BIPOLAR ANALOG INTEGRATED CIRCUIT
μPC1353C

2.4 WATTS AUDIO AMPLIFIER, SIF AMPLIFIER AND DETECTOR FOR TV SILICON MONOLITHIC BIPOLAR INTEGRATED CIRCUIT

DESCRIPTION:

The μPC1353C is a silicon monolithic integrated circuit designed for SIF and Audio section in television receivers. This IC has all functions including sound IF Amplifier, FM Detector, DC volume control circuit, Audio Output amplifier with 2.4 Watts output power and voltage regulator.
This IC is encapsulated in 14 pin dual in-line package with heat tab.

FEATURES:

1. All functions for SIF and audio stage are provided by this one-chip IC and this IC will realize reduction of assembly cost as well as reduction of number of other components.

2. Audio output power is controlled by electronic attenuation circuit which operate at DC. Therefore, unnecessary radiation, oscillation etc. are eliminated. Due to DC control, shielded wire is not required and variable resistor will be placed anywhere required.

3. Electronic attenuator has enough attenuation (Typ. 80 dB) by the adoption of squelch circuit.
   In addition, as attenuation characteristic is same with resistance change of variable resistor, suitable variable resistor will be selected easily.

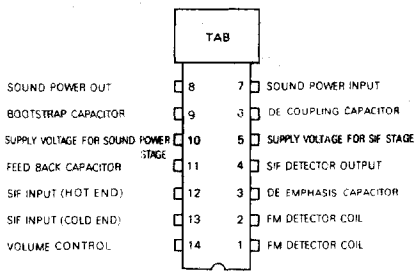
4. As Peak differencial detection method is adopted for FM detection, outside circuitry can be very simple and circuit adjustment will be very easy.

5. As operation voltage (Vcc) range for output stage is very wide (9-18 V), suitable Vcc can be freely determined for required output level.

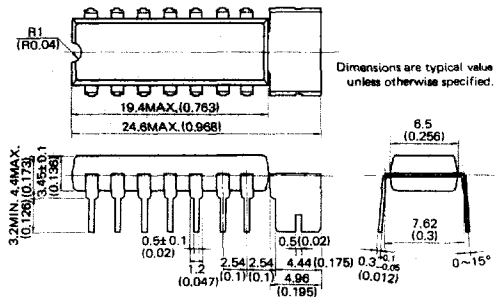
   For example:

   P_O = 2.4 W at Vcc = 18 V, R_L = 8 Ohms
   P_O = 1.2 W at Vcc = 12 V, R_L = 8 Ohms

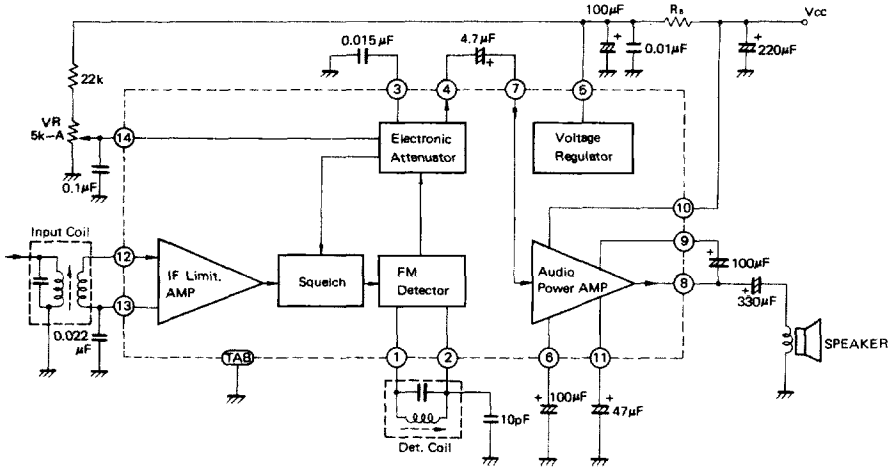
CONNECTION DIAGRAM (Top View)



PACKAGE DIMENSIONS in millimeters (inches)



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta=25 °C)

Supply Voltage Pin 10	V_{10}	20	V
Supply Current Pin 10	I_{10}	1	A
Supply Current Pin 5	I_5	100	mA
Input Signal Voltage	Vi	3	V_{P-P}
Power Dissipation	P_{d1}	0.8 (Ta=75 °C) FREE AIR	W
Power Dissipation	P_{d2}	1.4*	W
Operating Temperature	T_{opt}	−20 to +75	°C
Storage Temperature	T_{stg}	−40 to +150	°C

* PRINTED CIRCUIT COPPER AREA 50x50 mm^2

ELECTRICAL CHARACTERISTICS (Ta=25±3 °C)

1 IF STAGE

(V_{CC}=12 V R_B=100 Ω R_g=50 Ω V_{14}≥1.3 V
f_o=4.5 MHz f_M=400 Hz f=± 25 kHz)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Pin 5 Voltage	V_{5A}	7.5	8.0	8.5	V	
Pin 5 Voltage	V_{5B}	7.5	8.0	8.5	V	V_{CC}=18V R_B=330Ω
Pin 10 Current	I_{10A}	14	19	24	mA	NO INPUT SIGNAL
Pin 10 Current	I_{10B}	16	28	35	mA	V_{CC}=18V R_B=330Ω NO INPUT SIGNAL
IF Limiting Voltage	Vi(lim)		200	400	μVr.m.s.	V_{OAF}(Vi=10mVr.m.s.) −3dB
Detector Output Voltage	V_{OAF}	300	360		mVr.m.s.	Vi=10mVr.m.s.
Detector Distortion	T.H.D.$_1$		0.7		%	Vi=10mVr.m.s.
AM Rejection	AMR	−40	−50		dB	AM MOD 30% f_M= 400Hz Vi=10mVr.m.s.
Maximum Attenuation	ATT_{max}	−60	−80		dB	V_{14}=0V

2 SOUND POWER STAGE

(V_{CC}=12 V R_B=100 Ω R_L=8 Ω
f=400 Hz R_G=600 Ω)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Sound Stage Voltage Gain	G_{VAF}	33	37	41	dB	Vi=30mVr.m.s.
Sound Output Power	PoA	0.9	1.2		W	T.H.D.=10%
Sound Output Power	PoB	2.0	2.4		W	V_{CC}=18V R_B=330Ω T.H.D.=10%
Sound Output Distortion	T.H.D.2A		0.6	2.0	%	Po=0.5W
Sound Output Distortion	T.H.D.2B		0.5	2.0	%	V_{CC}=18V R_B=330Ω Po=0.5W

3 IF STAGE + SOUND POWER STAGE

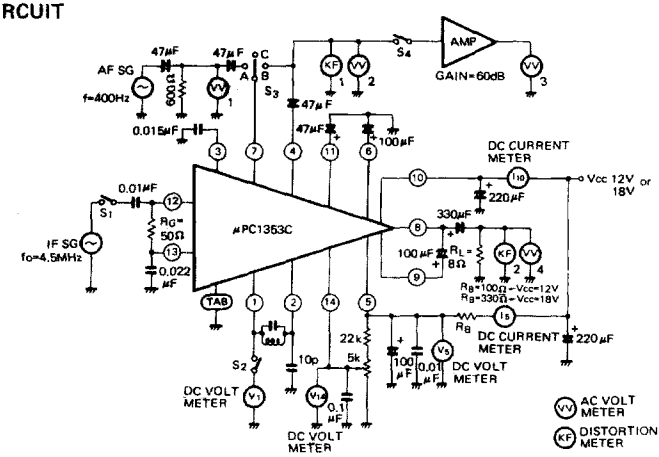
Over All Sound Output Distortion	T.H.D.$_3$		1.5	4.0	%	P_o = 0.5W Vi= 10mVr.m.s.

4 REFERENCE DATA

CHARACTERISTIC	SYMBOL		UNIT	TEST CONDITIONS
Pin 10 Current	I_{10}	200 ~ 210	mA	T.H.D.$_{2A}$=10%
Pin 10 Current	I_{10}	270 ~ 280	mA	T.H.D.$_{2B}$=10%
Sound Output Power	PoA'	1.1	W	T.H.D.=3%
Sound Output Power	PoB'	2.0	W	V_{CC}=18V R_B=330Ω T.H.D.=3%
Sound Stage Band Width	BW	50 ~ 50k	Hz	−3dB

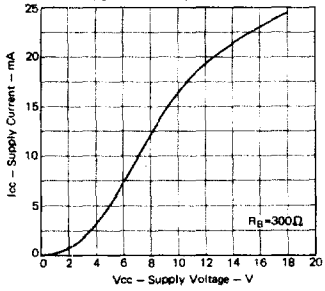
PIN INPEDANCE	fo=4.5 MHz		5.5 MHz		6.0 MHz		6.5 MHz		UNIT
	R	C	R	C	R	C	R	C	
Pin 12 IF Input	2	9.5	2	9.4	1.9	9.4	1.9	9.4	kΩ/pF
Pin 1 Detector Connect	2.4	6.3	2.4	6.2	2.4	6.1	2.4	6.1	kΩ/pF
Pin 2 Detector Connect	11.5	9	9	8.5	8.5	8.3	7.8	8.1	kΩ/pF

TEST CIRCUIT

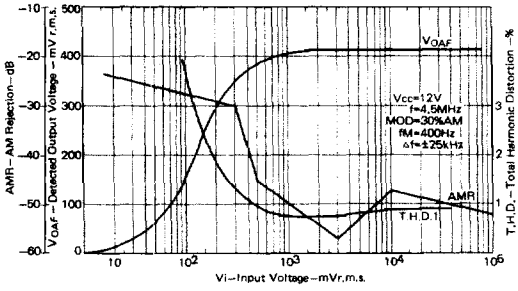


CHARACTERISTICS

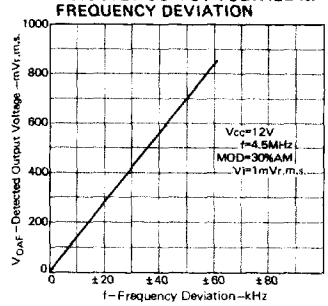
SUPPLY CURRENT vs. SUPPLY VOLTAGE



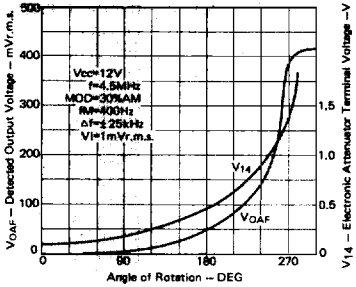
DETECTED OUTPUT VOLTAGE, AM REJECTION, TOTAL HARMONIC DISTORTION vs. INPUT VOLTAGE



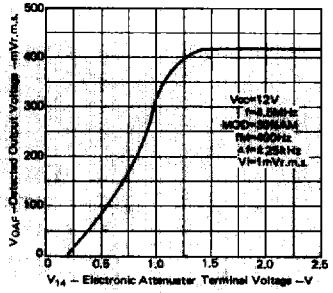
DETECTED OUTPUT VOLTAGE vs. FREQUENCY DEVIATION



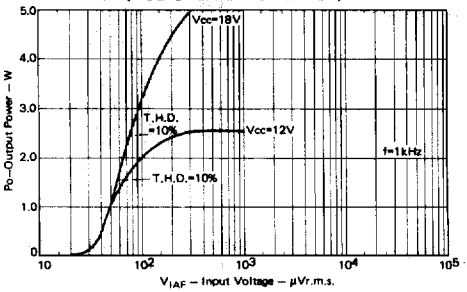
DETECTED OUTPUT VOLTAGE, ELECTRONIC ATTENUATER TERMINAL VOLTAGE vs. ANGLE OF ROTATION (A CURVE VOLUME)



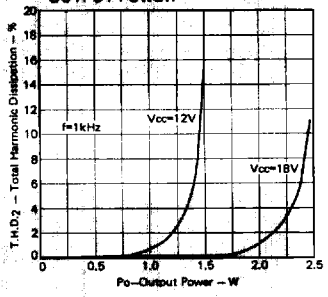
DETECTED OUTPUT VOLTAGE vs. ELECTRONIC ATTENUATER TERMINAL VOLTAGE



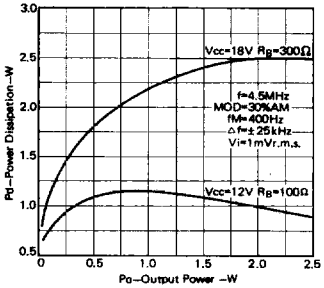
OUTPUT POWER vs. INPUT VOLTAGE (AUDIO AMPLIFIER STAGE)



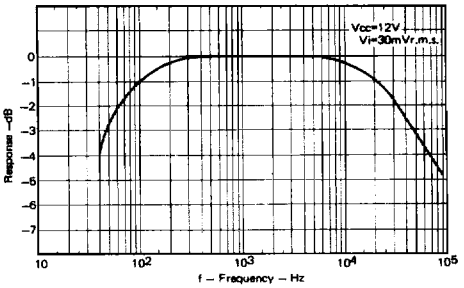
TOTAL HARMONIC DISTORTION (AUDIO AMPLIFIER STAGE) vs. OUTPUT POWER



POWER DISSIPATION vs. OUTPUT POWER

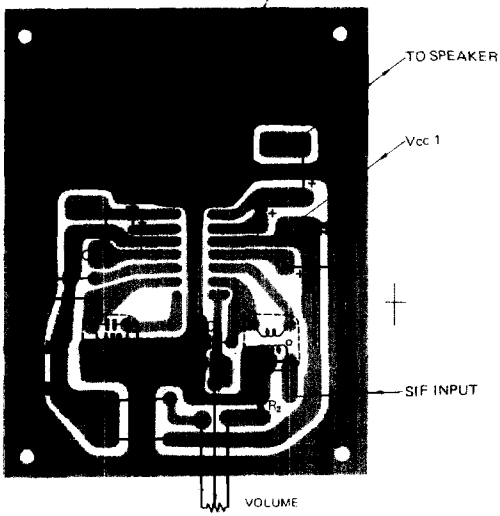


FREQUENCY RESPONSE (AUDIO AMPLIFIER)

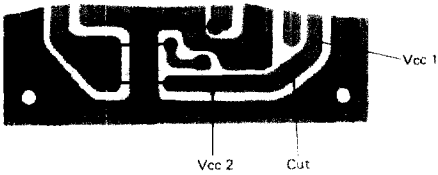


PRINTED CIRCUIT BOARD AND COMPONENTS TABLE

AT ONE SUPPLY POWER SYSTEM GND



AT TWO SUPPLY POWER SYSTEM



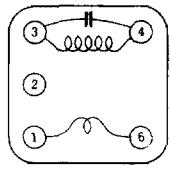
SYMBOL	CHARACTERISTIC
C1	CERAMIC 0.022 μF
C_2	CERAMIC 10 pF
C_3	CHEMICAL 100μF 10V
C_4	CHEMICAL 330μF 25V
C_5	CHEMICAL 100μF 25V
C_6	CHEMICAL 220μF 25V
C_7	CHEMICAL 47μF 10V
C_8	CERAMIC 0.01μF
C_9	CHEMICAL 100μF 10V
C_{10}	CHEMICAL 4.7μF 10V
C_{11}	CERAMIC 0.015μF
C12	CERAMIC 0.1μF
VR	5k-A Curve
T_1	INPUT COIL
T_2	DET. COIL

SYMBOL	CHARACTERISTIC
R_1	22k 1/4W
R_2	270 1/4W
R_B	100Ω or 330Ω 1/2W

COIL SPEC.

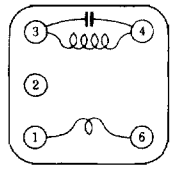
INPUT COIL

FOR
4.5 MHz



3 – 4 20T
1 – 6 5T
C 82pF
fo 4.5MHz
Q_u 110±20%
Coil Material
0.1φ OUEW

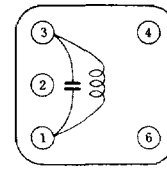
FOR
5.5 MHz



3 – 4 28T
1 – 6 4T
C 82pF
fo 5.5MHz
Q_u 59±20%
Coil Material
0.1φ OUEW

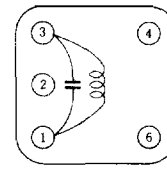
DETECTOR COIL

FOR
4.5 MHz



1 – 3 24T
C 82pF
fo 4.5MHz
Qu 108±20%
Coil Material
0.1φ OUEW

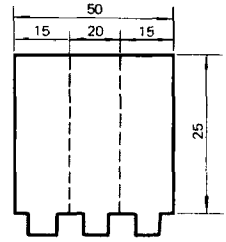
FOR
5.5 MHz



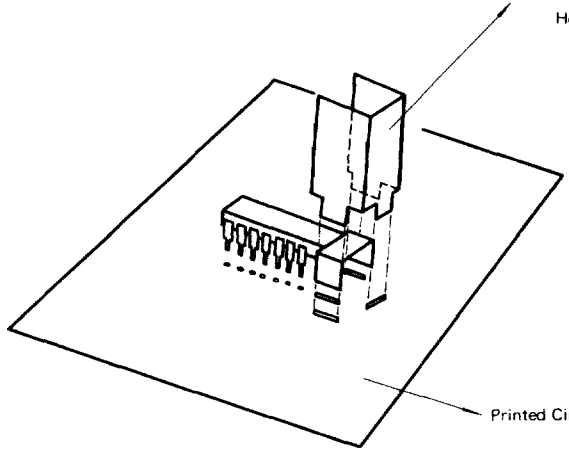
1 – 3 29T
C 76pF
fo 5.5MHz
Q_u 49±20%
Coil Material
0.1φ OUEW

MOUNTING HEATSINK

The method of mounting the heatsink show below, in the case of heatsink need, when sound output power will be larger and the heatsink don't directly mount with IC's TAB.



Heat sink



Printed Circuit Board