SONY

CXA2038R

AFM Monaural Signal Processor for 8 mm VCR

Description

The CXA2038R is a bipolar IC designed as an AFM monaural signal processor for 8 mm VCRs. All functions necessary for AFM monaural are concentrated onto a single 64-pin LQFP.

Features

- Low supply voltage (3.15 V) design
- Low power consumption (V_{CC}=3.15 V)
    - Recording: 65 mW
    - Playback: 103 mW
- Built-in BPF (1.5 MHz)
- FM modulator center frequency made non-adjusting.
- Supports NTSC and PAL
- Enables both parallel and 3-line serial mode control
- Supports electronic volume (EVR) control
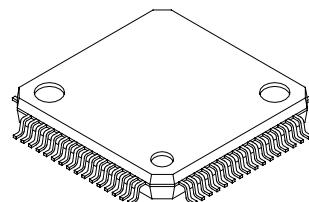
Applications

8 mm VCRs

Structure

Bipolar silicon monolithic IC

64 pin LQFP (Plastic)

Absolute Maximum Ratings (Ta=25 °C)

• Supply voltage	V_{CC}	7	V
• Operating temperature	Topr	–20 to +75	°C
• Storage temperature	Tstg	–65 to +150	°C
• Allowable power dissipation			
	P_D	1120	mW
(When mounted on board)			
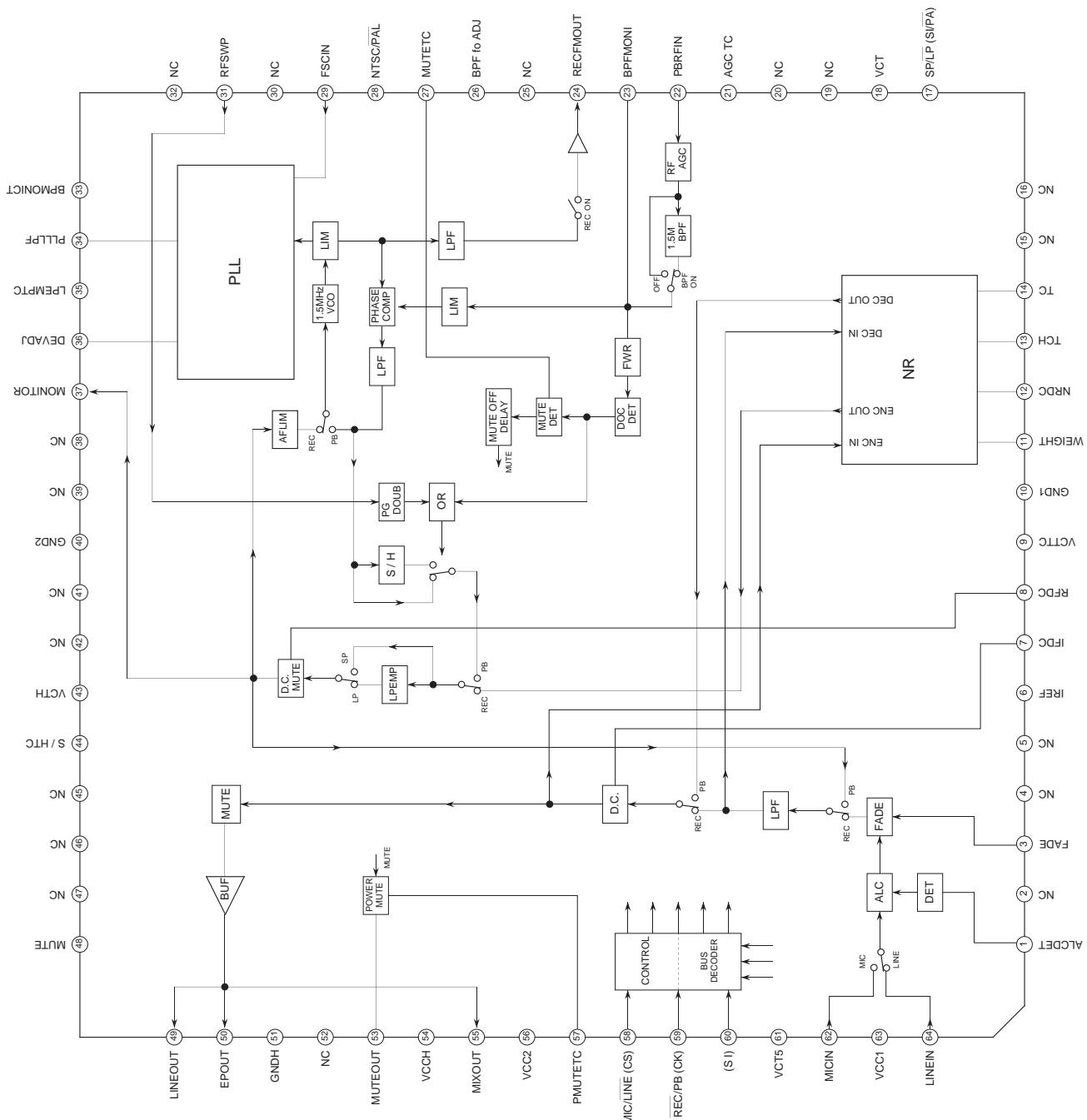
Operating Conditions

• Recommended supply voltage			
	V_{CC}	3.15	V
	VccH	4.75	V
• Supply voltage range	V_{CC}	3 to 5.25	V
	VccH	4.5 to 5.25	V
However, VccH ≥ V_{CC}			

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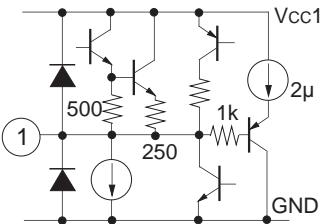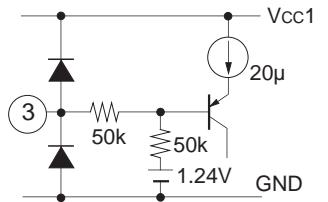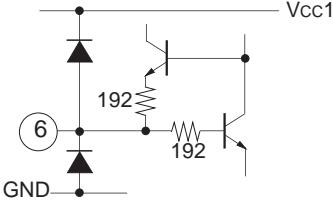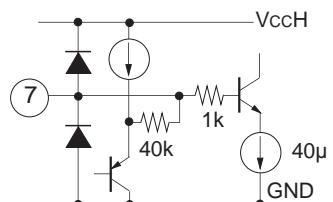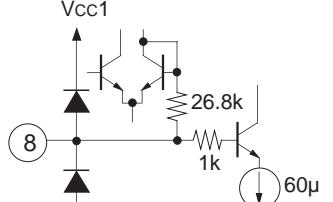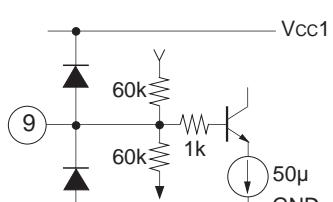
Block Diagram
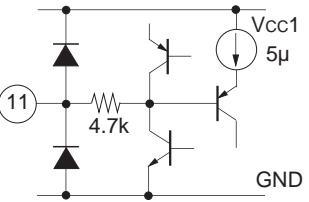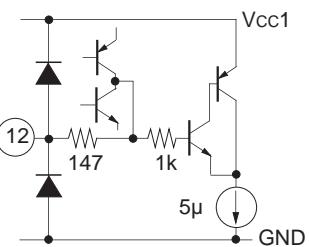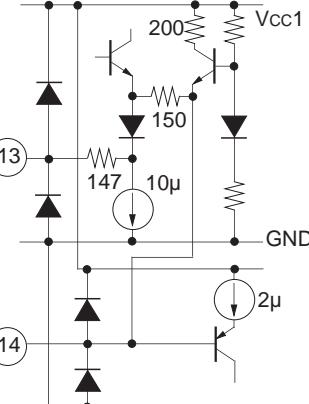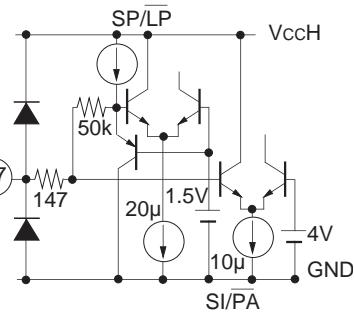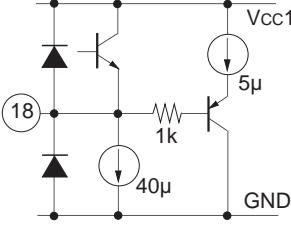
Pin Description   (Vcc1, Vcc2=3.15 V, VccH=4.75 V, Ta=27 °C)
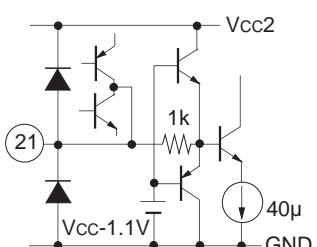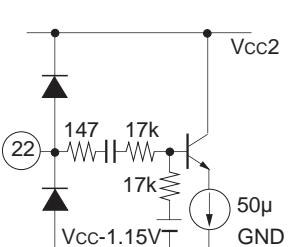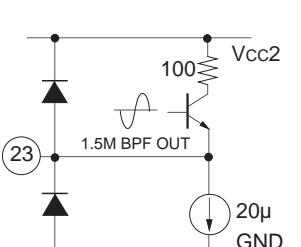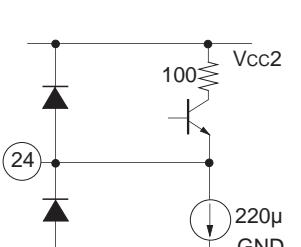
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
1	ALCDET	—	—		ALC time constant pin. ALC is OFF when this pin is connected to GND.
2	NC	—	—		
3	FADE	See attached sheet.	—		EVR control pin for fader. 0 to 0.5 V with fixed gain. Increasing the applied voltage lowers the gain and causes the fader to operate.
4	NC	—	—		
5	NC	—	—		
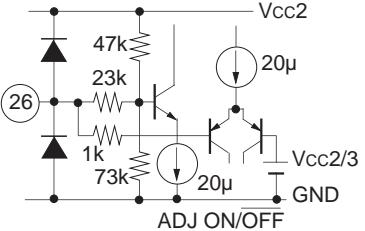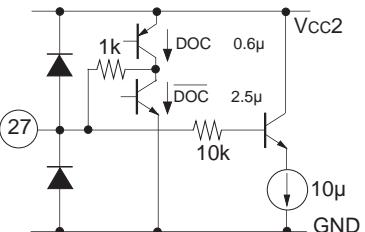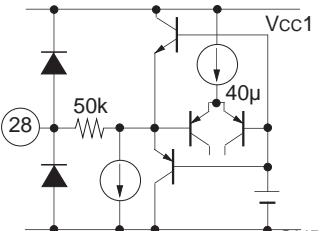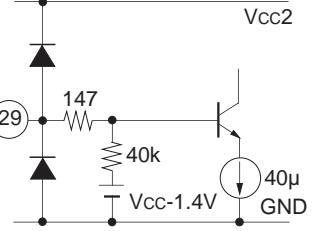
Pin No.	Symbol	Pin voltage DC	Pin voltage AC	Equivalent circuit	Description
6	IREF	1.17 V	—		Pin for generating the reference current. Connect a 47 kΩ external resistor. Be careful not to cause cross talk.
7	IFDC	1.90 V	—		Signal path DC monitor pin.
8	RFDC	1.88 V	—		Signal path DC monitor pin.
9	VCT TC	1.83 V	—		IC internal bias pin. Connect a decoupling capacitor.
10	GND1	0 V *1	—		Audio system GND pin.

*1 Externally applied voltage

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
11	WEIGHT	1.18 V	—		NR WEIGHT time constant pin.
12	NRDC	1.68 V	—		NR block DC monitor pin.
13	TCH	0.47 V	—		NR attack/recovery time constant pins.
14	TC	1.1 V	—		
15	NC	—	—		

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
16	NC	—	—		
17	SI/$\overline{\text{PA}}$ (SP/$\overline{\text{LP}}$)	—	—		Serial/parallel (SP/$\overline{\text{LP}}$) mode switching pin. When this pin is 4.3 V or more, the IC operates in serial control mode and mode control for the IC is performed by Pins 58 (CS), 59 (CK) and 60 (SI). When this pin is 3.5 V or less, the IC operates in parallel control mode as follows. L (0 to 1 V) — LP H (2 to 3.5 V) or OPEN — SP
18	VCT	1.23 V	—		IC internal bias pin. Connect a decoupling capacitor.
19	NC	—	—		
20	NC	—	—		
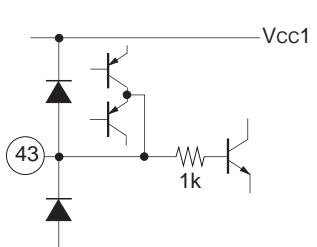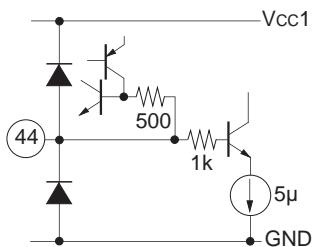
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
21	RFAGC TC	2.3 V	—		Pin for deciding RFAGC time constant.
22	PBRFIN	—	Reference input AFM 15 mVp-p		Input pin for PB RF signal. The reference input level is approximately 200 mVp-p (Y + C + AFM). Note that the reference input level for the AFM component is 15 mVp-p.
23	BPFMONI	1.0 V	Reference output 110 mVp-p		Pin for monitoring the BPF output. Connect a 4.7 kΩ external resistor.
24	RECFMOUT	0.9 V	1.5 MHz Reference output 210 mVp-p		Recording FM modulated audio output pin.
25	NC	—	—		

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
26	BPF f0 ADJ	See attached sheet.	—		Pin for varying the BPF fo. Non-adjusting mode when 0 to 0.8 V (Vcc = 3.15 V).
27	MUTETC	2.3 V	—		Time constant pin for determining the MUTE OFF delay time.
28	NTSC/$\overline{PAL}$	—	—		NTSC/$\overline{PAL}$ switching pin during parallel mode. <table><tr><td>L (0 to 1 V)</td><td>PAL</td></tr><tr><td>H (2 V to Vcc1)</td><td>NTSC</td></tr></table>
29	Fsc IN	1.53 V	Reference input 300 mVp-p		fsc input pin. The input level is 200 to 500 mVp-p. During NTSC: 3.579545 MHz During PAL: 4.433619 MHz
30	NC	—	—		

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
31	RFSWP	—	Input ⊓_⊔ 30Hz		RFSWP input pin. H (2 to Vcc1) L (0 to 1V) ⊓_⊔ 30Hz
32	NC	—	—		
33	BPFMONI CTL	—	—		BPF ON/OFF switch control pin. L (0 to 3.5 V) or OPEN — BPF ON H2 (4.3 V to VccH) — BPF OFF
34	PLLLPF	—	—		PLL time constant pin. Since this pin has a small attraction and discharge current, signals should be received with high impedance when monitoring this pin. Also, be careful not to cause cross talk.
35	LPEMP TC	1.87 V	—		LPEMP time constant pin. Be careful not to cause cross talk.
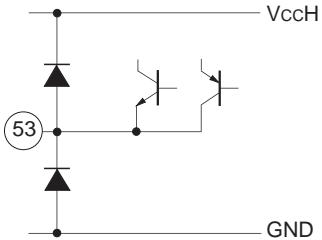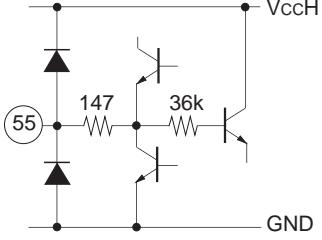
Pin No.	Symbol	Pin voltage DC	Pin voltage AC	Equivalent circuit	Description
36	DEVADJ	See attached sheet.	—	(circuit with Vcc1, 50k, 60k, 50k, 20µ, GND)	Deviation adjusting pin. The variable width is from 0 to Vcc1.
37	MONI	1.84 V	Reference output −15 dBm[2]	(circuit with Vcc1, 1k, 20µ, GND)	Pin for monitoring the signal before modulation during recording and after demodulation during playback.
38	NC	—	—		
39	NC	—	—		
40	GND2	[1] 0 V	—		RF system GND pin.

[1] Externally applied voltage

[2] 0dBm=2.19 Vp-p

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
41	NC	—	—		
42	NC	—	—		
43	VCTH	1.89 V	—		RF system reference bias pin. Connect a decoupling capacitor.
44	SHTC	1.7 V	—		S/H time constant pin.
45	NC	—	—		
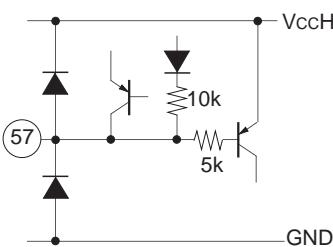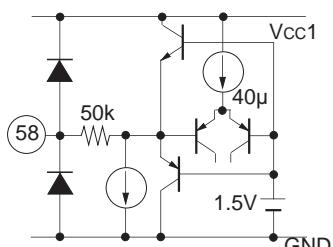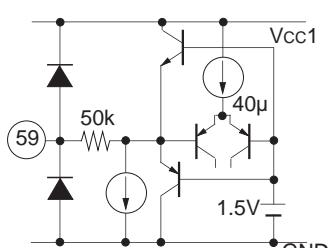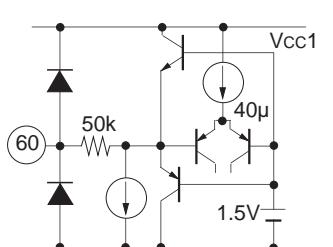
Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
46	NC	—	—		
47	NC	—	—		
48	MUTE ON/OFF	—	—		Mute control pin. L (0 to 1 V) — MUTE OFF H (2 V to Vcc1) or OPEN — MUTE ON Mute control is possible during both serial and parallel modes.
49	LINE OUT	2.01 V	Reference output −7 dBm [1]		LINEOUT pin. Set the load to 47 kΩ or more.
50	EPOUT	2.01 V	Reference output −7 dBm [1]		EPOUT pin. This pin can drive a load of 120 Ω.

[2] 0dBm=2.19 Vp-p

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
51	GNDH	*1 0 V	—		Output buffer system GND pin.
52	NC	—	—		
53	MUTEOUT	0 V	—		MUTEOUT pin. This pin outputs current during muting and power ON/OFF to operate the external SW Tr.
54	VccH	*1 4.75 V	—		Output buffer system power supply pin.
55	MIXOUT	2.01 V	Reference output −7 dBm *2		MIXOUT pin. Set the load to 47 kΩ or more.

*1 Externally applied voltage

*2 0dBm=2.19 Vp-p

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
56	Vcc2	*1 3.15 V	—		RF system power supply pin.
57	PMUTETC	4.75 V	—		Time constant pin for deciding the power ON/OFF mute time.
58	MIC/LINE (CS)	—	—		During parallel operation: MIC/LINE switching pin. During serial operation: CS input pin.
59	REC/PB (CK)	—	—		During parallel operation: REC/PB switching pin. During serial operation: CK input pin.
60	SI	—	—		During serial operation: SI input pin.

For pin 58:

L (0 to 1 V) or OPEN	LINE
H (2 V to Vcc1)	MIC

For pin 59:

L (0 to 1 V) or OPEN	REC
H (2 V to Vcc1)	PB

*1 Externally applied voltage

—14—

Pin No.	Symbol	Pin voltage		Equivalent circuit	Description
		DC	AC		
61	VCT5	2.02 V	—		IC internal bias pin. Connect a decoupling capacitor.
62	MICIN	1.16 V	Reference input −38 dBm [2]		Microphone input pin. Standard input level: −38 dBm. This pin has a small input signal level and high input impedance. Therefore, be careful not to cause cross talk with other signals.
63	Vcc1	[1] 3.15 V	—		Audio system power supply pin.
64	LINE IN	1.16 V	Reference input −38 dBm [2]		Line input pin. Standard input level: −38 dBm. This pin has a small input signal level and high input impedance. Therefore, be careful not to cause cross talk with other signals.

[1]   Externally applied voltage

[2]   0dBm=2.19 Vp-p

Electrical Characteristics

Vcc1, Vcc2=3.15 V, VccH=4.75 V, Ta=27 °C

No.	Item	Symbol	Measurement input signal conditions			Reference signal source			Control voltage					Switch condition, normally set to "b"									Mode condition	Measurement point	Measurement method	Ratings			Unit
			Input pin	Level	Frequency	Input pin	Level	Frequency	V3	V26	V33	V36	V44	1	3	22	29	31	33	44	62	64				Min.	Typ.	Max.	
1	Current consumption during recording 1 Vcc1 + Vcc2 systems	IREC1																					b	I1	During serial no signal	12	16	20	mA
2	Current consumption during recording 2 VccH system	IREC2																					b	I2	During serial no signal	2	3	4	mA
3	Current consumption during playback 1 Vcc1 + Vcc2 systems	IPB1																					c	I1	During serial no signal	21	28	35	mA
4	Current consumption during playback 2 VccH system	IPB2																					c	I2	During serial no signal	2	3	4	mA
5	MIC in LINE OUT reference output level	VLNOL	SG62	−38 dBm	1 kHz																	a	b	P49		−8	−7	−6	dBm
6	MIC in LINE OUT reference output distortion	HLNO	SG62	−38 dBm	1 kHz																	a	b	P49	Measure the THD to the 10 th.			0.2	%
7	ALC level 1 (REF + 20 dB)	VALC20	SG62	−18 dBm	1 kHz																	a	b	P49		−5	−2	1	dBm
8	ALC level 2 (REF + 36 dB)	VALC36	SG62	−2 dBm	1 kHz																	a	b	P49		−3	0	3	dBm
9	ALC effects (+36 dB/+20 dB)	VALC	SG62	+36 dB /+20 dB	1 kHz																	a	b	P49	Obtain with the ratio of +36 dB/+20 dB. VALC36/VALC20	0	0.6	2.5	dB
10	ALC maximum input distortion (REF + 36 dB)	HALCH	SG62	−2 dBm	1 kHz																	a	b	P49	Measure the THD to the 10 th.			1	%
11	FADER maximum attenuation	VFAL	SG62	−38 dBm	1 kHz	Vcc1					a								a	b	P49	A weight			−69	dBm
12	FADER dead voltage level	VFALO/VLNOL	SG62	−38 dBm	1 kHz	0.5 V					a								a	b	P49	Obtain with VFALO/VLNOL.	−0.5	0	0.5	dB

No.	Item	Symbol	Measurement input signal conditions			Reference signal source			Control voltage					Switch condition, normally set to "b"									Mode condition	Measurement point	Measurement method	Ratings			Unit
			Input pin	Level	Frequency	Input pin	Level	Frequency	V3	V26	V33	V36	V44	1	3	22	29	31	33	44	62	64				Min.	Typ.	Max.	
13	EE system frequency response (20 kHz/1 kHz)	FLN20	SG62	−38 dBm	20 kHz																a		b	P49	Obtain with the ratio of 20 kHz/1 kHz. FLN20/VLNOL	−3	0	1	dB
14	EE system frequency response (60 kHz/1 kHz)	FLN60	SG62	−38 dBm	60 kHz																a		b	P49	Obtain with the ratio of 60 kHz/1 kHz. FLN60/VLNOL			−10	dB
15	MIC IN output noise	NLN																					b	P49	A weight			−69	dBm
16	LINE in LINE OUT reference output level	VLNOLL	SG64	−38 dBm	1 kHz																	a	a	P49		−8	−7	−6	dBm
17	LINE in LINE OUT reference output distortion	HLNOL	SG64	−38 dBm	1 kHz																	a	a	P49	Measure the THD to the 10 th.			0.2	%
18	LINE IN output noise	NLNL																				a	a	P49	A weight			−69	dBm
19	Cross talk between input switches	VCTL	SG64	−28 dBm	1 kHz																	a	a	P49	A weight			−67	dBm
20	EE system MUTE switching level difference	VMDC																					b	P49	Measure the EE system output DC level difference during MUTE ON/OFF.	−100	0	+100	mVp-p
21	LINE maximum output	VLNMX	SG62		1 kHz									a							a		b	P49	Measure the output level when THD = 1 %.			0.5	dBm
22	LINE MUTE attenuation	VLNML	SG62	−38 dBm	1 kHz																a		f	P49	A weight			−75	dBm
23	NR encode reference output	VNRL 38	SG62	−38 dBm	1 kHz																a		b	P37		−16.6	−14.6	−12.6	dBm
24	NR encode linearity	VNRL 78	SG62	−73 dBm	1 kHz																a		b	P37	Obtain with −73 dBm/−33 dBm. VNRL73/VNRL33	−22.5	−21.5	−20.5	dB

No.	Item	Symbol	Measurement input signal conditions — Input pin	Level	Frequency	Reference signal source — Input pin	Level	Frequency	Control voltage (V3, V26, V33, V36, V44)	Switch condition, normally set to "b"	Mode condition	Measurement point	Measurement method	Min.	Typ.	Max.	Unit
25	NR encode frequency response	FNR14	SG62	−38 dBm	10 kHz					62=a	b	P37	Measure the ratio of f = 10 kHz/1 kHz. VNRF14/NRL38	3.9	4.9	5.9	dB
26	REC LP frequency response 1	FLP2	SG62	−38 dBm	2 kHz					62=a	d/b	P37	f = 2 kHz Obtain with the ratio of LP/SP.	1.6	2.1	2.5	dB
27	REC LP frequency response 2	FLP10	SG62	−38 dBm	10 kHz					62=a	d/b	P37	f = 10 kHz Obtain with the ratio of LP/SP.	2.5	3.0	3.5	dB
28	Oscillator frequency 1.5 MHz (NTSC)	FVCO1	SG29	200 mVp-p	3.579545 MHz					29=a	b	P24		1.4995	1.5	1.5005	MHz
29	Oscillator frequency 1.5 MHz (PAL)	FVCO2	SG29	200 mVp-p	4.433619 MHz					29=a	e	P24		1.4995	1.5	1.5005	MHz
30	REC FM output level	VFML				SG29	200 mVp-p	3.579545 MHz		29=a	b	P24		187	208	229	mVp-p
31	REC FM output secondary distortion	VFMH1				SG29	200 mVp-p	3.579545 MHz		29=a	b	P24			−45	−25	dB
32	REC FM output tertiary distortion	VFNH2				SG29	200 mVp-p	3.579545 MHz		29=a	e	P24			−50	−30	dB
33	AF LIM characteristics	VAFLM	SG62	−18 dBm	10 kHz	SG29	200 mVp-p	3.579545 MHz		29=a	b	P24		91	110	130	kHz
34	DEV variable width 1.5 M	VDEV	SG62	−38 dBm	1 kHz	SG29	200 mVp-p	3.579545 MHz	V36=Adjusting	29=a	b	P36	Adjustment method noted separately.	0.1		2.9	V
35	Reference FM modulation distortion	VRECH	SG62	−38 dBm	1 kHz	SG29	200 mVp-p	3.579545 MHz	V36=VDEV value	29=a	b	P24	Measurement method noted separately.			0.4	%
36	RFAGC level 1	VAGCL1	SG22	150 mVp-p	7 MHz	SG29	200 mVp-p	3.579545 MHz	V33=VccH	3=a, 22=a, 29=a, 33=a	c	P23			110		mVp-p

No.	Item	Symbol	Measurement input signal conditions			Reference signal source			Control voltage		Switch condition, normally set to "b"	Mode condition	Measurement point	Measurement method	Ratings			Unit
			Input pin	Level	Frequency	Input pin	Level	Frequency							Min.	Typ.	Max.	
37	RFAGC level 2	VAGCL2	SG22	300 mVp-p	7 MHz	SG29	200 mVp-p	3.579545 MHz	V33: VccH		22=a, 29=a, 33=a	c	P23			166		mVp-p
38	RFAGC level 3	VAGCL3	SG22	600 mVp-p	7 MHz	SG29	200 mVp-p	3.579545 MHz	V33: VccH		22=a, 29=a, 33=a	c	P23			167		mVp-p
39	BPF ADJ voltage	VBPAJ	SG22	15 mVp-p	1.4 MHz, 1.6 MHz	SG29	200 mVp-p	3.579545 MHz	V26: Adjusting		22=a, 29=a	c	P26	Adjustment method noted separately.	1.2		3	V
40	BPF MONI level 1.5 MHz	VBPML	SG22	15 mVp-p	1.5 MHz	SG29	200 mVp-p	3.579545 MHz	V26: VBPAJ value		22=a, 29=a	c	P23			110		mVp-p
41	Frequency response 0.8 M/1.5 M	FBP0.8	SG22	15 mVp-p	0.8 MHz	SG29	200 mVp-p	3.579545 MHz	V26: VBPAJ value		22=a, 29=a	c	P23	Obtain the ratio of 0.8 MHz/1.5 MHz. FBP0.8/VBPML		−31	−28	dB
42	Frequency response 1.3 M/1.5 M PBRFIN → BPFMONI	FBP1.3	SG22	15 mVp-p	1.3 MHz	SG29	200 mVp-p	3.579545 MHz	V26: VBPAJ value		22=a, 29=a	c	P23	Obtain the ratio of 1.3 MHz/1.5 MHz. FBP1.3/VBPML		−15	−8	dB
43	Frequency response 1.4 M/1.5 M PBRFIN → BPFMONI	FBP1.4	SG22	15 mVp-p	1.4 MHz	SG29	200 mVp-p	3.579545 MHz	V26: VBPAJ value		22=a, 29=a	c	P23	Obtain the ratio of 1.4 MHz/1.5 MHz. FBP1.4/VBPML	−6	−2		dB
44	Frequency response 1.6 M/1.5 M PBRFIN → BPFMONI	FBP1.6	SG22	15 mVp-p	1.6 MHz	SG29	200 mVp-p	3.579545 MHz	V26: VBPAJ value		22=a, 29=a	c	P23	Obtain the ratio of 1.6 MHz/1.5 MHz. FBP1.6/VBPML	−6	−2		dB
45	Frequency response 1.7 M/1.5 M PBRFIN → BPFMONI	FBP1.7	SG22	15 mVp-p	1.7 MHz	SG29	200 mVp-p	3.579545 MHz	V26: VBPAJ value		22=a, 29=a	c	P23	Obtain the ratio of 1.7 MHz/1.5 MHz. FBP1.7/VBPML		−15	−8	dB
46	Frequency response 2.5 M/1.5 M PBRFIN → BPFMONI	FBP2.5	SG22	15 mVp-p	2.5 MHz	SG29	200 mVp-p	3.579545 MHz	V26: VBPAJ value		22=a, 29=a	c	P23	Obtain the ratio of 2.5 MHz/1.5 MHz. FBP2.5/VBPML		−31	−28	dB
47	Demodulation level	VPBL	SG22	15 mVp-p	1.5 MHz DEV±60 kHz fs=1 kHz	SG31 / SG29	3 Vp-p / 200 mVp-p	30 Hz / 3.579545 MHz	V36: VDEV value / V26: VBPAJ value		22=a, 29=a, 31=a	c	P49		−9.8	−7.8	−5.8	dBm
48	Demodulation distortion factor	HPB	SG22	15 mVp-p	1.5 MHz DEV±60 kHz fs=1 kHz	SG31 / SG29	3 Vp-p / 200 mVp-p	30 Hz / 3.579545 MHz	V36: VDEV value / V26: VBPAJ value		22=a, 29=a, 31=a	c	P49			0.25	0.5	%

No.	Item	Symbol	Measurement input signal conditions			Reference signal source			Control voltage					Switch condition, normally set to "b"									Mode condition	Measurement point	Measurement method	Ratings			Unit
			Input pin	Level	Frequency	Input pin	Level	Frequency	V3	V26	V33	V36	V44	1	3	22	29	31	33	44	62	64				Min.	Typ.	Max.	
49	Demodulation noise	NPB	SG22	15 mVp-p	1.5 MHz	SG31 SG29	3 Vp-p 200 mVp-p	30 Hz 3.579545 MHz		VBPAJ value		VDEV value				a	a	a					c	P49	A weight			−75	dBm
50	DOC detection sensitivity a (during SP)	VDOC1	SG22	See Fig. 1	1.5 MHz	SG29	200 mVp-p	3.579545 MHz		VBPAJ value			2.4 V			a	a			a			c	P37	Obtain the value for a where 15 mVp-p = 0 dB. See Fig. 1.	−17.5	−12.5	−7.5	dB
51	Hysteresis b (during SP)	VDOC2	SG22	See Fig. 1	1.5 MHz 30 %AM	SG29	200 mVp-p	3.579545 MHz		VBPAJ value			2.4 V			a	a			a			c	P37	Obtain the ratio of b/a. VDOC2/VDOC1 See Fig. 1.	1	2	4.5	dB
52	DOC detection sensitivity a (during LP)	VDOC3	SG22	See Fig. 1	1.5 MHz 30 %AM	SG29	200 mVp-p	3.579545 MHz		VBPAJ value			2.4 V			a	a			a			c	P37	Obtain the value for a where 15 mVp-p = 0 dB. See Fig. 1.	−20.5	15.5	10.5	dB
53	MUTE OFF DELAY T1	TMUON	SG22	See Fig. 2	1.5 MHz Tone Burst	SG31 SG29	3 Vp-p 200 mVp-p	30 HZ 3.579545 MHz		VBPAJ value			2.4 V			a		a					c	P49		420	530	640	μs
54	MUTE hold time T2	TMUOF	SG22	See Fig. 2	1.5 MHz Tone Burst	SG31 SG29	3 Vp-p 200 mVp-p	30 HZ 3.579545 MHz		VBPAJ value							a	a					c	P49		120	150	180	ms
55	PG doubler width (See Fig. 3.)	TPGH	SG22	15 mVp-p	1.5 MHz	SG31 SG29	3 Vp-p 200 mVp-p	30 Hz 3.579545 MHz		VBPAJ value			2.4 V			a	a	a		a			c			5.5	7.5	9.5	μs
56	PG doubler delay (See Fig. 3.)	TPGD	SG22	15 mVp-p	1.5 MHz	SG31 SG29	3 Vp-p 200 mVp-p	30 Hz 3.579545 MHz		VBPAJ value			2.4 V			a	a	a		a			c			1	2	3	μs
57	POWER ON/OFF NOISE	NPMU																					b	TP49	Measure the EE system output DC level difference during power ON/OFF.	−100	0	+100	mVp-p
58	CS, CK, SIN input Low level	VSIL	58 59 60		DC																		b	P58 P59 P60		0		1	V
59	CS, CK, SIN input High level	VSIH	58 59 60		DC																		b	P58 P59 P60		2		Vcc	V
60	MUTE ON/OFF Low level	V48L	48		DC																		b	P48		0		1	V

No.	Item	Symbol	Measurement input signal conditions — Input pin	Level	Frequency	Reference signal source — Input pin	Level	Frequency	Control voltage V3	V26	V33	V36	V44	Switch condition, normally set to "b" 1	3	22	29	31	33	44	62	64	Mode condition	Measurement point	Measurement method	Min.	Typ.	Max.	Unit
61	MUTE ON/$\overline{\text{OFF}}$ High level	V48H	48		DC																		b	P48		2		Vcc	V
62	Serial/$\overline{\text{parallel}}$ Low level	V17SL	17		DC																		b	P17		0		3.5	V
63	Serial/$\overline{\text{parallel}}$ High level	V17SH	17		DC																		b	P17		4.3		Vcc	V
64	SP/$\overline{\text{LP}}$ Low level	V17L	17		DC																		b	P17		0		1	V
65	SP/$\overline{\text{LP}}$ High level	V17H	17		DC																		b	P17		2		3.5	V
66	NTSC/$\overline{\text{PAL}}$ Low level	V28L	28		DC																		b	P28		0		1	V
67	NTSC/$\overline{\text{PAL}}$ High level	V28H	28		DC																		b	P28		2		Vcc	V
68	MUTE ON/$\overline{\text{OFF}}$ Low level	V48L	48		DC																		b	P48		0		1	V
69	MUTE ON/$\overline{\text{OFF}}$ High level	V48H	48		DC																		b	P48		2		Vcc	V
70	MIC/$\overline{\text{LINE}}$ Low level	V58L	58		DC																		b	P58		0		1	V
71	MIC/$\overline{\text{LINE}}$ High level	V58H	58		DC																		b	P58		2		Vcc	V
72	PB/$\overline{\text{REC}}$ Low level	V59L	59		DC																		b	P59		0		1	V
73	PB/$\overline{\text{REC}}$ High level	V59H	59		DC																		b	P59		2		Vcc	V
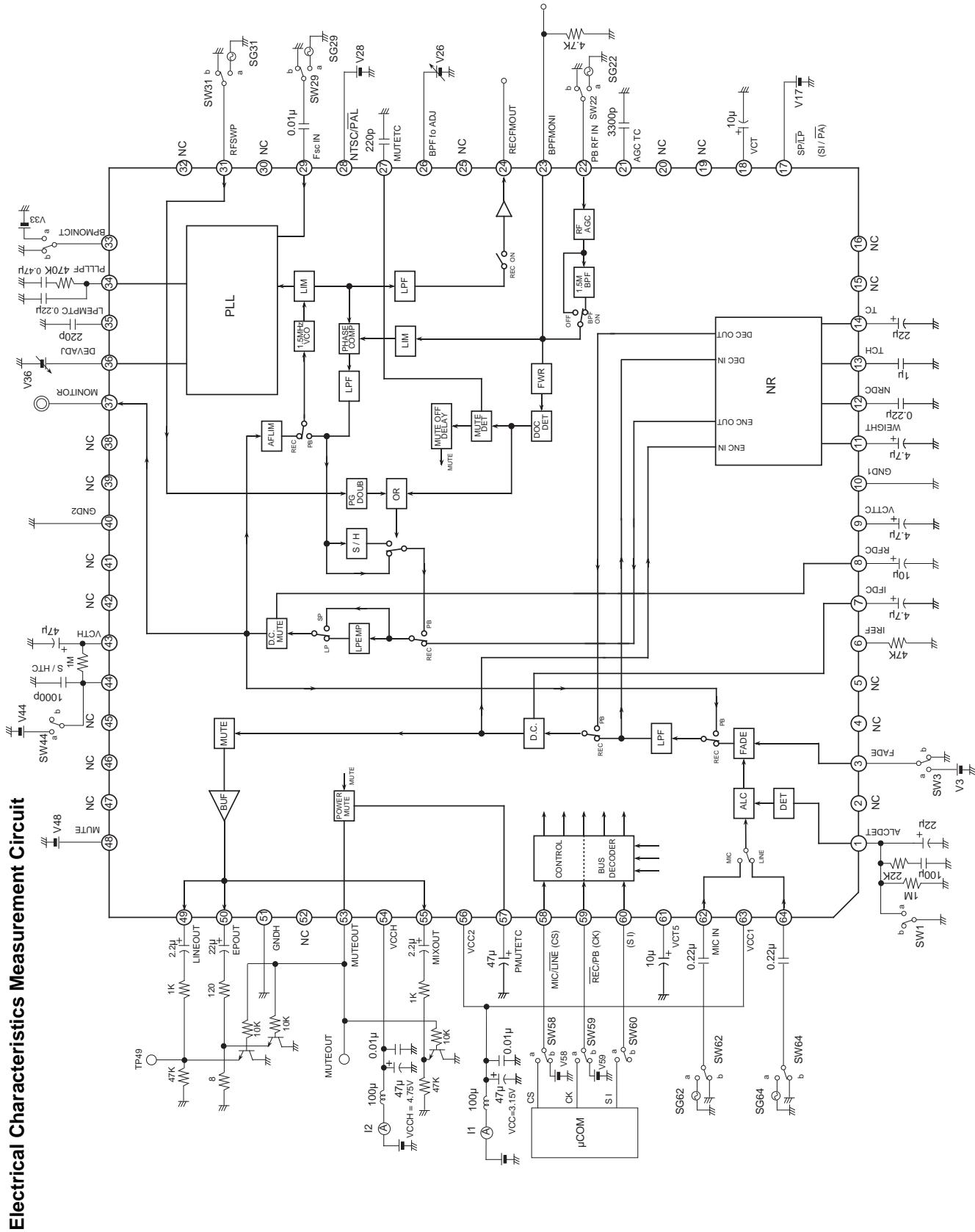
Mode Condition Table

Electrical characteristics measurement circuit mode table

Mode condition	Bus decoder condition table during serial								Condition table during parallel					Mode contents
	bit 0-5	bit 6	bit 7-10	bit 11 LINE/MIC	bit 12 LP/SP	bit 13 PAL/NTSC	bit 14 MUTE	bit 15 REC/PB	V58 LINE/MIC	V17 LP/SP	V28 PAL/NTSC	V48 MUTE	V59 REC/PB	
Value 0	—	—	—											
Value 1	—	—	—											
									L	H				
a		0		0	1	1	0	0	L	H	H	L	L	REC (LINE)
b		0		1	1	1	0	0	H	H	H	L	L	REC (MIC)
c		0		1	1	1	0	1	H	H	H	L	H	PB
d		0		1	0	1	0	0	H	L	H	L	L	LP MODE
e		0		1	1	0	0	0	H	H	L	L	L	PAL MODE
f		0		1	1	1	1	0	H	H	H	H	L	REC MUTE
g		0		1	1	1	1	1	H	H	H	H	H	PB MUTE

Note)
- bit 6 should be "0".
- During serial control, set switches 58, 59 and 60 to "a", and V17 to 4.3 to V_{CC}H.
- During parallel control, set switches 58, 59 and 60 to "b", and V17 to L (0 to 1 V) during LP and H (2 V to 3.5 V) during SP.

Electrical Characteristics Measurement Circuit

Input/Output Waveform

Fig. 1

Pin 22 input waveform

b | a

Pin 37 output waveform

Level when the 1.5 MHz signal is AM modulated
(2 mVp-p to 20 mVp-p) at 1 kHz and the 1.5 MHz,
15 mVp-p input is set to 0 dB.

Fig. 2

Pin 22 input waveform   15m Vp-p

1ms   200ms

1.5MHz DEV±60kHz
fs=1kHz

T1   T2

Pin 37 output waveform

Fig. 3

Pin 31 input waveform

Pin 37 output waveform

PGD delay   PGD width
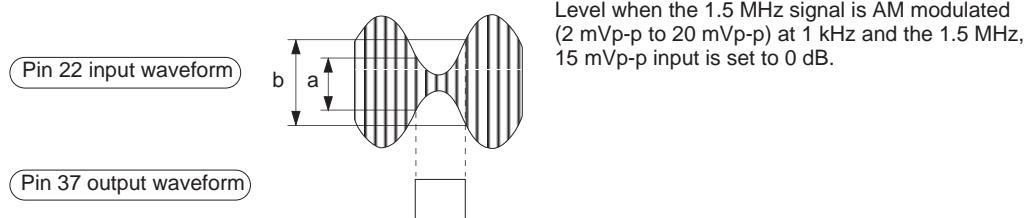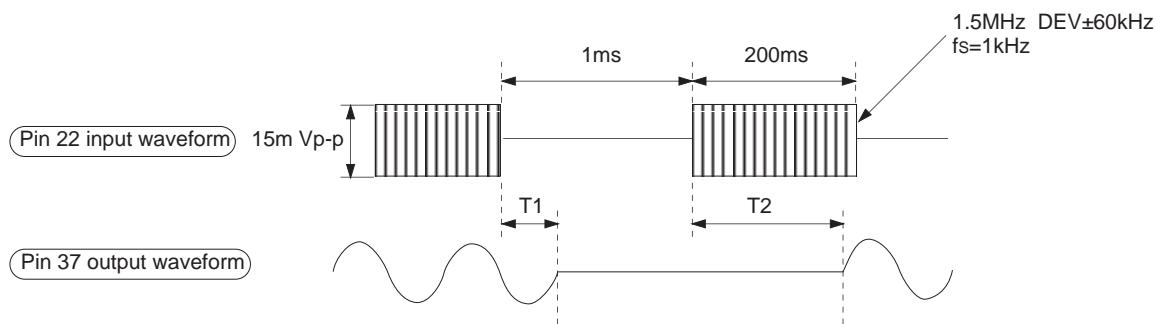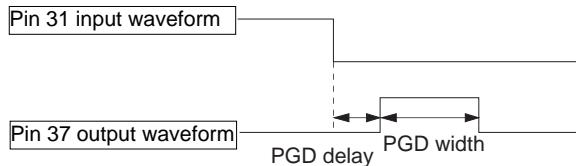
Adjustment and measurement methods

• DEV adjustment method

Input the reference input (–38 dBm, 1 kHz) to the MIC input and adjust the voltage applied to Pin 36 so that the Pin 24 output reference frequency deflection is 1.5 MHz ±62.8 kHz.

When adjusting DEV, connect a 10 kΩ load resistor between Pin 24 and GND.

• Reference modulation distortion factor

Demodulate the Pin 24 output into the audio signal with the reference demodulator under the same conditions as for DEV adjustment above, then measure the distortion factor.

• BPF f0 adjustment method

Input 15 mVp-p, 1.4 MHz and 1.6 MHz signals to Pin 22 and adjust the voltage applied to Pin 26 so that the 1.4 MHz and 1.6 MHz levels output to Pin 23 are equal.

Note that since adjustment OFF mode results when the Pin 26 voltage is between 0 to 0.8 V, the BPF f0 should be adjusted with the Pin 26 voltage between 1.2 to 3 V (when Vcc1 = 3.15 V). When adjusting the BPF f0, connect a 4.7 kΩ load resistor between Pin 23 and GND.

Mode Control Tables

Parallel CTL mode table

Pin No.	Symbol	CTL voltage				
		LOW (0 to 1 V)	OPEN	HIGH1 (2 V to Vcc1)	HIGH2 (2 V to 3.5V)	HIGH3 (4.3 V to VccH)
17	SP/LP	LP	SP	—	SP	SERIAL*1
28	NTSC/PAL	PAL	—	NTSC	—	—
33	BPF ON/OFF	BPF ON	BPF ON	—	BPF ON	1.5 MBPFOFF
48	MUTE	MUTE OFF	MUTE ON	MUTE ON	—	—
58	MIC/LINE	LINE	LINE	MIC	—	—
59	REC/PB	REC	REC	PB	—	—

*1 When Pin 17 is 4.3 V or more, the IC operates in serial control mode.

Serial CTL mode table

When Pin 17 is 4.3 V or more, the IC operates in serial control mode.
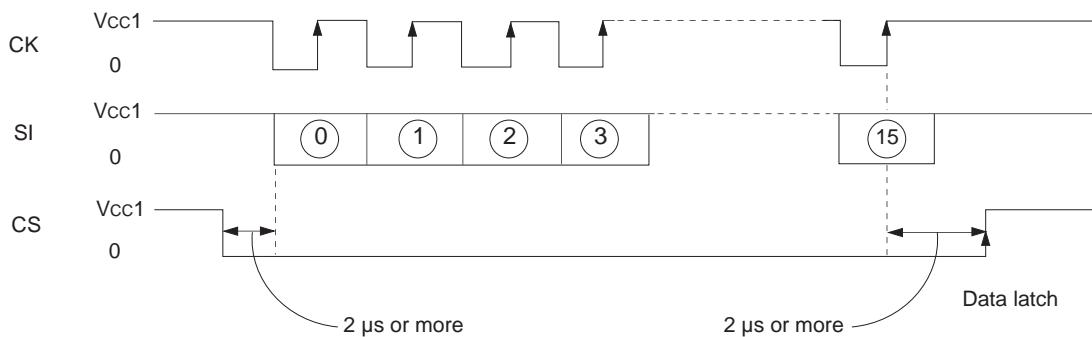
bit No.	Control name	CTL value	Mode
0	—	—	—
1	—	—	—
2	—	—	—
3	—	—	
4	—	—	
5	—	—	
6	—	L	
7	—	—	
8	—	—	
9	—	—	
10	—	—	
11	MIC/LINE switching	L	LINEIN
		H	MICIN
12	SP/LP switching	L	LP
		H	SP
13	NTSC/PAL switching	L	PAL
		H	NTSC
14	MUTE	L	OFF
		H	MUTEON
15	PB/REC	L	REC
		H	PB
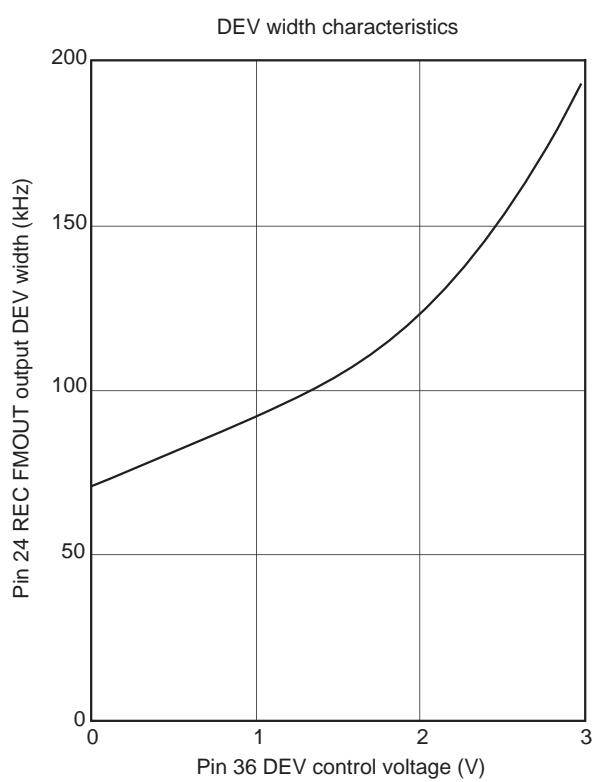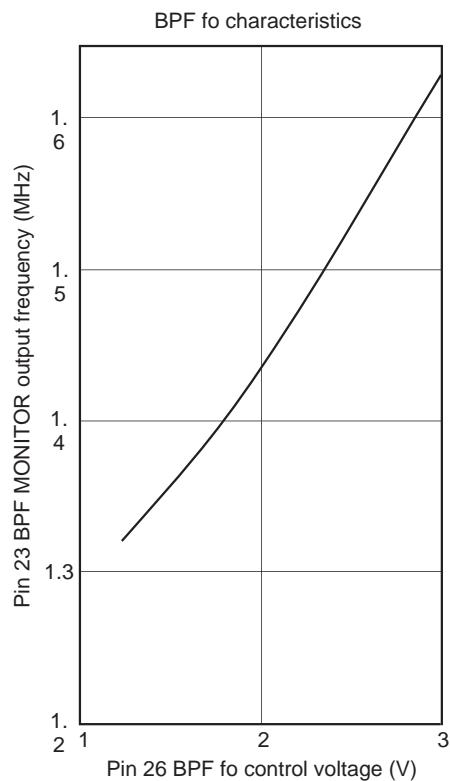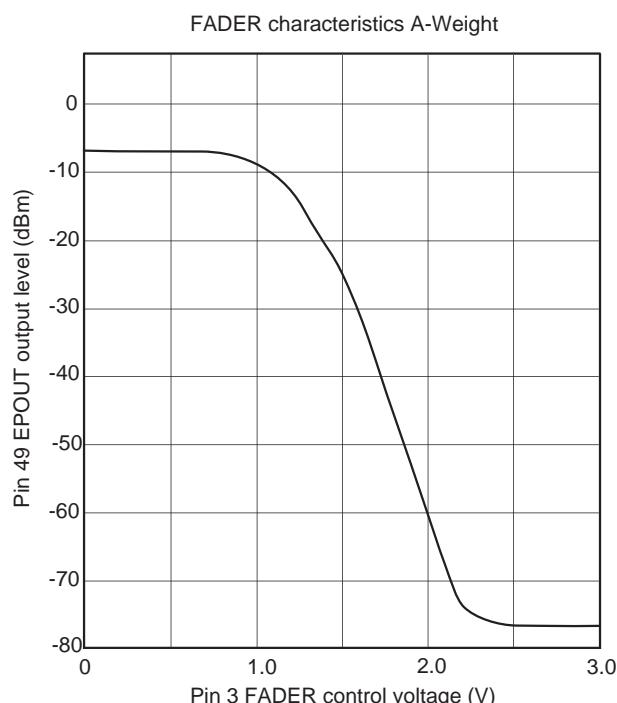
Pin No.	Symbol	CTL voltage		
		LOW (0 to 1 V)	OPEN	HIGH (2 V to Vcc)
58	CS	L	L	H
59	CK	L	L	H
60	SI	L	L	H

Note) bit 6 should normally be set to
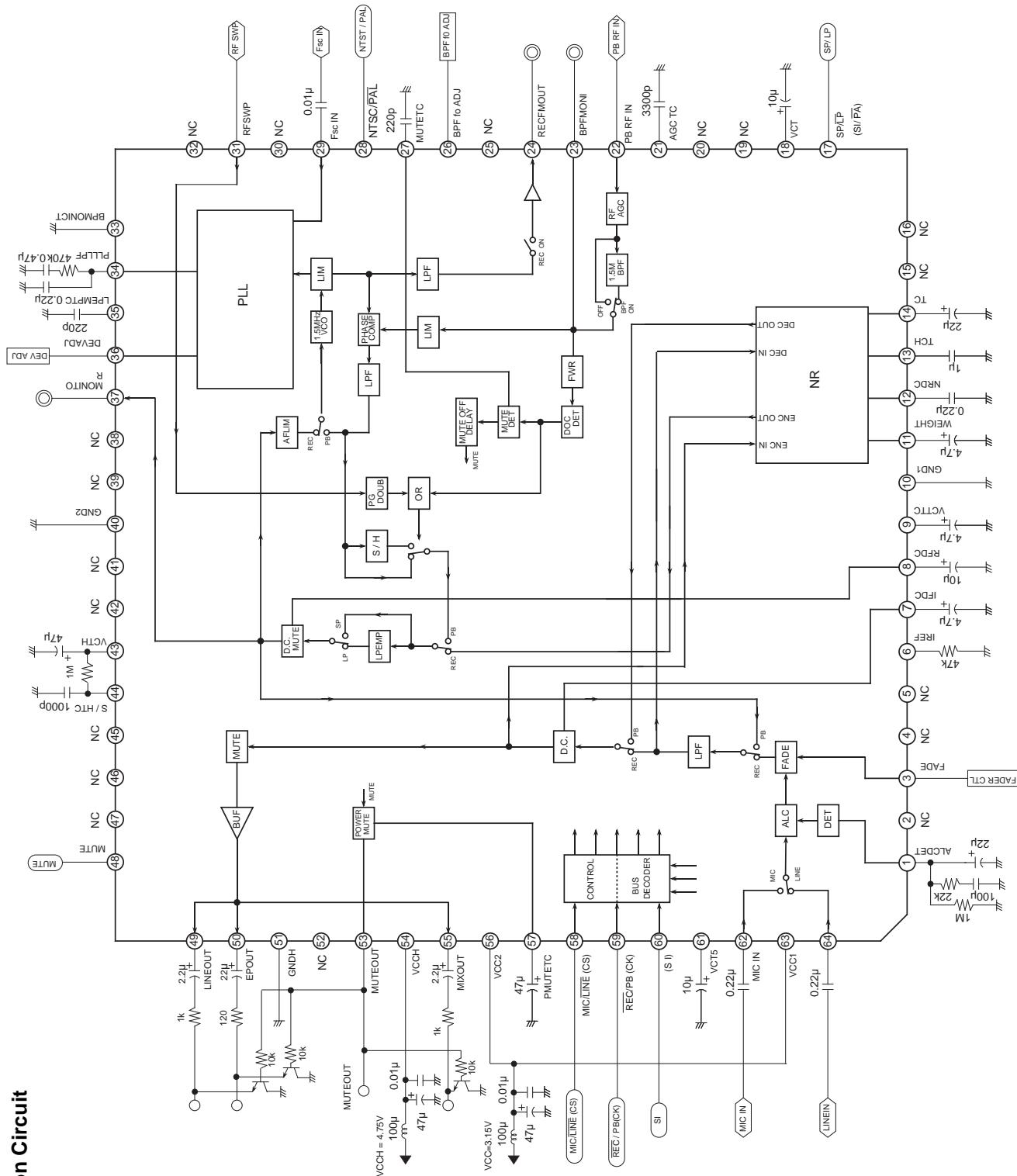
Input conditions

| Item	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	f_{ck}			800	kHz
Setup time	tsu	400			ns
Hold time	t_{HLD}	400			ns
CS fall time to SI start time	t1	2			μs
Final CK rise time to CS rise time	t2	2			μs

FADER characteristics A-Weight

BPF fo characteristics

DEV width characteristics
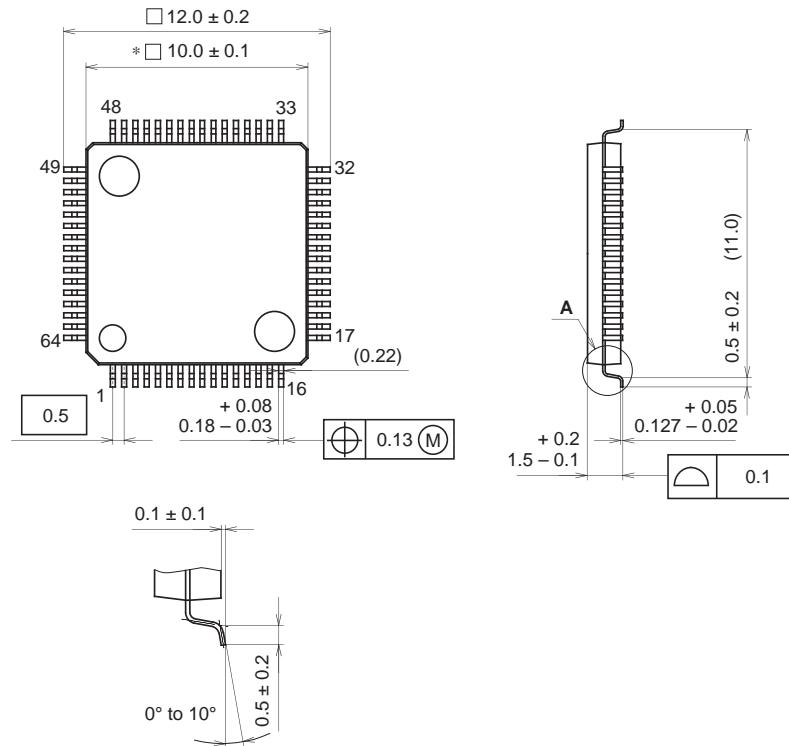
Application Circuit

Package Outline   Unit : mm

64PIN LQFP (PLASTIC)

NOTE: Dimension "∗" does not include mold protrusion.

DETAIL **A**

SONY CODE	LQFP-64P-L01
EIAJ CODE	LQFP064-P-1010
JEDEC CODE	————

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER/PALLADIUM PLATING
LEAD MATERIAL	42/COPPER ALLOY
PACKAGE MASS	0.3g