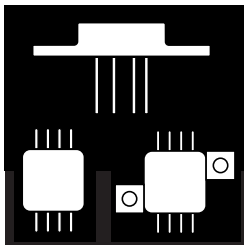


HIGH POWER, HIGH CURRENT OPERATIONAL AMPLIFIER



8-Pin, TO-3 And DIP, 10 Amp Monolithic Power Operational Amplifier

FEATURES

- Available In Isolated Standard TO-3, "Copper Slug" TO-3 And Power DIP Packages
- 10 Amp Peak Output Current
- Power Supplies to $\pm 40V$
- Programmable Current Limit
- FET Input
- Available Screened to MIL-STD-883

DESCRIPTION

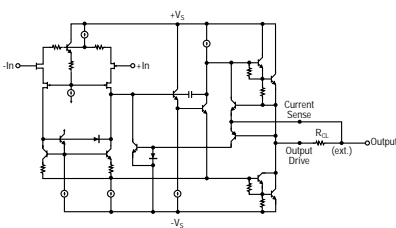
The OMA541 is a power operational amplifier capable of operation from power supplies up to $\pm 40V$ and continuous output current up to 5A. Internal current limit circuitry can be user-programmed with a single external resistor, protecting the amplifier and load from fault conditions. The OMA541 pinout is compatible with popular power operational amplifiers such as the OPA511, OPA512 and OPA3573. This device is ideally suited for Military motor driver, servo amplifier, synchro exertation as well as other power drive circuitry. The OMA541SKC incorporates a copper slug to the header for improved thermal performance.

ABSOLUTE MAXIMUM RATINGS @ 25°C

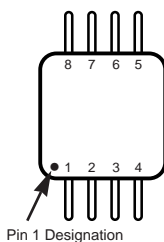
| | |
|--|----------------|
| Supply Voltage, $+V_S$ To $-V_S$ | 80V |
| Output Current, Continuous | 5A |
| Power Dissipation, Internal | 125W |
| Operating Temperature Range | -55°C to 125°C |
| Storage Temperature Range | -55°C to 150°C |
| Maximum Junction Temperature | 150°C |
| Lead Temperature (10 Sec. Soldering) | 300°C |

3.4

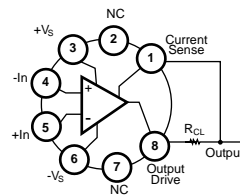
SCHEMATIC



PIN CONNECTION



- Pin 1: $-V_S$
- Pin 2: NC
- Pin 3: OUTPUT
- Pin 4: CS
- Pin 5: $+V_S$
- Pin 6: NC
- Pin 7: +IN
- Pin 8: -IN



TO-3 Top View

D-8 Top View

OMA541SK OMA541SKC OMA541SD OMA541SDZ

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$; $V_S = \pm 34 V_{DC}$ unless otherwise noted.)

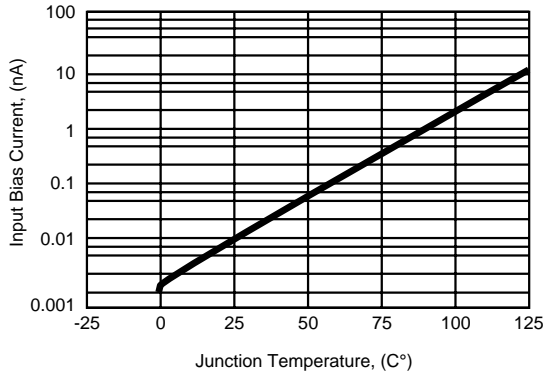
| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-------------------------------------|---|--------------------------------------|--------------------------------------|----------|------------------------------|
| Input Offset Voltage | | | | | |
| V_{OS} | | | ± 0.01 | ± 2 | mV |
| vs Temperature | -25°C to $+125^\circ\text{C}$ | | ± 15 | ± 30 | $\mu\text{V}/^\circ\text{C}$ |
| vs Temperature | -55°C to -25°C | | ± 20 | ± 40 | $\mu\text{V}/^\circ\text{C}$ |
| vs Supply Voltage | $V_S = \pm 10\text{V}$ to $\pm V_{MAX}$ | | ± 2.5 | ± 10 | $\mu\text{V}/\text{V}$ |
| vs Power | | | ± 20 | ± 60 | $\mu\text{V}/\text{W}$ |
| Input Bias Current | | | 4 | 50 | pA |
| I_B | | | | | |
| Input Offset Current | | | ± 1 | ± 30 | pA |
| I_{OS} | Specified Temperature Range | | ± 5 | ± 20 | nA |
| Input Characteristics | | | | | |
| Common-Mode Voltage Range | -55°C to $+85^\circ\text{C}$ | $\pm(\text{dB}/_{\text{GSE}} - 6)$ | $\pm(\text{dB}/_{\text{GSE}} - 3)$ | | V |
| | $+85^\circ\text{C}$ to $+125^\circ\text{C}$ | $\pm(\text{dB}/_{\text{GSE}} - 6.5)$ | $\pm(\text{dB}/_{\text{GSE}} - 3.2)$ | | V |
| Common-Mode Rejection | $V_{CM} = \pm(\text{dB}/_{\text{GSE}} - 6\text{V})$ | | 113 | | dB |
| | $V_{CM} = \pm 22\text{V}$ | 95 | | | dB |
| Input Capacitance* | | | 5 | | pF |
| Input Capacitance, DC* | | | 1 | | T |
| Gain Characteristics | | | | | |
| Open Loop Gain at 10Hz | $R_L = 10\text{k}$ | 90 | 97 | | dB |
| Gain Bandwidth Product* | | | 1.6 | | MHz |
| Output | | | | | |
| Voltage Swing | $I_O = 5\text{A}$, Continuous | $\pm(\text{dB}/_{\text{GSE}} - 5.5)$ | $\pm(\text{dB}/_{\text{GSE}} - 4.5)$ | | V |
| | $I_O = 2\text{A}$ | $\pm(\text{dB}/_{\text{GSE}} - 4.5)$ | $\pm(\text{dB}/_{\text{GSE}} - 3.6)$ | | V |
| | $I_O = 0.5\text{A}$ | $\pm(\text{dB}/_{\text{GSE}} - 4)$ | $\pm(\text{dB}/_{\text{GSE}} - 3.2)$ | | V |
| Current Peak | | 9 | 10 | | A |
| AC Performance | | | | | |
| Slew Rate | | 6 | 10 | | V/ μS |
| Power Bandwidth* | $R_L = 8$, $V_O = 20V_{rms}$ | | 55 | | KHz |
| Setting Time to 0.1%* | 2V Step | | 2 | | μS |
| Capacitive Load* | Specified Temperature Range, $G = 1$ | 3.3 | | | A |
| | Specified Temperature Range, $G > 10$ | | | SOA | |
| Phase Margin* | Specified Temperature Range, $R_L = 8$ | | 40 | | Degrees |
| Power Supply | | | | | |
| Power Supply Voltage, $\pm V_S$ | | ± 10 | ± 35 | ± 40 | V |
| Current Quiescent | | | 20 | 25 | mA |
| | Specified Temperature Range | | 25 | 35 | mA |
| Thermal Resistance | | | | | |
| θ_{JC} (Junction-to-Case) | AC Output f 60 Hz | | | | |
| | OMA541SK | | 1.25 | 1.5 | $^\circ\text{C}/\text{W}$ |
| | OMA541SKC | | 1.00 | 1.2 | $^\circ\text{C}/\text{W}$ |
| | OMA541SD | | .85 | .95 | $^\circ\text{C}/\text{W}$ |
| | DC Output | | | | |
| | OMA541SK | | 1.60 | 1.9 | $^\circ\text{C}/\text{W}$ |
| | OMA541SKC | | 1.20 | 1.5 | $^\circ\text{C}/\text{W}$ |
| | OMA541SD | | 1.00 | 1.15 | $^\circ\text{C}/\text{W}$ |
| θ_{JA} (Junction-to-Ambient) | | | 30 | | $^\circ\text{C}/\text{W}$ |

Note: *Guaranteed - not tested 100%.

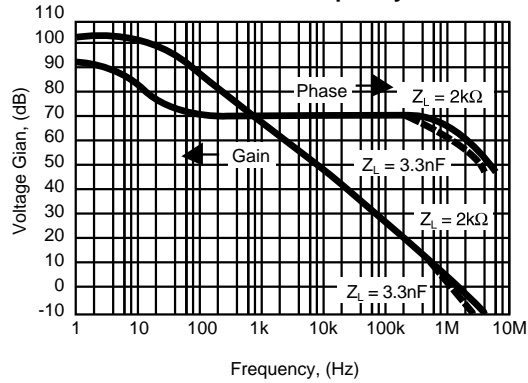
TYPICAL PERFORMANCE CURVES

$T_A = +25^\circ\text{C}$, $V_S = \pm V_{DC}$ unless otherwise noted

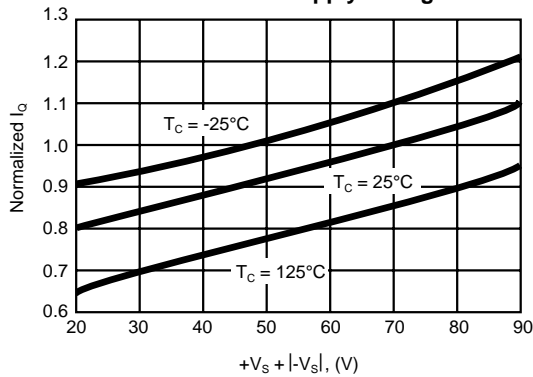
Input Bias Current VS Temperature



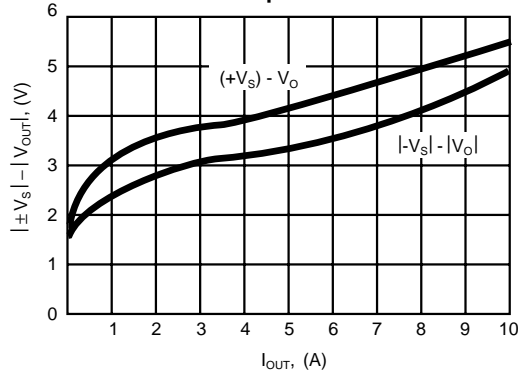
Open-Loop Gain and Phase VS Frequency



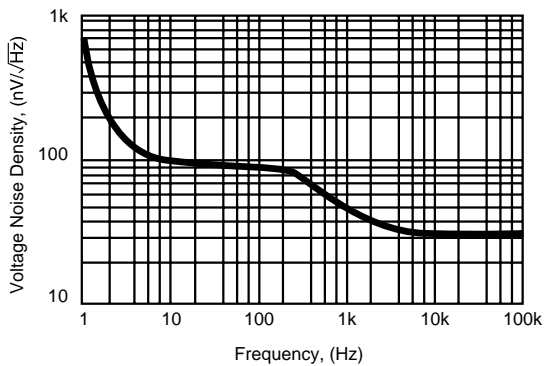
Normalized Quiescent Current VS Total Power Supply Voltage



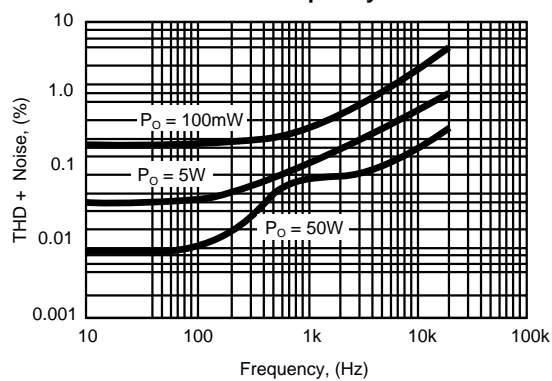
Output Voltage Swing VS Output Current



Voltage Noise Density VS Frequency



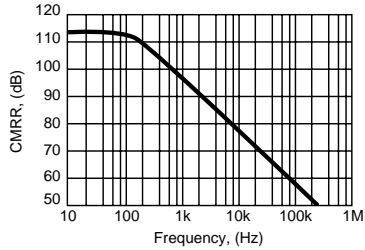
Total Harmonic Distortion VS Frequency



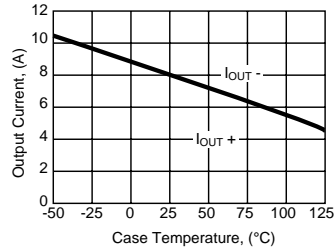
3.4

OMA541SK OMA541SKC OMA541SD OMA541SDZ

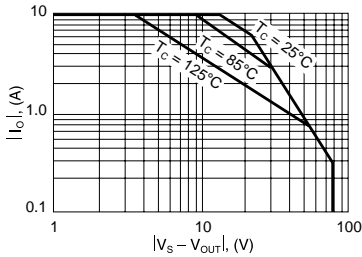
Typical Common-Mode Rejection VS Frequency (Case Dependent)



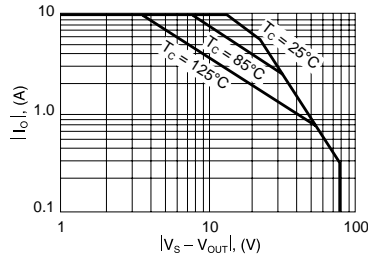
Typical Output Current VS Temperature (Case Dependent)



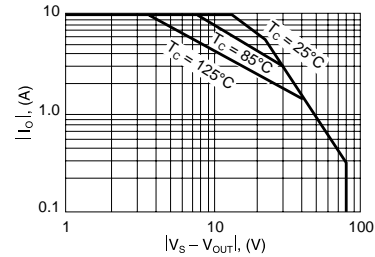
Copper Slug TO-3 Safe Operating Area OMA541SKC



Standard TO-3 Safe Operating Area OMA541SK

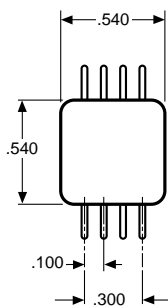


Power DIP Safe Operating Area OMA541SD/SDZ

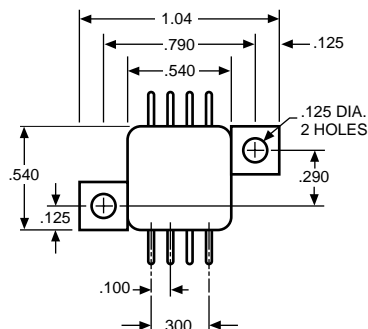


MECHANICAL OUTLINE

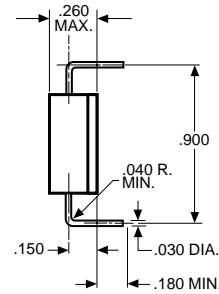
D-8



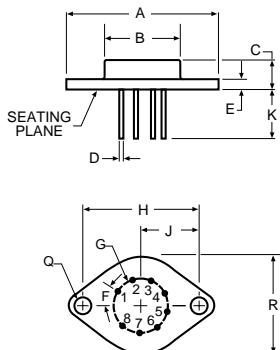
D-8Z



COMMON LEAD



TO-3-8



| DIM | INCHES | | MILLIMETERS | |
|-----|-------------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.510 | 1.550 | 38.35 | 39.37 |
| B | .745 | .770 | 18.92 | 19.56 |
| C | .260 | .300 | 6.60 | 7.62 |
| D | .038 | .042 | 0.97 | 1.07 |
| E | .080 | .105 | 2.03 | 2.67 |
| F | 40° BASIC | | 40° BASIC | |
| G | .500 BASIC | | 12.7 BASIC | |
| H | 1.186 BASIC | | 30.12 BASIC | |
| J | .593 BASIC | | 15.06 BASIC | |
| K | .400 | .500 | 10.16 | 12.70 |
| Q | .151 | .161 | 3.84 | 4.09 |
| R | .980 | 1.020 | 24.89 | 25.91 |

Note: Leads in true position within 0.010" (0.25mm) R at MMC at seating plane.

Pin numbers shown for reference only. Numbers may not be marked on package.