Alfa-MOS Technology

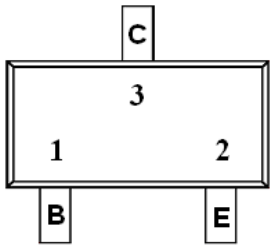
AFT4403

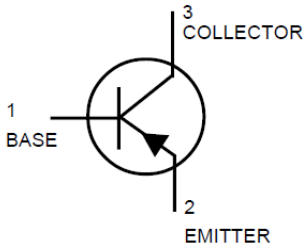
PNP General Purpose Amplifier

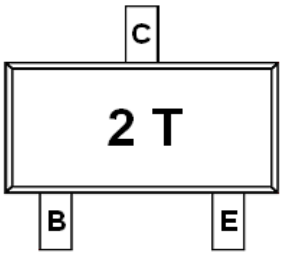
Features

•This device is designed for general purpose amplifier and switching applications

Pin Description (SOT-23)







Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFT4403T1S23RG	2T	SOT-23	Tape & Reel	3000 EA

Absolute Maximum Ratings (T_A=25℃ Unless otherwise noted)

Symbol	Parameter	Value	Unit
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	-600	mA
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	℃

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℃ Unless otherwise noted)

Symbol	Parameter	Max.	Unit
P_D	Total Device Dissipation FR– 5 Board, (1) T_A = 25℃	225	mW
	Derate above 25℃	1.8	mW/℃
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	556	℃/W
P_D	Total Device Dissipation Alumina Substrate, (2) T_A = 25℃	300	mW
	Derate above 25℃	2.4	mW/℃
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	417	℃/W

Notes :
1) FR–5 = 1.0 x 0.75 x 0.062 in.
2) Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.
3) Pulse Test: Pulse Width < 300 ∫s, Duty Cycle < 2.0%.

Electrical Characteristics (T_A=25℃ Unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Max.	Unit
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 = -0.1μA, I_E = 0	-40		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = -0.1μA, I_C = 0	-5.0		V
I_{BEV}	Base Cutoff Current	V_{CE} = -35V, V_{EB} = -0.4V		-0.1	uA
I_{CEX}	Collector Cutoff Current	V_{CE} = -35V, V_{EB} = -0.4V		-0.1	uA
On Characteristics *					
h_{FE}	DC Current Gain	I_C = -0.1mA, V_{CE} = -1.0V	30		
		I_C = -1.0mA, V_{CE} = -1.0V	60		
		I_C = -10mA, V_{CE} = -1.0V	100		
		I_C = -150mA, V_{CE} = -2.0V	100	300	
		I_C = -500mA, V_{CE} = -2.0V	20		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = -150mA, I_B = -15mA		-0.4	V
		I_C = -500mA, I_B = -50mA		-0.75	
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = -150mA, I_B = -15mA	-0.75	-0.95	V
		I_C = -500mA, I_B = -50mA		-1.3	
Small Signal Characteristics					
f_T	Current Gain - Bandwidth Product	I_C = -20mA, V_{CE} = -10V, f = 100MHz	200		MHz
Ccb	Collector–Base Capacitance	V_{CB} = -10V, I_E = 0, f = 1.0MHz		8.5	pF
Ceb	Emitter–Base Capacitance	V_{EB} = -0.5V, I_C = 0, f = 1.0MHz		30	pF
hie	Input Impedance	V_{CE} =-10V, I_C =1.0mA, f = 1.0 kHz	1.5	15	kΩ
hre	Voltage Feedback Ratio	V_{CE} =-10V, I_C =1.0mA, f =1.0 kHz	0.1	8.0	X10 –4
hfe	Small–Signal Current Gain	V_{CE} =-10V, I_C =1.0mA, f =1.0 kHz	60	500	
hoe	Output Admittance	V_{CE} =-10V, I_C =1.0mA, f =1.0 kHz	1.0	100	umhos
Switching Characteristics					
td	Delay Time	V_{CC} = -30V, V_{EB} = -2.0V		15	ns
tr	Rise Time	I_C = -150mA, I_{B1} = -15mA		20	
ts	Storage Time	V_{CC} = -30V, I_C = -150mA,		225	ns
tf	Fall Time	I_{B1} = I_{B2} = -15mA		30	

- Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%
- f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

Test Circuits

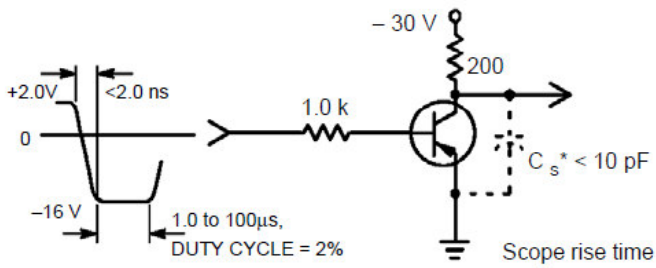


Figure 1. Turn–On Time

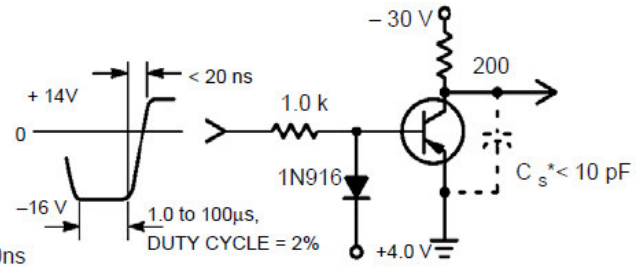


Figure 2. Turn–Off Time

Scope rise time < 4.0ns

*Total shunt capacitance of test jig connectors, and oscilloscope

Typical Characteristics (TRANSIENT)

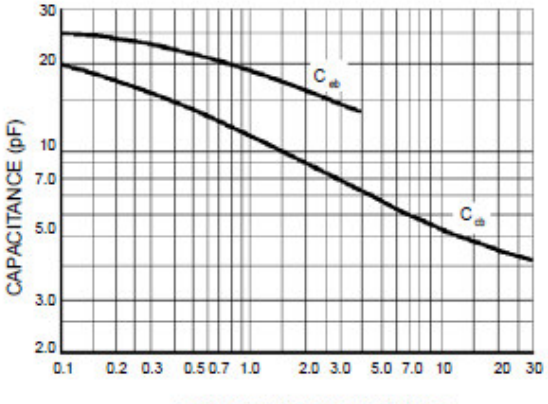


Figure 3. Capacitance

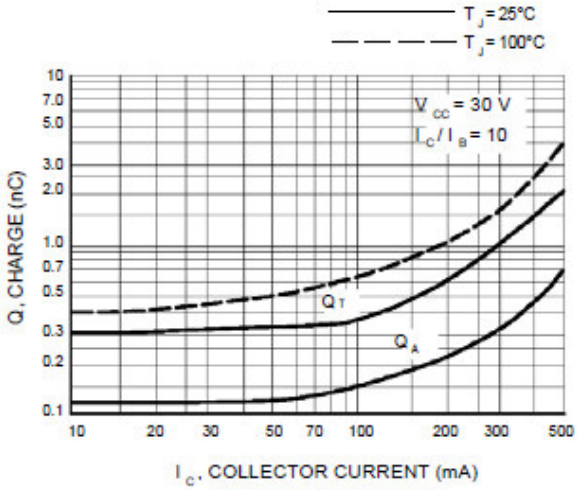


Figure 4. Charge Data

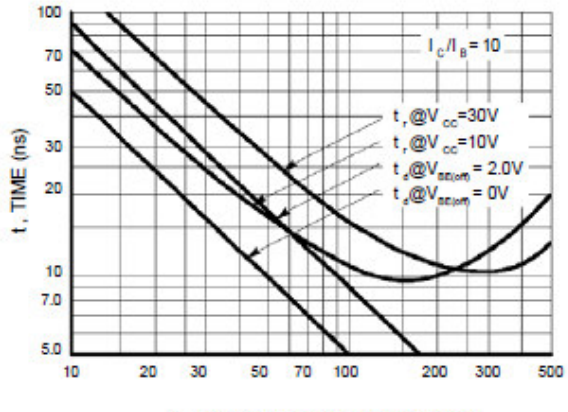


Figure 5. Turn–On Time

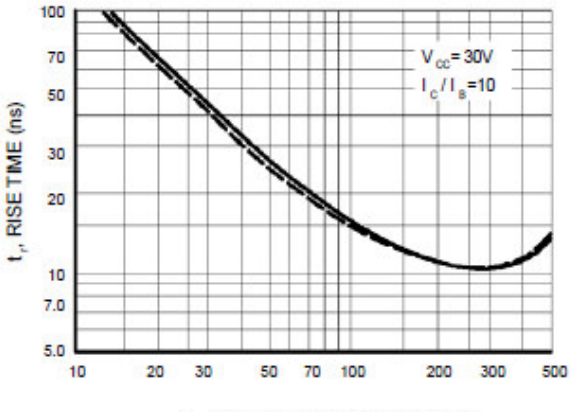


Figure 6. Rise Time

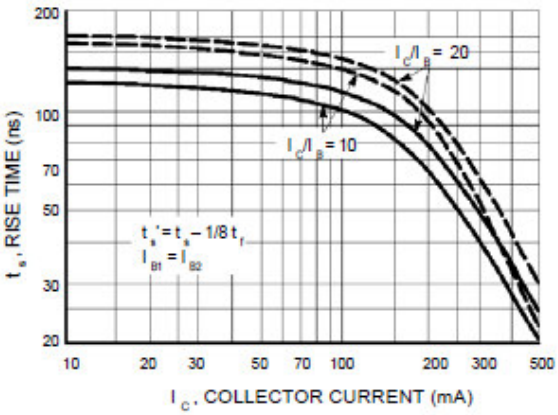


Figure 7. Storage Time

Typical Characteristics (AUDIO SMALL–SIGNAL)

V_{CE} = –10 Vdc, T_A = 25°C
Bandwidth = 1.0 Hz

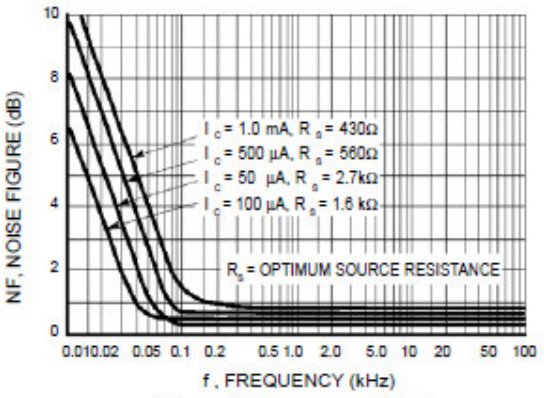


Figure 8. Frequency Effects

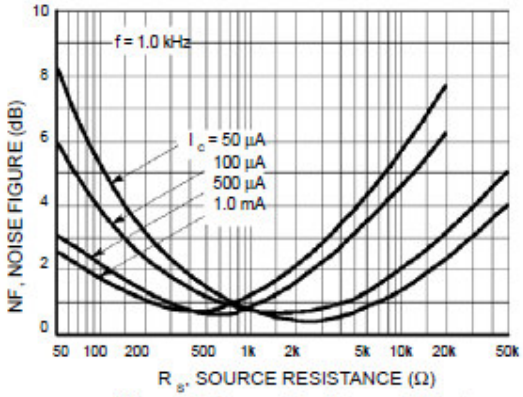


Figure 9. Source Resistance Effects

h PARAMETERS

(V_{CE} = –10 Vdc, f = 1.0 kHz, T_A = 25°C)

This group of graphs illustrates the relationship between h fe and other "h" parameters for this series of ransistors. To obtain these curves, a high–gain and a low–gain unit were selected from the MMBT4401LT1 lines, and the same units were used to develop the correspondingly numbered curves on each graph.

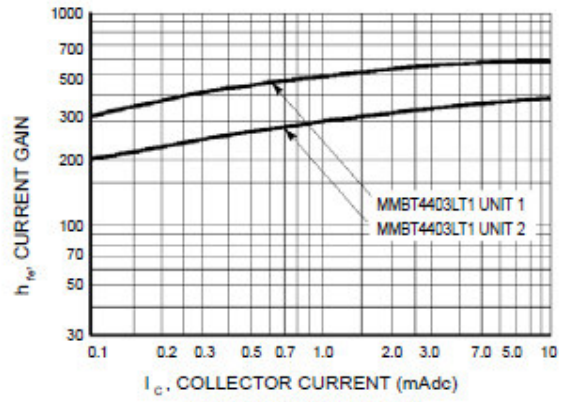


Figure 10. Current Gain

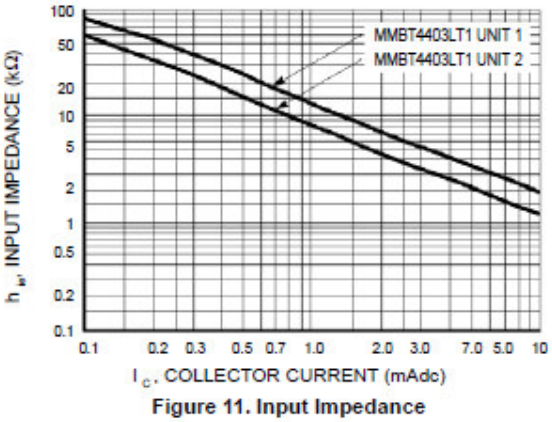


Figure 11. Input Impedance

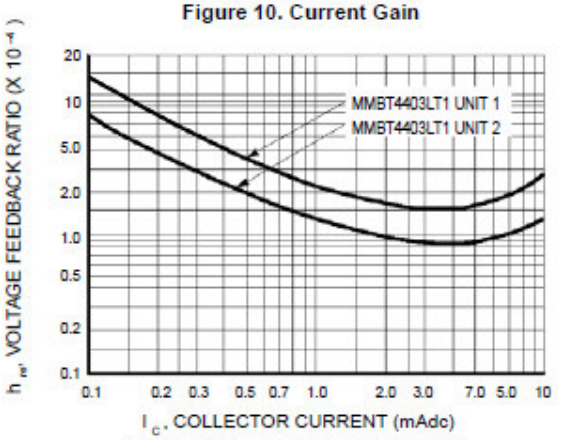


Figure 12. Voltage Feedback Ratio

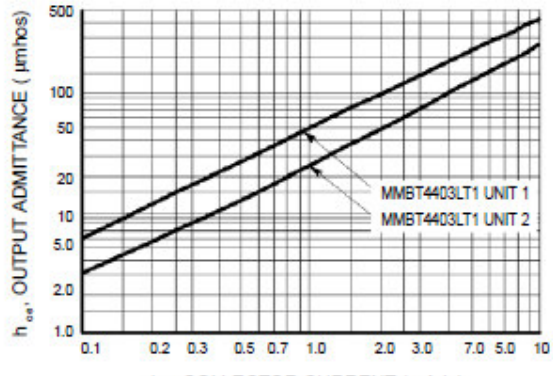


Figure 13. Output Admittance

Typical Characteristics

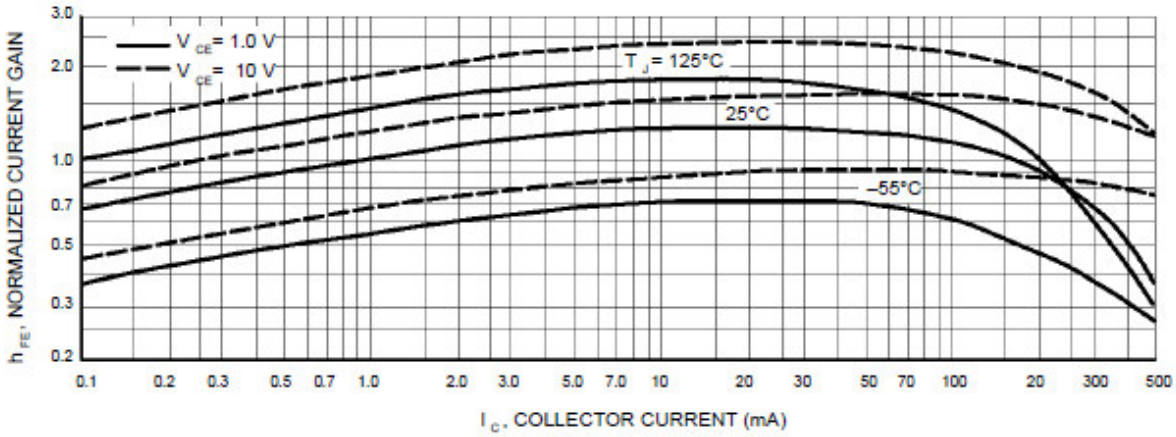


Figure 14. DC Current Gain

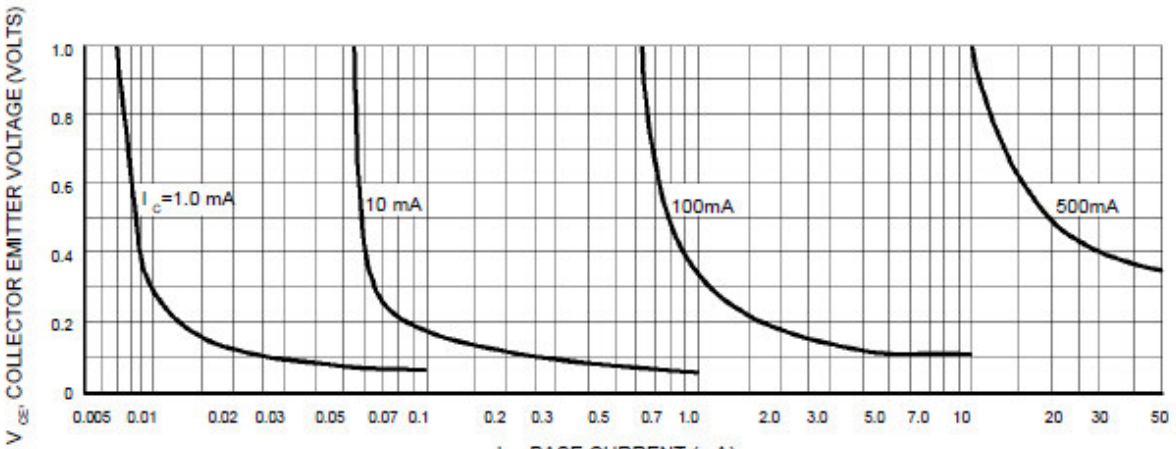


Figure 15. Collector Saturation Region

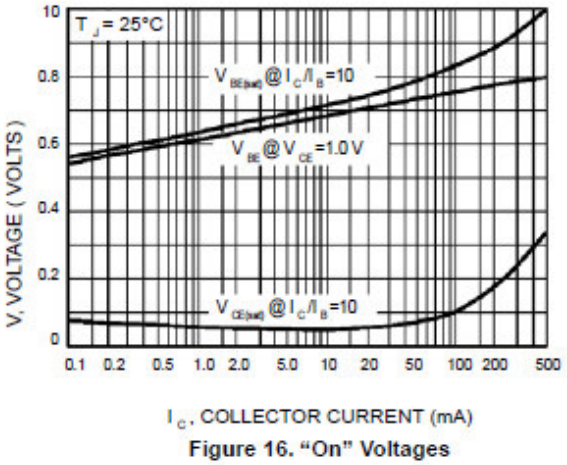


Figure 16. "On" Voltages

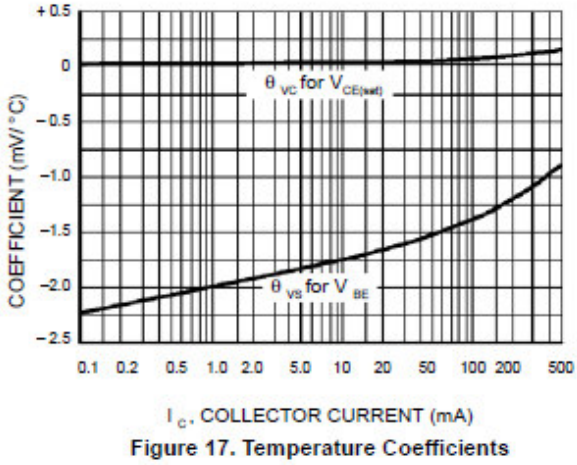
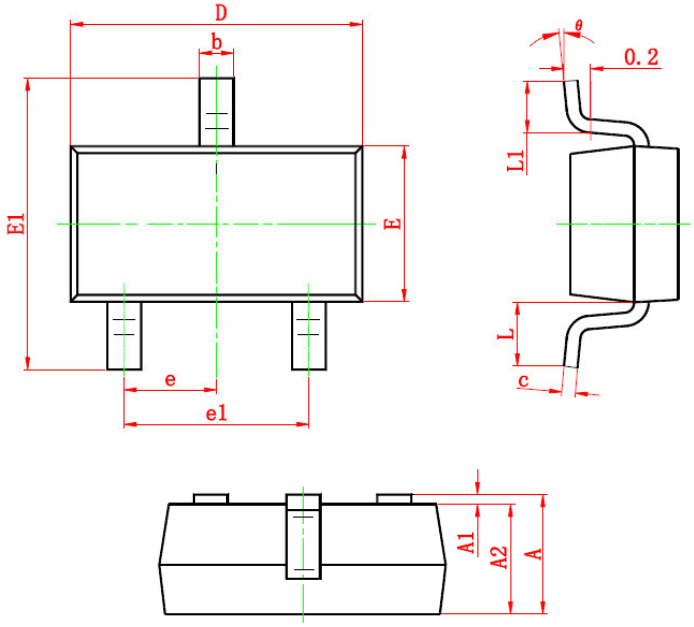


Figure 17. Temperature Coefficients

Package Information (SOT-23)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.200	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.100	0.035	0.039
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	6°

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