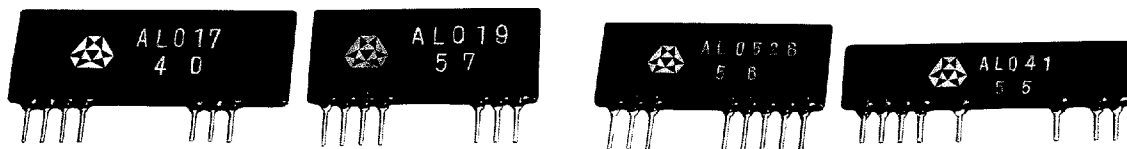


DIGITAL AUDIO ACTIVE LOW PASS FILTERS, AL SERIES (EXAMPLE)



| Part No. | Filter factor | Cut-off frequency (kHz) | Ripple (dB) | Attenuation (dB) | Distortion (%) at 1kHz | S/N (dB), S=2V | Remarks |
|----------|---------------|-------------------------|-------------|------------------|------------------------|----------------|--|
| AL017 | 9th | | | 80 | | | |
| AL018 | 9th | 20 | ±0.5 | 80 | 0.003 | 100 | Built-in aperture compensation circuit |
| AL030 | 11th | | | 90 | | | |

• The above listed products are especially suited for CD players. Various other products with different filter factors, cutoff frequencies, aperture compensation circuits, etc. are also available.

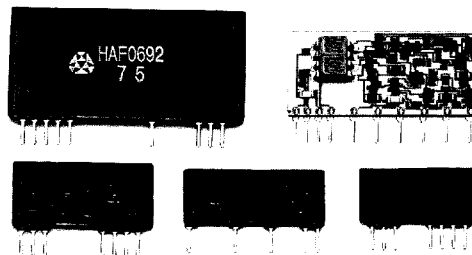
ACTIVE FILTERS, HAF SERIES (TYPICAL)

TEMPERATURE AND HUMIDITY RANGE

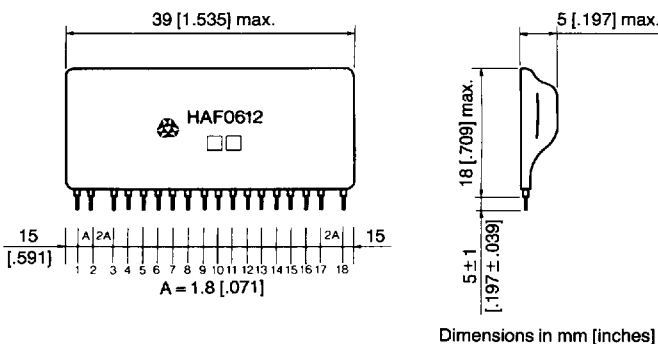
Operating temperature range (°C) [°F] 0 to 60 [32 to 140]

Storage temperature range (°C) [°F] -25 to +80 [-13 to +176]

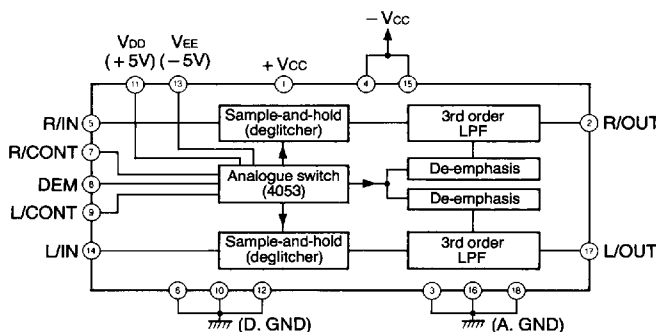
Humidity (%) RH 95 max. (Maximum wet-bulb temperature: 38°C [100.4°F])



LOW PASS FILTER, HAF0612 TYPE [3rd order stereo audio module]



Block diagram

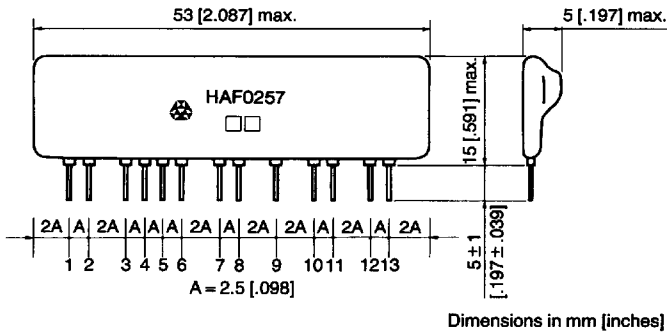


ELECTRICAL CHARACTERISTICS

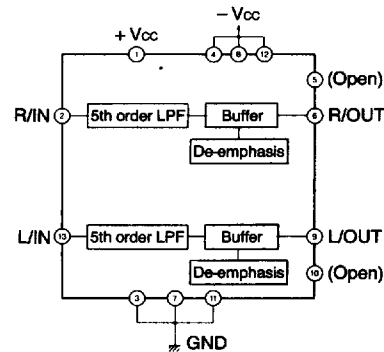
| | |
|--------------------------------|--|
| Frequency characteristics (dB) | Passband [DC to 20kHz] +0.5/-1, De-emphasis: RIAA ON/OFF |
| Distortion factor [THD+N] (%) | 0.003 typ./0.005 max. [Input 1kHz, 2V _{rms} , 30kHz LPF/ON] |
| Output noise (μV) | 57 max. [30kHz LPF/ON] |
| Crosstalk (dB) | -90 max. |

• Sampling frequency: 96kHz, Duty factor: 25%, Vcc*: ±12V, 25 ± 5°C [77 ± 9°F]
 • HAF0612 operates with Vcc: ±5V. Single power-supply operation is also available. Please contact TDK.

LOW PASS FILTER, HAF0257 TYPE [5th order stereo active]



Block diagram

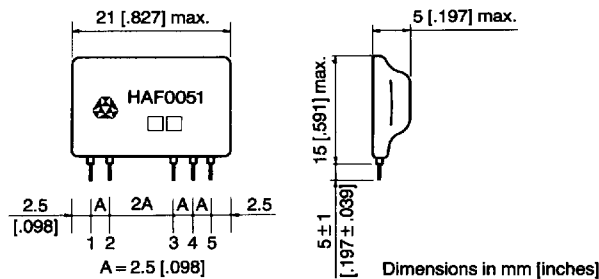


ELECTRICAL CHARACTERISTICS

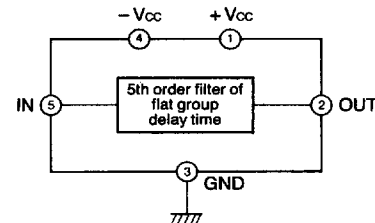
| | |
|--------------------------------|--|
| Ripple (dB) | ± 0.5 [DC to 22kHz] De-emphasis: RIAA, ON |
| Attenuation (dB) | - 75 max. [60kHz or higher] |
| Distortion factor [THD+N]* (%) | 0.0006 typ./0.003 max. |
| Insertion loss (dB) | 0 ± 0.5 [100Hz] |
| Signal-to-noise ratio* (dB) | 90 min. |
| Crosstalk (dB) | - 90 max. [1kHz] |

* Input 1kHz, 2V_{rms}; 30kHz LPF/ON
• Vcc: ± 12V, 25 ± 5°C [77 ± 9°F]

LOW PASS FILTER, HAF0051 TYPE [Flat group delay time, 5th order monaural]



Block diagram

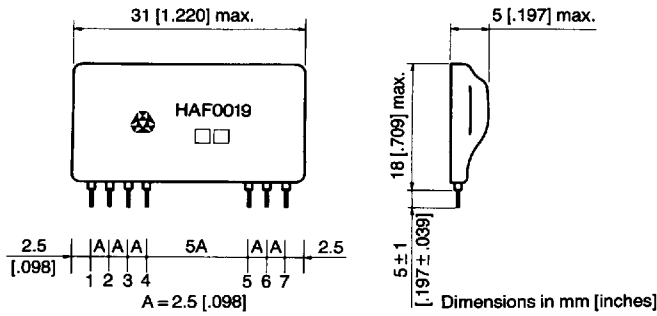


ELECTRICAL CHARACTERISTICS

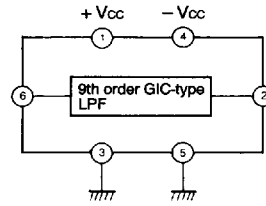
| | |
|-----------------------------------|--|
| Ripple (dB) | ± 0.1 typ./ ± 0.5 max. [DC. to 20kHz] |
| Attenuation (dB) | 55 min. [68kHz or higher] |
| Distortion factor [THD+N]* (%) | 0.002 typ./0.005 max. |
| Insertion loss (dB) | 6 ± 0.5 [1kHz] |
| Signal-to-noise ratio* (dB) | 100 min. |
| Group delay time deviation (μsec) | 10 max. [DC. to 20kHz] |

* Input 1kHz, 2V_{rms}; 30kHz LPF/ON
• Vcc: ± 15V, 25 ± 5°C [77 ± 9°F]

LOW PASS FILTER, HAF0019 TYPE [9th order monaural]



Block diagram

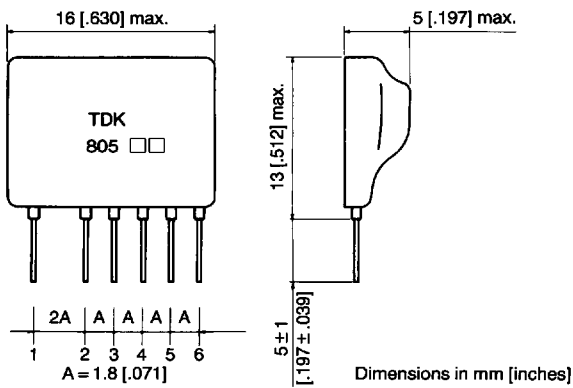


ELECTRICAL CHARACTERISTICS

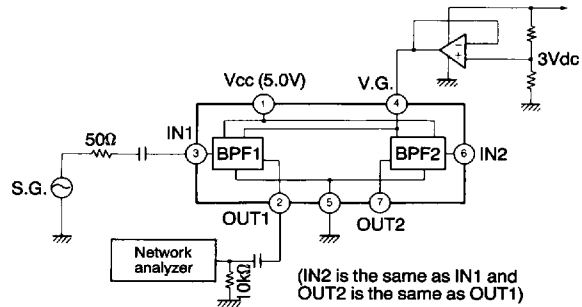
| | |
|--------------------------------|---------------------------|
| Ripple (dB) | ± 0.5 [DC. to 20kHz] |
| Attenuation (dB) | 78 min. [28kHz or higher] |
| Distortion factor [THD+N]* (%) | 0.003 typ./0.005 max. |
| Insertion loss (dB) | 6 ± 0.5 [1kHz] |
| Signal-to-noise ratio* (dB) | 96 min. |

* Input 1kHz, 2V_{rms}; 30kHz LPF/ON
 • V_{cc}: ± 15V, 25 ± 5°C [77 ± 9°F]

BAND PASS FILTER, HAF0805 TYPE [for 8mm VCR's ATF]



Block diagram



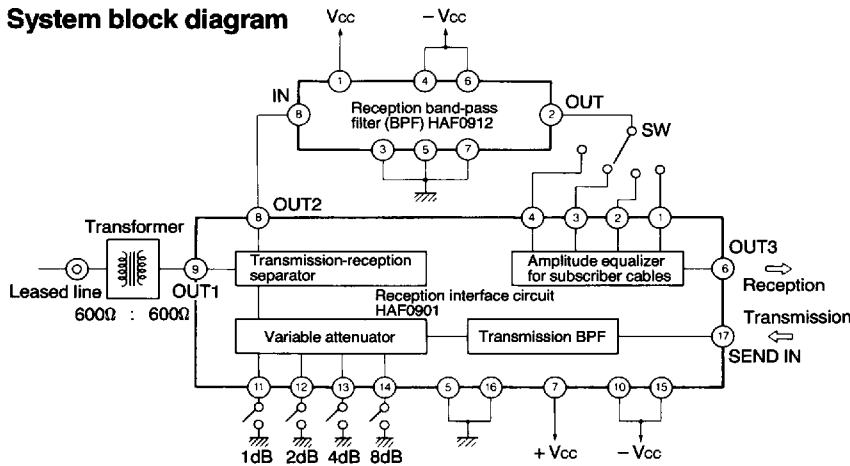
ELECTRICAL CHARACTERISTICS

| | OUT1 | OUT2 | Remarks |
|--|---------|---------|----------------------------------|
| Center frequency <i>f</i> ₀ (kHz) | 16.5 | 46.2 | Both NTSC and PAL are available. |
| Gain at <i>f</i> ₀ (dB) | 6 ± 1 | 6 ± 1 | |
| Q | 10 typ. | 10 typ. | |

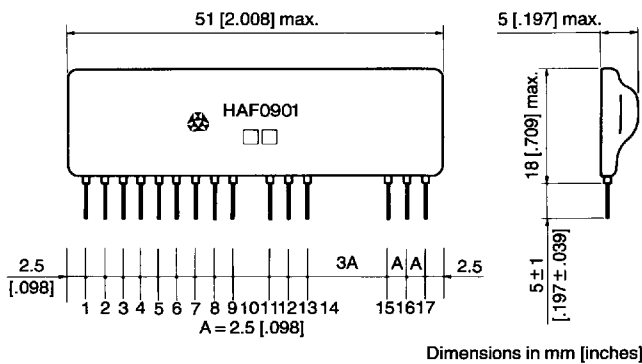
• V_{cc}: + 5.0V, 25 ± 5°C [77 ± 9°F]

FILTER BLOCK, HAF0901 AND HAF0912 TYPES [for modem in videotex]

System block diagram

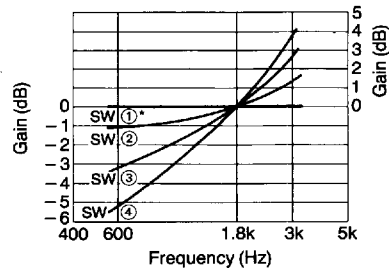


HAF0901 [Transmission interface circuit]



FREQUENCY CHARACTERISTICS OF CABLE AMPLITUDE EQUALIZER

(Relative gains where the gain at 1800Hz is assumed to be 0dB)



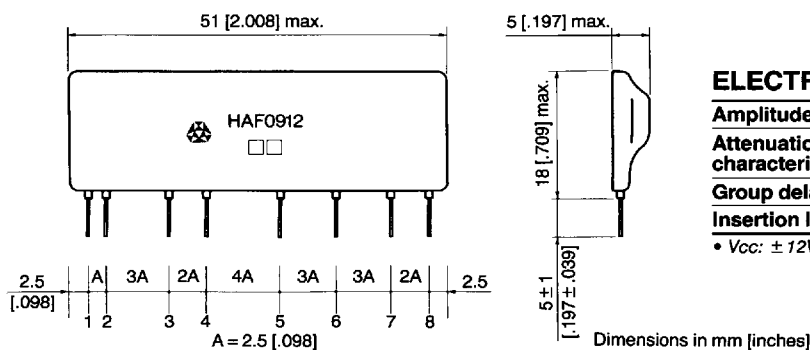
*See filter block

ELECTRICAL CHARACTERISTICS

| Item | Rating |
|----------------------------------|---|
| Transmission BPF | 0 ± 0.5 dB [at 390, 450Hz], -20 dB max. [at 200, 1000Hz] |
| Variable attenuator | Variable by 1dB between 0 to 15dB |
| Transmission-reception separator | Receiving: 0 ± 0.5 dB [OUT2/OUT1] Transmitting [Run-around to reception side]: -20 dB max. (OUT2/SEND IN) |
| Cable amplitude equalizer | Four types of equalizers can be switched. (See "Frequency characteristics of amplitude equalizer" above.) Error is ± 1.0 dB in each equalizer. |

- Vcc: ± 12 V, $25 \pm 5^\circ\text{C}$ [$77 \pm 9^\circ\text{F}$]
- Pin ⑨ (OUT1): Termination of 600Ω . Pins ⑧ and ⑥ (OUT2, 3): Load resistance of $10k\Omega$ min.

HAF0912 [Reception BPF]



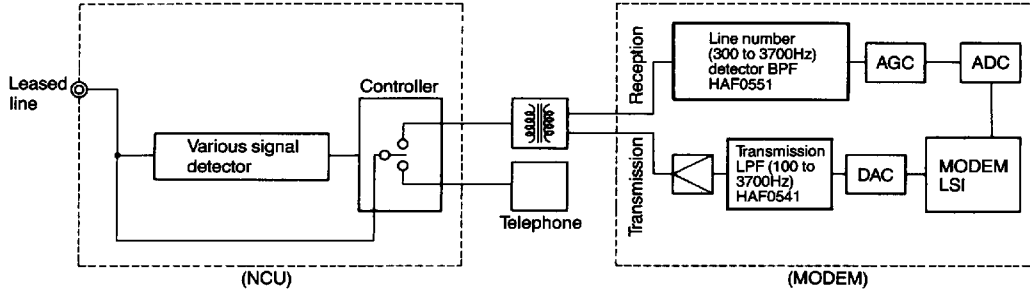
ELECTRICAL CHARACTERISTICS

| | |
|---|--|
| Amplitude (dB) | 0 ± 0.8 [800 to 3000Hz] |
| Attenuation-to-amplitude characteristics (dB) | -50 max. [390, 450Hz] -20 max. [4kHz or higher] |
| Group delay time (msec.) | 1 ± 0.1 max. [1000 to 2600Hz] |
| Insertion loss (dB) | 0 ± 0.8 [1.8kHz] |

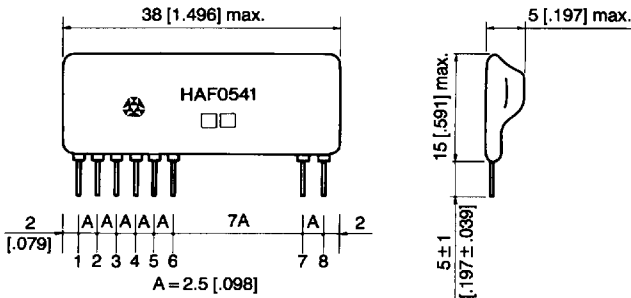
- Vcc: ± 12 V, $25 \pm 5^\circ\text{C}$ [$77 \pm 9^\circ\text{F}$]

FILTER BLOCK, HAF0541 AND HAF0551 TYPES [for facsimile]

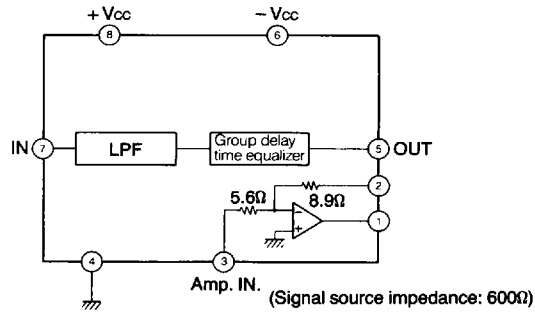
System block diagram



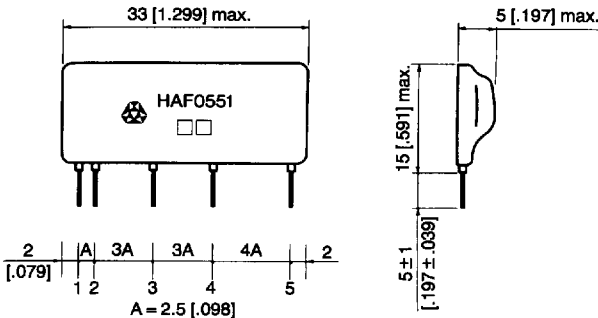
HAF0541



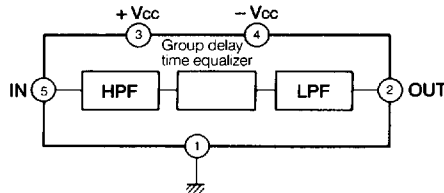
Block diagram



HAF0551



Block diagram



Dimensions in mm [inches]

ELECTRICAL CHARACTERISTICS

| Type | HAF0541 | HAF0551 |
|------------------------------------|---------------------------|--------------------------|
| Passband (Hz) | 100 to 3700 | 300 to 3700 [3dB max.] |
| Ripple (dB) | 1 max. [100 to 2kHz] | 0.6 max. [700 to 2000Hz] |
| Attenuation (dB) | 55 min. [10kHz or higher] | 40 min. [50Hz, 50kHz] |
| Group delay time deviation (μsec.) | 100 max. | 640 ± 50 [630 to 2900Hz] |
| Insertion loss (dB) | 0 ± 1 | 0 ± 1 [1kHz] |

• Vcc: ± 12V, 25 ± 5°C [77 ± 9°F]