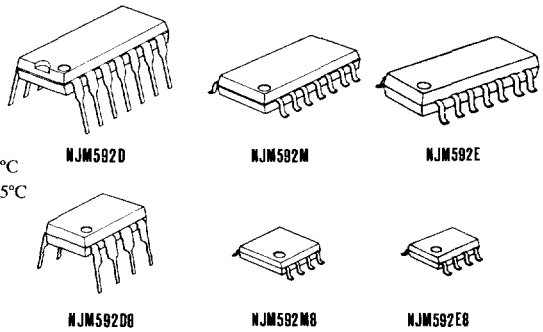
# NJM592

The NJM592 is a video amplifier of differential input and differential output.
The NJM592 is suitable for a preamplifier of memory equipment and video and pulse signal amplifier.

## ■ Absolute Maximum Ratings (Ta=25°C)

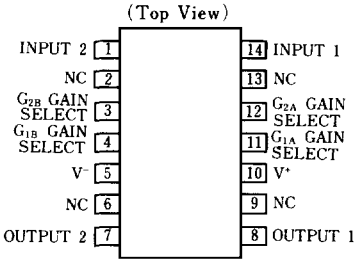
| | | |
|---|---|---|
| Supply Voltage | $V^+/V^-$ | ±8V |
| Differential Input Voltage | $V_{DIFF}$ | ±5V |
| Common Mode Input Voltage | $V_{CM}$ | ±6V |
| Output Current | $I_O$ | 10mA |
| Operating Temperature Range | $T_{opr}$ | −20°C~+75°C |
| Storage Temperature Range | $T_{stg}$ | −40°C~+125°C |
| Power Dissipation | $P_D$ (D-Type) | 500mW |
| | (M,E-Type) | 300mW |
| | (D8-Type) | 500mW |
| | (M8,E8-Type) | 300mW |

## ■ Package Outline

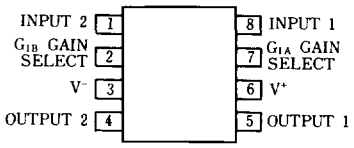



## ■ Connection Diagram

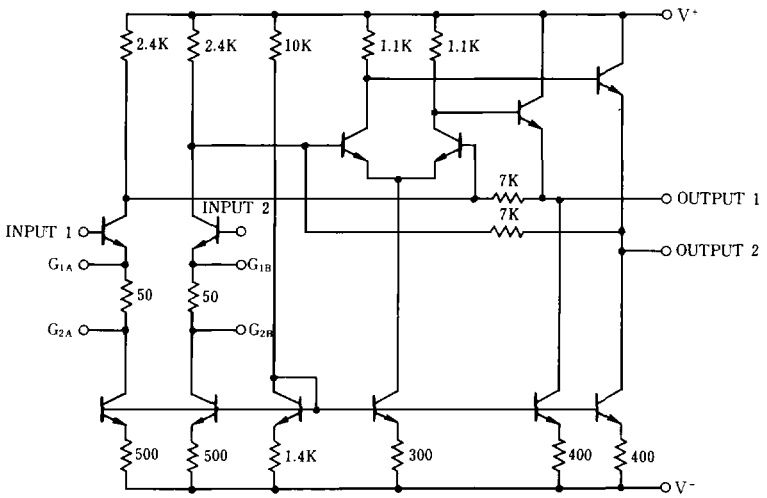
D,M,E-Type
(Top View)




D8,M8,E8-Type
(Top View)




## ■ Equivalent Circuit

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## ■ Electrical Characteristics (Ta=25°C, $V^+/V^-=\pm6V$, $V_{CM}=0$)

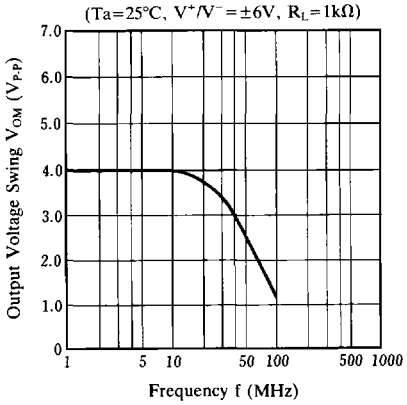
| Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Differential Voltage Gain1 (note 1)<br>Differential Voltage Gain2 (note 2, 4) | $R_L=2k\Omega$, $V_{OUT}=3V_{P-P}$ | 250<br>80 | 400<br>100 | 600<br>120 | V/V |
| Bandwidth Gain1 (note 1)<br>Bandwidth Gain2 (note 2,4) | | —<br>— | 40<br>90 | —<br>— | MHz |
| Rise Time Gain1 (note 1)<br>Rise Time Gain2 (note 2,4) | $V_{OUT}=1V_{P-P}$ | —<br>— | 10.5<br>4.5 | —<br>— | ns |
| Propagation Delay Gain1 (note 1)<br>Propagation Delay Gain2 (note 2,4) | $V_{OUT}=1V_{P-P}$ | —<br>— | 7.5<br>6.0 | —<br>— | ns |
| Input Resistance Gain1 (note 1)<br>Input Resistance Gain2 (note 2,4) | | —<br>— | 4.0<br>30 | —<br>— | kΩ |
| Input Capacitance Gain2 (note 2,4) | | — | 2.0 | — | pF |
| Input Offset Current | | — | 0.4 | 5.0 | μA |
| Input Bias Current | | — | 9.0 | 30 | μA |
| Input Noise Voltage | BW=1kHz~10MHz | — | 12 | — | μVrms |
| Input Voltage Range | | — | — | ±1.0 | V |
| Common Mode Rejection Ratio Gain2 (note 4)<br>Common Mode Rejection Ratio Gain2 (note 4) | $V_{CM}=\pm1V$, f<100kHz<br>$V_{CM}=\pm1V$, f=5MHz | 60<br>— | 86<br>60 | —<br>— | dB |
| Supply Voltage Rejection Ratio Gain2 (note 4) | $\Delta V^+/V^- = \pm0.5V$ | 50 | 70 | — | dB |
| Output Offset Voltage Gain1 (note 1)<br>Output Offset Voltage Gain2 (note 2,4)<br>Output Offset Voltage Gain3 (note,3) | $R_L=\infty$<br>$R_L=\infty$<br>$R_L=\infty$ | —<br>—<br>— | —<br>—<br>0.35 | 1.5<br>1.5<br>0.75 | V |
| Output Common Mode Voltage | $R_L=\infty$ | 2.4 | 2.9 | 3.4 | V |
| Output Voltage Swing | $R_L=2k\Omega$ | 3.0 | 4.0 | — | V |
| Output Resistance | | — | 20 | — | Ω |
| Power Supply Current | $R_L=\infty$ | — | 18 | 24 | mA |

(note 1): Gain select pins $G_{1A}$ and $G_{1B}$ connected together. (Gain1)
(note 2): Gain select pins $G_{2A}$ and $G_{2B}$ connected together. (Gain2)
(note 3): All gain select pins open.
(note 4): Apply to only 14 pin package.

## ■ Typical Characteristics

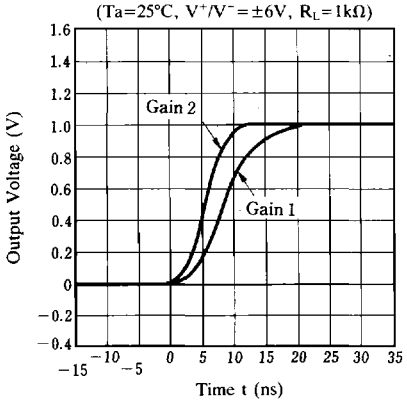
### Output Voltage Swing

(Ta=25°C, V⁺/V⁻=±6V, $R_L$=1kΩ)



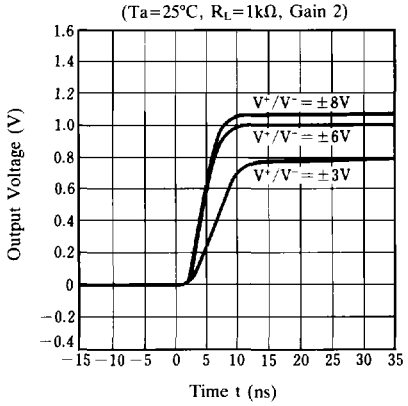

### Pulse Responce

(Ta=25°C, V⁺/V⁻=±6V, $R_L$=1kΩ)



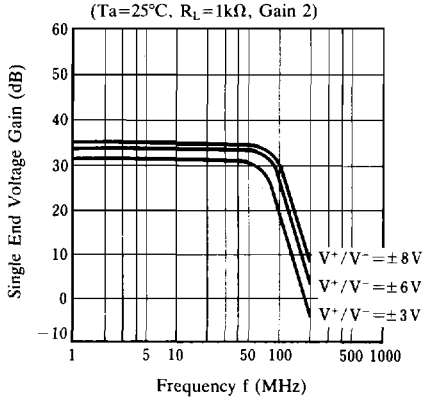

### Pulse Responce

(Ta=25°C, $R_L$=1kΩ, Gain 2)



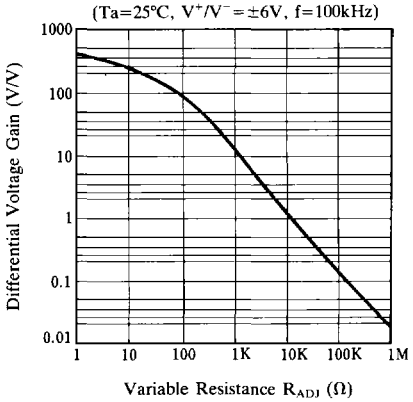

### Single End Voltage Gain

(Ta=25°C, $R_L$=1kΩ, Gain 2)

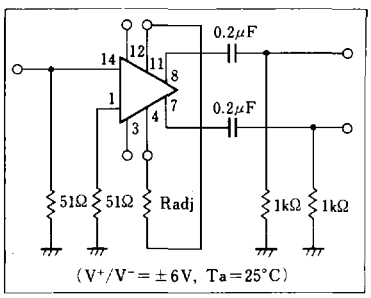



### Differential Voltage Gain

(Ta=25°C, V⁺/V⁻=±6V, f=100kHz)



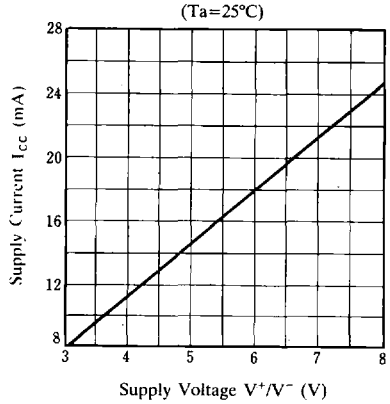

### Differential Voltage Gain Adjustment Circuit



## ■ Typical Characteristics

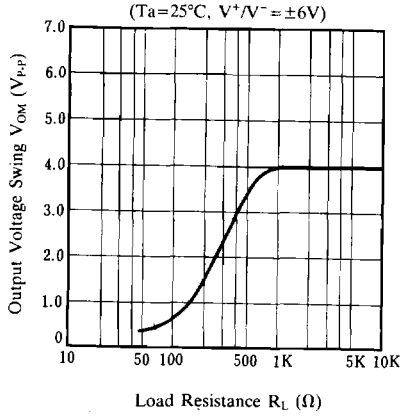
### Supply Current

(Ta=25°C)



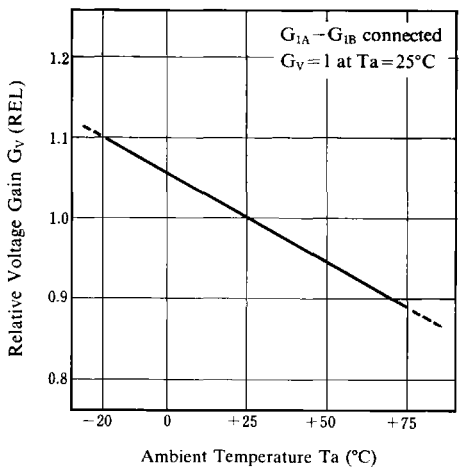

### Output Voltage Swing

(Ta=25°C, $V^+/V^-$ = ±6V)




### Voltage Gain

($V^+/V^-$ = ±6V, $R_L$ = 1kΩ, f=100kHz)

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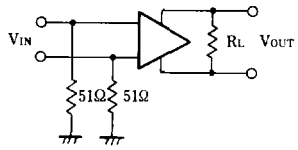
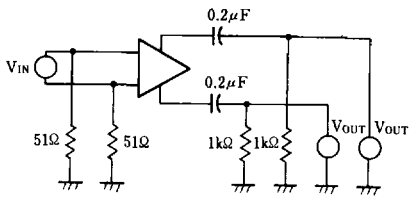
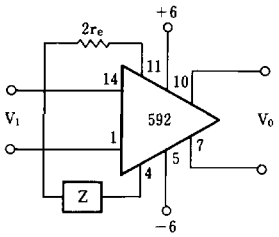
## ■ Test Circuit




## ■ Typical Application

### Basic circuit



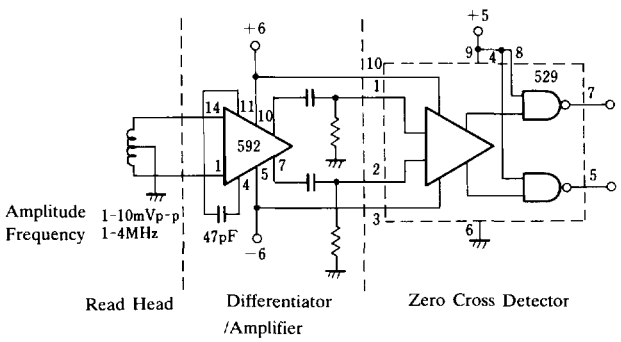

$$\frac{V_0(s)}{V_1(s)} \cong \frac{1.4\times10^4}{Z(s)+2r_e} \cong \frac{1.4\times10^4}{Z(s)+32}$$

### Filter Network

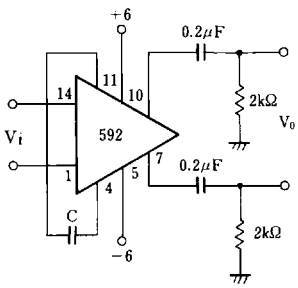
| Z NETWORK | FILTER TYPE | $\frac{V_0(s)}{V_1(s)}$ TRANSFER FUNCTION |
|---|---|---|
| R L | LOW PASS | $\frac{1.0\times10^4}{L}\left[\frac{1}{s+R/L}\right]$ |
| R C | HIGH PASS | $\frac{1.4\times10^4}{R}\left[\frac{s}{s+1/RC}\right]$ |
| R L C | BAND PASS | $\frac{1.4\times10^4}{L}\left[\frac{s}{s^2+R/L\,s+1/LC}\right]$ |
| L R C | BAND REJECT | $\frac{1.4\times10^4}{R}\left[\frac{s^2+1/LC}{s^2+1/LC+s/RC}\right]$ |

(note): R includes 2 $r_e$ ($\approx 32\Omega$)

### Disk/Tape Phase Modulated Readback Systems




### Differentiation with High Common Mode Noise Rejection




$F_1 \ll 1/2\pi(32)C$

$V_0 = 1.4\times10^4 C\frac{dVi}{dT}$