

General purpose operational amplifier

μ A741/ μ A741C/SA741C

DESCRIPTION

The μ A741 is a high performance operational amplifier with high open-loop gain, internal compensation, high common mode range and exceptional temperature stability. The μ A741 is short-circuit-protected and allows for nulling of offset voltage.

FEATURES

- Internal frequency compensation
- Short circuit protection
- Excellent temperature stability
- High input voltage range

PIN CONFIGURATION

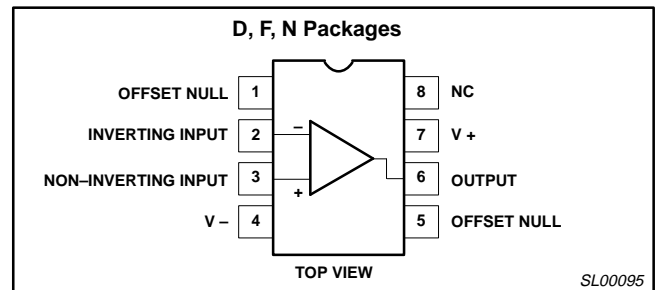


Figure 1. Pin Configuration

ORDERING INFORMATION

| DESCRIPTION | TEMPERATURE RANGE | ORDER CODE | DWG # |
|---|-------------------|--------------|---------|
| 8-Pin Plastic Dual In-Line Package (DIP) | -55°C to +125°C | μ A741N | SOT97-1 |
| 8-Pin Plastic Dual In-Line Package (DIP) | 0 to +70°C | μ A741CN | SOT97-1 |
| 8-Pin Plastic Dual In-Line Package (DIP) | -40°C to +85°C | SA741CN | SOT97-1 |
| 8-Pin Ceramic Dual In-Line Package (CERDIP) | -55°C to +125°C | μ A741F | 0580A |
| 8-Pin Ceramic Dual In-Line Package (CERDIP) | 0 to +70°C | μ A741CF | 0580A |
| 8-Pin Small Outline (SO) Package | 0 to +70°C | μ A741CD | SOT96-1 |

ABSOLUTE MAXIMUM RATINGS

| SYMBOL | PARAMETER | RATING | UNIT |
|------------|--|-------------|------|
| V_S | Supply voltage | | |
| | μ A741C | ± 18 | V |
| | μ A741 | ± 22 | V |
| P_D | Internal power dissipation | | |
| | D package | 780 | mW |
| | N package | 1170 | mW |
| | F package | 800 | mW |
| V_{IN} | Differential input voltage | ± 30 | V |
| V_{IN} | Input voltage ¹ | ± 15 | V |
| I_{SC} | Output short-circuit duration | Continuous | |
| T_A | Operating temperature range | | |
| | μ A741C | 0 to +70 | °C |
| | SA741C | -40 to +85 | °C |
| | μ A741 | -55 to +125 | °C |
| T_{STG} | Storage temperature range | -65 to +150 | °C |
| T_{SOLD} | Lead soldering temperature (10sec max) | 300 | °C |

NOTES:

1. For supply voltages less than $\pm 15V$, the absolute maximum input voltage is equal to the supply voltage.

General purpose operational amplifier

 μ A741/ μ A741C/SA741C**DC ELECTRICAL CHARACTERISTICS** $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$, unless otherwise specified.

| SYMBOL | PARAMETER | TEST CONDITIONS | μ A741 | | | μ A741C | | | UNIT | |
|--------------------------|---------------------------------|---|------------|----------|------|-------------|----------|----------------------------|------------------------------|----|
| | | | Min | Typ | Max | Min | Typ | Max | | |
| V_{OS} | Offset voltage | $R_S=10\text{k}\Omega$ $R_S=10\text{k}\Omega$, over temp. | | 1.0 | 5.0 | | 2.0 | 6.0 | mV | |
| $\Delta V_{OS}/\Delta T$ | | | | 1.0 | 6.0 | | 10 | 7.5 | mV/ $^\circ\text{C}$ | |
| I_{OS} | | | | 20 | 200 | | 20 | 200 | nA | |
| $\Delta I_{OS}/\Delta T$ | Offset current | Over temp. $T_A=+125^\circ\text{C}$ $T_A=-55^\circ\text{C}$ | | 7.0 | 200 | | | 300 | nA | |
| | | | | 20 | 500 | | | | nA | |
| | | | | 200 | | | 200 | | $\mu\text{A}/^\circ\text{C}$ | |
| I_{BIAS} | Input bias current | Over temp. $T_A=+125^\circ\text{C}$ $T_A=-55^\circ\text{C}$ | | 80 | 500 | | 80 | 500 | nA | |
| $\Delta I_B/\Delta T$ | | | | 30 | 500 | | | 800 | nA | |
| | | | | 300 | 1500 | | | | nA | |
| | | | 1 | | | 1 | | $\text{nA}/^\circ\text{C}$ | | |
| V_{OUT} | Output voltage swing | $R_L=10\text{k}\Omega$ | ± 12 | ± 14 | | ± 12 | ± 14 | | V | |
| | | $R_L=2\text{k}\Omega$, over temp. | ± 10 | ± 13 | | ± 10 | ± 13 | | V | |
| A_{VOL} | Large-signal voltage gain | $R_L=2\text{k}\Omega$, $V_O=\pm 10\text{V}$ | 50 | 200 | | 20 | 200 | | V/mV | |
| | | $R_L=2\text{k}\Omega$, $V_O=\pm 10\text{V}$, over temp. | 25 | | | 15 | | | V/mV | |
| | Offset voltage adjustment range | | | ± 30 | | | ± 30 | | mV | |
| PSRR | Supply voltage rejection ratio | $R_S \leq 10\text{k}\Omega$ | | | | | 10 | 150 | $\mu\text{V}/\text{V}$ | |
| | | $R_S \leq 10\text{k}\Omega$, over temp. | | 10 | 150 | | | | $\mu\text{V}/\text{V}$ | |
| CMRR | Common-mode rejection ratio | | | | | 70 | 90 | | dB | |
| | | Over temp. | 70 | 90 | | | | | dB | |
| I_{CC} | Supply current | $T_A=+125^\circ\text{C}$ $T_A=-55^\circ\text{C}$ | | 1.4 | 2.8 | | 1.4 | 2.8 | mA | |
| | | | | | 1.5 | 2.5 | | | | mA |
| | | | | | 2.0 | 3.3 | | | | mA |
| V_{IN} | Input voltage range | (μ A741, over temp.) | ± 12 | ± 13 | | ± 12 | ± 13 | | V | |
| R_{IN} | Input resistance | | 0.3 | 2.0 | | 0.3 | 2.0 | | M Ω | |
| P_D | Power consumption | $T_A=+125^\circ\text{C}$ $T_A=-55^\circ\text{C}$ | | 50 | 85 | | 50 | 85 | mW | |
| | | | | | 45 | 75 | | | | mW |
| | | | | | 45 | 100 | | | | mW |
| R_{OUT} | Output resistance | | | 75 | | | 75 | | Ω | |
| I_{SC} | Output short-circuit current | | 10 | 25 | 60 | 10 | 25 | 60 | mA | |

General purpose operational amplifier

 μ A741/ μ A741C/SA741C**DC ELECTRICAL CHARACTERISTICS** $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$, unless otherwise specified.

| SYMBOL | PARAMETER | TEST CONDITIONS | SA741C | | | UNIT |
|--------------------------|---------------------------------|---|----------|----------|------|------------------------------|
| | | | Min | Typ | Max | |
| V_{OS} | Offset voltage | $R_S=10\text{k}\Omega$ | | 2.0 | 6.0 | mV |
| $\Delta V_{OS}/\Delta T$ | | $R_S=10\text{k}\Omega$, over temp. | | 10 | 7.5 | $\mu\text{V}/^\circ\text{C}$ |
| I_{OS} | Offset current | Over temp. | | 20 | 200 | nA |
| $\Delta I_{OS}/\Delta T$ | | | | 200 | 500 | $\text{pA}/^\circ\text{C}$ |
| I_{BIAS} | Input bias current | Over temp. | | 80 | 500 | nA |
| $\Delta I_B/\Delta T$ | | | | 1 | 1500 | $\text{nA}/^\circ\text{C}$ |
| V_{OUT} | Output voltage swing | $R_L=10\text{k}\Omega$ | ± 12 | ± 14 | | V |
| | | $R_L=2\text{k}\Omega$, over temp. | ± 10 | ± 13 | | V |
| A_{VOL} | Large-signal voltage gain | $R_L=2\text{k}\Omega$, $V_O=\pm 10\text{V}$ | 20 | 200 | | V/mV |
| | | $R_L=2\text{k}\Omega$, $V_O=\pm 10\text{V}$, over temp. | 15 | | | V/mV |
| | Offset voltage adjustment range | | | ± 30 | | mV |
| PSRR | Supply voltage rejection ratio | $R_S \leq 10\text{k}\Omega$ | | 10 | 150 | $\mu\text{V}/\text{V}$ |
| CMRR | Common mode rejection ratio | | 70 | 90 | | dB |
| V_{IN} | Input voltage range | Over temp. | ± 12 | ± 13 | | V |
| R_{IN} | Input resistance | | 0.3 | 2.0 | | $\text{M}\Omega$ |
| P_d | Power consumption | | | 50 | 85 | mW |
| R_{OUT} | Output resistance | | | 75 | | Ω |
| I_{SC} | Output short-circuit current | | | 25 | | mA |

AC ELECTRICAL CHARACTERISTICS $T_A=25^\circ\text{C}$, $V_S = \pm 15\text{V}$, unless otherwise specified.

| SYMBOL | PARAMETER | TEST CONDITIONS | μ A741, μ A741C | | | UNIT |
|----------|--|--|-------------------------|-----|-----|------------------------|
| | | | Min | Typ | Max | |
| R_{IN} | Parallel input resistance | Open-loop, $f=20\text{Hz}$ | 0.3 | | | $\text{M}\Omega$ |
| C_{IN} | Parallel input capacitance | Open-loop, $f=20\text{Hz}$ | | 1.4 | | pF |
| | Unity gain crossover frequency | Open-loop | | 1.0 | | MHz |
| t_R | Transient response unity gain Rise time | $V_{IN}=20\text{mV}$, $R_L=2\text{k}\Omega$, $C_L \leq 100\text{pF}$ | | 0.3 | | μs |
| | | | | 5.0 | | % |
| SR | Slew rate | $C \leq 100\text{pF}$, $R_L \geq 2\text{k}\Omega$, $V_{IN}=\pm 10\text{V}$ | | 0.5 | | $\text{V}/\mu\text{s}$ |

General purpose operational amplifier

μ A741/ μ A741C/SA741C

EQUIVALENT SCHEMATIC

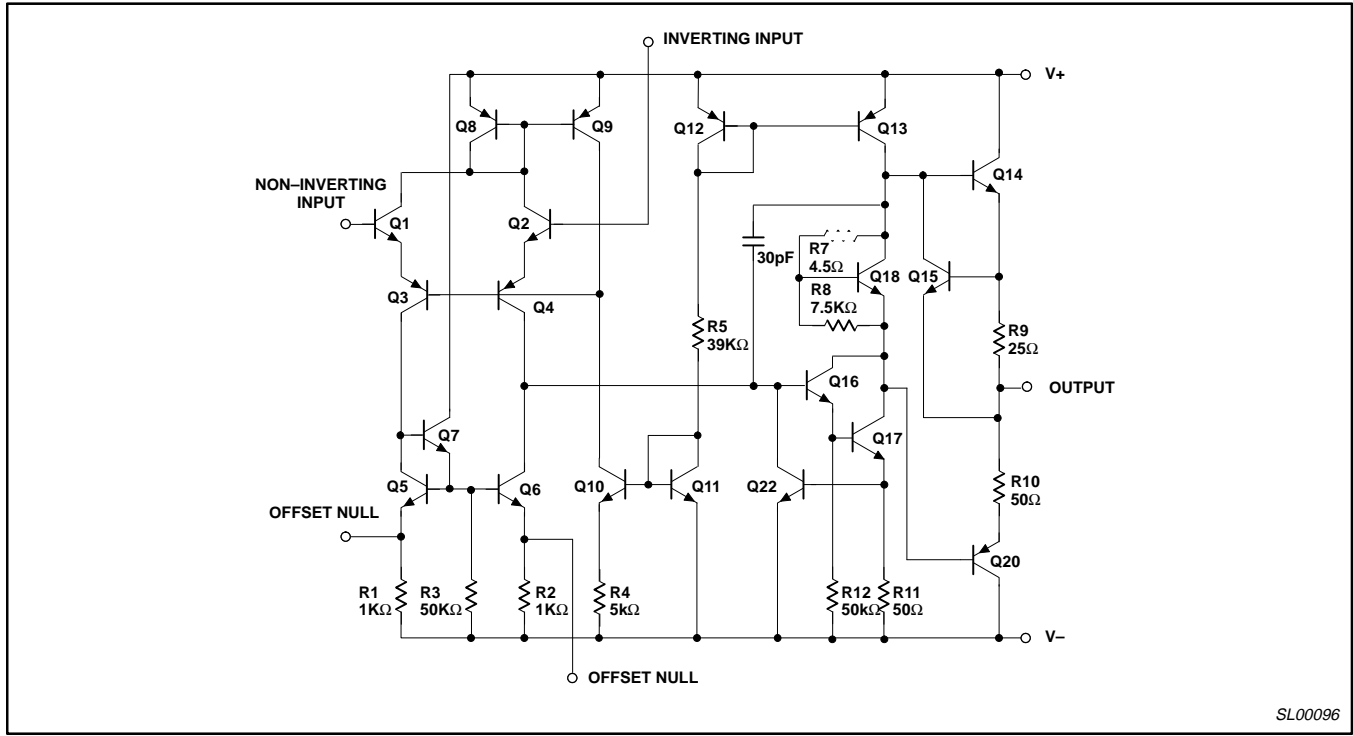


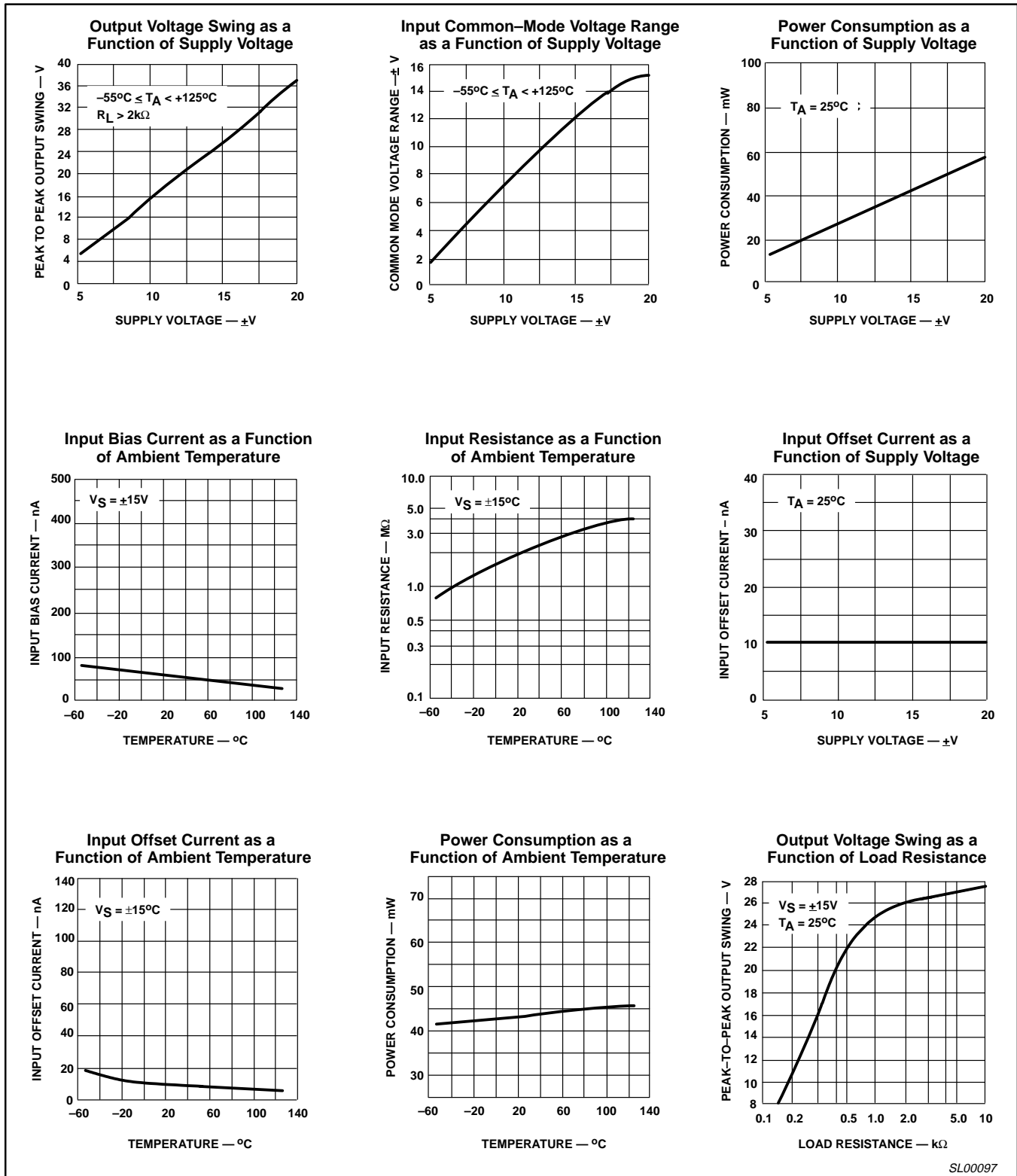
Figure 2. Equivalent Schematic

SL00096

General purpose operational amplifier

μ A741/ μ A741C/SA741C

TYPICAL PERFORMANCE CHARACTERISTICS



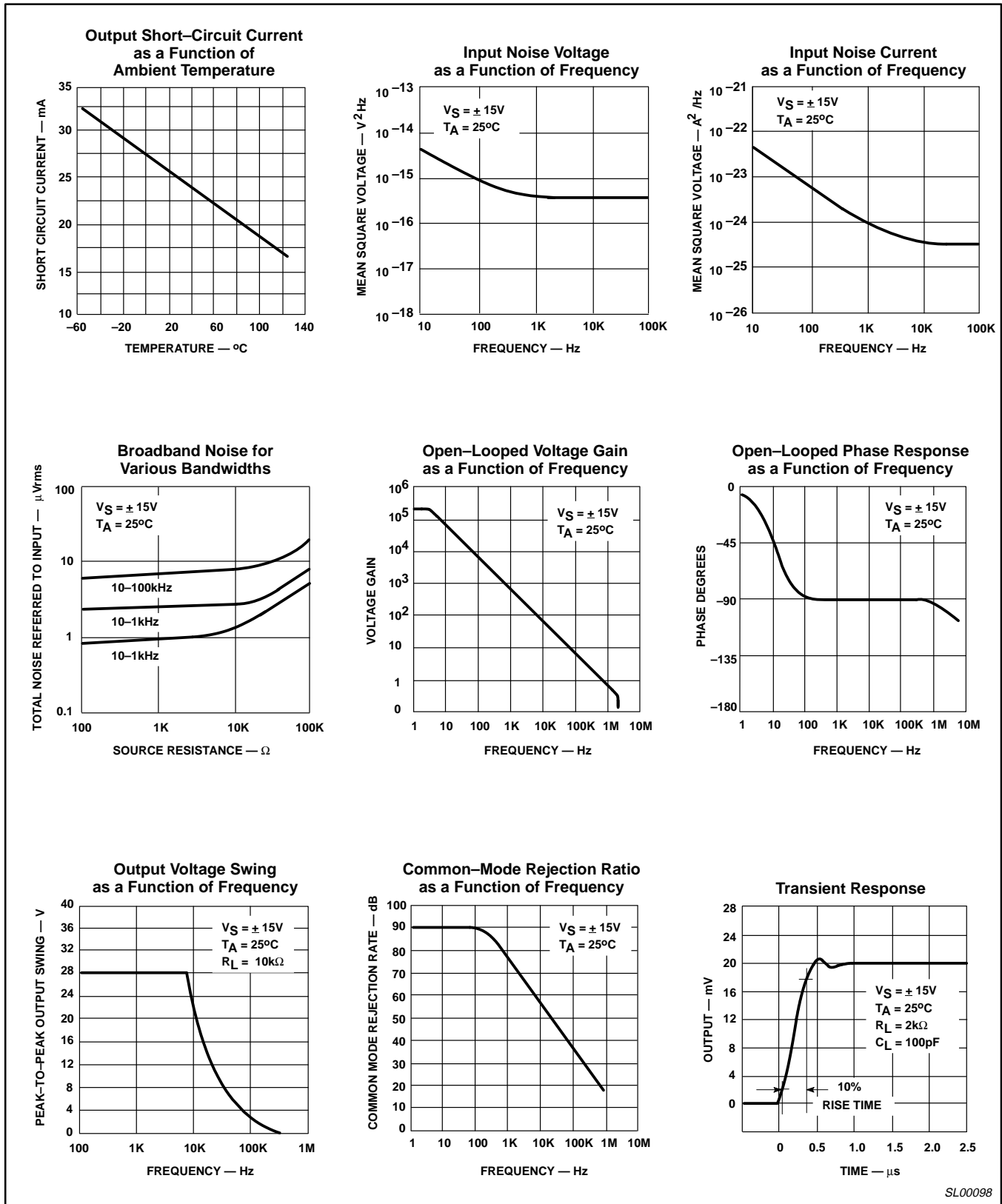
SL00097

Figure 3. Typical Performance Characteristics

General purpose operational amplifier

μ A741/ μ A741C/SA741C

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



SL00098

Figure 4. Typical Performance Characteristics (cont.)

General purpose operational amplifier

μ A741/ μ A741C/SA741C

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

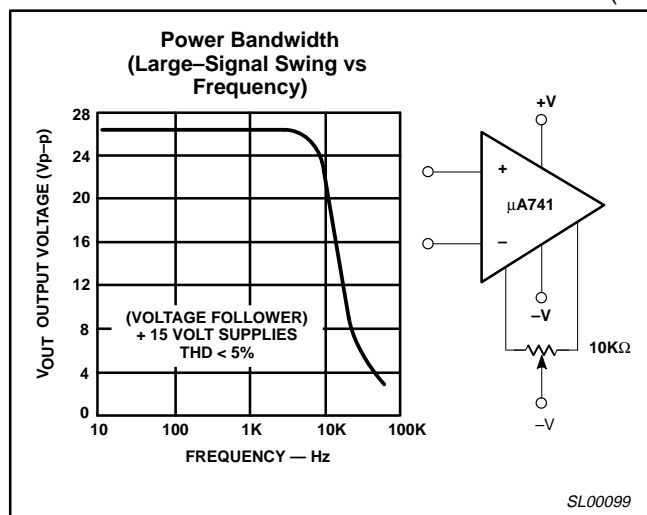


Figure 5. Typical Performance Characteristics (cont.)