

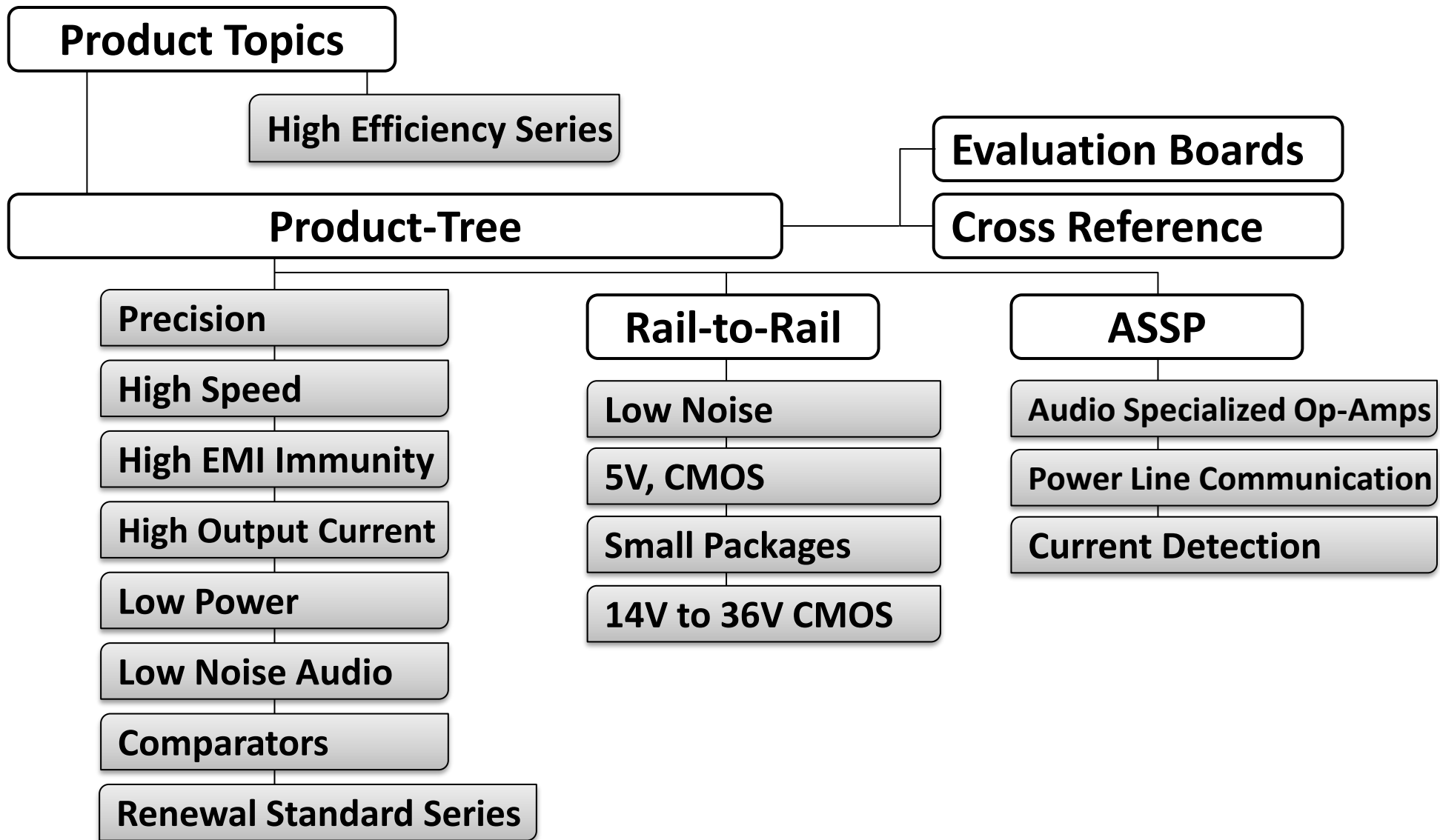
# Op-Amp and Comparator ICs Selection Guide

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*New Japan Radio Co., Ltd.*

**Apr. 2020**



# High Efficiency Op-Amps -NJU775xx Series-

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## Low Power (GBW < 1MHz)

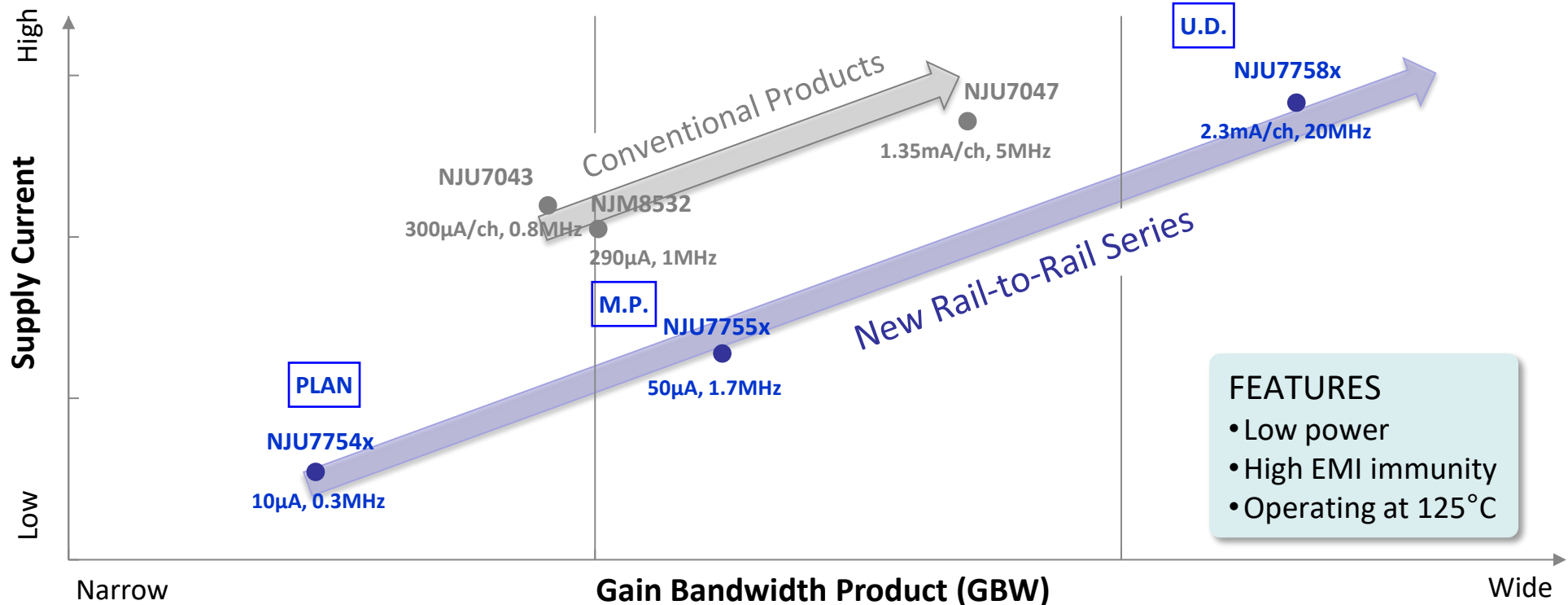
Battery-powered instruments,  
pressure/gas sensors & fire alarms

## General-Purpose (GBW 1MHz to 10MHz)

Industrial equipment,  
automotive accessories,  
current detectors & audio

## High Speed (GBW > 10MHz)

Ultrasonic/photoelectric sensors,  
motor controllers  
& measuring instruments



# Features of NJU775xx Series

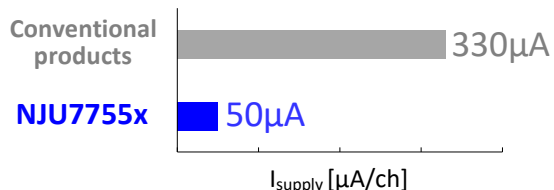
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## High Efficiency

- ✓ Low power and wide GBW

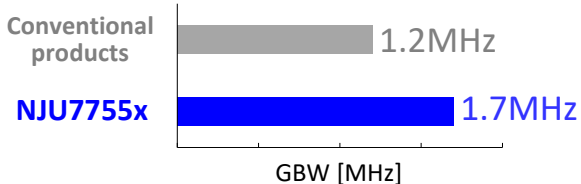
$$\text{Efficiency} = \frac{\text{GBW}}{I_{\text{supply}}}$$

Supply current



85% less supply current

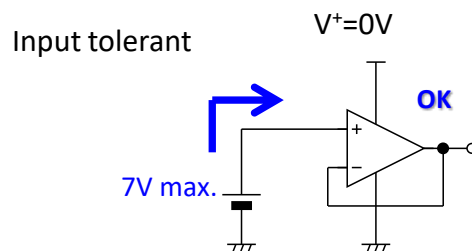
Gain bandwidth product



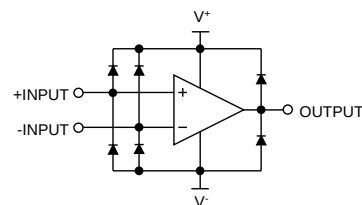
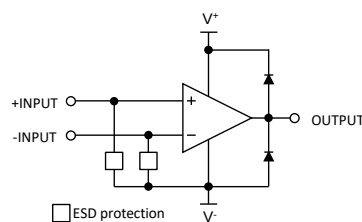
1.4 times wider GBW

## Input tolerant

- ✓ Protects Op-amps from excessive input



### BLOCK DIAGRAM COMPARISON

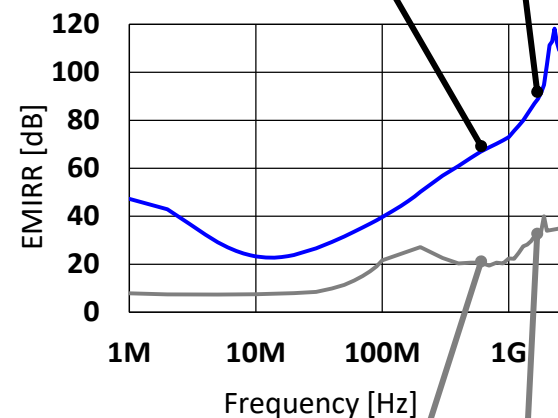


## High EMI Immunity

- ✓ Tolerance to RF noise

EMIRR = 90dB ( $f = 1.8\text{GHz}$ )

70dB ( $f = 800\text{MHz}$ )



20dB ( $f = 800\text{MHz}$ )

EMIRR = 32dB ( $f = 1.8\text{GHz}$ )

## 5V SUPPLY

### Low Power

150 $\mu$ V, 1 $\mu$ V/ $^{\circ}$ C max.

NJU77600 [1ch]  
NJU77602 [2ch]  
NJU77604 [4ch]

$I_{\text{supply}}=12\mu\text{A/ch}$   
R-R I/O

### Low Noise

150 $\mu$ V, 5 $\mu$ V/ $^{\circ}$ C max.

NJU7076 [1ch]  
NJU7077 [2ch]  
NJU7078 [4ch]

$e_n=10\text{nV}/\sqrt{\text{Hz}}$   
R-R Output

500 $\mu$ V, 10 $\mu$ V/ $^{\circ}$ C max.

New

NJU7066 [2ch]

$e_n=10\text{nV}/\sqrt{\text{Hz}}$   
R-R Output

### Zero-Drift

15 $\mu$ V, 0.05 $\mu$ V/ $^{\circ}$ C max.

NJU7098AF1-C [1ch]

R-R Output

## 36V SUPPLY

### 20V/ $\mu$ s High Speed

800 $\mu$ V, 9 $\mu$ V/ $^{\circ}$ C max.

NJM8512A [2ch]  
NJM8513A [4ch]

400 $\mu$ V, 5 $\mu$ V/ $^{\circ}$ C max.

NJM8512B [2ch]  
NJM8513B [4ch]

### Single Supply

450 $\mu$ V, 4 $\mu$ V/ $^{\circ}$ C typ.

NJM2119 [2ch]

### Low Noise

50 $\mu$ V, 0.6 $\mu$ V/ $^{\circ}$ C max.

NJMOP277 [1ch]  
NJMOP2277 [2ch]

60 $\mu$ V, 1.2 $\mu$ V/ $^{\circ}$ C max.

NJMOP177 [1ch]  
NJMOP1772 [2ch]

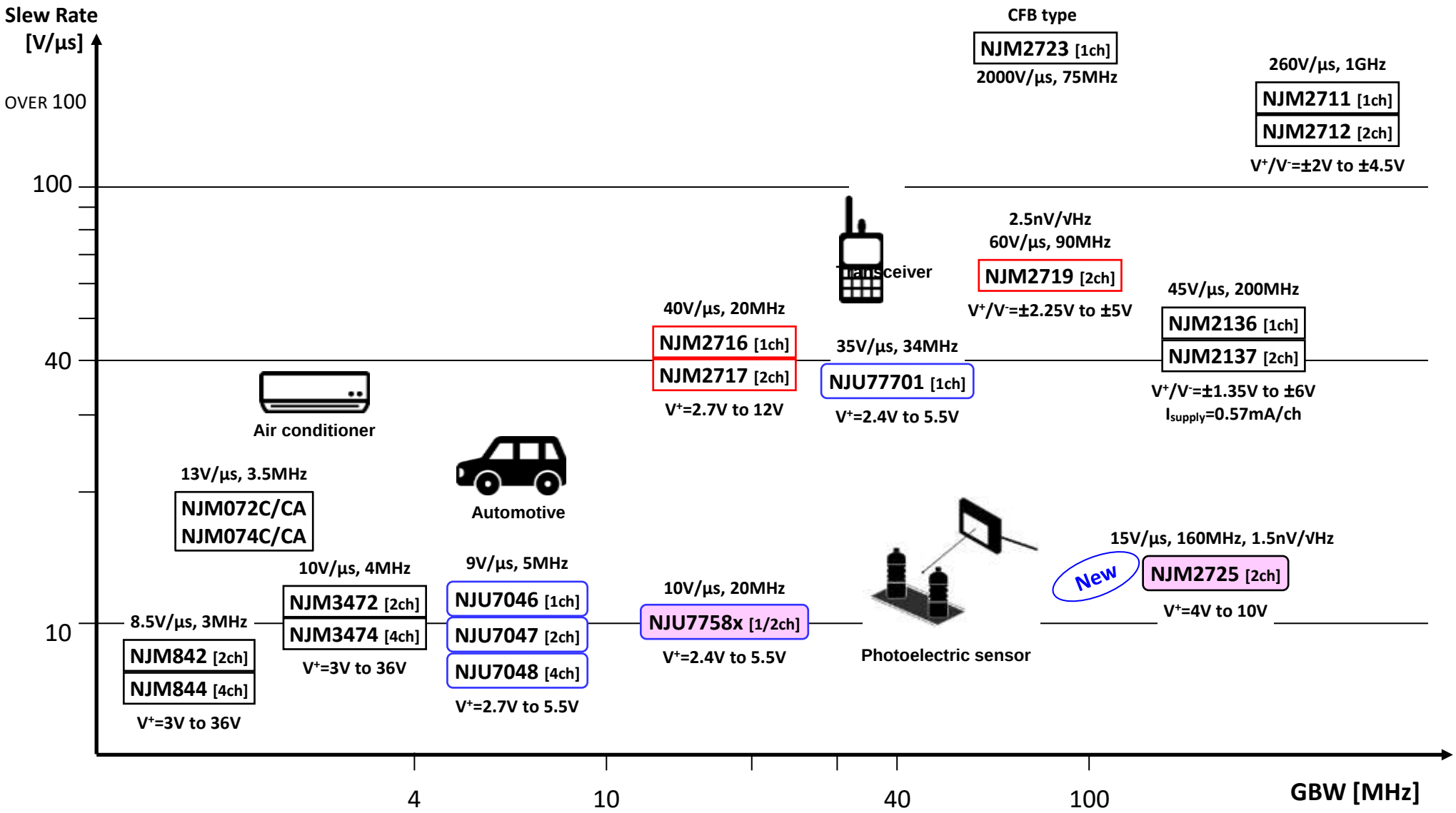
# Precision Op-Amps

| Characteristics | Rail-to-Rail | EMI-Immunity | Ch. | Supply Voltage                       | I <sub>SUPPLY</sub><br>(per Ch.) | V <sub>IO</sub><br>(25°C) | V <sub>IO</sub><br>(All Temp.) | V <sub>IO</sub><br>Drift | I <sub>B</sub> | Common-Mode Input Voltage Range |                        | -V <sub>sat</sub><br>V <sub>OL</sub> -V <sup>-</sup> | +V <sub>sat</sub><br>V <sup>+</sup> -V <sub>OH</sub> | CMR        | SR           | f <sub>T</sub> | Voltage Noise  | Package / Pin |                   |      |                    |        |       |     | SPICE Model | Notes |
|-----------------|--------------|--------------|-----|--------------------------------------|----------------------------------|---------------------------|--------------------------------|--------------------------|----------------|---------------------------------|------------------------|------------------------------------------------------|------------------------------------------------------|------------|--------------|----------------|----------------|---------------|-------------------|------|--------------------|--------|-------|-----|-------------|-------|
|                 |              |              |     | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>mA                       | max.<br>μV                | max.<br>μV                     | max.<br>μV/°C            | typ.<br>nA     | min.<br>V                       | max.<br>V              | max.<br>V                                            | max.<br>V                                            | typ.<br>dB | typ.<br>V/μs | typ.<br>MHz    | typ.<br>nV/√Hz | DMP           | SOP <sup>*1</sup> | SSOP | MSOP <sup>*2</sup> | SOT-23 | SC88A | DFN |             |       |
|                 |              |              |     |                                      |                                  |                           |                                |                          |                |                                 |                        |                                                      |                                                      |            |              |                |                |               |                   |      |                    |        |       |     |             |       |
| NJMOP177G       |              |              | 1   | 6 to 36                              | 1.6                              | 60                        | 100                            | 1.2                      | 1.2            | (V) +2                          | (V <sup>+</sup> ) -2   | 3                                                    | 3                                                    | 140        | 0.3          | 1.1            | 8              |               | 8                 |      |                    |        |       |     | ✓           |       |
| NJMOP1772       |              |              | 2   | 6 to 36                              | 1.3                              | 60                        | 100                            | 1.2                      | 1.2            | (V) +2                          | (V <sup>+</sup> ) -2   | 3                                                    | 3                                                    | 135        | 0.3          | 1.1            | 8              |               | 8                 |      |                    |        |       |     | ✓           |       |
| NJMOP277G       |              | Yes          | 1   | 4.5 to 36                            | 0.76                             | 50                        | 100                            | 0.6                      | 0.5            | (V) +2                          | (V <sup>+</sup> ) -2   | 1.5                                                  | 0.5                                                  | 140        | 0.7          | 1              | 8              |               | 8                 |      | 8                  |        |       |     | ✓           |       |
| NJMOP2277G      |              | Yes          | 2   | 4.5 to 36                            | 0.76                             | 50                        | 100                            | 0.6                      | 0.5            | (V) +2                          | (V <sup>+</sup> ) -2   | 1.5                                                  | 0.5                                                  | 140        | 0.7          | 1              | 8              |               | 8                 |      | 8                  |        |       |     | ✓           |       |
| NJMOP277F       |              | Yes          | 1   | 4.5 to 36                            | 0.76                             | 20                        | 50                             | 0.15                     | 0.5            | (V) +2                          | (V <sup>+</sup> ) -2   | 1.5                                                  | 0.5                                                  | 140        | 0.7          | 1              | 8              |               | 8                 |      | 8                  |        |       |     | ✓           |       |
| NJMOP2277F      |              | Yes          | 2   | 4.5 to 36                            | 0.76                             | 20                        | 50                             | 0.15                     | 0.5            | (V) +2                          | (V <sup>+</sup> ) -2   | 1.5                                                  | 0.5                                                  | 140        | 0.7          | 1              | 8              |               | 8                 |      |                    |        |       |     | ✓           |       |
| NJM2119         |              |              | 2   | 4 to 36                              | 0.5                              | 450                       | -                              | -                        | 18             | (V)                             | (V <sup>+</sup> ) -1.5 | 0.01                                                 | 1.6                                                  | 100        | 0.3          | 1              | -              | 8             |                   |      |                    |        |       |     | ✓           |       |
| NJM8512A        |              | Yes          | 2   | 9 to 32                              | 1.3                              | 800                       | 1400                           | 9                        | 0.025          | (V) +2.5                        | (V <sup>+</sup> ) -2.5 | 1.2                                                  | 1.5                                                  | 108        | 20           | 7              | 10             |               | 8                 |      | 8                  |        |       |     | ✓           |       |
| NJM8512B        |              | Yes          | 2   | 9 to 32                              | 1.3                              | 400                       | 700                            | 5                        | 0.025          | (V) +2.5                        | (V <sup>+</sup> ) -2.5 | 1.2                                                  | 1.5                                                  | 108        | 20           | 7              | 10             |               | 8                 |      | 8                  |        |       |     | ✓           |       |
| NJM8513A        |              | Yes          | 4   | 9 to 32                              | 1.3                              | 800                       | 1400                           | 9                        | 0.025          | (V) +2.5                        | (V <sup>+</sup> ) -2.5 | 1.2                                                  | 1.5                                                  | 108        | 20           | 7              | 10             |               |                   | 14   |                    |        |       |     | ✓           |       |
| NJM8513B        |              | Yes          | 4   | 9 to 32                              | 1.3                              | 400                       | 700                            | 5                        | 0.025          | (V) +2.5                        | (V <sup>+</sup> ) -2.5 | 1.2                                                  | 1.5                                                  | 108        | 20           | 7              | 10             |               |                   | 14   |                    |        |       |     | ✓           |       |
| NJU7076         | Out          | Yes          | 1   | 2.2 to 5.5                           | 0.6                              | 150                       | 400                            | 5                        | 0.001          | (V)                             | (V <sup>+</sup> ) -1   | 0.15                                                 | 0.15                                                 | 90         | 0.5          | 1.3            | 10             |               |                   |      |                    | 5      |       |     | ✓           |       |
| NJU7076B        | Out          | Yes          | 1   | 2.2 to 5.5                           | 0.6                              | 300                       | 400                            | 5                        | 0.001          | (V)                             | (V <sup>+</sup> ) -1   | 0.15                                                 | 0.15                                                 | 90         | 0.5          | 1.3            | 10             |               |                   |      |                    |        | 5     |     | ✓           |       |
| NJU7066         | Out          | Yes          | 2   | 2.2 to 5.5                           | 0.6                              | 500                       | 800                            | 10                       | 0.001          | (V)                             | (V <sup>+</sup> ) -1   | 0.15                                                 | 0.15                                                 | 90         | 0.5          | 1.3            | 10             |               |                   |      | 8                  |        |       |     |             |       |
| NJU7077         | Out          | Yes          | 2   | 2.2 to 5.5                           | 0.6                              | 150                       | 400                            | 5                        | 0.001          | (V)                             | (V <sup>+</sup> ) -1   | 0.15                                                 | 0.15                                                 | 90         | 0.5          | 1.3            | 10             |               |                   |      | 8                  |        |       |     | ✓           |       |
| NJU7078         | Out          | Yes          | 4   | 2.2 to 5.5                           | 0.575                            | 200                       | 400                            | 5                        | 0.001          | (V)                             | (V <sup>+</sup> ) -1   | 0.15                                                 | 0.15                                                 | 90         | 0.5          | 1.3            | 10             |               |                   | 14   |                    |        |       |     |             |       |
| NJU7098AF1-C    | Out          | Yes          | 1   | 3 to 10                              | 0.6                              | 15                        | 15                             | 0.05                     | 0.02           | (V)                             | (V <sup>+</sup> ) -1.5 | 0.01                                                 | 0.15                                                 | 130        | 3            | 3              | 120            |               |                   |      |                    | 6      |       |     | ✓           |       |
| NJU77600 (U.D.) | I/O          | Yes          | 1   | 2.3 to 5.5                           | 12                               | 150                       | 400                            | 1                        | 0.001          | (V)                             | (V <sup>+</sup> )      | 0.15                                                 | 0.15                                                 | -          | 0.04         | 0.08           | -              |               |                   |      |                    | 5      |       |     |             |       |
| NJU77602 (U.D.) | I/O          | Yes          | 2   | 2.3 to 5.5                           | 12                               | 150                       | 400                            | 1                        | 0.001          | (V)                             | (V <sup>+</sup> )      | 0.15                                                 | 0.15                                                 | -          | 0.04         | 0.08           | -              |               | 8                 |      | 8                  |        |       | 8   |             |       |
| NJU77604 (U.D.) | I/O          | Yes          | 4   | 2.3 to 5.5                           | 12                               | 200                       | 400                            | 1                        | 0.001          | (V)                             | (V <sup>+</sup> )      | 0.15                                                 | 0.15                                                 | -          | 0.04         | 0.08           | -              |               |                   | 14   |                    |        |       |     |             |       |

# High Speed Op-Amps

● : U.D.     : Rail-to-rail output  
 : M.P.     : Rail-to-rail I/O

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# High Speed Op-Amps

| Characteristics<br>Product Name | Rail-to-Rail | EMI-Immunity | Ch. | Supply Voltage                       | I <sub>SUPPLY</sub><br>(per Ch.) | SR           | GBW         | f <sub>T</sub> | Common-Mode<br>Input Voltage Range |                        | -V <sub>sat</sub><br>V <sub>OL</sub> -V <sup>-</sup> | +V <sub>sat</sub><br>V <sup>+</sup> -V <sub>OH</sub> | R <sub>L</sub> | I <sub>O</sub> <sup>*3</sup> | Voltage Noise  | V <sub>IO</sub> | Topr       | Package / Pin |                   |      |                    |     |        |       | SPICE Model | Notes                 |
|---------------------------------|--------------|--------------|-----|--------------------------------------|----------------------------------|--------------|-------------|----------------|------------------------------------|------------------------|------------------------------------------------------|------------------------------------------------------|----------------|------------------------------|----------------|-----------------|------------|---------------|-------------------|------|--------------------|-----|--------|-------|-------------|-----------------------|
|                                 |              |              |     | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>mA                       | typ.<br>V/μs | typ.<br>MHz | typ.<br>MHz    | min.<br>V                          | max.<br>V              | max.<br>V                                            | max.<br>V                                            | Ω              | typ.<br>mA                   | typ.<br>nV/√Hz | max.<br>mV      | °C         | DMP           | SOP <sup>*1</sup> | SSOP | MSOP <sup>*2</sup> | DFN | SOT-23 | SC88A |             |                       |
| NJM072C/CA                      |              |              | 2   | 8 to 36                              | 1.4                              | 13           | 3.5         | 3              | (V <sup>-</sup> ) +4               | (V <sup>+</sup> ) -4   | 3                                                    | 3                                                    | 10k            | 50                           | 18             | 10/6            | -40 to 85  |               | 8                 | 8    |                    |     |        |       | ✓           |                       |
| NJM074C/CA                      |              |              | 4   | 8 to 36                              | 1.4                              | 13           | 3.5         | 3              | (V <sup>-</sup> ) +4               | (V <sup>+</sup> ) -4   | 3                                                    | 3                                                    | 10k            | 50                           | 18             | 10/6            | -40 to 85  |               | 14                | 14   |                    |     |        |       | ✓           |                       |
| NJM2136                         |              |              | 1   | 2.7 to 12                            | 0.63                             | 45           | 200         | 40             | (V <sup>-</sup> ) +1.3             | (V <sup>+</sup> ) -1.3 | 1.6                                                  | 1.4                                                  | 1k             | 3                            | -              | 5               | -40 to 85  | 8             |                   | 8    |                    |     |        |       | ✓           |                       |
| NJM2137                         |              |              | 2   | 2.7 to 12                            | 0.57                             | 45           | 200         | 40             | (V <sup>-</sup> ) +1.3             | (V <sup>+</sup> ) -1.3 | 1.6                                                  | 1.4                                                  | 1k             | 3                            | -              | 5               | -40 to 85  | 8             |                   | 8    |                    |     |        |       | ✓           |                       |
| NJM2711                         |              |              | 1   | 4 to 9                               | 1.9                              | 260          | 1000        | 180            | (V <sup>-</sup> ) +1.2             | (V <sup>+</sup> ) -1.2 | 1.3                                                  | 1.3                                                  | 1k             | 23                           | 6.8            | 7               | -40 to 85  |               |                   |      |                    |     | 5      |       |             |                       |
| NJM2712                         |              |              | 2   | 4 to 9                               | 1.9                              | 260          | 1000        | 180            | (V <sup>-</sup> ) +1.2             | (V <sup>+</sup> ) -1.2 | 1.3                                                  | 1.3                                                  | 1k             | 23                           | 6.8            | 7               | -40 to 85  | 8             |                   |      | 8                  |     |        |       |             |                       |
| NJM2716                         | Out          |              | 1   | 2.7 to 12                            | 4.2                              | 40           | -           | 30             | (V <sup>-</sup> )                  | (V <sup>+</sup> ) -1.2 | 0.5                                                  | 0.5                                                  | 4k             | 2.5                          | 40             | 10              | -40 to 85  |               |                   |      |                    |     | 5      |       | ✓           |                       |
| NJM2717                         | Out          |              | 2   | 2.7 to 12                            | 4                                | 40           | -           | 20             | (V <sup>-</sup> )                  | (V <sup>+</sup> ) -1.2 | 0.5                                                  | 0.5                                                  | 4k             | 2.5                          | 40             | 11              | -40 to 85  | 8             |                   | 8    | 8                  |     |        |       | ✓           |                       |
| NJM2719                         | Out          |              | 2   | 4.5 to11                             | 7                                | 60           | -           | 100            | (V <sup>-</sup> ) +0.5             | (V <sup>+</sup> ) -1.3 | 0.3                                                  | 0.4                                                  | 1k             | 18                           | 2.5            | 9               | -40 to 85  |               |                   | 8    | 8                  |     |        |       | ✓           |                       |
| NJM2723                         |              |              | 1   | 7 to 35                              | 2.9                              | 2000         | 75          | -              | (V <sup>-</sup> ) +4               | (V <sup>+</sup> ) -4   | 3.5                                                  | 3.5                                                  | 1k             | 30                           | 5              | 20              | -40 to 85  |               | 8                 |      |                    |     |        |       |             | CFB typ               |
| NJM2725 (U.D.)                  |              |              | 2   | 4 to10                               | 4                                | 15           | 160         | -              | (V <sup>-</sup> ) +1.5             | (V <sup>+</sup> ) -1   | 1.3                                                  | 1.5                                                  | 1k             | 30                           | 1.5            | 1               | -40 to 125 |               | 8                 |      | 8                  |     |        |       |             |                       |
| NJM3472                         |              | Yes          | 2   | 3 to36                               | 2                                | 10           | 3           | 3.6            | (V <sup>-</sup> )                  | (V <sup>+</sup> ) -2.0 | 0.7                                                  | 1.3                                                  | 10k            | 30                           | -              | 5.5             | -40 to 125 |               | 8                 | 8    | 8                  |     |        |       | ✓           |                       |
| NJM3474                         |              | Yes          | 4   | 3 to 36                              | 2                                | 10           | 3           | 3.6            | (V <sup>-</sup> )                  | (V <sup>+</sup> ) -2.0 | 0.7                                                  | 1.3                                                  | 10k            | 30                           | -              | 5.5             | -40 to 125 |               | 14                | 14   |                    |     |        |       |             |                       |
| NJM842                          |              | Yes          | 2   | 3 to36                               | 1.65                             | 8.5          | 3.5         | -              | (V <sup>-</sup> )                  | (V <sup>+</sup> ) -1.8 | 0.01                                                 | 1.3                                                  | 2k             | 30                           | -              | 3.5             | -40 to 125 |               | 8                 | 8    | 8                  |     |        |       | ✓           |                       |
| NJM844                          |              | Yes          | 4   | 3 to 36                              | 1.65                             | 8.5          | 3.5         | -              | (V <sup>-</sup> )                  | (V <sup>+</sup> ) -1.8 | 0.01                                                 | 1.3                                                  | 2k             | 30                           | -              | 3.5             | -40 to 125 |               | 14                | 14   |                    |     |        |       | ✓           |                       |
| NJU7046                         | I/O          | Yes          | 1   | 2.7 to 5.5                           | 1.4                              | 9            | 5           | 5              | (V <sup>-</sup> )                  | (V <sup>+</sup> )      | 0.05                                                 | 0.05                                                 | 10k            | 100                          | 20             | 5               | -40 to 125 |               |                   |      |                    |     | 5      | 5     | ✓           |                       |
| NJU7047                         | I/O          | Yes          | 2   | 2.7 to 5.5                           | 1.35                             | 9            | 5           | 5              | (V <sup>-</sup> )                  | (V <sup>+</sup> )      | 0.05                                                 | 0.05                                                 | 10k            | 100                          | 20             | 5               | -40 to 125 |               | 8                 |      | 8                  | 8   |        |       | ✓           |                       |
| NJU7048                         | I/O          | Yes          | 4   | 2.7 to 5.5                           | 1.325                            | 9            | 5           | 5              | (V <sup>-</sup> )                  | (V <sup>+</sup> )      | 0.05                                                 | 0.05                                                 | 10k            | 100                          | 20             | 5               | -40 to 125 |               | 14                | 14   |                    |     |        |       | ✓           |                       |
| NJU7758x (U.D.)                 | I/O          | Yes          | 1/2 | 2.4 to 5.5                           | 1.8                              | 10           | 20          | -              | (V <sup>-</sup> ) -0.2             | (V <sup>+</sup> ) +0.2 | 0.025                                                | 0.025                                                | -              | -                            | 8              | 4               | -55 to 125 |               | 8                 |      | 8                  | 8   | 5      |       |             |                       |
| NJU77701                        | I/O          | Yes          | 1   | 2.4 to 5.5                           | 3.8                              | 35           | 34          | 25             | (V <sup>-</sup> )                  | (V <sup>+</sup> )      | 0.08                                                 | 0.1                                                  | 600            | 110                          | 6              | 1.5             | -40 to 125 |               |                   |      |                    |     | 5      |       | ✓           | Stable Gain<br>≥ 14dB |



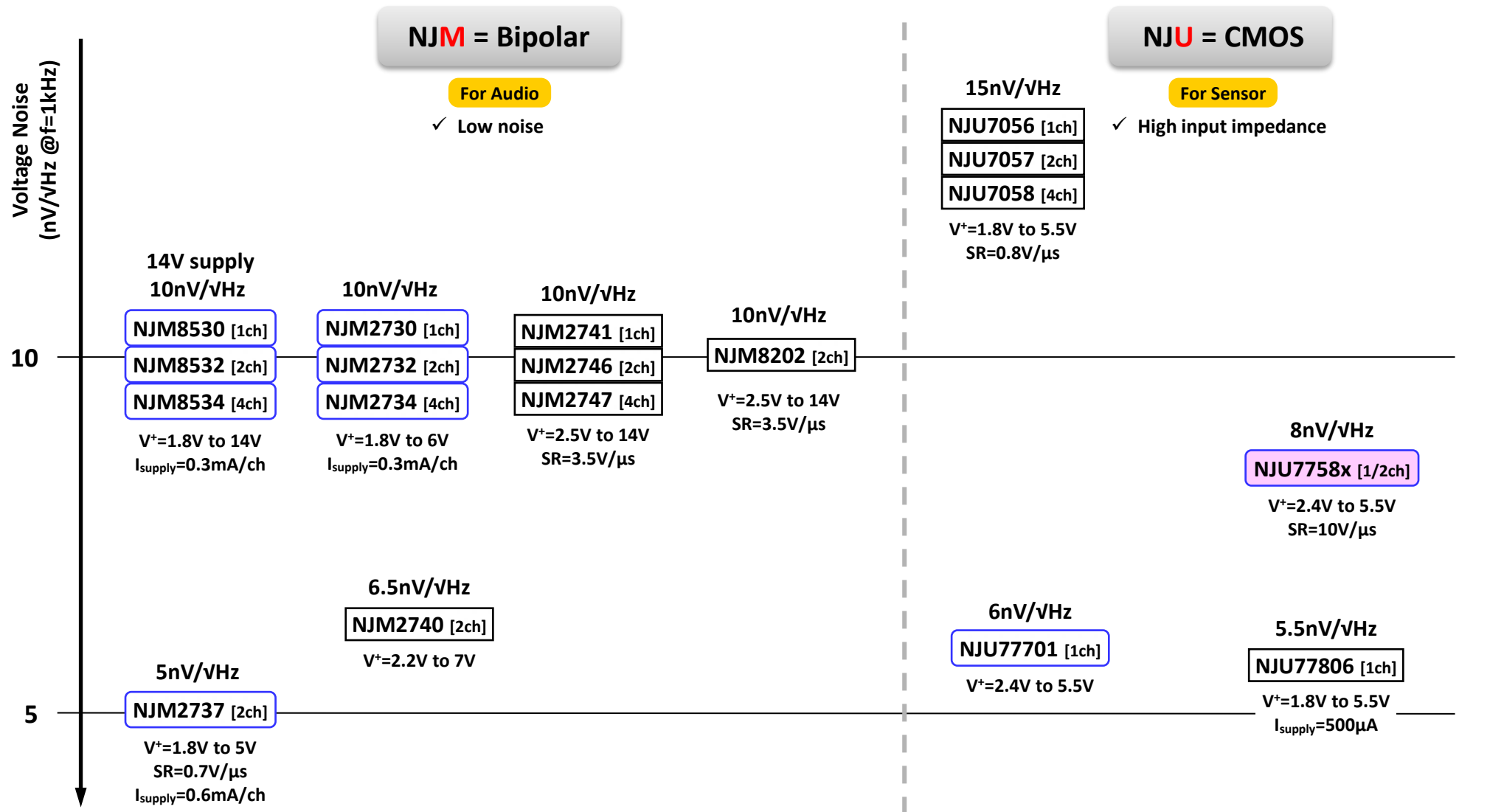
Voltage Noise  $\leq 15\text{nV}/\sqrt{\text{Hz}}$

# Low Noise, Rail-to-Rail Op-Amps

○ : U.D.  
○ : M.P.

□ : Rail-to-rail output  
□ : Rail-to-rail I/O

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# Low Noise, Rail-to-Rail Op-Amps

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| Characteristics<br><br>Product Name | Rail-to-Rail | EMI-Immunity |     | Supply Voltage                       | I <sub>SUPPLY</sub><br>(per Ch.) | V <sub>IO</sub> | Common-Mode<br>Input Voltage Range |                        | -Vs <sub>at</sub><br>V <sub>OL</sub> -V <sup>-</sup> | +Vs <sub>at</sub><br>V <sup>+</sup> -V <sub>OH</sub> | R <sub>L</sub> | Io <sup>*3</sup> | SR           | GBW         | Voltage Noise  | Package / Pin |                   |      |                    |       |       |      |     | SPICE Model        | Notes |
|-------------------------------------|--------------|--------------|-----|--------------------------------------|----------------------------------|-----------------|------------------------------------|------------------------|------------------------------------------------------|------------------------------------------------------|----------------|------------------|--------------|-------------|----------------|---------------|-------------------|------|--------------------|-------|-------|------|-----|--------------------|-------|
|                                     |              |              |     | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>mA                       | max.<br>mV      | min.<br>V                          | max.<br>V              | max.<br>V                                            | max.<br>V                                            | Ω              | typ.<br>mA       | typ.<br>V/μs | typ.<br>MHz | typ.<br>nV/√Hz | DMP           | SOP <sup>*1</sup> | SSOP | MSOP <sup>*2</sup> | SOT23 | SC88A | PCSP | DFN |                    |       |
|                                     |              |              |     | Ch.                                  |                                  |                 |                                    |                        |                                                      |                                                      |                |                  |              |             |                |               |                   |      |                    |       |       |      |     |                    |       |
| NJM2730                             | I/O          |              | 1   | 1.8 to 5                             | 0.32                             | 5               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 20k            | 10               | 0.4          | 1           | 10             |               |                   |      | 5                  |       |       |      | ✓   |                    |       |
| NJM2732                             | I/O          |              | 2   | 1.8 to 6                             | 0.29                             | 5               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 20k            | 10               | 0.4          | 1           | 10             | 8             | 8                 | 8    | 8                  |       | 20    |      | ✓   |                    |       |
| NJM2734                             | I/O          |              | 4   | 1.8 to 6                             | 0.3                              | 5               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 20k            | 10               | 0.4          | 1           | 10             | 14            |                   | 14   |                    |       | 20    |      | ✓   |                    |       |
| NJM2737                             | I/O          |              | 2   | 1.8 to 6                             | 0.6                              | 5               | (V)                                | (V <sup>+</sup> )      | 0.15                                                 | 0.1                                                  | 20k            | 10               | 0.7          | 3.1         | 5              | 8             |                   | 8    | 8                  |       |       |      | ✓   |                    |       |
| NJM2740                             | Out          |              | 2   | 2.2 to 7                             | 1.75                             | 6               | (V) +1.1                           | (V <sup>+</sup> ) -1   | 0.5                                                  | 0.5                                                  | 2.5k           | 1                | 4            | 12          | 6.5            | 8             |                   | 8    | 8                  |       |       |      | ✓   |                    |       |
| NJM2741                             | Out          |              | 1   | 2.5 to 14                            | 2.2                              | 6               | (V)                                | (V <sup>+</sup> ) -1   | 0.25                                                 | 0.25                                                 | 5k             | 1                | 3.5          | 10          | 10             |               |                   |      | 5                  | 5     |       |      | ✓   |                    |       |
| NJM2746                             | Out          |              | 2   | 2.5 to 14                            | 2                                | 6               | (V)                                | (V <sup>+</sup> ) -1   | 0.25                                                 | 0.25                                                 | 5k             | 1                | 3.5          | 10          | 10             | 8             | 8                 | 8    | 8                  |       | 8     |      | ✓   |                    |       |
| NJM2747                             | Out          |              | 4   | 2.5 to 14                            | 2                                | 6               | (V)                                | (V <sup>+</sup> ) -1   | 0.25                                                 | 0.25                                                 | 5k             | 1                | 3.5          | 10          | 10             | 14            |                   | 14   |                    |       | 20    |      | ✓   |                    |       |
| NJM8202                             | Out          | Yes          | 2   | 2.5 to 14                            | 2                                | 6               | (V)                                | (V <sup>+</sup> ) -1   | 0.25                                                 | 0.25                                                 | 5k             | 1                | 3.5          | 10          | 10             | 8             | 8                 | 8    | 8                  |       |       |      | ✓   |                    |       |
| NJM8530                             | I/O          |              | 1   | 1.8 to 14                            | 0.32                             | 4               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 20k            | 10               | 0.4          | 1           | 10             |               |                   |      | 5                  |       |       |      | ✓   |                    |       |
| NJM8532                             | I/O          |              | 2   | 1.8 to 14                            | 0.29                             | 4               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 20k            | 10               | 0.4          | 1           | 10             | 8             |                   | 8    | 8                  |       |       |      | ✓   |                    |       |
| NJM8534                             | I/O          |              | 4   | 1.8 to 14                            | 0.3                              | 4               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 20k            | 10               | 0.4          | 1           | 10             |               |                   | 14   |                    |       |       |      | ✓   |                    |       |
| NJU7046                             | I/O          | Yes          | 1   | 2.7 to 5.5                           | 1.4                              | 5               | (V)                                | (V <sup>+</sup> )      | 0.05                                                 | 0.05                                                 | 10k            | 100              | 9            | 5           | 20             |               |                   |      | 5                  | 5     |       |      | ✓   |                    |       |
| NJU7047                             | I/O          | Yes          | 2   | 2.7 to 5.5                           | 1.35                             | 5               | (V)                                | (V <sup>+</sup> )      | 0.05                                                 | 0.05                                                 | 10k            | 100              | 9            | 5           | 20             |               | 8                 |      | 8                  |       |       | 8    | ✓   |                    |       |
| NJU7048                             | I/O          | Yes          | 4   | 2.7 to 5.5                           | 1.325                            | 5               | (V)                                | (V <sup>+</sup> )      | 0.05                                                 | 0.05                                                 | 10k            | 100              | 9            | 5           | 20             |               | 14                | 14   |                    |       |       |      | ✓   |                    |       |
| NJU7056                             | Out          | Yes          | 1   | 1.8 to 5.5                           | 0.26                             | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                                  | 0.1                                                  | 10k            | 45               | 0.8          | 2.1         | 15             |               |                   |      | 5                  | 5     |       |      | ✓   |                    |       |
| NJU7057                             | Out          | Yes          | 2   | 1.8 to 5.5                           | 0.26                             | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                                  | 0.1                                                  | 10k            | 45               | 0.8          | 2.1         | 15             |               |                   | 8    |                    |       |       | 8    | ✓   |                    |       |
| NJU7058                             | Out          | Yes          | 4   | 1.8 to 5.5                           | 0.275                            | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                                  | 0.1                                                  | 10k            | 45               | 0.8          | 2.1         | 15             |               |                   | 14   |                    |       |       |      | ✓   |                    |       |
| NJU7758x (U.D.)                     | I/O          | Yes          | 1/2 | 2.4 to 5.5                           | 1.8                              | 4               | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                                | 0.025                                                | -              | -                | 10           | 20          | 8              |               | 8                 |      | 8                  | 5     |       |      | 8   |                    |       |
| NJU77701                            | I/O          | Yes          | 1   | 2.4 to 5.5                           | 3.8                              | 1.5             | (V)                                | (V <sup>+</sup> )      | 0.08                                                 | 0.1                                                  | 600            | 110              | 35           | 34          | 6              |               |                   |      | 5                  |       |       |      | ✓   | Stable Gain ≥ 14dB |       |
| NJU77806                            | Out          | Yes          | 1   | 1.8 to 5.5                           | 0.5                              | 2               | (V) -0.1                           | (V <sup>+</sup> ) -0.9 | 0.1                                                  | 0.1                                                  | 10k            | 70               | 1.1          | 4.4         | 5.5            |               |                   |      |                    | 5     |       |      | ✓   | Stable Gain ≥ 14dB |       |

\*1 SOP8: JEDEC 150mil  
\*2 MSOP8 (VSP8): meet JEDEC MO-187-DA, thin type  
\*3 Short circuit



# 5.5V, Rail-to-Rail CMOS Op-Amps

● : PLAN

● : U.D.

○ : M.P.

□ : Rail-to-rail output

□ : Rail-to-rail I/O

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## High Efficiency (Wide GBW & Low Power)

0.3MHz

NJU7754X [1/2/4ch]

$I_{supply}=10\mu A/ch$

1.7MHz, 0.8V/ $\mu s$

NJU77551 [1ch]

NJU77552 [2ch]

NJU77554 [4ch]

$I_{supply}=50\mu A/ch$

20MHz, 10V/ $\mu s$

NJU7758x [1/2ch]

$I_{supply}=1800\mu A/ch$

## Low Power

NJU77001 [1ch]

NJU77002 [2ch]

NJU77004 [4ch]

$I_{supply}=0.23\mu A/ch$

NJU7026 [1ch]

NJU7027 [2ch]

NJU7028 [4ch]

$I_{supply}=13\mu A/ch$

## Low Noise

15nV/ $\sqrt{Hz}$

NJU7056 [1ch]

NJU7057 [2ch]

NJU7058 [4ch]

$I_{supply}=260\mu A/ch$

## High Speed

9V/ $\mu s$ , 5MHz

NJU7046 [1ch]

NJU7047 [2ch]

NJU7048 [4ch]

$I_{supply}=1.3mA/ch$

35V/ $\mu s$ , 34MHz

NJU77701 [1ch]

$I_{supply}=3.8mA$

## Precision

10nV/ $\sqrt{Hz}$

150 $\mu V$ , 5 $\mu V/^{\circ}C$  max.

NJU7076 [1ch]

NJU7077 [2ch]

NJU7078 [4ch]

$I_{supply}=600\mu A/ch$

150 $\mu V$ , 1 $\mu V/^{\circ}C$  max.

NJU77600 [1ch]

NJU77602 [2ch]

NJU77604 [4ch]

$I_{supply}=12\mu A/ch$

500 $\mu V$ , 10 $\mu V/^{\circ}C$  max.

NJU7066 [2ch]

New



# 5.5V, Rail-to-Rail CMOS Op-Amps

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| Characteristics<br>Product Name | Rail-to-Rail | EMI-Immunity | Ch. | Supply Voltage                       | I <sub>SUPPLY</sub><br>(per Ch.) | V <sub>IO</sub> | V <sub>IO</sub><br>Drift | SR           | GBW         | Voltage Noise  | Common-Mode<br>Input Voltage Range |                        | -V <sub>sat</sub><br>V <sub>OL</sub> -V | +V <sub>sat</sub><br>V <sup>+</sup> -V <sub>OH</sub> | I <sub>O</sub> <sup>*3</sup> | Package / Pin     |      |                    |       |       |     | SPICE Model | Notes              |
|---------------------------------|--------------|--------------|-----|--------------------------------------|----------------------------------|-----------------|--------------------------|--------------|-------------|----------------|------------------------------------|------------------------|-----------------------------------------|------------------------------------------------------|------------------------------|-------------------|------|--------------------|-------|-------|-----|-------------|--------------------|
|                                 |              |              |     | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>mA                       | max.<br>mV      | typ.<br>μV/°C            | typ.<br>V/μs | typ.<br>MHz | typ.<br>nV/√Hz | min.<br>V                          | max.<br>V              | max.<br>V                               | max.<br>V                                            | typ.<br>mA                   | SOP <sup>*1</sup> | SSOP | MSOP <sup>*2</sup> | SOT23 | SC88A | DFN |             |                    |
| NJU7026                         | Out          | Yes          | 1   | 1.8 to 5.5                           | 0.013                            | 4               | 1.5                      | 0.05         | 0.16        | 50             | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                     | 0.1                                                  | 15                           |                   |      |                    | 5     | 5     |     | ✓           |                    |
| NJU7027                         | Out          | Yes          | 2   | 1.8 to 5.5                           | 0.013                            | 4               | 1.5                      | 0.05         | 0.16        | 50             | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                     | 0.1                                                  | 15                           |                   |      | 8                  |       |       | 8   | ✓           |                    |
| NJU7028                         | Out          | Yes          | 4   | 1.8 to 5.5                           | 0.012                            | 4               | 1.5                      | 0.05         | 0.16        | 50             | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                     | 0.1                                                  | 15                           |                   | 14   |                    |       |       |     | ✓           |                    |
| NJU7046                         | I/O          | Yes          | 1   | 2.7 to 5.5                           | 1.4                              | 5               | 2                        | 9            | 5           | 20             | (V)                                | (V <sup>+</sup> )      | 0.05                                    | 0.05                                                 | 100                          |                   |      |                    | 5     | 5     |     | ✓           |                    |
| NJU7047                         | I/O          | Yes          | 2   | 2.7 to 5.5                           | 1.35                             | 5               | 2                        | 9            | 5           | 20             | (V)                                | (V <sup>+</sup> )      | 0.05                                    | 0.05                                                 | 100                          | 8                 |      | 8                  |       |       | 8   | ✓           |                    |
| NJU7048                         | I/O          | Yes          | 4   | 2.7 to 5.5                           | 1.325                            | 5               | 2                        | 9            | 5           | 20             | (V)                                | (V <sup>+</sup> )      | 0.05                                    | 0.05                                                 | 100                          | 14                | 14   |                    |       |       |     | ✓           |                    |
| NJU7056                         | Out          | Yes          | 1   | 1.8 to 5.5                           | 0.26                             | 4               | 0.7                      | 0.8          | 2.1         | 15             | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                     | 0.1                                                  | 45                           |                   |      |                    | 5     | 5     |     | ✓           |                    |
| NJU7057                         | Out          | Yes          | 2   | 1.8 to 5.5                           | 0.26                             | 4               | 0.7                      | 0.8          | 2.1         | 15             | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                     | 0.1                                                  | 45                           |                   |      | 8                  |       |       | 8   | ✓           |                    |
| NJU7058                         | Out          | Yes          | 4   | 1.8 to 5.5                           | 0.275                            | 4               | 0.7                      | 0.8          | 2.1         | 15             | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                     | 0.1                                                  | 45                           |                   | 14   |                    |       |       |     | ✓           |                    |
| NJU7076                         | Out          | Yes          | 1   | 2.2 to 5.5                           | 0.6                              | 0.15            | 0.5                      | 0.5          | 1.3         | 10             | (V)                                | (V <sup>+</sup> ) -1   | 0.15                                    | 0.15                                                 | 100                          |                   |      |                    | 5     |       |     | ✓           |                    |
| NJU7076B                        | Out          | Yes          | 1   | 2.2 to 5.5                           | 0.6                              | 0.3             | 0.5                      | 0.5          | 1.3         | 10             | (V)                                | (V <sup>+</sup> ) -1   | 0.15                                    | 0.15                                                 | 100                          |                   |      |                    |       | 5     |     | ✓           |                    |
| NJU7066                         | Out          | Yes          | 2   | 2.2 to 5.5                           | 0.6                              | 0.5             | 0.5                      | 0.5          | 1.3         | 10             | (V)                                | (V <sup>+</sup> ) -1   | 0.15                                    | 0.15                                                 | 100                          |                   |      | 8                  |       |       |     |             |                    |
| NJU7077                         | Out          | Yes          | 2   | 2.2 to 5.5                           | 0.6                              | 0.15            | 0.5                      | 0.5          | 1.3         | 10             | (V)                                | (V <sup>+</sup> ) -1   | 0.15                                    | 0.15                                                 | 100                          |                   |      | 8                  |       |       |     | ✓           |                    |
| NJU7078                         | Out          | Yes          | 4   | 2.2 to 5.5                           | 0.575                            | 0.2             | 0.5                      | 0.5          | 1.3         | 10             | (V)                                | (V <sup>+</sup> ) -1   | 0.15                                    | 0.15                                                 | 100                          |                   | 14   |                    |       |       |     |             |                    |
| NJU77000/A                      | I/O          | Yes          | 1   | 1.5 to 5.5                           | 0.00029                          | 1.8/1.0         | 0.65                     | 0.0008       | 0.0011      | 600            | (V)                                | (V <sup>+</sup> )      | 0.1                                     | 0.1                                                  | 10                           |                   |      |                    | 5     |       |     | ✓           |                    |
| NJU77001/A                      | I/O          | Yes          | 1   | 1.5 to 5.5                           | 0.00029                          | 1.8/1.0         | 0.65                     | 0.0008       | 0.0011      | 600            | (V)                                | (V <sup>+</sup> )      | 0.1                                     | 0.1                                                  | 10                           |                   |      |                    | 5     | 5     |     | ✓           |                    |
| NJU77002/A                      | I/O          | Yes          | 2   | 1.5 to 5.5                           | 0.00023                          | 2.0/1.3         | 0.65                     | 0.0007       | 0.001       | 700            | (V)                                | (V <sup>+</sup> )      | 0.1                                     | 0.1                                                  | 10                           | 8                 |      | 8                  |       |       | 8   | ✓           |                    |
| NJU77004/A                      | I/O          | Yes          | 4   | 1.5 to 5.5                           | 0.00023                          | 2.2/1.5         | 0.65                     | 0.0007       | 0.001       | 700            | (V)                                | (V <sup>+</sup> )      | 0.1                                     | 0.1                                                  | 10                           |                   | 14   |                    |       |       |     | ✓           |                    |
| NJU7754x (Plan)                 | I/O          | Yes          | -   | 1.8 to 5.5                           | 0.01                             | 4               | 1                        | -            | 0.3         | -              | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                   | 0.025                                                | 40                           | x                 | x    | x                  | x     | x     | x   |             |                    |
| NJU77550                        | I/O          | Yes          | 1   | 1.8 to 5.5                           | 0.055                            | 5               | 1                        | 0.8          | 1.7         | 24             | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                   | 0.025                                                | 40                           |                   |      |                    | 5     | 5     |     |             |                    |
| NJU77551                        | I/O          | Yes          | 1   | 1.8 to 5.5                           | 0.055                            | 5               | 1                        | 0.8          | 1.7         | 24             | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                   | 0.025                                                | 40                           |                   |      |                    | 5     | 5     |     |             |                    |
| NJU77552                        | I/O          | Yes          | 2   | 1.8 to 5.5                           | 0.05                             | 5               | 1                        | 0.8          | 1.7         | 24             | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                   | 0.025                                                | 40                           | 8                 |      | 8                  |       |       | 8   | ✓           |                    |
| NJU77554                        | I/O          | Yes          | 4   | 1.8 to 5.5                           | 0.05                             | 5               | 1                        | 0.8          | 1.7         | 24             | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                   | 0.025                                                | 40                           |                   | 14   |                    |       |       |     |             |                    |
| NJU7758x (U.D.)                 | I/O          | Yes          | 1/2 | 2.4 to 5.5                           | 1.8                              | 4               | 1                        | 10           | 20          | 8              | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                   | 0.025                                                | -                            | 8                 |      | 8                  | 5     |       | 8   |             |                    |
| NJU77600 (U.D.)                 | I/O          | Yes          | 1   | 2.3 to 5.5                           | 0.012                            | 0.15            | -                        | 0.04         | 0.08        | -              | (V)                                | (V <sup>+</sup> )      | 0.025                                   | 0.025                                                | -                            |                   |      |                    | 5     |       |     |             |                    |
| NJU77602 (U.D.)                 | I/O          | Yes          | 2   | 2.3 to 5.5                           | 0.012                            | 0.15            | -                        | 0.04         | 0.08        | -              | (V)                                | (V <sup>+</sup> )      | 0.025                                   | 0.025                                                | -                            | 8                 |      | 8                  |       |       | 8   |             |                    |
| NJU77604 (U.D.)                 | I/O          | Yes          | 4   | 2.3 to 5.5                           | 0.012                            | 0.15            | -                        | 0.04         | 0.08        | -              | (V)                                | (V <sup>+</sup> )      | 0.025                                   | 0.025                                                | -                            |                   | 14   |                    |       |       |     |             |                    |
| NJU77701                        | I/O          | Yes          | 1   | 2.4 to 5.5                           | 3.8                              | 1.5             | 0.5                      | 35           | 34          | 6              | (V)                                | (V <sup>+</sup> )      | 0.08                                    | 0.1                                                  | 110                          |                   |      |                    | 5     |       |     | ✓           | Stable Gain ≥ 14dB |

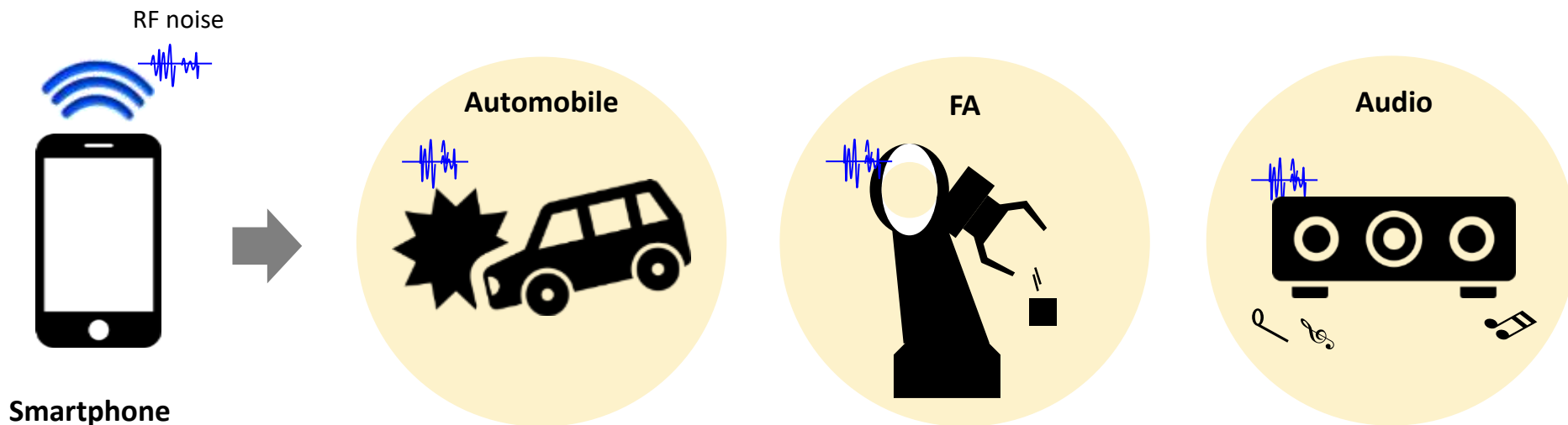
\*1 SOP8: JEDEC 150mil  
\*2 MSOP8 (VSP8): meet JEDEC MO-187-DA, thin type  
\*3 Short circuit



## ■ What is “High EMI Immunity”?

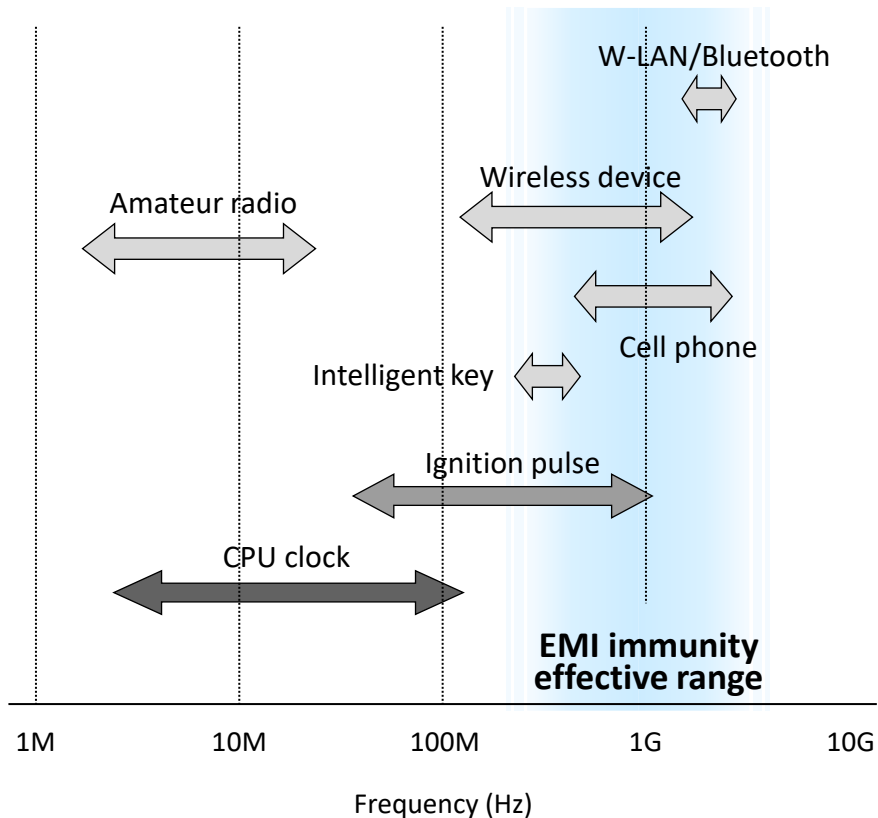
- Prevent malfunction due to RF noise\*.
- RF noise is emitted from wireless communication devices, e.g., smartphone.
- Essential to the aircraft and cars involved in human life.

\*RF noise: High frequency interface signal



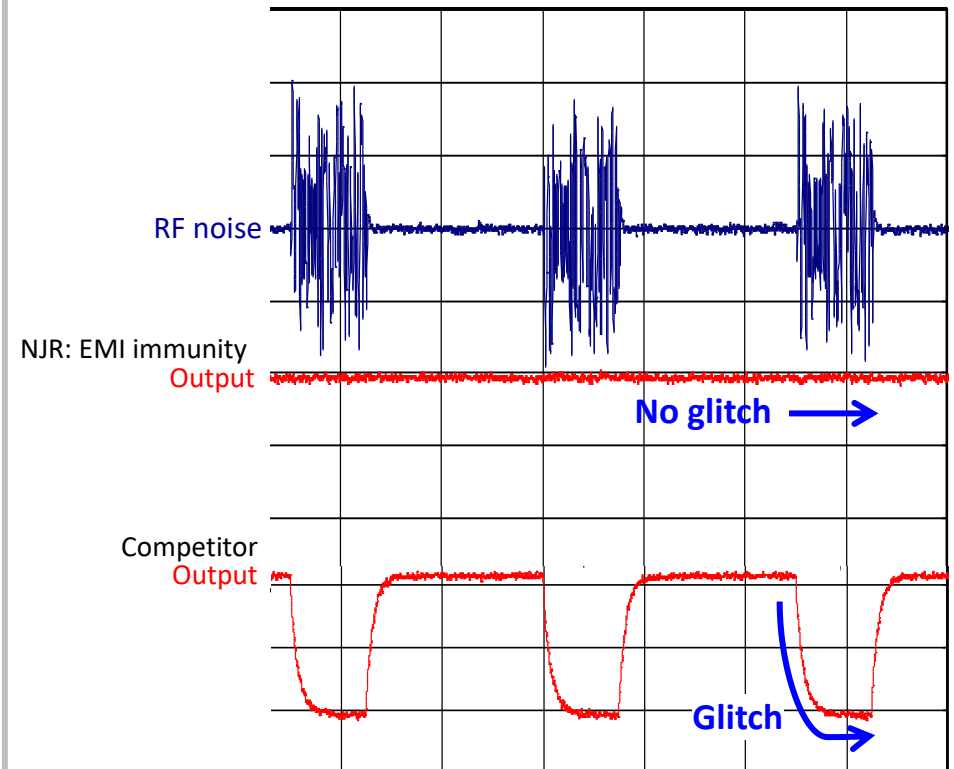
## EMI Immunity Effective Range

- Effective to 300MHz to 5GHz



## Bluetooth (2.4GHz) Irradiation Test

- EMI immunity product waveform in straight  
⇒ Low impact of RF noise



# High EMI Immunity Op-Amps

 : U.D.  
 : M.P.  
 : Rail-to-rail I/O

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## Low Power

- ✓  $I_{\text{supply}}=0.23\mu\text{A/ch}$
- ✓  $V^+=1.5\text{V to }36\text{V}$

Alarm units, testers,  
& long life battery equipment.

## Standard

- ✓ Low noise
- ✓ 14V operation (bipolar)

Audio amplifiers & general sensors.

## Precision

- ✓ Low input offset
- ✓ Low input offset drift

Tolerant to temperature changes.  
Measuring & industrial equipment.

Low Power

Ultra-Low Power

Low Noise

1.7MHz, 50 $\mu\text{A/ch}$

U.D.

Grand Sensing

Lowest Power

$I_{\text{supply}}=0.23\mu\text{A/ch}$

NJU7026 [1ch]

NJU7027 [2ch]

NJU7028 [4ch]

$V^+=1.8\text{V to }5.5\text{V}$   
 $I_{\text{supply}}=13\mu\text{A/ch}$

NJU77001 [1ch]

NJU77002 [2ch]

NJU77004 [4ch]

$V^+=1.5\text{V to }5.5\text{V}$

NJU7056 [1ch]

NJU7057 [2ch]

NJU7058 [4ch]

$V^+=1.8\text{V to }5.5\text{V}$   
 $\text{en}=15\text{nV/VHz}$

NJU77551 [1ch]

NJU77552 [2ch]

NJU77554 [4ch]

$V^+=1.8\text{V to }5.5\text{V}$   
 $\text{GBW}=1.7\text{MHz}$

NJU77600 [1ch]

NJU77602 [2ch]

NJU77604 [4ch]

$V_{\text{io}}=150\mu\text{V max.}$   
 $V_{\text{io drift}}=1\mu\text{V}/^\circ\text{C max.}$

$V^+=2.3\text{V to }5.5\text{V}$   
 $I_{\text{supply}}=12\mu\text{A/ch}$

$V_{\text{io}}=150\mu\text{V max.}$   
 $V_{\text{io drift}}=5\mu\text{V}/^\circ\text{C max.}$

NJU7076 [1ch]

NJU7077 [2ch]

NJU7078 [4ch]

500 $\mu\text{V}$ , 10 $\mu\text{V}/^\circ\text{C max.}$

**New** NJU7066 [2ch]

16V Supply

36V Supply

High Speed

Low Noise

High Speed

J-FET Input

NJU7067 [2ch]

NJU7068 [4ch]

$V^+=4\text{V to }16\text{V}$   
 $I_{\text{supply}}=14\mu\text{A/ch}$

Overvoltage protection

NJM8524 [4ch]

$V^+=3\text{V to }36\text{V}$   
 $I_{\text{supply}}=25\mu\text{A/ch}$

NJU7046 [1ch]

NJU7047 [2ch]

NJU7048 [4ch]

$V^+=2.7\text{V to }5.5\text{V}$   
 $\text{SR}=9\text{V}/\mu\text{s}$

For Audio

$\text{SR}=3.5\text{V}/\mu\text{s}$

NJM8202 [2ch]

$V^+=2.5\text{V to }14\text{V}$   
 $\text{en}=10\text{nV/VHz}$

$V_{\text{io}}=1.5\text{mV max.}$   
 $V_{\text{io drift}}=0.5\mu\text{V}/^\circ\text{C typ.}$

NJU77701 [1ch]

$V^+=2.4\text{V to }5.5\text{V}$   
 $\text{SR}=35\text{V}/\mu\text{s}$

$V_{\text{io}}=400\mu\text{V max.}$   
 $V_{\text{io drift}}=0.8\mu\text{V}/^\circ\text{C typ.}$

NJM8512A/B [2ch]

NJM8513A/B [4ch]

$V^+/V^-=\pm 4.5\text{V to } \pm 16\text{V}$

There are part of our op-amps. Please contact us for other products.



# High EMI Immunity Op-Amps

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| Characteristics<br>Product Name | Rail-to-Rail | EMI-Immunity | Ch. | Supply Voltage                       | I <sub>SUPPLY</sub><br>(per Ch.) | V <sub>IO</sub> | Common-Mode<br>Input Voltage Range |                        | V <sub>sat</sub> | R <sub>L</sub> | I <sub>O</sub> <sup>*3</sup> | SR           | GBW         | en             | Package / Pin |                   |      |                    |       |       |     | SPICE Model | Notes                        |
|---------------------------------|--------------|--------------|-----|--------------------------------------|----------------------------------|-----------------|------------------------------------|------------------------|------------------|----------------|------------------------------|--------------|-------------|----------------|---------------|-------------------|------|--------------------|-------|-------|-----|-------------|------------------------------|
|                                 |              |              |     | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>mA                       | max.<br>mV      | min.<br>V                          | max.<br>V              | min.<br>V        | Ω              | typ.<br>mA                   | typ.<br>V/μs | typ.<br>MHz | typ.<br>nV/VHz | DMP           | SOP <sup>*1</sup> | SSOP | MSOP <sup>*2</sup> | SOT23 | SC88A | DFN |             |                              |
| NJM8202                         | Out          | Yes          | 2   | 2.5 to 14                            | 2                                | 6               | (V)                                | (V <sup>+</sup> ) -1   | 0.25             | 5k             | 1                            | 3.5          | 10          | 10             | 8             | 8                 | 8    | 8                  |       |       |     | ✓           |                              |
| NJM8512A/B                      | -            | Yes          | 2   | 9 to 32                              | 1.3                              | 0.8/0.4         | (V) +2.5                           | (V <sup>+</sup> ) -2.5 | 1.2              | 600            | 30                           | 20           | 7           | 10             |               | 8                 |      | 8                  |       |       |     | ✓           |                              |
| NJM8513A/B                      | -            | Yes          | 4   | 9 to 32                              | 1.3                              | 0.8/0.4         | (V) +2.5                           | (V <sup>+</sup> ) -2.5 | 1.2              | 600            | 30                           | 20           | 7           | 10             |               |                   | 14   |                    |       |       |     | ✓           |                              |
| NJM8524                         | Out          | Yes          | 4   | 3 to 36                              | 0.025                            | 1.8             | (V)                                | (V <sup>+</sup> ) -1.6 | 0.2              | 20k            | 10                           | 0.025        | 0.06        | 80             |               |                   | 14   |                    |       |       |     | ✓           | Overvoltage Protection       |
| NJU7026                         | Out          | Yes          | 1   | 1.8 to 5.5                           | 0.013                            | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1              | 100k           | 15                           | 0.05         | 0.16        | 50             |               |                   |      | 5                  | 5     |       |     | ✓           |                              |
| NJU7027                         | Out          | Yes          | 2   | 1.8 to 5.5                           | 0.013                            | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1              | 100k           | 15                           | 0.05         | 0.16        | 50             |               |                   |      | 8                  |       | 8     |     | ✓           |                              |
| NJU7028                         | Out          | Yes          | 4   | 1.8 to 5.5                           | 0.012                            | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1              | 100k           | 15                           | 0.05         | 0.16        | 50             |               |                   | 14   |                    |       |       |     | ✓           |                              |
| NJU7046                         | I/O          | Yes          | 1   | 2.7 to 5.5                           | 1.4                              | 5               | (V)                                | (V <sup>+</sup> )      | 0.05             | 10k            | 100                          | 9            | 5           | 20             |               |                   |      | 5                  | 5     |       |     | ✓           |                              |
| NJU7047                         | I/O          | Yes          | 2   | 2.7 to 5.5                           | 1.35                             | 5               | (V)                                | (V <sup>+</sup> )      | 0.05             | 10k            | 100                          | 9            | 5           | 20             |               | 8                 |      | 8                  |       | 8     |     | ✓           |                              |
| NJU7048                         | I/O          | Yes          | 4   | 2.7 to 5.5                           | 1.325                            | 5               | (V)                                | (V <sup>+</sup> )      | 0.05             | 10k            | 100                          | 9            | 5           | 20             |               | 14                | 14   |                    |       |       |     | ✓           |                              |
| NJU7056                         | Out          | Yes          | 1   | 1.8 to 5.5                           | 0.26                             | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1              | 10k            | 45                           | 0.8          | 2.1         | 15             |               |                   |      | 5                  | 5     |       |     | ✓           |                              |
| NJU7057                         | Out          | Yes          | 2   | 1.8 to 5.5                           | 0.26                             | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1              | 10k            | 45                           | 0.8          | 2.1         | 15             |               |                   |      | 8                  |       | 8     |     | ✓           |                              |
| NJU7058                         | Out          | Yes          | 4   | 1.8 to 5.5                           | 0.275                            | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1              | 10k            | 45                           | 0.8          | 2.1         | 15             |               |                   | 14   |                    |       |       |     | ✓           |                              |
| NJU7067                         | Out          | Yes          | 2   | 4 to 16                              | 0.014                            | 4               | (V)                                | (V <sup>+</sup> ) -1.6 | 0.05             | 10k            | 12                           | 0.03         | 0.06        | 45             | 8             |                   | 8    |                    |       |       |     | ✓           |                              |
| NJU7068                         | Out          | Yes          | 4   | 4 to 16                              | 0.014                            | 4               | (V)                                | (V <sup>+</sup> ) -1.6 | 0.05             | 10k            | 12                           | 0.03         | 0.06        | 45             | 14            |                   | 14   |                    |       |       |     | ✓           |                              |
| NJU7076                         | Out          | Yes          | 1   | 2.2 to 5.5                           | 0.6                              | 0.15            | (V)                                | (V <sup>+</sup> ) -1   | 0.15             | 600            | 100                          | 0.5          | 1.3         | 10             |               |                   |      | 5                  |       |       |     | ✓           |                              |
| NJU7076B                        |              | Yes          | 1   | 2.2 to 5.5                           | 0.6                              | 0.3             | (V)                                | (V <sup>+</sup> ) -1   | 0.15             | 600            | 100                          | 0.5          | 1.3         | 10             |               |                   |      |                    | 5     |       |     | ✓           |                              |
| NJU7066                         |              | Yes          | 2   | 2.2 to 5.5                           | 0.6                              | 0.5             | (V)                                | (V <sup>+</sup> ) -1   | 0.15             | 600            | 100                          | 0.5          | 1.3         | 10             |               |                   |      | 8                  |       |       |     | ✓           |                              |
| NJU7077                         |              | Yes          | 2   | 2.2 to 5.5                           | 0.6                              | 0.15            | (V)                                | (V <sup>+</sup> ) -1   | 0.15             | 600            | 100                          | 0.5          | 1.3         | 10             |               |                   |      | 8                  |       |       |     | ✓           |                              |
| NJU7078                         |              | Yes          | 4   | 2.2 to 5.5                           | 0.575                            | 0.2             | (V)                                | (V <sup>+</sup> ) -1   | 0.15             | 600            | 100                          | 0.5          | 1.3         | 10             |               |                   | 14   |                    |       |       |     | ✓           |                              |
| NJU77000/A                      | I/O          | Yes          | 1   | 1.5 to 5.5                           | 0.00029                          | 1.8/1.0         | (V)                                | (V <sup>+</sup> )      | 0.1              | 100k           | 10                           | 0.0008       | 0.0011      | 600            |               |                   |      | 5                  |       |       |     | ✓           |                              |
| NJU77001/A                      | I/O          | Yes          | 1   | 1.5 to 5.5                           | 0.00029                          | 1.8/1.0         | (V)                                | (V <sup>+</sup> )      | 0.1              | 100k           | 10                           | 0.0008       | 0.0011      | 600            |               |                   |      | 5                  | 5     |       |     | ✓           |                              |
| NJU77002/A                      | I/O          | Yes          | 2   | 1.5 to 5.5                           | 0.00023                          | 2.0/1.3         | (V)                                | (V <sup>+</sup> )      | 0.1              | 100k           | 10                           | 0.0007       | 0.001       | 700            |               | 8                 |      | 8                  |       | 8     |     | ✓           |                              |
| NJU77004/A                      | I/O          | Yes          | 4   | 1.5 to 5.5                           | 0.00023                          | 2.2/1.5         | (V)                                | (V <sup>+</sup> )      | 0.1              | 100k           | 10                           | 0.0007       | 0.001       | 700            |               |                   | 14   |                    |       |       |     | ✓           |                              |
| NJU77550/1                      | I/O          | Yes          | 1   | 1.8 to 5.5                           | 0.055                            | 5               | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025            | 10k            | 40                           | 0.8          | 1.7         | 24             |               |                   |      | 5                  | 5     |       |     | ✓           | Overvoltage Input Protection |
| NJU77552                        | I/O          | Yes          | 2   | 1.8 to 5.5                           | 0.05                             | 5               | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025            | 10k            | 40                           | 0.8          | 1.7         | 24             |               | 8                 |      | 8                  |       | 8     |     |             |                              |
| NJU77554                        | I/O          | Yes          | 4   | 1.8 to 5.5                           | 0.05                             | 5               | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025            | 10k            | 40                           | 0.8          | 1.7         | 24             |               |                   | 14   |                    |       |       |     |             |                              |
| NJU77600 (U.D.)                 | I/O          | Yes          | 1   | 2.3 to 5.5                           | 0.012                            | 0.15            | (V)                                | (V <sup>+</sup> )      | 0.025            | 100k           | -                            | 0.04         | 0.08        | -              |               |                   |      | 5                  |       |       |     |             |                              |
| NJU77602 (U.D.)                 | I/O          | Yes          | 2   | 2.3 to 5.5                           | 0.012                            | 0.15            | (V)                                | (V <sup>+</sup> )      | 0.025            | 100k           | -                            | 0.04         | 0.08        | -              |               | 8                 |      | 8                  |       | 8     |     |             |                              |
| NJU77604 (U.D.)                 | I/O          | Yes          | 4   | 2.3 to 5.5                           | 0.012                            | 0.15            | (V)                                | (V <sup>+</sup> )      | 0.025            | 100k           | -                            | 0.04         | 0.08        | -              |               |                   | 14   |                    |       |       |     |             |                              |
| NJU77701                        | I/O          | Yes          | 1   | 2.4 to 5.5                           | 3.8                              | 1.5             | (V)                                | (V <sup>+</sup> )      | 0.08             | 600            | 110                          | 35           | 34          | 6              |               |                   |      | 5                  |       |       |     | ✓           | recommended Gain ≥ 14dB      |



# 14V to 36V, Rail-to-Rail Op-Amps

 : Rail-to-rail output

 : Rail-to-rail I/O

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## ■ 1.8V to 14V

10nV/VHz

**NJM8530** [1ch]

**NJM8532** [2ch]

**NJM8534** [4ch]

$V^+ = 1.8\text{V to } 14\text{V}$

$\text{SR} = 0.4\text{V}/\mu\text{s}$

$I_{\text{supply}} = 0.3\text{mA/ch}$

10nV/VHz

**NJM2741** [1ch]

**NJM2746** [2ch]

**NJM2747** [4ch]

$V^+ = 2.5\text{V to } 14\text{V}$

$\text{SR} = 3.5\text{V}/\mu\text{s}$

$I_{\text{supply}} = 2\text{mA/ch}$

High EMI immunity

**NJM8202** [2ch]

$V^+ = 2.5\text{V to } 14\text{V}$

$\text{SR} = 3.5\text{V}/\mu\text{s}$

$I_{\text{supply}} = 2\text{mA/ch}$

## ■ 1V to 16V

Low power

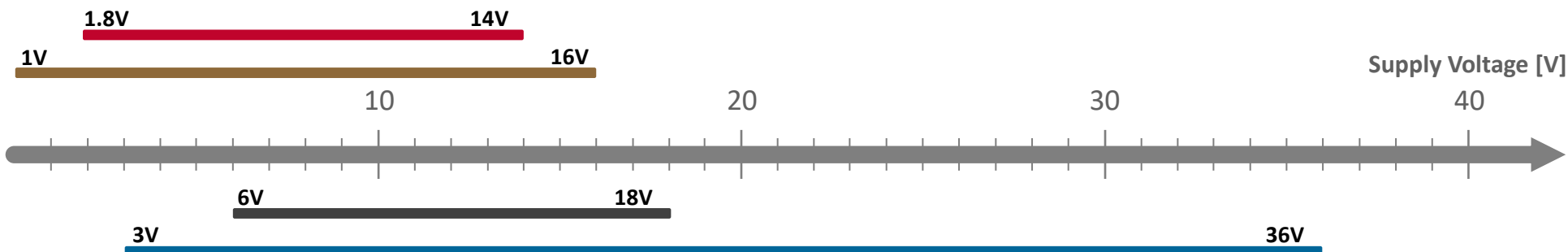
**NJU7067** [2ch]

**NJU7068** [4ch]

$I_{\text{supply}} = 14\mu\text{A/ch}$

$\text{SR} = 0.03\text{V}/\mu\text{s}$

\* $I_o = 3\text{mA}$



## ■ 6V to 18V

**NJU77902** [2ch]

$V^+ = 6\text{V to } 18\text{V}$

$\text{SR} = 9\text{V}/\mu\text{s}$

$I_{\text{supply}} = 3.5\text{mA/ch}$

## ■ 3V to 36V

High output current

**NJU77903** [1ch]

$V^+ = 6.8\text{V to } 36\text{V}$

$\text{SR} = 3\text{V}/\mu\text{s}$

$I_{\text{supply}} = 9.5\text{mA/ch}$

$I_o = 400\text{mA}$

Low power

**NJM8524** [4ch]

$V^+ = 3\text{V to } 36\text{V}$

$\text{SR} = 0.03\text{V}/\mu\text{s}$

$I_{\text{supply}} = 25\mu\text{A/ch}$

\* $I_o$ : short-circuit output current



# 14V to 36V, Rail-to-Rail Op-Amps

| Characteristics<br><br>Product Name | Rail-to-Rail | EMI-<br>Immunity | Ch. | Supply<br>Voltage                    |            | I <sub>SUPPLY</sub><br>(per Ch.) | V <sub>IO</sub> | Common-Mode<br>Input Voltage Range |                       | -Vs <sub>at</sub><br>V <sub>OL</sub> -V <sup>-</sup> | +Vs <sub>at</sub><br>V <sup>+</sup> -V <sub>OH</sub> | R <sub>L</sub> | I <sub>o</sub> <sup>*3</sup> | SR          | GBW            | Voltage<br>Noise | Package / Pin     |      |                    |       |       |     |        |      | SPICE<br>Model | Notes |  |
|-------------------------------------|--------------|------------------|-----|--------------------------------------|------------|----------------------------------|-----------------|------------------------------------|-----------------------|------------------------------------------------------|------------------------------------------------------|----------------|------------------------------|-------------|----------------|------------------|-------------------|------|--------------------|-------|-------|-----|--------|------|----------------|-------|--|
|                                     |              |                  |     | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>mA | max.<br>mV                       | min.<br>V       | max.<br>V                          | max.<br>V             | max.<br>V                                            | Ω                                                    | typ.<br>mA     | typ.<br>V/μs                 | typ.<br>MHz | typ.<br>nV/√Hz | DMP              | SOP <sup>*1</sup> | SSOP | MSOP <sup>*2</sup> | SOT23 | SC88A | DFN | TO-252 | PCSP |                |       |  |
|                                     |              |                  |     |                                      |            |                                  |                 |                                    |                       |                                                      |                                                      |                |                              |             |                |                  |                   |      |                    |       |       |     |        |      |                |       |  |
| NJM2741                             | Out          |                  | 1   | 2.5                                  | 14         | 2.2                              | 6               | (V <sup>-</sup> )                  | (V <sup>+</sup> )-1   | 0.25                                                 | 0.25                                                 | 5k             | 1                            | 3.5         | 10             | 10               |                   |      |                    |       | 5     | 5   |        |      |                | ✓     |  |
| NJM2746                             | Out          |                  | 2   | 2.5                                  | 14         | 2                                | 6               | (V <sup>-</sup> )                  | (V <sup>+</sup> )-1   | 0.25                                                 | 0.25                                                 | 5k             | 1                            | 3.5         | 10             | 10               | 8                 | 8    | 8                  | 8     |       |     | 8      |      |                | ✓     |  |
| NJM2747                             | Out          |                  | 4   | 2.5                                  | 14         | 2                                | 6               | (V <sup>-</sup> )                  | (V <sup>+</sup> )-1   | 0.25                                                 | 0.25                                                 | 5k             | 1                            | 3.5         | 10             | 10               | 14                |      | 14                 |       |       |     |        | 20   |                | ✓     |  |
| NJM8202                             | Out          | Yes              | 2   | 2.5                                  | 14         | 2                                | 6               | (V <sup>-</sup> )                  | (V <sup>+</sup> )-1   | 0.25                                                 | 0.25                                                 | 5k             | 1                            | 3.5         | 10             | 10               | 8                 | 8    | 8                  | 8     |       |     |        |      |                | ✓     |  |
| NJM8524                             | Out          | Yes              | 4   | 3                                    | 36         | 0.025                            | 1.8             | (V <sup>-</sup> )                  | (V <sup>+</sup> )-1.6 | 0.2                                                  | 0.2                                                  | 20k            | 10                           | 0.025       | 0.06           | 80               |                   |      | 14                 |       |       |     |        |      |                | ✓     |  |
| NJM8530                             | I/O          |                  | 1   | 1.8                                  | 14         | 0.32                             | 4               | (V <sup>-</sup> )                  | (V <sup>+</sup> )     | 0.1                                                  | 0.1                                                  | 20k            | 10                           | 0.4         | 1              | 10               |                   |      |                    |       | 5     |     |        |      |                | ✓     |  |
| NJM8532                             | I/O          |                  | 2   | 1.8                                  | 14         | 0.29                             | 4               | (V <sup>-</sup> )                  | (V <sup>+</sup> )     | 0.1                                                  | 0.1                                                  | 20k            | 10                           | 0.4         | 1              | 10               | 8                 |      | 8                  | 8     |       |     |        |      |                | ✓     |  |
| NJM8534                             | I/O          |                  | 4   | 1.8                                  | 14         | 0.3                              | 4               | (V <sup>-</sup> )                  | (V <sup>+</sup> )     | 0.1                                                  | 0.1                                                  | 20k            | 10                           | 0.4         | 1              | 10               |                   |      | 14                 |       |       |     |        |      |                | ✓     |  |
| NJU7067                             | Out          | Yes              | 2   | 4                                    | 16         | 0.014                            | 4               | (V <sup>-</sup> )                  | (V <sup>+</sup> )-1.6 | 0.05                                                 | 0.05                                                 | 10k            | 12                           | 0.03        | 0.06           | 45               | 8                 |      | 8                  |       |       |     |        |      |                | ✓     |  |
| NJU7068                             | Out          | Yes              | 4   | 4                                    | 16         | 0.014                            | 4               | (V <sup>-</sup> )                  | (V <sup>+</sup> )-1.6 | 0.05                                                 | 0.05                                                 | 10k            | 12                           | 0.03        | 0.06           | 45               | 14                |      | 14                 |       |       |     |        |      |                | ✓     |  |
| NJU77902                            | I/O          | Yes              | 2   | 6                                    | 18         | 3.5                              | 10              | (V <sup>-</sup> )                  | (V <sup>+</sup> )     | 0.2                                                  | 0.2                                                  | -              | 1000                         | 9           | 3              | 80               |                   |      |                    |       |       |     | 8      |      |                | ✓     |  |
| NJU77903                            | I/O          | Yes              | 1   | 6.8                                  | 36         | 9.5                              | 6               | (V <sup>-</sup> )                  | (V <sup>+</sup> )     | 0.6                                                  | 0.6                                                  | -              | 400                          | 3.5         | 1.5            | 50               |                   |      |                    |       |       |     | 8      | 5    |                | ✓     |  |

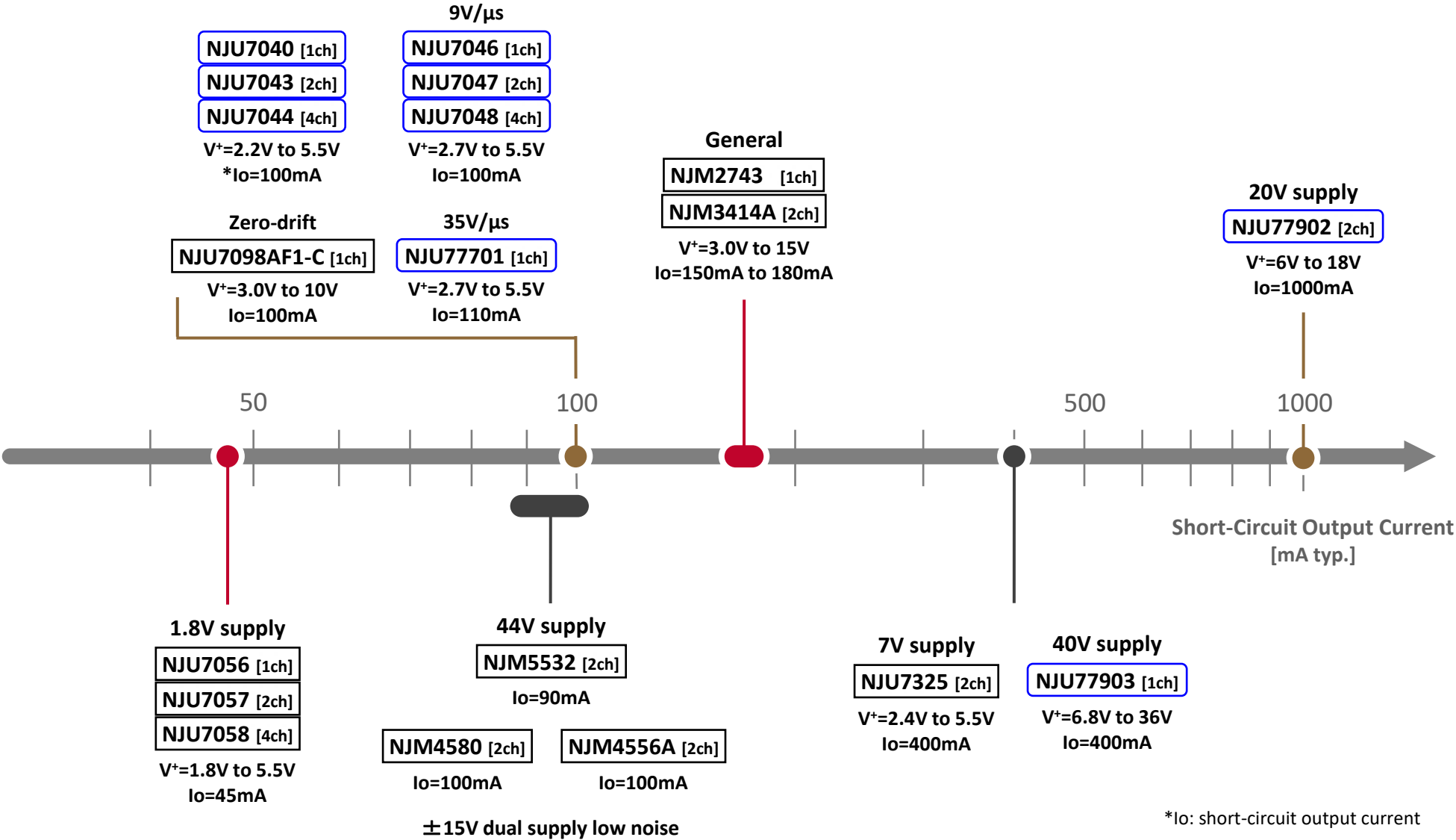
\*1 SOP8: JEDEC 150mil

\*2 MSOP8 (VSP8): meet JEDEC MO-187-DA, thin type

\*3 Short circuit



# High Output Current Op-Amps





# High Output Current Op-Amps

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| Characteristics<br><br>Product Name | Rail-to-Rail | EMI-Immunity | Ch. | Supply Voltage                       | I <sub>SUPPLY</sub><br>(per Ch.) | V <sub>IO</sub> | Common-Mode Input Voltage Range |                        | V <sub>sat</sub> | I <sub>O</sub> <sup>+3</sup> | Vo   | Power |      | Supply Voltage | SR           | GBW         | Voltage Noise  | Package / Pin |                   |      |                    |       |       |     |      | SPICE Model | Notes              |  |
|-------------------------------------|--------------|--------------|-----|--------------------------------------|----------------------------------|-----------------|---------------------------------|------------------------|------------------|------------------------------|------|-------|------|----------------|--------------|-------------|----------------|---------------|-------------------|------|--------------------|-------|-------|-----|------|-------------|--------------------|--|
|                                     |              |              |     | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>mA                       | max.<br>mV      | min.<br>V                       | max.<br>V              | min.<br>V        | typ.<br>mA                   | 100Ω | 32Ω   | 16Ω  | V              | typ.<br>V/μs | typ.<br>MHz | typ.<br>nV/√Hz | DMP           | SOP <sup>+1</sup> | SSOP | MSOP <sup>+2</sup> | SOT23 | SC88A | DFN | PCSP |             |                    |  |
|                                     |              |              |     | typ. Vp-p                            | typ. mW                          | typ. mW         |                                 |                        |                  |                              |      |       |      |                |              |             |                |               |                   |      |                    |       |       |     |      |             |                    |  |
| NJM2743                             |              |              | 1   | 3 to 15                              | 2                                | 5               | (V)                             | (V <sup>+</sup> ) -2   | 1.5              | 150                          | 3.2  | 37    | 65   | @5V            | 0.85         | 0.8         | 22             |               |                   |      |                    | 5     |       |     |      | ✓           |                    |  |
| NJM3414A                            |              |              | 2   | 3 to 15                              | 2                                | 5               | (V)                             | (V <sup>+</sup> ) -2   | 1.5              | 180                          | 3.4  | 45    | 85   | @5V            | 1            | 1.3         | 18             | 8             |                   | 8    |                    |       |       |     |      | ✓           |                    |  |
| NJM4556A                            |              |              | 2   | 4 to 36                              | 4.5                              | 6               | (V) +1.5                        | (V <sup>+</sup> ) -1.5 | 4.5              | 100                          | 18   | 15    | -    | @30V           | 3            | 8           | 12             | 8             |                   | 8    |                    |       |       |     |      | ✓           |                    |  |
| NJM4580                             |              |              | 2   | 4 to 36                              | 3                                | 3               | (V) +3                          | (V <sup>+</sup> ) -3   | 3                | 100                          | 15   | 15    | -    | @30V           | 5            | 15          | 5              | 8             | 8                 | 8    | 8                  |       |       |     |      | ✓           |                    |  |
| NJM5532                             |              |              | 2   | 6 to 44                              | 4.5                              | 4               | (V) +3                          | (V <sup>+</sup> ) -3   | 3                | 90                           | 10   | 15    | -    | @30V           | 8            | 10          | 5              | 8             |                   |      |                    |       |       |     |      |             |                    |  |
| NJU7036                             | Out          |              | 2   | 2.7 to 5.5                           | 1.75                             | 10              | (V)                             | (V <sup>+</sup> ) -1.2 | 0.15             | 500                          | 4.95 | 90    | 180  | @5V            | 0.7          | 0.4         | 60             |               |                   |      |                    |       |       | 20  | ✓    |             |                    |  |
| NJU7040                             | I/O          | Yes          | 1   | 2.2 to 5.5                           | 0.45                             | 10              | (V)                             | (V <sup>+</sup> )      | 0.1              | 100                          | 4.1  | 35    | 37   | @5V            | 0.85         | 0.8         | 40             |               |                   |      |                    | 5     |       |     |      | ✓           |                    |  |
| NJU7043                             | I/O          | Yes          | 2   | 1.8 to 5.5                           | 0.30                             | 10              | (V)                             | (V <sup>+</sup> )      | 0.1              | 100                          | 4.1  | 35    | 37   | @5V            | 0.7          | 0.8         | 40             | 8             | 8                 | 8    | 8                  |       |       |     |      | ✓           |                    |  |
| NJU7044                             | I/O          | Yes          | 4   | 2.2 to 5.5                           | 0.45                             | 10              | (V)                             | (V <sup>+</sup> )      | 0.12             | 100                          | 4.1  | 35    | 37   | @5V            | 0.8          | 0.8         | 40             | 14            |                   | 14   |                    |       |       |     |      | ✓           |                    |  |
| NJU7046                             | I/O          | Yes          | 1   | 2.7 to 5.5                           | 1.4                              | 5               | (V)                             | (V <sup>+</sup> )      | 0.12             | 100                          | 4.2  | 35    | 37   | @5V            | 9            | 5           | 20             |               |                   |      |                    | 5     | 5     |     |      | ✓           |                    |  |
| NJU7047                             | I/O          | Yes          | 2   | 2.7 to 5.5                           | 1.35                             | 5               | (V)                             | (V <sup>+</sup> )      | 0.12             | 100                          | 4.2  | 35    | 37   | @5V            | 9            | 5           | 20             |               | 8                 |      | 8                  |       |       | 8   |      | ✓           |                    |  |
| NJU7048                             | I/O          | Yes          | 4   | 2.7 to 5.5                           | 1.325                            | 5               | (V)                             | (V <sup>+</sup> )      | 0.12             | 100                          | 4.2  | 35    | 37   | @5V            | 9            | 5           | 20             |               | 14                | 14   |                    |       |       |     |      | ✓           |                    |  |
| NJU7056                             | Out          | Yes          | 1   | 1.8 to 5.5                           | 0.26                             | 4               | (V)                             | (V <sup>+</sup> ) -0.9 | 0.1              | 45                           | 3.4  | 14    | -    | @5V            | 0.8          | 2.1         | 15             |               |                   |      |                    | 5     | 5     |     |      | ✓           |                    |  |
| NJU7057                             | Out          | Yes          | 2   | 1.8 to 5.5                           | 0.26                             | 4               | (V)                             | (V <sup>+</sup> ) -0.9 | 0.1              | 45                           | 3.4  | 14    | -    | @5V            | 0.8          | 2.1         | 15             |               |                   |      | 8                  |       |       | 8   |      | ✓           |                    |  |
| NJU7058                             | Out          | Yes          | 4   | 1.8 to 5.5                           | 0.275                            | 4               | (V)                             | (V <sup>+</sup> ) -0.9 | 0.1              | 45                           | 3.4  | 14    | -    | @5V            | 0.8          | 2.1         | 15             |               |                   | 14   |                    |       |       |     |      | ✓           |                    |  |
| NJU7098AF1-C                        | Out          | Yes          | 1   | 3 to 10                              | 0.6                              | 0.015           | (V)                             | (V <sup>+</sup> ) -1.5 | 0.15             | 100                          | 4.1  | 40    | 37   | @5V            | 3            | 3           | 120            |               |                   |      |                    | 6     |       |     |      | ✓           |                    |  |
| NJU7325                             | Out          |              | 2   | 2.4 to 5.5                           | 3                                | 15              | (V) +0.4                        | (V <sup>+</sup> ) -1.0 | 0.45             | 400                          | 4.88 | 75    | 137  | @5V            | 1            | 1.5         | 43             |               |                   |      | 8                  |       |       | 8   |      |             |                    |  |
| NJU77701                            | I/O          | Yes          | 1   | 2.4 to 5.5                           | 3.8                              | 1.5             | (V)                             | (V <sup>+</sup> )      | 0.08             | 110                          | 4.6  | 50    | 55   | @5V            | 35           | 34          | 6              |               |                   |      |                    | 5     |       |     |      | ✓           | Stable Gain ≥ 14dB |  |
| NJU77902                            | I/O          | Yes          | 2   | 6 to 18                              | 3.5                              | 10              | (V)                             | (V <sup>+</sup> )      | 0.2              | 1000                         | 14.5 | 830   | 1500 | @15V           | 9            | 3           | 80             |               |                   |      |                    |       |       | 8   |      | ✓           |                    |  |
| NJU77903                            | I/O          | Yes          | 1   | 6.8 to 36                            | 9.5                              | 6               | (V)                             | (V <sup>+</sup> )      | 0.6              | 400                          | 11.8 | 513   | 320  | @12V           | 3.5          | 1.5         | 50             |               |                   |      |                    |       |       | 8   |      | ✓           |                    |  |

**[Attention]** The values of short-circuit output current and output power are reference values. Especially in the CMOS type, the current capability changes depending on the power supply voltage. Please be careful with heat generated by the output current.

# Supply Current $\leq 300\mu\text{A}/\text{ch}$ . Low Supply Current Op-Amps

○ : U.D.  
○ : M.D.  
□ : Rail-to-rail I/O

[Contents](#)

## ■ 2V, 14V, 36V Operation

| J-FET Input                                                                  |                                                                                                                          |                                                                                 |                                                                                 |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Rail-to-rail output                                                          | SR=3.5V/ $\mu\text{s}$ , 1MHz                                                                                            | Single supply, ground sensing                                                   | 0.4V/ $\mu\text{s}$ , 1MHz                                                      |
| 0.025V/ $\mu\text{s}$ , 60kHz                                                |                                                                                                                          | 2.1V/ $\mu\text{s}$ , 1.8MHz                                                    |                                                                                 |
| <b>NJM8524</b> [4ch]                                                         | <b>NJM062C/CA</b> [2ch]<br><b>NJM064C/CA</b> [4ch]                                                                       | <b>NJM2132</b> [2ch]                                                            | <b>NJM8530</b> [1ch]<br><b>NJM8532</b> [2ch]<br><b>NJM8534</b> [4ch]            |
| V <sup>+</sup> =3V to 36V<br>I <sub>supply</sub> =20 $\mu\text{A}/\text{ch}$ | V <sup>+</sup> /V <sup>-</sup> = $\pm 2\text{V}$ to $\pm 18\text{V}$<br>I <sub>supply</sub> =200 $\mu\text{A}/\text{ch}$ | V <sup>+</sup> =2.7V to 32V<br>I <sub>supply</sub> =220 $\mu\text{A}/\text{ch}$ | V <sup>+</sup> =1.8V to 14V<br>I <sub>supply</sub> =300 $\mu\text{A}/\text{ch}$ |

## ■ 5.5V Operation

| Lowest power                                                                      |                                                                                           |                                                                                 |                                                                                 |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 0.8V/ms, 1kHz                                                                     | 0.05V/ $\mu\text{s}$ , 0.16MHz<br>150 $\mu\text{V}$ , 1 $\mu\text{V}/^\circ\text{C}$ max. | 0.05V/ $\mu\text{s}$ , 0.16MHz                                                  | 0.8V/ $\mu\text{s}$ , 1.7MHz                                                    |
| <b>NJU77001</b> [1ch]<br><b>NJU77002</b> [2ch]<br><b>NJU77004</b> [4ch]           | <b>NJU77600</b> [1ch]<br><b>NJU77602</b> [2ch]<br><b>NJU77604</b> [4ch]                   | <b>NJU7026</b> [1ch]<br><b>NJU7027</b> [2ch]<br><b>NJU7028</b> [4ch]            | <b>NJU77551</b> [1ch]<br><b>NJU77552</b> [2ch]<br><b>NJU77554</b> [4ch]         |
| V <sup>+</sup> =1.5V to 5.5V<br>I <sub>supply</sub> =0.23 $\mu\text{A}/\text{ch}$ | V <sup>+</sup> =2.3V to 5.5V<br>I <sub>supply</sub> =12 $\mu\text{A}/\text{ch}$           | V <sup>+</sup> =1.8V to 5.5V<br>I <sub>supply</sub> =13 $\mu\text{A}/\text{ch}$ | V <sup>+</sup> =1.8V to 5.5V<br>I <sub>supply</sub> =50 $\mu\text{A}/\text{ch}$ |



# Low Supply Current Op-Amps

| Characteristics<br>Product Name | Rail-to-Rail | EMI-Immunity | Ch. | Supply Voltage                       | I <sub>SUPPLY</sub><br>(per Ch.) |            | I <sub>SUPPLY</sub><br>(All Amps) | V <sub>IO</sub> | Common-Mode<br>Input Voltage Range |                        | -Vs <sub>at</sub><br>V <sub>OL</sub> -V <sub>-</sub> | +Vs <sub>at</sub><br>V <sub>+</sub> -V <sub>OH</sub> | R <sub>L</sub> | I <sub>O</sub> <sup>*3</sup> | SR           | f <sub>T</sub> | GBW         | Voltage Noise  | Package / Pin |                   |      |                    |       |       |     | SPICE Model | Notes |
|---------------------------------|--------------|--------------|-----|--------------------------------------|----------------------------------|------------|-----------------------------------|-----------------|------------------------------------|------------------------|------------------------------------------------------|------------------------------------------------------|----------------|------------------------------|--------------|----------------|-------------|----------------|---------------|-------------------|------|--------------------|-------|-------|-----|-------------|-------|
|                                 |              |              |     | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>μA                       | max.<br>μA | max.<br>μA                        | max.<br>mV      | min.<br>V                          | max.<br>V              | max.<br>V                                            | max.<br>V                                            | Ω              | typ.<br>mA                   | typ.<br>V/μs | typ.<br>MHz    | typ.<br>MHz | typ.<br>nV/√Hz | DMP           | SOP <sup>*1</sup> | SSOP | MSOP <sup>*2</sup> | SOT23 | SC88A | DFN |             |       |
| NJM062C/A                       |              |              | 2   | 4 to 36                              | 200                              | 250        | 500                               | 15/6            | (V) +2                             | (V <sup>+</sup> ) -2   | 5                                                    | 5                                                    | 10k            | 5                            | 3.5          | 1              | 1           | 35             |               | 8                 | 8    |                    |       |       |     | ✓           |       |
| NJM064C/A                       |              |              | 4   | 4 to 36                              | 200                              | 250        | 1000                              | 15/6            | (V) +2                             | (V <sup>+</sup> ) -2   | 5                                                    | 5                                                    | 10k            | 5                            | 3.5          | 1              | 1           | 35             |               | 14                | 14   |                    |       |       |     | ✓           |       |
| NJM2132                         |              |              | 2   | 2.7 to 32                            | 220                              | 250        | 500                               | 4.5             | (V)                                | (V <sup>+</sup> ) -1.5 | 2                                                    | 2                                                    | 10k            | 4                            | 2.1          | 1.5            | 1.8         | 32             | 8             |                   | 8    |                    |       |       |     | ✓           |       |
| NJM8524                         | Out          |              | 4   | 3 to 36                              | 25                               | 37.5       | 150                               | 1.8             | (V)                                | (V <sup>+</sup> ) -1.6 | 0.15                                                 | 0.1                                                  | 20k            | 6.5                          | 0.025        |                | 0.06        | 80             |               |                   | 14   |                    |       |       |     | ✓           |       |
| NJM8530                         | I/O          |              | 1   | 1.8 to 14                            | 320                              | 550        | 550                               | 4               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 20k            | 10                           | 0.4          | -              | 1           | 10             |               |                   |      |                    | 5     |       |     | ✓           |       |
| NJM8532                         | I/O          |              | 2   | 1.8 to 14                            | 290                              | 450        | 900                               | 4               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 20k            | 10                           | 0.4          | -              | 1           | 10             | 8             |                   | 8    | 8                  |       |       |     | ✓           |       |
| NJM8534                         | I/O          |              | 4   | 1.8 to 14                            | 300                              | 450        | 1800                              | 4               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 20k            | 10                           | 0.4          | -              | 1           | 10             |               |                   | 14   |                    |       |       |     | ✓           |       |
| NJU7026                         | I/O          | Yes          | 1   | 1.8 to 5.5                           | 13                               | 20         | 20                                | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                                  | 0.1                                                  | 100k           | 20                           | 0.05         | 0.16           | 0.16        | 50             |               |                   |      |                    | 5     | 5     |     | ✓           |       |
| NJU7027                         | I/O          | Yes          | 2   | 1.8 to 5.5                           | 13                               | 20         | 40                                | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                                  | 0.1                                                  | 100k           | 20                           | 0.05         | 0.16           | 0.16        | 50             |               |                   |      | 8                  |       |       | 8   | ✓           |       |
| NJU7028                         | I/O          | Yes          | 4   | 1.8 to 5.5                           | 12                               | 18         | 72                                | 4               | (V)                                | (V <sup>+</sup> ) -0.9 | 0.1                                                  | 0.1                                                  | 100k           | 20                           | 0.05         | 0.16           | 0.16        | 50             |               |                   | 14   |                    |       |       |     | ✓           |       |
| NJU77000                        | I/O          | Yes          | 1   | 1.5 to 5.5                           | 0.29                             | 0.49       | 0.49                              | 1.8             | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 100k           | 10                           | 0.0008       | 0.0011         | 0.0011      | 600            |               |                   |      |                    | 5     |       |     | ✓           |       |
| NJU77001                        | I/O          | Yes          | 1   | 1.5 to 5.5                           | 0.29                             | 0.49       | 0.49                              | 1.8             | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 100k           | 10                           | 0.0008       | 0.0011         | 0.0011      | 600            |               |                   |      |                    | 5     | 5     |     | ✓           |       |
| NJU77002                        | I/O          | Yes          | 2   | 1.5 to 5.5                           | 0.23                             | 0.38       | 0.76                              | 2               | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 100k           | 10                           | 0.0007       | 0.001          | 0.001       | 700            |               | 8                 |      | 8                  |       |       | 8   | ✓           |       |
| NJU77004                        | I/O          | Yes          | 4   | 1.5 to 5.5                           | 0.23                             | 0.33       | 1.32                              | 2.2             | (V)                                | (V <sup>+</sup> )      | 0.1                                                  | 0.1                                                  | 100k           | 10                           | 0.0007       | 0.001          | 0.001       | 700            |               |                   | 14   |                    |       |       |     | ✓           |       |
| NJU77550/1                      | I/O          | Yes          | 1   | 1.8 to 5.5                           | 55                               | 75         | 75                                | 5               | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                                | 0.025                                                | 10k            | 40                           | 0.8          | 1.2            | 1.7         | 24             |               |                   |      |                    | 5     | 5     |     |             |       |
| NJU77552                        | I/O          | Yes          | 2   | 1.8 to 5.5                           | 50                               | 70         | 140                               | 5               | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                                | 0.025                                                | 10k            | 40                           | 0.8          | 1.2            | 1.7         | 24             |               | 8                 |      | 8                  |       |       | 8   | ✓           |       |
| NJU77554                        | I/O          | Yes          | 4   | 1.8 to 5.5                           | 50                               | 70         | 280                               | 5               | (V) -0.2                           | (V <sup>+</sup> ) +0.2 | 0.025                                                | 0.025                                                | 10k            | 40                           | 0.8          | 1.2            | 1.7         | 24             |               |                   | 14   |                    |       |       |     |             |       |
| NJU77600 (U.D.)                 | I/O          | Yes          | 1   | 2.3 to 5.5                           | 0.012                            | 0.02       | 0.02                              | 0.15            | (V)                                | (V <sup>+</sup> )      | 0.025                                                | 0.025                                                | 100k           | -                            | 0.04         | -              | 0.08        | -              |               |                   |      |                    | 5     |       |     |             |       |
| NJU77602 (U.D.)                 | I/O          | Yes          | 2   | 2.3 to 5.5                           | 0.012                            | 0.02       | 0.04                              | 0.15            | (V)                                | (V <sup>+</sup> )      | 0.025                                                | 0.025                                                | 100k           | -                            | 0.04         | -              | 0.08        | -              |               | 8                 |      | 8                  |       |       |     | 8           |       |
| NJU77604 (U.D.)                 | I/O          | Yes          | 4   | 2.3 to 5.5                           | 0.012                            | 0.02       | 0.08                              | 0.15            | (V)                                | (V <sup>+</sup> )      | 0.025                                                | 0.025                                                | 100k           | -                            | 0.04         | -              | 0.08        | -              |               |                   | 14   |                    |       |       |     |             |       |

\*1 SOP8: JEDEC 150mil

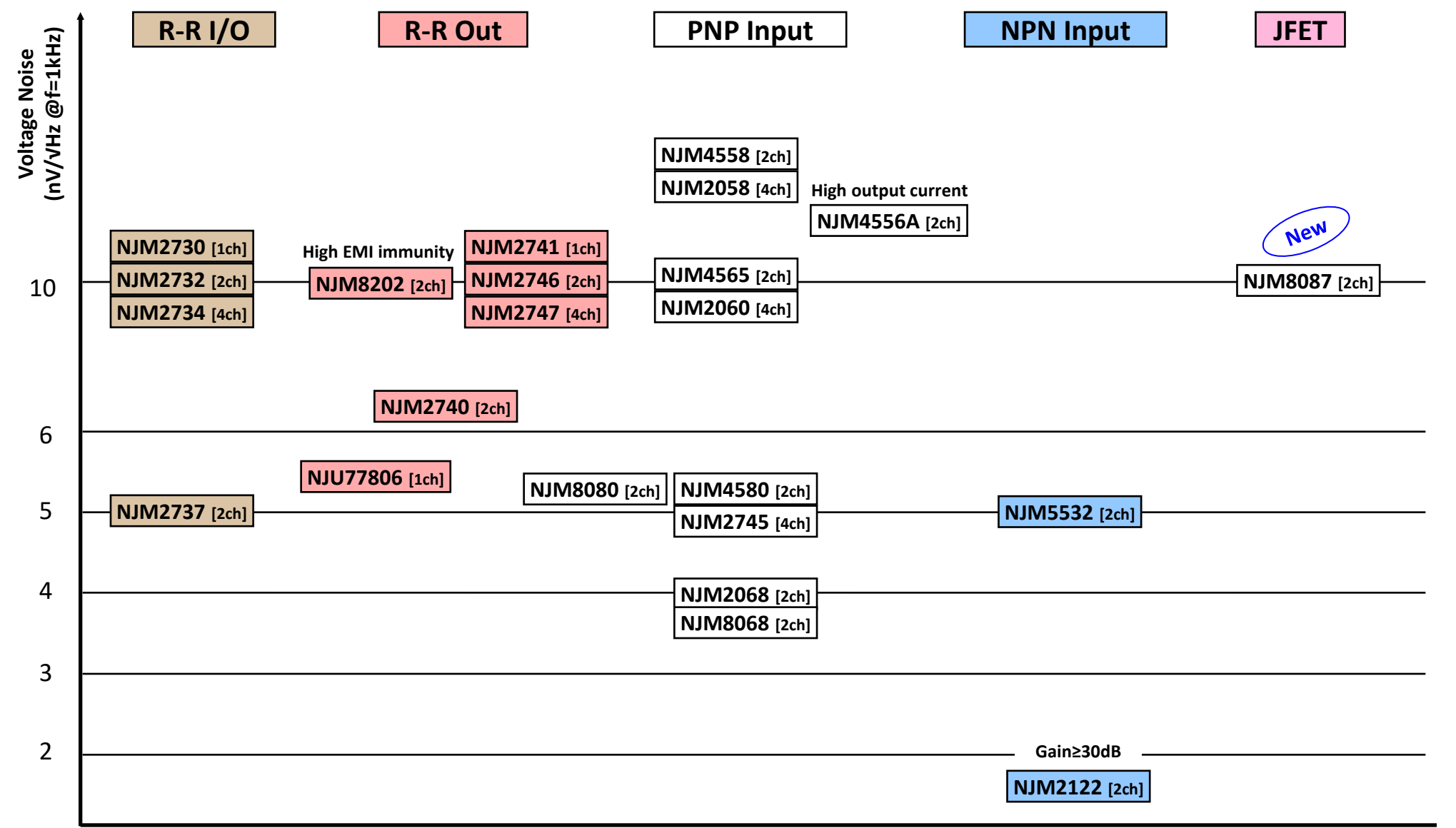
\*2 MSOP8 (VSP8): meet JEDEC MO-187-DA, thin type

\*3 Short circuit



# Low Noise, Audio Op-Amps

Contents





# Low Noise, Audio Op-Amps

| Product Name<br>(D): Noise Test Option |             |            | EMI-<br>Immunity | Supply<br>Voltage                    | I <sub>SUPPLY</sub><br>(per Ch.) | Voltage<br>Noise | THD       | V <sub>IO</sub> | SR           | GBW         | I <sub>o</sub> <sup>*3</sup> | Common-Mode<br>Input Voltage<br>Range |                        | -Vs <sub>at</sub><br>V <sub>OL</sub> -V | +Vs <sub>at</sub><br>V <sup>+</sup> -V <sub>OH</sub> | R <sub>L</sub> | Package / Pin |                   |      |                    |       |       |     |  | SPICE<br>Model       | Notes                  |
|----------------------------------------|-------------|------------|------------------|--------------------------------------|----------------------------------|------------------|-----------|-----------------|--------------|-------------|------------------------------|---------------------------------------|------------------------|-----------------------------------------|------------------------------------------------------|----------------|---------------|-------------------|------|--------------------|-------|-------|-----|--|----------------------|------------------------|
|                                        |             |            |                  |                                      |                                  |                  |           |                 |              |             |                              |                                       |                        |                                         |                                                      |                | DMP           | SOP <sup>*1</sup> | SSOP | MSOP <sup>*2</sup> | SOT23 | SC88A | DFN |  |                      |                        |
|                                        |             |            |                  | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>mA                       | typ.<br>nV/√Hz   | typ.<br>% | max.<br>mV      | typ.<br>V/μs | typ.<br>MHz | typ.<br>mA                   | min.<br>V                             | max.<br>V              | max.<br>V                               | max.<br>V                                            | Ω              |               |                   |      |                    |       |       |     |  |                      |                        |
| Single                                 | Dual        | Quad       |                  |                                      |                                  |                  |           |                 |              |             |                              |                                       |                        |                                         |                                                      |                |               |                   |      |                    |       |       |     |  |                      |                        |
| NJM2723                                |             |            |                  | 7 to 35                              | 2.8                              | 6                | -         | 20              | 2000         | 75          | 30                           | (V <sup>+</sup> ) +4                  | (V <sup>+</sup> ) -4   | 11.5                                    | 11.5                                                 | 150            |               | 8                 |      |                    |       |       |     |  | Current<br>Feed Back |                        |
|                                        | NJM4558(D)  | NJM2058    |                  | 8 to 36                              | 1.75                             | 12.5             | -         | 6               | 1            | 3           | 68                           | (V <sup>+</sup> ) +3                  | (V <sup>+</sup> ) -3   | 3                                       | 3                                                    | 10k            | 8/14          | 8                 | 8/14 |                    |       |       |     |  | ✓                    |                        |
|                                        |             | NJM2060    |                  | 8 to 36                              | 2.25                             | 10               | -         | 6               | 4            | 10          | 68                           | (V <sup>+</sup> ) +3                  | (V <sup>+</sup> ) -3   | 3                                       | 3                                                    | 2k             | 14            |                   | 14   |                    |       |       |     |  | ✓                    |                        |
|                                        | NJM4565(D)  |            |                  | 8 to 36                              | 2.25                             | 9                | -         | 3               | 4            | 10          | 76                           | (V <sup>+</sup> ) +3                  | (V <sup>+</sup> ) -3   | 3                                       | 3                                                    | 2k             | 8             | 8                 | 8    |                    |       |       |     |  | ✓                    |                        |
|                                        | NJM4580(D)  |            |                  | 4 to 36                              | 3                                | 5                | 0.0005    | 3               | 5            | 15          | 100                          | (V <sup>+</sup> ) +3                  | (V <sup>+</sup> ) -3   | 3                                       | 3                                                    | 2k             | 8             | 8                 | 8    | 8                  |       |       |     |  | ✓                    |                        |
|                                        | NJM8080     |            |                  | 4 to 36                              | 3                                | 5                | 0.0005    | 3               | 5            | 15          | 100                          | (V <sup>+</sup> ) +3                  | (V <sup>+</sup> ) -3   | 3                                       | 3                                                    | 2k             |               | 8                 | 8    | 8                  |       |       |     |  | ✓                    |                        |
|                                        |             | NJM2745M/V |                  | 4 to 19                              | 3                                | 5                | 0.001     | 3               | 5            | 15          | 100                          | (V <sup>+</sup> ) +2                  | (V <sup>+</sup> ) -2   | 2                                       | 2                                                    | 2k             | 14            |                   | 14   |                    |       |       |     |  | ✓                    |                        |
|                                        | NJM2068(D)  |            |                  | 8 to 36                              | 2.5                              | 4                | 0.001     | 3               | 6            | 19          | 65                           | (V <sup>+</sup> ) +3                  | (V <sup>+</sup> ) -3   | 3                                       | 3                                                    | 2k             | 8             |                   | 8    |                    |       |       |     |  | ✓                    |                        |
|                                        | NJM8068     |            |                  | 8 to 36                              | 2.5                              | 3.5              | 0.001     | 3               | 6.8          | 19          | 65                           | (V <sup>+</sup> ) +3                  | (V <sup>+</sup> ) -3   | 3                                       | 3                                                    | 2k             |               | 8                 |      | 8                  |       |       |     |  | ✓                    |                        |
|                                        | NJM4556A(D) |            |                  | 4 to 36                              | 4.5                              | 12               | -         | 6               | 3            |             | 100                          | (V <sup>+</sup> ) +1.5                | (V <sup>+</sup> ) -1.5 | 4.5                                     | 4.5                                                  | 150            | 8             |                   | 8    |                    |       |       |     |  | ✓                    | High Output<br>Current |
|                                        | NJM2122     |            |                  | 4 to 14                              | 3.5                              | 1.5              | -         | 6               | 2.4          | 12          | 2                            | (V <sup>+</sup> ) +1.8                | (V <sup>+</sup> ) -1.8 | 0.5                                     | 0.5                                                  | 2.5k           | 8             |                   |      |                    |       |       |     |  |                      | Stable Gain ≥<br>30dB  |
| NJM2741                                | NJM2746     | NJM2747    |                  | 2.5 to 14                            | 2                                | 10               | 0.001     | 6               | 3.5          | 10          | 1                            | (V <sup>-</sup> )                     | (V <sup>+</sup> ) -1   | 0.25                                    | 0.25                                                 | 5k             | 8/14          | 8                 | 8/14 | 8                  | 5     | 5     | 8   |  | ✓                    |                        |
|                                        | NJM2740     |            |                  | 2.2 to 7                             | 1.75                             | 6.5              | 0.002     | 6               | 4            | 12          | 1                            | (V <sup>-</sup> ) +1.1                | (V <sup>+</sup> ) -1   | 0.5                                     | 0.5                                                  | 2.5k           | 8             |                   | 8    | 8                  |       |       |     |  | ✓                    |                        |
|                                        | NJM8202     |            | Yes              | 2.5 to 14                            | 2                                | 10               | 0.001     | 6               | 3.5          | 10          | 1                            | (V <sup>-</sup> )                     | (V <sup>+</sup> ) -1   | 0.25                                    | 0.25                                                 | 5k             | 8             | 8                 | 8    | 8                  |       |       |     |  | ✓                    |                        |
| NJU77806                               |             |            | Yes              | 1.8 to 5.5                           | 0.5                              | 5.5              | 0.005     | 2               | 1.1          | 4.4         | 70                           | (V <sup>-</sup> ) -0.1                | (V <sup>+</sup> ) -0.9 | 0.1                                     | 0.1                                                  | 10k            |               |                   |      |                    |       | 5     |     |  | ✓                    |                        |
| NJM2730                                | NJM2732     | NJM2734    |                  | 1.8 to 5.5                           | 0.32                             | 10               | 0.01      | 5               | 0.4          | 1           | 10                           | (V <sup>-</sup> )                     | (V <sup>+</sup> )      | 0.1                                     | 0.1                                                  | 20k            | 8/14          | 8                 | 8/14 | 8                  | 5     |       |     |  | ✓                    |                        |
|                                        | NJM2737     |            |                  | 1.8 to 6                             | 0.6                              | 5                | 0.0009    | 5               | 0.7          | 3.1         | 10                           | (V <sup>-</sup> )                     | (V <sup>+</sup> )      | 0.15                                    | 0.1                                                  | 20k            | 8             |                   | 8    | 8                  |       |       |     |  | ✓                    |                        |

\*1 SOP8: JEDEC 150mil  
\*2 MSOP8 (VSP8): meet JEDEC MO-187-DA, thin type  
\*3 Short circuit

## Low Power

Push-Pull Output

Rail-to-rail input

$T_{RLH}=850\text{ns}$

**NJU77230** [1ch]

**NJU77231** [1ch]

**NJU77232** [2ch]

$V^+=1.8\text{V to }5.5$

$I_{\text{supply}}=10\mu\text{A/ch}$

$T_{RLH}=540\text{ns}$

$I_{\text{sink}}=25\text{mA}$

**NJU7108** [1ch]

$V^+=1\text{V to }5.5\text{V}$

$I_{\text{supply}}=10\mu\text{A}$

$T_{RLH}=3300\text{ns}$

$I_{\text{sink}}=2\text{mA}$

**NJU7116** [1ch]

$V^+=1.8\text{V to }3.6\text{V}$

$I_{\text{supply}}=1\mu\text{A}$

Open-Drain Output

Rail-to-rail input

$T_{RLH}=1100\text{ns}$

**NJU77240** [1ch]

**NJU77241** [1ch]

**NJU77242** [2ch]

$V^+=1.8\text{V to }5.5$

$I_{\text{supply}}=10\mu\text{A/ch}$

$T_{RLH}=540\text{ns}$

$I_{\text{sink}}=25\text{mA}$

**NJU7118** [1ch]

$V^+=1\text{V to }5.5\text{V}$

$I_{\text{supply}}=10\mu\text{A}$

$T_{RLH}=900\text{ns}$

$I_{\text{sink}}=2\text{mA}$

**NJU7141** [1ch]

$V^+=1\text{V to }5.5\text{V}$

$I_{\text{supply}}=5\mu\text{A}$

## Standard

Open-Collector Output

$T_{RLH}=1500\text{ns}$

**NJM2903** [2ch]

**NJM2901** [4ch]

$V^+=2\text{V to }36\text{V}$

$T_{RLH}=500\text{ns}$

**NJM12903** [2ch]

**NJM12901** [4ch]

$V^+=2\text{V to }14\text{V}$

$I_{\text{supply}}=200\mu\text{A/ch}$

$T_{RLH}=1300\text{ns}$

**NJM390A** [1ch]

**NJM391A** [1ch]

$V^+=2\text{V to }36\text{V}$

## High Speed

Push-Pull Output

$T_{RLH}=110\text{ns}$

$I_{\text{sink}}=25\text{mA}$

**NJU7109** [1ch]

$V^+=1.8\text{V to }5.5\text{V}$

$I_{\text{supply}}=100\mu\text{A}$

Open-Drain Output

$T_{RLH}=160\text{ns}$

$I_{\text{sink}}=25\text{mA}$

**NJU7119** [1ch]

$V^+=1.8\text{V to }5.5\text{V}$

$I_{\text{supply}}=100\mu\text{A}$

# Comparators

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| Characteristics<br>Product Name | Ch. | Output Type | Supply Voltage                       | I <sub>SUPPLY</sub><br>(per Ch.) | V <sub>IO</sub> | Common-Mode Input Voltage Range |           | t <sub>RLH</sub> | t <sub>RHL</sub> | -Vs <sub>at</sub><br>V <sub>OL</sub> -V <sub>I</sub> | +Vs <sub>at</sub><br>V <sub>I</sub> -V <sub>OH</sub> | Package / Pin |                   |      |                    |       |       |     | SPICE Model | Notes |
|---------------------------------|-----|-------------|--------------------------------------|----------------------------------|-----------------|---------------------------------|-----------|------------------|------------------|------------------------------------------------------|------------------------------------------------------|---------------|-------------------|------|--------------------|-------|-------|-----|-------------|-------|
|                                 |     |             | V <sup>+</sup> - V <sup>-</sup><br>V | typ.<br>uA                       | max.<br>mV      | min.<br>V                       | max.<br>V | typ.<br>ns       | typ.<br>ns       | max.<br>V                                            | max.<br>V                                            | DMP           | SOP <sup>*1</sup> | SSOP | MSOP <sup>*2</sup> | SOT23 | SC88A | DFN |             |       |
| NJM390A                         | 1   | O.D.        | 2 to 36                              | 300                              | 3               | (V-)                            | (V+) -1.5 | 1300             | 500              | 0.4 (I <sub>sink</sub> =4mA)                         | -                                                    |               |                   |      |                    | 5     | 5     |     |             |       |
| NJM391A                         | 1   | O.D.        | 2 to 36                              | 300                              | 3               | (V-)                            | (V+) -1.5 | 1300             | 500              | 0.4 (I <sub>sink</sub> =4mA)                         | -                                                    |               |                   |      |                    | 5     | 5     | 6   |             |       |
| NJM2903                         | 2   | O.D.        | 2 to 36                              | 200                              | 7               | (V-)                            | (V+) -1.5 | 1500             | 750              | 0.4 (I <sub>sink</sub> =3mA)                         | -                                                    | 8             | 8                 | 8    | 8                  |       |       |     | ✓           |       |
| NJM2901                         | 4   | O.D.        | 2 to 36                              | 200                              | 7               | (V-)                            | (V+) -1.5 | 1500             | 750              | 0.4 (I <sub>sink</sub> =3mA)                         | -                                                    | 14            |                   | 14   |                    |       |       |     | ✓           |       |
| NJM12903                        | 2   | O.D.        | 2 to 14                              | 200                              | 4               | (V-)                            | (V+) -1.5 | 500              | 130              | 0.3 (I <sub>sink</sub> =3mA)                         | -                                                    | 8             | 8                 | 8    | 8                  |       |       |     | ✓           |       |
| NJM12901                        | 4   | O.D.        | 2 to 14                              | 200                              | 4               | (V-)                            | (V+) -1.5 | 500              | 130              | 0.3 (I <sub>sink</sub> =3mA)                         | -                                                    | 14            |                   | 14   |                    |       |       |     |             |       |
| NJU7108                         | 1   | P.P.        | 1 to 5.5                             | 10                               | 4               | (V-)                            | (V+) -0.5 | 500              | 190              | 0.3 (I <sub>sink</sub> =5mA)                         | 0.3 (I <sub>sink</sub> =5mA)                         |               |                   |      |                    |       | 5     |     | ✓           |       |
| NJU7109                         | 1   | P.P.        | 1.8 to 5.5                           | 100                              | 7               | (V-)                            | (V+) -0.6 | 110              | 70               | 0.3 (I <sub>sink</sub> =5mA)                         | 0.3 (I <sub>sink</sub> =5mA)                         |               |                   |      |                    | 5     | 5     |     | ✓           |       |
| NJU7116                         | 1   | P.P.        | 1.8 to 3.6                           | 1                                | 2.5             | (V-)                            | (V+) -0.5 | 3300             | 1200             | 0.3 (I <sub>sink</sub> =2mA)                         | 0.3 (I <sub>sink</sub> =2mA)                         |               |                   |      |                    | 5     |       | 6   | ✓           |       |
| NJU7118                         | 1   | O.D.        | 1 to 5.5                             | 10                               | 4               | (V-)                            | (V+) -0.5 | 540              | 190              | 0.3 (I <sub>sink</sub> =5mA)                         | -                                                    |               |                   |      |                    |       | 5     |     |             |       |
| NJU7119                         | 1   | O.D.        | 1.8 to 5.5                           | 100                              | 7               | (V-)                            | (V+) -0.6 | 160              | 70               | 0.3 (I <sub>sink</sub> =5mA)                         | -                                                    |               |                   |      |                    |       | 5     |     |             |       |
| NJU7141                         | 1   | O.D.        | 1 to 5.5                             | 5                                | 10              | (V-)                            | (V+) -0.5 | 900              | 350              | 0.3 (I <sub>sink</sub> =2mA)                         | -                                                    |               |                   |      |                    | 5     |       |     | ✓           |       |
| NJU77230                        | 1   | P.P.        | 1.8 to 5.5                           | 6                                | 6               | (V-)                            | (V+)      | 780              | 480              | 0.3 (I <sub>sink</sub> =3mA)                         | 0.3 (I <sub>sink</sub> =3mA)                         |               |                   |      |                    | 5     | 5     |     |             |       |
| NJU77231                        | 1   | P.P.        | 1.8 to 5.5                           | 6                                | 6               | (V-)                            | (V+)      | 780              | 480              | 0.3 (I <sub>sink</sub> =3mA)                         | 0.3 (I <sub>sink</sub> =3mA)                         |               |                   |      |                    | 5     | 5     | 6   | ✓           |       |
| NJU77232                        | 2   | P.P.        | 1.8 to 5.5                           | 6                                | 6               | (V-)                            | (V+)      | 780              | 480              | 0.3 (I <sub>sink</sub> =3mA)                         | 0.3 (I <sub>sink</sub> =3mA)                         |               |                   |      | 8                  |       |       | 8   | ✓           |       |
| NJU77240                        | 1   | O.D.        | 1.8 to 5.5                           | 6                                | 6               | (V-)                            | (V+)      | 840              | 450              | 0.3 (I <sub>sink</sub> =3mA)                         | -                                                    |               |                   |      |                    | 5     | 5     |     |             |       |
| NJU77241                        | 1   | O.D.        | 1.8 to 5.5                           | 6                                | 6               | (V-)                            | (V+)      | 840              | 450              | 0.3 (I <sub>sink</sub> =3mA)                         | -                                                    |               |                   |      |                    | 5     | 5     | 6   | ✓           |       |
| NJU77242                        | 2   | O.D.        | 1.8 to 5.5                           | 6                                | 6               | (V-)                            | (V+)      | 840              | 450              | 0.3 (I <sub>sink</sub> =3mA)                         | -                                                    |               |                   |      | 8                  |       |       | 8   |             |       |

O.D.: Open Drain

P.P.: Push-Pull



# Small Package Op-Amps & Comparators

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## ■ DFN (ESON)



**DFN8-U1**  
2.0x2.0x0.397 mm

### Comparators

Push-pull output

**NJU77232** [2ch]

Open-drain output

**NJU77242** [2ch]

### Low Noise

$I_{\text{supply}}=13\mu\text{A/ch}$

**NJU7027** [2ch]

$I_{\text{supply}}=0.23\mu\text{A/ch}$

**NJU77002** [2ch]

### Low Noise

$\text{en}=10\text{nV}/\sqrt{\text{Hz}}$

**NJM2746** [2ch]

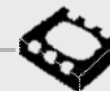
$\text{en}=15\text{nV}/\sqrt{\text{Hz}}$

**NJU7057** [2ch]

### High Speed

9V/ $\mu\text{s}$

**NJU7047** [2ch]



**DFN6-G1**  
1.6x1.6x0.397 mm

### Comparators

Push-pull output

**NJU77231** [1ch]

Open-drain output

**NJU77241** [1ch]

Push-pull output

**NJU7116** [1ch]

$I_{\text{supply}}=1\mu\text{A/ch}$

## ■ QFN



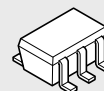
**EQFN12-E2**  
1.8x1.8x0.397 mm

**NJM2904C** [2ch]

**EQFN14-D7**  
1.6x1.6x0.397 mm

**NJM2903C** [2ch]

## ■ SC-88A



1.25x2.0x0.95 mm

### Low Power

$I_{\text{supply}}=0.29\mu\text{A/ch}$

**NJU77001** [1ch]

$I_{\text{supply}}=13\mu\text{A/ch}$

**NJU7026** [1ch]

$I_{\text{supply}}=80\mu\text{A/ch}, 36\text{V}$

**NJM2130** [1ch]

### Low Noise

$\text{en}=5.5\text{nV}/\sqrt{\text{Hz}}$

**NJU77806** [1ch]

$\text{en}=10\text{nV}/\sqrt{\text{Hz}}$

**NJM2741** [1ch]

$\text{en}=15\text{nV}/\sqrt{\text{Hz}}$

**NJU7056** [1ch]

### Comparators

**NJU77230/31** [1ch]

**NJU77240/41** [1ch]

**NJU7108/18** [1ch]

**NJU7109/19** [1ch]



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## Op-Amps

| Characteristics<br>Product Name | Rail-to-Rail | EMI-Immunity | Ch. | Supply Voltage                       |     | I <sub>SUPPLY</sub><br>(per Ch.)<br>typ. mA | V <sub>IO</sub><br>max. mV | Common-Mode Input Voltage Range |                        | -Vs <sub>at</sub><br>V <sub>OL</sub> -V <sub>-</sub><br>max. V | +Vs <sub>at</sub><br>V <sub>+</sub> -V <sub>OH</sub><br>max. V | R <sub>L</sub><br><br>Ω | I <sub>o</sub> *1<br>typ. mA | SR<br>typ. V/μs | GBW<br>typ. MHz | Voltage Noise<br>typ. nV/√Hz | Package / Pin |            |             | SPICE Model | Notes |
|---------------------------------|--------------|--------------|-----|--------------------------------------|-----|---------------------------------------------|----------------------------|---------------------------------|------------------------|----------------------------------------------------------------|----------------------------------------------------------------|-------------------------|------------------------------|-----------------|-----------------|------------------------------|---------------|------------|-------------|-------------|-------|
|                                 |              |              |     | V <sup>+</sup> - V <sup>-</sup><br>V |     |                                             |                            | min. V                          | max. V                 |                                                                |                                                                |                         |                              |                 |                 |                              | SC88A (2020)  | DFN (2020) | EQFN (1818) |             |       |
| NJM2741                         | Out          |              | 1   | 2.5                                  | 14  | 2.2                                         | 6                          | (V)                             | (V <sup>+</sup> ) -1   | 0.25                                                           | 0.25                                                           | 5k                      | 1                            | 3.5             | 10              | 10                           | 5             |            |             | ✓           |       |
| NJM2746                         |              |              | 2   |                                      |     | 2                                           |                            |                                 |                        |                                                                |                                                                |                         |                              |                 |                 |                              |               | 8          |             | ✓           |       |
| NJM2904C                        | -            |              | 2   | 3                                    | 32  | 0.35                                        | 7                          | (V)                             | (V <sup>+</sup> ) -1.5 | 1.5                                                            | 1.5                                                            | 2k                      | 40                           | 0.6             | 1.1             | 30                           |               |            | 12          | ✓           |       |
| NJU7026                         | Out          | Yes          | 1   | 1.8                                  | 5.5 | 0.013                                       | 4                          | (V)                             | (V <sup>+</sup> ) -0.9 | 0.1                                                            | 0.1                                                            | 100k                    | 15                           | 0.05            | 0.16            | 50                           | 5             |            |             | ✓           |       |
| NJU7027                         |              | Yes          | 2   |                                      |     |                                             |                            |                                 |                        |                                                                |                                                                |                         |                              |                 |                 |                              |               | 8          |             | ✓           |       |
| NJU7047                         | I/O          | Yes          | 2   | 2.7                                  | 5.5 | 1.35                                        | 5                          | (V)                             | (V <sup>+</sup> )      | 0.05                                                           | 0.05                                                           | 10k                     | 100                          | 9               | 5               | 20                           |               | 8          |             | ✓           |       |
| NJU7056                         | Out          | Yes          | 1   | 1.8                                  | 5.5 | 0.26                                        | 4                          | (V)                             | (V <sup>+</sup> ) -0.9 | 0.1                                                            | 0.1                                                            | 10k                     | 45                           | 0.8             | 2.1             | 15                           | 5             |            |             | ✓           |       |
| NJU7057                         |              | Yes          | 2   |                                      |     |                                             |                            |                                 |                        |                                                                |                                                                |                         |                              |                 |                 |                              |               | 8          |             | ✓           |       |
| NJU77001/A                      | I/O          | Yes          | 1   | 1.5                                  | 5.5 | 0.00029                                     | 1.8/1.0                    | (V)                             | (V <sup>+</sup> )      | 0.1                                                            | 0.1                                                            | 100k                    | 10                           | 0.0008          | 0.0011          | 600                          | 5             |            |             | ✓           |       |
| NJU77002/A                      |              | Yes          | 2   |                                      |     | 0.00023                                     | 2.0/1.3                    |                                 |                        |                                                                |                                                                |                         |                              | 0.0007          | 0.001           | 700                          |               | 8          |             | ✓           |       |
| NJU77806                        | I/O          | Yes          | 1   | 1.8                                  | 5.5 | 0.5                                         | 2                          | (V) -0.1                        | (V <sup>+</sup> ) -0.9 | 0.1                                                            | 0.1                                                            | 10k                     | 70                           | 1.1             | 4.4             | 5.5                          | 5             |            |             | ✓           |       |

O.D.: Open Drain  
P.P.: Push-Pull

## Comparators

| Characteristics<br>Product Name | Rail-to-Rail | EMI-Immunity | Ch. | Supply Voltage                       |         | I <sub>SUPPLY</sub><br>(per Ch.) | V <sub>IO</sub> | Common-Mode Input Voltage Range |                        | t <sub>RLH</sub> | t <sub>RHL</sub> | -Vs <sub>at</sub><br>V <sub>OL</sub> -V <sub>-</sub> | +Vs <sub>at</sub><br>V <sub>+</sub> -V <sub>OH</sub> | Output Type | Package / Pin |            |             |    | SPICE Model | Notes |
|---------------------------------|--------------|--------------|-----|--------------------------------------|---------|----------------------------------|-----------------|---------------------------------|------------------------|------------------|------------------|------------------------------------------------------|------------------------------------------------------|-------------|---------------|------------|-------------|----|-------------|-------|
|                                 |              |              |     | V <sup>+</sup> - V <sup>-</sup><br>V | typ. uA | max. mV                          | min. V          | max. V                          | typ. ns                | typ. ns          | max. V           | max. V                                               | SC88A (2020)                                         |             | DFN (2020)    | DFN (1616) | EQFN (1616) |    |             |       |
| NJM2903C                        | -            |              | 2   | 2                                    | 36      | 225                              | 5               | (V <sup>-</sup> )               | (V <sup>+</sup> ) -1.5 | 1300             | 750              | 0.4 (I <sub>SINK</sub> =4mA)                         | -                                                    | O.D.        |               |            |             | 14 | ✓           |       |
| NJU7108                         | Out          |              | 1   | 1                                    | 5.5     | 10                               | 4               | (V <sup>-</sup> )               | (V <sup>+</sup> ) -0.5 | 500              | 190              | 0.3 (I <sub>SINK</sub> =5mA)                         | 0.3 (I <sub>SINK</sub> =5mA)                         | P.P.        | 5             |            |             |    | ✓           |       |
| NJU7109                         | Out          |              | 1   | 1.8                                  | 5.5     | 100                              | 7               | (V <sup>-</sup> )               | (V <sup>+</sup> ) -0.6 | 110              | 70               | 0.3 (I <sub>SINK</sub> =5mA)                         | 0.3 (I <sub>SINK</sub> =5mA)                         | P.P.        | 5             |            |             |    | ✓           |       |
| NJU7118                         | -            |              | 1   | 1                                    | 5.5     | 10                               | 4               | (V <sup>-</sup> )               | (V <sup>+</sup> ) -0.5 | 540              | 190              | 0.3 (I <sub>SINK</sub> =5mA)                         | -                                                    | O.D.        | 5             |            |             |    |             |       |
| NJU7119                         | -            |              | 1   | 1.8                                  | 5.5     | 100                              | 7               | (V <sup>-</sup> )               | (V <sup>+</sup> ) -0.6 | 160              | 70               | 0.3 (I <sub>SINK</sub> =5mA)                         | -                                                    | O.D.        | 5             |            |             |    |             |       |
| NJU77230                        | In           | Yes          | 1   | 1.8                                  | 5.5     | 6                                | 6               | (V <sup>-</sup> )               | (V <sup>+</sup> )      | 780              | 480              | 0.3 (I <sub>SINK</sub> =3mA)                         | 0.3 (I <sub>SINK</sub> =5mA)                         | P.P.        | 5             |            |             |    |             |       |
| NJU77231                        |              | Yes          | 1   | 1.8                                  | 5.5     | 6                                | 6               | (V <sup>-</sup> )               | (V <sup>+</sup> )      | 780              | 480              | 0.3 (I <sub>SINK</sub> =3mA)                         | 0.3 (I <sub>SINK</sub> =5mA)                         | P.P.        | 5             |            | 6           |    | ✓           |       |
| NJU77232                        |              | Yes          | 2   | 1.8                                  | 5.5     | 6                                | 6               | (V <sup>-</sup> )               | (V <sup>+</sup> )      | 780              | 480              | 0.3 (I <sub>SINK</sub> =3mA)                         | 0.3 (I <sub>SINK</sub> =5mA)                         | P.P.        |               | 8          |             |    | ✓           |       |
| NJU77240                        | In           | Yes          | 1   | 1.8                                  | 5.5     | 6                                | 6               | (V <sup>-</sup> )               | (V <sup>+</sup> )      | 840              | 450              | 0.3 (I <sub>SINK</sub> =3mA)                         | -                                                    | O.D.        | 5             |            |             |    |             |       |
| NJU77241                        |              | Yes          | 1   | 1.8                                  | 5.5     | 6                                | 6               | (V <sup>-</sup> )               | (V <sup>+</sup> )      | 840              | 450              | 0.3 (I <sub>SINK</sub> =3mA)                         | -                                                    | O.D.        | 5             |            | 6           |    |             |       |
| NJU77242                        |              | Yes          | 2   | 1.8                                  | 5.5     | 6                                | 6               | (V <sup>-</sup> )               | (V <sup>+</sup> )      | 840              | 450              | 0.3 (I <sub>SINK</sub> =3mA)                         | -                                                    | O.D.        |               | 8          |             |    | ✓           |       |



\*1 Short circuit



## Concept

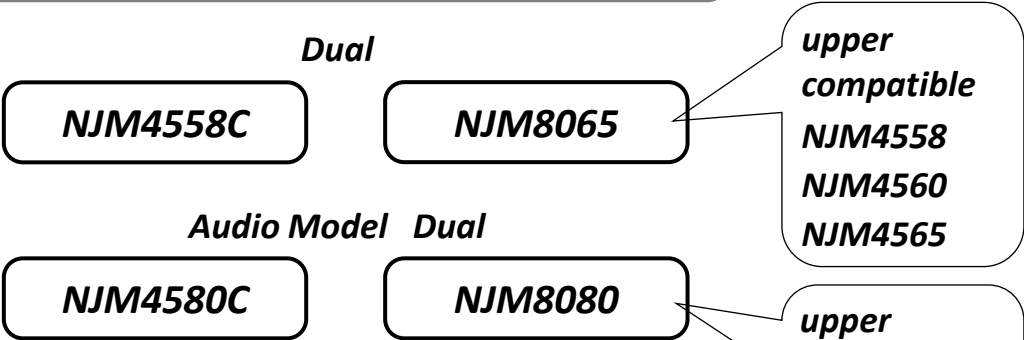
These OpAmps are **re-designed** as “*the new standard OpAmps*” with [competitive price](#) and [global standard packages](#).

In addition, some of specifications such as temperature range, ESD are improved.

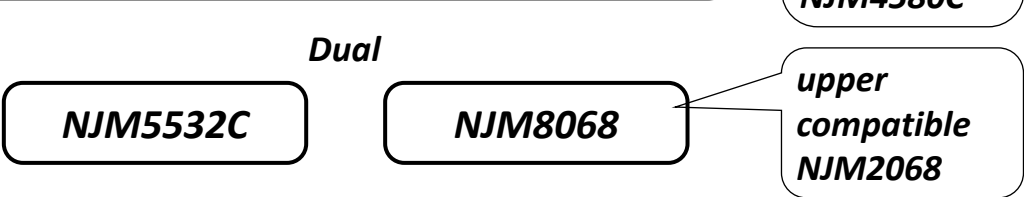
## Features

- ✓ Shrunk Chip by new process, new design
- ✓ Global Standard Package: SOP JEDEC 150mil  
MSOP(TVSP) Meet JEDEC MO-187-DA THIN TYPE  
SSOP
- ✓ Expanded Temperature Range, Spec

## Dual Supply Bipolar OP-Amp



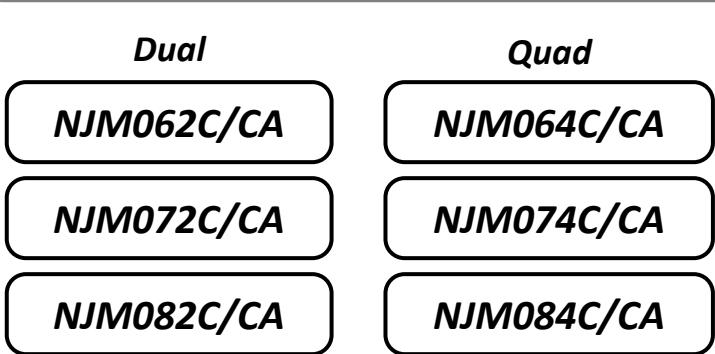
## Dual Supply Low Noise OP-Amp



## Single Supply Bipolar OP-Amp

| Single  | Dual        | Quad        |
|---------|-------------|-------------|
| NJM321A | NJM358C/CA  | NJM324C/CA  |
| NJM8021 | NJM2904C/CA | NJM2902C/CA |

## Dual Supply JFET OP-Amp



## Single Supply Bipolar Comparator

| Single  | Dual        | Quad        |
|---------|-------------|-------------|
| NJM391A | NJM393C/CA  | NJM339C/CA  |
| NJM8191 | NJM2903C/CA | NJM2901C/CA |



# A-Grade <Offset Voltage option>

[Contents](#)

## Single Supply Bip OP-Amp

*Dual*

**NJM358C/CA**

**NJM2904C/CA**

*Quad*

**NJM324C/CA**

**NJM2902C/CA**

| Standard        | A-grade (offset voltage) |
|-----------------|--------------------------|
| <b>NJM358C</b>  | <b>NJM358CA</b>          |
| 7mV max.        | 2mV max.                 |
| <b>NJM2904C</b> | <b>NJM2904CA</b>         |
| 7mV max.        | 2mV max.                 |
| <b>NJM324C</b>  | <b>NJM324CA</b>          |
| 7mV max.        | 2.5mV max.               |
| <b>NJM2902C</b> | <b>NJM2902CA</b>         |
| 7mV max.        | 2.5mV max.               |

## Single Supply Bip Comparator

*Dual*

**NJM393C/CA**

**NJM2903C/CA**

*Quad*

**NJM339C/CA**

**NJM2901C/CA**

| Standard        | A-grade (offset voltage) |
|-----------------|--------------------------|
| <b>NJM393C</b>  | <b>NJM393CA</b>          |
| 5mV max.        | 2mV max.                 |
| <b>NJM2903C</b> | <b>NJM2903CA</b>         |
| 5mV max.        | 2mV max.                 |
| <b>NJM339C</b>  | <b>NJM339CA</b>          |
| 5mV max.        | 2.5mV max.               |
| <b>NJM2901C</b> | <b>NJM2901CA</b>         |
| 5mV max.        | 2.5mV max.               |

# Package Line Up of Renewal Standard Series

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| Part Number                  | Package |          |                 |      |      |                  |       |       |        |                |                |
|------------------------------|---------|----------|-----------------|------|------|------------------|-------|-------|--------|----------------|----------------|
|                              | SC-88A  | SOT-23-5 | DFN6<br>(ESON6) | SOP8 | DMP8 | MSOP8<br>(TVSP8) | SSOP8 | SOP14 | SSOP14 | EQFN12         | EQFN14         |
| <b>Operational Amplifier</b> |         |          |                 |      |      |                  |       |       |        |                |                |
| NJM8020/8021                 | ✓       | ✓        | ✓ (8021 only)   |      |      |                  |       |       |        |                |                |
| NJM320A/321A                 | ✓       | ✓        | ✓ (321A only)   |      |      |                  |       |       |        |                |                |
| NJM358C/CA                   |         |          |                 | ✓    |      |                  | ✓     |       |        |                |                |
| NJM2904C/CA                  |         |          |                 | ✓    | ✓    | ✓                | ✓     |       |        | ✓ (2904C only) |                |
| NJM324C/CA                   |         |          |                 |      |      |                  |       | ✓     | ✓      |                |                |
| NJM2902C/CA                  |         |          |                 |      |      |                  |       | ✓     | ✓      |                |                |
| NJM4558C                     |         |          |                 | ✓    |      |                  | ✓     |       |        |                |                |
| NJM8065                      |         |          |                 | ✓    | ✓    | ✓                | ✓     |       |        |                |                |
| NJM4580C                     |         |          |                 | ✓    |      |                  | ✓     |       |        |                |                |
| NJM8080                      |         |          |                 | ✓    |      | ✓                | ✓     |       |        |                |                |
| NJM5532C                     |         |          |                 | ✓    |      |                  |       |       |        |                |                |
| NJM8068                      |         |          |                 | ✓    |      | ✓                |       |       |        |                |                |
| NJM062C/CA                   |         |          |                 | ✓    |      |                  | ✓     |       |        |                |                |
| NJM072C/CA                   |         |          |                 | ✓    |      |                  | ✓     |       |        |                |                |
| NJM082C/CA                   |         |          |                 | ✓    |      |                  | ✓     |       |        |                |                |
| NJM064C/CA                   |         |          |                 |      |      |                  |       | ✓     | ✓      |                |                |
| NJM074C/CA                   |         |          |                 |      |      |                  |       | ✓     | ✓      |                |                |
| NJM084C/CA                   |         |          |                 |      |      |                  |       | ✓     | ✓      |                |                |
| <b>Comparator</b>            |         |          |                 |      |      |                  |       |       |        |                |                |
| NJM8190/8191                 | ✓       | ✓        | ✓ (8191 only)   |      |      |                  |       |       |        |                |                |
| NJM390A/391A                 | ✓       | ✓        | ✓ (391A only)   |      |      |                  |       |       |        |                |                |
| NJM393C/CA                   |         |          |                 | ✓    |      |                  | ✓     |       |        |                |                |
| NJM2903C/CA                  |         |          |                 | ✓    | ✓    | ✓                | ✓     |       |        |                | ✓ (2903C only) |
| NJM339C/CA                   |         |          |                 |      |      |                  |       | ✓     | ✓      |                |                |
| NJM2901C/CA                  |         |          |                 |      |      |                  |       | ✓     | ✓      |                |                |

# Cross-Reference of Renewal Standard Series

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| Supplier       | NJR           | ST              | TI             | ON Semi        | ON Semi<br>(ex-Fairchild) | ROHM            | Renesas              | KEC        |
|----------------|---------------|-----------------|----------------|----------------|---------------------------|-----------------|----------------------|------------|
| Part<br>Number | NJM358C / CA  | LM358 / 358A    | LM358 / 358A   | LM358 / 358A   | LM358 / -                 | BA10358 / -     | μPC358 / μPC358(5)   | KIA358 / - |
|                | NJM324C / CA  | LM324 / 324A    | LM324 / 324A   | LM324 / 324A   | LM324 / -                 | BA10324 / -     | -                    | KIA324 / - |
|                | NJM393C / CA  | LM393 / 393A    | LM393 / 393A   | LM393 / -      | LM393 / -                 | BA10393 / -     | μPC393 / μPC393(5)   | KIA393 / - |
|                | NJM339C / CA  | LM339 / 339A    | LM339 / 339A   | LM339 / -      | LM339 / -                 | BA10339 / -     | μPC339 / μPC339(5)   | KIA339 / - |
|                | NJM2904C / CA | LM2904 / 2904A  | LM2904 / 2904A | LM2904 / 2904A | LM2904 / -                | BA2904S / 2904W | μPC1251 / μPC1251(5) | -          |
|                | NJM2902C / CA | LM2902 / 2902AW | LM2902 / 2902A | LM2902 / -     | LM2902 / -                | BA2902S / -     | -                    | -          |
|                | NJM2903C / CA | LM2903 / -      | LM2903 / 2903A | LM2903 / -     | LM2903 / -                | BA2903S / 2903W | μPC277 / μPC277(5)   | -          |
|                | NJM2901C / CA | LM2901 / -      | LM2901 / 2901A | LM2901 / -     | LM2901 / -                | BA2901S / -     | μPC177 / μPC177(5)   | -          |
|                | NJM4558C      | MC4558C         | RC4558         | -              | KA4558                    | BA4558          | μPC4558              | KIA4558    |
|                | NJM4580C      | -               | RC4580         | -              | -                         | BA4580R         | μPC4572              | -          |
|                | NJM062C / CA  | TL062C / -      | TL062C / AC    | -              | -                         | -               | μPC4062 / -          | -          |
|                | NJM064C / CA  | TL064C / AC     | TL064C / AC    | -              | -                         | -               | μPC4064 / -          | -          |
|                | NJM072C / CA  | TL072C / AC     | TL072C / AC    | -              | -                         | -               | μPC4072 / -          | -          |
|                | NJM074C / CA  | TL074C / AC     | TL074C / AC    | -              | -                         | -               | μPC4074 / -          | -          |
|                | NJM082C / CA  | TL082C / AC     | TL082C / AC    | -              | -                         | -               | μPC4082 / -          | -          |
|                | NJM084C / CA  | TL084C / AC     | TL084C / AC    | -              | -                         | -               | μPC4084 / -          | -          |
|                | NJM8065       | MC4558C         | RC4558         | -              | KA4558                    | BA4558 / 4560   | μPC4558 / 4560       | KIA4558    |
|                | NJM8080       | -               | RC4580         | -              | -                         | BA4580R         | μPC4572              | -          |
|                | NJM5532C      | -               | NE5532         | NE5532         | NE5532                    | BA15532         | -                    | -          |
|                | NJM8068       | LM833           | LM833          | LM833          | -                         | -               | μPC4570              | -          |



# Evaluation Boards Support

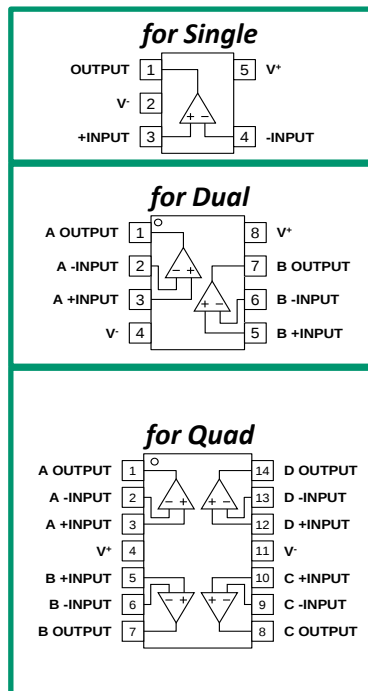
# NJR Provides universal evaluation boards

Contents

## Features

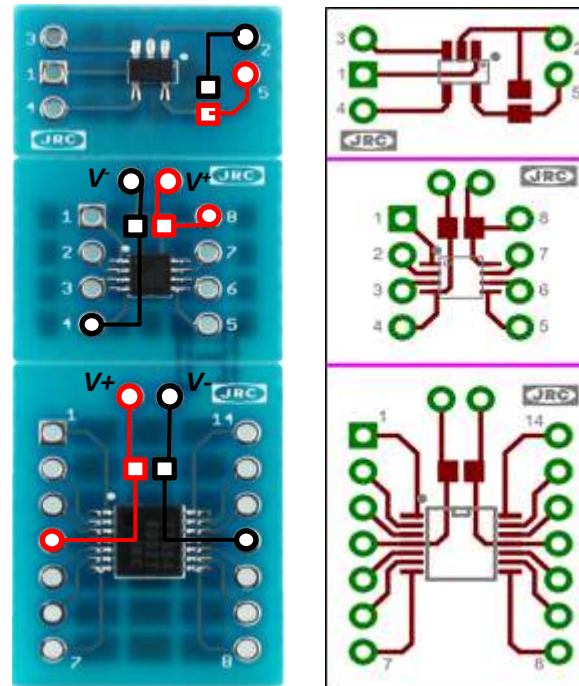
- ✓ The universal board covers Single (SOT-23-5), Dual (MSOP8) and Quad type (SSOP14).
- ✓ Users can add external components according to demand applications.
- ✓ NJR provides the board on request.

### Pin functions

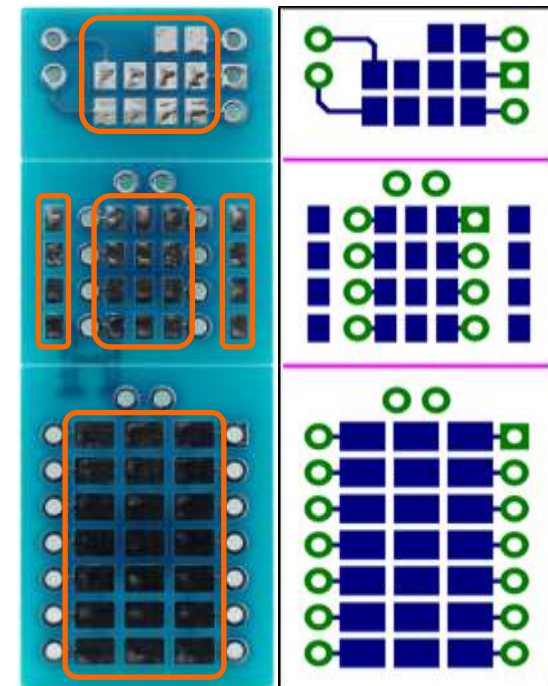


### Top view

○ V<sup>-</sup> terminal ○ V<sup>+</sup> terminal



### Bottom view



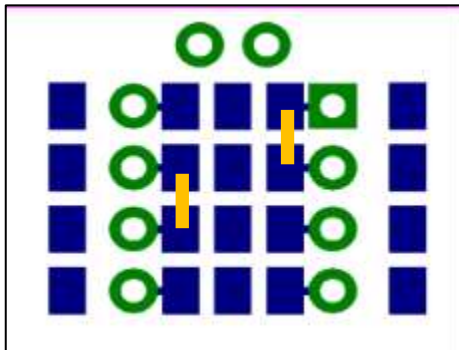
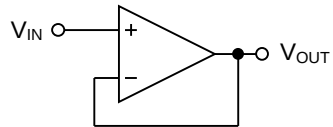
□ Ideal pads for additional elements  
\* Examples are showed in next page

# Ideal pad examples

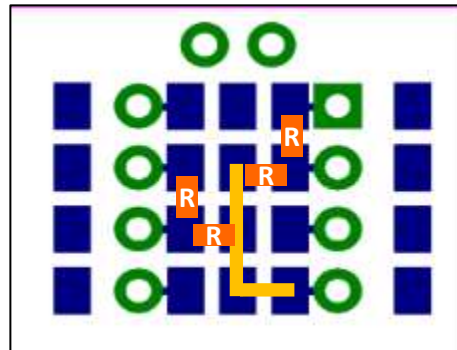
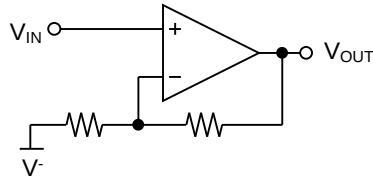
Contents

- R** Resistor
- C** Capacitor
- Line** Line

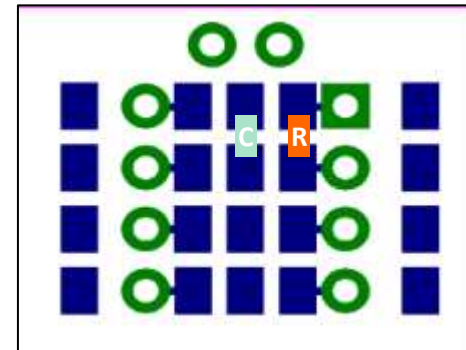
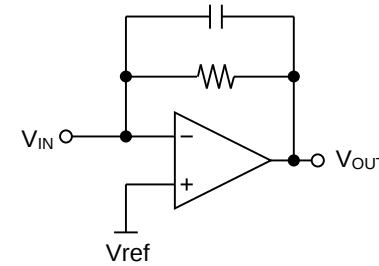
*Buffer*



*Non-inverting amplifier*



*Transimpedance amplifier*





# ASSPs

# Audio Specialized Op-Amps



● : U.D.  
○ : M.P.

[Contents](#)

## Entry Models



✓ For upgrading from conventional products!

**Bipolar-input**

**NJM8801 [2ch]**



**Bipolar-input**

**NJM4582 [2ch]**



**Bipolar-input**

100mA Output current

**NJM8830 [2ch]**

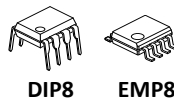


## Mass Production Models

- ✓ Small ESON8 package
- ✓ Single supply, rail-to-rail output (NJM8832)
- ✓ Middle/high-end audio, portable audio

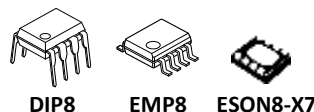
**Bipolar-input**

**MUSES8820 [2ch]**



**JFET-input**

**MUSES8920 [2ch]**



**Bipolar-input**

2.1nV/√Hz, 0.0009%

**MUSES8832 [2ch]**



## Flagship Models



- ✓ DIP8 package using the OFC\*
- ✓ Circuit design for good sound quality

\*Oxygen-Free Copper (99.99%)

**JFET-input**

**MUSES01 [2ch]**



**Bipolar-input**

**MUSES02 [2ch]**



**JFET-input**

Single OpAmp

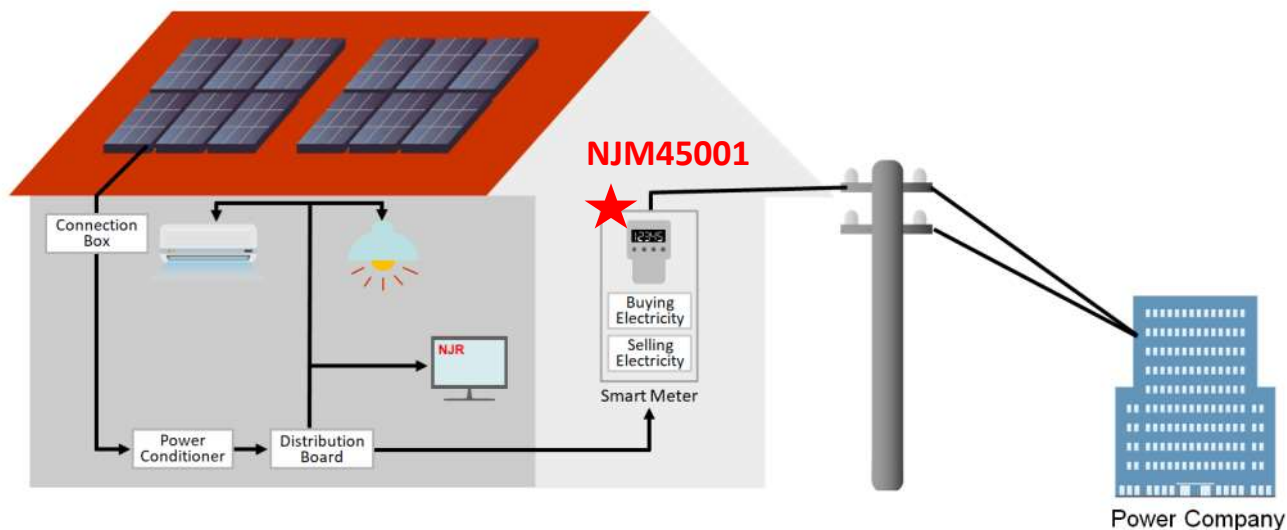
**MUSES03 [1ch]**



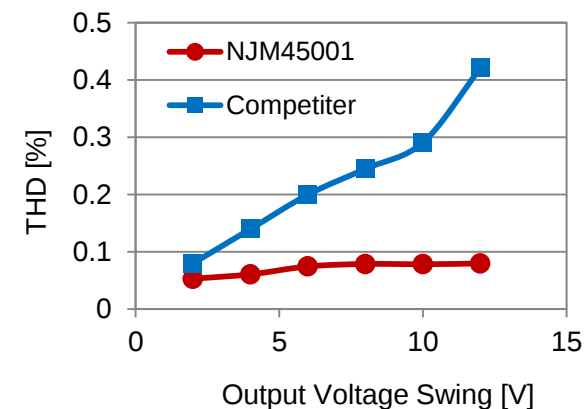
# Power-Line Communication Solution -NJM45001-

[Contents](#)

## ■ Power-Line Communication System for Smart Grid

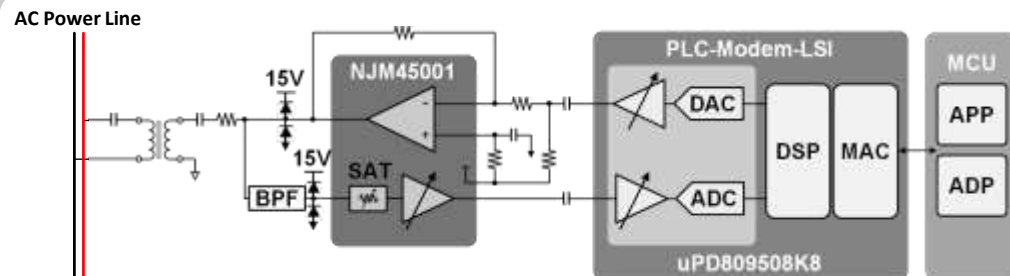


THD vs. Output Voltage Swing



## FEATURES

- High output current (3A)
- TX/RX amplifier built into a single chip
- Supply voltage: 8V to 22V
- Low distortion: 0.08% (at 12Vp-p output)



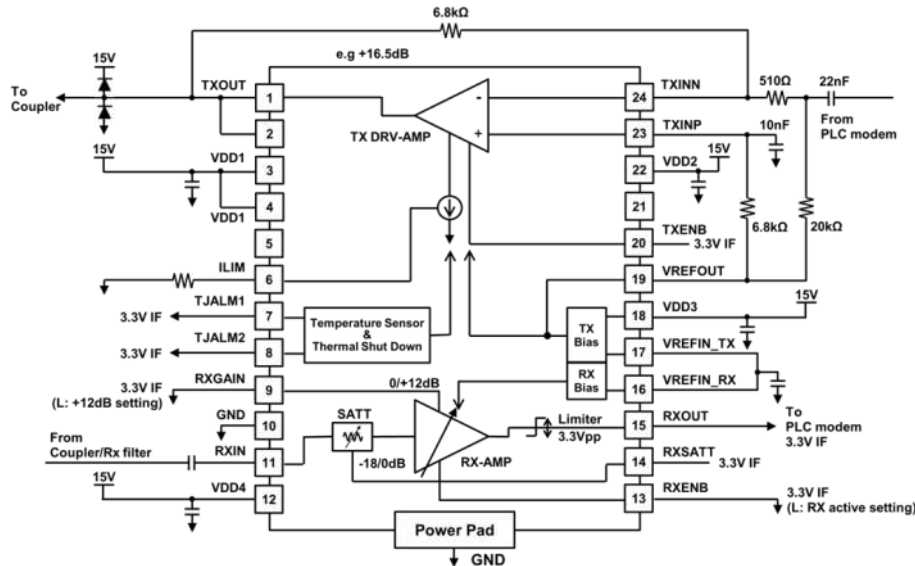
### NJM45001

- Analog front-end IC for power-line communication.
- Compatible with Renesas PLC modem ICs (e.g., uPD809508K8).

# Power-Line Communication AFE -NJM45001-

Contents

## ■ Block Diagram



## NJM45001

### High-performance

- Power-line driver with thermal protection and current limiter
- Built-in low noise receiver
- Supply voltage: 8V to 22V

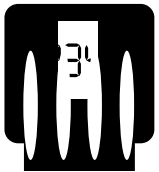
### High performance transmission driver

- High output current: 3A typ.
- Low distortion: 60dB typ.

### Flexible receive gain control

- -18dB / -6dB / 0dB / 12dB

## ■ Applications



Smart meters



Lightning systems



HEMS

## ■ Package

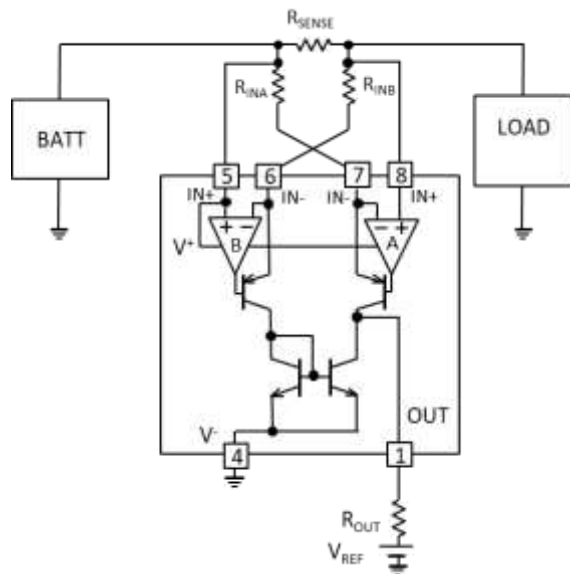


NJM45001VP1  
( HTSSOP24 )

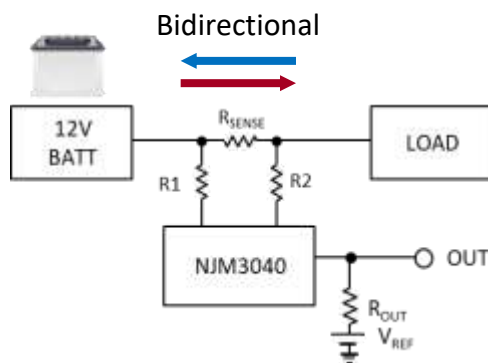
# Current Detection Amplifier -NJM3040-

[Contents](#)

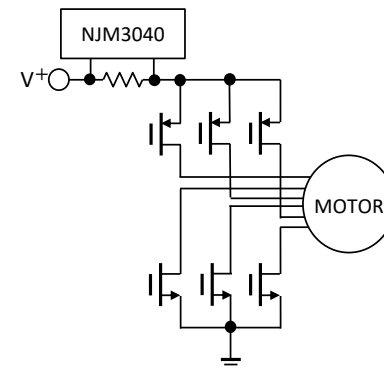
## ■ Block Diagram



## ■ Applications



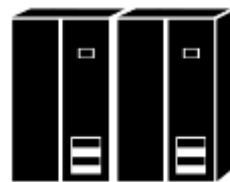
Bidirectional current detection



High-side current detection

## NJM3040

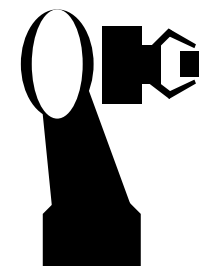
- Input offset voltage: 550 $\mu$ V max.
- Input voltage range: 6V to 36V
- Low power: 0.5mA typ.
- Supply voltage rejection ratio: 120dB typ.
- Operating temperature: -40°C to 125°C
- High EMI immunity
- Package: MSOP8 (VSP8)



Power conditioner



Automotive



Industrial equipment



# Cross Reference

# OP-Amp Cross Reference - 1 -

[Contents](#)

| NJR                           | Renesas                      | ROHM             | ST      | TI      | KEC             | ON Semi         | TOSHIBA |
|-------------------------------|------------------------------|------------------|---------|---------|-----------------|-----------------|---------|
| NJM2125<br>NJM321A<br>NJM8021 | -                            | -                | -       | LM321   | KIA75S358S      | LM321           | TA75S01 |
| NJM320A<br>NJM8020            | -                            | -                | TS321   | -       | -               | -               | -       |
| NJM2904<br>NJM2904C           | HA17904                      | BA2904           | LM2904  | LM2904  | -               | LM2904          | -       |
| NJM358C                       | μPC1251<br>μPC358<br>HA17358 | LM358            | LM358   | LM358   | KIA358<br>LM358 | LM358           | -       |
| NJM12904                      | -                            | -                | -       | -       | -               | -               | TA75W01 |
| NJM2902<br>NJM2902C           | HA17902                      | BA2902           | LM2902  | LM2902  | -               | LM2902          | -       |
| NJM324C                       | μPC451/μPC324<br>HA17324     | BA10324<br>LM324 | LM324   | LM324   | KIA324          | LM324<br>LA6324 | -       |
| NJM3404A                      | -                            | BA3404           | -       | -       | -               | -               | -       |
| NJM3403A                      | μPC3403                      | -                | -       | MC3403  | -               | MC3403          | -       |
| NJM3414A                      | -                            | -                | -       | TL3414A | -               | -               | -       |
| NJM2132                       | -                            | -                | MC33172 | -       | -               | MC33172         | -       |
| NJM2742                       | μPC842/μPC4742               | BA3472           | -       | TL3472  | -               | -               | -       |
| NJM2744                       | μPC844/μPC4744               | BA3474           | -       | TL3474  | -               | -               | -       |
| NJM3472                       | μPC842/μPC4742               | BA3472           | -       | TL3472  | -               | MC33072         | -       |
| NJM3474                       | μPC844/μPC4744               | BA3474           | -       | TL3474  | -               | MC33074         | -       |
| NJM842                        | μPC842/μPC4742               | BA3472           | -       | TL3472  | -               | MC33072         | -       |
| NJM844                        | μPC844/μPC4744               | BA3474           | -       | TL3474  | -               | MC33074         | -       |

(note) We recommend that you completely review our datasheet to confirm op amp function.

# OP-Amp Cross Reference - 2 -

[Contents](#)

| NJR                                                 | Renesas                      | ROHM    | ST     | TI               | ADI    | On Semi              | TOSHIBA  |
|-----------------------------------------------------|------------------------------|---------|--------|------------------|--------|----------------------|----------|
| <b>NJM3472</b>                                      | μPC842/μPC4742               | BA3472  | -      | TL3472           | -      | MC33072              | -        |
| <b>NJM3474</b>                                      | μPC844/μPC4744               | BA3474  | -      | TL3474           | -      | MC33074              | -        |
| <b>NJM842</b>                                       | μPC842/μPC4742               | BA3472  | -      | TL3472           | -      | MC33072              | -        |
| <b>NJM844</b>                                       | μPC844/μPC4744               | BA3474  | -      | TL3474           | -      | MC33074              | -        |
| <b>NJM4558</b><br><b>NJM4558C</b>                   | μPC258<br>μPC4558<br>HA17558 | BA4558  | MC4558 | RC4558           | -      | KA4558               | TA75W558 |
| <b>NJM4565</b><br><b>NJM8065</b>                    | μPC259<br>μPC4560            | BA4560  | -      | -                | -      | -                    | -        |
| <b>NJM4556A</b>                                     | μPC4556                      | -       | -      | -                | -      | -                    | -        |
| <b>NJM4580</b><br><b>NJM4580C</b><br><b>NJM8080</b> | μPC4572                      | BA4580  | RC4580 | RC4580           | -      | -                    | -        |
| <b>NJM2068</b><br><b>NJM8068</b>                    | μPC4570                      | -       | LM833  | LM833            | -      | LM833                | -        |
| <b>NJM2058</b><br><b>NJM2059</b>                    | μPC458<br>μPC4741            | -       | -      | -                | -      | -                    | -        |
| <b>NJM318</b>                                       | μPC318/μPC159                | -       | -      | LM318            | -      | -                    | -        |
| <b>NJM5532</b><br><b>NJM5532C</b>                   | -                            | BA15532 | -      | NE5532           | -      | -                    | -        |
| <b>NJMOP177</b>                                     | -                            | -       | -      | OPA177<br>OPA277 | OP177  | OP177<br>OP07/AD8677 | -        |
| <b>NJMOP1772</b>                                    | -                            | -       | -      | OPA2277          | OP1772 | OP2177               | -        |
| <b>NJMOP277</b>                                     | -                            | -       | -      | OPA277           | OP1177 | OP1177               | -        |
| <b>NJMOP2277</b>                                    | -                            | -       | -      | OPA2277          | OP2177 | OP2177               | -        |

(note) We recommend that you completely review our datasheet to confirm op amp function.



# OP-Amp Cross Reference - 3 -

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| NJR     | Renesas           | ST    | TI                                                | ADI    | ADI (ex-LT) |
|---------|-------------------|-------|---------------------------------------------------|--------|-------------|
| NJM062C | μPC4062/μPC832    | TL062 | TL062                                             | -      | -           |
| NJM064C | μPC4064/μPC834    | TL064 | TL064                                             | -      | -           |
| NJM072C | μPC4072/μPC822    | TL072 | TL072                                             | -      | -           |
| NJM082C | μPC4082/μPC803    | TL082 | TL082                                             | -      | -           |
| NJM074C | μPC4074/μPC824    | TL074 | TL074                                             | -      | -           |
| NJM084C | μPC4084/μPC804    | TL084 | TL084                                             | -      | -           |
| NJM8512 | μPC814<br>μPC4094 | -     | OPA2131/2132<br>OPA2140/OPA2141<br>TL052<br>LF412 | AD8512 | LT1057      |
| NJM8513 | -                 | -     | OPA4131/4132<br>OPA4140/4141                      | AD8513 | -           |
| NJM2748 | μPC811<br>μPC4091 | -     | -                                                 | -      | -           |
| NJM2749 | μPC812<br>μPC4092 | -     | -                                                 | -      | -           |

(note) We recommend that you completely review our datasheet to confirm op amp function.

# OP-Amp Cross Reference - 4 -

[Contents](#)

| NJR                  | Renesas   | Renesas<br>(ex-Intersil) | Rohm             | ST                | TI               | MAXIM   | ADI       | TOSHIBA | MICROCHIP |
|----------------------|-----------|--------------------------|------------------|-------------------|------------------|---------|-----------|---------|-----------|
| NJU7076              | -         | -                        | -                | -                 | LMV771           | -       | -         | -       | -         |
| NJU7077              | -         | -                        | -                | -                 | LMV772           | -       | -         | -       | -         |
| NJU7078              | -         | -                        | -                | -                 | LMV774           | -       | -         | -       | -         |
| NJU7046              | HA1630S06 | -                        | BU7495           | -                 | LMV721           | -       | AD8601D   | TC75S60 | -         |
| NJU7047              | HA1630D06 | -                        | -                | -                 | LMV722           | -       | AD8602D   | TC75W60 | -         |
| NJU7048              | HA1630Q06 | -                        | -                | -                 | -                | -       | AD8604D   | -       | -         |
| NJU77701             | -         | ISL28191                 | -                | -                 | -                | MAX4488 | -         | -       | -         |
| NJU77000<br>NJU77001 | -         | -                        | BU7411<br>BU7265 | TSU101            | LPV521           | MAX4470 | -         | -       | MCP6141   |
| NJU77002             | -         | -                        | BU7266           | TSU102            | -                | MAX4471 | -         | -       | MCP6142   |
| NJU77004             | -         | -                        | -                | TSU104            | -                | MAX4472 | -         | -       | MCP6144   |
| NJU7056              | HA1630S08 | -                        | LMR321<br>BU7461 | TSV851<br>LMV321L | LMV321           | -       | -         | TC75S54 | MCP6L1    |
| NJU7057              | HA1630D08 | -                        | LMR358<br>BU7462 | TSV852<br>LMV358L | LMV358           | -       | ADA4692-2 | TC75W54 | MCP6L2    |
| NJU7058              | HA1630Q08 | -                        | LMR324<br>BU7464 | TSV854<br>LMV324L | LMV324           | -       | ADA4692-4 | -       | MCP6L4    |
| NJU7026              | HA1630S01 | -                        | BU7421           | TSV621            | LPV321           | -       | -         | TC75S55 | -         |
| NJU7027              | HA1630D01 | -                        | -                | TSV622            | LPV358           | -       | -         | TC75W55 | -         |
| NJU7028              | HA1630Q01 | -                        | -                | TSV624            | LPV324           | -       | -         | -       | -         |
| NJU77806             | -         | -                        | -                | -                 | OPA377<br>LMV771 | -       | AD8691    | TC75S63 | MCP6286   |

(note) We recommend that you completely review our datasheet to confirm op amp function.

# OP-Amp Cross Reference - 5 -

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| NJR             | TI      | MAXIM   | ADI    | MICROCHIP |
|-----------------|---------|---------|--------|-----------|
| <b>NJU77551</b> | OPA348  | MAX9636 | AD8541 | MCP6001   |
| <b>NJU77552</b> | OPA2348 | MAX9637 | AD8542 | MCP6002   |
| <b>NJU77554</b> | OPA4348 | -       | AD8544 | MCP6004   |

| NJR            | TI                                | ST        |
|----------------|-----------------------------------|-----------|
| <b>NJU7001</b> | TLC271C(L) <sup>*1</sup>          | TS271C(L) |
| <b>NJU7021</b> | TLC271C(M) <sup>*1</sup>          | TS271C(M) |
| <b>NJU7031</b> | TLC271C(H) <sup>*1</sup>          | TS271C(H) |
| <b>NJU7002</b> | TLC27L2C                          | TS27L2C   |
| <b>NJU7022</b> | TLC27M2C<br>LMC662C <sup>*2</sup> | TS27M2C   |
| <b>NJU7032</b> | TLC272C<br>LMC662C <sup>*2</sup>  | TS272C    |
| <b>NJU7004</b> | TLC27L4C                          | TS27L4C   |
| <b>NJU7024</b> | TLC27M4C<br>LMC660C <sup>*2</sup> | TS27M4C   |
| <b>NJU7034</b> | TLC274C<br>LMC660C <sup>*2</sup>  | TS274C    |

| NJR            | TI                                  | ST                       |
|----------------|-------------------------------------|--------------------------|
| <b>NJU7051</b> | TLC271BC(L) <sup>*1</sup>           | TS271BC(L) <sup>*1</sup> |
| <b>NJU7061</b> | TLC271BC(M) <sup>*1</sup>           | TS271BC(M) <sup>*1</sup> |
| <b>NJU7071</b> | TLC271BC(H) <sup>*1</sup>           | TS271BC(H) <sup>*1</sup> |
| <b>NJU7052</b> | TLC27L2BC                           | TS27L2BC                 |
| <b>NJU7062</b> | TLC27M2BC<br>LMC662AI <sup>*3</sup> | TS27M2BC                 |
| <b>NJU7072</b> | TLC272BC<br>LMC662AI <sup>*3</sup>  | TS272BC                  |
| <b>NJU7064</b> | TLC27M4BC<br>LMC660AI <sup>*3</sup> | TS27M4BC                 |
| <b>NJU7074</b> | TLC274BC<br>LMC660AI <sup>*3</sup>  | TS274BC                  |

| NJR            | TOSHIBA |
|----------------|---------|
| <b>NJU7011</b> | TC75S55 |
| <b>NJU7012</b> | TC75S54 |
| <b>NJU7013</b> | TC75S54 |
| <b>NJU7007</b> | TC75S55 |
| <b>NJU7008</b> | TC75S54 |
| <b>NJU7014</b> | TC75W55 |
| <b>NJU7015</b> | TC75W54 |
| <b>NJU7016</b> | TC75W54 |
| <b>NJU7019</b> | TC75W55 |

\*1) The characteristics of I<sub>IB</sub> and I<sub>OUT</sub> vary with the version of the TLC271

\*2) The characteristics of LMC660/662C are medium between NJU702X and NJU703X

\*3) The characteristics of LMC660AI/662AI are medium between NJU706X and NJU707X

(note) We recommend that you completely review our datasheet to confirm op amp function.

# Comparators Cross Reference

[Contents](#)

| NJR                                | Renesas                     | Rohm             | ST     | TI      | MAXIM  | On Semi | TOSHIBA  |
|------------------------------------|-----------------------------|------------------|--------|---------|--------|---------|----------|
| <b>NJM2903</b><br><b>NJM2903C</b>  | HA17903                     | BA2903<br>LM2903 | LM2903 | LM2903  | -      | LM2903  | -        |
| <b>NJM393C</b>                     | μPC393<br>μPC277<br>HA17393 | BA10393<br>LM393 | LM393  | LM393   | -      | LM393   | TA75W393 |
| <b>NJM2901</b><br><b>NJM2901C</b>  | HA17901                     | BA2901<br>LM2901 | LM2901 | LM2901  | -      | LM2901  | -        |
| <b>NJM339C</b>                     | μPC339<br>μPC177<br>HA17339 | BA2901<br>LM2901 | LM339  | LM339   | -      | LM339   | -        |
| <b>NJM391A</b><br><b>NJM8191</b>   | -                           | BA8391           | TS391R | TL331   | -      | -       | TS75S393 |
| <b>NJM390A</b><br><b>NJM8190</b>   | -                           | -                | TS391  | -       | -      | -       | -        |
| <b>NJU7109</b>                     | HA1631S02                   | -                | -      | -       | -      | -       | TC75S57  |
| <b>NJU7119</b>                     | HA1631S04                   | -                | -      | -       | -      | -       | TC75S59  |
| <b>NJU7108</b>                     | HA1631S01                   | -                | -      | -       | -      | -       | TC75S56  |
| <b>NJU7118</b>                     | HA1631S03                   | -                | -      | -       | -      | -       | TC75S58  |
| <b>NJU77230</b><br><b>NJU77231</b> | HA1631S01                   | BU7231<br>BU7251 | -      | LMV7271 | MAX985 | -       | TC75S56  |
| <b>NJU77232</b>                    | HA1631D01                   | BU7232<br>BU7252 | -      | LMV7272 | MAX989 | -       | TC75W56  |
| <b>NJU77240</b><br><b>NJU77241</b> | HA1631S03                   | BU7230<br>BU7250 | TS331  | LMV7275 | MAX986 | -       | TC75S58  |
| <b>NJU77242</b>                    | HA1631D03                   | BU7233<br>BU7253 | TS332  | -       | MAX990 | -       | TC75W58  |

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