NEC

BiCMOS INTEGRATED CIRCUIT

μPC2807,2807A

PREAMPLIFIER FOR INFRARED REMOTE CONTROLLER

DESCRIPTION

The μPC2807 and 2807A are semiconductors integrated circuit developed as preamplifiers for the receiver module of infrared remote controllers. These preamplifiers can be directly connected to a PIN photodiode, and integrate a high-gain first stage amplifier, limiter, bandpass filter, detector circuit, and waveform-shaping circuit on a single chip.

FEATURES

- Only PIN photodiode required as an external component.
- Following carrier frequencies (f_O) selectable (five types):

★ μPC2807 : f_O = 32.7, 36.0, 36.7, 37.9 kHz

★ μPC2807A : f_O = 40.0 kHz

- Fixed trap frequency

★ f_T = 54 kHz

- Active-low output
- Supplied in form of wafer

APPLICATION

- Receiver module of infrared remote controller

ORDERING INFORMATION

Part Number	Condition in shipment
μPC2807W	Wafer
μPC2807AW	Wafer

Contact an NEC sales representative in advance since a memorandum on product quality need to be prepared for shipment in the form of wafer.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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The mark ★ shows major revised points.

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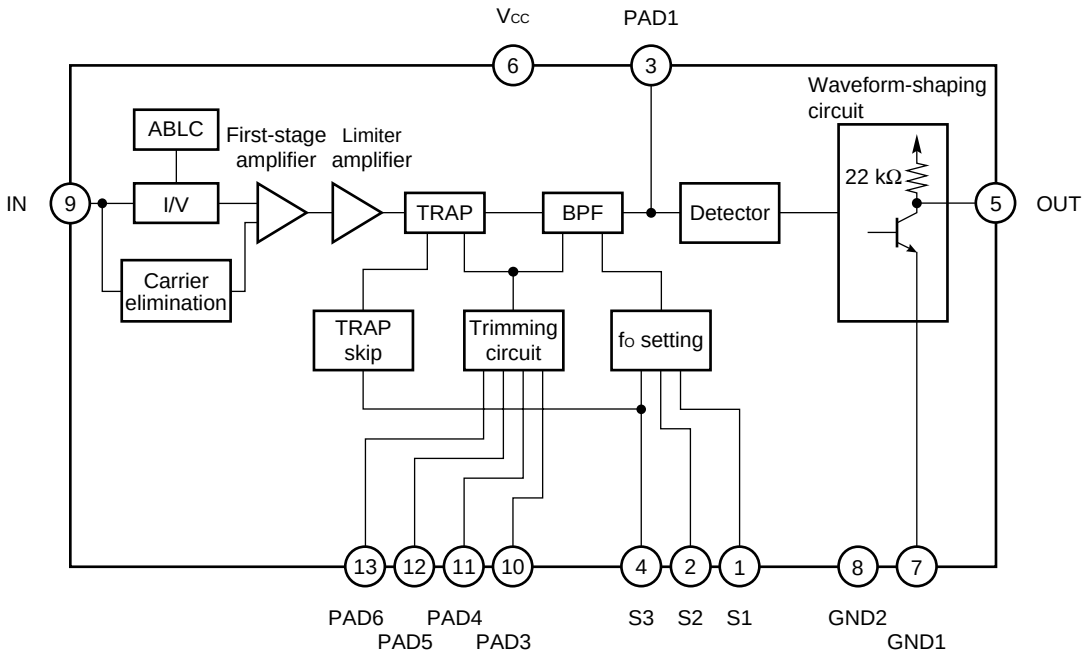
BLOCK DIAGRAM



PAD FUNCTION

Symbol	Pad No.	Function
V_{CC}	6	Power pad. Apply a voltage of 5 V ± 10 %. Connect an external smoothing filter if noise on power line is high.
GND1	7	GND pad (for output transistor)
GND2	8	GND pad (for circuits excluding output transistor)
IN	9	Input pad. Internal impedance is 190 kΩ TYP. PIN photodiode can be directly connected.
OUT	5	Output pad. Open-collector output with pull-up resistor (22 kΩ TYP.) To connect pull-up resistor, use resistor of 10 kΩ or higher.
S1	1	BPF center frequency setting pads. Connect pad corresponding to carrier frequency to be used to GND [Note].
S2	2	
S3	4	
PAD1	3	BPF output pad. Parameters such as voltage gain and BPF bandwidth can be tested. Do not connect this pad to anything on final assembly.
PAD3	10	Test and trimming pads. Do not connect these pads to anything.
PAD4	11	
PAD5	12	
PAD6	13	

Note Connect each of BPF center frequency setting pads as follows depending on the carrier frequency.

• μPC2807

Carrier Frequency	S1	S2	S3
32.7 kHz	GND	Leave unconnected.	Leave unconnected.
36.0 kHz	GND	GND	GND
36.7 kHz	Leave unconnected.	GND	GND
37.9 kHz	Leave unconnected.	Leave unconnected.	Leave unconnected.

★ • μPC2807A

Carrier Frequency	S1	S2	S3
40.0 kHz	Leave unconnected.	Leave unconnected.	Leave unconnected.

ELECTRICAL SPECIFICATIONS

Absolute Maximum Ratings (T_A = +25 ± 3 °C)

Parameter	Symbol	Ratings	Unit
Supply voltage	V_{CC}	5.5	V
Output sink current	I_{OSINK}	2.5	mA
Input voltage	V_{IN}	0 to V_{CC}	V
Storage temperature	T_{stg}	–40 to +125	°C

Caution Product quality may suffer if the absolute maximum rating is exceeded even momentarily for any parameter. That is, the absolute maximum ratings are rated values at which the product is on the verge of suffering physical damage, and therefore the product must be used under conditions that ensure that the absolute maximum ratings are not exceeded.

Recommended Operating Conditions (T_A = 25 ± 3 °C)

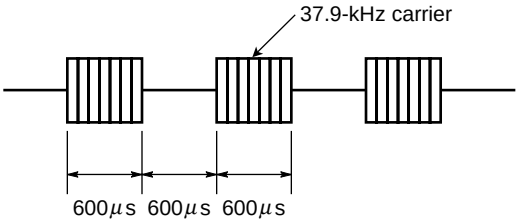
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Supply voltage	V_{CC}		4.5	5.0	5.5	V
Operating ambient temperature	T_A		–25	+25	+80	°C

Electrical Characteristics (T_A = +25 ± 3 °C, V_{CC} = 5 V)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
★	Circuit current	I_{CC}	With no signal applied. S1. S2, and S3: Leave unconnected.	1.1	1.5	1.9	mA
★	Low-level output voltage 1	V_{OL1}	Without external pull-up resistor	–	0.05	0.4	V
★	Low-level output voltage 2	V_{OL2}	With external 10-kΩ pull-up resistor connected	–	0.10	0.5	V
	High-level output voltage	V_{OH}		4.8	5.0	–	V
★	Voltage gain 1 μPC2807	A_{v1}	S1, S2, and S3: Leave unconnected., V_{IN} = 30 dB μV[Note1], f 37.9 kHz	70	80	86	dB
★	Voltage gain 2 μPC2807A	A_{v2}	S1, S2, and S3: Leave unconnected., V_{IN} = 30 dB μV[Note1], f = 40.0 kHz	72	82	88	dB
★	BPF bandwidth	f_{BW}	–3 dB bandwidth. S1, S2, S3: Leave unconnected., V_{IN} = 30 dB μV[Note1]	1.5	3.0	4.5	kHz
	Output pulse width 1	t_{BW1}	S1, S2, and S3: Leave unconnected., V_{IN} = 500 μV_{p-p}, f = 37.9 kHz[Note3], Burst length: 600 μs, Cycle: 1.2 ms[Note2] Average value of output from start of signal input to 60th pulse	400	600	800	μs
	Output pulse width 2	t_{PW2}	S1, S2, and S3: Leave unconnected., V_{IN} = 50 mV_{p-p}, f = 37.9 kHz[Note3], Burst length: 600 μs, Cycle: 1.2 ms[Note2] Average value of output from start of signal input to 60th pulse	400	600	800	μs

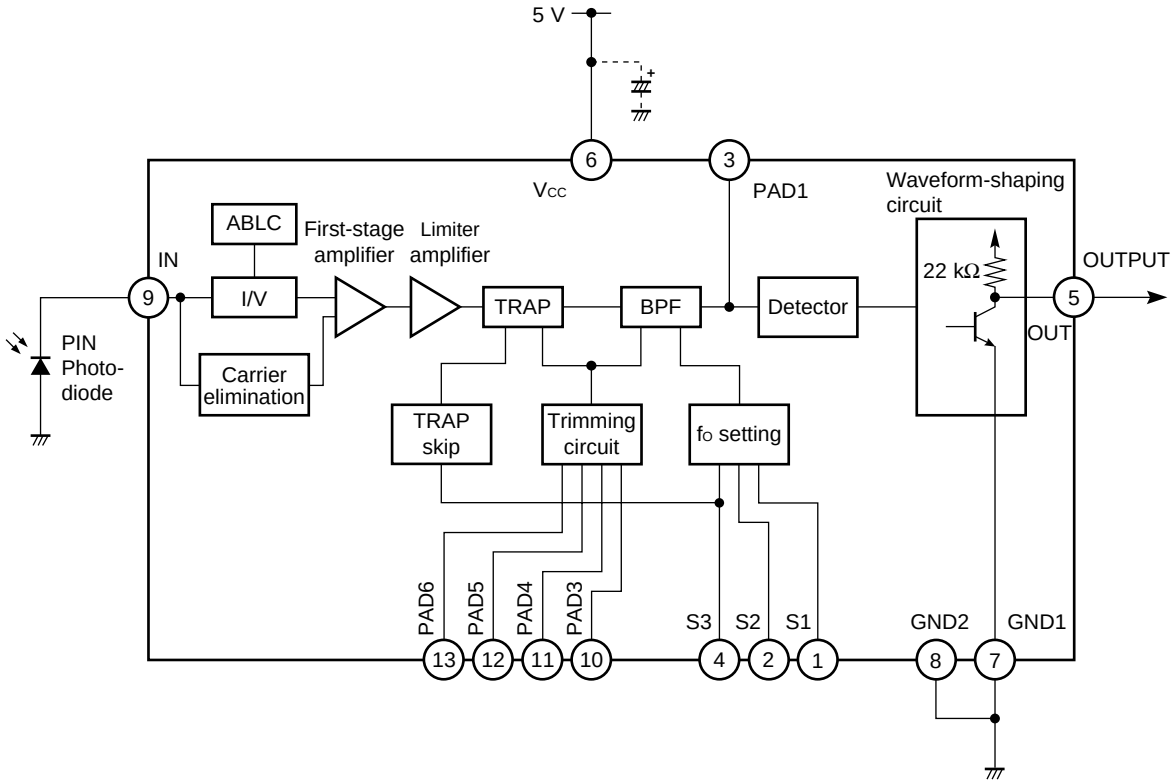
Notes 1. 30 dB μV = 31.6 μV r.m.s.

2. Input the following burst signal.



★ **3.** f = 37.9 kHz for the μPC2807. In the μPC2807A, measurement is at f = 40.0 kHz.

APPLICATION CIRCUIT EXAMPLE (at carrier frequency of 37.9 kHz)



★ **Remark** f = 37.9 kHz for the μPC2807. In the μPC2807A, f = 40.0 kHz.

NOTES FOR BiCMOS DEVICES

① PRECAUTION AGAINST ESD FOR SEMICONDUCTORS

Note:

Strong electric field, when exposed to a device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred. Environmental control must be adequate. When it is dry, humidifier should be used. It is recommended to avoid using insulators that easily build static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work bench and floor should be grounded. The operator should be grounded using wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions need to be taken for PW boards with semiconductor devices on it.

② HANDLING OF UNUSED INPUT PINS

Note:

No connection for device inputs can be cause of malfunction. If no connection is provided to the input pins, it is possible that an internal input level may be generated due to noise, etc., hence causing malfunction. Input levels of devices must be fixed high or low by using a pull-up or pull-down circuitry. Each unused pin should be connected to V_{DD} or GND with a resistor, if it is considered to have a possibility of being an output pin. All handling related to the unused pins must be judged device by device and related specifications governing the devices.

③ STATUS BEFORE INITIALIZATION OF BiCMOS DEVICES

Note:

Power-on does not necessarily define initial status of device. Production process of BiCMOS does not define the initial operation status of the device. Immediately after the power source is turned ON, the devices with reset function have not yet been initialized. Hence, power-on does not guarantee out-pin levels, I/O settings or contents of registers. Device is not initialized until the reset signal is received. Reset operation must be executed immediately after power-on for devices having reset function.

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  (Note)

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