Panasonic

AN8837SB

Low power consumption CD-DA head amplifier IC for 3-beam system optical pick-up

■ Overview

The AN8837SB is a head amplifier IC for digital servo. It can configure an efficient CD system in combination with the MN6627XX series, and allows a full-automatic adjustment of tracking balance-gain-offset and focus balance-gain-offset with fewer external parts.
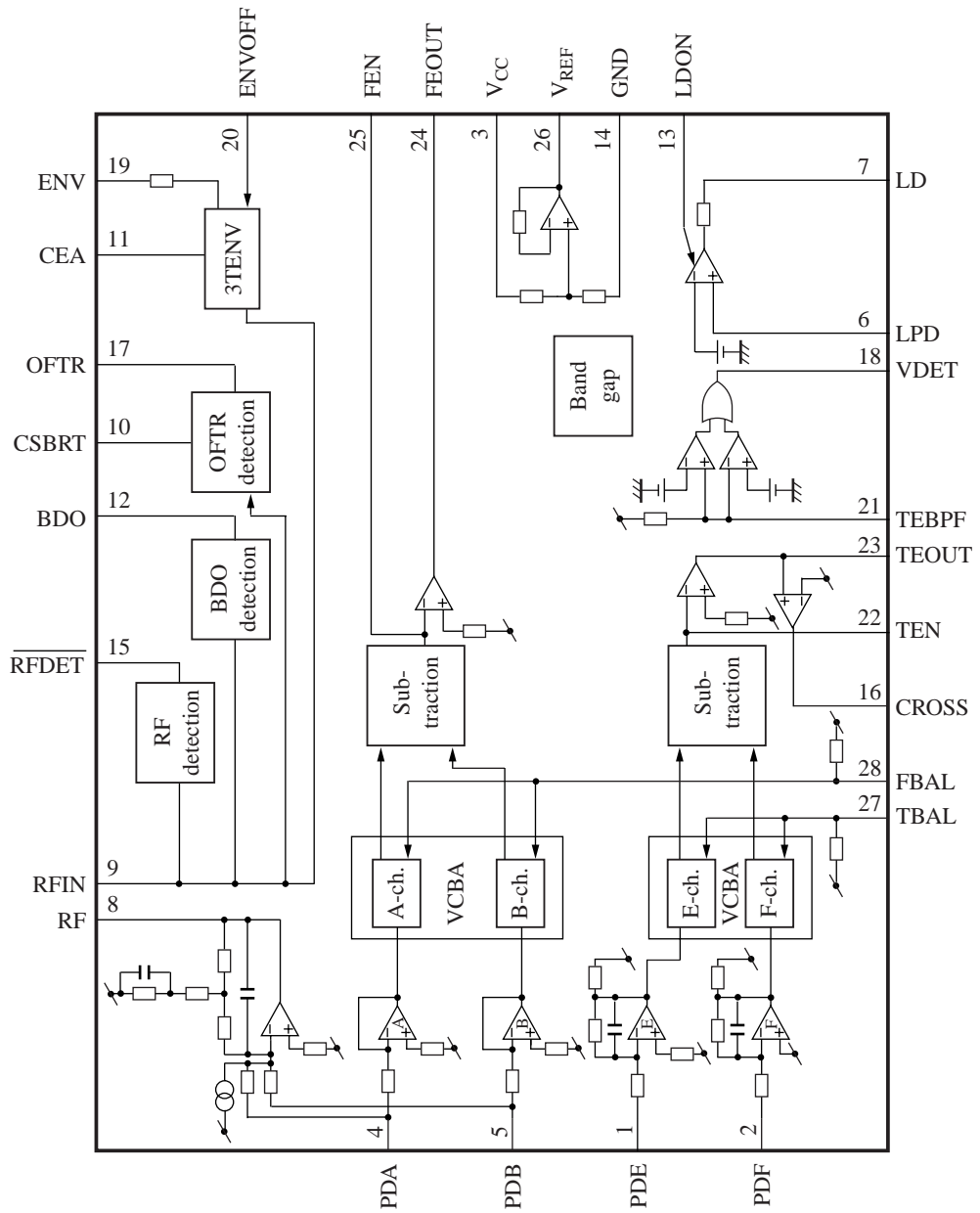
■ Features

- Operating supply voltage V_{CC} = 2.7 V to 5.5 V
- Balance adjustment function built-in
  Focus error amp./tracking error amp.
- OFTR/BDO detection
- CROSS detection and vibration detection
- APC amp.

■ Applications

- CD player

Unit: mm

SSOP028-P-0375
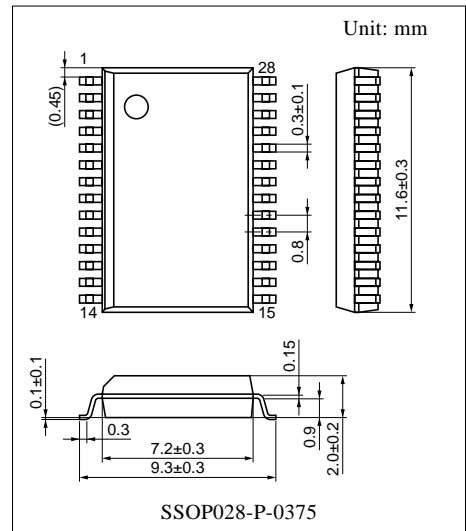
■ Block Diagram

■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Tracking signal input pin 1	15	NRFDET output pin
2	Tracking signal input pin 2	16	CROSS output pin
3	Power supply pin	17	OFTR output pin
4	Focus signal input pin 1	18	VDET output pin
5	Focus signal input pin 2	19	3TENV output pin
6	APC amp. input pin	20	ENV control pin
7	APC amp. output pin	21	VDET input pin
8	RF adding output pin	22	TE amp. input pin
9	Input pin for the detection circuits	23	TE amp. output pin
10	Capacitor connection pin for OFTR	24	FE amp. outtput pin
11	Capacitor connection pin for HPF amp.	25	FE amp. intput pin
12	BDO output pin	26	V_{REF} output pin
13	APC control pin	27	TBAL control pin
14	GND pin	28	FBAL control pin

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	5.8	V
Supply current	I_{CC}	20	mA
Power dissipation	P_D	116	mW
Operating ambient temperature *	T_{opr}	−20 to +75	°C
Storage temperature *	T_{stg}	−55 to +125	°C

Note) ∗: Except for the operating ambient temperature and storage temperature, all ratings are for $T_a = 25°C$.

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V_{CC}	2.7 to 5.5	V

■ Electrical Characteristics at $T_a = 25°C$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Current consumption with no load	I_{TOT}	$V_{CC} = 3$ V	3.8	5.8	7.8	mA
V_{REF} output pin	V_{REF}	$V_{CC} = 3$ V	1.37	1.50	1.63	V
Focus error amplification						
Focus error amp. output offset voltage	V_{FO-OF}	$V_{CC} = 3$ V	−100	0	100	mV
Focus error offset balance crosstalk amount	V_{FO-OFB}	$V_{CC} = 3$ V $V_{FB} = V_{REF} \pm 0.375$V	−120	0	120	mV
Focus error amp. V-V conversion gain	G_{FO1}	$V_{CC} = 3$ V $V_{FB} = V_{REF}$	9.6	12.2	14.7	dB
Focus error amp. V-V conversion relative gain	ΔG_{FO2}	$V_{CC} = 3$ V $V_{FB} = V_{REF}$	−1.5	0	1.5	dB
Focus balance variable range 1−H	B_{FO1-H}	$V_{CC} = 3$ V $V_{FB} = V_{REF} +0.375$V	1.21	1.31	1.41	——
Focus balance variable range 1−L	B_{FO1-L}	$V_{CC} = 3$ V $V_{FB} = V_{REF} - 0.375$V	0.48	0.69	0.9	——
Focus balance variable range 2−H	B_{FO2-H}	$V_{CC} = 3$ V $V_{FB} = V_{REF} +0.375$V	0.48	0.69	0.9	——
Focus balance variable range 2−L	B_{FO2-L}	$V_{CC} = 3$ V $V_{FB} = V_{REF} - 0.375$V	1.21	1.31	1.41	——
Focus error amp. frequency characteristics	G_{FOF}	$V_{CC} = 3$ V f = 3 kHz, 50 kHz	−4.7	−3.2	−1.7	dB
Tracking error amplification						
Tracking error amp. output offset voltage	V_{TR-OF}	$V_{CC} = 3$ V	−97	0	97	mV
Tracking error offset balance crosstalk amount	V_{TR-OFB}	$V_{CC} = 3$ V $V_{TB} = V_{REF} \pm 0.375$V	−120	0	120	mV
Tracking error amp. I−V conversion gain	R_{TR1}	$V_{CC} = 3$ V $V_{TB} = V_{REF}$	570	740	910	kΩ
Tracking error amp. I−V conversion relative gain	ΔR_{TR2}	$V_{CC} = 3$ V $V_{TB} = V_{REF}$	−18	0	18	%
Tracking balance variable range 1−H	B_{TR1-H}	$V_{CC} = 3$ V $V_{TB} = V_{REF} +0.375$V	0.47	0.68	0.89	——
Tracking balance variable range 1−L	B_{TR1-L}	$V_{CC} = 3$ V $V_{TB} = V_{REF} - 0.375$V	1.22	1.33	1.44	——
Tracking balance variable range 2−H	B_{TR2-H}	$V_{CC} = 3$ V $V_{TB} = V_{REF} +0.375$V	1.22	1.33	1.44	——
Tracking balance variable range 2−L	B_{TR2-L}	$V_{CC} = 3$ V $V_{TB} = V_{REF} - 0.375$V	0.47	0.68	0.89	——
Tracking error amp. frequency characteristics	G_{TR1}	$V_{CC} = 3$ V f = 5 kHz, 100 kHz	−5.0	−3.5	−2.0	dB
TEMUTE operation	V_{23M}	$V_{CC} = 3$ V	−75	0	75	mV

■ Electrical Characteristics at $T_a = 25°C$ (continude)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
CROSS detection						
CROSS high-level output	V_{CR-H}	$V_{CC} = 3$ V, $V_{TB} = V_{REF}$, f = 10 kHz	2.6	—	—	V
CROSS low-level output	V_{CR-L}	$V_{CC} = 3$ V, $V_{TB} = V_{REF}$, f = 10 kHz	—	—	0.4	V
CROSS comparator hysteresis 1	ΔV_{HiS1}	$V_{CC} = 3$ V	35	50	65	mV
CROSS comparator hysteresis 2	ΔV_{HiS2}	$V_{CC} = 3$ V	−57	−42	−27	mV
RF amplification						
RF amp. offset voltage	V_{RF-OF}	$V_{CC} = 3$ V	−910	−710	−510	mV
RF amp. transfer gain	G_{RF}	$V_{CC} = 3$ V	7.7	9.3	10.9	dB
RF amp. relative transfer gain	ΔG_{RF}	$V_{CC} = 3$ V	− 0.8	0	0.8	dB
RF amp. frequency characteristics *	G_{RFF}	$V_{CC} = 3$ V f = 500 kHz, 3 MHz	−3.7	−1.5	0.7	dB
RF amp. relative frequency characteristics *	ΔG_{RFF}	$V_{CC} = 3$ V f = 500 kHz, 3 MHz	−1.0	0	1.0	dB
RF amp. EQ characteristics 1 *	G_{EQ1}	$V_{CC} = 3$ V f = 500 kHz, 1.5 MHz	0.5	1.7	3.6	dB
RF amp. EQ characteristics 2 *	G_{EQ2}	$V_{CC} = 3$ V f = 100 kHz, 500 kHz	−3.5	−2.0	− 0.5	dB
RF detection						
RFDET detection operation	V_{NRF}	$V_{CC} = 3$ V, f = 500 kHz	88	132	176	mV[p-p]
RFDET high-level	V_{NRF-H}	$V_{CC} = 3$ V, f = 500 kHz	2.6	—	—	V
RFDET low-level	V_{NRF-L}	$V_{CC} = 3$ V, f = 500 kHz	—	—	0.4	V
BDO						
BDO detection level	V_{BDO}	$V_{CC} = 3$ V	−70	−44	−18	mV
BDO high-level	V_{BDO-H}	f = 5 kHz, 170 mV[p-p], $V_{CC} = 3$ V	2.6	—	—	V
BDO low-level	V_{BDO-L}	f = 5 kHz, 170 mV[p-p], $V_{CC} = 3$ V	—	—	0.4	V
OFTR						
OFTR detection current	G_{FAGC1}	$V_{CC} = 3$ V	1.03	1.45	1.87	μA
OFTR high-level	V_{OFT-H}	$V_{CC} = 3$ V, f = 5 kHz, 700 mV[p-p]	2.6	—	—	V
OFTR low-level	V_{OFT-L}	$V_{CC} = 3$ V, f = 5 kHz, 700 mV[p-p]	—	—	0.4	V
LD APC						
APC operating voltage	V_{APC}	$V_{CC} = 3$ V	147	170	193	mV

Note) ∗: The values mentioned above are subject to change according to the state of a printed circuit board, a socket, etc.

■ Electrical Characteristics at $T_a = 25°C$ (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
VDET						
VDET detection level 1	V_{DET1}	$V_{CC} = 3$ V	38	51	64	mV
VDET detection level 2	V_{DET2}	$V_{CC} = 3$ V	−64	−51	−38	mV
VDET high-level	V_{DET-H}	$V_{CC} = 3$ V	2.6	—	—	V
VDET low-level	V_{DET-L}	$V_{CC} = 3$ V	—	—	0.4	V
TEBPF input impedance	Z_{TEB}	$V_{CC} = 3$ V	140	200	260	kΩ
3TENV						
ENV amp. offset voltage	V_{ENV-OF}	$V_{CC} = 3$ V	−75	0	75	mV
CEA-ENV transfer characteristics	G_{CENV}	$V_{CC} = 3$ V	6	7.6	9.2	times
CEA input impedance	Z_{CEA}	$V_{CC} = 3$ V	6.8	8.7	10.6	kΩ
ENV output impedance	Z_{ENV}	$V_{CC} = 3$ V	6.2	8.0	9.8	kΩ
ENV amp. operation	V_{OP-ENV}	$V_{CC} = 3$ V, f = 800 kHz AM modulation	70	110	150	mV[p-p]
ENV amp. no-operation	$V_{ENV-OFF}$	$V_{CC} = 3$ V, f = 800 kHz AM modulation	−15	0	15	mV[p-p]
RF amplification						
RF-amp. output impedance	Z_{RFOS}	$V_{CC} = 3$ V	—	—	29	Ω

■ Application Circuit Example