PNP General Purpose Amplifier

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 500 mA. Sourced from Process 63. See PN2907A for characteristics.

Absolute Maximum Ratings* TA = 25°C unless otherwise noted

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{CEO}$</td>
<td>Collector-Emitter Voltage</td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td>$V_{CBO}$</td>
<td>Collector-Base Voltage</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td>$V_{EB}O$</td>
<td>Emitter-Base Voltage</td>
<td>5.0</td>
<td>V</td>
</tr>
<tr>
<td>$I_C$</td>
<td>Collector Current - Continuous</td>
<td>800</td>
<td>mA</td>
</tr>
<tr>
<td>$T_{J}, T_{stg}$</td>
<td>Operating and Storage Junction Temperature Range</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

NOTES:
1) These ratings are based on a maximum junction temperature of 150 degrees C.
2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Thermal Characteristics TA = 25°C unless otherwise noted

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Characteristic</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_D$</td>
<td>Total Device Dissipation</td>
<td>625</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td>Denote above 25°C</td>
<td>5.0</td>
<td>mW/°C</td>
</tr>
<tr>
<td>$R_{JC}$</td>
<td>Thermal Resistance, Junction to Case</td>
<td>83.3</td>
<td>°C/W</td>
</tr>
<tr>
<td>$R_{JA}$</td>
<td>Thermal Resistance, Junction to Ambient</td>
<td>200</td>
<td>°C/W</td>
</tr>
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</table>

*Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

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## Electrical Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OFF CHARACTERISTICS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V_{BR(CEO)}</td>
<td>Collector-Emitter Breakdown Voltage*</td>
<td>I_C = 10 mA, I_B = 0</td>
<td>40</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>V_{BR(CBO)}</td>
<td>Collector-Base Breakdown Voltage</td>
<td>I_C = 10 µA, I_C = 0</td>
<td>60</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>V_{BR(EBO)}</td>
<td>Emitter-Base Breakdown Voltage</td>
<td>I_E = 10 µA, I_C = 0</td>
<td>5.0</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>I_CEX</td>
<td>Collector Cutoff Current</td>
<td>V_CE = 30 V</td>
<td>50 nA</td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>I_B</td>
<td>Base Cutoff Current</td>
<td>V_BE = 0.5 V</td>
<td>50 nA</td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>I_CBO</td>
<td>Collector Cutoff Current</td>
<td>V_CB = 50 V, I_E = 0</td>
<td>20 nA</td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td>ON CHARACTERISTICS*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h_{FE}</td>
<td>DC Current Gain</td>
<td>V_CE = 10 V, I_C = 0.1 mA</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_CE = 10 V, I_C = 1.0 mA</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_CE = 10 V, I_C = 10 mA</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_CE = 10 V, I_C = 150 mA</td>
<td>100</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>V_CE = 10 V, I_C = 500 mA</td>
<td>300</td>
<td></td>
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<tr>
<td>V_{CE(sat)}</td>
<td>Collector-Emitter Saturation Voltage</td>
<td>I_C = 150 mA, I_B = 15 mA</td>
<td>0.4</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_C = 500 mA, I_B = 50 mA</td>
<td>1.6</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>V_{BE(sat)}</td>
<td>Base-Emitter Saturation Voltage</td>
<td>I_C = 150 mA, I_B = 15 mA</td>
<td>1.3</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_C = 500 mA, I_B = 50 mA</td>
<td>2.6</td>
<td></td>
<td>V</td>
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<td></td>
<td>SMALL SIGNAL CHARACTERISTICS</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>C_{OB}</td>
<td>Output Capacitance</td>
<td>V_CC = 10 V, f = 1.0 MHz</td>
<td>8.0</td>
<td></td>
<td>pF</td>
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<tr>
<td>C_{IB}</td>
<td>Input Capacitance</td>
<td>V_BE = 2.0 V, f = 1.0 MHz</td>
<td>30</td>
<td></td>
<td>pF</td>
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<tr>
<td>h_{FE}</td>
<td>Small-Signal Current Gain</td>
<td>I_C = 50 mA, V_{CE} = 20 V, f = 100 MHz</td>
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<td>SWITCHING CHARACTERISTICS</td>
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<tr>
<td>t_{on}</td>
<td>Turn-on Time</td>
<td>V_CC = 30 V, I_C = 150 mA</td>
<td>45 ns</td>
<td></td>
<td></td>
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<tr>
<td>t_{d}</td>
<td>Delay Time</td>
<td>I_{B1} = 15 mA, PW = 200 ns</td>
<td>10 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_r</td>
<td>Rise Time</td>
<td></td>
<td>40 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_{off}</td>
<td>Turn-off Time</td>
<td>V_CC = 6.0 V, I_C = 150 mA</td>
<td>100 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_s</td>
<td>Storage Time</td>
<td>I_{B1} = I_{B2} = 15 mA</td>
<td>80 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t_f</td>
<td>Fall Time</td>
<td></td>
<td>30 ns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%
TO-92 Tape and Reel Data

TO-92 Packaging
Configuration: Figure 1.0

TO-92 TNR/AMMO PACKING INFORMATION

<table>
<thead>
<tr>
<th>Packing Style</th>
<th>Quantity</th>
<th>EOL code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reel A</td>
<td>2,000</td>
<td>D26Z</td>
</tr>
<tr>
<td>E</td>
<td>2,000</td>
<td>D27Z</td>
</tr>
<tr>
<td>Ammo M</td>
<td>2,000</td>
<td>D74Z</td>
</tr>
<tr>
<td>P</td>
<td>2,000</td>
<td>D75Z</td>
</tr>
</tbody>
</table>

Unit weight:
- Reel: 0.22 gm
- Ammo: 1.04 kg

Max quantity per intermediate box: 10,000 units

BULK OPTION
See Bulk Packing Information table

TO-92 TAPE and REEL OPTION
See Fig 2.0 for various Reeling Styles

AMMO PACK OPTION
See Fig 3.0 for 2 Ammo Pack Options

(To-92) BULK PACKING INFORMATION

<table>
<thead>
<tr>
<th>EOL code</th>
<th>DESCRIPTION</th>
<th>LEADCLIP</th>
<th>QUANTITY</th>
</tr>
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<tbody>
<tr>
<td>J18Z</td>
<td>TO-18 OPTION STD</td>
<td>NO LEAD CLIP</td>
<td>2.0 K / BOX</td>
</tr>
<tr>
<td>J55Z</td>
<td>TO-5 OPTION STD</td>
<td>NO LEAD CLIP</td>
<td>1.5 K / BOX</td>
</tr>
<tr>
<td>95Z</td>
<td>TO-92 STANDARD STRAIGHT FOR: PKG 92, 94 (NON PROELECTRON SERIES), etc.</td>
<td>NO LEAD CLIP</td>
<td>2.0 K / BOX</td>
</tr>
<tr>
<td>L9Z</td>
<td>TO-92 STANDARD STRAIGHT FOR: PKG 95, 96</td>
<td>NO LEAD CLIP</td>
<td>2.0 K / BOX</td>
</tr>
</tbody>
</table>

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TO-92 Reeling Style
Configuration: Figure 2.0

Machine Option “A” (H)
- Style “A”, D26Z, D70Z (s/h)
- First wire off is emitter
- Adhesive tape is on the top side
- Flat of transistor is on bottom

Machine Option “E” (J)
- Style “E”, D27Z, D71Z (s/h)
- First wire off is emitter
- Adhesive tape is on the top side
- Flat of transistor is on bottom

TO-92 Radial Ammo Packaging
Configuration: Figure 3.0

ORDER STYLE D74Z (M)
- First wire off is emitter (on pkg. 92)
- Adhesive tape is on bottom side
- Flat of transistor is on bottom

ORDER STYLE D75Z (P)
- First wire off is collector (on pkg. 92)
- Adhesive tape is on bottom side
- Flat of transistor is on top
### TO-92 Tape and Reel Data, continued

#### TO-92 Tape and Reel Taping

**Dimension Configuration:** Figure 4.0

#### TO-92 Reel Configuration: Figure 5.0

### ITEM DESCRIPTION | SYMBOL | DIMENSION
--- | --- | ---
Base of Package to Lead Bend | \( b \) | 0.036 (max)
Component Height | \( H_6 \) | 0.924 (\( \pm 0.025 \))
Lead Clinch Height | \( H_0 \) | 0.630 (\( \pm 0.020 \))
Component Base Height | \( H_1 \) | 0.748 (\( \pm 0.020 \))
Component Alignment (side/side) | \( Pd \) | 0.040 (max)
Component Alignment (front/back) | \( Pd \) | 0.031 (max)
Component Pitch | \( P \) | 0.050 (\( \pm 0.020 \))
Feed Hole Pitch | \( P_0 \) | 0.050 (\( \pm 0.008 \))
Hole Center to First Lead | \( P_1 \) | 0.130 (\( \pm 0.008 \))
Hole Center to Component Center | \( P_2 \) | 0.247 (\( \pm 0.007 \))
Lead Spread | \( F_1/F_2 \) | 0.124 (\( \pm 2.020 \))
Lead Thickness | \( d \) | 0.016 (\( \pm 0.002 \))
Cut Lead Length | \( L \) | 0.429 (max)
Taped Lead Length | \( L_1 \) | 0.209 (\( \pm 0.051 \))
Taped Lead Thickness | \( t \) | 0.032 (\( \pm 0.006 \))
Carrier Tape Thickness | \( t_1 \) | 0.021 (\( \pm 0.006 \))
Carrier Tape Width | \( W \) | 0.738 (\( \pm 0.020 \))
Hold - down Tape Width | \( W_0 \) | 0.236 (\( \pm 0.012 \))
Hold - down Tape position | \( W_1 \) | 0.035 (max)
Feed Hole Position | \( W_2 \) | 0.320 (\( \pm 0.025 \))
Spooled Hole Diameter | \( W_0 \) | 0.157 (\( \pm 0.008 \))
Lead Spring Out | \( S \) | 0.024 (max)

Note: All dimensions are in inches.

### ITEM DESCRIPTION | SYMBOL | MINIMUM | MAXIMUM
--- | --- | --- | ---
Reel Diameter | \( D_1 \) | 13.975 | 14.025
 Arbor Hole Diameter (Standard) | \( D_2 \) | 1.000 | 1.000
 Arbor Hole Diameter (Small Hole) | \( D_2 \) | 0.950 | 0.970
Core Diameter | \( D_3 \) | 3.000 | 3.000
Hub Recess Inner Diameter | \( D_4 \) | 2.700 | 2.700
Hub Recess Depth | \( W_1 \) | 0.370 | 0.570
Flange to Flange Inner Width | \( W_2 \) | 1.620 | 1.690
Hub to Hub Center Width | \( W_3 \) | 2.030 | 2.030

Note: All dimensions are inches.

July 1999, Rev. A
TO-92 Package Dimensions

TO-92 (FS PKG Code 92, 94, 96)

Dimensions shown below are in:

- inches [millimeters]

Part Weight per unit (gram): 0.1977

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SOT-23 Tape and Reel Data

**SOT-23 Packaging Configuration:** Figure 10

**Packaging Description:**
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature primarily composed of polywater film, adhesive layer, sealant, and anti-static sprayed agent). These reel parts in standard option are shipped with 3,000 units per 7” or 177cm diameter reel. The reels are dark blue in color and made of polystyrene plastic anti-static coated. Other option comes in 10,000 units per 13” or 330cm diameter reel. This and some other options are described in the Packaging Information table.

These full reels are individually labeled and placed inside a standard intermediate made of recyclable corrugated brown paper with a Fairchild logo printing. One pizza box contains eight reels maximum. And these intermediate boxes are placed inside a labeled shipping box which comes in different sizes depending on the number of parts shipped.

**SOT-23 Unit Orientation**

- 3P
- 3P
- 3P
- 3P

**SOT-23 Tape Leader and Trailer Configuration:** Figure 20

**SOT-23 Tape Leader and Trailer Configuration:**

- **Components**
  - **Leader Tape**
    - 500mm minimum or 125 empty pockets
  - **Trailer Tape**
    - 300mm minimum or 75 empty pockets
- **Carry Tape**
- **Human Readable Label**

**SOT-23 Tape Leader and Trailer Configuration:**

- **Human Readable Label**
- **Antistatic Cover Tape**
- **Embosed Carrier Tape**
- **Customized Label**

**SOT-23 Tape Leader and Trailer Configuration:**

- **Human Readable Label**
- **Antistatic Cover Tape**
- **Embosed Carrier Tape**
- **Customized Label**

**SOT-23 Packaging Information**

<table>
<thead>
<tr>
<th>Packaging Option</th>
<th>Standard (flow code)</th>
<th>087Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaging Type</td>
<td>TNRI</td>
<td>TNRI</td>
</tr>
<tr>
<td>Qty per Reel/Tube/Bag</td>
<td>3,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Reel Diameter (mm)</td>
<td>7.86</td>
<td>13.73</td>
</tr>
<tr>
<td>Box Dimension (mm)</td>
<td>187x107x183</td>
<td>343x343x64</td>
</tr>
<tr>
<td>Max qty per Box</td>
<td>24,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Weight per unit (g)</td>
<td>0.082</td>
<td>0.082</td>
</tr>
<tr>
<td>Weight per Reel (kg)</td>
<td>0.1175</td>
<td>0.406</td>
</tr>
</tbody>
</table>

**Human Readable Label sample**

187mm x 107mm x 183mm Intermediate Box for Standard Option

343mm x 343mm x 64mm Intermediate Box for L87Z Option

**Human Readable Label sample**

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September 1999, Rev. C
SOT-23 Tape and Reel Data, continued

**SOT-23 Embossed Carrier Tape**

Configuration: Figure 3.0

![Diagram of SOT-23 tape configuration](image)

**Dimensions are in millimeter**

<table>
<thead>
<tr>
<th>Pkg type</th>
<th>A0</th>
<th>B0</th>
<th>W</th>
<th>D0</th>
<th>D1</th>
<th>E1</th>
<th>E2</th>
<th>F</th>
<th>P1</th>
<th>P0</th>
<th>K0</th>
<th>T</th>
<th>Wc</th>
<th>Tc</th>
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</thead>
<tbody>
<tr>
<td>SOT-23</td>
<td>3.15</td>
<td>2.77</td>
<td>8.0</td>
<td>1.55</td>
<td>1.25</td>
<td>1.75</td>
<td>0.25</td>
<td>3.95</td>
<td>4.0</td>
<td>0.75</td>
<td>0.35</td>
<td>0.238</td>
<td>0.38</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).

**User Direction of Feed**

![Diagram of user direction of feed](image)

**SOT-23 Reel Configuration:** Figure 4.0

**Dimensions are in inches and millimeters**

<table>
<thead>
<tr>
<th>Tape Size</th>
<th>Reel Option</th>
<th>Dim A</th>
<th>Dim B</th>
<th>Dim C</th>
<th>Dim D</th>
<th>Dim N</th>
<th>Dim W1</th>
<th>Dim W2</th>
<th>Dim W3 (LSL-USL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8mm</td>
<td>7&quot; Dia</td>
<td>0.059</td>
<td>0.059</td>
<td>0.059</td>
<td>0.150</td>
<td>6.020</td>
<td>0.331</td>
<td>0.237</td>
<td>0.331 – 0.439</td>
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<tr>
<td></td>
<td>13&quot; Dia</td>
<td>0.059</td>
<td>0.059</td>
<td>0.059</td>
<td>0.150</td>
<td>6.020</td>
<td>0.331</td>
<td>0.237</td>
<td>0.331 – 0.439</td>
</tr>
</tbody>
</table>

September 1999, Rev. C
SOT-23 Package Dimensions

SOT-23 (FS PKG Code 49)

Scale 1:1 on letter size paper
Dimensions shown below are in:
inches [millimeters]
Part Weight per unit (gram): 0.0082

Controlling dimension is inch, Values in [ ] are millimeters

NOTE: UNLESS OTHERWISE SPECIFIED
1. Standard Lead Finish: 150 microns +/− 25 microns
   Minimum Tin / Lead (Solder) on Alloy 42
2. Reference: JEDEC Registration TO-236, Variation AB, Issue G, Dated Jul 1993

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<tr>
<th>ACEx™</th>
<th>FAST™</th>
<th>PowerTrench®</th>
<th>SyncFET™</th>
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<tbody>
<tr>
<td>Bottomless™</td>
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<td>QFET™</td>
<td>TinyLogic™</td>
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<td>GTO™</td>
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<td>SILENT SWITCHER®</td>
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<tr>
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<td>OPTOLOGIC™</td>
<td>SMART START™</td>
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<tr>
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<td>OPTOPLANAR™</td>
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<tr>
<td>FACT Quiet Series™</td>
<td>PACMAN™</td>
<td>SuperSOT™-6</td>
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<td>FAST®</td>
<td>POP™</td>
<td>SuperSOT™-8</td>
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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

<table>
<thead>
<tr>
<th>Datasheet Identification</th>
<th>Product Status</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Formative or In Design</td>
<td>Preliminary</td>
<td>This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.</td>
</tr>
<tr>
<td>First Production</td>
<td>No Identification Needed</td>
<td>This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.</td>
</tr>
<tr>
<td>Not In Production</td>
<td>Obsolete</td>
<td>This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.</td>
</tr>
</tbody>
</table>
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