

TA8100N/F

3V AM/FM IF IC WITH POWER AMPLIFIER

TA8100N/F is AM/FM IF IC with power amplifier and suitable for low voltage portable radio. This IC is able to drive LED for Turning Indication.

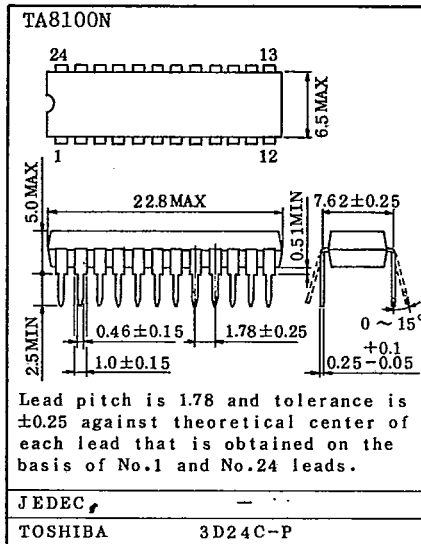
- . It can drive 4Ω load directly
: $P_o=220\text{mW}$ (Typ.), THD=10% (3V/4Ω)
- . Incorporates, AM RF Amp, AM Local Oscillator, AM Mixer, AM/FM IF Amp, AM/FM Detector, AM AGC Circuit and B Class-Audio Power Amplifier.
- . Low Overload Distortion at AM.
- . Wide Power Supply Voltage Range
: $V_{opr}=1.8\sim 5\text{V}$ ($T_a=25^\circ\text{C}$)

MAXIMUM RATINGS ($T_a=25^\circ\text{C}$)

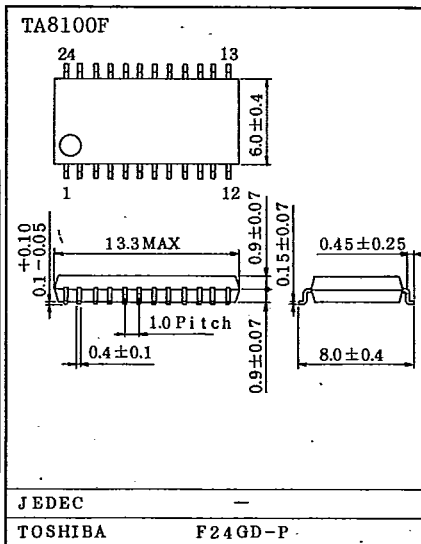
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	VCC	6	V
Output Current (Peak)	$I_{O(\text{peak})}$	550	mA
LED Current	I_{LED}	15	mA
Power Dissipation (Note)	TA8100F	800	mW
	TA8100N	1200	
Operating Temperature	T_{opr}	-25~75	°C
Storage Temperature	T_{stg}	-55~150	°C

Note : Derated above $T_a=25^\circ\text{C}$ in the proportion of 6.4mW/°C for TA8100F and of 9.6mW/°C for TA8100N.

Unit in mm

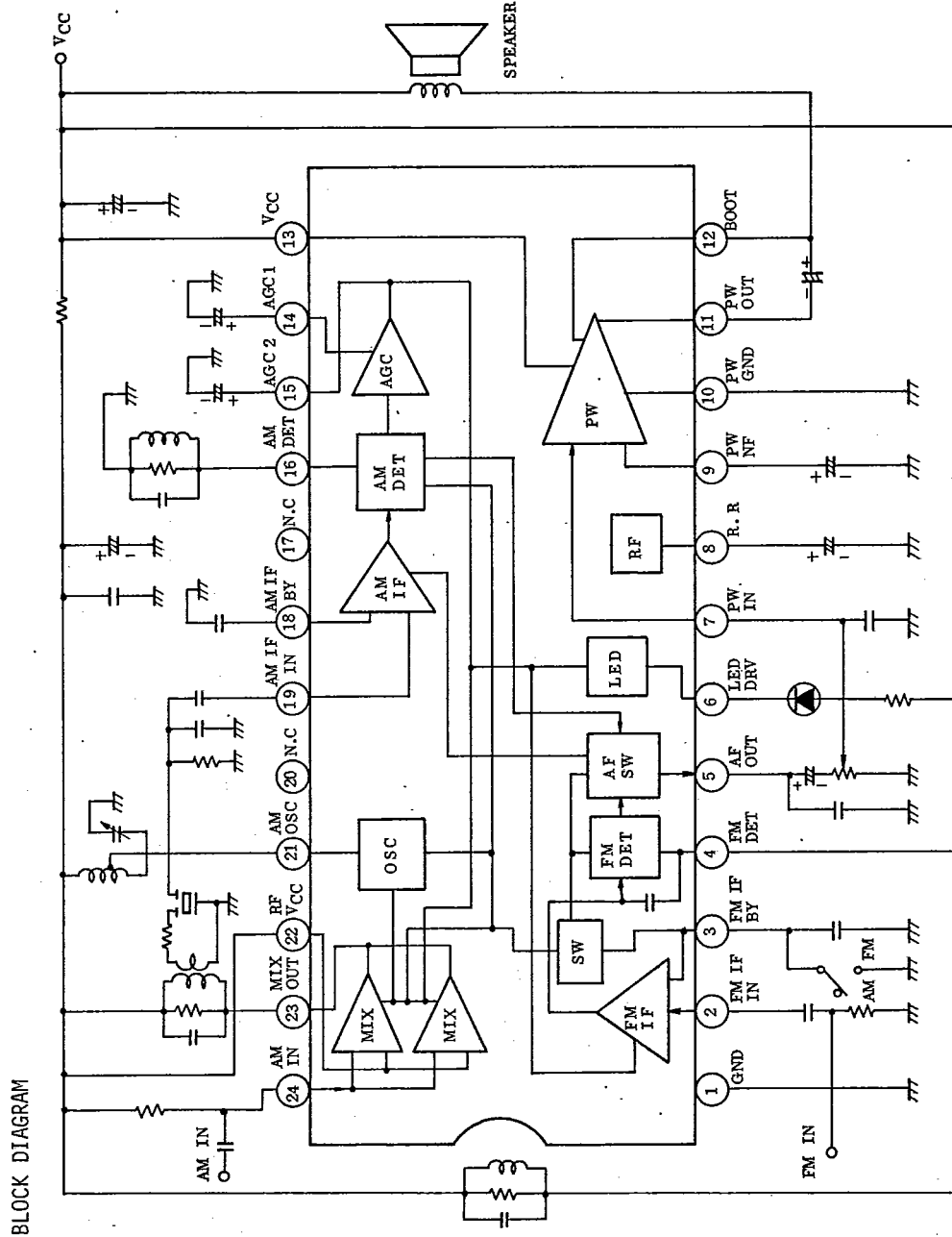


Unit in mm



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(Note) 17, 20 pin: Non Connection

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TERMINAL EXPLANATION

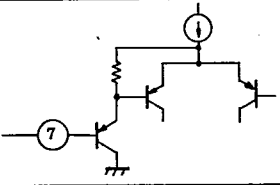
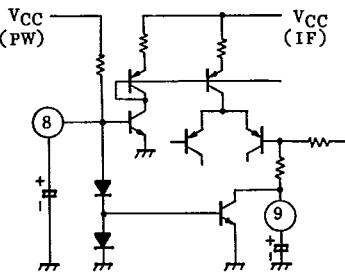
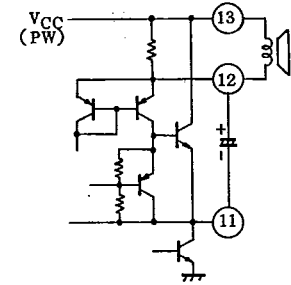
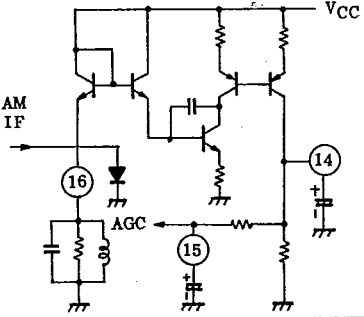
TERMINAL VOLTAGE: Typical Terminal Voltage at No Signal with Test Circuit
(V_{CC}=3.0V, T_a=25°C)

No.	TERMINAL NAME	CONTENTS	EQUIVALENT CIRCUIT	VOLTAGE	
				AM(V)	FM(V)
1	GND	IF GND	-	0	0
2	FM IF IN	FM IF (10.7MHz) Input Terminal		2.4	2.0
3	FM IF BY	FM IF BYPASS		0	2.0
4	FM DET	FM Quad Rature Detection Circuit		3.0	3.0
5	AF OUT	Audio Signal Output Terminal	<p>()..... ON at FM only</p>	0.3	0.8
6	LED DRIVER	LED Terminal		-	-

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TERMINAL EXPLANATION

No.	TERMINAL NAME	CONTENTS	EQUIVALENT CIRCUIT	VOLTAGE	
				AM(V)	FM(V)
7	PW IN	Audio Signal Input Terminal		0.01	0.01
8	RIPPLE	Ripple Filter Terminal		1.4	1.4
9	PW NF	NF Terminal		0.6	0.6
10	PW GND	GND	-	0	0
11	PW OUT	Audio Signal Output Terminal		1.5	1.5
12	BOOT	Bootstrap		2.8	2.8
13	VCC	Power Supply	-	3.0	3.0
14	AGC 1	AM AGC 1		0.6	0
15	AGC 2	AM AGC 2		0.6	0
16	AM DET	AM Detector		0	0

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No.	TERMINAL NAME	CONTENTS	EQUIVALENT CIRCUIT	VOLTAGE	
				AM(V)	FM(V)
17	N.C	Non Connection	-	-	-
18	AM IF BY	AM IF Amplifier Bypass		1.3	0
19	AM IF IN	AM IF (455kHz) Input Terminal		1.3	0
20	N.C	Non Connection	-	-	-
21	AM OSC	AM Oscillation Terminal		3.0	3.0
22	VCC	Power Supply	-	3.0	3.0
23	AM MIX OUT	AM MIXER Output Terminal		3.0	3.0
24	AM IN	AM RF Signal Input Terminal		3.0	3.0

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ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $V_{CC}=3V$, $T_a=25^{\circ}C$ FM : $f=10.7MHz$, $\Delta f=\pm 22.5kHz$ dev., $f_m=1kHz$ AM : $f=1MHz$, Mod=30%, $f_m=1kHz$ PW : $f=1kHz$, $R_L=4\Omega$, $R_g=600\Omega$

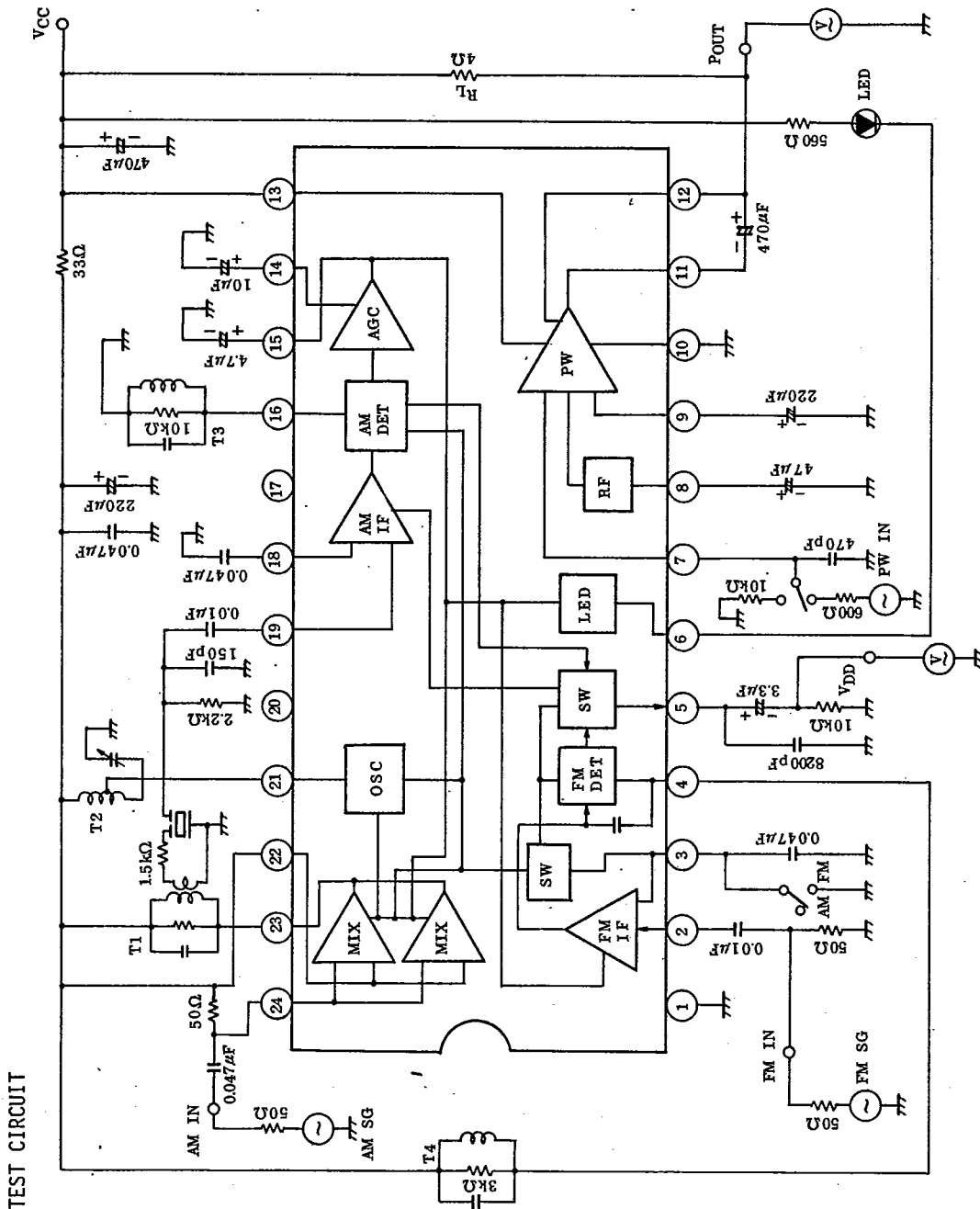
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Power Supply Current (Including PW Amplifier)	I _{CC} (FM)	-	V _{IN} =0	-	12	20	mA	
			V _{IN} =0, V _{CC} =4.5V	-	14	23		
	I _{CC} (AM)	-	V _{IN} =0	-	11	19		
			V _{IN} =0, V _{CC} =4.5V	-	13	22		
FM	Input Limiting Voltage	V _{IN} (lim)	-3dB Limiting Point	-	36	42	dB μ	
	Recovered Output Voltage	V _{OD}	V _{IN} =80dB μ	22	31	44	mV _{rms}	
	Signal to Noise Ratio	S/N	V _{IN} =80dB μ	-	70	-	dB	
	Total Harmonic Distortion	THD	V _{IN} =80dB μ	-	0.3	-	%	
	AM Rejection Ratio	AMR	V _{IN} =80dB μ , Mod=30%	-	33	-	dB	
	LED Sensitivity	V _L	I _L =1mA	44	50	56	dB μ	
AM	Gain	G _v	V _{IN} =30dB μ	5	11	17	mV _{rms}	
	Recovered Output Voltage	V _{OD}	V _{IN} =66dB μ	22	31	44	mV _{rms}	
	Signal to Noise Ratio	S/N	V _{IN} =66dB μ	-	46	-	dB	
	Total Harmonic Distortion	THD 1	-	V _{IN} =66dB μ	-	1.5	-	%
		THD 2	-	V _{IN} =106dB μ	-	4.0	-	
	Local OSC Stop Voltage	V _{stop}	-	V _{OSC} :-6dB down point	-	-	1.5	V
LED Sensitivity	V _L	-	I _L =1mA	24	30	36	dB μ	
PW	Voltage Gain	G _v	V _{IN} =-40dBm (7.7mV)	37	40	43	dB	
	Output Power	P _{o1}	THD=10%	180	220	-	mW	
		P _{o2}	V _{CC} =4.5V, THD=10%	-	500	-		
	Total Harmonic Distortion	THD	-	P _O =50mW	-	0.5	2	%
Output Noise	V _{NO}	-	R _g =10k Ω BW=30Hz~20kHz	-	0.18	-	mV _{rms}	

V_{IN} : Open Measurement

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TEST CIRCUIT

TOSHIBA

9097247 TOSHIBA. ELECTRONIC

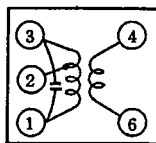
02E 17690 D

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COIL DATA

T1 AM MIX



(BOTTOM VIEW)

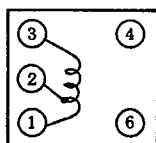
Co (pF)	f (MHz)	Q _o	TURNS		
			1-2	2-3	4-6
1-3	455	1-3	12	51	17
1500		60			

SUMIDA ELECTRIC Co.,Ltd

2150-2105-261

WIRE : 0.1mm ϕ UEW

T2 AM OSC



(BOTTOM VIEW)

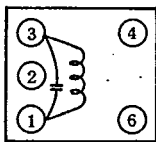
f (kHz)	L (μ H)	Q _o	TURNS	
			1-2	2-3
796	268	125	15	89

SUMIDA ELECTRIC Co.,Ltd

2157-2239-213A

WIRE : 0.06mm ϕ UEW

T3 AM DET



(BOTTOM VIEW)

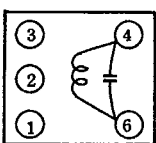
Co (pF)	f (kHz)	Q _o	TURNS
			1-3
1-3	455	105	127
330			

SUMIDA ELECTRIC Co.,Ltd

2150-2083-061

WIRE : 0.06mm ϕ UEW

T4 FM DET



(BOTTOM VIEW)

Co (pF)	f (MHz)	Q _o	TURNS
			4-6
4-6	10.7	95	10
150			

SUMIDA ELECTRIC Co.,Ltd

2153-4095-331

WIRE : 0.14mm ϕ UEW

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APPLICATION NOTE

1. AM IF INPUT

AM IF signal (455kHz) is fed to pin (19).

To keep stability at weak signal, connect the external resistor and capacitor as shown in Fig.1.

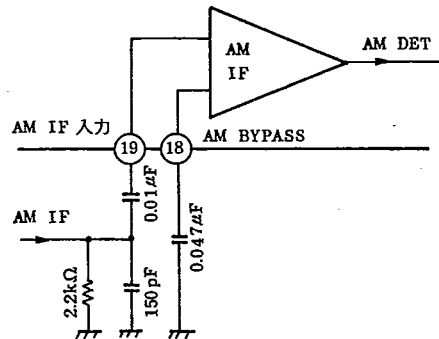


Fig.1 AM IF

2. BOOTSTRAP

When the load resistor, R_L is 16Ω , oscillation may occur just before clipping of the output wave.

(Except for $R_L=8\Omega$, 4Ω) So, connect the small resistor as shown in Fig.2.

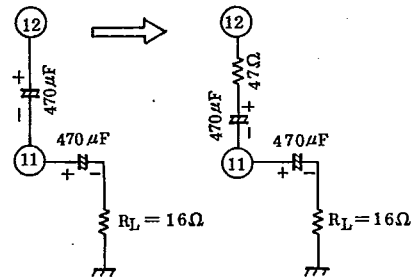


Fig.2 BOOTSTRAP

3. FM IF INPUT

It is not needed to use a transistor between F/E and AM/FM IF to get a high gain because this IC has a enough gain ($V_{IN(lim)}=36dB\mu$).

When the signal source impedance is high, be careful of the value of R_1 and pattern layout to keep stability at weak signal (Fig.3).

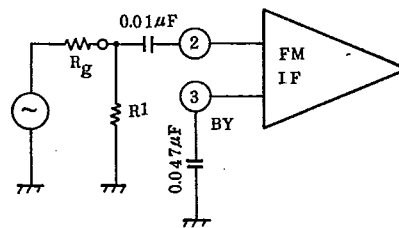
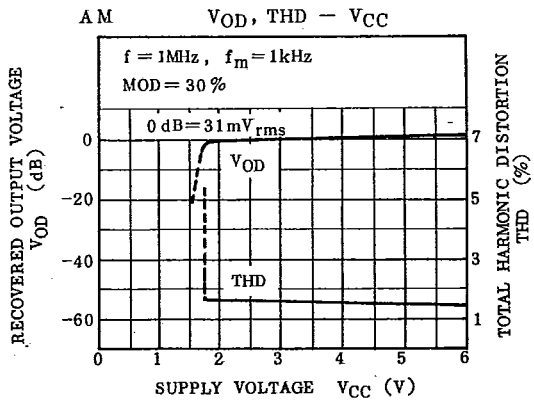
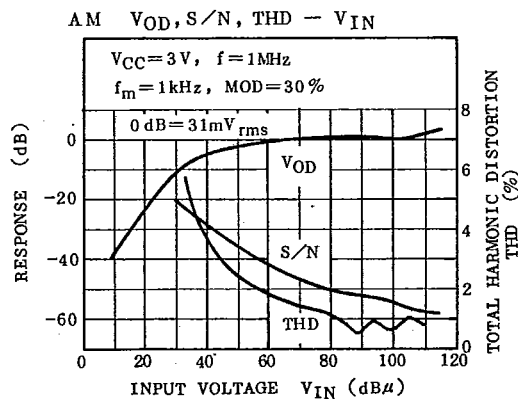
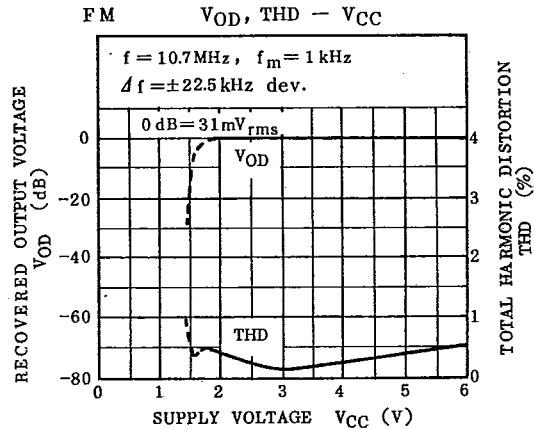
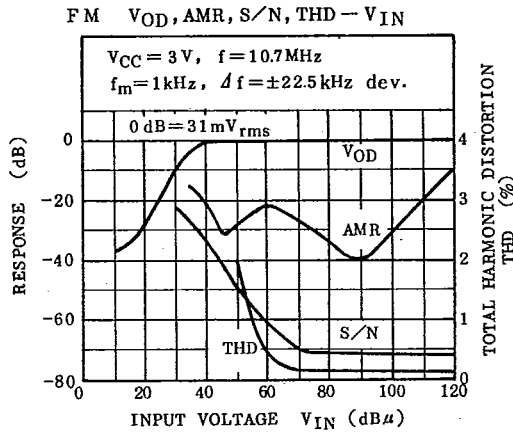
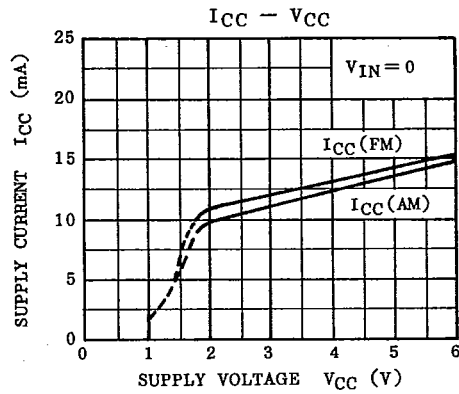


Fig.3 FM IF

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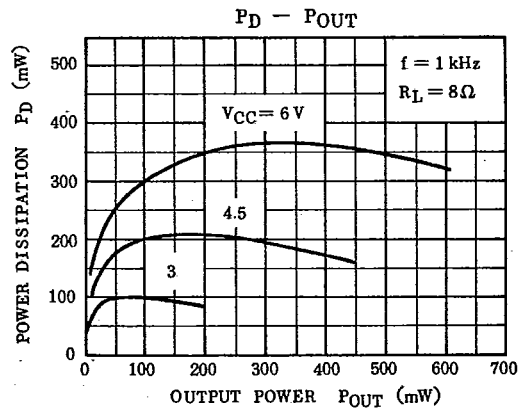
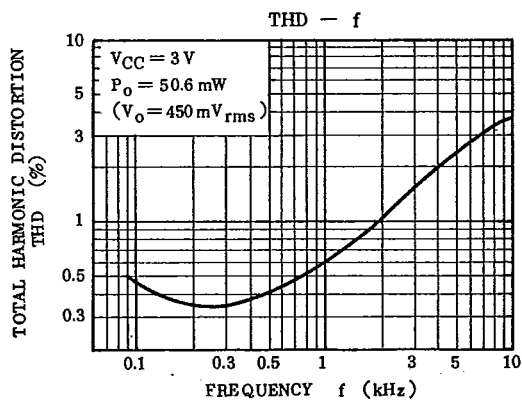
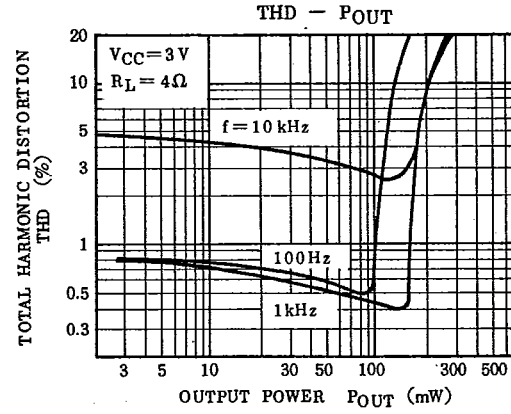
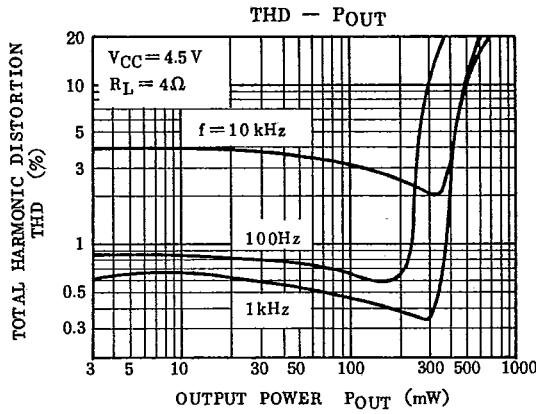
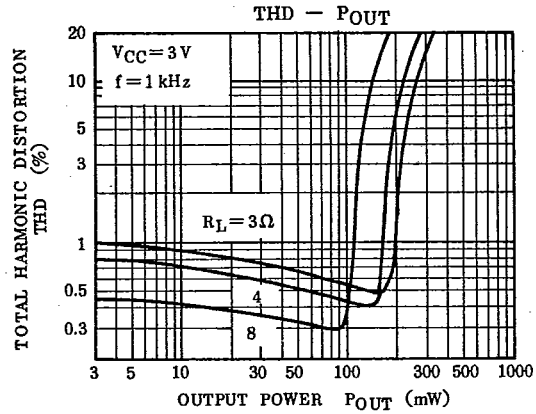
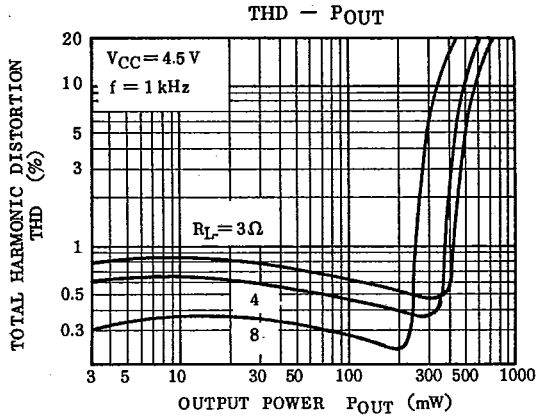
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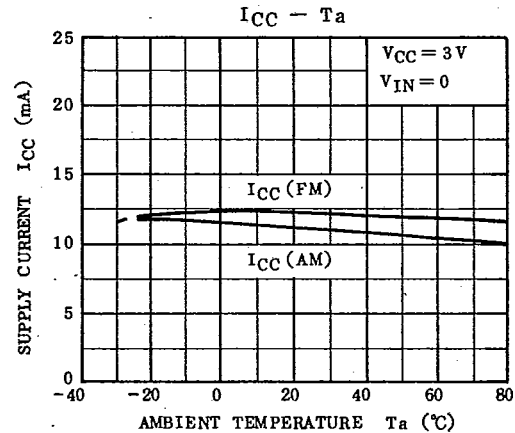
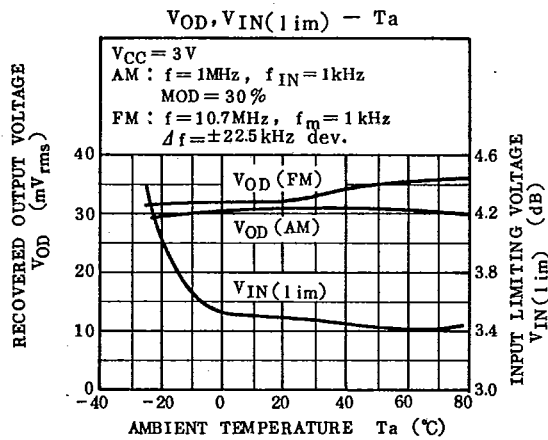
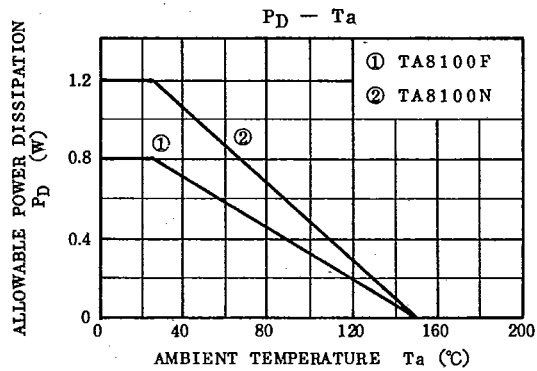
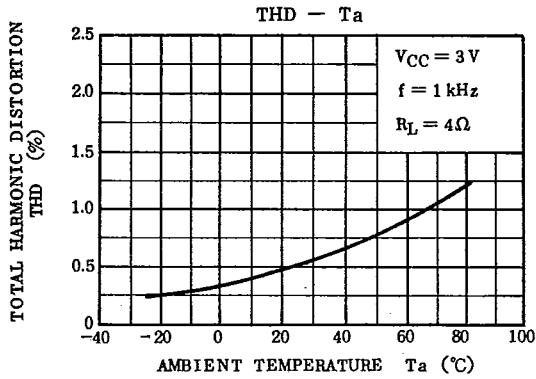
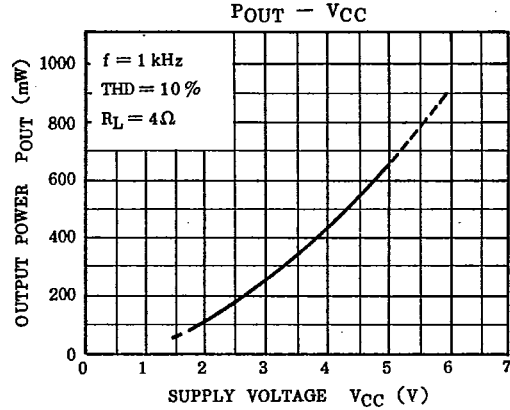
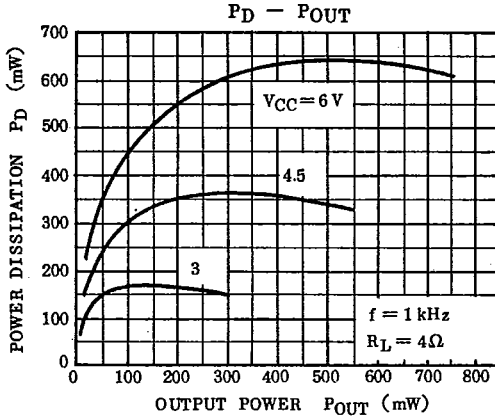
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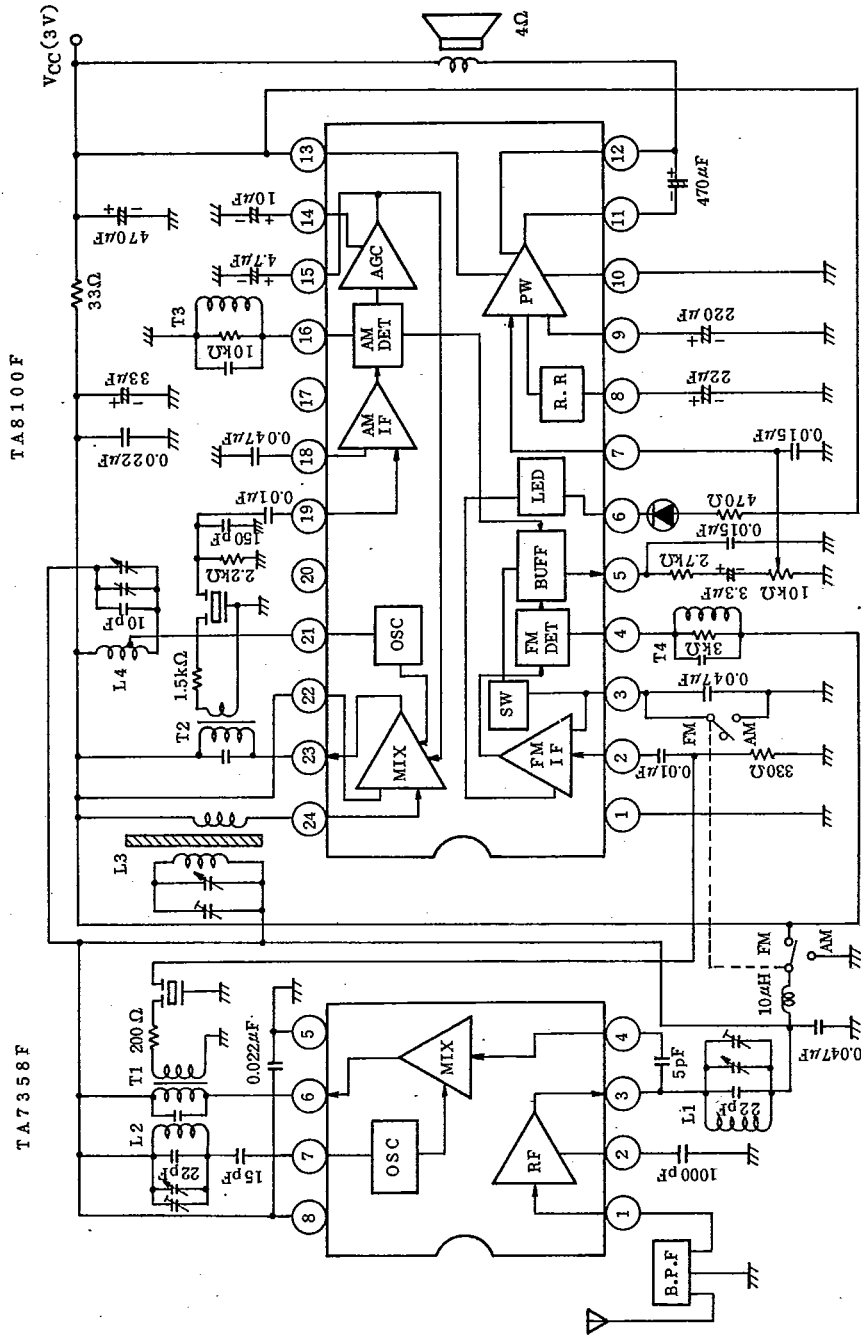
AUDIO LINEAR IC

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APPLICATION CIRCUIT

3V AM/FM RADIO CIRCUIT (for example)

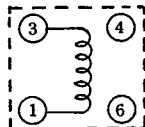


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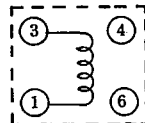
COIL DATA (APPLICATION CIRCUIT)

L1 : FM RF COIL



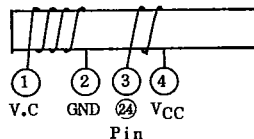
f (MHz)	L(μH)	Q _o	TURNS		WIRE (mm)
100	0.06	100	1-3	1-3	0.5 UEW
			$\frac{1}{2}$		

L2 : FM OSC COIL



f (MHz)	L(μH)	Q _o	TURNS		WIRE (mm)
100	0.045	100	3-1	3-1	0.5 UEW
			$\frac{3}{4}$		

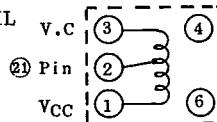
L3 : AM ANT COIL



f (kHz)	L(μH)	Q _o	TURNS		WIRE (mm)
796	600	200	1-2	3-4	7/0.07 USTC

CORE : 10mmφ × 80mm

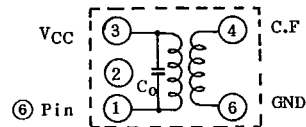
L4 : AM OSC COIL



f (kHz)	L(μH)	Q _o	TURNS		WIRE (mm)
796	268	90	1-2	2-3	0.08 UEW

MITSUMI YT20582, SUMIDA 2157-2239-213A

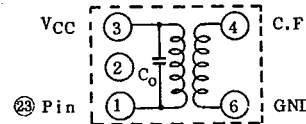
T1 : FM IFT



f (MHz)	C _o (pF)	Q _o	TURNS		WIRE (mm)
10.7	82	90	6-4	3-1	0.12 UEW

MITSUMI YT20580, SUMIDA 2153-414-041(5821)

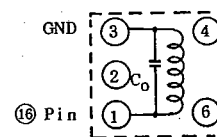
T2 : AM IFT



f (kHz)	C _o (pF)	Q _o	TURNS		WIRE (mm)
455	330	110	4-6	1-3	0.07 UEW

MITSUMI YT20583

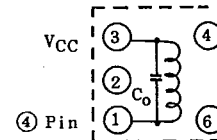
T3 : AM DET



f (kHz)	C _o (pF)	Q _o	TURNS		WIRE (mm)
455	330	105	3-1	3-1	0.06 UEW

SUMIDA 2150-2083-061(4838)

T4 : FM DET



f (MHz)	C _o (pF)	Q _o	TURNS		WIRE (mm)
10.7	150	100	1-3	1-3	0.12 UEW

SUMIDA 2153-4095-331

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