

STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT SERIES FM stereo transmitter IC for audio systems.

TYPE **BH1416F**

FEATURES

- It is possible to attempt to improve a timbre because it has the pre-emphasis circuit, limiter circuit and low-pass filter circuit.
- Built-in the pilot-tone system FM stereo modulator circuit.
- The transmission frequency is stable because it has PLL system FM transmitter circuit.
- PLL controls data input in parallel (4bits , 14ch).

○ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit	Conditions
Supply voltage	V <sub>CC</sub>	+7.0	V	Pin8, 12
Data input voltage	V <sub>IN-D</sub>	-0.3 ~ V <sub>CC</sub> +0.3	V	Pin15, 16, 17, 18
Phase comparator output voltage	V <sub>OUT-P</sub>	-0.3 ~ V <sub>CC</sub> +0.3	V	Pin7
Power dissipation	P <sub>d</sub>	450	mW	(*1)
Storage temperature	T <sub>stg</sub>	-55 ~ +125	°C	

(\*1) To use at a temperature higher than Ta=25°C, derate 4.5mW per 1°C.

Status of this document

The Japanese version of this document is the formal specification. A customer may use this translation version only for a reference to help reading the formal version. If there are any differences in translation version of this document, formal version takes priority.

Application example

The application circuit is recommended for use. Make sure to confirm the adequacy of the characteristics.

When using the circuit with changes to the external circuit constants, make sure to leave an adequate margin for external components including static and transitional characteristics as well as dispersion of the IC.

Note that ROHM cannot provide adequate confirmation of patents.

The product described in this specification is designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys.)

Should you intend to use this product with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

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## ○ Operating Range

Parameter	Symbol	Limits	Unit	Conditions
Operating supply voltage	V <sub>CC</sub>	4.0 ~ 6.0	V	Pin 8, 12
Operating temperature	T <sub>opr</sub>	-40 ~ +85	°C	
Audio input level	V <sub>IN-A</sub>	~ -10	dBV	Pin 1, 22
Audio input frequency band	f <sub>IN-A</sub>	20 ~ 15k	Hz	Pin 1, 22
Pre-emphasis time constant set up range	τ <sub>PRE</sub>	~ 155	μsec	Pin 2, 21
Transmission frequency	f <sub>TX</sub>	76.8 ~ 78.0 (step 0.2) 88.0 ~ 89.2 (step 0.2)	MHz	Pin 9, 11
Control terminal "H" level input voltage	V <sub>IH</sub>	0.8V <sub>CC</sub> ~ V <sub>CC</sub>	V	Pin 15, 16, 17, 18
Control terminal "L" level input voltage	V <sub>IL</sub>	GND ~ 0.2V <sub>CC</sub>	V	Pin 15, 16, 17, 18

## ○ Electrical Characteristics

 Unless otherwise specified Ta=25°C , V<sub>CC</sub>=5.0V

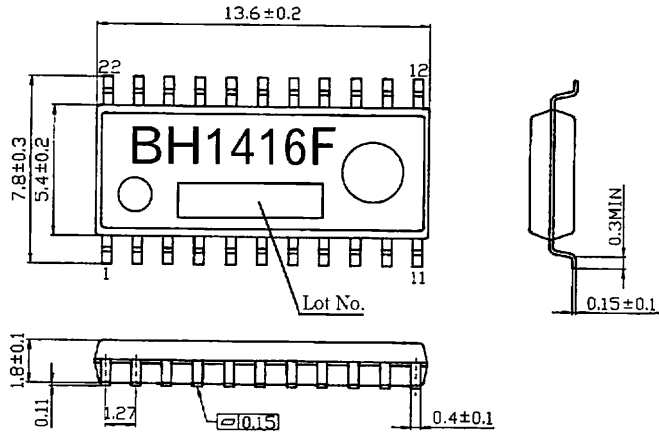
 Signal source : f<sub>IN</sub>=400Hz

Parameter	Symbol	Limits			Unit	Conditions
		Min.	Typ.	Max.		
Quiescent current	I <sub>Q</sub>	14	20	28	mA	
Channel separation	Sep	25	40	—	dB	V <sub>IN</sub> =-20dBV, L→R, R→L
Total harmonic distortion	THD	—	0.1	0.3	%	V <sub>IN</sub> =-20dBV, L+R
Channel balance	C.B	-2	0	+2	dB	V <sub>IN</sub> =-20dBV, L+R
Input output gain	G <sub>V</sub>	-2	0	+2	dB	V <sub>IN</sub> =-20dBV, L+R
Pilot modulation rate	M <sub>P</sub>	12	15	18	%	V <sub>IN</sub> =-20dBV, L+R, Pin5
Sub carrier rejection ratio	SCR	—	-30	-20	dB	V <sub>IN</sub> =-20dBV, L+R
Pre-emphasis time constant	τ <sub>PRE</sub>	40	50	60	μsec	V <sub>IN</sub> =-20dBV, L+R
Limiter input level	V <sub>IN(LIM)</sub>	-16	-13	-10	dBV	Output level at 1dB gain compression
LPF cut off frequency	f <sub>C(LPF)</sub>	12	15	18	kHz	V <sub>O</sub> =-3dB, Pin2, 21 Open
Transmission output level	V <sub>TX</sub>	98	101	104	dB μV	f <sub>TX</sub> =89.2MHz
"H" level input current	I <sub>IH</sub>	—	—	1.0	μA	Pin 15, 16, 17, 18 V <sub>IN</sub> =5V
"L" level input current	I <sub>IL</sub>	-1.0	—	—	μA	Pin 15, 16, 17, 18 V <sub>IN</sub> =0V
"H" level output voltage	V <sub>OH</sub>	V <sub>CC</sub> -1.0	V <sub>CC</sub> -0.15	—	V	Pin 7 I <sub>OUT</sub> =-1.0mA
"L" level output voltage	V <sub>OL</sub>	—	0.15	1.0	V	Pin 7 I <sub>OUT</sub> =1.0mA
"off" level leak current 1	I <sub>OFF1</sub>	—	—	100	nA	Pin 7 V <sub>OUT</sub> =5V
"off" level leak current 2	I <sub>OFF2</sub>	-100	—	—	nA	Pin 7 V <sub>OUT</sub> =GND

◎ This product is not designed for protection against radioactive rays.

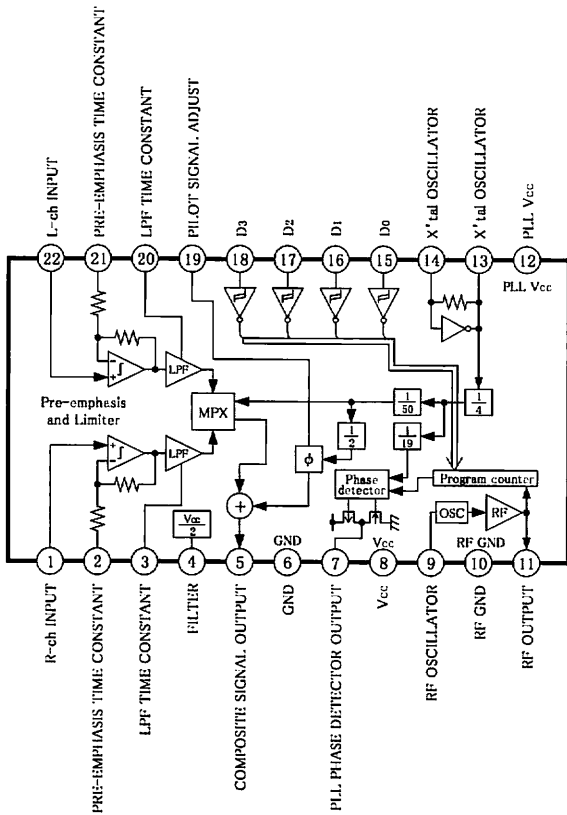
◎ The specification of transmission output level be based on the Radio Law in every country and the area.

○ External Dimension Diagram · Marking Diagram



SOP-22 (Unit : mm)

○ Block Diagram



○ Pin No. · Pin Name

No.	Name	No.	Name
1	R-ch INPUT	12	PLL Vcc
2	PRE-EMPHASIS TIME CONSTANT	13	X'tal OSCILLATOR
3	LPF TIME CONSTANT	14	X'tal OSCILLATOR
4	FILTER	15	D <sub>0</sub>
5	COMPOSITE SIGNAL OUTPUT	16	D <sub>1</sub>
6	GND	17	D <sub>2</sub>
7	PLL PHASE DETECTOR OUTPUT	18	D <sub>3</sub>
8	Vcc	19	PILOT SIGNAL ADJUST
9	RF OSCILLATOR	20	LPF TIME CONSTANT
10	RF GND	21	PRE-EMPHASIS TIME CONSTANT
11	RF OUTPUT	22	L-ch INPUT

○ Cautions On Use

(1) Absolute maximum ratings

If applied voltage, operating temperature range, or other absolute maximum ratings are exceeded, the LSI may be damaged. Do not apply voltages or temperatures that exceed the absolute maximum ratings. If you think of a case in which absolute maximum ratings are exceeded, enforce fuses or other physical safety measures and investigate how not to apply the conditions under which absolute maximum ratings are exceeded to the LSI.

(2) GND potential

Make the GND pin voltage such that it is the lowest voltage even when operating below it. Actually confirm that the voltage of each pin does not become a lower voltage than the GND pin, including transient phenomena.

(3) Thermal design

Perform thermal design in which there are adequate margins by taking into account the allowable power dissipation in actual states of use.

(4) Shorts between pins and misinstallation

When mounting the LSI on a board, pay adequate attention to orientation and placement discrepancies of the LSI. If it is misinstalled and the power is turned on, the LSI may be damaged. It also may be damaged if it is shorted by a foreign substance coming between pins of the LSI or between a pin and a power supply or a pin and a GND.

(5) Operation in strong magnetic fields

Adequately evaluate use in a strong magnetic field, since there is a possibility of malfunction.

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