

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| STRUCTURE      | Silicon Monolithic Integrated Circuit                                                                                                                                                                                                                                                                                                                                                                                                                    |
| PRODUCT SERIES | FM stereo transmitter IC for audio systems.                                                                                                                                                                                                                                                                                                                                                                                                              |
| TYPE           | <b>BH1417FV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| FEATURES       | <ul style="list-style-type: none"> <li>• It is possible to attempt to improve a timbre because it has the pre-emphasis circuit, limiter circuit and low-pass filter circuit.</li> <li>• Built-in the pilot-tone system FM stereo modulator circuit.</li> <li>• The transmission frequency is stable because it has PLL system FM transmitter circuit.</li> <li>• PLL controls data input in parallel (4bits , 14ch) . It deal with U.S. band.</li> </ul> |

○ Absolute Maximum Ratings (Ta=25°C)

| Parameter                       | Symbol             | Limits         | Unit | Conditions         |
|---------------------------------|--------------------|----------------|------|--------------------|
| Supply voltage                  | Vcc                | +7.0           | V    | Pin 8, 13          |
| Data input voltage              | V <sub>IN-D</sub>  | -0.3 ~ Vcc+0.3 | V    | Pin 17, 18, 19, 20 |
| Phase comparator output voltage | V <sub>OUT-P</sub> | -0.3 ~ Vcc+0.3 | V    | Pin 7              |
| Power dissipation               | Pd                 | 630            | mW   | (*1)               |
| Storage temperature             | Tstg               | -55 ~ +125     | °C   |                    |

(\*1) To use at a temperature higher than Ta=25°C, derate 6.3mW 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, 13          |
| Operating temperature                    | T <sub>opr</sub>  | -40 ~ +85                                  | °C   |                    |
| Audio input level                        | V <sub>IN-A</sub> | ~ -10                                      | dBV  | Pin 1, 24          |
| Audio input frequency band               | f <sub>IN-A</sub> | 20 ~ 15k                                   | Hz   | Pin 1, 24          |
| Pre-emphasis time constant set up range  | τ <sub>PRE</sub>  | ~ 155                                      | μsec | Pin 2, 23          |
| Transmission frequency                   | f <sub>TX</sub>   | 87.7~88.9(step0.2)<br>106.7~107.9(step0.2) | MHz  | Pin 10, 12         |
| Control terminal "H" level input voltage | V <sub>IH</sub>   | 0.8V <sub>CC</sub> ~ V <sub>CC</sub>       | V    | Pin 17, 18, 19, 20 |
| Control terminal "L" level input voltage | V <sub>IL</sub>   | GND ~ 0.2V <sub>CC</sub>                   | V    | Pin 17, 18, 19, 20 |

## ○ Electrical Characteristics

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

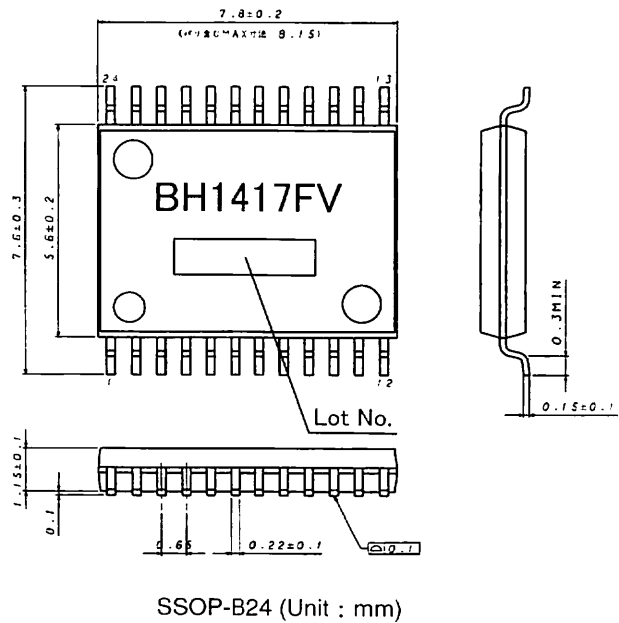
Signal source : f<sub>IN</sub>=400Hz

| 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, 23 Open    |
| Transmission output level   | V <sub>TX</sub>      | 96                   | 99                    | 102  | dB μV | f <sub>TX</sub> =107.9MHz              |
| "H" level input current     | I <sub>IH</sub>      | —                    | —                     | 1.0  | μA    | Pin 17, 18, 19, 20 V <sub>IN</sub> =5V |
| "L" level input current     | I <sub>IL</sub>      | -1.0                 | —                     | —    | μA    | Pin 17, 18, 19, 20 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            |

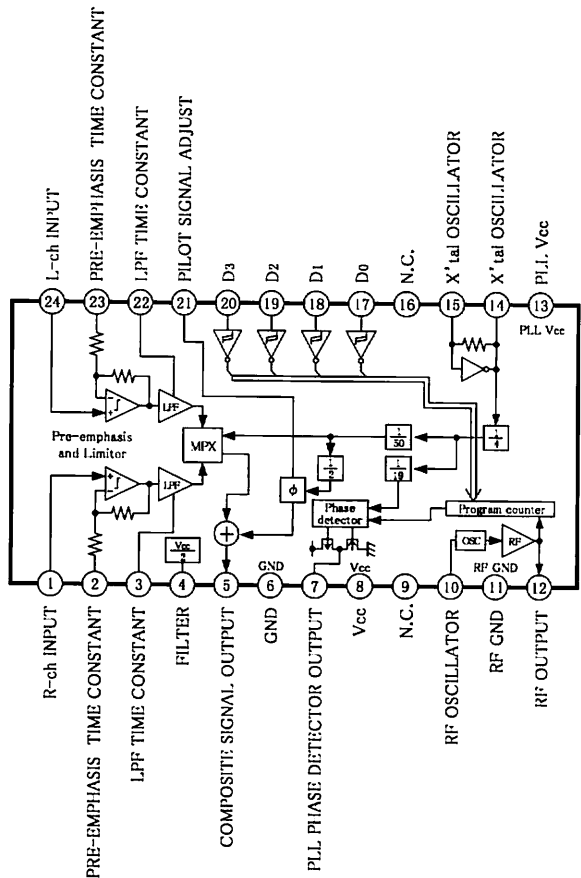
◎ This product is not designed for protection against radioactive rays.

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

○ External Dimension Diagram • Marking Diagram



○ Block Diagram



○ Pin No. • Pin Name

| No. | Name                       | No. | Name                       |
|-----|----------------------------|-----|----------------------------|
| 1   | R-ch INPUT                 | 13  | PLL Vcc                    |
| 2   | PRE-EMPHASIS TIME CONSTANT | 14  | X'tal OSCILLATOR           |
| 3   | LPF TIME CONSTANT          | 15  | X'tal OSCILLATOR           |
| 4   | FILTER                     | 16  | N.C.                       |
| 5   | COMPOSITE SIGNAL OUTPUT    | 17  | D <sub>0</sub>             |
| 6   | GND                        | 18  | D <sub>1</sub>             |
| 7   | PLL PHASE DETECTOR OUTPUT  | 19  | D <sub>2</sub>             |
| 8   | Vcc                        | 20  | D <sub>3</sub>             |
| 9   | N.C.                       | 21  | PILOT SIGNAL ADJUST        |
| 10  | RF OSCILLATOR              | 22  | LPF TIME CONSTANT          |
| 11  | RF GND                     | 23  | PRE-EMPHASIS TIME CONSTANT |
| 12  | RF OUTPUT                  | 24  | 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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