Ordering number: EN3248C

Monolithic Linear IC

SANYO

No.3248C

LA2805,2805M

Telephone Answering Machine Use

Overview

The LA2805,2805M is a telephone answering machine-use bipolar IC that performs the basic functions required for telephone answering machine and has the microcomputer interfaces and analog switches to control these functions.

The LA2805,2805M is applicable to telephone answering machines of both 2-mechanism and 1-mechanism types and available in compact DIP-24S and MFP-24D packages.

Functions

1) Preamp for recording/playback (with ALC)
2) Recording amp (DC bias)
3) Analog switches
4) Voice detector (VOX)
5) Zero-cross comparator for beep tone detection
6) Power amp (Po=300mW, R_L=8Ω, V_{CC}=9V)
7) Line amp
8) Microcomputer interface

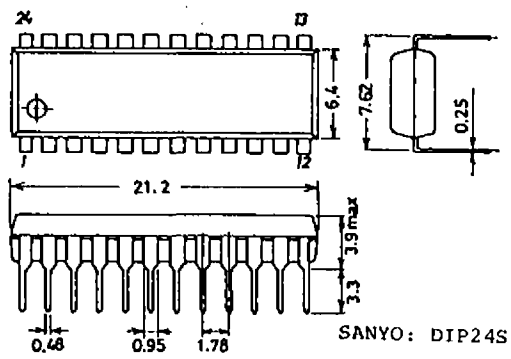
Features

- Since the LA2805,2805M contains all the functions required for telephone answering machine and can be controlled by a microcomputer, a unique system can be made up.
- The recording amp gain and recording bias current can be set independently by an external resistor.
- Low distortion
- Compact package (DIP-24S,MFP-24D)

Maximum Ratings at Ta=25°C

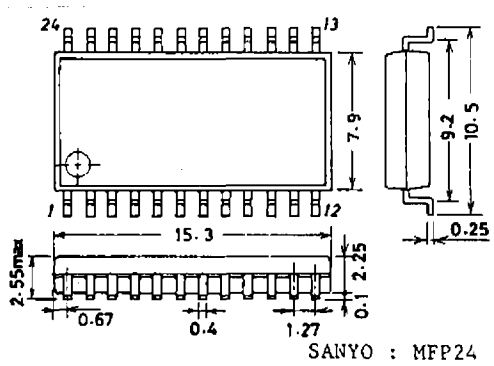
			unit
Maximum Supply Voltage	V_{CC} max	14	V
Maximum Supply Voltage	P.V_{CC} max	14	V
Allowable Power Dissipation	Pd max	1.26	W
Control Signal Input Voltage	VID	−0.3 to +4.2	V
Operating Temperature	Topr	−20 to +70	°C
Storage Temperature	Tstg	−40 to +150	°C

Package Dimensions 3067
(unit: mm)



SANYO: DIP24S

Package Dimensions 3108
(unit: mm)



SANYO : MFP24

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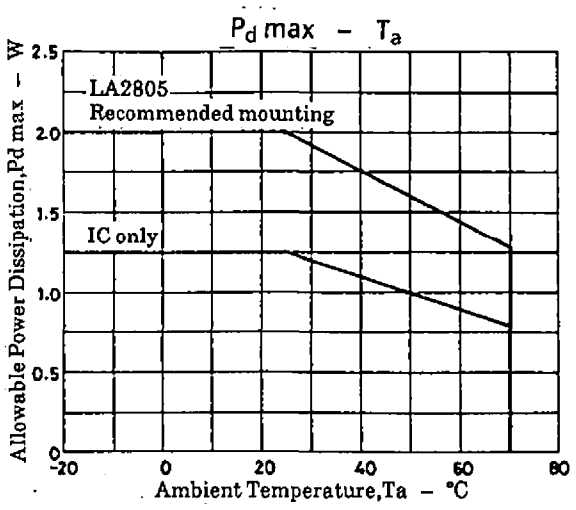
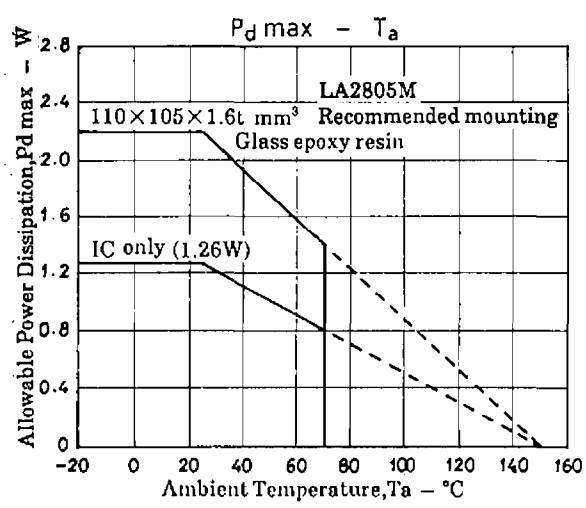
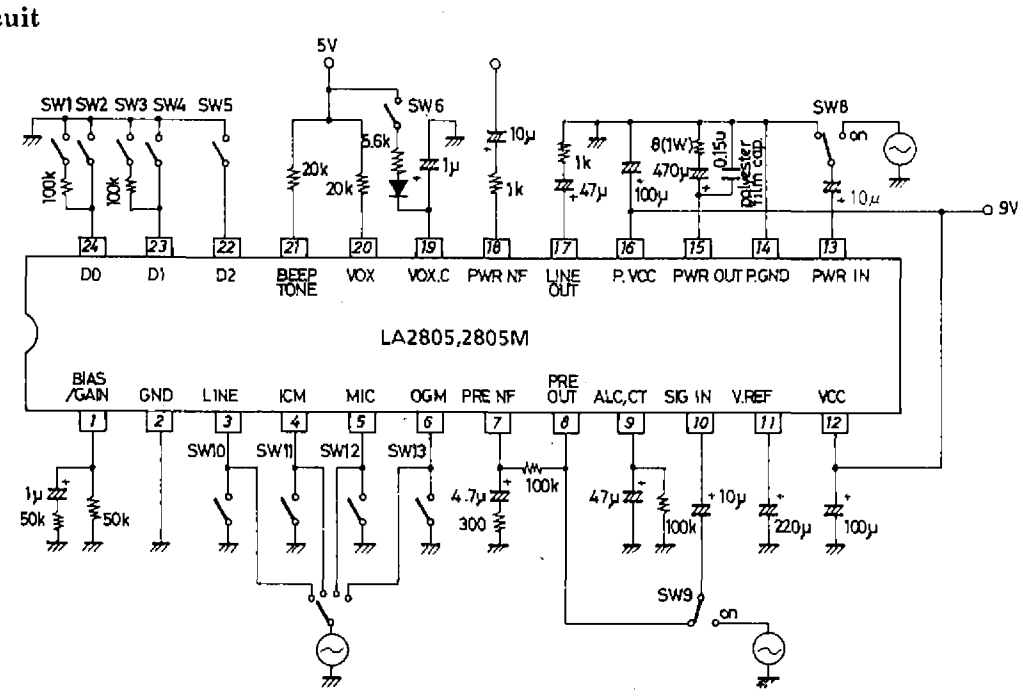
Operating Conditions at Ta = 25°C					unit
Recommended Supply Voltage	V_{CC}			9	V
Recommended Supply Voltage	$P.V_{CC}$			9	V
Operating Voltage Range	V_{CC} op			7 to 12	V
Operating Voltage Range	$P.V_{CC}$ op			7 to 12	V
Load Resistance	R_L	Power amp		8	Ω
Control Signal 'H'-Level Input Voltage	$V_{IH}1$	Pins D_0,D_1		3.5 to 4.2 (or open)	V
Control Signal 'M'-Level Input Voltage	$V_{IM}1$	Pins D_0,D_1		2.0 to 2.8 (or grounded through 100kΩ)	V
Control Signal 'L'-Level Input Voltage	$V_{IL}1$	Pins D_0,D_1		0 to 0.8	V
Control Signal 'H'-Level Input Voltage	$V_{IH}2$	Pins D_2,MUTE		2.0 to 4.2 (or open:D_2)	V
Control Signal 'L'-Level Input Voltage	$V_{IL}2$	Pins D_2,MUTE		0 to 0.8	V
Preamp Input Signal Voltage	V_{IN}			0 to 1.0	Vp-p

Operating Characteristics at Ta = 25°C, V_{CC}, $P.V_{CC}$ = 9V, f = 1kHz				min	typ	max	unit
Quiescent Current	$I_{CC}1$	V_{CC}			12	18	mA
Quiescent Current	$I_{CC}2$	$P.V_{CC}$			20	30	mA
[Preamp]							
Voltage Gain	VG_C	−70dBs input	: ICM REC	47	49	51	dB
Total Harmonic Distortion	THD	−40dBs input			0.5	1.0	%
ALC Turn Point	V_{ALC}			−58	−54	−50	dBs
ALC Saturation Output Level	V_{OS}	−40dBs input		400	500	625	mVrms
Equivalent Input Noise Voltage	V_{NI}	Input short (2.2kΩ contained),flat				50	μVrms
ALC Range	ALC W	From ALC ON until THD = 1%		40	45		dB
[REC amp]							
Voltage Gain	VG_R	Between pins 10 and 4, ZAC = 25kΩ	: ICM REC	−7.0	−4.0	−1.0	dB
Output Bias Voltage	V_B	ZDC = 50kΩ		0.8	1.3	1.7	V
Total Harmonic Distortion	THD	Preamp input −40dBs			0.5	1.0	%
[Line amp] at R_L = 1kΩ							
Voltage Gain	VG_L	Between pins 10 and 17,	: OGMOUT	8	9.3	11	dB
Total Harmonic Distortion	THD	Preamp input −40dBs			0.5	1.0	%
Maximum Output Voltage	V_O max	THD = 1%		1.8			Vrms
[Power amp] at R_L = 8Ω, input pin 13							
Voltage Gain	VG_P	−20dBs input	: ICM REC	20	22	24	dB
Output Power	Po	THD = 10%		0.2	0.3		W
Total Harmonic Distortion	THD	Po = 0.15W			0.5	1.0	%
Input Resistance	r_i			7	10	13	kΩ
Ripple Rejection	SVRR	Rg = 0, f_r = 100Hz, Vccr = −20dBs		38	41		dB
Output Noise Voltage	V_{NO}	Input short,flat			0.3	0.5	mVrms
[Beep tone detector] 5V applied to pin 21 through R = 20kΩ							
Output Signal Duty Ratio	D-R	Pin 10 input −22dBs		40	50	60	%
Output Terminal ON-State Voltage	V_{sat}					0.4	V
[VOX] 5V applied to pin 20 through R = 20kΩ							
Sensitivity	$V_{OX}L$	Pin 10 input −24dBs				0.3	V
	$V_{OX}H$	Pin 10 input −28dBs		4		5	V
Output Terminal On-State Voltage	V_{sat}					0.3	V
[VRFF]							
Output Voltage	V_{ref}			3.6	3.8	4.0	V



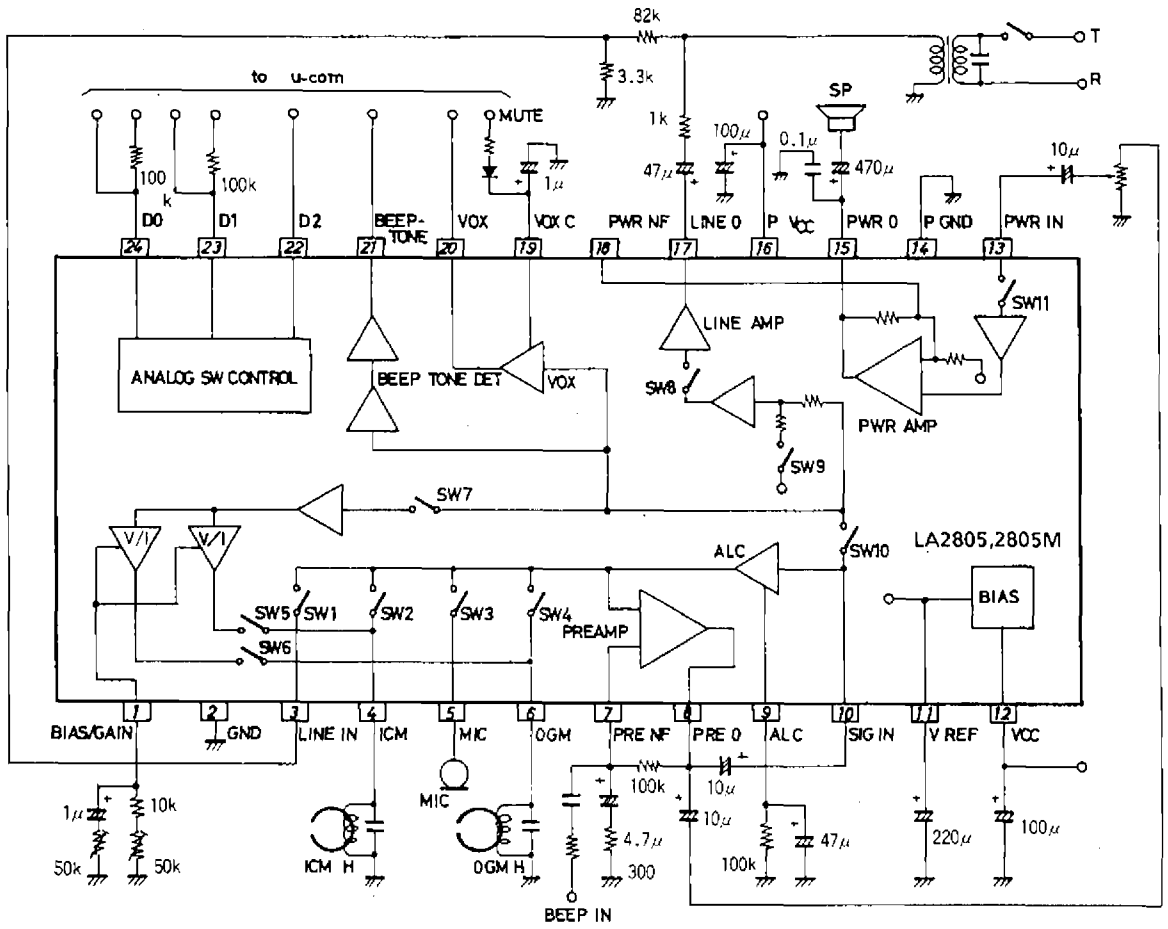


Test Circuit



Unit (resistance: Ω, capacitance: F)

Equivalent Circuit Block Diagram



Unit (resistance: Ω, capacitance: F)

LA2805,2805M Control Mode

D_2	D_1	D_0	Mode	Input	Output	Line Amp	Power Amp	REC Amp	Remarks
H	H	H	ICM REC	LINE	ICM	–	○	○	
H	H	M	2WAY REC	LINE	ICM	–	–	○	
H	H	L	DICT REC	MIC	ICM	–	–	○	
H	L	H	2WAY BEEP	OGM	ICM	○	○	○	Line amp gain : −6dB
H	L	M	ICM OUT	ICM	–	○	○	–	
H	L	L	ICM PLAY	ICM	–	–	○	–	
L	H	H	OGM REC I	MIC	OGM	–	–	○	
L	H	M	OGM CHANGE	LINE	OGM	–	○	○	
L	H	L	OGM REC II	MIC	–	–	–	–	
L	L	H	OGM OUT	OGM	–	○	○	–	
L	L	M	OGM PLAY	OGM	–	–	○	–	
L	L	L	BEEP REC	ICM	OGM	–	–	○	
L	M	L	ROOM MONI	MIC	–	○	–	–	

Others : MUTE control

Description of Equivalent Circuit Block Diagram

1) D_0 to D_2 (pins 24 to 22)
   Each pin can be driven by the microcomputer output.
2) VREF
   Provides V_{ref} (pin 11) of approximately 3.8V.
3) Preamp
   Amplifies the input signal at pins 3 to 6.
4) ALC
   The ALC operates in the input range of −54dBs to approximately −10dBs. The ALC saturation output level is 500mVrms.
5) MUTE
   Mutes the preamp output and power amp input. When pin 19 is at "H" level, the SW10 and SW11 open and VOX output (pin 20) is at "L" level.
6) REC Amp
   Amp used for recording.
7) V/I Recording Current
   V/I conversion is made to draw the recording current for DC bias. The conversion gain and bias current can be changed arbitrarily by external resistors connected to pin 1.
8) Line Amp
   Buffer amp for line output.
9) Beep Tone DET
   A microcomputer is used to identify the beep tone signal or remote control signal included in the pin 21 output. Zero-cross comparator for pin 10 input signal.
10) VOX
    Detects the presence or absence of a call. Pin 10 input signal (V10) level detection.
    V10≧ −24dBs ..... Pin 20 "L"
11) Power Amp
    Po=300mW(typ) at P.V_{CC}=9V,R_L=8Ω

Mode Description

1) ICM REC (Incoming Message Rec.)
   · Incoming message recording.
   · Recording of dictation sent from the place where you have gone (remote-controlled from the place where you have gone).
2) 2-WAY REC
   · Recording of both conversations while talking over the telephone.
   · Incoming message recording.
3) DICT REC
   · MIC-used dictation recording (recording of message to family or brief message contents).
4) 2-WAY BEEP
   · Speaker-output of alarm sound and incoming message recording and also line-output to your calling party.
   · Your calling party is made known that the incoming message is being recorded.
   · Line-output is down 6dB from line-output at other mode.
5) ICM OUT
   · Incoming message playback.
   · Listening to the incoming message through the telephone installed in the place where you have gone.
   · Incoming message line-out.
   · Recorded dictation playback.

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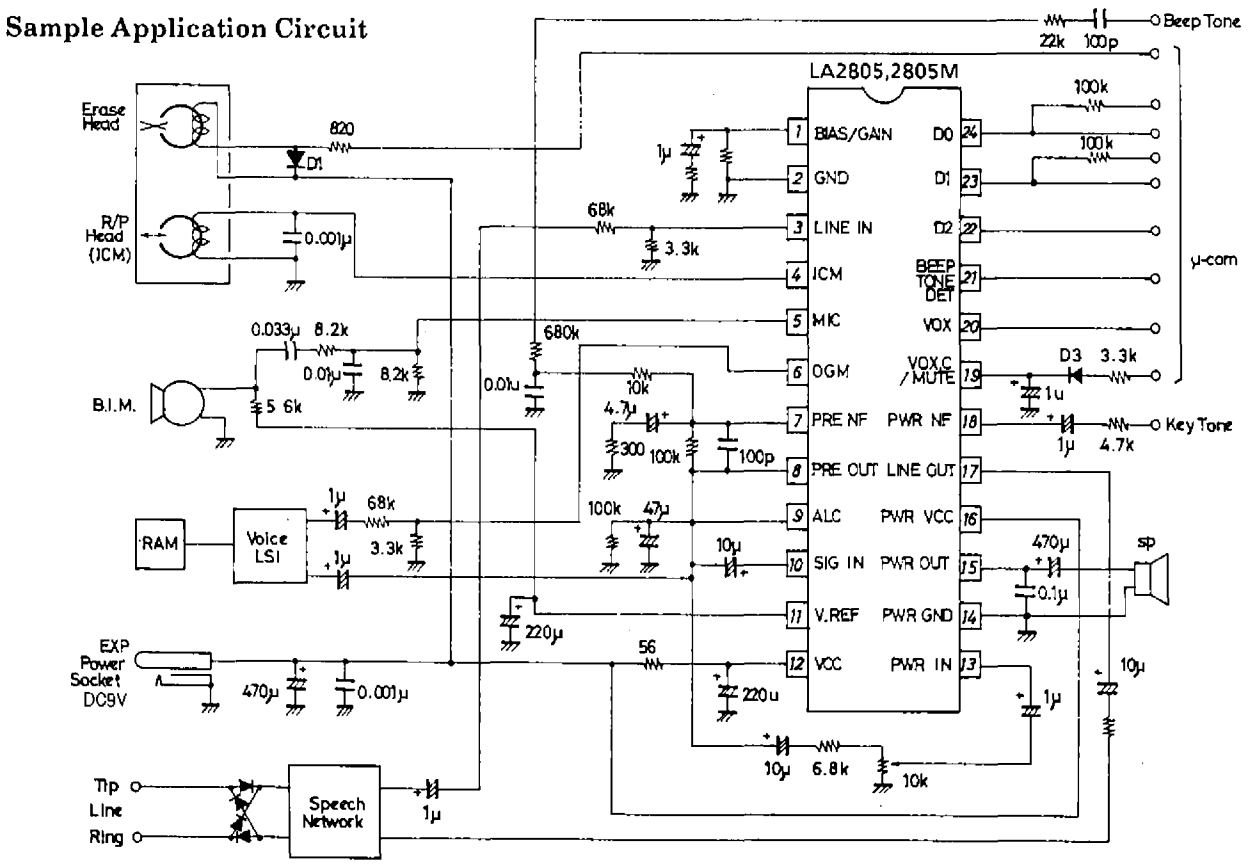
6) ICM PLAY
   · Incoming message playback.
   · Recorded dictation playback.
7) OGM REC I (Outgoing Message Rec. I)
   · Outgoing message recording (tape).
8) OGM Change
   · Change outgoing message by remote control from the place where you have gone.
9) OGM REC II
   · Outgoing message recording (IC).
10) OGM OUT
   · Outgoing message playback.
   · Outgoing message line-output (at remote control operation mode, etc.).
11) OGM PLAY
   · Outgoing message playback and check.
12) Beep REC
   · BEEP signal recording before and after outgoing message.
13) ROOM MONI
   · Listening to the MIC-used input by remote control from the place where you have gone.

Sample Application Circuit



Unit (resistance: Ω, capacitance: F)

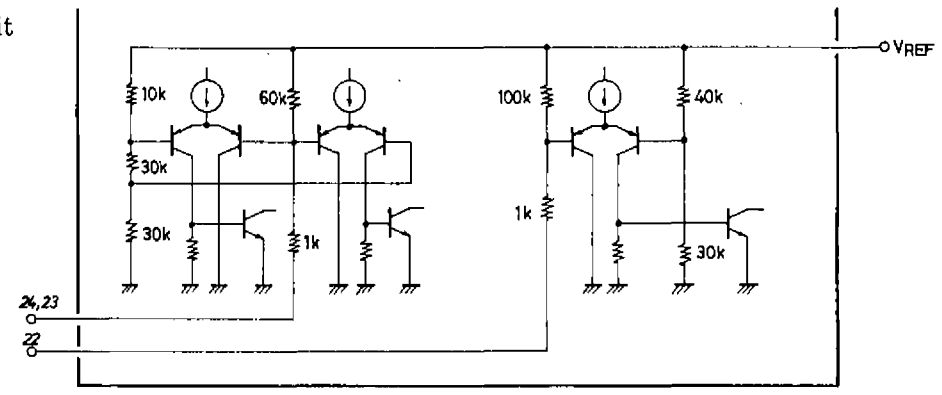
Proper Cares in Using IC

1. Printed Circuit Board
   When designing the printed circuit board, make the ground line at pin 2 thicker and shorter. Especially, it should be noted that if a common impedance exists in the ground, the distortion may worsen.

2. Power Amplifier
   For the oscillation preventing capacitor connected across output pin 15 and ground, it is recommended to use a polyester film capacitor which is excellent in temperature characteristic and frequency characteristic. The use of an aluminum electrolytic capacitor or ceramic capacitor may cause oscillation to occur at low temperature.

3. Shock Noise
   The shock noise which occurs from the preamplifier at the time of input selection can be masked by applying MUTE signal to pin 19. It is recommended that 3 msec or greater of MUTE signal pulse width.

4. Control Input Circuit



Unit (resistance: Ω)

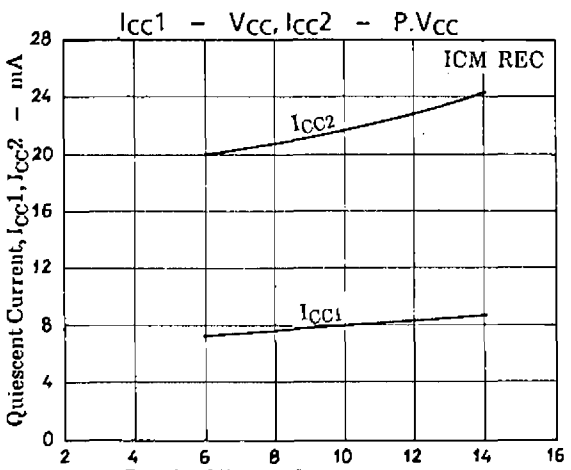
Input circuit of control pins (22, 23, 24) is shown above.
Tri-state input pins (23, 24) selection level $V_{CONT1,2}$:

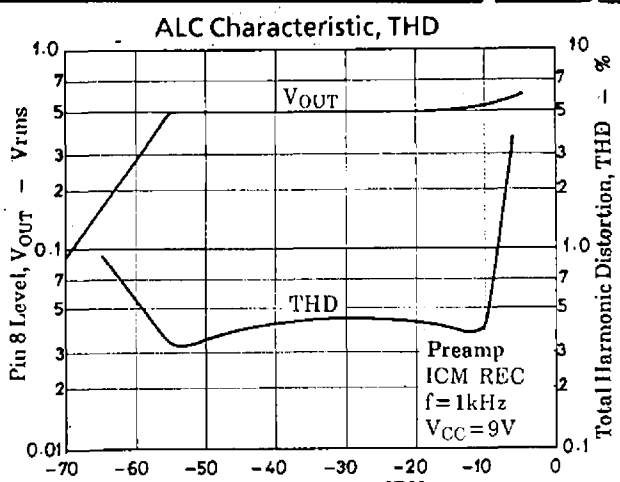
$$V_{CONT1} = V_{REF} \times \frac{6}{7}\ [V], \quad V_{CONT2} = V_{REF} \times \frac{3}{7}\ [V]$$

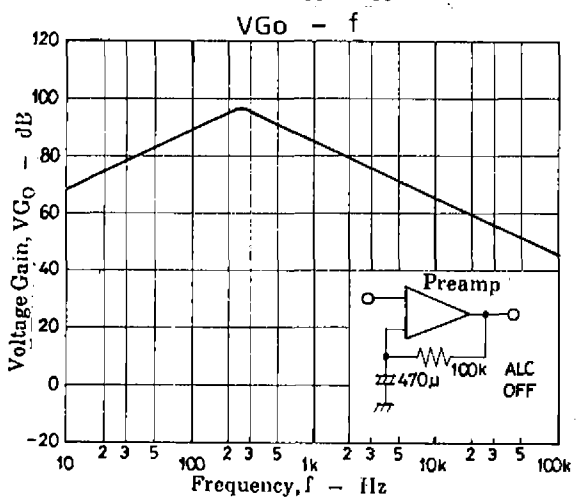
5. Maximum Rating
   If the IC is used in the vicinity of the maximum rating, even a slight variation in conditions may cause the maximum rating to be exceeded, thereby leading to a breakdown. Allow an ample margin of variation for supply voltage, etc. and use the IC in the range where the maximum rating is not exceeded.

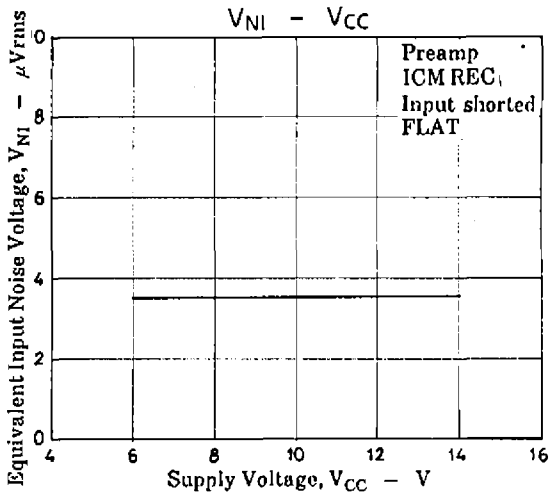
6. Short between Pins
   If the supply voltage is applied when the space between pins is shorted, a breakdown or deterioration may occur. When installing the IC on the board or applying the supply voltage, make sure that the space between pins is not shorted with solder, etc.

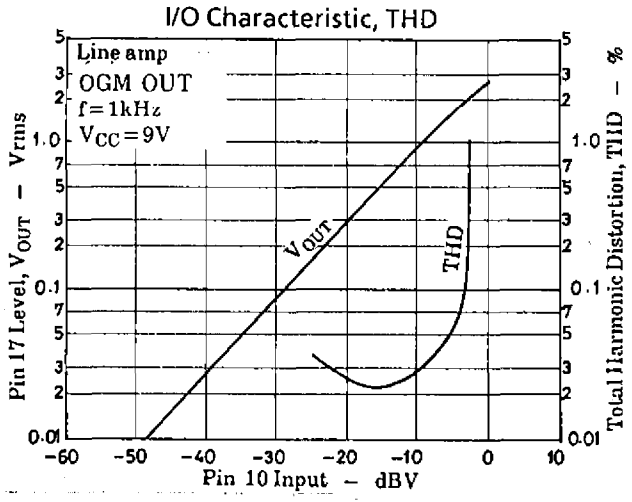
7. Load Short
   If the IC is used with the load shorted for a long time, a breakdown or deterioration may occur. Be sure not to short the load.

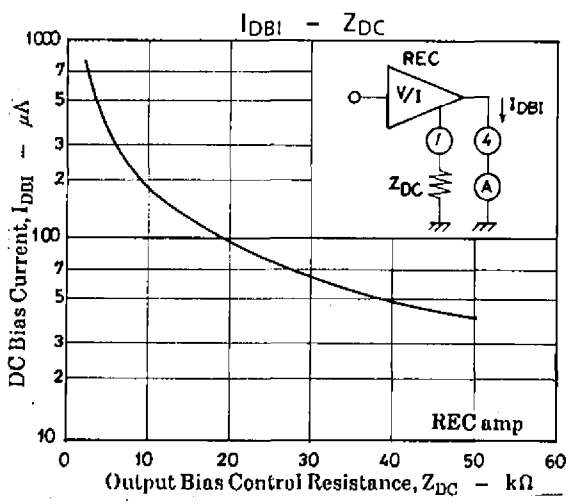

ICC1 – VCC, ICC2 – P.VCC
ICM REC
ICC2
ICC1
Quiescent Current, ICC1, ICC2 – mA
Supply Voltage, VCC, P.VCC – V

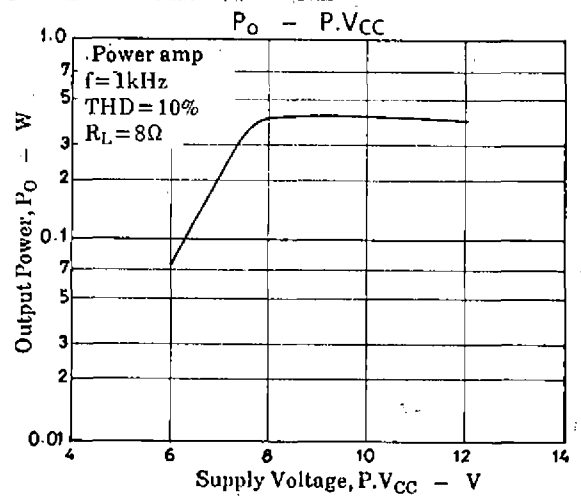

ALC Characteristic, THD
VOUT
THD
Preamp
ICM REC
f=1kHz
VCC=9V
Pin 8 Level, VOUT – Vrms
Total Harmonic Distortion, THD – %
Pin 3 Input – dBV

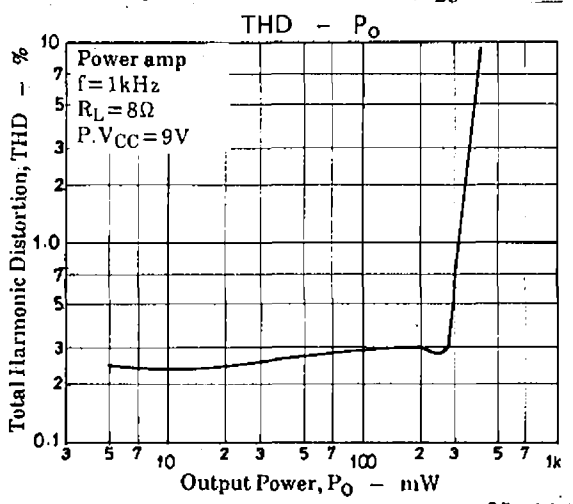

VGo – f
Preamp
100k
470µ
ALC
OFF
Voltage Gain, VGO – dB
Frequency, f – Hz


VNI – VCC
Preamp
ICM REC
Input shorted
FLAT
Equivalent Input Noise Voltage, VNI – µVrms
Supply Voltage, VCC – V


I/O Characteristic, THD
Line amp
OGM OUT
f=1kHz
VCC=9V
VOUT
THD
Pin 17 Level, VOUT – Vrms
Total Harmonic Distortion, THD – %
Pin 10 Input – dBV


IDBI – ZDC
REC
V/I
IDBI
ZDC
REC amp
DC Bias Current, IDBI – µA
Output Bias Control Resistance, ZDC – kΩ


PO – P.VCC
Power amp
f=1kHz
THD=10%
RL=8Ω
Output Power, PO – W
Supply Voltage, P.VCC – V


THD – PO
Power amp
f=1kHz
RL=8Ω
P.VCC=9V
Total Harmonic Distortion, THD – %
Output Power, PO – mW