SONY CX20037A/CXA1237AR

Audio Signal Processing for VTR

For the availability of this product, please contact the sales office.

Description

CX20037A/CXA1237AR is a bipolar IC which has been developed for the processing of VTR audio signals, and by performing frequency modulation/demodulation and noise reduction operations, it enables high performance record/playback. Its capabilities include the following functions:

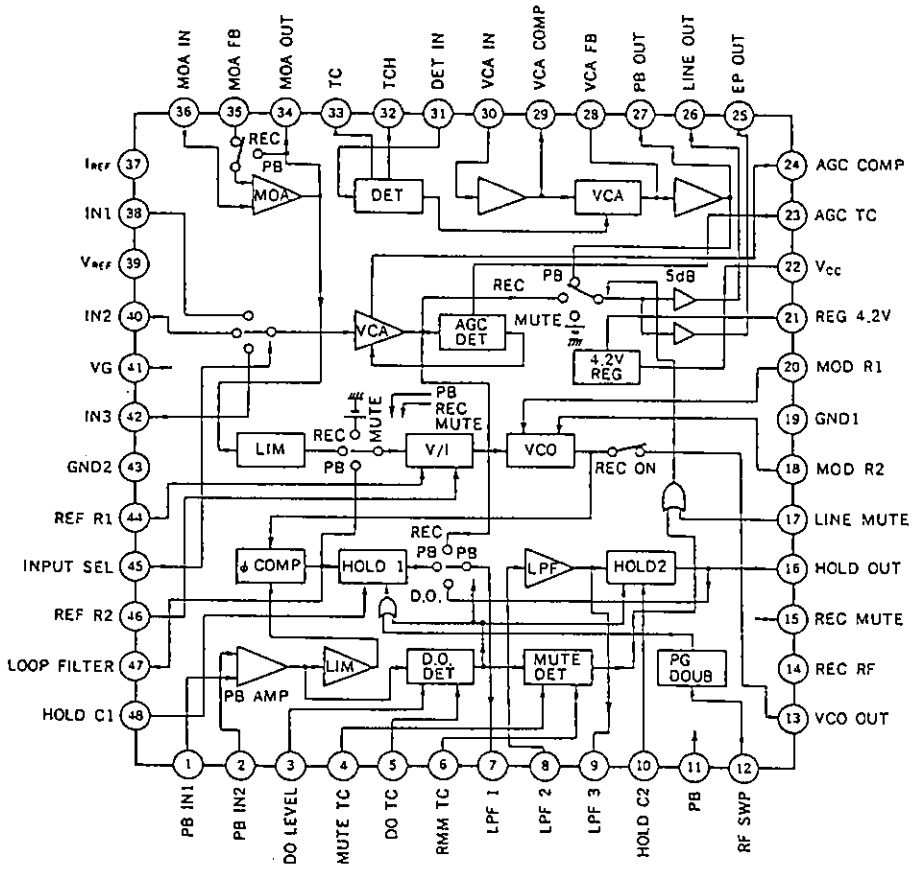
Frequency modulator, Frequency demodulator, Hold circuit, Low pass filter, Dropout detector, Mute detector, PB amplifier, Limiter, Overmodulation limiter, AGC amplifier, Line amplifier, Earphone amplifier, Input selector, and Noise reduction circuit.

CX20037A	CXA1237AR
48 pin QFP (Plastic)	48 pin VQFP (Plastic)

Features

- Single-chip integration of a frequency modulation/demodulation system and a noise reduction system.
- A broad power supply voltage range by virtue of a built-in regulator (4.5V to 7.0V: Single power supply)
- A low distortion, low drift frequency modulator
- Built-in line amplifier, earphone amplifier, and AGC amplifier
- A logarithmic compressing/expanding "compander" (Companding factor: 2) operated noise reduction system
- Reduced noise modulation (noise reduction) by a fixed preemphasis system
- Less peripheral components

Block Diagram and Pin Configuration



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Absolute Maximum Ratings (Ta=25°)

• Supply voltage	Vcc	10	V
• Operating temperature	Topr	−20 to +75	°C
• Storage temperature	Tstg	−55 to +150	°C
• Allowable power dissipation	PD	920	mW (CX20037A)
		1100*	mW (CXA1237AR)

Recommended Operating Condition

• Supply voltage	Vcc	4.5 to 7.0	V

* When mounted on the ceramic board
40 mm × 25 mm t=0.635m

Pin Description

No.	Symbol	Description	DC (V)	AC (V)	Impedance (Ω)
1	PB IN1	Amplifies PB FM wave by 40dB. Preamp input pin	1.8 (PB)		10k
2	PB IN2	↑ (PB FM input)	1.8 (PB)	10mVp-p (PB)	10k
3	DO LEVEL	Sets the dropout detector level.	—		H *1
4	MUTE TC	Connects a muting time constant (in a Mute Off mode).	3.5 (PB)		50k
5	DO TC	Connects a dropout detector time constant.	1.4 (PB)		L *2
6	RMM TC	Connects a muting mode hold time constant (0V in Mute On mode).	4.2 (PB)		H
7	LPF1	Connects CR for the demodulator output LPF.	2.1	−15dBm	L
8	LPF2	↑ (OP. amp input)	2.1	↑	H
9	LPF3	↑ (OP. amp output)	2.1	↑	L
10	HOLD C2	Connects a hold time constant for the prior level hold circuit serving for dropout detection (in a Hold Off mode).	2.8	↑	H
11	PB	REC/PB switching control pin 5 to 4V→PB, 1 to 0V→REC	0		50k
12	RF SWP	Inputs timing pulses which serve for engaging a prior level hold mode at the RF switching position. 5 to 4V→High, 2 to 0V→Low	0		50k
13	VCO OUT	Modulator output pin	3.3		1k
14	REC RF	LPF output pin	0		1k
15	REC MUTE	Control pin to suspend modulating operations 5 to 3.8V→Mute, 2.6 to 0V→Normal	0		50k
16	HOLD OUT	Prior level hold circuit output pin	2.1	−15dBm	L
17	LINE MUTE	Control pin to mute the line and EP outputs 5 to 3.8V→Mute, 2.0 to 0V→Normal	0		50k

No.	Symbol	Description	DC (V)	AC (V)	Impedance (Ω)
18	MOD R2	Connects a reference resistor to determine the modulator oscillating frequency. f≃1.5MHz	3.90	0.5	820
19	GND1	Ground level for other than the PB amplifier and LIM	0		
20	MOD R1	Connects a reference resistor to determine the modulator oscillating frequency. f≃1.5MHz	3.90	0.5	820
21	REG 4.2V	4.2V regulator output	4.2		
22	Vcc	Vcc=4.5 to 7.0V	5.0		
23	AGC TC	Determines the attack and recovery time constant for AGC.	1.9		≃20k (static)
24	AGC COMP	Exercises the AGC amplifier phase compensation.	2.65		H
25	EP OUT	EP amplifier output pin	2.1		L
26	LINE OUT	Line amplifier output pin, having a 5dB gain.	2.1		L
27	PB OUT	PB output pin of the NR circuit	2.1		L
28	VCA FB	Inverting input pin of the VCA output amplifier. Performs the I→V conversion.	2.1		H
29	VCA COMP	Exercises the VCA phase compensation.	2.1		750
30	VCA IN	VCA input pin. Imaginarily short-circuited to VG and serves as a current input.	2.1		L
31	DET IN	Detector input pin. DC biased internally, and serves as a current input.	1.30		L
32	TCH	Determines the detector hold time constant.	2.60		≃5k (static)
33	TC	Smoothens full-wave rectified waveforms of the detector. In addition, it determines the attack and recovery time constant.	2.05		≃50k (static)
34	MOA OUT	REC Out pin of the noise reduction circuit.	2.1		L
35	MOA FB	Inverting input pin of MOA. Feeds the PB output back into the REC mode.	2.1		H
36	MOA IN	Input pin of the NR circuit	2.1		10k
37	IREF	Reference current input pin of the noise reduction detector.	0.80		≃3k
38	IN1	Audio signal input pin from line/tuner/camera.	2.1	−29 to +1 dBm	20k

No.	Symbol	Description	DC (V)	AC (V)	Impedance (Ω)
39	VREF	VCA reference voltage serving the noise reduction circuit and AGC amplifier, with the maximum output current at 4mA.	1.95		10
40	IN2	Audio signal input pin from line/tuner/camera.	2.1	−29 to +1dBm	20k
41	VG	Neutral potential (Vcc/2) pin, with the maximum output current at +1mA −200μA	2.1		130
42	IN3	Audio signal input pin from line/tuner/camera.	2.1	−29 to +1dBm	20k
43	GND2	Ground for the PB amplifier and LIM	0		
44	REF R1	Connects a reference resistor to set the frequency deviation. Modulator input signal	2.1	−15dBm	L
45	INPUT SEL	Switches the input to pins 38, 40 and 42, at three values: IN=5 to 3.6V, IN2=High Z, IN1=0.4 to 0V	2.1		13.8k
46	REF R2	Connects a reference resistor to set the frequency deviation. Modulator input signal	2.1		L
47	LOOP FILTER	Demodulator output	—		H
48	HOLD C1	Connects a hold time constant for the prior level hold circuit serving the RF switching position.	2.8 (PB)	−15dBm (PB)	H

Note*1) H is approximately 500 kΩ minimum
***2)** L is approximately 50Ω maximum

Electrical Characteristics

(Ta=25°C, Vcc=5.0V; See the Electrical Characteristics Test Circuit.)

No.	Item	Symbol	Switch condition																											Input condition					Other condition	Min.	Typ.	Max.	Unit	Test point
			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	IN1	IN2	IN3	IN4	IN5						
1	Current consumption (PB)	Icc (PB)	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	a	a	OFF	b	OFF	OFF	OFF	a	OFF	OFF	b	a	a	a	OFF	a	a	ON	a						DC current between Vcc and OUT2 to be measured.	16.0	24.0	32.0	mA	Vcc OUT2
2	Current consumption (REC)	Icc (REC)	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	a	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃						〃	16.0	23.0	30.0	mA	〃
3	Regulator output (4.2V)	VREG	〃	〃	〃	〃	〃	OFF	ON	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃							4.00	4.20	4.50	V	OUT2
4	Reference voltage	VREF	〃	〃	ON	〃	〃	〃	OFF	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃							1.80	1.95	2.10	V	〃
5	Neutral potential	V-G	〃	ON	OFF	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃							2.00	2.10	2.25	V	〃
6	Input switch crosstalk (Input 1)	ICT-1	〃	OFF	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	ON	〃	〃	〃	〃	a	b	b	〃	〃	〃	〃	〃	〃		10kHz −5dBm				10kHz Band Pass filter weighted		−61.0	−55.0	dBm	OUT3
7	Input switch crosstalk (Input 2)	ICT-2	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	b	〃	a	b	〃	〃	〃	〃	〃		〃				〃		−60.0	−54.0	dBm	〃
8	Input switch crosstalk (Input 3)	ICT-3	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	c	a	b	〃	〃	〃	〃	〃	〃		〃				〃		−61.0	−55.0	dBm	〃
9	AGC cover range 1	ACR-1	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	c	b	a	a	〃	〃	〃	〃	〃		400Hz −5dBm					−10.0	−8.5	−7.0	dBm	〃
10	AGC cover range 2	ACR-2	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	b	a	b	〃	〃	〃	〃	〃	〃		400Hz −35dBm					−17.0	−15.5	−14.0	dBm	〃
11	AGC full gain	A-FG	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	a	〃	a	b	〃	〃	〃	〃	〃		400Hz −55dBm					−37.0	−35.5	−34.0	dBm	〃
12	Line output	LO-L	〃	〃	〃	ON	〃	〃	〃	〃	〃	〃	〃	〃	〃	OFF	〃	〃	〃	〃	b	〃	b	a	〃	〃	〃	〃	〃		400Hz −35dBm					−12.0	−10.8	−9.6	dBm	〃
13	Line output distortion factor	LO-THD	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	a	a	OFF	a	OFF	OFF	OFF	a	OFF	OFF	b	a	b	a	OFF	a	a	ON	a		1kHz −10dBm						0.18	0.5	%	OUT3
14	Line output noise level	LO-SN	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	a	〃	〃	〃	〃	〃	〃	〃						R_g=1kΩ 30kHz LPF weighted		−74.0	−70.0	dBm	〃
15	Earphone output	EO-L	〃	〃	〃	OFF	ON	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	b	〃	〃	〃	〃	〃	〃	〃		400Hz −10dBm					−27.3	−25.8	−24.3	dBm	〃
16	Noise reduction frequency characteristics 1 (encoded)	EFR-1	ON	〃	〃	〃	OFF	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	〃	a	〃	ON	b	〃	〃	〃		400Hz −15dBm					−16.5	−15.0	−13.5	dBm	〃

(Ta = 25°C, Vcc = 5.0V; See the Electrical Characteristics Test Circuit)

No.	Item	Symbol	Switch condition																									Input condition					Other condition	Min.	Typ.	Max.	Unit	Test point
			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	IN1	IN2	IN3	IN4	IN5					
17	Noise reduction frequency characteristics 2 (encoded)	EFR-2	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕		400Hz −35dBm					−26.5	−25.0	−23.5	dBm	OUT3
18	Noise reduction frequency characteristics 3 (encoded)	EFR-3	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕		400Hz −55dBm					−36.5	−35.0	−33.5	dBm	↕
19	Noise reduction frequency characteristics 4 (encoded)	EFR-4	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕		7kHz −15dBm					−12.4	−10.9	−9.4	dBm	↕
20	Noise reduction frequency characteristics 5 (encoded)	EFR-5	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕		7kHz −35dBm					−22.4	−20.9	−19.4	dBm	↕
21	Noise reduction frequency characteristics 6 (encoded)	EFR-6	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕		7kHz −55dBm					−32.4	−30.9	−29.4	dBm	↕
22	Noise reduction noise level (encoded)	E-NL	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	OFF	↕	↕	↕	↕						R_g=10Ω 30kHz LPF weighted		−60.0	−53.0	dBm	↕
23	Noise reduction distortion factor (encoded)	E-THD	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	ON	↕	↕	↕	↕		1kHz −15dBm						0.15	0.56	%	↕
24	Noise reduction feed-through (encoded)	E-FT	OFF	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	b	OFF	b				Engage pin 33 DC level at V_{REF} +200mV	1kHz 20mVp-p		1kHz BPF (Q=5, G=40dB) weighted		−5.8	+0.2	dBm	OUT4
25	Line muting output	L-M	↕	↕	↕	ON	↕	↕	↕	↕	b	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	b	↕	↕	a	a	ON	a		10kHz −5dBm						−79.0	−73.0	dBm	OUT3

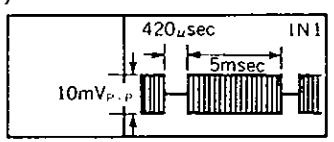
(Ta = 25°C, Vcc = 5.0V; See the Electrical Characteristics Test Circuit)

No.	Item	Symbol	Switch condition																											Input condition					Other condition	Min.	Typ.	Max.	Unit	Test point
			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	IN1	IN2	IN3	IN4	IN5						
26	Deviation limiter output	D-LL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	a	a	OFF	a	ON	OFF	OFF	a	OFF	OFF	b	a	a	a	ON	b	a	ON	a		400Hz −5dBm					610	650	690	mVp-p	OUT3
27	Modulator output level	RF-L	↓	↓	↓	↓	↓	↓	↓	↓	↓	b	ON	↓	OFF	↓	↓	↓	↓	↓	↓	↓	↓	OFF	a	↓	↓	↓							140	170	200	mVp-p	OUT1
28	Modulator secondary distortion	M-2ND	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						Level ratio against carrier (1.5MHz)		−56	−45	dB	↓
29	Modulator tertiary distortion	M-3RD	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						↓		−36	−29	dB	↓
30	RF switch crosstalk	RF-CT	↓	↓	↓	↓	↓	↓	↓	↓	↓	a	↓	b	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						Measure the 1.5MHz level, and calculate its ratio against T27.		−44	−35	dB	↓
31	Demodulator output	D-L	↓	↓	↓	↓	↓	↓	↓	ON	↓	↓	OFF	↓	↓	↓	↓	↓	OFF	ON	↓	↓	↓	↓	↓	↓	↓	↓	↓	fc=1.5MHz fs=1kHz 60% FM					IN1 input level: 10mVp-p	−16.5	−15.0	−13.5	dBm	OUT3
32	Demodulator output distortion factor	D-THD	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	fc=1.5MHz fs=1kHz 60% FM					↓		0.18	0.34	%	↓
33	Demodulator noise level	D-NL	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	fc=1.5MHz fs=1kHz 60% FM					IN1 input level: 10mVp-p		−71.0	−64.0	dBm	OUT3
34	Demodulator AM rejection	D-AMR	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	fc=1.5MHz fs=1kHz (sin) 30% AM					↓		−71.0	−64.0	dBm	↓
35	Demodulator frequency characteristic	D-FR	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	fc=1.5MHz fs=15kHz 60% FM					↓	−18.7	−16.7	−14.7	dBm	↓
36	Demodulator output level (Low level)	D-LL	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	ON	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	fc=1.5MHz fs=1kHz 60% FM					IN1 input level: 0.56mVp-p		0.26	0.56	%	↓
37	PB line output	PB-LL	↓	↓	↓	ON	↓	↓	↓	OFF	↓	↓	↓	↓	↓	↓	↓	↓	OFF	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	fc=1.5MHz fs=400kHz 60% FM					N1 input level: 10mVp-p	−13.0	−10.0	−7.0	dBm	↓
38	PG doubler pulse width	PG-PW	↓	↓	↓	OFF	↓	↓	↓	↓	↓	↓	↓	↓	↓	ON	ON	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	fc=1.5MHz fs=15kHz 60% FM				1kHz square wave at 0 to 4V	IN1 input level: 10mVp-p	6.0	9.5	13.0	μsec	↓

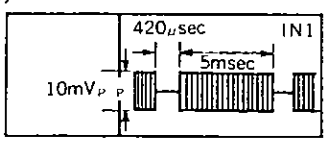
(Ta = 25°C, Vcc = 5.0V; See the Electrical Characteristics Test Circuit)

No.	Item	Symbol	Switch condition S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	Input condition IN1	IN2	IN3	IN4	IN5	Other condition	Min.	Typ.	Max.	Unit	Test point
39	Hold 1 noise level	HI-NL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	a	a	OFF	b	OFF	OFF	ON	a	OFF	ON	b	a	a	a	OFF	a	a	ON	a	fc=1.5MHz Unmodulated				1kHz square wave at 0 to 4V	IN1 input level: 10mVp-p		−68.0	−64.0	dBm	OUT3
40	Dropout detector "on" level	DO-ON								OFF							OFF	b												fc=1.5MHz fs=400MHz (Triangular wave) 100% AM					The 10mVp-p IN1 input level is designated as 0dB	−17.0	−13.0	−9.0	dB	OUT1
41	Dropout detector "off" level	DO-OFF																																		−13.0	−8.0	−4.0	dB	
42	Hold 2 droop	H2-DR								ON							a													fc=1.5MHz fs=Square wave 100% AM					*1		20.0	33.0	V/sec	OUT3
43	Muting off	M-OFF				ON				OFF															ON	b					7kHz (sin) −15dBm				*2	−21.2	−18.2	−15.2	dBm	
44	Muting on	M-ON																																	*3		−87.2	−80.2	dBm	
45	Muting hold time	M-HT																																	*4	18.0	30.0	42.0	msec	
46	Power supply voltage characteristics (7.0V)	Vccmax				OFF			ON										OFF					OFF	a									Vcc=7.0V	4.05	4.25	4.55	V	OUT2
47	Power supply voltage characteristics (4.5V)	Vccmax																																	Vcc=4.5	4.00	4.20	4.50	V	
48	Frequency deviation 1	M-D1							OFF				ON												ON	b					400Hz (sin) −15dBm				fc=1.5MHz	−80	−60	−40	kHz	OUT1
49	Frequency deviation 2	M-D2																													400Hz (sin) −15dBm				fc=1.5MHz	40	60	80	kHz	

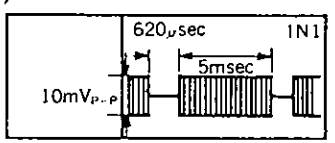
*1)



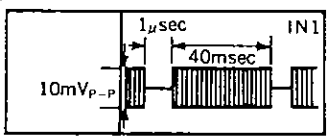
*2)



*3)



*4)



Electrical Characteristics Test Circuit

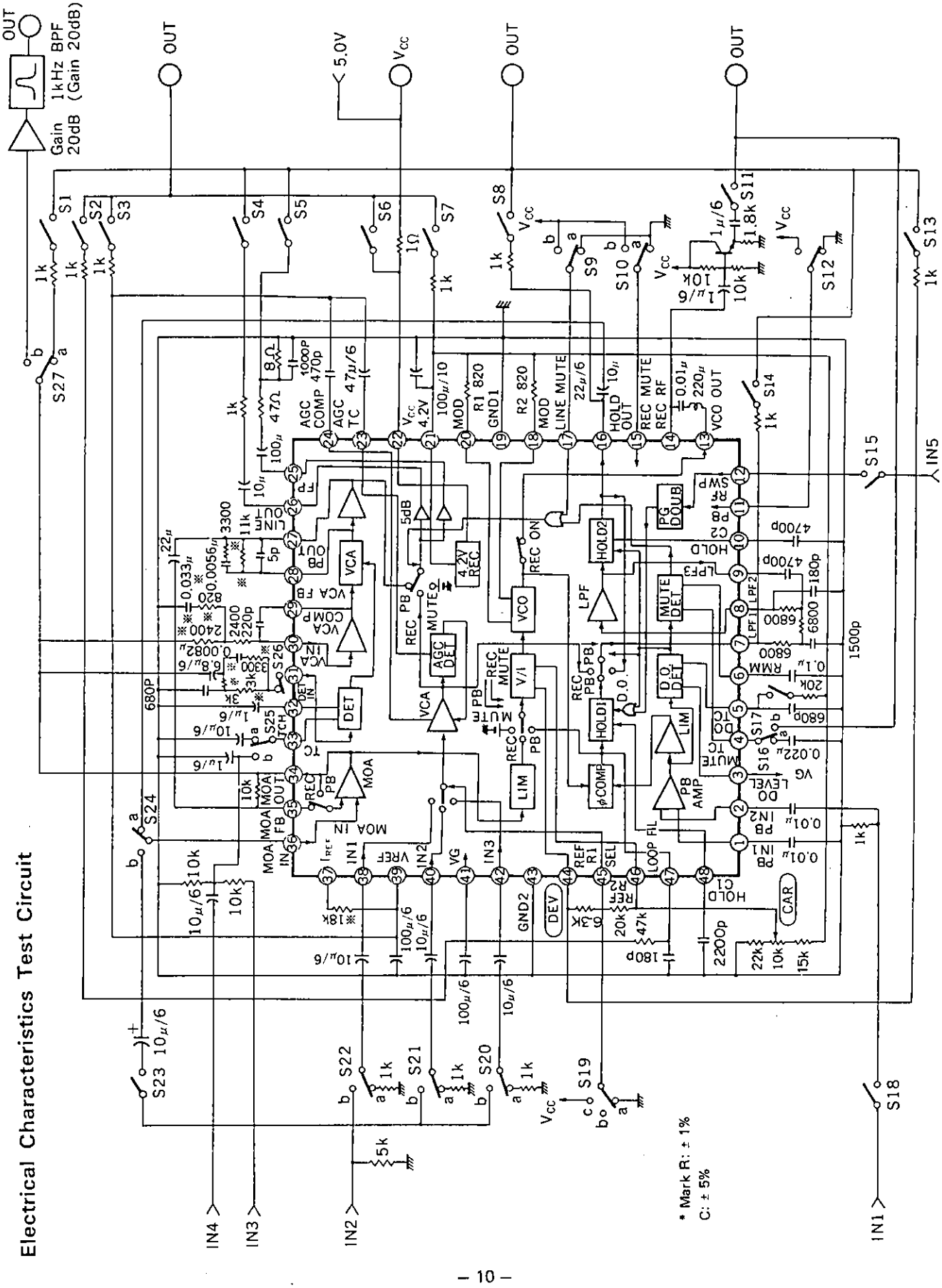
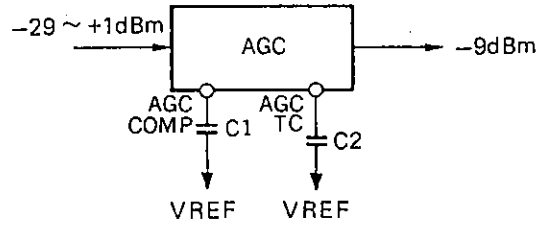


Fig. 1

Functions

1. AGC Amplifier

Cover range: −29 dBm to +1 dBm
Full gain: 20 dB



C1: Phase compensating capacitor
C2: Determines the attack and recovery time constant, and its connection to V_{REF} will improve the AGC distortion factor.

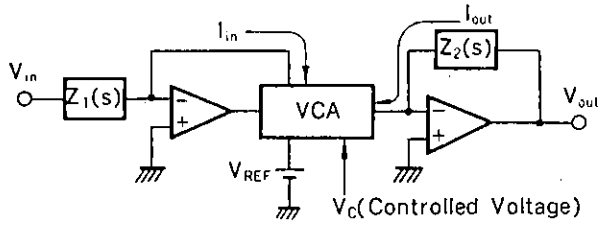
2. Noise Reduction

(1) Main OP amplifier

Being switched internally, behaves as a voltage follower in the PB mode, or provides encoding characteristics by incorporating the decoder circuit in the OP amplifier negative feedback loop during recording.

(2) Voltage-controlled amplifier

The voltage-controlled amplifier consists of a current divider of input and output, and the impedance elements (used in common with emphasis) are connected to before and after of the voltage controlled amplifier to convert it voltage to current and the current to voltage.



The voltage-controlled amplifier exhibits a control sensitivity level at 0.33 dB/mV, and its gain is determined relative to the reference voltage (V_{REF}). Specifically, when set at $V_{REF}-V_C=30$ mV, for example, its voltage-controlled gain will be made 10 dB.
By assuming G as the voltage-controlled gain of the above circuit, the following interrelation may be obtained.

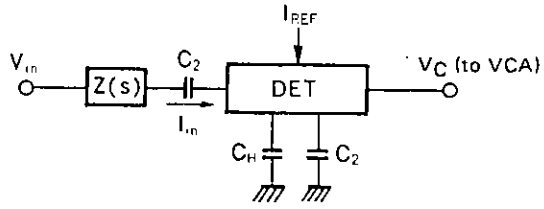
$$V_{out}=V_{in}.G.Z_2(s)/Z_1(s)$$

When defining $I_o=I_{in}+I_{out}$, the maximum I_o value of the voltage-controlled amplifier becomes 1.4 mAp-p.

(3) Detector

To accommodate a broad dynamic range, the detector has been made to a curretnt input type and performs logarithmic conversions. Since the detector input has been DC biased, cutting of the DC with C_1 becomes necessary. When so arranged, input current I_{in} will meet the equation below.

$$I_{in}=V_{in}/Z(s)$$



Control voltage Vc of the voltage-controlled amplifier is a function of the ratio of its input current (I_{in}) to the reference current, and when reference current=100 μA, input current=81.4 μArms and

$V_C = V_{REF}$ (VCA_{Gain}=0 dB)

will result.

The recovery time constant is determined by C_2, and since it has been set rather short, a high level ripple component of the detector output will result and low band distortions due to intermodulation will also be increased. Accordingly, a capacitor (C_H) has been employed to suppress the peaks of the full-wave rectified waveform, for an improved distortion factor at a shorter recovery time constant.

3. Line Amplifier

The line amplifier exhibits a fixed 5 dB gain.

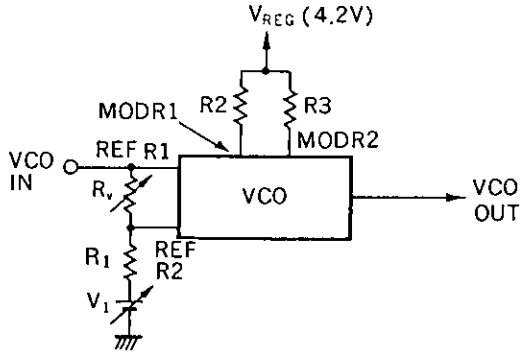
4. Earphone Amplifier

The earphone amplifier being basically a voltage follower, its gain is adjusted by varying the value of its protective resistor.

5. LIM (Deviation Limiter)

Being an overmodulation preventive limiter, the limiting level is fixed at −10.5 dBm (650 mVp-p). It will behave as a voltage follower in the presence of a signal below −10 dBm in level.

6. VCO (Voltage-controlled Oscillator)

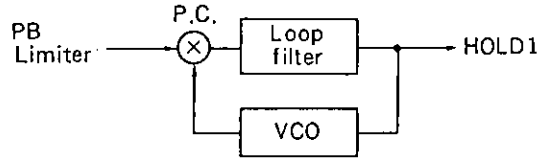


The VCO's fo (=1.5 MHz) is determined by a capacitor incorporated and externally connected R_2 and R_3 resistors, but may be adjusted by either sinking or forcing a current into pin 46 (REF R_2) through R_1 and V_1.

The frequency deviation may be adjusted by varying the variable resistor (R_V).

7. Demodulator

A PLL detecting process has been employed for the demodulator that has been structured with a VCO (voltage-controlled oscillator), PC (phase comparator), and loop filter.



8. Hold 1

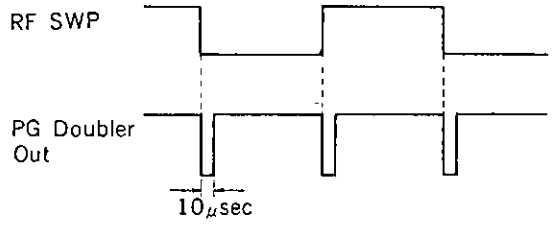
Normally this circuit behaves as a low pass filter, but when a dropout has occurred or RF switching pulses (pin 12) have been switched, it will perform hold operations.

9. Hold 2

Similarly to Hold 1, this circuit also behaves normally as a low pass filter, but in the presence of a dropout, it will hold a delayed phase signal from the low pass filter (pin 9 output).

10. PG (Pulse Generator Doubler)

PG generates pulse signals to engage holding operations of the Hold 1 circuit at the rising and falling of the RF switching pulses. The generated pulse width will be about 10 μsec.



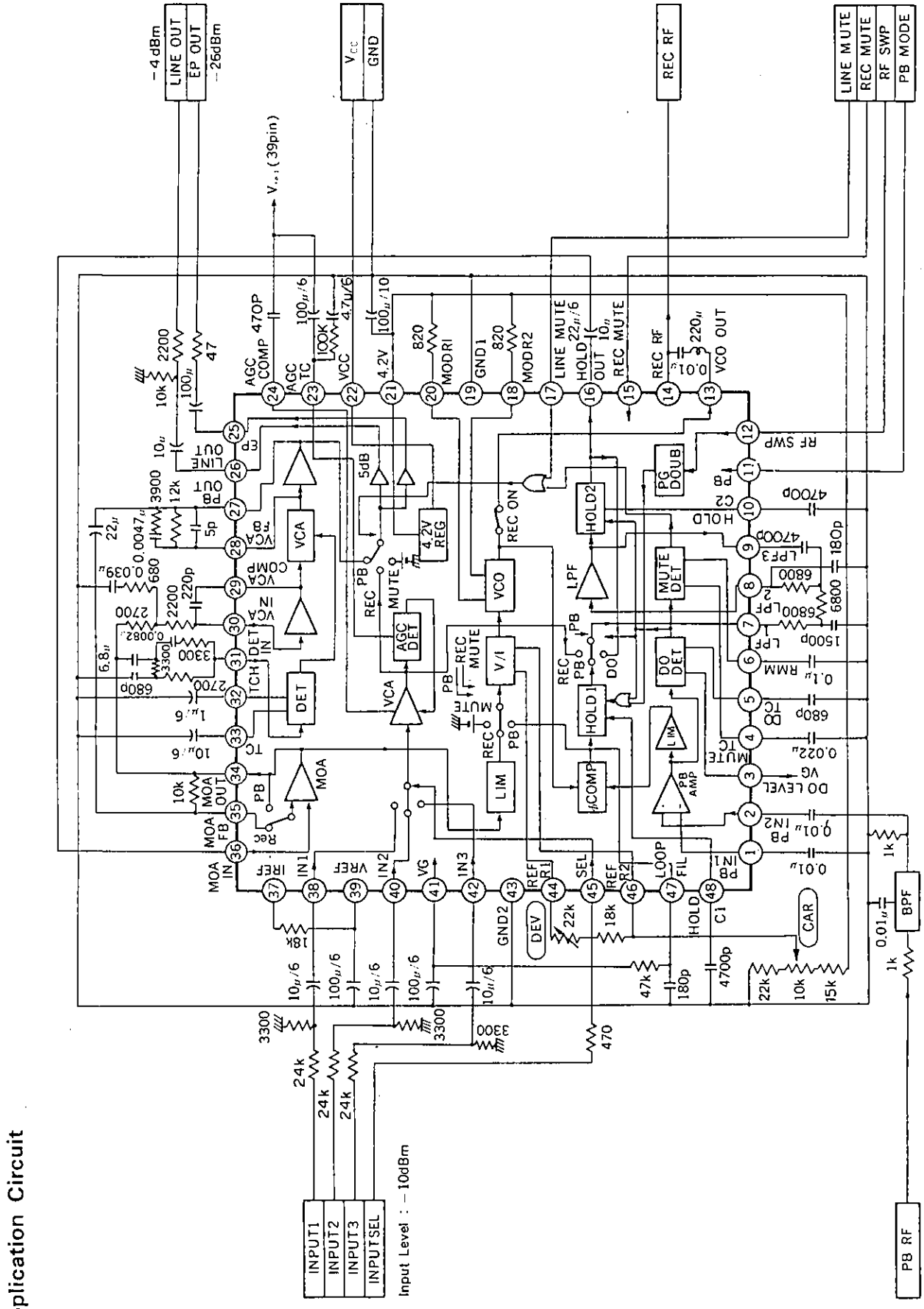
11. Dropout Detector

Upon detecting a dropout, this circuit will engage holding operations of the Hold 1 and 2 circuits. The full-wave rectified waveform input will be smoothened by a capacitor connected to the DO TC (pin 5), and the dropout level set by a DC potential at DO LEVEL (pin 3).

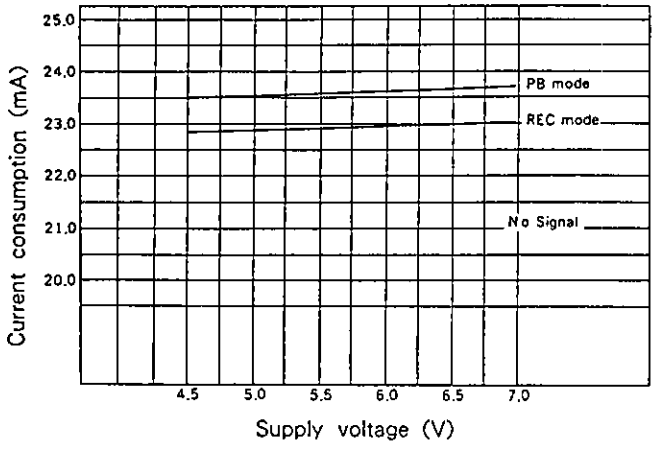
12. Muting Detector

When upon detecting a dropout and its time duration is found to be long, this circuit will mute both Line out and EP out. The dropout duration to activate muting circuits has been set at about 500 μsec, but may be varied with the capacitor connected to MUTE TC (pin 4). The muting hold time (about 30 msec) is set with a capacitor connected to RMMTC (pin 6) (Muting Mode Recovery).

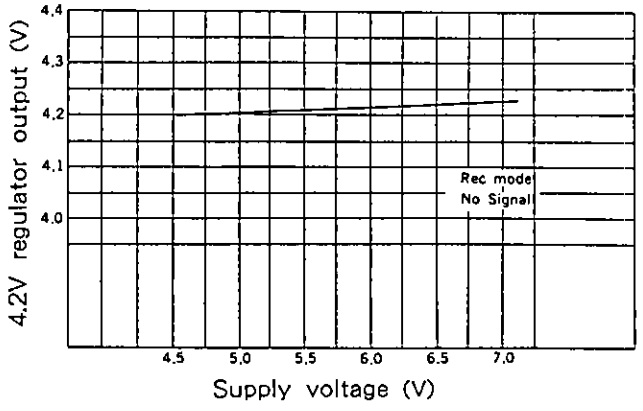
Application Circuit



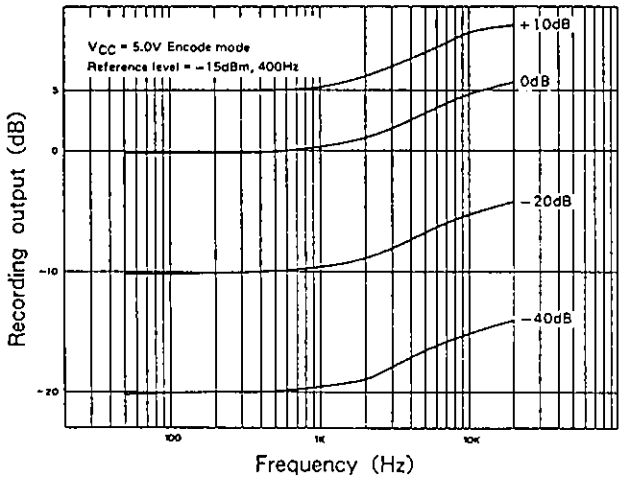
Current consumption vs. Supply voltage



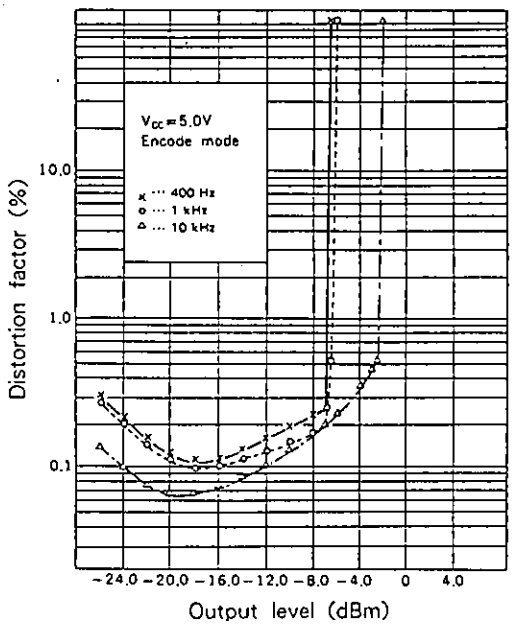
4.2V regulator output vs. Supply voltage



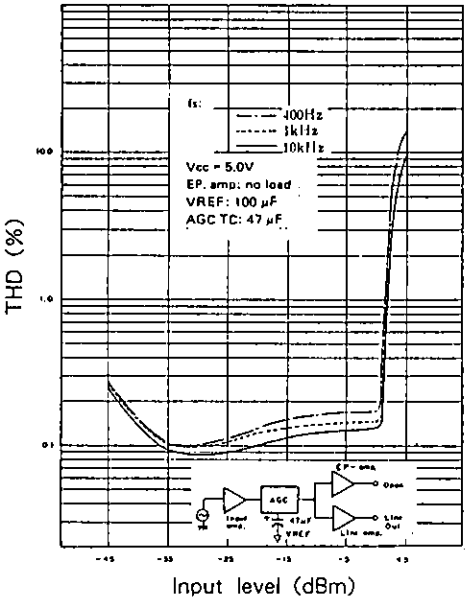
Noise reduction frequency characteristics



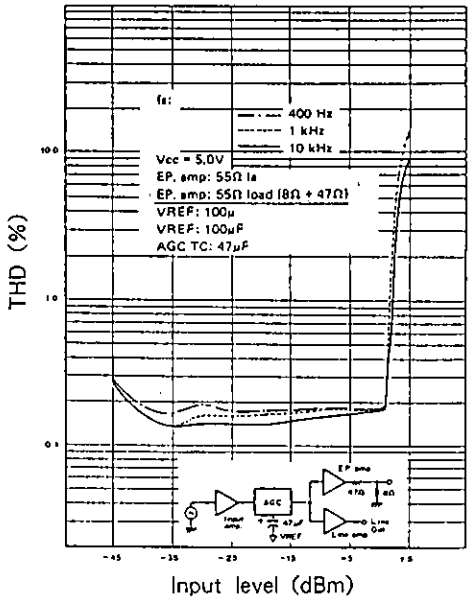
Noise reduction distortion factor vs. Output level



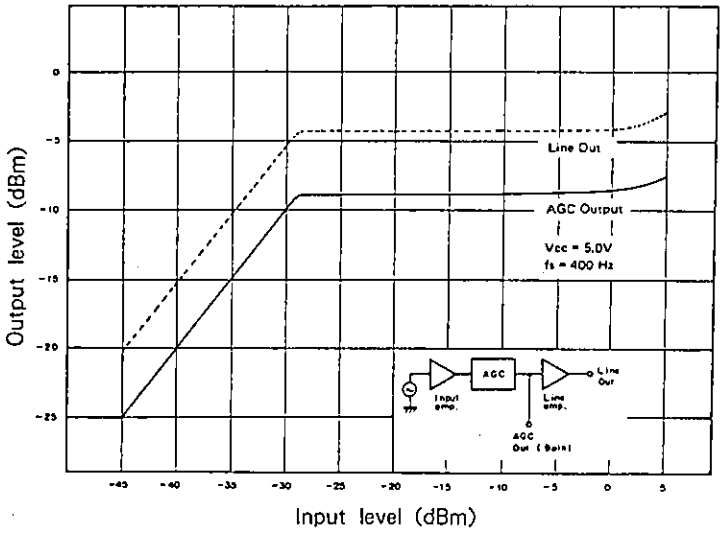
Line output distortion factor vs. Input signal (EP amp at no load)



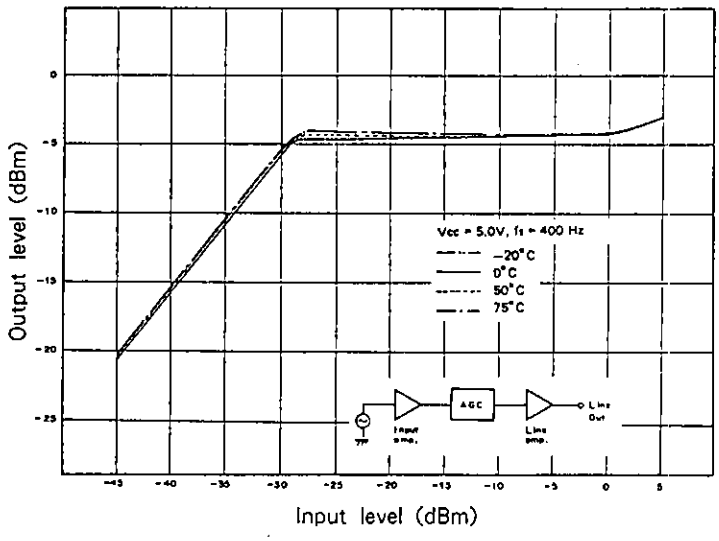
Line output distortion factor vs. Input signal (EP amp at load)



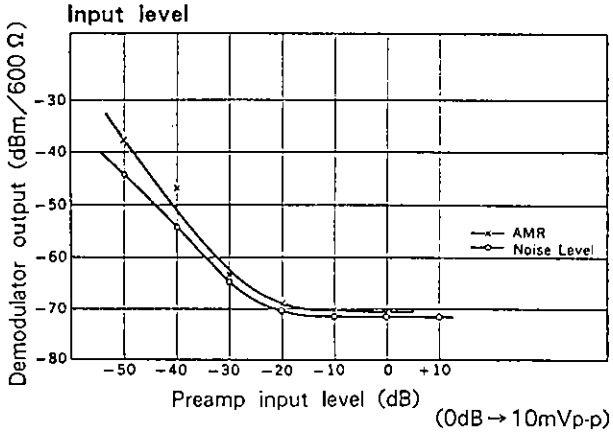
AGC cover range



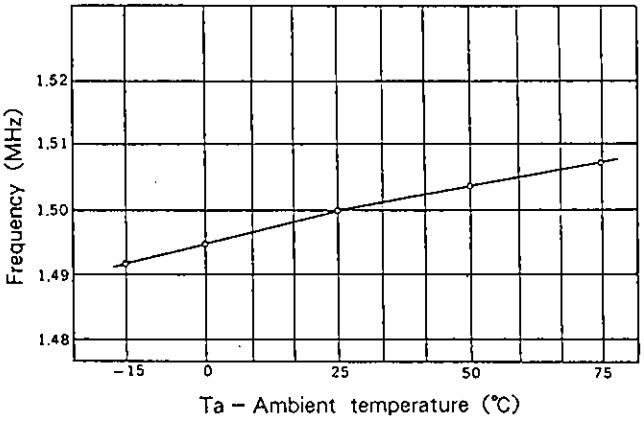
Line out level temperature characteristics



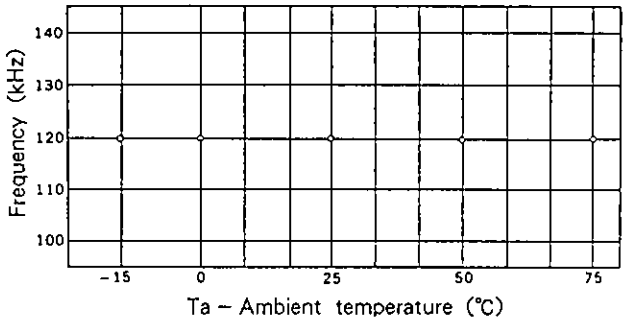
Demodulator noise level and AM rejection vs. Input level



Modulator carrie temperature characteristics

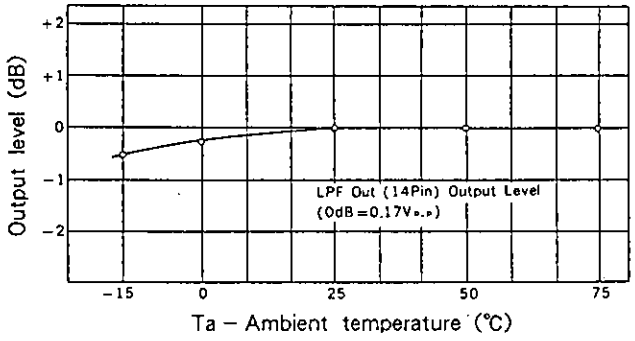


Frequency deviation temperature characteristics



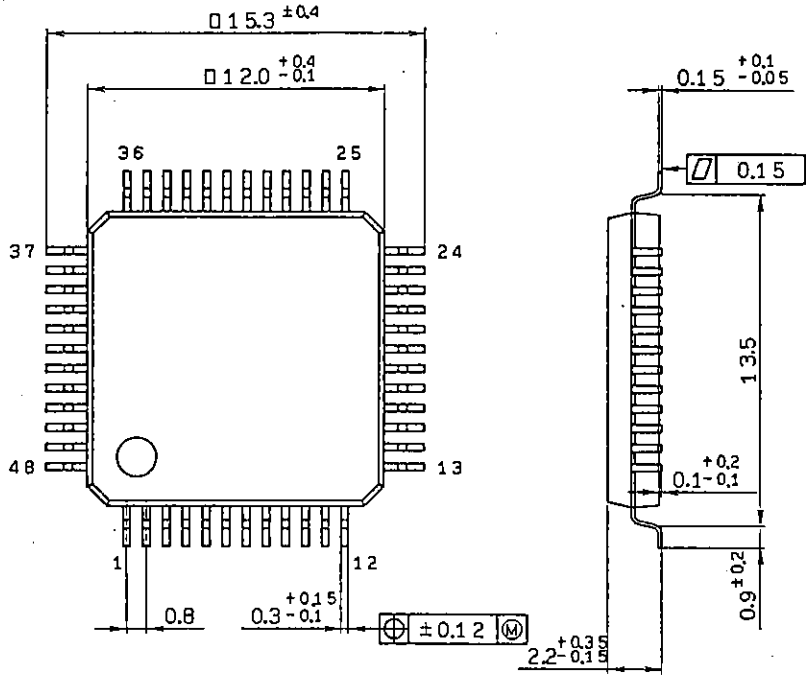
(Set at ref. level (± 60kHz) with 25°C and measure the p-p levels at individual ta.)

Modulator output level temperature characteristics



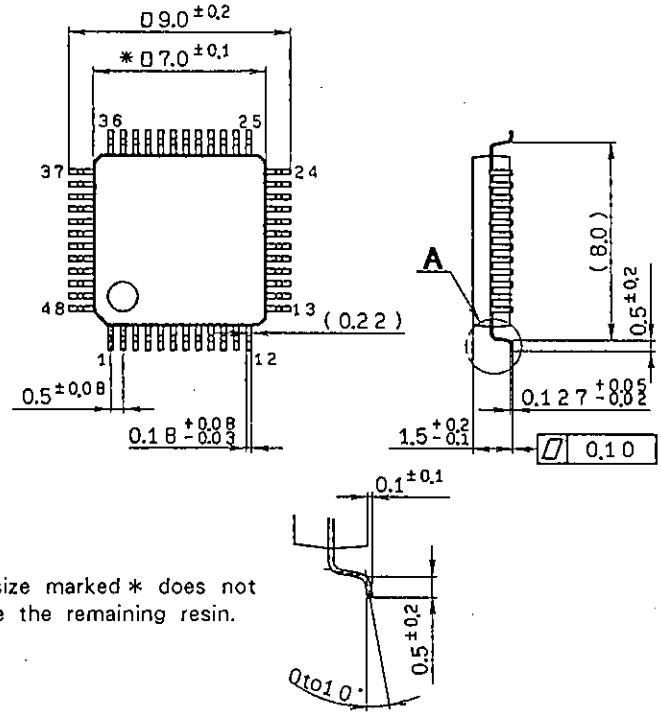
Package Outline Unit : mm

CX20037A 48 pin QFP (Plastic) 0.6g



QFP-48P-L04

CXA1237AR 48 pin VQFP (Plastic) 0.2g



This size marked * does not include the remaining resin.

Detailed diagram of A section VQFP-48P-L01