

PN2907A / MMBT2907A / PZT2907A

60 V PNP General Purpose Transistor

Features

- High DC Current Gain (hFE) Range: 100 – 300
- High-Current Gain Bandwidth Product (f_T): 200 MHz (Minimum.)
- Maximum Turn-On Time (t_{on}): 45 ns
- Maximum Turn-Off Time (t_{off}): 100 ns
- Ultra-Small Surface-Mount Package: SOT-223 (PZT2907A)

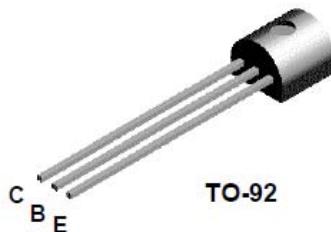
Description

The PN2907A, MMBT2907A, and PZT2907A are 60 V -PNP bipolar transistors designed for use as a general-purpose amplifier or switch in applications that require up to 500 mA. Offered in an ultra-small surface-mount package (SOT-223), the PZT2907A is ideal for space-constrained systems. The NPN complementary types are the PN2222A, MMBT2222A, and PZT2222A; respectively.

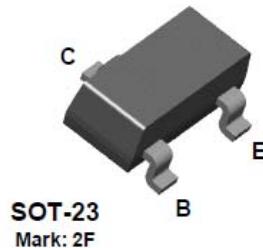
Applications

- General-Purpose Amplifier
- Switch

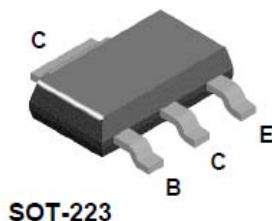
PN2907A



MMBT2907A



PZT2907A



Ordering Information

| Part Number | Top Mark | Package | Packing Method |
|----------------|----------|------------|----------------|
| PN2907ABU | 2907A | TO-92 3 L | Bulk |
| PN2907ATF | 2907A | TO-92 3 L | Tape and Reel |
| PN2907ATAR | 2907A | TO-92 3 L | Ammo |
| PN2907ATA | 2907A | TO-92 3 L | Ammo |
| PN2907ATFR | 2907A | TO-92 3 L | Tape and Reel |
| MMBT2907A_D87Z | 2F | SOT-23 3L | Tape and Reel |
| MMBT2907A | 2F | SOT-23 3L | Tape and Reel |
| PZT2907A | 2907A | SOT-223 4L | Tape and Reel |

Absolute Maximum Ratings⁽¹⁾

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | Ratings | Units |
|-------------------------------|--|--------------|------------------|
| V_{CEO} | Collector-Emitter Voltage | -60 | V |
| V_{CBO} | Collector-Base Voltage | -60 | V |
| V_{EBO} | Emitter-Base Voltage | -5.0 | V |
| I_C | Collector Current-Continuous | -800 | mA |
| T_J, T_{STG} ⁽²⁾ | Operating and Storage Junction Temperature Range | -55 to + 150 | $^\circ\text{C}$ |

Notes:

1. These ratings are limiting values above which the serviceability of any semiconductor device may be impaired. These ratings are based on a maximum junction temperature of 150°C . These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low duty-cycle operations.
2. All voltages (V) and currents (A) are negative polarity for PNP Transistors.

Thermal Characteristics⁽³⁾

Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | Max. | | | Units |
|-----------------|---|---------|-----------|----------|----------------------------|
| | | PN2897A | MMBT2907A | PZT2907A | |
| P_D | Total Device Dissipation | 625 | 350 | 1000 | mW |
| | Derate above 25°C | 5.0 | 2.8 | 8.0 | $\text{mW}/^\circ\text{C}$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 83.3 | | | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 200 | 357 | 125 | $^\circ\text{C}/\text{W}$ |

Note:

3. PCB size FR-4 76 x 114 x 0.6T mm³ (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

Electrical Characteristics⁽⁴⁾

Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

| Symbol | Parameter | Test Condition | Min. | Max. | Units |
|-------------------------------------|---|--|------|-------|---------------|
| Off Characteristics | | | | | |
| $V_{(\text{BR})\text{CEO}}$ | Collector-Emitter Breakdown Voltage ⁽⁵⁾ | $I_C = 1.0 \text{ mA}, I_B = 0$ | -60 | | V |
| $V_{(\text{BR})\text{CBO}}$ | Collector-Base Breakdown Voltage | $I_C = 10 \mu\text{A}, I_E = 0$ | -60 | | V |
| $V_{(\text{BR})\text{EBO}}$ | Emitter-Base Breakdown Voltage | $I_E = 10 \mu\text{A}, I_C = 0$ | -5.0 | | V |
| I_B | Base Cut-Off Current | $V_{\text{CB}} = 30 \text{ V}, V_{\text{EB}} = 0.5 \text{ V}$ | | -50 | nA |
| I_{CEX} | Collector Cut-Off Current | $V_{\text{CE}} = 30 \text{ V}, V_{\text{BE}} = 0.5 \text{ V}$ | | -50 | nA |
| I_{CBO} | Collector Cut-Off Current | $V_{\text{CE}} = 50 \text{ V}, I_E = 0$ | | -0.02 | μA |
| | | $V_{\text{CB}} = 50 \text{ V}, I_E = 0, T_A = 150^\circ\text{C}$ | | -20 | μA |
| On Characteristics | | | | | |
| I_{DSS} | DC Current Gain | $I_C = 0.1 \text{ mA}, V_{\text{CE}} = 10 \text{ V}$ | -75 | | |
| | | $I_C = 1.0 \text{ mA}, V_{\text{CE}} = 10 \text{ V}$ | -100 | | |
| | | $I_C = 10 \text{ mA}, V_{\text{CE}} = 10 \text{ V}$ | -100 | | |
| | | $I_C = 150 \text{ mA}, V_{\text{CE}} = 10 \text{ V}^{(5)}$ | -100 | -300 | |
| | | $I_C = 500 \text{ mA}, V_{\text{CE}} = 10 \text{ V}^{(5)}$ | -50 | | |
| I_{DSS} | Collector-Emitter Saturation Voltage ⁽⁵⁾ | $I_C = 150 \text{ mA}, V_{\text{CE}} = 15 \text{ V}$ | | -0.4 | V |
| | | $I_C = 500 \text{ mA}, V_{\text{CE}} = 50 \text{ V}$ | | -1.6 | V |
| I_{DSS} | Base-Emitter Saturation Voltage | $I_C = 150 \text{ mA}, V_{\text{CE}} = 15 \text{ V}^{(5)}$ | | -1.3 | V |
| | | $I_C = 500 \text{ mA}, V_{\text{CE}} = 50 \text{ V}$ | | -2.6 | V |
| Small Signal Characteristics | | | | | |
| f_T | Current Gain-Bandwidth Product | $I_C = 50 \text{ mA}, V_{\text{CE}} = 20 \text{ V}, f = 100 \text{ MHz}$ | 200 | | MHz |
| C_{obo} | Output Capacitance | $V_{\text{CB}} = 10 \text{ V}, I_E = 0, f = 100 \text{ kHz}$ | | -8.0 | pF |
| C_{ibo} | Input Capacitance | $V_{\text{EB}} = 2.0 \text{ V}, I_C = 0, f = 100 \text{ kHz}$ | | -30 | pF |
| Switching Characteristics | | | | | |
| t_{on} | Turn-on Time | $V_{\text{CC}} = 32 \text{ V}, I_C = 150 \text{ mA}, I_{\text{B1}} = 15 \text{ mA}$ | | -45 | ns |
| t_d | Delay | | | -10 | |
| t_r | Rise Time | | | -40 | |
| t_{off} | Turn-off Time | $V_{\text{CC}} = 6.0 \text{ V}, I_C = 150 \text{ mA}, I_{\text{B1}} = I_{\text{B2}} = 15 \text{ mA}$ | | -100 | |
| t_s | Storage Time | | | -80 | |
| t_f | Fall Time | | | -30 | |

Notes:

4. All voltages (V) and currents (A) are negative polarity for PNP transistors.
5. Pulse test: pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2.0\%$

Typical Performance Characteristics

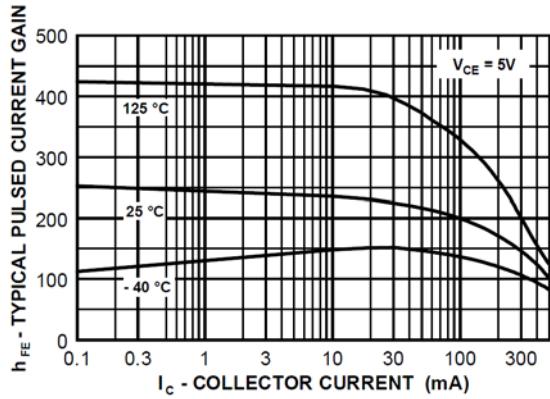


Figure 1. Typical Pulsed Current Gain vs. Collector Current

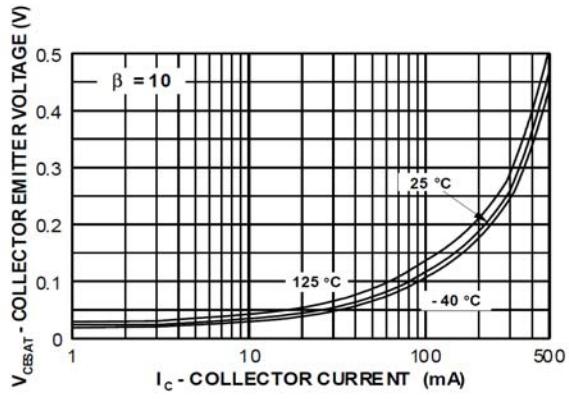


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

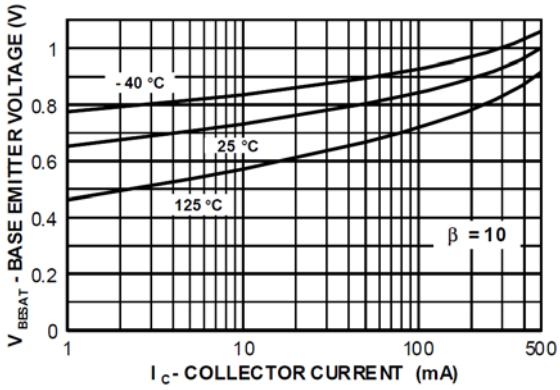


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

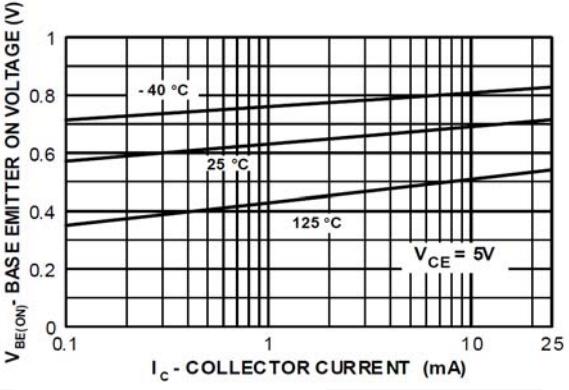


Figure 4. Base Emitter ON Voltage vs. Collector Current

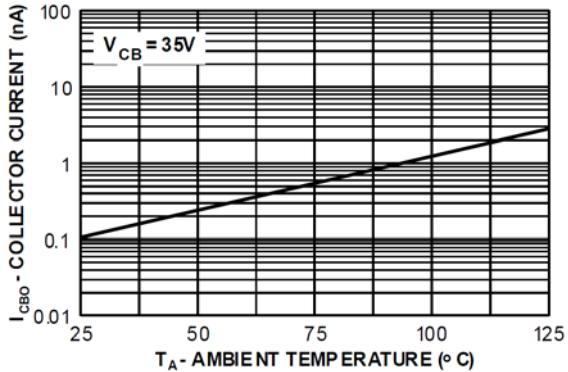


Figure 5. Collector-Cut-Off Current vs. Ambient Temperature

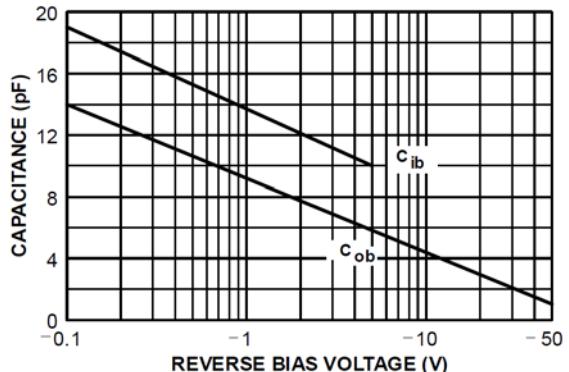


Figure 6. Input and Output Capacitance vs. Reverse Bias Voltage

Typical Performance Characteristics (Continued)

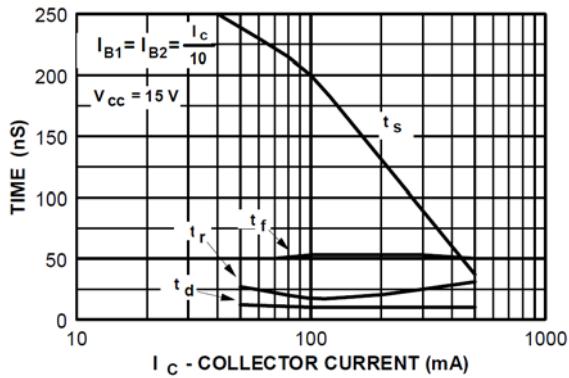


Figure 7. Switching Times vs. Collector Current

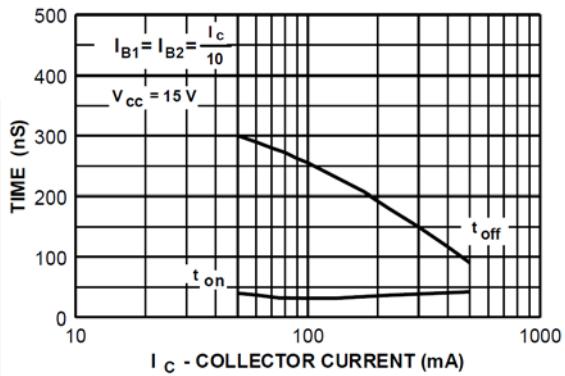


Figure 8. Turn-On and Turn-Off Times vs. Collector Current

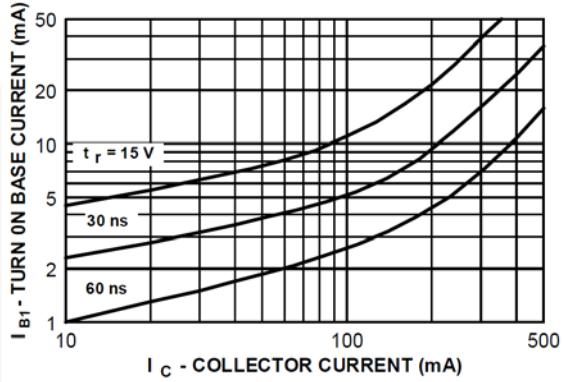


Figure 9. Rise Time vs. Collector and Turn-On Base Currents

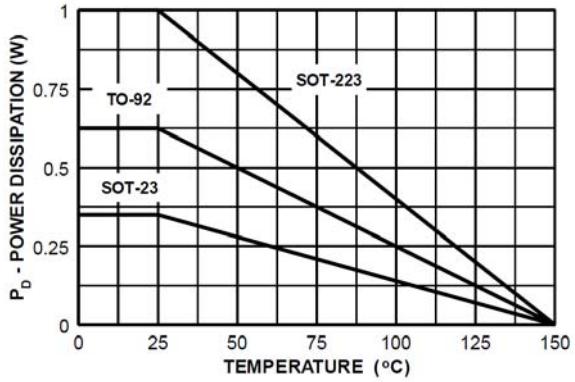


Figure 10. Power Dissipation vs. Ambient Temperature

Typical Performance Characteristics (f = 1.0 kHz)

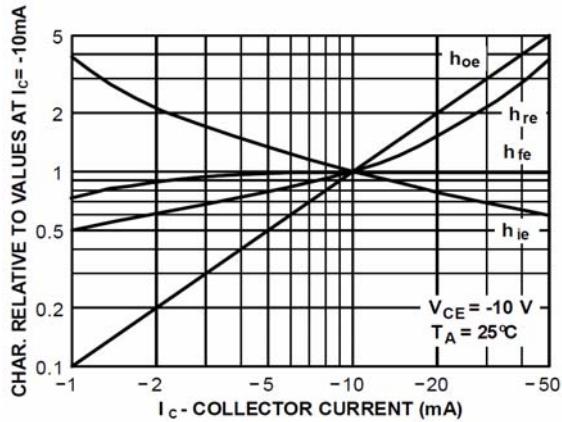


Figure 11. Common Emitter Characteristics

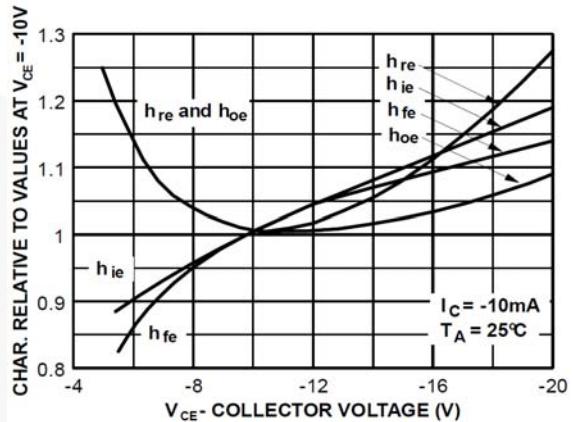


Figure 12. Common Emitter Characteristics

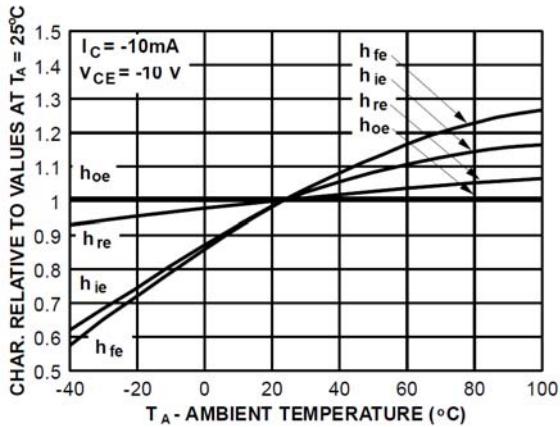


Figure 13. Common Emitter Characteristics

Physical Dimensions

TO-92 (Bulk)

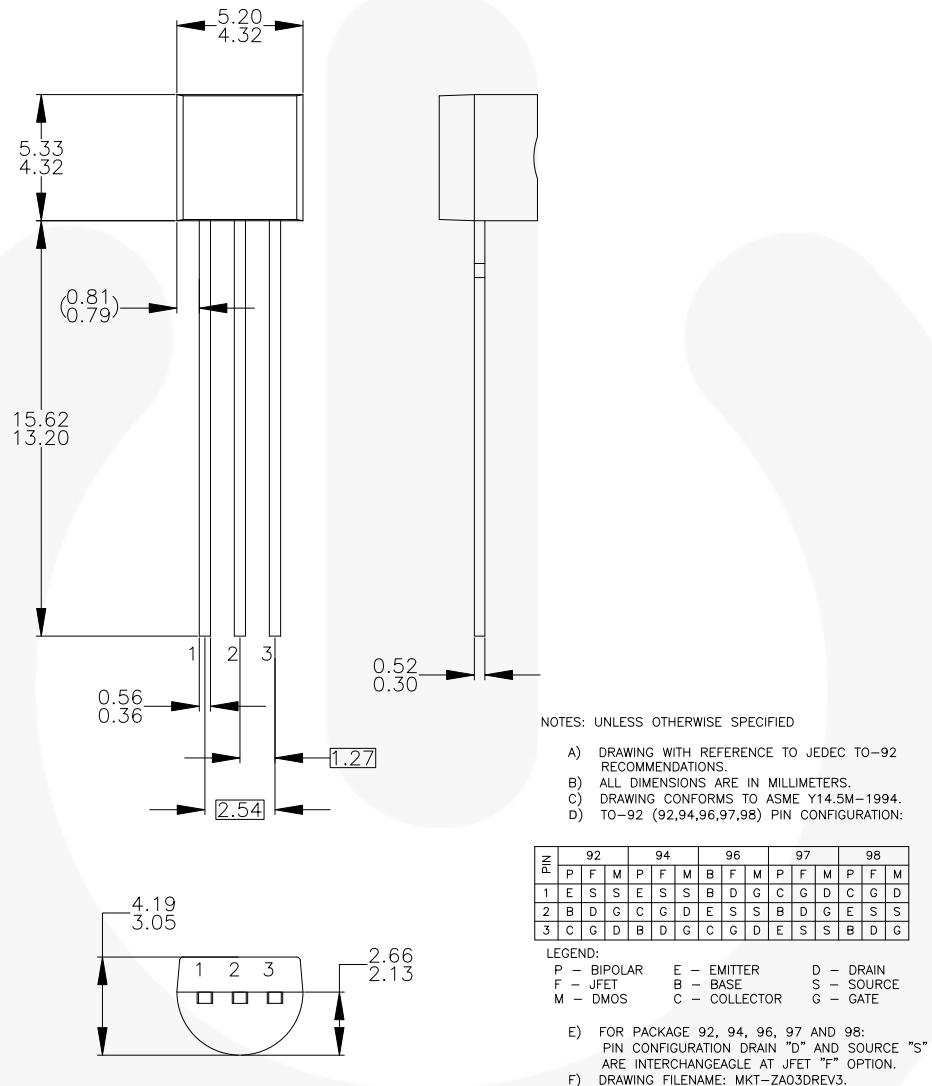


Figure 14. 3-LEAD, TO92, JEDEC TO-92 COMPLIANT STRAIGHT LEAD CONFIGURATION (OLD TO92AM3) (ACTIVE)

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:
<http://www.fairchildsemi.com/dwg/ZA/ZA03D.pdf>

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:
http://www.fairchildsemi.com/packaging/tr/to92pdd_tr.pdf

Physical Dimensions (Continued)

TO-92 (Tape and Reel, Ammo)

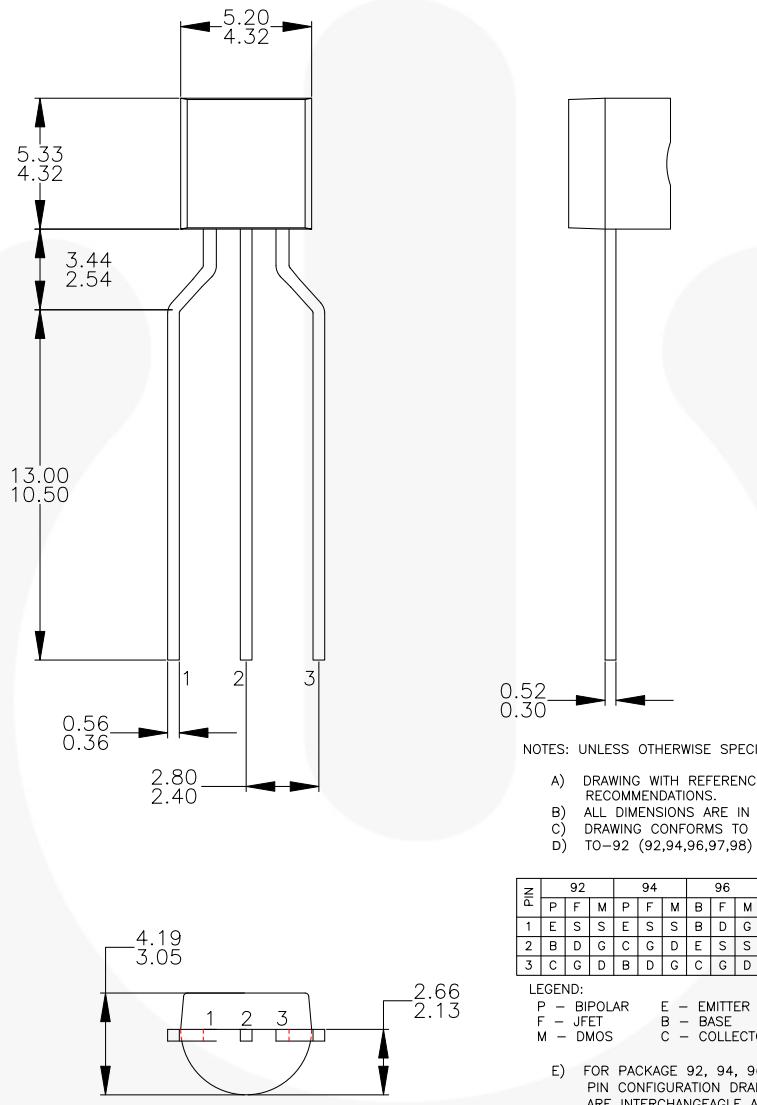


Figure 15. 3-LEAD, TO92, MILDED 0.200 IN LINE SPACING LD FORM (J61Z OPTION) (ACTIVE)

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:
<http://www.fairchildsemi.com/dwg/ZA03F.pdf>.

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:

http://www.fairchildsemi.com/packaging/tr/to92_tr.pdf.

Physical Dimensions (Continued)

SOT-23

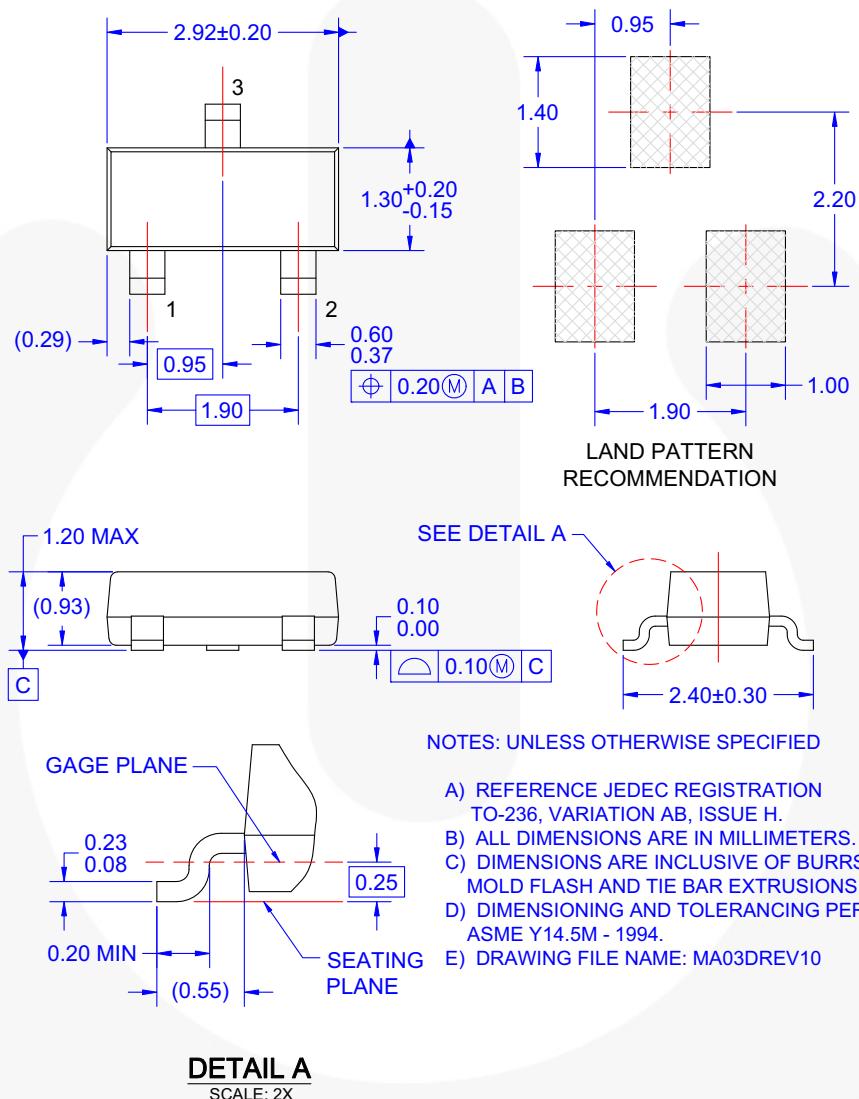


Figure 16. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE (ACTIVE)

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:
<http://www.fairchildsemi.com/dwg/MA/MA03D.pdf>

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:

http://www.fairchildsemi.com/packaging/tr/SOT23-3L_tr.pdf

Physical Dimensions (Continued)

SOT-223

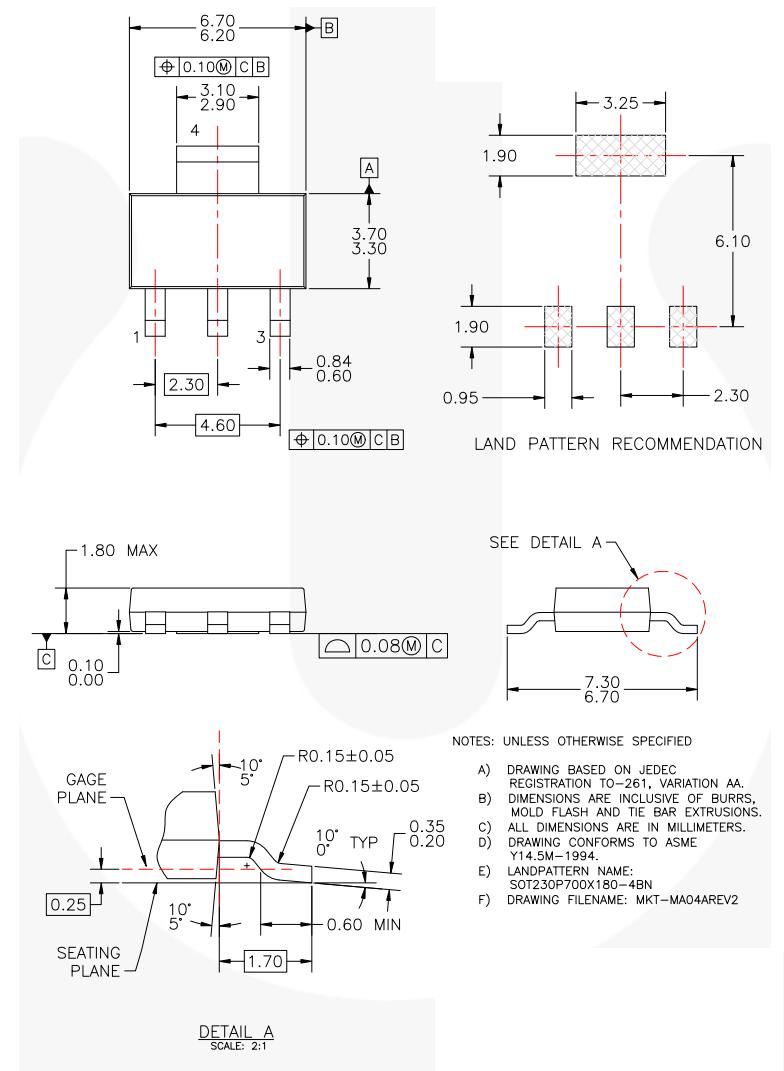


Figure 17. MOLDED PACKAGING, SOT-223, 4-LEAD (ACTIVE)

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:
<http://www.fairchildsemi.com/dwg/MA/MA04A.pdf>

For current tape and reel specifications, visit Fairchild Semiconductor's online packaging area:
http://www.fairchildsemi.com/packaging/tr/sot223_tr.pdf



TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

2Cool™
AccuPower™
AX-CAP®*
BitSiC™
Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
DEUXPEED®
Dual Cool™
EcoSPARK®
EfficientMax™
ESBC™
 Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FETBench™

FPS™
F-PFS™
FRFET®
Global Power Resource™
GreenBridge™
Green FPS™
Green FPS™ e-Series™
Gmax™
GTO™
IntelliMAX™
ISOPLANAR™
Making Small Speakers Sound Louder and Better™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
mWSaver™
OptoHiT™
OPTOLOGIC®
OPTOPLANAR®

PowerTrench®
PowerXS™
Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™
 Saving our world, 1mW/W/kW at a time™
SignalWise™
SmartMax™
SMART START™
Solutions for Your Success™
SPM®
STEALTH™
SuperFET®
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS®
SyncFET™

Sync-Lock™
 SYSTEM GENERAL®*
TinyBoost™
TinyBuck™
TinyCalc™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TransiC™
TriFault Detect™
TRUECURRENT®*
μSerDes™
 UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
VoltagePlus™
XS™

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in 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.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

| Datasheet Identification | Product Status | Definition |
|--------------------------|-----------------------|---|
| Advance Information | Formative / In Design | Datasheet contains the design specifications for product development. Specifications may change in any manner without notice. |
| Preliminary | First Production | Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design. |
| No Identification Needed | Full Production | Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design. |
| Obsolete | Not In Production | Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only. |

Rev. I64

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Fairchild Semiconductor:

[PN2907A_D81Z](#) [PN2907A_J61Z](#) [PN2907A_S00Z](#) [PN2907ANLBU](#) [PN2907A_D29Z](#) [PN2907A_J05Z](#)
[PN2907A_J18Z](#) [PN2907A_D11Z](#) [PN2907A_D26Z](#) [PN2907A_D27Z](#) [PN2907A_D28Z](#) [PN2907A_D74Z](#)
[PN2907A_D75Z](#) [PN2907ARA](#) [PN2907ARM](#) [PN2907ARP](#) [PN2907BU_Q](#) [PN2907TFR_Q](#) [PN2907A_J05Z_Q](#)