

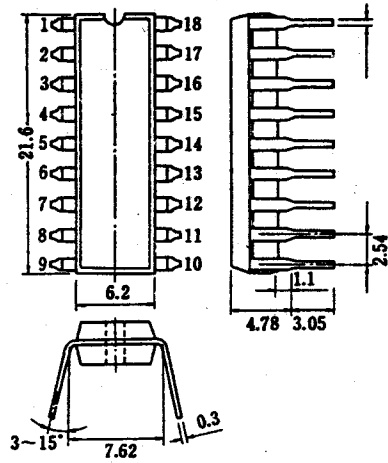
CD/AN7223

FM/AM 中频放大器

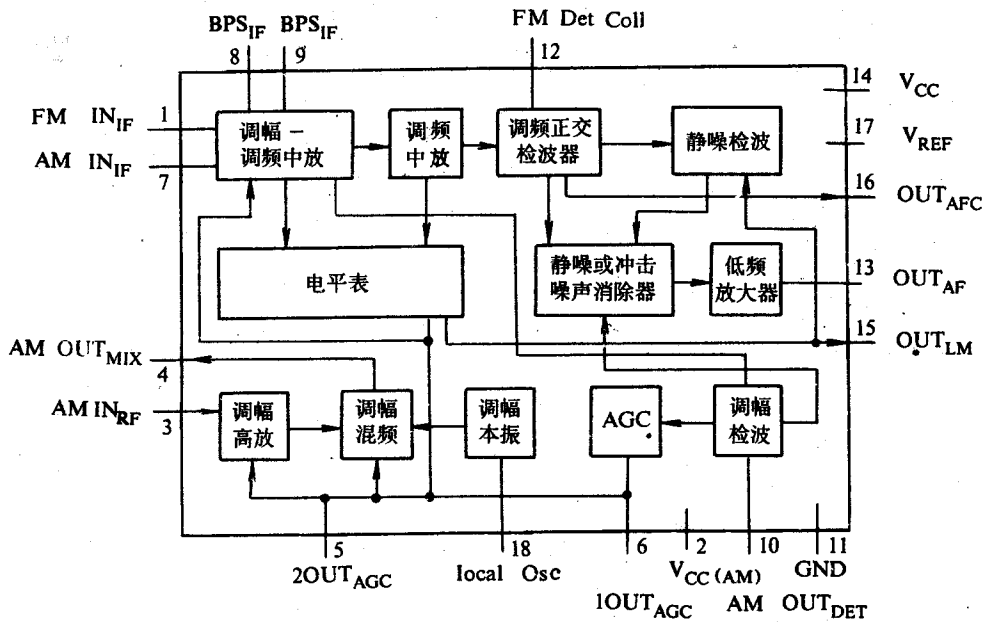
简要说明

CD/AN7223 盒式收录机用调幅调谐器、调频/调幅中频放大器是高性能、多功能调频/调幅中频系统。该电路的电源电压范围宽 ($V_{CC} = 2.8 \sim 12V$)，电路内部设有调频、调幅检波电路、调频/调幅两用的信号电平表驱动电路，电路内的调幅部分设有高频放大器，接收灵敏度较高。该电路还具有静噪和 AFC(自动频率控制)功能，该电路开关转换时冲击噪声电平小，调幅和调频工作时稳定性好，短波段频率可用至 30MHz。

外形图



电路框图 [$V_{CC(max)} = 14.4V, P_{D(max)} = 317mW$]



电参数 ($V_{CC} = 5V$)

调频

电源电流	I_{tot}	(直流测定)	14mA
鉴频输出电平	V_0	$V_I = 80dB\mu, f = 10.7MHz, f_{dev} = 22.5kHz, f_m = 400Hz$	90mV
限幅灵敏度	$V_{I(lim)}$	$V_0 - 3dB$ 时之输入	44.5dB μ
静噪灵敏度	$V_{I(mute)}$	$V_0 - 20dB$ 以上输入	50dB μ

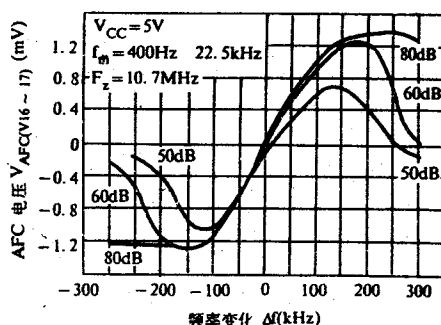
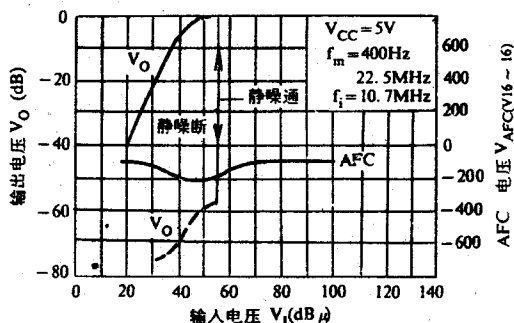
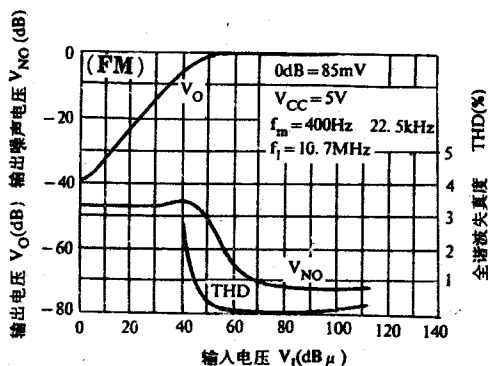
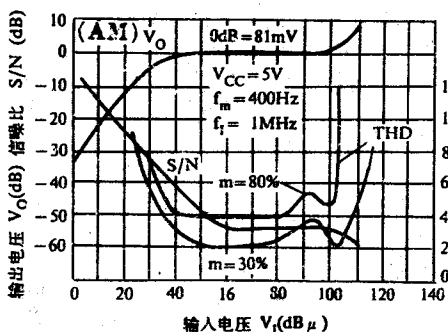
续表

信号电平表驱动输出 1 $V_{O(15-11)}$	$V_I = 0\text{dB}\mu, f = 10.7\text{MHz}, f_{\text{dev}} = 22.5\text{kHz}, f_m = 400\text{Hz}$	3mV
信号电平表驱动输出 2 $V_{O(15-11)}$	$V_I = 80\text{dB}\mu, f = 10.7\text{MHz}, f_{\text{dev}} = 22.5\text{kHz}, f_m = 400\text{Hz}$	1.26V

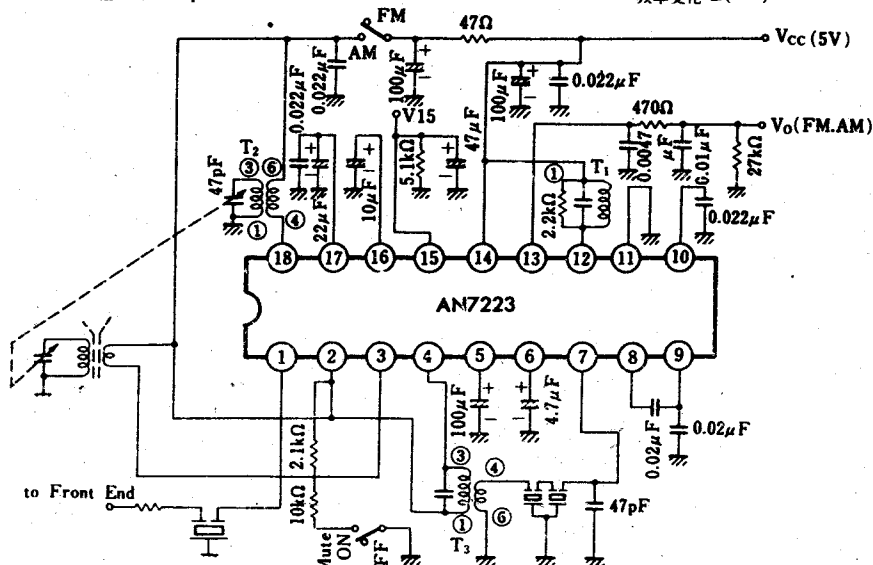
调幅

电源电流	I_{ax}	直流测定	13mA
检波输出电平	V_O	$V_I = 80\text{dB}\mu, f = 1\text{MHz}, m = 30\%, f_m = 400\text{Hz}$	80mV
最大灵敏度	S	$V_O = 10\text{mV}$ 时之输入电平	9.5dB μ
信号电平表驱动输出 1 $V_{O(15-11)}$	$V_I = -10\text{dB}\mu, f = 1\text{MHz}, m = 30\%, f_m = 400\text{Hz}$		0 ~ 130mV
信号电平表驱动输出 2 $V_{O(15-11)}$	$V_I = 80\text{dB}\mu, f = 1\text{MHz}, m = 30\%, f_m = 400\text{Hz}$		1.25V

特点与性能



典型应用



AN7223

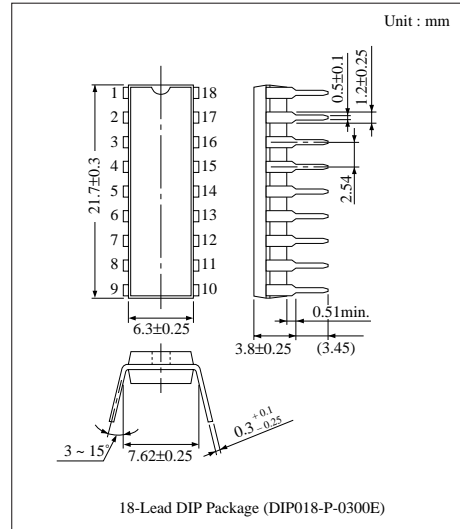
AM Tuner, FM/AM IF Amplifier Circuit for Radio Cassette Recorder

Overview

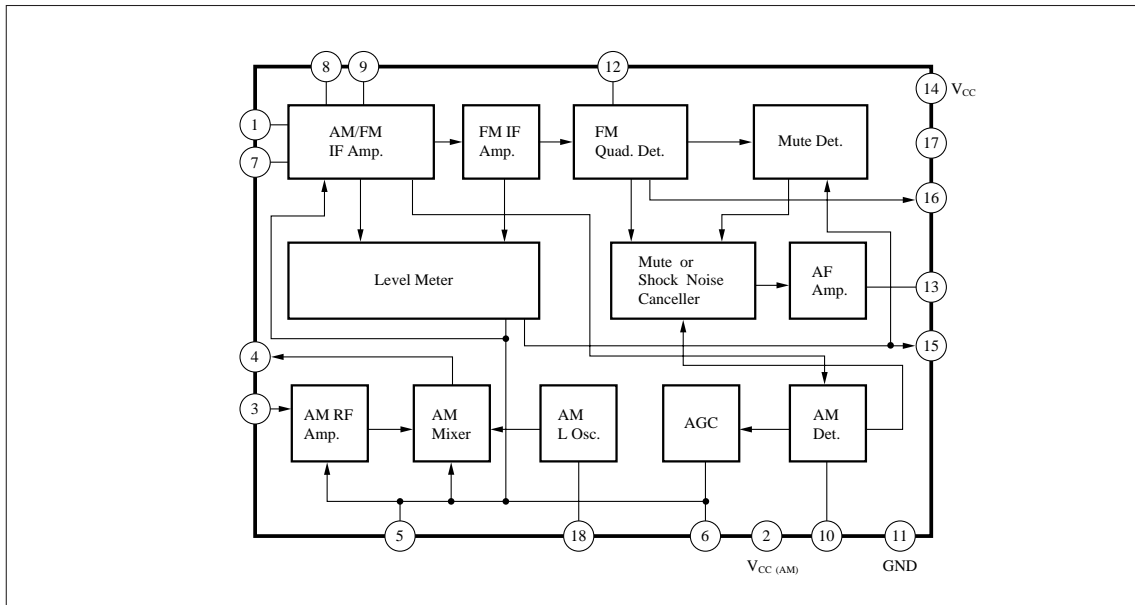
The AN7223 is an IC designed for high-class radio cassette recorder with multifunctioned FM/AM IF system.

Features

- Wide operating supply voltage range : $V_{CC} = 2.8V \sim 12V$
- Incorporating both FM and AM detectors
- Incorporating a level indicator output (FM/AM common use)
- AM : High sensitivity, including RF amplifier
- Low power consumption
- Muting control
- AFC control
- Fewer external parts
- High stability on both AM and FM
- Low shock noise level from function switch operation
- SW band available ($f = 30MHz$)



Block Diagram



■ Pin Descriptions

Pin No.	Pin Name	Pin No.	Pin Name
1	FM IF Amp. Input	10	AM Detection Output
2	V _{CC} (AM)	11	GND
3	AM RF Amp. Input	12	FM Detector Coil
4	AM Mixer Output	13	AF Output
5	AGC Output (2)	14	V _{CC}
6	AGC Output (1)	15	Level Meter Output
7	AM IF Amp. Input	16	AFC Output
8	IF By-pass	17	Reference Voltage
9	IF By-pass	18	Local Oscillation

■ Absolute Maximum Ratings (Ta=25°C)

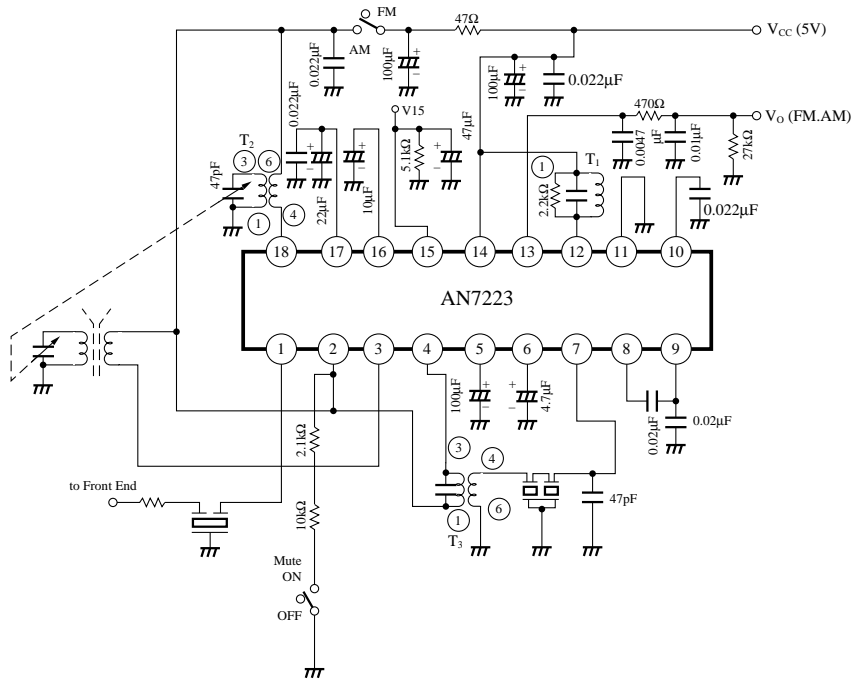
Parameter	Symbol	Rating	Unit
Supply Voltage	V _{CC}	14.4	V
Power Dissipation	P _D	317	mW
Operating Ambient Temperature	T _{opr}	-20 ~ + 75	°C
Storage Temperature	T _{stg}	-55 ~ + 150	°C

■ Electrical Characteristics (V_{CC}=5V, Ta= 25°C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit			
FM	Total Circuit Current	I _{tot}	(DC measurement)			9	14	20	mA
	Demodulation Output Level	v _{O (FM)}	V _i = 80dBμ, f=10.7MHz, f _{dev.} = 22.5kHz, f _m = 400Hz			75	100	125	mV
	Limiting Sensitivity	V _{i (lim)}	Input at v _O = -3dB			41.5	44.5	47.5	dBμ
	Muting Sensitivity	V _{i (mute)}	Input at v _O = less than -20dB			45	50	59	dBμ
	Signal Meter Driving Output 1	V ₁₅	V _i = 50dBμ, f=10.7MHz, f _{dev.} = 22.5kHz, f _m = 400Hz			120	600	1150	mV
Signal Meter Driving Output 2	V ₁₅	V _i = 80dBμ, f= 10.7MHz, f _{dev.} = 22.5kHz, f _m = 400Hz			1.14	1.26	1.42	V	
AM	Total Circuit Current	I _{tot}	(DC measurement)			8	13	19	mA
	Detection Output Level	v _{O (AM)}	V _i = 80dBμ, f= 1MHz, Mod.= 30%, f _m = 400Hz			60	80	100	mV
	Max.Sensitivity	S _{max.}	Input at v _O = 10mV			4.5	9.5	12.5	dBμ
	Signal Meter Driving Output 1	V ₁₅	V _i = -10dBμ, f= 1MHz, Mod.= 30%, f _m = 400Hz			0	—	130	mV
	Signal Meter Driving Output 2	V ₁₅	V _i = 80dBμ, f= 1MHz, Mod.= 30%, f _m = 400Hz			1.12	1.25	1.38	V

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■ Application Circuit



■ Coil Specifications

Symbol	Use, Freq	Type No.	Maker	Connection Diagram	Number of Turns	Tuning Cap.	Unloaded Q
T ₁	FM Quad. Coil 10.7MHz	EIF-7S752A	MATSUSHITA		1 - 2 8T 2 - 3 5T 4 - 6 3T	100pF	90±20%
T ₂	AM MW Osc. Coil	ELL-7S754	MATSUSHITA		1 - 2 4T 2 - 3 125T 4 - 6 7T	—	95±20%
T ₃	AM Mix. Output 455kHz	EIA-7S802A	MATSUSHITA		3 - 2 35T 6 - 4 10T 2 - 1 19T	1500pF	60±30%

■ Ceramic Filter Specification

Symbol	Use	Type No.	Maker	Center Freq.	Band Width	Loss
CF ₁	AM IF	CFM2-455B	TOKO	455kHz	7kHz (-6dB)	2.6dB

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AN7223

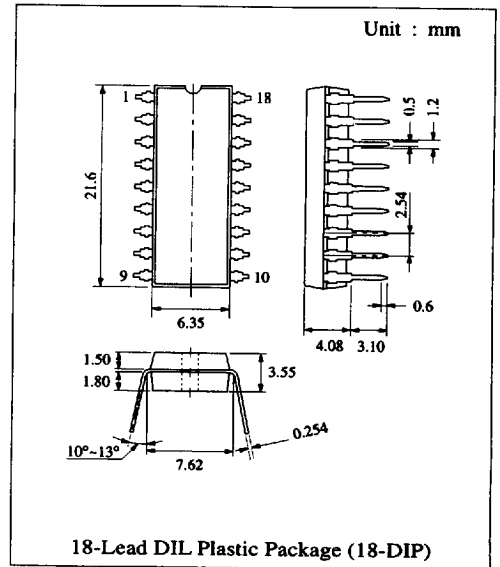
AM Tuner, FM-AM IF Amplifier

■ Description

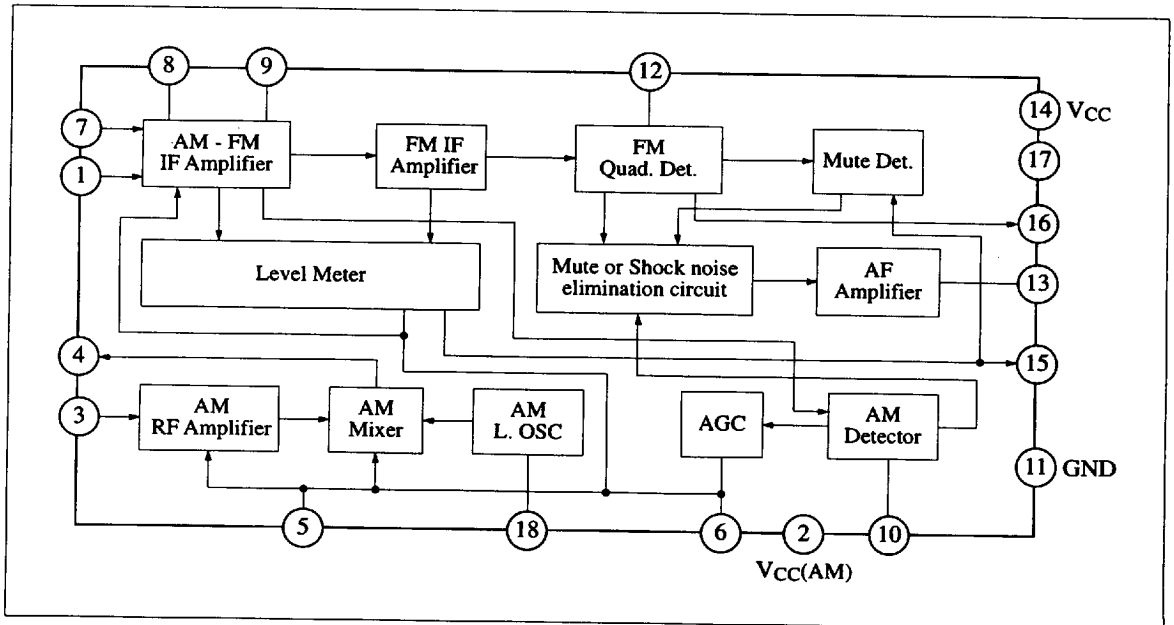
The AN7223 is a monolithic integrated circuit designed for high performance, multi-function FM-AM IF system of high grade radio cassette recorder.

■ Features

- Wide operation voltage ($V_{CC} = 2.8V \sim 12V$)
- Built-in detectors and level meter output for both FM and AM
- AM is highly sensitive due to RF amplifier
- Muting control and AFC control terminals
- Small shock noise at mode switch
- SW (f = 30MHz) band available



■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V _{CC}	14.4	V
Supply Current	I _{CC}	20	mA
Power Dissipation (Ta = 75°C)	P _D	317	mW
Operating Ambient Temperature	Topr	-20 ~ +75	°C
Storage Temperature	Tstg	-55 ~ +150	°C

Operating Supply Voltage Range: V_{CC} = 2.8V ~ 12.0V

■ Electrical Characteristics (V_{CC}=5V, Ta=25°C)

Item		Symbol	Test Cct	Condition	min.	typ.	max.	Unit
F M	Total Circuit Current	I _{tot}	2	DC Measurement	9	14	20	mA
	Limiting Sensitivity	V _{in(lim)}	1	Measure V _{in} at V _O = -3dB	41.5	44.5	47.5	dBμ
	Meter Output Voltage (1)	V ₁₅₋₁₁	1	V _{in} = 50dBμ, f = 10.7MHz, f _{dev} = 22.5kHz, f _m = 400Hz	120	600	1150	mV
	Meter Output Voltage (2)	V ₁₅₋₁₁	1	V _{in} = 80dBμ, f = 10.7MHz, f _{dev} = 22.5kHz, f _m = 400Hz	1.14	1.26	1.42	V
	Muting Sensitivity	V _{in(mute)}	1	Measure V _{in} at V _O = -20dB	45	50	59	dB
	Demodulator Output Level	V _O	1	V _{in} = 80dBμ, f = 10.7MHz, f _{dev} = 22.5kHz, f _m = 400Hz	75	100	125	mV
A M	Total Circuit Current	I _{tot}	3	DC Measurement	8	13	19	mA
	Maximum Sensitivity	S _{max}	1	Measure V _{in} at V _O = 10mV	4.5	9.5	15	dB
	Detector Output Voltage	V _O	1	V _{in} = 80dBμ, f = 1MHz, Mod = 30%, f _m = 400Hz	60	80	100	mV
	Meter Output Voltage 1	V ₁₅₋₁₁	1	V _{in} = -10dBμ, f = 1MHz, Mod = 30%, f _m = 400Hz	0		130	mV
	Meter Output Voltage 2	V ₁₅₋₁₁	1	V _{in} = 80dBμ, f = 1MHz, Mod = 30%, f _m = 400Hz	1.12	1.25	1.38	V

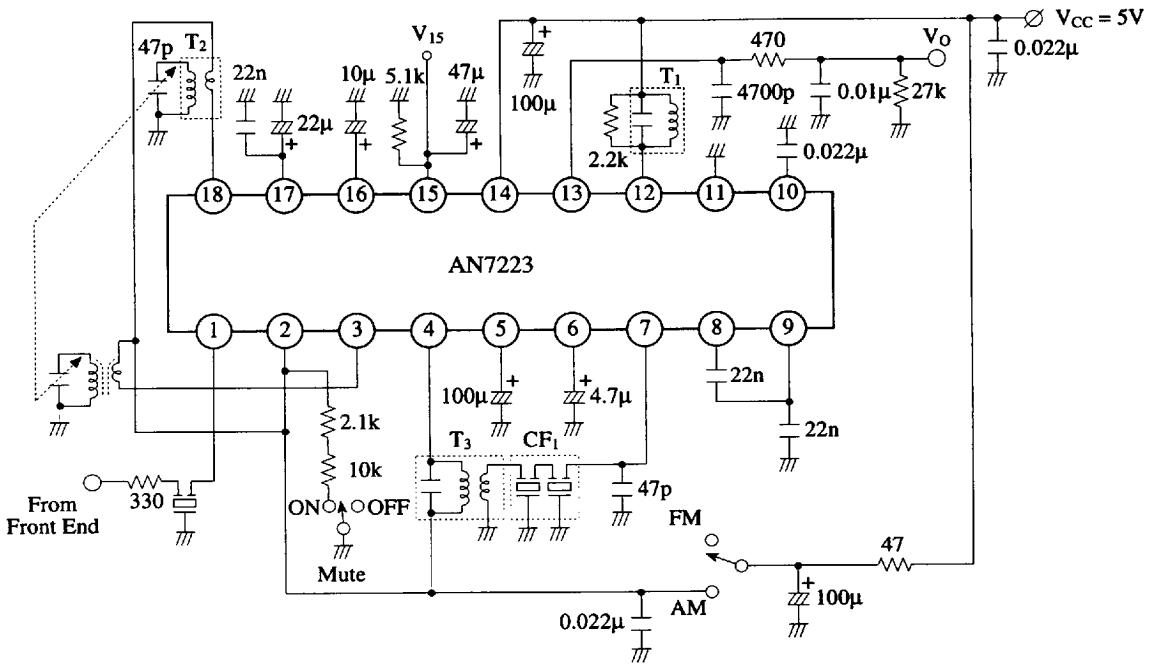
■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	FM IF Amplifier Input	10	AM Detector Output
2	V _{CC} AM	11	GND
3	AM RF Amplifier Input	12	FM Detector Coil
4	AM Mixer Output	13	AF Output
5	AGC Output (2)	14	V _{CC}
6	AGC Output (1)	15	Level Meter Output
7	AM IF Amplifier Input	16	AFC Output
8	IF By-pass	17	Reference Voltage
9	IF By-pass	18	Local Oscillator

■ 6932852 0013868 519 ■

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■ Application Circuit



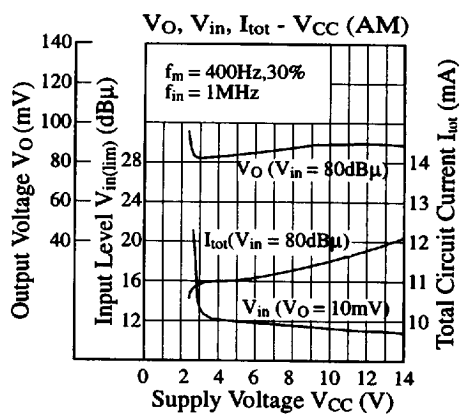
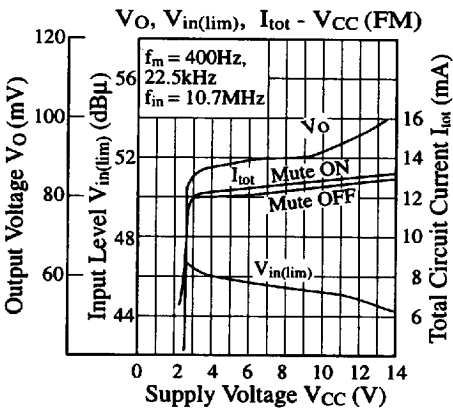
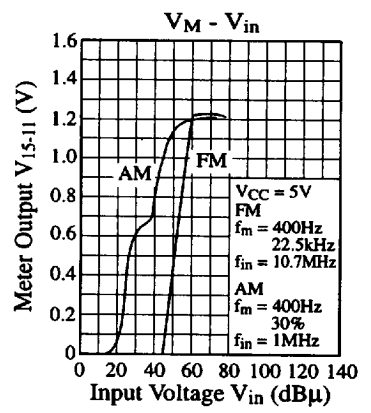
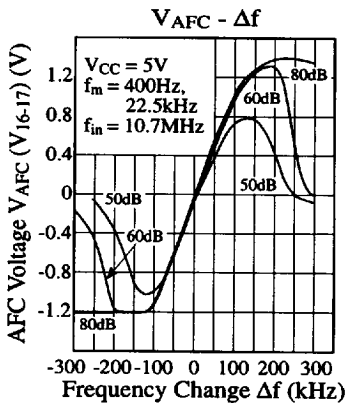
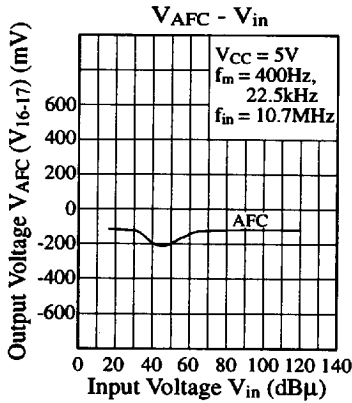
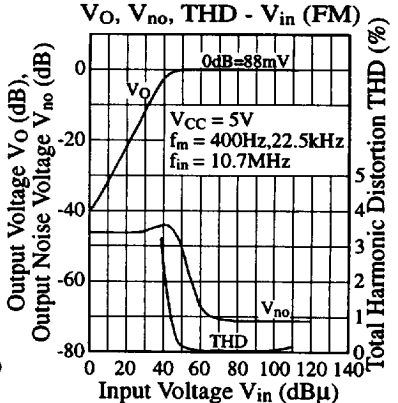
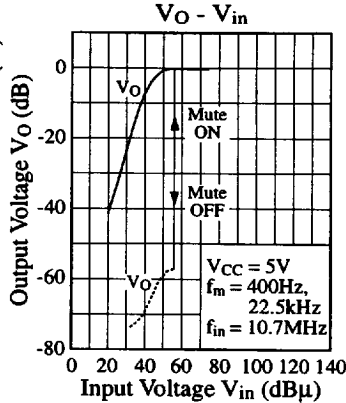
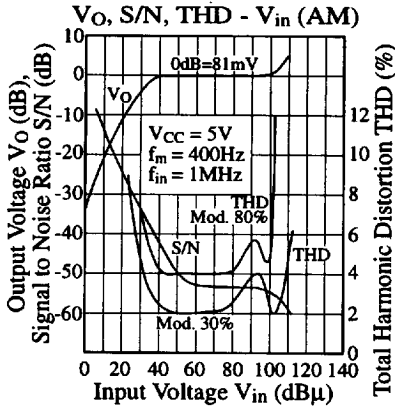
■ Coil Specifications

Symbol	Use, Freq.	Type No.	Maker	Connection Diagram	Number of Turns	Tuning Cap.	Unloaded Q
T ₁	FM Quad Coil 10.7MHz	EIF-7S752A	Matsushita		①...② 8T ②...③ 5T ④...⑥ 3T	100pF	90±20%
T ₂	AM MW Osc. Coil	ELL-7S754	Matsushita		①...② 4T ②...③ 125T ④...⑥ 7T	-	95±20%
T ₃	AM Mixer Output 455kHz	EIA-7S802A	Matsushita		③...② 35T ⑥...④ 10T ②...① 19T	1500pF	60±30%

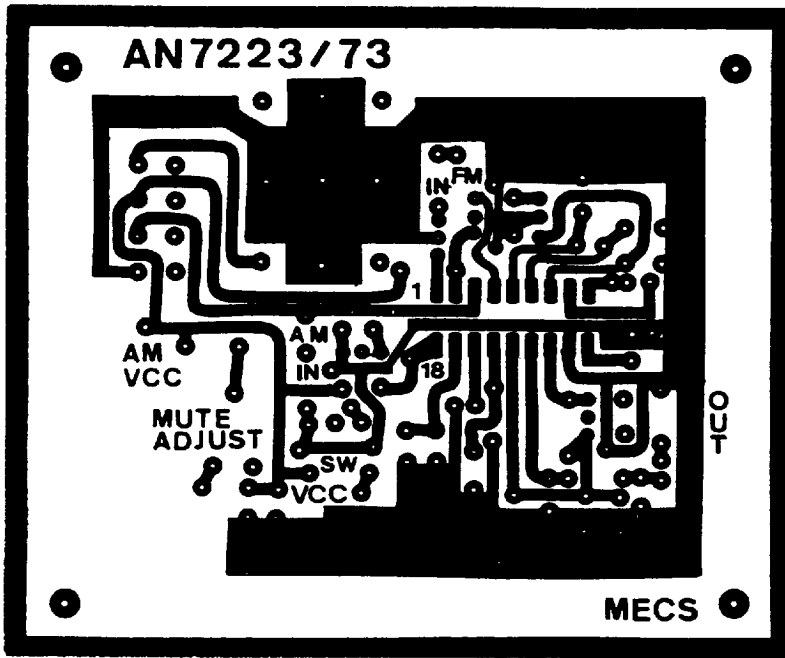
■ Ceramic Filter Specification

Symbol	Use	Type No.	Maker	Center Freq.	Band Width	Loss
CF ₁	AM IF	CFM2-455B	Toko	455kHz	7kHz (-6dB)	2.6dB

■ Characteristics Curve



■ Printed Circuit Board Layout (Scale: 1:1)



■ 6932852 0013872 T4T ■
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AN7223 调频/调幅中频放大电路

AN7223 调频/调幅中频放大集成电路,适合于在收音机及磁带收录机中应用。它采用 18 脚双列直插塑封结构。FM 部分是由中放、正交检波、静噪和自动频率控制(AFC)电路组成。AM 部分是由高放、混频、本振、中放、检波和 AGC 电路组成。还有冲击噪声抑制器、音频放大器、电平表电路、稳压器等为 FM/AM 两部分共用。

1 电路特点

- (1)电源电压范围宽: $V_{CC}=2.8\sim 12V$
- (2)电路内有 FM 和 AM 两种电路的检波器。
- (3)电路内有 FM/AM 共用的电平表指示输出电路。
- (4)调幅工作灵敏度高,因没有高频放大级。
- (5)功率消耗低。
- (6)电路设有静噪控制和 AFC 控制功能。
- (7)外接元件数量少。
- (8)AM 和 FM 工作稳定性高。
- (9)功能开关转接时冲击噪声小。
- (10)可工作于短波段($f=30MHz$)

2 参数表

表 1、表 2 分别为 AN7223 的电参数和极限参数。

表 2 AN7223 电参数 ($T_a=25^{\circ}C, V_{CC}=5V$)

参 数	测 试 条 件	最小值	典型值	最大值
FM 部分				
电源电流 $I_{CC}(mA)$	DC 测试	9	14	20
检波输出电压 $V_o(mV)$	$V_{in}=80dB_{\mu}, f=10.7MHz$ $f_{dev}=22.5kHz, f_m=400Hz$	65	90	115
极限灵敏度 $V_{in}(Lim)(dB_{\mu})$		41.5	44.5	47.5
静噪灵敏度 $V_{in}(mvte)(dB_{\mu})$		45	50	59
信号表输出电压 $V_{o(15-11)}(mV)$	$V_{in}=0dB_{\mu}, f=10.7MHz$ $f_{dev}=22.5kHz, f_m=400Hz$	0	3	15
信号表输出电压 $V_{o(15-11)}(V)$	$V_{in}=80dB_{\mu}, f=10.7MHz$ $f_{dev}=22.5kHz, f_m=400Hz$	1.14	1.26	1.42
AM 部分				
电源电流 $I_{CC}(mV)$	DC 测试	8	13	19
检波输出电压 $V_o(mV)$	$V_{in}=80dB_{\mu}, f=1MHz$ $f_{dev}=22.5kHz, f_m=400Hz$	60	80	100
最大灵敏度 $S_{max}(dB_{\mu})$		4	9.5	15
信号表输出电压 $V_{o(15-11)}(mV)$	$V_{in}=-10dB_{\mu}, f=1MHz$ $Mod=30\%, f_m=400Hz$	0		130
信号表输出电压 $V_{o(15-11)}(V)$	$V_{in}=80dB_{\mu}, f=1MHz$ $MOD=30\%, f_m=400Hz$	1.12	1.25	1.38

表 1 AN7223 极限参数 ($T_a = 25^\circ\text{C}$)

参 数	参 数	额 定 值
电源电压	$V_{cc}(V)$	14.4
电源电流	$I_{cc}(mA)$	20
功耗	$P_o(mW)$	317
工作温度	$T_{opr}(^\circ\text{C})$	$-20 \sim +75$
贮存温度	$T_{tg}(^\circ\text{C})$	$-55 \sim +150$

3 电路图

图 1 为 AN7223 外形图,其管脚作用是:① MF-IF 输入;② AM 电源;③ AM-RF 输入;④ AM 混频输出;⑤ AGC 输出 2;⑥ AGC 输出 1;⑦ AM-IF 输入;⑧ IF 旁路;⑨ IF 旁路;⑩ AM 检波输出;⑪ 地;⑫ FM 检波线圈;⑬ 音频输出;⑭ V_{cc} ;⑮ 电平表输出;⑯ AFC 输出;⑰ 参考电压;⑱ 本机振荡。

图 2 为 AN7223 内电路方框图,图 3 为 AN7224 测试电路:测试 V_o 、 $V_{in}(lim)$ 、 $V_{in}(mvte)$ 、 $V_o(15-11)$ 、 S 。图 4 为 AN7223 应用电路。

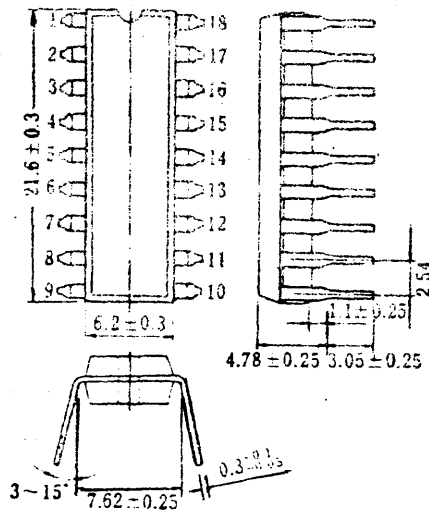


图 1 AN7223 外形图

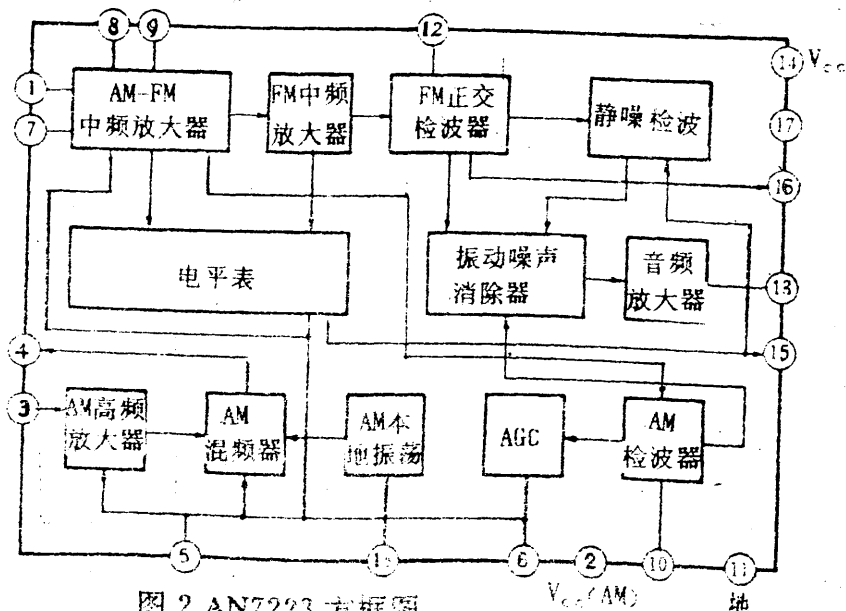


图 2 AN7223 方框图

调频/调幅中频放大器

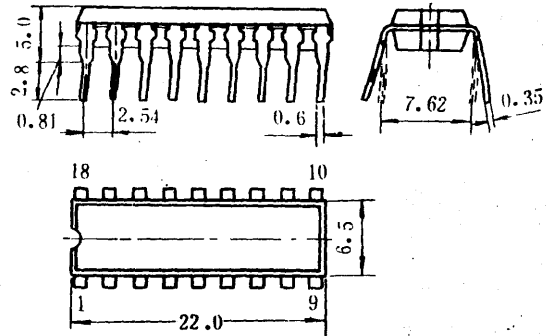
CD7223

简要说明

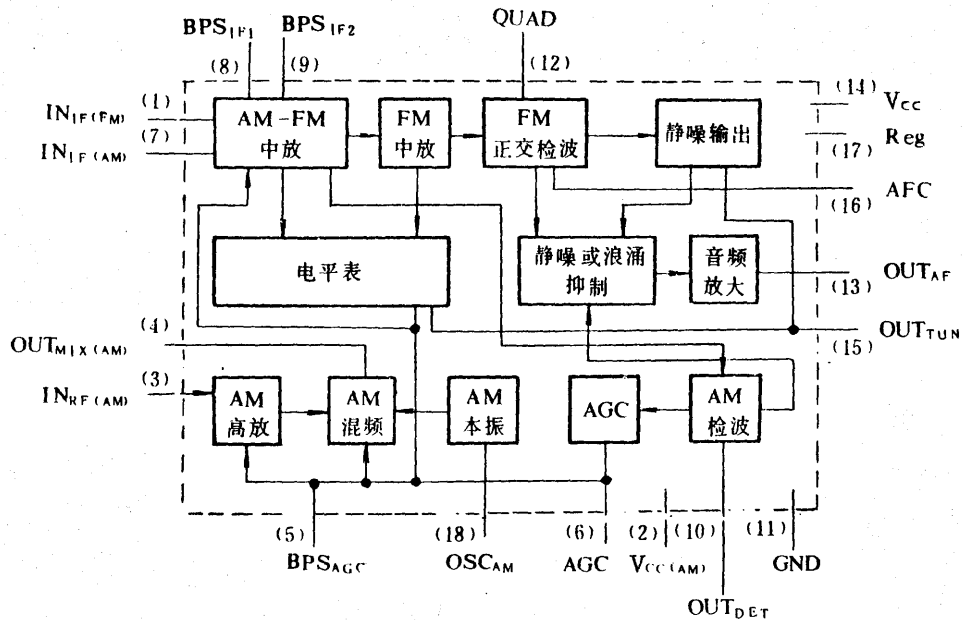
CD7223 是多功能调频/调幅中频放大电路。它含有调幅高频放大、调频/调幅检波、调谐指示输出、自动频率控制输出、噪声抑制等功能。它具有调频/调幅稳定度高,没有冲击噪声,外接元件少,工作电源电压范围宽($V_{CC}=2.8\sim 12V$)等特点。在调幅应用时,短波频率高达 30MHz 也能使用。CD7223 适合各种盒式收音机使用。

CD7223 采用 18 引线塑料双列直插式封装。

外形图



功能框图



引出端符号说明

AFC	自动频率控制	OUT _{AF}	音频输出
AGC	自动增益控制	OUT _{DET}	检波输出
BPS _{AGC}	自动增益控制旁路	OUT _{MIX(AM)}	调幅混频输出
BPS _{IF}	中频旁路	OUT _{TUN}	调谐指示输出
GND	地	QUAD	鉴频
IN _{IF(AM)}	调幅中频输入	Reg	稳压源
IN _{IF(FM)}	调频中频输入	V _{CC}	电源
IN _{RF(AM)}	调幅高频输入	V _{CC(AM)}	调幅电源
OSC _{AM}	调幅本机振荡		

极限值 ($T_A=25^\circ\text{C}$)

名称	符号	额定值	单位
最高电源电压	$V_{CC(max)}$	14.4	V
最大电源电流	$I_{CC(max)}$	20	mA
最大允许功耗	$P_{D(max)}$	317	mW
工作环境温度	T_A	-20~+75	°C
贮存温度	T_{stg}	-55~+150	°C

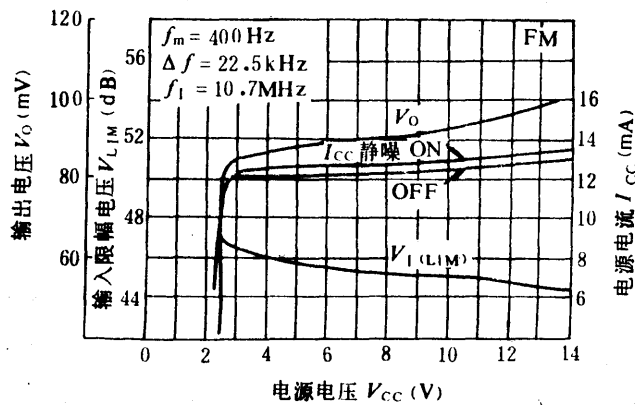
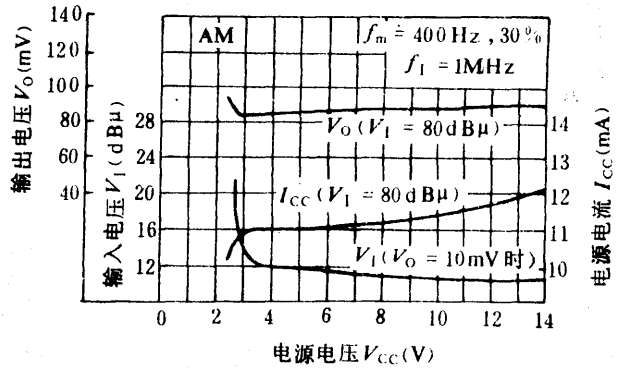
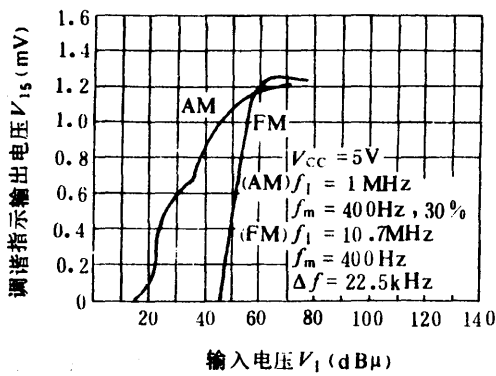
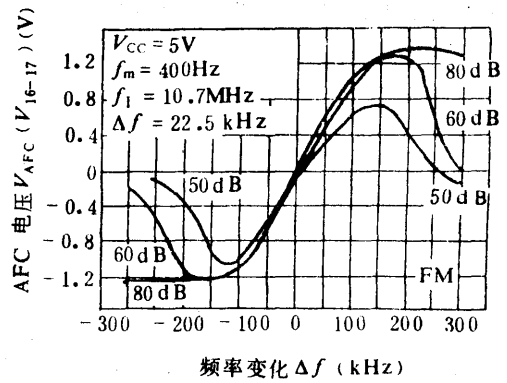
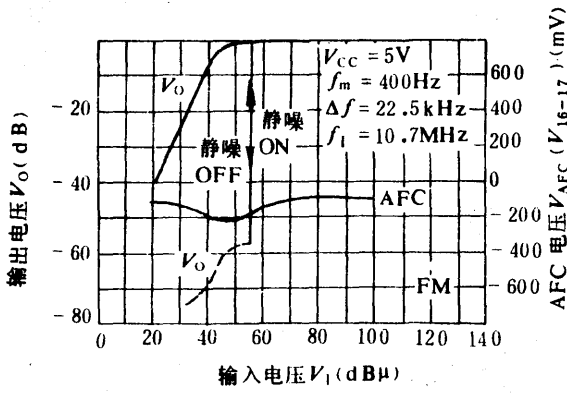
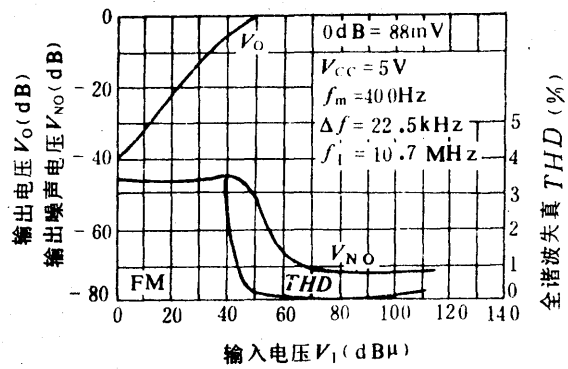
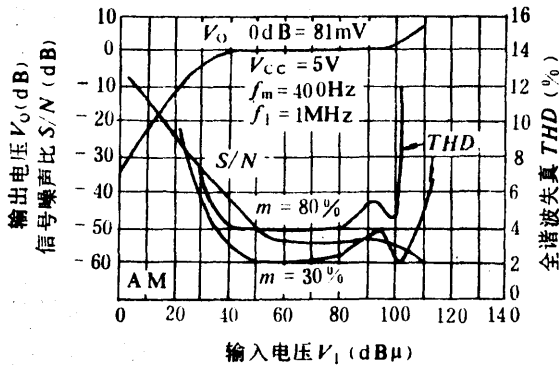
推荐工作条件 ($T_A=25^\circ\text{C}$)

名称	符号	数值	单位
电源电压	V_{CC}	2.8~12	V

电特性 ($V_{CC}=5V, T_A=25^\circ\text{C}$)

参数	符号	测试线路	测试条件	最小	典型	最大	单位	
F M	电源电流	I_{CC}	2	(DC 测试)	9	14	20	mA
	鉴频输出电压	V_{OF}	1	$V_1=80\text{dB}\mu, f=10.7\text{MHz}$ $\Delta f=22.5\text{kHz}, f_m=400\text{Hz}$	65	90	115	mV
	输入限幅电压	V_{LIM}	1	V_o 为 -3dB 时的输入	41.5	44.5	47.5	dB μ
	静噪输入电压	V_{MUT}	1	V_o 为 -20dB 以上的输入	45	50	59	dB μ
	调谐指示驱动输出 1	$V_{15(1)}$	1	$V_1=0\text{dB}\mu, f=10.7\text{MHz}$ $\Delta f=22.5\text{kHz}, f_m=400\text{Hz}$	0	3	15	mV
	调谐指示驱动输出 2	$V_{15(2)}$	1	$V_1=80\text{dB}\mu, f=10.7\text{MHz}$ $\Delta f=22.5\text{kHz}, f_m=400\text{Hz}$	1.14	1.26	1.42	V
A M	电源电流	I_{CC}	3	(DC 测试)	8	13	19	mA
	检波输出电压	V_{OD}	1	$V_1=80\text{dB}\mu, f=1\text{MHz}$ $m=30\%, f_m=400\text{Hz}$	60	80	100	mV
	最大灵敏度	S_{max}	1	$V_o=10\text{mV}$ 时的输入	4	9.5	15	dB μ
	调谐指示驱动输出 1	$V_{15(3)}$	1	$V_1=-10\text{dB}\mu, f=1\text{MHz}$ $m=30\%, f_m=400\text{Hz}$	0	—	130	mV
	调谐指示驱动输出 2	$V_{15(4)}$	1	$V_1=80\text{dB}\mu, f=1\text{MHz}$ $m=30\%, f_m=400\text{Hz}$	1.12	1.25	1.38	V

特性曲线



典型应用

