Alfa-MOS Technology

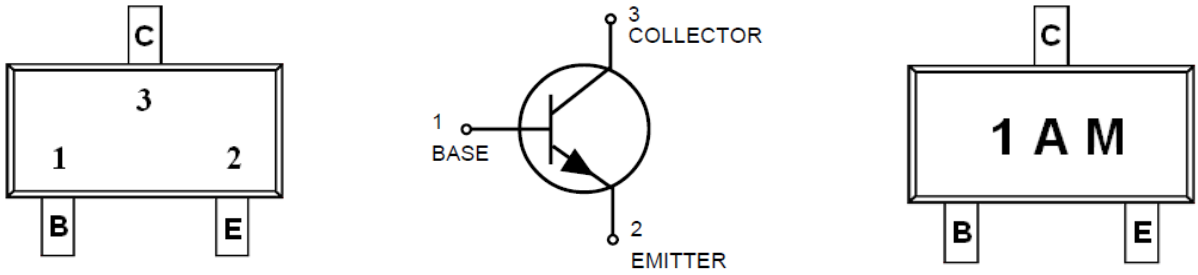
AFT3904

NPN General Purpose Amplifier

Features

- This device is designed as a general purpose amplifier and switch.
- The useful dynamic range extends to 100 mA as a switch and to 100 MHz as an amplifier.

Pin Description (SOT-23)



Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFT3904T1S23RG	1AM	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	60	V
V_{EBO}	Emitter-Base Voltage	6.0	V
I_C	Collector Current - Continuous	200	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	60		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 10μA, I_C = 0	6.0		V
I_{BL}	Base Cutoff Current	V_{CE} = 30V, V_{EB} = 3V		50	nA
I_{CEX}	Collector Cutoff Current	V_{CE} = 30V, V_{EB} = 3V		50	nA
On Characteristics *					
h_{FE}	DC Current Gain	I_C = 0.1mA, V_{CE} = 1.0V	40		
		I_C = 1.0mA, V_{CE} = 1.0V	70		
		I_C = 10mA, V_{CE} = 1.0V	100	300	
		I_C = 50mA, V_{CE} = 1.0V	60		
		I_C = 100mA, V_{CE} = 1.0V	30		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 10mA, I_B = 1.0mA		0.2	V
		I_C = 50mA, I_B = 5.0mA		0.3	
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = 10mA, I_B = 1.0mA	0.65	0.85	V
		I_C = 50mA, I_B = 5.0mA		0.95	
Small Signal Characteristics					
f_T	Current Gain - Bandwidth Product	I_C = 10mA, V_{CE} = 20V, f = 100MHz	300		MHz
C_{obo}	Output Capacitance	V_{CB} = 5.0V, I_E = 0, f = 1.0MHz		4.0	pF
C_{ibo}	Input Capacitance	V_{EB} = 0.5V, I_C = 0, f = 1.0MHz		8.0	pF
NF	Noise Figure	I_C = 100μA, V_{CE} = 5.0V, R_S = 1.0kΩ, f = 1.0kHz		5.0	dB
h_{ie}	Input Impedance	V_{CE} =10V, I_C =1.0mA, f = 1.0 kHz	1.0	10	kΩ
h_{re}	Voltage Feedback Ratio	V_{CE} =10V, I_C =1.0mA, f =1.0 kHz	0.5	8.0	X10 –4
h_{fe}	Small–Signal Current Gain	V_{CE} =10V, I_C =1.0mA, f =1.0 kHz	100	400	
h_{oe}	Output Admittance	V_{CE} =10V, I_C =1.0mA, f =1.0 kHz	1.0	40	umhos
Switching Characteristics					
t_d	Delay Time	V_{CC} = 3.0V, V_{BE} = 0.5V		35	ns
t_r	Rise Time	I_C = 10mA, I_{B1} = 1.0mA		35	ns
t_s	Storage Time	V_{CC} = 3.0V, I_C = 10mA,		200	ns
t_f	Fall Time	I_{B1} = I_{B2} = 1.0mA		50	ns

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

Test Circuits

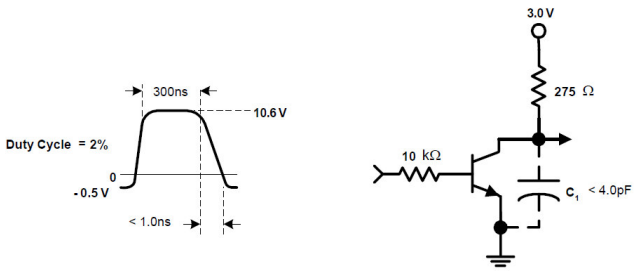


Figure 1: Delay and Rise Time Equivalent Test Circuit

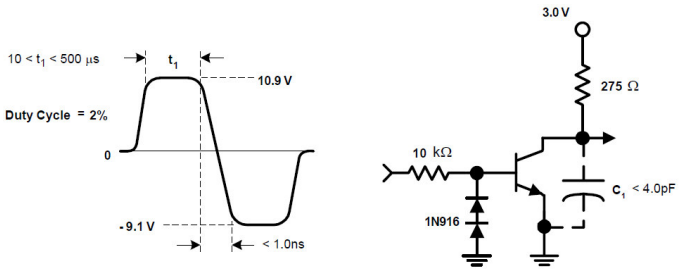
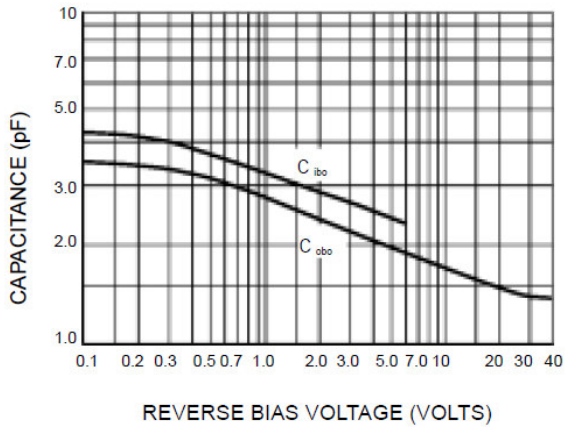


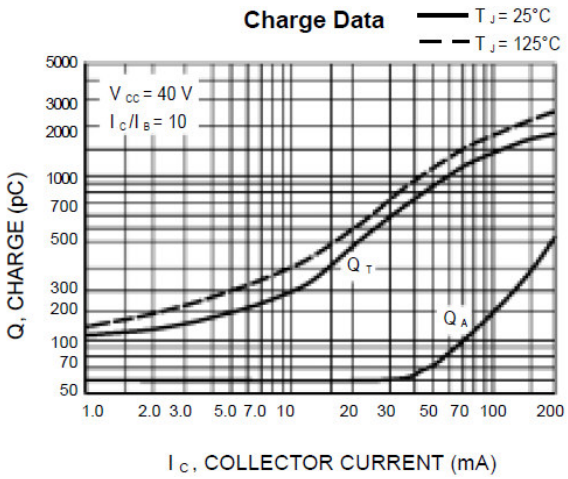
Figure 2: Storage and Fall Time Equivalent Test Circuit

Typical Characteristics (TRANSIENT)

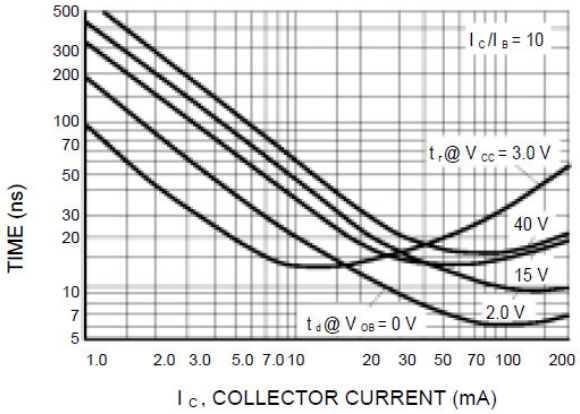
Capacitance



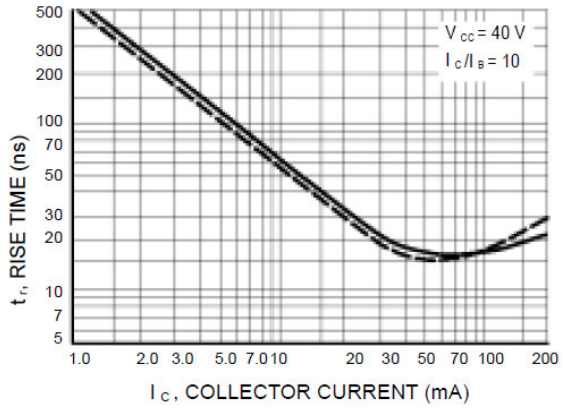
Charge Data



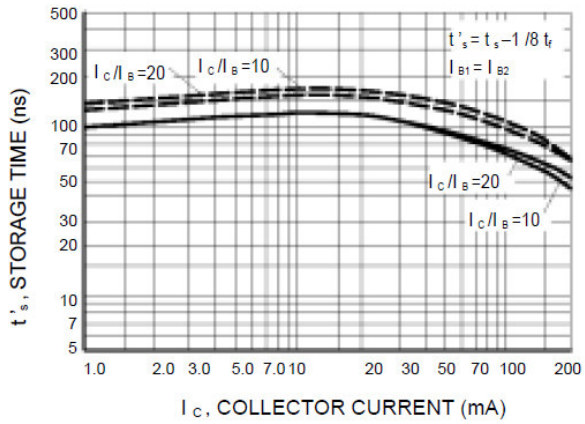
Turn–On Time



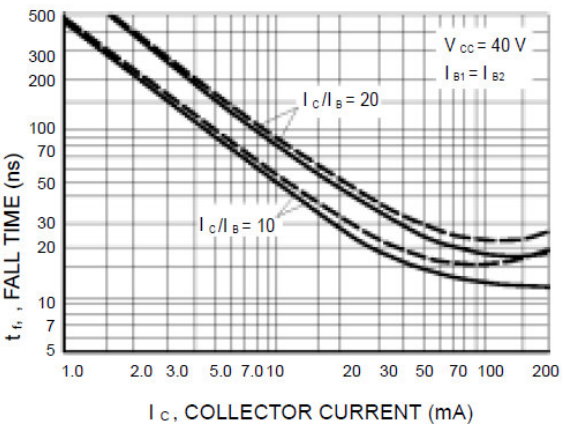
Rise Time



Storage Time



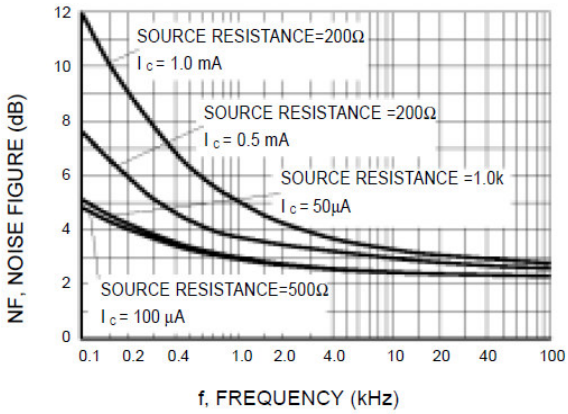
Fall Time

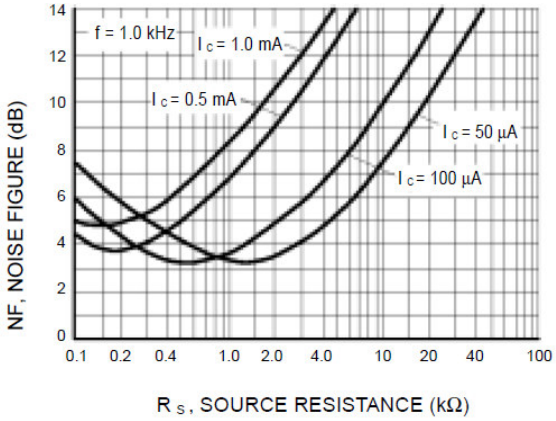


Typical Characteristics (AUDIO SMALL–SIGNAL)

NOISE FIGURE VARIATIONS

(V_{CE} = 5.0 Vdc, T_A = 25°C, Bandwidth = 1.0 Hz)

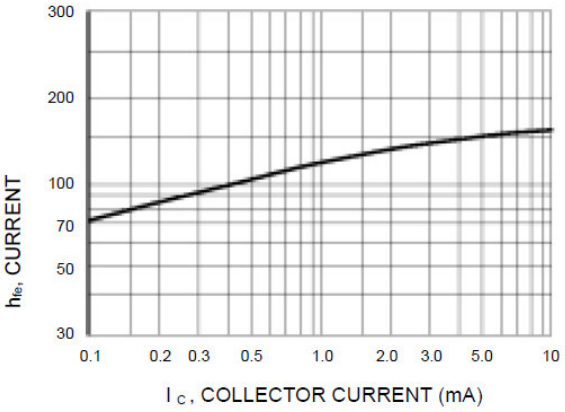




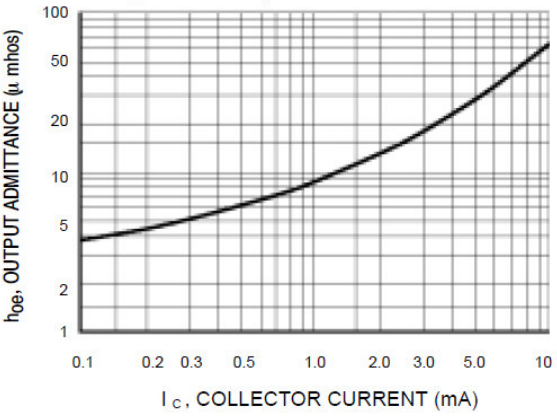
h PARAMETERS

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

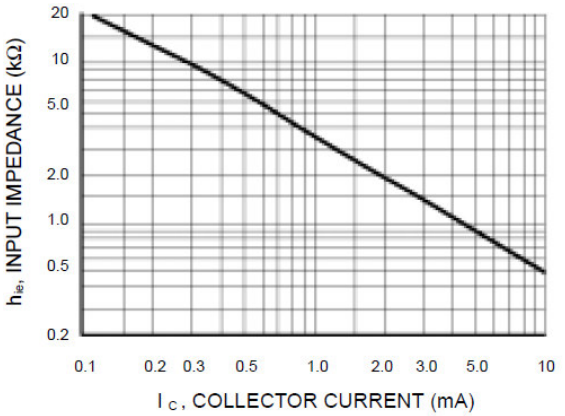
Current Gain



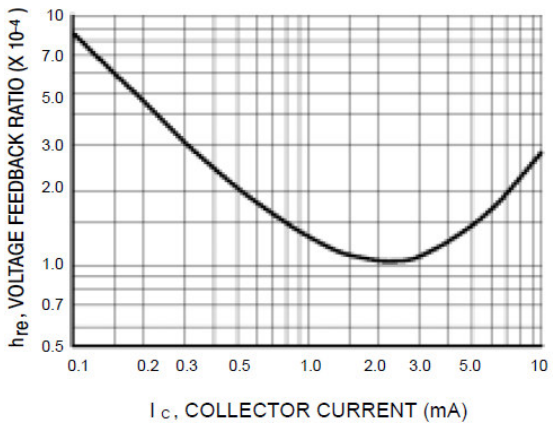
Output Admittance



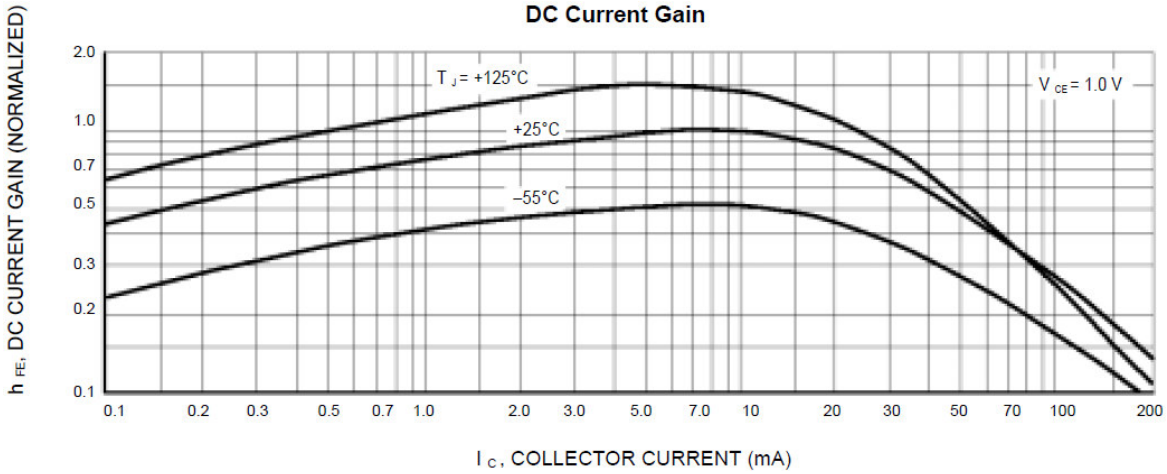
Input Impedance

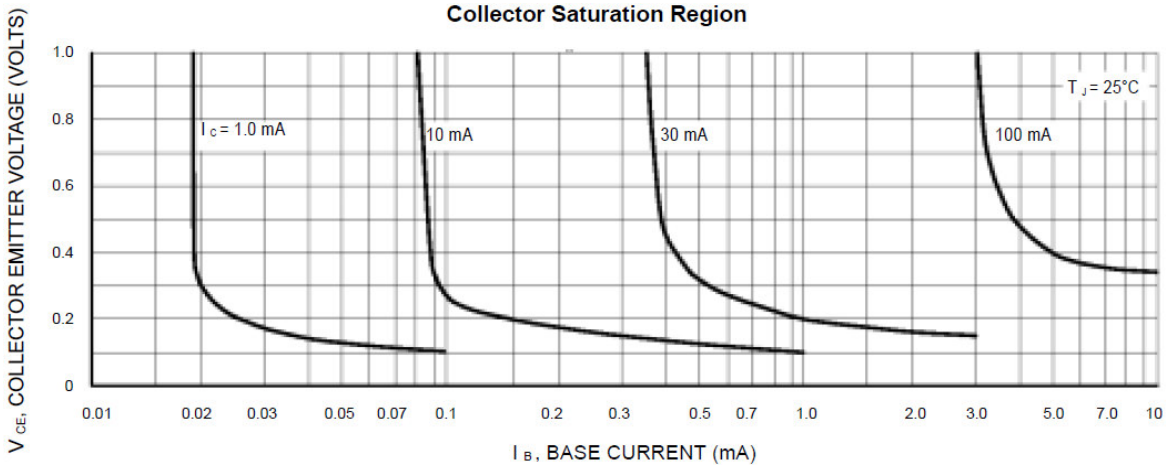


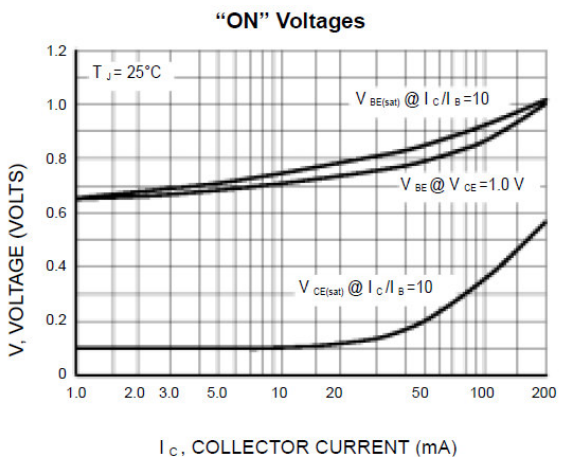
Voltage Feedback Ratio

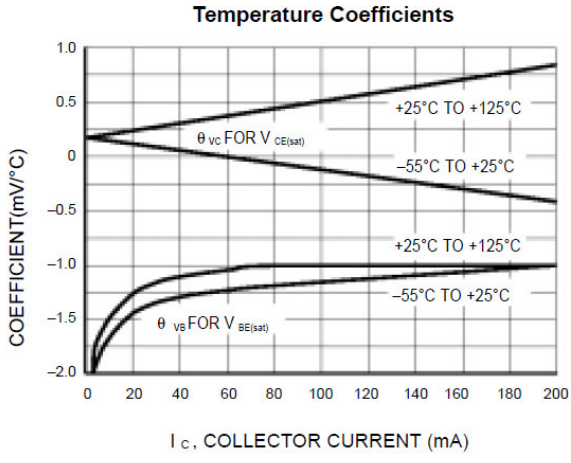


Typical Characteristics (STATIC)

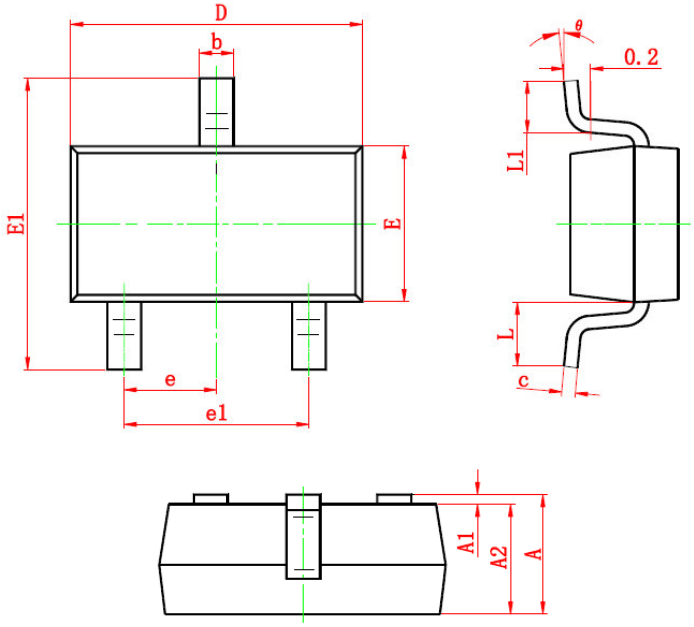








Package Information (SOT-23)



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°

2F, No.80, Sec.1, Cheng Kung Rd., Nan Kang Dist., Taipei City 115, Taiwan (R.O.C.)
Tel : 886 2) 2651 3928
Fax : 886 2) 2786 8483
©http://www.alfa-mos.com