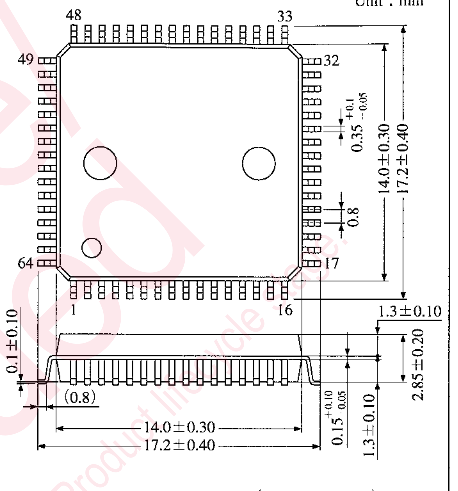
AN6477FBP

Speech Network IC Incorporating Cross-Point Switch

■ Overview

The AN6477FBP is a speech network IC which includes a transmitter/receiver noise reducing function and is suitable for quality cordless telephones. It incorporates a cross-point switch controlled by serial input. It allows speech path switching and mixing, and provides for three- or four-person communication and other sophisticated functions. It also incorporates REC/PLAY amplifiers with VOX circuits.



QFH package with 64 pins (QFH064-P-1414)

■ Features

- The speech block can operate on line voltage, with no external power supply, and is operational even during a commercial power failure.
- Incorporates a transmitter/receiver noise reducing function to improve the handset's howling margin (transmitter noise reduction can be turned ON and OFF from outside) .
- Incorporates auto. PAD, dial mute, DC voltage regulation, and other basic speech functions.
- The cross-point switch can be operated independently.
- Each output of the cross-point switch can correspond to multiple inputs, allowing three- or four-person communication.
- The REC/PLAY amplifiers incorporate ALC and VOX circuits.
- Receiver volume can be increased by 6dB or 9dB.

■ Pin Descriptions

Pin No.	Pin name	Pin No.	Pin name
1	Ground	33	RF2 link output
2	Line power (+) input	34	RF1 link output
3	Side-tone adjustment	35	Intercom link output
4	Line voltage control (1)	36	VOX detection control
5	Int. ref. voltage output (2)	37	VOX amp. input
6	Int. ref. voltage output (1)	38	Time stamp link output
7	Trans. preamp. output	39	Recording link output
8	Noise reduction detection output	40	ALC input
9	Noise reduction detection input	41	ALC detection control
10	Noise reduction amp. output	42	Loudspeaker link input
11	Auto. PAD control	43	Recording input
12	Rec. preamp. input	44	Recording inverting input
13	Rec. preamp. output	45	Recording preamp. output
14	Rec. amp. input	46	Recording bias current control
15	Rec. amp. output (1)	47	To recording head
16	Rec. amp. output (2)	48	EQ amp. inverse input
17	BT signal input	49	EQ amp. output
18	DTMF preamp. output	50	REC/PLAY int. ref. voltage output
19	DTMF signal input	51	Ground
20	MIC preamp. output	52	MIX preamp. output
21	MIC preamp. input (1)	53	MIX link input
22	MIC preamp. input (2)	54	AUX preamp. output
23	Dial mute control	55	AUX link input
24	Line voltage control	56	Intercom link input
25	Trans. noise reduction control	57	RF1 link input
26	Strobe signal input	58	RF2 link input
27	Clock signal input	59	Power-ON reset control
28	Data input	60	External supply voltage input
29	Ground	61	Internal supply voltage output
30	Logic power supply input	62	Circuit voltage control (2)
31	VOX detector output	63	Line current bypass (2)
32	SP link output	64	Line current bypass (1)

■ Absolute Maximum Ratings (Ta = 25℃)

Parameter	Symbol	Rating	Unit
Supply voltage (1)	V_{CC}	7.0	V
Supply current (1)	V_L	12.0	V
Supply voltage (2)	I_{CC}	50	mA
Supply current (2)	I_L	135	mA
Power dissipation[Note)]	P_D	619	mW
Operating ambient temperature	T_{opr}	−20 to +75	℃
Storage temperature	T_{stg}	−55 to +150	℃

Note) In a free-air condition with Ta = 75℃.

■ Recommended Operating Range (Ta=25℃)

Parameter	Symbol	Range
Operating supply voltage range (1)	V_{CC}	4.5 to 5.5V
Operating supply voltage range (2)	V_L	3 to 11V

■ Recommended Operating Conditions (Ta=−20 to +75℃)

Parameter		Symbol	Condition	min	typ	max	Unit
Supply voltage		V_{CC}		4.5	5	5.5	V
Clock frequency		f_{CLK}	Input duty 40 to 50%	—	—	250	kHz
Input pulse width	CLK (Low)	$t_{WL(CLK)}$		1.6	—	2.0	μs
	CLK (High)	$t_{Wh(CLK)}$		2.0	—	2.4	μs
	STB	$t_{W(STB)}$		1.2	—	—	μs
Setup time	DATA	$t_{SU(DATA)}$		1.6	—	—	μs
	STB	$t_{SU(STB)}$		0.8	—	—	μs
Hold time	DATA	$t_{h(DATA)}$		1.6	—	—	μs
	STB	$t_{h(STB)}$		1.2	—	—	μs
Clock pulse rise time		$t_{r(CLK)}$		—	—	20	μs
Clock pulse fall time		$t_{r(CLK)}$		—	—	20	μs
Input voltage		V_i		0	—	V_{CC}	V

■ Electrical Characteristics (Ta=25±2℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Power supply characteristics during power failure						
Line DC voltage (I−1)	V_{L-I1}	V−DCC=High, I_L=20mA V_{CC}=0V	3.3	3.6	3.9	V
Line DC voltage (I−2)	V_{L-I2}	V−DCC=High, I_L=60mA V_{CC}=0V	4.85	5.15	5.55	V
Line DC voltage (I−3)	V_{L-I3}	V−DCC=High, I_L=120mA V_{CC}=0V	6.85	7.25	7.75	V
Line DC voltage−H (I−1)	V_{LH-I1}	V−DCC=Low, I_L=30mA V_{CC}=0V	4.75	5.25	5.75	V
Line DC voltage−H (I−2)	V_{LH-I2}	V−DCC=Low, I_L=60mA V_{CC}=0V	5.95	6.45	6.95	V
Line DC voltage−H (I−3)	V_{LH-I3}	V−DCC=Low, I_L=120mA V_{CC}=0V	8.4	9.0	9.7	V
Internal supply voltage (I)	V_{reg-I}	V−DCC=High, I_L=20mA V_{CC}=0V	1.8	2.0	2.2	V
Internal ref. supply voltage (I)	V_{ref-I}	V−DCC=High, I_L=20mA V_{CC}=0V	0.9	1.0	1.1	V
Normal power supply characteristics						
Line DC voltage (E−1)	V_{L-E1}	V−DCC=High, I_L=20mA V_{CC}=5V	3.15	3.45	3.85	V
Line DC voltage (E−2)	V_{L-E2}	V−DCC=High, I_L=60mA V_{CC}=5V	4.5	4.9	5.3	V
Line DC voltage (E−3)	V_{L-E3}	V−DCC=High, I_L=120mA V_{CC}=5V	6.7	7.2	7.7	V
Line DC voltage (E−1)	V_{LH-E1}	V−DCC=Low, I_L=30mA V_{CC}=5V	4.7	5.25	5.8	V

■ Electrical Characteristics (cont.) (Ta=25±2℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Power supply characteristics during power failure (cont.)						
Line DC voltage−H (E−2)	V_{LH-E2}	V−D_{CC}=Low, I_L=60mA V_{CC}=5V	5.8	6.45	7.1	V
Line DC voltage−H (E−3)	V_{LH-E3}	V−D_{CC}=Low, I_L=120mA V_{CC}=5V	8.2	8.9	9.6	V
Internal supply voltage (E)	V_{reg-E}	V−D_{CC}=High, I_L=20mA V_{CC}=5V	4.6	4.85	5.0	V
Internal ref. supply voltage (E)	V_{ref-E}	V−D_{CC}=High, I_L=20mA V_{CC}=5V	2.25	2.5	2.7	V
Total circuit current	I_{total}	V−D_{CC}=High, I_L=20mA V_{CC}=5V	17	27	35	mA
Receiver during power failure						
Rec. gain (I−1)	G_{V-IR1}	I_L=30mA, V_{CC}=0V V_{in}=−42dBm	30.5	32.5	34.5	dB
Rec. gain (I−2)	G_{V-IR2}	I_L=80mA, V_{CC}=0V V_{in}=−42dBm	27	29	31	dB
Rec. auto. PAD width (I) Note.1)	A_{P-IR}	I_L=30 to 80mA, V_{CC}=0V V_{in}=−42dBm	2.5	3.5	5	dB
Rec. max output (I)	V_{O-IR}	With I_L=30mA, V_{CC}=0V and THD=5%	0	4	—	dBm
Rec. noise reduction (I)	N_{L-IR}	I_L=30mA, V_{CC}=0V, V_{in}=−42 dBm, V_{in}−M=−65/−50dBm	4	6	8	dB
BT amp. gain (I)	G_{V-IBT}	I_L=30mA, V_{CC}=0V V−DMC=Low, V_{in}=−30dBm	19	21	23	dB
Receiver on external power supply						
Rec. gain (E−1)	D_{V-ER1}	I_L=30mA, V_{CC}=5V V_{in}=−42dBm	30.5	32.5	34.5	dB
Rec. gain (E−2)	D_{V-ER2}	I_L=80mA, V_{CC}=5V V_{in}=−42dBm	26.8	28.8	30.8	dB
Rec. auto. PAD width (E) Note.1)	A_{P-ER}	I_L=30 to 80mA, V_{CC}=5V V_{in}=−42dBm	2.5	3.7	5	dB
Rec. max output (E)	V_{O-ER}	With I_L=30mA, V_{CC}=5V and THD=5%	4	12	—	dBm
Rec. noise reduction (E)	N_{L-ER}	I_L=30mA, V_{CC}=5V, V_{in}=−42 dBm, V_{in}−M=−65/−50dBm	6	8	10	dB
Rec. digital volume (1) Note.2)	G_{V-DV1}	I_L=30mA, V_{CC}=5V V_{in}=−42dBm, DV−1 ON	5	6	7	dB
Rec. digital volume (2) Note.2)	G_{V-DV2}	I_L=30mA, V_{CC}=5V V_{in}=−42dBm, DV−2 ON	7.5	9	10.5	dB
BT amp. gain (E)	G_{V-EBT}	I_L=30mA, V_{CC}=5V V−DMC=Low, V_{in}=−30dBm	19.5	21.5	23.5	dB
Rec. gain difference	ΔG−R	For V_{CC}=0V and V_{CC}=5V (between G_V−IR1 and G_V−ER1)	−1.2	−0.1	1.2	dB
Transmitter amp. during power failure						
Trans. gain (I−1)	G_{V-IM1}	R=27Ω (pin③), I_L=30mA V_{CC}=0V, V_{in}=−38dBm	28.2	30.2	32.2	dB
Trans. gain (I−2)	G_{V-IM2}	I_L=80mA, V_{CC}=0V V_{in}=−38dBm	24.4	26.4	28.4	dB
Trans. auto. PAD width (I) Note.1)	A_{P-IM}	I_L=30 to 80mA, V_{CC}=0V V_{in}=−38dBm	2.1	3.4	4.6	dB

Note.1) Gain decrease when line current I_L is changed from 30 to 80mA. If Pin⑪ (auto. PAD control) is connected to Pin㊶ (int. supply voltage output), the gain will not change.
Note.2) Gain increase from receiver gain (E−1).
Note) Unless otherwise specified, input signal f_{in}=1kHz, control voltage V−DCC=High, and control voltage V−DMC=High.

■ Electrical Characteristics (cont.) (Ta=25±2℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Transmitter amp. during power failure (cont.)						
Trans. max output (I−1)	V_{O-IM1}	With I_L=30mA, V_{CC}=0V and THD=5%	0	3.5	—	dBm
Trans. max output (I−2)	V_{O-IM2}	I_L=30mA, V_{CC}=0V THD=5%, V−DCC=Low	0	3.5	—	dBm
Trans. noise reduction (I)	N_{L-IT}	Trans. gain difference for V_{IN}=−75, −55dBm with I_L=30mA, V_{CC}=0V	11	14	17	dB
DTMF gain (I−1)	G_{V-ID1}	I_L=30mA, V_{CC}=0V V−DMC=Low, V_{in}=−30dBm	17.5	19.5	21.5	dB
DTMF gain (I−2)	G_{V-ID2}	I_L=80mA, V_{CC}=0V V−DMC=Low, V_{in}=−30dBm	13.7	15.7	17.7	dB
DTMF auto. PAD width (I) Note 1)	A_{P-IDT}	I_L=30 to 80mA, V_{CC}=0V V−DMC=Low, V_{in}=−30dBm	2.1	3.4	4.6	dB
DTMF max output (I−1)	V_{O-ID1}	I_L=30mA, V_{CC}=0V V−DMC=Low, THD=5%	0	3.8	—	dBm
DTMF max output (I−2)	V_{O-ID2}	I_L=30mA, V_{CC}=0V, THD=5% V−DMC=Low, V−DCC=Low	0	3.5	—	dBm
Transmitter amp. on normal power supply						
Trans. gain (E−1)	G_{V-EM1}	I_L=30mA, V_{CC}=5V V_{in}=−38dBm	28.6	30.6	32.6	dB
Trans. gain (E−2)	G_{V-EM2}	I_L=80mA, V_{CC}=5V V_{in}=−38dBm	25.0	27.0	29.0	dB
Trans. auto. PAD width (E) Note 1)	A_{P-EM}	I_L=30 to 80mA, V_{CC}=5V V_{in}=−38dBm	2.1	3.6	4.6	dB
Trans. max output (E−1)	V_{O-EM1}	With I_L=30mA, V_{CC}=5V and THD=5%	2	6	—	dBm
Trans. max output (E−2)	V_{O-EM2}	I_L=30mA, V_{CC}=5V THD=5%, V−DCC=Low	2	6	—	dBm
Trans. noise reduction (E)	N_{L-ET}	Trans. gain difference for V_{in}=−75, −55dBm with I_L=30mA, V_{CC}=5V	15	18	21	dB
DTMF gain (E−1)	G_{V-ED1}	I_L=30mA, V_{CC}=5V DM=ON, V_{in}=−30dBm	18.1	20.1	22.1	dB
DTMF gain (E−2)	G_{V-ED2}	I_L=80mA, V_{CC}=5V V−DMC=Low, V_{in}=−30dBm	14.5	16.5	18.5	dB
DTMF auto. PAD width (E) Note 1)	A_{P-EDT}	I_L=30 to 80mA, V_{CC}=5V V−DMC=Low, V_{in}=−30dBm	2.1	3.6	4.6	dB
DTMF max output (E−1)	V_{O-ED1}	I_L=30mA, V_{CC}=5V V−DMC=Low, THD=5%	2	6	—	dBm
DTMF max output (E−2)	V_{O-ED2}	I_L=30mA, V_{CC}=5V, DM=ON V−DMC=Low, THD=5%	2	6	—	dBm
Trans. gain difference	ΔG−M	For V_{CC}=0V, 5V (between G_V−IM1 and G_V−EM1)	−1.8	−0.8	0.7	dB
DTMF gain difference	ΔG−MF	For V_{CC}=0V, 5V (between G_V−ID1−G_V−ED1)	−2.3	−1.3	0.2	dB

Note 1) Gain decrease when line current I_L is changed from 30 to 80mA. If Pin⑪ (auto. PAD control) Pin⑥① (int. supply voltage output), the gain will not change.

Note) Unless otherwise specified, input signal f_{in}=1kHz, control voltage V−DCC=High, and control voltage, V−DMC=High.

■ Electrical Characteristics (cont.) $(T_a = 25 \pm 2°C)$

Parameter	Symbol	Condition	min	typ	max	Unit
Recording preamplifiers						
Rec. preamp. gain	G_{V-RP}	$V_{in}=-36$dBm $R_{in}=0\Omega$	43	45	47	dB
Rec. preamp. output	V_{O-RP}	$V_{in}=-45$dBm $R_{in}=10k\Omega$	−13.4	−11.4	−9.4	dBm
Rec. preamp. output noise voltage Note 1)	V_{no-RP}	DIN/AUDIO $R_g=10k\Omega$	—	0.8	2.5	mVrms
Recording amplifier						
Head bias current	I_{-REC}	L−SW (h07) =ON	145	180	215	μA
Head output	G_{V-REC}	L−SW (h07) =ON $V_{in}=-15$dBm, $R_L=1k\Omega$	40.0	50.0	63.0	mVrms
Playing EQ amplifier						
EQ amp. gain	G_{V-EQ}	L−SW (h0F) =ON $V_{in}=-40$dBm	27.8	29.8	31.8	dB
EQ amp. output noise voltage	V_{no-EQ}	L−SW (h0F) =ON DIN/AUDIO, $R_L=1k\Omega$	—	0.45	1.2	mVrms
VOX detector						
VOX sensitivity (1)	V_{S1}	I−VOX=12.5μA	3.5	4.8	—	V
VOX sensitivity (2)	V_{S2}	I−VOX=24.5μA	—	0.025	0.5	V
Link SW input amplifier						
MIX amp. gain	G_{V-MIX}	$V_{in}=-36$dBm	5	6	7	dB
AUX amp. gain	G_{V-AUX}	$V_{in}=-36$dBm	5	6	7	dB
Link SW output amplifier						
SP output gain (1) Note 1)	G_{V-SPO1}	AUX IN, $V_{in}=-36$dBm L−SW (h3A) =ON	11	12	13	dB
SP output gain (2) Note 1)	G_{V-SPO2}	AUX IN, $V_{in}=-36$dBm L−SW (h3A&h2F) =ON	−1.5	−0.5	0.5	dB
Intercom output gain Note 1)	G_{V-DHO}	AUX IN, $V_{in}=-36$dBm L−SW (h3B) =ON	18.5	20	21.5	dB
RF1 output gain Note 1)	G_{V-RF1O}	AUX IN, $V_{in}=-36$dBm L−SW (h3C) =ON	16.5	18	19.5	dB
RF2 output gain Note 1)	G_{V-RF2O}	AUX IN, $V_{in}=-36$dBm L−SW (h3D) =ON	16.5	18	19.5	dB
Recording output gain Note 1)	G_{V-RECO}	AUX IN, $V_{in}=-36$dBm L−SW (h3E) =ON	−1.0	0	1.0	dB
Receiver output gain Note 1)	G_{V-RO}	AUX IN, $V_{in}=-36$dBm L−SW (h38) =ON	19.9	21.4	22.9	dB
Line output gain Note 1)	G_{V-TO}	AUX IN, $V_{in}=-36$dBm L−SW (h39) =ON	17.7	19.2	20.7	dB
Rec. output gain difference Note 2)	$G_{\Delta-RO}$	MIX IN, $V_{in}=-36$dBm L−SW (h30) =ON	−1.0	0	1.0	dB
Time stamp output gain Note 1)	G_{V-TSO}	MIX IN, $V_{in}=-36$dBm L−SW (h37) =ON	−1.0	0	1.0	dB

Note 1) Each amp. gain is measured from AUX OUT or MIX OUT to its output (the AUX or MIX preamp. gain is not included in the calculation).
Note 2) The difference from the receiver output gain (G_{V-RO}).
Note) Unless otherwise specified, external supply voltage $V_{CC}=5V$, line current $I_L=0mA$, input signal frequency $f_{in}=1kHz$, control voltage V−DCC=High, and control voltage V−DMC=High.

Electrical Characteristics (cont.) (Ta = 25±2℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Link SW input						
MIC input gain Note 2)	G_{V-MI}	V_{in} = −38dBm, rec. output L−SW (h0E) = ON	−1	0	1	dB
Rec. input gain Note 2)	G_{V-RI}	V_{in} = −42dBm, rec. output L−SW (h16) = ON	−1	0	1	dB
Intercom input gain	G_{V-DHI}	V_{in} = −30dBm, rec. output L−SW (h1E) = ON	5	6	7	dB
RF1 input gain	G_{V-RF1I}	V_{in} = −30dBm, rec. output L−SW (h26) = ON	−1	0	1	dB
RF2 input gain	G_{V-RF2I}	V_{in} = −30dBm, rec. output L−SW (h2E) = ON	−1	0	1	dB
SP link input gain	G_{V-SPI}	V_{in} = −30dBm, rec. output L−SW (h02) = ON	11	12	13	dB
Link maximum output						
SP OUT max. output	V_{O-SP}	Input L−SP IN, THD = 5% L−SW (h02) = ON	0	4	—	dBm
DH OUT max. output	V_{O-DH}	Input RF1 IN, THD = 5% L−SW (h23) = ON	0	4	—	dBm
RF1 OUT max. output	V_{O-RF1}	Input RF2 IN, THD = 5% L−SW (h25) = ON	0	4	—	dBm
RF2 OUT max. output	V_{O-RF2}	Input RF1 IN, THD = 5% L−SW (h2C) = ON	0	4	—	dBm
L−REC OUT max. output	V_{O-LR}	Input AUX IN, THD = 5% L−SW (h3E) = ON	0	4	—	dBm
Controls						
Dial mute High level voltage	V_{DMC-H}		2	—	V_{CC} +0.2	V
Dial mute High level control current	I_{DMC-H}	V−DMC = 5V	15	38	80	μA
Dial mute Low level voltage	V_{DMC-L}		−0.2	—	0.3	V
Dial mute Low level control current	I_{DMC-L}	V−DMC = 0V	−40	−20	−10	μA
DC voltage control High level voltage	V_{DCC-H}		2	—	V_{CC} +0.2	V
DC voltage control High level control current	I_{DCC-H}	V−DCC = 5V	10	25	50	μA
DC voltage control Low level voltage	V_{DCC-L}		−0.2	—	0.4	V
DC voltage control Low level control current	I_{DCC-L}	V−DCC = 0V	−2	−0.1	—	μA
Trans. noise reduction High level voltage	V_{NLT-H}		2	—	V_{CC} +0.2	V
Trans. noise reduction High level control current	I_{NLT-H}	V−NLT = 5V	10	25	50	μA
Trans. noise reduction Low level voltage	V_{NLT-L}		−0.2	—	0.4	V
Trans. noise reduction Low level control current	I_{NLT-L}	V−NLT = 0V	−2	−0.1	—	μA

Note) Unless otherwise specified, external supply voltage V_{CC} = 5V, line current I_L = 0mA, input signal frequency f_{in} = 1kHz, control voltage V−DCC = High, and control voltage V−DMC = High.

Note 2) Each amp. gain is measured from MIC OUT or R PRE OUT to its output.

■ Electrical Characteristics (cont.) ($T_a = 25 \pm 2$℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Controls (cont.)						
Data input high level voltage	V_{DIN-H}		2	—	V_{CC} +0.2	V
Data input high level control current	I_{DIN-H}	V−DIN=5V	70	160	250	μA
Data input low level voltage	V_{DIN-L}		−0.2	—	0.3	V
Data input low level control current	I_{DIN-L}	V−DIN=0V	−1	−0.1	—	μA
Power supply block						
AC impedance (I)	Z_{AC-I}	I_L=80mA, V_{CC}=0V V_{in}=200mVrms, F_{in}=1kHz	450	570	750	Ω
AC impedance (E)	Z_{AC-E}	I_L=80mA, V_{CC}=5V V_{in}=200mVrms, F_{in}=1kHz	450	580	750	Ω
Input impedance						
BT amp. input impedance	Z_{in-BT}	Pin ⑰ input	8.7	9.7	10.7	kΩ
ALC amp. input impedance	Z_{in-ALC}	Pin ㊵ input	8.5	9.5	10.5	kΩ
Intercom preamp. input impedance	Z_{in-DH}	Pin 56 input	8.5	9.5	10.5	kΩ
RF1 preamp. input impedance	Z_{in-RF1}	Pin 57 input	8.5	9.5	10.5	kΩ
RF2 preamp. input impedance	Z_{in-RF2}	Pin 58 input	8.5	9.5	10.5	kΩ

■ Electrical Characteristics (Design Values for Reference) ($T_a = 25 \pm 2$℃)

The following are design values for reference, and not guaranteed values.

Parameter	Symbol	Condition	min	typ	max	Unit
Speech block						
Rec. output noise voltage (I)	V_{n-IR}	I_L=30mA, V_{CC}=0V DIN/AUDIO	—	0.3	—	mVrms
Rec. output noise voltage (E)	V_{n-ER}	I_L=30mA, V_{CC}=5V DIN/AUDIO	—	0.3	—	mVrms
Trans. output noise voltage (I)	V_{n-IT}	I_L=30mA, V_{CC}=0V DIN/AUDIO	—	0.3	—	mVrms
Trans. output noise voltage (E)	V_{n-ET}	I_L=30mA, V_{CC}=5V DIN/AUDIO	—	0.3	—	mVrms
Dial mute trans. amp. mute attenuation	M_{-TDM}	I_L=30mA, V_{CC}=5V V_{in}=−30dBm, V−DBM=H/L	—	75	—	dB
Trans. preamp. mute attenuation	M_{-TM}	I_L=30mA, V_{in}=−30dBm, V_{CC}=5V, L_{SW} (h3f) =OFF/ON	—	70	—	dB
Rec. output mute attenuation	M_{-RO}	I_L=30mA, V_{in}=−30dBm, V_{CC}=5V, L_{SW} (h27) =OFF/ON	—	50	—	dB
Rec. preamp. input impedance	Z_{in-R}	Pin ⑫ input	—	500	—	kΩ
MIC preamp. input impedance	Z_{in-M}	Pin ㉑ and ㉒ input	—	500	—	kΩ
REC/PLAY block						
ALC amp. ALC width	W_{-ALC}	I_L=0mA, V_{CC}=5V and ALC output distortion ≦2%	—	40	—	dB
ALC amp. ALC effect	⊿ALC	I_L=0mA, V_{CC}=5V V_{in}=−45dBm to −20dBm	—	1	—	dB
Rec. amp. mute attenuation	M_{-REC}	V_{CC}=5V, V_{in}=−10dBm I_L=0mA, LSW (h07) =ON/OFF	—	80	—	dB

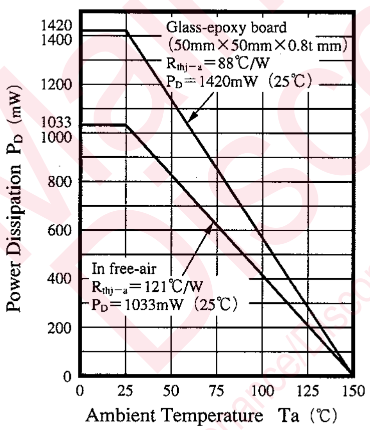
■ Electrical Characteristics (Design Values for Reference) (cont.) (Ta=25±2℃)

The following are design values for reference, and not guaranteed values.

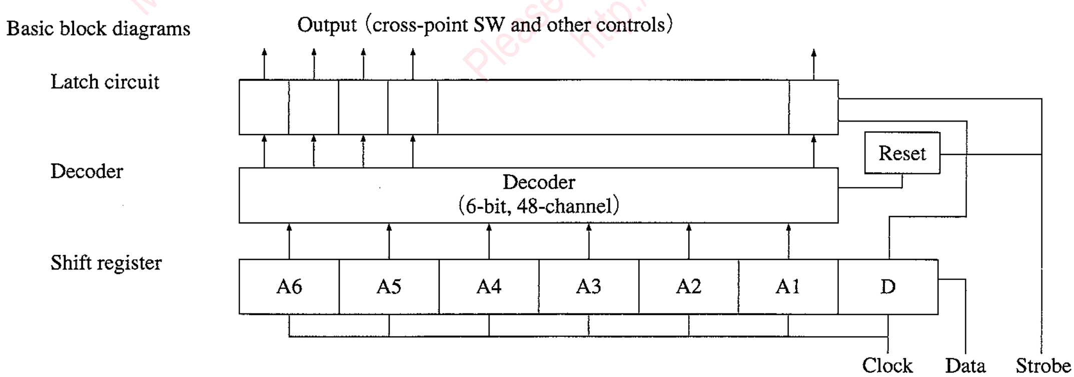
Parameter	Symbol	Condition	min	typ	max	Unit
EQ amp. mute attenuation	M_{-EQ}	V_{CC}=5V, V_{in}=−30dBm I_L=0mA, LSW (h0F) =ON/OFF	—	80	—	dB
Rec. preamp. input impedance	Z_{in-REC}	Pin ㊸ input	—	10	—	kΩ
EQ amp. input impedance	Z_{in-EQ}	Pin ㊼ and ㊽ input	—	500	—	kΩ
VOX amp. input impedance	Z_{in-VOX}	Pin ㊲ input	—	500	—	Ω
Link switch						
Link SW mute attenuation	M_{-LS}	V_{CC}=5V, I_L=30mA, AC output measured at link ON/OFF,	—	75	—	dB
MIX preamp. input impedance	Z_{in-MIX}	Pin 53 input	—	500	—	kΩ
AUX preamp. input impedance	Z_{in-AUX}	Pin 55 input	—	500	—	kΩ
CPC output impedance	$Z_{OUT-CPC}$	Pin ㉕ input	—	100	—	kΩ
Noise reduction amp. input impedance	Z_{in-NL}	Pin ⑨ input	—	45	—	Ω

■ Characteristics Curve

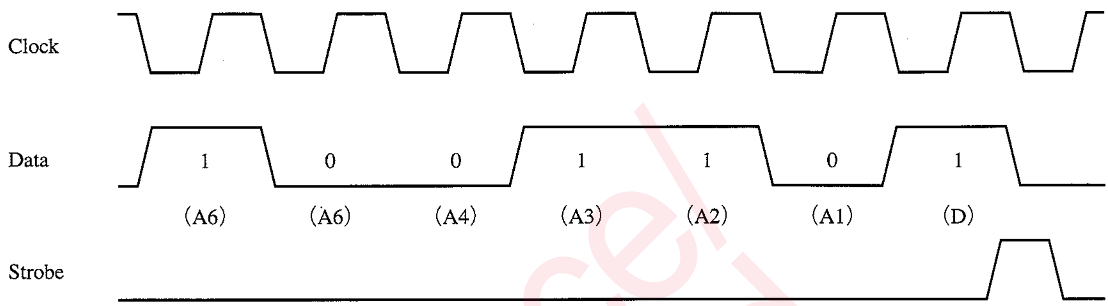
P_D — Ta



■ Logic Specifications



Time Charts (assuming the address h26 latch is to be set)



1. Data is read into the shift register in synchronization with a rising edge of the clock, with the higher data being shifted sequentially on a first-come highest-bit basis.
2. When the strobe is low, data is shifted sequentially on the sift register in synchronization with the clock. Data on the latch circuit will not change.
3. When the strobe goes high, the latched data whose address is represented by the highest six bits of the shift register is updated. Latched data is set when the least significant bit is 1, and reset when the bit is 0.
4. Referring to 3 above, if the address is h00 (the highest six bits of the shift register are all 0s), the latch circuit is cleared (all reset) regardless of the data content.
5. At power-on (V_{CC} ON), the latch circuit is cleared (by power-ON reset).

■ Logic Circuits Address Specifications

1. Cross-point switch

Input \ Output	Handset rec.	Line output	Loudspeaker	Intercom	RF1	RF2	Recording	Time stamp
Loudspeaker			02					
Microphone		09	0A	0B	0C	0D	0E	
Receiver	10		12		14	15	16	
Intercom	18		1A		1C	1D	1E	
RF1	20	21		23		25	26	
RF2	28	29		2B	2C		2E	
MIX	30	31	32	33	34	35		37
AUX	38	39	3A	3B	3C	3D	3E	

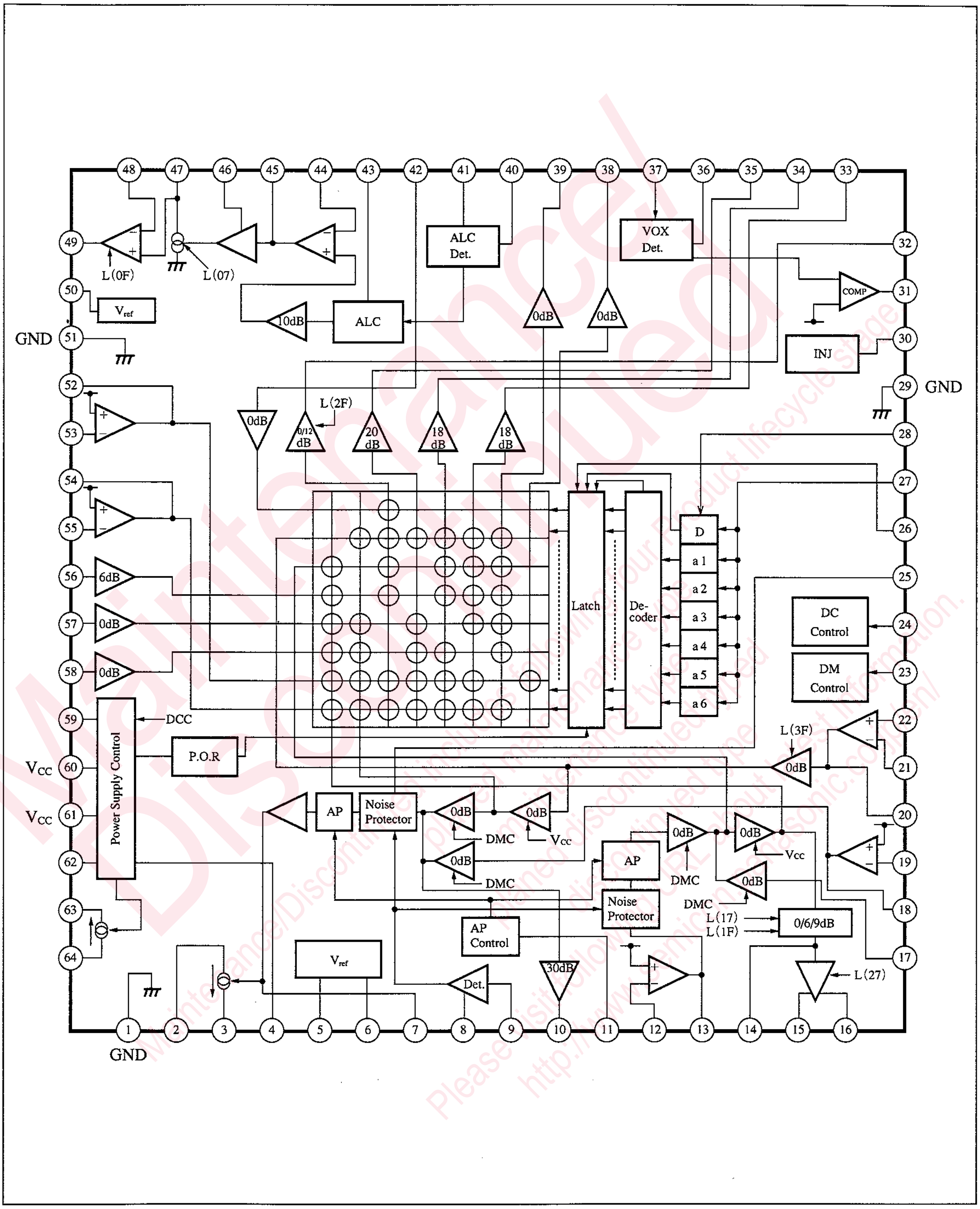
Note) Empty space means "not applicable." Address is in hexadecimal.

2. Other control switches

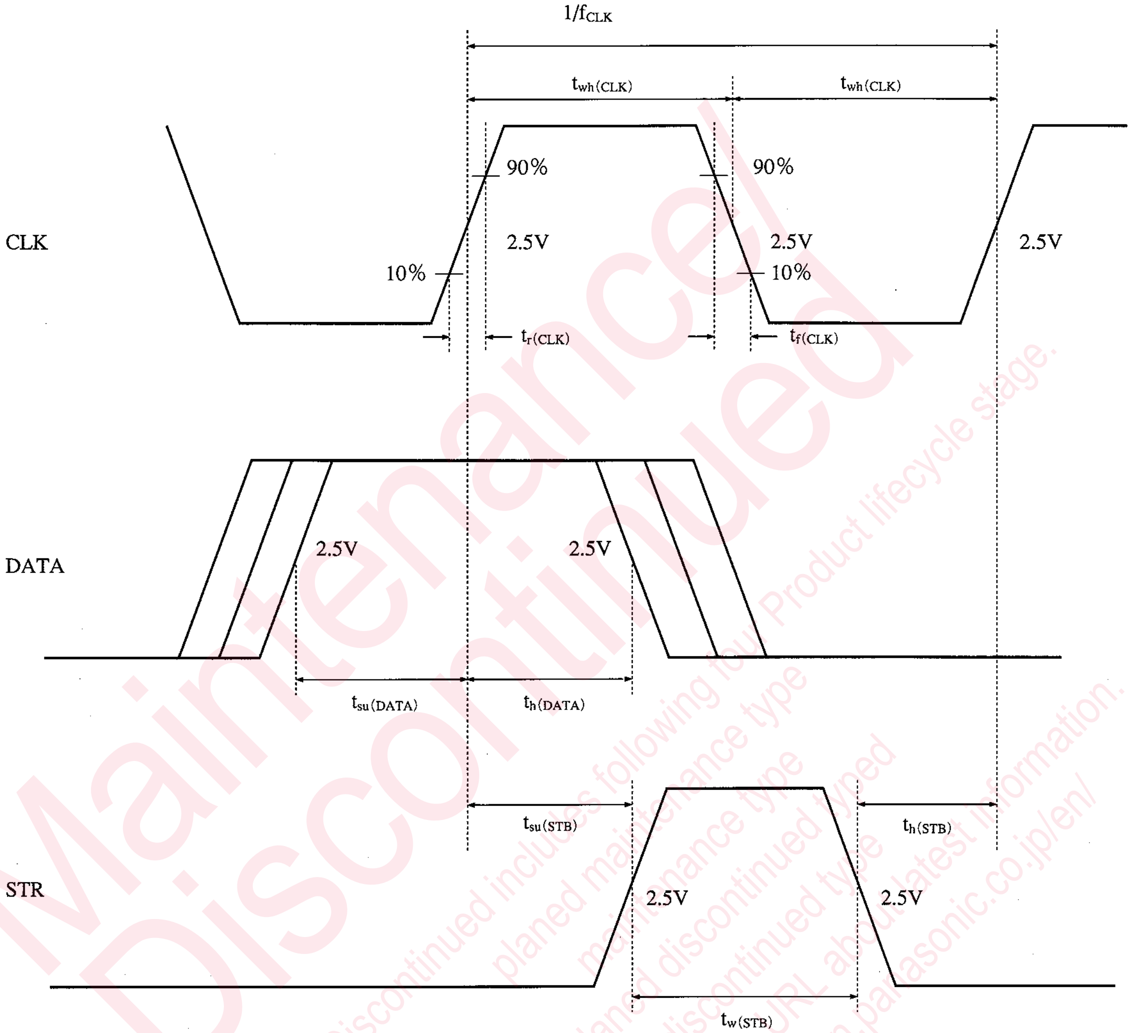
Address	Description
00	Cross-point SW all reset
07	Recording amp. ON
0F	Playing amp. ON
17	Receiver volume 6 dB up
1F	Receiver volume 9 dB up
27	Handset receiver amp. mute
2F	SP output amp. gain 12 dB down
3F	MIC preamp. mute
09, 21, 29	Receiver noise reduction is enabled.

Note) Address is in hexadecimal.

■ Block Diagram



Timing Charts



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