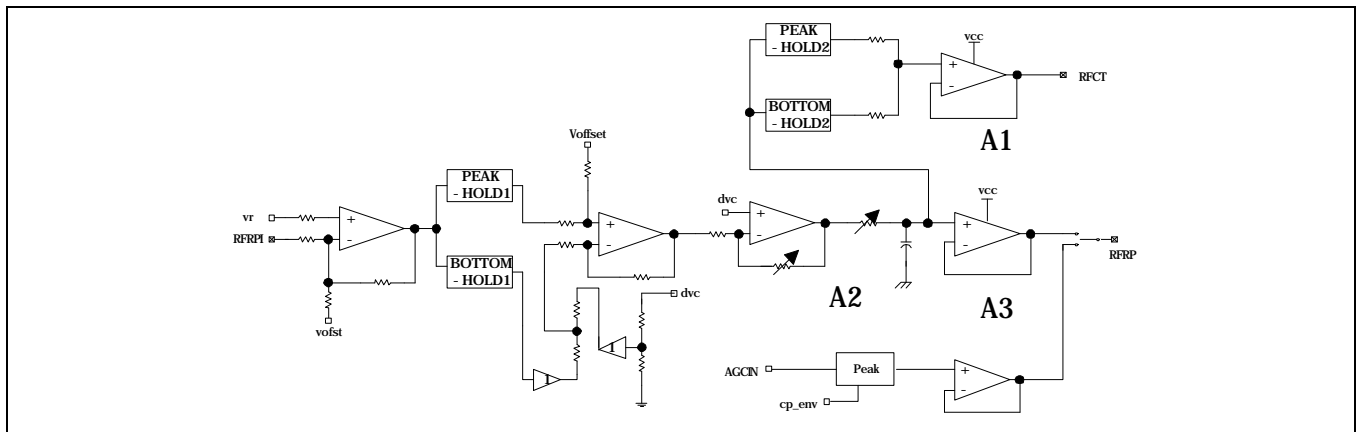


AGC & EQ



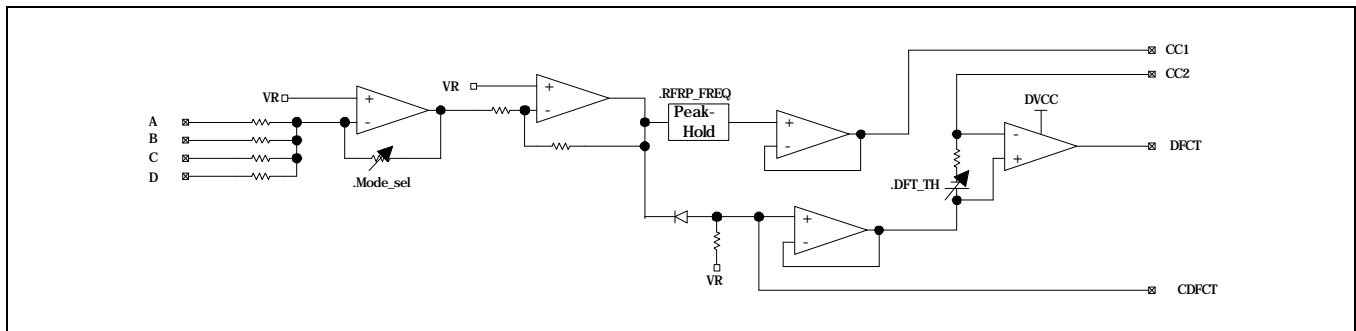
- Input level of RF AMP signal is convert to ouput level selected by AGC block.
- It is discreminated that CD-ROM or CD-RW.
- AGC Amp is designed to work with the Wide Range PLL.
- Boost Control of the Summing Amp is possible using the EQ Control Switc

RFRP & RFCT Block & Envelope Detector



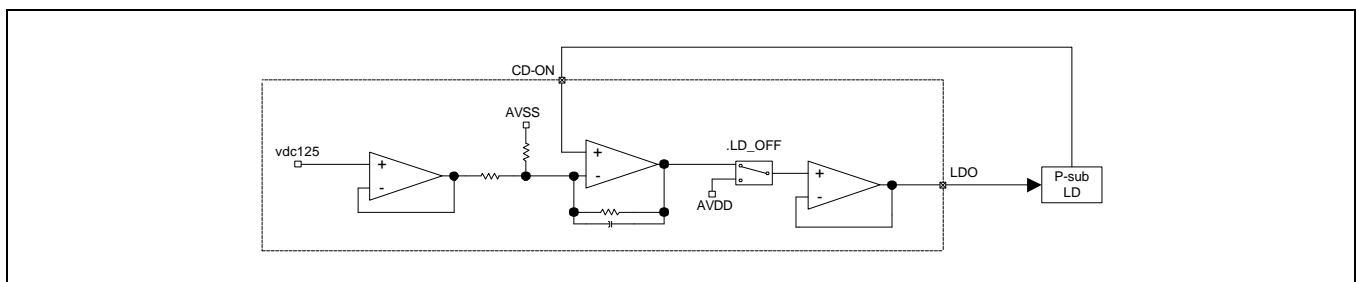
- This circuit generates RF's amplitude signals by detecting the upper envelope, using Servo Control signals for Focus Error signal balance adjustment.
- Capacitance connected to CE that decides the time-constant value.
- RFRP is a block for detecting signals crossing the Track.
- Using the AC-coupled ABCD signals, carries out Peak and Bottom hold operation.

### Defect Detector Block



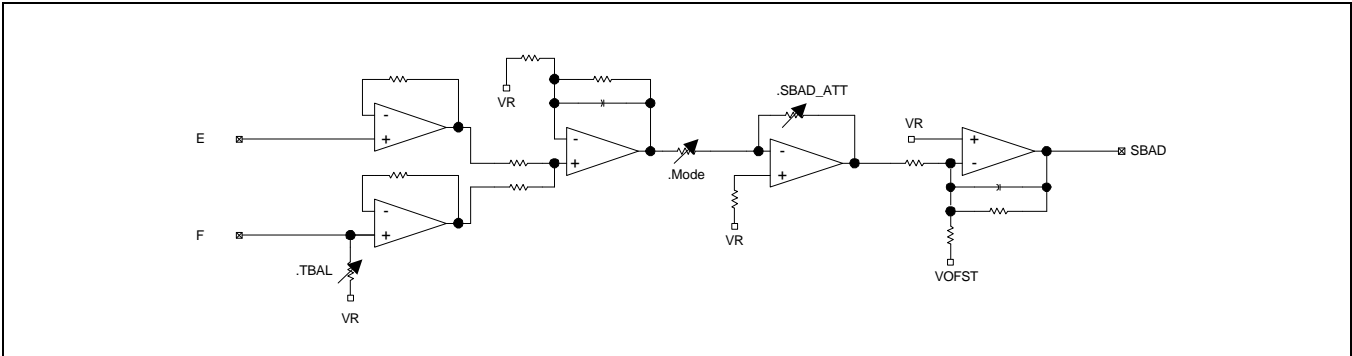
- Block for detecting defects such as disc scratch or finger prints.
- External capacitor decides the time constant value.
- It detects ABCD signals through high speed peak hold and low speed bottom hold.
- After add DC to high speed peak hold, .then compares it to low-speed peak hold output.

### ALPC



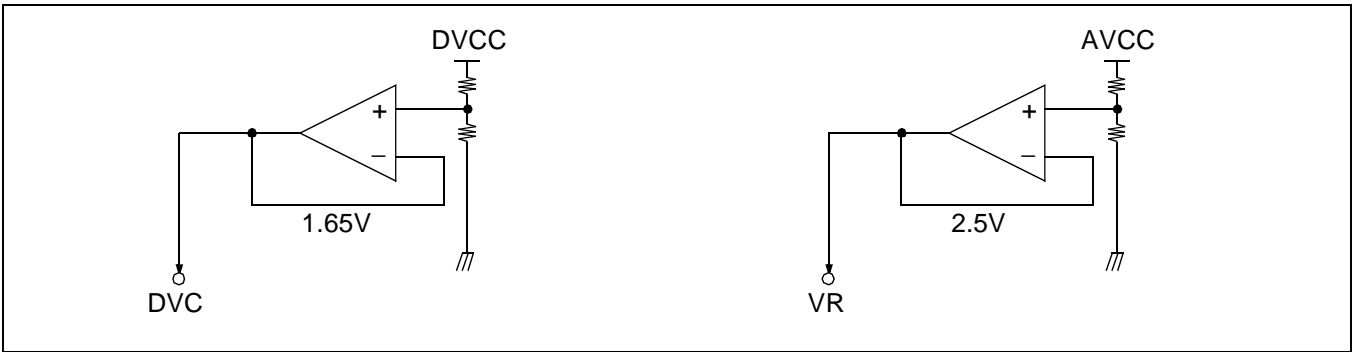
- Circuit for controlling the light power of the Laser Diode.
- Laser Power fluctuation caused by voltage and temperature changes are detected by Monitor Photo Diode's output current, then it is able to control the stable output power of Laser Diode.
- ALPC on/off is controlled by LDON switch.

**SBAD**



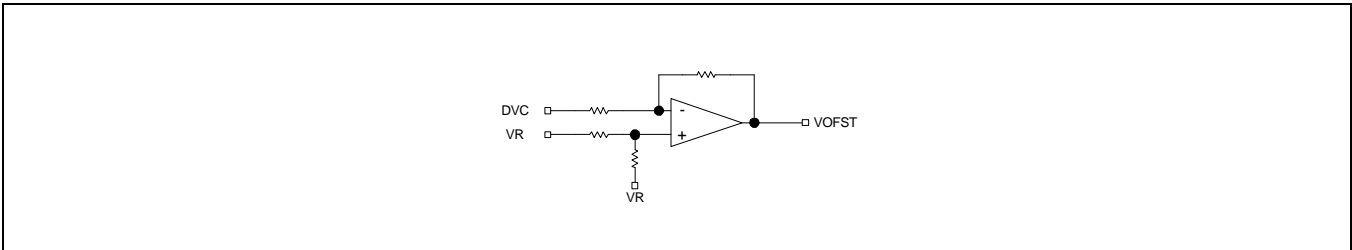
- E, F signal are excited tracking balance adjust and added, and passed LPF.
- It is expressed by  $K(E + F)$

**Reference Block**



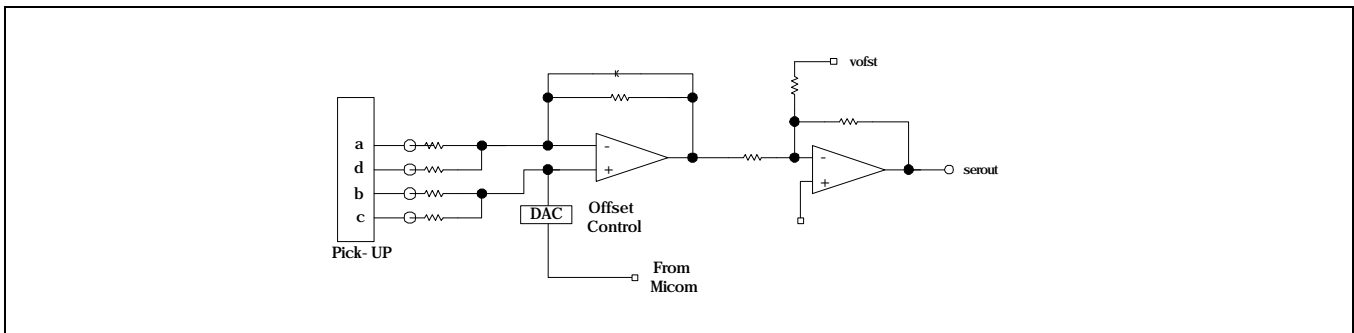
- This block generates Reference voltage.
- The Output voltages are 1.65V (from RF part supply input) and 2.5V (from SERVO part supply input) .

**Vdc Offset Block**



- It shifts the output stage to match the Servo and DSP block.

## Center Servo Block



- This block controls level shift in seek mode.
- Output signal is expressed by  $-K((B + C) - (A + D))$

## ELECTRICAL CHARACTERISTICS

## Bias Block

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
1	VR Output Voltage	VR	VR Voltage Measurement	2.4	2.5	2.6	V
2	VR Output Voltage1	VR1	VR=3mA Impression	2.4	2.5	2.6	V
3	VR Output Voltage2	VR2	VR=-3mA Impression	2.4	2.5	2.6	V
4	DVC Output Voltage	DVC	DVC Voltage Measurement	1.55	1.65	1.75	V
5	DVC Output Voltage1	DVC1	DVC=3mA Impression	1.55	1.65	1.75	V
6	DVC Output Voltage1	DVC2	DVC=-3mA Impression	1.55	1.65	1.75	V

## Supply Voltage

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
7	Operating Power Voltage	Vcc		4.5	5.0	5.5	V
8	Power Current	Icc	Vin = 0	75	85	95	mA

## Tracking Error Amp

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
9	Tracking Balance Adjustment Range	TBAL1	E: 1kHz Sine 100mVpp F: 1kHz Sine(I) 100mVpp TBAL=FF	-	-	0.8	Vpp
10		TBAL2	E: 1kHz Sine 100mVpp F: 1kHz Sine(I) 100mVpp TBAL=80	0.9	1.0	1.1	Vpp
11		TBAL3	E: 1kHz Sine 100mVpp F: 1kHz Sine(I) 100mVpp TBAL=00	1.25	-	-	Vpp
12	BandWidth (-3dB Freq.)	TBW1	E: 100mVpp Sine Frequency Sweep F: 100mVpp Sine Frequency Sweep	-	40	-	kHz
13		TBW2		-	360	-	kHz
14	Offset Voltage	TOFS1	E,F: VR TBAL = 00 (CD-ROM mode)	- 80	0	80	mV
15		TOFS2	E,F: VR TBAL = 00 (CD-RW mode)	-320	0	320	mV
16	High Output Voltage	THout	-	2.5	-	-	V
17	Low Output Voltage	TLout	-	-	-	0.5	V
18	Output Voltage 1	TEout1	E: 1kHz Sine 60mVpp F: 1kHz Sine(1) 60mVpp (CD-ROM Mode)	1.1	1.2	1.3	Vpp
19	Output Voltage 2	TEout2	E: 1kHz Sine 15mVpp F: 1kHz Sine(1) 15mVpp (CD-RW Mode)	1.0	1.2	1.4	Vpp

## Focus Error AMP

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	
20	Output Voltage 1	FEout1	AC IN = 300mVpp(each) + Sine 1kHz + VR, BD IN = VR,	1.1	1.2	1.3	Vpp	
21	Output Voltage 2	FEout2	BD IN = 300mVpp(each) + Sine 1kHz + VR, AC IN = VR,	1.1	1.2	1.3	Vpp	
22	Output Voltage 3 (CD-R)	FEout3	AC IN = 75mVpp(each) + Sine 1kHz + VR, BD IN = VR,	1.0	1.2	1.4	Vpp	
23	Output Voltage 4 (CD-R)	FEout4	BD IN = 75mVpp(each) + Sine 1kHz + VR, AC IN = VR,	1.0	1.2	1.4	Vpp	
24	Voltage Gain Difference1	$\Delta$ GFE1	GTE1-GTE2	-	0	-	dB	
25	Voltage Gain Difference2	$\Delta$ GFE2	GTE3-GTE4	-	0	-	dB	
26	Bandwidth (-3dB Freq.)	FBW1	(A,C) : 100mVpp Sine Frequency SWEEP	FE_LPF = 00	32	40	48	kHz
27		TBW2	(B,D) : 100mVpp Sine(I) Frequency SWEEP	FE_LPF = 11	-	180	-	
28	Offset Voltage	FOFF1	(A-D) : VR, GAIN_FE=8dB, FEOFST = 80 (CD-ROM Mode)	- 40	0	40	mV	
29		FOFF2	(A-D) : VR, GAIN_FE=8dB, FEOFST = 80 (CD-R/W Mode)	-100	0	100	mV	
30	Output High Voltage	FHout	-	2.5	-	-	V	
31	Output Low Voltage	FLout	-	-	-	0.5	V	

## AGC &amp; EQ Block

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
32	Frequency Characteristic1	F1	-3dB Frequency at RFEQO , CAV mode, Input=2.5V DC	45	-	-	MHz
33	GAIN Characteristic1	G1	CAV Mode,CD-ROM Mode at RFEQO	1	3	5	dB
34	GAIN Characteristic2	G2	CAV Mode,CD-RW Mode at RFEQO	13	15	17	dB
35	Peak Frequency1	Fp1	CLV Mode, 4X Mode	4.2	5.2	6.2	MHz
36	Peak Frequency2	Fp2	CLV Mode, 8X Mode	8.4	10.4	12.4	MHz
37	AGC Voltage Gain	GAGC	AGCIN=1Vpp, Sine, 1Meg, AGC level Adjustment	0.75	-	1.5	Vpp
38	AGC Standard Output	GAGCOP	AGCIN=1Vpp, Sine, 1Meg	0.9	1	1.1	Vpp
39	Maximum Gain (Gpeak) Range	RFEQO	(A-D):250mVppSweepingSine+VC, CLV mode, 8X at 10.4MHz , EQG_CEN=3.5	2.5	3.5	4.5	dB
40			EQG_CEN=5.5dB	4.5	5.5	6.5	
41			EQG_CEN=7.5dB	6.5	7.5	8.5	

## RF Envelop Detector

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
42	Output Voltage 1	VOENV1	ABCD: Not inputting	0.4	–	–	V
43	Output Voltage 2	VOENV2	ABCD: 250mVpp(each) + Sine 500kHz + VR, No signal Standard	–	0.7	–	V
44	Output Voltage 3	VOENV3	ABCD: 250mVpp(each) + Sine 500kHz + VR	–	–	2.8	V

## RFRP

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
45	Output Level 1	VRPO1	RFRPI : 1.0Vpp 10kHz Sine 70% AM fcarrier :1Mhz Modulation	0.9	1	1.1	Vpp
46	Output Level 2	VRPO2	RFRPI : 1.0Vpp 30kHz Sine 70% AM fcarrier :1Mhz Modulation	0.7	–	–	Vpp
47	Output Level 3	VRPO3	RFRPI : 1.0Vpp 80kHz Sine 70% AM fcarrier :3Mhz Modulation	0.7	–	–	Vpp
48	Output Level 4	VRPO4	RFRPI : 1.0Vpp 160kHz Sine 70% AM fcarrier :6Mhz Modulation	0.7	–	–	Vpp
49	Output Level 5	VRPO5	RFRPI : 1.0Vpp 320kHz Sine 70% AM fcarrier :10Mhz Modulation	0.7	–	–	Vpp

## RFCT

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
50	Level	Vctl	RFRPI : 1.0Vpp 10kHz sine 70% AM fcarrier : 1MHz Modulation	1.35	1.65	1.95	V

## Defect Detector

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
51	Detected Min. Operation Input Voltage	VDFCT1	200Hz Square Wave Full AM fcar 1MHz Sine + Vc	–	0.3	0.5	V
52	Detected Max. Operation Input Voltage	VDFCT2		1.8	–	–	V
53	High Output Voltage	Hout	–	2.5	–	–	V
54	Low Output Voltage	Lout	–	–	–	0.5	V
55	High Speed Peak Hold Charge/discharge Time Constant Range	HPhR	250mVpp 200Hz Square Wave Full AM fcar 1MHz Sine + Vc, RFRP_FREQ: STEP Variation	5.6	–	100	uS/V
56	Low Speed Peak Hold Discharge Time Constant Range	LPhR	250mVpp 200Hz Square Wave Full AM fcar 1MHz Sine + Vc	10	–	100	uS/V

**ALPC**

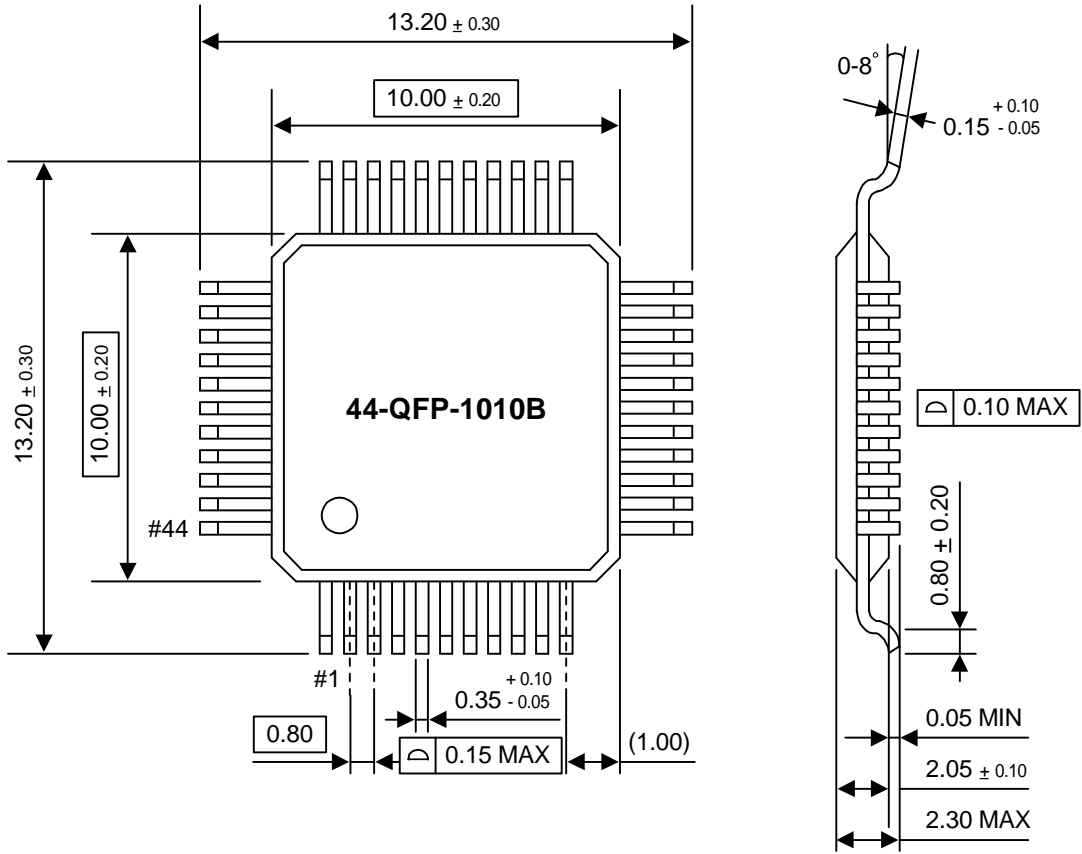
No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
57	ALPC Operating Voltage PL	VAPPL	VPD=0mV, VLDON=0V	–	–	1.1	V
58	ALPC Operating Voltage PH	VAPPH	VPD=600mV, VLDON=0V	3.9	–	–	V
59	LD-OFF Voltage	VLDOF	LDC=L, VCC Standard	–0.7	–	–	V
60	ALPC Operating Voltage HP	VAPHP	VPD=2.5V	3.9	–	–	V
61	ALPC Operating Voltage 1	VALPC1	IPD=0.8mA LD Impression, VLDON=0V	2.5	–	–	V
62	ALPC Operating Voltage 2	VALPC2	IPD=–0.8mA LD Impression, VLDON=0V	–	–	2.5	V

**SBAD**

No	Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
63	Voltage Gain 1	SBGv1	f=1kHz, CD-Rom mode	6	9	10	dB
64	Voltage Gain 2	SBGv2	f=1kHz, CD-RW mode	18	21	22	dB
65	Frequency Characteristics	SBfc	–3dB point	–	44	–	kHz
66	Standard Operating Voltage	SBVopr1	VR Standard, CD-Rom mode	–1.75	–1.65	–1.55	V
67	Standard Operating Voltage	SBVopr2	VR Standard, CD-RW mode	–1.55	–1.45	–1.35	V
68	Output Upper Voltage	SBVoh	GND Standard	2.5	–	–	V
69	Output Lower Voltage	SBVol	GND Standard	–	–	0.5	V



**PACKAGE DIMENSION**



**NOTE:** Dimensions are in millimeters.