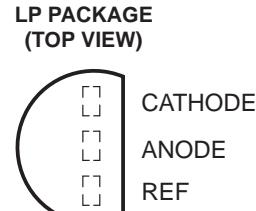


- Temperature Compensated
- Programmable Output Voltage
- Low Output Resistance
- Low Output Noise
- Sink Capability up to 100 mA



### description/ordering information

The TL430 is a 3-terminal adjustable shunt regulator, featuring excellent temperature stability, wide operating current range, and low output noise. The output voltage can be set by two external resistors to any desired value between 3 V and 30 V. The TL430 can replace Zener diodes in many applications, providing improved performance.

The TL430C is characterized for operation from 0°C to 70°C.

### ORDERING INFORMATION

| TA          | PACKAGE <sup>†</sup> | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|-------------|----------------------|-----------------------|------------------|
| 0°C to 70°C | TO-226 / TO-92 (LP)  | Bulk of 1000          | TL430CLP         |
|             |                      | Reel of 2000          | TL430CLPR        |

<sup>†</sup> Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

### symbol



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.

# TL430

## ADJUSTABLE SHUNT REGULATORS

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### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

|  |                |
|--|----------------|
| Regulator voltage (see Note 1) .....                               | 30 V           |
| Continuous regulator current .....                                 | 150 mA         |
| Package thermal impedance, $\theta_{JA}$ (see Notes 2 and 3) ..... | 140°C/W        |
| Operating virtual junction temperature, $T_J$ .....                | 150°C          |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds ..... | 260°C          |
| Storage temperature range, $T_{stg}$ .....                         | -65°C to 150°C |

<sup>†</sup> Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values are with respect to the anode terminal.

- Maximum power dissipation is a function of  $T_J(max)$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_J(max) - T_A)/\theta_{JA}$ . Operating at the absolute maximum  $T_J$  of 150°C can impact reliability.
- The package thermal impedance is calculated in accordance with JESD 51-7.

### recommended operating conditions

|       |                                      | MIN       | MAX | UNIT  |
|-------|--------------------------------------|-----------|-----|-------|
| $V_Z$ | Regulator voltage                    | $V_{ref}$ | 30  | V     |
| $I_Z$ | Regulator current                    | 2         | 100 | mA    |
| $T_A$ | Operating free-air temperature range | TL430C    | 0   | 70 °C |

### electrical characteristics over recommended operating conditions, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

| PARAMETER                  | TEST FIGURE  | TEST CONDITIONS | TL430C  |                      |      | UNIT |        |
|----------------------------|--|-----------------|---|----------------------|------|------|--------|
|                            |  |                 | MIN   | TYP                  | MAX  |      |        |
| $V_{I(\text{ref})}$        | Reference input voltage                                | 1               | $V_Z = V_{I(\text{ref})}$ , $I_Z = 10 \text{ mA}$   | 2.5                  | 2.75 | 3    | V      |
| $\alpha V_{I(\text{ref})}$ | Temperature coefficient of reference input voltage     | 1               | $V_Z = V_{I(\text{ref})}$ , $I_Z = 10 \text{ mA}$ , $T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$ | 120                  |      |      | ppm/°C |
| $I_{I(\text{ref})}$        | Reference input current                                | 2               | $I_Z = 10 \text{ mA}$ , $R1 = 10 \text{ k}\Omega$ , $R2 = \infty$                                 | 3                    | 10   |      | μA     |
| $I_{ZK}$                   | Regulator current near lower knee of regulation range  | 1               | $V_Z = V_{I(\text{ref})}$   | 0.5                  | 2    |      | mA     |
| $I_{ZK}$                   | Regulator current at maximum limit of regulation range | 1               | $V_Z = V_{I(\text{ref})}$   | 50                   |      |      | mA     |
|                            |  | 2               | $V_Z = 5 \text{ V}$ to $30 \text{ V}$ , See Note 4  | 100                  |      |      |        |
| $r_Z$                      | Differential regulator resistance (see Note 5)         | 1               | $V_Z = V_{I(\text{ref})}$ , $\Delta I_Z = (52 - 2) \text{ mA}$                                    | 1.5                  | 3    |      | Ω      |
| $V_n$                      | Noise voltage  | 2               | $f = 0.1 \text{ Hz}$ to $10 \text{ Hz}$   | $V_Z = 3 \text{ V}$  | 50   |      | μV     |
|                            |  |                 |   | $V_Z = 12 \text{ V}$ | 200  |      |        |
|                            |  |                 |   | $V_Z = 30 \text{ V}$ | 650  |      |        |

NOTES: 4. The average power dissipation,  $V_Z \cdot I_Z \cdot$  duty cycle, must not exceed the maximum continuous rating in any 10-ms interval.  
 5. The regulator resistance for  $V_Z > V_{I(\text{ref})}$ ,  $r_Z'$ , is given by:

$$r_Z' = r_Z \left( 1 + \frac{R1}{R2} \right)$$

PARAMETER MEASUREMENT INFORMATION

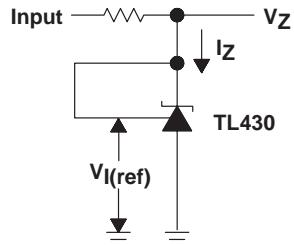


Figure 1. Test Circuit for  $V_Z = V_{I(\text{ref})}$

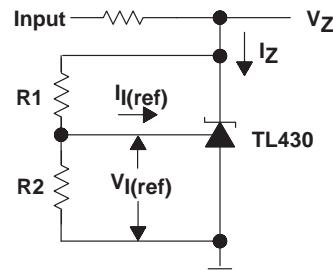


Figure 2. Test Circuit for  $V_Z > V_{I(\text{ref})}$

# TL430 ADJUSTABLE SHUNT REGULATORS

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## TYPICAL CHARACTERISTICS

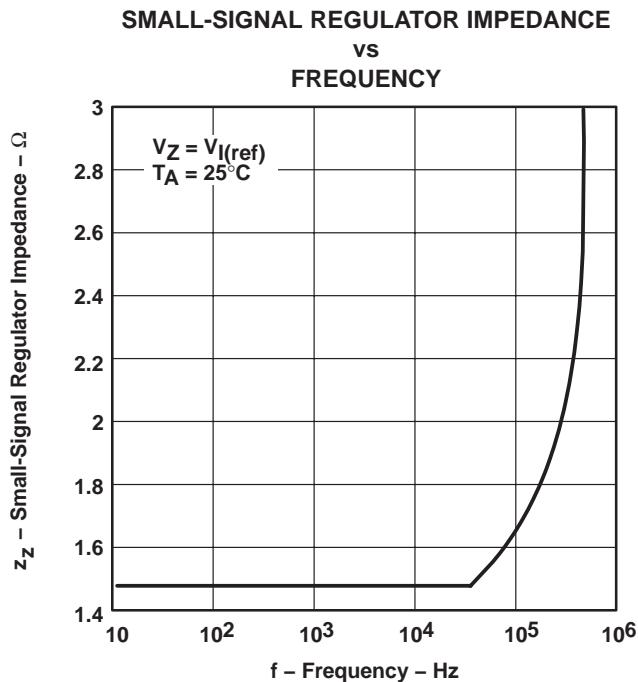


Figure 3

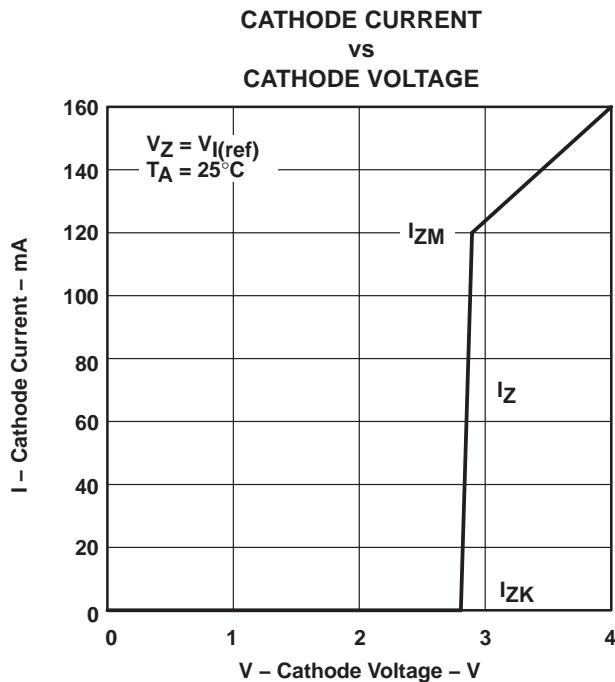


Figure 4

## APPLICATION INFORMATION

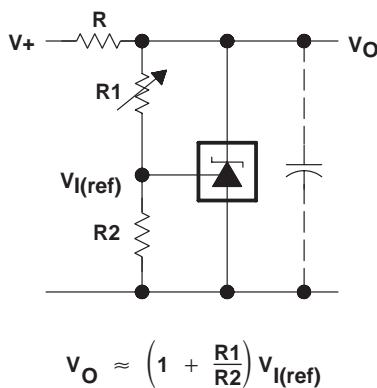


Figure 5. Shunt Regulator

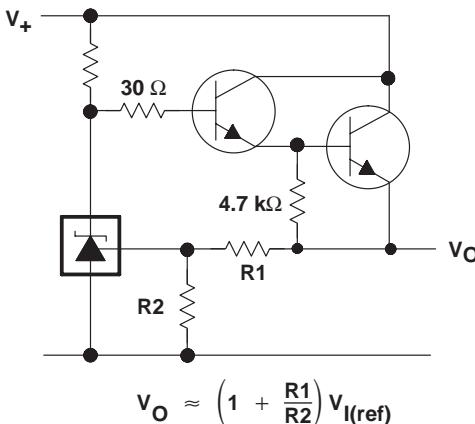


Figure 6. Series Regulator

APPLICATION INFORMATION

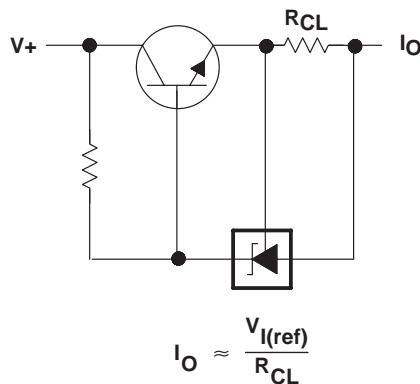


Figure 7. Current Limiter

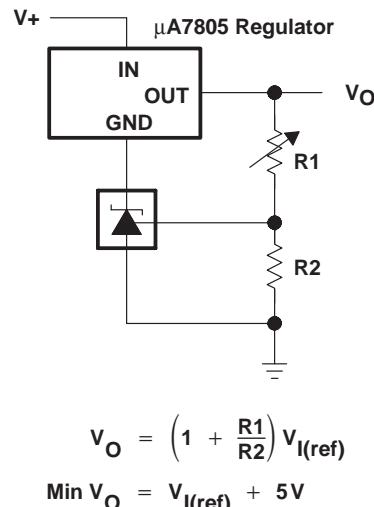


Figure 8. Output Control of a 3-Terminal Fixed Regulator

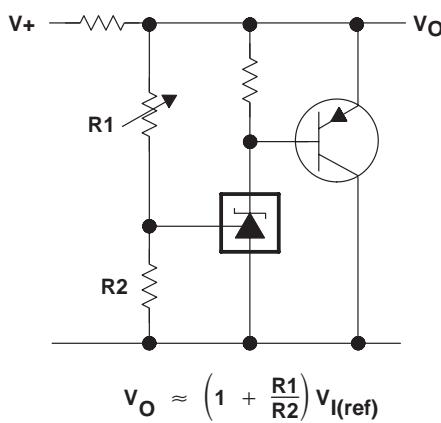


Figure 9. Higher-Current Applications

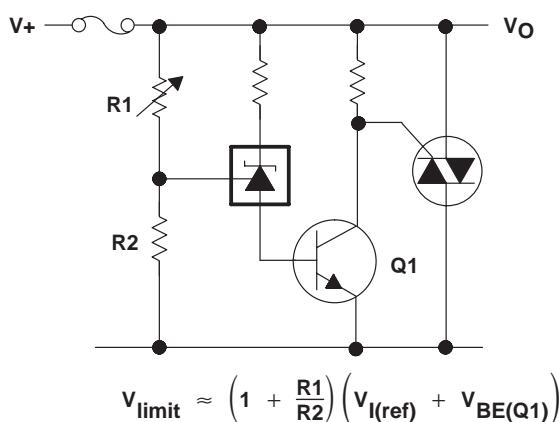


Figure 10. Crowbar

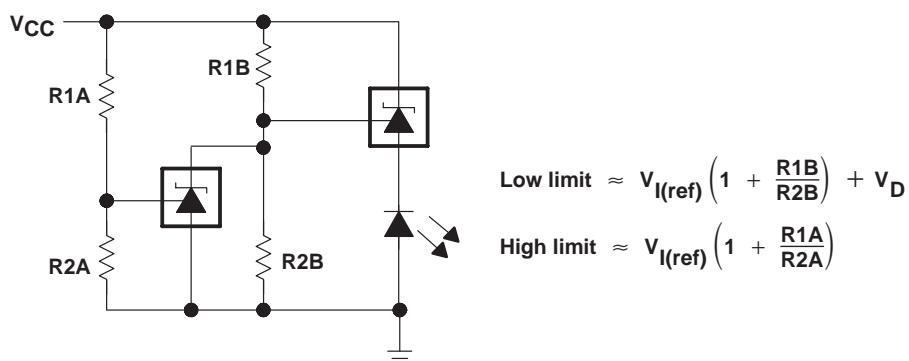


Figure 11. V<sub>CC</sub> Monitor

**PACKAGING INFORMATION**

| Orderable part number | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|-----------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| TL430CLP              | Active        | Production           | TO-92 (LP)   3 | 1000   BULK           | Yes         | SN                                   | N/A for Pkg Type                  | 0 to 70      | TL430C              |
| TL430CLP.A            | Active        | Production           | TO-92 (LP)   3 | 1000   BULK           | Yes         | SN                                   | N/A for Pkg Type                  | 0 to 70      | TL430C              |

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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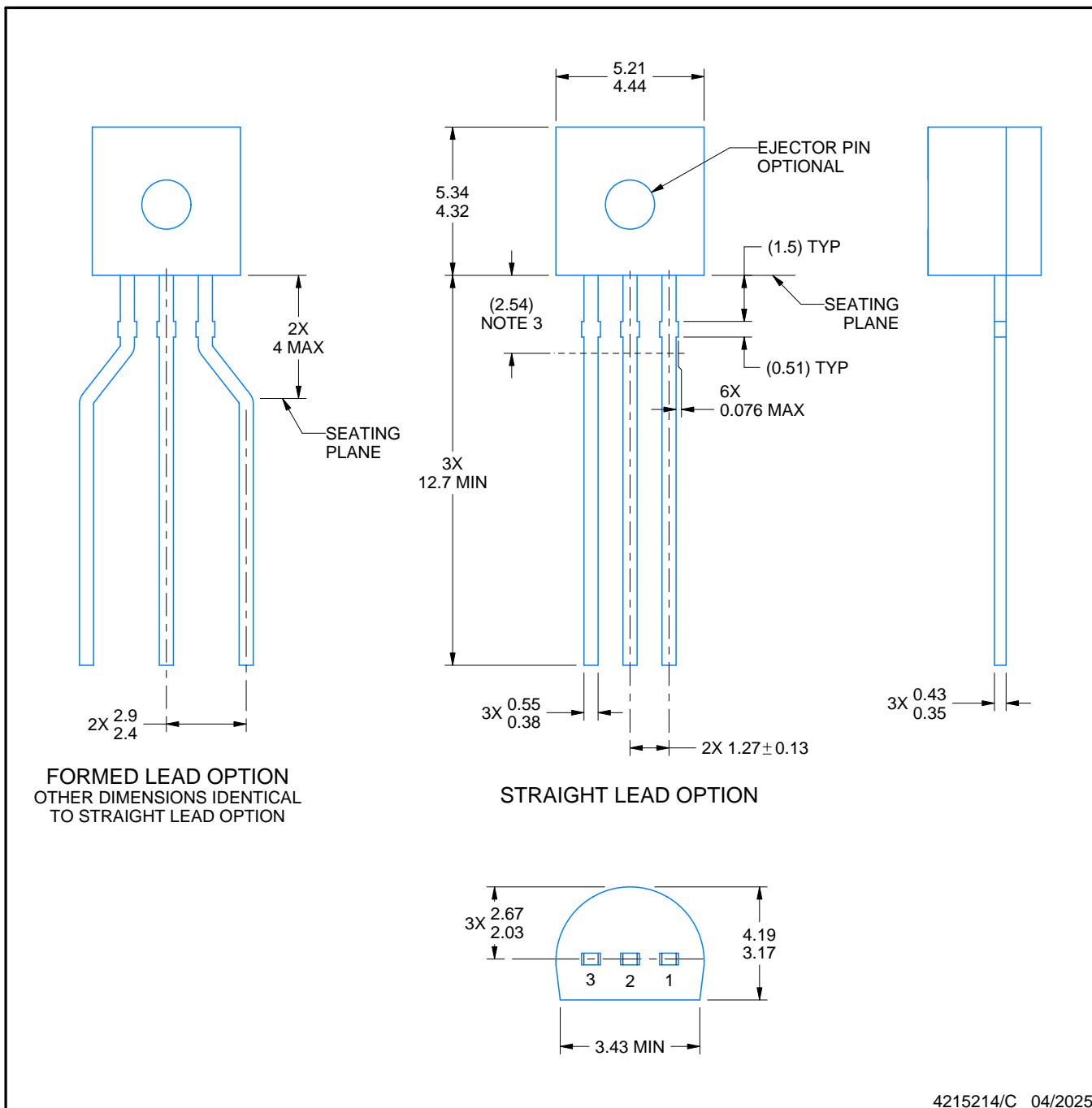
# PACKAGE OUTLINE

LP0003A



TO-92 - 5.34 mm max height

TO-92



4215214/C 04/2025

## NOTES:

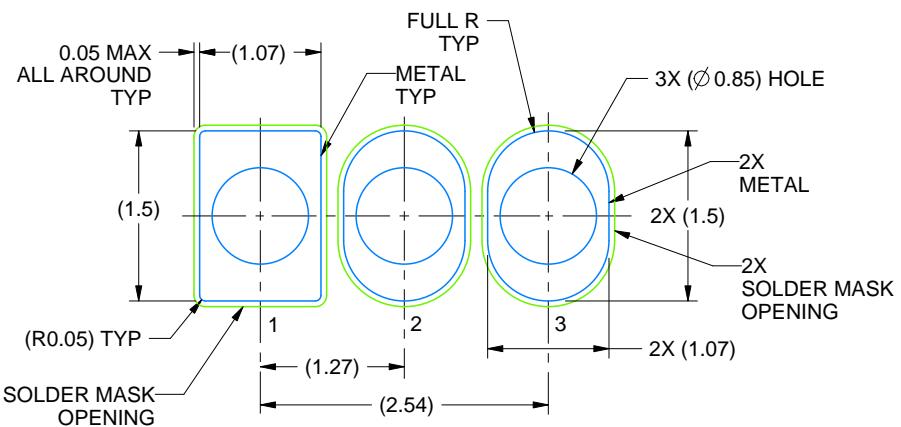
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Lead dimensions are not controlled within this area.
4. Reference JEDEC TO-226, variation AA.
5. Shipping method:
  - a. Straight lead option available in bulk pack only.
  - b. Formed lead option available in tape and reel or ammo pack.
  - c. Specific products can be offered in limited combinations of shipping medium and lead options.
  - d. Consult product folder for more information on available options.

# EXAMPLE BOARD LAYOUT

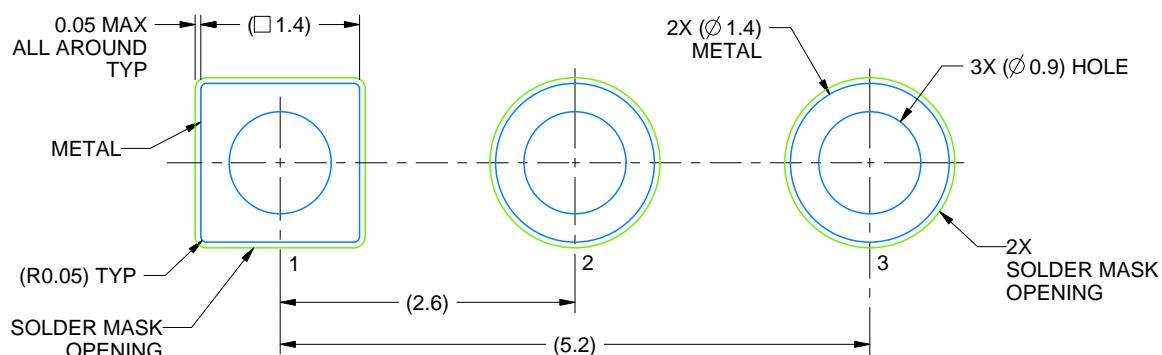
LP0003A

TO-92 - 5.34 mm max height

TO-92



LAND PATTERN EXAMPLE  
STRAIGHT LEAD OPTION  
NON-SOLDER MASK DEFINED  
SCALE:15X



LAND PATTERN EXAMPLE  
FORMED LEAD OPTION  
NON-SOLDER MASK DEFINED  
SCALE:15X

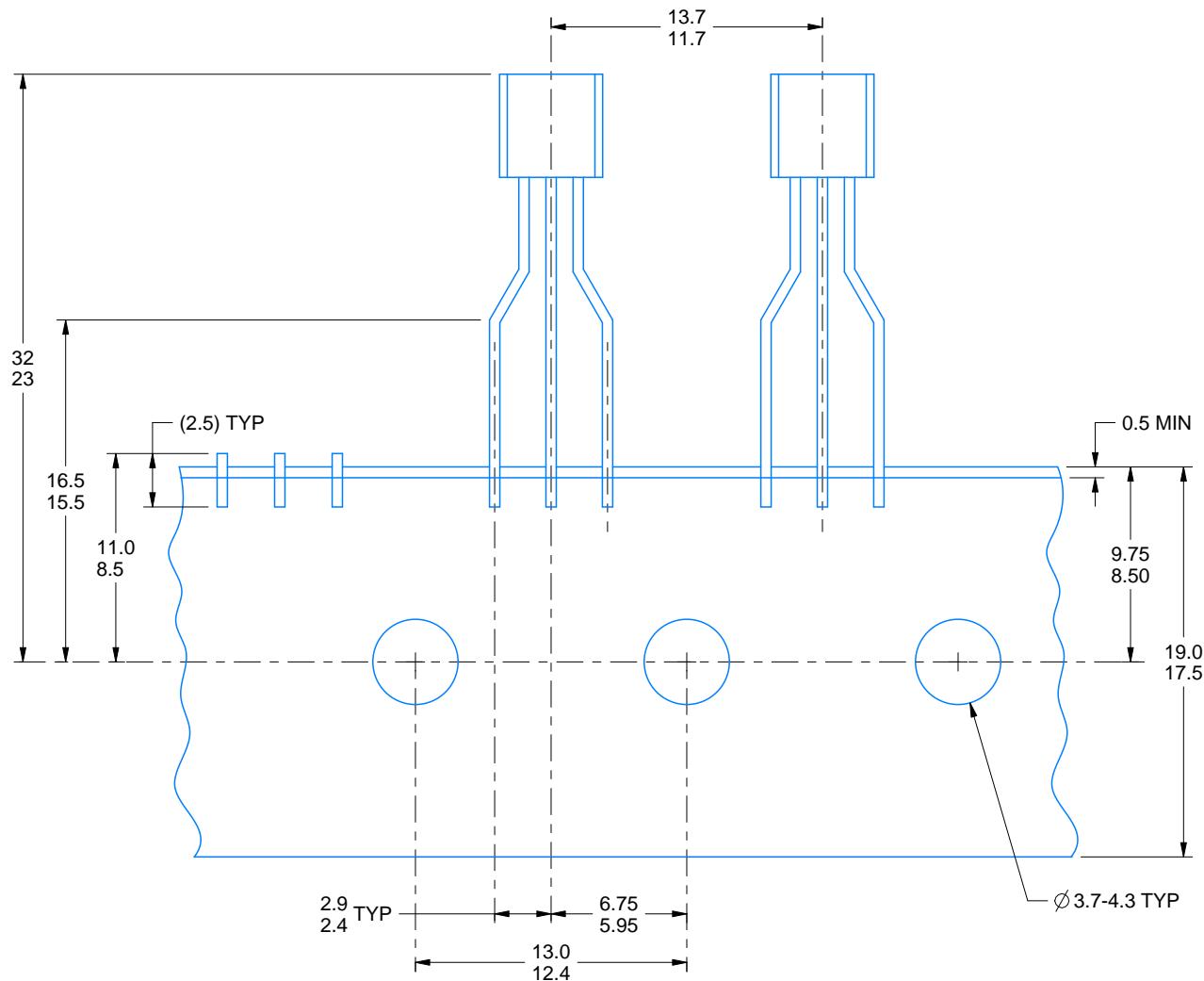
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# TAPE SPECIFICATIONS

LP0003A

TO-92 - 5.34 mm max height

TO-92



FOR FORMED LEAD OPTION PACKAGE

4215214/C 04/2025

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