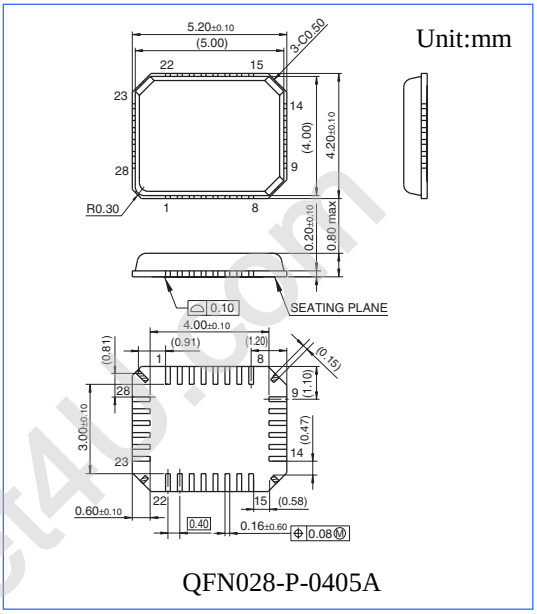
Panasonic

Low-power-consumption IC with built-in low-noise LNA.

RF-IC for GPS Receivers AN18400A

■ Product Outline

AN18400A is an IC that integrates LNA, Mix, VCO and PLL circuits necessary for GPS reception. With built-in LNA/VCO, this IC results in much smaller GPS modules and reduces the number of externally connected components. Also, due to its low power consumption, the AN18400A is suitable for cell phones and PDAs.



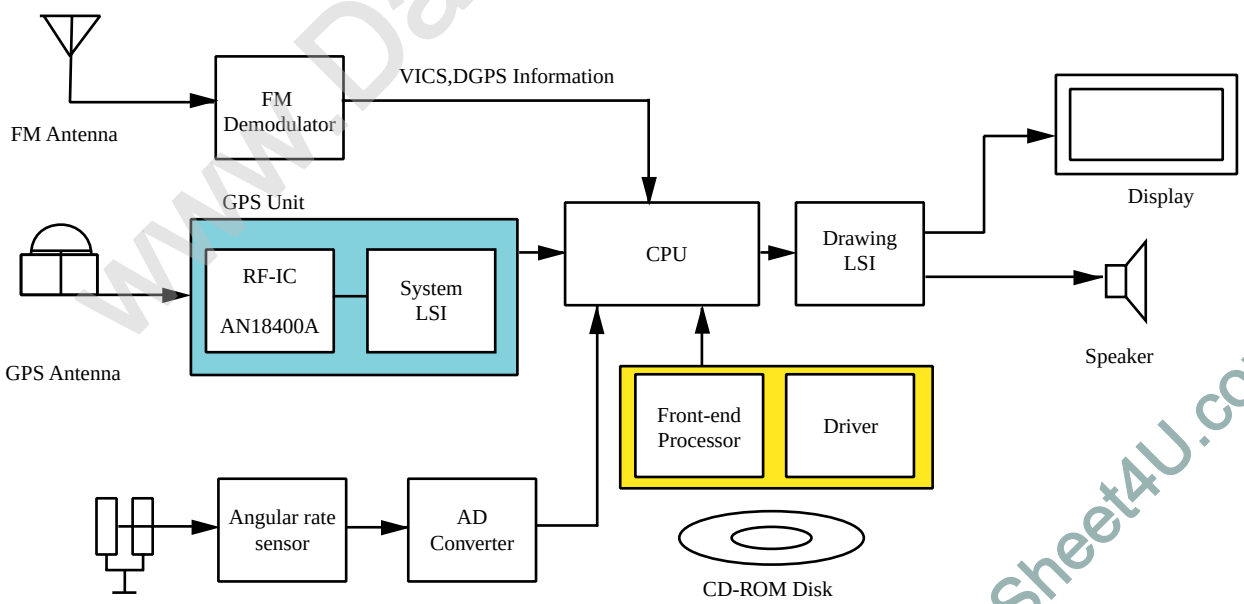
■ Features

- Built-in low-noise (NF = 1.6dB) LNA
- Low current draw: 24 mA
- Ultracompact package
- Built-in antenna connection detection circuit

■ Applications

- GPS for car navigation systems, cell phones and PDAs

■ Application (Car Navigation System)



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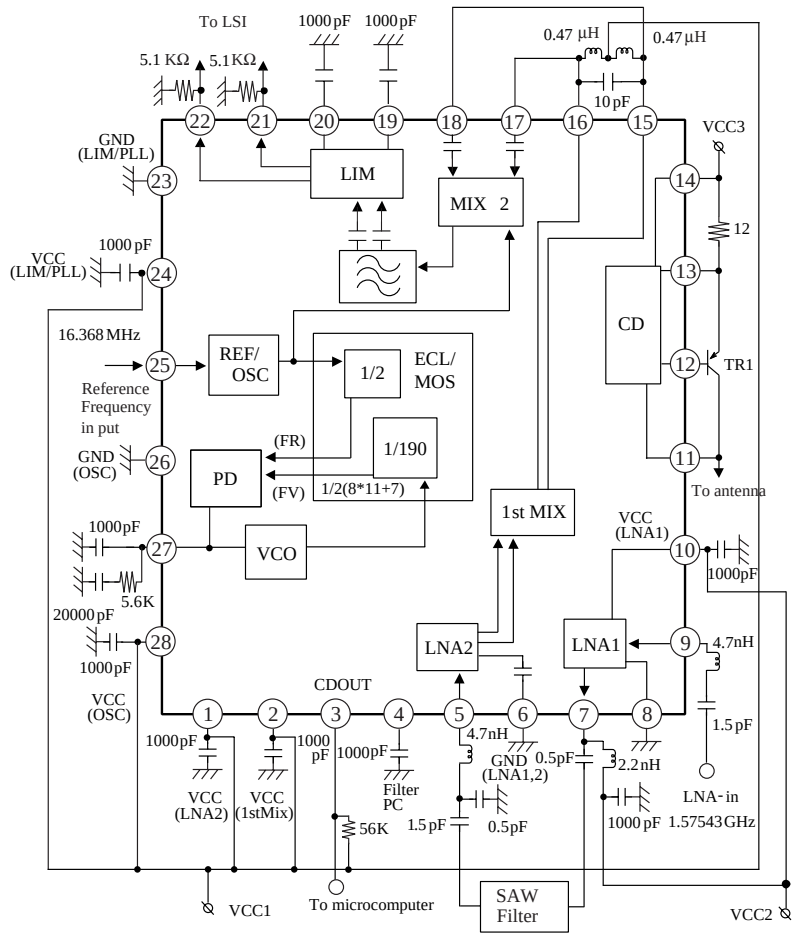
E00124AE

New publication, effective from May.28 2002.

■ Block Diagram



■ Pin Description

Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	VCC1	VCC(LNA2)	15	1st Mix1	1st Mix Output terminal 1
2	VCC2	VCC(1stMix)	16	1st Mix2	1st Mix Output terminal 2
3	CDout	CD output terminal	17	2nd Mix1	2nd Mix Output terminal 1
4	Filter_PC	Filter PC terminal	18	2nd Mix2	2nd Mix Output terminal 2
5	LNA2	LNA2 Input terminal	19	Limpc1	Limitting amp. bypass condenser 1
6	GND1	GND(LNA1,2)	20	Limpc2	Limitting amp. bypass condenser 2
7	LNA1_OUT	LNA1 Output terminal	21	Limout1	Limitting amp. Output terminal 1
8	GND2	LNA1 Input terminal	22	Limout2	Limitting amp. Output terminal 2
9	LNA1_IN	LNA1 Input terminal	23	GND3	GND(LIM/PLL)
10	VCC3	VCC(LNA1)	24	VCC5	VCC(LIM/PLL)
11	CD1	Antenna/Connector contact terminal	25	RFin	RF Input terminal
12	CD2	Base contact terminal	26	GND4	GND(OSC)
13	CD3	Emitter contact terminal	27	Bt	Bt terminal
14	VCC4	VCC(CD)	28	VCC6	VCC(OSC)

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit	Note
Storage temperature	T_{stg}	-55 to +150	°C	1
Operating ambient temperature	T_{opr}	-40 to +85	°C	1
Supply Voltage	V_{cc}	3.2	V	
Supply current	I_{cc}	120	mA	
Power dissipation	PD	293	mW	2

Note 1) Except for the (power dissipation,) operating ambient temperature and storage temperature, all ratings are for Ta=25°C.

Note 2) Ta=75°C. For the independent IC without a heat sink.

■ Absolute Maximum Ratings

Operating Supply voltage range	V_{cc}	2.7 V to 3.15 V

■ Electric characteristics (unless specially regulated, Operating ambient temperature is 25°C ± 2°C and Supply Voltage is 3V.)

Paramenter	Symbol	Conditions	min	typ	max	Unit
Power Consumption 1	Icc1	No input except NA1/Antenna detection off (11 to 14 pin OPEN)	15	18.5	24	mA
Power Consumption 2	Icc2	Operating current of LNA1 No input	4	5.5	7.5	mA
Power Consumption 3	Icc3	Supply Current of power terminal for antenna detection (Supply voltage Vcc3=5V)	1	2	3	mA
LNA1 gain	LNAG	fRF=1575.42MHz (-40dBm) 50 Ω Terminal measurement	14.5	17.5	20.5	dB
LNA1 maximum output	LNAM	fRF=1575.42MHz (-10dBm) 50 Ω Terminal measurement	-6	-3	–	dBm
Conversion gain1	CG1a	LNA2 + 1stMix fRF=1575.42MHz (-50dBm) 50 Ω Terminal measurement	19	22	25	dB
1stMix maximum output	MIXM	LNA2 + 1stMix fRF=1575.42MHz (-30dBm) 50 Ω Terminal measurement	-22	-19	–	dBm
Conversion gain2	CG2Ha	2ndMix + 4MHzBPF + Lim fIF1=20.46MHz (-80dBm) High impedance measurement	56	66	–	dB
Limiter amplifier output voltage	VLIMa	2ndMix + 4MHzBPF + Lim fIF1=20.46MHz (-80dBm) High impedance measurement	0.9	1.55	2.1	V
Limiter amplifier peak voltage	FILAP	2ndMix + 4MHzBPF + Lim fIF1=20.46MHz (-80dBm) High impedance measurement	0.3	0.6	–	Vpp
Current detector circuit (H)	VCDH	VCC3=5V From 11PIN, DC=0 to 1mA Or, more than DC=75mA	2.7	–	–	V
Current detector circuit (H)	VCDL	VCC3=5V From 11PIN, DC=10 to 40mA	–	–	0.7	V

■ Electric characteristics (unless specially regulated, Operating ambient temperature is 25°C ± 2°C and Supply Voltage is 3V.)

Paramenter	Symbol	Conditions	min	typ	max	Unit
LNA1Noise figure	LNANF	fRF=1575.42MHz 50 Ω Terminal measurement	–	1.6	–	dB
LNA1_OIP3	LNAIP	fRF1=1573.42MHz fRF2=1577.42MHz 50 Ω Terminal measurement	0	–	–	dBm
Conversion gain1b	CG1b	LNA2 + 1stMix fRF=1575.42MHz (-50dBm) high impedance measurement	40	43	46	dB
1st Mix maximum output b	MIXMb	LNA2 + 1stMix fRF=1575.42MHz (-30dBm) high impedance measurement	-3	3	–	dBm
Mix1 Noise figure	MINF	LNA2 + 1stMix fRF=1575.42MHz 50 Ω Terminal measurement	–	7	–	dB
Mix1_OIP3	MIIP	fRF1=1574.42MHz fRF2=1576.42MHz 50 Ω Terminal measurement	–	-12.5	–	dBm
Conversion gain2	CG2Hb	2ndMix + 4MHzBPF + Lim fIF1=20.46MHz (-80dBm) 50 Ω Terminal measurement	–	43	–	dB
Charging pump, Hi Current	I27H		–	350	–	μ A
Charging pump, Low Current	I27L		–	350	–	μ A
Charging pump, Leakage current	I27LE		-0.1	–	0.1	μ A
Reference Input Level	Rref	fREF=16.368MHz	-20	-10	0	dBm
4MHzBPF_Q1	4BPFQ1	Gain margin between fIF1=25.46MHz and 20.46MHz High impedance measurement	-8	-5	-2	dB
4MHzBPF_Q2	4BPFQ2	Gain margin between fIF1=18.46MHz and 20.46MHz High impedance measurement	-8	-5	-2	dB

Note) The Characteristics listed above are reference values based on the IC design and are not guaranteed.

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