

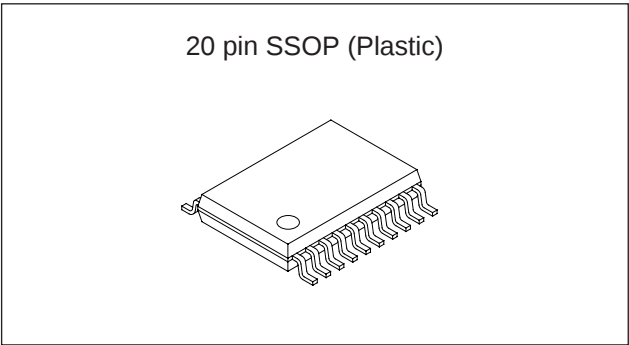
Read/Write Amplifier (with Built-in Filters) for FDDs

Description

The CXA3071N is a monolithic IC designed for use with three-mode Floppy Disk Drives, and contains a read circuit (with a four-mode filter system), a write circuit, an erase circuit, and a supply voltage detection circuit, all on a single chip.

Features

- Single 5V power supply
- All filter, write current and other characteristics can be set with a single external resistor.
- Filter system can be switched among four modes: 1M, 1.6M/2M, which are each inner track/outer track.
- Filter characteristics can be set to Chebyshev (1dB ripple) for 1.6M, 2M/inner track only, and to Butterworth for the other modes and a custom selection can be made between Chebyshev (1dB ripple) and Butterworth for 1.6M, 2M/inner track only.
- 1M/outer track  $f_0$  and the  $f_c$  ratio for each mode can be customized.
- Preamplifier voltage gain can be set to 45dB or 48dB by switching the filter mode and inner/outer track.
- Preamplifier and filter output are monitored with the same pins. These pins are normally set to filter output, but the preamplifier output can be monitored by temporarily setting the SETR pin (Pin 20) to Low.
- Time domain filter can be switched between two modes: 1M, 1.6M/2M.  
In addition, the pulse width can be customized.
- Write current can be switched among six modes according to the mode and inner/outer track setting.  
The current value can be customized for each mode.
- Erase current remains constant, and the current value can be customized.
- Damping resistor can be built in. Resistor can be customized between 2kΩ and 15kΩ in 1kΩ steps.
- Supply voltage detection circuit



Applications

Three-mode FDDs

Structure

Bipolar silicon monolithic IC

Absolute Maximum Ratings (Ta = 25°C)

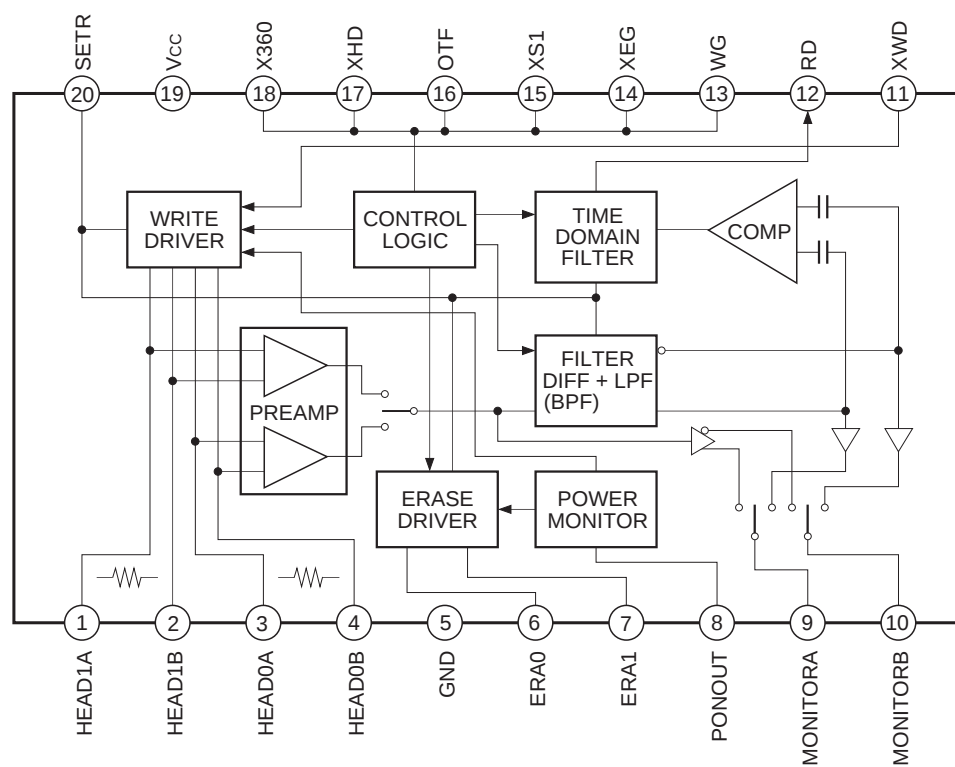
|                                    |      |                   |    |
|------------------------------------|------|-------------------|----|
| • Supply voltage                   | Vcc  | 7.0               | V  |
| • Digital signal input pin voltage |      | −0.5 to Vcc + 0.3 | V  |
| • Power ON output applied voltage  |      | Vcc + 0.3         | V  |
| • Erase output applied voltage     |      | Vcc + 0.3         | V  |
| • Write head applied voltage       |      | 15                | V  |
| • Power ON output current          |      | 7                 | mA |
| • Operating temperature            | Topr | −20 to +75        | °C |
| • Storage temperature              | Tstg | −65 to +150       | °C |
| • Allowable power dissipation      | PD   | 375               | mW |

Operating Conditions

|                |            |   |
|----------------|------------|---|
| Supply voltage | 4.4 to 6.0 | V |
|----------------|------------|---|

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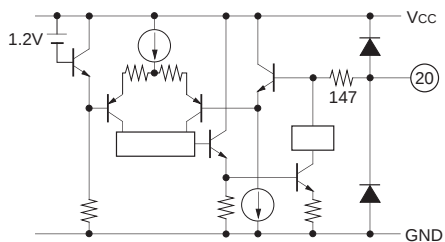
# Block Diagram and Pin Configuration



## Pin Description

| Pin No. | Symbol    | Pin voltage                                                   | Equivalent circuit | Description                                                                                                                                                                                                                                                                           |
|---------|-----------|---------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | HEAD1A    | —                                                             |                    | Magnetic head inputs/outputs. Connect the recording/playback magnetic head to these pins, and connect the center tap to V <sub>CC</sub> . When the logical voltage for Pin 15 (XS1) is Low, the HEAD1 system is active; when the logical voltage is High, the HEAD0 system is active. |
| 2       | HEAD1B    | —                                                             |                    |                                                                                                                                                                                                                                                                                       |
| 3       | HEAD0A    | —                                                             |                    |                                                                                                                                                                                                                                                                                       |
| 4       | HEAD0B    | —                                                             |                    |                                                                                                                                                                                                                                                                                       |
| 5       | GND       | —                                                             |                    | GND connection.                                                                                                                                                                                                                                                                       |
| 6       | ERA0      | —                                                             |                    | Erase output for the HEAD0 system.                                                                                                                                                                                                                                                    |
| 7       | ERA1      | —                                                             |                    | Erase output for the HEAD1 system.                                                                                                                                                                                                                                                    |
| 8       | PON OUT   | —                                                             |                    | Reduced voltage detection output. This is an open collector that outputs a low signal when V <sub>CC</sub> is below the specified value.                                                                                                                                              |
| 9       | MONI-TORA | 4.0V during filter output<br>3.4V during pre-amplifier output |                    | MONITOR differential outputs. These pins are set to filter output during normal read mode, but the preamplifier output can be monitored by temporarily setting Pin 20 (SETR) to Low.                                                                                                  |
| 10      | MONI-TORB | 4.0V during filter output<br>3.4V during pre-amplifier output |                    |                                                                                                                                                                                                                                                                                       |

| Pin No. | Symbol          | Pin voltage                    | Equivalent circuit | Description                                                                                                                                                                                                                                            |
|---------|-----------------|--------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11      | XWD             | —                              |                    | Write data input. This pin is a Schmitt-type input that is triggered when the logical voltage goes from High to Low.                                                                                                                                   |
| 12      | RD              | —                              |                    | Read data output.<br>This pin is active when the logical voltage of the write gate signal and the erase gate signal is High.                                                                                                                           |
| 13      | WG              | 0.5V <sub>CC</sub> during read |                    | WG signal input.<br>The write system becomes active when the logical voltage is High.<br>The IC is in power saving mode when the logical voltage is Low.<br>The read system becomes active when the logical voltage is Z.                              |
| 14      | XEG             | —                              |                    | XEG signal input. The erase system becomes active when the logical voltage is Low.                                                                                                                                                                     |
| 15      | XS1             | —                              |                    | Head side switching signal input. The HEAD1 system is active when the logical voltage is Low, and the HEAD0 system is active when the logical voltage is High, but only when the logical voltage for the WG signal is Z and of the XEG signal is High. |
| 16      | OTF             | —                              |                    | Filter inner track/outer track mode control. Outer track mode is selected when the logical voltage is High.                                                                                                                                            |
| 17      | XHD             | —                              |                    | Filter, time domain filter and write current 1M/2M mode control. 1.6M/2M mode is selected when the logical voltage is Low.                                                                                                                             |
| 18      | X360            | —                              |                    | Filter, time domain filter and write current 1.6M/2M mode control. 1.6M mode is selected when the logical voltage is Low.                                                                                                                              |
| 19      | V <sub>CC</sub> | —                              |                    | Power supply (5V) connection.                                                                                                                                                                                                                          |

| Pin No. | Symbol | Pin voltage | Equivalent circuit                                                                | Description                                                                                                                                                                                                                           |
|---------|--------|-------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20      | SETR   | 3.8V        |  | Filter cutoff frequency, time domain filter<br>1st monostable multivibrator pulse width,<br>read data, write current and erase current<br>setting resistor connection. Connect the<br>setting resistor R between this pin and<br>Vcc. |

## Electrical Characteristics

## Current Consumption

(Ta = 25°C, V<sub>CC</sub> = 5V)

| Item                                     | Symbol | Conditions          | Measurement circuit | Measurement point | Min. | Typ. | Max. | Unit |
|------------------------------------------|--------|---------------------|---------------------|-------------------|------|------|------|------|
| Current consumption in read mode         | ICCR   | WG = "Z"            | —                   | —                 | 15.0 | 25.0 | 35.0 | mA   |
| Current consumption in write/erase mode  | ICCWE  | WG = "H", XEG = "L" | —                   | —                 | 11.0 | 17.0 | 23.0 | mA   |
| Current consumption in power saving mode | ICCPs  | WG = "L"            | —                   | —                 | —    | 1.2  | 2.0  | mA   |

## Power Supply Monitoring System

(Ta = 25°C)

| Item                                           | Symbol | Conditions                        | Measurement circuit | Measurement point | Min. | Typ. | Max. | Unit |
|------------------------------------------------|--------|-----------------------------------|---------------------|-------------------|------|------|------|------|
| Power supply ON/OFF detector threshold voltage | VTH    |                                   | —                   | —                 | 3.5  | 3.9  | 4.3  | V    |
| Power ON output saturation voltage             | VSP    | V <sub>CC</sub> = 3.5V<br>I = 1mA | —                   | —                 | —    | —    | 0.5  | V    |

## Read System

(Ta = 25°C, V<sub>CC</sub> = 5V)

| Item                                           | Symbol | Conditions                                      | Measurement circuit | Measurement point | Min. | Typ. | Max. | Unit   |
|------------------------------------------------|--------|-------------------------------------------------|---------------------|-------------------|------|------|------|--------|
| Preamplifier voltage gain 1M/outer track       | GVLO   | f = 100kHz, OTF = "H",<br>XHD = "H", X360 = "X" | 1                   | A, B              | 43.1 | 45.0 | 46.6 | dB     |
| Preamplifier voltage gain 1M/inner track       | GVLI   | f = 100kHz, OTF = "L",<br>XHD = "H", X360 = "X" | 1                   | A, B              | 46.1 | 48.0 | 49.6 | dB     |
| Preamplifier voltage gain 1.6M, 2M/outer track | GVHO   | f = 100kHz, OTF = "H",<br>XHD = "L", X360 = "X" | 1                   | A, B              | 43.1 | 45.0 | 46.6 | dB     |
| Preamplifier voltage gain 1.6M, 2M/inner track | GVHI   | f = 100kHz, OTF = "L",<br>XHD = "L", X360 = "X" | 1                   | A, B              | 46.1 | 48.0 | 49.6 | dB     |
| Preamplifier frequency response                | BWO    | Gv/Gv0 = -3dB                                   | 1                   | A, B              | 5    | —    | —    | MHz    |
| Preamplifier input conversion noise voltage    | ENO    | Bw = 400Hz to 1MHz,<br>Vi = 0                   | 1                   | A, B              | —    | 2.0  | 2.9  | nV/√Hz |

## Read System

(Ta = 25°C, VCC = 5V)

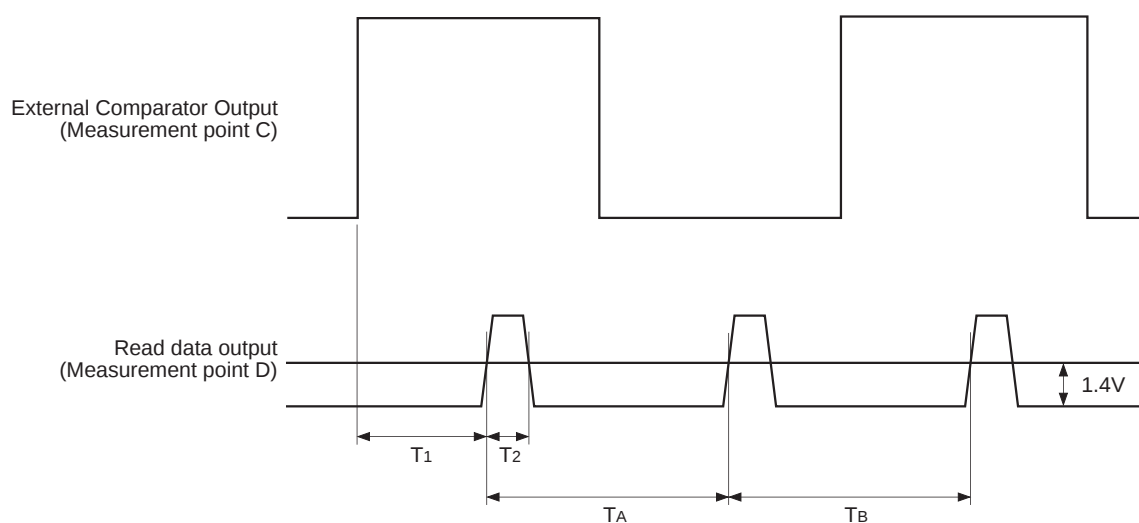
| Item                                                    | Symbol | Conditions                                                                                             | Measurement circuit | Measurement point | Min. | Typ. | Max. | Unit |
|---------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------|---------------------|-------------------|------|------|------|------|
| Filter output voltage amplitude                         | VOF    |                                                                                                        | 1                   | A, B              | 1.4  | —    | —    | Vp-p |
| Time domain filter monostable multivibrator pulse width | T1     | X360 = "X", XHD = "H" (1M mode)                                                                        | 1                   | C, D              | 2.25 | 2.50 | 2.75 | μs   |
|                                                         |        | X360 = "X", XHD = "L" (1.6M/2M mode)                                                                   | 1                   | C, D              | 1.16 | 1.29 | 1.42 | μs   |
| Read data pulse width                                   | T2     |                                                                                                        | 1                   | D                 | 300  | 400  | 500  | ns   |
| Read data output low output voltage                     | VOL    | IOL = 2mA                                                                                              | 1                   | D                 | —    | —    | 0.5  | V    |
| Read data output high output voltage                    | VOH    | IOH = -0.4mA                                                                                           | 1                   | D                 | 2.8  | —    | —    | V    |
| Read data output*1 rise time                            | tr     | RL = 2kΩ<br>CL = 20pF                                                                                  | 1                   | D                 | —    | —    | 100  | ns   |
| Read data output*1 fall time                            | tf     | RL = 2kΩ<br>CL = 20pF                                                                                  | 1                   | D                 | —    | —    | 100  | ns   |
| Peak shift*2                                            | PS     | VI = 0.25mVp-p to 3.5mVp-p<br>X360 = "H", XHD = "L"<br>OTF = "L"<br>f = 125kHz,<br>2M/inner track mode | 1                   | D                 | —    | —    | 1    | %    |

\*1 Read data output: 0.5V to 2.4V

\*2 Signal input level

1M, 1.6M, 2M/outer track: VI = 0.25mVp-p to 5mVp-p

1M, 1.6M, 2M/inner track: VI = 0.25mVp-p to 3.5mVp-p



**Fig. 1. 1st and 2nd monostable multivibrator pulse width precision and peak shift measurement conditions**

- 1st monostable multivibrator pulse width precision

When X360 = "X" and XHD = "H":

$$ETM1 = \left( \frac{T_1}{2.5\mu s} - 1 \right) \times 100 [\%]$$

When X360 = "X" and XHD = "L":

$$ETM1' = \left( \frac{T_1}{1.29\mu s} - 1 \right) \times 100 [\%]$$

- 2nd monostable multivibrator pulse width =  $T_2$
- Peak shift

$$PS = \frac{1}{2} \left| \frac{T_A - T_B}{T_A + T_B} \right| \times 100 [\%]$$

## Read System (Filters)

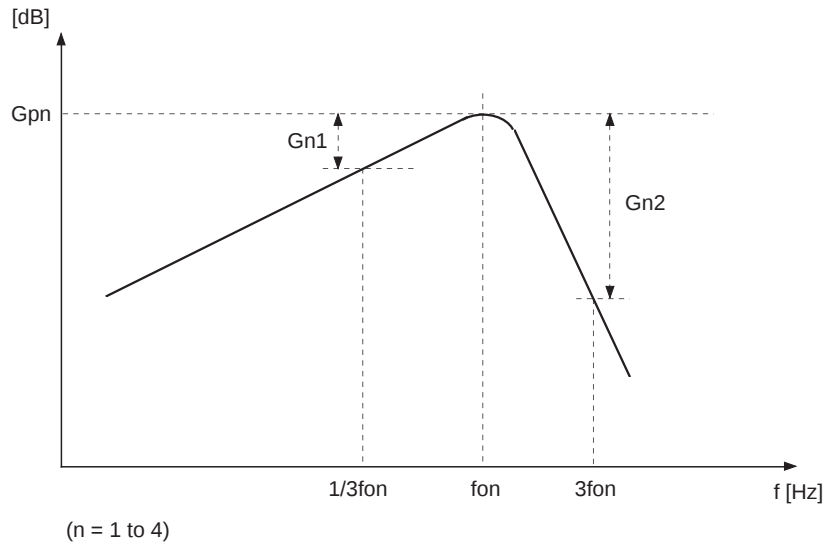
(Ta = 25°C, Vcc = 5V)

| Item                          |                                 | Symbol          | Conditions                                     | Measurement circuit | Measurement point | Min.  | Typ.  | Max.  | Unit |
|-------------------------------|---------------------------------|-----------------|------------------------------------------------|---------------------|-------------------|-------|-------|-------|------|
| 1M<br>outer<br>track          | Peak frequency                  | f <sub>01</sub> | WG = "Z", X360 = "X"<br>XHD = "H"<br>OTF = "H" | 1                   | A, B              | 165.6 | 184.0 | 202.4 | kHz  |
|                               | Peak voltage gain <sup>*3</sup> | G <sub>p1</sub> | Refer to Fig. 1<br>at f <sub>01</sub>          | 1                   | A, B              | 4.1   | 6.0   | 7.6   | dB   |
|                               | Frequency response (1)          | G <sub>11</sub> | Refer to Fig. 1<br>at 1/3f <sub>01</sub>       | 1                   | A, B              | -7.4  | -6.9  | -6.4  | dB   |
|                               | Frequency response (2)          | G <sub>12</sub> | Refer to Fig. 1<br>at 3f <sub>01</sub>         | 1                   | A, B              | -24.9 | -23.0 | -21.4 | dB   |
| 1M<br>inner<br>track          | Peak frequency                  | f <sub>02</sub> | WG = "Z", X360 = "X"<br>XHD = "H"<br>OTF = "L" | 1                   | A, B              | 177.2 | 196.9 | 216.6 | kHz  |
|                               | Peak voltage gain <sup>*3</sup> | G <sub>p2</sub> | Refer to Fig. 1<br>at f <sub>02</sub>          | 1                   | A, B              | 4.1   | 6.0   | 7.6   | dB   |
|                               | Frequency response (1)          | G <sub>21</sub> | Refer to Fig. 1<br>at 1/3f <sub>02</sub>       | 1                   | A, B              | -7.4  | -6.9  | -6.4  | dB   |
|                               | Frequency response (2)          | G <sub>22</sub> | Refer to Fig. 1<br>at 3f <sub>02</sub>         | 1                   | A, B              | -24.9 | -23.0 | -21.4 | dB   |
| 1.6M/<br>2M<br>outer<br>track | Peak frequency                  | f <sub>03</sub> | WG = "Z", X360 = "X"<br>XHD = "L"<br>OTF = "H" | 1                   | A, B              | 311.3 | 345.9 | 380.5 | kHz  |
|                               | Peak voltage gain <sup>*3</sup> | G <sub>p3</sub> | Refer to Fig. 1<br>at f <sub>03</sub>          | 1                   | A, B              | 4.2   | 6.1   | 7.7   | dB   |
|                               | Frequency response (1)          | G <sub>31</sub> | Refer to Fig. 1<br>at 1/3f <sub>03</sub>       | 1                   | A, B              | -7.4  | -6.9  | -6.4  | dB   |
|                               | Frequency response (2)          | G <sub>32</sub> | Refer to Fig. 1<br>at 3f <sub>03</sub>         | 1                   | A, B              | -25.3 | -23.4 | -21.8 | dB   |
| 1.6M/<br>2M<br>inner<br>track | Peak frequency                  | f <sub>04</sub> | WG = "Z", X360 = "X"<br>XHD = "L"<br>OTF = "L" | 1                   | A, B              | 346.2 | 384.6 | 423.0 | kHz  |
|                               | Peak voltage gain <sup>*3</sup> | G <sub>p4</sub> | Refer to Fig. 1<br>at f <sub>04</sub>          | 1                   | A, B              | 5.8   | 7.7   | 9.3   | dB   |
|                               | Frequency response (1)          | G <sub>41</sub> | Refer to Fig. 1<br>at 1/3f <sub>04</sub>       | 1                   | A, B              | -8.3  | -7.8  | -7.3  | dB   |
|                               | Frequency response (2)          | G <sub>42</sub> | Refer to Fig. 1<br>at 3f <sub>04</sub>         | 1                   | A, B              | -37.8 | -35.9 | -34.3 | dB   |

<sup>\*3</sup>  $G_{pn} = 20 \log_{10} (V_{Filterout}/V_{Preout})$

V<sub>Filterout</sub> = Filter differential output voltage

(N = 1 to 4).



**Fig. 2. Filter frequency response measurement conditions**

### Write/Erase System

(Ta = 25°C, Vcc = 5V)

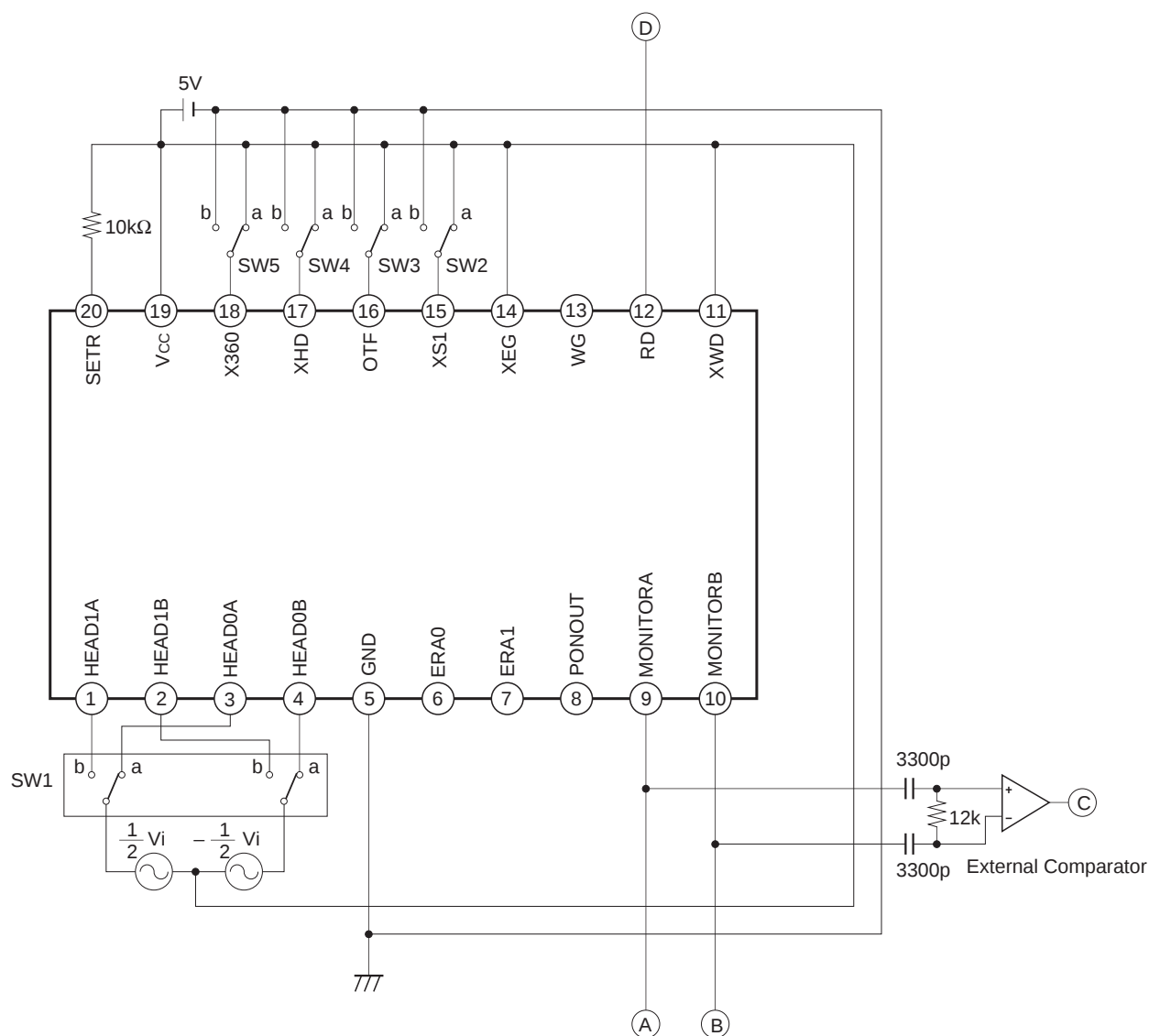
| Item                                  | Symbol | Conditions                                                        | Measurement circuit | Measurement point | Min. | Typ. | Max.  | Unit              |
|---------------------------------------|--------|-------------------------------------------------------------------|---------------------|-------------------|------|------|-------|-------------------|
| Damping resistor precision            | RD     | Vcc = 0V<br>SW1 = b                                               | 2                   | A', B'<br>C', D'  | -20  | —    | +20   | %                 |
| 1M/outer track write current          | IWLO   | WG = "H", OTF = "H"<br>XHD = "H", X360 = "X"                      | 2                   | A, B<br>C, D      | 8.83 | 9.5  | 10.17 | mA <sub>0-p</sub> |
| 1M/inner track write current          | IWLI   | WG = "H", OTF = "L"<br>XHD = "H", X360 = "X"                      | 2                   | A, B<br>C, D      | 6.62 | 7.12 | 7.62  | mA <sub>0-p</sub> |
| 1.6M/outer track write current        | IWMO   | WG = "H", OTF = "H"<br>XHD = "L", X360 = "L"                      | 2                   | A, B<br>C, D      | 7.44 | 8.0  | 8.56  | mA <sub>0-p</sub> |
| 1.6M/inner track write current        | IWMI   | WG = "H", OTF = "L"<br>XHD = "L", X360 = "L"                      | 2                   | A, B<br>C, D      | 5.95 | 6.4  | 6.85  | mA <sub>0-p</sub> |
| 2M/outer track write current          | IWHO   | WG = "H", OTF = "H"<br>XHD = "L", X360 = "H"                      | 2                   | A, B<br>C, D      | 4.18 | 4.5  | 4.82  | mA <sub>0-p</sub> |
| 2M/inner track write current          | IWHI   | WG = "H", OTF = "L"<br>XHD = "L", X360 = "H"                      | 2                   | A, B<br>C, D      | 2.76 | 2.97 | 3.18  | mA <sub>0-p</sub> |
| Write current output unbalance        | DW     | WG = "H"                                                          | 2                   | A, B<br>C, D      | -1   | —    | +1    | %                 |
| Head I/O pin leak current for writes  | ILKW   | WG = "H"                                                          | 2                   | A, B<br>C, D      | —    | —    | 10    | μA                |
| Write head pin current at saturation  | ISW    | WG = "H", OTF = "H"<br>XHD = "H", X360 = "X"<br>VSW = 1V, SW2 = b | 2                   | A, B<br>C, D      | 8.45 | 9.5  | 10.55 | mA <sub>0-p</sub> |
| Erase current                         | IE     | XEG = "L"                                                         | 2                   | E, F              | 5.40 | 6.0  | 6.60  | mA                |
| Erase current output pin leak current | ILKE   | XEG = "L"                                                         | 2                   | E, F              | —    | —    | 10    | μA                |

## Logic Input Block

(Ta = 25°C, Vcc = 5V)

| Item                                                 | Symbol | Conditions | Measurement circuit | Measurement point   | Min.               | Typ. | Max.               | Unit |
|------------------------------------------------------|--------|------------|---------------------|---------------------|--------------------|------|--------------------|------|
| Digital signal input low input voltage               | VLD    |            | 2                   | I, J, K, L, M       | —                  | —    | 0.8                | V    |
| Digital signal input high input voltage              | VHD    |            | 2                   | I, J, K, L, M       | 2.0                | —    | —                  | V    |
| Schmitt-type digital signal input low input voltage  | VLSD   |            | 2                   | G                   | —                  | —    | 0.8                | V    |
| Schmitt-type digital signal input high input voltage | VHSD   |            | 2                   | G                   | 2.0                | —    | —                  | V    |
| WG pin digital signal input high input voltage       | VMHD   |            | 2                   | H                   | 0.7V <sub>CC</sub> | —    | —                  | V    |
| WG pin digital signal input low input voltage        | VMLD   |            | 2                   | H                   | —                  | —    | 0.3V <sub>CC</sub> | V    |
| Digital signal input low input current               | ILD    | VL = 0V    | 2                   | G, H, I, J, K, L, M | −100               | —    | —                  | μA   |
| Digital signal input high input current              | IHD    | VH = 5V    | 2                   | G, H, I, J, K, L, M | —                  | —    | 100                | μA   |

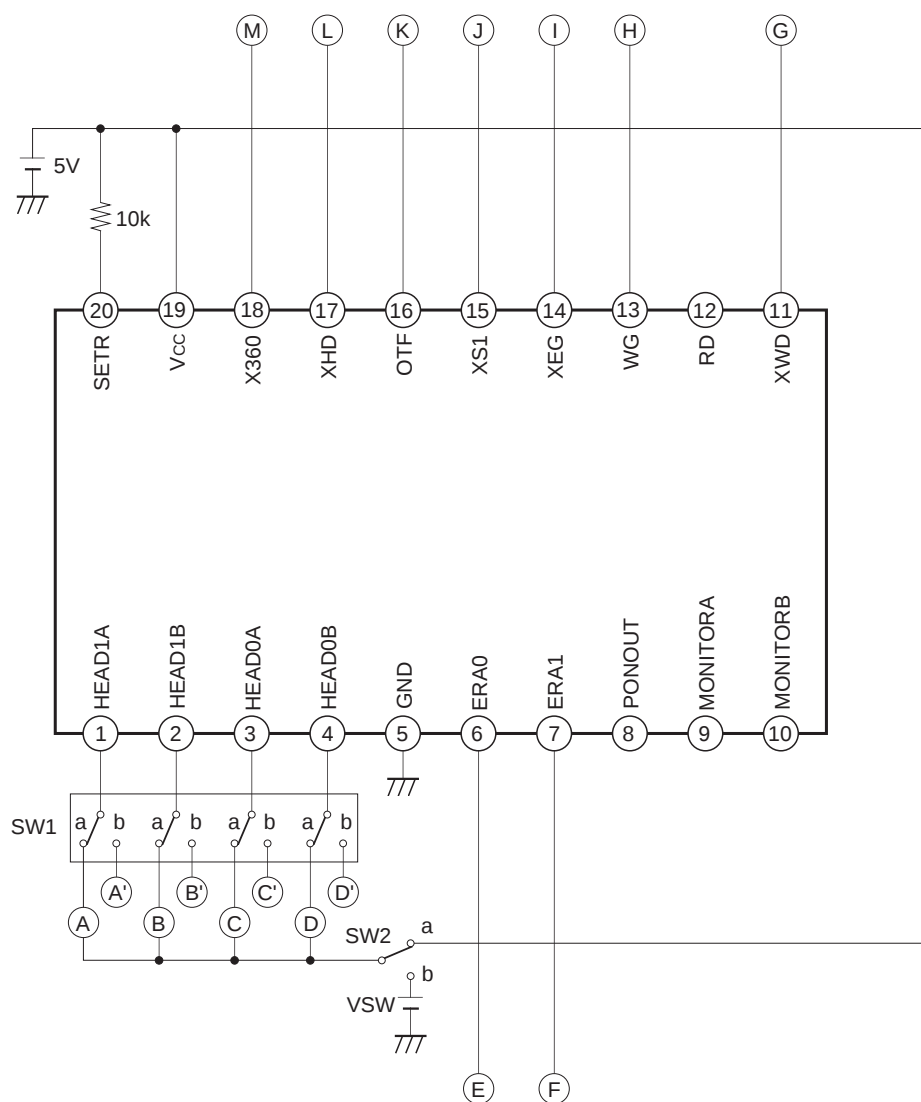
# Electrical Characteristics Measurement Circuit 1



**Note)** Unless otherwise specified, switches are assumed to be set to "a".

CR time constant of external comparator input stage is equivalent to the time constant of comparator input stage within the IC.

## Electrical Characteristics Measurement Circuit 2



**Note)** Unless otherwise specified, switches are assumed to be set to "a".

# Description of Operation

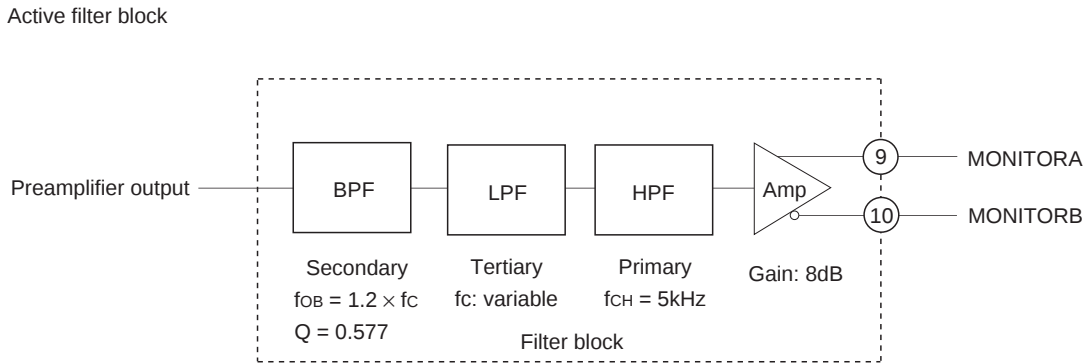
## (1) Read system

### Preamplifier

The preamplifier amplifies input signals.  
The voltage gain can be switched depending on the settings of Pins 16, 17 and 18.

### Filter

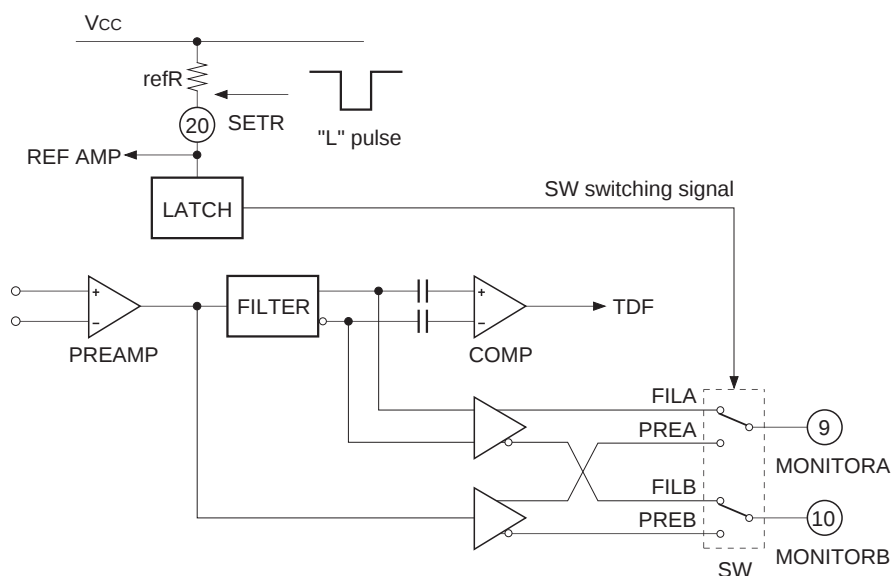
The filter differentiates the signals amplified by the preamplifier. The high-band noise components are attenuated by the low-pass filter.  
The filters can be switched among four modes, depending on the settings of Pins 16, 17 and 18.  
In 1M/outer track mode, the peak frequency  $f_{01}$  is fixed and used as a reference (1.00), and  $f_0$  for the other three modes is switched by the internal settings of the IC.



The center frequency  $f_{0B}$  of the BPF is fixed to 1.2 times the cutoff frequency  $f_0$  of the LPF. The LPF characteristics are set to Chebyshev (1dB ripple) for 1.6M, 2M/inner track mode only, and the Butterworth for all other modes.

| Pin16<br>OTF | Pin17<br>XHD | Pin18<br>X360 | LPF characteristics                    | $f_0$ ratio |
|--------------|--------------|---------------|----------------------------------------|-------------|
| H            | H            | X             | 1M/outer track: Butterworth            | 1.00        |
| L            | H            | X             | 1M/inner track: Butterworth            | 1.07        |
| H            | L            | L             | 1.6M/outer track: Butterworth          | 1.88        |
| L            | L            | L             | 1.6M/inner track: Chebyshev 1dB ripple | 2.09        |
| H            | L            | H             | 2M/outer track: Butterworth            | 1.88        |
| L            | L            | H             | 2M/inner track: Chebyshev 1dB ripple   | 2.09        |

## Monitor switching



### Monitor block configuration

The monitor pins are used for both the preamplifier output and filter output. These pins are set to filter output during normal read mode, but the preamplifier output can be monitored by temporarily setting the SETR pin (Pin 20) to Low.

The monitored contents are returned from the preamplifier output to the filter output by switching to write mode ( $WG = Z \rightarrow \text{High}$ ).

Note that the specifications for inputting a low signal to the SETR pin are the same as for the TTL input pin, but an open collector output (or open drain output) should be used while inputting the signal.

| SETR (Pin 20) | MONITORA (Pin 9) | MONITORB (Pin 10) | Monitor mode        |
|---------------|------------------|-------------------|---------------------|
| Z             | FILOUTA          | FILOUTB           | Filter output       |
|               | PREOUTA          | PREOUTB           | Preamplifier output |

## Comparator

The comparator detects the crosspoint of the filter differential output.

## Time domain filter

The time domain filter converts the comparator output to read data.

This filter is equipped with two monostable multivibrators. 1st monostable multivibrator eliminates unnecessary pulses, and 2nd monostable multivibrator determines the pulse width of the read data.

Note that the 1st monostable multivibrator pulse width T1 is fixed internally.

T1 can be switched as follows by the settings of Pins 17 and 18:

When XHD = "H" and X360 = "X": T1 (1M) = 2500 [ns]

When XHD = "L" and X360 = "L" or

XHD = "L" and X360 = "H": T1(1.6M/2M) = 1290 [ns]

The pulse width for 2nd monostable multivibrator is fixed at 400 [ns].

## (2) Write system

Write data input through Pin 11 is frequency-divided by the T flip-flop and generates the recording current for the head. The recording current can be switched by the settings of Pins 17 and 18. Note that the write current  $I_w$  is fixed internally for each mode.

Furthermore, the inner/outer track write current  $I_w$  can be changed for each mode by switching Pin 16. However, the current ratio between the inner and outer tracks is fixed.

## (3) Erase current

The erase current  $I_E$  is fixed internally.

Pins 6 and 7 are constant current outputs.

## (4) Power ON/OFF detection system

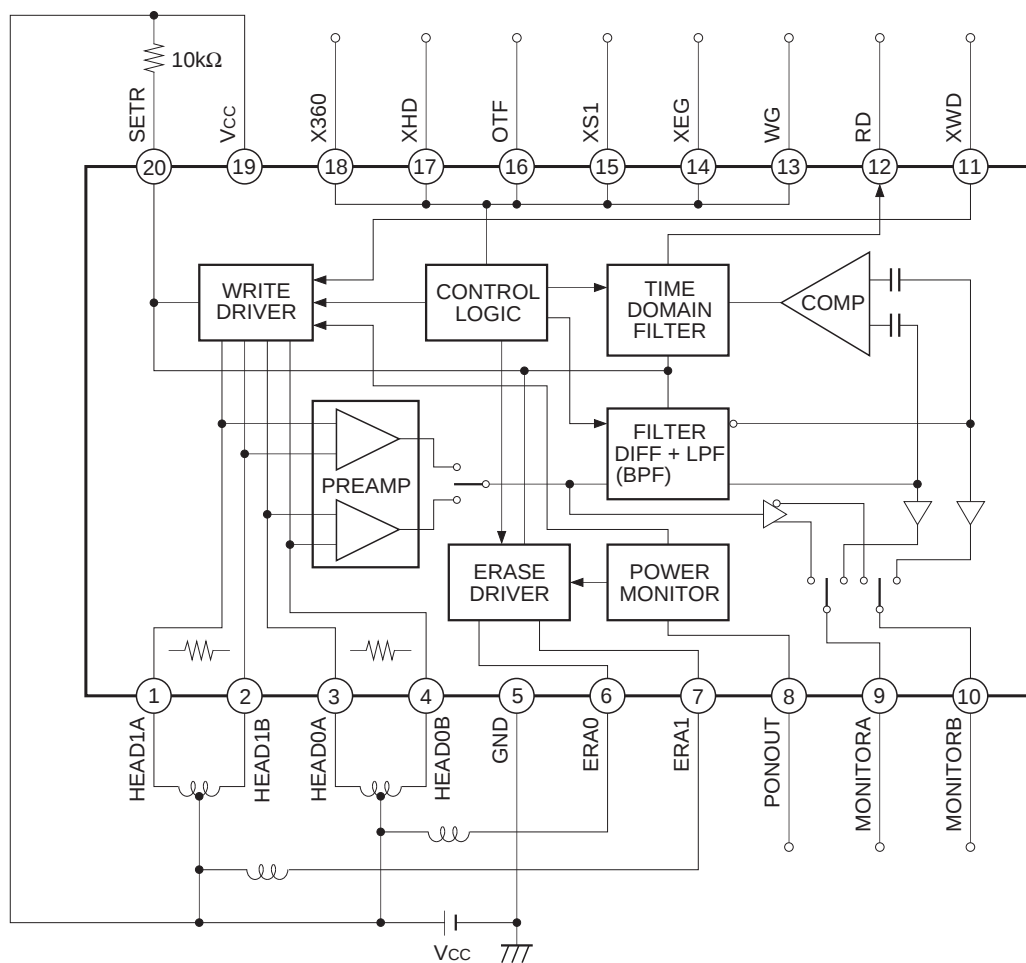
The power ON/OFF detection system detects a reduced voltage in the supply voltage.

When  $V_{CC}$  is below the specified value, the write system and erase system cease operation, disabling the write and erase functions.

## Notes on Operation

- Select the voltage gain so that the preamplifier output amplitude is 1Vp-p or less.  
If the preamplifier output amplitude exceeds 1Vp-p, the filter output waveform becomes distorted.
- Observe the following point when mounting this device.
- The GND should be as large as possible.
- Connect a  $V_{CC}$  decoupling capacitor of about 0.1 $\mu$ F as close to the device as possible.

## Application Circuit

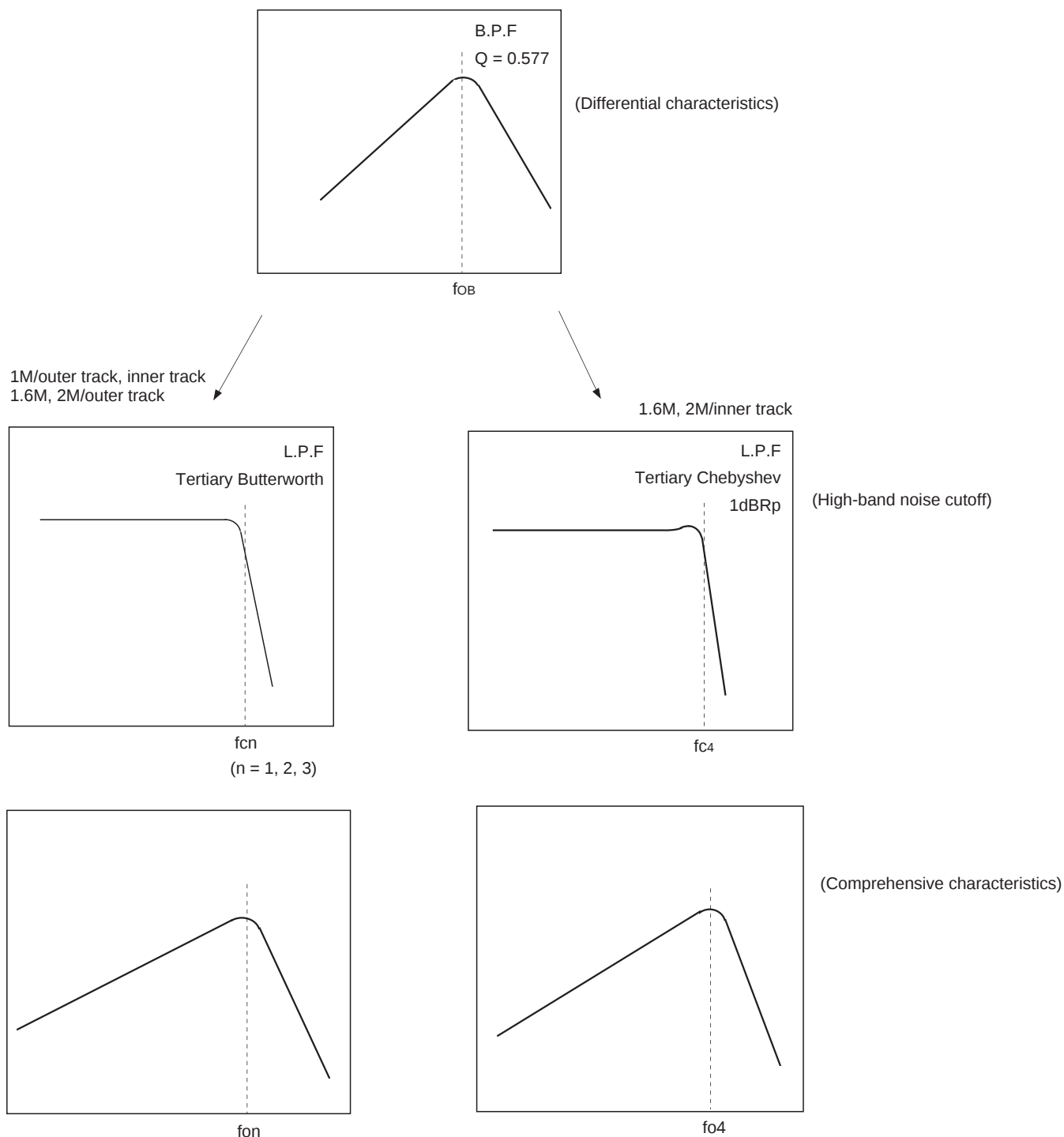


**Note)** When using two modes (1M and 2M), connect X360 (Pin 18) to Vcc and set XHD (Pin 17) high or low to switch modes.

Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

## Filter Frequency Response

The LPF characteristics are set to Chebyshev (1dB ripple) for 1.6M, 2M/inner track mode only, and to Butterworth for other modes. The 1.6M and 2M characteristics and  $f_c$  ratio are identical.



The BPF center frequency  $f_{0B}$  is fixed at 1.2 times the LPF cutoff frequency.

$$f_{0B} = 1.2f_c$$

In the comprehensive characteristics, the relationship between the peak frequencies  $f_0$  and  $f_c$  is as follows, depending on the differences of the LPF type:

Butterworth characteristics  $f_{cn} = 1.28f_{0n}$  ( $n = 1, 2, 3$ )

Chebyshev (1dB ripple characteristics)  $f_{c4} = 1.09f_{04}$

## Custom Selection of Filters

The LPF cutoff frequency  $f_c$  in 1M/outer track mode can be customized. In addition, assuming the LPF cutoff frequency value as 1.00, the  $f_c$  ratio can be selected for the other three modes.

In addition, the LPF characteristics are set to Chebyshev (1dB ripple) for 1.6M, 2M/inner track mode only, and to Butterworth for the other modes. However, a custom selection can be made between Chebyshev (1dB ripple) and Butterworth for 1.6M, 2M/inner track mode only. (However, the 1.6M and 2M characteristics and  $f_c$  ratio are identical.)

Note that the BPF center frequency  $f_{0B}$  is fixed at 1.2 times  $f_c$ .

| Mode                 | LPF type                                                                            | $f_c$ ratio when $f_{c1}$ is assumed as 1                                                                                         |
|----------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| 1M/outer track       | Butterworth                                                                         | <span style="border: 1px solid black;">1.0</span>                                                                                 |
| 1M/inner track       | Butterworth                                                                         | <span style="border: 1px solid black;">1.07</span> , 1.14, 1.23, 1.33, 1.45, 1.60, 2.00                                           |
| 1.6M, 2M/outer track | Butterworth                                                                         | 1.23, 1.33, 1.39, 1.45, 1.52, 1.60, 1.68, 1.78, <span style="border: 1px solid black;">1.88</span> , 2.00, 2.13, 2.29, 2.46, 2.67 |
| 1.6M, 2M/inner track | Butterworth<br><span style="border: 1px solid black;">Chebyshev (1dB ripple)</span> | 1.23, 1.33, 1.39, 1.45, 1.52, 1.60, 1.68, <span style="border: 1px solid black;">1.78</span> , 1.88, 2.00, 2.13, 2.29, 2.46, 2.67 |

\* The boxed ratio indicates the setting for the CXA3071N.

## Write Current Setting Method

Assuming the outer track as 1.00, the write current ratio is fixed within the IC for each mode.

The write current for the outer track is fixed within the IC.

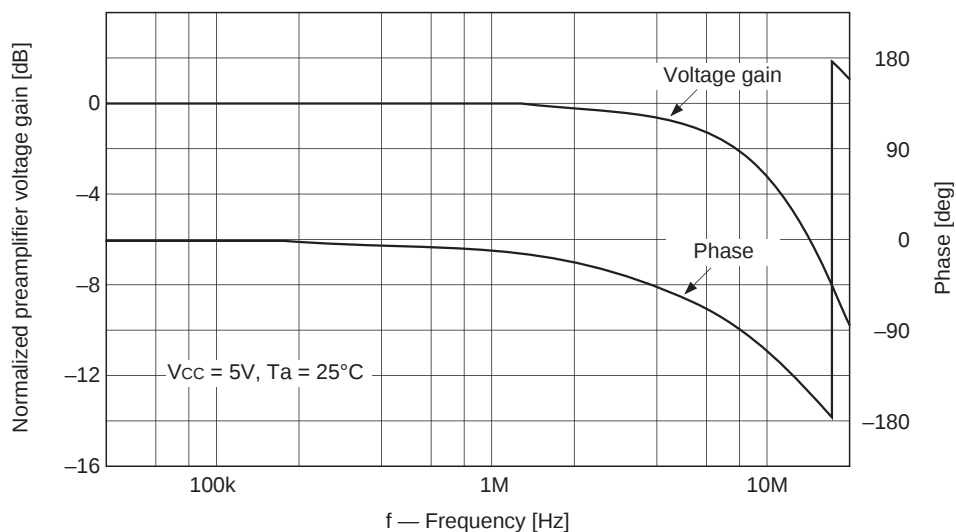
The setting is for the outer track current when OTF is High, and for the inner track current when OTF is Low.

| Track     | Write current inner track setting ratio                                                        |
|-----------|------------------------------------------------------------------------------------------------|
| 1M mode   | 1.00, 0.92, 0.86, 0.80, <span style="border: 1px solid black;">0.75</span> , 0.71, 0.66, 0.63  |
| 1.6M mode | 1.00, 0.92, 0.86, <span style="border: 1px solid black;">0.80</span> , 0.75, 0.71, 0.66, 0.63  |
| 2M mode   | 1.00, 0.92, 0.86, 0.80 , 0.75, 0.71, <span style="border: 1px solid black;">0.66</span> , 0.63 |

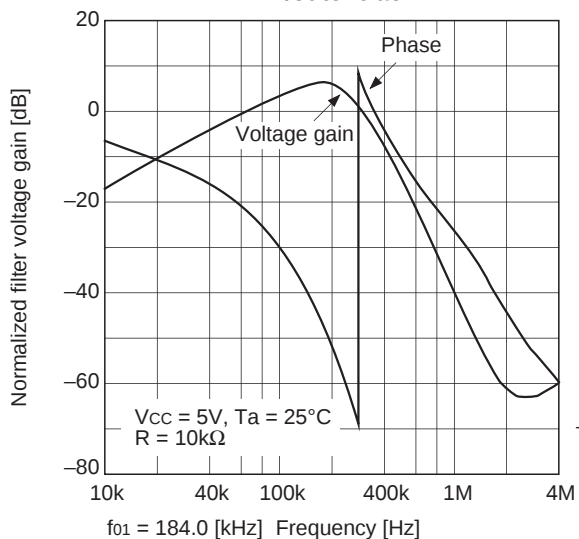
\* The boxed ratio indicates the setting for the CXA3071N.

## Example of Representative Characteristics

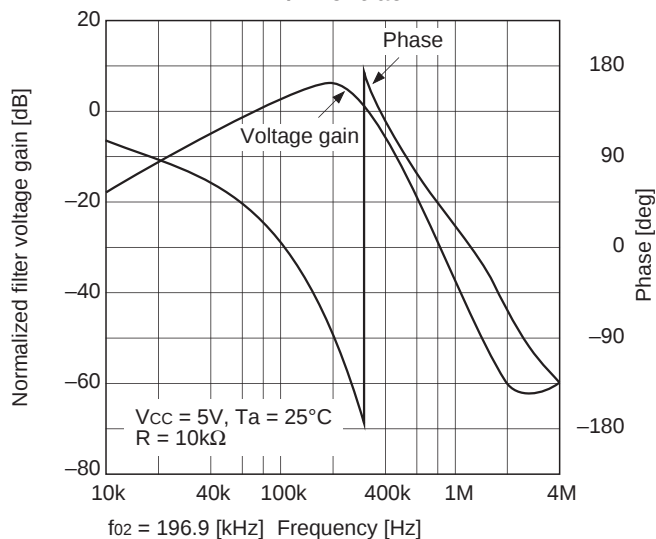
Normalized preamplifier voltage gain and phase vs. Frequency



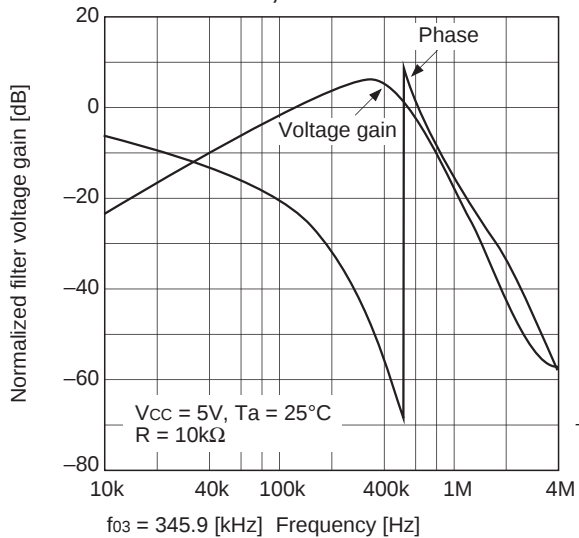
1M/outer track



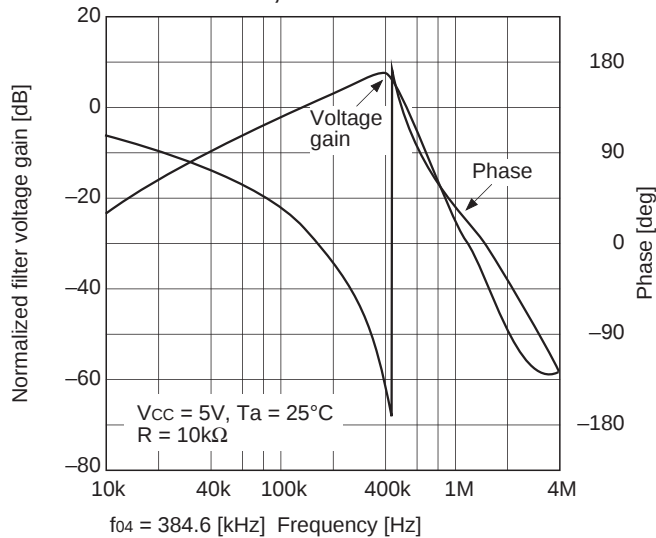
1M/inner track

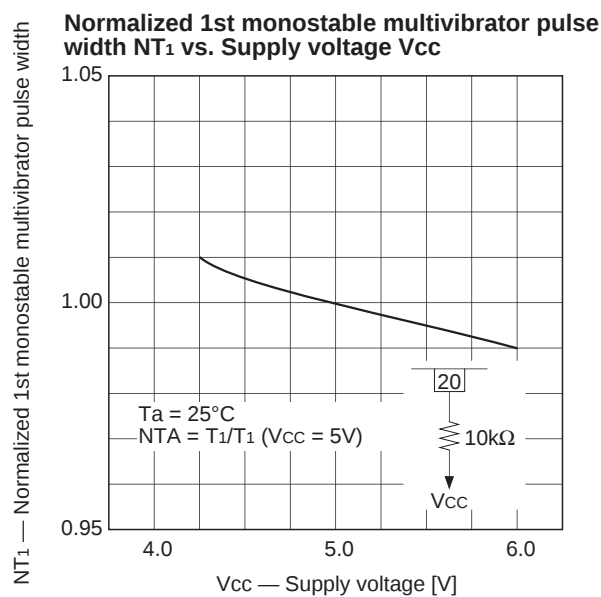
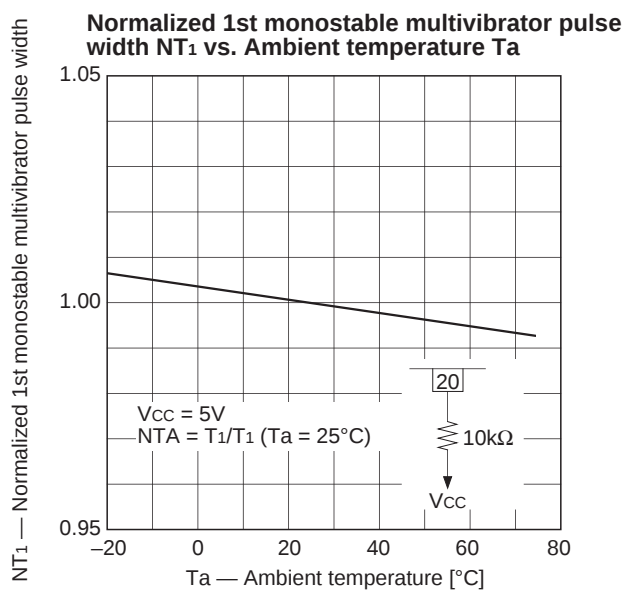
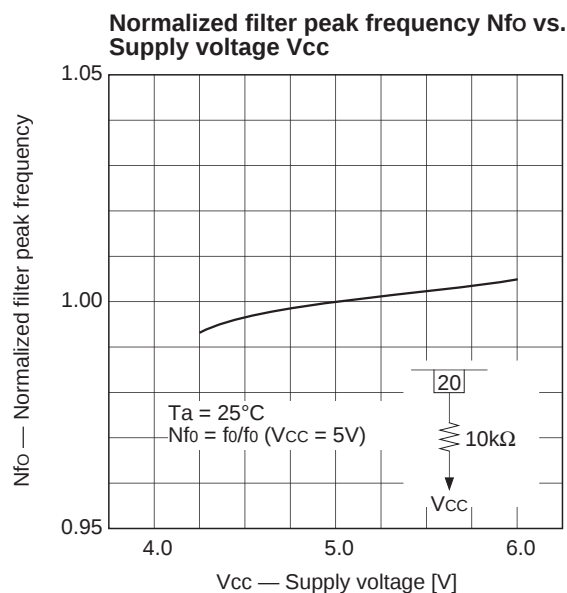
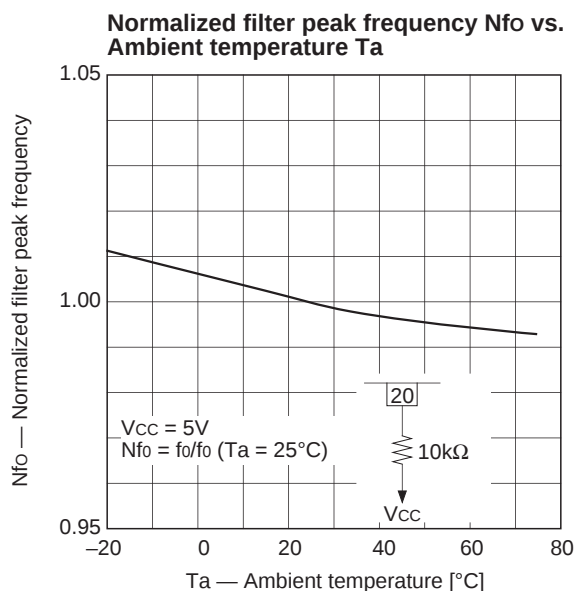
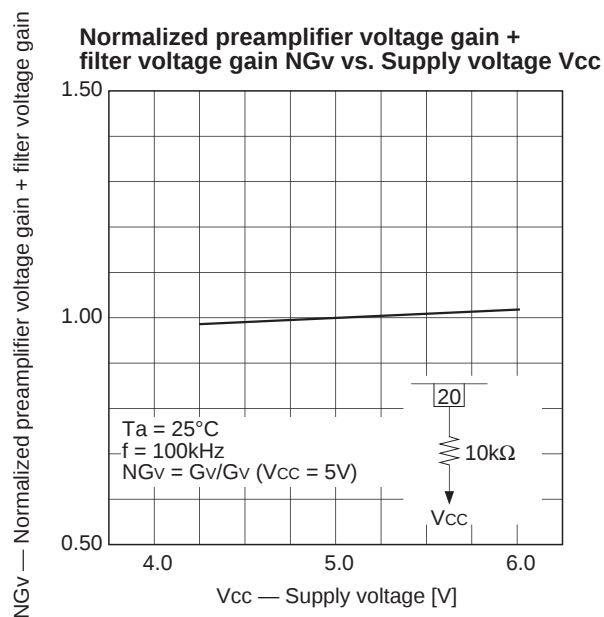
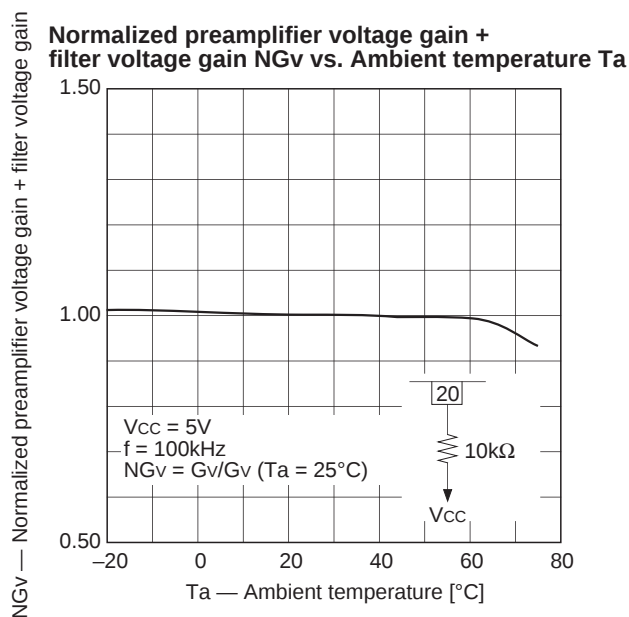


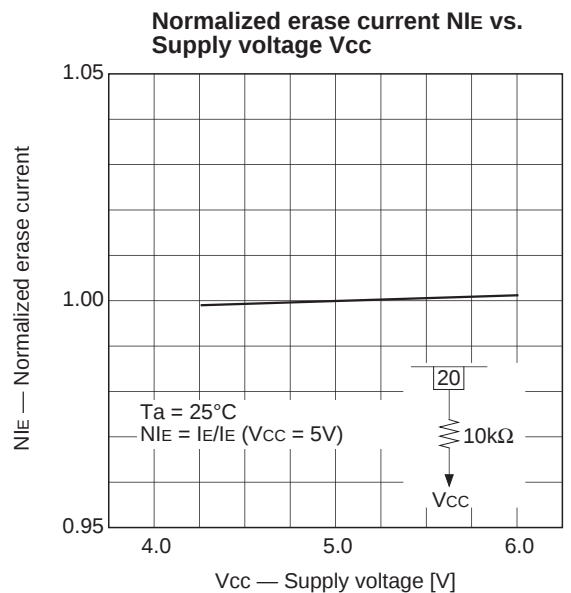
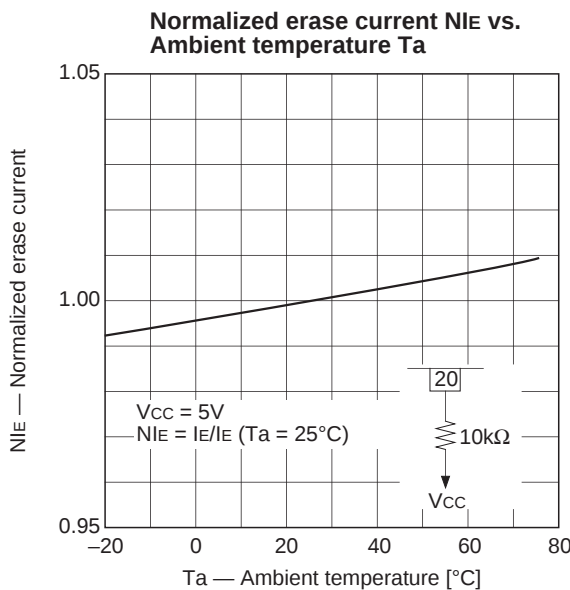
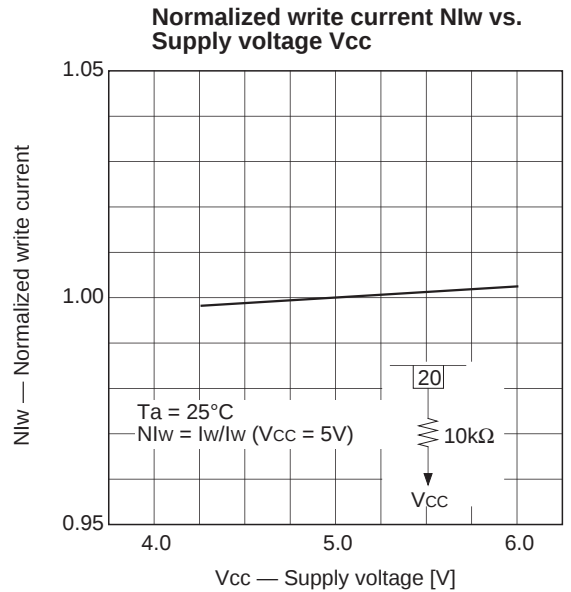
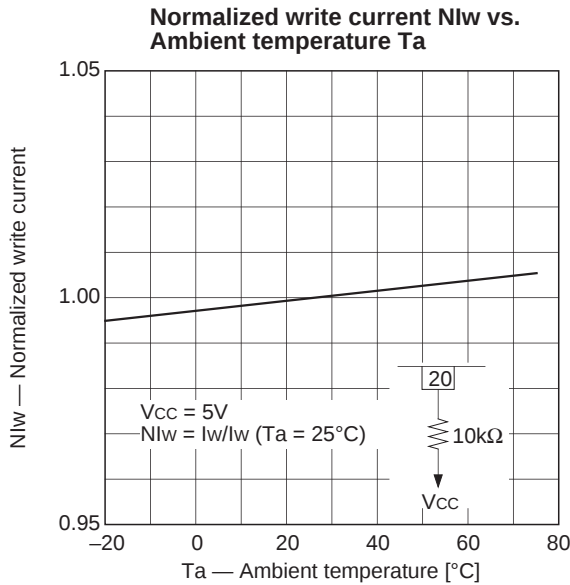
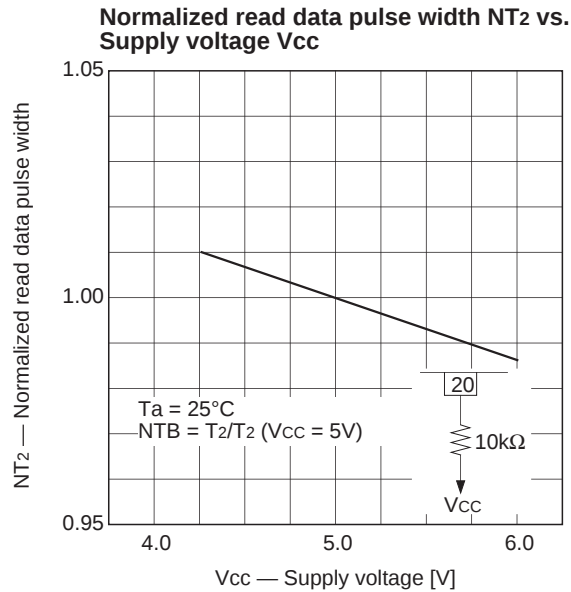
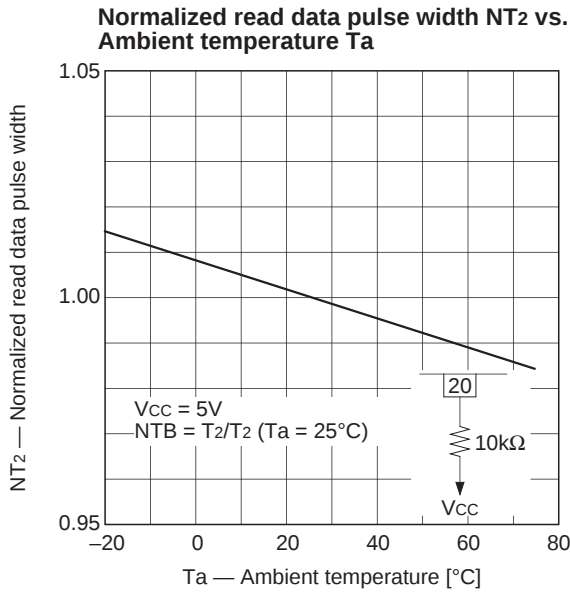
1.6M, 2M/outer track

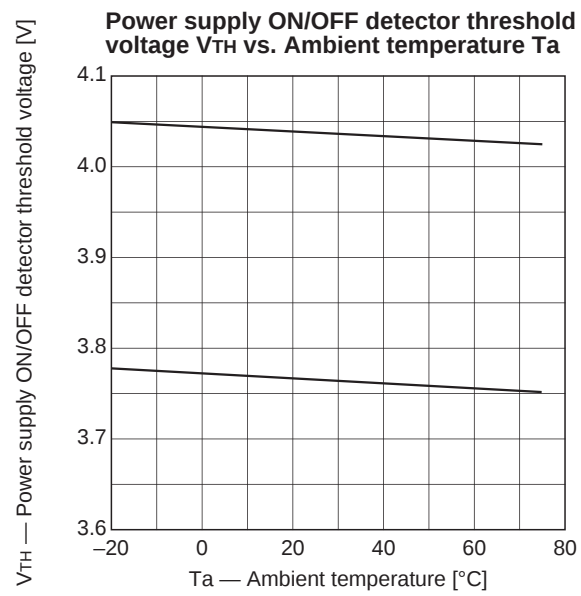


1.6M, 2M/inner track





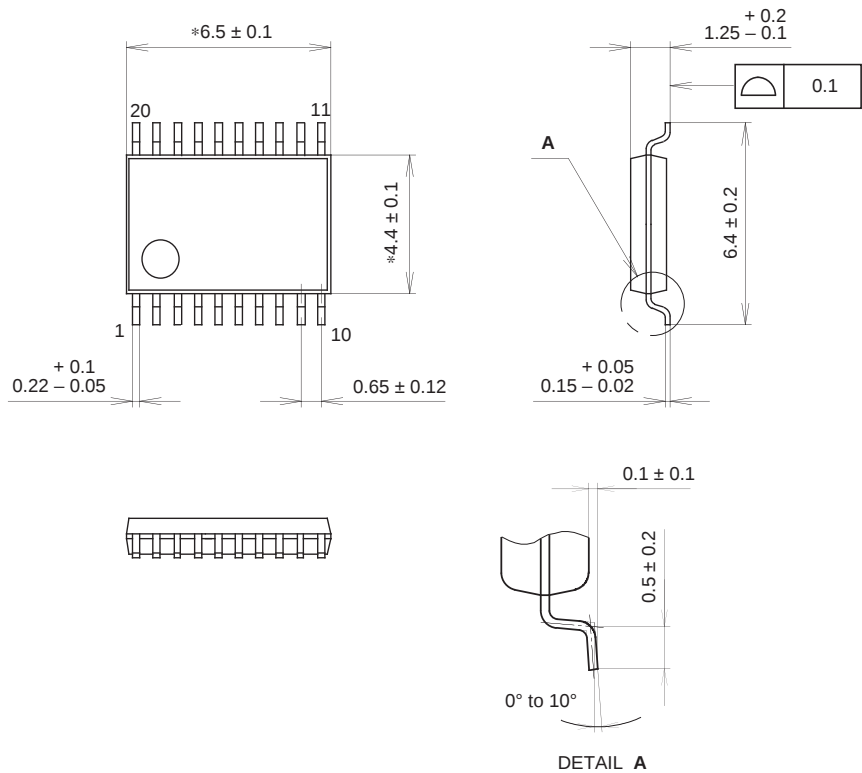




Package Outline

Unit: mm

20PIN SSOP (PLASTIC)



NOTE: Dimension "\*" does not include mold protrusion.

PACKAGE STRUCTURE

|            |                |
|------------|----------------|
| SONY CODE  | SSOP-20P-L01   |
| EIAJ CODE  | SSOP020-P-0044 |
| JEDEC CODE |                |

|                  |                            |
|------------------|----------------------------|
| PACKAGE MATERIAL | EPOXY RESIN                |
| LEAD TREATMENT   | SOLDER / PALLADIUM PLATING |
| LEAD MATERIAL    | COPPER / 42 ALLOY          |
| PACKAGE WEIGHT   | 0.1g                       |

NOTE : PALLADIUM PLATING

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