This device is designed primarily for low level audio and general purpose applications with high impedance signal sources. Sourced from Process 52.

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{DG}</td>
<td>Drain-Gate Voltage</td>
<td>40</td>
<td>V</td>
</tr>
<tr>
<td>V_{GS}</td>
<td>Gate-Source Voltage</td>
<td>-40</td>
<td>V</td>
</tr>
<tr>
<td>I_{GF}</td>
<td>Forward Gate Current</td>
<td>50</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**

<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>625/5.0</td>
<td>mW / mW/°C</td>
</tr>
<tr>
<td></td>
<td>Derate above 25°C</td>
<td>350/2.8</td>
<td>mW / mW/°C</td>
</tr>
<tr>
<td>R_{JUC}</td>
<td>Thermal Resistance, Junction to Case</td>
<td>125</td>
<td>°C/W</td>
</tr>
<tr>
<td>R_{JUA}</td>
<td>Thermal Resistance, Junction to Ambient</td>
<td>357</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.*
### Electrical Characteristics

TA = 25°C unless otherwise noted

#### OFF 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>$V_{BR\text{GSS}}$</td>
<td>Gate-Source Breakdown Voltage</td>
<td>$I_G = -1.0 , \mu A, V_{DS} = 0$</td>
<td>-40</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>$I_{\text{GSS}}$</td>
<td>Gate Reverse Current</td>
<td>$V_{GS} = -20 , V, V_{DS} = 0$</td>
<td></td>
<td>-100</td>
<td>pA</td>
</tr>
<tr>
<td>$V_{\text{GSS}(\text{off})}$</td>
<td>Gate-Source Cutoff Voltage</td>
<td>$V_{DS} = 20 , V, I_D = 10 , nA$</td>
<td>201</td>
<td>-0.3</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>202</td>
<td>-0.8</td>
<td>V</td>
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#### ON CHARACTERISTICS

<table>
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<tr>
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<th>Test Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{\text{DSS}}$</td>
<td>Zero-Gate Voltage Drain Current*</td>
<td>$V_{DS} = 20 , V, I_{GSS} = 0$</td>
<td>201</td>
<td>0.2</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>202</td>
<td>0.9</td>
<td>mA</td>
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</tbody>
</table>

#### SMALL SIGNAL CHARACTERISTICS

<table>
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<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y_f$</td>
<td>Forward Transfer Admittance</td>
<td>$V_{DS} = 20 , V, f = 1.0 , kHz$</td>
<td>201</td>
<td>500</td>
<td>( \mu \text{mhos} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>202</td>
<td>1000</td>
<td>( \mu \text{mhos} )</td>
</tr>
</tbody>
</table>

*Pulse Test: Pulse Width ≤ 300 \( \mu \text{s} \)

### Typical Characteristics

**Parameter Interactions**

**Common Drain-Source**

- $T_A = 25^\circ C$
- \( V_{GS(\text{off})} = -4.5 \, V \)
- \( V_{GS} = 0 \, V \)

- $V_{DS} = 3.0 \, V$
- $I_D = 10 \, nA$
- $R_{DS} = 10^\circ \, \Omega$
- $V_{DS}$ = DRAM SOURCE VOLTAGE (V)
Typical Characteristics (continued)

Transfer Characteristics

- Output Conductance vs. Drain Current
  - $V_{DS} = 10V$
  - $V_{GS(OFF)} = -2.5V$
  - $T_A = -55^\circ C$
  - $T_A = +25^\circ C$
  - $T_A = +125^\circ C$

Leakage Current vs. Voltage

- Leakage Current vs. Voltage
  - $I_D = 10 mA$
  - $I_D = 1.0 mA$
  - $T_A = +85^\circ C$

Noise Voltage vs. Frequency

- Noise Voltage vs. Frequency
  - $V_{DDG} = 10V$
  - $BW = 6.0 Hz @ f = 10 Hz, 100 Hz$
  - $0.21Hz @ f = 1.0 kHz$

Transconductance vs. Drain Current

- Transconductance vs. Drain Current
  - $V_{DS} = 10V$
  - $I = 1.0 kHz$
  - $V_{GS(OFF)} = -5.5V$

Output Conductance vs. Drain Current

- Output Conductance vs. Drain Current
  - $V_{DDG} = 5.0V$
  - $V_{DS} = 5.0V$
  - $I = 10V$
  - $I = 15V$
  - $I = 20V$

Three graphs are shown: one for output conductance, one for leakage current, and one for noise voltage. Each graph includes specific conditions for temperature and voltage.
N-Channel General Purpose Amplifier

Typical Characteristics (continued)

Common Source Characteristics

Capacitance vs. Voltage

Input Admittance

Forward Transadmittance

Output Admittance

Reverse Transadmittance

Capacitance vs. Voltage

Input Admittance

Forward Transadmittance

Output Admittance

Reverse Transadmittance
N-Channel General Purpose Amplifier

(continued)

Common Gate Characteristics

**Input Admittance**

- \( V_{DG} = 10V \)
- \( I_{D} = 10 mA \)
- (CG)

**Forward Transadmittance**

- \( V_{DG} = 10V \)
- \( I_{D} = 10 mA \)
- (CG)

**Output Admittance**

- \( V_{DG} = 10V \)
- \( I_{D} = 10 mA \)
- (CG)

**Reverse Transadmittance**

- \( V_{DG} = 10V \)
- \( I_{D} = 10 mA \)
- (CG)
TO-92 Tape and Reel Data

TO-92 Packaging
Configuration: Figure 1.0

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

TAPE and REEL OPTION
See Fig 2.0 for various Reeling Styles

AMMO PACK OPTION
See Fig 3.0 for 2 Ammo Pack Options

AMMO PACK OPTION
See Fig 3.0 for 2 Ammo Pack Options

BULK OPTION
See Bulk Packing Information table

BULK OPTION
See Bulk Packing Information table

TO-92 TNR/AMMO PACKING INFORMATION

Packing Style Quantity EOL code
Reel A 2,000 D36Z
E 2,000 D37Z
Ammo M 2,000 D46Z
P 2,000 D52Z

Unit weight
Real weight with components = 0.22 gm
Ammo weight with components = 1.04 kg
Max quantity per intermediate box = 10,000 units

(TO-92) BULK PACKING INFORMATION

<table>
<thead>
<tr>
<th>EOL CODE</th>
<th>DESCRIPTION</th>
<th>LEADCLIP</th>
<th>QUANTITY</th>
</tr>
</thead>
<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>NO EOL</td>
<td>TO-92 STANDARD STRAIGHT FOR: PKG 92, 94 (NON PROELECTRON SERIES), NH</td>
<td>NO LEAD CLIP</td>
<td>2.0 K / BOX</td>
</tr>
<tr>
<td>L36Z</td>
<td>TO-92 STANDARD STRAIGHT FOR: PKG 92, 94 (PROELECTRON SERIES) BCXXX, BFXXX, BRXXX, SC, SB</td>
<td>NO LEAD CLIP</td>
<td>2.0 K / BOX</td>
</tr>
</tbody>
</table>

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March 2001, Rev. B1
TO-92 Tape and Reel Data, continued

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 Collector
- Adhesive Tape is on the Top Side
- Flat of Transistor is on Top

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

Note: All dimensions are in inches.

July 1999, Rev. A
TO-92 Package Dimensions

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

Scale 1:1 on letter size paper
Dimensions shown below are in:

inches [millimeters]

Part Weight per unit (gram): 0.1977
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 polyester film, adhesive layer, sealant, and anti-static sprayed agent). These nested 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 Tape Leader and Trailer Configuration: Figure 20

<table>
<thead>
<tr>
<th>Packaging/Information</th>
<th>Standard (no flow code)</th>
<th>D87Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaging Option</td>
<td>TNRI</td>
<td>TNRI</td>
</tr>
<tr>
<td>Qty per Reel/Tub/Bag</td>
<td>3000</td>
<td>10000</td>
</tr>
<tr>
<td>Reel Diameter (mm)</td>
<td>7 1/8” or 13”</td>
<td></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 (gm)</td>
<td>0.0082</td>
<td>0.0082</td>
</tr>
<tr>
<td>Weight per Reel (lb)</td>
<td>0.1775</td>
<td>0.4006</td>
</tr>
<tr>
<td>Note/Comments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOT-23 Unit Orientation:**

- **3P**

**Human Readable Label sample:**

**Customized Label**

**Embossed Carrier Tape**

**Antistatic Cover Tape**

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

- **Trailer Tape:** 300mm minimum or 75 empty pockets
- **Components:**
- **Leader Tape:** 500mm minimum or 125 empty pockets

**Human Readable Label**

**Intermediate Box for L87Z Option:**

- **187mm x 107mm x 183mm**

**Intermediate Box for Standard Option:**

- **343mm x 342mm x 64mm**
SOT-23 Tape and Reel Data, continued

**SOT-23 Embossed Carrier Tape**

**Configuration: Figure 3.0**

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

**User Direction of Feed**

**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>
</tr>
</thead>
<tbody>
<tr>
<td>SOT-23</td>
<td>1.15</td>
<td>2.77</td>
<td>8.0</td>
<td>1.55</td>
<td>1.75</td>
<td>6.25</td>
<td>2.58</td>
<td>3.0</td>
<td>4.0</td>
<td>4.0</td>
<td>1.35</td>
<td>0.236</td>
<td>0.86</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).

**Sketch A (Side or Front Sectional View)**

Component Rotation

**Sketch B (Top View)**

Component Rotation

**Sketch C (Top View)**

Component lateral movement

**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>0.700</td>
<td>0.059</td>
<td>0.812</td>
<td>0.002</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>177.8</td>
<td>1.5</td>
<td>13</td>
<td>0.2</td>
<td>14.4</td>
<td>14.4</td>
<td>14.4</td>
<td>14.4</td>
</tr>
<tr>
<td>8mm</td>
<td>13&quot; Dia</td>
<td>13.00</td>
<td>0.059</td>
<td>0.812</td>
<td>0.002</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>330</td>
<td>1.5</td>
<td>13</td>
<td>0.2</td>
<td>14.4</td>
<td>14.4</td>
<td>14.4</td>
<td>14.4</td>
</tr>
</tbody>
</table>

See detail AA

September 1999, Rev. C
SOT-23 Package Dimensions

SOT-23 (FS PKG Code 49)

Part Weight per unit (gram): 0.0082

Dimensions shown below are in:
- Inches [millimeters]

Scale 1:1 on letter size paper

NOTE: UNLESS OTHERWISE SPECIFIED
1. STANDARD LEAD FINISH: 150 MICRONCHES / 3.81 MICROMETERS
   MINIMUM TIN / LEAD (SOLDER) ON ALLOY 42
2. REFERENCE JEDEC REGISTRATION TO-236, VARIATION AB, ISSUE C, DATED JUL 1993
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<table>
<thead>
<tr>
<th>Trademark</th>
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<th>Trademark</th>
<th>Trademark</th>
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<tbody>
<tr>
<td>ACEx™</td>
<td>FAST™</td>
<td>PowerTrench®</td>
<td>SyncFET™</td>
</tr>
<tr>
<td>Bottomless™</td>
<td>GlobalOptoisolator™</td>
<td>QFET™</td>
<td>TinyLogic™</td>
</tr>
<tr>
<td>CoolFET™</td>
<td>GTO™</td>
<td>QS™</td>
<td>UHC™</td>
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<td>CROSSVOLT™</td>
<td>HiSec™</td>
<td>QT Optoelectronics™</td>
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<td>DOME™</td>
<td>ISOPLANAR™</td>
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<td>E'CMOS™</td>
<td>MICROWIRE™</td>
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<td>EnSigna™</td>
<td>OPTOLOGIC™</td>
<td>SMART START™</td>
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<td>FACT™</td>
<td>OPTOPLANAR™</td>
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<td>FAST®</td>
<td>POP™</td>
<td>SuperSOT™-8</td>
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</tr>
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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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<tbody>
<tr>
<td>Advance Information</td>
<td>Formative or</td>
<td>This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.</td>
</tr>
<tr>
<td></td>
<td>In Design</td>
<td></td>
</tr>
<tr>
<td>Preliminary</td>
<td>First Production</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>No Identification Needed</td>
<td>Full Production</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>
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<tr>
<td>Obsolete</td>
<td>Not In Production</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>
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