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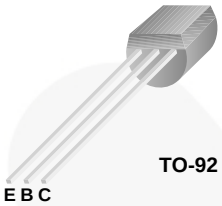
July 2014

PN2222A
NPN General-Purpose Amplifier

Features

- This device is for use as a medium power amplifier and switch requiring collector currents up to 500mA.



TO-92

Ordering Information

Part Number	Top Mark	Package	Packing Method
PN2222ABU	PN2222A	TO-92 3L	Bulk
PN2222ATA	PN2222A	TO-92 3L	Ammo
PN2222ATF	PN2222A	TO-92 3L	Tape and Reel
PN2222ATFR	PN2222A	TO-92 3L	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	40	V
V_{CBO}	Collector-Base Voltage	75	V
V_{EBO}	Emitter-Base Voltage	6.0	V
I_C	Collector Current	1.0	A
T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C

Note:

1. These rating 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 operation.

Thermal Characteristics[3]

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

Symbol	Parameter	Max.	Unit
P_D	Total Device Dissipation	625	mW
	Derate Above 25°C	5.0	mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	°C/W

Note:

3. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (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.

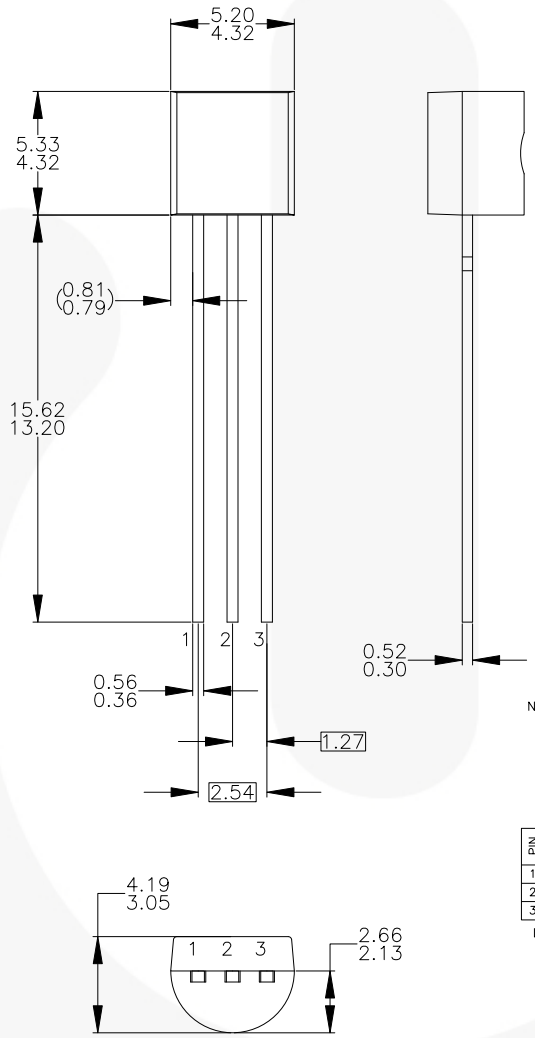
Symbol	Parameter	Conditions	Min.	Max.	Unit
Off Characteristics					
$BV_{(BR)CEO}$	Collector-Emitter Breakdown Voltage[4]	I_C = 10 mA, I_B = 0	40		V
$BV_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 10 µA, I_E = 0	75		V
$BV_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 10 µA, I_C = 0	6.0		V
I_{CEX}	Collector Cut-Off Current	V_{CE} = 60 V, $V_{EB(off)}$ = 3.0 V		10	nA
I_{CBO}	Collector Cut-Off Current	V_{CB} = 60 V, I_E = 0		0.01	µA
		V_{CB} = 60 V, I_E = 0, T_A = 125°C		10	
I_{EBO}	Emitter Cut-Off Current	V_{EB} = 3.0 V, I_C = 0		10	nA
I_{BL}	Base Cut-Off Current	V_{CE} = 60 V, $V_{EB(off)}$ = 3.0 V		20	nA
On Characteristics					
h_{FE}	DC Current Gain	I_C = 0.1 mA, V_{CE} = 10 V	35		
		I_C = 1.0 mA, V_{CE} = 10 V	50		
		I_C = 10 mA, V_{CE} = 10 V	75		
		I_C = 10 mA, V_{CE} = 10 V, T_A = -55°C	35		
		I_C = 150 mA, V_{CE} = 10 V[4]	100	300	
		I_C = 150 mA, V_{CE} = 1 V[4]	50		
		I_C = 500 mA, V_{CE} = 10 V[4]	40		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage[4]	I_C = 150 mA, I_B = 15 mA		0.3	V
		I_C = 500 mA, I_B = 50 mA		1.0	
$V_{BE(sat)}$	Base-Emitter Saturation Voltage[4]	I_C = 150 mA, I_B = 15 mA	0.6	1.2	V
		I_C = 500 mA, I_B = 50 mA		2.0	
Small Signal Characteristics					
f_T	Current Gain Bandwidth Product	I_C = 20 mA, V_{CE} = 20 V, f = 100 MHz	300		MHz
C_{obo}	Output Capacitance	V_{CB} = 10 V, I_E = 0, f = 1 MHz		8.0	pF
C_{ibo}	Input Capacitance	V_{EB} = 0.5 V, I_C = 0, f = 1 MHz		25	pF
$rb'C_c$	Collector Base Time Constant	I_C = 20 mA, V_{CB} = 20 V, f = 31.8 MHz		150	pS
NF	Noise Figure	I_C = 100 µA, V_{CE} = 10 V, R_S = 1.0 kΩ, f = 1.0 kHz		4.0	dB
$Re(h_{ie})$	Real Part of Common-Emitter High Frequency Input Impedance	I_C = 20 mA, V_{CE} = 20 V, f = 300 MHz		60	Ω
Switching Characteristics					
t_d	Delay Time	V_{CC} = 30 V, $V_{EB(off)}$ = 0.5 V, I_C = 150 mA, I_{B1} = 15 mA		10	ns
t_r	Rise Time			25	ns
t_s	Storage Time	V_{CC} = 30 V, I_C = 150 mA, I_{B1} = I_{B2} = 15 mA		225	ns
t_f	Fall Time			60	ns

Note:

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

Physical Dimensions

TO-92 (Bulk)



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 1. 3-LEAD, TO92, JEDEC TO-92 COMPLIANT STRAIGHT LEAD CONFIGURATION (OLD TO92AM3)

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Physical Dimensions (Continued)

TO-92 (Ammo, Tape and Reel)

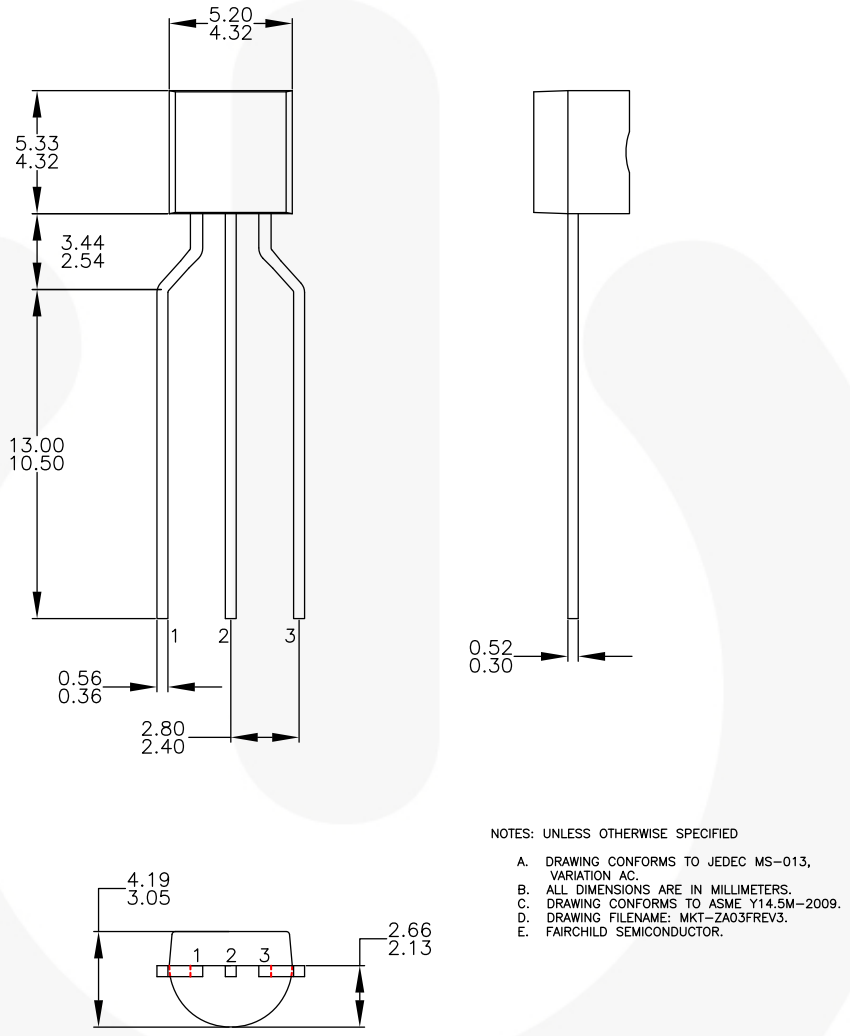

Figure 2. 3-LEAD, TO-92, MOLDED 0.200 IN LINE SPACING LEAD FORM (J61Z OPTION)

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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.

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