

**SONY****CXA1994AM/BM****M-ary FSK Demodulating Comparator****Description**

The CXA1994AM/BM is a comparator which allows the M-ary (4-level) FSK data to be demodulated in combination with an FM IF amplifier for pagers.

**Features**

- Low power consumption  
70 $\mu$ A (at  $V_{CC} = 1.4V$ , including the current on battery saving control pin)
- Low voltage operation  
 $V_{CC} = 1.0$  to  $4.0V$

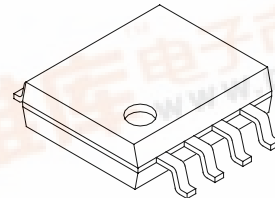
**Applications**

M-ary FSK pagers

**Function**

- Window comparator for MSB detection
- Battery saving control pin
- Threshold level adjustment pin

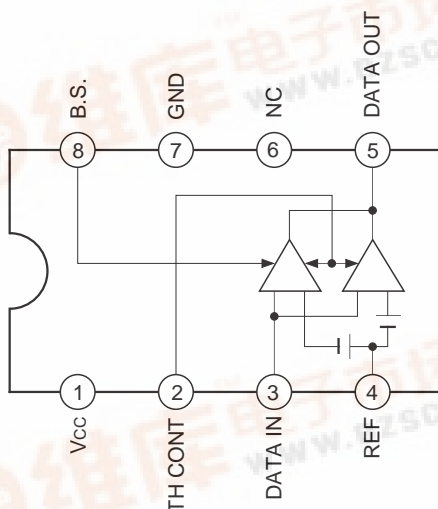
8 pin SOP (Plastic)

**Absolute Maximum Ratings** ( $T_a = 25^{\circ}C$ )

- |                         |           |             |             |
|-------------------------|-----------|-------------|-------------|
| • Supply voltage        | $V_{CC}$  | 7.0         | V           |
| • Operating temperature | $T_{opr}$ | -20 to +75  | $^{\circ}C$ |
| • Storage temperature   | $T_{stg}$ | -65 to +150 | $^{\circ}C$ |

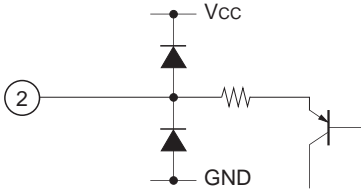
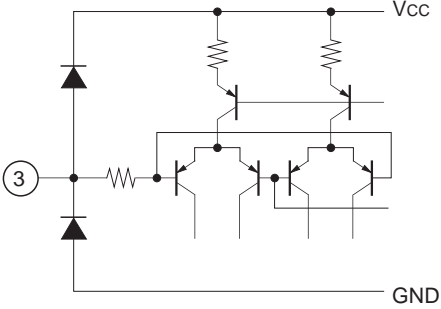
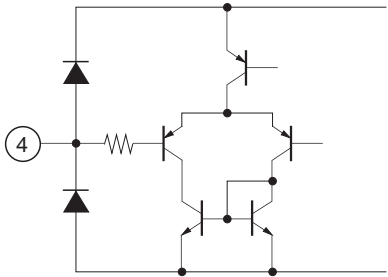
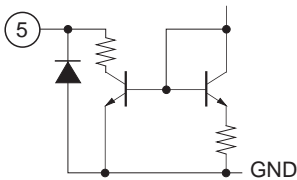
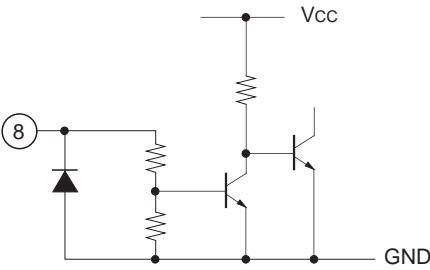
**Operating Conditions**

- |                  |          |            |   |
|------------------|----------|------------|---|
| • Supply voltage | $V_{CC}$ | 1.0 to 4.0 | V |
|------------------|----------|------------|---|

**Block Diagram**

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## Pin Description

Pin No.	Symbol	Pin voltage	Equivalent circuit	Description
1	Vcc	1.5V		Vcc.
2	TH CONT	—		Adjusts the threshold level for comparator.
3	DATA IN	0.2V		Signal input. Connected to the COMP IN pin of the CXA1484A.
4	REF	0.2V		Reference input. Connected to the SENSE pin of the CXA1484A.
5	DATA OUT	—		Comparator output.
6	NC	—		
7	GND	0		Ground.
8	B.S.	—		Battery saving control.

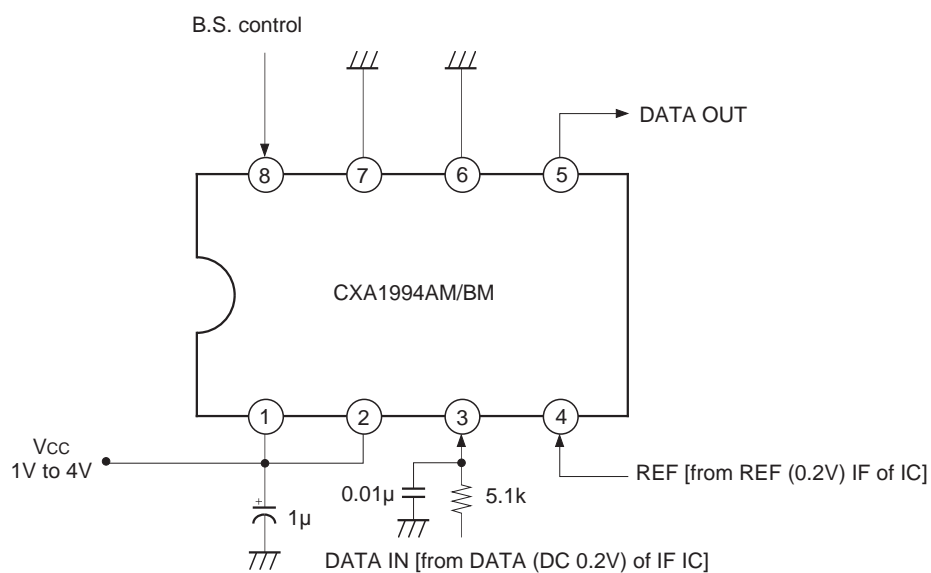
**Electrical Characteristics**(V<sub>CC</sub> = 1.4V, T<sub>a</sub> = 25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Current consumption	I <sub>CC</sub>			70	100	μA
Current consumption	I <sub>CCS</sub>				6	μA
Comparator input voltage high level	V <sub>COMP</sub> H	V <sub>REF</sub> as a reference		50		mV
Comparator input voltage low level	V <sub>COMP</sub> L	V <sub>REF</sub> as a reference		−50		mV
Comparator output saturation voltage	V <sub>sat</sub>				0.4	V
Logic input voltage high level	V <sub>THH</sub>		0.9			V
Logic input voltage low level	V <sub>THL</sub>				0.35	V

**Pin Description**

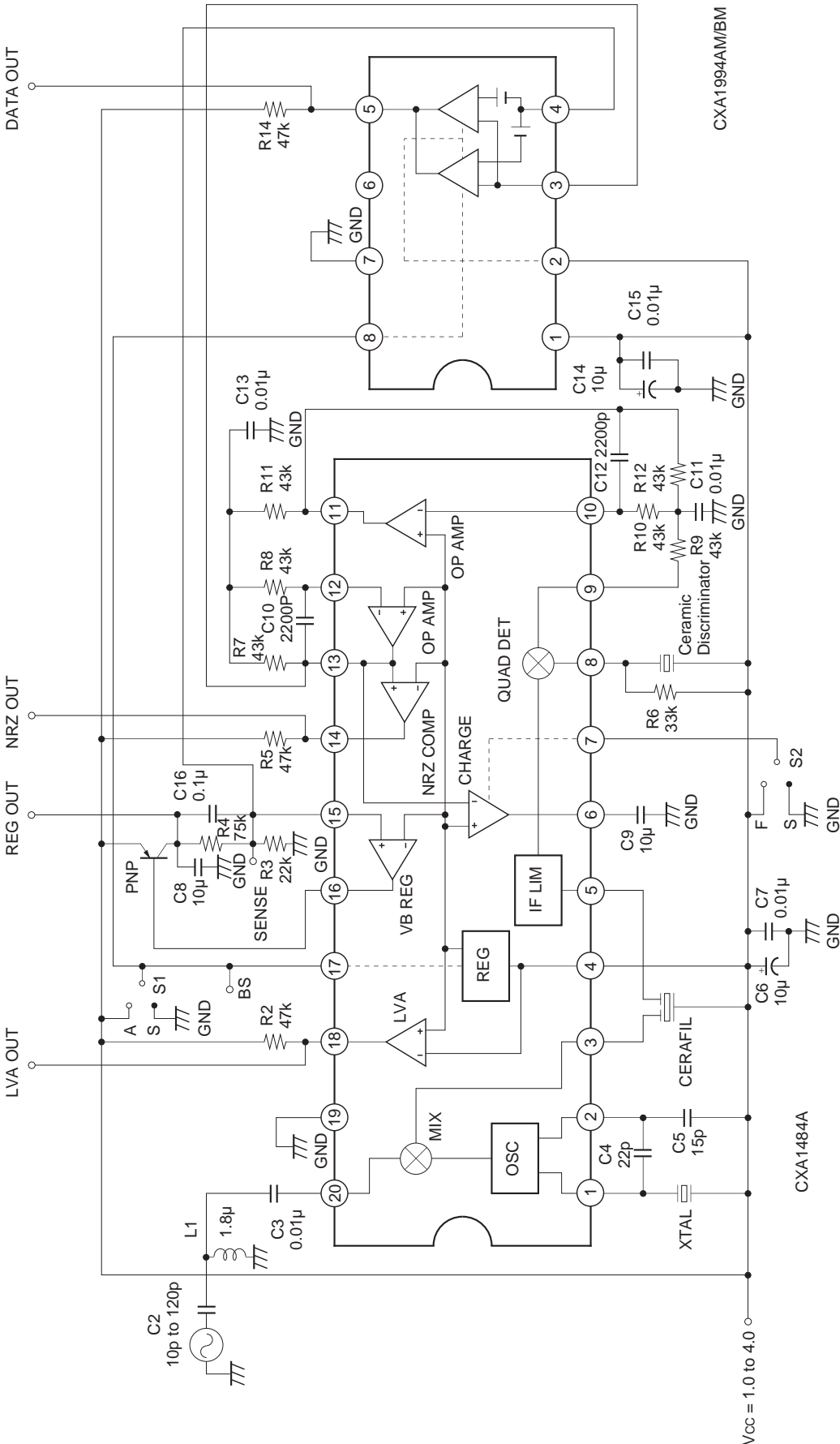
- |                    |  |
|--------------------|--|
| 1. V <sub>CC</sub> | Power supply pin of 1V or more   |
| 2. TH CONT         | This pin adjusts the threshold level and the default is approximately ±50mV from the reference voltage. The threshold level can be set lower by inserting a resistor between V <sub>CC</sub> and this pin. (The level cannot be set higher.) |
| 3. DATA IN         | The signal after passing through the data filter of the IF IC (CXA1484A) is input.   |
| 4. REF             | Connects to the reference voltage pin of the IF IC. (Pin 15 of the CXA1484A)   |
| 5. DATA OUT        | Comparator output.   |
| 6. NC              | Not connected.   |
| 7. GND             | Ground.  |
| 8. B.S.            | Battery saving control pin. Battery saving state for low; normal operation for high.   |

# Electrical Characteristics Measurement Circuit



\* The comparator level can be set lower by inserting a resistor between Pin 1 (Vcc) and Pin 2.

Application Circuit



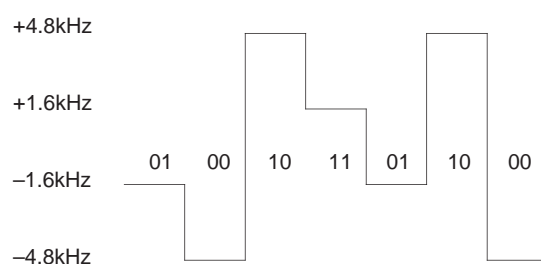
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## Description of Operation

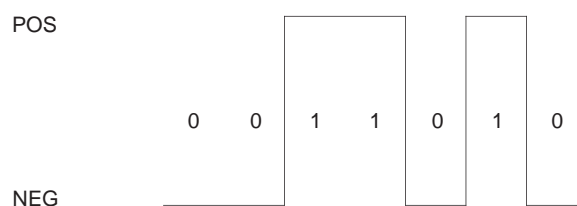
### M-ary (M = 2- or 4-level) FSK emodulation system

Polarity discrimination output and MSB comparator output are used to demodulate the 4-level waveform shown below.

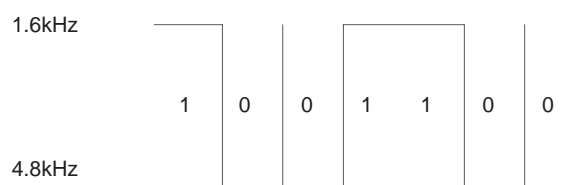
### 4-level FSK demodulating waveform



### Polarity discrimination output



### MSB comparator output

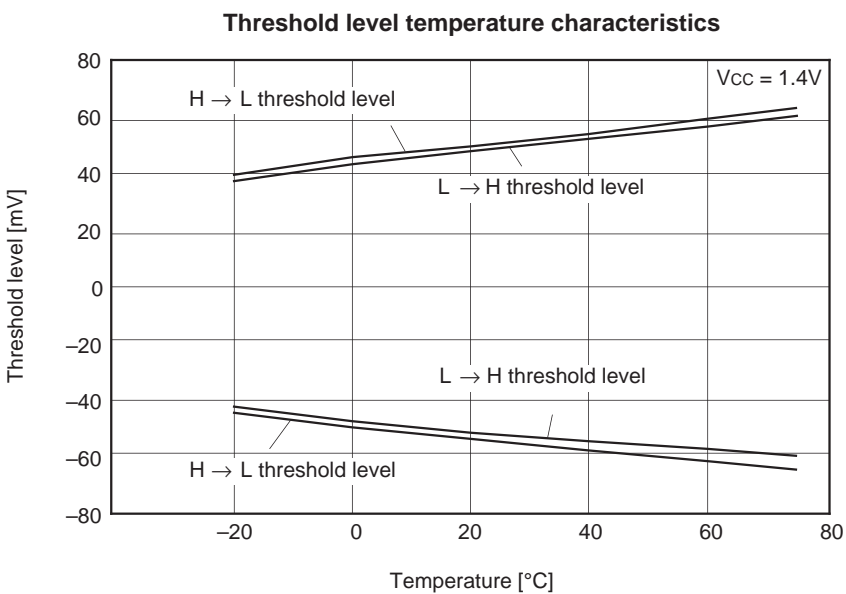
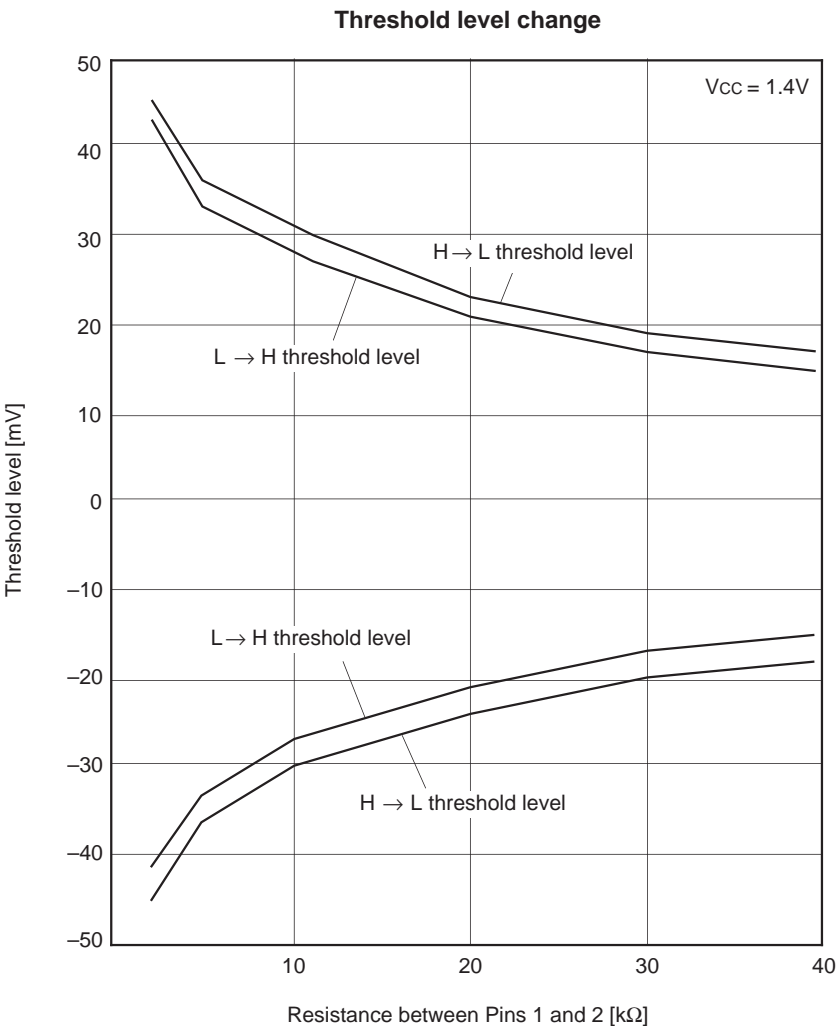


The 4-level FSK demodulating data is divided into a polarity discrimination output and a MSB comparator output shown above. Here, the polarity discrimination output corresponds to a conventional NRZ comparator output. The MSB comparator output is made comparing to the optional level setting between MSB and LSB levels as reference.

For the 2-level FSK demodulation, it corresponds to a conventional NRZ comparator output.

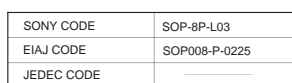
Take care that the polarity of NRZ output is inverted in CXA1484A.

Example of Representative Characteristics



## CXA1994AM

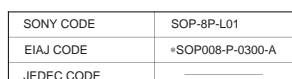
## 8PIN SOP (PLASTIC)



NOTE : PALLADIUM PLATING  
This product uses S-PdPPF (Sony Spec.-Palladium Pre-Plated Lead Frame).

## CXA1994BM

8PIN SOP (PLASTIC) 300mil



PACKAGE STRUCTURE	
PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	COPPER / 42 ALLOY
PACKAGE WEIGHT	0.1g