

DUAL NON-INVERTING POWER DRIVER

FEATURES

- 3.0A Peak Current Totem Pole Output
- 5 to 35V Operation
- 25ns Rise and Fall Times
- 25ns Propagation Delays
- Thermal Shutdown and Under-Voltage Protection
- High-Speed, Power MOSFET Compatible
- Efficient High Frequency Operation
- Low Cross-Conduction Current Spike
- Enable and Shutdown Functions
- Wide Input Voltage Range
- ESD Protection to 2kV

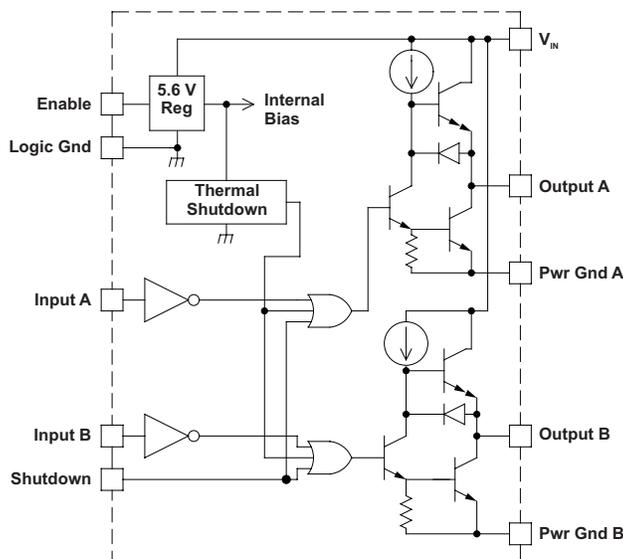
DESCRIPTION

The UC1708 family of power drivers is made with a high-speed, high-voltage, Schottky process to interface control functions and high-power switching devices – particularly power MOSFETs. Operating over a 5 V to 35 V supply range, these devices contain two independent channels. The A and B inputs are compatible with TTL and CMOS logic families, but can withstand input voltages as high as V_{IN} . Each output can source or sink up to 3 A as long as power dissipation limits are not exceeded.

Although each output can be activated independently with its own inputs, they can be forced low in common through the action of either a digital high signal at the Shutdown terminal or by forcing the Enable terminal low. The Shutdown terminal will only force the outputs low, it will not effect the behavior of the rest of the device. The Enable terminal effectively places the device in under-voltage lockout, reducing power consumption by as much as 90%. During under-voltage and disable (Enable terminal forced low) conditions, the outputs are held in a self-biasing, low-voltage, state.

The UC3708 and UC2708 are available in plastic 8-pin MINI DIP and 16-pin *bat-wing* DIP packages for commercial operation over a 0°C to 70°C temperature range and industrial temperature range of –25°C to 85°C respectively. For operation over a –55°C to 125°C temperature range, the UC1708 is available in hermetically sealed 8-pin MINI CDIP, 16 pin CDIP and 20 pin CLCC packages. Surface mount devices are also available.

BLOCK DIAGRAM



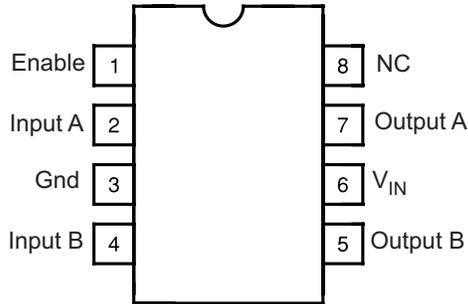
NOTE: Shutdown feature is not available in J or N packages only.



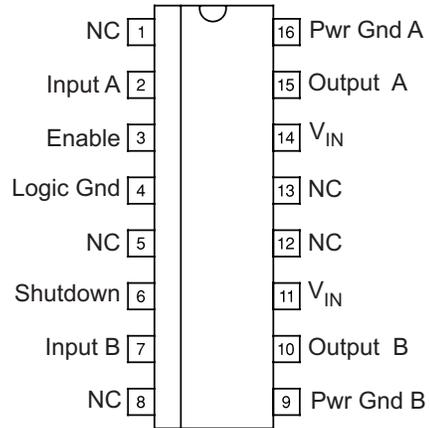
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

CONNECTION DIAGRAMS

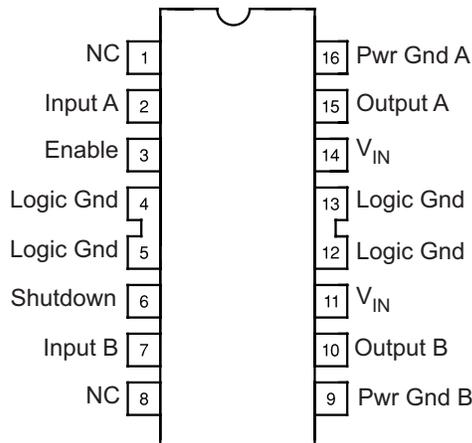
DIL-8 (Top View)
J Or N Package



SOIC-16 (Top View)
DW Package

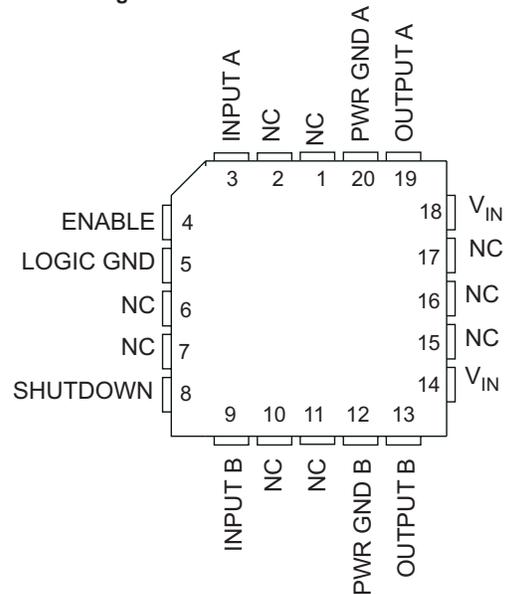


DIL-16 (Top View)
JE Or NE Package



Note: In JE package, Pin 4 is Logic Ground.
Pins 5, 12, and 13 are no connect.

CLCC-20 (Top View)
L Package



ABSOLUTE MAXIMUM RATINGS⁽¹⁾

| | | VALUE | UNIT |
|---|----------------|----------------------------|------|
| Supply Voltage, V_{IN} | | 35 | V |
| Output Current (Each Output, Source or Sink) | Steady-State | 0.5 | A |
| | Peak Transient | 3 | A |
| Output Voltage | | -0.3 to ($V_{IN} + 0.3$) | V |
| Enable and Shutdown Inputs | | -0.3 to 6.2 | V |
| A and B Inputs | | -0.3 to ($V_{IN} + 0.3$) | V |
| Operating Junction Temperature ⁽²⁾ | | 150 | °C |
| Storage Temperature Range | | -65 to 150 | °C |
| Lead Temperature (Soldering, 10 Seconds) | | 300 | °C |

(1) All voltages are with respect to Logic Gnd pin. All currents are positive into, negative out of, device terminals.

(2) Consult Unitorde Integrated Circuits databook for information regarding thermal specifications and limitations of packages.

ELECTRICAL CHARACTERISTICS

Unless otherwise stated, $V_{IN}=10V$ to $35V$, and these specifications apply for: $-55^{\circ}C < T_A < 125^{\circ}C$ for the UC1708, $-25^{\circ}C < T_A < 85^{\circ}C$ for the UC2708, and $0^{\circ}C < T_A < 70^{\circ}C$ for the UC3708, $T_A = T_J$

| PARAMETER | | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------|-------------------------------------|-----------------------|------|------|-----|------|
| V_{IN} | Supply current | Outputs low | | 18 | 26 | mA |
| | | Outputs high | | 14 | 18 | |
| | | Enable = 0 V | | 1 | 4 | |
| | A, B and shutdown inputs low level | | | | 0.8 | V |
| | A, B and shutdown inputs high level | | 2.0 | | | V |
| | A, B Input current low | $V_{A,B} = 0.4V$ | -1 | -0.6 | | mA |
| | A, B Input current high | $V_{A,B} = 2.4V$ | -200 | | 50 | A |
| | A, B Input leakage current high | $V_{A,B} = 35.3V$ | | | 200 | A |
| | Shutdown input current low | $V_{SHUTDOWN} = 0.4V$ | | 20 | 100 | A |
| | Shutdown input current high | $V_{SHUTDOWN} = 2.4V$ | | 170 | 500 | A |
| | | $V_{SHUTDOWN} = 6.2V$ | | 0.6 | 1.5 | mA |
| | Enable input current low | $V_{ENABLE} = 0V$ | -600 | -460 | 200 | A |
| | Enable input current high | $V_{ENABLE} = 6.2V$ | | | 200 | A |
| | Enable threshold rising | | | 2.8 | 3.6 | V |
| | Enable threshold falling | | 1.0 | 2.4 | 3.4 | V |
| $V_{IN} - V_{OUT}$ | Output High Saturation | $I_{OUT} = -50mA$ | | | 2.0 | V |
| | | $I_{OUT} = -500mA$ | | | 2.5 | V |
| V_{OUT} | Output Low Saturation | $I_{OUT} = 50mA$ | | | 0.5 | V |
| | | $I_{OUT} = 500mA$ | | | 2.5 | V |
| | Thermal Shutdown | | | 155 | | °C |

SWITCHING CHARACTERISTICS (see Figure 1)

(VIN = 20V, delays measured to 10% output change.)

| PARAMETER | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|----------------------------------|----------------------------|---------------|-----|-----|-----|------|
| FROM A,B INPUT TO OUTPUT: | | | | | | |
| Rise Time Delay (TPLH) | CL = 0pF | | | 25 | 40 | ns |
| | CL = 1000pF | UC1708 | | 25 | 45 | ns |
| | | UC2708/UC3708 | | 25 | 40 | |
| | CL = 2200pF | UC1708 | | 25 | 50 | ns |
| | | UC2708/UC3708 | | 25 | 45 | |
| | 10% to 90% Rise (TTLH) | CL = 0pF | | | 55 | 75 |
| CL = 1000pF ⁽¹⁾ | | UC1708 | | 25 | 80 | ns |
| | | UC2708/UC3708 | | 25 | 50 | |
| CL = 2200pF | | UC1708 | | 40 | 85 | ns |
| | | UC2708/UC3708 | | 40 | 55 | |
| Fall Time Delay (TPHL) | | CL = 0pF | | | 25 | 40 |
| | CL = 1000pF ⁽¹⁾ | | | 25 | 45 | |
| | CL = 2200pF | | | 35 | 50 | |
| 90% to 10% Fall (TTHL) | CL = 0pF | | | 15 | 20 | ns |
| | CL = 1000pF ⁽¹⁾ | | | 25 | 45 | |
| | CL = 2200pF | | | 40 | 55 | |

(1) These parameters, specified at 1000pF, although ensured over recommended operating conditions, are not tested in production.

SWITCHING CHARACTERISTICS (see Figure 1)

(VIN = 20V, delays measured to 10% output change.)

| PARAMETER | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---------------------------------------|--|---------------|-----|-----|-----|------|
| FROM SHUTDOWN INPUT TO OUTPUT: | | | | | | |
| Rise Time Delay (TPLH) | CL = 0pF | | | 25 | 75 | ns |
| | CL = 1000pF ⁽¹⁾ | UC1708 | | 30 | 80 | ns |
| | | UC2708/UC3708 | | 30 | 75 | |
| | CL = 2200pF | UC1708 | | 35 | 85 | ns |
| | | UC2708/UC3708 | | 35 | 75 | |
| | 10% to 90% Rise (TTLH) | CL = 0pF | | | 50 | 75 |
| CL = 1000pF ⁽¹⁾ | | UC1708 | | 25 | 80 | ns |
| | | UC2708/UC3708 | | 25 | 50 | |
| CL = 2200pF | | UC1708 | | 40 | 85 | ns |
| | | UC2708/UC3708 | | 40 | 55 | |
| Fall Time Delay (TPHL) | | CL = 0pF | | | 25 | 45 |
| | CL = 1000pF ⁽¹⁾ | | | 30 | 50 | |
| | CL = 2200pF | | | 35 | 55 | |
| 90% to 10% Fall (TTHL) | CL = 0pF | | | 25 | 20 | ns |
| | CL = 1000pF ⁽¹⁾ | | | 25 | 45 | |
| | CL = 2200pF | | | 40 | 55 | |
| Total Supply Current | F = 200kHz, 50% duty cycle, both channels; CL = 0pF | | | 23 | 25 | mA |
| | F = 200kHz, 50% duty cycle, both channels; CL = 2200pF | | | 38 | 45 | |

(1) These parameters, specified at 1000pF, although ensured over recommended operating conditions, are not tested in production.

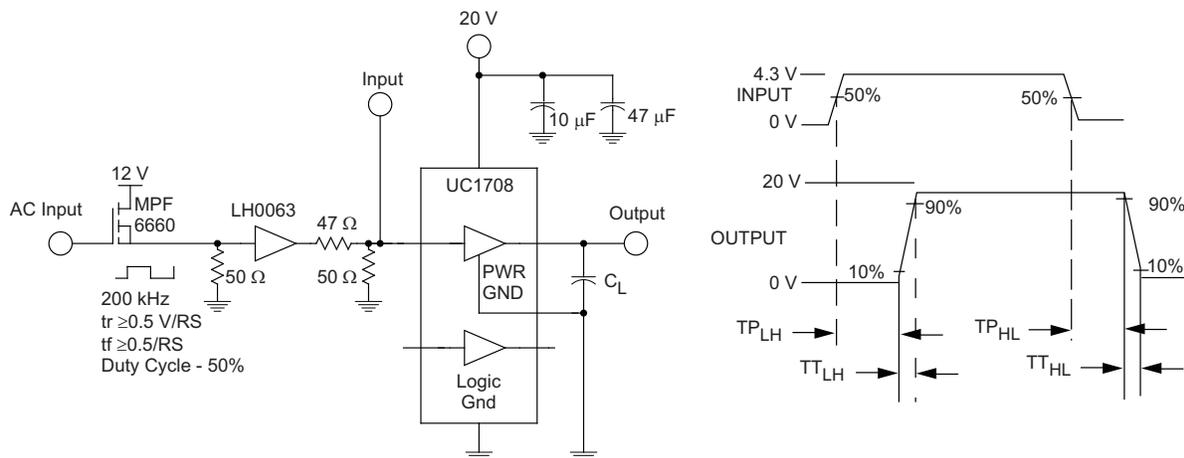
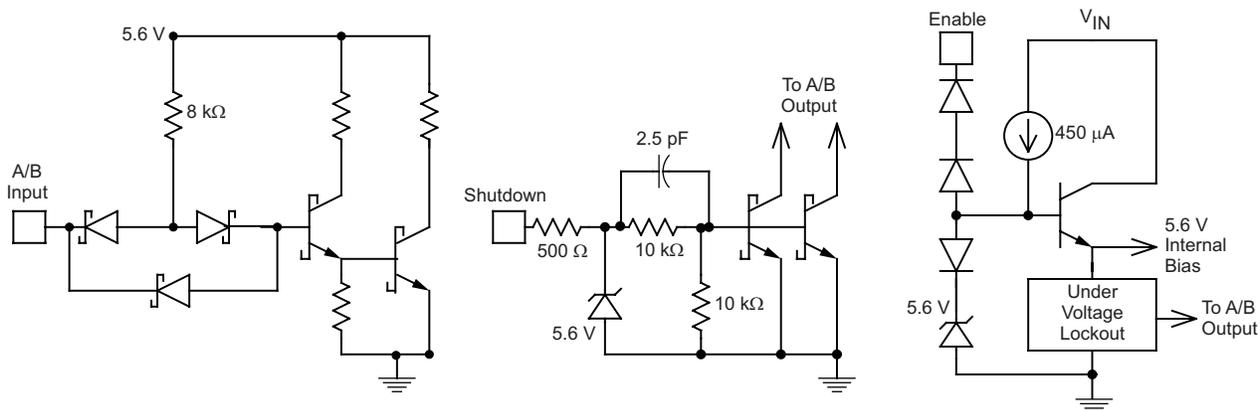


Figure 1. AC Test Circuit and Switching Time Waveforms



NOTE: Shutdown feature available only in JE, NE or DW Packages.

Figure 2. Equivalent Input Circuits

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| 5962-0051401Q2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type |
| 5962-0051401QEA | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 SNPB | N / A for Pkg Type |
| 5962-0051401QPA | ACTIVE | CDIP | JG | 8 | 1 | TBD | A42 SNPB | N / A for Pkg Type |
| 5962-0051401V2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type |
| 5962-0051401VEA | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 | N / A for Pkg Type |
| 5962-0051401VPA | ACTIVE | CDIP | JG | 8 | 1 | TBD | A42 | N / A for Pkg Type |
| UC1708J | ACTIVE | CDIP | JG | 8 | 1 | TBD | A42 SNPB | N / A for Pkg Type |
| UC1708J883B | ACTIVE | CDIP | JG | 8 | 1 | TBD | A42 SNPB | N / A for Pkg Type |
| UC1708JE | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 SNPB | N / A for Pkg Type |
| UC1708JE883B | ACTIVE | CDIP | J | 16 | 1 | TBD | A42 SNPB | N / A for Pkg Type |
| UC1708L883B | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type |
| UC2708D | OBSOLETE | | UTR | | | TBD | Call TI | Call TI |
| UC2708DW | ACTIVE | SOIC | DW | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| UC2708DWG4 | ACTIVE | SOIC | DW | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| UC2708DWTR | ACTIVE | SOIC | DW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| UC2708DWTRG4 | ACTIVE | SOIC | DW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| UC2708J | OBSOLETE | | UTR | | | TBD | Call TI | Call TI |
| UC2708JE | OBSOLETE | | UTR | | | TBD | Call TI | Call TI |
| UC2708N | ACTIVE | PDIP | P | 8 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | N / A for Pkg Type |
| UC2708NE | ACTIVE | PDIP | N | 16 | | TBD | Call TI | Call TI |
| UC2708NEG4 | ACTIVE | PDIP | N | 16 | | TBD | Call TI | Call TI |
| UC2708NG4 | ACTIVE | PDIP | P | 8 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | N / A for Pkg Type |
| UC2708Q | OBSOLETE | | UTR | | | TBD | Call TI | Call TI |
| UC3708DW | ACTIVE | SOIC | DW | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| UC3708DWG4 | ACTIVE | SOIC | DW | 16 | 40 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| UC3708DWTR | ACTIVE | SOIC | DW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| UC3708DWTRG4 | ACTIVE | SOIC | DW | 16 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR |
| UC3708N | ACTIVE | PDIP | P | 8 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | N / A for Pkg Type |
| UC3708NE | ACTIVE | PDIP | N | 16 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | N / A for Pkg Type |
| UC3708NEG4 | ACTIVE | PDIP | N | 16 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | N / A for Pkg Type |
| UC3708NG4 | ACTIVE | PDIP | P | 8 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | N / A for Pkg Type |
| UC3708Q | OBSOLETE | | UTR | | | TBD | Call TI | Call TI |

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

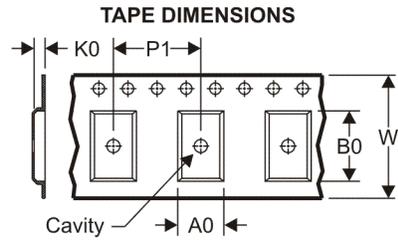
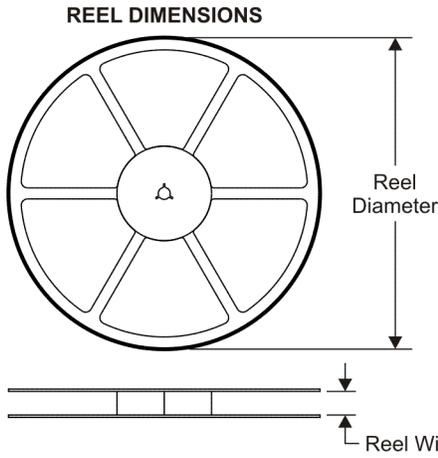
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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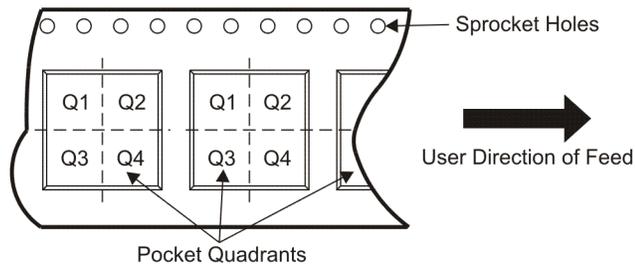
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TAPE AND REEL INFORMATION



| | |
|----|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

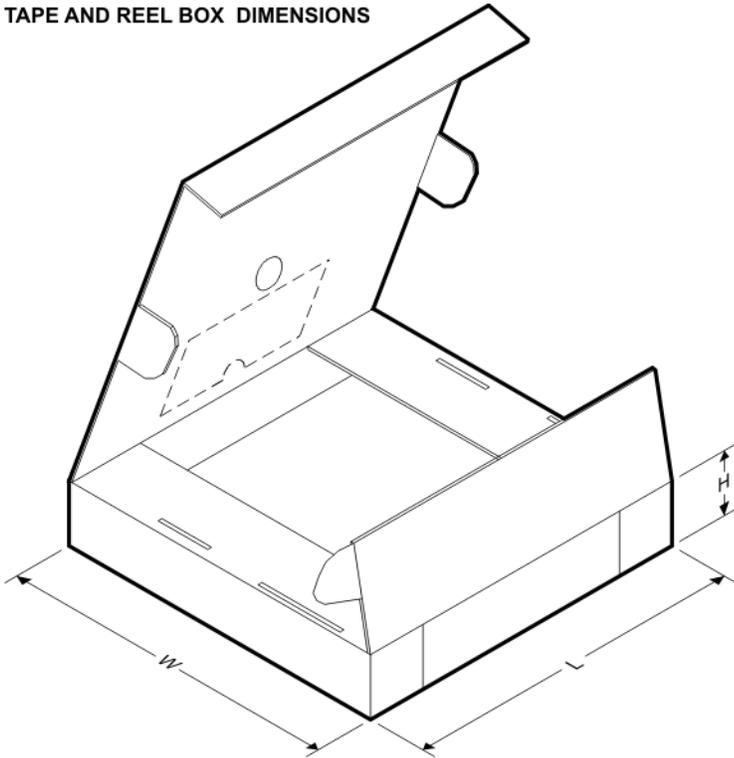
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| UC2708DWTR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.85 | 10.8 | 2.7 | 12.0 | 16.0 | Q1 |
| UC3708DWTR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.85 | 10.8 | 2.7 | 12.0 | 16.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS



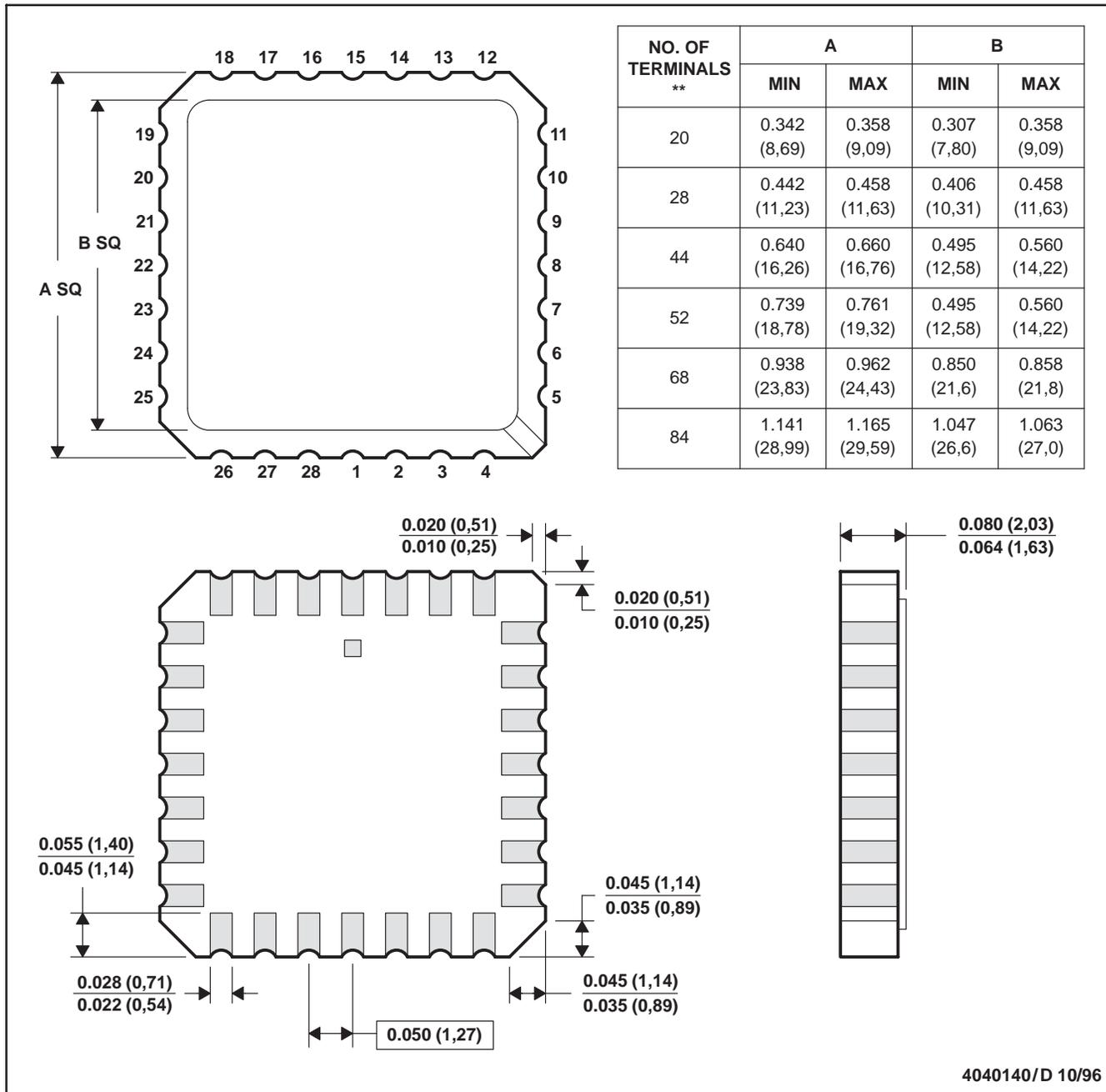
*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|------------|--------------|-----------------|------|------|-------------|------------|-------------|
| UC2708DWTR | SOIC | DW | 16 | 2000 | 346.0 | 346.0 | 33.0 |
| UC3708DWTR | SOIC | DW | 16 | 2000 | 346.0 | 346.0 | 33.0 |

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a metal lid.
 - D. The terminals are gold plated.
 - E. Falls within JEDEC MS-004

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---------------|------------------------|------------------------|------------------------|------------------------|
| A | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC |
| B MAX | 0.785 (19,94) | .840 (21,34) | 0.960 (24,38) | 1.060 (26,92) |
| B MIN | — | — | — | — |
| C MAX | 0.300 (7,62) | 0.300 (7,62) | 0.310 (7,87) | 0.300 (7,62) |
| C MIN | 0.245 (6,22) | 0.245 (6,22) | 0.220 (5,59) | 0.245 (6,22) |

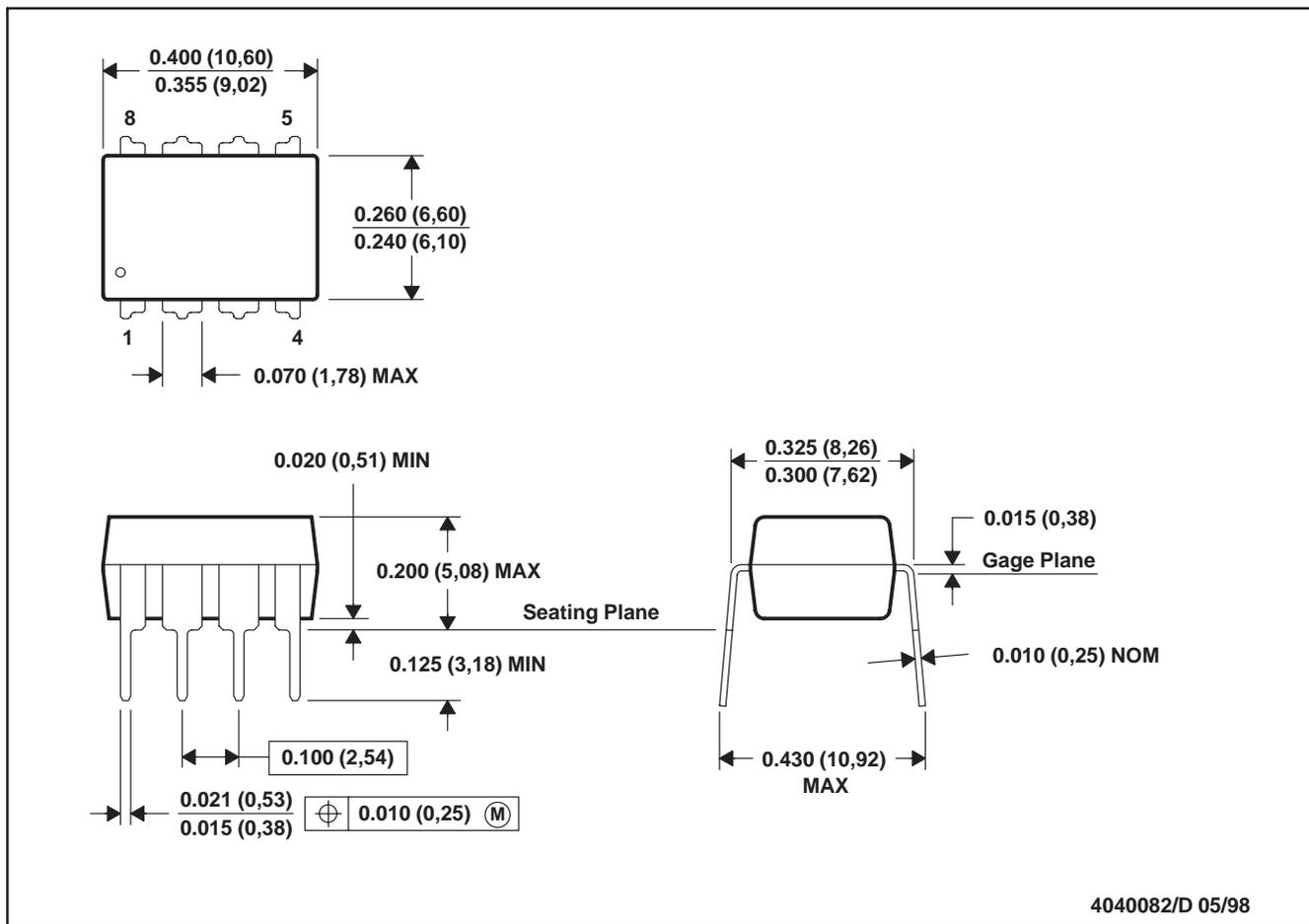


4040083/F 03/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE



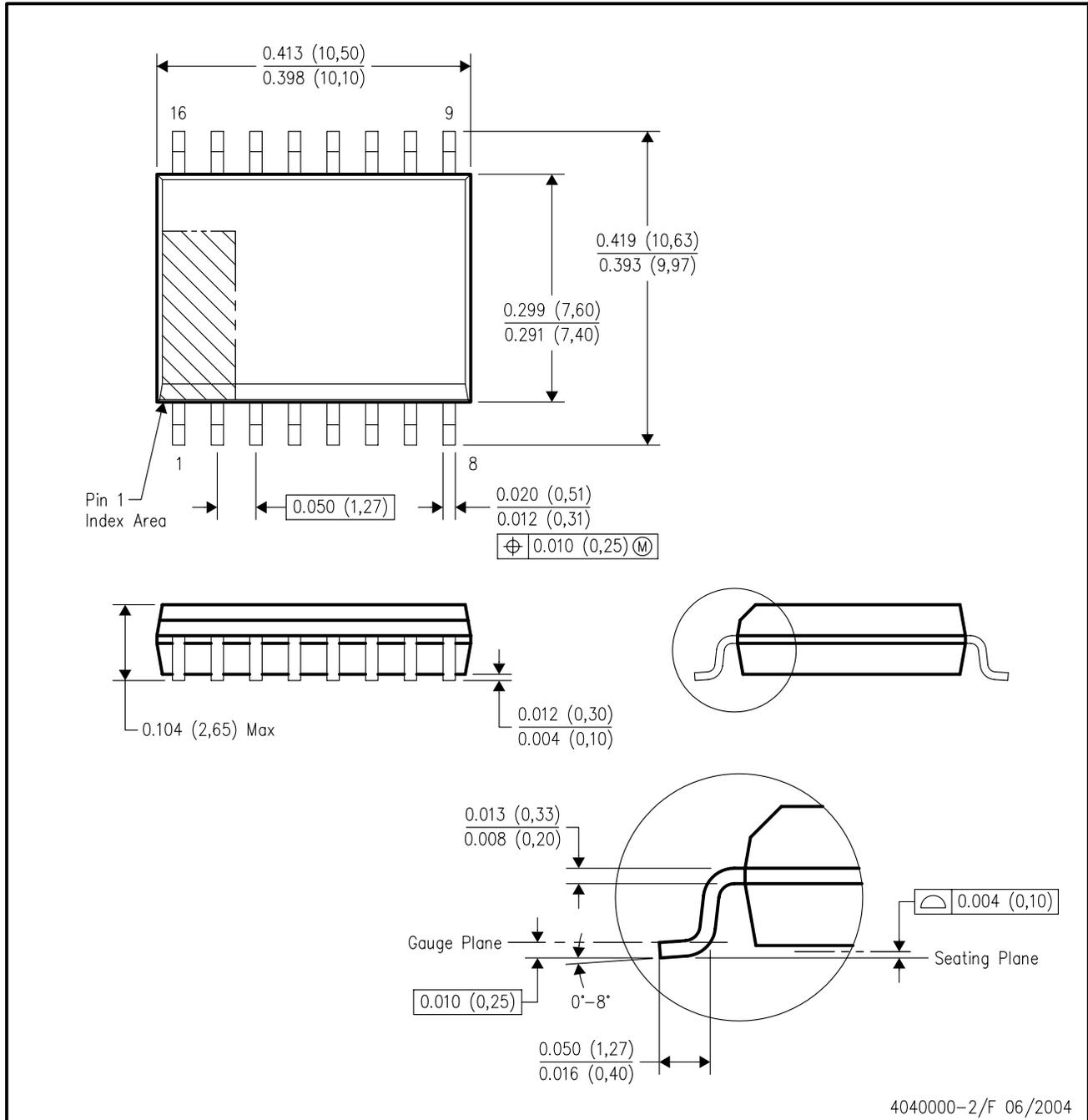
- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-001

For the latest package information, go to http://www.ti.com/sc/docs/package/pkg_info.htm



DW (R-PDSO-G16)

PLASTIC SMALL-OUTLINE PACKAGE

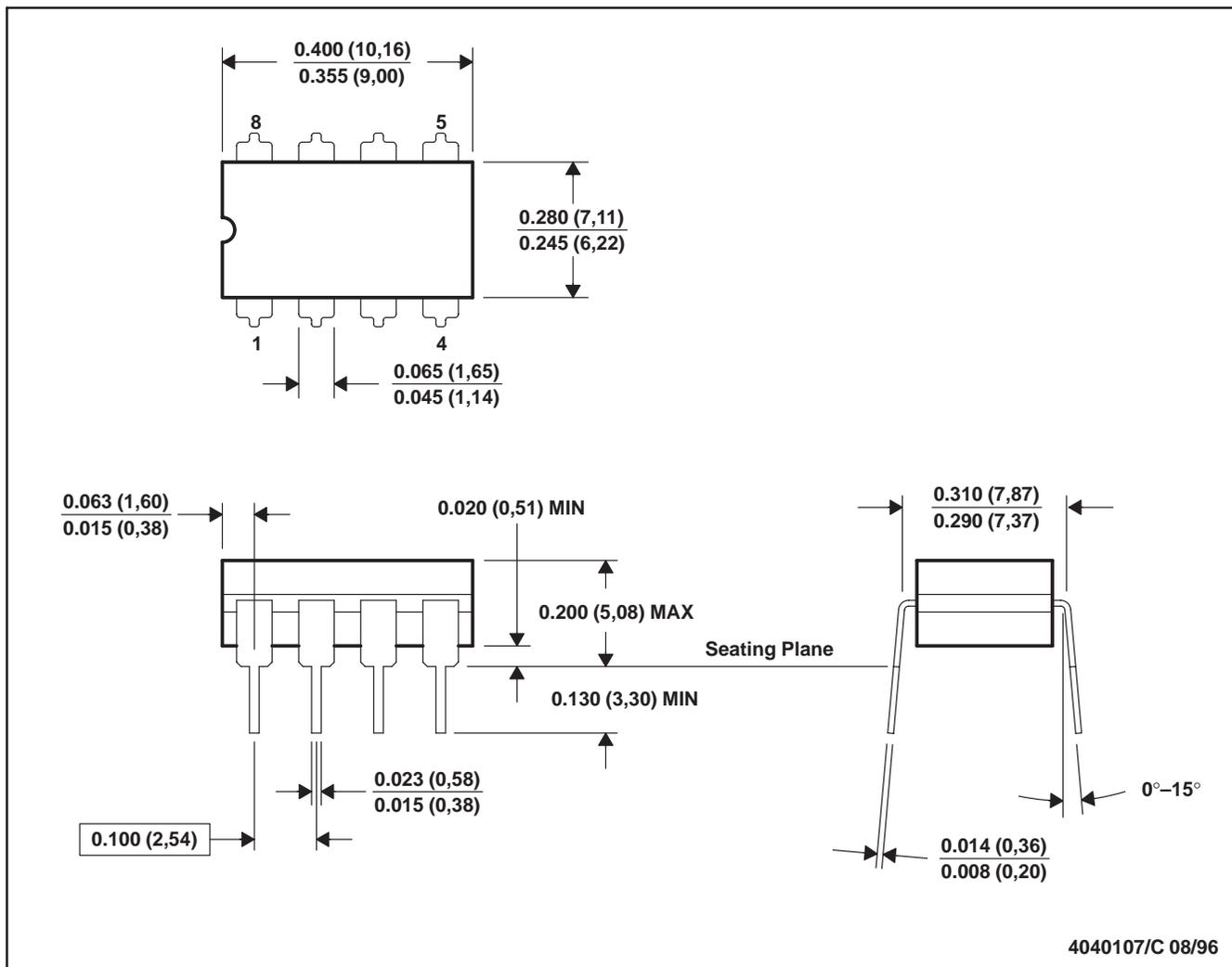


4040000-2/F 06/2004

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-013 variation AA.

JG (R-GDIP-T8)

CERAMIC DUAL-IN-LINE



4040107/C 08/96

- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. This package can be hermetically sealed with a ceramic lid using glass frit.
 D. Index point is provided on cap for terminal identification.
 E. Falls within MIL STD 1835 GDIP1-T8

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

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