Alfa-MOS Technology

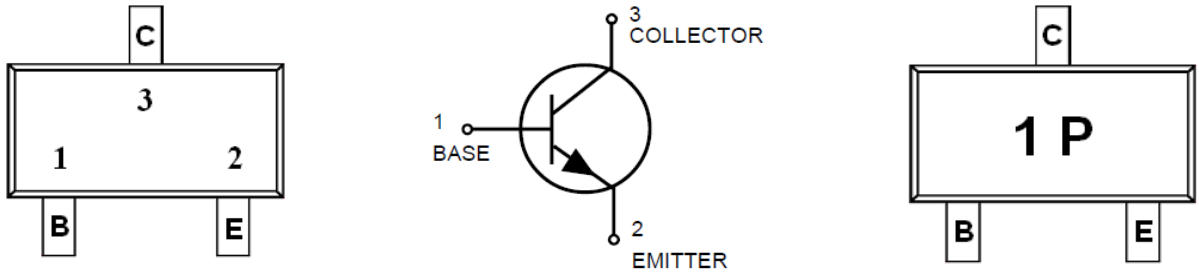
AFT2222A

NPN General Purpose Amplifier

Features

• This device is designed as a general purpose amplifier and switch.

Pin Description (SOT-23)



Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFT2222AT1S23RG	1P	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	75	V
V_{EBO}	Emitter-Base Voltage	6.0	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.

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 = 10μA, I_E = 0	75		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 10μA, I_C = 0	6.0		V
I_{CBO}	Collector Cutoff Current	V_{CB} = 60V, I_E = 0.4V		0.01	uA
		V_{CB} = 60V, I_E = 0.4V T_A = 125℃		10	
I_{EBO}	Emitter Cutoff Current	V_{EB} = 3.0V, I_C = 0V		100	nA
I_{BL}	Base Cutoff Current	V_{CE} = 60V, V_{EB} = 3.0V		20	nA
I_{CEX}	Collector Cutoff Current	V_{CE} = 60V, V_{EB} = 3.0V		10	nA
On Characteristics *					
h_{FE}	DC Current Gain	I_C = 0.1mA, V_{CE} = 10V	35		
		I_C = 1.0mA, V_{CE} = 10V	50		
		I_C = 10mA, V_{CE} = 10V	75		
		I_C = 10mA, V_{CE} = 10V, T_A = -55℃	35		
		I_C = 150mA, V_{CE} = 10V	100	300	
		I_C = 150mA, V_{CE} = 1.0V	50		
		I_C = 500mA, V_{CE} = 10V	40		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 150mA, I_B = 15mA		0.3	V
		I_C = 500mA, I_B = 50mA		1.0	
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = 150mA, I_B = 15mA	0.6	1.2	V
		I_C = 500mA, I_B = 50mA		2.0	
Small Signal Characteristics					
f_T	Current Gain - Bandwidth Product	I_C = 20mA, V_{CE} = 20V, f = 100MHz	300		MHz
Cobo	Output Capacitance	V_{CB} = 10V, I_E = 0, f = 1.0MHz		8	pF
Cibo	Input Capacitance	V_{EB} = 0.5V, I_C = 0, f = 1.0MHz		25	pF
hie	Input Impedance	V_{CE} =10V, I_C =1.0mA, f = 1.0 kHz	2.0	8.0	kΩ
		V_{CE} =10V, I_C =10mA, f = 1.0 kHz	0.25	1.25	
hre	Voltage Feedback Ratio	V_{CE} =10V, I_C =1.0mA, f =1.0 kHz		8.0	X10 –4
		V_{CE} =10V, I_C =10mA, f = 1.0 kHz		4.0	
hfe	Small–Signal Current Gain	V_{CE} =10V, I_C =1.0mA, f =1.0 kHz	50	300	
		V_{CE} =10V, I_C =10mA, f = 1.0 kHz	75	375	
hoe	Output Admittance	V_{CE} =10V, I_C =1.0mA, f =1.0 kHz	5.0	35	umhos
		V_{CE} =10V, I_C =10mA, f = 1.0 kHz	25	200	
rb ,C_c	Current Base Time Constant	V_{CB} =20V, I_E =20mA, f = 31.8MHz		150	ps
NF	Noise Figure	I_C = 100μA, V_{CE} = 10V, R_S = 1.0kΩ, f = 1.0kHz		4.0	dB
Switching Characteristics					
td	Delay Time	V_{CC} = 30V, $V_{BE(off)}$ = -0.5V		10	ns
tr	Rise Time	I_C = 150mA, I_{B1} = 15mA		25	ns
ts	Storage Time	V_{CC} = 3.0V, I_C = 150mA,		225	ns
tf	Fall Time	I_{B1} = I_{B2} = 15mA		60	ns

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

Switching Time Equivalent Test Circuits

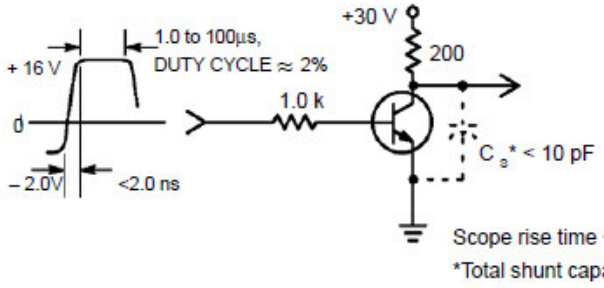


Figure 1. Turn–On Time

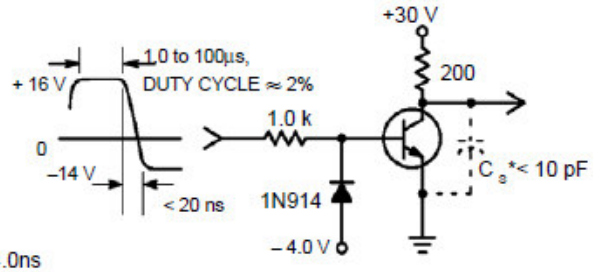


Figure 2. Turn–Off Time

Typical Characteristics (TRANSIENT)

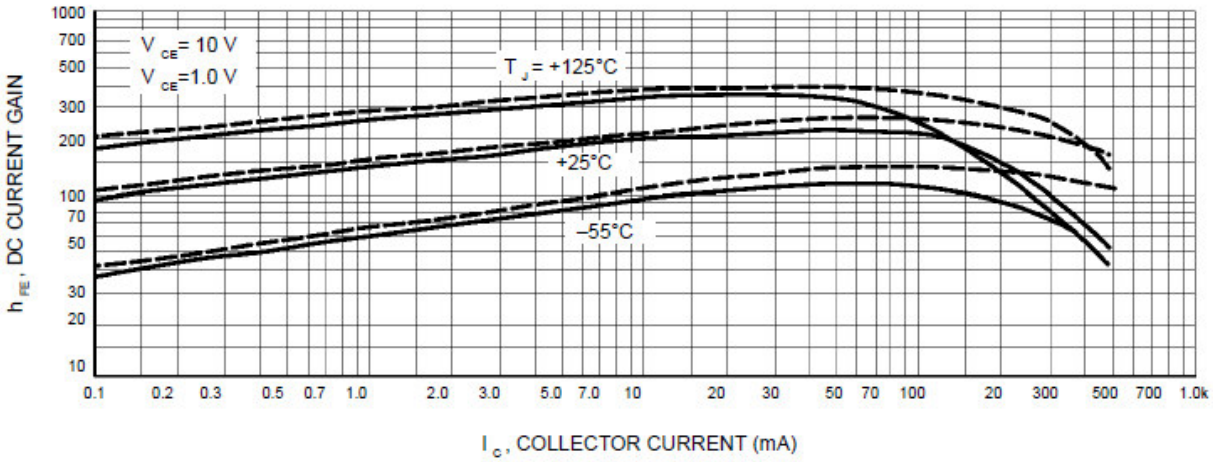


Figure 3. DC Current Gain

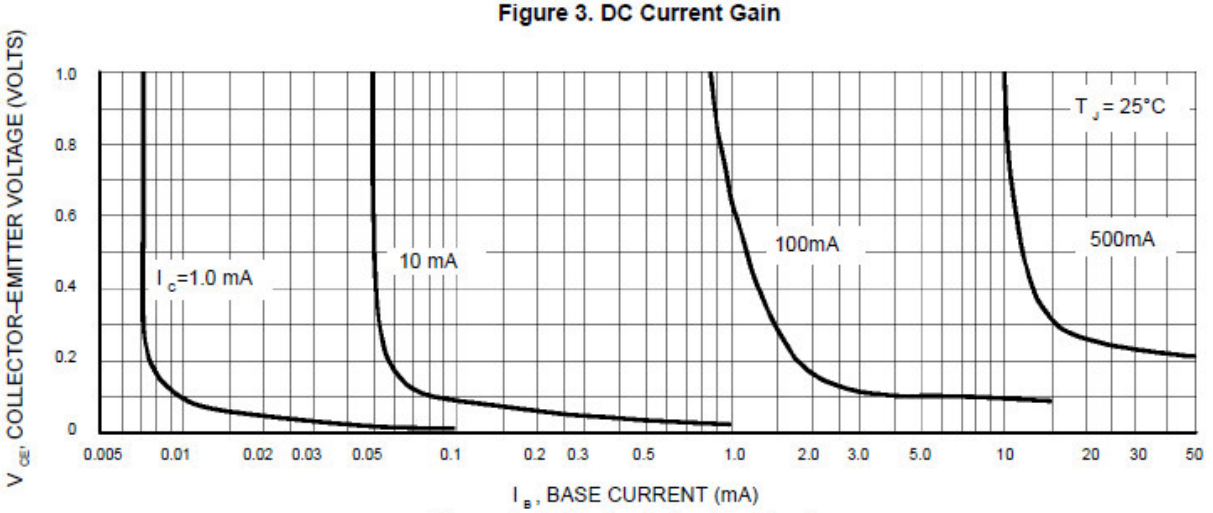


Figure 4. Collector Saturation Region

Typical Characteristics (TRANSIENT)

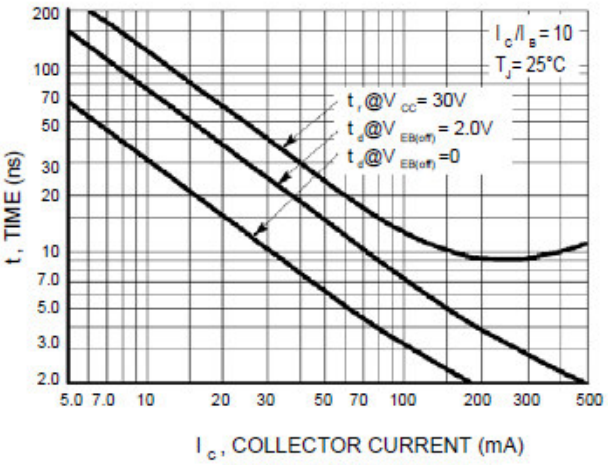


Figure 5. Turn–On Time

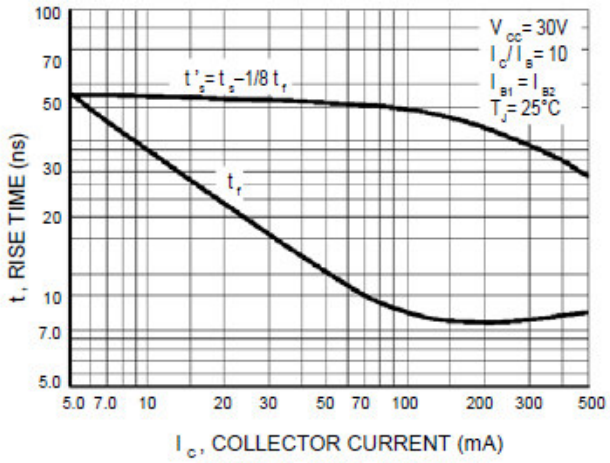


Figure 6. Turn - Off Time

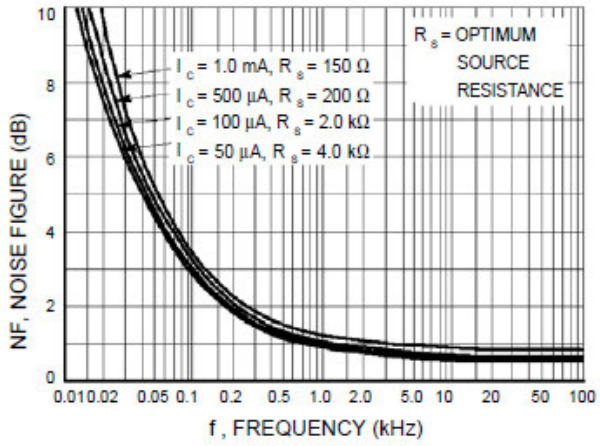


Figure 7. Frequency Effects

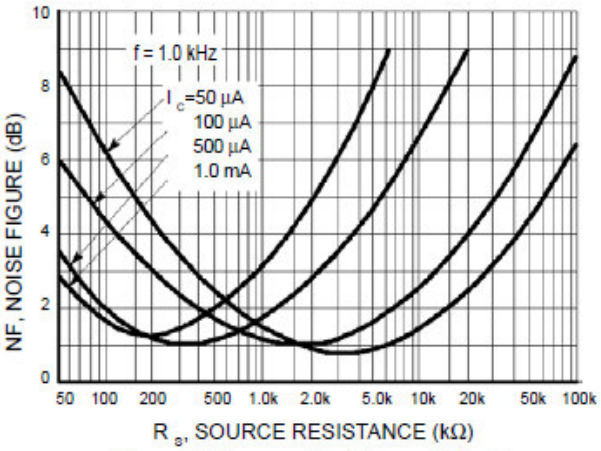


Figure 8. Source Resistance Effects

Typical Characteristics (TRANSIENT)

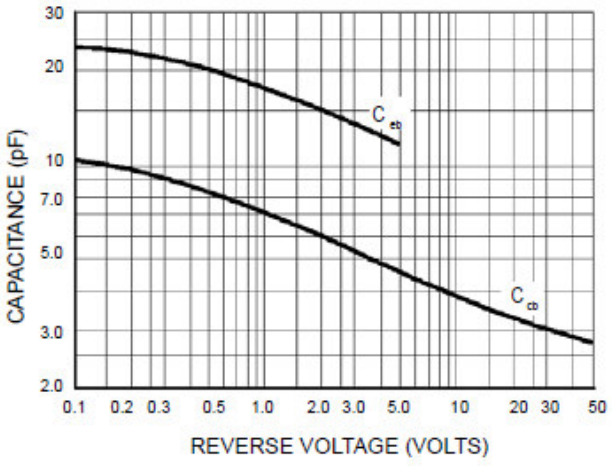


Figure 9. Capacitance

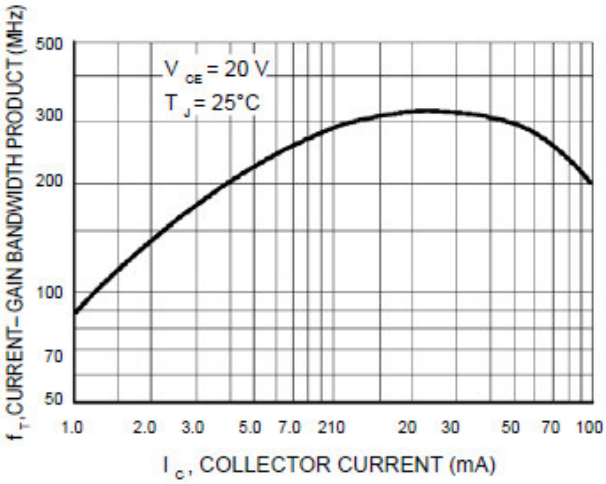


Figure 10. Current– Gain Bandwidth Product

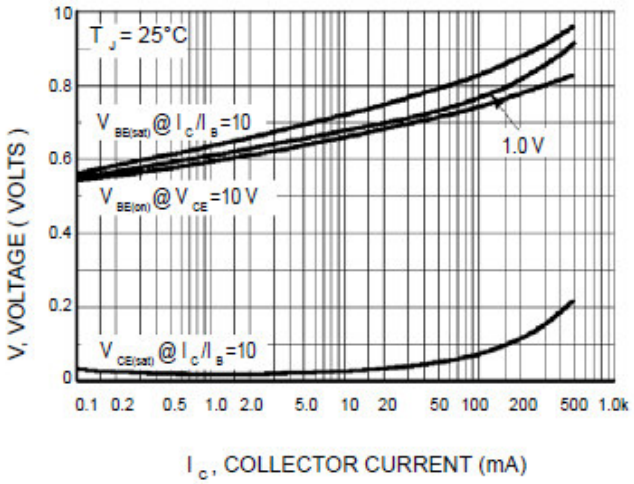


Figure 11. "On" Voltages

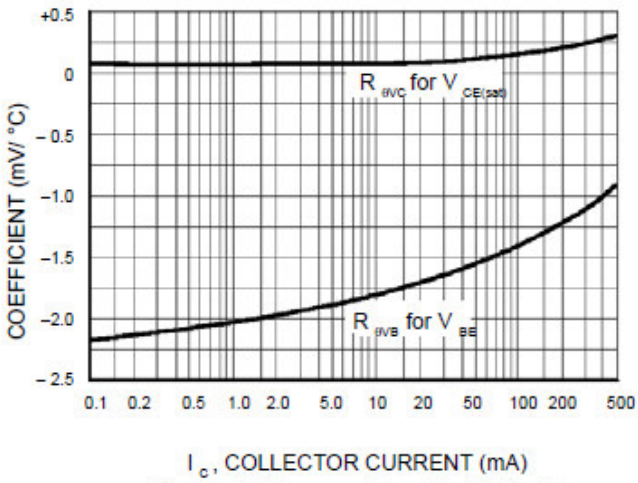
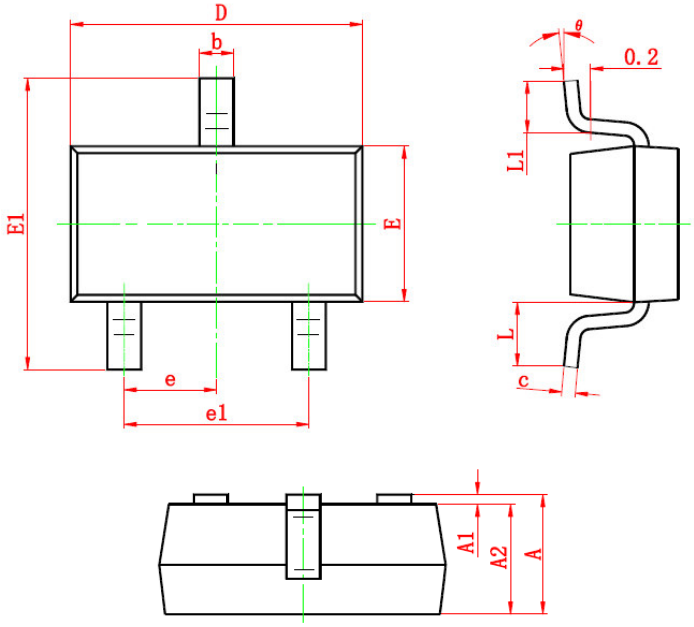


Figure 12. Temperature Coefficients

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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