

## FEATURES

- Generates + and – from Single Input
- Up to  $\pm 18\text{V}$  Output
- Only Needs Four  $1\mu\text{F}$  Capacitors
- No Inductors
- 10mA Output Current Minimum
- Operates Down to 4V
- No Latchup
- 8-Pin Minidip

## APPLICATIONS

- Line Drivers
- Op Amp Suppliers
- Battery Splitters
- RS232 Power

## DESCRIPTION

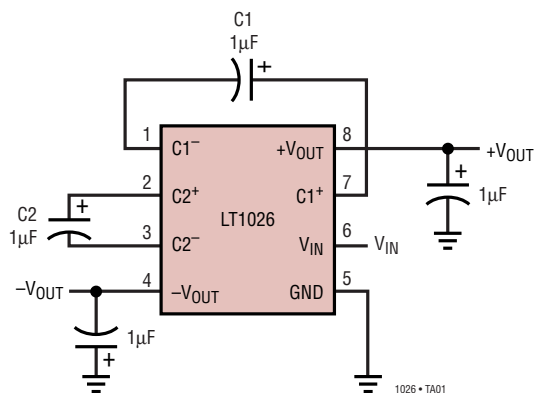
The LT<sup>®</sup>1026 is a switched capacitor voltage doubler and inverter on a single monolithic die. Capable of operating from a 4V to 10V input, it provides  $\pm 7\text{V}$  to  $\pm 18\text{V}$  output. Output currents of over 10mA are available. Two charge pumps first double the input voltage then invert the doubled voltage. Manufactured in bipolar technology, the LT1026 is not susceptible to latchup and generates up to 36V.

The LT1026 offers a convenient way of generating additional system voltages without using inductors. Powering interface circuits, op amps or data acquisition circuitry off logic supplies is simplified.

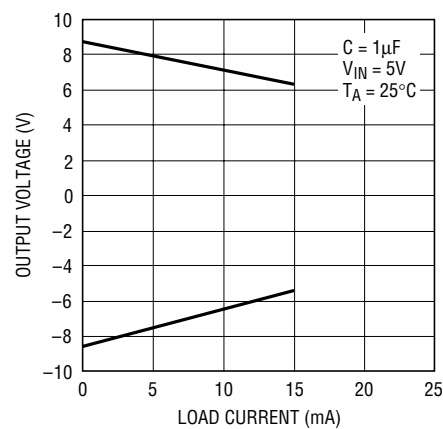
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## TYPICAL APPLICATION

**Voltage Doubler and Inverter**



**Output Voltage**



## ABSOLUTE MAXIMUM RATINGS (Note 1)

|                              |        |                                            |                |
|------------------------------|--------|--------------------------------------------|----------------|
| Supply Voltage .....         | 10V    | Operating Temperature Range                |                |
| $V^+$ .....                  | 20V    | LT1026C .....                              | 0°C to 70°C    |
| $V^-$ .....                  | -20V   | LT1026I .....                              | -40°C to 85°C  |
| Short-Circuit Duration ..... | 10 sec | LT1026M (OBSOLETE) .....                   | -55°C to 125°C |
|                              |        | Lead Temperature (Soldering, 10 sec) ..... | 300°C          |

## PACKAGE/ORDER INFORMATION

|                                                                                                                                                                        |                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                |                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <div><p>TOP VIEW</p><p>H PACKAGE<br/>8-LEAD TO-5 METAL CAN<br/><math>T_{JMAX} = 150^{\circ}\text{C}</math>, <math>\theta_{JA} = 150^{\circ}\text{C/W}</math></p></div> | <div><p>TOP VIEW</p><p>J8 PACKAGE<br/>8-LEAD CERDIP<br/><math>T_{JMAX} = 150^{\circ}\text{C}</math>, <math>\theta_{JA} = 150^{\circ}\text{C/W}</math></p></div> | <div><p>TOP VIEW</p><p>N8 PACKAGE<br/>8-LEAD PDIP<br/>S8 PACKAGE<br/>8-LEAD PLASTIC SO<br/><math>T_{JMAX} = 150^{\circ}\text{C}</math>, <math>\theta_{JA} = 100^{\circ}\text{C/W}</math> (N8)<br/><math>T_{JMAX} = 150^{\circ}\text{C}</math>, <math>\theta_{JA} = 150^{\circ}\text{C/W}</math> (S8)</p></div> |                    |
| ORDER PART<br>NUMBER                                                                                                                                                   | ORDER PART<br>NUMBER                                                                                                                                            | ORDER PART<br>NUMBER                                                                                                                                                                                                                                                                                           | S8 PART<br>MARKING |
| LT1026CH<br>LT1026MH                                                                                                                                                   | LT1026CJ8<br>LT1026MJ8                                                                                                                                          | LT1026CN8<br>LT1026CS8<br>LT1026IS8                                                                                                                                                                                                                                                                            | 1026<br>1026I      |
| <div><p><b>OBSOLETE PACKAGES</b></p><p>Consider the N8 or S8 Packages for Alternate Source</p></div>                                                                   |                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                |                    |

Consult LTC Marketing for parts specified with wider operating temperature ranges.

## ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at  $T_A = 25^{\circ}\text{C}$ .

| PARAMETERS     | CONDITIONS                       |                                   |          |   | MIN    | TYP    | MAX | UNITS |
|----------------|----------------------------------|-----------------------------------|----------|---|--------|--------|-----|-------|
| Output Voltage | $V_{IN} = 4\text{V}$<br>(Note 2) | $I_L = 0\text{mA}$                | Positive | ● | 6.5    | 7      |     | V     |
|                |                                  | $I_L = 0\text{mA}$                | Negative | ● | -6     | -6.7   |     | V     |
|                |                                  | $I_L = 10\text{mA}$               | Positive | ● | 5.25   | 5.7    |     | V     |
|                |                                  | $I_L = -10\text{mA}$              | Negative | ● | -4.5   | -5     |     | V     |
|                | $V_{IN} = 5\text{V}$             | $I_L = 15\text{mA}$               | Positive | ● | 6.25   | 7      |     | V     |
|                |                                  | $I_L = -15\text{mA}$              | Negative | ● | -5.5   | -6.2   |     | V     |
|                | $V_{IN} = 10\text{V}$            | $I_L = 0\text{mA}$                | Positive | ● | 18     | 18.5   |     | V     |
|                |                                  | $I_L = 0\text{mA}$                | Negative | ● | -17.7  | -18    |     | V     |
|                |                                  | $I_L = 10\text{mA}$               | Positive | ● | 16     | 17.6   |     | V     |
|                |                                  | $I_L = -10\text{mA}$              | Negative | ● | -15.3  | -17    |     | V     |
|                |                                  | $I_L = 15\text{mA}$               | Positive | ● | 15.25  | 17     |     | V     |
|                |                                  | $I_L = -15\text{mA}$              | Negative | ● | -14.5  | -16.5  |     | V     |
|                | $V_{IN} = 5\text{V}$             | $I_L = 10\text{mA}, -10\text{mA}$ | Positive | ● | 6.25   | 7.2    |     | V     |
|                |                                  |                                   | Negative | ● | -5.5   | -6.5   |     | V     |
|                | $V_{IN} = 10\text{V}$            | $I_L = 10\text{mA}, -10\text{mA}$ | Positive | ● | 15     | 16.8   |     | V     |
|                |                                  |                                   | Negative | ● | -14.25 | -15.75 |     | V     |

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# ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at  $T_A = 25^\circ\text{C}$ .

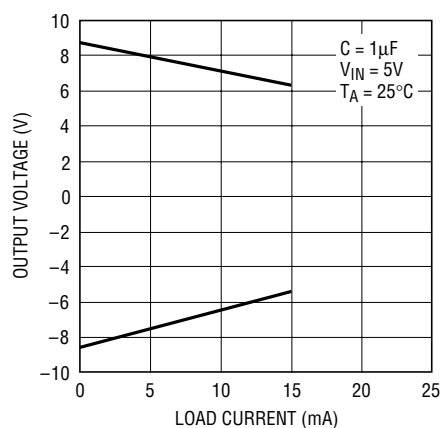
| PARAMETERS     | CONDITIONS                                 | MIN | TYP | MAX  | UNITS |
|----------------|--------------------------------------------|-----|-----|------|-------|
| Supply Current | $V_{IN} = 4\text{V}$ $I_L = 0\text{mA}$ ●  |     | 7   | 12.5 | mA    |
|                | $V_{IN} = 10\text{V}$ $I_L = 0\text{mA}$ ● |     | 15  | 30   | mA    |

**Note 1:** Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

**Note 2:**  $V_{IN\text{ min}} = -4.5$  for  $T_A \leq 40^\circ\text{C}$

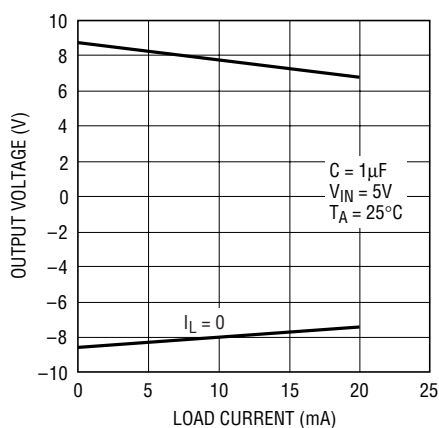
## TYPICAL PERFORMANCE CHARACTERISTICS

**Load Regulation (Both Outputs Loaded)**



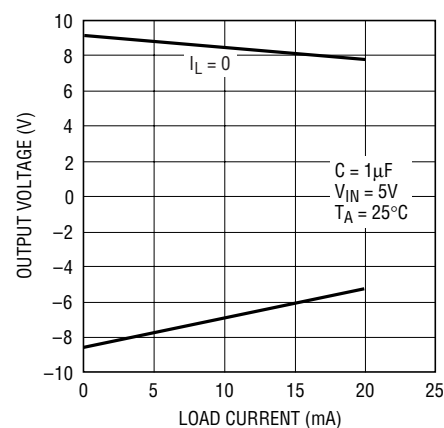
LT1026 • TPC01

**Load Regulation for Positive Loading**



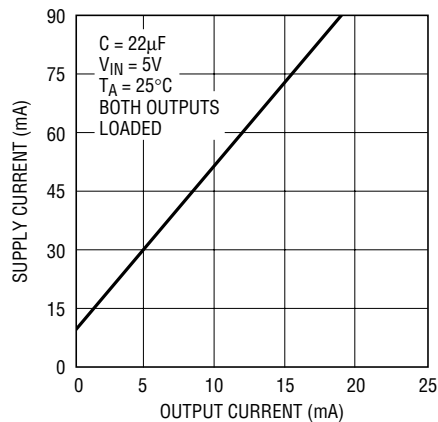
LT1026 • TPC02

**Load Regulation for Negative Loading**



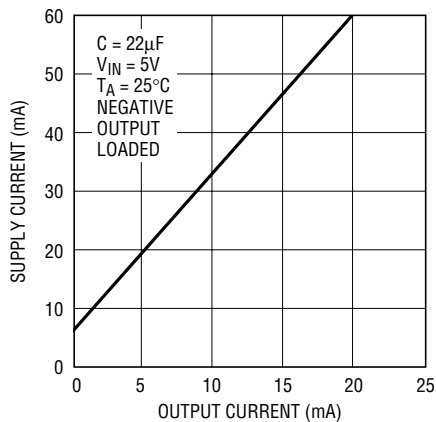
LT1026 • TPC03

**Supply Current**



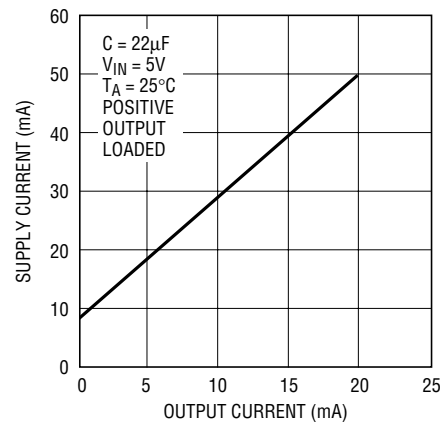
LT1026 • TPC04

**Supply Current**



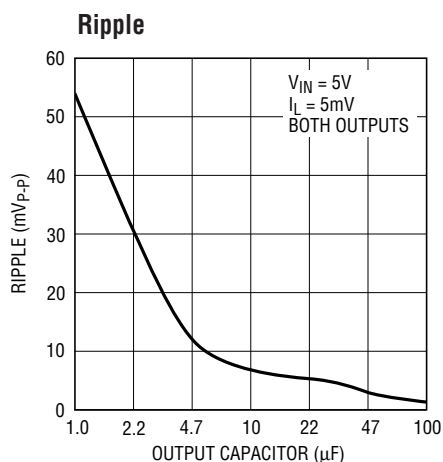
LT1026 • TPC05

**Supply Current**

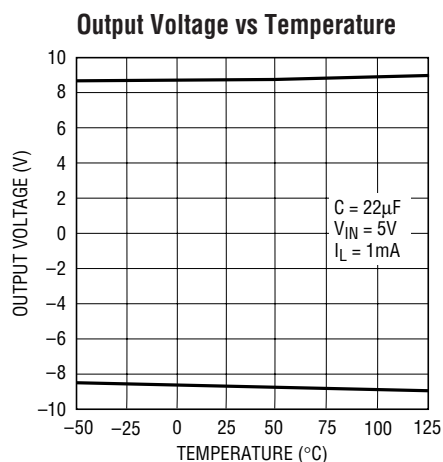


LT1026 • TPC06

## TYPICAL PERFORMANCE CHARACTERISTICS



1026 • TPC07



LT1026 • TPC08

## APPLICATIONS INFORMATION

The LT1026 is a nonregulating voltage converter that converts a single input voltage into both a positive and negative output at up to 15mA. A positive input voltage is first doubled and then the doubled voltage is inverted. The voltage output level is dependent on both the input voltage and the output loading. The total output current available depends on the individual loading of the outputs since loading on one output affects the load and the voltage of the other.

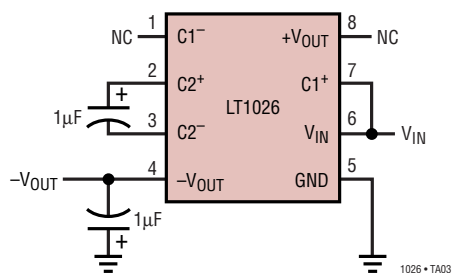
Only four external components are needed for operation. Two charge pump capacitors and two output storage capacitors. Nominal value for these capacitors is 1μF, but the LT1026 will operate (with reduced performance) down to 0.1μF. Higher value capacitors (22μF) will reduce ripple and slightly lower output impedance. For higher output currents the outputs of several converters may be paralleled with common output capacitors.

The substrate diodes are an inherent part of the IC, and must always be reversed biased to isolate the individual transistors. In the LT1026 the substrate is tied to the negative output. If the negative output is not used, such as when only the voltage doubler output is needed,  $-V_{OUT}$  must be tied to ground so the substrate diodes are properly biased. The substrate diodes must never become forward biased even during overload conditions. For example, pulling  $-V_{OUT}$  positive with respect to ground can forward bias the substrate diodes. Clamping the substrate to ground with an external diode would be needed to ensure proper operation and prevent the substrate from carrying any current.

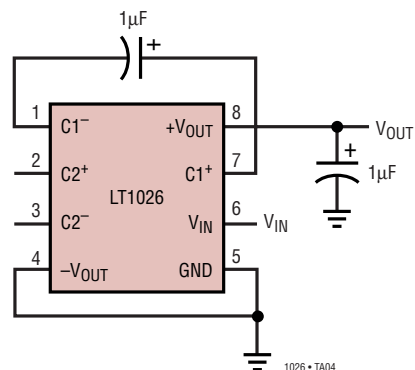
No overload protection is included on the LT1026. Neither output is damaged by momentary shorts, but during sustained shorts the resulting high current flow will overheat the IC.

# TYPICAL APPLICATIONS

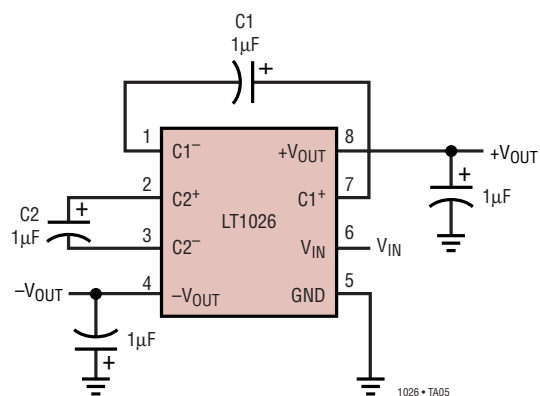
Positive to Negative Converter



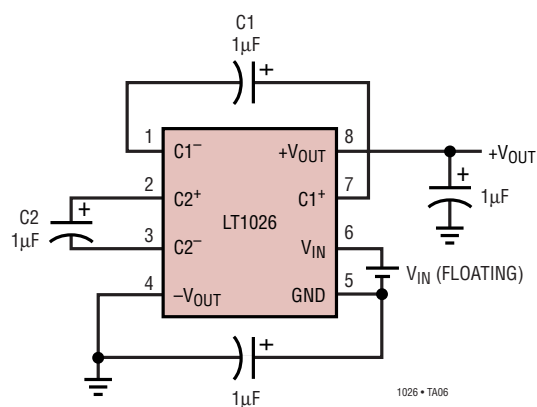
Voltage Doubler



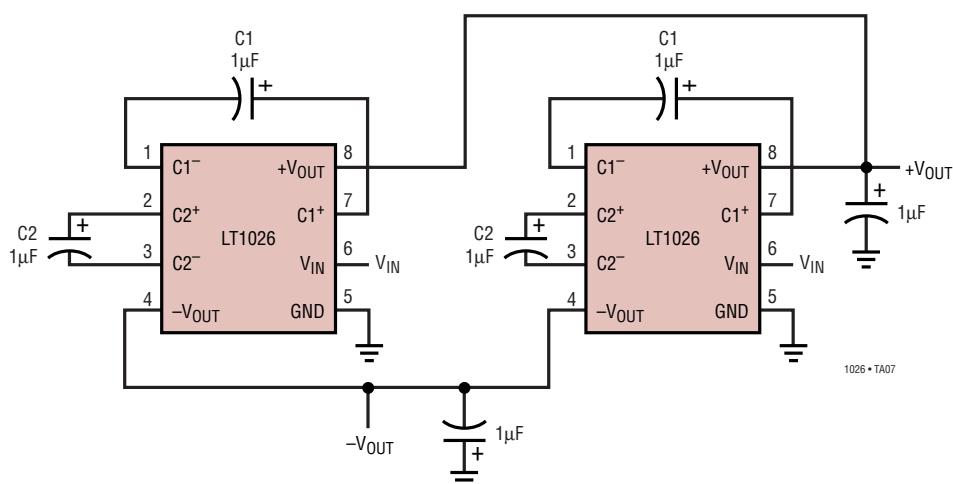
Standard Configuration Voltage Doubler and Inverter



Voltage Quadrupler

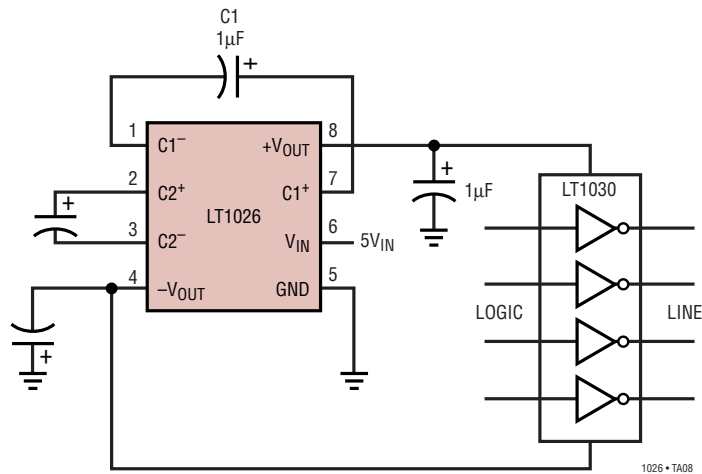


Parallel Converters for Higher Output Current and Lower Output Impedance



## TYPICAL APPLICATIONS

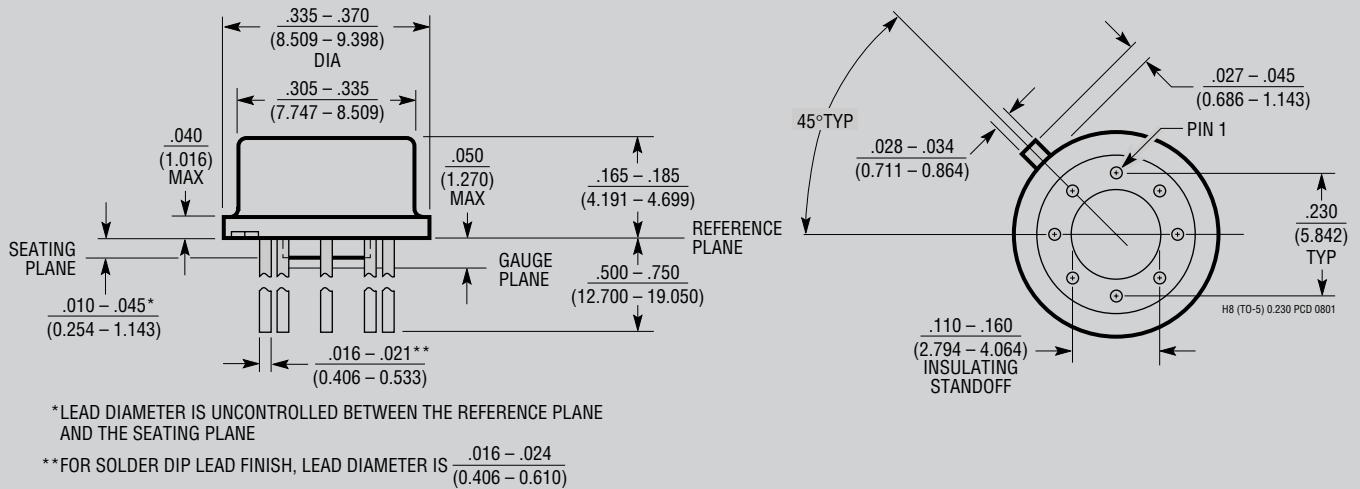
5V Powered RS232 Line Driver



1026 • TA08

## PACKAGE DESCRIPTION

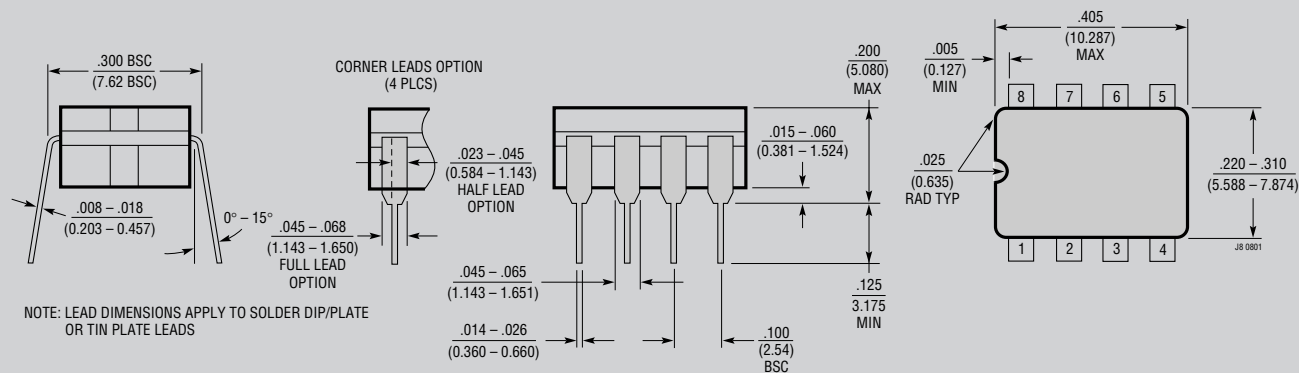
**H Package**  
**8-Lead TO-5 Metal Can (.230 Inch PCD)**  
 (Reference LTC DWG # 05-08-1321)



**OBSOLETE PACKAGE**

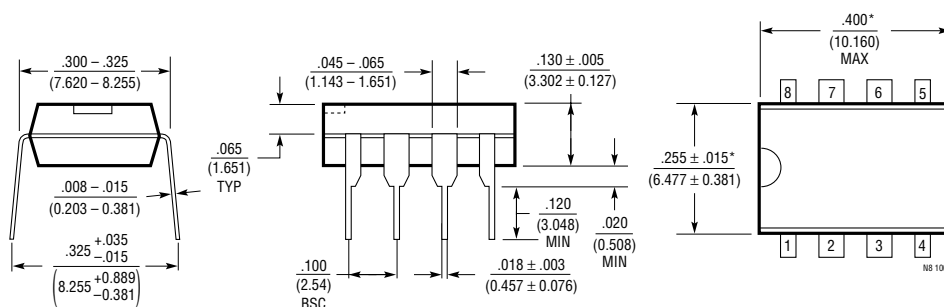
## PACKAGE DESCRIPTION

### J8 Package 8-Lead Cerdip (Narrow .300 Inch, Hermetic) (Reference LTC DWG # 05-08-1110)



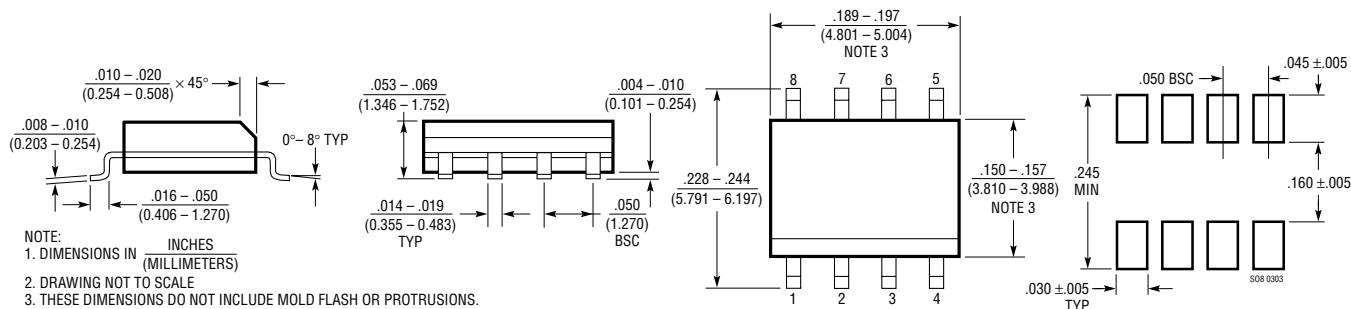
## OBSOLETE PACKAGE

### N8 Package 8-Lead PDIP (Narrow .300 Inch) (Reference LTC DWG # 05-08-1510)



NOTE:  
1. DIMENSIONS ARE IN INCHES  
MILLIMETERS  
\*THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.  
MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010 INCH (0.254mm)

### S8 Package 8-Lead Plastic Small Outline (Narrow 0.150) (LTC DWG # 05-08-1610)



RECOMMENDED SOLDER PAD LAYOUT

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