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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD SEMICONDUCTOR®

January 2014

PN2907A / MMBT2907A / PZT2907A
60 V PNP General-Purpose Transistor

Features

- High DC Current Gain (h_{FE}) 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)

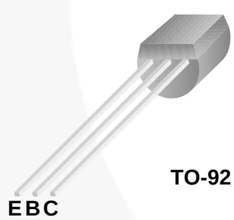
Applications

- General-Purpose Amplifier
- Switch

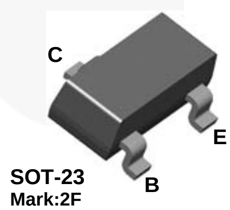
Description

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.

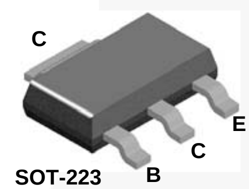
PN2907A



MMBT2907A



PZT2907A



Ordering Information

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

Absolute Maximum Ratings(1),(2)

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°C unless otherwise noted.

Symbol	Parameter	Value	Unit
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}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Notes:

1. These ratings are based on a maximum junction temperature of 150°C.
2. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty cycle operations.

Thermal Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Max.			Unit
		PN2907A(4)	MMBT2907A(3)	PZT2907A(4)	
P_D	Total Device Dissipation	625	350	1000	mW
	Derate Above 25°C	5.0	2.8	8.0	mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3			°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	357	125	°C/W

Notes:

3. Device is mounted on FR-4 PCB 1.6 inch X 1.6 inch X 0.06 inch.
4. PCB size: FR-4 76 x 114 x 1.57 mm^3 (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.

Electrical Characteristics

Values are at T_A = 25°C unless otherwise noted.

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

Notes:

5. Pulse test: pulse width ≤ 300 µs, duty cycle ≤ 2.0%.

Typical Performance Characteristics

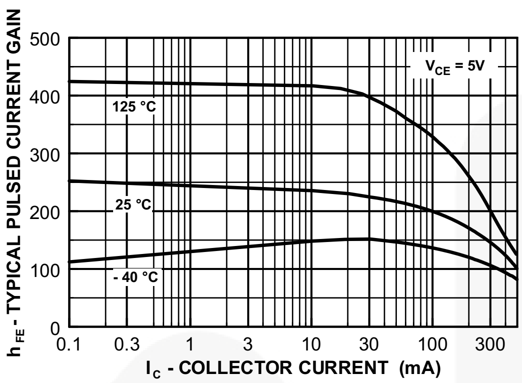


Figure 1. Typical Pulsed Current Gain vs. Collector Current

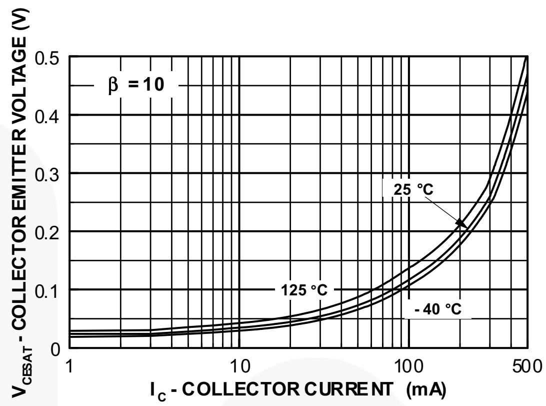


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

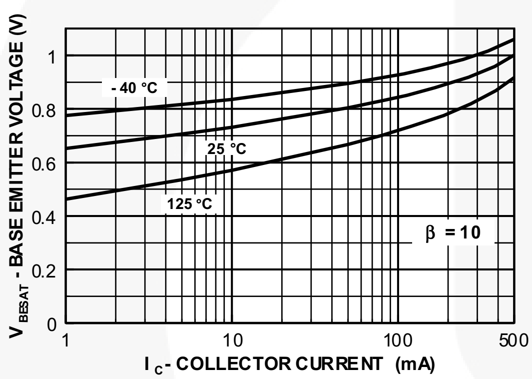


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

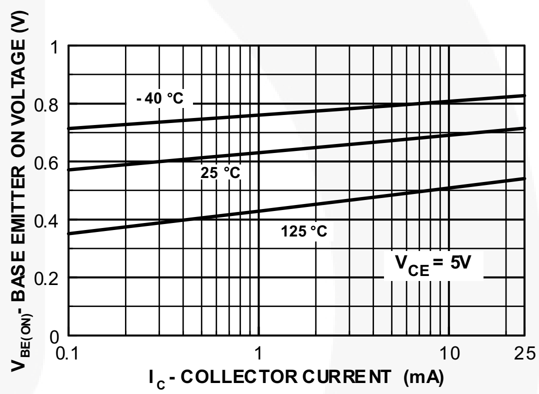


Figure 4. Base-Emitter On Voltage vs. Collector Current

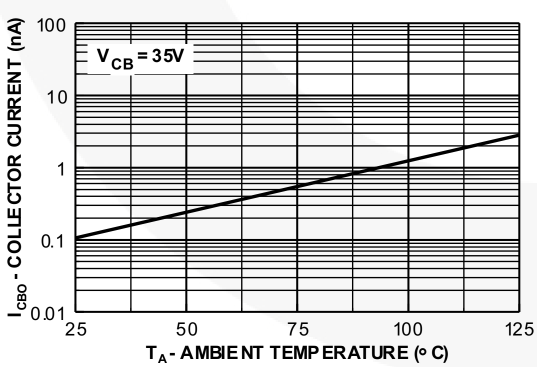


Figure 5. Collector Cut-Off Current vs. Ambient Temperature

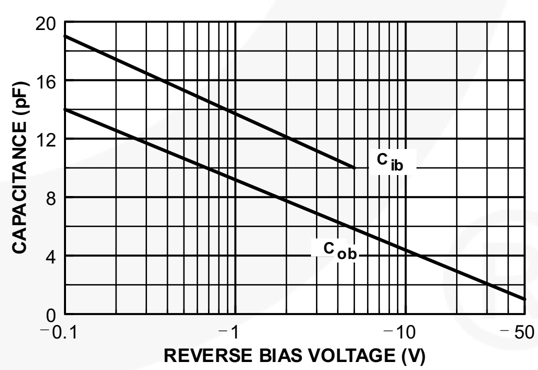


Figure 6. Input and Output Capacitance vs. Reverse Bias Voltage

Typical Performance Characteristics (Continued)

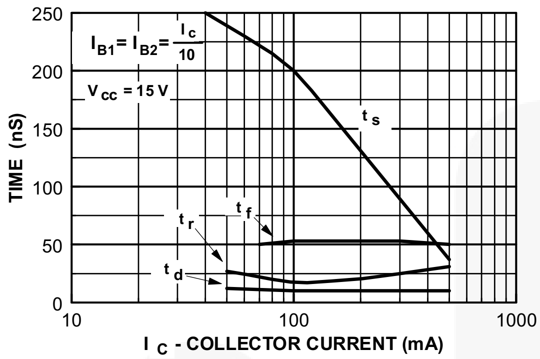


Figure 7. Switching Times vs. Collector Current

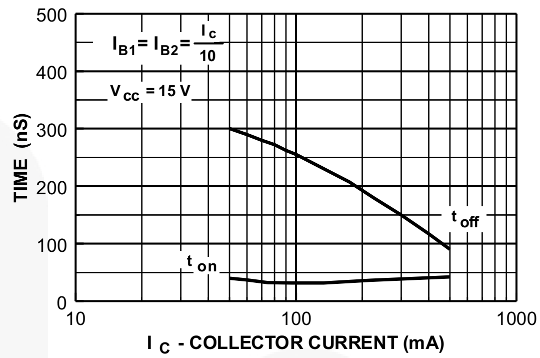


Figure 8. Turn-On and Turn-Off Times vs. Collector Current

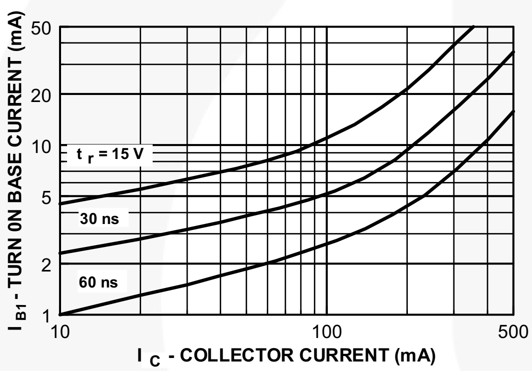


Figure 9. Rise Time vs. Collector and Turn-On Base Currents

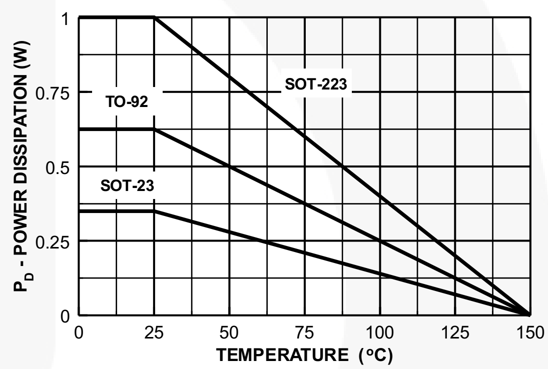


Figure 10. Power Dissipation vs. Ambient Temperature

Typical Performance Characteristics (f = 1.0 kHz)

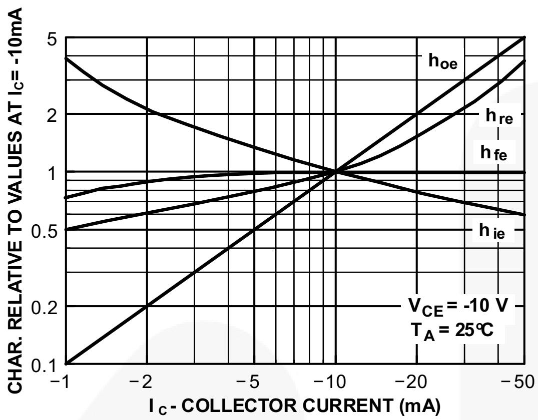


Figure 11. Common Emitter Characteristics

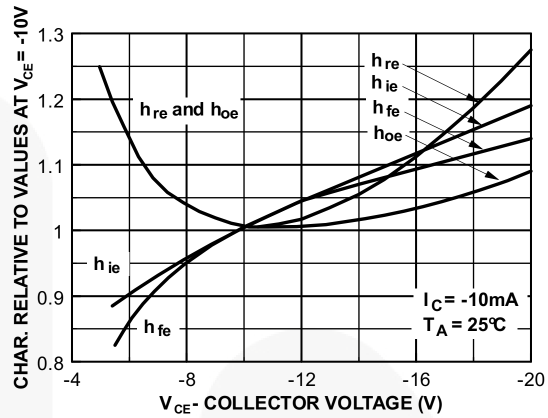


Figure 12. Common Emitter Characteristics

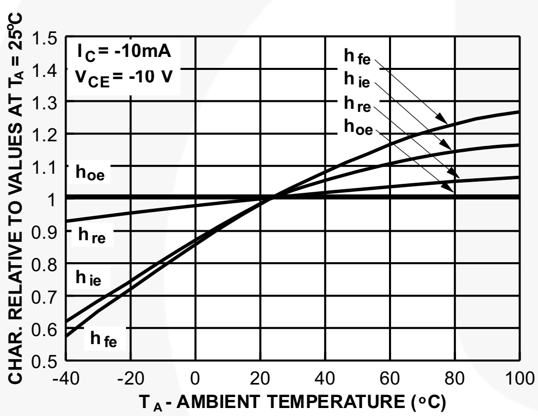
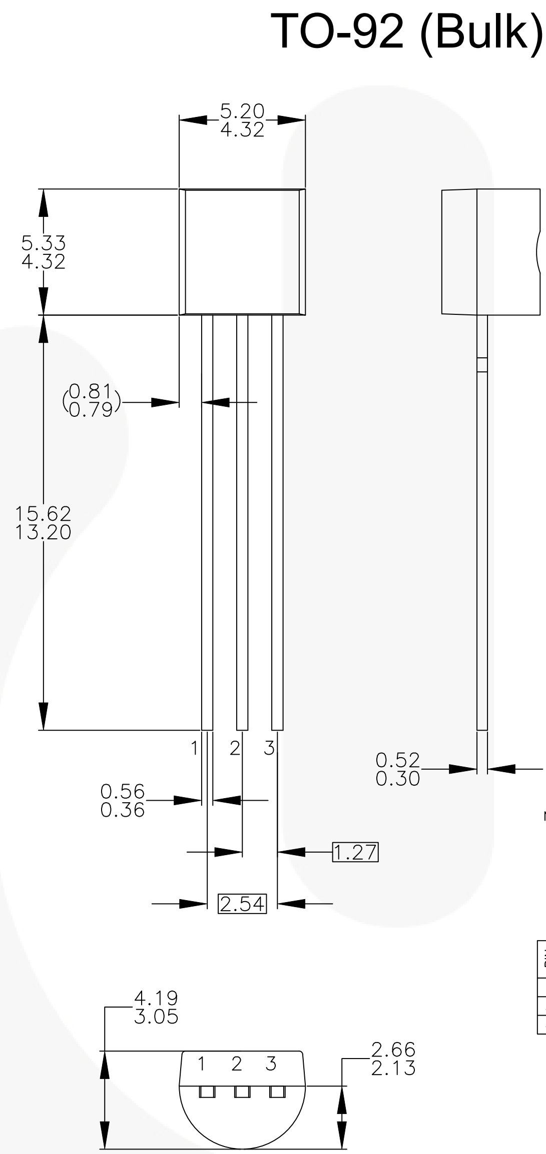


Figure 13. Common Emitter Characteristics

Physical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

A) DRAWING WITH REFERENCE TO JEDEC TO-92 RECOMMENDATIONS.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DRAWING CONFORMS TO ASME Y14.5M-1994.
D) TO-92 (92,94,96,97,98) PIN CONFIGURATION:

PIN	92			94			96			97			98		
	P	F	M	P	F	M	B	F	M	P	F	M	P	F	M
1	E	S	S	E	S	S	B	D	G	C	G	D	C	G	D
2	B	D	G	C	G	D	E	S	S	B	D	G	E	S	S
3	C	G	D	B	D	G	C	G	D	E	S	S	B	D	G

LEGEND:
P – BIPOLAR
F – JFET
M – DMOS
E – EMITTER
B – BASE
C – COLLECTOR
D – DRAIN
S – SOURCE
G – GATE

E) FOR PACKAGE 92, 94, 96, 97 AND 98: PIN CONFIGURATION DRAIN "D" AND SOURCE "S" ARE INTERCHANGEAGLE AT JFET "F" OPTION.
F) DRAWING FILENAME: MKT-ZA03DREV3.

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

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Physical Dimensions (Continued)

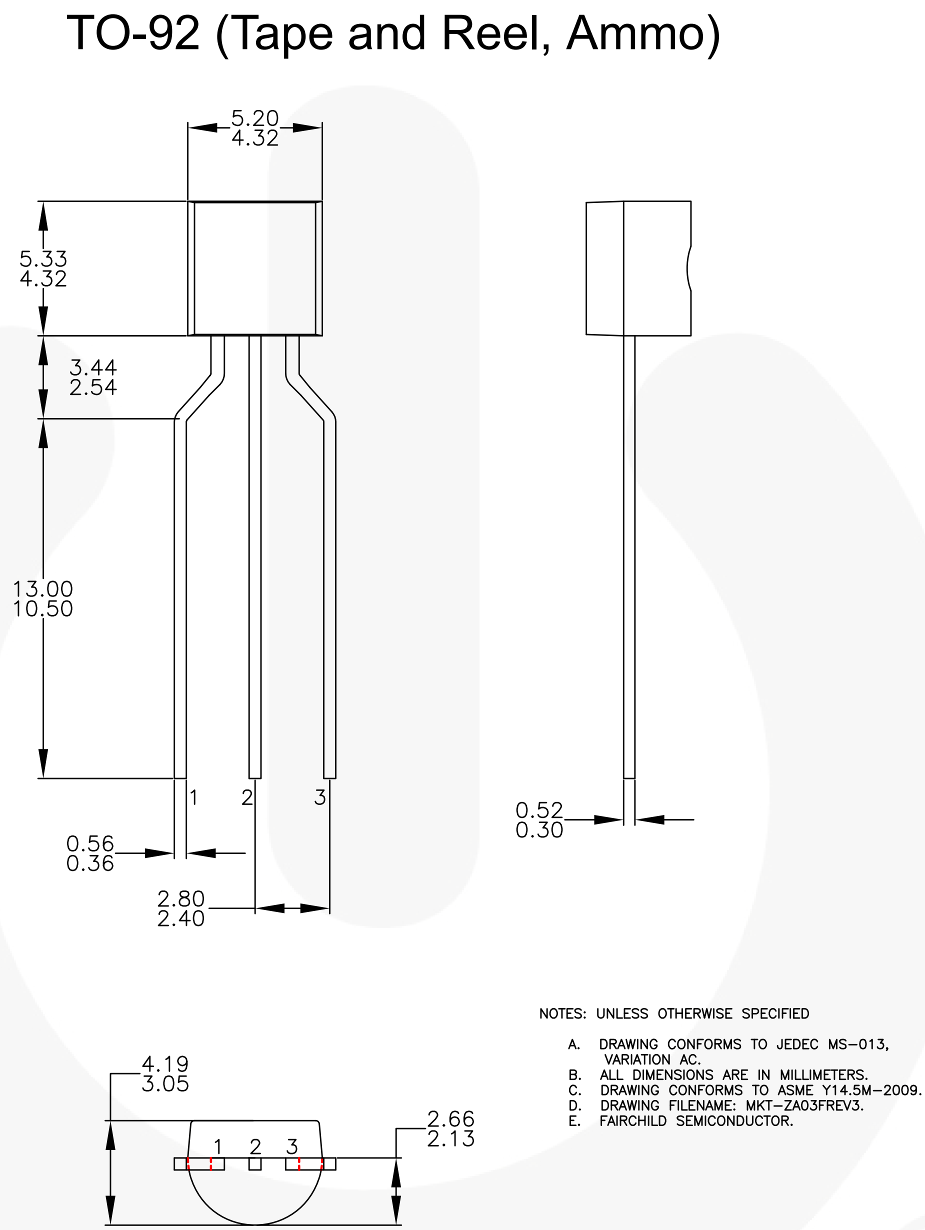

Figure 15. 3-LEAD, TO92, MOLDED 0.200 IN LINE SPACING LEAD FORM (J61Z OPTION) (ACTIVE)

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Physical Dimensions (Continued)

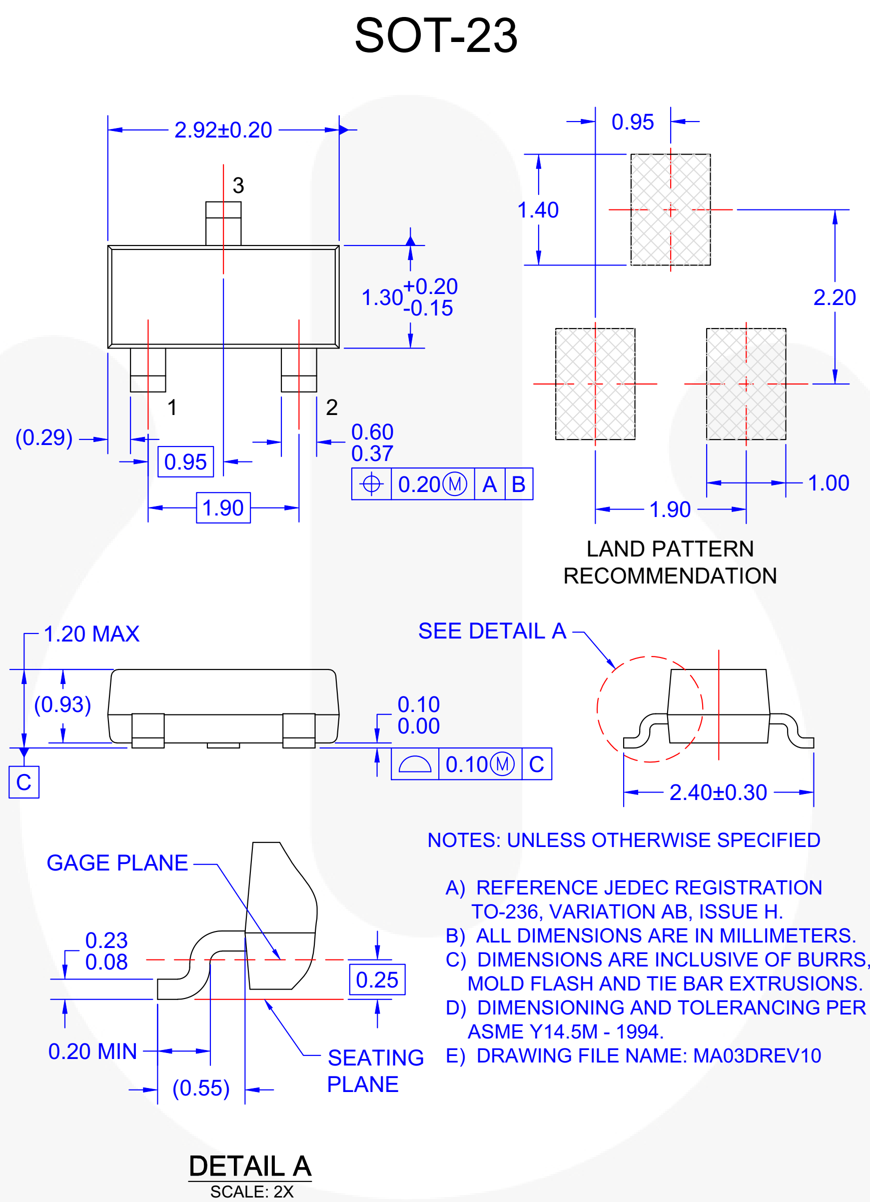

Figure 16. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE (ACTIVE)

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Physical Dimensions (Continued)

SOT-223

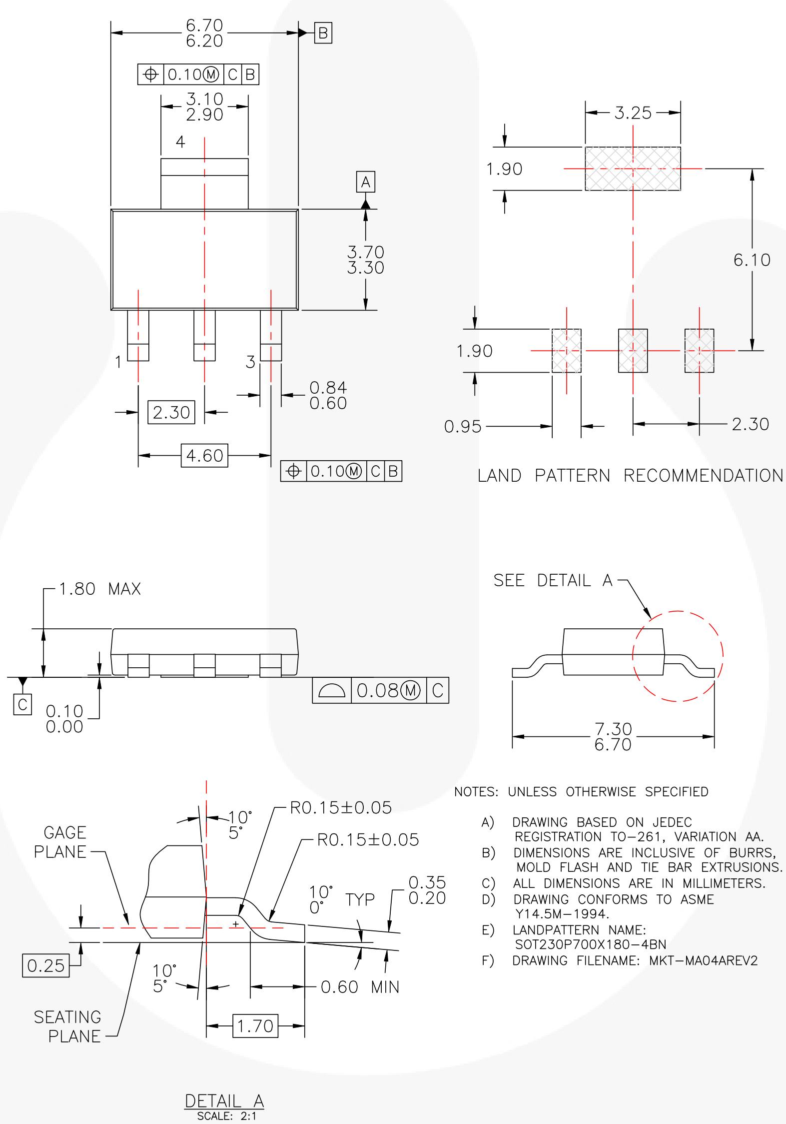

Figure 17. MOLDED PACKAGING, SOT-223, 4-LEAD (ACTIVE)

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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. I66

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