DATA SHEET

Part No.	AN26112A
Package Code No.	ULGA006-F-1517

Contents

AN26112A

VHF/UHF amplifier IC with Path Through mode for TV Applications

■ Overview

- AN26112A is a VHF/UHF amplifier IC (40 MHz to 900 MHz)
- Realizing high performance by using 0.30 µm Bi-CMOS process (fT = 20 GHz, fmax = 20 GHz).
- Achieving miniaturization by using small size package.

■ Features

- With Path Through mode
- Operation voltage +3.30 V typ.
- Current consumption 68 mA typ.

•Gain	High Gain	12.5 dB typ.	fRX = 450 MHz, Z_0 = 50 Ω
	Path Through	–2.0 dB typ.	fRX = 450 MHz, Z_0 = 50 Ω
•Noise figure	High Gain	3.0 dB typ.	fRX = 450 MHz, Z_0 = 50 Ω
•Distortion (IIP3)	High Gain	12.0 dBm typ.	fRX = 450 MHz, Z_0 = 50 Ω

- Small package (6 pin Plastic Package with heat sink).

■ Applications

- VHF /UHF Applications

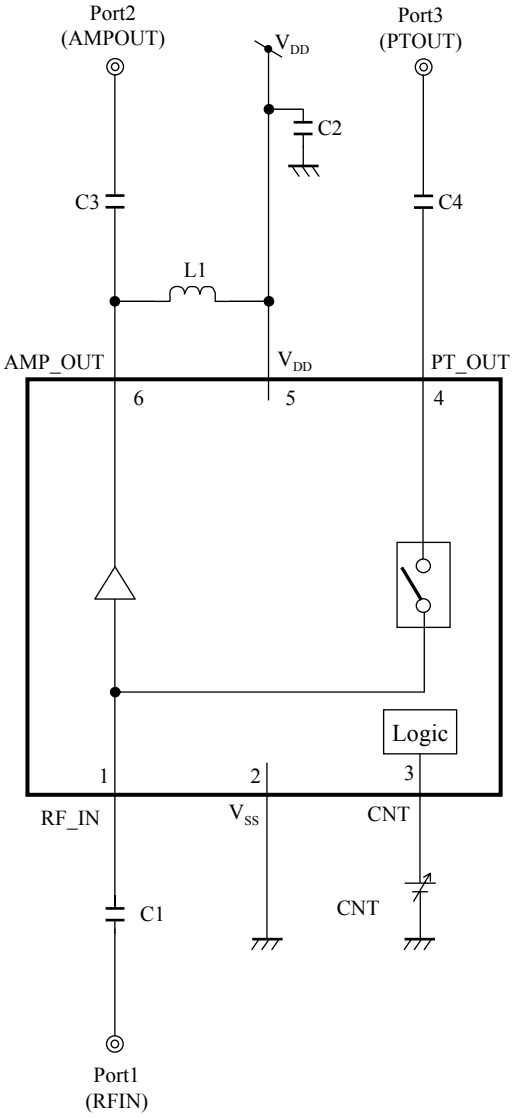
■ Package

- 6 pin Fine Pitch Land Grid Array Package (LGA Type)
  Size : 1.52 mm × 1.72 mm × 0.40 mm

■ Type

- Bi–CMOS IC

■ Application Circuit Example (Block Diagram)



Notes) • This application circuit is an example. The operation of mass production set is not guaranteed. Perform enough evaluation and verification on the design of mass production set.

• This block diagram is for explaining functions. The part of the block diagram may be omitted, or it may be simplified.

■ Pin Descriptions

Pin No.	Pin name	Type	Description
1	RF_IN	Input	RF input
2	V_{SS}	Ground	V_{SS}
3	CNT	Input	High Gain / Path Through mode control
4	PT_OUT	Output	AMP RF output
5	V_{DD}	Power supply	V_{DD}
6	AMP_OUT	Output	Path Through output

■ Absolute Maximum Ratings

Note) Absolute maximum ratings are limit values which do not result in damages to this IC, and IC operation is not guaranteed at these limit values.

A No.	Parameter	Symbol	Rating	Unit	Notes
1	Supply voltage	V_{DD}	3.6	V	*1
2	Supply current	I_{DD}	95	mA	—
3	Power dissipation	P_D	83	mW	*2
4	Operating ambient temperature	T_{opr}	–20 to +80	°C	*3
5	Storage temperature	T_{stg}	–40 to +150	°C	*3

Notes) *1 : The values under the condition not exceeding the above absolute maximum ratings and the power dissipation.

*2 : The power dissipation shown is the value at T_a = 80°C for the independent (unmounted) IC package without a heat sink. When using this IC, refer to • P_D-T_a diagram in the ■ Technical Data standard and design the heat radiation with sufficient margin so that the allowable value might not be exceeded based on the conditions of power supply voltage, load, and ambient temperature.

*3 : Except for the power dissipation, operating ambient temperature, and storage temperature, all ratings are for T_a = 25°C.

■ Operating Supply Voltage Range

Parameter	Symbol	Range	Unit	Notes
Supply voltage range	V_{DD}	3.13 to 3.47	V	*1

Note) *1 : The values under the condition not exceeding the above absolute maximum ratings and the power dissipation.

■ Allowable Voltage Range

Notes)
- Allowable current and voltage ranges are limit ranges which do not result in damages to this IC, and IC operation is not guaranteed within these limit ranges.
- Do not apply voltage to N.C. pins.
- Voltage values are with respect to the GND.
- Applying external voltage to any pin not mentioned below leads to the malfunction and the damage of the device.
- Below ratings are specified for prevention of malfunction and stress, not for guaranteed operation.

Pin No.	Pin name	Rating	Unit	Notes
1	RF_IN	—	V	*1
3	CNT	–0.3 to (V_{DD} + 0.3)	V	*3
4	PT_OUT	–0.3 to (V_{DD} + 0.3)	V	*2,3
6	AMP_OUT	–0.3 to (V_{DD} + 0.3)	V	*2,3

Notes) *1 : RF signal input pin (Maximum input power is TBD). Do not apply DC current.
*2 : RF signal output pin.
*3 : V_{DD} + 0.3 V must not be exceeded 3.6 V.

■ Electrical Characteristics at V_{DD} = 3.30 V

Note) T_a = 25°C±2°C unless otherwise specified.

B No.	Parameter	Symbol	Conditions	Limits			Unit	Notes
				Min	Typ	Max		
DC Electrical Characteristics								
DC-1	Supply current HG	$I_{DD}H$	V_{DD} current at High-gain mode No input signal	—	68	85	mA	—
DC-2	Supply current PT	$I_{DD}P$	V_{DD} current at Path Through mode No input signal	—	0.2	60	µA	—
DC-3	SW voltage (High-gain mode)	VIH	VIH = V_{DD} × 0.85	2.81	3.30	—	V	—
DC-4	SW voltage (Path Through mode)	VIL	VIH = V_{DD} × 0.10	—	0.0	0.33	V	—
DC-5	SW current (High)	IIH	Current at CNT pin VIH = V_{DD}	—	3.3	10	µA	—

■ Electrical Characteristics (continued) at V_{DD} = 3.30 V

Note) T_a = 25°C±2°C, fRX = 450 MHz, PRX = –15 dBm, Z_0 = 50 Ω, CW unless otherwise specified.

B No.	Parameter	Symbol	Conditions	Limits			Unit	Notes
				Min	Typ	Max		
AC Electrical Characteristics								
A-1	Power Gain High Gain	GHS	Power Gain at High Gain mode f = fRX	10.5	12.5	14.5	dB	—
A-2	Power Gain Path Through	GPS	Power Gain at Path Through mode f = fRX	–3.0	–2.0	–0.8	dB	—
A-3	IIP3 ±10 MHz offset High Gain	IIP3HS	IIP3 at High Gain mode f1 = 450 MHz f2 = 460 MHz Input 2 signals (f1, f2)	9.0	12.0	—	dBm	—

■ Control Pin Mode Table

Note) Control voltage range : See B No. DC-3 / B No. DC-4 at page 8

Pin No.	Description	Pin voltage		Remarks
		Low	High	
3	High-gain/Path Through switching (Gain control)	Path Through	High-gain	—

■ Truth Table

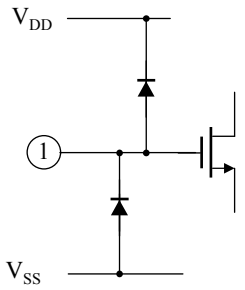
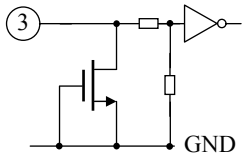
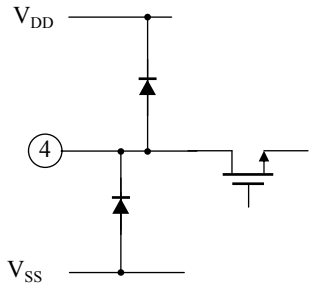
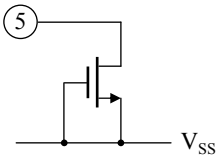
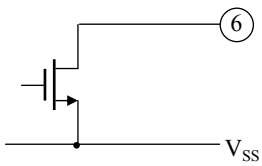
Note) Control voltage range : See B No. DC-3 / B No. DC-4 at page 8

CNT	LNA	Mode
High	High-gain	High-gain
Low	Path Through	Path Through

■ Technical Data

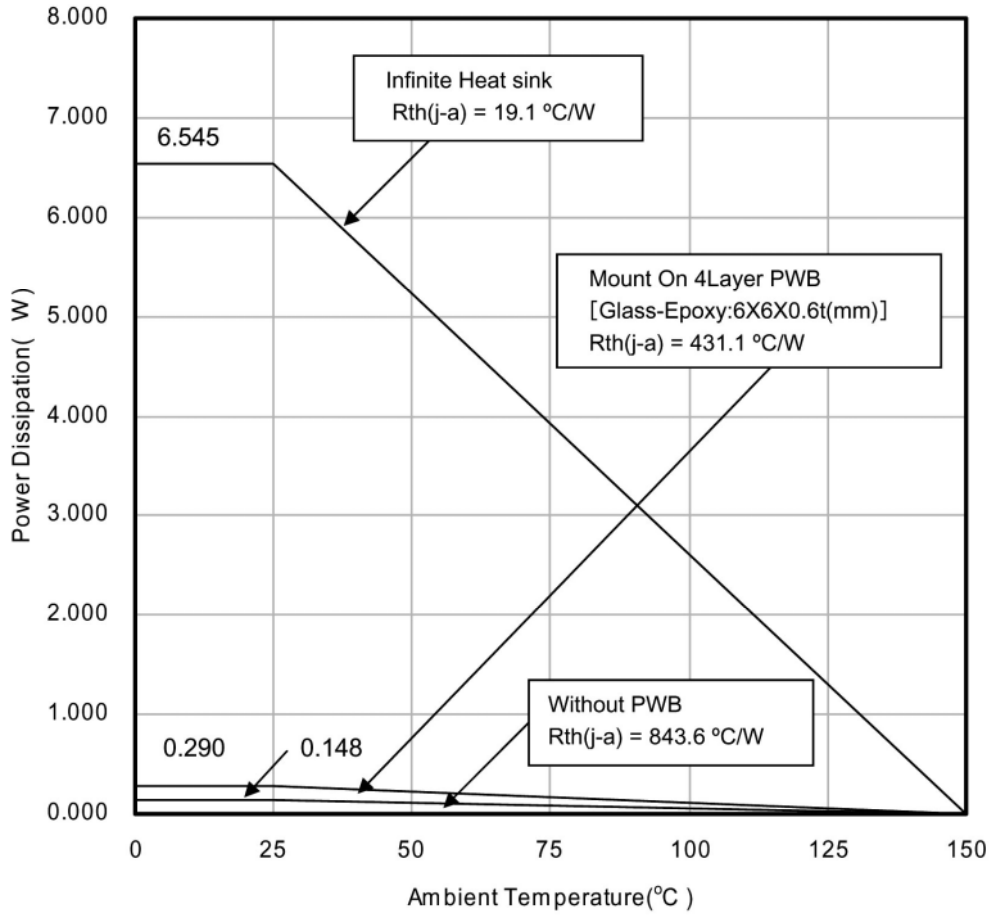
- I/O block circuit diagrams and pin function descriptions

Note) The characteristics listed below are reference values derived from the design of the IC and are not guaranteed.

Pin No.	Voltage	Internal Circuit	Descriptions
1	0.75 V		RF input
2	0.0 V	—	GND
3	—		High Gain / Path Through mode control
4	0.0 V		Path Through output
5	3.3 V		Power supply
6	—		AMP output

■ Technical Data

• P_D — T_a diagram



■ Usage Notes

• Special attention and precaution in using

1. This IC is intended to be used for general electronic equipment [TV].
   Consult our sales staff in advance for information on the following applications:
   - Special applications in which exceptional quality and reliability are required, or if the failure or malfunction of this IC may directly jeopardize life or harm the human body.
   - Any applications other than the standard applications intended.
     (1) Space appliance (such as artificial satellite, and rocket)
     (2) Traffic control equipment (such as for automobile, airplane, train, and ship)
     (3) Medical equipment for life support
     (4) Submarine transponder
     (5) Control equipment for power plant
     (6) Disaster prevention and security device
     (7) Weapon
     (8) Others : Applications of which reliability equivalent to (1) to (7) is required

   It is to be understood that our company shall not be held responsible for any damage incurred as a result of or in connection with your using the IC described in this book for any special application, unless our company agrees to your using the IC in this book for any special application.

2. Pay attention to the direction of LSI. When mounting it in the wrong direction onto the PCB (printed-circuit-board), it might smoke or ignite.

3. Pay attention in the PCB (printed-circuit-board) pattern layout in order to prevent damage due to short circuit between pins. In addition, refer to the Pin Description for the pin configuration.

4. Perform a visual inspection on the PCB before applying power, otherwise damage might happen due to problems such as a solder-bridge between the pins of the semiconductor device. Also, perform a full technical verification on the assembly quality, because the same damage possibly can happen due to conductive substances, such as solder ball, that adhere to the LSI during transportation.

5. Take notice in the use of this product that it might break or occasionally smoke when an abnormal state occurs such as output pin-V_{CC} short (Power supply fault), output pin-GND short (Ground fault), or output-to-output-pin short (load short) .
   And, safety measures such as an installation of fuses are recommended because the extent of the above-mentioned damage and smoke emission will depend on the current capability of the power supply.

6. When designing your equipment, comply with the range of absolute maximum rating and the guaranteed operating conditions (operating power supply voltage and operating environment etc.). Especially, please be careful not to exceed the range of absolute maximum rating on the transient state, such as power-on, power-off and mode-switching. Otherwise, we will not be liable for any defect which may arise later in your equipment.
   Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.

7. When using the LSI for new models, verify the safety including the long-term reliability for each product.

8. When the application system is designed by using this LSI, be sure to confirm notes in this book.
   Be sure to read the notes to descriptions and the usage notes in the book.

Request for your special attention and precautions in using the technical information and semiconductors described in this book

(1) If any of the products or technical information described in this book is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially, those with regard to security export control, must be observed.

(2) The technical information described in this book is intended only to show the main characteristics and application circuit examples of the products. No license is granted in and to any intellectual property right or other right owned by Panasonic Corporation or any other company. Therefore, no responsibility is assumed by our company as to the infringement upon any such right owned by any other company which may arise as a result of the use of technical information described in this book.

(3) The products described in this book are intended to be used for general applications (such as office equipment, communications equipment, measuring instruments and household appliances), or for specific applications as expressly stated in this book.
Consult our sales staff in advance for information on the following applications:
- Special applications (such as for airplanes, aerospace, automotive equipment, traffic signaling equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.

It is to be understood that our company shall not be held responsible for any damage incurred as a result of or in connection with your using the products described in this book for any special application, unless our company agrees to your using the products in this book for any special application.

(4) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.

(5) When designing your equipment, comply with the range of absolute maximum rating and the guaranteed operating conditions (operating power supply voltage and operating environment etc.). Especially, please be careful not to exceed the range of absolute maximum rating on the transient state, such as power-on, power-off and mode-switching. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.

(6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.

20100202