# LM301A, LM201A

## Non Compensated Single Operational Amplifiers

A general purpose operational amplifier that allows the user to choose the compensation capacitor best suited to his needs. With proper compensation, summing amplifier slew rates to 10 V/μs can be obtained.

- Low Input Offset Current: 20 nA Maximum Over Temperature Range
- External Frequency Compensation for Flexibility
- Class AB Output Provides Excellent Linearity
- Output Short Circuit Protection
- Guaranteed Drift Characteristics

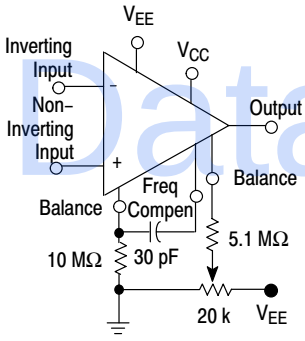


**Figure 1. Standard Compensation and Offset Balancing Circuit**

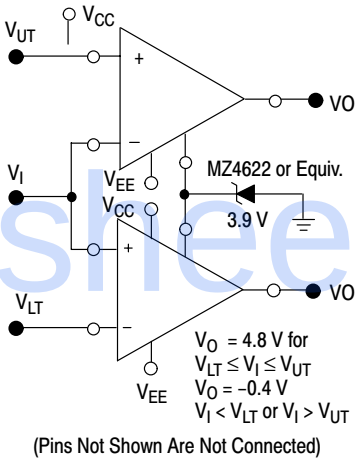


**Figure 2. Double–Ended Limit Detector**

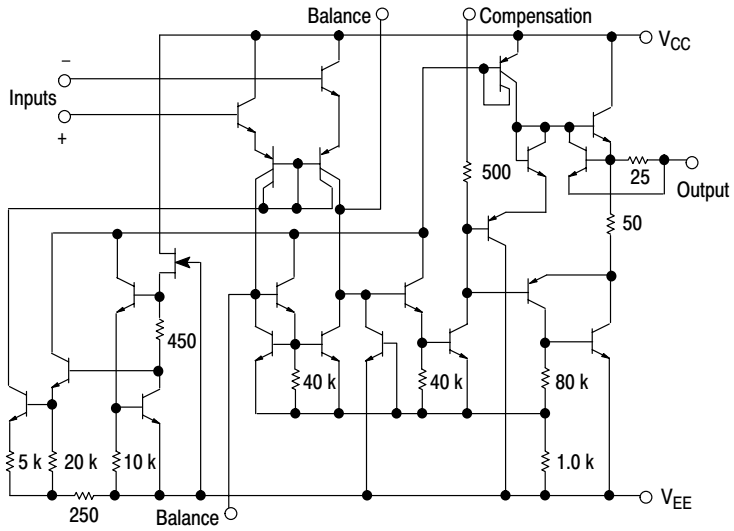


**Figure 3. Representative Circuit Schematic**

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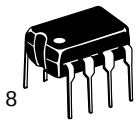
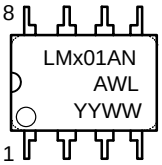
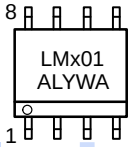
**MARKING DIAGRAMS**



**PDIP–8**
**N SUFFIX**
**CASE 626**

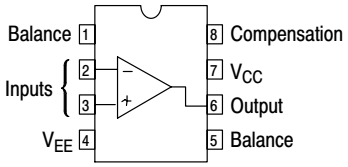



**SO–8**
**D SUFFIX**
**CASE 751**




x = 2 or 3
A = Assembly Location
WL, L = Wafer Lot
YY, Y = Year
WW, W = Work Week

**PIN CONNECTIONS**




(Top View)

**ORDERING INFORMATION**

| Device | Package | Shipping |
|---|---|---|
| LM301AD | SO–8 | 98 Units/Rail |
| LM301ADR2 | SO–8 | 2500 Tape & Reel |
| LM301AN | PDIP–8 | 50 Units/Rail |
| LM201AD | SO–8 | 98 Units/Rail |
| LM201ADR2 | SO–8 | 2500 Tape & Reel |
| LM201AN | PDIP–8 | 50 Units/Rail |

**MAXIMUM RATINGS**

| Rating | Symbol | Value | | Unit |
|---|---|---|---|---|
| | | LM201A | LM301A | |
| Power Supply Voltage | $V_{CC}$, $V_{EE}$ | ±22 | ±18 | Vdc |
| Input Differential Voltage | $V_{ID}$ | ±30 | | V |
| Input Common Mode Range (Note 1) | $V_{ICR}$ | ±15 | | V |
| Output Short Circuit Duration | $t_{SC}$ | Continuous | | |
| Power Dissipation (Package Limitation)<br>Plastic Dual–In–Line Package<br>Derate above $T_A$ = +25°C | $P_D$ | <br>625<br>5.0 | <br>625<br>5.0 | <br>mW<br>mW/°C |
| Operating Ambient Temperature Range | $T_A$ | –25 to +85 | 0 to +70 | °C |
| Storage Temperature Range | $T_{stg}$ | –65 to +150 | | °C |

**ELECTRICAL CHARACTERISTICS** ($T_A$ = +25°C, unless otherwise noted.) Unless otherwise specified, these specifications apply for supply voltages from ±5.0 V to ±20 V for the LM201A, and from ±5.0 V to ±15 V for the LM301A.

| Characteristic | Symbol | LM201A | | | LM301A | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Input Offset Voltage ($R_S \le 50$ kΩ) | $V_{IO}$ | – | 0.7 | 2.0 | – | 2.0 | 7.5 | mV |
| Input Offset Current | $I_{IO}$ | – | 1.5 | 10 | – | 3.0 | 50 | nA |
| Input Bias Current | $I_{IB}$ | – | 30 | 75 | – | 70 | 250 | nA |
| Input Resistance | $r_i$ | 1.5 | 4.0 | – | 0.5 | 2.0 | – | MΩ |
| Supply Current<br>$V_{CC}/V_{EE}$ = ±20 V<br>$V_{CC}/V_{EE}$ = ±15 V | $I_{CC}$,$I_{EE}$ | <br>–<br>– | <br>1.8<br>– | <br>3.0<br>– | <br>–<br>– | <br>–<br>1.8 | <br>–<br>3.0 | mA |
| Large Signal Voltage Gain<br>($V_{CC}/V_{EE}$ = ±15 V, $V_O$ = ±10 V, $R_L$ > 2.0 kΩ) | $A_V$ | 50 | 160 | – | 25 | 160 | – | V/mV |
| **The following specifications apply over the operating temperature range.** | | | | | | | | |
| Input Offset Voltage ($R_S \le 50$ kΩ) | $V_{IO}$ | – | – | 3.0 | – | – | 10 | mV |
| Input Offset Current | $I_{IO}$ | – | – | 20 | – | – | 70 | nA |
| Avg Temperature Coefficient of Input Offset Voltage (Note 2)<br>$T_A(min) \le T_A \le T_A(max)$ | $\Delta V_{IO}/\Delta T$ | – | 3.0 | 15 | – | 6.0 | 30 | μV/°C |
| Avg Temperature Coefficient of Input Offset Current (Note 2)<br>+25°C ≤ $T_A \le T_A$ (max)<br>$T_A(min) \le T_A \le$ 25°C | $\Delta I_{IO}/\Delta T$ | <br>–<br>– | <br>0.01<br>0.02 | <br>0.1<br>0.2 | <br>–<br>– | <br>0.01<br>0.02 | <br>0.3<br>0.6 | nA/°C |
| Input Bias Current | $I_{IB}$ | – | – | 100 | – | – | 300 | nA |
| Large Signal Voltage Gain<br>($V_{CC}/V_{EE}$ = ±15 V, $V_O$ = ±10V, $R_L$ > 2.0 kΩ) | $A_{VOL}$ | 25 | – | – | 15 | – | – | V/mV |
| Input Voltage Range<br>$V_{CC}/V_{EE}$ = ±20 V<br>$V_{CC}/V_{EE}$ = ±15 V | $V_{ICR}$ | <br>–15<br>– | <br>–<br>– | <br>+15<br>– | <br>–<br>–12 | <br>–<br>– | <br>–<br>+12 | V |
| Common Mode Rejection ($R_S \le 50$ kΩ) | CMR | 80 | 96 | – | 70 | 90 | – | dB |
| Supply Voltage Rejection ($R_S \le 50$ kΩ) | PSR | 80 | 96 | – | 70 | 96 | – | dB |
| Output Voltage Swing<br>($V_{CC}/V_{EE}$ = ±15 V, $R_L$ = ±10 kΩ, $R_L$ > 2.0 kΩ) | $V_O$ | ±12<br>±10 | ±14<br>±13 | –<br>– | ±12<br>±10 | ±14<br>±13 | –<br>– | V |
| Supply Currents ($T_A = T_A(max)$, $V_{CC}/V_{EE}$ = ±20 V) | $I_{CC}$,$I_{EE}$ | – | 1.2 | 2.5 | – | – | – | mA |

1. For supply voltages less than ±15 V, the absolute maximum input voltage is equal to the supply voltage.
2. Guaranteed by design.

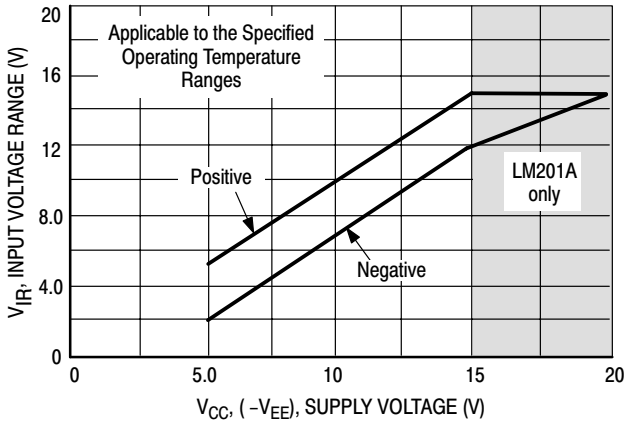



**Figure 4. Minimum Input Voltage Range**

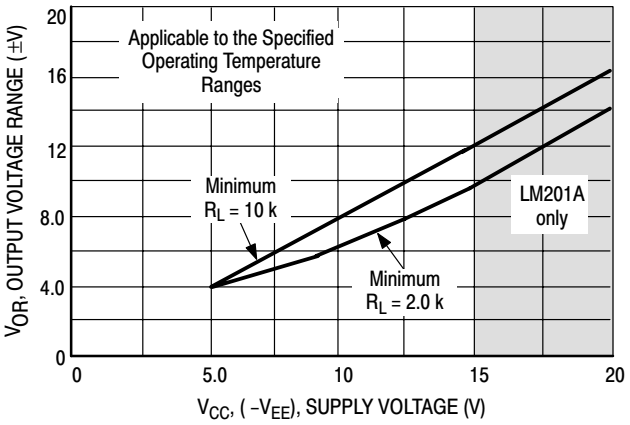



**Figure 5. Minimum Output Voltage Swing**

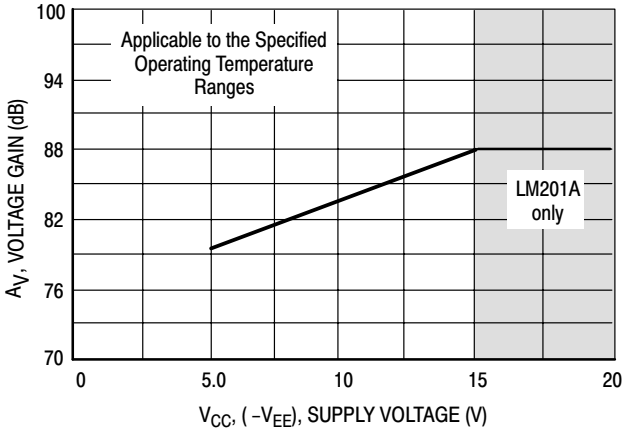



**Figure 6. Minimum Voltage Gain**

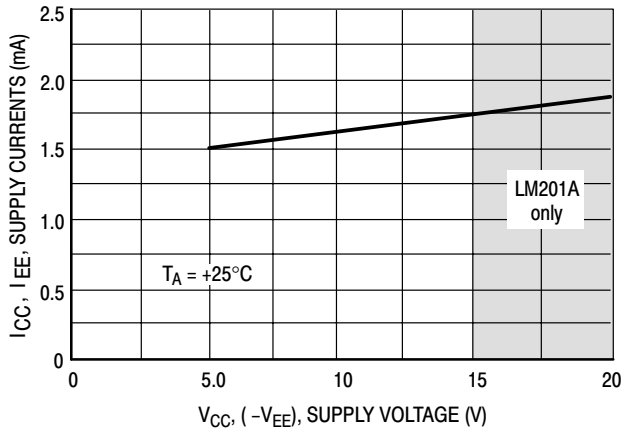



**Figure 7. Typical Supply Currents**

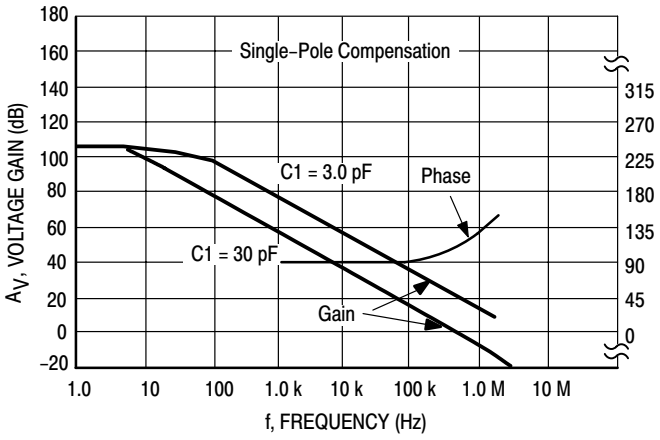



**Figure 8. Open Loop Frequency Response**

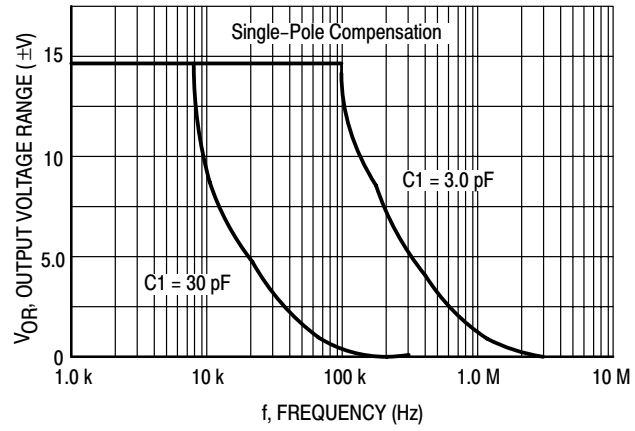



**Figure 9. Large Signal Frequency Response**

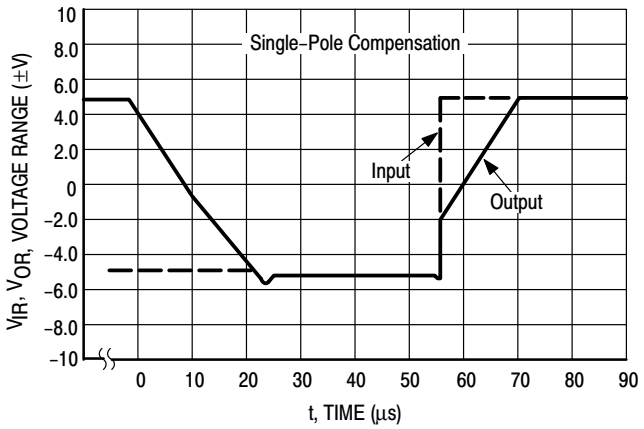



**Figure 10. Voltage Follower Pulse Response**

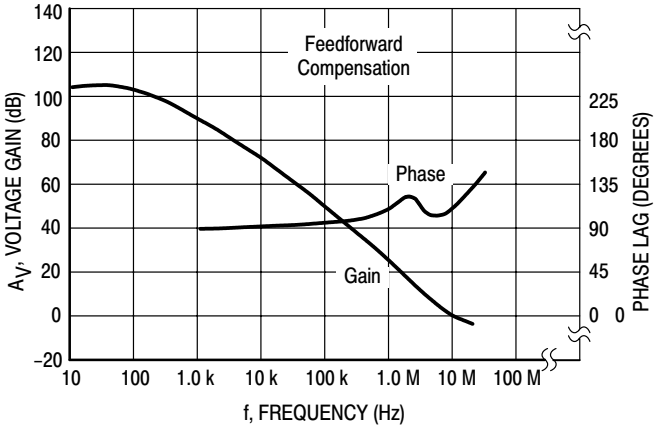



**Figure 11. Open Loop Frequency Response**

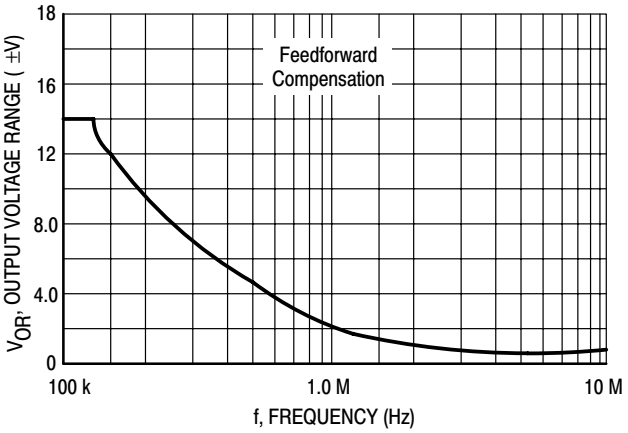



**Figure 12. Large Signal Frequency Response**

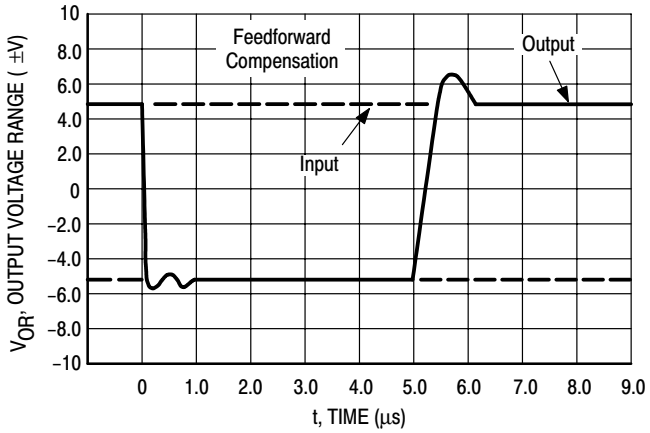



**Figure 13. Inverter Pulse Response**

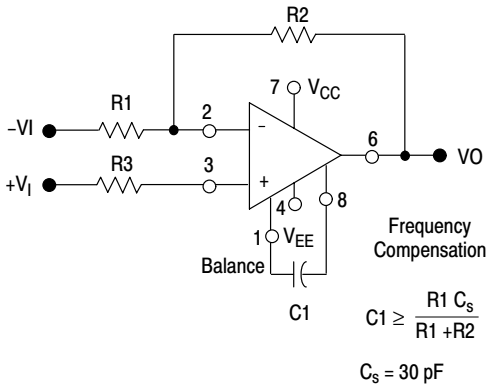



**Figure 14. Single−Pole Compensation**

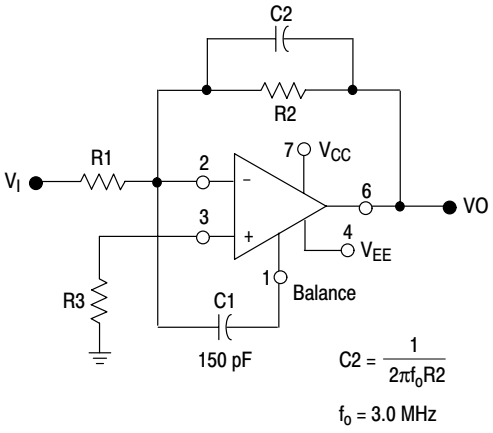
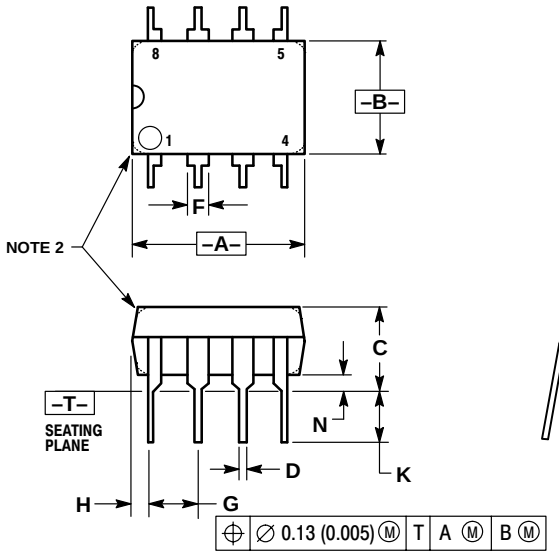



**Figure 15. Feedforward Compensation**

## PACKAGE DIMENSIONS

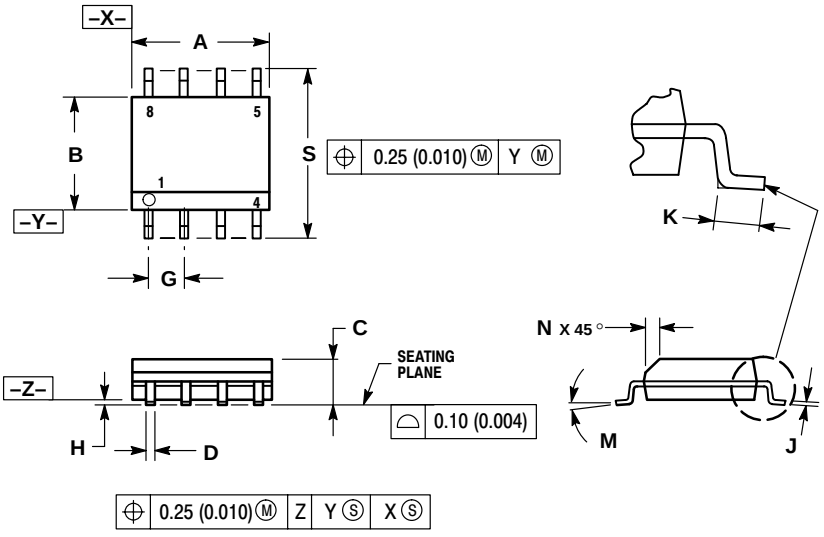
**PDIP–8**
**N SUFFIX**
CASE 626–05
ISSUE L




NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 9.40 | 10.16 | 0.370 | 0.400 |
| B | 6.10 | 6.60 | 0.240 | 0.260 |
| C | 3.94 | 4.45 | 0.155 | 0.175 |
| D | 0.38 | 0.51 | 0.015 | 0.020 |
| F | 1.02 | 1.78 | 0.040 | 0.070 |
| G | 2.54 BSC | | 0.100 BSC | |
| H | 0.76 | 1.27 | 0.030 | 0.050 |
| J | 0.20 | 0.30 | 0.008 | 0.012 |
| K | 2.92 | 3.43 | 0.115 | 0.135 |
| L | 7.62 BSC | | 0.300 BSC | |
| M | --- | 10° | --- | 10° |
| N | 0.76 | 1.01 | 0.030 | 0.040 |

**SO–8**
**D SUFFIX**
CASE 751–07
ISSUE W




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.197 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.053 | 0.069 |
| D | 0.33 | 0.51 | 0.013 | 0.020 |
| G | 1.27 BSC | | 0.050 BSC | |
| H | 0.10 | 0.25 | 0.004 | 0.010 |
| J | 0.19 | 0.25 | 0.007 | 0.010 |
| K | 0.40 | 1.27 | 0.016 | 0.050 |
| M | 0° | 8° | 0° | 8° |
| N | 0.25 | 0.50 | 0.010 | 0.020 |
| S | 5.80 | 6.20 | 0.228 | 0.244 |

# Notes

# Notes

## PUBLICATION ORDERING INFORMATION

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