25-05941

FAIRCHILD
SEMICONDUCTOR®

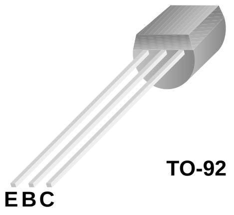
October 2011

2N3906 / MMBT3906 / PZT3906
PNP General Purpose Amplifier

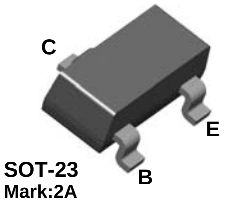
Features

- This device is designed for general purpose amplifier and switching applications at collector currents of 10µA to 100 mA.

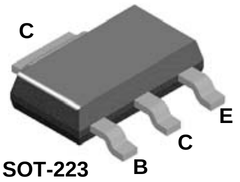
2N3906



MMBT3906



PZT3906



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

Symbol	Parameter	Value	Units
V_{CEO}	Collector-Emitter Voltage	-40	V
V_{CBO}	Collector-Base Voltage	-40	V
V_{EBO}	Emitter-Base Voltage	-5.0	V
I_C	Collector Current - Continuous	-200	mA
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	°C

* 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 T_a = 25°C unless otherwise noted

Symbol	Parameter	Max.			Units
		2N3906	*MMBT3906	**PZT3906	
P_D	Total Device Dissipation Derate above 25°C	625 5.0	350 2.8	1,000 8.0	mW 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

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

** Device mounted on FR-4 PCB 36 mm X 18 mm X 1.5 mm; mounting pad for the collector lead min. 6 cm^2.

Electrical Characteristics T_a = 25°C unless otherwise noted

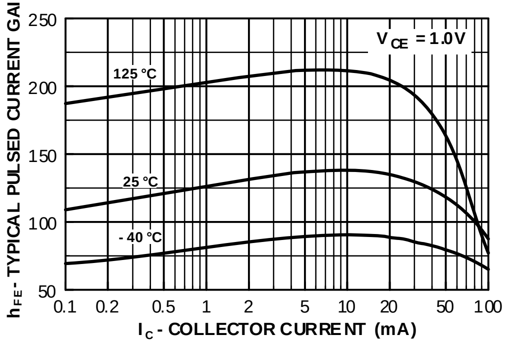
Symbol	Parameter	Test Condition	Min.	Max.	Units
OFF CHARACTERISTICS					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage*	I_C = -1.0mA, I_B = 0	-40		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = -10μA, I_E = 0	-40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = -10μA, I_C = 0	-5.0		V
I_{BL}	Base Cutoff Current	V_{CE} = -30V, V_{BE} = -3.0V		-50	nA
I_{CEX}	Collector Cutoff Current	V_{CE} = -30V, V_{BE} = -3.0V		-50	nA
ON CHARACTERISTICS					
h_{FE}	DC Current Gain*	I_C = -0.1mA, V_{CE} = -1.0V I_C = -1.0mA, V_{CE} = -1.0V I_C = -10mA, V_{CE} = -1.0V I_C = -50mA, V_{CE} = -1.0V I_C = -100mA, V_{CE} = -1.0V	60 80 100 60 30	300	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = -10mA, I_B = -1.0mA I_C = -50mA, I_B = -5.0mA		-0.25 -0.4	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = -10mA, I_B = -1.0mA I_C = -50mA, I_B = -5.0mA	-0.65	-0.85 -0.95	V V
SMALL SIGNAL CHARACTERISTICS					
f_T	Current Gain - Bandwidth Product	I_C = -10mA, V_{CE} = -20V, f = 100MHz	250		MHz
C_{obo}	Output Capacitance	V_{CB} = -5.0V, I_E = 0, f = 100kHz		4.5	pF
C_{ibo}	Input Capacitance	V_{EB} = -0.5V, I_C = 0, f = 100kHz		10.0	pF
NF	Noise Figure	I_C = -100μA, V_{CE} = -5.0V, R_S = 1.0kΩ, f = 10Hz to 15.7kHz		4.0	dB
SWITCHING CHARACTERISTICS					
t_d	Delay Time	V_{CC} = -3.0V, V_{BE} = -0.5V I_C = -10mA, I_{B1} = -1.0mA		35	ns
t_r	Rise Time			35	ns
t_s	Storage Time	V_{CC} = -3.0V, I_C = -10mA, I_{B1} = I_{B2} = -1.0mA		225	ns
t_f	Fall Time			75	ns

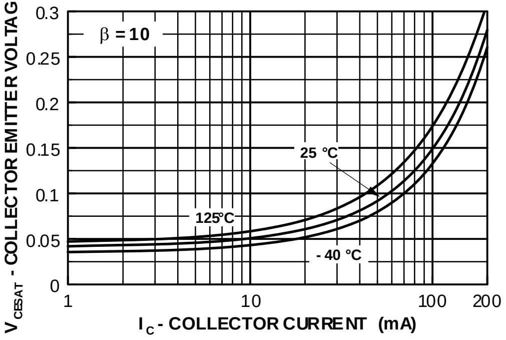
* Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%

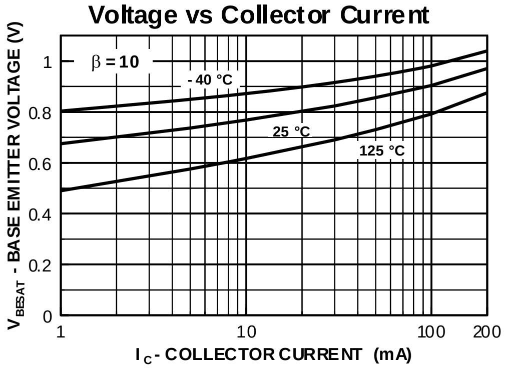
Ordering Information

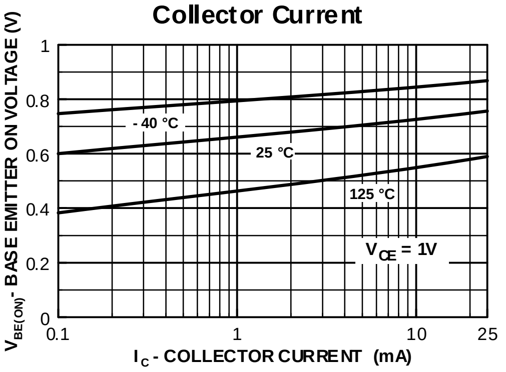
Part Number	Marking	Package	Packing Method	Pack Qty
2N3906BU	2N3906	TO-92	BULK	10000
2N3906TA	2N3906	TO-92	AMMO	2000
2N3906TAR	2N3906	TO-92	AMMO	2000
2N3906TF	2N3906	TO-92	TAPE REEL	2000
2N3906TFR	2N3906	TO-92	TAPE REEL	2000
MMBT3906	2A	SOT-23	TAPE REEL	3000
PZT3906	3906	SOT-223	TAPE REEL	2500

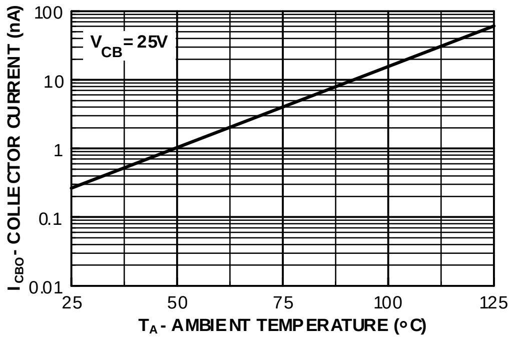
Typical Performance Characteristics

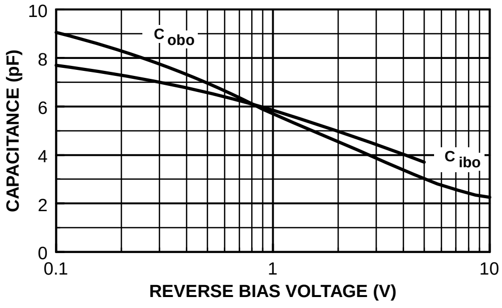

Typical Pulsed Current Gain vs Collector Current


Collector-Emitter Saturation Voltage vs Collector Current


Base-Emitter Saturation Voltage vs Collector Current

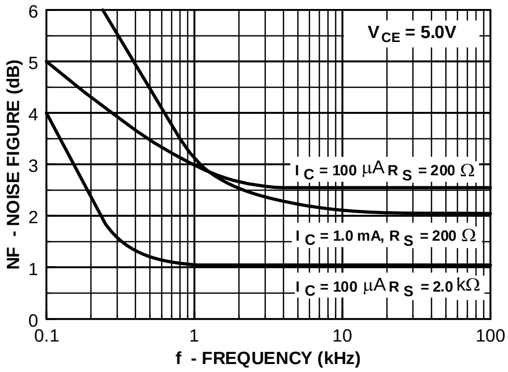

Base Emitter ON Voltage vs Collector Current


Collector-Cutoff Current vs Ambient Temperature

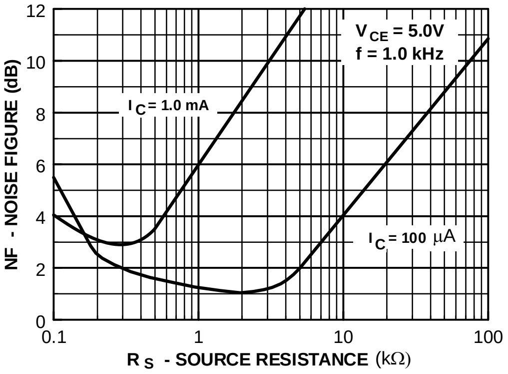

Common-Base Open Circuit Input and Output Capacitance vs Reverse Bias Voltage

Typical Performance Characteristics (continued)

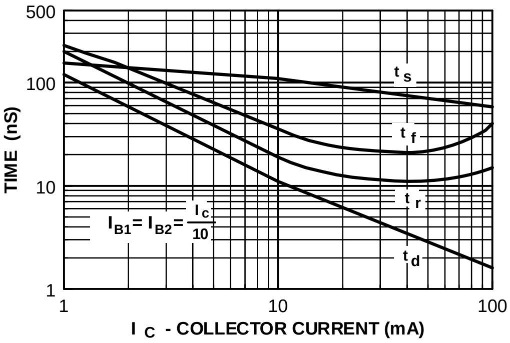
Noise Figure vs Frequency



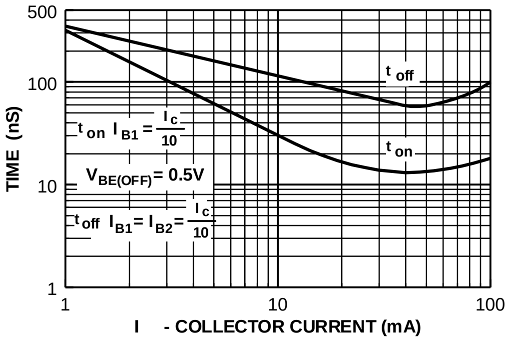
Noise Figure vs Source Resistance



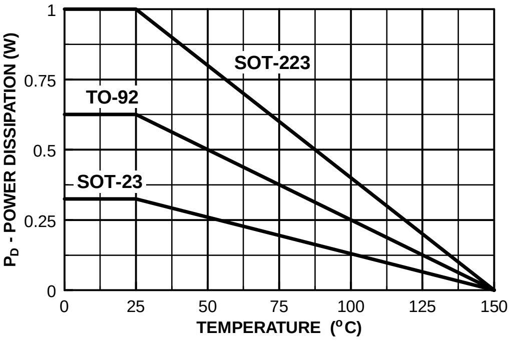
Switching Times vs Collector Current



Turn On and Turn Off Times vs Collector Current

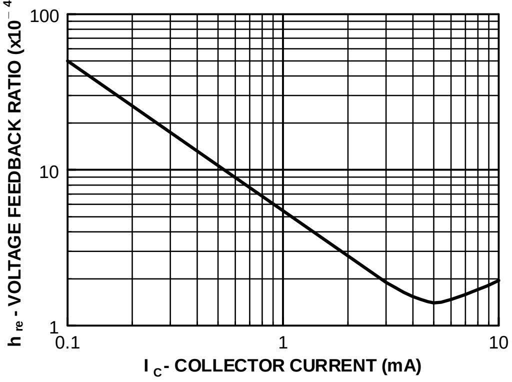


Power Dissipation vs Ambient Temperature

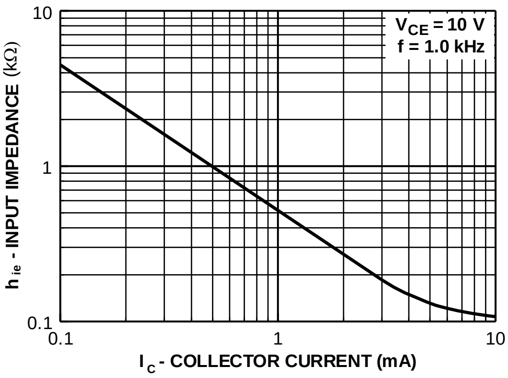


Typical Performance Characteristics (continued)

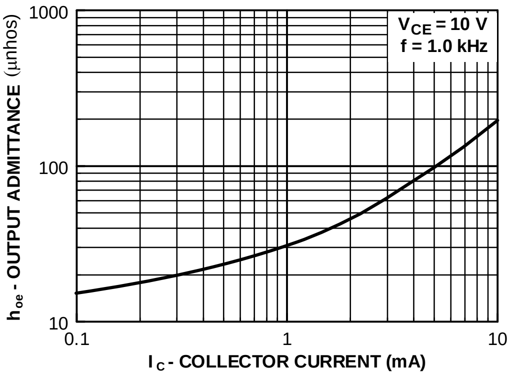
Voltage Feedback Ratio



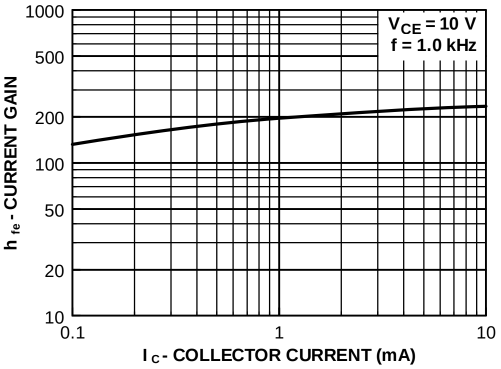
Input Impedance



Output Admittance



Current Gain



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PRODUCT STATUS DEFINITIONS

Definition of Terms

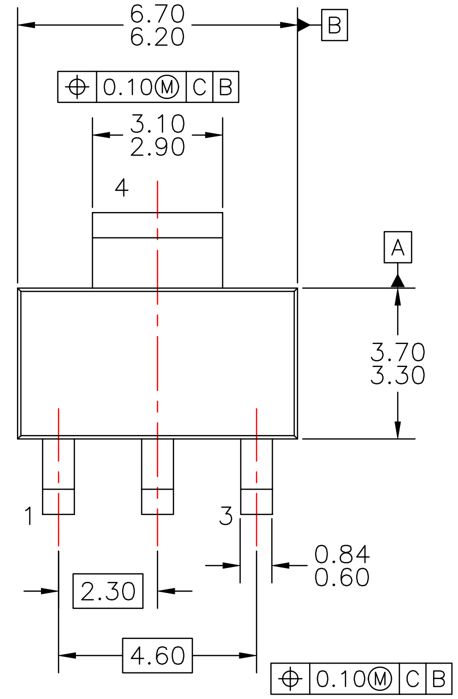
Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data 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.

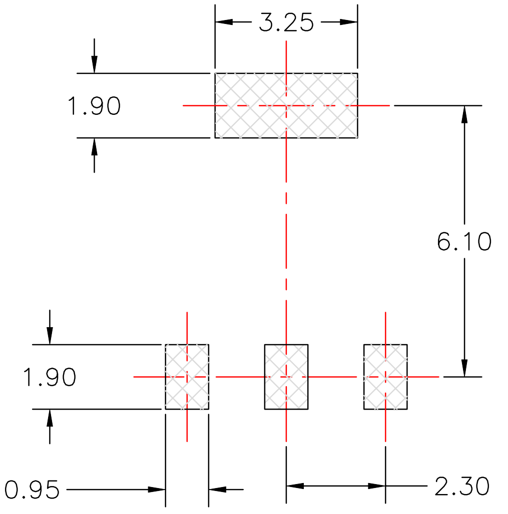
Rev. I57

APPROVED
July-14-2008

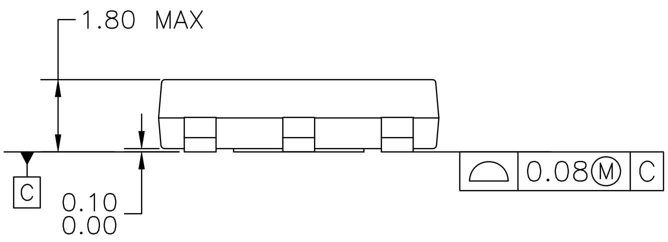
REVISIONS

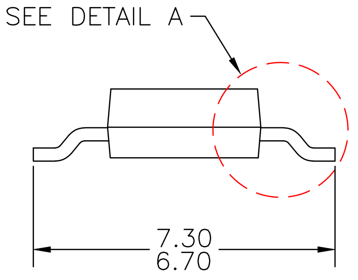
LTR	DESCRIPTION	DATE	NAME/SITE
A	RELEASE TO DOCUMENT CONTROL	JAN.25,1996	TL/FSCP
2	CHG DWG TEMPLATE FR NATIONAL TO FAIRCHILD; CHG DIM STYLE FR DUAL INCH[MM] TO SINGLE, MM; CHG LD WID FR $0.74^{+0.05}_{-0.07}$ TO 0.60–0.84; REMOVE PKG THICK DIM (1.6); CHG TOTAL PKG HT FR $^{1.80}_{1.55}$ TO 1.80 MAX; CHG FOOT LANDING DIM FR 0.91 MIN TO 0.60 MIN; CHG LD THICKNESS FR $0.3^{+0.02}_{-0.07}$ TO 0.20–0.35; ADD DRAFT ANGLE OF MOLDED BODY TOP & BOT; CHG LD LGTH TO PKG EDGE DIM TO BASIC: CHG LD PITCH FR 2.29 BS TO 2.30 BS; CHG BODY WID FR $3.56^{+0.15}_{-0.25}$ TO $^{3.70}_{3.30}$; CHG BODY LN FR $6.5^{+0.2}_{-0.2}$ TO $^{6.70}_{6.20}$; CHG TOTAL PKG WID FR $6.96^{+0.33}_{-0.25}$ TO $^{7.30}_{6.70}$; CHG PAD SIZE FR 0.99 MAX TO 0.95; CHG PAD PITCH FR 2.286 TO 2.30; CHG THERMAL TAB SIZE FR 3.28 MAX TO 3.25; CHG PAD SIZE FR 1.5 TO 1.90; CHG PAD SPACE FR 6.3 TO 6.10; CHG NOTE '2' TO 'A' W/O DATE; DEL NOTE ON LD FINISH; ADD NOTES B, C, D, E & F.	12FEB08	LZSC/FSCP

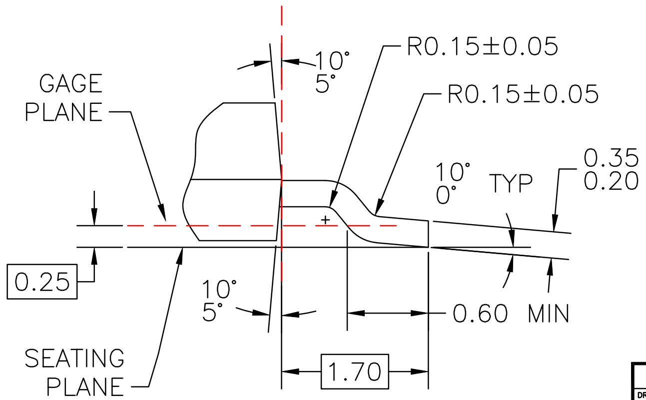




LAND PATTERN RECOMMENDATION







DETAIL A
SCALE: 2:1

NOTES: UNLESS OTHERWISE SPECIFIED

A) DRAWING BASED ON JEDEC REGISTRATION TO–261, VARIATION AA.
B) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
C) ALL DIMENSIONS ARE IN MILLIMETERS.
D) DRAWING CONFORMS TO ASME Y14.5M–1994.
E) LANDPATTERN NAME: SOT230P700X180–4BN
F) DRAWING FILENAME: MKT–MA04AREV2

APPROVALS	DATE
DRAWN: J.U. COMPARATIVO JR.	26FEB2008
CHECKED: L.Z. STA CRUZ	
APPROVED: M.R. GESTOLE	
G.S. BAJE	

PROJECTION
INCH
[MM]

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MOLDED PACKAGE
SOT–223, 4 LEAD

SCALE	SIZE	DRAWING NUMBER	REV
1:1	A3	MKT–MA04A	2

FORMERLY: N/A
SHEET : 1 OF 1