

# GERMANIUM POWER TRANSISTORS

| Type<br>Number | Case<br>Type | $V_{CBO}$<br>V | $V_{CEO}$<br>V | $V_{EBO}$<br>V | $V_{CER}$<br>V | $V_{CES}$<br>V | CURRENT GAIN |                  |                       | SATURATION VOLTAGES |                  |                    |                        |
|----------------|--------------|----------------|----------------|----------------|----------------|----------------|--------------|------------------|-----------------------|---------------------|------------------|--------------------|------------------------|
|                |              |                |                |                |                |                | Min.         | $h_{FE}$<br>Max. | $V_{CE} @ I_C$<br>V A | $V_{CE(s)}$<br>V    | $V_{BE(s)}$<br>V | $I_C @ I_B$<br>A A | $\theta_{J-C}$<br>°C/W |

## 10 AMP GERMANIUM PNP (Cont.)

|         |        |     |     |      |     |    |    |     |     |      |      |      |      |       |      |
|---------|--------|-----|-----|------|-----|----|----|-----|-----|------|------|------|------|-------|------|
| 2N629   | TO-3   | 80  |     | 40.0 |     | 60 | 10 | 30  | 2.0 | 10.0 | 1.00 |      | 10.0 | 1.000 | .80  |
| 2N630   | TO-3   | 100 |     | 50.0 |     | 75 | 10 | 30  | 2.0 | 10.0 | 1.00 |      | 10.0 | 1.000 | .80  |
| 2N1073  | TO-3   | 40  |     | .8   | 40  |    | 20 | 60  | 2.0 | 5.0  | 1.00 |      | 5.0  | .500  | 1.20 |
| 2N1073A | TO-3   | 80  |     | .8   | 80  |    | 20 | 60  | 2.0 | 5.0  | 1.00 |      | 5.0  | .500  | 1.20 |
| 2N1073B | TO-3   | 120 |     | .8   | 120 |    | 20 | 60  | 2.0 | 5.0  | 1.00 |      | 5.0  | .500  | 1.20 |
| 2N1430  | TO-41* | 120 | 100 | 1.0  |     |    | 30 | 120 | 2.0 | 5.0  | .40  | .90  | 10.0 | 1.000 | 1.20 |
| 2N2212  | TO-41* | 120 | 60  | 1.5  | 120 |    | 50 | 120 | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | .80  |
| 2N2288  | TO-3   | 40  | 30  | .8   | 40  |    | 20 | 60  | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | 1.20 |
| 2N2289  | TO-3   | 80  | 50  | .8   | 80  |    | 20 | 60  | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | 1.20 |
| 2N2290  | TO-3   | 120 | 70  | .8   | 120 |    | 20 | 60  | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | 1.20 |
| 2N2291  | TO-3   | 40  | 30  | .8   | 40  |    | 50 | 120 | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | 1.20 |
| 2N2292  | TO-3   | 80  | 50  | .8   | 80  |    | 50 | 120 | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | 1.20 |
| 2N2293  | TO-3   | 120 | 70  | .8   | 120 |    | 50 | 120 | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | 1.20 |
| 2N2294  | TO-41* | 40  |     | .8   | 40  |    | 50 | 120 | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | 1.20 |
| 2N2295  | TO-41* | 80  |     | .8   | 80  |    | 50 | 120 | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | 1.20 |
| 2N2296  | TO-41* | 120 |     | .8   | 120 |    | 50 | 120 | 2.0 | 5.0  | 1.00 | 1.00 | 5.0  | .500  | 1.20 |
| 2N2444  | TO-3   | 80  | 80  | 1.0  |     |    | 75 | 120 | 2.0 | 3.0  | 1.00 | 1.50 | 5.0  | .500  | 1.00 |
| 2N2869  | TO-3   | 60  | 50  | 10.0 |     |    | 50 | 165 | 2.0 | 1.0  | .75  |      | 5.0  | .500  | 1.50 |
| 2N2870  | TO-3   | 80  | 50  | 10.0 |     |    | 50 | 165 | 2.0 | 1.0  | .50  |      | 5.0  | .500  | 1.50 |
| 2N5156  | TO-3   | 100 | 60  | 60.0 |     |    | 25 | 60  | 2.0 | 5.0  | 1.00 | 1.80 | 10.0 | 1.000 | .80  |

\*TO-3 with solder lugs

## 12 AMP GERMANIUM PNP

|        |       |    |    |      |  |    |    |    |     |     |     |  |      |       |      |
|--------|-------|----|----|------|--|----|----|----|-----|-----|-----|--|------|-------|------|
| 2N173  | TO-36 | 60 | 50 | 40.0 |  | 50 | 35 | 70 | 2.0 | 5.0 | .30 |  | 12.0 | 2.000 | 1.00 |
| 2N174A | TO-36 | 80 | 55 | 60.0 |  | 70 | 25 | 70 | 2.0 | 5.0 | .90 |  | 12.0 | 2.000 | .80  |
| 2N441  | TO-36 | 40 | 40 | 20.0 |  | 40 | 20 | 40 | 2.0 | 5.0 | .30 |  | 12.0 | 2.000 | 1.00 |
| 2N442  | TO-36 | 50 | 45 | 30.0 |  | 45 | 20 | 40 | 2.0 | 5.0 | .30 |  | 12.0 | 2.000 | 1.00 |
| 2N443  | TO-36 | 60 | 55 |      |  | 50 | 20 | 40 | 2.0 | 5.0 | .30 |  | 12.0 | 2.000 | 1.00 |

## 15 AMP GERMANIUM PNP

|         |       |     |    |      |  |    |    |     |     |      |      |  |      |       |      |
|---------|-------|-----|----|------|--|----|----|-----|-----|------|------|--|------|-------|------|
| 2N278   | TO-36 | 50  | 45 | 30.0 |  | 45 | 35 | 70  | 2.0 | 5.0  | .30  |  | 12.0 | 2.000 | 1.00 |
| 2N677   | TO-3  | 50  | 20 | 25.0 |  | 30 | 20 | 60  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N677A  | TO-3  | 60  | 30 | 25.0 |  | 40 | 20 | 60  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N677B  | TO-3  | 90  | 60 | 25.0 |  | 70 | 20 | 60  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N677C  | TO-3  | 100 | 70 | 25.0 |  | 80 | 20 | 60  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N678   | TO-3  | 50  | 20 | 25.0 |  | 30 | 50 | 100 | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N678A  | TO-3  | 60  | 30 | 25.0 |  | 40 | 50 | 100 | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N678B  | TO-3  | 90  | 60 | 25.0 |  | 70 | 50 | 100 | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N678C  | TO-3  | 100 | 70 | 25.0 |  | 80 | 50 | 100 | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1031  | TO-3  | 50  |    | 10.0 |  | 30 | 20 | 60  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1031A | TO-3  | 60  |    | 15.0 |  | 40 | 20 | 60  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1031B | TO-3  | 90  |    | 15.0 |  | 70 | 20 | 60  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1031C | TO-3  | 100 |    | 15.0 |  | 80 | 20 | 60  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1032  | TO-3  | 50  |    | 10.0 |  | 30 | 50 | 100 | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1032A | TO-3  | 60  |    | 15.0 |  | 40 | 50 | 100 | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1032B | TO-3  | 90  |    | 15.0 |  | 70 | 50 | 100 | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1032C | TO-3  | 100 |    | 15.0 |  | 80 | 50 | 100 | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1099  | TO-36 | 80  | 55 | 40.0 |  | 70 | 35 | 70  | 2.0 | 5.0  | .30  |  | 12.0 | 2.000 | .80  |
| 2N1100  | TO-36 | 100 | 65 | 80.0 |  | 80 | 25 | 50  | 2.0 | 5.0  | .30  |  | 12.0 | 2.000 | .80  |
| 2N1120  | TO-3  | 80  |    | 40.0 |  | 70 | 20 | 50  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | 1.50 |
| 2N1146  | TO-3  | 40  |    | 30.0 |  | 30 | 60 | 150 | 2.0 | 5.0  | 1.00 |  | 15.0 | 1.000 | .80  |
| 2N1146A | TO-3  | 60  |    | 30.0 |  | 40 | 60 | 150 | 2.0 | 5.0  | 1.00 |  | 4.0  | .200  | 2.50 |
| 2N1146B | TO-3  | 80  |    | 30.0 |  | 60 | 60 | 150 | 2.0 | 5.0  | 1.00 |  | 10.0 | 1.000 | 2.50 |
| 2N1146C | TO-3  | 100 |    | 30.0 |  | 75 | 60 | 150 | 2.0 | 5.0  | 1.00 |  | 15.0 | 1.000 | .80  |
| 2N1147  | TO-3  | 40  |    | 30.0 |  | 30 | 60 | 150 | 2.0 | 5.0  | 1.00 |  | 15.0 | 1.000 | .80  |
| 2N1147A | TO-3  | 60  |    | 30.0 |  | 40 | 60 | 150 | 2.0 | 5.0  | 1.00 |  | 15.0 | 1.000 | .80  |
| 2N1147B | TO-3  | 80  |    | 30.0 |  | 60 | 60 | 150 | 2.0 | 5.0  | 1.00 |  | 15.0 | 1.000 | .80  |
| 2N1147C | TO-3  | 100 |    | 30.0 |  | 75 | 60 | 150 | 2.0 | 5.0  | 1.00 |  | 15.0 | 1.000 | .80  |
| 2N1358  | TO-36 | 80  | 40 | 60.0 |  | 70 | 25 | 50  | 2.0 | 5.0  | .30  |  | 12.0 | 2.000 | .80  |
| 2N1412  | TO-36 | 100 | 65 | 60.0 |  | 80 | 25 | 50  | 2.0 | 5.0  | .70  |  | 12.0 | 2.000 | .80  |
| 2N1412A |       |     |    |      |  |    |    |     |     |      |      |  |      |       |      |
| 2N1549  | TO-3  | 40  |    | 20.0 |  | 30 | 10 | 30  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1549A | TO-3  | 40  |    | 20.0 |  | 30 | 10 | 30  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1550  | TO-3  | 60  |    | 30.0 |  | 45 | 10 | 30  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1550A | TO-3  | 60  |    | 30.0 |  | 45 | 10 | 30  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1551  | TO-3  | 80  |    | 40.0 |  | 60 | 10 | 30  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1551A | TO-3  | 80  |    | 40.0 |  | 60 | 10 | 30  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1552  | TO-3  | 100 |    | 50.0 |  | 75 | 10 | 30  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1552A | TO-3  | 100 |    | 50.0 |  | 75 | 10 | 30  | 2.0 | 10.0 | 1.00 |  | 10.0 | 1.000 | .80  |
| 2N1553  | TO-3  | 40  | 20 | 20.0 |  | 30 | 30 | 60  | 2.0 | 10.0 | .50  |  | 10.0 | 1.000 | .80  |

## CASE OUTLINE DRAWINGS & DIMENSIONS

Technical drawing of a mechanical part showing front and top views with dimensions.

**Front View Dimensions:**

- Top flange width: .335
- Top flange thickness: .370
- Top flange inner width: .205
- Top flange outer width: .335
- Top flange height: .260
- Top flange base height: .240
- Top flange base width: 1.50 MIN
- Top flange base thickness: .008
- Top flange base width: .125
- Top flange base thickness: .019
- Top flange base width: .016

**Top View Dimensions:**

- Top flange width: .200
- Top flange thickness: .100
- Top flange inner width: .029
- Top flange outer width: .045
- Top flange base width: .034
- Top flange base thickness: .028
- Top flange base width: .028
- Top flange base thickness: .028
- Top flange base width: .028
- Top flange base thickness: .028
- Top flange base width: .028
- Top flange base thickness: .028

Technical drawing of a 3-lead chip carrier. The top view shows a circular body with a diameter of .650. Three leads extend from the bottom, with a center-to-center distance of .146 between adjacent leads and a lead thickness of .136. The leads are positioned at 90° intervals. The side view shows a maximum height of .115 and a body thickness of .330. The top view also indicates a .330 dimension from the center to the lead base. The side view shows a .524 dimension for the top width and a .444 dimension for the bottom width. The top view shows a .146 dimension from the center to the lead base and a .136 dimension for the lead thickness. The side view shows a .033 dimension for the top thickness and a .027 dimension for the bottom thickness. The side view also shows a .444 dimension for the top width and a .360 dimension for the bottom width.

Technical drawing of a hex head bolt. The drawing includes a side view at the top and an end view at the bottom. Dimensions and callouts are as follows:

- Side View Dimensions:**
  - UNDERCUT 1.0"  $\pm .093 \pm .010$
  - Hex head height:  $.500 \pm .015$  MAX.
  - Thread length: 1.500 MIN.
  - Thread pitch: 1/2 20 UNF 2A
  - Thread diameter:  $.025 \pm .003$
  - Hex head width:  $1.00 \pm .010$
- End View Dimensions:**
  - Hex head width:  $.875$  MAX.
  - Hex head width:  $.750 \pm .010$
  - Hex head width:  $.200 \pm .010$
  - Hex head width:  $.100 \pm .010$
- Callouts:**
  - A: Hex head
  - B: Thread
  - C: Thread relief
  - D: Hex head
  - E: Hex head
- NOTE 1:**

THREAD RELIEF IS .090 MAX.  
BY .430 DIA.  
NOMINAL

The technical drawing illustrates a shaft-hub assembly with various dimensions and tolerances:

- Shaft Dimensions:**
  - Total length: 1.97
  - Section A-A diameter: .043
  - Section B-B diameter: .038
  - Section C-C diameter: .043
  - Section D-D diameter: .038
  - Section E-E diameter: .043
  - Section F-F diameter: .038
  - Section G-G diameter: .043
  - Section H-H diameter: .038
  - Section I-I diameter: .043
  - Section J-J diameter: .038
  - Section K-K diameter: .043
  - Section L-L diameter: .038
  - Section M-M diameter: .043
  - Section N-N diameter: .038
  - Section O-O diameter: .043
  - Section P-P diameter: .038
  - Section Q-Q diameter: .043
  - Section R-R diameter: .038
  - Section S-S diameter: .043
  - Section T-T diameter: .038
  - Section U-U diameter: .043
  - Section V-V diameter: .038
  - Section W-W diameter: .043
  - Section X-X diameter: .038
  - Section Y-Y diameter: .043
  - Section Z-Z diameter: .038
- Hub Dimensions:**
  - Top flange outer diameter: .875 MAX
  - Top flange thickness: .135 MAX
  - Top flange inner diameter: .450
  - Top flange hole diameter: .250
  - Bottom flange outer diameter: .312 MIN
  - Bottom flange thickness: .043
  - Bottom flange inner diameter: .038
  - Bottom flange hole diameter: .043
- Fit Specifications:**
  - SEATING PLANE
  - .186 MAX BOTH ENDS
  - .161 / .151
  - .440 / .420
  - .225 / .205
  - .675 / .655
  - .1177
  - .525 R MAX

Technical drawing of a mechanical part, showing front and top views with dimensions.

**Front View Dimensions:**

- Top width: .875 MAX.
- Top thickness: .250
- Shoulder thickness: .450
- Base thickness: .560
- Base width: .500
- Base width at bottom: .581
- Internal hole diameter: .135 MAX.

**Top View Dimensions:**

- Overall width: 1.177
- Overall depth: .675
- Inner width: .655
- Inner depth: .675
- Right side thickness: .125
- Right side thickness at bottom: .210
- Left side thickness: .420
- Left side thickness at bottom: .440
- Left side radius: 188 R MAX.
- Right side radius: .525 MAX. RAD.
- Bottom right corner radius: .151
- Bottom right corner radius at bottom: .275

Technical drawing of a transistor package showing side and top views with dimensions.

**Side View Dimensions:**

- Overall width: 1.250 DIA MAX.
- Base width: 1.005 DIA MAX.
- Base thickness: .210 MAX.
- Emitter thickness: .360 MAX.
- Lead thickness: .500 MAX.
- Lead width: .375 MAX.
- Lead height: .312 MAX.
- Lead diameter: .210 MAX.
- Lead pitch: .610 MAX.
- Lead thread: 10-32 UNF-2A
- Lead diameter: .137 MAX.
- Lead diameter: .123 MAX.

**Top View Dimensions:**

- Base diameter: .140 DIA. MAX.
- Base radius: .345 R
- Emitter diameter: .140 DIA. MAX.

## CASE OUTLINE DRAWINGS & DIMENSIONS

Technical drawing of a 28-pin DIP package. The top view shows a circular package with a diameter of 550 (530) and four mounting holes labeled A, B, C, and D. The side view shows a package with a maximum height of 970 (930), a body diameter of 430 (415), and a mounting tab diameter of 725 (690). The package is labeled with "1 28 UNF-28 250 WIP FULL THREAD" and "SOLDER LUGS".

Technical drawing of a mechanical part, likely a valve or actuator component, showing top and side views with dimensions.

**Top View Dimensions:**

- Overall width: 620 MAX.
- Top flange width: 470.
- Top flange thickness: .500.
- Top flange outer radius: .050 MAX.
- Top flange inner radius: .028.
- Top flange inner width: .034.
- Top flange inner length: .958.
- Top flange inner width (inner): .570.
- Top flange inner width (outer): .590.
- Top flange inner length (outer): .962.
- Top flange inner width (outer): .145 R MAX.
- Top flange inner width (outer): .142.
- Top flange inner width (outer): .152.
- Top flange inner width (outer): .350 R MAX.
- Top flange inner width (outer): .190.
- Top flange inner width (outer): .210.
- Top flange inner width (outer): .093.
- Top flange inner width (outer): .107.

**Side View Dimensions:**

- Overall height: 250.
- Top flange thickness: .340.
- Top flange outer radius: .050 MAX.
- Top flange inner radius: .028.
- Top flange inner width: .034.
- Top flange inner length: .958.
- Top flange inner width (inner): .570.
- Top flange inner width (outer): .590.
- Top flange inner length (outer): .962.
- Top flange inner width (outer): .145 R MAX.
- Top flange inner width (outer): .142.
- Top flange inner width (outer): .152.
- Top flange inner width (outer): .350 R MAX.
- Top flange inner width (outer): .190.
- Top flange inner width (outer): .210.
- Top flange inner width (outer): .093.
- Top flange inner width (outer): .107.

[illegible]

Technical drawing of the 1N4148 diode showing side and top views with dimensions.

**Side View Dimensions:**

- Top flange thickness: .25
- Threaded section length: .09
- Bottom flange thickness: .25
- Lead length: .53
- Lead diameter: .09 DIA. (3)
- Thread specification: 1-1/4 - 16UN - 2A
- Component: HEX NUT

**Top View Dimensions:**

- Hexagonal base width: .58
- Base thickness: .02
- Collector diameter: .29
- Emitter diameter: .29
- Base to emitter distance: 1.5
- Labels: BASE, COLLECTOR, EMITTER

The drawing shows a 2N4350 JFET with the following dimensions:

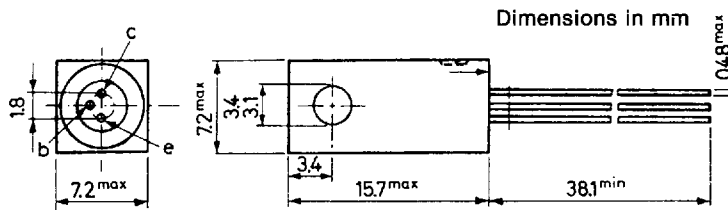
- Side View Dimensions:**
  - Gate lead thread: 3/8-24UNF-2A
  - Gate lead diameter: .093
  - Gate lead height: .82
  - Drain lead diameter: .09 DIA. (3)
  - Drain lead height: .72
  - Source lead diameter: 1.26 DIA.
  - Source lead height: .53
- Top View Dimensions:**
  - Emitter diameter: .02
  - Collector diameter: .29
  - Base diameter: .58

Technical drawing of the 8-32NC-2A plug gage. The drawing shows a top view and a side view. The top view is a circle with a diameter of .152. It has two threaded holes, each with a diameter of .054 and a depth of .107. The side view shows a plug with a diameter of .060 and a length of .250. The plug is labeled '8-32NC-2A'.

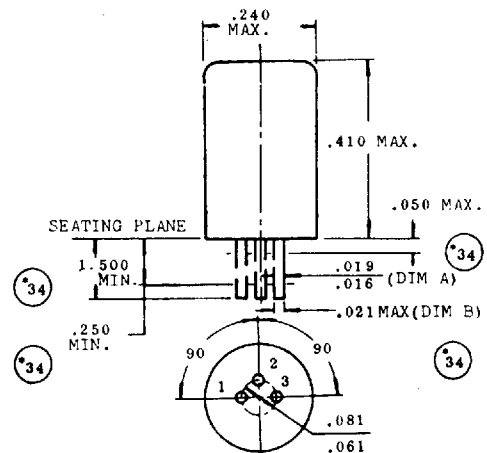
# GERMANIUM POWER TRANSISTORS

## CASE OUTLINE DRAWINGS & DIMENSIONS

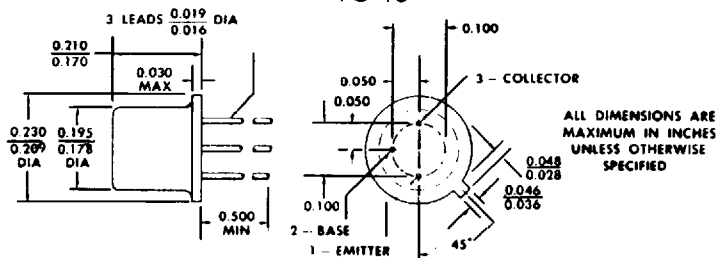
NS257



TO-1



TO-18



THE COLLECTOR IS ELECTRICAL CONTACT WITH THE CASE.

ALL JEDEC TO-18 DIMENSIONS AND NOTES ARE APPLICABLE.



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