

DATA SHEET

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

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

- AN26112A is a VHF/UHF amplifier IC (40 MHz to 900 MHz)
- Realizing high performance by using 0.30 μm Bi-CMOS process ($f_T = 20 \text{ GHz}$, $f_{\text{max}} = 20 \text{ GHz}$).
- Achieving miniaturization by using small size package.

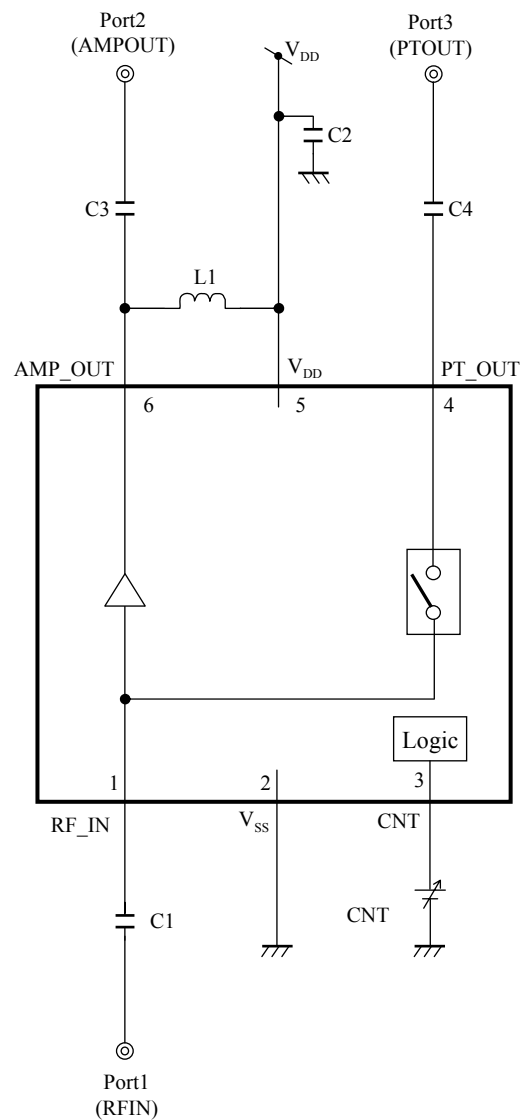
• With Path Through mode			
• Operation voltage		+3.30 V typ.	
• Current consumption		68 mA typ.	
• Gain	High Gain	12.5 dB typ.	f _{RX} = 450 MHz, Z ₀ = 50 Ω
	Path Through	−2.0 dB typ.	f _{RX} = 450 MHz, Z ₀ = 50 Ω
• Noise figure	High Gain	3.0 dB typ.	f _{RX} = 450 MHz, Z ₀ = 50 Ω
• Distortion (IIP3)	High Gain	12.0 dBm typ.	f _{RX} = 450 MHz, Z ₀ = 50 Ω
• Small package (6 pin Plastic Package with heat sink).			

- VHF /UHF Applications

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

- 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 $T_a = 80^\circ\text{C}$ 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 $T_a = 25^\circ\text{C}$.

■ 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 $V_{DD} = 3.30\text{ V}$

Note) $T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$ unless otherwise specified.

B No.	Parameter	Symbol	Conditions	Limits			Unit	Notes
				Min	Typ	Max		
DC Electrical Characteristics								
DC-1	Supply current HG	I _{DDH}	V _{DD} current at High-gain mode No input signal	—	68	85	mA	—
DC-2	Supply current PT	I _{DDP}	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 $V_{DD} = 3.30\text{ V}$

Note) $T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$, $f_{RX} = 450\text{ MHz}$, $PRX = -15\text{ dBm}$, $Z_0 = 50\ \Omega$, 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

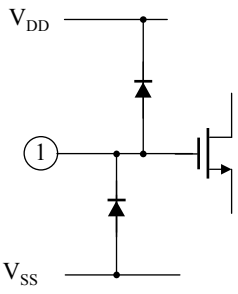
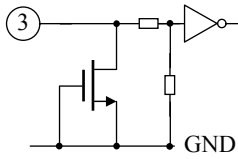
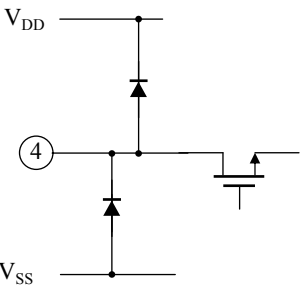
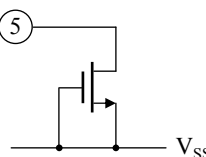
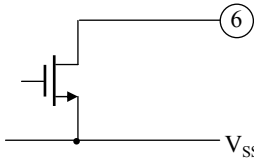
Note) Control voltage range : See B No. DC-3 / B No. DC-4 at page 8

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

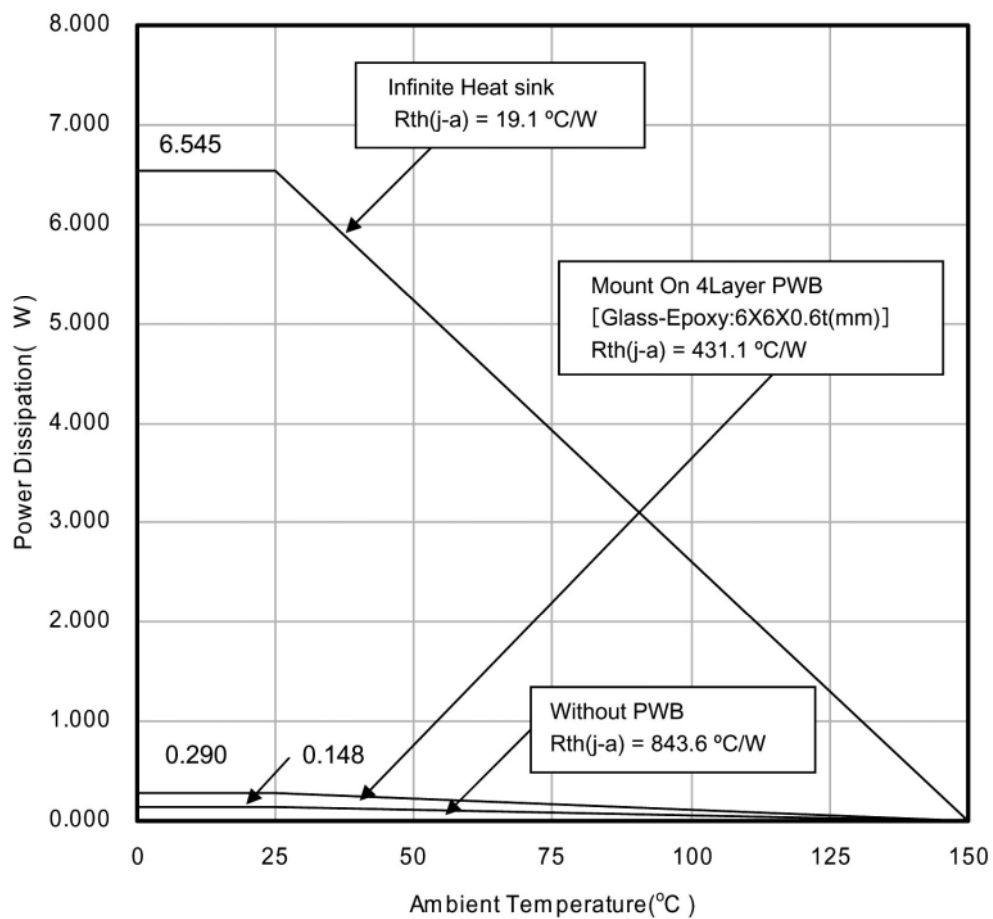
■ Technical Data

- 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
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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.
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