

## 1.1 Scope.

This specification covers the detail requirement for a high speed, current feedback operational amplifier. It is highly recommended that this data sheet be used as a baseline for new military or aerospace specification control drawings.

## 1.2 Part Number.

The complete part numbers per Table 1 of this specification is as follows:

| Device | Part Number   | Package |
|--------|---------------|---------|
| -1     | OP-160AZ/883  | Z       |
| -1     | OP-160ARC/883 | RC      |

## 1.2.3 Case Outline.

**Letter Case Outline (Lead Finish Per MIL-M-38510)**

|    |                                              |
|----|----------------------------------------------|
| Z  | 8-Lead Ceramic Dual-in-Line Package (Cerdip) |
| RC | 20-Contact Leadless Chip Carrier (LCC)       |

## 1.3 Absolute Maximum Ratings. ( $T_A = +25^\circ\text{C}$ unless otherwise noted)

|                                           |                                                      |
|-------------------------------------------|------------------------------------------------------|
| Supply Voltage                            | $\pm 18\text{ V}$                                    |
| Input Voltage                             | Supply Voltage                                       |
| Differential Input Voltage                | $\pm 1\text{ V}$                                     |
| Inverting Input Current                   | $\pm 7\text{ mA}$ Continuous $\pm 20\text{ mA}$ Peak |
| Output Short-Circuit Duration             | 10 Seconds                                           |
| Storage Temperature Range                 | $-65^\circ\text{C} \leq T_A \leq +150^\circ\text{C}$ |
| Operating Temperature Range               | $-55^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$ |
| Lead Temperature Range (Soldering 60 sec) | $+300^\circ\text{C}$                                 |
| Maximum Junction Temperature ( $T_J$ )    | $+175^\circ\text{C}$                                 |

## 1.5 Thermal Characteristics.

Thermal Resistance, Cerdip (Z) Package:

|                                       |                             |
|---------------------------------------|-----------------------------|
| Junction-to-Case ( $\theta_{JC}$ )    | $= 16^\circ\text{C/W}$ max  |
| Junction-to-Ambient ( $\theta_{JA}$ ) | $= 148^\circ\text{C/W}$ max |

Thermal Resistance, LCC (RC) Package:

|                                       |                            |
|---------------------------------------|----------------------------|
| Junction-to-Case ( $\theta_{JC}$ )    | $= 38^\circ\text{C/W}$ max |
| Junction-to-Ambient ( $\theta_{JA}$ ) | $= 98^\circ\text{C/W}$ max |

# OP-160—SPECIFICATIONS

Table 1.

| Test                                                         | Symbol              | Device Types | Limits |     | Group A Subgroups | Test Condition <sup>1</sup>                                                                                                  | Units |
|--------------------------------------------------------------|---------------------|--------------|--------|-----|-------------------|------------------------------------------------------------------------------------------------------------------------------|-------|
| Input Offset Voltage <sup>2</sup>                            | V <sub>OS</sub>     | -1           | Min    | Max | 1                 | T <sub>A</sub> = +25°C                                                                                                       | mV    |
|                                                              |                     |              |        | ±5  | 2, 3              | T <sub>A</sub> = -55°C, +125°C                                                                                               |       |
| Noninverting Input Bias Current                              | I <sub>B+</sub>     | -1           |        | ±1  | 1                 | T <sub>A</sub> = +25°C                                                                                                       | μA    |
|                                                              |                     |              |        | ±2  | 2, 3              | T <sub>A</sub> = -55°C, +125°C                                                                                               |       |
| Inverting Input Bias Current                                 | I <sub>B-</sub>     | -1           |        | ±20 | 1                 | T <sub>A</sub> = +25°C                                                                                                       | μA    |
|                                                              |                     |              |        | ±30 | 2, 3              | T <sub>A</sub> = -55°C, +125°C                                                                                               |       |
| Noninverting Input Bias Current Common-Mode Rejection Ratio  | CMRRI <sub>B+</sub> | -1           |        | 75  | 1                 | V <sub>CM</sub> = ±11 V, T <sub>A</sub> = +25°C                                                                              | nA/V  |
|                                                              |                     |              |        | 150 | 2, 3              | V <sub>CM</sub> = ±10 V; T <sub>A</sub> = -55°C, +125°C                                                                      |       |
| Inverting Input Bias Current Common-Mode Rejection Ratio     | CMRRI <sub>B-</sub> | -1           |        | 75  | 1                 | V <sub>CM</sub> = ±11 V, T <sub>A</sub> = +25°C                                                                              | nA/V  |
|                                                              |                     |              |        | 150 | 2, 3              | V <sub>CM</sub> = ±10 V; T <sub>A</sub> = -55°C, +125°C                                                                      |       |
| Noninverting Input Bias Current Power Supply Rejection Ratio | PSRRI <sub>B+</sub> | -1           |        | 5   | 1                 | V <sub>S</sub> = ±9 V, ±18 V; T <sub>A</sub> = +25°C                                                                         | nA/V  |
|                                                              |                     |              |        | 10  | 2, 3              | V <sub>S</sub> = ±9 V, ±18 V; T <sub>A</sub> = -55°C, +125°C                                                                 |       |
| Inverting Input Bias Current Power Supply Rejection Ratio    | PSRRI <sub>B-</sub> | -1           |        | 50  | 1                 | V <sub>S</sub> = ±9 V, ±18 V; T <sub>A</sub> = +25°C                                                                         | nA/V  |
|                                                              |                     |              |        | 100 | 2, 3              | V <sub>S</sub> = ±9 V, ±18 V; T <sub>A</sub> = -55°C, +125°C                                                                 |       |
| Common-Mode Rejection                                        | CMR                 | -1           | 60     |     | 1                 | V <sub>CM</sub> = ±11 V, T <sub>A</sub> = +25°C                                                                              | dB    |
|                                                              |                     |              | 56     |     | 2, 3              | V <sub>CM</sub> = ±10 V; T <sub>A</sub> = -55°C, +125°C                                                                      |       |
| Power Supply Rejection                                       | PSR                 | -1           | 74     |     | 1                 | V <sub>S</sub> = ±9 V, ±18 V; T <sub>A</sub> = +25°C                                                                         | dB    |
|                                                              |                     |              | 70     |     | 2, 3              | V <sub>S</sub> = ±9 V, ±18 V; T <sub>A</sub> = -55°C, +125°C                                                                 |       |
| Input Voltage Range <sup>3</sup>                             | IVR                 | -1           | ±11    |     | 1                 | T <sub>A</sub> = +25°C                                                                                                       | V     |
|                                                              |                     |              | ±10    |     | 2, 3              | T <sub>A</sub> = -55°C, +125°C                                                                                               |       |
| Output Voltage Swing                                         | V <sub>O</sub>      | -1           | ±11    |     | 4                 | R <sub>L</sub> = 500 Ω, T <sub>A</sub> = +25°C                                                                               | V     |
|                                                              |                     |              | ±10    |     | 5, 6              | R <sub>L</sub> = 500 Ω; T <sub>A</sub> = -55°C, +125°C                                                                       |       |
| Output Current                                               | I <sub>O</sub>      | -1           | ±35    |     | 4                 | V <sub>O</sub> = ±10 V, T <sub>A</sub> = +25°C                                                                               | mA    |
| Transimpedance                                               | R <sub>T</sub>      | -1           | 3      |     | 4                 | V <sub>O</sub> = ±10 V; R <sub>L</sub> = 500 Ω; T <sub>A</sub> = +25°C                                                       | MΩ    |
|                                                              |                     |              | 1.75   |     | 5, 6              | V <sub>O</sub> = ±10 V; R <sub>L</sub> = 500 Ω; V <sub>O</sub> = ±10 V; T <sub>A</sub> = -55°C, +125°C                       |       |
| Slew Rate                                                    | SR                  | -1           | 1000   |     | 7                 | A <sub>V</sub> = +2, R <sub>L</sub> = 500 Ω; T <sub>A</sub> = +25°C<br>V <sub>O</sub> = ±10 V, Test at V <sub>O</sub> = ±5 V | V/μs  |
| Supply Current                                               | I <sub>SY</sub>     | -1           |        | 8   | 1                 | No Load, T <sub>A</sub> = +25°C                                                                                              | mA    |
|                                                              |                     |              |        | 9   | 2, 3              | No Load; T <sub>A</sub> = -55°C, +125°C                                                                                      |       |

## NOTES

<sup>1</sup>V<sub>S</sub> = ±15 V, V<sub>CM</sub> = 0 V, R<sub>F</sub> = 820 Ω; unless otherwise specified.

<sup>2</sup>The input offset voltage (V<sub>OS</sub>) and inverting bias current can be adjusted with an external 10 kΩ potentiometer between the NULL pins with wiper connected to V+ to make output offset voltage zero.

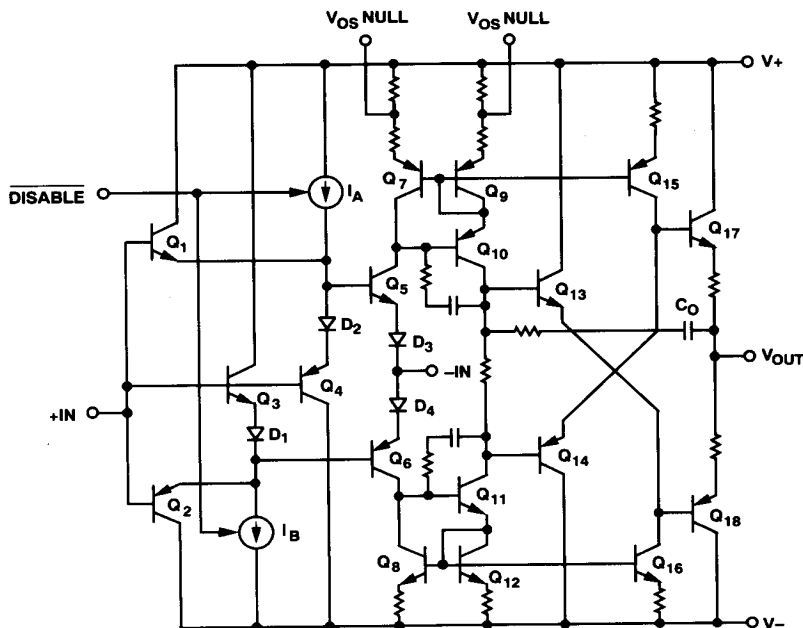
<sup>3</sup>Input voltage range (IVR) guaranteed by common-mode rejection (CMR) test.

**Table 2. Electrical Test Requirements**

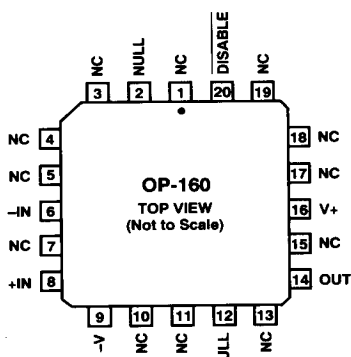
| MIL-STD-883 Test Requirements               | Subgroups (See Table 1) |
|---------------------------------------------|-------------------------|
| Interim Electrical Parameters (Pre-Burn-In) | 1                       |
| Final Electrical Test Parameters            | 1, * 2, 3, 4, 5, 6      |
| Group A Test Requirements                   | 1, 2, 3, 4, 5, 6, 7     |

\*PDA applies to Subgroup 1 only. No other subgroups are included in PDA.

## 3.2.1 Functional Block Diagram and Terminal Assignments.

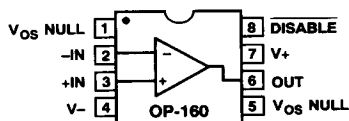


**20-Position LCC  
(RC Suffix)**



NC = NO CONNECT

**8-Pin Ceramic DIP  
(Z Suffix)**



# OP-160

## 3.2.4 Microcircuit Technology Group.

This microcircuit is covered by technology group (49).

## 4.2.1 Life Test/Burn-In Circuit.

Steady state life test is per MIL-STD-883 Method 1005. Burn-in performed per MIL-STD-883 Method 1015 test condition (C).

