CA-550 Series and CA-650 Series are low noise wideband current amplifiers (current to voltage converter) with a high gain. There are the following 9 types depending on the gain and package type. CA-550 Series is in a static-shielded 40-pin dual inline package. Low-profile mount is available. CA-650 Series is in a static-shielded 20-pin single inline package. This series is suitable for space-saving, multi-channel and high-density mounting.

<table>
<thead>
<tr>
<th>Model</th>
<th>CA-554F2</th>
<th>CA-654F2</th>
<th>CA-555F2</th>
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<th>CA-657F2</th>
</tr>
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<tbody>
<tr>
<td>Gain (V/A)</td>
<td>1 M</td>
<td>1 M</td>
<td>100 M</td>
<td>1 G</td>
<td>10 G</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency Response</td>
<td>DC to 1 MHz</td>
<td>DC to 500 kHz</td>
<td>DC to 250 kHz</td>
<td>DC to 100 kHz</td>
<td>DC to 20 kHz</td>
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</tr>
<tr>
<td>Equivalent Input Noise Current Density</td>
<td>150 fA/√Hz (typ.)</td>
<td>45 fA/√Hz (typ.)</td>
<td>15 fA/√Hz (typ.)</td>
<td>6 fA/√Hz (typ.)</td>
<td>2.5 fA/√Hz (typ.)</td>
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</tr>
<tr>
<td>Output Section</td>
<td>DC coupling unbalanced, single-ended output</td>
<td>±10 V</td>
<td>±5 mA</td>
<td>±3 mV</td>
<td>±15 mV</td>
<td>±20 mV</td>
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<td>±20 mV</td>
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<tr>
<td>Maximum Output Voltage</td>
<td>±10 V</td>
<td>±5 mA</td>
<td>±3 mV</td>
<td>±15 mV</td>
<td>±20 mV</td>
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</tr>
<tr>
<td>Output Impedance</td>
<td>100 MΩ or more</td>
<td>1 MΩ or more</td>
<td>100 MΩ or more</td>
<td>1 GΩ or more</td>
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<tr>
<td>Recommended Signal Source Resistance</td>
<td>100 kΩ or more</td>
<td>1 MΩ or more</td>
<td>10 MΩ or more</td>
<td>100 MΩ or more</td>
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<tr>
<td>Input Bias Current</td>
<td>±10 nA</td>
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<td>±10 nA</td>
<td>±1 nA</td>
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<td>Amplification Section</td>
<td>Gain (V/A)</td>
<td>±10 V</td>
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<tr>
<td>Output Gain Flatness (when setting fc 0, within ±0.5 dB)</td>
<td>±1×10^-1 (1 M)</td>
<td>±1×10^-1 (10 M)</td>
<td>±1×10^-1 (100 M)</td>
<td>±1×10^-1 (1 G)</td>
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</table>
WIDEBAND CURRENT AMPLIFIER

CA-550 Series / CA-650 Series

Basic connection diagram

- CA-550 Series
- CA-650 Series

Block diagram

- CA-550 Series
- CA-650 Series

Equation of external capacitor (EXT LPF CAPACITOR)

- CA-653F2
  \[ CLPF [\mu F] = \frac{10^8}{FC \text{ [Hz]}} - 1000 \text{ (Fc} \leq 100 \text{ kHz)} \]

- CA-557F2/657F2
  \[ CLPF [\mu F] = \frac{10^6}{FC \text{ [Hz]}} - 1000 \text{ (Fc} \leq 1 \text{ kHz)} \]

- CA-554F2/555F2/556F2

CA-654F2/655F2/656F2

- CA-557F2/657F2
  \[ CLPF [\mu F] = \frac{10^7}{FC \text{ [Hz]}} - 1000 \text{ (Fc} \leq 10 \text{ kHz)} \]
**Characteristics**

- **Frequency Response**

**CA-653F2 (1 M V/A)**

- Cs=10 pF: fc=1 MHz or more
- Cs=100 pF: fc=700 kHz or more
- Cs=1 nF: fc=350 kHz or more

**CA-554F2/CA-654F2 (10 M V/A)**

- Cs=10 pF: fc=578.8 kHz
- Cs=100 pF: fc=530.9 kHz
- Cs=1 nF: fc=149.6 kHz

**CA-555F2/CA-655F2 (100 M V/A)**

- Cs=10 pF: fc=290.1 kHz
- Cs=100 pF: fc=217.5 kHz
- Cs=1 nF: fc=48.7 kHz

**CA-556F2/CA-656F2 (1 G V/A)**

- Cs=10 pF: fc=112.2 kHz
- Cs=100 pF: fc=74.5 kHz
- Cs=1 nF: fc=15.4 kHz

**CA-557F2/CA-657F2 (10 G V/A)**

- Cs=10 pF: fc=21.75 kHz
- Cs=100 pF: fc=15.85 kHz
- Cs=1 nF: fc=4.34 kHz
Characteristics

Output Noise Voltage Density

CA-653F2 (1 M V/A)

CA-554F2/CA-654F2 (10 M V/A)

CA-555F2/CA-655F2 (100 M V/A)

CA-556F2/CA-656F2 (1 G V/A)

CA-557F2/CA-657F2 (10 G V/A)

150 nV/√Hz (Equivalent input noise current 150 fA/√Hz)

422 nV/√Hz (Equivalent input noise current 42.2 fA/√Hz)

1.36 μV/√Hz (Equivalent input noise current 13.6 fA/√Hz)

4.42 μV/√Hz (Equivalent input noise current 4.42 fA/√Hz)

14.3 μV/√Hz (Equivalent input noise current 1.43 fA/√Hz)
Characteristics

Pulse Response

CA-653F2 (1 M V/A)

- $C_s=10 \text{ pF}$: $t_r=0.35 \text{ μs}$
- $C_s=100 \text{ pF}$: $t_r=0.50 \text{ μs}$
- $C_s=1 \text{ nF}$: $t_r=1.00 \text{ μs}$

CA-554F2/CA-654F2 (10 M V/A)

- $C_s=10 \text{ pF}$: $t_r=0.61 \text{ μs}$
- $C_s=100 \text{ pF}$: $t_r=0.68 \text{ μs}$
- $C_s=1 \text{ nF}$: $t_r=2.42 \text{ μs}$

CA-555F2/CA-655F2 (100 M V/A)

- $C_s=10 \text{ pF}$: $t_r=1.22 \text{ μs}$
- $C_s=100 \text{ pF}$: $t_r=1.64 \text{ μs}$
- $C_s=1 \text{ nF}$: $t_r=7.07 \text{ μs}$

CA-556F2/CA-656F2 (1 G V/A)

- $C_s=10 \text{ pF}$: $t_r=3.06 \text{ μs}$
- $C_s=100 \text{ pF}$: $t_r=4.68 \text{ μs}$
- $C_s=1 \text{ nF}$: $t_r=22.8 \text{ μs}$

CA-557F2/CA-657F2 (10 G V/A)

- $C_s=10 \text{ pF}$: $t_r=15.5 \text{ μs}$
- $C_s=100 \text{ pF}$: $t_r=21.2 \text{ μs}$
- $C_s=1 \text{ nF}$: $t_r=85.1 \text{ μs}$
**Dimensions**

- **CA-550 Series**
  - Dimensions: 59.0 x 2.54 x 9.0
  - 19 x 2.54 = 48.26

- **CA-650 Series**
  - Dimensions: 66.7 x 2.54 x 13.0
  - 19 x 2.54 = 48.26

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**Evaluation kit**

PA-001-2179 for both CA-550 series and CA-650 series

The kit to evaluate characteristics before mounting on the printed circuit board.

1. Current input
2. Main output
3. Power input (HR10-7R-4P connector)
4. Power input (terminal block)
5. LPF output
6. LPF cut-off frequency setting switch
7. Offset voltage adjusting variable resistor

* Terminals and switches on the evaluation kit

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